TEST REPORT
EN 50549-1
Requirements for generating plants to be connected in parallel with distribution networks
Part 1: Connection to a LV distribution network - Generating plants up to and including Type B
EN 50549-10
Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units

Report Reference No ....: 250327092GZU-001

Date of issue ....: 28 Mar 2025

Total number of pages ....: 221 pages

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Testing location/ address ....: Same as above

Tested by (name + signature) ....: Rex Liu
Engineer
Rex Liu

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Supervisor
Jason Fu

Applicant's name ....: Zendure USA Inc.

Address ....: 1765 E BAYSHORE RD # 201 EAST PALO ALTO, CA 94303-5501 USA

Test specification:

Standard.......................................: EN 50549-1:2019 + A1:2023
EN 50549-10:2022

Test procedure ....: Netherlands considered and Type approval for type A and B

Non-standard test method ....: N/A

Test Report Form No. ....: EN 50549-1a

Test Report Form(s) Originator ...: Intertek Guangzhou

Master TRF ....: Dated 2019-05

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Test item description...............:	SolarFlow 2400 AC Coupled Inverter
Trade Mark..................................:	ZENDURE SuperCharged+-
Manufacturer...............................:	ZENDURE TECHNOLOGY CO., LIMITED
	Office 92, 15th Floor, Lee Garden Two, 28 Yun Ping Road, Causeway Bay, Hong Kong, China.
Model/Type reference.................:	ZDSF2400AC

Ratings ....:	Model	ZDSF2400AC
	Battery voltage Range	37.5-54.75 V dc
	Battery charge current	60 A dc
	Battery discharge current	54.17 A dc
	Nominal output voltage	230 V ac
	Nominal output Frequency	50 Hz
	Max. output current	10.43 A
	Max. output power	2400 W
	Max. apparent power	2400 VA
	Power factor range	0.8leading~0.8lagging
	Safety level	Class I
	Ingress Protection	IP 65
	Operation Ambient Temperature	-20℃ - +60℃
	Software version	V1

Summary of testing:

Tests performed (name of test and test clause):

EN 50549-1	EN 50549-10	Test Description
4.4.2	5.2.1, 5.2.2	Operating frequency range
4.4.3	5.2.1, 5.2.2	Minimal requirements for active power delivery at underfrequency
4.4.4	5.2.1, 5.2.2	Continuous voltage operation range
4.5.2	5.3.1	Rate of change of frequency (ROCOF)
4.5.3	5.3.3	UVRT
4.5.4	5.3.3	OVRT
4.5.5	5.3.2	Phase jump
4.6.1	5.4.3	Power response to over frequency
4.6.2	5.4.3	Power response to under frequency
4.7.2.2	5.5	Q Capabilities (Power Factor) Q(U) Capabilities
4.7.2.3.3	5.5	Q Control. Voltage related control mode
4.7.2.3.4	5.5	Q Control Power related control modes
4.7.3	5.6	Voltage control by active power
4.7.4	5.3.3	Zero current mode
4.8	5.7.2	Harmonic emissions Flicker and voltage fluctuations
4.9.3	5.8.3	Interface protection
4.9.4.2	5.8.6	Islanding
4.10.2	5.9.3	Reconnection after tripping
4.10.3	5.9.4	Starting to generate electrical power
4.11	5.10 5.11	Active power reduction by setpoint and Ceasing active power (Logic interface)
4.13	5.12	Single fault tolerance of interface protection and interface switch

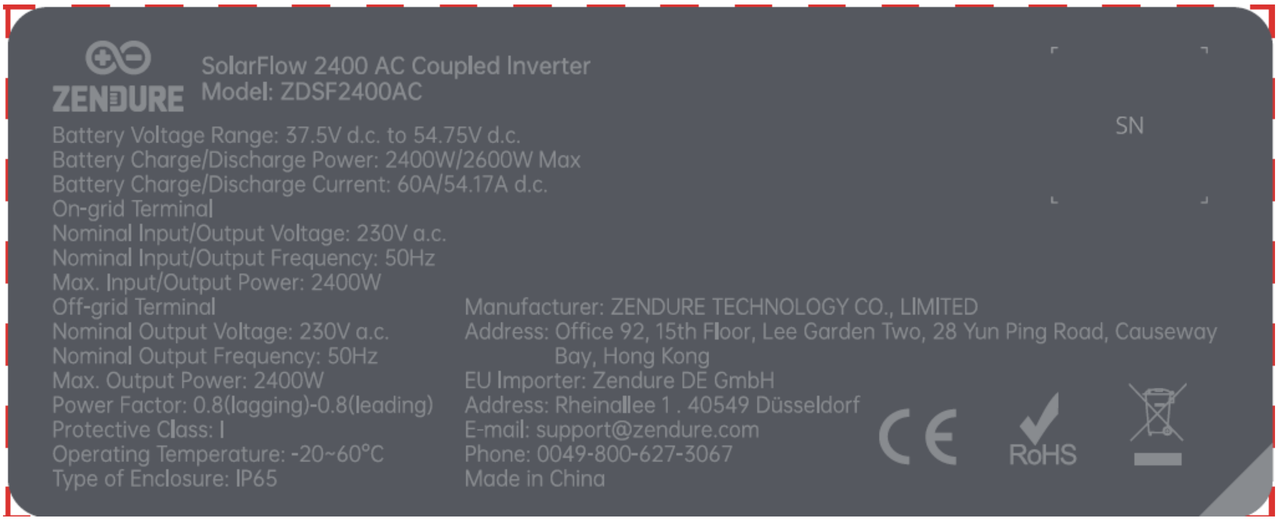
Remark:

Testing location:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China

Copy of marking plate



ZENDURE
SolarFlow 2400 AC Coupled Inverter
Model: ZDSF2400AC

Battery Voltage Range: 37.5V d.c. to 54.75V d.c.
Battery Charge/Discharge Power: 2400W/2600W Max
Battery Charge/Discharge Current: 60A/54.17A d.c.
On-grid Terminal
Nominal Input/Output Voltage: 230V a.c.
Nominal Input/Output Frequency: 50Hz
Max. Input/Output Power: 2400W
Off-grid Terminal
Nominal Output Voltage: 230V a.c.
Nominal Output Frequency: 50Hz
Max. Output Power: 2400W
Power Factor: 0.8(lagging)-0.8(leading)
Protective Class: I
Operating Temperature: -20~60°C
Type of Enclosure: IP65

Manufacturer: ZENDURE TECHNOLOGY CO., LIMITED
Address: Office 92, 15th Floor, Lee Garden Two, 28 Yun Ping Road, Causeway Bay, Hong Kong
EU Importer: Zendure DE GmbH
Address: Rheinallee 1 . 40549 Düsseldorf
E-mail: support@zendure.com
Phone: 0049-800-627-3067
Made in China

Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation.

Test item particulars .... :	
Temperature range... :	-20℃~+60℃
AC Overvoltage category .... :	☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
DC Overvoltage category .... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
IP protection class .... :	IP 65
Possible test case verdicts:	
- test case does not apply to the test object .... :	N/A (Not applicable)
- test object does meet the requirement .... :	P (Pass)
- test object does not meet the requirement .... :	F (Fail)
Testing .... :	
Date of receipt of test item .... :	14 Jan 2025
Date (s) of performance of tests .... :	14 Jan 2025 to 03 Mar 2025

General remarks:

The test results presented in this report relate only to the object tested.
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"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

When determining for test conclusion, measurement uncertainty of tests has been considered.
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The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

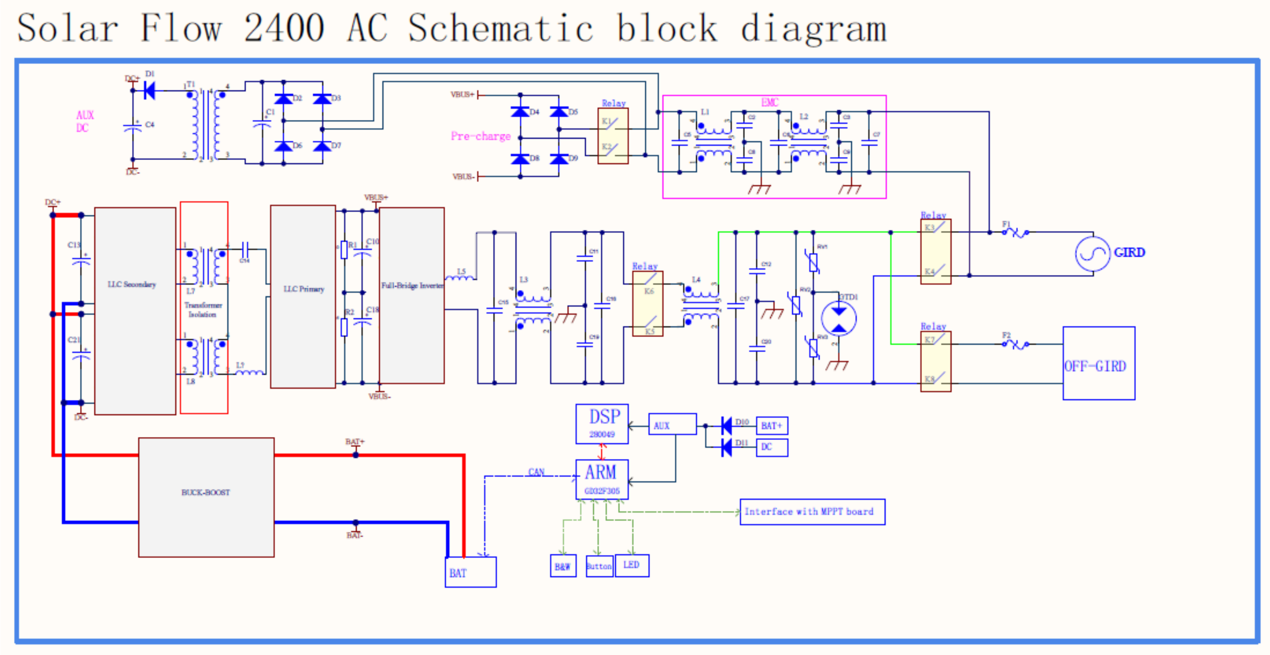
Throughout this report a point is used as the decimal separator.

General product information:

This product is an energy storage inverter, with a bidirectional AC port supporting up to 2400W. The battery side provides 2400W of charging and discharging power.

By integrating with devices such as batteries and smart meters, it forms a comprehensive energy storage solution. It supports storing electricity generated from photovoltaics or during low electricity price periods into the battery and discharging it when household electricity demand is high or during peak electricity price periods, thereby reducing household energy costs.

The topology diagram as following:


Solar Flow 2400 AC Schematic block diagram
AUX DC
DC+
DC-
Pre-charge
VBUS+
VBUS-
Relay
K1
K2
EMC
LLC Secondary
Transformer Isolation
LLC Primary
Full-Bridge Inverter
GIRD
OFF-GIRD
DSP
280049
ARM
GD32F305
AUX
BAT+
DC
CAN
Interface with MPPT board
BUCK-BOOST
BAT+
BAT-
BAT
B&W
Button
LED

The product was tested on:

The Software version: V1

The Hardware version: V1

Factory:

Guangdong huichuang New Power Co., Ltd.
NO.17, Jiaolian Houde Road, Wan Jiang Street, Dongguan City, Guangdong Province, China.

SHENZHEN TOP-TEK TECHNOLOGY CO., LTD.
No. 3, Second to Fifth Floor, Liao Third Industrial Zone, Langxin Community, Shiyang Street, Bao'an District Shenzhen, Guangdong Province, China.

Shenzhen H&T Enerlife Technology company limited
701, No 18, Baoshan Road, Tianliao community, Yutang street, Guangming District, Shenzhen, Guangdong Province, China.

4	**Requirements on generating plants**		P
4.1	**General**	This report is only evaluated and tested for generating unit; The generating plant incorporated with the generating unit shall further consider this clause and sub-clause.	N/A
4.2	**Connection scheme**	Shall consider in final PGS	N/A
4.3	**Choice of switchgear**		P
4.3.1	**General** Switches shall be chosen based on the characteristics of the power system in which they are intended to be installed. For this purpose, the short circuit current at the installation point shall be assessed, taking into account, *inter alia*, the short circuit current contribution of the generating plant.	The short circuit current at the installation point shall be considered in final PGS	P
4.3.2	**Interface switch** Switches shall be power relays, contactors or mechanical circuit breakers each having a breaking and making capacity corresponding to the rated current of the generating plant and corresponding to the short circuit contribution of the generating plant. The short-time withstand current of the switching devices shall be coordinated with rated short circuit power at the point of connection. In case of loss of auxiliary supply power to the switchgear, a secure disconnection of the switch is required immediately. Where means of isolation (according to HD 60364-5-551) is not required to be accessible to the DSO at all times, automatic disconnection with single fault tolerance according to 4.13 shall be provided. The function of the interface switch might be combined with either the main switch or the generating unit switch in a single switching device. In case of a combination, the single switching device shall be compliant to the requirements of both, the interface switch and the combined main switch or generating unit switch. As a consequence, at least two switches in series shall be present between any generating unit and the POC.	The interface switch is constructed of redundancy, made up of two series relays and power and control separately. The EUT is a PV inverter, further evaluation refers to EN 62109–1 and EN 62109–2 with respect to the interface switch.	P

4.4	**Normal operating range**		**P**
4.4.1	**General** Generating plants when generating power shall have the capability to operate in the operating ranges specified below regardless of the topology and the settings of the interface protection.		P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.4.2	**Operating frequency range** The generating plant shall be capable of operating continuously when the frequency at the point of connection stays within the range of 49 Hz to 51 Hz. In the frequency range from 47 Hz to 52 Hz the generating plant should be capable of operating until the interface protection trips. Therefore, the generating plant shall at least be capable of operating in the frequency ranges, for the duration and for the minimum requirement as indicated in Table 1. Respecting the legal framework, it is possible that for some synchronous areas more stringent time periods and/or frequency ranges will be required by the DSO and the responsible party. Nevertheless, they are expected to be within the boundaries of the stringent requirement as indicated in Table 1 unless producer, DSO, TSO and responsible party agree on wider frequency ranges and longer durations.	(See appended table 4.4.2)	P
4.4.3	**Minimal requirement for active power delivery at underfrequency** A generating plant shall be resilient to the reduction of frequency at the point of connection while reducing the maximum active power as little as possible. The admissible active power reduction due to underfrequency is limited by the full line in Figure 5 and is characterized by a maximum allowed reduction rate of 10 % of P_{max} per 1 Hz for frequencies below 49,5 Hz. It is possible that a more stringent power reduction characteristic is required by the responsible party. Nevertheless this requirement is expected to be limited to an admissible active power reduction represented by the dotted line in Figure 5 which is characterised by a reduction rate of 2 % of the maximum power P_{max} per 1 Hz for frequencies below 49 Hz. If any technologies intrinsic design or ambient conditions have influence on the power reduction behaviour of the system, the manufacturer shall specify at which ambient conditions the requirements can be fulfilled and eventual limitations. The information can be provided in the format of a graph showing the intrinsic behaviour of the generating unit for example at different ambient conditions. The power reduction and the ambient conditions shall comply with the specification given by the responsible party. If the generating unit does not meet the power reduction at the specified ambient conditions, the producer and the responsible party shall agree on acceptable ambient conditions.	(See appended table 4.4.3)	P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.4.4	**Continuous operating voltage range** When generating power, the generating plant shall be capable of operating continuously when the voltage at the point of connection stays within the range of 85 % U_n to 110 % U_n. Beyond these values the under and over voltage ride through immunity limits as specified in clause 4.5.3 and 4.5.4 shall apply. In case of voltages below U_n, it is allowed to reduce the apparent power to maintain the current limits of the generating plant. The reduction shall be as small as technically feasible. For this requirement all phase to phase voltages and in case a neutral is connected, additionally all phase to neutral voltages shall be evaluated.	(See appended table 4.4.4)	P
4.5	**Immunity to disturbances**		P
4.5.1	**General** In general, generating plants should contribute to overall power system stability by providing immunity towards dynamic voltage changes unless safety standards require a disconnection. The following clauses describe the required immunity for generating plants taking into account the connection technology of the generating modules. The following withstand capabilities shall be provided regardless of the settings of the interface protection.		P
4.5.2	**Rate of change of frequency (ROCOF) immunity** ROCOF immunity of a power generating plant means that the generating modules in this plant stay connected with the distribution network and are able to operate when the frequency on the distribution network changes with a specified ROCOF. The generating units and all elements in the generating plant that might cause their disconnection or impact their behaviour shall have this same level of immunity. The generating modules in a generating plant shall have ROCOF immunity for a ROCOF equal or exceeding the value specified by the responsible party. If no ROCOF immunity value is specified, the following ROCOF immunity shall apply, making distinction between generating technologies: • Non-synchronous generating technology: at least 2 Hz/s • Synchronous generating technology: at least 1 Hz/s The ROCOF immunity is defined with a sliding measurement window of 500 ms.	(See appended table 4.5.2) For 5Hz/s	P
4.5.3	**Under-voltage ride through (UVRT)**		P

4.5.3.1	**General** Generating modules classified as type B modules according to COMMISSION REGULATION 2016/631 shall comply with the requirements of 4.5.3.2 and 4.5.3.3. Generating modules classified as type A and smaller according to COMMISSION REGULATION 2016/631 should comply with these requirements. The actual behaviour of type A modules and smaller shall be specified in the connection agreement. The requirements apply to all kinds of faults (1ph, 2ph and 3ph).	Type B modules	P
4.5.3.2	**Generating plant with non-synchronous generating technology** Generating modules shall be capable of remaining connected to the distribution network as long as the voltage at the point of connection remains above the voltage-time curve of Figure 6. The voltage is relative to U_n. The smallest phase to neutral voltage, or if no neutral is present, the smallest phase to phase voltage shall be evaluated. The responsible party may define a different UVRT characteristic. Nevertheless, this requirement is expected to be limited to the most stringent curve as indicated in Figure 6. This means that the whole generating module has to comply with the UVRT requirement. This includes all elements in a generating plant: the generating units and all elements that might cause their disconnection. For the generating unit, this requirement is considered to be fulfilled if it stays connected to the distribution grid as long as the voltage at its terminals remains above the defined voltage-time diagram. After the voltage returns to continuous operating voltage range, 90 % of pre-fault power or available power whichever is the smallest shall be resumed as fast as possible, but at the latest within 1 s unless the DSO and the responsible party requires another value.	(See appended table 4.5.3)	P
4.5.3.3	**Generating plant with synchronous generating technology**		N/A

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.5.4	**Over-voltage ride through (OVRT)** Generating modules, except for micro-generating plants, shall be capable of staying connected to the distribution network as long as the voltage at the point of connection remains below the voltage-time curve of Figure 8. The highest phase to neutral voltage or if no neutral is present the highest phase to phase voltage shall be evaluated. This means that not only the generating units shall comply with this OVRT requirement but also all elements in a generating plant that might cause its disconnection..	(See appended table 4.5.4)	P
4.6	**Active response to frequency deviation**		P
4.6.1	**Power response to overfrequency** Generating plants shall be capable of activating active power response to overfrequency at a programmable frequency threshold f_1 at least between and including 50,2 Hz and 52 Hz with a programmable droop in a range of at least s=2 % to s=12 %. The droop reference is P_{ref}. Unless defined differently by the responsible party: • $P_{ref}=P_{max}$, in the case of synchronous generating technology and electrical energy storage systems. • $P_{ref}=P_M$, the actual AC output power at the instant when the frequency reaches the threshold f_1, in the case of all other non-synchronous generating technology The power value calculated according to the droop is a maximum power limit. If e.g. the available primary power decreases during a high frequency period below the power defined by the droop function, lower power values are permitted. The generating plant shall be capable of activating active power response to overfrequency as fast as technically feasible with an intrinsic dead time that shall be as short as possible with a maximum of 2 s and with a step response time of maximum 30 s, unless another value is defined by the relevant party. An intentional delay shall be programmable to adjust the dead time to a value between the intrinsic dead time and 2 s.	(See appended table 4.6.1)	P

Clause	Requirement - Test	Result - Remark	Verdict
	After activation, the active power frequency response shall use the actual frequency at any time, reacting to any frequency increase or decrease according to the programmed droop with an accuracy of ± 10 % of the nominal power (see Figure 9). The resolution of the frequency measurement shall be ± 10 mHz or less. The accuracy is evaluated with a 1 min average value. At POC, loads if present in the producer's network might interfere with the response of the generating plant. The effect of loads is not considered for the evaluation of the accuracy, only the behaviour of the generating plant is relevant.		P
	Generating plants reaching their minimum regulating level shall, in the event of further frequency increase, maintain this power level constant unless the DSO and the responsible party requires to disconnect the complete plant or if the plant consists of multiple units by disconnecting individual units. The active power frequency response is only deactivated if the frequency falls below the frequency threshold f_1. If required by the DSO and the responsible party an additional deactivation threshold frequency f_{stop} shall be programmable in the range of at least 50 Hz to f_1. If f_{stop} is configured to a frequency below f_1 there shall be no response according to the droop in case of a frequency decrease (see Figure 10). The output power is kept constant until the frequency falls below f_{stop} for a configurable time t_{stop}.		P
	If at the time of deactivation of the active power frequency response the momentary active power PM is below the available active power PA, the active power increase of the generating plant shall not exceed the gradient defined in 4.10.2. Settings for the threshold frequency f_1, the droop and the intentional delay are provided by the DSO and the responsible party. If no settings are provided, the default settings in Table 2 should be applied.		P
	The enabling and disabling of the function and its settings shall be field adjustable and means shall be provided to protect these from unpermitted interference (e.g. password or seal) if required by the DSO and the responsible party.	The enabling and disabling can be access by communication interface	P

Clause	Requirement - Test	Result - Remark	Verdict
	Alternatively for the droop function described above, the following procedure is allowed for generating modules if permitted by the DSO and the responsible party: • the generating units shall disconnect at randomized frequencies, ideally uniformly distributed between the frequency threshold f_1 and 52 Hz; • in case the frequency decreases again, the generating unit shall start its reconnection procedure once the frequency falls below the specific frequency that initiated the disconnection; for this procedure, the connection conditions described in 4.10 do not apply; • the randomization shall either be at unit level by changing the threshold over time, or on plant level by choosing different values for each unit within a plant, or on distribution system level if the DSO specifies a specific threshold for each plant or unit connected to its distribution system.		P
	EES units that are in charging mode at the time the frequency passes the threshold f_1 shall not reduce the charging power below P_M until frequency returns below f_1. Storage units should increase the charging power according to the configured droop. In case the maximum charging capacity is reached or to prevent any other risk of injury or damage of equipment, a reduction of charging power is permitted.		P
4.6.2	**Power response to underfrequency** EES units shall be capable of activating active power response to underfrequency. Other generating units/plants should be capable of activating active power response to underfrequency. If active power to underfrequency is provided by a generating plant/unit, the function shall comply with the requirements below. Active power response to underfrequency shall be provided when all of the following conditions are met: • when generating, the generating unit is operating at active power below its maximum active power P_{max}; • when generating, the generating unit is operating at active power below the available active power P_A; • the voltages at the point of connection of the generating plant are within the continuous operating voltage range; and • when generating, the generating unit is operating with currents lower than its current limit. In the case of EES units, active power frequency response to underfrequency shall be provided in charging and generating mode.		P

Clause	Requirement - Test	Result - Remark	Verdict
	The active power response to underfrequency shall be delivered at a programmable frequency threshold f_1 at least between and including 49,8 Hz and 46,0 Hz with a programmable droop in a range of at least 2 % to 12 %. The droop reference P_{ref} is P_{max}. If the available primary power or a local set value increases during an underfrequency period above the power defined by the droop function, higher power values are permitted. The power value calculated according to the droop is therefore a minimum limit. The generating unit shall be capable of activating active power response to underfrequency as fast as technically feasible with an intrinsic dead time that shall be as short as possible with a maximum of 2 s and with a step response time of maximum 30 s unless another value is defined by the relevant party. An intentional initial delay shall be programmable to adjust the dead time to a value between the intrinsic dead time and 2 s.		P
	After activation, the active power frequency response shall use the actual frequency at any time, reacting to any frequency increase or decrease according to the programmed droop with an accuracy of ± 10 % of the nominal power. The accuracy is evaluated with a 1 min average value. The resolution of the frequency measurement shall be ± 10 mHz or less. At POC loads, if present in the producer's network, might interfere with the response of the generating plant. The effect of loads is not considered for the evaluation of the accuracy, only the behaviour of the generating plant is relevant.		P
	Generating modules reaching any of the conditions above during the provision of active power frequency response shall, in the event of further frequency decrease, maintain this power level constant. The active power frequency response is only deactivated if the frequency increases above the frequency threshold f_1.		P
	Settings for the threshold frequency f_1, the droop and the intentional delay are defined by the DSO and the responsible party, if no settings are provided, the function shall be disabled.		P
	The activation and deactivation of the function and its settings shall be field adjustable and means shall be provided to protect these from unpermitted interference (e.g. password or seal) if required by the DSO and the responsible party.		P
4.7	**Power response to voltage changes**		P

Clause	Requirement - Test	Result - Remark	Verdict
4.7.1	**General** When the contribution to voltage support is required by the DSO and the responsible party, the generating plant shall be designed to have the capability of managing reactive and/or active power generation according to the requirements of this clause.		P
4.7.2	**Voltage support by reactive power**		P
4.7.2.1	**General** Generating plants shall not lead to voltage changes out of acceptable limits. These limits should be defined by national regulation. Generating units and plants shall be able to contribute to meet this requirement during normal network operation. Throughout the continuous operating frequency (see 4.4.2) and voltage (see 4.4.4) range, the generating plant shall be capable to deliver the requirements stipulated below. Outside these ranges, the generating plant shall follow the requirements as good as technically feasible although there is no specified accuracy required.		P
4.7.2.2	**Capabilities** Unless specified differently below, for specific generating technologies, generating plants shall be able to operate with active factors as defined by the DSO and the responsible party from active factor = $0{,}90_{\text{underexcited}}$ to active factor= $0{,}90_{\text{overexcited}}$ The reactive power capability shall be evaluated at the terminals of the/each generating unit	(See appended table 4.7.2.2)	P
	CHP generating units with a capacity ≤ 150 kVA shall be able to operate with active factors as defined by the DSO from $\cos \varphi = 0{,}95_{\text{underexcited}}$ to $\cos \varphi = 0{,}95_{\text{overexcited}}$ Generating units with an induction generator coupled directly to the grid and used in generating plants above micro generating level, shall be able to operate with active factors as defined by the DSO from $\cos \varphi = 0{,}95_{\text{underexcited}}$ to $\cos \varphi = 1$ at the terminals of the unit. Deviating from 4.7.2.3 only the cos φ set point mode is required. Deviating from the accuracy requirements below, the accuracy is only required at active power P_D.		N/A
	Generating units with an induction generator coupled directly to the grid and used in micro generating plants shall operate with an active factor above 0,95 at the terminals of the generating unit. A controlled voltage support by reactive power is not required from this technology.		N/A

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
	Generating units with linear generators, coupled directly and synchronously to the grid shall operate with an active factor above 0,95 at the terminals of the generating unit, and therefore a controlled voltage support by reactive power is not required from this technology.		N/A
	In case of different generating technologies with different requirements in one generating plant, each unit shall provide voltage support by reactive power as required for its specific technology. A compensation of one technology to reach the general plant requirement is not expected. The DSO and the responsible party may relax the above requirements. This relaxation might be general or specific for a certain generating plant or generating technology.	It should be considered in generating plant.	N/A
	All involved parties can expect to have access to information documenting the actual choices regarding active power capabilities relative to reactive power requirements and related to the power rating in the operating voltage range (see further in this clause). A P-Q Diagram shall be included in the product documentation of a generating unit. When operating above the apparent power threshold S_{min} equal to 10 % of the maximum apparent power S_{max} or the minimum regulating level of the generating plant, whichever is the higher value, the reactive power capability shall be provided with an accuracy of ± 2 % S_{max}. Up to this apparent power threshold S_{min}, deviations above 2 % are permissible; nevertheless the accuracy shall always be as good as technically feasible and the exchange of uncontrolled reactive power in this low-power operation mode shall not exceed 10 % of the maximum apparent power S_{max}. At POC loads, if present in the producer's network might interfere with the response of the generating plant. The effect of loads is not considered for the evaluation of the accuracy, only the behaviour of the generating plant is relevant. For generating units with a reactive power capability according Figure 12 the reactive power capability at active power P_D shall be at least according Figure 13. For generating units with a reduced reactive power capability Figure 13 is only applicable up to the maximum reactive power capability.	(See appended table 4.7.2.2)	P
4.7.2.3	**Control modes**		P

Clause	Requirement - Test	Result - Remark	Verdict
4.7.2.3.1	**General** Where required, the form of the contribution to voltage control shall be specified by the DSO. The control shall refer to the terminals of the generating units The generating plant/unit shall be capable of operating in the control modes specified below within the limits specified in 4.7.2.2. The control modes are exclusive; only one mode may be active at a time. • Q setpoint mode • Q (U) • Cos φ setpoint mode • Cos φ (P) For mass market products, it is recommended to implement all control modes. In case of site specific generating plant design, only the control modes required by the DSO need to be implemented. The configuration, activation and deactivation of the control modes shall be field adjustable. For field adjustable configurations and activation of the active control mode, means shall be provided to protect the settings from unpermitted interference (e.g. password or seal) if required by the DSO. Which control modes are available in a product and how they are configured shall be stated in the product documentation.		P
4.7.2.3.2	**Setpoint control modes** Q setpoint mode and cos φ setpoint mode control the reactive power output and the cos φ of the output respectively, according to a set point set in the control of the generating plant/unit. In the case of change of the set point local or by remote control the settling time for the new set point shall be less than one minute.	(See appended table 4.7.2.2)	P
4.7.2.3.3	**Voltage related control mode** The voltage related control mode Q (U) controls the reactive power output as a function of the voltage. There is no preferred state of the art for evaluating the voltage. Therefore it is the responsibility of the generating plant designer to choose a method. One of the following methods should be used: • the positive sequence component of the fundamental; • the average of the voltages measured independently for each phase to neutral or phase to phase; • phase independently the voltage of every phase to determine the reactive power for every phase.	Method 1 used	P

	For voltage related control modes, a characteristic with a minimum and maximum value and three connected lines according to Figure 16 shall be configurable. In addition to the characteristic, further parameters shall be configurable: • The dynamics of the control shall correspond with a first order filter having a time constant that is configurable in the range of 3 s to 60 s.	(See appended table 4.7.2.3.3)	P
	To limit the reactive power at low active power two methods shall be configurable: • a minimal cos φ shall be configurable in the range of 0-0,95; • two active power levels shall be configurable both at least in the range of 0 % to 100 % of P_D. The lock-in value turns the Q(U) mode on, the lock-out value turns Q(U) off. If lock-in is larger than lock-out a hysteresis is given. See also Figure 14. The static accuracy shall be in accordance with 4.7.2.2. The dynamic accuracy shall be in accordance with Figure 15 with a maximum tolerance of +/- 5% of P_D plus a time delay of up to 3 seconds deviating from an ideal first order filter response.		P
4.7.2.3.4	**Power related control mode** The power related control mode cos φ (P) controls the cos φ of the output as a function of the active power output. For power related control modes, a characteristic with a minimum and maximum value and three connected lines shall be configurable in accordance with Figure 16. Resulting from a change in active power output a new cos φ set point is defined according to the set characteristic. The response to a new cos φ set value shall be as fast as technically feasible to allow the change in reactive power to be in synchrony with the change in active power. The new reactive power set value shall be reached at the latest within 10 s after the end value of the active power is reached. The static accuracy of each cos φ set point shall be according to 4.7.2.2.	(See appended table 4.7.2.3.4)	P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.7.3	**Voltage related active power reduction** In order to avoid disconnection due to overvoltage protection (see 4.9.2.3 and 4.9.2.4), generating plants/units are allowed to reduce active power output as a function of this rising voltage. The final implemented logic can be chosen by the manufacturer. Nevertheless, this logic shall not cause steps or oscillations in the output power. The power reduction caused by such a function may not be faster than an equivalent of a time constant tau = 3 s (= 33%/s at a 100% change). The enabling and disabling of the function shall be field adjustable and means have to be provided to protect the setting from unpermitted interference (e.g. password or seal) if required by the DSO.	This function is chosen by manufacturer	P
4.7.4	**Short circuit current requirements on generating plants**		P
4.7.4.1	**General** The following clauses describe the required short circuit current contribution for generating plants taking into account the connection technology of the generating modules. Generating modules classified as type B modules according to COMMISSION REGULATION 2016/631 shall comply with the requirements of 4.7.4.2 and 4.7.4.3. Generating modules classified as type A according to COMMISSION REGULATION 2016/631 should comply with these requirements. The actual behaviour of type A modules shall be specified in the connection agreement.		P
4.7.4.2	**Generating plant with non-synchronous generating technology**		P
4.7.4.2.1	**Voltage support during faults and voltage steps** In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN 50549-2 applies.	Only EN 50549-1 applies, but if required by the responsible party for additional reactive current, the EN 50549-2 shall be applied.	P

Clause	Requirement - Test	Result - Remark	Verdict
4.7.4.2.2	**Zero current mode for converter connected generating technology** If UVRT capability (see 4.5.3) is provided additional to the requirements of 4.5, generating units connected to the grid by a converter shall have the capability to reduce their current as fast as technically feasible down to or below 10 % of the rated current when the voltage is outside of a static voltage range. Generating units based on a doubly fed induction machine can only reduce the positive sequence current below 10 % of the rated current. Negative sequence current shall be tolerated during unbalanced faults. In case this current reduction is not sufficient, the DSO should choose suitable interface protection settings. The static voltage range shall be adjustable from 20 % to 100 % of U_n for the undervoltage boundary and from 100 % to 130 % of U_n for the overvoltage boundary. The default setting shall be 50% of U_n for the undervoltage boundary and 120% of U_n for the overvoltage boundary. Each phase to neutral voltage or if no neutral is present each phase to phase voltage shall be evaluated. At voltage re-entry into the voltage range, 90% of pre-fault power or available power, whichever is the smallest, shall be resumed as fast as possible, but at the latest according to 4.5.3 and 4.5.4. All described settings are defined by the DSO and the responsible party. If no settings are provided, the function shall be disabled. The enabling and disabling and the settings shall be field adjustable and means have to be provided to protect these from unpermitted interference (e.g. password or seal) if required by the DSO.	The test is performed together with the clause 4.5.3 and 4.5.4 Default setting for testing.	P
4.7.4.2.3	**Induction generator based units** In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN50549-2 applies.		N/A

4.7.4.3	**Generating plant with synchronous generating technology - Synchronous generator based units** In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN50549-2 applies.		N/A
4.8	**EMC and power quality** Similar to any other apparatus or fixed installation, generating units shall comply with the requirements on electromagnetic compatibility established in Directive 2014/30/EU or 2014/53/EU, whichever applies. EMC limits and tests, described in EN 61000 series, have been traditionally developed for loads, without taking into account the particularities of generating units, such as their capability to create overvoltages or high frequency disturbances due to the presence of power converters, which were either impossible or less frequent in case of loads.	The units have declared to comply with Directive 2014/30/EU or 2014/53/EU	P
4.9	**Interface protection**		P
4.9.1	**General** According to HD 60364-5-551:2010, 551.7.4, means of automatic switching shall be provided to disconnect the generating plant from the distribution network in the event of loss of that supply or deviation of the voltage or frequency at the supply terminals from values declared for normal supply. This automatic means of disconnection has following main objectives: • prevent the power production of the generating plant to cause an overvoltage situation in the distribution network it is connected to. Such overvoltages could result in damages to the equipment connected to the distribution network as well as the distribution network itself; • detect unintentional island situations and disconnect the generating plant in this case. This is contributing to prevent damage to other equipment, both in the producers' installations and the distribution network due to out of phase re-closing and to allow for maintenance work after an intentional disconnection of a section of the distribution network; • assist in bringing the distribution network to a controlled state in case of voltage or frequency deviations beyond corresponding regulation values.		P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
	• disconnect the generating plant from the distribution network in case of faults internal to the power generating plant. Protection against internal faults (short-circuits) shall be coordinated with network protection, according to DSO protection criteria. Protection against e.g. overload, electric shock and against fire hazards shall be implemented additionally according to HD 60364-1 and local requirements; • prevent damages to the generating unit due to incidents (e.g. short circuits) on the distribution network Interface protections may contribute to preventing damage to the generating units due to out-of-phase reclosing of automatic reclosing which may happen after some hundreds of ms. However, in some countries some technologies of generating units are explicitly required to have an appropriate immunity level against the consequences of out-of-phase reclosing. The type of protection and the sensitivity and operating times depend upon the protection and the characteristics of the distribution network. A wide variety of approaches to achieve the above mentioned objectives is used throughout Europe. Besides the passive observation of voltage and frequency other active and passive methods are available and used to detect island situations. The requirements given in this clause are intended to provide the necessary functions for all known approaches as well as to give guidance in their use. Which functions are available in a product shall be stated in the product documentation.		P
	The interface protection system shall comply with the requirements of this European Standard, the available functions and configured settings shall comply with the requirements of the DSO and the responsible party. In any case, the settings defined shall be understood as the values for the interface protection system, i.e. where there is a wider technical capability of the generation module, it shall not be withheld by the settings of the protections (other than the interface protection). For micro generating plants, the interface protection system and the point of measurement might be integrated into the generating units. For generating plants with nominal current above 16 A the DSO may define a threshold above which the interface protection system shall be realized as a dedicated device and not integrated into the generating units.	Integrated into the generating units.	P

	to place the protection system as close to the point of connection as possible, to avoid tripping due to overvoltages resulting from the voltage rise within the producer’s network; • to allow for periodic field tests. In some countries periodic field tests are not required if the protection system meets the requirements of single fault safety. The interface protection relay acts on the interface switch. The DSO may require that the interface protection relay acts additionally on another switch with a proper delay in case the interface switch fails to operate. In case of failure of the power supply of the interface protection, the interface protection shall trigger the interface switch without delay. An uninterruptible power supply may be required by the DSO, for instance in case of UVRT capability, delay in protection etc. In case of field adjustable settings of threshold and operation time, means shall be provided to protect the settings from unpermitted interference (e.g. password or seal) if required by the DSO.		P
4.9.2	**Void**		--
4.9.3	**Requirements on voltage and frequency protection**	(See appended table 4.9.3)	P
4.9.3.1	**General** Part or all of the following described functions may be required by the DSO and the responsible party. The protection functions shall evaluate at least all phases where generating units, covered by this protection system, are connected to. In case of three phase generating units/plants and in all cases when the protection system is implemented as an external protection system in a three phase power supply system, all phase to phase voltages and, if a neutral conductor is present, all phase to neutral voltages shall be evaluated. The frequency shall be evaluated on at least one of the voltages.		P

Clause	Requirement - Test	Result - Remark	Verdict
	If multiple signals (e.g. 3 phase to phase voltages) are to be evaluated by one protection function, this function shall evaluate all of the signals separately. The output of each evaluation shall be OR connected, so that if one signal passes the threshold of a function, the function shall trip the protection in the specified time. The minimum required accuracy for protection is: • for frequency measurement ± 0,05 Hz; • for voltage measurement ± 1 % of U_n. • The reset time shall be ≤50ms • The interface protection relay shall not conduct continuous starting and disengaging operations of the interface protection relay. Therefore a reasonable reset ratio shall be implemented which shall not be zero but be below 2% of nominal value for voltage and below 0,2Hz for frequency.		P
4.9.3.2	**Undervoltage protection [27]** The protection shall comply with EN 60255-127. The evaluation of the r.m.s. or the fundamental value is allowed. Undervoltage protection may be implemented with two completely independent protection thresholds, each one able to be activated or not. The standard adjustment ranges are as follows. Undervoltage threshold stage 1 [27 <]: • Threshold (0,2 – 1) U_n adjustable by steps of 0,01 U_n • Operate time (0,1 – 100) s adjustable in steps of 0,1 s Undervoltage threshold stage 2 [27 < <]: • Threshold (0,2 – 1) U_n adjustable by steps of 0,01 U_n • Operate time (0,1 – 5) s adjustable in steps of 0,05 s The undervoltage threshold stage 2 is not applicable for micro-generating plants		P

Clause	Requirement - Test	Result - Remark	Verdict
4.9.3.3	**Overvoltage protection [59]** The protection shall comply with EN 60255-127. The evaluation of the r.m.s. or the fundamental value is allowed. Overvoltage protection may be implemented with two completely independent protection thresholds, each one able to be activated or not. The standard adjustment ranges are as follows. Overvoltage threshold stage 1 [59 >]: • Threshold (1,0 – 1,2) U_n adjustable by steps of 0,01 U_n • Operate time (0,1 – 100) s adjustable in steps of 0,1 s Overvoltage threshold stage 2 [59 > >]: • Threshold (1,0 – 1,30) U_n adjustable by steps of 0,01 U_n • Operate time (0,1 – 5) s adjustable in steps of 0,05 s		P
4.9.3.4	**Overvoltage 10 min mean protection** The calculation of the 10 min value shall comply with the 10 min aggregation of EN 61000-4-30 Class S, but deviating from EN 61000-4-30 as a moving window is used. Therefore the function shall be based on the calculation of the square root of the arithmetic mean of the squared input values over 10 min. The calculation of a new 10 min value at least every 3 s is sufficient, which is then to be compared with the threshold value. • Threshold (1,0 – 1,15) U_n adjustable by steps of 0,01 U_n • Start time ≤ 3s not adjustable • Time delay setting = 0 ms		P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.9.3.5	**Underfrequency protection [81 <]** Underfrequency protection may be implemented with two completely independent protection thresholds, each one able to be activated or not. The standard adjustment ranges are as follows. Underfrequency threshold stage 1 [81 <]: • Threshold (47,0 – 50,0) Hz adjustment by steps of 0,1 Hz • Operate time (0,1 – 100) s adjustable in steps of 0,1 s Underfrequency threshold stage 2 [81 < <]: • Threshold (47,0 – 50,0) Hz adjustment by steps of 0,1 Hz • Operate time (0,1 – 5) s adjustable in steps of 0,05 s In order to use narrow frequency thresholds for islanding detection (see 4.9.3.3) it may be required to have the ability to activate and deactivate a stage by an external signal. The frequency protection shall function correctly in the input voltage range between 20 % U_n and 120 % U_n and shall be inhibited for input voltages of less than 20 % U_n. Under 0,2 U_n the frequency protection is inhibited. Disconnection may only happen based on undervoltage protection.		P
4.9.3.6	**Overfrequency protection [81 >]** Overfrequency protection may be implemented with two completely independent protection thresholds, each one able to be activated or not. The standard adjustment ranges are as follows. Overfrequency threshold stage 1 [81 >]: • Threshold (50,0 - 52,0) Hz adjustment by steps of 0,1 Hz • Operate time (0,1 – 100) s adjustable in steps of 0,1 s Overfrequency threshold stage 2 [81 > >]: • Threshold (50,0 - 52,0) Hz adjustment by steps of 0,1 Hz • Operate time (0,1 - 5) s adjustable in steps of 0,05 s In order to use narrow frequency thresholds for islanding detection (see4.9.3.3) it may be required to have the ability to activate and deactivate a stage by an external signal. The frequency protection shall function correctly in the input voltage range between 20 % U_n and 120 % U_n and shall be inhibited for input voltages of less than 20 % U_n.		P
4.9.4	**Means to detect island situation**		P

Clause	Requirement - Test	Result - Remark	Verdict
4.9.4.1	**General** sides the passive observation of voltage and frequency further means to detect an island may be required by the DSO. Detecting islanding situations shall not be contradictory to the immunity requirements of 4.5. Commonly used functions include: • Active methods tested with a resonant circuit; • ROCOF tripping; • Switch to narrow frequency band; • Vector shift • Transfer trip. Only some of the methods above rely on standards. Namely for ROCOF tripping and for the detection of a vector shift, also called a vector jump, currently no European Standard is available.		P
4.9.4.2	**Active methods tested with a resonant circuit** These are methods which pass the resonant circuit test for PV inverters according to EN 62116.	(See appended table 4.9.4.2)	P
4.9.4.3	**Switch to narrow frequency band (see Annex E and Annex F)** In case of local phenomena (e.g. a fault or the opening of circuit breaker along the line) the DSO in coordination with the responsible party may require a switch to a narrow frequency band to increase the interface protection relay sensitivity. In the event of a local fault it is possible to enable activation of the restrictive frequency window (using the two underfrequency/overfrequency thresholds described in 4.9.2.5 and 4.9.2.6) correlating its activation with another additional protection function. If required by the DSO, a digital input according to 4.9.4 shall be available to allow the DSO the activation of a restrictive frequency window by communication.		P
4.9.5	**Digital input to the interface protection** If required by the DSO, the interface protection shall have at least two configurable digital inputs. These inputs can for example be used to allow transfer trip or the switching to the narrow frequency band.		P
4.10	**Connection and starting to generate electrical power**		P

Clause	Requirement - Test	Result - Remark	Verdict
4.10.1	**General** Connection and starting to generate electrical power is only allowed after voltage and frequency are within the allowed voltage and frequency ranges for at least the specified observation time. It shall not be possible to overrule these conditions. Within these voltage and frequency ranges, the generating plant shall be capable of connecting and starting to generate electrical power. The setting of the conditions depends on whether the connection is due to a normal operational startup or an automatic reconnection after tripping of the interface protection. In case the settings for automatic reconnection after tripping and starting to generate power are not distinct in a generating plant, the tighter range and the start-up gradient shall be used. The frequency range, the voltage range, the observation time and the power gradient shall be field adjustable. For field adjustable settings, means shall be provided to protect the settings from unpermitted interference (e.g. password or seal) if required by the DSO.		P
4.10.2	**Automatic reconnection after tripping** The frequency range, the voltage range, the observation time shall be adjustable in the range according to Table 3 column 2. If no settings are specified by the DSO and the responsible party, the default settings for the reconnection after tripping of the interface protection are according to Table 3 column 3. After reconnection, the active power generated by the generating plant shall not exceed a specified gradient expressed as a percentage of the active nominal power of the unit per minute. If no gradient is specified by the DSO and the responsible party, the default setting is 10 % P_n/min. Generating modules for which it is technically not feasible to increase the power respecting the specified gradient over the full power range may connect after 1 min to 10 min (randomized value, uniformly distributed) or later.	(See appended table 4.10.2)	P

Clause	Requirement - Test	Result - Remark	Verdict
4.10.3	**Starting to generate electrical power** The frequency range, the voltage range, the observation time shall be adjustable in the range according to Table 4 column 2. If no settings are specified by the DSO and the responsible party, the default settings for connection or starting to generate electrical power due to normal operational startup or activity are according to Table 4 column 3. If applicable, the power gradient shall not exceed the maximum gradient specified by the DSO and the responsible party. Heat driven CHP generating units do not need to keep a maximum gradient, since the start up is randomized by the nature of the heat demand. For manual operations performed on site (e.g. for the purpose of initial start-up or maintenance) it is permitted to deviate from the observation time and ramp rate.	(See appended table 4.10.3) Default settings are applied.	P
4.10.4	**Synchronization** Synchronizing a generating plant/unit with the distribution network shall be fully automatic i.e. it shall not be possible to manually close the switch between the two systems to carry out synchronization.		P
4.11	**Ceasing and reduction of active power on set point**		P
4.11.1	**Ceasing active power** Generating plants with a maximum capacity of 0,8 kW or more shall be equipped with a logic interface (input port) in order to cease active power output within five seconds following an instruction being received at the input port. If required by the DSO and the responsible party, this includes remote operation.	(See appended table 4.11)	P
4.11.2	**Reduction of active power on set point** For generating modules of type B, a generating plant shall be capable of reducing its active power to a limit value provided remotely by the DSO. The limit value shall be adjustable in the complete operating range from the maximum active power to minimum regulating level. The adjustment of the limit value shall be possible with a maximum increment of 10% of nominal power. A generation unit/plant shall be capable of carrying out the power output reduction to the respective limit within an envelope of not faster than 0,66 % P_n/ s and not slower than 0,33 % P_n/ s with an accuracy of 5 % of nominal power. Generating plants are permitted to disconnect from the network at a limit value below it minimum regulating level. If required by the DSO, this includes remote operation.	(See appended table 4.11)	P

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict
4.12	**Remote information exchange** Generating plants whose power is above a threshold to be determined by the DSO and the responsible party shall have the capacity to be monitored by the DSO or TSO control centre or control centres as well as receive operation parameter settings for the functions specified in this European Standard from the DSO or TSO control centre or control centres. This information exchange is aimed at allowing the DSO and/or the TSO to improve, optimize and make safer the operation of their respective networks. The remote monitoring and operation parameter settings system that may be used by the DSO is not aimed at replacing the manual and automatic control means implemented by the generating plant operator to control the operation of the generating plant. It should not interact directly with the power generation equipment and the switching devices of the generating plant. It should interact with the operation and control system of the generating plant. In principle, standardized communication should be used. It is recommended that in case of using protocols for signal transmission used between the DSO or TSO control centre or control centres and the generating plant, relevant technical standards (e.g. EN 60870-5-101, EN 60870-5-104, EN 61850 and in particular EN 61850-7-4, EN 61850-7-420, IEC/TR 61850-90-7, as well as EN 61400-25 for wind turbines and relevant parts of IEC 62351 for relevant security measures) are recognized. Alternative protocols can be agreed between the DSO and the producer. These protocols include hardwired digital input/output and analogue input/output provided locally by DSO. The information needed for remote monitoring and the setting of configurable parameters are specific to each distribution network and to the way it is operated. Signal transmission times between the DSO and/or the TSO control centre and the generating plant will depend on the means of transmission used between the DSO and/or TSO control centre and the generating plant. Informative Annex B of EN50549-2 can be used as guidance regarding the monitoring information and the remote operation parameter setting.		N/A

4.13	**Requirements regarding single fault tolerance of interface protection system and interface switch** If required in 4.3.2, the interface protection system and the interface switch shall meet the requirements of single fault tolerance. A single fault shall not lead to a loss of the safety functions. Faults of common cause shall be taken into account if the probability for the occurrence of such a fault is significant. Whenever reasonably practical, the individual fault shall be displayed and lead to the disconnection of the power generating unit or system. Series-connected switches shall each have a independent breaking capacity corresponding to the rated current of the generating unit and corresponding to the short circuit contribution of the generating unit. The short-time withstand current of the switching devices shall be coordinated with maximum short circuit power at the connection point. At least one of the switches shall be a switch-disconnector suitable for overvoltage category 2. For single-phase generating units, the switch shall have one contact of this overvoltage category for both the neutral conductor and the line conductor. For poly-phase generating units, it is required to have one contact of this overvoltage category for all active conductors. The second switch may be formed of electronic switching components from an inverter bridge or another circuit provided that the electronic switching components can be switched off by control signals and that it is ensured that a failure is detected and leads to prevention of the operation at the latest at the next reconnection. For PV-inverters without simple separation between the network and the PV generating unit (e.g. PV Inverter without transformer) both switches mentioned in the paragraph above shall be switchdisconnectors with the requirements described therein, although one switching device is permitted to be located between PV array and PV inverter.	(See appended table 4.13) The EES units are complied with requirements of IEC/EN 62109, see separate report for details	P
Annex A	**Interconnection guidance**		Info
Annex B	**Void**		Info
Annex C	**Parameter Table**		Info
Annex D	**List of national requirements applicable for generating plants**		Info
Annex E	**Loss of Mains and overall power system security**		Info
Annex F	**Examples of protection strategies**		Info

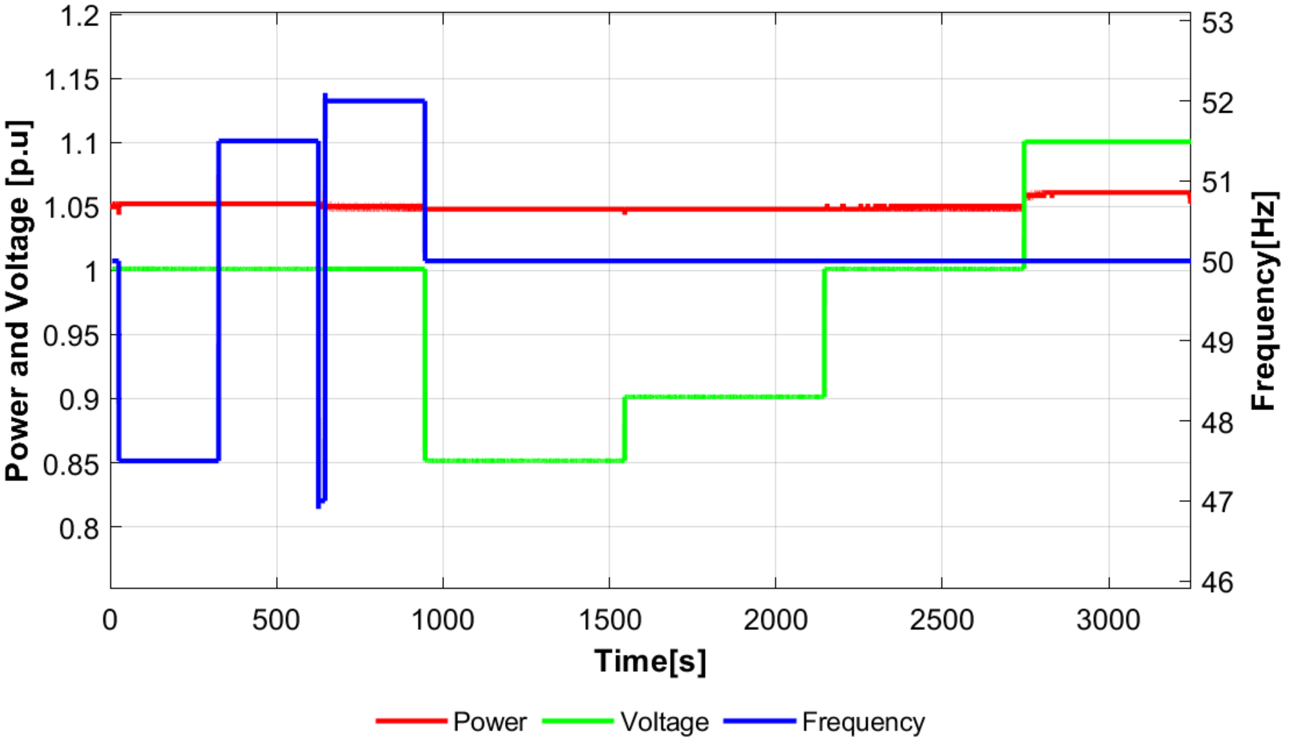
Annex G	**Abbreviations**	Info
Annex H	**Relationship between this European standard and the COMMISSION REGULATION (EU) 2016/631**	Info

5.2.1 & 5.2.2	**TABLE: Normal operating range (Operation range)**	P

Test Conditions			Measurements	Target value	Limit
U/Un	f [Hz]	Time	Pmax/Pn	Pmax/Pn	Pmax/Pn
100%	47.5	5min	100.05%	80%	≥80%
100%	51.5	5min	100.05%	100%	100%±5%
100%	47.0	20s	100.05%	75%	≥75%
100%	52.0	5min	100.05%	100%	100%±5%
85%	50.0	10min	100.05%	100%	80%-105%
90%	50.0	10min	100.05%	100%	85%-105%
100%	50.0	10min	100.05%	100%	100%±5%
110%	50.0	10min	100.06%	100%	100%±5%

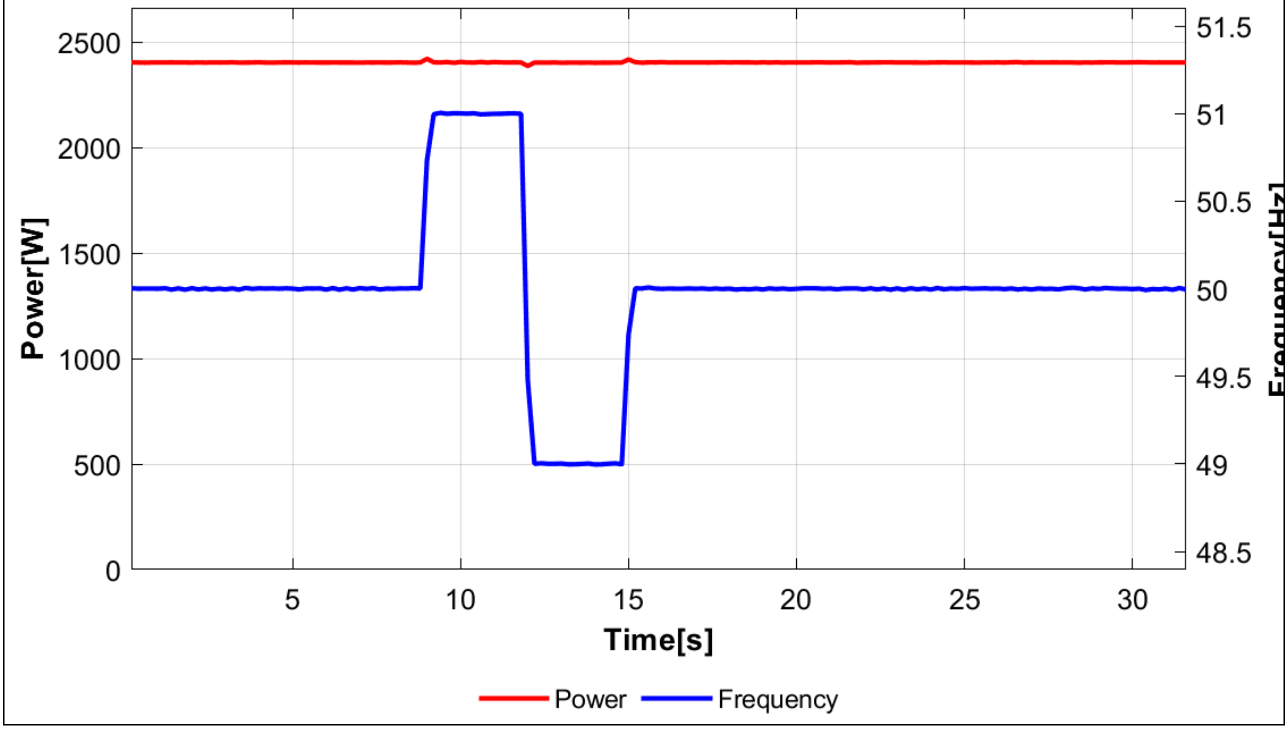
Note(s):

***** Function of interface protection and activating active power response to over/under frequency and voltage shall be disable.

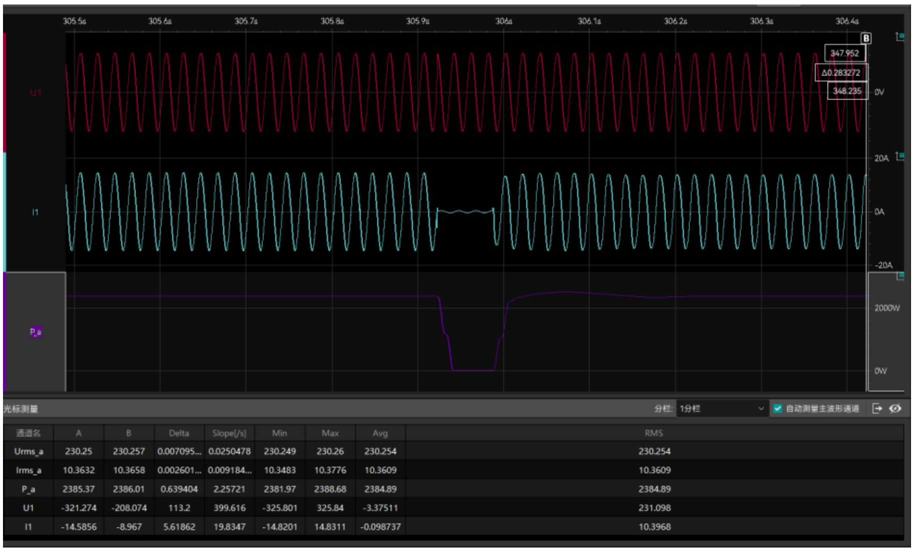


5.3.1	**TABLE: Immunity to disturbances - Rate of change of frequency (ROCOF)**	P

Test Condition		Measurement	Limit
f [Hz]	Time [s]		
50	3	Connect	Connect
51	3	Connect	Connect
49	3	Connect	Connect
50	6	Connect	Connect

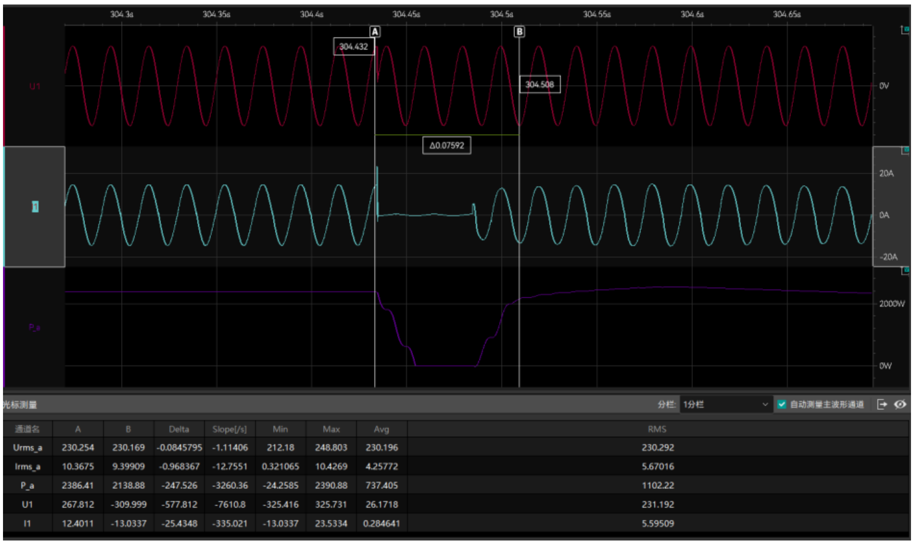


5.3.2	**TABLE: Phase jump**				P
Test Condition			Result	Limit	
P/Pn	Time	Phase displacement [°]			
100%	5min	+90°	No damage inverter connected	No damage inverter connected	
100%	5min	-90°	No damage inverter connected	No damage inverter connected	
100%	5min	+180°	No damage inverter reconnected	No damage inverter reconnected	
100%	5min	-180°	No damage inverter reconnected	No damage inverter reconnected	


305.5s
305.6s
305.7s
305.8s
305.9s
306s
306.1s
306.2s
306.3s
306.4s
B
347.952
Δ0.283272
348.235
U1
0V
I1
20A
0A
-20A
P_a
2000W
0W
光标测量
分栏: 1分栏
自动测量主波形通道

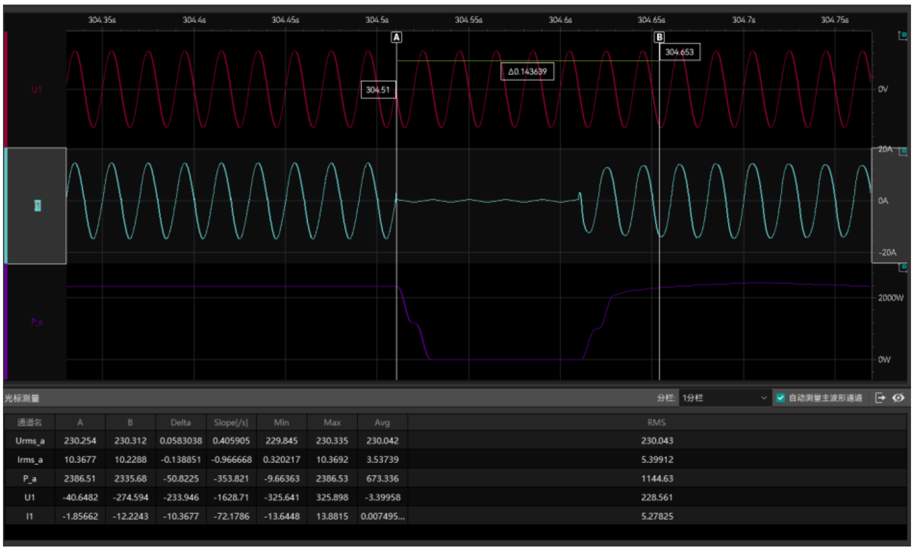
通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.25	230.257	0.007095...	0.0250478	230.249	230.26	230.254	230.254
Irms_a	10.3632	10.3658	0.002601...	0.009184...	10.3483	10.3776	10.3609	10.3609
P_a	2385.37	2386.01	0.639404	2.25721	2381.97	2388.68	2384.89	2384.89
U1	-321.274	-208.074	113.2	399.616	-325.801	325.84	-3.37511	231.098
I1	-14.5856	-8.967	5.61862	19.8347	-14.8201	14.8311	-0.098737	10.3968

+90°

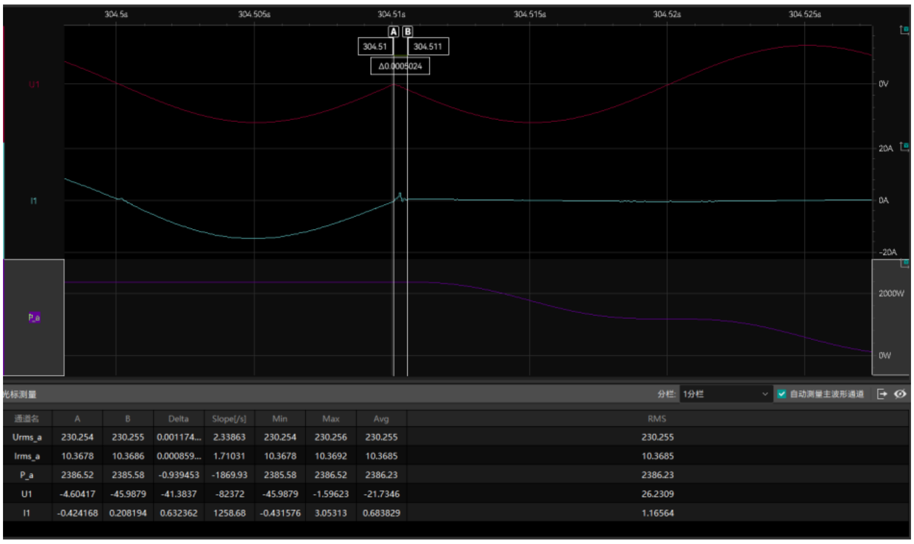

304.3s
304.35s
304.4s
304.45s
304.5s
304.55s
304.6s
304.65s
A
B
304.432
304.508
Δ0.07592
U1
0V
I1
20A
0A
-20A
P_a
2000W
0W
光标测量
分栏: 1分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.254	230.169	-0.0845795	-1.11406	212.18	248.803	230.196	230.292
Irms_a	10.3675	9.39909	-0.968367	-12.7551	0.321065	10.4269	4.25772	5.67016
P_a	2386.41	2138.88	-247.526	-3260.36	-24.2585	2390.88	737.405	1102.22
U1	267.812	-309.999	-577.812	-7610.8	-325.416	325.731	26.1718	231.192
I1	12.4011	-13.0337	-25.4348	-335.021	-13.0337	23.5334	0.284641	5.59509

-90°

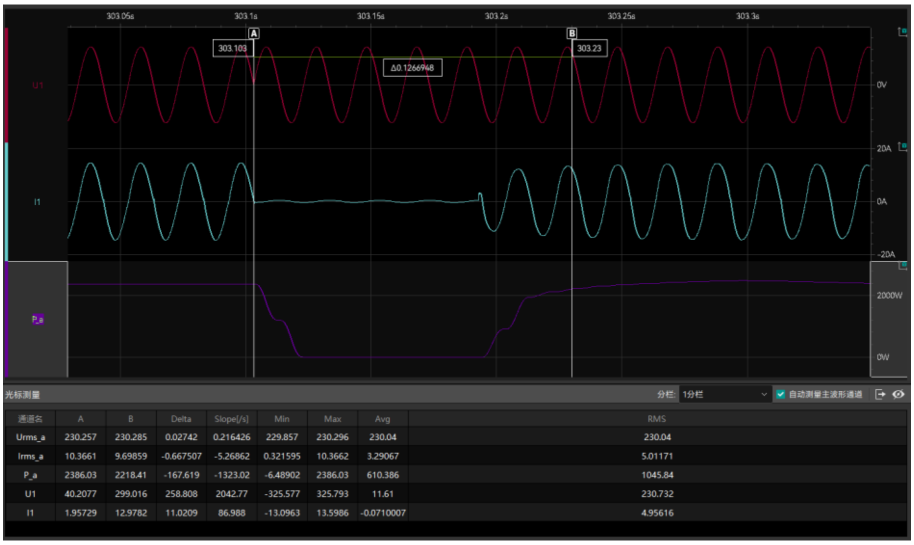

304.35s
304.4s
304.45s
304.5s
304.55s
304.6s
304.65s
304.7s
304.75s
A
B
304.51
304.653
Δ0.143639
U1
I1
P_a
0V
20A
0A
-20A
2000W
0W
光标测量
分栏: 1分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.254	230.312	0.0583038	0.405905	229.845	230.335	230.042	230.043
Irms_a	10.3677	10.2288	-0.138851	-0.966668	0.320217	10.3692	3.53739	5.39912
P_a	2386.51	2335.68	-50.8225	-353.821	-9.66363	2386.53	673.336	1144.63
U1	-40.6482	-274.594	-233.946	-1628.71	-325.641	325.898	-3.39958	228.561
I1	-1.85662	-12.2243	-10.3677	-72.1786	-13.6448	13.8815	0.007495...	5.27825

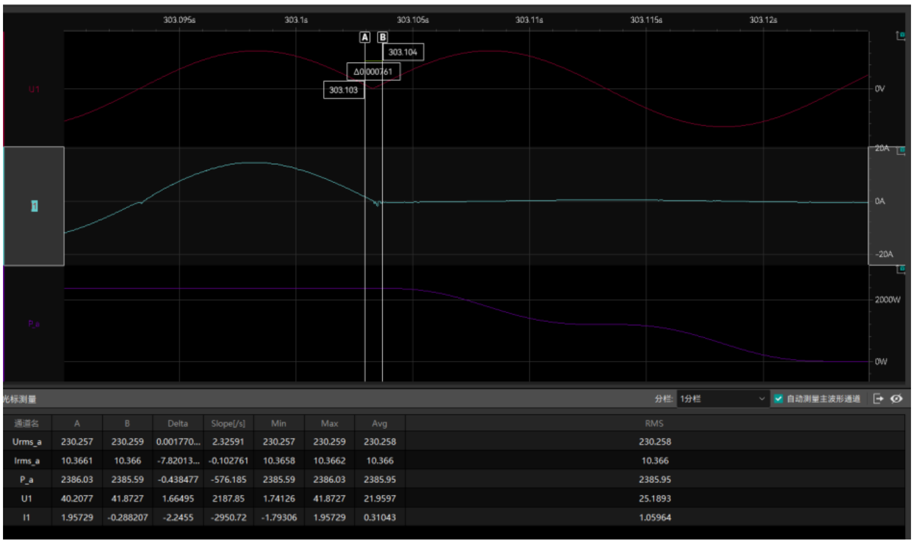

304.5s
304.505s
304.51s
304.515s
304.52s
304.525s
A
B
304.51
304.511
Δ0.0005024
U1
I1
P_a
0V
20A
0A
-20A
2000W
0W
光标测量
分栏: 1分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.254	230.255	0.001174...	2.33863	230.254	230.256	230.255	230.255
Irms_a	10.3678	10.3686	0.000859...	1.71031	10.3678	10.3692	10.3685	10.3685
P_a	2386.52	2385.58	-0.939453	-1869.93	2385.58	2386.52	2386.23	2386.23
U1	-4.60417	-45.9879	-41.3837	-82372	-45.9879	-1.59623	-21.7346	26.2309
I1	-0.424168	0.208194	0.632362	1258.68	-0.431576	3.05313	0.683829	1.16564

+180°


303.05s
303.1s
303.15s
303.2s
303.25s
303.3s
A
B
303.103
303.23
Δ0.1266968
U1
I1
P_a
0V
20A
0A
-20A
2000W
0W
光标测量
分栏: 1分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.257	230.285	0.02742	0.216426	229.857	230.296	230.04	230.04
Irms_a	10.3661	9.69859	-0.667507	-5.26862	0.321595	10.3662	3.29067	5.01171
P_a	2386.03	2218.41	-167.619	-1323.02	-6.48902	2386.03	610.386	1045.84
U1	40.2077	299.016	258.808	2042.77	-325.577	325.793	11.61	230.732
I1	1.95729	12.9782	11.0209	86.988	-13.0963	13.5986	-0.0710007	4.95616


303.095s
303.1s
303.105s
303.11s
303.115s
303.12s
A
B
303.104
Δ0.000761
303.103
U1
I1
P_a
0V
20A
0A
-20A
2000W
0W
光标测量
分栏: 1分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Urms_a	230.257	230.259	0.001770...	2.32591	230.257	230.259	230.258	230.258
Irms_a	10.3661	10.366	-7.82013...	-0.102761	10.3658	10.3662	10.366	10.366
P_a	2386.03	2385.59	-0.438477	-576.185	2385.59	2386.03	2385.95	2385.95
U1	40.2077	41.8727	1.66495	2187.85	1.74126	41.8727	21.9597	25.1893
I1	1.95729	-0.288207	-2.2455	-2950.72	-1.79306	1.95729	0.31043	1.05964

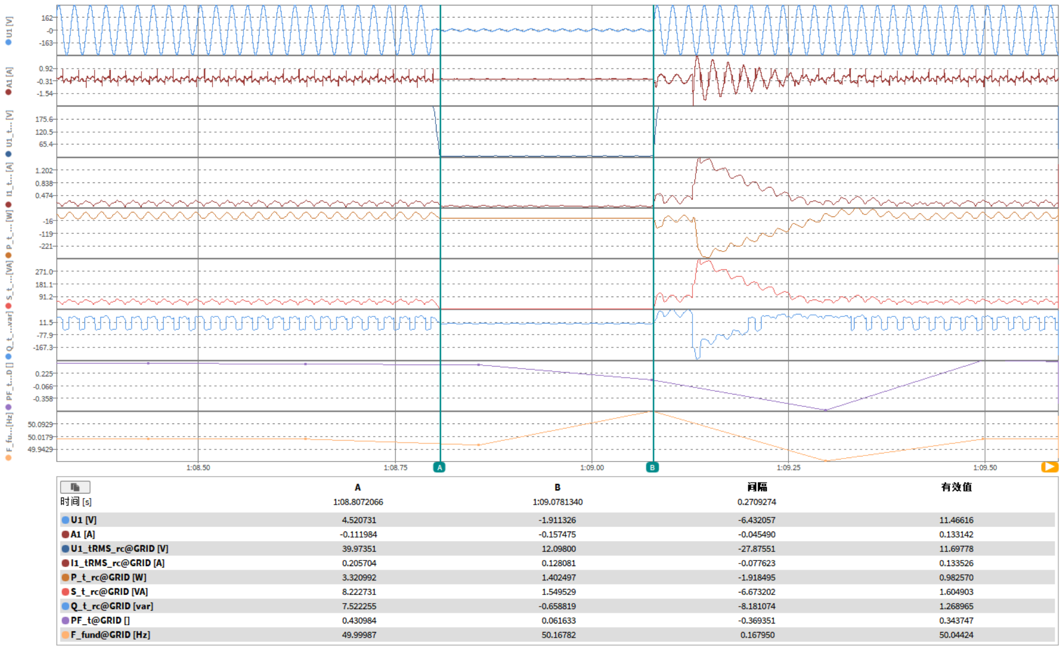
-180°

5.3.3	**TABLE: Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)**	P

ondition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	1.1	1.2	1.3	1.4
	1	Date	--	--	dd.mm.yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm:ss	See graph			
	3	Fault type (phase)	--	--		VD1		VD6	
	4	Setting voltage depth	Line to line	--	p.u.	0.05			
	5	Setting dip duration		--		250			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	270.93			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.05			
	10		Pos.		p.u.	0.05			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.006	1.005	1.005	1.004
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.009	0.311	1.014	0.310
	13	Active power	Total	t1-10s to t1	p.u.	1.015	0.312	1.019	0.310
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.034	-0.018	-0.033	-0.022
	16		Pos.			--	--	--	--
	17	$\cos_{\varphi}$	--	t1-10s to t1	--	0.9995	0.9975	0.9994	0.9968
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.048	0.045	0.866	0.866
	19	Line current	Phase 1	t1+50ms	p.u.	0.015	0.015	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	1.167	0.337
	22	Line current	Phase 1	t1+80ms	p.u.	0.015	0.017	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	1.182	0.362

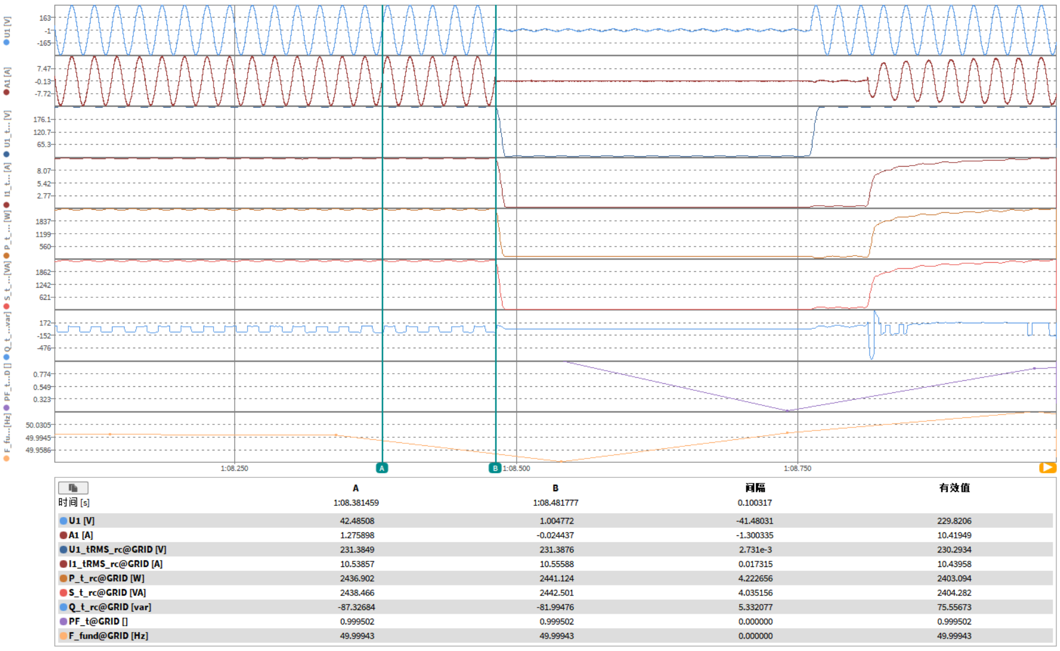
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.001	0.001	1.018	0.313
	26		Pos.			--	--	--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.005	1.005	1.003	1.005
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.012	0.313	1.006	0.313
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.202	0.221	0.104	0.104
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	0.067	-0.022	0.031	-0.022
	32		Pos.						
	33	Reactive power rising time	Pos.	--	s	0.202	0.221	0.104	0.104
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 1.1


U1 [V]
162
-0
-163
A1 [A]
0.92
-0.31
-1.54
U1_t... [V]
175.6
120.5
65.4
I1_t... [A]
1.202
0.838
0.474
P_t_... [W]
-16
-119
-221
S_t_...[VA]
271.0
181.1
91.2
Q_t_...var]
11.5
-77.9
-167.3
PF_t...D []
0.225
-0.066
-0.358
F_fu...[Hz]
50.0929
50.0179
49.9429
1:08.50
1:08.75
A
1:09.00
B
1:09.25
1:09.50

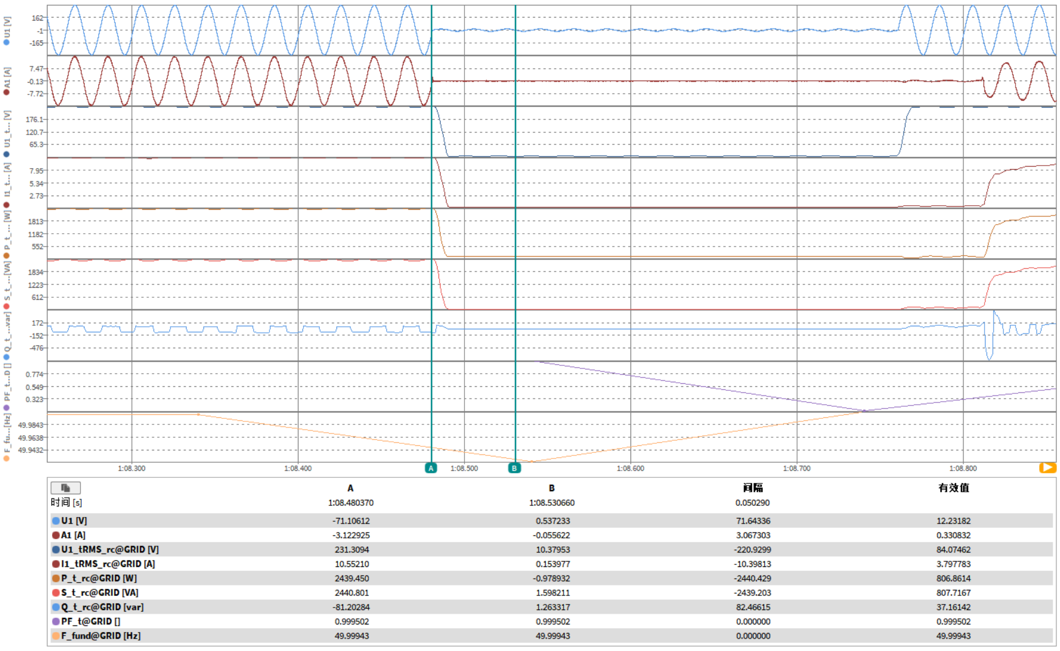
	A	B	间隔	有效值
时间 [s]	1:08.8072066	1:09.0781340	0.2709274	
● U1 [V]	4.520731	-1.911326	-6.432057	11.46616
● A1 [A]	-0.111984	-0.157475	-0.045490	0.133142
● U1_tRMS_rc@GRID [V]	39.97351	12.09800	-27.87551	11.69778
● I1_tRMS_rc@GRID [A]	0.205704	0.128081	-0.077623	0.133526
● P_t_rc@GRID [W]	3.320992	1.402497	-1.918495	0.982570
● S_t_rc@GRID [VA]	8.222731	1.549529	-6.673202	1.604903
● Q_t_rc@GRID [var]	7.522255	-0.658819	-8.181074	1.268965
● PF_t@GRID []	0.430984	0.061633	-0.369351	0.343747
● F_fund@GRID [Hz]	49.99987	50.16782	0.167950	50.04424

Empty load


U1 [V]
163
-1
-165
A1 [A]
7.47
-0.13
-7.72
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
8.07
5.42
2.77
P_t_... [W]
1837
1199
560
S_t_... [VA]
1862
1242
621
Q_t_... [var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
50.0305
49.9945
49.9586
1:08.250
A
B
1:08.500
1:08.750

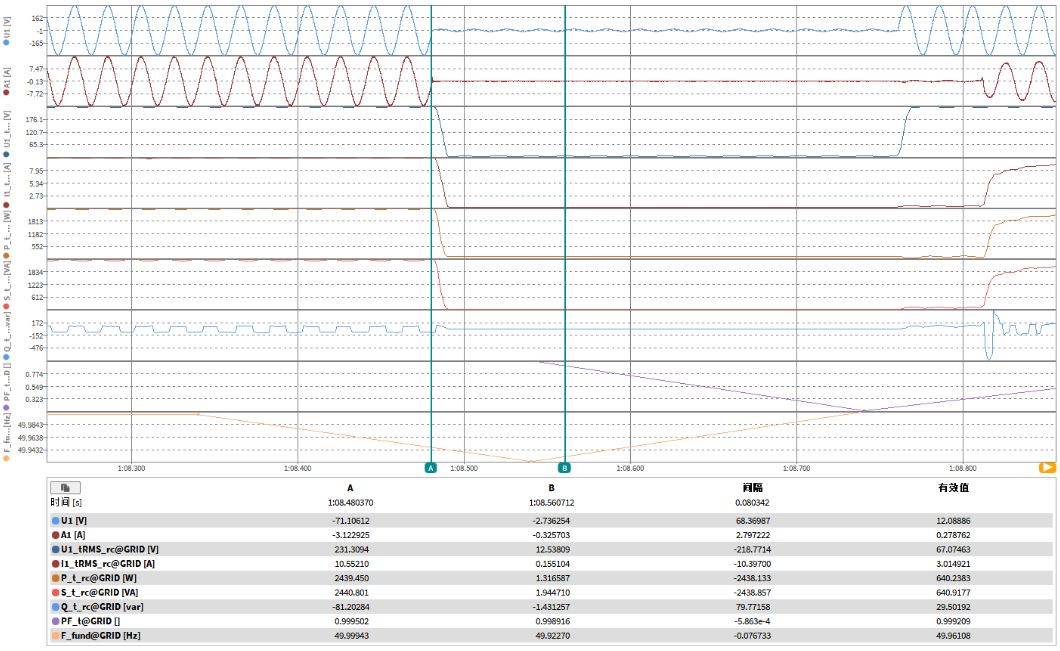
时间 [s]	A 1:08.381459	B 1:08.481777	间隔 0.100317	有效值
● U1 [V]	42.48508	1.004772	-41.48031	229.8206
● A1 [A]	1.275898	-0.024437	-1.300335	10.41949
● U1_tRMS_rc@GRID [V]	231.3849	231.3876	2.731e-3	230.2934
● I1_tRMS_rc@GRID [A]	10.53857	10.55588	0.017315	10.43958
● P_t_rc@GRID [W]	2436.902	2441.124	4.222656	2403.094
● S_t_rc@GRID [VA]	2438.466	2442.501	4.035156	2404.282
● Q_t_rc@GRID [var]	-87.32684	-81.99476	5.332077	75.55673
● PF_t@GRID []	0.999502	0.999502	0.000000	0.999502
● F_fund@GRID [Hz]	49.99943	49.99943	0.000000	49.99943

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
7.47
-0.13
-7.72
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
7.95
5.34
2.73
P_t_... [W]
1813
1182
552
S_t_... [VA]
1834
1223
612
Q_t_... [var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
49.9843
49.9638
49.9432
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700
1:08.800

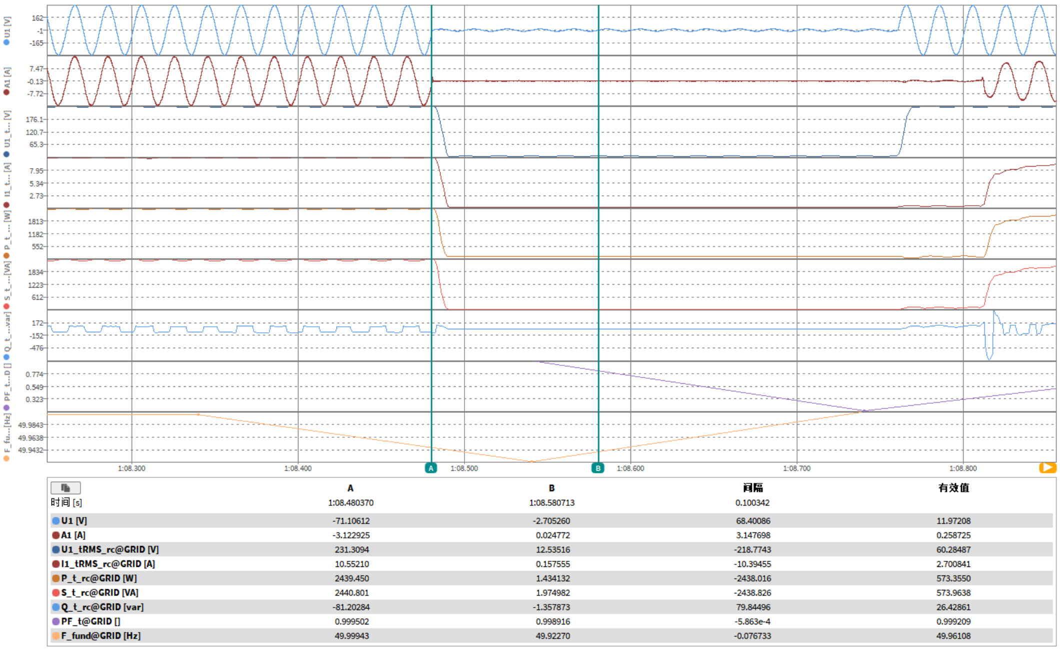
时间 [s]	A 1:08.480370	B 1:08.530660	间隔 0.050290	有效值
● U1 [V]	-71.10612	0.537233	71.64336	12.23182
● A1 [A]	-3.122925	-0.055622	3.067303	0.330832
● U1_tRMS_rc@GRID [V]	231.3094	10.37953	-220.9299	84.07462
● I1_tRMS_rc@GRID [A]	10.55210	0.153977	-10.39813	3.797783
● P_t_rc@GRID [W]	2439.450	-0.978932	-2440.429	806.8614
● S_t_rc@GRID [VA]	2440.801	1.598211	-2439.203	807.7167
● Q_t_rc@GRID [var]	-81.20284	1.263317	82.46615	37.16142
● PF_t@GRID []	0.999502	0.999502	0.000000	0.999502
● F_fund@GRID [Hz]	49.99943	49.99943	0.000000	49.99943

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
7.47
-0.13
-7.72
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
7.95
5.34
2.73
P_t_... [W]
1813
1182
552
S_t_...[VA]
1834
1223
612
Q_t_...var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
49.9843
49.9638
49.9432
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700
1:08.800

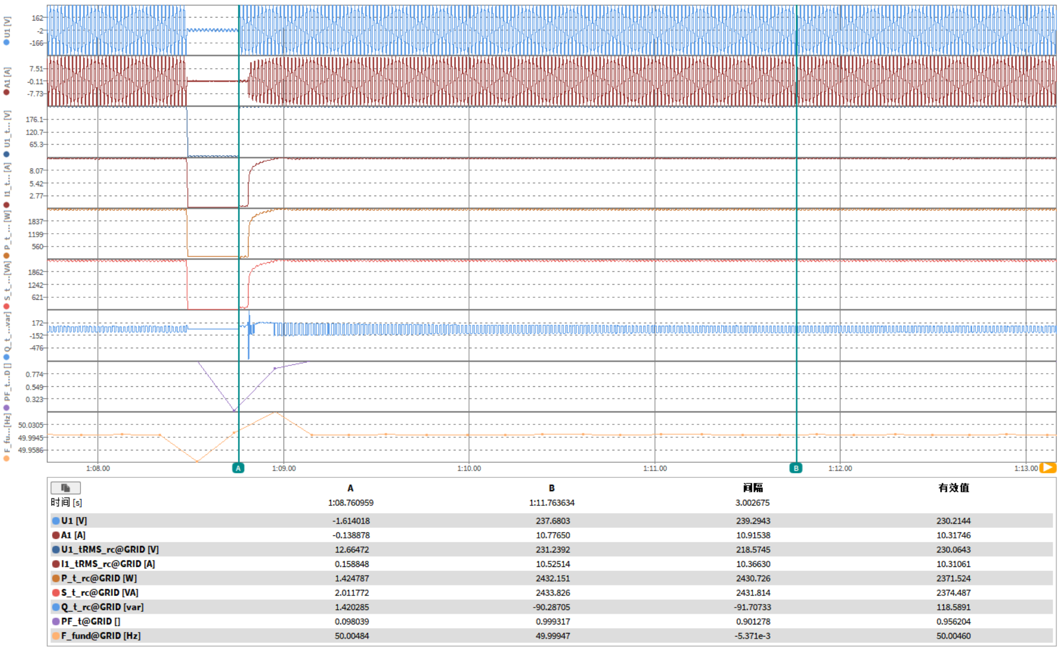
	A	B	间隔	有效值
时间 [s]	1:08.480370	1:08.560712	0.080342	
● U1 [V]	-71.10612	-2.736254	68.36987	12.08886
● A1 [A]	-3.122925	-0.325703	2.797222	0.278762
● U1_tRMS_rc@GRID [V]	231.3094	12.53809	-218.7714	67.07463
● I1_tRMS_rc@GRID [A]	10.55210	0.155104	-10.39700	3.014921
● P_t_rc@GRID [W]	2439.450	1.316587	-2438.133	640.2383
● S_t_rc@GRID [VA]	2440.801	1.944710	-2438.857	640.9177
● Q_t_rc@GRID [var]	-81.20284	-1.431257	79.77158	29.50192
● PF_t@GRID []	0.999502	0.998916	-5.863e-4	0.999209
● F_fund@GRID [Hz]	49.99943	49.92270	-0.076733	49.96108

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
7.47
-0.13
-7.72
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
7.95
5.34
2.73
P_t_... [W]
1813
1182
552
S_t_...[VA]
1834
1223
612
Q_t_...var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
49.9843
49.9638
49.9432
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700
1:08.800

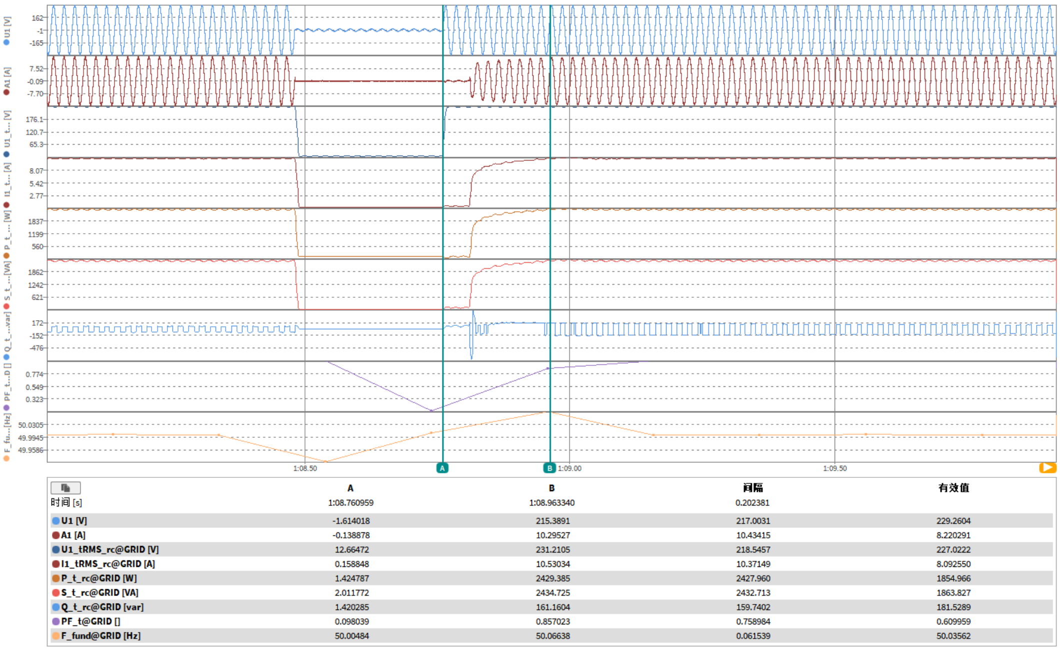
	A	B	间隔	有效值
时间 [s]	1:08.480370	1:08.580713	0.100342	
● U1 [V]	-71.10612	-2.705260	68.40086	11.97208
● A1 [A]	-3.122925	0.024772	3.147698	0.258725
● U1_tRMS_rc@GRID [V]	231.3094	12.53516	-218.7743	60.28487
● I1_tRMS_rc@GRID [A]	10.55210	0.157555	-10.39455	2.700841
● P_t_rc@GRID [W]	2439.450	1.434132	-2438.016	573.3550
● S_t_rc@GRID [VA]	2440.801	1.974982	-2438.826	573.9638
● Q_t_rc@GRID [var]	-81.20284	-1.357873	79.84496	26.42861
● PF_t@GRID []	0.999502	0.998916	-5.863e-4	0.999209
● F_fund@GRID [Hz]	49.99943	49.92270	-0.076733	49.96108

During dip (t1+100ms)


U1 [V]
162
-2
-166
A1 [A]
7.51
-0.11
-7.73
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
8.07
5.42
2.77
P_t_... [W]
1837
1199
560
S_t_... [VA]
1862
1242
621
Q_t_... [var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
50.0305
49.9945
49.9586
1:08.00
A
1:09.00
1:10.00
1:11.00
B
1:12.00
1:13.00

时间 [s]	A 1:08.760959	B 1:11.763634	间隔 3.002675	有效值
U1 [V]	-1.614018	237.6803	239.2943	230.2144
A1 [A]	-0.138878	10.77650	10.91538	10.31746
U1_tRMS_rc@GRID [V]	12.66472	231.2392	218.5745	230.0643
I1_tRMS_rc@GRID [A]	0.158848	10.52514	10.36630	10.31061
P_t_rc@GRID [W]	1.424787	2432.151	2430.726	2371.524
S_t_rc@GRID [VA]	2.011772	2433.826	2431.814	2374.487
Q_t_rc@GRID [var]	1.420285	-90.28705	-91.70733	118.5891
PF_t@GRID []	0.098039	0.999317	0.901278	0.956204
F_fund@GRID [Hz]	50.00484	49.99947	-5.371e-3	50.00460

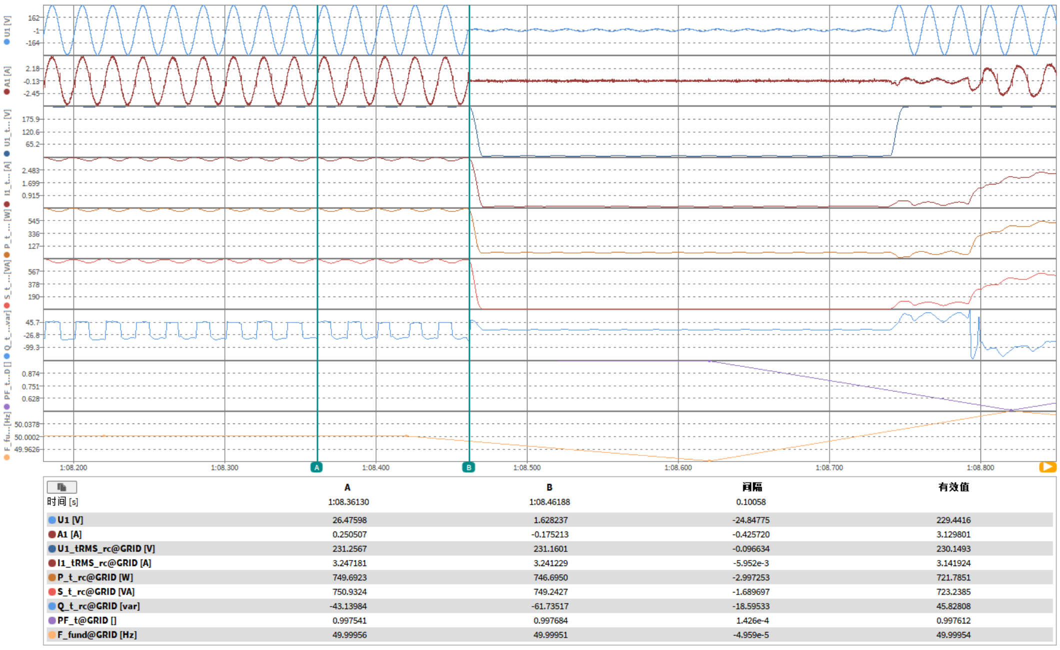
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
7.52
-0.09
-7.70
U1_t... [V]
176.1
120.7
65.3
I1_t... [A]
8.07
5.42
2.77
P_t_... [W]
1837
1199
560
S_t_... [VA]
1862
1242
621
Q_t_... [var]
172
-152
-476
PF_t...D []
0.774
0.549
0.323
F_fu... [Hz]
50.0305
49.9945
49.9586
1:08.50
A
B
1:09.00
1:09.50

时间 [s]	A 1:08.760959	B 1:08.963340	间隔 0.202381	有效值
U1 [V]	-1.614018	215.3891	217.0031	229.2604
A1 [A]	-0.138878	10.29527	10.43415	8.220291
U1_tRMS_rc@GRID [V]	12.66472	231.2105	218.5457	227.0222
I1_tRMS_rc@GRID [A]	0.158848	10.53034	10.37149	8.092550
P_t_rc@GRID [W]	1.424787	2429.385	2427.960	1854.966
S_t_rc@GRID [VA]	2.011772	2434.725	2432.713	1863.827
Q_t_rc@GRID [var]	1.420285	161.1604	159.7402	181.5289
PF_t@GRID []	0.098039	0.857023	0.758984	0.609959
F_fund@GRID [Hz]	50.00484	50.06638	0.061539	50.03562

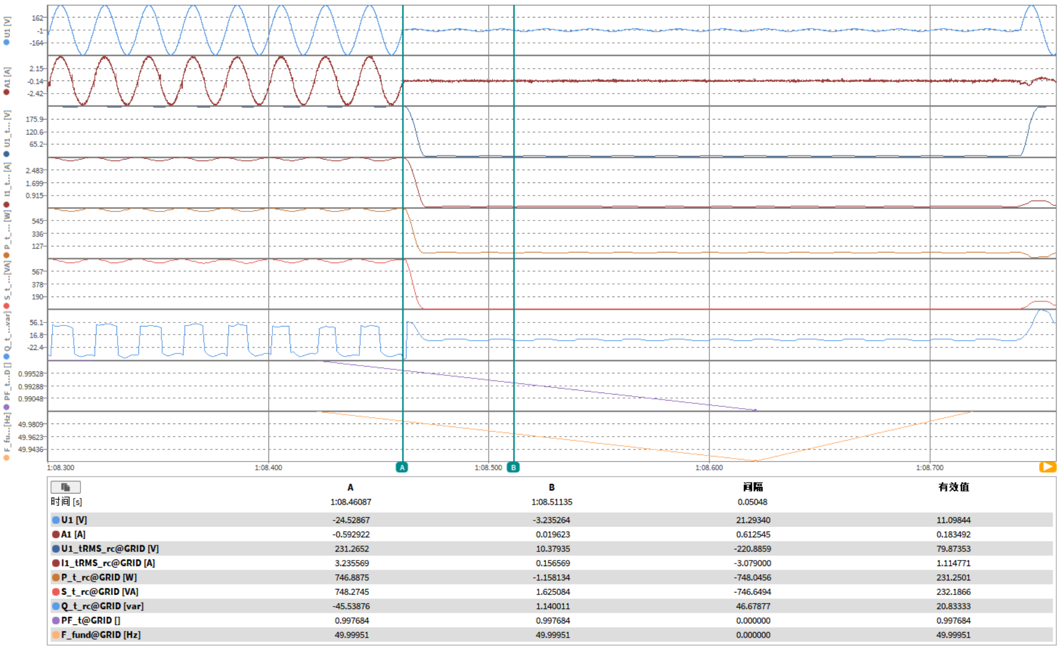
Recovery time

Graph of Test number 1.2


U1 [V]
162
-1
-164
A1 [A]
2.18
-0.13
-2.45
U1_t... [V]
175.9
120.6
65.2
I1_t... [A]
2.483
1.699
0.915
P_t... [W]
545
336
127
S_t... [VA]
567
378
190
Q_t... [var]
45.7
-26.8
-99.3
PF_t...D []
0.874
0.751
0.628
F_fu... [Hz]
50.0378
50.0002
49.9626
1:08.200
1:08.300
A
1:08.400
B
1:08.500
1:08.600
1:08.700
1:08.800

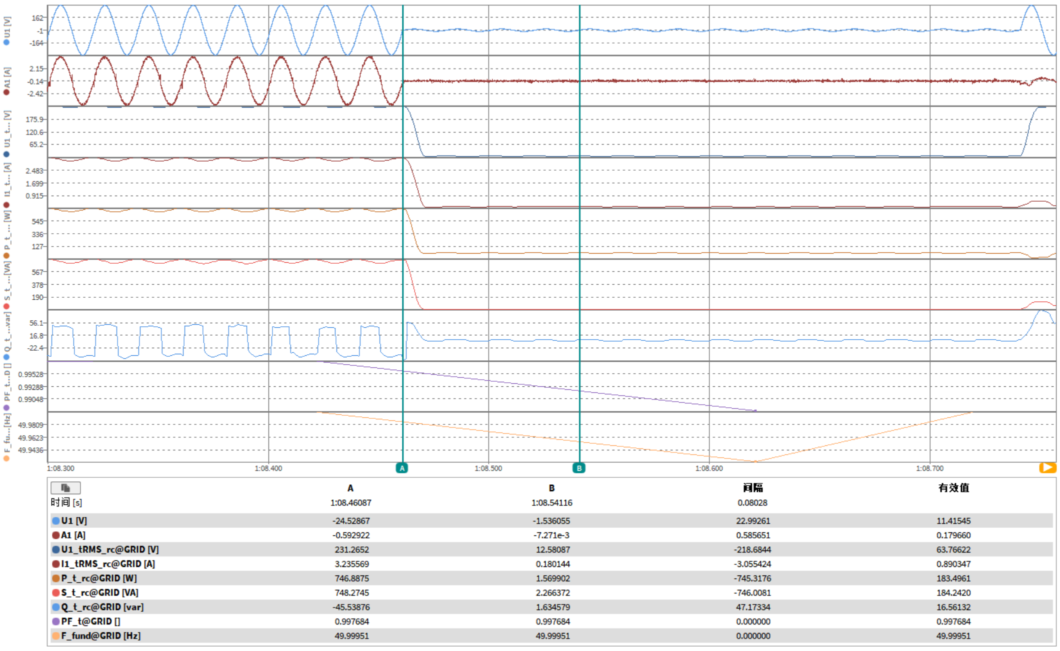
时间 [s]	A 1:08.36130	B 1:08.46188	间隔 0.10058	有效值
U1 [V]	26.47598	1.628237	-24.84775	229.4416
A1 [A]	0.250507	-0.175213	-0.425720	3.129801
U1_tRMS_rc@GRID [V]	231.2567	231.1601	-0.096634	230.1493
I1_tRMS_rc@GRID [A]	3.247181	3.241229	-5.952e-3	3.141924
P_t_rc@GRID [W]	749.6923	746.6950	-2.997253	721.7851
S_t_rc@GRID [VA]	750.9324	749.2427	-1.689697	723.2385
Q_t_rc@GRID [var]	-43.13984	-61.73517	-18.59533	45.82808
PF_t@GRID []	0.997541	0.997684	1.426e-4	0.997612
F_fund@GRID [Hz]	49.99956	49.99951	-4.959e-5	49.99954

Before dip (t1-100ms)


U1 [V]
162
-1
-164
A1 [A]
2.15
-0.14
-2.42
U1_t... [V]
175.9
120.6
65.2
I1_t... [A]
2.483
1.699
0.915
P_t... [W]
545
336
127
S_t... [VA]
567
378
190
Q_t... [var]
56.1
16.8
-22.4
PF_t...D []
0.99528
0.99288
0.99048
F_fu... [Hz]
49.9809
49.9623
49.9436
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700

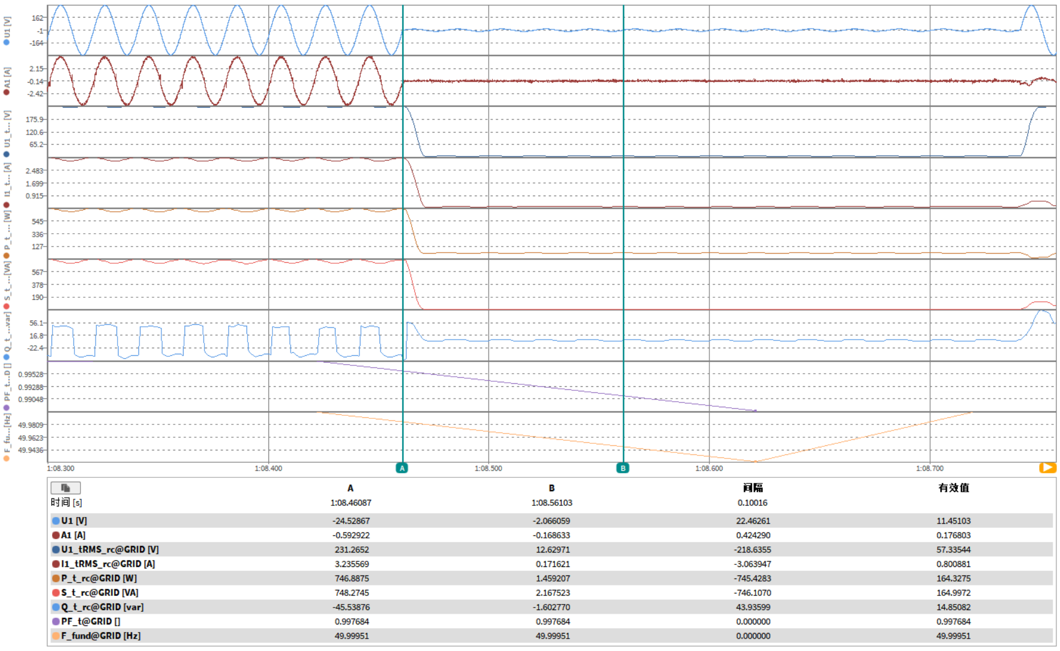
时间 [s]	A 1:08.46087	B 1:08.51135	间隔 0.05048	有效值
U1 [V]	-24.52867	-3.235264	21.29340	11.09844
A1 [A]	-0.592922	0.019623	0.612545	0.183492
U1_tRMS_rc@GRID [V]	231.2652	10.37935	-220.8859	79.87353
I1_tRMS_rc@GRID [A]	3.235569	0.156569	-3.079000	1.114771
P_t_rc@GRID [W]	746.8875	-1.158134	-748.0456	231.2501
S_t_rc@GRID [VA]	748.2745	1.625084	-746.6494	232.1866
Q_t_rc@GRID [var]	-45.53876	1.140011	46.67877	20.83333
PF_t@GRID []	0.997684	0.997684	0.000000	0.997684
F_fund@GRID [Hz]	49.99951	49.99951	0.000000	49.99951

During dip (t1+50ms)


U1 [V]
162
-1
-164
A1 [A]
2.15
-0.14
-2.42
U1_t... [V]
175.9
120.6
65.2
I1_t... [A]
2.483
1.699
0.915
P_t_... [W]
545
336
127
S_t_...[VA]
567
378
190
Q_t_...[var]
56.1
16.8
-22.4
PF_t...D []
0.99528
0.99288
0.99048
F_fu... [Hz]
49.9809
49.9623
49.9436
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700

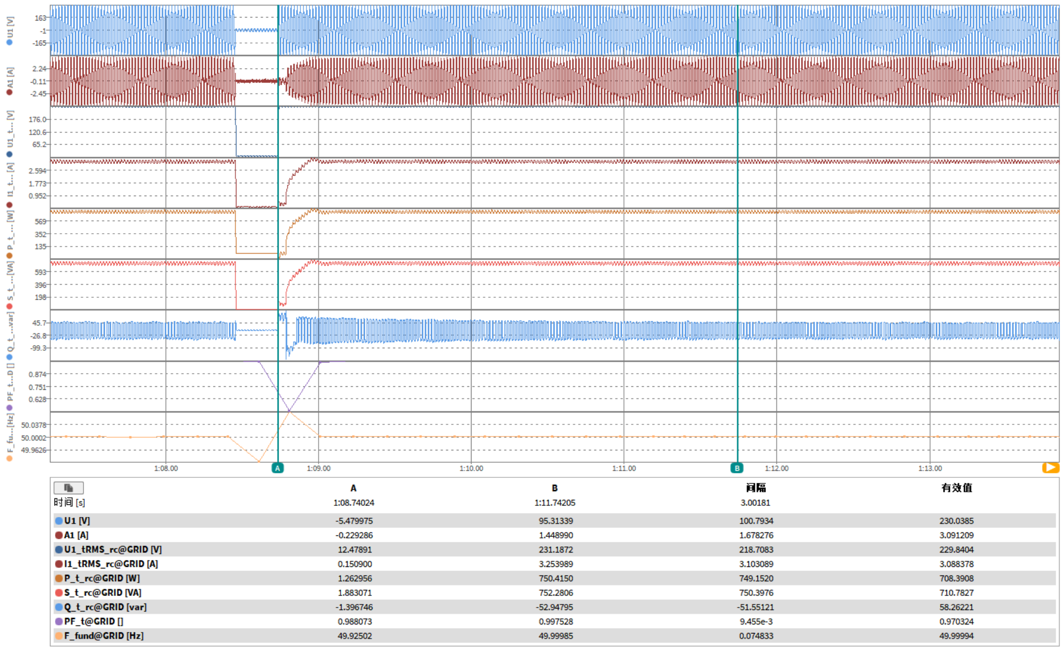
	A	B	间隔	有效值
时间 [s]	1:08.46087	1:08.54116	0.08028	
U1 [V]	-24.52867	-1.536055	22.99261	11.41545
A1 [A]	-0.592922	-7.271e-3	0.585651	0.179660
U1_tRMS_rc@GRID [V]	231.2652	12.58087	-218.6844	63.76622
I1_tRMS_rc@GRID [A]	3.235569	0.180144	-3.055424	0.890347
P_t_rc@GRID [W]	746.8875	1.569902	-745.3176	183.4961
S_t_rc@GRID [VA]	748.2745	2.266372	-746.0081	184.2420
Q_t_rc@GRID [var]	-45.53876	1.634579	47.17334	16.56132
PF_t@GRID []	0.997684	0.997684	0.000000	0.997684
F_fund@GRID [Hz]	49.99951	49.99951	0.000000	49.99951

During dip (t1+80ms)


U1 [V]
162
-1
-164
A1 [A]
2.15
-0.14
-2.42
U1_t... [V]
175.9
120.6
65.2
I1_t... [A]
2.483
1.699
0.915
P_t_... [W]
545
336
127
S_t_...[VA]
567
378
190
Q_t_...[var]
56.1
16.8
-22.4
PF_t...D []
0.99528
0.99288
0.99048
F_fu... [Hz]
49.9809
49.9623
49.9436
1:08.300
1:08.400
A
1:08.500
B
1:08.600
1:08.700

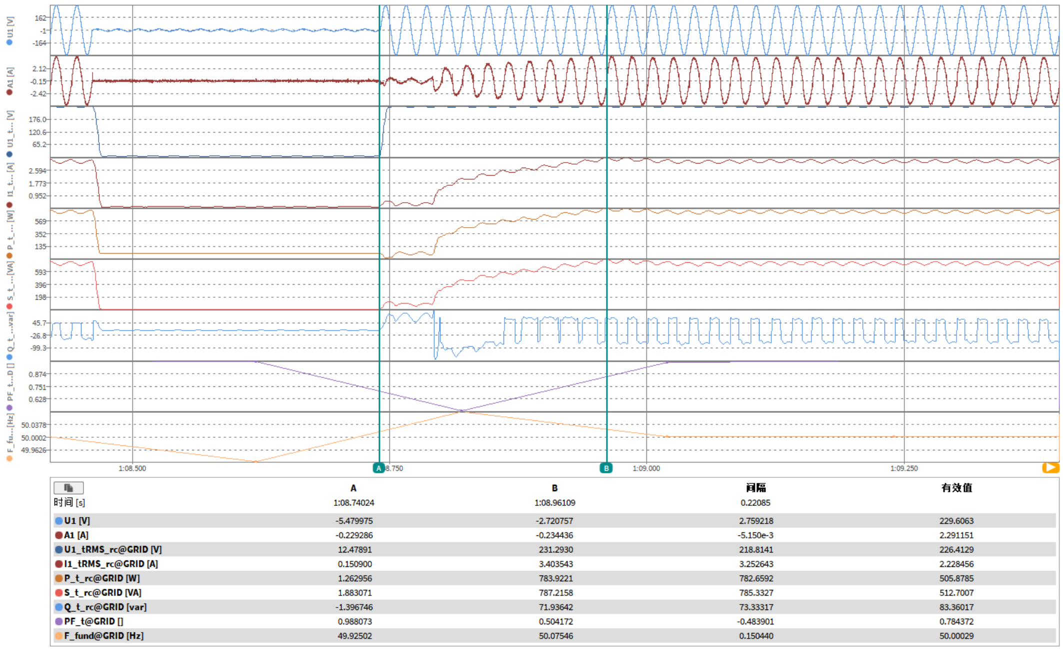
	A	B	间隔	有效值
时间 [s]	1:08.46087	1:08.56103	0.10016	
U1 [V]	-24.52867	-2.066059	22.46261	11.45103
A1 [A]	-0.592922	-0.168633	0.424290	0.176803
U1_tRMS_rc@GRID [V]	231.2652	12.62971	-218.6355	57.33544
I1_tRMS_rc@GRID [A]	3.235569	0.171621	-3.063947	0.800881
P_t_rc@GRID [W]	746.8875	1.459207	-745.4283	164.3275
S_t_rc@GRID [VA]	748.2745	2.167523	-746.1070	164.9972
Q_t_rc@GRID [var]	-45.53876	-1.602770	43.93599	14.85082
PF_t@GRID []	0.997684	0.997684	0.000000	0.997684
F_fund@GRID [Hz]	49.99951	49.99951	0.000000	49.99951

During dip (t1+100ms)


U1 [V]
163
-1
-165
A1 [A]
2.24
-0.11
-2.45
U1_t... [V]
176.0
120.6
65.2
I1_t... [A]
2.594
1.773
0.952
P_t_... [W]
569
352
135
S_t_... [VA]
593
396
198
Q_t_... [var]
45.7
-26.8
-99.3
PF_t...D []
0.874
0.751
0.628
F_fu... [Hz]
50.0378
50.0002
49.9626
1:08.00
A
1:09.00
1:10.00
1:11.00
B
1:12.00
1:13.00

	A	B	间隔	有效值
时间 [s]	1:08.74024	1:11.74205	3.00181	
U1 [V]	-5.479975	95.31339	100.7934	230.0385
A1 [A]	-0.229286	1.448990	1.678276	3.091209
U1_tRMS_rc@GRID [V]	12.47891	231.1872	218.7083	229.8404
I1_tRMS_rc@GRID [A]	0.150900	3.253989	3.103089	3.088378
P_t_rc@GRID [W]	1.262956	750.4150	749.1520	708.3908
S_t_rc@GRID [VA]	1.883071	752.2806	750.3976	710.7827
Q_t_rc@GRID [var]	-1.396746	-52.94795	-51.55121	58.26221
PF_t@GRID []	0.988073	0.997528	9.455e-3	0.970324
F_fund@GRID [Hz]	49.92502	49.99985	0.074833	49.99994

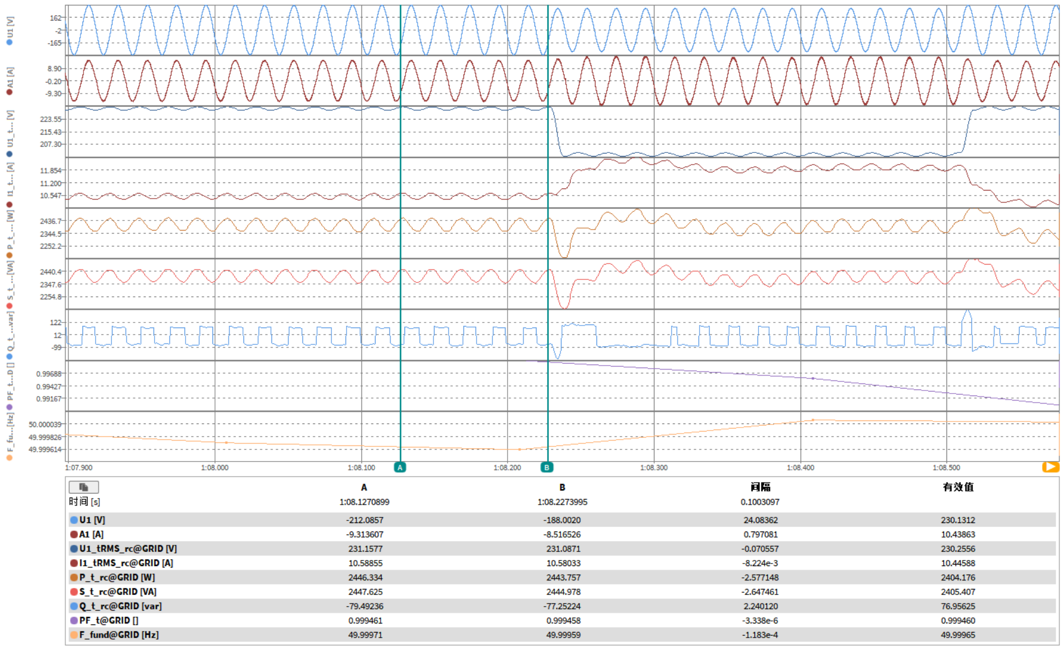
After dip (t2+3s)


U1 [V]
162
-1
-164
A1 [A]
2.12
-0.15
-2.42
U1_t... [V]
176.0
120.6
65.2
I1_t... [A]
2.594
1.773
0.952
P_t_... [W]
569
352
135
S_t_... [VA]
593
396
198
Q_t_... [var]
45.7
-26.8
-99.3
PF_t...D []
0.874
0.751
0.628
F_fu... [Hz]
50.0378
50.0002
49.9626
1:08.500
A
8.750
B
1:09.000
1:09.250

	A	B	间隔	有效值
时间 [s]	1:08.74024	1:08.96109	0.22085	
U1 [V]	-5.479975	-2.720757	2.759218	229.6063
A1 [A]	-0.229286	-0.234436	-5.150e-3	2.291151
U1_tRMS_rc@GRID [V]	12.47891	231.2930	218.8141	226.4129
I1_tRMS_rc@GRID [A]	0.150900	3.403543	3.252643	2.228456
P_t_rc@GRID [W]	1.262956	783.9221	782.6592	505.8785
S_t_rc@GRID [VA]	1.883071	787.2158	785.3327	512.7007
Q_t_rc@GRID [var]	-1.396746	71.93642	73.33317	83.36017
PF_t@GRID []	0.988073	0.504172	-0.483901	0.784372
F_fund@GRID [Hz]	49.92502	50.07546	0.150440	50.00029

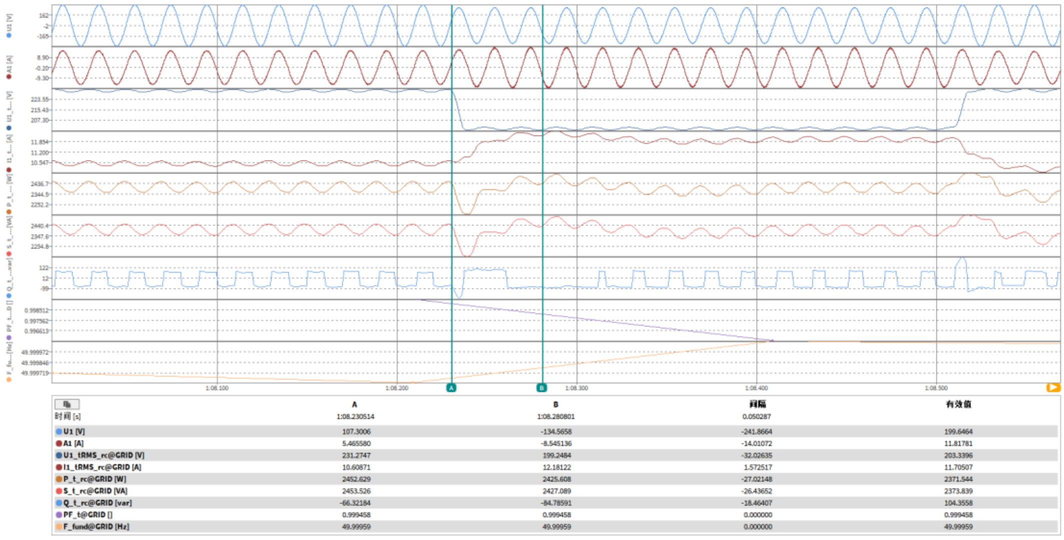
Recovery time

Graph of Test number 1.3


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
Q_t... [var]
PF_t...D []
F_fu... [Hz]
162
-2
-165
8.90
-0.20
-9.30
223.55
215.43
207.30
11.854
11.200
10.547
2436.7
2344.5
2252.2
2440.4
2347.6
2254.8
122
12
-99
0.99688
0.99427
0.99167
50.000039
49.999826
49.999614
1:07.900
1:08.000
1:08.100
A
1:08.200
B
1:08.300
1:08.400
1:08.500

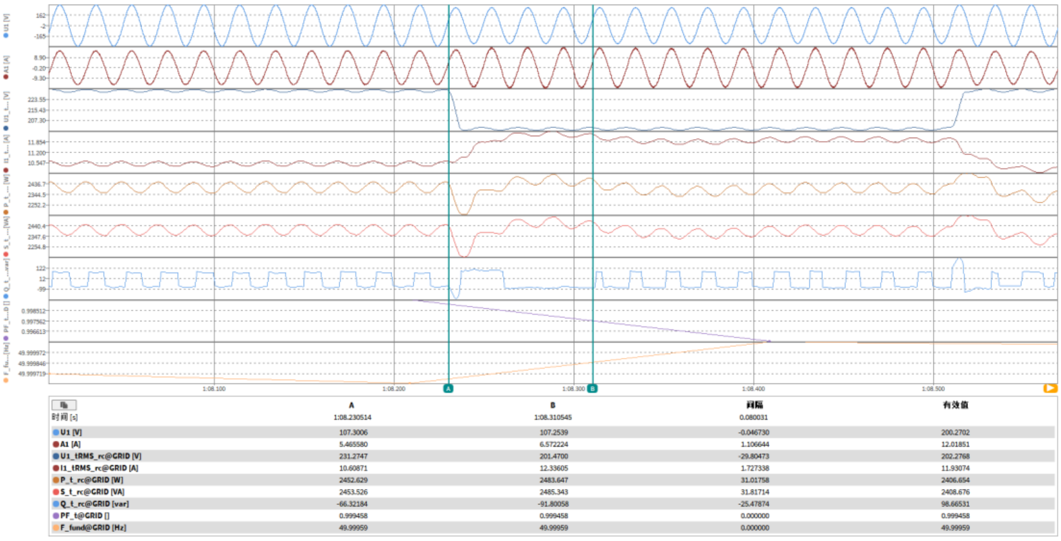
时间 [s]	A 1:08.1270899	B 1:08.2273995	间隔 0.1003097	有效值
● U1 [V]	-212.0857	-188.0020	24.08362	230.1312
● A1 [A]	-9.313607	-8.516526	0.797081	10.43863
● U1_tRMS_rc@GRID [V]	231.1577	231.0871	-0.070557	230.2556
● I1_tRMS_rc@GRID [A]	10.58855	10.58033	-8.224e-3	10.44588
● P_t_rc@GRID [W]	2446.334	2443.757	-2.577148	2404.176
● S_t_rc@GRID [VA]	2447.625	2444.978	-2.647461	2405.407
● Q_t_rc@GRID [var]	-79.49236	-77.25224	2.240120	76.95625
● PF_t@GRID []	0.999461	0.999458	-3.338e-6	0.999460
● F_fund@GRID [Hz]	49.99971	49.99959	-1.183e-4	49.99965

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
Q_t... [var]
PF_t...D []
F_fu... [Hz]
162
-2
-165
8.90
-0.20
-9.30
223.55
215.43
207.30
11.854
11.200
10.547
2436.7
2344.5
2252.2
2440.4
2347.6
2254.8
122
12
-99
0.998512
0.997562
0.996613
49.999972
49.999846
49.999719
1:08.100
1:08.200
A
B
1:08.300
1:08.400
1:08.500

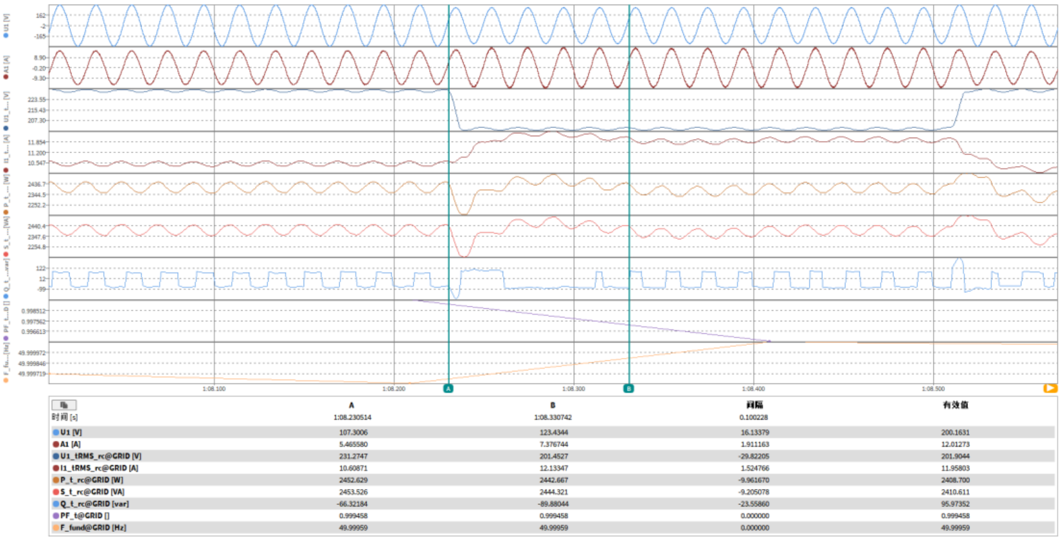
时间 [s]	A 1:08.230514	B 1:08.280801	间隔 0.050287	有效值
● U1 [V]	107.3006	-134.5658	-241.8664	199.6464
● A1 [A]	5.465580	-8.545136	-14.01072	11.81781
● U1_tRMS_rc@GRID [V]	231.2747	199.2484	-32.02635	203.3396
● I1_tRMS_rc@GRID [A]	10.60871	12.18122	1.572517	11.70507
● P_t_rc@GRID [W]	2452.629	2425.608	-27.02148	2371.544
● S_t_rc@GRID [VA]	2453.526	2427.089	-26.43652	2373.839
● Q_t_rc@GRID [var]	-66.32184	-84.78591	-18.46407	104.3558
● PF_t@GRID []	0.999458	0.999458	0.000000	0.999458
● F_fund@GRID [Hz]	49.99959	49.99959	0.000000	49.99959

During dip (t1+50ms)



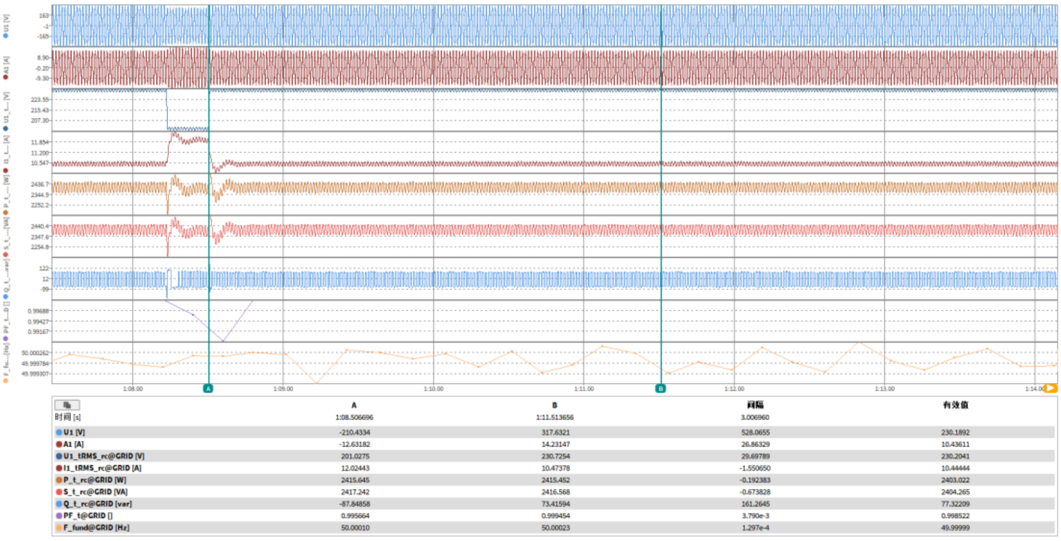
	A	B	间隔	有效值
时间 [s]	1:08.230514	1:08.310545	0.080031	
● U1 [V]	107.3006	107.2539	-0.046730	200.2702
● A1 [A]	5.465580	6.572224	1.106644	12.01851
● U1_tRMS_rc@GRID [V]	231.2747	201.4700	-29.80473	202.2768
● I1_tRMS_rc@GRID [A]	10.60871	12.33605	1.727338	11.93074
● P_t_rc@GRID [W]	2452.629	2483.647	31.01758	2406.654
● S_t_rc@GRID [VA]	2453.526	2485.343	31.81714	2408.676
● Q_t_rc@GRID [var]	-66.32184	-91.80058	-25.47874	98.66531
● PF_t@GRID []	0.999458	0.999458	0.000000	0.999458
● F_fund@GRID [Hz]	49.99959	49.99959	0.000000	49.99959

During dip (t1+80ms)



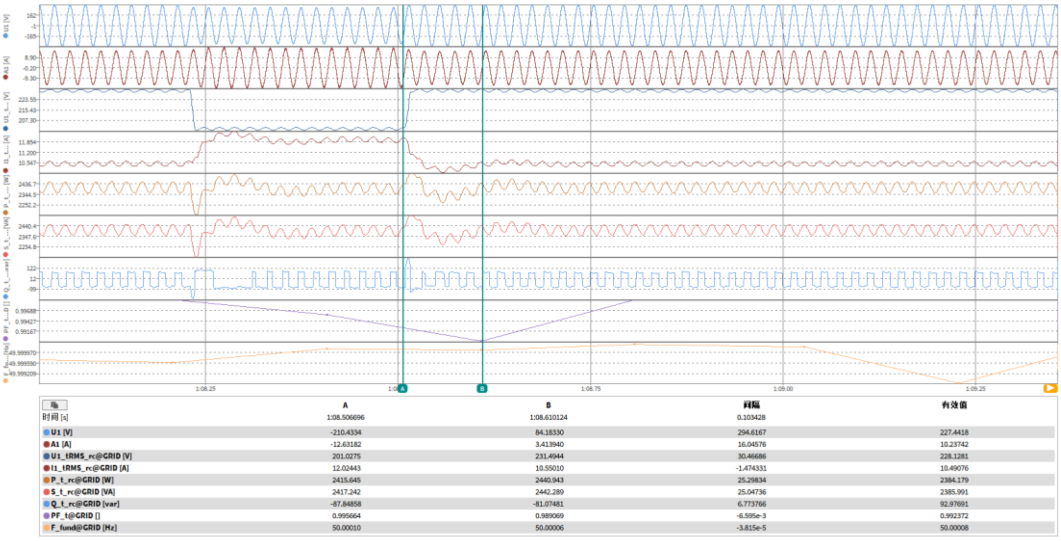
	A	B	间隔	有效值
时间 [s]	1:08.230514	1:08.330742	0.100228	
● U1 [V]	107.3006	123.4344	16.13379	200.1631
● A1 [A]	5.465580	7.376744	1.911163	12.01273
● U1_tRMS_rc@GRID [V]	231.2747	201.4527	-29.82205	201.9044
● I1_tRMS_rc@GRID [A]	10.60871	12.13347	1.524766	11.95803
● P_t_rc@GRID [W]	2452.629	2442.667	-9.961670	2408.700
● S_t_rc@GRID [VA]	2453.526	2444.321	-9.205078	2410.611
● Q_t_rc@GRID [var]	-66.32184	-89.88044	-23.55860	95.97352
● PF_t@GRID []	0.999458	0.999458	0.000000	0.999458
● F_fund@GRID [Hz]	49.99959	49.99959	0.000000	49.99959

During dip (t1+100ms)



	A	B	间隔	有效值
时间 [s]	1:08.506696	1:11.513656	3.006960	
U1 [V]	-210.4334	317.6321	528.0655	230.1892
A1 [A]	-12.63182	14.23147	26.86329	10.43611
U1_tRMS_rc@GRID [V]	201.0275	230.7254	29.69789	230.2041
I1_tRMS_rc@GRID [A]	12.02443	10.47378	-1.550650	10.44444
P_t_rc@GRID [W]	2415.645	2415.452	-0.192383	2403.022
S_t_rc@GRID [VA]	2417.242	2416.568	-0.673828	2404.265
Q_t_rc@GRID [var]	-87.84858	73.41594	161.2645	77.32209
PF_t@GRID []	0.995664	0.999454	3.790e-3	0.998522
F_fund@GRID [Hz]	50.00010	50.00023	1.297e-4	49.99999

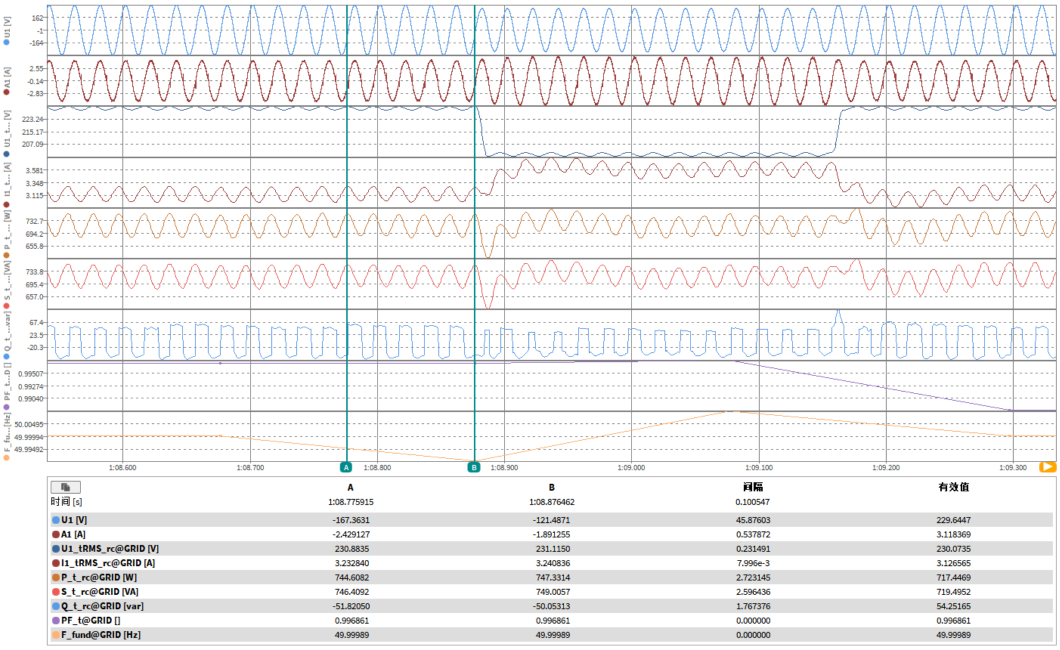
After dip (t2+3s)



	A	B	间隔	有效值
时间 [s]	1:08.506696	1:08.610124	0.103428	
U1 [V]	-210.4334	84.18330	294.6167	227.4418
A1 [A]	-12.63182	3.413940	16.04576	10.23742
U1_tRMS_rc@GRID [V]	201.0275	231.4944	30.46686	228.1281
I1_tRMS_rc@GRID [A]	12.02443	10.55010	-1.474331	10.49076
P_t_rc@GRID [W]	2415.645	2440.943	25.29834	2384.179
S_t_rc@GRID [VA]	2417.242	2442.289	25.04736	2385.991
Q_t_rc@GRID [var]	-87.84858	-81.07481	6.773766	92.97691
PF_t@GRID []	0.995664	0.989069	-6.595e-3	0.992372
F_fund@GRID [Hz]	50.00010	50.00006	-3.815e-5	50.00008

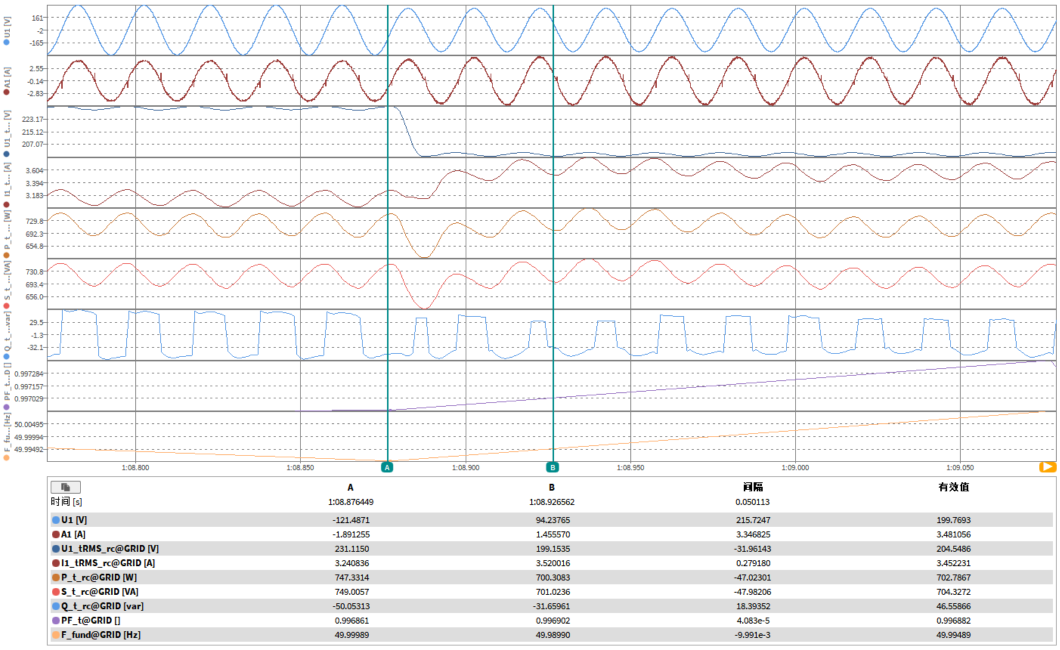
Recovery time

Graph of Test number 1.4


U1 [V]
162
-1
-164
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.24
215.17
207.09
I1_t... [A]
3.581
3.348
3.115
P_t... [W]
732.7
694.2
655.8
S_t... [VA]
733.8
695.4
657.0
Q_t... [var]
67.4
23.5
-20.3
PF_t... []
0.99507
0.99274
0.99040
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.600
1:08.700
A
1:08.800
B
1:08.900
1:09.000
1:09.100
1:09.200
1:09.300

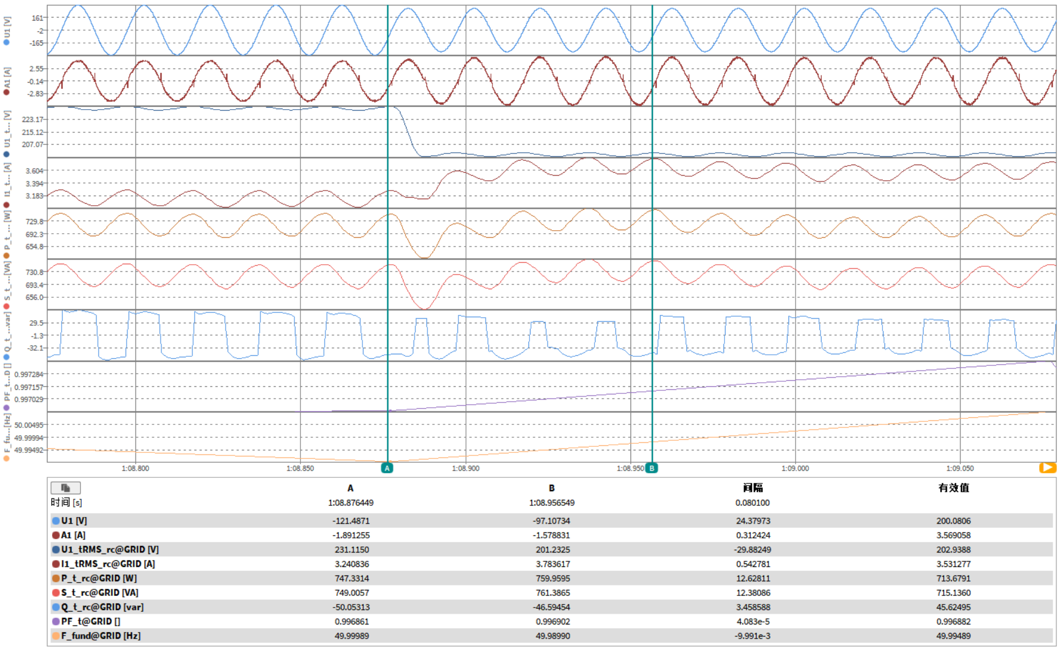
时间 [s]	A 1:08.775915	B 1:08.876462	间隔 0.100547	有效值
U1 [V]	-167.3631	-121.4871	45.87603	229.6447
A1 [A]	-2.429127	-1.891255	0.537872	3.118369
U1_tRMS_rc@GRID [V]	230.8835	231.1150	0.231491	230.0735
I1_tRMS_rc@GRID [A]	3.232840	3.240836	7.996e-3	3.126565
P_t_rc@GRID [W]	744.6082	747.3314	2.723145	717.4469
S_t_rc@GRID [VA]	746.4092	749.0057	2.596436	719.4952
Q_t_rc@GRID [var]	-51.82050	-50.05313	1.767376	54.25165
PF_t@GRID []	0.996861	0.996861	0.000000	0.996861
F_fund@GRID [Hz]	49.99989	49.99989	0.000000	49.99989

Before dip (t1-100ms)


U1 [V]
161
-2
-165
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.17
215.12
207.07
I1_t... [A]
3.604
3.394
3.183
P_t... [W]
729.8
692.3
654.8
S_t... [VA]
730.8
693.4
656.0
Q_t... [var]
29.5
-1.3
-32.1
PF_t... []
0.997284
0.997157
0.997029
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.800
1:08.850
A
1:08.900
B
1:08.950
1:09.000
1:09.050

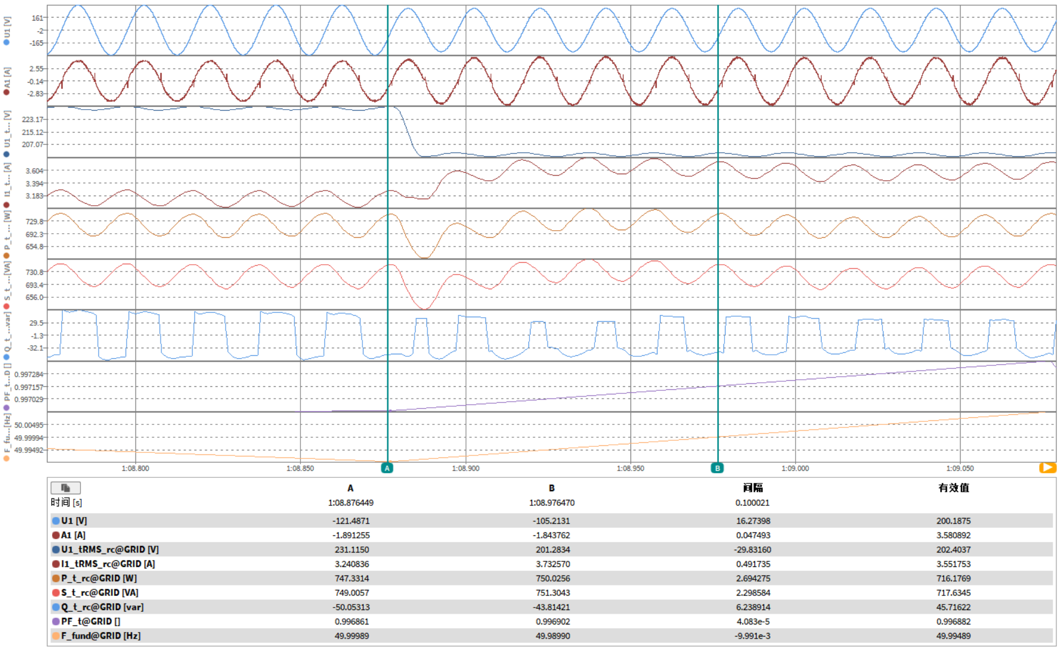
时间 [s]	A 1:08.876449	B 1:08.926562	间隔 0.050113	有效值
U1 [V]	-121.4871	94.23765	215.7247	199.7693
A1 [A]	-1.891255	1.455570	3.346825	3.481056
U1_tRMS_rc@GRID [V]	231.1150	199.1535	-31.96143	204.5486
I1_tRMS_rc@GRID [A]	3.240836	3.520016	0.279180	3.452231
P_t_rc@GRID [W]	747.3314	700.3083	-47.02301	702.7867
S_t_rc@GRID [VA]	749.0057	701.0236	-47.98206	704.3272
Q_t_rc@GRID [var]	-50.05313	-31.65961	18.39352	46.55866
PF_t@GRID []	0.996861	0.996902	4.083e-5	0.996882
F_fund@GRID [Hz]	49.99989	49.98990	-9.991e-3	49.99489

During dip (t1+50ms)


U1 [V]
161
-2
-165
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.17
215.12
207.07
I1_t... [A]
3.604
3.394
3.183
P_t_... [W]
729.8
692.3
654.8
S_t_... [VA]
730.8
693.4
656.0
Q_t_... [var]
29.5
-1.3
-32.1
PF_t...D []
0.997284
0.997157
0.997029
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.800
1:08.850
A
1:08.900
1:08.950
B
1:09.000
1:09.050

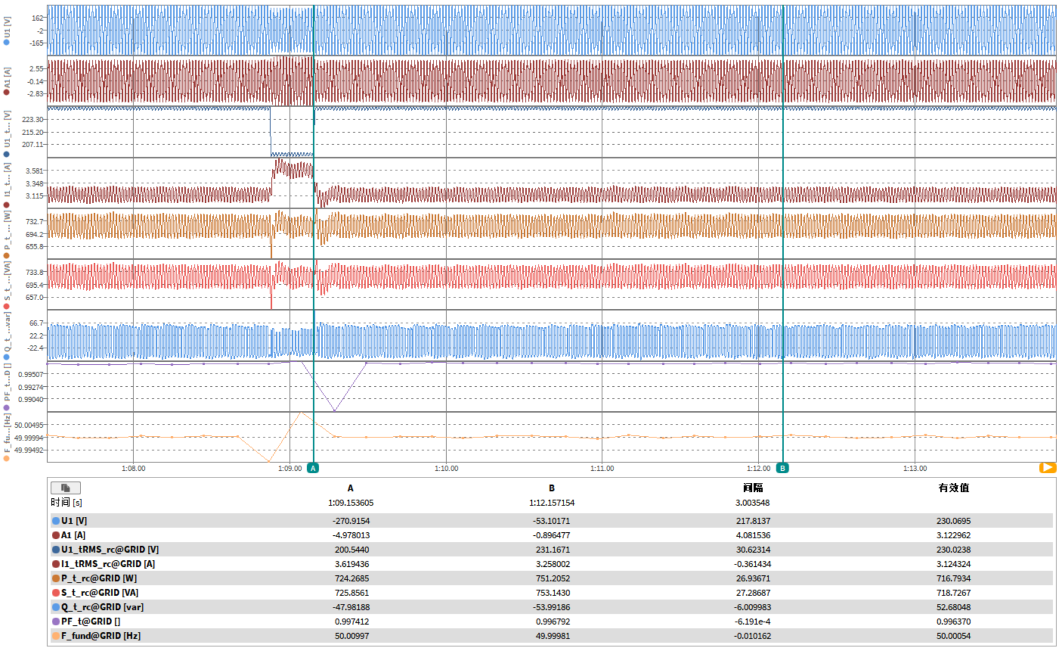
	A	B	间隔	有效值
时间 [s]	1:08.876449	1:08.956549	0.080100	
U1 [V]	-121.4871	-97.10734	24.37973	200.0806
A1 [A]	-1.891255	-1.578831	0.312424	3.569058
U1_tRMS_rc@GRID [V]	231.1150	201.2325	-29.88249	202.9388
I1_tRMS_rc@GRID [A]	3.240836	3.783617	0.542781	3.531277
P_t_rc@GRID [W]	747.3314	759.9595	12.62811	713.6791
S_t_rc@GRID [VA]	749.0057	761.3865	12.38086	715.1360
Q_t_rc@GRID [var]	-50.05313	-46.59454	3.458588	45.62495
PF_t@GRID []	0.996861	0.996902	4.083e-5	0.996882
F_fund@GRID [Hz]	49.99989	49.98990	-9.991e-3	49.99489

During dip (t1+80ms)


U1 [V]
161
-2
-165
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.17
215.12
207.07
I1_t... [A]
3.604
3.394
3.183
P_t_... [W]
729.8
692.3
654.8
S_t_... [VA]
730.8
693.4
656.0
Q_t_... [var]
29.5
-1.3
-32.1
PF_t...D []
0.997284
0.997157
0.997029
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.800
1:08.850
A
1:08.900
1:08.950
B
1:09.000
1:09.050

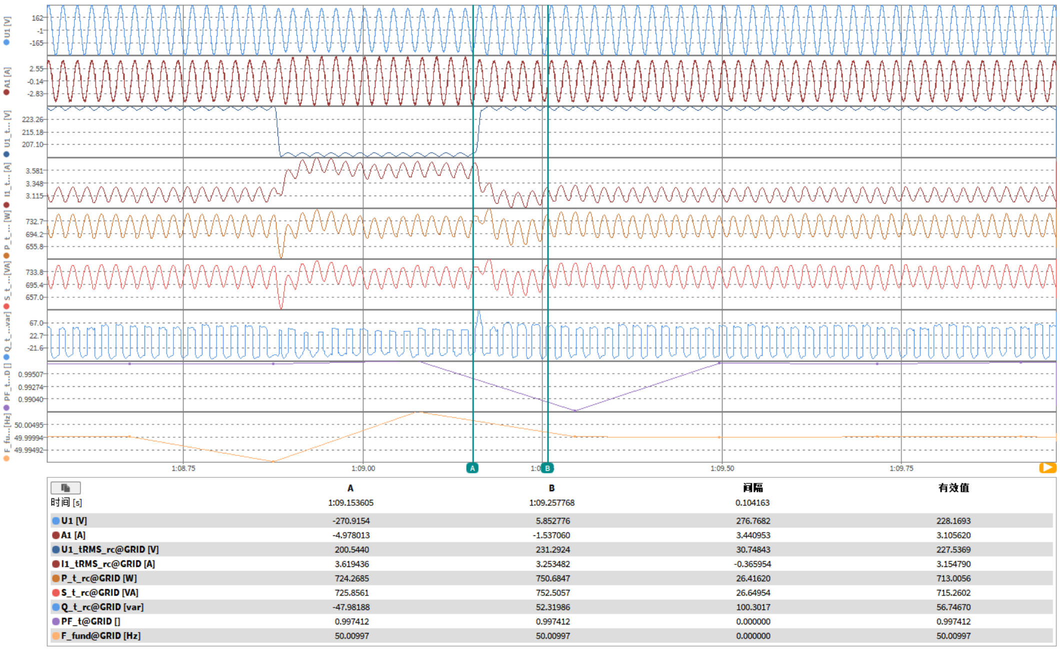
	A	B	间隔	有效值
时间 [s]	1:08.876449	1:08.976470	0.100021	
U1 [V]	-121.4871	-105.2131	16.27398	200.1875
A1 [A]	-1.891255	-1.843762	0.047493	3.580892
U1_tRMS_rc@GRID [V]	231.1150	201.2834	-29.83160	202.4037
I1_tRMS_rc@GRID [A]	3.240836	3.732570	0.491735	3.551753
P_t_rc@GRID [W]	747.3314	750.0256	2.694275	716.1769
S_t_rc@GRID [VA]	749.0057	751.3043	2.298584	717.6345
Q_t_rc@GRID [var]	-50.05313	-43.81421	6.238914	45.71622
PF_t@GRID []	0.996861	0.996902	4.083e-5	0.996882
F_fund@GRID [Hz]	49.99989	49.98990	-9.991e-3	49.99489

During dip (t1+100ms)


U1 [V]
162
-2
-165
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.30
215.20
207.11
I1_t... [A]
3.581
3.348
3.115
P_t_... [W]
732.7
694.2
655.8
S_t_... [VA]
733.8
695.4
657.0
Q_t_... [var]
66.7
22.2
-22.4
PF_t...D []
0.99507
0.99274
0.99040
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.00
1:09.00
A
1:10.00
1:11.00
1:12.00
B
1:13.00

	A	B	间隔	有效值
时间 [s]	1:09.153605	1:12.157154	3.003548	
U1 [V]	-270.9154	-53.10171	217.8137	230.0695
A1 [A]	-4.978013	-0.896477	4.081536	3.122962
U1_tRMS_rc@GRID [V]	200.5440	231.1671	30.62314	230.0238
I1_tRMS_rc@GRID [A]	3.619436	3.258002	-0.361434	3.124324
P_t_rc@GRID [W]	724.2685	751.2052	26.93671	716.7934
S_t_rc@GRID [VA]	725.8561	753.1430	27.28687	718.7267
Q_t_rc@GRID [var]	-47.98188	-53.99186	-6.009983	52.68048
PF_t@GRID []	0.997412	0.996792	-6.191e-4	0.996370
F_fund@GRID [Hz]	50.00997	49.99981	-0.010162	50.00054

After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
2.55
-0.14
-2.83
U1_t... [V]
223.26
215.18
207.10
I1_t... [A]
3.581
3.348
3.115
P_t_... [W]
732.7
694.2
655.8
S_t_... [VA]
733.8
695.4
657.0
Q_t_... [var]
67.0
22.7
-21.6
PF_t...D []
0.99507
0.99274
0.99040
F_fu... [Hz]
50.00495
49.99994
49.99492
1:08.75
1:09.00
A
B
1:09.50
1:09.75

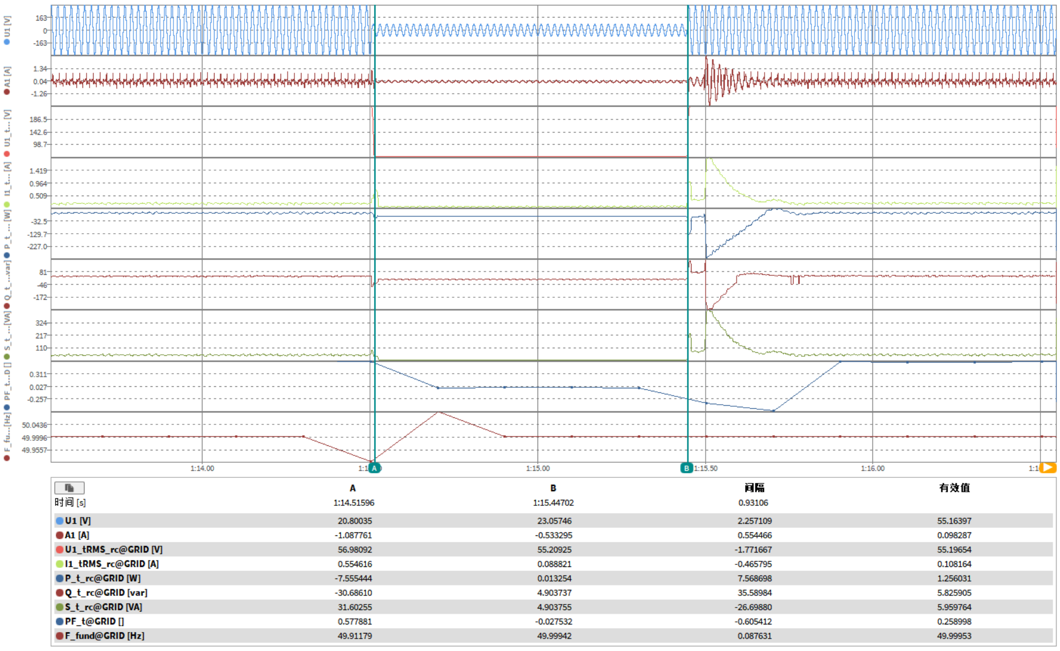
	A	B	间隔	有效值
时间 [s]	1:09.153605	1:09.257768	0.104163	
U1 [V]	-270.9154	5.852776	276.7682	228.1693
A1 [A]	-4.978013	-1.537060	3.440953	3.105620
U1_tRMS_rc@GRID [V]	200.5440	231.2924	30.74843	227.5369
I1_tRMS_rc@GRID [A]	3.619436	3.253482	-0.365954	3.154790
P_t_rc@GRID [W]	724.2685	750.6847	26.41620	713.0056
S_t_rc@GRID [VA]	725.8561	752.5057	26.64954	715.2602
Q_t_rc@GRID [var]	-47.98188	52.31986	100.3017	56.74670
PF_t@GRID []	0.997412	0.997412	0.000000	0.997412
F_fund@GRID [Hz]	50.00997	50.00997	0.000000	50.00997

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	2.1	2.2	2.3	2.4
	1	Date	--	--	dd.mm.yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm:ss	See graph			
	3	Fault type (phase)	--	--		VD2		VD7	
	4	Setting voltage depth	Line to line	--	p.u.	0.24			
	5	Setting dip duration		--		910			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	931.06			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.24			
	10		Pos.		p.u.	--			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.006	1.006	1.006	1.005
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.011	0.312	1.016	0.312
	13	Active power	Total	t1-10s to t1	p.u.	1.018	0.314	1.022	0.313
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.032	-0.021	0.034	-0.020
	16		Pos.			--	--	--	--
	17	Cos$_{\varphi}$	--	t1-10s to t1	--	0.9994	0.9970	0.9994	0.9973
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.235	0.235	0.877	0.876
	19	Line current	Phase 1	t1+50ms	p.u.	0.017	0.017	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	1.152	0.316
	22	Line current	Phase 1	t1+80ms	p.u.	0.018	0.016	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	1.167	0.362
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.003	0.003	1.018	0.317
	26		Pos.			--	--	--	--

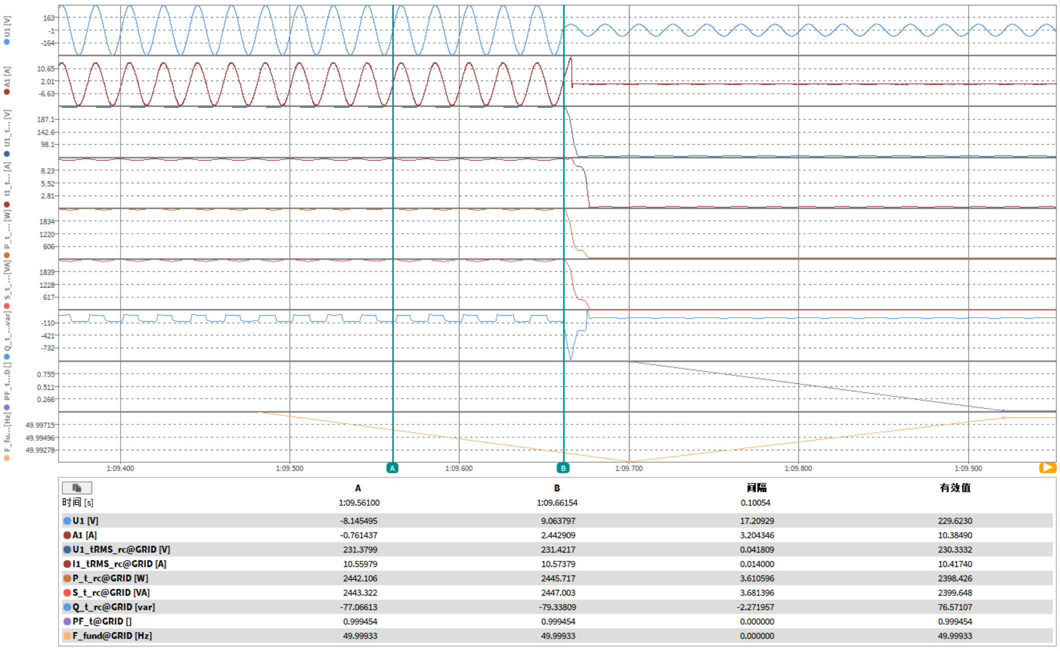
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.004	1.005	1.004	1.005
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.008	0.312	1.014	0.318
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.190	0.208	0.181	0.179
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	0.038	0.020	0.031	-0.020
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.190	0.208	0.181	0.179
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 2.1


U1 [V]
163
0
-163
A1 [A]
1.34
0.04
-1.26
U1_t... [V]
186.5
142.6
98.7
I1_t... [A]
1.419
0.964
0.509
P_t... [W]
-32.5
-129.7
-227.0
Q_t... [var]
81
-46
-172
S_t... [VA]
324
217
110
PF_t...D []
0.311
0.027
-0.257
F_fu... [Hz]
50.0436
49.9996
49.9557
1:14.00
A
1:15.00
B
1:15.50
1:16.00

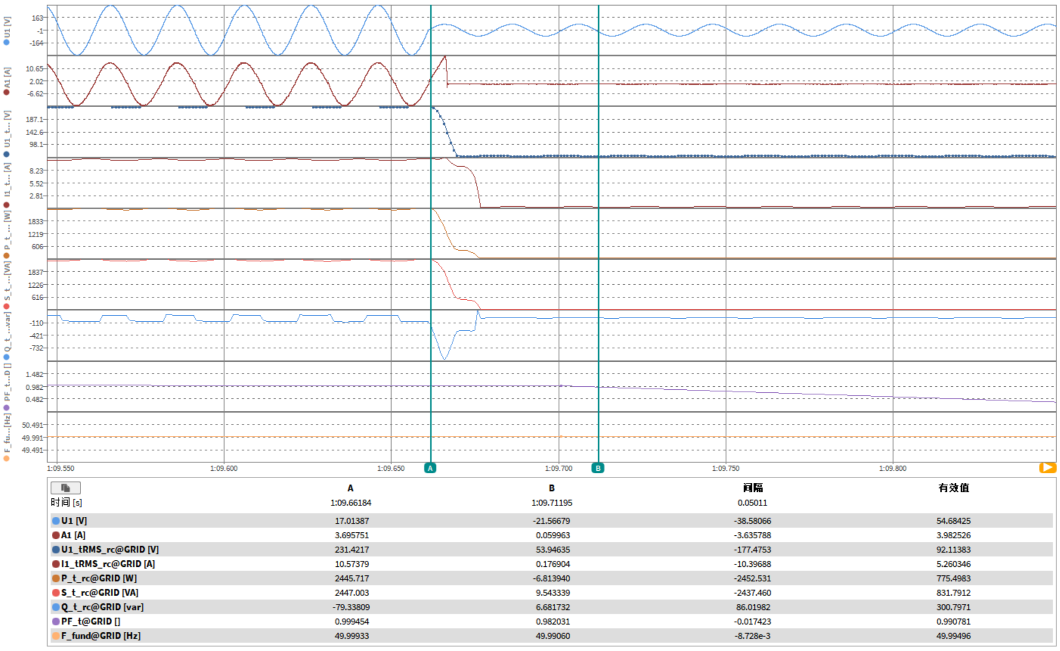
	A	B	间隔	有效值
时间 [s]	1:14.51596	1:15.44702	0.93106	
U1 [V]	20.80035	23.05746	2.257109	55.16397
A1 [A]	-1.087761	-0.533295	0.554466	0.098287
U1_tRMS_rc@GRID [V]	56.98092	55.20925	-1.771667	55.19654
I1_tRMS_rc@GRID [A]	0.554616	0.088821	-0.465795	0.108164
P_t_rc@GRID [W]	-7.555444	0.013254	7.568698	1.256031
Q_t_rc@GRID [var]	-30.68610	4.903737	35.58984	5.825905
S_t_rc@GRID [VA]	31.60255	4.903755	-26.69880	5.959764
PF_t@GRID []	0.577881	-0.027532	-0.605412	0.258998
F_fund@GRID [Hz]	49.91179	49.99942	0.087631	49.99953

Empty load


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t...D []
F_fu... [Hz]
163
-1
-164
10.65
2.01
-6.63
187.1
142.6
98.1
8.23
5.52
2.81
1834
1220
606
1839
1228
617
-110
-421
-732
0.755
0.511
0.266
49.99715
49.99496
49.99278
1:09.400
1:09.500
A
1:09.600
B
1:09.700
1:09.800
1:09.900

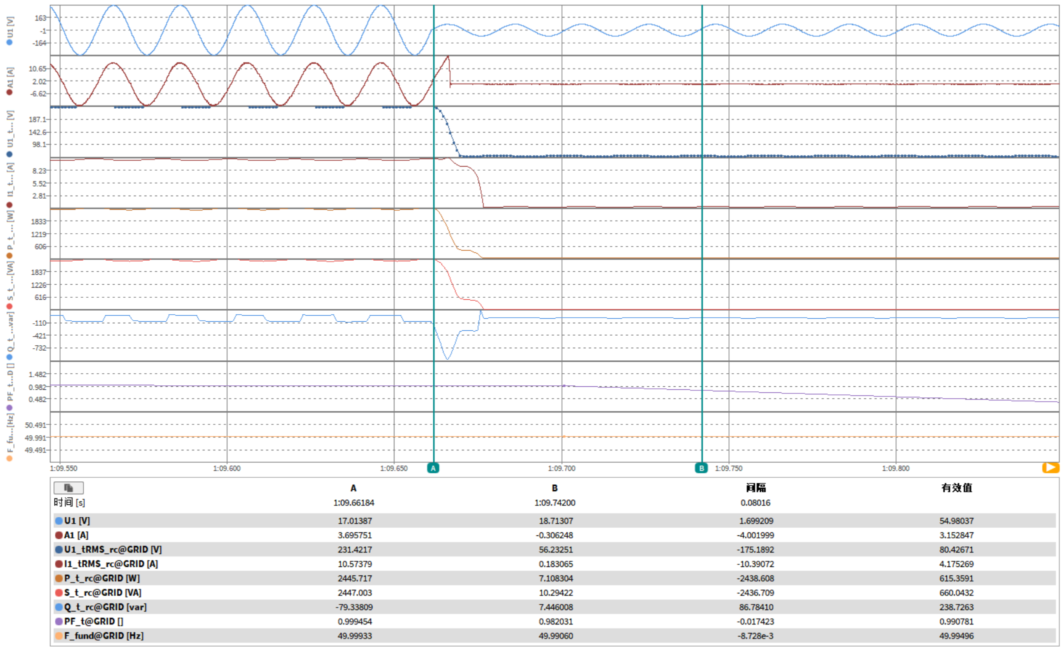
	A	B	间隔	有效值
时间 [s]	1:09.56100	1:09.66154	0.10054	
● U1 [V]	-8.145495	9.063797	17.20929	229.6230
● A1 [A]	-0.761437	2.442909	3.204346	10.38490
● U1_tRMS_rc@GRID [V]	231.3799	231.4217	0.041809	230.3332
● I1_tRMS_rc@GRID [A]	10.55979	10.57379	0.014000	10.41740
● P_t_rc@GRID [W]	2442.106	2445.717	3.610596	2398.426
● S_t_rc@GRID [VA]	2443.322	2447.003	3.681396	2399.648
● Q_t_rc@GRID [var]	-77.06613	-79.33809	-2.271957	76.57107
● PF_t@GRID []	0.999454	0.999454	0.000000	0.999454
● F_fund@GRID [Hz]	49.99933	49.99933	0.000000	49.99933

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t...D []
F_fu... [Hz]
163
-1
-164
10.65
2.02
-6.62
187.1
142.6
98.1
8.23
5.52
2.81
1833
1219
606
1837
1226
616
-110
-421
-732
1.482
0.982
0.482
50.491
49.991
49.491
1:09.550
1:09.600
1:09.650
A
1:09.700
B
1:09.750
1:09.800

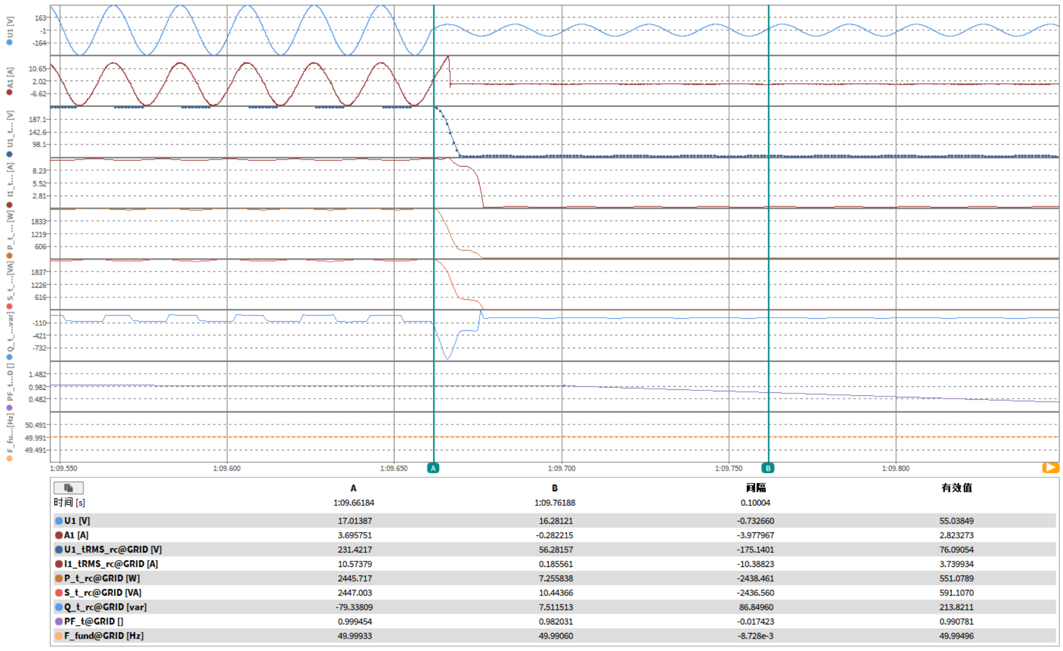
	A	B	间隔	有效值
时间 [s]	1:09.66184	1:09.71195	0.05011	
● U1 [V]	17.01387	-21.56679	-38.58066	54.68425
● A1 [A]	3.695751	0.059963	-3.635788	3.982526
● U1_tRMS_rc@GRID [V]	231.4217	53.94635	-177.4753	92.11383
● I1_tRMS_rc@GRID [A]	10.57379	0.176904	-10.39688	5.260346
● P_t_rc@GRID [W]	2445.717	-6.813940	-2452.531	775.4983
● S_t_rc@GRID [VA]	2447.003	9.543339	-2437.460	831.7912
● Q_t_rc@GRID [var]	-79.33809	6.681732	86.01982	300.7971
● PF_t@GRID []	0.999454	0.982031	-0.017423	0.990781
● F_fund@GRID [Hz]	49.99933	49.99060	-8.728e-3	49.99496

During dip (t1+50ms)


U1 [V]
163
-1
-164
A1 [A]
10.65
2.02
-6.62
U1_t... [V]
187.1
142.6
98.1
I1_t... [A]
8.23
5.52
2.81
P_t_... [W]
1833
1219
606
S_t_... [VA]
1837
1226
616
Q_t_... [var]
-110
-421
-732
PF_t... []
1.482
0.982
0.482
F_fu... [Hz]
50.491
49.991
49.491
1:09.550
1:09.600
1:09.650
A
1:09.700
B
1:09.750
1:09.800

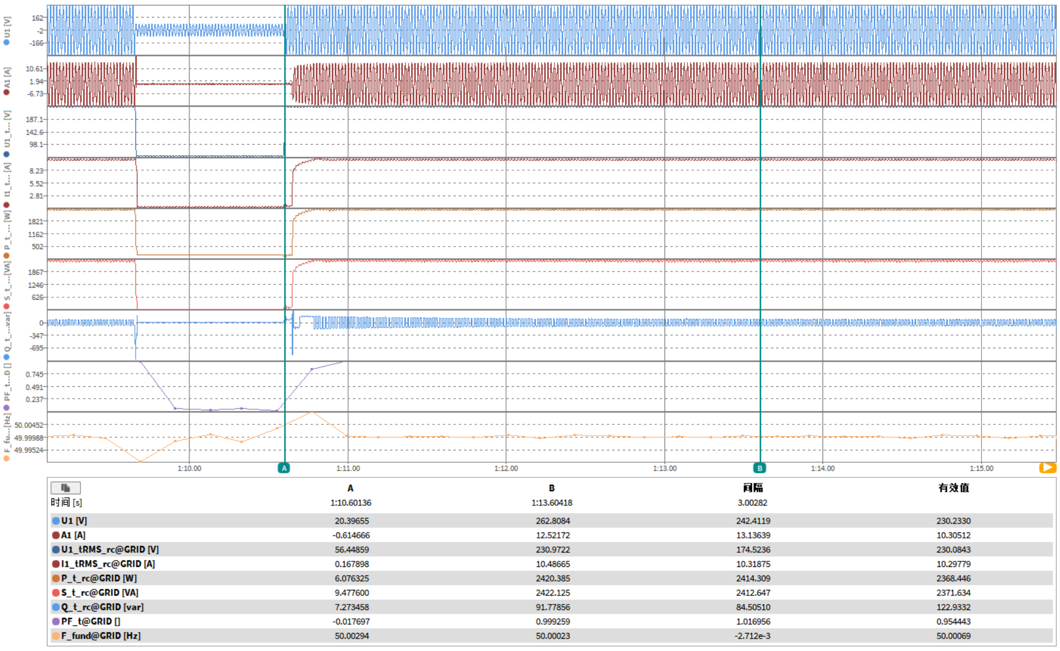
时间 [s]	A 1:09.66184	B 1:09.74200	间隔 0.08016	有效值
U1 [V]	17.01387	18.71307	1.699209	54.98037
A1 [A]	3.695751	-0.306248	-4.001999	3.152847
U1_tRMS_rc@GRID [V]	231.4217	56.23251	-175.1892	80.42671
I1_tRMS_rc@GRID [A]	10.57379	0.183065	-10.39072	4.175269
P_t_rc@GRID [W]	2445.717	7.108304	-2438.608	615.3591
S_t_rc@GRID [VA]	2447.003	10.29422	-2436.709	660.0432
Q_t_rc@GRID [var]	-79.33809	7.446008	86.78410	238.7263
PF_t@GRID []	0.999454	0.982031	-0.017423	0.990781
F_fund@GRID [Hz]	49.99933	49.99060	-8.728e-3	49.99496

During dip (t1+80ms)


U1 [V]
163
-1
-164
A1 [A]
10.65
2.02
-6.62
U1_t... [V]
187.1
142.6
98.1
I1_t... [A]
8.23
5.52
2.81
P_t_... [W]
1833
1219
606
S_t_... [VA]
1837
1226
616
Q_t_... [var]
-110
-421
-732
PF_t... []
1.482
0.982
0.482
F_fu... [Hz]
50.491
49.991
49.491
1:09.550
1:09.600
1:09.650
A
1:09.700
1:09.750
B
1:09.800

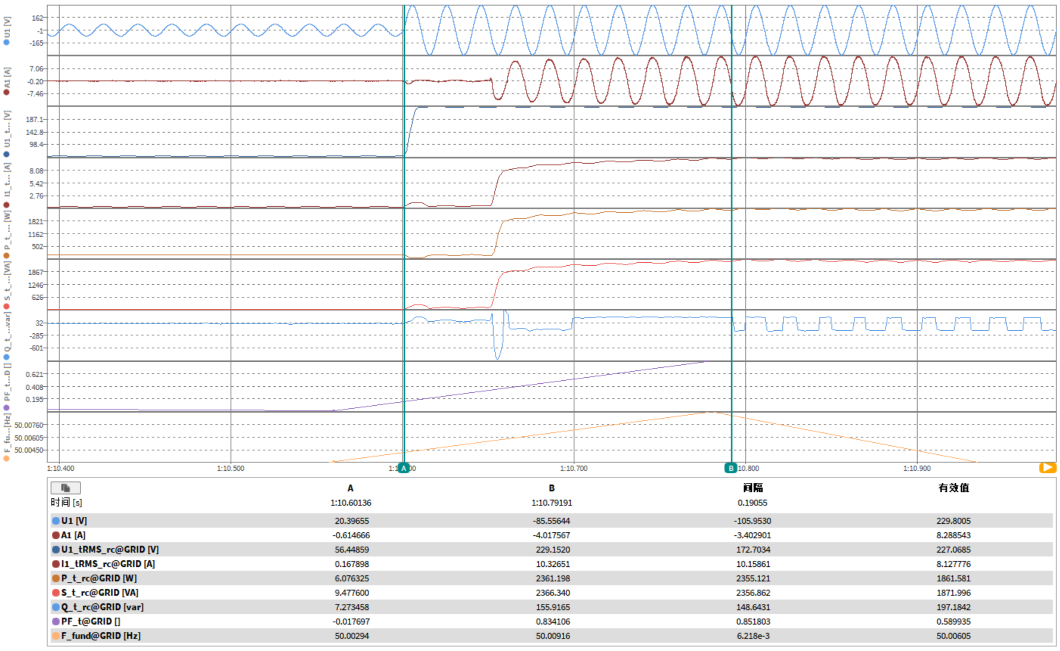
时间 [s]	A 1:09.66184	B 1:09.76188	间隔 0.10004	有效值
U1 [V]	17.01387	16.28121	-0.732660	55.03849
A1 [A]	3.695751	-0.282215	-3.977967	2.823273
U1_tRMS_rc@GRID [V]	231.4217	56.28157	-175.1401	76.09054
I1_tRMS_rc@GRID [A]	10.57379	0.185561	-10.38823	3.739934
P_t_rc@GRID [W]	2445.717	7.255838	-2438.461	551.0789
S_t_rc@GRID [VA]	2447.003	10.44366	-2436.560	591.1070
Q_t_rc@GRID [var]	-79.33809	7.511513	86.84960	213.8211
PF_t@GRID []	0.999454	0.982031	-0.017423	0.990781
F_fund@GRID [Hz]	49.99933	49.99060	-8.728e-3	49.99496

During dip (t1+100ms)


U1 [V]
162
-2
-166
A1 [A]
10.61
1.94
-6.73
U1_t...[V]
187.1
142.6
98.1
I1_t...[A]
8.23
5.52
2.81
P_t_...[W]
1821
1162
502
S_t_...[VA]
1867
1246
626
Q_t_...[var]
0
-347
-695
PF_t...D []
0.745
0.491
0.237
F_fu...[Hz]
50.00452
49.99988
49.99524
1:10.00
A
1:11.00
1:12.00
1:13.00
B
1:14.00
1:15.00

时间 [s]	A 1:10.60136	B 1:13.60418	间隔 3.00282	有效值
U1 [V]	20.39655	262.8084	242.4119	230.2330
A1 [A]	-0.614666	12.52172	13.13639	10.30512
U1_tRMS_rc@GRID [V]	56.44859	230.9722	174.5236	230.0843
I1_tRMS_rc@GRID [A]	0.167898	10.48665	10.31875	10.29779
P_t_rc@GRID [W]	6.076325	2420.385	2414.309	2368.446
S_t_rc@GRID [VA]	9.477600	2422.125	2412.647	2371.634
Q_t_rc@GRID [var]	7.273458	91.77856	84.50510	122.9332
PF_t@GRID []	-0.017697	0.999259	1.016956	0.954443
F_fund@GRID [Hz]	50.00294	50.00023	-2.712e-3	50.00069

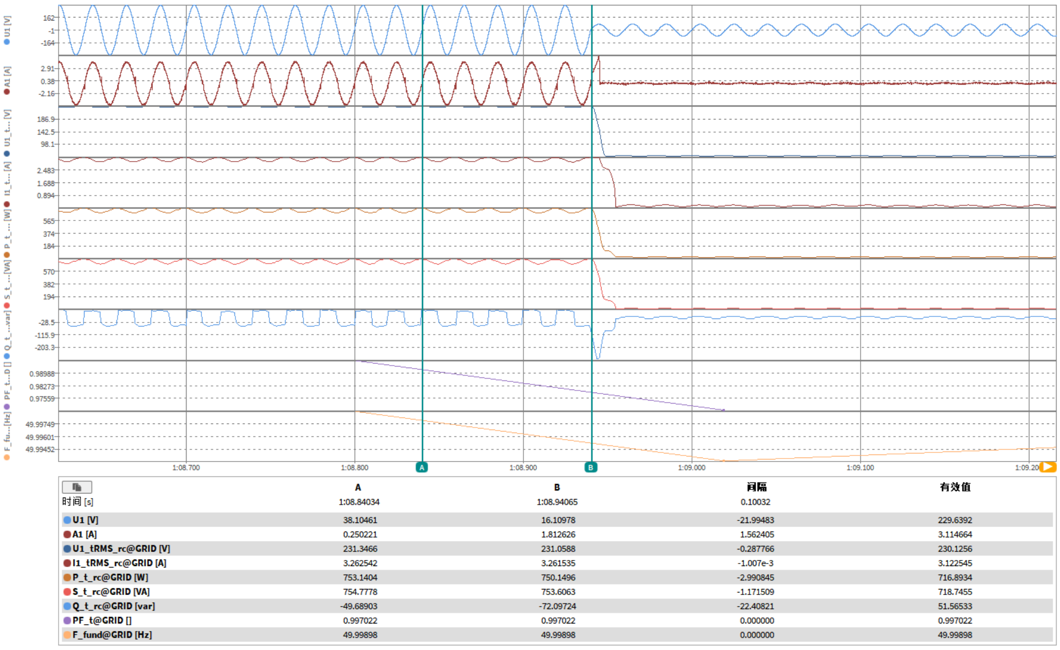
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
7.06
-0.20
-7.46
U1_t...[V]
187.1
142.8
98.4
I1_t...[A]
8.08
5.42
2.76
P_t_...[W]
1821
1162
502
S_t_...[VA]
1867
1246
626
Q_t_...[var]
32
-285
-601
PF_t...D []
0.621
0.408
0.195
F_fu...[Hz]
50.00760
50.00605
50.00450
1:10.400
1:10.500
A
1:10.700
B
10.800
1:10.900

时间 [s]	A 1:10.60136	B 1:10.79191	间隔 0.19055	有效值
U1 [V]	20.39655	-85.55644	-105.9530	229.8005
A1 [A]	-0.614666	-4.017567	-3.402901	8.288543
U1_tRMS_rc@GRID [V]	56.44859	229.1520	172.7034	227.0685
I1_tRMS_rc@GRID [A]	0.167898	10.32651	10.15861	8.127776
P_t_rc@GRID [W]	6.076325	2361.198	2355.121	1861.581
S_t_rc@GRID [VA]	9.477600	2366.340	2356.862	1871.996
Q_t_rc@GRID [var]	7.273458	155.9165	148.6431	197.1842
PF_t@GRID []	-0.017697	0.834106	0.851803	0.589935
F_fund@GRID [Hz]	50.00294	50.00916	6.218e-3	50.00605

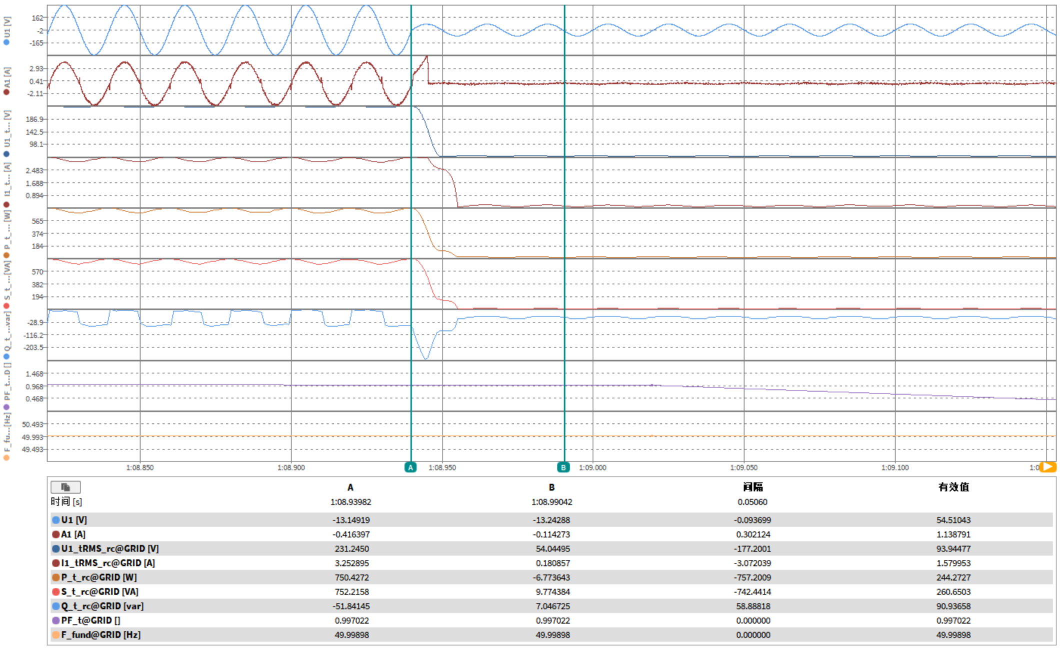
Recovery time

Graph of Test number 2.2


U1 [V]
162
-1
-164
A1 [A]
2.91
0.38
-2.16
U1_t... [V]
186.9
142.5
98.1
I1_t... [A]
2.483
1.688
0.894
P_t_... [W]
565
374
184
S_t_... [VA]
570
382
194
Q_t_... [var]
-28.5
-115.9
-203.3
PF_t... []
0.98988
0.98273
0.97559
F_fu... [Hz]
49.99749
49.99601
49.99452
1:08.700
1:08.800
A
1:08.900
B
1:09.000
1:09.100
1:09.20

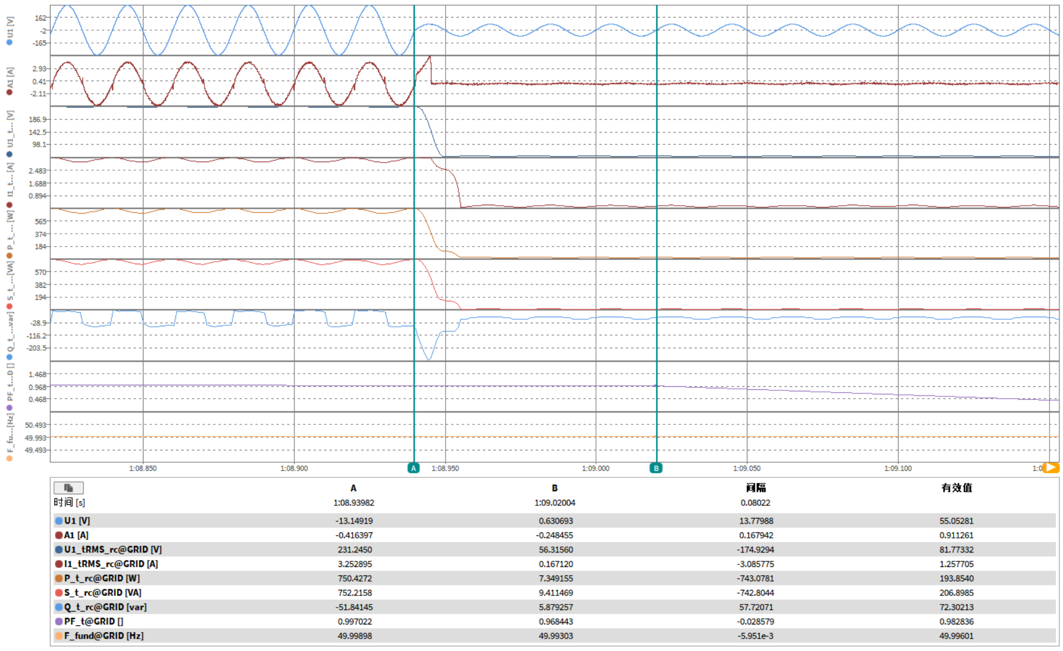
时间 [s]	A	B	间隔	有效值
	1:08.84034	1:08.94065	0.10032	
U1 [V]	38.10461	16.10978	-21.99483	229.6392
A1 [A]	0.250221	1.812626	1.562405	3.114664
U1_tRMS_rc@GRID [V]	231.3466	231.0588	-0.287766	230.1256
I1_tRMS_rc@GRID [A]	3.262542	3.261535	-1.007e-3	3.122545
P_t_rc@GRID [W]	753.1404	750.1496	-2.990845	716.8934
S_t_rc@GRID [VA]	754.7778	753.6063	-1.171509	718.7455
Q_t_rc@GRID [var]	-49.68903	-72.09724	-22.40821	51.56533
PF_t@GRID []	0.997022	0.997022	0.000000	0.997022
F_fund@GRID [Hz]	49.99898	49.99898	0.000000	49.99898

Before dip (t1-100ms)


U1 [V]
162
-2
-165
A1 [A]
2.93
0.41
-2.11
U1_t... [V]
186.9
142.5
98.1
I1_t... [A]
2.483
1.688
0.894
P_t_... [W]
565
374
184
S_t_... [VA]
570
382
194
Q_t_... [var]
-28.9
-116.2
-203.5
PF_t... []
1.468
0.968
0.468
F_fu... [Hz]
50.493
49.993
49.493
1:08.850
1:08.900
A
1:08.950
B
1:09.000
1:09.050
1:09.100

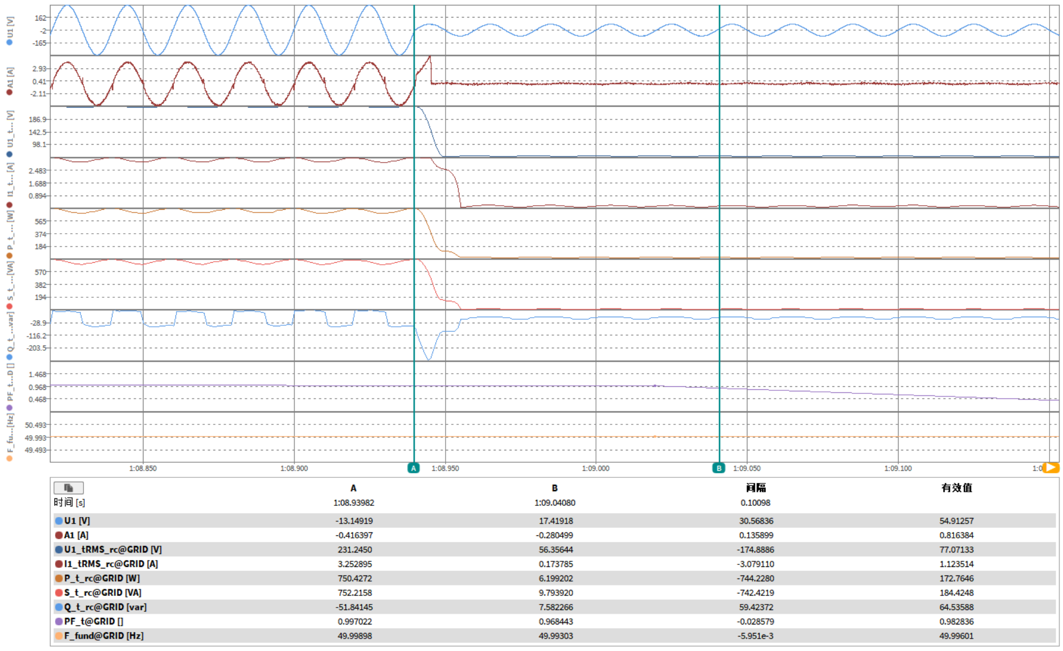
时间 [s]	A	B	间隔	有效值
	1:08.93982	1:08.99042	0.05060	
U1 [V]	-13.14919	-13.24288	-0.093699	54.51043
A1 [A]	-0.416397	-0.114273	0.302124	1.138791
U1_tRMS_rc@GRID [V]	231.2450	54.04495	-177.2001	93.94477
I1_tRMS_rc@GRID [A]	3.252895	0.180857	-3.072039	1.579953
P_t_rc@GRID [W]	750.4272	-6.773643	-757.2009	244.2727
S_t_rc@GRID [VA]	752.2158	9.774384	-742.4414	260.6503
Q_t_rc@GRID [var]	-51.84145	7.046725	58.88818	90.93658
PF_t@GRID []	0.997022	0.997022	0.000000	0.997022
F_fund@GRID [Hz]	49.99898	49.99898	0.000000	49.99898

During dip (t1+50ms)


U1 [V]
162
-2
-165
A1 [A]
2.93
0.41
-2.11
U1_t... [V]
186.9
142.5
98.1
I1_t... [A]
2.483
1.688
0.894
P_t_... [W]
565
374
184
S_t_... [VA]
570
382
194
Q_t_... [var]
-28.9
-116.2
-203.5
PF_t... []
1.468
0.968
0.468
F_fu... [Hz]
50.493
49.993
49.493
1:08.850
1:08.900
A
1:08.950
1:09.000
B
1:09.050
1:09.100

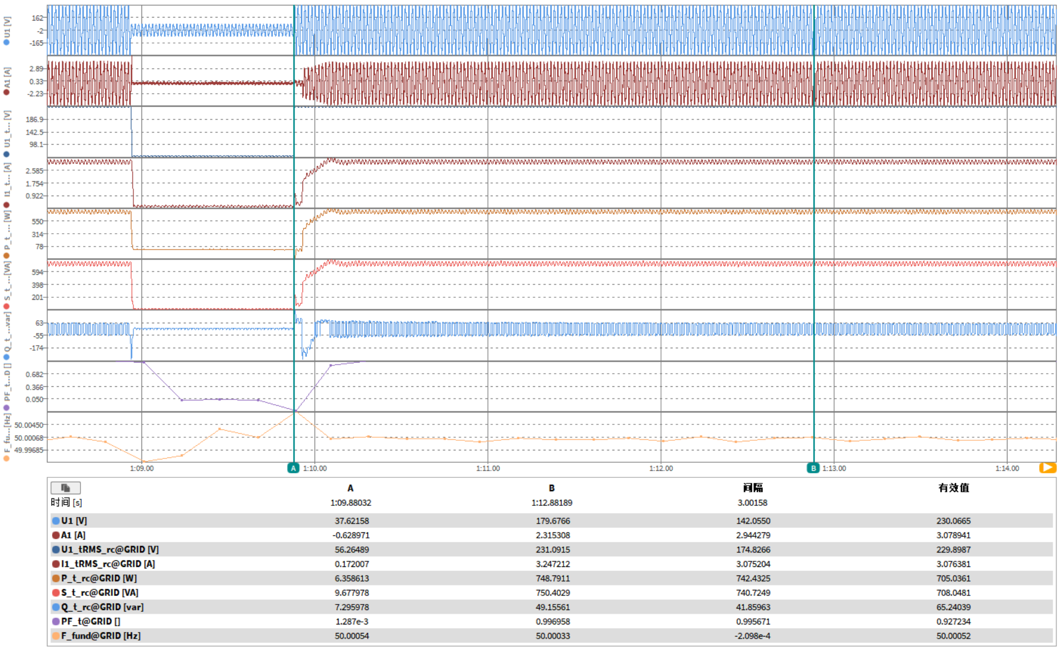
时间 [s]	A 1:08.93982	B 1:09.02004	间隔 0.08022	有效值
● U1 [V]	-13.14919	0.630693	13.77988	55.05281
● A1 [A]	-0.416397	-0.248455	0.167942	0.911261
● U1_tRMS_rc@GRID [V]	231.2450	56.31560	-174.9294	81.77332
● I1_tRMS_rc@GRID [A]	3.252895	0.167120	-3.085775	1.257705
● P_t_rc@GRID [W]	750.4272	7.349155	-743.0781	193.8540
● S_t_rc@GRID [VA]	752.2158	9.411469	-742.8044	206.8985
● Q_t_rc@GRID [var]	-51.84145	5.879257	57.72071	72.30213
● PF_t@GRID []	0.997022	0.968443	-0.028579	0.982836
● F_fund@GRID [Hz]	49.99898	49.99303	-5.951e-3	49.99601

During dip (t1+80ms)


U1 [V]
162
-2
-165
A1 [A]
2.93
0.41
-2.11
U1_t... [V]
186.9
142.5
98.1
I1_t... [A]
2.483
1.688
0.894
P_t_... [W]
565
374
184
S_t_... [VA]
570
382
194
Q_t_... [var]
-28.9
-116.2
-203.5
PF_t... []
1.468
0.968
0.468
F_fu... [Hz]
50.493
49.993
49.493
1:08.850
1:08.900
A
1:08.950
1:09.000
B
1:09.050
1:09.100

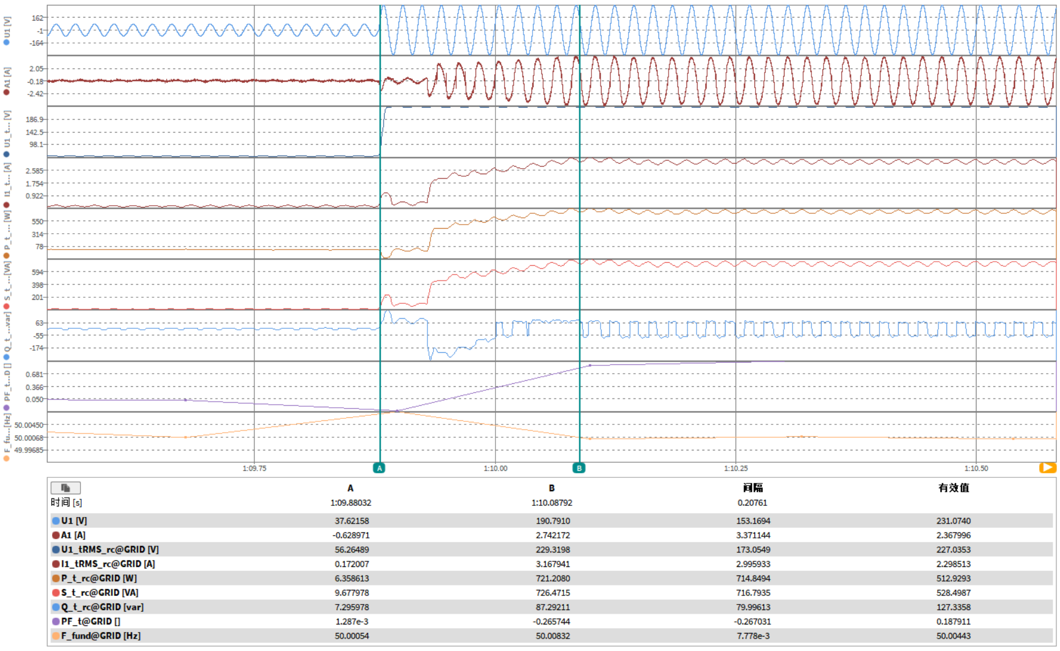
时间 [s]	A 1:08.93982	B 1:09.04080	间隔 0.10098	有效值
● U1 [V]	-13.14919	17.41918	30.56836	54.91257
● A1 [A]	-0.416397	-0.280499	0.135899	0.816384
● U1_tRMS_rc@GRID [V]	231.2450	56.35644	-174.8886	77.07133
● I1_tRMS_rc@GRID [A]	3.252895	0.173785	-3.079110	1.123514
● P_t_rc@GRID [W]	750.4272	6.199202	-744.2280	172.7646
● S_t_rc@GRID [VA]	752.2158	9.793920	-742.4219	184.4248
● Q_t_rc@GRID [var]	-51.84145	7.582266	59.42372	64.53588
● PF_t@GRID []	0.997022	0.968443	-0.028579	0.982836
● F_fund@GRID [Hz]	49.99898	49.99303	-5.951e-3	49.99601

During dip (t1+100ms)


U1 [V]
162
-2
-165
A1 [A]
2.89
0.33
-2.23
U1_t...[V]
186.9
142.5
98.1
I1_t...[A]
2.585
1.754
0.922
P_t_...[W]
550
314
78
S_t_...[VA]
594
398
201
Q_t_...[var]
63
-55
-174
PF_t...D []
0.682
0.366
0.050
F_fu...[Hz]
50.00450
50.00068
49.99685
1:09.00
A
1:10.00
1:11.00
1:12.00
B
1:13.00
1:14.00

	A	B	间隔	有效值
时间 [s]	1:09.88032	1:12.88189	3.00158	
● **U1 [V]**	37.62158	179.6766	142.0550	230.0665
● **A1 [A]**	-0.628971	2.315308	2.944279	3.078941
● **U1_tRMS_rc@GRID [V]**	56.26489	231.0915	174.8266	229.8987
● **I1_tRMS_rc@GRID [A]**	0.172007	3.247212	3.075204	3.076381
● **P_t_rc@GRID [W]**	6.358613	748.7911	742.4325	705.0361
● **S_t_rc@GRID [VA]**	9.677978	750.4029	740.7249	708.0481
● **Q_t_rc@GRID [var]**	7.295978	49.15561	41.85963	65.24039
● **PF_t@GRID []**	1.287e-3	0.996958	0.995671	0.927234
● **F_fund@GRID [Hz]**	50.00054	50.00033	-2.098e-4	50.00052

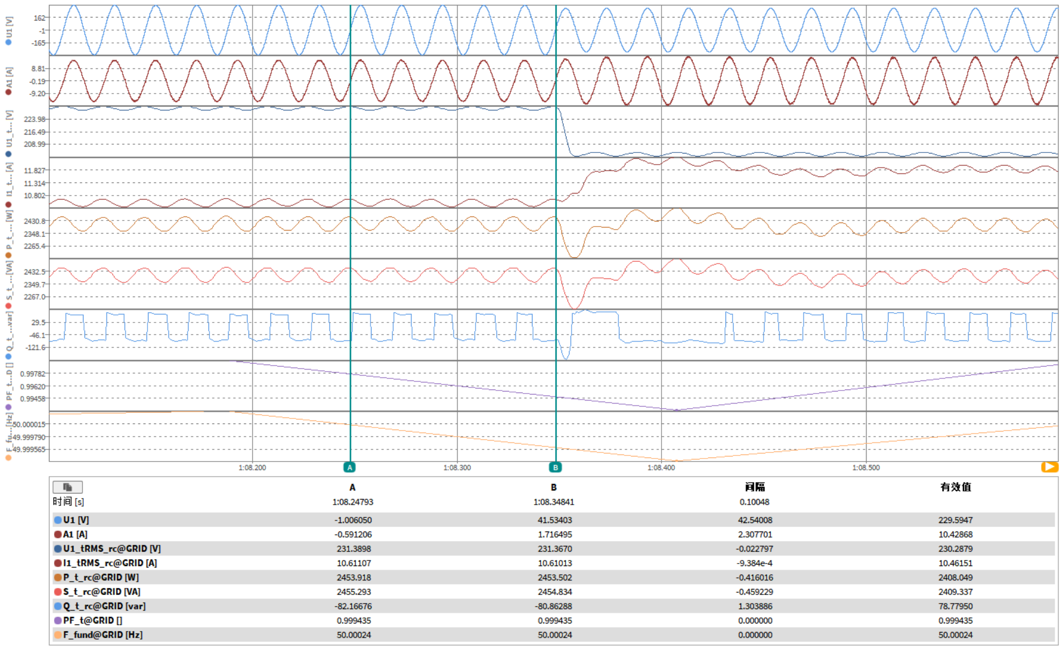
After dip (t2+3s)


U1 [V]
162
-1
-164
A1 [A]
2.05
-0.18
-2.42
U1_t...[V]
186.9
142.5
98.1
I1_t...[A]
2.585
1.754
0.922
P_t_...[W]
550
314
78
S_t_...[VA]
594
398
201
Q_t_...[var]
63
-55
-174
PF_t...D []
0.681
0.366
0.050
F_fu...[Hz]
50.00450
50.00068
49.99685
1:09.75
A
1:10.00
B
1:10.25
1:10.50

	A	B	间隔	有效值
时间 [s]	1:09.88032	1:10.08792	0.20761	
● **U1 [V]**	37.62158	190.7910	153.1694	231.0740
● **A1 [A]**	-0.628971	2.742172	3.371144	2.367996
● **U1_tRMS_rc@GRID [V]**	56.26489	229.3198	173.0549	227.0353
● **I1_tRMS_rc@GRID [A]**	0.172007	3.167941	2.995933	2.298513
● **P_t_rc@GRID [W]**	6.358613	721.2080	714.8494	512.9293
● **S_t_rc@GRID [VA]**	9.677978	726.4715	716.7935	528.4987
● **Q_t_rc@GRID [var]**	7.295978	87.29211	79.99613	127.3358
● **PF_t@GRID []**	1.287e-3	-0.265744	-0.267031	0.187911
● **F_fund@GRID [Hz]**	50.00054	50.00832	7.778e-3	50.00443

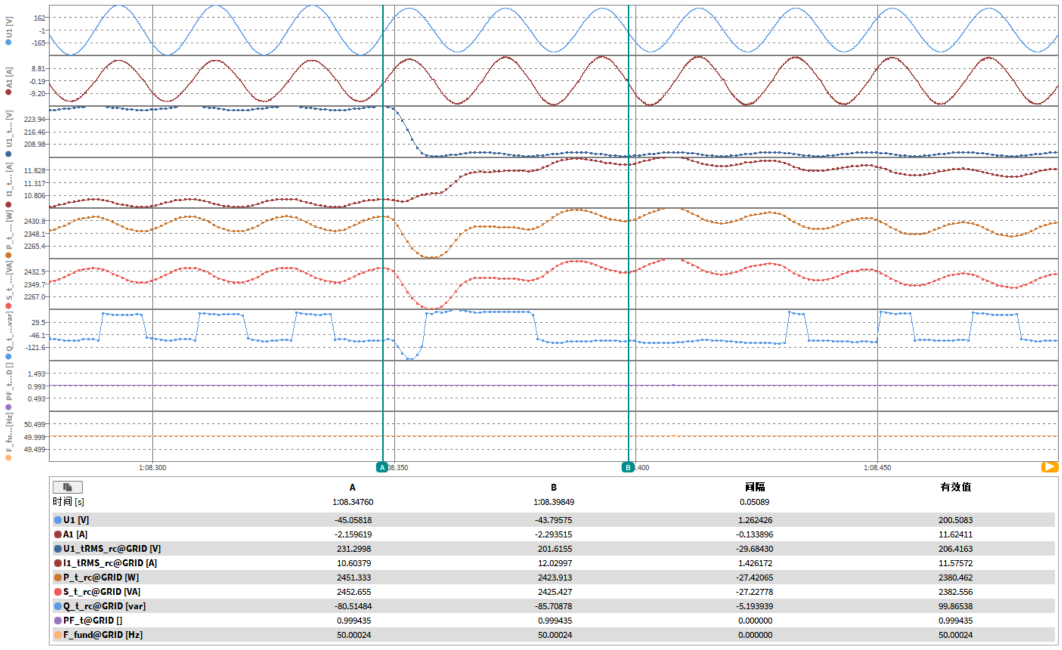
Recovery time

Graph of Test number 2.3


U1 [V]
162
-1
-165
A1 [A]
8.81
-0.19
-9.20
U1_t... [V]
223.98
216.49
208.99
I1_t... [A]
11.827
11.314
10.802
P_t_... [W]
2430.8
2348.1
2265.4
S_t_... [VA]
2432.5
2349.7
2267.0
Q_t_... [var]
29.5
-46.1
-121.6
PF_t_...D []
0.99782
0.99620
0.99458
F_fu... [Hz]
50.000015
49.999790
49.999565
1:08.200
A
1:08.300
B
1:08.400
1:08.500

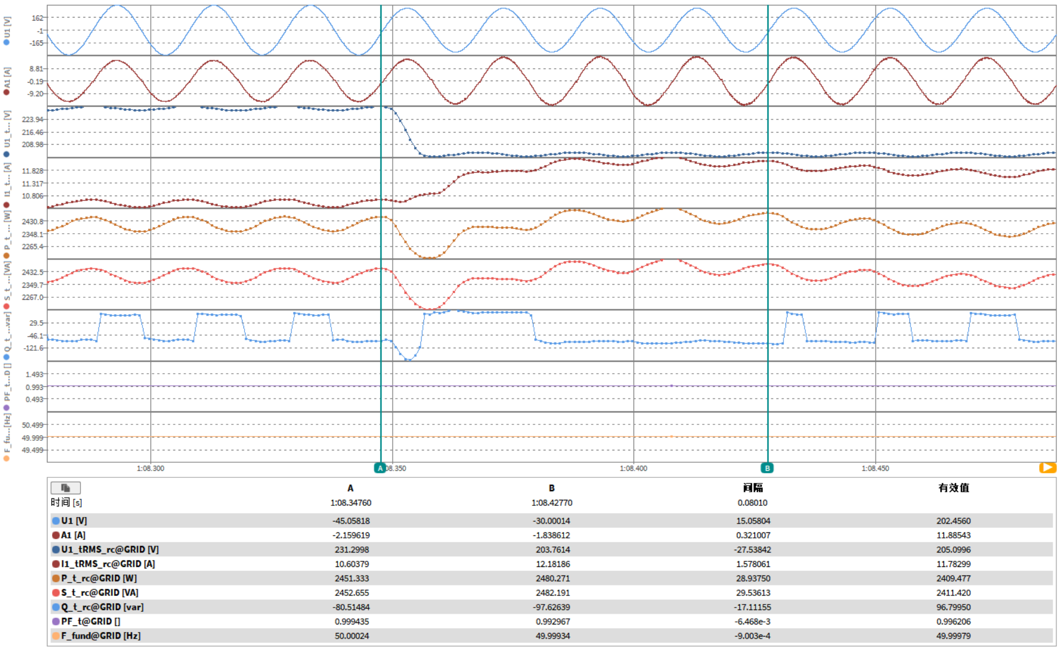
时间 [s]	A	B	间隔	有效值
	1:08.24793	1:08.34841	0.10048	
U1 [V]	-1.006050	41.53403	42.54008	229.5947
A1 [A]	-0.591206	1.716495	2.307701	10.42868
U1_tRMS_rc@GRID [V]	231.3898	231.3670	-0.022797	230.2879
I1_tRMS_rc@GRID [A]	10.61107	10.61013	-9.384e-4	10.46151
P_t_rc@GRID [W]	2453.918	2453.502	-0.416016	2408.049
S_t_rc@GRID [VA]	2455.293	2454.834	-0.459229	2409.337
Q_t_rc@GRID [var]	-82.16676	-80.86288	1.303886	78.77950
PF_t@GRID []	0.999435	0.999435	0.000000	0.999435
F_fund@GRID [Hz]	50.00024	50.00024	0.000000	50.00024

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
8.81
-0.19
-9.20
U1_t... [V]
223.94
216.46
208.98
I1_t... [A]
11.828
11.317
10.806
P_t_... [W]
2430.8
2348.1
2265.4
S_t_... [VA]
2432.5
2349.7
2267.0
Q_t_... [var]
29.5
-46.1
-121.6
PF_t_...D []
1.493
0.993
0.493
F_fu... [Hz]
50.499
49.999
49.499
1:08.300
A
B
1:08.450

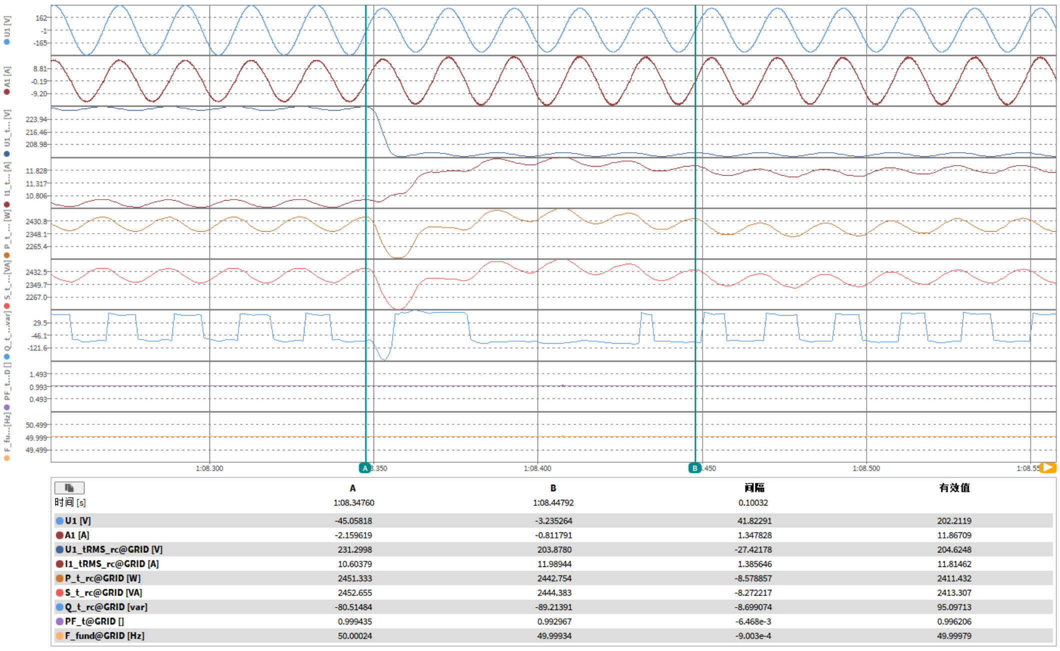
时间 [s]	A	B	间隔	有效值
	1:08.34760	1:08.39849	0.05089	
U1 [V]	-45.05818	-43.79575	1.262426	200.5083
A1 [A]	-2.159619	-2.293515	-0.133896	11.62411
U1_tRMS_rc@GRID [V]	231.2998	201.6155	-29.68430	206.4163
I1_tRMS_rc@GRID [A]	10.60379	12.02997	1.426172	11.57572
P_t_rc@GRID [W]	2451.333	2423.913	-27.42065	2380.462
S_t_rc@GRID [VA]	2452.655	2425.427	-27.22778	2382.556
Q_t_rc@GRID [var]	-80.51484	-85.70878	-5.193939	99.86538
PF_t@GRID []	0.999435	0.999435	0.000000	0.999435
F_fund@GRID [Hz]	50.00024	50.00024	0.000000	50.00024

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
8.81
-0.19
-9.20
U1_t... [V]
223.94
216.46
208.98
I1_t... [A]
11.828
11.317
10.806
P_t... [W]
2430.8
2348.1
2265.4
S_t... [VA]
2432.5
2349.7
2267.0
Q_t... [var]
29.5
-46.1
-121.6
PF_t... []
1.493
0.993
0.493
F_fu... [Hz]
50.499
49.999
49.499
1:08.300
A
08.350
1:08.400
B
1:08.450

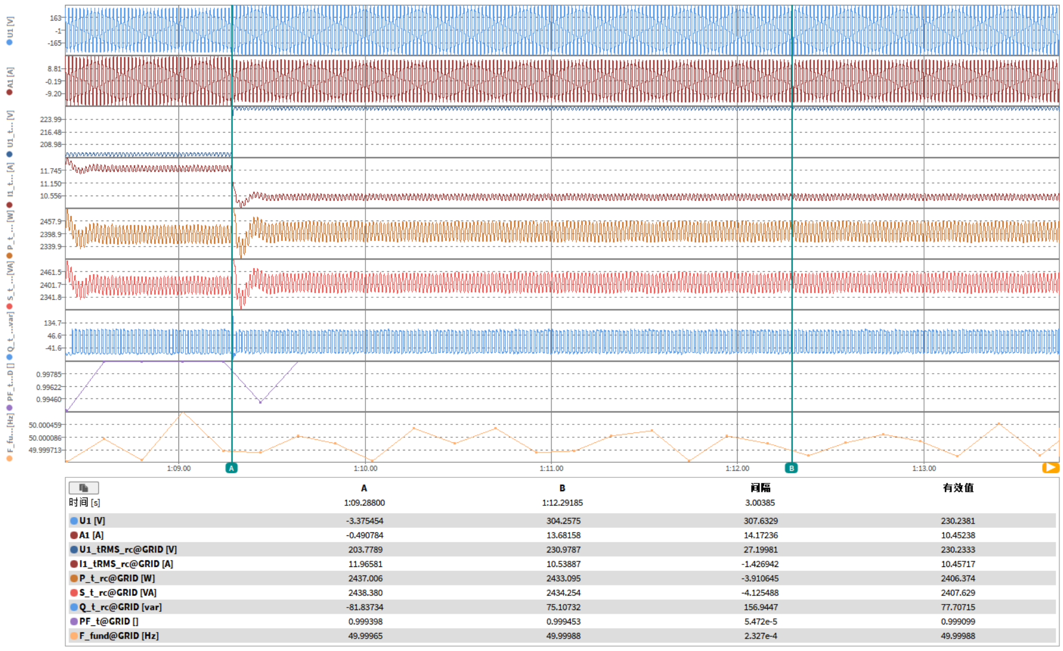
	A	B	间隔	有效值
时间 [s]	1:08.34760	1:08.42770	0.08010	
U1 [V]	-45.05818	-30.00014	15.05804	202.4560
A1 [A]	-2.159619	-1.838612	0.321007	11.88543
U1_tRMS_rc@GRID [V]	231.2998	203.7614	-27.53842	205.0996
I1_tRMS_rc@GRID [A]	10.60379	12.18186	1.578061	11.78299
P_t_rc@GRID [W]	2451.333	2480.271	28.93750	2409.477
S_t_rc@GRID [VA]	2452.655	2482.191	29.53613	2411.420
Q_t_rc@GRID [var]	-80.51484	-97.62639	-17.11155	96.79950
PF_t@GRID []	0.999435	0.992967	-6.468e-3	0.996206
F_fund@GRID [Hz]	50.00024	49.99934	-9.003e-4	49.99979

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
8.81
-0.19
-9.20
U1_t... [V]
223.94
216.46
208.98
I1_t... [A]
11.828
11.317
10.806
P_t... [W]
2430.8
2348.1
2265.4
S_t... [VA]
2432.5
2349.7
2267.0
Q_t... [var]
29.5
-46.1
-121.6
PF_t... []
1.493
0.993
0.493
F_fu... [Hz]
50.499
49.999
49.499
1:08.300
A
.350
1:08.400
B
.450
1:08.500
1:08.55

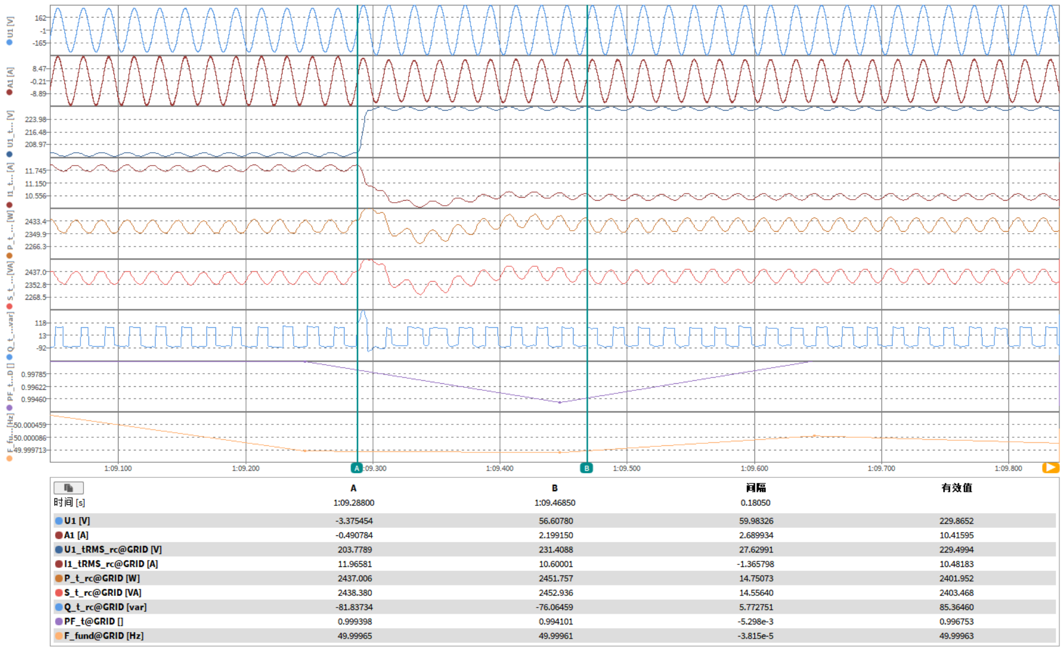
	A	B	间隔	有效值
时间 [s]	1:08.34760	1:08.44792	0.10032	
U1 [V]	-45.05818	-3.235264	41.82291	202.2119
A1 [A]	-2.159619	-0.811791	1.347828	11.86709
U1_tRMS_rc@GRID [V]	231.2998	203.8780	-27.42178	204.6248
I1_tRMS_rc@GRID [A]	10.60379	11.98944	1.385646	11.81462
P_t_rc@GRID [W]	2451.333	2442.754	-8.578857	2411.432
S_t_rc@GRID [VA]	2452.655	2444.383	-8.272217	2413.307
Q_t_rc@GRID [var]	-80.51484	-89.21391	-8.699074	95.09713
PF_t@GRID []	0.999435	0.992967	-6.468e-3	0.996206
F_fund@GRID [Hz]	50.00024	49.99934	-9.003e-4	49.99979

During dip (t1+100ms)


U1 [V]
163
-1
-165
A1 [A]
8.81
-0.19
-9.20
U1_t... [V]
223.99
216.48
208.98
I1_t... [A]
11.745
11.150
10.556
P_t_... [W]
2457.9
2398.9
2339.9
S_t_...[VA]
2461.5
2401.7
2341.8
Q_t_...var]
134.7
46.6
-41.6
PF_t...D []
0.99785
0.99622
0.99460
F_fu...[Hz]
50.000459
50.000086
49.999713
1:09.00
A
1:10.00
1:11.00
1:12.00
B
1:13.00

时间 [s]	A 1:09.28800	B 1:12.29185	间隔 3.00385	有效值
U1 [V]	-3.375454	304.2575	307.6329	230.2381
A1 [A]	-0.490784	13.68158	14.17236	10.45238
U1_tRMS_rc@GRID [V]	203.7789	230.9787	27.19981	230.2333
I1_tRMS_rc@GRID [A]	11.96581	10.53887	-1.426942	10.45717
P_t_rc@GRID [W]	2437.006	2433.095	-3.910645	2406.374
S_t_rc@GRID [VA]	2438.380	2434.254	-4.125488	2407.629
Q_t_rc@GRID [var]	-81.83734	75.10732	156.9447	77.70715
PF_t@GRID []	0.999398	0.999453	5.472e-5	0.999099
F_fund@GRID [Hz]	49.99965	49.99988	2.327e-4	49.99988

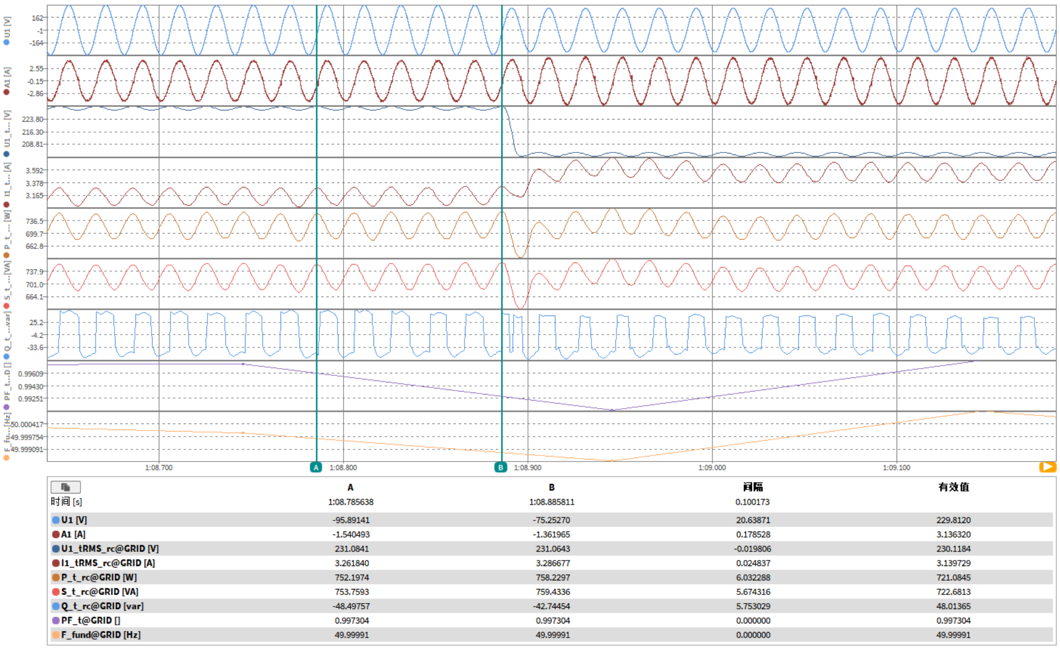
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
8.47
-0.21
-8.89
U1_t... [V]
223.98
216.48
208.97
I1_t... [A]
11.745
11.150
10.556
P_t_... [W]
2433.4
2349.9
2266.3
S_t_...[VA]
2437.0
2352.8
2268.5
Q_t_...var]
118
13
-92
PF_t...D []
0.99785
0.99622
0.99460
F_fu...[Hz]
50.000459
50.000086
49.999713
1:09.100
1:09.200
A
:09.300
1:09.400
B
1:09.500
1:09.600
1:09.700
1:09.800

时间 [s]	A 1:09.28800	B 1:09.46850	间隔 0.18050	有效值
U1 [V]	-3.375454	56.60780	59.98326	229.8652
A1 [A]	-0.490784	2.199150	2.689934	10.41595
U1_tRMS_rc@GRID [V]	203.7789	231.4088	27.62991	229.4994
I1_tRMS_rc@GRID [A]	11.96581	10.60001	-1.365798	10.48183
P_t_rc@GRID [W]	2437.006	2451.757	14.75073	2401.952
S_t_rc@GRID [VA]	2438.380	2452.936	14.55640	2403.468
Q_t_rc@GRID [var]	-81.83734	-76.06459	5.772751	85.36460
PF_t@GRID []	0.999398	0.994101	-5.298e-3	0.996753
F_fund@GRID [Hz]	49.99965	49.99961	-3.815e-5	49.99963

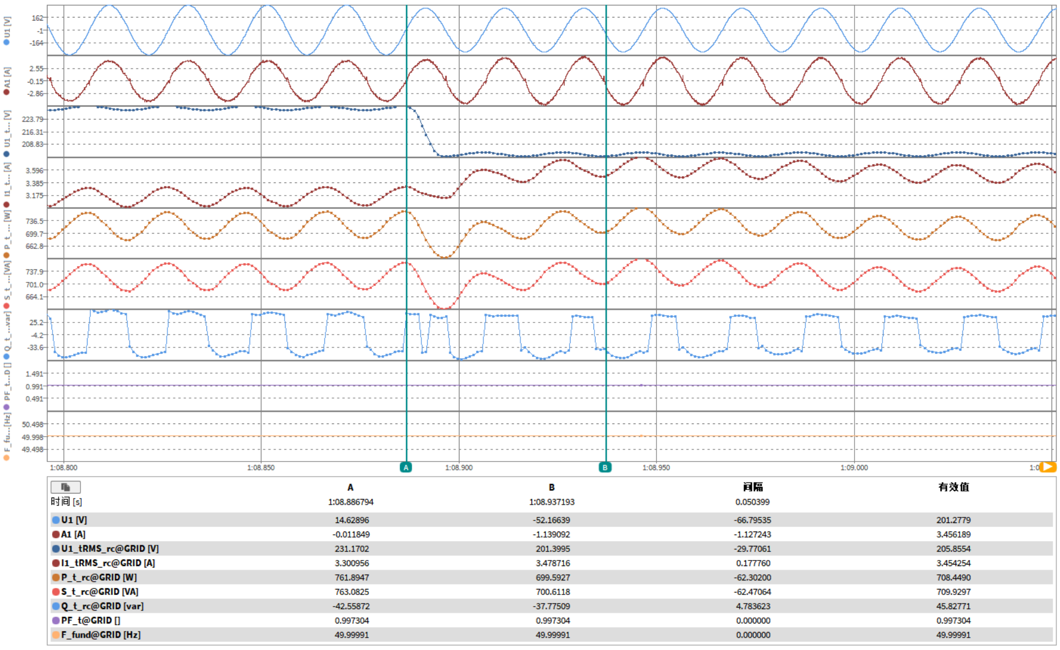
Recovery time

Graph of Test number 2.4


U1 [V]
162
-1
-164
A1 [A]
2.55
-0.15
-2.86
U1_t... [V]
223.80
216.30
208.81
I1_t... [A]
3.592
3.378
3.165
P_t_... [W]
736.5
699.7
662.8
S_t_... [VA]
737.9
701.0
664.1
Q_t_... [var]
25.2
-4.2
-33.6
PF_t... []
0.99609
0.99430
0.99251
F_fu... [Hz]
50.000417
49.999754
49.999091
1:08.700
A
1:08.800
B
1:08.900
1:09.000
1:09.100

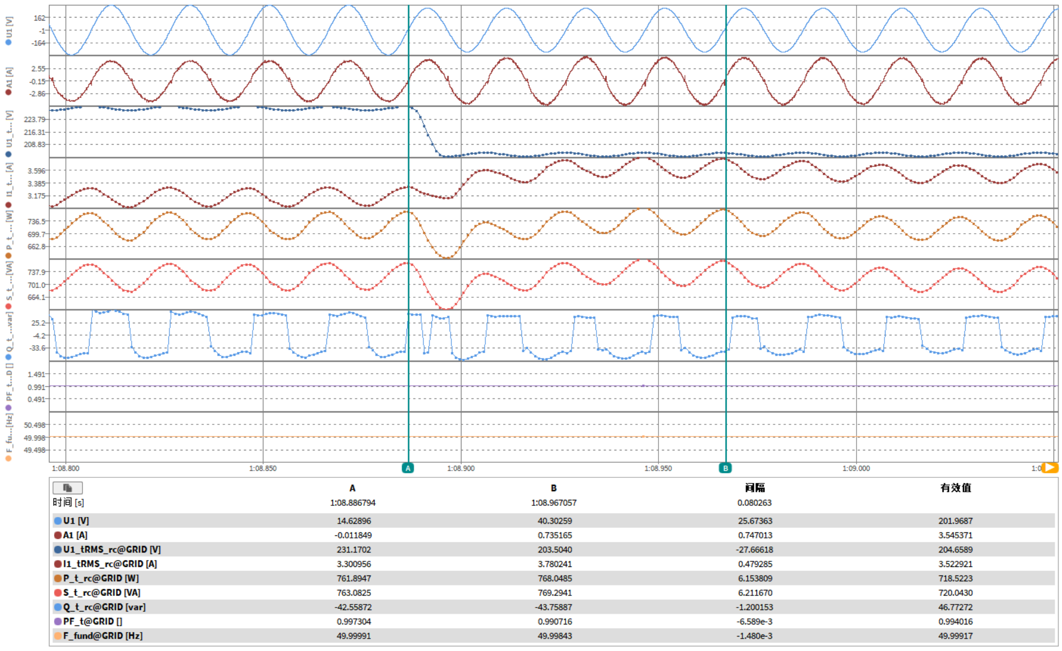
	A	B	间隔	有效值
时间 [s]	1:08.785638	1:08.885811	0.100173	
U1 [V]	-95.89141	-75.25270	20.63871	229.8120
A1 [A]	-1.540493	-1.361965	0.178528	3.136320
U1_tRMS_rc@GRID [V]	231.0841	231.0643	-0.019806	230.1184
I1_tRMS_rc@GRID [A]	3.261840	3.286677	0.024837	3.139729
P_t_rc@GRID [W]	752.1974	758.2297	6.032288	721.0845
S_t_rc@GRID [VA]	753.7593	759.4336	5.674316	722.6813
Q_t_rc@GRID [var]	-48.49757	-42.74454	5.753029	48.01365
PF_t@GRID []	0.997304	0.997304	0.000000	0.997304
F_fund@GRID [Hz]	49.99991	49.99991	0.000000	49.99991

Before dip (t1-100ms)


U1 [V]
162
-1
-164
A1 [A]
2.55
-0.15
-2.86
U1_t... [V]
223.79
216.31
208.83
I1_t... [A]
3.596
3.385
3.175
P_t_... [W]
736.5
699.7
662.8
S_t_... [VA]
737.9
701.0
664.1
Q_t_... [var]
25.2
-4.2
-33.6
PF_t... []
1.491
0.991
0.491
F_fu... [Hz]
50.498
49.998
49.498
1:08.800
1:08.850
A
1:08.900
B
1:08.950
1:09.000

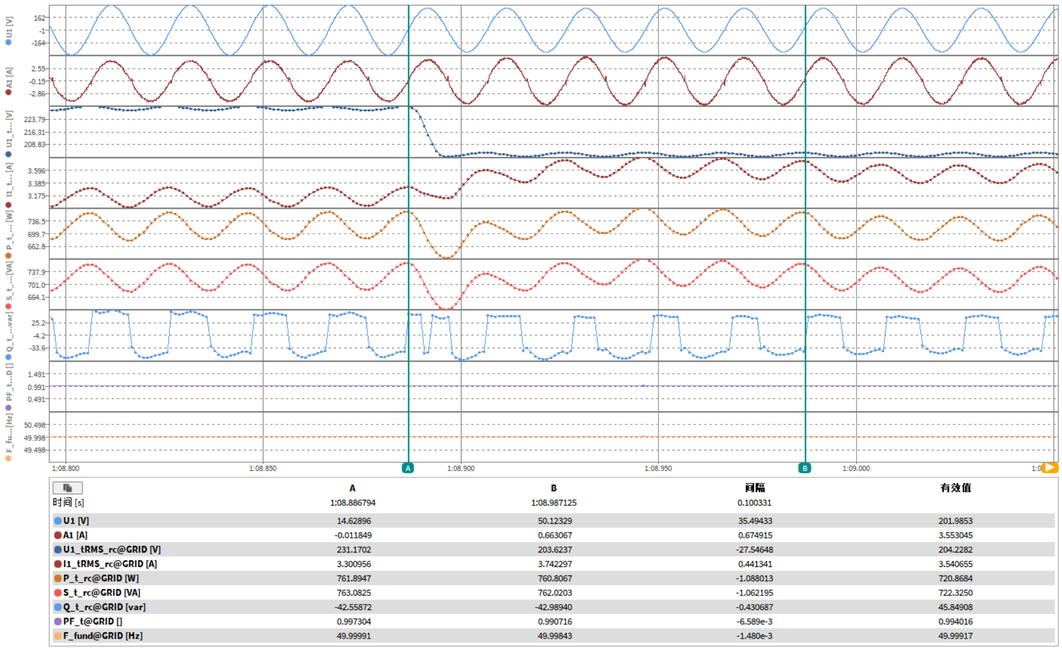
	A	B	间隔	有效值
时间 [s]	1:08.886794	1:08.937193	0.050399	
U1 [V]	14.62896	-52.16639	-66.79535	201.2779
A1 [A]	-0.011849	-1.139092	-1.127243	3.456189
U1_tRMS_rc@GRID [V]	231.1702	201.3995	-29.77061	205.8554
I1_tRMS_rc@GRID [A]	3.300956	3.478716	0.177760	3.454254
P_t_rc@GRID [W]	761.8947	699.5927	-62.30200	708.4490
S_t_rc@GRID [VA]	763.0825	700.6118	-62.47064	709.9297
Q_t_rc@GRID [var]	-42.55872	-37.77509	4.783623	45.82771
PF_t@GRID []	0.997304	0.997304	0.000000	0.997304
F_fund@GRID [Hz]	49.99991	49.99991	0.000000	49.99991

During dip (t1+50ms)


U1 [V]
162
-1
-164
A1 [A]
2.55
-0.15
-2.86
U1_t... [V]
223.79
216.31
208.83
I1_t... [A]
3.596
3.385
3.175
P_t_... [W]
736.5
699.7
662.8
S_t_... [VA]
737.9
701.0
664.1
Q_t_... [var]
25.2
-4.2
-33.6
PF_t... []
1.491
0.991
0.491
F_fu... [Hz]
50.498
49.998
49.498
1:08.800
1:08.850
A
1:08.900
1:08.950
B
1:09.000

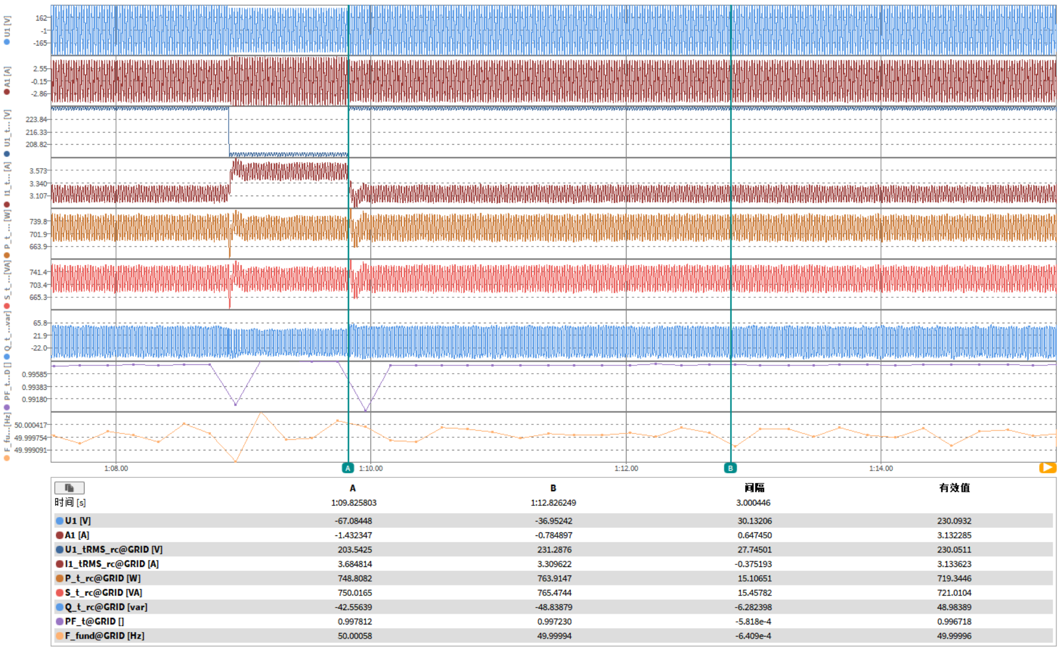
	A	B	间隔	有效值
时间 [s]	1:08.886794	1:08.967057	0.080263	
● U1 [V]	14.62896	40.30259	25.67363	201.9687
● A1 [A]	-0.011849	0.735165	0.747013	3.545371
● U1_tRMS_rc@GRID [V]	231.1702	203.5040	-27.66618	204.6589
● I1_tRMS_rc@GRID [A]	3.300956	3.780241	0.479285	3.522921
● P_t_rc@GRID [W]	761.8947	768.0485	6.153809	718.5223
● S_t_rc@GRID [VA]	763.0825	769.2941	6.211670	720.0430
● Q_t_rc@GRID [var]	-42.55872	-43.75887	-1.200153	46.77272
● PF_t@GRID []	0.997304	0.990716	-6.589e-3	0.994016
● F_fund@GRID [Hz]	49.99991	49.99843	-1.480e-3	49.99917

During dip (t1+80ms)


U1 [V]
162
-1
-164
A1 [A]
2.55
-0.15
-2.86
U1_t... [V]
223.79
216.31
208.83
I1_t... [A]
3.596
3.385
3.175
P_t_... [W]
736.5
699.7
662.8
S_t_... [VA]
737.9
701.0
664.1
Q_t_... [var]
25.2
-4.2
-33.6
PF_t... []
1.491
0.991
0.491
F_fu... [Hz]
50.498
49.998
49.498
1:08.800
1:08.850
A
1:08.900
1:08.950
B
1:09.000

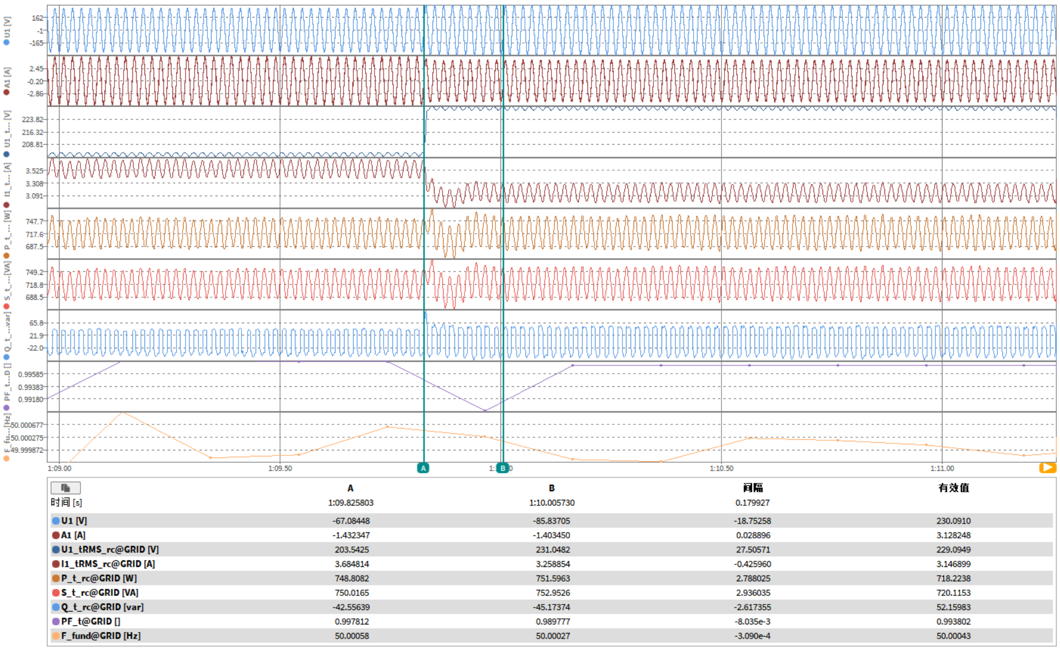
	A	B	间隔	有效值
时间 [s]	1:08.886794	1:08.987125	0.100331	
● U1 [V]	14.62896	50.12329	35.49433	201.9853
● A1 [A]	-0.011849	0.663067	0.674915	3.553045
● U1_tRMS_rc@GRID [V]	231.1702	203.6237	-27.54648	204.2282
● I1_tRMS_rc@GRID [A]	3.300956	3.742297	0.441341	3.540655
● P_t_rc@GRID [W]	761.8947	760.8067	-1.088013	720.8684
● S_t_rc@GRID [VA]	763.0825	762.0203	-1.062195	722.3250
● Q_t_rc@GRID [var]	-42.55872	-42.98940	-0.430687	45.84908
● PF_t@GRID []	0.997304	0.990716	-6.589e-3	0.994016
● F_fund@GRID [Hz]	49.99991	49.99843	-1.480e-3	49.99917

During dip (t1+100ms)


U1 [V]
162
-1
-165
A1 [A]
2.55
-0.15
-2.86
U1_t... [V]
223.84
216.33
208.82
I1_t... [A]
3.573
3.340
3.107
P_t_... [W]
739.8
701.9
663.9
S_t_...[VA]
741.4
703.4
665.3
Q_t_...var]
65.8
21.9
-22.0
PF_t...D []
0.99585
0.99383
0.99180
F_fu...[Hz]
50.000417
49.999754
49.999091
1:08.00
A
1:10.00
1:12.00
B
1:14.00

时间 [s]	A 1:09.825803	B 1:12.826249	间隔 3.000446	有效值
U1 [V]	-67.08448	-36.95242	30.13206	230.0932
A1 [A]	-1.432347	-0.784897	0.647450	3.132285
U1_tRMS_rc@GRID [V]	203.5425	231.2876	27.74501	230.0511
I1_tRMS_rc@GRID [A]	3.684814	3.309622	-0.375193	3.133623
P_t_rc@GRID [W]	748.8082	763.9147	15.10651	719.3446
S_t_rc@GRID [VA]	750.0165	765.4744	15.45782	721.0104
Q_t_rc@GRID [var]	-42.55639	-48.83879	-6.282398	48.98389
PF_t@GRID []	0.997812	0.997230	-5.818e-4	0.996718
F_fund@GRID [Hz]	50.00058	49.99994	-6.409e-4	49.99996

After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
2.45
-0.20
-2.86
U1_t... [V]
223.82
216.32
208.81
I1_t... [A]
3.525
3.308
3.091
P_t_... [W]
747.7
717.6
687.5
S_t_...[VA]
749.2
718.8
688.5
Q_t_...var]
65.8
21.9
-22.0
PF_t...D []
0.99585
0.99383
0.99180
F_fu...[Hz]
50.000677
50.000275
49.999872
1:09.00
1:09.50
A
B
1:10.50
1:11.00

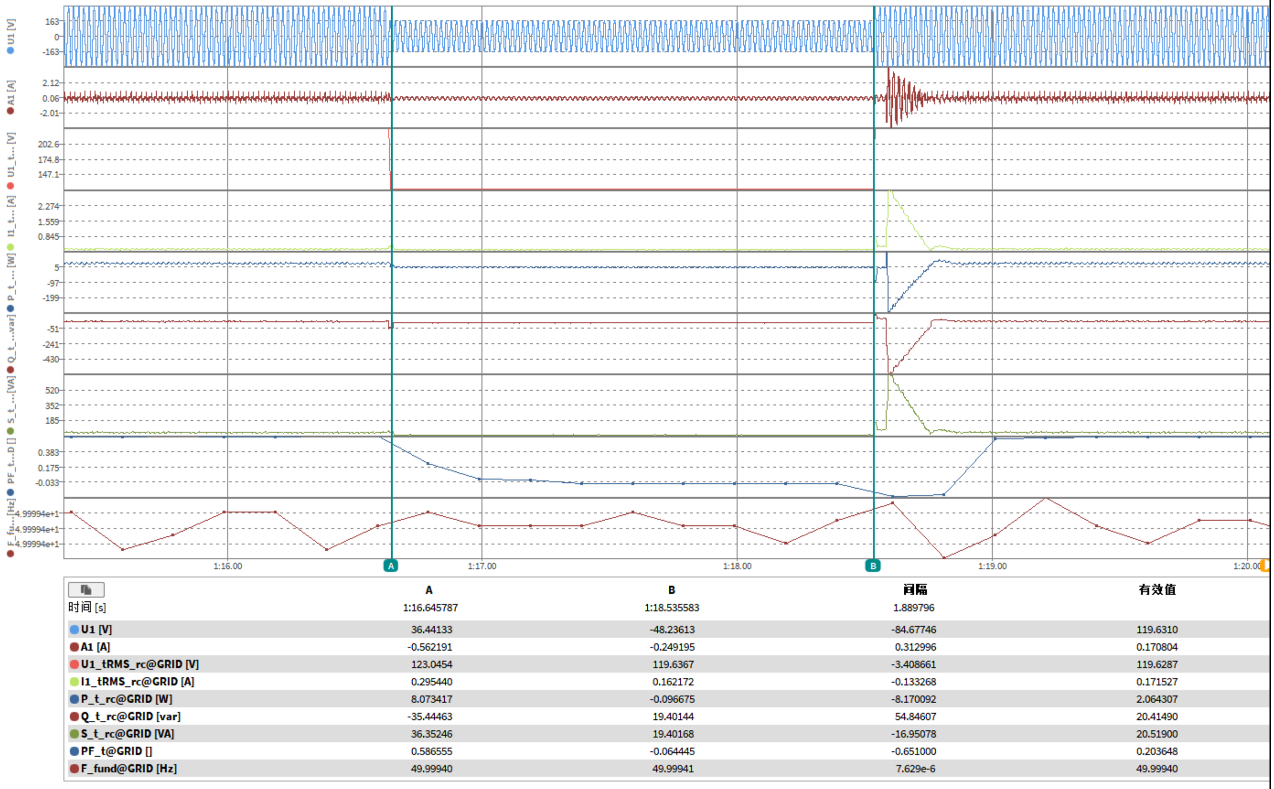
时间 [s]	A 1:09.825803	B 1:10.005730	间隔 0.179927	有效值
U1 [V]	-67.08448	-85.83705	-18.75258	230.0910
A1 [A]	-1.432347	-1.403450	0.028896	3.128248
U1_tRMS_rc@GRID [V]	203.5425	231.0482	27.50571	229.0949
I1_tRMS_rc@GRID [A]	3.684814	3.258854	-0.425960	3.146899
P_t_rc@GRID [W]	748.8082	751.5963	2.788025	718.2238
S_t_rc@GRID [VA]	750.0165	752.9526	2.936035	720.1153
Q_t_rc@GRID [var]	-42.55639	-45.17374	-2.617355	52.15983
PF_t@GRID []	0.997812	0.989777	-8.035e-3	0.993802
F_fund@GRID [Hz]	50.00058	50.00027	-3.090e-4	50.00043

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	3.1	3.2	3.3	3.4
	1	Date	--	--	dd.mm .yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm :ss	See graph			
	3	Fault type (phase)	--	--		VD3		VD8	
	4	Setting voltage depth	Line to line	--	p.u.	0.52			
	5	Setting dip duration		--		1870			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	1889.79			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.52			
	10		Pos.		p.u.	0.52			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.004	1.004	1.006	1.005
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.012	0.310	1.012	0.314
	13	Active power	Total	t1-10s to t1	p.u.	1.017	0.311	1.018	0.315
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.035	-0.021	-0.030	-0.024
	16		Pos.			--	--	--	--
	17	Cosφ	--	t1-10s to t1	--	0.9995	0.9968	0.9994	0.9969
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.515	0.525	-- -- 0.896	-- -- 0.896
	19	Line current	Phase 1	t1+50ms	p.u.	0.021	0.019	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	1.123	0.328
	22	Line current	Phase 1	t1+80ms	p.u.	0.023	0.021	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	1.132	0.354
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.006	0.006	1.013	0.317
	26		Pos.			--	--	--	--

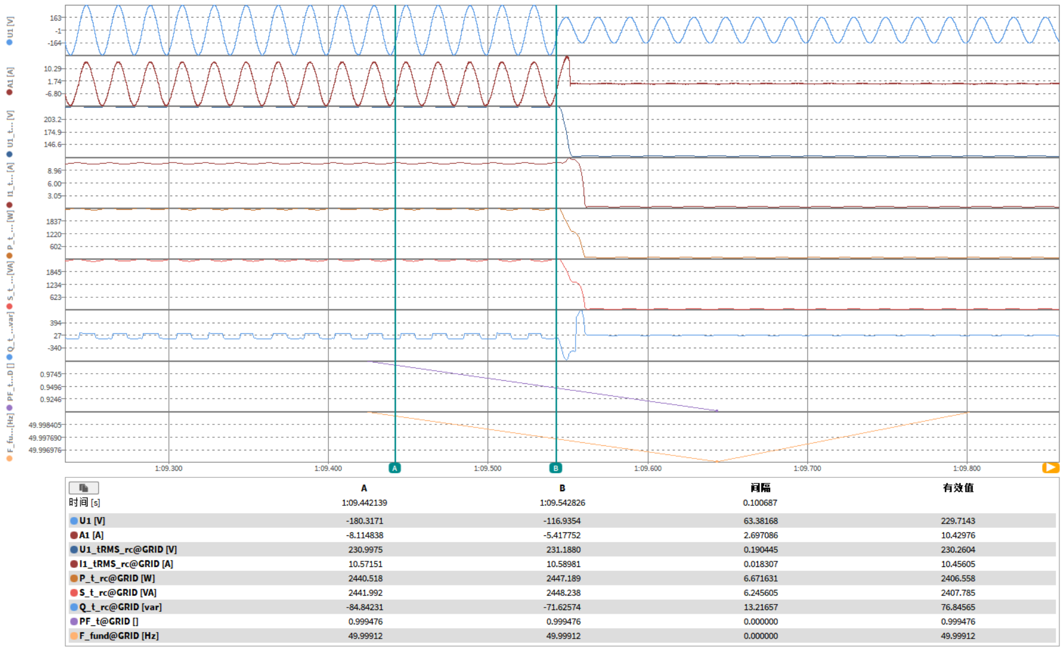
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.006	1.000	0.998	0.999
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.019	0.300	0.989	0.313
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.277	0.275	0.177	0.121
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.035	0.020	-0.030	0.023
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.277	0.275	0.177	0.121
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 3.1


U1 [V]
163
0
-163
A1 [A]
2.12
0.06
-2.01
U1_t... [V]
202.6
174.8
147.1
I1_t... [A]
2.274
1.559
0.845
P_t_... [W]
5
-97
-199
Q_t_...var]
-51
-241
-430
S_t_...[VA]
520
352
185
PF_t...D []
0.383
0.175
-0.033
F_fu...[Hz]
4.99994e+1
4.99994e+1
4.99994e+1
1:16.00
A
1:17.00
1:18.00
B
1:19.00
1:20.00

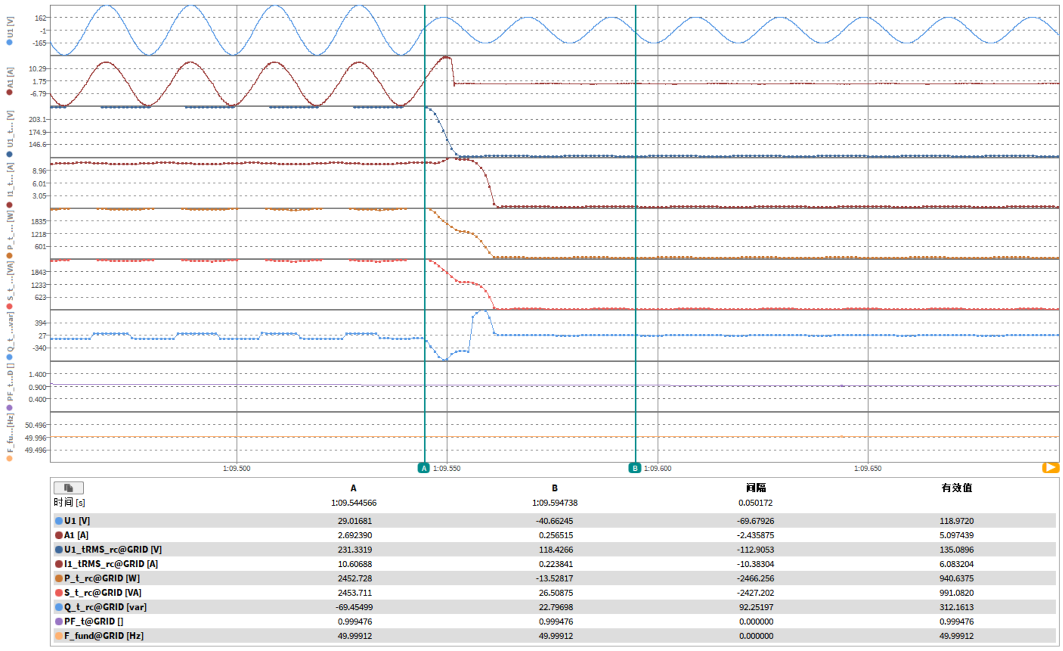
	A	B	间隔	有效值
时间 [s]	1:16.645787	1:18.535583	1.889796	
U1 [V]	36.44133	-48.23613	-84.67746	119.6310
A1 [A]	-0.562191	-0.249195	0.312996	0.170804
U1_tRMS_rc@GRID [V]	123.0454	119.6367	-3.408661	119.6287
I1_tRMS_rc@GRID [A]	0.295440	0.162172	-0.133268	0.171527
P_t_rc@GRID [W]	8.073417	-0.096675	-8.170092	2.064307
Q_t_rc@GRID [var]	-35.44463	19.40144	54.84607	20.41490
S_t_rc@GRID [VA]	36.35246	19.40168	-16.95078	20.51900
PF_t@GRID []	0.586555	-0.064445	-0.651000	0.203648
F_fund@GRID [Hz]	49.99940	49.99941	7.629e-6	49.99940

Empty load


U1 [V]
163
-1
-164
A1 [A]
10.29
1.74
-6.80
U1_t... [V]
203.2
174.9
146.6
I1_t... [A]
8.96
6.00
3.05
P_t_... [W]
1837
1220
602
S_t_... [VA]
1845
1234
623
Q_t_... [var]
394
27
-340
PF_t...D []
0.9745
0.9496
0.9246
F_fu... [Hz]
49.998405
49.997690
49.996976
1:09.300
1:09.400
A
1:09.500
B
1:09.600
1:09.700
1:09.800

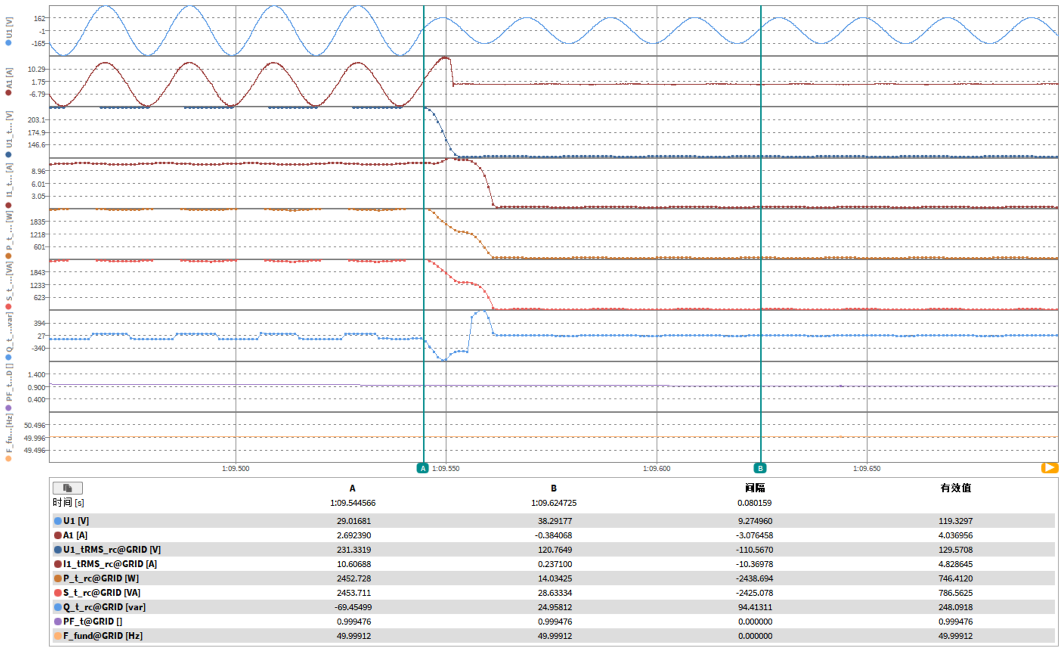
时间 [s]	A 1:09.442139	B 1:09.542826	间隔 0.100687	有效值
U1 [V]	-180.3171	-116.9354	63.38168	229.7143
A1 [A]	-8.114838	-5.417752	2.697086	10.42976
U1_tRMS_rc@GRID [V]	230.9975	231.1880	0.190445	230.2604
I1_tRMS_rc@GRID [A]	10.57151	10.58981	0.018307	10.45605
P_t_rc@GRID [W]	2440.518	2447.189	6.671631	2406.558
S_t_rc@GRID [VA]	2441.992	2448.238	6.245605	2407.785
Q_t_rc@GRID [var]	-84.84231	-71.62574	13.21657	76.84565
PF_t@GRID []	0.999476	0.999476	0.000000	0.999476
F_fund@GRID [Hz]	49.99912	49.99912	0.000000	49.99912

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
10.29
1.75
-6.79
U1_t... [V]
203.1
174.9
146.6
I1_t... [A]
8.96
6.01
3.05
P_t_... [W]
1835
1218
601
S_t_... [VA]
1843
1233
623
Q_t_... [var]
394
27
-340
PF_t...D []
1.400
0.900
0.400
F_fu... [Hz]
50.496
49.996
49.496
1:09.500
A
1:09.550
B
1:09.600
1:09.650

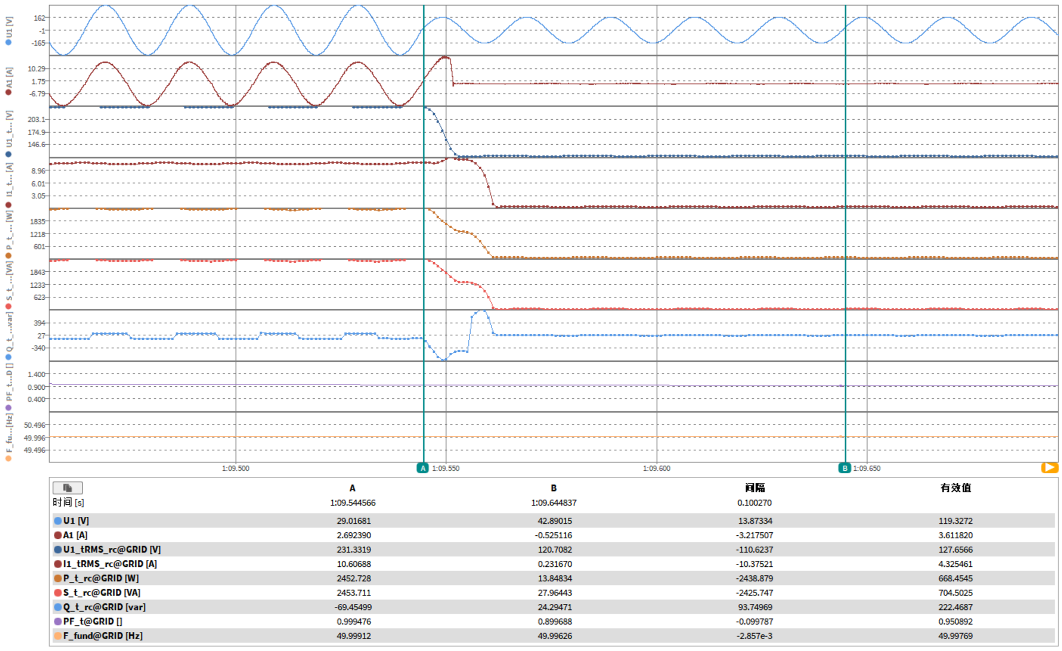
时间 [s]	A 1:09.544566	B 1:09.594738	间隔 0.050172	有效值
U1 [V]	29.01681	-40.66245	-69.67926	118.9720
A1 [A]	2.692390	0.256515	-2.435875	5.097439
U1_tRMS_rc@GRID [V]	231.3319	118.4266	-112.9053	135.0896
I1_tRMS_rc@GRID [A]	10.60688	0.223841	-10.38304	6.083204
P_t_rc@GRID [W]	2452.728	-13.52817	-2466.256	940.6375
S_t_rc@GRID [VA]	2453.711	26.50875	-2427.202	991.0820
Q_t_rc@GRID [var]	-69.45499	22.79698	92.25197	312.1613
PF_t@GRID []	0.999476	0.999476	0.000000	0.999476
F_fund@GRID [Hz]	49.99912	49.99912	0.000000	49.99912

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
10.29
1.75
-6.79
U1_t... [V]
203.1
174.9
146.6
I1_t... [A]
8.96
6.01
3.05
P_t_... [W]
1835
1218
601
S_t_... [VA]
1843
1233
623
Q_t_... [var]
394
27
-340
PF_t... []
1.400
0.900
0.400
F_fu... [Hz]
50.496
49.996
49.496
1:09.500
A
1:09.550
1:09.600
B
1:09.650

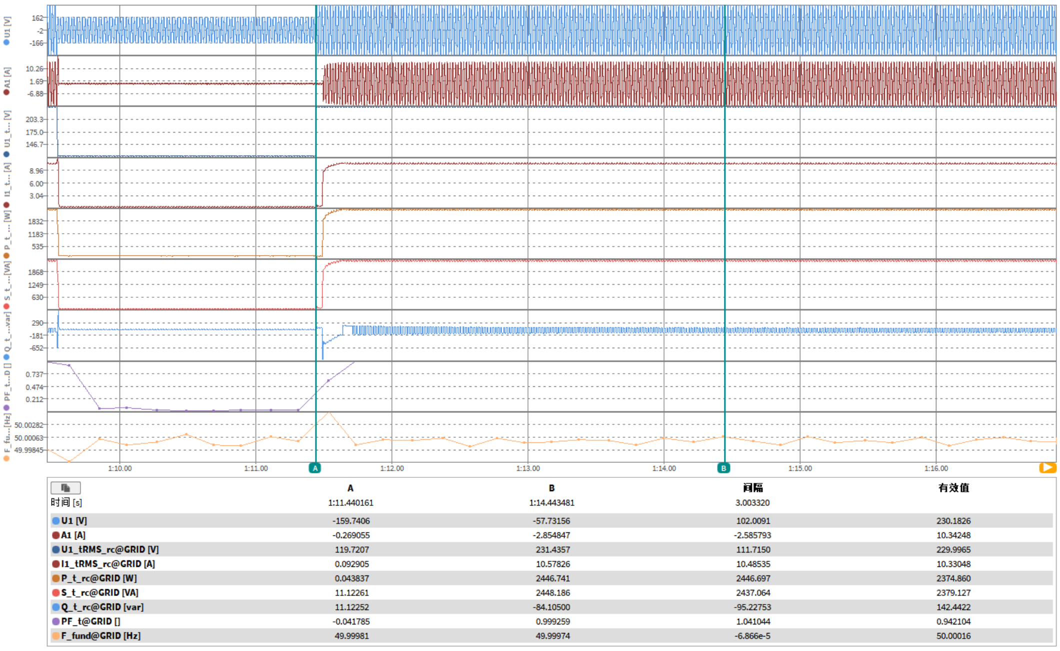
	A	B	间隔	有效值
时间 [s]	1:09.544566	1:09.624725	0.080159	
● **U1 [V]**	29.01681	38.29177	9.274960	119.3297
● **A1 [A]**	2.692390	-0.384068	-3.076458	4.036956
● **U1_tRMS_rc@GRID [V]**	231.3319	120.7649	-110.5670	129.5708
● **I1_tRMS_rc@GRID [A]**	10.60688	0.237100	-10.36978	4.828645
● **P_t_rc@GRID [W]**	2452.728	14.03425	-2438.694	746.4120
● **S_t_rc@GRID [VA]**	2453.711	28.63334	-2425.078	786.5625
● **Q_t_rc@GRID [var]**	-69.45499	24.95812	94.41311	248.0918
● **PF_t@GRID []**	0.999476	0.999476	0.000000	0.999476
● **F_fund@GRID [Hz]**	49.99912	49.99912	0.000000	49.99912

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
10.29
1.75
-6.79
U1_t... [V]
203.1
174.9
146.6
I1_t... [A]
8.96
6.01
3.05
P_t_... [W]
1835
1218
601
S_t_... [VA]
1843
1233
623
Q_t_... [var]
394
27
-340
PF_t... []
1.400
0.900
0.400
F_fu... [Hz]
50.496
49.996
49.496
1:09.500
A
1:09.550
1:09.600
B
1:09.650

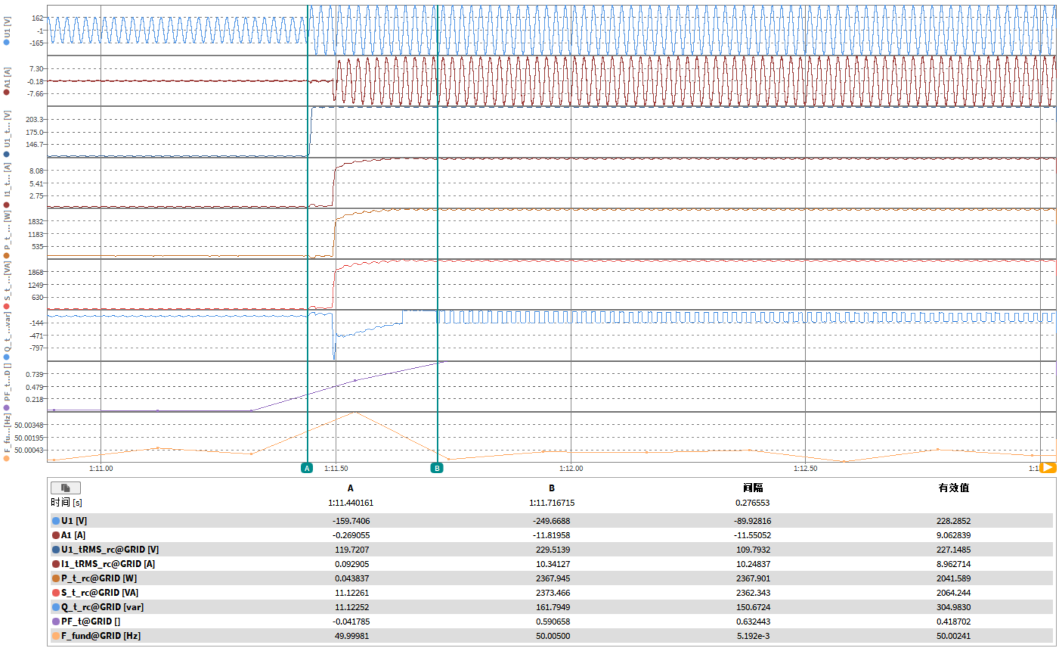
	A	B	间隔	有效值
时间 [s]	1:09.544566	1:09.644837	0.100270	
● **U1 [V]**	29.01681	42.89015	13.87334	119.3272
● **A1 [A]**	2.692390	-0.525116	-3.217507	3.611820
● **U1_tRMS_rc@GRID [V]**	231.3319	120.7082	-110.6237	127.6566
● **I1_tRMS_rc@GRID [A]**	10.60688	0.231670	-10.37521	4.325461
● **P_t_rc@GRID [W]**	2452.728	13.84834	-2438.879	668.4545
● **S_t_rc@GRID [VA]**	2453.711	27.96443	-2425.747	704.5025
● **Q_t_rc@GRID [var]**	-69.45499	24.29471	93.74969	222.4687
● **PF_t@GRID []**	0.999476	0.899688	-0.099787	0.950892
● **F_fund@GRID [Hz]**	49.99912	49.99626	-2.857e-3	49.99769

During dip (t1+100ms)


U1 [V]
162
-2
-166
A1 [A]
10.26
1.69
-6.88
U1_t... [V]
203.3
175.0
146.7
I1_t... [A]
8.96
6.00
3.04
P_t... [W]
1832
1183
535
S_t... [VA]
1868
1249
630
Q_t... [var]
290
-181
-652
PF_t... []
0.737
0.474
0.212
F_fu... [Hz]
50.00282
50.00063
49.99845
1:10.00
1:11.00
A
1:12.00
1:13.00
1:14.00
B
1:15.00
1:16.00

	A	B	间隔	有效值
时间 [s]	1:11.440161	1:14.443481	3.003320	
● U1 [V]	-159.7406	-57.73156	102.0091	230.1826
● A1 [A]	-0.269055	-2.854847	-2.585793	10.34248
● U1_tRMS_rc@GRID [V]	119.7207	231.4357	111.7150	229.9965
● I1_tRMS_rc@GRID [A]	0.092905	10.57826	10.48535	10.33048
● P_t_rc@GRID [W]	0.043837	2446.741	2446.697	2374.860
● S_t_rc@GRID [VA]	11.12261	2448.186	2437.064	2379.127
● Q_t_rc@GRID [var]	11.12252	-84.10500	-95.22753	142.4422
● PF_t@GRID []	-0.041785	0.999259	1.041044	0.942104
● F_fund@GRID [Hz]	49.99981	49.99974	-6.866e-5	50.00016

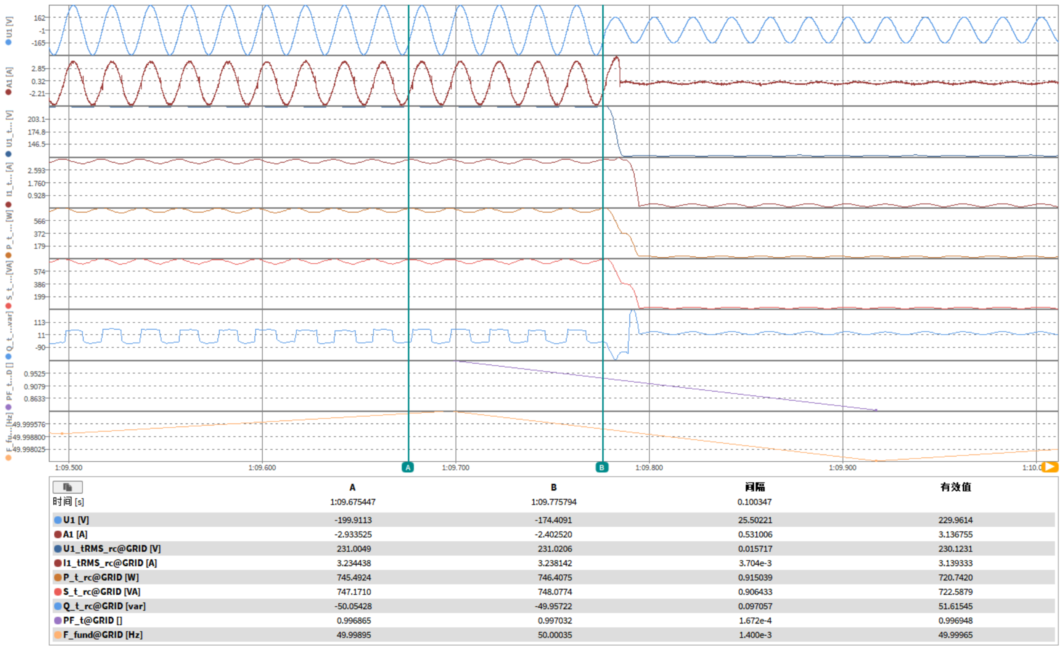
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
7.30
-0.18
-7.66
U1_t... [V]
203.3
175.0
146.7
I1_t... [A]
8.08
5.41
2.75
P_t... [W]
1832
1183
535
S_t... [VA]
1868
1249
630
Q_t... [var]
-144
-471
-797
PF_t... []
0.739
0.479
0.218
F_fu... [Hz]
50.00348
50.00195
50.00043
1:11.00
A
1:11.50
B
1:12.00
1:12.50

	A	B	间隔	有效值
时间 [s]	1:11.440161	1:11.716715	0.276553	
● U1 [V]	-159.7406	-249.6688	-89.92816	228.2852
● A1 [A]	-0.269055	-11.81958	-11.55052	9.062839
● U1_tRMS_rc@GRID [V]	119.7207	229.5139	109.7932	227.1485
● I1_tRMS_rc@GRID [A]	0.092905	10.34127	10.24837	8.962714
● P_t_rc@GRID [W]	0.043837	2367.945	2367.901	2041.589
● S_t_rc@GRID [VA]	11.12261	2373.466	2362.343	2064.244
● Q_t_rc@GRID [var]	11.12252	161.7949	150.6724	304.9830
● PF_t@GRID []	-0.041785	0.590658	0.632443	0.418702
● F_fund@GRID [Hz]	49.99981	50.00500	5.192e-3	50.00241

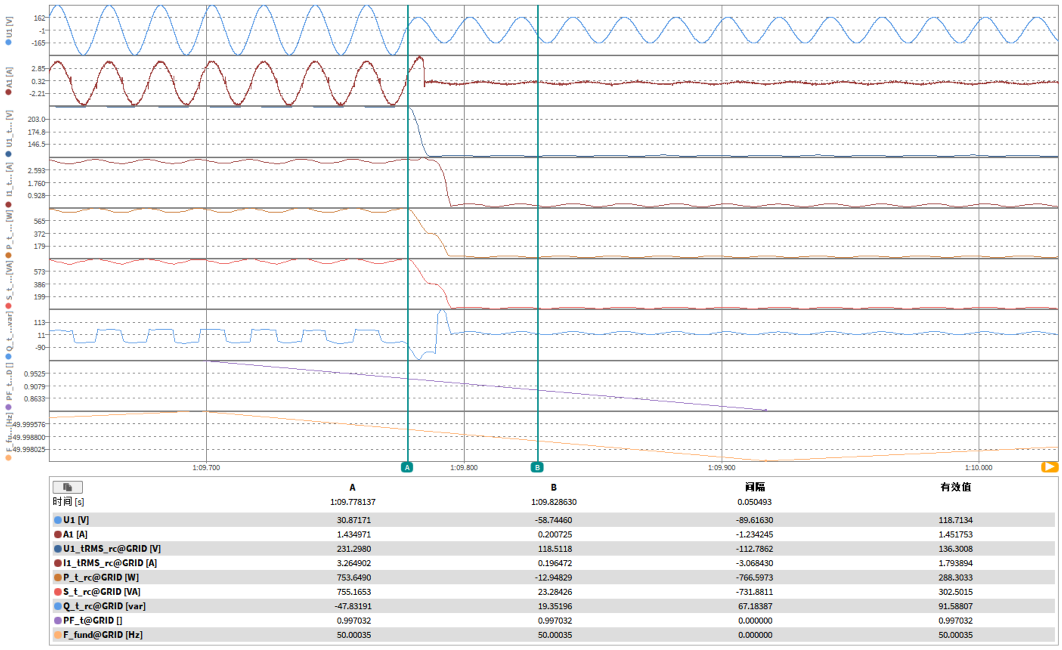
Recovery time

Graph of Test number 3.2


U1 [V]
162
-1
-165
A1 [A]
2.85
0.32
-2.21
U1_t... [V]
203.1
174.8
146.5
I1_t... [A]
2.593
1.760
0.928
P_t_... [W]
566
372
179
S_t_... [VA]
574
386
199
Q_t_... [var]
113
11
-90
PF_t_... []
0.9525
0.9079
0.8633
F_fu... [Hz]
49.999576
49.998800
49.998025
1:09.500
1:09.600
A
1:09.700
B
1:09.800
1:09.900
1:10.0

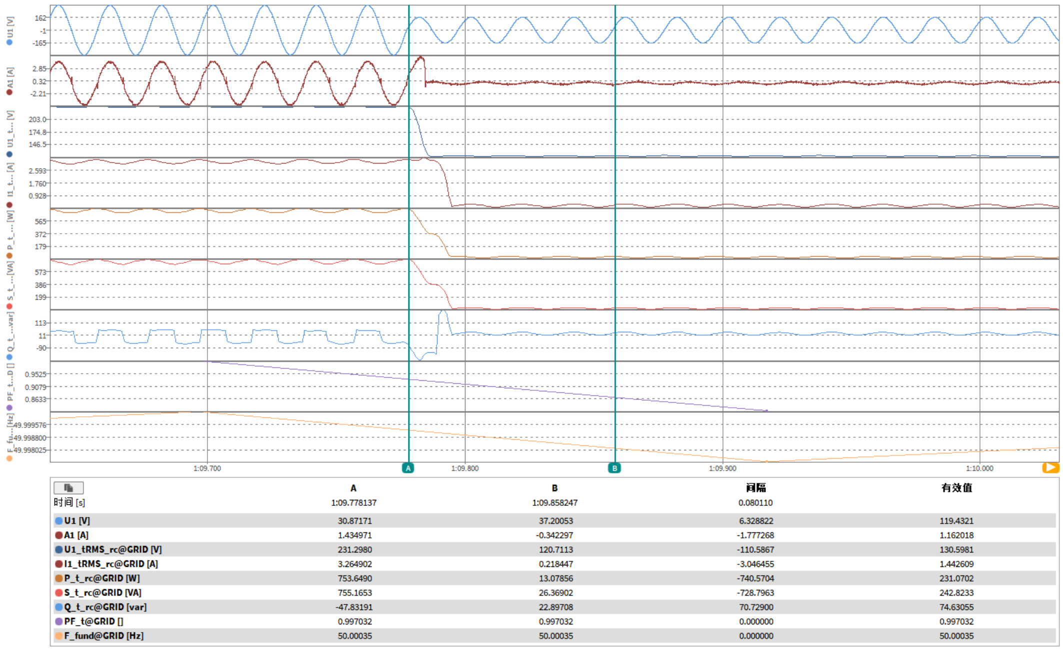
时间 [s]	A 1:09.675447	B 1:09.775794	间隔 0.100347	有效值
U1 [V]	-199.9113	-174.4091	25.50221	229.9614
A1 [A]	-2.933525	-2.402520	0.531006	3.136755
U1_tRMS_rc@GRID [V]	231.0049	231.0206	0.015717	230.1231
I1_tRMS_rc@GRID [A]	3.234438	3.238142	3.704e-3	3.139333
P_t_rc@GRID [W]	745.4924	746.4075	0.915039	720.7420
S_t_rc@GRID [VA]	747.1710	748.0774	0.906433	722.5879
Q_t_rc@GRID [var]	-50.05428	-49.95722	0.097057	51.61545
PF_t@GRID []	0.996865	0.997032	1.672e-4	0.996948
F_fund@GRID [Hz]	49.99895	50.00035	1.400e-3	49.99965

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
2.85
0.32
-2.21
U1_t... [V]
203.0
174.8
146.5
I1_t... [A]
2.593
1.760
0.928
P_t_... [W]
565
372
179
S_t_... [VA]
573
386
199
Q_t_... [var]
113
11
-90
PF_t_... []
0.9525
0.9079
0.8633
F_fu... [Hz]
49.999576
49.998800
49.998025
1:09.700
A
1:09.800
B
1:09.900
1:10.000

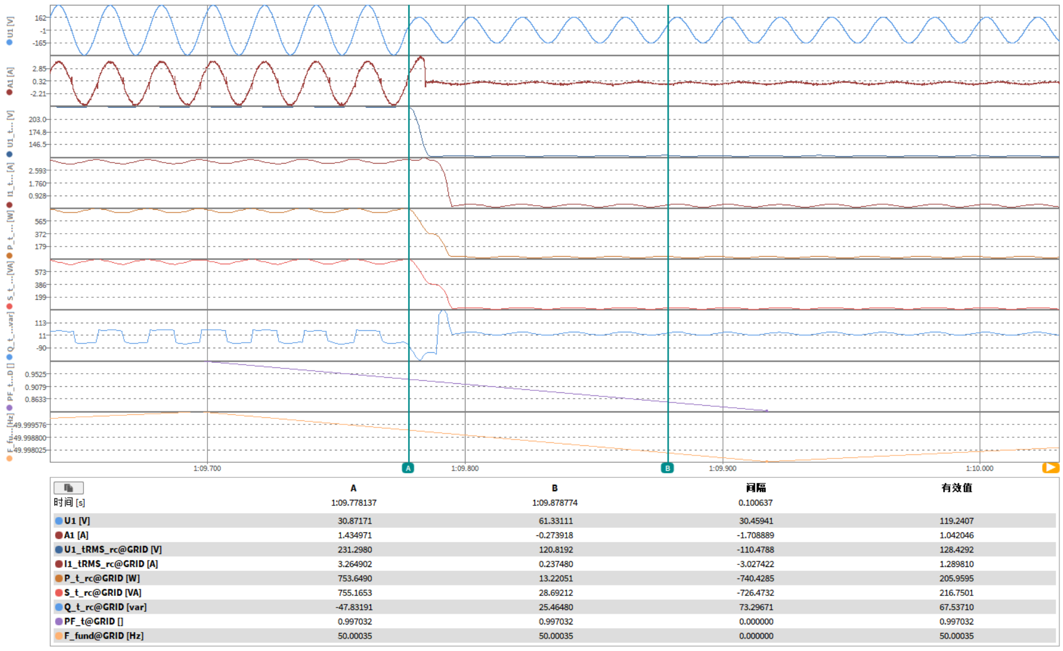
时间 [s]	A 1:09.778137	B 1:09.828630	间隔 0.050493	有效值
U1 [V]	30.87171	-58.74460	-89.61630	118.7134
A1 [A]	1.434971	0.200725	-1.234245	1.451753
U1_tRMS_rc@GRID [V]	231.2980	118.5118	-112.7862	136.3008
I1_tRMS_rc@GRID [A]	3.264902	0.196472	-3.068430	1.793894
P_t_rc@GRID [W]	753.6490	-12.94829	-766.5973	288.3033
S_t_rc@GRID [VA]	755.1653	23.28426	-731.8811	302.5015
Q_t_rc@GRID [var]	-47.83191	19.35196	67.18387	91.58807
PF_t@GRID []	0.997032	0.997032	0.000000	0.997032
F_fund@GRID [Hz]	50.00035	50.00035	0.000000	50.00035

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
2.85
0.32
-2.21
U1_t... [V]
203.0
174.8
146.5
I1_t... [A]
2.593
1.760
0.928
P_t... [W]
565
372
179
S_t... [VA]
573
386
199
Q_t... [var]
113
11
-90
PF_t...D []
0.9525
0.9079
0.8633
F_fu... [Hz]
49.999576
49.998800
49.998025
1:09.700
A
1:09.800
B
1:09.900
1:10.000

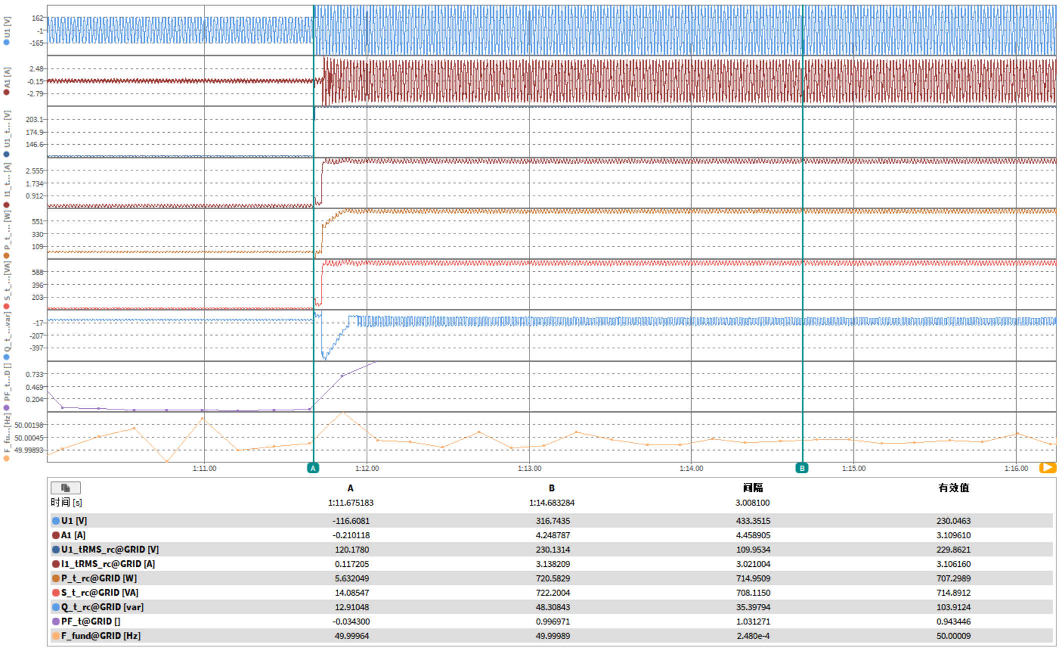
时间 [s]	A 1:09.778137	B 1:09.858247	间隔 0.080110	有效值
● U1 [V]	30.87171	37.20053	6.328822	119.4321
● A1 [A]	1.434971	-0.342297	-1.777268	1.162018
● U1_tRMS_rc@GRID [V]	231.2980	120.7113	-110.5867	130.5981
● I1_tRMS_rc@GRID [A]	3.264902	0.218447	-3.046455	1.442609
● P_t_rc@GRID [W]	753.6490	13.07856	-740.5704	231.0702
● S_t_rc@GRID [VA]	755.1653	26.36902	-728.7963	242.8233
● Q_t_rc@GRID [var]	-47.83191	22.89708	70.72900	74.63055
● PF_t@GRID []	0.997032	0.997032	0.000000	0.997032
● F_fund@GRID [Hz]	50.00035	50.00035	0.000000	50.00035

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
2.85
0.32
-2.21
U1_t... [V]
203.0
174.8
146.5
I1_t... [A]
2.593
1.760
0.928
P_t... [W]
565
372
179
S_t... [VA]
573
386
199
Q_t... [var]
113
11
-90
PF_t...D []
0.9525
0.9079
0.8633
F_fu... [Hz]
49.999576
49.998800
49.998025
1:09.700
A
1:09.800
B
1:09.900
1:10.000

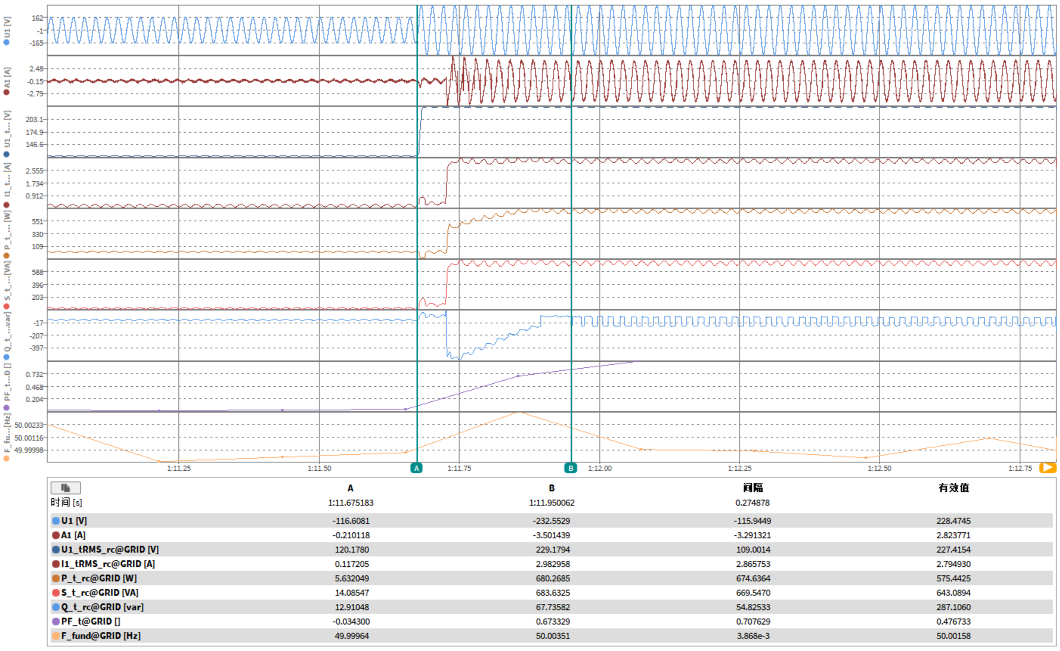
时间 [s]	A 1:09.778137	B 1:09.878774	间隔 0.100637	有效值
● U1 [V]	30.87171	61.33111	30.45941	119.2407
● A1 [A]	1.434971	-0.273918	-1.708889	1.042046
● U1_tRMS_rc@GRID [V]	231.2980	120.8192	-110.4788	128.4292
● I1_tRMS_rc@GRID [A]	3.264902	0.237480	-3.027422	1.289810
● P_t_rc@GRID [W]	753.6490	13.22051	-740.4285	205.9595
● S_t_rc@GRID [VA]	755.1653	28.69212	-726.4732	216.7501
● Q_t_rc@GRID [var]	-47.83191	25.46480	73.29671	67.53710
● PF_t@GRID []	0.997032	0.997032	0.000000	0.997032
● F_fund@GRID [Hz]	50.00035	50.00035	0.000000	50.00035

During dip (t1+100ms)


U1 [V]
162
-1
-165
A1 [A]
2.48
-0.15
-2.79
U1_t... [V]
203.1
174.9
146.6
I1_t... [A]
2.555
1.734
0.912
P_t_... [W]
551
330
109
S_t... [VA]
588
396
203
Q_t_...var]
-17
-207
-397
PF_t...D []
0.733
0.469
0.204
F_fu... [Hz]
50.00198
50.00045
49.99893
1:11.00
A
1:12.00
1:13.00
1:14.00
B
1:15.00
1:16.00

	A	B	间隔	有效值
时间 [s]	1:11.675183	1:14.683284	3.008100	
U1 [V]	-116.6081	316.7435	433.3515	230.0463
A1 [A]	-0.210118	4.248787	4.458905	3.109610
U1_tRMS_rc@GRID [V]	120.1780	230.1314	109.9534	229.8621
I1_tRMS_rc@GRID [A]	0.117205	3.138209	3.021004	3.106160
P_t_rc@GRID [W]	5.632049	720.5829	714.9509	707.2989
S_t_rc@GRID [VA]	14.08547	722.2004	708.1150	714.8912
Q_t_rc@GRID [var]	12.91048	48.30843	35.39794	103.9124
PF_t@GRID []	-0.034300	0.996971	1.031271	0.943446
F_fund@GRID [Hz]	49.99964	49.99989	2.480e-4	50.00009

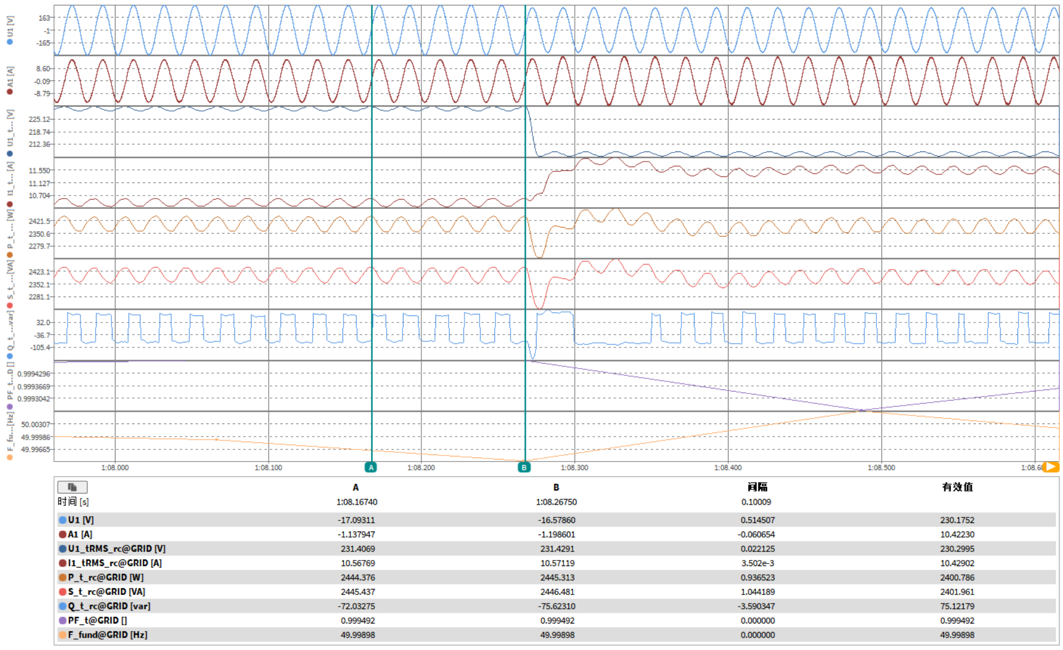
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
2.48
-0.15
-2.79
U1_t... [V]
203.1
174.9
146.6
I1_t... [A]
2.555
1.734
0.912
P_t_... [W]
551
330
109
S_t... [VA]
588
396
203
Q_t_...var]
-17
-207
-397
PF_t...D []
0.732
0.468
0.204
F_fu... [Hz]
50.00233
50.00116
49.99998
1:11.25
1:11.50
A
1:11.75
B
1:12.00
1:12.25
1:12.50
1:12.75

	A	B	间隔	有效值
时间 [s]	1:11.675183	1:11.950062	0.274878	
U1 [V]	-116.6081	-232.5529	-115.9449	228.4745
A1 [A]	-0.210118	-3.501439	-3.291321	2.823771
U1_tRMS_rc@GRID [V]	120.1780	229.1794	109.0014	227.4154
I1_tRMS_rc@GRID [A]	0.117205	2.982958	2.865753	2.794930
P_t_rc@GRID [W]	5.632049	680.2685	674.6364	575.4425
S_t_rc@GRID [VA]	14.08547	683.6325	669.5470	643.0894
Q_t_rc@GRID [var]	12.91048	67.73582	54.82533	287.1060
PF_t@GRID []	-0.034300	0.673329	0.707629	0.476733
F_fund@GRID [Hz]	49.99964	50.00351	3.868e-3	50.00158

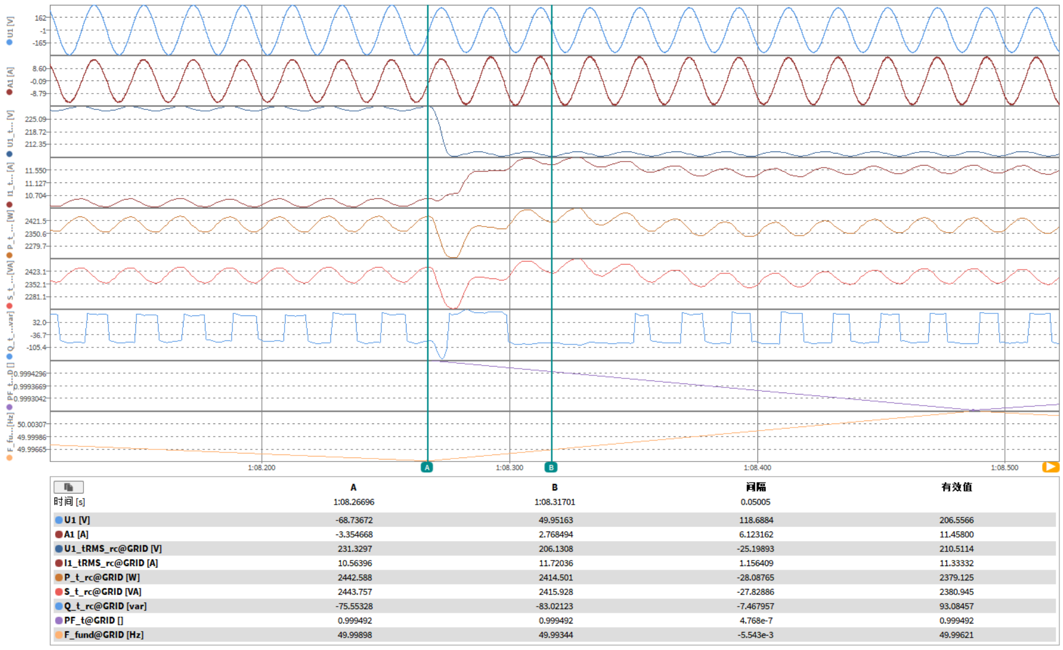
Recovery time

Graph of Test number 3.3


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
1:08.000
1:08.100
1:08.200
1:08.300
1:08.400
1:08.500
A
B

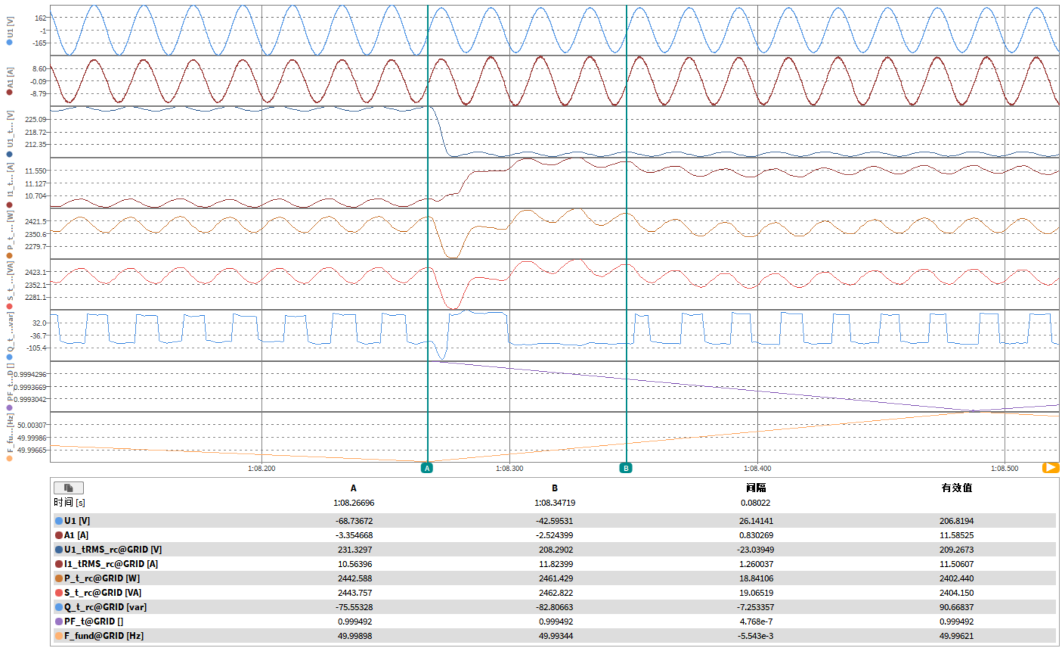
	A	B	间隔	有效值
时间 [s]	1:08.16740	1:08.26750	0.10009	
● U1 [V]	-17.09311	-16.57860	0.514507	230.1752
● A1 [A]	-1.137947	-1.198601	-0.060654	10.42230
● U1_tRMS_rc@GRID [V]	231.4069	231.4291	0.022125	230.2995
● I1_tRMS_rc@GRID [A]	10.56769	10.57119	3.502e-3	10.42902
● P_t_rc@GRID [W]	2444.376	2445.313	0.936523	2400.786
● S_t_rc@GRID [VA]	2445.437	2446.481	1.044189	2401.961
● Q_t_rc@GRID [var]	-72.03275	-75.62310	-3.590347	75.12179
● PF_t@GRID []	0.999492	0.999492	0.000000	0.999492
● F_fund@GRID [Hz]	49.99898	49.99898	0.000000	49.99898

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
1:08.200
1:08.300
1:08.400
1:08.500
A
B

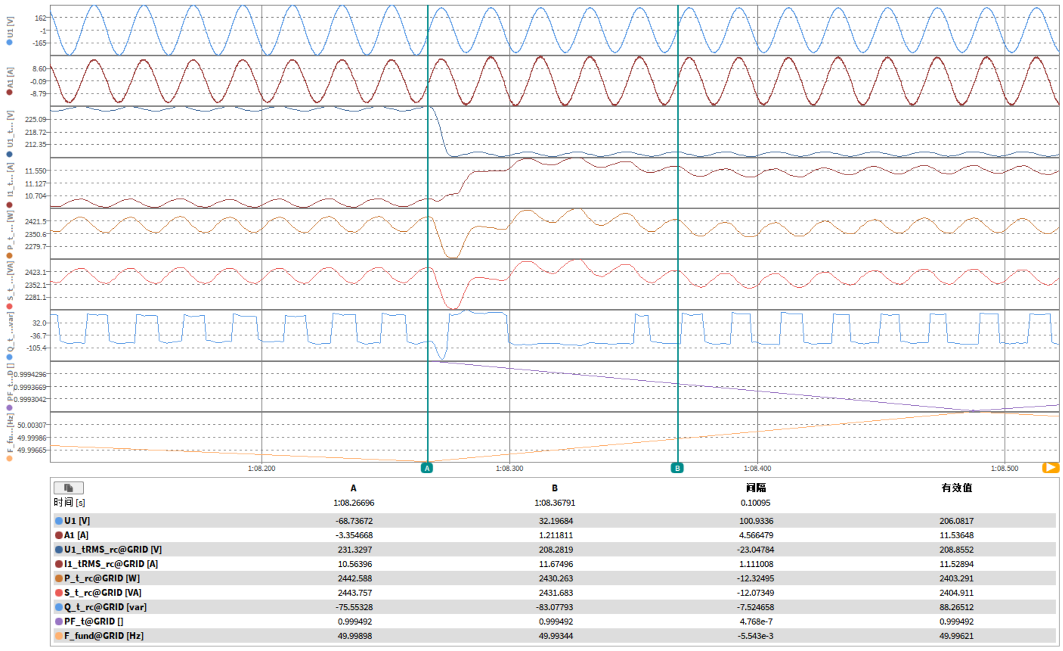
	A	B	间隔	有效值
时间 [s]	1:08.26696	1:08.31701	0.05005	
● U1 [V]	-68.73672	49.95163	118.6884	206.5566
● A1 [A]	-3.354668	2.768494	6.123162	11.45800
● U1_tRMS_rc@GRID [V]	231.3297	206.1308	-25.19893	210.5114
● I1_tRMS_rc@GRID [A]	10.56396	11.72036	1.156409	11.33332
● P_t_rc@GRID [W]	2442.588	2414.501	-28.08765	2379.125
● S_t_rc@GRID [VA]	2443.757	2415.928	-27.82886	2380.945
● Q_t_rc@GRID [var]	-75.55328	-83.02123	-7.467957	93.08457
● PF_t@GRID []	0.999492	0.999492	4.768e-7	0.999492
● F_fund@GRID [Hz]	49.99898	49.99344	-5.543e-3	49.99621

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
8.60
-0.09
-8.79
U1_t... [V]
225.09
218.72
212.35
I1_t... [A]
11.550
11.127
10.704
P_t_... [W]
2421.5
2350.6
2279.7
S_t_...[VA]
2423.1
2352.1
2281.1
Q_t_...[var]
32.0
-36.7
-105.4
PF_...D []
0.9994296
0.9993669
0.9993042
F_fu... [Hz]
50.00307
49.99986
49.99665
1:08.200
A
1:08.300
B
1:08.400
1:08.500

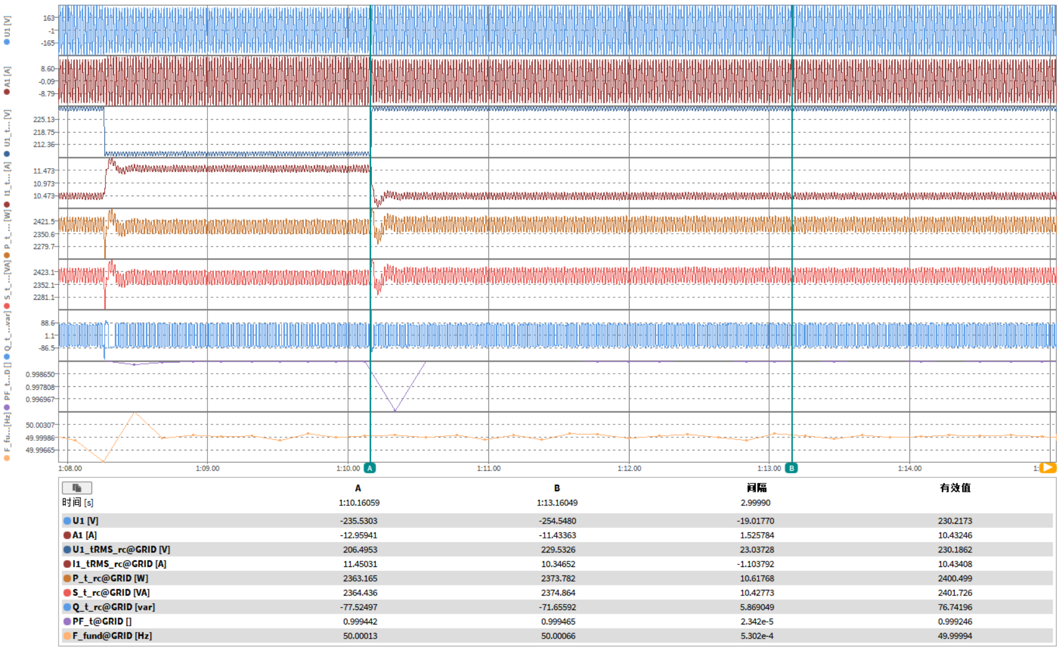
	A	B	间隔	有效值
时间 [s]	1:08.26696	1:08.34719	0.08022	
U1 [V]	-68.73672	-42.59531	26.14141	206.8194
A1 [A]	-3.354668	-2.524399	0.830269	11.58525
U1_tRMS_rc@GRID [V]	231.3297	208.2902	-23.03949	209.2673
I1_tRMS_rc@GRID [A]	10.56396	11.82399	1.260037	11.50607
P_t_rc@GRID [W]	2442.588	2461.429	18.84106	2402.440
S_t_rc@GRID [VA]	2443.757	2462.822	19.06519	2404.150
Q_t_rc@GRID [var]	-75.55328	-82.80663	-7.253357	90.66837
PF_t@GRID []	0.999492	0.999492	4.768e-7	0.999492
F_fund@GRID [Hz]	49.99898	49.99344	-5.543e-3	49.99621

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
8.60
-0.09
-8.79
U1_t... [V]
225.09
218.72
212.35
I1_t... [A]
11.550
11.127
10.704
P_t_... [W]
2421.5
2350.6
2279.7
S_t_...[VA]
2423.1
2352.1
2281.1
Q_t_...[var]
32.0
-36.7
-105.4
PF_...D []
0.9994296
0.9993669
0.9993042
F_fu... [Hz]
50.00307
49.99986
49.99665
1:08.200
A
1:08.300
B
1:08.400
1:08.500

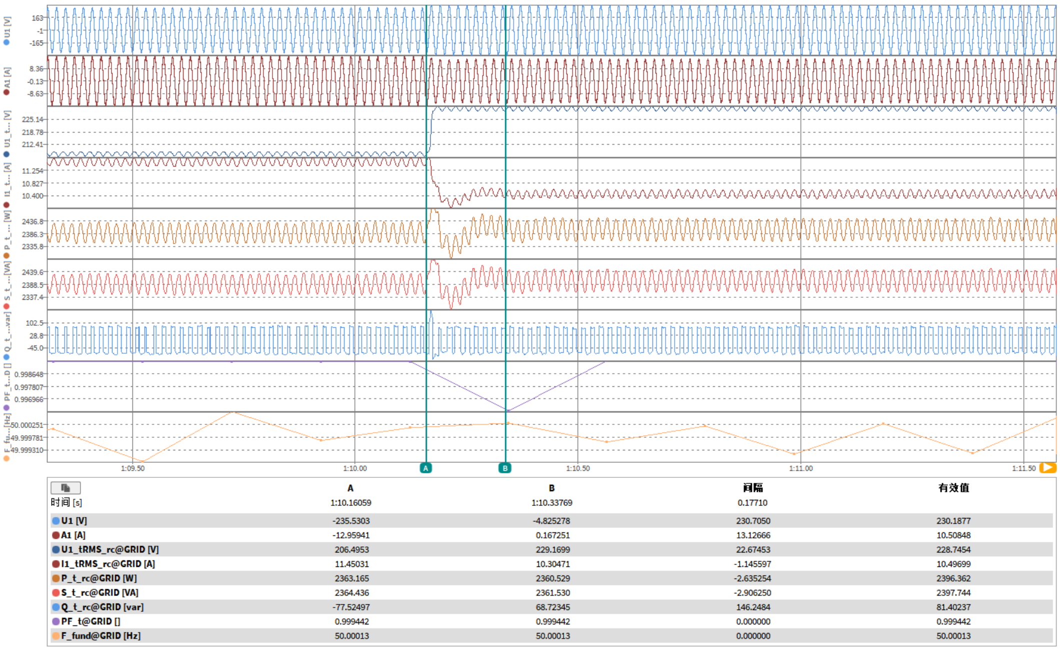
	A	B	间隔	有效值
时间 [s]	1:08.26696	1:08.36791	0.10095	
U1 [V]	-68.73672	32.19684	100.9336	206.0817
A1 [A]	-3.354668	1.211811	4.566479	11.53648
U1_tRMS_rc@GRID [V]	231.3297	208.2819	-23.04784	208.8552
I1_tRMS_rc@GRID [A]	10.56396	11.67496	1.111008	11.52894
P_t_rc@GRID [W]	2442.588	2430.263	-12.32495	2403.291
S_t_rc@GRID [VA]	2443.757	2431.683	-12.07349	2404.911
Q_t_rc@GRID [var]	-75.55328	-83.07793	-7.524658	88.26512
PF_t@GRID []	0.999492	0.999492	4.768e-7	0.999492
F_fund@GRID [Hz]	49.99898	49.99344	-5.543e-3	49.99621

During dip (t1+100ms)


U1 [V]
163
-1
-165
A1 [A]
8.60
-0.09
-8.79
U1_t...[V]
225.13
218.75
212.36
I1_t... [A]
11.473
10.973
10.473
P_t_... [W]
2421.5
2350.6
2279.7
S_t_... [VA]
2423.1
2352.1
2281.1
Q_t_... [var]
88.6
1.1
-86.5
PF_t... []
0.998650
0.997808
0.996967
F_fu... [Hz]
50.00307
49.99986
49.99665
1:08.00
1:09.00
1:10.00
A
1:11.00
1:12.00
1:13.00
B
1:14.00

	A	B	间隔	有效值
时间 [s]	1:10.16059	1:13.16049	2.99990	
U1 [V]	-235.5303	-254.5480	-19.01770	230.2173
A1 [A]	-12.95941	-11.43363	1.525784	10.43246
U1_tRMS_rc@GRID [V]	206.4953	229.5326	23.03728	230.1862
I1_tRMS_rc@GRID [A]	11.45031	10.34652	-1.103792	10.43408
P_t_rc@GRID [W]	2363.165	2373.782	10.61768	2400.499
S_t_rc@GRID [VA]	2364.436	2374.864	10.42773	2401.726
Q_t_rc@GRID [var]	-77.52497	-71.65592	5.869049	76.74196
PF_t@GRID []	0.999442	0.999465	2.342e-5	0.999246
F_fund@GRID [Hz]	50.00013	50.00066	5.302e-4	49.99994

After dip (t2+3s)

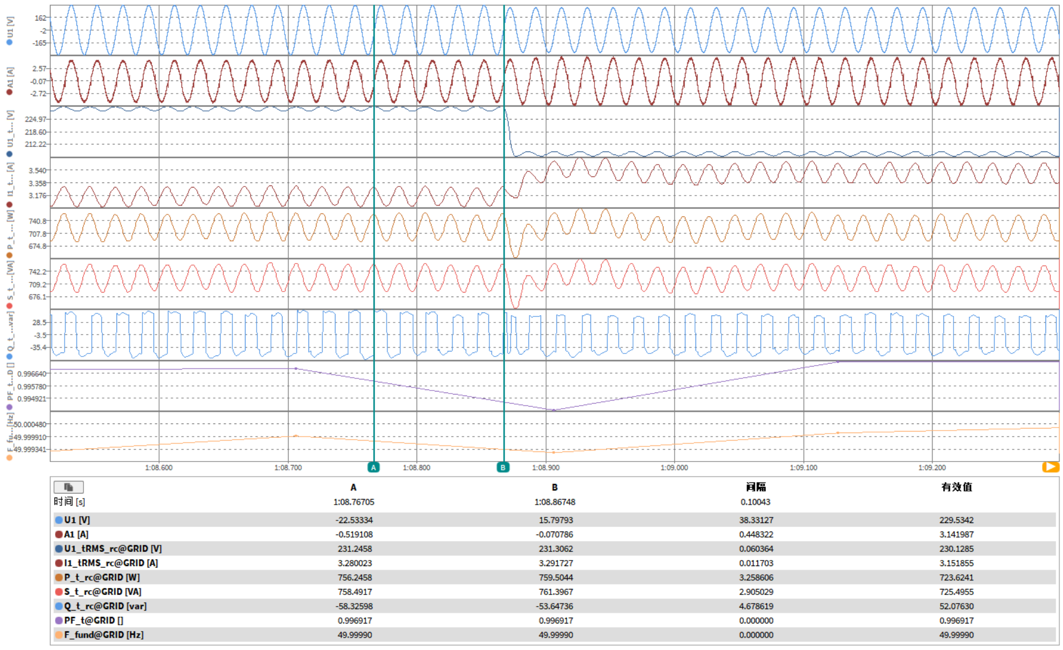

U1 [V]
163
-1
-165
A1 [A]
8.36
-0.13
-8.63
U1_t...[V]
225.14
218.78
212.41
I1_t... [A]
11.254
10.827
10.400
P_t_... [W]
2436.8
2386.3
2335.8
S_t_... [VA]
2439.6
2388.5
2337.4
Q_t_... [var]
102.5
28.8
-45.0
PF_t... []
0.998648
0.997807
0.996966
F_fu... [Hz]
50.000251
49.999781
49.999310
1:09.50
1:10.00
A
B
1:10.50
1:11.00
1:11.50

	A	B	间隔	有效值
时间 [s]	1:10.16059	1:10.33769	0.17710	
U1 [V]	-235.5303	-4.825278	230.7050	230.1877
A1 [A]	-12.95941	0.167251	13.12666	10.50848
U1_tRMS_rc@GRID [V]	206.4953	229.1699	22.67453	228.7454
I1_tRMS_rc@GRID [A]	11.45031	10.30471	-1.145597	10.49699
P_t_rc@GRID [W]	2363.165	2360.529	-2.635254	2396.362
S_t_rc@GRID [VA]	2364.436	2361.530	-2.906250	2397.744
Q_t_rc@GRID [var]	-77.52497	68.72345	146.2484	81.40237
PF_t@GRID []	0.999442	0.999442	0.000000	0.999442
F_fund@GRID [Hz]	50.00013	50.00013	0.000000	50.00013

Recovery time

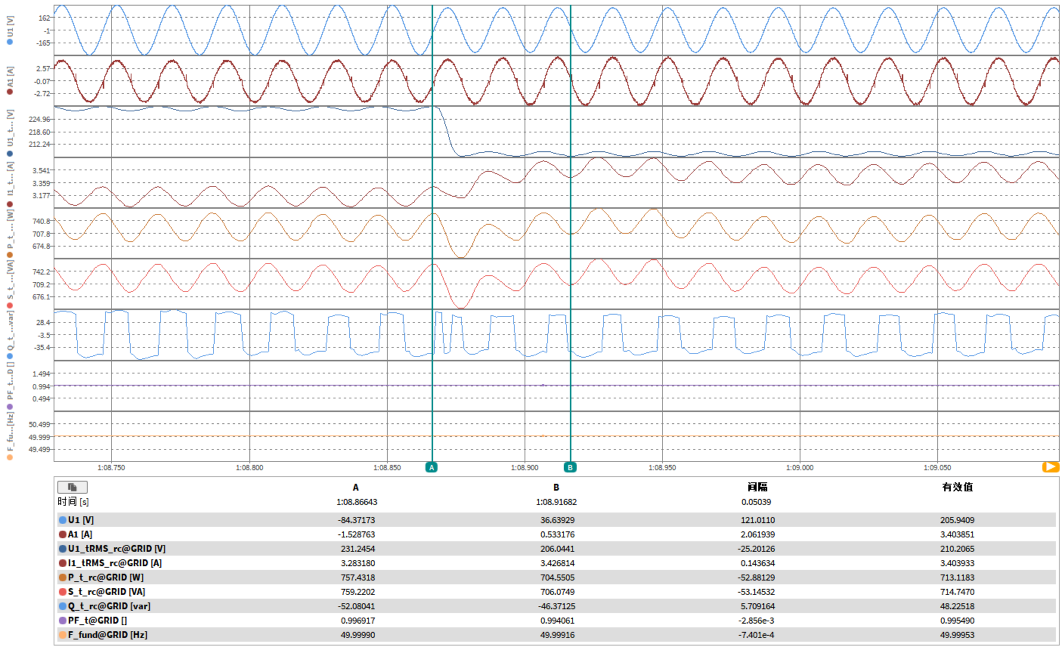
EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

Graph of Test number 3.4


U1 [V]
162
-2
-165
A1 [A]
2.57
-0.07
-2.72
U1_t... [V]
224.97
218.60
212.22
I1_t... [A]
3.540
3.358
3.176
P_t_... [W]
740.8
707.8
674.8
S_t_... [VA]
742.2
709.2
676.1
Q_t_... [var]
28.5
-3.5
-35.4
PF_t_... []
0.996640
0.995780
0.994921
F_fu... [Hz]
50.000480
49.999910
49.999341
1:08.600
1:08.700
A
1:08.800
B
1:08.900
1:09.000
1:09.100
1:09.200

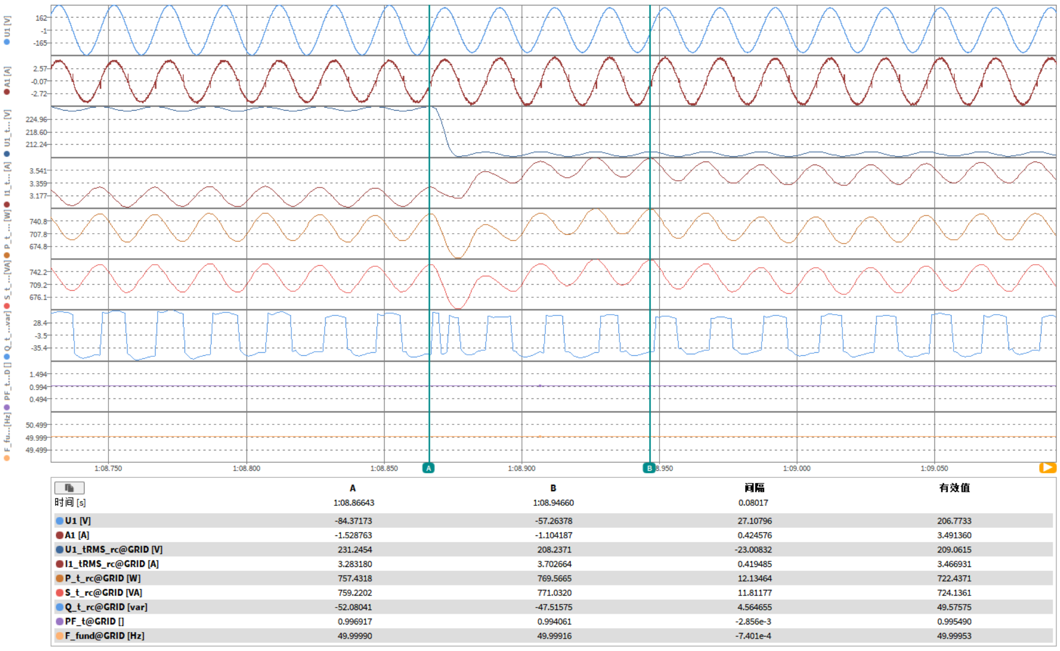
时间 [s]	A 1:08.76705	B 1:08.86748	间隔 0.10043	有效值
● U1 [V]	-22.53334	15.79793	38.33127	229.5342
● A1 [A]	-0.519108	-0.070786	0.448322	3.141987
● U1_tRMS_rc@GRID [V]	231.2458	231.3062	0.060364	230.1285
● I1_tRMS_rc@GRID [A]	3.280023	3.291727	0.011703	3.151855
● P_t_rc@GRID [W]	756.2458	759.5044	3.258606	723.6241
● S_t_rc@GRID [VA]	758.4917	761.3967	2.905029	725.4955
● Q_t_rc@GRID [var]	-58.32598	-53.64736	4.678619	52.07630
● PF_t@GRID []	0.996917	0.996917	0.000000	0.996917
● F_fund@GRID [Hz]	49.99990	49.99990	0.000000	49.99990

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
2.57
-0.07
-2.72
U1_t... [V]
224.96
218.60
212.24
I1_t... [A]
3.541
3.359
3.177
P_t_... [W]
740.8
707.8
674.8
S_t_... [VA]
742.2
709.2
676.1
Q_t_... [var]
28.4
-3.5
-35.4
PF_t_... []
1.494
0.994
0.494
F_fu... [Hz]
50.499
49.999
49.499
1:08.750
1:08.800
1:08.850
A
1:08.900
B
1:08.950
1:09.000
1:09.050

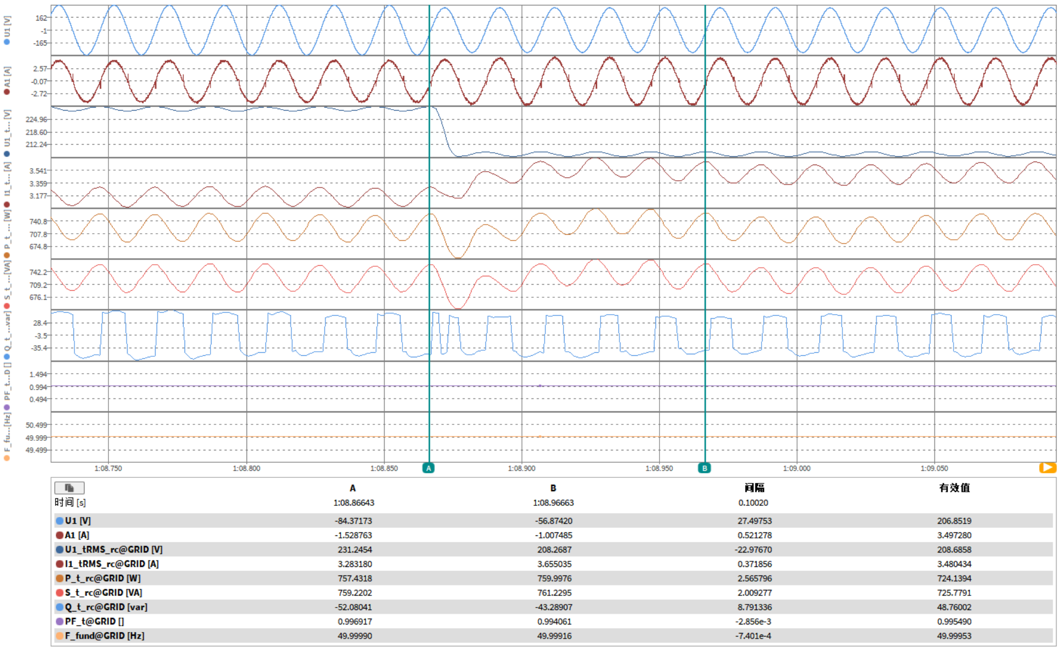
时间 [s]	A 1:08.86643	B 1:08.91682	间隔 0.05039	有效值
● U1 [V]	-84.37173	36.63929	121.0110	205.9409
● A1 [A]	-1.528763	0.533176	2.061939	3.403851
● U1_tRMS_rc@GRID [V]	231.2454	206.0441	-25.20126	210.2065
● I1_tRMS_rc@GRID [A]	3.283180	3.426814	0.143634	3.403933
● P_t_rc@GRID [W]	757.4318	704.5505	-52.88129	713.1183
● S_t_rc@GRID [VA]	759.2202	706.0749	-53.14532	714.7470
● Q_t_rc@GRID [var]	-52.08041	-46.37125	5.709164	48.22518
● PF_t@GRID []	0.996917	0.994061	-2.856e-3	0.995490
● F_fund@GRID [Hz]	49.99990	49.99916	-7.401e-4	49.99953

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
2.57
-0.07
-2.72
U1_t... [V]
224.96
218.60
212.24
I1_t... [A]
3.541
3.359
3.177
P_t_... [W]
740.8
707.8
674.8
S_t_... [VA]
742.2
709.2
676.1
Q_t_... [var]
28.4
-3.5
-35.4
PF_t... []
1.494
0.994
0.494
F_fu... [Hz]
50.499
49.999
49.499
1:08.750
1:08.800
1:08.850
A
1:08.900
B
8.950
1:09.000
1:09.050

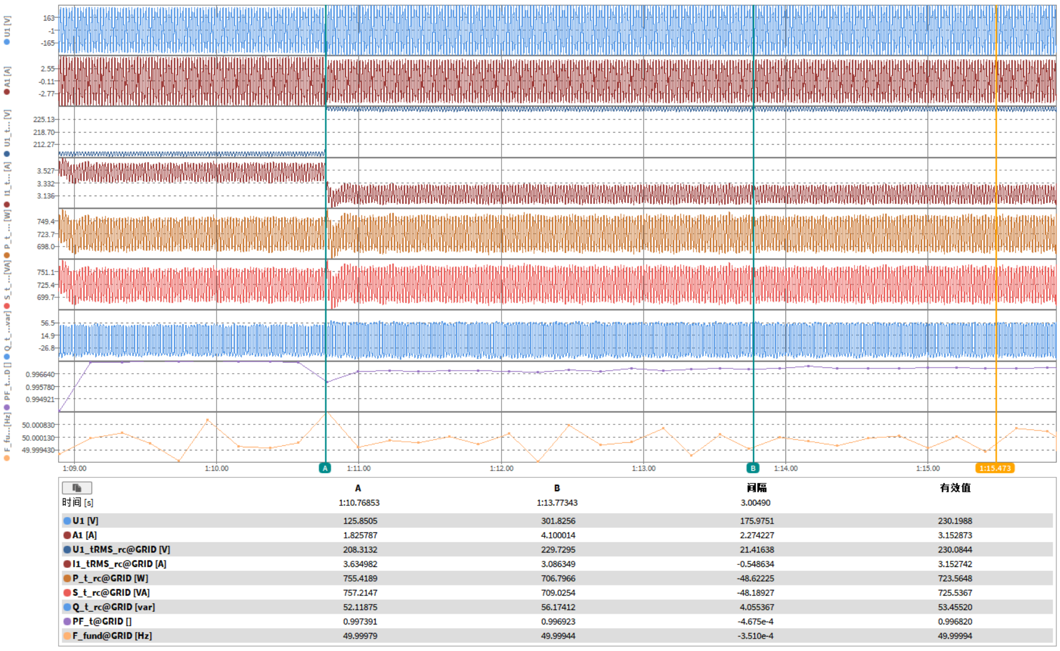
	A	B	间隔	有效值
时间 [s]	1:08.86643	1:08.94660	0.08017	
● **U1 [V]**	-84.37173	-57.26378	27.10796	206.7733
● **A1 [A]**	-1.528763	-1.104187	0.424576	3.491360
● **U1_tRMS_rc@GRID [V]**	231.2454	208.2371	-23.00832	209.0615
● **I1_tRMS_rc@GRID [A]**	3.283180	3.702664	0.419485	3.466931
● **P_t_rc@GRID [W]**	757.4318	769.5665	12.13464	722.4371
● **S_t_rc@GRID [VA]**	759.2202	771.0320	11.81177	724.1361
● **Q_t_rc@GRID [var]**	-52.08041	-47.51575	4.564655	49.57575
● **PF_t@GRID []**	0.996917	0.994061	-2.856e-3	0.995490
● **F_fund@GRID [Hz]**	49.99990	49.99916	-7.401e-4	49.99953

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
2.57
-0.07
-2.72
U1_t... [V]
224.96
218.60
212.24
I1_t... [A]
3.541
3.359
3.177
P_t_... [W]
740.8
707.8
674.8
S_t_... [VA]
742.2
709.2
676.1
Q_t_... [var]
28.4
-3.5
-35.4
PF_t... []
1.494
0.994
0.494
F_fu... [Hz]
50.499
49.999
49.499
1:08.750
1:08.800
1:08.850
A
1:08.900
1:08.950
B
1:09.000
1:09.050

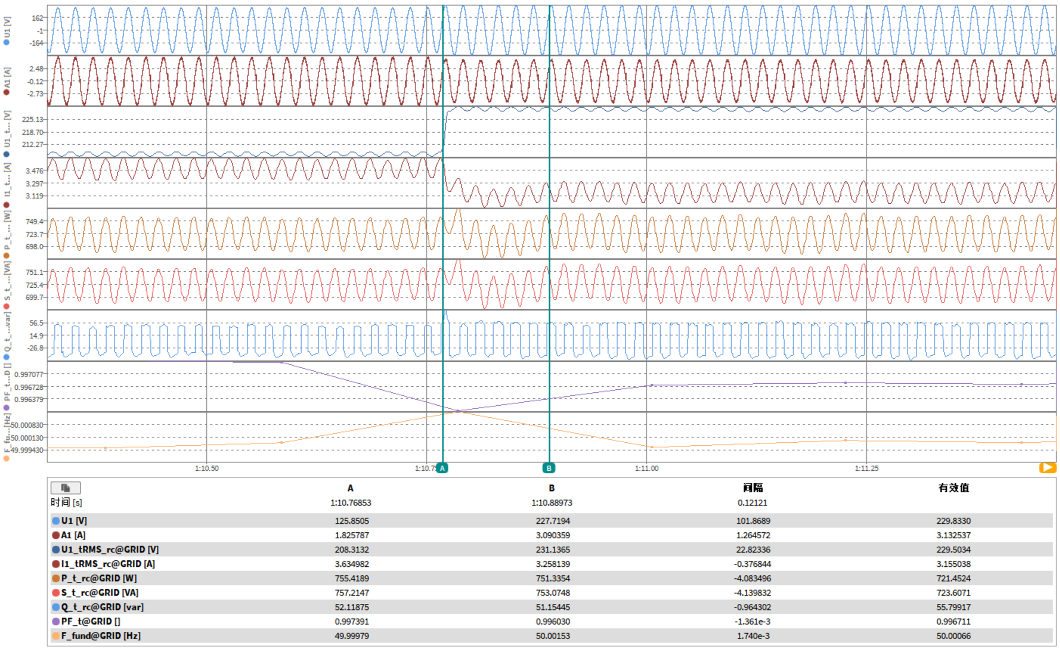
	A	B	间隔	有效值
时间 [s]	1:08.86643	1:08.96663	0.10020	
● **U1 [V]**	-84.37173	-56.87420	27.49753	206.8519
● **A1 [A]**	-1.528763	-1.007485	0.521278	3.497280
● **U1_tRMS_rc@GRID [V]**	231.2454	208.2687	-22.97670	208.6858
● **I1_tRMS_rc@GRID [A]**	3.283180	3.655035	0.371856	3.480434
● **P_t_rc@GRID [W]**	757.4318	759.9976	2.565796	724.1394
● **S_t_rc@GRID [VA]**	759.2202	761.2295	2.009277	725.7791
● **Q_t_rc@GRID [var]**	-52.08041	-43.28907	8.791336	48.76002
● **PF_t@GRID []**	0.996917	0.994061	-2.856e-3	0.995490
● **F_fund@GRID [Hz]**	49.99990	49.99916	-7.401e-4	49.99953

During dip (t1+100ms)


U1 [V]
163
-1
-165
A1 [A]
2.55
-0.11
-2.77
U1_t... [V]
225.13
218.70
212.27
I1_t... [A]
3.527
3.332
3.136
P_t_... [W]
749.4
723.7
698.0
S_t_... [VA]
751.1
725.4
699.7
Q_t_... [var]
56.5
14.9
-26.8
PF_t... []
0.996640
0.995780
0.994921
F_fu... [Hz]
50.000830
50.000130
49.999430
1:09.00
1:10.00
A
1:11.00
1:12.00
1:13.00
B
1:14.00
1:15.00
1:15.473

时间 [s]	A	B	间隔	有效值
	1:10.76853	1:13.77343	3.00490	
● U1 [V]	125.8505	301.8256	175.9751	230.1988
● A1 [A]	1.825787	4.100014	2.274227	3.152873
● U1_tRMS_rc@GRID [V]	208.3132	229.7295	21.41638	230.0844
● I1_tRMS_rc@GRID [A]	3.634982	3.086349	-0.548634	3.152742
● P_t_rc@GRID [W]	755.4189	706.7966	-48.62225	723.5648
● S_t_rc@GRID [VA]	757.2147	709.0254	-48.18927	725.5367
● Q_t_rc@GRID [var]	52.11875	56.17412	4.055367	53.45520
● PF_t@GRID []	0.997391	0.996923	-4.675e-4	0.996820
● F_fund@GRID [Hz]	49.99979	49.99944	-3.510e-4	49.99994

After dip (t2+3s)


U1 [V]
162
-1
-164
A1 [A]
2.48
-0.12
-2.73
U1_t... [V]
225.13
218.70
212.27
I1_t... [A]
3.476
3.297
3.119
P_t_... [W]
749.4
723.7
698.0
S_t_... [VA]
751.1
725.4
699.7
Q_t_... [var]
56.5
14.9
-26.8
PF_t... []
0.997077
0.996728
0.996379
F_fu... [Hz]
50.000830
50.000130
49.999430
1:10.50
1:10.7
A
B
1:11.00
1:11.25

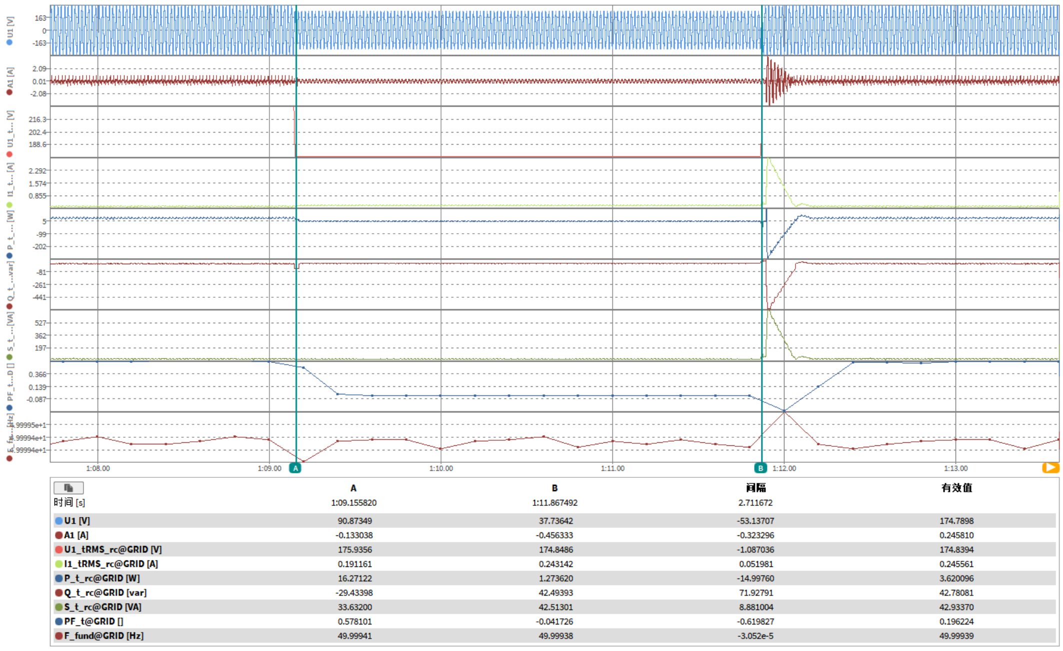
时间 [s]	A	B	间隔	有效值
	1:10.76853	1:10.88973	0.12121	
● U1 [V]	125.8505	227.7194	101.8689	229.8330
● A1 [A]	1.825787	3.090359	1.264572	3.132537
● U1_tRMS_rc@GRID [V]	208.3132	231.1365	22.82336	229.5034
● I1_tRMS_rc@GRID [A]	3.634982	3.258139	-0.376844	3.155038
● P_t_rc@GRID [W]	755.4189	751.3354	-4.083496	721.4524
● S_t_rc@GRID [VA]	757.2147	753.0748	-4.139832	723.6071
● Q_t_rc@GRID [var]	52.11875	51.15445	-0.964302	55.79917
● PF_t@GRID []	0.997391	0.996030	-1.361e-3	0.996711
● F_fund@GRID [Hz]	49.99979	50.00153	1.740e-3	50.00066

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	4.1	4.2	4.3	4.4
	1	Date	--	--	dd.mm .yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm :ss	See graph			
	3	Fault type (phase)	--	--		VD4		VD9	
	4	Setting voltage depth	Line to line	--	p.u.	0.76			
	5	Setting dip duration		--		2690			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	2711.67			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.76			
	10		Pos.		p.u.	0.76			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.002	1.001	1.005	1.006
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.007	0.302	1.010	0.310
	13	Active power	Total	t1-10s to t1	p.u.	1.008	0.302	1.015	0.311
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.031	-0.019	0.021	-0.018
	16		Pos.			--	--	--	--
	17	Cos$_{\varphi}$	--	t1-10s to t1	--	0.9994	0.9982	0.9995	0.9974
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.759	0.760	-- -- 0.936	-- -- 0.935
	19	Line current	Phase 1	t1+50ms	p.u.	0.025	0.023	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	1.069	0.311
	22	Line current	Phase 1	t1+80ms	p.u.	0.025	0.023	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	1.079	0.333
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.002	0.002	1.012	0.312
	26		Pos.			--	--	--	--

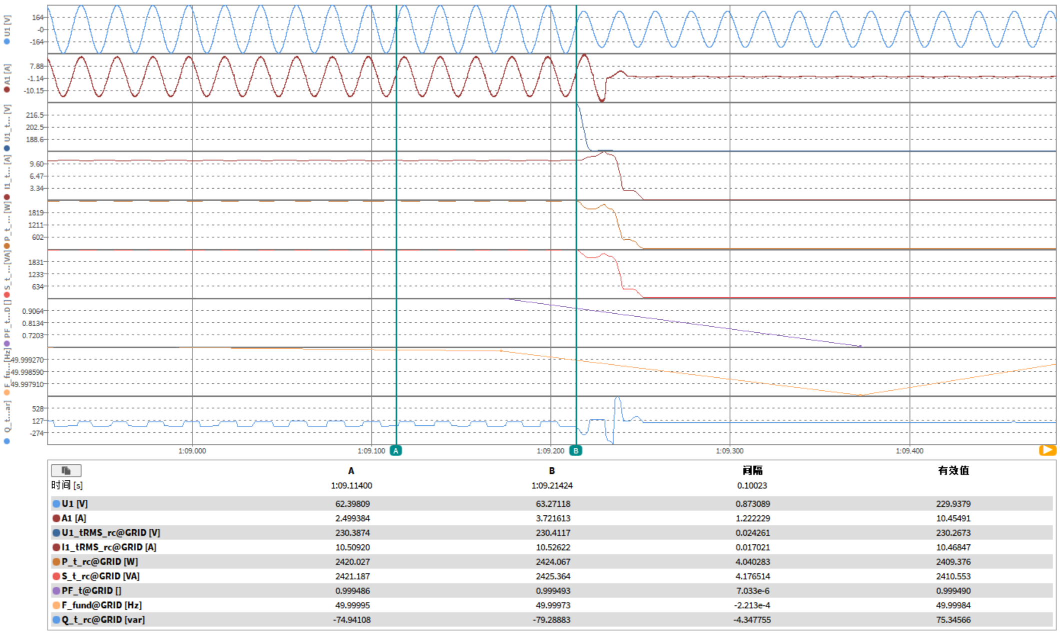
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.000	0.999	0.997
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.006	0.294	0.996	0.290
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.281	0.213	0.171	0.214
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.038	-0.015	-0.031	0.018
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.281	0.213	0.171	0.214
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 4.1


U1 [V]
163
0
-163
A1 [A]
2.09
0.01
-2.08
U1_t... [V]
216.3
202.4
188.6
I1_t... [A]
2.292
1.574
0.855
P_t_... [W]
5
-99
-202
Q_t_...var]
-81
-261
-441
S_t_...[VA]
527
362
197
PF_t...D []
0.366
0.139
-0.087
F_fu...[Hz]
4.99995e+1
4.99994e+1
4.99994e+1
1:08.00
1:09.00
A
1:10.00
1:11.00
B
1:12.00
1:13.00

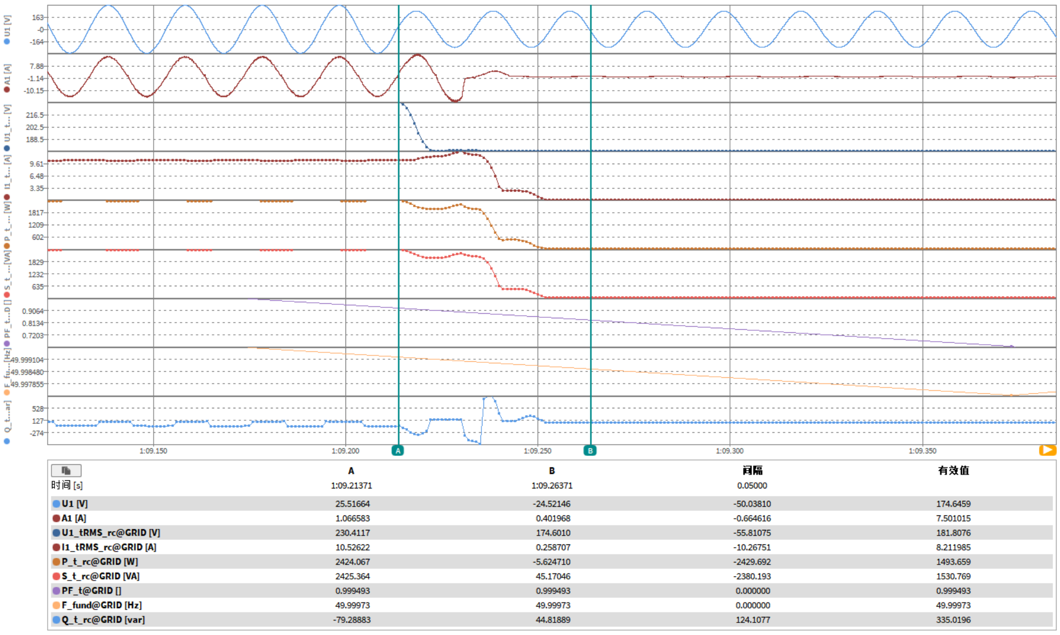
	A	B	间隔	有效值
时间 [s]	1:09.155820	1:11.867492	2.711672	
● U1 [V]	90.87349	37.73642	-53.13707	174.7898
● A1 [A]	-0.133038	-0.456333	-0.323296	0.245810
● U1_tRMS_rc@GRID [V]	175.9356	174.8486	-1.087036	174.8394
● I1_tRMS_rc@GRID [A]	0.191161	0.243142	0.051981	0.245561
● P_t_rc@GRID [W]	16.27122	1.273620	-14.99760	3.620096
● Q_t_rc@GRID [var]	-29.43398	42.49393	71.92791	42.78081
● S_t_rc@GRID [VA]	33.63200	42.51301	8.881004	42.93370
● PF_t@GRID []	0.578101	-0.041726	-0.619827	0.196224
● F_fund@GRID [Hz]	49.99941	49.99938	-3.052e-5	49.99939

Empty load


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
PF_t_... []
F_fu... [Hz]
Q_t_...ar]
1:09.000
1:09.100
A
1:09.200
B
1:09.300
1:09.400

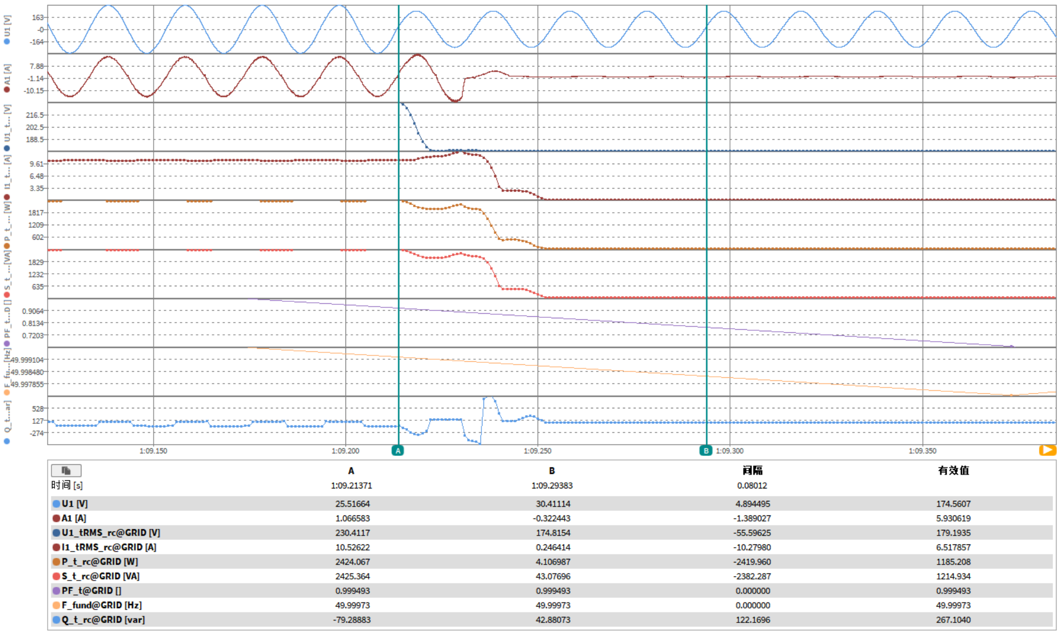
时间 [s]	A 1:09.11400	B 1:09.21424	间隔 0.10023	有效值
● U1 [V]	62.39809	63.27118	0.873089	229.9379
● A1 [A]	2.499384	3.721613	1.222229	10.45491
● U1_tRMS_rc@GRID [V]	230.3874	230.4117	0.024261	230.2673
● I1_tRMS_rc@GRID [A]	10.50920	10.52622	0.017021	10.46847
● P_t_rc@GRID [W]	2420.027	2424.067	4.040283	2409.376
● S_t_rc@GRID [VA]	2421.187	2425.364	4.176514	2410.553
● PF_t@GRID []	0.999486	0.999493	7.033e-6	0.999490
● F_fund@GRID [Hz]	49.99995	49.99973	-2.213e-4	49.99984
● Q_t_rc@GRID [var]	-74.94108	-79.28883	-4.347755	75.34566

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
PF_t_... []
F_fu... [Hz]
Q_t_...ar]
1:09.150
1:09.200
A
1:09.250
B
1:09.300
1:09.350

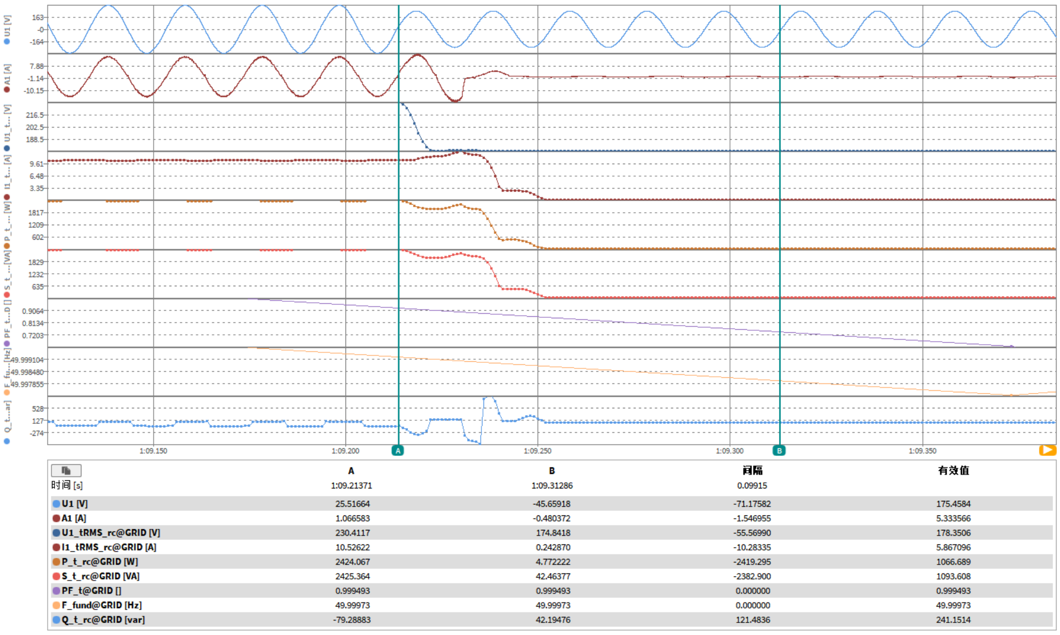
时间 [s]	A 1:09.21371	B 1:09.26371	间隔 0.05000	有效值
● U1 [V]	25.51664	-24.52146	-50.03810	174.6459
● A1 [A]	1.066583	0.401968	-0.664616	7.501015
● U1_tRMS_rc@GRID [V]	230.4117	174.6010	-55.81075	181.8076
● I1_tRMS_rc@GRID [A]	10.52622	0.258707	-10.26751	8.211985
● P_t_rc@GRID [W]	2424.067	-5.624710	-2429.692	1493.659
● S_t_rc@GRID [VA]	2425.364	45.17046	-2380.193	1530.769
● PF_t@GRID []	0.999493	0.999493	0.000000	0.999493
● F_fund@GRID [Hz]	49.99973	49.99973	0.000000	49.99973
● Q_t_rc@GRID [var]	-79.28883	44.81889	124.1077	335.0196

During dip (t1+50ms)


U1 [V]
163
-0
-164
A1 [A]
7.88
-1.14
-10.15
U1_t... [V]
216.5
202.5
188.5
I1_t... [A]
9.61
6.48
3.35
P_t_... [W]
1817
1209
602
S_t_... [VA]
1829
1232
635
PF_t...D []
0.9064
0.8134
0.7203
F_fu... [Hz]
49.999104
49.998480
49.997855
Q_t...ar]
528
127
-274
1:09.150
1:09.200
A
1:09.250
B
1:09.300
1:09.350

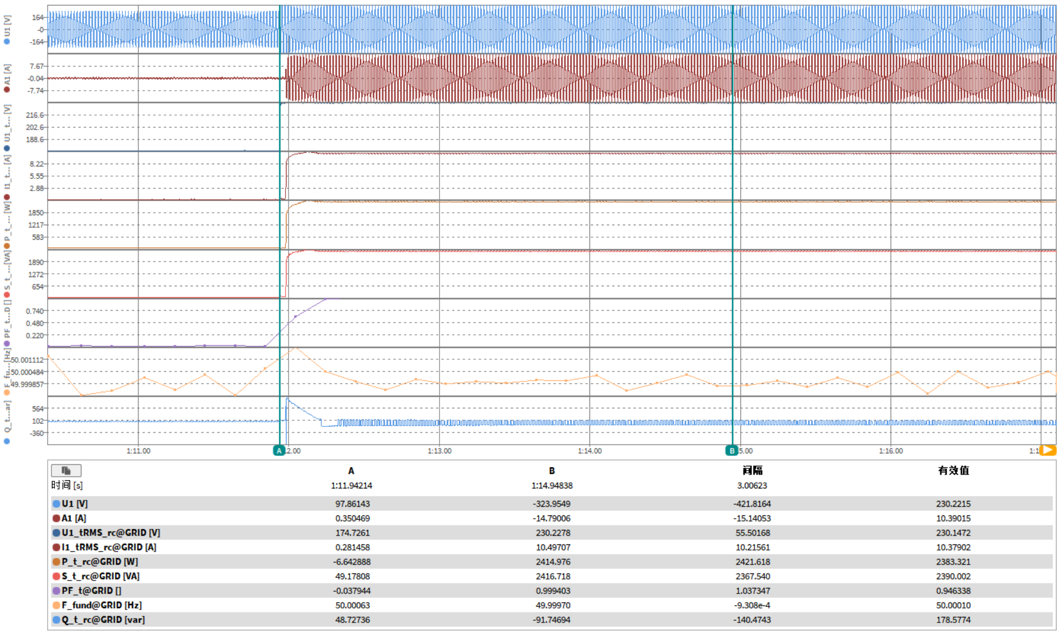
	A	B	间隔	有效值
时间 [s]	1:09.21371	1:09.29383	0.08012	
U1 [V]	25.51664	30.41114	4.894495	174.5607
A1 [A]	1.066583	-0.322443	-1.389027	5.930619
U1_tRMS_rc@GRID [V]	230.4117	174.8154	-55.59625	179.1935
I1_tRMS_rc@GRID [A]	10.52622	0.246414	-10.27980	6.517857
P_t_rc@GRID [W]	2424.067	4.106987	-2419.960	1185.208
S_t_rc@GRID [VA]	2425.364	43.07696	-2382.287	1214.934
PF_t@GRID []	0.999493	0.999493	0.000000	0.999493
F_fund@GRID [Hz]	49.99973	49.99973	0.000000	49.99973
Q_t_rc@GRID [var]	-79.28883	42.88073	122.1696	267.1040

During dip (t1+80ms)


U1 [V]
163
-0
-164
A1 [A]
7.88
-1.14
-10.15
U1_t... [V]
216.5
202.5
188.5
I1_t... [A]
9.61
6.48
3.35
P_t_... [W]
1817
1209
602
S_t_... [VA]
1829
1232
635
PF_t...D []
0.9064
0.8134
0.7203
F_fu... [Hz]
49.999104
49.998480
49.997855
Q_t...ar]
528
127
-274
1:09.150
1:09.200
A
1:09.250
1:09.300
B
1:09.350

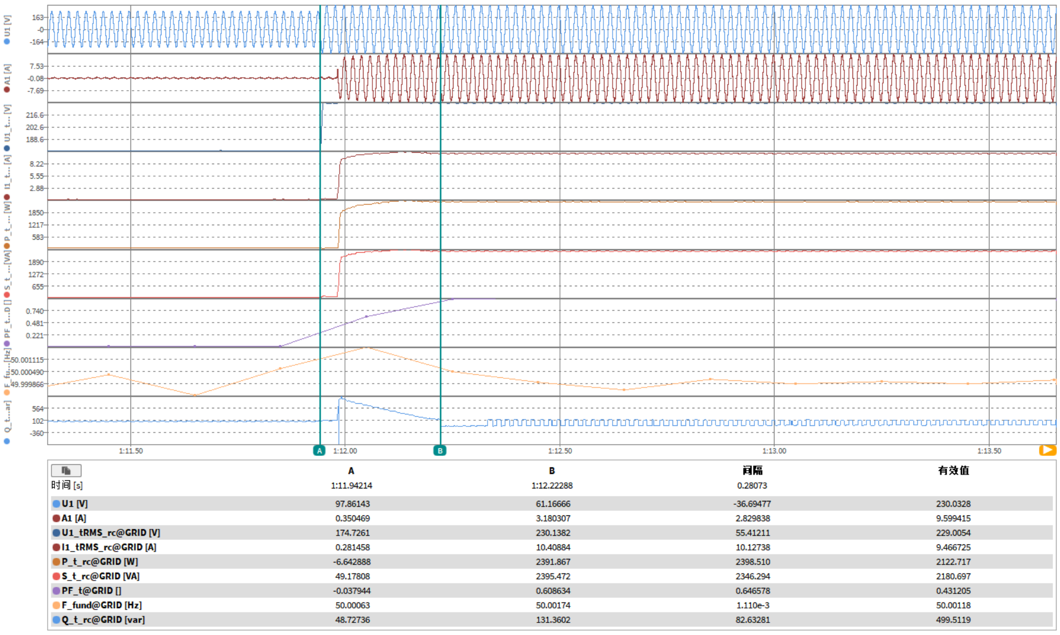
	A	B	间隔	有效值
时间 [s]	1:09.21371	1:09.31286	0.09915	
U1 [V]	25.51664	-45.65918	-71.17582	175.4584
A1 [A]	1.066583	-0.480372	-1.546955	5.333566
U1_tRMS_rc@GRID [V]	230.4117	174.8418	-55.56990	178.3506
I1_tRMS_rc@GRID [A]	10.52622	0.242870	-10.28335	5.867096
P_t_rc@GRID [W]	2424.067	4.772222	-2419.295	1066.689
S_t_rc@GRID [VA]	2425.364	42.46377	-2382.900	1093.608
PF_t@GRID []	0.999493	0.999493	0.000000	0.999493
F_fund@GRID [Hz]	49.99973	49.99973	0.000000	49.99973
Q_t_rc@GRID [var]	-79.28883	42.19476	121.4836	241.1514

During dip (t1+100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
PF_t...D []
F_fu... [Hz]
Q_t...ar]
1:11.00
1:13.00
1:14.00
1:16.00
A
B

时间 [s]	A 1:11.94214	B 1:14.94838	间隔 3.00623	有效值
U1 [V]	97.86143	-323.9549	-421.8164	230.2215
A1 [A]	0.350469	-14.79006	-15.14053	10.39015
U1_tRMS_rc@GRID [V]	174.7261	230.2278	55.50168	230.1472
I1_tRMS_rc@GRID [A]	0.281458	10.49707	10.21561	10.37902
P_t_rc@GRID [W]	-6.642888	2414.976	2421.618	2383.321
S_t_rc@GRID [VA]	49.17808	2416.718	2367.540	2390.002
PF_t@GRID []	-0.037944	0.999403	1.037347	0.946338
F_fund@GRID [Hz]	50.00063	49.99970	-9.308e-4	50.00010
Q_t_rc@GRID [var]	48.72736	-91.74694	-140.4743	178.5774

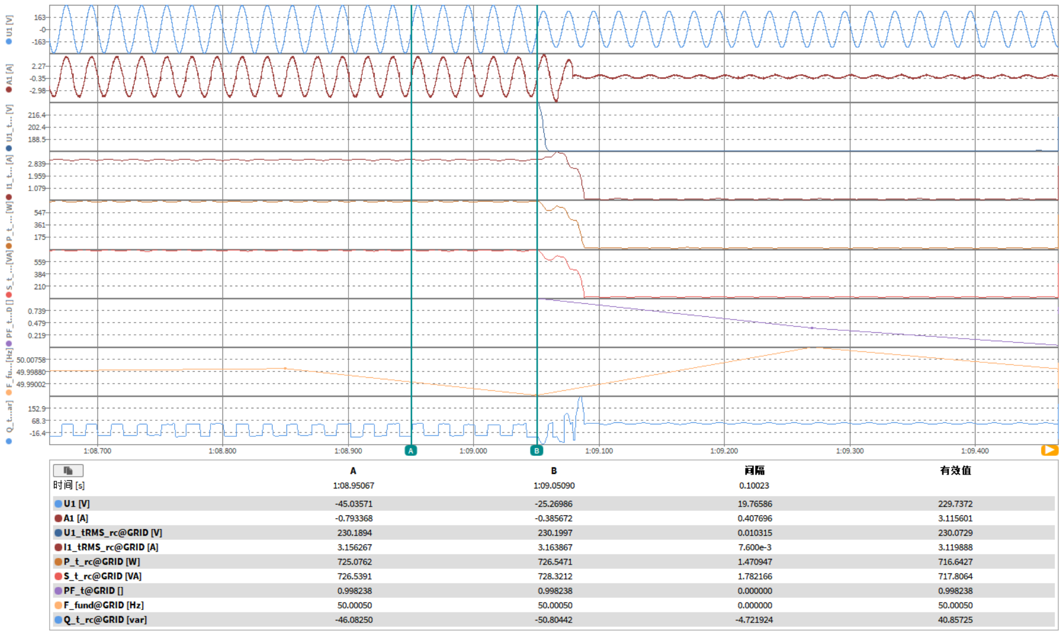
After dip (t2+3s)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
PF_t...D []
F_fu... [Hz]
Q_t...ar]
1:11.50
1:12.00
1:12.50
1:13.00
1:13.50
A
B

时间 [s]	A 1:11.94214	B 1:12.22288	间隔 0.28073	有效值
U1 [V]	97.86143	61.16666	-36.69477	230.0328
A1 [A]	0.350469	3.180307	2.829838	9.599415
U1_tRMS_rc@GRID [V]	174.7261	230.1382	55.41211	229.0054
I1_tRMS_rc@GRID [A]	0.281458	10.40884	10.12738	9.466725
P_t_rc@GRID [W]	-6.642888	2391.867	2398.510	2122.717
S_t_rc@GRID [VA]	49.17808	2395.472	2346.294	2180.697
PF_t@GRID []	-0.037944	0.608634	0.646578	0.431205
F_fund@GRID [Hz]	50.00063	50.00174	1.110e-3	50.00118
Q_t_rc@GRID [var]	48.72736	131.3602	82.63281	499.5119

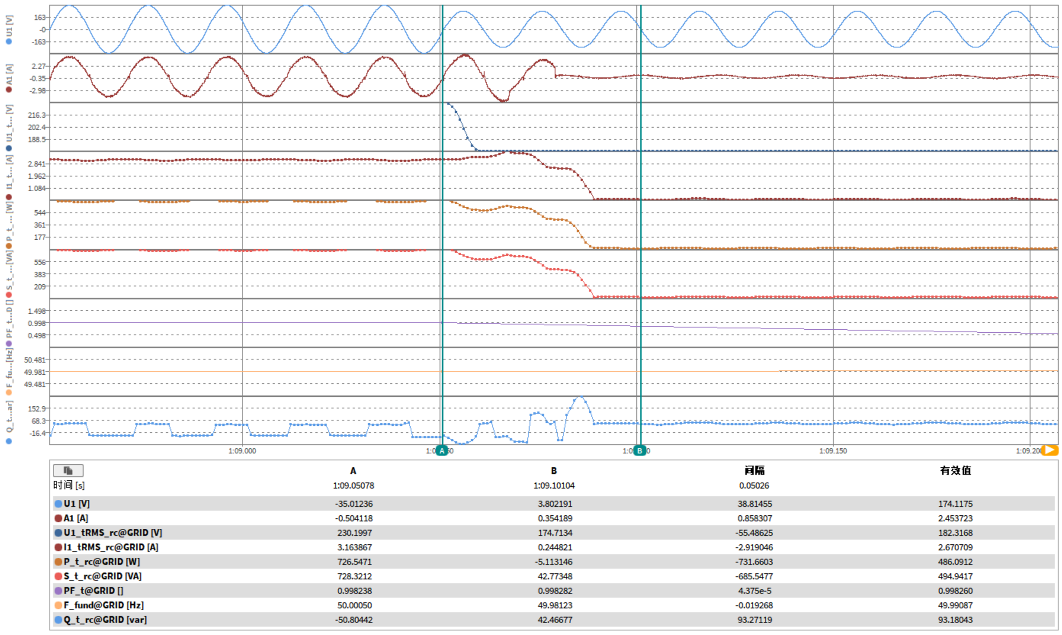
Recovery time

Graph of Test number 4.2


U1 [V]
163
-0-
-163
A1 [A]
2.27
-0.35
-2.98
U1_t... [V]
216.4
202.4
188.5
I1_t... [A]
2.839
1.959
1.079
P_t_... [W]
547
361
175
S_t_... [VA]
559
384
210
PF_t_...D []
0.739
0.479
0.219
F_fu... [Hz]
50.00758
49.99880
49.99002
Q_t... ar]
152.9
68.3
-16.4
1:08.700
1:08.800
1:08.900
A
1:09.000
B
1:09.100
1:09.200
1:09.300
1:09.400

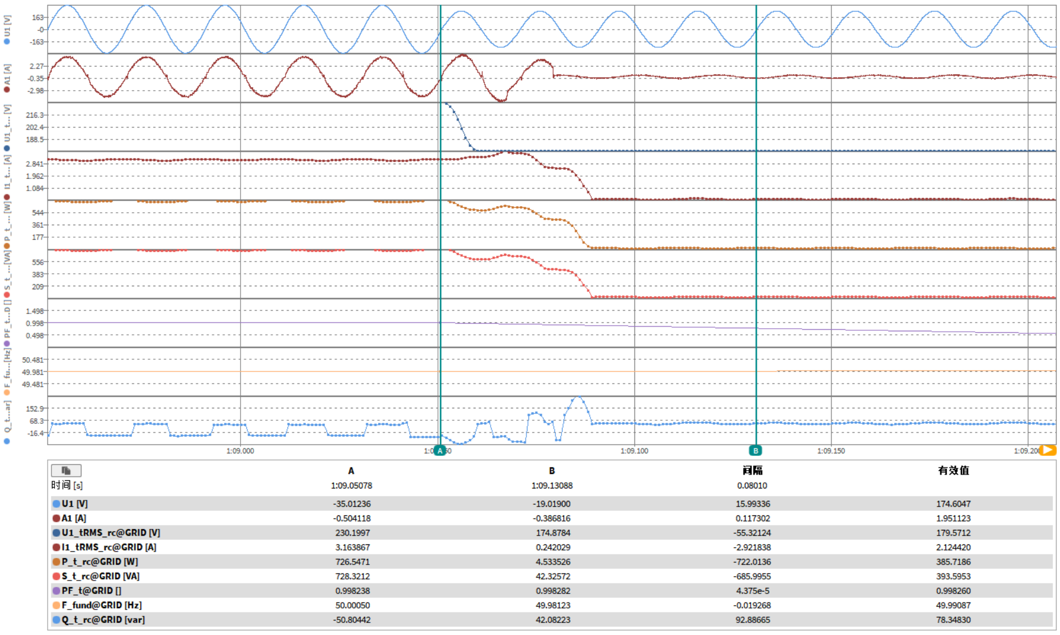
	A	B	间隔	有效值
时间 [s]	1:08.95067	1:09.05090	0.10023	
● **U1 [V]**	-45.03571	-25.26986	19.76586	229.7372
● **A1 [A]**	-0.793368	-0.385672	0.407696	3.115601
● **U1_tRMS_rc@GRID [V]**	230.1894	230.1997	0.010315	230.0729
● **I1_tRMS_rc@GRID [A]**	3.156267	3.163867	7.600e-3	3.119888
● **P_t_rc@GRID [W]**	725.0762	726.5471	1.470947	716.6427
● **S_t_rc@GRID [VA]**	726.5391	728.3212	1.782166	717.8064
● **PF_t@GRID []**	0.998238	0.998238	0.000000	0.998238
● **F_fund@GRID [Hz]**	50.00050	50.00050	0.000000	50.00050
● **Q_t_rc@GRID [var]**	-46.08250	-50.80442	-4.721924	40.85725

Before dip (t1-100ms)


U1 [V]
163
-0-
-163
A1 [A]
2.27
-0.35
-2.98
U1_t... [V]
216.3
202.4
188.5
I1_t... [A]
2.841
1.962
1.084
P_t_... [W]
544
361
177
S_t_... [VA]
556
383
209
PF_t_...D []
1.498
0.998
0.498
F_fu... [Hz]
50.481
49.981
49.481
Q_t... ar]
152.9
68.3
-16.4
1:09.000
A
B
1:09.150
1:09.200

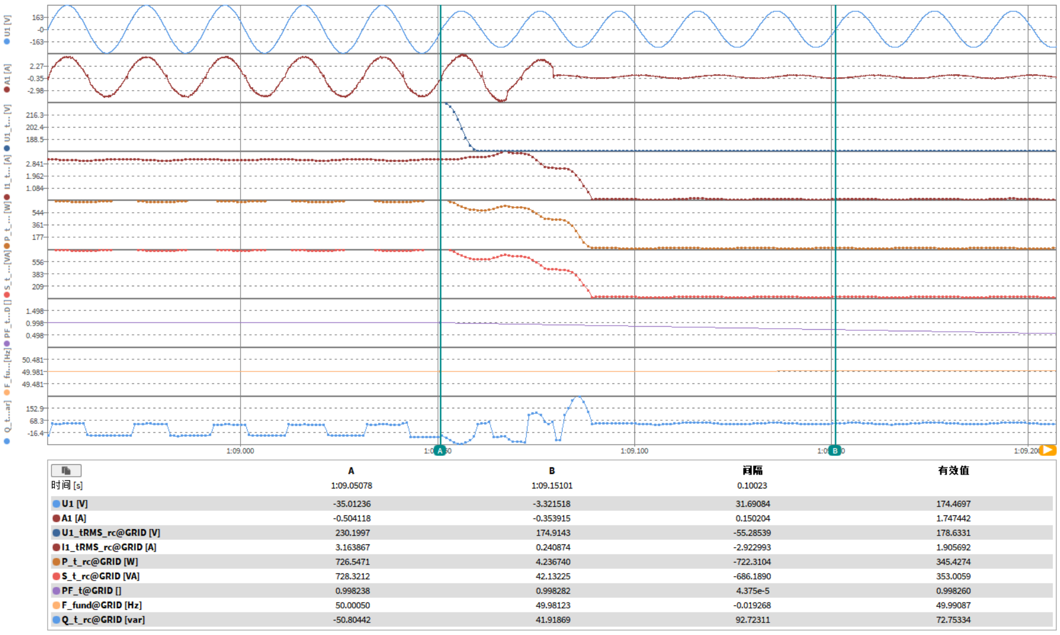
	A	B	间隔	有效值
时间 [s]	1:09.05078	1:09.10104	0.05026	
● **U1 [V]**	-35.01236	3.802191	38.81455	174.1175
● **A1 [A]**	-0.504118	0.354189	0.858307	2.453723
● **U1_tRMS_rc@GRID [V]**	230.1997	174.7134	-55.48625	182.3168
● **I1_tRMS_rc@GRID [A]**	3.163867	0.244821	-2.919046	2.670709
● **P_t_rc@GRID [W]**	726.5471	-5.113146	-731.6603	486.0912
● **S_t_rc@GRID [VA]**	728.3212	42.77348	-685.5477	494.9417
● **PF_t@GRID []**	0.998238	0.998282	4.375e-5	0.998260
● **F_fund@GRID [Hz]**	50.00050	49.98123	-0.019268	49.99087
● **Q_t_rc@GRID [var]**	-50.80442	42.46677	93.27119	93.18043

During dip (t1+50ms)


U1 [V]
163
-0
-163
A1 [A]
2.27
-0.35
-2.98
U1_t...[V]
216.3
202.4
188.5
I1_t...[A]
2.841
1.962
1.084
P_t_...[W]
544
361
177
S_t_...[VA]
556
383
209
PF_t...D []
1.498
0.998
0.498
F_fu...[Hz]
50.481
49.981
49.481
Q_t...ar]
152.9
68.3
-16.4
1:09.000
A
1:09.100
B
1:09.150
1:09.200

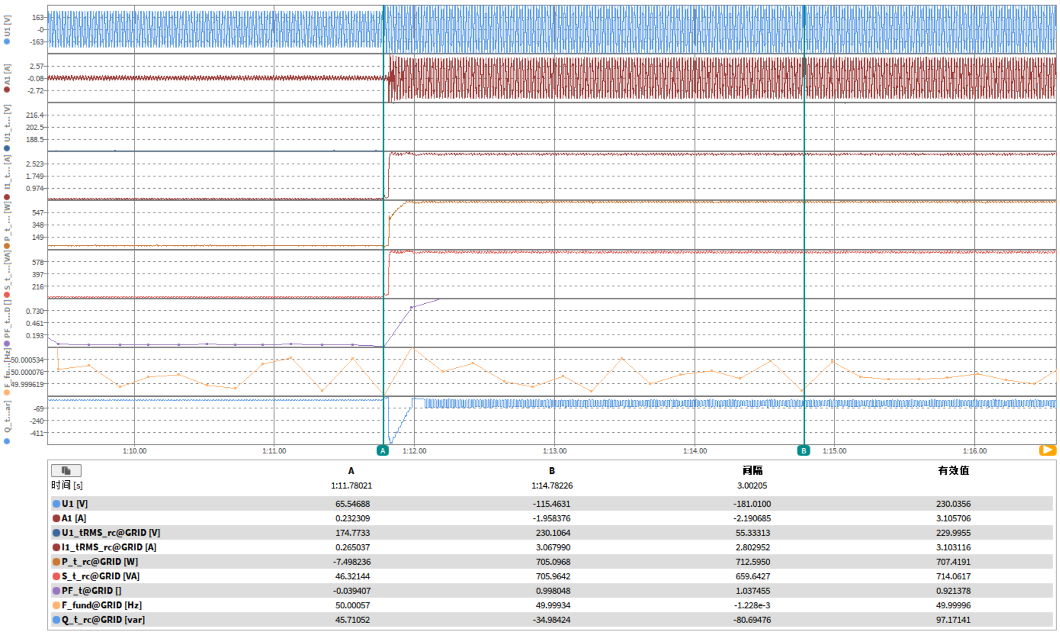
时间 [s]	A 1:09.05078	B 1:09.13088	间隔 0.08010	有效值
● U1 [V]	-35.01236	-19.01900	15.99336	174.6047
● A1 [A]	-0.504118	-0.386816	0.117302	1.951123
● U1_tRMS_rc@GRID [V]	230.1997	174.8784	-55.32124	179.5712
● I1_tRMS_rc@GRID [A]	3.163867	0.242029	-2.921838	2.124420
● P_t_rc@GRID [W]	726.5471	4.533526	-722.0136	385.7186
● S_t_rc@GRID [VA]	728.3212	42.32572	-685.9955	393.5953
● PF_t@GRID []	0.998238	0.998282	4.375e-5	0.998260
● F_fund@GRID [Hz]	50.00050	49.98123	-0.019268	49.99087
● Q_t_rc@GRID [var]	-50.80442	42.08223	92.88665	78.34830

During dip (t1+80ms)


U1 [V]
163
-0
-163
A1 [A]
2.27
-0.35
-2.98
U1_t...[V]
216.3
202.4
188.5
I1_t...[A]
2.841
1.962
1.084
P_t_...[W]
544
361
177
S_t_...[VA]
556
383
209
PF_t...D []
1.498
0.998
0.498
F_fu...[Hz]
50.481
49.981
49.481
Q_t...ar]
152.9
68.3
-16.4
1:09.000
A
1:09.100
B
1:09.200

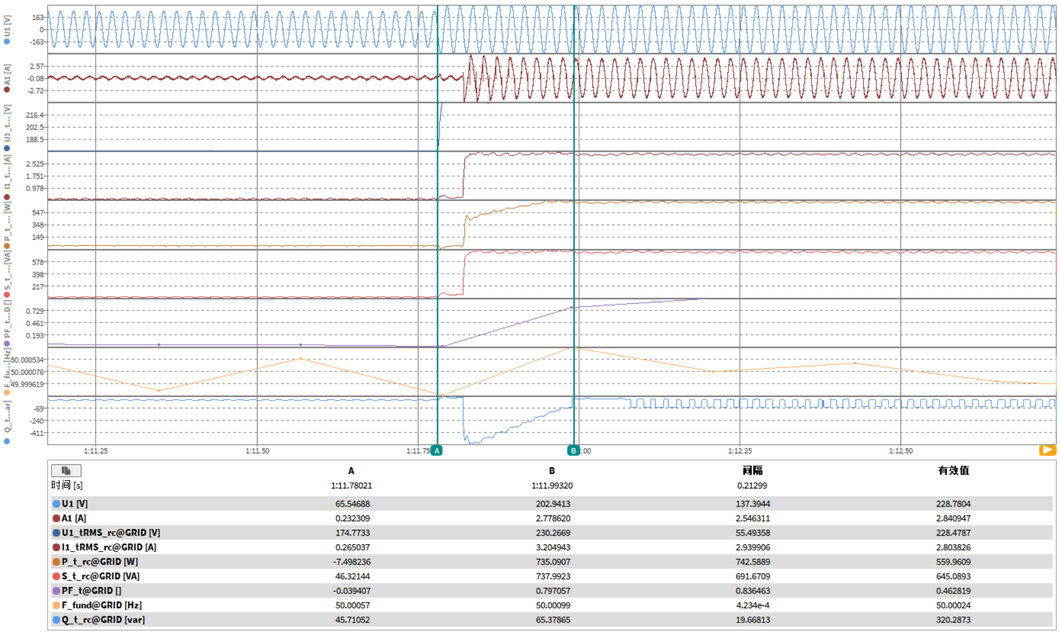
时间 [s]	A 1:09.05078	B 1:09.15101	间隔 0.10023	有效值
● U1 [V]	-35.01236	-3.321518	31.69084	174.4697
● A1 [A]	-0.504118	-0.353915	0.150204	1.747442
● U1_tRMS_rc@GRID [V]	230.1997	174.9143	-55.28539	178.6331
● I1_tRMS_rc@GRID [A]	3.163867	0.240874	-2.922993	1.905692
● P_t_rc@GRID [W]	726.5471	4.236740	-722.3104	345.4274
● S_t_rc@GRID [VA]	728.3212	42.13225	-686.1890	353.0059
● PF_t@GRID []	0.998238	0.998282	4.375e-5	0.998260
● F_fund@GRID [Hz]	50.00050	49.98123	-0.019268	49.99087
● Q_t_rc@GRID [var]	-50.80442	41.91869	92.72311	72.75334

During dip (t1+100ms)


U1 [V]
163
0
-163
A1 [A]
2.57
-0.08
-2.72
U1_t... [V]
216.4
202.5
188.5
I1_t... [A]
2.523
1.749
0.974
P_t... [W]
547
348
149
S_t... [VA]
578
397
216
PF_t...D []
0.730
0.461
0.193
F_fu... [Hz]
50.000534
50.000076
49.999619
Q_t...ar]
-69
-240
-411
1:10.00
1:11.00
A
1:12.00
1:13.00
1:14.00
B
1:15.00
1:16.00

	A	B	间隔	有效值
时间 [s]	1:11.78021	1:14.78226	3.00205	
U1 [V]	65.54688	-115.4631	-181.0100	230.0356
A1 [A]	0.232309	-1.958376	-2.190685	3.105706
U1_tRMS_rc@GRID [V]	174.7733	230.1064	55.33313	229.9955
I1_tRMS_rc@GRID [A]	0.265037	3.067990	2.802952	3.103116
P_t_rc@GRID [W]	-7.498236	705.0968	712.5950	707.4191
S_t_rc@GRID [VA]	46.32144	705.9642	659.6427	714.0617
PF_t@GRID []	-0.039407	0.998048	1.037455	0.921378
F_fund@GRID [Hz]	50.00057	49.99934	-1.228e-3	49.99996
Q_t_rc@GRID [var]	45.71052	-34.98424	-80.69476	97.17141

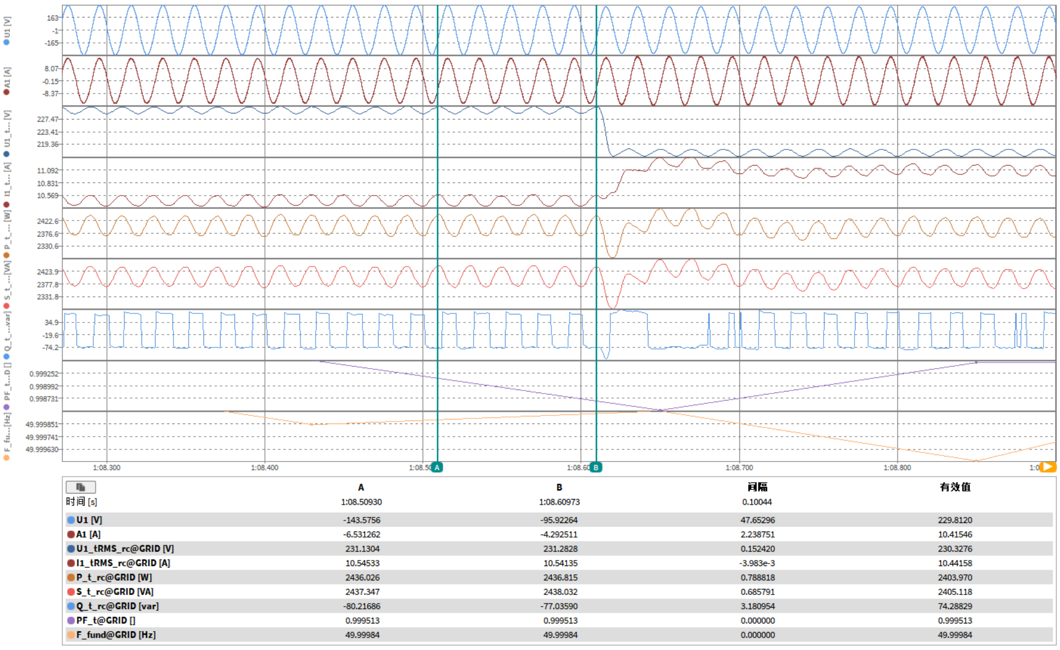
After dip (t2+3s)


U1 [V]
163
0
-163
A1 [A]
2.57
-0.08
-2.72
U1_t... [V]
216.4
202.5
188.5
I1_t... [A]
2.525
1.751
0.978
P_t... [W]
547
348
149
S_t... [VA]
578
398
217
PF_t...D []
0.729
0.461
0.193
F_fu... [Hz]
50.000534
50.000076
49.999619
Q_t...ar]
-69
-240
-411
1:11.25
1:11.50
1:11.75
A
B
.00
1:12.25
1:12.50

	A	B	间隔	有效值
时间 [s]	1:11.78021	1:11.99320	0.21299	
U1 [V]	65.54688	202.9413	137.3944	228.7804
A1 [A]	0.232309	2.778620	2.546311	2.840947
U1_tRMS_rc@GRID [V]	174.7733	230.2669	55.49358	228.4787
I1_tRMS_rc@GRID [A]	0.265037	3.204943	2.939906	2.803826
P_t_rc@GRID [W]	-7.498236	735.0907	742.5889	559.9609
S_t_rc@GRID [VA]	46.32144	737.9923	691.6709	645.0893
PF_t@GRID []	-0.039407	0.797057	0.836463	0.462819
F_fund@GRID [Hz]	50.00057	50.00099	4.234e-4	50.00024
Q_t_rc@GRID [var]	45.71052	65.37865	19.66813	320.2873

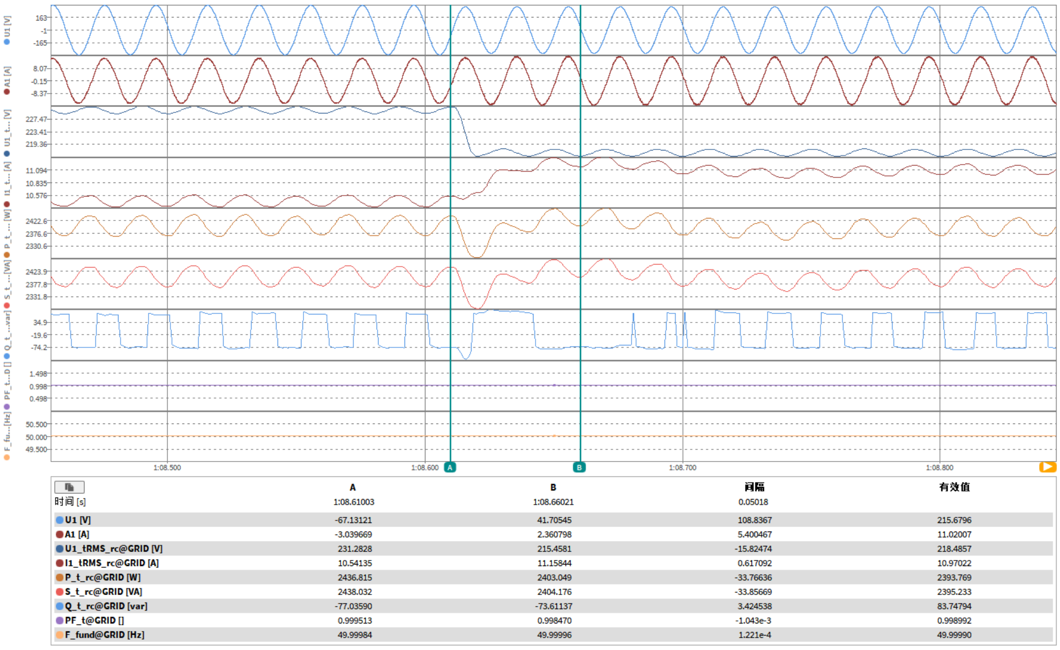
Recovery time

Graph of Test number 4.3


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
163
-1
-165
8.07
-0.15
-8.37
227.47
223.41
219.36
11.092
10.831
10.569
2422.6
2376.6
2330.6
2423.9
2377.8
2331.8
34.9
-19.6
-74.2
0.999252
0.998992
0.998731
49.999851
49.999741
49.999630
1:08.300
1:08.400
1:08.500
A
1:08.600
B
1:08.700
1:08.800

	A	B	间隔	有效值
时间 [s]	1:08.50930	1:08.60973	0.10044	
U1 [V]	-143.5756	-95.92264	47.65296	229.8120
A1 [A]	-6.531262	-4.292511	2.238751	10.41546
U1_tRMS_rc@GRID [V]	231.1304	231.2828	0.152420	230.3276
I1_tRMS_rc@GRID [A]	10.54533	10.54135	-3.983e-3	10.44158
P_t_rc@GRID [W]	2436.026	2436.815	0.788818	2403.970
S_t_rc@GRID [VA]	2437.347	2438.032	0.685791	2405.118
Q_t_rc@GRID [var]	-80.21686	-77.03590	3.180954	74.28829
PF_t@GRID []	0.999513	0.999513	0.000000	0.999513
F_fund@GRID [Hz]	49.99984	49.99984	0.000000	49.99984

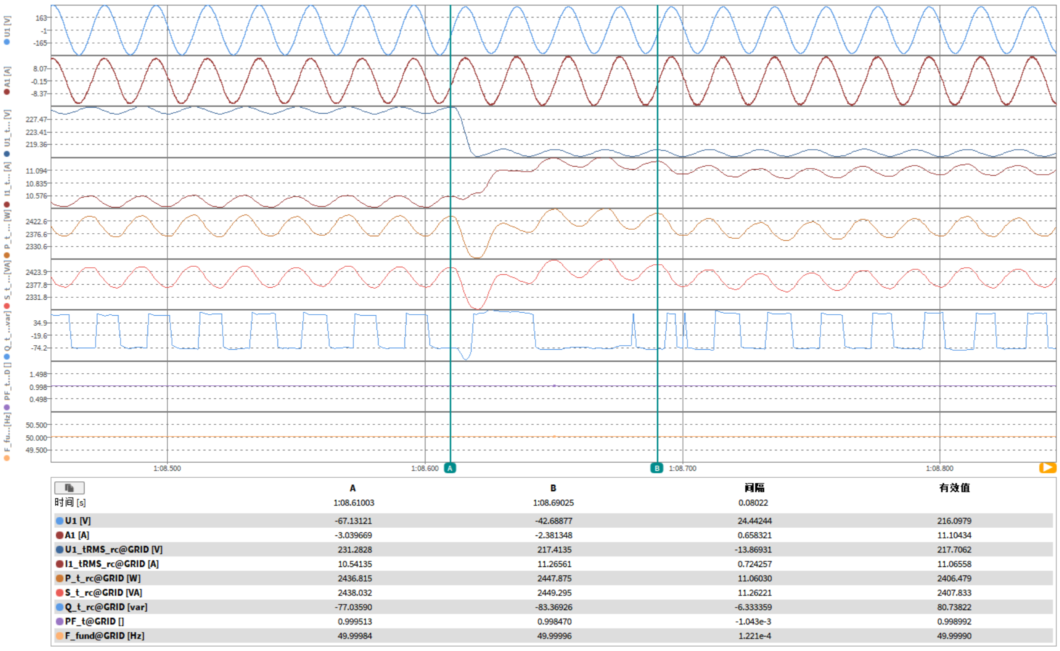
Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
163
-1
-165
8.07
-0.15
-8.37
227.47
223.41
219.36
11.094
10.835
10.576
2422.6
2376.6
2330.6
2423.9
2377.8
2331.8
34.9
-19.6
-74.2
1.498
0.998
0.498
50.500
50.000
49.500
1:08.500
1:08.600
A
B
1:08.700
1:08.800

	A	B	间隔	有效值
时间 [s]	1:08.61003	1:08.66021	0.05018	
U1 [V]	-67.13121	41.70545	108.8367	215.6796
A1 [A]	-3.039669	2.360798	5.400467	11.02007
U1_tRMS_rc@GRID [V]	231.2828	215.4581	-15.82474	218.4857
I1_tRMS_rc@GRID [A]	10.54135	11.15844	0.617092	10.97022
P_t_rc@GRID [W]	2436.815	2403.049	-33.76636	2393.769
S_t_rc@GRID [VA]	2438.032	2404.176	-33.85669	2395.233
Q_t_rc@GRID [var]	-77.03590	-73.61137	3.424538	83.74794
PF_t@GRID []	0.999513	0.998470	-1.043e-3	0.998992
F_fund@GRID [Hz]	49.99984	49.99996	1.221e-4	49.99990

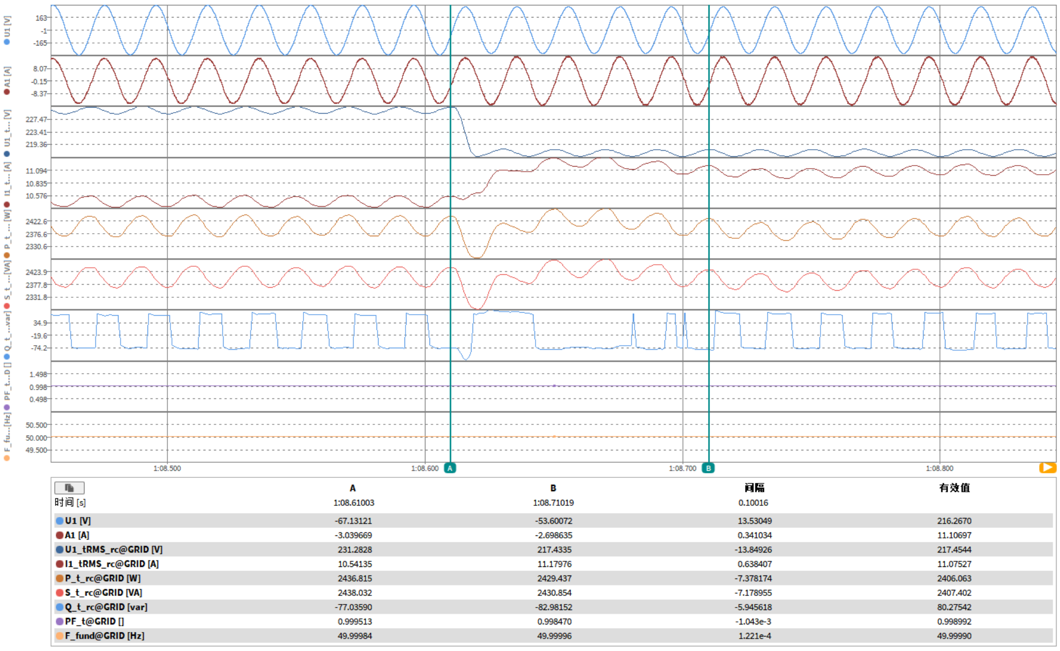
During dip (t1+50ms)

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict


U1 [V]
163
-1
-165
A1 [A]
8.07
-0.15
-8.37
U1_t...[V]
227.47
223.41
219.36
I1_t...[A]
11.094
10.835
10.576
P_t_...[W]
2422.6
2376.6
2330.6
S_t_...[VA]
2423.9
2377.8
2331.8
Q_t_...[var]
34.9
-19.6
-74.2
PF_t...D []
1.498
0.998
0.498
F_fu...[Hz]
50.500
50.000
49.500
1:08.500
1:08.600
A
B
1:08.700
1:08.800

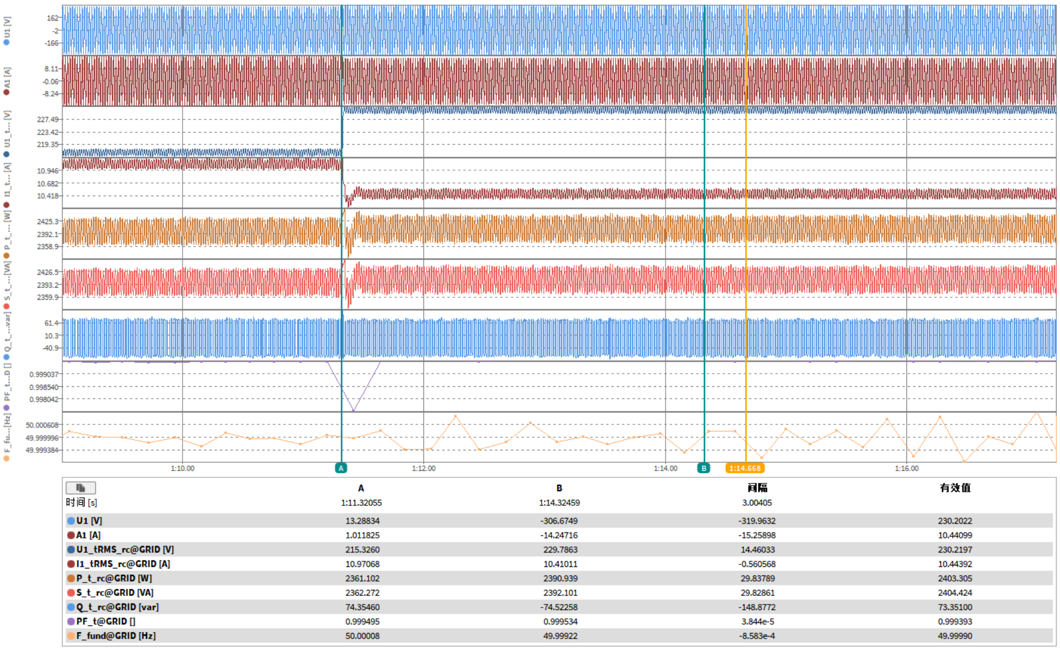
时间 [s]	A 1:08.61003	B 1:08.69025	间隔 0.08022	有效值
● U1 [V]	-67.13121	-42.68877	24.44244	216.0979
● A1 [A]	-3.039669	-2.381348	0.658321	11.10434
● U1_tRMS_rc@GRID [V]	231.2828	217.4135	-13.86931	217.7062
● I1_tRMS_rc@GRID [A]	10.54135	11.26561	0.724257	11.06558
● P_t_rc@GRID [W]	2436.815	2447.875	11.06030	2406.479
● S_t_rc@GRID [VA]	2438.032	2449.295	11.26221	2407.833
● Q_t_rc@GRID [var]	-77.03590	-83.36926	-6.333359	80.73822
● PF_t@GRID []	0.999513	0.998470	-1.043e-3	0.998992
● F_fund@GRID [Hz]	49.99984	49.99996	1.221e-4	49.99990

During dip (t1+80ms)


U1 [V]
163
-1
-165
A1 [A]
8.07
-0.15
-8.37
U1_t...[V]
227.47
223.41
219.36
I1_t...[A]
11.094
10.835
10.576
P_t_...[W]
2422.6
2376.6
2330.6
S_t_...[VA]
2423.9
2377.8
2331.8
Q_t_...[var]
34.9
-19.6
-74.2
PF_t...D []
1.498
0.998
0.498
F_fu...[Hz]
50.500
50.000
49.500
1:08.500
1:08.600
A
1:08.700
B
1:08.800

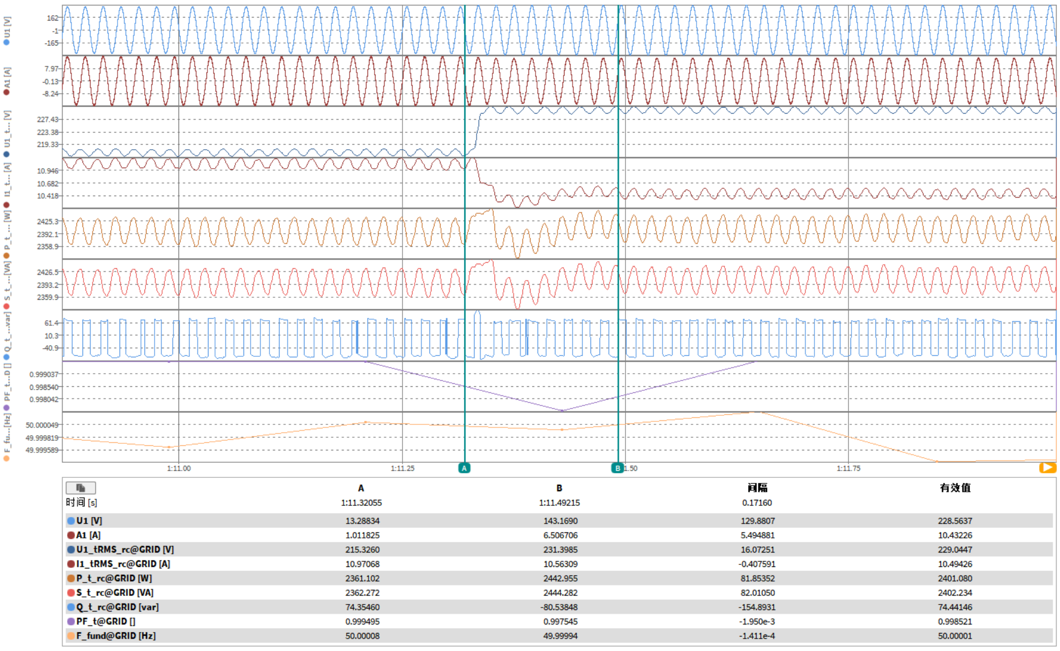
时间 [s]	A 1:08.61003	B 1:08.71019	间隔 0.10016	有效值
● U1 [V]	-67.13121	-53.60072	13.53049	216.2670
● A1 [A]	-3.039669	-2.698635	0.341034	11.10697
● U1_tRMS_rc@GRID [V]	231.2828	217.4335	-13.84926	217.4544
● I1_tRMS_rc@GRID [A]	10.54135	11.17976	0.638407	11.07527
● P_t_rc@GRID [W]	2436.815	2429.437	-7.378174	2406.063
● S_t_rc@GRID [VA]	2438.032	2430.854	-7.178955	2407.402
● Q_t_rc@GRID [var]	-77.03590	-82.98152	-5.945618	80.27542
● PF_t@GRID []	0.999513	0.998470	-1.043e-3	0.998992
● F_fund@GRID [Hz]	49.99984	49.99996	1.221e-4	49.99990

During dip (t1+100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t_... []
F_fu... [Hz]
162
-2
-166
8.11
-0.06
-8.24
227.49
223.42
219.35
10.946
10.682
10.418
2425.3
2392.1
2358.9
2426.5
2393.2
2359.9
61.4
10.3
-40.9
0.999037
0.998540
0.998042
50.000608
49.999996
49.999384
1:10.00
1:12.00
1:14.00
1:16.00
A
B
1:14.668

时间 [s]	A 1:11.32055	B 1:14.32459	间隔 3.00405	有效值
● U1 [V]	13.28834	-306.6749	-319.9632	230.2022
● A1 [A]	1.011825	-14.24716	-15.25898	10.44099
● U1_tRMS_rc@GRID [V]	215.3260	229.7863	14.46033	230.2197
● I1_tRMS_rc@GRID [A]	10.97068	10.41011	-0.560568	10.44392
● P_t_rc@GRID [W]	2361.102	2390.939	29.83789	2403.305
● S_t_rc@GRID [VA]	2362.272	2392.101	29.82861	2404.424
● Q_t_rc@GRID [var]	74.35460	-74.52258	-148.8772	73.35100
● PF_t@GRID []	0.999495	0.999534	3.844e-5	0.999393
● F_fund@GRID [Hz]	50.00008	49.99922	-8.583e-4	49.99990

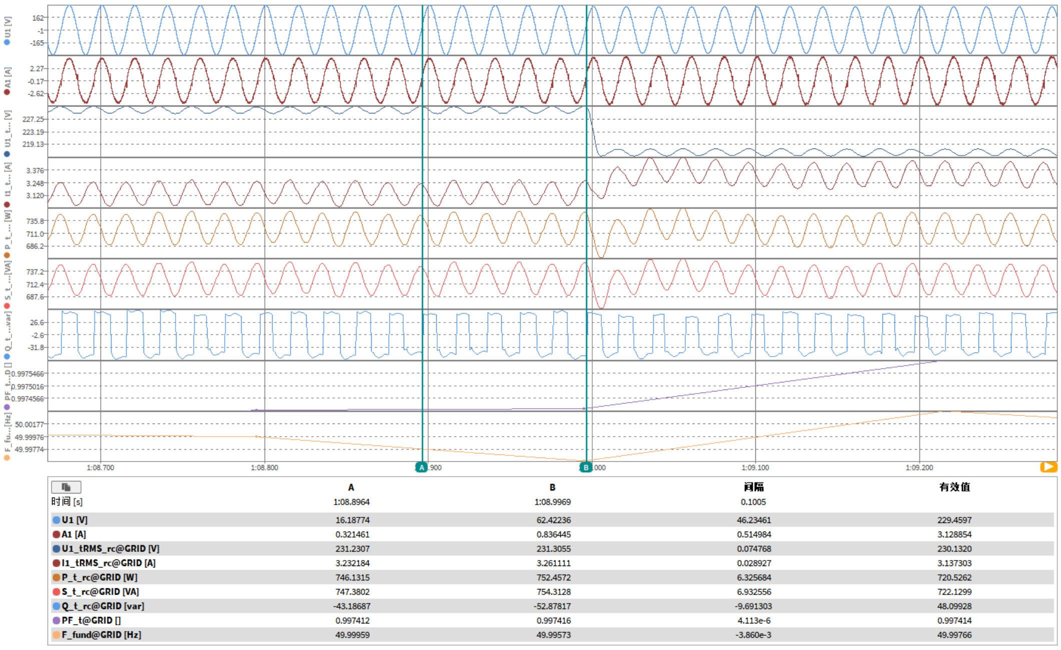
After dip (t2+3s)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t_... []
F_fu... [Hz]
162
-1
-165
7.97
-0.13
-8.24
227.43
223.38
219.33
10.946
10.682
10.418
2425.3
2392.1
2358.9
2426.5
2393.2
2359.9
61.4
10.3
-40.9
0.999037
0.998540
0.998042
50.000049
49.999819
49.999589
1:11.00
1:11.25
1:11.50
1:11.75
A
B

时间 [s]	A 1:11.32055	B 1:11.49215	间隔 0.17160	有效值
● U1 [V]	13.28834	143.1690	129.8807	228.5637
● A1 [A]	1.011825	6.506706	5.494881	10.43226
● U1_tRMS_rc@GRID [V]	215.3260	231.3985	16.07251	229.0447
● I1_tRMS_rc@GRID [A]	10.97068	10.56309	-0.407591	10.49426
● P_t_rc@GRID [W]	2361.102	2442.955	81.85352	2401.080
● S_t_rc@GRID [VA]	2362.272	2444.282	82.01050	2402.234
● Q_t_rc@GRID [var]	74.35460	-80.53848	-154.8931	74.44146
● PF_t@GRID []	0.999495	0.997545	-1.950e-3	0.998521
● F_fund@GRID [Hz]	50.00008	49.99994	-1.411e-4	50.00001

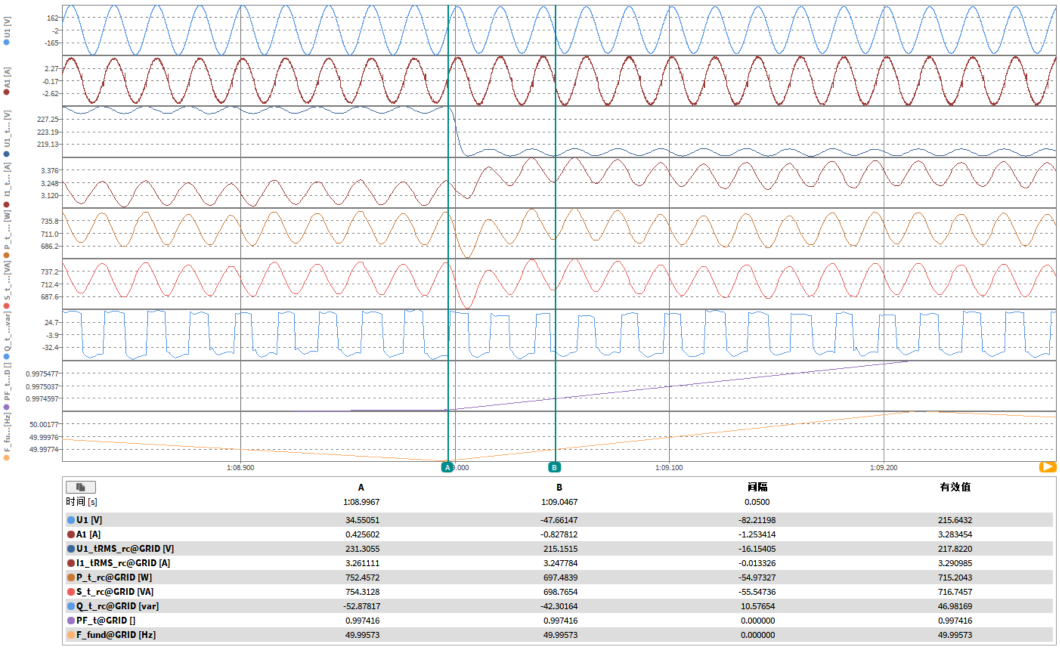
Recovery time

Graph of Test number 4.4


U1 [V]
162
-1
-165
A1 [A]
2.27
-0.17
-2.62
U1_t... [V]
227.25
223.19
219.13
I1_t... [A]
3.376
3.248
3.120
P_t_... [W]
735.8
711.0
686.2
S_t_... [VA]
737.2
712.4
687.6
Q_t_... [var]
26.6
-2.6
-31.8
PF_t... []
0.9975466
0.9975016
0.9974566
F_fu... [Hz]
50.00177
49.99976
49.99774
1:08.700
1:08.800
A
.900
B
.000
1:09.100
1:09.200

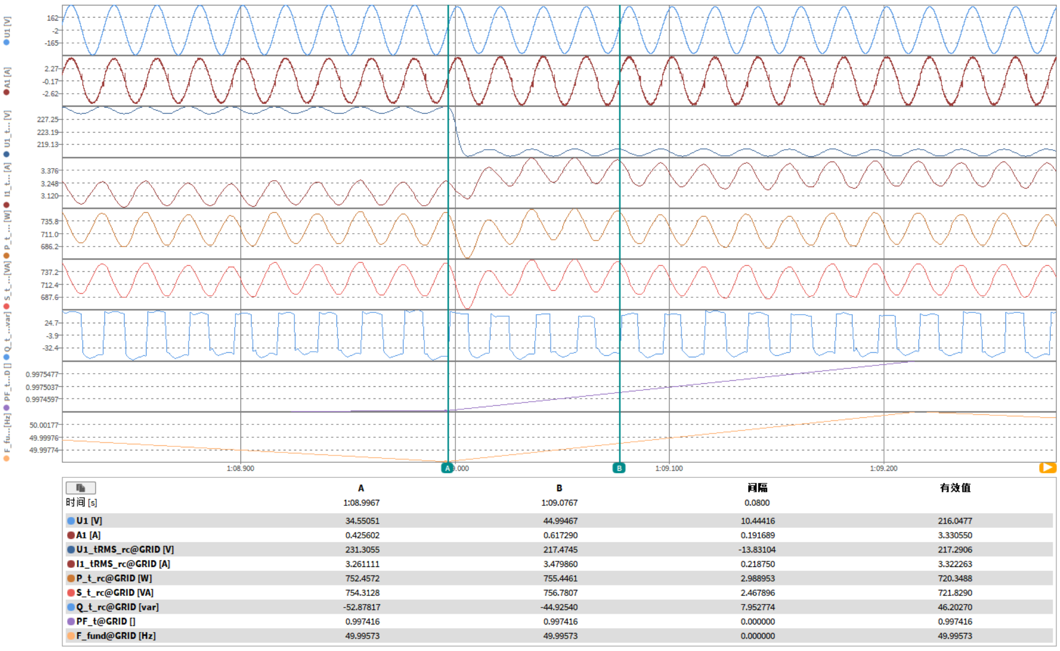
	A	B	间隔	有效值
时间 [s]	1:08.8964	1:08.9969	0.1005	
● **U1 [V]**	16.18774	62.42236	46.23461	229.4597
● **A1 [A]**	0.321461	0.836445	0.514984	3.128854
● **U1_tRMS_rc@GRID [V]**	231.2307	231.3055	0.074768	230.1320
● **I1_tRMS_rc@GRID [A]**	3.232184	3.261111	0.028927	3.137303
● **P_t_rc@GRID [W]**	746.1315	752.4572	6.325684	720.5262
● **S_t_rc@GRID [VA]**	747.3802	754.3128	6.932556	722.1299
● **Q_t_rc@GRID [var]**	-43.18687	-52.87817	-9.691303	48.09928
● **PF_t@GRID []**	0.997412	0.997416	4.113e-6	0.997414
● **F_fund@GRID [Hz]**	49.99959	49.99573	-3.860e-3	49.99766

Before dip (t1-100ms)


U1 [V]
162
-2
-165
A1 [A]
2.27
-0.17
-2.62
U1_t... [V]
227.25
223.19
219.13
I1_t... [A]
3.376
3.248
3.120
P_t_... [W]
735.8
711.0
686.2
S_t_... [VA]
737.2
712.4
687.6
Q_t_... [var]
24.7
-3.9
-32.4
PF_t... []
0.9975477
0.9975037
0.9974597
F_fu... [Hz]
50.00177
49.99976
49.99774
1:08.900
A
.000
B
1:09.100
1:09.200

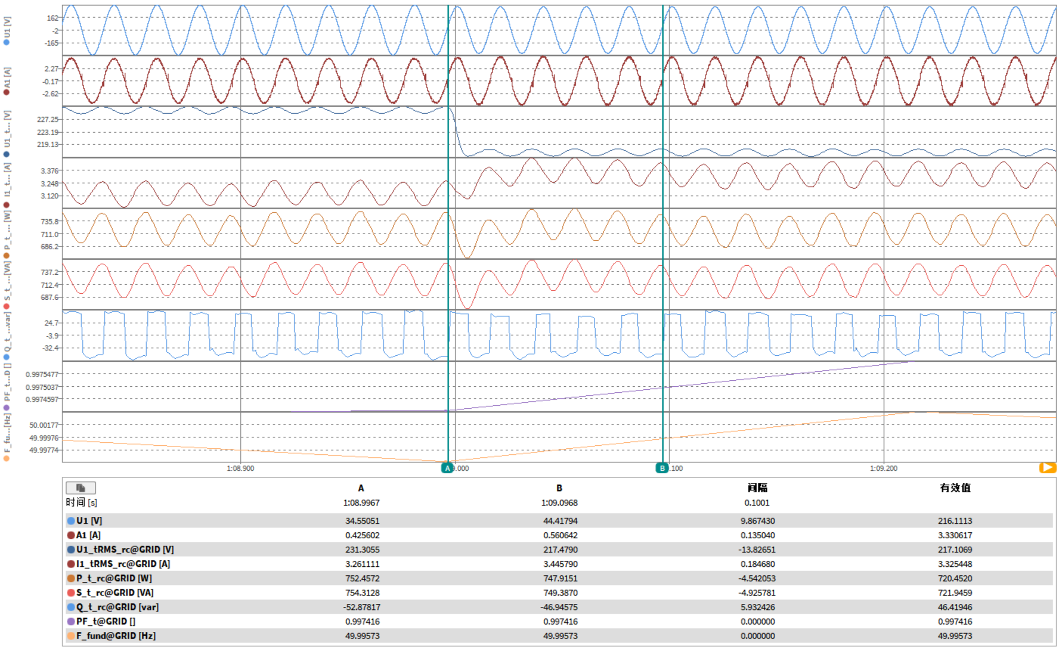
	A	B	间隔	有效值
时间 [s]	1:08.9967	1:09.0467	0.0500	
● **U1 [V]**	34.55051	-47.66147	-82.21198	215.6432
● **A1 [A]**	0.425602	-0.827812	-1.253414	3.283454
● **U1_tRMS_rc@GRID [V]**	231.3055	215.1515	-16.15405	217.8220
● **I1_tRMS_rc@GRID [A]**	3.261111	3.247784	-0.013326	3.290985
● **P_t_rc@GRID [W]**	752.4572	697.4839	-54.97327	715.2043
● **S_t_rc@GRID [VA]**	754.3128	698.7654	-55.54736	716.7457
● **Q_t_rc@GRID [var]**	-52.87817	-42.30164	10.57654	46.98169
● **PF_t@GRID []**	0.997416	0.997416	0.000000	0.997416
● **F_fund@GRID [Hz]**	49.99573	49.99573	0.000000	49.99573

During dip (t1+50ms)


U1 [V]
162
-2
-165
A1 [A]
2.27
-0.17
-2.62
U1_t... [V]
227.25
223.19
219.13
I1_t... [A]
3.376
3.248
3.120
P_t_... [W]
735.8
711.0
686.2
S_t_... [VA]
737.2
712.4
687.6
Q_t_... [var]
24.7
-3.9
-32.4
PF_t...D []
0.9975477
0.9975037
0.9974597
F_fu... [Hz]
50.00177
49.99976
49.99774
1:08.900
A
.000
B
1:09.100
1:09.200

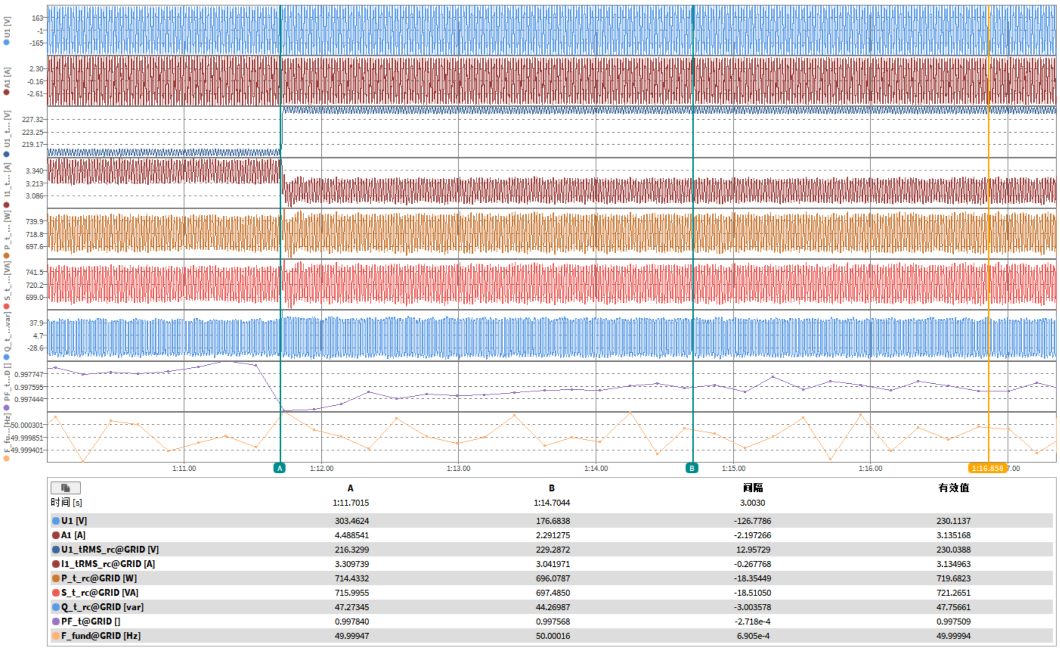
	A	B	间隔	有效值
时间 [s]	1:08.9967	1:09.0767	0.0800	
● U1 [V]	34.55051	44.99467	10.44416	216.0477
● A1 [A]	0.425602	0.617290	0.191689	3.330550
● U1_tRMS_rc@GRID [V]	231.3055	217.4745	-13.83104	217.2906
● I1_tRMS_rc@GRID [A]	3.261111	3.479860	0.218750	3.322263
● P_t_rc@GRID [W]	752.4572	755.4461	2.988953	720.3488
● S_t_rc@GRID [VA]	754.3128	756.7807	2.467896	721.8290
● Q_t_rc@GRID [var]	-52.87817	-44.92540	7.952774	46.20270
● PF_t@GRID []	0.997416	0.997416	0.000000	0.997416
● F_fund@GRID [Hz]	49.99573	49.99573	0.000000	49.99573

During dip (t1+80ms)


U1 [V]
162
-2
-165
A1 [A]
2.27
-0.17
-2.62
U1_t... [V]
227.25
223.19
219.13
I1_t... [A]
3.376
3.248
3.120
P_t_... [W]
735.8
711.0
686.2
S_t_... [VA]
737.2
712.4
687.6
Q_t_... [var]
24.7
-3.9
-32.4
PF_t...D []
0.9975477
0.9975037
0.9974597
F_fu... [Hz]
50.00177
49.99976
49.99774
1:08.900
A
.000
B
.100
1:09.200

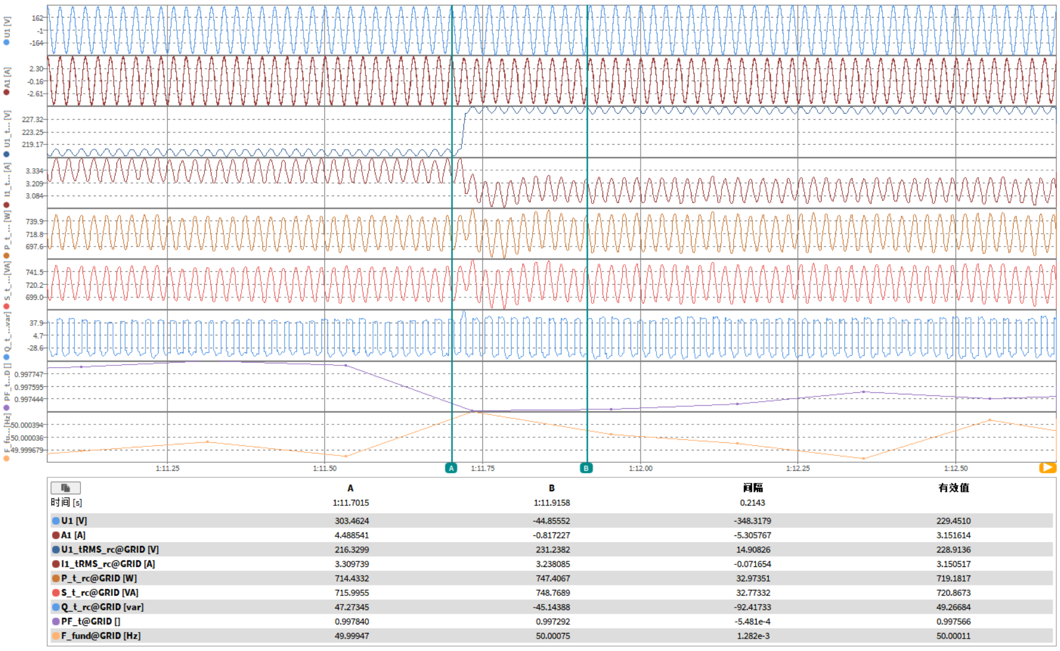
	A	B	间隔	有效值
时间 [s]	1:08.9967	1:09.0968	0.1001	
● U1 [V]	34.55051	44.41794	9.867430	216.1113
● A1 [A]	0.425602	0.560642	0.135040	3.330617
● U1_tRMS_rc@GRID [V]	231.3055	217.4790	-13.82651	217.1069
● I1_tRMS_rc@GRID [A]	3.261111	3.445790	0.184680	3.325448
● P_t_rc@GRID [W]	752.4572	747.9151	-4.542053	720.4520
● S_t_rc@GRID [VA]	754.3128	749.3870	-4.925781	721.9459
● Q_t_rc@GRID [var]	-52.87817	-46.94575	5.932426	46.41946
● PF_t@GRID []	0.997416	0.997416	0.000000	0.997416
● F_fund@GRID [Hz]	49.99573	49.99573	0.000000	49.99573

During dip (t1+100ms)


U1 [V]
163
-1
-165
A1 [A]
2.30
-0.16
-2.61
U1_t... [V]
227.32
223.25
219.17
I1_t... [A]
3.340
3.213
3.086
P_t_... [W]
739.9
718.8
697.6
S_t_...[VA]
741.5
720.2
699.0
Q_t_...var]
37.9
4.7
-28.6
PF_t...D []
0.997747
0.997595
0.997444
F_fu...[Hz]
50.000301
49.999851
49.999401
1:11.00
A
1:12.00
1:13.00
1:14.00
B
1:15.00
1:16.00
1:16.858
7.00

	A	B	间隔	有效值
时间 [s]	1:11.7015	1:14.7044	3.0030	
U1 [V]	303.4624	176.6838	-126.7786	230.1137
A1 [A]	4.488541	2.291275	-2.197266	3.135168
U1_tRMS_rc@GRID [V]	216.3299	229.2872	12.95729	230.0388
I1_tRMS_rc@GRID [A]	3.309739	3.041971	-0.267768	3.134963
P_t_rc@GRID [W]	714.4332	696.0787	-18.35449	719.6823
S_t_rc@GRID [VA]	715.9955	697.4850	-18.51050	721.2651
Q_t_rc@GRID [var]	47.27345	44.26987	-3.003578	47.75661
PF_t@GRID []	0.997840	0.997568	-2.718e-4	0.997509
F_fund@GRID [Hz]	49.99947	50.00016	6.905e-4	49.99994

After dip (t2+3s)


U1 [V]
162
-1
-164
A1 [A]
2.30
-0.16
-2.61
U1_t... [V]
227.32
223.25
219.17
I1_t... [A]
3.336
3.209
3.084
P_t_... [W]
739.9
718.8
697.6
S_t_...[VA]
741.5
720.2
699.0
Q_t_...var]
37.9
4.7
-28.6
PF_t...D []
0.997747
0.997595
0.997444
F_fu...[Hz]
50.000394
50.000036
49.999679
1:11.25
1:11.50
A
1:11.75
B
1:12.00
1:12.25
1:12.50

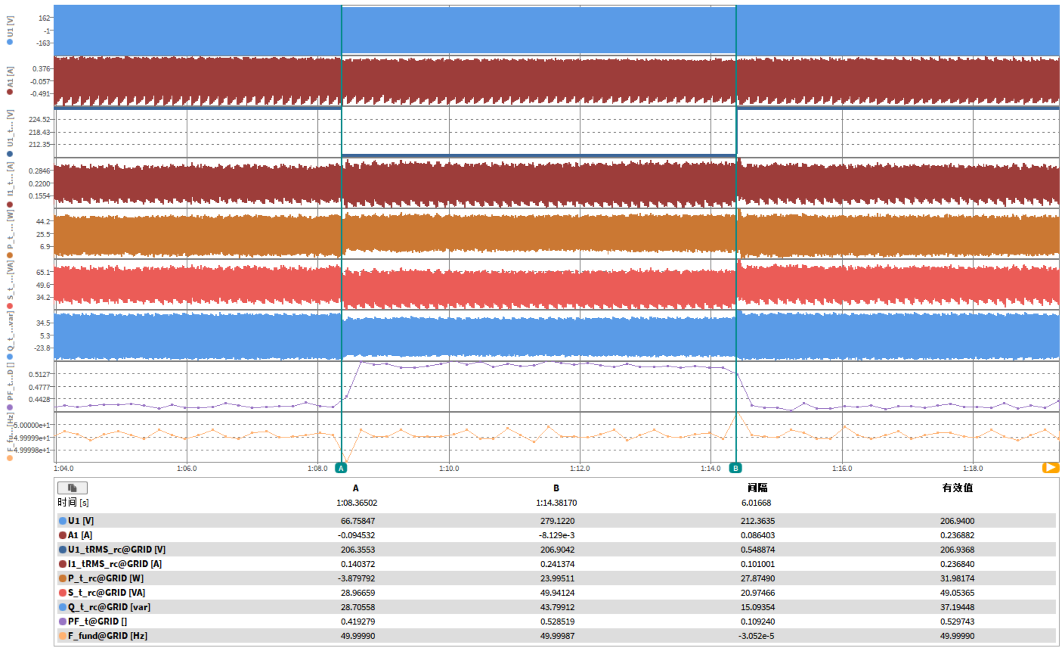
	A	B	间隔	有效值
时间 [s]	1:11.7015	1:11.9158	0.2143	
U1 [V]	303.4624	-44.85552	-348.3179	229.4510
A1 [A]	4.488541	-0.817227	-5.305767	3.151614
U1_tRMS_rc@GRID [V]	216.3299	231.2382	14.90826	228.9136
I1_tRMS_rc@GRID [A]	3.309739	3.238085	-0.071654	3.150517
P_t_rc@GRID [W]	714.4332	747.4067	32.97351	719.1817
S_t_rc@GRID [VA]	715.9955	748.7689	32.77332	720.8673
Q_t_rc@GRID [var]	47.27345	-45.14388	-92.41733	49.26684
PF_t@GRID []	0.997840	0.997292	-5.481e-4	0.997566
F_fund@GRID [Hz]	49.99947	50.00075	1.282e-3	50.00011

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	5.1	5.2	5.3	5.4
	1	Date	--	--	dd.mm .yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm :ss	See graph			
	3	Fault type (phase)	--	--		VD5		VD10	
	4	Setting voltage depth	Line to line	--	p.u.	0.90			
	5	Setting dip duration		--		6000			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	6016.68			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.90			
	10		Pos.		p.u.	0.90			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.006	1.005	1.006	1.005
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.018	0.312	1.011	0.311
	13	Active power	Total	t1-10s to t1	p.u.	1.024	0.313	1.017	0.312
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.032	-0.022	0.029	-0.022
	16		Pos.			--	--	--	--
	17	Cos$_{\varphi}$	--	t1-10s to t1	--	0.9995	0.9972	0.9995	0.9968
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.896	0.896	-- -- 0.897	-- -- 0.896
	19	Line current	Phase 1	t1+50ms	p.u.	1.129	0.323	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	1.119	0.325
	22	Line current	Phase 1	t1+80ms	p.u.	1.146	0.351	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	1.130	0.349
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.022	0.313	1.010	0.312
	26		Pos.			--	--	--	--

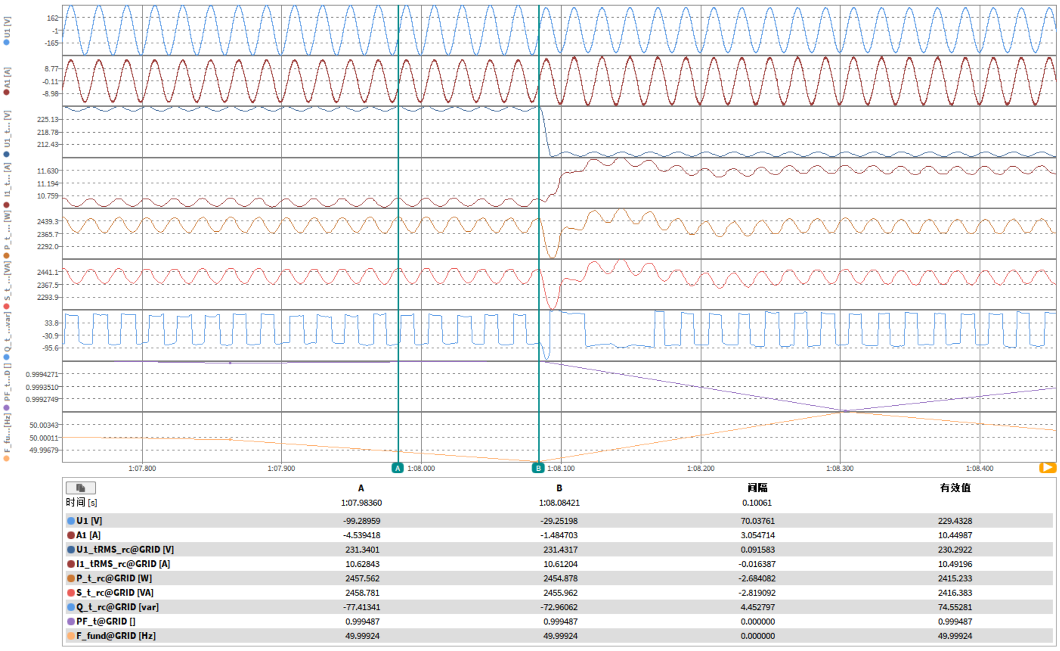
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	0.998	0.997	0.998	1.005
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.994	0.286	0.987	0.315
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.193	0.108	0.198	0.178
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.033	-0.023	0.029	0.022
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.193	0.108	0.198	0.178
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 5.1


U1 [V]
162
-1
-163
A1 [A]
0.376
-0.057
-0.491
U1_t... [V]
224.52
218.43
212.35
I1_t... [A]
0.2846
0.2200
0.1554
P_t_... [W]
44.2
25.5
6.9
S_t_... [VA]
65.1
49.6
34.2
Q_t_...var]
34.5
5.3
-23.8
PF_t...D []
0.5127
0.4777
0.4428
F_fu... [Hz]
5.00000e+1
4.99999e+1
4.99998e+1
1:04.0
1:06.0
1:08.0
A
1:10.0
1:12.0
1:14.0
B
1:16.0
1:18.0

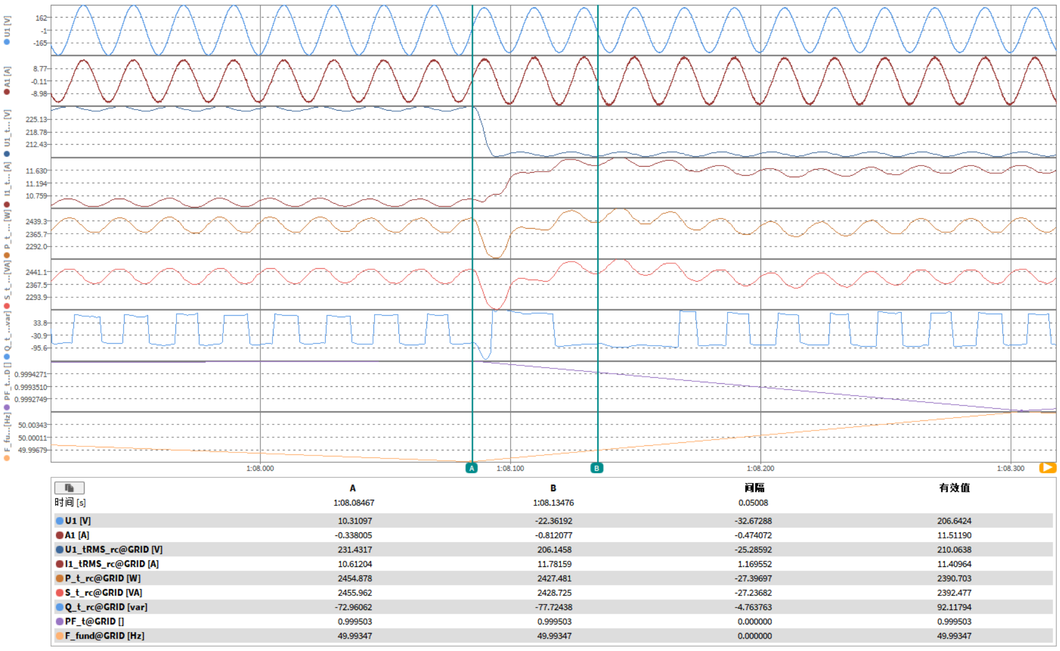
	A	B	间隔	有效值
时间 [s]	1:08.36502	1:14.38170	6.01668	
U1 [V]	66.75847	279.1220	212.3635	206.9400
A1 [A]	-0.094532	-8.129e-3	0.086403	0.236882
U1_tRMS_rc@GRID [V]	206.3553	206.9042	0.548874	206.9368
I1_tRMS_rc@GRID [A]	0.140372	0.241374	0.101001	0.236840
P_t_rc@GRID [W]	-3.879792	23.99511	27.87490	31.98174
S_t_rc@GRID [VA]	28.96659	49.94124	20.97466	49.05365
Q_t_rc@GRID [var]	28.70558	43.79912	15.09354	37.19448
PF_t@GRID []	0.419279	0.528519	0.109240	0.529743
F_fund@GRID [Hz]	49.99990	49.99987	-3.052e-5	49.99990

Empty load


U1 [V]
162
-1
-165
A1 [A]
8.77
-0.11
-8.98
U1_t... [V]
225.13
218.78
212.43
I1_t... [A]
11.630
11.194
10.759
P_t... [W]
2439.3
2365.7
2292.0
S_t... [VA]
2441.1
2367.5
2293.9
Q_t... [var]
33.8
-30.9
-95.6
PF_t...D []
0.9994271
0.9993510
0.9992749
F_fu... [Hz]
50.00343
50.00011
49.99679
1:07.800
1:07.900
A
1:08.000
B
1:08.100
1:08.200
1:08.300
1:08.400

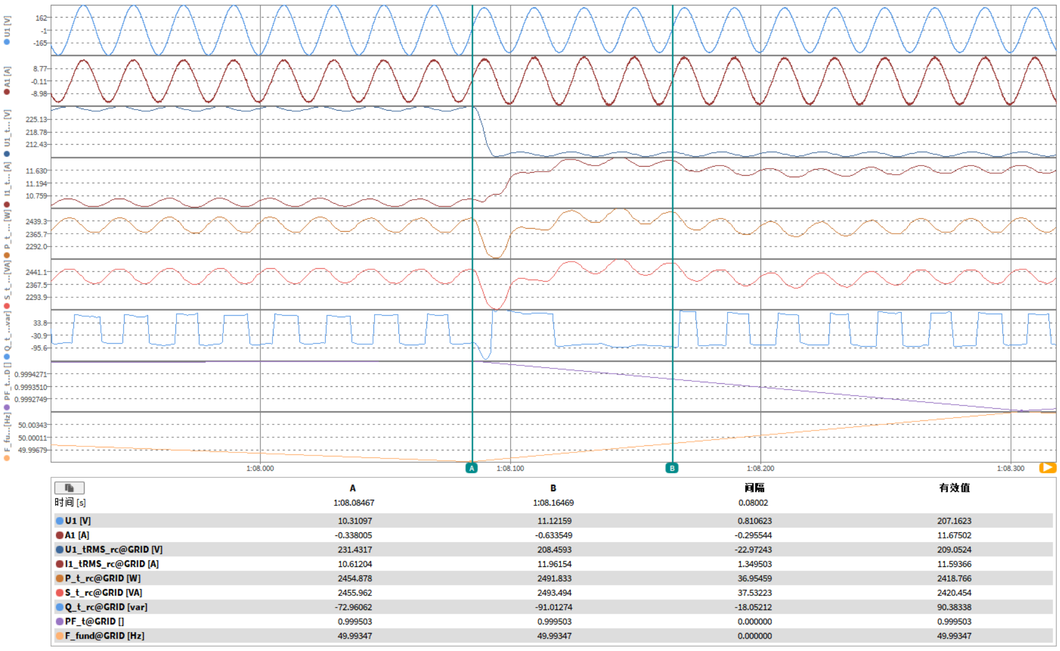
时间 [s]	A	B	间隔	有效值
	1:07.98360	1:08.08421	0.10061	
● **U1 [V]**	-99.28959	-29.25198	70.03761	229.4328
● **A1 [A]**	-4.539418	-1.484703	3.054714	10.44987
● **U1_tRMS_rc@GRID [V]**	231.3401	231.4317	0.091583	230.2922
● **I1_tRMS_rc@GRID [A]**	10.62843	10.61204	-0.016387	10.49196
● **P_t_rc@GRID [W]**	2457.562	2454.878	-2.684082	2415.233
● **S_t_rc@GRID [VA]**	2458.781	2455.962	-2.819092	2416.383
● **Q_t_rc@GRID [var]**	-77.41341	-72.96062	4.452797	74.55281
● **PF_t@GRID []**	0.999487	0.999487	0.000000	0.999487
● **F_fund@GRID [Hz]**	49.99924	49.99924	0.000000	49.99924

Before dip (t1-100ms)


U1 [V]
162
-1
-165
A1 [A]
8.77
-0.11
-8.98
U1_t... [V]
225.13
218.78
212.43
I1_t... [A]
11.630
11.194
10.759
P_t... [W]
2439.3
2365.7
2292.0
S_t... [VA]
2441.1
2367.5
2293.9
Q_t... [var]
33.8
-30.9
-95.6
PF_t...D []
0.9994271
0.9993510
0.9992749
F_fu... [Hz]
50.00343
50.00011
49.99679
1:08.000
A
1:08.100
B
1:08.200
1:08.300

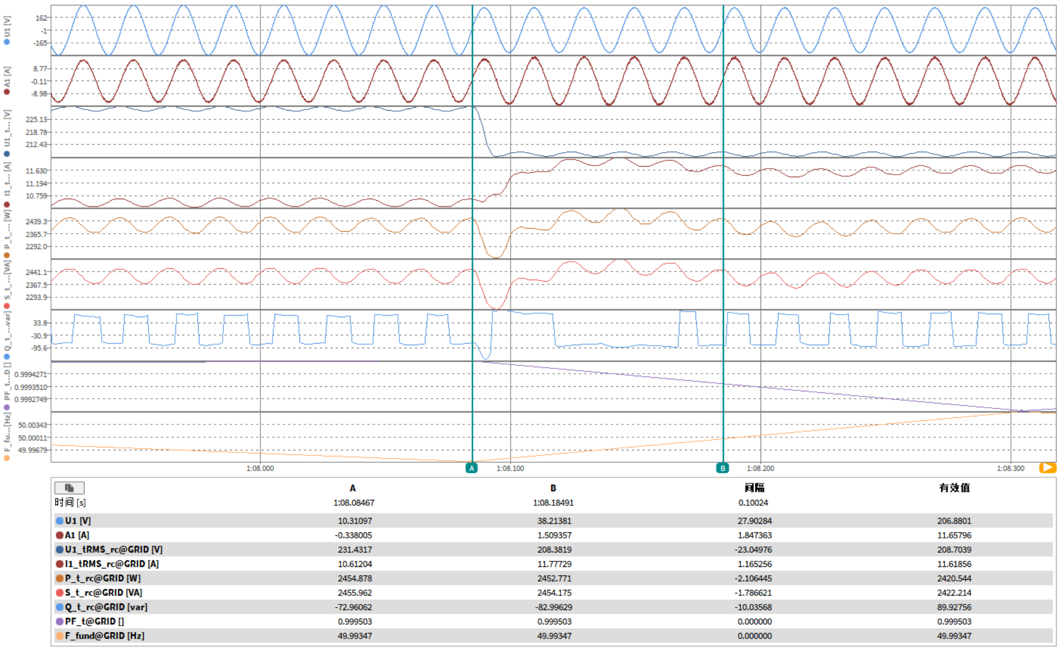
时间 [s]	A	B	间隔	有效值
	1:08.08467	1:08.13476	0.05008	
● **U1 [V]**	10.31097	-22.36192	-32.67288	206.6424
● **A1 [A]**	-0.338005	-0.812077	-0.474072	11.51190
● **U1_tRMS_rc@GRID [V]**	231.4317	206.1458	-25.28592	210.0638
● **I1_tRMS_rc@GRID [A]**	10.61204	11.78159	1.169552	11.40964
● **P_t_rc@GRID [W]**	2454.878	2427.481	-27.39697	2390.703
● **S_t_rc@GRID [VA]**	2455.962	2428.725	-27.23682	2392.477
● **Q_t_rc@GRID [var]**	-72.96062	-77.72438	-4.763763	92.11794
● **PF_t@GRID []**	0.999503	0.999503	0.000000	0.999503
● **F_fund@GRID [Hz]**	49.99347	49.99347	0.000000	49.99347

During dip (t1+50ms)


U1 [V]
162
-1
-165
A1 [A]
8.77
-0.11
-8.98
U1_t... [V]
225.13
218.78
212.43
I1_t... [A]
11.630
11.194
10.759
P_t_... [W]
2439.3
2365.7
2292.0
S_t_... [VA]
2441.1
2367.5
2293.9
Q_t_... [var]
33.8
-30.9
-95.6
PF_t...D []
0.9994271
0.9993510
0.9992749
F_fu... [Hz]
50.00343
50.00011
49.99679
1:08.000
A
1:08.100
B
1:08.200
1:08.300

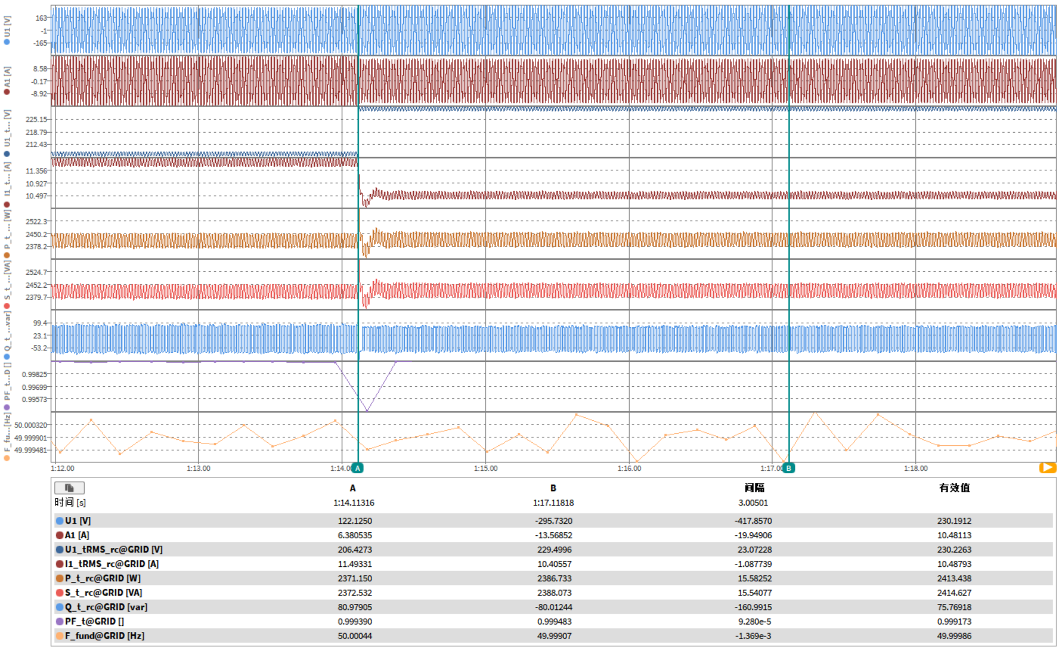
时间 [s]	A 1:08.08467	B 1:08.16469	间隔 0.08002	有效值
● U1 [V]	10.31097	11.12159	0.810623	207.1623
● A1 [A]	-0.338005	-0.633549	-0.295544	11.67502
● U1_tRMS_rc@GRID [V]	231.4317	208.4593	-22.97243	209.0524
● I1_tRMS_rc@GRID [A]	10.61204	11.96154	1.349503	11.59366
● P_t_rc@GRID [W]	2454.878	2491.833	36.95459	2418.766
● S_t_rc@GRID [VA]	2455.962	2493.494	37.53223	2420.454
● Q_t_rc@GRID [var]	-72.96062	-91.01274	-18.05212	90.38338
● PF_t@GRID []	0.999503	0.999503	0.000000	0.999503
● F_fund@GRID [Hz]	49.99347	49.99347	0.000000	49.99347

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
8.77
-0.11
-8.98
U1_t... [V]
225.13
218.78
212.43
I1_t... [A]
11.630
11.194
10.759
P_t_... [W]
2439.3
2365.7
2292.0
S_t_... [VA]
2441.1
2367.5
2293.9
Q_t_... [var]
33.8
-30.9
-95.6
PF_t...D []
0.9994271
0.9993510
0.9992749
F_fu... [Hz]
50.00343
50.00011
49.99679
1:08.000
A
1:08.100
B
1:08.200
1:08.300

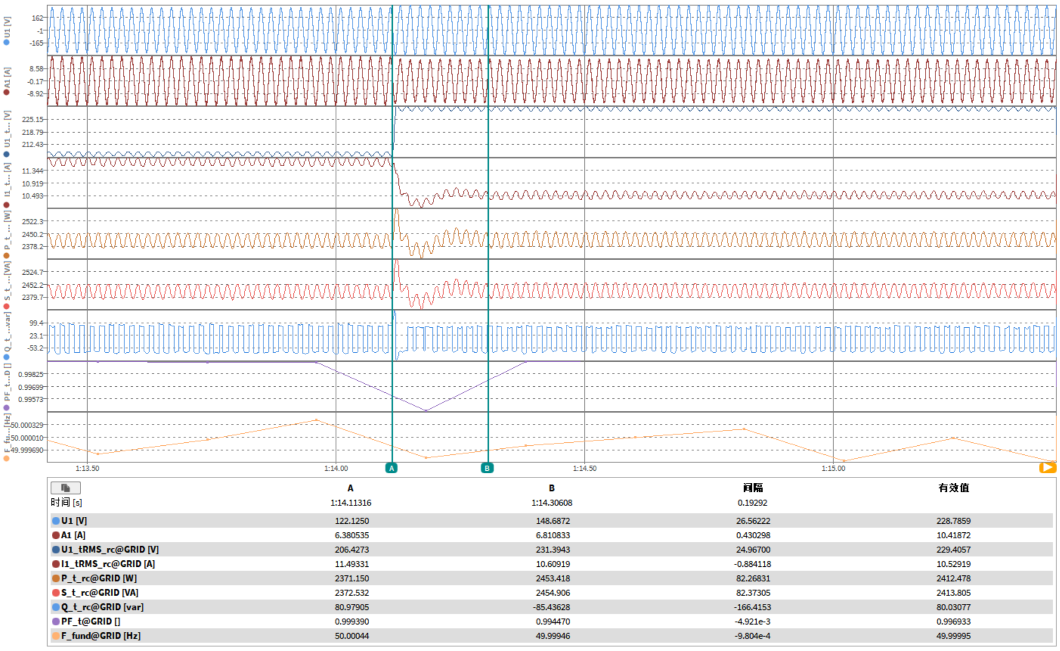
时间 [s]	A 1:08.08467	B 1:08.18491	间隔 0.10024	有效值
● U1 [V]	10.31097	38.21381	27.90284	206.8801
● A1 [A]	-0.338005	1.509357	1.847363	11.65796
● U1_tRMS_rc@GRID [V]	231.4317	208.3819	-23.04976	208.7039
● I1_tRMS_rc@GRID [A]	10.61204	11.77729	1.165256	11.61856
● P_t_rc@GRID [W]	2454.878	2452.771	-2.106445	2420.544
● S_t_rc@GRID [VA]	2455.962	2454.175	-1.786621	2422.214
● Q_t_rc@GRID [var]	-72.96062	-82.99629	-10.03568	89.92756
● PF_t@GRID []	0.999503	0.999503	0.000000	0.999503
● F_fund@GRID [Hz]	49.99347	49.99347	0.000000	49.99347

During dip (t1+100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_...var]
PF_t...D []
F_fu...[Hz]
163
-1
-165
8.58
-0.17
-8.92
225.15
218.79
212.43
11.356
10.927
10.497
2522.3
2450.2
2378.2
2524.7
2452.2
2379.7
99.4
23.1
-53.2
0.99825
0.99699
0.99573
50.000320
49.999901
49.999481
1:12.00
1:13.00
1:14.00
A
1:15.00
1:16.00
1:17.00
B
1:18.00

	A	B	间隔	有效值
时间 [s]	1:14.11316	1:17.11818	3.00501	
● U1 [V]	122.1250	-295.7320	-417.8570	230.1912
● A1 [A]	6.380535	-13.56852	-19.94906	10.48113
● U1_tRMS_rc@GRID [V]	206.4273	229.4996	23.07228	230.2263
● I1_tRMS_rc@GRID [A]	11.49331	10.40557	-1.087739	10.48793
● P_t_rc@GRID [W]	2371.150	2386.733	15.58252	2413.438
● S_t_rc@GRID [VA]	2372.532	2388.073	15.54077	2414.627
● Q_t_rc@GRID [var]	80.97905	-80.01244	-160.9915	75.76918
● PF_t@GRID []	0.999390	0.999483	9.280e-5	0.999173
● F_fund@GRID [Hz]	50.00044	49.99907	-1.369e-3	49.99986

After dip (t2+3s)

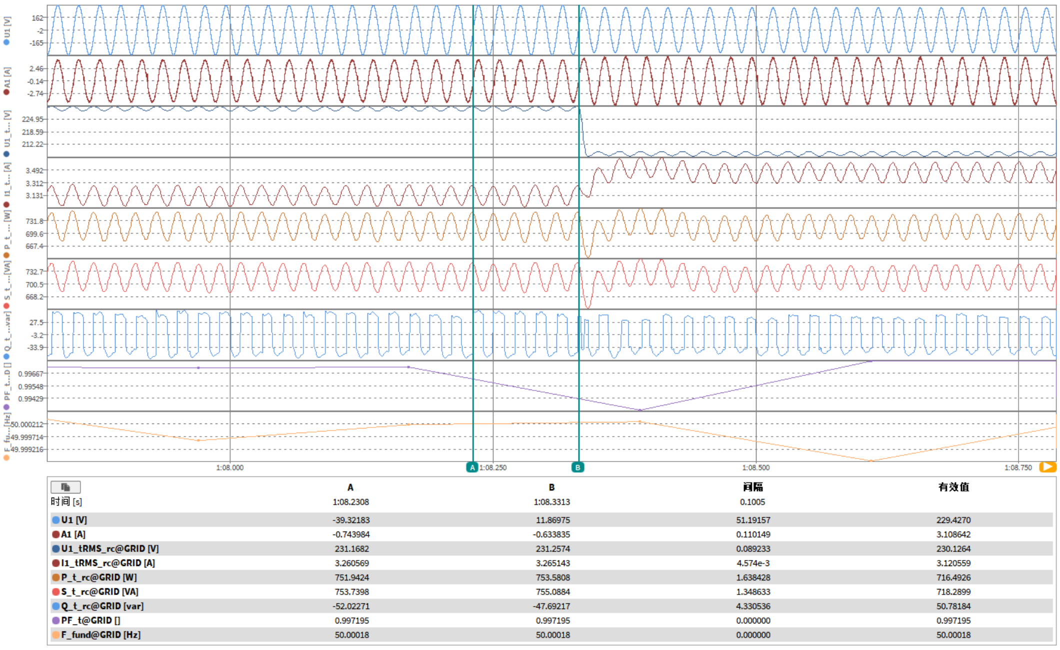

U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_...var]
PF_t...D []
F_fu...[Hz]
162
-1
-165
8.58
-0.17
-8.92
225.15
218.79
212.43
11.344
10.919
10.493
2522.3
2450.2
2378.2
2524.7
2452.2
2379.7
99.4
23.1
-53.2
0.99825
0.99699
0.99573
50.000329
50.000010
49.999690
1:13.50
1:14.00
A
B
1:14.50
1:15.00

	A	B	间隔	有效值
时间 [s]	1:14.11316	1:14.30608	0.19292	
● U1 [V]	122.1250	148.6872	26.56222	228.7859
● A1 [A]	6.380535	6.810833	0.430298	10.41872
● U1_tRMS_rc@GRID [V]	206.4273	231.3943	24.96700	229.4057
● I1_tRMS_rc@GRID [A]	11.49331	10.60919	-0.884118	10.52919
● P_t_rc@GRID [W]	2371.150	2453.418	82.26831	2412.478
● S_t_rc@GRID [VA]	2372.532	2454.906	82.37305	2413.805
● Q_t_rc@GRID [var]	80.97905	-85.43628	-166.4153	80.03077
● PF_t@GRID []	0.999390	0.994470	-4.921e-3	0.996933
● F_fund@GRID [Hz]	50.00044	49.99946	-9.804e-4	49.99995

Recovery time

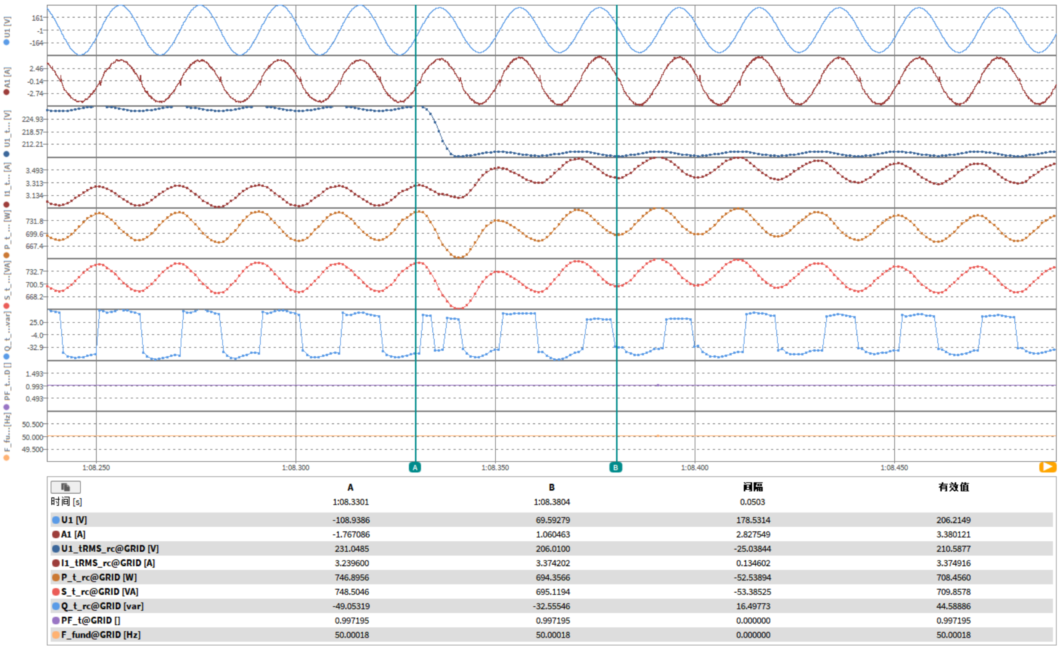
EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

Graph of Test number 5.2


U1 [V]
162
-2
-165
A1 [A]
2.46
-0.14
-2.74
U1_t... [V]
224.95
218.59
212.22
I1_t... [A]
3.492
3.312
3.131
P_t_... [W]
731.8
699.6
667.4
S_t_... [VA]
732.7
700.5
668.2
Q_t_... [var]
27.5
-3.2
-33.9
PF_t... []
0.99667
0.99548
0.99429
F_fu... [Hz]
50.000212
49.999714
49.999216
1:08.000
A
1:08.250
B
1:08.500
1:08.750

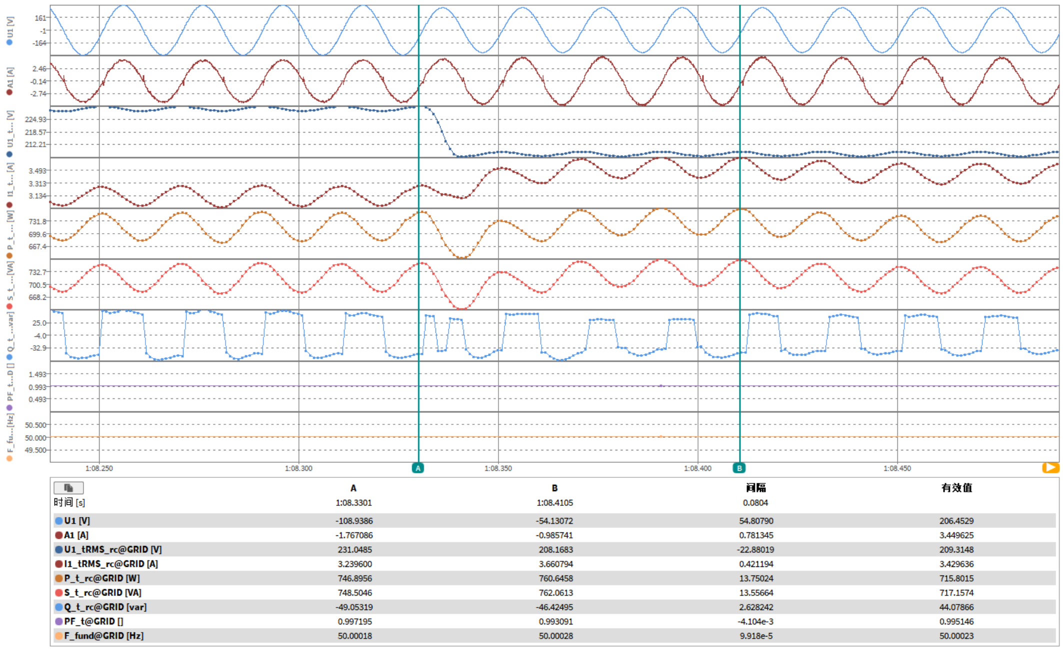
	A	B	间隔	有效值
时间 [s]	1:08.2308	1:08.3313	0.1005	
● **U1 [V]**	-39.32183	11.86975	51.19157	229.4270
● **A1 [A]**	-0.743984	-0.633835	0.110149	3.108642
● **U1_tRMS_rc@GRID [V]**	231.1682	231.2574	0.089233	230.1264
● **I1_tRMS_rc@GRID [A]**	3.260569	3.265143	4.574e-3	3.120559
● **P_t_rc@GRID [W]**	751.9424	753.5808	1.638428	716.4926
● **S_t_rc@GRID [VA]**	753.7398	755.0884	1.348633	718.2899
● **Q_t_rc@GRID [var]**	-52.02271	-47.69217	4.330536	50.78184
● **PF_t@GRID []**	0.997195	0.997195	0.000000	0.997195
● **F_fund@GRID [Hz]**	50.00018	50.00018	0.000000	50.00018

Before dip (t1-100ms)


U1 [V]
161
-1
-164
A1 [A]
2.46
-0.14
-2.74
U1_t... [V]
224.93
218.57
212.21
I1_t... [A]
3.493
3.313
3.134
P_t_... [W]
731.8
699.6
667.4
S_t_... [VA]
732.7
700.5
668.2
Q_t_... [var]
25.0
-4.0
-32.9
PF_t... []
1.493
0.993
0.493
F_fu... [Hz]
50.500
50.000
49.500
1:08.250
1:08.300
A
1:08.350
B
1:08.400
1:08.450

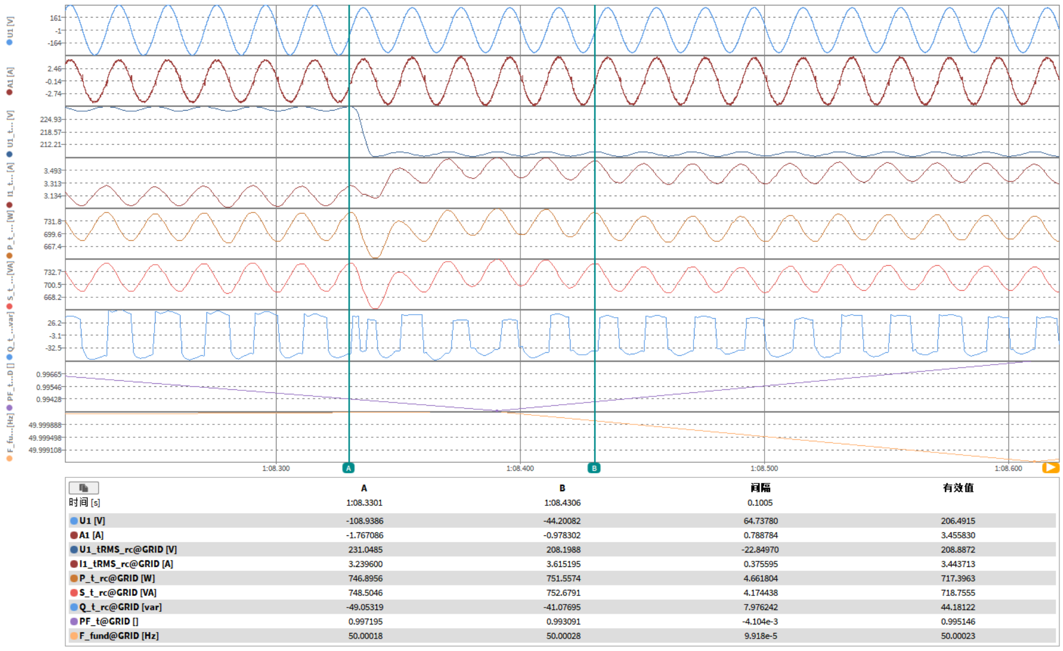
	A	B	间隔	有效值
时间 [s]	1:08.3301	1:08.3804	0.0503	
● **U1 [V]**	-108.9386	69.59279	178.5314	206.2149
● **A1 [A]**	-1.767086	1.060463	2.827549	3.380121
● **U1_tRMS_rc@GRID [V]**	231.0485	206.0100	-25.03844	210.5877
● **I1_tRMS_rc@GRID [A]**	3.239600	3.374202	0.134602	3.374916
● **P_t_rc@GRID [W]**	746.8956	694.3566	-52.53894	708.4560
● **S_t_rc@GRID [VA]**	748.5046	695.1194	-53.38525	709.8578
● **Q_t_rc@GRID [var]**	-49.05319	-32.55546	16.49773	44.58886
● **PF_t@GRID []**	0.997195	0.997195	0.000000	0.997195
● **F_fund@GRID [Hz]**	50.00018	50.00018	0.000000	50.00018

During dip (t1+50ms)


161
-1
-164
2.46
-0.14
-2.74
224.93
218.57
212.21
3.493
3.313
3.134
731.8
699.6
667.4
732.7
700.5
668.2
25.0
-4.0
-32.9
1.493
0.993
0.493
50.500
50.000
49.500
1:08.250
1:08.300
A
1:08.350
1:08.400
B
1:08.450

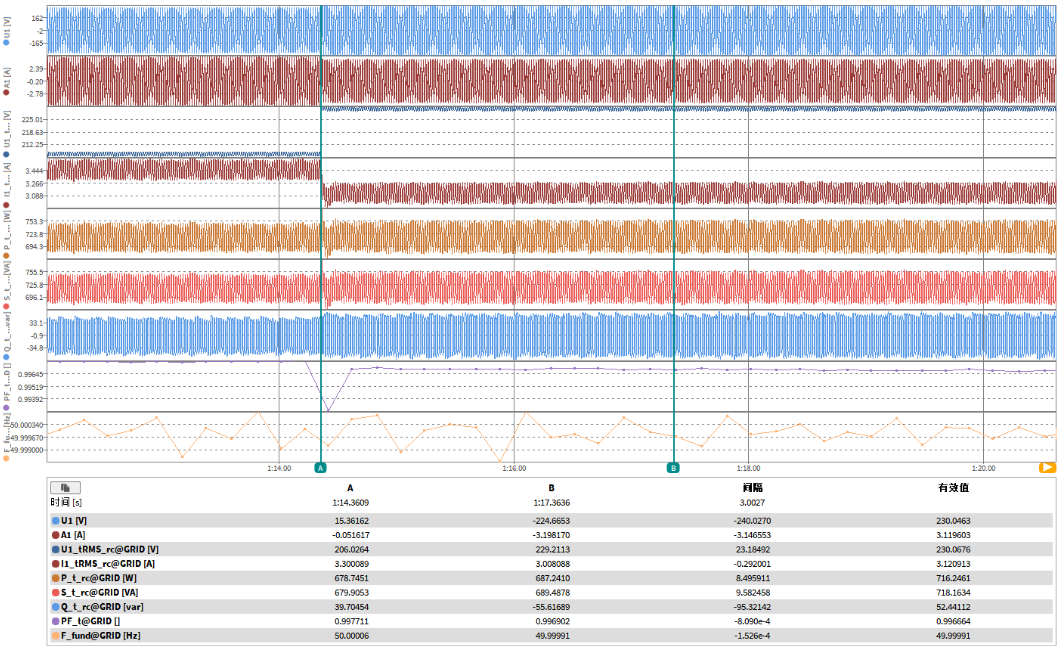
时间 [s]	A 1:08.3301	B 1:08.4105	间隔 0.0804	有效值
U1 [V]	-108.9386	-54.13072	54.80790	206.4529
A1 [A]	-1.767086	-0.985741	0.781345	3.449625
U1_tRMS_rc@GRID [V]	231.0485	208.1683	-22.88019	209.3148
I1_tRMS_rc@GRID [A]	3.239600	3.660794	0.421194	3.429636
P_t_rc@GRID [W]	746.8956	760.6458	13.75024	715.8015
S_t_rc@GRID [VA]	748.5046	762.0613	13.55664	717.1574
Q_t_rc@GRID [var]	-49.05319	-46.42495	2.628242	44.07866
PF_t@GRID []	0.997195	0.993091	-4.104e-3	0.995146
F_fund@GRID [Hz]	50.00018	50.00028	9.918e-5	50.00023

During dip (t1+80ms)


161
-1
-164
2.46
-0.14
-2.74
224.93
218.57
212.21
3.493
3.313
3.134
731.8
699.6
667.4
732.7
700.5
668.2
26.2
-3.1
-32.5
0.99665
0.99546
0.99428
49.999888
49.999498
49.999108
1:08.300
A
1:08.400
B
1:08.500
1:08.600

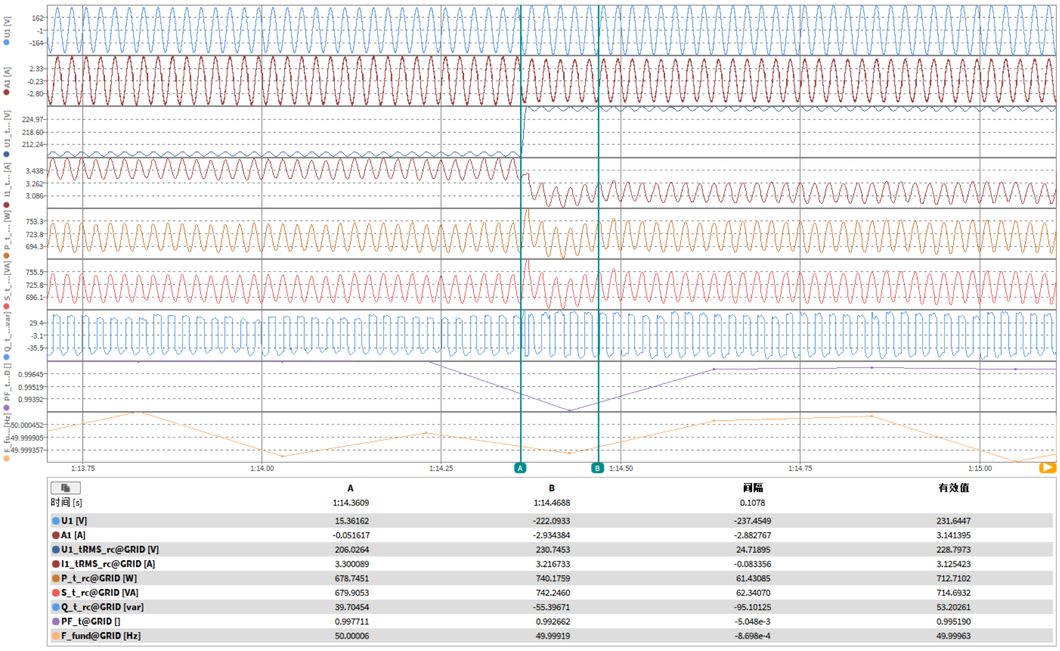
时间 [s]	A 1:08.3301	B 1:08.4306	间隔 0.1005	有效值
U1 [V]	-108.9386	-44.20082	64.73780	206.4915
A1 [A]	-1.767086	-0.978302	0.788784	3.455830
U1_tRMS_rc@GRID [V]	231.0485	208.1988	-22.84970	208.8872
I1_tRMS_rc@GRID [A]	3.239600	3.615195	0.375595	3.443713
P_t_rc@GRID [W]	746.8956	751.5574	4.661804	717.3963
S_t_rc@GRID [VA]	748.5046	752.6791	4.174438	718.7555
Q_t_rc@GRID [var]	-49.05319	-41.07695	7.976242	44.18122
PF_t@GRID []	0.997195	0.993091	-4.104e-3	0.995146
F_fund@GRID [Hz]	50.00018	50.00028	9.918e-5	50.00023

During dip (t1+100ms)


U1 [V]
162
-2
-165
A1 [A]
2.39
-0.20
-2.78
U1_t... [V]
225.01
218.63
212.25
I1_t... [A]
3.444
3.266
3.088
P_t_... [W]
753.3
723.8
694.3
S_t_...[VA]
755.5
725.8
696.1
Q_t_...var]
33.1
-0.9
-34.8
PF_t...D []
0.99645
0.99519
0.99392
F_fu... [Hz]
50.000340
49.999670
49.999000
1:14.00
A
1:16.00
B
1:18.00
1:20.00

时间 [s]	A	B	间隔	有效值
	1:14.3609	1:17.3636	3.0027	
● U1 [V]	15.36162	-224.6653	-240.0270	230.0463
● A1 [A]	-0.051617	-3.198170	-3.146553	3.119603
● U1_tRMS_rc@GRID [V]	206.0264	229.2113	23.18492	230.0676
● I1_tRMS_rc@GRID [A]	3.300089	3.008088	-0.292001	3.120913
● P_t_rc@GRID [W]	678.7451	687.2410	8.495911	716.2461
● S_t_rc@GRID [VA]	679.9053	689.4878	9.582458	718.1634
● Q_t_rc@GRID [var]	39.70454	-55.61689	-95.32142	52.44112
● PF_t@GRID []	0.997711	0.996902	-8.090e-4	0.996664
● F_fund@GRID [Hz]	50.00006	49.99991	-1.526e-4	49.99991

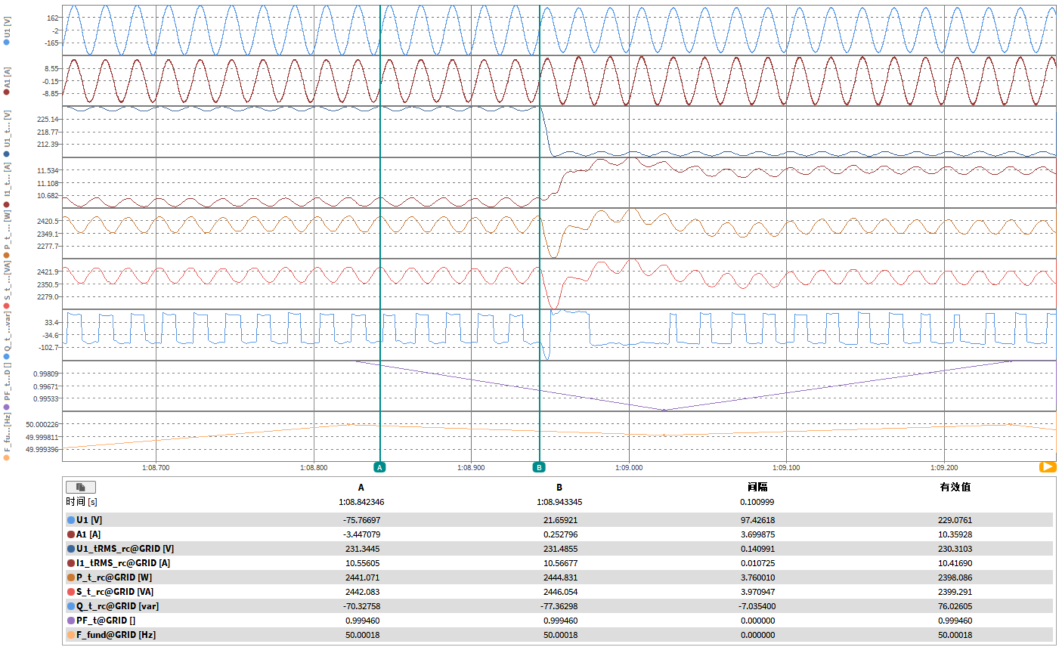
After dip (t2+3s)


U1 [V]
162
-1
-164
A1 [A]
2.33
-0.23
-2.80
U1_t... [V]
224.97
218.60
212.24
I1_t... [A]
3.438
3.262
3.086
P_t_... [W]
753.3
723.8
694.3
S_t_...[VA]
755.5
725.8
696.1
Q_t_...var]
29.4
-3.1
-35.5
PF_t...D []
0.99645
0.99519
0.99392
F_fu... [Hz]
50.000452
49.999905
49.999357
1:13.75
1:14.00
1:14.25
A
B
1:14.50
1:14.75
1:15.00

时间 [s]	A	B	间隔	有效值
	1:14.3609	1:14.4688	0.1078	
● U1 [V]	15.36162	-222.0933	-237.4549	231.6447
● A1 [A]	-0.051617	-2.934384	-2.882767	3.141395
● U1_tRMS_rc@GRID [V]	206.0264	230.7453	24.71895	228.7973
● I1_tRMS_rc@GRID [A]	3.300089	3.216733	-0.083356	3.125423
● P_t_rc@GRID [W]	678.7451	740.1759	61.43085	712.7102
● S_t_rc@GRID [VA]	679.9053	742.2460	62.34070	714.6932
● Q_t_rc@GRID [var]	39.70454	-55.39671	-95.10125	53.20261
● PF_t@GRID []	0.997711	0.992662	-5.048e-3	0.995190
● F_fund@GRID [Hz]	50.00006	49.99919	-8.698e-4	49.99963

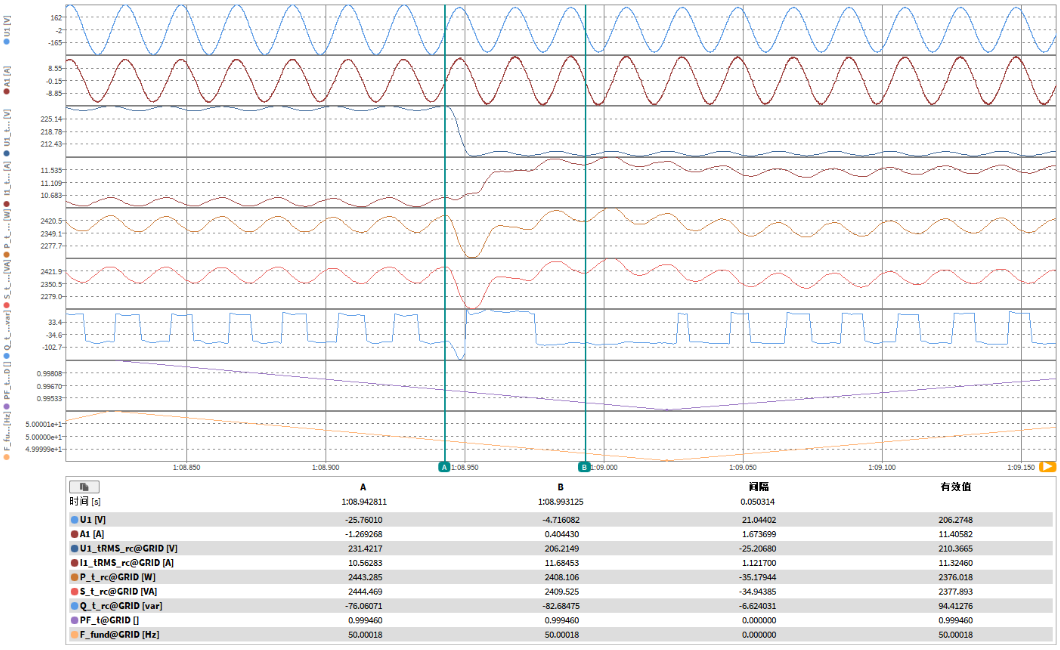
Recovery time

Graph of Test number 5.3


U1 [V]
162
-2
-165
A1 [A]
8.55
-0.15
-8.85
U1_t... [V]
225.14
218.77
212.39
I1_t... [A]
11.534
11.108
10.682
P_t_... [W]
2420.5
2349.1
2277.7
S_t_... [VA]
2421.9
2350.5
2279.0
Q_t_... [var]
33.4
-34.6
-102.7
PF_t... []
0.99809
0.99671
0.99533
F_fu... [Hz]
50.000226
49.999811
49.999396
1:08.700
1:08.800
A
1:08.900
B
1:09.000
1:09.100
1:09.200

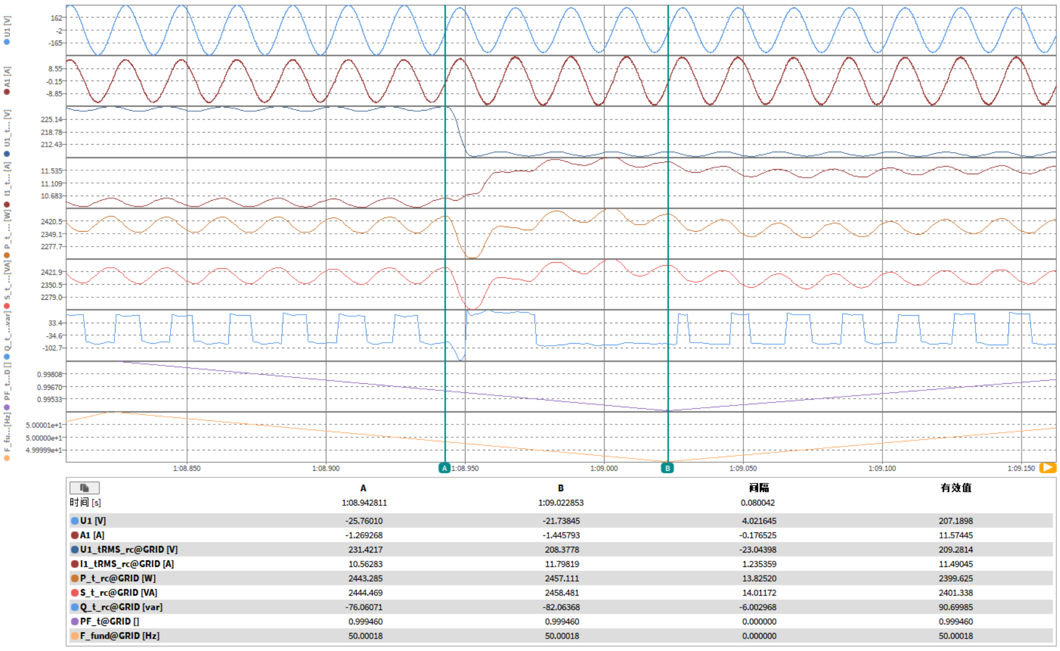
时间 [s]	A 1:08.842346	B 1:08.943345	间隔 0.100999	有效值
U1 [V]	-75.76697	21.65921	97.42618	229.0761
A1 [A]	-3.447079	0.252796	3.699875	10.35928
U1_tRMS_rc@GRID [V]	231.3445	231.4855	0.140991	230.3103
I1_tRMS_rc@GRID [A]	10.55605	10.56677	0.010725	10.41690
P_t_rc@GRID [W]	2441.071	2444.831	3.760010	2398.086
S_t_rc@GRID [VA]	2442.083	2446.054	3.970947	2399.291
Q_t_rc@GRID [var]	-70.32758	-77.36298	-7.035400	76.02605
PF_t@GRID []	0.999460	0.999460	0.000000	0.999460
F_fund@GRID [Hz]	50.00018	50.00018	0.000000	50.00018

Before dip (t1-100ms)


U1 [V]
162
-2
-165
A1 [A]
8.55
-0.15
-8.85
U1_t... [V]
225.14
218.78
212.43
I1_t... [A]
11.535
11.109
10.683
P_t_... [W]
2420.5
2349.1
2277.7
S_t_... [VA]
2421.9
2350.5
2279.0
Q_t_... [var]
33.4
-34.6
-102.7
PF_t... []
0.99808
0.99670
0.99533
F_fu... [Hz]
5.00001e+1
5.00000e+1
4.99999e+1
1:08.850
1:08.900
A
1:08.950
B
1:09.000
1:09.050
1:09.100
1:09.150

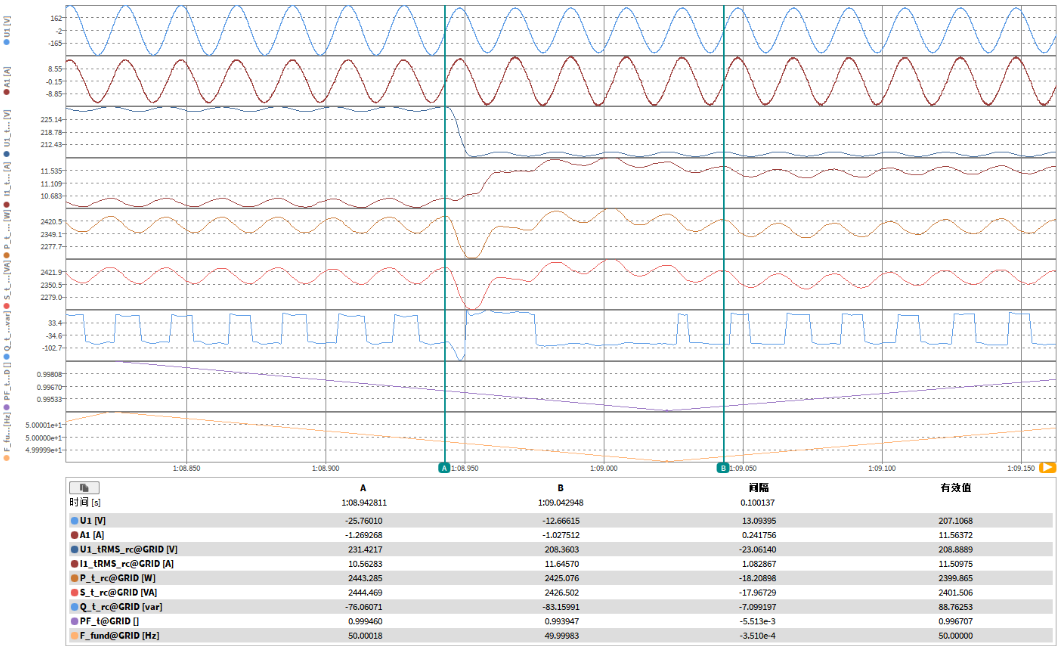
时间 [s]	A 1:08.942811	B 1:08.993125	间隔 0.050314	有效值
U1 [V]	-25.76010	-4.716082	21.04402	206.2748
A1 [A]	-1.269268	0.404430	1.673699	11.40582
U1_tRMS_rc@GRID [V]	231.4217	206.2149	-25.20680	210.3665
I1_tRMS_rc@GRID [A]	10.56283	11.68453	1.121700	11.32460
P_t_rc@GRID [W]	2443.285	2408.106	-35.17944	2376.018
S_t_rc@GRID [VA]	2444.469	2409.525	-34.94385	2377.893
Q_t_rc@GRID [var]	-76.06071	-82.68475	-6.624031	94.41276
PF_t@GRID []	0.999460	0.999460	0.000000	0.999460
F_fund@GRID [Hz]	50.00018	50.00018	0.000000	50.00018

During dip (t1+50ms)


U1 [V]
162
-2
-165
A1 [A]
8.55
-0.15
-8.85
U1_t... [V]
225.14
218.78
212.43
I1_t... [A]
11.535
11.109
10.683
P_t_... [W]
2420.5
2349.1
2277.7
S_t_... [VA]
2421.9
2350.5
2279.0
Q_t_... [var]
33.4
-34.6
-102.7
PF_t... []
0.99808
0.99670
0.99533
F_fu... [Hz]
5.00001e+1
5.00000e+1
4.99999e+1
1:08.850
1:08.900
A
1:08.950
1:09.000
B
1:09.050
1:09.100
1:09.150

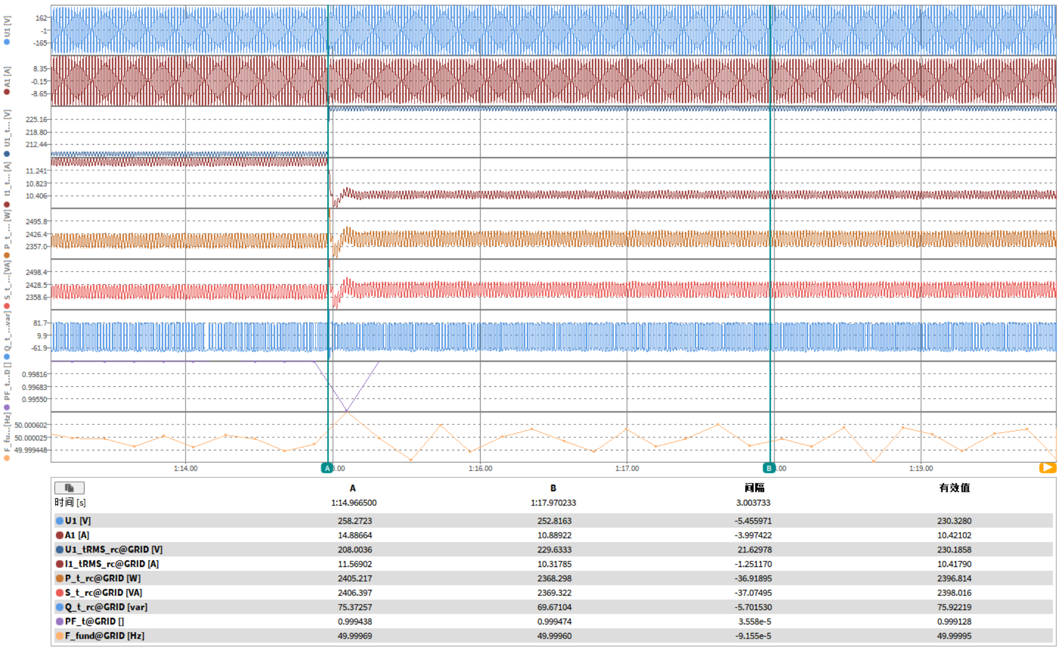
时间 [s]	A 1:08.942811	B 1:09.022853	间隔 0.080042	有效值
U1 [V]	-25.76010	-21.73845	4.021645	207.1898
A1 [A]	-1.269268	-1.445793	-0.176525	11.57445
U1_tRMS_rc@GRID [V]	231.4217	208.3778	-23.04398	209.2814
I1_tRMS_rc@GRID [A]	10.56283	11.79819	1.235359	11.49045
P_t_rc@GRID [W]	2443.285	2457.111	13.82520	2399.625
S_t_rc@GRID [VA]	2444.469	2458.481	14.01172	2401.338
Q_t_rc@GRID [var]	-76.06071	-82.06368	-6.002968	90.69985
PF_t@GRID []	0.999460	0.999460	0.000000	0.999460
F_fund@GRID [Hz]	50.00018	50.00018	0.000000	50.00018

During dip (t1+80ms)


U1 [V]
162
-2
-165
A1 [A]
8.55
-0.15
-8.85
U1_t... [V]
225.14
218.78
212.43
I1_t... [A]
11.535
11.109
10.683
P_t_... [W]
2420.5
2349.1
2277.7
S_t_... [VA]
2421.9
2350.5
2279.0
Q_t_... [var]
33.4
-34.6
-102.7
PF_t... []
0.99808
0.99670
0.99533
F_fu... [Hz]
5.00001e+1
5.00000e+1
4.99999e+1
1:08.850
1:08.900
A
1:08.950
1:09.000
B
1:09.050
1:09.100
1:09.150

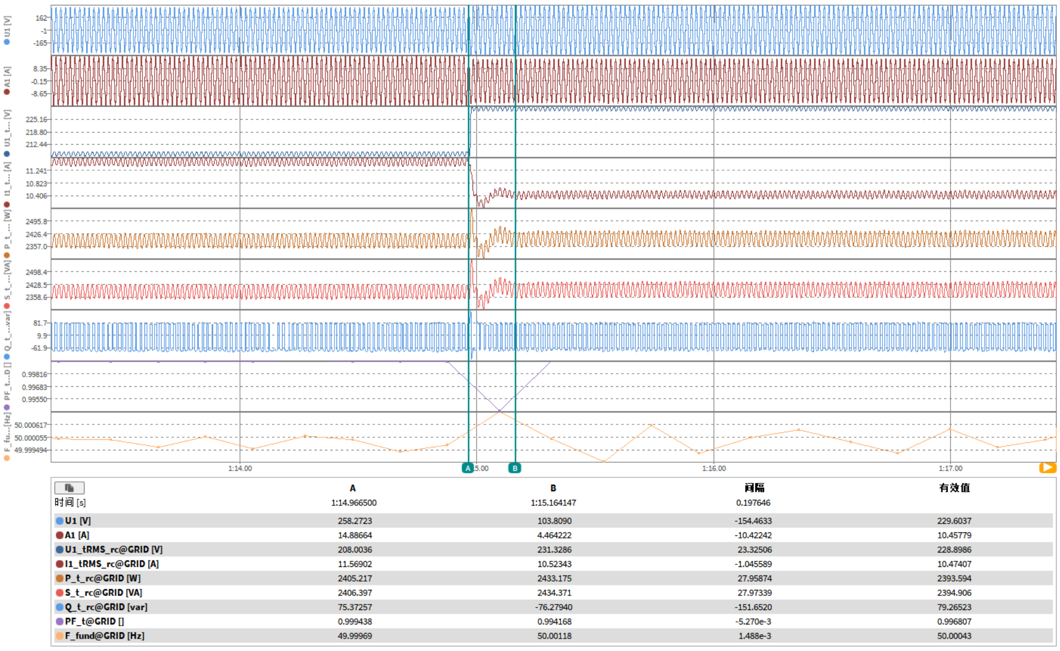
时间 [s]	A 1:08.942811	B 1:09.042948	间隔 0.100137	有效值
U1 [V]	-25.76010	-12.66615	13.09395	207.1068
A1 [A]	-1.269268	-1.027512	0.241756	11.56372
U1_tRMS_rc@GRID [V]	231.4217	208.3603	-23.06140	208.8889
I1_tRMS_rc@GRID [A]	10.56283	11.64570	1.082867	11.50975
P_t_rc@GRID [W]	2443.285	2425.076	-18.20898	2399.865
S_t_rc@GRID [VA]	2444.469	2426.502	-17.96729	2401.506
Q_t_rc@GRID [var]	-76.06071	-83.15991	-7.099197	88.76253
PF_t@GRID []	0.999460	0.993947	-5.513e-3	0.996707
F_fund@GRID [Hz]	50.00018	49.99983	-3.510e-4	50.00000

During dip (t1+100ms)


U1 [V]
162
-1
-165
A1 [A]
8.35
-0.15
-8.65
U1_t... [V]
225.16
218.80
212.44
I1_t... [A]
11.241
10.823
10.406
P_t... [W]
2495.8
2426.4
2357.0
S_t... [VA]
2498.4
2428.5
2358.6
Q_t... [var]
81.7
9.9
-61.9
PF_t... []
0.99816
0.99683
0.99550
F_fu... [Hz]
50.000602
50.000025
49.999448
1:14.00
A
1:16.00
1:17.00
B
1:19.00

	A	B	间隔	有效值
时间 [s]	1:14.966500	1:17.970233	3.003733	
U1 [V]	258.2723	252.8163	-5.455971	230.3280
A1 [A]	14.88664	10.88922	-3.997422	10.42102
U1_tRMS_rc@GRID [V]	208.0036	229.6333	21.62978	230.1858
I1_tRMS_rc@GRID [A]	11.56902	10.31785	-1.251170	10.41790
P_t_rc@GRID [W]	2405.217	2368.298	-36.91895	2396.814
S_t_rc@GRID [VA]	2406.397	2369.322	-37.07495	2398.016
Q_t_rc@GRID [var]	75.37257	69.67104	-5.701530	75.92219
PF_t@GRID []	0.999438	0.999474	3.558e-5	0.999128
F_fund@GRID [Hz]	49.99969	49.99960	-9.155e-5	49.99995

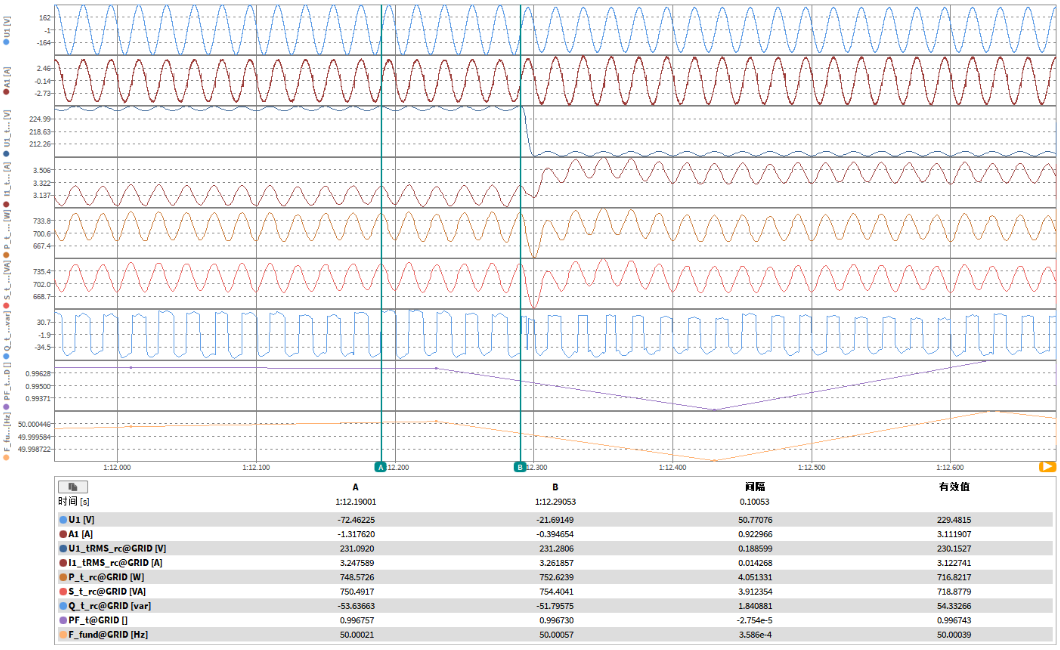
After dip (t2+3s)


U1 [V]
162
-1
-165
A1 [A]
8.35
-0.15
-8.65
U1_t... [V]
225.16
218.80
212.44
I1_t... [A]
11.241
10.823
10.406
P_t... [W]
2495.8
2426.4
2357.0
S_t... [VA]
2498.4
2428.5
2358.6
Q_t... [var]
81.7
9.9
-61.9
PF_t... []
0.99816
0.99683
0.99550
F_fu... [Hz]
50.000617
50.000055
49.999494
1:14.00
A
B
1:16.00
1:17.00

	A	B	间隔	有效值
时间 [s]	1:14.966500	1:15.164147	0.197646	
U1 [V]	258.2723	103.8090	-154.4633	229.6037
A1 [A]	14.88664	4.464222	-10.42242	10.45779
U1_tRMS_rc@GRID [V]	208.0036	231.3286	23.32506	228.8986
I1_tRMS_rc@GRID [A]	11.56902	10.52343	-1.045589	10.47407
P_t_rc@GRID [W]	2405.217	2433.175	27.95874	2393.594
S_t_rc@GRID [VA]	2406.397	2434.371	27.97339	2394.906
Q_t_rc@GRID [var]	75.37257	-76.27940	-151.6520	79.26523
PF_t@GRID []	0.999438	0.994168	-5.270e-3	0.996807
F_fund@GRID [Hz]	49.99969	50.00118	1.488e-3	50.00043

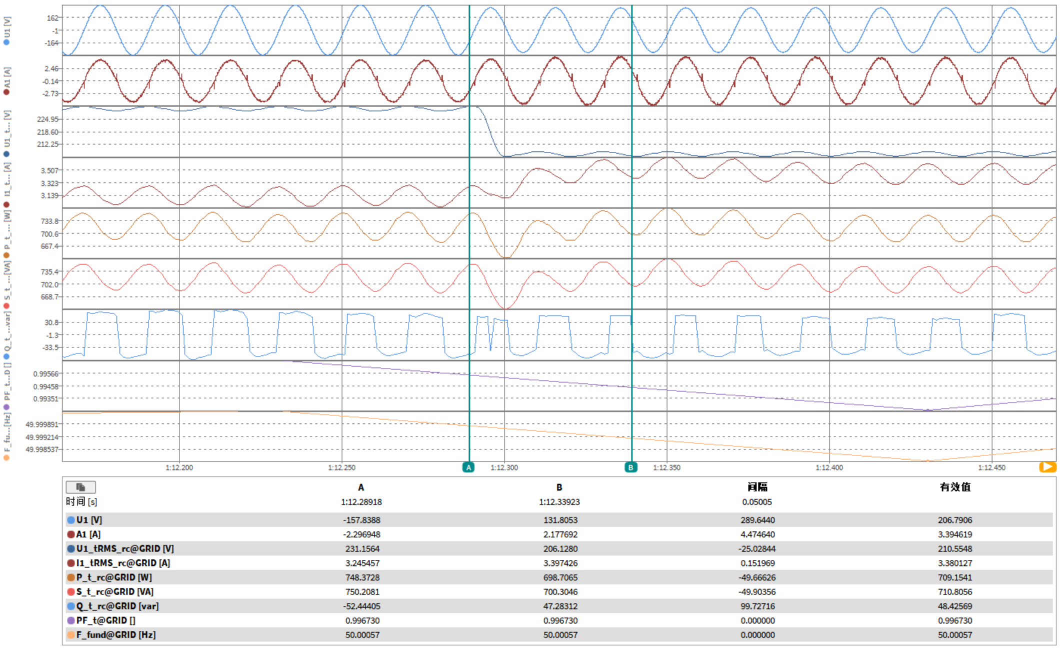
Recovery time

Graph of Test number 5.4


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
162
-1
-164
2.46
-0.14
-2.73
224.99
218.63
212.26
3.506
3.322
3.137
733.8
700.6
667.4
735.4
702.0
668.7
30.7
-1.9
-34.5
0.99628
0.99500
0.99371
50.000446
49.999584
49.998722
1:12.000
1:12.100
A
12.200
B
12.300
1:12.400
1:12.500
1:12.600

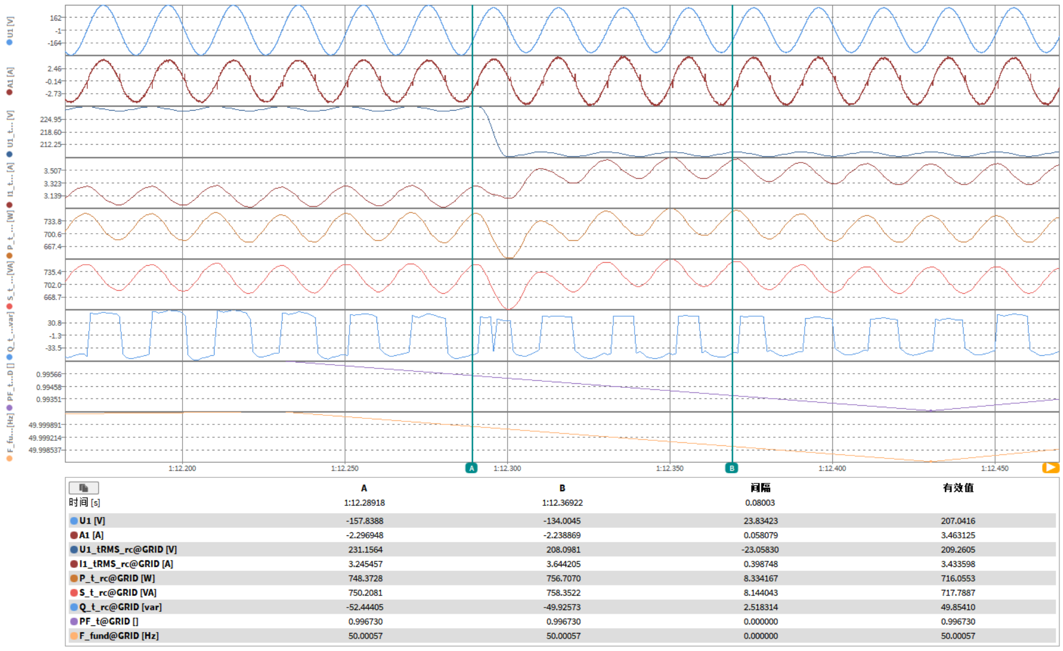
时间 [s]	A	B	间隔	有效值
	1:12.19001	1:12.29053	0.10053	
● **U1 [V]**	-72.46225	-21.69149	50.77076	229.4815
● **A1 [A]**	-1.317620	-0.394654	0.922966	3.111907
● **U1_tRMS_rc@GRID [V]**	231.0920	231.2806	0.188599	230.1527
● **I1_tRMS_rc@GRID [A]**	3.247589	3.261857	0.014268	3.122741
● **P_t_rc@GRID [W]**	748.5726	752.6239	4.051331	716.8217
● **S_t_rc@GRID [VA]**	750.4917	754.4041	3.912354	718.8779
● **Q_t_rc@GRID [var]**	-53.63663	-51.79575	1.840881	54.33266
● **PF_t@GRID []**	0.996757	0.996730	-2.754e-5	0.996743
● **F_fund@GRID [Hz]**	50.00021	50.00057	3.586e-4	50.00039

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t_... [W]
S_t_... [VA]
Q_t_... [var]
PF_t... []
F_fu... [Hz]
162
-1
-164
2.46
-0.14
-2.73
224.95
218.60
212.25
3.507
3.323
3.139
733.8
700.6
667.4
735.4
702.0
668.7
30.8
-1.3
-33.5
0.99566
0.99458
0.99351
49.999891
49.999214
49.998537
1:12.200
1:12.250
A
1:12.300
B
1:12.350
1:12.400
1:12.450

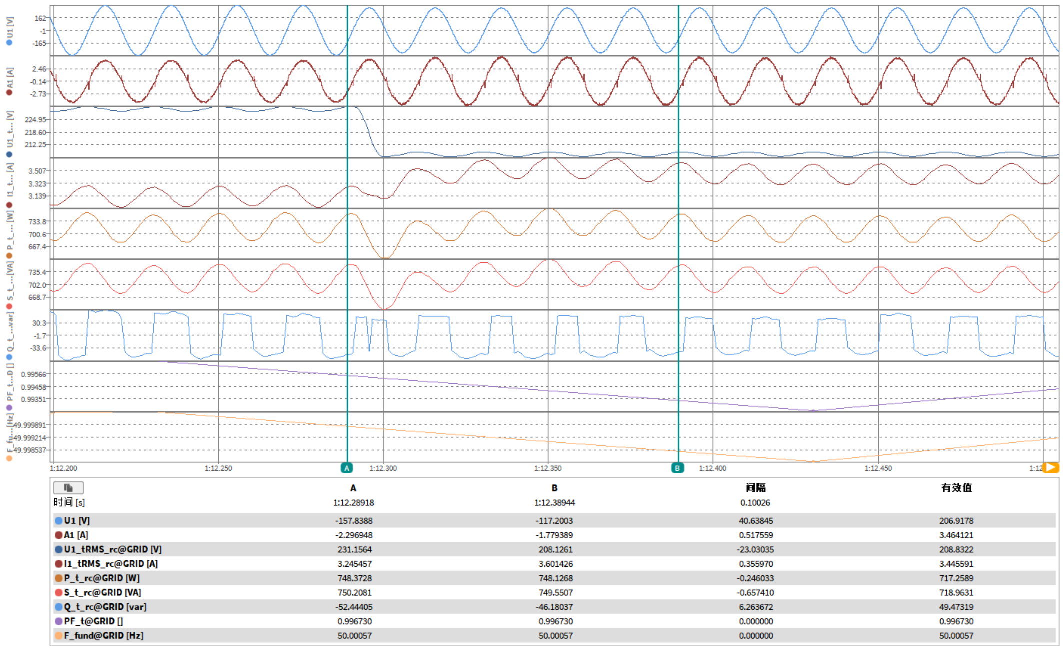
时间 [s]	A	B	间隔	有效值
	1:12.28918	1:12.33923	0.05005	
● **U1 [V]**	-157.8388	131.8053	289.6440	206.7906
● **A1 [A]**	-2.296948	2.177692	4.474640	3.394619
● **U1_tRMS_rc@GRID [V]**	231.1564	206.1280	-25.02844	210.5548
● **I1_tRMS_rc@GRID [A]**	3.245457	3.397426	0.151969	3.380127
● **P_t_rc@GRID [W]**	748.3728	698.7065	-49.66626	709.1541
● **S_t_rc@GRID [VA]**	750.2081	700.3046	-49.90356	710.8056
● **Q_t_rc@GRID [var]**	-52.44405	47.28312	99.72716	48.42569
● **PF_t@GRID []**	0.996730	0.996730	0.000000	0.996730
● **F_fund@GRID [Hz]**	50.00057	50.00057	0.000000	50.00057

During dip (t1+50ms)


U1 [V]
162
-1
-164
A1 [A]
2.46
-0.14
-2.73
U1_t... [V]
224.95
218.60
212.25
I1_t... [A]
3.507
3.323
3.139
P_t_... [W]
733.8
700.6
667.4
S_t_... [VA]
735.4
702.0
668.7
Q_t_... [var]
30.8
-1.3
-33.5
PF_t...D []
0.99566
0.99458
0.99351
F_fu... [Hz]
49.999891
49.999214
49.998537
1:12.200
1:12.250
A
1:12.300
1:12.350
B
1:12.400
1:12.450

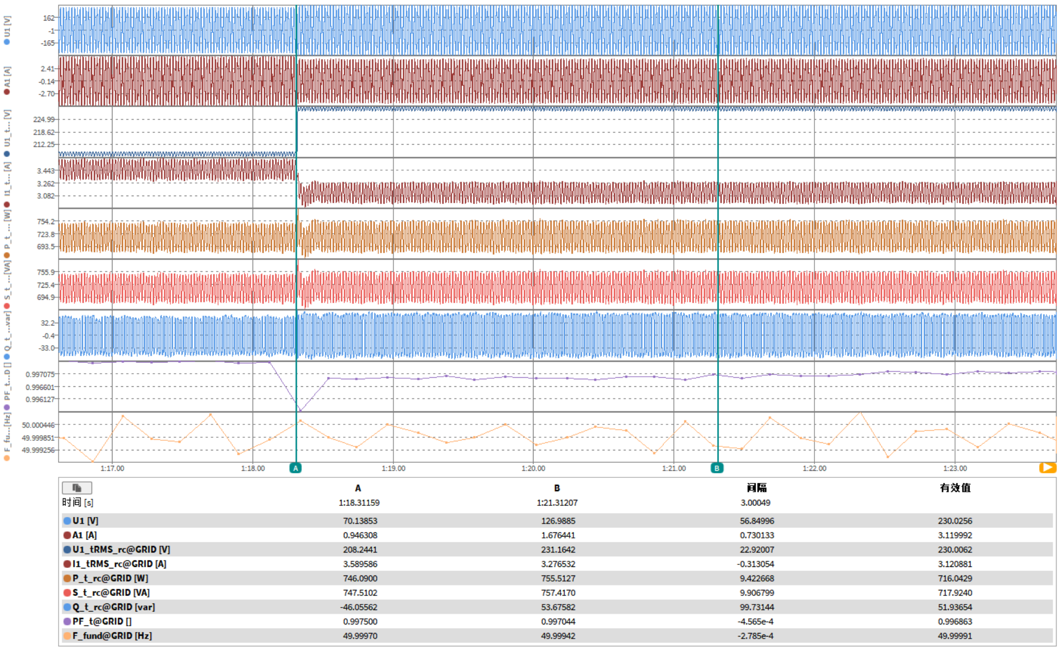
	A	B	间隔	有效值
时间 [s]	1:12.28918	1:12.36922	0.08003	
U1 [V]	-157.8388	-134.0045	23.83423	207.0416
A1 [A]	-2.296948	-2.238869	0.058079	3.463125
U1_tRMS_rc@GRID [V]	231.1564	208.0981	-23.05830	209.2605
I1_tRMS_rc@GRID [A]	3.245457	3.644205	0.398748	3.433598
P_t_rc@GRID [W]	748.3728	756.7070	8.334167	716.0553
S_t_rc@GRID [VA]	750.2081	758.3522	8.144043	717.7887
Q_t_rc@GRID [var]	-52.44405	-49.92573	2.518314	49.85410
PF_t@GRID []	0.996730	0.996730	0.000000	0.996730
F_fund@GRID [Hz]	50.00057	50.00057	0.000000	50.00057

During dip (t1+80ms)


U1 [V]
162
-1
-165
A1 [A]
2.46
-0.14
-2.73
U1_t... [V]
224.95
218.60
212.25
I1_t... [A]
3.507
3.323
3.139
P_t_... [W]
733.8
700.6
667.4
S_t_... [VA]
735.4
702.0
668.7
Q_t_... [var]
30.3
-1.7
-33.6
PF_t...D []
0.99566
0.99458
0.99351
F_fu... [Hz]
49.999891
49.999214
49.998537
1:12.200
1:12.250
A
1:12.300
1:12.350
B
1:12.400
1:12.450

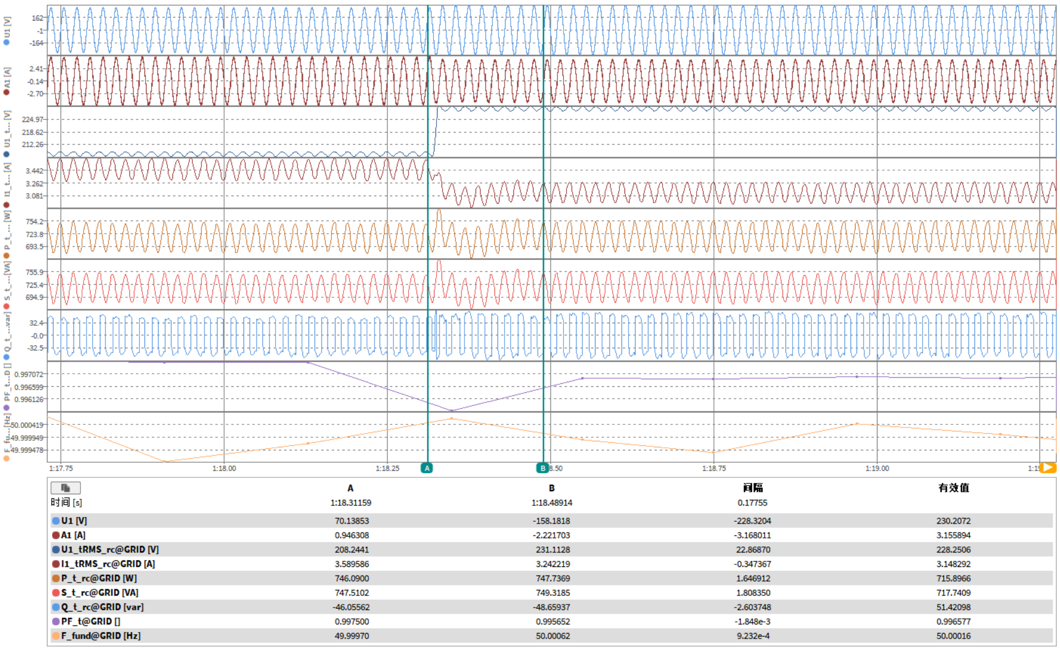
	A	B	间隔	有效值
时间 [s]	1:12.28918	1:12.38944	0.10026	
U1 [V]	-157.8388	-117.2003	40.63845	206.9178
A1 [A]	-2.296948	-1.779389	0.517559	3.464121
U1_tRMS_rc@GRID [V]	231.1564	208.1261	-23.03035	208.8322
I1_tRMS_rc@GRID [A]	3.245457	3.601426	0.355970	3.445591
P_t_rc@GRID [W]	748.3728	748.1268	-0.246033	717.2589
S_t_rc@GRID [VA]	750.2081	749.5507	-0.657410	718.9631
Q_t_rc@GRID [var]	-52.44405	-46.18037	6.263672	49.47319
PF_t@GRID []	0.996730	0.996730	0.000000	0.996730
F_fund@GRID [Hz]	50.00057	50.00057	0.000000	50.00057

During dip (t1+100ms)


U1 [V]
A1 [A]
U1_t...[V]
I1_t...[A]
P_t_...[W]
S_t_...[VA]
Q_t_...[var]
PF_t...D []
F_fu...[Hz]
162
-1
-165
2.41
-0.14
-2.70
224.99
218.62
212.25
3.443
3.262
3.082
754.2
723.8
693.5
755.9
725.4
694.9
32.2
-0.4
-33.0
0.997075
0.996601
0.996127
50.000446
49.999851
49.999256
1:17.00
1:18.00
A
1:19.00
1:20.00
1:21.00
B
1:22.00
1:23.00

时间 [s]	A 1:18.31159	B 1:21.31207	间隔 3.00049	有效值
U1 [V]	70.13853	126.9885	56.84996	230.0256
A1 [A]	0.946308	1.676441	0.730133	3.119992
U1_tRMS_rc@GRID [V]	208.2441	231.1642	22.92007	230.0062
I1_tRMS_rc@GRID [A]	3.589586	3.276532	-0.313054	3.120881
P_t_rc@GRID [W]	746.0900	755.5127	9.422668	716.0429
S_t_rc@GRID [VA]	747.5102	757.4170	9.906799	717.9240
Q_t_rc@GRID [var]	-46.05562	53.67582	99.73144	51.93654
PF_t@GRID []	0.997500	0.997044	-4.565e-4	0.996863
F_fund@GRID [Hz]	49.99970	49.99942	-2.785e-4	49.99991

After dip (t2+3s)


U1 [V]
A1 [A]
U1_t...[V]
I1_t...[A]
P_t_...[W]
S_t_...[VA]
Q_t_...[var]
PF_t...D []
F_fu...[Hz]
162
-1
-164
2.41
-0.14
-2.70
224.97
218.62
212.26
3.442
3.262
3.081
754.2
723.8
693.5
755.9
725.4
694.9
32.4
-0.0
-32.5
0.997072
0.996599
0.996126
50.000419
49.999949
49.999478
1:17.75
1:18.00
1:18.25
A
B
8.50
1:18.75
1:19.00

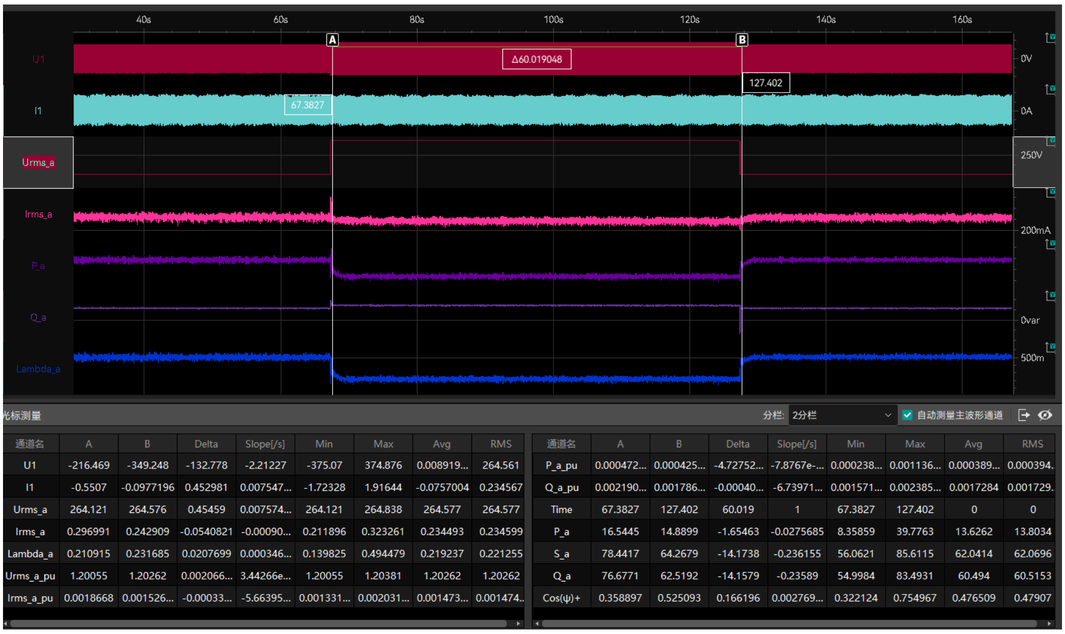
时间 [s]	A 1:18.31159	B 1:18.48914	间隔 0.17755	有效值
U1 [V]	70.13853	-158.1818	-228.3204	230.2072
A1 [A]	0.946308	-2.221703	-3.168011	3.155894
U1_tRMS_rc@GRID [V]	208.2441	231.1128	22.86870	228.2506
I1_tRMS_rc@GRID [A]	3.589586	3.242219	-0.347367	3.148292
P_t_rc@GRID [W]	746.0900	747.7369	1.646912	715.8966
S_t_rc@GRID [VA]	747.5102	749.3185	1.808350	717.7409
Q_t_rc@GRID [var]	-46.05562	-48.65937	-2.603748	51.42098
PF_t@GRID []	0.997500	0.995652	-1.848e-3	0.996577
F_fund@GRID [Hz]	49.99970	50.00062	9.232e-4	50.00016

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	6.1	6.2	6.3	6.4
	1	Date	--	--	dd.mm.yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm:ss	See graph			
	3	Fault type (phase)	--	--		VS2.2		VS4.2	
	4	Setting voltage depth	Line to line	--	p.u.	1.15			
	5	Setting dip duration		--		60000			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	60019			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.15			
	10		Pos.		p.u.	1.15			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.002	1.001	1.002	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.003	0.303	1.008	0.303
	13	Active power	Total	t1-10s to t1	p.u.	1.004	0.302	1.009	0.303
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.045	-0.020	-0.024	0.017
	16		Pos.			--	--	--	--
	17	Cosφ	--	t1-10s to t1	--	0.9990	0.9978	0.9997	0.9984
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.154	1.151	-- -- 1.042	-- -- 1.041
	19	Line current	Phase 1	t1+50ms	p.u.	0.847	0.259	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	0.966	0.295
	22	Line current	Phase 1	t1+80ms	p.u.	0.845	0.258	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	0.969	0.295
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.988	0.294	1.016	0.307
	26		Pos.			--	--	--	--

1.000	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.002	1.001	1.002	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.003	0.302	1.011	0.302
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.202	0.125	0.277	0.221
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.042	-0.020	-0.025	0.016
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.202	0.125	0.277	0.221
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

Graph of Test number 6.1

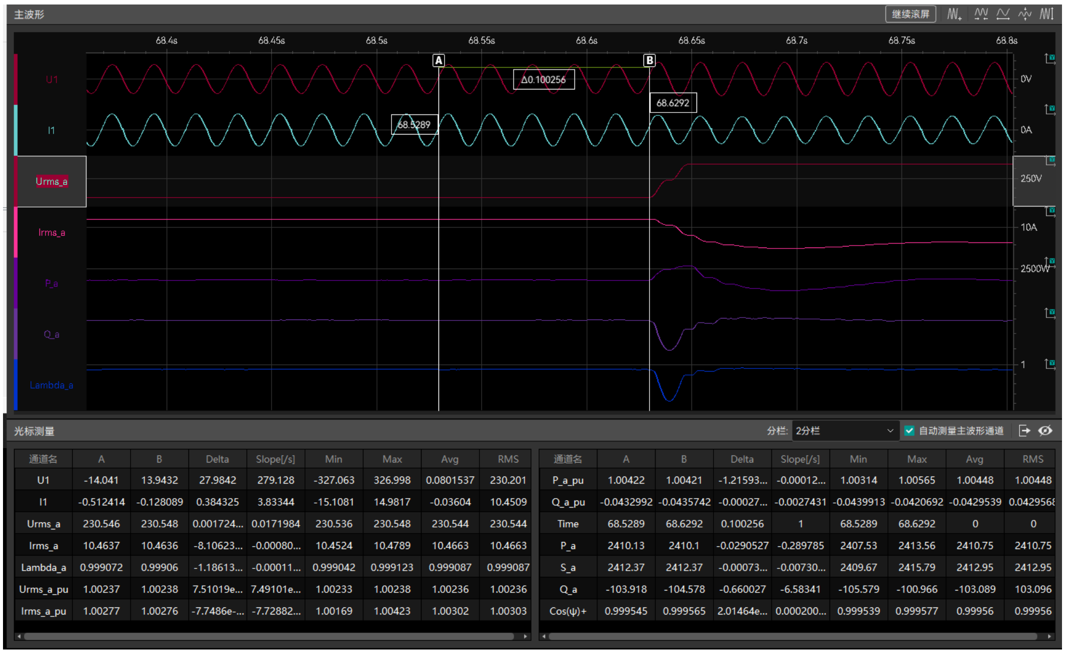


通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-216.469	-349.248	-132.778	-2.21227	-375.07	374.876	0.008919...	264.561
I1	-0.5507	-0.0977196	0.452981	0.007547...	-1.72328	1.91644	-0.0757004	0.234567
Urms_a	264.121	264.576	0.45459	0.007574...	264.121	264.838	264.577	264.577
Irms_a	0.296991	0.242909	-0.0540821	-0.00090...	0.211896	0.323261	0.234493	0.234599
Lambda_a	0.210915	0.231685	0.0207699	0.000346...	0.139825	0.494479	0.219237	0.221255
Urms_a_pu	1.20055	1.20262	0.002066...	3.44266e...	1.20055	1.20381	1.20262	1.20262
Irms_a_pu	0.0018668	0.001526...	-0.00033...	-5.66395...	0.001331...	0.002031...	0.001473...	0.001474..

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	0.000472...	0.000425...	-4.72752...	-7.8767e-...	0.000238...	0.001136...	0.000389...	0.000394..
Q_a_pu	0.002190...	0.001786...	-0.00040...	-6.73971...	0.001571...	0.002385...	0.0017284	0.001729..
Time	67.3827	127.402	60.019	1	67.3827	127.402	0	0
P_a	16.5445	14.8899	-1.65463	-0.0275685	8.35859	39.7763	13.6262	13.8034
S_a	78.4417	64.2679	-14.1738	-0.236155	56.0621	85.6115	62.0414	62.0696
Q_a	76.6771	62.5192	-14.1579	-0.23589	54.9984	83.4931	60.494	60.5153
Cos(ψ)+	0.358897	0.525093	0.166196	0.002769...	0.322124	0.754967	0.476509	0.47907

Empty load

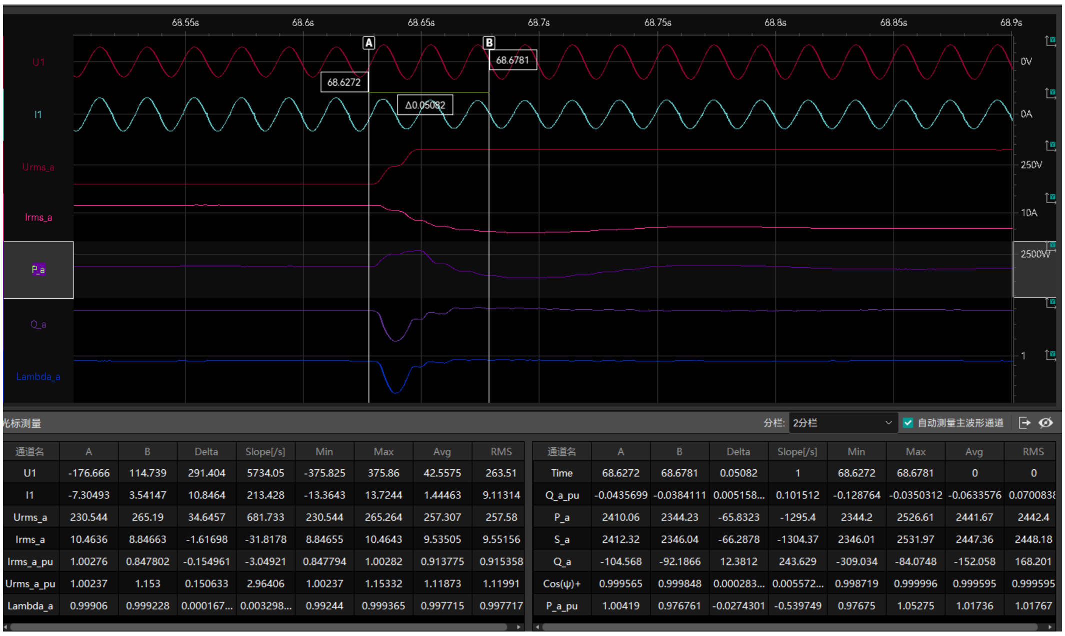
EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict


主波形
继续滚屏
68.4s
68.45s
68.5s
68.55s
68.6s
68.65s
68.7s
68.75s
68.8s
A
B
Δ0.100256
68.5289
68.6292
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-14.041	13.9432	27.9842	279.128	-327.063	326.998	0.0801537	230.201
I1	-0.512414	-0.128089	0.384325	3.83344	-15.1081	14.9817	-0.03604	10.4509
Urms_a	230.546	230.548	0.001724...	0.0171984	230.536	230.548	230.544	230.544
Irms_a	10.4637	10.4636	-8.10623...	-0.00080...	10.4524	10.4789	10.4663	10.4663
Lambda_a	0.999072	0.99906	-1.18613...	-0.00011...	0.999042	0.999123	0.999087	0.999087
Urms_a_pu	1.00237	1.00238	7.51019e...	7.49101e...	1.00233	1.00238	1.00236	1.00236
Irms_a_pu	1.00277	1.00276	-7.7486e-...	-7.72882...	1.00169	1.00423	1.00302	1.00303

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00422	1.00421	-1.21593...	-0.00012...	1.00314	1.00565	1.00448	1.00448
Q_a_pu	-0.0432992	-0.0435742	-0.00027...	-0.0027431	-0.0439913	-0.0420692	-0.0429539	0.0429568
Time	68.5289	68.6292	0.100256	1	68.5289	68.6292	0	0
P_a	2410.13	2410.1	-0.0290527	-0.289785	2407.53	2413.56	2410.75	2410.75
S_a	2412.37	2412.37	-0.00073...	-0.00730...	2409.67	2415.79	2412.95	2412.95
Q_a	-103.918	-104.578	-0.660027	-6.58341	-105.579	-100.966	-103.089	103.096
Cos(ψ)+	0.999545	0.999565	2.01464e...	0.000200...	0.999539	0.999577	0.99956	0.99956

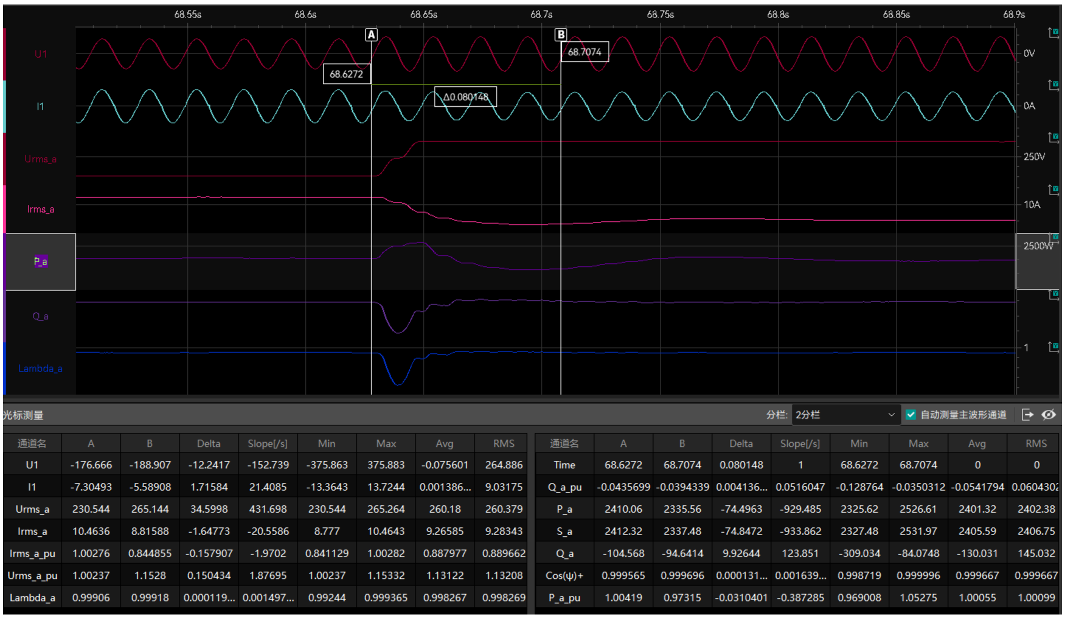
Before dip (t1-100ms)


68.55s
68.6s
68.65s
68.7s
68.75s
68.8s
68.85s
68.9s
A
B
68.6272
Δ0.05082
68.6781
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-176.666	114.739	291.404	5734.05	-375.825	375.86	42.5575	263.51
I1	-7.30493	3.54147	10.8464	213.428	-13.3643	13.7244	1.44463	9.11314
Urms_a	230.544	265.19	34.6457	681.733	230.544	265.264	257.307	257.58
Irms_a	10.4636	8.84663	-1.61698	-31.8178	8.84655	10.4643	9.53505	9.55156
Irms_a_pu	1.00276	0.847802	-0.154961	-3.04921	0.847794	1.00282	0.913775	0.915358
Urms_a_pu	1.00237	1.153	0.150633	2.96406	1.00237	1.15332	1.11873	1.11991
Lambda_a	0.99906	0.999228	0.000167...	0.003298...	0.99244	0.999365	0.997715	0.997717

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	68.6272	68.6781	0.05082	1	68.6272	68.6781	0	0
Q_a_pu	-0.0435699	-0.0384111	0.005158...	0.101512	-0.128764	-0.0350312	-0.0633576	0.0700838
P_a	2410.06	2344.23	-65.8323	-1295.4	2344.2	2526.61	2441.67	2442.4
S_a	2412.32	2346.04	-66.2878	-1304.37	2346.01	2531.97	2447.36	2448.18
Q_a	-104.568	-92.1866	12.3812	243.629	-309.034	-84.0748	-152.058	168.201
Cos(ψ)+	0.999565	0.999848	0.000283...	0.005572...	0.998719	0.999996	0.999595	0.999595
P_a_pu	1.00419	0.976761	-0.0274301	-0.539749	0.97675	1.05275	1.01736	1.01767

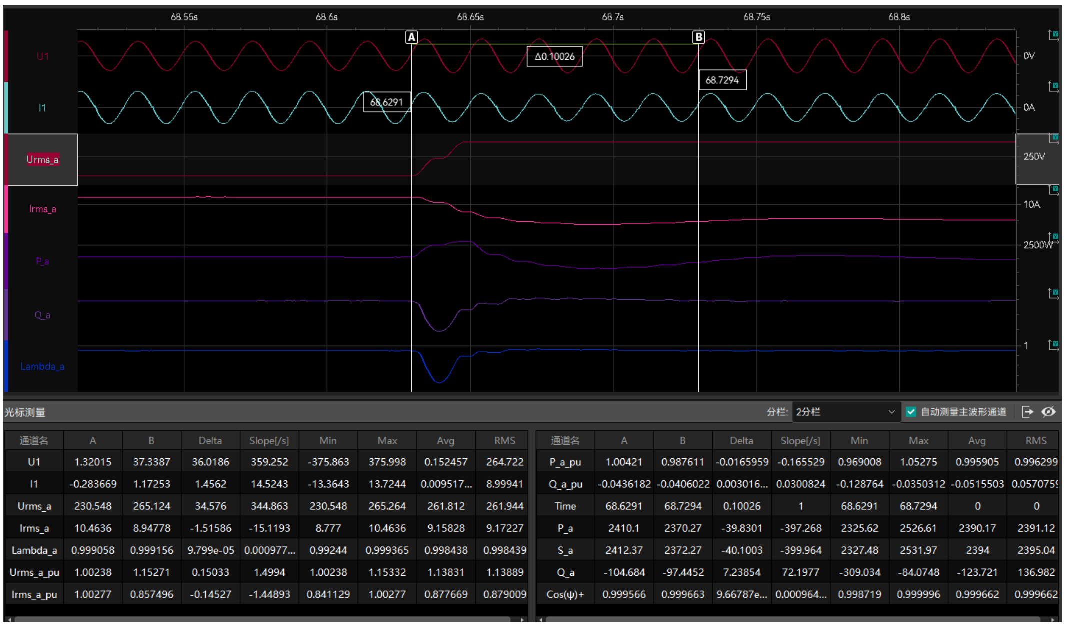
During dip (t1+50ms)


68.55s
68.6s
68.65s
68.7s
68.75s
68.8s
68.85s
68.9s
A
B
68.6272
68.7074
Δ0.080148
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-176.666	-188.907	-12.2417	-152.739	-375.863	375.883	-0.075601	264.886
I1	-7.30493	-5.58908	1.71584	21.4085	-13.3643	13.7244	0.001386...	9.03175
Urms_a	230.544	265.144	34.5998	431.698	230.544	265.264	260.18	260.379
Irms_a	10.4636	8.81588	-1.64773	-20.5586	8.777	10.4643	9.26585	9.28343
Irms_a_pu	1.00276	0.844855	-0.157907	-1.9702	0.841129	1.00282	0.887977	0.889662
Urms_a_pu	1.00237	1.1528	0.150434	1.87695	1.00237	1.15332	1.13122	1.13208
Lambda_a	0.99906	0.99918	0.000119...	0.001497...	0.99244	0.999365	0.998267	0.998269

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	68.6272	68.7074	0.080148	1	68.6272	68.7074	0	0
Q_a_pu	-0.0435699	-0.0394339	0.004136...	0.0516047	-0.128764	-0.0350312	-0.0541794	0.0604302
P_a	2410.06	2335.56	-74.4963	-929.485	2325.62	2526.61	2401.32	2402.38
S_a	2412.32	2337.48	-74.8472	-933.862	2327.48	2531.97	2405.59	2406.75
Q_a	-104.568	-94.6414	9.92644	123.851	-309.034	-84.0748	-130.031	145.032
Cos(ψ)+	0.999565	0.999696	0.000131...	0.001639...	0.998719	0.999996	0.999667	0.999667
P_a_pu	1.00419	0.97315	-0.0310401	-0.387285	0.969008	1.05275	1.00055	1.00099

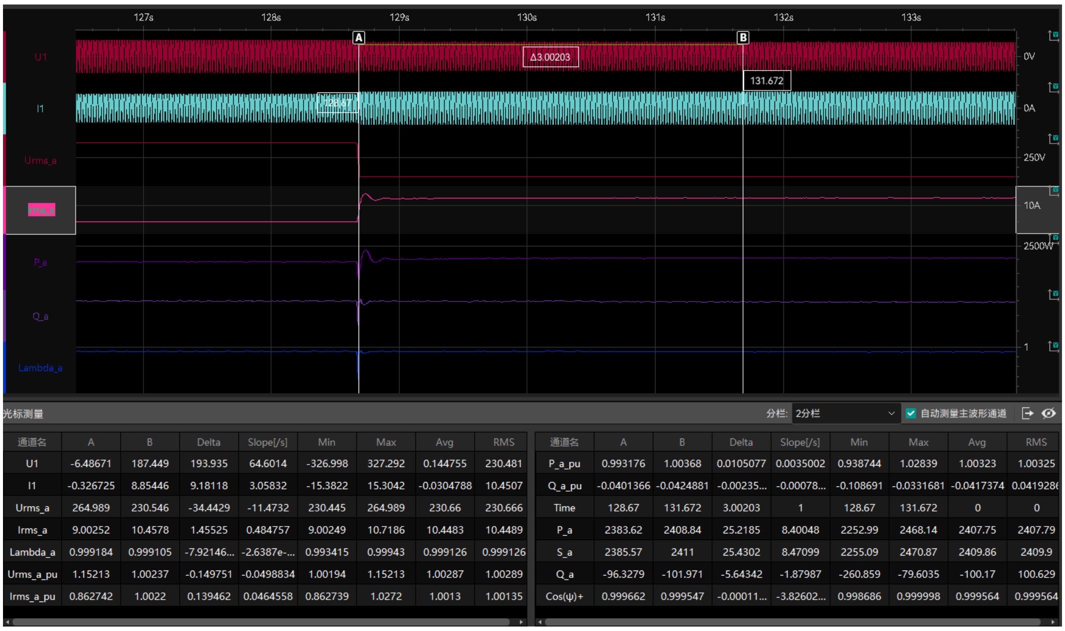
During dip (t1+80ms)


68.55s
68.6s
68.65s
68.7s
68.75s
68.8s
A
B
Δ0.10026
68.6291
68.7294
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	1.32015	37.3387	36.0186	359.252	-375.863	375.998	0.152457	264.722
I1	-0.283669	1.17253	1.4562	14.5243	-13.3643	13.7244	0.009517...	8.99941
Urms_a	230.548	265.124	34.576	344.863	230.548	265.264	261.812	261.944
Irms_a	10.4636	8.94778	-1.51586	-15.1193	8.777	10.4636	9.15828	9.17227
Lambda_a	0.999058	0.999156	9.799e-05	0.000977...	0.99244	0.999365	0.998438	0.998439
Urms_a_pu	1.00238	1.15271	0.15033	1.4994	1.00238	1.15332	1.13831	1.13889
Irms_a_pu	1.00277	0.857496	-0.14527	-1.44893	0.841129	1.00277	0.877669	0.879009

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00421	0.987611	-0.0165959	-0.165529	0.969008	1.05275	0.995905	0.996299
Q_a_pu	-0.0436182	-0.0406022	0.003016...	0.0300824	-0.128764	-0.0350312	-0.0515503	0.0570759
Time	68.6291	68.7294	0.10026	1	68.6291	68.7294	0	0
P_a	2410.1	2370.27	-39.8301	-397.268	2325.62	2526.61	2390.17	2391.12
S_a	2412.37	2372.27	-40.1003	-399.964	2327.48	2531.97	2394	2395.04
Q_a	-104.684	-97.4452	7.23854	72.1977	-309.034	-84.0748	-123.721	136.982
Cos(ψ)+	0.999566	0.999663	9.66787e...	0.000964...	0.998719	0.999996	0.999662	0.999662

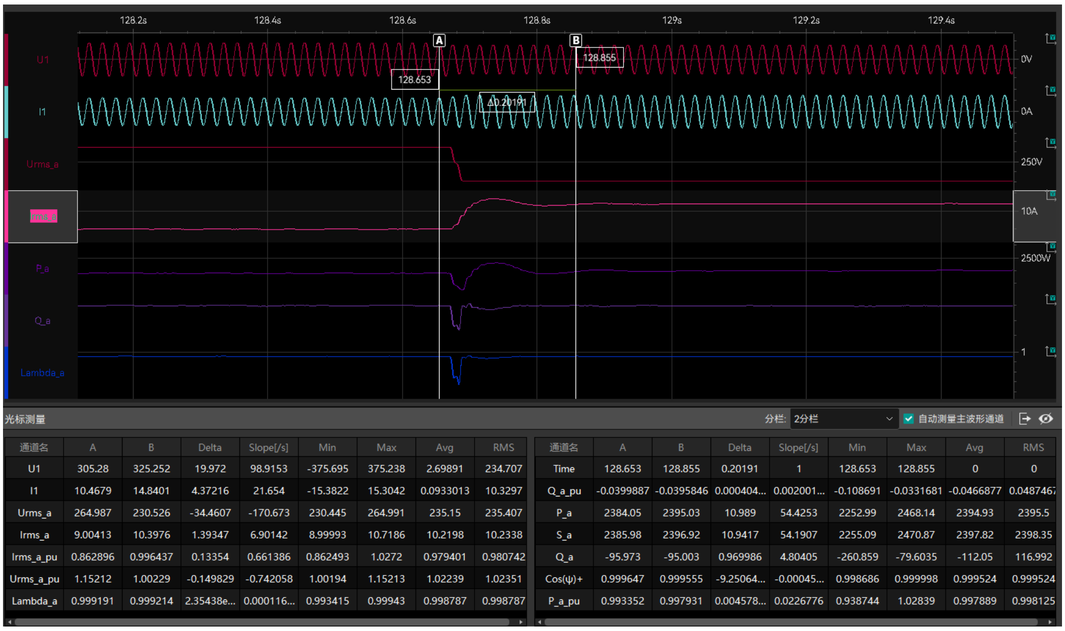
During dip (t1+100ms)


127s
128s
129s
130s
131s
132s
133s
A
B
Δ3.00203
131.672
128.67
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-6.48671	187.449	193.935	64.6014	-326.998	327.292	0.144755	230.481
I1	-0.326725	8.85446	9.18118	3.05832	-15.3822	15.3042	-0.0304788	10.4507
Urms_a	264.989	230.546	-34.4429	-11.4732	230.445	264.989	230.66	230.666
Irms_a	9.00252	10.4578	1.45525	0.484757	9.00249	10.7186	10.4483	10.4489
Lambda_a	0.999184	0.999105	-7.92146...	-2.6387e-...	0.993415	0.99943	0.999126	0.999126
Urms_a_pu	1.15213	1.00237	-0.149751	-0.0498834	1.00194	1.15213	1.00287	1.00289
Irms_a_pu	0.862742	1.0022	0.139462	0.0464558	0.862739	1.0272	1.0013	1.00135

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	0.993176	1.00368	0.0105077	0.0035002	0.938744	1.02839	1.00323	1.00325
Q_a_pu	-0.0401366	-0.0424881	-0.00235...	-0.00078...	-0.108691	-0.0331681	-0.0417374	0.0419286
Time	128.67	131.672	3.00203	1	128.67	131.672	0	0
P_a	2383.62	2408.84	25.2185	8.40048	2252.99	2468.14	2407.75	2407.79
S_a	2385.57	2411	25.4302	8.47099	2255.09	2470.87	2409.86	2409.9
Q_a	-96.3279	-101.971	-5.64342	-1.87987	-260.859	-79.6035	-100.17	100.629
Cos(ψ)+	0.999662	0.999547	-0.00011...	-3.82602...	0.998686	0.999998	0.999564	0.999564

After dip (t2+3s)

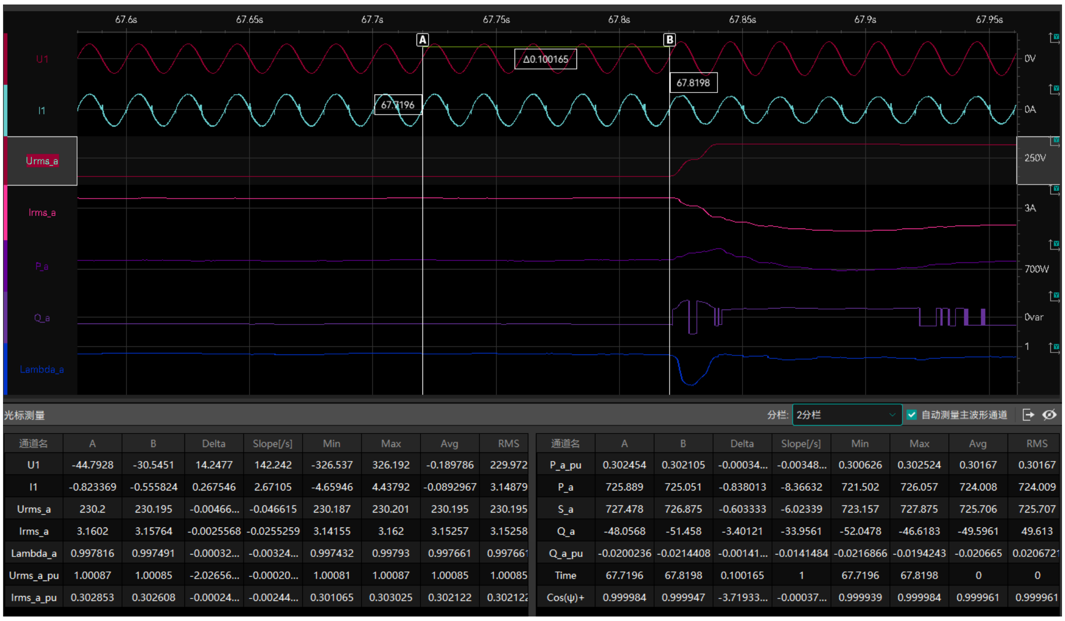

128.2s
128.4s
128.6s
128.8s
129s
129.2s
129.4s
A
B
128.653
128.855
Δ0.20191
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
10A
2500W
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	305.28	325.252	19.972	98.9153	-375.695	375.238	2.69891	234.707
I1	10.4679	14.8401	4.37216	21.654	-15.3822	15.3042	0.0933013	10.3297
Urms_a	264.987	230.526	-34.4607	-170.673	230.445	264.991	235.15	235.407
Irms_a	9.00413	10.3976	1.39347	6.90142	8.99993	10.7186	10.2198	10.2338
Irms_a_pu	0.862896	0.996437	0.13354	0.661386	0.862493	1.0272	0.979401	0.980742
Urms_a_pu	1.15212	1.00229	-0.149829	-0.742058	1.00194	1.15213	1.02239	1.02351
Lambda_a	0.999191	0.999214	2.35438e...	0.000116...	0.993415	0.99943	0.998787	0.998787

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	128.653	128.855	0.20191	1	128.653	128.855	0	0
Q_a_pu	-0.0399887	-0.0395846	0.000404...	0.002001...	-0.108691	-0.0331681	-0.0466877	0.0487467
P_a	2384.05	2395.03	10.989	54.4253	2252.99	2468.14	2394.93	2395.5
S_a	2385.98	2396.92	10.9417	54.1907	2255.09	2470.87	2397.82	2398.35
Q_a	-95.973	-95.003	0.969986	4.80405	-260.859	-79.6035	-112.05	116.992
Cos(ψ)+	0.999647	0.999555	-9.25064...	-0.00045...	0.998686	0.999998	0.999524	0.999524
P_a_pu	0.993352	0.997931	0.004578...	0.0226776	0.938744	1.02839	0.997889	0.998125

Recovery time

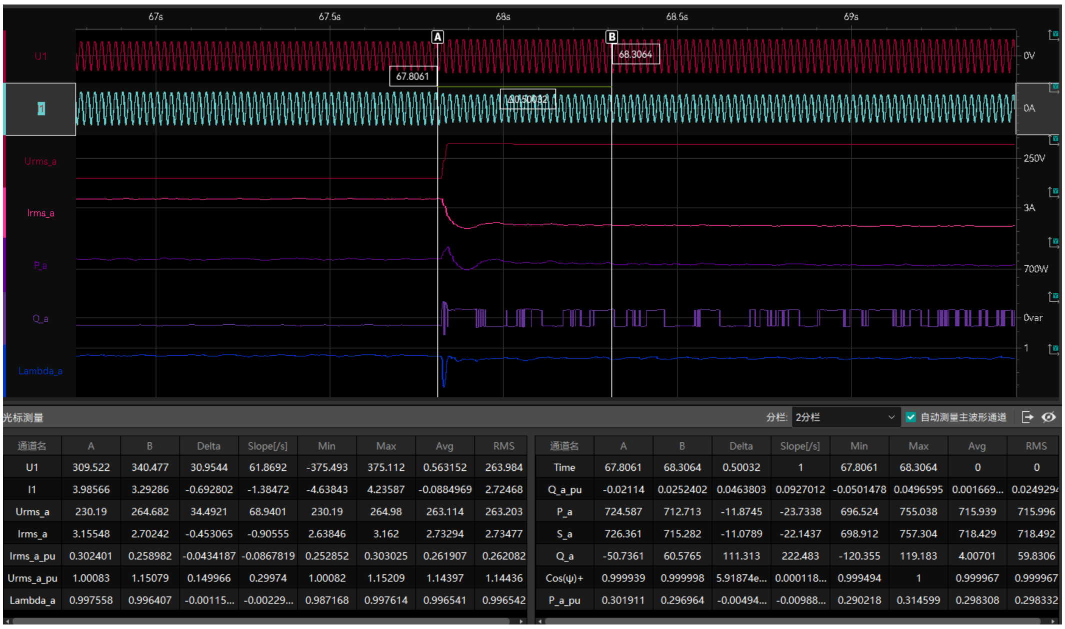
Graph of Test number 6.2


67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
67.9s
67.95s
A
B
Δ0.100165
67.8198
67.7196
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-44.7928	-30.5451	14.2477	142.242	-326.537	326.192	-0.189786	229.972
I1	-0.823369	-0.555824	0.267546	2.67105	-4.65946	4.43792	-0.0892967	3.14879
Urms_a	230.2	230.195	-0.00466...	-0.046615	230.187	230.201	230.195	230.195
Irms_a	3.1602	3.15764	-0.0025568	-0.0255259	3.14155	3.162	3.15257	3.15258
Lambda_a	0.997816	0.997491	-0.00032...	-0.00324...	0.997432	0.99793	0.997661	0.99766
Urms_a_pu	1.00087	1.00085	-2.02656...	-0.00020...	1.00081	1.00087	1.00085	1.00085
Irms_a_pu	0.302853	0.302608	-0.00024...	-0.00244...	0.301065	0.303025	0.302122	0.30212

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	0.302454	0.302105	-0.00034...	-0.00348...	0.300626	0.302524	0.30167	0.30167
P_a	725.889	725.051	-0.838013	-8.36632	721.502	726.057	724.008	724.009
S_a	727.478	726.875	-0.603333	-6.02339	723.157	727.875	725.706	725.707
Q_a	-48.0568	-51.458	-3.40121	-33.9561	-52.0478	-46.6183	-49.5961	49.613
Q_a_pu	-0.0200236	-0.0214408	-0.00141...	-0.0141484	-0.0216866	-0.0194243	-0.020665	0.020672
Time	67.7196	67.8198	0.100165	1	67.7196	67.8198	0	0
Cos(ψ)+	0.999984	0.999947	-3.71933...	-0.00037...	0.999939	0.999984	0.999961	0.999961

Before dip (t1-100ms)

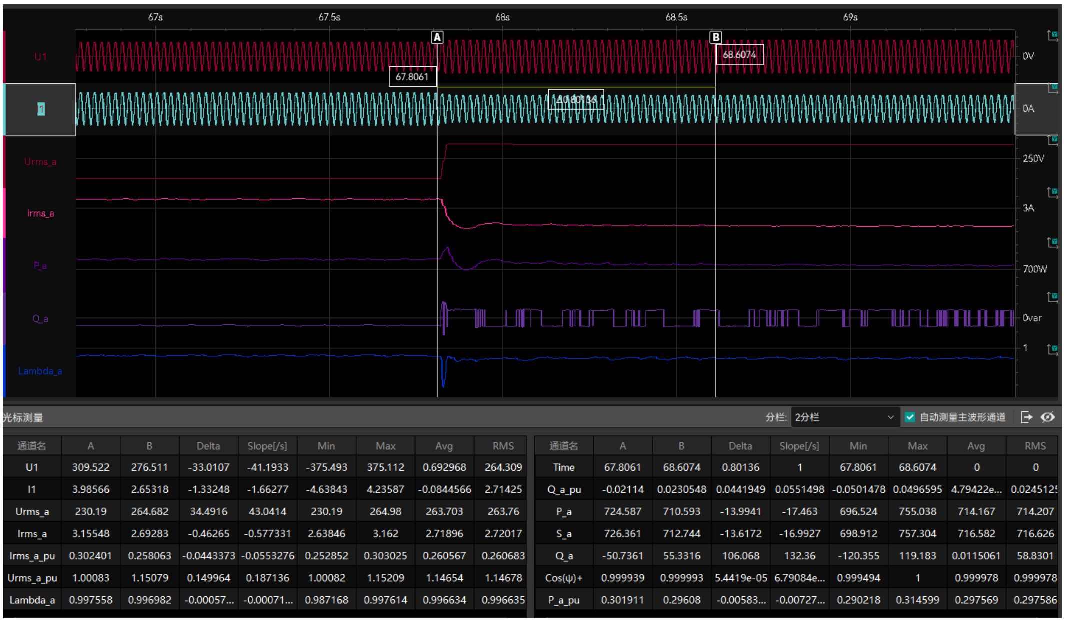

67s
67.5s
68s
68.5s
69s
A
B
68.3064
67.8061
Δ0.50032
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	309.522	340.477	30.9544	61.8692	-375.493	375.112	0.563152	263.984
I1	3.98566	3.29286	-0.692802	-1.38472	-4.63843	4.23587	-0.0884969	2.72468
Urms_a	230.19	264.682	34.4921	68.9401	230.19	264.98	263.114	263.203
Irms_a	3.15548	2.70242	-0.453065	-0.90555	2.63846	3.162	2.73294	2.73477
Irms_a_pu	0.302401	0.258982	-0.0434187	-0.0867819	0.252852	0.303025	0.261907	0.262082
Urms_a_pu	1.00083	1.15079	0.149966	0.29974	1.00082	1.15209	1.14397	1.14436
Lambda_a	0.997558	0.996407	-0.00115...	-0.00229...	0.987168	0.997614	0.996541	0.996542

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	67.8061	68.3064	0.50032	1	67.8061	68.3064	0	0
Q_a_pu	-0.02114	0.0252402	0.0463803	0.0927012	-0.0501478	0.0496595	0.001669...	0.024929
P_a	724.587	712.713	-11.8745	-23.7338	696.524	755.038	715.939	715.996
S_a	726.361	715.282	-11.0789	-22.1437	698.912	757.304	718.429	718.492
Q_a	-50.7361	60.5765	111.313	222.483	-120.355	119.183	4.00701	59.8306
Cos(ψ)+	0.999939	0.999998	5.91874e...	0.000118...	0.999494	1	0.999967	0.999967
P_a_pu	0.301911	0.296964	-0.00494...	-0.00988...	0.290218	0.314599	0.298308	0.298332

During dip (t1+50ms)

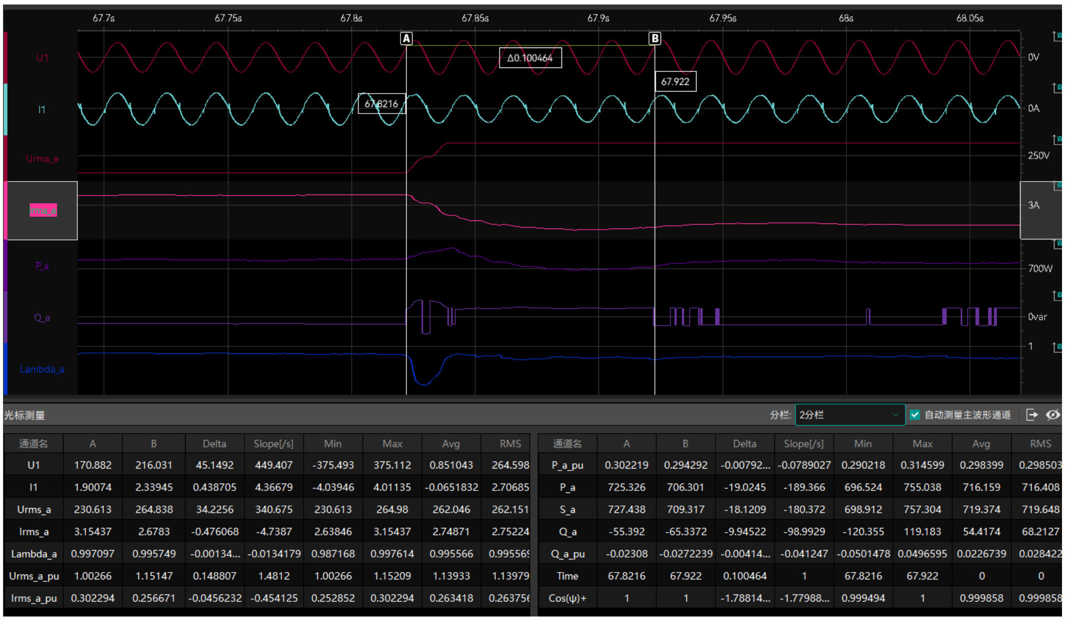
EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict


67s
67.5s
68s
68.5s
69s
A
B
67.8061
68.6074
Δ0.80136
U1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	309.522	276.511	-33.0107	-41.1933	-375.493	375.112	0.692968	264.309
I1	3.98566	2.65318	-1.33248	-1.66277	-4.63843	4.23587	-0.0844566	2.71425
Urms_a	230.19	264.682	34.4916	43.0414	230.19	264.98	263.703	263.76
Irms_a	3.15548	2.69283	-0.46265	-0.577331	2.63846	3.162	2.71896	2.72017
Irms_a_pu	0.302401	0.258063	-0.0443373	-0.0553276	0.252852	0.303025	0.260567	0.260683
Urms_a_pu	1.00083	1.15079	0.149964	0.187136	1.00082	1.15209	1.14654	1.14678
Lambda_a	0.997558	0.996982	-0.00057...	-0.00071...	0.987168	0.997614	0.996634	0.996635

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	67.8061	68.6074	0.80136	1	67.8061	68.6074	0	0
Q_a_pu	-0.02114	0.0230548	0.0441949	0.0551498	-0.0501478	0.0496595	4.79422e...	0.024512
P_a	724.587	710.593	-13.9941	-17.463	696.524	755.038	714.167	714.207
S_a	726.361	712.744	-13.6172	-16.9927	698.912	757.304	716.582	716.626
Q_a	-50.7361	55.3316	106.068	132.36	-120.355	119.183	0.0115061	58.8301
Cos(ψ)+	0.999939	0.999993	5.4419e-05	6.79084e...	0.999494	1	0.999978	0.999978
P_a_pu	0.301911	0.29608	-0.00583...	-0.00727...	0.290218	0.314599	0.297569	0.297586

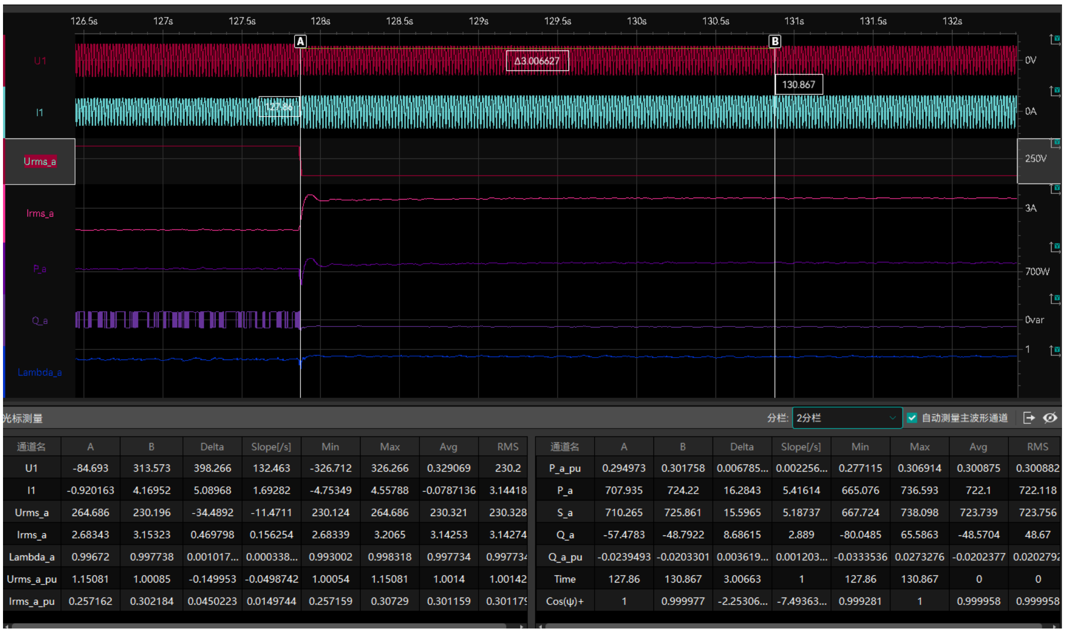
During dip (t1+80ms)


67.7s
67.75s
67.8s
67.85s
67.9s
67.95s
68s
68.05s
A
B
Δ0.100464
67.922
67.8216
U1
I1
Urms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	170.882	216.031	45.1492	449.407	-375.493	375.112	0.851043	264.598
I1	1.90074	2.33945	0.438705	4.36679	-4.03946	4.01135	-0.0651832	2.70685
Urms_a	230.613	264.838	34.2256	340.675	230.613	264.98	262.046	262.151
Irms_a	3.15437	2.6783	-0.476068	-4.7387	2.63846	3.15437	2.74871	2.75224
Lambda_a	0.997097	0.995749	-0.00134...	-0.0134179	0.987168	0.997614	0.995566	0.99556
Urms_a_pu	1.00266	1.15147	0.148807	1.4812	1.00266	1.15209	1.13933	1.13979
Irms_a_pu	0.302294	0.256671	-0.0456232	-0.454125	0.252852	0.302294	0.263418	0.26375

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	0.302219	0.294292	-0.00792...	-0.0789027	0.290218	0.314599	0.298399	0.298503
P_a	725.326	706.301	-19.0245	-189.366	696.524	755.038	716.159	716.408
S_a	727.438	709.317	-18.1209	-180.372	698.912	757.304	719.374	719.648
Q_a	-55.392	-65.3372	-9.94522	-98.9929	-120.355	119.183	54.4174	68.2127
Q_a_pu	-0.02308	-0.0272239	-0.00414...	-0.041247	-0.0501478	0.0496595	0.0226739	0.028422
Time	67.8216	67.922	0.100464	1	67.8216	67.922	0	0
Cos(ψ)+	1	1	-1.78814...	-1.77988...	0.999494	1	0.999858	0.999858

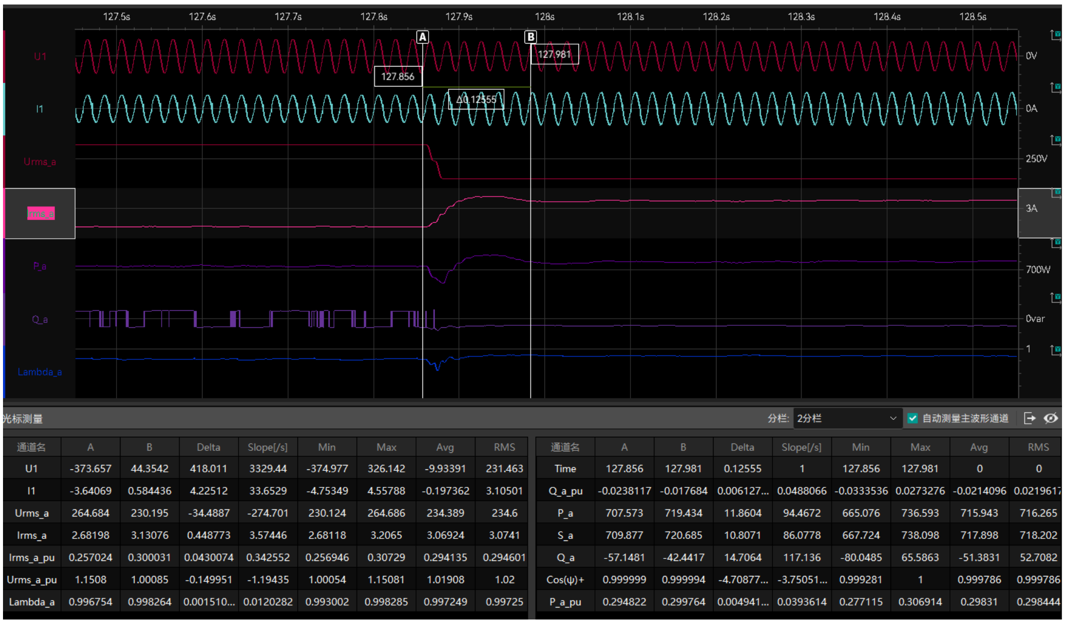
During dip (t1+100ms)


126.5s
127s
127.5s
128s
128.5s
129s
129.5s
130s
130.5s
131s
131.5s
132s
A
B
Δ3.006627
130.867
127.86
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-84.693	313.573	398.266	132.463	-326.712	326.266	0.329069	230.2
I1	-0.920163	4.16952	5.08968	1.69282	-4.75349	4.55788	-0.0787136	3.14418
Urms_a	264.686	230.196	-34.4892	-11.4711	230.124	264.686	230.321	230.328
Irms_a	2.68343	3.15323	0.469798	0.156254	2.68339	3.2065	3.14253	3.14274
Lambda_a	0.99672	0.997738	0.001017...	0.000338...	0.993002	0.998318	0.997734	0.99773
Urms_a_pu	1.15081	1.00085	-0.149953	-0.0498742	1.00054	1.15081	1.0014	1.00142
Irms_a_pu	0.257162	0.302184	0.0450223	0.0149744	0.257159	0.30729	0.301159	0.30117

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	0.294973	0.301758	0.006785...	0.002256...	0.277115	0.306914	0.300875	0.300882
P_a	707.935	724.22	16.2843	5.41614	665.076	736.593	722.1	722.118
S_a	710.265	725.861	15.5965	5.18737	667.724	738.098	723.739	723.756
Q_a	-57.4783	-48.7922	8.68615	2.889	-80.0485	65.5863	-48.5704	48.67
Q_a_pu	-0.0239493	-0.0203301	0.003619...	0.001203...	-0.0333536	0.0273276	-0.0202377	0.020279
Time	127.86	130.867	3.00663	1	127.86	130.867	0	0
Cos(ψ)+	1	0.999977	-2.25306...	-7.49363...	0.999281	1	0.999958	0.999958

After dip (t2+3s)

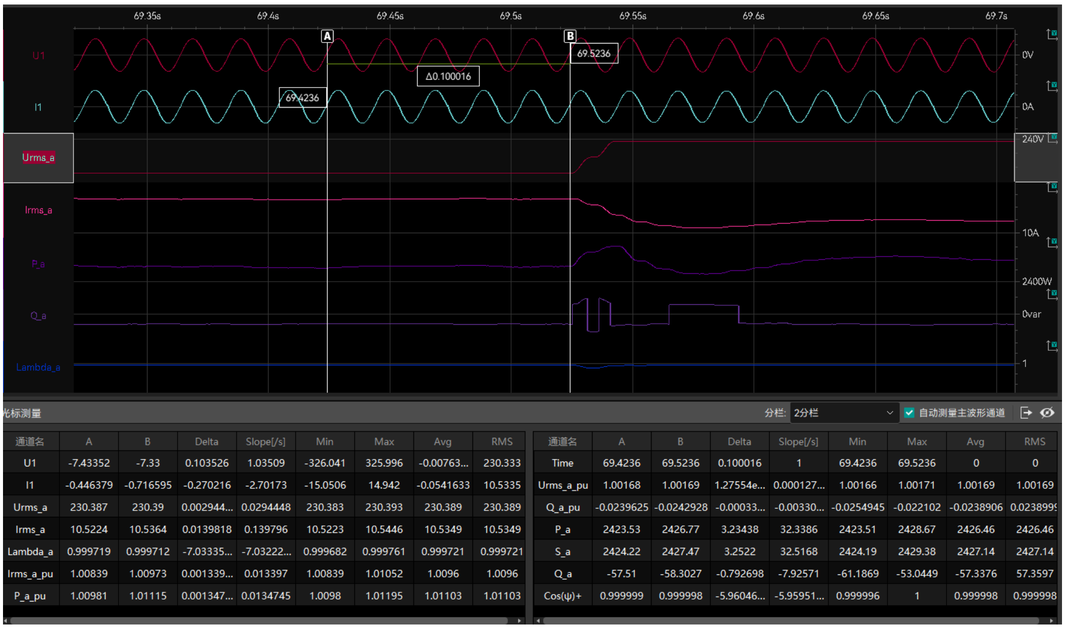

127.5s
127.6s
127.7s
127.8s
127.9s
128s
128.1s
128.2s
128.3s
128.4s
128.5s
A
B
127.856
127.981
Δ0.12555
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
3A
700W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-373.657	44.3542	418.011	3329.44	-374.977	326.142	-9.93391	231.463
I1	-3.64069	0.584436	4.22512	33.6529	-4.75349	4.55788	-0.197362	3.10501
Urms_a	264.684	230.195	-34.4887	-274.701	230.124	264.686	234.389	234.6
Irms_a	2.68198	3.13076	0.448773	3.57446	2.68118	3.2065	3.06924	3.0741
Irms_a_pu	0.257024	0.300031	0.0430074	0.342552	0.256946	0.30729	0.294135	0.294601
Urms_a_pu	1.1508	1.00085	-0.149951	-1.19435	1.00054	1.15081	1.01908	1.02
Lambda_a	0.996754	0.998264	0.001510...	0.0120282	0.993002	0.998285	0.997249	0.99725

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	127.856	127.981	0.12555	1	127.856	127.981	0	0
Q_a_pu	-0.0238117	-0.017684	0.006127...	0.0488066	-0.0333536	0.0273276	-0.0214096	0.021961
P_a	707.573	719.434	11.8604	94.4672	665.076	736.593	715.943	716.265
S_a	709.877	720.685	10.8071	86.0778	667.724	738.098	717.898	718.202
Q_a	-57.1481	-42.4417	14.7064	117.136	-80.0485	65.5863	-51.3831	52.7082
Cos(ψ)+	0.999999	0.999994	-4.70877...	-3.75051...	0.999281	1	0.999786	0.999786
P_a_pu	0.294822	0.299764	0.004941...	0.0393614	0.277115	0.306914	0.29831	0.298444

Recovery time

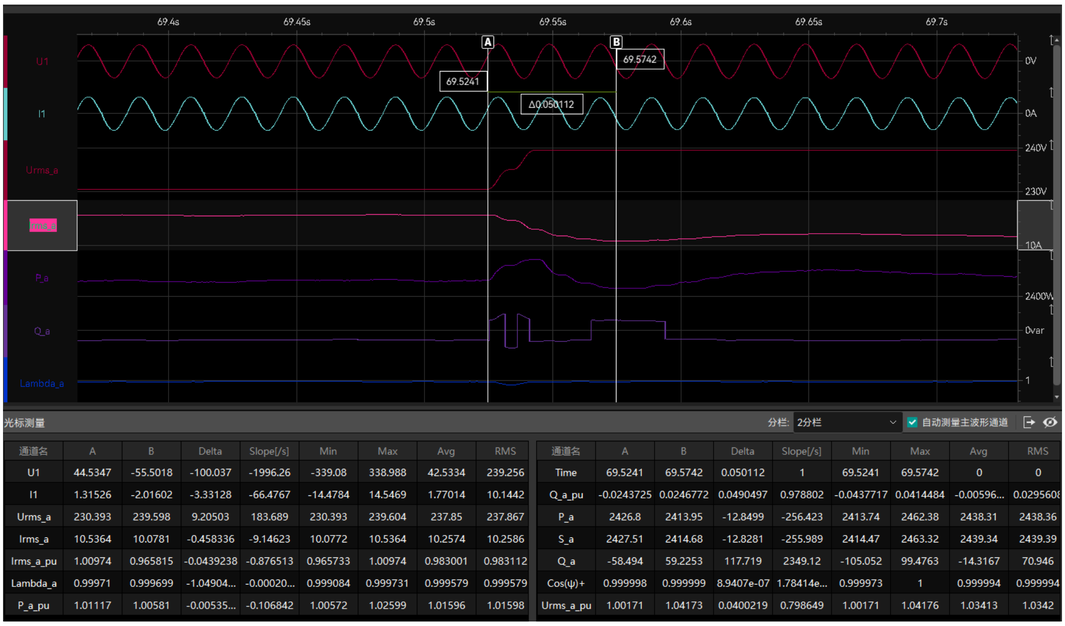
Graph of Test number 6.3


69.35s
69.4s
69.45s
69.5s
69.55s
69.6s
69.65s
69.7s
A
B
69.5236
Δ0.100016
69.4236
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-7.43352	-7.33	0.103526	1.03509	-326.041	325.996	-0.00763...	230.333
I1	-0.446379	-0.716595	-0.270216	-2.70173	-15.0506	14.942	-0.0541633	10.5335
Urms_a	230.387	230.39	0.002944...	0.0294448	230.383	230.393	230.389	230.389
Irms_a	10.5224	10.5364	0.0139818	0.139796	10.5223	10.5446	10.5349	10.5349
Lambda_a	0.999719	0.999712	-7.03335...	-7.03222...	0.999682	0.999761	0.999721	0.999721
Irms_a_pu	1.00839	1.00973	0.001339...	0.013397	1.00839	1.01052	1.0096	1.0096
P_a_pu	1.00981	1.01115	0.001347...	0.0134745	1.0098	1.01195	1.01103	1.01103

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	69.4236	69.5236	0.100016	1	69.4236	69.5236	0	0
Urms_a_pu	1.00168	1.00169	1.27554e...	0.000127...	1.00166	1.00171	1.00169	1.00169
Q_a_pu	-0.0239625	-0.0242928	-0.00033...	-0.00330...	-0.0254945	-0.022102	-0.0238906	0.0238999
P_a	2423.53	2426.77	3.23438	32.3386	2423.51	2428.67	2426.46	2426.46
S_a	2424.22	2427.47	3.2522	32.5168	2424.19	2429.38	2427.14	2427.14
Q_a	-57.51	-58.3027	-0.792698	-7.92571	-61.1869	-53.0449	-57.3376	57.3597
Cos(ψ)+	0.999999	0.999998	-5.96046...	-5.95951...	0.999996	1	0.999998	0.999998

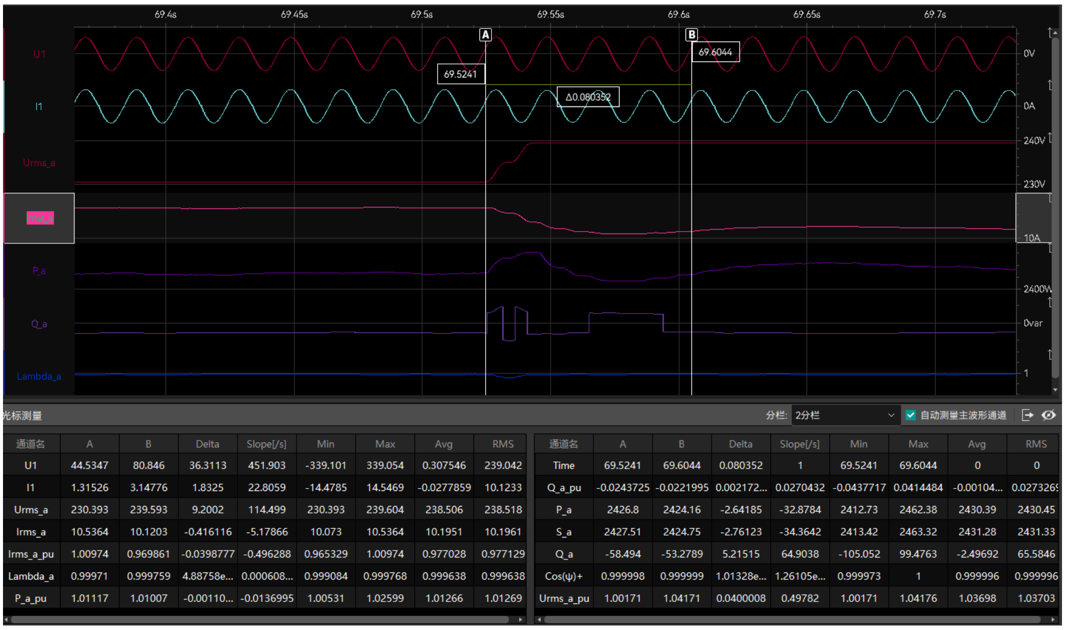
Before dip (t1-100ms)


69.4s
69.45s
69.5s
69.55s
69.6s
69.65s
69.7s
A
B
69.5742
69.5241
Δ0.050112
U1
I1
Urms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	44.5347	-55.5018	-100.037	-1996.26	-339.08	338.988	42.5334	239.256
I1	1.31526	-2.01602	-3.33128	-66.4767	-14.4784	14.5469	1.77014	10.1442
Urms_a	230.393	239.598	9.20503	183.689	230.393	239.604	237.85	237.867
Irms_a	10.5364	10.0781	-0.458336	-9.14623	10.0772	10.5364	10.2574	10.2586
Irms_a_pu	1.00974	0.965815	-0.0439238	-0.876513	0.965733	1.00974	0.983001	0.983112
Lambda_a	0.99971	0.999699	-1.04904...	-0.00020...	0.999084	0.999731	0.999579	0.999579
P_a_pu	1.01117	1.00581	-0.00535...	-0.106842	1.00572	1.02599	1.01596	1.01598

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	69.5241	69.5742	0.050112	1	69.5241	69.5742	0	0
Q_a_pu	-0.0243725	0.0246772	0.0490497	0.978802	-0.0437717	0.0414484	-0.00596...	0.0295608
P_a	2426.8	2413.95	-12.8499	-256.423	2413.74	2462.38	2438.31	2438.36
S_a	2427.51	2414.68	-12.8281	-255.989	2414.47	2463.32	2439.34	2439.39
Q_a	-58.494	59.2253	117.719	2349.12	-105.052	99.4763	-14.3167	70.946
Cos(ψ)+	0.999998	0.999999	8.9407e-07	1.78414e...	0.999973	1	0.999994	0.999994
Urms_a_pu	1.00171	1.04173	0.0400219	0.798649	1.00171	1.04176	1.03413	1.0342

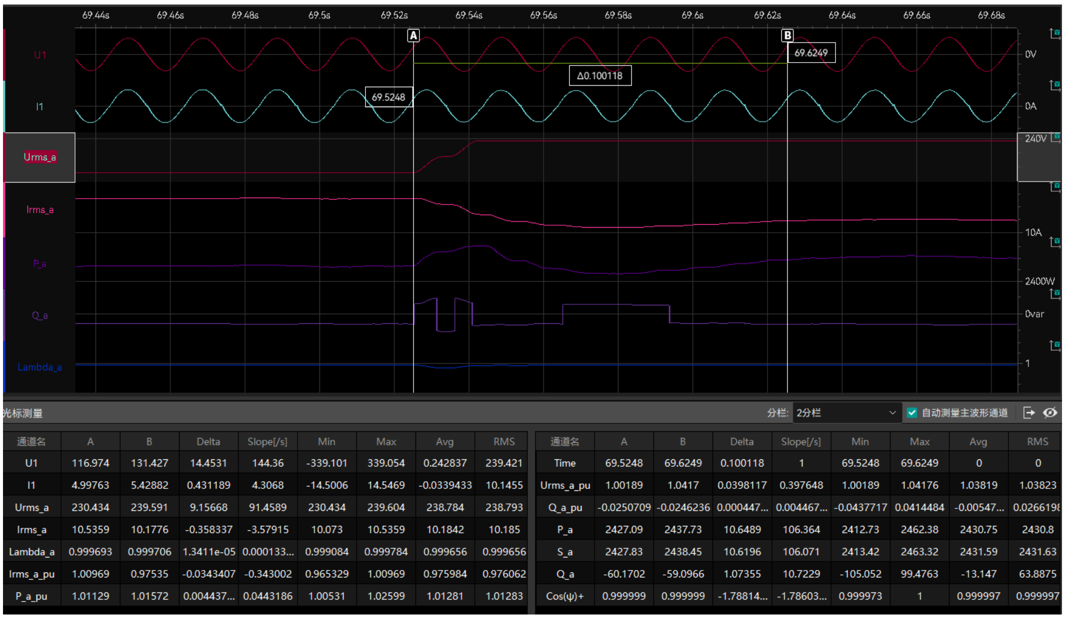
During dip (t1+50ms)


69.4s
69.45s
69.5s
69.55s
69.6s
69.65s
69.7s
A
B
69.5241
69.6044
Δ0.080352
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
10A
2400W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	44.5347	80.846	36.3113	451.903	-339.101	339.054	0.307546	239.042
I1	1.31526	3.14776	1.8325	22.8059	-14.4785	14.5469	-0.0277859	10.1233
Urms_a	230.393	239.593	9.2002	114.499	230.393	239.604	238.506	238.518
Irms_a	10.5364	10.1203	-0.416116	-5.17866	10.073	10.5364	10.1951	10.1961
Irms_a_pu	1.00974	0.969861	-0.0398777	-0.496288	0.965329	1.00974	0.977028	0.977129
Lambda_a	0.99971	0.999759	4.88758e...	0.000608...	0.999084	0.999768	0.999638	0.999638
P_a_pu	1.01117	1.01007	-0.00110...	-0.0136995	1.00531	1.02599	1.01266	1.01269

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	69.5241	69.6044	0.080352	1	69.5241	69.6044	0	0
Q_a_pu	-0.0243725	-0.0221995	0.002172...	0.0270432	-0.0437717	0.0414484	-0.00104...	0.0273269
P_a	2426.8	2424.16	-2.64185	-32.8784	2412.73	2462.38	2430.39	2430.45
S_a	2427.51	2424.75	-2.76123	-34.3642	2413.42	2463.32	2431.28	2431.33
Q_a	-58.494	-53.2789	5.21515	64.9038	-105.052	99.4763	-2.49692	65.5846
Cos(ψ)+	0.999998	0.999999	1.01328e...	1.26105e...	0.999973	1	0.999996	0.999996
Urms_a_pu	1.00171	1.04171	0.0400008	0.49782	1.00171	1.04176	1.03698	1.03703

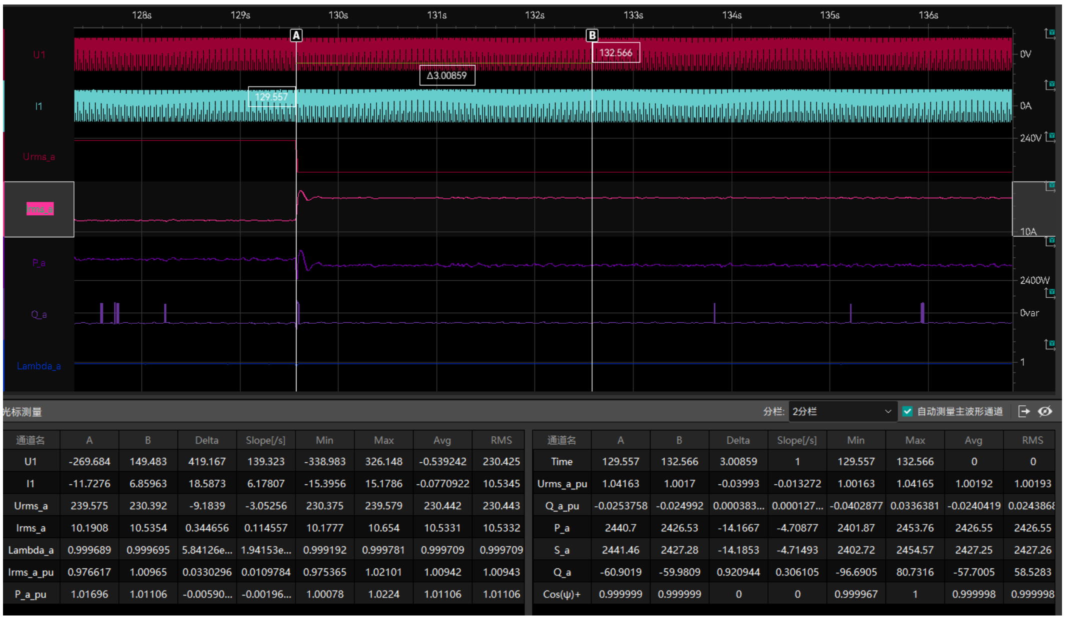
During dip (t1+80ms)


69.44s
69.46s
69.48s
69.5s
69.52s
69.54s
69.56s
69.58s
69.6s
69.62s
69.64s
69.66s
69.68s
A
B
69.5248
69.6249
Δ0.100118
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	116.974	131.427	14.4531	144.36	-339.101	339.054	0.242837	239.421
I1	4.99763	5.42882	0.431189	4.3068	-14.5006	14.5469	-0.0339433	10.1455
Urms_a	230.434	239.591	9.15668	91.4589	230.434	239.604	238.784	238.793
Irms_a	10.5359	10.1776	-0.358337	-3.57915	10.073	10.5359	10.1842	10.185
Lambda_a	0.999693	0.999706	1.3411e-05	0.000133...	0.999084	0.999784	0.999656	0.999656
Irms_a_pu	1.00969	0.97535	-0.0343407	-0.343002	0.965329	1.00969	0.975984	0.976062
P_a_pu	1.01129	1.01572	0.004437...	0.0443186	1.00531	1.02599	1.01281	1.01283

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	69.5248	69.6249	0.100118	1	69.5248	69.6249	0	0
Urms_a_pu	1.00189	1.0417	0.0398117	0.397648	1.00189	1.04176	1.03819	1.03823
Q_a_pu	-0.0250709	-0.0246236	0.000447...	0.004467...	-0.0437717	0.0414484	-0.00547...	0.0266198
P_a	2427.09	2437.73	10.6489	106.364	2412.73	2462.38	2430.75	2430.8
S_a	2427.83	2438.45	10.6196	106.071	2413.42	2463.32	2431.59	2431.63
Q_a	-60.1702	-59.0966	1.07355	10.7229	-105.052	99.4763	-13.147	63.8875
Cos(ψ)+	0.999999	0.999999	-1.78814...	-1.78603...	0.999973	1	0.999997	0.999997

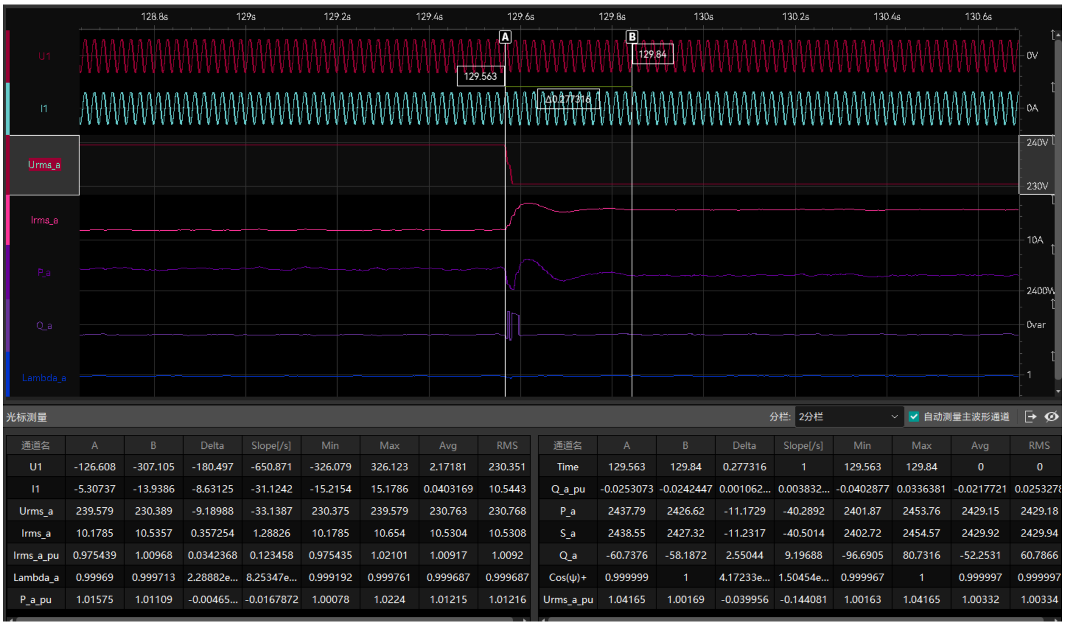
During dip (t1+100ms)


128s
129s
130s
131s
132s
133s
134s
135s
136s
A
B
132.566
Δ3.00859
129.557
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-269.684	149.483	419.167	139.323	-338.983	326.148	-0.539242	230.425
I1	-11.7276	6.85963	18.5873	6.17807	-15.3956	15.1786	-0.0770922	10.5345
Urms_a	239.575	230.392	-9.1839	-3.05256	230.375	239.579	230.442	230.443
Irms_a	10.1908	10.5354	0.344656	0.114557	10.1777	10.654	10.5331	10.5332
Lambda_a	0.999689	0.999695	5.84126e...	1.94153e...	0.999192	0.999781	0.999709	0.999709
Irms_a_pu	0.976617	1.00965	0.0330296	0.0109784	0.975365	1.02101	1.00942	1.00943
P_a_pu	1.01696	1.01106	-0.00590...	-0.00196...	1.00078	1.0224	1.01106	1.01106

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	129.557	132.566	3.00859	1	129.557	132.566	0	0
Urms_a_pu	1.04163	1.0017	-0.03993	-0.013272	1.00163	1.04165	1.00192	1.00193
Q_a_pu	-0.0253758	-0.024992	0.000383...	0.000127...	-0.0402877	0.0336381	-0.0240419	0.024386
P_a	2440.7	2426.53	-14.1667	-4.70877	2401.87	2453.76	2426.55	2426.55
S_a	2441.46	2427.28	-14.1853	-4.71493	2402.72	2454.57	2427.25	2427.26
Q_a	-60.9019	-59.9809	0.920944	0.306105	-96.6905	80.7316	-57.7005	58.5283
Cos(ψ)+	0.999999	0.999999	0	0	0.999967	1	0.999998	0.999998

After dip (t2+3s)

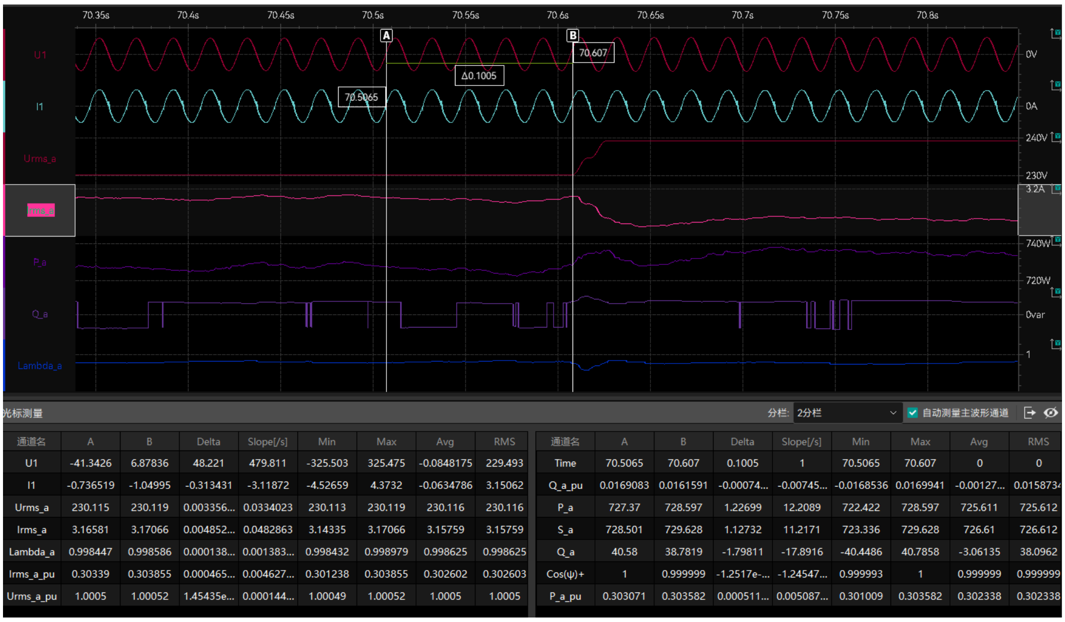

128.8s
129s
129.2s
129.4s
129.6s
129.8s
130s
130.2s
130.4s
130.6s
A
B
129.84
129.563
Δ0.277316
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-126.608	-307.105	-180.497	-650.871	-326.079	326.123	2.17181	230.351
I1	-5.30737	-13.9386	-8.63125	-31.1242	-15.2154	15.1786	0.0403169	10.5443
Urms_a	239.579	230.389	-9.18988	-33.1387	230.375	239.579	230.763	230.768
Irms_a	10.1785	10.5357	0.357254	1.28826	10.1785	10.654	10.5304	10.5308
Irms_a_pu	0.975439	1.00968	0.0342368	0.123458	0.975435	1.02101	1.00917	1.0092
Lambda_a	0.99969	0.999713	2.28882e...	8.25347e...	0.999192	0.999761	0.999687	0.999687
P_a_pu	1.01575	1.01109	-0.00465...	-0.0167872	1.00078	1.0224	1.01215	1.01216

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	129.563	129.84	0.277316	1	129.563	129.84	0	0
Q_a_pu	-0.0253073	-0.0242447	0.001062...	0.003832...	-0.0402877	0.0336381	-0.0217721	0.025327
P_a	2437.79	2426.62	-11.1729	-40.2892	2401.87	2453.76	2429.15	2429.18
S_a	2438.55	2427.32	-11.2317	-40.5014	2402.72	2454.57	2429.92	2429.94
Q_a	-60.7376	-58.1872	2.55044	9.19688	-96.6905	80.7316	-52.2531	60.7866
Cos(ψ)+	0.999999	1	4.17233e...	1.50454e...	0.999967	1	0.999997	0.999997
Urms_a_pu	1.04165	1.00169	-0.039956	-0.144081	1.00163	1.04165	1.00332	1.00334

Recovery time

Graph of Test number 6.4

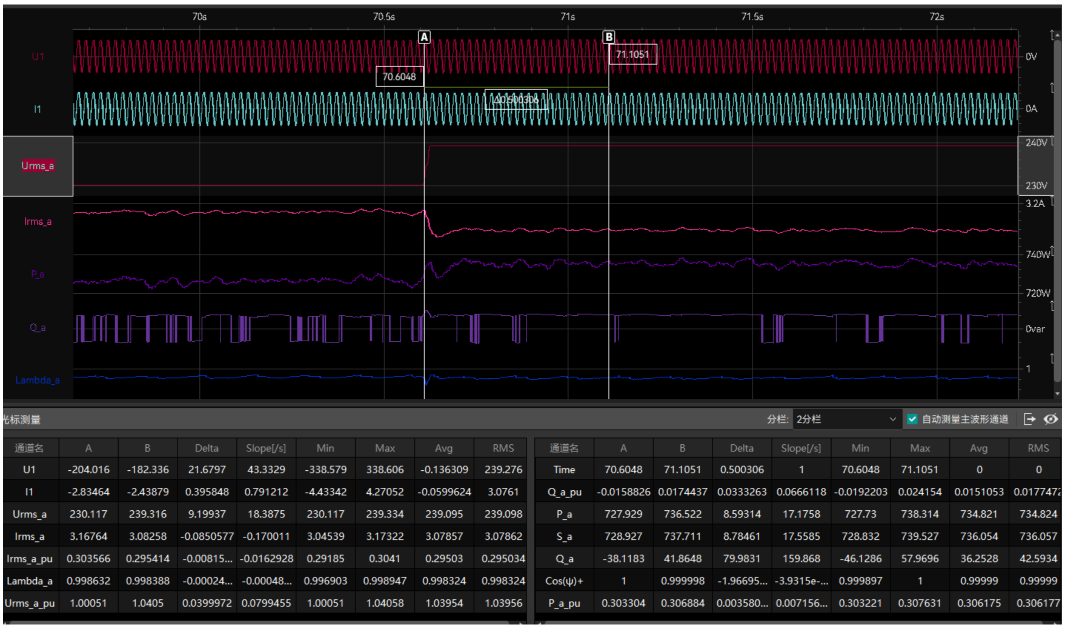

70.35s
70.4s
70.45s
70.5s
70.55s
70.6s
70.65s
70.7s
70.75s
70.8s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
70.5065
Δ0.1005
70.607
0V
0A
240V
230V
3.2A
740W
720W
0var
1

光标测量 分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-41.3426	6.87836	48.221	479.811	-325.503	325.475	-0.0848175	229.493
I1	-0.736519	-1.04995	-0.313431	-3.11872	-4.52659	4.3732	-0.0634786	3.15062
Urms_a	230.115	230.119	0.003356...	0.0334023	230.113	230.119	230.116	230.116
Irms_a	3.16581	3.17066	0.004852...	0.0482863	3.14335	3.17066	3.15759	3.15759
Lambda_a	0.998447	0.998586	0.000138...	0.001383...	0.998432	0.998979	0.998625	0.998625
Irms_a_pu	0.30339	0.303855	0.000465...	0.004627...	0.301238	0.303855	0.302602	0.302603
Urms_a_pu	1.0005	1.00052	1.45435e...	0.000144...	1.00049	1.00052	1.0005	1.0005

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.5065	70.607	0.1005	1	70.5065	70.607	0	0
Q_a_pu	0.0169083	0.0161591	-0.00074...	-0.00745...	-0.0168536	0.0169941	-0.00127...	0.0158734
P_a	727.37	728.597	1.22699	12.2089	722.422	728.597	725.611	725.612
S_a	728.501	729.628	1.12732	11.2171	723.336	729.628	726.61	726.612
Q_a	40.58	38.7819	-1.79811	-17.8916	-40.4486	40.7858	-3.06135	38.0962
Cos(ψ)+	1	0.999999	-1.2517e-...	-1.24547...	0.999993	1	0.999999	0.999999
P_a_pu	0.303071	0.303582	0.000511...	0.005087...	0.301009	0.303582	0.302338	0.302338

Before dip (t1-100ms)

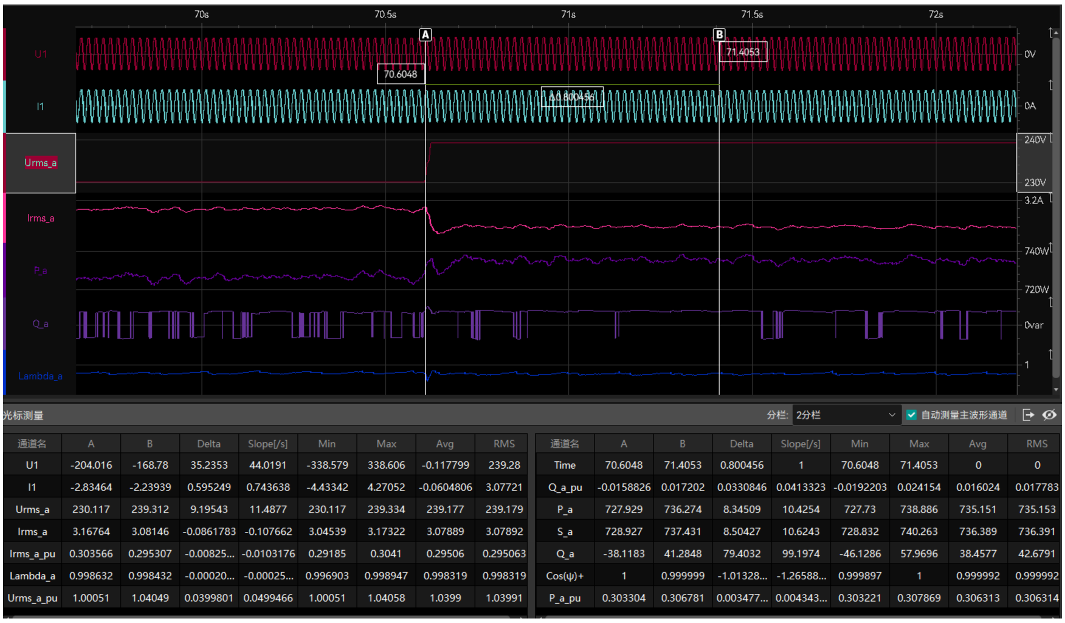

70s
70.5s
71s
71.5s
72s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
70.6048
Δ0.500306
71.1051
0V
0A
240V
230V
3.2A
740W
720W
0var
1

光标测量 分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-204.016	-182.336	21.6797	43.3329	-338.579	338.606	-0.136309	239.276
I1	-2.83464	-2.43879	0.395848	0.791212	-4.43342	4.27052	-0.0599624	3.0761
Urms_a	230.117	239.316	9.19937	18.3875	230.117	239.334	239.095	239.098
Irms_a	3.16764	3.08258	-0.0850577	-0.170011	3.04539	3.17322	3.07857	3.07862
Irms_a_pu	0.303566	0.295414	-0.00815...	-0.0162928	0.29185	0.3041	0.29503	0.295034
Lambda_a	0.998632	0.998388	-0.00024...	-0.00048...	0.996903	0.998947	0.998324	0.998324
Urms_a_pu	1.00051	1.0405	0.0399972	0.0799455	1.00051	1.04058	1.03954	1.03956

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.6048	71.1051	0.500306	1	70.6048	71.1051	0	0
Q_a_pu	-0.0158826	0.0174437	0.0333263	0.0666118	-0.0192203	0.024154	0.0151053	0.0177472
P_a	727.929	736.522	8.59314	17.1758	727.73	738.314	734.821	734.824
S_a	728.927	737.711	8.78461	17.5585	728.832	739.527	736.054	736.057
Q_a	-38.1183	41.8648	79.9831	159.868	-46.1286	57.9696	36.2528	42.5934
Cos(ψ)+	1	0.999998	-1.96695...	-3.9315e-...	0.999897	1	0.99999	0.99999
P_a_pu	0.303304	0.306884	0.003580...	0.007156...	0.303221	0.307631	0.306175	0.306177

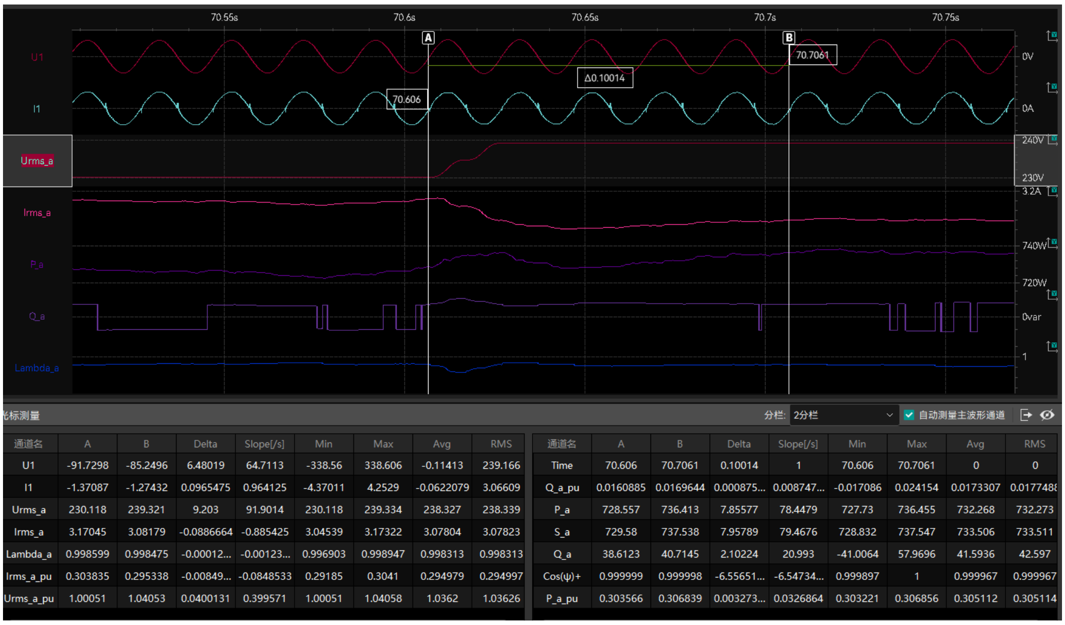
During dip (t1+50ms)


70s
70.5s
71s
71.5s
72s
A
B
70.6048
71.4053
Δ0.800456
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-204.016	-168.78	35.2353	44.0191	-338.579	338.606	-0.117799	239.28
I1	-2.83464	-2.23939	0.595249	0.743638	-4.43342	4.27052	-0.0604806	3.07721
Urms_a	230.117	239.312	9.19543	11.4877	230.117	239.334	239.177	239.179
Irms_a	3.16764	3.08146	-0.0861783	-0.107662	3.04539	3.17322	3.07889	3.07892
Irms_a_pu	0.303566	0.295307	-0.00825...	-0.0103176	0.29185	0.3041	0.29506	0.295063
Lambda_a	0.998632	0.998432	-0.00020...	-0.00025...	0.996903	0.998947	0.998319	0.998319
Urms_a_pu	1.00051	1.04049	0.0399801	0.0499466	1.00051	1.04058	1.0399	1.03991

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.6048	71.4053	0.800456	1	70.6048	71.4053	0	0
Q_a_pu	-0.0158826	0.017202	0.0330846	0.0413323	-0.0192203	0.024154	0.016024	0.017783
P_a	727.929	736.274	8.34509	10.4254	727.73	738.886	735.151	735.153
S_a	728.927	737.431	8.50427	10.6243	728.832	740.263	736.389	736.391
Q_a	-38.1183	41.2848	79.4032	99.1974	-46.1286	57.9696	38.4577	42.6791
Cos(ψ)+	1	0.999999	-1.01328...	-1.26588...	0.999897	1	0.999992	0.999992
P_a_pu	0.303304	0.306781	0.003477...	0.004343...	0.303221	0.307869	0.306313	0.306314

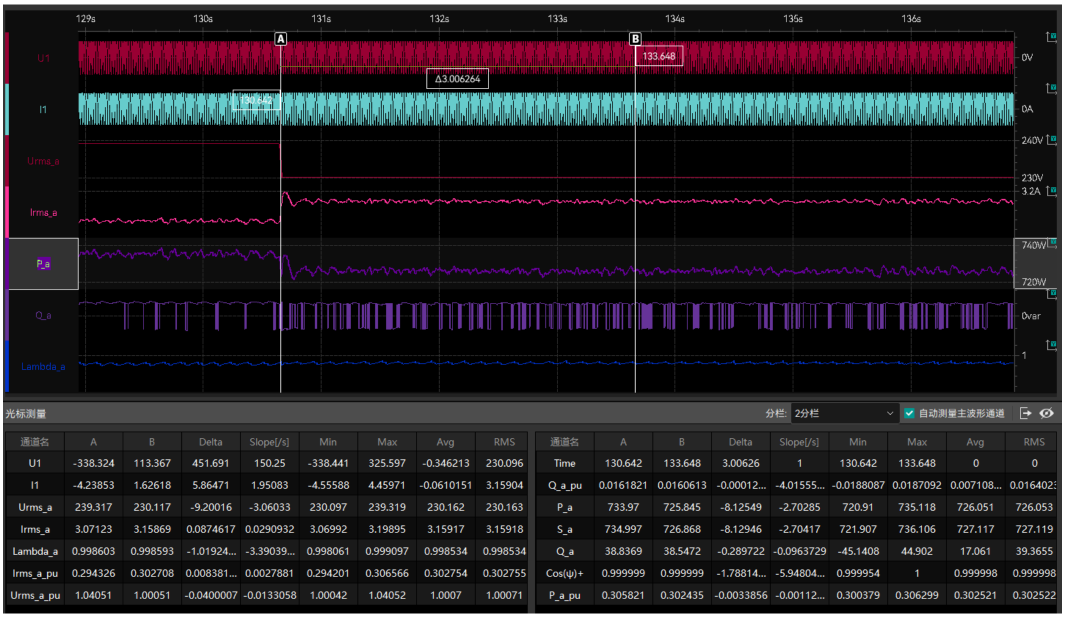
During dip (t1+80ms)


70.55s
70.6s
70.65s
70.7s
70.75s
A
B
70.606
70.7061
Δ0.10014
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-91.7298	-85.2496	6.48019	64.7113	-338.56	338.606	-0.11413	239.166
I1	-1.37087	-1.27432	0.0965475	0.964125	-4.37011	4.2529	-0.0622079	3.06609
Urms_a	230.118	239.321	9.203	91.9014	230.118	239.334	238.327	238.339
Irms_a	3.17045	3.08179	-0.0886664	-0.885425	3.04539	3.17322	3.07804	3.07823
Lambda_a	0.998599	0.998475	-0.00012...	-0.00123...	0.996903	0.998947	0.998313	0.998313
Irms_a_pu	0.303835	0.295338	-0.00849...	-0.0848533	0.29185	0.3041	0.294979	0.294997
Urms_a_pu	1.00051	1.04053	0.0400131	0.399571	1.00051	1.04058	1.0362	1.03626

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.606	70.7061	0.10014	1	70.606	70.7061	0	0
Q_a_pu	0.0160885	0.0169644	0.000875...	0.008747...	-0.017086	0.024154	0.0173307	0.017748
P_a	728.557	736.413	7.85577	78.4479	727.73	736.455	732.268	732.273
S_a	729.58	737.538	7.95789	79.4676	728.832	737.547	733.506	733.511
Q_a	38.6123	40.7145	2.10224	20.993	-41.0064	57.9696	41.5936	42.597
Cos(ψ)+	0.999999	0.999998	-6.55651...	-6.54734...	0.999897	1	0.999967	0.999967
P_a_pu	0.303566	0.306839	0.003273...	0.0326864	0.303221	0.306856	0.305112	0.305114

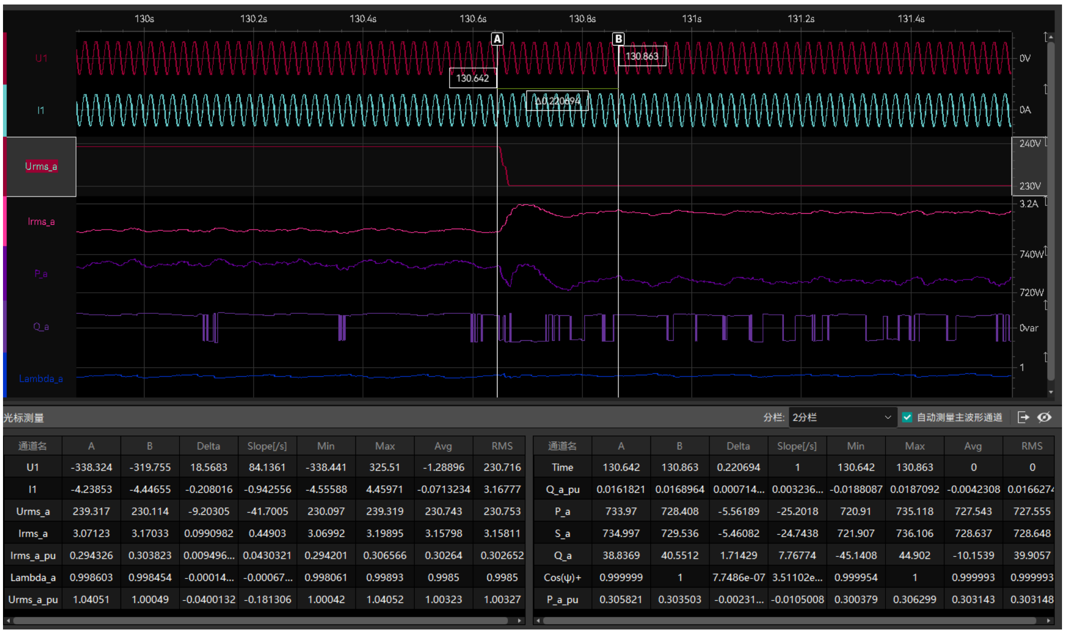
During dip (t1+100ms)


129s
130s
131s
132s
133s
134s
135s
136s
A
B
133.648
Δ3.006264
130.642
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-338.324	113.367	451.691	150.25	-338.441	325.597	-0.346213	230.096
I1	-4.23853	1.62618	5.86471	1.95083	-4.55588	4.45971	-0.0610151	3.15904
Urms_a	239.317	230.117	-9.20016	-3.06033	230.097	239.319	230.162	230.163
Irms_a	3.07123	3.15869	0.0874617	0.0290932	3.06992	3.19895	3.15917	3.15918
Lambda_a	0.998603	0.998593	-1.01924...	-3.39039...	0.998061	0.999097	0.998534	0.998534
Irms_a_pu	0.294326	0.302708	0.008381...	0.0027881	0.294201	0.306566	0.302754	0.302755
Urms_a_pu	1.04051	1.00051	-0.0400007	-0.0133058	1.00042	1.04052	1.0007	1.00071

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	130.642	133.648	3.00626	1	130.642	133.648	0	0
Q_a_pu	0.0161821	0.0160613	-0.00012...	-4.01555...	-0.0188087	0.0187092	0.007108...	0.0164023
P_a	733.97	725.845	-8.12549	-2.70285	720.91	735.118	726.051	726.053
S_a	734.997	726.868	-8.12946	-2.70417	721.907	736.106	727.117	727.119
Q_a	38.8369	38.5472	-0.289722	-0.0963729	-45.1408	44.902	17.061	39.3655
Cos(ψ)+	0.999999	0.999999	-1.78814...	-5.94804...	0.999954	1	0.999998	0.999998
P_a_pu	0.305821	0.302435	-0.0033856	-0.00112...	0.300379	0.306299	0.302521	0.302522

After dip (t2+3s)


130s
130.2s
130.4s
130.6s
130.8s
131s
131.2s
131.4s
A
B
130.863
130.642
Δ0.220694
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-338.324	-319.755	18.5683	84.1361	-338.441	325.51	-1.28896	230.716
I1	-4.23853	-4.44655	-0.208016	-0.942556	-4.55588	4.45971	-0.0713234	3.16777
Urms_a	239.317	230.114	-9.20305	-41.7005	230.097	239.319	230.743	230.753
Irms_a	3.07123	3.17033	0.0990982	0.44903	3.06992	3.19895	3.15798	3.15811
Irms_a_pu	0.294326	0.303823	0.009496...	0.0430321	0.294201	0.306566	0.30264	0.302652
Lambda_a	0.998603	0.998454	-0.00014...	-0.00067...	0.998061	0.99893	0.9985	0.9985
Urms_a_pu	1.04051	1.00049	-0.0400132	-0.181306	1.00042	1.04052	1.00323	1.00327

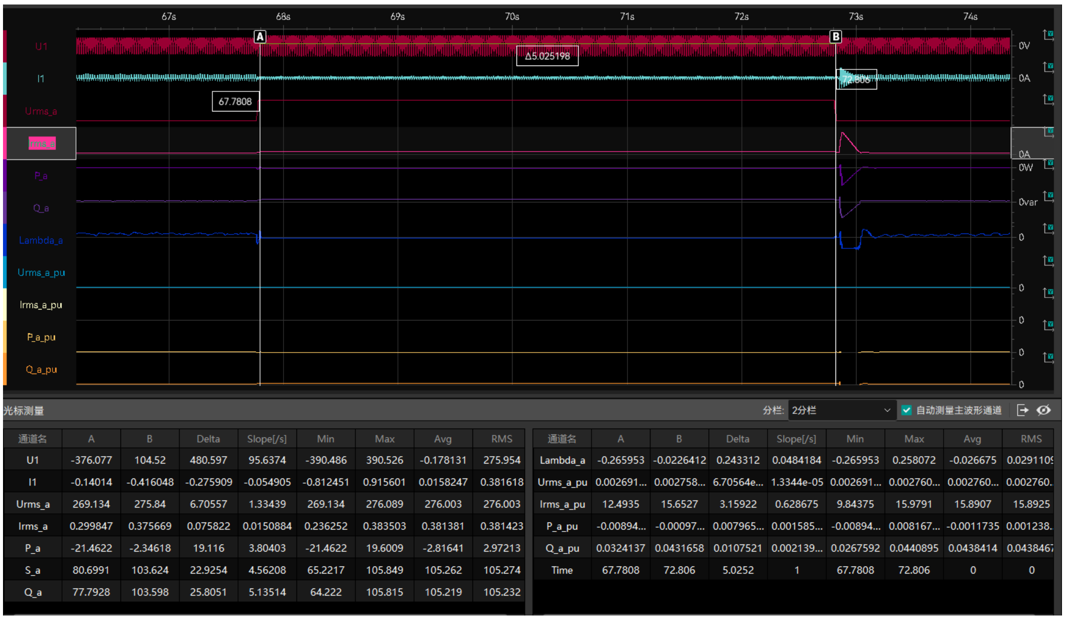
通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	130.642	130.863	0.220694	1	130.642	130.863	0	0
Q_a_pu	0.0161821	0.0168964	0.000714...	0.003236...	-0.0188087	0.0187092	-0.0042308	0.0166274
P_a	733.97	728.408	-5.56189	-25.2018	720.91	735.118	727.543	727.555
S_a	734.997	729.536	-5.46082	-24.7438	721.907	736.106	728.637	728.648
Q_a	38.8369	40.5512	1.71429	7.76774	-45.1408	44.902	-10.1539	39.9057
Cos(ψ)+	0.999999	1	7.7486e-07	3.51102e...	0.999954	1	0.999993	0.999993
P_a_pu	0.305821	0.303503	-0.00231...	-0.0105008	0.300379	0.306299	0.303143	0.303148

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	7.1	7.2	7.3	7.4
	1	Date	--	--	dd.mm .yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm :ss	See graph			
	3	Fault type (phase)	--	--		VS2.1		VS4.1	
	4	Setting voltage depth	Line to line	--	p.u.	1.20			
	5	Setting dip duration		--		5000			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	5025.2			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.20			
	10		Pos.		p.u.	1.20			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.002	1.001	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.005	0.302	1.004	0.303
	13	Active power	Total	t1-10s to t1	p.u.	1.007	0.302	1.006	0.303
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.023	0.018	-0.024	0.017
	16		Pos.			--	--	--	--
	17	Cosφ	--	t1-10s to t1	--	0.9999	0.9982	0.9997	0.9984
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.201	1.201	-- -- 1.051	-- -- 1.051
	19	Line current	Phase 1	t1+50ms	p.u.	0.036	0.036	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	0.962	0.289
	22	Line current	Phase 1	t1+80ms	p.u.	0.036	0.036	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	0.962	0.289
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.001	-0.001	1.009	0.306
	26		Pos.			--	--	--	--

After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.002	1.001	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.007	0.302	1.007	0.302
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.120	0.223	0.277	0.212
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.027	0.017	-0.025	0.016
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.120	0.233	0.277	0.212
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

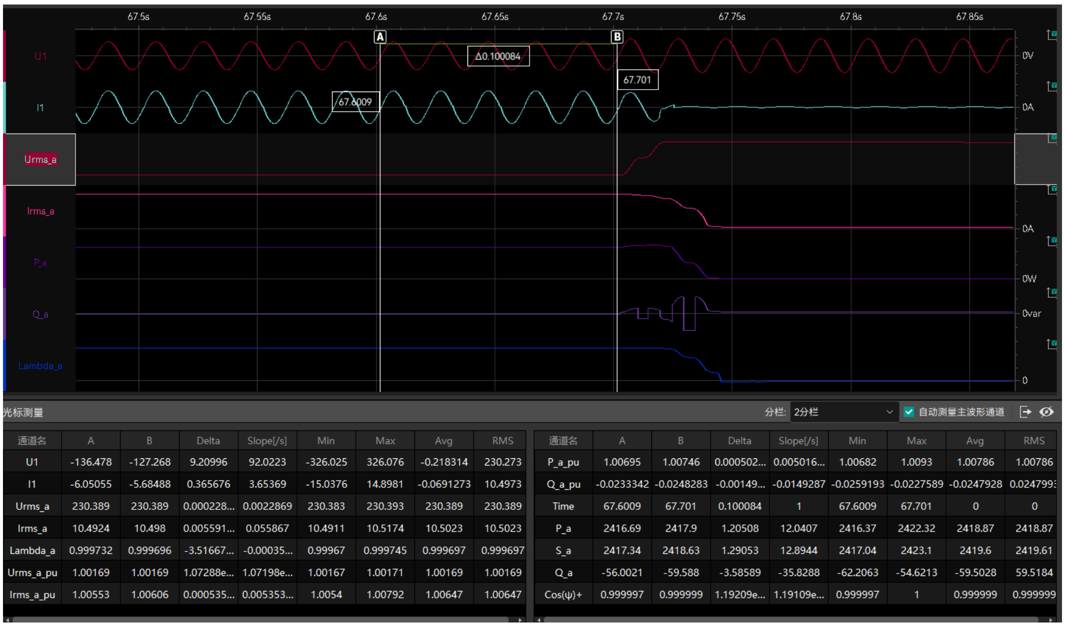
Graph of Test number 7.1



通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-376.077	104.52	480.597	95.6374	-390.486	390.526	-0.178131	275.954
I1	-0.14014	-0.416048	-0.275909	-0.054905	-0.812451	0.915601	0.0158247	0.381618
Urms_a	269.134	275.84	6.70557	1.33439	269.134	276.089	276.003	276.003
Irms_a	0.299847	0.375669	0.075822	0.0150884	0.236252	0.383503	0.381381	0.381423
P_a	-21.4622	-2.34618	19.116	3.80403	-21.4622	19.6009	-2.81641	2.97213
S_a	80.6991	103.624	22.9254	4.56208	65.2217	105.849	105.262	105.274
Q_a	77.7928	103.598	25.8051	5.13514	64.222	105.815	105.219	105.232

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Lambda_a	-0.265953	-0.0226412	0.243312	0.0484184	-0.265953	0.258072	-0.026675	0.029110
Urms_a_pu	0.002691...	0.002758...	6.70564e...	1.3344e-05	0.002691...	0.002760...	0.002760...	0.002760.
Irms_a_pu	12.4935	15.6527	3.15922	0.628675	9.84375	15.9791	15.8907	15.8925
P_a_pu	-0.00894...	-0.00097...	0.007965...	0.001585...	-0.00894...	0.008167...	-0.0011735	0.001238.
Q_a_pu	0.0324137	0.0431658	0.0107521	0.002139...	0.0267592	0.0440895	0.0438414	0.0438467
Time	67.7808	72.806	5.0252	1	67.7808	72.806	0	0

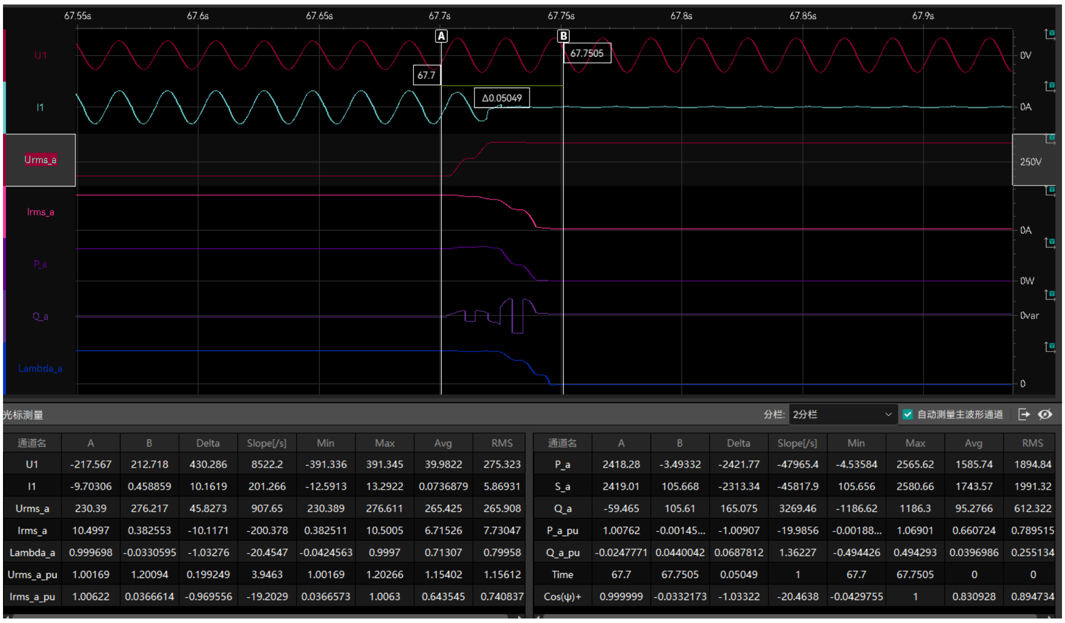
Empty load


67.5s
67.55s
67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
A
B
Δ0.100084
67.6009
67.701
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
0A
0W
0var
0
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-136.478	-127.268	9.20996	92.0223	-326.025	326.076	-0.218314	230.273
I1	-6.05055	-5.68488	0.365676	3.65369	-15.0376	14.8981	-0.0691273	10.4973
Urms_a	230.389	230.389	0.000228...	0.0022869	230.383	230.393	230.389	230.389
Irms_a	10.4924	10.498	0.005591...	0.055867	10.4911	10.5174	10.5023	10.5023
Lambda_a	0.999732	0.999696	-3.51667...	-0.00035...	0.99967	0.999745	0.999697	0.999697
Urms_a_pu	1.00169	1.00169	1.07288e...	1.07198e...	1.00167	1.00171	1.00169	1.00169
Irms_a_pu	1.00553	1.00606	0.000535...	0.005353...	1.0054	1.00792	1.00647	1.00647

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00695	1.00746	0.000502...	0.005016...	1.00682	1.0093	1.00786	1.00786
Q_a_pu	-0.0233342	-0.0248283	-0.00149...	-0.0149287	-0.0259193	-0.0227589	-0.0247928	0.0247993
Time	67.6009	67.701	0.100084	1	67.6009	67.701	0	0
P_a	2416.69	2417.9	1.20508	12.0407	2416.37	2422.32	2418.87	2418.87
S_a	2417.34	2418.63	1.29053	12.8944	2417.04	2423.1	2419.6	2419.61
Q_a	-56.0021	-59.588	-3.58589	-35.8288	-62.2063	-54.6213	-59.5028	59.5184
Cos(ψ)+	0.999997	0.999999	1.19209e...	1.19109e...	0.999997	1	0.999999	0.999999

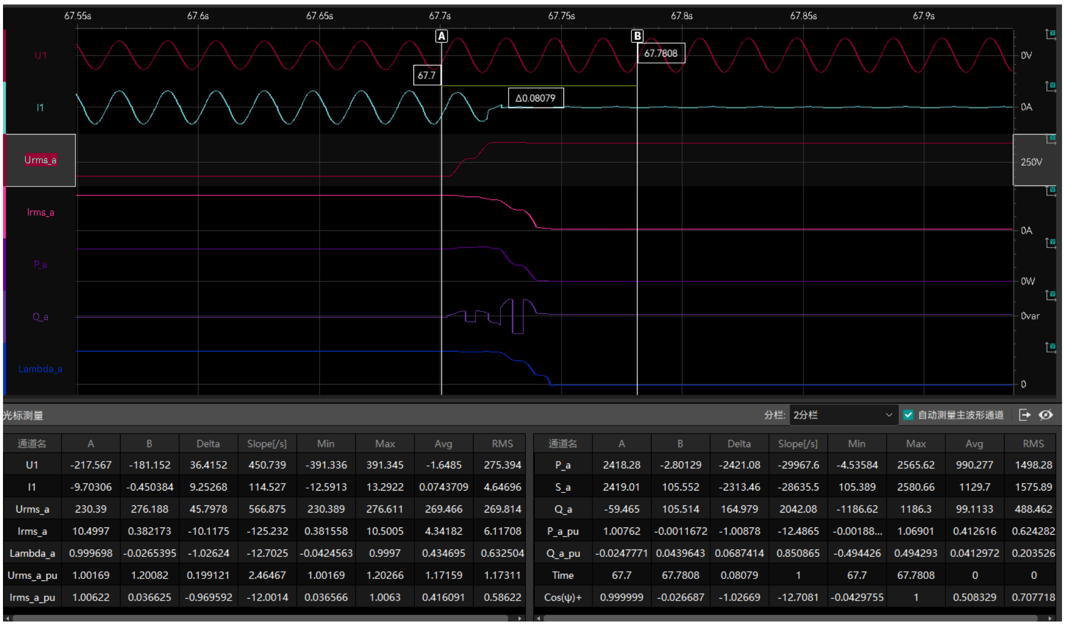
Before dip (t1-100ms)


67.55s
67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
67.9s
A
B
67.7
67.7505
Δ0.05049
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
0A
0W
0var
0
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-217.567	212.718	430.286	8522.2	-391.336	391.345	39.9822	275.323
I1	-9.70306	0.458859	10.1619	201.266	-12.5913	13.2922	0.0736879	5.86931
Urms_a	230.39	276.217	45.8273	907.65	230.389	276.611	265.425	265.908
Irms_a	10.4997	0.382553	-10.1171	-200.378	0.382511	10.5005	6.71526	7.73047
Lambda_a	0.999698	-0.0330595	-1.03276	-20.4547	-0.0424563	0.9997	0.71307	0.79958
Urms_a_pu	1.00169	1.20094	0.199249	3.9463	1.00169	1.20266	1.15402	1.15612
Irms_a_pu	1.00622	0.0366614	-0.969556	-19.2029	0.0366573	1.0063	0.643545	0.740837

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	2418.28	-3.49332	-2421.77	-47965.4	-4.53584	2565.62	1585.74	1894.84
S_a	2419.01	105.668	-2313.34	-45817.9	105.656	2580.66	1743.57	1991.32
Q_a	-59.465	105.61	165.075	3269.46	-1186.62	1186.3	95.2766	612.322
P_a_pu	1.00762	-0.00145...	-1.00907	-19.9856	-0.00188...	1.06901	0.660724	0.789515
Q_a_pu	-0.0247771	0.0440042	0.0687812	1.36227	-0.494426	0.494293	0.0396986	0.255134
Time	67.7	67.7505	0.05049	1	67.7	67.7505	0	0
Cos(ψ)+	0.999999	-0.0332173	-1.03322	-20.4638	-0.0429755	1	0.830928	0.894734

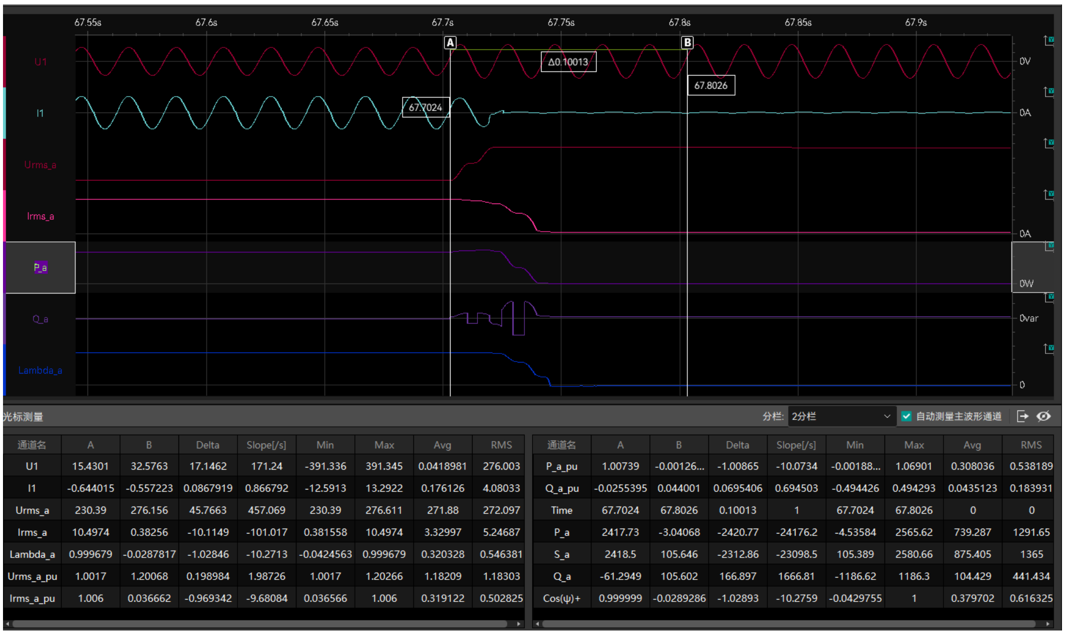
During dip (t1+50ms)


67.55s
67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
67.9s
A
B
67.7
67.7808
Δ0.08079
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
0A
0W
0var
0
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-217.567	-181.152	36.4152	450.739	-391.336	391.345	-1.6485	275.394
I1	-9.70306	-0.450384	9.25268	114.527	-12.5913	13.2922	0.0743709	4.64696
Urms_a	230.39	276.188	45.7978	566.875	230.389	276.611	269.466	269.814
Irms_a	10.4997	0.382173	-10.1175	-125.232	0.381558	10.5005	4.34182	6.11708
Lambda_a	0.999698	-0.0265395	-1.02624	-12.7025	-0.0424563	0.9997	0.434695	0.632504
Urms_a_pu	1.00169	1.20082	0.199121	2.46467	1.00169	1.20266	1.17159	1.17311
Irms_a_pu	1.00622	0.036625	-0.969592	-12.0014	0.036566	1.0063	0.416091	0.58622

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	2418.28	-2.80129	-2421.08	-29967.6	-4.53584	2565.62	990.277	1498.28
S_a	2419.01	105.552	-2313.46	-28635.5	105.389	2580.66	1129.7	1575.89
Q_a	-59.465	105.514	164.979	2042.08	-1186.62	1186.3	99.1133	488.462
P_a_pu	1.00762	-0.0011672	-1.00878	-12.4865	-0.00188...	1.06901	0.412616	0.624282
Q_a_pu	-0.0247771	0.0439643	0.0687414	0.850865	-0.494426	0.494293	0.0412972	0.203526
Time	67.7	67.7808	0.08079	1	67.7	67.7808	0	0
Cos(ψ)+	0.999999	-0.026687	-1.02669	-12.7081	-0.0429755	1	0.508329	0.707718

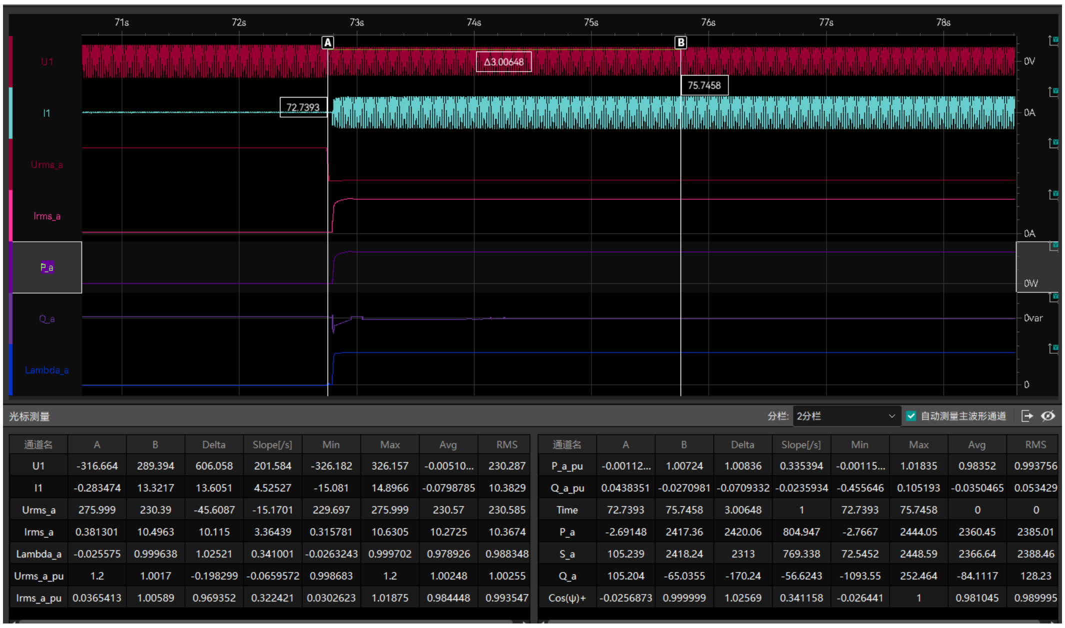
During dip (t1+80ms)


67.55s
67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
67.9s
A
B
Δ0.10013
67.7024
67.8026
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
0A
0W
0var
0
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	15.4301	32.5763	17.1462	171.24	-391.336	391.345	0.0418981	276.003
I1	-0.644015	-0.557223	0.0867919	0.866792	-12.5913	13.2922	0.176126	4.08033
Urms_a	230.39	276.156	45.7663	457.069	230.39	276.611	271.88	272.097
Irms_a	10.4974	0.38256	-10.1149	-101.017	0.381558	10.4974	3.32997	5.24687
Lambda_a	0.999679	-0.0287817	-1.02846	-10.2713	-0.0424563	0.999679	0.320328	0.546381
Urms_a_pu	1.0017	1.20068	0.198984	1.98726	1.0017	1.20266	1.18209	1.18303
Irms_a_pu	1.006	0.036662	-0.969342	-9.68084	0.036566	1.006	0.319122	0.502825

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00739	-0.00126...	-1.00865	-10.0734	-0.00188...	1.06901	0.308036	0.538189
Q_a_pu	-0.0255395	0.044001	0.0695406	0.694503	-0.494426	0.494293	0.0435123	0.183931
Time	67.7024	67.8026	0.10013	1	67.7024	67.8026	0	0
P_a	2417.73	-3.04068	-2420.77	-24176.2	-4.53584	2565.62	739.287	1291.65
S_a	2418.5	105.646	-2312.86	-23098.5	105.389	2580.66	875.405	1365
Q_a	-61.2949	105.602	166.897	1666.81	-1186.62	1186.3	104.429	441.434
Cos(ψ)+	0.999999	-0.0289286	-1.02893	-10.2759	-0.0429755	1	0.379702	0.616325

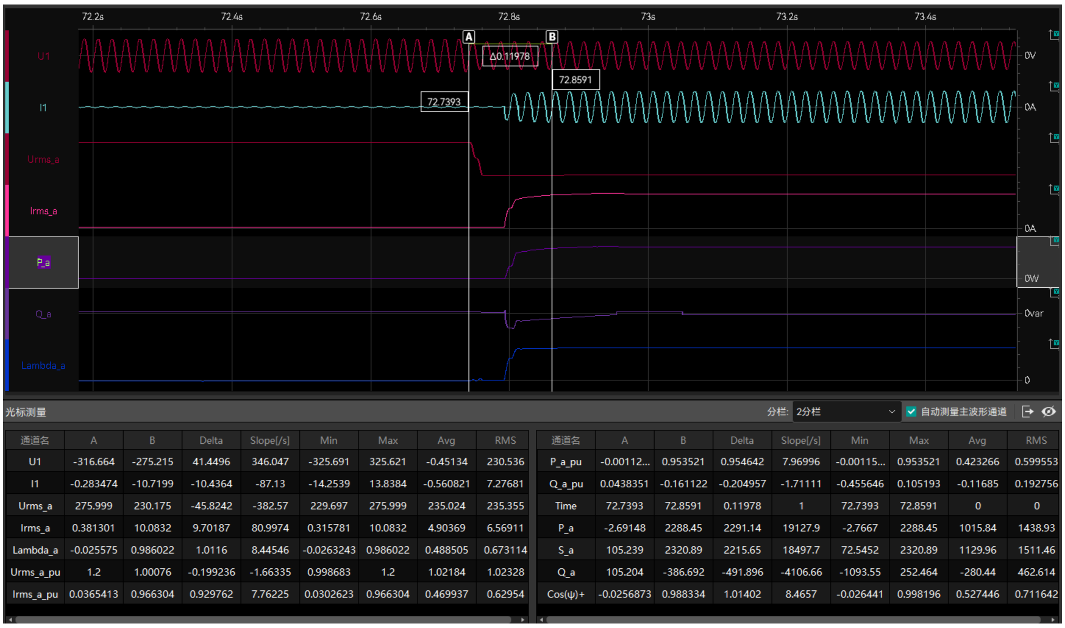
During dip (t1+100ms)


71s
72s
73s
74s
75s
76s
77s
78s
A
B
Δ3.00648
75.7458
72.7393
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
0A
0W
0var
0
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-316.664	289.394	606.058	201.584	-326.182	326.157	-0.00510...	230.287
I1	-0.283474	13.3217	13.6051	4.52527	-15.081	14.8966	-0.0798785	10.3829
Urms_a	275.999	230.39	-45.6087	-15.1701	229.697	275.999	230.57	230.585
Irms_a	0.381301	10.4963	10.115	3.36439	0.315781	10.6305	10.2725	10.3674
Lambda_a	-0.025575	0.999638	1.02521	0.341001	-0.0263243	0.999702	0.978926	0.988348
Urms_a_pu	1.2	1.0017	-0.198299	-0.0659572	0.998683	1.2	1.00248	1.00255
Irms_a_pu	0.0365413	1.00589	0.969352	0.322421	0.0302623	1.01875	0.984448	0.993547

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	-0.00112...	1.00724	1.00836	0.335394	-0.00115...	1.01835	0.98352	0.993756
Q_a_pu	0.0438351	-0.0270981	-0.0709332	-0.0235934	-0.455646	0.105193	-0.0350465	0.053429
Time	72.7393	75.7458	3.00648	1	72.7393	75.7458	0	0
P_a	-2.69148	2417.36	2420.06	804.947	-2.7667	2444.05	2360.45	2385.01
S_a	105.239	2418.24	2313	769.338	72.5452	2448.59	2366.64	2388.46
Q_a	105.204	-65.0355	-170.24	-56.6243	-1093.55	252.464	-84.1117	128.23
Cos(ψ)+	-0.0256873	0.999999	1.02569	0.341158	-0.026441	1	0.981045	0.989995

After dip (t2+3s)

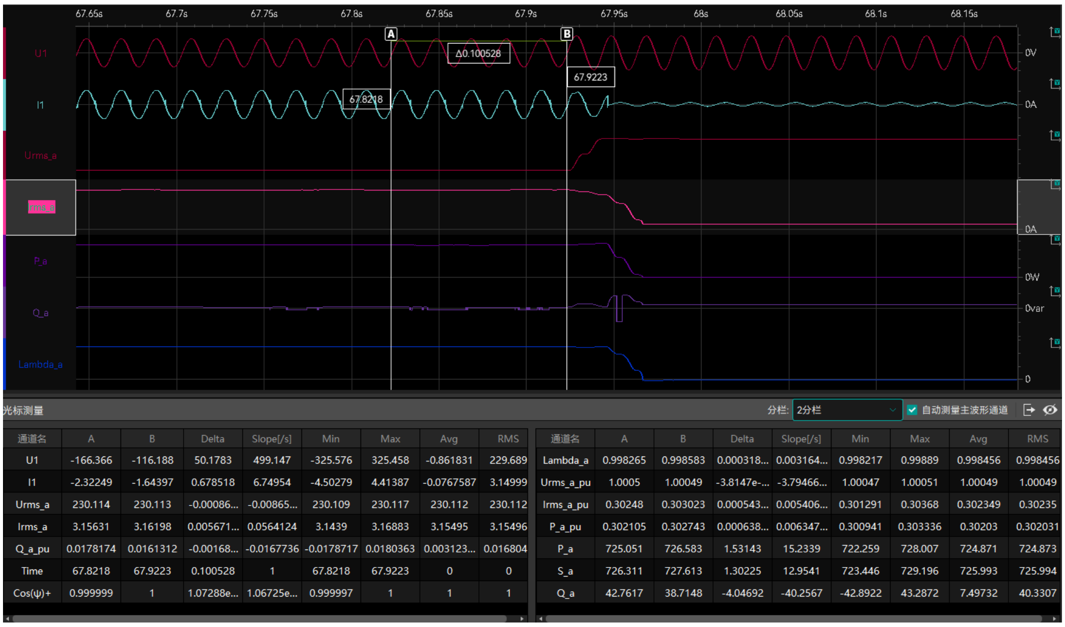

72.2s
72.4s
72.6s
72.8s
73s
73.2s
73.4s
A
B
Δ0.11978
72.8591
72.7393
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
0A
0W
0var
0
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-316.664	-275.215	41.4496	346.047	-325.691	325.621	-0.45134	230.536
I1	-0.283474	-10.7199	-10.4364	-87.13	-14.2539	13.8384	-0.560821	7.27681
Urms_a	275.999	230.175	-45.8242	-382.57	229.697	275.999	235.024	235.355
Irms_a	0.381301	10.0832	9.70187	80.9974	0.315781	10.0832	4.90369	6.56911
Lambda_a	-0.025575	0.986022	1.0116	8.44546	-0.0263243	0.986022	0.488505	0.673114
Urms_a_pu	1.2	1.00076	-0.199236	-1.66335	0.998683	1.2	1.02184	1.02328
Irms_a_pu	0.0365413	0.966304	0.929762	7.76225	0.0302623	0.966304	0.469937	0.62954

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	-0.00112...	0.953521	0.954642	7.96996	-0.00115...	0.953521	0.423266	0.599553
Q_a_pu	0.0438351	-0.161122	-0.204957	-1.71111	-0.455646	0.105193	-0.11685	0.192756
Time	72.7393	72.8591	0.11978	1	72.7393	72.8591	0	0
P_a	-2.69148	2288.45	2291.14	19127.9	-2.7667	2288.45	1015.84	1438.93
S_a	105.239	2320.89	2215.65	18497.7	72.5452	2320.89	1129.96	1511.46
Q_a	105.204	-386.692	-491.896	-4106.66	-1093.55	252.464	-280.44	462.614
Cos(ψ)+	-0.0256873	0.988334	1.01402	8.4657	-0.026441	0.998196	0.527446	0.711642

Recovery time

Graph of Test number 7.2


67.65s
67.7s
67.75s
67.8s
67.85s
67.9s
67.95s
68s
68.05s
68.1s
68.15s
A
B
Δ0.100528
67.9223
67.8218
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
0A
0W
0var
0

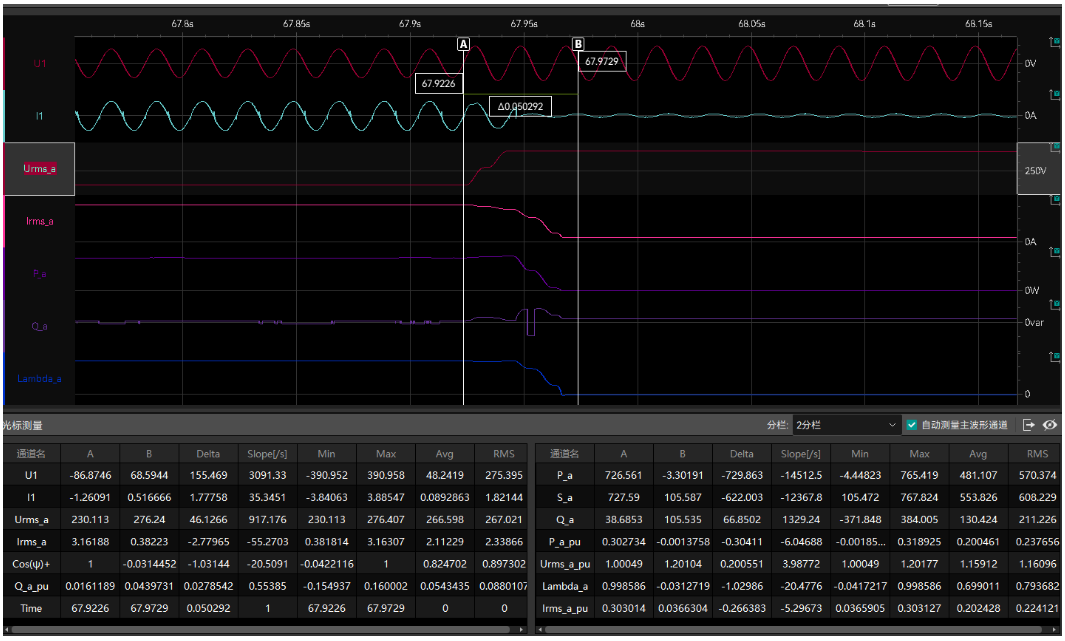
光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-166.366	-116.188	50.1783	499.147	-325.576	325.458	-0.861831	229.689
I1	-2.32249	-1.64397	0.678518	6.74954	-4.50279	4.41387	-0.0767587	3.14999
Urms_a	230.114	230.113	-0.00086...	-0.00865...	230.109	230.117	230.112	230.112
Irms_a	3.15631	3.16198	0.005671...	0.0564124	3.1439	3.16883	3.15495	3.15496
Q_a_pu	0.0178174	0.0161312	-0.00168...	-0.0167736	-0.0178717	0.0180363	0.003123...	0.016804
Time	67.8218	67.9223	0.100528	1	67.8218	67.9223	0	0
Cos(ψ)+	0.999999	1	1.07288e...	1.06725e...	0.999997	1	1	1

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Lambda_a	0.998265	0.998583	0.000318...	0.003164...	0.998217	0.99889	0.998456	0.998456
Urms_a_pu	1.0005	1.00049	-3.8147e-...	-3.79466...	1.00047	1.00051	1.00049	1.00049
Irms_a_pu	0.30248	0.303023	0.000543...	0.005406...	0.301291	0.30368	0.302349	0.30235
P_a_pu	0.302105	0.302743	0.000638...	0.006347...	0.300941	0.303336	0.30203	0.302031
P_a	725.051	726.583	1.53143	15.2339	722.259	728.007	724.871	724.873
S_a	726.311	727.613	1.30225	12.9541	723.446	729.196	725.993	725.994
Q_a	42.7617	38.7148	-4.04692	-40.2567	-42.8922	43.2872	7.49732	40.3307

Before dip (t1-100ms)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67.85s
67.9s
67.95s
68s
68.05s
68.1s
68.15s
A
B
67.9729
67.9226
Δ0.050292
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
0A
0W
0var
0

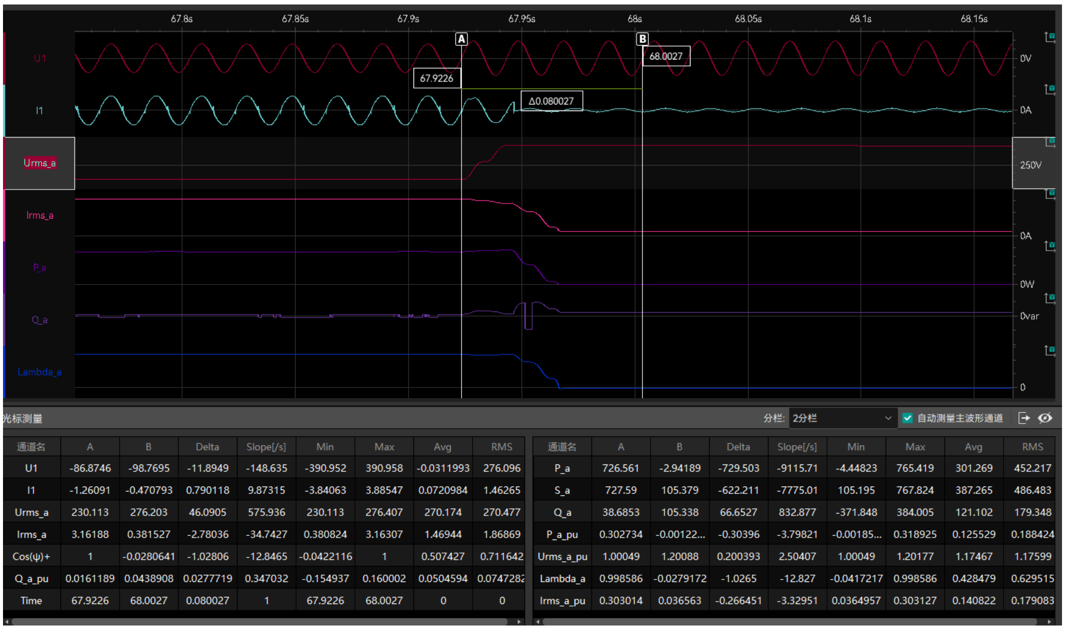
光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-86.8746	68.5944	155.469	3091.33	-390.952	390.958	48.2419	275.395
I1	-1.26091	0.516666	1.77758	35.3451	-3.84063	3.88547	0.0892863	1.82144
Urms_a	230.113	276.24	46.1266	917.176	230.113	276.407	266.598	267.021
Irms_a	3.16188	0.38223	-2.77965	-55.2703	0.381814	3.16307	2.11229	2.33866
Cos(ψ)+	1	-0.0314452	-1.03144	-20.5091	-0.0422116	1	0.824702	0.897302
Q_a_pu	0.0161189	0.0439731	0.0278542	0.55385	-0.154937	0.160002	0.0543435	0.0880107
Time	67.9226	67.9729	0.050292	1	67.9226	67.9729	0	0

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	726.561	-3.30191	-729.863	-14512.5	-4.44823	765.419	481.107	570.374
S_a	727.59	105.587	-622.003	-12367.8	105.472	767.824	553.826	608.229
Q_a	38.6853	105.535	66.8502	1329.24	-371.848	384.005	130.424	211.226
P_a_pu	0.302734	-0.0013758	-0.30411	-6.04688	-0.00185...	0.318925	0.200461	0.237656
Urms_a_pu	1.00049	1.20104	0.200551	3.98772	1.00049	1.20177	1.15912	1.16096
Lambda_a	0.998586	-0.0312719	-1.02986	-20.4776	-0.0417217	0.998586	0.699011	0.793682
Irms_a_pu	0.303014	0.0366304	-0.266383	-5.29673	0.0365905	0.303127	0.202428	0.224121

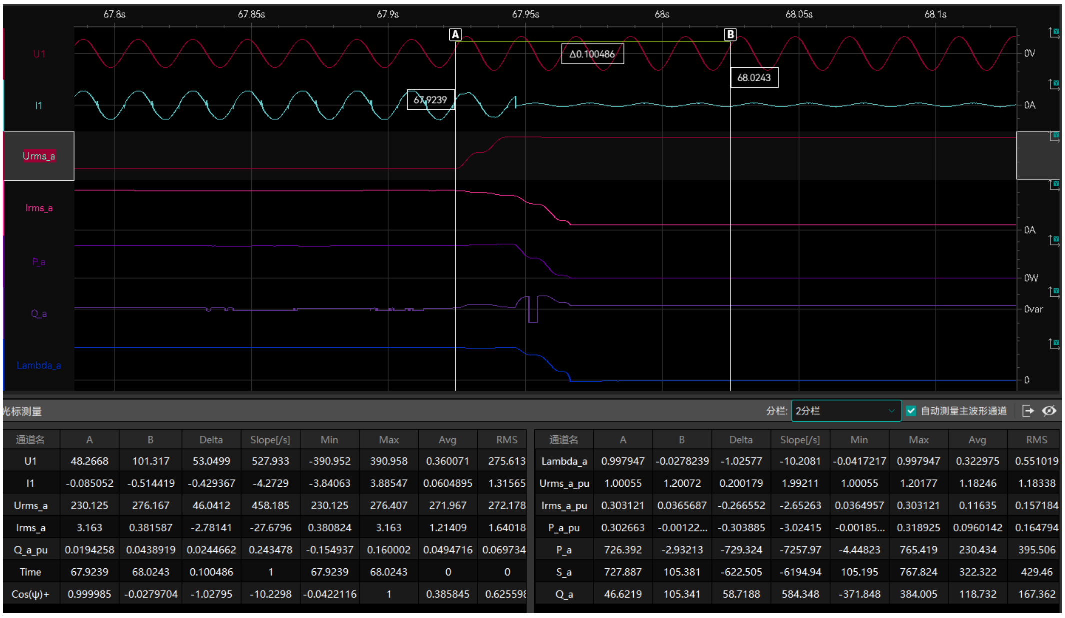
During dip (t1+50ms)


67.8s
67.85s
67.9s
67.95s
68s
68.05s
68.1s
68.15s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
67.9226
68.0027
Δ0.080027
0V
0A
250V
0A
0W
0var
0
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-86.8746	-98.7695	-11.8949	-148.635	-390.952	390.958	-0.0311993	276.096
I1	-1.26091	-0.470793	0.790118	9.87315	-3.84063	3.88547	0.0720984	1.46265
Urms_a	230.113	276.203	46.0905	575.936	230.113	276.407	270.174	270.477
Irms_a	3.16188	0.381527	-2.78036	-34.7427	0.380824	3.16307	1.46944	1.86869
Cos(ψ)+	1	-0.0280641	-1.02806	-12.8465	-0.0422116	1	0.507427	0.711642
Q_a_pu	0.0161189	0.0438908	0.0277719	0.347032	-0.154937	0.160002	0.0504594	0.0747282
Time	67.9226	68.0027	0.080027	1	67.9226	68.0027	0	0

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	726.561	-2.94189	-729.503	-9115.71	-4.44823	765.419	301.269	452.217
S_a	727.59	105.379	-622.211	-7775.01	105.195	767.824	387.265	486.483
Q_a	38.6853	105.338	66.6527	832.877	-371.848	384.005	121.102	179.348
P_a_pu	0.302734	-0.00122...	-0.30396	-3.79821	-0.00185...	0.318925	0.125529	0.188424
Urms_a_pu	1.00049	1.20088	0.200393	2.50407	1.00049	1.20177	1.17467	1.17599
Lambda_a	0.998586	-0.0279172	-1.0265	-12.827	-0.0417217	0.998586	0.428479	0.629515
Irms_a_pu	0.303014	0.036563	-0.266451	-3.32951	0.0364957	0.303127	0.140822	0.179083

During dip (t1+80ms)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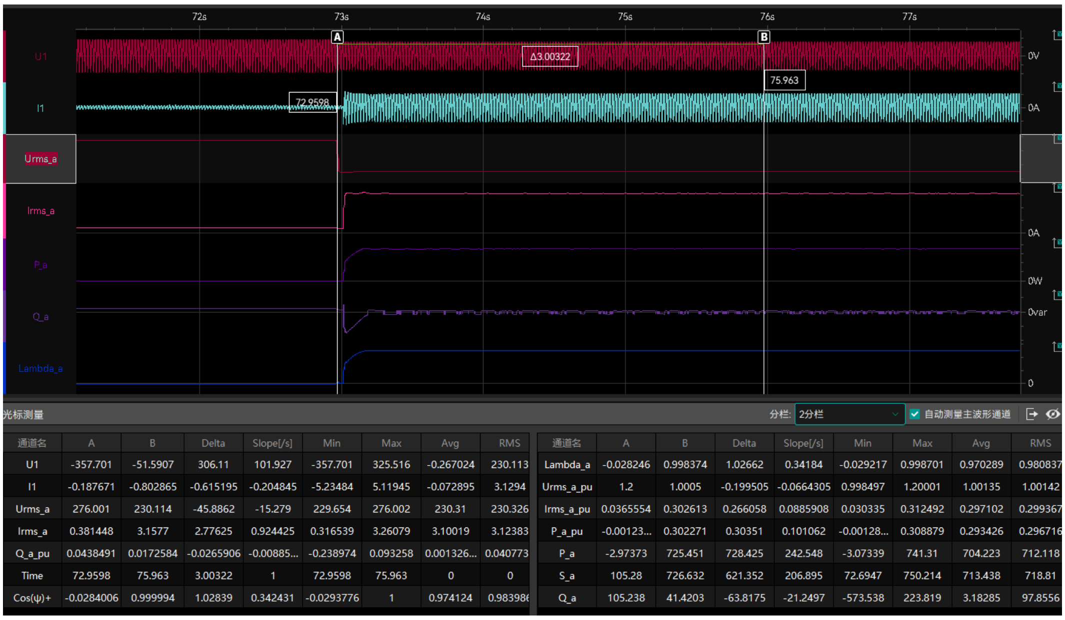
67.85s
67.9s
67.95s
68s
68.05s
68.1s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
Δ0.100486
68.0243
67.9239
0V
0A
0A
0W
0var
0
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	48.2668	101.317	53.0499	527.933	-390.952	390.958	0.360071	275.613
I1	-0.085052	-0.514419	-0.429367	-4.2729	-3.84063	3.88547	0.0604895	1.31565
Urms_a	230.125	276.167	46.0412	458.185	230.125	276.407	271.967	272.178
Irms_a	3.163	0.381587	-2.78141	-27.6796	0.380824	3.163	1.21409	1.64018
Q_a_pu	0.0194258	0.0438919	0.0244662	0.243478	-0.154937	0.160002	0.0494716	0.069734
Time	67.9239	68.0243	0.100486	1	67.9239	68.0243	0	0
Cos(ψ)+	0.999985	-0.0279704	-1.02795	-10.2298	-0.0422116	1	0.385845	0.62559

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Lambda_a	0.997947	-0.0278239	-1.02577	-10.2081	-0.0417217	0.997947	0.322975	0.551019
Urms_a_pu	1.00055	1.20072	0.200179	1.99211	1.00055	1.20177	1.18246	1.18338
Irms_a_pu	0.303121	0.0365687	-0.266552	-2.65263	0.0364957	0.303121	0.11635	0.157184
P_a_pu	0.302663	-0.00122...	-0.303885	-3.02415	-0.00185...	0.318925	0.0960142	0.164794
P_a	726.392	-2.93213	-729.324	-7257.97	-4.44823	765.419	230.434	395.506
S_a	727.887	105.381	-622.505	-6194.94	105.195	767.824	322.322	429.46
Q_a	46.6219	105.341	58.7188	584.348	-371.848	384.005	118.732	167.362

During dip (t1+100ms)

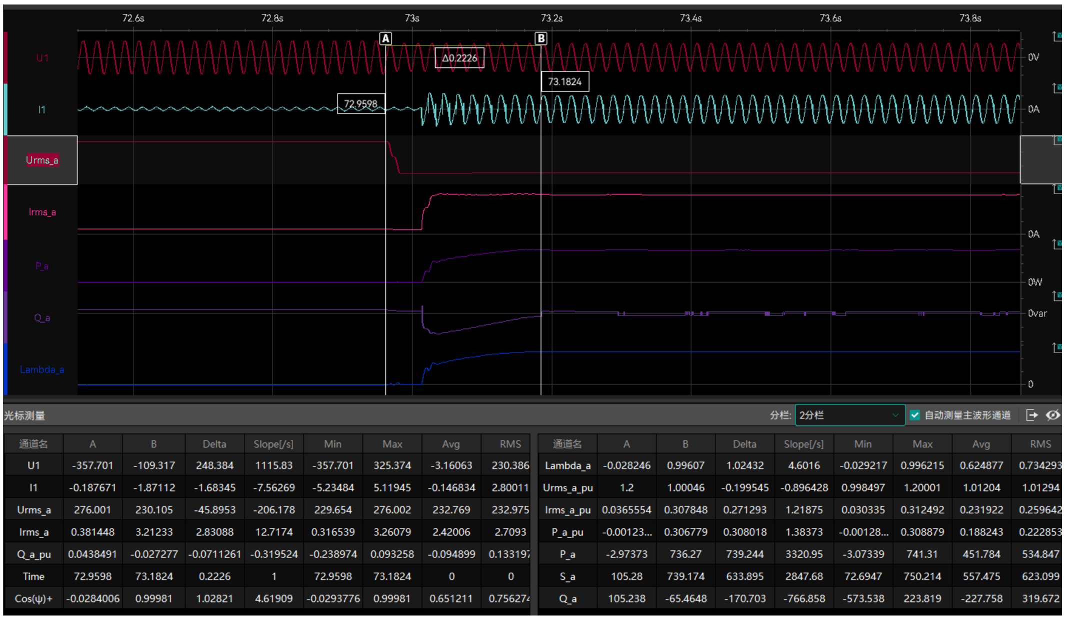


分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-357.701	-51.5907	306.11	101.927	-357.701	325.516	-0.267024	230.113
I1	-0.187671	-0.802865	-0.615195	-0.204845	-5.23484	5.11945	-0.072895	3.1294
Urms_a	276.001	230.114	-45.8862	-15.279	229.654	276.002	230.31	230.326
Irms_a	0.381448	3.1577	2.77625	0.924425	0.316539	3.26079	3.10019	3.12383
Q_a_pu	0.0438491	0.0172584	-0.0265906	-0.00885...	-0.238974	0.093258	0.001326...	0.040773
Time	72.9598	75.963	3.00322	1	72.9598	75.963	0	0
Cos(ψ)+	-0.0284006	0.999994	1.02839	0.342431	-0.0293776	1	0.974124	0.98398

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Lambda_a	-0.028246	0.998374	1.02662	0.34184	-0.029217	0.998701	0.970289	0.980837
Urms_a_pu	1.2	1.0005	-0.199505	-0.0664305	0.998497	1.20001	1.00135	1.00142
Irms_a_pu	0.0365554	0.302613	0.266058	0.0885908	0.030335	0.312492	0.297102	0.299367
P_a_pu	-0.00123...	0.302271	0.30351	0.101062	-0.00128...	0.308879	0.293426	0.296716
P_a	-2.97373	725.451	728.425	242.548	-3.07339	741.31	704.223	712.118
S_a	105.28	726.632	621.352	206.895	72.6947	750.214	713.438	718.81
Q_a	105.238	41.4203	-63.8175	-21.2497	-573.538	223.819	3.18285	97.8556

After dip (t2+3s)



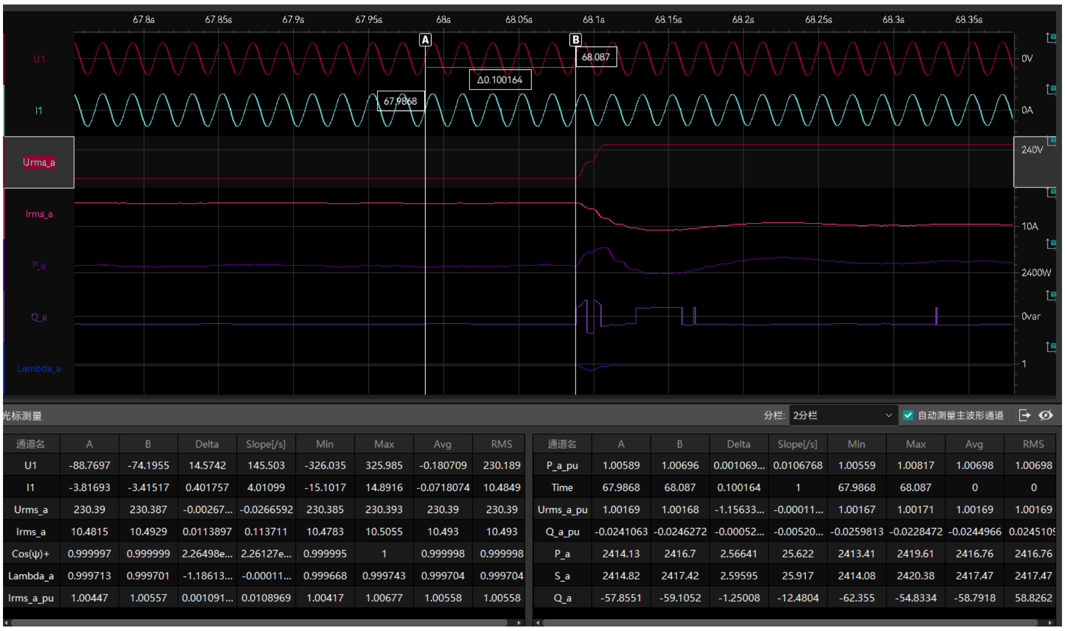
分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-357.701	-109.317	248.384	1115.83	-357.701	325.374	-3.16063	230.386
I1	-0.187671	-1.87112	-1.68345	-7.56269	-5.23484	5.11945	-0.146834	2.80011
Urms_a	276.001	230.105	-45.8953	-206.178	229.654	276.002	232.769	232.975
Irms_a	0.381448	3.21233	2.83088	12.7174	0.316539	3.26079	2.42006	2.7093
Q_a_pu	0.0438491	-0.027277	-0.0711261	-0.319524	-0.238974	0.093258	-0.094899	0.13319
Time	72.9598	73.1824	0.2226	1	72.9598	73.1824	0	0
Cos(ψ)+	-0.0284006	0.99981	1.02821	4.61909	-0.0293776	0.99981	0.651211	0.75627

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Lambda_a	-0.028246	0.99607	1.02432	4.6016	-0.029217	0.996215	0.624877	0.734293
Urms_a_pu	1.2	1.00046	-0.199545	-0.896428	0.998497	1.20001	1.01204	1.01294
Irms_a_pu	0.0365554	0.307848	0.271293	1.21875	0.030335	0.312492	0.231922	0.259642
P_a_pu	-0.00123...	0.306779	0.308018	1.38373	-0.00128...	0.308879	0.188243	0.222853
P_a	-2.97373	736.27	739.244	3320.95	-3.07339	741.31	451.784	534.847
S_a	105.28	739.174	633.895	2847.68	72.6947	750.214	557.475	623.099
Q_a	105.238	-65.4648	-170.703	-766.858	-573.538	223.819	-227.758	319.672

Recovery time

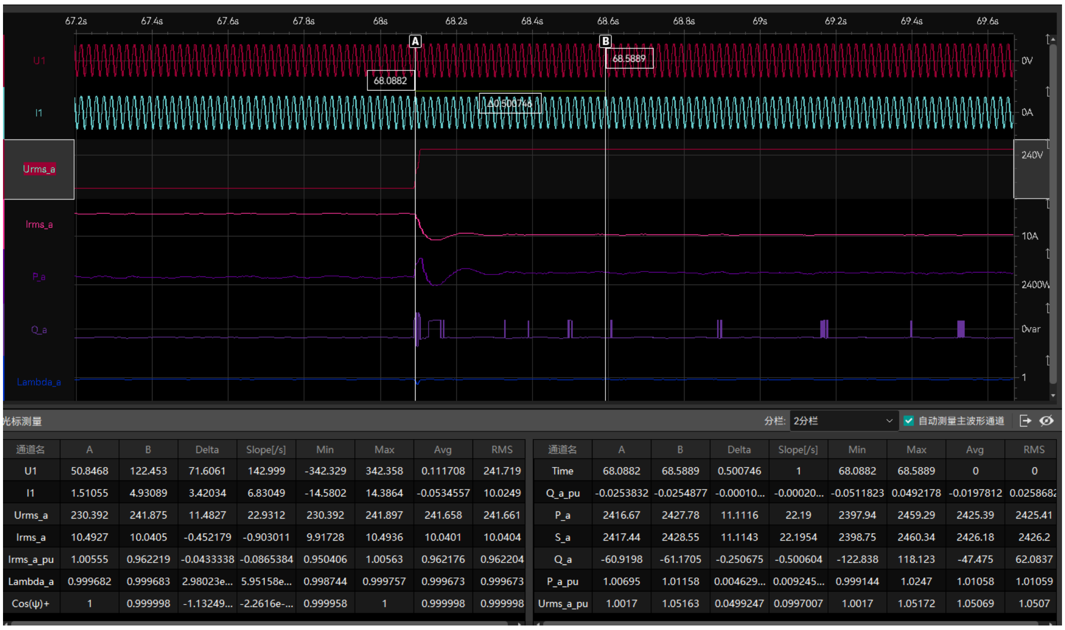
Graph of Test number 7.3


67.8s
67.85s
67.9s
67.95s
68s
68.05s
68.1s
68.15s
68.2s
68.25s
68.3s
68.35s
A
B
67.9868
68.087
Δ0.100164
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-88.7697	-74.1955	14.5742	145.503	-326.035	325.985	-0.180709	230.189
I1	-3.81693	-3.41517	0.401757	4.01099	-15.1017	14.8916	-0.0718074	10.4849
Urms_a	230.39	230.387	-0.00267...	-0.0266592	230.385	230.393	230.39	230.39
Irms_a	10.4815	10.4929	0.0113897	0.113711	10.4783	10.5055	10.493	10.493
Cos(ψ)+	0.999997	0.999999	2.26498e...	2.26127e...	0.999995	1	0.999998	0.999998
Lambda_a	0.999713	0.999701	-1.18613...	-0.00011...	0.999668	0.999743	0.999704	0.999704
Irms_a_pu	1.00447	1.00557	0.001091...	0.0108969	1.00417	1.00677	1.00558	1.00558

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00589	1.00696	0.001069...	0.0106768	1.00559	1.00817	1.00698	1.00698
Time	67.9868	68.087	0.100164	1	67.9868	68.087	0	0
Urms_a_pu	1.00169	1.00168	-1.15633...	-0.00011...	1.00167	1.00171	1.00169	1.00169
Q_a_pu	-0.0241063	-0.0246272	-0.00052...	-0.00520...	-0.0259813	-0.0228472	-0.0244966	0.0245109
P_a	2414.13	2416.7	2.56641	25.622	2413.41	2419.61	2416.76	2416.76
S_a	2414.82	2417.42	2.59595	25.917	2414.08	2420.38	2417.47	2417.47
Q_a	-57.8551	-59.1052	-1.25008	-12.4804	-62.355	-54.8334	-58.7918	58.8262

Before dip (t1-100ms)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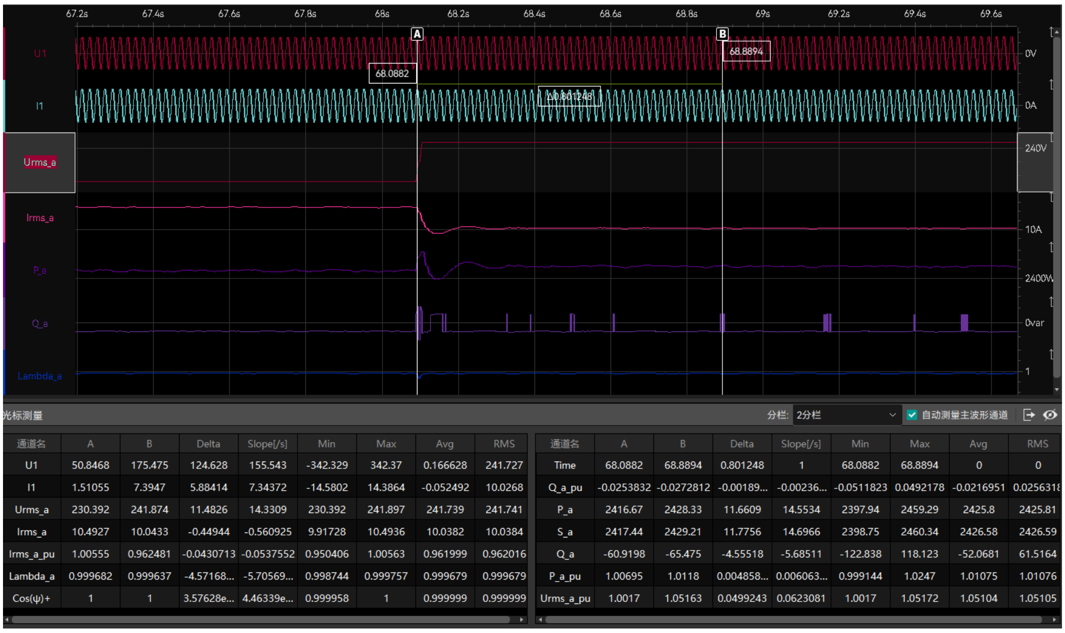
67.4s
67.6s
67.8s
68s
68.2s
68.4s
68.6s
68.8s
69s
69.2s
69.4s
69.6s
A
B
68.0882
68.5889
Δ0.500746
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	50.8468	122.453	71.6061	142.999	-342.329	342.358	0.111708	241.719
I1	1.51055	4.93089	3.42034	6.83049	-14.5802	14.3864	-0.0534557	10.0249
Urms_a	230.392	241.875	11.4827	22.9312	230.392	241.897	241.658	241.661
Irms_a	10.4927	10.0405	-0.452179	-0.903011	9.91728	10.4936	10.0401	10.0404
Irms_a_pu	1.00555	0.962219	-0.0433338	-0.0865384	0.950406	1.00563	0.962176	0.962204
Lambda_a	0.999682	0.999683	2.98023e...	5.95158e...	0.998744	0.999757	0.999673	0.999673
Cos(ψ)+	1	0.999998	-1.13249...	-2.2616e-...	0.999958	1	0.999998	0.999998

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	68.0882	68.5889	0.500746	1	68.0882	68.5889	0	0
Q_a_pu	-0.0253832	-0.0254877	-0.00010...	-0.00020...	-0.0511823	0.0492178	-0.0197812	0.0258682
P_a	2416.67	2427.78	11.1116	22.19	2397.94	2459.29	2425.39	2425.41
S_a	2417.44	2428.55	11.1143	22.1954	2398.75	2460.34	2426.18	2426.2
Q_a	-60.9198	-61.1705	-0.250675	-0.500604	-122.838	118.123	-47.475	62.0837
P_a_pu	1.00695	1.01158	0.004629...	0.009245...	0.999144	1.0247	1.01058	1.01059
Urms_a_pu	1.0017	1.05163	0.0499247	0.0997007	1.0017	1.05172	1.05069	1.0507

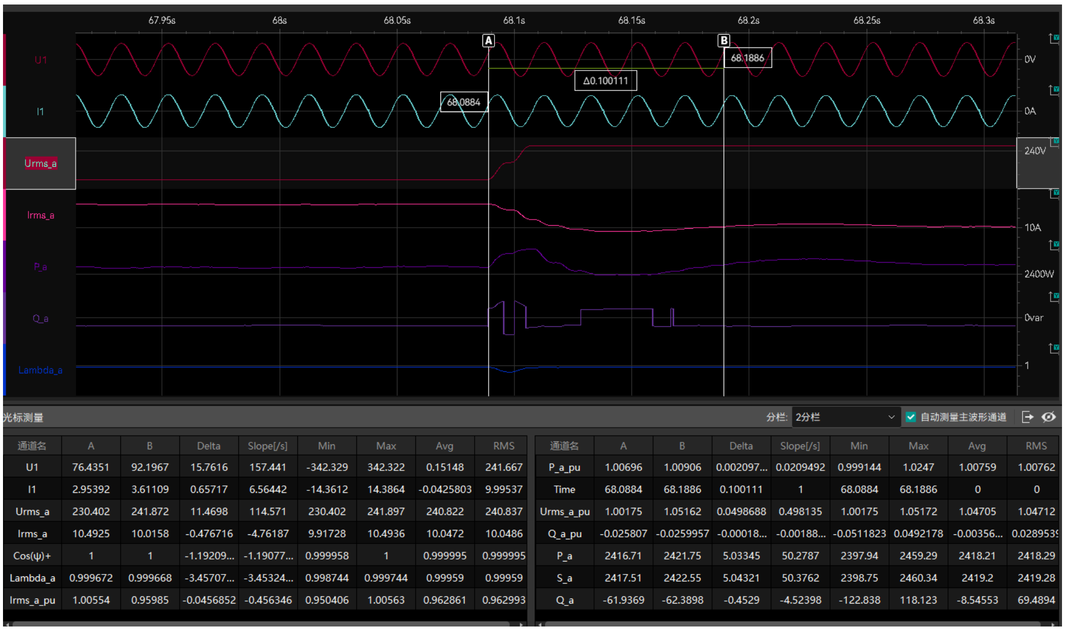
During dip (t1+50ms)


67.2s
67.4s
67.6s
67.8s
68s
68.2s
68.4s
68.6s
68.8s
69s
69.2s
69.4s
69.6s
A
B
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
68.0882
68.8894
Δ0.801248
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	50.8468	175.475	124.628	155.543	-342.329	342.37	0.166628	241.727
I1	1.51055	7.3947	5.88414	7.34372	-14.5802	14.3864	-0.052492	10.0268
Urms_a	230.392	241.874	11.4826	14.3309	230.392	241.897	241.739	241.741
Irms_a	10.4927	10.0433	-0.44944	-0.560925	9.91728	10.4936	10.0382	10.0384
Irms_a_pu	1.00555	0.962481	-0.0430713	-0.0537552	0.950406	1.00563	0.961999	0.962016
Lambda_a	0.999682	0.999637	-4.57168...	-5.70569...	0.998744	0.999757	0.999679	0.999679
Cos(ψ)+	1	1	3.57628e...	4.46339e...	0.999958	1	0.999999	0.999999

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	68.0882	68.8894	0.801248	1	68.0882	68.8894	0	0
Q_a_pu	-0.0253832	-0.0272812	-0.00189...	-0.00236...	-0.0511823	0.0492178	-0.0216951	0.0256318
P_a	2416.67	2428.33	11.6609	14.5534	2397.94	2459.29	2425.8	2425.81
S_a	2417.44	2429.21	11.7756	14.6966	2398.75	2460.34	2426.58	2426.59
Q_a	-60.9198	-65.475	-4.55518	-5.68511	-122.838	118.123	-52.0681	61.5164
P_a_pu	1.00695	1.0118	0.004858...	0.006063...	0.999144	1.0247	1.01075	1.01076
Urms_a_pu	1.0017	1.05163	0.0499243	0.0623081	1.0017	1.05172	1.05104	1.05105

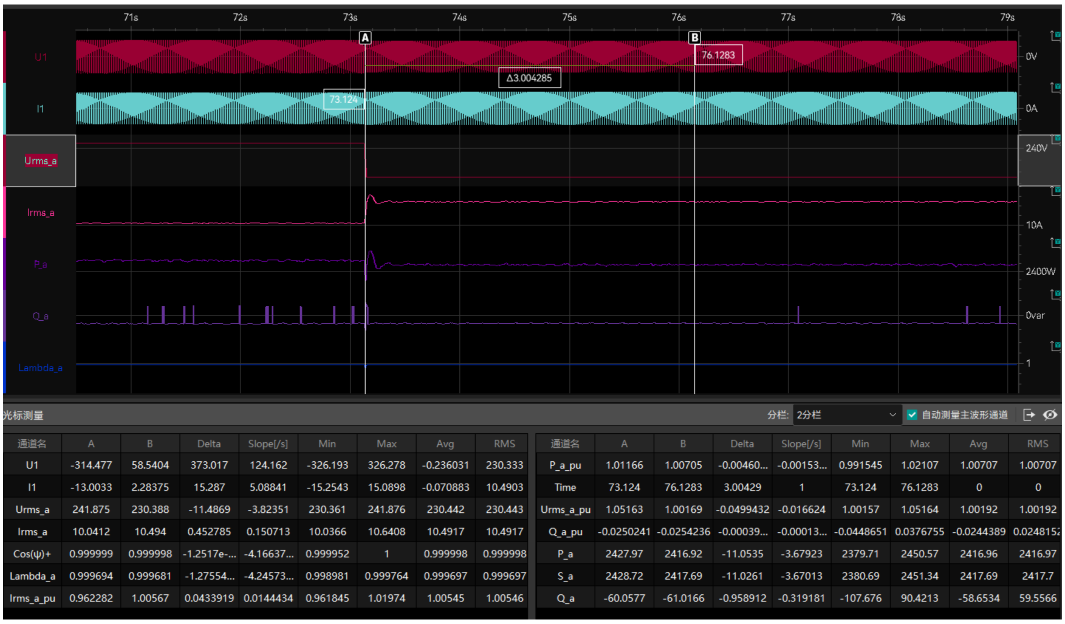
During dip (t1+80ms)


67.95s
68s
68.05s
68.1s
68.15s
68.2s
68.25s
68.3s
A
B
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
68.0884
68.1886
Δ0.100111
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	76.4351	92.1967	15.7616	157.441	-342.329	342.322	0.15148	241.667
I1	2.95392	3.61109	0.65717	6.56442	-14.3612	14.3864	-0.0425803	9.99537
Urms_a	230.402	241.872	11.4698	114.571	230.402	241.897	240.822	240.837
Irms_a	10.4925	10.0158	-0.476716	-4.76187	9.91728	10.4936	10.0472	10.0486
Cos(ψ)+	1	1	-1.19209...	-1.19077...	0.999958	1	0.999995	0.999995
Lambda_a	0.999672	0.999668	-3.45707...	-3.45324...	0.998744	0.999744	0.99959	0.99959
Irms_a_pu	1.00554	0.95985	-0.0456852	-0.456346	0.950406	1.00563	0.962861	0.962993

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.00696	1.00906	0.002097...	0.0209492	0.999144	1.0247	1.00759	1.00762
Time	68.0884	68.1886	0.100111	1	68.0884	68.1886	0	0
Urms_a_pu	1.00175	1.05162	0.0498688	0.498135	1.00175	1.05172	1.04705	1.04712
Q_a_pu	-0.025807	-0.0259957	-0.00018...	-0.00188...	-0.0511823	0.0492178	-0.00356...	0.0289539
P_a	2416.71	2421.75	5.03345	50.2787	2397.94	2459.29	2418.21	2418.29
S_a	2417.51	2422.55	5.04321	50.3762	2398.75	2460.34	2419.2	2419.28
Q_a	-61.9369	-62.3898	-0.4529	-4.52398	-122.838	118.123	-8.54553	69.4894

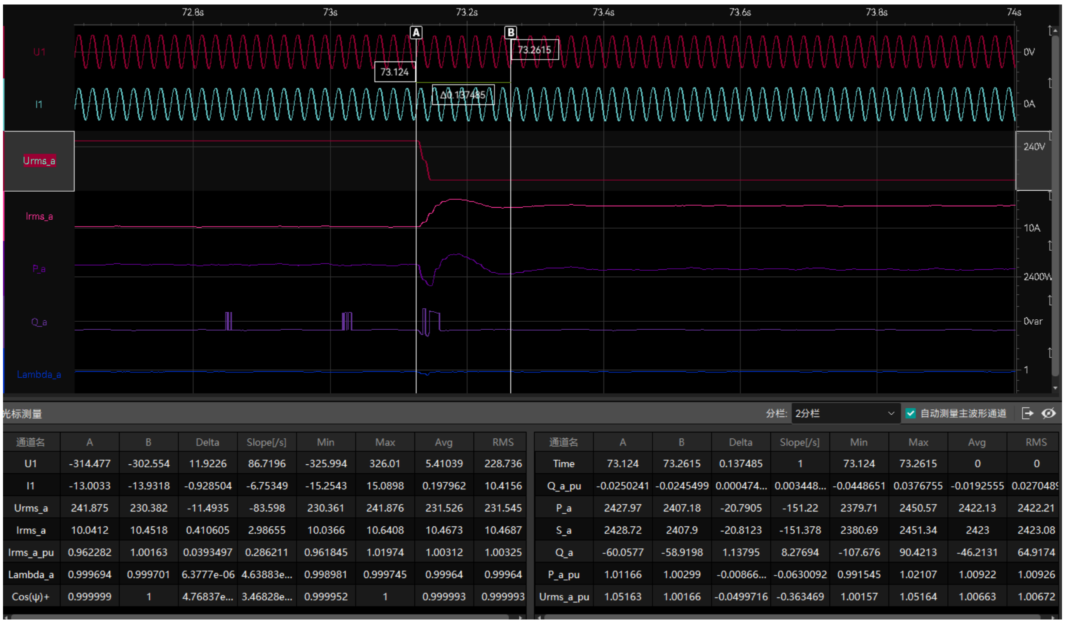
During dip (t1+100ms)


71s
72s
73s
74s
75s
76s
77s
78s
79s
A
B
76.1283
Δ3.004285
73.124
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-314.477	58.5404	373.017	124.162	-326.193	326.278	-0.236031	230.333
I1	-13.0033	2.28375	15.287	5.08841	-15.2543	15.0898	-0.070883	10.4903
Urms_a	241.875	230.388	-11.4869	-3.82351	230.361	241.876	230.442	230.443
Irms_a	10.0412	10.494	0.452785	0.150713	10.0366	10.6408	10.4917	10.4917
Cos(ψ)+	0.999999	0.999998	-1.2517e-...	-4.16637...	0.999952	1	0.999998	0.999998
Lambda_a	0.999694	0.999681	-1.27554...	-4.24573...	0.998981	0.999764	0.999697	0.999697
Irms_a_pu	0.962282	1.00567	0.0433919	0.0144434	0.961845	1.01974	1.00545	1.00546

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a_pu	1.01166	1.00705	-0.00460...	-0.00153...	0.991545	1.02107	1.00707	1.00707
Time	73.124	76.1283	3.00429	1	73.124	76.1283	0	0
Urms_a_pu	1.05163	1.00169	-0.0499432	-0.016624	1.00157	1.05164	1.00192	1.00192
Q_a_pu	-0.0250241	-0.0254236	-0.00039...	-0.00013...	-0.0448651	0.0376755	-0.0244389	0.024815
P_a	2427.97	2416.92	-11.0535	-3.67923	2379.71	2450.57	2416.96	2416.97
S_a	2428.72	2417.69	-11.0261	-3.67013	2380.69	2451.34	2417.69	2417.7
Q_a	-60.0577	-61.0166	-0.958912	-0.319181	-107.676	90.4213	-58.6534	59.5566

After dip (t2+3s)

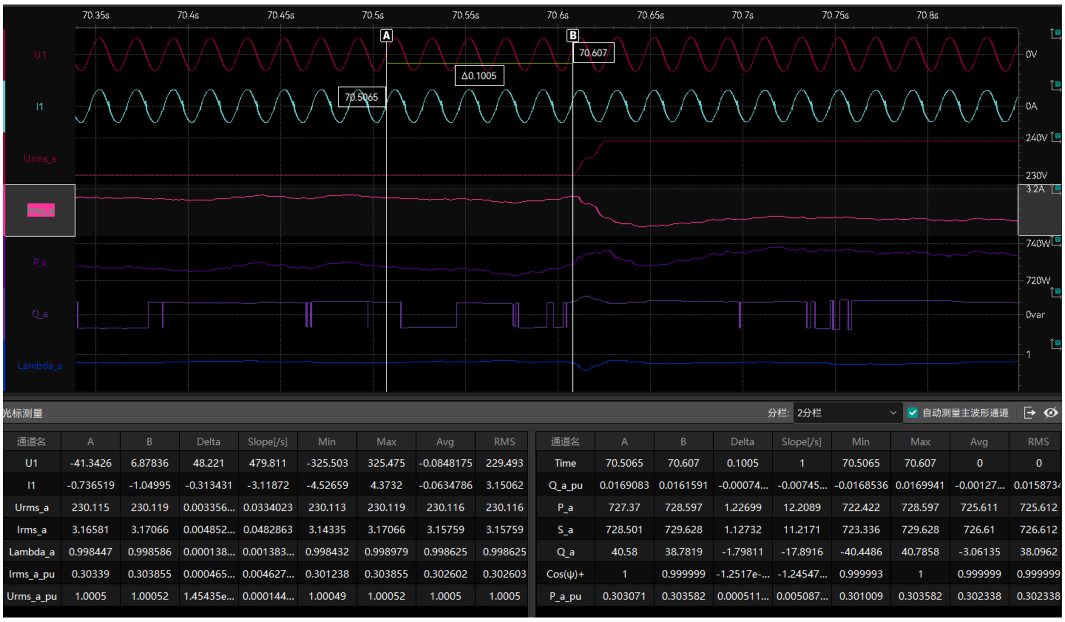

72.8s
73s
73.2s
73.4s
73.6s
73.8s
74s
A
B
73.2615
73.124
Δ0.137485
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
10A
2400W
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-314.477	-302.554	11.9226	86.7196	-325.994	326.01	5.41039	228.736
I1	-13.0033	-13.9318	-0.928504	-6.75349	-15.2543	15.0898	0.197962	10.4156
Urms_a	241.875	230.382	-11.4935	-83.598	230.361	241.876	231.526	231.545
Irms_a	10.0412	10.4518	0.410605	2.98655	10.0366	10.6408	10.4673	10.4687
Irms_a_pu	0.962282	1.00163	0.0393497	0.286211	0.961845	1.01974	1.00312	1.00325
Lambda_a	0.999694	0.999701	6.3777e-06	4.63883e...	0.998981	0.999745	0.99964	0.99964
Cos(ψ)+	0.999999	1	4.76837e...	3.46828e...	0.999952	1	0.999993	0.999993

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	73.124	73.2615	0.137485	1	73.124	73.2615	0	0
Q_a_pu	-0.0250241	-0.0245499	0.000474...	0.003448...	-0.0448651	0.0376755	-0.0192555	0.027048
P_a	2427.97	2407.18	-20.7905	-151.22	2379.71	2450.57	2422.13	2422.21
S_a	2428.72	2407.9	-20.8123	-151.378	2380.69	2451.34	2423	2423.08
Q_a	-60.0577	-58.9198	1.13795	8.27694	-107.676	90.4213	-46.2131	64.9174
P_a_pu	1.01166	1.00299	-0.00866...	-0.0630092	0.991545	1.02107	1.00922	1.00926
Urms_a_pu	1.05163	1.00166	-0.0499716	-0.363469	1.00157	1.05164	1.00663	1.00672

Recovery time

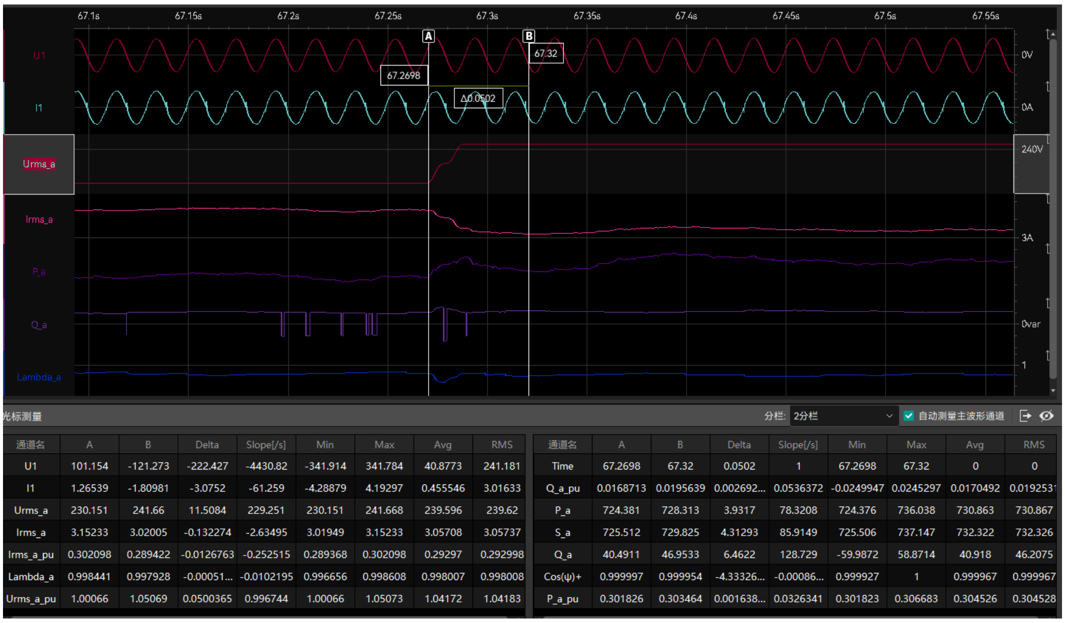
Graph of Test number 7.4


70.35s
70.4s
70.45s
70.5s
70.55s
70.6s
70.65s
70.7s
70.75s
70.8s
A
B
70.607
Δ0.1005
70.5065
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-41.3426	6.87836	48.221	479.811	-325.503	325.475	-0.0848175	229.493
I1	-0.736519	-1.04995	-0.313431	-3.11872	-4.52659	4.3732	-0.0634786	3.15062
Urms_a	230.115	230.119	0.003356...	0.0334023	230.113	230.119	230.116	230.116
Irms_a	3.16581	3.17066	0.004852...	0.0482863	3.14335	3.17066	3.15759	3.15759
Lambda_a	0.998447	0.998586	0.000138...	0.001383...	0.998432	0.998979	0.998625	0.998625
Irms_a_pu	0.30339	0.303855	0.000465...	0.004627...	0.301238	0.303855	0.302602	0.302603
Urms_a_pu	1.0005	1.00052	1.45435e...	0.000144...	1.00049	1.00052	1.0005	1.0005

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.5065	70.607	0.1005	1	70.5065	70.607	0	0
Q_a_pu	0.0169083	0.0161591	-0.00074...	-0.00745...	-0.0168536	0.0169941	-0.00127...	0.0158734
P_a	727.37	728.597	1.22699	12.2089	722.422	728.597	725.611	725.612
S_a	728.501	729.628	1.12732	11.2171	723.336	729.628	726.61	726.612
Q_a	40.58	38.7819	-1.79811	-17.8916	-40.4486	40.7858	-3.06135	38.0962
Cos(ψ)+	1	0.999999	-1.2517e-...	-1.24547...	0.999993	1	0.999999	0.999999
P_a_pu	0.303071	0.303582	0.000511...	0.005087...	0.301009	0.303582	0.302338	0.302338

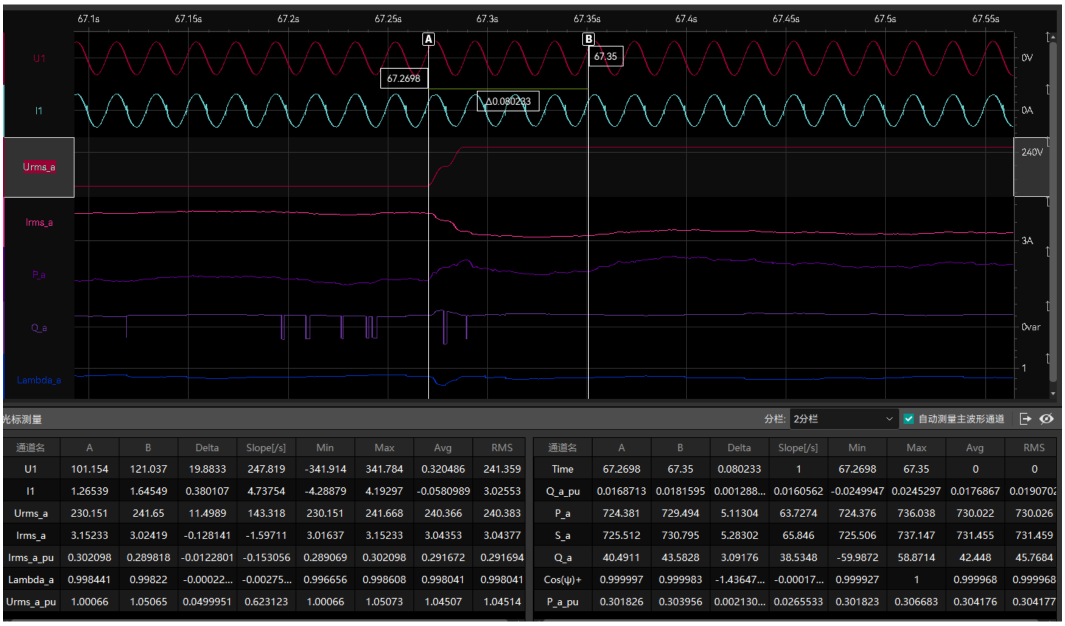
Before dip (t1-100ms)


67.1s
67.15s
67.2s
67.25s
67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
A
B
67.32
67.2698
Δ0.0502
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
3A
0var
1
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	101.154	-121.273	-222.427	-4430.82	-341.914	341.784	40.8773	241.181
I1	1.26539	-1.80981	-3.0752	-61.259	-4.28879	4.19297	0.455546	3.01633
Urms_a	230.151	241.66	11.5084	229.251	230.151	241.668	239.596	239.62
Irms_a	3.15233	3.02005	-0.132274	-2.63495	3.01949	3.15233	3.05708	3.05737
Irms_a_pu	0.302098	0.289422	-0.0126763	-0.252515	0.289368	0.302098	0.29297	0.292998
Lambda_a	0.998441	0.997928	-0.00051...	-0.0102195	0.996656	0.998608	0.998007	0.998008
Urms_a_pu	1.00066	1.05069	0.0500365	0.996744	1.00066	1.05073	1.04172	1.04183

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	67.2698	67.32	0.0502	1	67.2698	67.32	0	0
Q_a_pu	0.0168713	0.0195639	0.002692...	0.0536372	-0.0249947	0.0245297	0.0170492	0.0192531
P_a	724.381	728.313	3.9317	78.3208	724.376	736.038	730.863	730.867
S_a	725.512	729.825	4.31293	85.9149	725.506	737.147	732.322	732.326
Q_a	40.4911	46.9533	6.4622	128.729	-59.9872	58.8714	40.918	46.2075
Cos(ψ)+	0.999997	0.999954	-4.33326...	-0.00086...	0.999927	1	0.999967	0.999967
P_a_pu	0.301826	0.303464	0.001638...	0.0326341	0.301823	0.306683	0.304526	0.304528

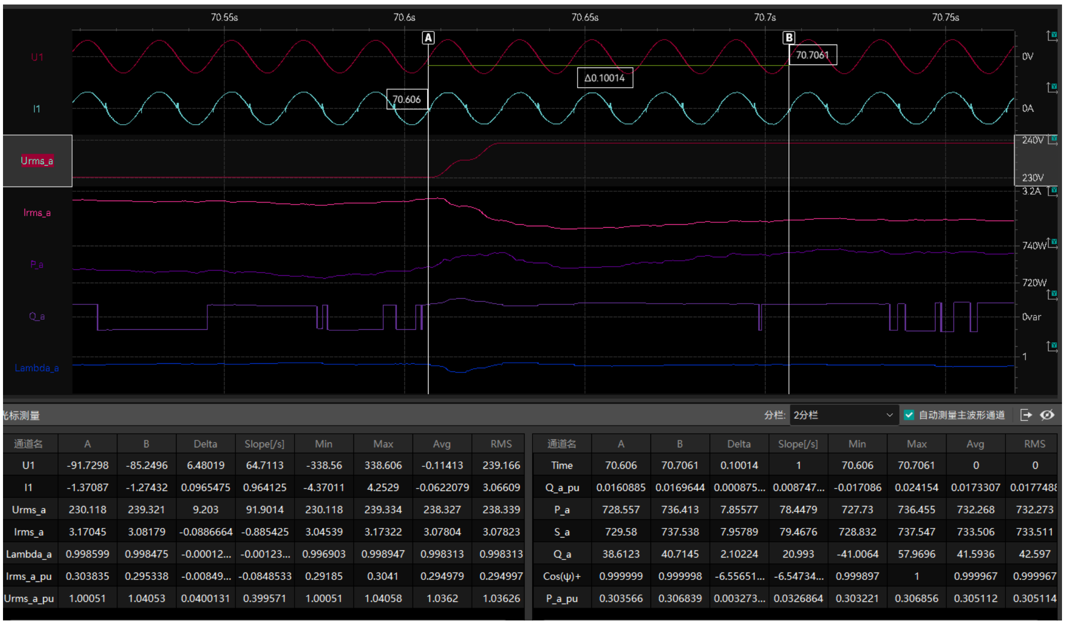
During dip (t1+50ms)


67.1s
67.15s
67.2s
67.25s
67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
A
B
67.2698
67.35
Δ0.080233
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
3A
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	101.154	121.037	19.8833	247.819	-341.914	341.784	0.320486	241.359
I1	1.26539	1.64549	0.380107	4.73754	-4.28879	4.19297	-0.0580989	3.02553
Urms_a	230.151	241.65	11.4989	143.318	230.151	241.668	240.366	240.383
Irms_a	3.15233	3.02419	-0.128141	-1.59711	3.01637	3.15233	3.04353	3.04377
Irms_a_pu	0.302098	0.289818	-0.0122801	-0.153056	0.289069	0.302098	0.291672	0.291694
Lambda_a	0.998441	0.99822	-0.00022...	-0.00275...	0.996656	0.998608	0.998041	0.998041
Urms_a_pu	1.00066	1.05065	0.0499951	0.623123	1.00066	1.05073	1.04507	1.04514

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	67.2698	67.35	0.080233	1	67.2698	67.35	0	0
Q_a_pu	0.0168713	0.0181595	0.001288...	0.0160562	-0.0249947	0.0245297	0.0176867	0.019070
P_a	724.381	729.494	5.11304	63.7274	724.376	736.038	730.022	730.026
S_a	725.512	730.795	5.28302	65.846	725.506	737.147	731.455	731.459
Q_a	40.4911	43.5828	3.09176	38.5348	-59.9872	58.8714	42.448	45.7684
Cos(ψ)+	0.999997	0.999983	-1.43647...	-0.00017...	0.999927	1	0.999968	0.999968
P_a_pu	0.301826	0.303956	0.002130...	0.0265533	0.301823	0.306683	0.304176	0.304177

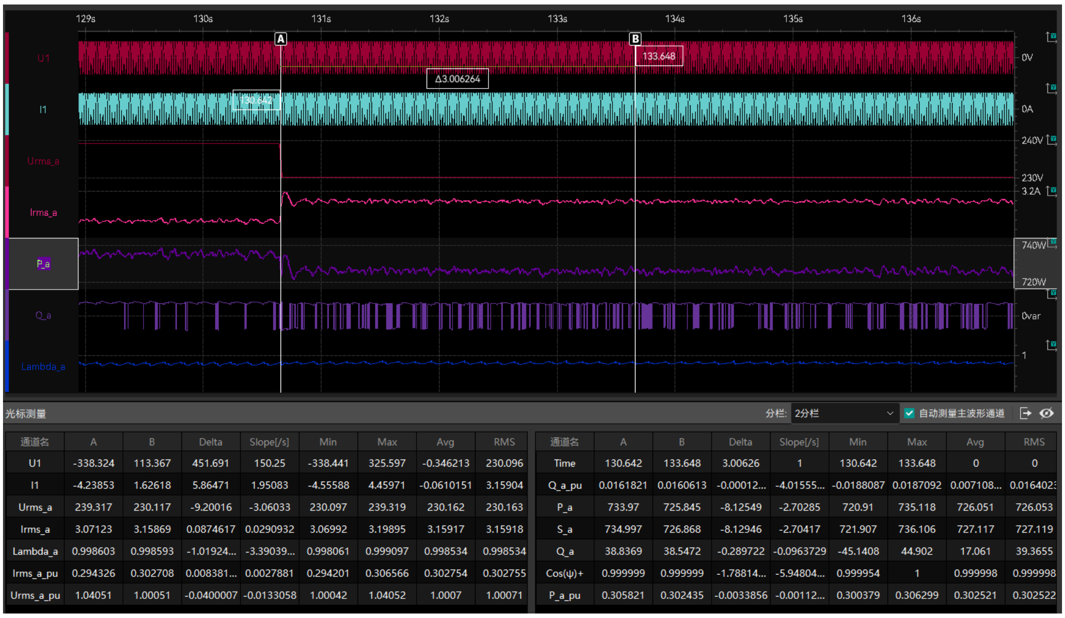
During dip (t1+80ms)


70.55s
70.6s
70.65s
70.7s
70.75s
A
B
70.606
70.7061
Δ0.10014
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
240V
230V
3.2A
740W
720W
0var
1
光标测量
分栏:
2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-91.7298	-85.2496	6.48019	64.7113	-338.56	338.606	-0.11413	239.166
I1	-1.37087	-1.27432	0.0965475	0.964125	-4.37011	4.2529	-0.0622079	3.06609
Urms_a	230.118	239.321	9.203	91.9014	230.118	239.334	238.327	238.339
Irms_a	3.17045	3.08179	-0.0886664	-0.885425	3.04539	3.17322	3.07804	3.07823
Lambda_a	0.998599	0.998475	-0.00012...	-0.00123...	0.996903	0.998947	0.998313	0.998313
Irms_a_pu	0.303835	0.295338	-0.00849...	-0.0848533	0.29185	0.3041	0.294979	0.294997
Urms_a_pu	1.00051	1.04053	0.0400131	0.399571	1.00051	1.04058	1.0362	1.03626

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	70.606	70.7061	0.10014	1	70.606	70.7061	0	0
Q_a_pu	0.0160885	0.0169644	0.000875...	0.008747...	-0.017086	0.024154	0.0173307	0.017748
P_a	728.557	736.413	7.85577	78.4479	727.73	736.455	732.268	732.273
S_a	729.58	737.538	7.95789	79.4676	728.832	737.547	733.506	733.511
Q_a	38.6123	40.7145	2.10224	20.993	-41.0064	57.9696	41.5936	42.597
Cos(ψ)+	0.999999	0.999998	-6.55651...	-6.54734...	0.999897	1	0.999967	0.999967
P_a_pu	0.303566	0.306839	0.003273...	0.0326864	0.303221	0.306856	0.305112	0.305114

During dip (t1+100ms)



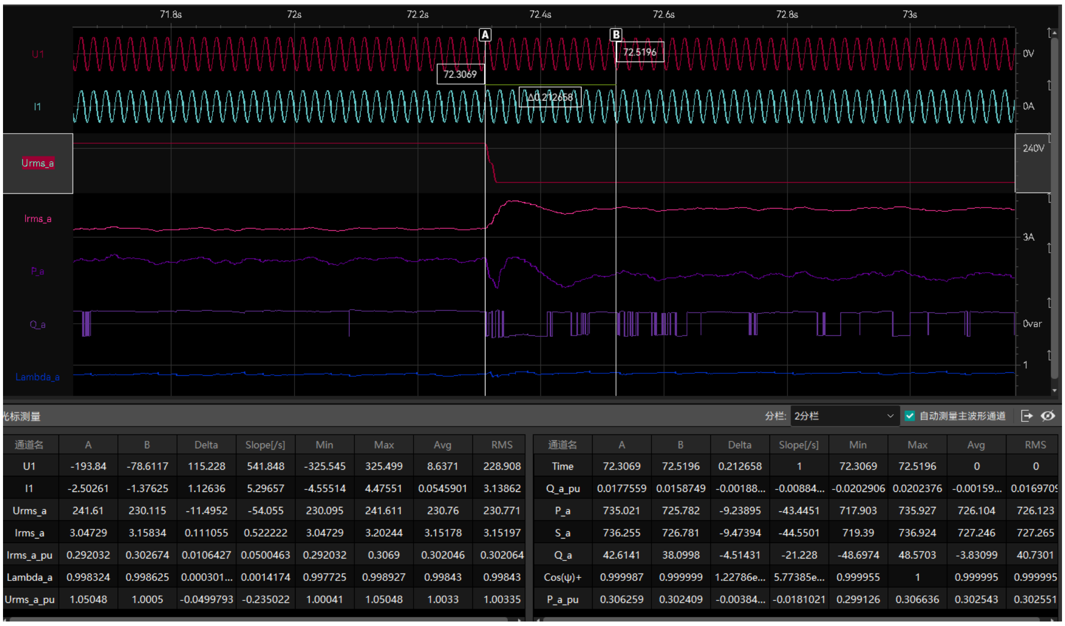
光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-338.324	113.367	451.691	150.25	-338.441	325.597	-0.346213	230.096
I1	-4.23853	1.62618	5.86471	1.95083	-4.55588	4.45971	-0.0610151	3.15904
Urms_a	239.317	230.117	-9.20016	-3.06033	230.097	239.319	230.162	230.163
Irms_a	3.07123	3.15869	0.0874617	0.0290932	3.06992	3.19895	3.15917	3.15918
Lambda_a	0.998603	0.998593	-1.01924...	-3.39039...	0.998061	0.999097	0.998534	0.998534
Irms_a_pu	0.294326	0.302708	0.008381...	0.0027881	0.294201	0.306566	0.302754	0.302755
Urms_a_pu	1.04051	1.00051	-0.0400007	-0.0133058	1.00042	1.04052	1.0007	1.00071

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	130.642	133.648	3.00626	1	130.642	133.648	0	0
Q_a_pu	0.0161821	0.0160613	-0.00012...	-4.01555...	-0.0188087	0.0187092	0.007108...	0.016402
P_a	733.97	725.845	-8.12549	-2.70285	720.91	735.118	726.051	726.053
S_a	734.997	726.868	-8.12946	-2.70417	721.907	736.106	727.117	727.119
Q_a	38.8369	38.5472	-0.289722	-0.0963729	-45.1408	44.902	17.061	39.3655
Cos(ψ)+	0.999999	0.999999	-1.78814...	-5.94804...	0.999954	1	0.999998	0.999998
P_a_pu	0.305821	0.302435	-0.0033856	-0.00112...	0.300379	0.306299	0.302521	0.302522

After dip (t2+3s)



光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-193.84	-78.6117	115.228	541.848	-325.545	325.499	8.6371	228.908
I1	-2.50261	-1.37625	1.12636	5.29657	-4.55514	4.47551	0.0545901	3.13862
Urms_a	241.61	230.115	-11.4952	-54.055	230.095	241.611	230.76	230.771
Irms_a	3.04729	3.15834	0.111055	0.522222	3.04729	3.20244	3.15178	3.15197
Irms_a_pu	0.292032	0.302674	0.0106427	0.0500463	0.292032	0.3069	0.302046	0.302064
Lambda_a	0.998324	0.998625	0.000301...	0.0014174	0.997725	0.998927	0.99843	0.99843
Urms_a_pu	1.05048	1.0005	-0.0499793	-0.235022	1.00041	1.05048	1.0033	1.00335

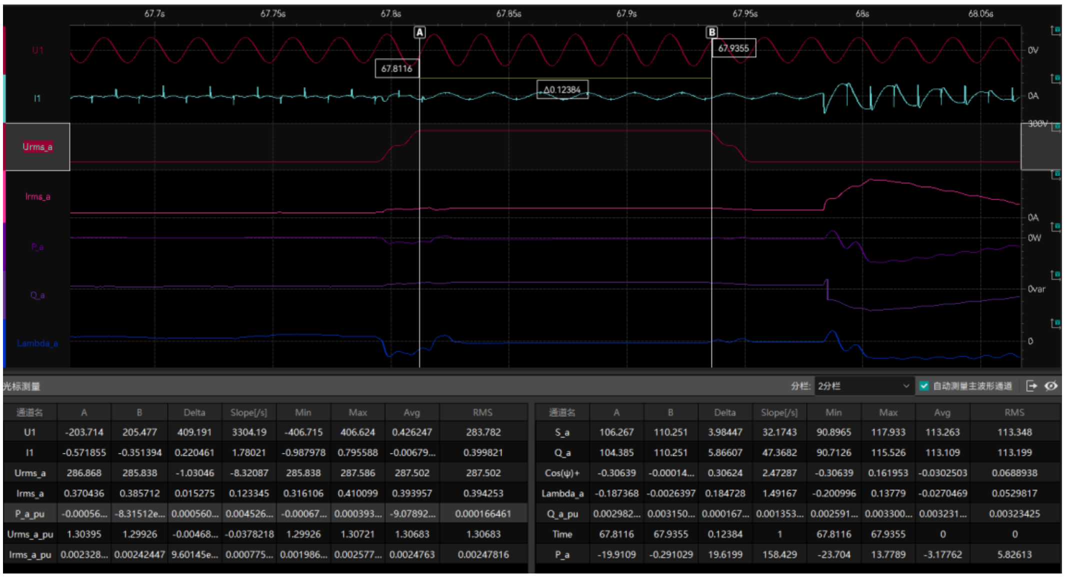
通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Time	72.3069	72.5196	0.212658	1	72.3069	72.5196	0	0
Q_a_pu	0.0177559	0.0158749	-0.00188...	-0.00884...	-0.0202906	0.0202376	-0.00159...	0.016970
P_a	735.021	725.782	-9.23895	-43.4451	717.903	735.927	726.104	726.123
S_a	736.255	726.781	-9.47394	-44.5501	719.39	736.924	727.246	727.265
Q_a	42.6141	38.0998	-4.51431	-21.228	-48.6974	48.5703	-3.83099	40.7301
Cos(ψ)+	0.999987	0.999999	1.22786e...	5.77385e...	0.999955	1	0.999995	0.999995
P_a_pu	0.306259	0.302409	-0.00384...	-0.0181021	0.299126	0.306636	0.302543	0.302551

Recovery time

Condition						Measurement			
	No.	Parameter	Phase ref.	Time ref.	unit				
General Info.	0	Test number	--	--	--	8.1	8.2	8.3	8.4
	1	Date	--	--	dd.mm.yyyy	14-Jan-2025 to 21-Feb-2025			
	2	Time (start of test)	--	--	hh:mm:ss	See graph			
	3	Fault type (phase)	--	--		VS1		VS3	
	4	Setting voltage depth	Line to line	--	p.u.	1.25			
	5	Setting dip duration		--		100			
	6	Point of fault entry	Total	--	ms	See graph			
	7	Point of fault clearance	Total	--	ms	See graph			
	8	Fault duration in empty load test	Total	--	ms	123.8			
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.25			
	10		Pos.		p.u.	1.25			
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.000	1.003	1.003
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.004	0.301	1.015	0.314
	13	Active power	Total	t1-10s to t1	p.u.	1.005	0.301	1.018	0.315
	14		Pos.			--	--	--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.025	0.017	-0.019	-0.015
	16		Pos.			--	--	--	--
	17	Cosφ	--	t1-10s to t1	--	0.9999	0.9983	0.9997	0.9979
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.250	1.250	-- -- 1.069	-- -- 1.067
	19	Line current	Phase 1	t1+50ms	p.u.	0.038	0.038	--	--
	20		Phase 2			--	--	--	--
	21		Phase 3			--	--	0.914	0.268
	22	Line current	Phase 1	t1+80ms	p.u.	0.038	0.038	--	--
	23		Phase 2			--	--	--	--
	24		Phase 3			--	--	0.943	0.379
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.001	-0.001	1.019	0.322
	26		Pos.			--	--	--	--

After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.002	1.000	1.001	0.998
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.005	0.301	1.007	0.290
	29		Pos.			--	--	--	--
	39	Active power rising time	Pos.	--	s	0.104	0.162	0.168	0.151
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.029	0.018	-0.021	-0.016
	32		Pos.			--	--	--	--
	33	Reactive power rising time	Pos.	--	s	0.104	0.162	0.168	0.151
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes			

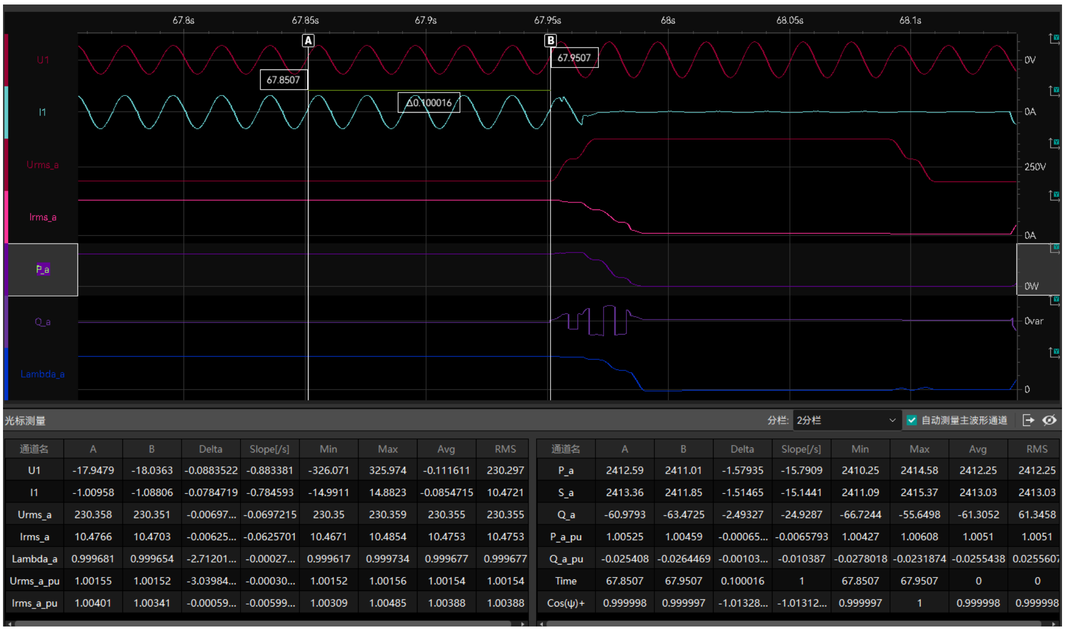
Graph of Test number 8.1



通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-203.714	205.477	409.191	3304.19	-406.715	406.624	0.426247	283.782
I1	-0.571855	-0.351394	0.220461	1.78021	-0.987978	0.795588	-0.00679...	0.399821
Urms_a	286.868	285.838	-1.03046	-8.32087	285.838	287.586	287.502	287.502
Irms_a	0.370436	0.385712	0.015275	0.123345	0.316106	0.410099	0.393957	0.394253
P_a_pu	-0.00056...	-8.31512e...	0.000560...	0.004526...	-0.00067...	0.000393...	-9.07892...	0.000166461
Urms_a_pu	1.30395	1.29926	-0.00468...	-0.0378218	1.29926	1.30721	1.30683	1.30683
Irms_a_pu	0.002328...	0.00242447	9.60145e...	0.000775...	0.001986...	0.002577...	0.0024763	0.00247816

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
S_a	106.267	110.251	3.98447	32.1743	90.8965	117.933	113.263	113.348
Q_a	104.385	110.251	5.86607	47.3682	90.7126	115.526	113.109	113.199
Cos(ψ)+	-0.30639	-0.00014...	0.30624	2.47287	-0.30639	0.161953	-0.0302503	0.0688938
Lambda_a	-0.187368	-0.0026397	0.184728	1.49167	-0.200996	0.13779	-0.0270469	0.0529817
Q_a_pu	0.002982...	0.003150...	0.000167...	0.001353...	0.002591...	0.003300...	0.003231...	0.00323425
Time	67.8116	67.9355	0.12384	1	67.8116	67.9355	0	0
P_a	-19.9109	-0.291029	19.6199	158.429	-23.704	13.7789	-3.17762	5.82613

Empty load


67.8s
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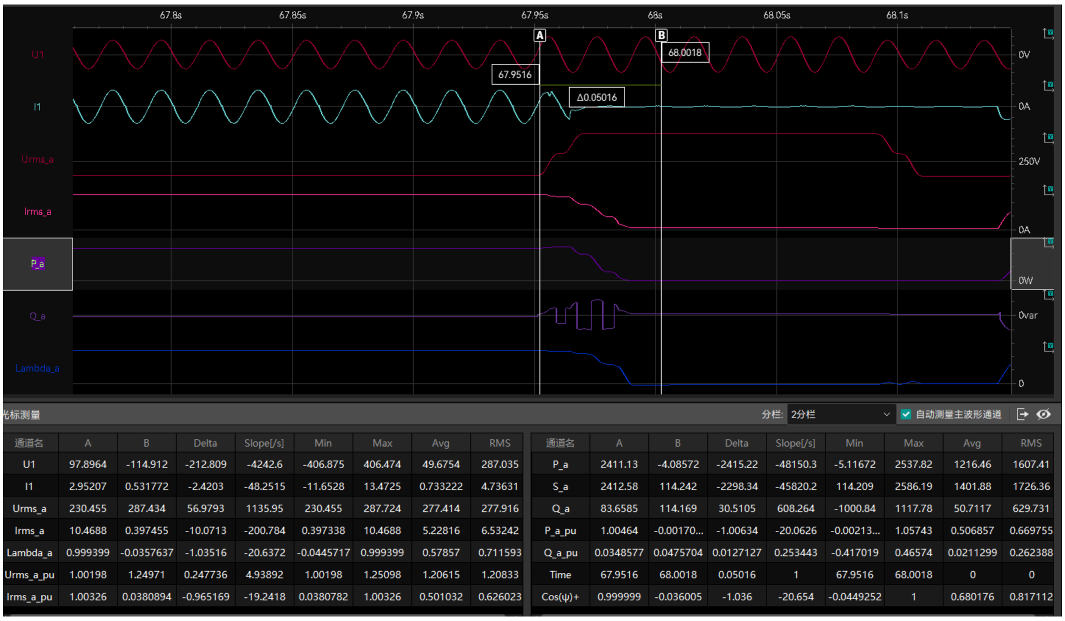
67.9s
67.95s
68s
68.05s
68.1s
A
B
67.8507
67.9507
Δ0.100016
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
0A
0W
0var
0
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-17.9479	-18.0363	-0.0883522	-0.883381	-326.071	325.974	-0.111611	230.297
I1	-1.00958	-1.08806	-0.0784719	-0.784593	-14.9911	14.8823	-0.0854715	10.4721
Urms_a	230.358	230.351	-0.00697...	-0.0697215	230.35	230.359	230.355	230.355
Irms_a	10.4766	10.4703	-0.00625...	-0.0625701	10.4671	10.4854	10.4753	10.4753
Lambda_a	0.999681	0.999654	-2.71201...	-0.00027...	0.999617	0.999734	0.999677	0.999677
Urms_a_pu	1.00155	1.00152	-3.03984...	-0.00030...	1.00152	1.00156	1.00154	1.00154
Irms_a_pu	1.00401	1.00341	-0.00059...	-0.00599...	1.00309	1.00485	1.00388	1.00388

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	2412.59	2411.01	-1.57935	-15.7909	2410.25	2414.58	2412.25	2412.25
S_a	2413.36	2411.85	-1.51465	-15.1441	2411.09	2415.37	2413.03	2413.03
Q_a	-60.9793	-63.4725	-2.49327	-24.9287	-66.7244	-55.6498	-61.3052	61.3458
P_a_pu	1.00525	1.00459	-0.00065...	-0.0065793	1.00427	1.00608	1.0051	1.0051
Q_a_pu	-0.025408	-0.0264469	-0.00103...	-0.010387	-0.0278018	-0.0231874	-0.0255438	0.0255607
Time	67.8507	67.9507	0.100016	1	67.8507	67.9507	0	0
Cos(ψ)+	0.999998	0.999997	-1.01328...	-1.01312...	0.999997	1	0.999998	0.999998

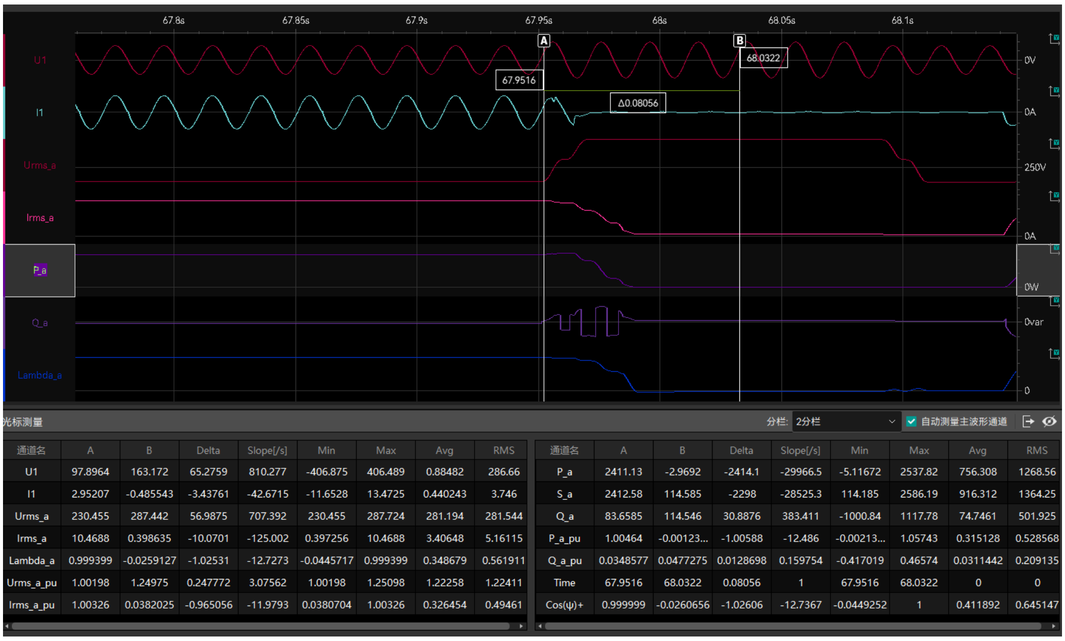
Before dip (t1-100ms)


67.8s
67.85s
67.9s
67.95s
68s
68.05s
68.1s
A
B
67.9516
68.0018
Δ0.05016
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
250V
0A
0W
0var
0
光标测量
分栏: 2分栏
☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	97.8964	-114.912	-212.809	-4242.6	-406.875	406.474	49.6754	287.035
I1	2.95207	0.531772	-2.4203	-48.2515	-11.6528	13.4725	0.733222	4.73631
Urms_a	230.455	287.434	56.9793	1135.95	230.455	287.724	277.414	277.916
Irms_a	10.4688	0.397455	-10.0713	-200.784	0.397338	10.4688	5.22816	6.53242
Lambda_a	0.999399	-0.0357637	-1.03516	-20.6372	-0.0445717	0.999399	0.57857	0.711593
Urms_a_pu	1.00198	1.24971	0.247736	4.93892	1.00198	1.25098	1.20615	1.20833
Irms_a_pu	1.00326	0.0380894	-0.965169	-19.2418	0.0380782	1.00326	0.501032	0.626023

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	2411.13	-4.08572	-2415.22	-48150.3	-5.11672	2537.82	1216.46	1607.41
S_a	2412.58	114.242	-2298.34	-45820.2	114.209	2586.19	1401.88	1726.36
Q_a	83.6585	114.169	30.5105	608.264	-1000.84	1117.78	50.7117	629.731
P_a_pu	1.00464	-0.00170...	-1.00634	-20.0626	-0.00213...	1.05743	0.506857	0.669755
Q_a_pu	0.0348577	0.0475704	0.0127127	0.253443	-0.417019	0.46574	0.0211299	0.262388
Time	67.9516	68.0018	0.05016	1	67.9516	68.0018	0	0
Cos(ψ)+	0.999999	-0.036005	-1.036	-20.654	-0.0449252	1	0.680176	0.817112

During dip (t1+50ms)



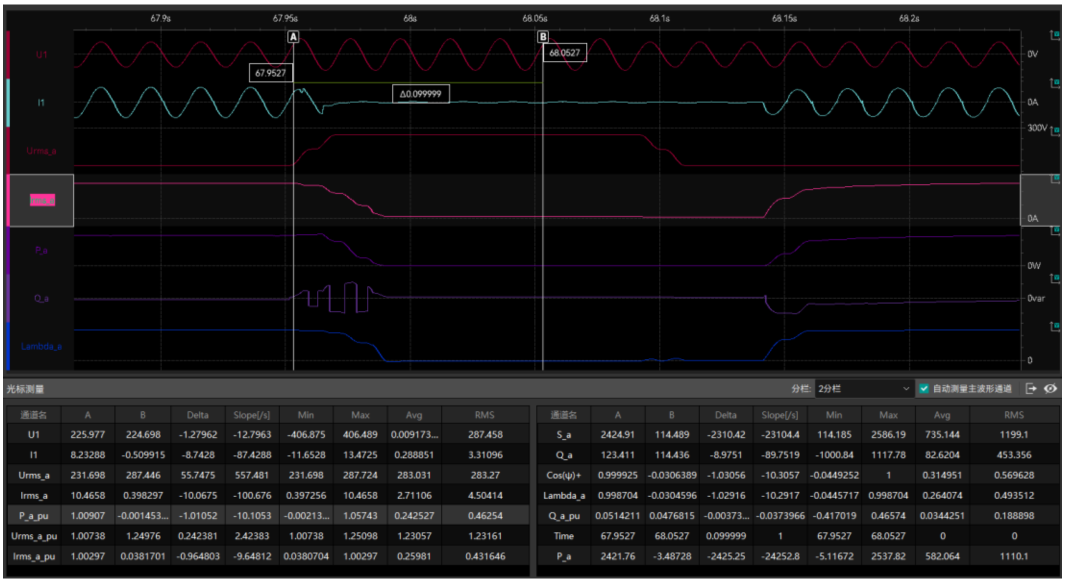
光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	97.8964	163.172	65.2759	810.277	-406.875	406.489	0.88482	286.66
I1	2.95207	-0.485543	-3.43761	-42.6715	-11.6528	13.4725	0.440243	3.746
Urms_a	230.455	287.442	56.9875	707.392	230.455	287.724	281.194	281.544
Irms_a	10.4688	0.398635	-10.0701	-125.002	0.397256	10.4688	3.40648	5.16115
Lambda_a	0.999399	-0.0259127	-1.02531	-12.7273	-0.0445717	0.999399	0.348679	0.561911
Urms_a_pu	1.00198	1.24975	0.247772	3.07562	1.00198	1.25098	1.22258	1.22411
Irms_a_pu	1.00326	0.0382025	-0.965056	-11.9793	0.0380704	1.00326	0.326454	0.49461

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	2411.13	-2.9692	-2414.1	-29966.5	-5.11672	2537.82	756.308	1268.56
S_a	2412.58	114.585	-2298	-28525.3	114.185	2586.19	916.312	1364.25
Q_a	83.6585	114.546	30.8876	383.411	-1000.84	1117.78	74.7461	501.925
P_a_pu	1.00464	-0.00123...	-1.00588	-12.486	-0.00213...	1.05743	0.315128	0.528568
Q_a_pu	0.0348577	0.0477275	0.0128698	0.159754	-0.417019	0.46574	0.0311442	0.209135
Time	67.9516	68.0322	0.08056	1	67.9516	68.0322	0	0
Cos(ψ)+	0.999999	-0.0260656	-1.02606	-12.7367	-0.0449252	1	0.411892	0.645147

During dip (t1+80ms)



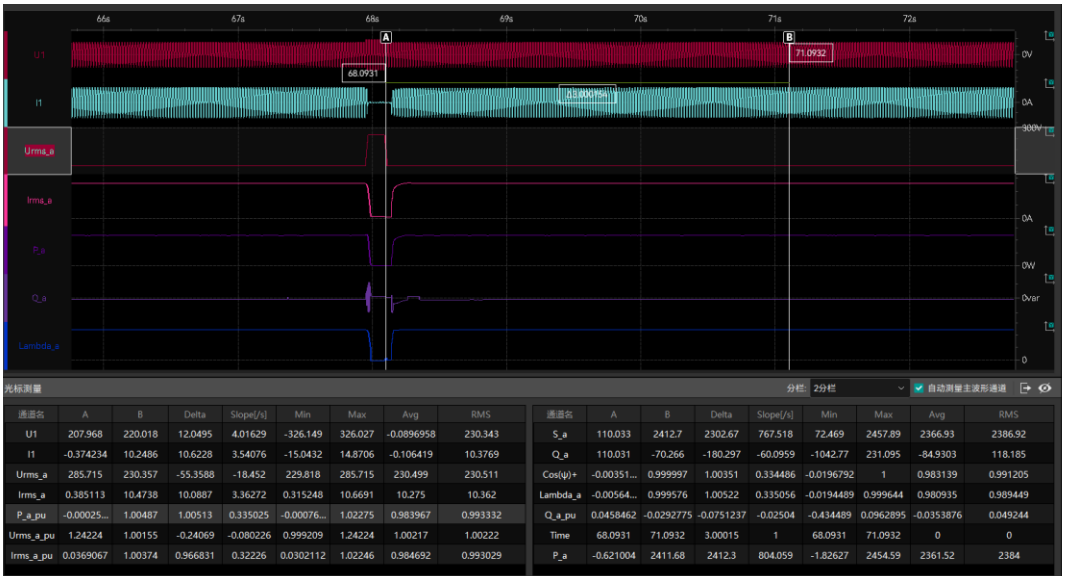
光标测量

分栏: 2分栏 ☑ 自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	225.977	224.698	-1.27962	-12.7963	-406.875	406.489	0.009173...	287.458
I1	8.23288	-0.509915	-8.7428	-87.4288	-11.6528	13.4725	0.288851	3.31096
Urms_a	231.698	287.446	55.7475	557.481	231.698	287.724	283.031	283.27
Irms_a	10.4658	0.398297	-10.0675	-100.676	0.397256	10.4658	2.71106	4.50414
P_a_pu	1.00907	-0.001453...	-1.01052	-10.1053	-0.00213...	1.05743	0.242527	0.46254
Urms_a_pu	1.00738	1.24976	0.242381	2.42383	1.00738	1.25098	1.23057	1.23161
Irms_a_pu	1.00297	0.0381701	-0.964803	-9.64812	0.0380704	1.00297	0.25981	0.431646

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
S_a	2424.91	114.489	-2310.42	-23104.4	114.185	2586.19	735.144	1199.1
Q_a	123.411	114.436	-8.9751	-89.7519	-1000.84	1117.78	82.6204	453.356
Cos(ψ)+	0.999925	-0.0306389	-1.03056	-10.3057	-0.0449252	1	0.314951	0.569628
Lambda_a	0.998704	-0.0304596	-1.02916	-10.2917	-0.0445717	0.998704	0.264074	0.493512
Q_a_pu	0.0514211	0.0476815	-0.00373...	-0.0373966	-0.417019	0.46574	0.0344251	0.188898
Time	67.9527	68.0527	0.099999	1	67.9527	68.0527	0	0
P_a	2421.76	-3.48728	-2425.25	-24252.8	-5.11672	2537.82	582.064	1110.1

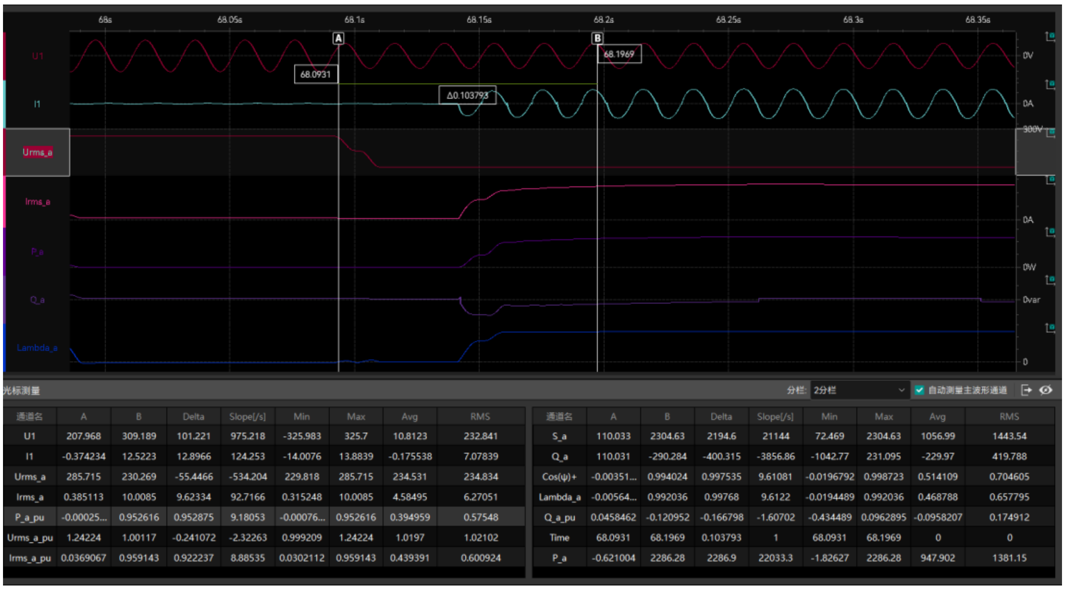
During dip (t1+100ms)


66s
67s
68s
69s
70s
71s
72s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
68.0931
71.0932
Δ3.00015s
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	207.968	220.018	12.0495	4.01629	-326.149	326.027	-0.0896958	230.343
I1	-0.374234	10.2486	10.6228	3.54076	-15.0432	14.8706	-0.106419	10.3769
Urms_a	285.715	230.357	-55.3588	-18.452	229.818	285.715	230.499	230.511
Irms_a	0.385113	10.4738	10.0887	3.36272	0.315248	10.6691	10.275	10.362
P_a_pu	-0.00025...	1.00487	1.00513	0.335025	-0.00076...	1.02275	0.983967	0.993332
Urms_a_pu	1.24224	1.00155	-0.24069	-0.080226	0.999209	1.24224	1.00217	1.00222
Irms_a_pu	0.0369067	1.00374	0.966831	0.32226	0.0302112	1.02246	0.984692	0.993029

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
S_a	110.033	2412.7	2302.67	767.518	72.469	2457.89	2366.93	2386.92
Q_a	110.031	-70.266	-180.297	-60.0959	-1042.77	231.095	-84.9303	118.185
Cos(ψ)+	-0.00351...	0.999997	1.00351	0.334486	-0.0196792	1	0.983139	0.991205
Lambda_a	-0.00564...	0.999576	1.00522	0.335056	-0.0194489	0.999644	0.980935	0.989449
Q_a_pu	0.0458462	-0.0292775	-0.0751237	-0.02504	-0.434489	0.0962895	-0.0353876	0.049244
Time	68.0931	71.0932	3.00015	1	68.0931	71.0932	0	0
P_a	-0.621004	2411.68	2412.3	804.059	-1.82627	2454.59	2361.52	2384

After dip (t2+3s)


68s
68.05s
68.1s
68.15s
68.2s
68.25s
68.3s
68.35s
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
A
B
68.0931
68.1969
Δ0.103793
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

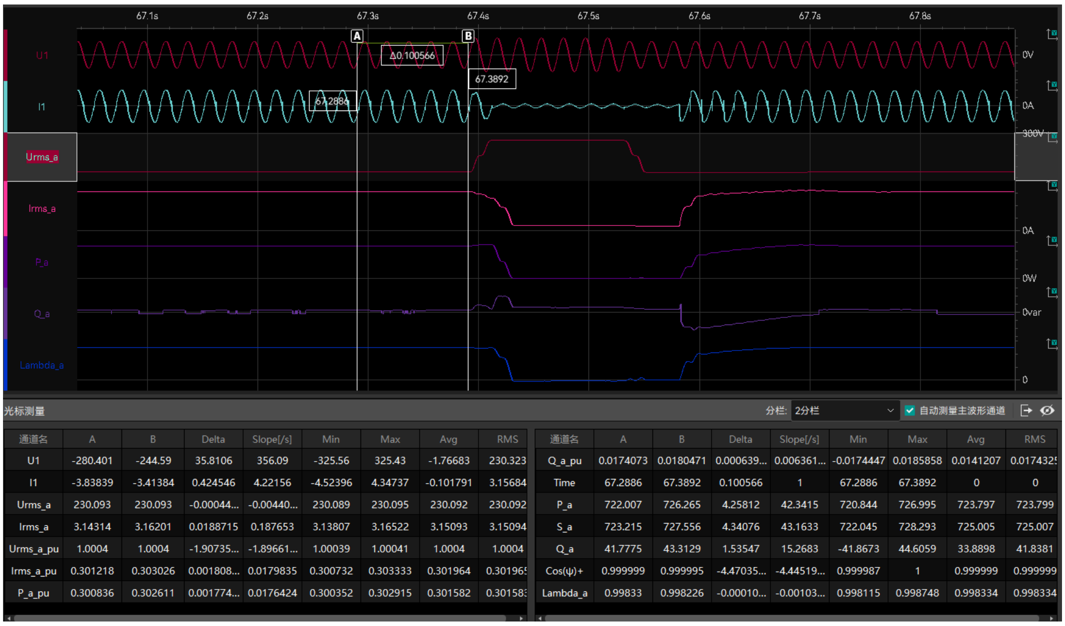
通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	207.968	309.189	101.221	975.218	-325.983	325.7	10.8123	232.841
I1	-0.374234	12.5223	12.8966	124.253	-14.0076	13.8839	-0.175538	7.07839
Urms_a	285.715	230.269	-55.4466	-534.204	229.818	285.715	234.531	234.834
Irms_a	0.385113	10.0085	9.62334	92.7166	0.315248	10.0085	4.58495	6.27051
P_a_pu	-0.00025...	0.952616	0.952875	9.18053	-0.00076...	0.952616	0.394959	0.57548
Urms_a_pu	1.24224	1.00117	-0.241072	-2.32263	0.999209	1.24224	1.0197	1.02102
Irms_a_pu	0.0369067	0.959143	0.922237	8.88535	0.0302112	0.959143	0.439391	0.600924

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
S_a	110.033	2304.63	2194.6	21144	72.469	2304.63	1056.99	1443.54
Q_a	110.031	-290.284	-400.315	-3856.86	-1042.77	231.095	-229.97	419.788
Cos(ψ)+	-0.00351...	0.994024	0.997535	9.61081	-0.0196792	0.998723	0.514109	0.704605
Lambda_a	-0.00564...	0.992036	0.99768	9.6122	-0.0194489	0.992036	0.468788	0.657795
Q_a_pu	0.0458462	-0.120952	-0.166798	-1.60702	-0.434489	0.0962895	-0.0958207	0.174912
Time	68.0931	68.1969	0.103793	1	68.0931	68.1969	0	0
P_a	-0.621004	2286.28	2286.9	22033.3	-1.82627	2286.28	947.902	1381.15

Recovery time

EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

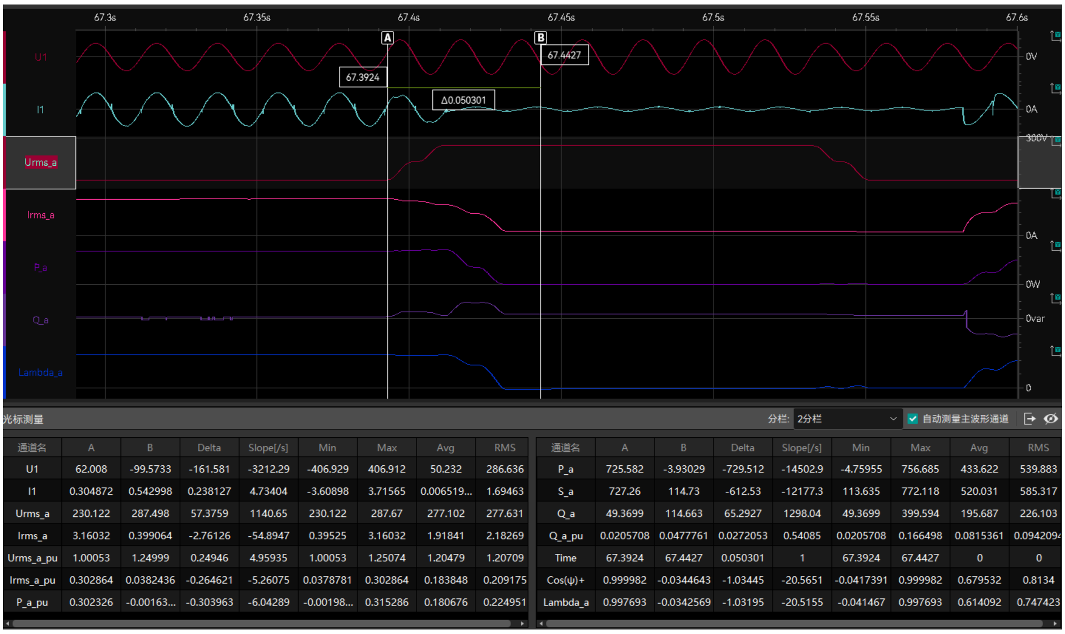
Graph of Test number 8.2


67.1s
67.2s
67.3s
67.4s
67.5s
67.6s
67.7s
67.8s
A
B
Δ0.100566
67.3892
67.2886
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-280.401	-244.59	35.8106	356.09	-325.56	325.43	-1.76683	230.323
I1	-3.83839	-3.41384	0.424546	4.22156	-4.52396	4.34737	-0.101791	3.15684
Urms_a	230.093	230.093	-0.00044...	-0.00440...	230.089	230.095	230.092	230.092
Irms_a	3.14314	3.16201	0.0188715	0.187653	3.13807	3.16522	3.15093	3.15094
Urms_a_pu	1.0004	1.0004	-1.90735...	-1.89661...	1.00039	1.00041	1.0004	1.0004
Irms_a_pu	0.301218	0.303026	0.001808...	0.0179835	0.300732	0.303333	0.301964	0.30196
P_a_pu	0.300836	0.302611	0.001774...	0.0176424	0.300352	0.302915	0.301582	0.30158

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Q_a_pu	0.0174073	0.0180471	0.000639...	0.006361...	-0.0174447	0.0185858	0.0141207	0.017432
Time	67.2886	67.3892	0.100566	1	67.2886	67.3892	0	0
P_a	722.007	726.265	4.25812	42.3415	720.844	726.995	723.797	723.799
S_a	723.215	727.556	4.34076	43.1633	722.045	728.293	725.005	725.007
Q_a	41.7775	43.3129	1.53547	15.2683	-41.8673	44.6059	33.8898	41.8381
Cos(ψ)+	0.999999	0.999995	-4.47035...	-4.44519...	0.999987	1	0.999999	0.999999
Lambda_a	0.99833	0.998226	-0.00010...	-0.00103...	0.998115	0.998748	0.998334	0.998334

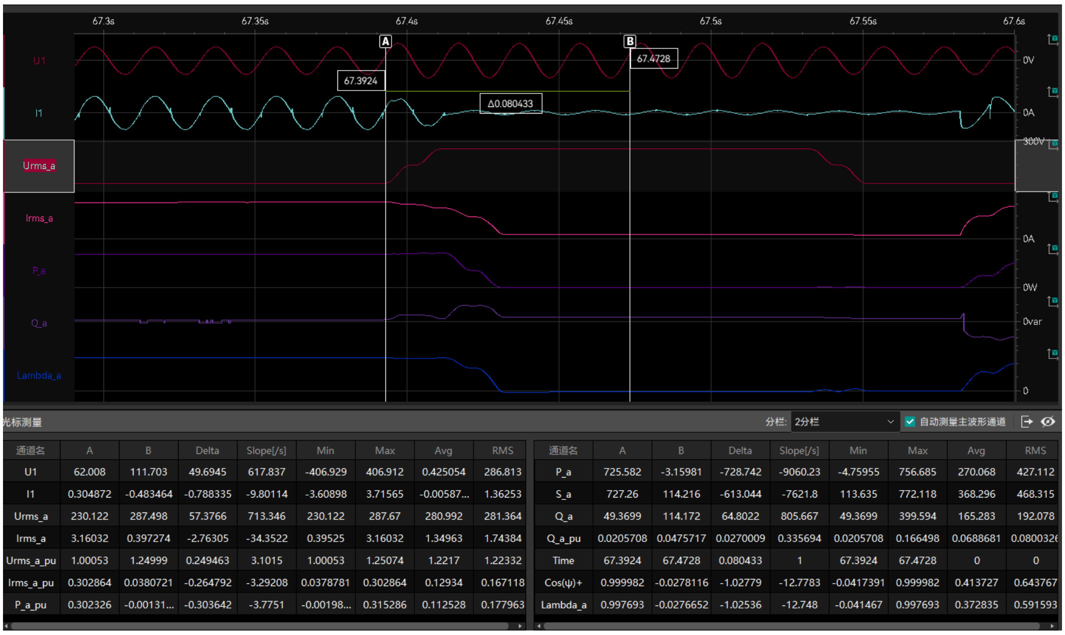
Before dip (t1-100ms)


67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
67.6s
A
B
67.3924
67.4427
Δ0.050301
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	62.008	-99.5733	-161.581	-3212.29	-406.929	406.912	50.232	286.636
I1	0.304872	0.542998	0.238127	4.73404	-3.60898	3.71565	0.006519...	1.69463
Urms_a	230.122	287.498	57.3759	1140.65	230.122	287.67	277.102	277.631
Irms_a	3.16032	0.399064	-2.76126	-54.8947	0.39525	3.16032	1.91841	2.18269
Urms_a_pu	1.00053	1.24999	0.24946	4.95935	1.00053	1.25074	1.20479	1.20709
Irms_a_pu	0.302864	0.0382436	-0.264621	-5.26075	0.0378781	0.302864	0.183848	0.209175
P_a_pu	0.302326	-0.00163...	-0.303963	-6.04289	-0.00198...	0.315286	0.180676	0.224951

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	725.582	-3.93029	-729.512	-14502.9	-4.75955	756.685	433.622	539.883
S_a	727.26	114.73	-612.53	-12177.3	113.635	772.118	520.031	585.317
Q_a	49.3699	114.663	65.2927	1298.04	49.3699	399.594	195.687	226.103
Q_a_pu	0.0205708	0.0477761	0.0272053	0.54085	0.0205708	0.166498	0.0815361	0.094209
Time	67.3924	67.4427	0.050301	1	67.3924	67.4427	0	0
Cos(ψ)+	0.999982	-0.0344643	-1.03445	-20.5651	-0.0417391	0.999982	0.679532	0.8134
Lambda_a	0.997693	-0.0342569	-1.03195	-20.5155	-0.041467	0.997693	0.614092	0.747423

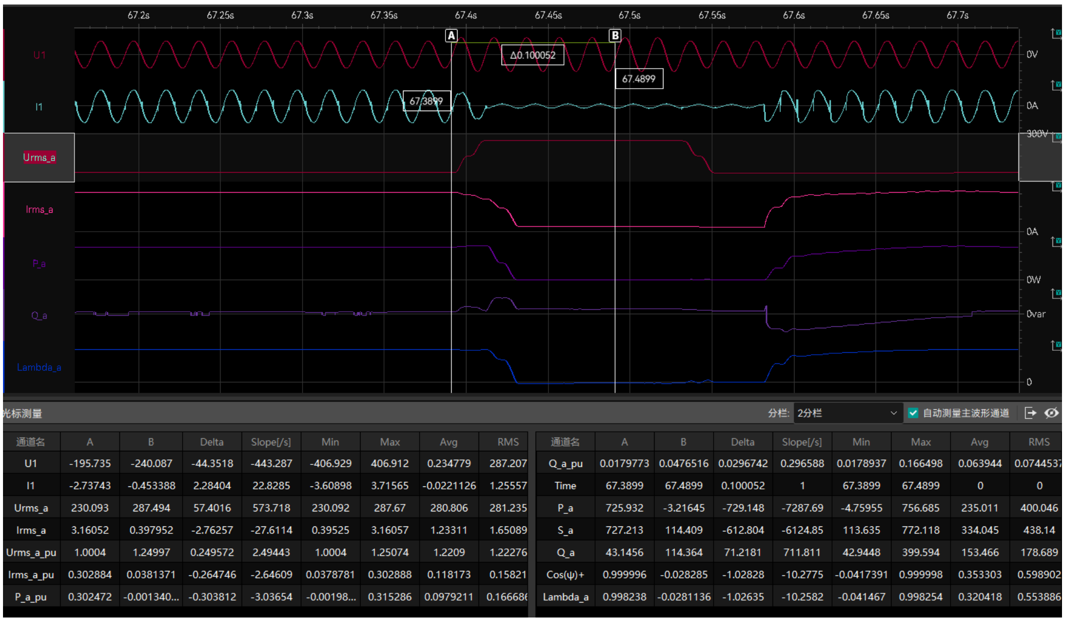
During dip (t1+50ms)


67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
67.6s
A
B
67.3924
67.4728
Δ0.080433
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
300V
0A
0W
0var
0
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	62.008	111.703	49.6945	617.837	-406.929	406.912	0.425054	286.813
I1	0.304872	-0.483464	-0.788335	-9.80114	-3.60898	3.71565	-0.00587...	1.36253
Urms_a	230.122	287.498	57.3766	713.346	230.122	287.67	280.992	281.364
Irms_a	3.16032	0.397274	-2.76305	-34.3522	0.39525	3.16032	1.34963	1.74384
Urms_a_pu	1.00053	1.24999	0.249463	3.1015	1.00053	1.25074	1.2217	1.22332
Irms_a_pu	0.302864	0.0380721	-0.264792	-3.29208	0.0378781	0.302864	0.12934	0.167118
P_a_pu	0.302326	-0.00131...	-0.303642	-3.7751	-0.00198...	0.315286	0.112528	0.177963

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
P_a	725.582	-3.15981	-728.742	-9060.23	-4.75955	756.685	270.068	427.112
S_a	727.26	114.216	-613.044	-7621.8	113.635	772.118	368.296	468.315
Q_a	49.3699	114.172	64.8022	805.667	49.3699	399.594	165.283	192.078
Q_a_pu	0.0205708	0.0475717	0.0270009	0.335694	0.0205708	0.166498	0.0688681	0.080032
Time	67.3924	67.4728	0.080433	1	67.3924	67.4728	0	0
Cos(ψ)+	0.999982	-0.0278116	-1.02779	-12.7783	-0.0417391	0.999982	0.413727	0.643767
Lambda_a	0.997693	-0.0276652	-1.02536	-12.748	-0.041467	0.997693	0.372835	0.591593

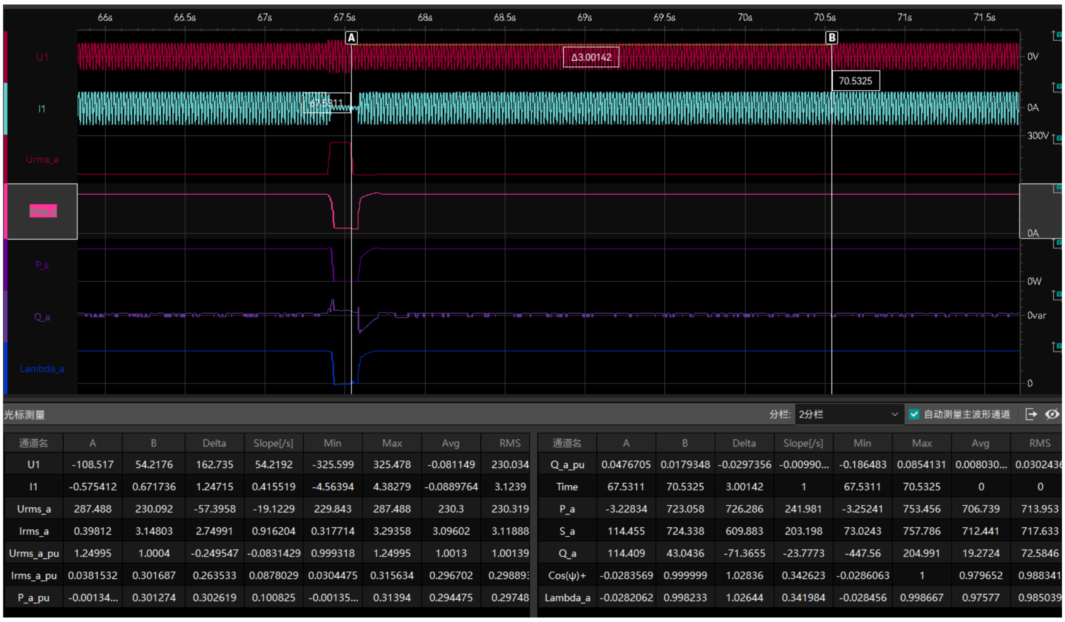
During dip (t1+80ms)


67.2s
67.25s
67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
67.6s
67.65s
67.7s
A
B
Δ0.100052
67.3899
67.4899
U1
I1
Urms_a
Irms_a
P_a
Q_a
Lambda_a
0V
0A
300V
0A
0W
0var
0
光标测量
分栏: 2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-195.735	-240.087	-44.3518	-443.287	-406.929	406.912	0.234779	287.207
I1	-2.73743	-0.453388	2.28404	22.8285	-3.60898	3.71565	-0.0221126	1.25557
Urms_a	230.093	287.494	57.4016	573.718	230.092	287.67	280.806	281.235
Irms_a	3.16052	0.397952	-2.76257	-27.6114	0.39525	3.16057	1.23311	1.65089
Urms_a_pu	1.0004	1.24997	0.249572	2.49443	1.0004	1.25074	1.2209	1.22276
Irms_a_pu	0.302884	0.0381371	-0.264746	-2.64609	0.0378781	0.302888	0.118173	0.15821
P_a_pu	0.302472	-0.001340...	-0.303812	-3.03654	-0.00198...	0.315286	0.0979211	0.16668

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Q_a_pu	0.0179773	0.0476516	0.0296742	0.296588	0.0178937	0.166498	0.063944	0.074453
Time	67.3899	67.4899	0.100052	1	67.3899	67.4899	0	0
P_a	725.932	-3.21645	-729.148	-7287.69	-4.75955	756.685	235.011	400.046
S_a	727.213	114.409	-612.804	-6124.85	113.635	772.118	334.045	438.14
Q_a	43.1456	114.364	71.2181	711.811	42.9448	399.594	153.466	178.689
Cos(ψ)+	0.999996	-0.028285	-1.02828	-10.2775	-0.0417391	0.999998	0.353303	0.598902
Lambda_a	0.998238	-0.0281136	-1.02635	-10.2582	-0.041467	0.998254	0.320418	0.553886

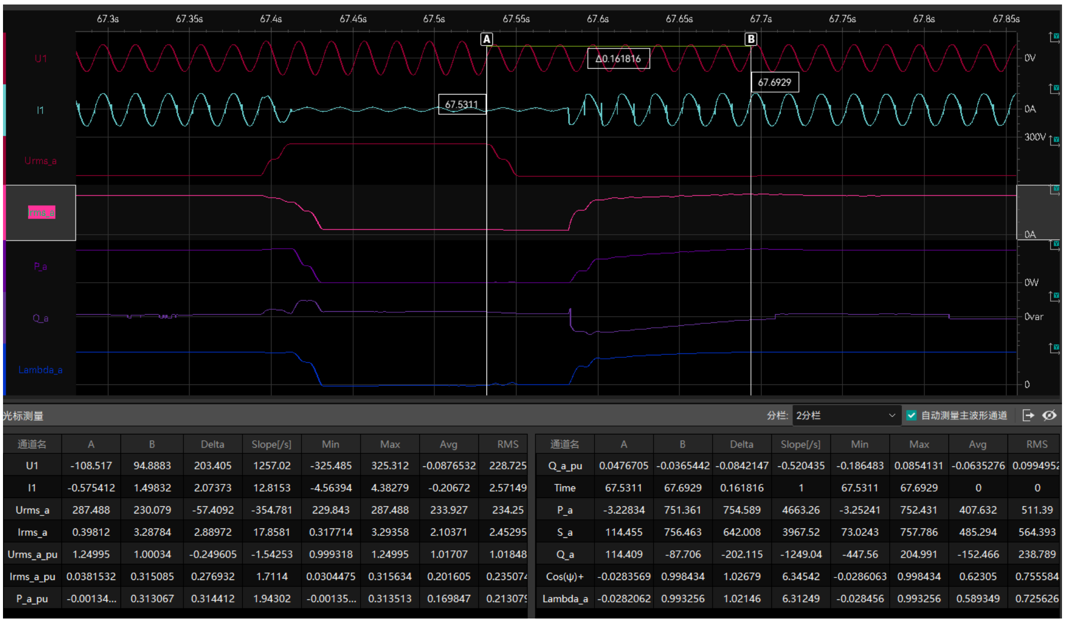
During dip (t1+100ms)


66s
66.5s
67s
67.5s
68s
68.5s
69s
69.5s
70s
70.5s
71s
71.5s
A
B
U1
I1
Urms_a
P_a
Q_a
Lambda_a
Δ3.00142
70.5325
67.5311
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-108.517	54.2176	162.735	54.2192	-325.599	325.478	-0.081149	230.034
I1	-0.575412	0.671736	1.24715	0.415519	-4.56394	4.38279	-0.0889764	3.1239
Urms_a	287.488	230.092	-57.3958	-19.1229	229.843	287.488	230.3	230.319
Irms_a	0.39812	3.14803	2.74991	0.916204	0.317714	3.29358	3.09602	3.11888
Urms_a_pu	1.24995	1.0004	-0.249547	-0.0831429	0.999318	1.24995	1.0013	1.00139
Irms_a_pu	0.0381532	0.301687	0.263533	0.0878029	0.0304475	0.315634	0.296702	0.29889
P_a_pu	-0.00134...	0.301274	0.302619	0.100825	-0.00135...	0.31394	0.294475	0.29748

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Q_a_pu	0.0476705	0.0179348	-0.0297356	-0.00990...	-0.186483	0.0854131	0.008030...	0.030243
Time	67.5311	70.5325	3.00142	1	67.5311	70.5325	0	0
P_a	-3.22834	723.058	726.286	241.981	-3.25241	753.456	706.739	713.953
S_a	114.455	724.338	609.883	203.198	73.0243	757.786	712.441	717.633
Q_a	114.409	43.0436	-71.3655	-23.7773	-447.56	204.991	19.2724	72.5846
Cos(ψ)+	-0.0283569	0.999999	1.02836	0.342623	-0.0286063	1	0.979652	0.988341
Lambda_a	-0.0282062	0.998233	1.02644	0.341984	-0.028456	0.998667	0.97577	0.985039

After dip (t2+3s)

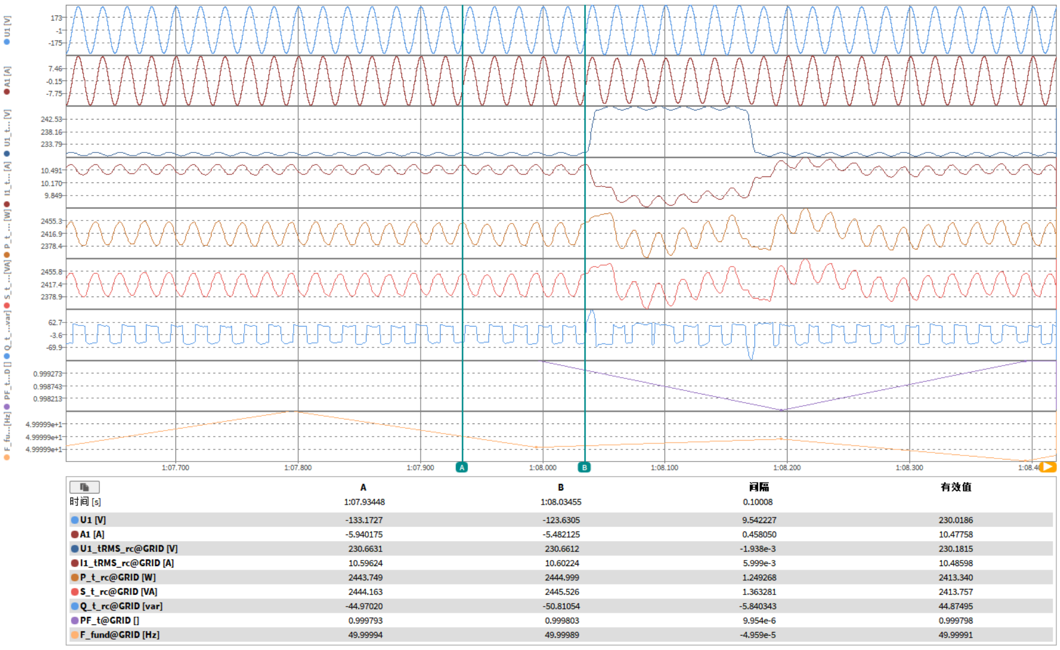

67.3s
67.35s
67.4s
67.45s
67.5s
67.55s
67.6s
67.65s
67.7s
67.75s
67.8s
67.85s
A
B
U1
I1
Urms_a
P_a
Q_a
Lambda_a
Δ0.161816
67.6929
67.5311
0V
0A
300V
0A
0W
0var
0
光标测量
分栏:
2分栏
自动测量主波形通道

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
U1	-108.517	94.8883	203.405	1257.02	-325.485	325.312	-0.0876532	228.725
I1	-0.575412	1.49832	2.07373	12.8153	-4.56394	4.38279	-0.20672	2.57149
Urms_a	287.488	230.079	-57.4092	-354.781	229.843	287.488	233.927	234.25
Irms_a	0.39812	3.28784	2.88972	17.8581	0.317714	3.29358	2.10371	2.45295
Urms_a_pu	1.24995	1.00034	-0.249605	-1.54253	0.999318	1.24995	1.01707	1.01848
Irms_a_pu	0.0381532	0.315085	0.276932	1.7114	0.0304475	0.315634	0.201605	0.23507
P_a_pu	-0.00134...	0.313067	0.314412	1.94302	-0.00135...	0.313513	0.169847	0.21307

通道名	A	B	Delta	Slope[/s]	Min	Max	Avg	RMS
Q_a_pu	0.0476705	-0.0365442	-0.0842147	-0.520435	-0.186483	0.0854131	-0.0635276	0.099495
Time	67.5311	67.6929	0.161816	1	67.5311	67.6929	0	0
P_a	-3.22834	751.361	754.589	4663.26	-3.25241	752.431	407.632	511.39
S_a	114.455	756.463	642.008	3967.52	73.0243	757.786	485.294	564.393
Q_a	114.409	-87.706	-202.115	-1249.04	-447.56	204.991	-152.466	238.789
Cos(ψ)+	-0.0283569	0.998434	1.02679	6.34542	-0.0286063	0.998434	0.62305	0.755584
Lambda_a	-0.0282062	0.993256	1.02146	6.31249	-0.028456	0.993256	0.589349	0.725626

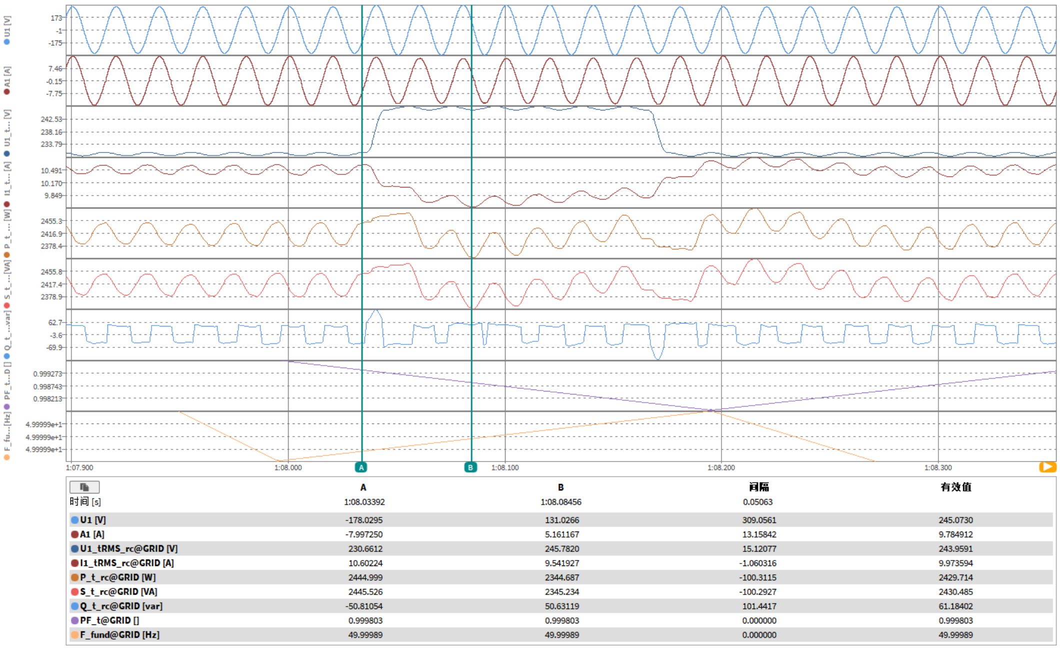
Recovery time

Graph of Test number 8.3


U1 [V]
A1 [A]
U1_t...[V]
I1_t...[A]
P_t_...[W]
S_t_...[VA]
Q_t_...[var]
PF_t...D []
F_fu...[Hz]
173
-1
-175
7.46
-0.15
-7.75
242.53
238.16
233.79
10.491
10.170
9.849
2455.3
2416.9
2378.4
2455.8
2417.4
2378.9
62.7
-3.6
-69.9
0.999273
0.998743
0.998213
4.99999e+1
4.99999e+1
4.99999e+1
1:07.700
1:07.800
1:07.900
A
1:08.000
B
1:08.100
1:08.200
1:08.300
1:08.4

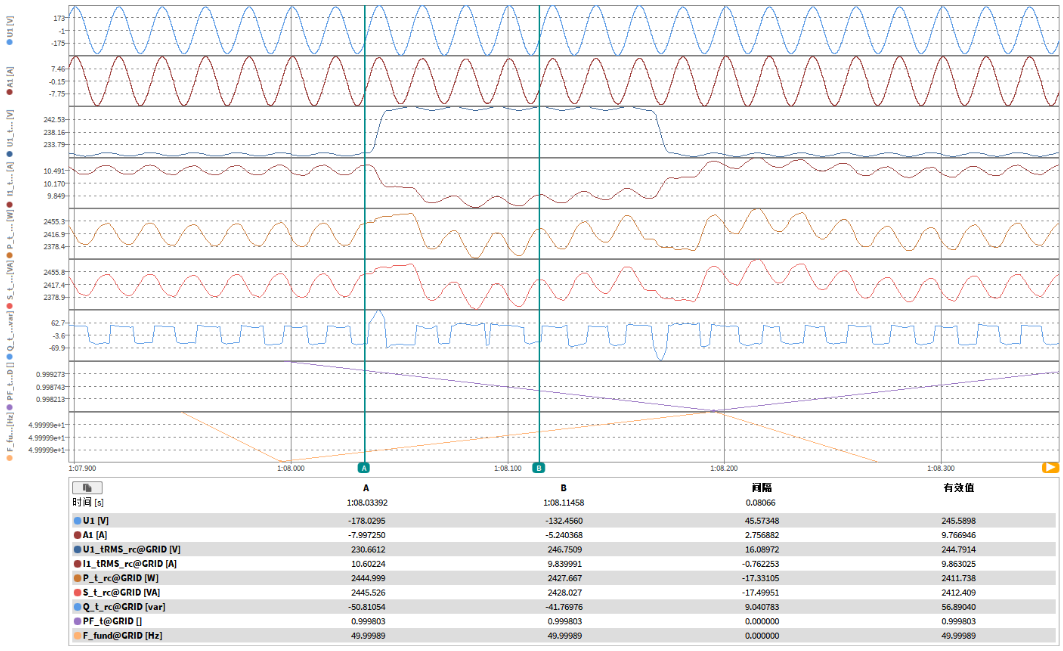
时间 [s]	A 1:07.93448	B 1:08.03455	间隔 0.10008	有效值
U1 [V]	-133.1727	-123.6305	9.542227	230.0186
A1 [A]	-5.940175	-5.482125	0.458050	10.47758
U1_tRMS_rc@GRID [V]	230.6631	230.6612	-1.938e-3	230.1815
I1_tRMS_rc@GRID [A]	10.59624	10.60224	5.999e-3	10.48598
P_t_rc@GRID [W]	2443.749	2444.999	1.249268	2413.340
S_t_rc@GRID [VA]	2444.163	2445.526	1.363281	2413.757
Q_t_rc@GRID [var]	-44.97020	-50.81054	-5.840343	44.87495
PF_t@GRID []	0.999793	0.999803	9.954e-6	0.999798
F_fund@GRID [Hz]	49.99994	49.99989	-4.959e-5	49.99991

Before dip (t1-100ms)


U1 [V]
A1 [A]
U1_t...[V]
I1_t...[A]
P_t_...[W]
S_t_...[VA]
Q_t_...[var]
PF_t...D []
F_fu...[Hz]
173
-1
-175
7.46
-0.15
-7.75
242.53
238.16
233.79
10.491
10.170
9.849
2455.3
2416.9
2378.4
2455.8
2417.4
2378.9
62.7
-3.6
-69.9
0.999273
0.998743
0.998213
4.99999e+1
4.99999e+1
4.99999e+1
1:07.900
1:08.000
A
B
1:08.100
1:08.200
1:08.300

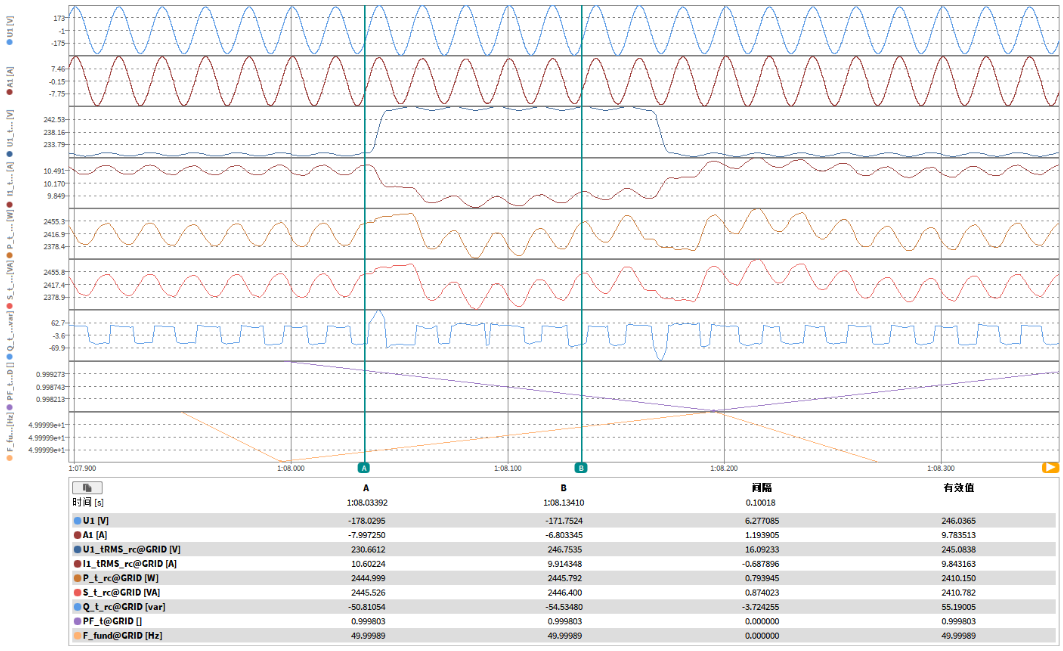
时间 [s]	A 1:08.03392	B 1:08.08456	间隔 0.05063	有效值
U1 [V]	-178.0295	131.0266	309.0561	245.0730
A1 [A]	-7.997250	5.161167	13.15842	9.784912
U1_tRMS_rc@GRID [V]	230.6612	245.7820	15.12077	243.9591
I1_tRMS_rc@GRID [A]	10.60224	9.541927	-1.060316	9.973594
P_t_rc@GRID [W]	2444.999	2344.687	-100.3115	2429.714
S_t_rc@GRID [VA]	2445.526	2345.234	-100.2927	2430.485
Q_t_rc@GRID [var]	-50.81054	50.63119	101.4417	61.18402
PF_t@GRID []	0.999803	0.999803	0.000000	0.999803
F_fund@GRID [Hz]	49.99989	49.99989	0.000000	49.99989

During dip (t1+50ms)


U1 [V]
173
-1
-175
A1 [A]
7.46
-0.15
-7.75
U1_t...[V]
242.53
238.16
233.79
I1_t...[A]
10.491
10.170
9.849
P_t_...[W]
2455.3
2416.9
2378.4
S_t_...[VA]
2455.8
2417.4
2378.9
Q_t_...var]
62.7
-3.6
-69.9
PF_t...D []
0.999273
0.998743
0.998213
F_fu...[Hz]
4.99999e+1
4.99999e+1
4.99999e+1
1:07.900
1:08.000
A
1:08.100
B
1:08.200
1:08.300

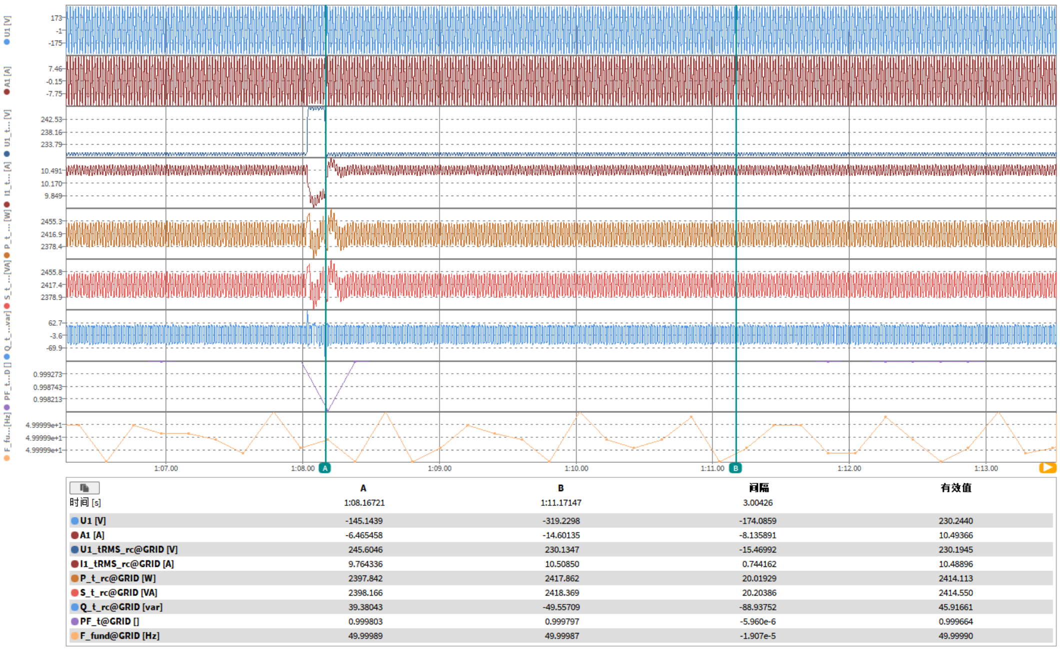
	A	B	间隔	有效值
时间 [s]	1:08.03392	1:08.11458	0.08066	
● **U1 [V]**	-178.0295	-132.4560	45.57348	245.5898
● **A1 [A]**	-7.997250	-5.240368	2.756882	9.766946
● **U1_tRMS_rc@GRID [V]**	230.6612	246.7509	16.08972	244.7914
● **I1_tRMS_rc@GRID [A]**	10.60224	9.839991	-0.762253	9.863025
● **P_t_rc@GRID [W]**	2444.999	2427.667	-17.33105	2411.738
● **S_t_rc@GRID [VA]**	2445.526	2428.027	-17.49951	2412.409
● **Q_t_rc@GRID [var]**	-50.81054	-41.76976	9.040783	56.89040
● **PF_t@GRID []**	0.999803	0.999803	0.000000	0.999803
● **F_fund@GRID [Hz]**	49.99989	49.99989	0.000000	49.99989

During dip (t1+80ms)


U1 [V]
173
-1
-175
A1 [A]
7.46
-0.15
-7.75
U1_t...[V]
242.53
238.16
233.79
I1_t...[A]
10.491
10.170
9.849
P_t_...[W]
2455.3
2416.9
2378.4
S_t_...[VA]
2455.8
2417.4
2378.9
Q_t_...var]
62.7
-3.6
-69.9
PF_t...D []
0.999273
0.998743
0.998213
F_fu...[Hz]
4.99999e+1
4.99999e+1
4.99999e+1
1:07.900
1:08.000
A
1:08.100
B
1:08.200
1:08.300

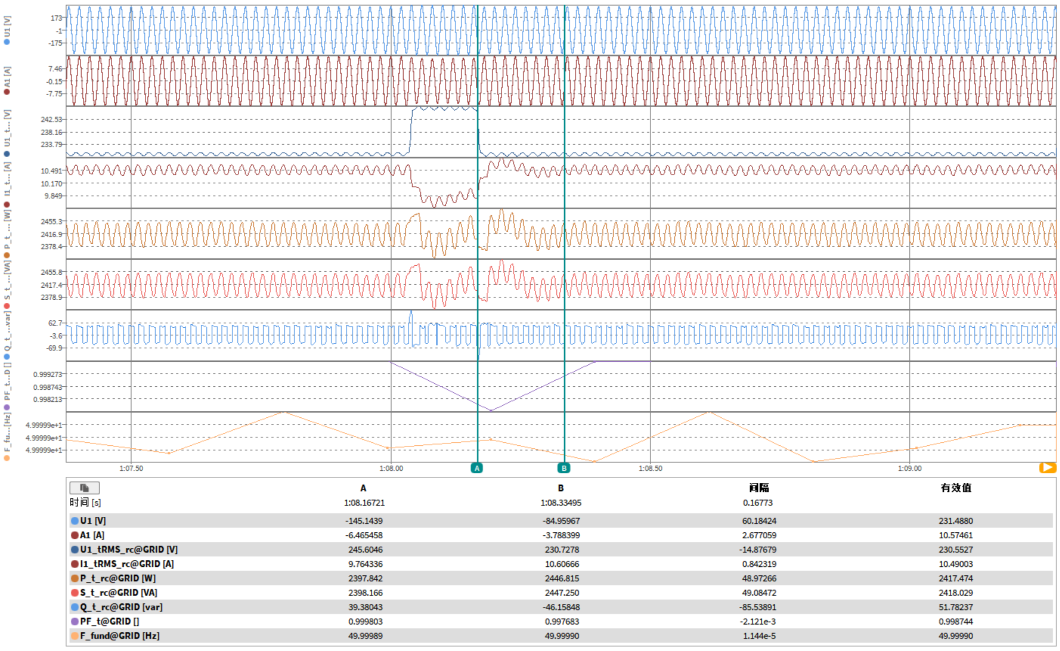
	A	B	间隔	有效值
时间 [s]	1:08.03392	1:08.13410	0.10018	
● **U1 [V]**	-178.0295	-171.7524	6.277085	246.0365
● **A1 [A]**	-7.997250	-6.803345	1.193905	9.783513
● **U1_tRMS_rc@GRID [V]**	230.6612	246.7535	16.09233	245.0838
● **I1_tRMS_rc@GRID [A]**	10.60224	9.914348	-0.687896	9.843163
● **P_t_rc@GRID [W]**	2444.999	2445.792	0.793945	2410.150
● **S_t_rc@GRID [VA]**	2445.526	2446.400	0.874023	2410.782
● **Q_t_rc@GRID [var]**	-50.81054	-54.53480	-3.724255	55.19005
● **PF_t@GRID []**	0.999803	0.999803	0.000000	0.999803
● **F_fund@GRID [Hz]**	49.99989	49.99989	0.000000	49.99989

During dip (t1+100ms)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
Q_t... [var]
PF_t...D []
F_fu... [Hz]
173
-1
-175
7.46
-0.15
-7.75
242.53
238.16
233.79
10.491
10.170
9.849
2455.3
2416.9
2378.4
2455.8
2417.4
2378.9
62.7
-3.6
-69.9
0.999273
0.998743
0.998213
4.99999e+1
4.99999e+1
4.99999e+1
1:07.00
1:08.00
A
1:09.00
1:10.00
1:11.00
B
1:12.00
1:13.00

时间 [s]	A 1:08.16721	B 1:11.17147	间隔 3.00426	有效值
● U1 [V]	-145.1439	-319.2298	-174.0859	230.2440
● A1 [A]	-6.465458	-14.60135	-8.135891	10.49366
● U1_tRMS_rc@GRID [V]	245.6046	230.1347	-15.46992	230.1945
● I1_tRMS_rc@GRID [A]	9.764336	10.50850	0.744162	10.48896
● P_t_rc@GRID [W]	2397.842	2417.862	20.01929	2414.113
● S_t_rc@GRID [VA]	2398.166	2418.369	20.20386	2414.550
● Q_t_rc@GRID [var]	39.38043	-49.55709	-88.93752	45.91661
● PF_t@GRID []	0.999803	0.999797	-5.960e-6	0.999664
● F_fund@GRID [Hz]	49.99989	49.99987	-1.907e-5	49.99990

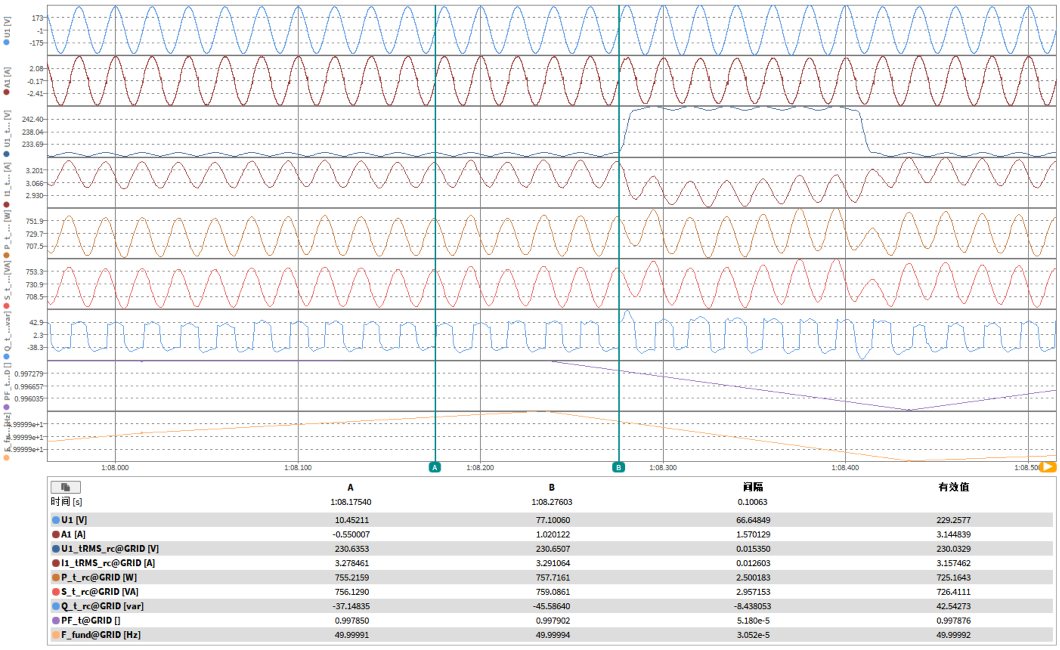
After dip (t2+3s)


U1 [V]
A1 [A]
U1_t... [V]
I1_t... [A]
P_t... [W]
S_t... [VA]
Q_t... [var]
PF_t...D []
F_fu... [Hz]
173
-1
-175
7.46
-0.15
-7.75
242.53
238.16
233.79
10.491
10.170
9.849
2455.3
2416.9
2378.4
2455.8
2417.4
2378.9
62.7
-3.6
-69.9
0.999273
0.998743
0.998213
4.99999e+1
4.99999e+1
4.99999e+1
1:07.50
1:08.00
A
B
1:08.50
1:09.00

时间 [s]	A 1:08.16721	B 1:08.33495	间隔 0.16773	有效值
● U1 [V]	-145.1439	-84.95967	60.18424	231.4880
● A1 [A]	-6.465458	-3.788399	2.677059	10.57461
● U1_tRMS_rc@GRID [V]	245.6046	230.7278	-14.87679	230.5527
● I1_tRMS_rc@GRID [A]	9.764336	10.60666	0.842319	10.49003
● P_t_rc@GRID [W]	2397.842	2446.815	48.97266	2417.474
● S_t_rc@GRID [VA]	2398.166	2447.250	49.08472	2418.029
● Q_t_rc@GRID [var]	39.38043	-46.15848	-85.53891	51.78237
● PF_t@GRID []	0.999803	0.997683	-2.121e-3	0.998744
● F_fund@GRID [Hz]	49.99989	49.99990	1.144e-5	49.99990

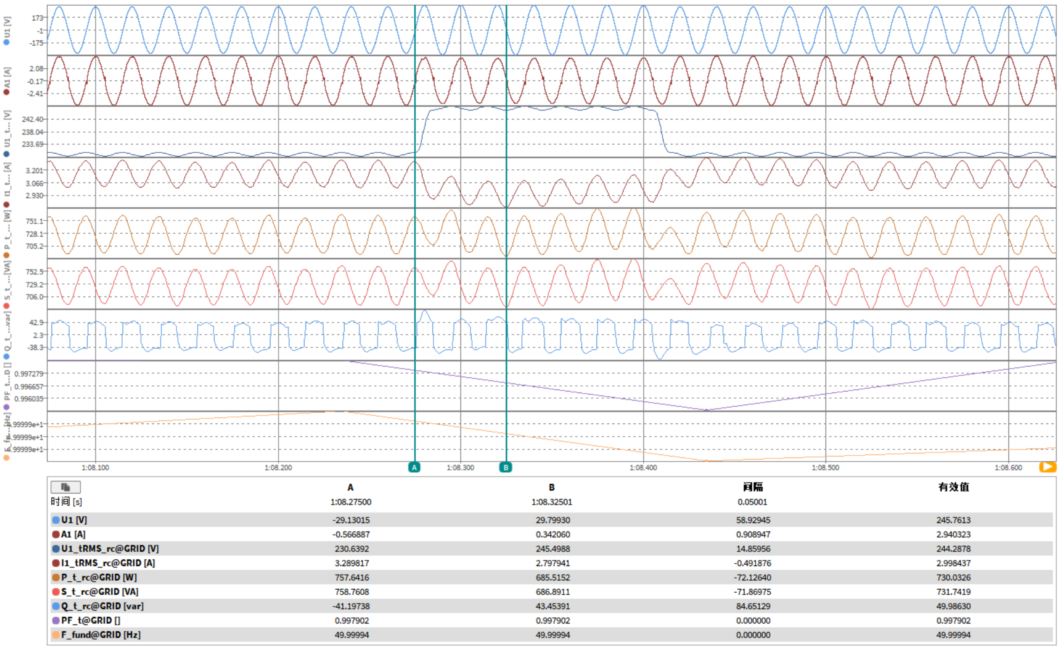
Recovery time

Graph of Test number 8.4


U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t... [V]
242.40
238.04
233.69
I1_t... [A]
3.201
3.066
2.930
P_t_... [W]
751.9
729.7
707.5
S_t_...[VA]
753.3
730.9
708.5
Q_t_...var]
42.9
2.3
-38.3
PF_t...D []
0.997279
0.996657
0.996035
F_...[Hz]
99999e+1
99999e+1
99999e+1
1:08.000
1:08.100
A
1:08.200
B
1:08.300
1:08.400
1:08.500

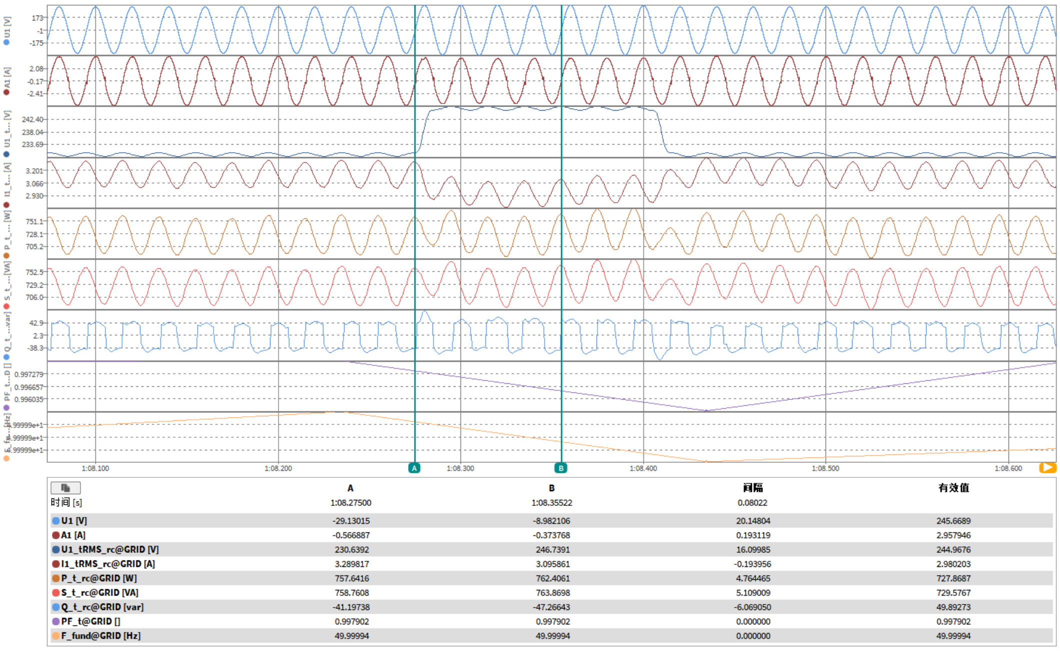
时间 [s]	A 1:08.17540	B 1:08.27603	间隔 0.10063	有效值
U1 [V]	10.45211	77.10060	66.64849	229.2577
A1 [A]	-0.550007	1.020122	1.570129	3.144839
U1_tRMS_rc@GRID [V]	230.6353	230.6507	0.015350	230.0329
I1_tRMS_rc@GRID [A]	3.278461	3.291064	0.012603	3.157462
P_t_rc@GRID [W]	755.2159	757.7161	2.500183	725.1643
S_t_rc@GRID [VA]	756.1290	759.0861	2.957153	726.4111
Q_t_rc@GRID [var]	-37.14835	-45.58640	-8.438053	42.54273
PF_t@GRID []	0.997850	0.997902	5.180e-5	0.997876
F_fund@GRID [Hz]	49.99991	49.99994	3.052e-5	49.99992

Before dip (t1-100ms)


U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t... [V]
242.40
238.04
233.69
I1_t... [A]
3.201
3.066
2.930
P_t_... [W]
751.1
728.1
705.2
S_t_...[VA]
752.5
729.2
706.0
Q_t_...var]
42.9
2.3
-38.3
PF_t...D []
0.997279
0.996657
0.996035
F_...[Hz]
99999e+1
99999e+1
99999e+1
1:08.100
1:08.200
A
1:08.300
B
1:08.400
1:08.500
1:08.600

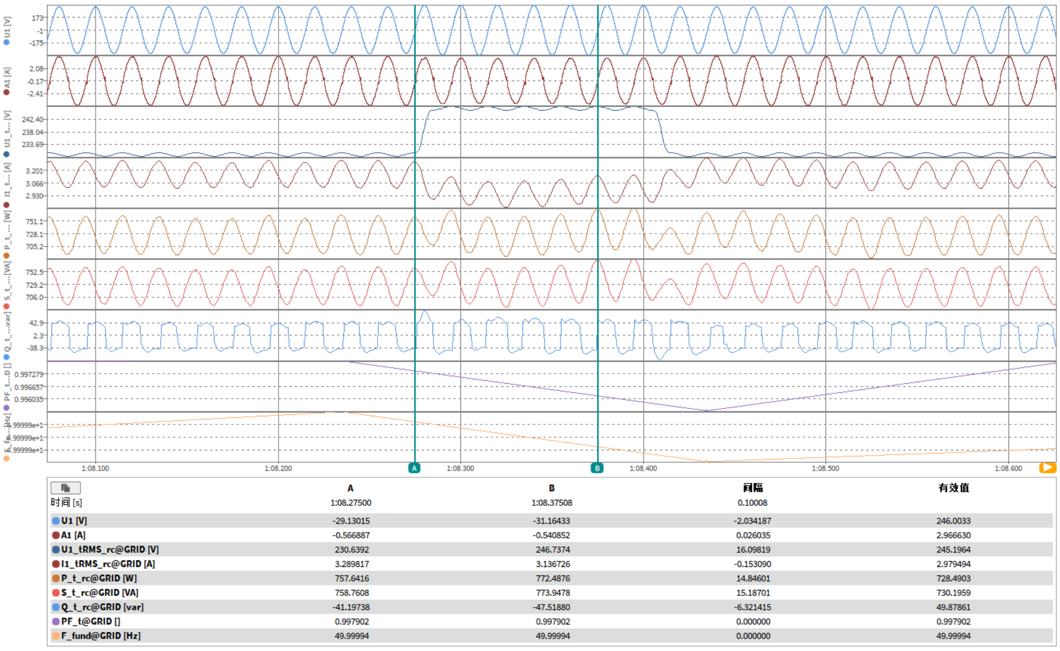
时间 [s]	A 1:08.27500	B 1:08.32501	间隔 0.05001	有效值
U1 [V]	-29.13015	29.79930	58.92945	245.7613
A1 [A]	-0.566887	0.342060	0.908947	2.940323
U1_tRMS_rc@GRID [V]	230.6392	245.4988	14.85956	244.2878
I1_tRMS_rc@GRID [A]	3.289817	2.797941	-0.491876	2.998437
P_t_rc@GRID [W]	757.6416	685.5152	-72.12640	730.0326
S_t_rc@GRID [VA]	758.7608	686.8911	-71.86975	731.7419
Q_t_rc@GRID [var]	-41.19738	43.45391	84.65129	49.98630
PF_t@GRID []	0.997902	0.997902	0.000000	0.997902
F_fund@GRID [Hz]	49.99994	49.99994	0.000000	49.99994

During dip (t1+50ms)


U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t... [V]
242.40
238.04
233.69
I1_t... [A]
3.201
3.066
2.930
P_t_... [W]
751.1
728.1
705.2
S_t_...[VA]
752.5
729.2
706.0
Q_t_...var]
42.9
2.3
-38.3
PF_t...D []
0.997279
0.996657
0.996035
F_fu...[Hz]
99999e+1
99999e+1
99999e+1
1:08.100
1:08.200
A
1:08.300
B
1:08.400
1:08.500
1:08.600

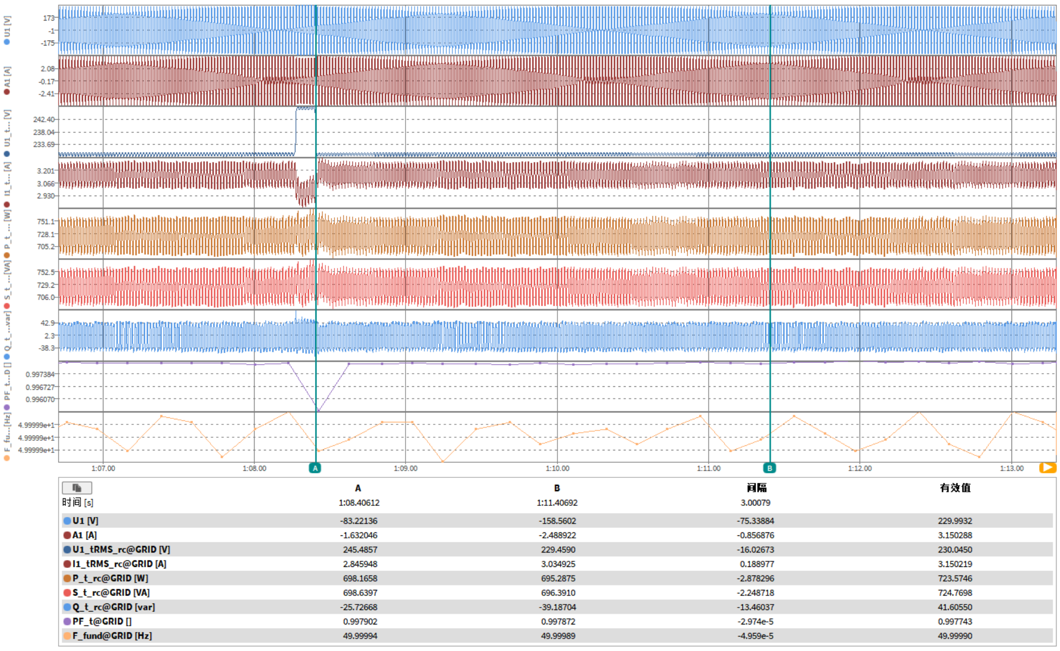
	A	B	间隔	有效值
时间 [s]	1:08.27500	1:08.35522	0.08022	
U1 [V]	-29.13015	-8.982106	20.14804	245.6689
A1 [A]	-0.566887	-0.373768	0.193119	2.957946
U1_tRMS_rc@GRID [V]	230.6392	246.7391	16.09985	244.9676
I1_tRMS_rc@GRID [A]	3.289817	3.095861	-0.193956	2.980203
P_t_rc@GRID [W]	757.6416	762.4061	4.764465	727.8687
S_t_rc@GRID [VA]	758.7608	763.8698	5.109009	729.5767
Q_t_rc@GRID [var]	-41.19738	-47.26643	-6.069050	49.89273
PF_t@GRID []	0.997902	0.997902	0.000000	0.997902
F_fund@GRID [Hz]	49.99994	49.99994	0.000000	49.99994

During dip (t1+80ms)


U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t... [V]
242.40
238.04
233.69
I1_t... [A]
3.201
3.066
2.930
P_t_... [W]
751.1
728.1
705.2
S_t_...[VA]
752.5
729.2
706.0
Q_t_...var]
42.9
2.3
-38.3
PF_t...D []
0.997279
0.996657
0.996035
F_fu...[Hz]
99999e+1
99999e+1
99999e+1
1:08.100
1:08.200
A
1:08.300
B
1:08.400
1:08.500
1:08.600

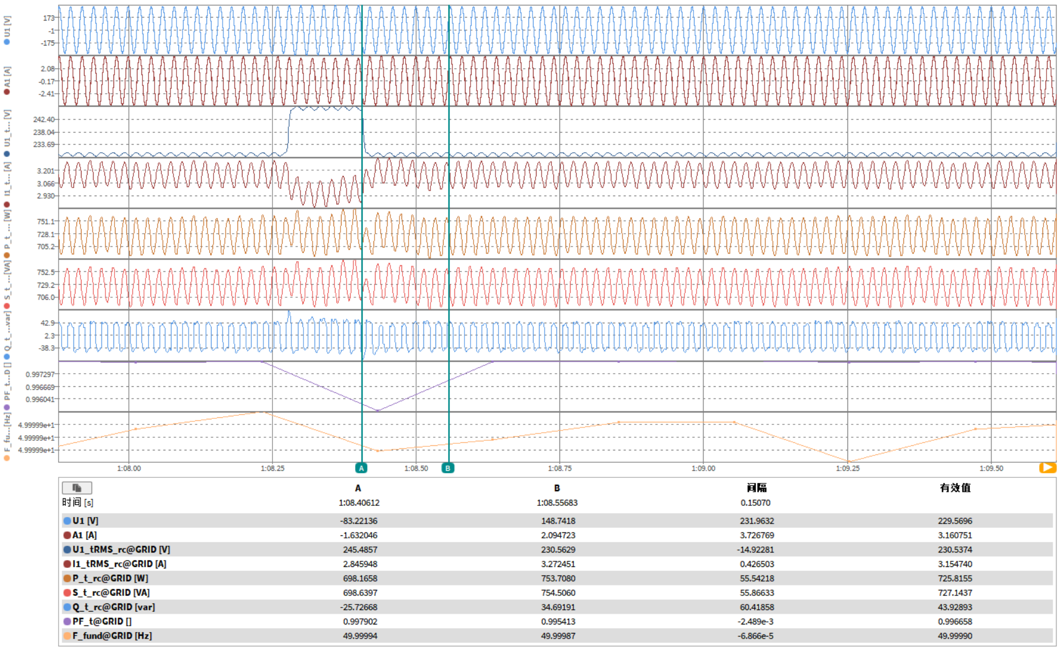
	A	B	间隔	有效值
时间 [s]	1:08.27500	1:08.37508	0.10008	
U1 [V]	-29.13015	-31.16433	-2.034187	246.0033
A1 [A]	-0.566887	-0.540852	0.026035	2.966630
U1_tRMS_rc@GRID [V]	230.6392	246.7374	16.09819	245.1964
I1_tRMS_rc@GRID [A]	3.289817	3.136726	-0.153090	2.979494
P_t_rc@GRID [W]	757.6416	772.4876	14.84601	728.4903
S_t_rc@GRID [VA]	758.7608	773.9478	15.18701	730.1959
Q_t_rc@GRID [var]	-41.19738	-47.51880	-6.321415	49.87861
PF_t@GRID []	0.997902	0.997902	0.000000	0.997902
F_fund@GRID [Hz]	49.99994	49.99994	0.000000	49.99994

During dip (t1+100ms)


U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t....[V]
242.40
238.04
233.69
I1_t....[A]
3.201
3.066
2.930
P_t....[W]
751.1
728.1
705.2
S_t....[VA]
752.5
729.2
706.0
Q_t....[var]
42.9
2.3
-38.3
PF_t....D []
0.997384
0.996727
0.996070
F_fu....[Hz]
4.99999e+1
4.99999e+1
4.99999e+1
1:07.00
1:08.00
A
1:09.00
1:10.00
1:11.00
B
1:12.00
1:13.00

	A	B	间隔	有效值
时间 [s]	1:08.40612	1:11.40692	3.00079	
U1 [V]	-83.22136	-158.5602	-75.33884	229.9932
A1 [A]	-1.632046	-2.488922	-0.856876	3.150288
U1_tRMS_rc@GRID [V]	245.4857	229.4590	-16.02673	230.0450
I1_tRMS_rc@GRID [A]	2.845948	3.034925	0.188977	3.150219
P_t_rc@GRID [W]	698.1658	695.2875	-2.878296	723.5746
S_t_rc@GRID [VA]	698.6397	696.3910	-2.248718	724.7698
Q_t_rc@GRID [var]	-25.72668	-39.18704	-13.46037	41.60550
PF_t@GRID []	0.997902	0.997872	-2.974e-5	0.997743
F_fund@GRID [Hz]	49.99994	49.99989	-4.959e-5	49.99990

After dip (t2+3s)

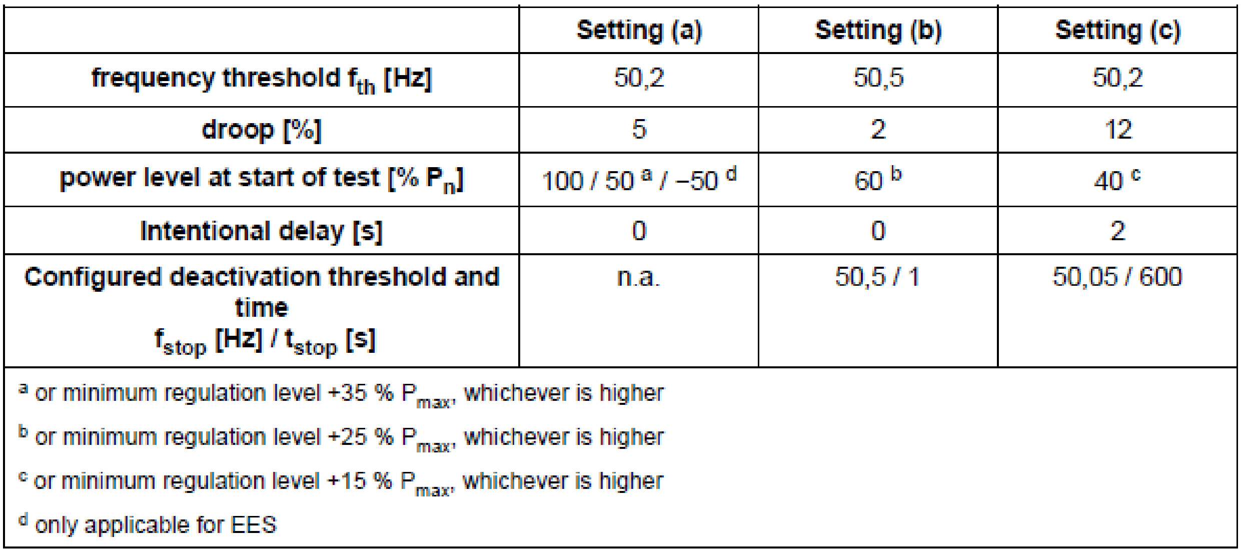

U1 [V]
173
-1
-175
A1 [A]
2.08
-0.17
-2.41
U1_t....[V]
242.40
238.04
233.69
I1_t....[A]
3.201
3.066
2.930
P_t....[W]
751.1
728.1
705.2
S_t....[VA]
752.5
729.2
706.0
Q_t....[var]
42.9
2.3
-38.3
PF_t....D []
0.997297
0.996669
0.996041
F_fu....[Hz]
4.99999e+1
4.99999e+1
4.99999e+1
1:08.00
1:08.25
A
1:08.50
B
1:08.75
1:09.00
1:09.25
1:09.50

	A	B	间隔	有效值
时间 [s]	1:08.40612	1:08.55683	0.15070	
U1 [V]	-83.22136	148.7418	231.9632	229.5696
A1 [A]	-1.632046	2.094723	3.726769	3.160751
U1_tRMS_rc@GRID [V]	245.4857	230.5629	-14.92281	230.5374
I1_tRMS_rc@GRID [A]	2.845948	3.272451	0.426503	3.154740
P_t_rc@GRID [W]	698.1658	753.7080	55.54218	725.8155
S_t_rc@GRID [VA]	698.6397	754.5060	55.86633	727.1437
Q_t_rc@GRID [var]	-25.72668	34.69191	60.41858	43.92893
PF_t@GRID []	0.997902	0.995413	-2.489e-3	0.996658
F_fund@GRID [Hz]	49.99994	49.99987	-6.866e-5	49.99990

Recovery time

5.4.3.2	**Power response to over-frequencies**	P

Table 6 — Frequency threshold and droop



	Setting (a)	Setting (b)	Setting (c)
frequency threshold f_{th} [Hz]	50,2	50,5	50,2
droop [%]	5	2	12
power level at start of test [% P_n]	100 / 50 [a] / −50 [d]	60 [b]	40 [c]
Intentional delay [s]	0	0	2
Configured deactivation threshold and time f_{stop} [Hz] / t_{stop} [s]	n.a.	50,5 / 1	50,05 / 600

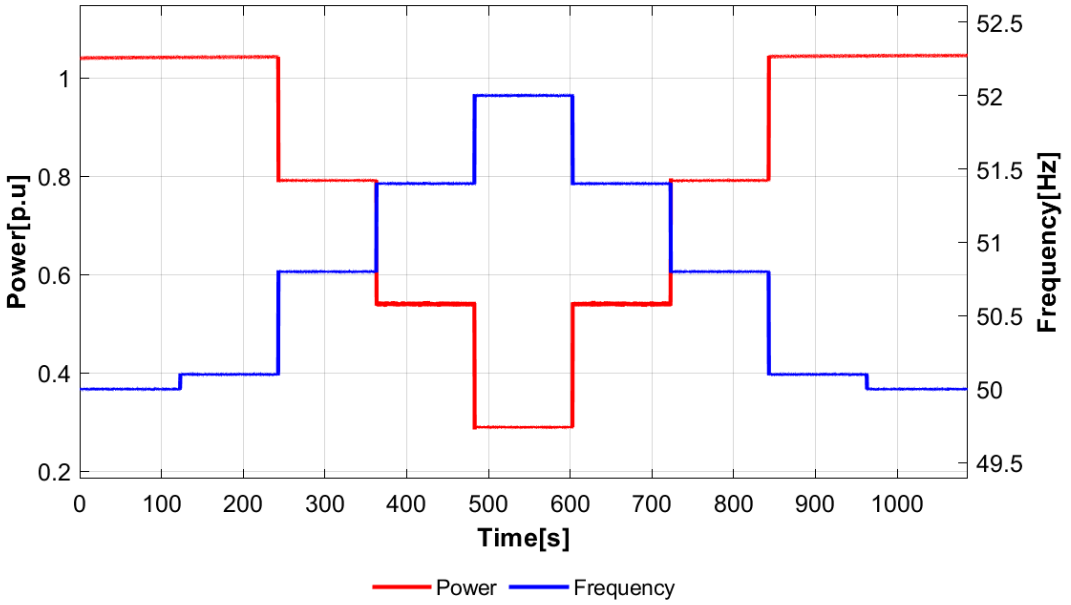
[a] or minimum regulation level +35 % P_{max}, whichever is higher

[b] or minimum regulation level +25 % P_{max}, whichever is higher

[c] or minimum regulation level +15 % P_{max}, whichever is higher

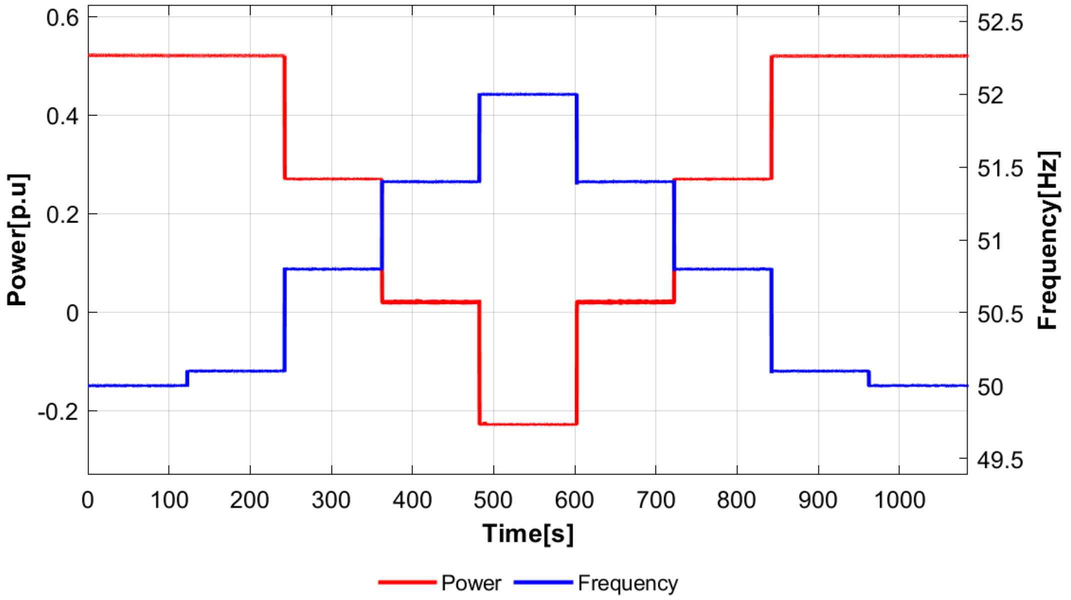
[d] only applicable for EES

P(f) curve setting: Available P adjust to follow droop during the over-frequency transient								
Parameter	Test No. 1 (For ESS)- **Setting (a)-100%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	104.15%	50.00	--	--	--	100%	4.15%	± 10%
50.10	104.25%	50.10	--	--	--	100%	4.25%	
50.80	79.15%	50.80	0.2	1.0	0.2	76%	3.15%	
51.40	54.02%	51.40	0.2	0.8	0.2	52%	2.02%	
52.00	28.98%	52.00	0.2	1.0	0.2	28%	0.98%	
51.40	54.01%	51.40	0.2	0.8	0.2	52%	2.01%	
50.80	79.15%	50.80	0.2	1.0	0.2	76%	3.15%	
50.10	104.44%	50.10	0.2	1.0	0.2	100%	4.44%	
50.00	104.54%	50.00	--	--	--	100%	4.54%	



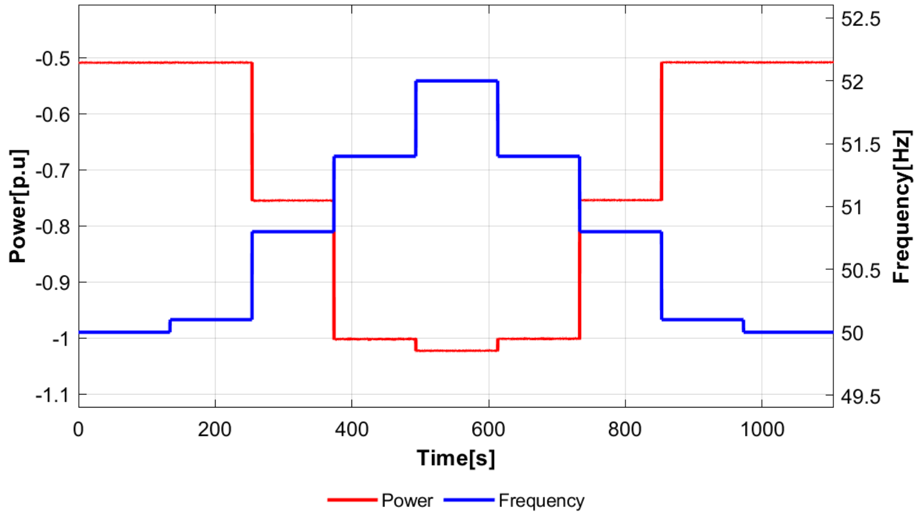
Note(s):

Parameter	Test No. 2 (For ESS)- **Setting (a)-50%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	52.05%	50.00	--	--	--	50%	2.05%	± 10%
50.10	52.02%	50.10	--	--	--	50%	2.02%	
50.80	27.00%	50.80	0.2	1.0	0.2	26%	1.00%	
51.40	1.99%	51.40	0.2	0.8	0.2	2%	-0.01%	
52.00	-22.85%	52.00	0.2	0.8	0.2	-22%	-0.85%	
51.40	2.00%	51.40	0.2	1.0	0.2	2%	0.00%	
50.80	26.97%	50.80	0.2	0.8	0.2	26%	0.97%	
50.10	51.96%	50.10	0.2	0.8	0.2	50%	1.96%	
50.00	51.96%	50.00	--	--	--	50%	1.96%	



Note(s):

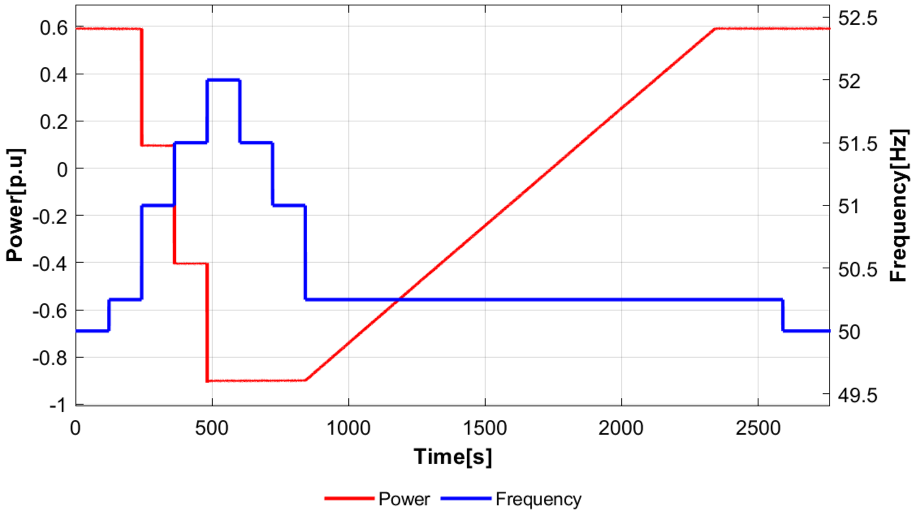
Parameter	Test No. 3 (For ESS)- **Setting (a)-(-50%) Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	-51.81%	50.00	--	--	--	-50%	-1.81%	± 10%
50.10	-51.79%	50.10	--	--	--	-50%	-1.79%	
50.80	-76.41%	50.80	0.2	1.0	0.2	-74%	-2.41%	
51.40	-101.03%	51.40	0.2	0.8	0.2	-98%	-3.03%	
52.00	-103.27%	52.00	0.2	1.0	0.2	-100%	-3.27%	
51.40	-101.16%	51.40	0.2	1.0	0.2	-98%	-3.16%	
50.80	-76.50%	50.80	0.2	0.6	0.2	-74%	-2.50%	
50.10	-51.89%	50.10	0.2	0.6	0.2	-50%	-1.89%	
50.00	-51.85%	50.00	--	--	--	-50%	-1.85%	



Note(s):

Parameter	Test No. 4 (For ESS)- **Setting (b)-60%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	59.10%	50.00	--	--	--	60%	-0.90%	± 10%
50.25	59.06%	50.25	--	--	--	60%	-0.94%	
51.00	9.36%	51.00	0.2	0.8	0.2	10%	-0.64%	
51.50	-40.35%	51.50	0.4	0.8	0.2	-40%	-0.35%	
52.00	-90.04%	52.00	0.2	0.8	0.2	-90%	-0.04%	
51.50	-90.08%	51.50	0.2	1.0	0.2	-90%	-0.08%	
51.00	-90.00%	51.00	0.2	0.8	0.2	-90%	0.00%	
50.25	59.16%	50.25	0.2	0.8	0.2	60%	-0.84%	
50.00	59.08%	50.00	--	--	0.2	60%	-0.92%	

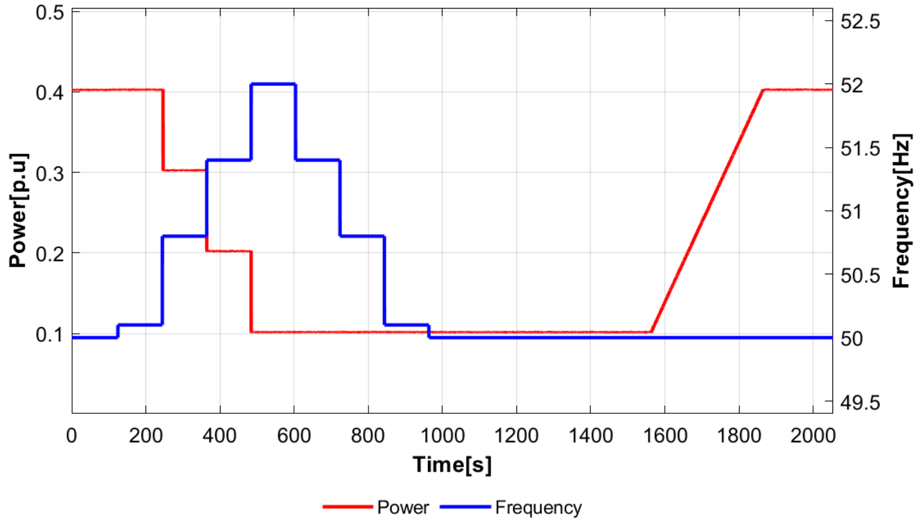
Test Condition	Measurement		Limitation	
	Power Gradient [%Pn/min]	Delay Time [s]	Power Gradient [%Pn/min]	Delay Time [s]
51.00-50.25	5.96	0.2	≤ 10%	≥1s



Note(s):

Parameter	Test No. 5 (For ESS)- **Setting (c)-40Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	41.42%	50.00	--	--	--	40%	1.42%	± 10%
50.10	41.43%	50.10	--	--	--	40%	1.43%	
50.80	30.63%	50.80	0.2	1.0	2.2	30%	0.63%	
51.40	20.21%	51.40	0.2	0.8	0.2	20%	0.21%	
52.00	9.80%	52.00	0.2	1.0	0.2	10%	-0.20%	
51.40	9.78%	51.40	--	--	--	10%	-0.22%	
50.80	9.78%	50.80	--	--	--	10%	-0.22%	
50.10	9.77%	50.10	--	--	--	10%	-0.23%	
50.00	41.45%	50.00	--	--	--	40%	1.45%	

Test Condition	Measurement		Limitation	
	Power Gradient [%Pn/min]	Delay Time [s]	Power Gradient [%Pn/min]	Delay Time [s]
50.10-50.00	9.68	620.2	≤ 10%	≥600s



Note(s):

5.4.3.3	**Power response to under-frequency**	P

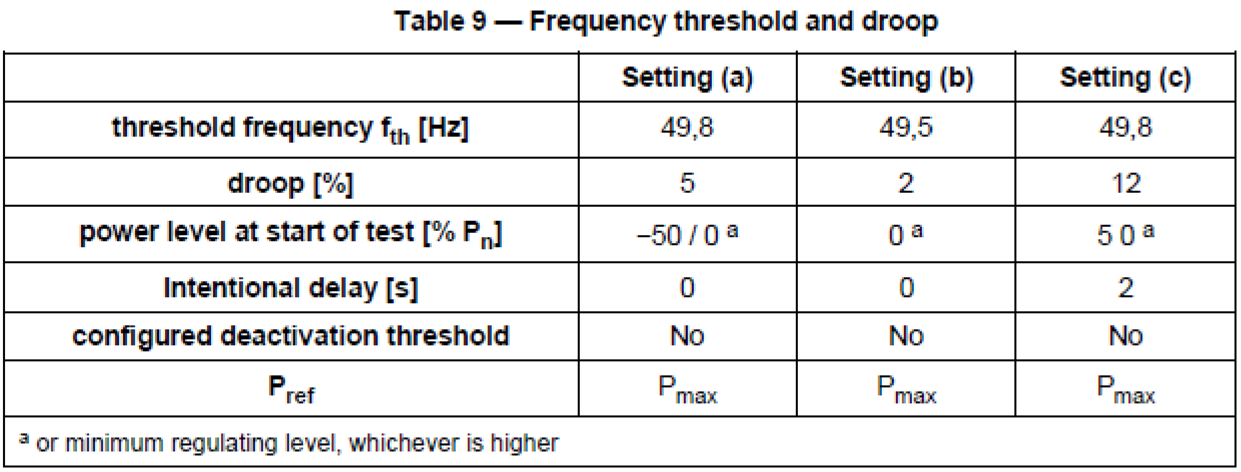
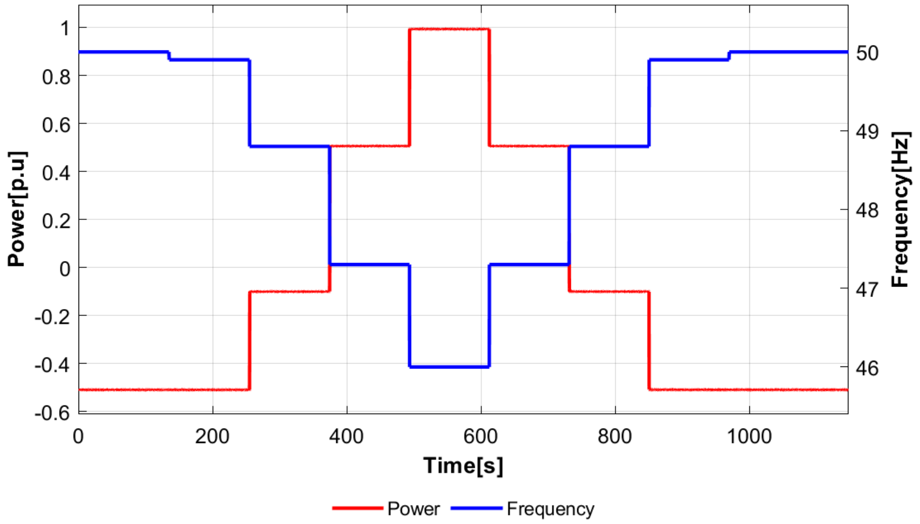


Table 9 — Frequency threshold and droop

	Setting (a)	**Setting (b)**	**Setting (c)**
threshold frequency f_{th} [Hz]	49,8	49,5	49,8
droop [%]	5	2	12
power level at start of test [% P_n]	−50 / 0 [a]	0 [a]	5 0 [a]
Intentional delay [s]	0	0	2
configured deactivation threshold	No	No	No
P_{ref}	P_{max}	P_{max}	P_{max}

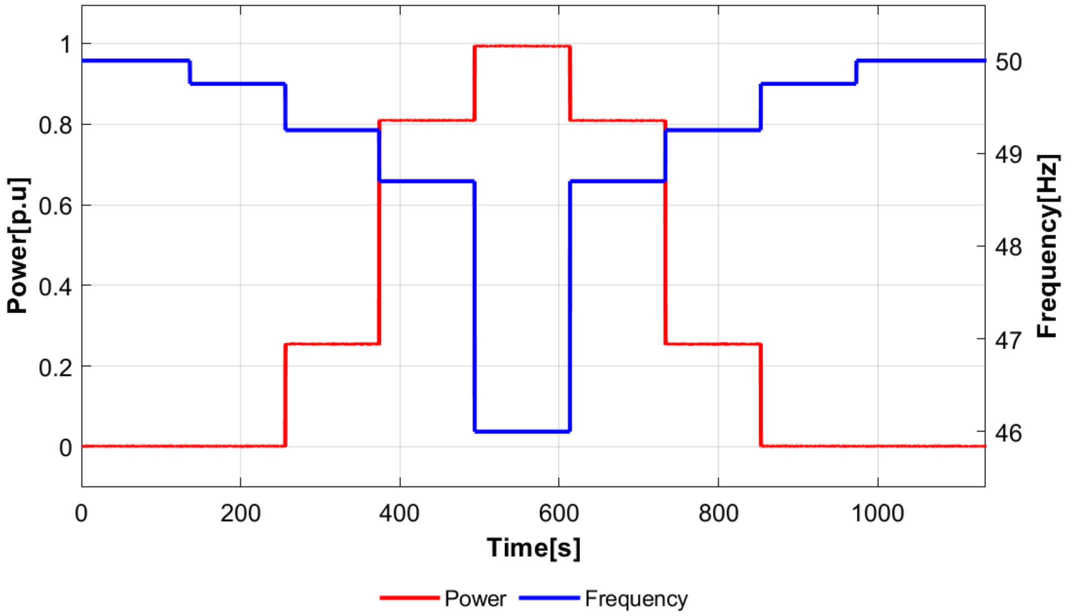
[a] or minimum regulating level, whichever is higher

P(f) curve setting: Available P adjust to follow droop during the over-frequency transient								
Parameter	Test No. 1 (For EES)- **Setting (a)-(-50%)Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	-49.48%	50.00	--	--	--	-50%	0.52%	± 10%
49.90	-49.53%	49.90	--	--	--	-50%	0.47%	
48.80	-10.07%	48.80	0.2	1.0	0.2	-10%	-0.07%	
47.30	49.64%	47.30	0.2	1.0	0.2	50%	-0.36%	
46.00	99.35%	46.00	0.2	1.0	0.2	100%	-0.65%	
47.30	49.69%	47.30	0.2	0.8	0.2	50%	-0.31%	
48.80	-10.10%	48.80	0.2	0.8	0.2	-10%	-0.10%	
49.90	-49.63%	49.90	0.2	0.8	0.2	-50%	0.37%	
50.00	-49.63%	50.00	--	--	--	-50%	0.37%	



Note(s):

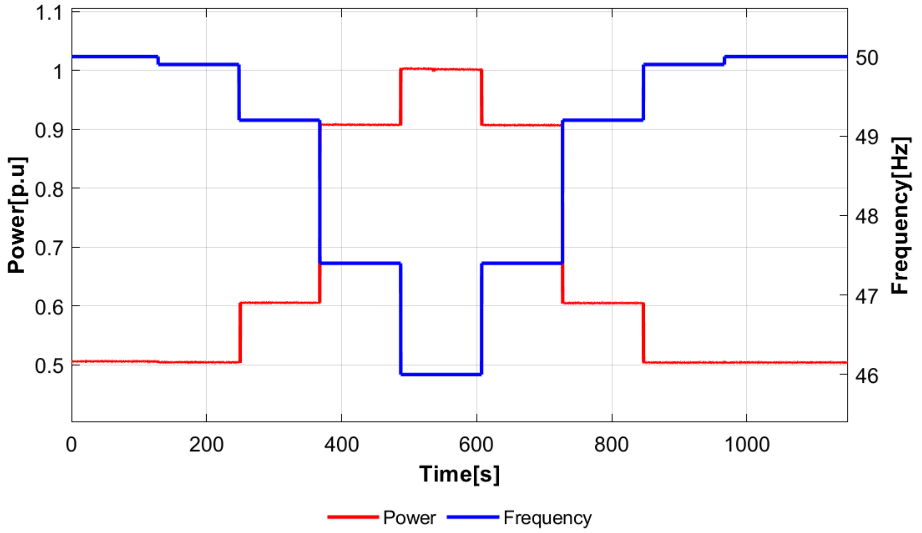
Parameter	Test No. 2 (For EES)- **Setting (b)-0%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	1.12%	50.00	--	--	--	0%	1.12%	± 10%
49.75	1.12%	49.75	--	--	--	0%	1.12%	
49.25	26.16%	49.25	0.2	2.0	0.2	25%	1.16%	
48.70	81.19%	48.70	0.2	1.0	0.2	80%	1.19%	
46.00	99.54%	46.00	0.2	1.0	0.2	100%	-0.46%	
48.70	81.42%	48.70	0.2	0.6	0.2	80%	1.42%	
49.25	26.21%	49.25	0.2	1.6	0.2	25%	1.21%	
49.75	1.11%	49.75	0.2	1.6	0.2	0%	1.11%	
50.00	1.11%	50.00	--	--	--	0%	1.11%	



Note(s):

P(f) curve setting for test: f1: 49.5Hz; fstop: 49.5Hz (Deactivated); Droop: 2% (100%Pref / Hz)

Parameter	Test No. 3 (For EES)- **Setting (c)-50%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	49.76%	50.00	--	--	--	50%	-0.24%	± 10%
49.90	49.76%	49.90	--	--	--	50%	-0.24%	
49.20	59.79%	49.20	0.2	1.0	2.2	60%	-0.21%	
47.40	90.00%	47.40	0.2	1.2	0.2	90%	0.00%	
46.00	99.58%	46.00	0.2	1.0	0.2	100%	-0.42%	
47.40	90.13%	47.40	0.2	1.2	0.2	90%	0.13%	
49.20	59.96%	49.20	0.2	1.2	0.2	60%	-0.04%	
49.90	49.87%	49.90	--	--	--	50%	-0.13%	
50.00	49.87%	50.00	--	--	--	50%	-0.13%	



Note(s):

5.5.1	**Q Capabilities (Power Factor)**	P

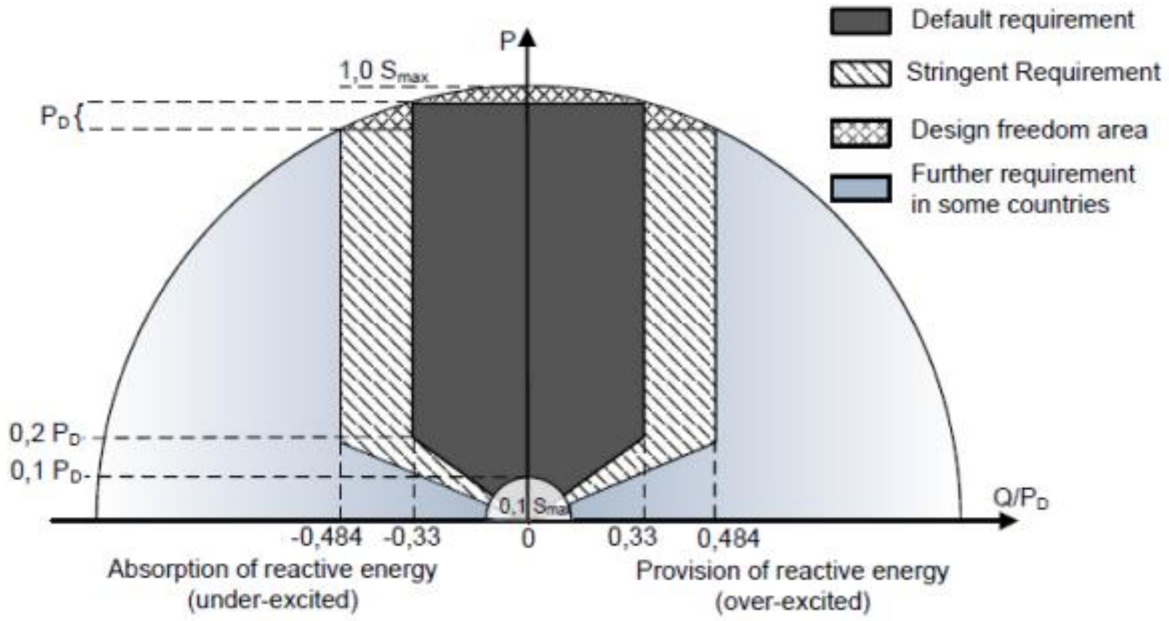
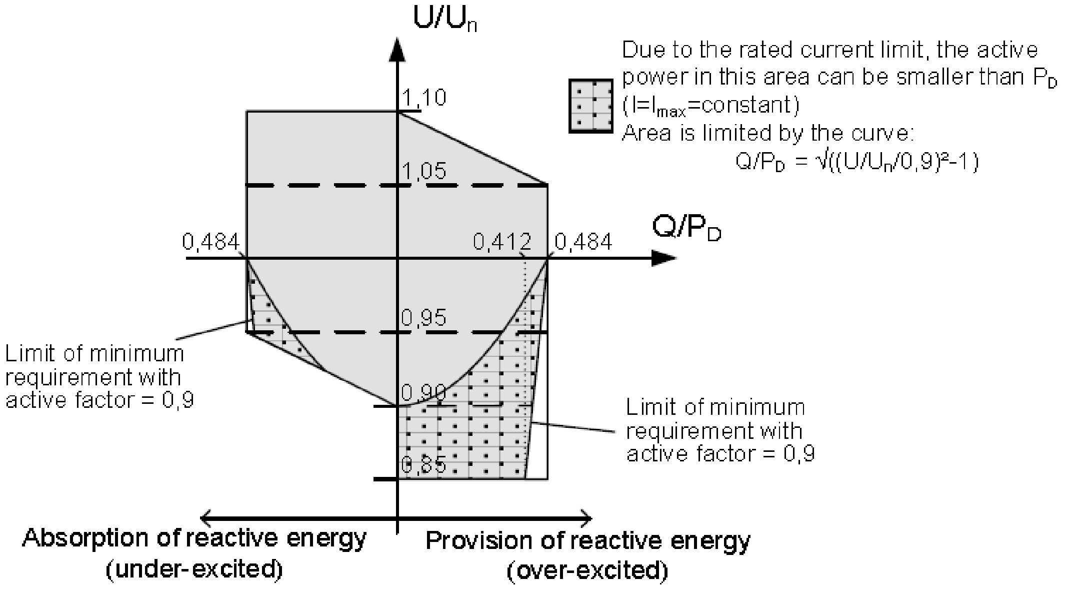

Default requirement
Stringent Requirement
Design freedom area
Further requirement in some countries
P
1,0 S_{max}
P_D
0,2 P_D
0,1 P_D
0,1 S_{max}
Q/P_D
-0,484
-0,33
0
0,33
0,484
Absorption of reactive energy (under-excited)
Provision of reactive energy (over-excited)

Figure 26 — reactive power capability at nominal voltage

Test Conditions		Measurements				Limit
P/Pn [%]	Q/Pn [%]	P/Pn [%]	Q/Pn [%]	cos(φ)	U/Un [%]	Q/Pn
0%	0	0.05	0.68	0.0724	99.95	--
10%		10.01	0.32	0.9994	99.97	≤ ±2%
20%		19.96	0.52	0.9996	99.98	
30%		29.90	0.13	1.0000	100.00	
40%		39.89	0.40	0.9999	100.03	
50%		49.87	0.07	1.0000	100.04	
60%		59.92	0.51	1.0000	100.07	
70%		69.92	0.09	1.0000	100.09	
80%		80.04	0.62	1.0000	100.11	
90%		90.12	0.25	1.0000	100.13	
100%		100.17	-0.46	1.0000	100.14	
0%	max. under-excited	0.13	0.54	0.2275	100.00	--
10%		10.67	-24.23	0.4031	100.00	≤-22.2%
20%		21.23	-47.58	0.4075	100.00	≤ -43.6%

30%		31.19	-50.11	0.5284	100.00	
40%		41.69	-49.03	0.6476	100.00	
50%		52.17	-49.55	0.7253	100.00	
60%		62.61	-50.24	0.7805	100.00	
70%		72.61	-50.69	0.8203	100.00	
80%		83.91	-50.56	0.8563	100.00	
90%		93.92	-50.61	0.8806	100.00	
Smax		102.73	-50.20	0.8987	100.00	
0%	max. over-excited	0.13	0.72	0.1757	99.99	--
10%		10.35	23.54	0.4025	100.01	≥+22.2%
20%		20.71	47.16	0.4020	100.04	≥+43.6%
30%		31.28	49.57	0.5336	100.06	
40%		41.37	50.00	0.6375	100.08	
50%		51.51	49.74	0.7194	100.10	
60%		62.09	49.76	0.7804	100.12	
70%		72.63	49.44	0.8267	100.14	
80%		83.19	49.82	0.8579	100.16	
90%		93.72	50.44	0.8806	100.18	
Smax		104.22	50.19	0.9010	100.20	

5.5.1.6	**Q(U) Capabilities**	P


U/Un
1,10
1,05
0,484
0,412
0,484
Q/PD
0,95
0,90
0,85
Due to the rated current limit, the active power in this area can be smaller than PD (I=Imax=constant)
Area is limited by the curve:
Q/PD = √((U/Un/0,9)²-1)
Limit of minimum requirement with active factor = 0,9
Limit of minimum requirement with active factor = 0,9
Absorption of reactive energy (under-excited)
Provision of reactive energy (over-excited)

Test Conditions		Measurements					Target value	Δ	Δ Limit
U/Un	Q/Pn [%]	P/Pn (%)	Q/Pn (%)	S/Sn (%)	I/In (%)	U/Un (%)	Q/Pn (%)	Δ Q/Pn (%)	Δ Q/Pn (%)
85%	0	104.82	-0.29	104.82	123.31	85.05	--	--	--
90%		104.72	-0.23	104.72	116.41	90.00	--	--	
95%		104.60	-0.13	104.60	110.15	95.00	--	--	
100%		104.46	-0.07	104.46	104.28	100.22	--	--	
105%		104.98	-0.01	104.98	100.03	104.98	--	--	
110%		104.73	0.09	104.73	95.08	110.19	--	--	
85%	max. under-excited	97.83	-47.13	108.59	127.97	85.18	--	--	--
90%		102.98	-50.01	114.48	127.64	90.05	--	--	
95%		102.89	-50.19	114.48	120.93	95.03	--	--	≤2
100%		102.99	-50.05	114.51	114.73	100.22	-48.4	-1.65	
105%		103.24	-49.98	114.71	109.74	104.99	-48.4	-1.58	
110%		103.07	-49.86	114.50	104.52	110.04	-48.4	-1.46	
85%	max. over-excited	103.69	50.21	115.21	135.53	85.04	41.2	9.01	≥-2
90%		106.27	50.18	117.52	130.50	90.09	43.6	6.58	
95%		106.30	50.30	117.60	123.78	95.04	46.0	4.30	

100%		103.72	50.05	115.17	114.96	100.22	48.4	1.65	
105%		105.39	50.42	116.83	111.30	105.00	48.4	2.02	
110%		105.15	50.49	116.64	106.08	109.99	--	--	--

Note(s):

The limitation capacity of reactive power shall be met to Figure 13 or better.

5.5.2	**TABLE: Voltage support by reactive power- test to determine the reactive power control modes**	P
5.5.2.3	**TABLE: Verification procedure for Set point control**	

Test no.1: Test for reactive power set point control accuracy

P=50%Pn

Reactive power step Q/Pn (pu)	Voltage	Set point Value	Measured Value	Deviation	Δ Limit
	p.u.	Q/Pn p.u.	Q/Pn p.u.	Q/Pn p.u.	
Q=0	100.11%	0	-0.09%	-0.09%	±2%Smax
$Q_{max,oe}$	100.12%	24.2%	24.40%	0.20%	
$Q_{max,ue}$	100.11%	-24.2%	-24.13%	0.07%	

Test no.2: Test for dynamic response

Tau= shortest time constant (not longer than 3s) 3s

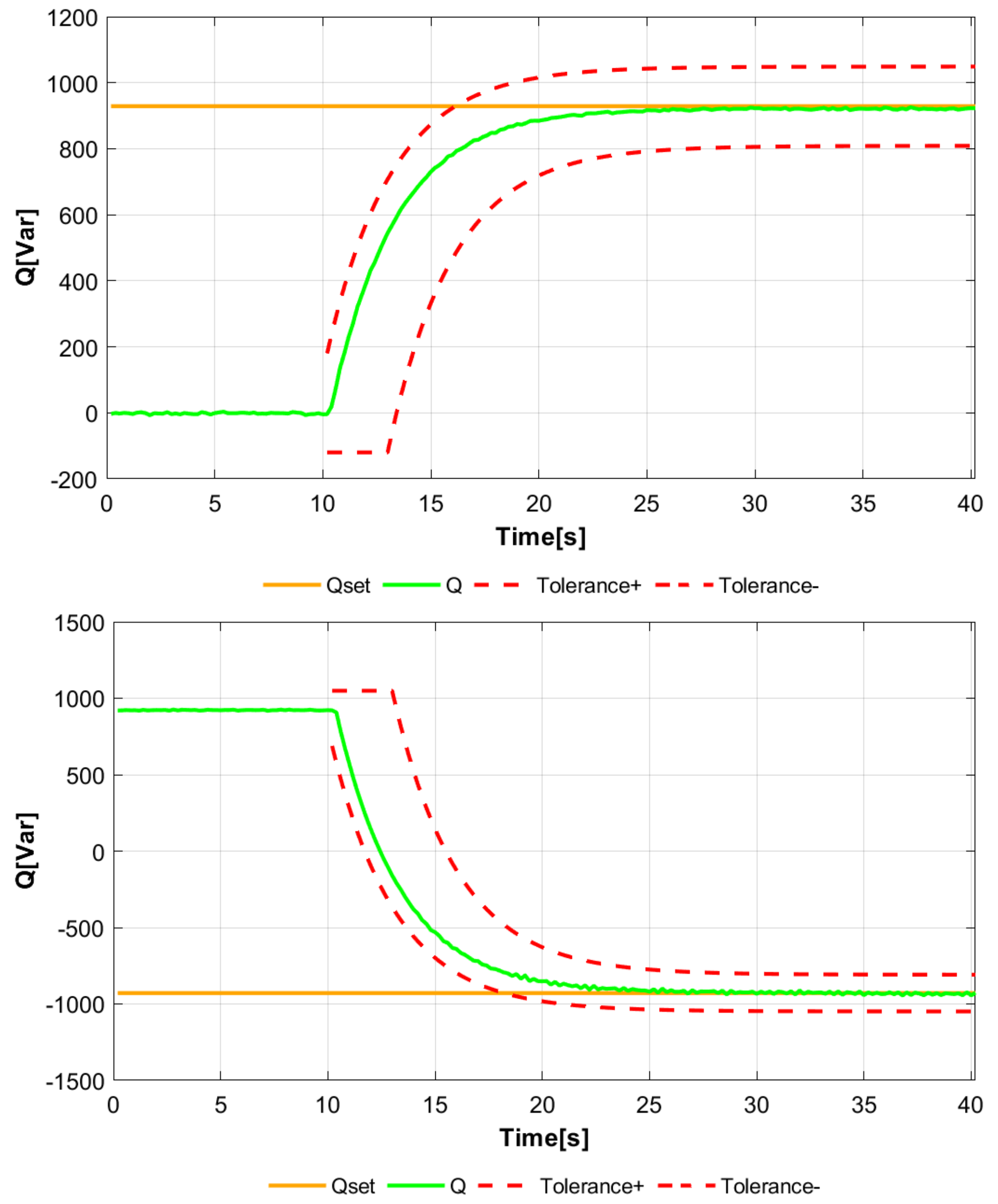
Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time / settling time
Q=0 → $Q_{max,oe}$	9s	--	6.4s
$Q_{max,oe}$ → $Q_{max,ue}$	9s	--	8.4s
$Q_{max,ue}$ → Q=0	9s	--	6.2s

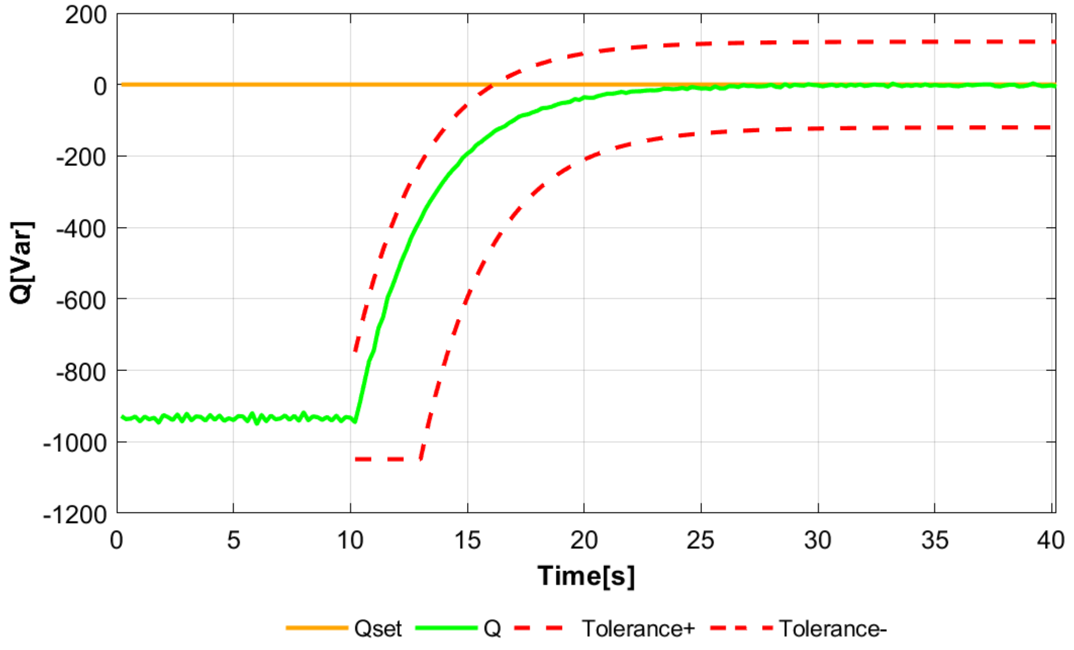
Tau= longest time (if longest time>60s, then test 60s) 60s

Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time / settling time
Q=0 → $Q_{max,oe}$	180s	--	103.4s
$Q_{max,oe}$ → $Q_{max,ue}$	180s	--	136.8s
$Q_{max,ue}$ → Q=0	180s	--	108.4s

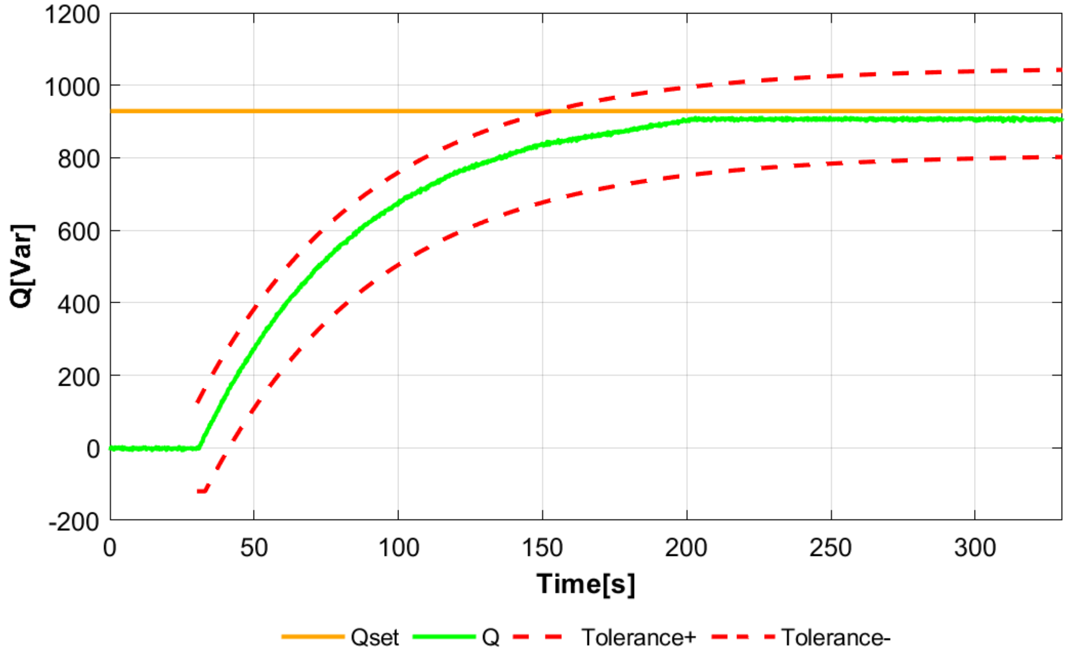
Diagram:

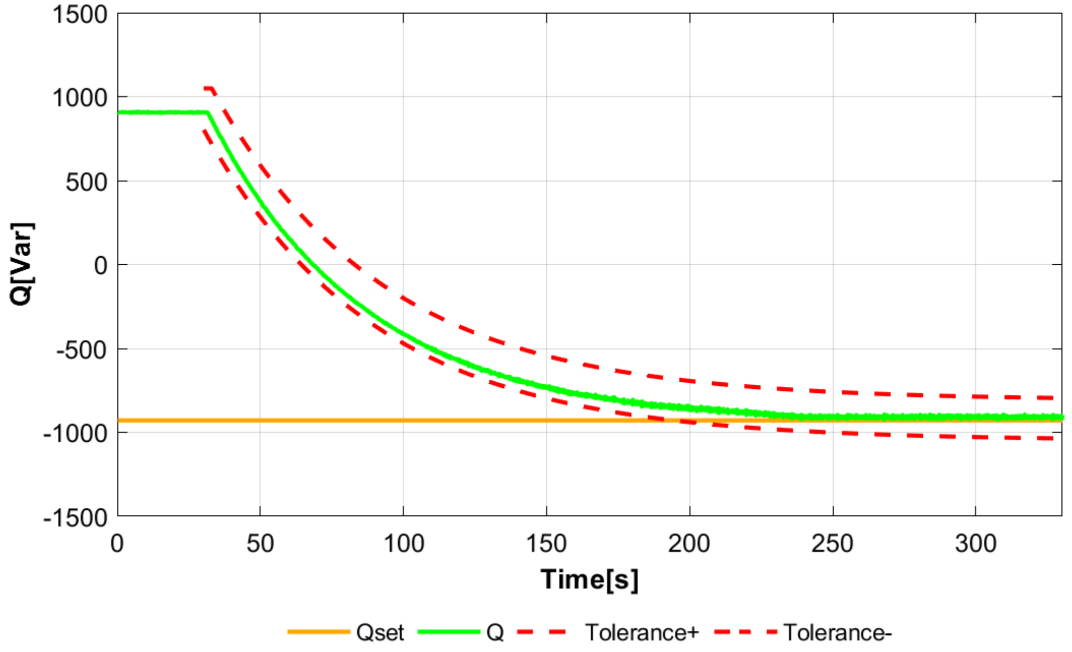
Tau= 3s

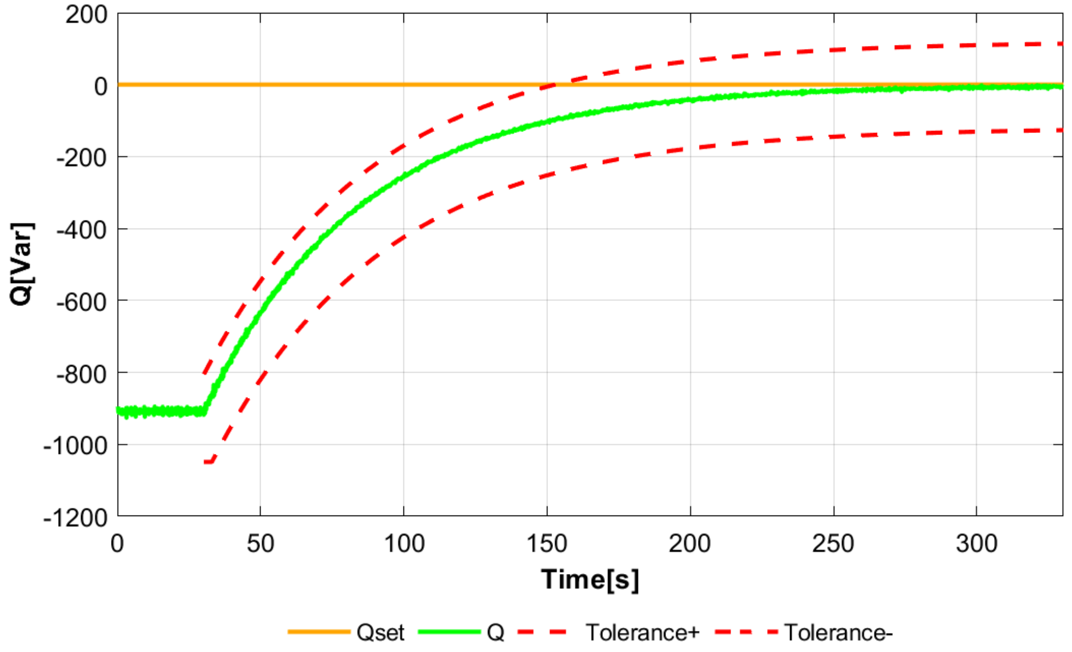

Q[Var]
1200
1000
800
600
400
200
0
-200
0
5
10
15
20
25
30
35
40
Time[s]
Qset
Q
Tolerance+
Tolerance-
Q[Var]
1500
1000
500
0
-500
-1000
-1500
0
5
10
15
20
25
30
35
40
Time[s]
Qset
Q
Tolerance+
Tolerance-


Q[Var]
200
0
-200
-400
-600
-800
-1000
-1200
0
5
10
15
20
25
30
35
40
Time[s]
Qset
Q
Tolerance+
Tolerance-

Tau= 60s

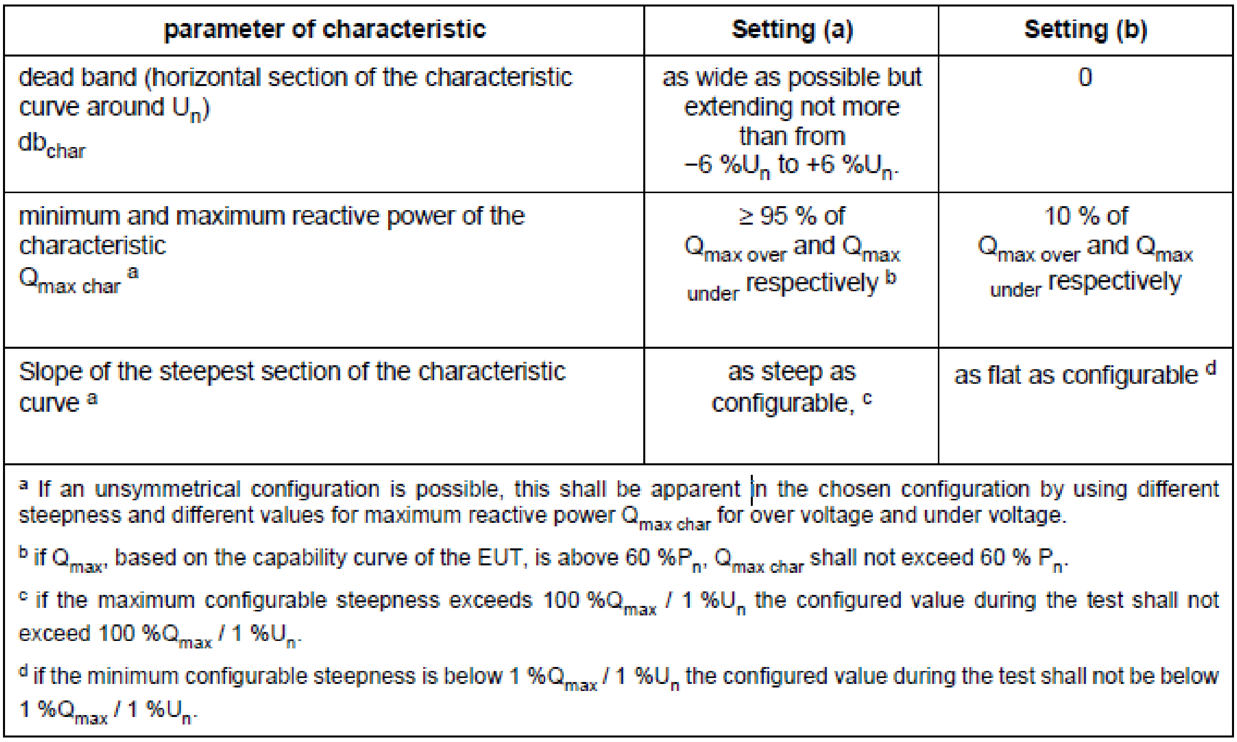

Q[Var]
1200
1000
800
600
400
200
0
-200
0
50
100
150
200
250
300
Time[s]
Qset
Q
Tolerance+
Tolerance-


1500
1000
500
0
-500
-1000
-1500
Q[Var]
0
50
100
150
200
250
300
Time[s]
Qset
Q
Tolerance+
Tolerance-


200
0
-200
-400
-600
-800
-1000
-1200
Q[Var]
0
50
100
150
200
250
300
Time[s]
Qset
Q
Tolerance+
Tolerance-

5.5.2.4.2	**TABLE: Test procedure for steady-state behaviour**	P

Table 17 — Q(U) characteristic configuration



parameter of characteristic	Setting (a)	Setting (b)
dead band (horizontal section of the characteristic curve around U_n) db_{char}	as wide as possible but extending not more than from $-6\ \%U_n$ to $+6\ \%U_n$.	0
minimum and maximum reactive power of the characteristic $Q_{max\ char}$ [a]	≥ 95 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively [b]	10 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively
Slope of the steepest section of the characteristic curve [a]	as steep as configurable, [c]	as flat as configurable [d]

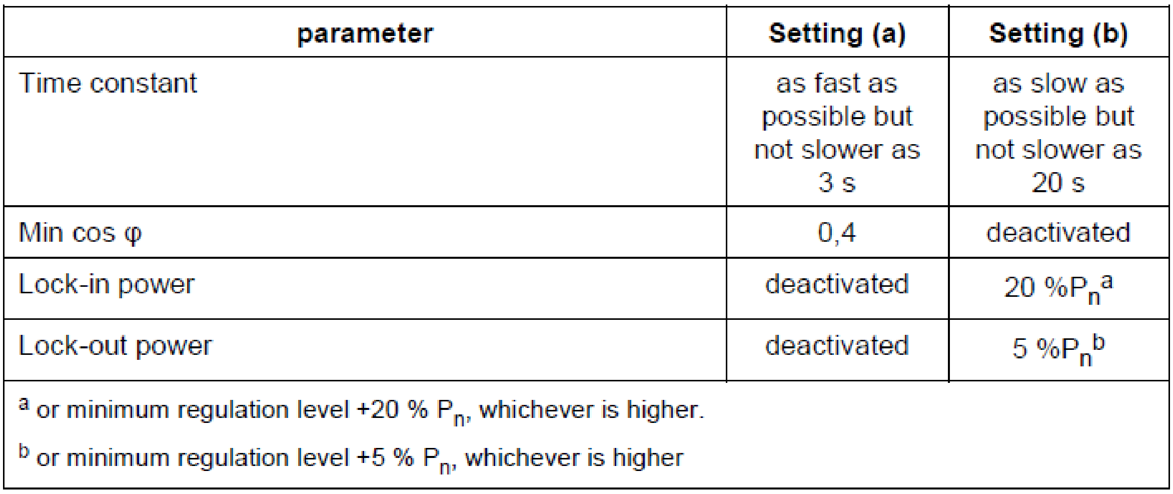
[a] If an unsymmetrical configuration is possible, this shall be apparent in the chosen configuration by using different steepness and different values for maximum reactive power $Q_{max\ char}$ for over voltage and under voltage.

[b] if Q_{max}, based on the capability curve of the EUT, is above 60 $\%P_n$, $Q_{max\ char}$ shall not exceed 60 % P_n.

[c] if the maximum configurable steepness exceeds 100 $\%Q_{max}$ / 1 $\%U_n$ the configured value during the test shall not exceed 100 $\%Q_{max}$ / 1 $\%U_n$.

[d] if the minimum configurable steepness is below 1 $\%Q_{max}$ / 1 $\%U_n$ the configured value during the test shall not be below 1 $\%Q_{max}$ / 1 $\%U_n$.

Table 18 — Q(U) additional parameter configuration



parameter	Setting (a)	Setting (b)
Time constant	as fast as possible but not slower as 3 s	as slow as possible but not slower as 20 s
Min cos φ	0,4	deactivated
Lock-in power	deactivated	20 $\%P_n$[a]
Lock-out power	deactivated	5 $\%P_n$[b]

[a] or minimum regulation level +20 % P_n, whichever is higher.

[b] or minimum regulation level +5 % P_n, whichever is higher

Test procedure for accuracy-**Setting (a)**					
Q(U) curve settings:	Set points	X1	X2	X3	X4
	U/Un	93%	94%	106%	108%
	Q/Qmax	100%	0	0	-100%

Test Conditions		Measurements			Target vlaue	Δ	Δ Limits	
U/Un	P/Pn	Q/Pn	U/Un	Cosφ	Q/Pn*	ΔQ/ Smax	ΔQ/ Smax	Cosφ
100%	100%	-0.07%	100.08%	1.0000	0.00%	-0.07%	≤ ±2 Smax%	≥0.4
103%	100%	-0.04%	103.08%	1.0000	0.00%	-0.04%		
105%	100%	-0.01%	105.08%	1.0000	0.00%	-0.01%		
107%	100%	-23.67%	106.51%	0.9727	-24.22%	0.55%		
108%	100%	-47.93%	108.07%	0.8990	-48.44%	0.51%		
111%	100%	-47.84%	111.07%	0.8986	-48.44%	0.60%		
114%	100%	-47.78%	114.07%	0.8989	-48.44%	0.66%		
115%	100%	-47.75%	115.07%	0.8991	-48.44%	0.69%		
114%	100%	-47.78%	114.07%	0.8989	-48.44%	0.66%		
111%	100%	-47.84%	111.07%	0.8986	-48.44%	0.60%		
108%	100%	-47.93%	108.07%	0.8991	-48.44%	0.51%		
107%	100%	-23.51%	106.51%	0.9731	-24.22%	0.71%		
105%	100%	-0.01%	105.08%	1.0000	0.00%	-0.01%		
103%	100%	-0.05%	103.08%	1.0000	0.00%	-0.05%		
100%	100%	-0.08%	100.09%	1.0000	0.00%	-0.08%		
97%	100%	-0.11%	97.09%	1.0000	0.00%	-0.11%		
94%	100%	-0.16%	94.09%	1.0000	0.00%	-0.16%		
93%	100%	47.87%	92.36%	0.9038	48.44%	-0.57%		
90%	100%	47.82%	90.10%	0.9039	48.44%	-0.62%		
87%	100%	47.78%	87.11%	0.9041	48.44%	-0.66%		
85%	100%	47.75%	85.11%	0.9041	48.44%	-0.69%		
87%	100%	47.77%	87.11%	0.9041	48.44%	-0.67%		
90%	100%	47.82%	90.10%	0.9039	48.44%	-0.62%		
93%	100%	47.85%	92.36%	0.9038	48.44%	-0.59%		
94%	100%	-0.15%	94.09%	1.0000	0.00%	-0.15%		
97%	100%	-0.11%	97.09%	1.0000	0.00%	-0.11%		
100%	100%	-0.07%	100.09%	1.0000	0.00%	-0.07%		
100%	20%	0.51%	100.01%	0.9997	0.00%	0.51%		

103%	20%	0.56%	103.01%	0.9996	0.00%	0.56%		
105%	20%	0.60%	105.01%	0.9995	0.00%	0.60%		
107%	20%	-25.84%	107.01%	0.5918	-24.22%	-1.62%		
108%	20%	-41.42%	108.00%	0.4069	-48.44%	7.02%*		
111%	20%	-41.37%	111.00%	0.4062	-48.44%	7.07%*		
114%	20%	-41.31%	114.00%	0.4012	-48.44%	7.13%*		
115%	20%	-41.29%	115.00%	0.4015	-48.44%	7.15%*		
114%	20%	-41.31%	114.00%	0.4011	-48.44%	7.13%*		
111%	20%	-41.37%	111.00%	0.4062	-48.44%	7.07%*		
108%	20%	-41.43%	108.00%	0.4069	-48.44%	7.01%*		
107%	20%	-25.83%	107.01%	0.5921	-24.22%	-1.61%		
105%	20%	0.59%	105.01%	0.9996	0.00%	0.59%		
103%	20%	0.55%	103.01%	0.9996	0.00%	0.55%		
100%	20%	0.52%	100.01%	0.9996	0.00%	0.52%		
97%	20%	0.47%	97.00%	0.9997	0.00%	0.47%		
94%	20%	0.42%	94.01%	0.9998	0.00%	0.42%		
93%	20%	42.07%	92.84%	0.4487	48.44%	-6.37%*		
90%	20%	42.03%	90.02%	0.4492	48.44%	-6.41%*		
87%	20%	42.00%	87.02%	0.4496	48.44%	-6.44%*		
85%	20%	41.98%	85.02%	0.4498	48.44%	-6.46%*		
87%	20%	42.01%	87.02%	0.4496	48.44%	-6.43%*		
90%	20%	42.04%	90.02%	0.4492	48.44%	-6.40%*		
93%	20%	42.08%	92.84%	0.4487	48.44%	-6.36%*		
94%	20%	0.43%	94.01%	0.9998	0.00%	0.43%		
97%	20%	0.47%	97.01%	0.9997	0.00%	0.47%		
100%	20%	0.51%	100.01%	0.9997	0.00%	0.51%		

Note(s):

Time constant: as fast as possible but not slower as 3 s.

Min cos φ: 0.4

P lock-in: deactivated; P lock-out: deactivated.

*: The accuracy exceeding 2% Smax is due to prioritizing the requirement of Min cos φ: 0.4.

Test procedure for accuracy-**Setting (b)**

cQ(U) curve settings:	Set points	X1	X2	X3
	U/Un	90%	100%	110%
	Q/Qmax	10%	0%	-10%

Test Conditions		Measurements		Target vlaue	Δ	Δ Limits
U/Un	P/Pn	Q/Pn	U/Un	Q/Pn*	ΔQ/ Smax	ΔQ/ Smax
100%	100%	-0.36%	100.08%	0.00%	-0.36%	≤ ±2 Smax%
103%	100%	-1.78%	103.08%	-1.46%	-0.32%	
106%	100%	-3.05%	106.08%	-2.91%	-0.14%	
109%	100%	-4.49%	109.08%	-4.38%	-0.11%	
112%	100%	-4.56%	112.07%	-4.84%	0.28%	
115%	100%	-4.52%	115.07%	-4.84%	0.32%	
112%	100%	-4.57%	112.07%	-4.84%	0.27%	
109%	100%	-4.64%	109.08%	-4.36%	-0.28%	
106%	100%	-3.19%	106.08%	-2.91%	-0.28%	
103%	100%	-1.77%	103.08%	-1.46%	-0.31%	
100%	100%	-0.36%	100.09%	0.00%	-0.36%	
97%	100%	-0.11%	97.09%	1.46%	-1.57%	
94%	100%	2.44%	94.19%	2.91%	-0.47%	
91%	100%	2.59%	91.09%	4.36%	-1.77%	
88%	100%	4.45%	88.10%	4.84%	-0.39%	
85%	100%	4.41%	85.10%	4.84%	-0.43%	
88%	100%	4.45%	88.10%	4.84%	-0.39%	
91%	100%	2.60%	91.09%	4.36%	-1.76%	
94%	100%	2.44%	94.19%	2.91%	-0.47%	
97%	100%	-0.10%	97.09%	1.46%	-1.56%	
100%	100%	-0.35%	100.08%	0.00%	-0.35%	
100%	20%	0.46%	100.01%	0.00%	0.46%	
103%	20%	-0.91%	103.01%	-1.46%	0.55%	
106%	20%	-2.34%	106.01%	-2.91%	0.57%	
109%	20%	-3.67%	109.01%	-4.36%	0.69%	
112%	20%	-4.03%	112.01%	-4.84%	0.81%	

115%	20%	-3.98%	115.01%	-4.84%	0.86%	
112%	20%	-4.03%	112.01%	-4.84%	0.81%	
109%	20%	-3.81%	109.01%	-4.36%	0.55%	
106%	20%	-2.47%	106.01%	-2.91%	0.44%	
103%	20%	-0.98%	103.01%	-1.46%	0.48%	
100%	20%	0.46%	100.01%	0.00%	0.46%	
97%	20%	0.48%	97.01%	1.46%	-0.98%	
94%	20%	3.21%	94.10%	2.91%	0.30%	
91%	20%	3.82%	91.01%	4.36%	-0.54%	
88%	20%	5.09%	88.01%	4.84%	0.25%	
85%	20%	5.05%	85.01%	4.84%	0.21%	
88%	20%	5.09%	88.01%	4.84%	0.25%	
91%	20%	3.91%	91.01%	4.36%	-0.45%	
94%	20%	3.23%	94.10%	2.91%	0.32%	
97%	20%	0.48%	97.01%	1.46%	-0.98%	
100%	20%	0.46%	100.01%	0.11%	0.35%	

Note(s):

Time constant: as slow as possible but not slower as 20 s.

P lock-in: 20%Pn; P lock-out: 5%Pn.

5.5.2.4.3	**Test procedure for dynamic behaviour**	P

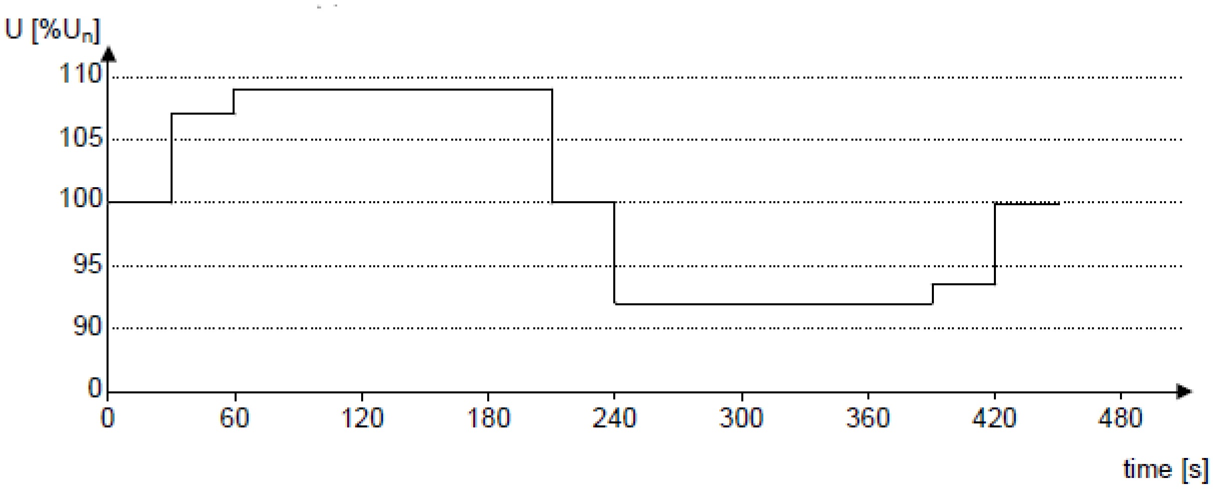


Figure 34 — Example voltage profile for setting (a) applied for the test of the dynamic behaviour of the Q(U), assuming < 30 s for stabilization of P and Q

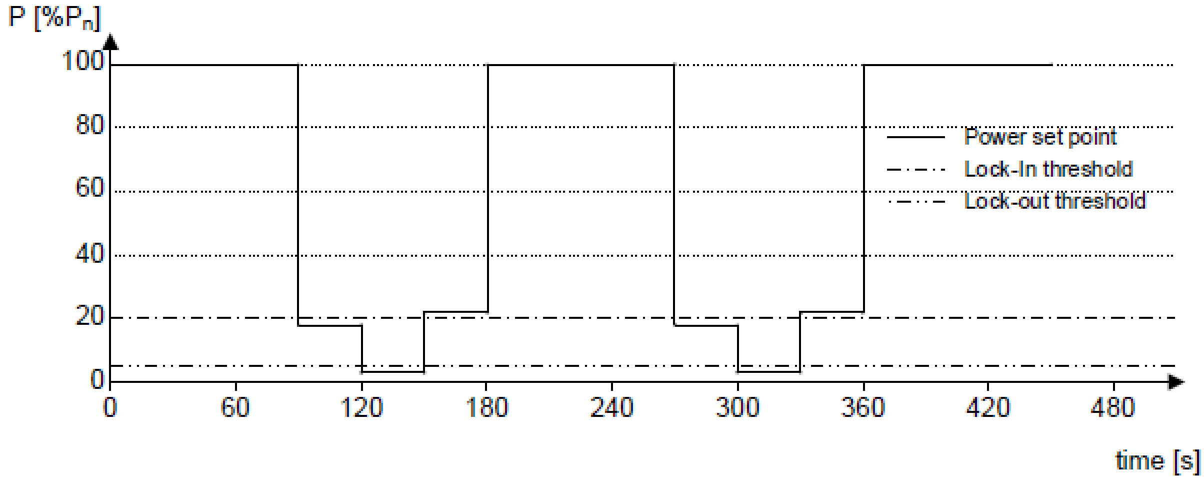


Figure 35 — Example active power set point profile for setting (a) applied for the test of the dynamic behaviour of the Q(U) control, assuming < 30 s for stabilization of P and Q

Q(U) curve settings:	Set points	X1	X2	X3	X4
	U/Un	93%	94%	106%	108%
	Q/Qmax	100%	0	0	-100%
	Tau	3s			

Test Conditions		Measurements			Deviation	Target vlaue	Compliance to the PT-1 curve?	Δ Limits
U/Un	P/Pn	Q/Pn	P/Pn	U/Un	ΔQ/Pn	Q/Pn*	Yes/No	ΔQ/Pn

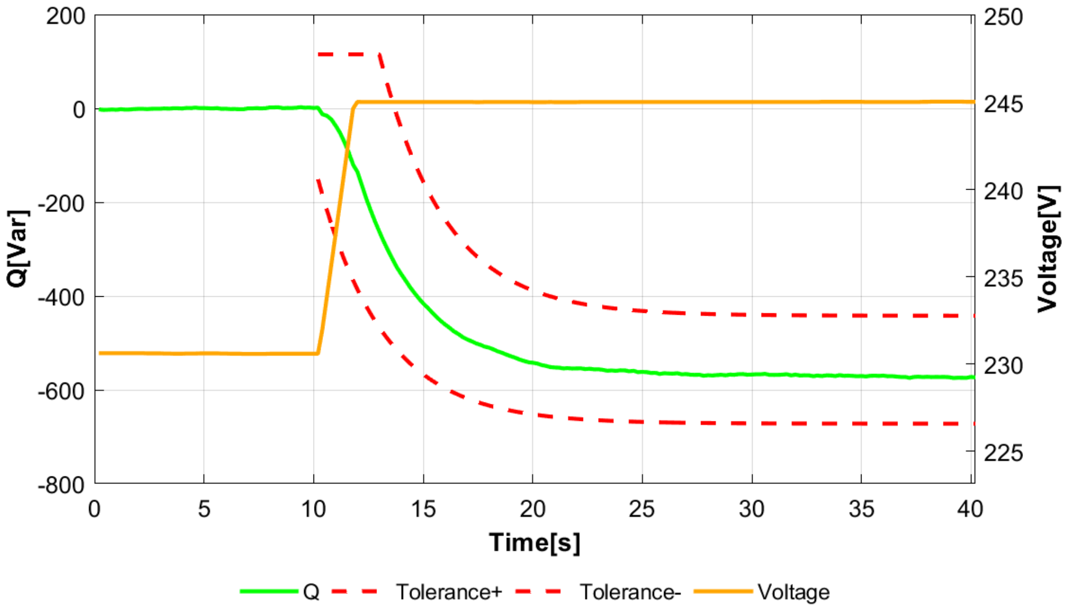
100%	100%	-0.01%	104.20%	100.26%	-0.01%	0.00%	N/A	⩽ ±5%
107%	100%	-24.96%	103.06%	106.54%	-0.74%	-24.22%	Yes	
109%	100%	-51.39%	102.08%	109.22%	-2.95%	-48.44%	Yes	
109%	18%	-46.18%	18.96%	109.03%	2.26%	-48.44%	N/A	
109%	3%	0.89%	3.24%	109.00%	0.89%	0.00%	Yes	
109%	22%	-51.11%	37.10%	109.07%	-2.67%	-48.44%	Yes	
109%	100%	-51.40%	102.08%	109.21%	-2.96%	-48.44%	N/A	
100%	100%	-0.02%	104.16%	100.24%	-0.02%	0.00%	Yes	
92%	100%	51.52%	104.75%	92.23%	3.08%	48.44%	Yes	
92%	18%	51.39%	20.99%	92.05%	2.95%	48.44%	N/A	
92%	3%	0.62%	3.28%	92.00%	0.62%	0.00%	Yes	
92%	22%	51.28%	25.27%	92.06%	2.84%	48.44%	Yes	
92%	100%	51.52%	105.84%	92.24%	3.08%	48.44%	N/A	
93%	100%	51.10%	105.78%	92.41%	2.66%	48.44%	N/A	
100%	100%	0.02%	104.07%	100.20%	0.02%	0.00%	Yes	

Note(s):

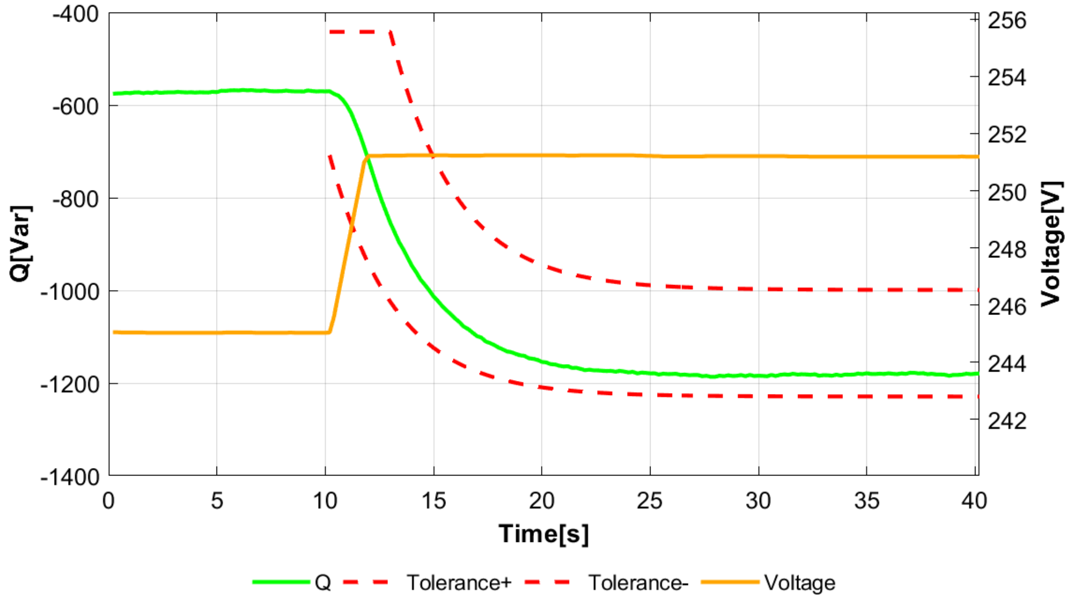
P lock-in: 20%Pn; P lock-out: 5%Pn.

Diagram:

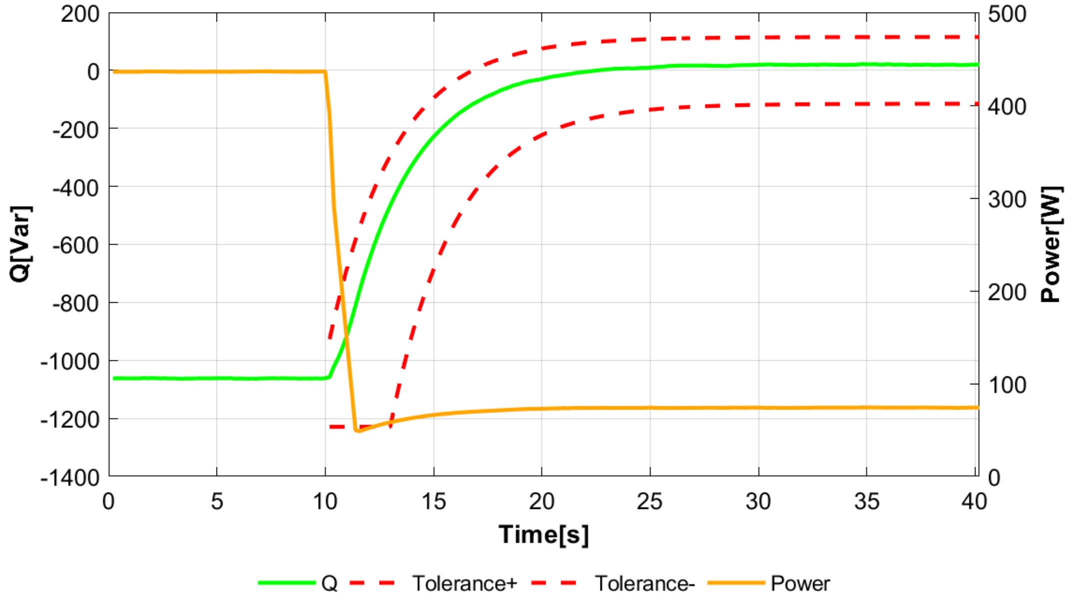
U/Un: 100%-107%



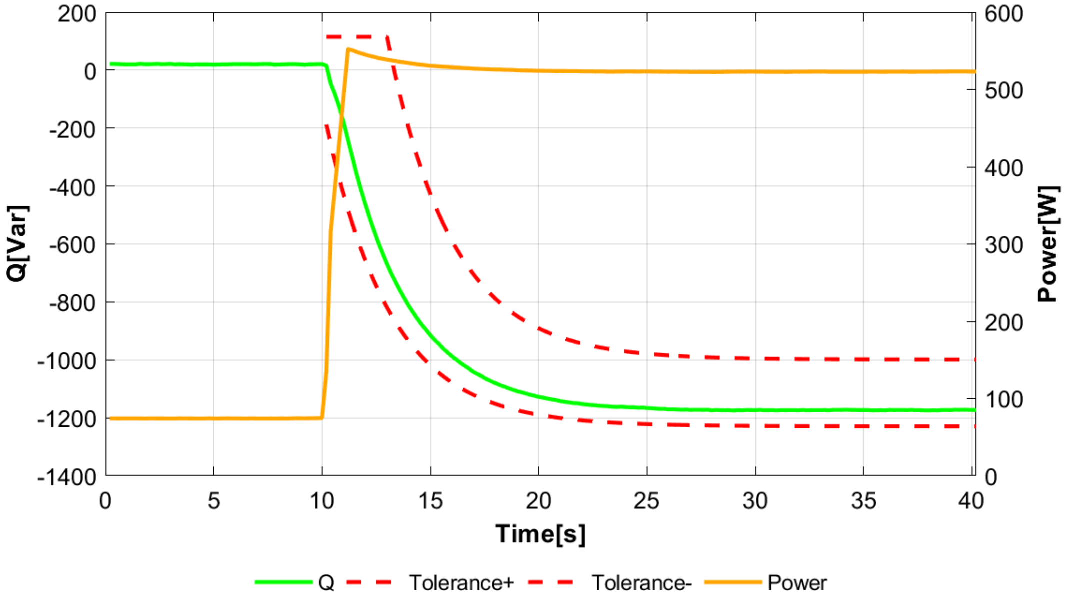
U/Un: 107%-109%



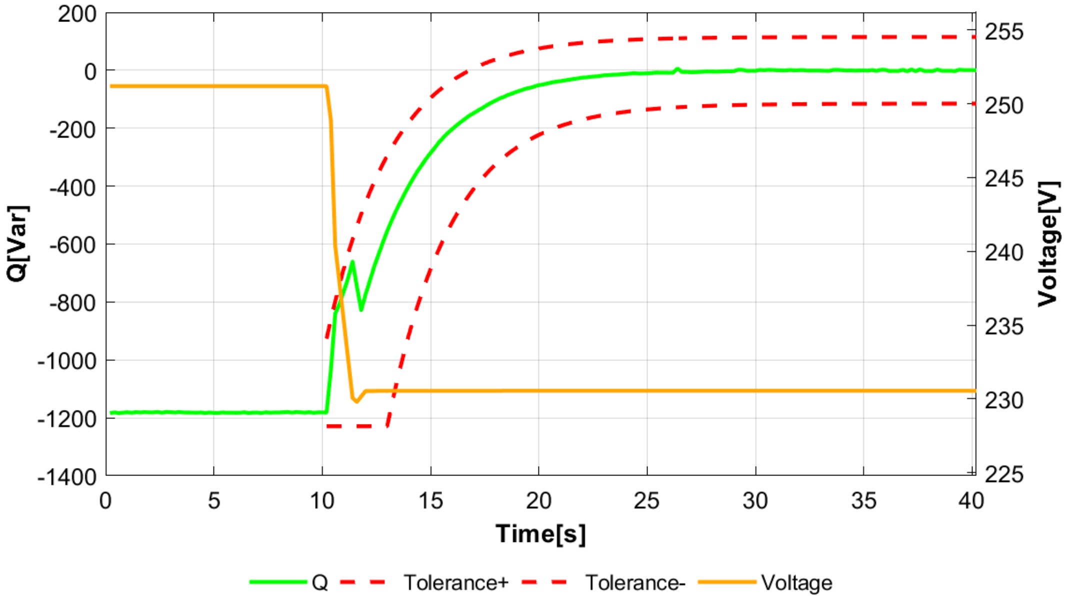
P/Pn:18%-3%



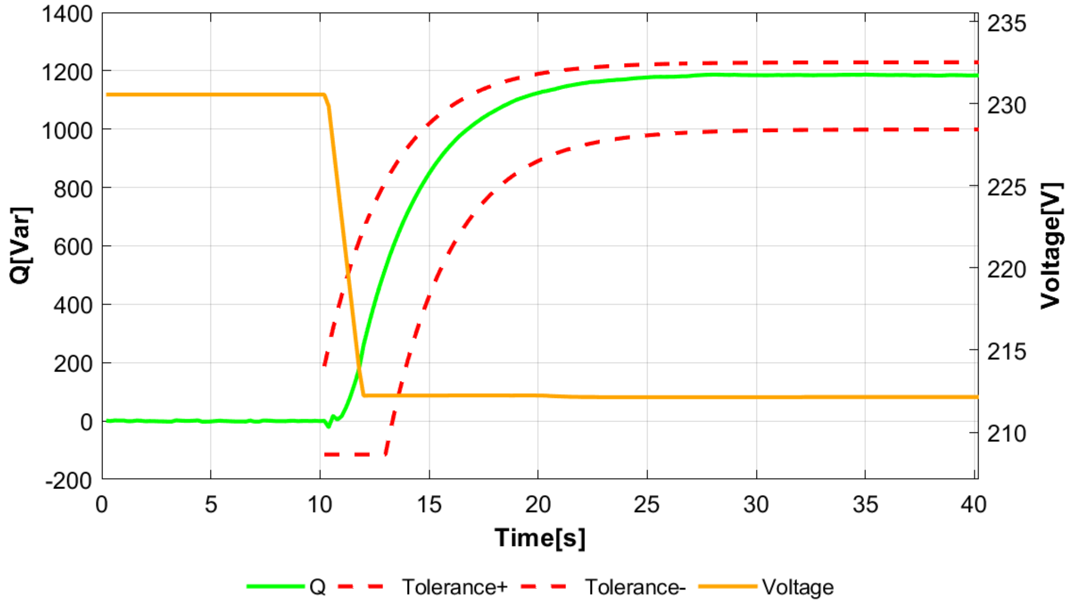
P/Pn:3%-22%



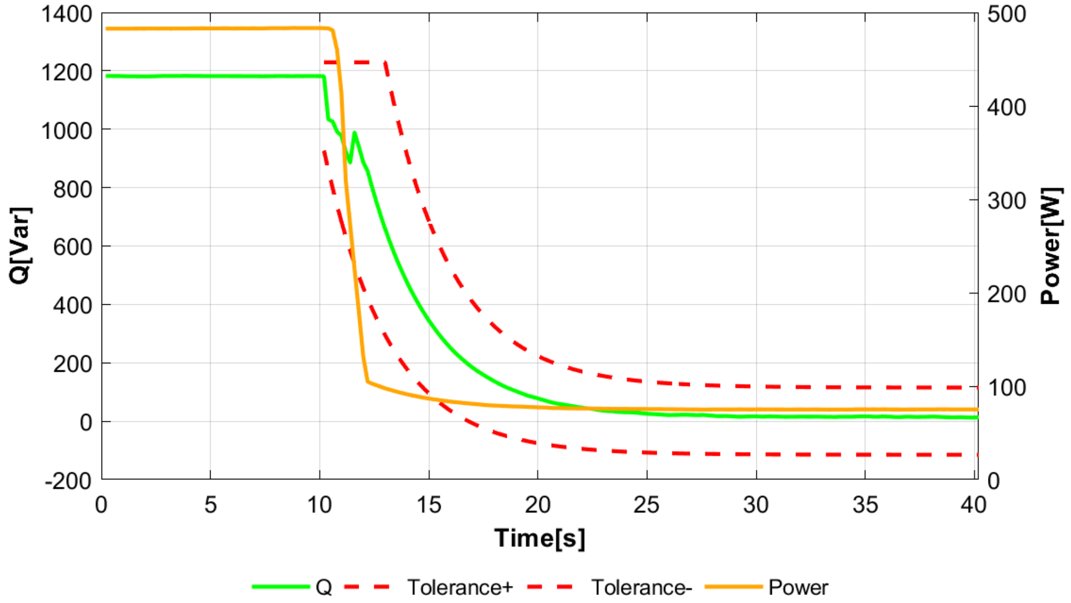
U/Un: 109%-100%



U/Un: 100%-92%



P/Pn:18%-3%



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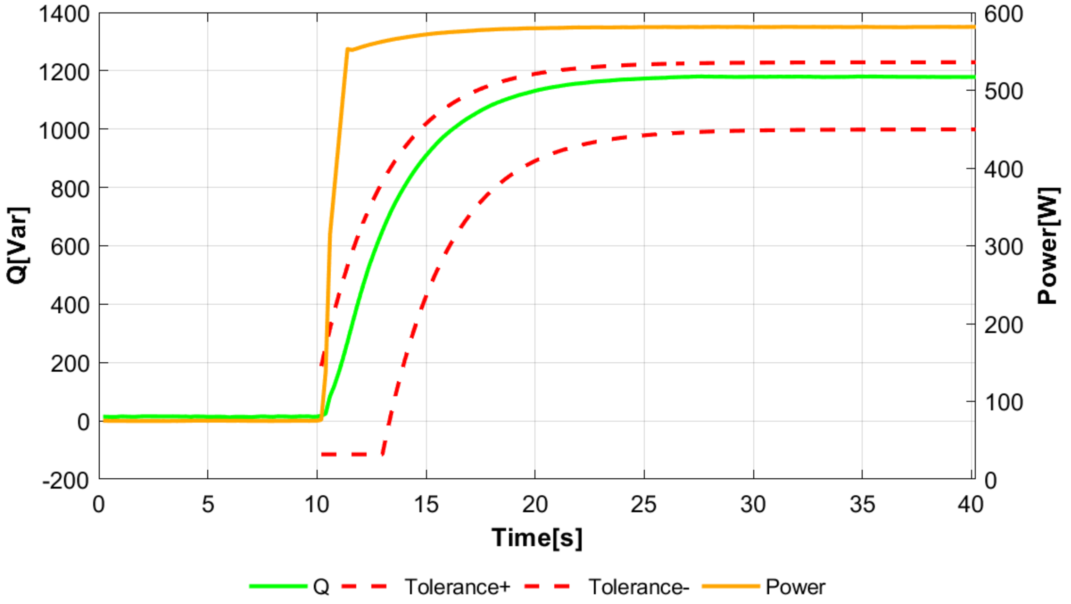
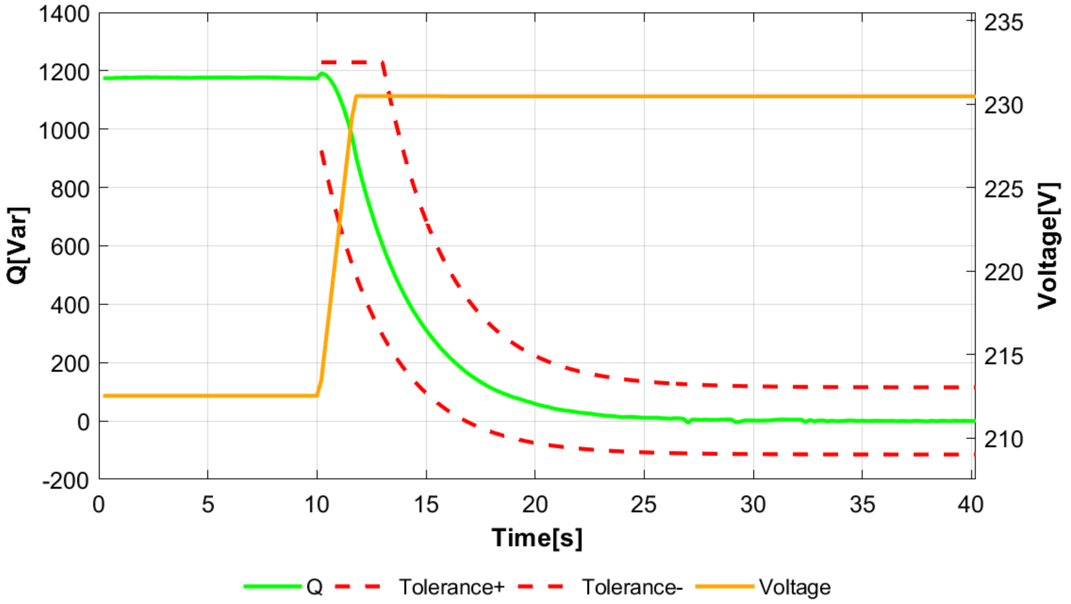
P/Pn:3%-22%



U/Un: 93%-100%



5.5.2.5	**Verification procedure for power related control modes for reactive power**	P

Table 19 — Q (P) or cos φ (P) characteristic configuration

parameter of characteristic	Setting (a)	Setting (b)	Setting (c)
minimum and maximum reactive power (Cos Φ[b]) of the characteristic $Q_{max\ char}$[a]	≥ 95 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively but not more than 60 % P_n	10 % of $Q_{max\ over}$ and $Q_{max\ under}$ respectively	$Q_{max\ char\ over}$ = 0 %P_n $Q_{max\ char\ over}$ = 33 %P_n
Slope of the steepest section of the characteristic curve[a]	as steep as configurable, but not more than 200 %Q_{max} / 10 %P_n	as flat as configurable, but not less than 2 %Q_{max} / 10 %P_n	0 below 50 %$P_{n;}$ 20 %Q_{max}/10 %P_n above 50 %P_n
Time constant	as fast as possible but not slower as 3 s	as slow as possible but not slower as 20 s[c]	3,33 s

[a] If multiple sections with different steepness are configurable, this shall be apparent in the chosen configuration by using different steepness and different values for maximum reactive power $Q_{max\ char\ over}$ and $Q_{max\ char\ under}$.

[b] The Cos Φ(P) characteristic shall be configured accordingly with the Cos Φ value representing the given reactive power value at P_n.

[c] The test is considered significant also for slower values of the time constant, as slow time constants are technical less demanding. 20 s is chosen to reduce test duration compared to 60 s as defined in EN 50549-2:2019.

Setting (c) represents a commonly applied characteristic.

Table 20 — cos φ (P) optional additional parameter configuration if applicable

parameter	Setting (a)	Setting (b)	
Lock-in voltage	deactivated	105 %U_n	
Lock-out voltage	deactivated	100 %U_n	

5.5.2.5.2	**Test procedure for quasi-stationary behaviour**
Setting (a)	

cosφ (P) curve settings:	Set points	1	2	3	4
	P/Pn	15%	20%	80%	90%
	Q	100%Q max over	0	0	100%Q max under

Test Conditions		Measurements			Target vlaue	Δ	Δ Limits
P / Pn	U / Un	P / Pn	Q / Pn	cosφ	Q / Pn	Δ Q / Smax	Δ Q / Smax
10%	100%	11.56%	48.48%	0.2319	48.44%	0.04%	±2%
15%	100%	16.55%	48.78%	0.3214	48.44%	0.34%	
20%	100%	19.97%	0.53%	0.9996	0.00%	0.53%	
30%	100%	29.93%	0.16%	1.0000	0.00%	0.16%	
40%	100%	39.92%	0.31%	1.0000	0.00%	0.31%	
50%	100%	49.94%	-0.06%	1.0000	0.00%	-0.06%	
60%	100%	59.99%	0.40%	1.0000	0.00%	0.40%	
70%	100%	69.99%	0.04%	1.0000	0.00%	0.04%	
80%	100%	80.11%	0.66%	1.0000	0.00%	0.66%	
85%	100%	84.39%	-23.77%	0.9625	-24.22%	0.45%	
90%	100%	88.70%	-48.23%	0.8785	-48.44%	0.21%	
100%	100%	98.79%	-48.29%	0.8984	-48.44%	0.15%	
90%	100%	88.77%	-48.25%	0.8786	-48.44%	0.19%	
85%	100%	84.50%	-23.98%	0.9620	-24.22%	0.24%	
80%	100%	80.24%	0.66%	1.0000	0.00%	0.66%	
70%	100%	70.13%	0.04%	1.0000	0.00%	0.04%	
60%	100%	60.09%	0.43%	1.0000	0.00%	0.43%	
50%	100%	50.05%	-0.06%	1.0000	0.00%	-0.06%	
40%	100%	40.01%	0.31%	1.0000	0.00%	0.31%	
30%	100%	30.00%	0.16%	1.0000	0.00%	0.16%	
20%	100%	20.00%	0.52%	0.9997	0.00%	0.52%	
15%	100%	16.59%	48.88%	0.3213	48.44%	0.44%	
10%	100%	11.57%	48.59%	0.2317	48.44%	0.15%	

Setting (c)

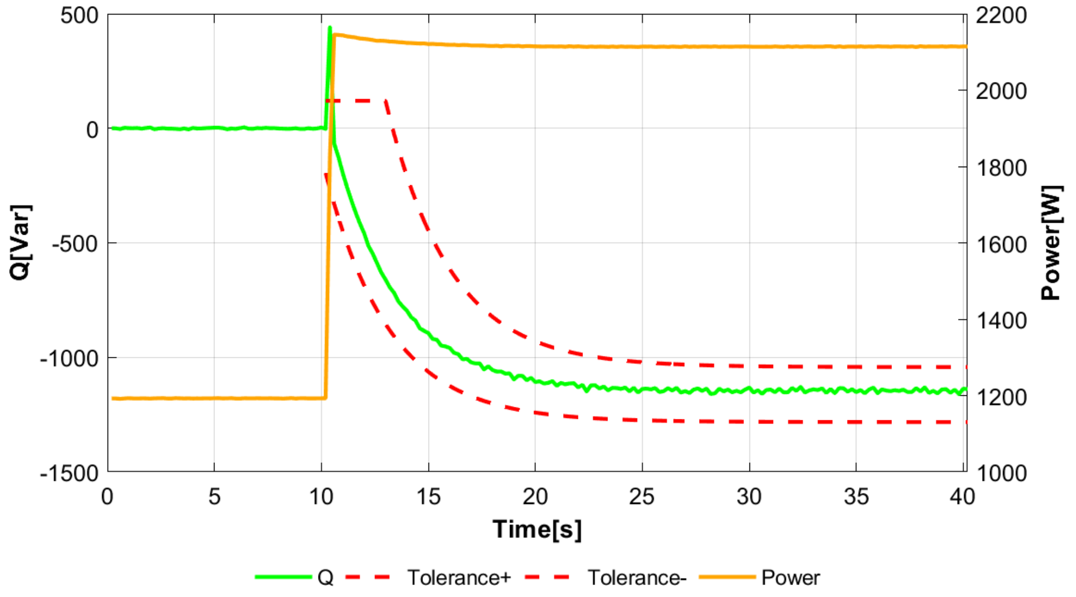
cosφ (P) curve settings:	Set points	1	2	3	4
	P/Pn	20%	40%	50%	100%
	Q	0	0	0	-Qmax

Test Conditions		Measurements			Target vlaue	∆	∆ Limits
P / Pn	U / Un	P / Pn	Q / Pn	cosφ	Q / Pn	∆ Q / Smax	∆ Q / Smax
10%	100%	9.93%	0.31%	0.9995	0.00%	0.31%	±2%
20%	100%	19.86%	0.55%	0.9996	0.00%	0.55%	
30%	100%	29.76%	0.19%	1.0000	0.00%	0.19%	
40%	100%	39.68%	0.35%	1.0000	0.00%	0.35%	
50%	100%	49.63%	-0.01%	1.0000	0.00%	-0.01%	
60%	100%	59.30%	-9.04%	0.9886	-9.69%	0.65%	
70%	100%	68.94%	-18.92%	0.9643	-19.38%	0.46%	
80%	100%	78.69%	-28.15%	0.9416	-29.07%	0.92%	
90%	100%	88.45%	-38.12%	0.9183	-38.76%	0.64%	
100%	100%	98.17%	-47.52%	0.9001	-48.44%	0.92%	
90%	100%	88.53%	-38.33%	0.9177	-38.76%	0.43%	
80%	100%	78.81%	-28.37%	0.9409	-29.07%	0.70%	
70%	100%	69.07%	-19.05%	0.9640	-19.38%	0.33%	
60%	100%	59.43%	-9.11%	0.9885	-9.69%	0.58%	
50%	100%	49.73%	-0.01%	1.0000	0.00%	-0.01%	
40%	100%	39.76%	0.34%	1.0000	0.00%	0.34%	
30%	100%	29.82%	0.20%	1.0000	0.00%	0.20%	
20%	100%	19.89%	0.54%	0.9996	0.00%	0.54%	
10%	100%	9.94%	0.31%	0.9995	0.00%	0.31%	

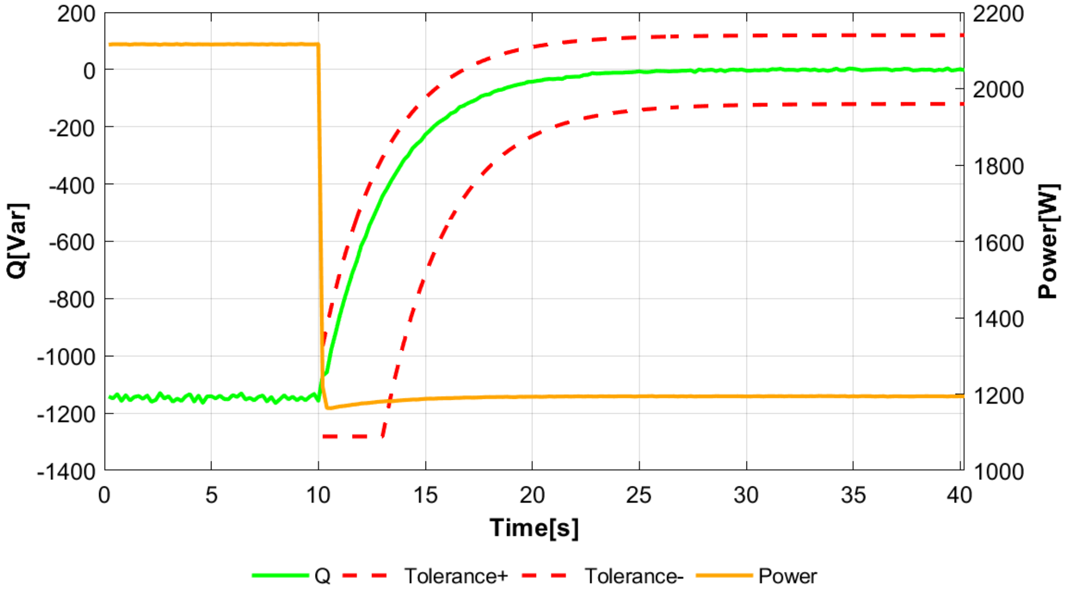
5.5.2.5.3	**Test procedure for dynamic behaviour**					
Setting (a)-Time constant: as fast as possible but not slower as 3s-3s						
Test Conditions	Measurements					
	Tsr [s]	Ts [s]	Td [s]	Reactive power/Pn [%]	Active power/Pn [%]	Grid voltage/Un [%]
20%Pn	--	--	--	0.55	19.89	99.97
20%Pn -> 50%Pn	--	--	--	-0.37	51.70	100.02
50%Pn -> 90%Pn	6.4	14.2	0.2	-47.80	88.16	99.97
90%Pn -> 50%Pn	6.4	16.6	0.2	0.00	49.73	100.02
50%Pn -> 20%Pn	--	--	--	0.54	19.89	99.97

Diagram:

50%Pn -> 90%Pn:

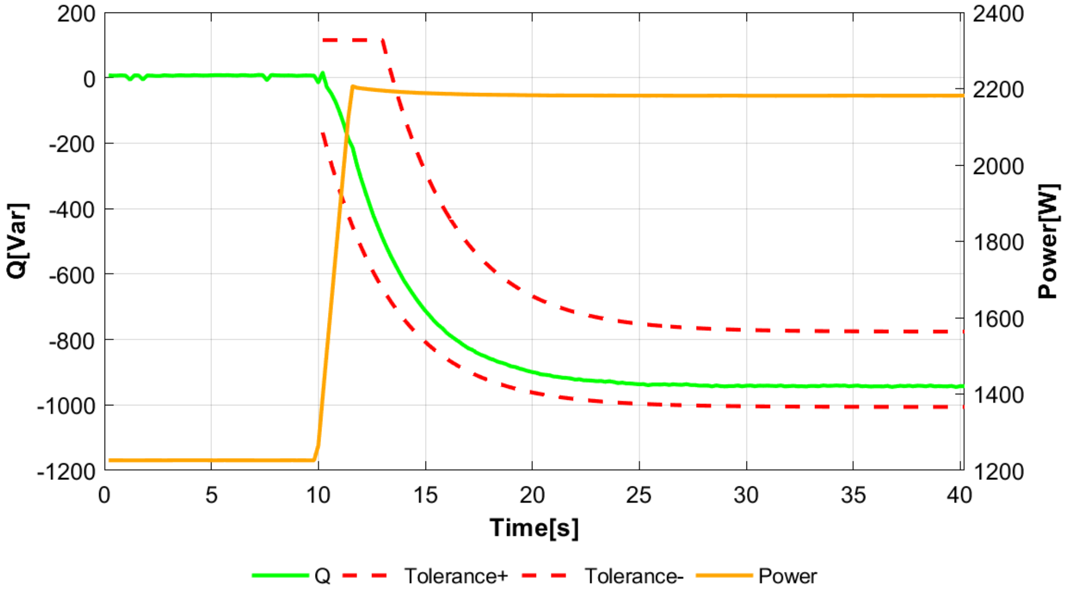


90%Pn -> 50%Pn:


200
0
-200
-400
-600
-800
-1000
-1200
-1400
Q[Var]
2200
2000
1800
1600
1400
1200
1000
Power[W]
0
5
10
15
20
25
30
35
40
Time[s]
Q
Tolerance+
Tolerance-
Power

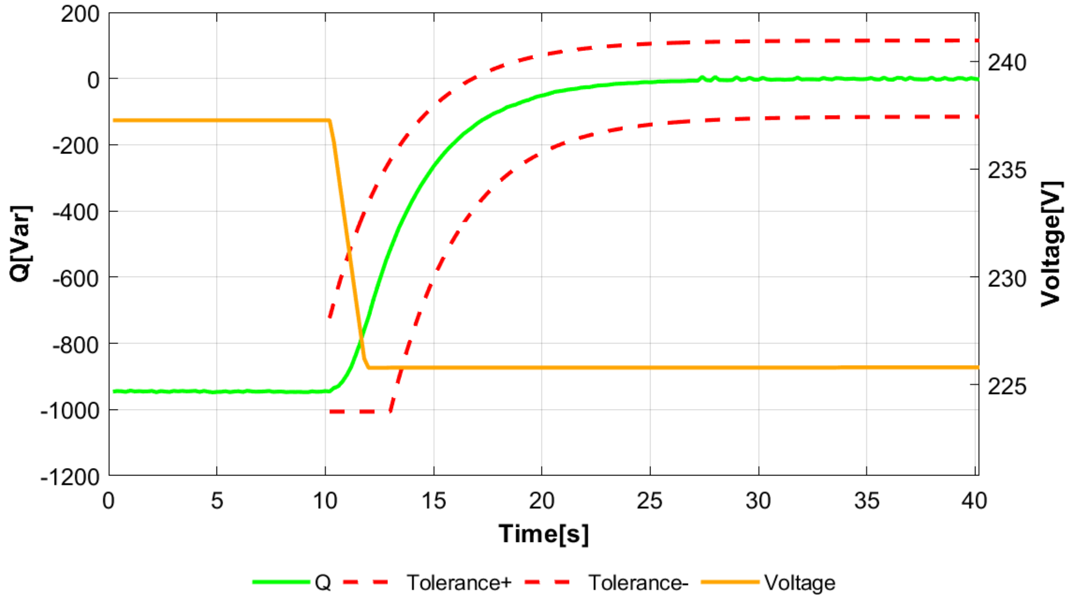
Setting (c)--Time constant: 3.33s							
Test Conditions		Measurements					
P	U/Un	Tsr [s]	Ts [s]	Td [s]	Reactive power [%]	Active power [%]	Grid voltage [%]
20%Pn	107%	--	--	--	0.62	20.44	107.03
20%Pn -> 50%Pn	107%	--	--	--	0.26	51.10	107.08
50%Pn -> 90%Pn	107%	6.6	15.2	0.2	-39.26	90.94	107.15
90%	103%	--	--	--	-39.39	91.04	103.16
90%	98%	6.2	14.4	0.2	-0.03	92.47	98.17
90%	107%	6.6	16.2	0.2	-39.29	90.84	107.15
90%	100%	--	--	--	0.38	89.55	99.25
90%Pn -> 50%Pn	100%	--	--	--	0.00	49.66	99.18
50%Pn -> 20%Pn	100%	--	--	--	0.56	19.76	99.13

Diagram:
50%Pn -> 90%Pn:

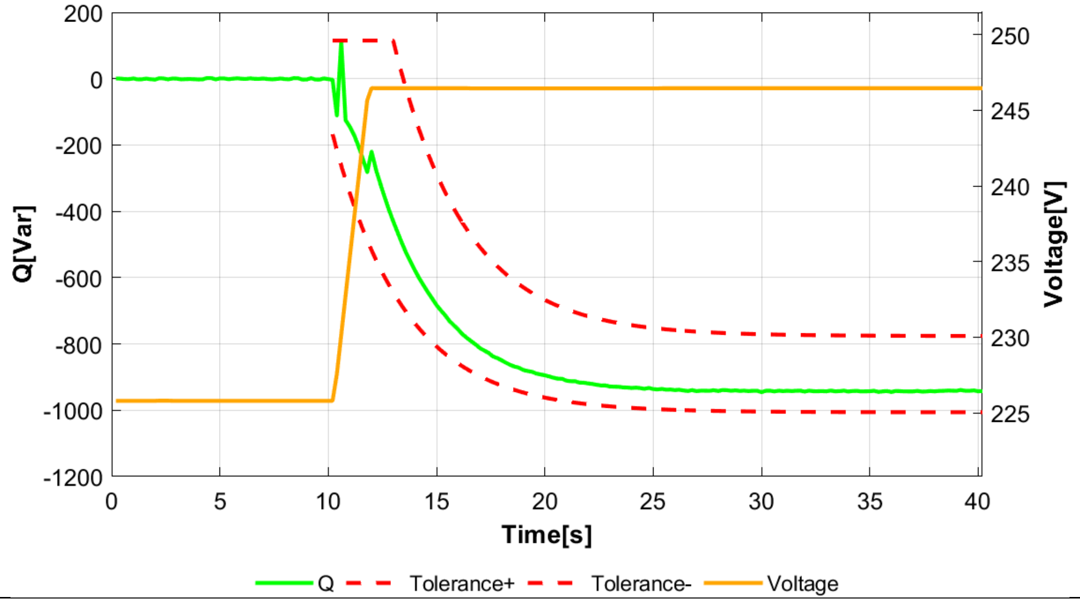


EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

103%Un -98%Un



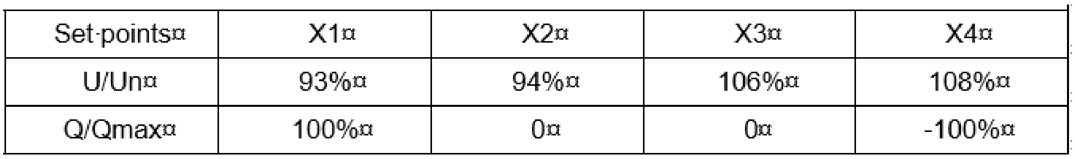
98%Un -107%Un



Lock-in voltage: 105%Un

Lock out voltage: 100%Un

5.6	**TABLE: Voltage related active power reduction - P(U)**		P
P(U) curve settings:	Set points	1	2
	U/Un	110%	115%
	P/Pn	100%	0%
	Q(U) function activated and configured the QU function to setting (a).		



Set points¤	X1¤	X2¤	X3¤	X4¤
U/Un¤	93%¤	94%¤	106%¤	108%¤
Q/Qmax¤	100%¤	0¤	0¤	-100%¤

Test procedure for steady-state behaviour

Test Conditions		Measurements			Target vlaue		Δ		Δ Limits	
U/Un	P/Pn	P/Pn	Q/Pn	U/Un	P/Pn	Q/Pn	ΔP/Smax	ΔQ/Smax	ΔP/Smax	ΔQ/Smax
100%	100%	100.07%	-0.37%	100.18%	100%	0.00%	0.07%	-0.37%	≤ ±2%	≤ ±2%
103%		100.44%	-0.32%	103.17%	100%	0.00%	0.44%	-0.32%		
106%		100.34%	-0.28%	105.43%	100%	0.00%	0.34%	-0.28%		
109%		98.60%	-47.90%	109.15%	100%	-48.43%	-1.40%	0.53%		
112%		60.96%	-47.88%	111.78%	60%	-48.43%	0.96%	0.55%		
115%		-1.44%	-47.72%	115.20%	0%	-48.43%*	-1.44%	0.71%		
112%		60.57%	-47.85%	111.80%	60%	-48.43%	0.57%	0.58%		
109%		98.60%	-47.88%	109.18%	100%	-48.43%	-1.40%	0.55%		
106%		100.31%	-0.28%	105.45%	100%	0.00%	0.31%	-0.28%		
103%		100.41%	-0.33%	103.20%	100%	0.00%	0.41%	-0.33%		
100%		100.04%	-0.36%	100.20%	100%	0.00%	0.04%	-0.36%		

Note:

*: It is acceptable If Q has not reached the target value, but has already reached the maximum capacity value.

Test procedure for dynamic behaviour-Tau ≥3s (eg.5s)

P=100%Pn

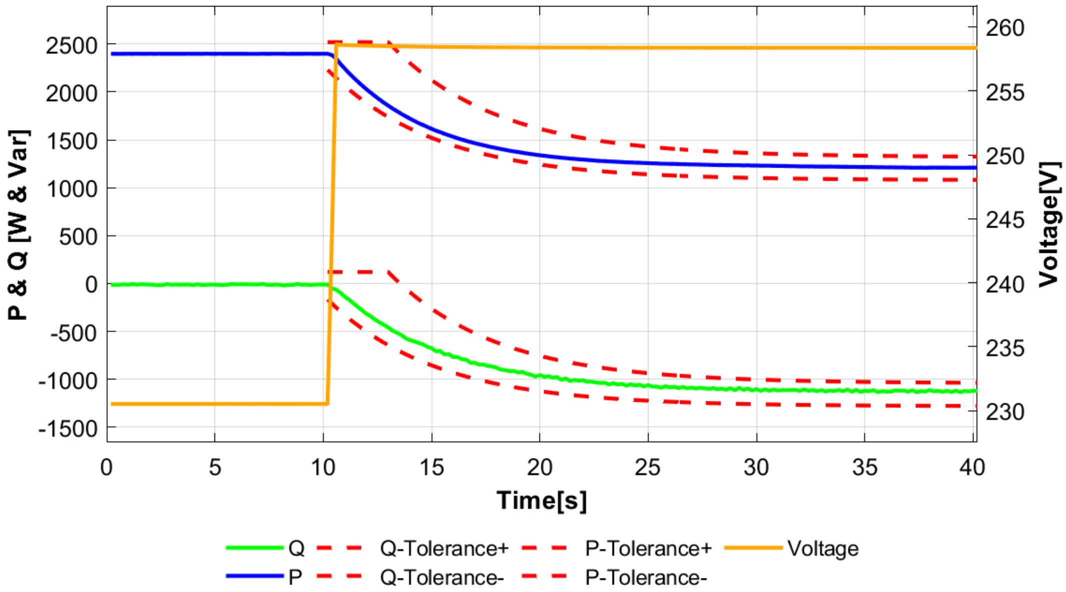
Q(U) function activated and configured the QU function to setting (a).

Test Conditions	Measurements					
	Dead time		response time		settling time	
	P	Q	P	Q	P	Q
100%Un -> 112.5%Un	0.2	0.2	10.6	10.0	20.4	20.2
112.5%Un -> 115%Un	0.2	--	10.2	--	19.8	--
115%Un -> 112.5%Un	0.2	--	10.0	--	20.8	--
112.5%Un -> 100%Un	0.2	0.2	10.4	10.4	20.2	20.4

Diagram:

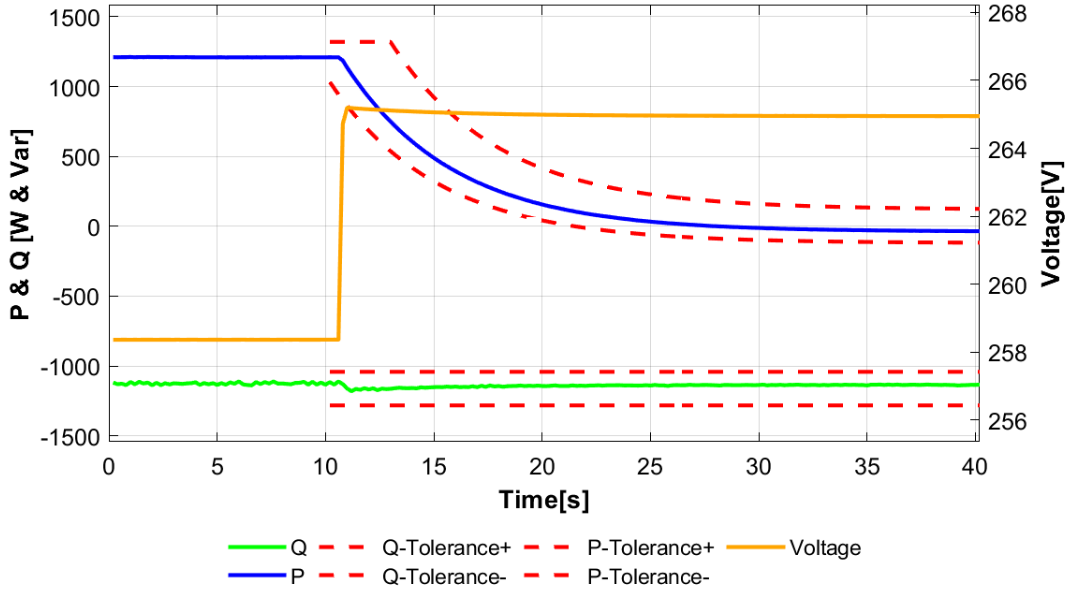
Graph showing the measured active power, reactive power and grid voltage as 10-period averages, together with the calculated dynamic tolerance bands (see e.g. Figure 32) for each step.

100%Un -> 112.5%Un:

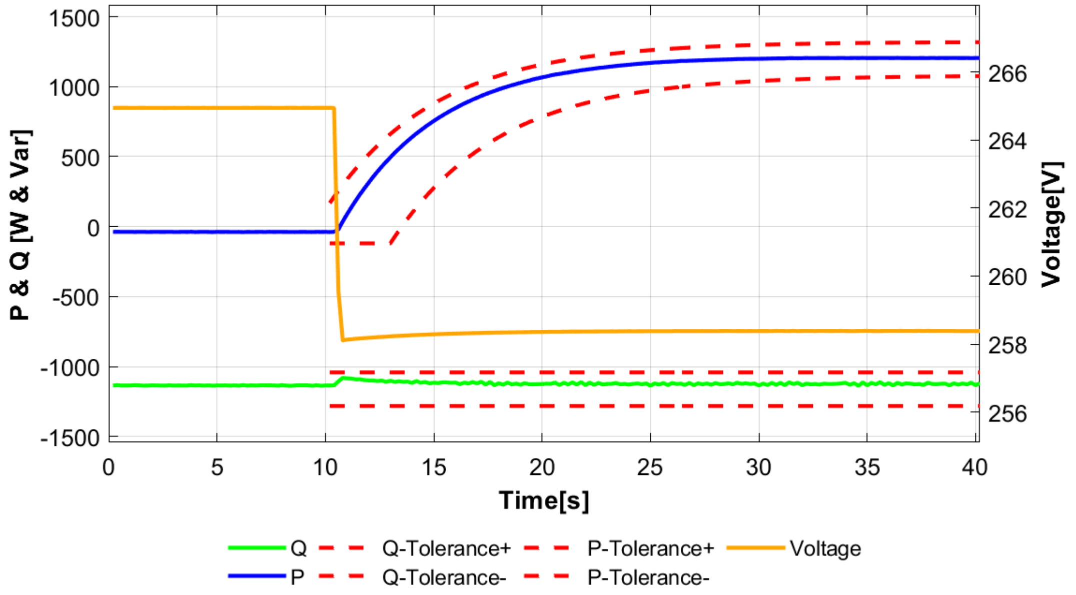


EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

112.5%Un -> 115%Un:

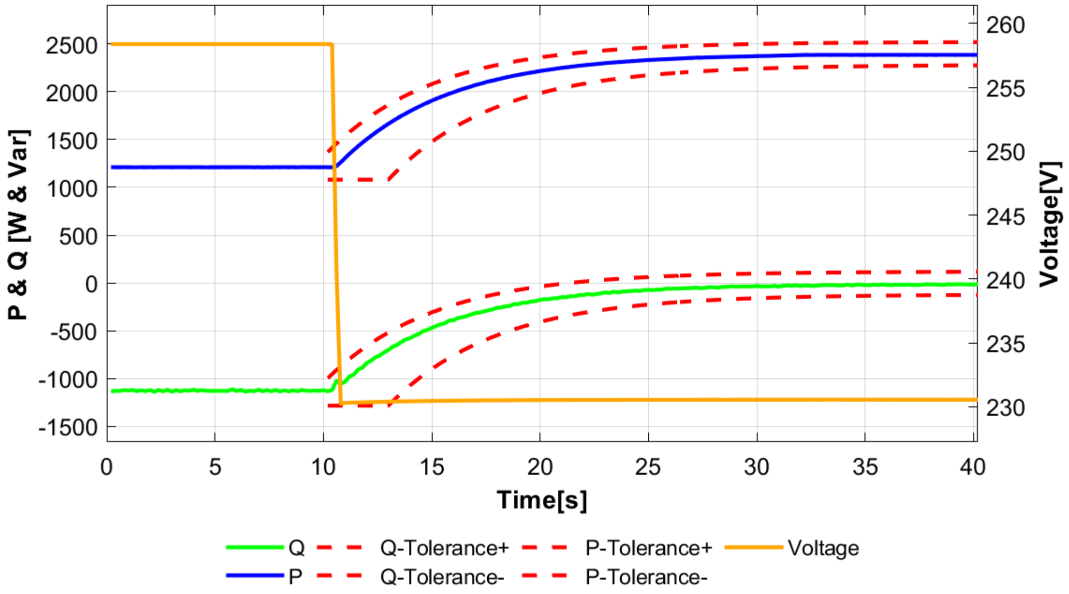


115%Un -> 112.5%Un:



EN 50549-1 & EN 50549-10			
Clause	Requirement - Test	Result - Remark	Verdict

112.5%Un -> 100%Un:



5.7.2	**Power Quality**	P
5.7.2.2.1	TABLE: Harmonics (according to DIN EN 61000-3-2)	P

Model: ZDSF2400AC

Active power P/P_n [%]	10	20	30	40	50	60	70	80	90	100	Limit [A]
Harmonic number	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	I[A]	
2	0.0089	0.0105	0.0137	0.0175	0.0210	0.0197	0.0287	0.0311	0.0354	0.0390	1.080
3	0.0643	0.0522	0.0388	0.0295	0.0381	0.0535	0.0759	0.1073	0.1381	0.1651	2.3
4	0.0175	0.0175	0.0186	0.0188	0.0193	0.0157	0.0191	0.0197	0.0200	0.0204	0.43
5	0.0407	0.0437	0.0503	0.0590	0.0660	0.0798	0.0698	0.0794	0.0898	0.1014	1.14
6	0.0103	0.0101	0.0107	0.0111	0.0116	0.0136	0.0109	0.0117	0.0120	0.0135	0.3
7	0.0300	0.0316	0.0370	0.0421	0.0497	0.0603	0.0486	0.0535	0.0604	0.0675	0.77
8	0.0086	0.0090	0.0092	0.0096	0.0097	0.0115	0.0097	0.0096	0.0100	0.0103	0.23
9	0.0299	0.0342	0.0369	0.0398	0.0434	0.0571	0.0420	0.0483	0.0506	0.0565	0.4
10	0.0079	0.0082	0.0083	0.0087	0.0089	0.0097	0.0091	0.0094	0.0095	0.0097	0.184
11	0.0204	0.0244	0.0287	0.0291	0.0308	0.0409	0.0282	0.0301	0.0341	0.0367	0.33
12	0.0069	0.0071	0.0071	0.0075	0.0082	0.0090	0.0081	0.0088	0.0087	0.0092	0.153
13	0.0243	0.0295	0.0304	0.0316	0.0347	0.0446	0.0310	0.0340	0.0369	0.0391	0.21
14	0.0057	0.0057	0.0066	0.0067	0.0076	0.0079	0.0076	0.0081	0.0081	0.0082	0.131
15	0.0182	0.0199	0.0210	0.0241	0.0243	0.0301	0.0204	0.0222	0.0256	0.0281	0.15
16	0.0050	0.0051	0.0058	0.0067	0.0065	0.0068	0.0072	0.0078	0.0076	0.0083	0.115
17	0.0204	0.0221	0.0263	0.0289	0.0296	0.0364	0.0231	0.0270	0.0292	0.0296	0.132
18	0.0047	0.0045	0.0050	0.0056	0.0064	0.0064	0.0065	0.0070	0.0076	0.0079	0.102
19	0.0145	0.0183	0.0197	0.0201	0.0209	0.0274	0.0195	0.0199	0.0206	0.0227	0.118
20	0.0047	0.0047	0.0053	0.0050	0.0059	0.0057	0.0064	0.0072	0.0072	0.0075	0.092
21	0.0195	0.0200	0.0205	0.0218	0.0240	0.0303	0.0202	0.0204	0.0218	0.0228	0.107
22	0.0044	0.0041	0.0049	0.0044	0.0057	0.0056	0.0059	0.0065	0.0072	0.0075	0.084
23	0.0124	0.0148	0.0177	0.0194	0.0199	0.0237	0.0168	0.0194	0.0197	0.0201	0.098
24	0.0044	0.0042	0.0042	0.0042	0.0051	0.0058	0.0059	0.0062	0.0071	0.0073	0.077
25	0.0148	0.0176	0.0193	0.0199	0.0200	0.0243	0.0184	0.0192	0.0196	0.0199	0.09
26	0.0038	0.0037	0.0043	0.0041	0.0047	0.0052	0.0053	0.0057	0.0065	0.0071	0.071
27	0.0112	0.0125	0.0149	0.0174	0.0188	0.0213	0.0151	0.0159	0.0185	0.0185	0.083
28	0.0041	0.0042	0.0041	0.0037	0.0044	0.0050	0.0051	0.0056	0.0061	0.0074	0.066
29	0.0111	0.0120	0.0137	0.0159	0.0179	0.0214	0.0142	0.0155	0.0174	0.0175	0.078
30	0.0048	0.0043	0.0043	0.0041	0.0045	0.0049	0.0050	0.0056	0.0061	0.0068	0.061
31	0.0108	0.0112	0.0128	0.0146	0.0163	0.0210	0.0128	0.0138	0.0144	0.0167	0.073
32	0.0050	0.0043	0.0051	0.0046	0.0048	0.0047	0.0057	0.0058	0.0064	0.0073	0.058
33	0.0104	0.0108	0.0114	0.0123	0.0134	0.0184	0.0110	0.0126	0.0127	0.0148	0.068
34	0.0064	0.0055	0.0058	0.0053	0.0056	0.0046	0.0056	0.0058	0.0061	0.0069	0.054
35	0.0111	0.0111	0.0116	0.0124	0.0140	0.0184	0.0115	0.0124	0.0143	0.0146	0.064
36	0.0072	0.0063	0.0065	0.0060	0.0062	0.0049	0.0060	0.0065	0.0065	0.0073	0.051

37	0.0111	0.0110	0.0118	0.0120	0.0132	0.0154	0.0114	0.0115	0.0130	0.0132	0.061
38	0.0074	0.0070	0.0073	0.0062	0.0069	0.0048	0.0067	0.0068	0.0075	0.0079	0.048
39	0.0115	0.0117	0.0123	0.0127	0.0134	0.0169	0.0117	0.0122	0.0131	0.0136	0.058
40	0.0066	0.0070	0.0065	0.0063	0.0074	0.0045	0.0070	0.0070	0.0072	0.0079	0.046
41	0.0110	0.0110	0.0114	0.0114	0.0128	0.0156	0.0115	0.0118	0.0123	0.0131	--
42	0.0070	0.0068	0.0068	0.0062	0.0066	0.0042	0.0070	0.0068	0.0075	0.0077	--
43	0.0110	0.0106	0.0111	0.0112	0.0128	0.0140	0.0115	0.0119	0.0125	0.0129	--
44	0.0059	0.0057	0.0058	0.0057	0.0058	0.0043	0.0066	0.0068	0.0068	0.0076	--
45	0.0106	0.0104	0.0111	0.0110	0.0117	0.0134	0.0109	0.0107	0.0111	0.0116	--
46	0.0061	0.0055	0.0058	0.0058	0.0062	0.0044	0.0063	0.0066	0.0069	0.0074	--
47	0.0102	0.0103	0.0107	0.0110	0.0116	0.0118	0.0109	0.0112	0.0114	0.0119	--
48	0.0065	0.0061	0.0064	0.0058	0.0058	0.0044	0.0066	0.0064	0.0067	0.0076	--
49	0.0105	0.0103	0.0105	0.0104	0.0109	0.0127	0.0103	0.0104	0.0107	0.0110	--
50	0.0053	0.0056	0.0062	0.0054	0.0054	0.0042	0.0054	0.0057	0.0057	0.0064	--
Remark: I_{ref} = 10.44A											

5.7.2.3.2	**TABLE: Flicker**	P

Flicker für Bemessungsströme ≤ 16 A (bei SCR = 20)

Method: Measurement was carried out according to the procedure in IEC 61000-3-3.

It should be noted:

-used measuring equipment;

-output voltage of the network simulation;

-reference impedance;

-one-period RMS values of current and voltage;

-the largest cψK value determined;

-Pst, Plt.

Model: ZDSF2400AC

	Pst			$c_{\psi k}$		
	L1	L2	L3	L1	L2	L3
1	0.020	--	--	0.40	--	--
2	0.020	--	--	0.40	--	--
3	0.020	--	--	0.40	--	--
4	0.020	--	--	0.40	--	--
5	0.020	--	--	0.40	--	--
6	0.020	--	--	0.40	--	--
7	0.020	--	--	0.40	--	--
8	0.020	--	--	0.40	--	--
9	0.020	--	--	0.40	--	--
10	0.020	--	--	0.40	--	--
11	0.020	--	--	0.40	--	--
12	0.020	--	--	0.40	--	--

Calculation		
Plt	L1	0.020
	L2	--
	L3	--
greatest ascertained $c_{\psi k}$		0.40

5.7.2.3.4	**TABLE: Rapid voltage change**		P
Operation type: Switching on at any power level (without default to primary energy source)			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.90over-excited	Test 3: cosφ=0.90under-excited
Ki	0.065	0.066	0.074
Kimax Limit	<1.2		
Operation type: start-up at Pn (reference condition) with circuit breaker reclosing			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.90over-excited	Test 3: cosφ=0.90under-excited
Ki	0.076	0.068	0.062
Kimax Limit	<1.2		
Operation type: shut-down (breaking operation at nominal power)			
Condition	Test 1: cosφ=1	Test 2: cosφ=0.90over-excited	Test 3: cosφ=0.90under-excited
Ki	0.661	0.465	0.435
Kimax Limit	<1.2		
Note: 1) Sk,fic/Sn = 20 2) ki is the ratio of the highest current occurring during a switching operation to the normal generator current, the current is to be considered as an r.m.s. value over a period 3) d_c and d_{Max} for voltage change refer to result of section 5.2.3 based on DIN EN 61000-3-3			

Switching actions	Ki
Marking operation without default (to primary energy carrier)	0.074
Worst case at switch over of generator sections	0.076
Marking operation at reference conditions (of primary energy carrier)	0.076
Breaking operation at nominal power	0.661
Worst case value of all switching operations Ki max	0.661

5.7.2.4	**TABLE: DC Injection**					P
Model: ZDSF2400AC						
Rated output current: 10.43A						
Power P/Pn		100%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0249A	0.239%	--	--	--	--	0.5%
Power P/Pn [%]		60%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0161A	0.154%	--	--	--	--	0.5%
Power P/Pn [%]		30%				
Measurement						Limitation
Phase L1		Phase L2		Phase L3		
0.0104A	0.100%	--	--	--	--	0.5%

5.8.6		TABLE: Islanding							P
No.	PEUT[1] (% of EUT rating)	Reactive load (% of QL in 6.1.d)1)	PAC[2] (% of nominal)	QAC[3] (% of nominal)	Run on time (ms)	PEUT (kW)	Actual Qf	VDC	Remarks[4]
1	100	100	0	0	277.0	2.40	1.01	49.7	Test A at BL
2	66	66	0	0	215.0	1.58	1.01	49.8	Test B at BL
3	33	33	0	0	240.0	0.79	1.00	50.0	Test C at BL
4	100	100	-5	-5	144.0	2.40	1.03	49.7	Test A at IB
5	100	100	-5	0	242.0	2.40	1.06	49.7	Test A at IB
6	100	100	-5	5	176.0	2.40	1.09	49.7	Test A at IB
7	100	100	0	-5	230.0	2.40	0.99	49.7	Test A at IB
8	100	100	0	5	204.0	2.40	1.03	49.7	Test A at IB
9	100	100	5	-5	142.0	2.40	0.94	49.7	Test A at IB
10	100	100	5	0	182.0	2.40	0.96	49.7	Test A at IB
11	100	100	5	5	213.0	2.40	0.98	49.7	Test A at IB
12	66	66	0	-5	186.0	1.58	0.98	49.8	Test B at IB
13	66	66	0	-4	272.0	1.58	0.99	49.8	Test B at IB
14	66	66	0	-3	106.0	1.58	1.00	49.8	Test B at IB
15	66	66	0	-2	104.0	1.58	1.00	49.8	Test B at IB
16	66	66	0	-1	216.0	1.58	1.00	49.8	Test B at IB
17	66	66	0	1	191.0	1.58	1.01	49.8	Test B at IB
18	66	66	0	2	215.0	1.58	1.02	49.8	Test B at IB
19	66	66	0	3	119.0	1.58	1.03	49.8	Test B at IB
20	66	66	0	4	214.0	1.58	1.03	49.8	Test B at IB
21	66	66	0	5	123.0	1.58	1.03	49.8	Test B at IB
22	33	33	0	-5	186.0	0.79	0.98	50.0	Test C at IB
23	33	33	0	-4	288.0	0.79	0.98	50.0	Test C at IB
24	33	33	0	-3	254.8	0.79	0.99	50.0	Test C at IB
25	33	33	0	-2	250.8	0.79	0.99	50.0	Test C at IB
26	33	33	0	-1	258.0	0.79	1.00	50.0	Test C at IB
27	33	33	0	1	186.0	0.79	1.01	50.0	Test C at IB
28	33	33	0	2	320.8	0.79	1.01	50.0	Test C at IB
29	33	33	0	3	291.2	0.79	1.01	50.0	Test C at IB
30	33	33	0	4	228.4	0.79	1.02	50.0	Test C at IB
31	33	33	0	5	202.0	0.79	1.02	50.0	Test C at IB

Remark:

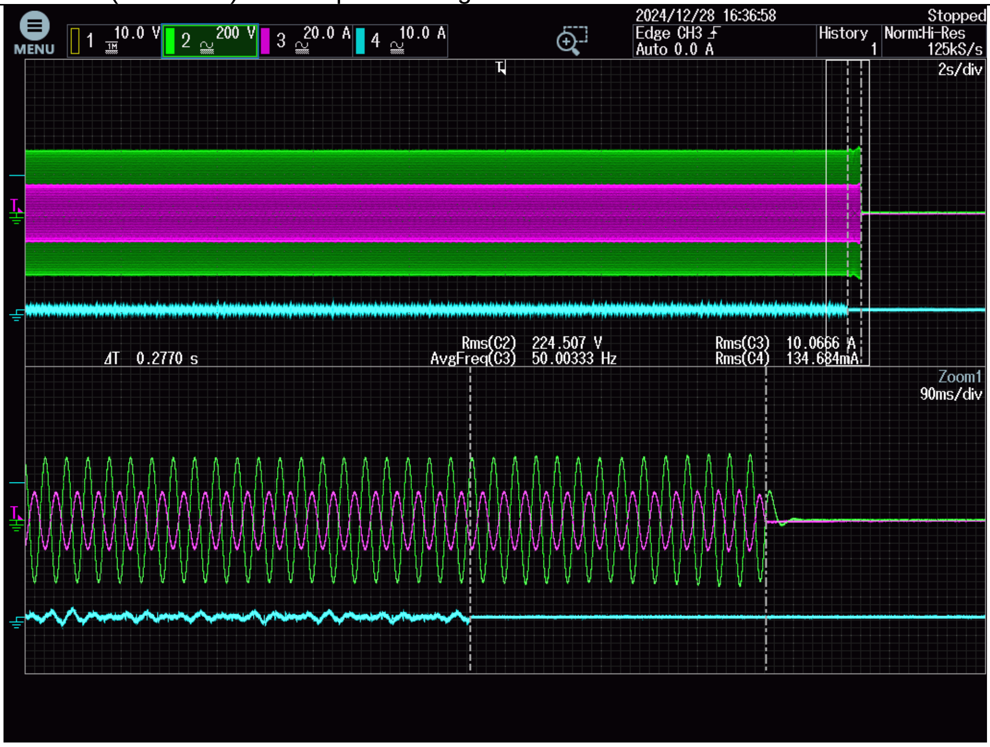
[1] PEUT: EUT output power

[2] PAC: Real power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0% test condition value.

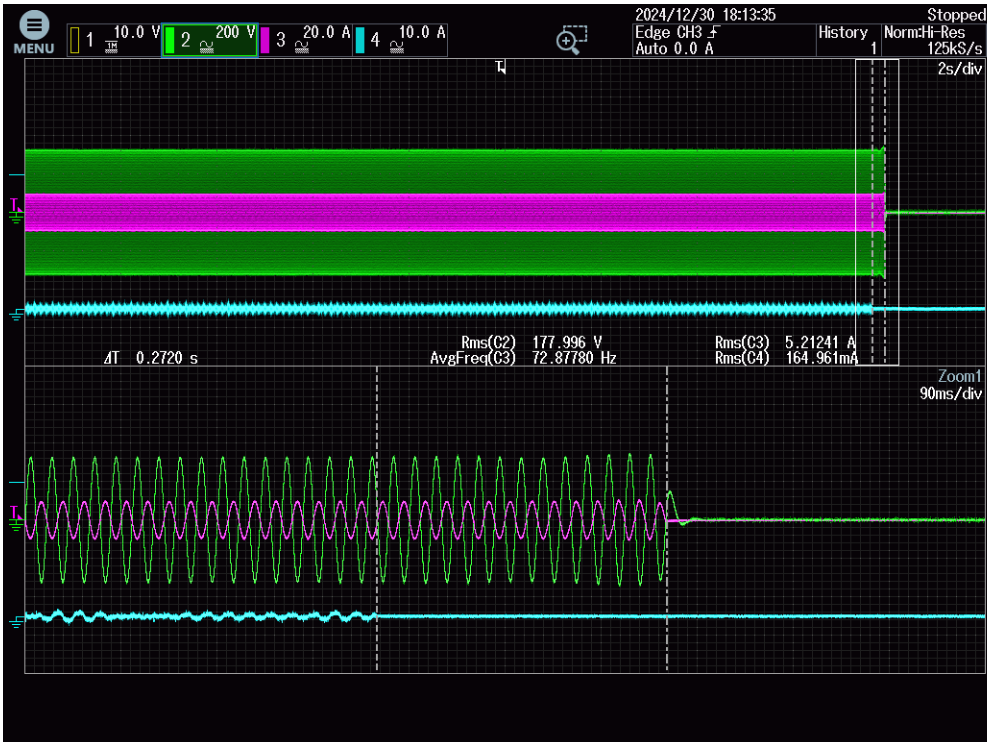
[3] QAC: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0% test condition value.

[4] BL: Balance condition, IB: Imbalance condition.

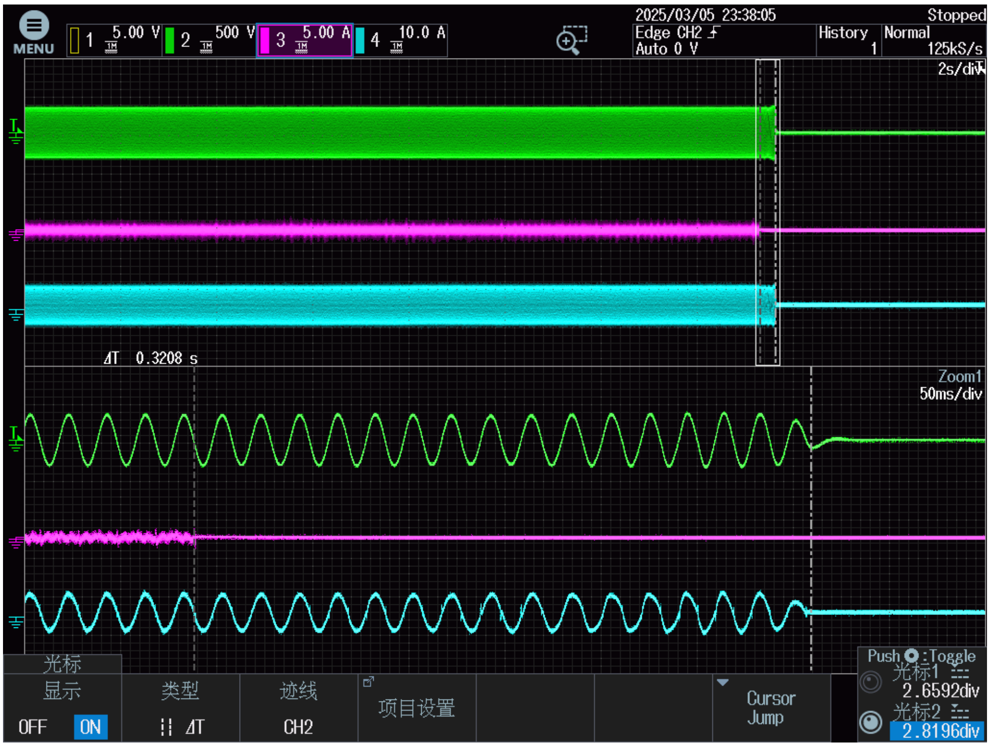
5) *Note: test condition A (100%): If any of the recorded run-on times are longer than the one recorded for the rated balance condition, i.e. test procedure 6.1 f), then the non-shaded parameter combinations (no.32~47) also require testing.



PEUT 100%, PAC 0%, QAC 0%, = 277.0ms



PEUT 66%, PAC 0%, QAC -4%, = 272.0ms



PEUT 33%, PAC 0%, QAC 2%, = 320.8ms

5.8.3	**TABLE: Interface protection**	P

All thresholds must be adjustable

Voltage values

Threshold	(27<)	tmin (27<)	(27<<)	tmin (27<<)	59>	tmax (59>)	59>>	tmax (59.S1)	59 10 min-mean
Range	0.2-1.0 U_n	0.1-100s	0.2-1.0 U_n	0.1-5s	1.0-1.2 U_n	0.1-100s	1.0-1.3 U_n	0.1-5s	1.0-1.15 U_n
Adjustable in Step	0.01 U_n	0.1s	0.01 U_n	0.05s	0.01 U_n	0.1s	0.01 U_n	0.05s	0.01 U_n

Frequency values

Threshold	81<	tmin (81<)	81<<	tmin (81<<)	81>	tmax (81>)	81>>	tmax (81>>)
Range	47.0-50.0Hz	0.1-100s	47.0-50.0Hz	0.1-5s	50.0-52.0Hz	0.1-100s	50.0-52.0Hz	0.1-5s
Steps	0.1 Hz	0.1s	0.1 Hz	0.05s	0.1 Hz	0.1s	0.1 Hz	0.05s

Note 1:	External SPI stays in operation conditions for 5s after disconnecting the mains voltage
Note 2:	The frequency protection shall function correctly in the input voltage range between 20% U_n and 120% Un and shall be inhibited for input voltages of less than 20% U_n. Under 20% U_n the frequency protection is inhibited. Disconnection may only happen based on undervoltage protection.

5.8.3.2	**TABLE: Interface protection**		P
Voltage and frequency protections			
Condition	Setting	Measurement	Limitation
		Trip value [V]	
		L1-N	
U<	20%Un	45.01	± 1% of U_n
		45.02	
		45.46	
U<	45%Un	102.55	
		102.52	
		102.54	
U<	65%Un	148.53	
		148.58	
		148.57	
U<	100%Un	230.01	
		230.00	
		230.08	
Notes: Ramp signal test			

Condition	Setting	Measurement	Limitation
		Trip value [V]	
		L1-N	
U<<	20%Un	45.02	± 1% of U_n
		45.08	
		45.10	
U<<	45%Un	102.56	
		102.50	
		102.51	
U<<	65%Un	148.58	
		148.57	
		148.57	
U<<	100%Un	230.05	
		230.08	
		230.03	
Notes: Ramp signal test			

Condition	Setting	Measurement	Limitation
		Trip value [V]	
		L1-N	
U>	100%Un	229.32	± 1% of U_n
		229.51	
		229.05	
U>	106%Un	242.90	
		242.80	
		242.88	
U>	112%Un	256.67	
		256.73	
		256.67	
U>	120%Un	276.16	
		276.04	
		276.07	
Notes: Ramp signal test			

Condition	Setting	Measurement	Limitation
		Trip value [V]	
		L1-N	
U>>	100%Un	229.44	± 1% of U_n
		229.68	
		229.13	
U>>	109%Un	249.79	
		249.76	
		249.73	
U>>	118%Un	271.49	
		271.44	
		271.34	
U>>	130%Un	299.21	
		299.10	
		299.04	
Notes: Ramp signal test			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
		L1-N	
U<	100	151.0	100-200
		150.5	
		150.0	
U<	30000	30050.5	30000-30100
		30050.0	
		30050.4	
U<	60000	60071.8	60000-60100
		60052.4	
		60070.2	
U<	100000	100091.2	100000-100100
		100071.1	
		100071.2	
Note(s): Jump signal test			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
		L1-N	
U<<	100	150.0	100-200
		150.5	
		151.0	
U<<	1500	1551.2	1500-1600
		1551.0	
		1550.8	
U<<	3000	3051.4	3000-3100
		3052.0	
		3051.0	
U<<	5000	5049.0	5000-5100
		5048.6	
		5048.8	
Note(s): Jump signal test			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
		L1-N	
U>	100	170.0	100-200
		171.0	
		170.5	
U>	30000	30050.3	30000-30100
		30049.3	
		30049.8	
U>	60000	60050.5	60000-60100
		60051.2	
		60050.7	
U>	100000	100070.5	100000-100100
		100090.8	
		100070.8	
Note(s): Jump signal test			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
		L1-N	
U>>	100	150.0	100-200
		152.0	
		150.5	
U>>	1500	1570.6	1500-1600
		1570.8	
		1570.4	
U>>	3000	3049.6	3000-3100
		3071.0	
		3071.0	
U>>	5000	5038.6	5000-5100
		5036.1	
		5056.1	
Note(s): Jump signal test			

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F>	50Hz	50.01	± 0.1% of f_n
		50.01	
		50.01	
F>	50.5Hz	50.51	
		50.51	
		50.51	
F>	51.5Hz	51.51	
		51.51	
		51.51	
F>	52Hz	52.01	
		52.01	
		52.01	

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F>>	50Hz	50.01	± 0.1% of f_n
		50.01	
		50.01	
F>>	50.5Hz	50.51	
		50.51	
		50.51	
F>>	51.5Hz	51.52	
		51.51	
		51.51	
F>>	52Hz	52.01	
		52.01	
		52.01	

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F<	47Hz	47.02	± 0.1% of f_n
		47.02	
		47.02	
F<	48Hz	48.00	
		48.00	
		48.00	
F<	49Hz	49.00	
		49.00	
		49.00	
F<	50Hz	49.96	
		49.96	
		49.96	

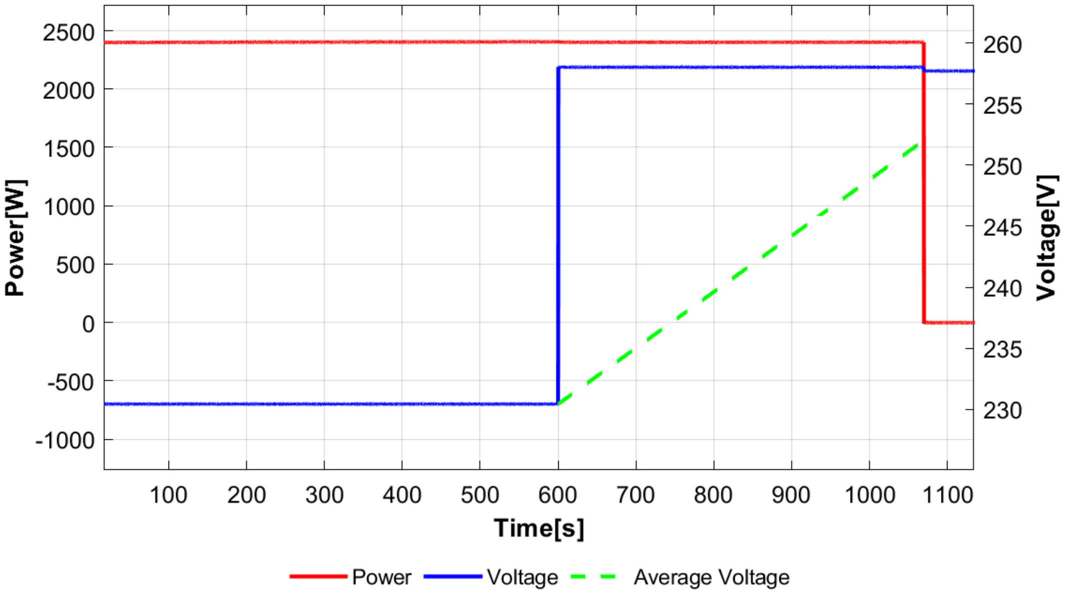
Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F<<	47Hz	47.01	± 0.1% of f_n
		47.01	
		47.01	
F<<	48Hz	48.00	
		48.00	
		48.00	
F<<	49Hz	49.01	
		49.00	
		49.01	
F<<	50Hz	49.96	
		49.96	
		49.96	

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F>	100	145.4	100-200
		142.6	
		124.6	
F>	30000	30096.9	30000-30100
		30077.2	
		30075.9	
F>	60000	60078.9	60000-60100
		60077.1	
		60077.4	
F>	100000	100073.6	100000-100100
		100075.0	
		100074.8	
Note(s):			

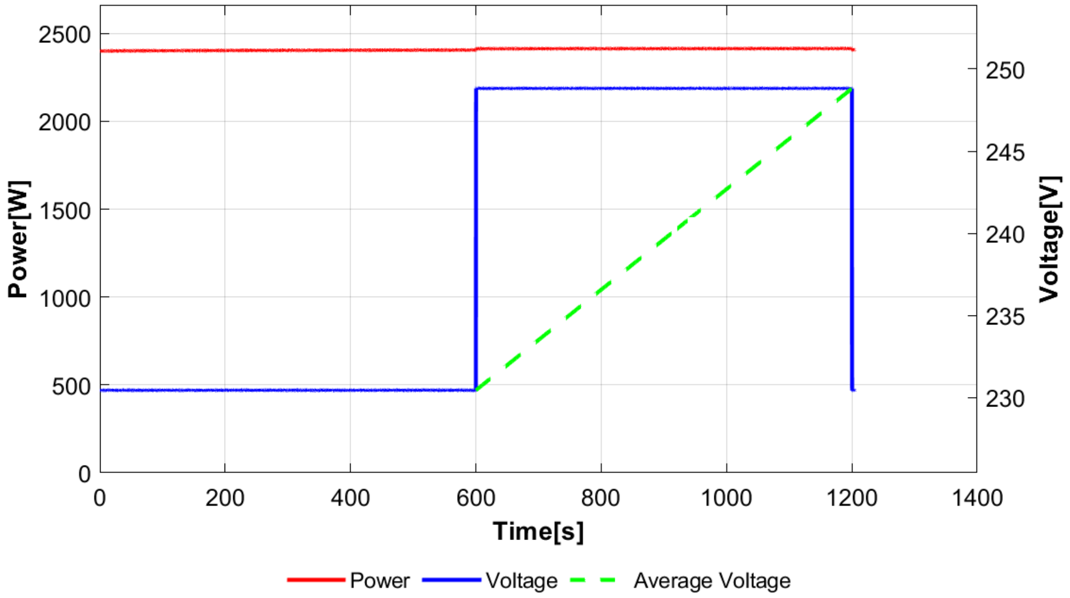
Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F>>	100	123.6	100-200
		125.6	
		123.6	
F>>	1500	1568.5	1500-1600
		1569.3	
		1568.3	
F>>	3000	3072.0	3000-3100
		3093.0	
		3053.2	
F>>	5000	5055.4	5000-5100
		5056.8	
		5057.6	
Note(s):			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F<	100	122.6	100-200
		145.0	
		145.4	
F<	30000	30063.4	30000-30100
		30084.2	
		30063.4	
F<	60000	60067.0	60000-60100
		60067.8	
		60067.4	
F<	100000	100088.1	100000-100100
		100087.9	
		100088.0	
Note(s):			

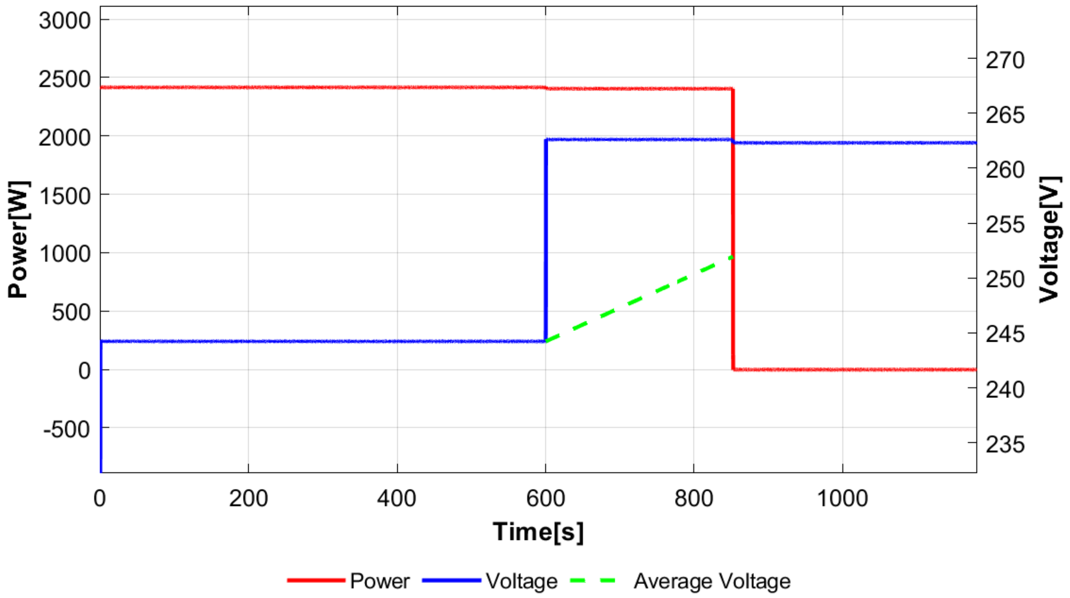
Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F<<	100	167.8	100-200
		167.4	
		146.6	
F<<	1500	1556.2	1500-1600
		1554.4	
		1555.2	
F<<	3000	3059.0	3000-3100
		3079.0	
		3059.2	
F<<	5000	5041.0	5000-5100
		5042.2	
		5062.6	
Note(s):			

5.8.3.3	**TABLE: Overvoltage 10 min mean protection**		P
Condition	Setting	Measurement	Limitation
		Trip value [U/Un]	
110%Un	110%Un	109.57%	± 1% of U_n
Condition	Setting	Measurement	Limitation
		Trip time	
a) Operation under 100%Un for 10 minutes, then jumped from 100%Un to 112%Un.			
U>	600	469.6	450-550
			

b) Operation under 100%Un for 10 minutes, then jumped from 100%Un to 108%Un.			
U>	600	--	No disconnect



c) Operation under 106%Un for 10 minutes, then jumped from 106%Un to 114%Un.			
U>	600	252.2	225-375 (≤ ½ a) ± 75s)



Note(s):

5.9.3 & 5.9.4	**TABLE: Reconnection after tripping**	P

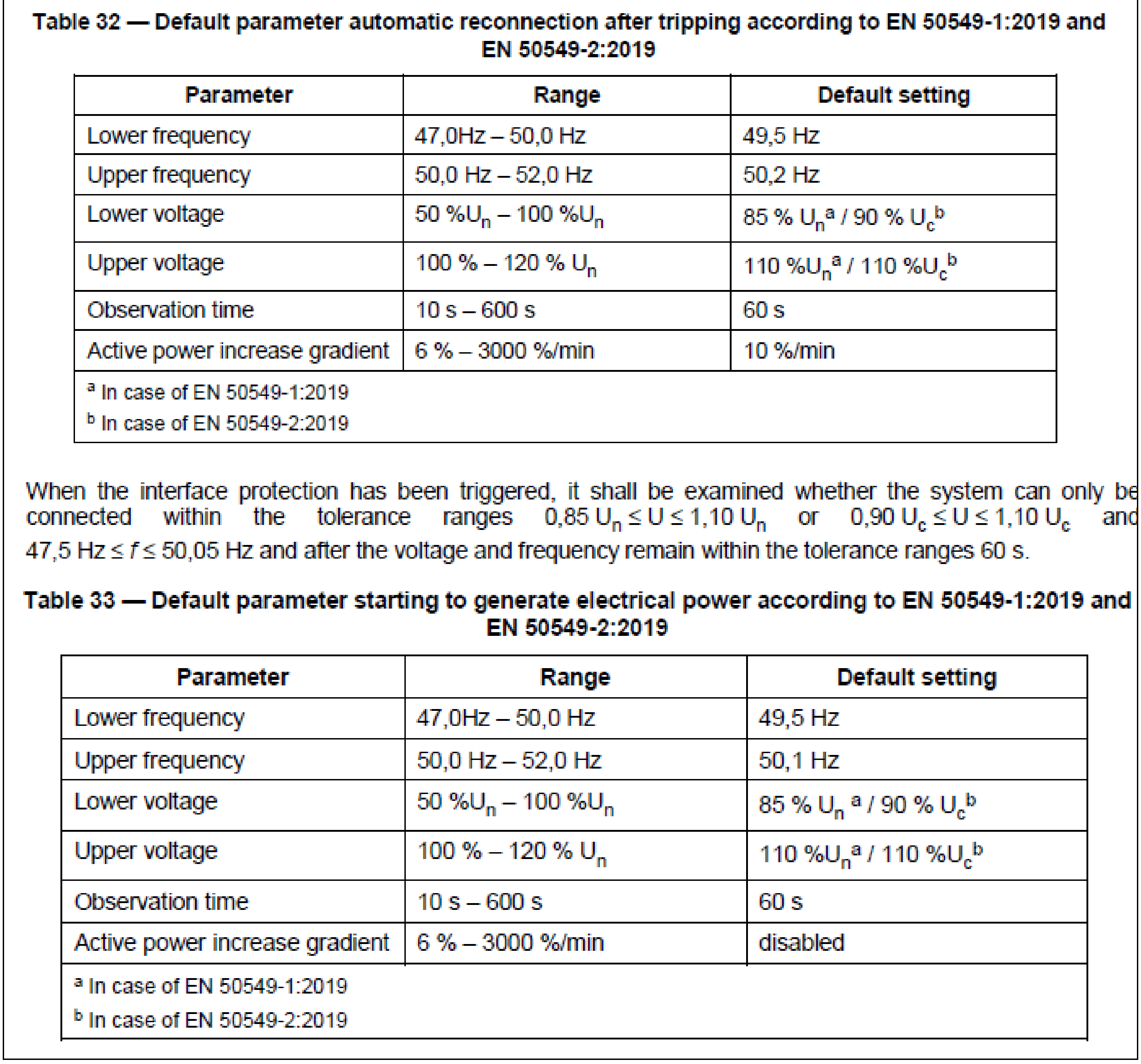


Table 32 — Default parameter automatic reconnection after tripping according to EN 50549-1:2019 and EN 50549-2:2019

Parameter	Range	Default setting
Lower frequency	47,0Hz – 50,0 Hz	49,5 Hz
Upper frequency	50,0 Hz – 52,0 Hz	50,2 Hz
Lower voltage	50 $\%U_n$ – 100 $\%U_n$	85 % U_n [a] / 90 % U_c [b]
Upper voltage	100 % – 120 % U_n	110 $\%U_n$ [a] / 110 $\%U_c$ [b]
Observation time	10 s – 600 s	60 s
Active power increase gradient	6 % – 3000 %/min	10 %/min

[a] In case of EN 50549-1:2019
[b] In case of EN 50549-2:2019

When the interface protection has been triggered, it shall be examined whether the system can only be connected within the tolerance ranges $0,85\,U_n \le U \le 1,10\,U_n$ or $0,90\,U_c \le U \le 1,10\,U_c$ and $47,5\text{ Hz} \le f \le 50,05\text{ Hz}$ and after the voltage and frequency remain within the tolerance ranges 60 s.

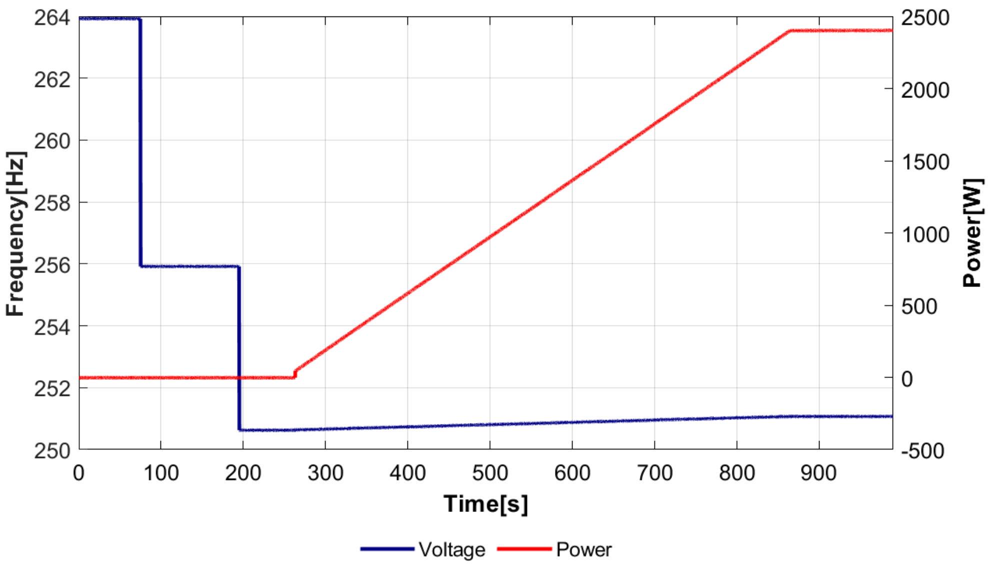
Table 33 — Default parameter starting to generate electrical power according to EN 50549-1:2019 and EN 50549-2:2019

Parameter	Range	Default setting
Lower frequency	47,0Hz – 50,0 Hz	49,5 Hz
Upper frequency	50,0 Hz – 52,0 Hz	50,1 Hz
Lower voltage	50 $\%U_n$ – 100 $\%U_n$	85 % U_n [a] / 90 % U_c [b]
Upper voltage	100 % – 120 % U_n	110 $\%U_n$ [a] / 110 $\%U_c$ [b]
Observation time	10 s – 600 s	60 s
Active power increase gradient	6 % – 3000 %/min	disabled

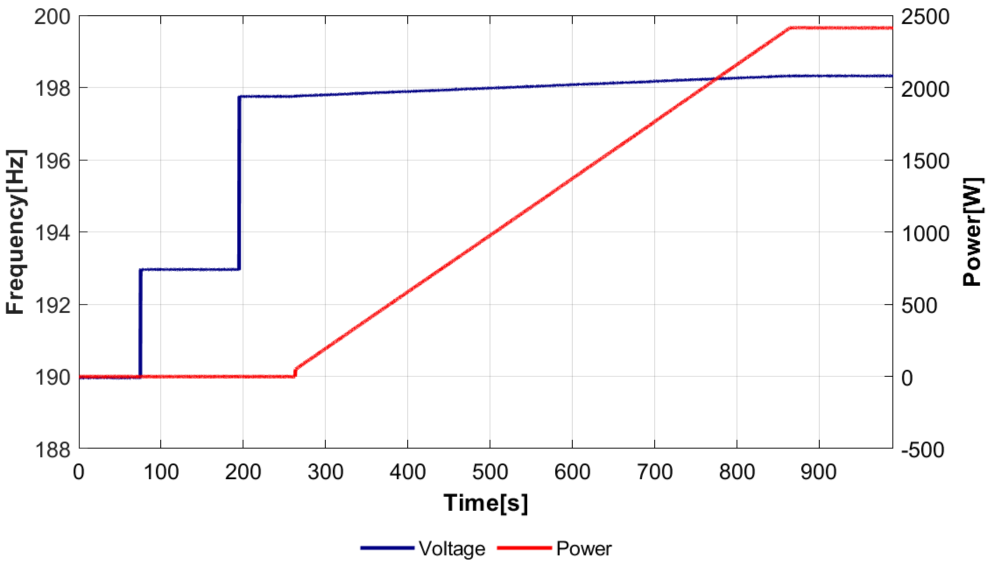
[a] In case of EN 50549-1:2019
[b] In case of EN 50549-2:2019

Condition	Measurement		Limitation	
	Delay time [s]	Power Gradient [per mimute]	Delay time	Power Gradient
Connection:				
U>110%Un	65.8	10.36	≥60s	--
U<85%Un	64.6	10.41		
f>50.1Hz	65.2	10.42		
f<49.5Hz	60.6	9.52		

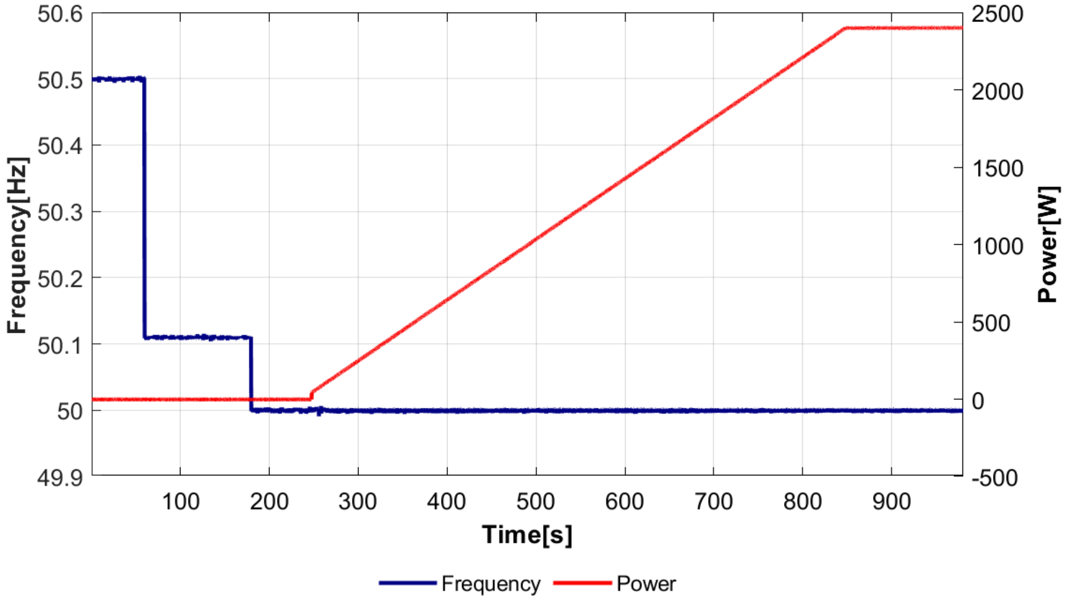
U>110%Un



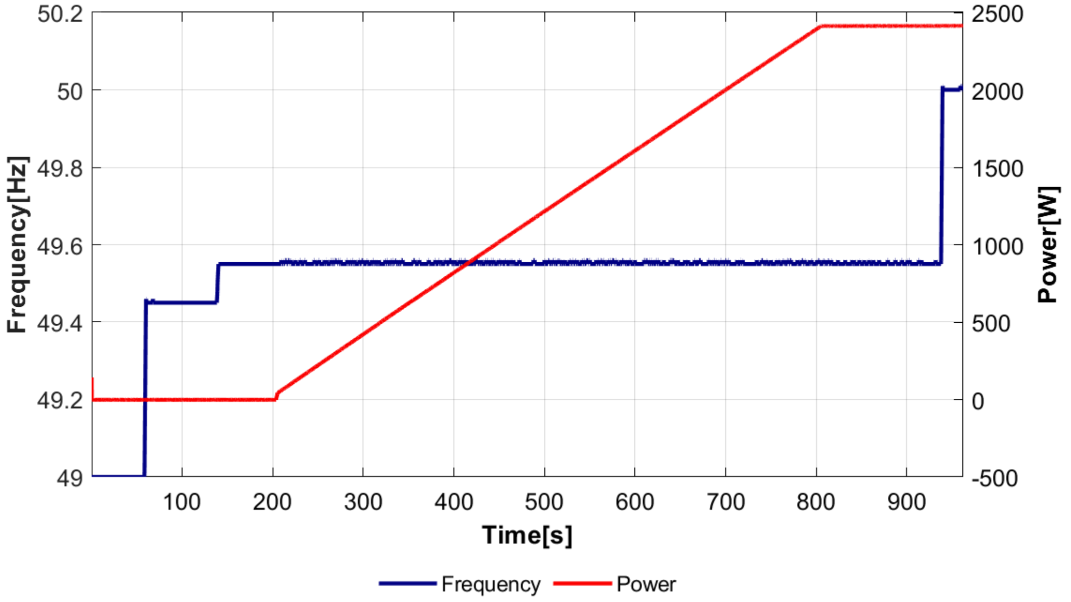
U<85%Un



f>50.1Hz

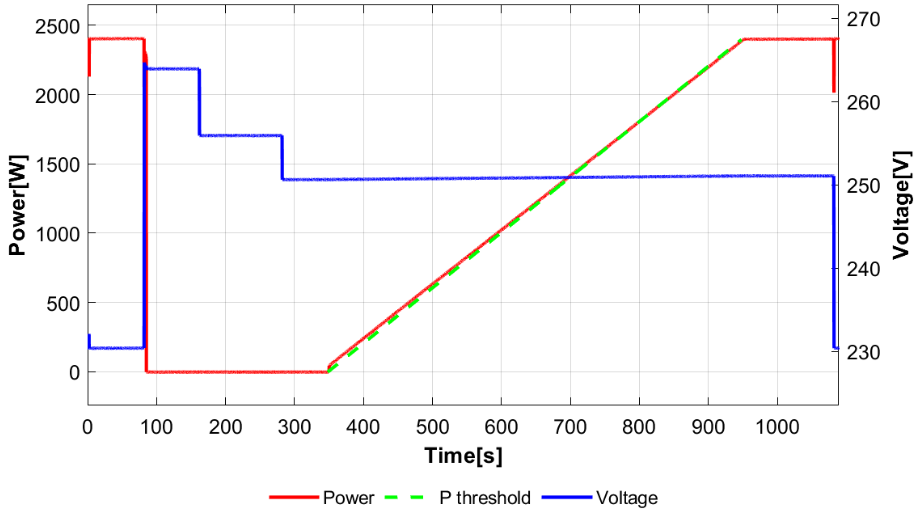


f<49.5Hz

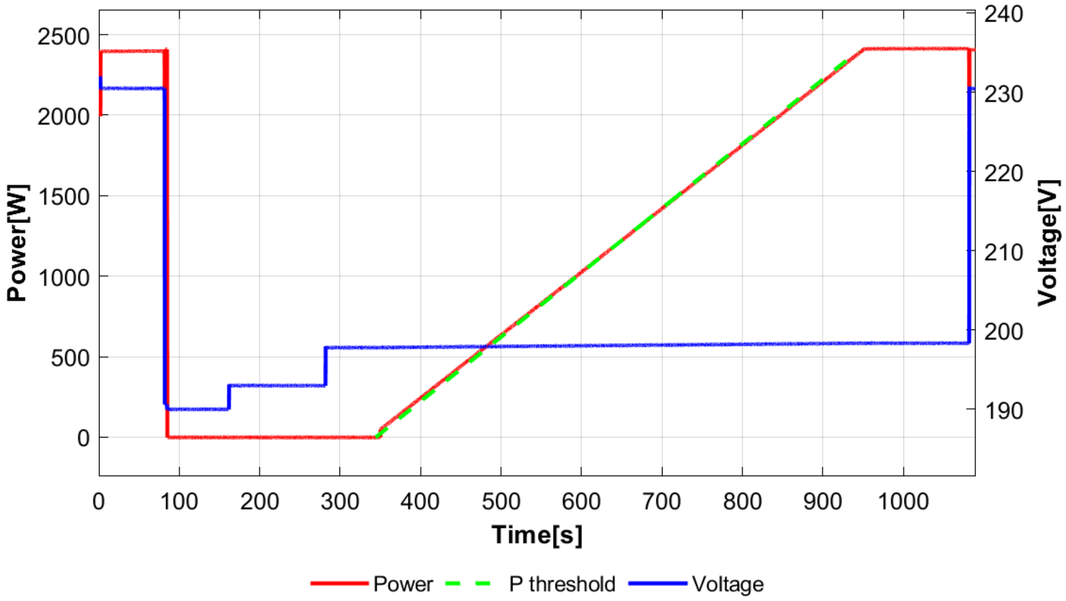


Condition	Measurement		Limitation	
	Delay time [s]	Power Gradient [per mimute]	Delay time	Power Gradient
Reonnection:				
U>110%Un	64.80	9.95%	≥60s	≤10%Pn/minutes
U<85%Un	66.80	9.93%		
f>50.2Hz	66.40	9.72%		
f<49.5Hz	67.00	9.75%		

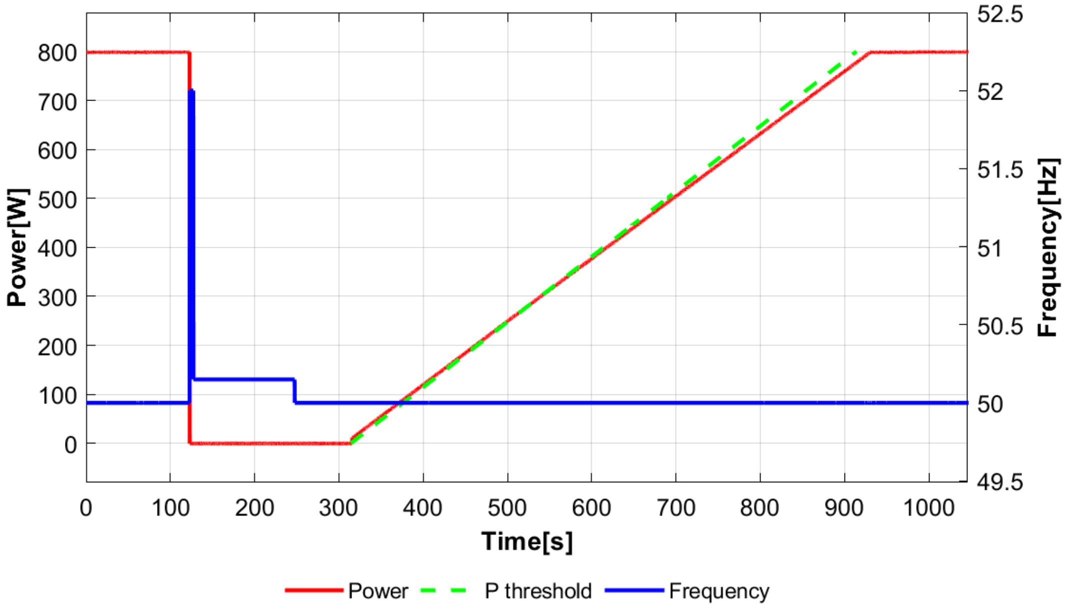
U>110%Un



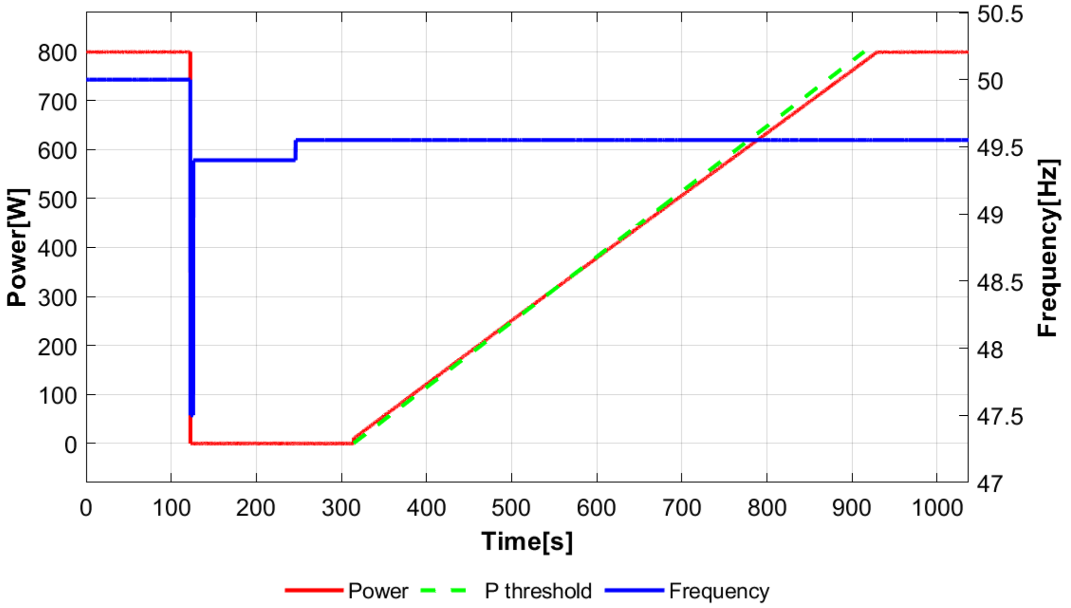
U<85%Un



f>50.2Hz

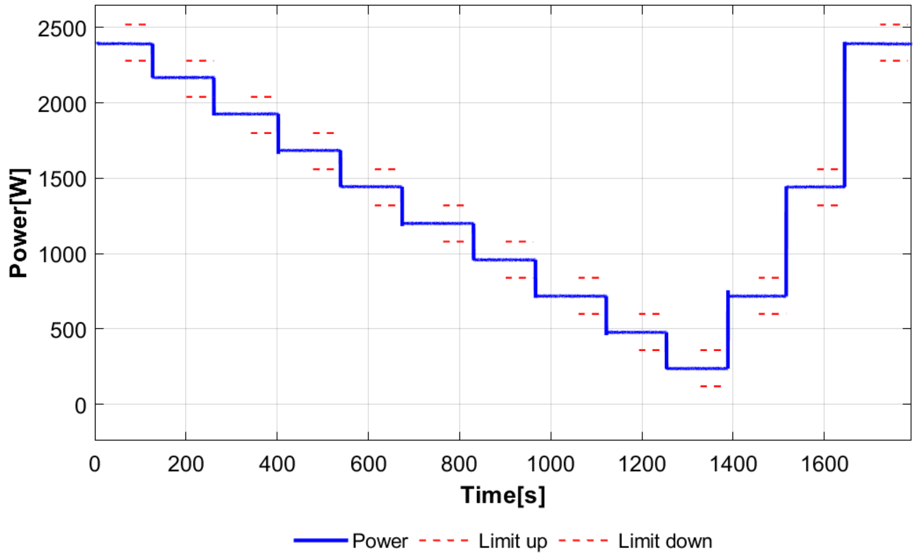


f<49.5Hz



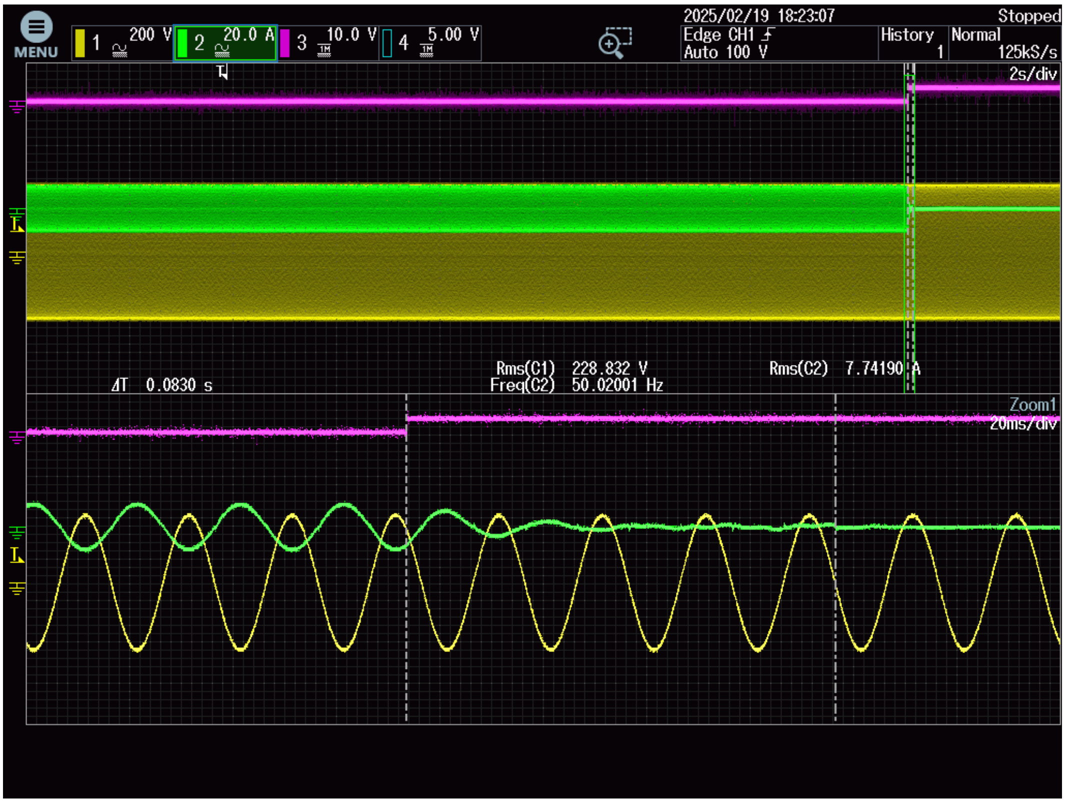
Note(s):

5.10	**TABLE: Active power reduction on set point**					P
Active power step [p.u. of Pn]	Requested set point value	Actual value		accuracy Actual value - Set point		Limit
P/Pn	P (W)	P (W)	P/Pn [p.u.]	ΔP (W)	ΔP/Pn [p.u.]	ΔP/Pn [p.u.]
100%	2400	2392.01	99.67%	-7.99	-0.33%	± 5%Pn
90%	2160	2168.70	90.36%	8.70	0.36%	
80%	1920	1926.77	80.28%	6.77	0.28%	
70%	1680	1684.66	70.19%	4.66	0.19%	
60%	1440	1444.14	60.17%	4.14	0.17%	
50%	1200	1200.59	50.02%	0.59	0.02%	
40%	960	958.81	39.95%	-1.19	-0.05%	
30%	720	718.32	29.93%	-1.68	-0.07%	
20%	480	477.97	19.92%	-2.03	-0.08%	
10%	240	237.55	9.90%	-2.45	-0.10%	
30%	720	718.02	29.92%	-1.98	-0.08%	± 5%Pn
60%	1440	1443.00	60.13%	3.00	0.13%	
100%	2400	2391.38	99.64%	-8.62	-0.36%	



Test Conditions	Measurements	Limitation
P/Pn	Gradient	Gradient
90% to 10%	0.52%Pn/s	0.33-0.66%Pn/s

Note(s):

5.11	**TABLE: Remote information exchange**	P
Test Conditions	Measurements [s]	∆ Limit
Command signal from connection to disconnection	0.083	≤ 5s
		
Note(s):		

MENU
1 200 V
2 20.0 A
3 10.0 V
4 5.00 V
2025/02/19 18:23:07
Edge CH1
Auto 100 V
History 1
Normal
Stopped
125kS/s
2s/div
ΔT 0.0830 s
Rms(C1) 228.832 V
Freq(C2) 50.02001 Hz
Rms(C2) 7.74190 A
Zoom1
20ms/div

5.12	**TABLE: Requirements regarding single fault tolerance of interface protection system and interface switch**	P

☒ Integrated interface switch

☒ Complied with DIN EN 62109-2

Switch manufacturer and type: XIAMEN HONGFA ELECTROACOUSTIC CO LTD, HF140FF-G.

Response time of interface switch for integrated NS protection:20ms

The max. initial short-circuited current of PGU Ik”: 16A

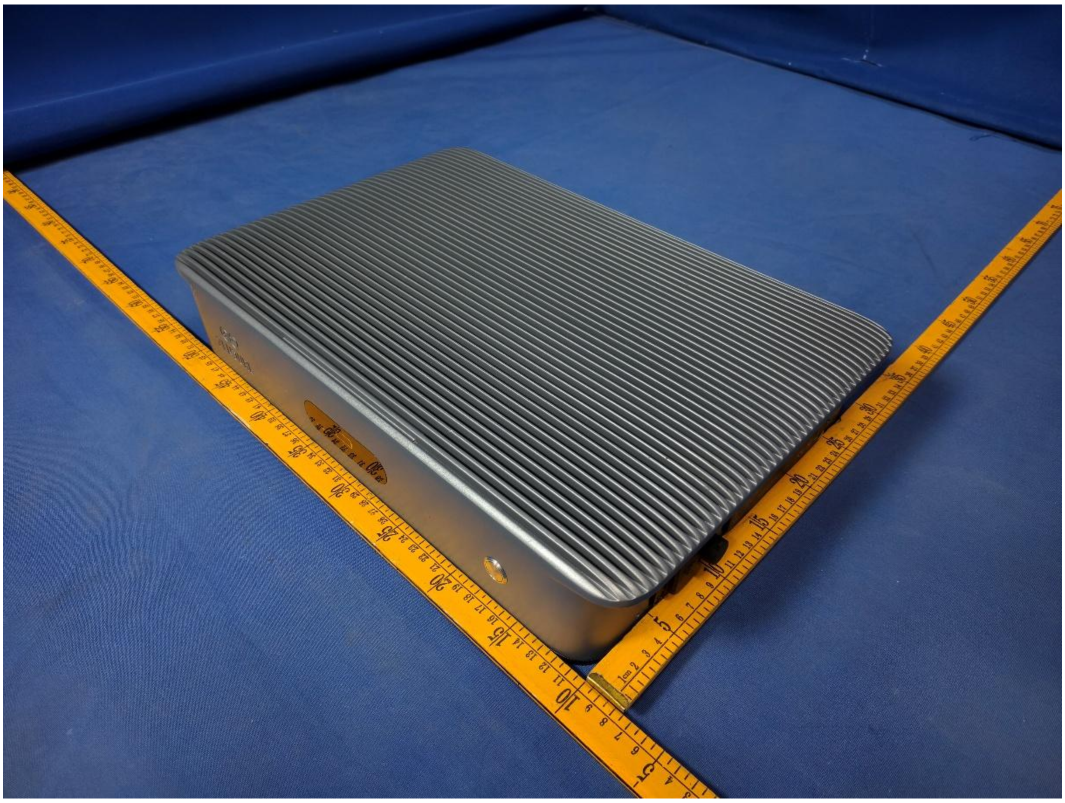
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
1.	PV input	Reverse before start up	50Vdc	10min	--	--	Cannot be connected to the grid normally, can be connected to the grid normally after recovery
2.	AC output	SC	50Vdc	10min	--	--	Output protection, transient short-circuit current 211A
3.	C7	S-C	50Vdc	10min	--	--.	Components damage, output shutdown, no danger
4.	C1	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
5.	Q1 2-3	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
6.	Q2 2-3	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
7.	Q3 2-3	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
8.	Q6 1-2	S-C	50Vdc	10min	--	--	Components damage, output shutdown, no danger
9.	T3 6-7	S-C	50Vdc	10min	--	--	Output shutdown, no damage, no danger, recoverable
10.	Q15 2-3	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
11.	C 304	S-C	50Vdc	10min	--	--	Components damage, output shutdown, no danger
12.	T5 9-10	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
13.	Q49 2-3	S-C	50Vdc	10min	--	--	Components damage, output shutdown, no danger
14.	Q50 2-3	S-C	50Vdc	10min	--	--	Components damage, output shutdown, no danger
15.	Q27 2-3	S-C	50Vdc	10min	--	--	Output shutdown, no damage, no danger, recoverable
16.	C267	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
17.	U22 1-4	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
18.	U22 2-3	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger

19.	C 214	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
20.	D50 1-2	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger
21.	D 38	S-C	50Vdc	10min	--	--	Normal working, no damage, no danger

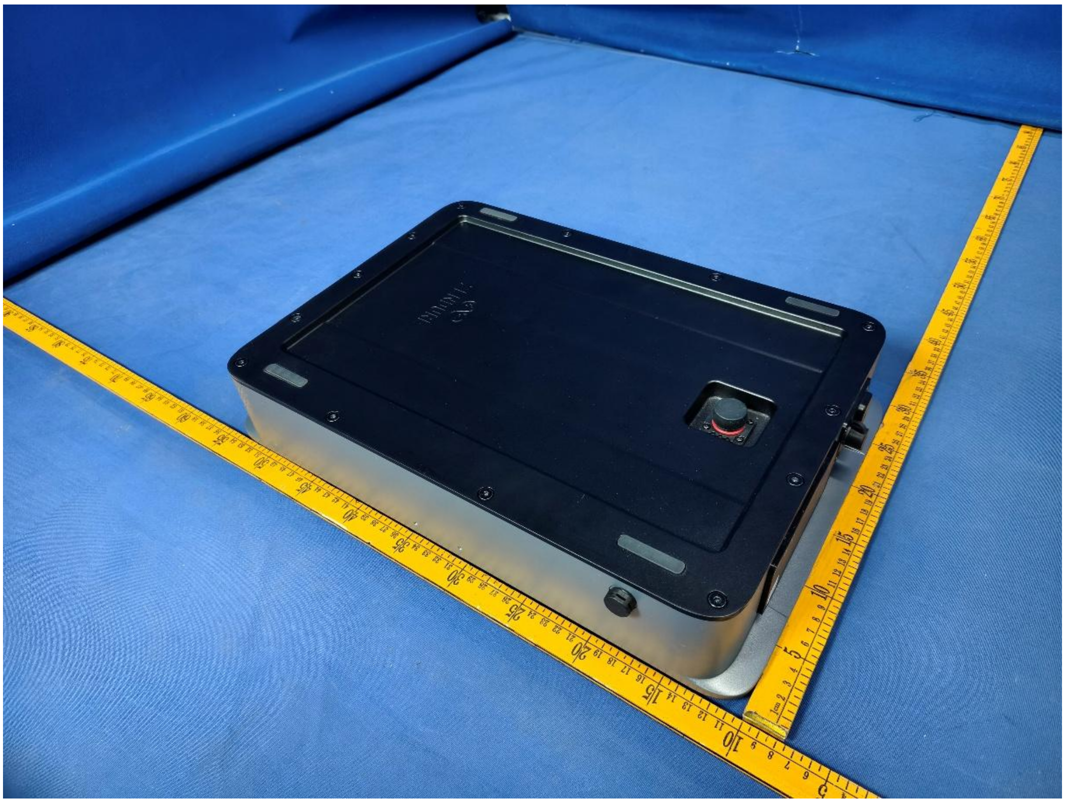
Supplement:

s-c: short-circuited, o-c: open-circuited, o-l: overload

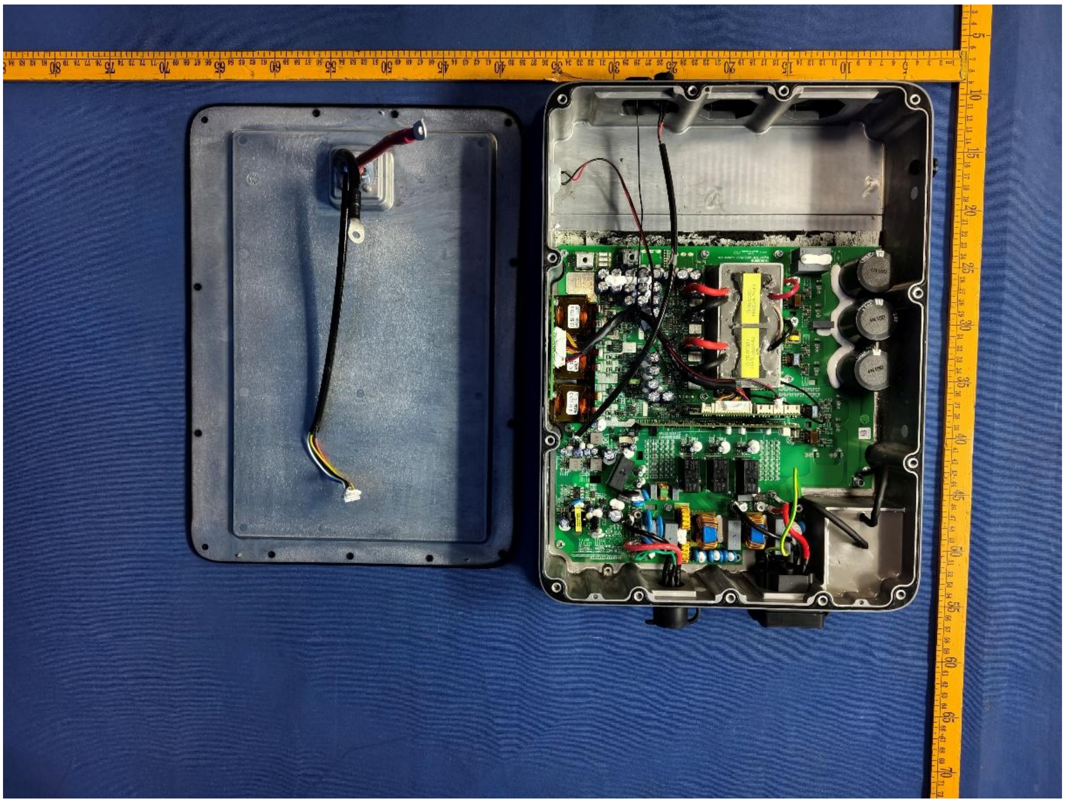
Appended photos



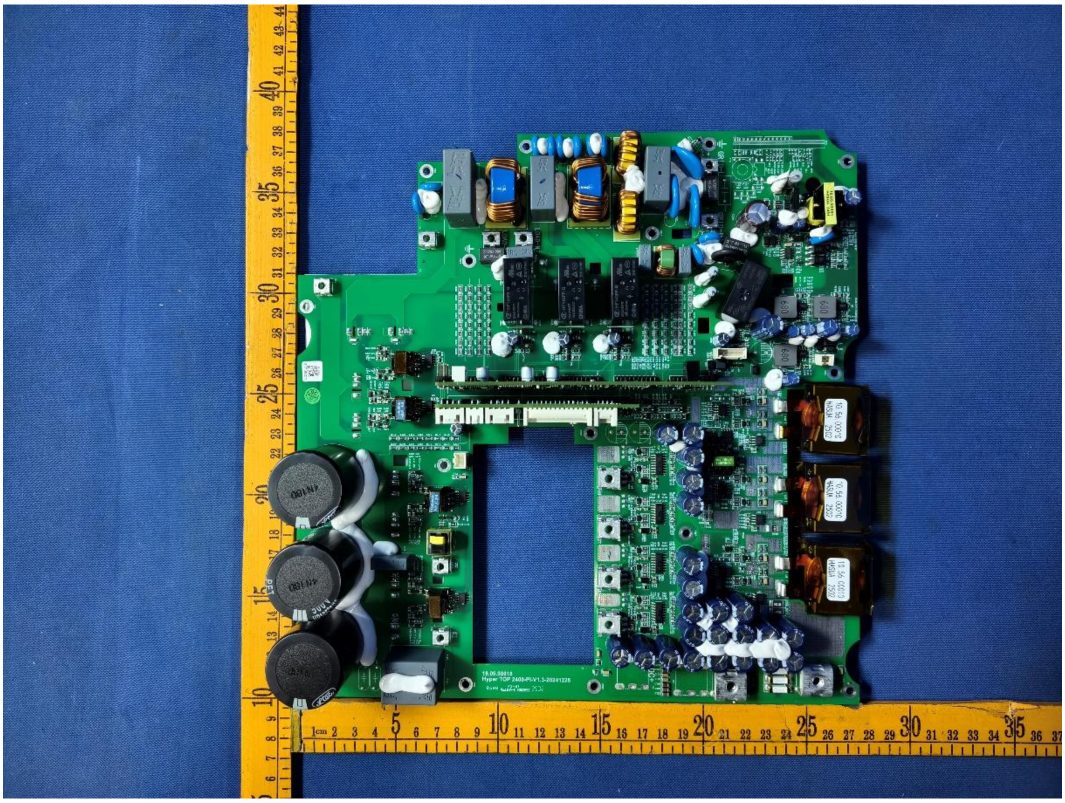
Overview



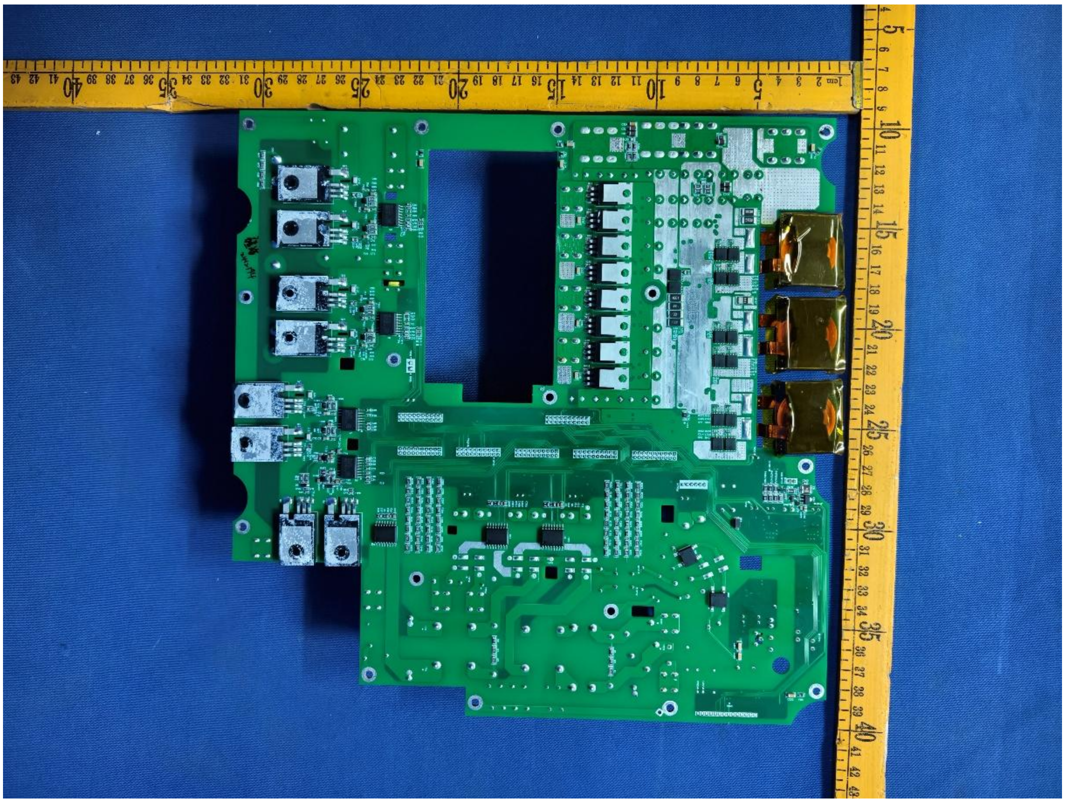
Bottom view



Internal view



Power board view (Components side)



Power board view (Soldered side)

--- End of test report---