

ATTACHMENT I

(Pictures of the EUT and Electrical Schemes)

1 PICTURES

Front view 1 (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



Back view 1 (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



IEC 62116:2014 (50Hz)

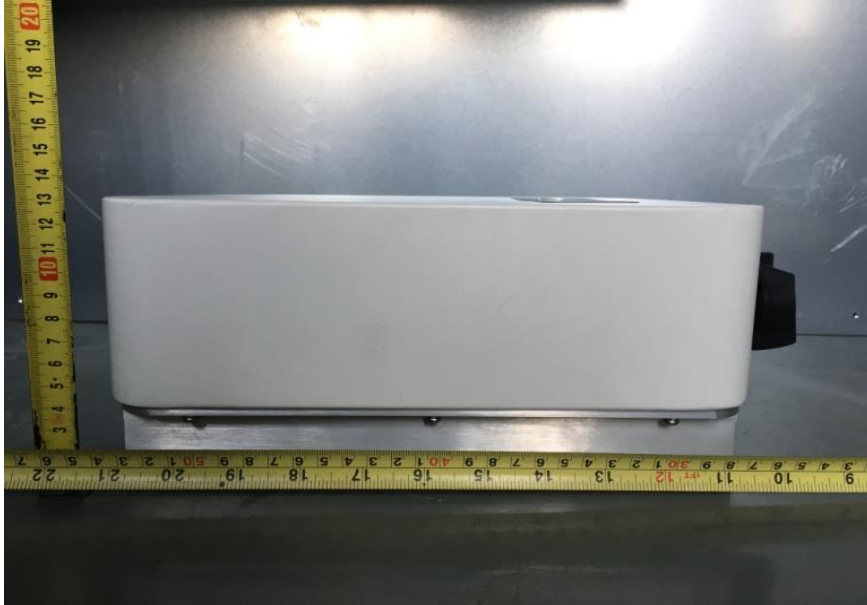
Front view 2 (SOFAR 1100TL-G3, SOFAR 1600TL-G3, SOFAR 2200TL-G3)



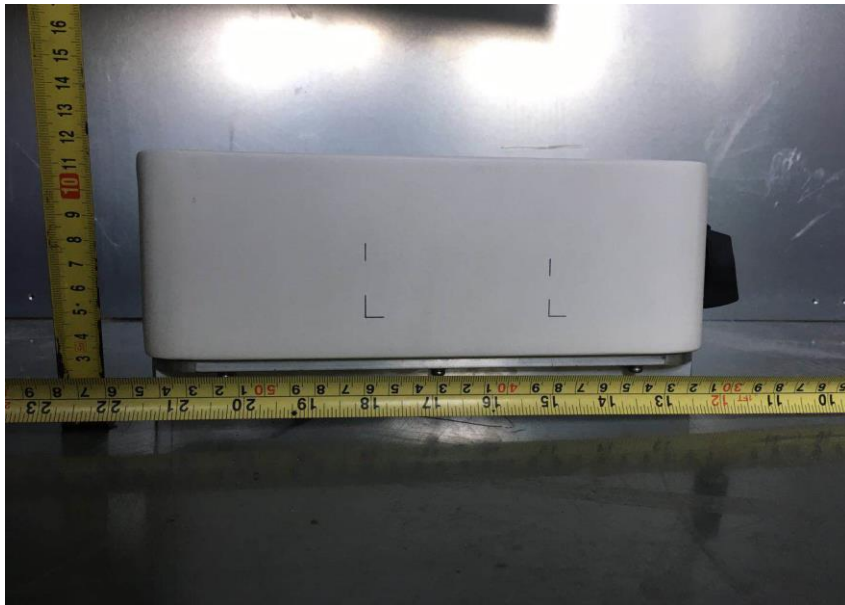
Back view 2 (SOFAR 1100TL-G3, SOFAR 1600TL-G3, SOFAR 2200TL-G3)



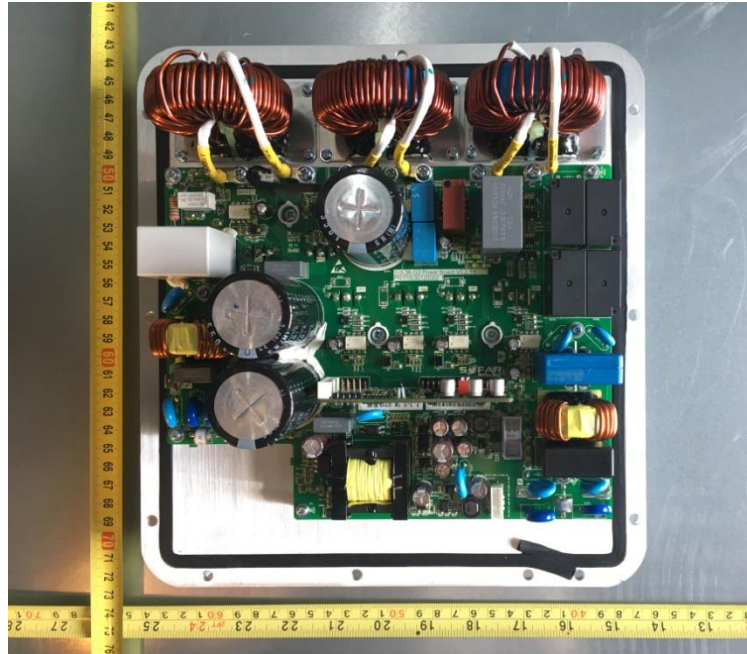
Side View (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



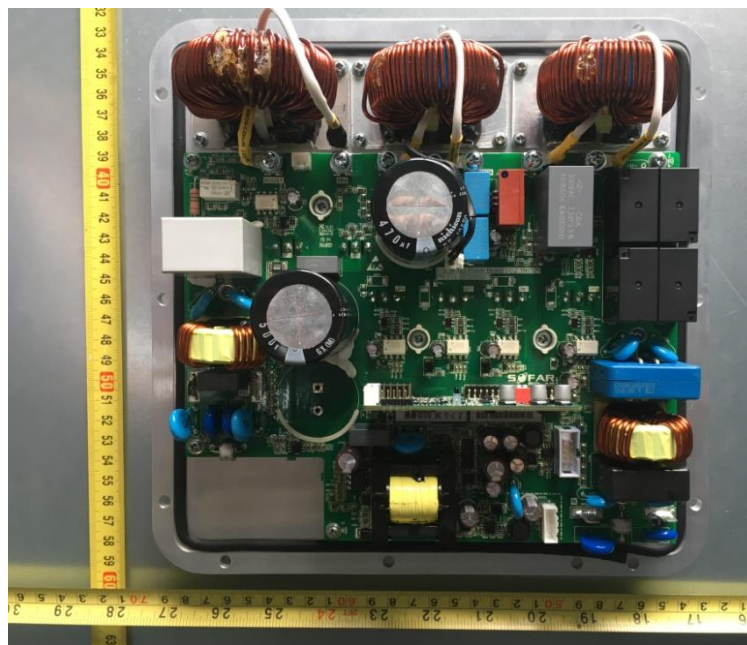
Side View (SOFAR 1100TL-G3, SOFAR 1600TL-G3, SOFAR 2200TL-G3)



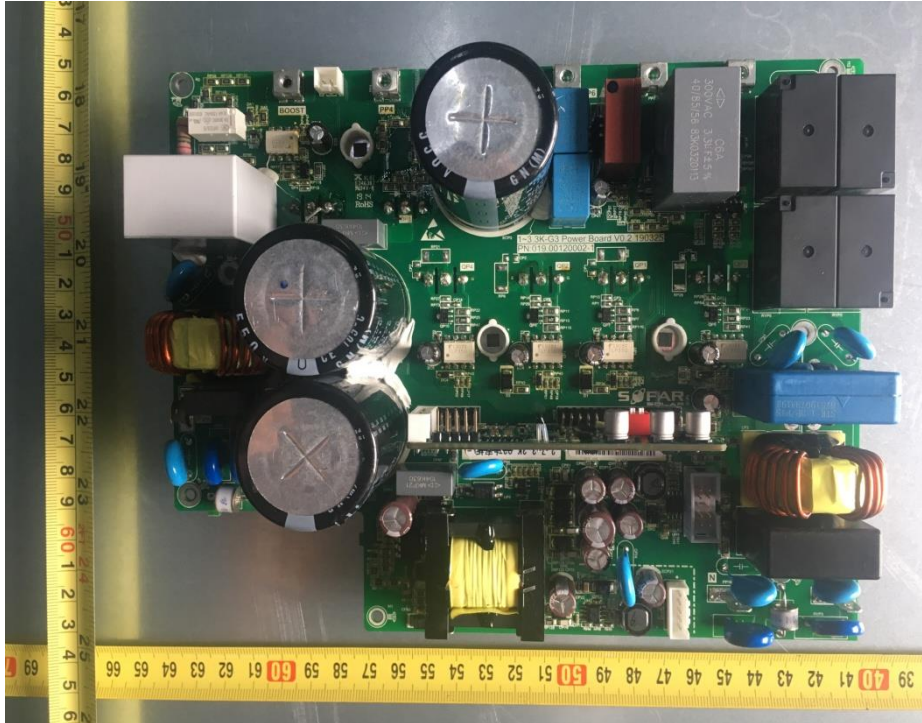
Internal view of enclosure (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



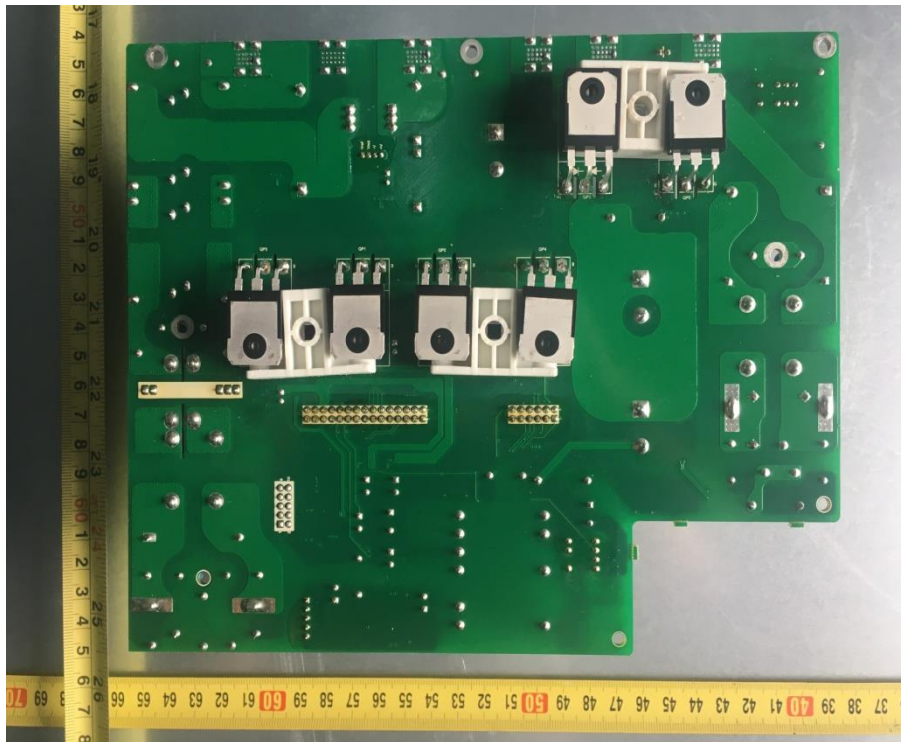
Internal view of enclosure (SOFAR 1100TL-G3, SOFAR 1600TL-G3, SOFAR 2200TL-G3)



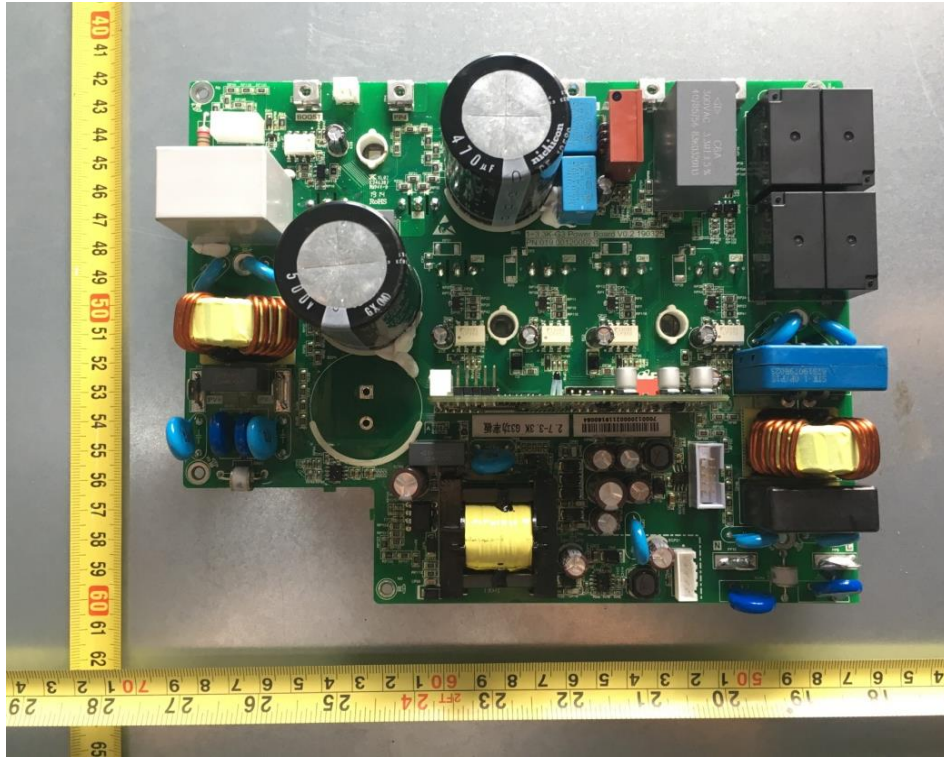
Front side of main board 1 (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



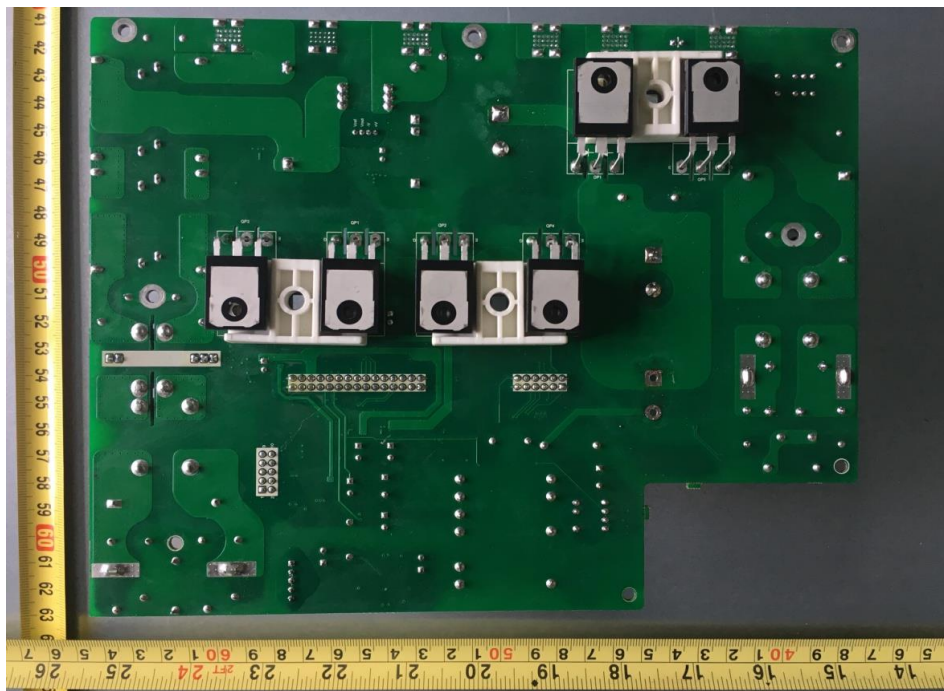
Back side of main board 1 (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



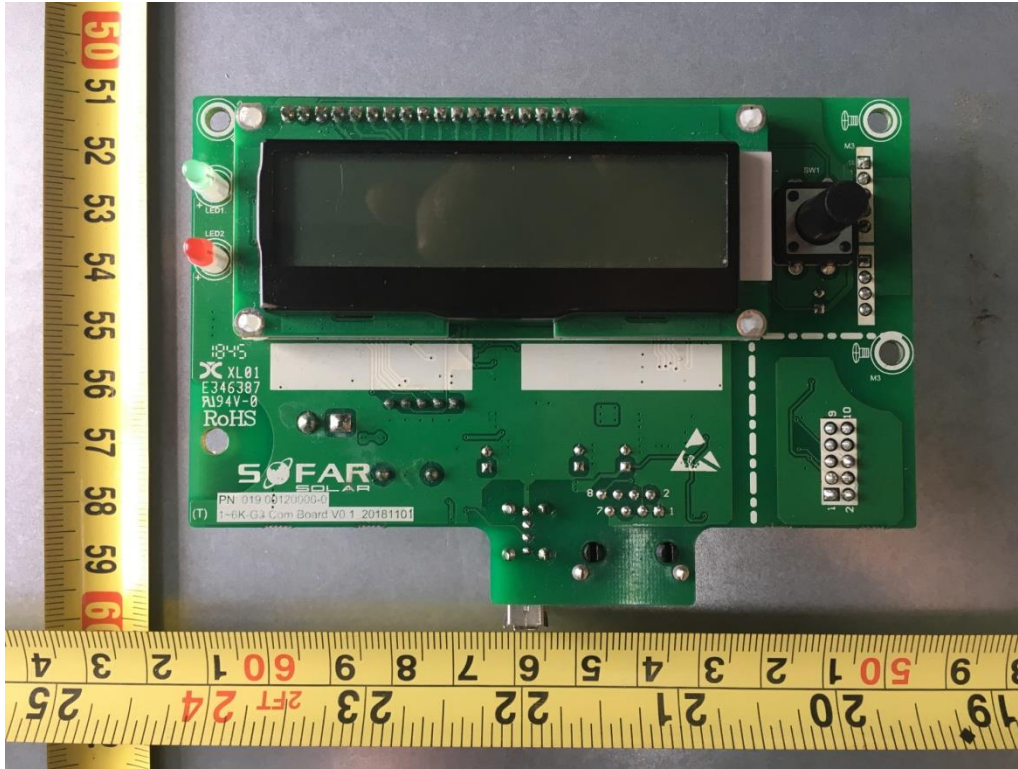
Front side of main board 2 (SOFAR 1100TL-G3、SOFAR 1600TL-G3、SOFAR 2200TL-G3)



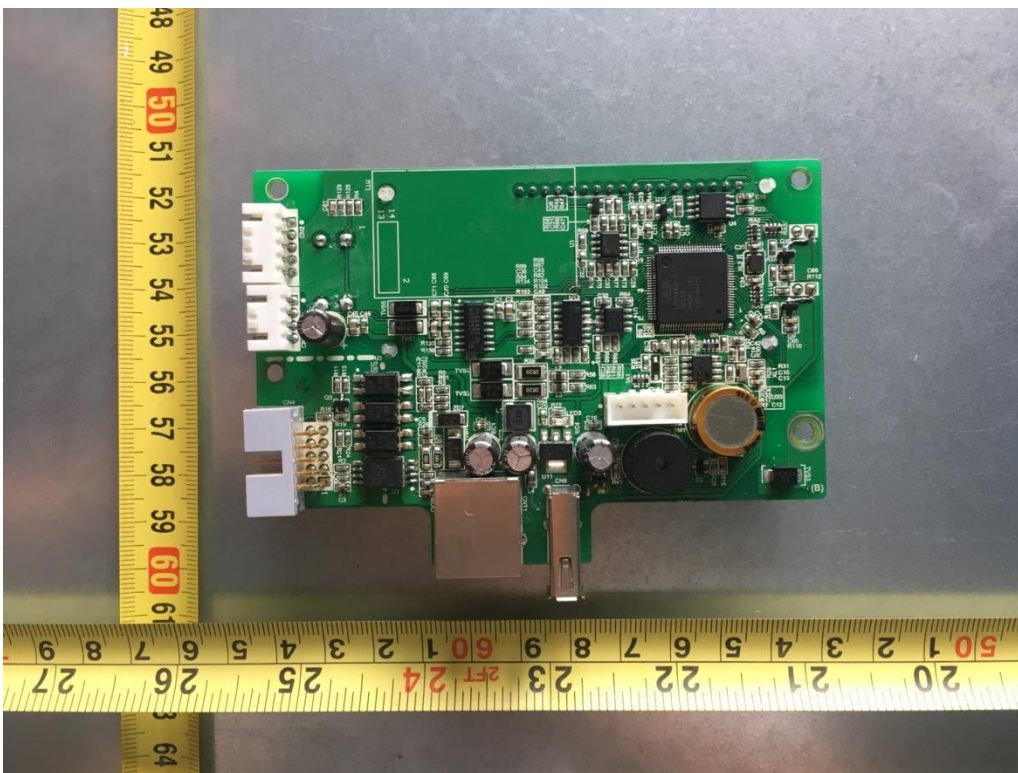
Back side of main board (SOFAR 1100TL-G3、SOFAR 1600TL-G3、SOFAR 2200TL-G3)



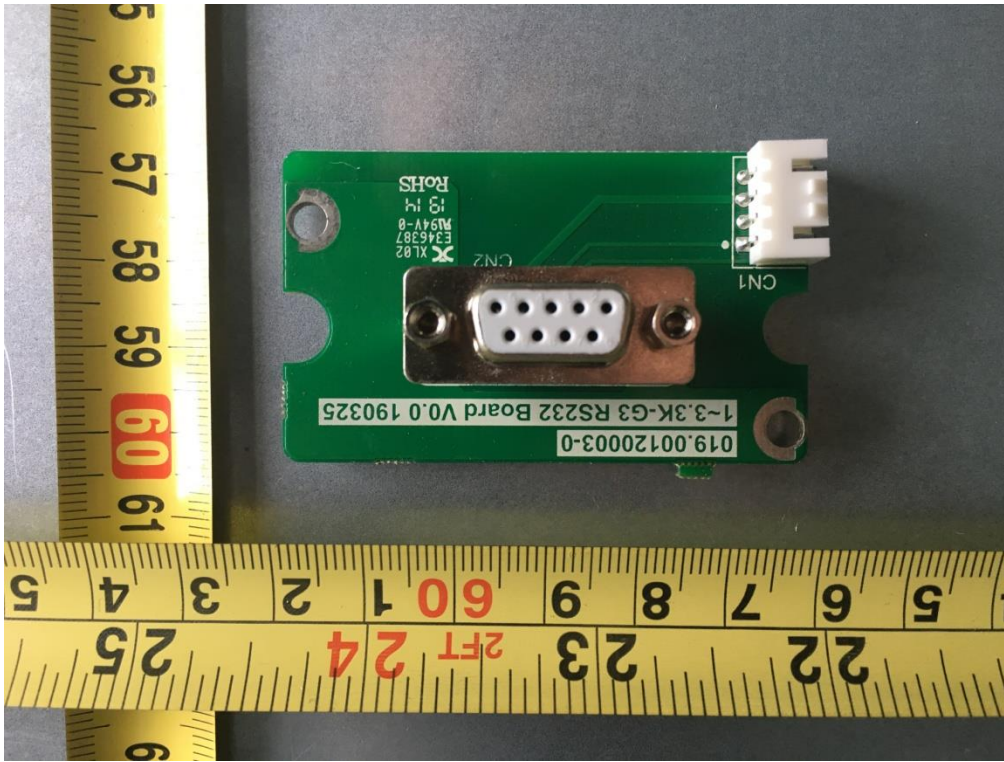
Front side of Control board



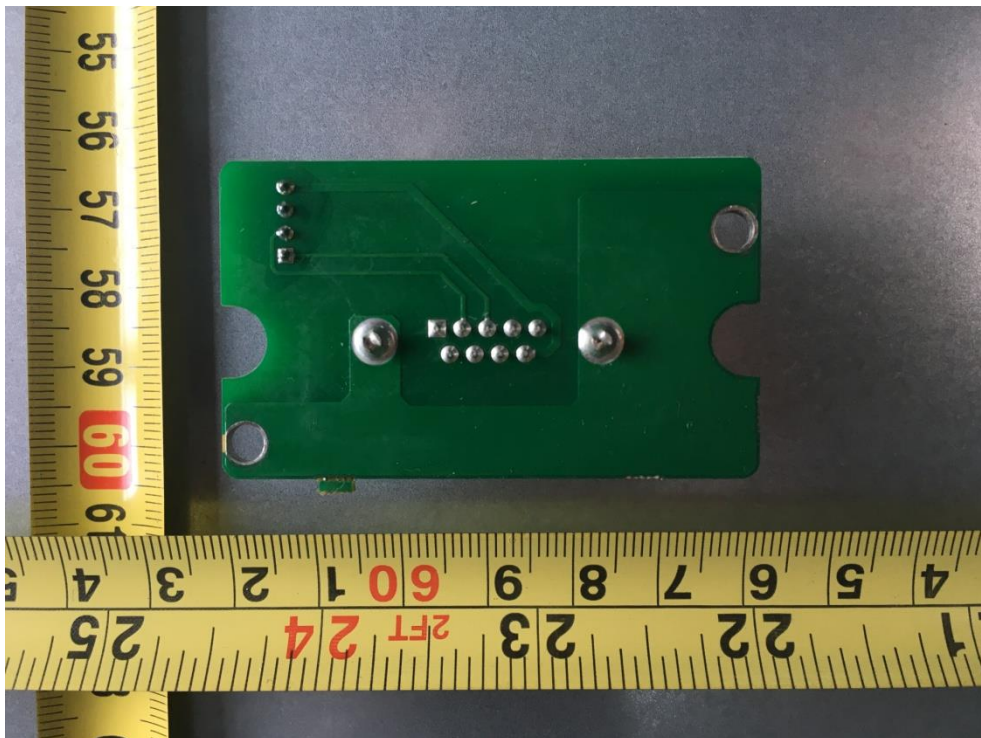
Front side of Control board



Front view of RS 232 board



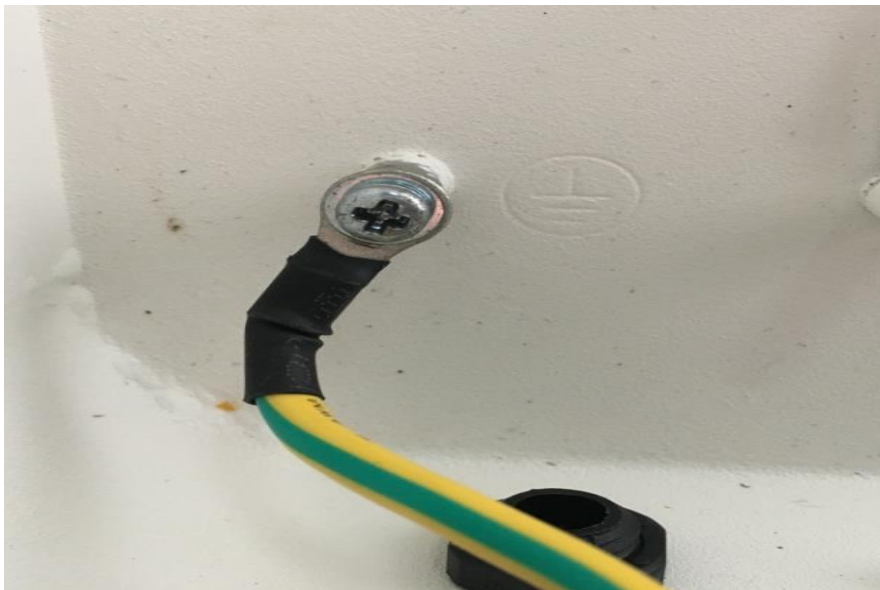
Back view of RS 232 board



Connection Interface



Grounding

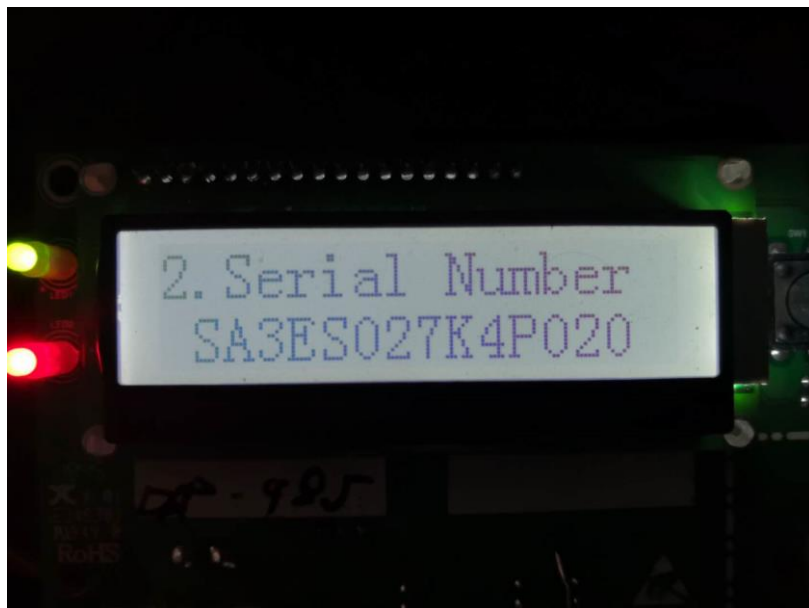


IEC 62116:2014 (50Hz)

Software Number (SOFAR 2700TL-G3, SOFAR 3000TL-G3, SOFAR 3300TL-G3)



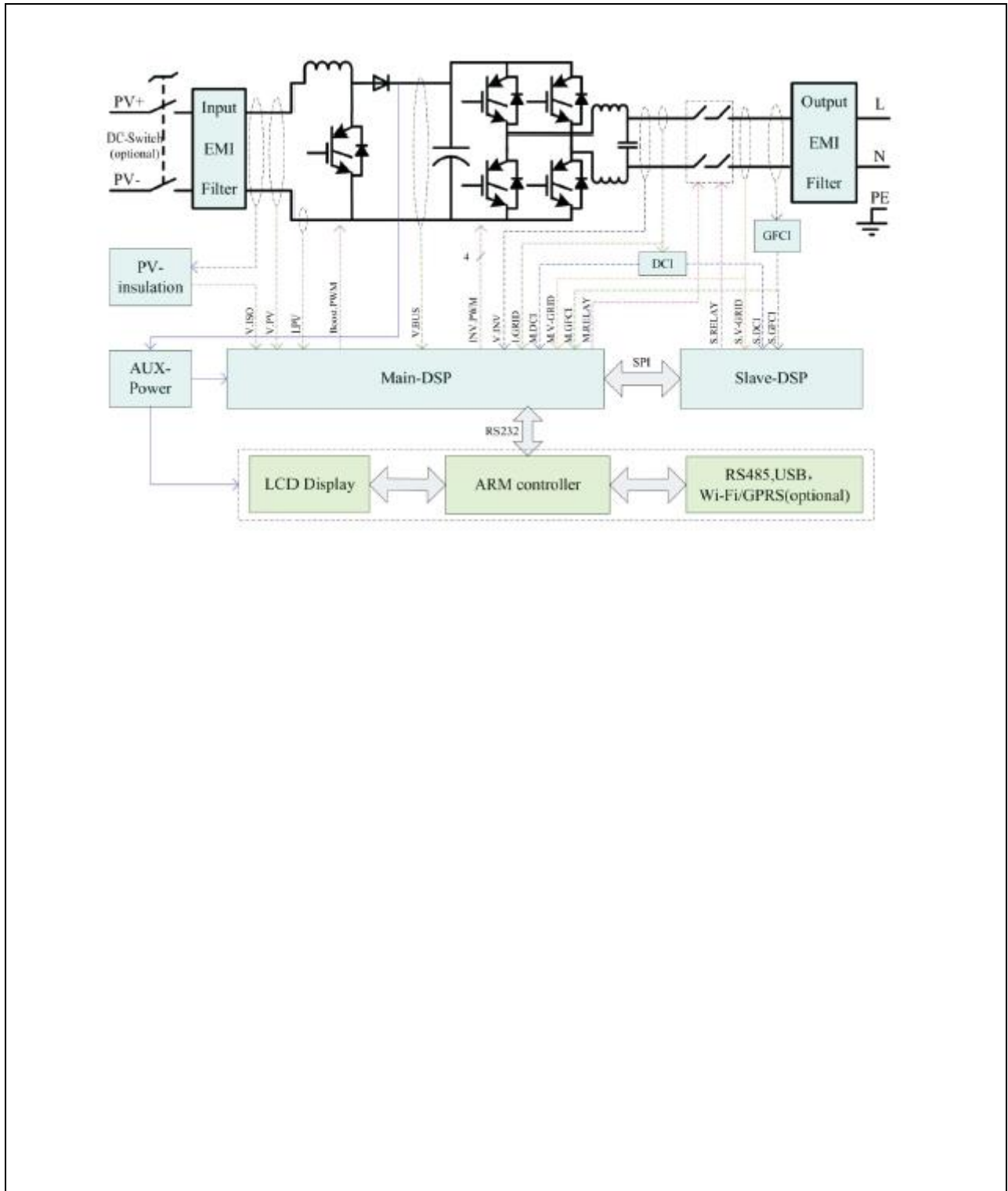
Software Number (SOFAR 1100TL-G3, SOFAR 1600TL-G3, SOFAR 2200TL-G3)



Software version



Electrical Schemes

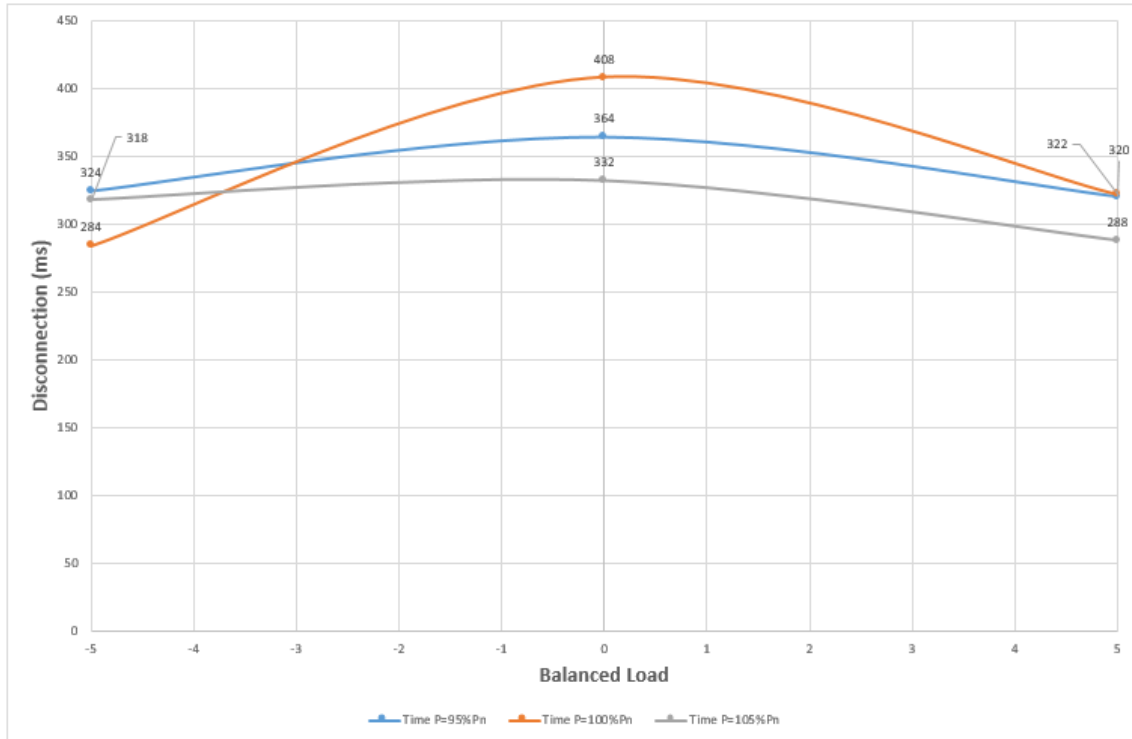


ATTACHMENT II

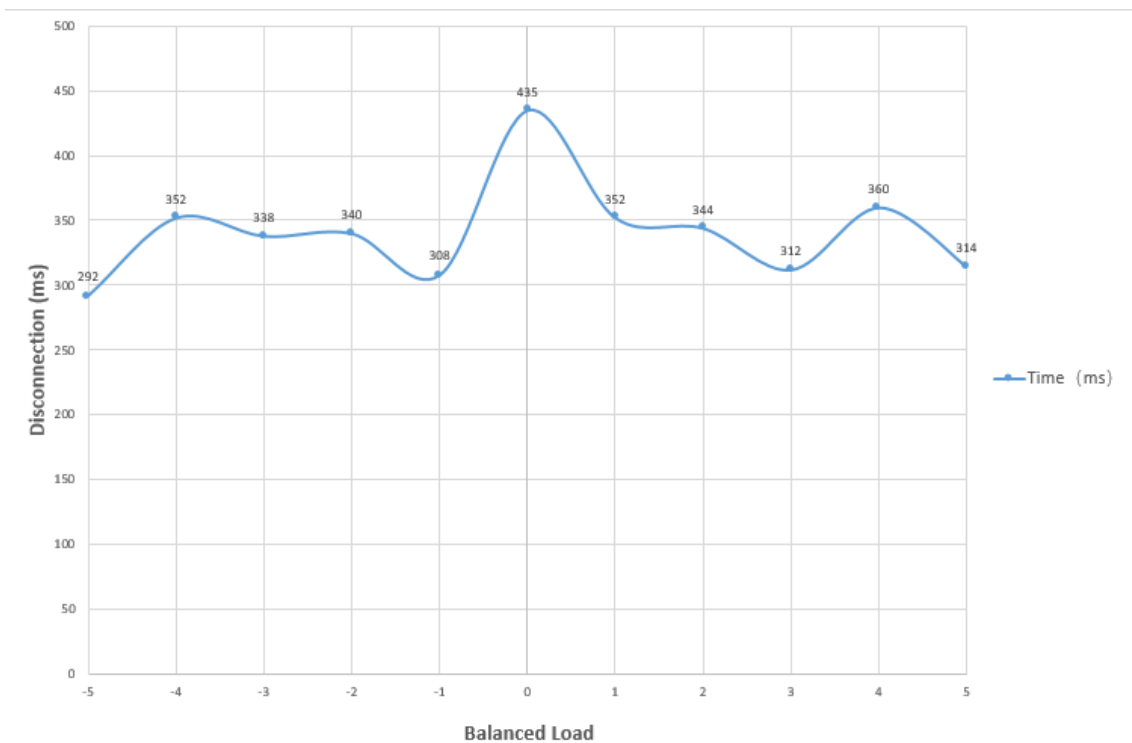
(GRAPHICS OF THE TEST RESULTS)

IEC 62116:2014 (50Hz)

Test Condition A

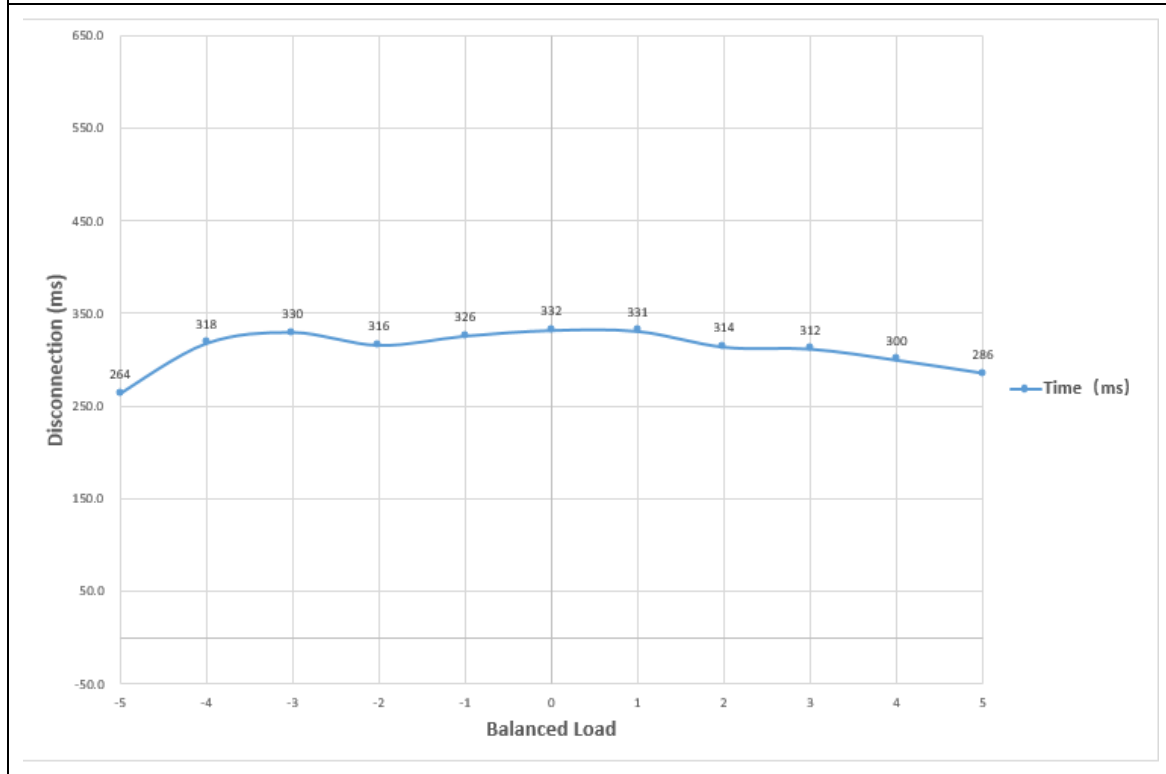


Test Condition B



IEC 62116:2014 (50Hz)

Test Condition C



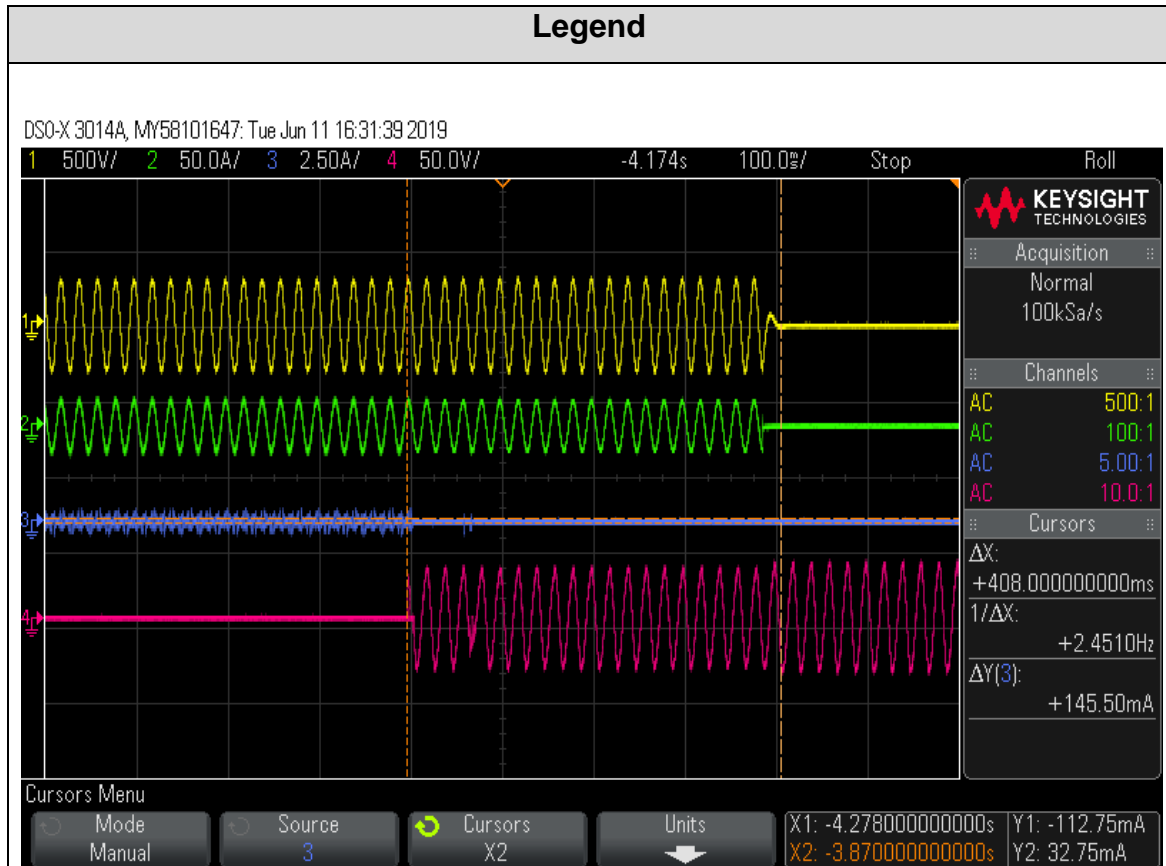
ATTACHMENT III

(GRAPHICS OF THE ISLANDING BEHAVIOR DETECTION)

1 DEFINITIONS

- M It represents the % change in active load from nominal output power
- N It represents the % change in reactive load from nominal output power

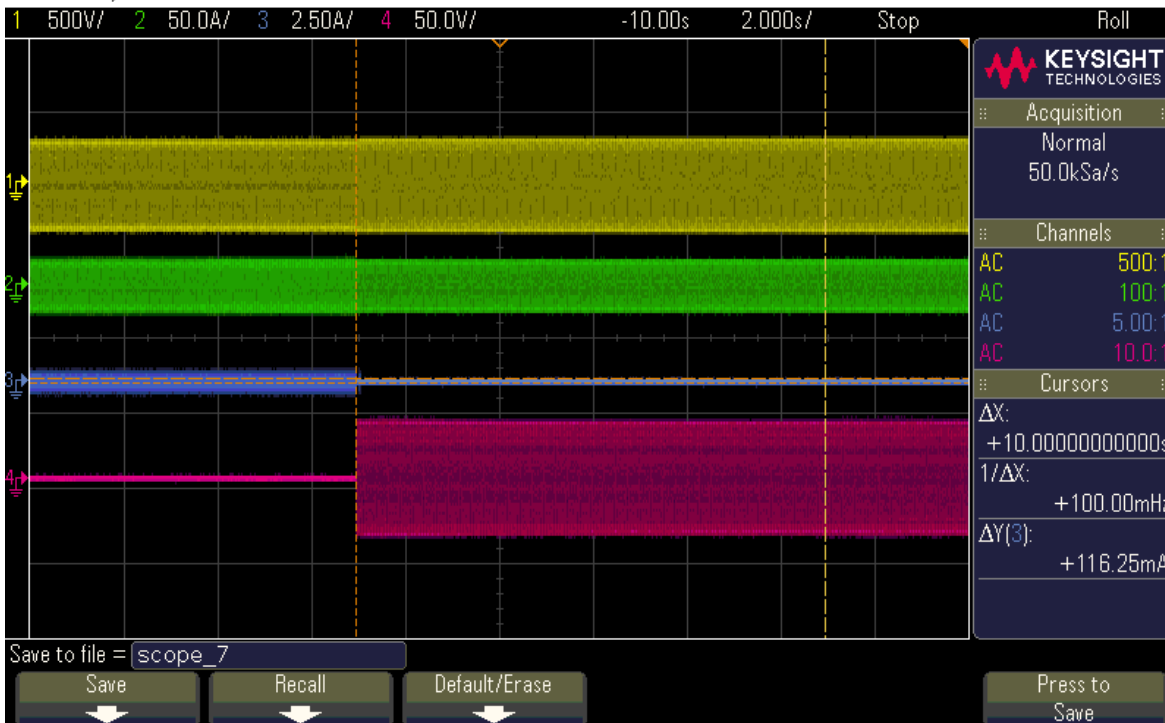
2 LEGEND



Colour	Label	Definition
Yellow	CH1	Output Voltage
Green	CH2	Output Current
Pink	CH4	Grid Switch

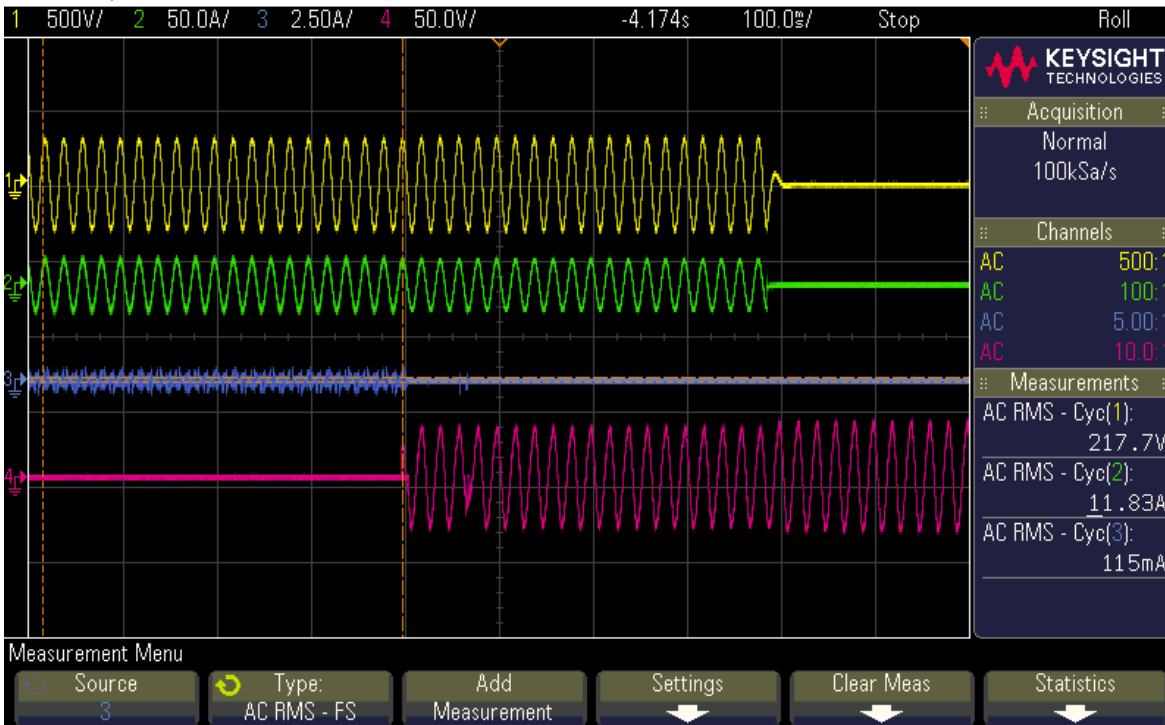
Test A(50Hz) M(%)=0 & N(%)=0 with De-activating anti-islanding protection

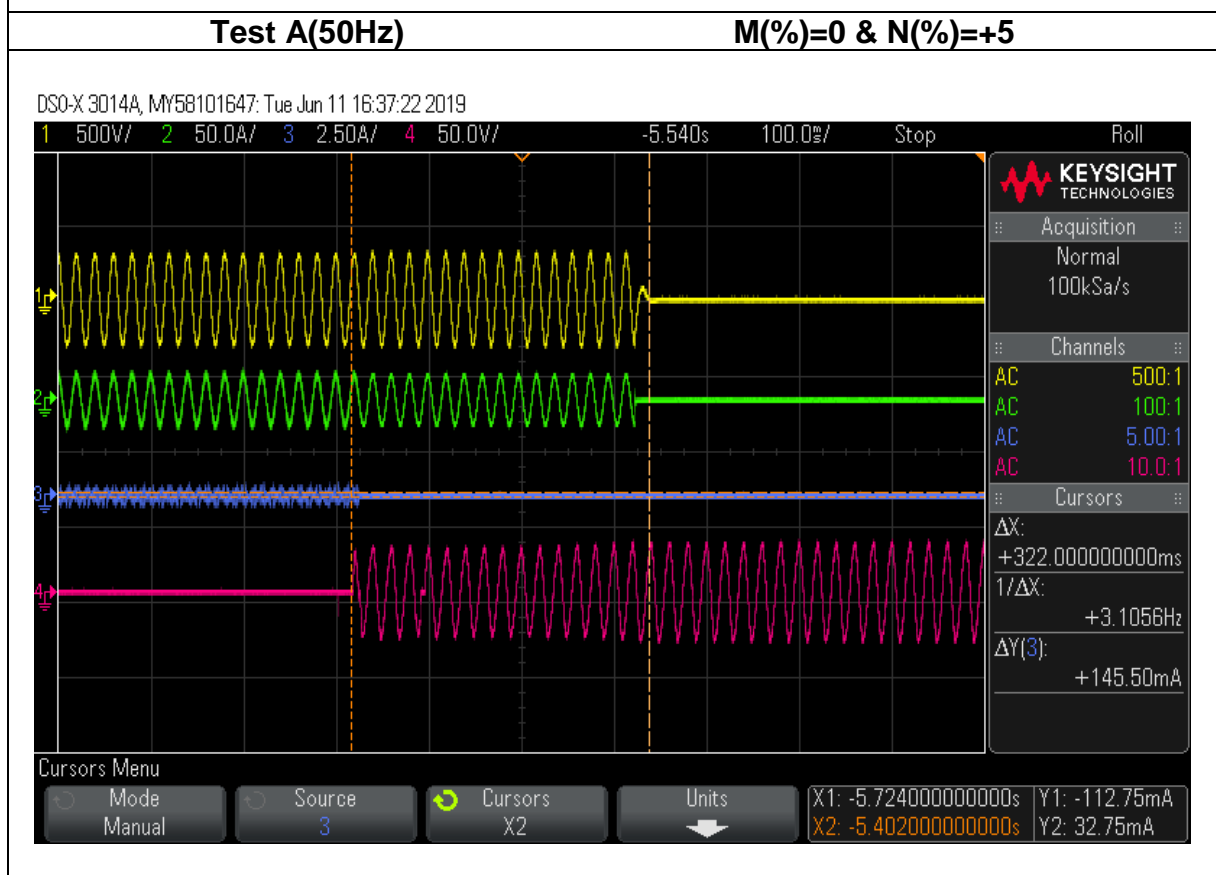
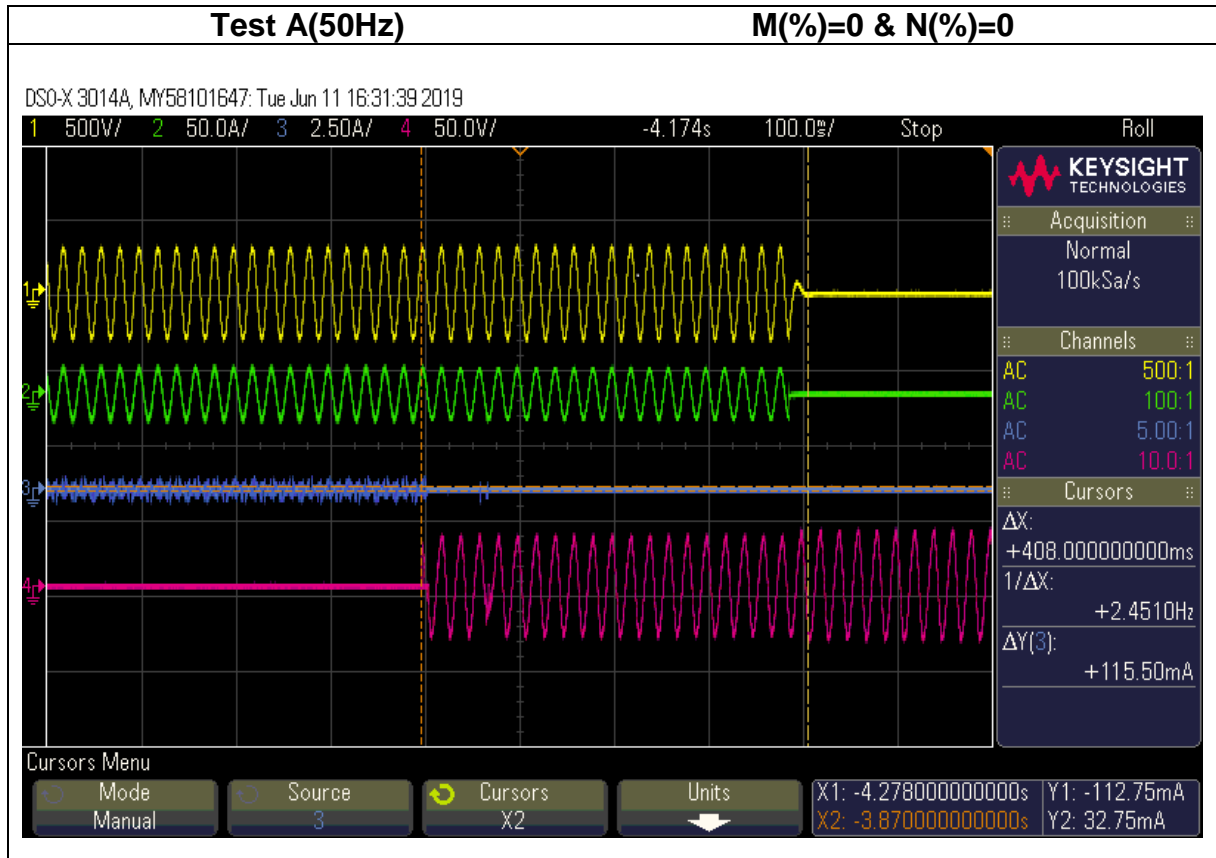
DSO-X 3014A, MY58101647: Tue Jun 11 16:10:05 2019

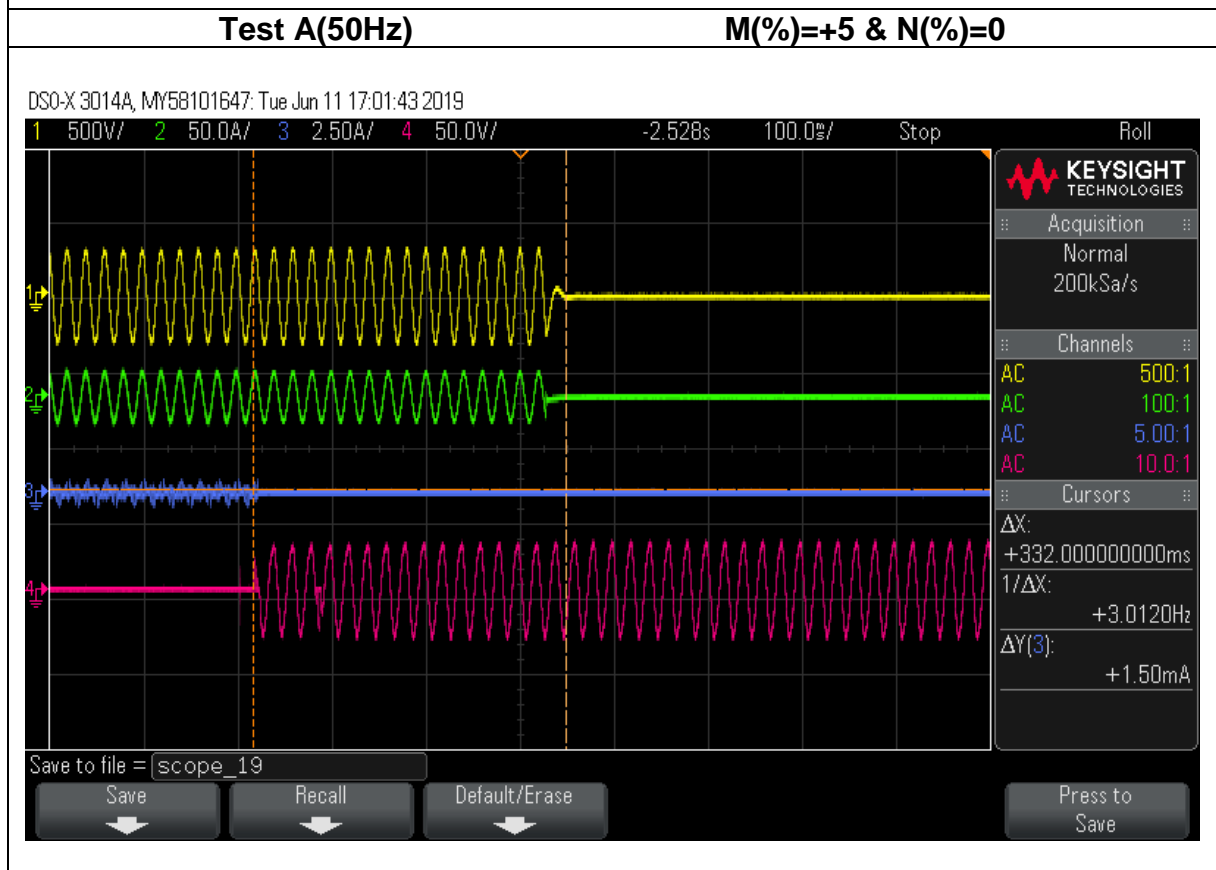
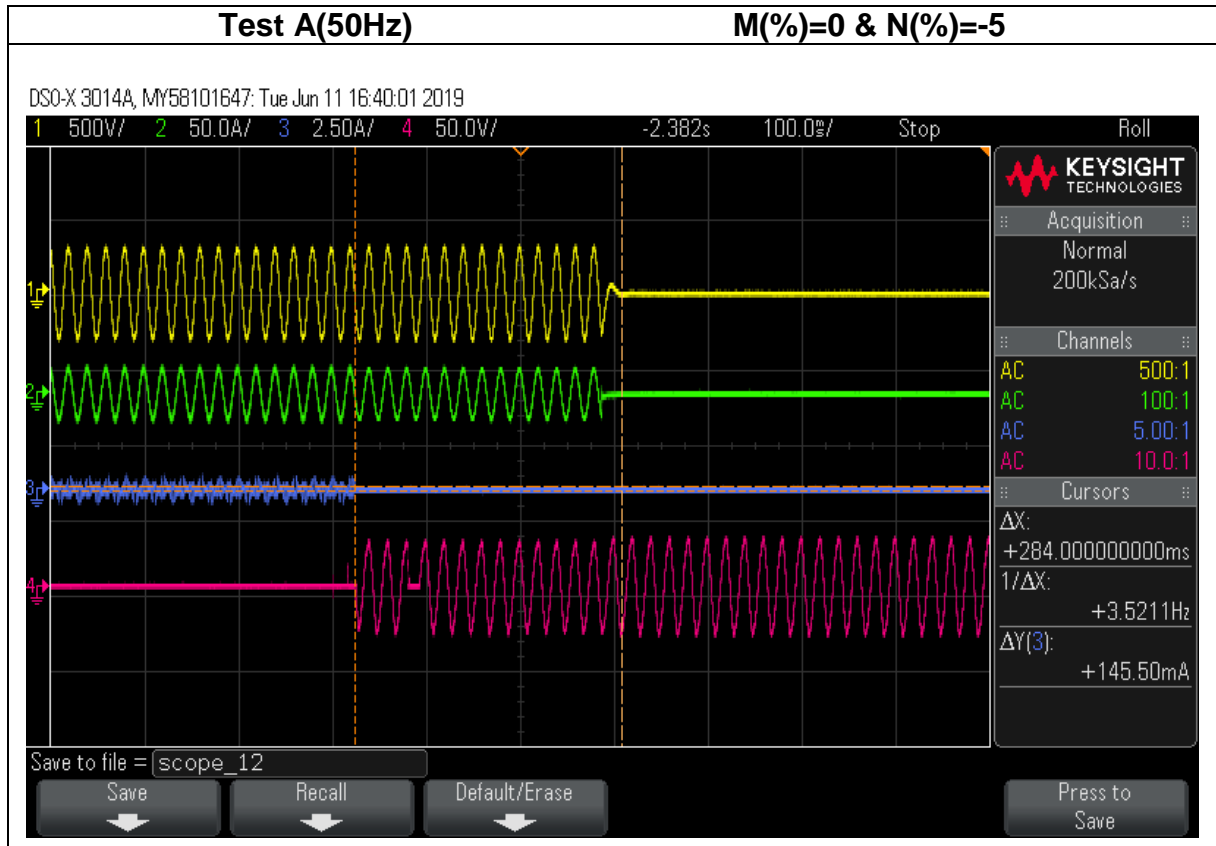


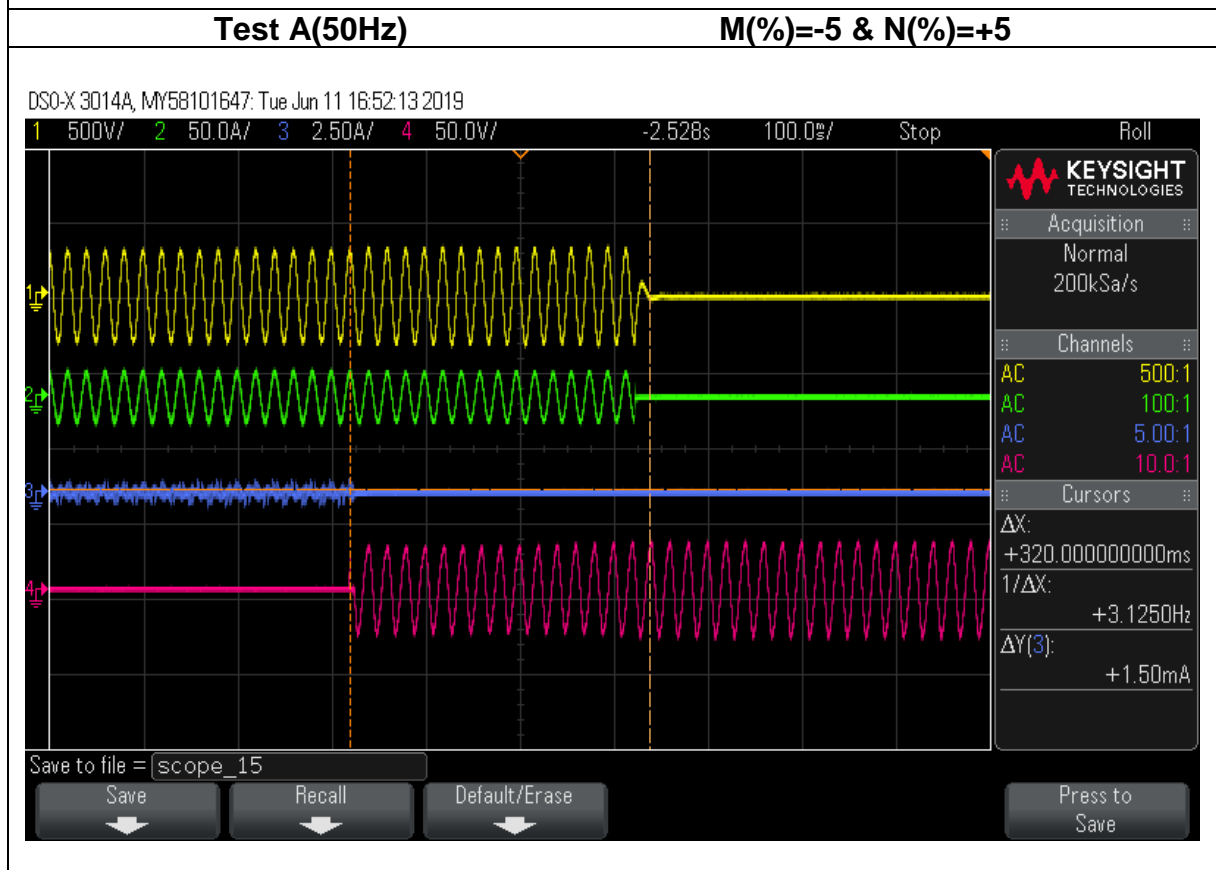
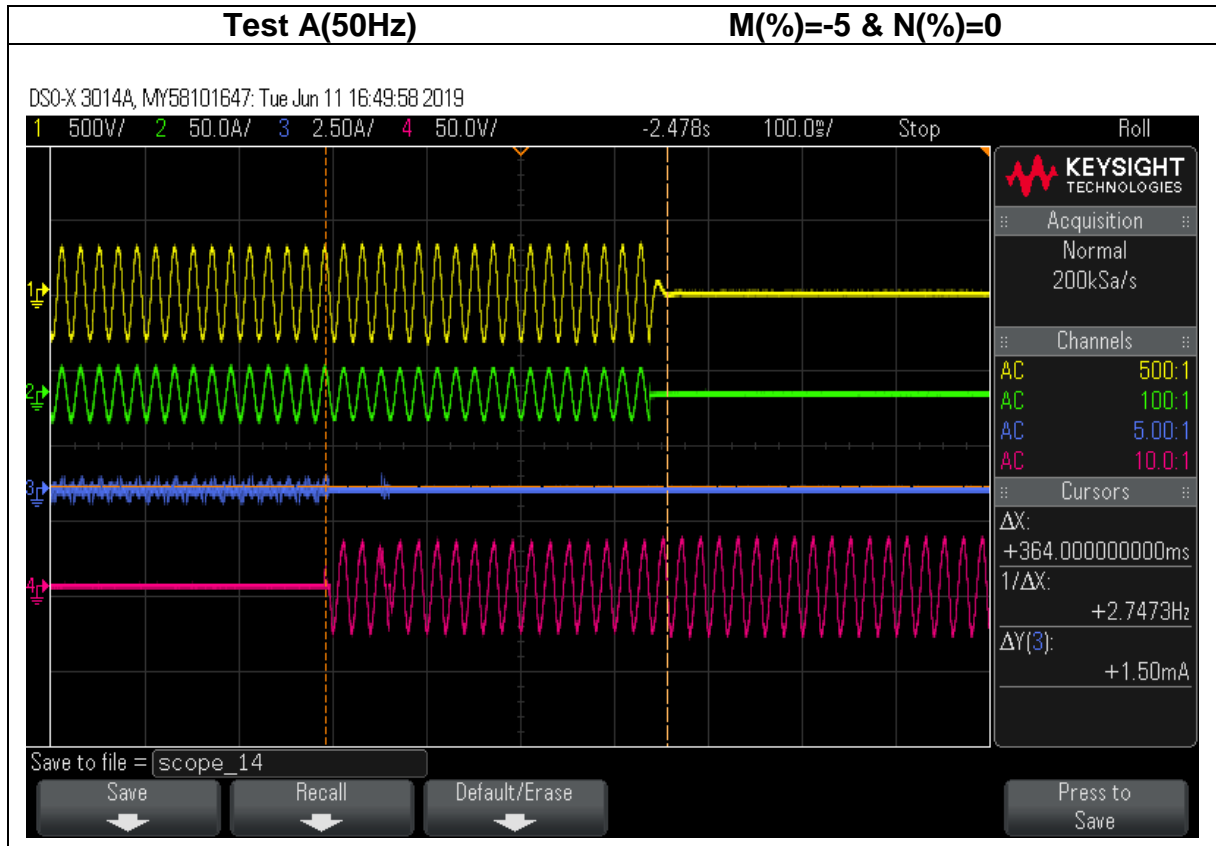
Current through S1 at Test A(50Hz) M(%)=0 & N(%)=0

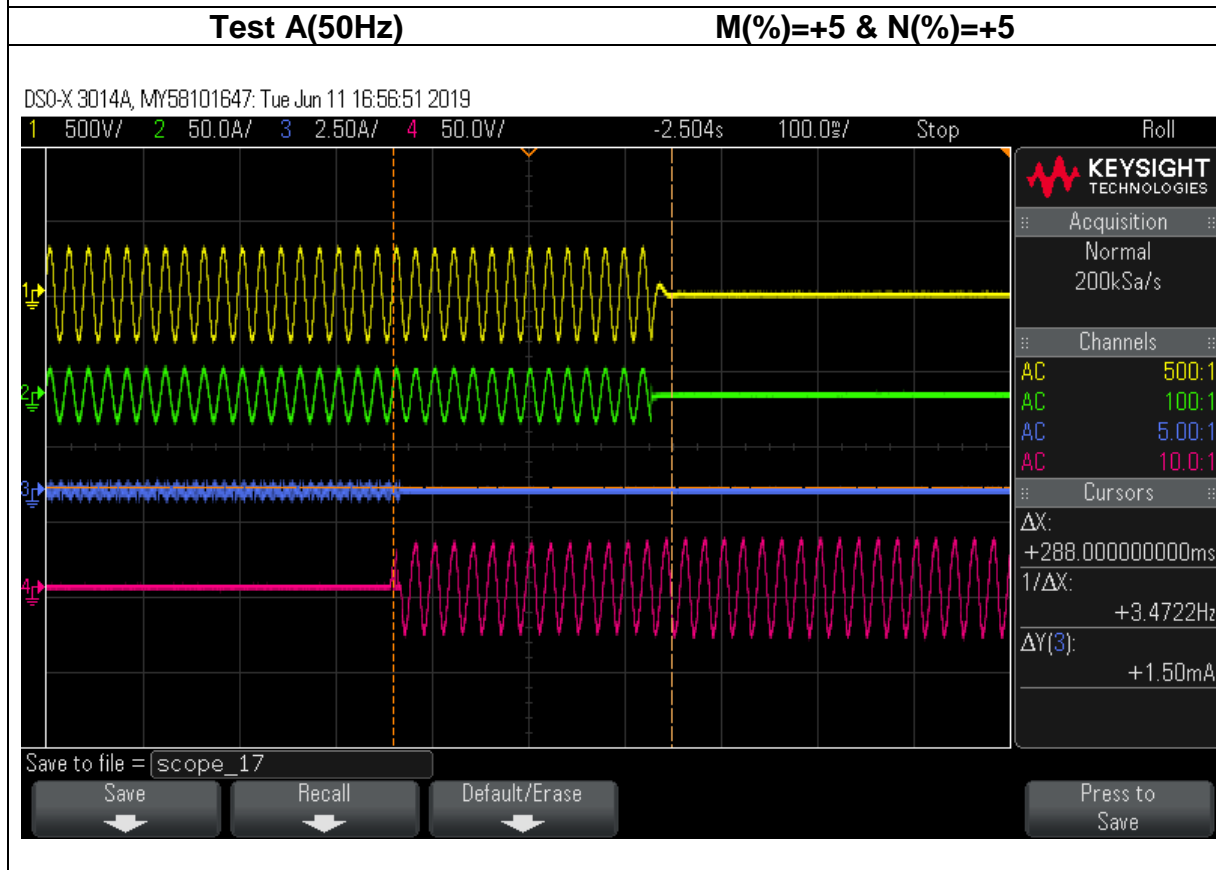
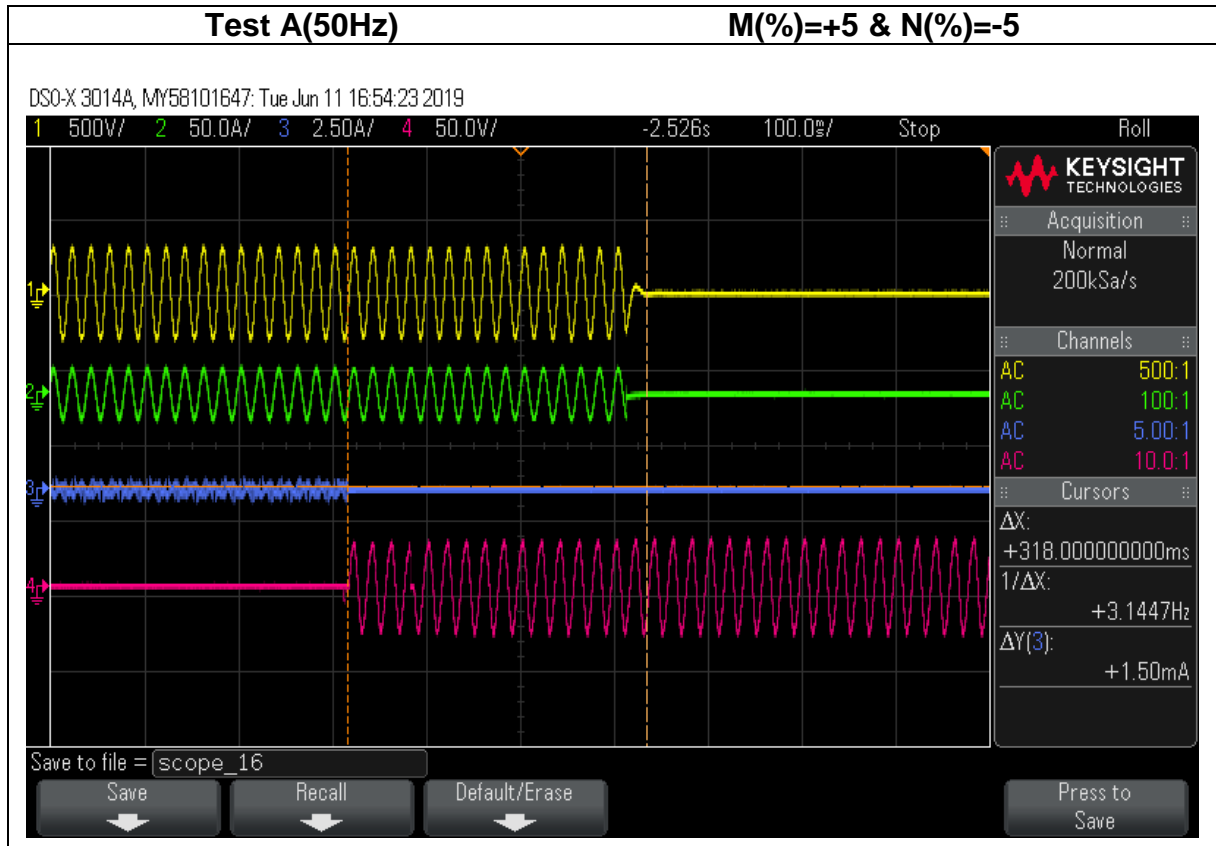
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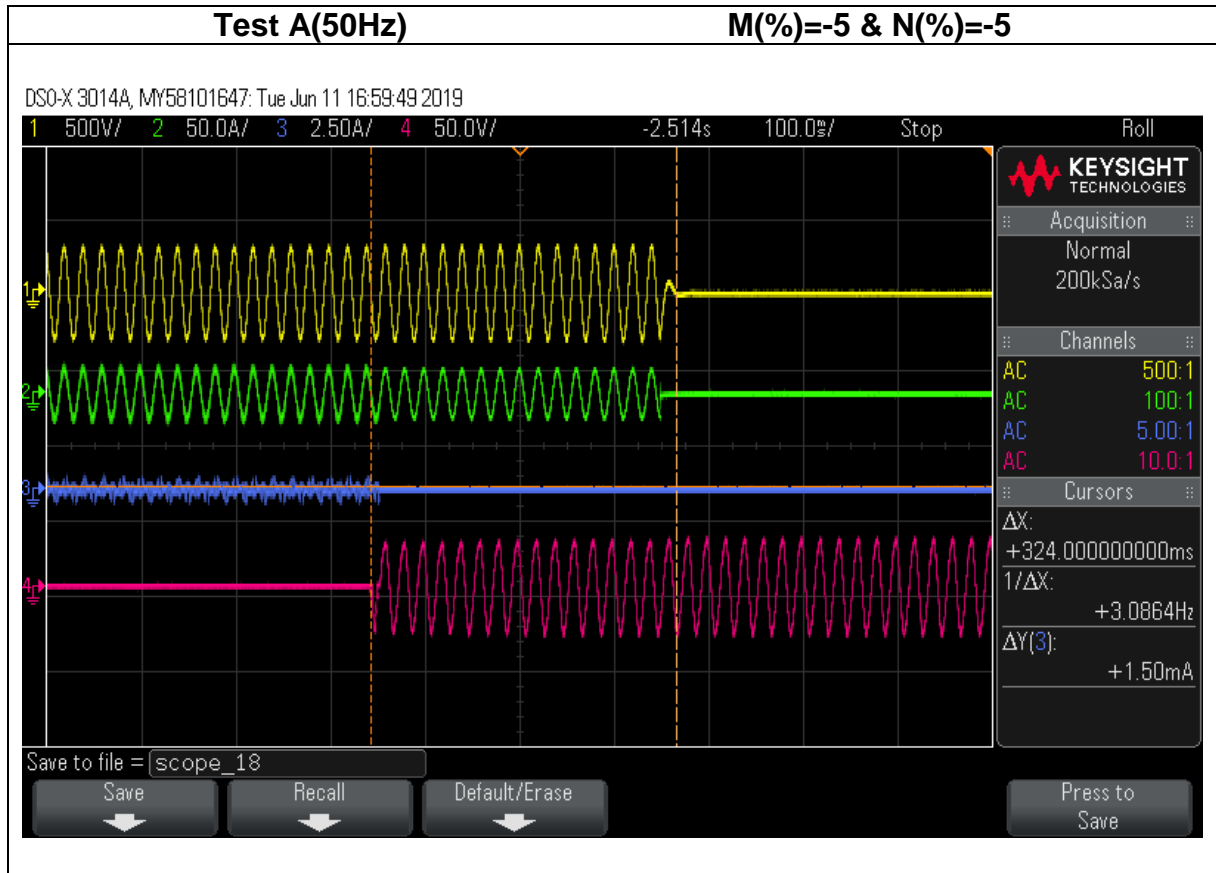






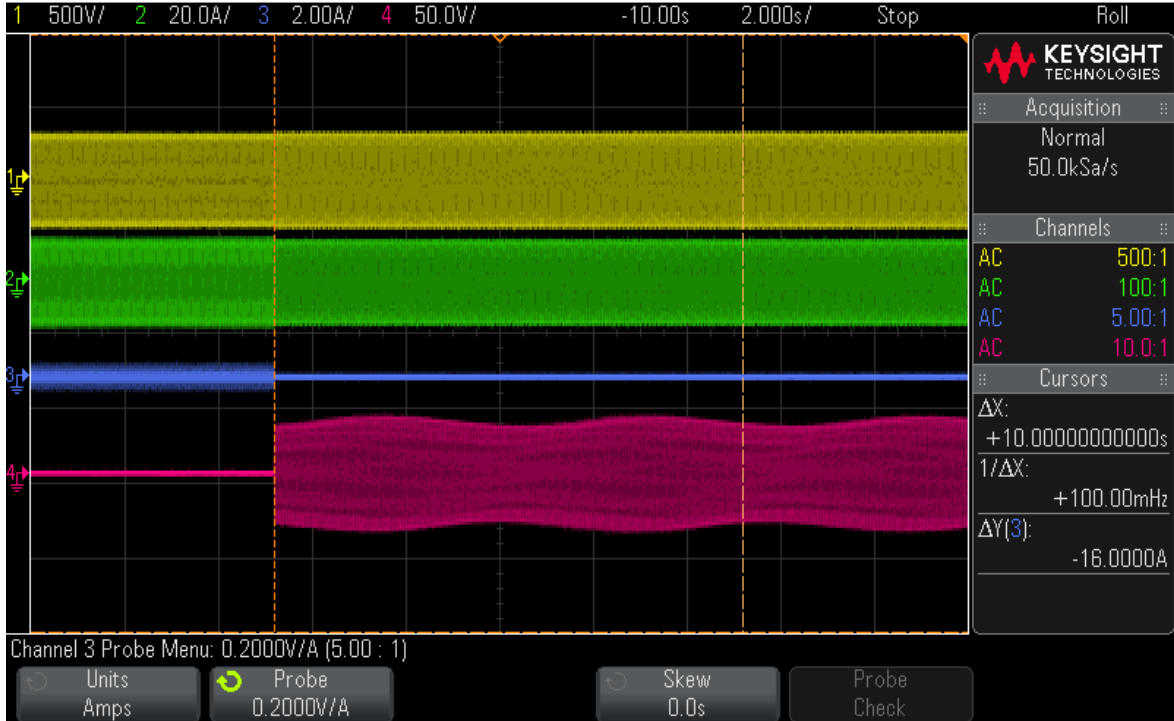






Test B(50Hz) M(%)=0 & N(%)=0 with De-activating anti-islanding protection

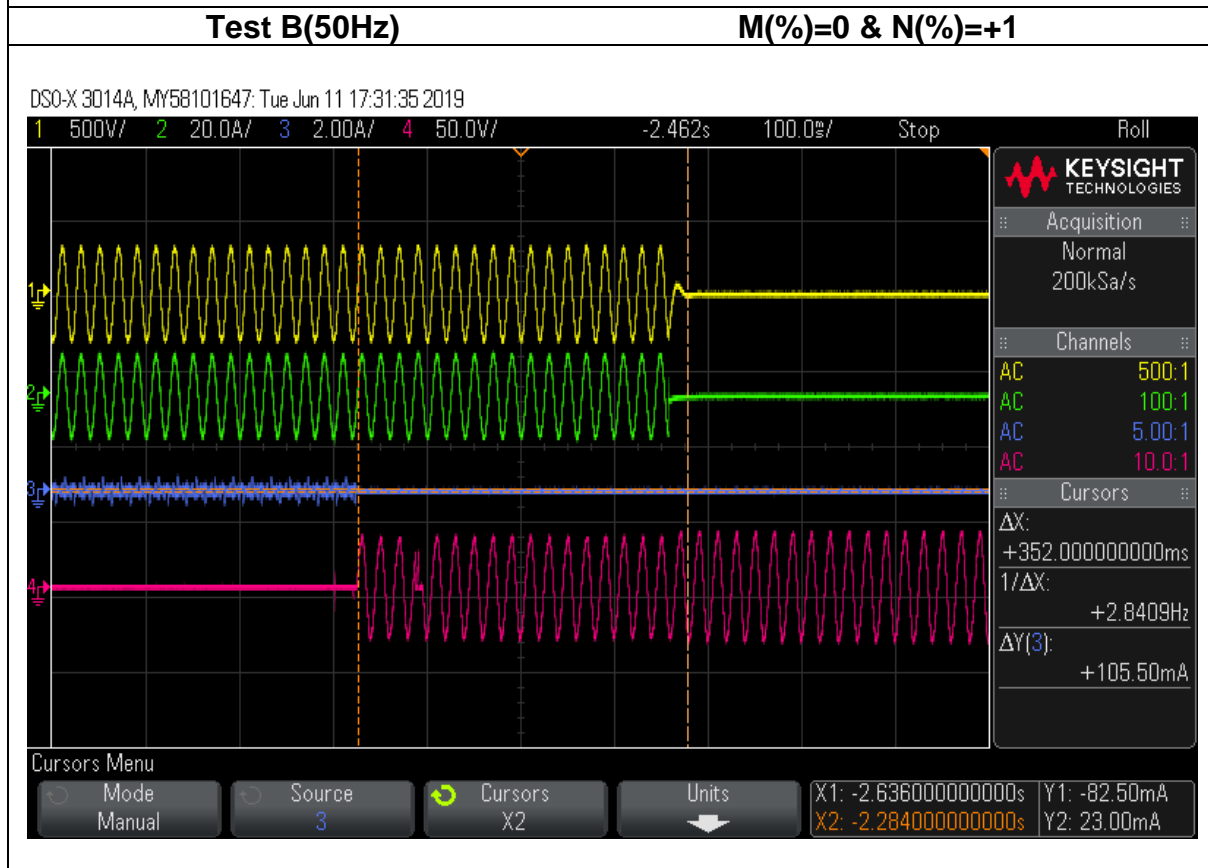
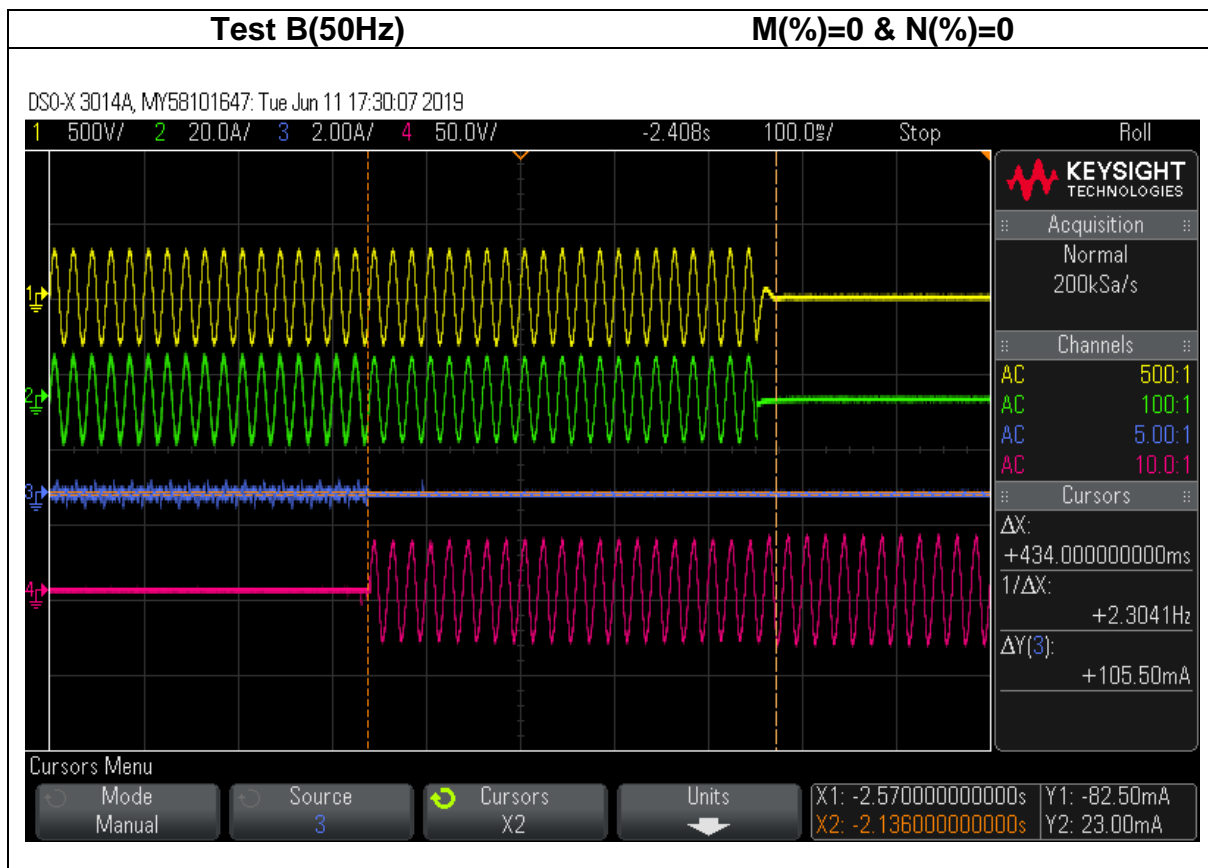
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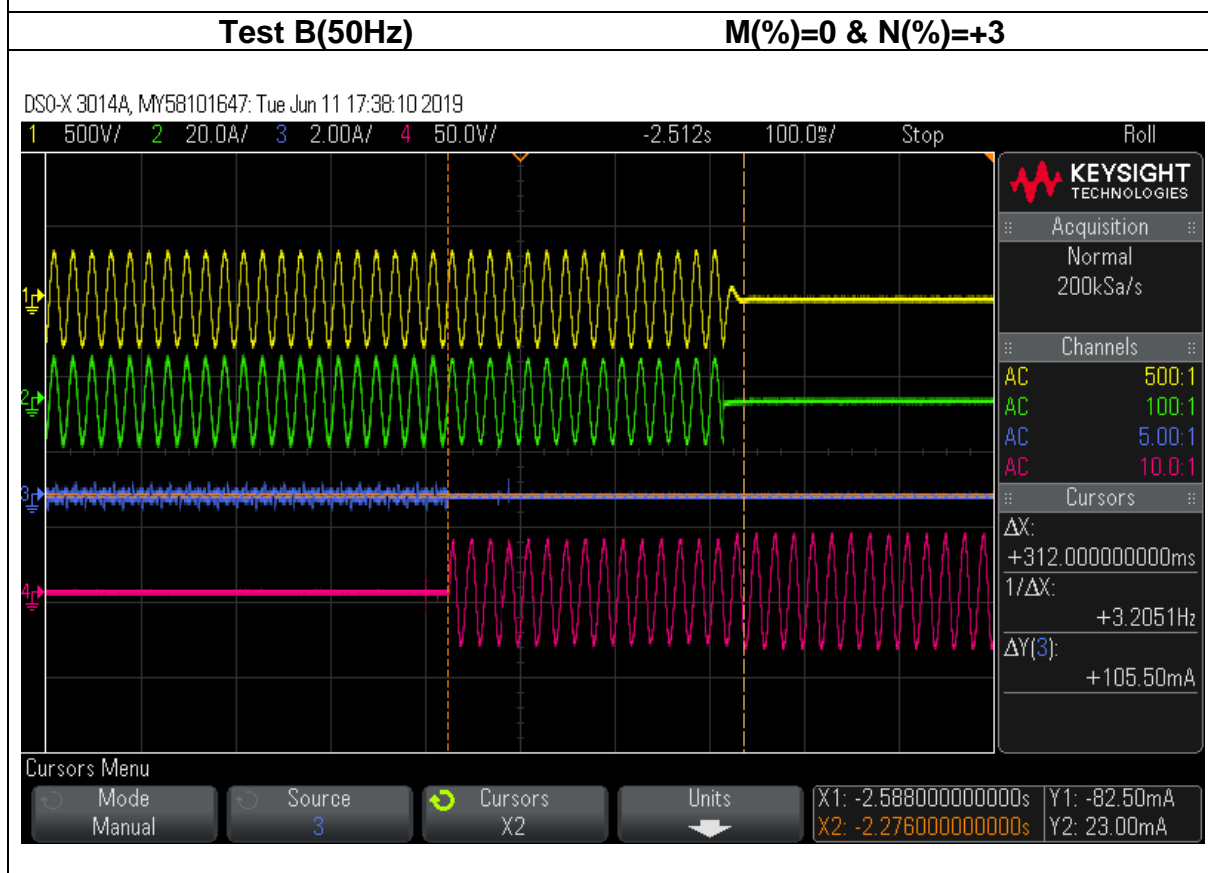
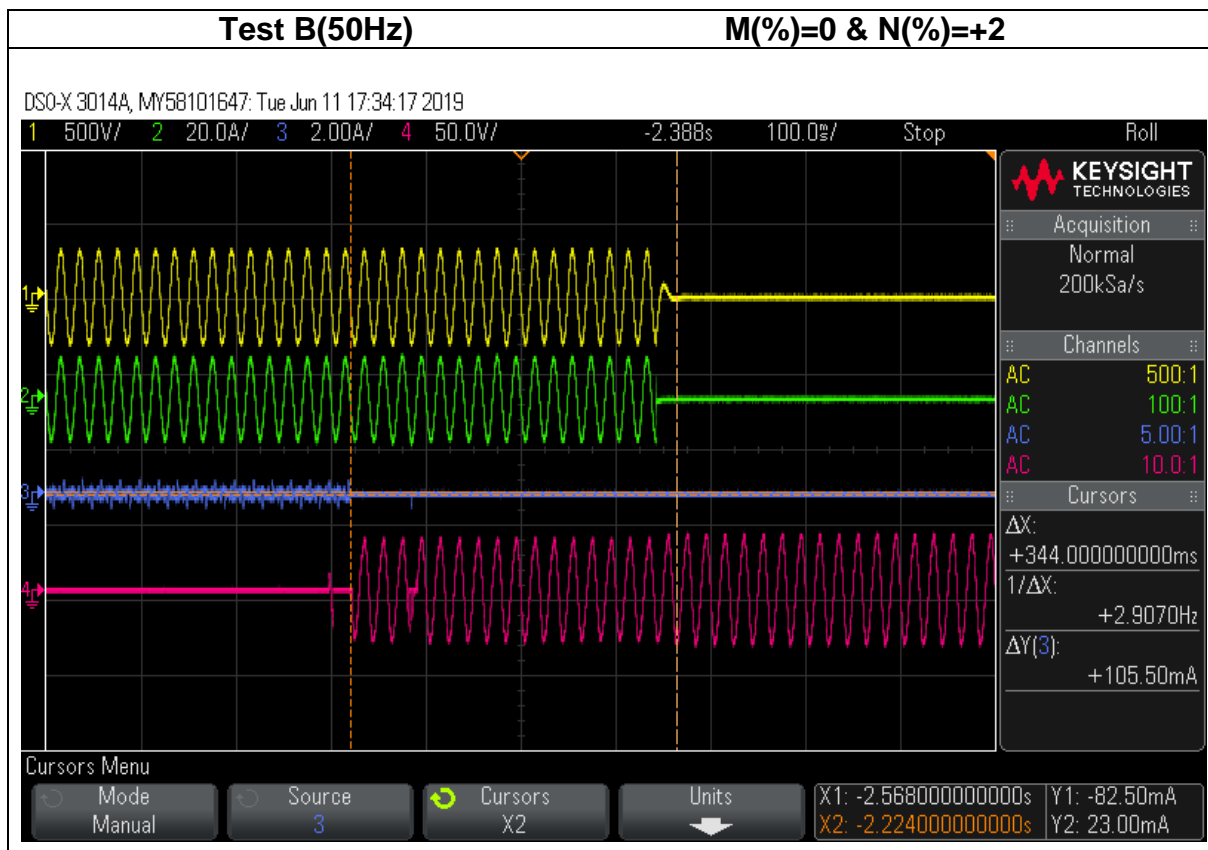


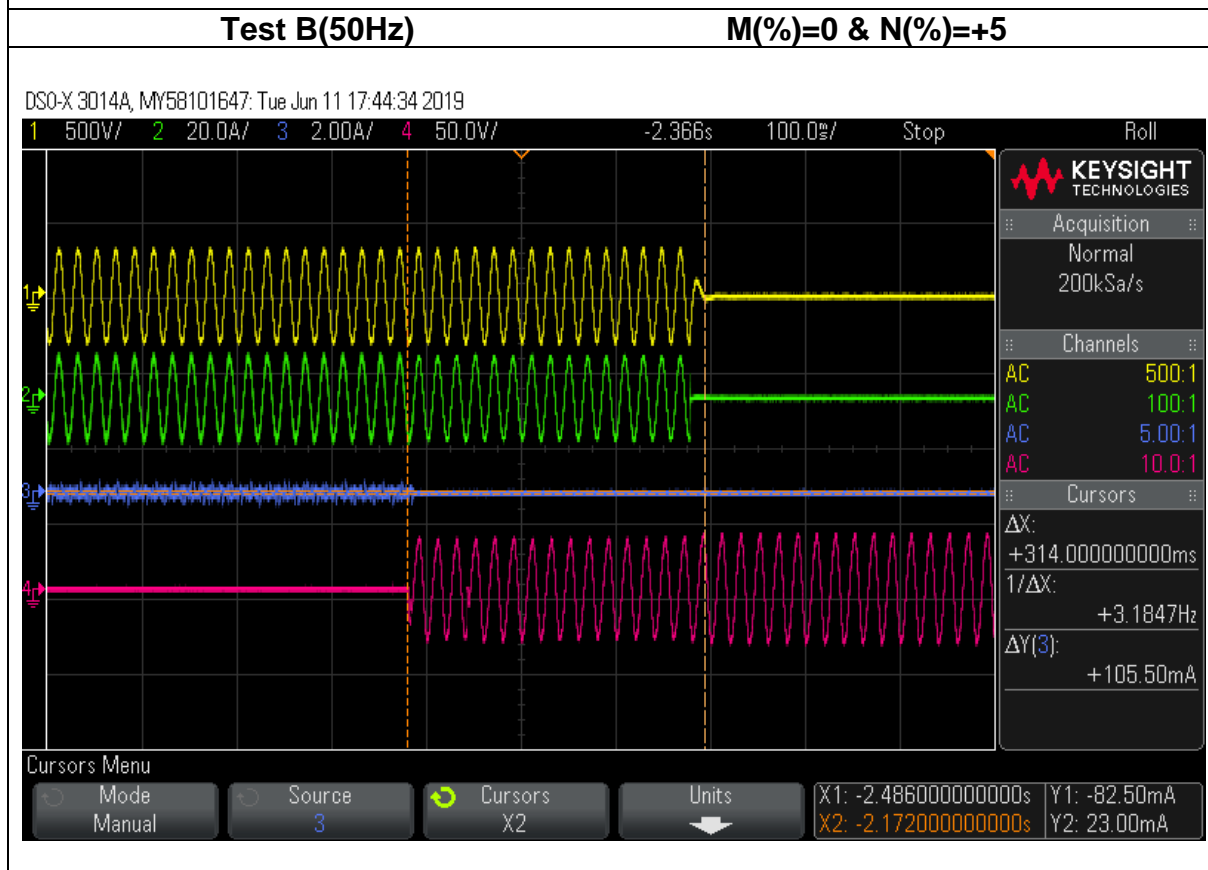
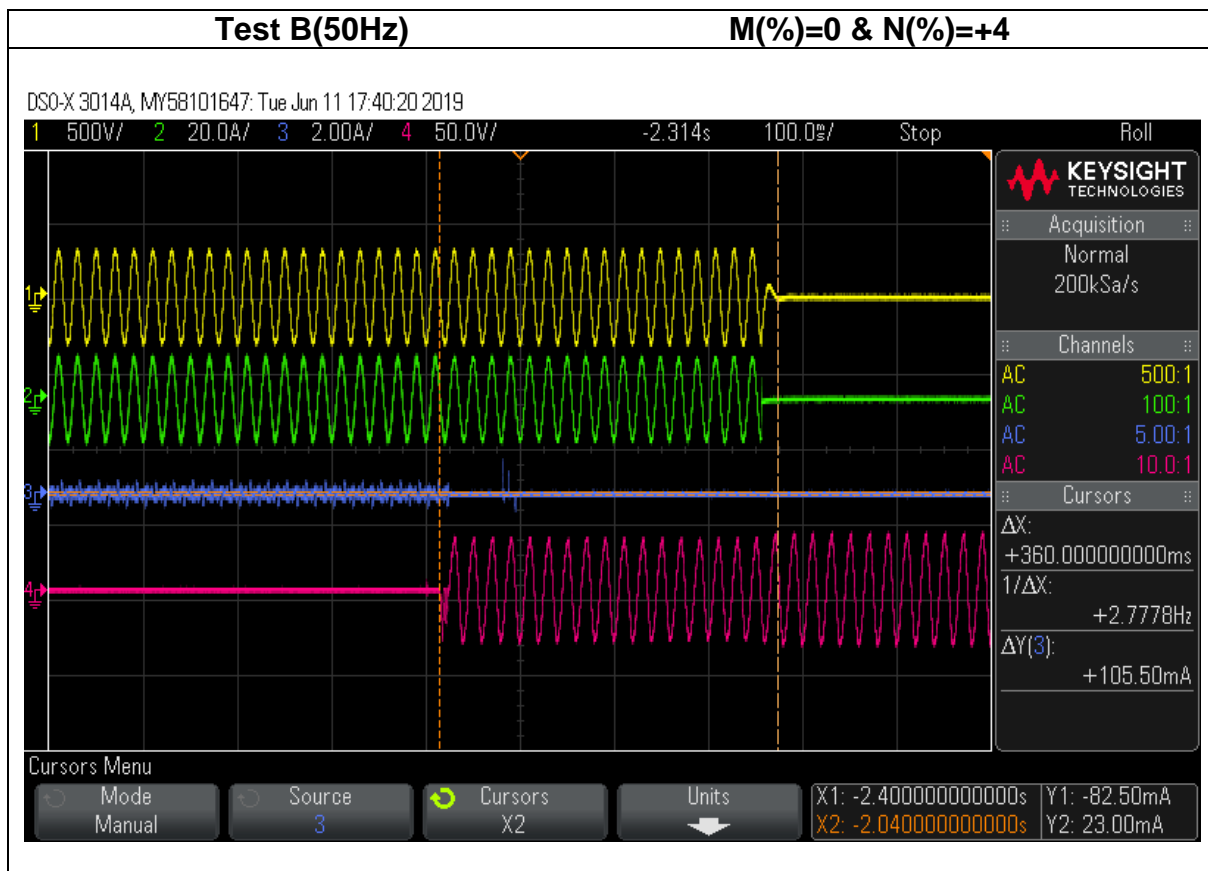
Current through S1 at Test B(50Hz) M(%)=0 & N(%)=0

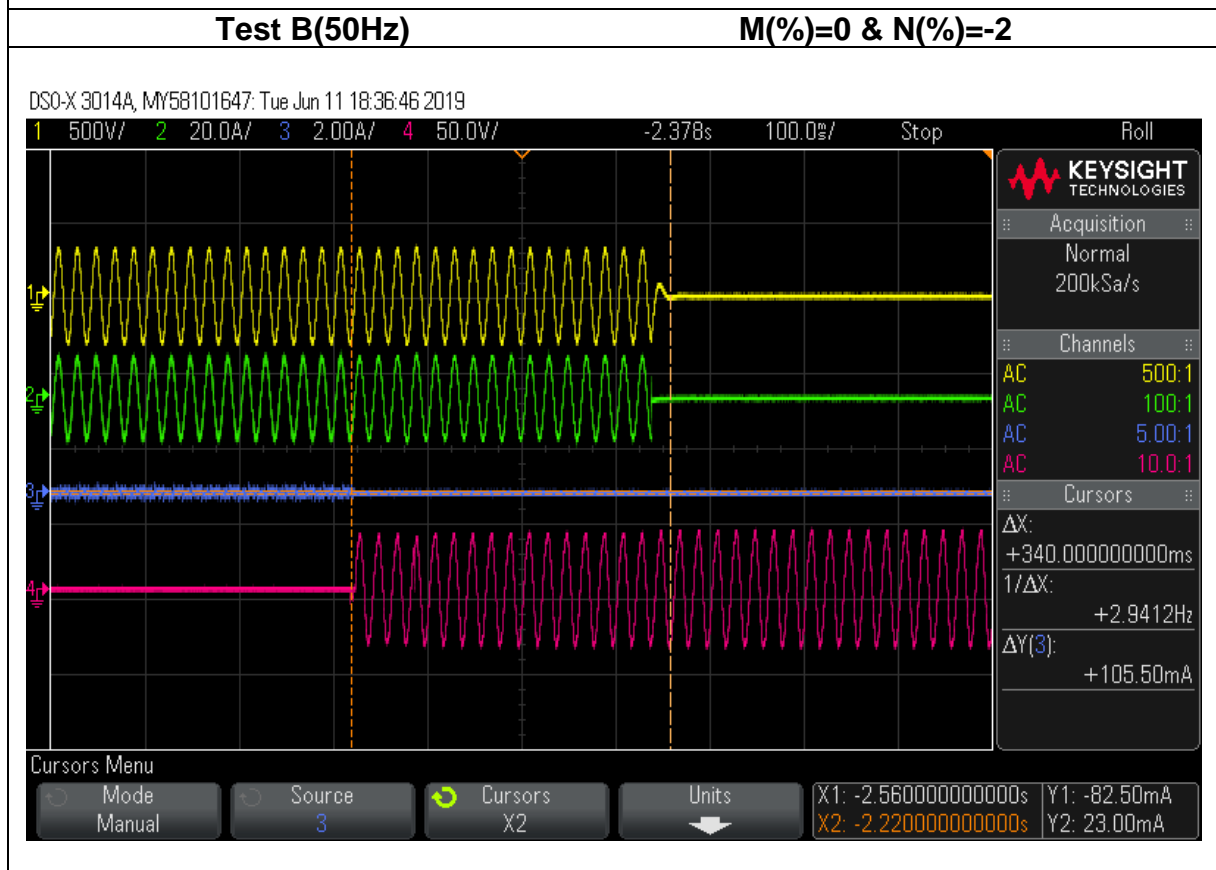
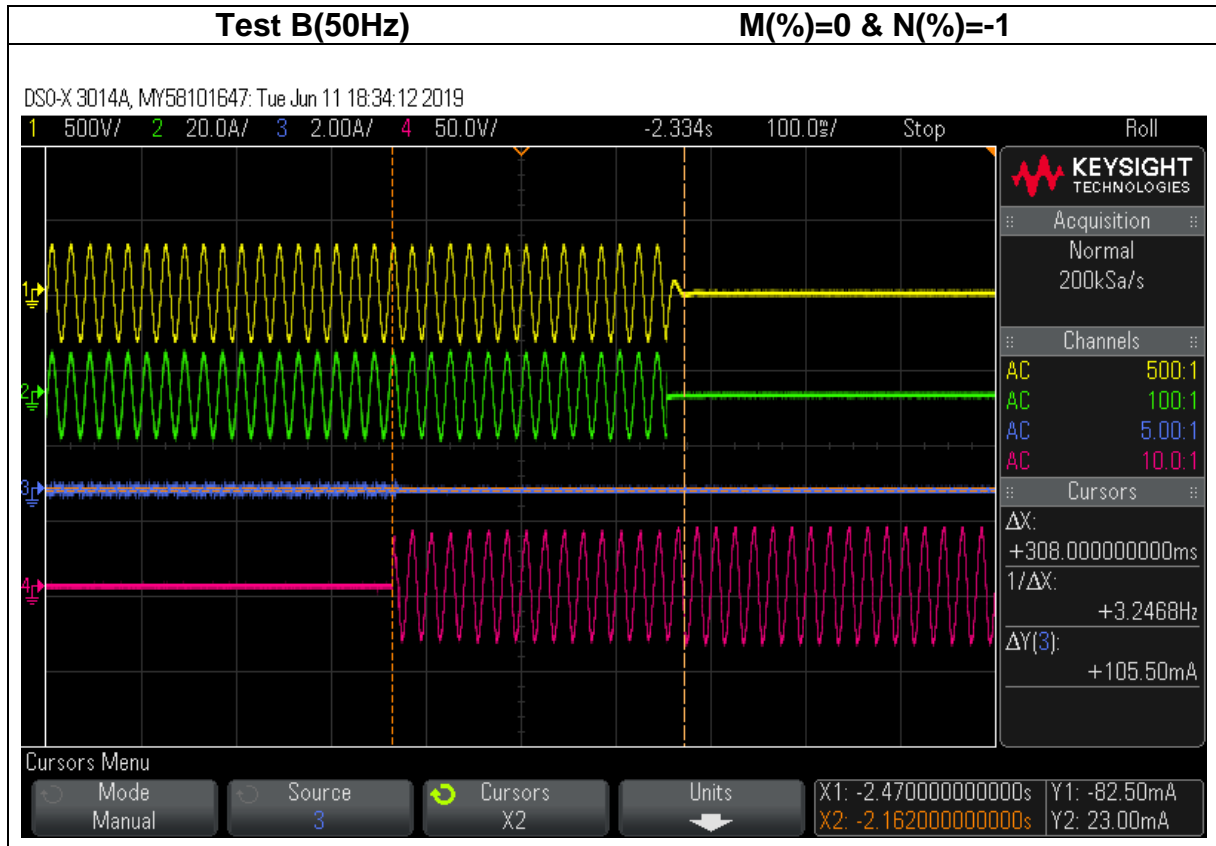
DSO-X 3014A, MY58101647: Tue Jun 11 17:29:21 2019

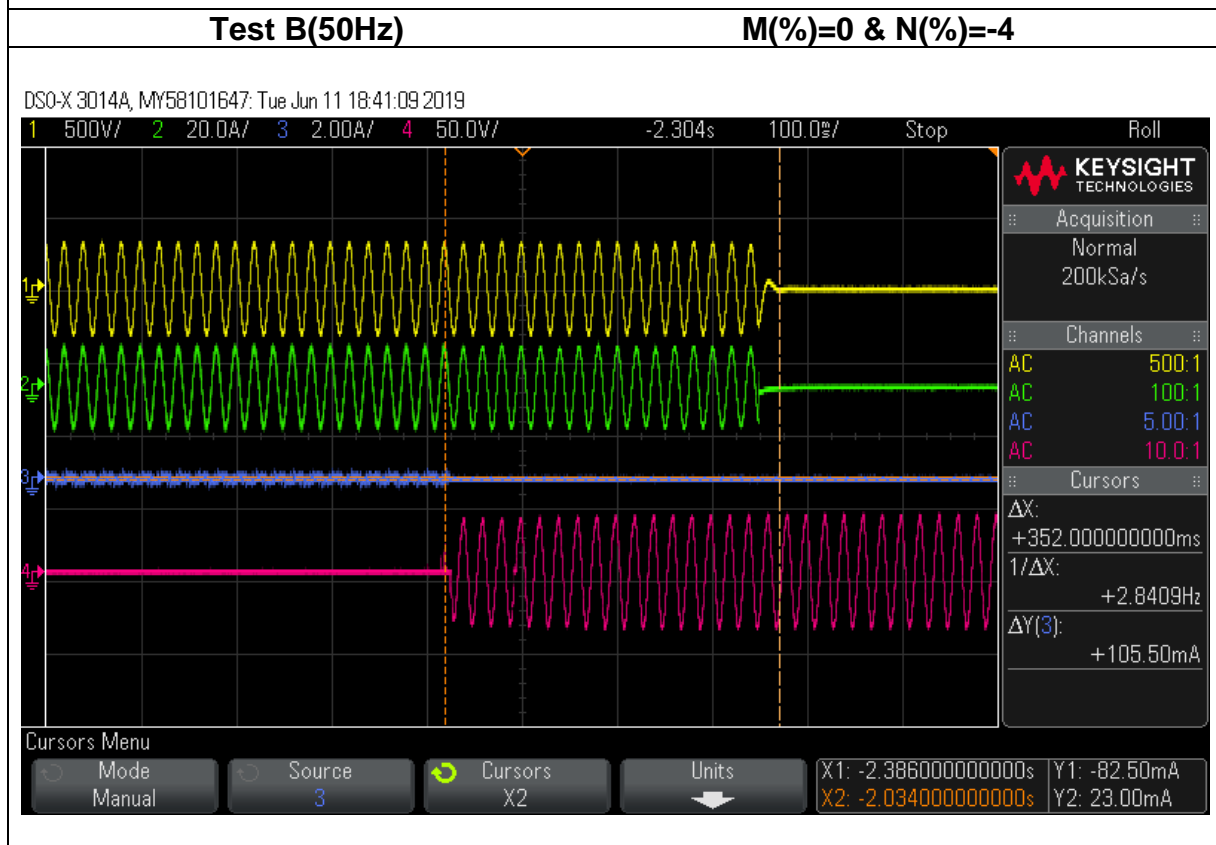
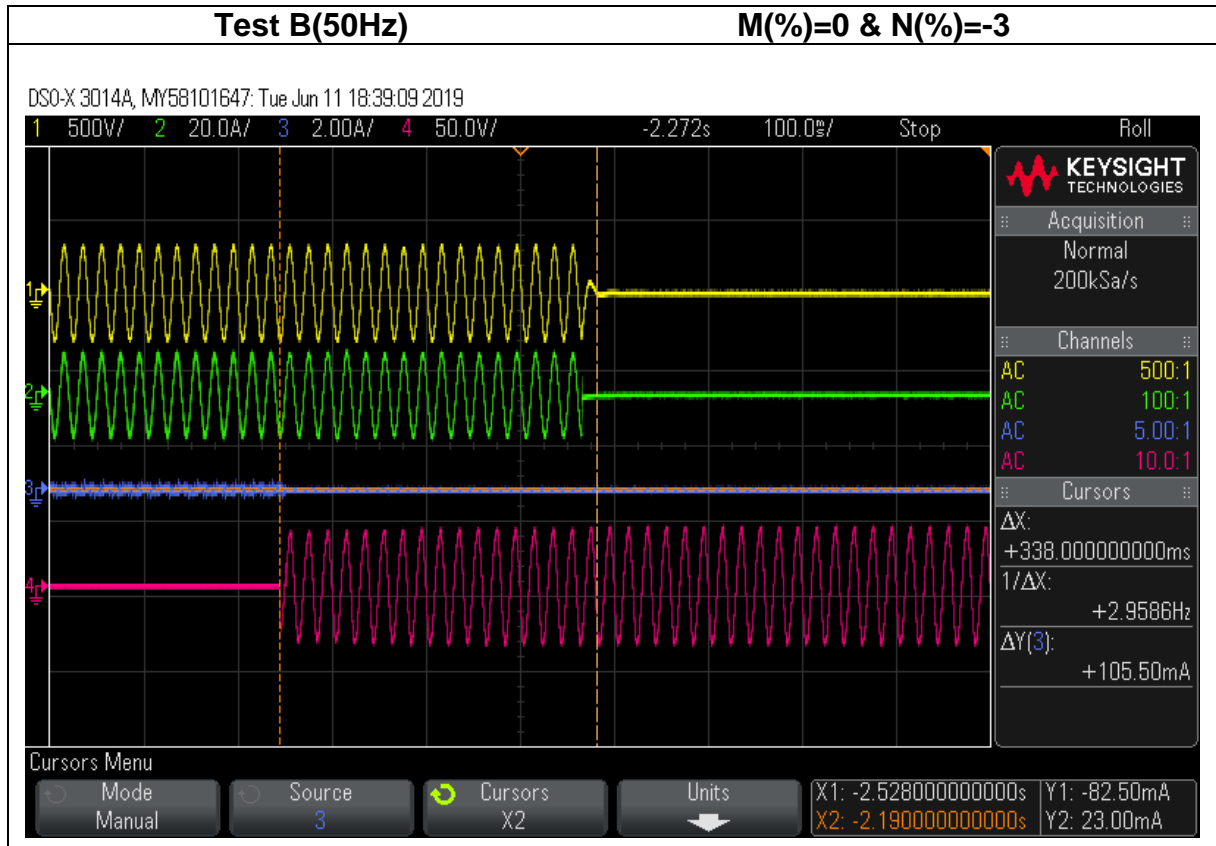


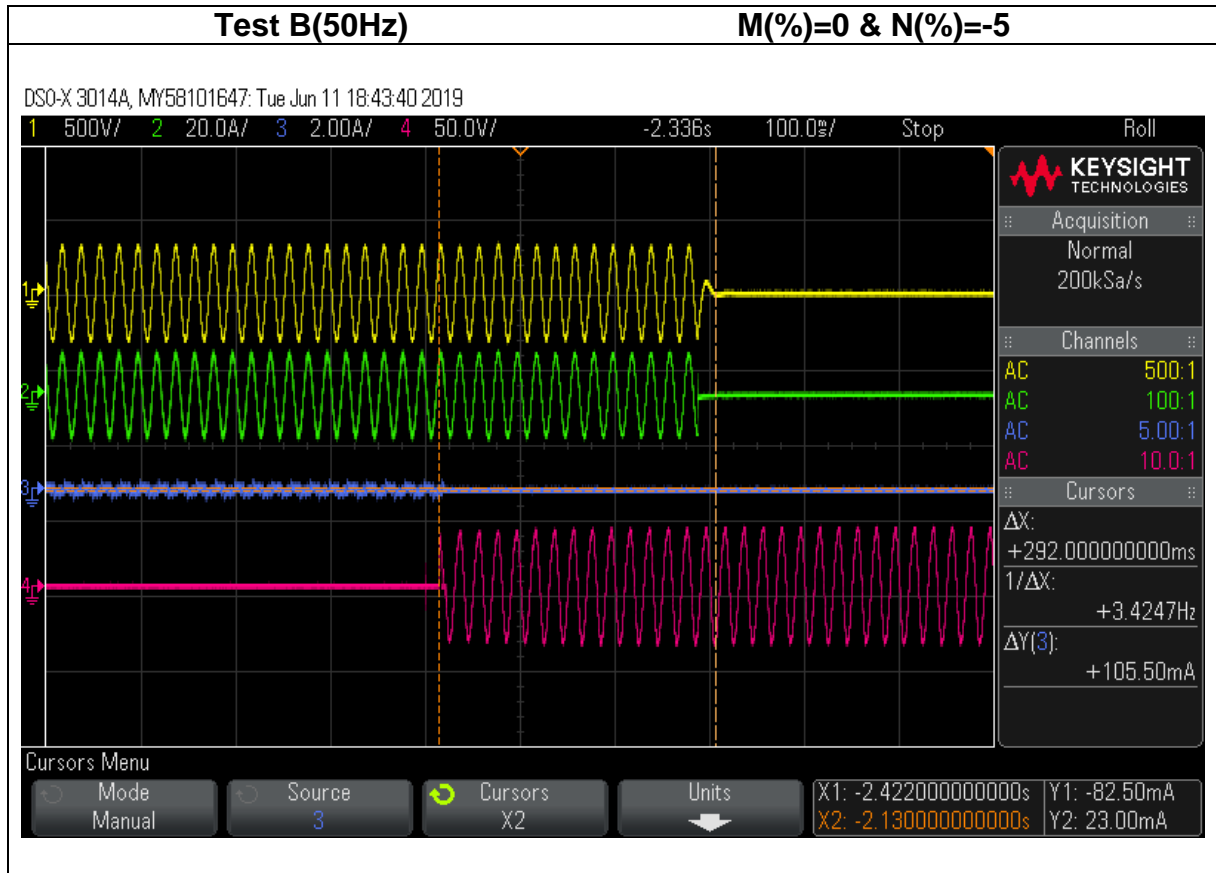




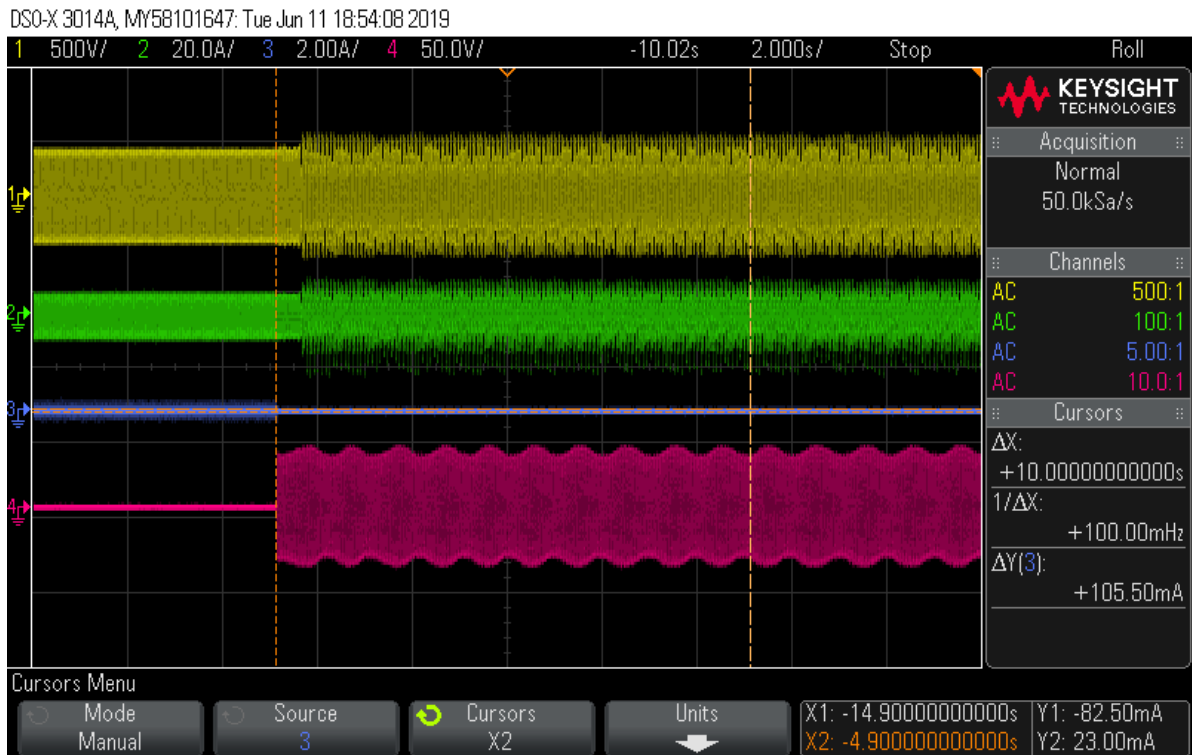




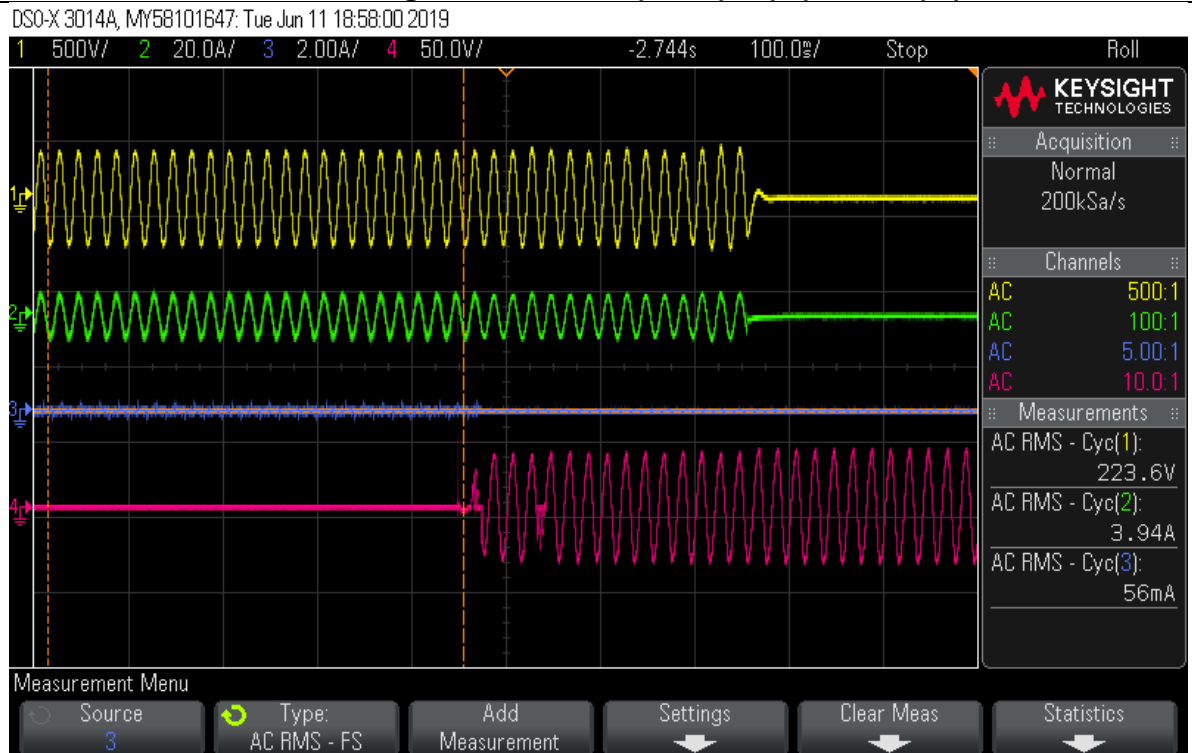




Test C(50Hz) M(%)=0 & N(%)=0 with De-activating anti-islanding protection

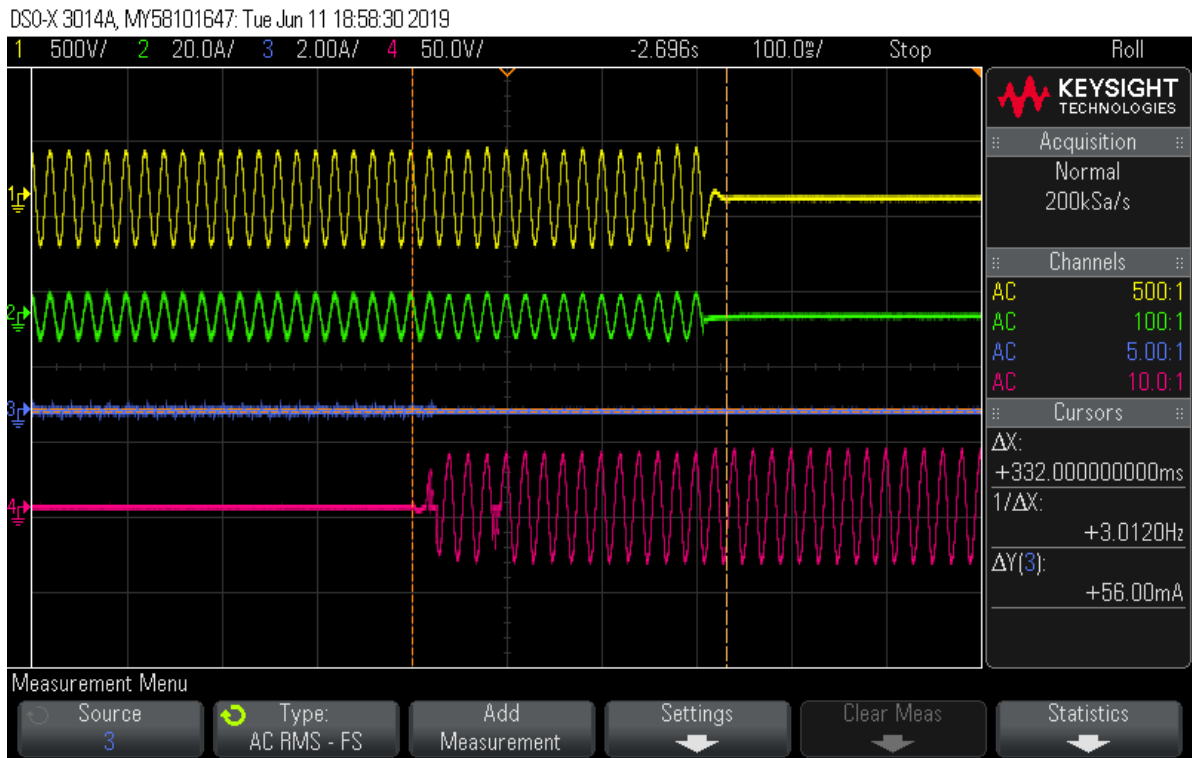


Current through S1 at Test C(50Hz) M(%)=0 & N(%)=0



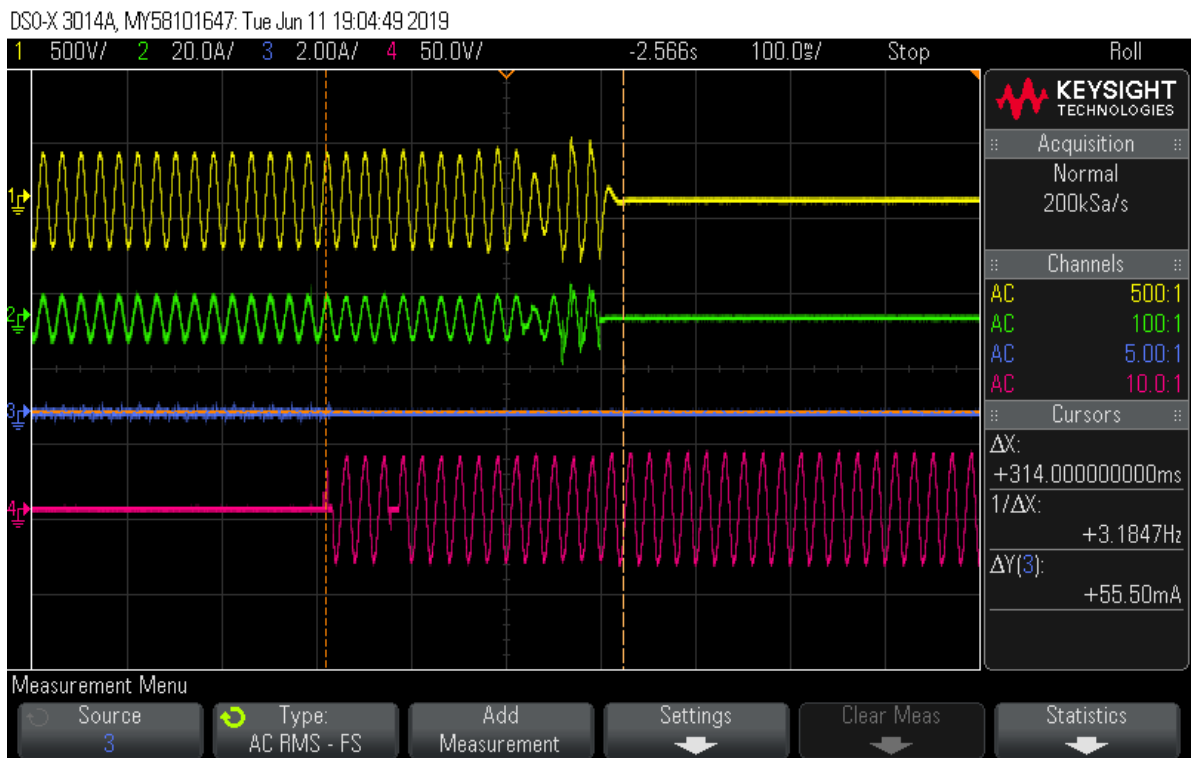
Test C(50Hz)

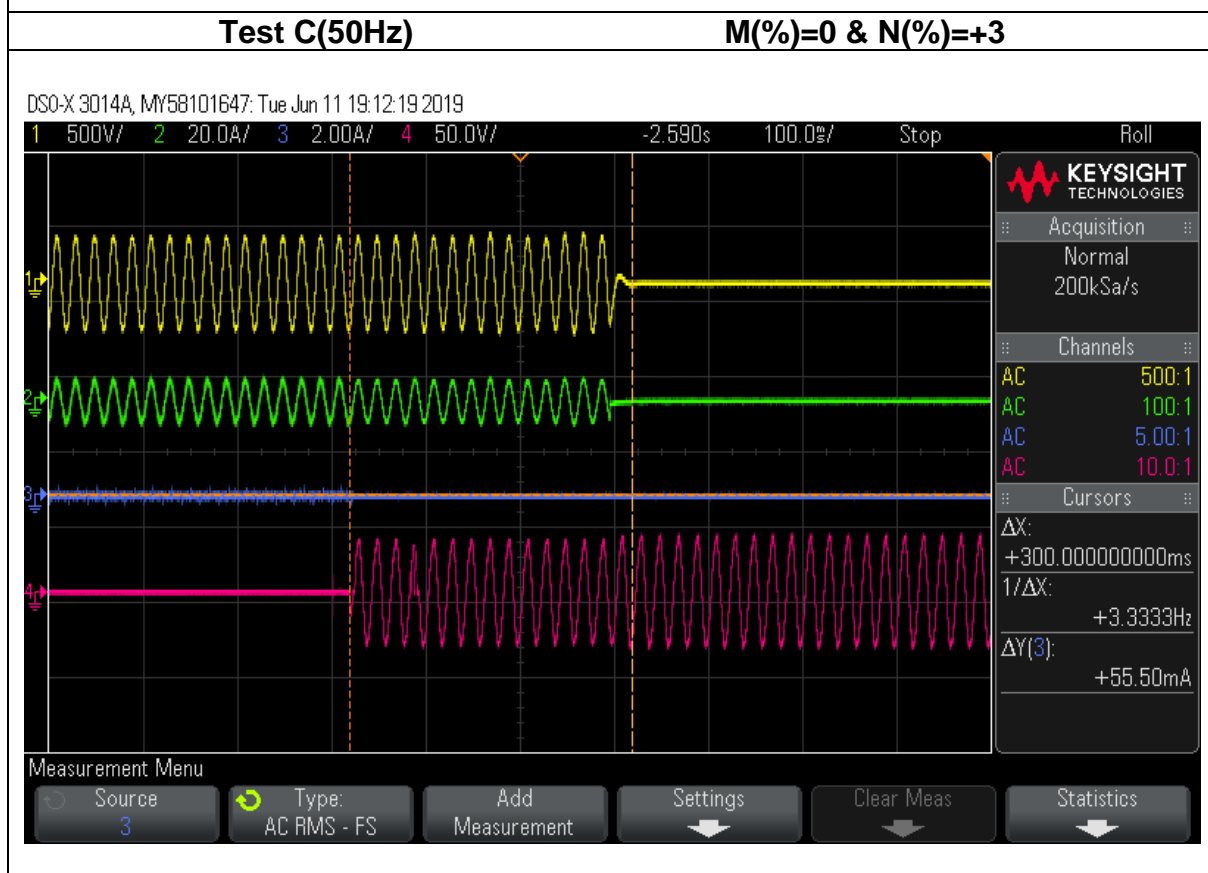
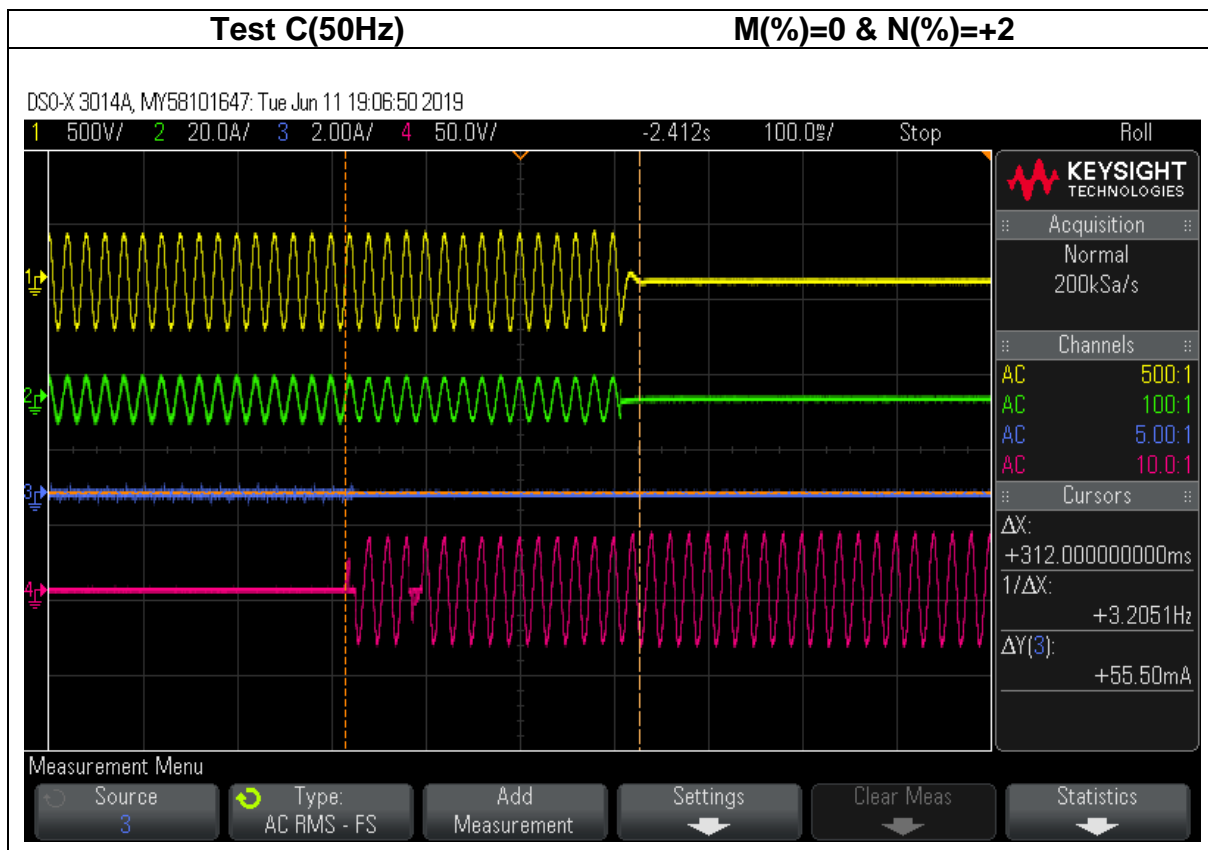
M(%)=0 & N(%)=0



Test C(50Hz)

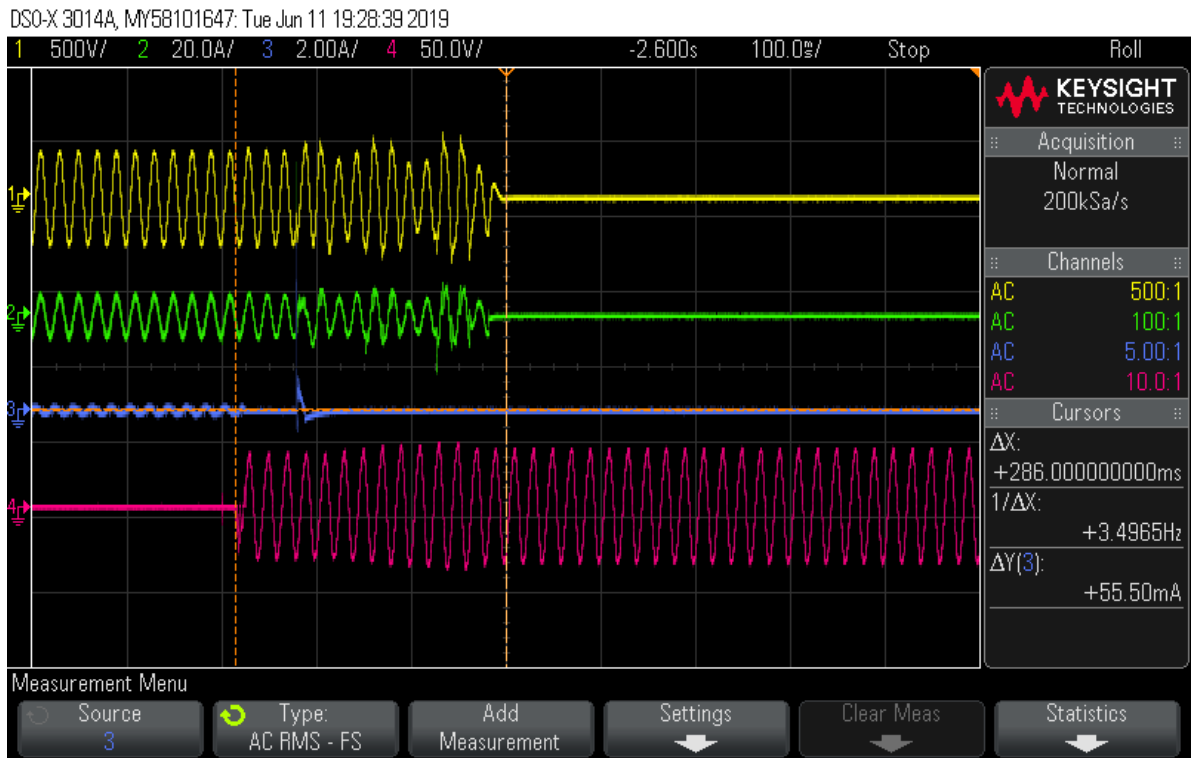
M(%)=0 & N(%)=+1





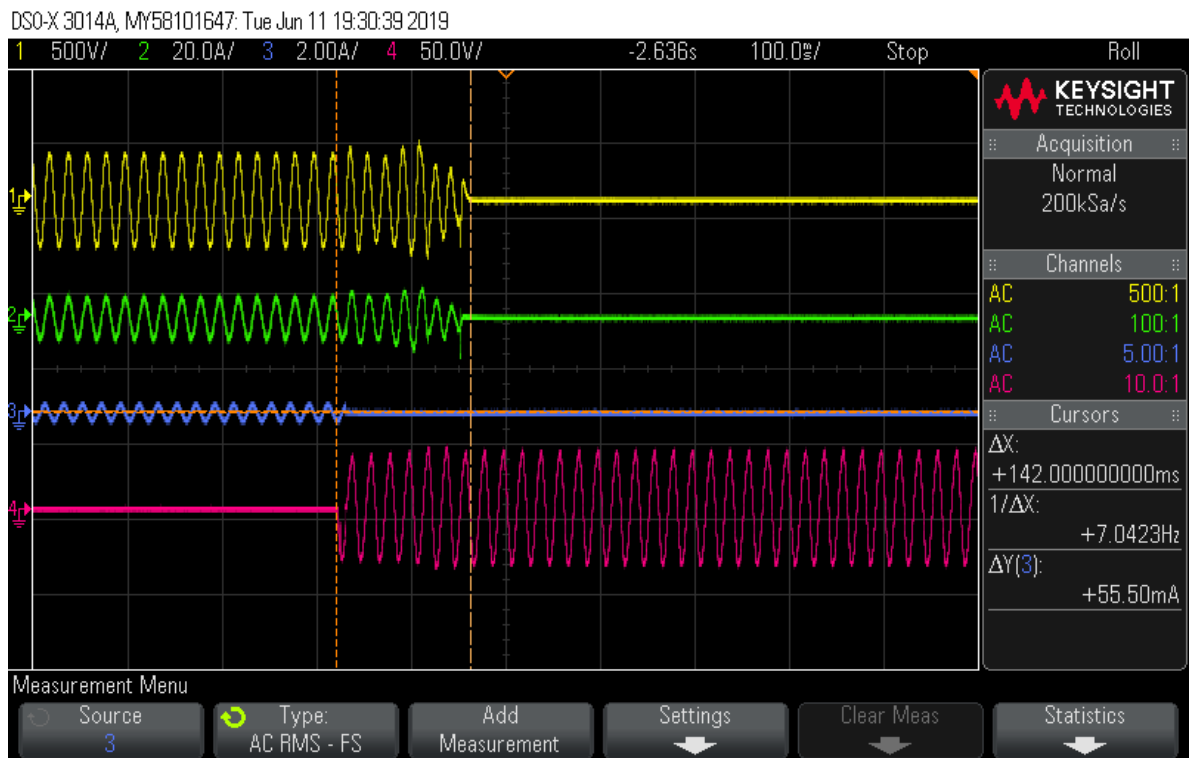
Test C(50Hz)

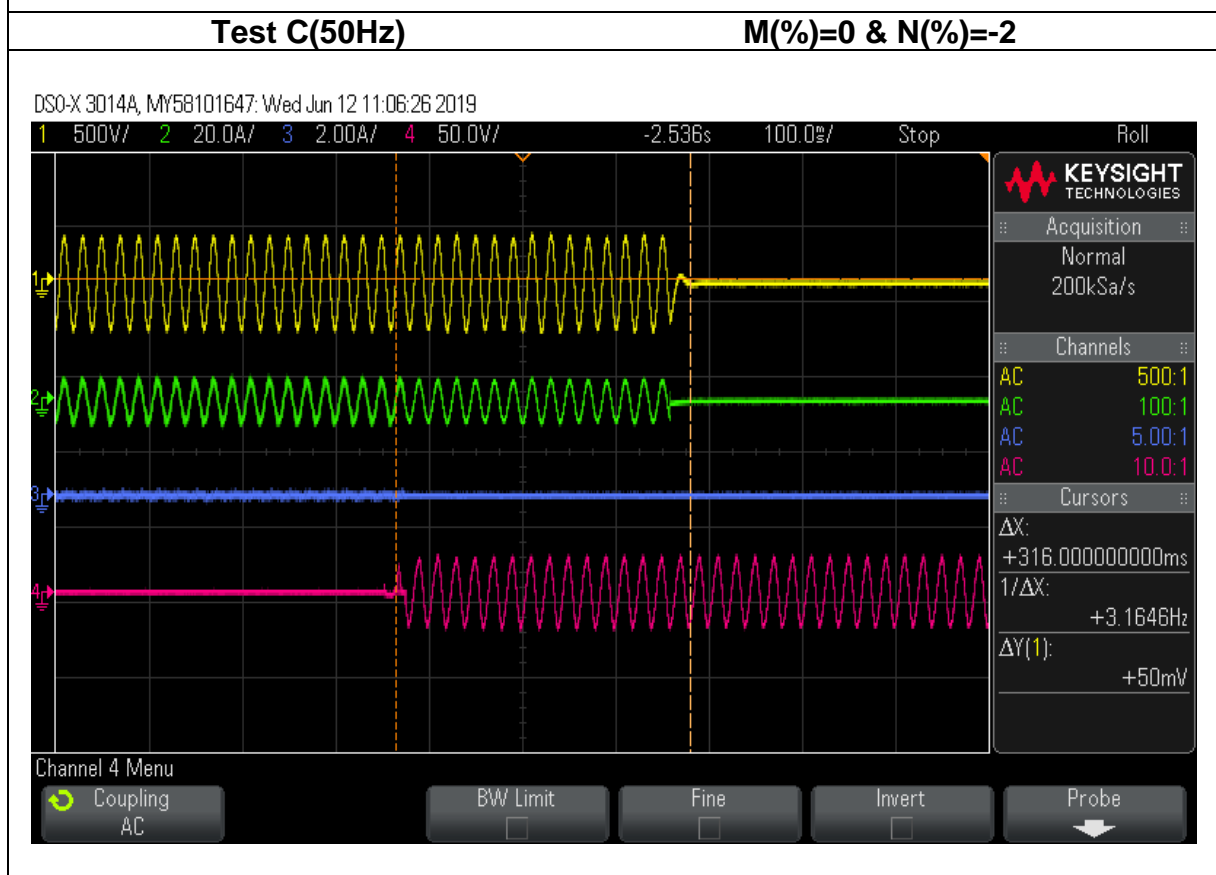
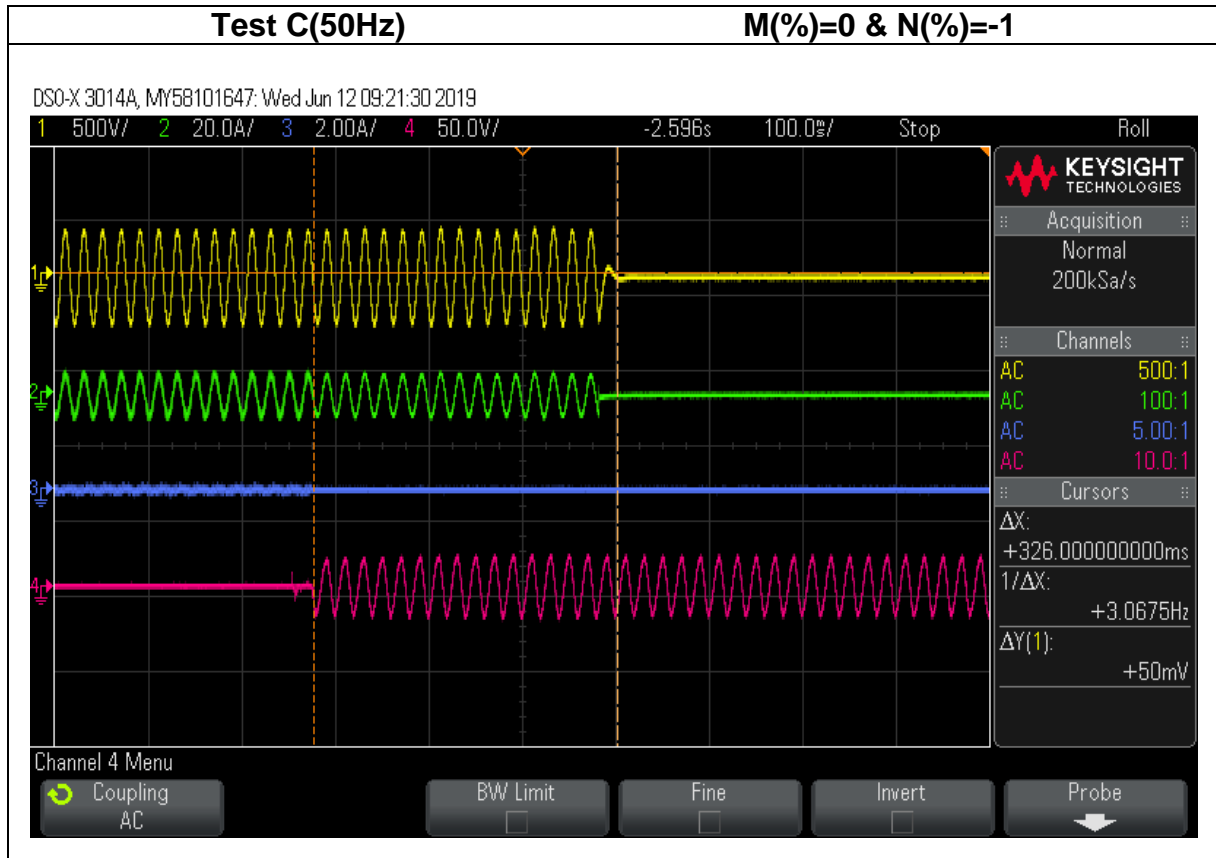
M(%)=0 & N(%)=+4

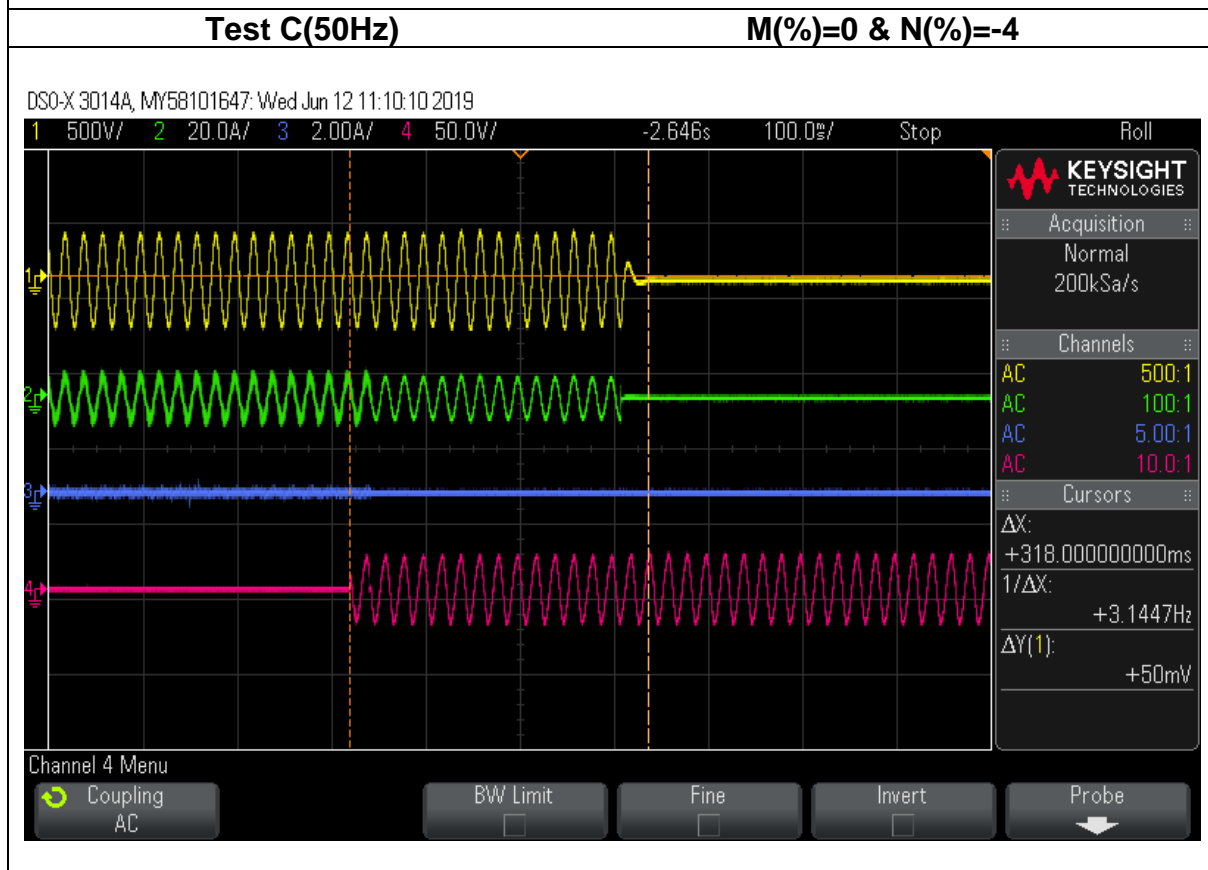
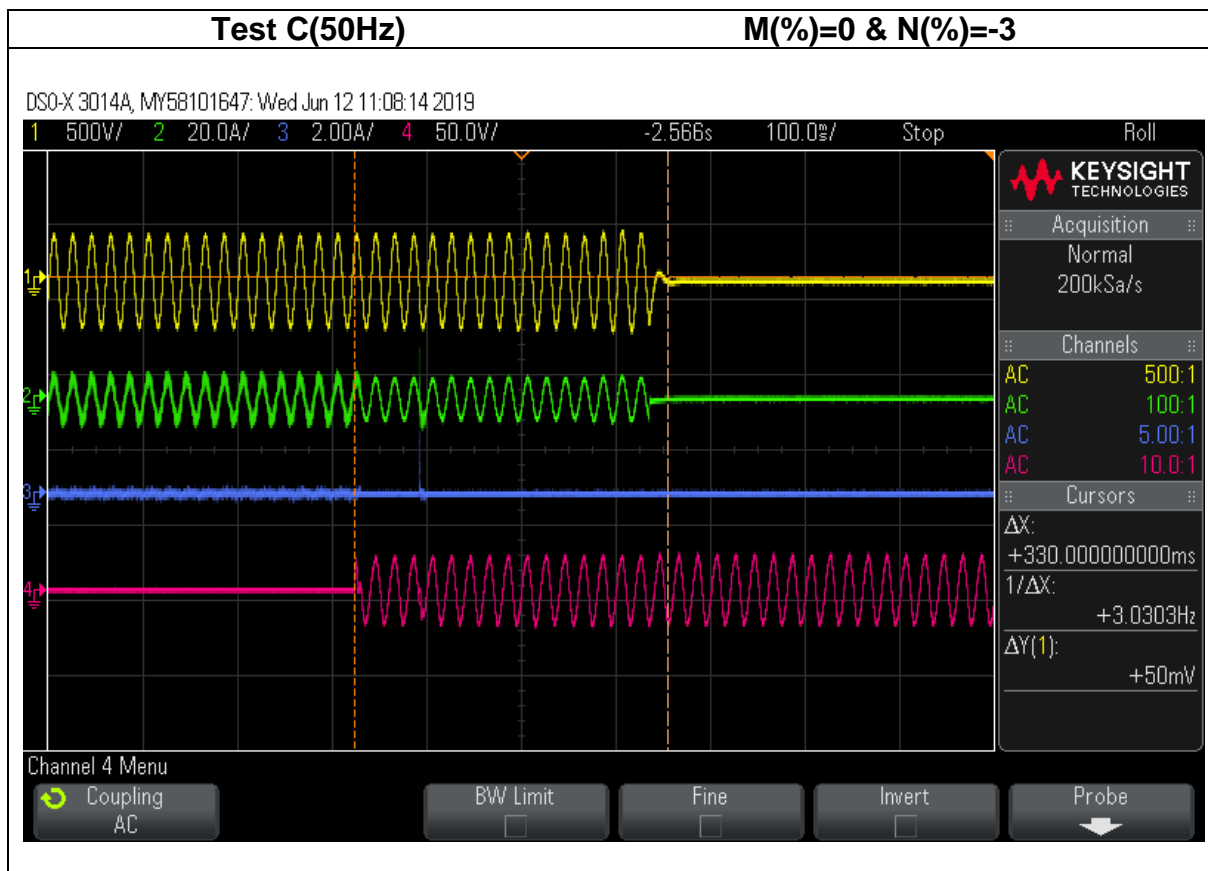


Test C(50Hz)

M(%)=0 & N(%)=+5





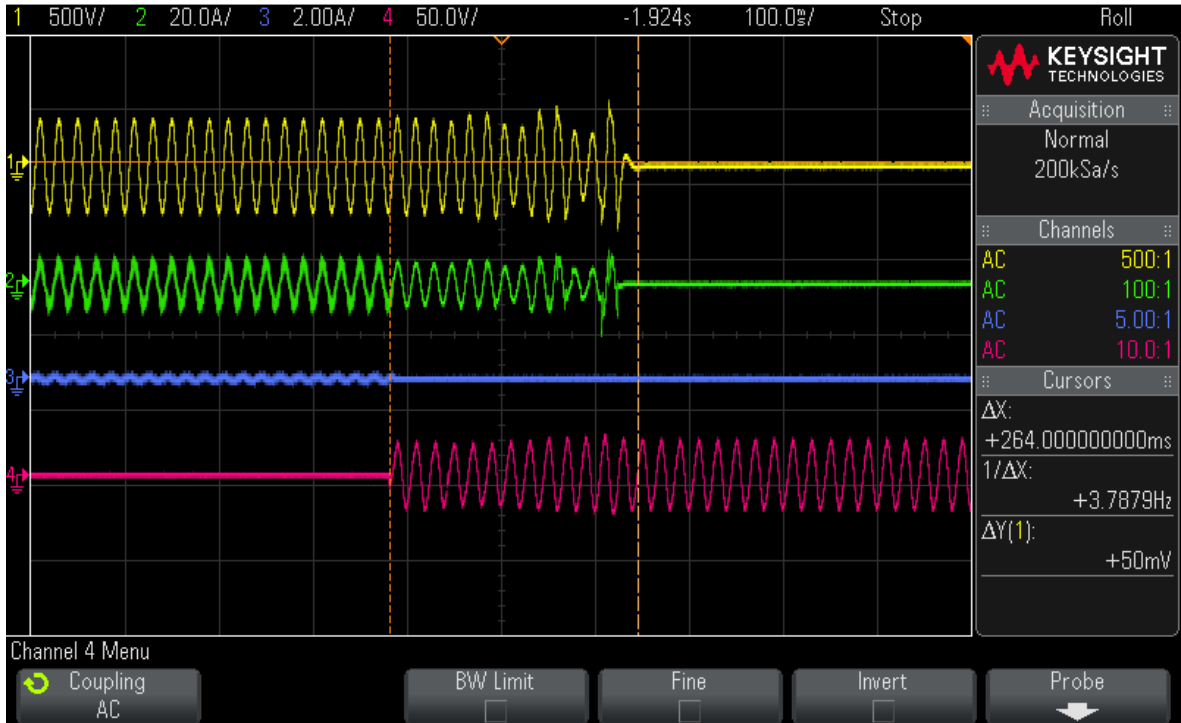


IEC 62116:2014 (50Hz)

Test C(50Hz)

M(%)=0 & N(%)=-5

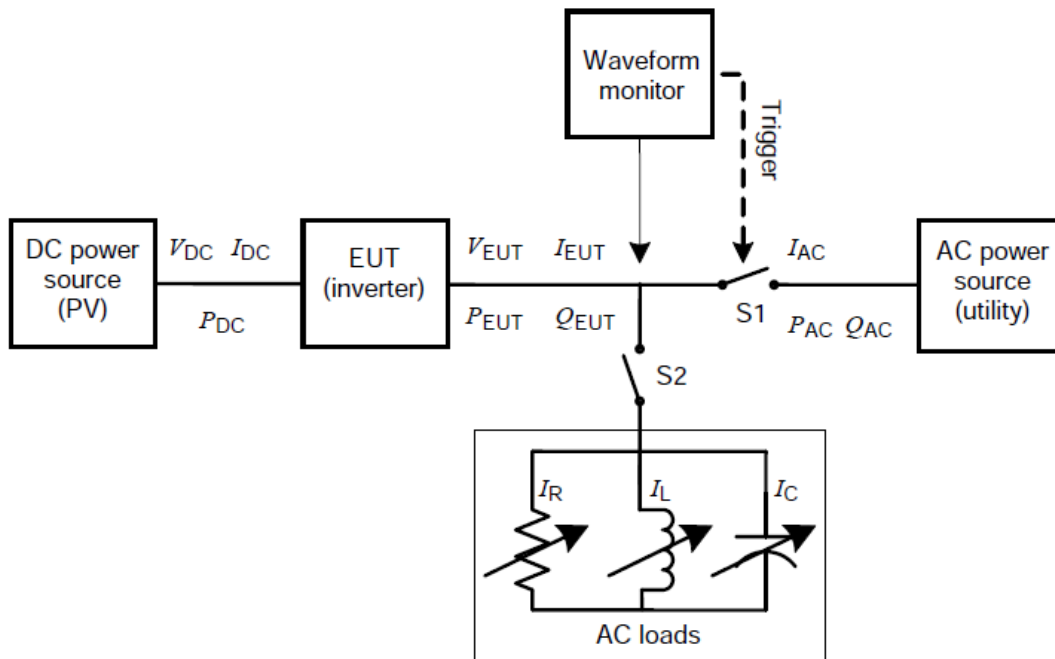
DSO-X 3014A, MY58101647: Wed Jun 12 11:15:12 2019



ATTACHMENT IV

(Testing information)

1 TESTING CIRCUIT



Current and voltage clamps have been connected to the inverter input/output for all the tests.
 All the tests and checks have been performed in accordance with the reference standard under testing.

2 TESTING EQUIPMENT

From	No.	Equipment Name	Model No.	Equipment No.	Calibration Date	Equipment calibration due date
Sofarsolar	1	Digital oscilloscope	DS05014A	MY5007026 6	2019-02-13	2020-02-12
	2	Voltage probe	SI-9110	111541	2019-02-13	2020-02-12
	3	Voltage probe	SI-9110	152627	2019-02-13	2020-02-12
	4	Voltage probe	SI-9110	111134	2019-02-13	2020-02-12
	5	Power analyzer	WT3000	91N610888	2019-02-13	2020-02-12
	6	Current probe	i1000s	29503223	2019-02-13	2020-02-12
	7	Current probe	i1000s	30413448	2019-02-13	2020-02-12
	8	Current probe	CP5150	C15015000 8	2019-02-13	2020-02-12
	9	Temperature & Humidity meter	TH101B	201030245 220	2019-02-13	2020-02-12
	10	Temperature & Humidity Chamber	HGTP-225R	HG1303080 1	2019-02-13	2020-02-12
SGS	11	True RMS Multimeter	Fluke / 289C	GZE012-53	2019-02-26	2020-02-25

IEC 62116:2014 (50Hz)

Items	Specifications
1) PV array simulator	
a) Voltage range	0 – 1000Vdc (0.01V step)
b) Current range	0 – 40A (0.01A step)
2) AC power source	
a) Output wiring	Three phase
b) Output capacity	100KVA
c) Output voltage	10-300Vrms
d) Output frequency	45-65Hz
e) Voltage stability	± 100ppm/°C
f) Output voltage distortion	0.05% max.
3) Digital meter	
a) Voltage range	0 – 1000Vdc, 0 – 600Vrms
b) Current range	0 – 30A
c) Frequency range (accuracy)	0.2%
d) Measurement items	Voltage (V) Current (A) Active power (W) Reactive power (Var) Volt-ampere (VA) Power factor (PF) Frequency (Hz) Electric energy (Wh)
4) Waveform recorder	
a) Sampling speed	1M/s
b) Recording device	Memory record and USB reading
c) Time accuracy	± 500ppm
5) AC load	
a) Resistive load	Maximum voltage: 300Vrms Current range: 0 – 100A Capacity: 100KW
b) Inductive load	Maximum voltage: 300Vrms Current range: 0 – 100A Capacity: 100KVA
c) Capacitive load	Maximum voltage: 300Vrms Current range: 0 – 100A Capacity: 100KVA

3 MEASUREMENT UNCERTAINTY

Voltage measurement uncertainty	±1.5 %
Current measurement uncertainty	±2.0 %
Frequency measurement uncertainty	±0.2 %
Time measurement uncertainty	±0.2 %
Power measurement uncertainty	±2.5 %
Phase Angle	±1°
cosφ	±0.01

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.

4 MEASUREMENT OF AC SOURCE USED FOR TEST

Items	Desired	Measured	Deviation	Limited
Voltage(V)	230	229.9	0.04%	±2%
Voltage THD (%)	<2.5%	0.03%		<2.5%
Frequency	50	50	0.0Hz	±0.1Hz
Phase angle distance	120°	--	--	± 1.5°

IEC 62116:2014 (50Hz)

AC source measurement result.

Normal Mode Uover: ■ ■ ■ ■ Update:500msec EAMP YOKOGAWA ◆
Iover: ■ ■ ■ ■ Integ:Reset

change items

PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
PLL	50.000 Hz	1	229.937		dc		
Freq	50.000 Hz	2	229.944	100.000	2	0.029	0.013
Urms1	229.937 V	3	0.021	0.009	4	0.028	0.012
Irms1	0.3661 A	5	0.037	0.016	6	0.022	0.010
P1	-0.0116kW	7	0.025	0.011	8	0.010	0.005
S1	0.0842kVA	9	0.008	0.003	10	0.005	0.002
Q1	0.0834kvar	11	0.007	0.003	12	0.003	0.001
λ1	-0.13723	13	0.007	0.003	14	0.004	0.002
φ1	G 97.888 °	15	0.006	0.002	16	0.001	0.000
Uthd1	0.033 %	17	0.002	0.001	18	0.001	0.000
Ithd1	25.176 %	19	0.004	0.002	20	0.006	0.003
Pthd1	0.007 %	21	0.007	0.003	22	0.003	0.001
Uthf1	0.023 %	23	0.005	0.002	24	0.007	0.003
Ithf1	3.823 %	25	0.003	0.001	26	0.003	0.001
Utif1	1.082	27	0.006	0.003	28	0.006	0.003
Itif1	164.949	29	0.003	0.001	30	0.006	0.003
		31	0.010	0.004	32	0.003	0.001
		33	0.005	0.002	34	0.002	0.001
		35	0.006	0.003	36	0.002	0.001
		37	0.004	0.002	38	0.005	0.002
		39	0.004	0.002	40	0.003	0.001

Element1

U1 600Vrms
I1 30Arms

Element2

U2 600Vrms
I2 30Arms

Element3

U3 600Vrms
I3 30Arms

Element4

U4 600Vrms
I4 30Arms

Integ:Reset

Time
-----:--:--

Timer
0:03:00

△PAGE▽ 1/7

▲PAGE▼ 1/3

Update 192

2019/06/11 11:16:00

Normal Mode Uover: ■ ■ ■ ■ Update:500msec EAMP YOKOGAWA ◆
Iover: ■ ■ ■ ■ Integ:Reset

change items

PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
PLL	50.000 Hz	41	229.937		dc		
Freq	50.000 Hz	42	0.003	0.001	42	0.002	0.001
Urms1	229.937 V	43	0.002	0.001	44	0.003	0.001
Irms1	0.3661 A	45	0.001	0.001	46	0.004	0.002
P1	-0.0116kW	47	0.004	0.002	48	0.005	0.002
S1	0.0842kVA	49	0.005	0.002	50	0.003	0.001
Q1	0.0834kvar	51	0.008	0.004	52	0.006	0.003
λ1	-0.13723	53	0.003	0.001	54	0.004	0.002
φ1	G 97.888 °	55	0.003	0.001	56	0.003	0.001
Uthd1	0.033 %	57	0.002	0.001	58	0.005	0.002
Ithd1	25.176 %	59	0.002	0.001	60	0.003	0.001
Pthd1	0.007 %	61	-----	-----	62	-----	-----
Uthf1	0.023 %	63	-----	-----	64	-----	-----
Ithf1	3.823 %	65	-----	-----	66	-----	-----
Utif1	1.082	67	-----	-----	68	-----	-----
Itif1	164.949	69	-----	-----	70	-----	-----
		71	-----	-----	72	-----	-----
		73	-----	-----	74	-----	-----
		75	-----	-----	76	-----	-----
		77	-----	-----	78	-----	-----
		79	-----	-----	80	-----	-----

Element1

U1 600Vrms
I1 30Arms

Element2

U2 600Vrms
I2 30Arms

Element3

U3 600Vrms
I3 30Arms

Element4

U4 600Vrms
I4 30Arms

Integ:Reset

Time
-----:--:--

Timer
0:03:00

△PAGE▽ 1/7

▲PAGE▼ 2/3

Update 192

2019/06/11 11:16:10