

Verification of Compliance

Product Name : **MPPT SOLAR INVERTER**
Model Number : **MAX II-10K**
Applicant : **Voltronic Power Technology Corp.**
Address : **No. 406, Xinhua 1st Road, Neihu District, Taipei, Taiwan, R.O.C.**
Report Number : **C61-V130-2106-209**
Issue Date : **July 26, 2021**
Applicable Standards : **EN IEC 61000-6-4:2019/ IEC 61000-6-4:2018 (Ed. 3.0)**
EN 61000-3-12:2011/ IEC 61000-3-12:2011 (Ed. 2.0)
EN IEC 61000-3-11:2019/ IEC 61000-3-11:2017 (Ed. 2.0)
EN IEC 61000-6-2:2019/ IEC 61000-6-2:2016 (Ed. 3.0)
EN 61000-4-2:2009/ IEC 61000-4-2:2008 (Ed. 2.0)
EN 61000-4-3:2006+A1:2008+A2:2010/
IEC 61000-4-3:2006+A1:2007+A2:2010 (Ed. 3.2)
EN 61000-4-4:2012/ IEC 61000-4-4:2012 (Ed. 3.0)
EN 61000-4-5:2014+A1:2017/
IEC 61000-4-5:2014+A1:2017 (Ed. 3.1)
EN 61000-4-6:2014/ IEC 61000-4-6:2013 (Ed. 4.0)
EN 61000-4-8:2010/ IEC 61000-4-8:2009 (Ed. 2.0):
EN 61000-4-34:2007+A1:2009/
IEC 61000-4-34:2005+A1:2009 (Ed. 1.1)



Based on the EMC Directive 2014/30/EU and the specifications of the customer, one sample of the designated product has been tested in our laboratory and found to be in compliance with the EMC standards cited above.



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Date: July 26, 2021

TAF 0905

FCC CAB Code TW1104, TW0019

NVLAP Lab Code 200575-0

ISED CAB Code TW0905

VCCI Accep. No. R-11527, C-11609, T-11441, G-10010, C-20010

T-20009, G-10614

CE EMC Test Report

for

MPPT SOLAR INVERTER

Model No. : MAX II-10K
Report Number : C61-V130-2106-209
Date of Receipt : June 21, 2021
Date of Report : July 26, 2021

Prepared for

Voltronic Power Technology Corp.

No. 406, Xinhua 1st Road, Neihu District, Taipei, Taiwan, R.O.C.

Prepared by



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Verification of Compliance

Equipment Under Test	: MPPT SOLAR INVERTER
Model No.	: MAX II-10K
Applicant	: Voltronic Power Technology Corp.
Address	: No. 406, Xinhua 1st Road, Neihu District, Taipei, Taiwan, R.O.C.
Applicable Standards	: EN IEC 61000-6-4:2019/ IEC 61000-6-4:2018 (Ed. 3.0) EN 61000-3-12:2011/ IEC 61000-3-12:2011 (Ed. 2.0) EN IEC 61000-3-11:2019/ IEC 61000-3-11:2017 (Ed. 2.0) EN IEC 61000-6-2:2019/ IEC 61000-6-2:2016 (Ed. 3.0) EN 61000-4-2:2009/ IEC 61000-4-2:2008 (Ed. 2.0) EN 61000-4-3:2006+A1:2008+A2:2010/ IEC 61000-4-3:2006+A1:2007+A2:2010 (Ed. 3.2) EN 61000-4-4:2012/ IEC 61000-4-4:2012 (Ed. 3.0) EN 61000-4-5:2014+A1:2017/ IEC 61000-4-5:2014+A1:2017 (Ed. 3.1) EN 61000-4-6:2014/ IEC 61000-4-6:2013 (Ed. 4.0) EN 61000-4-8:2010/ IEC 61000-4-8:2009 (Ed. 2.0): EN 61000-4-34:2007+A1:2009/ IEC 61000-4-34:2005+A1:2009 (Ed. 1.1)
Date of Testing	: July 1~8, 2021
Deviation	: The method, configuration and arrangement of the tests are following the requirement of customer and the applicable standards cited above.
Condition of Test Sample	: Engineering Sample



We, **Central Research Technology Co.**, hereby certify that one sample of the designated product was tested in our facility during the period mentioned above. The test records, data evaluation and Equipment Under Test (EUT) configurations shown in the present report are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in the present report is in compliance with the requirements set forth in the standards mentioned above and apply to the tested sample identified in the present report only. The test report shall not be reproduced, except in its entirety, without the written approval of Central Research Technology Co.

PREPARED BY : Iris Chen , **DATE** : July 26, 2021
(Iris Chen/System Executive)

APPROVED BY : Jim Chien , **DATE** : July 26, 2021
(Jim Chien/Technical Manager)

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Attachment 1 – Photographs of the Test Configurations

Attachment 2 – Photographs of Production

1. General Description

1.1 General Description of EUT

Equipment Under Test : MPPT SOLAR INVERTER

Model No. : MAX II-10K

Test Voltage : Charge and Normal Mode for 230Vac/50Hz

Stored Energy Mode for 48Vdc

PV Mode for 400Vdc

Highest Operating Frequency : <108MHz from the test specification

Function Description :

The EUT is an engineering sample of the MPPT SOLAR INVERTER. Please refer to the user's manual for the details.

The I/O ports of the EUT for final verification test are listed below:

No.	I/O Port Type	Quantity
1	AC input port	1
2	AC output port	1
3	DC output port	3
4	DC port (+,-)	1
5	PV port (+,-)	2
6	RJ45 (RS232/RS-485) port	2
7	Dry contact port	1
8	USB port	1

1.2 Test Mode

Final Verification Mode from test specification

Test Mode	Test condition	Test Item
Mode 1	Charge and Normal Mode	All Tests (Full Load)
Mode 2	Stored Energy Mode	CE & RE Tests (Full Load)
Mode 3	PV Mode	CE & RE Tests (Full Load)

1.3 Applied standards

Based on European Council EMC Directive 2014/30/EU and the specifications of the manufacturer, the applied standards to evaluate the compliance of the EUT are as following:

Applied Standards	Test Items	Results
<input checked="" type="checkbox"/> EN IEC 61000-6-4:2019/ IEC 61000-6-4:2018 (Ed. 3.0)	Conducted Emission Measurement	<u>PASS</u>
	Radiated Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-3-12:2011/ IEC 61000-3-12:2011 (Ed. 2.0)	Harmonic Current Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN IEC 61000-3-11:2019/ IEC 61000-3-11:2017 (Ed. 2.0)	Voltage Fluctuation and Flicker Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN IEC 61000-6-2:2019/ IEC 61000-6-2:2016 (Ed. 3.0)		
<input checked="" type="checkbox"/> EN 61000-4-2:2009/ IEC 61000-4-2:2008 (Ed. 2.0)	Electrostatic discharge Test (ESD)	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-3:2006+A1:2008+A2:2010/ IEC 61000-4-3:2006+A1:2007+A2:2010 (Ed. 3.2)	Radiated electromagnetic field immunity Test (RS)	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-4:2012/ IEC 61000-4-4:2012 (Ed. 3.0)	Electrical fast transient / burst immunity Test (EFT)	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-5:2014+A1:2017/ IEC 61000-4-5:2014+A1:2017 (Ed. 3.1)	Surge immunity Test	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-6:2014/ IEC 61000-4-6:2013 (Ed. 4.0)	Immunity to conducted disturbances, induced by radio-frequency fields (CS)	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-8:2010/ IEC 61000-4-8:2009 (Ed. 2.0)	Power frequency magnetic field immunity Test (PFM)	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-4-34:2007+A1:2009/ IEC 61000-4-34:2005+A1:2009 (Ed. 1.1)	Voltage dips, short interruptions Test	<u>PASS</u>

According to applied standards, the measurement instrumentation uncertainty is not taken into account in the determination of compliance.

1.4 Description of Performance Criteria

- Criteria A** : normal performance within levels specified by the manufacturer, requestor or purchaser;
- Criteria B** : temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the EUT recovers its normal performance, without operator intervention;
- Criteria C** : temporary loss of function or degradation of performance, the correction of which requires operator intervention;

1.5 Test Setup for the EUT

The EUT is an unique unit connected with other necessary accessories and support units listed in the next section. It has been tested against each standard after the following setup steps:

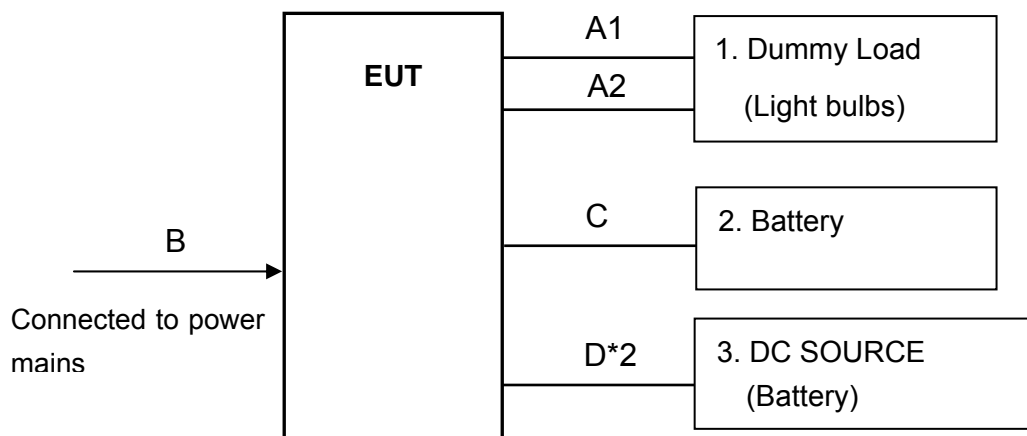
- a. Connect the Dummy Load and Battery to the EUT.
- b. Connect the EUT to the appropriate power source through power filter or other LISN in different site for each test item.
- c. According to the setup methods designated by its manufacturer, set the EUT in the operating condition.
- d. Repeat and keep the setup steps listed above before and during all tests.

1.6 The Support Units

No.	Unit	Model No.	FCC ID	Trade Name	Power Cord	Supported by lab.	Noe
1	Dummy Load (Light bulb)	N/A	N/A	N/A	1.5m		
2	Battery	NPA	N/A	YUASA	N/A		
3	DC SOURCE (Battery)	N/A	N/A	YUASA	N/A		

1.7 Layout of the Setup

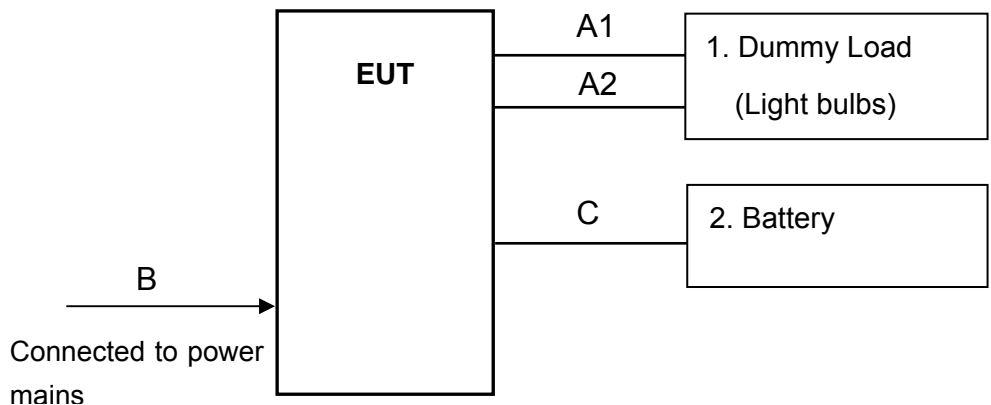
Conducted Emission & Radiated Emission Tests



Connecting Cables:

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A1	Power Cable	1.15m					
A2		0.85m					
B	Power Cable	1.6m					
C	Power Cable (+,-)	0.8m					
D	Power Cable (+,-)	10m					

Other Tests



Connecting Cables:

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A1	Power Cable	1.15m					
A2		0.85m					
B	Power Cable	1.6m					
C	Power Cable (+,-)	0.8m					

1.8 Test Capability

Test Facility

The test facility used for evaluating the conformance of the EUT with each standard in the present report meets what required in CISPR16 series and IEC/EN 61000-4-3.

Test Room	Type of Test Room	Descriptions
TR1	10m semi-anechoic chamber	For the radiated emission measurement. (below 1GHz)
TR1	10m semi-anechoic chamber with absorber	For the radiated emission measurement. (above 1GHz)
TR11	3m semi-anechoic chamber	For the radiated emission measurement. (below 1GHz)
TR5	Shielding Room	For the conducted emission measurement.
TR20	Shielding Room	
TR3	3m fully-anechoic chamber	For the radiated immunity test.
TR7	Shielding Room	For the Current Harmonic / Voltage Flicker and other immunity tests.
TR8	Shielding Room	
TR4	Shielding Room	
AR	Shielding Room	
TR12	Plane Grounding Site	
TR14	Plane Grounding Site	
TR300	3m fully-anechoic chamber	For the radiated emission measurement. (above 1GHz)

Test Laboratory Competence Information

Central Research Technology Co. has been accredited / filed / authorized by the agencies listed in the following table.

Certificate	Nation	Agency	Code	Mark
Accreditation Certificate	USA	NVLAP	200575-0	ISO/IEC 17025
	USA	FCC	TW1104, TW0019	ISO/IEC 17025
	R.O.C. (Taiwan)	TAF	0905	ISO/IEC 17025
	R.O.C. (Taiwan)	BSMI	SL2-IN-E-0033, SL2-IS-E-0033, SL2-R1/R2-E-0033, SL2-A1-E-0033, SL2-L1-E-0033	ISO/IEC 17025
	Canada	ISED	TW0905	ISO/IEC 17025
Site Filing Document	Japan	VCCI	R-11527,C-11609,T-11441, G-10010,C-20010, G-10614, T-20009	Test facility list & NSA Data
Authorization Certificate	Germany	TUV	UA 50235497	ISO/IEC 17025

The copy of each certificate can be downloaded from our web site: www.crc-lab.com

2. Conducted Emission Measurement

Test Result : PASS

2.1 Limits for Emission Measurement

Limits for conducted disturbances at the power mains

Frequency (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	79	66
0.5 to 5	73	60
5 to 30	73	60

Note 1- The lower limit shall apply at the transition frequency.

Note 2- The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

2.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESR/ 102550	April 21, 2021	April 21, 2022
LISN	R&S	ENV4200/ 833209/010	May 5, 2021	May 5, 2022
2 nd LISN	SchwarzBeck	NSLK-8128-RC/ 8128-383	July 8, 2020	July 8, 2021
ISN	FCC	<input type="checkbox"/> FCC-TLISN-T2- 02/20269	Aug. 9, 2020	Aug. 9, 2021
	TESEQ	<input type="checkbox"/> ISN T400A/ 28575	Aug. 9, 2020	Aug. 9, 2021
		<input type="checkbox"/> ISN T800/ 36191	Aug. 9, 2020	Aug. 9, 2021
50Ω terminator	SUHNER	65 BNC-50-0-1/133 NE/005	June 1, 2021	June 1, 2022
RF Switch	R&S	RSU28/ 338965/002	May 19, 2021	Nov. 19, 2021
RF Cable	N/A	N/A/ C0052 ~ 56	May 19, 2021	Nov. 19, 2021
Test Software	Audix	e3/ V6.110303a2	NCR	NCR
TR5 shielded room	ETS LINDGREN	TR5/ 15353-F	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

Measurement Uncertainty

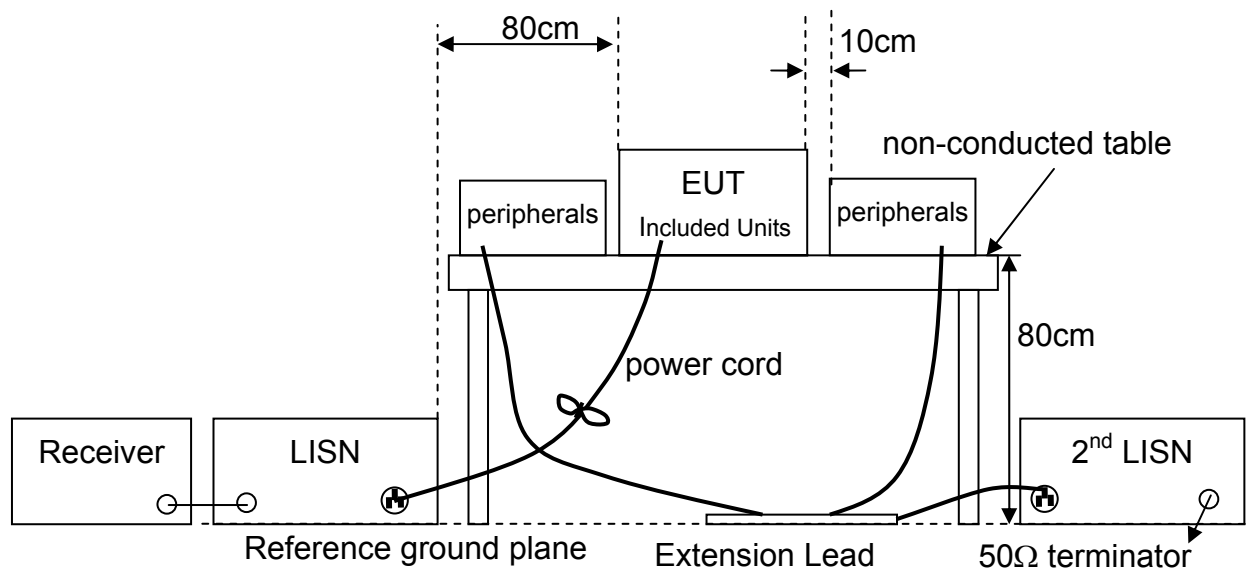
The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than U_{CISPR} in table 1 of CISPR 16-4-2 and the compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit.

Test Item	Uncertainty Value
Conducted emissions using a LISN : NSLK-8128-RC	2.48dB
Conducted emissions using a LISN :ENV 4200	2.52dB

2.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane and 0.4 meters from the conducting wall of the shielded room. Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the reference ground plane.
- c. Connect the EUT's power source to the appropriate power mains through the LISN.
- d. All the other peripherals are connected to the 2nd LISN, if any.
- e. The LISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.
- f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.
- g. Rapidly scan the signal from 150kHz to 30MHz by using the receiver through the Maximum-Peak detector to determine those frequencies associated with higher emission levels for each measured line.
- h. Then measure the maximum level of conducted disturbance for each frequency found from step g. by using the receiver through the Quasi-Peak and Average detectors per CISPR 16-1.
- i. Record the level for each frequency and compare with the required limit.
- j. If the peak emission level is lower than the specified Average limit, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. or Average values will be measured and presented.

2.4 Test Configurations

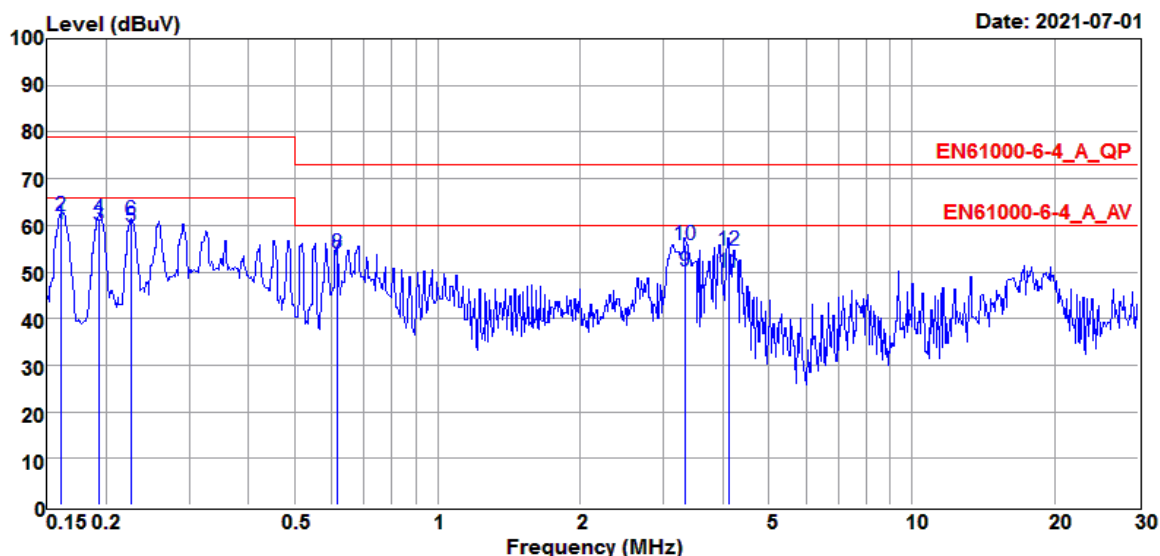


2.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

2.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)
Test Voltage : 230Vac/50Hz
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Line



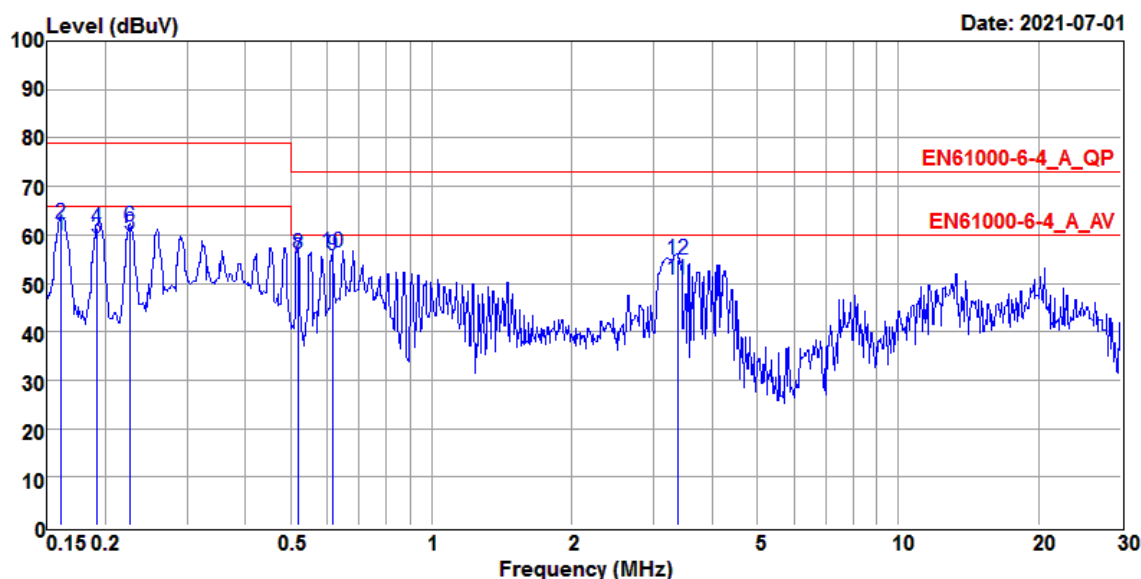
Site : TR5 Conduction Emission Chamber
Condition : EN61000-6-4_A_QP ENV-4200_L1 LINE
Power : 50Hz/230V
Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB		
1	0.161	60.26	50.32	9.94	66.00	-5.74	LINE	Average
2	0.161	62.13	52.19	9.94	79.00	-16.87	LINE	QP
3	0.193	60.07	50.08	9.99	66.00	-5.93	LINE	Average
4	0.193	61.55	51.56	9.99	79.00	-17.45	LINE	QP
5	0.227	59.77	49.78	9.99	66.00	-6.23	LINE	Average
6	0.227	61.23	51.24	9.99	79.00	-17.77	LINE	QP
7	0.617	52.55	42.58	9.97	60.00	-7.45	LINE	Average
8	0.617	54.01	44.04	9.97	73.00	-18.99	LINE	QP
9	3.338	50.06	39.99	10.07	60.00	-9.94	LINE	Average
10	3.338	55.67	45.60	10.07	73.00	-17.33	LINE	QP
11	4.113	49.93	39.84	10.09	60.00	-10.07	LINE	Average
12	4.113	54.73	44.64	10.09	73.00	-18.27	LINE	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

Test Mode : Mode 1(Charge and Normal Mode)
Test Voltage : 230Vac/50Hz
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : **Neutral**



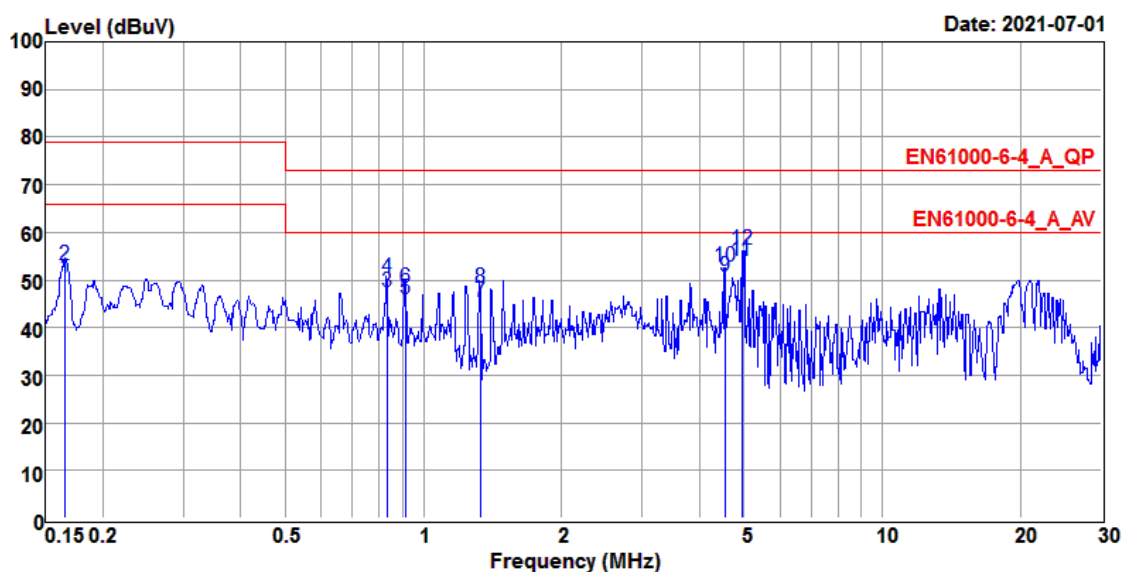
Site : TR5 Conduction Emission Chamber
Condition : EN61000-6-4_A_QP ENV-4200_N1 NEUTRAL
Power : 50Hz/230V
Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read Level	Limit Factor	Over Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB		
1	0.161	60.04	49.97	10.07	66.00	-5.96	NEUTRAL	Average
2	0.161	62.33	52.26	10.07	79.00	-16.67	NEUTRAL	QP
3	0.192	59.42	49.37	10.05	66.00	-6.58	NEUTRAL	Average
4	0.192	61.40	51.35	10.05	79.00	-17.60	NEUTRAL	QP
5	0.227	59.94	49.90	10.04	66.00	-6.06	NEUTRAL	Average
6	0.227	61.76	51.72	10.04	79.00	-17.24	NEUTRAL	QP
7	0.519	55.19	45.21	9.98	60.00	-4.81	NEUTRAL	Average
8	0.519	56.17	46.19	9.98	73.00	-16.83	NEUTRAL	QP
9	0.614	55.93	45.96	9.97	60.00	-4.07	NEUTRAL	Average
10	0.614	56.49	46.52	9.97	73.00	-16.51	NEUTRAL	QP
11	3.370	50.65	40.60	10.05	60.00	-9.35	NEUTRAL	Average
12	3.370	54.77	44.72	10.05	73.00	-18.23	NEUTRAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

Test Mode : Mode 2(Stored Energy Mode)
Test Voltage : N/A
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Line



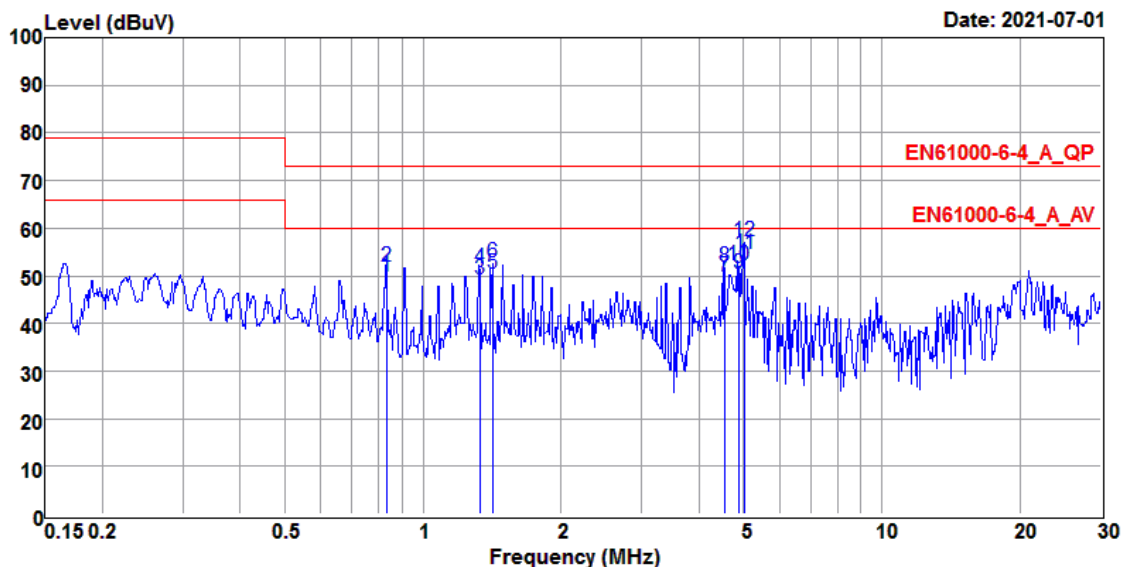
Site : TR5 Conduction Emission Chamber
 Condition : EN61000-6-4_A_QP ENV-4200_L1 LINE
 Power : BATTERY
 Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	Level	Line	Limit		
			dBuV	dBuV	dB		
1	0.166	50.41	40.46	9.95	66.00	-15.59	Average
2	0.166	53.18	43.23	9.95	79.00	-25.82	QP
3	0.833	47.63	37.66	9.97	60.00	-12.37	Average
4	0.833	50.33	40.36	9.97	73.00	-22.67	QP
5	0.915	45.97	36.00	9.97	60.00	-14.03	Average
6	0.915	48.40	38.43	9.97	73.00	-24.60	QP
7	1.331	45.46	35.47	9.99	60.00	-14.54	Average
8	1.331	48.38	38.39	9.99	73.00	-24.62	QP
9	4.538	50.79	40.68	10.11	60.00	-9.21	Average
10	4.538	52.93	42.82	10.11	73.00	-20.07	QP
11	4.938	53.87	43.75	10.12	60.00	-6.13	Average
12	4.938	56.32	46.20	10.12	73.00	-16.68	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

Test Mode : Mode 2(Stored Energy Mode)
Test Voltage : N/A
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Neutral



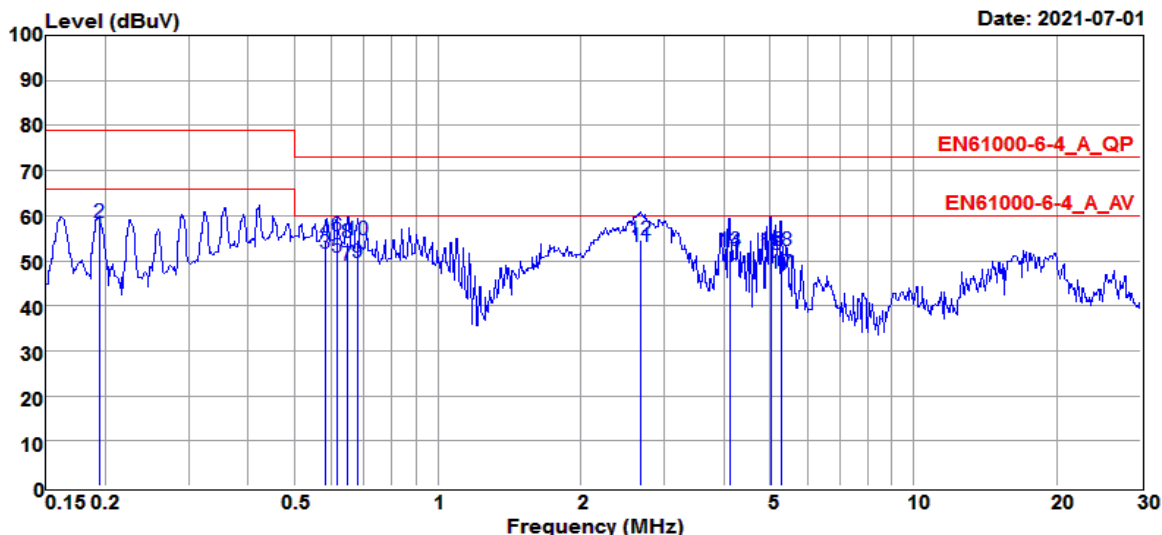
Site : TR5 Conduction Emission Chamber
Condition : EN61000-6-4_A_QP ENV-4200_N1 NEUTRAL
Power : BATTERY
Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read Level	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	dBuV	Factor	Line	Limit	dB
1	0.833	49.87	39.90	9.97	60.00	-10.13	NEUTRAL Average
2	0.833	52.07	42.10	9.97	73.00	-20.93	NEUTRAL QP
3	1.333	49.34	39.36	9.98	60.00	-10.66	NEUTRAL Average
4	1.333	51.72	41.74	9.98	73.00	-21.28	NEUTRAL QP
5	1.416	50.36	40.37	9.99	60.00	-9.64	NEUTRAL Average
6	1.416	52.72	42.73	9.99	73.00	-20.28	NEUTRAL QP
7	4.539	49.75	39.68	10.07	60.00	-10.25	NEUTRAL Average
8	4.539	51.86	41.79	10.07	73.00	-21.14	NEUTRAL QP
9	4.872	50.38	40.30	10.08	60.00	-9.62	NEUTRAL Average
10	4.872	52.13	42.05	10.08	73.00	-20.87	NEUTRAL QP
11	5.021	54.73	44.65	10.08	60.00	-5.27	NEUTRAL Average
12	5.021	57.22	47.14	10.08	73.00	-15.78	NEUTRAL QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

Test Mode : Mode 3(PV Mode)
Test Voltage : N/A
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Line



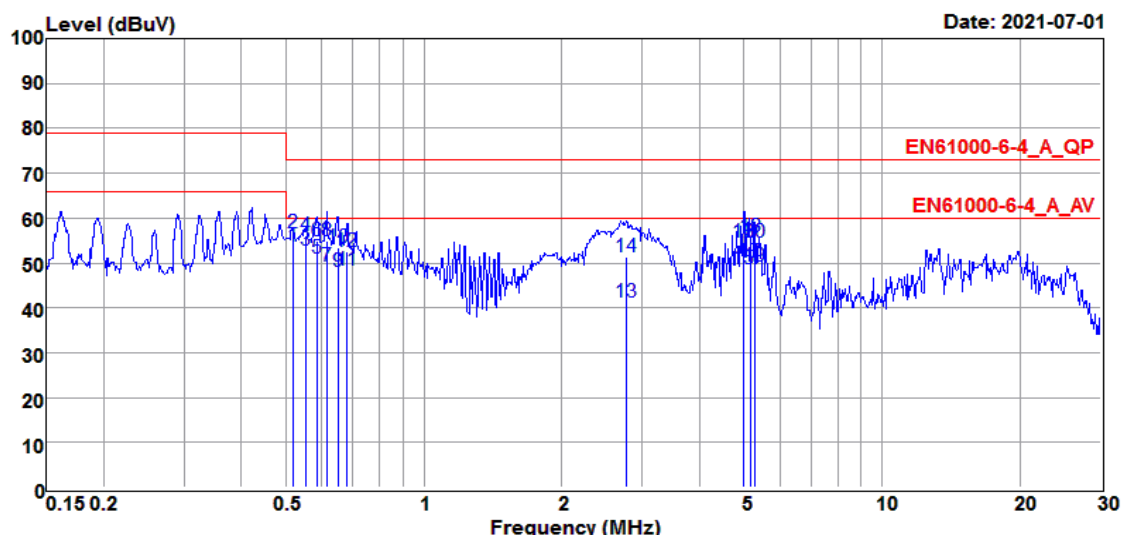
Site : TR5 Conduction Emission Chamber
 Condition : EN61000-6-4_A_QP ENV-4200_L1 LINE
 Power :
 Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read	Limit	Over			
	MHz	dBuV	Level	Factor	Line	Limit	Pol/Phase	Remark
			dBuV	dB	dBuV	dB		
1	0.194	55.73	45.74	9.99	66.00	-10.27	LINE	Average
2	0.194	58.48	48.49	9.99	79.00	-20.52	LINE	QP
3	0.581	51.63	41.66	9.97	60.00	-8.37	LINE	Average
4	0.581	54.42	44.45	9.97	73.00	-18.58	LINE	QP
5	0.615	50.82	40.85	9.97	60.00	-9.18	LINE	Average
6	0.615	55.64	45.67	9.97	73.00	-17.36	LINE	QP
7	0.648	49.06	39.09	9.97	60.00	-10.94	LINE	Average
8	0.648	54.06	44.09	9.97	73.00	-18.94	LINE	QP
9	0.680	49.50	39.52	9.98	60.00	-10.50	LINE	Average
10	0.680	54.50	44.52	9.98	73.00	-18.50	LINE	QP
11	2.674	53.13	43.08	10.05	60.00	-6.87	LINE	Average
12	2.674	54.72	44.67	10.05	73.00	-18.28	LINE	QP
13	4.115	52.33	42.24	10.09	60.00	-7.67	LINE	Average
14	4.115	52.04	41.95	10.09	73.00	-20.96	LINE	QP
15	5.023	52.13	42.01	10.12	60.00	-7.87	LINE	Average
16	5.023	51.31	41.19	10.12	73.00	-21.69	LINE	QP
17	5.282	47.13	36.99	10.14	60.00	-12.87	LINE	Average
18	5.282	52.34	42.20	10.14	73.00	-20.66	LINE	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

Test Mode : Mode 3(PV Mode)
Test Voltage : N/A
Tester : Der-Jan Ken **Temperature** : 24°C
Humidity : 61%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Neutral



Site : TR5 Conduction Emission Chamber
Condition : EN61000-6-4_A_QP ENV-4200_N1 NEUTRAL
Power :
Operator : DER-JAN KEN T24/H61/P1006

	Freq	Level	Read	Limit	Over			
	MHz	dBuV	Level	Factor	Line	Limit	Pol/Phase	Remark
			dBuV	dB	dBuV	dB		
1	0.519	53.76	43.78	9.98	60.00	-6.24	NEUTRAL	Average
2	0.519	56.83	46.85	9.98	73.00	-16.17	NEUTRAL	QP
3	0.552	52.73	42.75	9.98	60.00	-7.27	NEUTRAL	Average
4	0.552	56.18	46.20	9.98	73.00	-16.82	NEUTRAL	QP
5	0.585	50.94	40.97	9.97	60.00	-9.06	NEUTRAL	Average
6	0.585	54.92	44.95	9.97	73.00	-18.08	NEUTRAL	QP
7	0.614	49.22	39.25	9.97	60.00	-10.78	NEUTRAL	Average
8	0.614	55.00	45.03	9.97	73.00	-18.00	NEUTRAL	QP
9	0.649	48.12	38.14	9.98	60.00	-11.88	NEUTRAL	Average
10	0.649	53.40	43.42	9.98	73.00	-19.60	NEUTRAL	QP
11	0.680	48.35	38.37	9.98	60.00	-11.65	NEUTRAL	Average
12	0.680	52.52	42.54	9.98	73.00	-20.48	NEUTRAL	QP
13	2.768	41.13	31.11	10.02	60.00	-18.87	NEUTRAL	Average
14	2.768	51.45	41.43	10.02	73.00	-21.55	NEUTRAL	QP
15	4.990	48.55	38.47	10.08	60.00	-11.45	NEUTRAL	Average
16	4.990	54.51	44.43	10.08	73.00	-18.49	NEUTRAL	QP
17	5.154	50.02	39.94	10.08	60.00	-9.98	NEUTRAL	Average
18	5.154	55.85	45.77	10.08	73.00	-17.15	NEUTRAL	QP
19	5.284	49.33	39.24	10.09	60.00	-10.67	NEUTRAL	Average
20	5.284	54.49	44.40	10.09	73.00	-18.51	NEUTRAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

3. Radiated Emission Measurement

Test Result : **PASS**

3.1 Limits for Emission Measurement

Type of EUT	Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
<input checked="" type="checkbox"/>	Below 108	1000
<input type="checkbox"/>	108 - 500	2000
<input type="checkbox"/>	500 - 1000	5000
<input type="checkbox"/>	Above 1000	5 th harmonic of the highest frequency or 6GHz, whichever is lower

Limits for radiated disturbances at a measuring distance of 10m

Frequency (MHz)	Quasi-peak (dB μ V/m)
30 to 230	40
230 to 1000	47

Note 1- The lower limit shall apply at the transition frequency.
 Note 2- Additional provisions may be required for cases where interference occurs.

Limits for radiated disturbances at a measuring distance of 3m

Frequency (GHz)	Peak (dB μ V/m)	Average (dB μ V/m)
1 to 3	76	56
3 to 6	80	60

Note 1- The lower limit shall apply at the transition frequency.

3.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR/ 102308	July 16, 2020	July 16, 2021
Bilog Antenna with 5 dB Attenuator	SCHWARZBEC K & Mini-Circuits	VULB 9168 & BW-N5W5+ / VULB 9168-618 & 001	June 3, 2021	June 3, 2022
Bilog Antenna with 5 dB Attenuator	SCHWARZBEC K & Mini-Circuits	VULB 9168 & BW-N5W5+/ VULB 9168-01007 & 002	Aug. 24, 2020	Aug. 24, 2021
Pre-Amplifier	EMCI	EMC9135/ 980630	May 18, 2021	Nov. 18, 2021
Pre-Amplifier	EMCI	EMC9135/ 980550	May 18, 2021	Nov. 18, 2021
Spectrum Analyzer	R&S	FSP 7/ 100106	Mar. 24, 2021	Mar. 24, 2022
Spectrum Analyzer	R&S	FSP 7/ 100384	Feb. 19, 2021	Feb. 19, 2022
RF Cable	JYEBAO	0214/ C0058 + C0049 + C0049-2 + RSU + C0050-3	May 18, 2021	Nov. 18, 2021
RF Cable	JYEBAO	0214/ C0059 + C0050 + C0050-2 + RSU + C0050-3	May 18, 2021	Nov. 18, 2021
Test Software	Audix	e3/ V6.110303a2	NCR	NCR
TR1 Semi - anechoic Chamber	ETS. LINDGREN	TR1/ 17627-B	Feb. 8, 2021	Feb. 8, 2022

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.
3. The calibration date of the chamber TR1 listed above is the date of NSA measurement.

Measurement Uncertainty

The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than U_{CISPR} in table 1 of CISPR 16-4-2 and the compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit.

Test Site (Measuring distance)	Polarization	Frequency Range
		30MHz ~ 1000MHz
TR1(10m)	Horizontal	4.92dB
	Vertical	4.94dB

Test Site (Measuring distance)	Polarization	Frequency Range
		1GHz ~ 6GHz
TR1(3m)	Horizontal	4.62dB
	Vertical	4.48dB
TR300(3m)	Horizontal	4.98dB
	Vertical	4.90dB

3.3 Test Procedures

Below 1GHz measurement

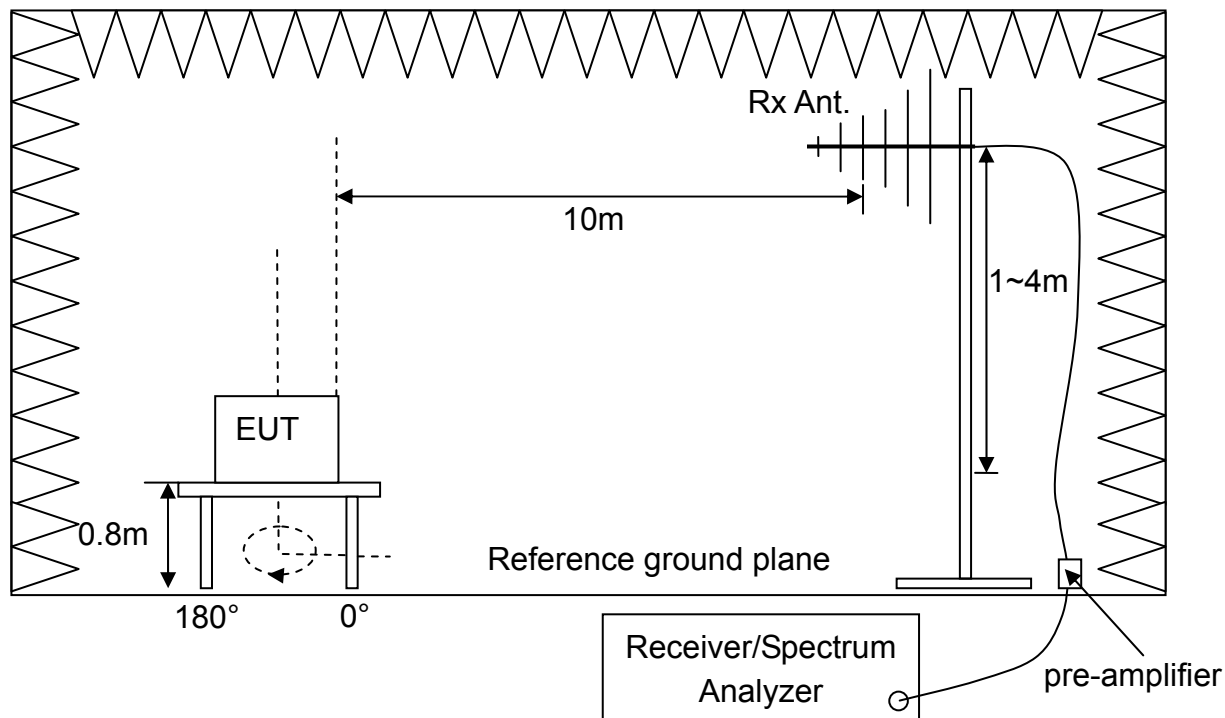
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane and 10 meters away from the interference receiving antenna in the semi-anechoic chamber.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 meters above the reference ground plane and 10 meters away from the interference-receiving antenna in the semi-anechoic chamber.
- d. Rapidly sweep the signal from 30MHz to 1GHz by using the spectrum through the Maximum-peak detector.
- e. Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 to 4 meters above the reference ground plane continuously to determine at least three frequencies associated with higher emission levels and record them.
- f. Then measure each frequency found from step e. by using the spectrum with rotating the EUT and positioning the receiving antenna height to determine the maximum level.
- g. Finely tune the antenna and turntable around the recorded position of each frequency found from step f. by using the receiver through the Quasi-Peak detector per CISPR 16-1 to find out where the maximum level occurred.
- h. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.
- i. Change the receiving antenna to another polarization to measure radiated emission by following step d. to h. again.
- j. If the peak emission level measured from step e. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.

Above 1GHz measurement

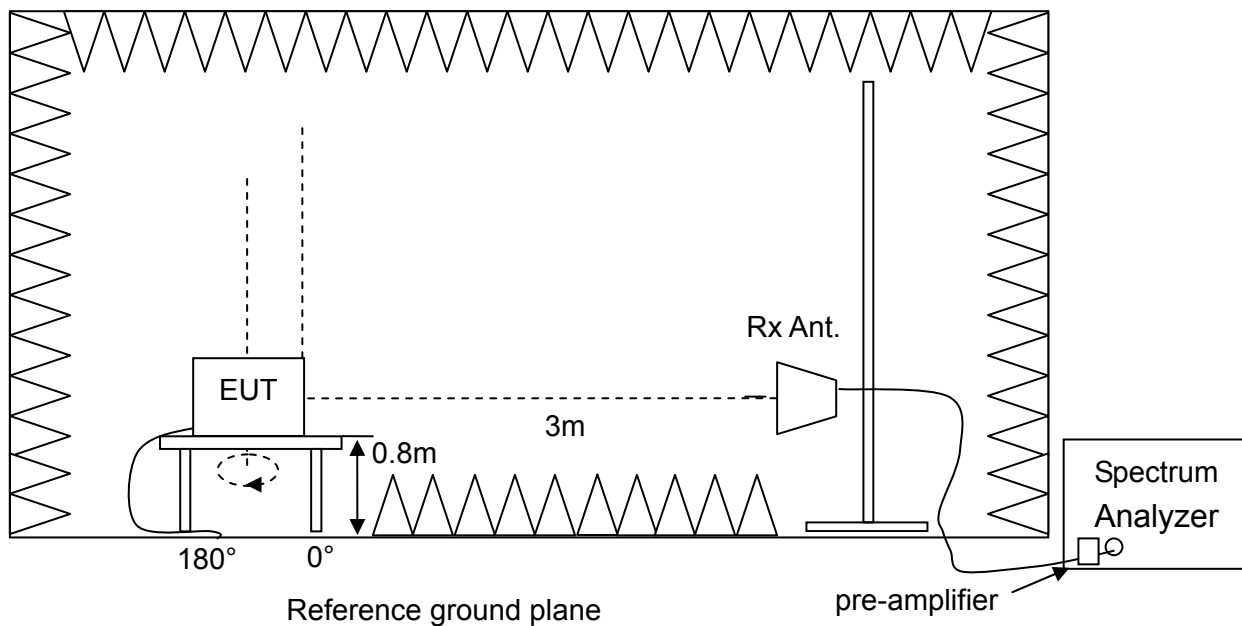
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it should be placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 3 meters away from the interference receiving antenna in the fully-anechoic chamber.
- c. If the EUT is floor-standing equipment, it should be placed on a non-conducted support with a height up to 0.15 meters above the reference ground plane and 3 meters away from the interference-receiving antenna in the fully-anechoic chamber.
- d. Rapidly sweep the signal from 1GHz to the upper frequency of measurement range by using the spectrum through the Maximum-peak detector.
- e. If the 3dB beamwidth of the receiving antenna (minima w is 2.8m @ 1GHz to 6GHz while test distance is 3m) encompasses EUT height, the center of the receiving antenna will be fixed at the height of the center of the EUT. If w of a 1m-height receiving antenna encompasses the whole EUT, the antenna will be fixed at 1m height. For any EUT with the height larger than w , the receiving antenna will travelled vertically so that the antenna beam scans the whole EUT.
- f. Rotate the EUT from 0° to 360° continuously and position the receiving antenna at specified height above the reference ground plane to determine the frequencies associated with higher emission levels and record them.
- g. Then measure each frequency found from step e. by using the spectrum with rotating the EUT to determine the maximum peak and average level.
- h. Record frequency, azimuth angle of the turntable and compare the maximum level with the required limit.
- i. Change the receiving antenna to another polarization to measure radiated emission by following step d. to g. again.

3.4 Test Configurations

Below 1GHz measurement



Above 1GHz measurement



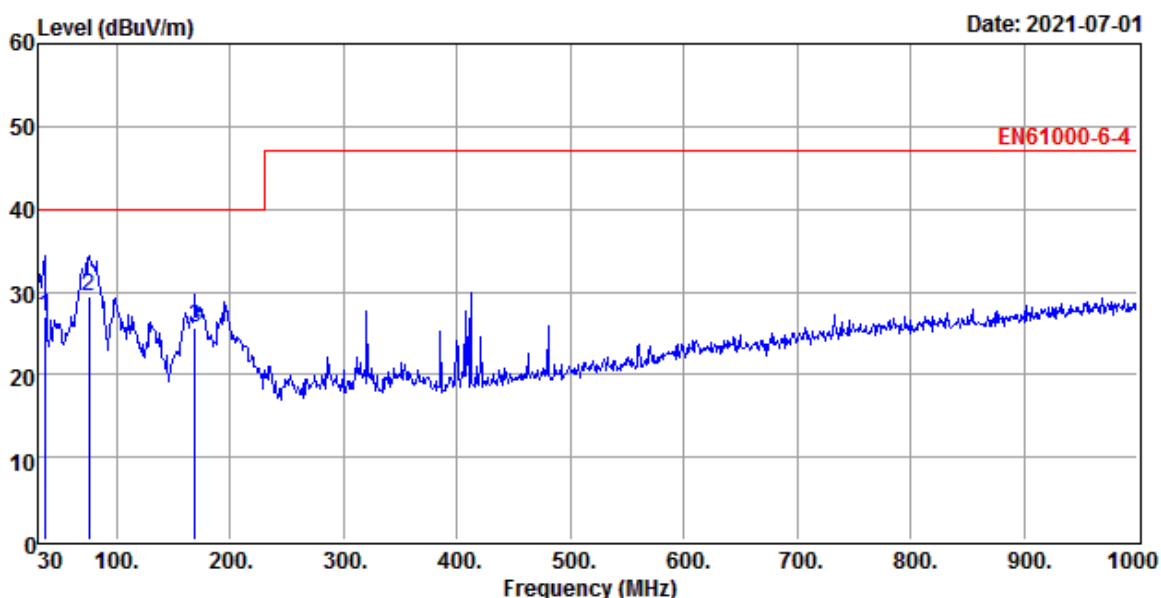
3.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

3.6 Test Results

Radiated Emission Measurement below 1000MHz

Test Mode : Mode 1(Charge and Normal Mode)
Test Voltage : 230Vac/50Hz
Tester : Jeffry **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Horizontal



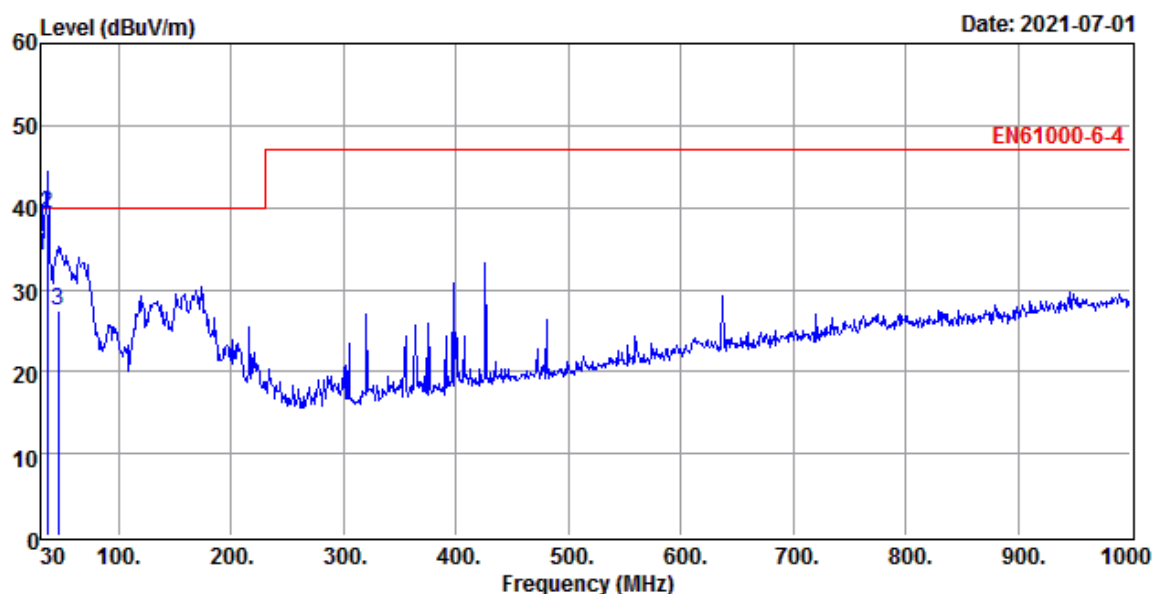
Site : TR1 10M RE CHAMBER
 Condition : EN61000-6-4 10m VULB_9168-01007 HORIZONTAL
 Power : 230V 50Hz
 Operator : Jeffry (1M) T:22 H:59 P:1008

	Read	Limit	Over	A/Pos	T/Pos				
Freq	Level	Level	Factor	Line	Limit			Pol/Phase	Remark
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	36.299	27.01	45.73	-18.72	40.00	-12.99	358	360	HORIZONTAL QP
2	75.528	29.38	49.79	-20.41	40.00	-10.62	386	214	HORIZONTAL QP
3	168.620	25.64	42.43	-16.79	40.00	-14.36	394	279	HORIZONTAL QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

Test Mode : Mode 1(Charge and Normal Mode)
Test Voltage : 230Vac/50Hz
Tester : Jeffry **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Vertical



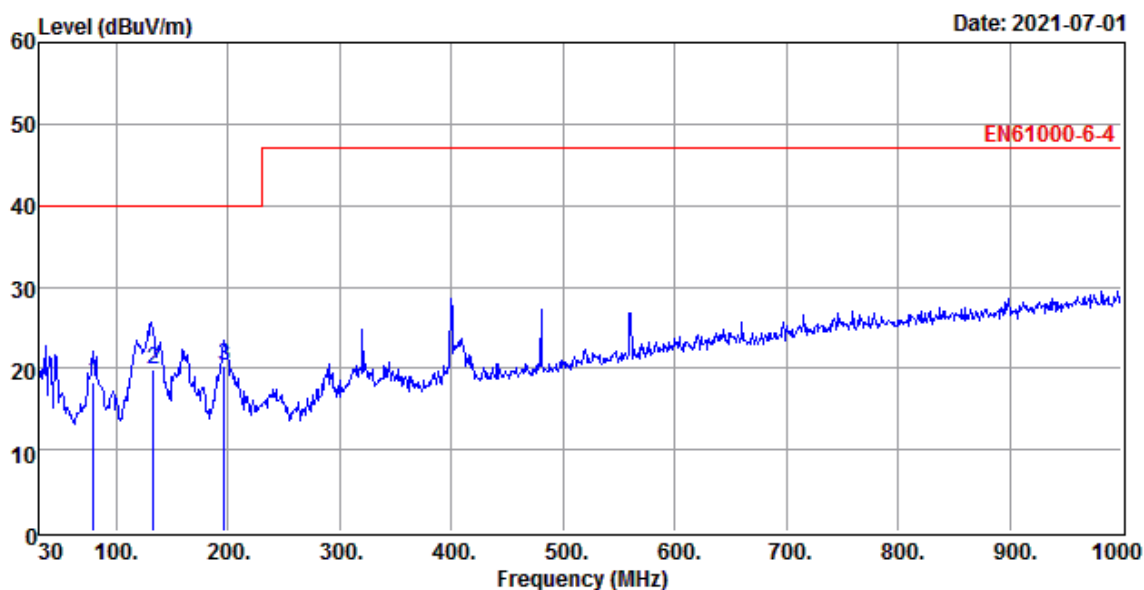
Site : TR1 10M RE CHAMBER
 Condition : EN61000-6-4 10m VULB_9168-618 VERTICAL
 Power : 230V 50HZ
 Operator : Jeffry (1M) T:22 H:59 P:1008

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	30.496	34.18	52.85	-18.67	40.00	-5.82	106	295	VERTICAL	QP
2	36.366	39.31	56.99	-17.68	40.00	-0.69	102	17	VERTICAL	QP
3	46.007	27.39	43.99	-16.60	40.00	-12.61	104	128	VERTICAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

Test Mode : Mode 2(Stored Energy Mode)
Test Voltage : N/A
Tester : Carl **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Horizontal



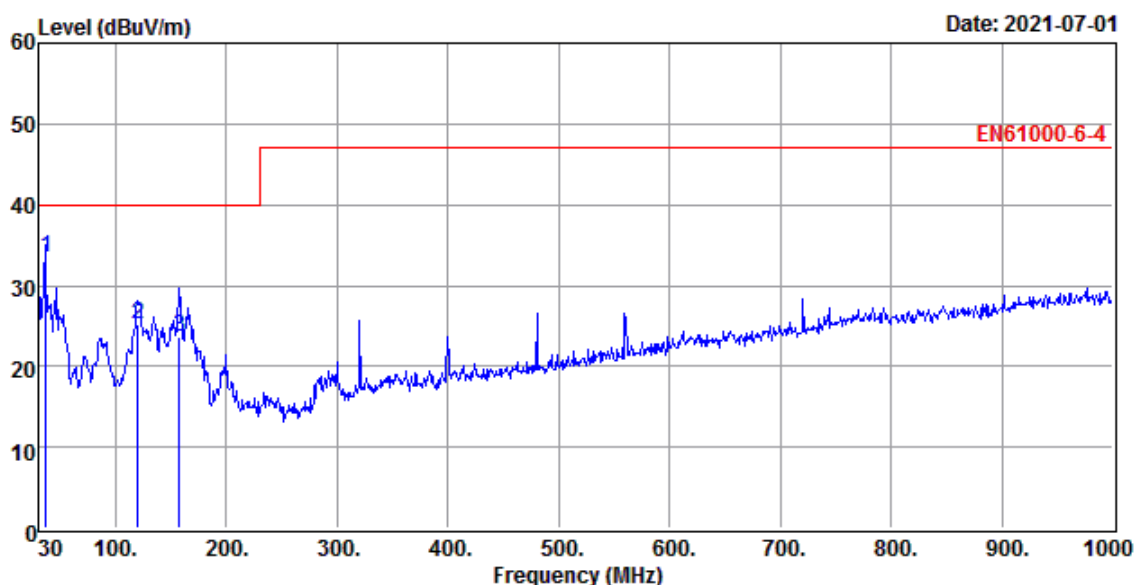
Site : TR1 10M RE CHAMBER
 Condition : EN61000-6-4 10m VULB_9168-01007 HORIZONTAL
 Power :
 Operator : CARL (1M) T:22 H:59 P:1008

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	79.280	18.26	39.67	-21.41	40.00	-21.74	264	206	HORIZONTAL	QP
2	133.140	19.96	37.63	-17.67	40.00	-20.04	399	62	HORIZONTAL	QP
3	196.630	20.30	39.80	-19.50	40.00	-19.70	359	209	HORIZONTAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

Test Mode : Mode 2(Stored Energy Mode)
Test Voltage : N/A
Tester : Carl **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Vertical



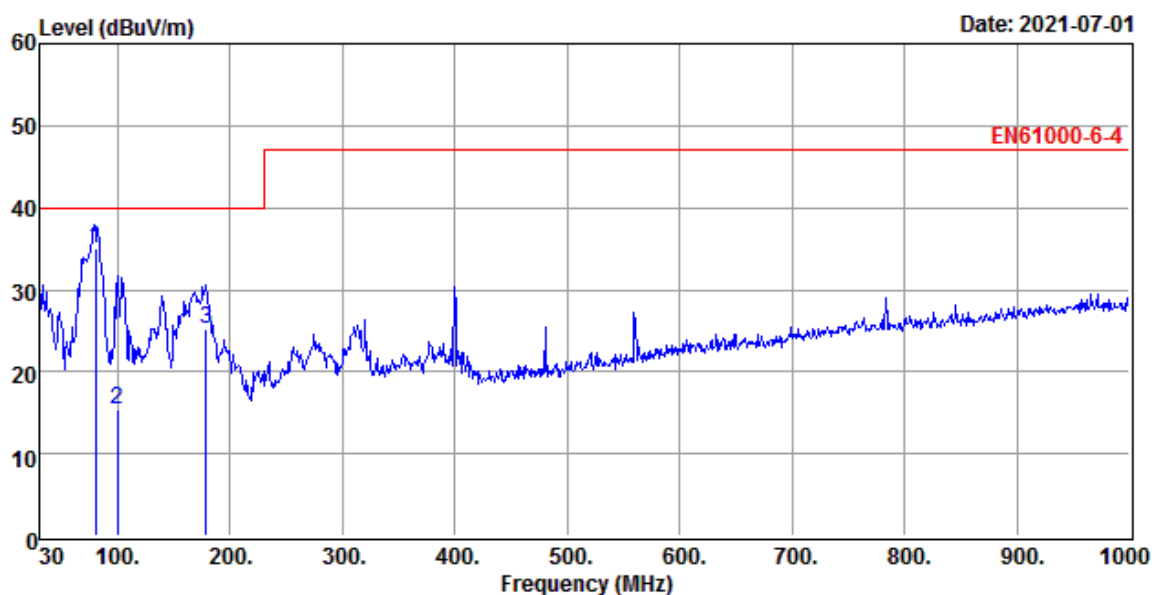
Site : TR1 10M RE CHAMBER
 Condition : EN61000-6-4 10m VULB_9168-618 VERTICAL
 Power :
 Operator : CARL (1M) T:22 H:59 P:1008

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	36.550	33.52	51.13	-17.61	40.00	-6.48	222	109	VERTICAL	QP
2	119.830	25.30	43.04	-17.74	40.00	-14.70	142	0	VERTICAL	QP
3	156.990	23.54	38.71	-15.17	40.00	-16.46	107	341	VERTICAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

Test Mode : Mode 3(PV Mode)
Test Voltage : N/A
Tester : Jeffry **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Horizontal



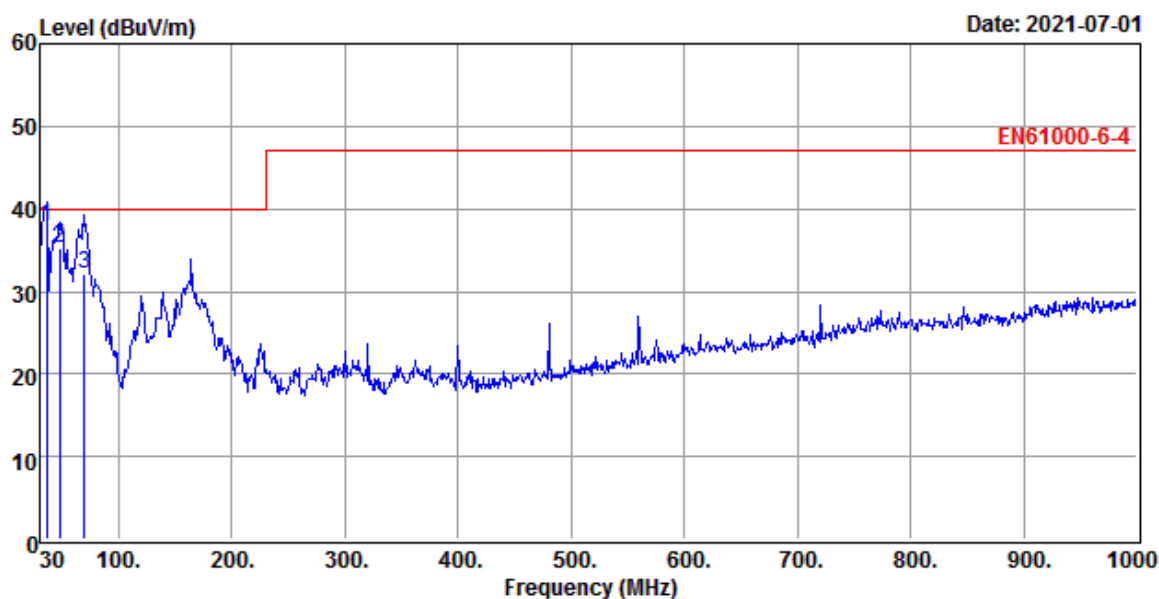
Site : TR1 10M RE CHAMBER
Condition : EN61000-6-4 10m VULB_9168-01007 HORIZONTAL
Power : DC 400V
Operator : Jeffry (1M) T:22 H:59 P:1008

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	80.100	35.07	56.73	-21.66	40.00	-4.93	392	27	HORIZONTAL	QP
2	99.228	15.36	37.34	-21.98	40.00	-24.64	384	65	HORIZONTAL	QP
3	178.206	25.14	42.86	-17.72	40.00	-14.86	394	300	HORIZONTAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

Test Mode : Mode 3(PV Mode)
Test Voltage : N/A
Tester : Jeffry **Temperature** : 22°C
Humidity : 59%RH **Frequency Range** : 30MHz~1GHz
IF Bandwidth : 120kHz **Polarization** : Vertical



Site : TR1 10M RE CHAMBER
 Condition : EN61000-6-4 10m VULB_9168-618 VERTICAL
 Power : DC 400V
 Operator : Jeffry (1M) T:22 H:59 P:1008

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	36.289	37.84	55.55	-17.71	40.00	-2.16	102	157	VERTICAL	QP
2	47.532	35.20	51.67	-16.47	40.00	-4.80	103	4	VERTICAL	QP
3	69.406	32.07	50.46	-18.39	40.00	-7.93	106	136	VERTICAL	QP

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.
3. Q.P is abbreviation of quasi-peak.

4. Harmonic Current Emission Measurement

Test Result : **PASS**

4.1 Limits for Emission Measurement

limits for equipment other than balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} %						Admissible harmonic parameters %	
	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THC/ I_{ref}	PWHC/ I_{ref}
33	21.6	10.7	7.2	3.8	3.1	2	23	23
66	24	13	8	5	4	3	26	26
120	27	15	10	6	5	4	30	30
250	35	20	13	9	8	6	40	40
≥ 350	41	24	15	12	10	8	47	47

The relative values of even harmonics up to order 12 shall not exceed 16/h %.
Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics.

Linear interpolation between successive R_{sce} values is permitted.

limits for balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} %				Admissible harmonic parameters %	
	I_5	I_7	I_{11}	I_{13}	THC/ I_{ref}	PWHC/ I_{ref}
33	10.7	7.2	3.1	2	13	22
66	14	9	5	3	16	25
120	19	12	7	4	22	28
250	31	20	12	7	37	38
≥ 350	40	25	15	10	48	46

The relative values of even harmonics up to order 12 shall not exceed 16/h %.
Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics.

Linear interpolation between successive R_{sce} values is permitted.

limits for balanced three-phase equipment under specified conditions (a, b, c)

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} %				Admissible harmonic parameters %	
	I_5	I_7	I_{11}	I_{13}	THC/ I_{ref}	PWHC/ I_{ref}
33	10.7	7.2	3.1	2	13	22
≥ 120	40	25	15	10	48	46

The relative values of even harmonics up to order 12 shall not exceed $16/h$ %.
 Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics.

Linear interpolation between successive R_{sce} values is permitted.

limits for balanced three-phase equipment under specified conditions (d, e, f)

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} %												Admissible harmonic parameters %	
	I_5	I_7	I_{11}	I_{13}	I_{17}	I_{19}	I_{23}	I_{25}	I_{29}	I_{31}	I_{35}	I_{37}	THC/ I_{ref}	PWHC/ I_{ref}
33	10.7	7.2	3.1	2	2	1.5	1.5	1.5	1	1	1	1	13	22
≥ 250	25	17.3	12.1	10.7	8.4	7.8	6.8	6.5	5.4	5.2	4.9	4.7	35	70

For R_{sce} equal to 33, the relative values of even harmonics up to order 12 shall not exceed $16/h$ %. The relative values of all harmonics from I_{14} to I_{40} not listed above shall not exceed 1 % of I_{ref} .

For $R_{sce} \geq 250$, the relative values of even harmonics up to order 12 shall not exceed $16/h$ %. The relative values of all harmonics from I_{14} to I_{40} not listed above shall not exceed 3 % of I_{ref} .

Linear interpolation between successive R_{sce} values is permitted.

4.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Multifunction AC/DC Power Source	EM Test	NetWave 60/ V1233113363	Feb. 22, 2021	Feb. 22, 2022
Digital Power Analyzer	EM Test	DPA 503 N/ V1233113364	Feb. 22, 2021	Feb. 22, 2022
Test Software	EM Test	net.control/ V3.0.1	NCR	NCR
TR14 Plane Grounding Site	CRC	TR14	NCR	NCR

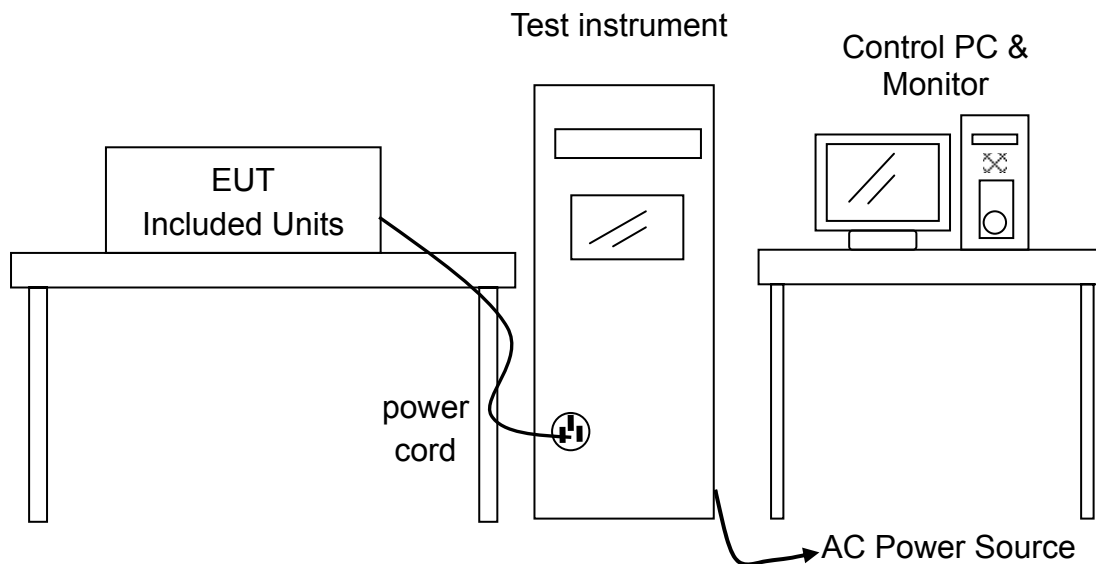
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

4.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters in the shielded room.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters in the shielded room.
- d. Decide the limit according to the type of the EUT and R_{sce} Value.
- e. Connects the EUT's power source to the mains power supplied by the test instrument. Turn on the EUT.
- f. Operating the EUT as required and measuring the harmonic current emissions on the current carrying lines of EUT's power source.

4.4 Test Configurations



4.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

4.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)
Tester : Jacky
Temperature : 30°C
Humidity : 53%RH
Date of Testing: July 5, 2021

Test Freq. (Hz)	50
Test Voltage (V)	230
Equipment Classification	Not Balanced (Table 2)
Short Circuit Ratio (Rsce)	33
Test Time (Minutes)	10
Power (Watt)	8.225e+3 W
Reference Current (A)	35.953
Power Factor	0.987
THC (A)	0.7048
THD=THC / I_{ref}	0.0196
PWHC / I_{ref} (%)	0

Maximum Harmonics (Line 1)

Hn	Frequency [Hz]	Voltage					Current				
		eff [V]	eff [%]	of Limit [%]	Limit [%]	Time Window	eff [A]	eff[%]	of Limit [%]	Limit [%]	Time Window
1	50.0	230.172	100.07	-	-	41	36.169	100.60	-	-	1764
2	100.0	0.183	0.08	19.88	0.40	936	0.280	0.78	6.50	12.00	34
3	150.0	0.088	0.04	3.08	1.25	31	0.574	1.60	4.93	32.40	6
4	200.0	0.064	0.03	7.00	0.40	2013	0.214	0.60	9.93	6.00	1869
5	250.0	0.069	0.03	1.99	1.50	1614	0.511	1.42	8.85	16.05	1178
6	300.0	0.056	0.02	6.12	0.40	98	0.375	1.04	26.04	4.00	2081
7	350.0	0.077	0.03	2.67	1.25	2506	0.248	0.69	6.40	10.80	39
8	400.0	0.050	0.02	5.46	0.40	2069	0.175	0.49	16.25	3.00	1848
9	450.0	0.072	0.03	5.24	0.60	2442	0.196	0.55	9.57	5.70	2973
10	500.0	0.025	0.01	2.69	0.40	2268	0.174	0.49	20.22	2.40	1429
11	550.0	0.047	0.02	2.94	0.70	1965	0.200	0.56	11.99	4.65	11
12	600.0	0.040	0.02	5.79	0.30	141	0.138	0.38	19.16	2.00	17
13	650.0	0.013	0.01	0.96	0.60	54	0.179	0.50	16.63	3.00	2504
14	700.0	0.054	0.02	7.80	0.30	1968	0.239	0.66	-	-	2034
15	750.0	0.043	0.02	6.20	0.30	135	0.211	0.59	-	-	95
16	800.0	0.038	0.02	5.55	0.30	1671	0.158	0.44	-	-	1706
17	850.0	0.049	0.02	7.13	0.30	2512	0.219	0.61	-	-	558
18	900.0	0.032	0.01	4.68	0.30	2856	0.139	0.39	-	-	2504
19	950.0	0.044	0.02	6.40	0.30	2435	0.172	0.48	-	-	2066
20	1000.0	0.033	0.01	4.77	0.30	210	0.137	0.38	-	-	140
21	1050.0	0.039	0.02	5.63	0.30	1958	0.142	0.39	-	-	1922
22	1100.0	0.030	0.01	4.39	0.30	335	0.109	0.30	-	-	730
23	1150.0	0.054	0.02	7.85	0.30	652	0.171	0.48	-	-	104
24	1200.0	0.026	0.01	3.70	0.30	1063	0.081	0.23	-	-	1863
25	1250.0	0.062	0.03	9.02	0.30	1198	0.165	0.46	-	-	1204
26	1300.0	0.018	0.01	2.58	0.30	1683	0.055	0.15	-	-	227
27	1350.0	0.048	0.02	6.99	0.30	2371	0.115	0.32	-	-	1967
28	1400.0	0.014	0.01	2.07	0.30	1166	0.049	0.14	-	-	742
29	1450.0	0.039	0.02	5.71	0.30	138	0.093	0.26	-	-	34
30	1500.0	0.013	0.01	1.83	0.30	2432	0.041	0.11	-	-	1758
31	1550.0	0.044	0.02	6.45	0.30	106	0.101	0.28	-	-	2912
32	1600.0	0.008	0.00	1.16	0.30	1672	0.031	0.09	-	-	741
33	1650.0	0.050	0.02	7.28	0.30	2674	0.099	0.28	-	-	2995
34	1700.0	0.008	0.00	1.12	0.30	1168	0.029	0.08	-	-	206
35	1750.0	0.042	0.02	6.10	0.30	1421	0.079	0.22	-	-	1967
36	1800.0	0.011	0.00	1.65	0.30	2479	0.028	0.08	-	-	582
37	1850.0	0.025	0.01	3.57	0.30	276	0.054	0.15	-	-	29
38	1900.0	0.018	0.01	2.57	0.30	2905	0.022	0.06	-	-	1645
39	1950.0	0.034	0.01	4.97	0.30	2844	0.073	0.20	-	-	236
40	2000.0	0.022	0.01	3.20	0.30	2440	0.018	0.05	-	-	267

Average Harmonics (Line 1)

Hn	Frequency [Hz]	Voltage				Current			
		eff [V]	eff [%]	of Limit [%]	Limit [%]	eff [A]	eff[%]	of Limit [%]	Limit [%]
1	50.0	230.145	100.06	-	-	35.939	99.96	-	-
2	100.0	0.176	0.08	19.10	0.40	0.217	0.60	7.55	8.00
3	150.0	0.079	0.03	2.74	1.25	0.445	1.24	5.73	21.60
4	200.0	0.059	0.03	6.39	0.40	0.206	0.57	14.34	4.00
5	250.0	0.063	0.03	1.84	1.50	0.484	1.35	12.57	10.70
6	300.0	0.043	0.02	4.65	0.40	0.352	0.98	36.67	2.67
7	350.0	0.072	0.03	2.50	1.25	0.218	0.61	8.42	7.20
8	400.0	0.043	0.02	4.67	0.40	0.136	0.38	18.93	2.00
9	450.0	0.065	0.03	4.73	0.60	0.177	0.49	12.95	3.80
10	500.0	0.015	0.01	1.64	0.40	0.157	0.44	27.34	1.60
11	550.0	0.041	0.02	2.57	0.70	0.141	0.39	12.69	3.10
12	600.0	0.027	0.01	3.87	0.30	0.090	0.25	18.74	1.33
13	650.0	0.005	0.00	0.40	0.60	0.161	0.45	22.32	2.00
14	700.0	0.046	0.02	6.71	0.30	0.220	0.61	-	-
15	750.0	0.031	0.01	4.52	0.30	0.173	0.48	-	-
16	800.0	0.032	0.01	4.65	0.30	0.147	0.41	-	-
17	850.0	0.042	0.02	6.11	0.30	0.204	0.57	-	-
18	900.0	0.027	0.01	3.87	0.30	0.131	0.37	-	-
19	950.0	0.034	0.01	4.98	0.30	0.157	0.44	-	-
20	1000.0	0.025	0.01	3.61	0.30	0.118	0.33	-	-
21	1050.0	0.033	0.01	4.71	0.30	0.133	0.37	-	-
22	1100.0	0.024	0.01	3.45	0.30	0.100	0.28	-	-
23	1150.0	0.045	0.02	6.58	0.30	0.153	0.43	-	-
24	1200.0	0.018	0.01	2.62	0.30	0.067	0.19	-	-
25	1250.0	0.054	0.02	7.84	0.30	0.158	0.44	-	-
26	1300.0	0.011	0.00	1.55	0.30	0.043	0.12	-	-
27	1350.0	0.042	0.02	6.05	0.30	0.107	0.30	-	-
28	1400.0	0.008	0.00	1.23	0.30	0.043	0.12	-	-
29	1450.0	0.034	0.01	4.95	0.30	0.085	0.24	-	-
30	1500.0	0.006	0.00	0.94	0.30	0.035	0.10	-	-
31	1550.0	0.037	0.02	5.43	0.30	0.097	0.27	-	-
32	1600.0	0.003	0.00	0.42	0.30	0.027	0.07	-	-
33	1650.0	0.043	0.02	6.25	0.30	0.094	0.26	-	-
34	1700.0	0.003	0.00	0.41	0.30	0.023	0.06	-	-
35	1750.0	0.036	0.02	5.20	0.30	0.073	0.20	-	-
36	1800.0	0.005	0.00	0.70	0.30	0.023	0.06	-	-
37	1850.0	0.019	0.01	2.71	0.30	0.049	0.14	-	-
38	1900.0	0.012	0.01	1.70	0.30	0.018	0.05	-	-
39	1950.0	0.027	0.01	3.97	0.30	0.066	0.18	-	-
40	2000.0	0.016	0.01	2.30	0.30	0.015	0.04	-	-

5. Voltage Fluctuations and Flickers Emission Measurement

Test Result : **PASS**

5.1 Limits for Emission Measurement

- the short-term flicker indicator, P_{st} , shall not be greater than 1.0;
- the long-term flicker indicator, P_{lt} , shall not be greater than 0.65;
- the relative steady-state voltage change, d_c , shall not exceed 3.3%;
- T_{max} , the accumulated time value of $d(t)$ with a deviation exceeding 3,3 % during a single voltage change at the EUT terminals, shall not exceed 500 ms;
- the maximum relative voltage change, d_{max} , shall not exceed
 - a) 4% without additional conditions;
 - b) 6% for equipment which is switched manually
 - c) 7% for equipment which is attended whilst in use

5.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Multifunction AC/DC Power Source	EM Test	NetWave 60/ V1233113363	Feb. 22, 2021	Feb. 22, 2022
Digital Power Analyzer	EM Test	DPA 503 N/ V1233113364	Feb. 22, 2021	Feb. 22, 2022
Artificial lumped Impedance for Flicker	EM Test	AIF 503 N63/ V1233113365	Feb. 22, 2021	Feb. 22, 2022
Test Software	EM Test	net.control/ V3.0.1	NCR	NCR
TR14 Plane Grounding Site	CRC	TR14	NCR	NCR

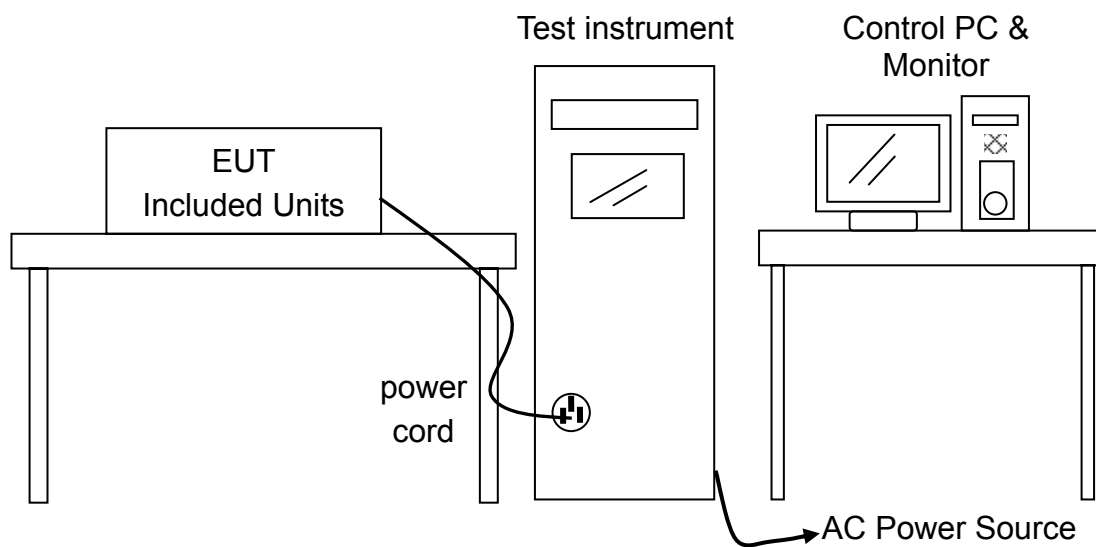
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

5.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters in the shielded room.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters in the shielded room.
- d. Decide the type of EUT to define the d_{max} limit and its corresponding test methods described in the relative standard.
- e. Maintain the supply voltage to be $\pm 2\%$ of the EUT's rated voltage and also the frequency to be $50\text{Hz} \pm 0.5\%$.
- f. Connects the EUT's power source to the mains power supplied by the test instrument.
- g. Operating the EUT as required and measuring the voltage fluctuation and flickers of EUT's power source.
- h. Verify the fluctuations of the test supply voltage to be less than 0.4 before and after the test.

5.4 Test Configurations



5.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

5.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Tester : Jacky

Temperature : 31°C

Humidity : 51%RH

Date of Testing: July 5, 2021

TEST FREQ	50Hz				
TEST VOLTS	230VAC				
TEST TIME	10 Minutes				
	P_{It}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	0.027	0.062	0.008	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

6. Electrostatic Discharge (ESD) Immunity Test

Test Result : PASS

6.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 61000-6-2 as §1.3 described
Basic Standard	: EN 61000-4-2/ IEC 61000-4-2
Required Performance	: B
Test Level	: 2 (Contact discharge) 3 (Air discharge)
Discharge Voltage	: Contact → ±4kV (Direct / Indirect discharge) Air → ±2kV, ±4kV, ±8kV (Direct discharge)
Time Interval	: 1 sec. minimum
Number of discharges	: Minimum 20 times at each test point
Test Voltage	: 230Vac/50Hz
Tester	: Jeff
Ambient Temperature	: 25°C
Relative Humidity	: 40%
Atmospheric Pressure	: 1006mbar
Date of Testing	: July 6, 2021

6.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Electrostatic Generator	EM TEST	DITO/ V1138110834	Nov. 9, 2020	Nov. 9, 2021
TR8 shielded room	ETS. LINDGREN	TR8/ 15353-C	NCR	NCR

Note:

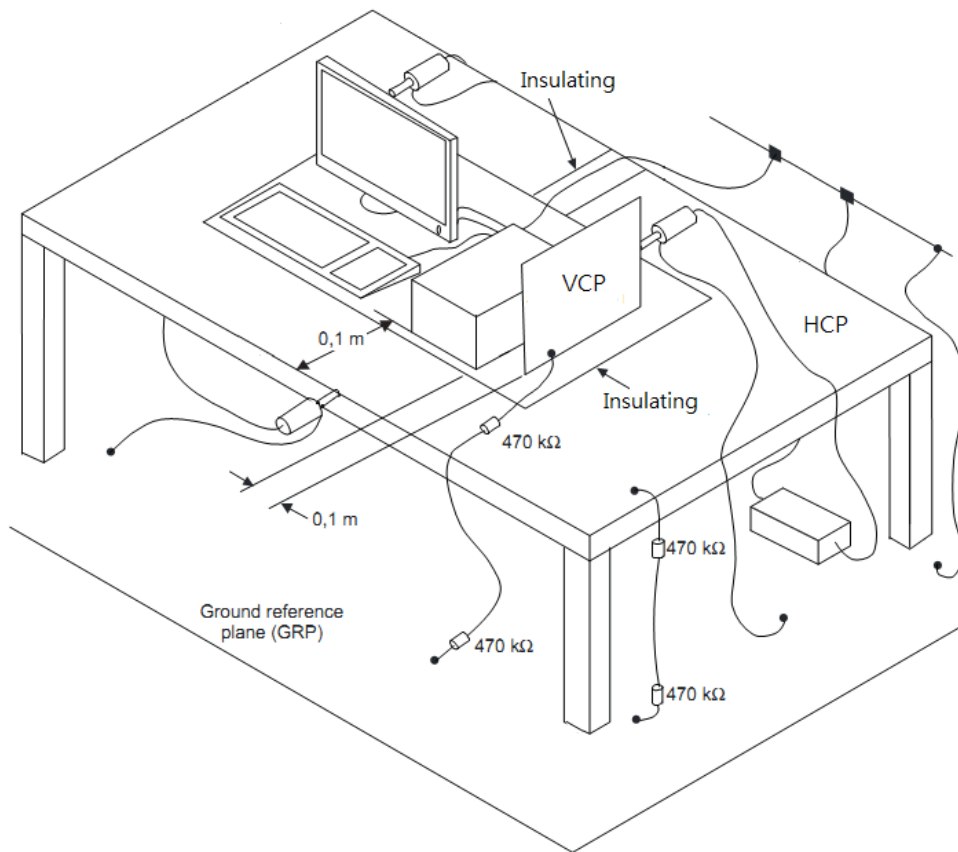
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

6.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the ground reference plane in the shielded room. Also a HCP (Horizontal Coupling Plane) which was connected to the ground reference plane via a cable with a 470k Ω resistor located at each end was placed on the wooden table and isolated with the EUT by an insulating support 0.5mm thick. The ground reference plane shall project beyond the EUT or HCP by at least 0.5m on all sides.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane in the shielded room. The ground reference plane shall project beyond the EUT by at least 0.5m on all sides.
- d. Keep the EUT 1m away from all other metallic walls in the shielded room as the minimum distance.
- e. The static electricity discharges shall be applied only to those points and surfaces of the EUT which are accessible to persons during normal use. Contact discharge is the preferred test method and it is applied to the conductive surfaces of EUT and coupling planes. Air discharge shall be used where contact discharge cannot be performed and it is applied to the insulating surfaces of EUT.
- f. The discharge return cable of the generator shall be kept at a distance of at least 0.2m from the EUT whilst the discharge is being applied.
- g. The time interval between successive single discharges was at least 1 second.
- h. Select appropriate points of the EUT for contact discharge and put marks on it to indicate the tested point(s). Then start the contact discharge with the tip of the discharge electrode to touch the EUT before the discharge switch is operated.
- i. Use the round discharge tip of the discharge electrode to scan the EUT to select the points for air discharge. Then start the air discharge by approaching the discharge electrode as fast as possible to touch the EUT. After each discharge, the ESD generator shall be removed from the EUT.
- j. The indirect HCP discharge test is applied at the front edge of each HCP opposite the center point of each unit of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

- k. The indirect VCP (Vertical Coupling Plane) discharge test is applied to the center of one vertical edge of the coupling plane. The VCP, of dimensions 0.5m×0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. It shall be applied with sufficient different positions such that the four faces of the EUT are completely illuminated.

6.4 Test Configurations



6.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

6.6 Test Results

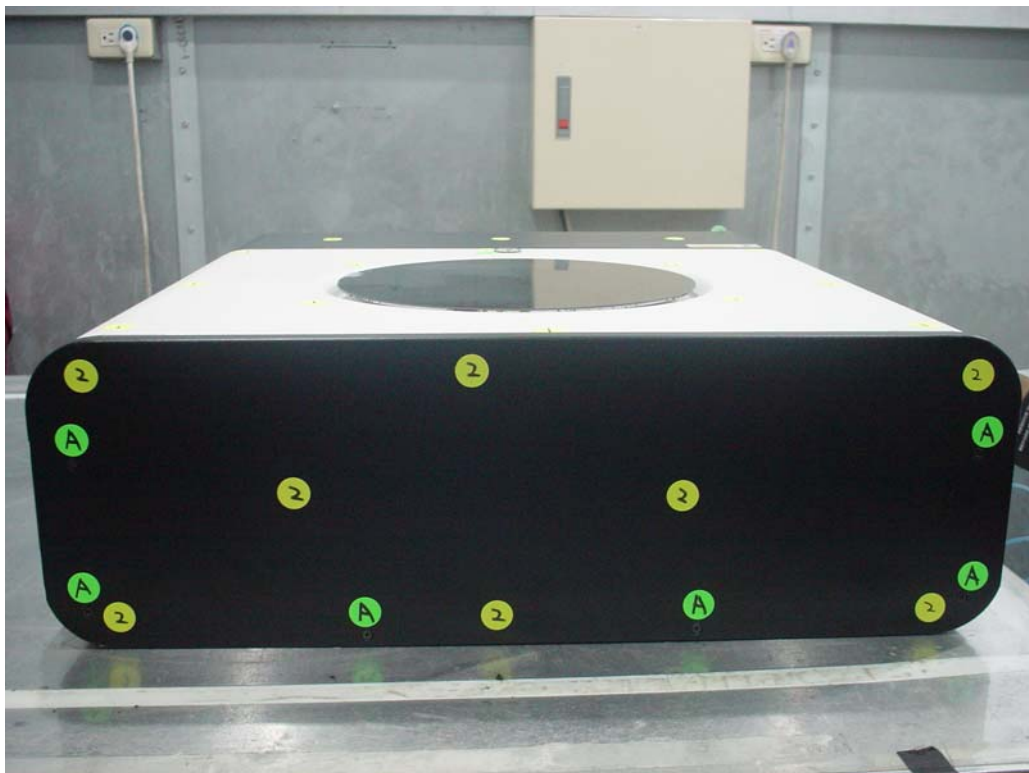
Test Mode : Mode 1(Charge and Normal Mode)

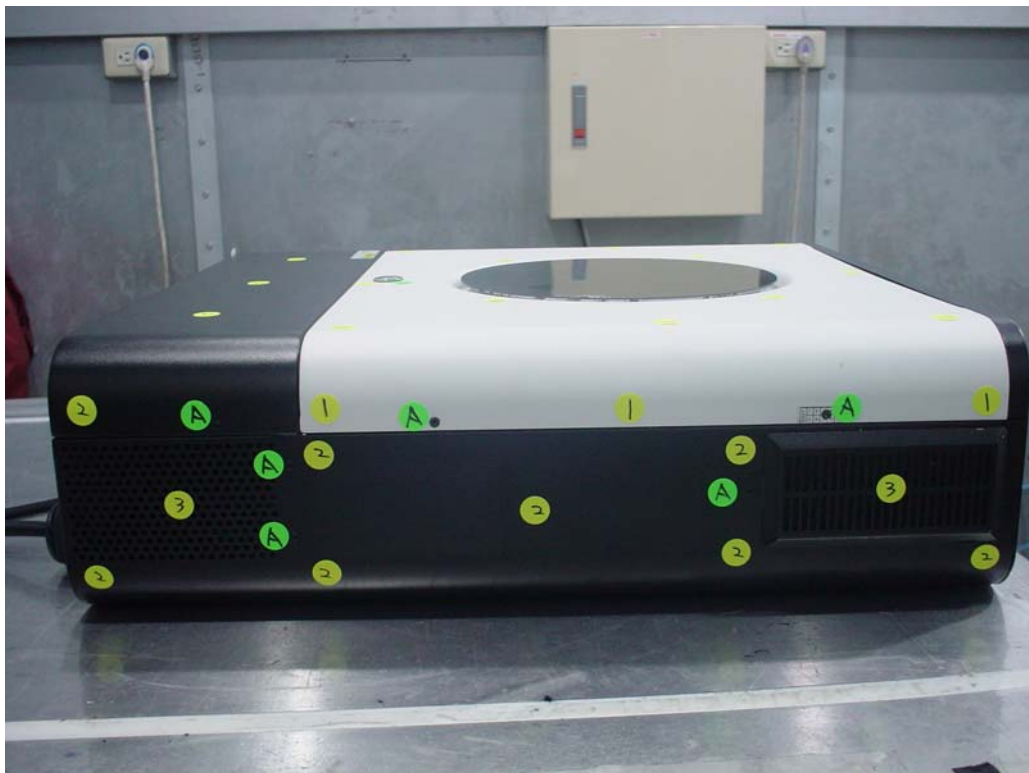
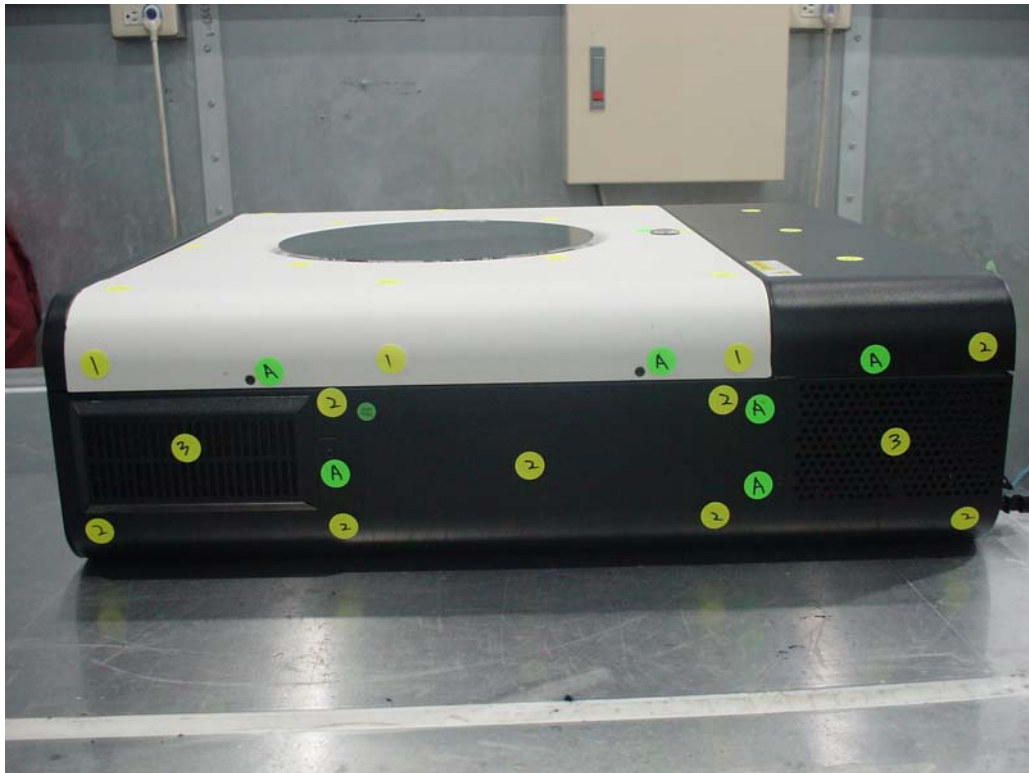
Discharge Voltage (kV)	Type of discharge	Label for Dischargeable Points	Performance		Result (Pass/Fail)
			Required	Observation	
±4	Contact	A~E	B	A(1)	Pass
±2	Air	2,3	B	A(1)	Pass
±4	Air	1~3	B	A(1)	Pass
±8	Air	1~3	B	A(1)	Pass
±4	HCP-Bottom	Front Edge of the HCP	B	A(1)	Pass
±4	VCP-Front	Center of the VCP	B	A(1)	Pass
±4	VCP-Left	Center of the VCP	B	A(1)	Pass
±4	VCP-Back	Center of the VCP	B	A(1)	Pass
±4	VCP-Right	Center of the VCP	B	A(1)	Pass

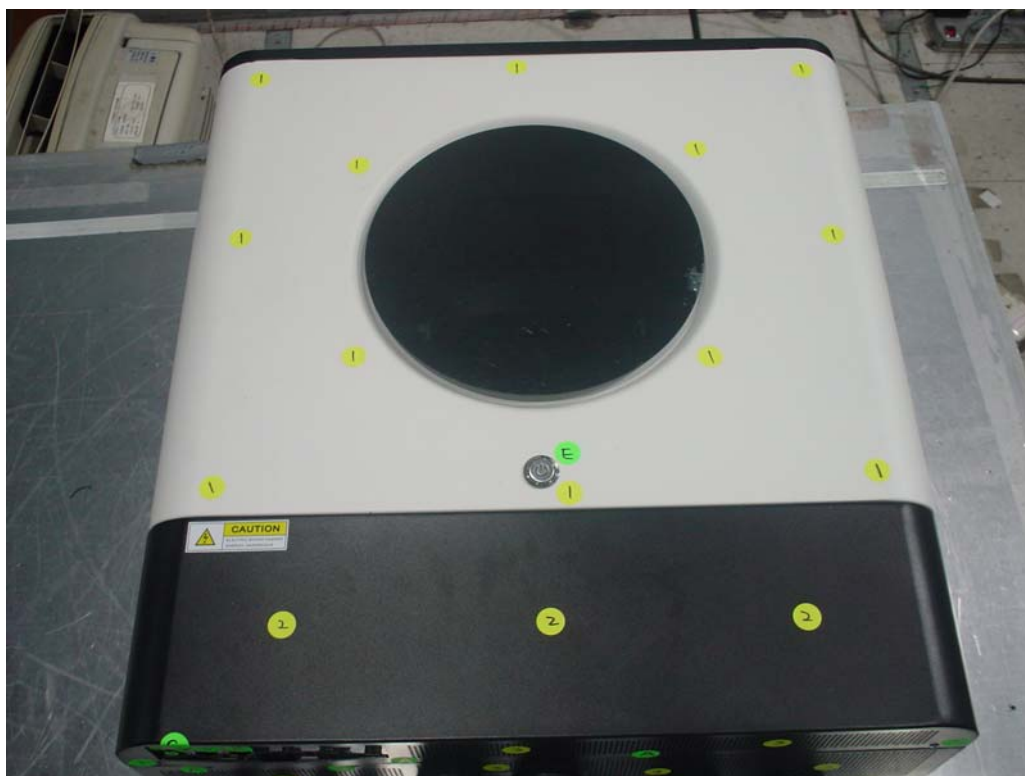
Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

Photographs of the Test Points on the EUT for ESD Test







7. Radiated Electromagnetic Field (RS) Immunity Test

Test Result : **PASS**

7.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 61000-6-2 as §1.3 described
Basic Standard	: EN 61000-4-3/ IEC 61000-4-3
Required Performance	: A
Test Level	: 3
Field Strength	: 10 V/m, 3 V/m
Test Frequency Range	: 80MHz ~ 1GHz (10 V/m) 1.4GHz ~ 6GHz (3 V/m)
Frequency Step	: 1% of the momentary frequency
Dwell Time	: Minimum 3 sec. per frequency
Modulation	: 1kHz Sine Wave with 80% Amplitude Modulation
Polarization of Antenna	: Horizontal and Vertical
Test Voltage	: 230Vac/50Hz
Tester	: Ryan
Ambient Temperature	: 23°C
Relative Humidity	: 55%
Atmospheric Pressure	: 1005mbar
Date of Testing	: July 7, 2021

7.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Signal Generator	R&S	SMB 100A / 113868	Mar. 7, 2021	Mar. 7, 2022
Dual Directional Coupler	AR	DC 6180A / 0350436	Mar. 4, 2021	Mar. 4, 2022
Boardband Amplifier	TESEQ	CBA 1G-275 / T44287	NCR	NCR
	R&S	BBA150 / 102412	NCR	NCR
Log Antenna	R&S	HL046 / 359132/004	NCR	NCR
Stacked log.-Per Antenna	Schwarzbeck Mess - Elektronik	STLP 9149 / 9149-467	NCR	NCR
Isotropic E Field Probe	AR	FL7006 / 0336500	Feb. 15, 2021	Feb. 15, 2022
Average Power Sensor	R&S	NRP6AN / 101001	Mar. 9, 2021	Mar. 9, 2022
Test Software	Audix	i2 / 5.16_20181108	NCR	NCR
TR3 fully-anechoic chamber	ETS. LINDGREN	TR3/ 15353-I	Mar. 16, 2021	Mar. 16, 2022

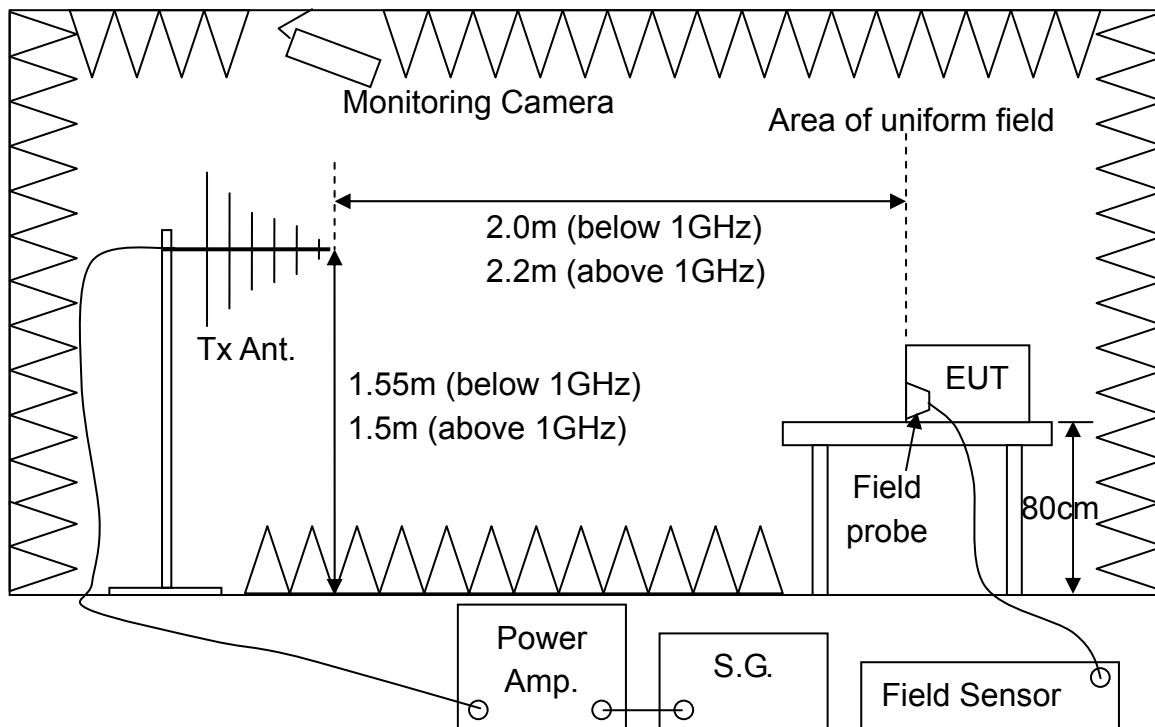
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.
3. The calibration date of the fully-anechoic chamber listed above is the date of Field Uniformity Calibration measurement.

7.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters and 2.0/2.2 meters away from the transmitting antenna in the fully anechoic chamber.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters and 2.0/2.2 meters away from the transmitting antenna in the fully anechoic chamber. Also if the floor-standing equipment which is capable of being stood on a non-conducting 0.8m high platform may be so arranged.
- d. All EUT's individual faces shall be fully enclosed by the "uniform area" and its wires shall be arranged parallel to the uniform area of the field.
- e. Before testing the EUT, the intensity of the established field strength is checked by placing the field sensor at a calibration grid point to give the calibrated field strength to measure the EUT.
- f. After the calibration has been verified, the test field can be generated using the values obtained from the calibration.
- g. Perform the test with the specified immunity level in the test frequency range and with the specified modulation type.
- h. The transmitting antenna is normally facing each of the four sides of the EUT with two polarizations (Vertical and Horizontal) to perform the test.
- i. The dwell time at each frequency shall be not less than the time necessary for the EUT to be exercised and be able to respond.
- j. The sensitive frequencies of EUT shall be analyzed separately, if any.
- k. Record the performance of the EUT.

7.4 Test Configurations



7.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

7.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Test Frequency Range : 80MHz ~ 1GHz				
Side of the EUT	Polarization	Performance		Result (Pass/Fail)
		Required	Observation	
Front	H	A	A(1)	Pass
	V	A	A(1)	Pass
Left	H	A	A(1)	Pass
	V	A	A(1)	Pass
Back	H	A	A(1)	Pass
	V	A	A(1)	Pass
Right	H	A	A(1)	Pass
	V	A	A(1)	Pass

Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

Test Frequency Range : 1.4GHz ~ 6GHz				
Side of the EUT	Polarization	Performance		Result (Pass/Fail)
		Required	Observation	
Front	H	A	A(1)	Pass
	V	A	A(1)	Pass
Left	H	A	A(1)	Pass
	V	A	A(1)	Pass
Back	H	A	A(1)	Pass
	V	A	A(1)	Pass
Right	H	A	A(1)	Pass
	V	A	A(1)	Pass

Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

8. Electrical fast transient / burst (EFT) Immunity Test

Test Result : PASS

8.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 61000-6-2 as §1.3 described
Basic Standard	: EN 61000-4-4/ IEC 61000-4-4
Required Performance	: B
Test Level	: 3
Voltage Peak	: <input checked="" type="checkbox"/> ±2kV (on AC power port) <input type="checkbox"/> ±2kV (on DC power port)
Impulse Frequency	: 5kHz
Wave Shape of the Pulse (T_r/T_h)	: 5ns / 50ns
Burst Duration	: 15ms
Burst Period	: 300ms
Time Duration	: 1 min
Test Voltage	: 230Vac/50Hz
Tester	: Jacky
Ambient Temperature	: 30°C
Relative Humidity	: 51%
Atmospheric Pressure	: 1008mbar
Date of Testing	: July 5, 2021

8.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EFT/Burst Simulator	EMC PARTNER	TRA2006 E-F-S-D-1501/103707	Aug. 24, 2020	Aug. 24, 2021
3 Phase CDN	EMC PARTNER	CDN2000A-06-63-1500/103582	Aug. 24, 2020	Aug. 24, 2021
Test Software	EMC PARTNER	TEMA/ Ver. 2.05	NCR	NCR
TR14 Plane Grounding Site	CRC	TR14	NCR	NCR

Note:

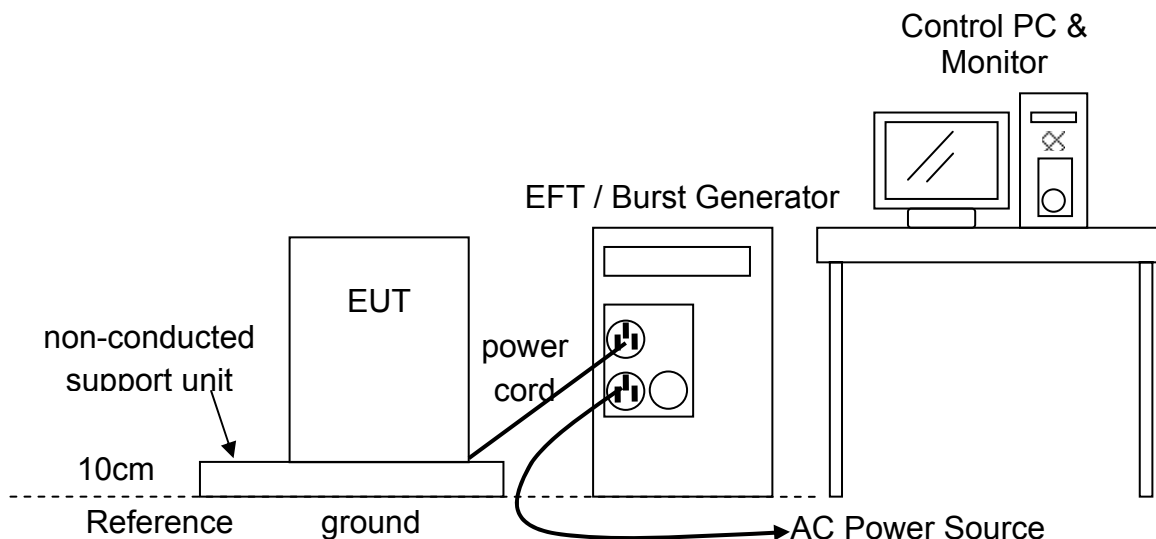
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

8.3 Test Procedures

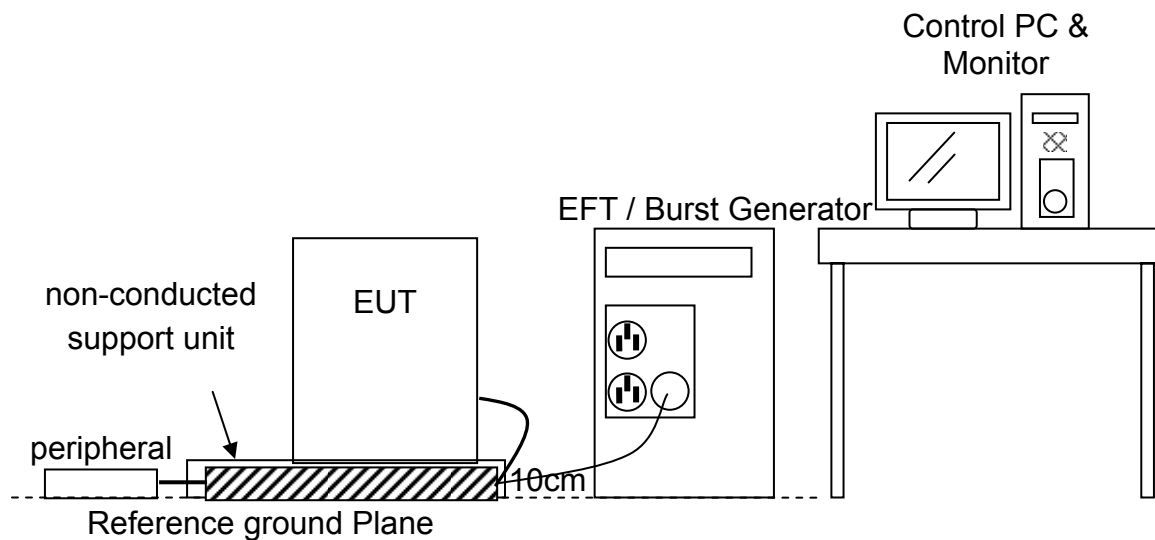
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a non-conducted support with a height 0.1 meters above the ground reference plane. Also the ground reference plane is placed on a wooden table with a height of 0.8 meters in the shielded room. The ground reference plane shall project beyond the EUT by at least 0.1m on all sides.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane in the shielded room. The ground reference plane shall project beyond the EUT by at least 0.1m on all sides.
- d. The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane.
- e. All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.
- f. Keep the EUT 0.5m away from all other conductive structures, except the ground reference plane beneath the EUT as the minimum distance. Also if any, the minimum distance between the coupling clamp and all other conductive structures, except the ground reference plane beneath the coupling clamp and EUT shall be 0.5m.
- g. Keep the length of the power and signal lines, if required, between the coupling device and the EUT to be 0.5m. If a non-detachable supply cable more than 0.5m long, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0,1 m above the ground reference plane.
- h. Connect the EUT's power source to the appropriate power through the coupling devices and perform the specified test level.
- i. If any, connect all the I/O signal, data and control lines between EUT and accessories/support units through the coupling devices and perform the specified test level.
- j. Record the performance of the EUT.

8.4 Test Configurations

Power supply port Test



I/O signal, data and control port Test (if any)



8.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

8.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Injected Line	Voltage Peak (kV)	Injected Method	Performance		Result (Pass/Fail)
			Required	Observation	
L	±2.0	Direct	B	A(1)	Pass
N	±2.0	Direct	B	A(1)	Pass
PE	±2.0	Direct	B	A(1)	Pass
L - N - PE	±2.0	Direct	B	A(1)	Pass

Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

9. Surge Immunity Test

Test Result : PASS

9.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	:	EN 61000-6-2 as §1.3 described
Basic Standard	:	EN 61000-4-5/ IEC 61000-4-5
Required Performance	:	B
Test Level	:	<input checked="" type="checkbox"/> 3 (line to line on AC power port) <input checked="" type="checkbox"/> 3 (line to earth (ground) on AC power port) <input type="checkbox"/> 2 (line to line on DC power port) <input type="checkbox"/> 1 (line to earth (ground) on DC power port) <input type="checkbox"/> 2 (on I/O signal, data and control port)
Open-circuit test Voltage	:	<input checked="" type="checkbox"/> ±0.5kV, ±1kV (line to line on AC power port) <input checked="" type="checkbox"/> ±0.5kV, ±1kV, ±2kV (line to earth (ground) on AC power port) <input type="checkbox"/> ±0.5kV (line to line on DC power port) <input type="checkbox"/> ±0.5kV (line to earth (ground) on DC power port) <input type="checkbox"/> ±1kV (on I/O signal, data and control port)
CW Waveform (T_r/T_h)	:	1.2 / 50μs (open-circuit voltage) 8 / 20μs (short-circuit current)
Phase Angle	:	0°, 90°, 180°, 270°
Time interval	:	1min. or less
Number of Test	:	at least 5 positive and 5 negative at selected points
Test Voltage	:	230Vac/50Hz
Tester	:	Jacky
Ambient Temperature	:	30°C
Relative Humidity	:	51%
Atmospheric Pressure	:	1008mbar
Date of Testing	:	July 5, 2021

9.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Surge Simulator	NoiseKen	LSS-F02A3A/ LSS1232638	Nov. 24, 2020	Nov. 24, 2021
Test Software	NoiseKen	Remote control software for LSS-F02/ V 1.1.1.0	NCR	NCR
TR14 Plane Grounding Site	CRC	TR14	NCR	NCR

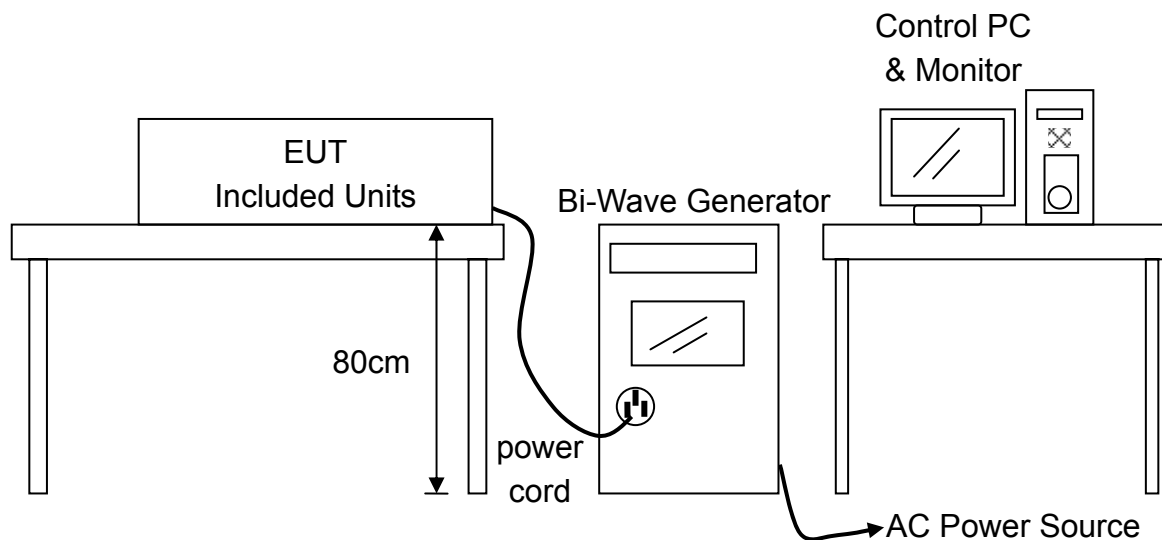
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

9.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters in the shielded room.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane in the shielded room.
- d. For the surge test applied to EUT's power supply and unshielded unsymmetrical interconnection lines, if required, the capacitive coupling network are used.
- e. If any, the surge test applied to the unshielded symmetrically interconnection lines of EUT, the gas arrestors coupling network are used.
- f. Keep the interconnection line, if required, or power cord between the EUT or its power source and the coupling / decoupling network to be 2m in length (or shorter).
- g. The surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave (positive and negative).
- h. All lower levels including the selected test level shall be satisfied and the test voltage has to be increased by steps up to the specified test level.
- i. Connect the EUT's power source to the appropriate power through the coupling devices and perform the specified test level.
- j. If any, connect all the interconnection lines between EUT and accessories/support units through the coupling devices and perform the specified test level.
- k. Record the performance of the EUT.

9.4 Test Configurations



9.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

9.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Coupled Line	Open-circuit Test Voltage (kV)	Performance					Result (Pass/Fail)
		Required	Observation				
			0°	90°	180°	270°	
L - PE	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
N - PE	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
L - N	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
L - PE	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
N - PE	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
L - N	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
L - PE	±2	B	A(1)	A(1)	A(1)	A(1)	Pass
N - PE	±2	B	A(1)	A(1)	A(1)	A(1)	Pass

Observation of Performance during Test

- (1) Normal operation condition specified by manufacturer during the test.

10. Conducted disturbances (CS) Immunity Test

Test Result : PASS

10.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	:	EN 61000-6-2 as §1.3 described
Basic Standard	:	EN 61000-4-6/ IEC 61000-4-6
Required Performance	:	A
Test Level	:	3
Voltage Level (e.m.f.)	:	10V (e.m.f.)
Test Frequency Range	:	150kHz ~ 80MHz
Frequency Step	:	1% of the momentary frequency
Dwell Time	:	Minimum 3 sec. per frequency
Modulation	:	1kHz Sine Wave with 80% Amplitude Modulation
Coupling Devices	:	<input checked="" type="checkbox"/> CDN-M3 (on AC power output port) <input type="checkbox"/> CDN-T2 (on RJ-11 port) <input type="checkbox"/> CDN-T4 (on LAN port) <input type="checkbox"/> CDN-T8 (on LAN port) <input type="checkbox"/> EM Clamp (on AC power output port)
Test Voltage	:	230Vac/50Hz
Tester	:	Jacky
Ambient Temperature	:	28°C
Relative Humidity	:	51%
Atmospheric Pressure	:	1006mbar
Date of Testing	:	July 6, 2021

10.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Signal Generator	R&S	SML03/ 101676	Aug. 3, 2020	Aug. 3, 2021
Dual Directional Coupler	AR	DC2600/ 28834	Feb. 17, 2021	Feb. 17, 2022
Power Amplifier	AR	75A250/ 28845	NCR	NCR
CDN	FCC	<input type="checkbox"/> FCC-801-M2-16A/ 2032	Feb. 8, 2021	Feb. 8, 2022
		<input checked="" type="checkbox"/> FCC-801-M3-16A/ 2060	Feb. 8, 2021	Feb. 8, 2022
		<input type="checkbox"/> FCC-801-M5-16A/ 2020	Nov. 17, 2020	Nov. 17, 2021
	FCC	<input type="checkbox"/> FCC-801-T2/ 2032	Oct. 22, 2020	Oct. 22, 2021
		<input type="checkbox"/> FCC-801-T4-RJ45/ 08031	Oct. 22, 2020	Oct. 22, 2021
		<input type="checkbox"/> NCDN-T8-RJ45/ 06016	Oct. 22, 2020	Oct. 22, 2021
ATTENUATOR	BIRD	300-A-MFN-06/ 37	Oct. 23, 2020	Oct. 23, 2021
EM CLAMP	TESEQ	KEMZ 801A / 38676	Oct. 28, 2020	Oct. 28, 2021
Dual Channel Power Meter	R&S	NRVD/ 839374/012	Nov. 18, 2020	Nov. 18, 2021
Power Sensor	R&S	URV5-Z2/ 835640/013	Feb. 17, 2021	Feb. 17, 2022
	R&S	URV5-Z2/ 100731	Feb. 17, 2021	Feb. 17, 2022
Test Software	Audix	i2 / 5.16_20181108	NCR	NCR
TR4 shielded room	ETS LINDGREN	TR4/ 15353-E	NCR	NCR

Note:

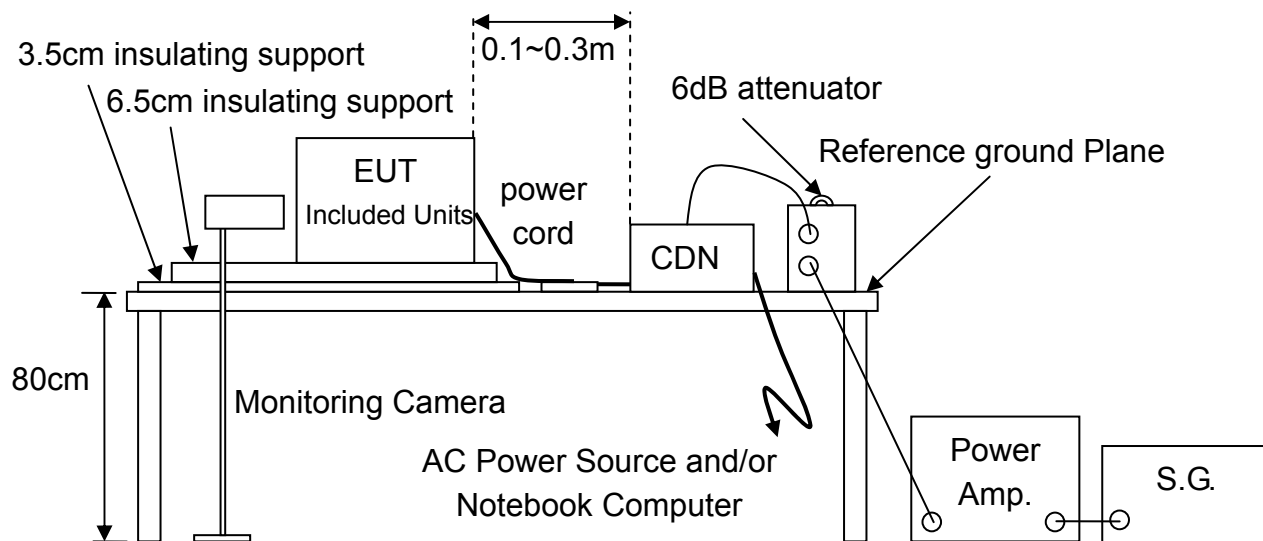
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

10.3 Test Procedures

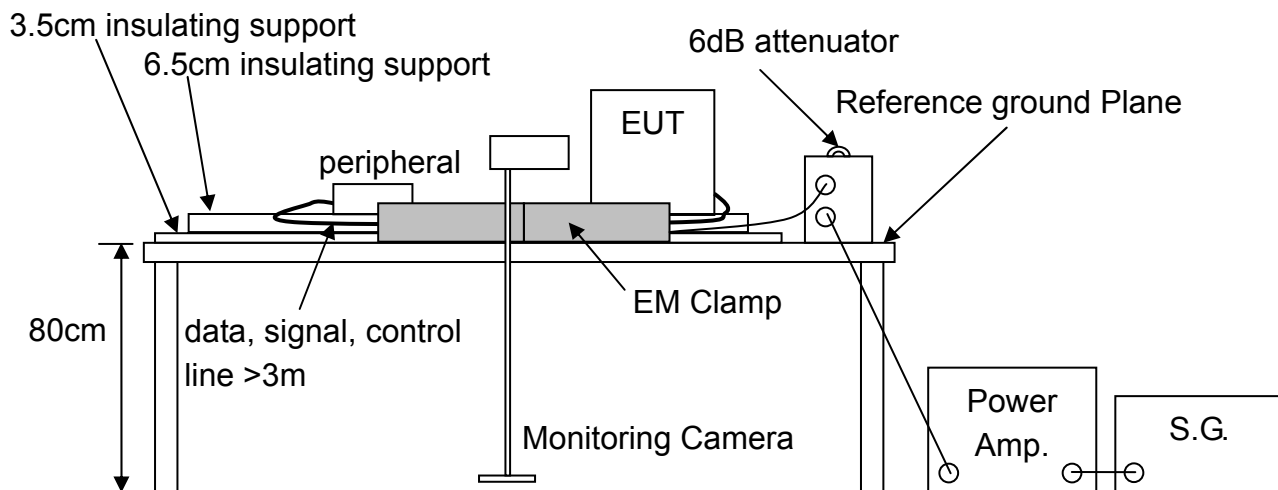
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a non-conducted support with a height 0.1 meters above the ground reference plane. Also the ground reference plane is placed on a wooden table with a height of 0.8 meters in the shielded room.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane in the shielded room.
- d. Decide the injection methods and test points according to the relative standard.
- e. All relevant cables shall be provide with the appropriate coupling and decoupling devices at a distance between 0.1m and 0.3m from the projected geometry of the EUT on the ground reference plane.
- f. All cables connected to each Auxiliary Equipment (AE), other than those being connected to the EUT, shall not be bundled nor wrapped and shall be kept between 30mm and 50mm above the ground reference plane.
- g. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF input ports of the coupling devices are terminated by a 50 Ω load resistor.
- h. Perform the test with the specified immunity level in the test frequency range and with the specified modulation type.
- i. The dwell time at each frequency shall be not less than the time necessary for the EUT to be exercised and be able to respond.
- j. The sensitive frequencies of EUT and harmonics or frequencies of dominant interest shall be analyzed separately, if any.
- k. Record the performance of the EUT.

10.4 Test Configurations

Power supply and/or LAN port Test



I/O signal, data and control port Test (if any)



10.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

10.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Injected Line	Coupling Devices	Performance		Result (Pass/Fail)
		Required	Observation	
Power Lines	CDN-M3	A	A(1)	Pass

Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

11. Power frequency magnetic field (PFM) Immunity Test

Test Result : **PASS**

11.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 61000-6-2 as §1.3 described
Basic Standard	: EN 61000-4-8/ IEC 61000-4-8
Required Performance	: A
Test Level	: 4
Magnetic Field Strength	: 30 A/m
Power Frequency	: 50 Hz
Test Duration	: 1 min.
Magnetic Field Orientation	: X, Y, Z-axis
Test Voltage	: 230Vac/50Hz
Tester	: Jacky
Environment Magnetic Field	: 0.02 A/m (< 3 A/m (20dB below the test field))
Ambient Temperature	: 30°C
Relative Humidity	: 51%
Atmospheric Pressure	: 1008mbar
Date of Testing	: July 5, 2021

11.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Current Source	FCC	F-1000-4-8-G-125A / 1008	July 15, 2020	July 15, 2021
Coil	FCC	F-1000-4-8-L-1M / 1007	July 15, 2020	July 15, 2021
Low Frequency Gauss Meter	F.W. BELL	4190 / 1010002	May 4, 2021	May 4, 2022
TR12 Plane Grounding Site	CRC	TR12	NCR	NCR

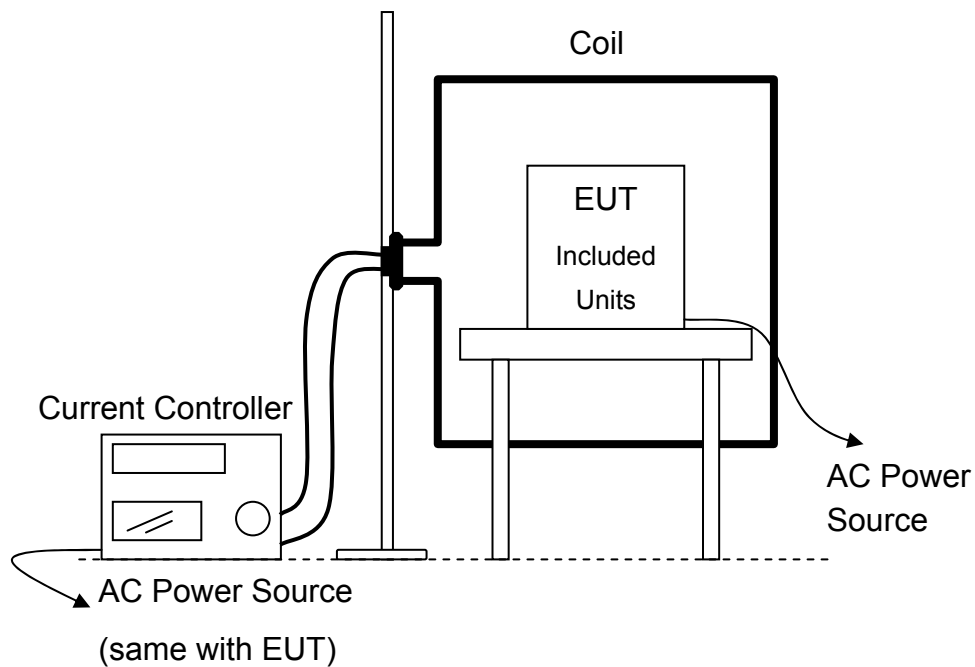
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

11.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height 0.8 meters.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane (minimum size is 1m×1m) in the shielded room.
- d. For the tabletop equipment, the induction coil with a square form in 1m side (or diameter) is used and shall enclose the EUT placed at its center. For the floor-standing equipment, the induction coil shall be able to envelop the EUT and made of conductors of relatively small cross-section.
- e. The dimensions of induction coil shall be able to keep the magnetic fields over the whole volume of the EUT with an acceptable variation of $\pm 3\text{dB}$.
- f. The test generator shall be placed at less than 3m distance from the induction coil.
- g. Keep all cables of EUT to be exposed to the magnetic field for 1m of their length.
- h. Before the test, maintain the electromagnetic field value of the test environment to be at least 20dB lower than the selected test level. Then tune up the currents of the test generator and use the Gauss Meter to calibrate the specified test level at the center of the induction coil.
- i. Perform the test with the specified magnetic field by rotating the induction coil to three different orientations to generate X, Y and Z directed magnetic field sequentially.
- j. Record the performance of the EUT.

11.4 Test Configurations



11.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

11.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Magnetic Field Orientation	Magnetic Field (A/m)	Frequency (Hz)	Performance		Result (Pass/Fail)
			Required	Observation	
X-axis	30	50	A	A(1)	Pass
Y-axis	30	50	A	A(1)	Pass
Z-axis	30	50	A	A(1)	Pass

Observation of Performance during Test

(1) Normal operation condition specified by manufacturer during the test.

12. Voltage dips, short interruptions Immunity Test

Test Result : **PASS**

12.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 61000-6-2 as §1.3 described
Basic Standard	: EN 61000-4-34/ IEC 61000-4-34
Required Performance and Test Level	: <input checked="" type="checkbox"/> B for 0% residual voltage dips with 1 cycle <input checked="" type="checkbox"/> C for 70% residual voltage dips with 25 cycles <input checked="" type="checkbox"/> C for 40% residual voltage dips with 10 cycles <input checked="" type="checkbox"/> C for 0% residual voltage interruptions with 250 cycles
Basis Test Voltage Level (U_T)	: 230Vac/50Hz
Test Duration	: Maximum 3 dips/interruptions with a sequence
Time interval	: 10s minimum between each test event
Phase Angle of Abrupt Changes	: 0°, 180°
Tester	: Jacky
Ambient Temperature	: 30°C
Relative Humidity	: 51%
Atmospheric Pressure	: 1008mbar
Date of Testing	: July 5, 2021

12.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Power Fail Simulator	EM Test	PFS503N63.1/ V1233113366	March 16, 2021	March 16, 2022
Test Software	EM Test	IEC.Control/ V5.2.10	NCR	NCR
TR14 Plane Grounding Site	CRC	TR14	NCR	NCR

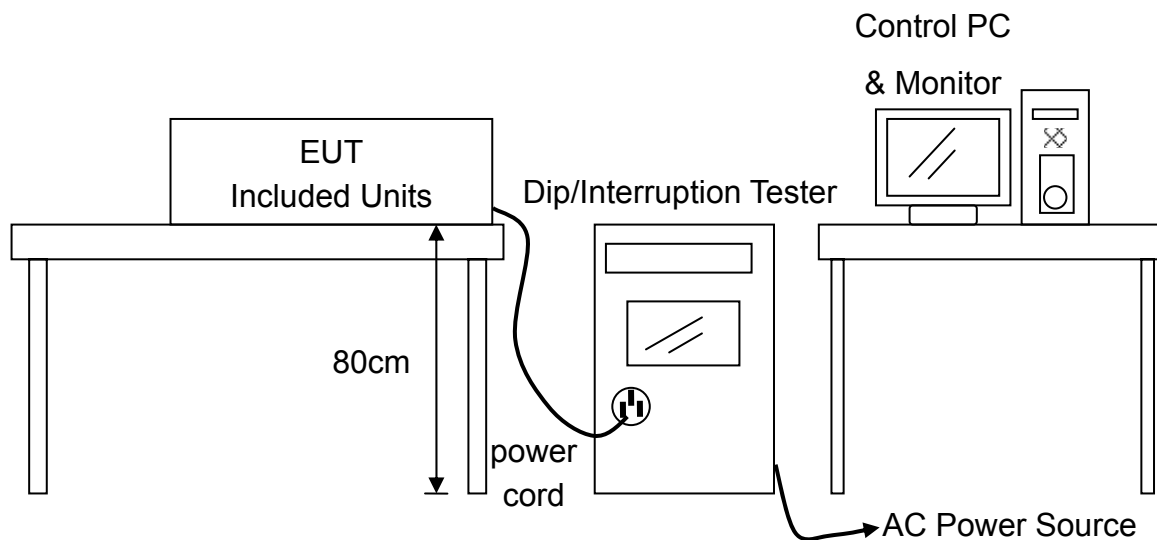
Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

12.3 Test Procedures

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height 0.8 meters above the ground reference plane in the shielded room.
- c. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 0.1 meters above the ground reference plane in the shielded room.
- d. The test shall be performed with the EUT connected to the test Generator with the shortest power supply cable as specified by the manufacturer.
- e. If any, tests on the three-phase EUT are accomplished by using three sets of equipment mutually synchronized.
- f. During the tests, the main voltage for testing is monitored within an accuracy of 2% and the zero crossing control of the generators must have an accuracy of $\pm 10^\circ$.
- g. The EUT shall be tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 sec. minimum (between each test event). Each representative mode of operation shall be test.
- h. Abrupt changes in supply voltage shall occur at zero crossings of the voltage and additional angles preferably selected from 0° , 45° , 90° , 135° , 180° , 225° , 270° , 315° on each phase.
- i. Connect the EUT's power source to the appropriate power through the test generator and perform the specified test level.
- j. Record the performance of the EUT.

12.4 Test Configurations



12.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

12.6 Test Results

Test Mode : Mode 1(Charge and Normal Mode)

Voltage Dips Test

Test level (% residual voltage)	Reduction Voltage (%)	Duration (cycle)	Performance		Result (Pass/Fail)
			Required	Observation	
0	>95	1	B	B(1)	Pass
40	60	10	C	B(1)	Pass
70	30	25	C	B(1)	Pass

Voltage Interruption Test

Test level (% residual voltage)	Reduction Voltage (%)	Duration (cycle)	Performance		Result (Pass/Fail)
			Required	Observation	
0	>95	250	C	B(1)(2)	Pass

Observation of Performance during Test

- (1) The light of bulb (Dummy Load) would flicker while test is performing, it could self-recover after the test.
- (2) The alarm would appear from the EUT while test is performing, it could self-recover after the test.

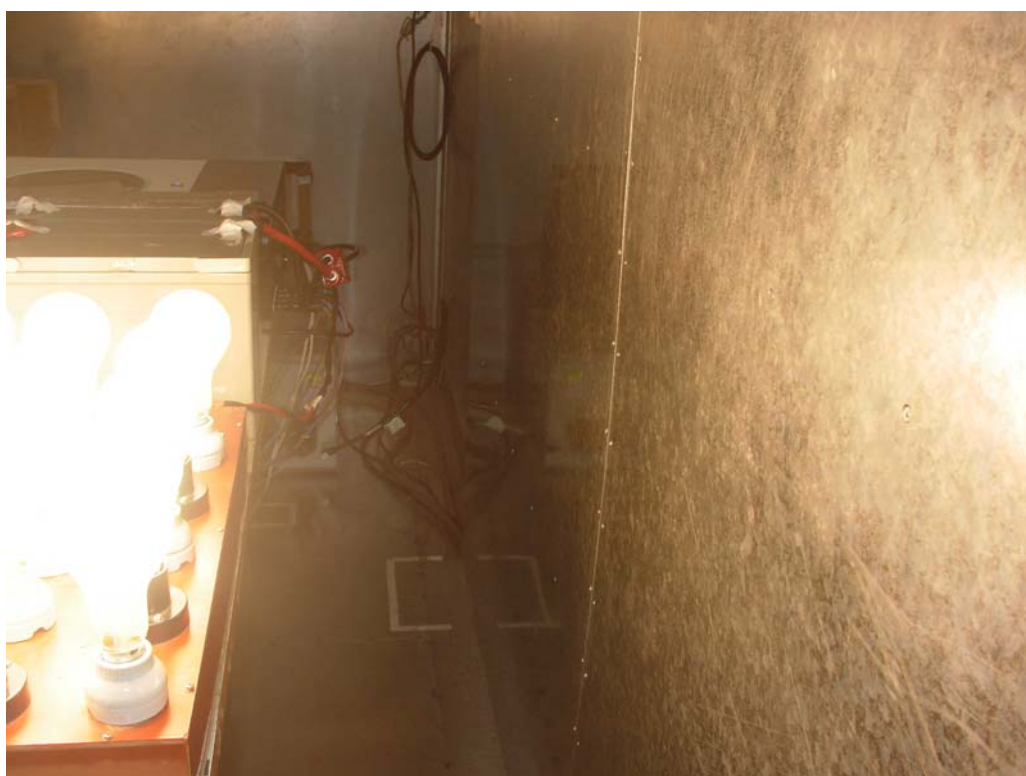
Attachment 1

Photographs of the Test Configurations

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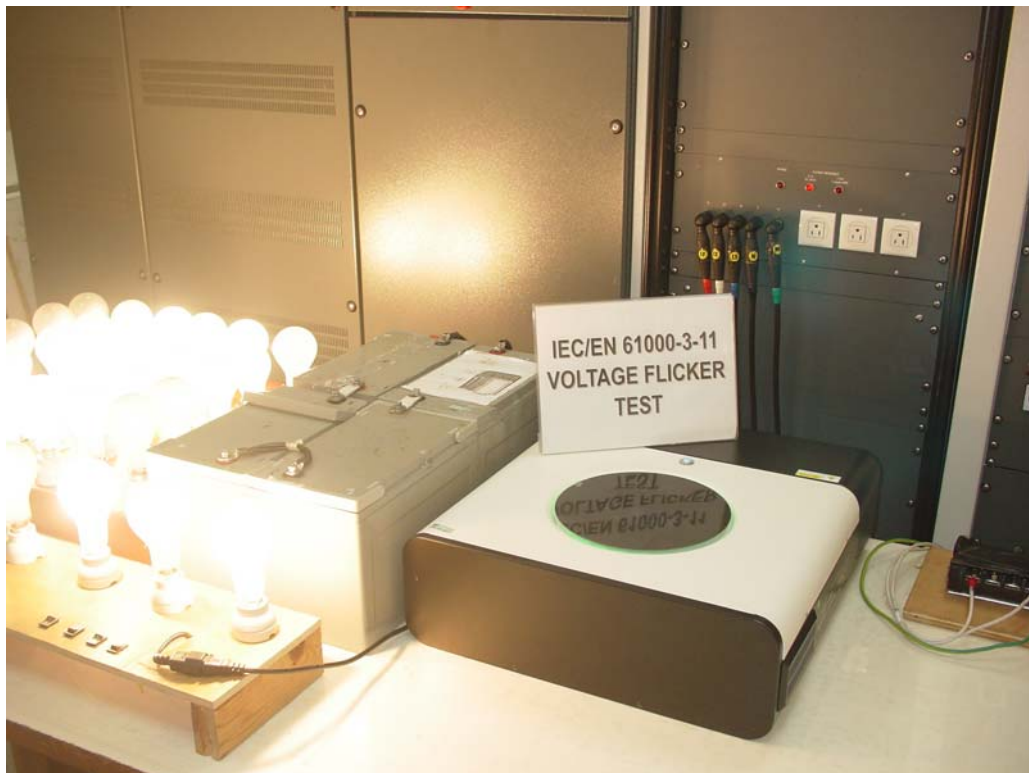
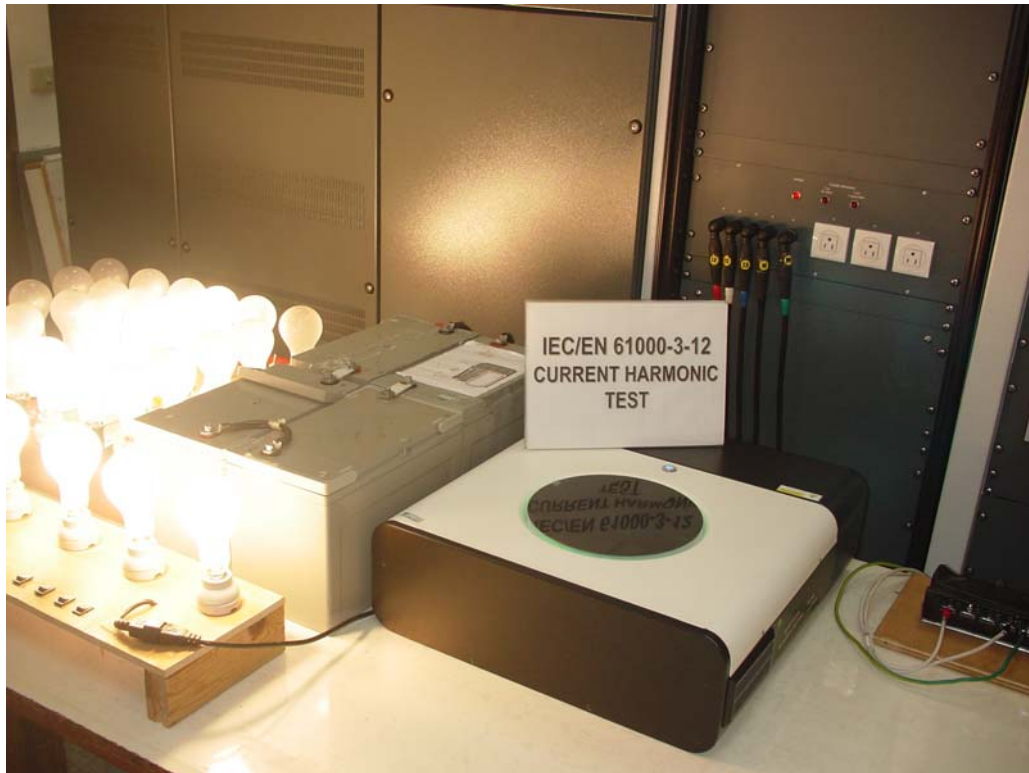
1. Conducted Emission Measurement



2. Radiated Emission Measurement



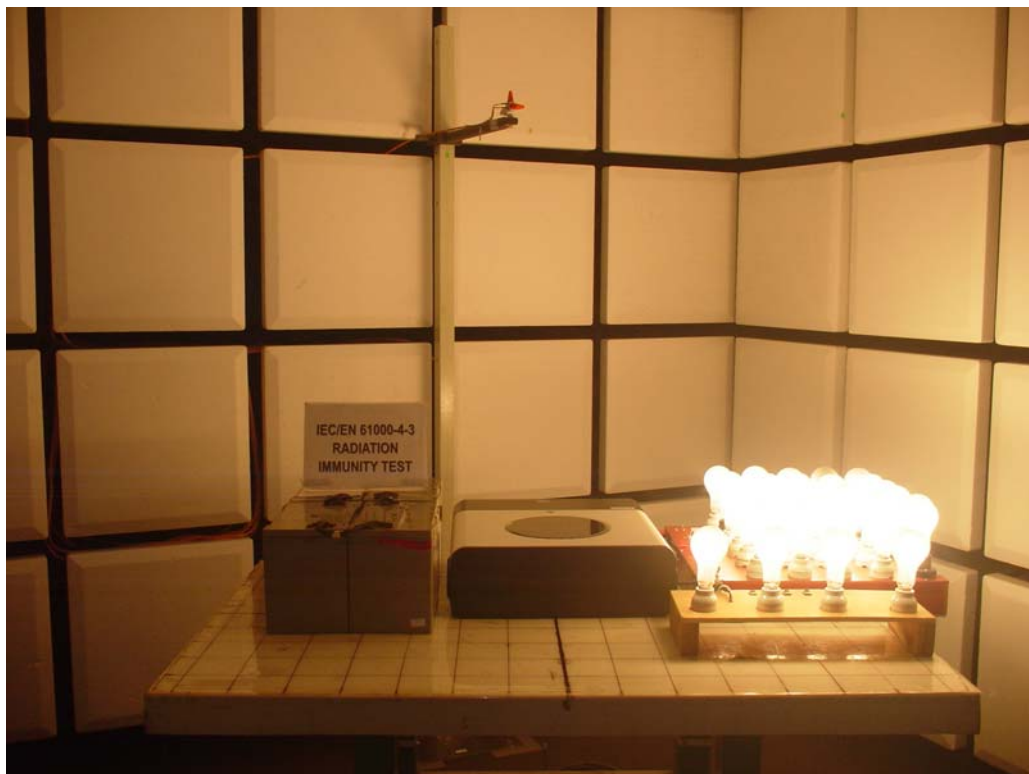
3. Harmonic Current & Voltage Fluctuations Emission Measurement



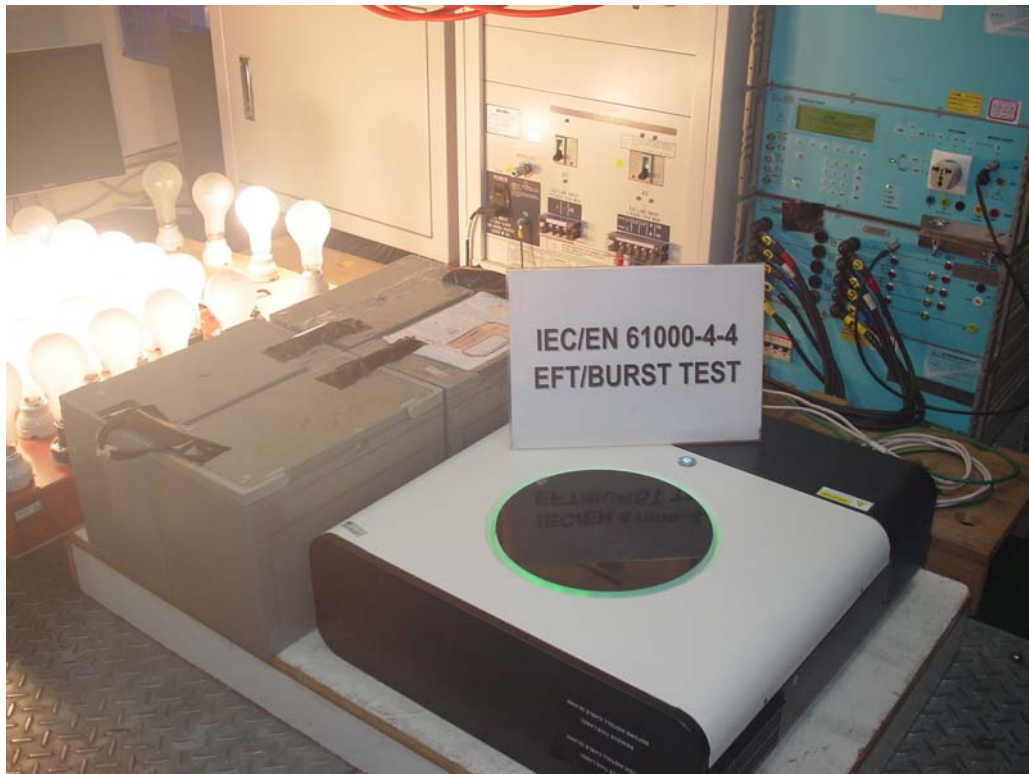
4. Electrostatic Discharge (ESD) Immunity Test



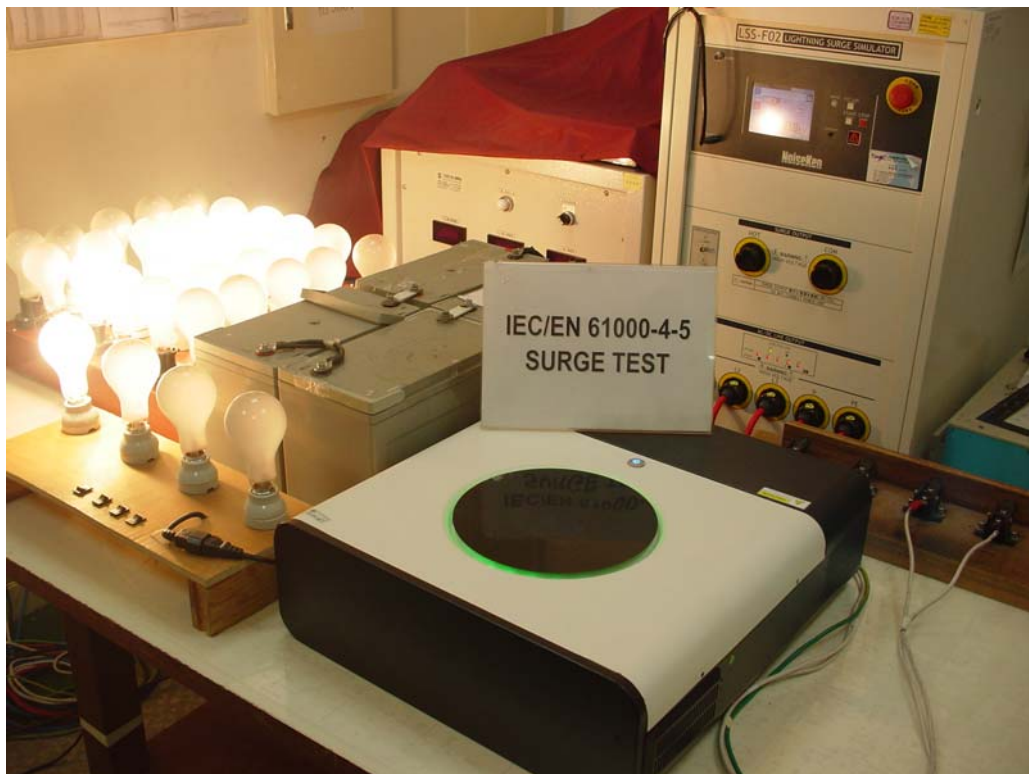
5. Radiated Electromagnetic Field (RS) Immunity Test



6. Electrical fast transient / burst (EFT) Immunity Test



7. Surge Immunity Test



8. Conducted disturbances (CS) Immunity Test



9. Power frequency magnetic field (PFM) Immunity Test



10. Voltage dips, short interruptions Immunity Test



Attachment 2
Photographs of Production
(Supplied by Customer)





