TESTING FOR THE VERIFICATION OF COMPLIANCE OF PV INVERTER WITH :

VDE 0126-1-1: AUTOMATIC DISCONNECTION DEVICE BETWEEN A GENERATOR AND THE PUBLIC LOW-VOLTAGE GRID. 2013

Protocol PE.T-LE-62

Test Report Number ..... :	**SHES190802098501**
Trademark ..... :	SUN SYNK
Tested Model ..... :	**SUNSYNK-8K-SG01LP1**
Variant Models ..... :	**SUNSYNK-7.6K-SG01LP1** **SUNSYNK-5K-SG01LP1** **SUNSYNK-3.6K-SG01LP1**

APPLICANT

Name ..... :	SunSynk Ltd.
Address ..... :	Flat A,3/F Wai Yip Industrial Building, 171 Wai Yip Street, Kwun Tong, Hong Kong

TESTING LABORATORY

Name ..... :	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
Address ..... :	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
Conducted (tested) by ..... :	Hugo Zhang (Project Engineer)
Reviewed & Approved by ..... :	(Technical Reviewer)
Date of issue ..... :	**15/08/2019**
Number of pages ..... :	**72**

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Test Report Historical Revision:

Test Report Version	Date	Resume
GZES190101037601	09/ 01 / 2019	First issuance
SHES190802098501	15/ 08 / 2019	This report is a first issuance for a co-license based on report number GZES190101037601, See further information in page 7.

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1 SCOPE

SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch has been contract by NingBo Deye Inverter Technology Co., Ltd., to perform the testing according the VDE 0126-1-1:2013: Automatic disconnection device between a generator and the public low-voltage grid.

2 GENERAL INFORMATION

2.1 Testing Period and Climatic conditions

The necessary testing has been performed along 7 days between the 19st of November and the 15th of December of 2018.

All the tests and checks have been performed in accordance with the reference Standard (the tests are done at 25 ± 5ºC, 96 kPa ± 10 kPa and 65% RH ± 10% RH).

SITE TEST

Name ..... : NingBo Deye Inverter Technology Co., Ltd.

Address ..... : No.26 South YongJiang Road, Daqi, Beilun, NingBo, China.

2.2 Equipment under Testing

Apparatus type ..... : Hybrid Inverter

Installation ..... : Fixed(permanent connection)

Manufacturer ..... : SunSynk Ltd.

Trade mark ..... :

Type..... : SUNSYNK

Model / Type reference ..... : SUNSYNK-8K-SG01LP1

Serial Number ..... : 1810254025 SD

Software Version ..... : MCU: Ver1585

Rated Characteristics ..... : Refer to page 7

Date of manufacturing: 2018

Input..... : DC

Output..... AC

Class of protection against electric shock ... : Class I

Degree of protection against moisture ..... : IP 20 / IP 65

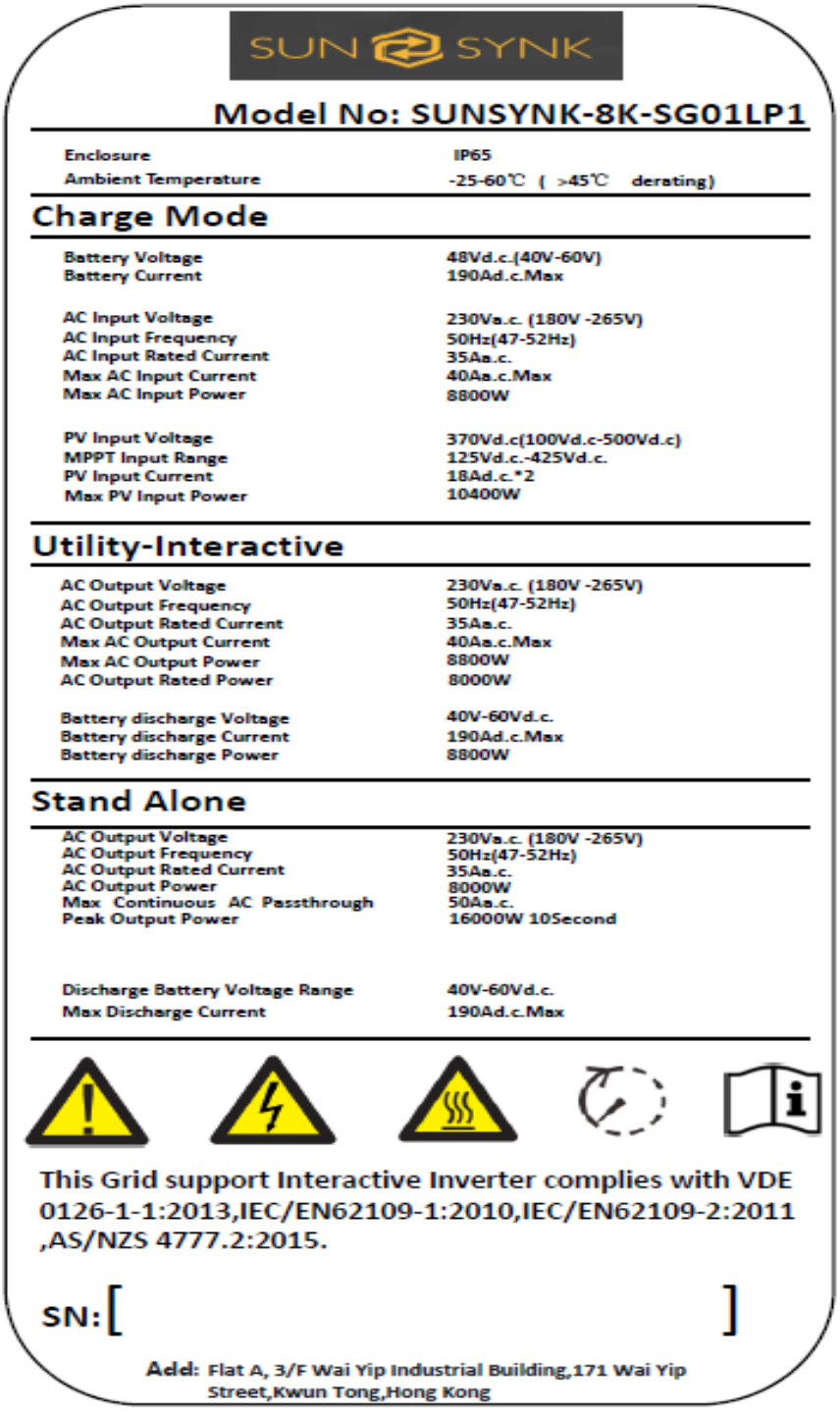
Type of connection to the main supply..... : TN

Cooling group ..... : Heat sink and Fan

Modular ..... : No

Internal Transformer..... : No

Copy of marking plate(representative):



Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation
3. Labels of other models are as the same with **SUNSYNK-8K-SG01LP1**'s except the parameters of rating.

Equipment under testing:

- **SUNSYNK-8K-SG01LP1**

The variants models are:

- **SUNSYNK-7.6K-SG01LP1**
- **SUNSYNK-5K-SG01LP1**
- **SUNSYNK-3.6K-SG01LP1**

Model Number	SUNSYNK-8K-SG01LP1	SUNSYNK-7.6K-SG01LP1	SUNSYNK-5K-SG01LP1	SUNSYNK-3.6K-SG01LP1
PV Side				
Max. input power	8800W	8448W	5500W	3960
Max. input voltage	500			
Max. input current	18Adc*2	18Adc*2	10Adc*2	10Adc*2
MPPT voltage range	150 - 425			
Battery Side				
Battery type	Lead-acid battery or lithium-ion battery			
Battery voltage(V)	48Vdc(42-58Vdc)			
Max. Charger and Discharger power(W)	8800W	8448W	5500W	3960W
AC Side				
Rated grid voltage	230Vac (185V -265V)			
Rated grid frequency	50Hz (47.5-51.5Hz)			
Rated output power	8000W	7680W	5000W	3600W
Rated output current	38.5Aac	33.5Aac	20.8Aac	15.7Aac
Power factor	0.9Leading~0.9Lagging			
Ambient temperature	-25℃ to 60℃ (>45℃ derating)			
Ingress protection	IP20 / IP65	IP20 / IP65	IP65	IP65
Protective class	Class I			

The variants models have been included in this test report without tests because the following features don´t change regarding to the tested model:

- Same connection system and hardware topology
- Same control algorithm.
- Output power within 2.5 and 2/3 of the EUT or Modular inverters.
- Same Firmware Version.

The results obtained apply only to the particular sample tested that is the subject of the present test report. The most unfavorable result values of the verifications and tests performed are contained herein. Throughout this report a point (~~comma~~) is used as the decimal separator.

2.3 Manufacturer and Factory information

Manufacturer Name..... : SunSynk Ltd.

Manufacturer Address..... : Flat A,3/F Wai Yip Industrial Building, 171 Wai Yip Street, Kwun Tong, Hong Kong

Factory Name..... : NingBo Deye Inverter Technology Co., Ltd.

Factory Address..... : No.26 South YongJiang Road, Daqi, Beilun, NingBo, China.

2.4 Test Equipment List

From	No.	Equipment Name	MARK/Model No.	Equipment No.	Equipment calibration due date
Deye	1	AC source	Parwa / PVS7030T	16100790	2019-05-28
	2	PV array simulator	Chroma / 62150H-600S	62150EC00514	2019-05-28
	3	Current clamp	FLUKE / i1000s	32233919	2019-02-27
	4	Differential probe	Sanhua / SI-9110	152655	2019-02-27
	5	Temperature & Humidity meter	VICTOR / VC230A	WS01	2019-02-28
	6	Power analyzer	ZLG / PA3000	PA3005-P0005-1246	2019-02-27
	7	Digital oscilloscope	Agilent	MY50070266	2019-02-27
	8	RLC load	Porwa / PV-RLC-385-30K	16101795	2019-05-28
	9	Temperature & Humidity Chamber	Henggong / HGTP-225R	HG13030801	2019-02-27
SGS	10	True RMS Multimeter	Fluke / 289C	GZE012-53	2019-03-05

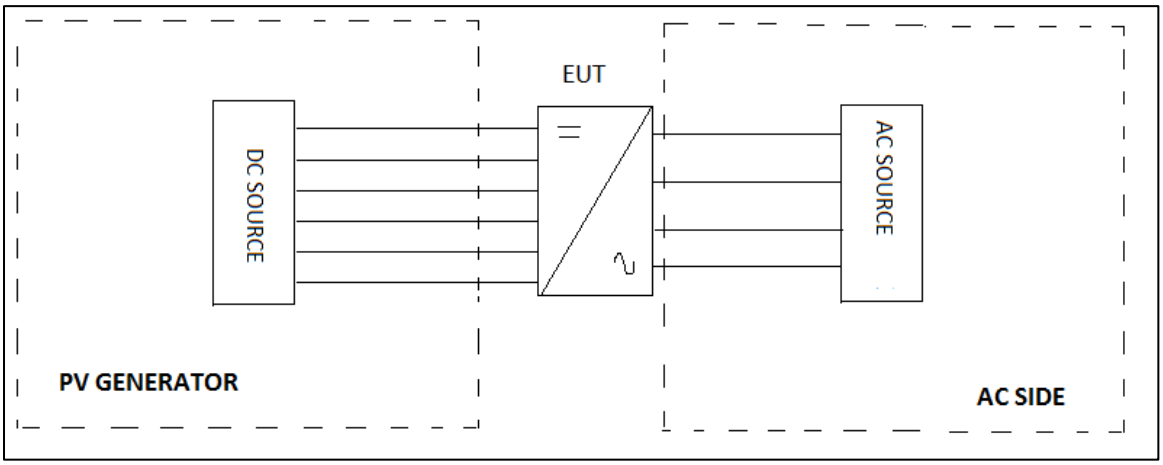
2.5 Measurement Uncertainty

Associated uncertainties through measurements showed in this this report are the maximum allowable uncertainties.

Magnitude	**Uncertainty**
Voltage measurement	±0.05 %
Current measurement	±0.05 %
Frequency measurement	±0.001 Hz
Time measurement	±0.001s
Power measurement	±0.5 %
Phase Angle	±0.1º
Temperature	±3º C
Note1: Measurements uncertainties showed in this table are maximum allowable uncertainties. The measurement uncertainties associated with other parameters measured during the tests are in the laboratory at disposal of the solicitant. Note2: Where the standard requires lower uncertainties that those in this table. Most restrictive uncertainty has been considered.	

2.6 Test set up of the different standard

Below is the simplified construction of the test set up.



Different equipment has been used to take measures as it shows in chapter 2.3. Current and voltage clamps have been connected to the inverter input / output for all the tests.
All the tests described in the following pages have used this specified test setup.

2.7 Definitions

In	Nominal Current	P	Power
p.u	Per unit	I	Current
Pn	Nominal Power	M	Change for real power
Sn	Apparent Power	N	Change for reactive power
PGU	Power Generation Unit	F	Frequency
Pst	Short-term flicker strength	Q_f	Quality factor
Plt	Long-term flicker strength	NS	Network and System
$C_{\psi K}$	Flicker coefficient for continuous operation	Un	Nominal Voltage
S_r	Apparent Power Rated	PWHD	Partial weight harmonic distortion
S_k	Short-circuit Apparent Power	THD	Total harmonic distortion
K_{imax}	Maximum switching current factor	Z_{test}	Test circuit impedance at which the emission test
Z_{ref}	The reference impedance	EUT	Equipment under test

3 RESUME OF TEST RESULTS

INTERPRETATION KEYS

Test object does meet the requirement ..... **P** Pass
Test object does not meet the requirement ..... **F** Fails
Test case does not apply to the test object ..... **N/A** Not applicable
To make a reference to a table or an annex..... See additional sheet
To indicate that the test has not been realized..... **N/R** Not realized

CHAPTER OF THE STANDARD, DESCRIPTION AND VERIFICATION			
4	**Requirements**		
4.1	Functional safety		P
4.2	Reconnection		P
4.3.1	Voltage monitoring -20%		P
4.3.2	Voltage monitoring +10%		P
4.3.3	Voltage monitoring +15%		P
4.4.1	Frequency monitoring: 51.5Hz		P
4.4.2	Frequency monitoring: 47.5Hz		P
4.5	DC current monitoring		P
4.6	Anti-Islanding Protection		P
4.7	Marking		P
4.8	Residual Current		P

4 TEST RESULTS

4.1 FUNCTIONAL SAFETY

The security as defined in 4.3 to 4.8 of the standard must turn in an error state and display this error condition.

Testing of the single-fault tolerance and fault detection with subsequent disconnection is carried out by fault simulation, if necessary with additional fault tests.

It must be checked that a single fault does not lead to loss of the safety function.

The results are offered in the table below:

Based on an analysis of the products circuits, capacitors, diodes, solid –state devices and similar component were subjected to shorting or opening while the product was energized at rated voltage and under load (if grid connected it shall be tied to a simulated grid). Evidence of malfunction as specified above shall be noted and recorder.

In addition the utility – interactive inverter was monitored for backfeed current that flows from the simulated utility source into the photovoltaic array as a result of a faulted components. This was done by monitoring the dc current to the dc supply input with the dc source off and the simulated circuit operating.

Results for Component Short and open - circuit:

No.	Component	Fault	Backfeed Current (A)	Comments
1.	C65	S/C	0	EUT protected immediately and disconnect from grid, ”AC hardware overcurrent fault” alarm. No hazard
2.	C78	S/C	0	EUT protected immediately and disconnect from grid, ”AC hardware overcurrent fault” alarm. No hazard
3.	U27(pin4-pin2)	S/C	0	EUT protected immediately and disconnect from grid, Damage of Boost IGBT. No hazard
4.	XS1(pin 10 – pin11)	S/C	0	EUT protected immediately and disconnect from grid, Damage of Inverter IGBT. No hazard
5.	RY1(pin5-pin4)	S/C	0	EUT protected immediately, ”Relay fault” alarm. No hazard
6.	RY2(pin5-pin4)	S/C	0	EUT protected immediately, ”Relay fault” alarm. No hazard

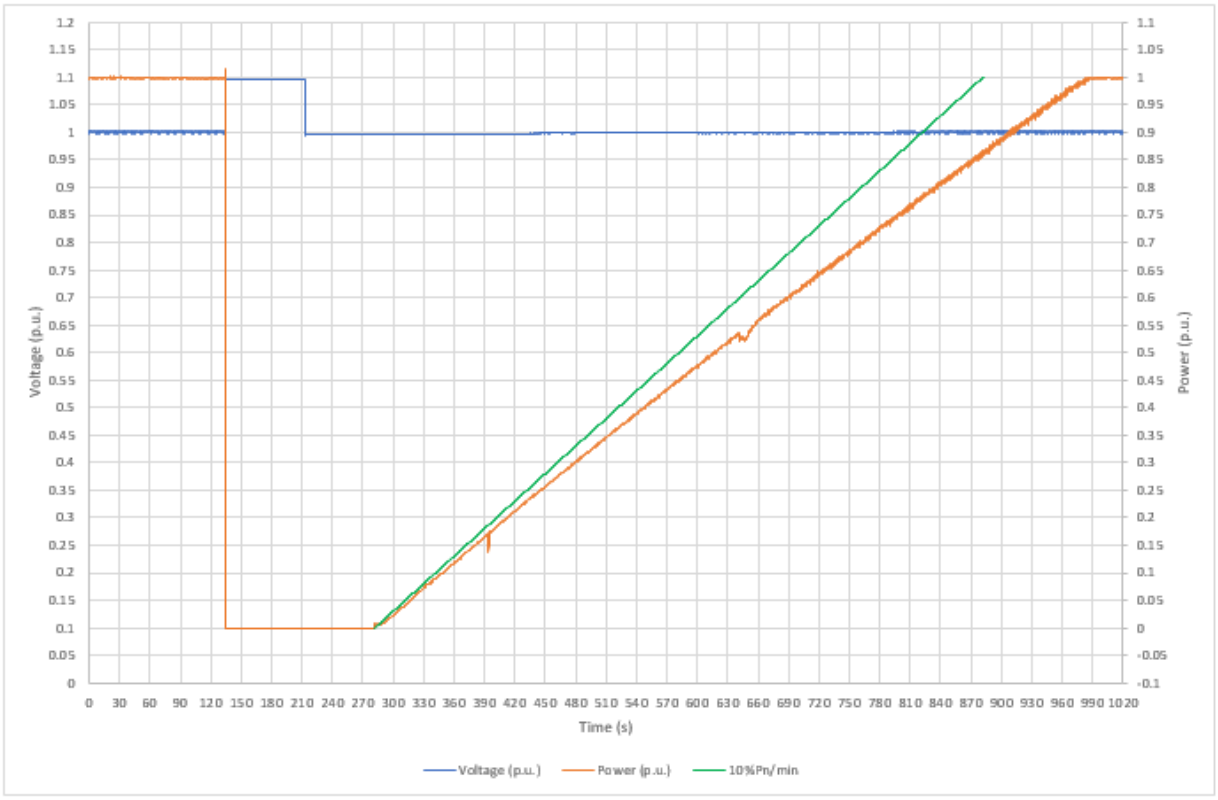
7.	RY3(pin5-pin4)	S/C	0	EUT protected immediately,"Relay fault" alarm. No hazard
8.	RY5(pin5-pin4)	S/C	0	EUT protected immediately,"Relay fault" alarm. No hazard
9.	RY6(pin5-pin4)	S/C	0	EUT protected immediately, "Relay fault" alarm. No hazard
10	RY7(pin5-pin4)	S/C	0	EUT protected immediately, "Relay fault" alarm. No hazard
11	U17(PIN1-PIN2)	S/C	0	Normal operation
12	C24	S/C	0	EUT protected immediately and disconnect from grid. No hazard
13	C119	S/C	0	EUT protected immediately and disconnect from grid. No hazard
14	C16	S/C	0	Normal
15	C3	S/C	0	EUT protected immediately and disconnect from grid. No hazard
16	C12	S/C	0	EUT protected immediately and disconnect from grid. No hazard
17	C19	S/C	0	EUT protected immediately and disconnect from grid. No hazard
18	C31	S/C	0	EUT protected immediately and disconnect from grid. No hazard
19	C123	O/C	0	EUT protected immediately and disconnect from grid. No hazard
20	C116	S/C	0	EUT protected immediately and disconnect from grid. No hazard
21	R207	S/C	0	EUT protected immediately and disconnect from grid." BUS Voltage is unbalanced" alarm. No hazard
22	R215	S/C	0	EUT protected immediately and disconnect from grid" BUS Voltage is unbalanced" alarm. No hazard
23	R219	S/C	0	EUT protected immediately and disconnect from grid. No hazard
24	R113	S/C	0	EUT protected immediately and disconnect from grid. " AC Voltage Over" alarm. No hazard
25	R77	S/C	0	Normal
26	R156	S/C	0	EUT protected immediately and disconnect from grid. " AC Voltage fault" alarm.
27	Q1(D-S)	S/C	0	Normal
28	Q3(D-S)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
29	Q5(D-S)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
30	Q7(D-S)	S/C	0	EUT protected immediately and disconnect from grid. No hazard

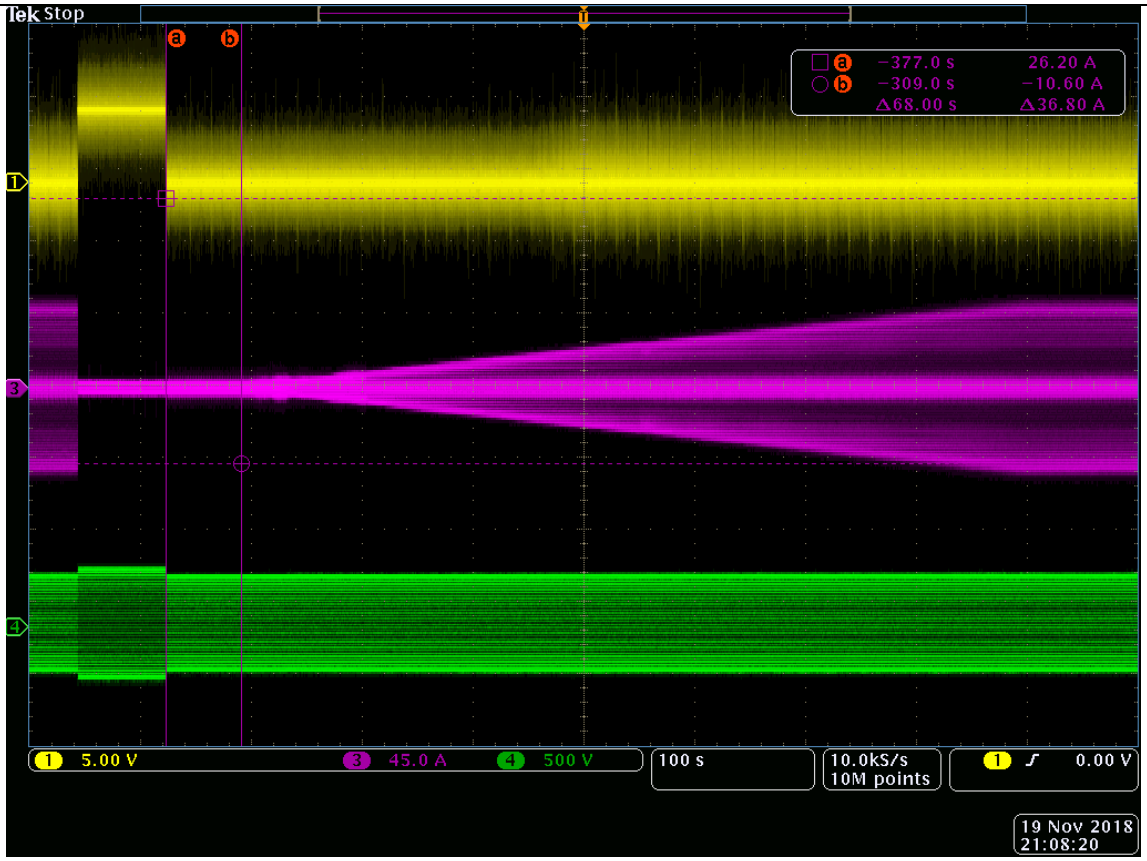
31	Q9(D-S)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
32	Q11(D-S)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
33	QR1(C-E)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
34	QR8(C-E)	S/C	0	EUT protected immediately and disconnect from grid. No hazard
35	Bus cap C166	S/C	0	“BUS Voltage is unbalanced” alarm. EUT protected immediately and disconnect from grid. No hazard
36	Bus cap C173	S/C	0	“BUS Voltage is unbalanced” alarm. EUT protected immediately and disconnect from grid. No hazard
37	Q21(C-E)	S/C	0	Unit derated to half power. No hazard
38	Q24(C-E)	S/C	0	Unit derated to half power. No hazard

4.2 CONNECTION AND RECONNECTION CONDITIONS

The power generation system shall be connected to the network only if both voltage and frequency are within the tolerance range according to article 4.2. It is shown that the active power don't exceed the gradient of 10 % of the active power per minute (green line).

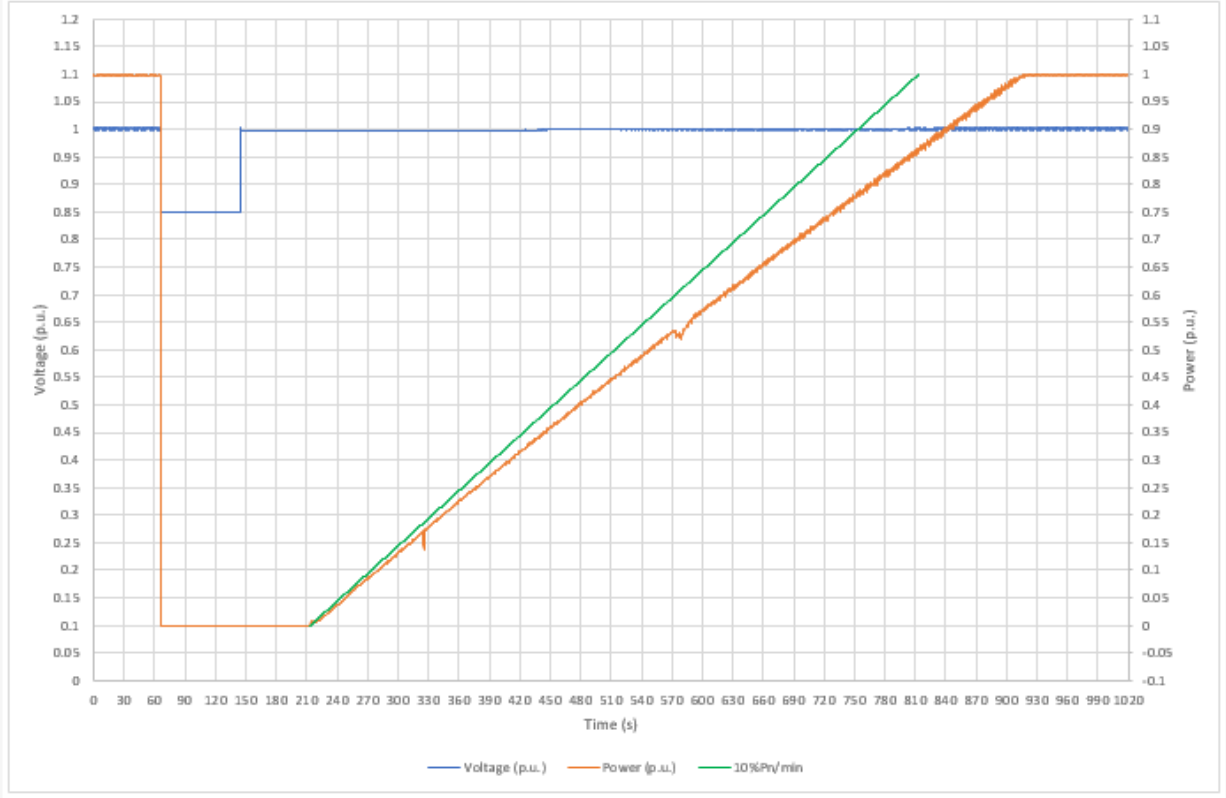
Overvoltage Un+10%Un

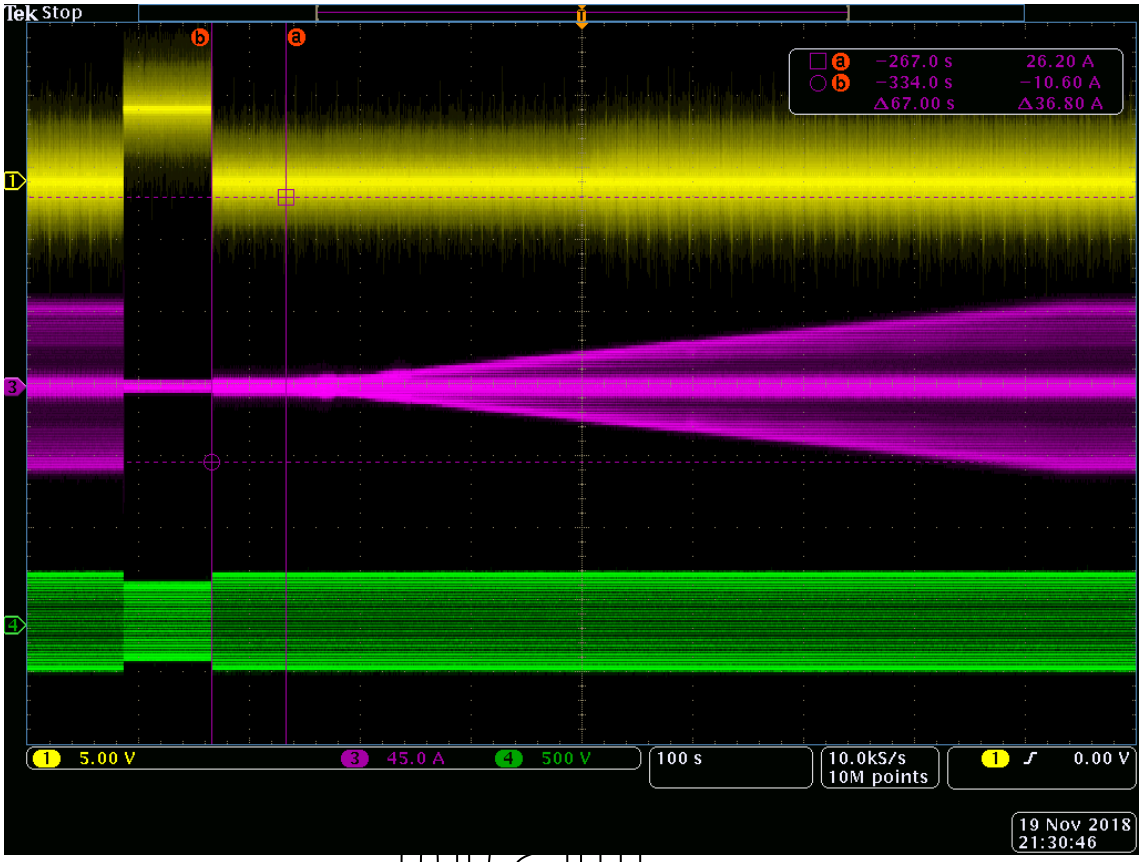




Reconnection delay time limit: 60 s	Reconnection time measured: 68 s

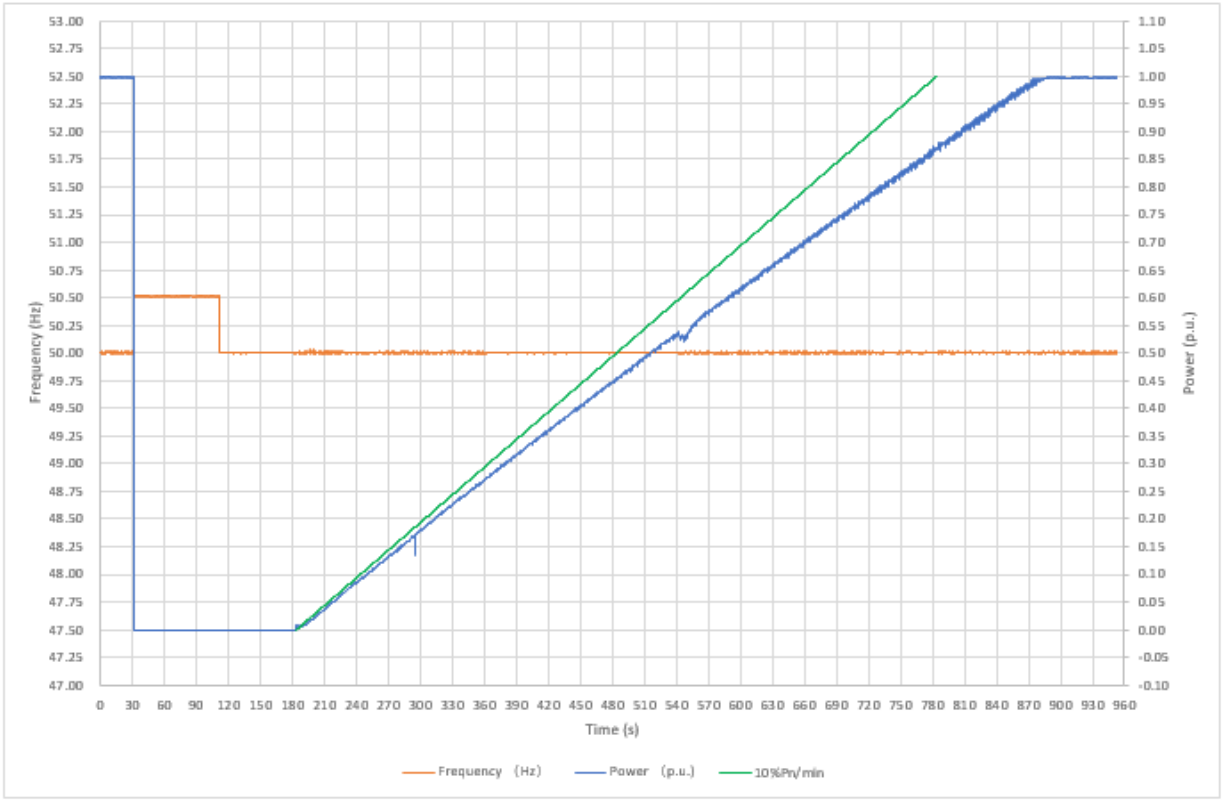
Undervoltage Un-15%Un

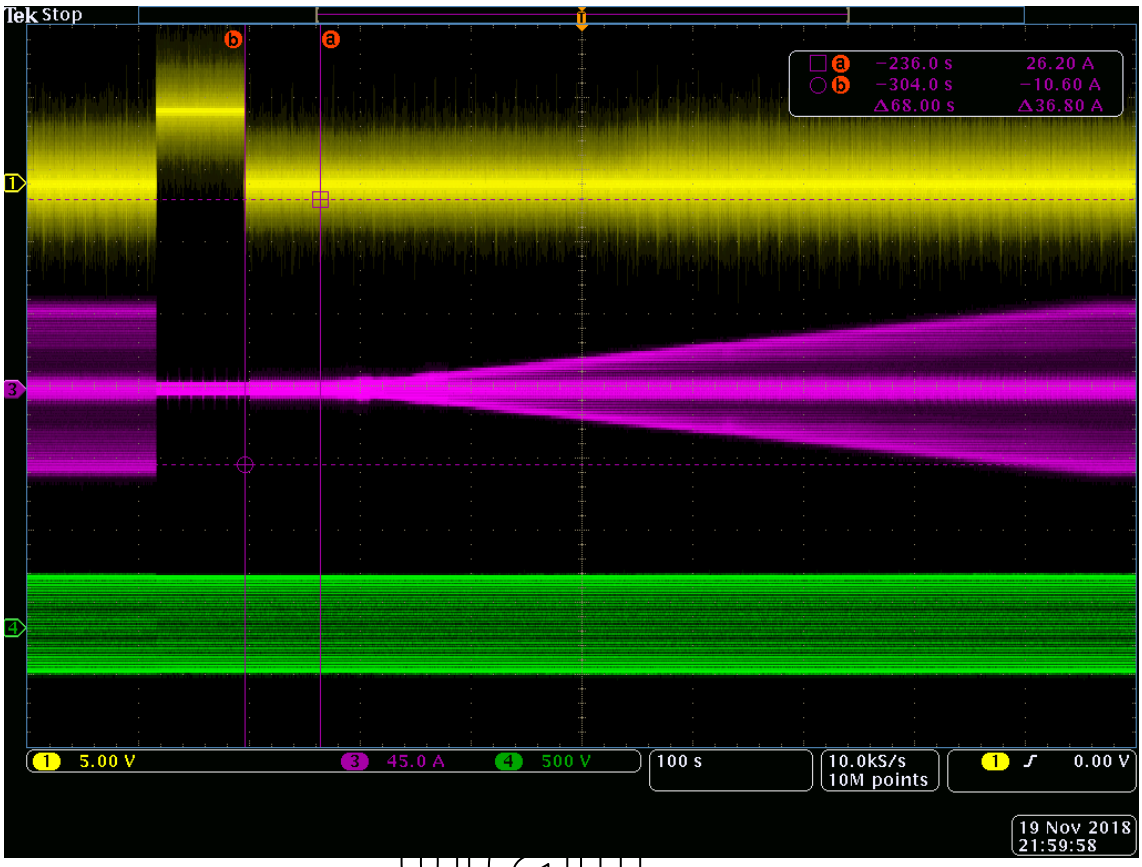




Reconnection delay time limit: 60 s | Reconnection time measured: 67 s

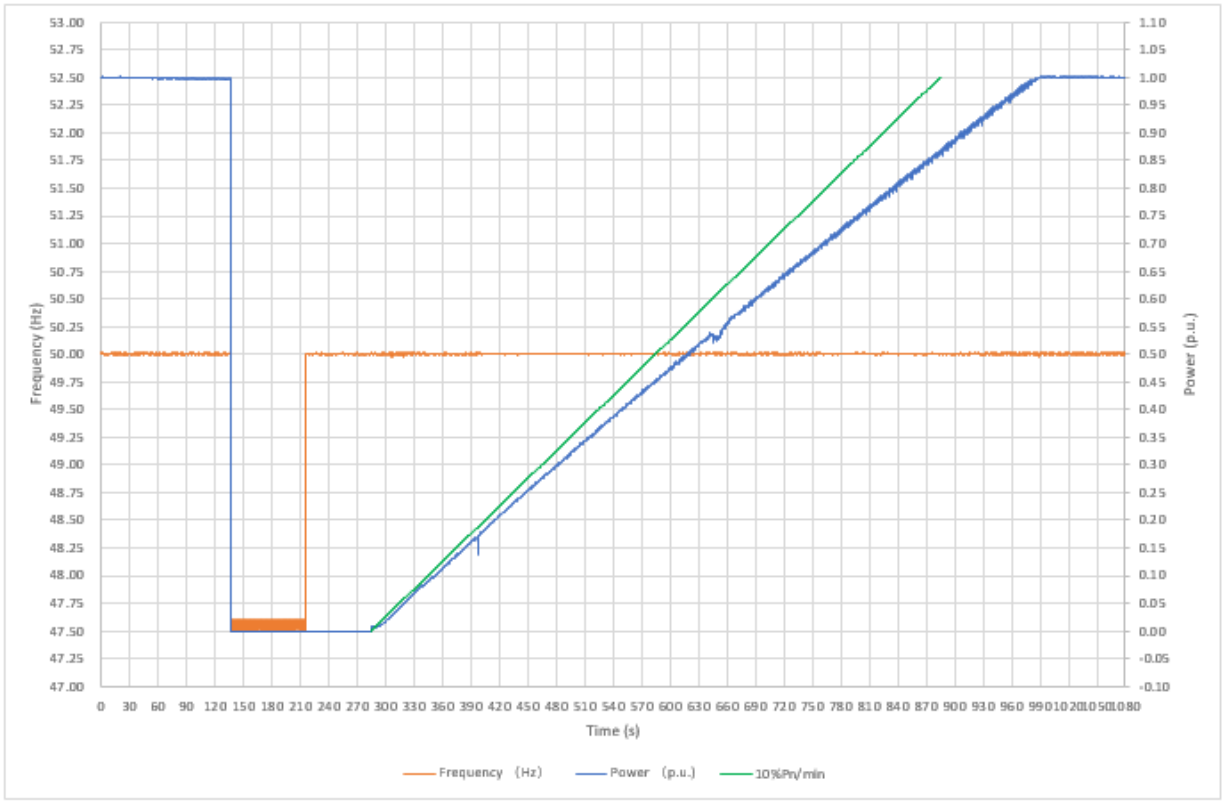
Overfrequency 50.05 Hz

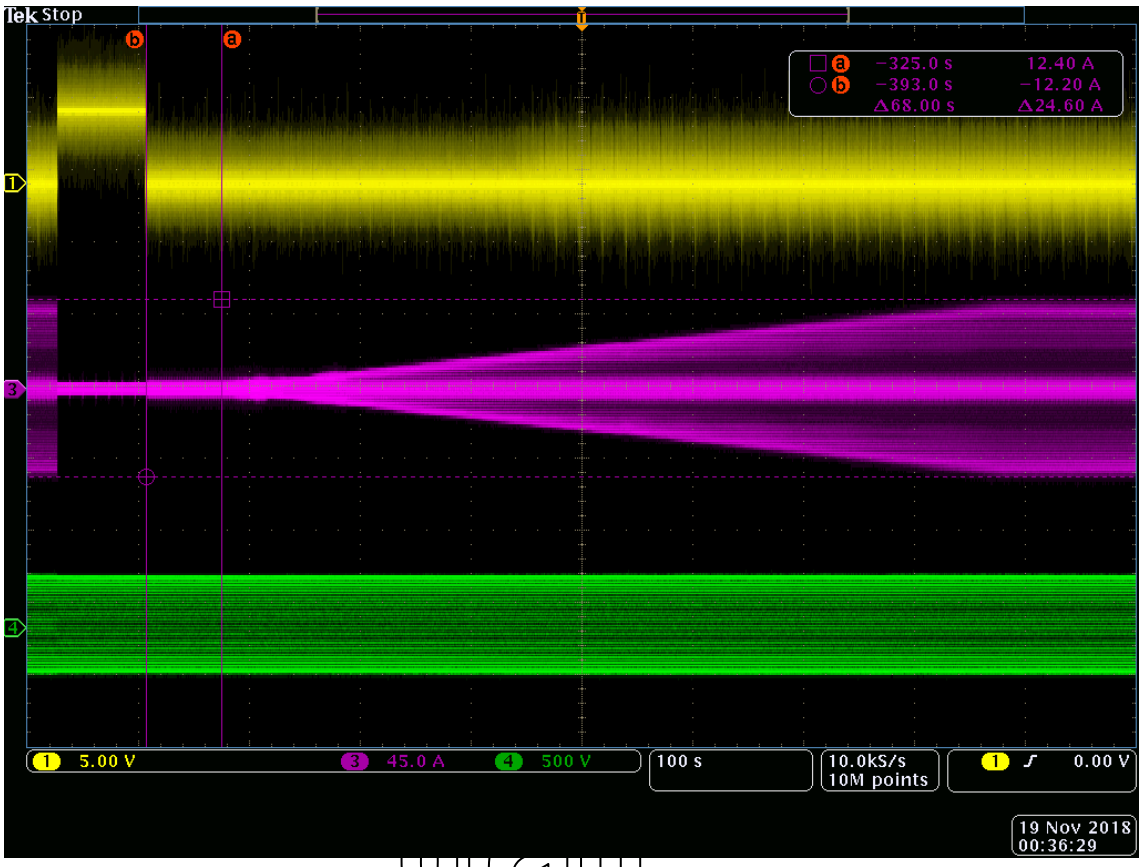




Reconnection delay time limit: 60 s | Reconnection time measured: 68 s

Underfrequency 47.5 Hz





Reconnection delay time limit: 60 s | Reconnection time measured: 68 s

4.3 VOLTAGE MONITORING

According to article 4.3 the NS protection should disconnect the power generation system from the net in the event of inadmissible voltage values. This point of the standard redirect to the point 6.5 of the VDE AR-N 4105:2011.

a) For measurement of the phase to phase voltages the phase angle must be turned so that one phase to phase voltage reaches the limit value, whereby the phase to neutral voltages for testing the overvoltage are set to 110 % *U*n and for undervoltage to 90 % *U*n.

b) For the measurement of the phase to neutral voltage, one phase to neutral voltage should be changed, whereby both other phase to neutral voltages are maintained at the nominal voltage. This test must be carried out separately for each phase.

To measure the response time, a voltage changes of:

– Nominal voltage to 118 % *U*n for overvoltage and
– Nominal voltage to 77 % *U*n for undervoltage

is carried out.

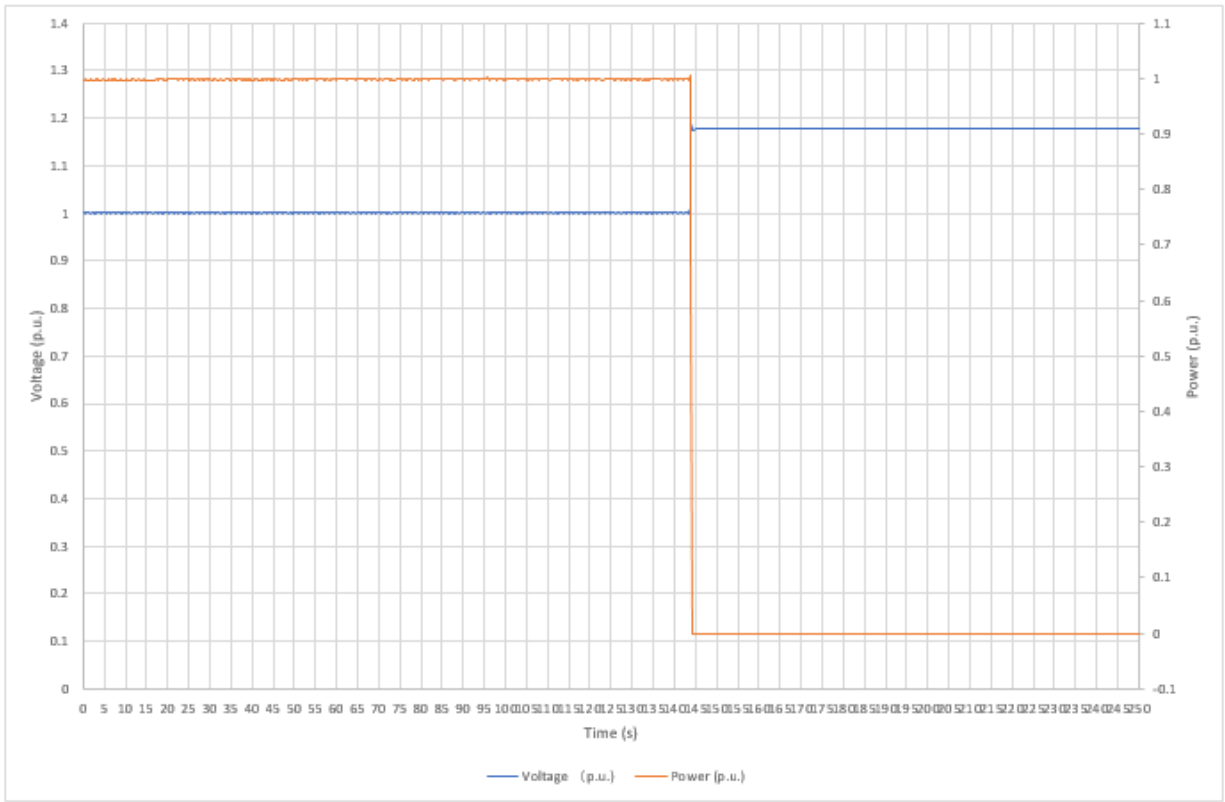
All tests for verification of the disconnection values and times must be carried out three times.

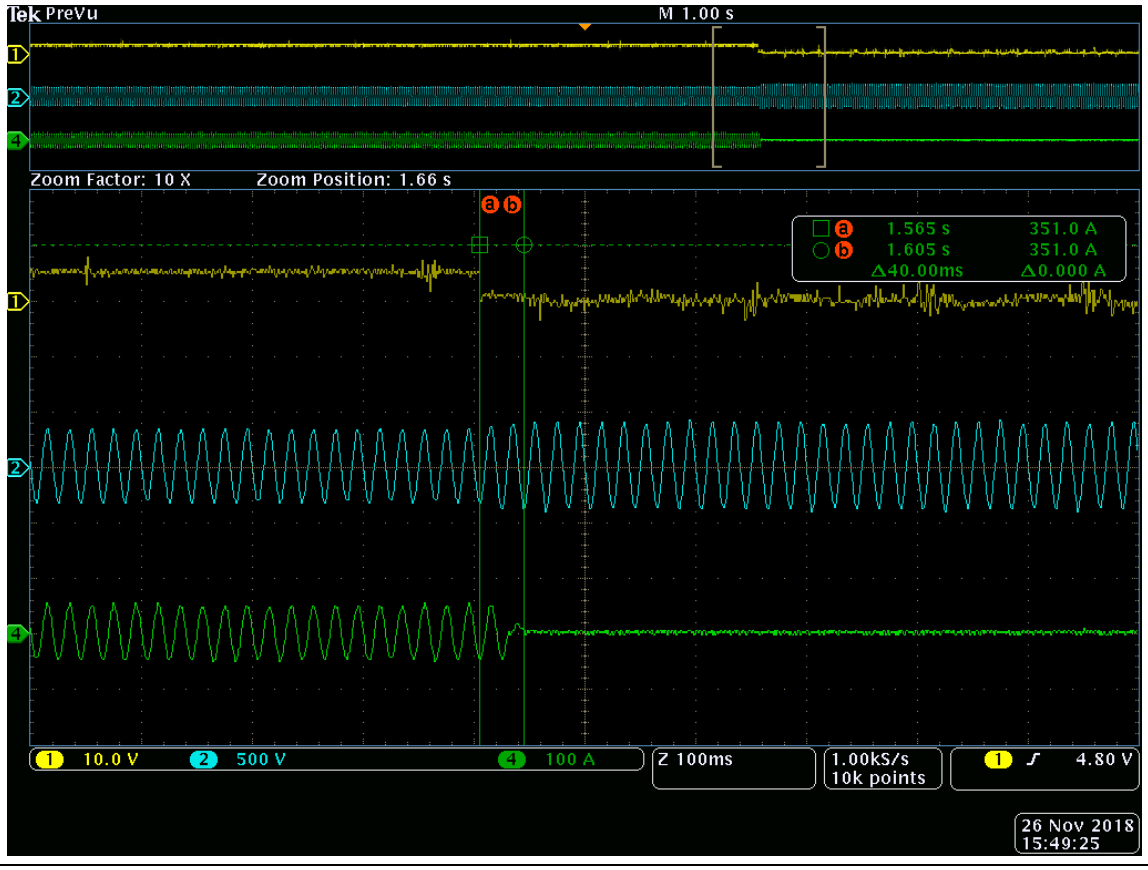
The results are offered in the table below:

Disconnection time measured					
Protective function	**Voltage changes**	**Disconnection time limits**	**Test 1**	**Test 2**	**Test 3**
Rise-in-voltage protection (U>>)	100% Un to 118% Un	< 200 ms	40	34	38
Voltage drop protection (U<)	100% Un to 77% Un	< 200 ms	195	194	194

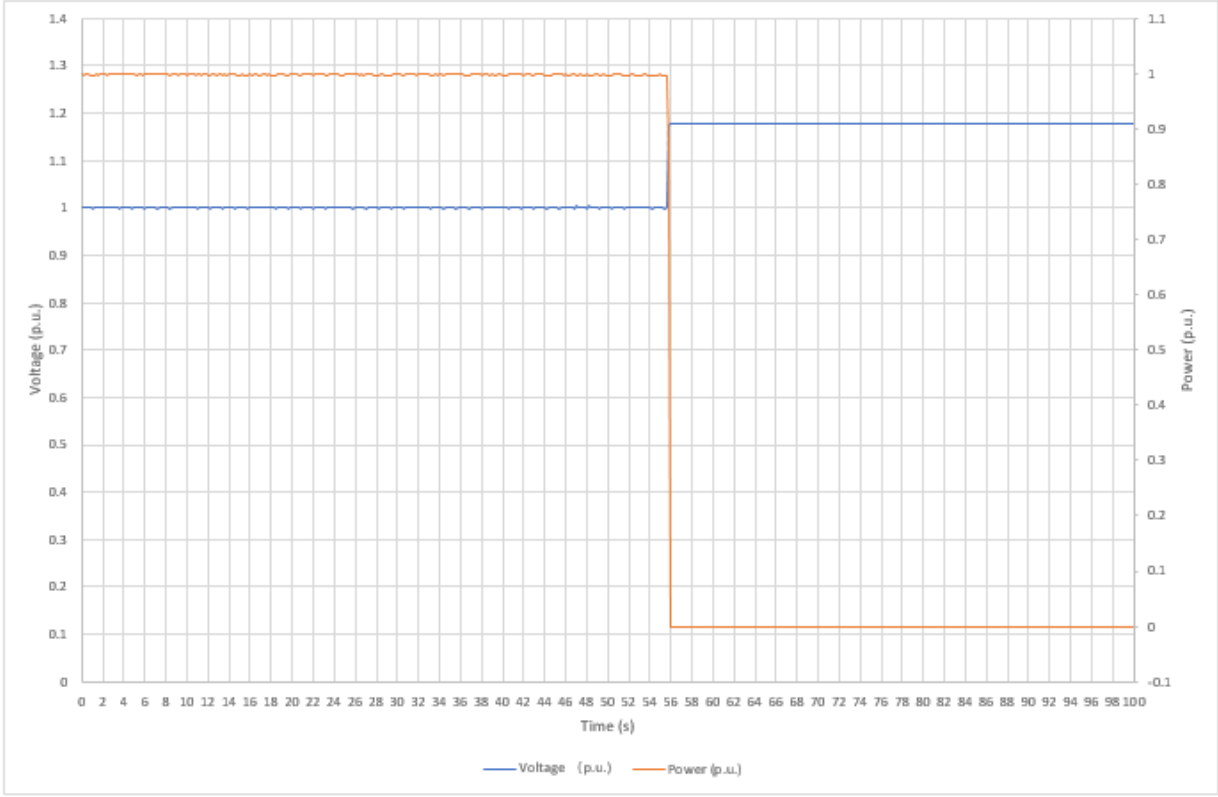
In the picture below are offered waveforms and graphically the results of the test.

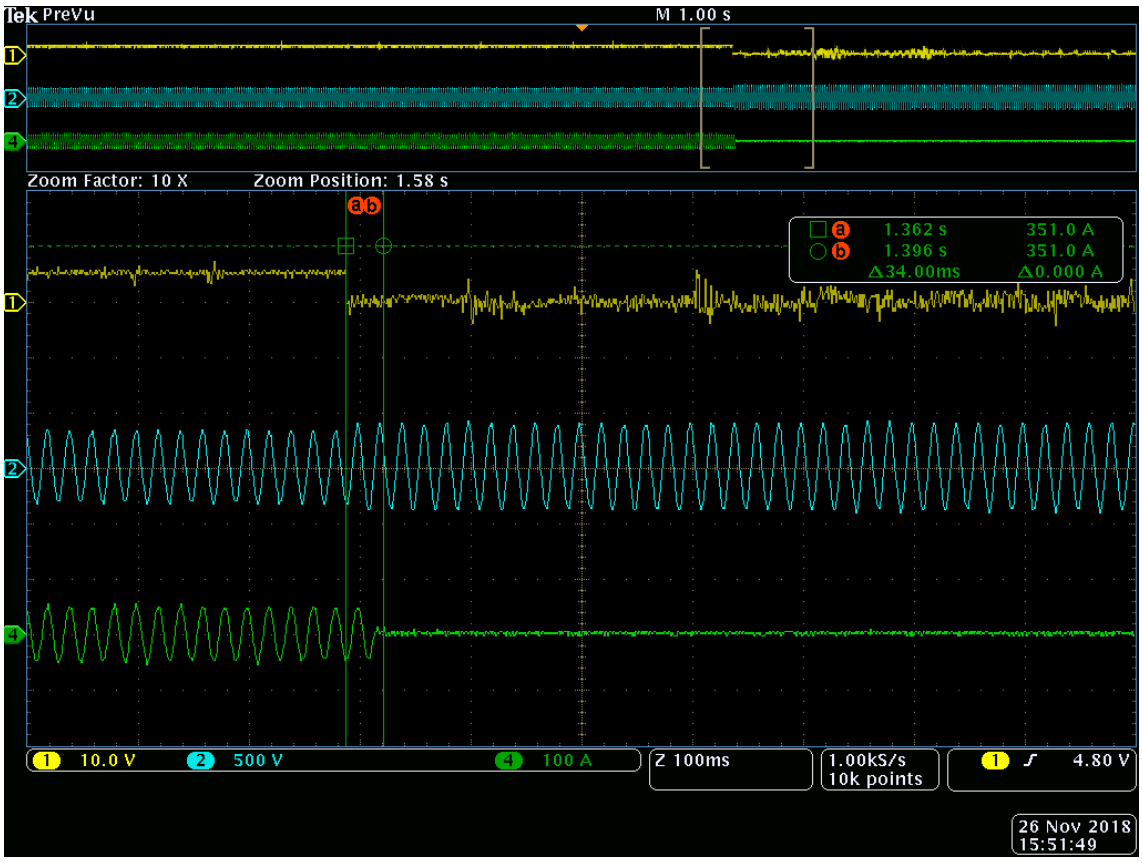
Nominal voltage to 118 % Un for overvoltage - Test 1



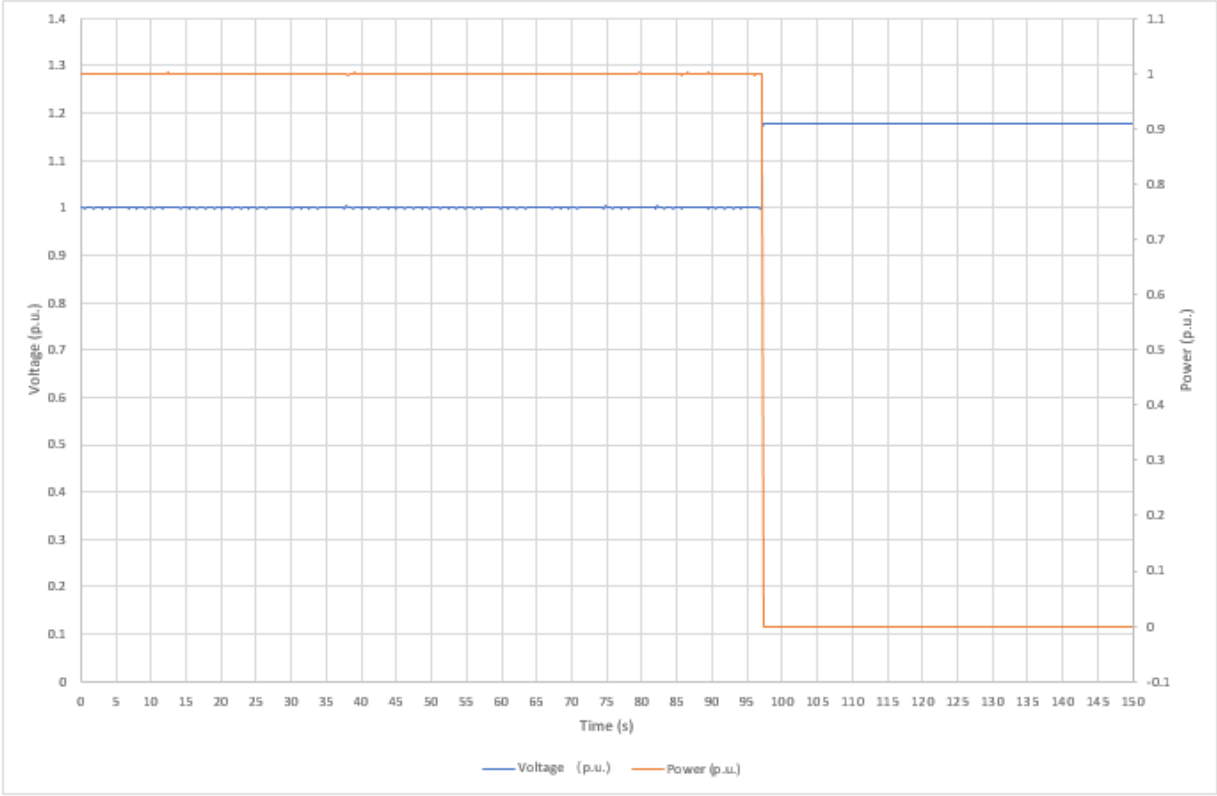


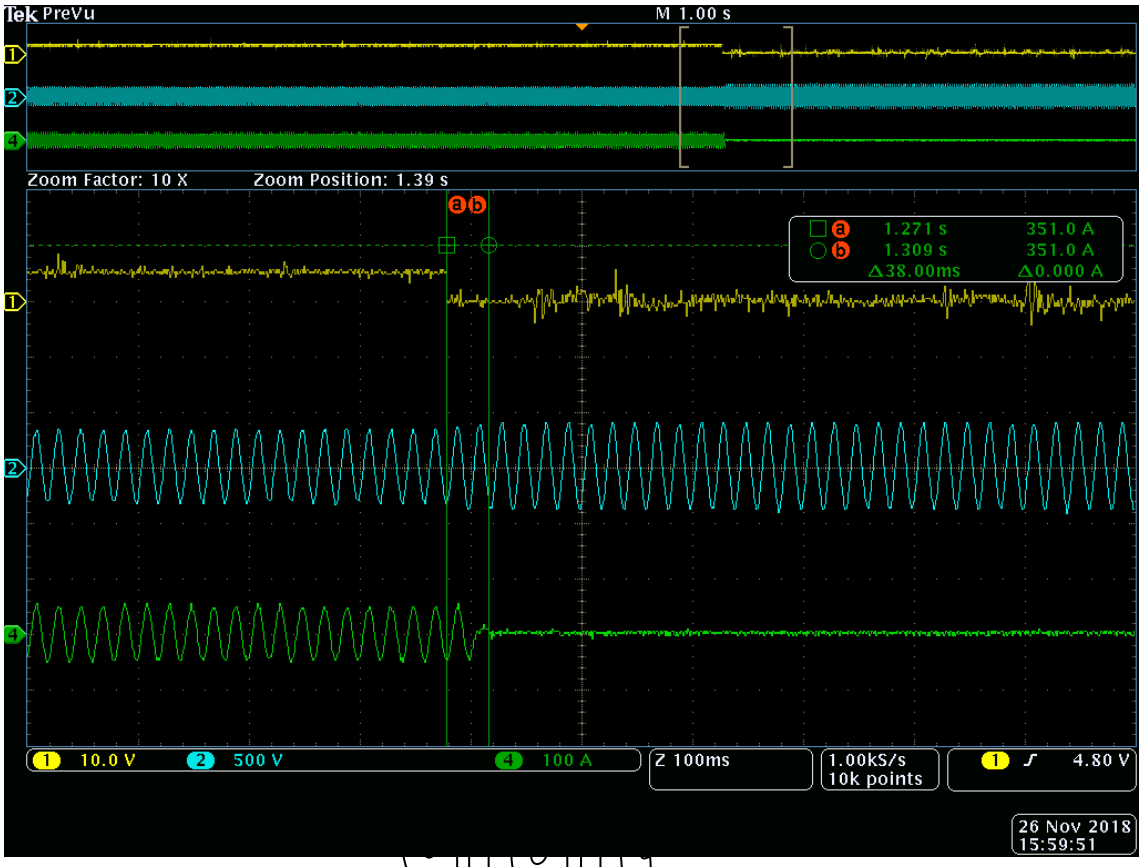
Nominal voltage to 118 % Un for overvoltage - Test 2



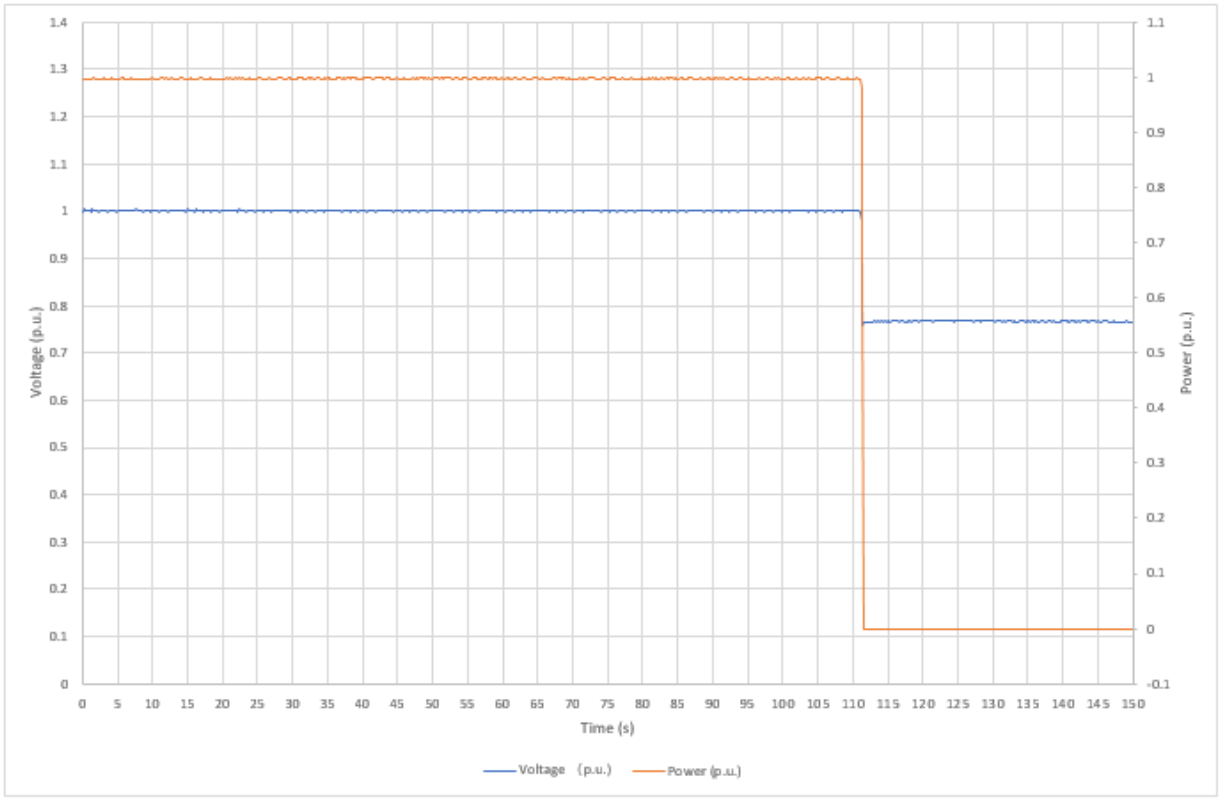


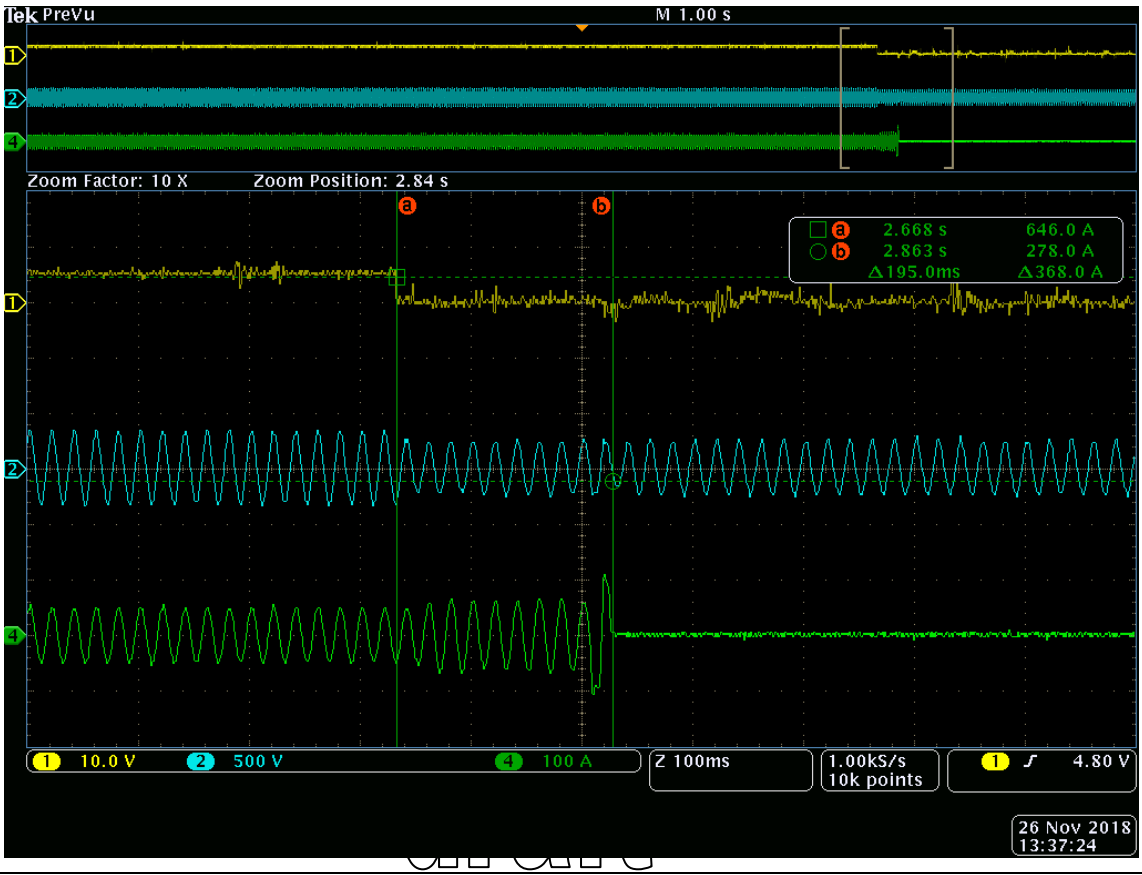
Nominal voltage to 118 % Un for overvoltage - Test 3



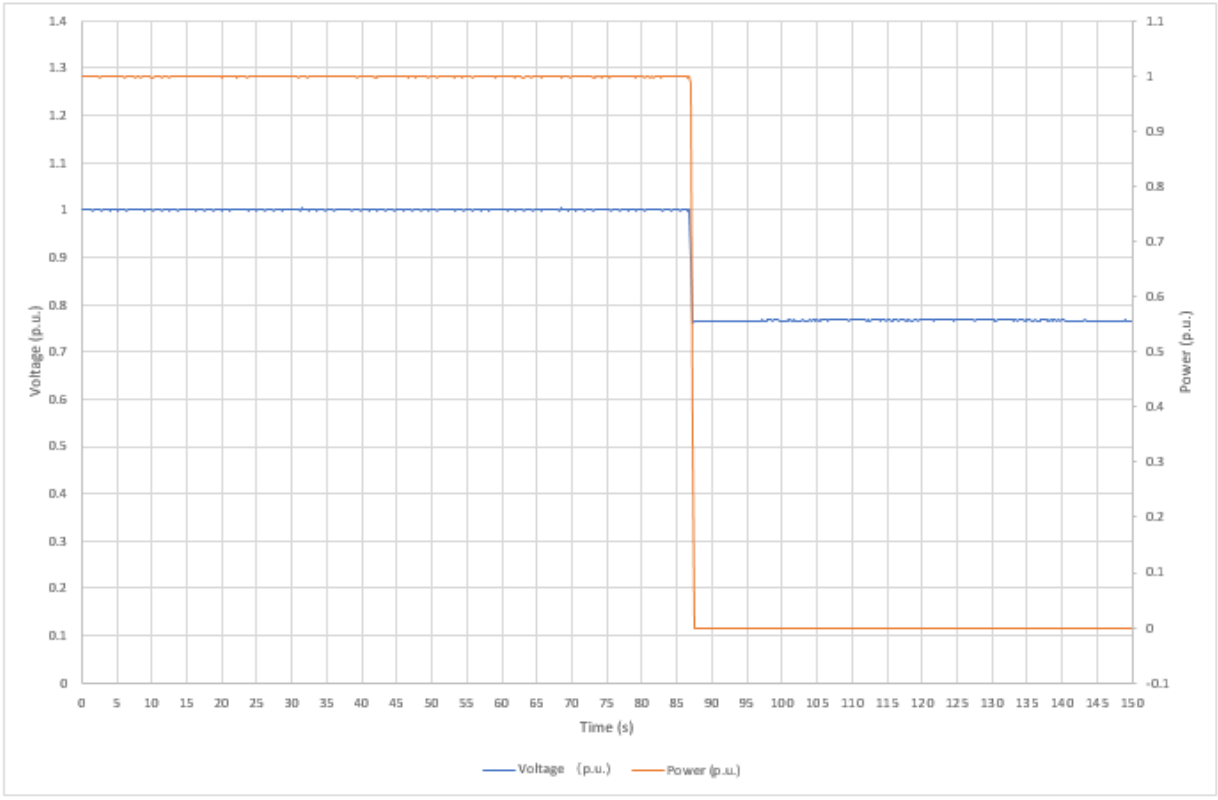


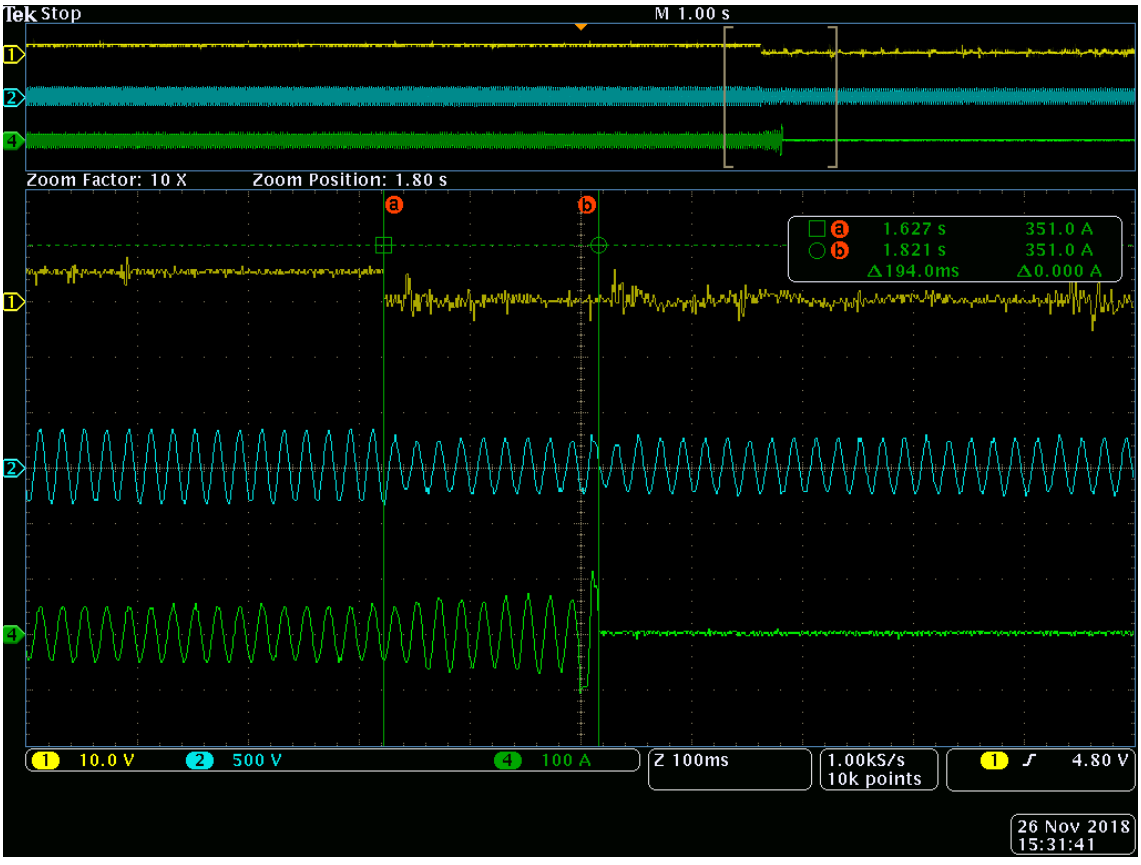
Nominal voltage to 77 % Un for undervoltage - Test 1



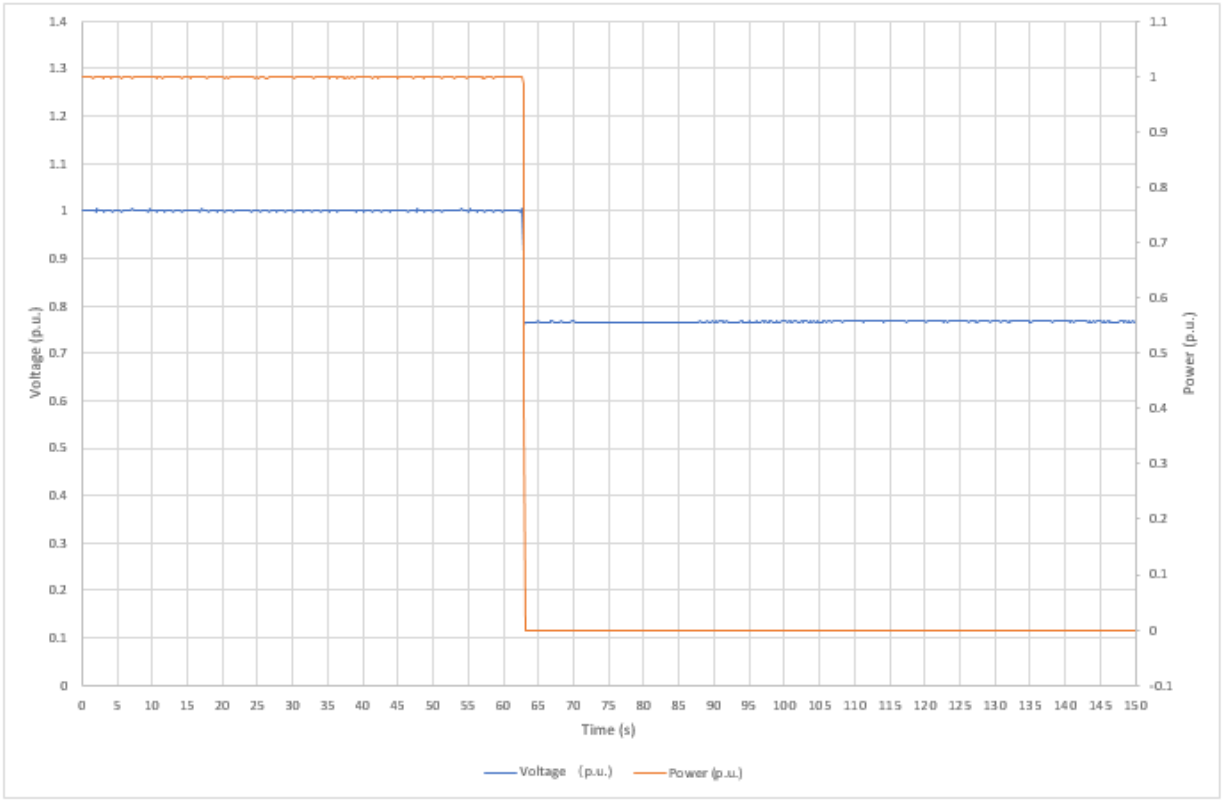


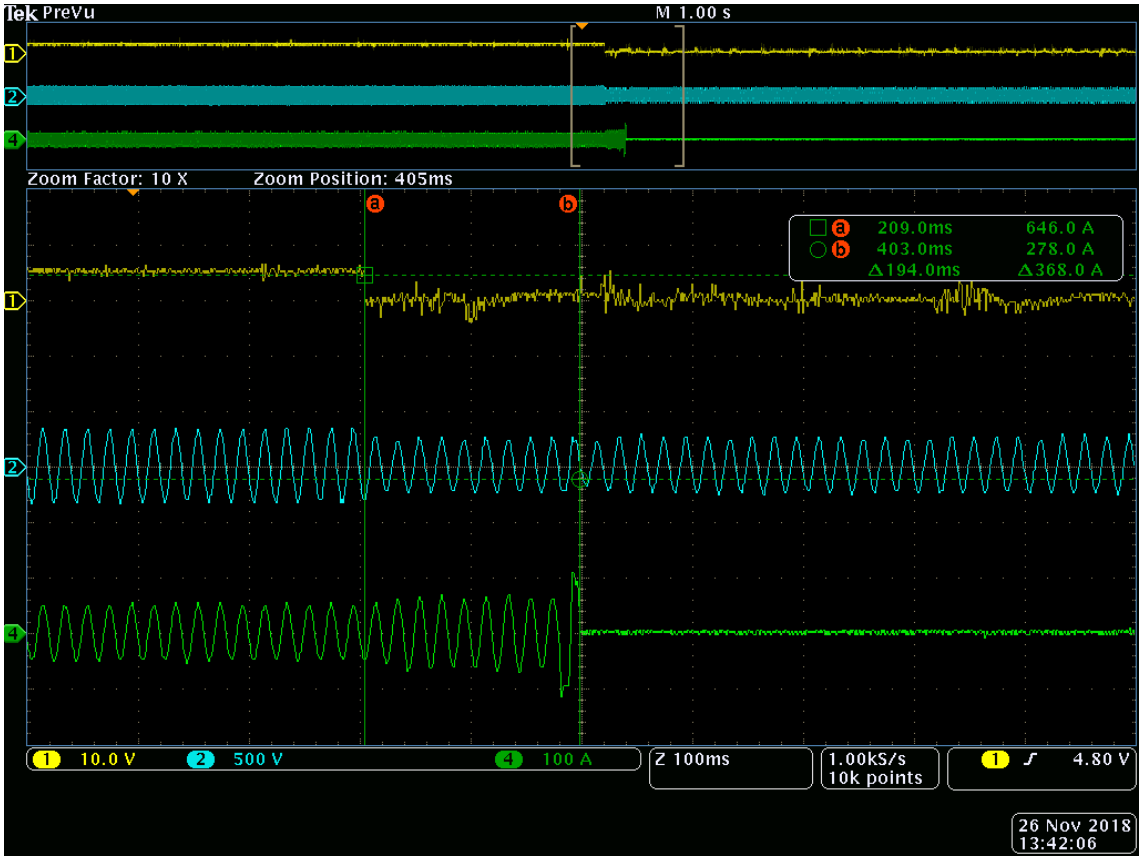
Nominal voltage to 77 % Un for undervoltage - Test 2





Nominal voltage to 77 % Un for undervoltage - Test 3





The rise-in voltage protection $U>$ test is carried out as follows:

a) The voltage is set to 100 % U_n and maintained for 600 s. The voltage is then set to 112 % U_n. Disconnection must be effected within 600 seconds.

NOTE This test serves to verify the measuring accuracy and the maximum set time.

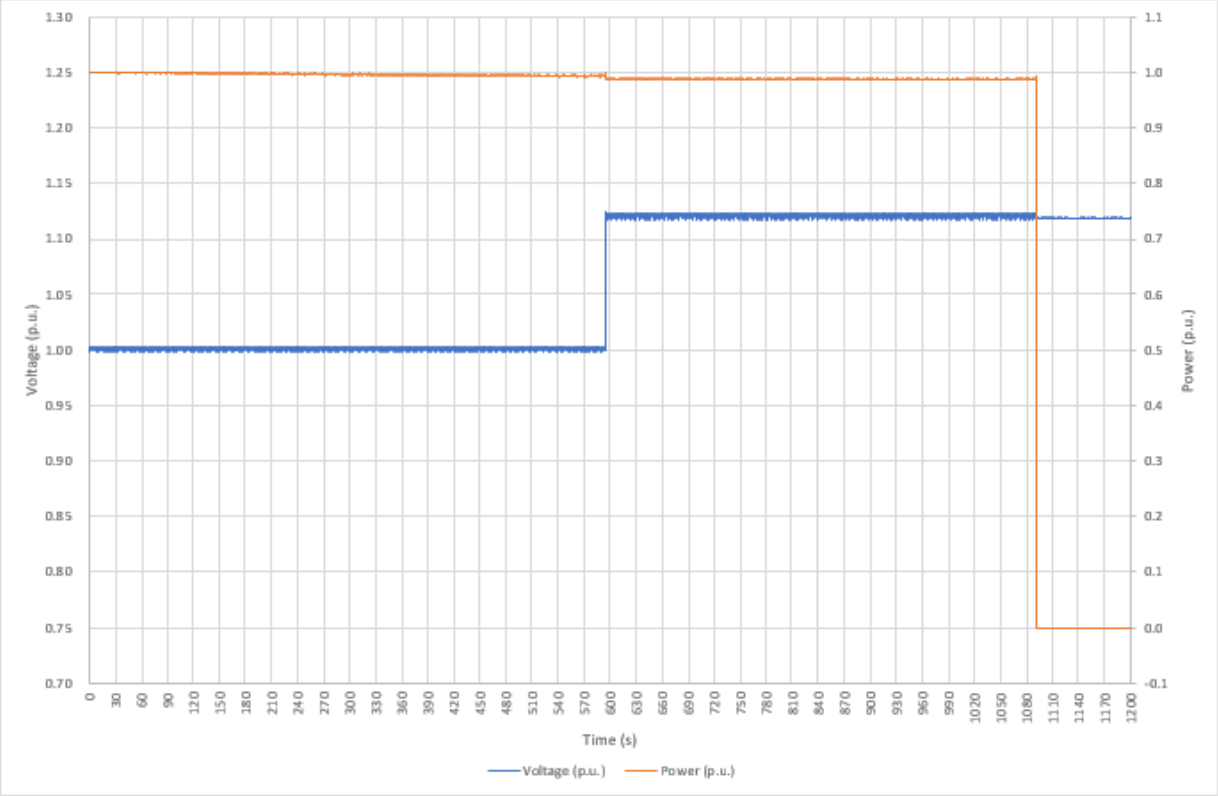
b) The voltage is set for 600 s to U_n, then for 600 s to 108 % U_n. Disconnection should not occur.

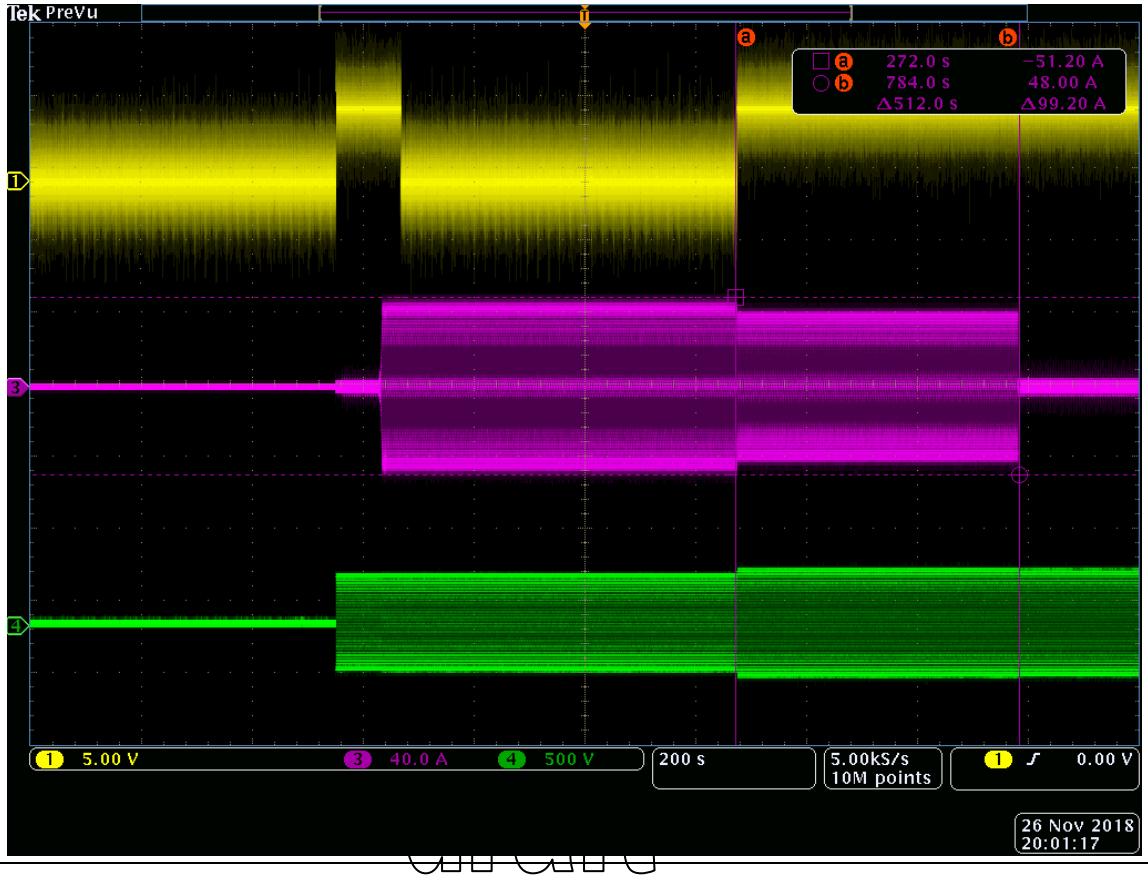
NOTE This test serves to verify the measuring accuracy.

c) The voltage is set to 106 % U_n and maintained for 600 s. The voltage is then set to 114 % U_n. Disconnection must be effected within 300 seconds.

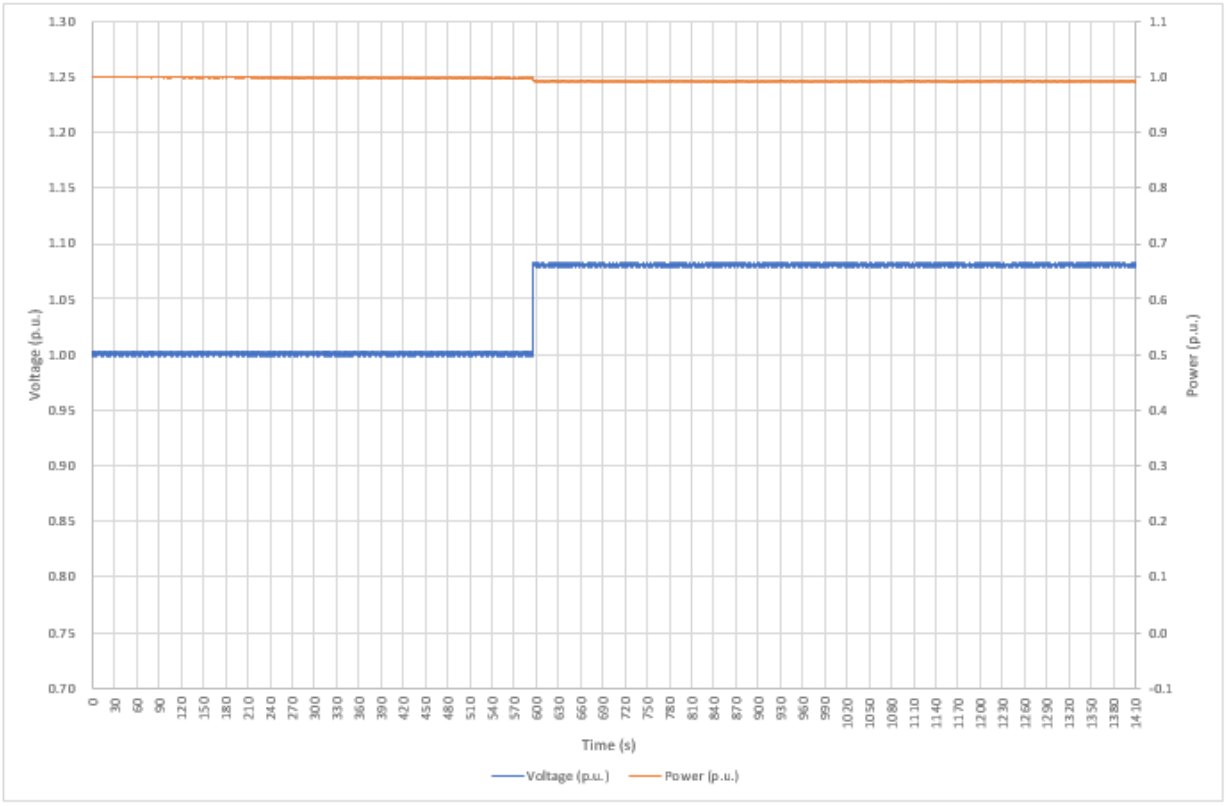
In the pictures below are offered graphically the results of the test.

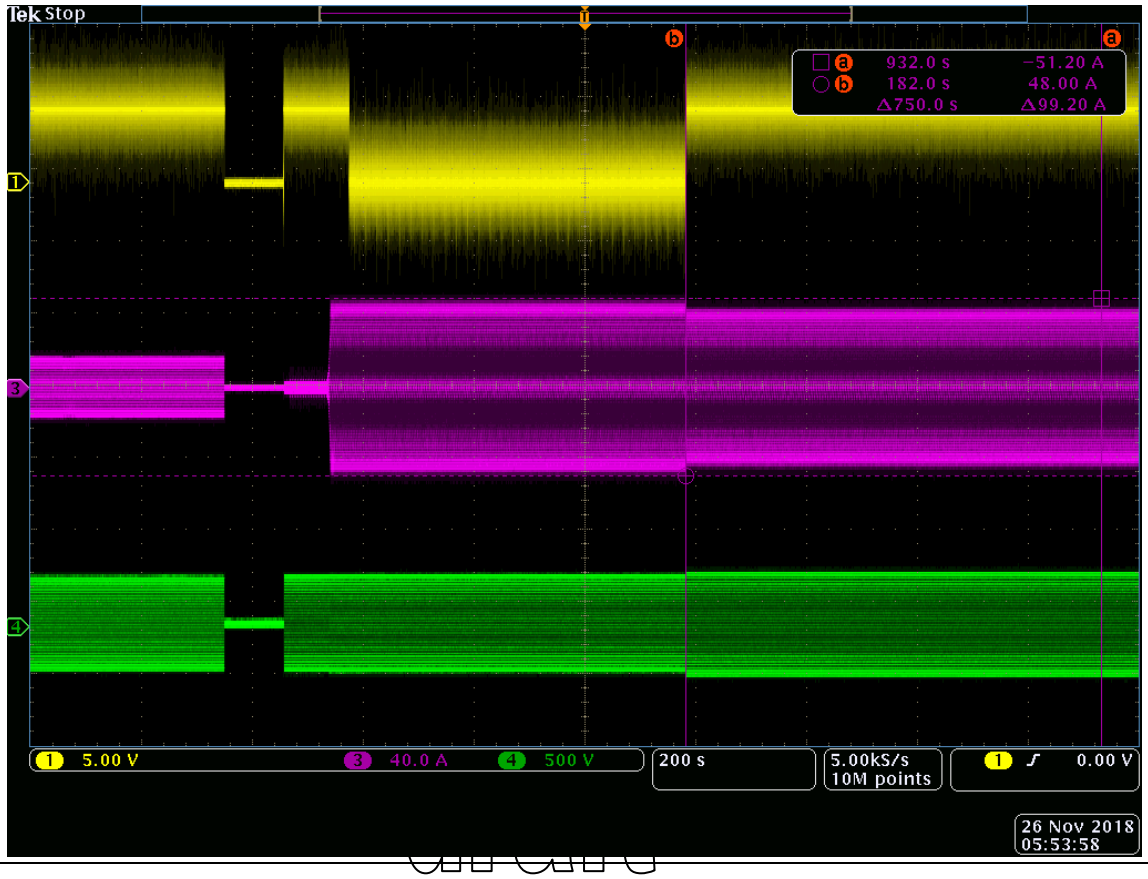
Measured a)


Voltage (p.u.)
Power (p.u.)
Time (s)
Voltage (p.u.)
Power (p.u.)

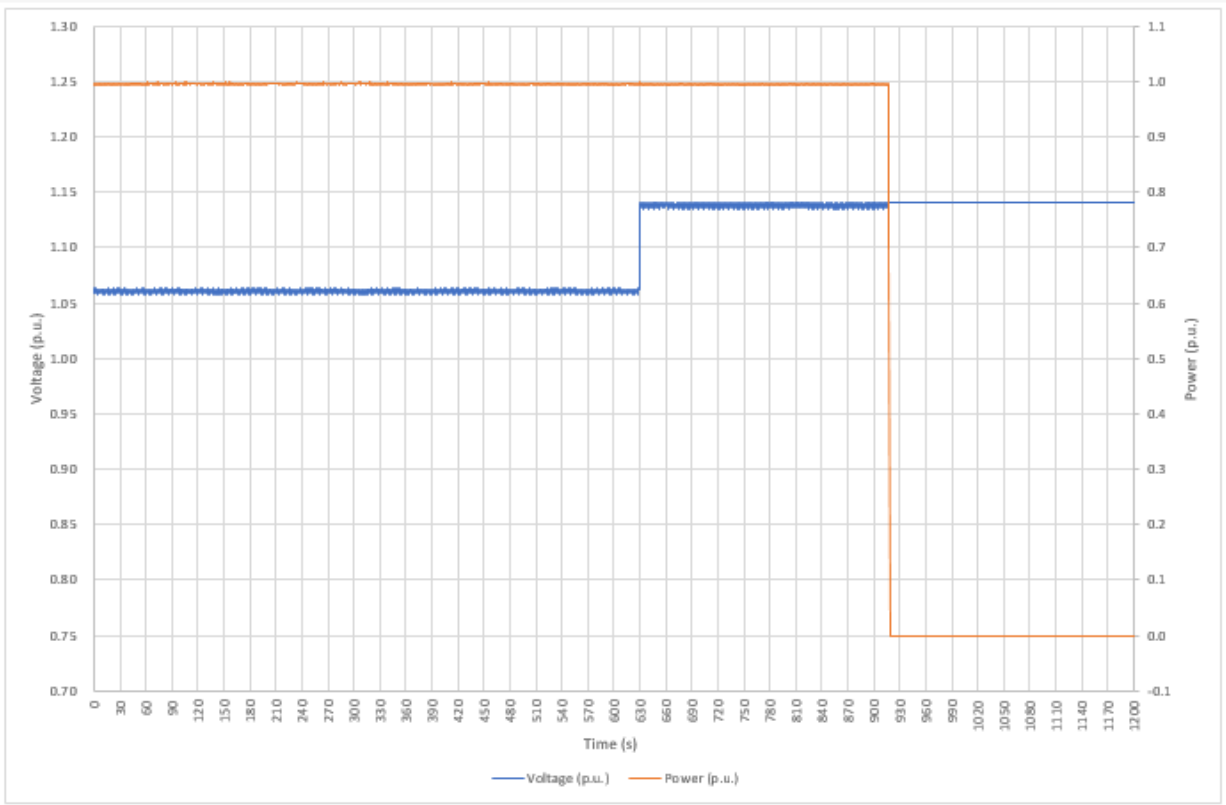

Tek PreVu
a 272.0 s −51.20 A
b 784.0 s 48.00 A
Δ512.0 s Δ99.20 A
1 5.00 V
3 40.0 A
4 500 V
200 s
5.00kS/s
10M points
1 0.00 V
26 Nov 2018
20:01:17

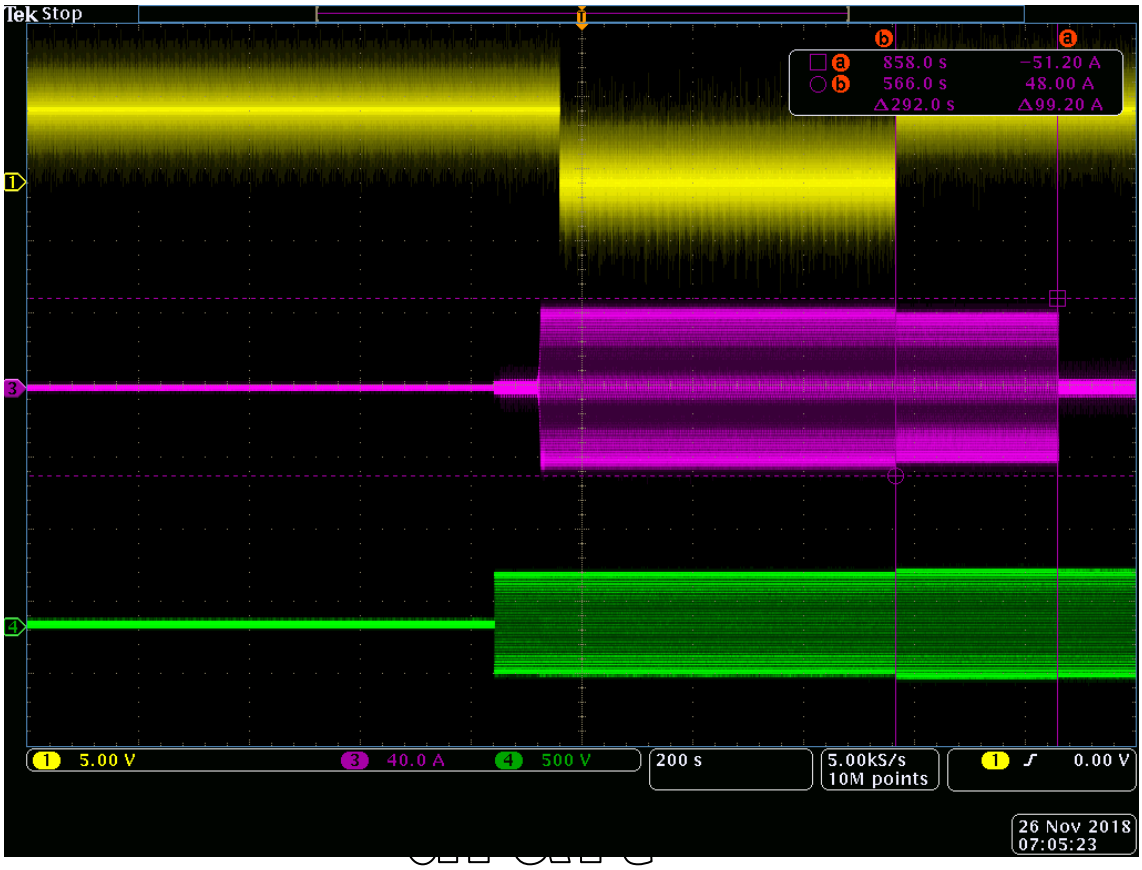
Measured b)


Voltage (p.u.)
Power (p.u.)
Time (s)
Voltage (p.u.)
Power (p.u.)


Tek Stop
932.0 s
−51.20 A
182.0 s
48.00 A
Δ750.0 s
Δ99.20 A
1 5.00 V
3 40.0 A
4 500 V
200 s
5.00kS/s
10M points
1 0.00 V
26 Nov 2018
05:53:58

Measured c)


Voltage (p.u.)
Power (p.u.)
Time (s)
Voltage (p.u.)
Power (p.u.)


Tek Stop
858.0 s
566.0 s
Δ292.0 s
−51.20 A
48.00 A
Δ99.20 A
1 5.00 V
3 40.0 A
4 500 V
200 s
5.00kS/s
10M points
1 0.00 V
26 Nov 2018
07:05:23

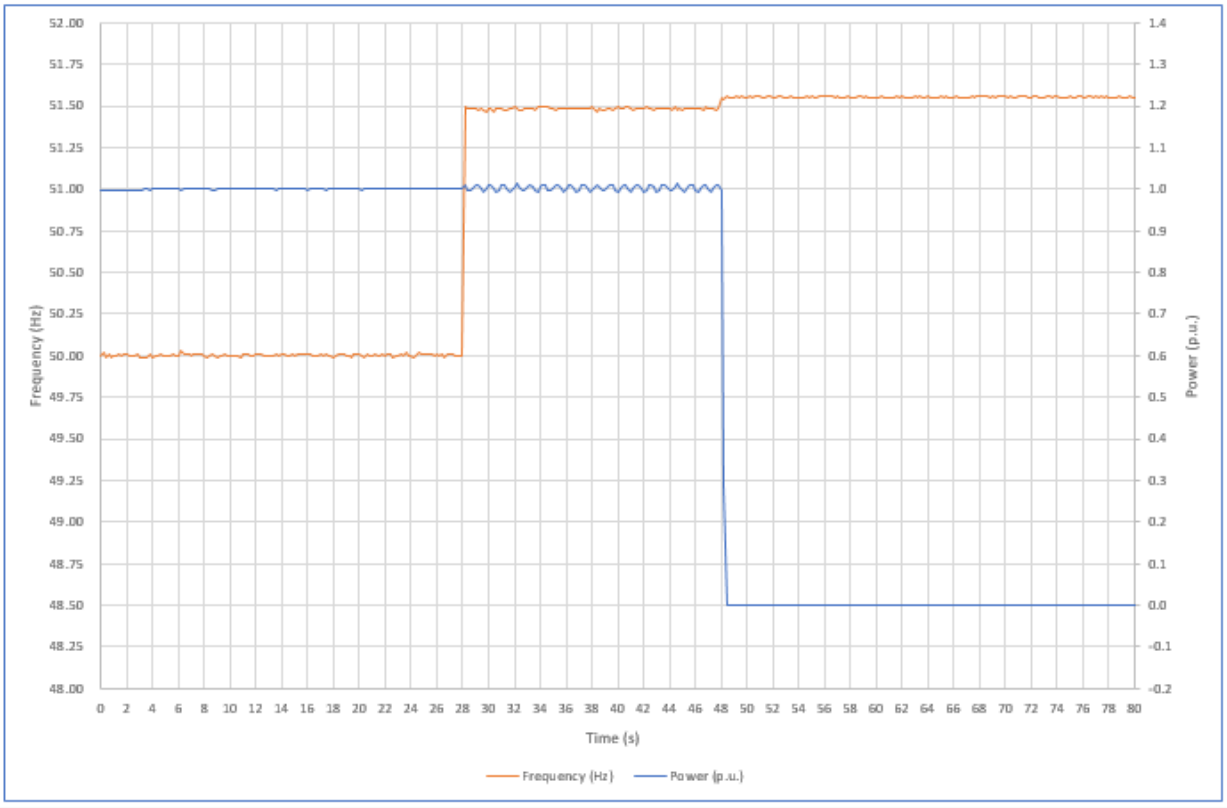
4.4 FREQUENCY MONITORING

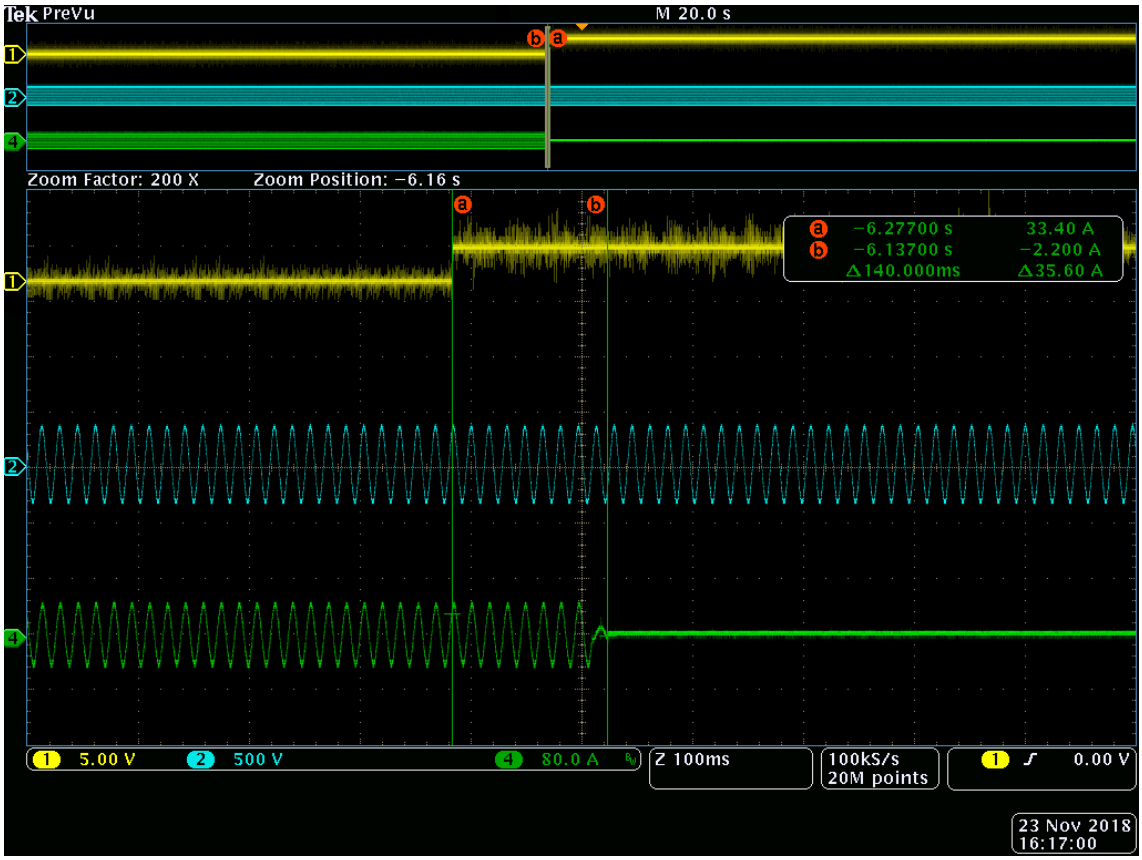
According to article 4.4 the NS protection should disconnect the power generation system from the net in the event of inadmissible frequency values.

Disconnection time measured					
Protective function	**Frequency changes**	**Disconnection time limits**	**Test 1**	**Test 2**	**Test 3**
Frequency increase protection (f>)	50.00 Hz to 51.48 Hz to 51.55 Hz	< 200 ms	140 ms	191 ms	126 ms
Frequency decrease protection (f<)	50.00Hz to 47.53Hz to 47.45 Hz	< 200 ms	95 ms	96 ms	129 ms

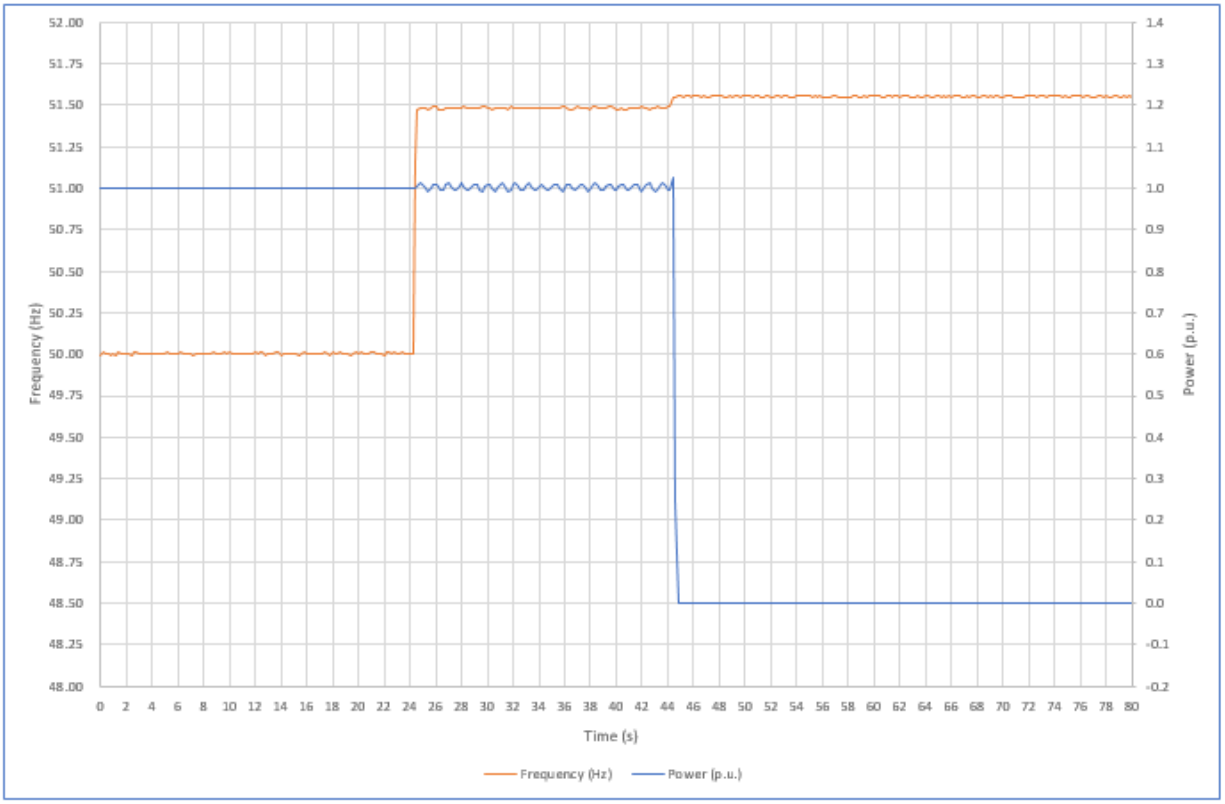
In the picture below are offered waveforms and graphically the results of the test.

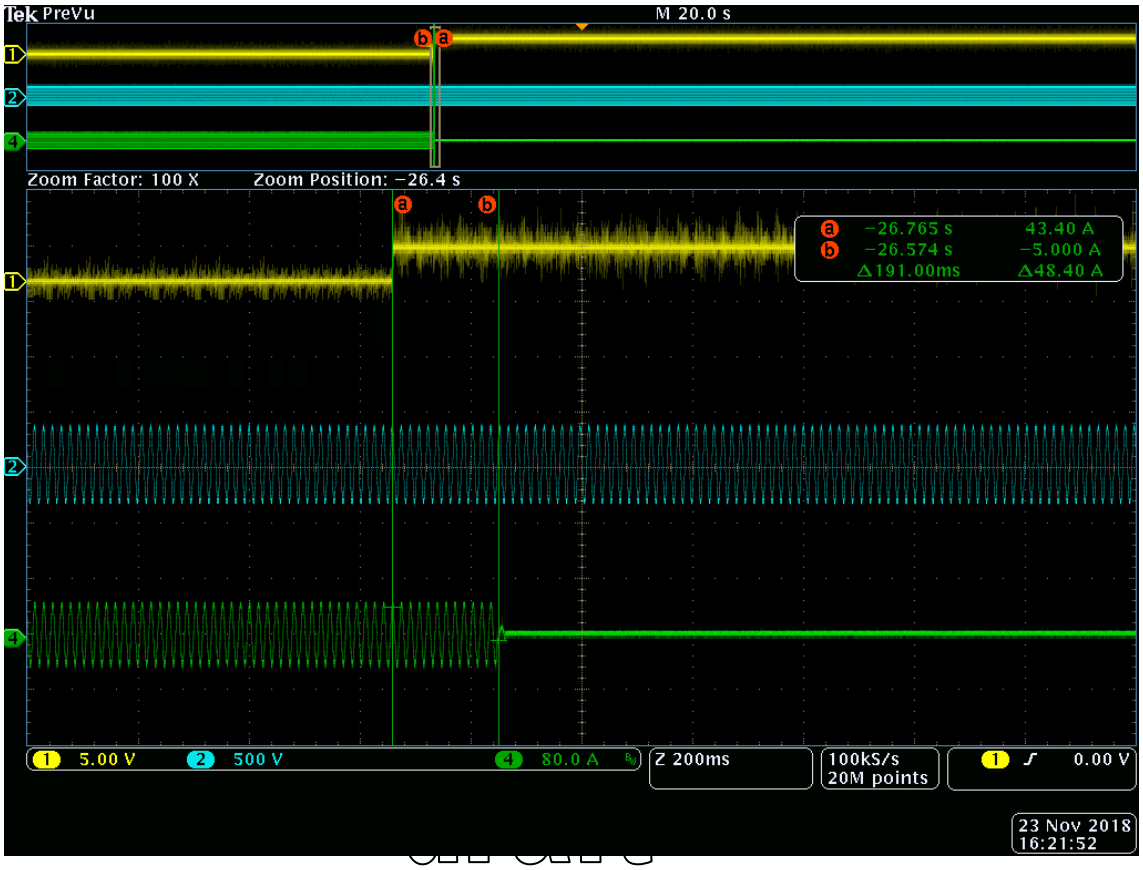
Overfrequency 51.5 Hz- Test 1



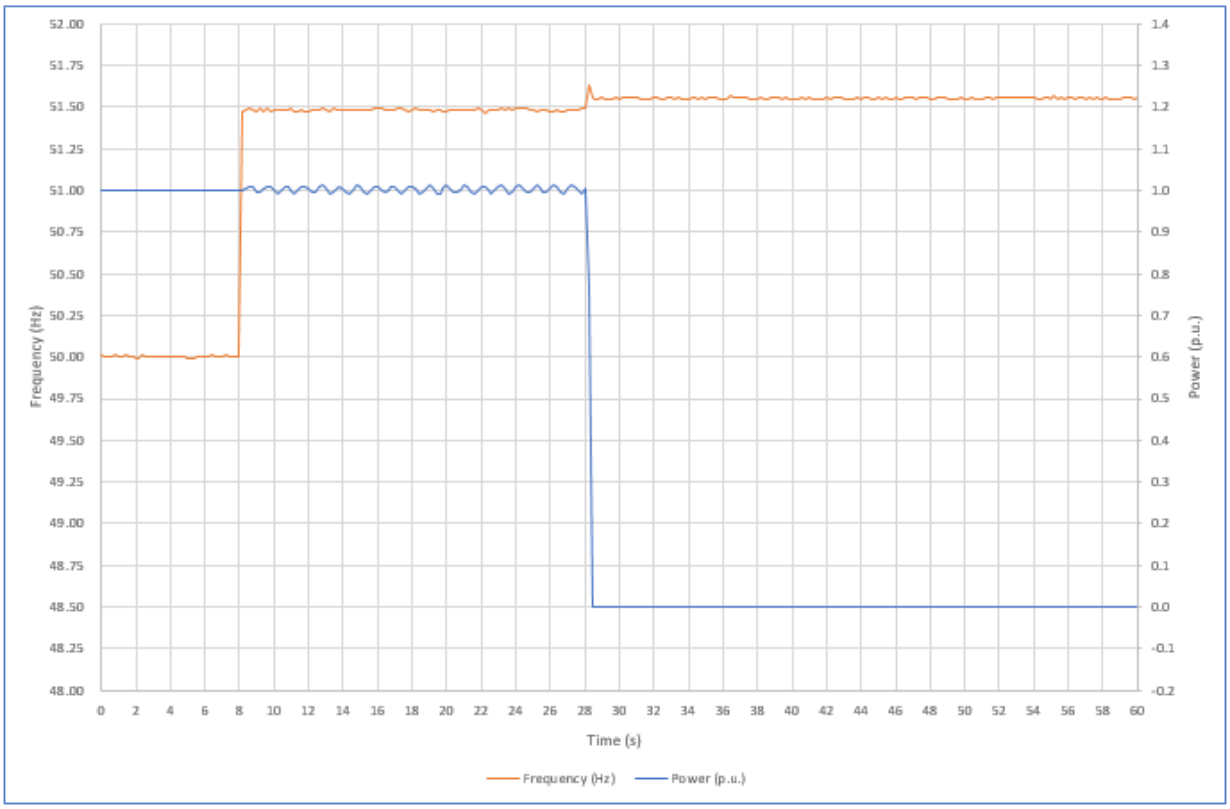


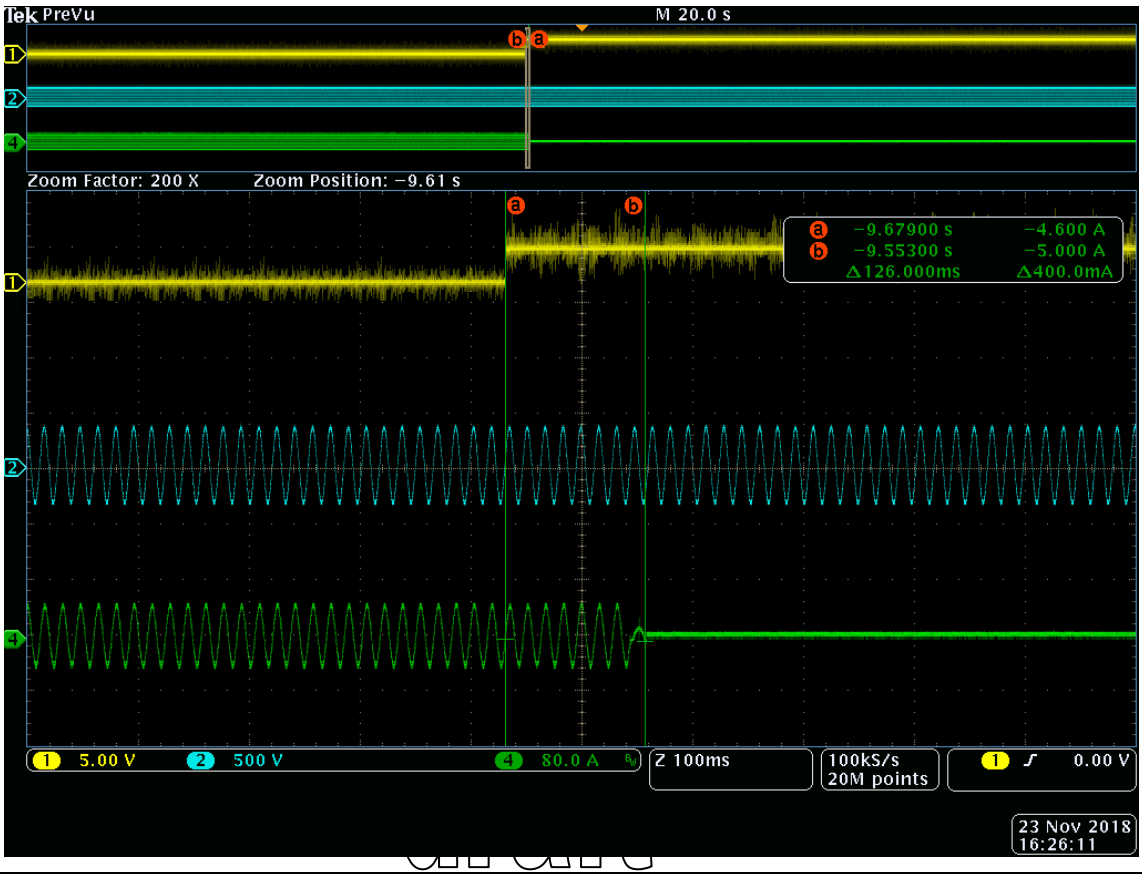
Overfrequency 51.5 Hz- Test 2



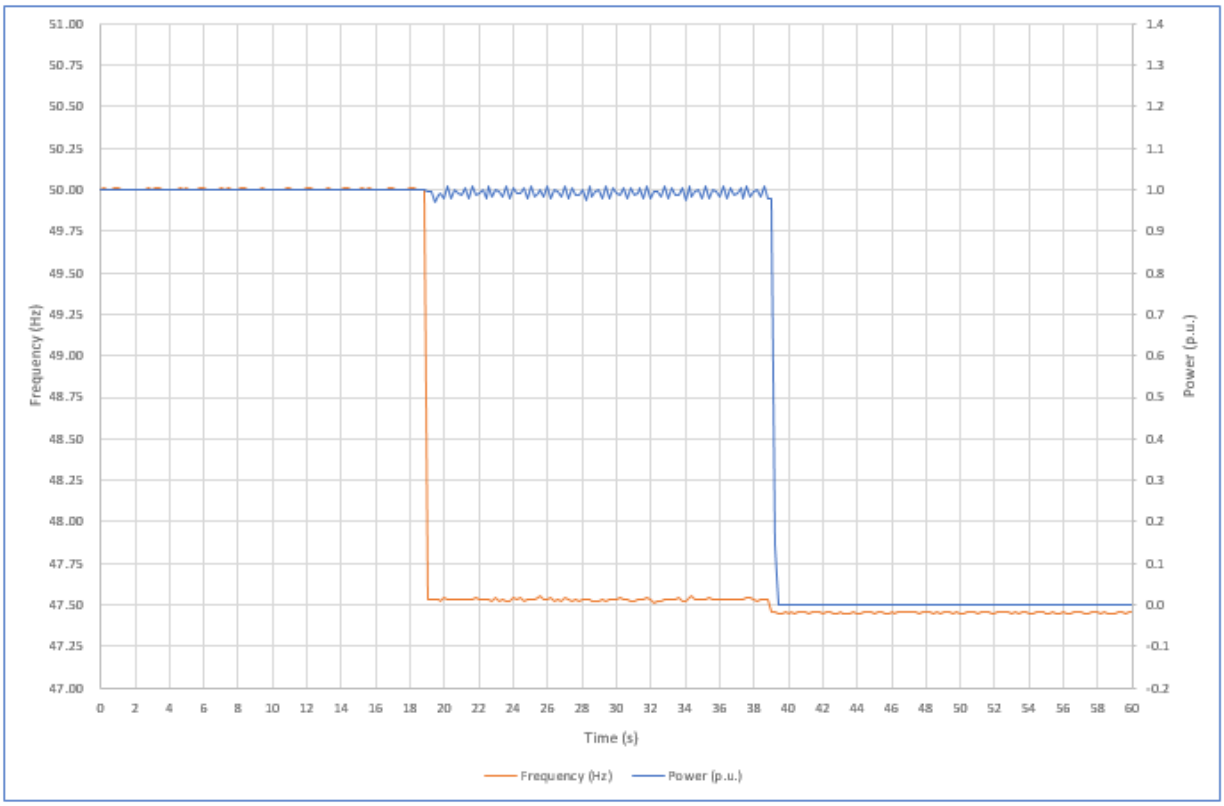


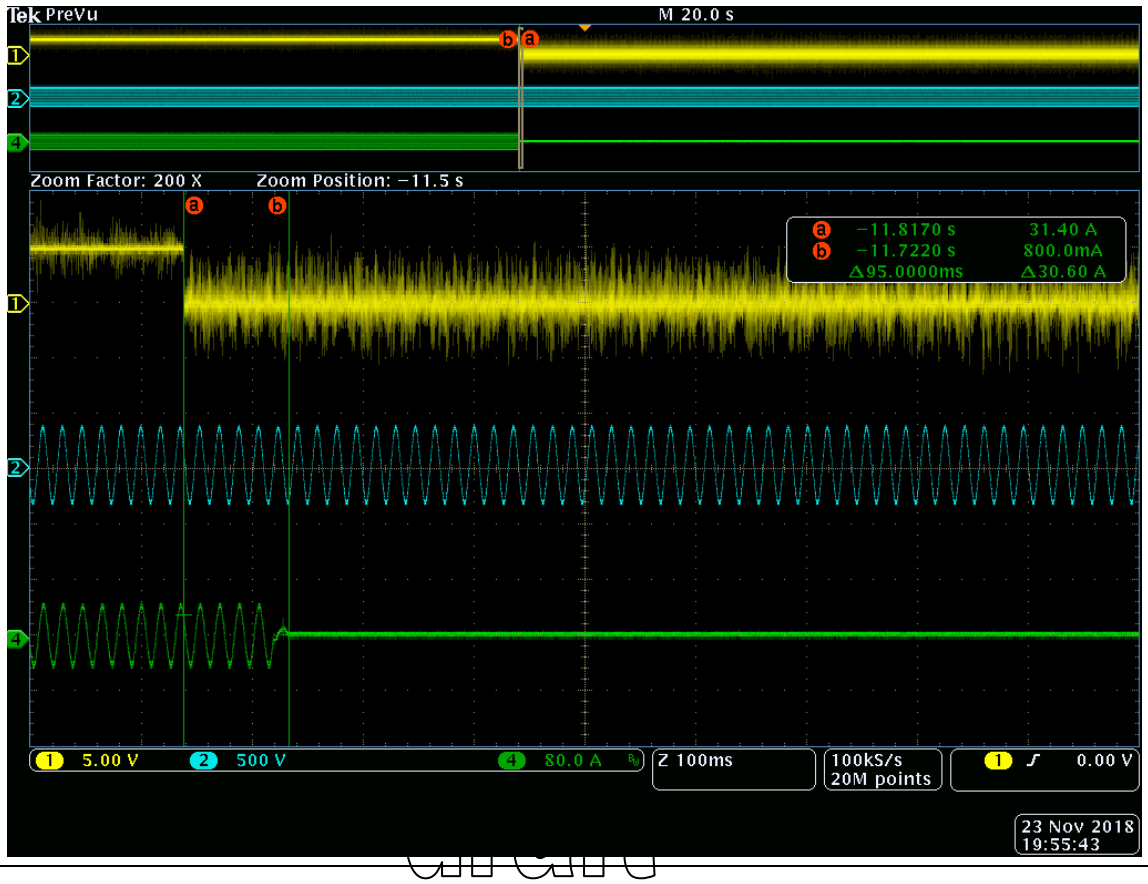
Overfrequency 51.5 Hz- Test 3



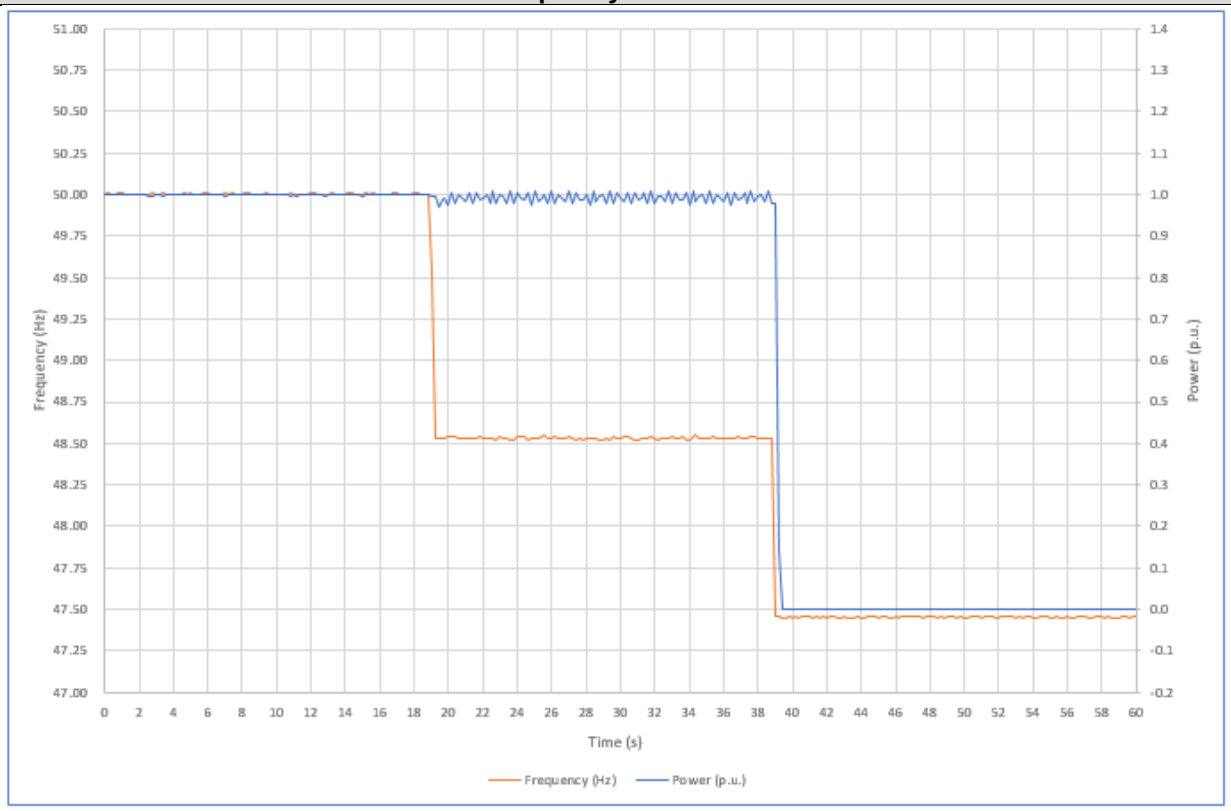


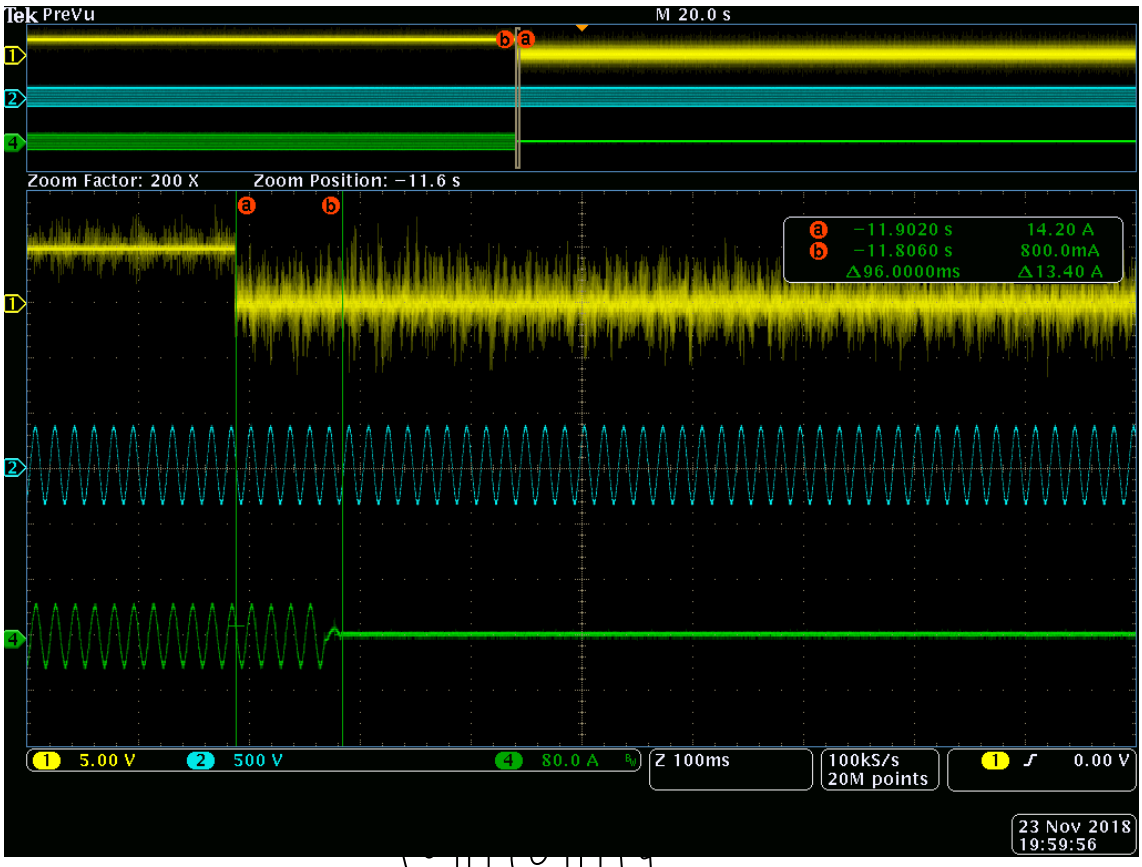
Underfrequency 47.5 Hz- Test 1



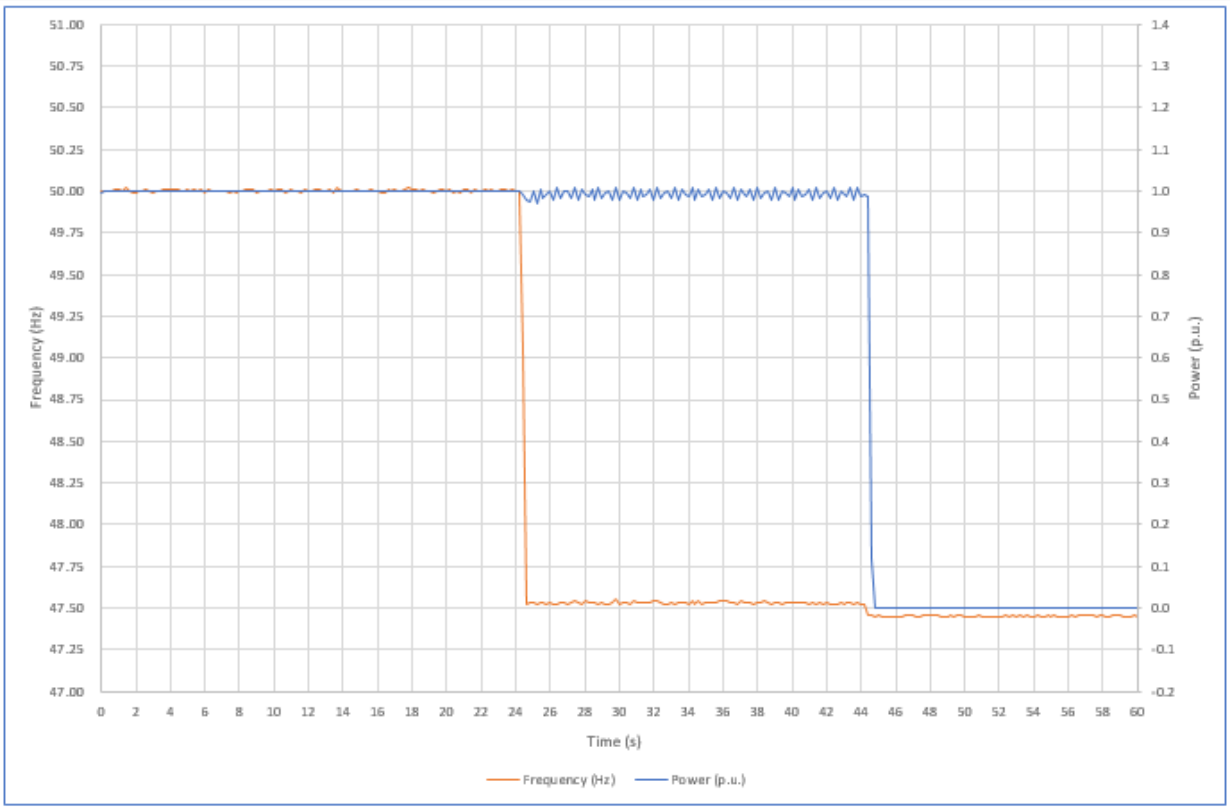


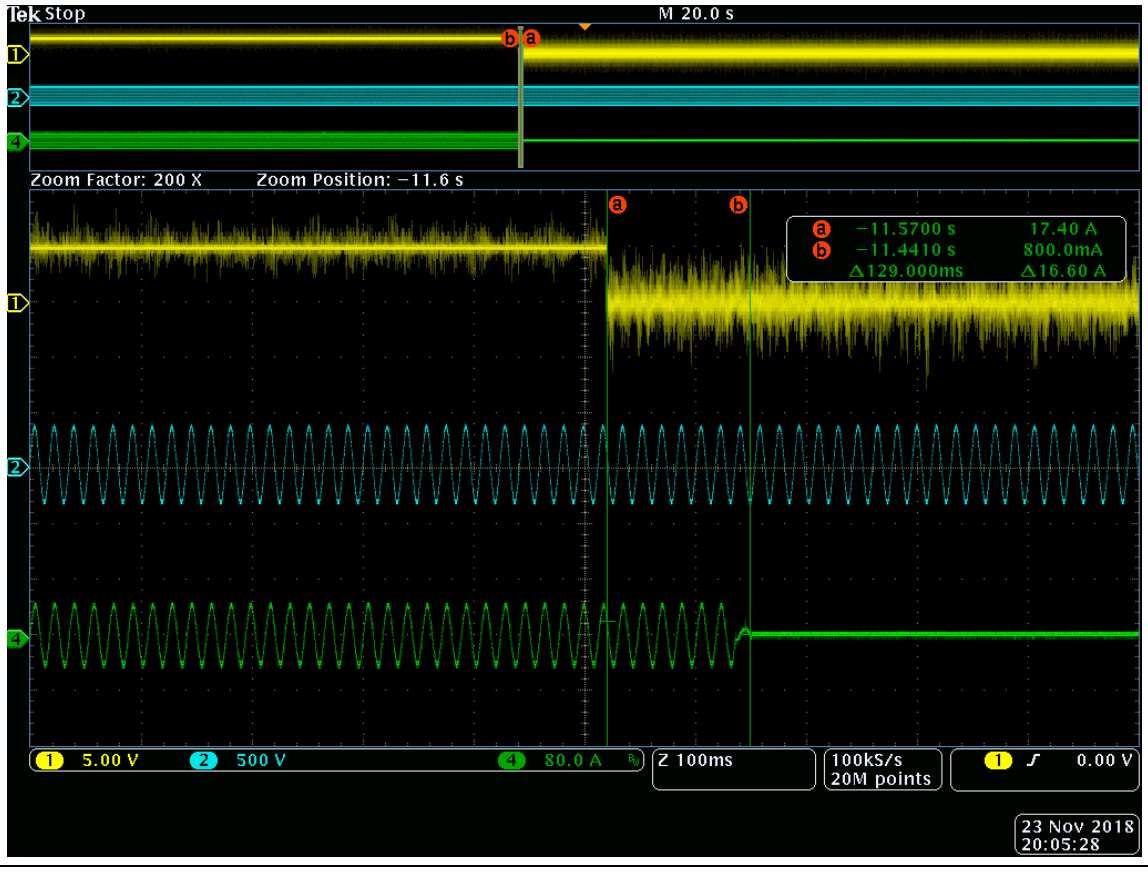
Underfrequency 47.5 Hz- Test 2





Underfrequency 47.5 Hz- Test 3



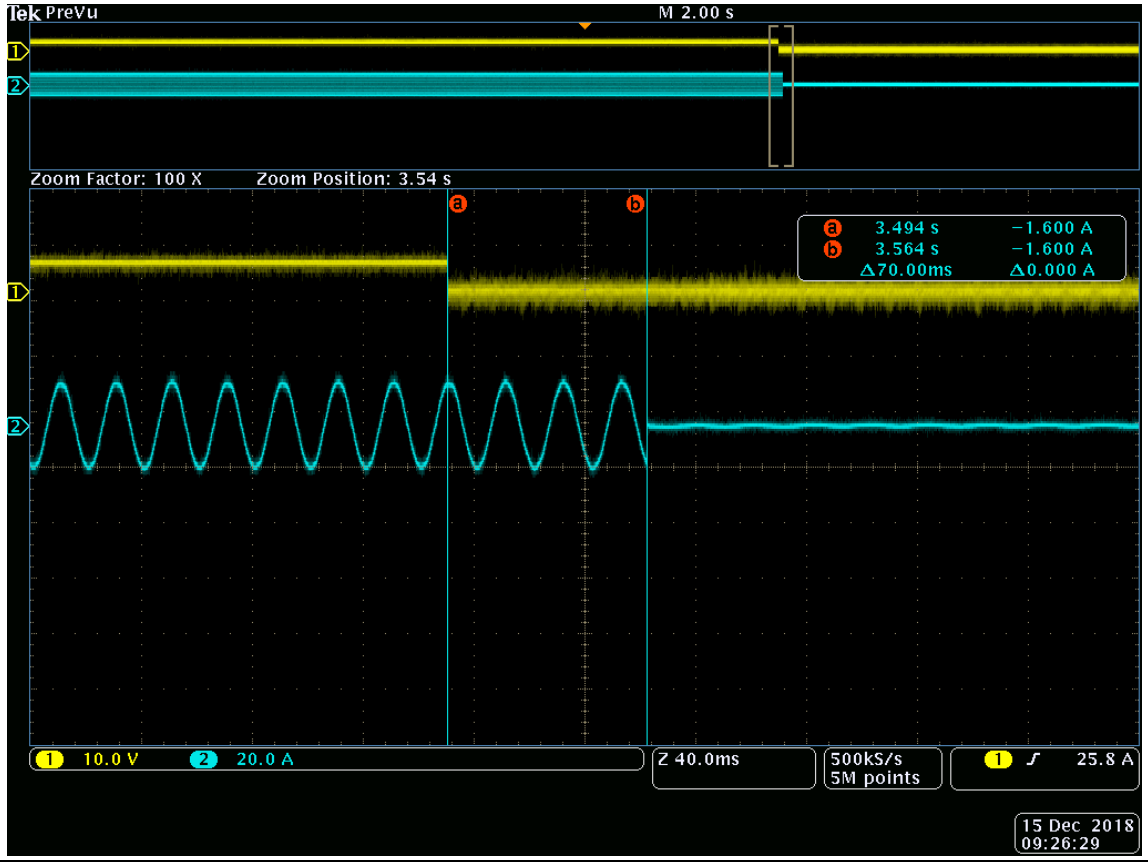


4.5 DC CURRENT MONITORING

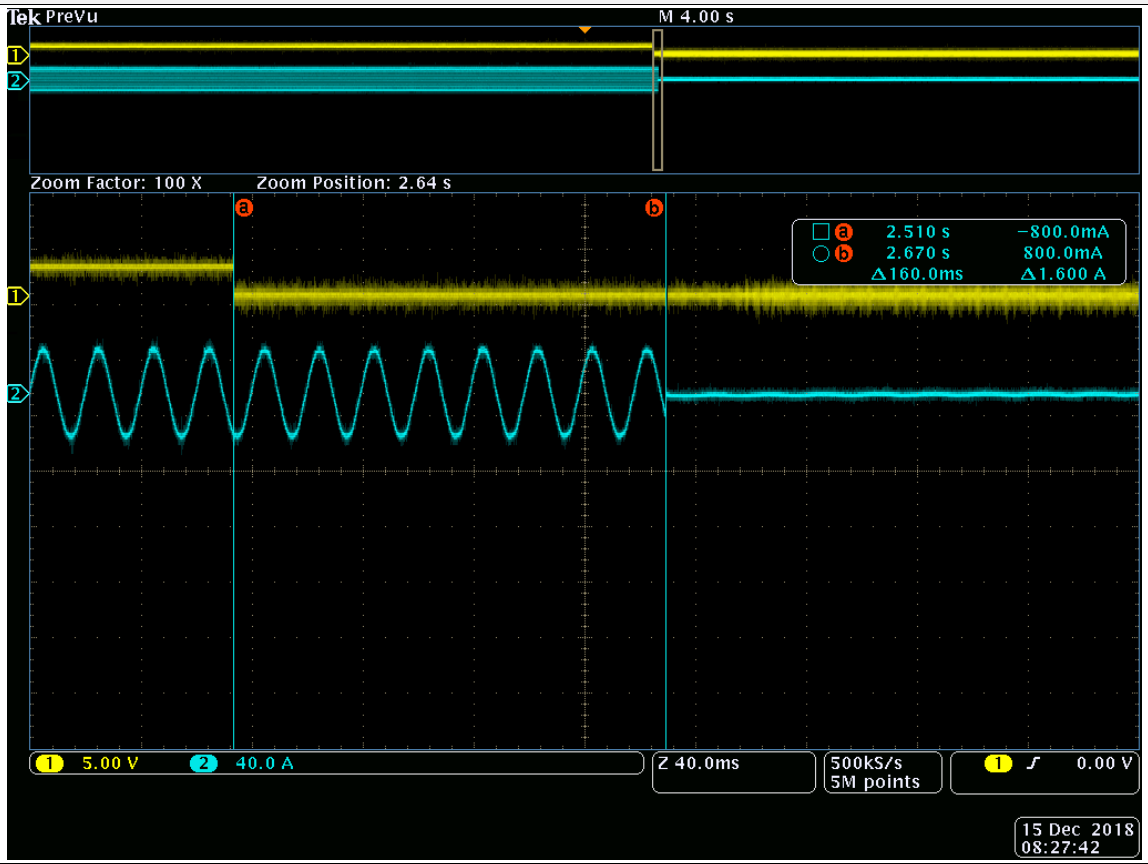
The verification of the protection against DC component emission test has been measured according to the standard, at the required active power levels.

(I > 1 A)			
Output Power %	**(33 ± 5) %**	**(66 ± 5) %**	**(100 ± 5) %**
Time (ms) **Time Limit (200 ms)**	70	160	134

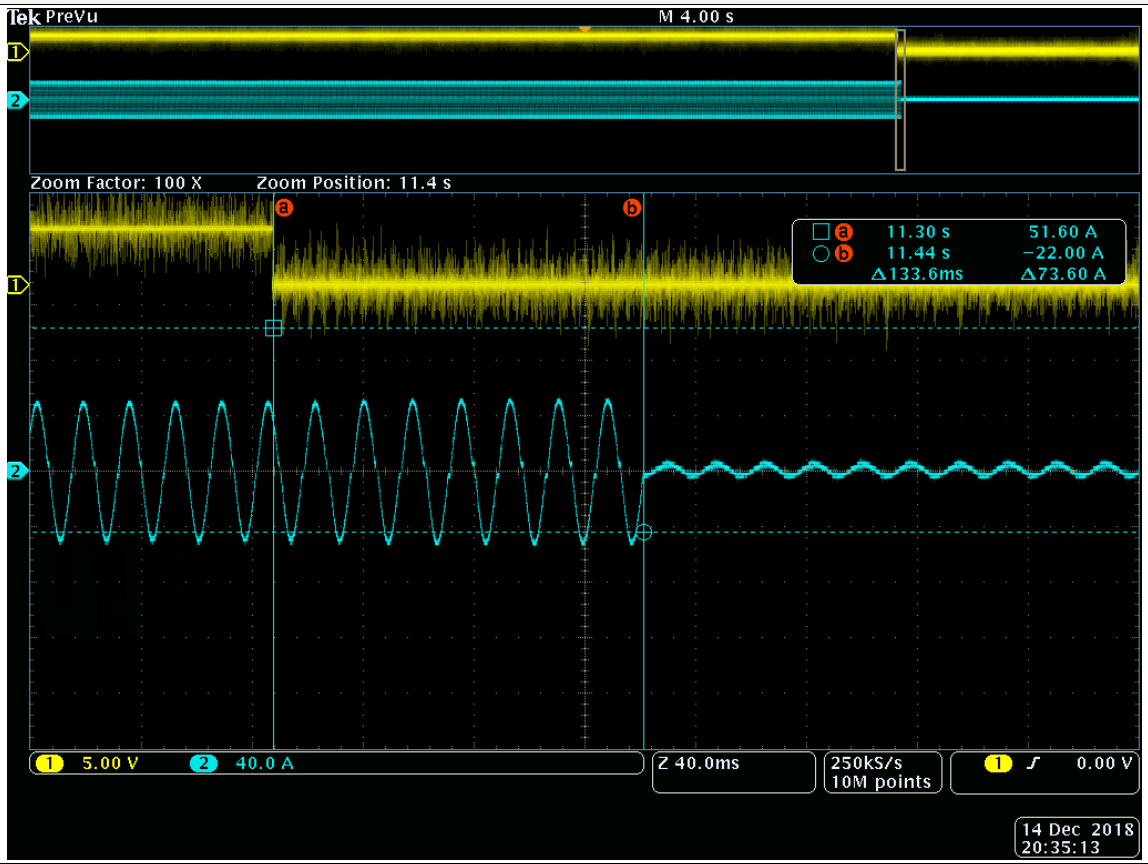
Power at 33%Pn



Power at 66%Pn

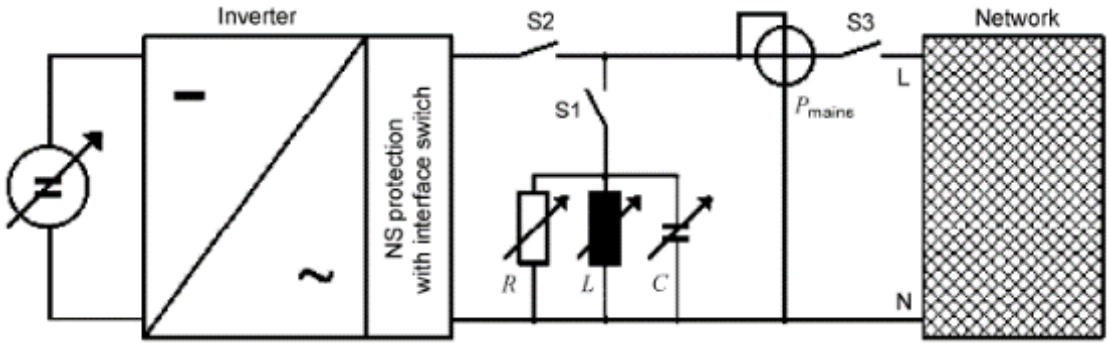


Power at 100%Pn



4.6 ANTI ISLANDING PROTECTION

This test has been performed according to the point 6.5.3 of VDE-AR-N 4105:2011-08 and the paragraph 5.4.6 of VDE V 0124-100:2012-07.

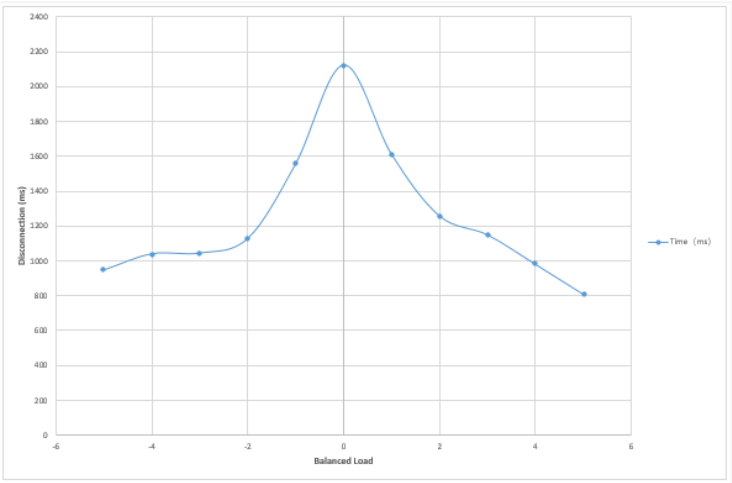


All the tests and checks have been performed in accordance with the reference Standard as specified previously. The used quality factor of resonant load was Qf=2.
There are required three different tests:

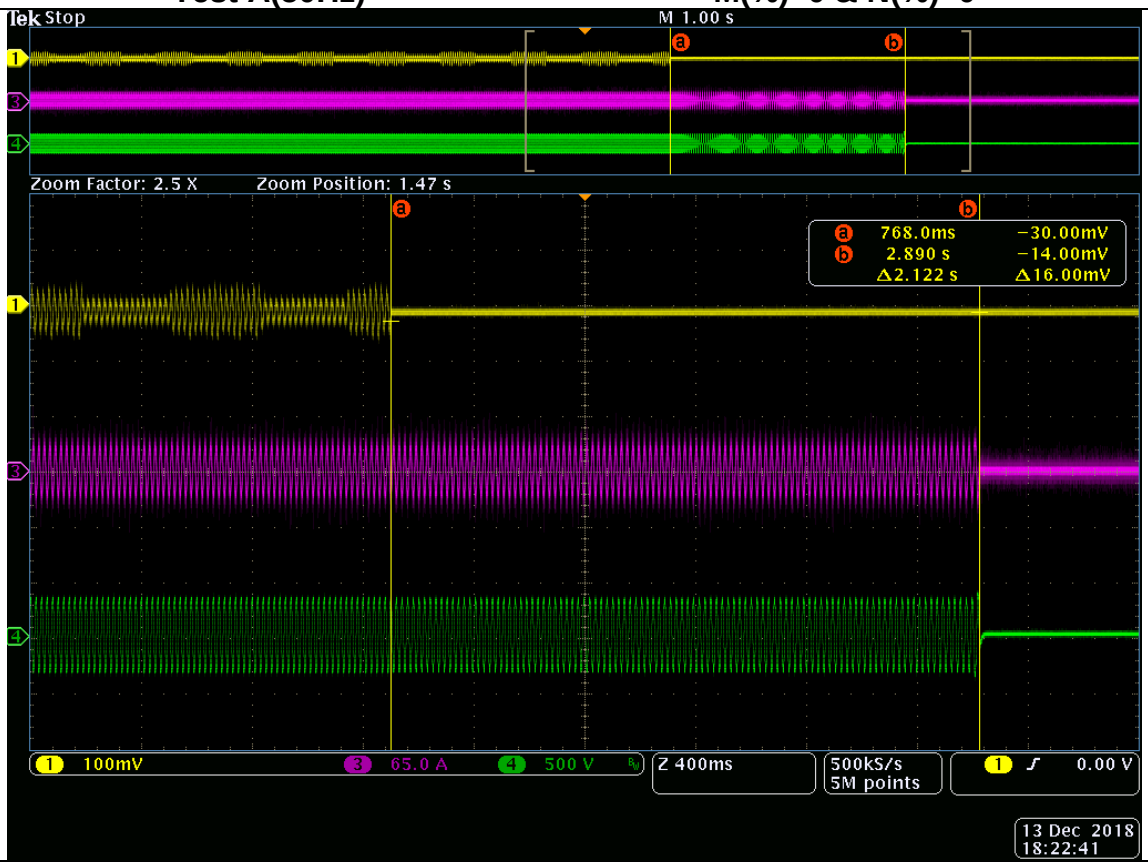
Test A is at full power
Test B is at 50%Pn
Test C is at 20%Pn

4.6.1 Test A

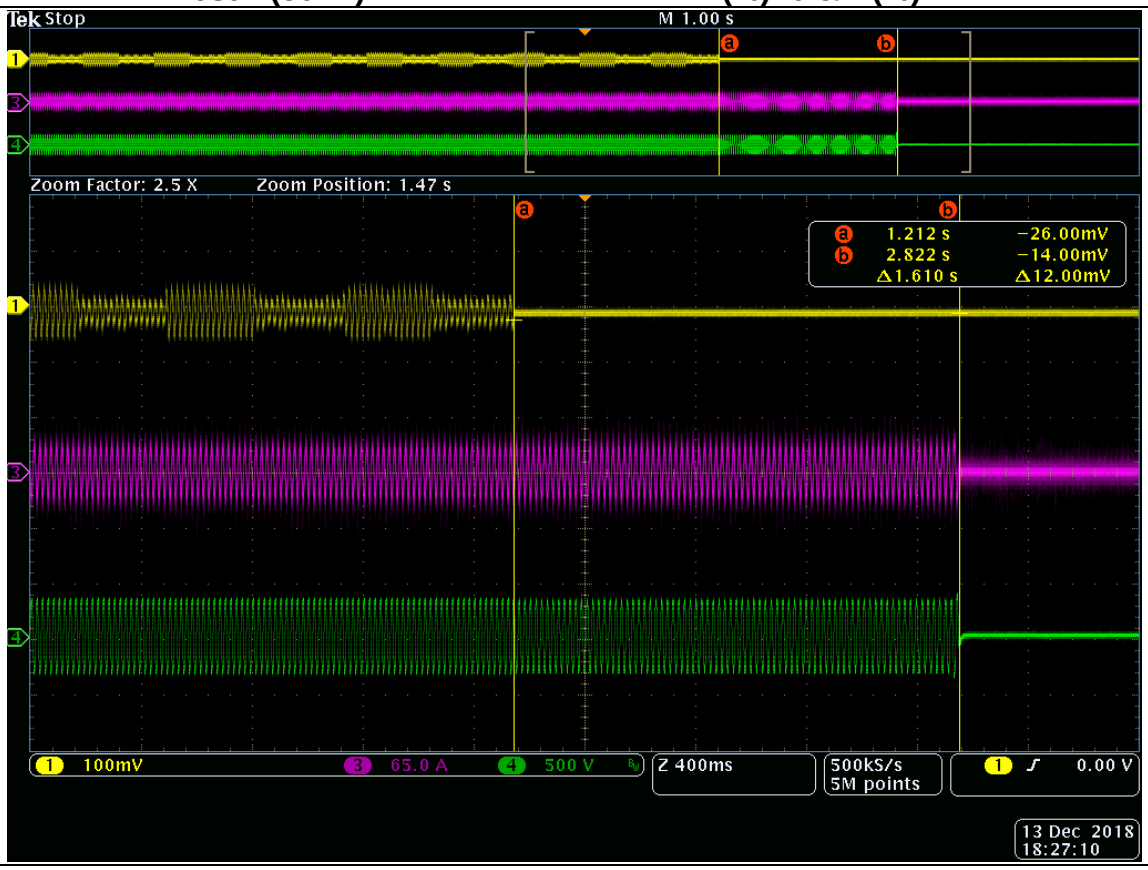
Balanced Load		
M (%)	**N (%)**	**Disconnection (ms) (limit at t=5s)**
0	-5	950
0	-4	1042
0	-3	1046
0	-2	1130
0	-1	1558
0	0	2122
0	1	1610
0	2	1258
0	3	1150
0	4	982
0	5	810



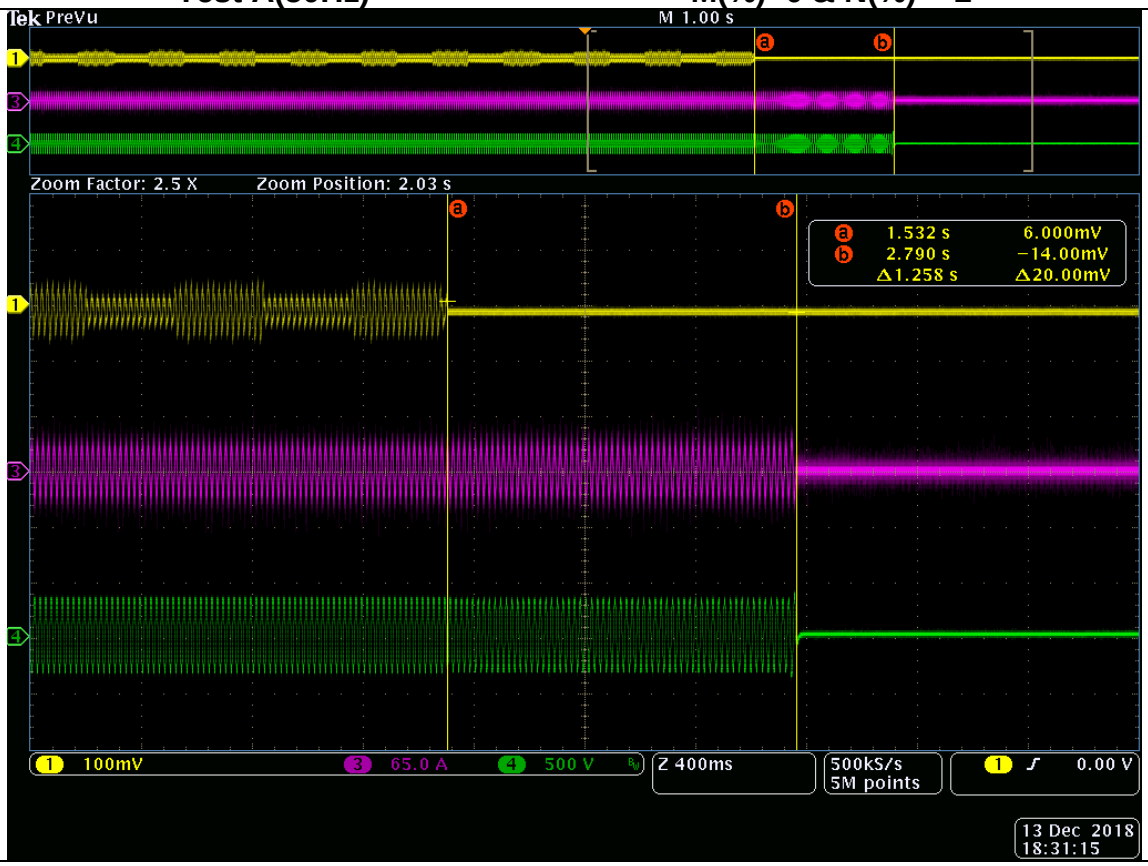
Test A(50Hz) **M(%)=0 & N(%)=0**



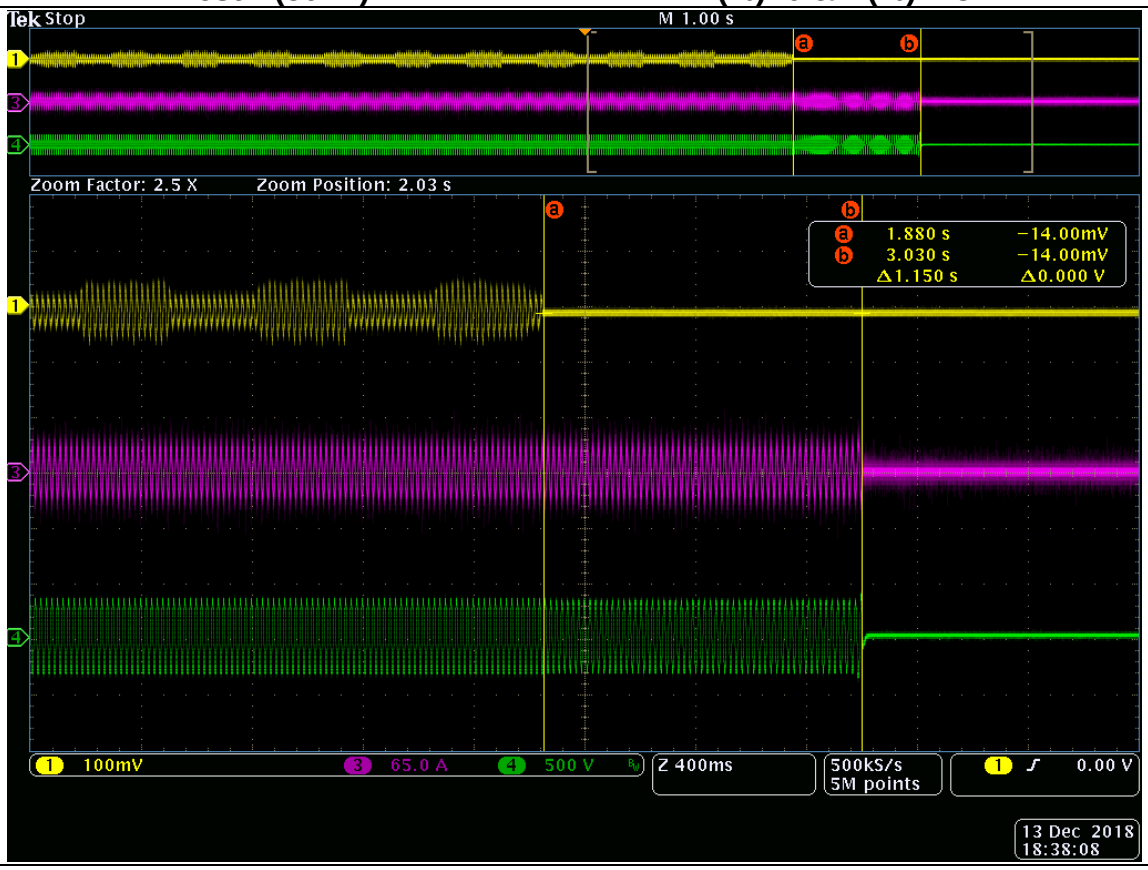
Test A(50Hz) **M(%)=0 & N(%)=+1**



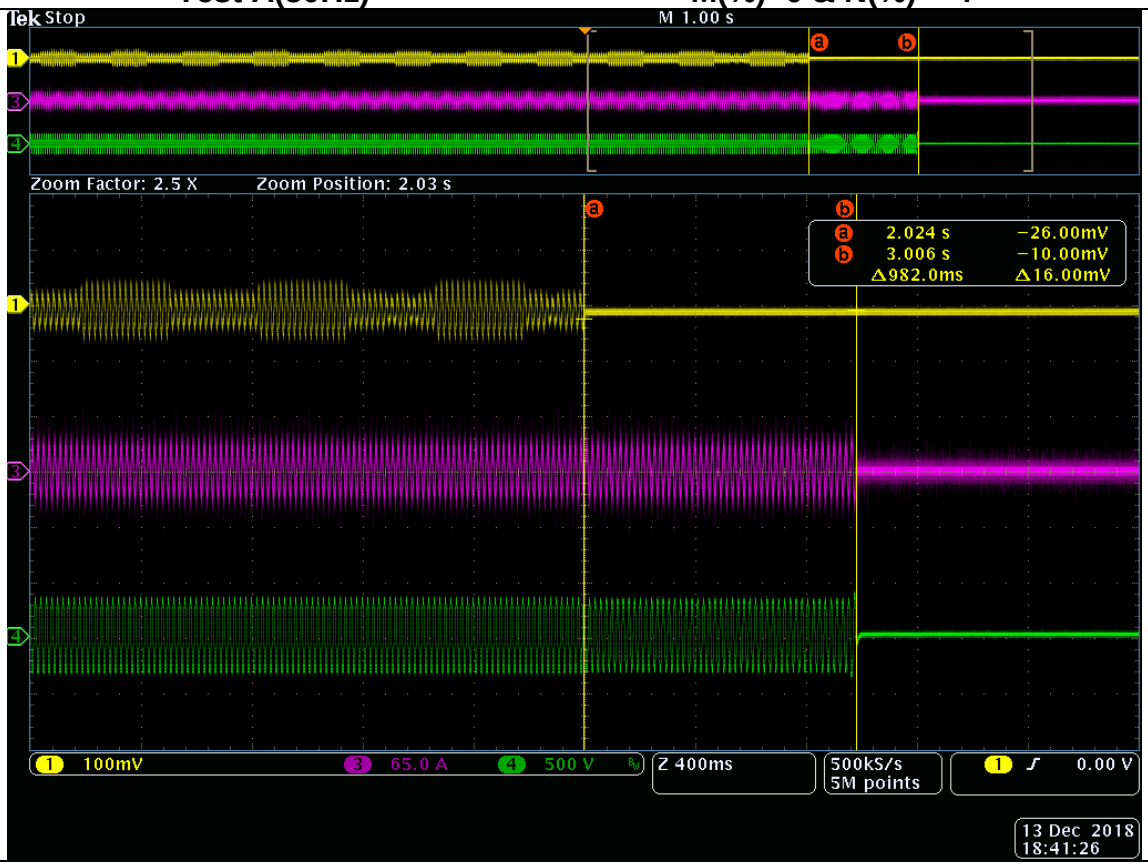
Test A(50Hz) **M(%)=0 & N(%)=+2**



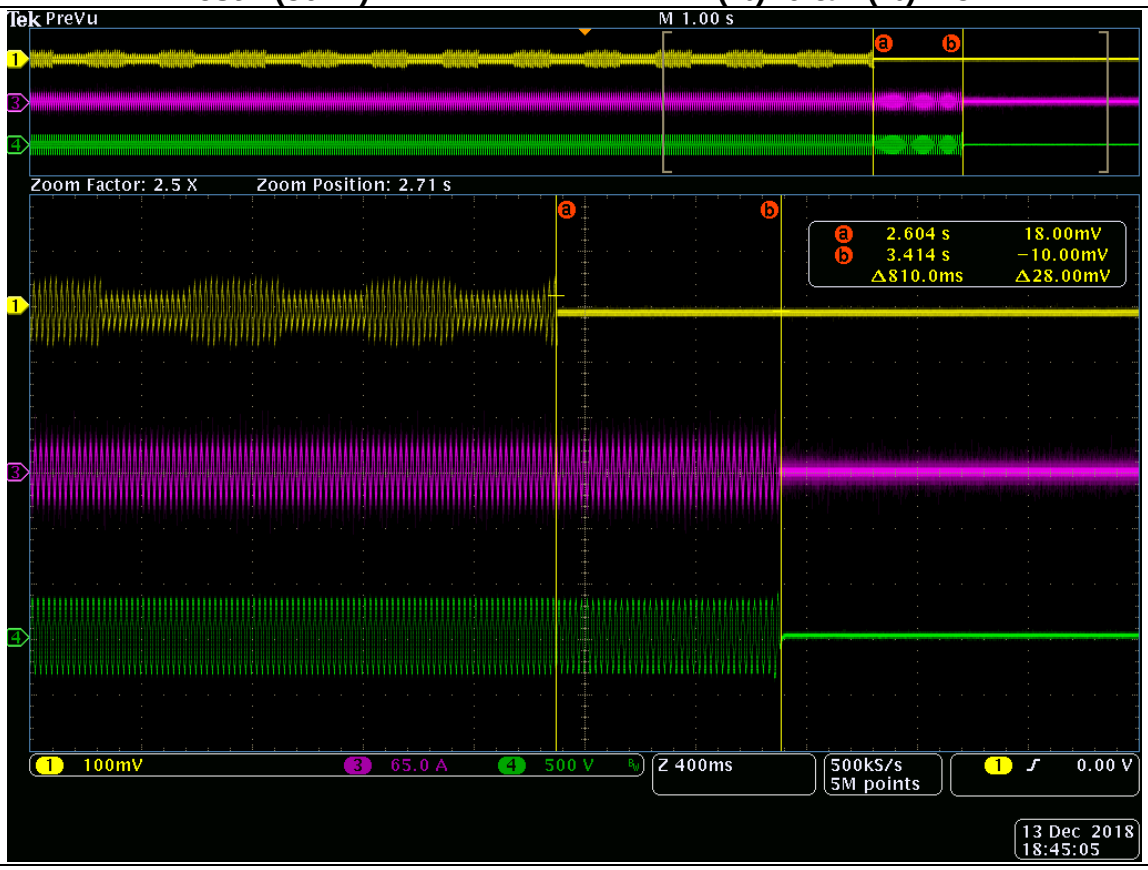
Test A(50Hz) **M(%)=0 & N(%)=+3**



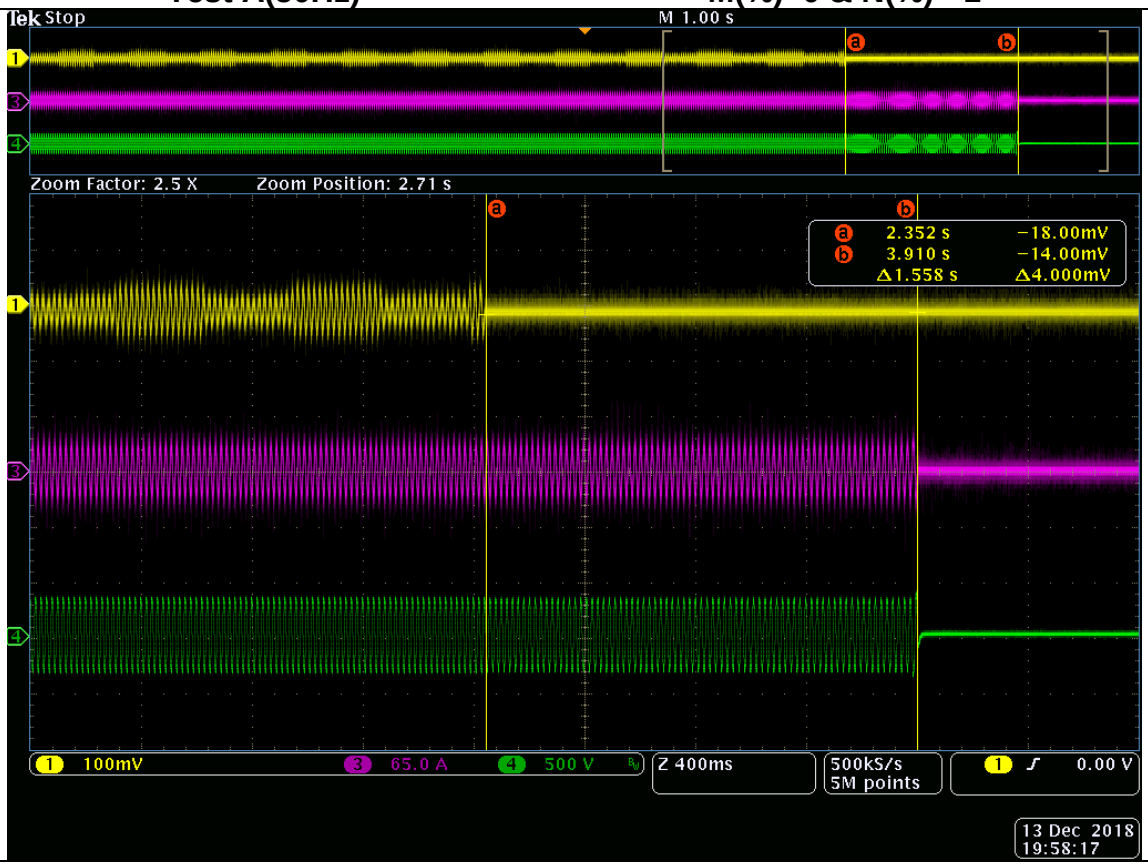
Test A(50Hz) **M(%)=0 & N(%)=+4**



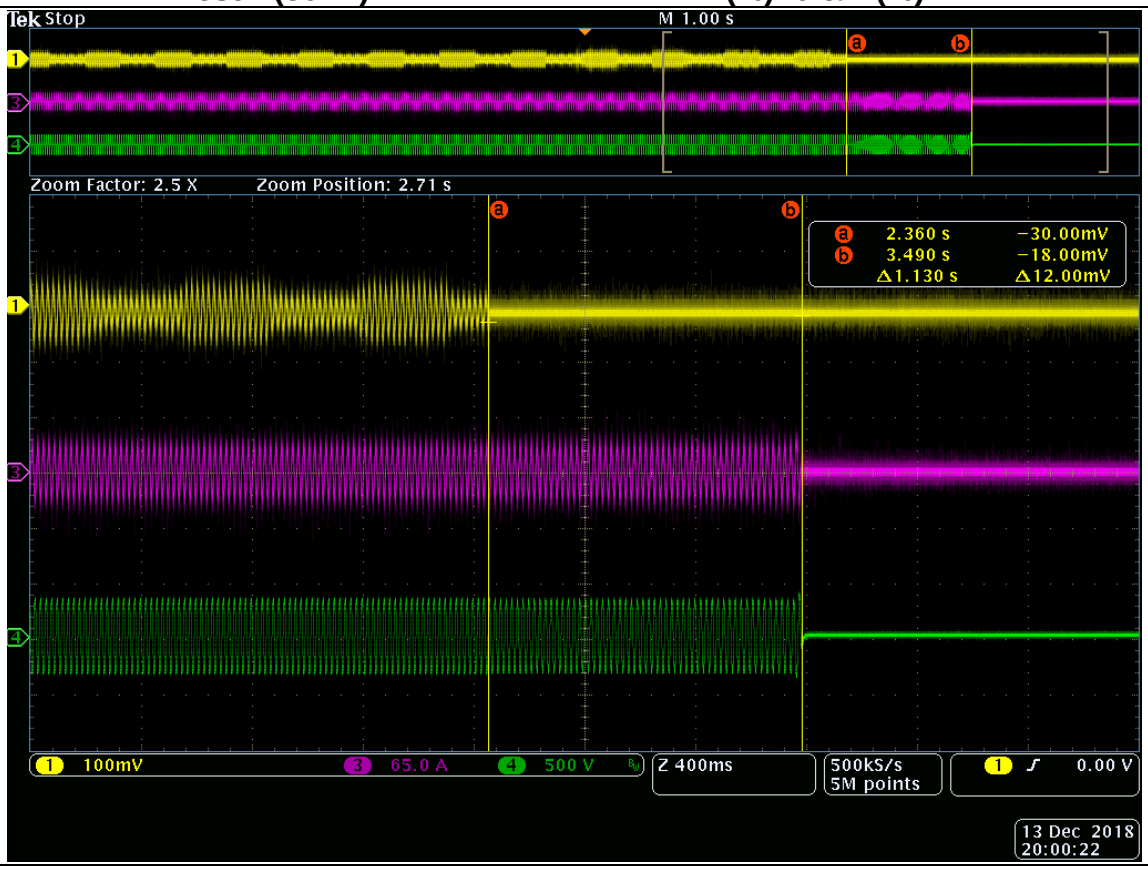
Test A(50Hz) **M(%)=0 & N(%)=+5**



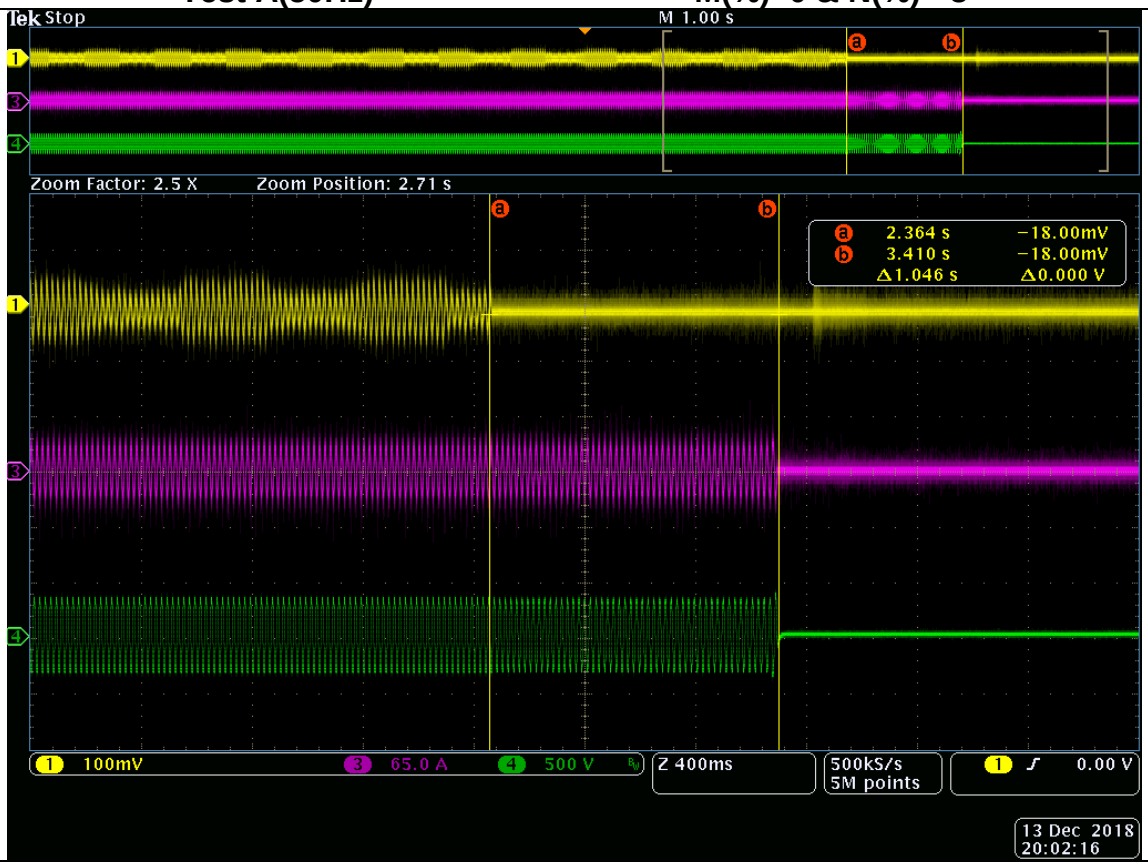
Test A(50Hz)	M(%)=0 & N(%)=-1



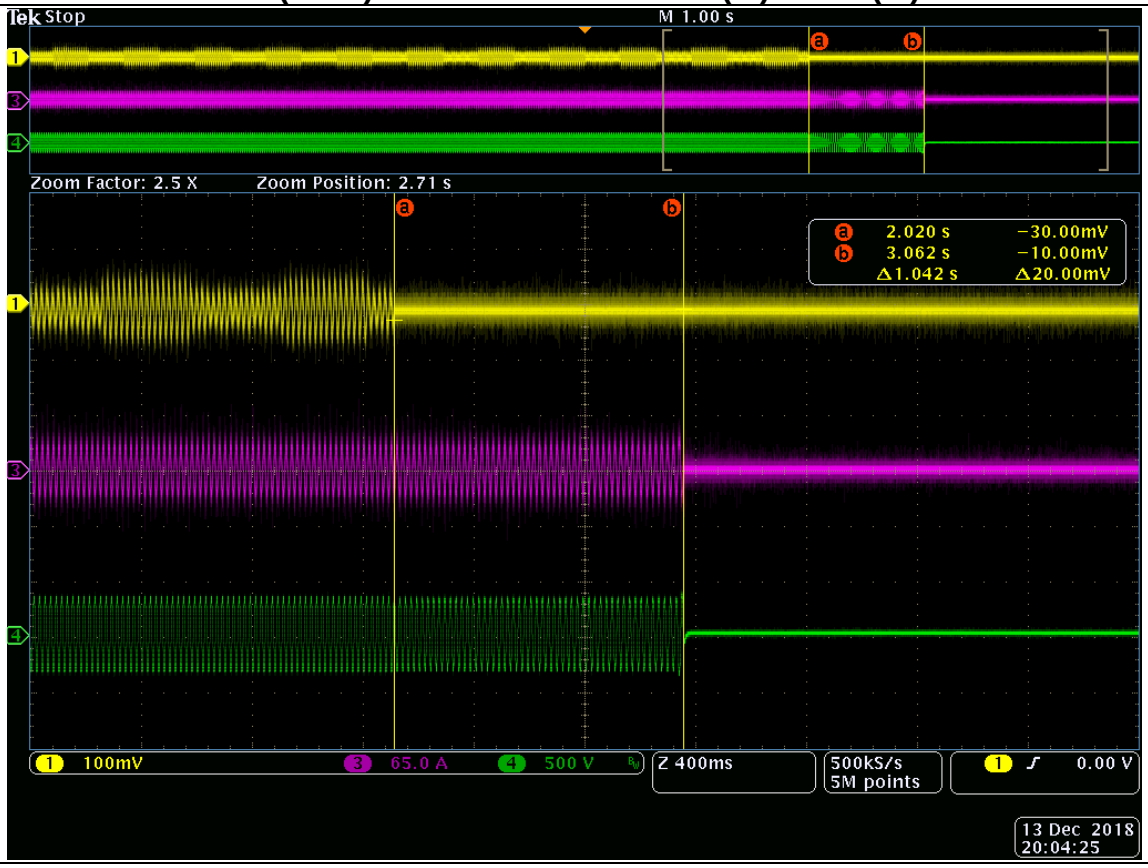
Test A(50Hz)	M(%)=0 & N(%)=-2

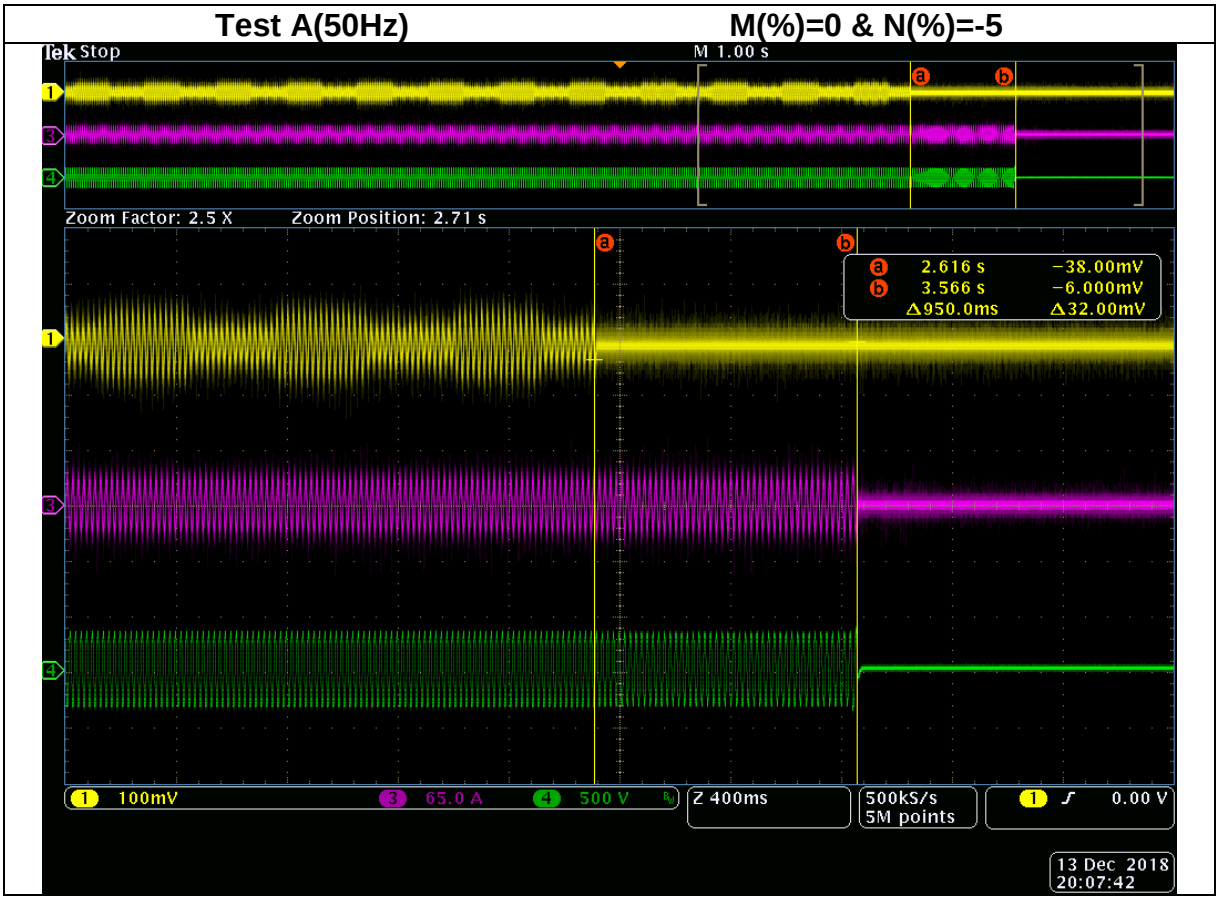


Test A(50Hz) **M(%)=0 & N(%)=-3**



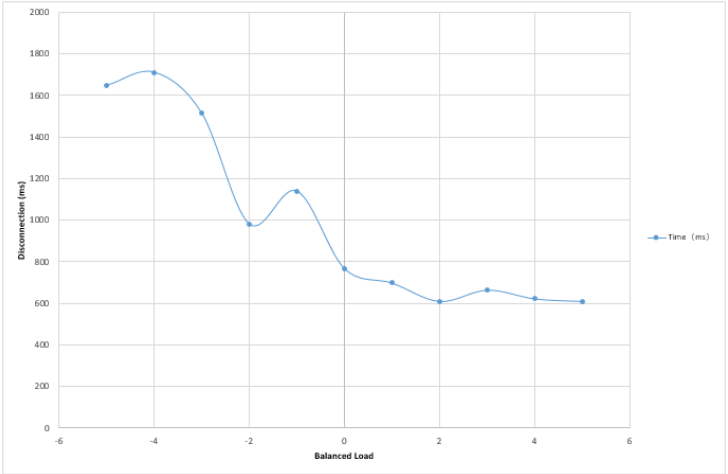
Test A(50Hz) **M(%)=0 & N(%)=-4**



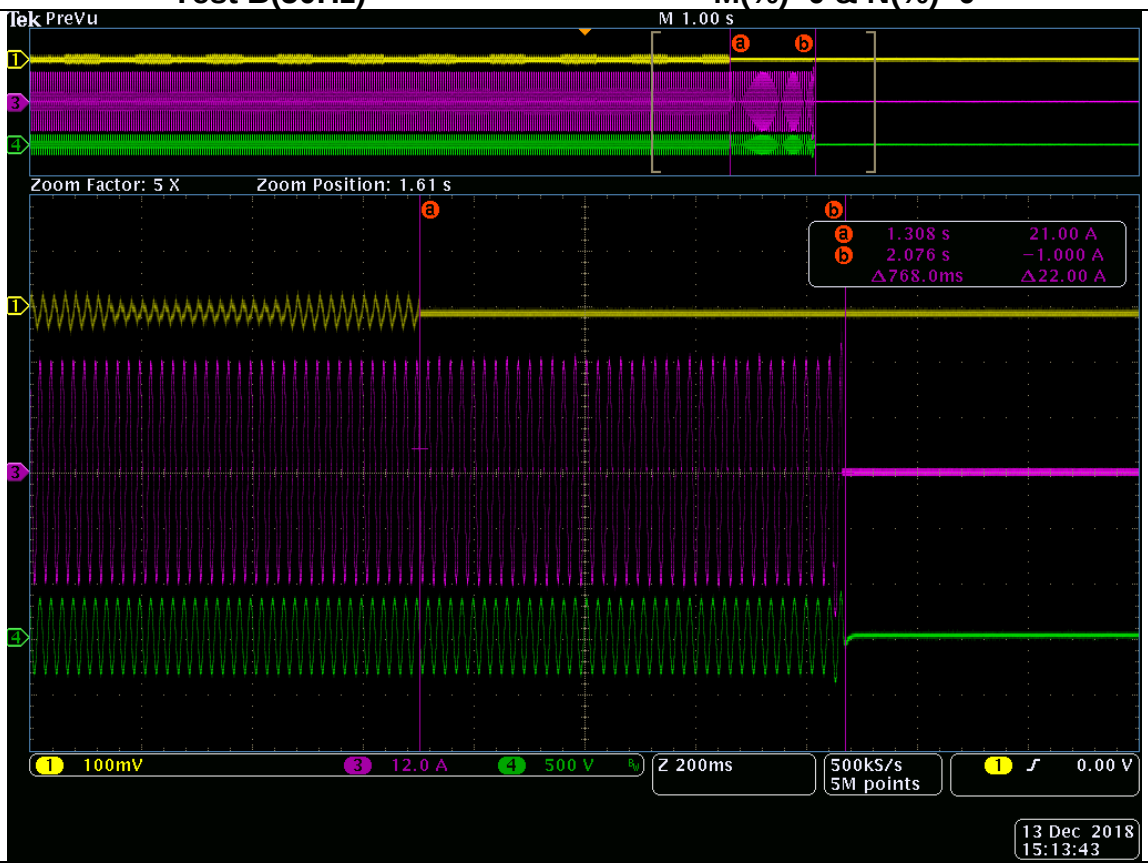


4.6.2 Test B

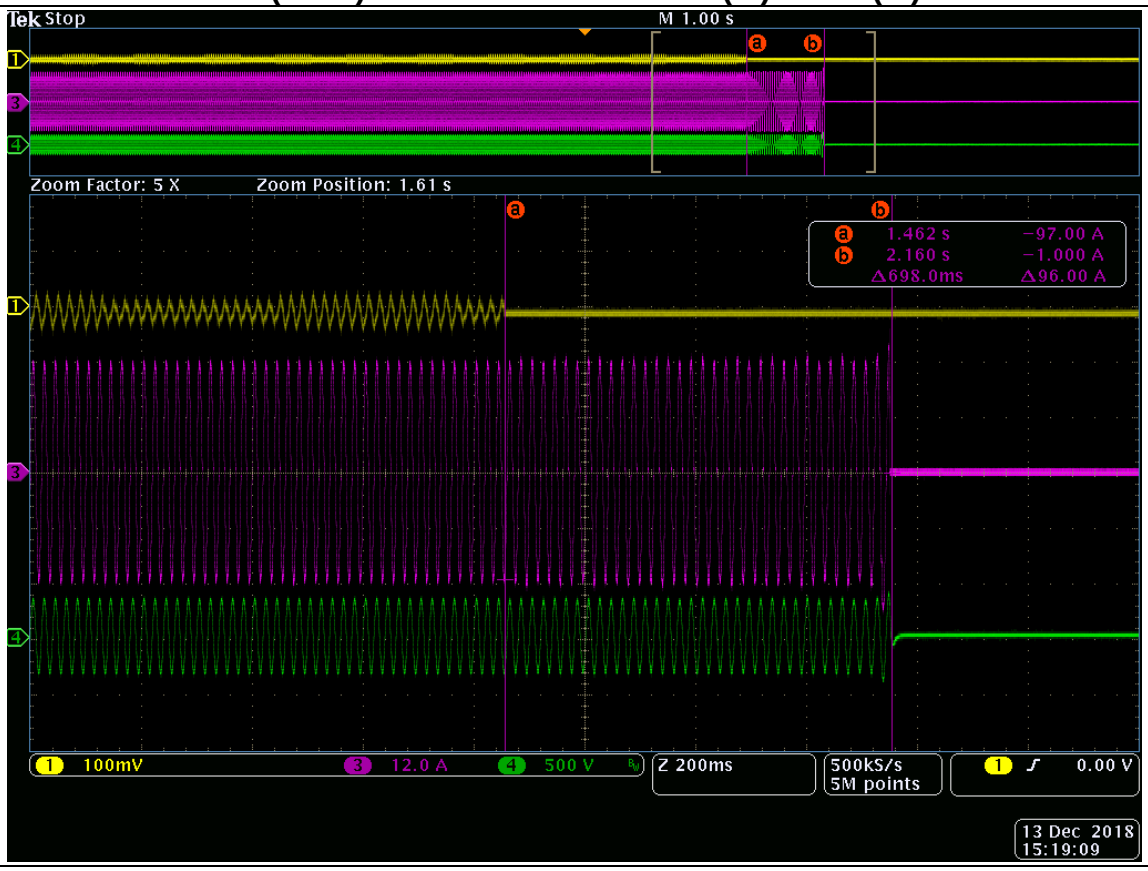
Balanced Load		
M (%)	N (%)	Disconnection (ms) (limit at t=5s)
0	-5	1646
0	-4	1710
0	-3	1514
0	-2	982
0	-1	1140
0	0	768
0	1	698
0	2	610
0	3	664
0	4	622
0	5	610



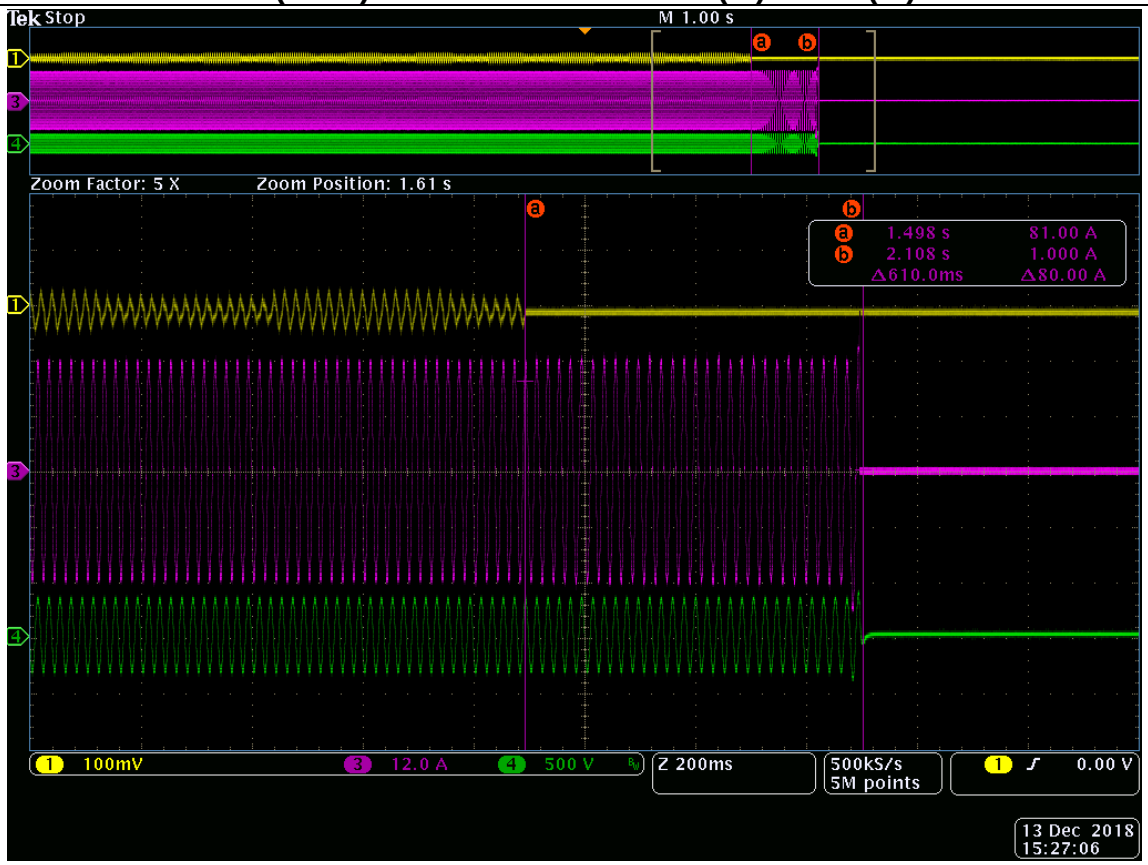
Test B(50Hz) **M(%)=0 & N(%)=0**



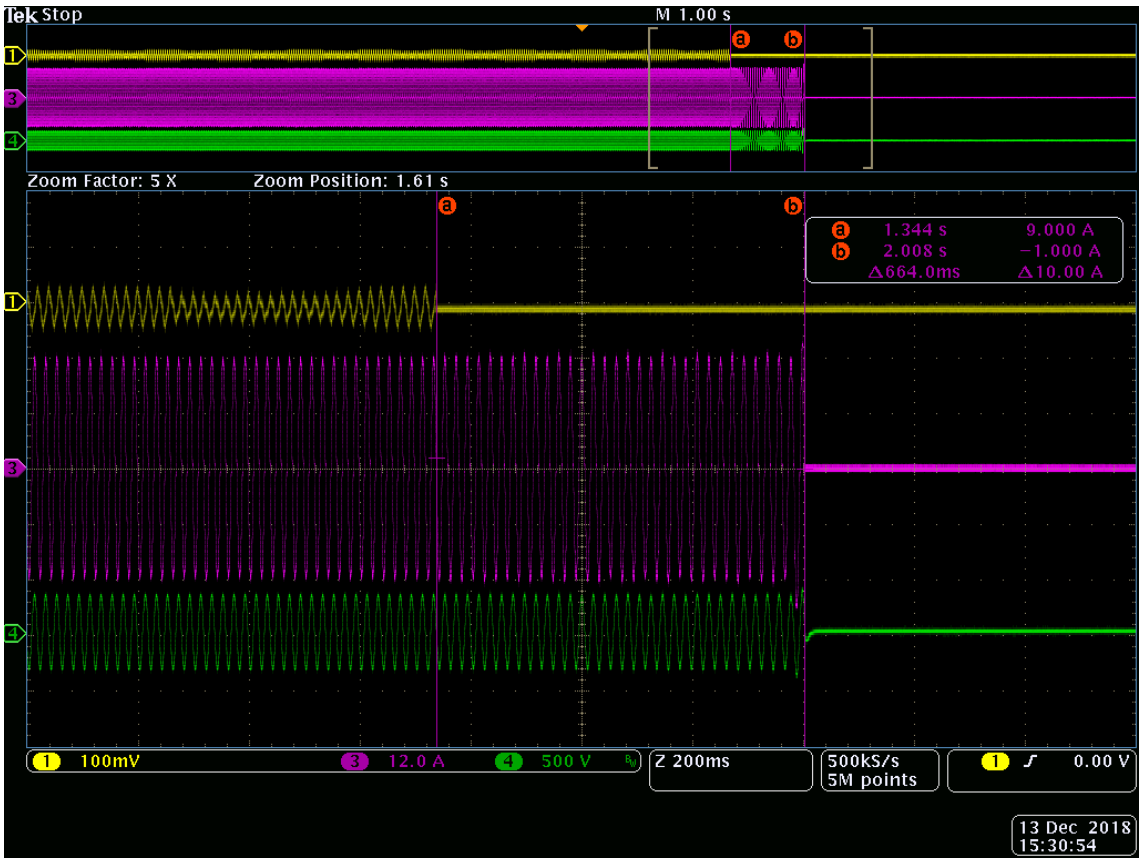
Test B(50Hz) **M(%)=0 & N(%)=+1**



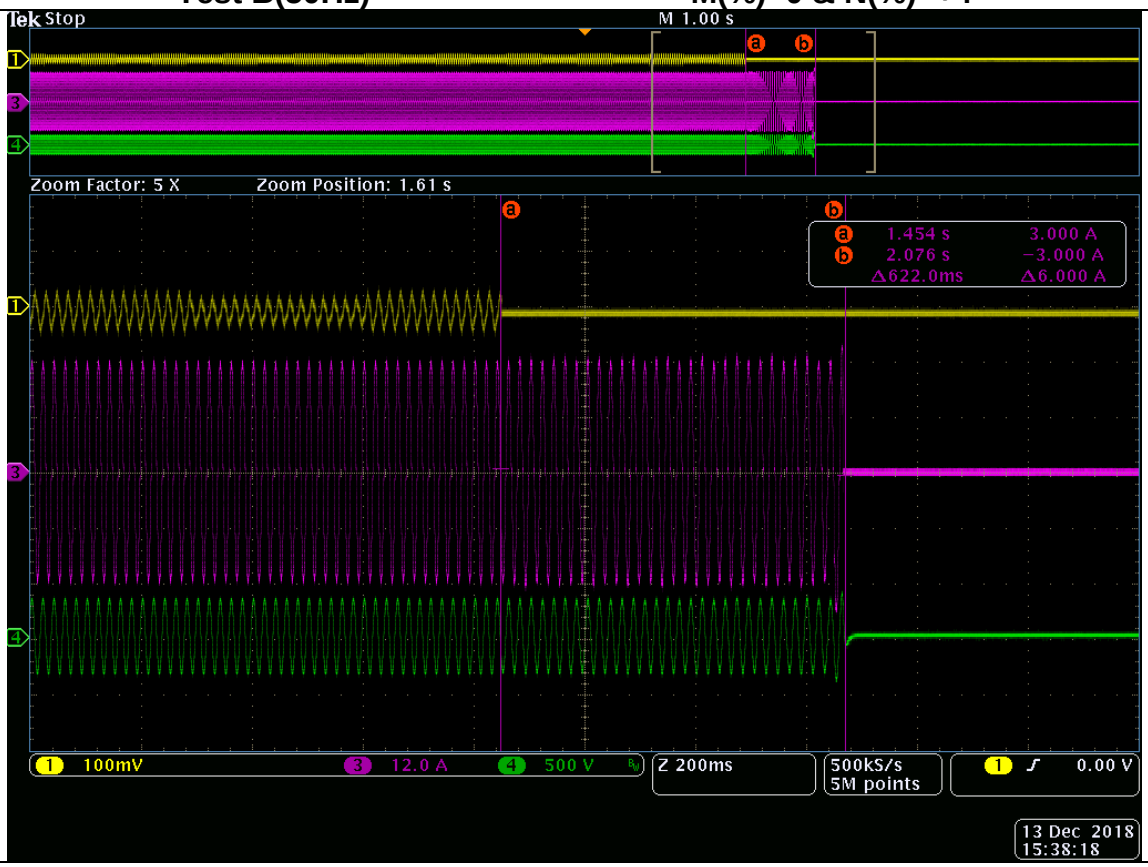
Test B(50Hz)	M(%)=0 & N(%)=+2



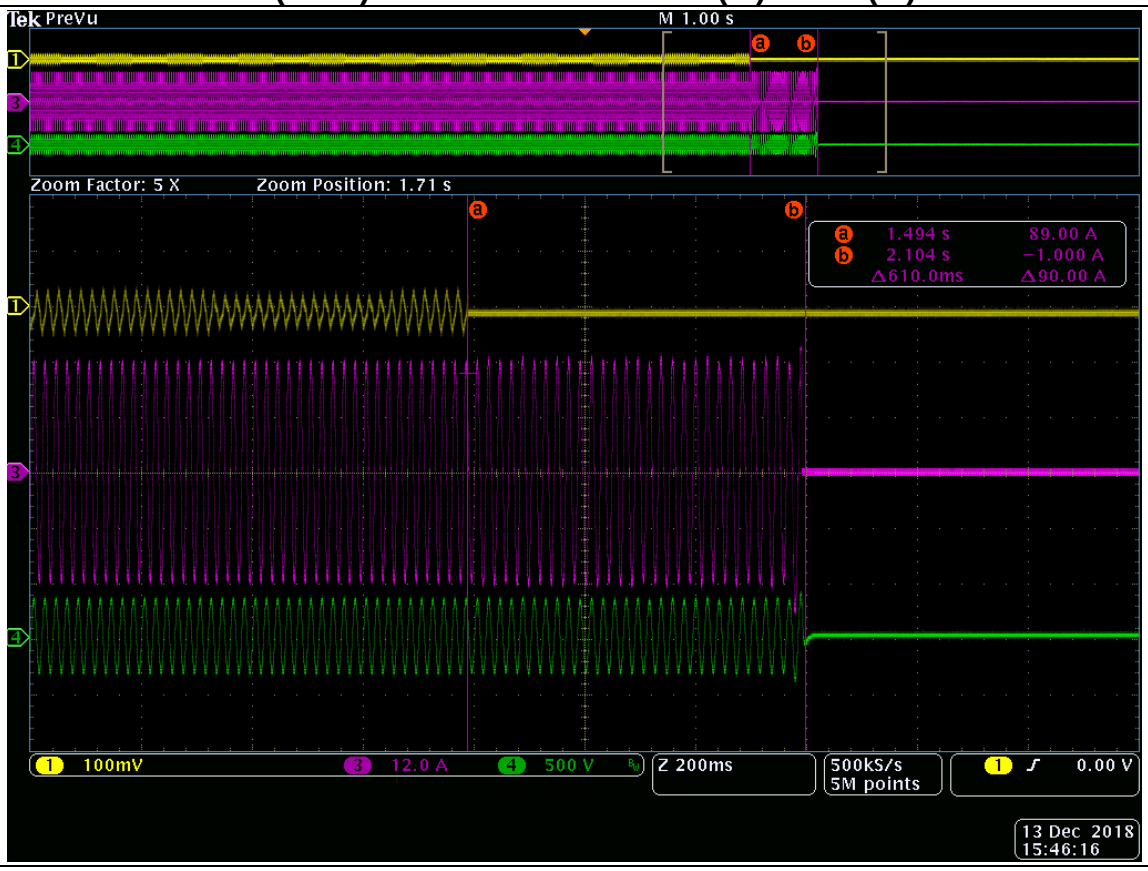
Test B(50Hz)	M(%)=0 & N(%)=+3



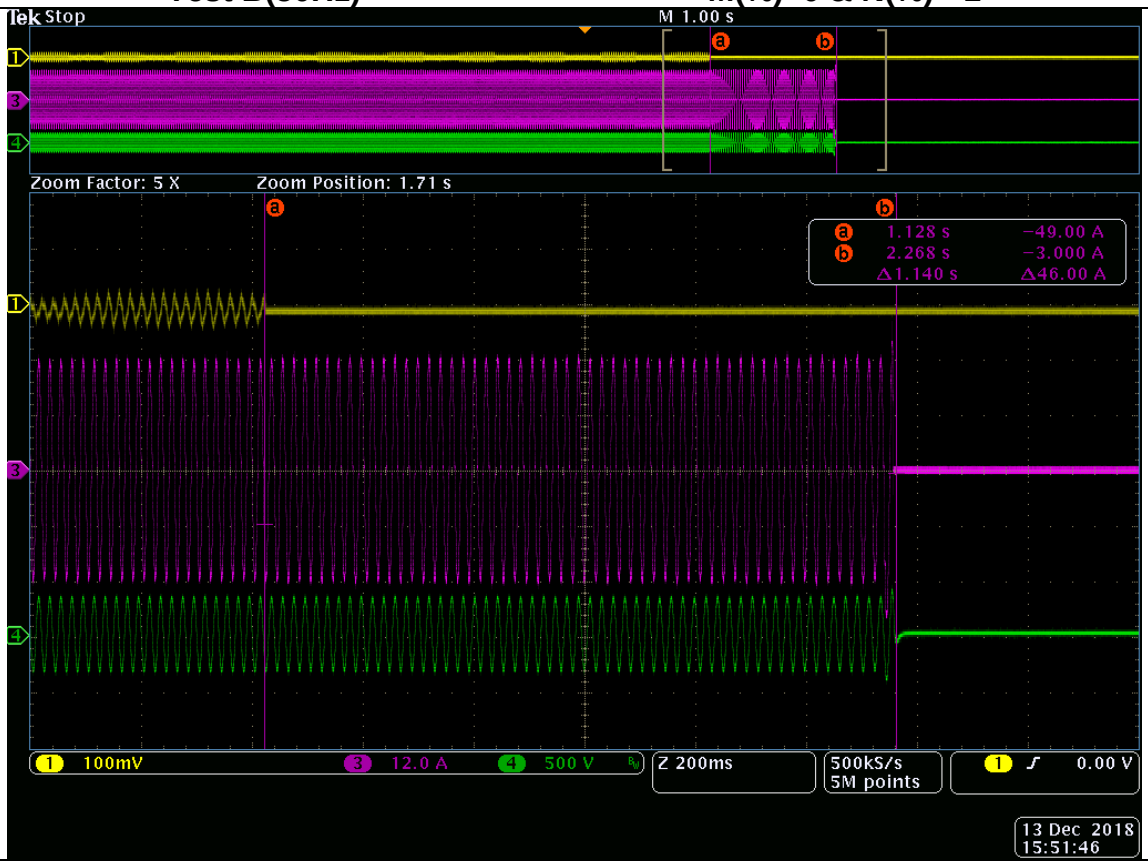
Test B(50Hz)	M(%)=0 & N(%)=+4



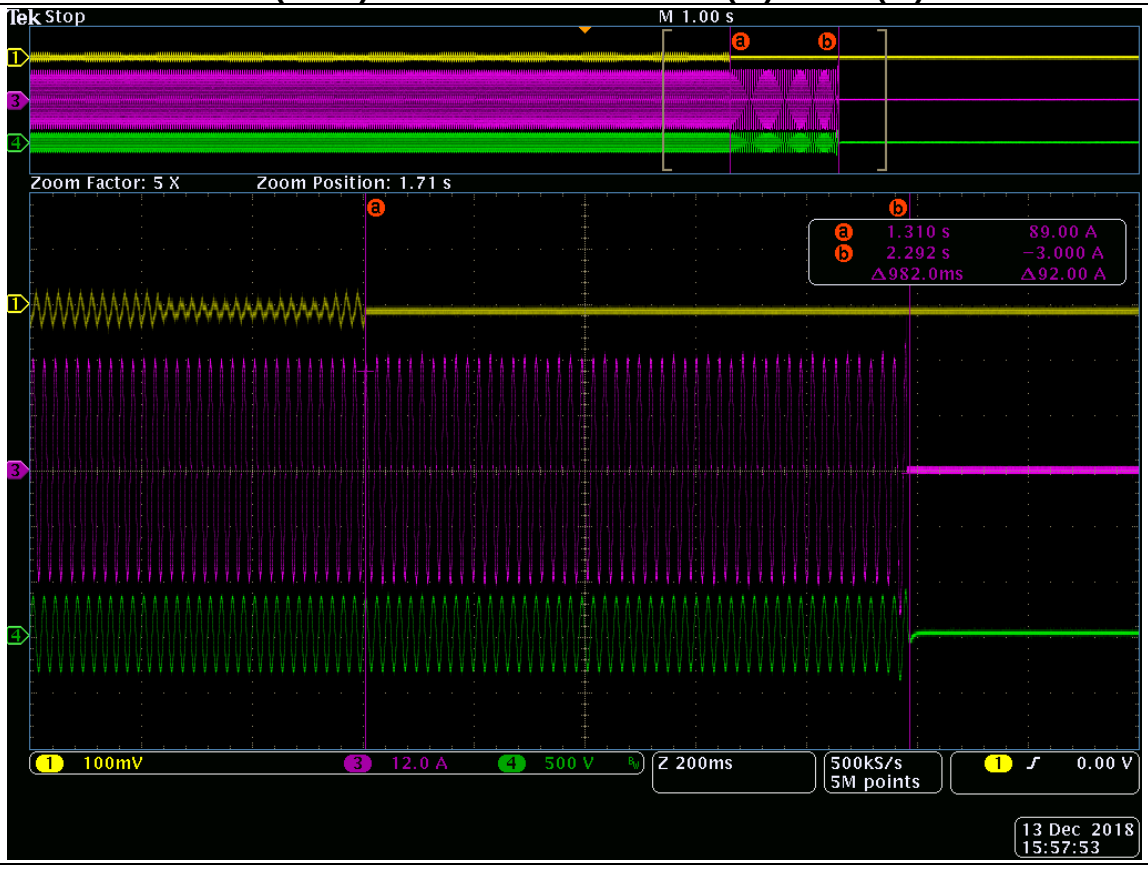
Test B(50Hz)	M(%)=0 & N(%)=+5



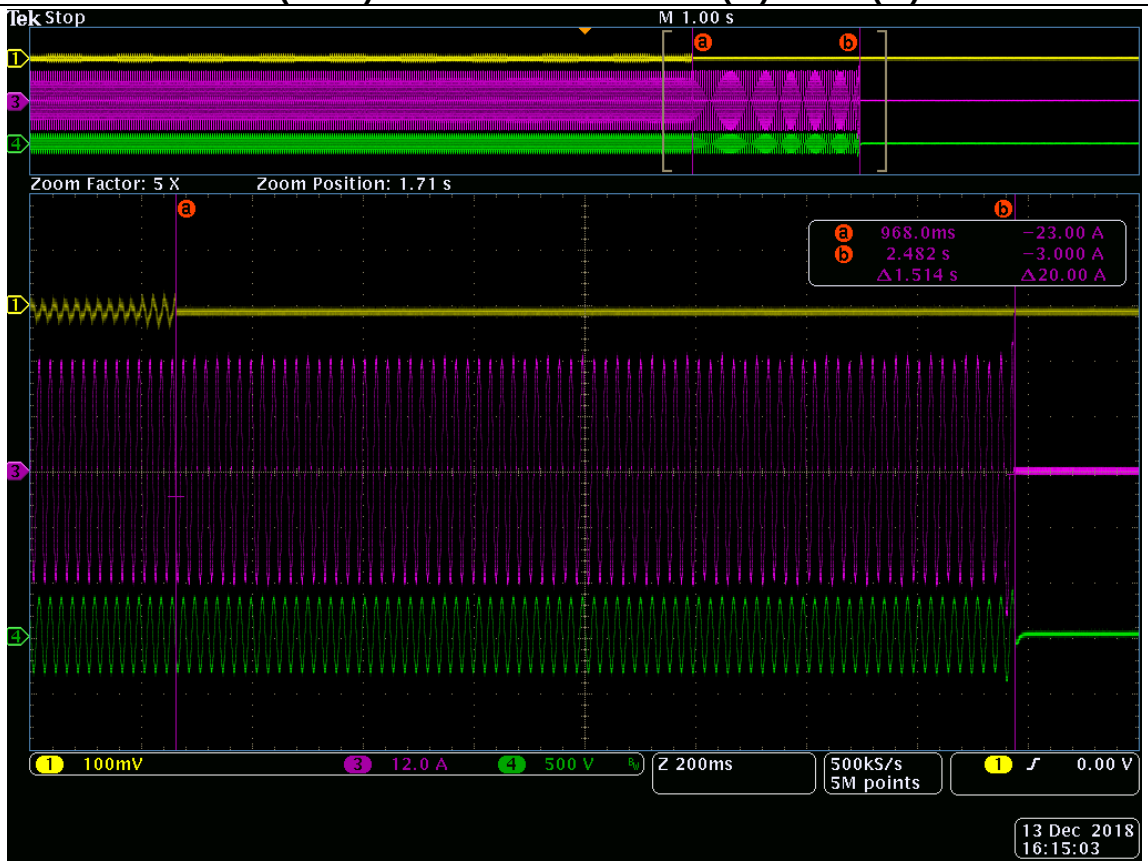
Test B(50Hz)	M(%)=0 & N(%)=-1



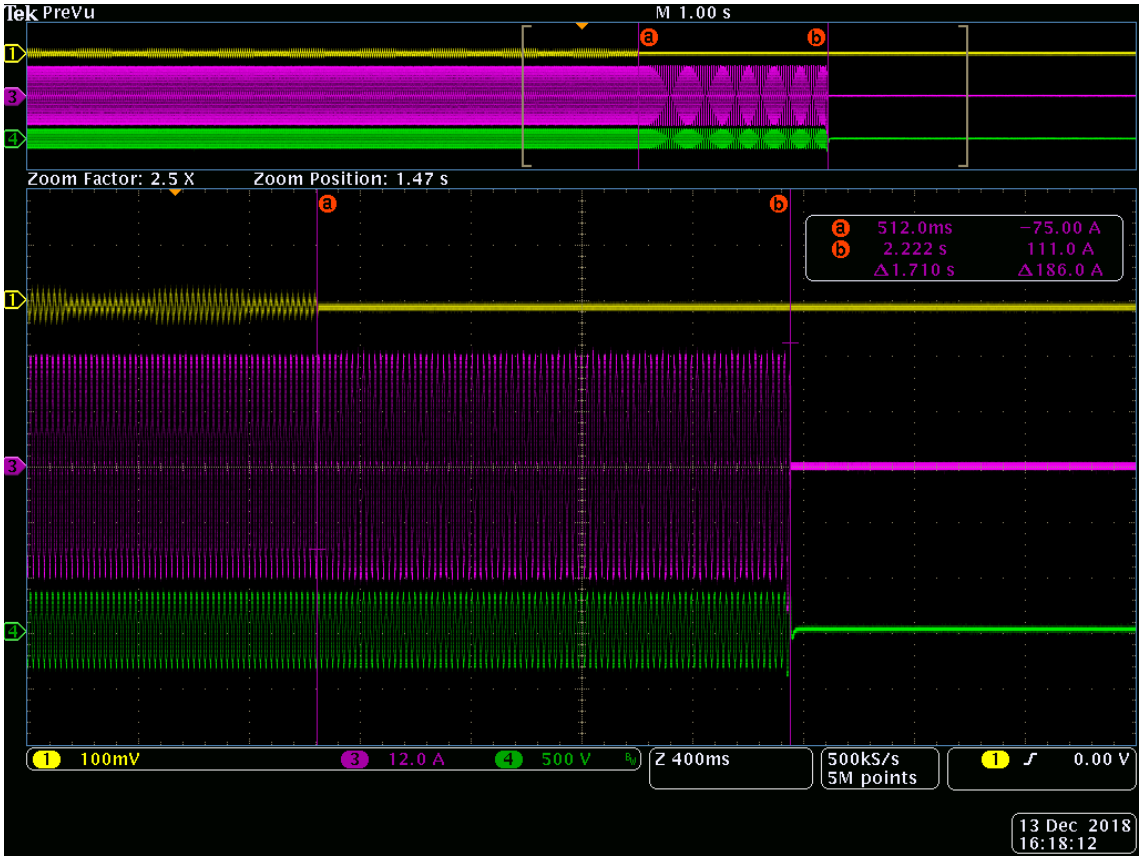
Test B(50Hz)	M(%)=0 & N(%)=-2



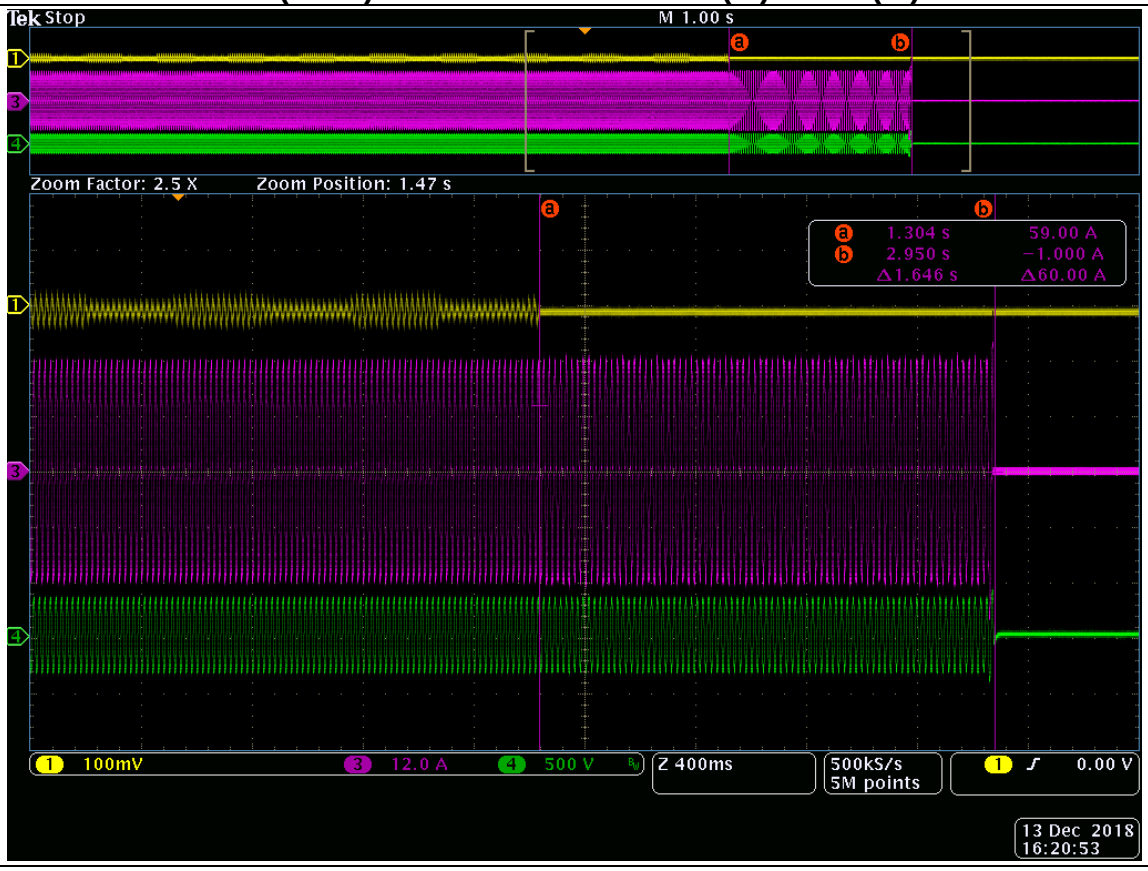
Test B(50Hz)	M(%)=0 & N(%)=-3



Test B(50Hz)	M(%)=0 & N(%)=-4

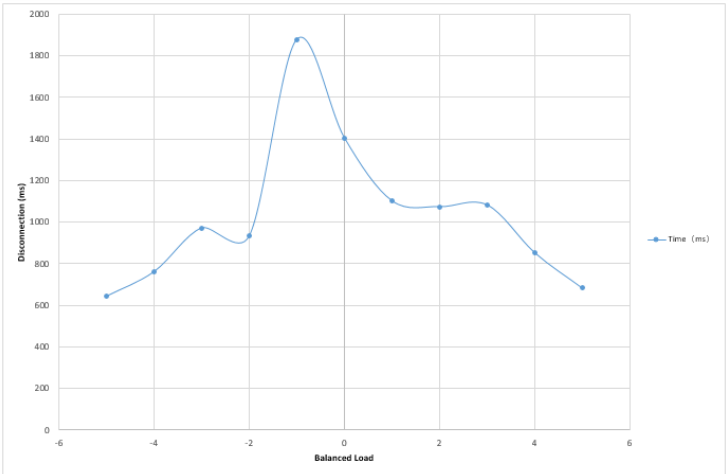


Test B(50Hz)	M(%)=0 & N(%)=-5

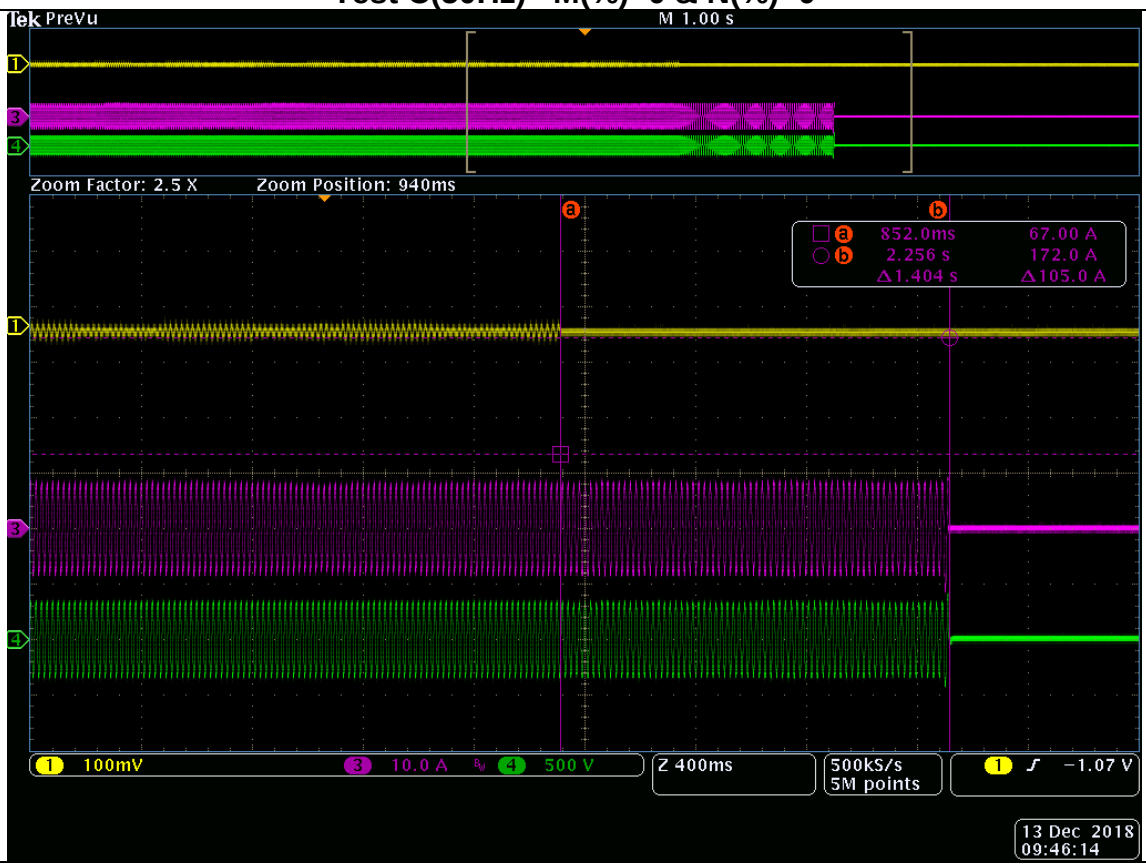


4.6.3 Test C

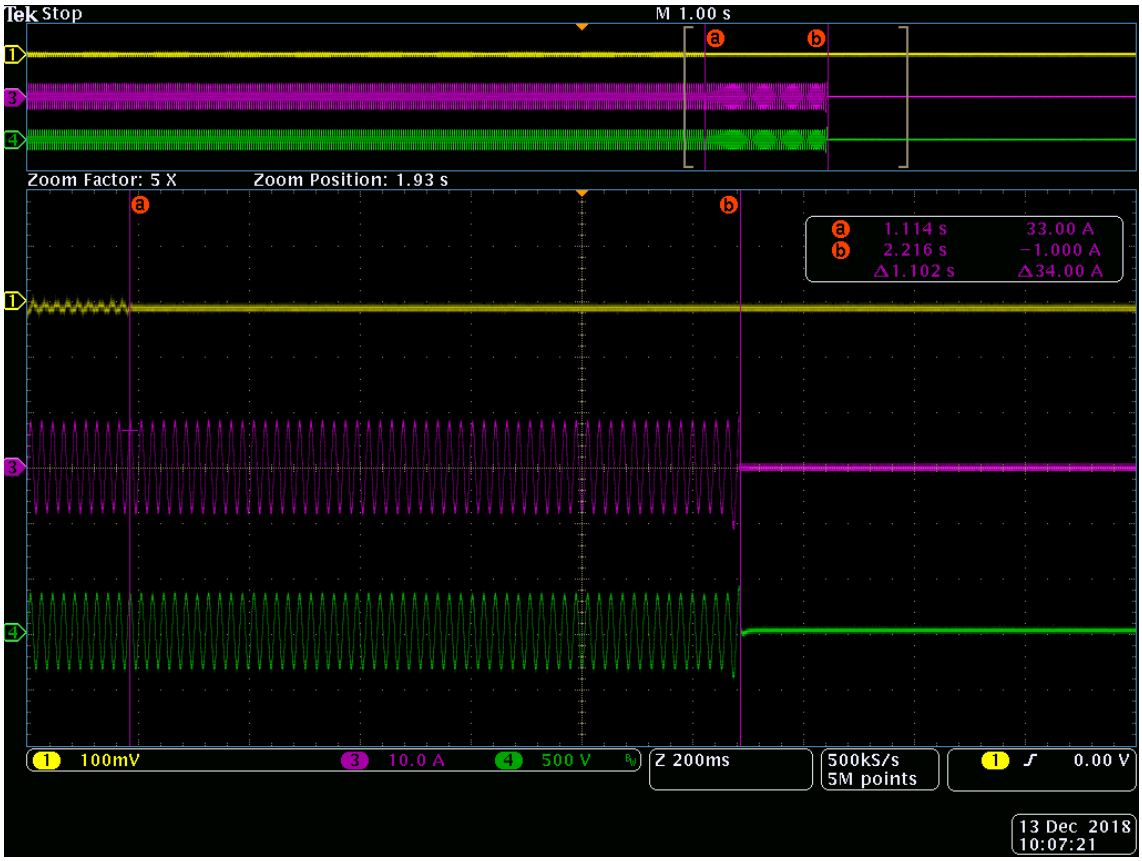
Balanced Load		
M (%)	N (%)	Disconnection (ms) (limit at t=5s)
0	-5	644
0	-4	762
0	-3	972
0	-2	934
0	-1	1878
0	0	1404
0	1	1102
0	2	1074
0	3	1082
0	4	852
0	5	682



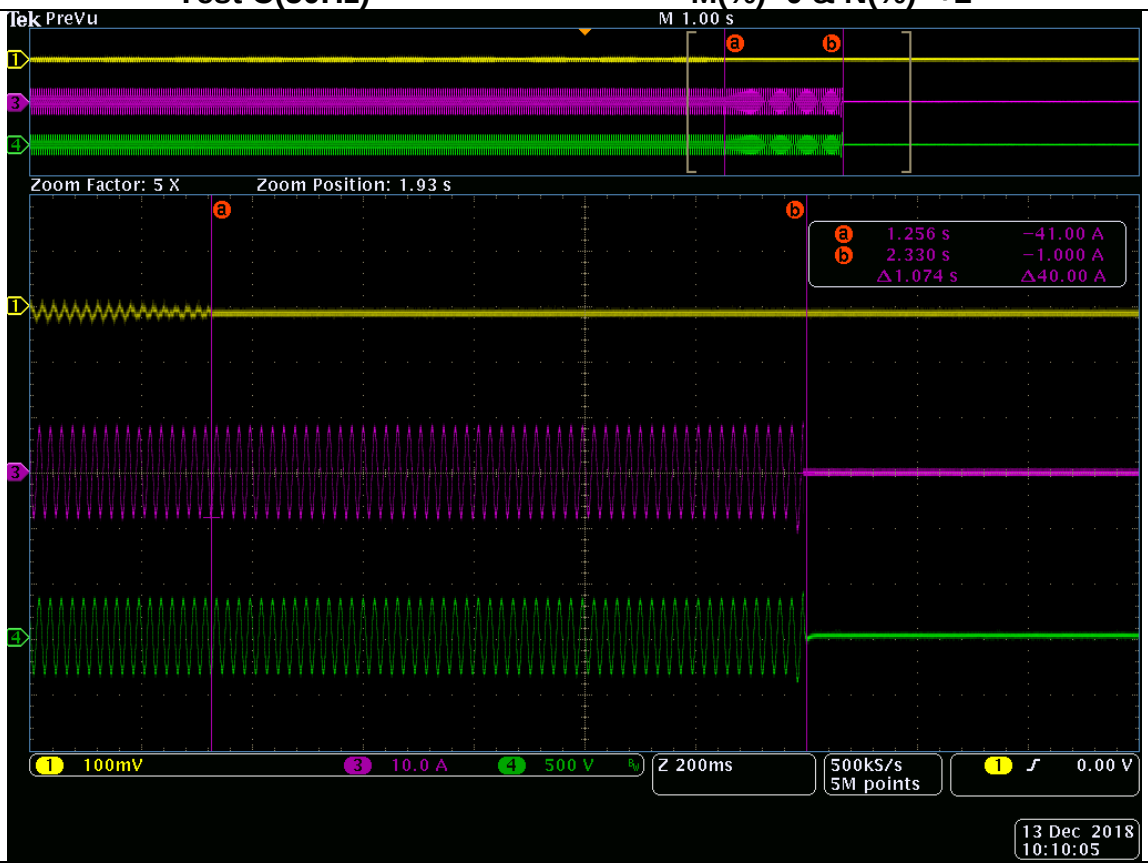
Test C(50Hz) M(%)=0 & N(%)=0



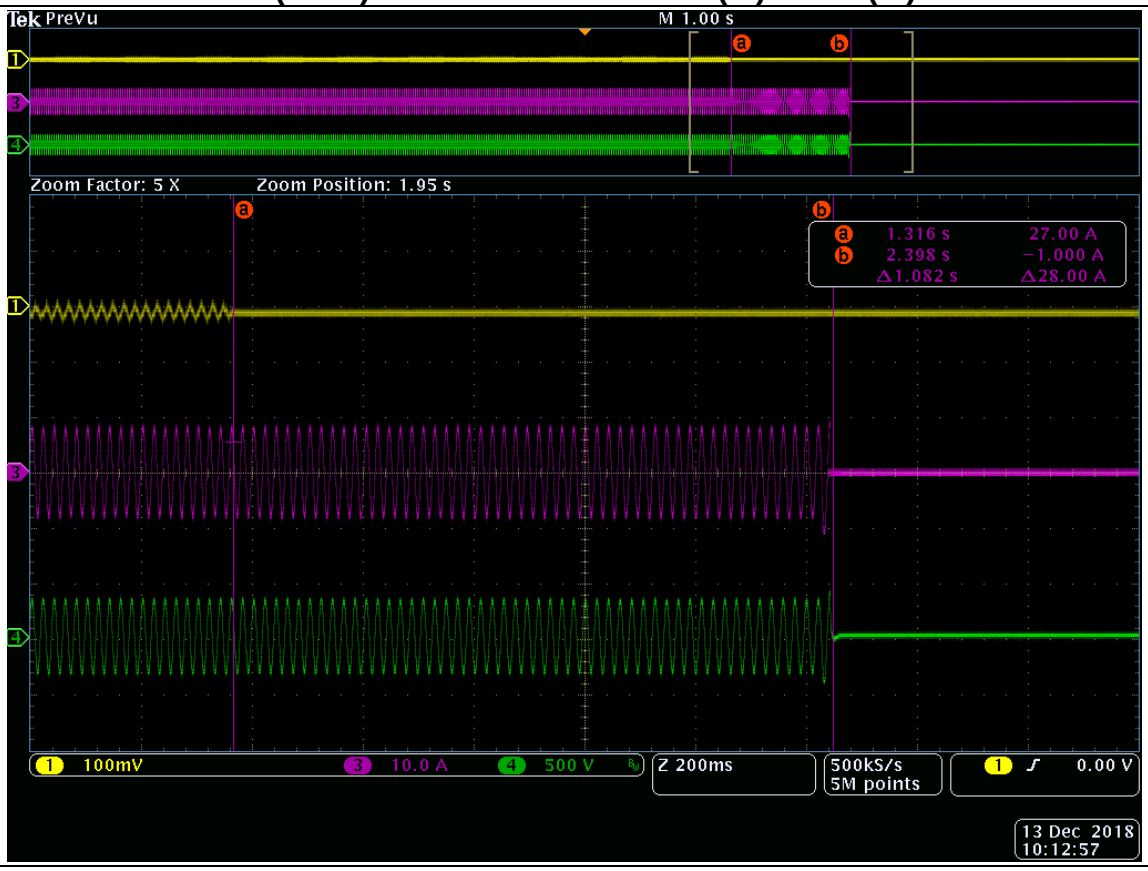
Test C(50Hz) M(%)=0 & N(%)=+1



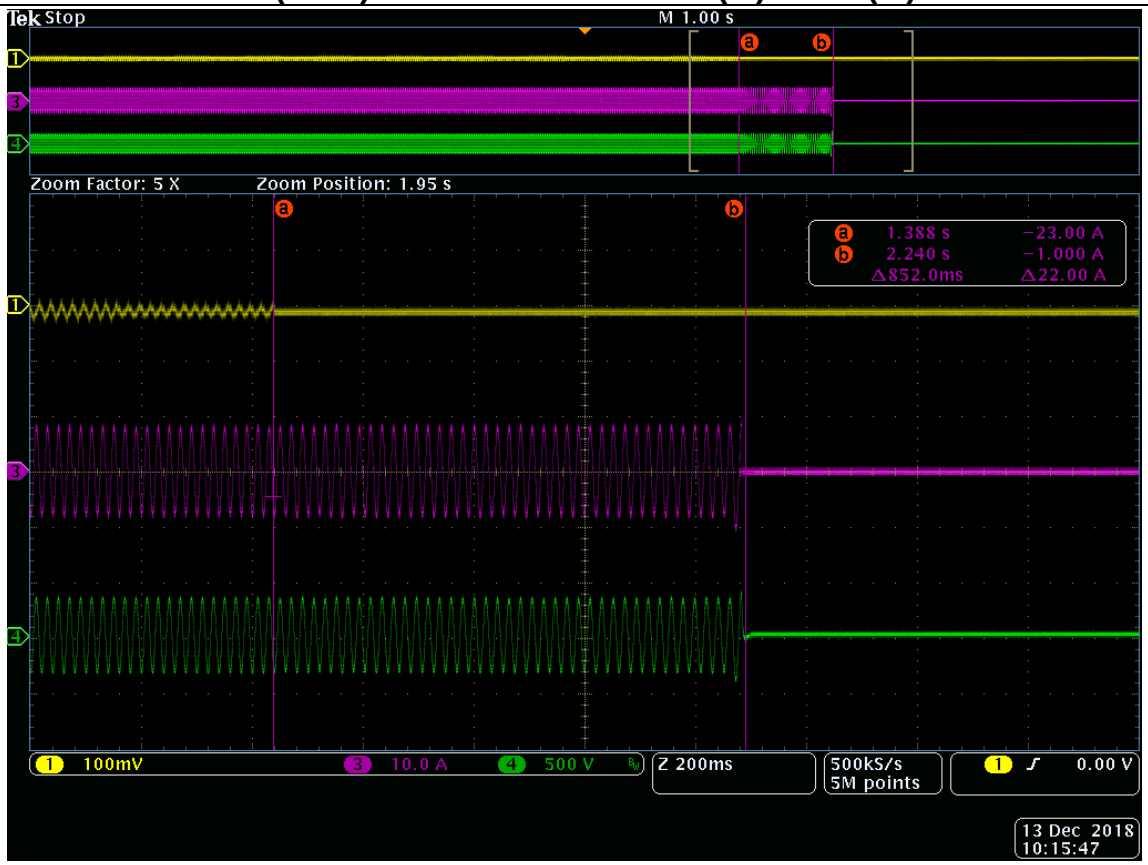
Test C(50Hz) **M(%)=0 & N(%)=+2**



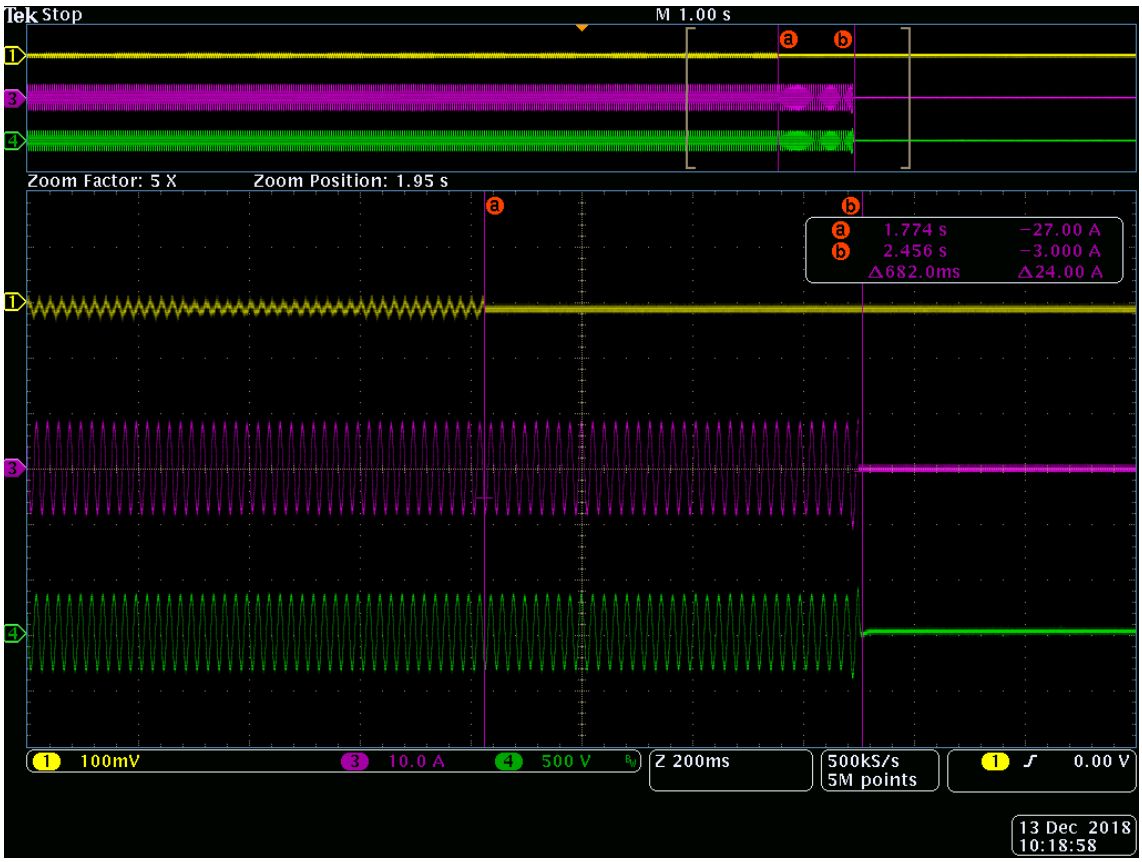
Test C(50Hz) **M(%)=0 & N(%)=+3**



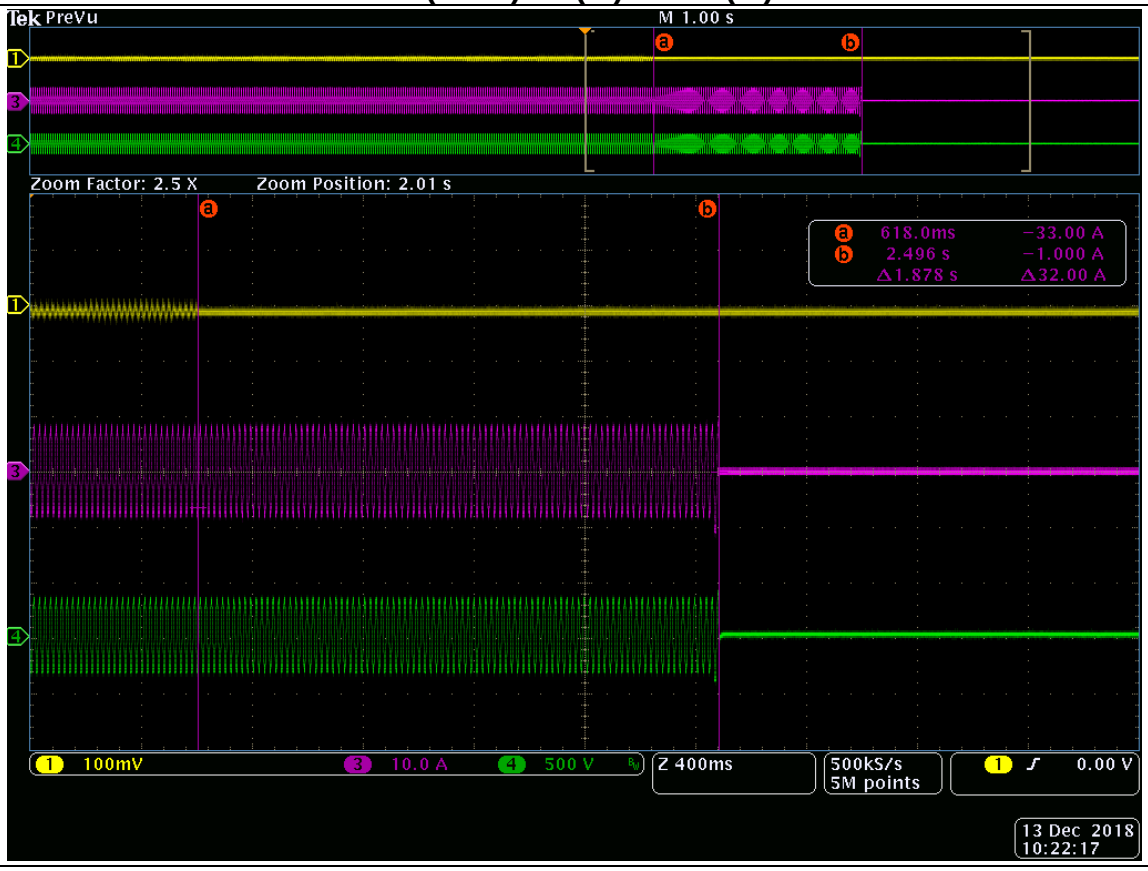
Test C(50Hz)	M(%)=0 & N(%)=+4



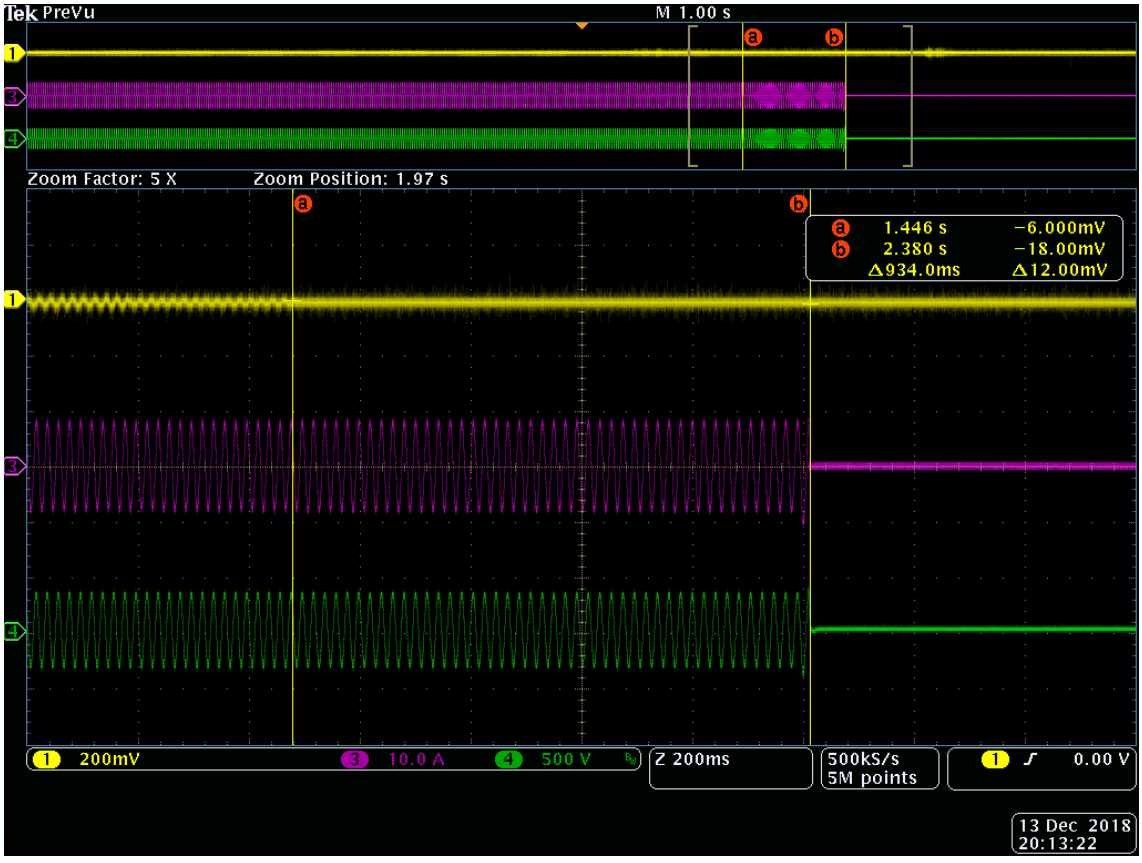
Test C(50Hz)	M(%)=0 & N(%)=+5



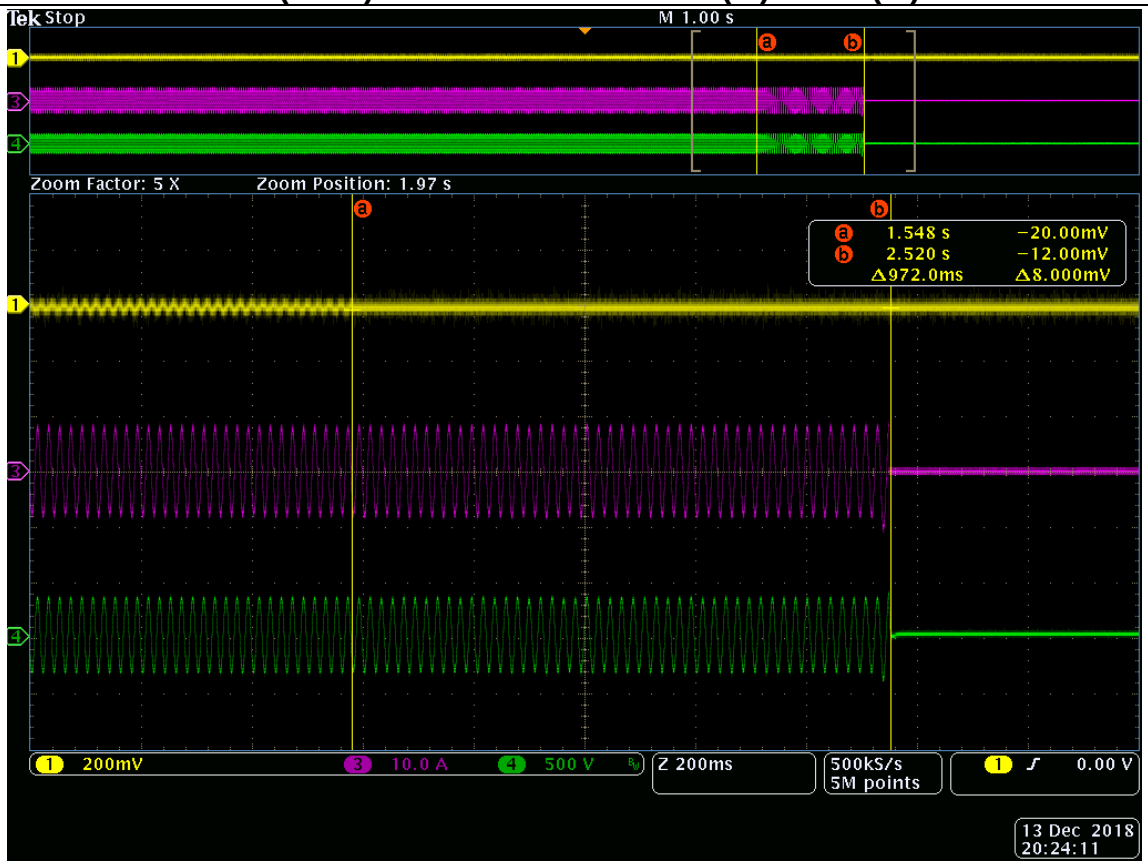
Test C(50Hz) M(%)=0 & N(%)=-1



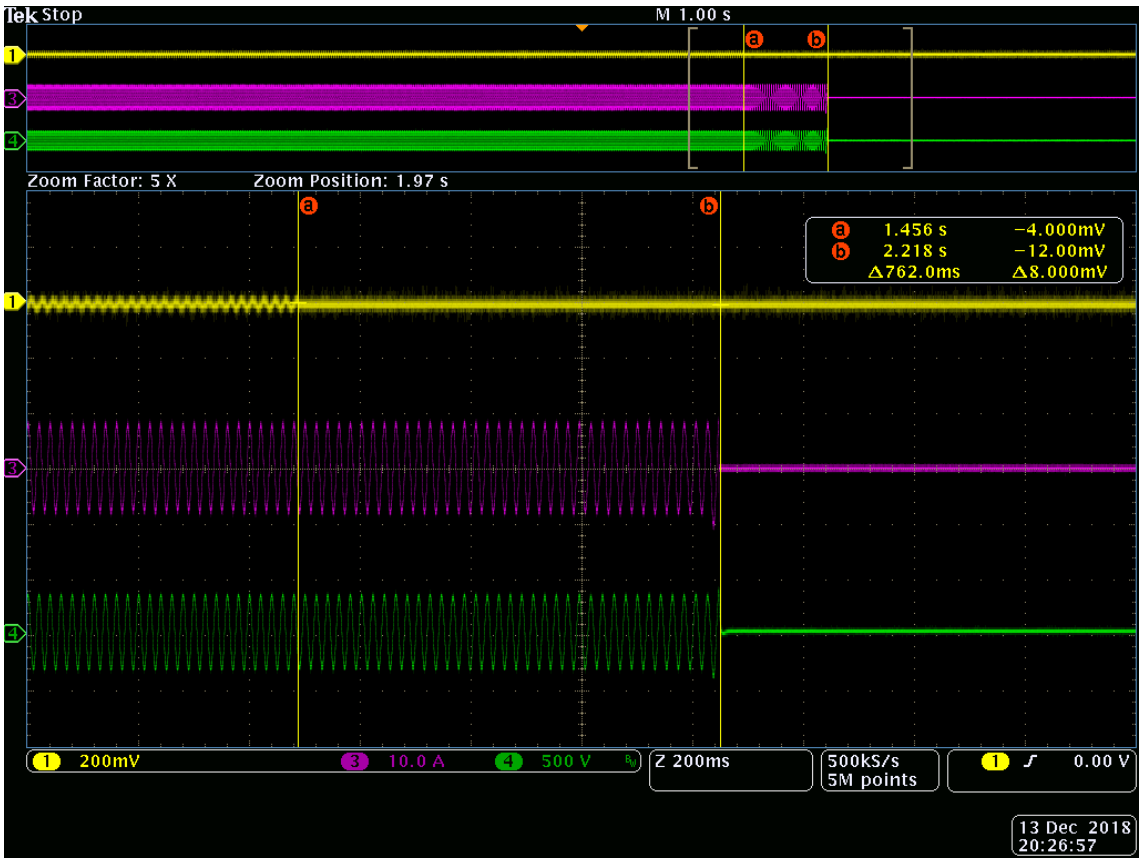
Test C(50Hz) M(%)=0 & N(%)=-2



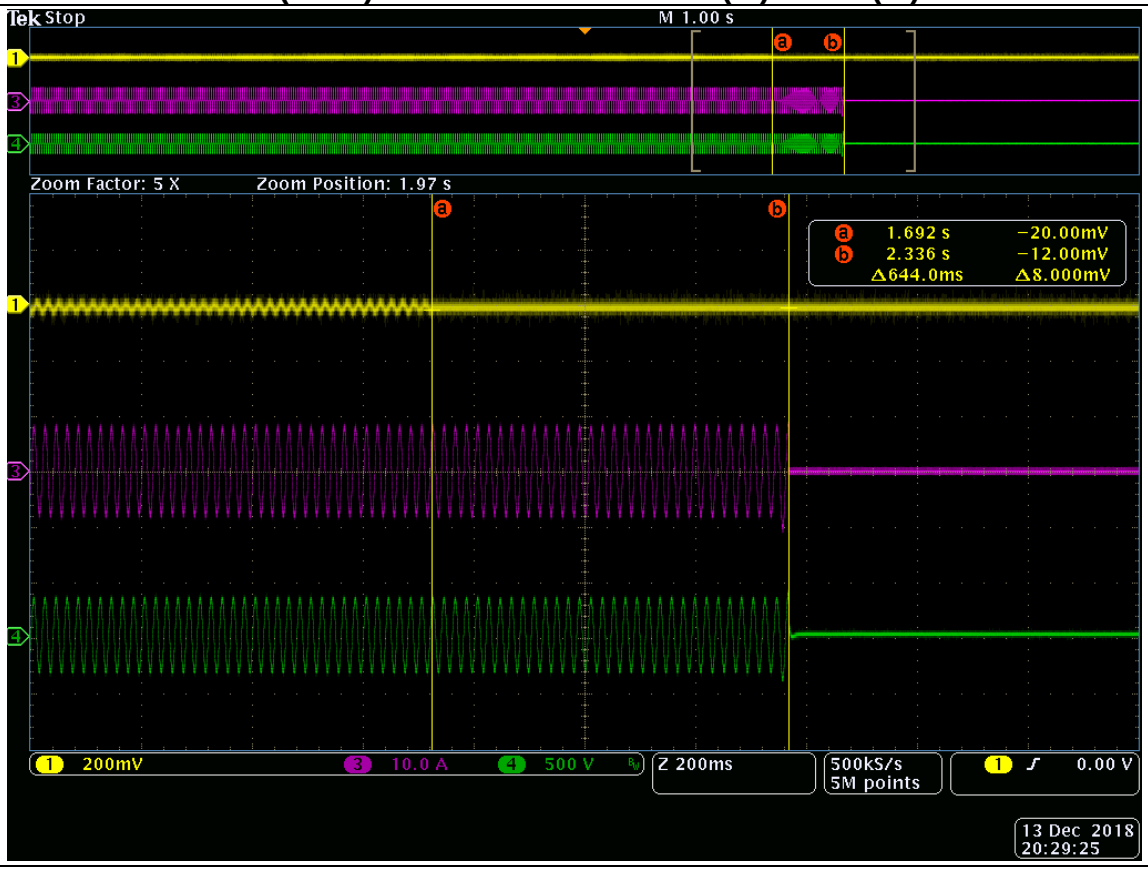
Test C(50Hz)	M(%)=0 & N(%)=-3



Test C(50Hz)	M(%)=0 & N(%)=-4



Test C(50Hz)	M(%)=0 & N(%)=-5



4.7 MARKING

As it can be seen in the pictures below (chapter 5 in this report) and the picture of the rating plate on 2.2 of this report the inverter accomplish all the requirements in this point of the VDE V 0126-1-1.

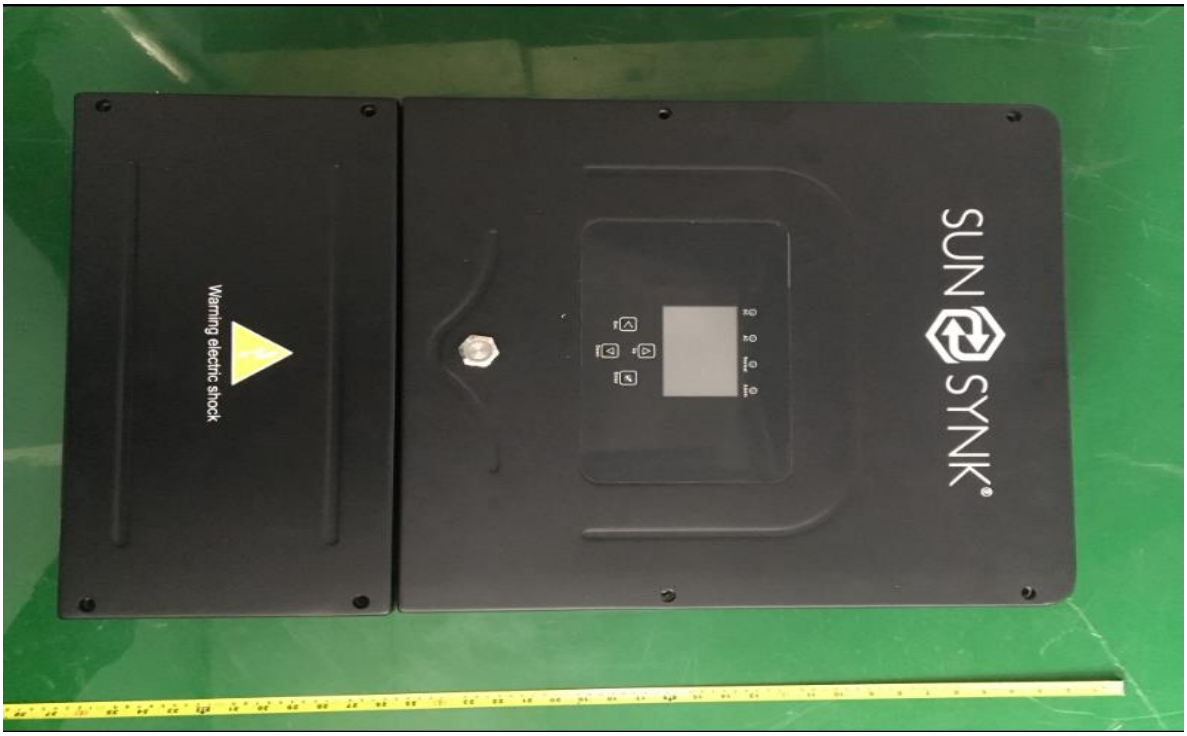
4.8 RESIDUAL CURRENT

This test has been done according to the standard EN 62109-2:2012-04, 4.8.

The compliances with these requirements are stated in the following test reports:

- IEC 62109-2: test report nº GZES190101037602.

5 PICTURES

IP20
Front 1

Front 2

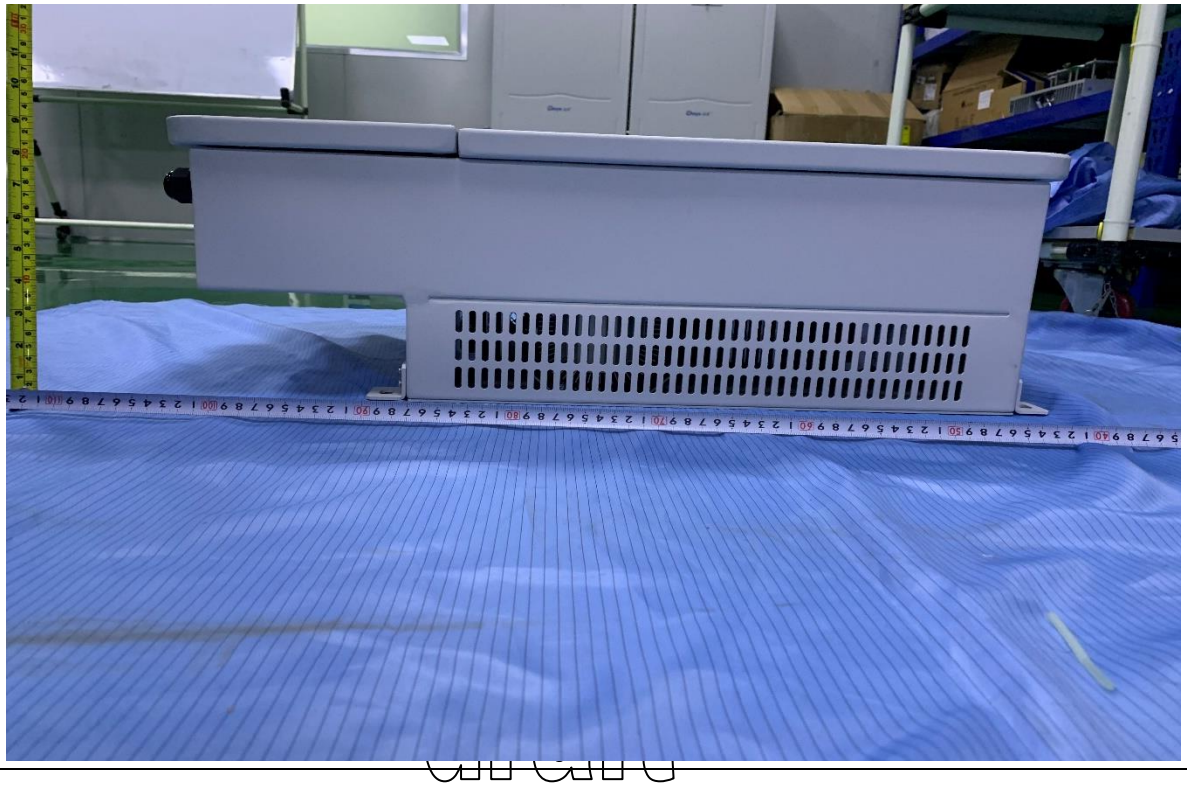

IP65
Front 1

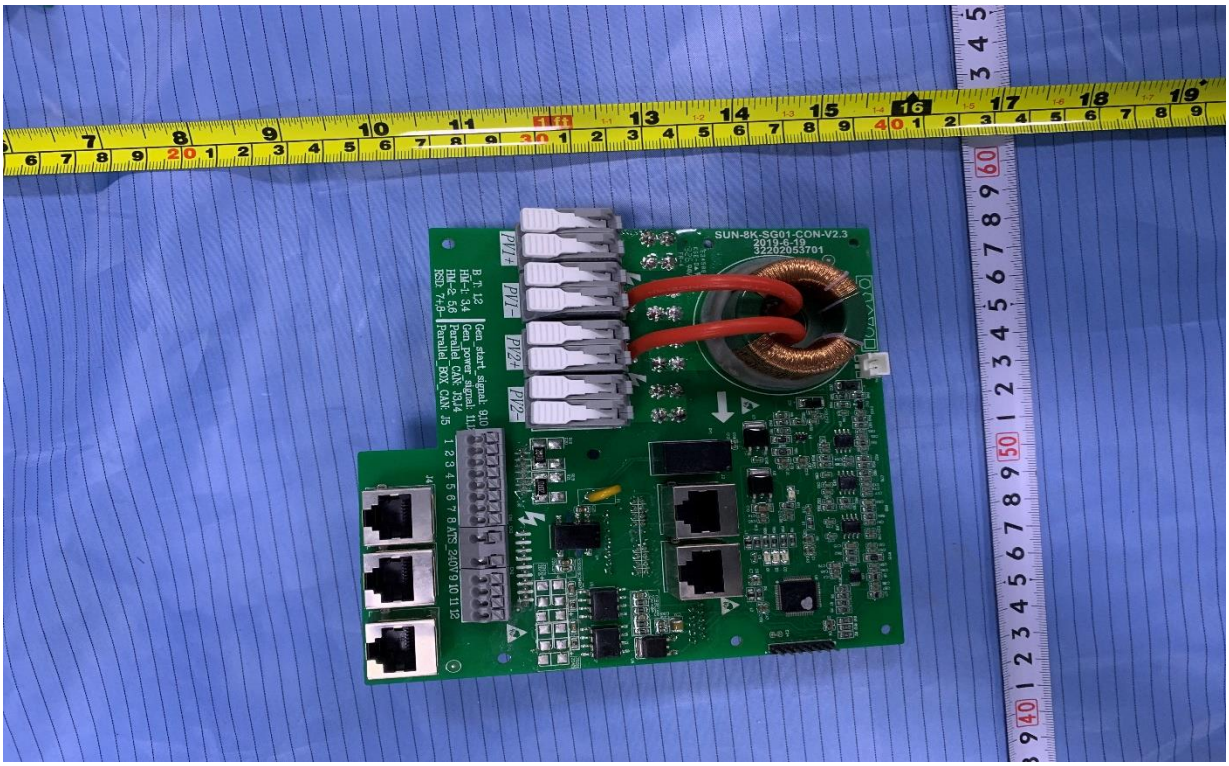
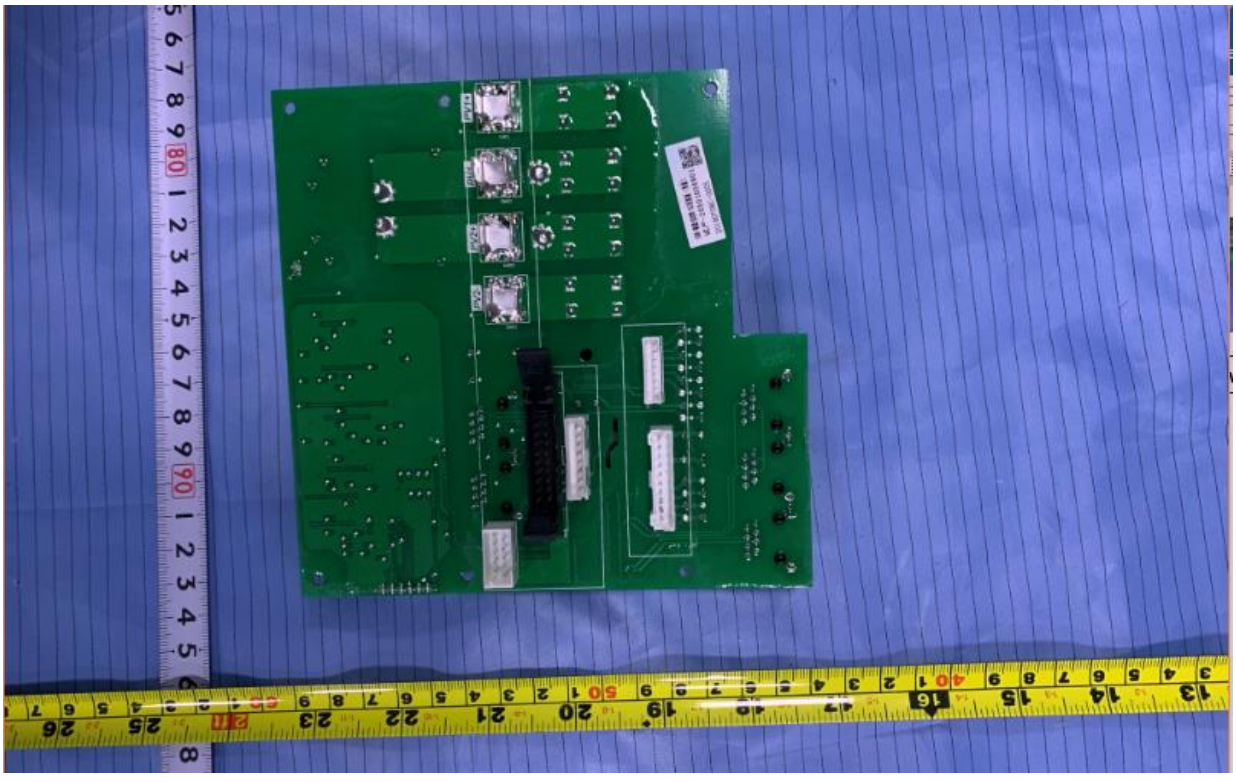
Front 2

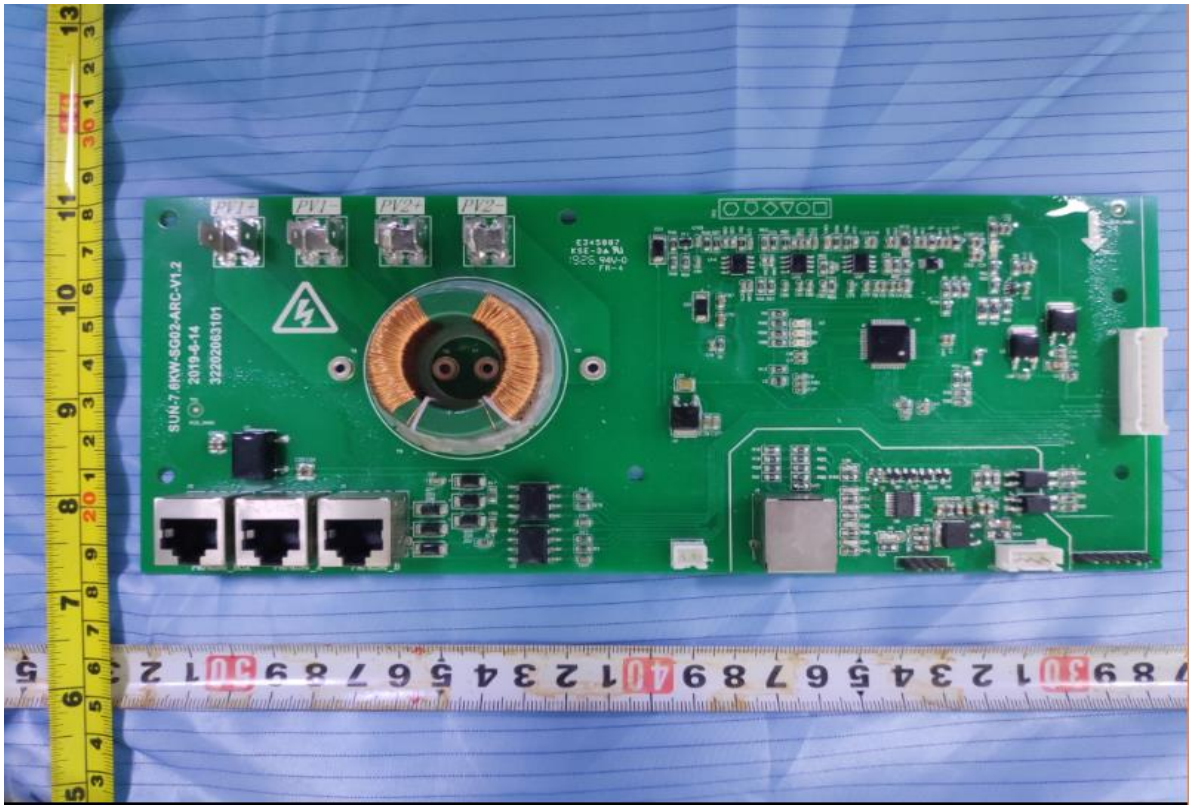
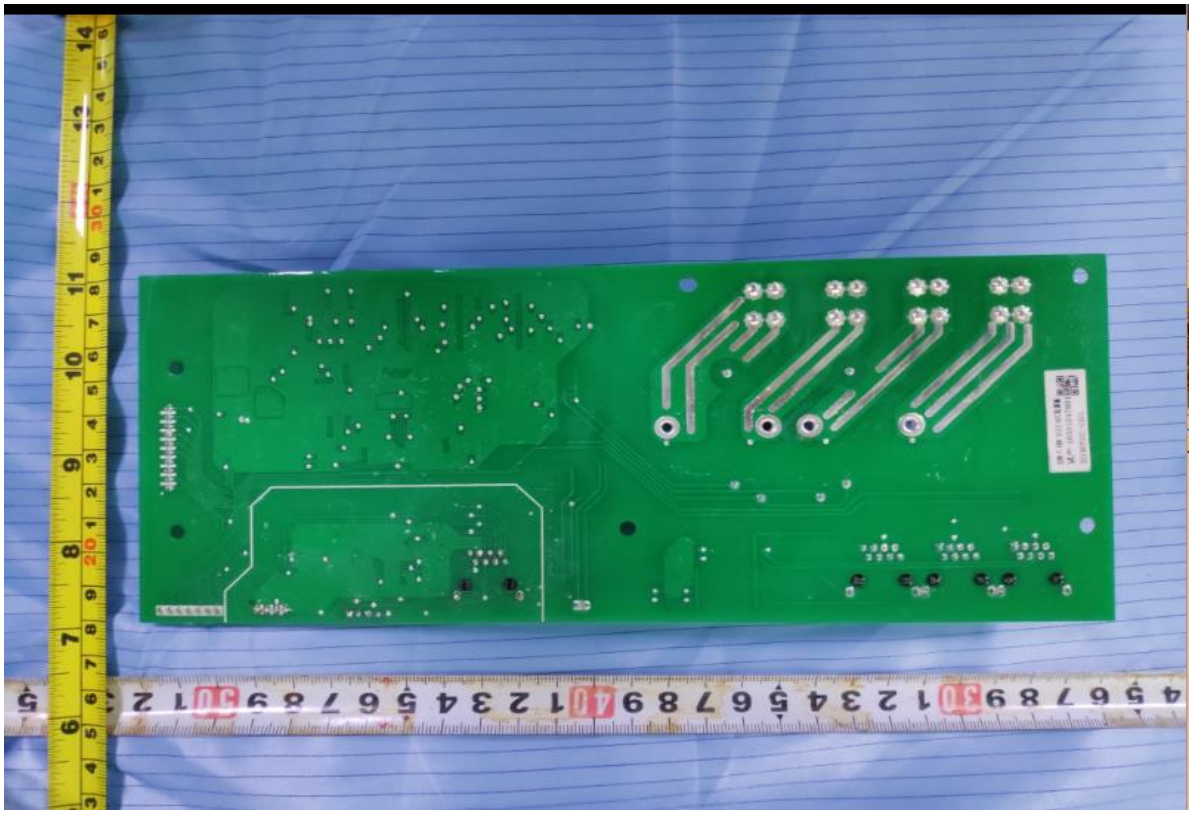

IP20
Left Side

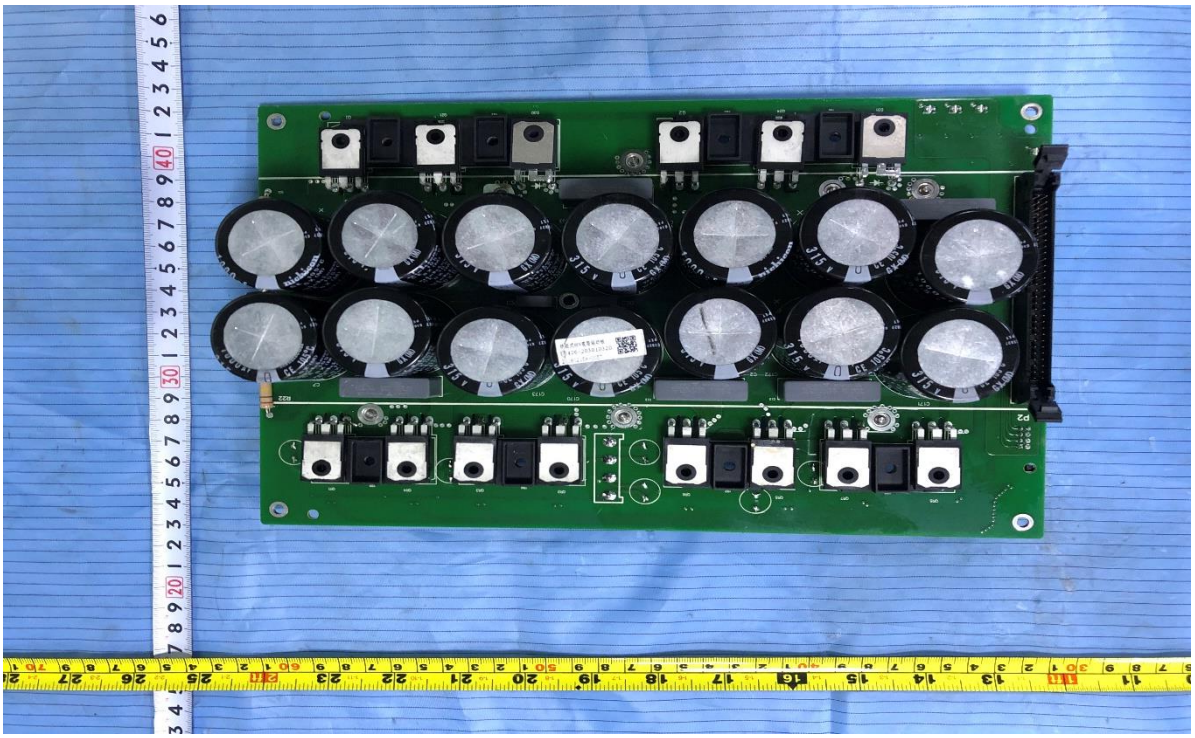
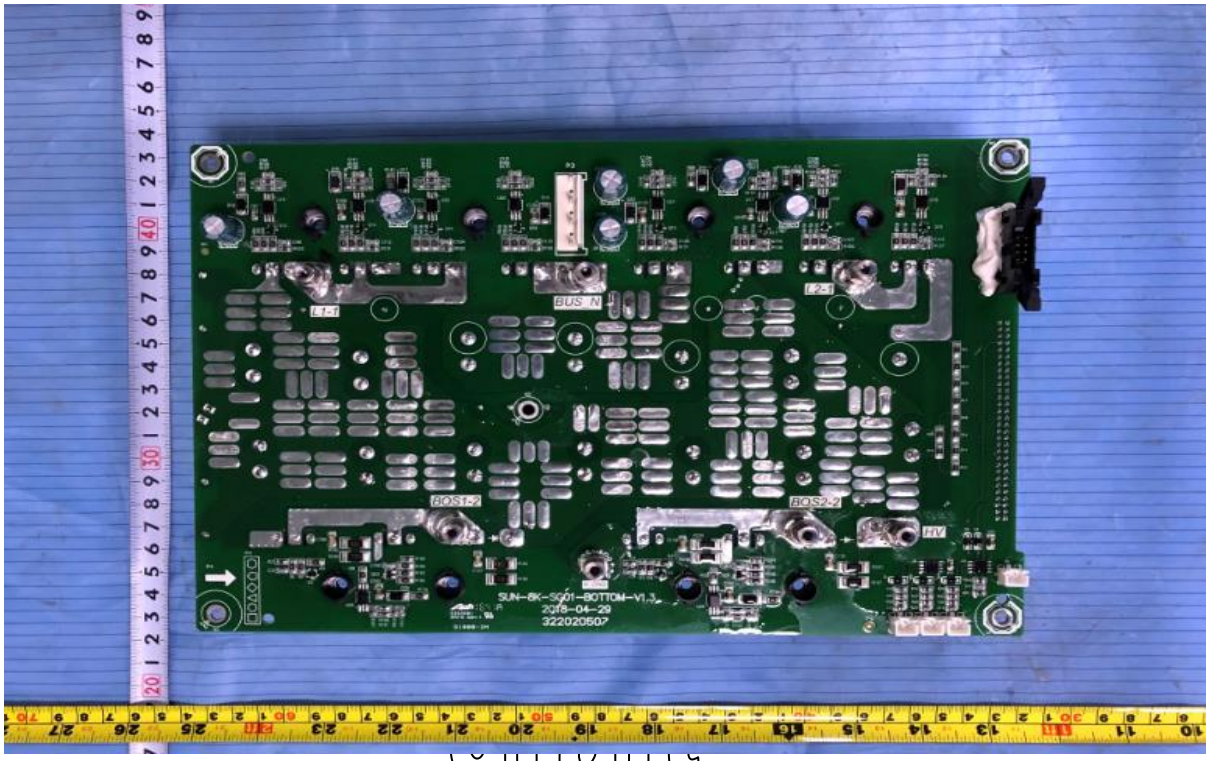
Rigt Side

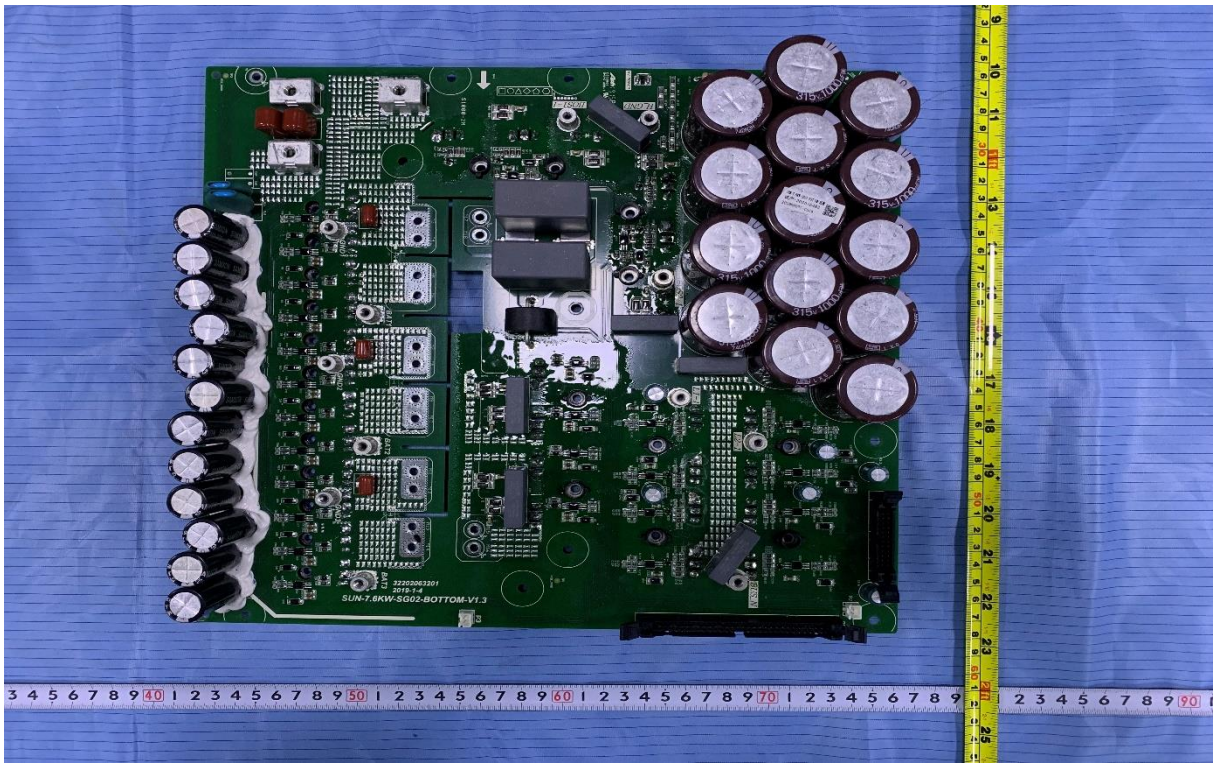
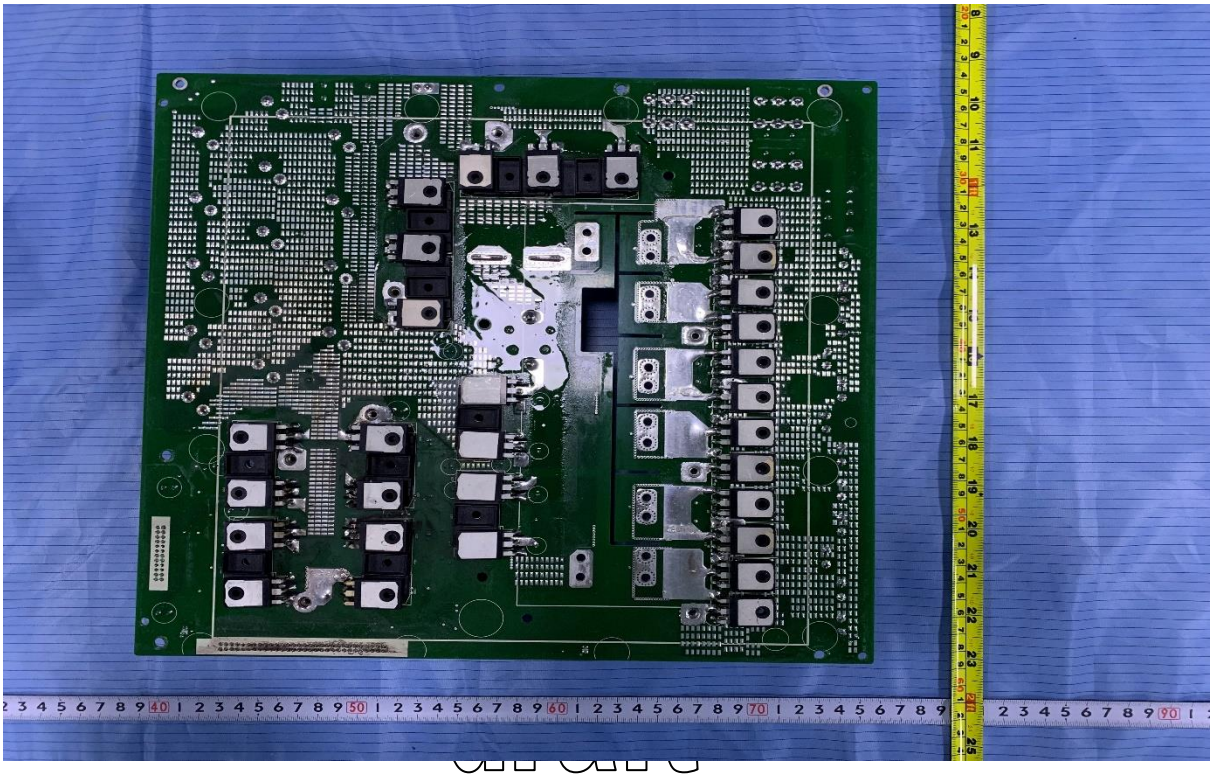

IP65
Left Side

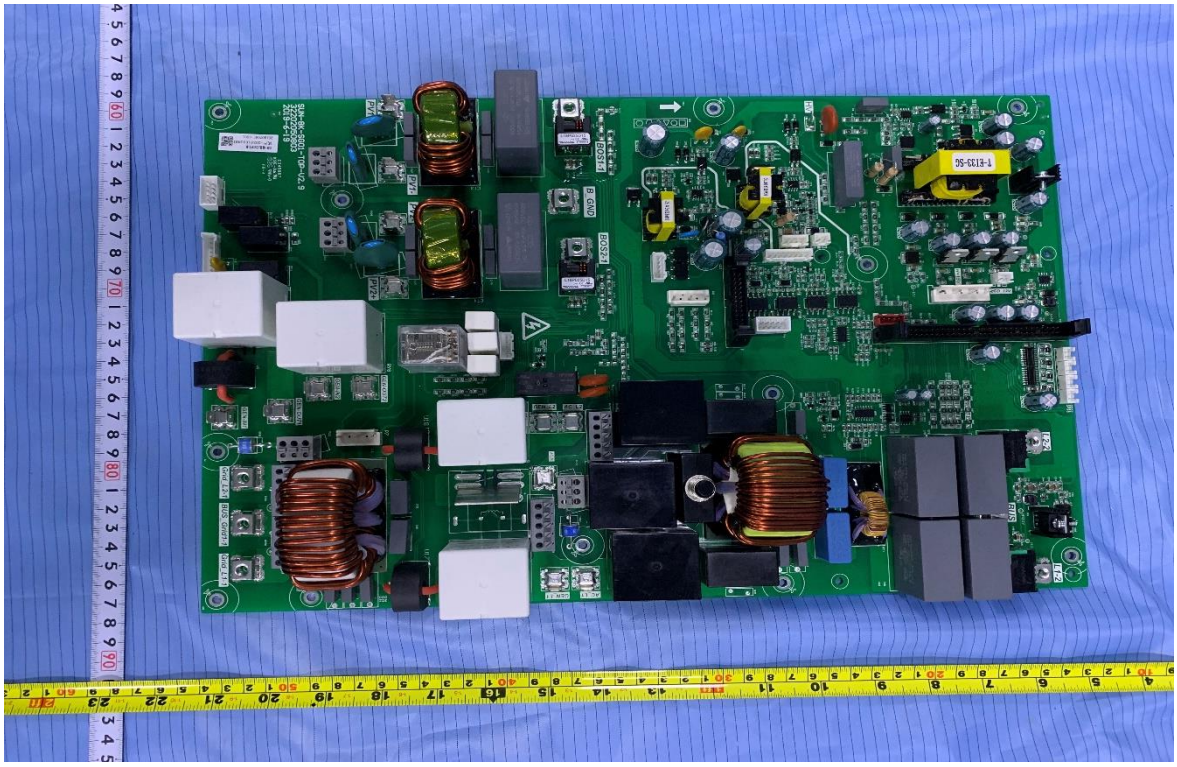
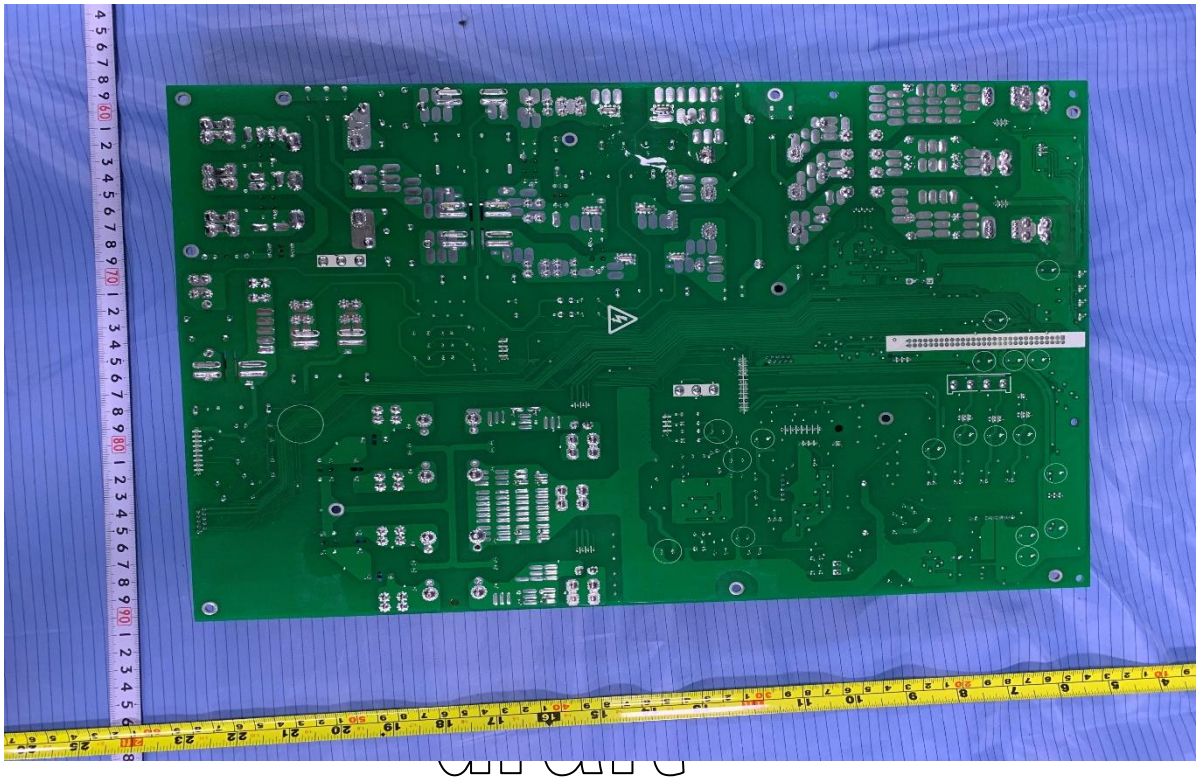
Rigt Side


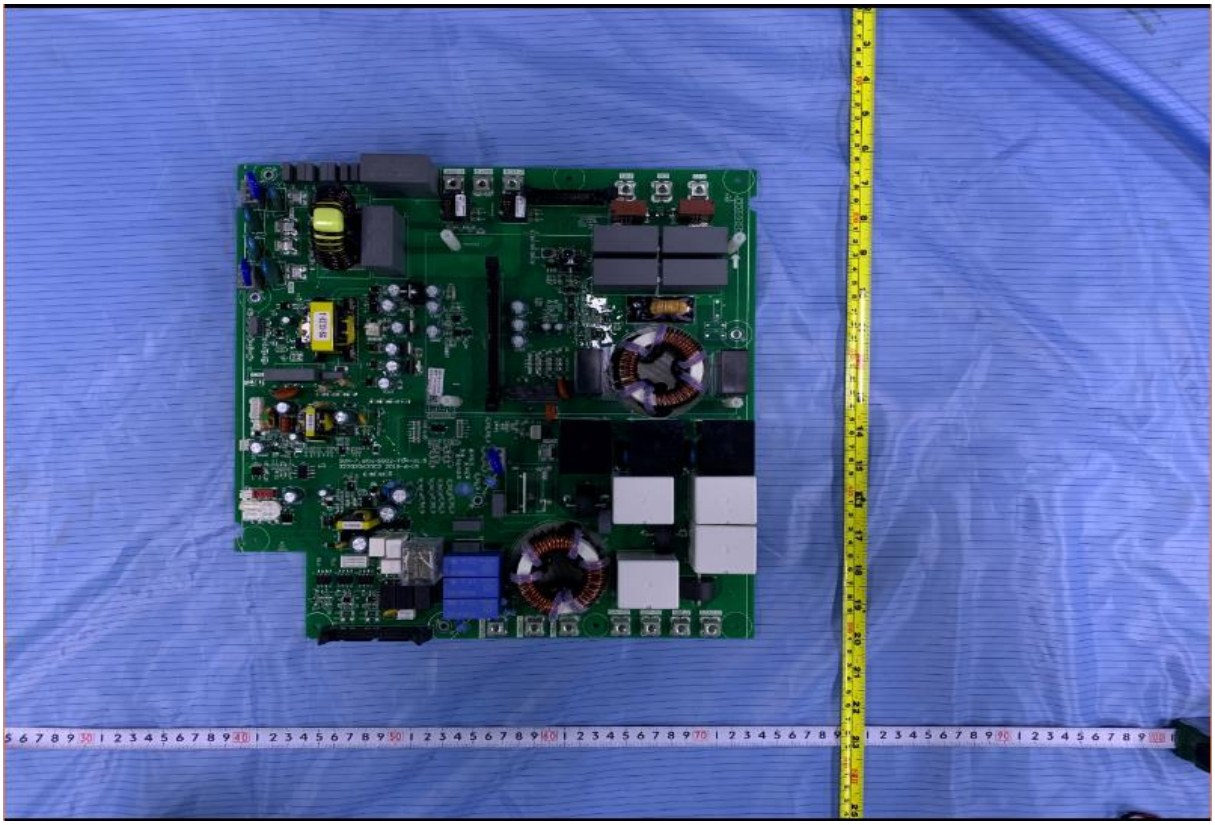
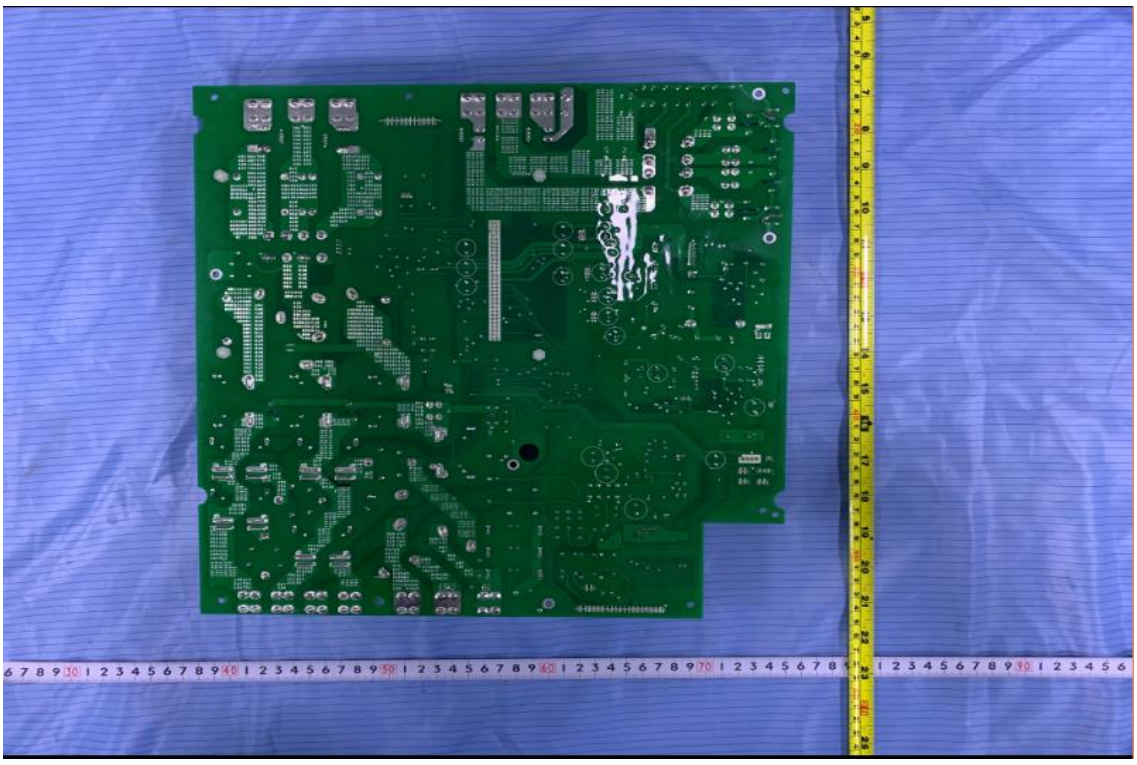
IP20
Front view of ARC Board

Back view of ARC Board


IP65
Front view of ARC Board

Back view of ARC Board


IP20
Front view of Driving Board

Back view of Driving Board


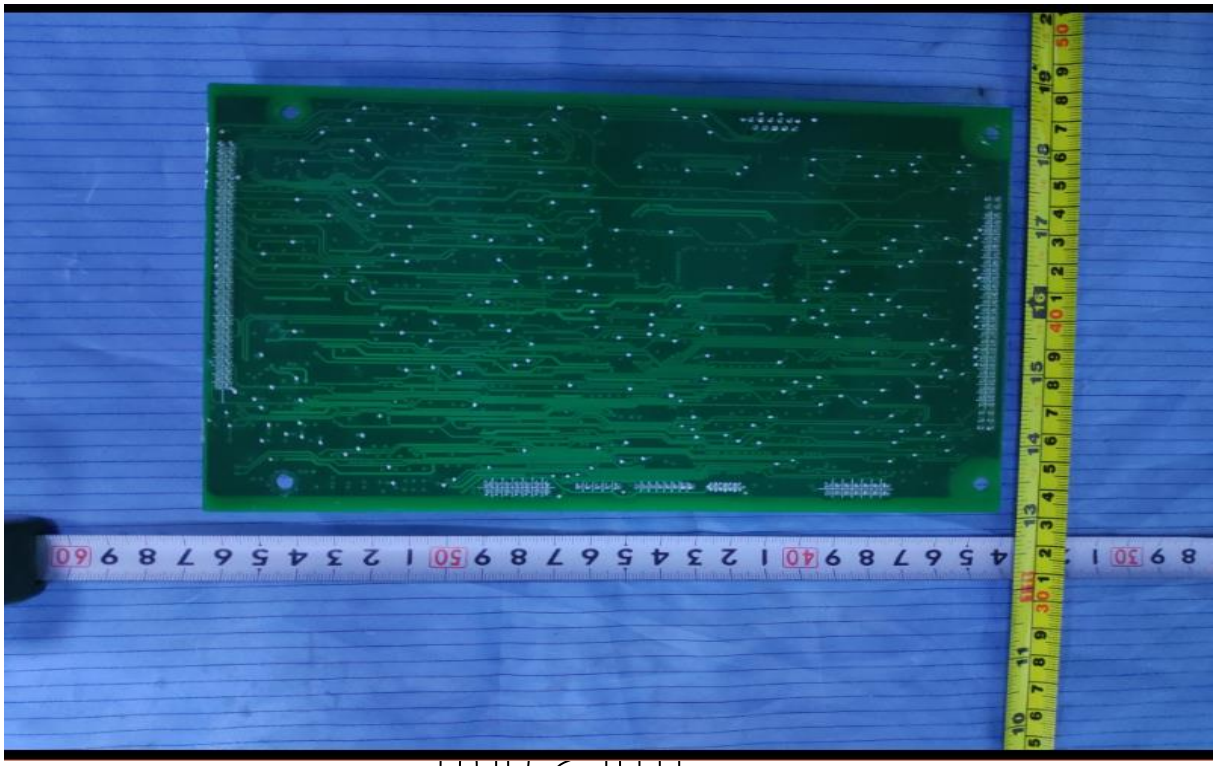
IP65
Front view of Driving Board

Back view of Driving Board


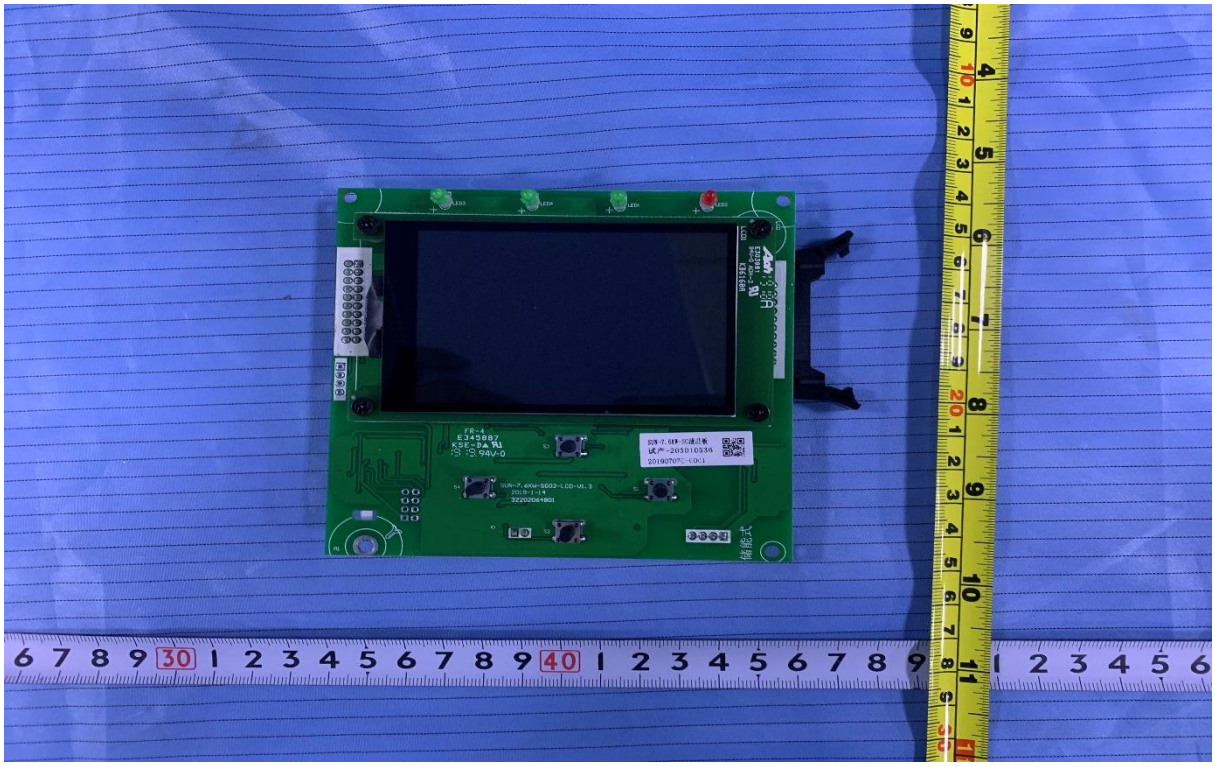
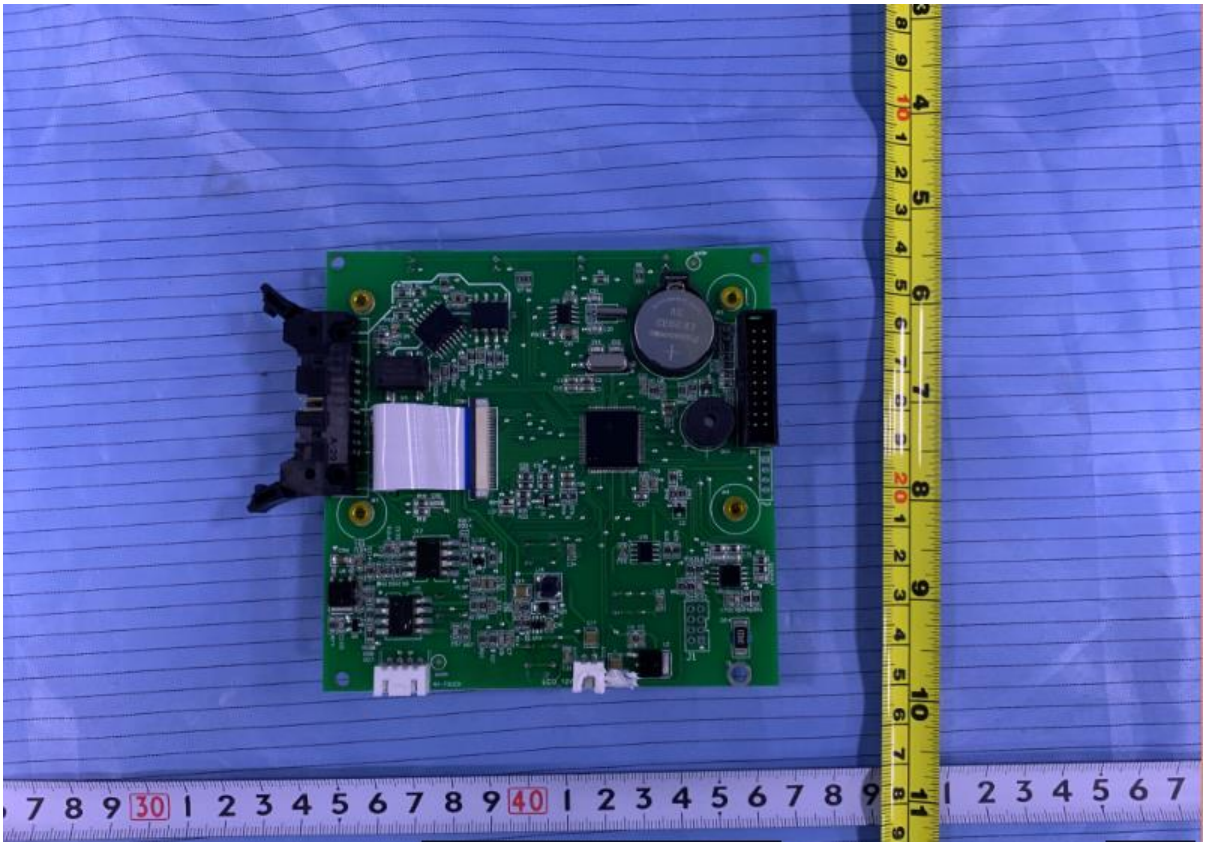
IP20
Front view of Main Board

Back view of Main Board


IP65
Front view of Main Board

Back view of Main Board


Front view of Control Board

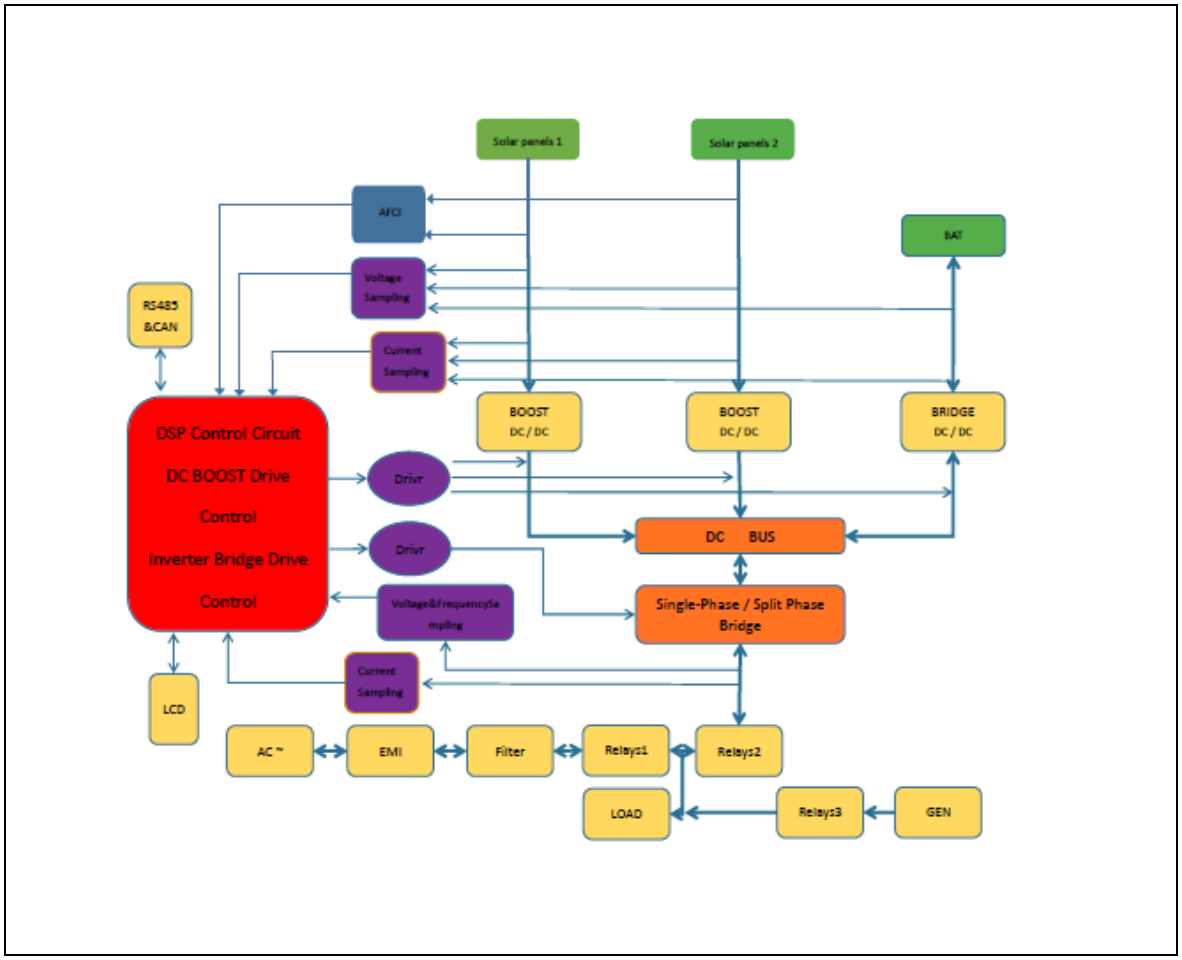
Back view of Control Board



Front view of Display Board

Back view of Display Board


Serial Number and Software Version

6 ELECTRICAL SCHEMES



----------END OF REPORT----------