Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

Prüfbericht-Nr.: *Test report no.*:	**CN26H8IB 001**	**Auftrags-Nr.:** *Order no.*:	27224645	Seite 1 von 10 *Page 1 of 10*
Kunden-Referenz-Nr.: *Client reference no.*:	2752991	**Auftragsdatum:** *Order date:*	2026-03-18	
Auftraggeber: *Client*:	**SunEnergyXT Holdings S.à r.l.** 1 Rue Jean Piret L-2350 Luxembourg			
Prüfgegenstand: *Test item*:	Hybrid Energy Storage System			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	SunEnergyXT 500, SunEnergyXT 500 PRO			
Auftrags-Inhalt: *Order content*:	A3 certificate			
Prüfgrundlage: *Test specification*:	VDE-AR-N 4105/11.18 Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks DIN VDE V 0124-100/06.20 Grid integration of generator plants – Low-voltage – Test requirements for generator units to be connected to and operated in parallel with low-voltage distribution networks			

Wareneingangsdatum: *Date of sample receipt*:	2026-03-19
Prüfmuster-Nr.: *Test sample no:*	A004232903-001
Prüfzeitraum: *Testing period*:	2026-03-19 - 2026-03-23
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shenzhen) Co., Ltd.
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.
Prüfergebnis*: *Test result**:	Pass



erstellt von: *created by:*	Kenny Mai	**genehmigt von:** *authorized by*:	Gaison Li
Datum: *Date:* 2026-03-27		**Ausstellungsdatum:** *Issue date:* 2026-03-27	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Sachverständige(r)/Expert

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Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*: Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

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Prüfbericht-Nr.: CN26H8IB 001
Test report no.:

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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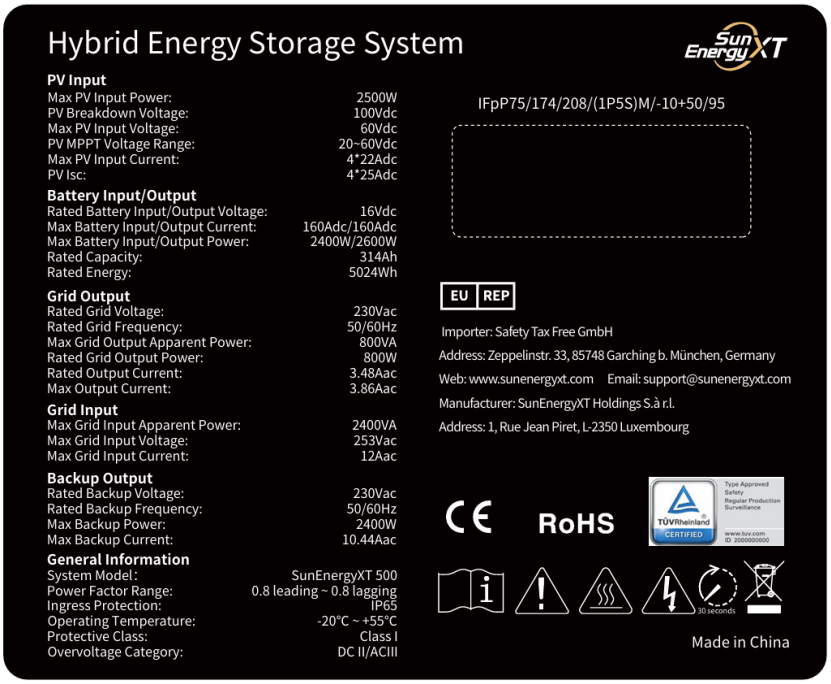
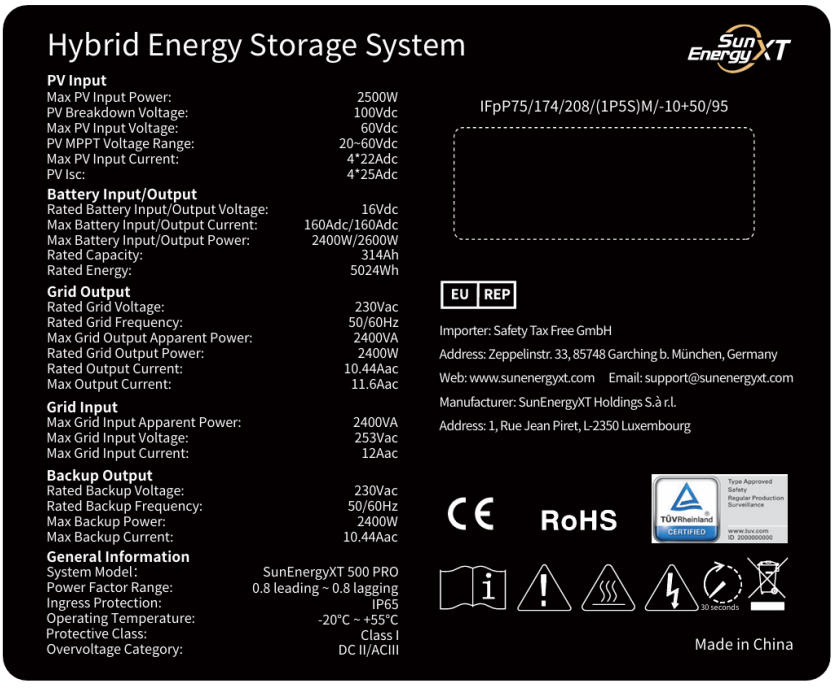
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2023, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2023, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.*

Liste der verwendeten Prüfmittel
List of used test equipment

1	**Produktdetails** *Product details*	See below.

Copy of marking plate:





Produktbeschreibung
Product description

General product information:

Product Description:

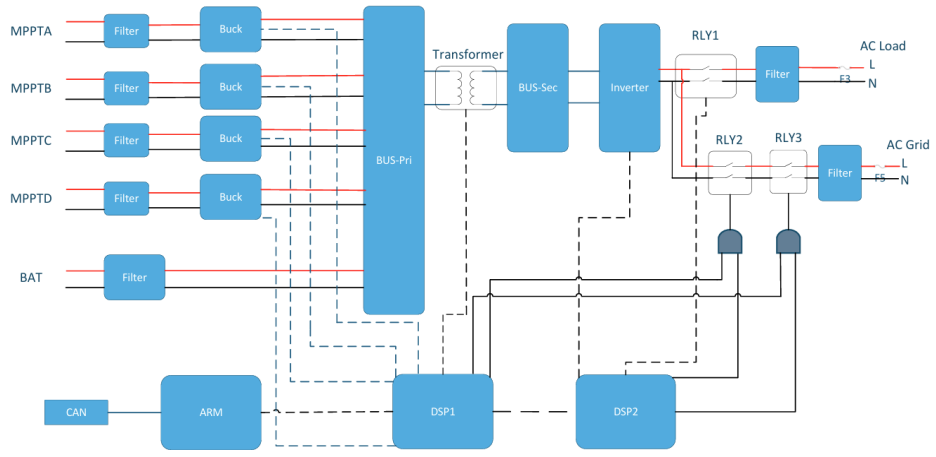
The equipment with model name SunEnergyXT 500 PRO, SunEnergyXT 500 are single-phase Energy Storage System, which will be installed and connected to the grid after installation. The equipment shall be fixed to suitable manner as specified in the installation instruction.

Model difference:

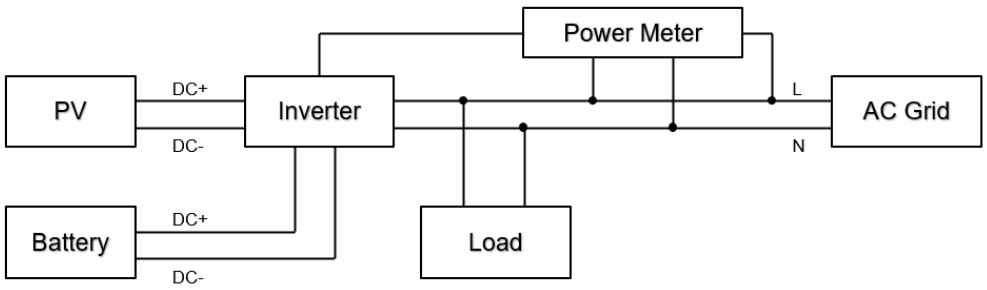
The models SunEnergyXT 500 PRO and SunEnergyXT 500 are the same in construction, hardware, and software, except that the output power is different due to being adjusted by software.

Model		SunEnergyXT 500 PRO	SunEnergyXT 500
AC output (On Grid)	Rated Output Power [kW]	2.4	0.8
	Max. Output Apparent power [kVA]	2.4	0.8
	Rated Output Current [A]	10.44	3.48
	Max. Output Current [A]	11.6	3.86

The system diagram block is shown as below:



$P_{AV,E}$ monitoring device and scheme:



Produktbeschreibung
Product description

The user can set the export limit(Power Meter) through the monitoring platform of the Converter to control the power output from the converter to the grid.
Export Restriction Control Procedures:
1.Select Export limitation setting
2.Enter password: XXX
3.Select setup type and enter the export limit value

Meter:
Meter Model: SHELLY PRO 3EM
Manufacturer: Allterco Robotics EOOD

MODELS LIST

MODELS LIST		SunEnergyXT 500 PRO	SunEnergyXT 500
PV Input	V_{MAX} PV [Vdc]	60	
	ISC PV [A]	4*25	
	MPPT Voltage Range VMPP [Vdc]	20-60	
	Max. Input Current IMAX [A]	4*22	
	MPPT Full Power Voltage Range [Vdc]	27.5-58	
	Number of MPPT	4	
	String per MPPT	1	
	Overvoltage Category (OVC)	II	
Battery Input/output	Battery Type	LiFePO4	
	Battery voltage range [V]	14 -18	
	Rated battery voltage [V]	16	
	Max continuous charging current [A]	160	
	Max continuous discharging current [A]	160	
	Max charging power [kW]	2.4	
	Max discharging power [kW]	2.6	
	Rated Capacity [Ah]	314	

Produktbeschreibung
Product description

	Rated Energy [Wh]	5024	
	Overvoltage Category (OVC)	II	
AC input (Grid)	Rated Input Voltage [Vac]	230	
	Rated Input Frequency [Hz]	50/60	
	Max. Input power [kW]	2.4	
	Max. Input Current [A]	12	
	Overvoltage Category (OVC)	III	
AC output (On Grid)	Rated Output Voltage [Vac]	230	
	Rated Output Frequency [Hz]	50/60	
	Rated Output Power [kW]	2.4	0.8
	Max. Output Apparent power [kVA]	2.4	0.8
	Rated Output Current [A]	10.44	3.48
	Max. Output Current [A]	11.6	3.86
	Power Factor cosφ [λ]	0.8 leading~0.8 lagging	
	Overvoltage Category (OVC)	III	
AC output (Off Grid)	Rated output power [kW]	2.4	
	Max. output apparent power [kVA]	2.4	
	Max. output current [A]	10.44	
	Rated output voltage [Vac]	230	
	Rated output frequency [Hz]	50/60	
	Overvoltage Category (OVC)	III	

Produktbeschreibung
Product description

CONSTRUCTION	Firmware version	V2.1
	Hardware version	V2.1
	Type of inverter	Isolated
	Type of NS Protection	Integrated
	Protective Class	I
	Enclosure Protection (IP)	IP65
	Acoustic Noise	＜35dB
	Operating Temperature Range [ºC]	-20°C ~55°C (Derating above 45°C)
	Pollution degree (PD)	3
	Altitude [m]	2000
	Size W*H*D [mm]	536*379.7*307
	Weight [kg]	58±1
Note:		

Produktbeschreibung
Product description

2	**Maße / Gewicht** *Dimensions / Weight*	See models list
3	**Bedienelemente** *Operating elements*	N/A
4	**Ausstattung / Zubehör** *Equipment / Accessories*	N/A
5	**Verwendete Materialien** *Used materials*	N/A
6	**Sonstiges** *Other*	N/A

Absatz *Clause*	Anforderungen - Prüfungen *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
1	**Anwendungsbereich** **Scope** Details zur Ausgestaltung der messtechnischen Nachweise und zur Dokumentation der Messergebnisse sind in DIN VDE-V 0124-100 (VDE V 0124-100):2020-06 beschrieben. ***Details on the design of the measuring certificates and the documentation of the measurement results are described in DIN VDE-V 0124-100 (VDE V 0124-100):2020-06.***		

ANLAGE zum Prüfbericht-Nr.: CN26H8IB 001
APPENDIX to Test Report No.:

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

List of Appendix :

- CN26H8IB 001 attachment 1–VDE V 0124-100: 2020 Test report (143 pages)
- CN26H8IB 001 attachment 2– Photo documentation (11 pages exculding cover page)

-End of test report-

Absatz	Anforderungen - Prüfungen	Messergebnisse - Bemerkungen	Bewertung
Clause	*Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

	DIN VDE V 0124-100/06.20	
1	**Anwendungsbereich** ***Scope***	
	Diese DIN-VDE-Vornorm dient dem Nachweis der elektrischen Eigenschaften von Erzeugungseinheiten (EZE) nach der VDE-AR N 4105:2018-11 und gegebenenfalls anderen Netzanschlussbedingungen. *This DIN VDE preliminary standard serves to verify the electrical properties of power generation units (PGU) in accordance with VDE-AR N 4105:2018-11 and, if applicable, other grid connection conditions.*	
5	**Prüfungen** ***Tests***	
5.1	**Allgemeines** ***General information***	**P**
5.2	**Nachweis zulässger Netzrückwirkungen** ***Verification of permitted network reaction***	**P**
5.3	**Nachweis des Symmetrieverhaltens von Umrichtern** ***Verification of symmetry behaviour of inverter***	**P**
5.4	**Nachweis des Verhaltens der Erzeugungseinheit am Netz** ***Verification of behaviours of PGU on grid***	**P**
5.5	**Nachweis des NA-Schutzes** ***Verification of NS-protections***	**P**
5.6	**Zuschaltbedingungen und Synchronisierung** ***Connection conditions and synchrouzation***	**P**
5.7	**Nachweis der PAV,E-überwachung** ***Verification of PAV,E-monitoring***	**P**
5.8	**Nachweis der dynamischen Netzstützung** ***Verification of dynamic network support***	**P**

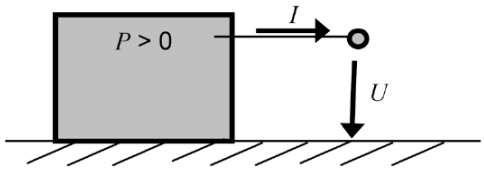
ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

See following pages for test data.

Test Engineer:	Kenny Mai	Reviewer:	Gaison Li
Signature:	see cover page	Signature:	see cover page

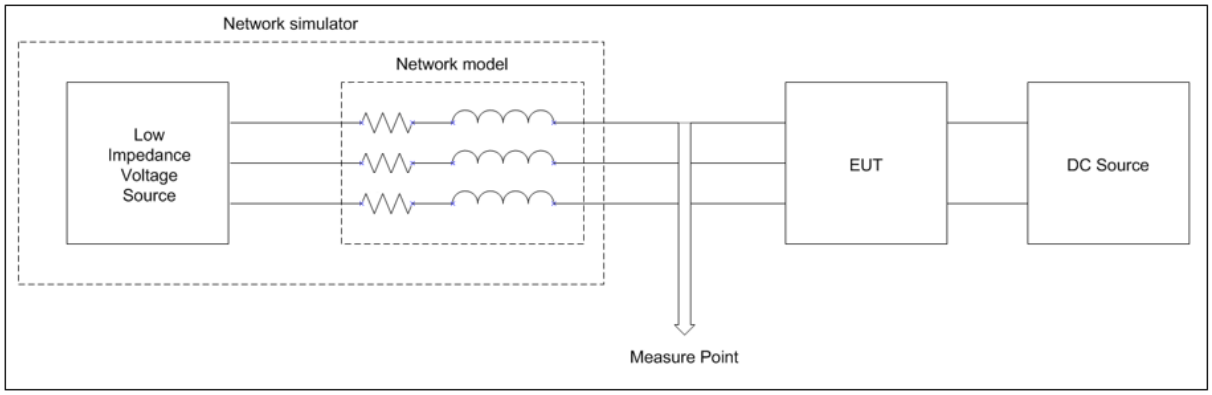
Testing Location:	
Name:	see cover page
Address:	see cover page

Test Sample No.:	see cover page

Test Condition:	Generator reference system applied in test: 

Test Date:	see cover page

Test bench diagram:



A network model (grid impedance simulator) only connected in test bench in flicker test (<75A condition), in the other tests the network model is bypassed.

Test items			Remark
5.2	Verification of permitted network reaction		P
5.2.2	Rapid voltage change (Kimax)		P
5.2.3	Flicker		P
5.2.4	Harmonics and Inter-harmonics (I inter, I higher)		P
5.2.5	Commutation notches		N/A
5.2.6	DC current feeding to network (Idc)		P
5.3	Verification of symmetry behaviours of inverter		N/A
5.3.2	Tests of three-phase inverter (Imbalance)		N/A
5.3.3	Symmetry operation with a symmetry device		N/A
5.4	Verification of behaviours of PGU on network		P
5.4.2	Measurement of active- and reactive power ranges (P&Q range)		P
5.4.3	Active power reduction through setting provision (P control)		P
5.4.4	Active power output of PGU by over-frequency (LFSM-O)		P
5.4.5	Active power output of ESS by over-frequency (LFSM-O)		P
5.4.6	Active power output of PGU by under-frequency (LFSM-U)		P
5.4.7	Active power output of ESS by under-frequency (LFSM-U)		P
5.4.8.2	Tests of reactive power / displacement factor setting accuracy (Fixed cosφ)		P
5.4.8.3	Tests of displacement factor- / active power character curve (cosφ(P))		P
5.4.8.4	Tests of reactive power-voltage character curve (Q(U))		P
5.5	Verification of NS-protection		P
5.5.2	NS-protection		P
5.5.3	Central NS-protecton		N/A
5.5.4	Integrated NS-protection		P
5.5.6	Interface switch (Functional safety)		P
5.5.7	Protection devices and protection settings (OV/UV, OF/UF)		P
5.5.9	Constructional features of NS protection		P
5.5.10	Islanding detection		P
5.6	Connection conditions and synchronization (Reconnection)		P
5.7	Verification of $P_{AV,E}$ monitoring		P
5.8	Verification of dynamic network supporting (FVRT)		P

5.2.2	TABLE: Rapid voltage change (Kimax)			P
Test Conditions	Measurements			Limit
	U [V]	I [A]	Ki	Ki
Starting to 50%Pn	230.12	5.239	0.502	≤ 1.2
Starting to 100% Pn	230.15	10.47	1.003	≤ 1.2
Stopping at 100% Pn	230.10	0.457	0.043	≤ 1.2
Note(s):				

5.2.3	TABLE: Flicker				P
L1					
Measurement	Plt	0.015			
	Limit	0.65			
	Pst	dc[%]	dmax[%]	d(t)[ms]	$C_{\Psi k}$
	1.0	3.3	4.0	500	--
1	0.015	0.008	0.54	0.00	--
2	0.015	0.001	0.54	0.00	--
3	0.015	0.005	0.54	0.00	--
4	0.015	0.004	0.53	0.00	--
5	0.015	0.011	0.53	0.00	--
6	0.015	0.004	0.53	0.00	--
7	0.015	0.008	0.53	0.00	--
8	0.015	0.006	0.53	0.00	--
9	0.015	0.005	0.53	0.00	--
10	0.015	0.008	0.53	0.00	--
11	0.015	0.008	0.53	0.00	--
12	0.015	0.010	0.53	0.00	--
L2					
Measurement	Plt	--			
	Limit	0.65			
	Pst	dc[%]	dmax[%]	d(t)[ms]	$C_{\Psi k}$
	1.0	3.3	4.0	500	--
1	--	--	--	--	--
2	--	--	--	--	--
3	--	--	--	--	--
4	--	--	--	--	--
5	--	--	--	--	--
6	--	--	--	--	--
7	--	--	--	--	--
8	--	--	--	--	--
9	--	--	--	--	--
10	--	--	--	--	--
11	--	--	--	--	--

12	--	--	--	--	--
L3					
Measurement	Plt	--			
	Limit	0.65			
	Pst	dc[%]	dmax[%]	d(t)[ms]	$C_{\Psi k}$
	1.0	3.3	4.0	500	--
1	--	--	--	--	--
2	--	--	--	--	--
3	--	--	--	--	--
4	--	--	--	--	--
5	--	--	--	--	--
6	--	--	--	--	--
7	--	--	--	--	--
8	--	--	--	--	--
9	--	--	--	--	--
10	--	--	--	--	--
11	--	--	--	--	--
12	--	--	--	--	--

Note(s): PGU and ESS with nominal current ≤75A (Per DIN EN 61000-3-3 / DIN EN 61000-3-11)

5.2.4	TABLE: Iinter & Ihigher											P
Harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
Order No.	I/In [%]											
2	0.053	0.059	0.053	0.033	0.062	0.077	0.081	0.105	0.109	0.118	0.138	1.080
3	0.119	0.120	0.189	0.172	0.150	0.173	0.144	0.152	0.176	0.166	0.198	2.300
4	0.033	0.034	0.055	0.029	0.020	0.029	0.034	0.032	0.043	0.040	0.031	0.430
5	0.146	0.180	0.139	0.143	0.134	0.148	0.114	0.161	0.151	0.176	0.186	1.140
6	0.035	0.030	0.019	0.018	0.016	0.021	0.025	0.028	0.026	0.024	0.023	0.300
7	0.228	0.158	0.151	0.153	0.144	0.207	0.138	0.144	0.126	0.165	0.156	0.770
8	0.028	0.019	0.043	0.017	0.017	0.031	0.046	0.036	0.030	0.026	0.023	0.230
9	0.286	0.268	0.288	0.250	0.217	0.249	0.228	0.244	0.200	0.225	0.231	0.400
10	0.023	0.018	0.027	0.015	0.019	0.018	0.019	0.029	0.024	0.018	0.026	0.184
11	0.227	0.387	0.239	0.371	0.291	0.295	0.336	0.298	0.282	0.265	0.282	0.330
12	0.048	0.034	0.043	0.055	0.058	0.059	0.064	0.069	0.074	0.064	0.056	0.153
13	0.293	0.369	0.353	0.262	0.307	0.294	0.244	0.275	0.294	0.280	0.276	0.210
14	0.023	0.022	0.035	0.022	0.025	0.025	0.031	0.027	0.031	0.035	0.038	0.131
15	0.334	0.344	0.397	0.309	0.426	0.484	0.331	0.432	0.633	0.774	0.878	0.150
16	0.033	0.029	0.033	0.038	0.043	0.044	0.038	0.043	0.043	0.047	0.054	0.115
17	0.302	0.298	0.303	0.398	0.262	0.432	0.372	0.355	0.460	0.601	0.699	0.132
18	0.033	0.037	0.024	0.045	0.040	0.042	0.042	0.045	0.045	0.045	0.057	0.102
19	0.261	0.227	0.241	0.207	0.186	0.220	0.279	0.226	0.266	0.349	0.442	0.118
20	0.031	0.031	0.038	0.033	0.025	0.029	0.027	0.023	0.027	0.023	0.026	0.092
21	0.180	0.151	0.120	0.113	0.196	0.123	0.213	0.195	0.192	0.228	0.302	0.107
22	0.027	0.027	0.034	0.021	0.020	0.020	0.020	0.014	0.017	0.020	0.019	0.084
23	0.129	0.127	0.166	0.164	0.168	0.127	0.171	0.190	0.147	0.171	0.209	0.098
24	0.030	0.028	0.025	0.021	0.018	0.022	0.021	0.022	0.018	0.019	0.019	0.077
25	0.099	0.089	0.091	0.114	0.067	0.071	0.054	0.102	0.088	0.075	0.081	0.090
26	0.020	0.019	0.023	0.023	0.020	0.026	0.030	0.024	0.030	0.027	0.027	0.071
27	0.113	0.097	0.083	0.100	0.051	0.053	0.027	0.032	0.078	0.083	0.067	0.083
28	0.024	0.015	0.016	0.017	0.023	0.016	0.016	0.020	0.019	0.017	0.017	0.066
29	0.077	0.076	0.104	0.046	0.054	0.066	0.030	0.045	0.071	0.058	0.044	0.078
30	0.020	0.018	0.019	0.016	0.019	0.020	0.025	0.022	0.023	0.021	0.019	0.061
31	0.097	0.105	0.116	0.097	0.082	0.057	0.030	0.024	0.053	0.057	0.045	0.073
32	0.015	0.010	0.011	0.018	0.015	0.017	0.018	0.017	0.019	0.019	0.022	0.058
33	0.106	0.125	0.095	0.110	0.101	0.048	0.041	0.019	0.030	0.051	0.052	0.068
34	0.013	0.011	0.011	0.011	0.011	0.017	0.023	0.021	0.020	0.021	0.022	0.054
35	0.102	0.131	0.124	0.062	0.079	0.034	0.057	0.026	0.015	0.037	0.045	0.064
36	0.022	0.018	0.018	0.027	0.025	0.039	0.043	0.040	0.040	0.040	0.039	0.051
37	0.074	0.099	0.067	0.039	0.016	0.040	0.054	0.024	0.042	0.048	0.042	0.061
38	0.022	0.022	0.023	0.025	0.026	0.042	0.042	0.034	0.041	0.040	0.044	0.048
39	0.066	0.083	0.055	0.068	0.037	0.043	0.037	0.018	0.026	0.041	0.054	0.058
40	0.034	0.034	0.040	0.036	0.038	0.049	0.048	0.044	0.046	0.042	0.044	0.046
Note(s): The max. value of three phases were chosen.												

Inter-harmonics												
P/Pn [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [Hz]	I/In [%]											
75	--	--	--	--	--	--	--	--	--	--	--	--
125	--	--	--	--	--	--	--	--	--	--	--	--
175	--	--	--	--	--	--	--	--	--	--	--	--
225	--	--	--	--	--	--	--	--	--	--	--	--
275	--	--	--	--	--	--	--	--	--	--	--	--
325	--	--	--	--	--	--	--	--	--	--	--	--
375	--	--	--	--	--	--	--	--	--	--	--	--
425	--	--	--	--	--	--	--	--	--	--	--	--
475	--	--	--	--	--	--	--	--	--	--	--	--
525	--	--	--	--	--	--	--	--	--	--	--	--
575	--	--	--	--	--	--	--	--	--	--	--	--
625	--	--	--	--	--	--	--	--	--	--	--	--
675	--	--	--	--	--	--	--	--	--	--	--	--
725	--	--	--	--	--	--	--	--	--	--	--	--
775	--	--	--	--	--	--	--	--	--	--	--	--
825	--	--	--	--	--	--	--	--	--	--	--	--
875	--	--	--	--	--	--	--	--	--	--	--	--
925	--	--	--	--	--	--	--	--	--	--	--	--
975	--	--	--	--	--	--	--	--	--	--	--	--
1025	--	--	--	--	--	--	--	--	--	--	--	--
1075	--	--	--	--	--	--	--	--	--	--	--	--
1125	--	--	--	--	--	--	--	--	--	--	--	--
1175	--	--	--	--	--	--	--	--	--	--	--	--
1225	--	--	--	--	--	--	--	--	--	--	--	--
1275	--	--	--	--	--	--	--	--	--	--	--	--
1325	--	--	--	--	--	--	--	--	--	--	--	--
1375	--	--	--	--	--	--	--	--	--	--	--	--
1425	--	--	--	--	--	--	--	--	--	--	--	--
1475	--	--	--	--	--	--	--	--	--	--	--	--
1525	--	--	--	--	--	--	--	--	--	--	--	--
1575	--	--	--	--	--	--	--	--	--	--	--	--
1625	--	--	--	--	--	--	--	--	--	--	--	--
1675	--	--	--	--	--	--	--	--	--	--	--	--
1725	--	--	--	--	--	--	--	--	--	--	--	--
1775	--	--	--	--	--	--	--	--	--	--	--	--
1825	--	--	--	--	--	--	--	--	--	--	--	--
1875	--	--	--	--	--	--	--	--	--	--	--	--
1925	--	--	--	--	--	--	--	--	--	--	--	--
1975	--	--	--	--	--	--	--	--	--	--	--	--
Note(s): The max. value of three phases were chosen.												

Higher frequency Harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [kHz]	I/In [%]											
2.1	--	--	--	--	--	--	--	--	--	--	--	--
2.3	--	--	--	--	--	--	--	--	--	--	--	--
2.5	--	--	--	--	--	--	--	--	--	--	--	--
2.7	--	--	--	--	--	--	--	--	--	--	--	--
2.9	--	--	--	--	--	--	--	--	--	--	--	--
3.1	--	--	--	--	--	--	--	--	--	--	--	--
3.3	--	--	--	--	--	--	--	--	--	--	--	--
3.5	--	--	--	--	--	--	--	--	--	--	--	--
3.7	--	--	--	--	--	--	--	--	--	--	--	--
3.9	--	--	--	--	--	--	--	--	--	--	--	--
4.1	--	--	--	--	--	--	--	--	--	--	--	--
4.3	--	--	--	--	--	--	--	--	--	--	--	--
4.5	--	--	--	--	--	--	--	--	--	--	--	--
4.7	--	--	--	--	--	--	--	--	--	--	--	--
4.9	--	--	--	--	--	--	--	--	--	--	--	--
5.1	--	--	--	--	--	--	--	--	--	--	--	--
5.3	--	--	--	--	--	--	--	--	--	--	--	--
5.5	--	--	--	--	--	--	--	--	--	--	--	--
5.7	--	--	--	--	--	--	--	--	--	--	--	--
5.9	--	--	--	--	--	--	--	--	--	--	--	--
6.1	--	--	--	--	--	--	--	--	--	--	--	--
6.3	--	--	--	--	--	--	--	--	--	--	--	--
6.5	--	--	--	--	--	--	--	--	--	--	--	--
6.7	--	--	--	--	--	--	--	--	--	--	--	--
6.9	--	--	--	--	--	--	--	--	--	--	--	--
7.1	--	--	--	--	--	--	--	--	--	--	--	--
7.3	--	--	--	--	--	--	--	--	--	--	--	--
7.5	--	--	--	--	--	--	--	--	--	--	--	--
7.7	--	--	--	--	--	--	--	--	--	--	--	--
7.9	--	--	--	--	--	--	--	--	--	--	--	--
8.1	--	--	--	--	--	--	--	--	--	--	--	--
8.3	--	--	--	--	--	--	--	--	--	--	--	--
8.5	--	--	--	--	--	--	--	--	--	--	--	--
8.7	--	--	--	--	--	--	--	--	--	--	--	--
8.9	--	--	--	--	--	--	--	--	--	--	--	--
Note(s): The max. value of three phases were chosen.												

5.2.5	TABLE: Commutation notches			N/A
Test Conditions P/ P_{Emax}	Measurements			
	I_{com} [A]			
	L1	L2	L3	
25% - 35%	--	--	--	
65% - 75%	--	--	--	
> 90%	--	--	--	
Note(s):				

5.2.6	TABLE: DC current feeding to network (Idc)			P
Test Conditions P/ P_{Emax}	Measurements			Limit
	Idc / In [%]			Idc/In
	L1	L2	L3	
30% - 40%	0.494%	--	--	0.5%
60% - 70%	0.259%	--	--	0.5%
> 95%	0.296%	--	--	0.5%
Note(s):				

5.3.2	TABLE: Tests of three-phase inverter (Imbalance)						N/A
Test Conditions		Measurements					Limit
cosφ	S/S_{Emax} [%]	S_{asy}/S_{Emax} [%]					S_{asy}/S_{Emax} [%]
1.0	100	--	--	--	--	--	≤ ±5
1.0	50	--	--	--	--	--	
Max. un	100	--	--	--	--	--	
Max. un	50	--	--	--	--	--	
Max. ov	100	--	--	--	--	--	
Max. ov	50	--	--	--	--	--	
Note(s): S_{asy}: Max. Asymmetry power among three phases.							

5.3.3	TABLE: Symmetry operation with a symmetry device		N/A
Test Conditions	Measurements [kVA]		Limit [kVA]
	Max. S_{1min}	Min. S_{1min}	S_{1min}
Interruption of symmetry device	--	--	≤ 4.83
Test Conditions	Measurements [kVA]		Limit [kVA]
	$S_{asy\ 100ms}$		S_{asy}
Cut-in a load in another phase	--		≤ 4.83
Cut-off a load in same phase	--		
Cut-in a generator	--		
Cut-off a generator for ESS in charging mode	--		
Cut-in a generator for ESS in charging mode	--		
Note(s): S_{1min}: The output power 1min after interruption of symmetry devices. $S_{asy100ms}$: Max. Asymmetry power among three phases 100ms after tripping of test condition.			

5.4.2	TABLE: Measurement of active- and reactive power ranges (P&Q range)					P		
Test Conditions		Measurements				Δ Limit		
U/Un	cosφ	U [V]	P_{max} [kW]	cosφ	S_{max} [kVA]	cosφ	P_{max}/ P_{Emax}	S_{max}/ S_{Emax}
0.9	1.0	207.20	2397.94	1.000	2398.02	--	≤102%	≤102%
1.0		230.20	2395.47	1.000	2395.60			
1.09		250.91	2395.45	1.000	2395.64			
0.9	Max.un	218.68	1950.02	-0.804	2423.85	≤0.95		
1.0		230.18	1948.39	-0.804	2422.94			
1.09		250.89	1954.62	-0.806	2424.60			
0.9	Max.ov	207.21	1931.01	0.803	2403.04			
1.0		230.21	1911.77	0.804	2378.66			
1.09		250.92	1933.28	0.806	2399.19			
Note(s):								

5.4.3(a)	TABLE: Active power reduction through setting provision (P control)		P
Test Conditions	Measurements		Limit
P/Pn [%]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	Δ P/Pn [%]
100	99.73	-0.27	≤ 5%
90	89.83	-0.17	
80	79.87	-0.13	
70	69.94	-0.06	
60	59.99	-0.01	
50	50.00	0.00	
40	40.08	0.08	
30	30.10	0.10	
20	20.12	0.12	
10	10.18	0.18	
No disconnection occur			Y

5.4.3(b)	TABLE: Active power reduction through setting provision (P control)	P
Test Conditions	Measurements	Limit
P/Pn [%]	ΔP/Δt [%Pn/s]	ΔP/Δt [%Pn/s]
100->5	0.41	0.33-0.66
5->100	0.42	

5.4.3(c)	TABLE: Active power reduction through setting provision (P control)		N/A
Test Conditions		Measurements	Limit
P/Pn [%]		P/Pn [%]	P/Pn [%]
Interface port 1	Interface port 2	Interface port 3		
70	90	50		
--	--	--	--	≤ 50
P/Pn [%]		P/Pn [%]	P/Pn [%]
Interface port 1	Interface port 2	Interface port 3		
60	100	80		
--	--	--	--	≤ 60
P/Pn [%]		P/Pn [%]	P/Pn [%]
Interface port 1	Interface port 2	Interface port 3		
90	50	70		
--	--	--	--	≤ 50

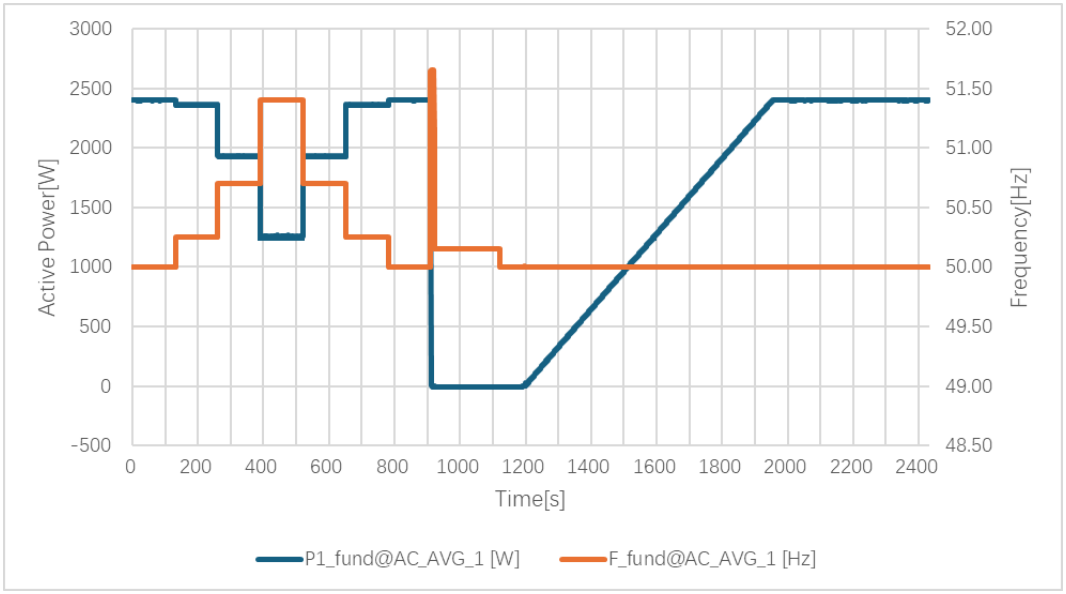
5.4.3(d)	TABLE: Active power reduction through setting provision (P control)	P
Test Conditions	Measurements	Limit
P/Pn [%]	$T_{response}$ [s]	$T_{response}$ [s]
100->0	0.40	≤ 5
Note(s):		

5.4.4(a)	TABLE: Active power output of PGU by over-frequency (LFSM-O)										P
LFSM-O settings	f_{active}		f_{stop}			$f_{deactive}$			Droop		
	50.2		N/A			50.2			5%(40%P_M/Hz)		
Test Conditions	Measurements						Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	99.98	50.00	--	--	--	100	-0.02	≤±10	≤2	≤20
50.25	100	98.28	50.25	0.2	0.7	0.1	98	0.28			
50.70	100	80.33	50.70	0.2	0.7	0.1	80	0.33			
51.40	100	52.40	51.40	0.2	0.8	0.1	52	0.40			
50.70	100	80.33	50.70	0.1	0.4	0.1	80	0.33			
50.25	100	98.30	50.25	0.2	0.5	0.1	98	0.30			
50.00	100	99.99	50.00	0.1	0.3	0.1	100	-0.01			
51.65	100	Disconnection					0	--			
50.15	100	No Reconnection					0	--			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.00	100	99.95	50.00	7.94	100	-0.05	≤±10	≤10

Note(s):

Plotting diagram:

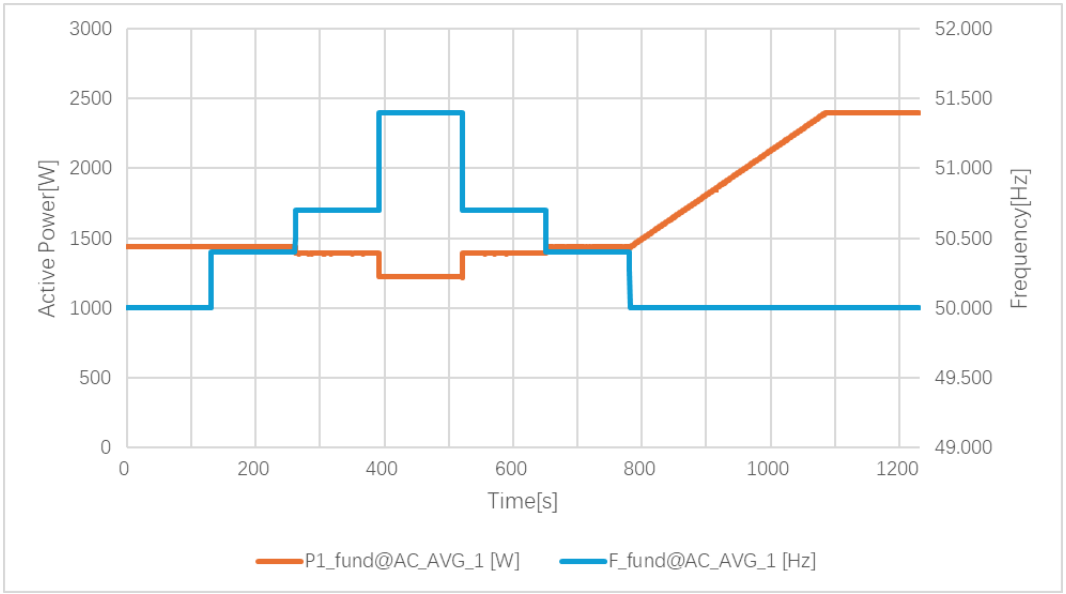


5.4.4(b)	TABLE: Active power output of PGU by over-frequency (LFSM-O)										P
LFSM-O settings	f_{active}		f_{stop}			$f_{deactive}$		Droop			
	50.5		N/A			50.2		12%(16.67%P_M/Hz)			
Test Conditions	Measurements						Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	60	59.99	50.00	--	--	--	60	-0.01	≤±10	≤2	≤20
50.40	60	60.01	50.40	--	--	--	60	0.01			
50.70	60->100	57.96	50.70	0.2	0.3	0.1	58	-0.04			
51.40	100	50.99	51.40	0.2	0.5	0.1	51	-0.01			
50.70	100	57.96	50.70	0.2	0.4	0.1	58	-0.04			
50.40	100	59.84	50.40	0.2	0.2	0.1	60	-0.16			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.00	100	99.90	50.00	7.91	100	-0.10	≤±10	≤10

Note(s):

Plotting diagram:

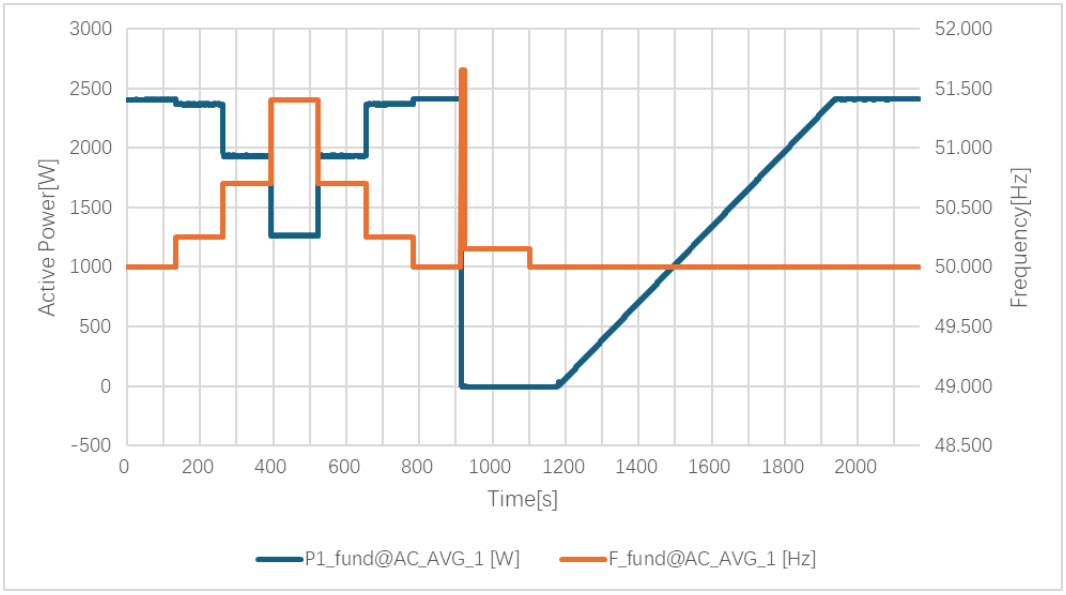


5.4.5(a)	TABLE: Active power output of ESS by over-frequency (LFSM-O)										P
LFSM-O settings	f_{active}		f_{stop}				$f_{deactive}$		Droop		
	50.2		N/A				50.2		5%(40%P_{Emax}/Hz)		
Test Conditions	Measurements						Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	100.23	50.00	--	--	--	100	0.23	≤±10	≤1	≤20
50.25	100	98.56	50.25	0.1	0.6	0.2	98	0.56			
50.70	100	80.54	50.70	0.1	0.6	0.1	80	0.54			
51.40	100	52.56	51.40	0.2	0.6	0.1	52	0.56			
50.70	100	80.54	50.70	0.2	0.6	0.1	80	0.54			
50.25	100	98.59	50.25	0.3	0.7	0.1	98	0.59			
50.00	100	100.33	50.00	0.1	0.2	0.1	100	0.33			
51.65	100	Disconnection					0	--			
50.15	100	No Reconnection					0	--			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.00	100	100.3	50.00	7.99	100	0.3	≤±10	≤10

Note(s):

Plotting diagram:

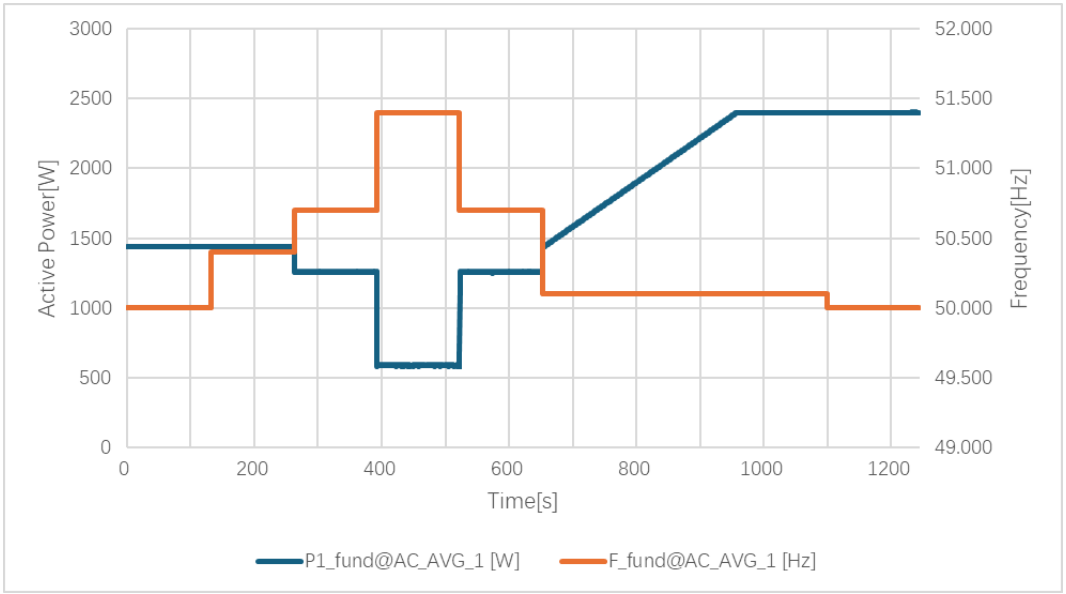


5.4.5(b)	TABLE: Active power output of ESS by over-frequency (LFSM-O)										P
LFSM-O settings	f_{active}		f_{stop}				$f_{deactive}$		Droop		
	50.5		N/A				50.2		5%(40%P_{Emax}/Hz)		
Test Conditions	Measurements						Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	60	59.94	50.00	--	--	--	60	-0.06	≤±10	≤1	≤20
50.40	60	59.96	50.40	--	--	--	60	-0.04			
50.70	60->100	52.40	50.70	0.3	0.4	0.2	52	0.40			
51.40	100	24.54	51.40	0.3	0.8	0.1	24	0.54			
50.70	100	52.40	50.70	0.2	0.6	0.1	52	0.40			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.10	100	99.96	50.10	9.37	100	-0.04	≤±10	≤10
50.00	100	99.65	50.00	--	100	-0.35	≤±10	--

Note(s):

Plotting diagram:

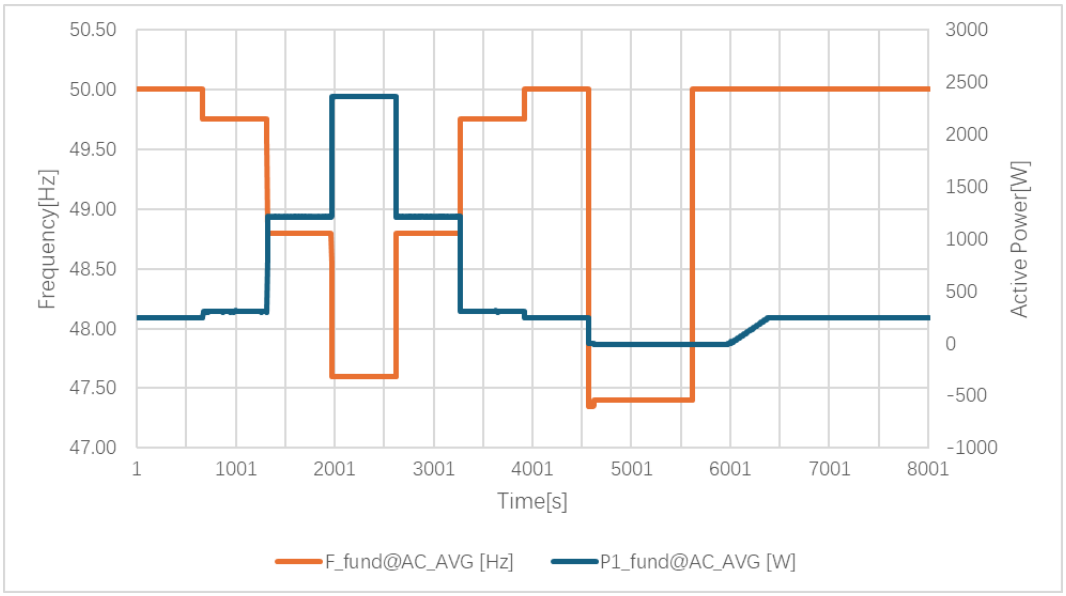


5.4.6(a)	TABLE: Active power output of PGU by under-frequency (LFSM-U)										P
LFSM-U settings	f_{active}		f_{stop}				$f_{deactive}$		Droop		
	49.8		N/A				49.8		5%(40%P_{Emax}/Hz)		
Test Conditions	Measurements						Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	10.17	50.00	--	--	--	10	0.17	≤±10	≤2	≤20
49.75	100	12.71	49.75	0.4	0.6	0.2	12	0.71			
48.80	100	50.48	48.80	0.6	1	0.2	50	0.48			
47.60	100	98.33	47.60	0.4	1.2	0.2	98	0.33			
48.80	100	50.51	48.80	0.4	0.8	0.2	50	0.51			
49.75	100	12.73	49.75	0.6	0.8	0.2	12	0.73			
50.00	100	10.19	50.00	0.4	0.8	0.2	10	0.19			
47.35	100	Disconnection					0	--			
47.40	100	No Reconnection					0	--			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.00	100	10.18	50.00	7.97	10	0.18	≤±10	≤10

Note(s):
Product power was limited to 10% at the beginning of test by a lower priority command from user.

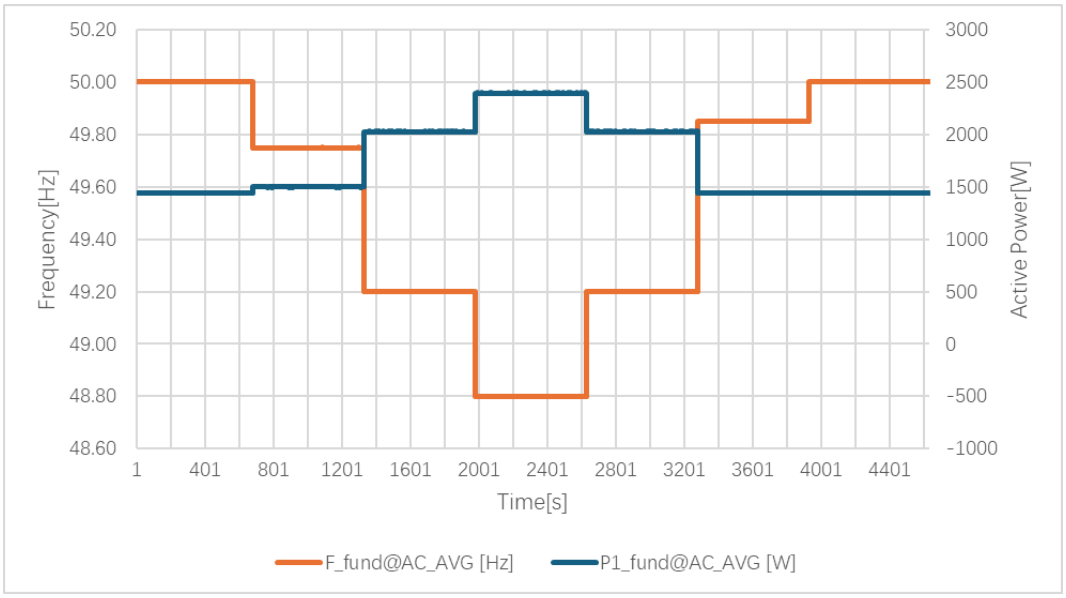
Plotting diagram:



5.4.6(b)	TABLE: Active power output of PGU by under-frequency (LFSM-U)								P		
LFSM-U settings	f_{active}		f_{stop}		$f_{deactive}$		Droop				
	49.8		N/A		49.8		5%(40%P_{Emax}/Hz)				
Test Conditions			Measurements					Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]		P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	59.96	50.00	--	--	--		60	-0.04	≤±10	≤2	≤20
49.75	100	62.51	49.75	0.4	0.8	0.2		62	0.51			
49.20	100	84.40	49.20	0.4	0.8	0.2		84	0.40			
48.80	100	99.81	48.80	0.2	0.6	0.2		100	-0.19			
49.20	100	84.42	49.20	0.4	0.8	0.2		84	0.42			
49.85	100	60.00	49.85	0.2	0.6	0.2		60	0.00			
50.00	100	60.00	50.00	--	--	--		60	0.00			

Note(s):
Product power was limited to 60% at the beginning of test by a lower priority command from user.

Plotting diagram:

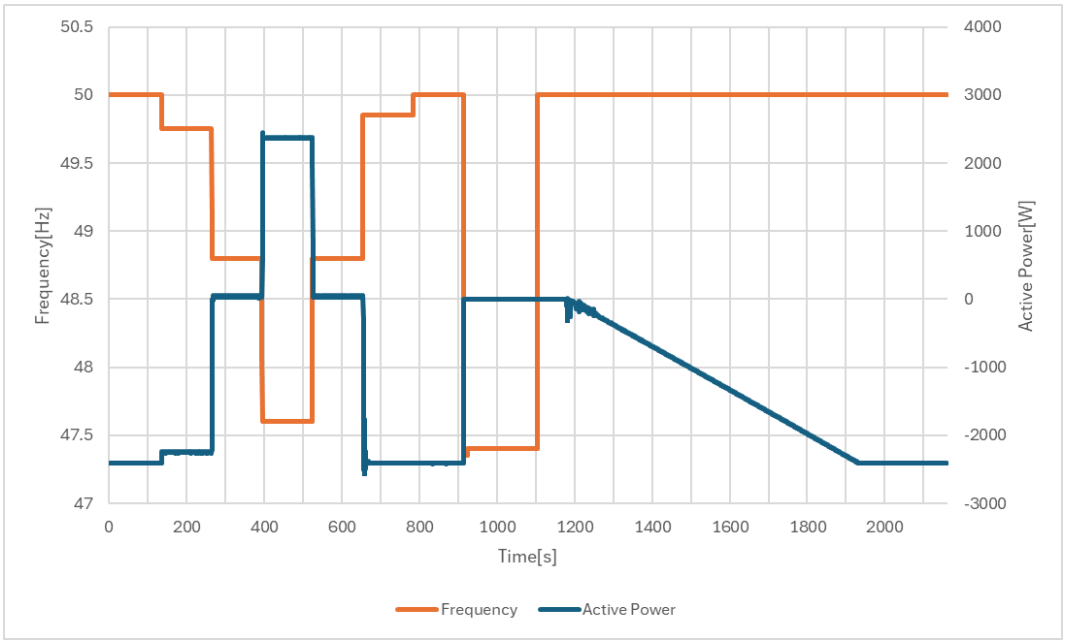


5.4.7(a)	TABLE: Active power output of ESS by under-frequency (LFSM-U)									P	
LFSM-U settings	f_{active}		f_{stop}		$f_{deactive}$		Droop				
	49.8		N/A		49.8		2%(100%P_{Emax}/Hz)				
Test Conditions			Measurements					Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]		P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	-100.20	50.00	--	--	--		-100	0.20	≤±10	≤1	≤20
49.75	100	-93.64	49.75	0.2	0.4	0.2		-95	1.36			
48.80	100	1.46	48.80	0.2	0.5	0.1		0	1.46			
47.60	100	97.42	47.60	0.2	0.4	0.3		100	-2.58			
48.80	100	1.61	48.80	0.3	0.5	0.2		0	1.61			
49.85	100	-100.42	49.85	0.8	7.5	0.2		-100	0.42			
50.00	100	-100.46	50.00	--	--	--		-100	0.46			
47.35	100	Disconnection						0	--			
47.40	100	No Reconnection						0	--			

Test Conditions		Measurements			Target	Tolerance	Limit	
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	$\Delta P/\Delta t$ [%/min]	P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	$\Delta P/\Delta t$ [%/min]
50.00	100	-100.40	50.00	8.01	-100	-0.04	≤±10	≤10

Note(s):
Product was set in charging mode under rated power at the beginning of test.

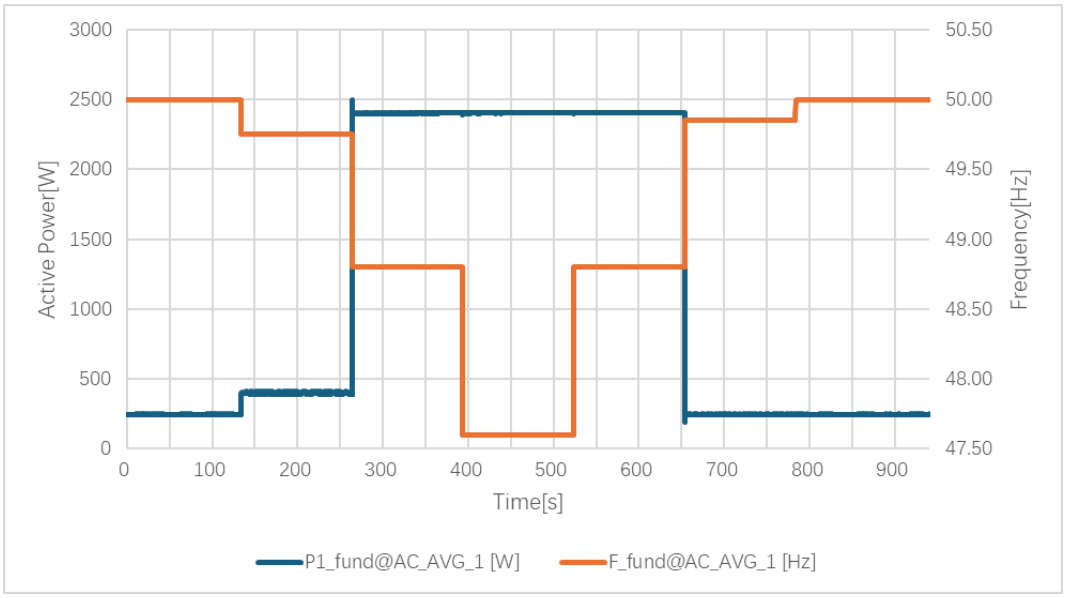
Plotting diagram:



5.4.7(b)	TABLE: Active power output of ESS by under-frequency (LFSM-U)								P		
LFSM-U settings	f_{active}		f_{stop}		$f_{deactive}$		Droop				
	49.8		N/A		49.8		2%(100%P_{Emax}/Hz)				
Test Conditions			Measurements					Target	Tolerance	Limit		
f [Hz]	P_{rim} [%]	P/P_{Emax} [%]	f [Hz]	T_{rise} [s]	T_{set} [s]	T_v [s]		P/P_{Emax} [%]	$\Delta P/P_{Emax}$ [%]	ΔP [%]	T_{rise} [s]	T_{set} [s]
50.00	100	10.27	50.00	--	--	--		10	0.27	≤±10	≤1	≤20
49.75	100	16.68	49.75	0.4	0.6	0.2		15	1.68			
48.80	100	100.08	48.80	0.4	0.6	0.1		100	0.08			
47.60	100	100.11	47.60	--	--	--		100	0.11			
48.80	100	100.15	48.80	--	--	--		100	0.15			
49.85	100	10.27	49.85	0.3	0.5	0.1		10	0.27			
50.00	100	10.27	50.00	--	--	--		10	0.27			

Note(s):
Product power was limited to 10% at the beginning of test by a lower priority command from user.

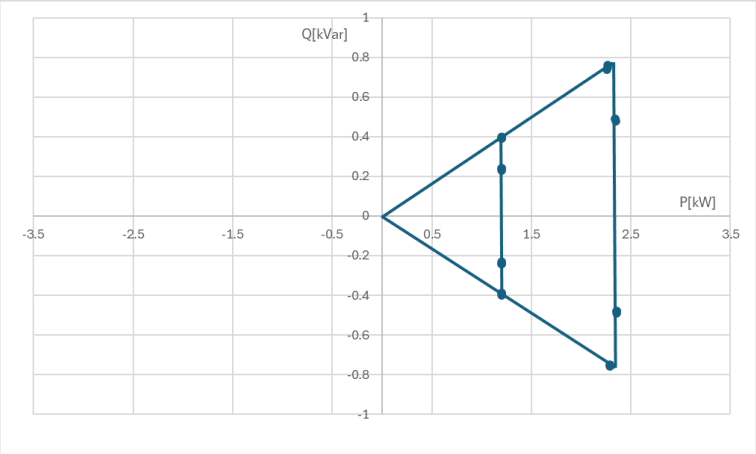
Plotting diagram:



5.4.8.2	TABLE: Tests of reactive power / displacement factor setting accuracy (Fixed cosφ)								P
Test Conditions			Measurements					Target	Tolerance	Limit
U/Un [%]	P/P_{Emax} [%]	cosφ	P [kW]	Q [kVar]	S [kVA]	U [V]	cosφ	Q [kVar]	$\Delta Q/P_{Emax}$ [%]	$\Delta Q/P_{Emax}$ [%]
90	50	0.95 under-excited	1.20	-0.39	1.27	207.17	-0.950	-0.39	0.01	≤± 4
90	S_{Emax}		2.29	-0.75	2.41	207.19	-0.950	-0.79	1.49	≤± 4
100	50		1.20	-0.40	1.27	230.18	-0.949	-0.39	-0.23	≤± 4
100	S_{Emax}		2.29	-0.75	2.41	230.19	-0.950	-0.79	1.59	≤± 4
110	50		1.20	-0.39	1.27	253.19	-0.950	-0.39	0.03	≤± 4
110	S_{Emax}		2.29	-0.76	2.41	253.20	-0.948	-0.79	1.00	≤± 4
90	50	0.98 under-excited	1.20	-0.24	1.23	207.17	-0.981	-0.24	0.30	≤± 4
90	S_{Emax}		2.36	-0.48	2.41	207.19	-0.980	-0.49	0.33	≤± 4
100	50		1.20	-0.24	1.23	230.18	-0.980	-0.24	0.03	≤± 4
100	S_{Emax}		2.36	-0.48	2.41	230.20	-0.979	-0.49	0.10	≤± 4
110	50		1.20	-0.23	1.22	253.19	-0.982	-0.24	0.38	≤± 4
110	S_{Emax}		2.36	-0.49	2.41	253.21	-0.979	-0.49	-0.16	≤± 4
90	50	0.95 over-excited	1.20	0.40	1.26	207.18	0.949	0.39	0.14	≤± 4
90	S_{Emax}		2.27	0.76	2.39	207.20	0.949	0.79	-1.41	≤± 4
100	50		1.20	0.39	1.26	230.19	0.951	0.39	-0.12	≤± 4
100	S_{Emax}		2.27	0.75	2.39	230.21	0.949	0.79	-1.66	≤± 4
110	50		1.20	0.39	1.26	253.20	0.951	0.39	-0.22	≤± 4
110	S_{Emax}		2.26	0.74	2.38	253.22	0.950	0.79	-1.94	≤± 4
90	50	0.98 over-excited	1.20	0.24	1.23	207.18	0.980	0.24	-0.07	≤± 4
90	S_{Emax}		2.35	0.48	2.39	207.20	0.980	0.49	-0.42	≤± 4
100	50		1.20	0.24	1.22	230.18	0.981	0.24	-0.32	≤± 4
100	S_{Emax}		2.34	0.49	2.39	230.21	0.978	0.49	0.24	≤± 4
110	50		1.20	0.23	1.22	253.19	0.982	0.24	-0.62	≤± 4
110	S_{Emax}		2.34	0.49	2.39	253.22	0.979	0.49	-0.03	≤± 4

Note(s):

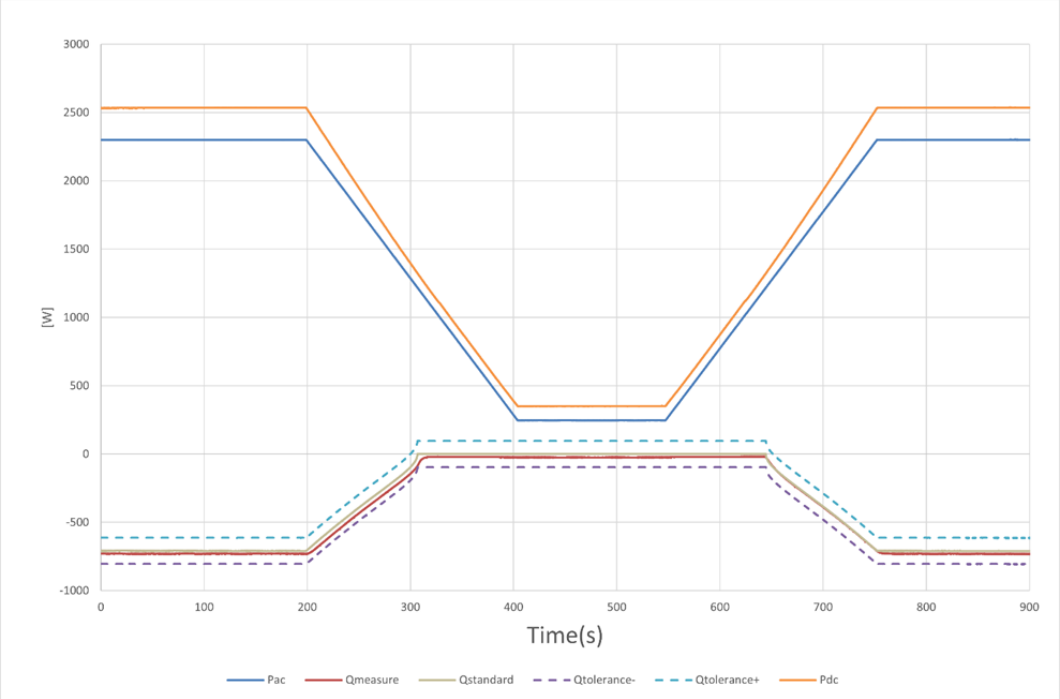
P-Q Diagram:



5.4.8.3(a)	TABLE: Tests of displacement factor- / active power character curve (cosφ(P))			P
cosφ (P) curve settings:	P/P_{Emax} [%]	10	50	100
	cosφ	1.0	1.0	0.95
	3Tau [s]	10		

Test Conditions	Limit
$P_{dc}/P_{dc,r}$ [%]	$\Delta Q/P_{Emax}$ [%]
100->10->100 with ramp ≤30%$P_{dc,r}$/min	≤±4.0

Plotting diagram:

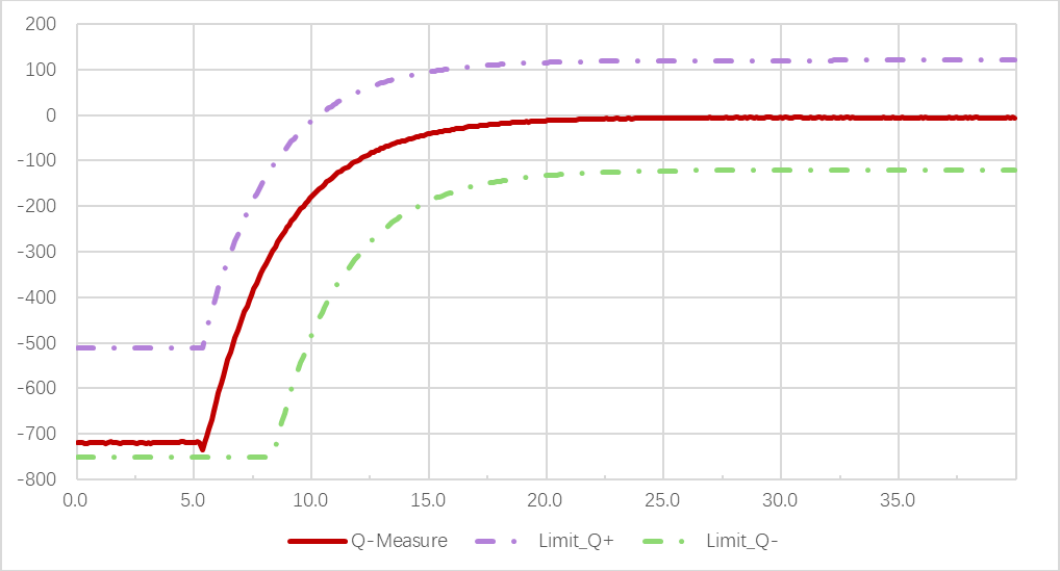


5.4.8.3(b)	TABLE: Tests of displacement factor- / active power character curve (cosφ(P))	P

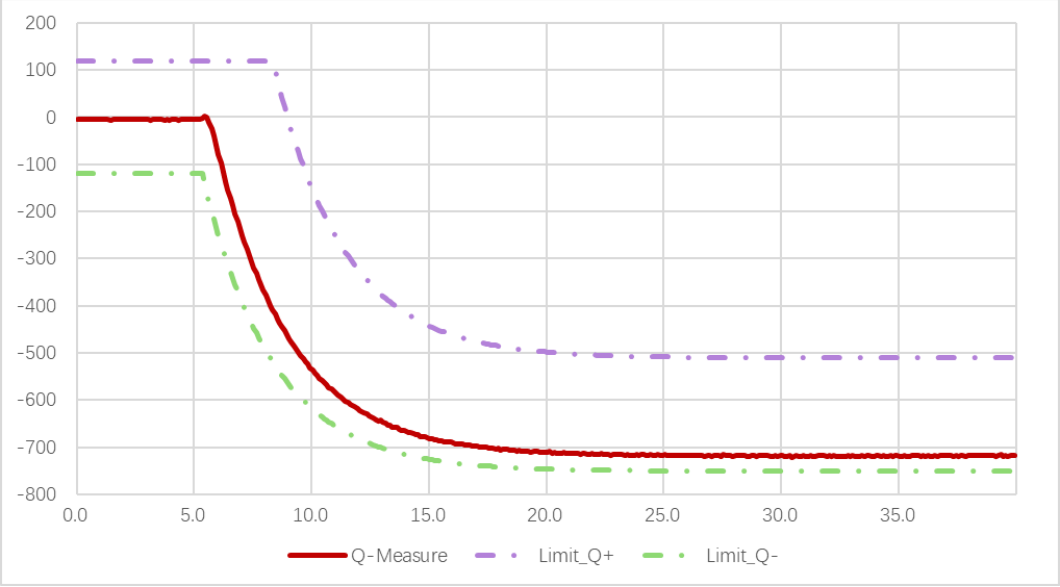
Test Conditions	Measurements	Limit
$P_{rim}/P_{dc,r}$ [%]	Response time T [s]	Response time T [s]
100->40	10.5	Complied with PT-1 curve
40->100	9.9	
100->75	10.3	

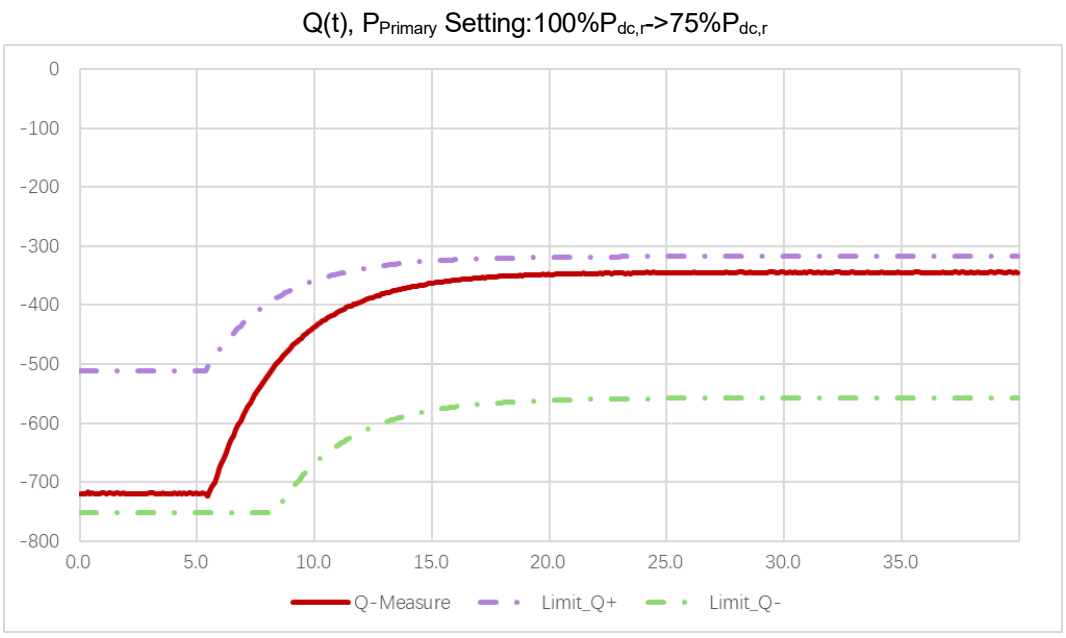
Plotting diagram:

Q(t), $P_{Primary}$ Setting:100%$P_{dc,r}$->40%$P_{dc,r}$



Q(t), $P_{Primary}$ Setting:40%$P_{dc,r}$->100%$P_{dc,r}$

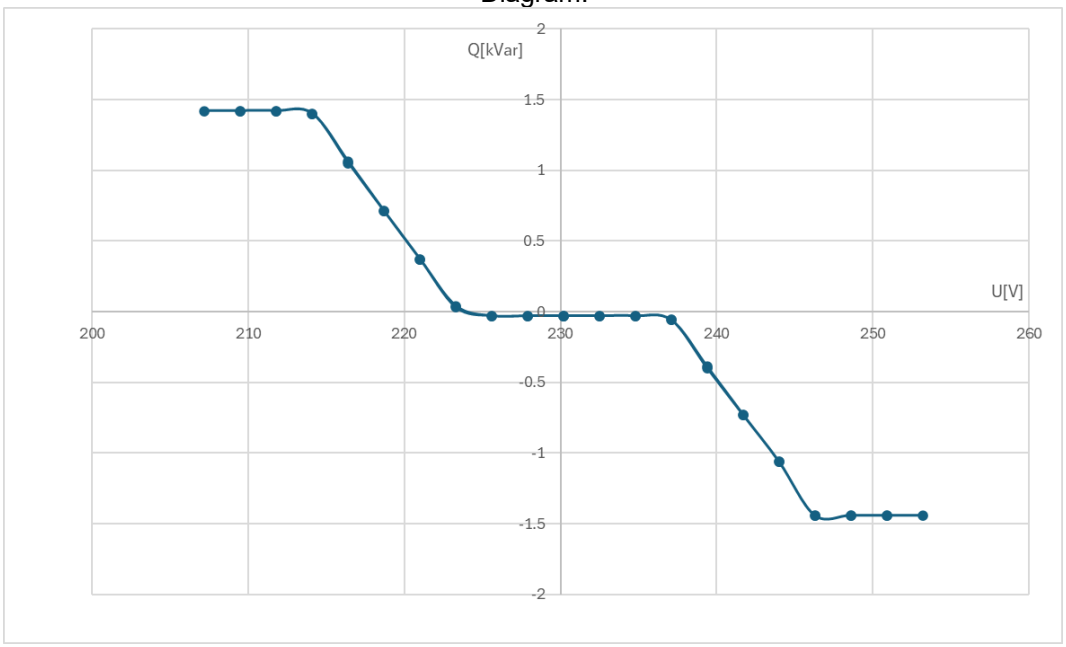



Q(t), PPrimary Setting:100%Pdc,r->75%Pdc,r
0
-100
-200
-300
-400
-500
-600
-700
-800
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Q-Measure
Limit_Q+
Limit_Q-

5.4.8.4(a)	TABLE: Tests of reactive power-voltage character curve (Q(U))					P
Q (U) curve settings:	U/Un	0.93	0.97	1.03	1.07	
	Q/S_{Emax}	+0.60	0	0	-0.60	
	3Tau [s]	6				

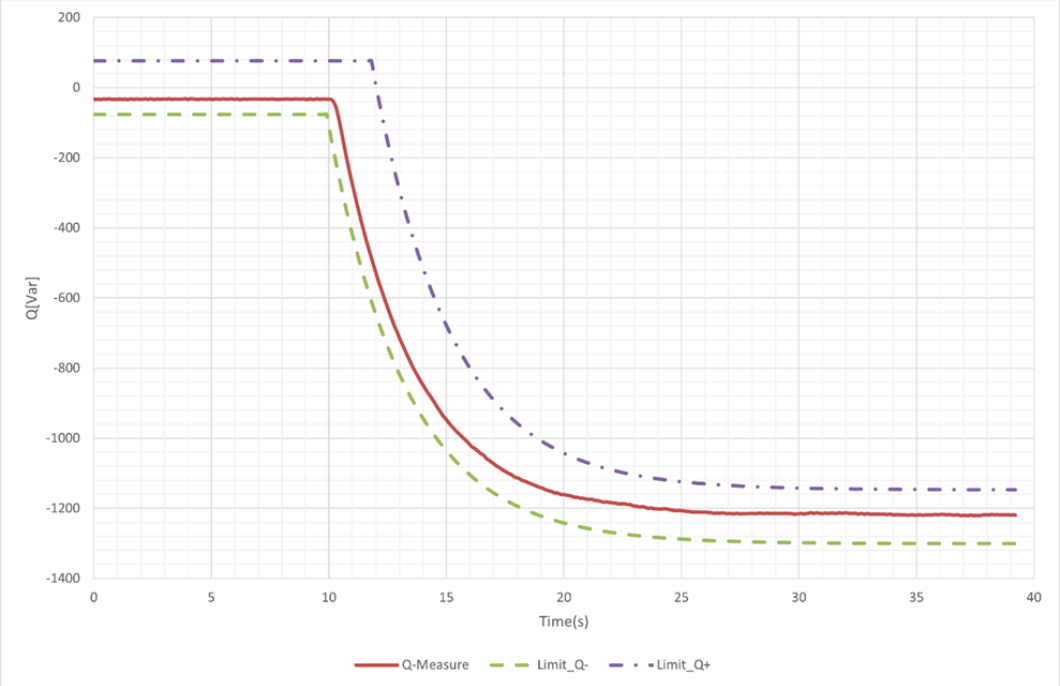
Test Conditions	Measurements		Target	Tolerance	Limit
U/Un[%]	Q[kVar]	U [V]	Q[kVar]	$\Delta Q/P_{Emax}$[%]	ΔQ [kVar]
100	-0.03	230.21	0.00	-1.29%	$\pm(0.01*U_{n,Y}*K_{QU}+0.04P_{Emax})$, $K_{QU}=\lvert Q_{max}\rvert/(0.04*U_{n,Y})$
99	-0.03	227.91	0.00	-1.25%	
98	-0.03	225.61	0.00	-1.21%	
97	0.04	223.31	0.00	1.58%	
96	0.37	221.01	0.36	0.54%	
95	0.71	218.71	0.72	-0.33%	
94	1.06	216.41	1.08	-1.04%	
93	1.40	214.11	1.44	-1.58%	
92	1.42	211.81	1.44	-0.92%	
91	1.42	209.51	1.44	-0.92%	
90	1.42	207.21	1.44	-0.87%	
91	1.42	209.51	1.44	-0.87%	
92	1.42	211.81	1.44	-0.92%	
93	1.40	214.11	1.44	-1.54%	
94	1.05	216.42	1.08	-1.08%	
95	0.71	218.71	0.72	-0.42%	
96	0.37	221.01	0.36	0.42%	
97	0.03	223.31	0.00	1.42%	
98	-0.03	225.61	0.00	-1.25%	
99	-0.03	227.91	0.00	-1.29%	
100	-0.03	230.21	0.00	-1.33%	
101	-0.03	232.51	0.00	-1.38%	
102	-0.03	234.81	0.00	-1.38%	
103	-0.06	237.11	0.00	-2.50%	
104	-0.39	239.41	-0.36	-1.42%	
105	-0.73	241.71	-0.72	-0.29%	
106	-1.06	244.00	-1.08	1.04%	
107	-1.44	246.29	-1.44	-0.08%	
108	-1.44	248.59	-1.44	-0.08%	
109	-1.44	250.89	-1.44	-0.13%	
110	-1.44	253.20	-1.44	-0.17%	
109	-1.44	250.89	-1.44	-0.13%	
108	-1.44	248.59	-1.44	-0.13%	
107	-1.44	246.29	-1.44	-0.08%	
106	-1.06	244.00	-1.08	1.00%	
105	-0.73	241.70	-0.72	-0.33%	
104	-0.40	239.41	-0.36	-1.50%	
103	-0.06	237.11	0.00	-2.54%	
102	-0.03	234.81	0.00	-1.42%	
101	-0.03	232.51	0.00	-1.38%	
100	-0.03	230.21	0.00	-1.38%	

Diagram:

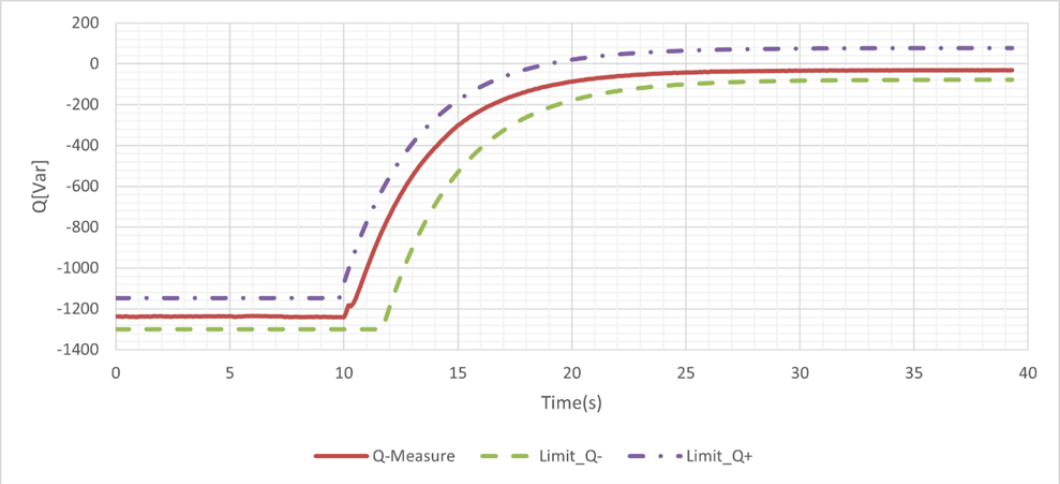


5.4.8.4(b)	TABLE: Tests of reactive power-voltage character curve (Q(U))					P
Test Conditions	Measurement			Target	Limit	
	Settling time T [s]	Q_{Start} [kVar]	Q_{end} [kVar]	Q_{end}/S_{Emax} [%]	Settling time T [s]	$\Delta Q_{end}/P_{Emax}$ [%]
Un -> Un+$\Delta U_{ind,Y}$	10	-0.058	-1.218	-0.85Qmax	PT1 complied, See attached curve for detail.	--
Un+$\Delta U_{ind,Y}$-> Un	10	-1.223	-0.030	0		≤±4
Un -> Un+$\Delta U_{ind,Y}$	10	-0.044	-1.233	-0.85Qmax		--
Un+$\Delta U_{ind,Y}$-> Un	10	-1.213	-0.030	0		≤±4
Un -> Un+$\Delta U_{ind,Y}$	10	-0.044	-1.238	-0.85Qmax		--
Un+$\Delta U_{ind,Y}$-> Un	10	-1.246	-0.030	0		≤±4
Un -> Un+$\Delta U_{cap,Y}$	10	-0.019	1.227	0.85Qmax		--
Un+$\Delta U_{cap,Y}$-> Un	10	1.126	-0.031	0		≤±4
Un -> Un+$\Delta U_{cap,Y}$	10	-0.013	1.226	0.85Qmax		--
Un+$\Delta U_{cap,Y}$-> Un	10	1.198	-0.31	0		≤±4
Un -> Un+$\Delta U_{cap,Y}$	10	-0.006	1.225	0.85Qmax		--
Un+$\Delta U_{cap,Y}$-> Un	10	1.211	-0.031	0		≤±4

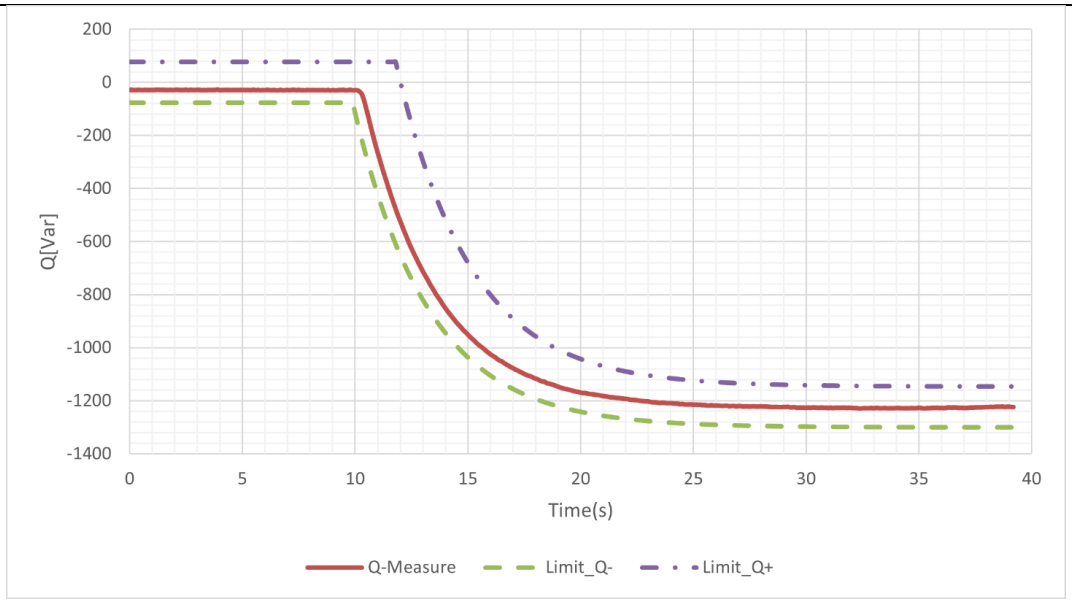
Plotting Diagram



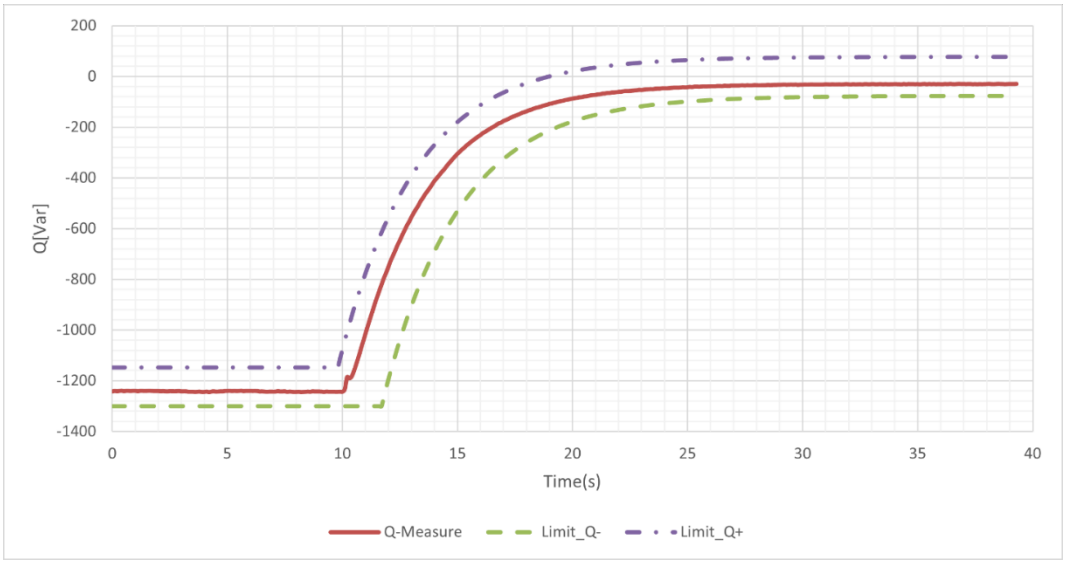
Un -> Un+$\Delta U_{ind,Y}$



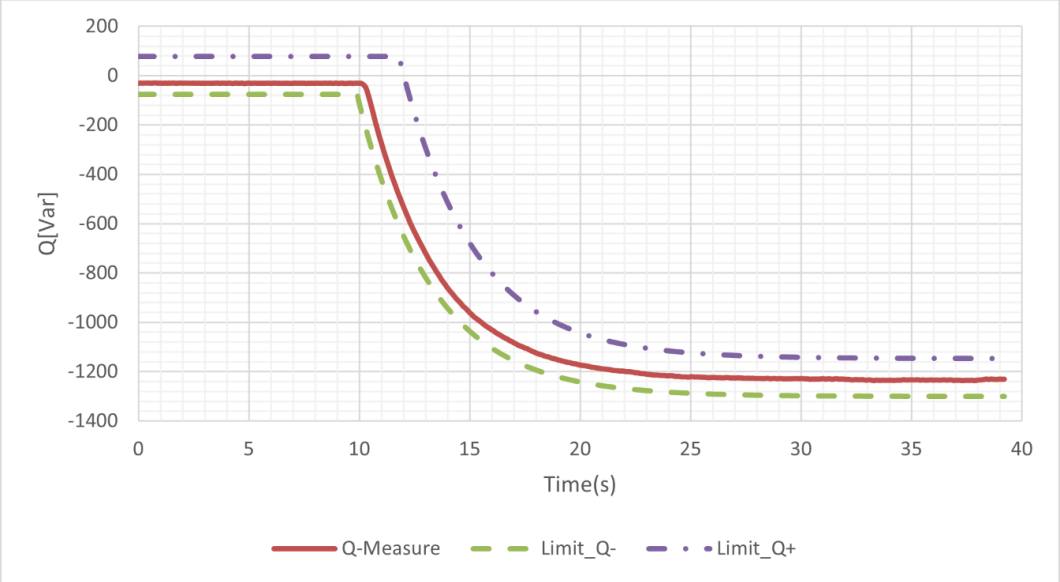
Un+$\Delta U_{ind,Y}$-> Un



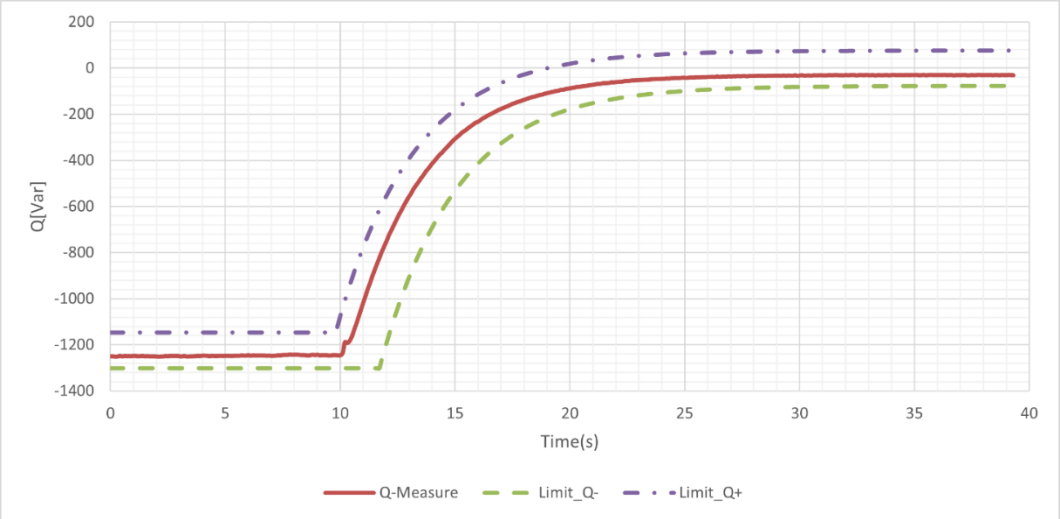
Un -> Un+$\Delta U_{ind,Y}$



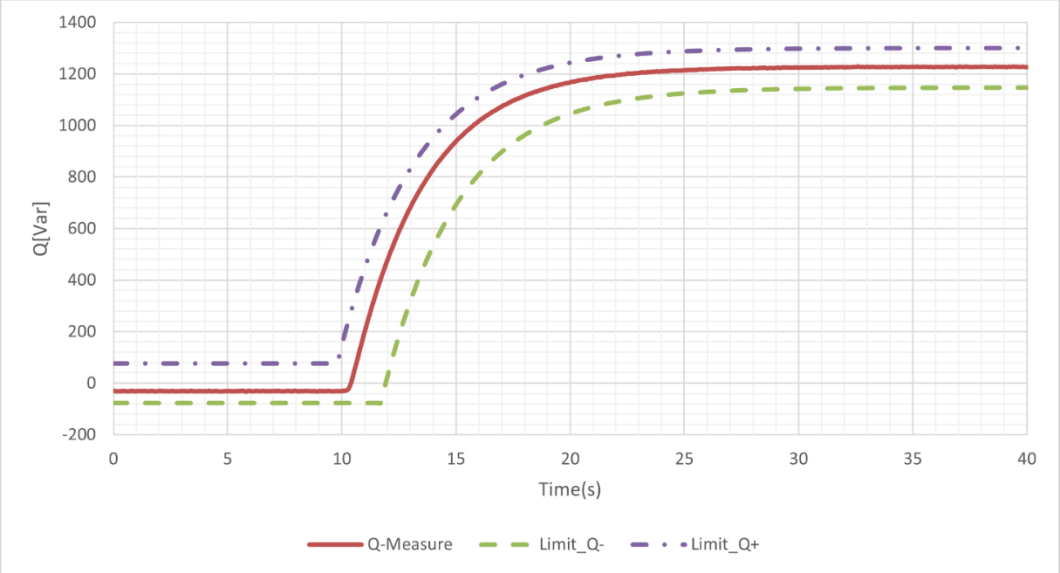
Un+$\Delta U_{ind,Y}$-> Un



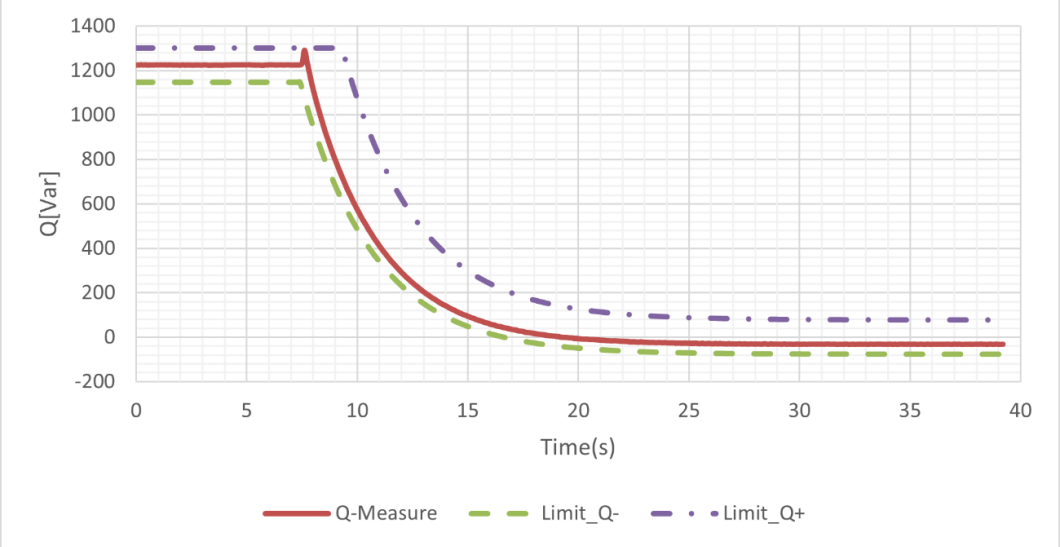
Un -> Un+$\Delta U_{ind,Y}$



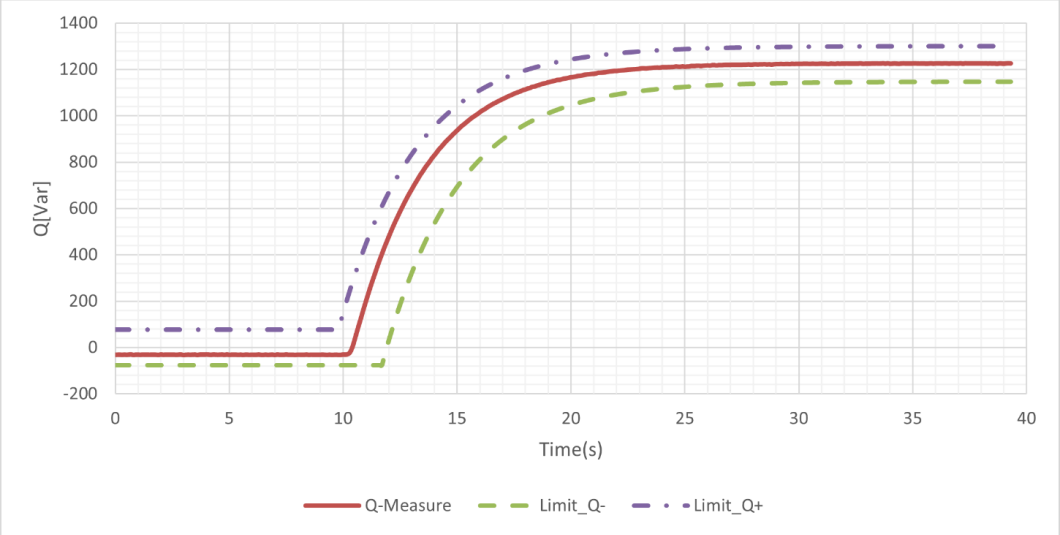
Un+$\Delta U_{ind,Y}$-> Un



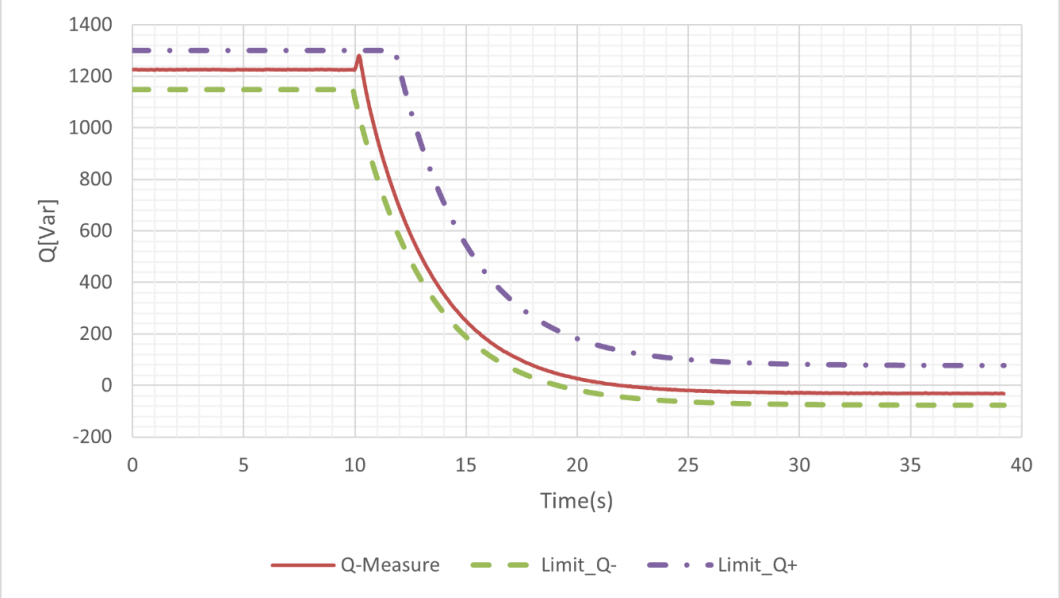
Un -> Un+$\Delta U_{cap,Y}$



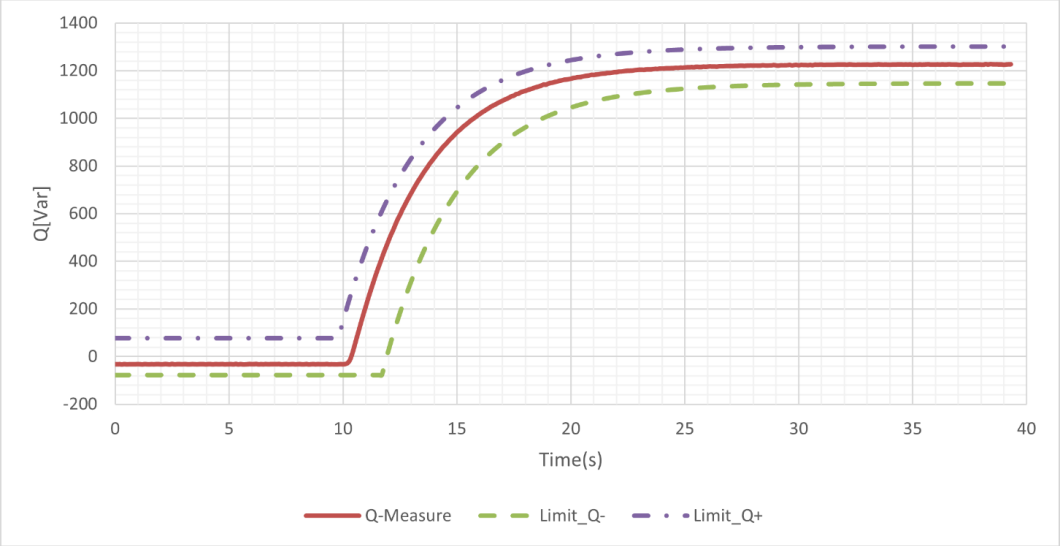
Un+$\Delta U_{cap,Y}$-> Un



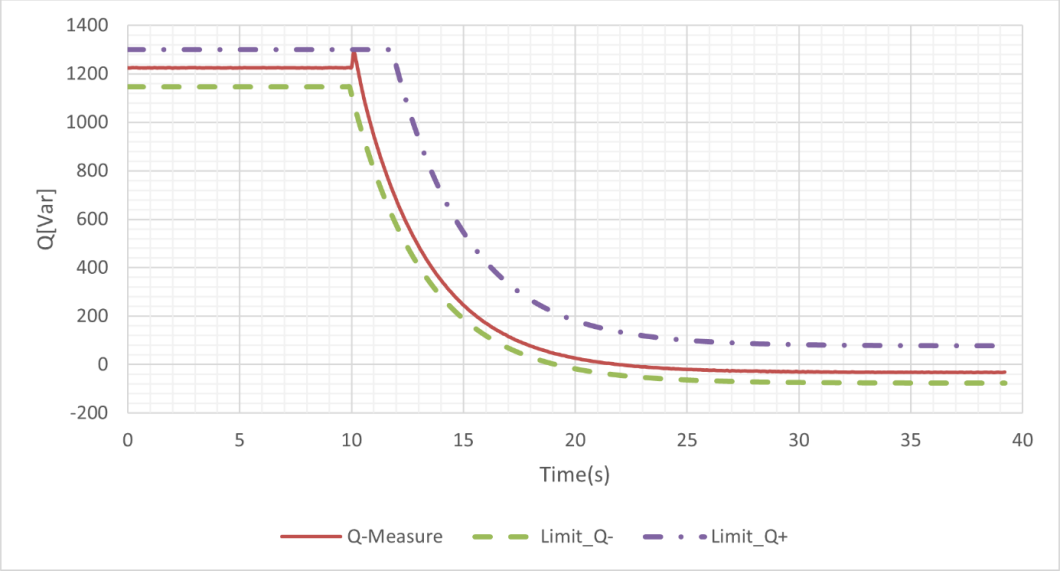
Un -> Un+$\Delta U_{cap,Y}$



Un+$\Delta U_{cap,Y}$-> Un



Un -> Un+$\Delta U_{cap,Y}$



Un+$\Delta U_{cap,Y}$-> Un

Note(s):

5.5.2, 5.5.4, 5.5.6	TABLE: NS-protection, Integrated interface switch (Functional safety)	P

The max. initial short-circuited current Ik" [A]:	16
Switch type:	SMIA-S-212DMG
Manufactuer:	Sanyou Corporation Limited
DIN EN 62109-1 cert/report No.:	CN26TBUE 001

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
Abnormal operation condition							
1.	PCE PV + and -	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: "PV Voltage Abnormal". EUT shut down and disconnected from grid immediately. No damage. No hazard.
2.	PCE BAT + and -	S-C	BAT 18Vdc Grid 230Vac	5min	--	--	Error message: "Bat Voltage Abnormal". EUT shut down and disconnected from grid immediately. No damage. No hazard.
3.	PCE GRID L and N	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: "Grid Voltage Abnormal". EUT shut down and disconnected from grid immediately. No damage. No hazard.
4.	PCE GRID L and PE	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: "Grid Voltage Abnormal". EUT shut down and disconnected from grid immediately. No damage. No hazard.

5.	PCE BAT-PV	Backfeed current test	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Reverse connection of PV voltage”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
6.	Cooling failure	Heatsink wrap up in a blanket	PV 58Vdc Grid 230Vac	2H	--	--	Error message: “NTC OTP”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
7.	PCE Output	Phase sequence before start up	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
8.	PCE Ouput	Phase mis-wiring grid connection	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
9.	PCE Input	Reverse	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Reverse connection of PV voltage”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
Power board							
10.	CF7	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Hardware overcurrent”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

11.	EC90	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Hardware overcurrent”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
12.	Q44 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “PV relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
13.	Q44 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
14.	Q44 2 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
15.	Boost Q24 G to D	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
16.	Boost Q24 G to S	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
17.	Boost Q24 S to D	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Abnormal”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.

18.	C285	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
19.	INV Q39 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. Q39 damage. No hazard.
20.	INV Q39 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
21.	INV Q39 3 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
22.	CV1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
23.	C397	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
24.	Sam bus- R328	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

25.	Sam bus- R328	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
26.	Sam L inner R343	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
27.	Sam L inner R343	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Overload”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
28.	Grid RLY4	S-C before start	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT can not start. No damage. No hazard.
29.	Grid RLY5	S-C before start	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT can not start. No damage. No hazard.
30.	U9 pin 1 to pin 4	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
31.	U9 pin 2 to pin 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
32.	GS2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.

33.	LF8 pin1 to pin2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard
34.	LF8 pin1 to pin4	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
35.	GS1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
36.	MOV1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
37.	F2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
38.	CY25	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
39.	+5 DSP failure C328	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

40.	EC15	O-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
41.	T1 pin1 to pin2 C200	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
42.	T1 pin8 to pin9 EC107	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
43.	Q17 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. Q17 damage. No hazard.
44.	Q17 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
45.	Q17 3 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message. EUT cannot start. No damage. No hazard.
46.	C108	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message. EUT cannot start. No damage. No hazard.
47.	EC5	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message. EUT cannot start. No damage. No hazard.

48.	F4	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
49.	TX3 pin7 to pin9 C359	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
50.	TX3 pin11 to pin12 C380	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
51.	Q32 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
52.	Q32 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. Q32 damage. No hazard.
53.	Q32 2 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

54.	TR1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
55.	C375	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
56.	C38	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
57.	C12	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
58.	T2 pin9 to pin10 C228	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
59.	T2 pin5 to pin4 EC22	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

60.	T2 pin1 to pin2 EC25	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
61.	Q19 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
62.	Q19 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
63.	Q19 3 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
LLC board							
64.	Q2 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
65.	Q2 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.

66.	Q2 3 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
67.	Q7 1 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
68.	Q7 1 to 3	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
69.	Q7 3 to 2	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “LLC Boost Soft-Start Timeout”. EUT shut down and disconnected from grid immediately. Q24 damage. No hazard.
Main control board							
70.	EC2		PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
71.	EC8		PV 58Vdc Grid 230Vac	5min	--	--	No Error message. EUT cannot start. No damage. No hazard.
Control board							

72.	PVA voltage samp R144	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “PVA Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
73.	PVA voltage samp C165	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “PVA Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
74.	PVA current samp R111	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “PVA Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
75.	PVA current samp C169	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “PVA Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
76.	C88	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
77.	C85	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
78.	MCU1	power supply failure	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.

79.	C1L1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
80.	C182	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
81.	LLC current samp R220	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Overcurrent charging”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
82.	LLC current samp C81	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT Derating. No damage. No hazard.
83.	Temp. samp C47	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “temperature low”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
84.	Temp. samp C157	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “temperature low”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
85.	BAT current samp R270	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Overcurrent charging”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

86.	BAT current samp C139	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Overcurrent charging”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
87.	V_BUSHIGH R92	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
88.	C117	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
89.	MCU2	power supply failure	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT cannot start. No damage. No hazard.
90.	Y1	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
91.	MCU1 and MCU2	Communi cation failure	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Communication Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
92.	C266	S-C	PV 58Vdc Grid 230Vac	5min	--	--	No Error message EUT work normal but Unable to parallelize. No damage. No hazard.

93.	Output current samp R134	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Off-grid current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
94.	Output current samp C153	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Off-grid current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
95.	sam_Lout R126	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
96.	sam_Lout C145	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “BUS Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
97.	sam_Lout1 R322	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
98.	sam_Lout1 C372	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Voltage Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.

99.	RelayCheck_DSP R120	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
100.	RelayCheck_DSP C138	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Relay Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
101.	Igrid_DSP R136	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
102.	Igrid_DSP C151	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Grid Current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
103.	Igrid+ R93	O-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
104.	Igrid+ C22	S-C	PV 58Vdc Grid 230Vac	5min	--	--	Error message: “INV Current Abnormal”. EUT shut down and disconnected from grid immediately. No damage. No hazard.
BMS board							

105.	TVS1	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
106.	U9	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
107.	C169	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT shut down immediately. No damage. No hazard.
108.	Y1	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
109.	C6	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT shut down immediately. No damage. No hazard.
110.	U22	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
111.	Z42	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal, Communication Abnormal. No damage. No hazard.

112.	Q12 pin1 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
113.	Q12 pin1 to pin3	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “charger Abnormal”. EUT shut down immediately. No damage. No hazard.
114.	Q12 pin3 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “charger Abnormal”. EUT shut down immediately. No damage. No hazard.
115.	C126	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
116.	C123	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
117.	C135	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT shut down immediately. F7 damage. No hazard.
118.	Q30 pin1 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Discharge MOS driver Abnormal”. EUT shut down immediately. No damage. No hazard.

119.	Q30 pin1 to pin3	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Discharge MOS driver Abnormal”. EUT shut down immediately. No damage. No hazard.
120.	Q30 pin3 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
121.	Q43 pin1 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Charge MOS driver Abnormal”. EUT shut down immediately. No damage. No hazard.
122.	Q43 pin1 to pin3	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “Charge MOS driver Abnormal”. EUT shut down immediately. No damage. No hazard.
123.	Q43 pin3 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
124.	TM1	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	Error message: “MOS OTP”. EUT shut down immediately. No damage. No hazard.
125.	F4	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.

126.	R561	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
127.	Q118 pin1 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
128.	Q118 pin1 to pin3	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
129.	Q118 pin3 to pin2	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
130.	R267	S-C	BAT 16Vdc PV 58Vdc Grid 230Vac	5min	--	--	No error message. EUT work normal. No damage. No hazard.
Note(s): s-c: short-circuited, o-c: open-circuited, o-l: overload.							

5.5.3	TABLE: Central NS protection		N/A
Test Condition		Limit	Result
1.	Disconnect the auxiliary power	Disconnect immediately	Pass/Failed
2.	Operate the self-check device.	Disconnect immediately	Pass/Failed
Following information shall be stated in documentation of PGU:			
1.	The max. action time of central interface switch	Pass/Failed	
2.	The action time of protection device	Pass/Failed	
3.	The max. initial short-circuited current Ik":	Pass/Failed, Ik": ??A	
4.	The max. fuse	Pass/Failed	
Connection diagram/Build plan			

5.5.7(a)	TABLE: Protection devices and protection settings (OV/UV)					P
Condition	Setting U/Un [%]	Measurement Trip value [V]				Limitation ΔU/Un [%]
		L123	L1	L2	L3	
U>>	125	--	287.95	--	--	≤±1.0
U<	80	--	183.66	--	--	
U<<	45	--	102.19	--	--	
Condition	Setting U/Un [%]	Measurement Trip value [V]				Limitation ΔU/Un [%]
		L123	L1-L2	L2-L3	L3-L1	
U>>	125	--	--	--	--	≤±1.0
U<	80	--	--	--	--	
U<<	45	--	--	--	--	
Condition	Setting [ms]	Measurement Trip time [ms]				Limitation [ms]
		L123	L1	L2	L3	
U>>	100	--	125	--	--	≤200
U<	3000	--	3007	--	--	3000-3100
U<<	300	--	309	--	--	300-400
Condition	Setting	Measurement Trip time [ms]				Limitation [ms]
		L123	L1-L2	L2-L3	L3-L1	
U>>	100	--	--	--	--	≤200
U<	3000	--	--	--	--	3000-3100
U<<	300	--	--	--	--	300-400

Condition	Setting [s]	Measurement Trip time [s]				Limitation [s]
		L123	L1	L2	L3	
U> 230->257.6	500	--	527.3	--	--	450-550
U> 230->248.4	No disconnect	--	No disconnect	--	--	No disconnect
U> 244->262.2	300	--	333.6	--	--	225-375
Note(s): Tests on L-L voltages are applicable to product over 30kVA.						

5.5.7(b)	TABLE: Protection devices and protection settings (OF/UF)		P
Condition	Setting f [Hz]	Measurement Trip value [Hz]	Limitation Δf/fn [%]
f>	51.5	51.50	≤±0.1
f<	47.5	47.50	
Condition	Setting [ms]	Measurement Trip time [ms]	Limitation [ms]
f>	100	116	≤200
f<	100	116	≤200
Note(s):			

5.5.7(c)	TABLE: Protection devices and protection settings	P
1.	The last 5 fault indication can be read	Pass/Failed
	Fault 1: AC volt low	Pass
	Fault 2: AC volt high	Pass
	Fault 3: AC frequency low	Pass
	Fault 4: AC frequency high	Pass
	Fault 5: PV volt low	Pass
2.	Fault indication can be read after a supply interruption ≤3s	Pass/Failed
	Fault 1: AC volt low	Pass
	Fault 2: AC volt high	Pass
	Fault 3: AC frequency low	Pass
	Fault 4: AC frequency high	Pass
	Fault 5: PV volt low	Pass

5.5.9	TABLE: Constructional features of NS protection	P
1.	The protection settings can be read on PGU or data interface equipment	Pass
		Interface equipment: Communication with PC
2.	The NS protection settings shall be protected.	Pass
		Protection type: Passoword Protected
3.	If all protection settings are fixed	Pass

5.5.10	TABLE: Islanding detection (per IEC 62116: 2014)					P
Power 100%						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: -10% Q_C: +10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -10% Q_C: +5%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -10% Q_C: 0%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -10% Q_C: -5%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -10% Q_C: -10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: +10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: -10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: +5%	L1: 2.300	L1: 2.400	L1: 2.580	1.08	753	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		

P_R: -5% Q_C: 0%	L1: 2.300	L1: 2.380	L1: 2.440	1.05	731	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: -5% Q_C: -5%	L1: 2.300	L1: 2.400	L1: 2.320	1.03	727	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +5%	L1: 2.420	L1: 2.400	L1: 2.580	1.03	641	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: 0%	L1: 2.420	L1: 2.380	L1: 2.440	1.00	1069	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -5%	L1: 2.420	L1: 2.380	L1: 2.320	0.97	409	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: +5%	L1: 2.540	L1: 2.380	L1: 2.560	0.97	801	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: 0%	L1: 2.520	L1: 2.400	L1: 2.440	0.96	678	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: -5%	L1: 2.520	L1: 2.380	L1: 2.320	0.93	730	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: +10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +5% Q_C: -10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +10% Q_C: +10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +10% Q_C: +5%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		

P_R: +10% Q_C: 0%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +10% Q_C: -5%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: +10% Q_C: -10%	L1: --	L1: --	L1: --	--	--	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
Power 66%						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1: 1.580	L1: 1.560	L1: 1.540	0.98	152	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -4%	L1: 1.580	L1: 1.560	L1: 1.540	0.98	373	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -3%	L1: 1.580	L1: 1.560	L1: 1.560	0.99	447	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -2%	L1: 1.580	L1: 1.560	L1: 1.580	0.99	378	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: -1%	L1: 1.580	L1: 1.560	L1: 1.580	0.99	456	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: 0%	L1: 1.580	L1: 1.560	L1: 1.600	1.00	441	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +1%	L1: 1.580	L1: 1.560	L1: 1.620	1.01	445	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +2%	L1: 1.580	L1: 1.560	L1: 1.640	1.01	465	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +3%	L1: 1.580	L1: 1.560	L1: 1.660	1.02	774	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		

P_R: 0% Q_C: +4%	L1: 1.580	L1: 1.560	L1: 1.680	1.02	389	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_C: +5%	L1: 1.580	L1: 1.560	L1: 1.700	1.03	261	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
Power 33%						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_c: -5%	L1: 0.805	L1: 0.793	L1: 0.778	0.98	144	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: -4%	L1: 0.804	L1: 0.792	L1: 0.784	0.98	182	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: -3%	L1: 0.804	L1: 0.792	L1: 0.793	0.99	196	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: -2%	L1: 0.805	L1: 0.792	L1: 0.803	0.99	138	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: -1%	L1: 0.806	L1: 0.792	L1: 0.811	0.99	234	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: 0%	L1: 0.807	L1: 0.793	L1: 0.820	1.00	177	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: +1%	L1: 0.806	L1: 0.792	L1: 0.826	1.00	548	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: +2%	L1: 0.804	L1: 0.792	L1: 0.834	1.01	242	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: +3%	L1: 0.804	L1: 0.792	L1: 0.843	1.02	596	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		
P_R: 0% Q_c: +4%	L1: 0.805	L1: 0.792	L1: 0.851	1.02	210	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		

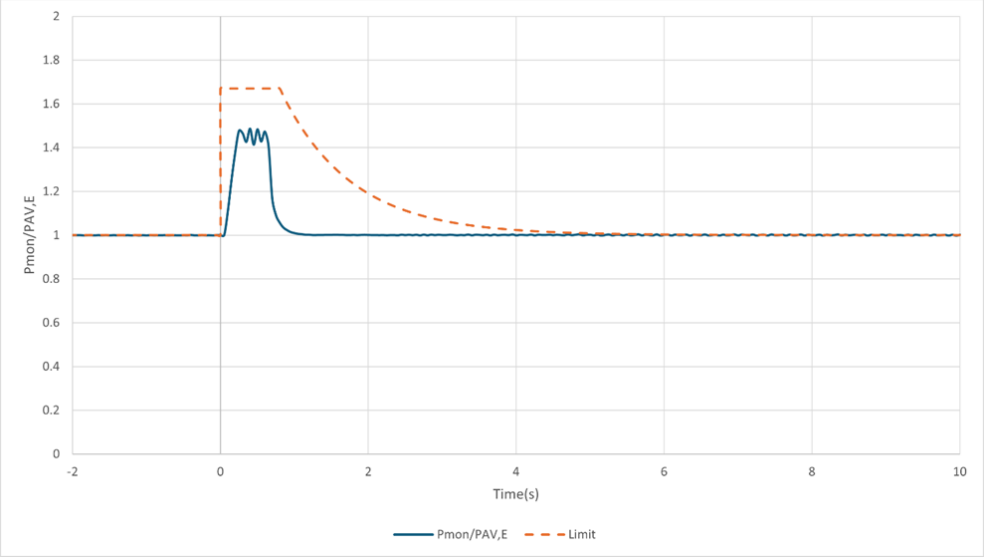
P_R: 0% Q_c: +5%	L1: 0.804	L1: 0.792	L1: 0.860	1.03	171	
	L2: --	L2: --	L2: --	--		9000
	L3: --	L3: --	L3: --	--		

5.6	TABLE: Connection conditions and synchronization (Reconnection)			P
Condition	Measurement		Limitation	
	Reconnection	Delay time [s]	Reconnection	Delay time [s]
f<47.45Hz	No	78	No	≥60
f≥47.55Hz	Yes	138	Yes	≥60
f>50.15Hz	No	77	No	≥60
f≤50.05Hz	Yes	104	Yes	≥60
U<0.84Un	No	78	No	≥60
U≥0.86Un	Yes	135	Yes	≥60
U>1.11Un	No	78	No	≥60
U≤1.09Un	Yes	141	Yes	≥60
Note(s):				

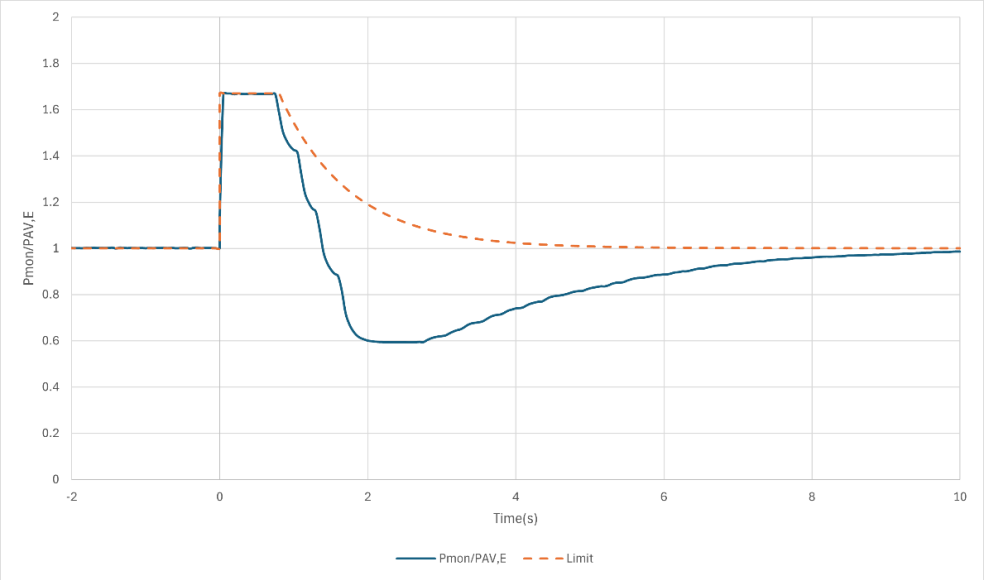
5.7	TABLE: $P_{AV,E}$ monitoring	P
$P_{AV,E}$ value setting: 60% Pn		
Power limit method		
Test method	Condition	
Jump of primary energy	P_{rim}/ $P_{dc,r}$: 60%->100%	
Cut of load	P_{load}/Pn: 40%->0%	

Power curve:

Jump of primary energy



Cut of load

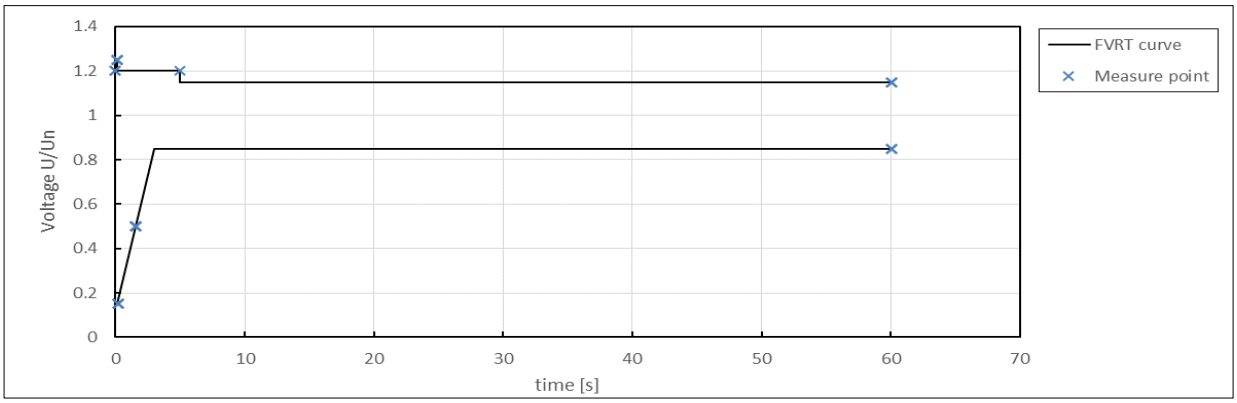


Disconnection method

Condition	Trip time [ms]	
	Measurement	Limitation
0.98* $P_{AV,E}$	N/A	No disconnect
1.02 $P_{AV,E}$ -1.067* $P_{AV,E}$	N/A	< 10000+200
1.067 $P_{AV,E}$ -1.670* $P_{AV,E}$	N/A	< 3000 + 200
1.690* $P_{AV,E}$	N/A	< 200

5.8	TABLE: Verification of dynamic network supporting (FVRT)	P

FRT curve settings:



Fault Type	3-phase fault and 2-phase fault
Transformer Type	Dy5
NS protection settings	See table 5.5.7 for detail.
Any auxilliary power supply in fault ride through?	Yes/No
Terminal sequence	For D1: U-L1, V-L2, W-L3 For D2: U-L3, V-L1, W-L2

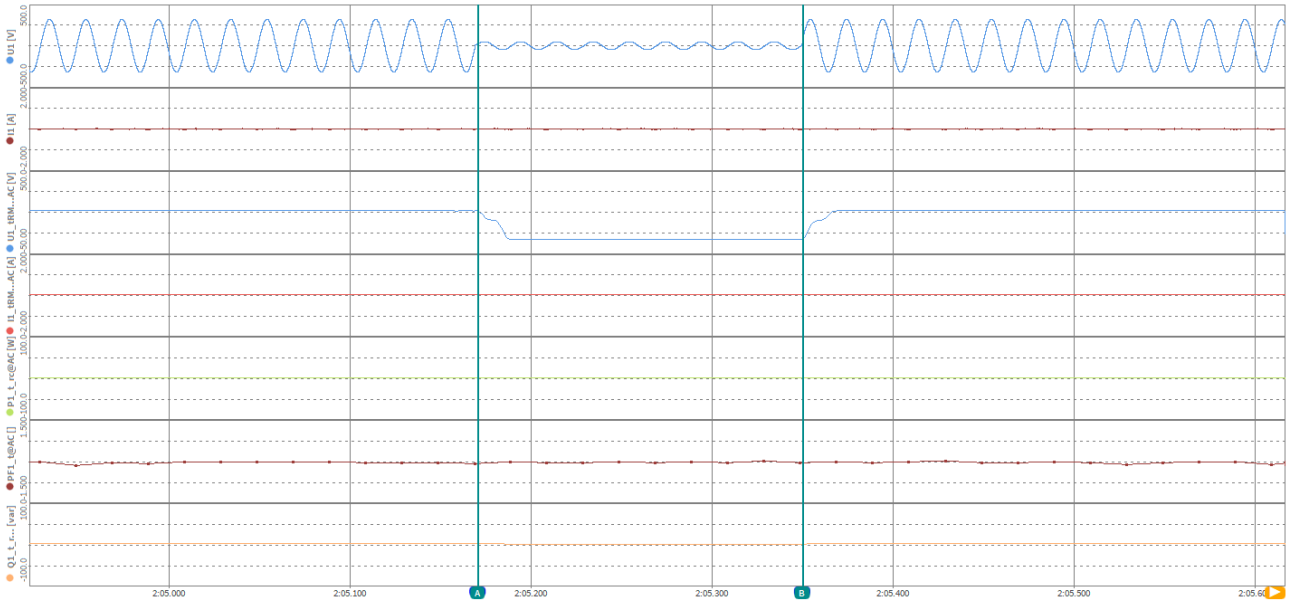
D1	Test Equipment	Test Sample
Connection terminal	U	L1
	V	L2
	W	L3 (L for single phase)
D2	Test Equipment	Test Sample
Connection terminal	U	L3
	V	L1 (L for single phase)
	W	L2

VDE No.	U	V	W	Type	Remark
--	1.00, -150°	1.00, 90°	1.00, -30°	A	Initial status
1.3, 1.4	0.62, -173.3°	0.15, 90°	0.62, -6.9°	D	UVRT
2.3, 2.4, 3.3, 3.4	0.76, -161.1°	0.50, 90°	0.76, -19.1°	D	
4.3, 4.4	0.93, -152.8°	0.85, 89.9°	0.93, -27.4°	D	
5.3, 5.4	1.08, -144.5°	1.25, 89.1°	1.06, -36.3°	D	OVRT
6.3, 6.4	1.06, -145.5°	1.20, 89.3°	1.05, -35.1°	D	
7.3, 7.4	1.04, -146.6°	1.15, 89.4°	1.04, -33.9°	D	

Test	U/Un [p.u.]	Fault type	Fault duration [ms]	P/Pn [p.u.]	Q/Pn [p.u.]	Test No.
1	0.15…..0.25	A	For 0.15pu ≥150 For 0.25pu ≥500	1.0	0…±0.1	1.1
				0.2…0.6		1.2
		D1		1.0		1.3
				0.2…0.6		1.4
		D2		1.0		1.3 (D2)
2	0.50….0.60	A	For 0.5pu ≥1500 For 0.60pu ≥ 2000	1.0	Max. over-excited	2.1
				0.2…0.6		2.2
		D1		1.0		2.3
				0.2…0.6		2.4
3	0.50….0.60	A	For 0.5pu ≥1500 For 0.60pu ≥ 2000	1.0	Max. under-excited	3.1
				0.2…0.6		3.2
		D1		1.0		3.3
				0.2…0.6		3.4
4	0.85….0.90	A	≥ 60000	1.0	0…±0.1	4.1
				0.2…0.6		4.2
		D1		1.0		4.3
				0.2…0.6		4.4
5	1.2….1.25	A	≥ 100	1.0	0…±0.1	5.1
				0.2…0.6		5.2
		D1		1.0		5.3
				0.2…0.6		5.4
		D2		1.0		5.3 (D2)
6	1.15…1.20	A	≥ 5000	1.0	0…±0.1	6.1
				0.2…0.6		6.2
		D1		1.0		6.3
				0.2…0.6		6.4
7	1.10…1.15	A	≥ 60000	1.0	0…±0.1	7.1
				0.2…0.6		7.2
		D1		1.0		7.3

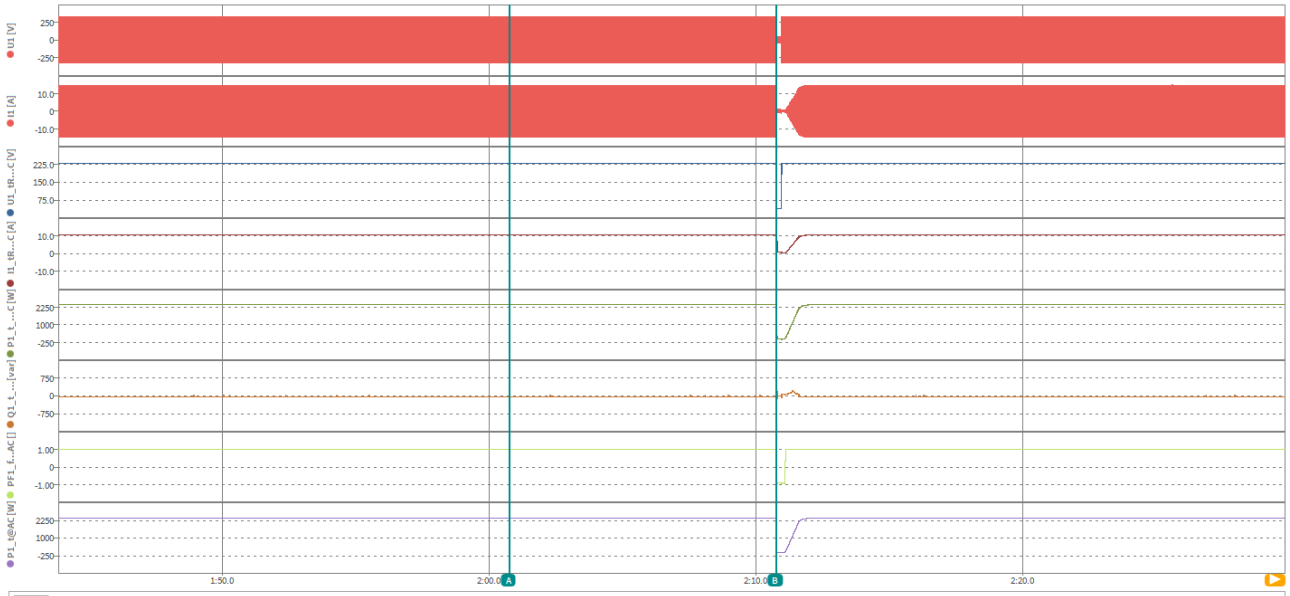
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	1.1	1.2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	20:42:43	20:39:01
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.15	0.15
	5	Setting dip duration		--		150	150
	6	Point of fault entry	Total	--	ms	125170	125170
	7	Point of fault clearance	Total	--	ms	125350	125350
	8	Fault duration in empty load test	Total	--	ms	179	179
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.150	0.150
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.000
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.001	0.203
	13	Active power	Total	t1-10s to t1	p.u.	1.002	0.203
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.016	-0.013
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.151	0.151
	19	Line current	Phase 1	t1+60ms	p.u.	0.053	0.051
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.052	0.052
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.007	-0.007
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.000
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.003	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.677	0.358
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.013
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 1.1 idle test



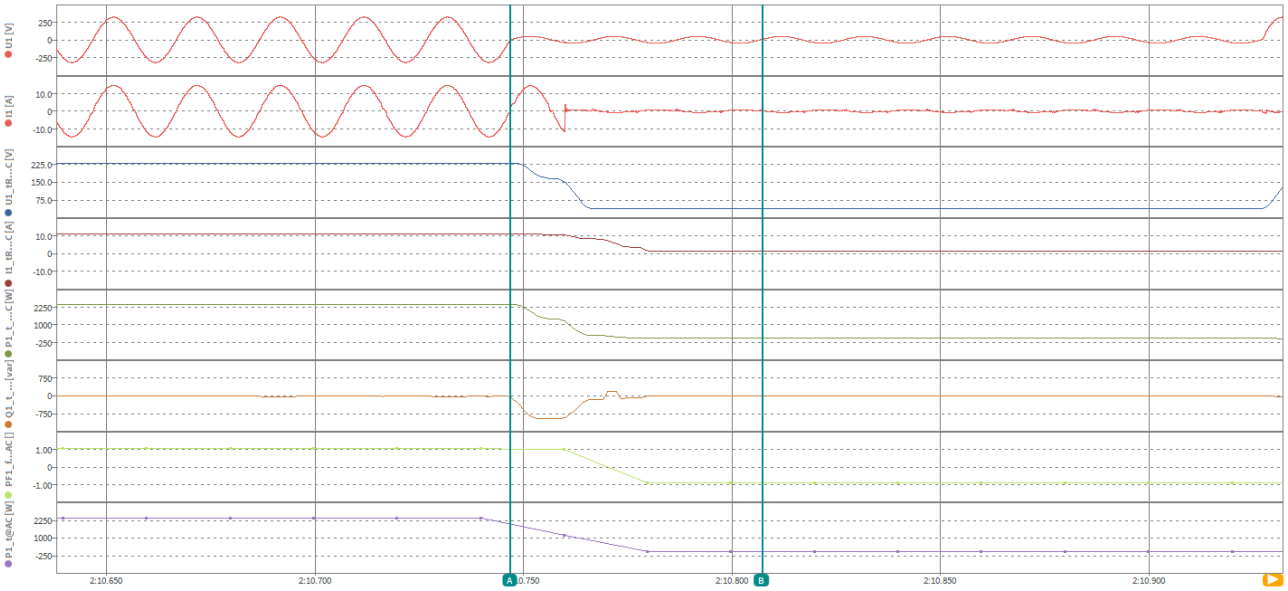
时间 [s]	A 2:05.1708073	B 2:05.3500504	间隔 0.1792431
U1 [V]	21.83199	24.12391	2.291918
I1 [A]	-0.013351	-8.106e-3	5.245e-3
U1_tRMS_rc@AC [V]	228.2706	34.45711	-193.8135
I1_tRMS_rc@AC [A]	0.013117	0.013910	7.923e-4
P1_t_rc@AC [W]	-0.253833	-0.030157	0.223676
PF1_t@AC []	-0.083862	-0.063188	0.020674
Q1_t_rc@AC [var]	2.983560	0.478343	-2.505217

Test No. 1.1 with PGU



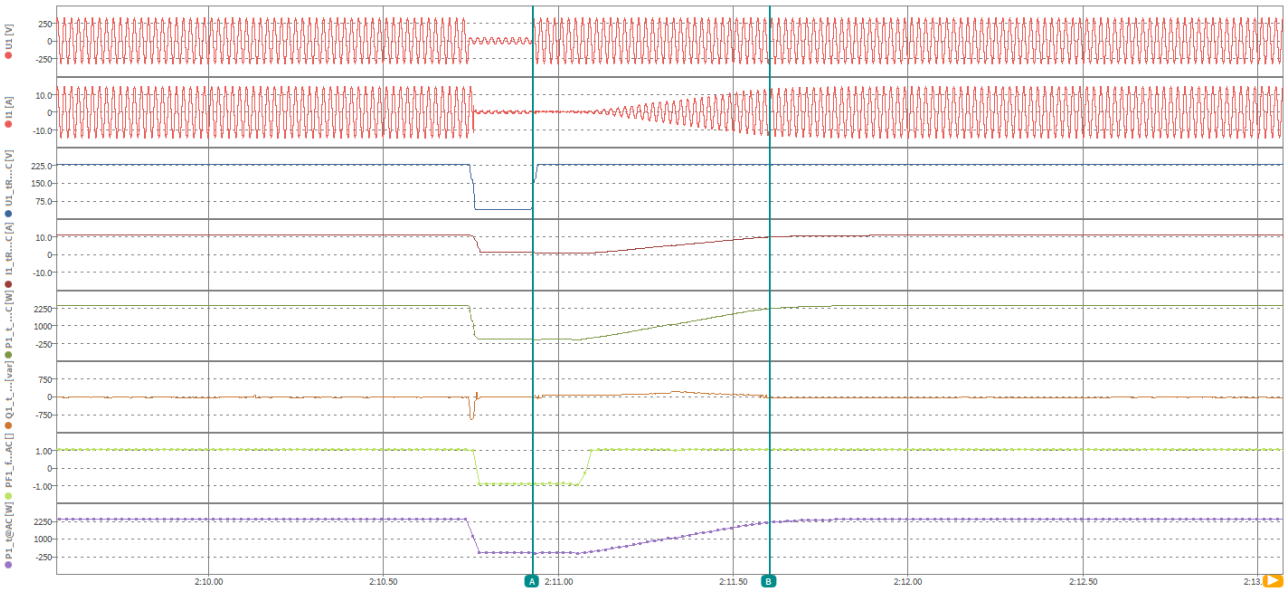
时间 [s]	A 2:00.7469000	B 2:10.7469000	间隔 0:10.0000000
U1 [V]	12.68196	8.255482	-4.426480
I1 [A]	0.093851	0.571284	0.477433
U1_tRMS_rc@AC [V]	230.1461	229.6107	-0.535400
I1_tRMS_rc@AC [A]	10.45629	10.43219	-0.024102
P1_t_rc@AC [W]	2406.180	2395.027	-11.15308
Q1_t_rc@AC [var]	-37.64635	-38.83741	-1.191055
PF1_fund@AC []	0.999999	0.999999	5.364e-7
P1_t@AC [W]	2405.102	2405.485	0.383545

Before dip



	A	B	间隔
时间 [s]	2:10.7469000	2:10.8072000	0.0603000
U1 [V]	8.255482	6.314040	-1.941443
I1 [A]	0.571284	0.640426	0.069141
U1_tRMS_rc@AC [V]	229.6107	34.64631	-194.9643
I1_tRMS_rc@AC [A]	10.43219	0.549642	-9.882550
P1_t_rc@AC [W]	2395.027	-16.59273	-2411.620
Q1_t_rc@AC [var]	-38.83741	-9.344525	29.49288
PF1_fund@AC []	0.999999	-0.951047	-1.951047
P1_t@AC [W]	2405.485	-16.69884	-2422.184

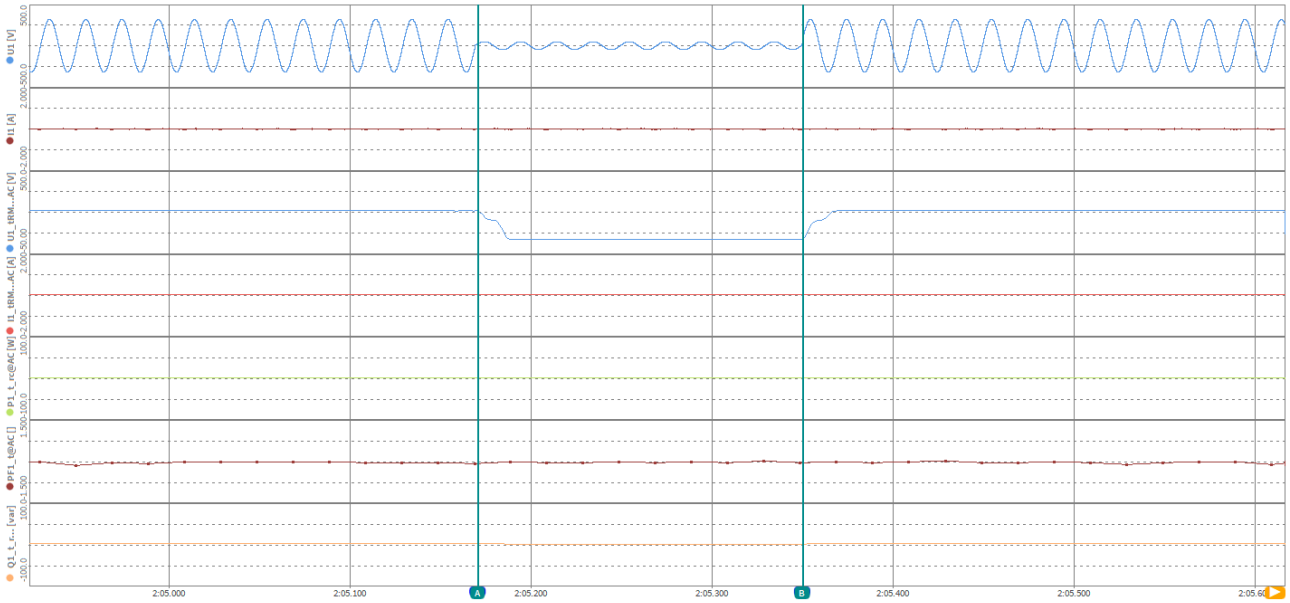
t1+60ms



	A	B	间隔
时间 [s]	2:10.9269000	2:11.6040000	0.6771000
U1 [V]	1.280546	-250.4325	-251.7131
I1 [A]	0.384722	-10.43650	-10.82122
U1_tRMS_rc@AC [V]	34.72352	230.1678	195.4443
I1_tRMS_rc@AC [A]	0.539285	9.407765	8.868481
P1_t_rc@AC [W]	-16.20441	2164.391	2180.595
Q1_t_rc@AC [var]	-9.384830	-64.94751	-55.56268
PF1_fund@AC []	-0.938089	0.999997	1.938085
P1_t@AC [W]	-16.20915	2149.882	2166.091

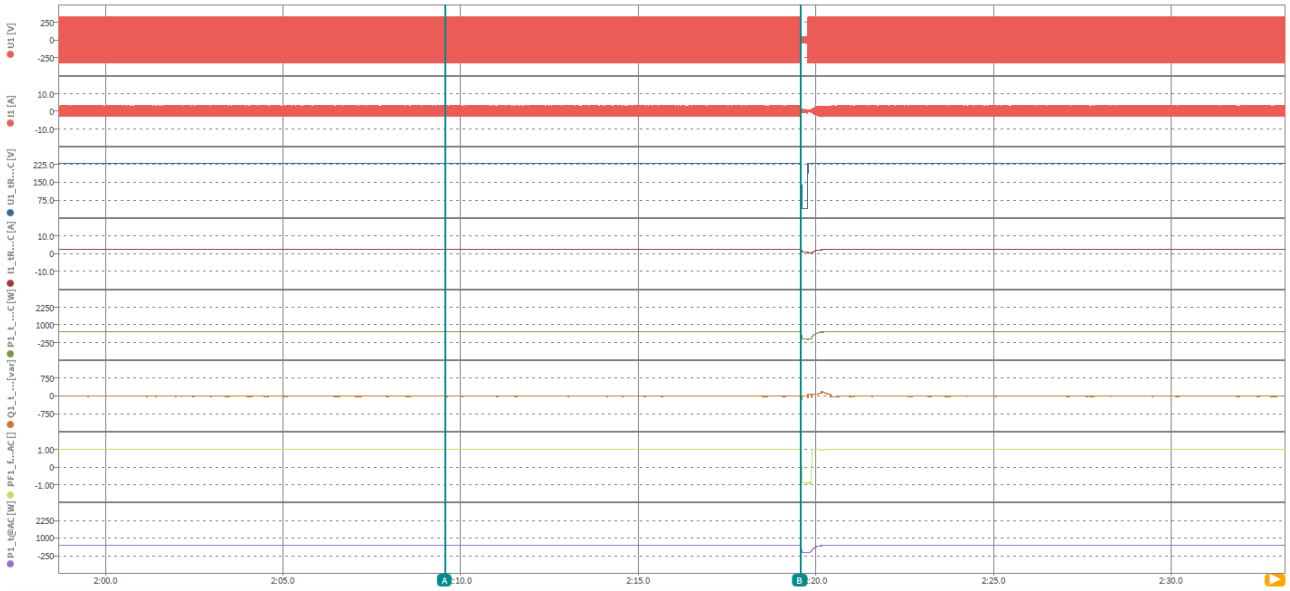
Active power rising time

Test No. 1.2 idle test



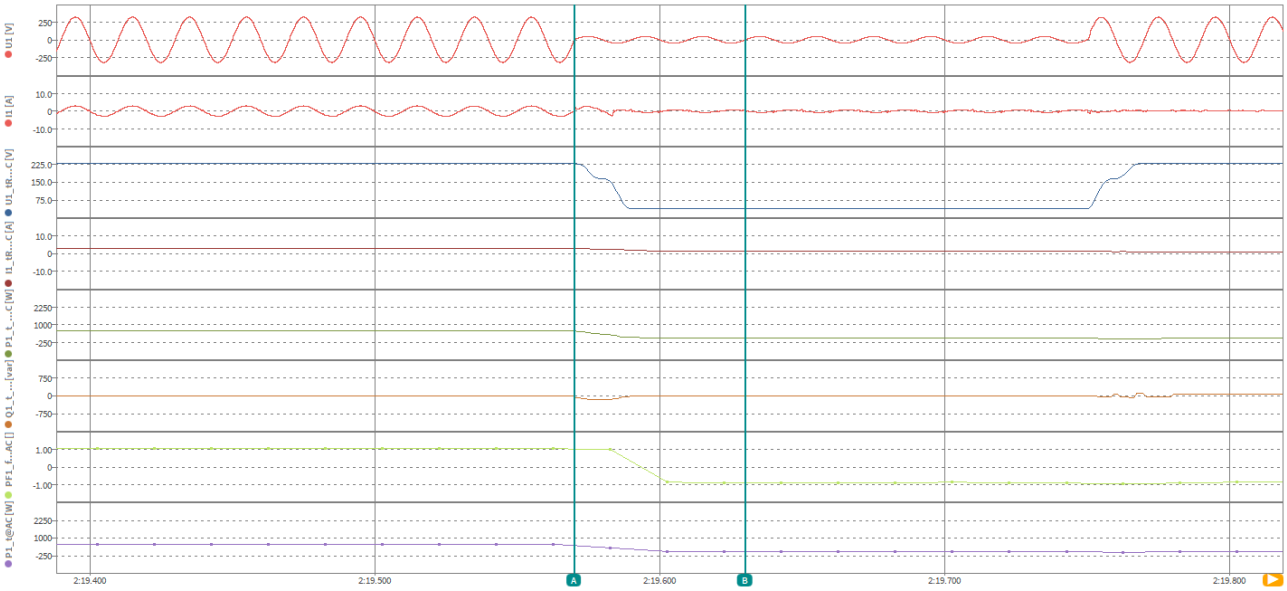
时间 [s]	A 2:05.1708073	B 2:05.3500504	间隔 0.1792431
U1 [V]	21.83199	24.12391	2.291918
I1 [A]	-0.013351	-8.106e-3	5.245e-3
U1_tRMS_rc@AC [V]	228.2706	34.45711	-193.8135
I1_tRMS_rc@AC [A]	0.013117	0.013910	7.923e-4
P1_t_rc@AC [W]	-0.253833	-0.030157	0.223676
PF1_t@AC []	-0.083862	-0.063188	0.020674
Q1_t_rc@AC [var]	2.983560	0.478343	-2.505217

Test No. 1.2 with PGU



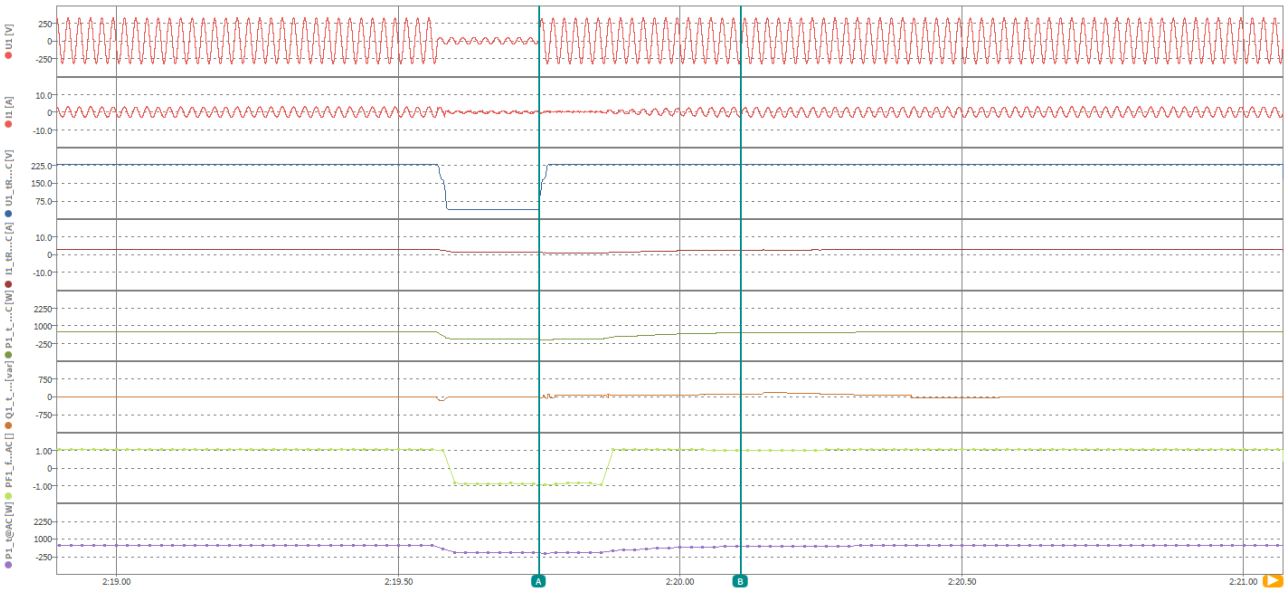
时间 [s]	A 2:09.570100	B 2:19.570100	间隔 0:10.000000
U1 [V]	23.89550	8.781910	-15.11359
I1 [A]	0.211272	2.150807	1.939535
U1_tRMS_rc@AC [V]	230.1125	229.5445	-0.567947
I1_tRMS_rc@AC [A]	2.118122	2.119637	1.515e-3
P1_t_rc@AC [W]	486.4839	485.4222	-1.061676
Q1_t_rc@AC [var]	-29.97042	-33.12395	-3.153532
PF1_fund@AC []	0.999842	0.999824	-1.776e-5
P1_t@AC [W]	486.5627	486.1069	-0.455719

Before dip



	A	B	间隔
时间 [s]	2:19.570100	2:19.630100	0.060000
U1 [V]	8.781910	2.768994	-6.012917
I1 [A]	2.150807	-0.051584	-2.202392
U1_tRMS_rc@AC [V]	229.5445	34.67927	-194.8653
I1_tRMS_rc@AC [A]	2.119637	0.533018	-1.586619
P1_t_rc@AC [W]	485.4222	-16.41412	-501.8364
Q1_t_rc@AC [var]	-33.12395	-8.500599	24.62335
PF1_fund@AC []	0.999824	-0.946132	-1.945956
P1_t@AC [W]	486.1069	-16.58004	-502.6870

t1+60ms

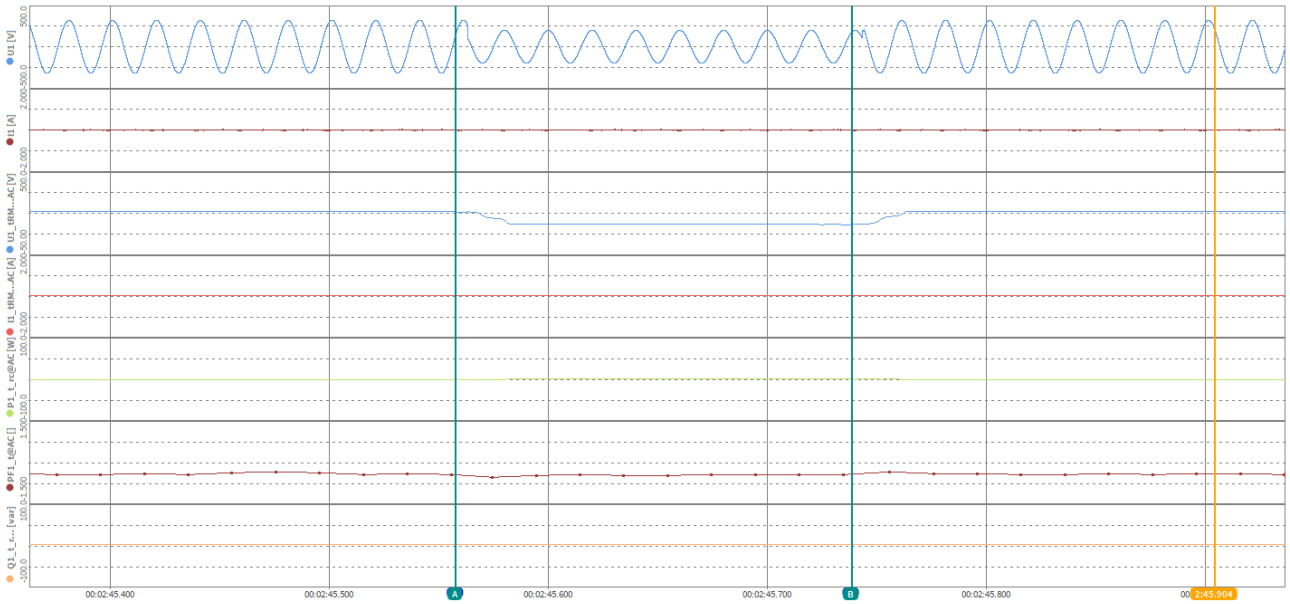


	A	B	间隔
时间 [s]	2:19.75040	2:20.10800	0.35760
U1 [V]	23.23008	-181.4735	-204.7036
I1 [A]	-0.781741	-1.947012	-1.165271
U1_tRMS_rc@AC [V]	34.74559	230.1100	195.3644
I1_tRMS_rc@AC [A]	0.529477	1.956424	1.426946
P1_t_rc@AC [W]	-16.29308	440.7915	457.0846
Q1_t_rc@AC [var]	-8.543120	91.52189	100.0650
PF1_fund@AC []	-0.938324	0.985826	1.924150
P1_t@AC [W]	-16.08033	436.4584	452.5388

Active power rising time

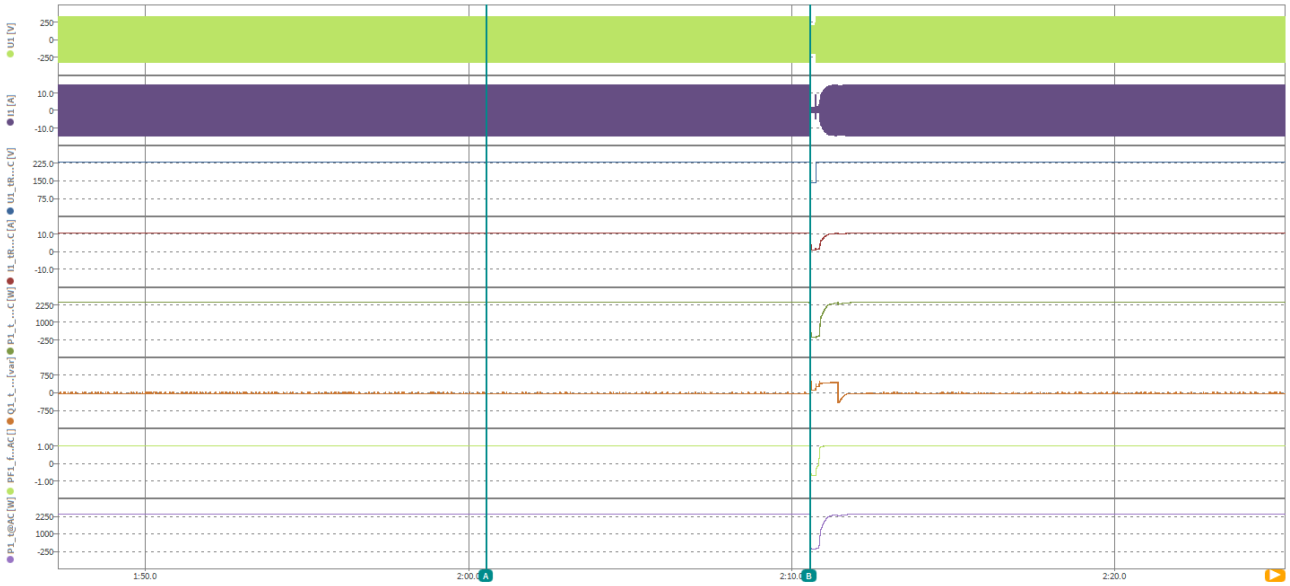
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	1.3	1.3-D2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.06
	2	Time (start of test)	--	--	hh:mm:ss.f	18:48:42	19:10:04
	3	Fault type (phase)	--	--		D1	D2
	4	Setting voltage depth	Line to line	--	p.u.	0.62	0.15
	5	Setting dip duration		--		150	150
	6	Point of fault entry	Total	--	ms	165557	124962
	7	Point of fault clearance	Total	--	ms	165738	125142
	8	Fault duration in empty load test	Total	--	ms	180	180
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.620	0.151
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.000	0.995
	13	Active power	Total	t1-10s to t1	p.u.	1.001	0.995
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.013	-0.025
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	1.000
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.621	0.151
	19	Line current	Phase 1	t1+60ms	p.u.	0.089	0.046
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.091	0.045
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.039	-0.006
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.001	0.996
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.360	0.534
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.013	-0.025
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 1.3 idle test



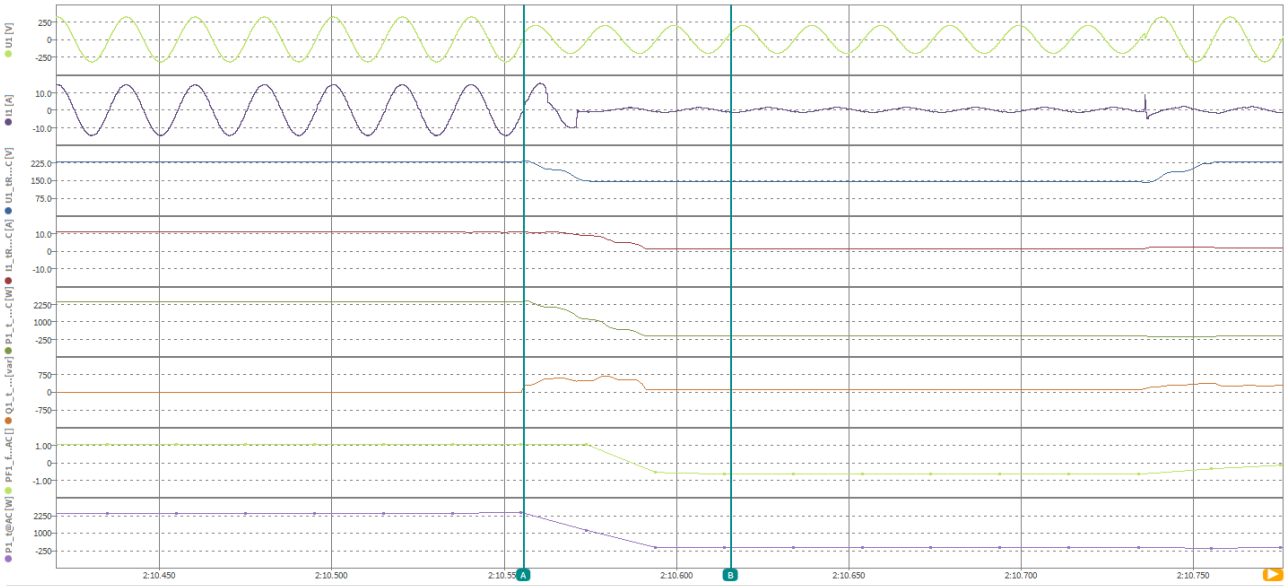
	A	B	间隔
时间 [s]	2:45.5578240	2:45.7384621	0.1806382
U1 [V]	115.7041	166.7774	51.07332
I1 [A]	-0.014305	-0.018120	-3.815e-3
U1_tRMS_rc@AC [V]	232.7140	141.3486	-91.36543
I1_tRMS_rc@AC [A]	0.012368	0.014402	2.034e-3
P1_t_rc@AC [W]	-1.397775	-0.987610	0.410165
PF1_t@AC []	-0.476796	-0.453860	0.022936
Q1_t_rc@AC [var]	2.516030	1.780156	-0.735873

Test No. 1.3 with PGU



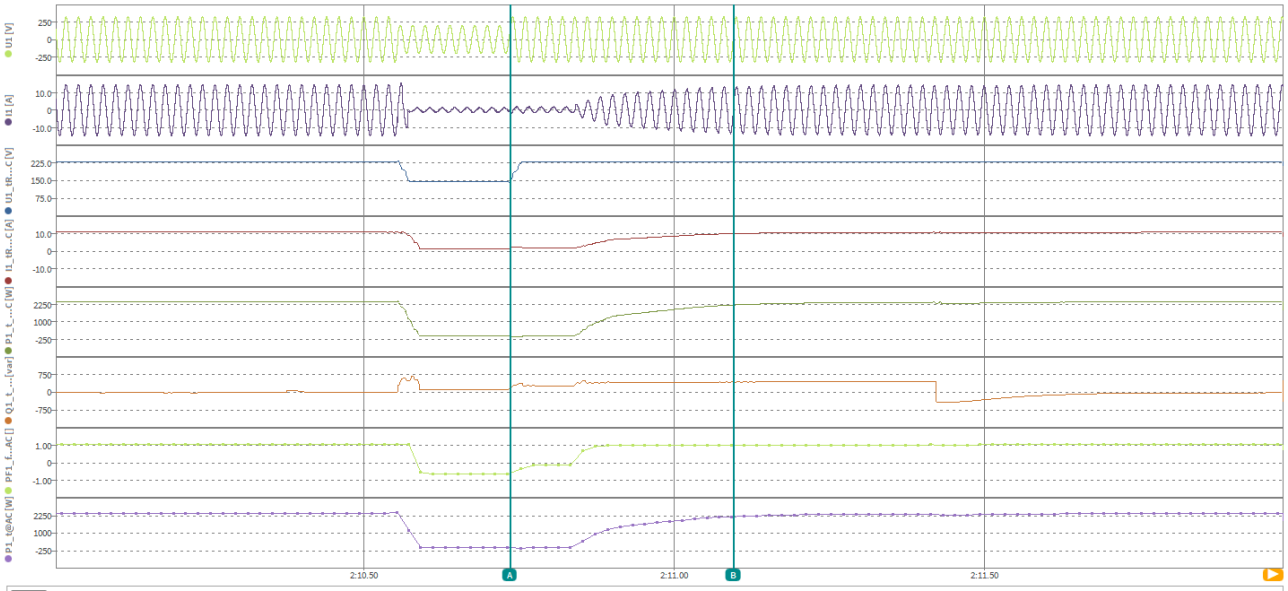
	A	B	间隔
时间 [s]	2:00.555800	2:10.555800	0:10.000000
U1 [V]	25.11382	103.9298	78.81594
I1 [A]	0.767112	-7.406474	-8.173585
U1_tRMS_rc@AC [V]	230.2028	231.3636	1.160797
I1_tRMS_rc@AC [A]	10.44086	10.49068	0.049824
P1_t_rc@AC [W]	2403.201	2426.879	23.67871
Q1_t_rc@AC [var]	-38.89050	-37.04352	1.846977
PF1_fund@AC []	1.000000	1.000000	-2.384e-7
P1_t@AC [W]	2403.227	2430.348	27.12134

Before dip



	A	B	间隔
时间 [s]	2:10.555800	2:10.615800	0.060000
U1 [V]	103.9298	92.49664	-11.43313
I1 [A]	-7.406474	-1.327992	6.078482
U1_tRMS_rc@AC [V]	231.3636	142.7503	-88.61336
I1_tRMS_rc@AC [A]	10.49068	0.929103	-9.561580
P1_t_rc@AC [W]	2426.879	-91.52291	-2518.402
Q1_t_rc@AC [var]	-37.04352	95.99052	133.0340
PF1_fund@AC []	1.000000	-0.694139	-1.694138
P1_t@AC [W]	2430.348	-91.55460	-2521.903

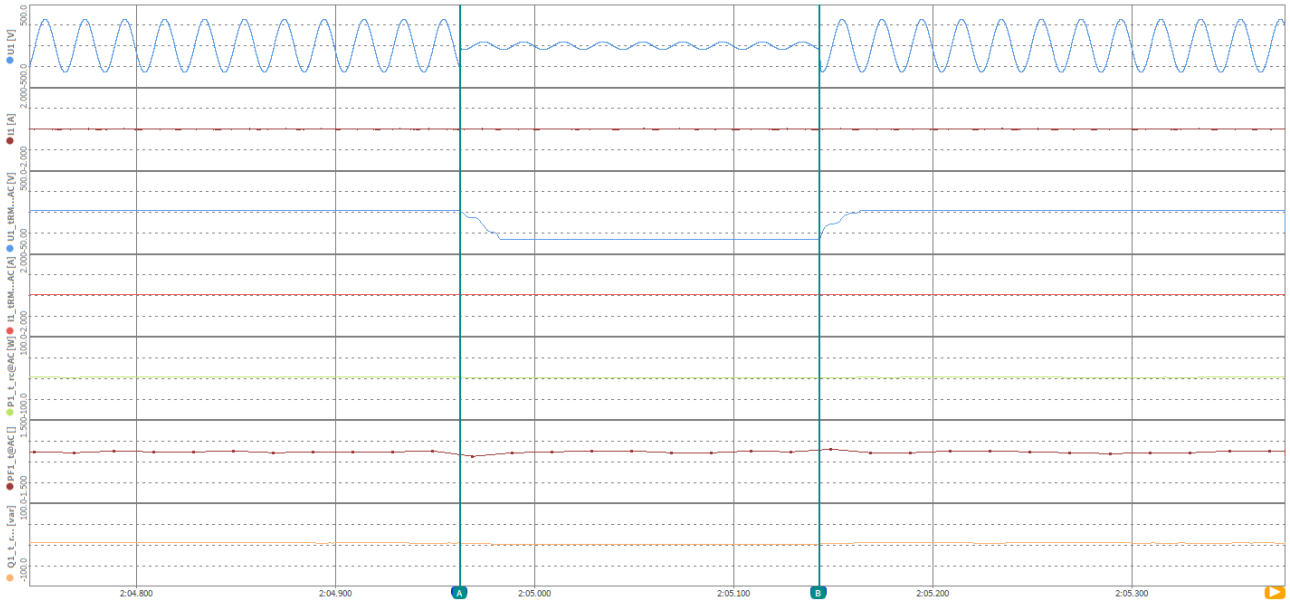
t1+60ms



	A	B	间隔
时间 [s]	2:10.7357	2:11.0960	0.3603
U1 [V]	80.89304	43.98084	-36.91221
I1 [A]	0.382662	-1.333952	-1.716614
U1_tRMS_rc@AC [V]	139.4847	230.2174	90.73264
I1_tRMS_rc@AC [A]	0.953472	9.579010	8.625538
P1_t_rc@AC [W]	-91.90044	2162.836	2254.736
Q1_t_rc@AC [var]	96.13497	430.4513	334.3163
PF1_fund@AC []	-0.703131	0.981878	1.685009
P1_t@AC [W]	-94.37277	2162.856	2257.228

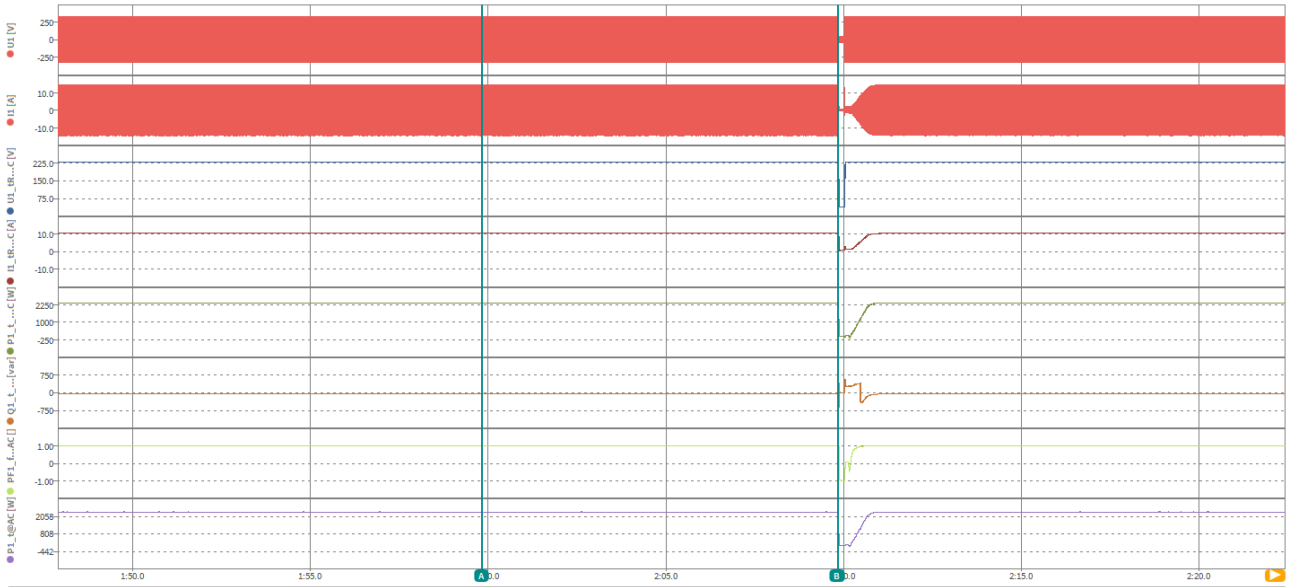
Active power rising time

Test No. 1.3(D2) idle test



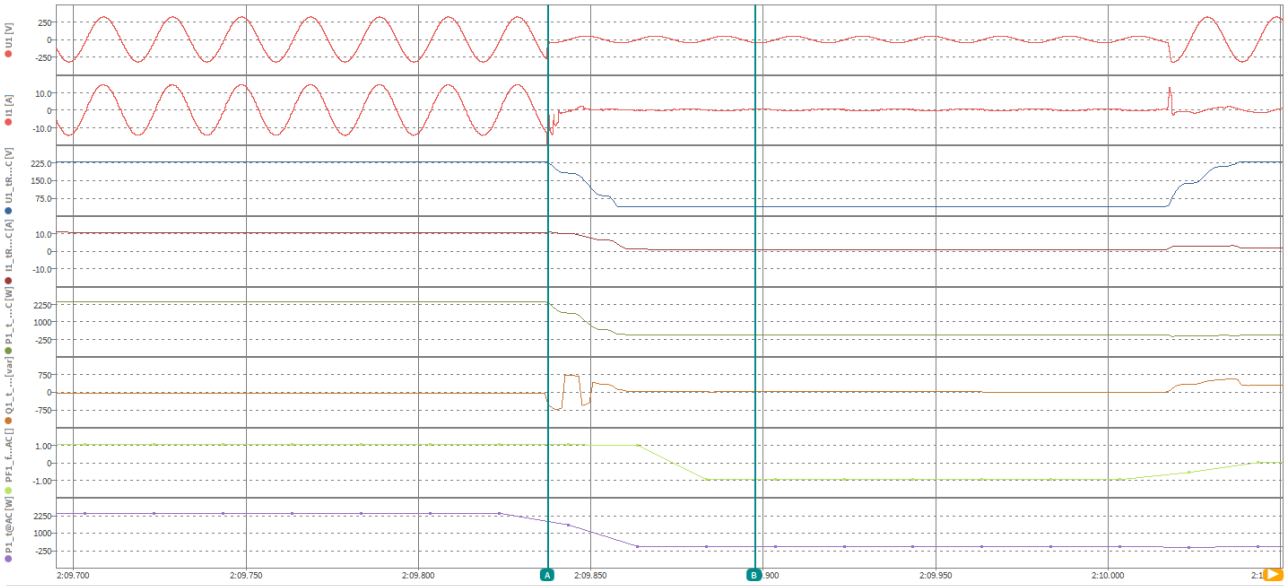
时间 [s]	A 2:04.9628994	B 2:05.1429122	间隔 0.1800128
U1 [V]	-270.4342	-40.72070	229.7135
I1 [A]	-0.032425	-0.018120	0.014305
U1_tRMS_rc@AC [V]	230.0989	34.59398	-195.5049
I1_tRMS_rc@AC [A]	0.015400	0.015739	3.395e-4
P1_t_rc@AC [W]	1.237106	0.167091	-1.070014
PF1_t@AC []	0.372383	0.330277	-0.042106
Q1_t_rc@AC [var]	3.320501	0.518212	-2.802289

Test No. 1.3(D2) with PGU



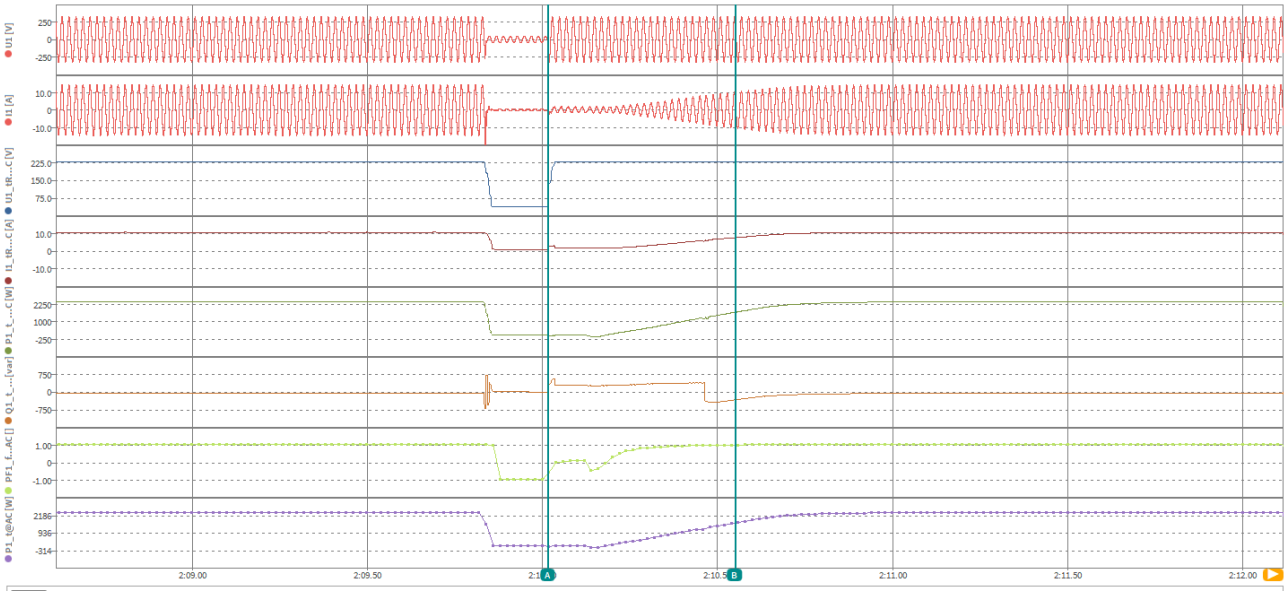
时间 [s]	A 1:59.8377000	B 2:09.8376000	间隔 9.9999000
U1 [V]	-302.3875	-21.03973	281.3478
I1 [A]	-13.67556	-14.58751	-0.911951
U1_tRMS_rc@AC [V]	230.1427	230.1422	-5.646e-4
I1_tRMS_rc@AC [A]	10.38504	10.38537	3.328e-4
P1_t_rc@AC [W]	2389.263	2389.382	0.118164
Q1_t_rc@AC [var]	-60.96975	-59.08987	1.879879
PF1_fund@AC []	0.999789	0.999788	-1.729e-6
P1_t@AC [W]	2389.494	2388.139	-1.354492

Before dip



	A	B	间隔
时间 [s]	2:09.8376000	2:09.8976000	0.0600000
U1 [V]	-21.03973	-45.27259	-24.23287
I1 [A]	-14.58751	0.732080	15.31959
U1_tRMS_rc@AC [V]	230.1422	34.65195	-195.4902
I1_tRMS_rc@AC [A]	10.38537	0.476748	-9.908625
P1_t_rc@AC [W]	2389.382	-15.97222	-2405.354
Q1_t_rc@AC [var]	-59.08987	4.219743	63.30961
PF1_fund@AC []	0.999788	-0.999448	-1.999236
P1_t@AC [W]	2388.139	-12.02133	-2400.160

t1+60ms

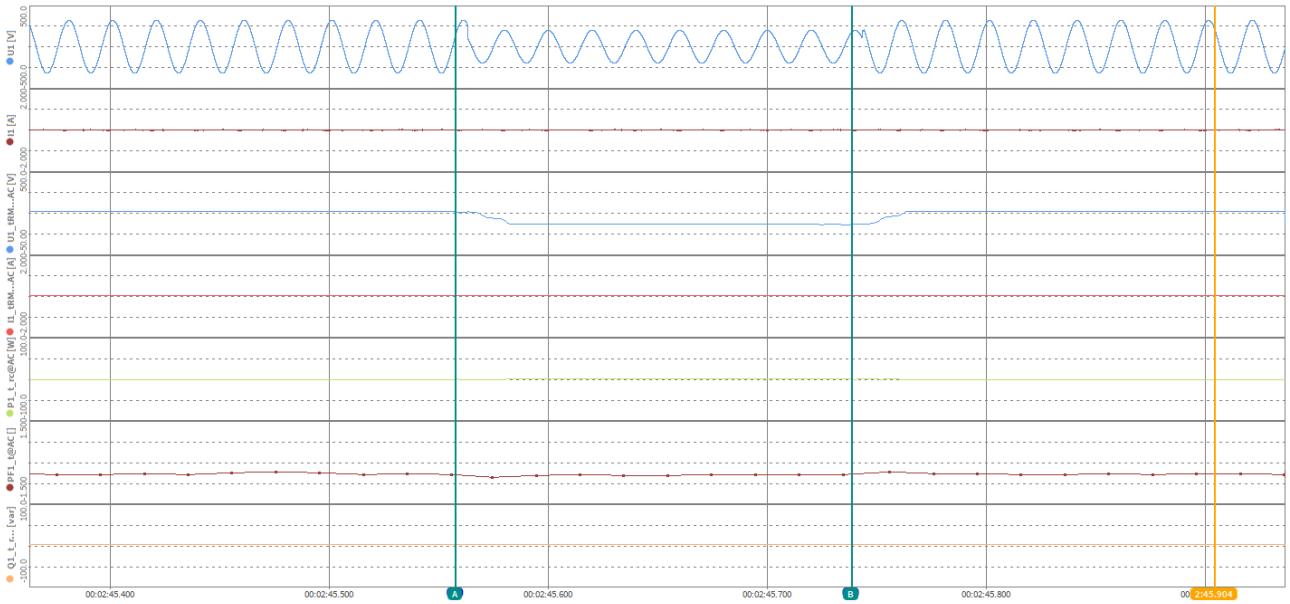


	A	B	间隔
时间 [s]	2:10.0174	2:10.5509	0.5335
U1 [V]	-46.48185	263.7680	310.2498
I1 [A]	1.379386	6.975070	5.595684
U1_tRMS_rc@AC [V]	34.53215	230.1268	195.5946
I1_tRMS_rc@AC [A]	0.476643	7.257008	6.780365
P1_t_rc@AC [W]	-15.71255	1631.841	1647.554
Q1_t_rc@AC [var]	-4.902164	-355.1076	-350.2054
PF1_fund@AC []	-0.999926	0.976966	1.976892
P1_t@AC [W]	-15.68014	1598.946	1614.626

Active power rising time

Condition						Measurement
	No.	Parameter	Phase ref.	Time ref.	unit	
General Info.	0	Test number	--	--	--	1.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	18:52:46
	3	Fault type (phase)	--	--		D1
	4	Setting voltage depth	Line to line	--	p.u.	0.62
	5	Setting dip duration		--		150
	6	Point of fault entry	Total	--	ms	165557
	7	Point of fault clearance	Total	--	ms	165738
	8	Fault duration in empty load test	Total	--	ms	180
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.620
	10		Pos.		p.u.	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	0.203
	13	Active power	Total	t1-10s to t1	p.u.	0.202
	14		Pos.			--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.011
	16		Pos.			--
	17	Cos_{φ}	--	t1-10s to t1	--	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.621
	19	Line current	Phase 1	t1+60ms	p.u.	0.098
	20		Phase 2			--
	21		Phase 3			--
	22	Line current	Phase 1	t1+100ms	p.u.	0.097
	23		Phase 2			--
	24		Phase 3			--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.039
	26		Pos.			--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.202
	29		Pos.			--
	39	Active power rising time	Pos.	--	s	0.139
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.012
	32		Pos.			--
	33	Reactive power rising time	Pos.	--	s	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes

Test No. 1.4 idle test



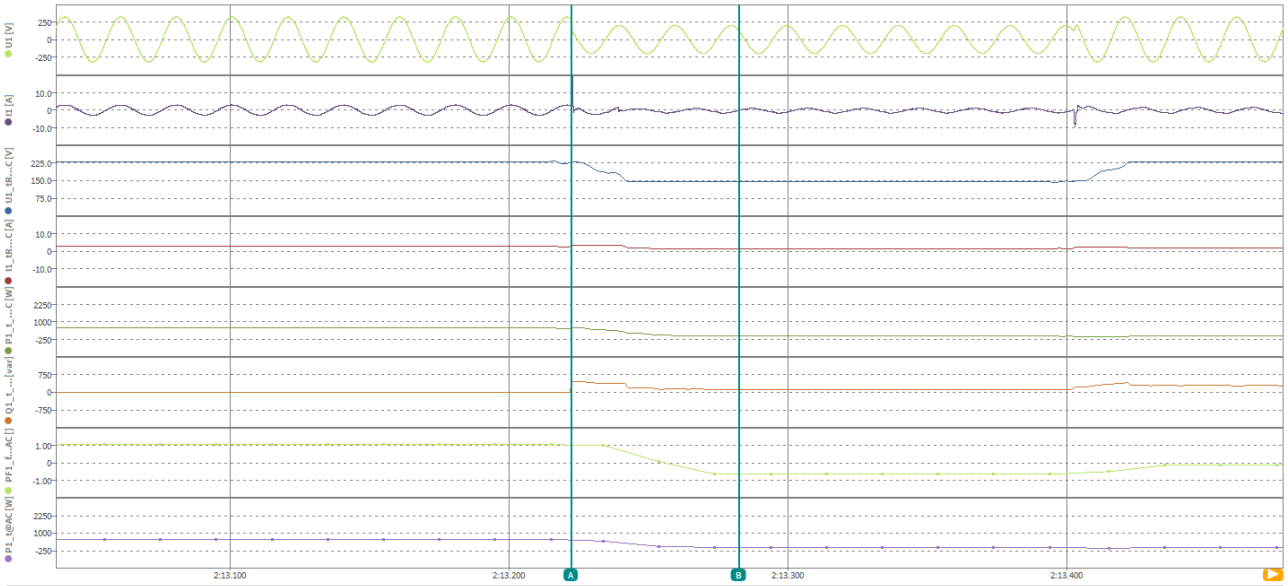
	A	B	间隔
时间 [s]	2:45.5578240	2:45.7384621	0.1806382
U1 [V]	115.7041	166.7774	51.07332
I1 [A]	-0.014305	-0.018120	-3.815e-3
U1_tRMS_rc@AC [V]	232.7140	141.3486	-91.36543
I1_tRMS_rc@AC [A]	0.012368	0.014402	2.034e-3
P1_t_rc@AC [W]	-1.397775	-0.987610	0.410165
PF1_t@AC []	-0.476796	-0.453860	0.022936
Q1_t_rc@AC [var]	2.516030	1.780156	-0.735873

Test No. 1.4 with PGU



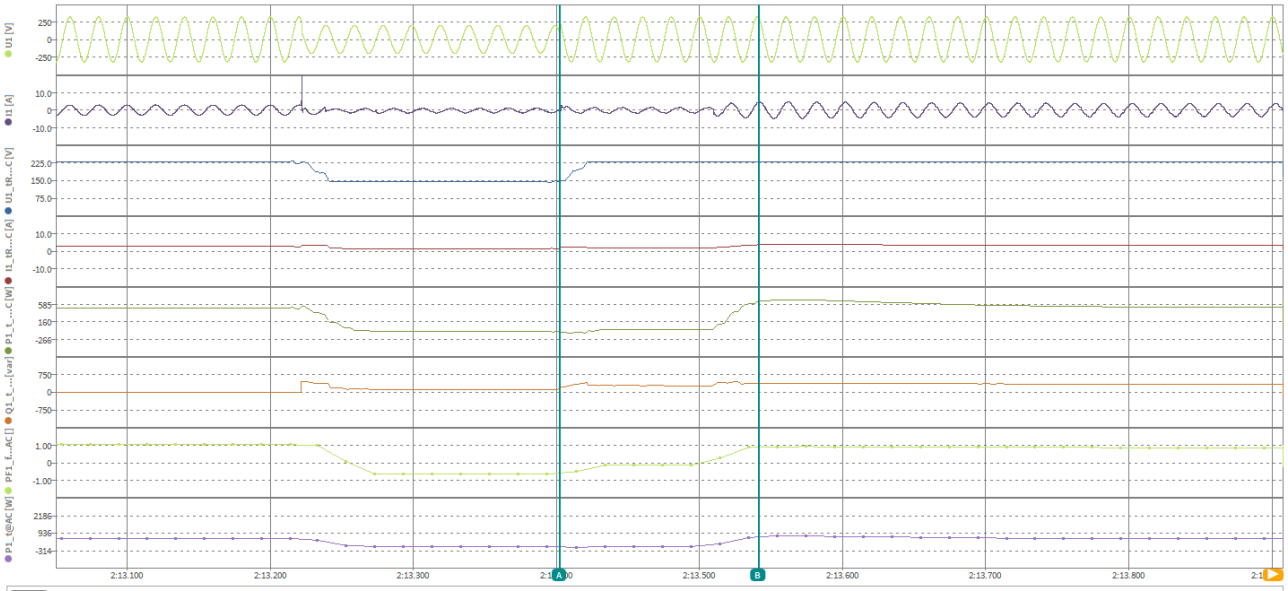
	A	B	间隔
时间 [s]	2:03.2223000	2:13.2223000	0:10.0000000
U1 [V]	278.4071	267.6594	-10.74767
I1 [A]	2.512336	5.304814	2.792478
U1_tRMS_rc@AC [V]	230.1691	227.8941	-2.274979
I1_tRMS_rc@AC [A]	2.116261	2.098953	-0.017309
P1_t_rc@AC [W]	486.4702	477.4908	-8.979401
Q1_t_rc@AC [var]	-24.72434	-28.47438	-3.750032
PF1_fund@AC []	0.999812	0.999835	2.319e-5
P1_t@AC [W]	486.8127	486.3378	-0.474854

Before dip



	A	B	间隔
时间 [s]	2:13.2223000	2:13.2824000	0.0601000
U1 [V]	267.6594	112.8385	-154.8209
I1 [A]	5.304814	-0.088215	-5.393029
U1_tRMS_rc@AC [V]	227.8941	142.7787	-85.11548
I1_tRMS_rc@AC [A]	2.098953	1.027762	-1.071191
P1_t_rc@AC [W]	477.4908	-92.94543	-570.4362
Q1_t_rc@AC [var]	-28.47438	113.5539	142.0283
PF1_fund@AC []	0.999835	-0.688213	-1.688048
P1_t@AC [W]	486.3378	-88.07166	-574.4095

t1+60ms

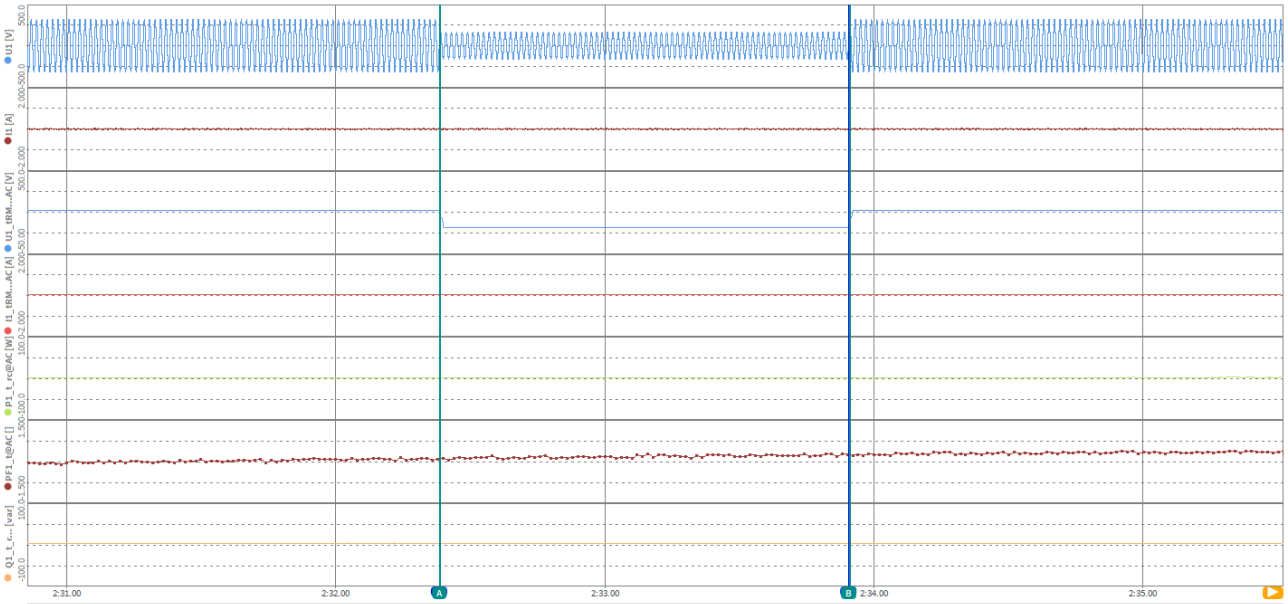


	A	B	间隔
时间 [s]	2:13.4024	2:13.5413	0.1389
U1 [V]	121.4778	317.3595	195.8816
I1 [A]	-1.958013	4.523993	6.482006
U1_tRMS_rc@AC [V]	143.8125	230.1717	86.35919
I1_tRMS_rc@AC [A]	0.960394	3.117751	2.157357
P1_t_rc@AC [W]	-92.85744	625.7526	718.6100
Q1_t_rc@AC [var]	102.2435	351.2967	249.0533
PF1_fund@AC []	-0.705559	0.846966	1.552525
P1_t@AC [W]	-95.95130	581.8492	677.8005

Active power rising time

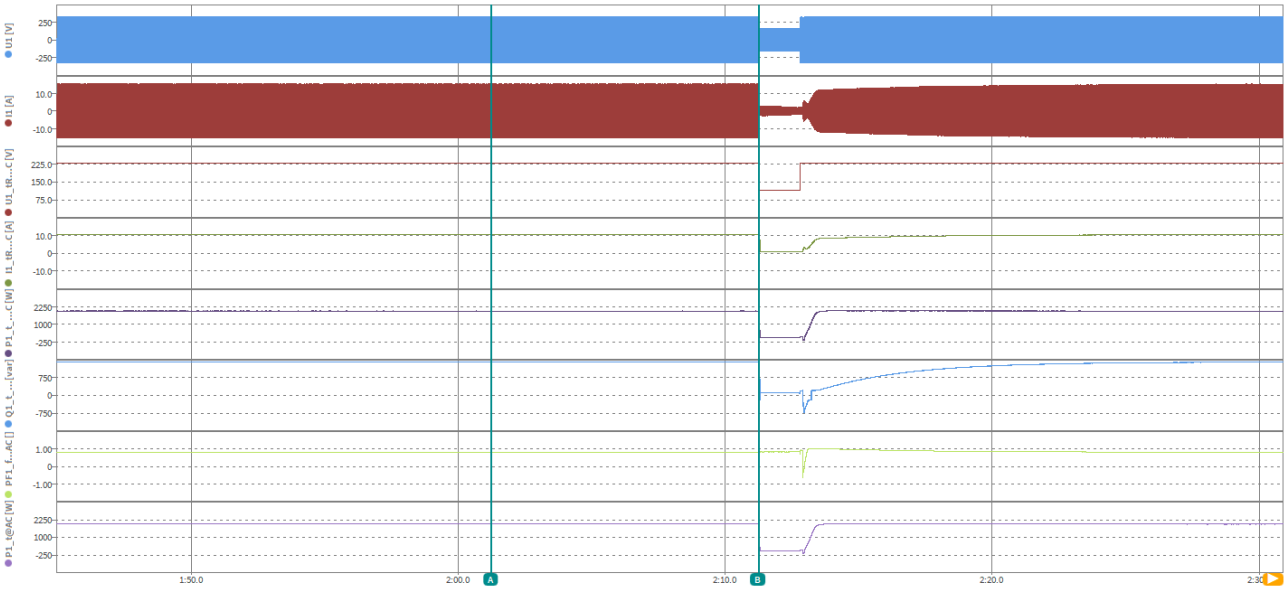
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	2.1	2.2
	1	Date	--	--	dd.mm.yyyy	2026.03.06	2026.03.06
	2	Time (start of test)	--	--	hh:mm:ss.f	17:48:42	17:40:07
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.50	0.50
	5	Setting dip duration		--		1500	1500
	6	Point of fault entry	Total	--	ms	152388.88	152388.88
	7	Point of fault clearance	Total	--	ms	153908.85	153908.85
	8	Fault duration in empty load test	Total	--	ms	1519.97	1519.97
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.5000	0.5000
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	0.999	0.999
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.005	0.629
	13	Active power	Total	t1-10s to t1	p.u.	0.808	0.201
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	0.597	0.595
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.804	0.320
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.499	0.499
	19	Line current	Phase 1	t1+60ms	p.u.	0.087	0.047
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.086	0.047
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.006	0.004
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	0.999	0.999
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.807	0.201
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.598	0.454
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	0.595	0.593
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	9.998	9.991
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 2.1 idle test



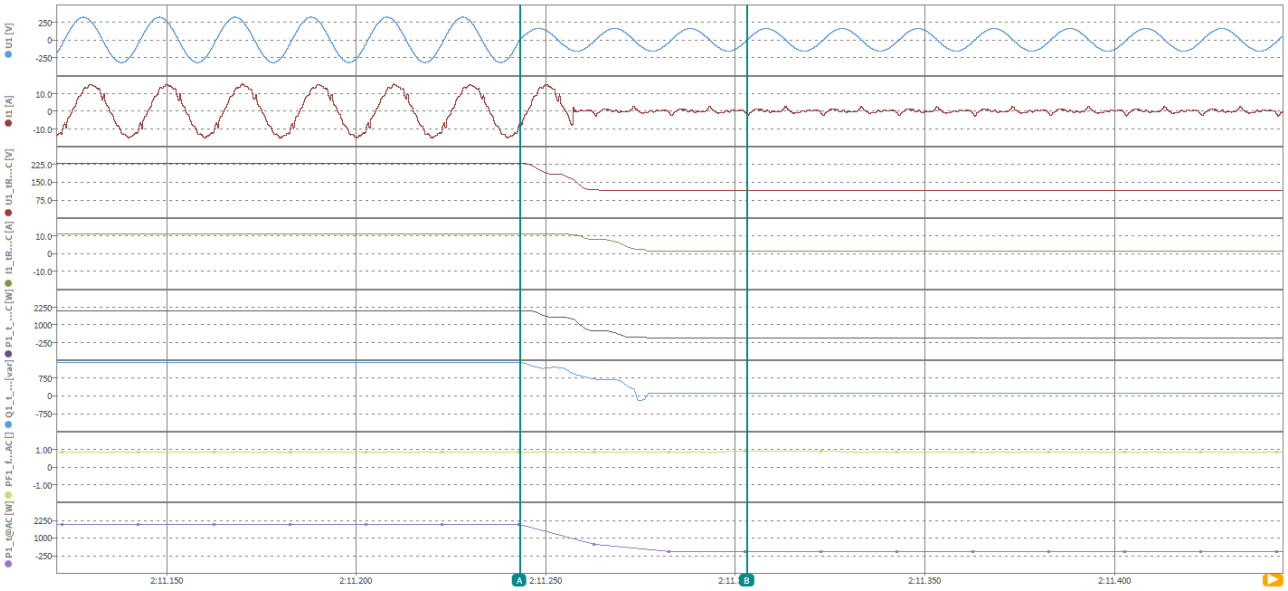
	A	B	间隔
时间 [s]	2:32.388881	2:33.908858	1.519977
U1 [V]	74.24045	145.3314	71.09094
I1 [A]	1.907e-3	1.431e-3	-4.768e-4
U1_tRMS_rc@AC [V]	229.9421	114.8878	-115.0543
I1_tRMS_rc@AC [A]	0.013725	0.013876	1.511e-4
P1_t_rc@AC [W]	0.176467	0.359181	0.182714
PF1_t@AC []	0.057511	0.228203	0.170692
Q1_t_rc@AC [var]	3.151037	1.553213	-1.597824

Test No. 2.1 with PGU



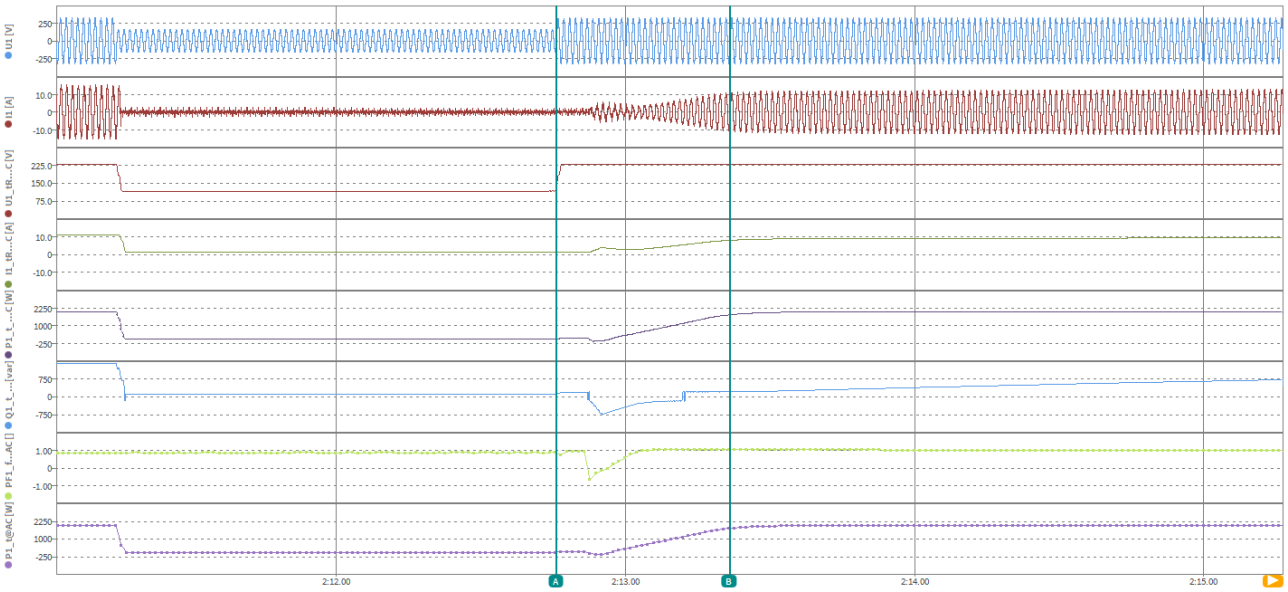
	A	B	间隔
时间 [s]	2:01.243200	2:11.243200	0:10.000000
U1 [V]	6.805182	10.57434	3.769160
I1 [A]	-6.650806	-5.903364	0.747442
U1_tRMS_rc@AC [V]	229.8295	228.8223	-1.007248
I1_tRMS_rc@AC [A]	10.49463	10.52105	0.026416
P1_t_rc@AC [W]	1938.516	1928.976	-9.539795
Q1_t_rc@AC [var]	1435.195	1440.440	5.244629
PF1_fund@AC []	0.805829	0.804461	-1.368e-3
P1_t@AC [W]	1938.440	1922.662	-15.77734

Before dip



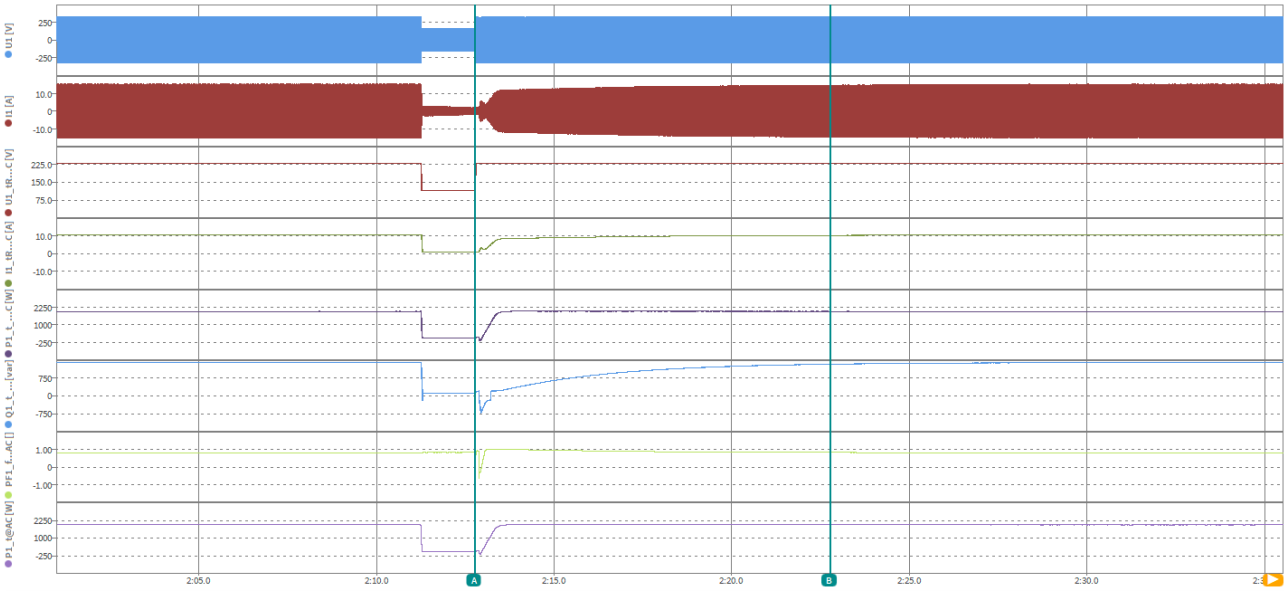
	A	B	间隔
时间 [s]	2:11.243200	2:11.303200	0.060000
U1 [V]	10.57434	5.888462	-4.685879
I1 [A]	-5.903364	-2.631426	3.271938
U1_tRMS_rc@AC [V]	228.8223	114.7963	-114.0260
I1_tRMS_rc@AC [A]	10.52105	0.911111	-9.609936
P1_t_rc@AC [W]	1928.976	12.70858	-1916.267
Q1_t_rc@AC [var]	1440.440	103.8172	-1336.623
PF1_fund@AC []	0.804461	0.837758	0.033297
P1_t@AC [W]	1922.662	12.70712	-1909.955

t1+60ms



	A	B	间隔
时间 [s]	2:12.7630	2:13.3611	0.5981
U1 [V]	-3.643275	-188.9787	-185.3354
I1 [A]	-1.303554	-6.794572	-5.491019
U1_tRMS_rc@AC [V]	115.3453	229.8692	114.5239
I1_tRMS_rc@AC [A]	0.714635	7.555971	6.841336
P1_t_rc@AC [W]	13.23564	1725.400	1712.164
Q1_t_rc@AC [var]	81.36022	199.4130	118.0528
PF1_fund@AC []	0.854652	0.998797	0.144145
P1_t@AC [W]	13.62360	1682.344	1668.720

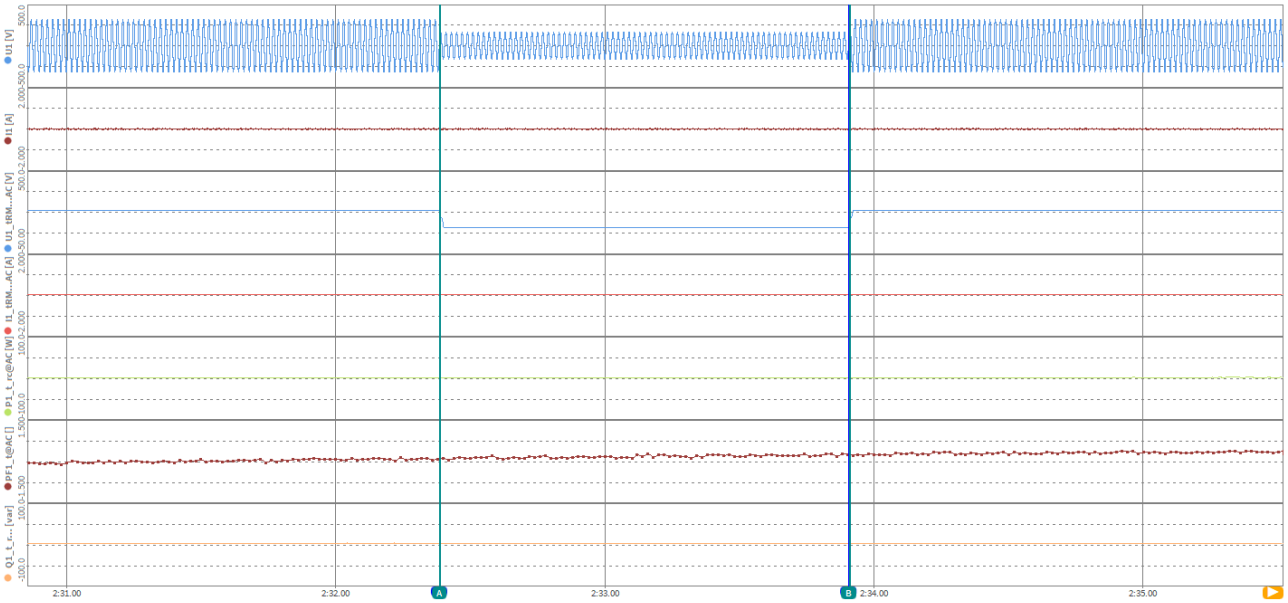
Active power rising time



	A	B	间隔
时间 [s]	2:12.7644	2:22.7630	9.9986
U1 [V]	129.7097	-2.407074	-132.1168
I1 [A]	0.970960	-7.067085	-8.038044
U1_tRMS_rc@AC [V]	114.8123	229.8244	115.0121
I1_tRMS_rc@AC [A]	0.753913	10.29192	9.538006
P1_t_rc@AC [W]	13.28654	1939.728	1926.442
Q1_t_rc@AC [var]	85.53272	1353.611	1268.078
PF1_fund@AC []	0.854652	0.820929	-0.033723
P1_t@AC [W]	13.62360	1939.632	1926.008

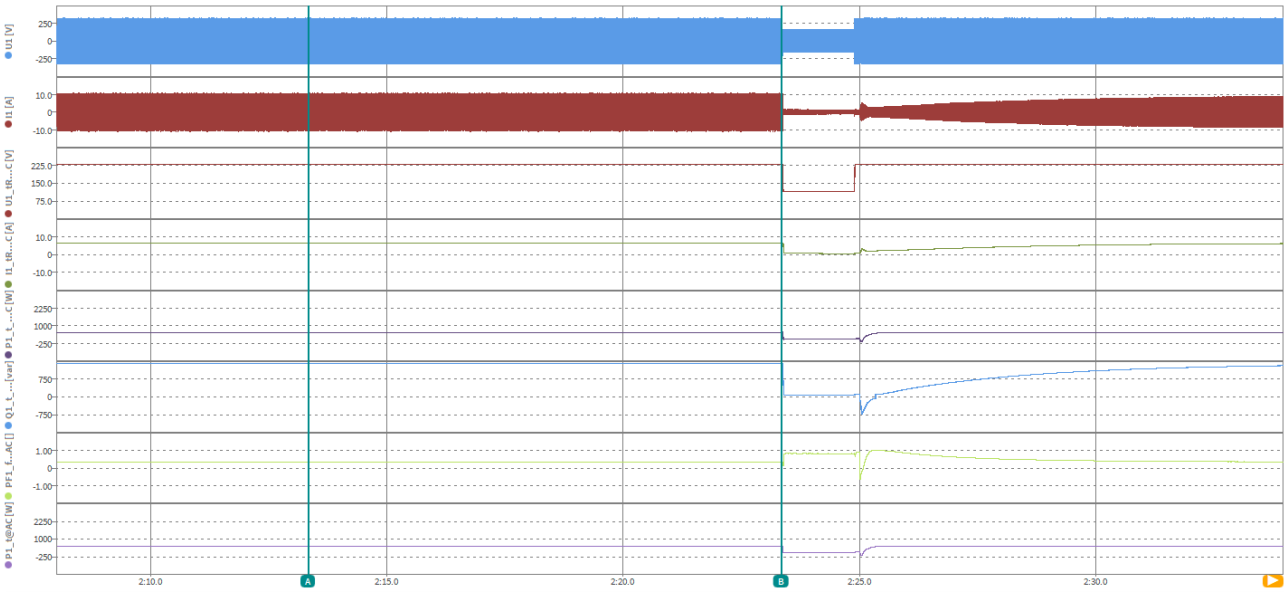
Reactive power rising time

Test No. 2.2 idle test



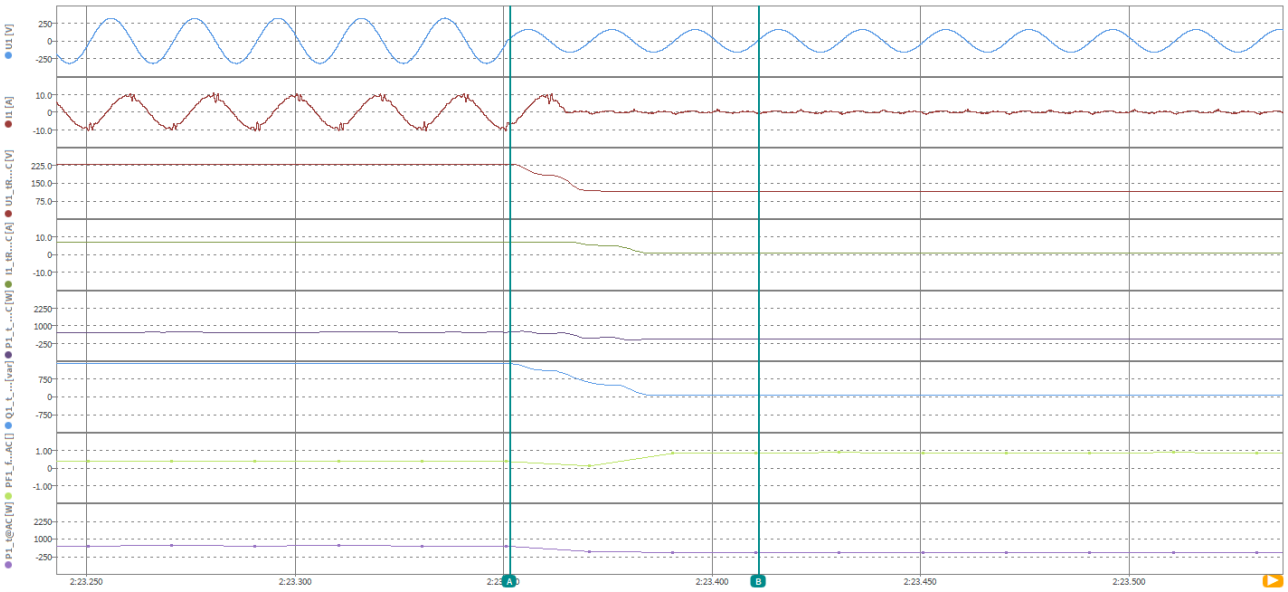
	A	B	间隔
时间 [s]	2:32.388881	2:33.908858	1.519977
U1 [V]	74.24045	145.3314	71.09094
I1 [A]	1.907e-3	1.431e-3	-4.768e-4
U1_tRMS_rc@AC [V]	229.9421	114.8878	-115.0543
I1_tRMS_rc@AC [A]	0.013725	0.013876	1.511e-4
P1_t_rc@AC [W]	0.176467	0.359181	0.182714
PF1_t@AC []	0.057511	0.228203	0.170692
Q1_t_rc@AC [var]	3.151037	1.553213	-1.597824

Test No. 2.2 with PGU



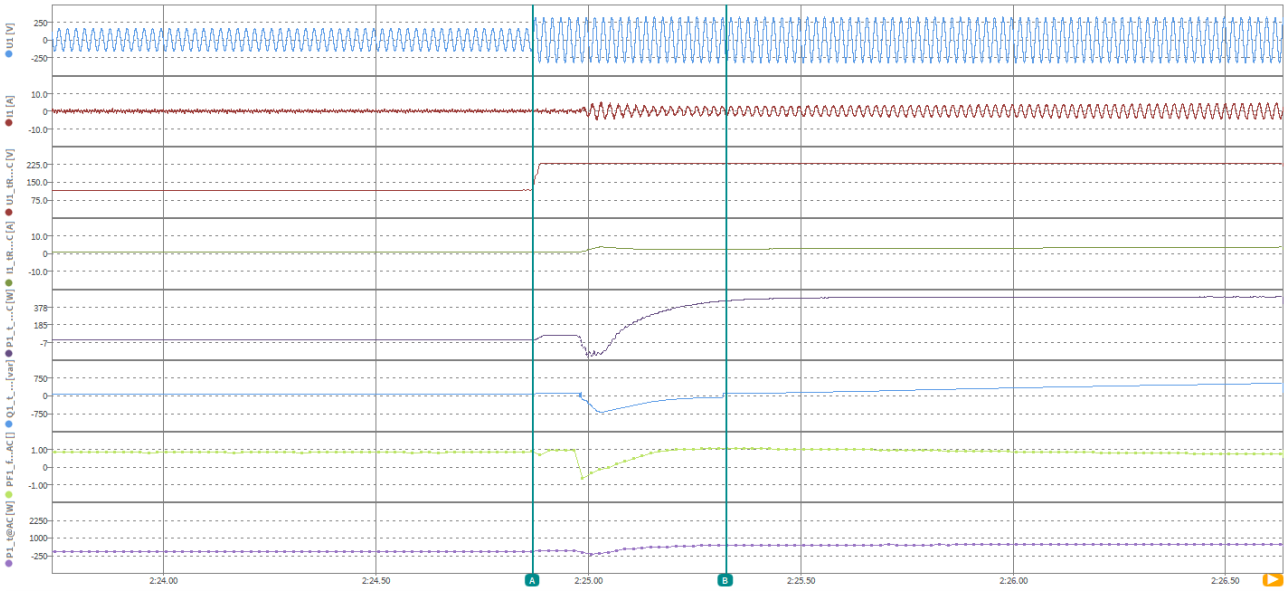
	A	B	间隔
时间 [s]	2:13.351500	2:23.351500	0:10.000000
U1 [V]	45.95900	26.33643	-19.62257
I1 [A]	-10.36441	-8.651734	1.712680
U1_tRMS_rc@AC [V]	229.6517	228.5769	-1.074783
I1_tRMS_rc@AC [A]	6.545852	6.620415	0.074563
P1_t_rc@AC [W]	481.1242	478.9184	-2.205841
Q1_t_rc@AC [var]	1424.194	1435.491	11.29749
PF1_fund@AC []	0.321129	0.317969	-3.160e-3
P1_t@AC [W]	481.2444	474.7878	-6.456635

Before dip



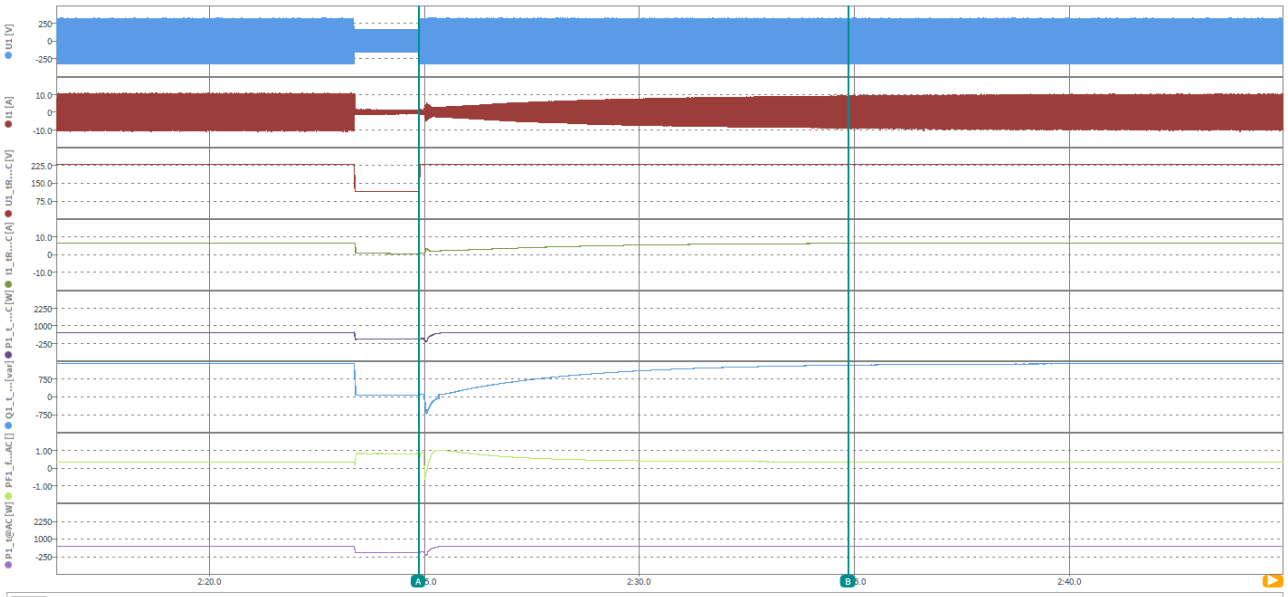
	A	B	间隔
时间 [s]	2:23.351500	2:23.411200	0.059700
U1 [V]	26.33643	9.980679	-16.35575
I1 [A]	-8.651734	-1.333594	7.318140
U1_tRMS_rc@AC [V]	228.5769	114.8712	-113.7057
I1_tRMS_rc@AC [A]	6.620415	0.492074	-6.128341
P1_t_rc@AC [W]	478.9184	9.655541	-469.2628
Q1_t_rc@AC [var]	1435.491	55.69433	-1379.797
PF1_fund@AC []	0.317969	0.802707	0.484738
P1_t@AC [W]	474.7878	9.646734	-465.1410

t1+60ms



	A	B	间隔
时间 [s]	2:24.8704	2:25.3246	0.4542
U1 [V]	-29.40273	-295.0707	-265.6679
I1 [A]	-0.809670	-2.749801	-1.940131
U1_tRMS_rc@AC [V]	115.2205	229.6568	114.4362
I1_tRMS_rc@AC [A]	0.408115	1.953263	1.545149
P1_t_rc@AC [W]	11.01603	440.2081	429.1921
Q1_t_rc@AC [var]	45.71462	86.26083	40.54621
PF1_fund@AC []	0.787811	0.999911	0.212099
P1_t@AC [W]	10.67073	436.3723	425.7015

Active power rising time

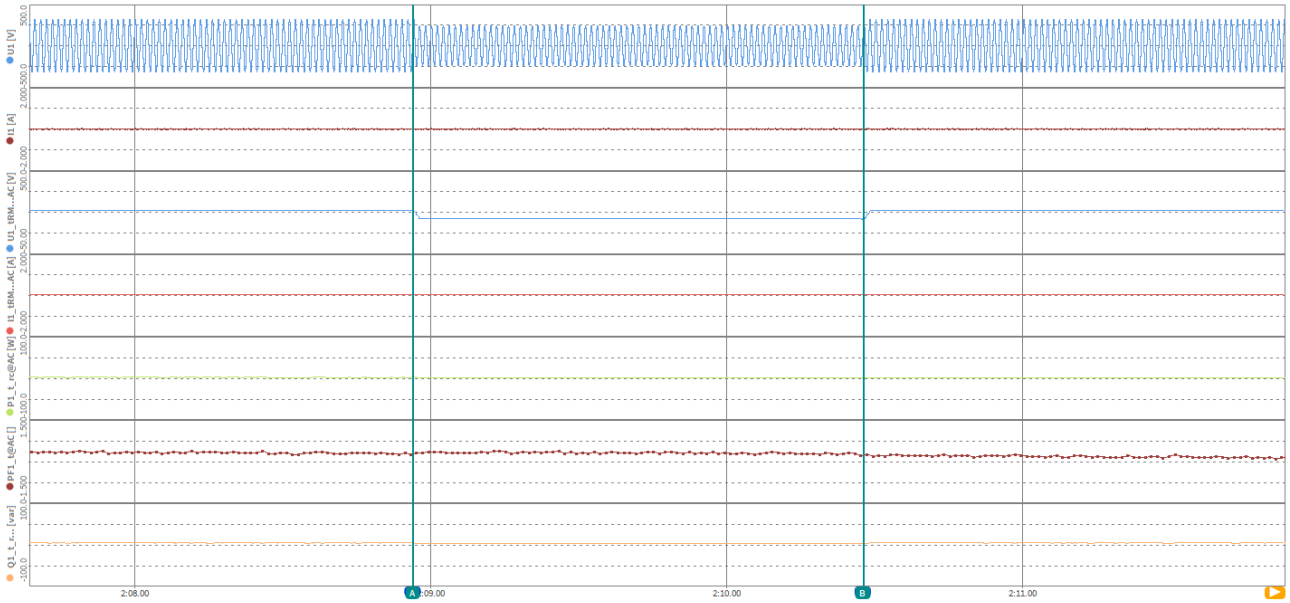


	A	B	间隔
时间 [s]	2:24.870600	2:34.861900	9.991300
U1 [V]	-19.32430	-96.89022	-77.56591
I1 [A]	-0.999928	6.825686	7.825613
U1_tRMS_rc@AC [V]	115.2205	229.6603	114.4398
I1_tRMS_rc@AC [A]	0.408115	6.282812	5.874697
P1_t_rc@AC [W]	11.01603	488.0046	476.9885
Q1_t_rc@AC [var]	45.71462	1357.884	1312.169
PF1_fund@AC []	0.787811	0.338964	-0.448848
P1_t@AC [W]	10.67073	487.8011	477.1304

Reactive power rising time

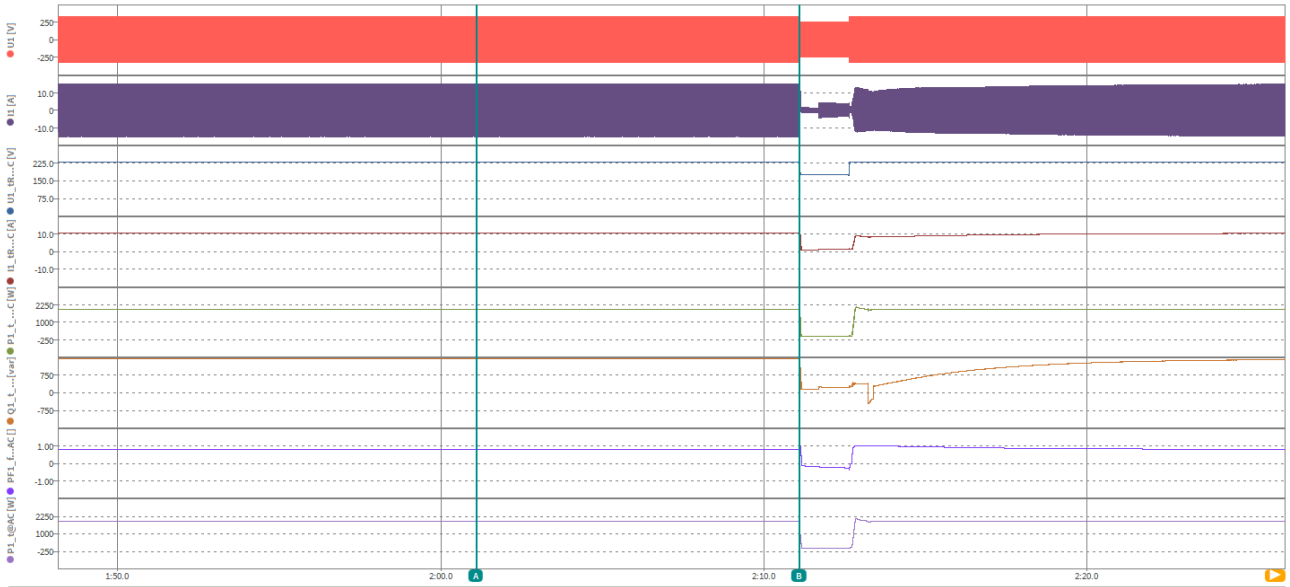
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	2.3	2.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	20:04:37	19:24:15
	3	Fault type (phase)	--	--		D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	0.76	0.76
	5	Setting dip duration		--		1500	1500
	6	Point of fault entry	Total	--	ms	128942	128942
	7	Point of fault clearance	Total	--	ms	130463	130463
	8	Fault duration in empty load test	Total	--	ms	1520	1520
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.760	0.760
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	0.991	0.632
	13	Active power	Total	t1-10s to t1	p.u.	0.784	0.198
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	0.608	0.601
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.791	0.313
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.761	0.761
	19	Line current	Phase 1	t1+60ms	p.u.	0.085	0.095
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.084	0.090
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.014	-0.036
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.785	0.198
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.188	0.105
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	0.605	0.599
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	9.977	10.006
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 2.3 idle test



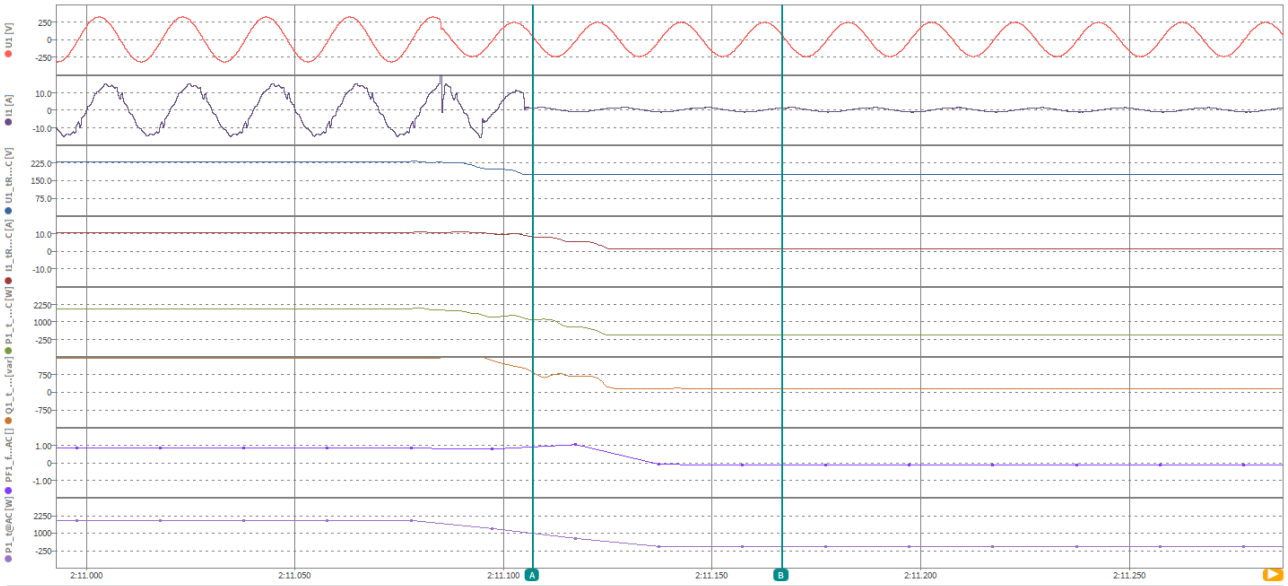
时间 [s]	A 2:08.942942	B 2:10.463208	间隔 1.520266
U1 [V]	225.0867	214.5562	-10.53047
I1 [A]	0.012875	6.676e-3	-6.199e-3
U1_tRMS_rc@AC [V]	231.4832	175.2967	-56.18649
I1_tRMS_rc@AC [A]	0.015159	0.016605	1.446e-3
P1_t_rc@AC [W]	0.931762	0.616066	-0.315696
PF1_t@AC []	0.243876	0.210021	-0.033855
Q1_t_rc@AC [var]	3.383086	2.844821	-0.538265

Test No. 2.3 with PGU



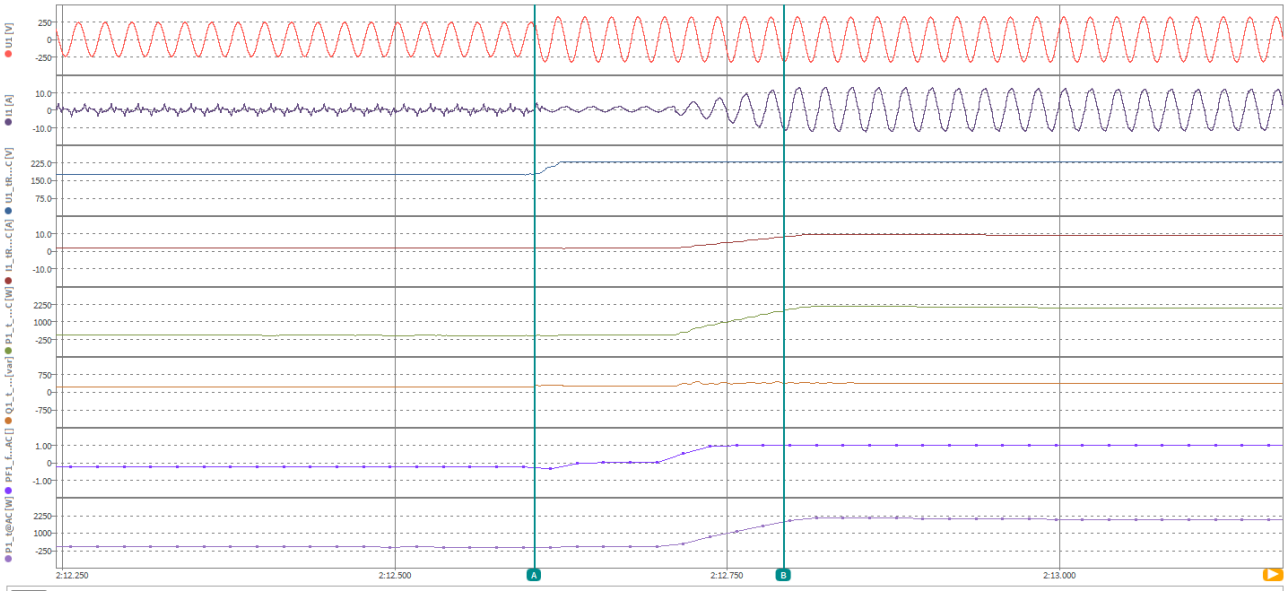
时间 [s]	A 2:01.1070000	B 2:11.1070000	间隔 0:10.0000000
U1 [V]	119.7877	47.43338	-72.35432
I1 [A]	12.59565	1.117587	-11.47807
U1_tRMS_rc@AC [V]	230.2172	174.9439	-55.27322
I1_tRMS_rc@AC [A]	10.34444	8.093267	-2.251170
P1_t_rc@AC [W]	1883.761	1103.442	-780.3191
Q1_t_rc@AC [var]	1456.994	887.1860	-569.8079
PF1_fund@AC []	0.793809	0.743905	-0.049904
P1_t@AC [W]	1883.707	1309.822	-573.8845

Before dip



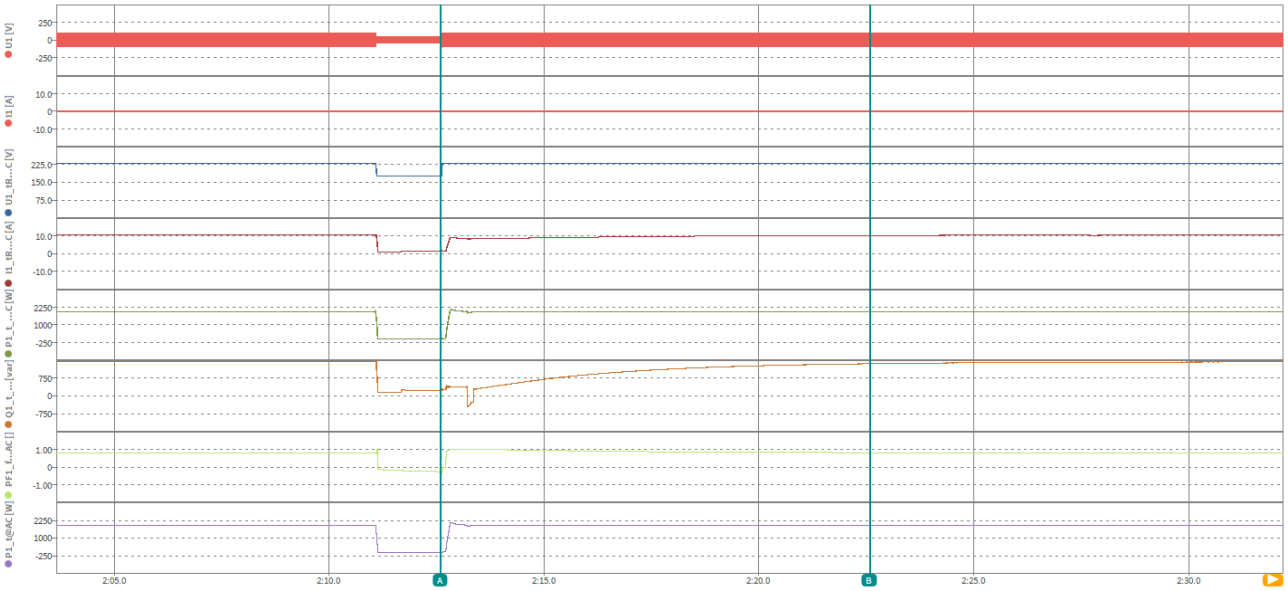
	A	B	间隔
时间 [s]	2:11.1070000	2:11.1667000	0.0597000
U1 [V]	47.43338	69.56554	22.13216
I1 [A]	1.117587	1.049042	-0.068545
U1_tRMS_rc@AC [V]	174.9439	174.9247	-0.019226
I1_tRMS_rc@AC [A]	8.093267	0.884150	-7.209118
P1_t_rc@AC [W]	1103.442	-26.18921	-1129.631
Q1_t_rc@AC [var]	887.1860	152.4261	-734.7598
PF1_fund@AC []	0.743905	-0.160959	-0.904863
P1_t@AC [W]	1309.822	-24.38943	-1334.212

t1+60ms



	A	B	间隔
时间 [s]	2:12.60510	2:12.79260	0.18750
U1 [V]	188.0043	-318.9573	-506.9616
I1 [A]	-2.149344	-10.58400	-8.434654
U1_tRMS_rc@AC [V]	175.8143	230.2292	54.41495
I1_tRMS_rc@AC [A]	1.264653	7.629901	6.365248
P1_t_rc@AC [W]	-41.01733	1713.602	1754.620
Q1_t_rc@AC [var]	218.5280	386.3987	167.8707
PF1_fund@AC []	-0.276569	0.967569	1.244139
P1_t@AC [W]	-39.33635	1476.755	1516.091

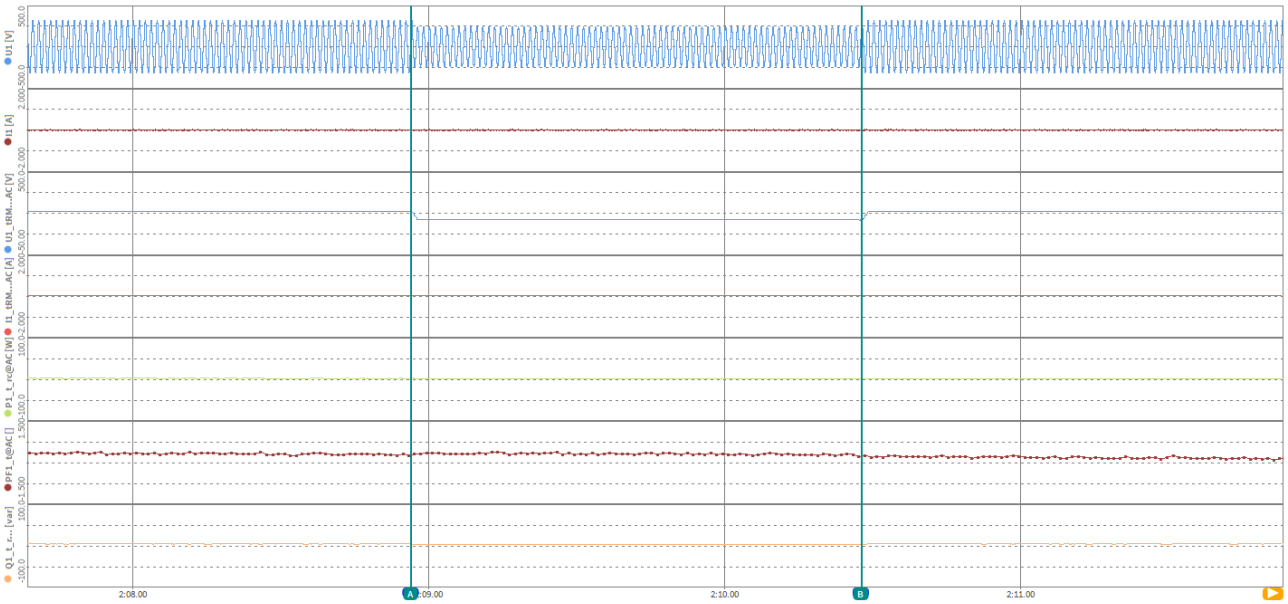
Active power rising time



	A	B	间隔
时间 [s]	2:12.605800	2:22.583200	9.977400
U1 [V]	-98.79828	-91.74467	7.053614
I1 [A]	-0.197020	-0.167813	0.029206
U1_tRMS_rc@AC [V]	175.8143	230.2143	54.39999
I1_tRMS_rc@AC [A]	1.264653	10.24762	8.982963
P1_t_rc@AC [W]	-41.01733	1918.076	1959.093
Q1_t_rc@AC [var]	218.5280	1373.522	1154.994
PF1_fund@AC []	-0.276569	0.813895	1.090464
P1_t@AC [W]	-39.33635	1917.577	1956.913

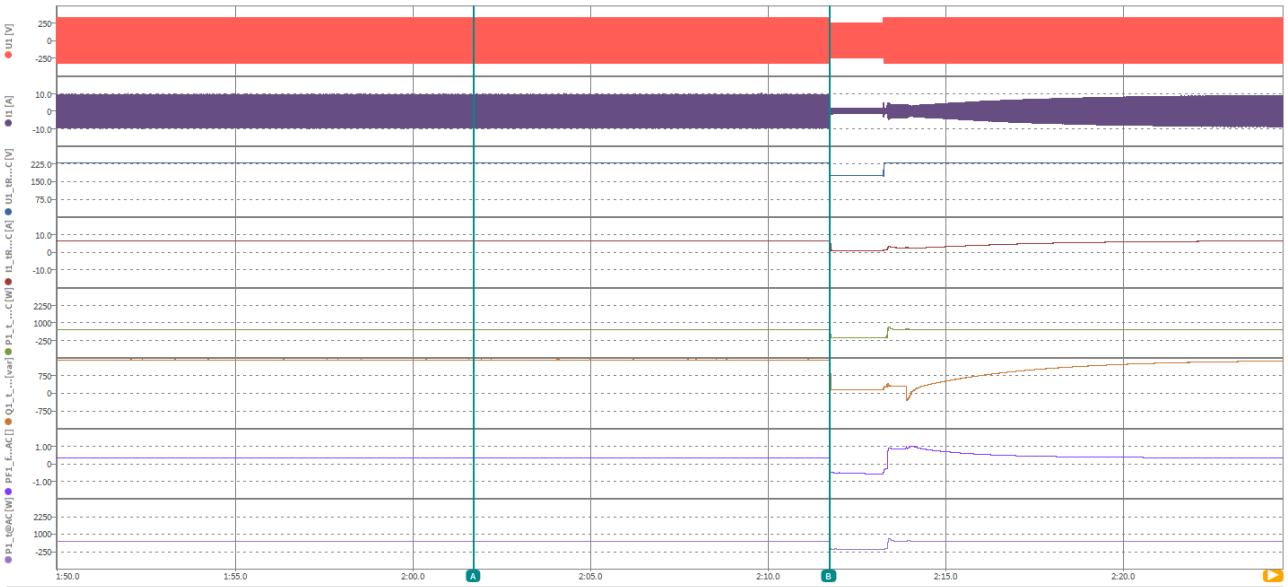
Reactive power rising time

Test No. 2.4 idle test



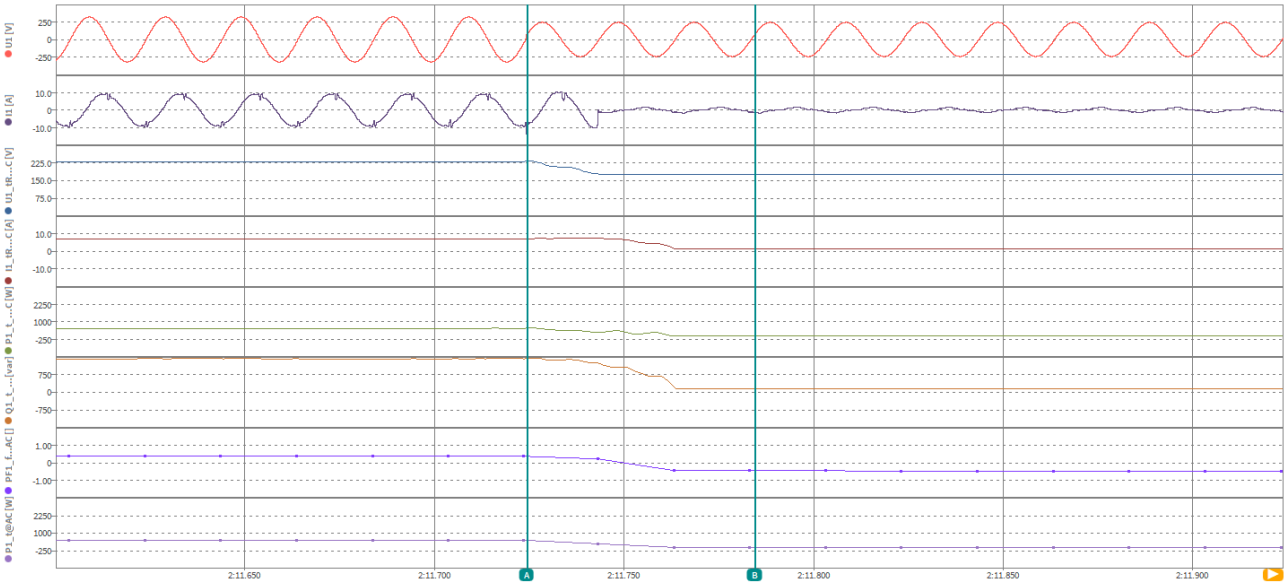
	A	B	间隔
时间 [s]	2:08.942942	2:10.463208	1.520266
U1 [V]	225.0867	214.5562	-10.53047
I1 [A]	0.012875	6.676e-3	-6.199e-3
U1_tRMS_rc@AC [V]	231.4832	175.2967	-56.18649
I1_tRMS_rc@AC [A]	0.015159	0.016605	1.446e-3
P1_t_rc@AC [W]	0.931762	0.616066	-0.315696
PF1_t@AC []	0.243876	0.210021	-0.033855
Q1_t_rc@AC [var]	3.383086	2.844821	-0.538265

Test No. 2.4 with PGU



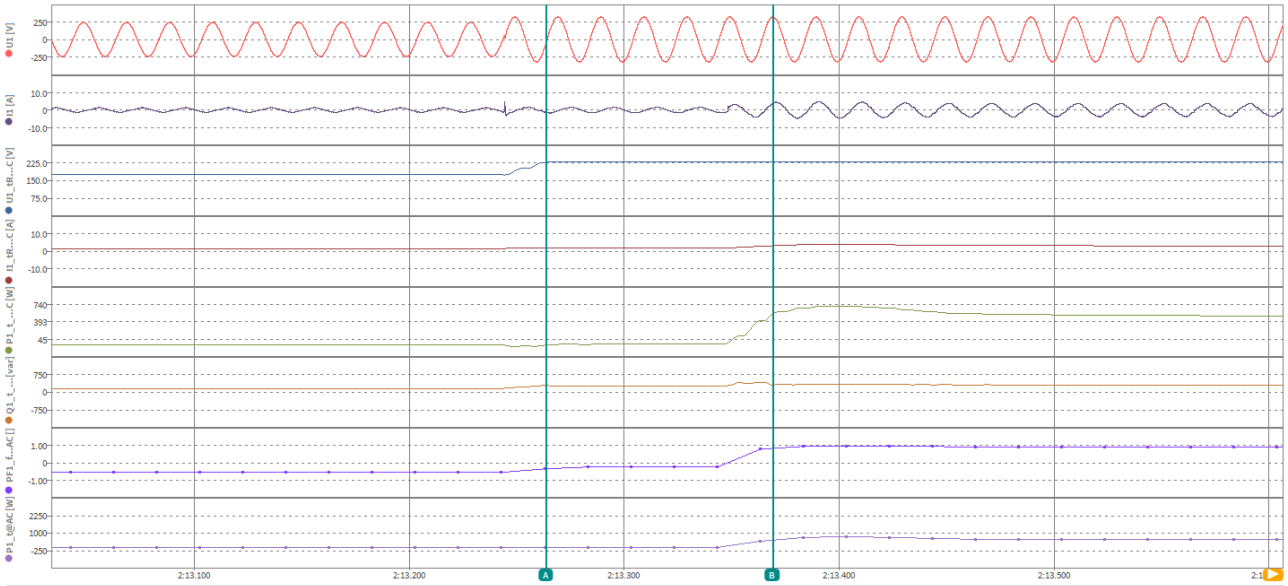
	A	B	间隔
时间 [s]	2:01.724500	2:11.724500	0:10.000000
U1 [V]	33.85186	78.54486	44.69300
I1 [A]	-9.370447	-10.72347	-1.353026
U1_tRMS_rc@AC [V]	230.1878	230.7630	0.575287
I1_tRMS_rc@AC [A]	6.590319	6.575687	-0.014632
P1_t_rc@AC [W]	475.8629	474.0807	-1.782257
Q1_t_rc@AC [var]	1440.443	1441.467	1.024048
PF1_fund@AC []	0.314636	0.314176	-4.603e-4
P1_t@AC [W]	475.9135	476.2644	0.350952

Before dip



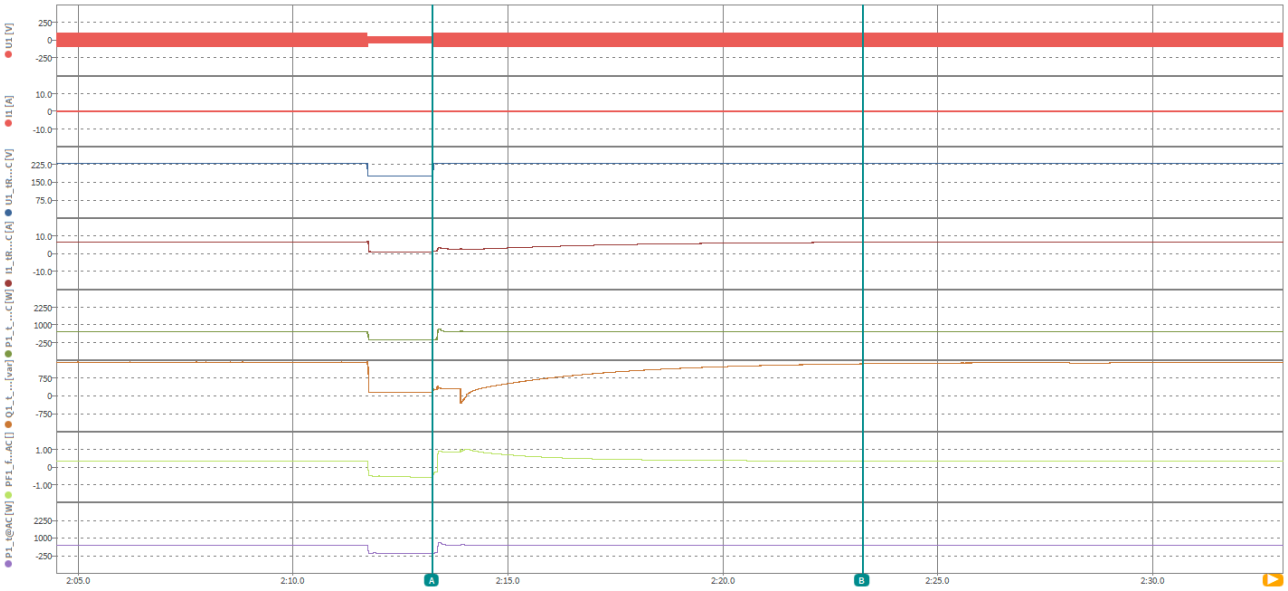
	A	B	间隔
时间 [s]	2:11.724500	2:11.784600	0.060100
U1 [V]	78.54486	78.63594	0.091076
I1 [A]	-10.72347	-1.440048	9.283424
U1_tRMS_rc@AC [V]	230.7630	174.9671	-55.79596
I1_tRMS_rc@AC [A]	6.575687	0.996071	-5.579616
P1_t_rc@AC [W]	474.0807	-83.74413	-557.8248
Q1_t_rc@AC [var]	1441.467	152.8408	-1288.626
PF1_fund@AC []	0.314176	-0.505372	-0.819548
P1_t@AC [W]	476.2644	-83.74003	-560.0045

t1+60ms



	A	B	间隔
时间 [s]	2:13.2639	2:13.3692	0.1053
U1 [V]	-28.48101	325.8674	354.3484
I1 [A]	-1.316071	3.898740	5.214811
U1_tRMS_rc@AC [V]	227.6389	230.1776	2.538605
I1_tRMS_rc@AC [A]	1.298443	2.587665	1.289222
P1_t_rc@AC [W]	-92.96085	513.1238	606.0847
Q1_t_rc@AC [var]	280.5771	302.4400	21.86292
PF1_fund@AC []	-0.606896	0.727613	1.334509
P1_t@AC [W]	-91.12342	394.2685	485.3919

Active power rising time

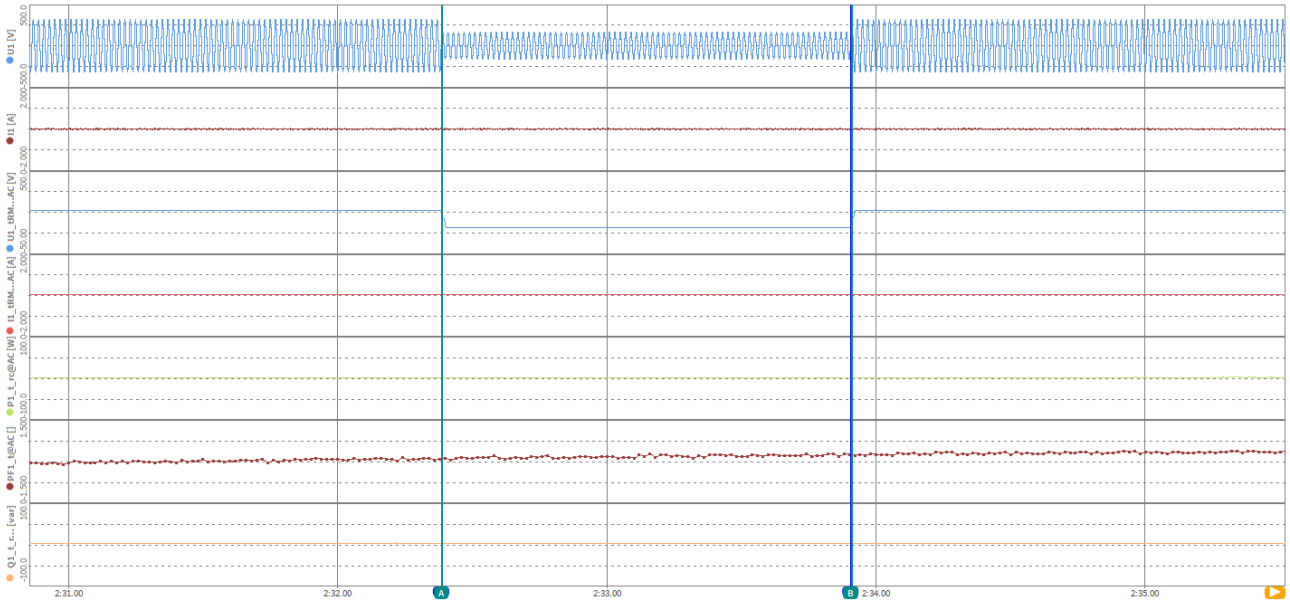


	A	B	间隔
时间 [s]	2:13.2430000	2:23.2490000	0:10.0060000
U1 [V]	24.22476	-90.96528	-115.1900
I1 [A]	-0.174966	-0.174966	0.000000
U1_tRMS_rc@AC [V]	174.2093	230.1887	55.97939
I1_tRMS_rc@AC [A]	0.873738	6.302189	5.428451
P1_t_rc@AC [W]	-90.41882	477.0660	567.4848
Q1_t_rc@AC [var]	122.4472	1370.006	1247.559
PF1_fund@AC []	-0.602968	0.329100	0.932068
P1_t@AC [W]	-90.93868	476.7230	567.6617

Reactive power rising time

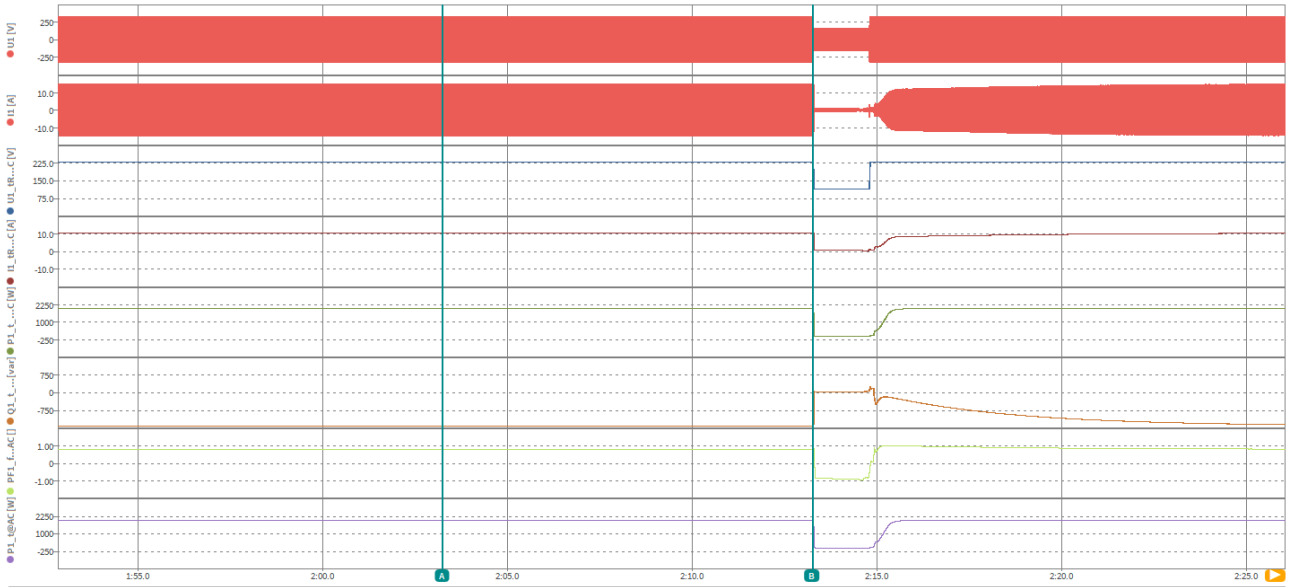
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	3.1	3.2
	1	Date	--	--	dd.mm.yyyy	2026.03.09	2026.03.09
	2	Time (start of test)	--	--	hh:mm:ss.f	17:16:10	17:21:32
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.50	0.50
	5	Setting dip duration		--		1500	1500
	6	Point of fault entry	Total	--	ms	152388	152388
	7	Point of fault clearance	Total	--	ms	153908	153908
	8	Fault duration in empty load test	Total	--	ms	1519	1519
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.500	0.500
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.014	0.638
	13	Active power	Total	t1-10s to t1	p.u.	0.814	0.200
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.605	-0.606
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.803	0.313
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.500	0.500
	19	Line current	Phase 1	t1+60ms	p.u.	0.051	0.052
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.049	0.051
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.018	-0.018
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.814	0.200
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.567	0.275
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.604	-0.605
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	9.999	9.993
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 3.1 idle test



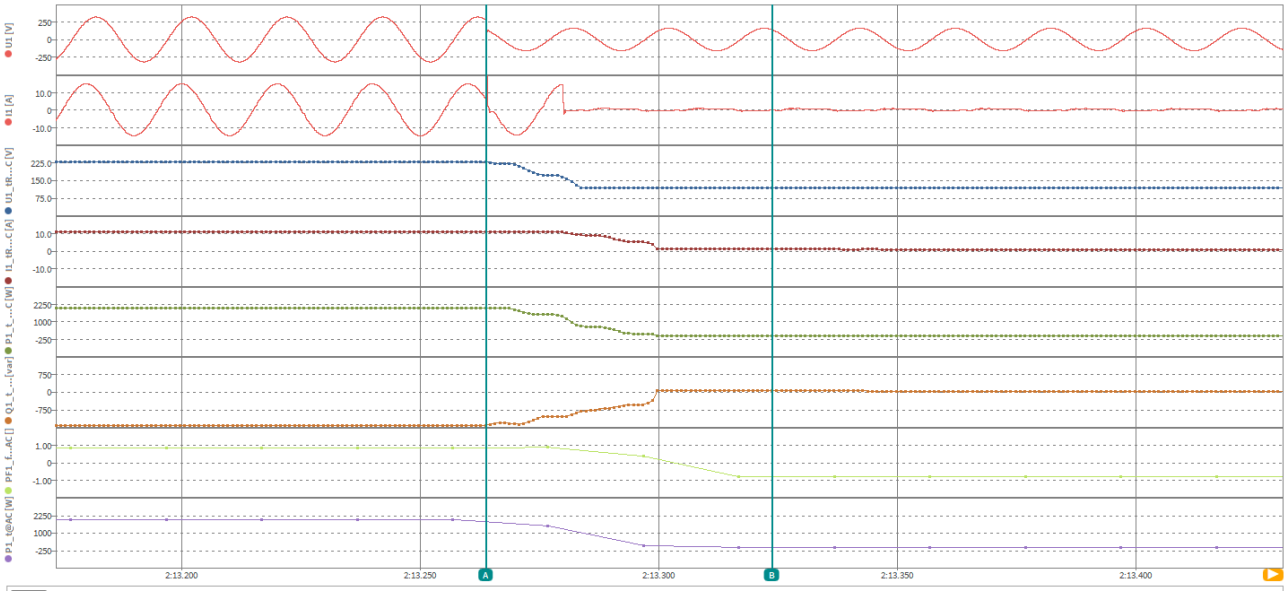
时间 [s]	A 2:32.388881	B 2:33.908858	间隔 1.519977
U1 [V]	74.24045	145.3314	71.09094
I1 [A]	1.907e-3	1.431e-3	-4.768e-4
U1_tRMS_rc@AC [V]	229.9421	114.8878	-115.0543
I1_tRMS_rc@AC [A]	0.013725	0.013876	1.511e-4
P1_t_rc@AC [W]	0.176467	0.359181	0.182714
PF1_t@AC []	0.057511	0.228203	0.170692
Q1_t_rc@AC [var]	3.151037	1.553213	-1.597824

Test No. 3.1 with PGU



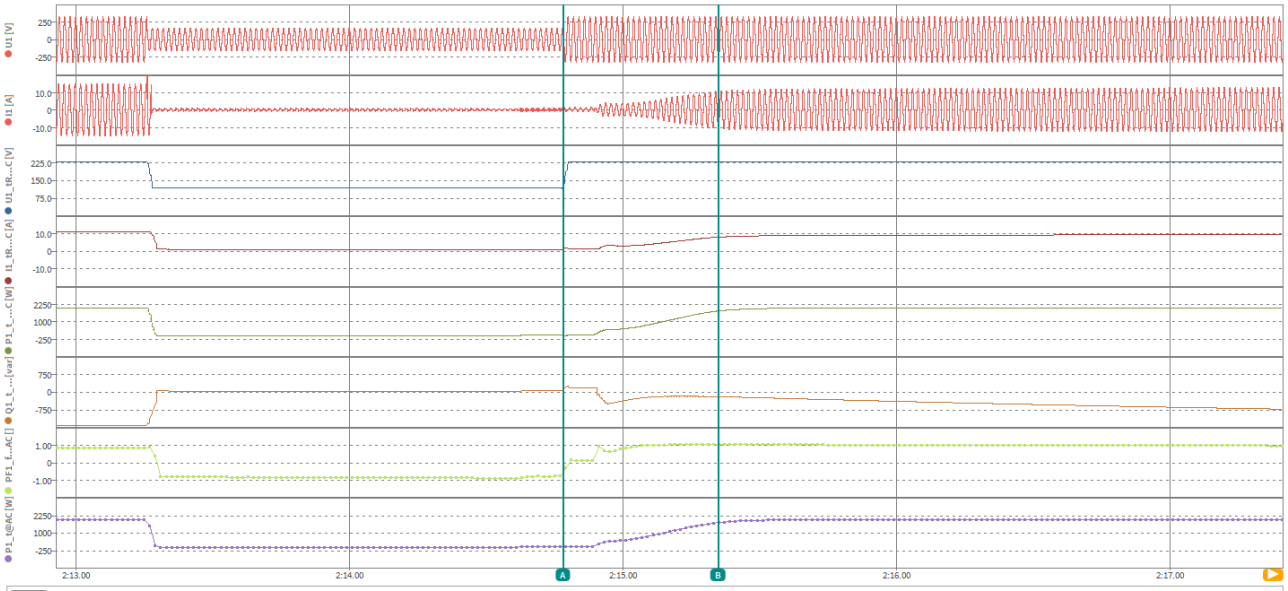
时间 [s]	A 2:03.263900	B 2:13.263900	间隔 0:10.000000
U1 [V]	276.4373	264.3736	-12.06374
I1 [A]	5.576745	8.747117	3.170371
U1_tRMS_rc@AC [V]	230.1512	230.1680	0.016769
I1_tRMS_rc@AC [A]	10.58470	10.58134	-3.362e-3
P1_t_rc@AC [W]	1954.550	1954.750	0.200073
Q1_t_rc@AC [var]	-1454.039	-1452.771	1.268433
PF1_fund@AC []	0.802480	0.802872	3.918e-4
P1_t@AC [W]	1954.740	1954.411	-0.328735

Before dip



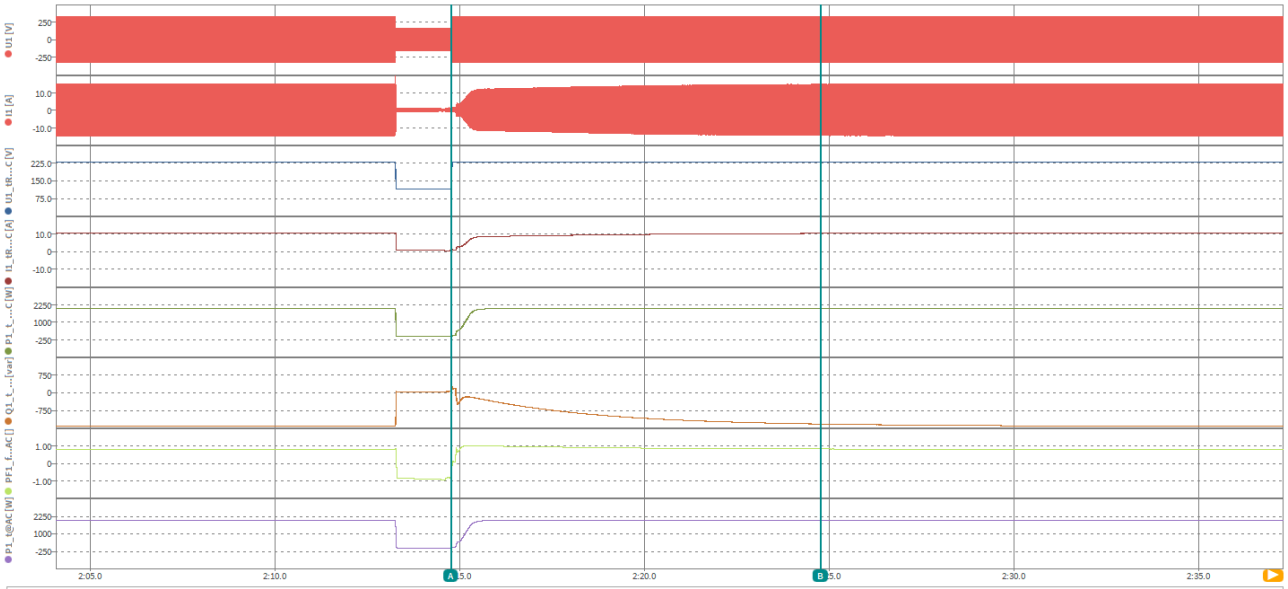
	A	B	间隔
时间 [s]	2:13.263900	2:13.323800	0.059900
U1 [V]	264.3736	141.2535	-123.1201
I1 [A]	8.747117	-0.043973	-8.791090
U1_tRMS_rc@AC [V]	230.1680	115.1721	-114.9959
I1_tRMS_rc@AC [A]	10.58134	0.527211	-10.05413
P1_t_rc@AC [W]	1954.750	-45.79720	-2000.547
Q1_t_rc@AC [var]	-1452.771	39.86896	1492.639
PF1_fund@AC []	0.802872	-0.862948	-1.665821
P1_t@AC [W]	1954.411	-47.19655	-2001.607

t1+60ms



	A	B	间隔
时间 [s]	2:14.7839	2:15.3505	0.5666
U1 [V]	138.7022	-281.8988	-420.6009
I1 [A]	-0.290140	-9.916291	-9.626151
U1_tRMS_rc@AC [V]	114.8214	230.1628	115.3414
I1_tRMS_rc@AC [A]	0.456933	7.522903	7.065970
P1_t_rc@AC [W]	-19.83032	1718.233	1738.063
Q1_t_rc@AC [var]	48.57376	-213.8710	-262.4448
PF1_fund@AC []	-0.786026	0.993858	1.779884
P1_t@AC [W]	-20.01885	1692.080	1712.099

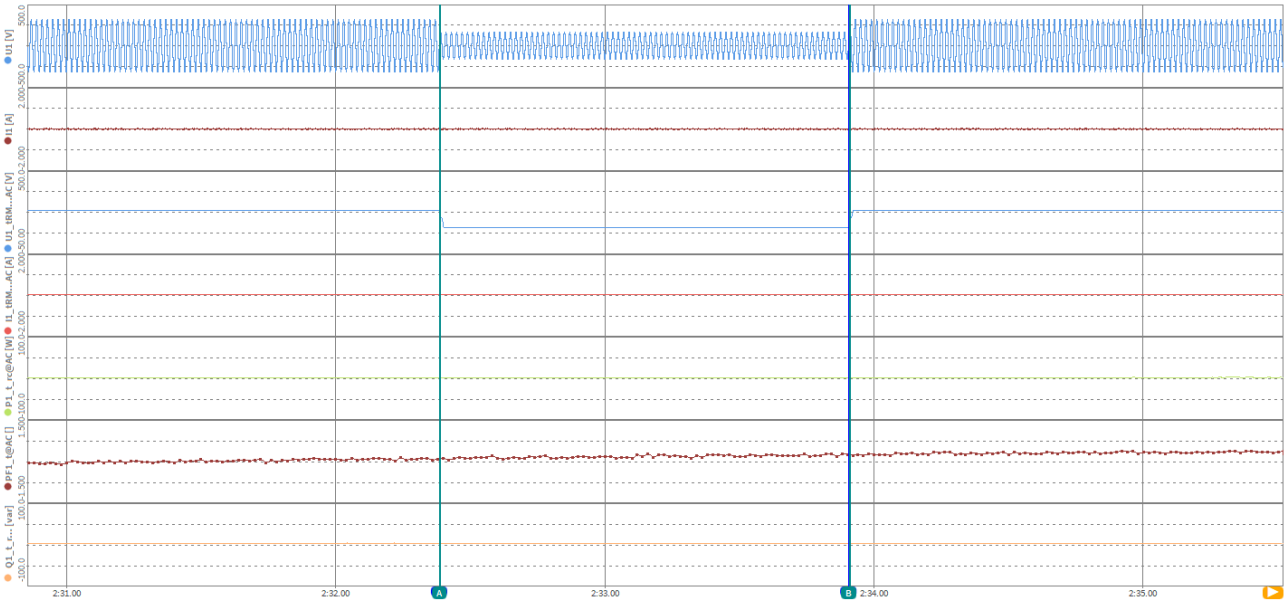
Active power rising time



	A	B	间隔
时间 [s]	2:14.7840	2:24.7839	9.9999
U1 [V]	138.4306	278.4677	140.0371
I1 [A]	-0.870689	5.943314	6.814003
U1_tRMS_rc@AC [V]	114.9594	230.1453	115.1859
I1_tRMS_rc@AC [A]	0.456296	10.35317	9.896873
P1_t_rc@AC [W]	-19.64278	1953.031	1972.674
Q1_t_rc@AC [var]	48.63890	-1364.950	-1413.589
PF1_fund@AC []	-0.786026	0.820035	1.606061
P1_t@AC [W]	-20.01885	1952.939	1972.958

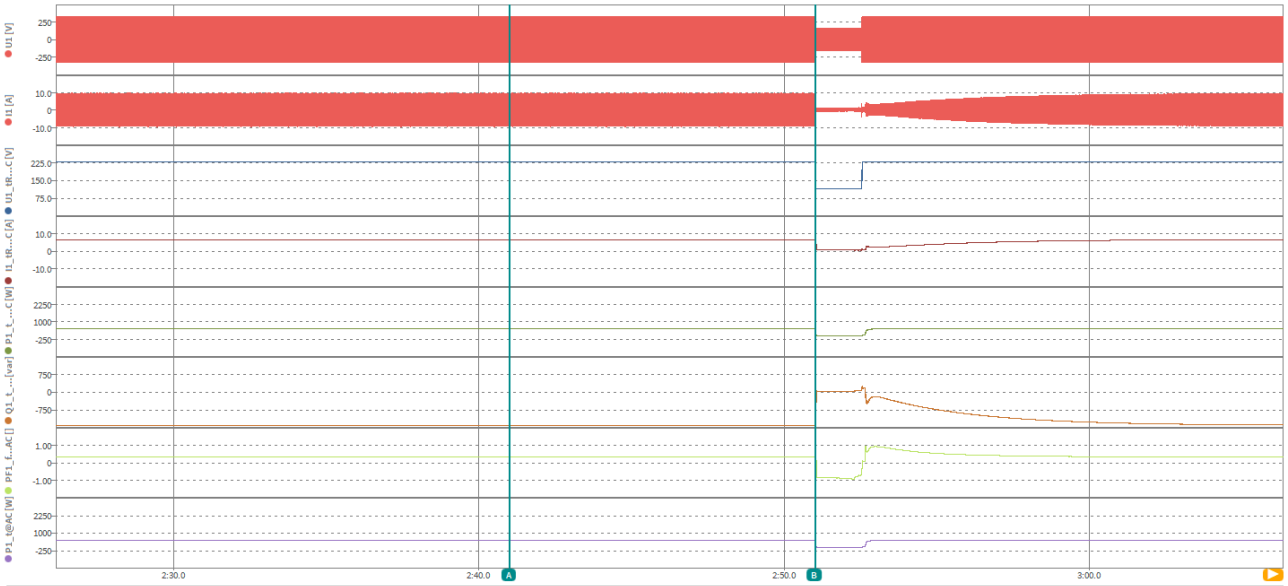
Reactive power rising time

Test No. 3.2 idle test



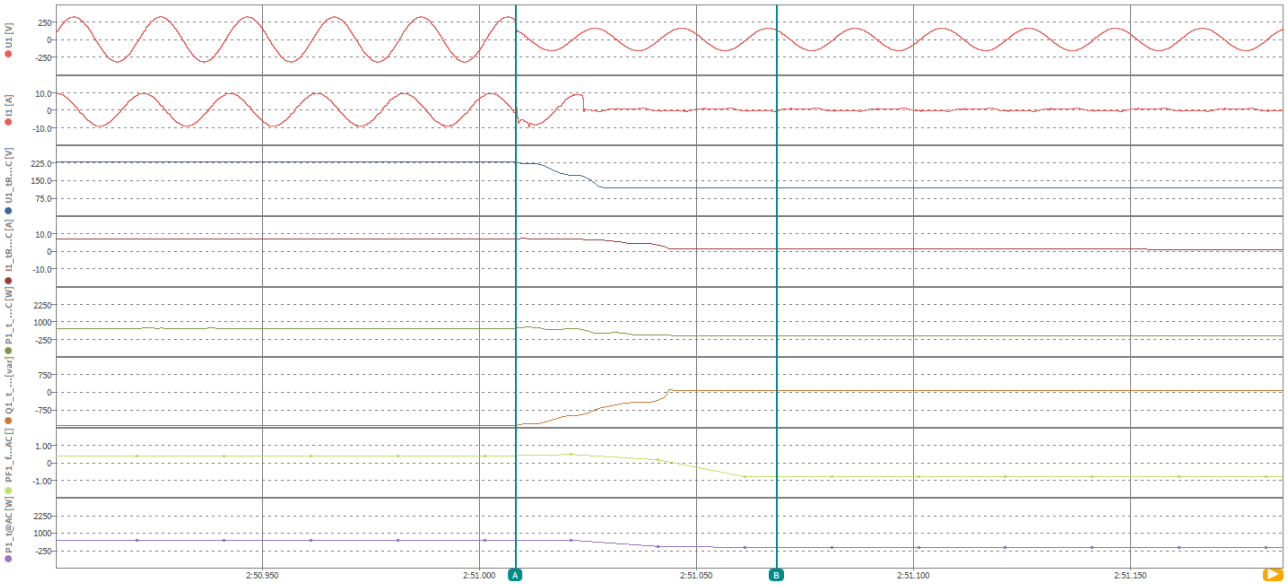
	A	B	间隔
时间 [s]	2:32.388881	2:33.908858	1.519977
U1 [V]	74.24045	145.3314	71.09094
I1 [A]	1.907e-3	1.431e-3	-4.768e-4
U1_tRMS_rc@AC [V]	229.9421	114.8878	-115.0543
I1_tRMS_rc@AC [A]	0.013725	0.013876	1.511e-4
P1_t_rc@AC [W]	0.176467	0.359181	0.182714
PF1_t@AC []	0.057511	0.228203	0.170692
Q1_t_rc@AC [var]	3.151037	1.553213	-1.597824

Test No. 3.2 with PGU



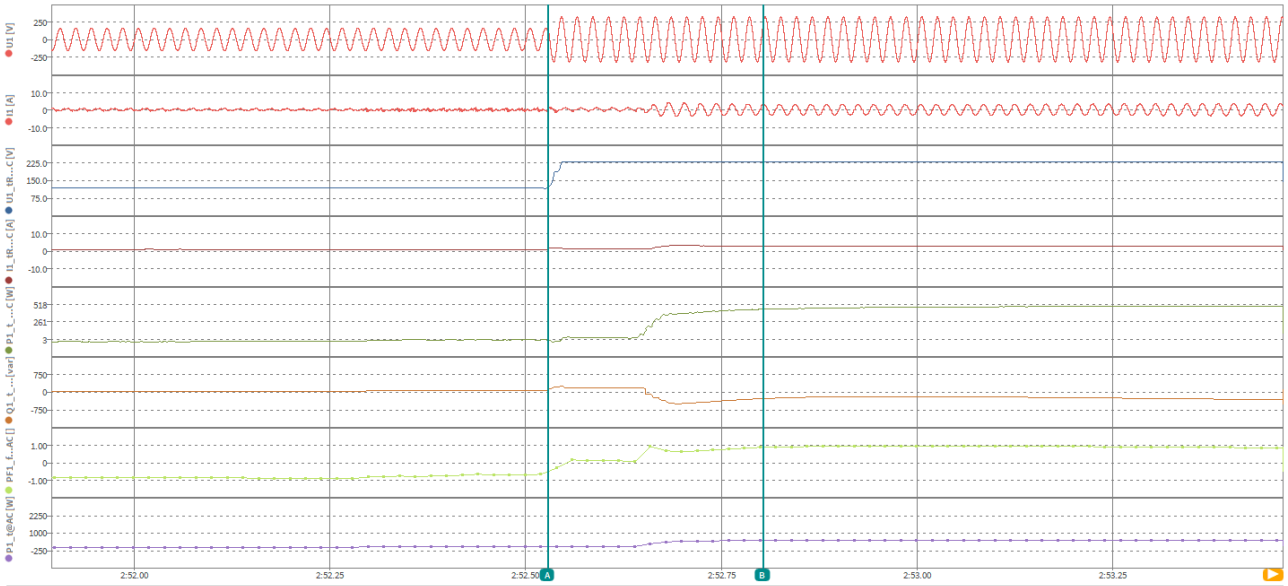
	A	B	间隔
时间 [s]	2:41.008400	2:51.008400	0:10.000000
U1 [V]	271.3983	204.1865	-67.21187
I1 [A]	-2.231464	8.986727	11.21819
U1_tRMS_rc@AC [V]	230.1186	230.1234	4.822e-3
I1_tRMS_rc@AC [A]	6.655273	6.655693	4.191e-4
P1_t_rc@AC [W]	480.4760	479.5627	-0.913269
Q1_t_rc@AC [var]	-1454.181	-1454.618	-0.436768
PF1_fund@AC []	0.313100	0.313111	1.097e-5
P1_t@AC [W]	479.1414	479.1846	0.043152

Before dip



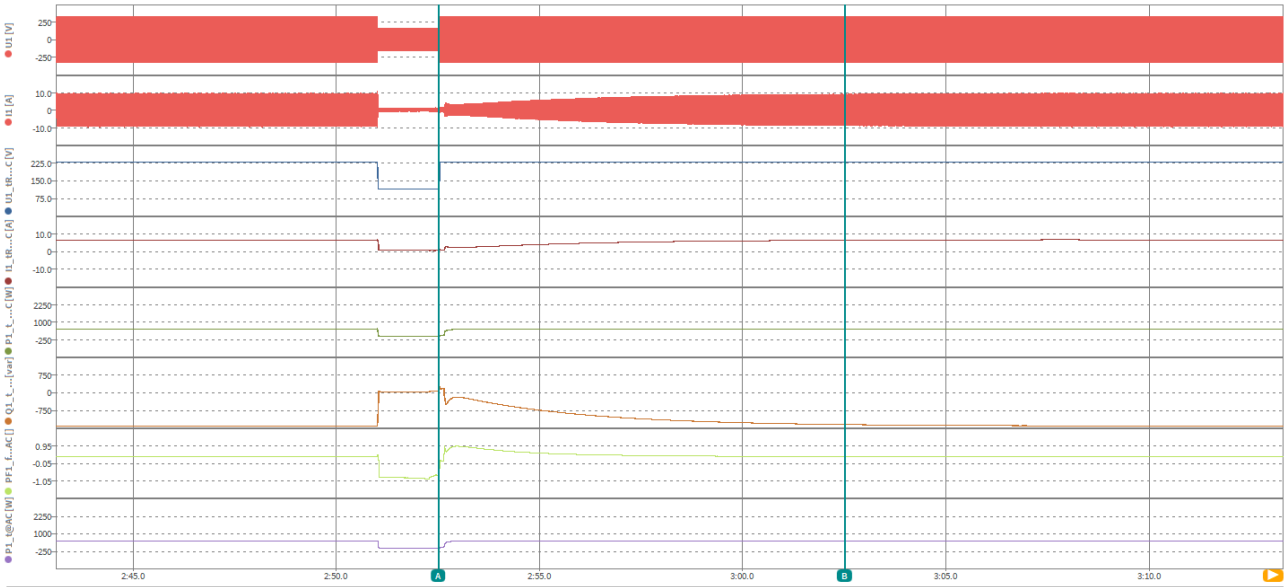
	A	B	间隔
时间 [s]	2:51.008400	2:51.068600	0.060200
U1 [V]	204.1865	130.1279	-74.05854
I1 [A]	8.986727	-0.477299	-9.464026
U1_tRMS_rc@AC [V]	230.1234	115.1873	-114.9361
I1_tRMS_rc@AC [A]	6.655693	0.541936	-6.113757
P1_t_rc@AC [W]	479.5627	-45.17461	-524.7374
Q1_t_rc@AC [var]	-1454.618	43.08165	1497.699
PF1_fund@AC []	0.313111	-0.856221	-1.169332
P1_t@AC [W]	479.1846	-45.55909	-524.7437

t1+60ms



	A	B	间隔
时间 [s]	2:52.5284	2:52.8035	0.2751
U1 [V]	138.4561	186.6179	48.16175
I1 [A]	-0.736579	3.149644	3.886223
U1_tRMS_rc@AC [V]	114.8940	230.1233	115.2293
I1_tRMS_rc@AC [A]	0.453612	2.286927	1.833315
P1_t_rc@AC [W]	-19.54405	437.5546	457.0986
Q1_t_rc@AC [var]	48.31397	-292.4235	-340.7375
PF1_fund@AC []	-0.709493	0.834473	1.543966
P1_t@AC [W]	-20.13388	438.3201	458.4540

Active power rising time

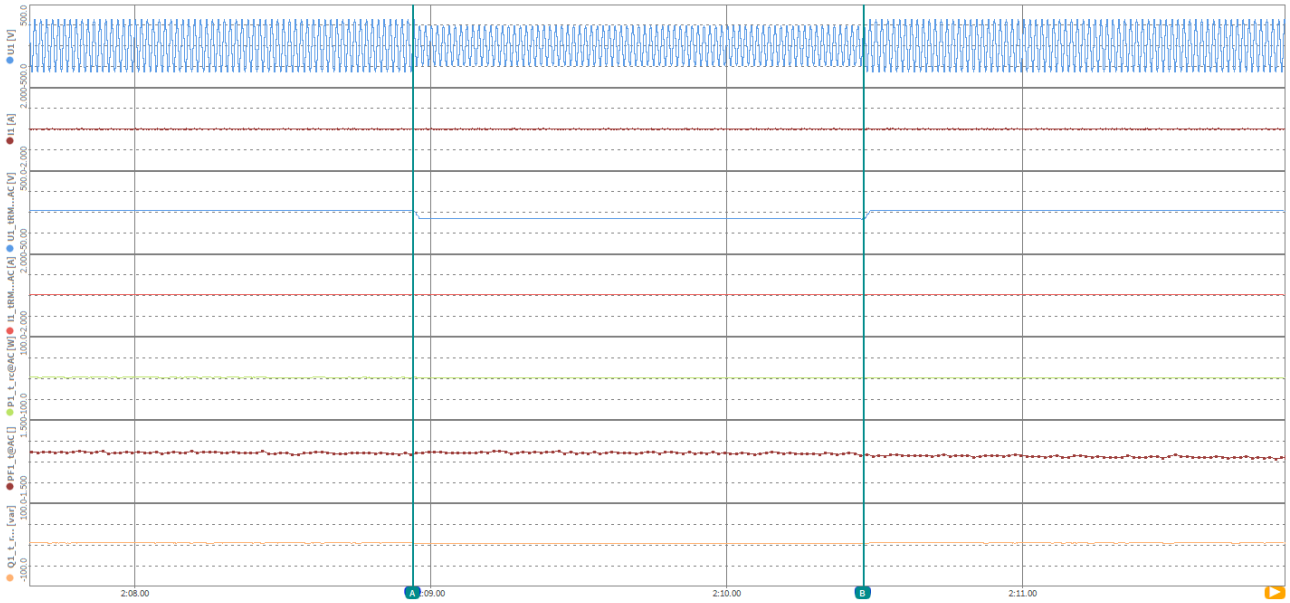


	A	B	间隔
时间 [s]	2:52.5285000	3:02.5224000	9.9939000
U1 [V]	145.9882	83.59910	-62.38914
I1 [A]	-2.332195	9.027259	11.35945
U1_tRMS_rc@AC [V]	114.8940	230.1223	115.2283
I1_tRMS_rc@AC [A]	0.453612	6.378207	5.924595
P1_t_rc@AC [W]	-19.54405	477.5413	497.0853
Q1_t_rc@AC [var]	48.31397	-1387.911	-1436.225
PF1_fund@AC []	-0.709493	0.325578	1.035071
P1_t@AC [W]	-20.13388	477.5446	497.6785

Reactive power rising time

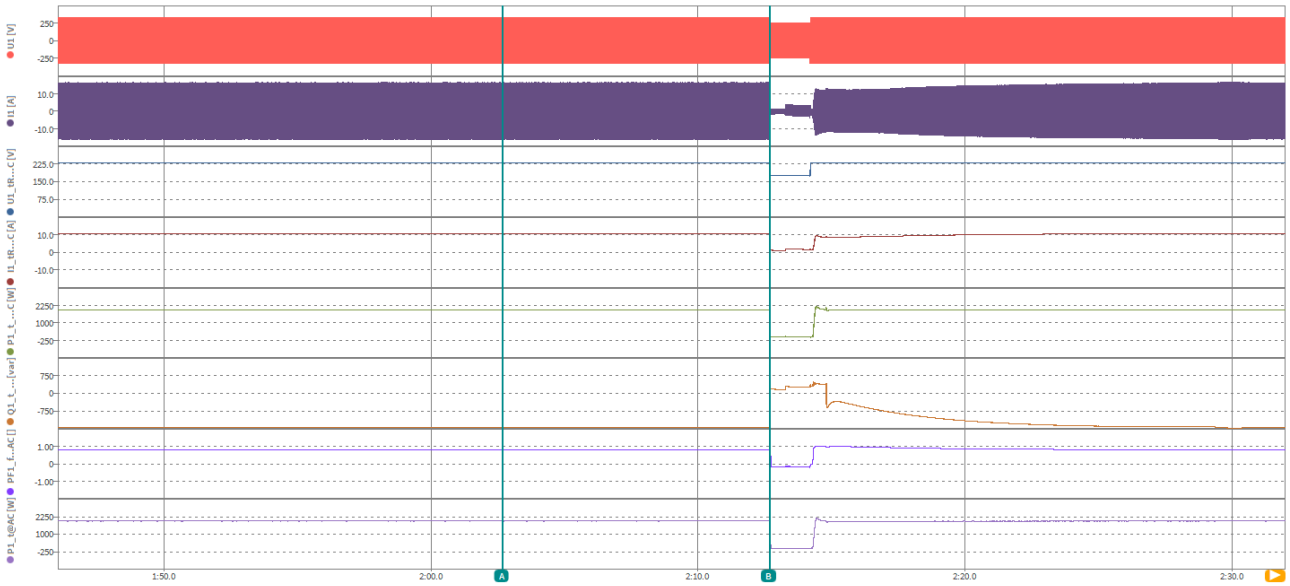
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	3.3	3.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	19:47:11	19:51:08
	3	Fault type (phase)	--	--		D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	0.76	0.76
	5	Setting dip duration		--		1500	1500
	6	Point of fault entry	Total	--	ms	128942	128942
	7	Point of fault clearance	Total	--	ms	130463	130463
	8	Fault duration in empty load test	Total	--	ms	1520	1520
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.760	0.760
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.019	0.656
	13	Active power	Total	t1-10s to t1	p.u.	0.806	0.200
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.625	-0.625
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	0.790	0.305
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.761	0.761
	19	Line current	Phase 1	t1+60ms	p.u.	0.097	0.099
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.094	0.097
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	-0.011	-0.011
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.807	0.200
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.188	0.121
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.624	-0.624
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	9.994	9.992
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 3.3 idle test



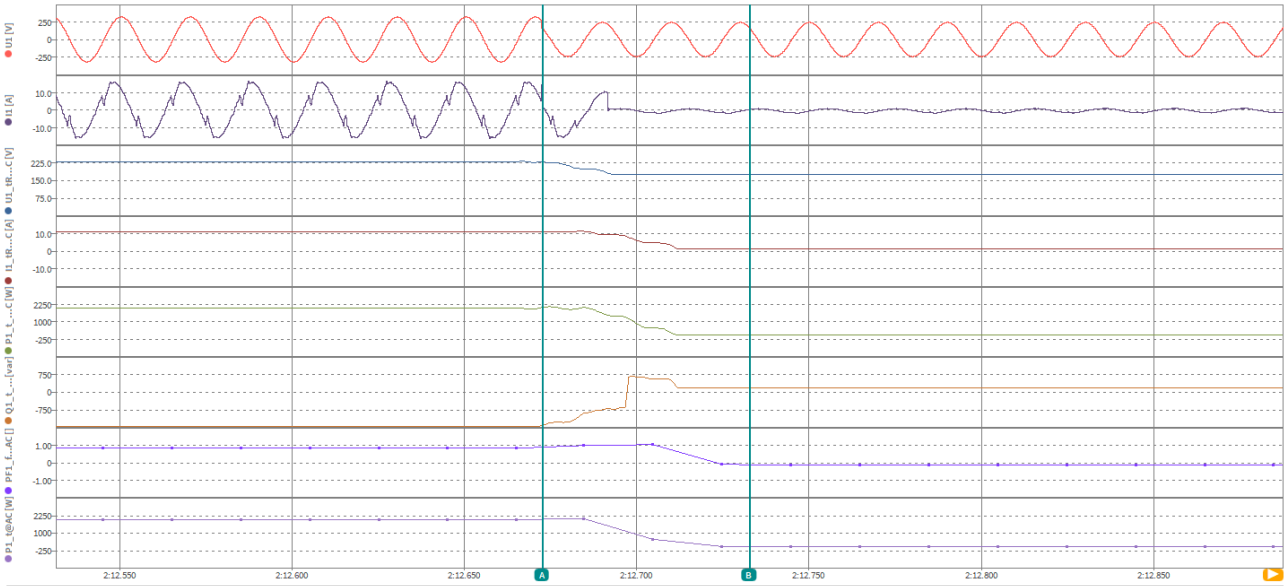
	A	B	间隔
时间 [s]	2:08.942942	2:10.463208	1.520266
U1 [V]	225.0867	214.5562	-10.53047
I1 [A]	0.012875	6.676e-3	-6.199e-3
U1_tRMS_rc@AC [V]	231.4832	175.2967	-56.18649
I1_tRMS_rc@AC [A]	0.015159	0.016605	1.446e-3
P1_t_rc@AC [W]	0.931762	0.616066	-0.315696
PF1_t@AC []	0.243876	0.210021	-0.033855
Q1_t_rc@AC [var]	3.383086	2.844821	-0.538265

Test No. 3.3 with PGU



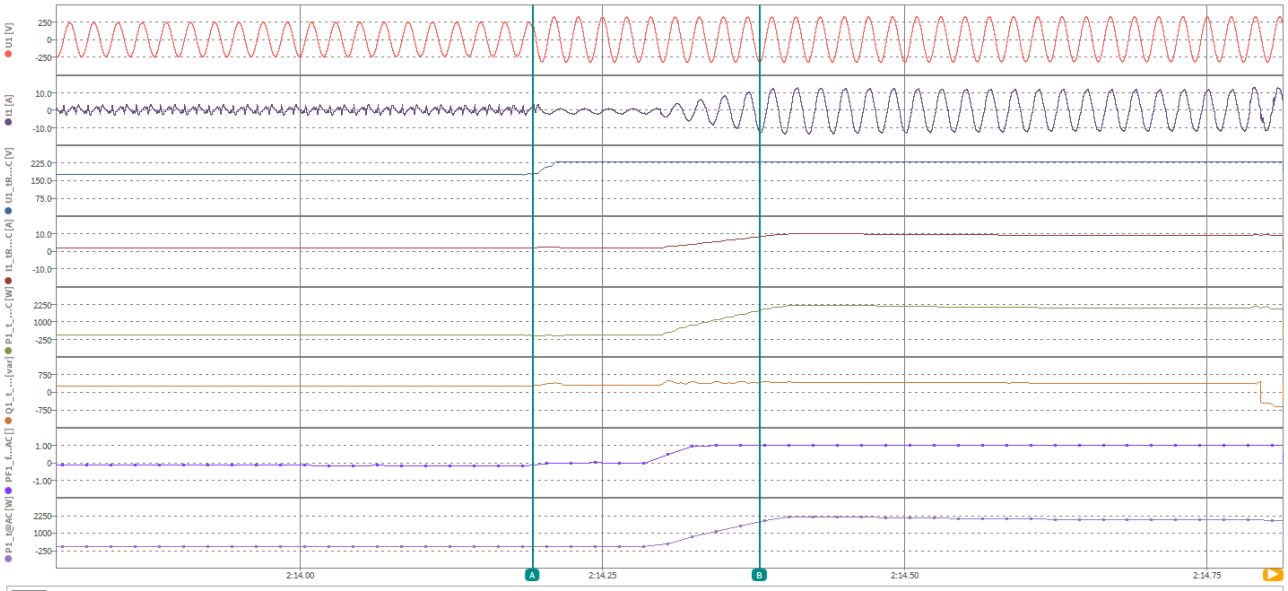
	A	B	间隔
时间 [s]	2:02.672700	2:12.672700	0:10.000000
U1 [V]	267.1993	162.3647	-104.8346
I1 [A]	3.522039	14.66990	11.14786
U1_tRMS_rc@AC [V]	230.1839	228.2292	-1.954712
I1_tRMS_rc@AC [A]	10.63328	10.75795	0.124676
P1_t_rc@AC [W]	1934.748	1946.431	11.68286
Q1_t_rc@AC [var]	-1499.180	-1496.597	2.583374
PF1_fund@AC []	0.800112	0.799457	-6.544e-4
P1_t@AC [W]	1934.971	1935.423	0.452759

Before dip



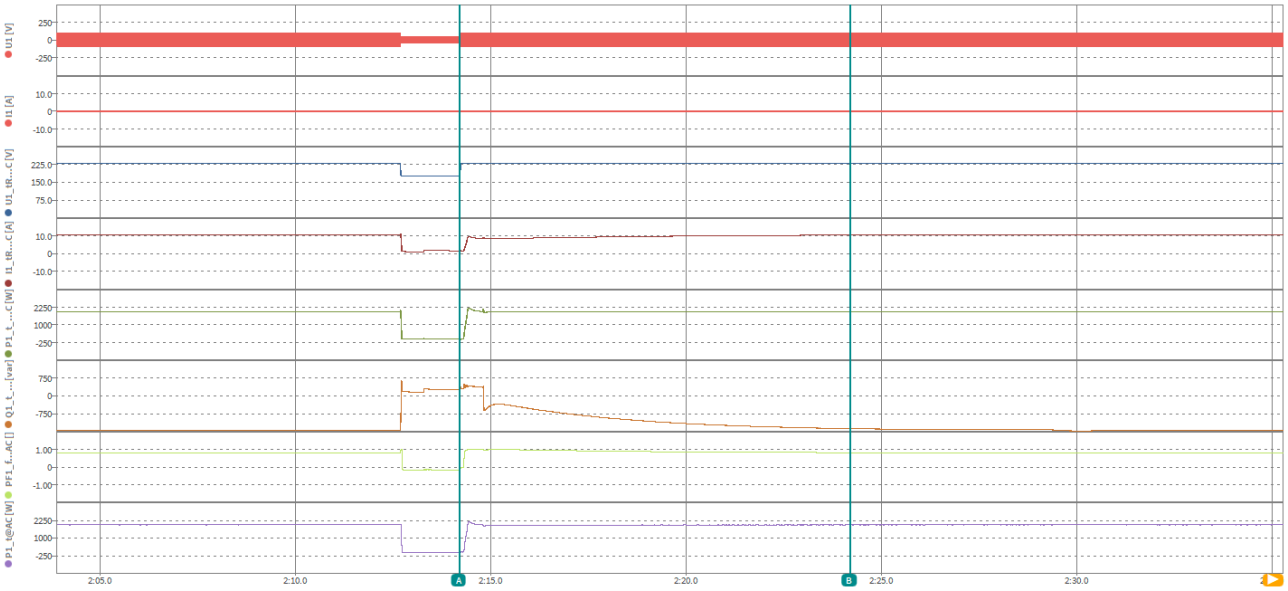
	A	B	间隔
时间 [s]	2:12.672700	2:12.732800	0.060100
U1 [V]	162.3647	168.0942	5.729437
I1 [A]	14.66990	0.292659	-14.37724
U1_tRMS_rc@AC [V]	228.2292	174.9845	-53.24477
I1_tRMS_rc@AC [A]	10.75795	1.008981	-9.748972
P1_t_rc@AC [W]	1946.431	-23.48035	-1969.912
Q1_t_rc@AC [var]	-1496.597	174.9877	1671.584
PF1_fund@AC []	0.799457	-0.149696	-0.949153
P1_t@AC [W]	1935.423	-22.40109	-1957.825

t1+60ms



	A	B	间隔
时间 [s]	2:14.192700	2:14.380500	0.187800
U1 [V]	193.1393	-324.3153	-517.4547
I1 [A]	-2.248883	-11.85298	-9.604097
U1_tRMS_rc@AC [V]	176.3318	230.2275	53.89572
I1_tRMS_rc@AC [A]	1.457571	7.737813	6.280243
P1_t_rc@AC [W]	-22.37841	1738.393	1760.771
Q1_t_rc@AC [var]	256.0399	389.3341	133.2942
PF1_fund@AC []	-0.224267	0.967525	1.191792
P1_t@AC [W]	-30.74716	1477.503	1508.251

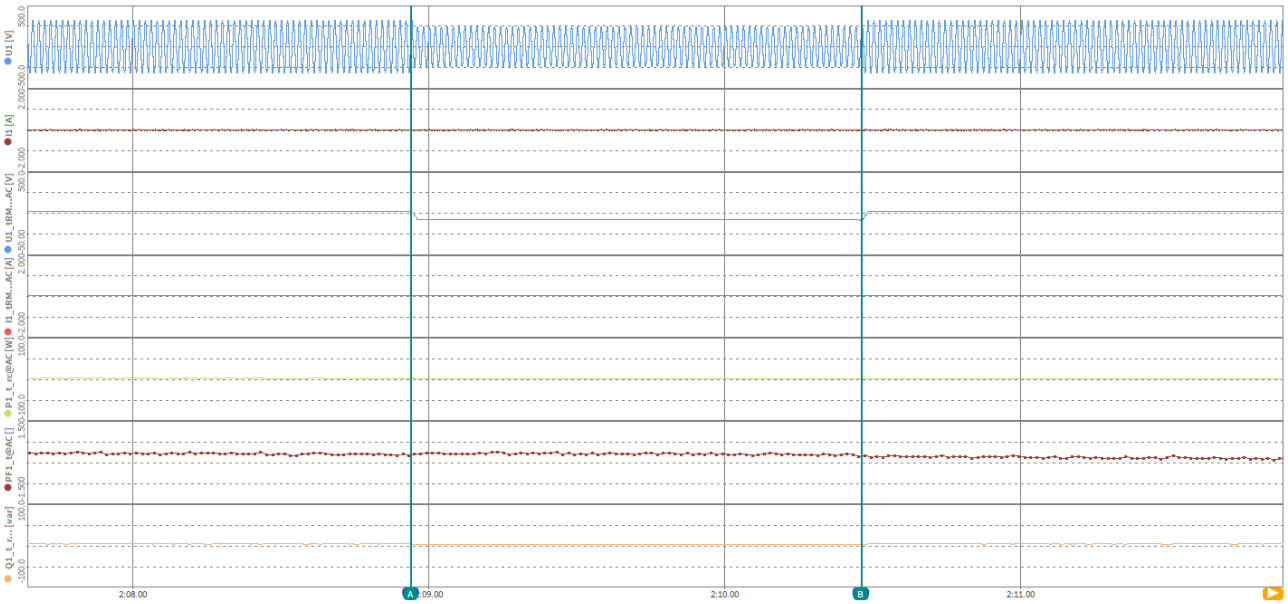
Active power rising time



	A	B	间隔
时间 [s]	2:14.1929000	2:24.1869000	9.9940000
U1 [V]	-64.53586	-20.89214	43.64372
I1 [A]	-0.189271	-0.192251	-2.980e-3
U1_tRMS_rc@AC [V]	176.3318	230.1792	53.84743
I1_tRMS_rc@AC [A]	1.457571	10.43326	8.975686
P1_t_rc@AC [W]	-22.37841	1935.295	1957.673
Q1_t_rc@AC [var]	256.0399	-1421.945	-1677.985
PF1_fund@AC []	-0.224267	0.814064	1.038331
P1_t@AC [W]	-30.74716	1935.270	1966.017

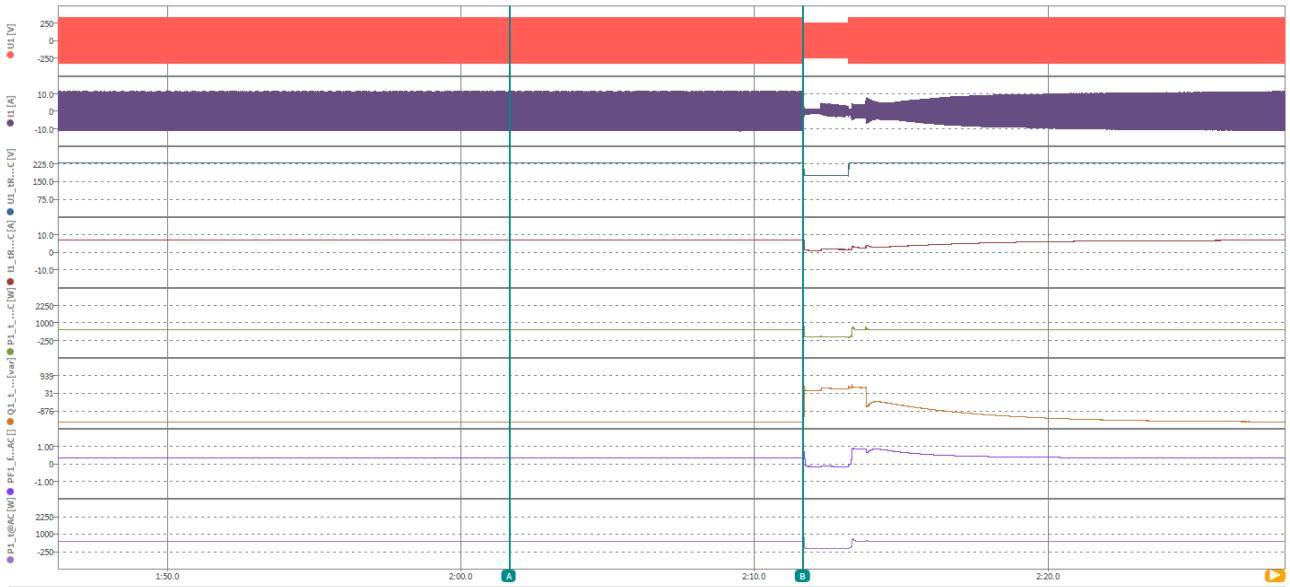
Reactive power rising time

Test No. 3.4 idle test



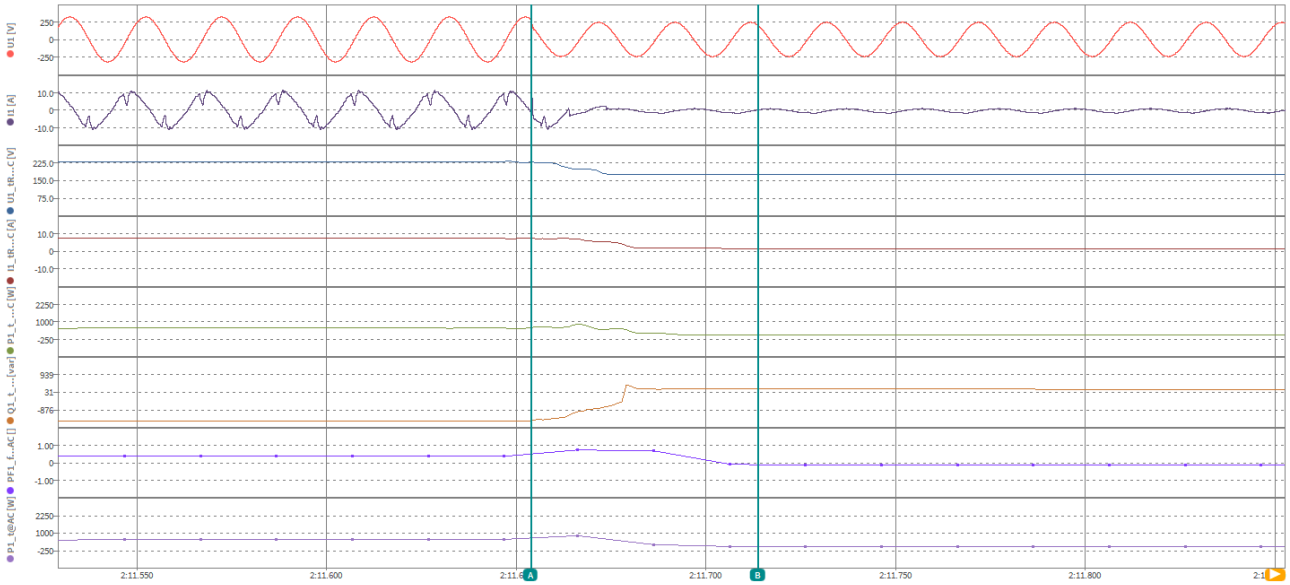
	A	B	间隔
时间 [s]	2:08.942942	2:10.463208	1.520266
U1 [V]	225.0867	214.5562	-10.53047
I1 [A]	0.012875	6.676e-3	-6.199e-3
U1_tRMS_rc@AC [V]	231.4832	175.2967	-56.18649
I1_tRMS_rc@AC [A]	0.015159	0.016605	1.446e-3
P1_t_rc@AC [W]	0.931762	0.616066	-0.315696
PF1_t@AC []	0.243876	0.210021	-0.033855
Q1_t_rc@AC [var]	3.383086	2.844821	-0.538265

Test No. 3.4 with PGU



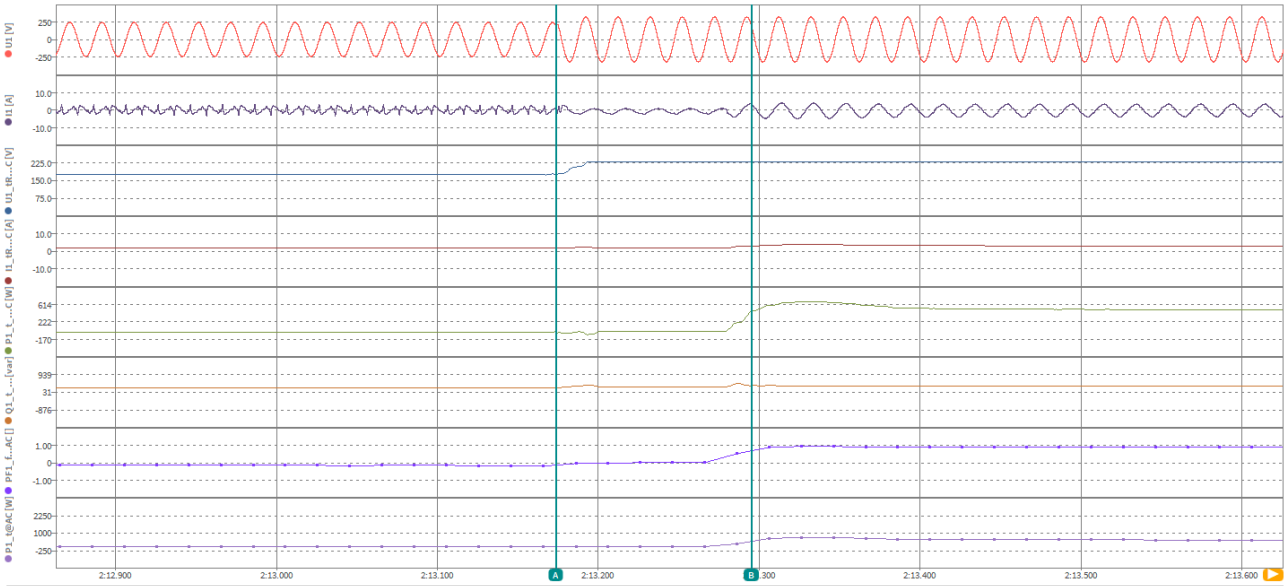
	A	B	间隔
时间 [s]	2:01.653900	2:11.653900	0:10.000000
U1 [V]	283.0956	283.6163	0.520706
I1 [A]	-2.056360	-1.904965	0.151396
U1_tRMS_rc@AC [V]	230.1432	227.5319	-2.611313
I1_tRMS_rc@AC [A]	6.836171	6.951550	0.115379
P1_t_rc@AC [W]	480.7199	501.3313	20.61139
Q1_t_rc@AC [var]	-1498.057	-1500.146	-2.089111
PF1_fund@AC []	0.313421	0.314357	9.363e-4
P1_t@AC [W]	481.0359	483.0625	2.026611

Before dip



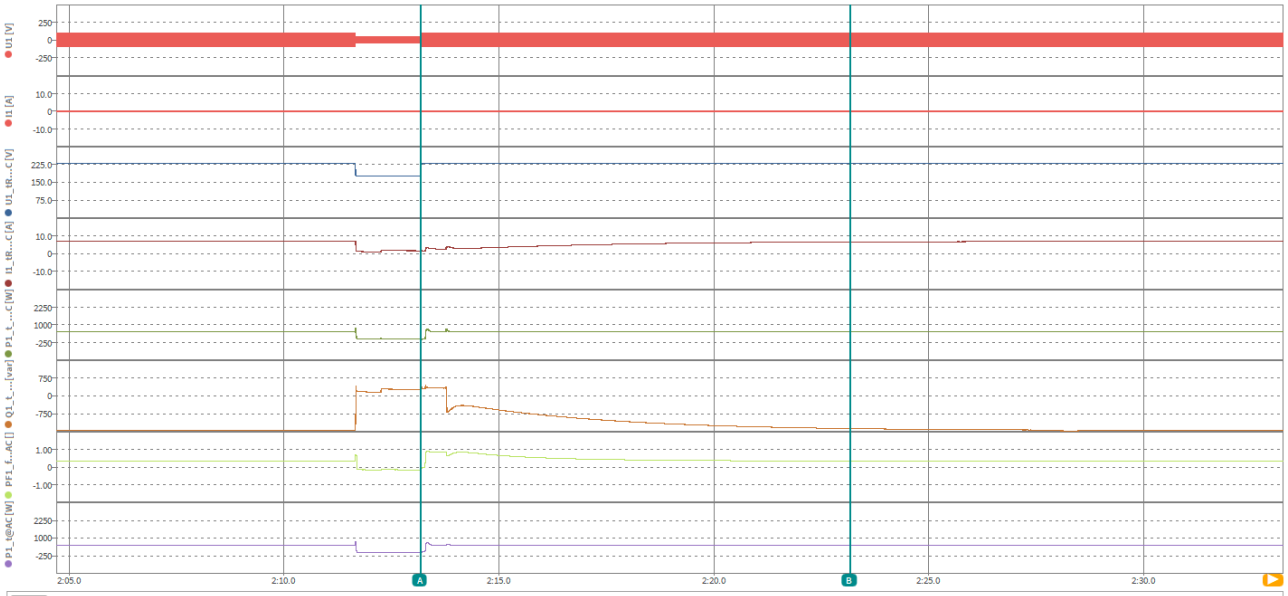
	A	B	间隔
时间 [s]	2:11.653900	2:11.713800	0.059900
U1 [V]	283.6163	194.0858	-89.53047
I1 [A]	-1.904965	0.048280	1.953244
U1_tRMS_rc@AC [V]	227.5319	175.0080	-52.52383
I1_tRMS_rc@AC [A]	6.951550	1.031489	-5.920061
P1_t_rc@AC [W]	501.3313	-21.70282	-523.0341
Q1_t_rc@AC [var]	-1500.146	179.2095	1679.356
PF1_fund@AC []	0.314357	-0.139129	-0.453486
P1_t@AC [W]	483.0625	-21.11588	-504.1784

t1+60ms



	A	B	间隔
时间 [s]	2:13.1741	2:13.2956	0.1215
U1 [V]	183.0876	163.6086	-19.47904
I1 [A]	0.886321	3.008247	2.121925
U1_tRMS_rc@AC [V]	176.7962	230.1792	53.38297
I1_tRMS_rc@AC [A]	1.413024	2.446072	1.033047
P1_t_rc@AC [W]	-24.09137	438.2747	462.3661
Q1_t_rc@AC [var]	248.6530	353.4451	104.7921
PF1_fund@AC []	-0.220617	0.502839	0.723457
P1_t@AC [W]	-30.61179	181.7694	212.3812

Active power rising time

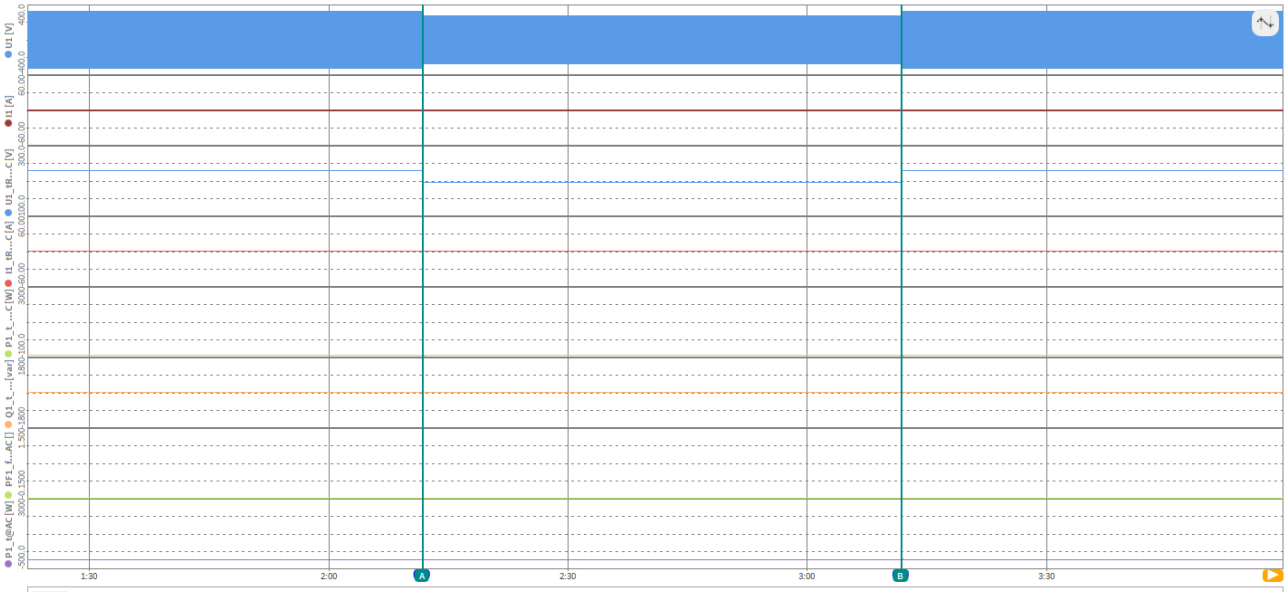


	A	B	间隔
时间 [s]	2:13.174200	2:23.166700	9.992500
U1 [V]	-47.91928	27.74453	75.66381
I1 [A]	-0.186291	-0.195232	-8.941e-3
U1_tRMS_rc@AC [V]	175.4706	230.1518	54.68117
I1_tRMS_rc@AC [A]	1.435649	6.507143	5.071494
P1_t_rc@AC [W]	-19.36168	480.0788	499.4405
Q1_t_rc@AC [var]	251.1690	-1418.598	-1669.767
PF1_fund@AC []	-0.220617	0.328243	0.548861
P1_t@AC [W]	-30.61179	480.5283	511.1400

Reactive power rising time

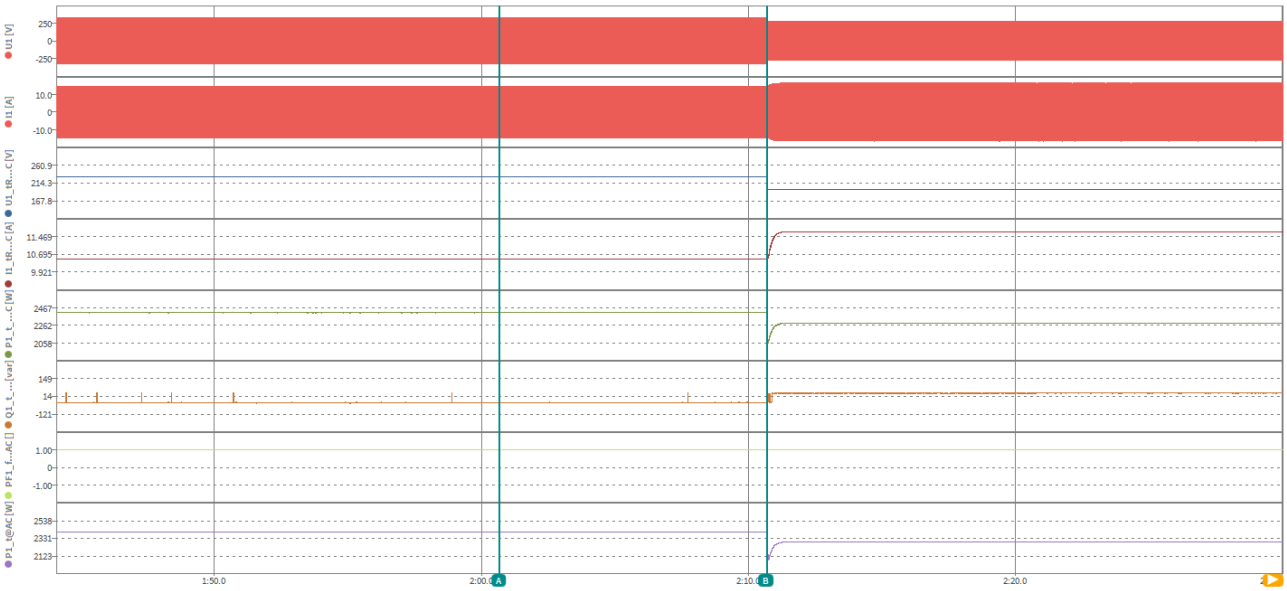
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	4.1	4.2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	20:48:34	20:53:25
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	0.85	0.85
	5	Setting dip duration		--		60000	60000
	6	Point of fault entry	Total	--	ms	131758	131758
	7	Point of fault clearance	Total	--	ms	191778	191778
	8	Fault duration in empty load test	Total	--	ms	60020	60020
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.850	0.850
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.002	0.203
	13	Active power	Total	t1-10s to t1	p.u.	1.003	0.203
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.015	-0.011
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.851	0.850
	19	Line current	Phase 1	t1+60ms	p.u.	1.025	0.207
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	1.046	0.215
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.952	0.203
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.004	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.169	0.187
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 4.1 idle test



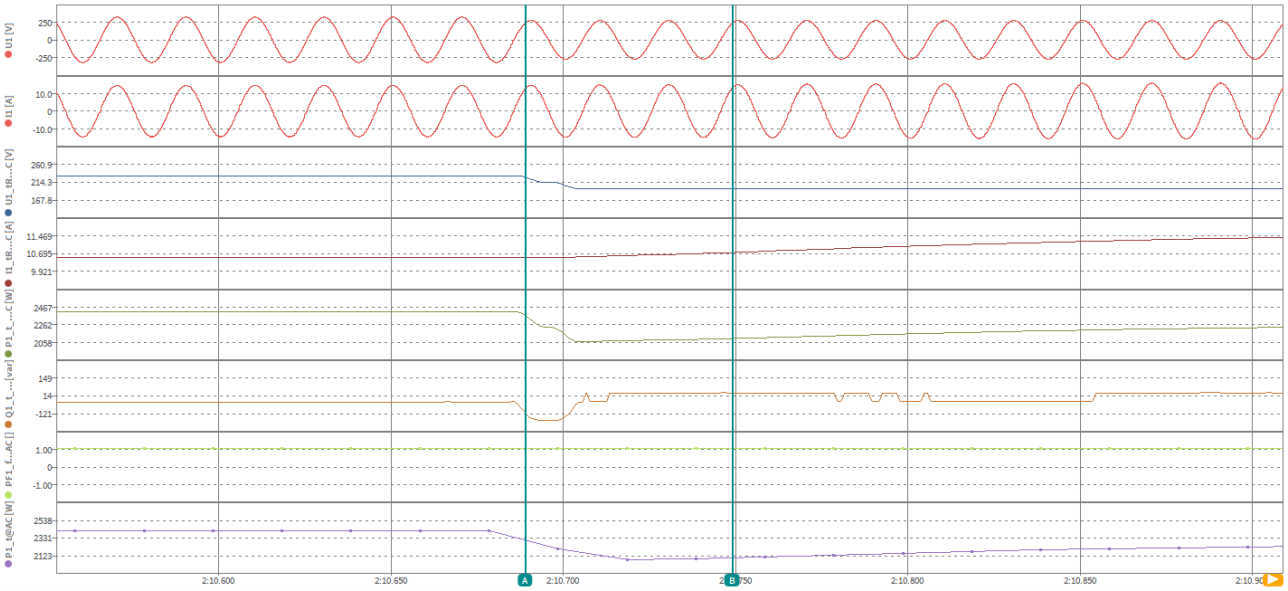
时间 [s]	A 2:11.7586	B 3:11.7786	间隔 1:00.0201
U1 [V]	140.9128	187.5725	46.65971
I1 [A]	-0.140667	-0.285625	-0.144959
U1_tRMS_rc@AC [V]	229.9253	195.3552	-34.57018
I1_tRMS_rc@AC [A]	0.198997	0.204526	5.529e-3
P1_t_rc@AC [W]	-32.35763	-32.66989	-0.312260
Q1_t_rc@AC [var]	32.34885	23.00196	-9.346895
PF1_fund@AC []	-0.824351	-0.987878	-0.163527
P1_t@AC [W]	-32.93346	-31.89416	1.039293

Test No. 4.1 with PGU



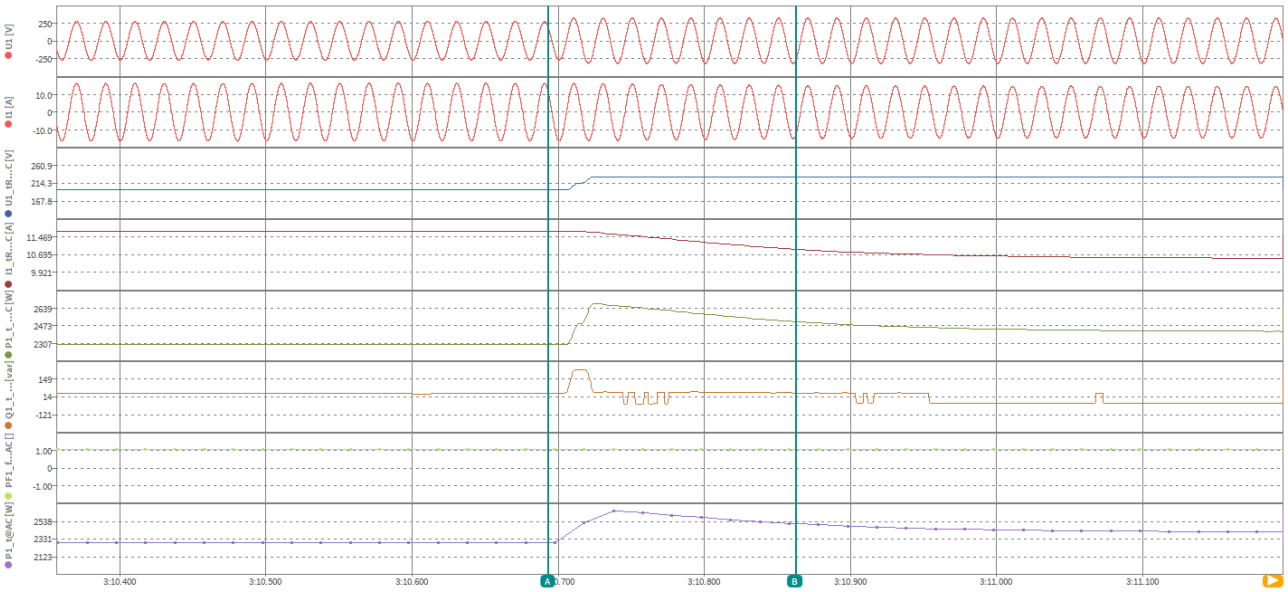
时间 [s]	A 2:00.68920	B 2:10.68920	间隔 0:10.00000
U1 [V]	289.2454	245.3678	-43.87760
I1 [A]	13.20687	13.03164	-0.175238
U1_tRMS_rc@AC [V]	230.1588	227.3320	-2.826813
I1_tRMS_rc@AC [A]	10.46549	10.46573	2.346e-4
P1_t_rc@AC [W]	2408.431	2376.560	-31.87109
Q1_t_rc@AC [var]	-37.70849	-111.9524	-74.24392
PF1_fund@AC []	0.999998	0.999998	-1.788e-7
P1_t@AC [W]	2408.794	2406.237	-2.557129

Before dip



	A	B	间隔
时间 [s]	2:10.68920	2:10.74920	0.06000
U1 [V]	245.3678	245.1804	-0.187397
I1 [A]	13.03164	13.52218	0.490546
U1_tRMS_rc@AC [V]	227.3320	195.6723	-31.65973
I1_tRMS_rc@AC [A]	10.46573	10.69137	0.225640
P1_t_rc@AC [W]	2376.560	2091.713	-284.8464
Q1_t_rc@AC [var]	-111.9524	34.92533	146.8777
PF1_fund@AC []	0.999998	0.999990	-7.570e-6
P1_t@AC [W]	2406.237	2080.498	-325.7390

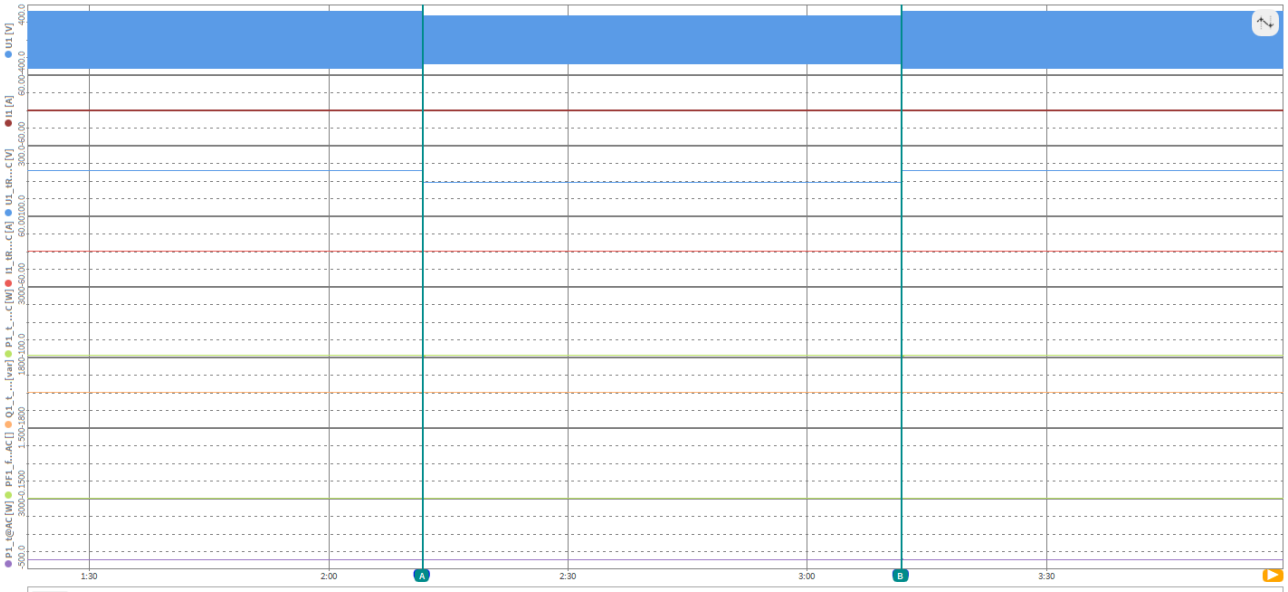
t1+60ms



	A	B	间隔
时间 [s]	3:10.6934	3:10.8624	0.1690
U1 [V]	191.0377	-286.6864	-477.7241
I1 [A]	11.47536	-13.72906	-25.20442
U1_tRMS_rc@AC [V]	195.6449	230.1424	34.49751
I1_tRMS_rc@AC [A]	11.68051	10.88457	-0.795947
P1_t_rc@AC [W]	2284.947	2504.660	219.7126
Q1_t_rc@AC [var]	36.12314	41.30798	5.184845
PF1_fund@AC []	0.999987	0.999998	1.103e-5
P1_t@AC [W]	2286.256	2510.081	223.8250

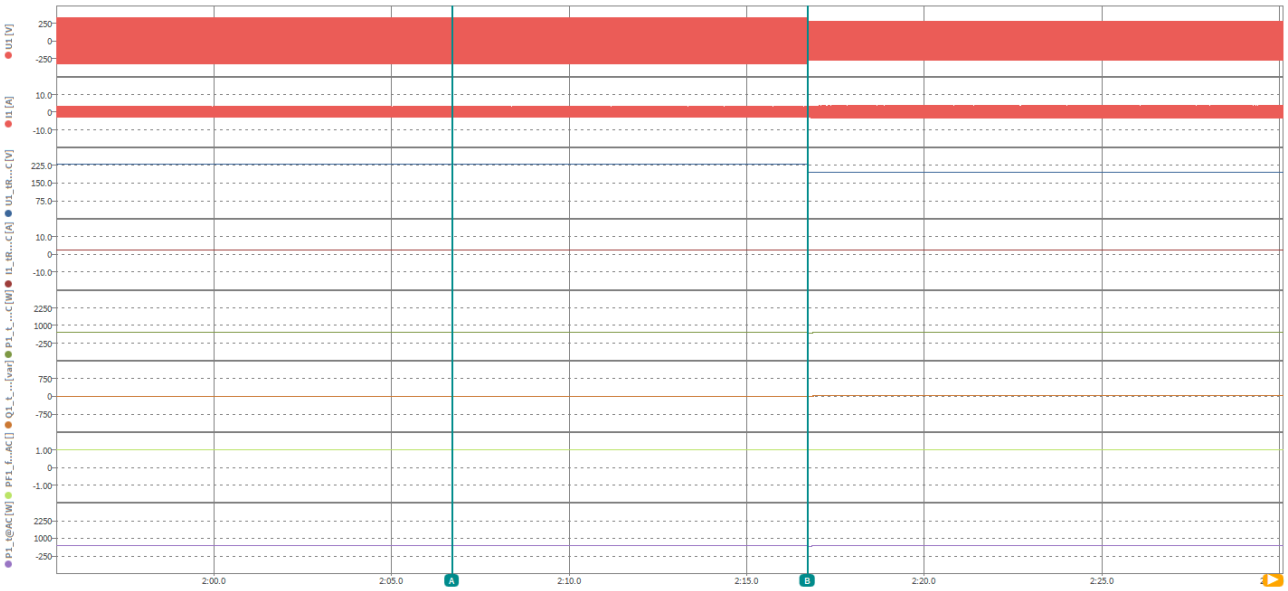
Active power rising time

Test No. 4.2 idle test



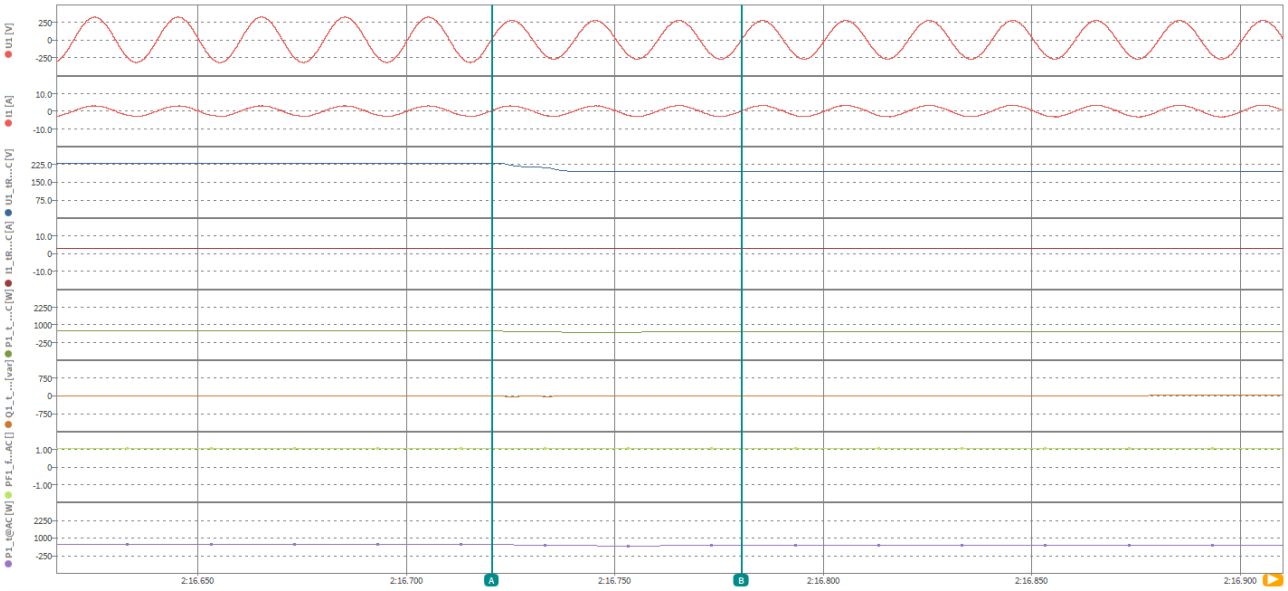
时间 [s]	A 2:11.7586	B 3:11.7786	间隔 1:00.0201
U1 [V]	140.9128	187.5725	46.65971
I1 [A]	-0.140667	-0.285625	-0.144959
U1_tRMS_rc@AC [V]	229.9253	195.3552	-34.57018
I1_tRMS_rc@AC [A]	0.198997	0.204526	5.529e-3
P1_t_rc@AC [W]	-32.35763	-32.66989	-0.312260
Q1_t_rc@AC [var]	32.34885	23.00196	-9.346895
PF1_fund@AC []	-0.824351	-0.987878	-0.163527
P1_t@AC [W]	-32.93346	-31.89416	1.039293

Test No. 4.2 with PGU



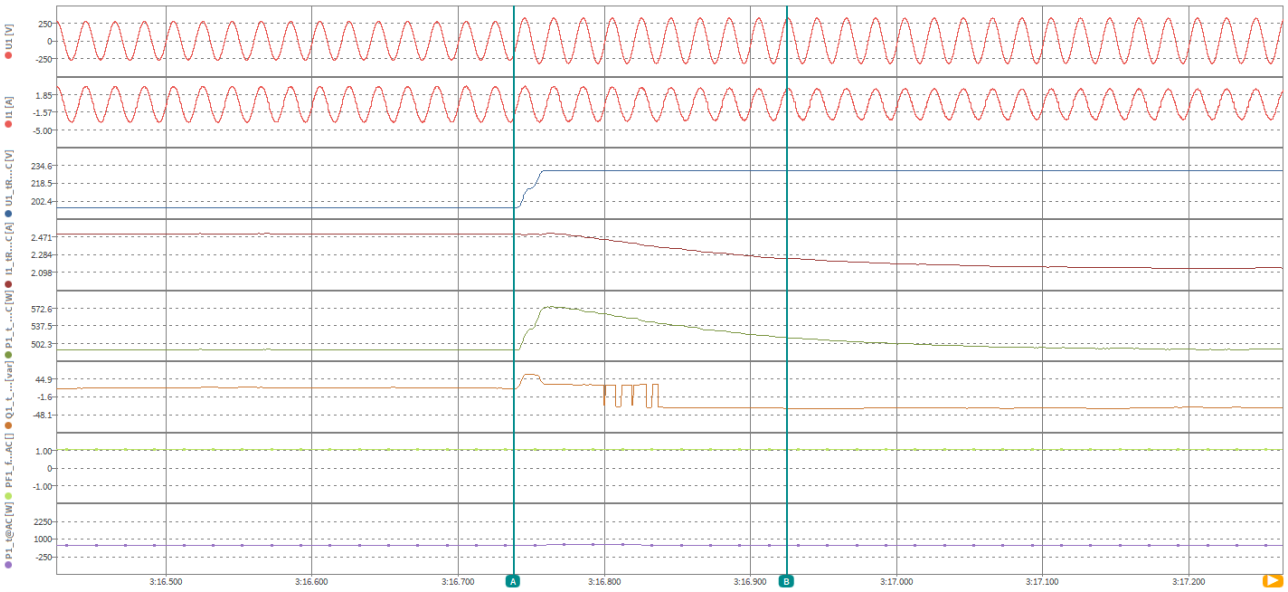
时间 [s]	A 2:06.7206	B 2:16.7206	间隔 0:10.0000
U1 [V]	32.45759	25.76113	-6.696463
I1 [A]	0.595722	0.914607	0.318885
U1_tRMS_rc@AC [V]	230.1163	230.1392	0.022812
I1_tRMS_rc@AC [A]	2.118658	2.121714	3.056e-3
P1_t_rc@AC [W]	486.7963	487.5673	0.770935
Q1_t_rc@AC [var]	-26.87818	-26.54702	0.331167
PF1_fund@AC []	0.999817	0.999803	-1.442e-5
P1_t@AC [W]	486.6114	487.3103	0.698914

Before dip



	A	B	间隔
时间 [s]	2:16.7206	2:16.7804	0.0598
U1 [V]	25.76113	8.489848	-17.27128
I1 [A]	0.914607	0.105772	-0.808835
U1_tRMS_rc@AC [V]	230.1392	195.6333	-34.50581
I1_tRMS_rc@AC [A]	2.121714	2.162676	0.040962
P1_t_rc@AC [W]	487.5673	422.5759	-64.99133
Q1_t_rc@AC [var]	-26.54702	-20.88065	5.666367
PF1_fund@AC []	0.999803	0.999913	1.098e-4
P1_t@AC [W]	487.3103	421.1917	-66.11859

t1+60ms

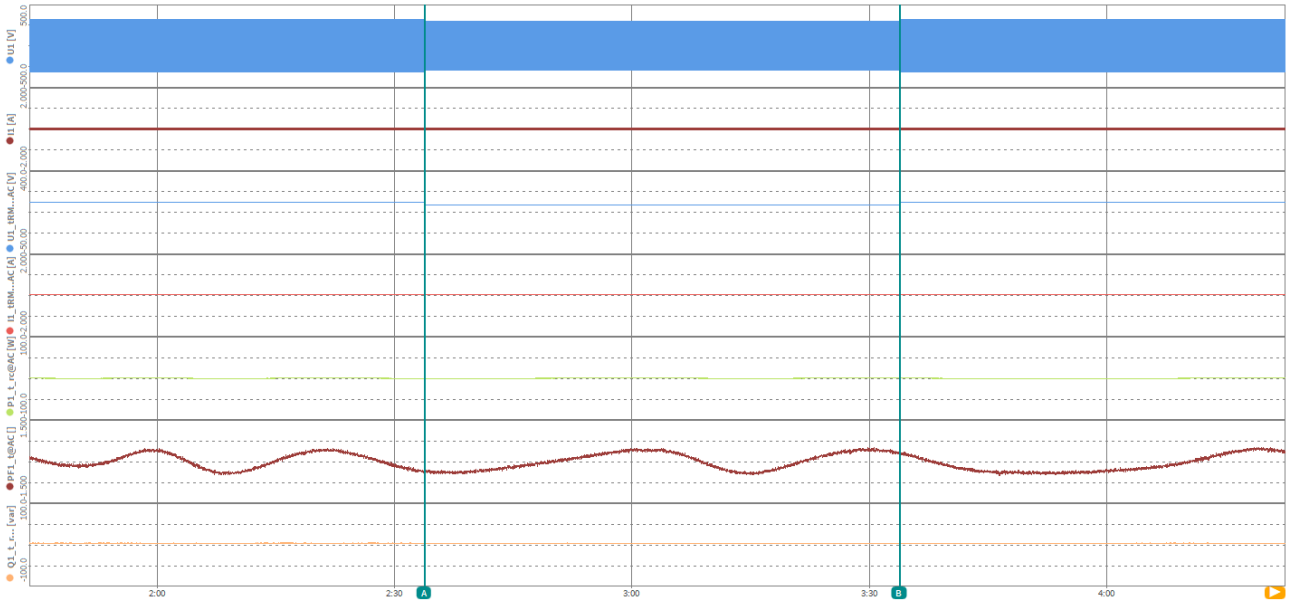


	A	B	间隔
时间 [s]	3:16.7380	3:16.9250	0.1870
U1 [V]	-189.6949	323.2563	512.9512
I1 [A]	-2.461400	2.917323	5.378723
U1_tRMS_rc@AC [V]	195.6034	230.1054	34.50203
I1_tRMS_rc@AC [A]	2.494658	2.233347	-0.261311
P1_t_rc@AC [W]	487.5674	512.8299	25.26254
Q1_t_rc@AC [var]	19.65974	-33.22785	-52.88759
PF1_fund@AC []	0.999943	0.999900	-4.262e-5
P1_t@AC [W]	487.6151	515.3650	27.74985

Active power rising time

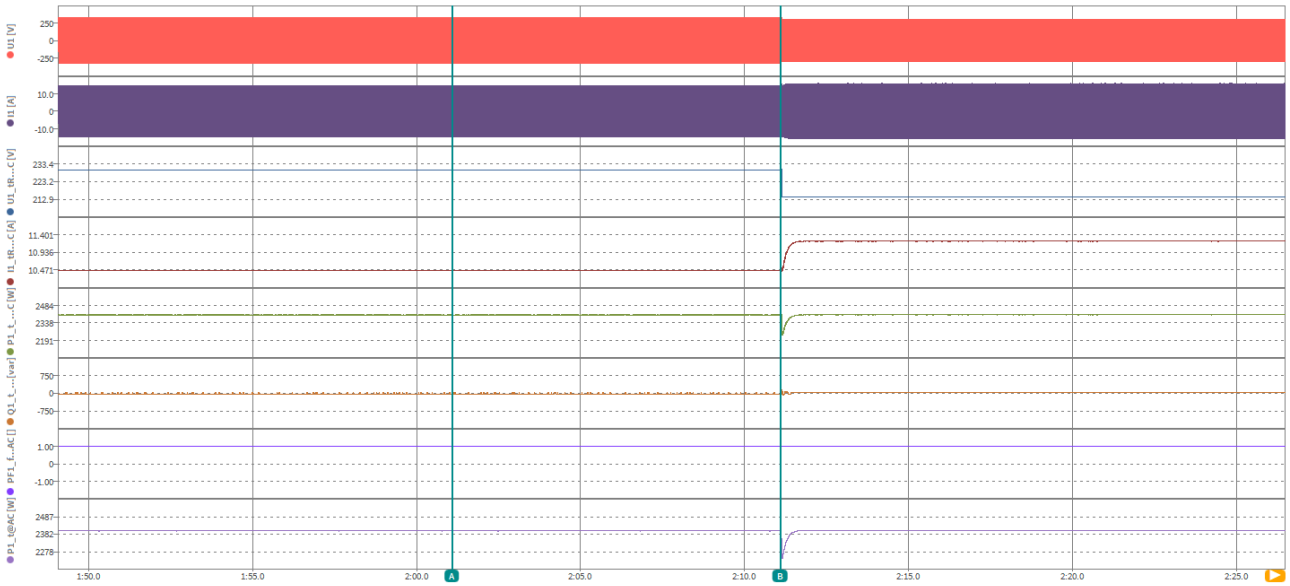
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	4.3	4.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	19:03:53	18:58:27
	3	Fault type (phase)	--	--		D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	0.93	0.93
	5	Setting dip duration		--		60000	60000
	6	Point of fault entry	Total	--	ms	153822	153822
	7	Point of fault clearance	Total	--	ms	213843	213843
	8	Fault duration in empty load test	Total	--	ms	60020	60020
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	0.9299	0.9299
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.000	0.202
	13	Active power	Total	t1-10s to t1	p.u.	1.001	0.202
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.014	-0.012
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	0.931	0.931
	19	Line current	Phase 1	t1+60ms	p.u.	1.015	0.204
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	1.030	0.208
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.002	0.202
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.002	0.202
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.268	0.315
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.014	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 4.3 idle test



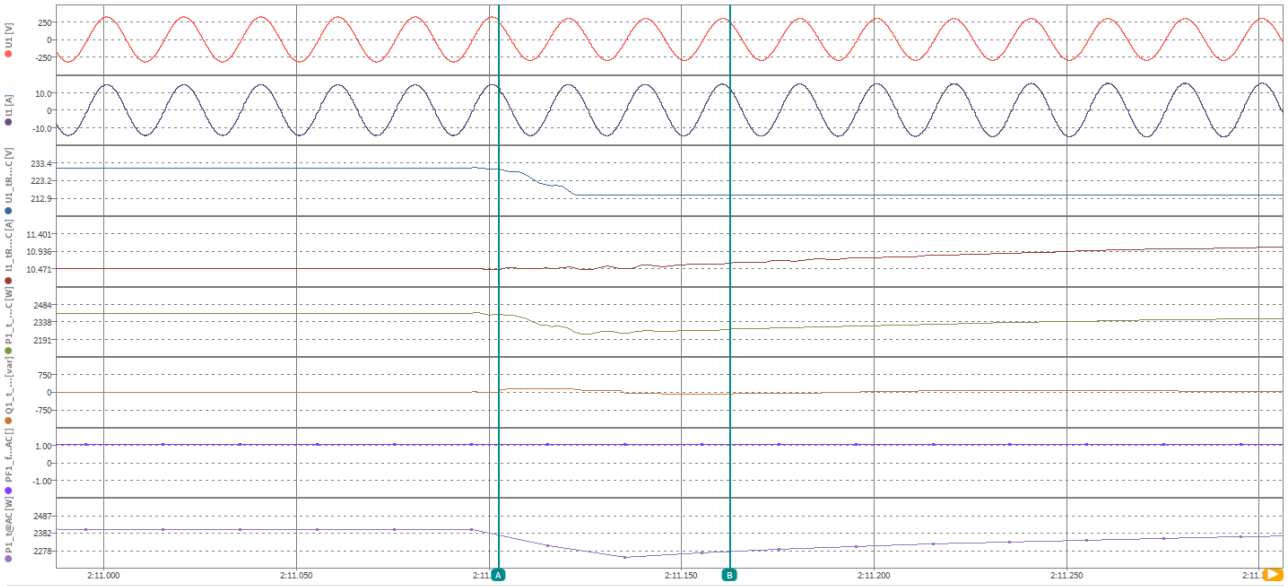
时间 [s]	A 2:33.8226429	B 3:33.8436140	间隔 1:00.0209711
U1 [V]	-135.7982	-236.0573	-100.2591
I1 [A]	-5.722e-3	-0.014782	-9.060e-3
U1_tRMS_rc@AC [V]	228.3906	215.4747	-12.91597
I1_tRMS_rc@AC [A]	0.016072	0.015146	-9.256e-4
P1_t_rc@AC [W]	-1.273999	0.870635	2.144634
PF1_t@AC []	-0.352048	0.358270	0.710318
Q1_t_rc@AC [var]	3.442477	3.145360	-0.297117

Test No. 4.3 with PGU



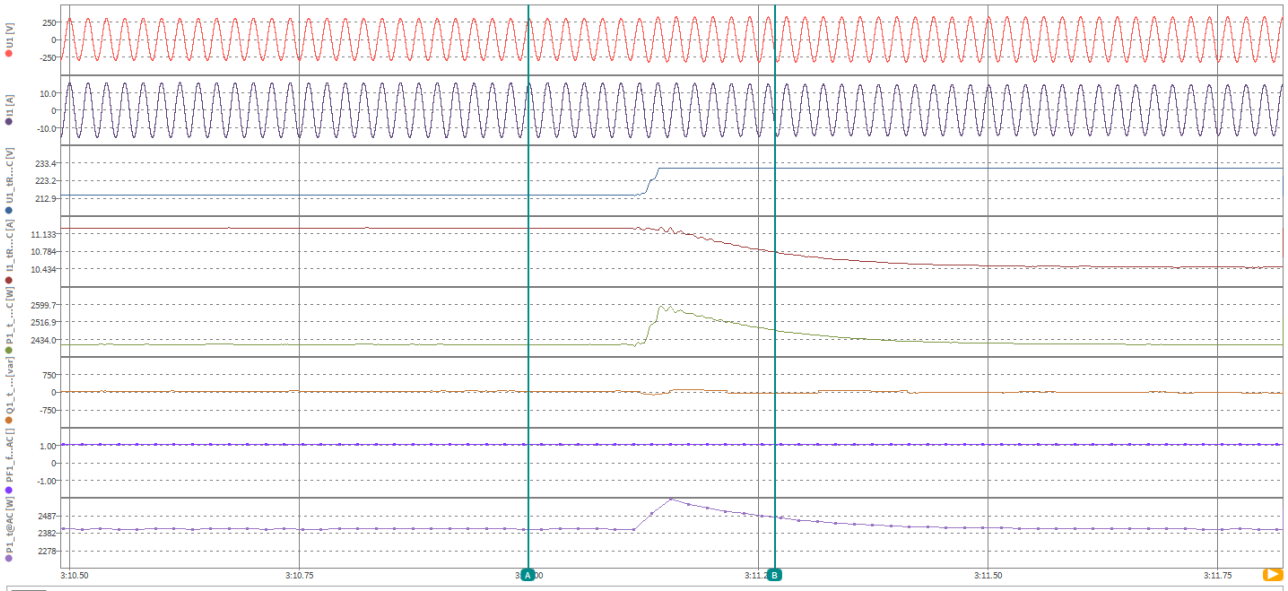
时间 [s]	A 2:01.102600	B 2:11.102600	间隔 0:10.000000
U1 [V]	275.5172	265.0187	-10.49852
I1 [A]	12.41207	14.70685	2.294779
U1_tRMS_rc@AC [V]	230.2152	229.9371	-0.278183
I1_tRMS_rc@AC [A]	10.43527	10.42368	-0.011591
P1_t_rc@AC [W]	2402.068	2396.484	-5.583984
Q1_t_rc@AC [var]	-37.29066	-38.24570	-0.955036
PF1_fund@AC []	0.999999	1.000000	8.345e-7
P1_t@AC [W]	2401.839	2401.291	-0.548584

Before dip



	A	B	间隔
时间 [s]	2:11.102600	2:11.162600	0.060000
U1 [V]	265.0187	249.2879	-15.73086
I1 [A]	14.70685	12.05266	-2.654195
U1_tRMS_rc@AC [V]	229.9371	214.1171	-15.82001
I1_tRMS_rc@AC [A]	10.42368	10.59515	0.171476
P1_t_rc@AC [W]	2396.484	2267.075	-129.4089
Q1_t_rc@AC [var]	-38.24570	-83.23885	-44.99316
PF1_fund@AC []	1.000000	0.999388	-6.115e-4
P1_t@AC [W]	2401.291	2260.923	-140.3677

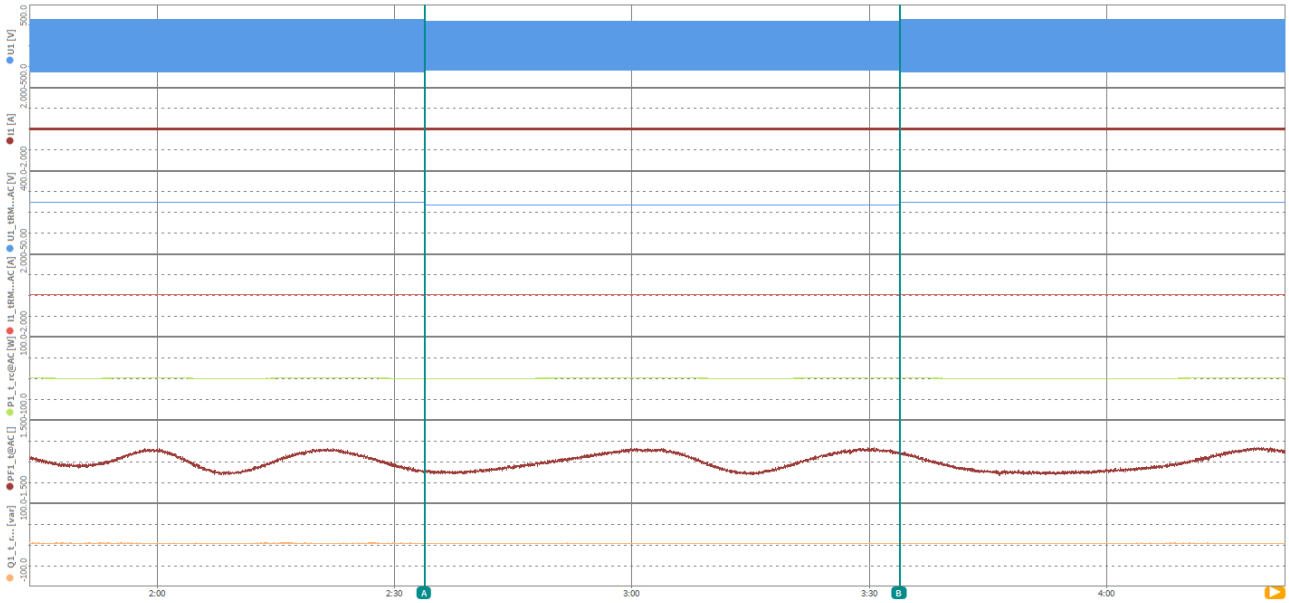
t1+60ms



	A	B	间隔
时间 [s]	3:11.00000	3:11.26840	0.26840
U1 [V]	294.2276	-228.6489	-522.8765
I1 [A]	15.19561	-10.82063	-26.01624
U1_tRMS_rc@AC [V]	214.1062	230.1954	16.08923
I1_tRMS_rc@AC [A]	11.22489	10.75296	-0.471929
P1_t_rc@AC [W]	2403.018	2474.818	71.80005
Q1_t_rc@AC [var]	37.97657	-47.93508	-85.91165
PF1_fund@AC []	0.999998	0.999949	-4.971e-5
P1_t@AC [W]	2403.143	2483.347	80.20361

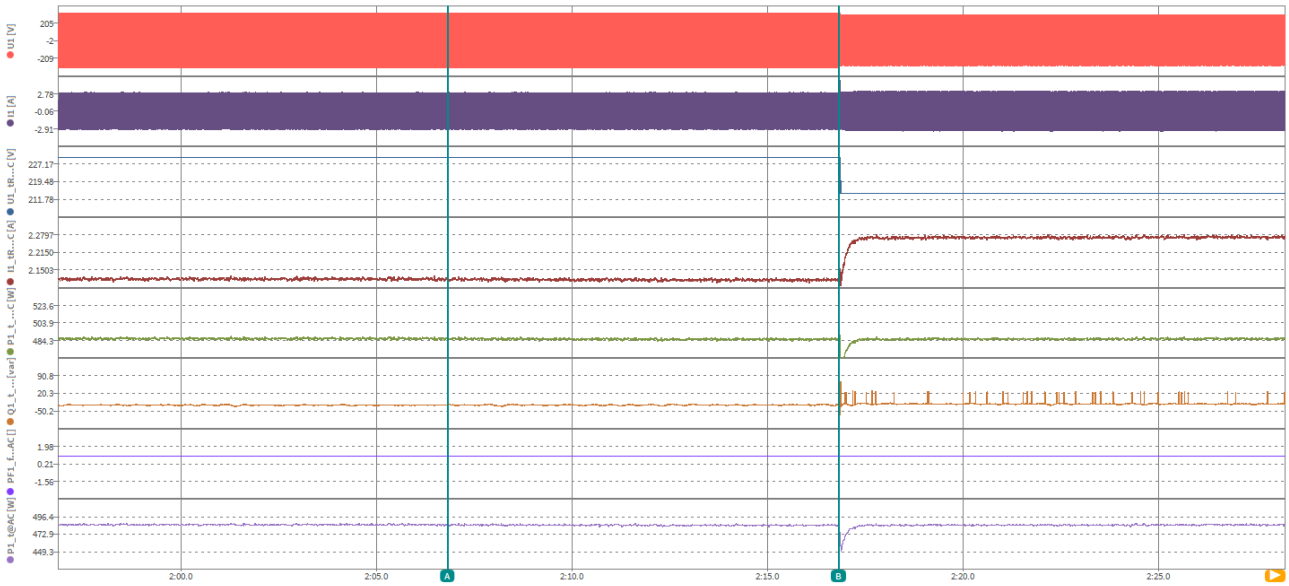
Active power rising time

Test No. 4.4 idle test



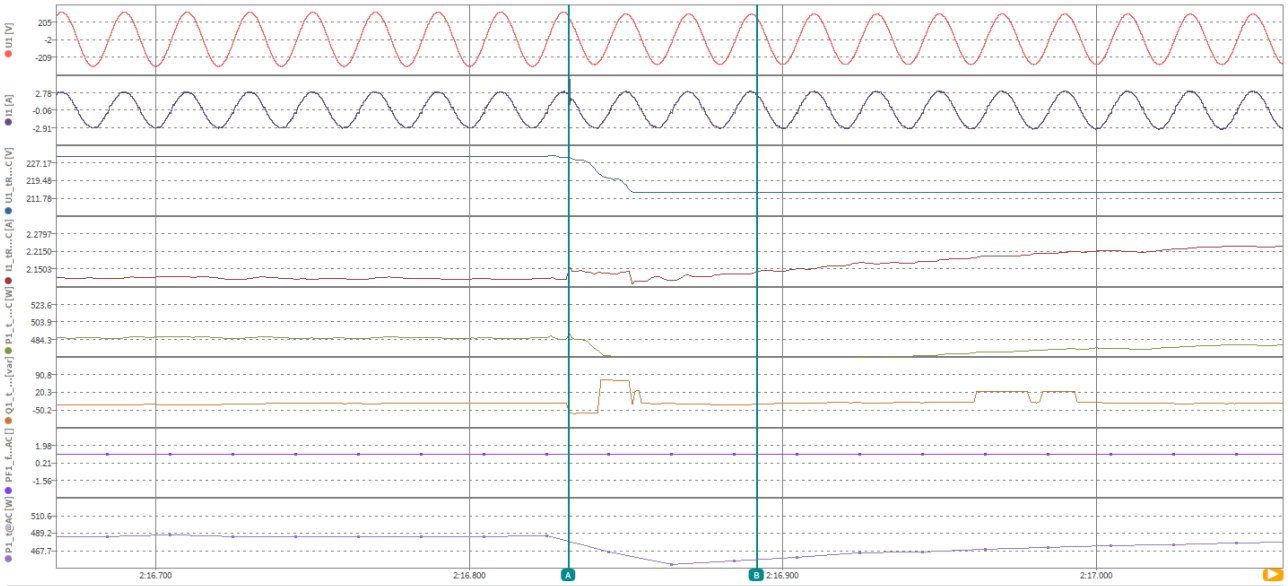
时间 [s]	A 2:33.8226429	B 3:33.8436140	间隔 1:00.0209711
U1 [V]	-135.7982	-236.0573	-100.2591
I1 [A]	-5.722e-3	-0.014782	-9.060e-3
U1_tRMS_rc@AC [V]	228.3906	215.4747	-12.91597
I1_tRMS_rc@AC [A]	0.016072	0.015146	-9.256e-4
P1_t_rc@AC [W]	-1.273999	0.870635	2.144634
PF1_t@AC []	-0.352048	0.358270	0.710318
Q1_t_rc@AC [var]	3.442477	3.145360	-0.297117

Test No. 4.4 with PGU



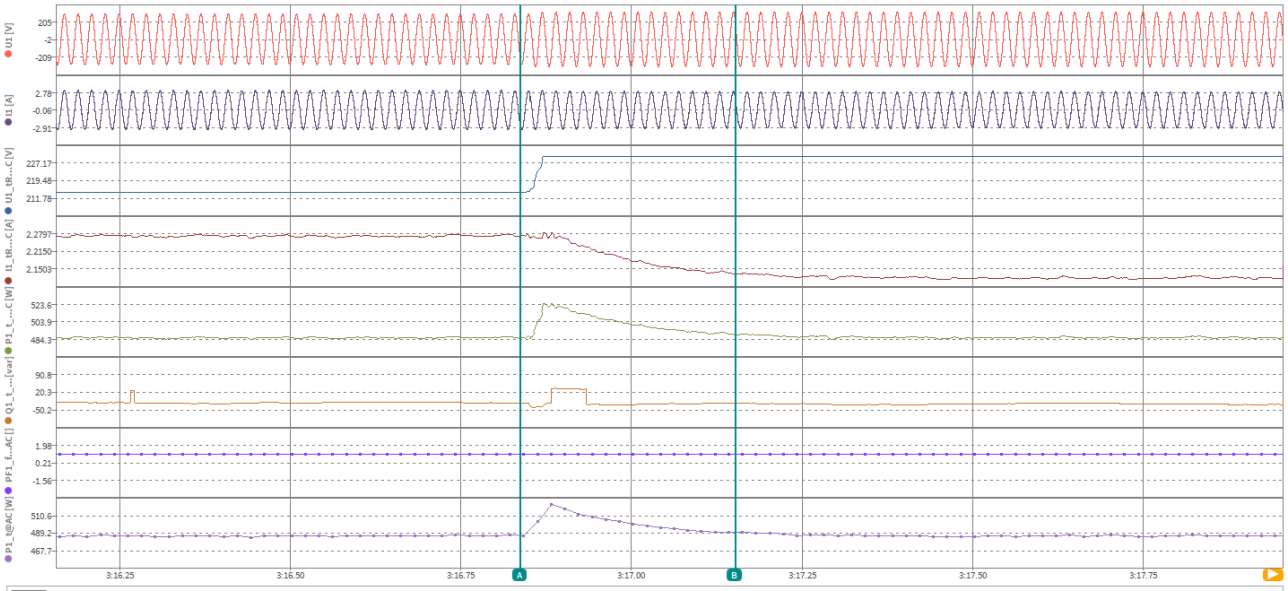
时间 [s]	A 2:06.83180	B 2:16.83180	间隔 0:10.00000
U1 [V]	285.2969	285.8963	0.599384
I1 [A]	2.611876	2.616048	4.172e-3
U1_tRMS_rc@AC [V]	230.1695	229.7230	-0.446472
I1_tRMS_rc@AC [A]	2.110868	2.106962	-3.906e-3
P1_t_rc@AC [W]	485.1560	483.2932	-1.862793
Q1_t_rc@AC [var]	-26.09904	-26.47204	-0.372997
PF1_fund@AC []	0.999801	0.999872	7.087e-5
P1_t@AC [W]	484.8910	484.8863	-4.700e-3

Before dip



	A	B	间隔
时间 [s]	2:16.83180	2:16.89180	0.06000
U1 [V]	285.8963	258.9946	-26.90172
I1 [A]	2.616048	2.483726	-0.132322
U1_tRMS_rc@AC [V]	229.7230	214.0745	-15.64851
I1_tRMS_rc@AC [A]	2.106962	2.133250	0.026288
P1_t_rc@AC [W]	483.2932	455.6396	-27.65356
Q1_t_rc@AC [var]	-26.47204	-30.72589	-4.253845
PF1_fund@AC []	0.999872	0.998875	-9.965e-4
P1_t@AC [W]	484.8863	454.2273	-30.65900

t1+60ms

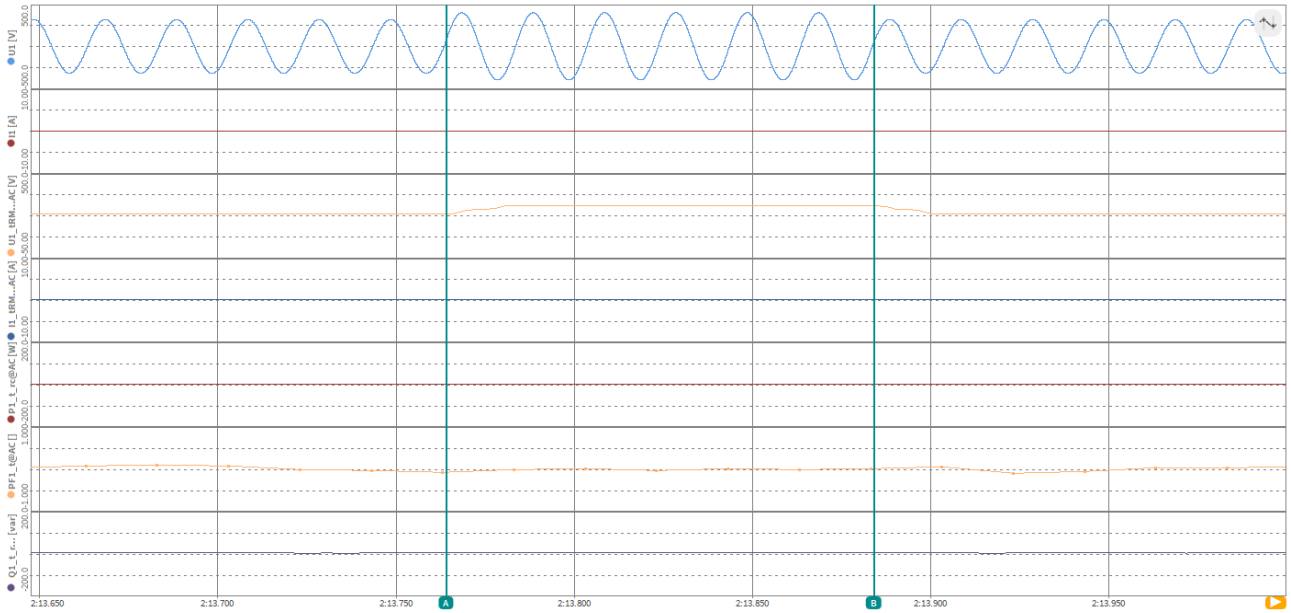


	A	B	间隔
时间 [s]	3:16.837200	3:17.152000	0.314800
U1 [V]	-181.5395	279.7082	461.2477
I1 [A]	-2.040267	2.574921	4.615188
U1_tRMS_rc@AC [V]	214.0657	230.1703	16.10461
I1_tRMS_rc@AC [A]	2.267105	2.125982	-0.141123
P1_t_rc@AC [W]	484.6253	488.6694	4.044098
Q1_t_rc@AC [var]	-25.75891	-25.57183	0.187077
PF1_fund@AC []	0.999973	0.999802	-1.715e-4
P1_t@AC [W]	486.3445	489.2658	2.921295

Active power rising time

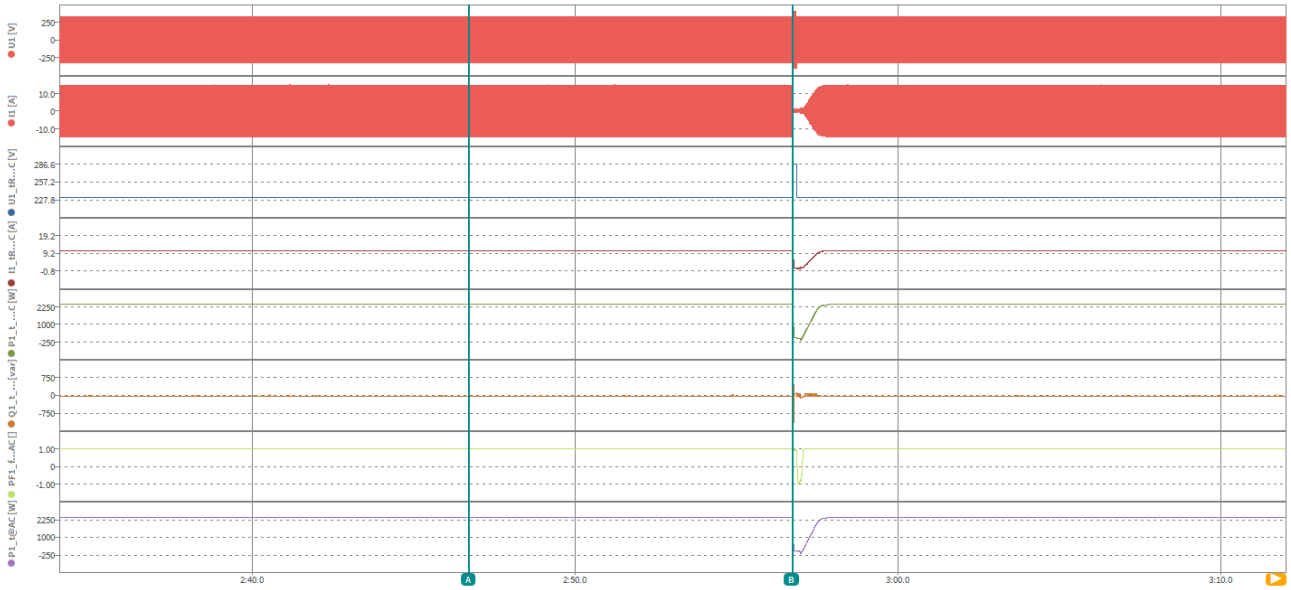
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	5.1	5.2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	21:38:59	21:32:47
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	1.25	1.25
	5	Setting dip duration		--		100	100
	6	Point of fault entry	Total	--	ms	133764.29	133764.29
	7	Point of fault clearance	Total	--	ms	133884.18	133884.18
	8	Fault duration in empty load test	Total	--	ms	119.89	119.89
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.2502	1.2502
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.003	0.203
	13	Active power	Total	t1-10s to t1	p.u.	1.003	0.203
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.016	-0.012
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.250	1.250
	19	Line current	Phase 1	t1+60ms	p.u.	0.026	0.019
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.027	0.019
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.011	0.010
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.004	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.685	0.404
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 5.1 idle test



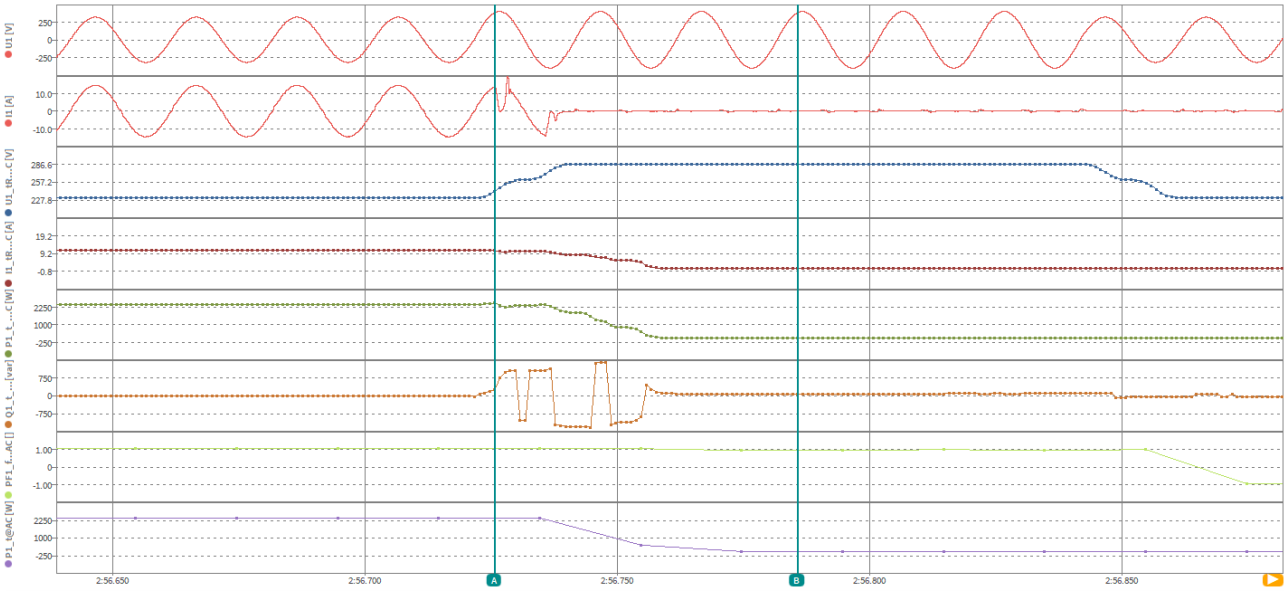
时间 [s]	A 2:13.7642937	B 2:13.8841806	间隔 0.1198868
U1 [V]	62.70552	49.80374	-12.90178
I1 [A]	0.024164	8.726e-3	-0.015438
U1_tRMS_rc@AC [V]	230.0185	287.4770	57.45851
I1_tRMS_rc@AC [A]	0.010434	0.011155	7.209e-4
P1_t_rc@AC [W]	-0.189317	-0.022268	0.167048
PF1_t@AC []	-0.077978	-6.418e-3	0.071560
Q1_t_rc@AC [var]	2.392466	3.206621	0.814155

Test No. 5.1 with PGU



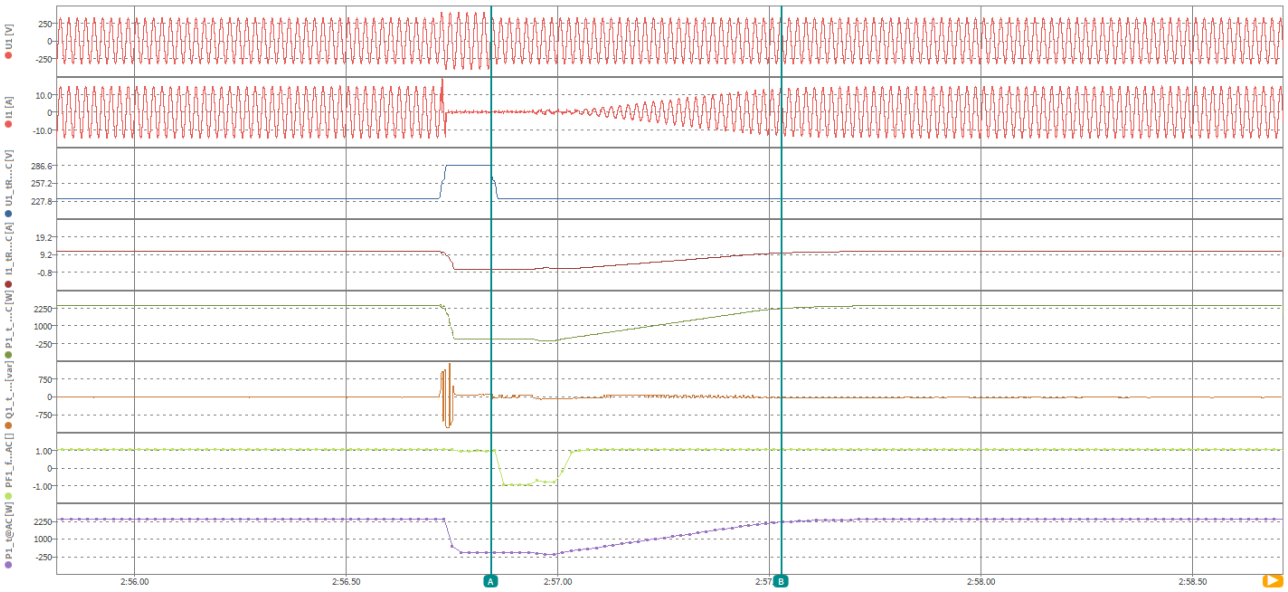
时间 [s]	A 2:46.725700	B 2:56.725700	间隔 0:10.000000
U1 [V]	311.8406	388.9849	77.14439
I1 [A]	14.10035	13.83272	-0.267625
U1_tRMS_rc@AC [V]	230.1531	236.2038	6.050735
I1_tRMS_rc@AC [A]	10.46346	10.45421	-9.244e-3
P1_t_rc@AC [W]	2407.918	2462.419	54.50073
Q1_t_rc@AC [var]	-36.61116	184.5460	221.1571
PF1_fund@AC []	0.999999	0.999998	-4.172e-7
P1_t@AC [W]	2407.920	2408.736	0.815918

Before dip



	A	B	间隔
时间 [s]	2:56.725700	2:56.785700	0.060000
U1 [V]	388.9849	388.9969	0.011921
I1 [A]	13.83272	-0.059929	-13.89265
U1_tRMS_rc@AC [V]	236.2038	287.5465	51.34274
I1_tRMS_rc@AC [A]	10.45421	0.276040	-10.17817
P1_t_rc@AC [W]	2462.419	21.40999	-2441.009
Q1_t_rc@AC [var]	184.5460	76.43230	-108.1137
PF1_fund@AC []	0.999998	0.913081	-0.086917
P1_t@AC [W]	2408.736	22.94500	-2385.791

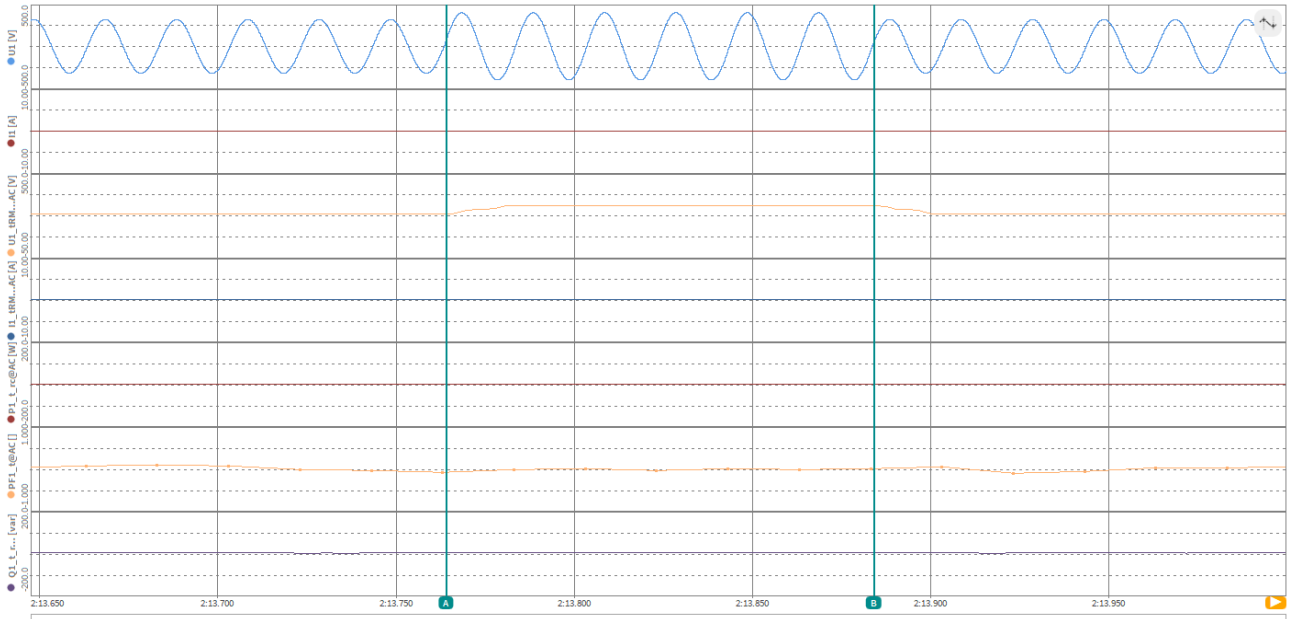
t1+60ms



	A	B	间隔
时间 [s]	2:56.843700	2:57.528200	0.684500
U1 [V]	196.2164	287.5841	91.36773
I1 [A]	-0.077810	11.90809	11.98590
U1_tRMS_rc@AC [V]	287.2940	230.1631	-57.13091
I1_tRMS_rc@AC [A]	0.313462	9.467114	9.153653
P1_t_rc@AC [W]	20.17124	2178.560	2158.389
Q1_t_rc@AC [var]	87.76757	-42.77501	-130.5426
PF1_fund@AC []	0.917550	0.999996	0.082446
P1_t@AC [W]	19.47226	2141.038	2121.566

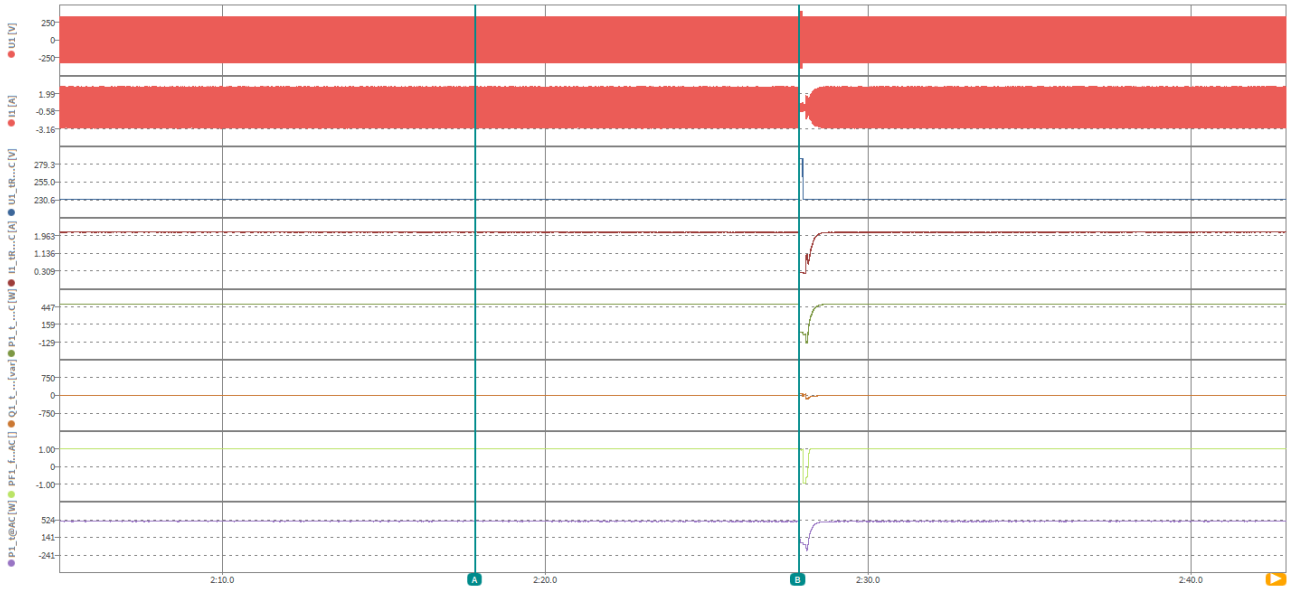
Active power rising time

Test No. 5.2 idle test



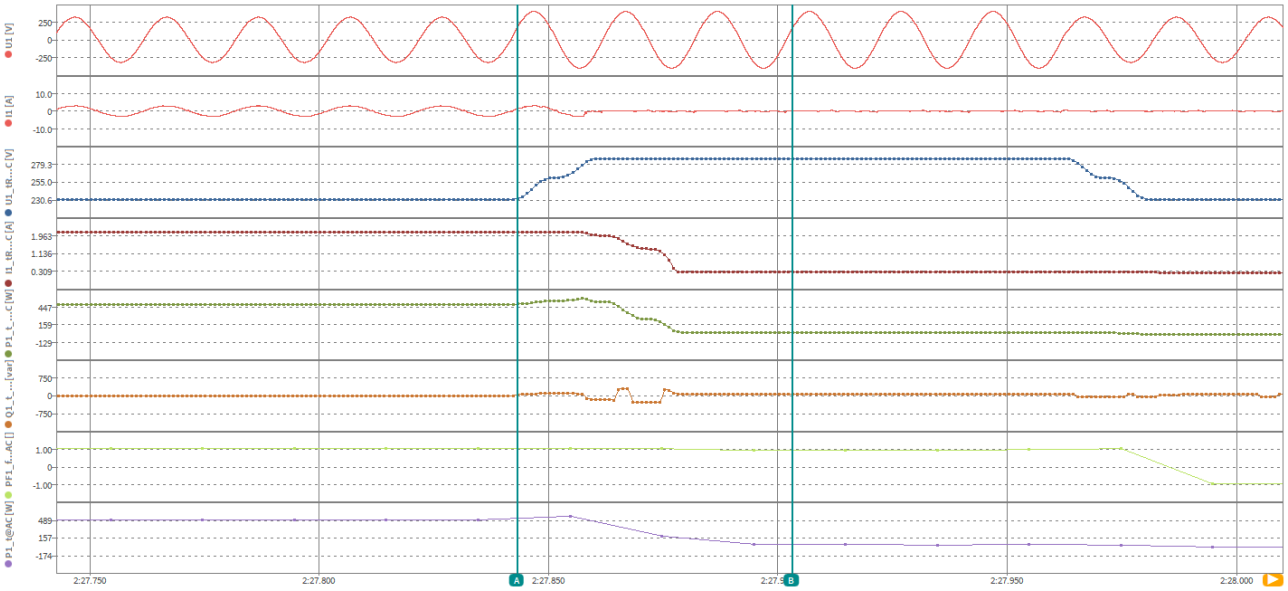
时间 [s]	A 2:13.7642937	B 2:13.8841806	间隔 0.1198868
U1 [V]	62.70552	49.80374	-12.90178
I1 [A]	0.024164	8.726e-3	-0.015438
U1_tRMS_rc@AC [V]	230.0185	287.4770	57.45851
I1_tRMS_rc@AC [A]	0.010434	0.011155	7.209e-4
P1_t_rc@AC [W]	-0.189317	-0.022268	0.167048
PF1_t@AC []	-0.077978	-6.418e-3	0.071560
Q1_t_rc@AC [var]	2.392466	3.206621	0.814155

Test No. 5.2 with PGU



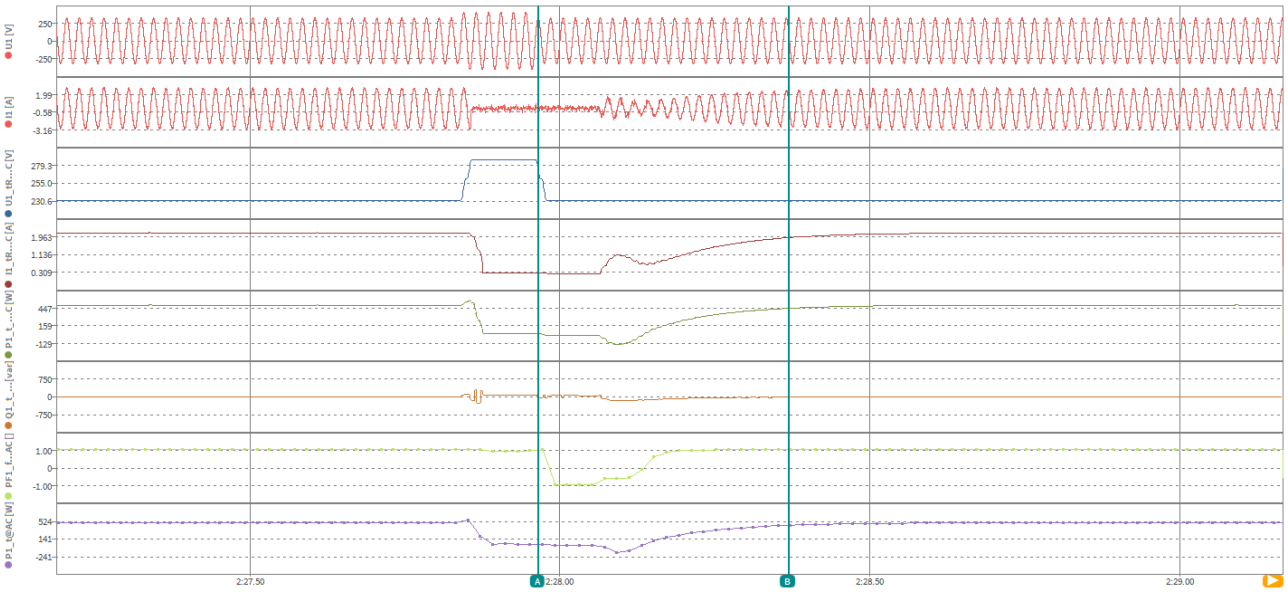
时间 [s]	A 2:17.843200	B 2:27.843200	间隔 0:10.000000
U1 [V]	145.4177	179.4052	33.98752
I1 [A]	1.285944	1.315150	0.029206
U1_tRMS_rc@AC [V]	230.1163	230.2304	0.114059
I1_tRMS_rc@AC [A]	2.123354	2.114806	-8.548e-3
P1_t_rc@AC [W]	487.8206	485.9472	-1.873413
Q1_t_rc@AC [var]	-27.91031	-30.32814	-2.417828
PF1_fund@AC []	0.999815	0.999820	5.007e-6
P1_t@AC [W]	487.9647	486.2079	-1.756805

Before dip



	A	B	间隔
时间 [s]	2:27.843200	2:27.903100	0.059900
U1 [V]	179.4052	168.6730	-10.73217
I1 [A]	1.315150	0.205908	-1.109243
U1_tRMS_rc@AC [V]	230.2304	287.5780	57.34767
I1_tRMS_rc@AC [A]	2.114806	0.200759	-1.914047
P1_t_rc@AC [W]	485.9472	21.49468	-464.4525
Q1_t_rc@AC [var]	-30.32814	53.58352	83.91166
PF1_fund@AC []	0.999820	0.933748	-0.066072
P1_t@AC [W]	486.2079	21.78611	-464.4217

t1+60ms

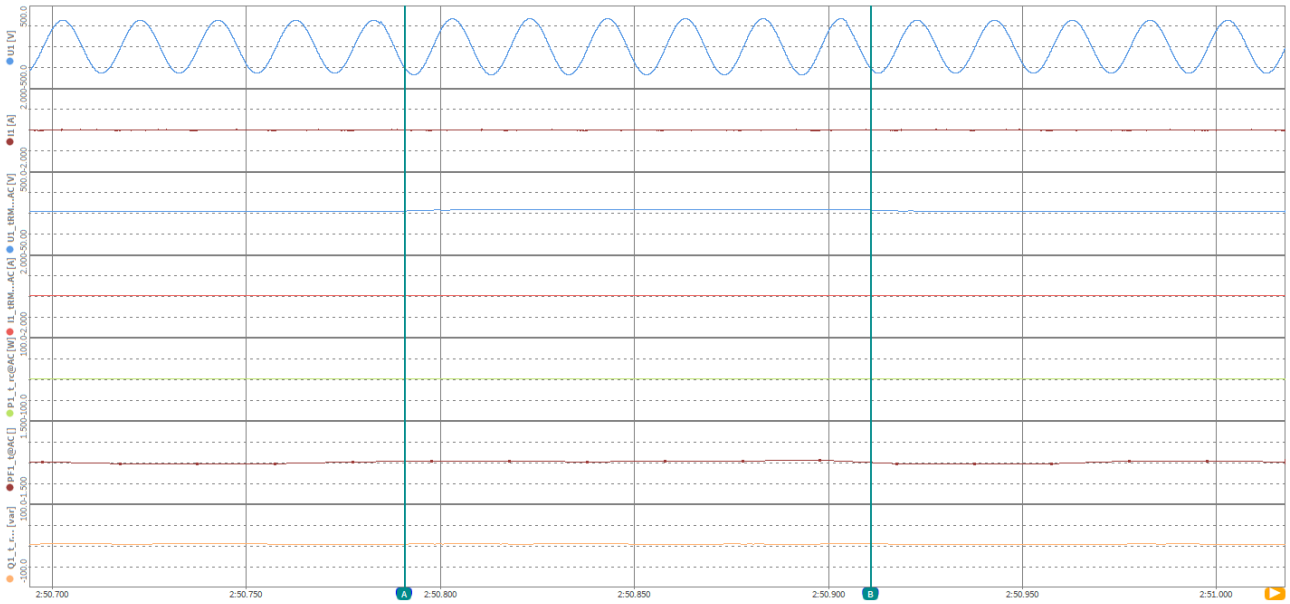


	A	B	间隔
时间 [s]	2:27.965200	2:28.368800	0.403600
U1 [V]	288.6591	259.6090	-29.05011
I1 [A]	0.028286	2.099547	2.071262
U1_tRMS_rc@AC [V]	284.4556	230.1098	-54.34581
I1_tRMS_rc@AC [A]	0.214730	1.887334	1.672604
P1_t_rc@AC [W]	20.39265	432.8853	412.4926
Q1_t_rc@AC [var]	57.57650	-34.95197	-92.52847
PF1_fund@AC []	0.943227	0.999758	0.056531
P1_t@AC [W]	20.60089	424.2656	403.6647

Active power rising time

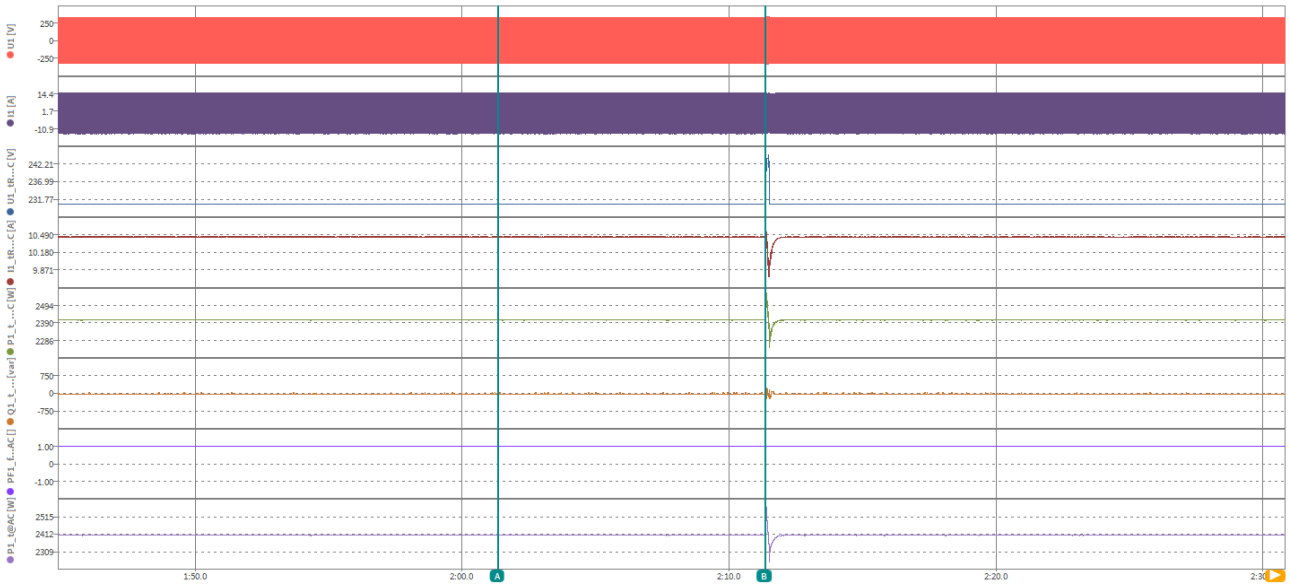
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	5.3	5.3-D2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.06
	2	Time (start of test)	--	--	hh:mm:ss.f	20:23:56	19:16:33
	3	Fault type (phase)	--	--		D1	D2
	4	Setting voltage depth	Line to line	--	p.u.	1.06	1.25
	5	Setting dip duration		--		100	100
	6	Point of fault entry	Total	--	ms	170790	170120
	7	Point of fault clearance	Total	--	ms	170910	170241
	8	Fault duration in empty load test	Total	--	ms	120	121
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.059	1.250
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.001	0.996
	13	Active power	Total	t1-10s to t1	p.u.	1.002	0.996
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.015	-0.026
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	1.000
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.061	1.250
	19	Line current	Phase 1	t1+60ms	p.u.	0.992	0.098
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.953	0.099
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.035	0.028
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.002	0.996
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.109	0.699
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.015	-0.026
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 5.3 idle test



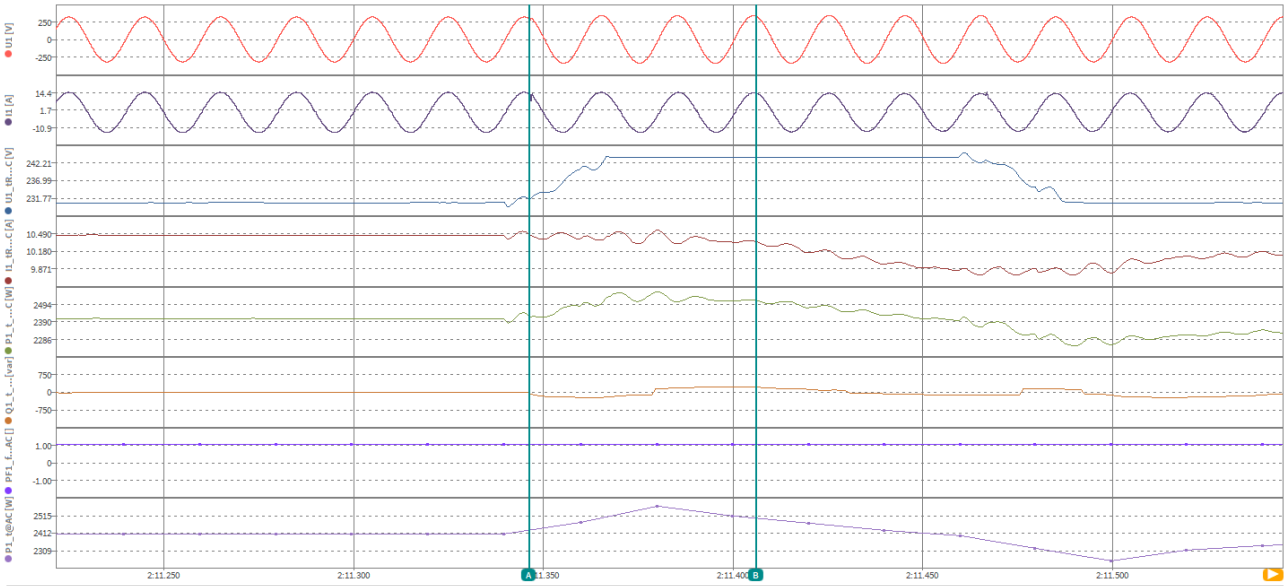
	A	B	间隔
时间 [s]	2:50.790861	2:50.910994	0.120134
U1 [V]	-247.0915	-262.8961	-15.80453
I1 [A]	6.676e-3	-2.861e-3	-9.537e-3
U1_tRMS_rc@AC [V]	232.8883	241.6124	8.724075
I1_tRMS_rc@AC [A]	0.014088	0.014639	5.511e-4
P1_t_rc@AC [W]	-0.093345	0.087611	0.180956
PF1_t@AC []	4.870e-4	0.063978	0.063491
Q1_t_rc@AC [var]	3.279605	3.535895	0.256290

Test No. 5.3 with PGU



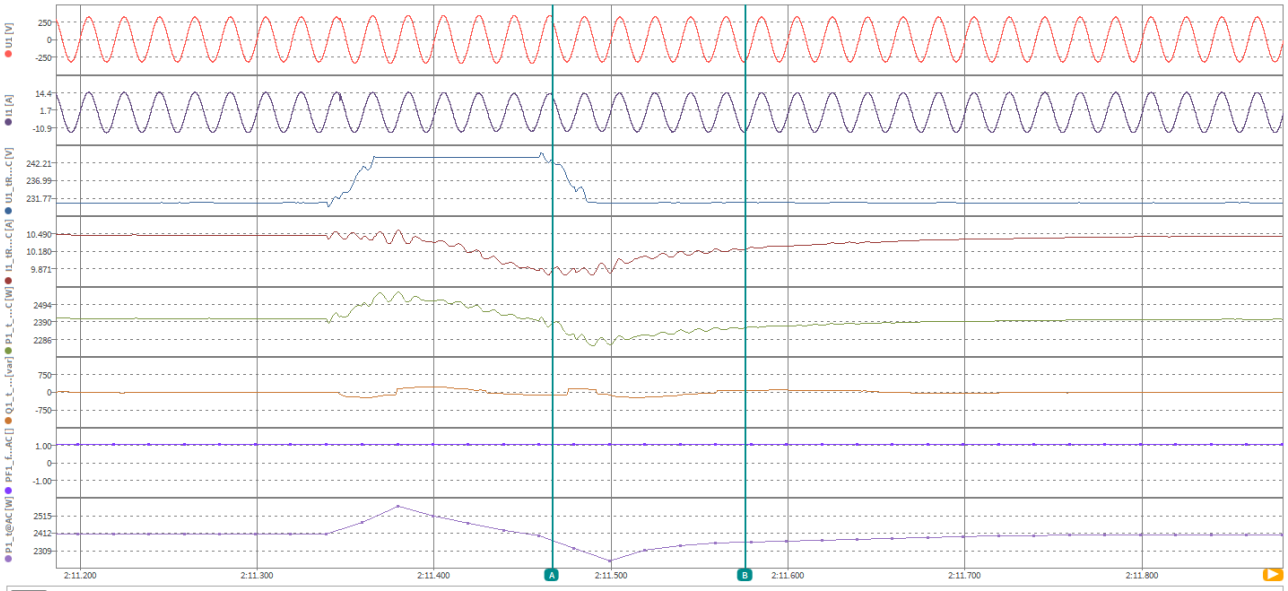
	A	B	间隔
时间 [s]	2:01.3463000	2:11.3463000	0:10.0000000
U1 [V]	296.5996	297.2124	0.612736
I1 [A]	13.53502	13.47423	-0.060797
U1_tRMS_rc@AC [V]	230.2034	231.7430	1.539597
I1_tRMS_rc@AC [A]	10.44564	10.51707	0.071430
P1_t_rc@AC [W]	2404.340	2436.984	32.64453
Q1_t_rc@AC [var]	-36.90543	-36.56627	0.339169
PF1_fund@AC []	1.000000	0.999999	-4.768e-7
P1_t@AC [W]	2403.667	2404.492	0.825195

Before dip



	A	B	间隔
时间 [s]	2:11.3463000	2:11.4062000	0.0599000
U1 [V]	297.2124	331.8637	34.65128
I1 [A]	13.47423	14.04226	0.568032
U1_tRMS_rc@AC [V]	231.7430	243.9977	12.25470
I1_tRMS_rc@AC [A]	10.51707	10.34711	-0.169962
P1_t_rc@AC [W]	2436.984	2516.991	80.00659
Q1_t_rc@AC [var]	-36.56627	196.7856	233.3518
PF1_fund@AC []	0.999999	0.996628	-3.372e-3
P1_t@AC [W]	2404.492	2510.255	105.7634

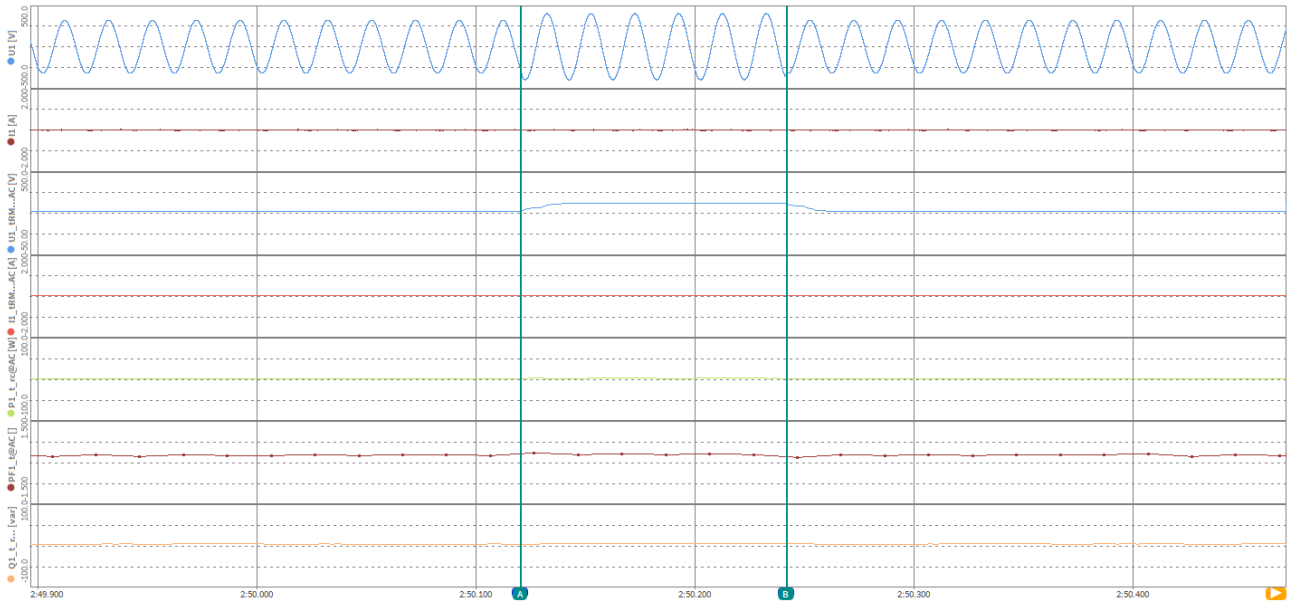
t1+60ms



	A	B	间隔
时间 [s]	2:11.4668000	2:11.5760000	0.1092000
U1 [V]	301.7695	-308.6105	-610.3800
I1 [A]	13.39734	-13.85748	-27.25482
U1_tRMS_rc@AC [V]	242.3006	230.2160	-12.08453
I1_tRMS_rc@AC [A]	9.743368	10.19804	0.454667
P1_t_rc@AC [W]	2357.200	2347.005	-10.19507
Q1_t_rc@AC [var]	-130.7447	59.16761	189.9123
PF1_fund@AC []	0.998661	0.999993	1.333e-3
P1_t@AC [W]	2393.870	2349.110	-44.75952

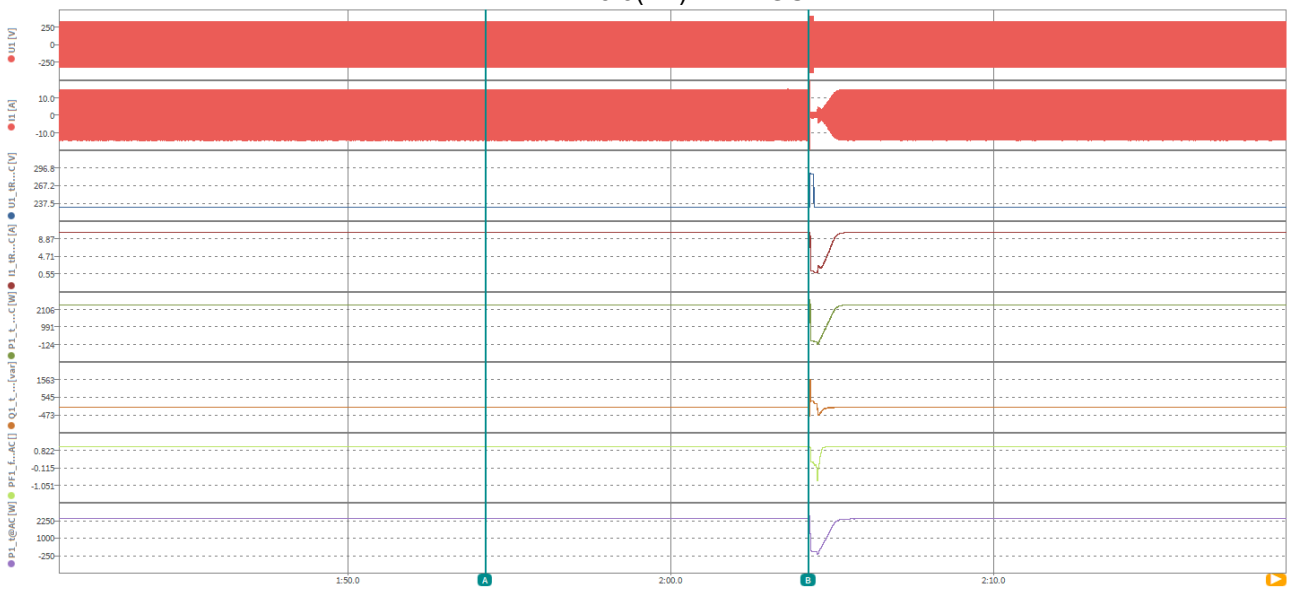
Active power rising time

Test No. 5.3(D2) idle test



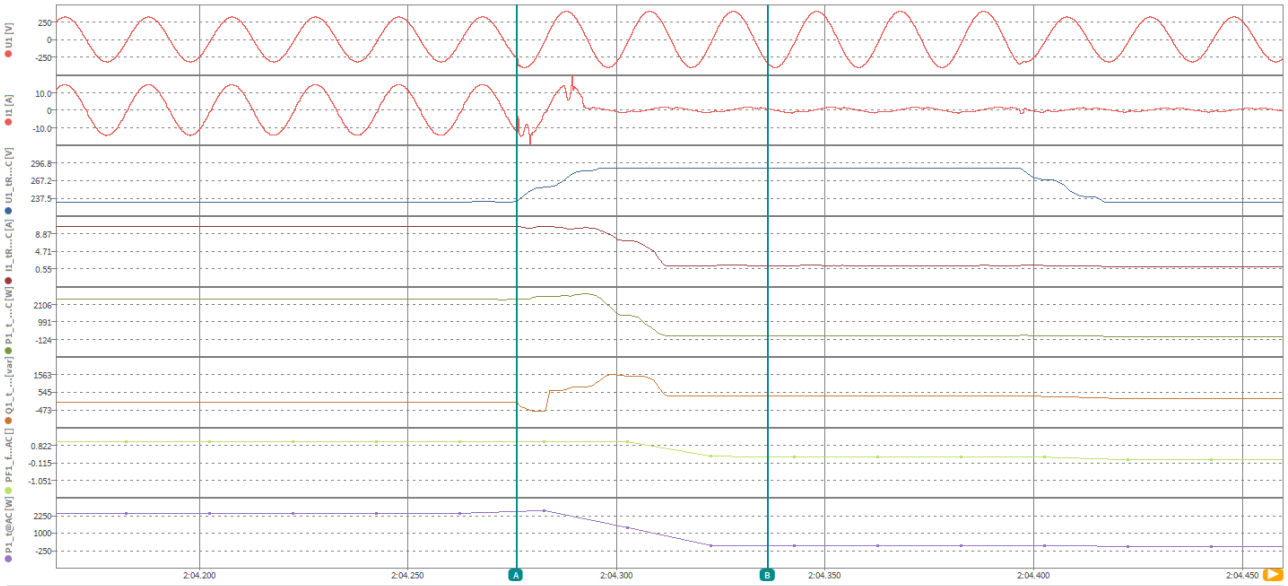
时间 [s]	A 2:50.120523	B 2:50.241939	间隔 0.121415
U1 [V]	-262.1513	-328.0921	-65.94086
I1 [A]	-4.292e-3	-0.019550	-0.015259
U1_tRMS_rc@AC [V]	230.0869	287.3709	57.28398
I1_tRMS_rc@AC [A]	0.014430	0.014742	3.125e-4
P1_t_rc@AC [W]	0.972465	1.071717	0.099252
PF1_t@AC []	0.230686	0.262558	0.031871
Q1_t_rc@AC [var]	3.174522	4.098735	0.924213

Test No. 5.3(D2) with PGU



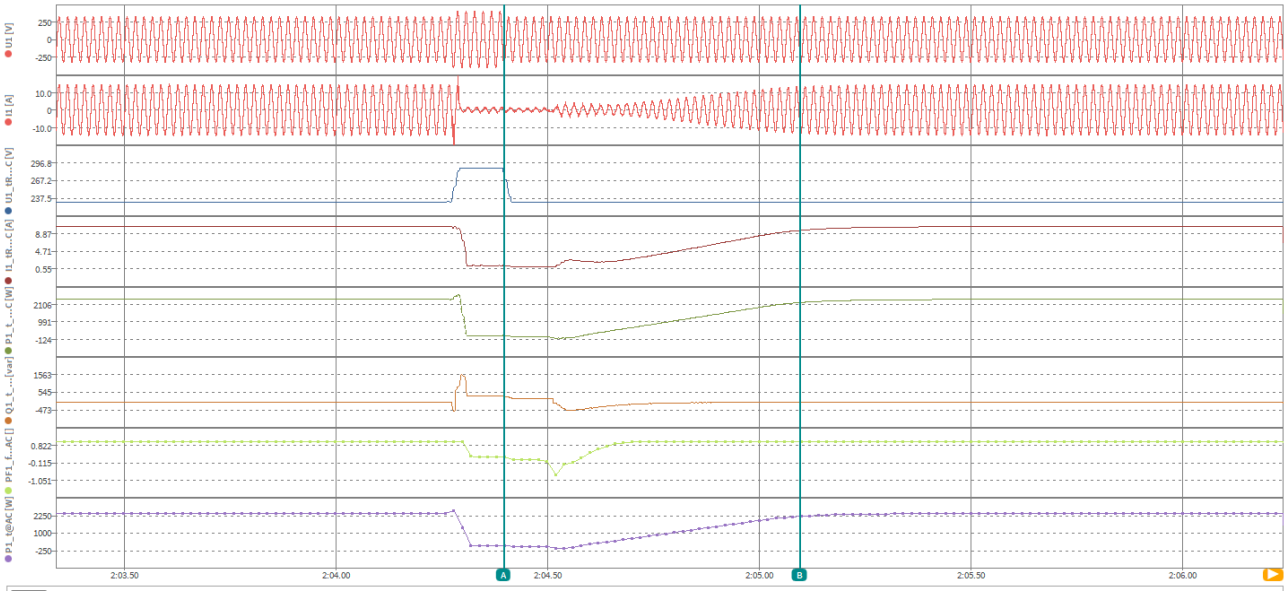
时间 [s]	A 1:54.276000	B 2:04.276000	间隔 10.000000
U1 [V]	-271.8990	-271.1208	0.778198
I1 [A]	-12.47333	-12.56870	-0.095367
U1_tRMS_rc@AC [V]	230.1371	230.0901	-0.046967
I1_tRMS_rc@AC [A]	10.39205	10.39105	-9.966e-4
P1_t_rc@AC [W]	2390.797	2390.091	-0.706299
Q1_t_rc@AC [var]	-61.83580	-61.40444	0.431355
PF1_fund@AC []	0.999767	0.999783	1.651e-5
P1_t@AC [W]	2391.624	2391.924	0.300049

Before dip



	A	B	间隔
时间 [s]	2:04.276000	2:04.336300	0.060300
U1 [V]	-271.1208	-354.9714	-83.85063
I1 [A]	-12.56870	0.533596	13.10229
U1_tRMS_rc@AC [V]	230.0901	287.5538	57.46367
I1_tRMS_rc@AC [A]	10.39105	1.027160	-9.363895
P1_t_rc@AC [W]	2390.091	48.44622	-2341.644
Q1_t_rc@AC [var]	-61.40444	291.3634	352.7679
PF1_fund@AC []	0.999783	0.180845	-0.818938
P1_t@AC [W]	2391.924	51.66393	-2340.260

t1+60ms

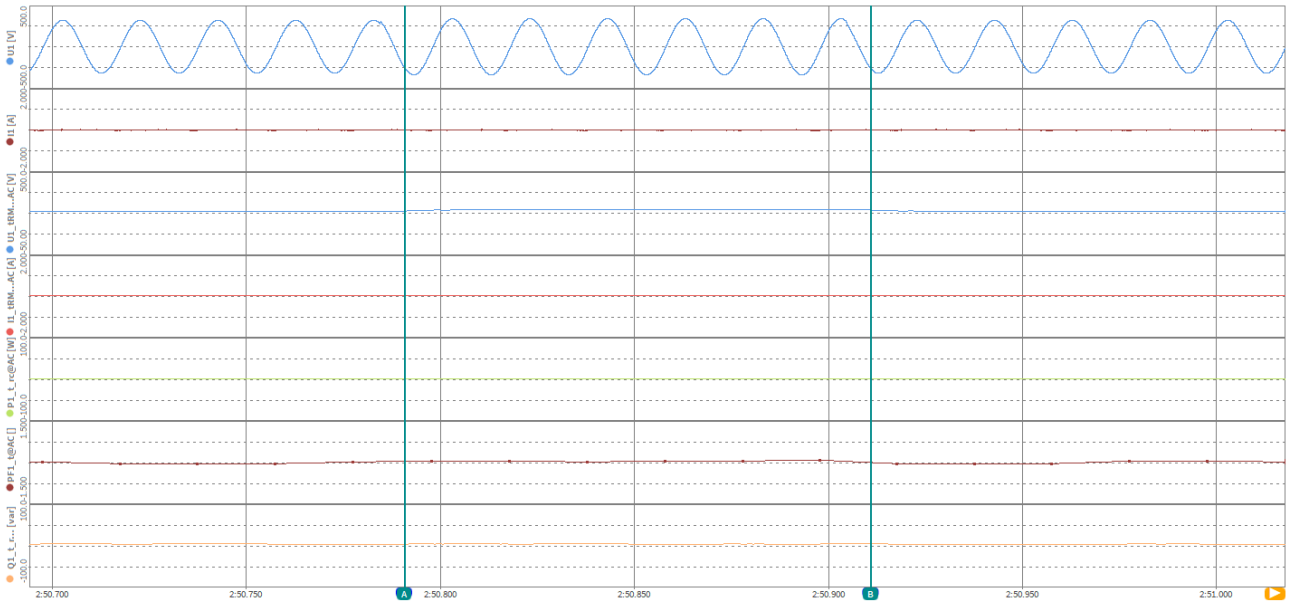


	A	B	间隔
时间 [s]	2:04.397000	2:05.095700	0.698700
U1 [V]	-341.2171	-252.7962	88.42087
I1 [A]	-2.041325	-10.77937	-8.738041
U1_tRMS_rc@AC [V]	287.5694	230.1440	-57.42542
I1_tRMS_rc@AC [A]	1.028967	9.454128	8.425162
P1_t_rc@AC [W]	45.96439	2174.639	2128.675
Q1_t_rc@AC [var]	292.3075	-71.38762	-363.6951
PF1_fund@AC []	0.164662	0.999705	0.835043
P1_t@AC [W]	47.59835	2151.258	2103.660

Active power rising time

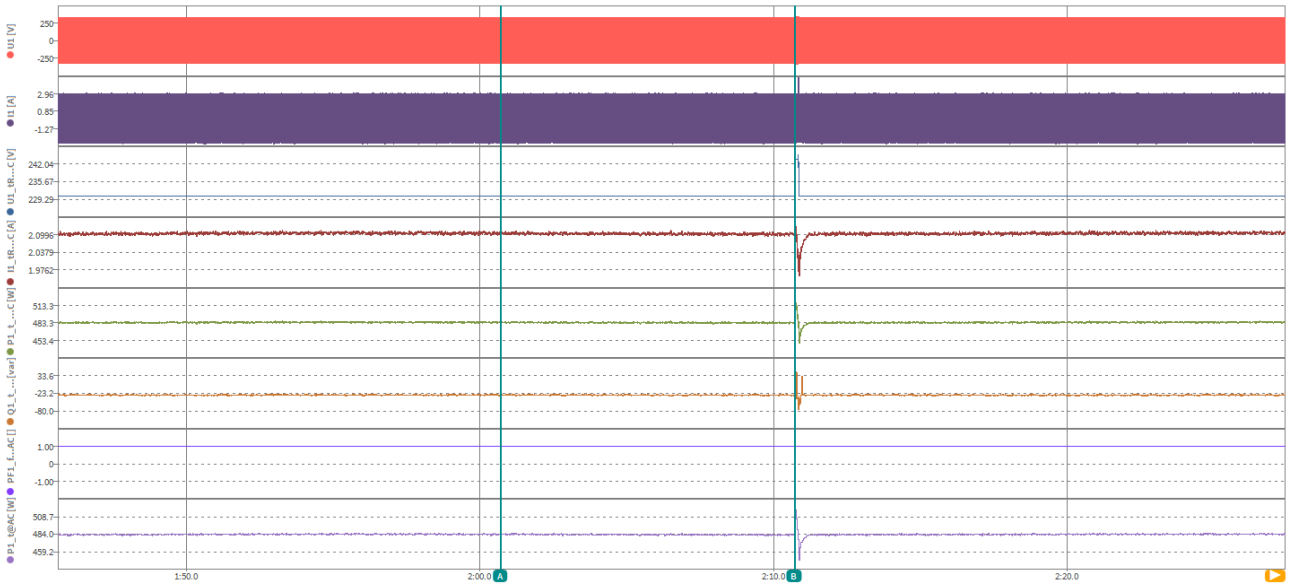
Condition						Measurement
	No.	Parameter	Phase ref.	Time ref.	unit	
General Info.	0	Test number	--	--	--	5.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	20:20:11
	3	Fault type (phase)	--	--		D1
	4	Setting voltage depth	Line to line	--	p.u.	1.06
	5	Setting dip duration		--		100
	6	Point of fault entry	Total	--	ms	170790
	7	Point of fault clearance	Total	--	ms	170910
	8	Fault duration in empty load test	Total	--	ms	120
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.059
	10		Pos.		p.u.	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	0.202
	13	Active power	Total	t1-10s to t1	p.u.	0.201
	14		Pos.			--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.012
	16		Pos.			--
	17	Cos_{φ}	--	t1-10s to t1	--	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.061
	19	Line current	Phase 1	t1+60ms	p.u.	0.201
	20		Phase 2			--
	21		Phase 3			--
	22	Line current	Phase 1	t1+100ms	p.u.	0.193
	23		Phase 2			--
	24		Phase 3			--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.210
	26		Pos.			--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	0.201
	29		Pos.			--
	39	Active power rising time	Pos.	--	s	0.083
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.013
	32		Pos.			--
	33	Reactive power rising time	Pos.	--	s	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes

Test No. 5.4 idle test



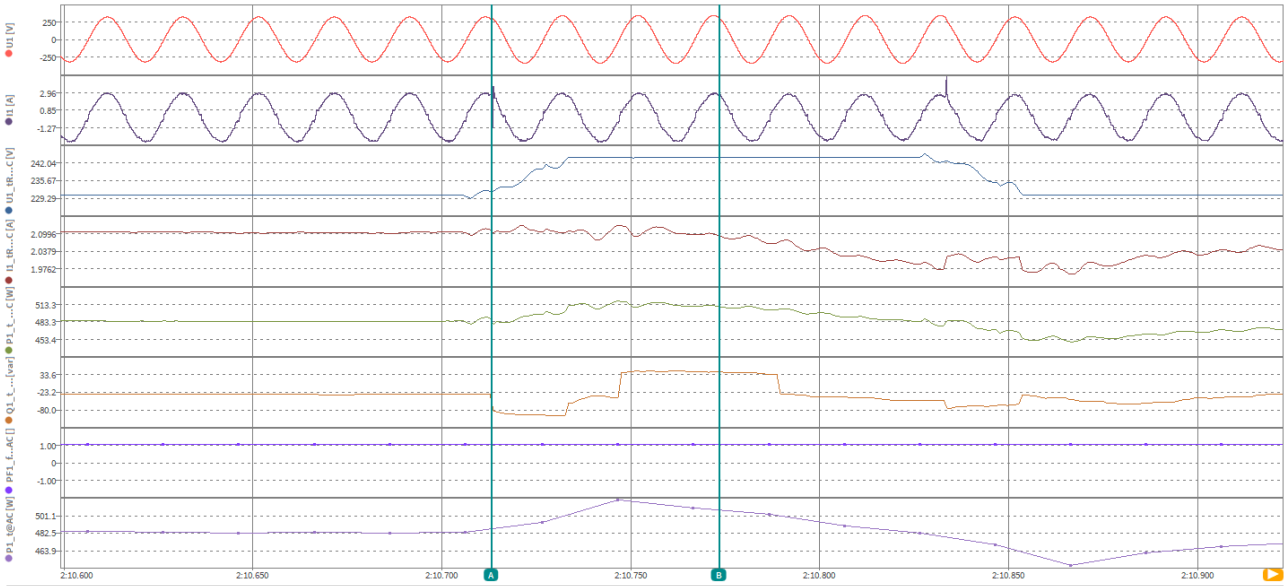
	A	B	间隔
时间 [s]	2:50.790861	2:50.910994	0.120134
U1 [V]	-247.0915	-262.8961	-15.80453
I1 [A]	6.676e-3	-2.861e-3	-9.537e-3
U1_tRMS_rc@AC [V]	232.8883	241.6124	8.724075
I1_tRMS_rc@AC [A]	0.014088	0.014639	5.511e-4
P1_t_rc@AC [W]	-0.093345	0.087611	0.180956
PF1_t@AC []	4.870e-4	0.063978	0.063491
Q1_t_rc@AC [var]	3.279605	3.535895	0.256290

Test No. 5.4 with PGU



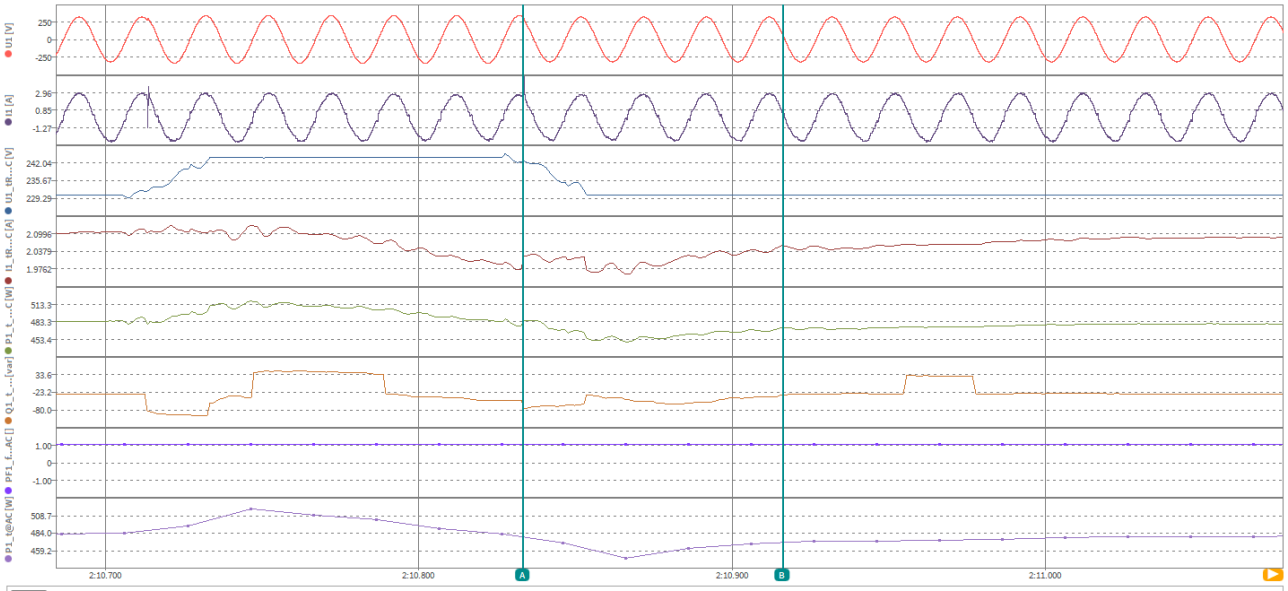
	A	B	间隔
时间 [s]	2:00.7133000	2:10.7133000	0:10.0000000
U1 [V]	285.9297	286.2909	0.361204
I1 [A]	2.614856	2.616644	1.788e-3
U1_tRMS_rc@AC [V]	230.1684	231.5103	1.341904
I1_tRMS_rc@AC [A]	2.107492	2.113208	5.716e-3
P1_t_rc@AC [W]	484.0455	488.3043	4.258789
Q1_t_rc@AC [var]	-31.63545	-30.07485	1.560600
PF1_fund@AC []	0.999757	0.999741	-1.562e-5
P1_t@AC [W]	483.9345	483.3453	-0.589203

Before dip



	A	B	间隔
时间 [s]	2:10.7133000	2:10.7735000	0.0602000
U1 [V]	286.2909	311.1448	24.85395
I1 [A]	2.616644	2.669096	0.052452
U1_tRMS_rc@AC [V]	231.5103	243.9612	12.45084
I1_tRMS_rc@AC [A]	2.113208	2.093752	-0.019456
P1_t_rc@AC [W]	488.3043	509.0470	20.74274
Q1_t_rc@AC [var]	-30.07485	42.21321	72.28807
PF1_fund@AC []	0.999741	0.998722	-1.019e-3
P1_t@AC [W]	483.3453	508.8726	25.52728

t1+60ms

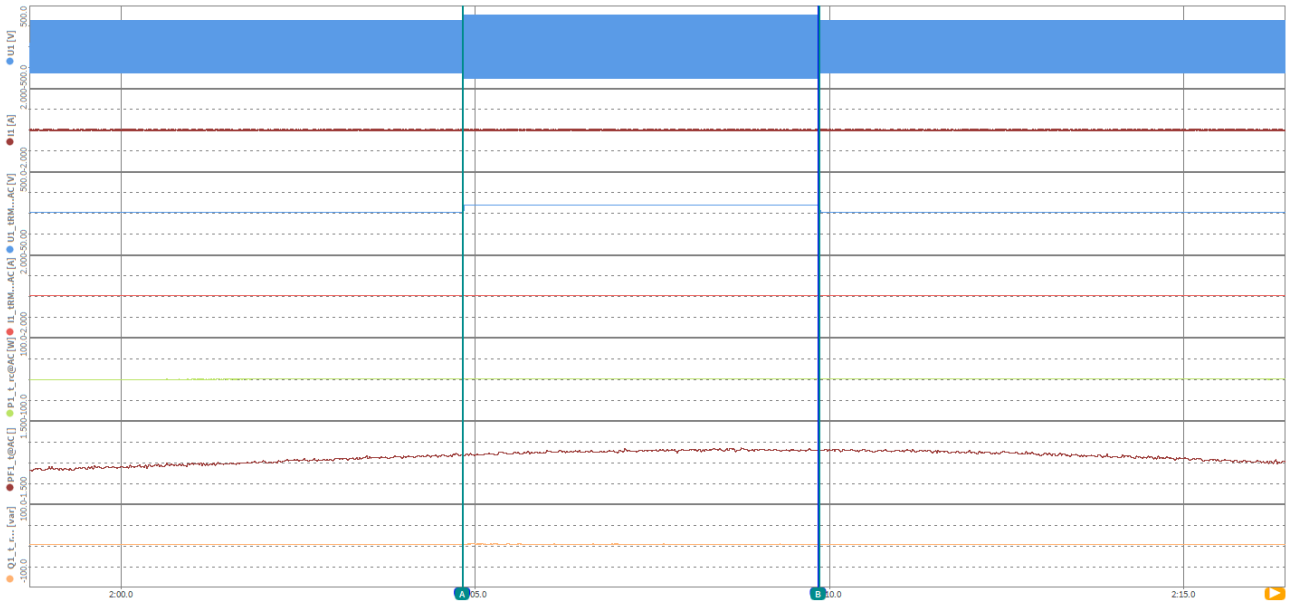


	A	B	间隔
时间 [s]	2:10.8334000	2:10.9162000	0.0828000
U1 [V]	315.5394	53.24173	-262.2976
I1 [A]	2.487302	0.231862	-2.255440
U1_tRMS_rc@AC [V]	242.4736	230.1735	-12.30009
I1_tRMS_rc@AC [A]	1.971662	2.054143	0.082481
P1_t_rc@AC [W]	475.4478	471.5342	-3.913544
Q1_t_rc@AC [var]	-50.05973	-34.69921	15.36053
PF1_fund@AC []	0.996786	0.997852	1.066e-3
P1_t@AC [W]	482.3530	467.9199	-14.43304

Active power rising time

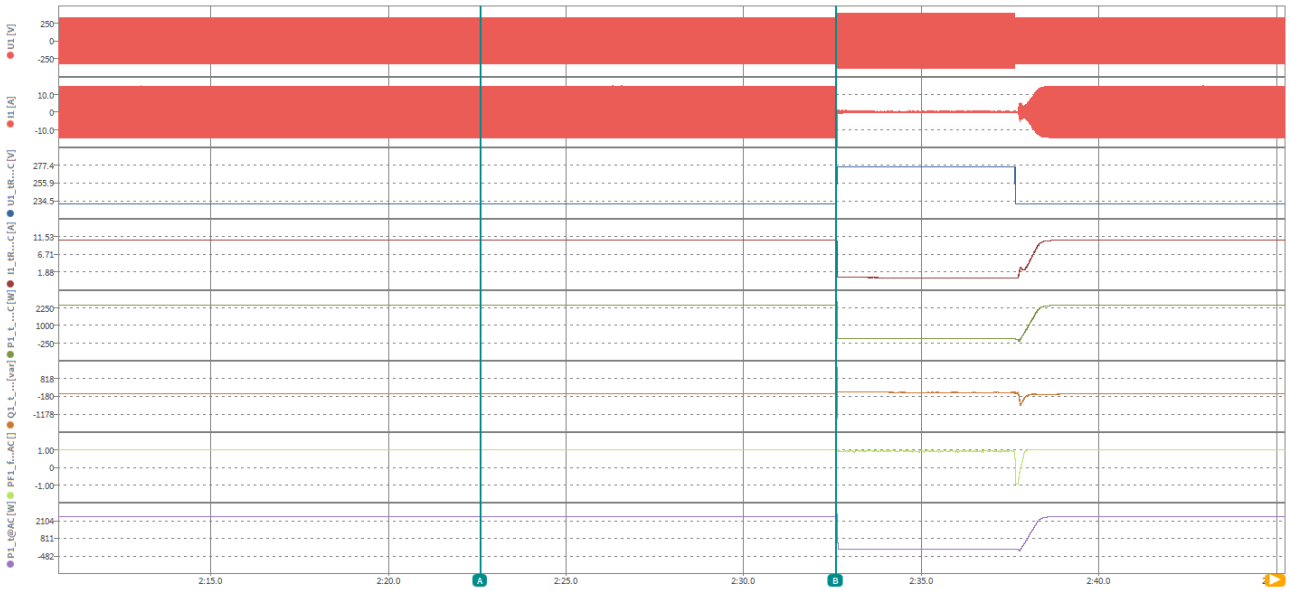
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	6.1	6.2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	21:21:44	21:26:36
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	1.20	1.20
	5	Setting dip duration		--		5000	5000
	6	Point of fault entry	Total	--	ms	124829	124829
	7	Point of fault clearance	Total	--	ms	129849	129849
	8	Fault duration in empty load test	Total	--	ms	5020	5020
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.200	1.200
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.003	0.203
	13	Active power	Total	t1-10s to t1	p.u.	1.004	0.203
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.016	-0.011
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.201	1.201
	19	Line current	Phase 1	t1+60ms	p.u.	0.026	0.017
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.026	0.017
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	0.005	0.005
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.004	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.685	0.424
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 6.1 idle test



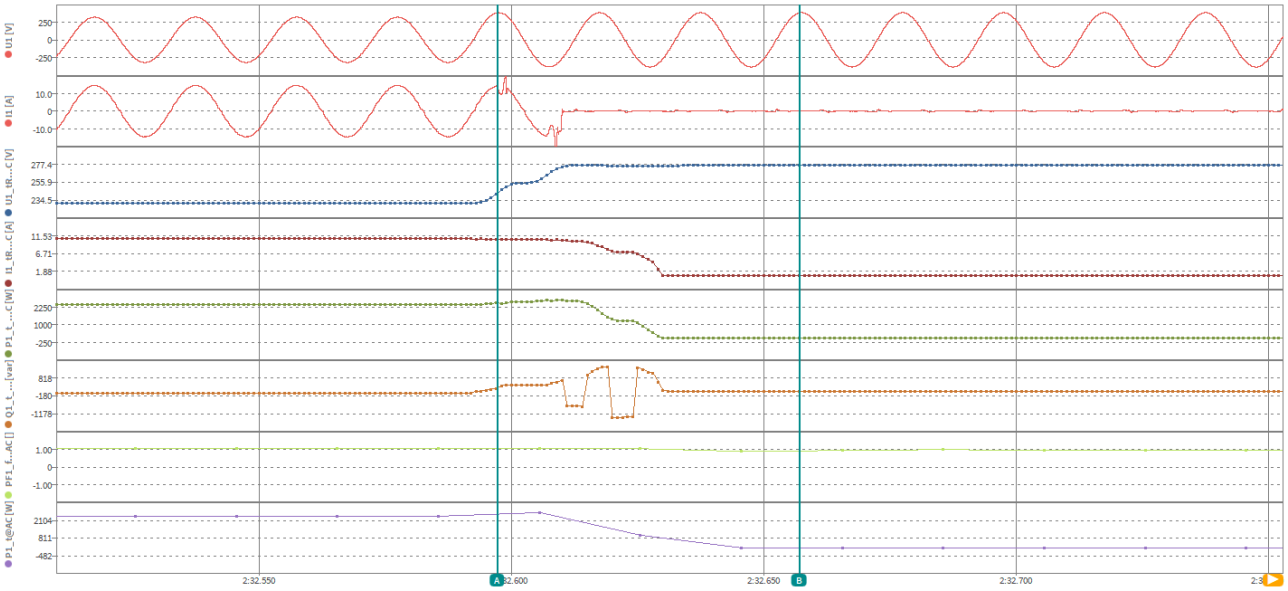
	A	B	间隔
时间 [s]	2:04.829667	2:09.849829	5.020162
U1 [V]	253.6898	225.1415	-28.54824
I1 [A]	-3.338e-3	-9.060e-3	-5.722e-3
U1_tRMS_rc@AC [V]	230.4463	275.6668	45.22054
I1_tRMS_rc@AC [A]	0.014017	0.014515	4.985e-4
P1_t_rc@AC [W]	0.712485	1.810954	1.098469
PF1_t@AC []	0.226533	0.455777	0.229244
Q1_t_rc@AC [var]	3.150543	3.568116	0.417574

Test No. 6.1 with PGU



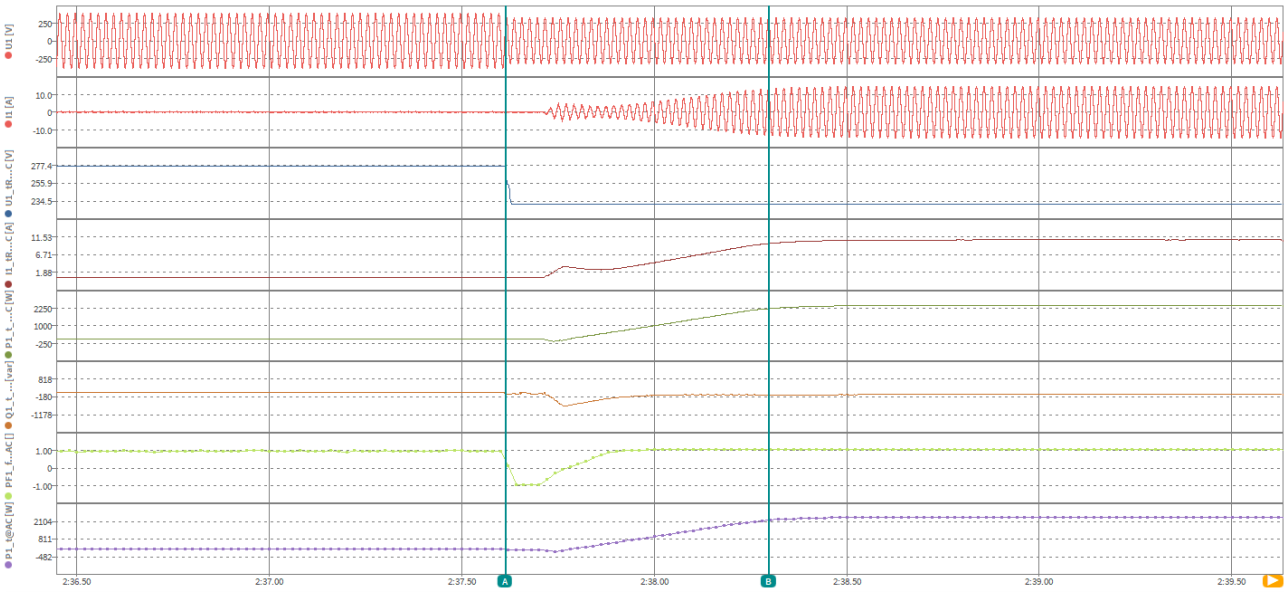
	A	B	间隔
时间 [s]	2:22.597300	2:32.597300	0:10.000000
U1 [V]	325.3269	389.6663	64.33940
I1 [A]	14.60937	13.56987	-1.039505
U1_tRMS_rc@AC [V]	230.1574	241.2722	11.11476
I1_tRMS_rc@AC [A]	10.46657	10.43323	-0.033333
P1_t_rc@AC [W]	2408.635	2507.248	98.61328
Q1_t_rc@AC [var]	-39.45348	224.1630	263.6165
PF1_fund@AC []	0.999998	0.999996	-1.490e-6
P1_t@AC [W]	2410.315	2408.913	-1.402100

Before dip



	A	B	间隔
时间 [s]	2:32.597300	2:32.657100	0.059800
U1 [V]	389.6663	387.5931	-2.073288
I1 [A]	13.56987	0.027094	-13.54277
U1_tRMS_rc@AC [V]	241.2722	276.0484	34.77625
I1_tRMS_rc@AC [A]	10.43323	0.273546	-10.15969
P1_t_rc@AC [W]	2507.248	13.94401	-2493.304
Q1_t_rc@AC [var]	224.1630	74.21332	-149.9497
PF1_fund@AC []	0.999996	0.871369	-0.128628
P1_t@AC [W]	2408.913	14.54303	-2394.370

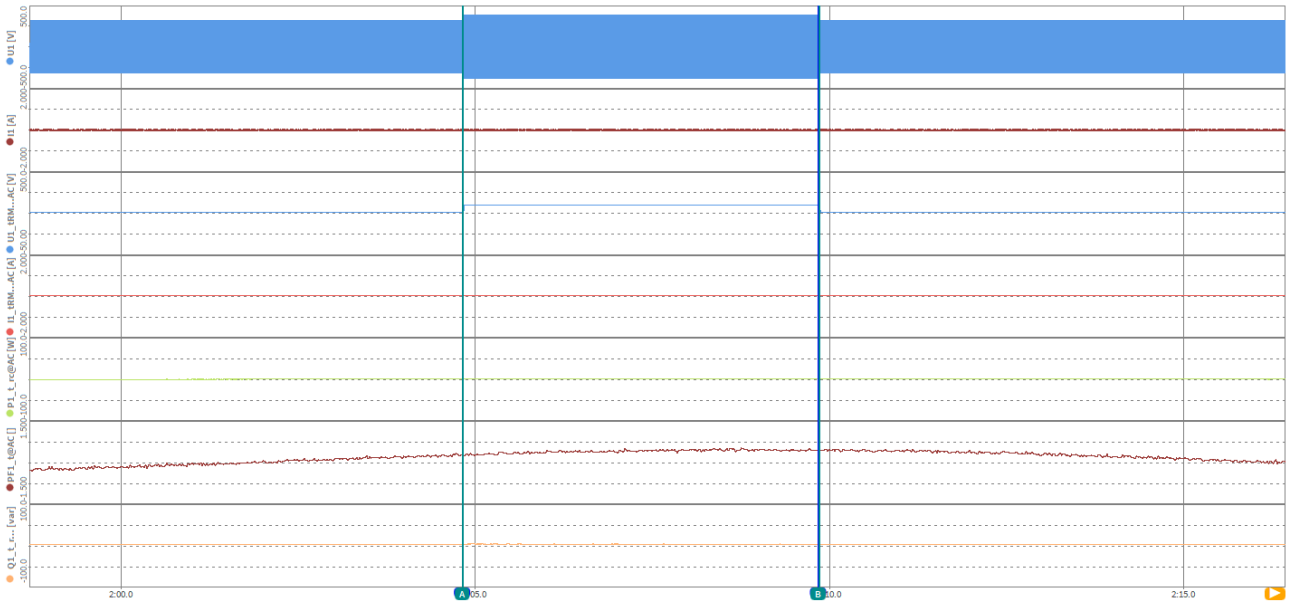
t1+60ms



	A	B	间隔
时间 [s]	2:37.613800	2:38.298500	0.684700
U1 [V]	129.3140	309.6907	180.3768
I1 [A]	-0.025954	12.66805	12.69400
U1_tRMS_rc@AC [V]	276.1037	230.1667	-45.93701
I1_tRMS_rc@AC [A]	0.128942	9.436346	9.307404
P1_t_rc@AC [W]	10.61805	2170.323	2159.705
Q1_t_rc@AC [var]	33.98122	-83.60889	-117.5901
PF1_fund@AC []	0.911337	0.999795	0.088458
P1_t@AC [W]	11.07410	2135.436	2124.362

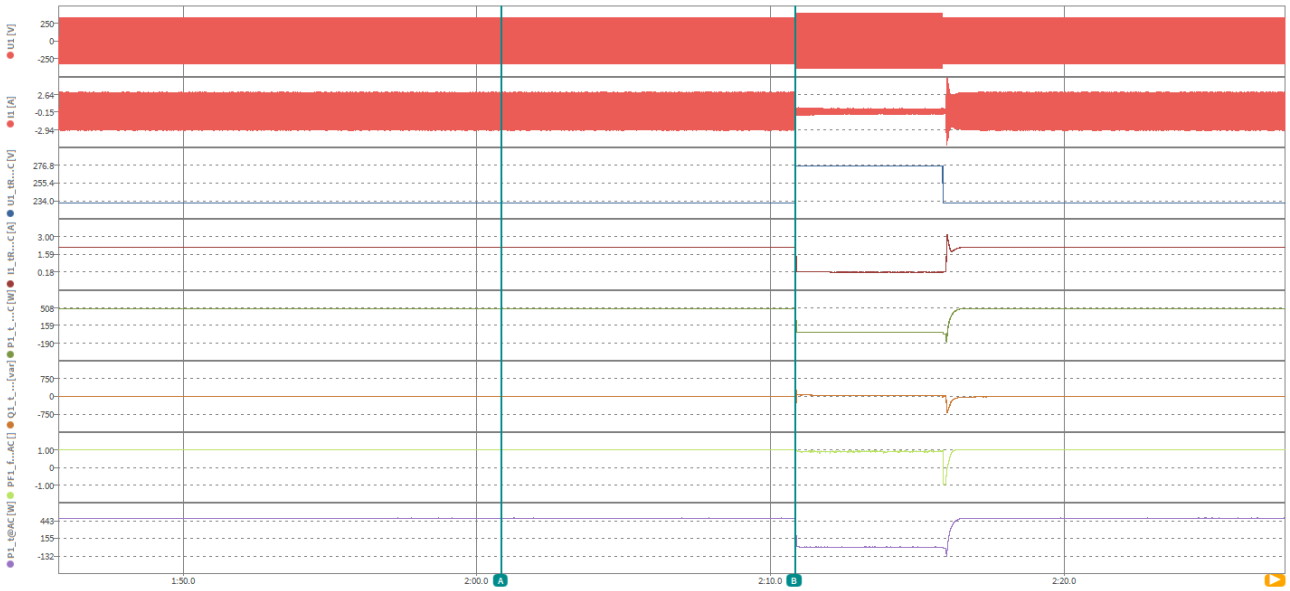
Active power rising time

Test No. 6.2 idle test



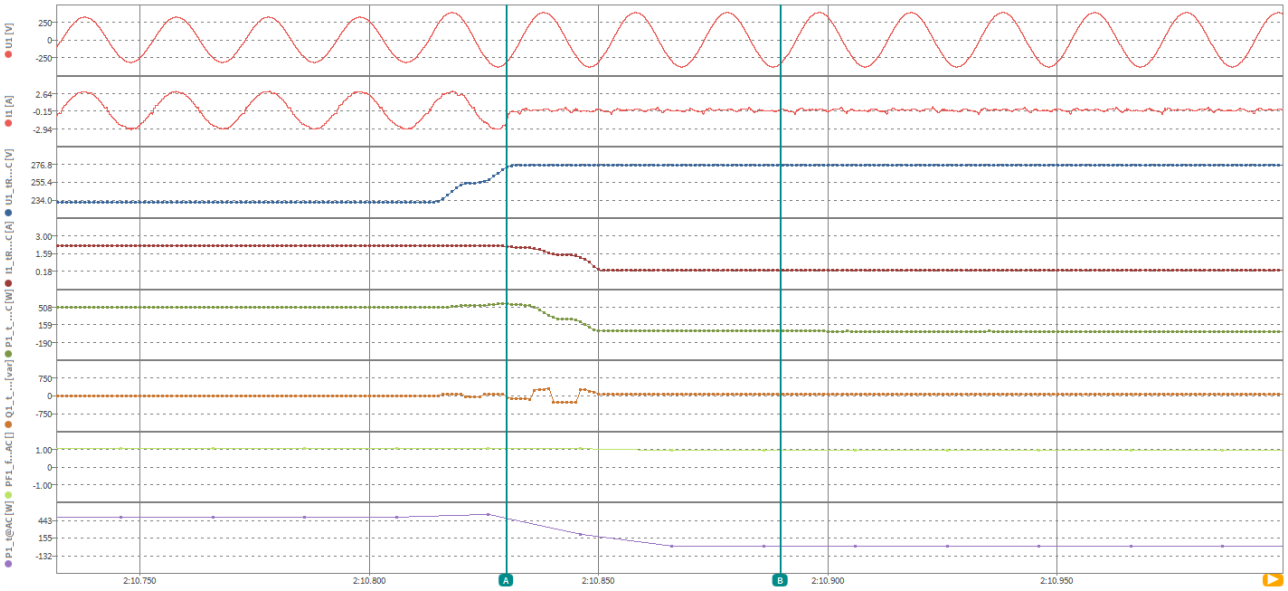
时间 [s]	A 2:04.829667	B 2:09.849829	间隔 5.020162
U1 [V]	253.6898	225.1415	-28.54824
I1 [A]	-3.338e-3	-9.060e-3	-5.722e-3
U1_tRMS_rc@AC [V]	230.4463	275.6668	45.22054
I1_tRMS_rc@AC [A]	0.014017	0.014515	4.985e-4
P1_t_rc@AC [W]	0.712485	1.810954	1.098469
PF1_t@AC []	0.226533	0.455777	0.229244
Q1_t_rc@AC [var]	3.150543	3.568116	0.417574

Test No. 6.2 with PGU



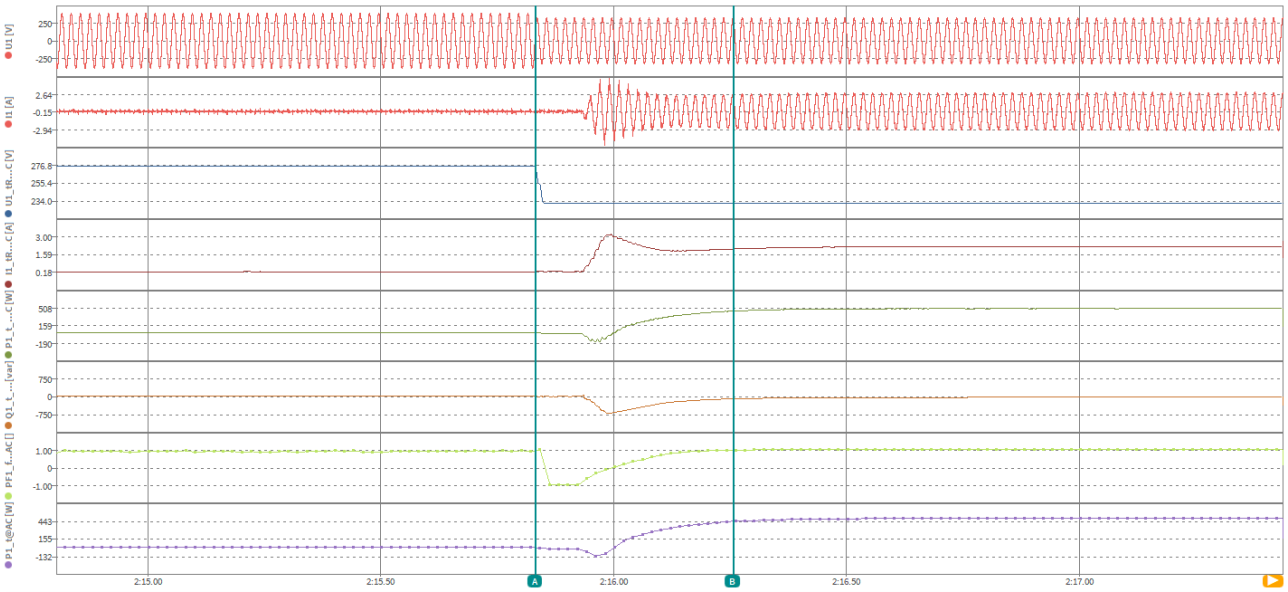
时间 [s]	A 2:00.833000	B 2:10.833000	间隔 0:10.000000
U1 [V]	-4.877329	-7.442475	-2.565146
I1 [A]	-0.158873	-0.419345	-0.260472
U1_tRMS_rc@AC [V]	230.1117	275.9071	45.79541
I1_tRMS_rc@AC [A]	2.123330	2.019683	-0.103647
P1_t_rc@AC [W]	487.8291	541.9893	54.16019
Q1_t_rc@AC [var]	-27.48813	-129.4971	-102.0090
PF1_fund@AC []	0.999799	0.999827	2.801e-5
P1_t@AC [W]	488.0317	541.7255	53.69379

Before dip



	A	B	间隔
时间 [s]	2:10.830000	2:10.889700	0.059700
U1 [V]	-319.6683	-339.9422	-20.27393
I1 [A]	-0.190463	0.174317	0.364780
U1_tRMS_rc@AC [V]	270.5212	276.0777	5.556427
I1_tRMS_rc@AC [A]	2.114279	0.179363	-1.934917
P1_t_rc@AC [W]	569.4390	15.39777	-554.0413
Q1_t_rc@AC [var]	53.61504	47.06319	-6.551853
PF1_fund@AC []	0.999827	0.924101	-0.075726
P1_t@AC [W]	541.7255	16.63314	-525.0923

t1+60ms

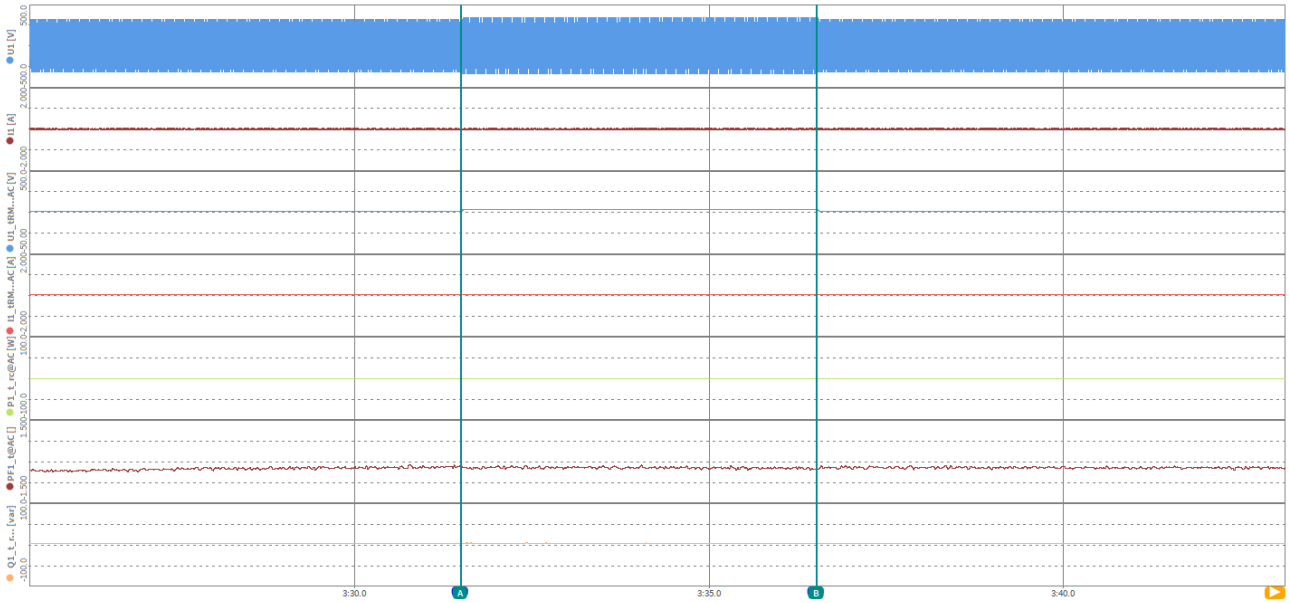


	A	B	间隔
时间 [s]	2:15.833000	2:16.257300	0.424300
U1 [V]	-8.259535	316.3674	324.6269
I1 [A]	-0.050988	2.615724	2.666712
U1_tRMS_rc@AC [V]	276.1271	230.1261	-46.00104
I1_tRMS_rc@AC [A]	0.118217	1.946382	1.828165
P1_t_rc@AC [W]	10.60777	435.7138	425.1061
Q1_t_rc@AC [var]	30.87128	-103.8261	-134.6973
PF1_fund@AC []	0.919577	0.974160	0.054582
P1_t@AC [W]	10.05469	430.9532	420.8985

Active power rising time

Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	6.3	6.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	20:10:51	20:14:56
	3	Fault type (phase)	--	--		D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	1.05	1.05
	5	Setting dip duration		--		5000	5000
	6	Point of fault entry	Total	--	ms	211493	211493
	7	Point of fault clearance	Total	--	ms	216513	216513
	8	Fault duration in empty load test	Total	--	ms	5020	5020
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.050	1.050
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.002	0.202
	13	Active power	Total	t1-10s to t1	p.u.	1.003	0.202
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.016	-0.012
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.051	1.051
	19	Line current	Phase 1	t1+60ms	p.u.	0.994	0.202
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.983	0.199
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.004	0.202
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.003	0.202
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.167	0.212
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 6.3 idle test



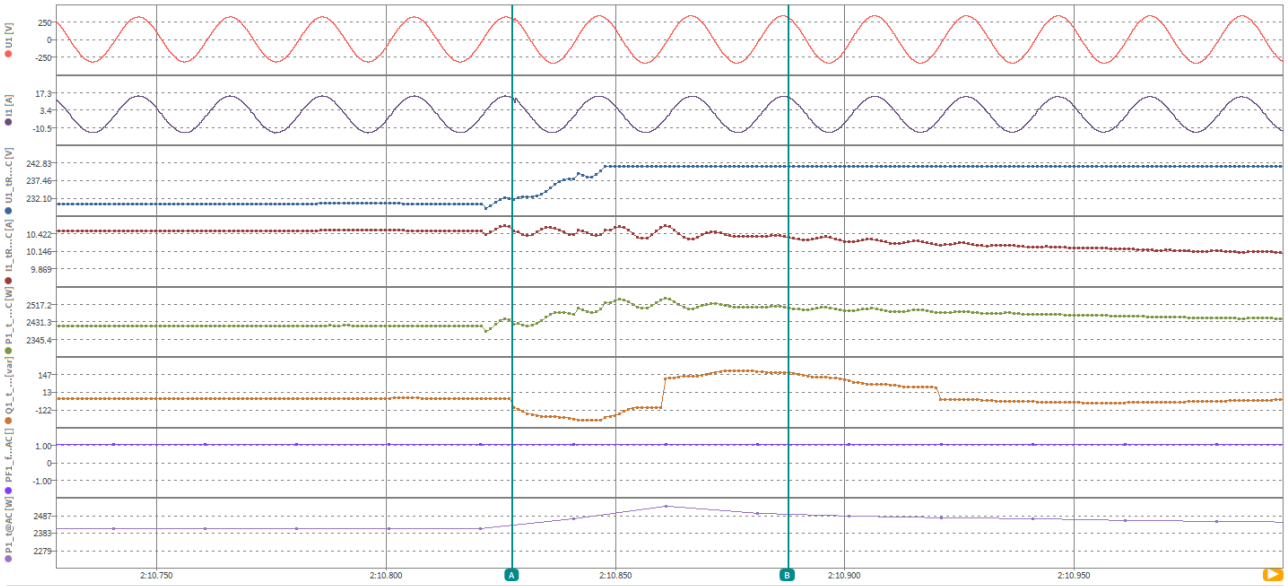
时间 [s]	A 3:31.493096	B 3:36.513878	间隔 5.020782
U1 [V]	190.2316	243.1145	52.88291
I1 [A]	-2.384e-3	-0.010967	-8.583e-3
U1_tRMS_rc@AC [V]	229.2365	242.2512	13.01469
I1_tRMS_rc@AC [A]	0.015543	0.012529	-3.014e-3
P1_t_rc@AC [W]	-0.719773	-0.842429	-0.122657
PF1_t@AC []	-0.199180	-0.272556	-0.073376
Q1_t_rc@AC [var]	3.489558	2.915961	-0.573597

Test No. 6.3 with PGU



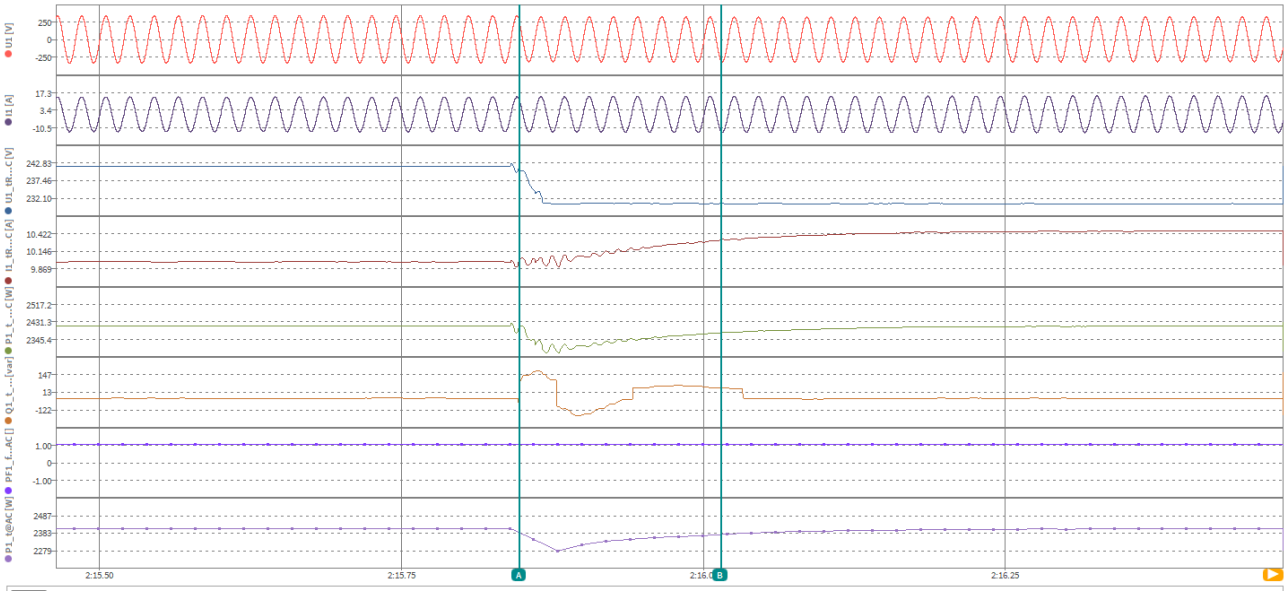
时间 [s]	A 2:00.827600	B 2:10.827600	间隔 0:10.000000
U1 [V]	288.1553	288.8932	0.737906
I1 [A]	13.01944	13.05759	0.038147
U1_tRMS_rc@AC [V]	230.2108	231.6322	1.421417
I1_tRMS_rc@AC [A]	10.45703	10.52312	0.066093
P1_t_rc@AC [W]	2407.052	2437.177	30.12500
Q1_t_rc@AC [var]	-35.92039	-39.26735	-3.346951
PF1_fund@AC []	1.000000	0.999999	-8.345e-7
P1_t@AC [W]	2406.332	2407.285	0.952881

Before dip



	A	B	间隔
时间 [s]	2:10.827600	2:10.887600	0.060000
U1 [V]	288.8932	316.0560	27.16279
I1 [A]	13.05759	13.73053	0.672936
U1_tRMS_rc@AC [V]	231.6322	241.7052	10.07291
I1_tRMS_rc@AC [A]	10.52312	10.37509	-0.148026
P1_t_rc@AC [W]	2437.177	2502.481	65.30347
Q1_t_rc@AC [var]	-39.26735	161.9171	201.1844
PF1_fund@AC []	0.999999	0.997787	-2.213e-3
P1_t@AC [W]	2407.285	2498.900	91.61499

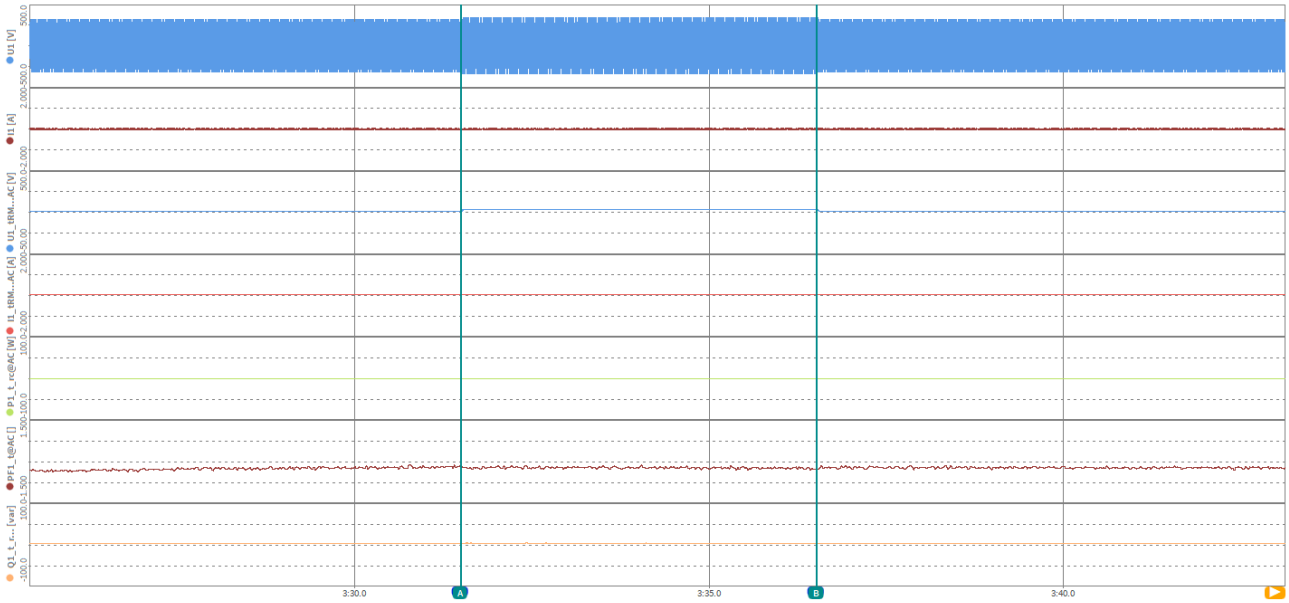
t1+60ms



	A	B	间隔
时间 [s]	2:15.8479	2:16.0144	0.1665
U1 [V]	299.0315	-280.7803	-579.8118
I1 [A]	13.25488	-12.83407	-26.08895
U1_tRMS_rc@AC [V]	240.1678	230.2131	-9.954651
I1_tRMS_rc@AC [A]	9.894313	10.30825	0.413935
P1_t_rc@AC [W]	2376.021	2372.686	-3.334961
Q1_t_rc@AC [var]	-36.12371	44.00471	80.12843
PF1_fund@AC []	0.999996	0.999883	-1.126e-4
P1_t@AC [W]	2406.768	2364.609	-42.15894

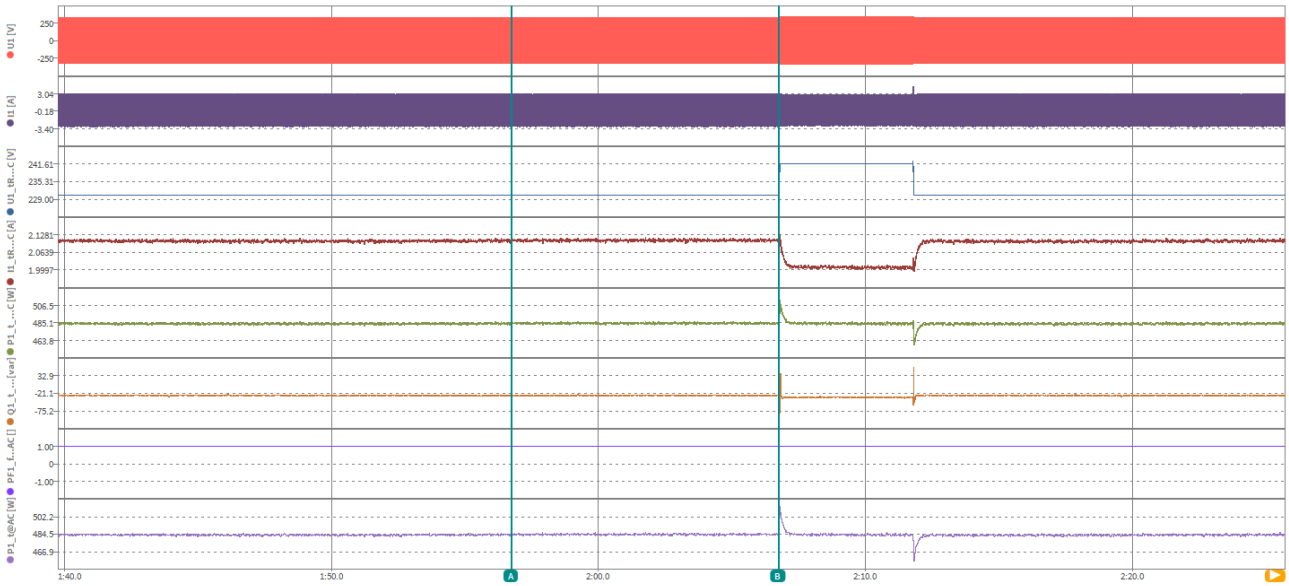
Active power rising time

Test No. 6.4 idle test



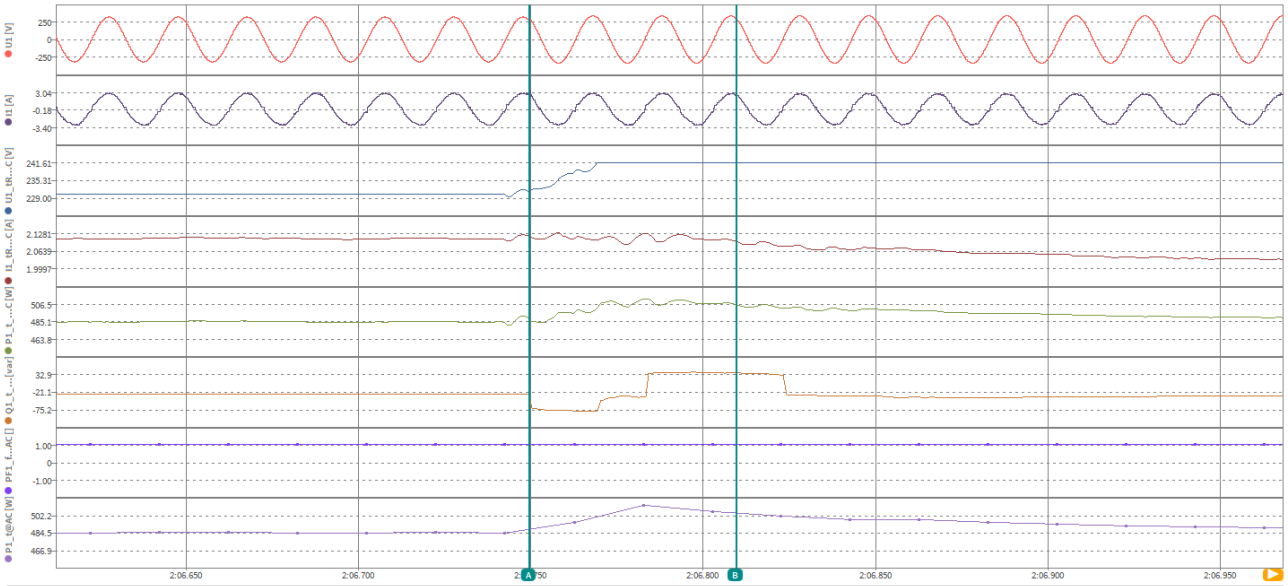
	A	B	间隔
时间 [s]	3:31.493096	3:36.513878	5.020782
U1 [V]	190.2316	243.1145	52.88291
I1 [A]	-2.384e-3	-0.010967	-8.583e-3
U1_tRMS_rc@AC [V]	229.2365	242.2512	13.01469
I1_tRMS_rc@AC [A]	0.015543	0.012529	-3.014e-3
P1_t_rc@AC [W]	-0.719773	-0.842429	-0.122657
PF1_t@AC []	-0.199180	-0.272556	-0.073376
Q1_t_rc@AC [var]	3.489558	2.915961	-0.573597

Test No. 6.4 with PGU



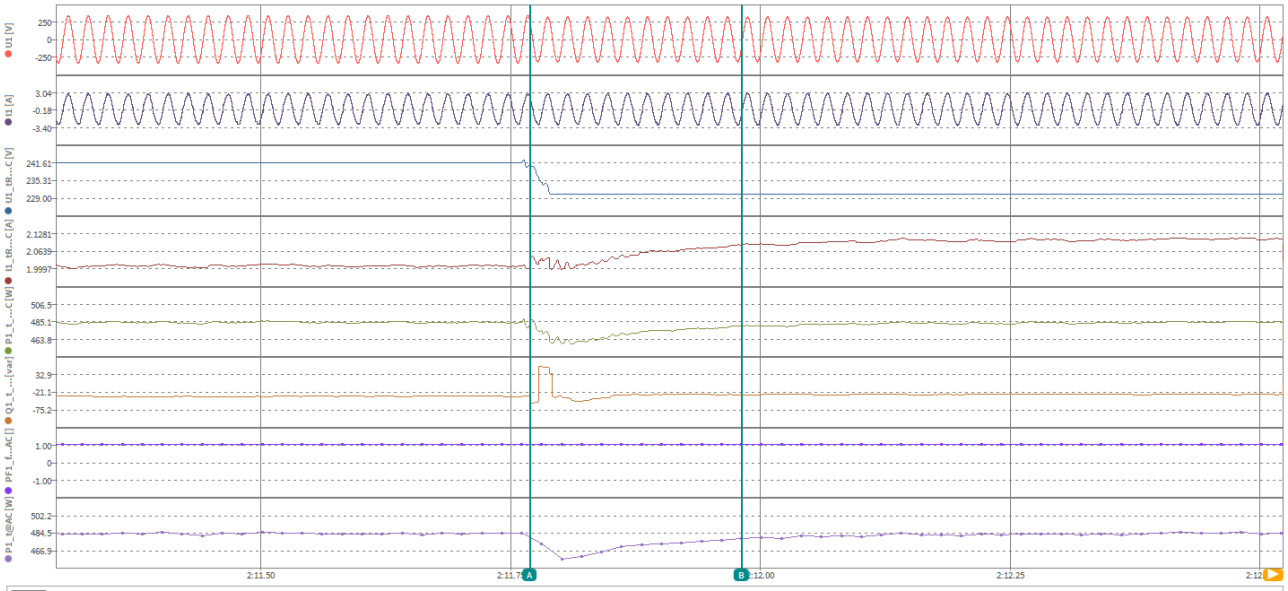
	A	B	间隔
时间 [s]	1:56.749500	2:06.749500	0:10.000000
U1 [V]	281.6999	283.0191	1.319170
I1 [A]	2.547503	2.397299	-0.150204
U1_tRMS_rc@AC [V]	230.1716	231.7800	1.608368
I1_tRMS_rc@AC [A]	2.107447	2.121073	0.013626
P1_t_rc@AC [W]	484.2137	490.7724	6.558685
Q1_t_rc@AC [var]	-28.88513	-28.89526	-0.010138
PF1_fund@AC []	0.999759	0.999826	6.706e-5
P1_t@AC [W]	483.6508	483.8763	0.225464

Before dip



	A	B	间隔
时间 [s]	2:06.749500	2:06.809500	0.060000
U1 [V]	283.0191	310.5505	27.53139
I1 [A]	2.397299	2.642274	0.244975
U1_tRMS_rc@AC [V]	231.7800	241.6597	9.879745
I1_tRMS_rc@AC [A]	2.121073	2.102525	-0.018548
P1_t_rc@AC [W]	490.7724	506.6505	15.87811
Q1_t_rc@AC [var]	-28.89526	38.29501	67.19028
PF1_fund@AC []	0.999826	0.999309	-5.170e-4
P1_t@AC [W]	483.8763	506.4891	22.61288

t1+60ms

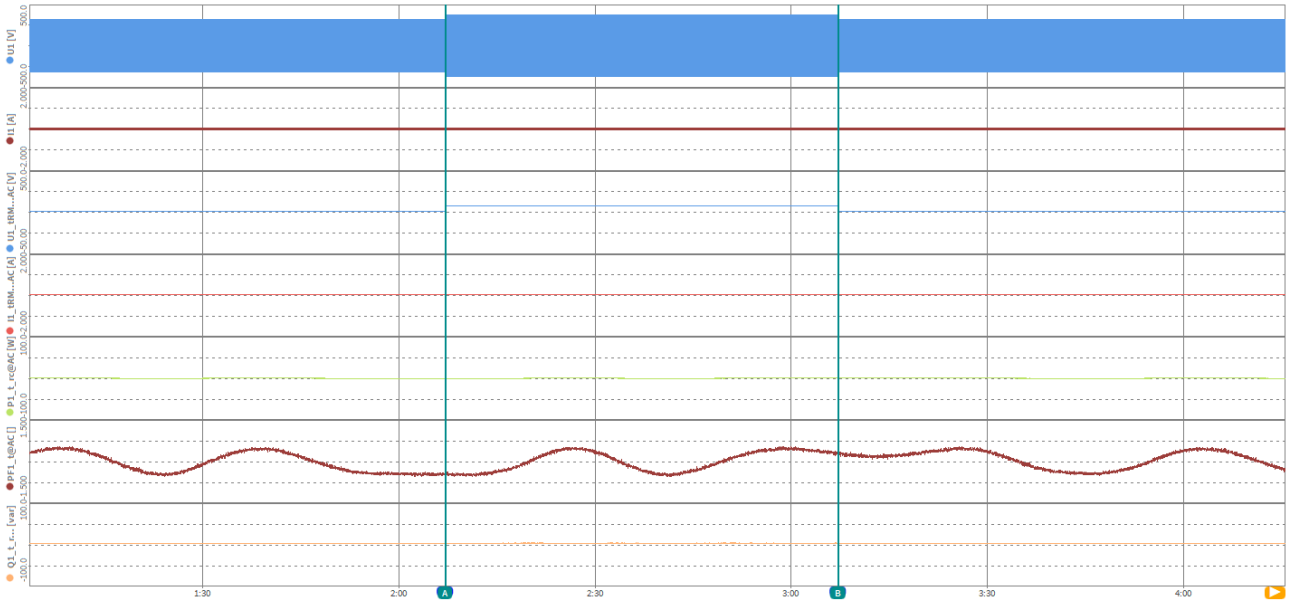


	A	B	间隔
时间 [s]	2:11.769700	2:11.981700	0.212000
U1 [V]	293.2577	-116.0412	-409.2989
I1 [A]	4.087687	-0.982881	-5.070567
U1_tRMS_rc@AC [V]	240.6566	230.1699	-10.48671
I1_tRMS_rc@AC [A]	1.997796	2.083515	0.085719
P1_t_rc@AC [W]	479.5781	478.6024	-0.975739
Q1_t_rc@AC [var]	-34.01332	-30.32989	3.683426
PF1_fund@AC []	0.999473	0.999720	2.477e-4
P1_t@AC [W]	483.7321	476.5242	-7.207855

Active power rising time

Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	7.1	7.2
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	21:03:17	20:58:22
	3	Fault type (phase)	--	--		A	A
	4	Setting voltage depth	Line to line	--	p.u.	1.15	1.15
	5	Setting dip duration		--		60000	60000
	6	Point of fault entry	Total	--	ms	127210	127210
	7	Point of fault clearance	Total	--	ms	187232	187232
	8	Fault duration in empty load test	Total	--	ms	60022	60022
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.150	1.150
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.002	0.203
	13	Active power	Total	t1-10s to t1	p.u.	1.003	0.203
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.016	-0.012
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.998
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.151	1.151
	19	Line current	Phase 1	t1+60ms	p.u.	0.970	0.199
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.940	0.192
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.002	0.203
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.003	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.173	0.085
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.016	-0.012
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 7.1 idle test



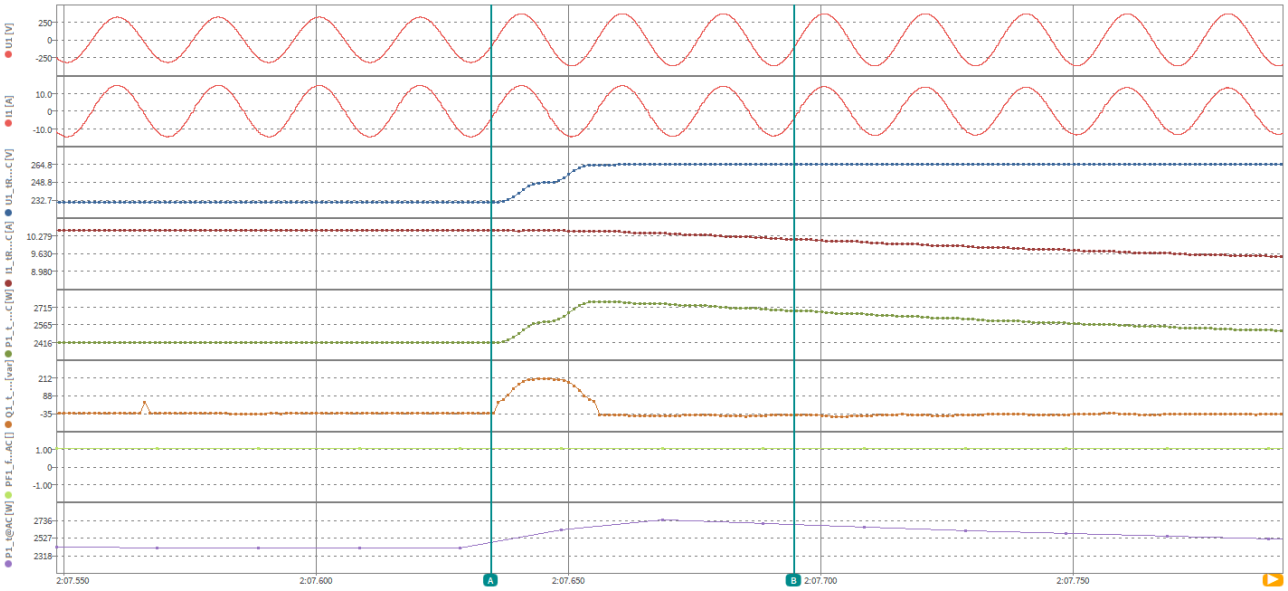
	A	B	间隔
时间 [s]	2:07.2107841	3:07.2328331	1:00.0220490
U1 [V]	166.2476	300.7999	134.5522
I1 [A]	-0.023365	-4.292e-3	0.019073
U1_tRMS_rc@AC [V]	230.0049	262.2922	32.28731
I1_tRMS_rc@AC [A]	0.012603	0.013434	8.303e-4
P1_t_rc@AC [W]	-1.396442	1.245954	2.642396
PF1_t@AC []	-0.482121	0.353774	0.835896
Q1_t_rc@AC [var]	2.540340	3.295930	0.755589

Test No. 7.1 with PGU



	A	B	间隔
时间 [s]	1:57.634700	2:07.634700	0:10.000000
U1 [V]	-87.04377	-88.63640	-1.592636
I1 [A]	-4.067150	-4.179802	-0.112653
U1_tRMS_rc@AC [V]	230.1594	230.1744	0.015045
I1_tRMS_rc@AC [A]	10.46044	10.45853	-1.910e-3
P1_t_rc@AC [W]	2407.285	2406.981	-0.303955
Q1_t_rc@AC [var]	-36.89350	-38.26492	-1.371418
PF1_fund@AC []	0.999997	0.999997	3.576e-7
P1_t@AC [W]	2406.409	2406.407	-1.953e-3

Before dip



	A	B	间隔
时间 [s]	2:07.634700	2:07.694700	0.060000
U1 [V]	-88.63640	-102.1135	-13.47709
I1 [A]	-4.179802	-3.889528	0.290275
U1_tRMS_rc@AC [V]	230.1744	264.6424	34.46797
I1_tRMS_rc@AC [A]	10.45853	10.12451	-0.334019
P1_t_rc@AC [W]	2406.981	2678.924	271.9429
Q1_t_rc@AC [var]	-38.26492	-49.12110	-10.85619
PF1_fund@AC []	0.999997	0.999981	-1.550e-5
P1_t@AC [W]	2406.407	2695.410	289.0024

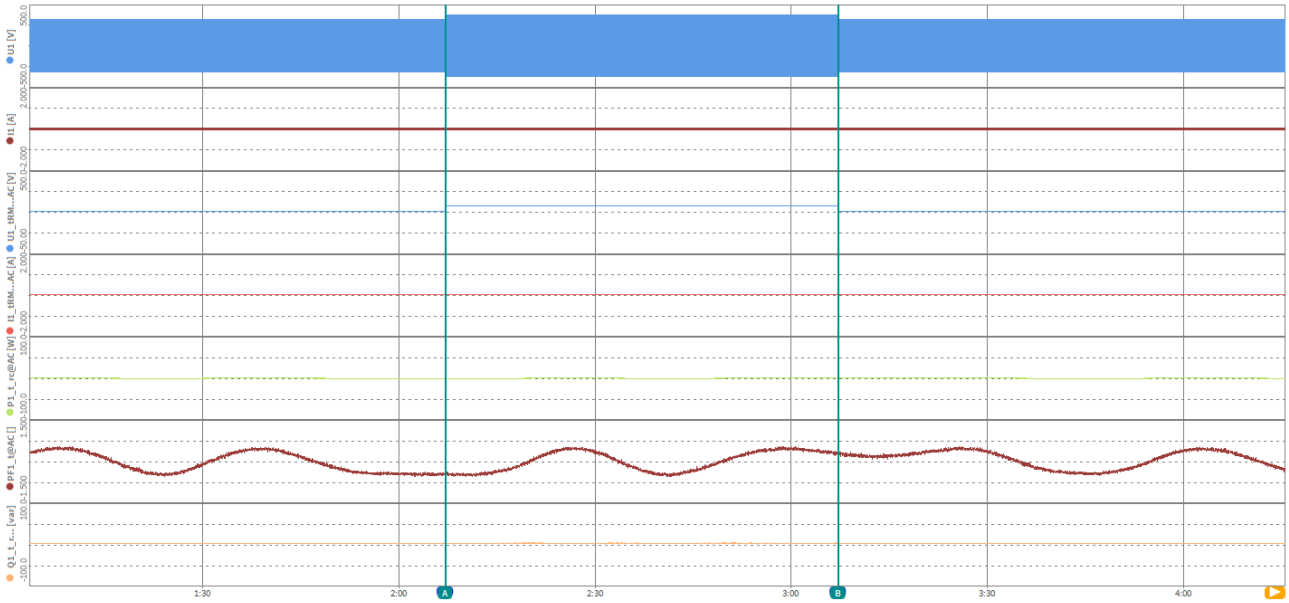
t1+60ms



	A	B	间隔
时间 [s]	3:07.65630	3:07.82950	0.17320
U1 [V]	68.45236	-302.9945	-371.4469
I1 [A]	3.191504	-13.35713	-16.54863
U1_tRMS_rc@AC [V]	264.6765	230.1730	-34.50346
I1_tRMS_rc@AC [A]	9.084534	10.04452	0.959985
P1_t_rc@AC [W]	2404.136	2311.672	-92.46362
Q1_t_rc@AC [var]	-39.63072	-37.56340	2.067322
PF1_fund@AC []	0.999964	0.999989	2.444e-5
P1_t@AC [W]	2402.899	2311.102	-91.79712

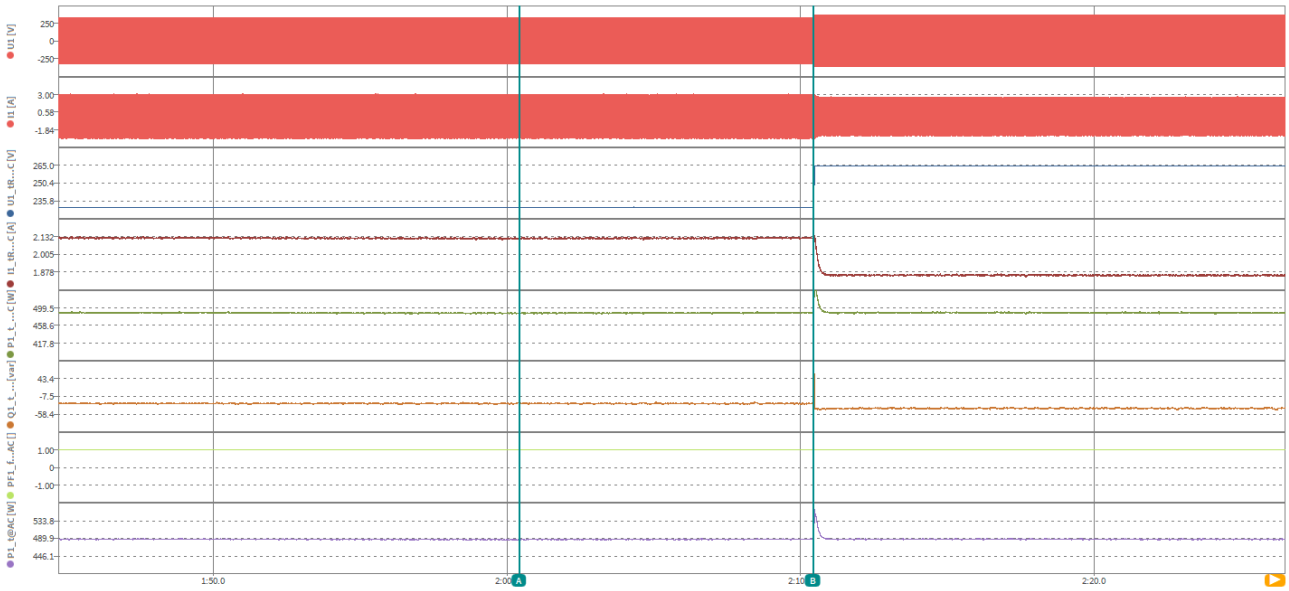
Active power rising time

Test No. 7.2 idle test



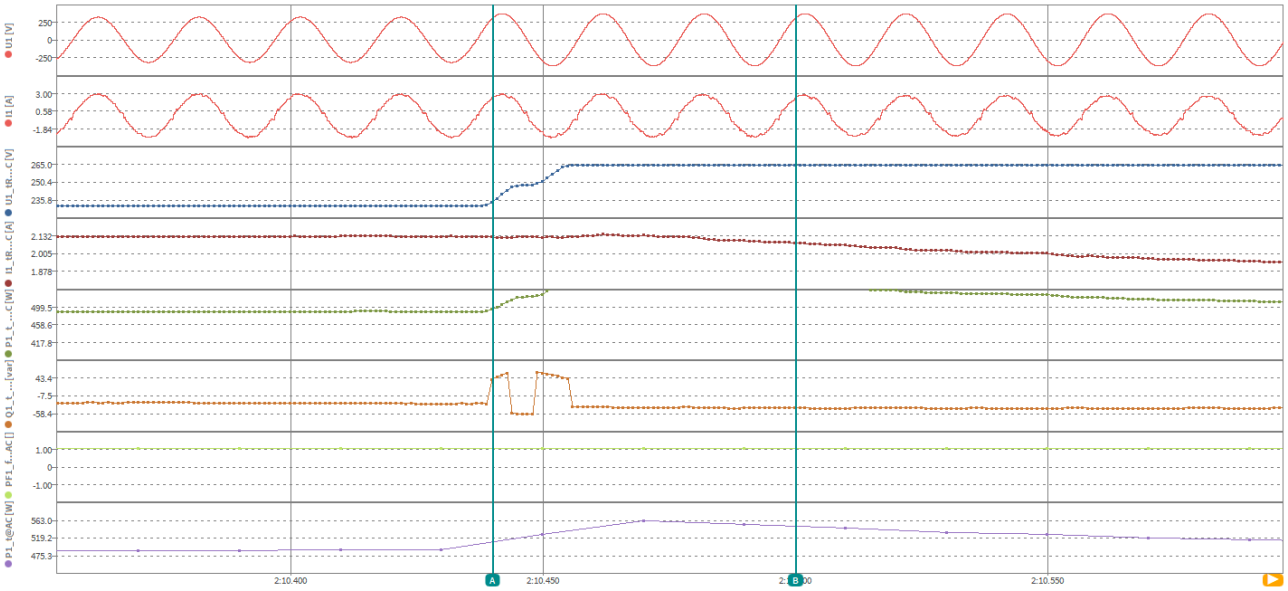
时间 [s]	A 2:07.2107841	B 3:07.2328331	间隔 1:00.0220490
U1 [V]	166.2476	300.7999	134.5522
I1 [A]	-0.023365	-4.292e-3	0.019073
U1_tRMS_rc@AC [V]	230.0049	262.2922	32.28731
I1_tRMS_rc@AC [A]	0.012603	0.013434	8.303e-4
P1_t_rc@AC [W]	-1.396442	1.245954	2.642396
PF1_t@AC []	-0.482121	0.353774	0.835896
Q1_t_rc@AC [var]	2.540340	3.295930	0.755589

Test No. 7.2 with PGU



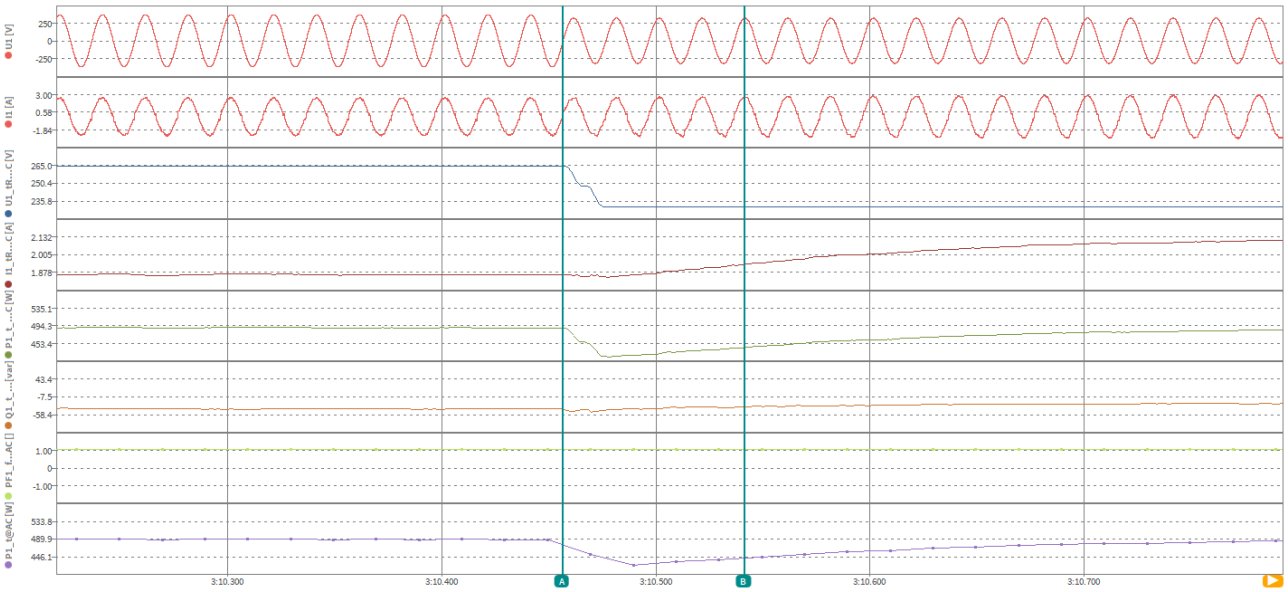
时间 [s]	A 2:00.44010	B 2:10.44010	间隔 0:10.00000
U1 [V]	281.5459	322.6736	41.12768
I1 [A]	2.574000	2.627048	0.053048
U1_tRMS_rc@AC [V]	230.1176	233.4866	3.369019
I1_tRMS_rc@AC [A]	2.115013	2.119920	4.908e-3
P1_t_rc@AC [W]	485.8884	493.4443	7.555908
Q1_t_rc@AC [var]	-28.12460	38.87268	66.99728
PF1_fund@AC []	0.999815	0.999746	-6.884e-5
P1_t@AC [W]	487.2203	487.2943	0.073975

Before dip



	A	B	间隔
时间 [s]	2:10.44010	2:10.50010	0.06000
U1 [V]	322.6736	322.7666	0.092983
I1 [A]	2.627048	2.590094	-0.036955
U1_tRMS_rc@AC [V]	233.4866	264.6027	31.11609
I1_tRMS_rc@AC [A]	2.119920	2.076891	-0.043029
P1_t_rc@AC [W]	493.4443	547.7988	54.35449
Q1_t_rc@AC [var]	38.87268	-43.84987	-82.72255
PF1_fund@AC []	0.999746	0.999646	-9.990e-5
P1_t@AC [W]	487.2943	551.6837	64.38940

t1+60ms

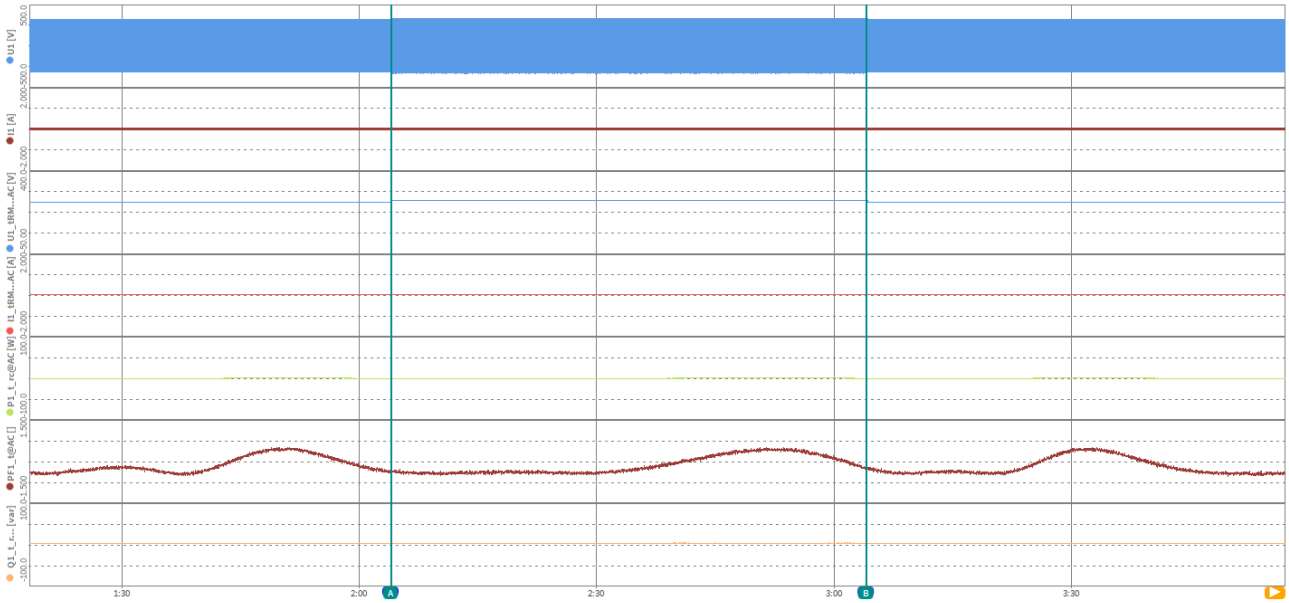


	A	B	间隔
时间 [s]	3:10.456300	3:10.541300	0.085000
U1 [V]	-70.13131	320.0634	390.1947
I1 [A]	-0.413981	2.575788	2.989769
U1_tRMS_rc@AC [V]	264.6320	230.1400	-34.49205
I1_tRMS_rc@AC [A]	1.848271	1.921448	0.073177
P1_t_rc@AC [W]	487.2039	440.4763	-46.72754
Q1_t_rc@AC [var]	-43.15660	-39.02774	4.128860
PF1_fund@AC []	0.998525	0.998571	4.584e-5
P1_t@AC [W]	487.5994	436.4660	-51.13336

Active power rising time

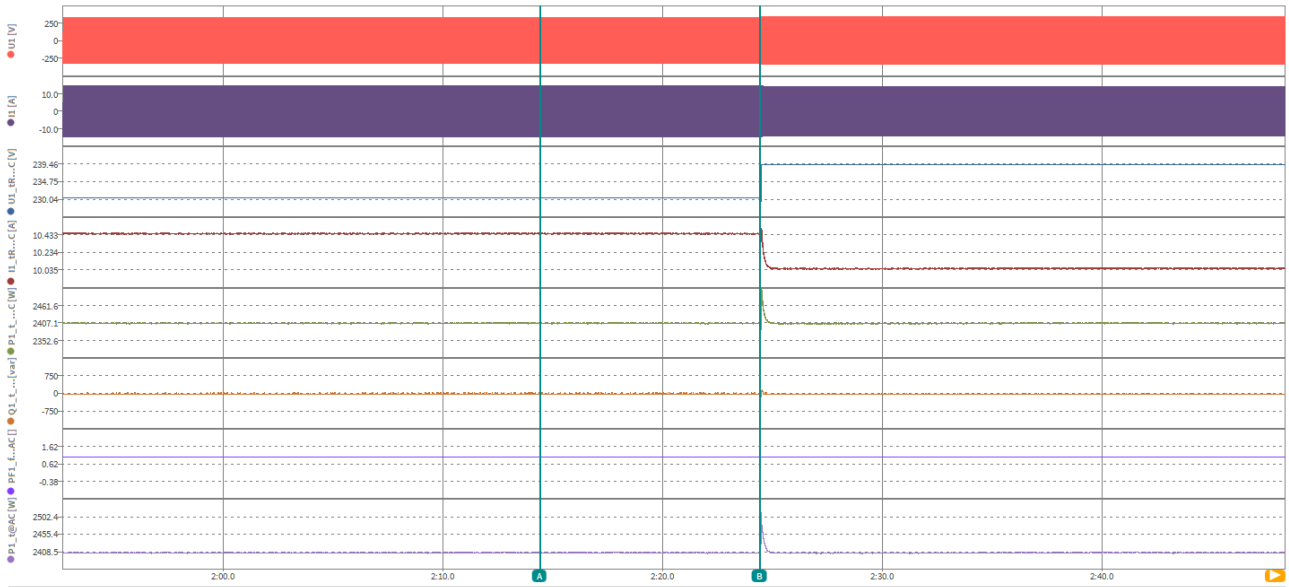
Condition						Measurement	
	No.	Parameter	Phase ref.	Time ref.	unit		
General Info.	0	Test number	--	--	--	7.3	7.4
	1	Date	--	--	dd.mm.yyyy	2026.03.05	2026.03.05
	2	Time (start of test)	--	--	hh:mm:ss.f	19:09:10	19:14:02
	3	Fault type (phase)	--	--		D1	D1
	4	Setting voltage depth	Line to line	--	p.u.	1.04	1.04
	5	Setting dip duration		--		60000	60000
	6	Point of fault entry	Total	--	ms	124075	124075
	7	Point of fault clearance	Total	--	ms	184095	184095
	8	Fault duration in empty load test	Total	--	ms	60020	60020
	9	Voltage depth/height in empty load test	Total	t1+100ms to t2 and t1-10s to t1	p.u.	1.040	1.040
	10		Pos.		p.u.	1.000	1.000
Before dip <t1	11	Voltage	Line to neutral	t1-100s to t1	p.u.	1.001	1.001
	12	Current	Pos.	t1-500ms to t1-100ms	p.u.	1.001	0.203
	13	Active power	Total	t1-10s to t1	p.u.	3.006	0.608
	14		Pos.			--	--
	15	Reactive power	Total	t1-10s to t1	p.u.	-0.014	-0.011
	16		Pos.			--	--
	17	Cos_{φ}	--	t1-10s to t1	--	1.000	0.999
During dip t1 to t2	18	Voltage	Line to neutral	t1+100ms to t2-20ms	p.u.	1.041	1.041
	19	Line current	Phase 1	t1+60ms	p.u.	0.994	0.202
	20		Phase 2			--	--
	21		Phase 3			--	--
	22	Line current	Phase 1	t1+100ms	p.u.	0.985	0.200
	23		Phase 2			--	--
	24		Phase 3			--	--
	25	Active power	Total	t1+100ms to t2-20ms	p.u.	1.002	0.203
	26		Pos.			--	--
After dip > t2	27	Voltage	Line to neutral	t2+3s to t2+10s	p.u.	1.001	1.001
	28	Active power	Total	t2+3s to t2+10s	p.u.	1.002	0.203
	29		Pos.			--	--
	39	Active power rising time	Pos.	--	s	0.168	0.159
	31	Reactive power	Total	t2+3s to t2+10s	p.u.	-0.015	-0.011
	32		Pos.			--	--
	33	Reactive power rising time	Pos.	--	s	--	--
	34	PGU does not disconnect from grid till 60s after fault	--	t2 to t2+60s	Yes / No	Yes	Yes

Test No. 7.3 idle test



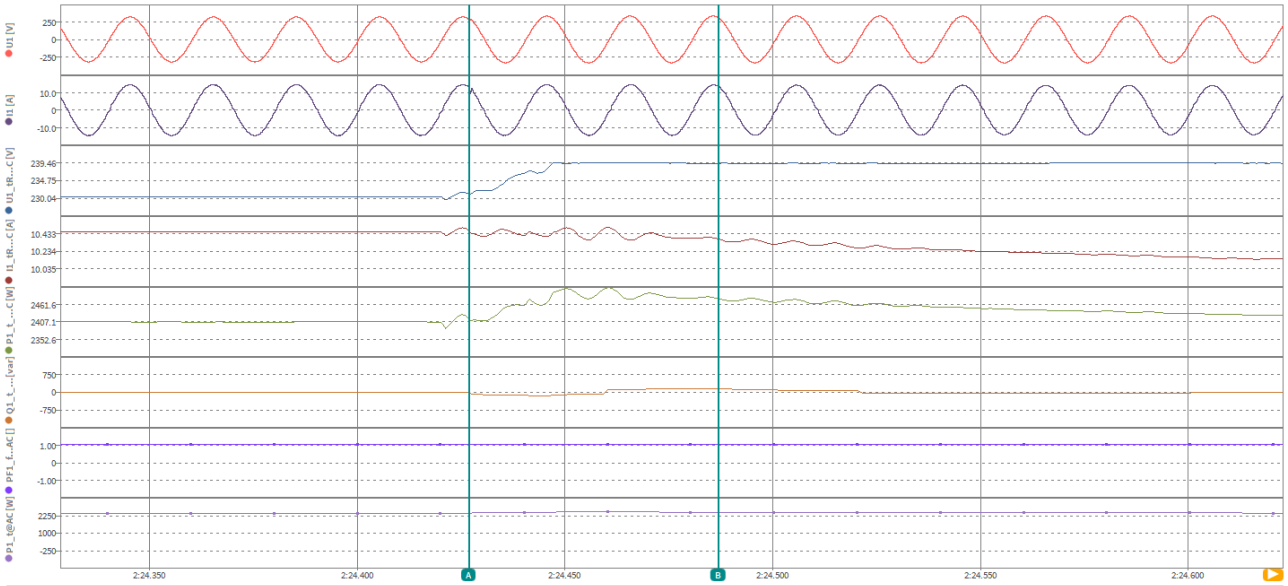
时间 [s]	A 2:04.07535	B 3:04.09572	间隔 1:00.02037
U1 [V]	-91.04586	-162.9269	-71.88106
I1 [A]	-5.245e-3	-0.010014	-4.768e-3
U1_tRMS_rc@AC [V]	231.7116	237.9625	6.250839
I1_tRMS_rc@AC [A]	0.014280	0.013145	-1.135e-3
P1_t_rc@AC [W]	-1.288909	-0.597366	0.691543
PF1_t@AC []	-0.370974	-0.209702	0.161272
Q1_t_rc@AC [var]	3.047500	3.070360	0.022859

Test No. 7.3 with PGU



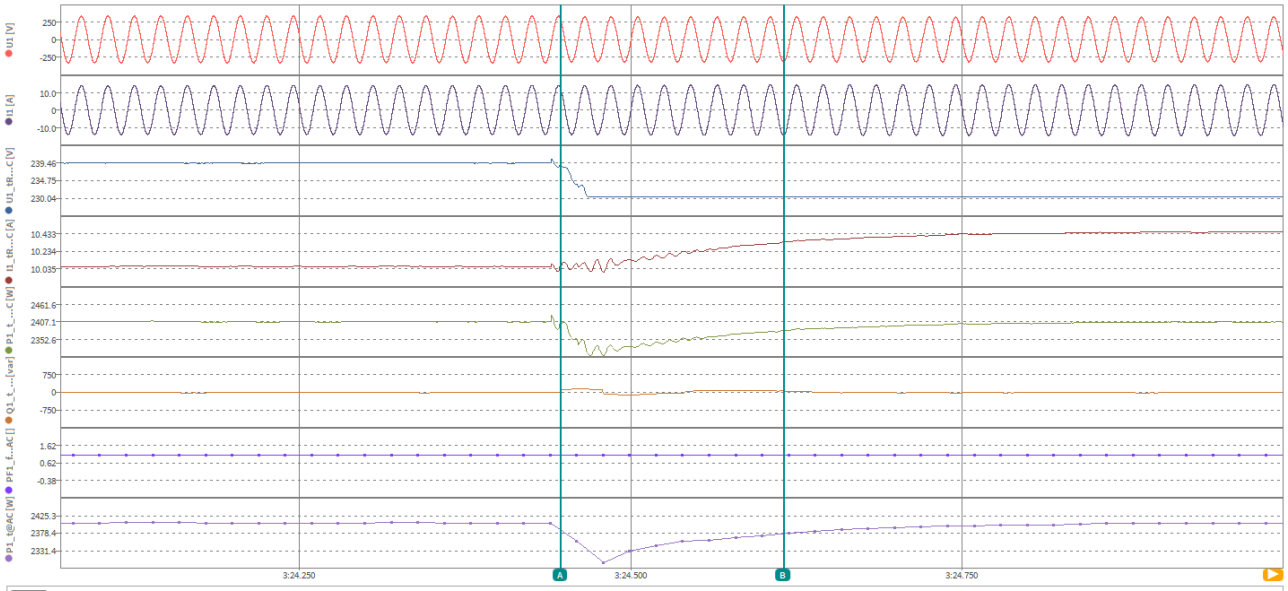
时间 [s]	A 2:14.42700	B 2:24.42700	间隔 0:10.00000
U1 [V]	286.5768	287.4313	0.854492
I1 [A]	12.92408	12.96163	0.037551
U1_tRMS_rc@AC [V]	230.2098	231.1302	0.920456
I1_tRMS_rc@AC [A]	10.45023	10.48644	0.036209
P1_t_rc@AC [W]	2405.471	2423.441	17.97070
Q1_t_rc@AC [var]	-36.38760	-37.62441	-1.236813
PF1_fund@AC []	1.000000	1.000000	-1.788e-7
P1_t@AC [W]	2405.818	2403.178	-2.640381

Before dip



	A	B	间隔
时间 [s]	2:24.42700	2:24.48700	0.06000
U1 [V]	287.4313	309.0854	21.65413
I1 [A]	12.96163	13.55767	0.596046
U1_tRMS_rc@AC [V]	231.1302	239.4016	8.271347
I1_tRMS_rc@AC [A]	10.48644	10.37347	-0.112968
P1_t_rc@AC [W]	2423.441	2480.248	56.80615
Q1_t_rc@AC [var]	-37.62441	125.6020	163.2264
PF1_fund@AC []	1.000000	0.998721	-1.279e-3
P1_t@AC [W]	2403.178	2479.349	76.17090

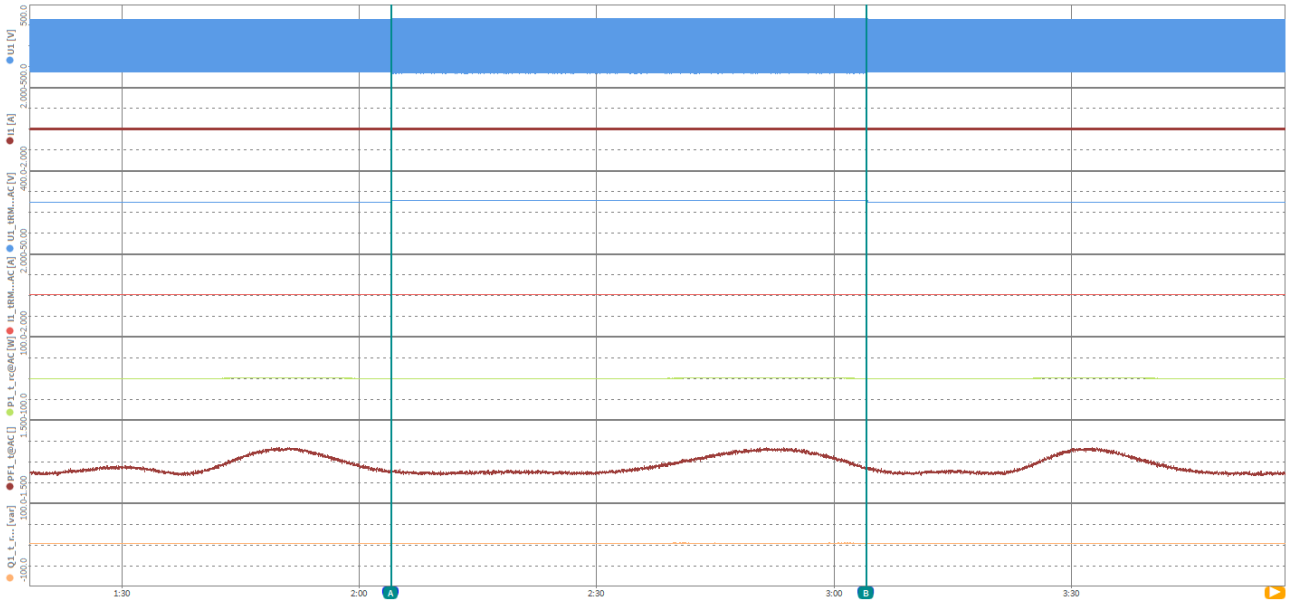
t1+60ms



	A	B	间隔
时间 [s]	3:24.447300	3:24.615500	0.168200
U1 [V]	298.8444	-325.6576	-624.5020
I1 [A]	12.59089	-14.81772	-27.40860
U1_tRMS_rc@AC [V]	238.3878	230.2044	-8.183365
I1_tRMS_rc@AC [A]	10.00061	10.32615	0.325540
P1_t_rc@AC [W]	2383.744	2376.805	-6.939209
Q1_t_rc@AC [var]	-36.49064	39.01770	75.50834
PF1_fund@AC []	0.999994	0.999935	-5.955e-5
P1_t@AC [W]	2404.849	2370.656	-34.19263

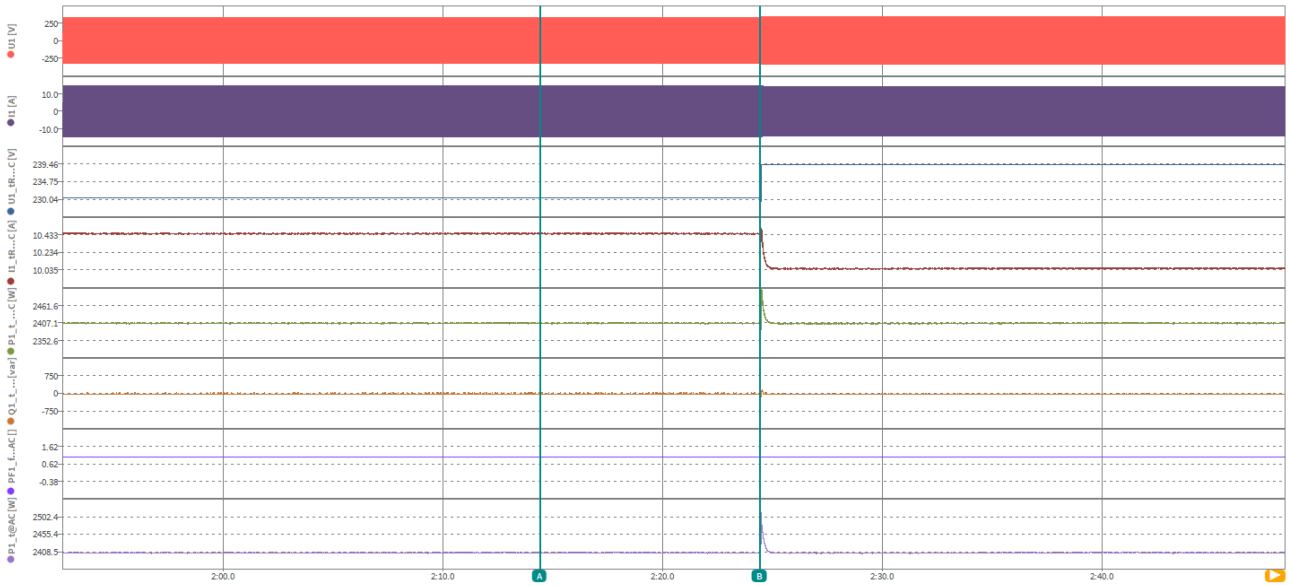
Active power rising time

Test No. 7.4 idle test



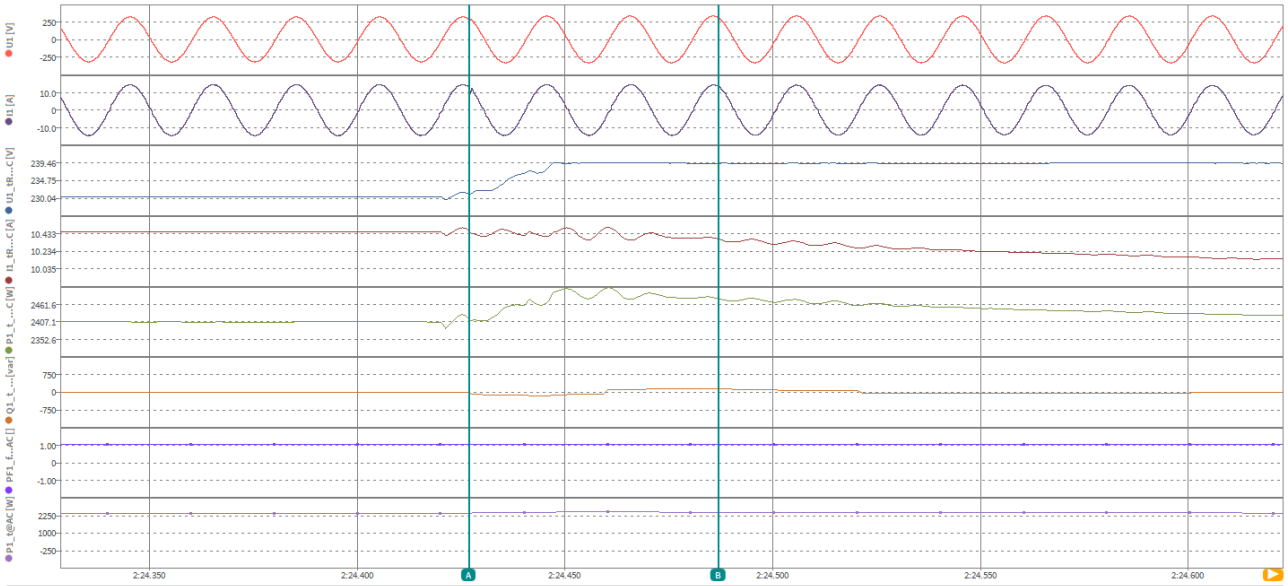
时间 [s]	A 2:04.07535	B 3:04.09572	间隔 1:00.02037
U1 [V]	-91.04586	-162.9269	-71.88106
I1 [A]	-5.245e-3	-0.010014	-4.768e-3
U1_tRMS_rc@AC [V]	231.7116	237.9625	6.250839
I1_tRMS_rc@AC [A]	0.014280	0.013145	-1.135e-3
P1_t_rc@AC [W]	-1.288909	-0.597366	0.691543
PF1_t@AC []	-0.370974	-0.209702	0.161272
Q1_t_rc@AC [var]	3.047500	3.070360	0.022859

Test No. 7.4 with PGU



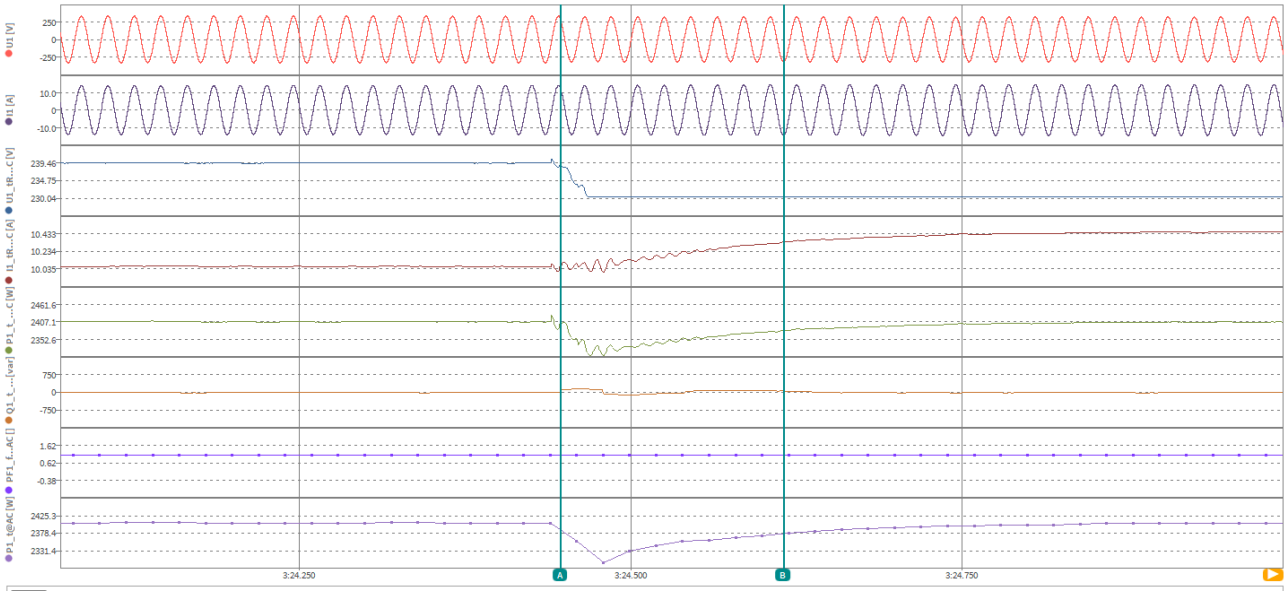
时间 [s]	A 2:14.42700	B 2:24.42700	间隔 0:10.00000
U1 [V]	286.5768	287.4313	0.854492
I1 [A]	12.92408	12.96163	0.037551
U1_tRMS_rc@AC [V]	230.2098	231.1302	0.920456
I1_tRMS_rc@AC [A]	10.45023	10.48644	0.036209
P1_t_rc@AC [W]	2405.471	2423.441	17.97070
Q1_t_rc@AC [var]	-36.38760	-37.62441	-1.236813
PF1_fund@AC []	1.000000	1.000000	-1.788e-7
P1_t@AC [W]	2405.818	2403.178	-2.640381

Before dip



	A	B	间隔
时间 [s]	2:24.42700	2:24.48700	0.06000
U1 [V]	287.4313	309.0854	21.65413
I1 [A]	12.96163	13.55767	0.596046
U1_tRMS_rc@AC [V]	231.1302	239.4016	8.271347
I1_tRMS_rc@AC [A]	10.48644	10.37347	-0.112968
P1_t_rc@AC [W]	2423.441	2480.248	56.80615
Q1_t_rc@AC [var]	-37.62441	125.6020	163.2264
PF1_fund@AC []	1.000000	0.998721	-1.279e-3
P1_t@AC [W]	2403.178	2479.349	76.17090

t1+60ms



	A	B	间隔
时间 [s]	3:24.447300	3:24.615500	0.168200
U1 [V]	298.8444	-325.6576	-624.5020
I1 [A]	12.59089	-14.81772	-27.40860
U1_tRMS_rc@AC [V]	238.3878	230.2044	-8.183365
I1_tRMS_rc@AC [A]	10.00061	10.32615	0.325540
P1_t_rc@AC [W]	2383.744	2376.805	-6.939209
Q1_t_rc@AC [var]	-36.49064	39.01770	75.50834
PF1_fund@AC []	0.999994	0.999935	-5.955e-5
P1_t@AC [W]	2404.849	2370.656	-34.19263

Active power rising time

---END---

TÜVRheinland®

PHOTO DOCUMENTATION

CN26H8IB 001 ATTACHMENT 2

for

Hybrid Energy Storage System

SunEnergyXT 500, SunEnergyXT 500 PRO

SunEnergyXT Holdings S.à r.l.



This documentation consists of 11 pages (excluding this cover page)



Figure 1. Front view

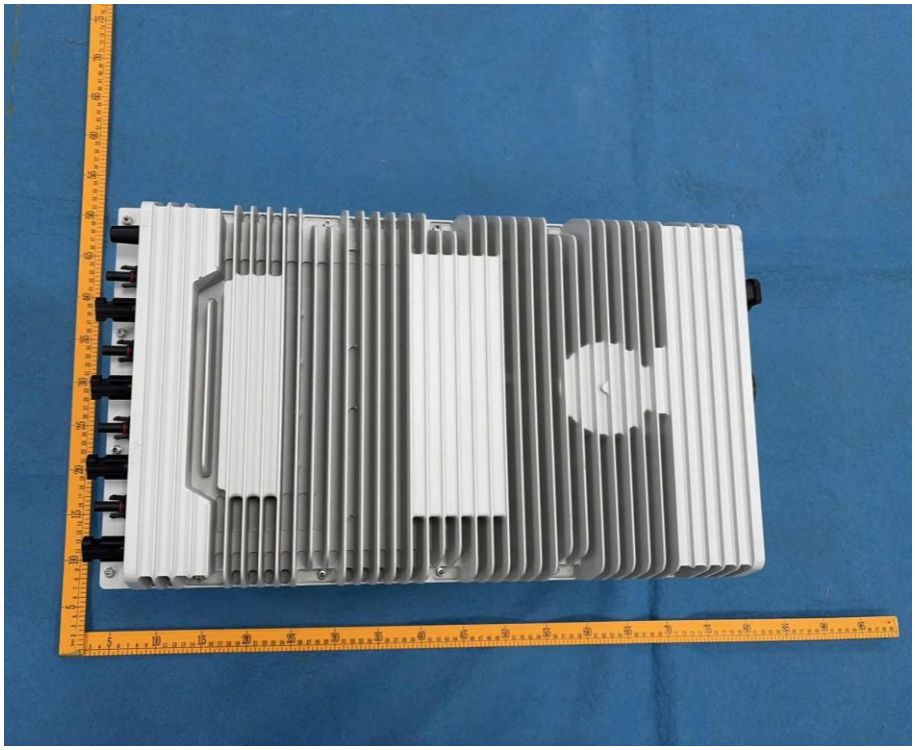


Figure 2. Back view

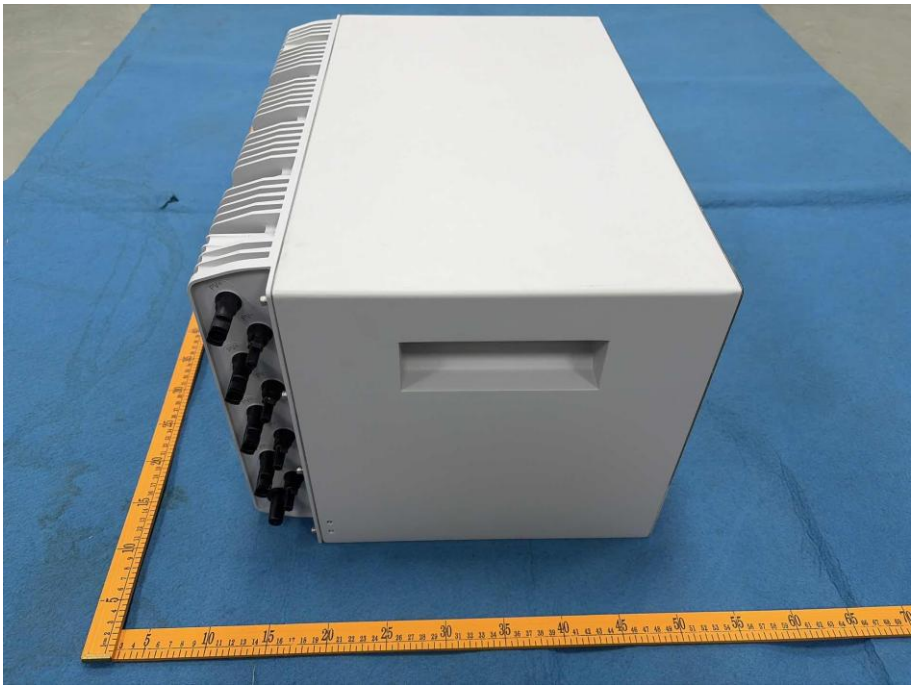


Figure 3. Left view



Figure 4. Right view



Figure 5. Top view

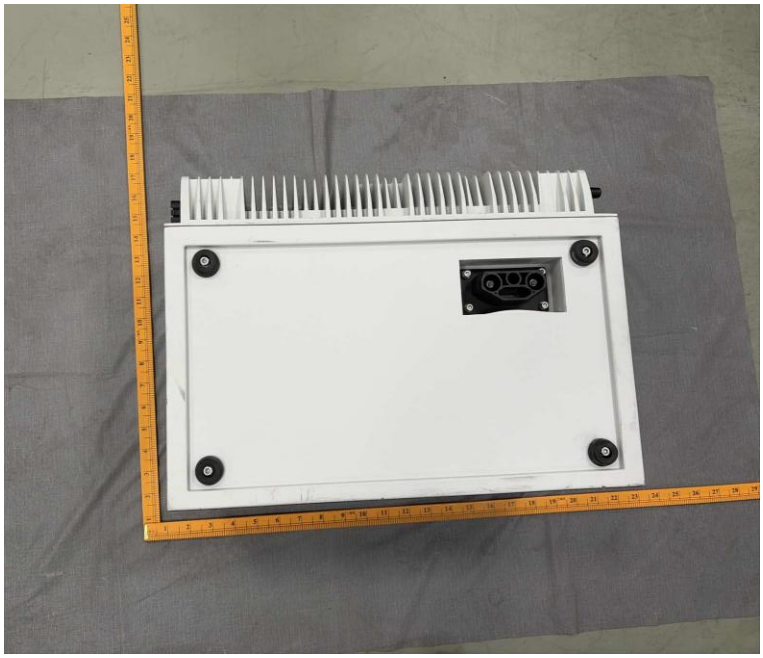


Figure 6. Bottom view



Figure 7. AC terminal view



Figure 8. DC terminal view



Figure 9. PE terminal view

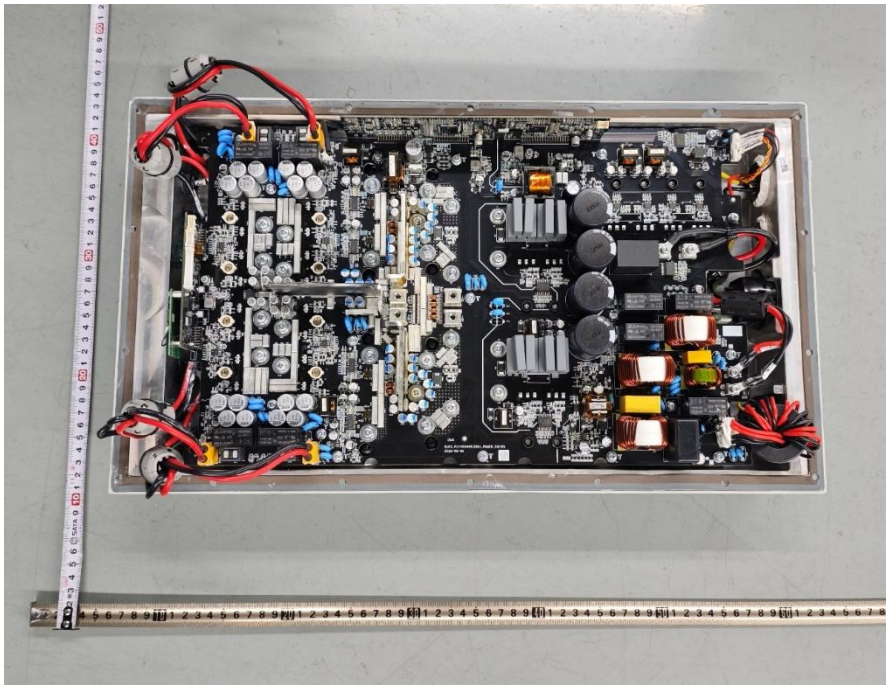


Figure 10. Open view of inverter part 1

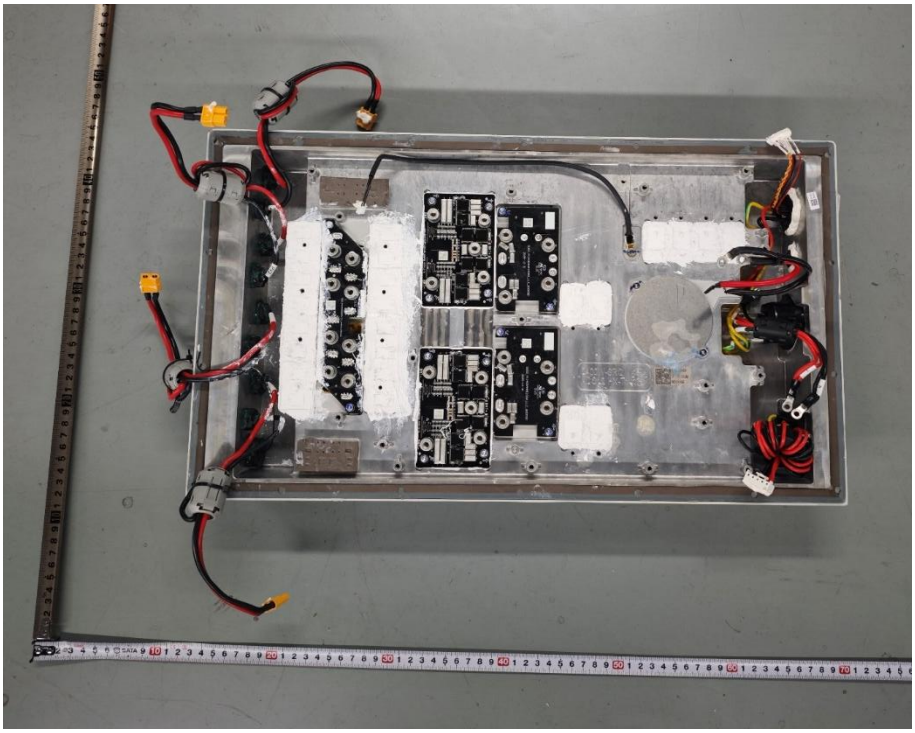


Figure 11. Open view of inverter part 2

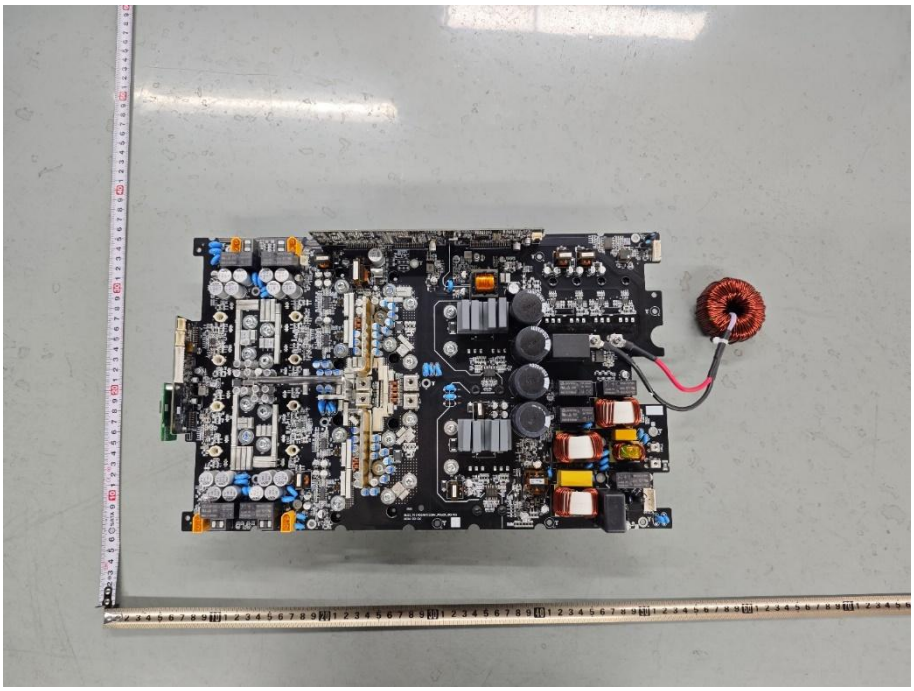


Figure 12. Power board front view of inverter part

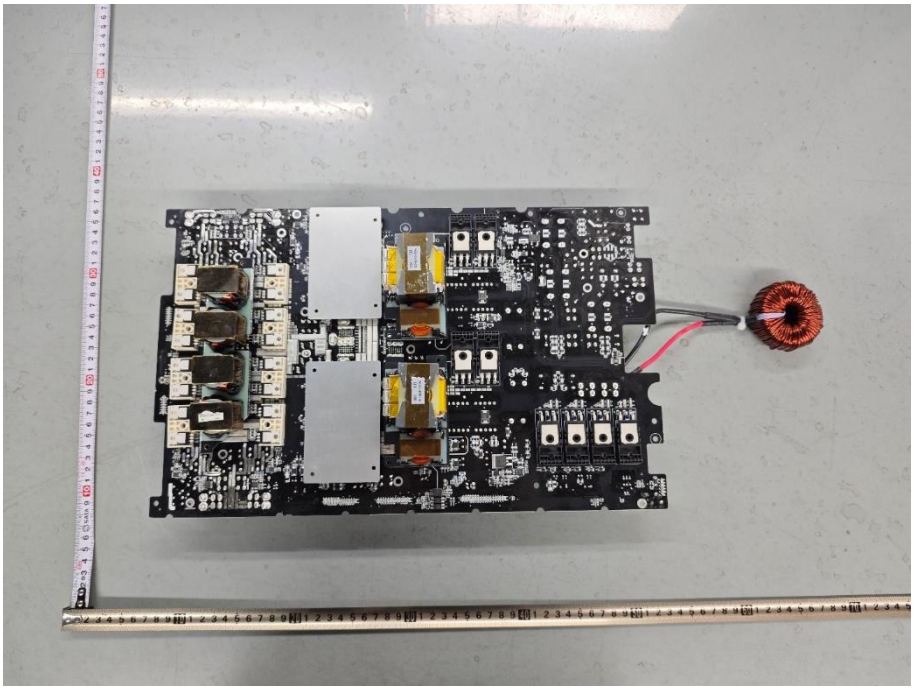


Figure 13. Power board back view of inverter part

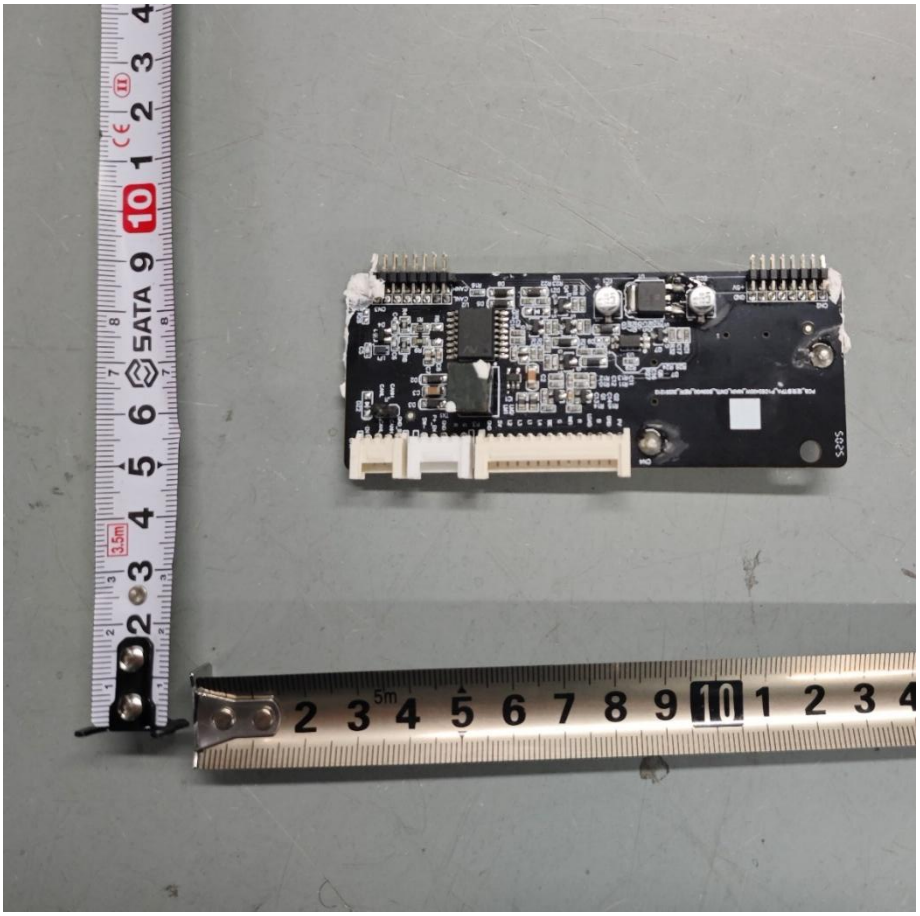


Figure 14. communication board front view of inverter part

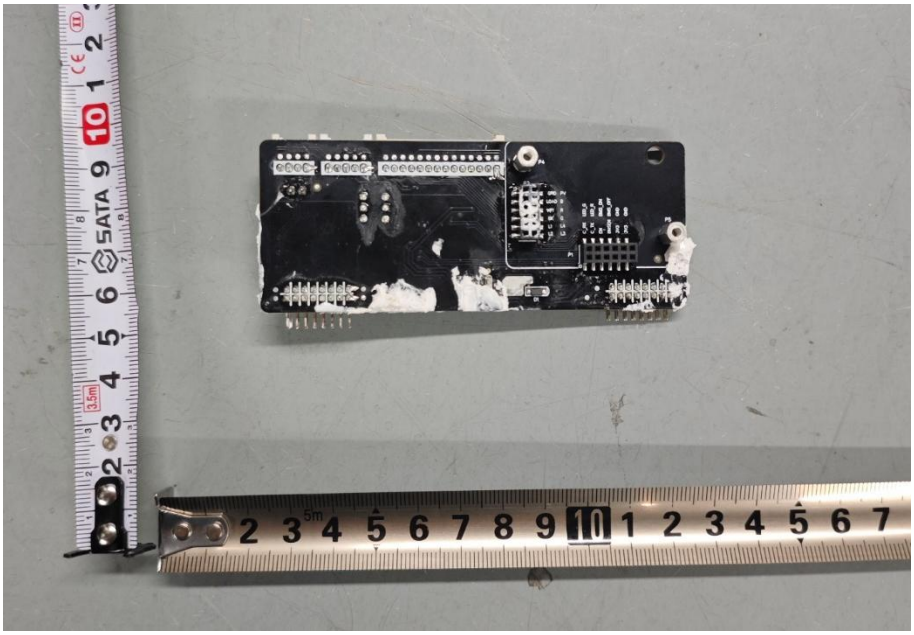


Figure 15 communication board back view of inverter part

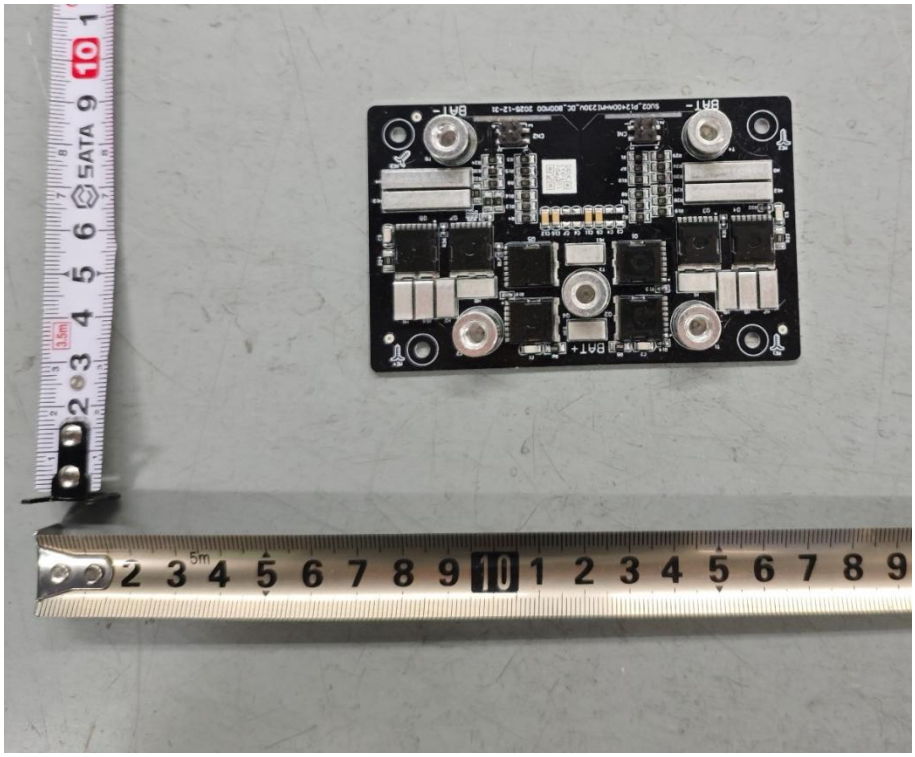


Figure 16. LLC board front view of inverter part

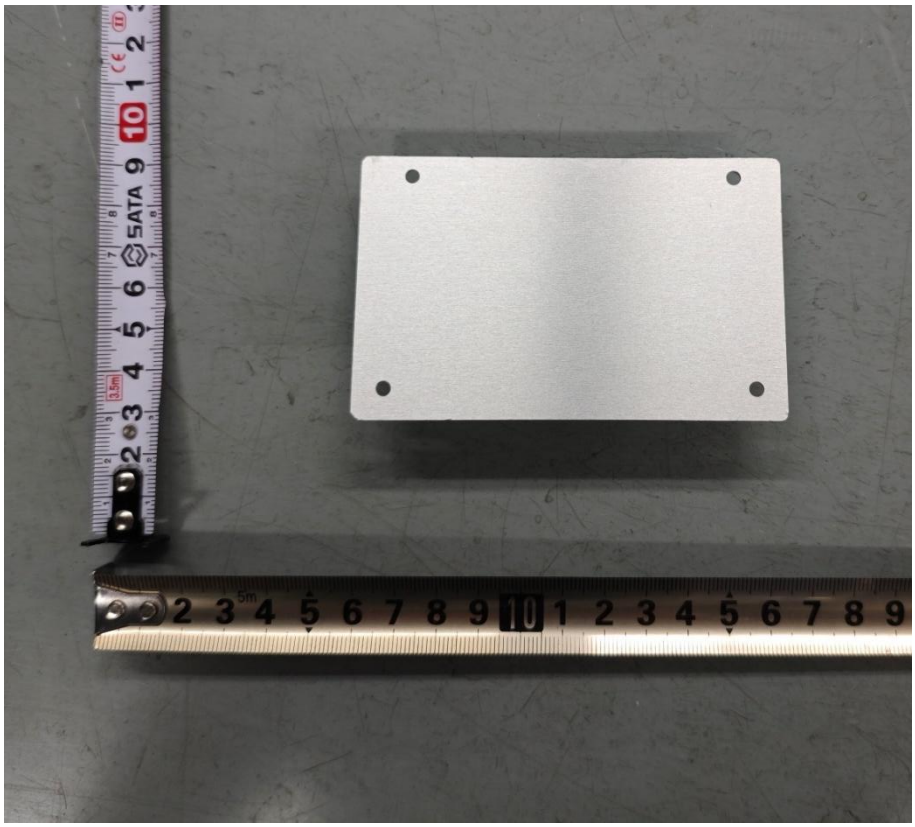


Figure 17. LLC board back view of inverter part

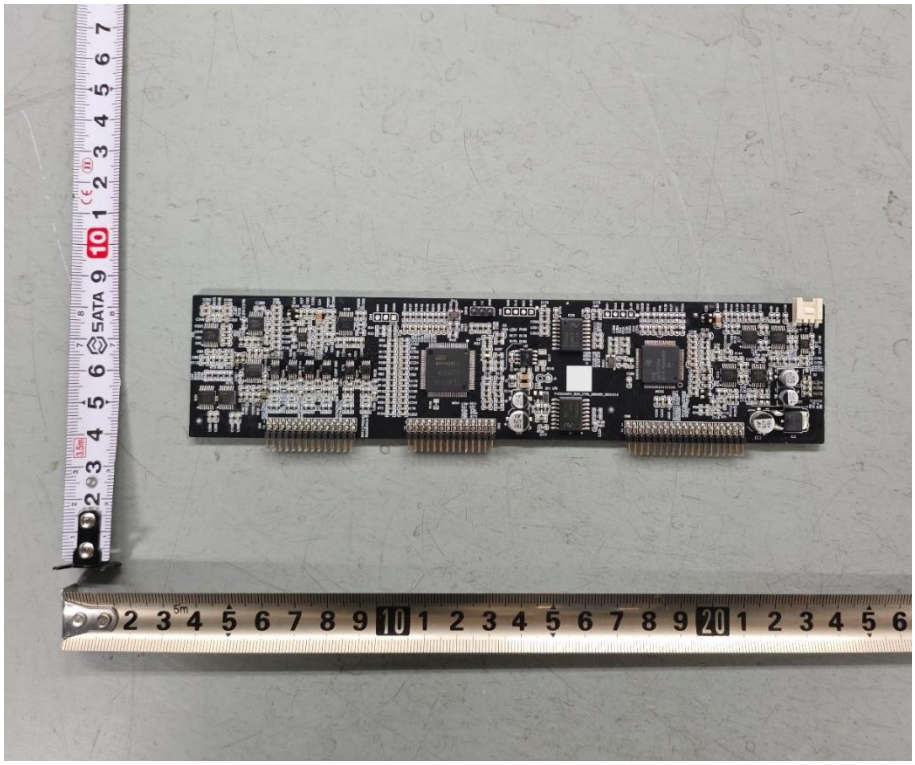


Figure 18. Control board front view of inverter part

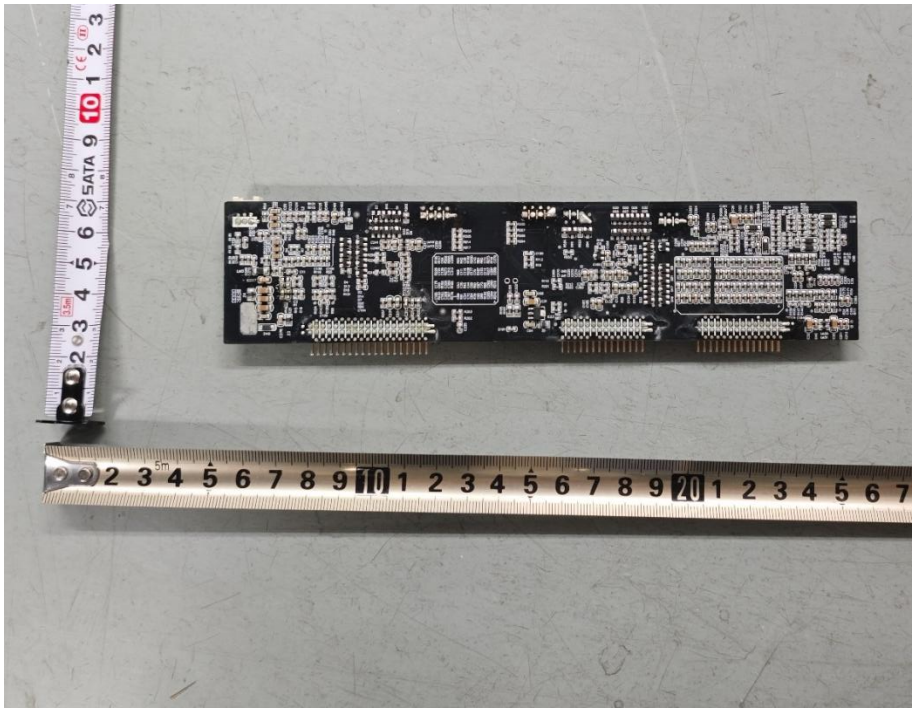


Figure 19. Control board front back of inverter part

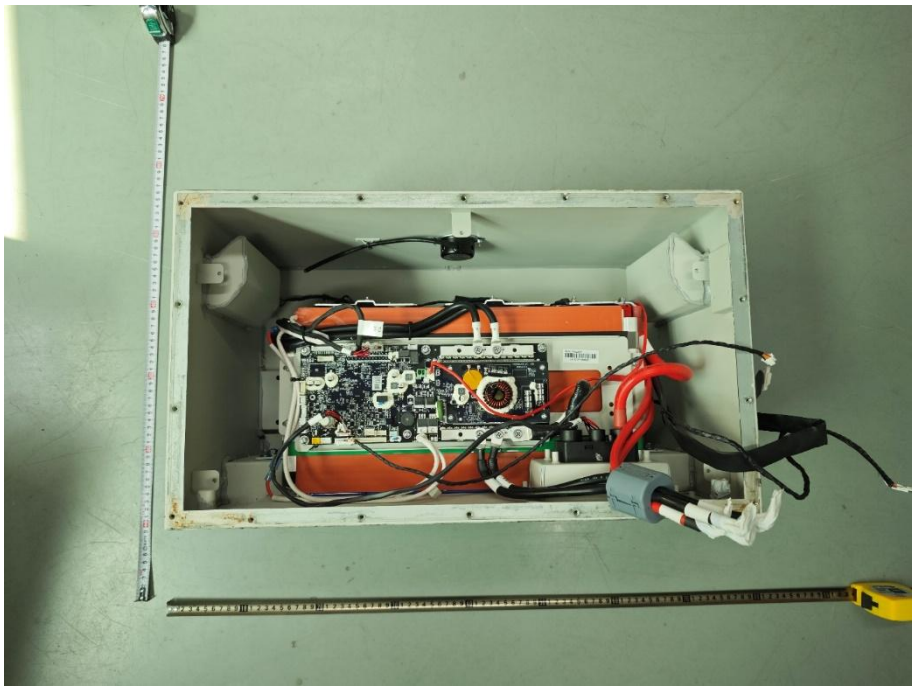


Figure 20. Open view of battery part

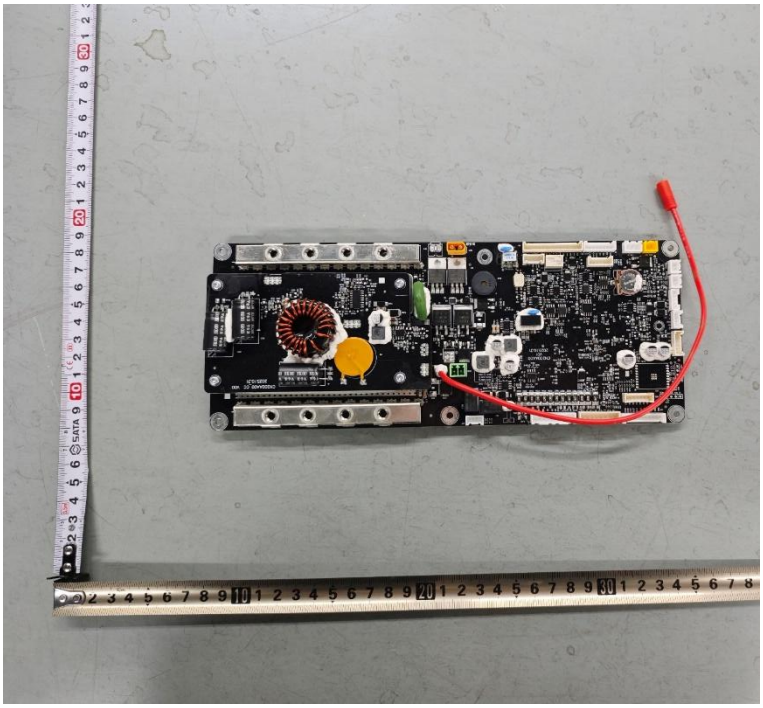


Figure 21. BMS board front view of battery part

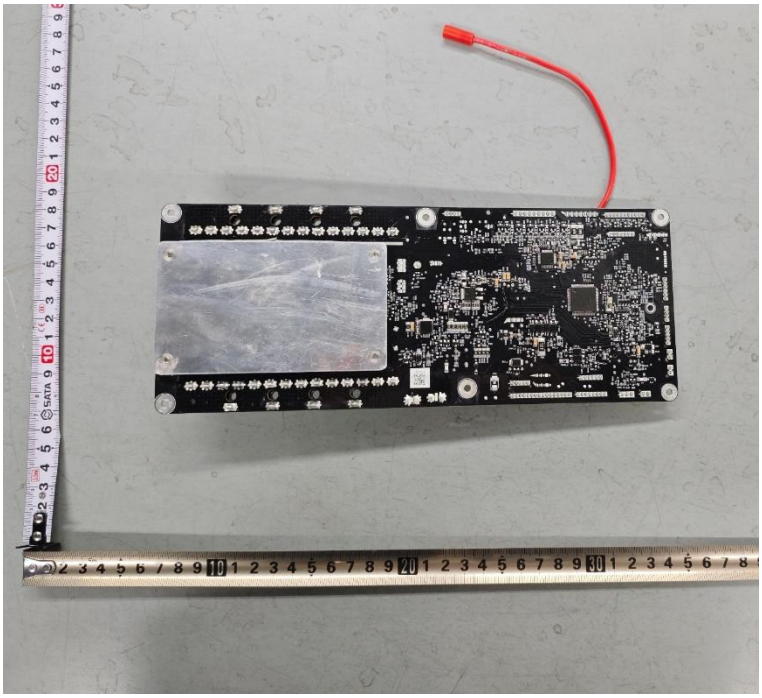


Figure 22. BMS board back view of battery part

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