

Verification of Compliance

Product Name : LCD MONITOR
Brand Name : Lenovo
Model Number : D17238FT* (the * in the model name can be 0 to 9, A to Z or blank for marketing use only)
Applicant : HONGFUJIN PRECISION ELECTRONICS (CHONGQING) CO., LTD.
Address : NO.1 EAST DISTRICT 1ST RD., SHAPINGBA DISTRICT, CHONGQING, 401332, China
Report Number : C32-C016-1706-287
Issue Date : July 18, 2017
Applicable Standards : EN 55032:2012+AC:2013 Class B ITE
EN 55032:2015+AC:2016-07 Class B ITE
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55024:2010+A1:2015
IEC 61000-4-2:2008 (Ed. 2.0)
IEC 61000-4-3:2010 (Ed. 3.2)
IEC 61000-4-4:2012 (Ed. 3.0)
IEC 61000-4-5:2014 (Ed. 3.0)
IEC 61000-4-6:2013 (Ed. 4.0)
IEC 61000-4-8:2009 (Ed. 2.0)
IEC 61000-4-11:2004 (Ed. 2.0)

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.



TAF 0905
FCC CAB Code TW0905, TW1104
NVLAP Lab Code 200575-0
IC Code 4699A
VCCI Accep. No. R-1527, C-1609, T-11441, G-10
C-20010, G-614, T-20009



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(Tsun-Yu Shih/ General Manager)

Date: July 18, 2017

CE EMC Test Report

for

LCD MONITOR

Brand Name : Lenovo
Model No. : D17238FT* (the * in the model name can be
0 to 9, A to Z or blank for marketing use
only)
Report Number : C32-C016-1706-287
Date of Receipt : July 3, 2017
Date of Report : July 18, 2017

Prepared for

HONGFUJIN PRECISION ELECTRONICS (CHONGQING) CO., LTD.

NO.1 EAST DISTRICT 1ST RD., SHAPINGBA DISTRICT, CHONGQING, 401332, China



Prepared by

Central Research Technology Co.

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Verification of Compliance

Equipment under Test : LCD MONITOR

Model Number : D17238FT* (the * in the model name can be 0 to 9, A to Z or blank for marketing use only)

Applicant : HONGFUJIN PRECISION ELECTRONICS (CHONGQING) CO., LTD.

Address : NO.1 EAST DISTRICT 1ST RD., SHAPINGBA DISTRICT, CHONGQING, 401332, China

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IEC 61000-4-2:2008 (Ed. 2.0)
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IEC 61000-4-4:2012 (Ed. 3.0)
IEC 61000-4-5:2014 (Ed. 3.0)
IEC 61000-4-6:2013 (Ed. 4.0)
IEC 61000-4-8:2009 (Ed. 2.0)
IEC 61000-4-11:2004 (Ed. 2.0)

Date of Testing : July 7~11, 2017

Deviation : The test method and configuration 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

: Rosa Hsieh
(Rosa Hsieh/System Executive)

DATE :

July 18, 2017

APPROVED BY

: J. Y. Shih
(Tsun-Yu Shih/General Manager)

DATE :

July 18, 2017

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Attachment 1 – Photographs of the Test Configurations

1. General Description

1.1 General Description of EUT

Equipment under Test : LCD MONITOR

Model Number : D17238FT* (the * in the model name can be 0 to 9, A to Z or blank for marketing use only)

Power in : 100-240Vac, 50/60Hz

Highest Operating Frequency : 2.5GHz from the test specification

Manufacturer : HONGFUJIN PRECISION ELECTRONICS (CHONGQING) CO., LTD.

Function Description :

The EUT are engineering samples of the LCD MONITOR. Please refer to the user's manual for the details.

The devices (supplied by the manufacturer) installed inside the EUT are listed below:

Components	Model No.
Panel	LGD LM238WF2
PI Board	ILPI-381
IF Board	ILIF-540
Scalar IC	Realtek Rdt2525AR-CG

The Photographs of EUT please refer to the attached file of construction photos of the EUT.

The I/O ports of EUT are listed below:

No.	I/O Port Type	Quantity
1	D-Sub port	1
2	HDMI port	1
3	Display port	1
4	USB 3.0 upstream port	1
5	USB 3.0 port	2
6	Audio output port	1

1.2 Test Mode

Pre-Scan Mode

Test Mode	Mode description			
	Test Condition/ Panel	Resolution		Rotation
Mode 1	LGD LM238WF2 with stand	HDMI	1920*1080@60Hz	0°
Mode 2			1280*1024@75Hz	
Mode 3			800*600@75Hz	
Mode 4		D-Sub	1920*1080@60Hz	
Mode 5			1280*1024@75Hz	
Mode 6			800*600@75Hz	
Mode 7		DP	1920*1080@60Hz	
Mode 8			1280*1024@75Hz	
Mode 9			800*600@75Hz	
Mode 10		DP	1920*1080@60Hz	90°
Mode 11	LGD LM238WF2 without stand	DP	1920*1080@60Hz	0°
Mode 12	LGD LM238WF2 with stand	DP	1920*1080@60Hz ITU-R BT 1729 color bar	0°
Mode 13	Test Voltage: 230V/50Hz	DP	1920*1080@60Hz ITU-R BT 471-1 color bar	0°
Mode 14	LGD LM238WF2 with stand	DP	1920*1080@60Hz ITU-R BT 1729 color bar	0°
Mode 15	Test Voltage: 110V/60Hz	DP	1920*1080@60Hz ITU-R BT 471-1 color bar	0°

Final Verification Mode

Test Mode	Mode Description				
	Test Condition/ Panel	Resolution	Rotation	Test Voltage	Test Item
Mode 12	LGD LM238WF2 with stand	DP 1920*1080@60Hz ITU-R BT 1729 color bar	0°	230Vac/50Hz	CE and RE Tests
Mode 13		DP 1920*1080@60Hz ITU-R BT 471-1 color bar	0°		
Mode 7		DP 1920*1080@60Hz “H” pattern	0°		
		DP 1920*1080@60Hz “H” pattern	0°	240Vac/50Hz 100Vac/50Hz	DIP Test

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 55032:2012+AC:2013 Class B ITE	Conducted Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN 55032:2015+AC :2016-07 Class B ITE	Radiated Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-3-2:2014	Harmonic Current Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN 61000-3-3:2013	Voltage Fluctuation and Flicker Emission Measurement	<u>PASS</u>
<input checked="" type="checkbox"/> EN 55024:2010+A1:2015		
<input checked="" type="checkbox"/> IEC 61000-4-2:2008 (Ed. 2.0)	Electrostatic discharge Test (ESD)	<u>PASS</u>
<input checked="" type="checkbox"/> IEC 61000-4-3:2010 (Ed. 3.2)	Radiated electromagnetic field immunity Test (RS)	<u>PASS</u>
<input checked="" type="checkbox"/> IEC 61000-4-4:2012 (Ed. 3.0)	Electrical fast transient / burst immunity Test (EFT)	<u>PASS</u>
<input checked="" type="checkbox"/> IEC 61000-4-5:2014 (Ed. 3.0)	Surge immunity Test	<u>PASS</u>
<input checked="" type="checkbox"/> 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"/> IEC 61000-4-8:2009 (Ed. 2.0)	Power frequency magnetic field immunity Test (PFM)	<u>PASS</u>
<input checked="" type="checkbox"/> IEC 61000-4-11:2004 (Ed. 2.0)	Voltage dips, short interruptions Test	<u>PASS</u>

1.4 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 EUT and all the support units to the appropriate power source.
- b. Turn on the EUT and all the accessories and support units.
- c. Install an EMC test software (BurnIn Test V8.1) into the PC and execute it under the Windows environment.
- d. The PC runs ITU color bar on the EUT continuously.(for EN 55032)
- e. The PC runs “H” pattern on the EUT continuously.(for other tests)
- f. The PC sends the CCD receiving image to the EUT continuously.
- g. The PC reads/writes messages from/ to USB storage device by the EUT.
- h. The PC sends audio signals to the audio device.
- i. The PC sends messages to the modem. (if any)
- j. The PC sends “H” patterns to the printer, which prints them on paper. (if any)
- k. Repeat and keep the setup steps listed above before and during all tests.

1.5 The Support Units

Conducted Emission and Radiated Emission tests

No.	Unit	Model No.	FCC ID	Trade Name	Power Cord	Supported by lab.
1	PC	ThinkCentre M73	DoC	Lenovo	1.8m	✓
2	PS/2 Mouse	MU29J	DoC	IBM	N/A	✓
3	PS/2 Keyboard	SK-8820	DoC	IBM	N/A	✓
4	Printer	LQ300+	N/A	EPSON	1.8m	✓
5	Modem	DM-1414	IFAXDM1414	ACEEX	1.8m	✓
6	USB 3.0 HDD	HD-PCTU3	DoC	Seagate	N/A	✓
7	Earphone	ZBW4308GL	N/A	xiaomi.tw	N/A	✓

ESD Test

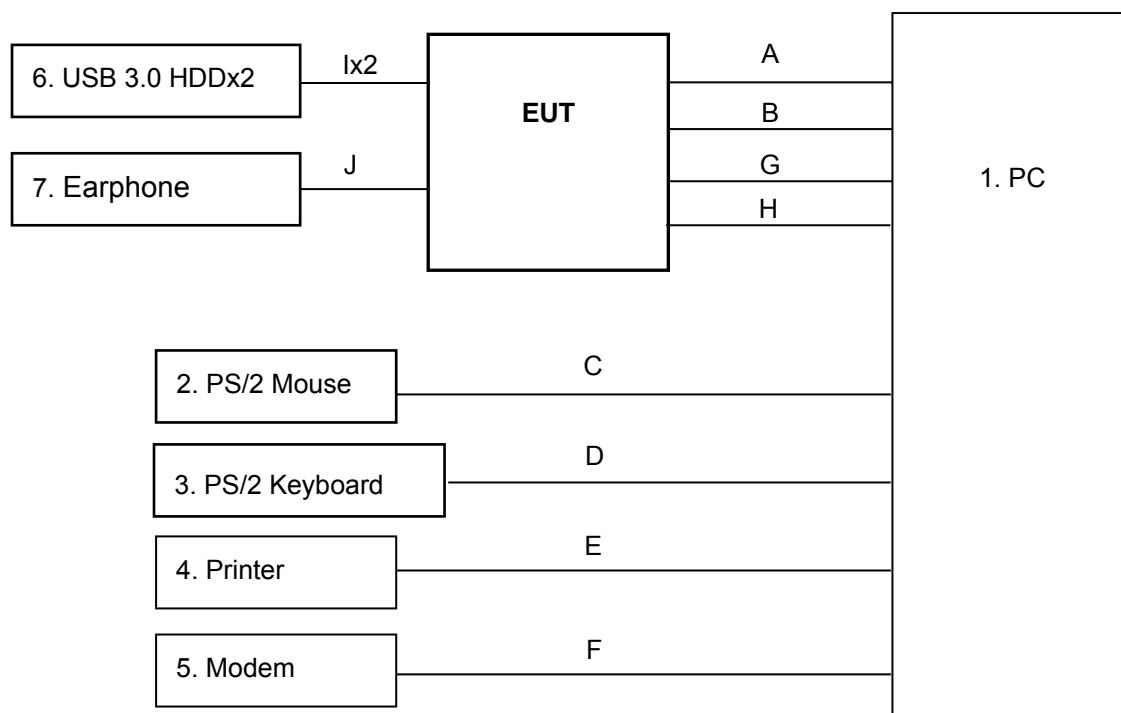
No.	Unit	Model No.	FCC ID	Trade Name	Power Cord	Supported by lab.
1	PC	ThinkCentre M73	DoC	Lenovo	1.8m	✓
2	PS/2 Mouse	MU29J	DoC	IBM	N/A	✓
3	PS/2 Keyboard	SK-8820	DoC	IBM	N/A	✓
4	USB 3.0 HDD	HD-LXU3	DoC	BUFFALO	1.5m	✓
5	Earphone	ZBW4308GL	N/A	xiaomi.tw	N/A	✓

Other Tests

No.	Unit	Model No.	FCC ID	Trade Name	Power Cord	Supported by lab.
1	PC	ThinkCentre M73	DoC	Lenovo	1.8m	✓
2	PS/2 Mouse	MU29J	DoC	IBM	N/A	✓
3	PS/2 Keyboard	SK-8820	DoC	IBM	N/A	✓
4	USB 3.0 HDD	HD-PCTU3	DoC	BUFFALO	1.5m	✓
5	Earphone	ZBW4308GL	N/A	xiaomi.tw	N/A	✓

1.6 Layout of the Setup

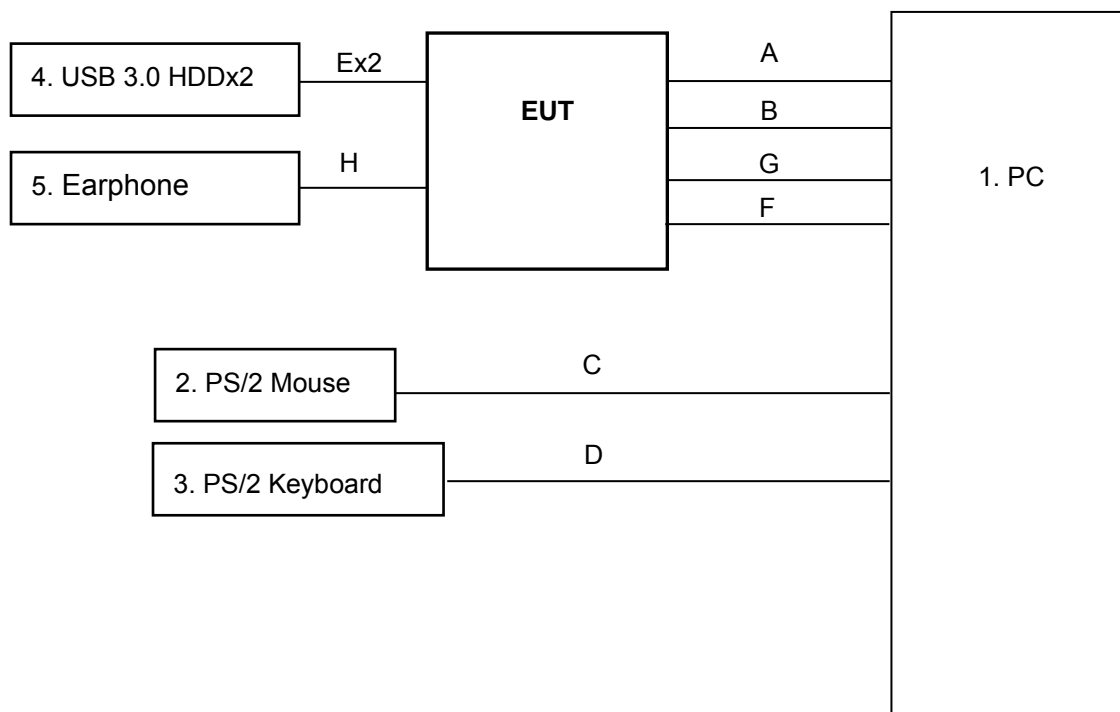
For Conducted Emission and Radiated Emission tests



Connecting Cables :

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A	DP Cable	1.8m	✓				
B	HDMI Cable	1.8m	✓			✓	For CE test
		1.8m	✓				For RE test
C	Mouse Cable	1.8m	✓			✓	
D	Keyboard Cable	1.8m	✓			✓	
E	USB Cable	1.8m	✓	✓		✓	2 cores
F	Modem Cable	1.8m	✓	✓		✓	2 cores
G	USB 3.0 upstream Cable	1.8m	✓	✓			2 cores
H	D-Sub cable	1.8m	✓	✓			2 cores
I	USB 3.0 Cable	1.0m	✓			✓	
J	Earphone Cable	1.2m	✓			✓	

Other Tests



Connecting Cables :

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A	DP Cable	1.8m	✓				
B	HDMI Cable	1.8m	✓	✓			
C	Mouse Cable	1.8m	✓			✓	
D	Keyboard Cable	1.8m	✓			✓	
E	USB 3.0 Cable	1.0m	✓			✓	
F	USB 3.0 upstream Cable	1.8m	✓	✓			
G	D-Sub cable	1.8m	✓	✓			2 cores
H	Earphone Cable	1.2m	✓			✓	

1.7 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 CISPR16-1-4, CISPR16-2-3.

Test Room	Type of Test Room	Descriptions
TR1	10m semi-anechoic chamber	Complying with the NSA and the site VSWR requirements in documents CISPR 22, CISPR 32 and CISPR 16-1-4 for the radiated emission measurement.
TR1	10m semi-anechoic chamber with absorber	
TR11	3m semi-anechoic chamber	Complying with the NSA requirements in documents CISPR 22, ANSI C63.4: 2014 for the radiated emission measurement.
TR5	Shielding Room	For the conducted emission measurement.
TR20	Shielding Room	
TR3	3m fully-anechoic chamber	Complying with the field uniformity requirements in standard IEC/ EN 61000-4-3 for the radiated immunity test.
TR7	Shielding Room	For the Current Harmonic / Voltage Flicker and other immunity tests.
TR8	Shielding Room	
TR4	Shielding Room (3m×3m×3m)	
TR12	Plane Grounding Site	
TR14	Plane Grounding Site	
TR300	3m fully-anechoic chamber	Complying with the site VSWR requirements set in documents CISPR 16-1-4 for the radiated emission measurement.

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	TW0905, TW1104	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
Site Filing Document	Canada	IC	4699A-1,-3	Test facility list & NSA Data
	Japan	VCCI	R-1527,C-1609,T-11441,G-10, C-20010, G-614, 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)	Class A Equipment		Class B Equipment	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	79	66	66 – 56	56 – 46
0.5 to 5	73	60	56	46
5 to 30	73	60	60	50

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 for Class B equipment.

☐ Limits for conducted common mode disturbances at telecommunication ports

Frequency (MHz)	Class A Equipment				Class B Equipment			
	Voltage Limits		Current Limits		Voltage Limits		Current Limits	
	Q.P. (dB μ V)	Average (dB μ V)	Q.P. (dB μ A)	Average (dB μ A)	Q.P. (dB μ V)	Average (dB μ V)	Q.P. (dB μ A)	Average (dB μ A)
0.15 to 0.5	97 - 87	84 – 74	53 – 43	40 – 30	84 – 74	74 - 64	40 – 30	30 - 20
0.5 to 30	87	74	43	30	74	64	30	20

Note 1- The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.
 Note 2- The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test.

2.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESCS30/ 836858/021	Jan. 17, 2017	Jan. 17, 2018
LISN	R&S	ESH2-Z5/ 880669/039	March 25, 2017	March 25, 2018
2 nd LISN	R&S	ENV4200/ 833209/010	April 26, 2017	April 26, 2018
ISN	FCC	<input type="checkbox"/> FCC-TLISN-T2- 02/20269	August 11, 2016	August 11, 2017
	TESEQ	<input type="checkbox"/> ISN T400A/ 28575	July 21, 2016	July 21, 2017
		<input type="checkbox"/> ISN T800/ 36191	July 21, 2016	July 21, 2017
50Ω terminator	SUHNER	65 BNC-50-0-1/133 NE/005	May 12, 2017	May 12, 2018
RF Switch	R&S	RSU28/ 338965/002	Jan. 13, 2017	July 13, 2017
RF Cable	N/A	N/A/ C0052 ~ 56	Jan. 13, 2017	July 13, 2017
Test Software	Audix	e3/ Ver. 5.2004-2-19m	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

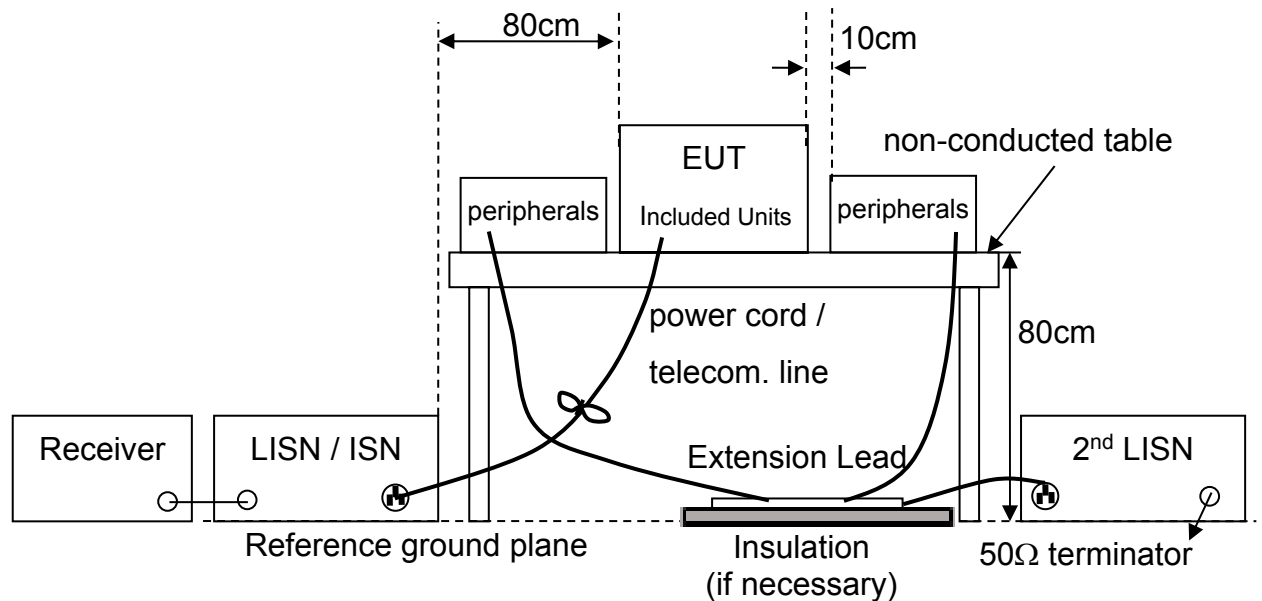
The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than U_{CISPR} in table 1 of CISPR 16-4-2.

Equipment	Model Number	Uncertainty Value
LISN	ESH2-Z5	2.22dB
	ENV 4200	2.18dB
ISN	FCC-TLISN-T2-02	2.10dB
	ISN T400A	2.10dB
	ISN T800	2.16dB

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 up to 0.15 meters above the reference ground plane.
- c. For EN 55032, all cables connecting to AE located outside the chamber shall drop directly to, but be insulated from, the RGP (or turntable). The thickness of the insulation shall not be more than 150 mm.
- d. Connect the EUT's power source / telecommunication lines to the appropriate power mains / peripherals through the LISN / ISN.
- e. All the other peripherals are connected to the 2nd LISN, if any.
- f. The LISN / ISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.
- g. 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.
- h. 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.
- i. 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.
- j. Record the level for each frequency and compare with the required limit.
- k. If required, measure the conducted emissions on telecommunication lines of EUT by using the test receiver connected to the coupling RF output port of ISN and repeat step g. to i.
- l. 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

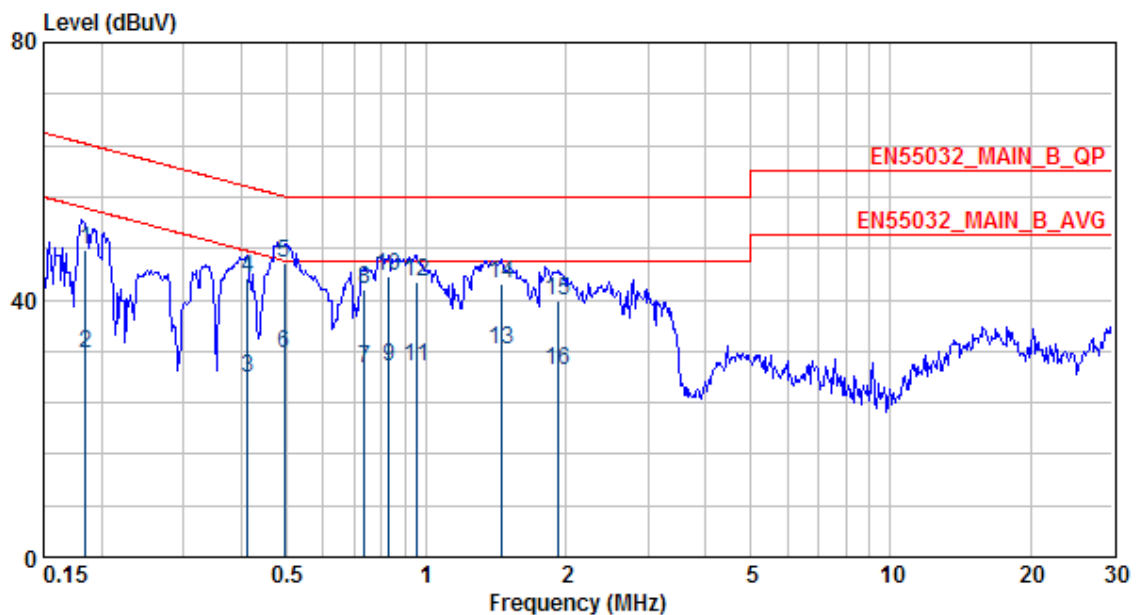


2.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

2.6 Test Results

Test Mode : Mode 12 **Test Voltage** : 230Vac/50Hz
Tester : Jacky **Temperature** : 26°C
Humidity : 60%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Line

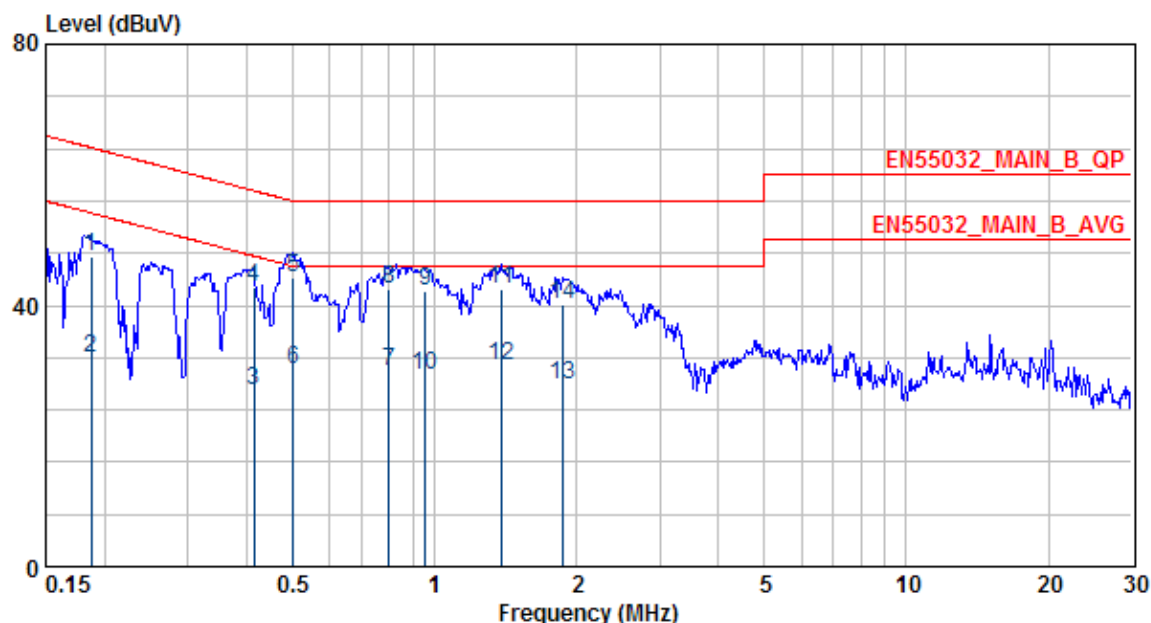


	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.185	47.76	0.35	47.41	64.28	-16.52	LINE	QP
2	0.185	31.70	0.35	31.35	54.28	-22.58	LINE	AVERAGE
3	0.413	27.70	0.38	27.32	47.59	-19.89	LINE	AVERAGE
4	0.413	43.51	0.38	43.13	57.59	-14.08	LINE	QP
5	0.494	45.66	0.39	45.27	56.10	-10.44	LINE	QP
6	0.494	31.77	0.39	31.38	46.10	-14.33	LINE	AVERAGE
7	0.735	29.22	0.40	28.82	46.00	-16.78	LINE	AVERAGE
8	0.735	41.75	0.40	41.35	56.00	-14.25	LINE	QP
9	0.830	29.46	0.40	29.06	46.00	-16.54	LINE	AVERAGE
10	0.830	43.53	0.40	43.13	56.00	-12.47	LINE	QP
11	0.953	29.51	0.41	29.10	46.00	-16.49	LINE	AVERAGE
12	0.953	42.75	0.41	42.34	56.00	-13.25	LINE	QP
13	1.449	32.25	0.44	31.81	46.00	-13.75	LINE	AVERAGE
14	1.449	42.64	0.44	42.20	56.00	-13.36	LINE	QP
15	1.928	39.74	0.46	39.28	56.00	-16.26	LINE	QP
16	1.928	29.03	0.46	28.57	46.00	-16.97	LINE	AVERAGE

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.
4. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the EUT shall be deemed to meet both limits.

Test Mode : Mode 12 **Test Voltage** : 230Vac/50Hz
Tester : Jacky **Temperature** : 26°C
Humidity : 60%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Neutral

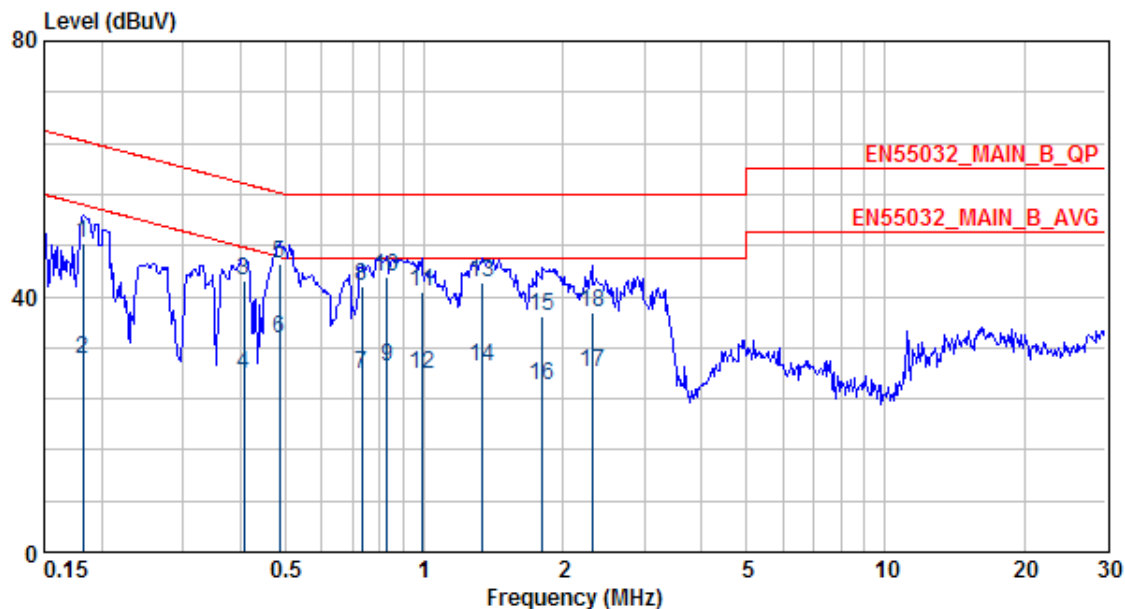


	Freq	Level	Factor	Read	Limit	Over		
	MHz	dBuV	dB	Level	Line	Limit	Pol/Phase	Remark
1	0.187	47.35	0.20	47.15	64.15	-16.81	NEUTRAL	QP
2	0.187	31.82	0.20	31.62	54.15	-22.34	NEUTRAL	AVERAGE
3	0.414	26.85	0.22	26.63	47.57	-20.72	NEUTRAL	AVERAGE
4	0.414	42.78	0.22	42.56	57.57	-14.79	NEUTRAL	QP
5 @	0.502	44.25	0.23	44.02	56.00	-11.75	NEUTRAL	QP
6	0.502	30.14	0.23	29.91	46.00	-15.86	NEUTRAL	AVERAGE
7	0.800	29.90	0.23	29.67	46.00	-16.10	NEUTRAL	AVERAGE
8	0.800	42.47	0.23	42.24	56.00	-13.53	NEUTRAL	QP
9	0.958	42.25	0.25	42.00	56.00	-13.75	NEUTRAL	QP
10	0.958	29.39	0.25	29.14	46.00	-16.61	NEUTRAL	AVERAGE
11	1.381	42.35	0.27	42.08	56.00	-13.65	NEUTRAL	QP
12	1.381	30.88	0.27	30.61	46.00	-15.12	NEUTRAL	AVERAGE
13	1.868	27.87	0.29	27.58	46.00	-18.13	NEUTRAL	AVERAGE
14	1.868	40.29	0.29	40.00	56.00	-15.71	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.
4. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the EUT shall be deemed to meet both limits.

Test Mode : Mode 13 **Test Voltage** : 230Vac/50Hz
Tester : Jacky **Temperature** : 26°C
Humidity : 60%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Line

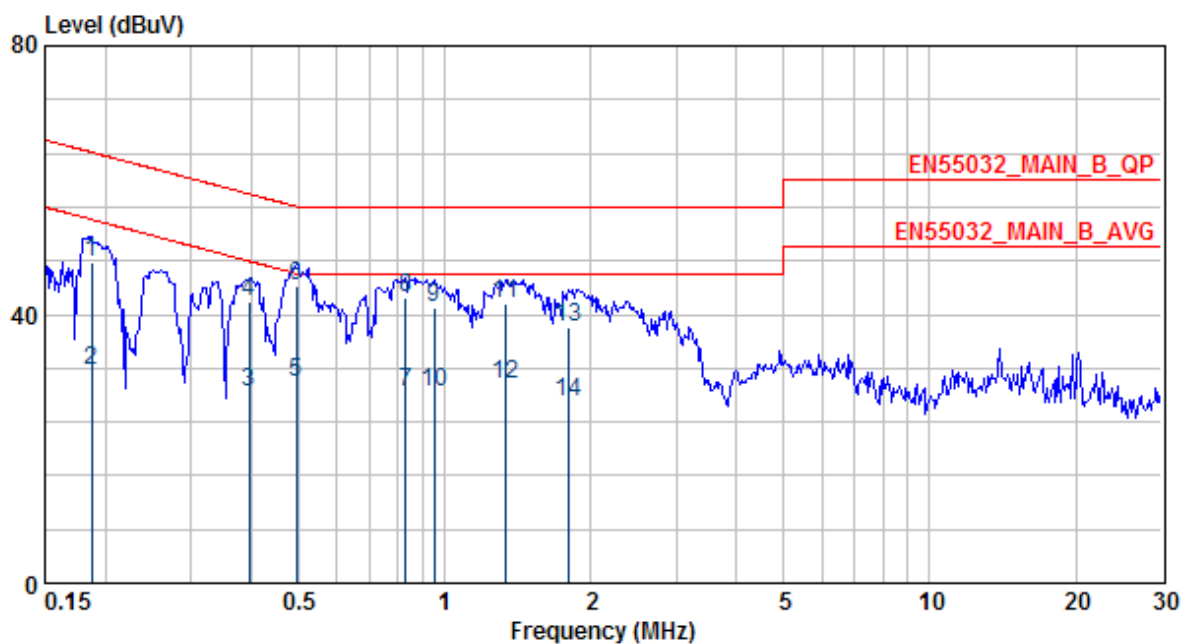


	Freq	Level	Factor	Read	Limit	Over		
	MHz	dBuV	dB	Level	Line	Limit	Pol/Phase	Remark
1	0.182	48.30	0.35	47.95	64.37	-16.07	LINE	QP
2	0.182	30.09	0.35	29.74	54.37	-24.28	LINE	AVERAGE
3	0.406	42.38	0.38	42.00	57.73	-15.35	LINE	QP
4	0.406	27.83	0.38	27.45	47.73	-19.90	LINE	AVERAGE
5	0.486	45.25	0.39	44.86	56.23	-10.98	LINE	QP
6	0.486	33.36	0.39	32.97	46.23	-12.87	LINE	AVERAGE
7	0.731	27.97	0.40	27.57	46.00	-18.03	LINE	AVERAGE
8	0.731	41.59	0.40	41.19	56.00	-14.41	LINE	QP
9	0.830	28.96	0.40	28.56	46.00	-17.04	LINE	AVERAGE
10	0.830	42.98	0.40	42.58	56.00	-13.02	LINE	QP
11	0.989	40.79	0.41	40.38	56.00	-15.21	LINE	QP
12	0.989	27.82	0.41	27.41	46.00	-18.18	LINE	AVERAGE
13	1.331	42.14	0.43	41.71	56.00	-13.86	LINE	QP
14	1.331	29.10	0.43	28.67	46.00	-16.90	LINE	AVERAGE
15	1.810	36.97	0.45	36.52	56.00	-19.03	LINE	QP
16	1.810	26.02	0.45	25.57	46.00	-19.98	LINE	AVERAGE
17	2.309	28.01	0.47	27.54	46.00	-17.99	LINE	AVERAGE
18	2.309	37.49	0.47	37.02	56.00	-18.51	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.
4. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the EUT shall be deemed to meet both limits.

Test Mode : Mode 13 **Test Voltage** : 230Vac/50Hz
Tester : Jacky **Temperature** : 26°C
Humidity : 60%RH **Frequency Range** : 150kHz~30MHz
IF Bandwidth : 9kHz **Phase** : Neutral



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.187	47.85	0.20	47.65	64.15	-16.31	NEUTRAL	QP
2	0.187	31.63	0.20	31.43	54.15	-22.53	NEUTRAL	AVERAGE
3	0.396	28.44	0.22	28.22	47.95	-19.51	NEUTRAL	AVERAGE
4	0.396	41.96	0.22	41.74	57.95	-15.99	NEUTRAL	QP
5	0.494	29.89	0.23	29.66	46.10	-16.21	NEUTRAL	AVERAGE
6	0.494	44.26	0.23	44.03	56.10	-11.84	NEUTRAL	QP
7	0.830	28.50	0.24	28.26	46.00	-17.50	NEUTRAL	AVERAGE
8	0.830	42.40	0.24	42.16	56.00	-13.60	NEUTRAL	QP
9	0.953	40.98	0.25	40.73	56.00	-15.02	NEUTRAL	QP
10	0.953	28.35	0.25	28.10	46.00	-17.65	NEUTRAL	AVERAGE
11	1.338	41.57	0.27	41.30	56.00	-14.43	NEUTRAL	QP
12	1.338	29.60	0.27	29.33	46.00	-16.40	NEUTRAL	AVERAGE
13	1.810	38.17	0.28	37.89	56.00	-17.83	NEUTRAL	QP
14	1.810	26.83	0.28	26.55	46.00	-19.17	NEUTRAL	AVERAGE

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.
4. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the EUT shall be deemed to meet both limits.

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 type="checkbox"/>	Below 108	1000
<input type="checkbox"/>	108 - 500	2000
<input type="checkbox"/>	500 - 1000	5000
<input checked="" 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)	Class A Equipment	Class B Equipment
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 230	40	30
230 to 1000	47	37

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)	Class A Equipment		Class B Equipment	
	Peak (dBμV/m)	Average (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
1 to 3	76	56	70	50
3 to 6	80	60	74	54

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

3.2 Test Instruments

☒ Below 1GHz measurement

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESCS 30/ 836858/020	Sept. 19, 2016	Sept. 19, 2017
Bilog Antenna with 4dB Attenuator	SCHWARZBEC K & Mini-Circuits	VULB 9168 & UNAT-4+/ VULB 9168-618 & 001	June 20, 2017	June 20, 2018
Bilog Antenna with 4dB Attenuator	SCHWARZBEC K & Mini-Circuits	VULB 9168 & UNAT-4+/ VULB 9168-619 & 002	July 14, 2016	July 14, 2017
Pre-Amplifier	Mini-circuit	ZKL-1R5+/ 001	Feb. 18, 2017	Aug. 18, 2017
Pre-Amplifier	Mini-circuit	ZKL-1R5+/ 002	Feb. 18, 2017	Aug. 18, 2017
Spectrum Analyzer	R&S	FSP7/ 100108	Sept. 5, 2016	Sept. 5, 2017
Spectrum Analyzer	R&S	FSP7/ 100384	Feb. 7, 2017	Feb. 7, 2018
RF Cable	JYEBAO	0214/ C0058 + C0049 + C0049-2 + RSU + C0050-3	Feb. 18, 2017	Aug. 18, 2017
RF Cable	JYEBAO	0214/ C0059 + C0050 + C0050-2 + RSU + C0050-3	Feb. 18, 2017	Aug. 18, 2017
Test Software	Audix	e3/ V6.110303a	NCR	NCR
TR1 Semi - anechoic Chamber	ETS. LINDGREN	TR1/ 17627-B	Feb. 18, 2017	Feb. 18, 2018

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.

☒ Above 1GHz measurement (TR1)

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Horn Antenna	EMCO	3117/ 0082847	Nov. 23, 2016	Nov. 23, 2017
Bore-sight Antenna Mast	Sunol	TLT2/ 051110-5	NCR	NCR
Pre-Amplifier	MITEQ	TTA1800-30-HG-N-M/ 1904295	Nov. 22, 2016	Nov. 22, 2017
RF Cable	Suhner	Sucoflex 104 / C0093	Feb. 22, 2017	August 22, 2017
MXA Signal Analyzer	KeySight	N9020A/ MY54420147	June 27, 2017	June 27, 2018
Test Software	Audix	e3/ V9 20150907c	NCR	NCR
TR1 Semi - anechoic Chamber with absorber	ETS. LINDGREN	TR1/ 17627-B	Feb. 11, 2017	Feb. 11, 2018

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 site VSWR 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_{cisp} in table 1 of CISPR 16-4-2.

Test Site (Measuring distance)	Polarization	Frequency Range	
		30MHz ~200MHz	200MHz ~1000MHz
TR1(10m)	Horizontal	3.76dB	2.84dB
	Vertical	3.86dB	3.06dB

Test Site (Measuring distance)	Polarization	Frequency Range
		1GHz ~6GHz
TR1(3m)	Horizontal	4.60dB
	Vertical	4.62dB
TR300(3m)	Horizontal	5.08dB
	Vertical	5.02dB

3.3 Test Procedures

Below 1GHz measurement

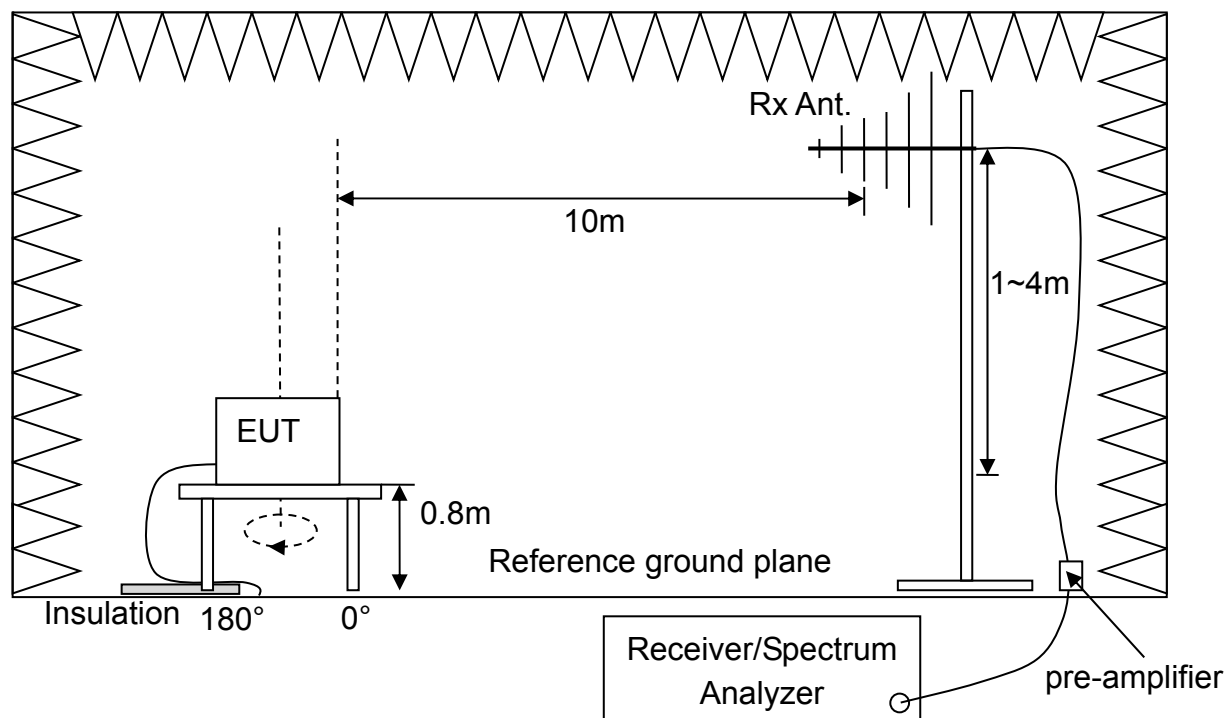
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane and 10 meters away from 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. For EN 55032, all cables connecting to AE located outside the chamber shall drop directly to, but be insulated from, the RGP (or turntable). The thickness of the insulation shall not be more than 150 mm.
- e. Rapidly sweep the signal from 30MHz to 1GHz by using the spectrum through the Maximum-peak detector.
- f. 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.
- g. 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.
- h. 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.
- i. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.
- j. Change the receiving antenna to another polarization to measure radiated emission by following step d. to h. again.
- k. 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

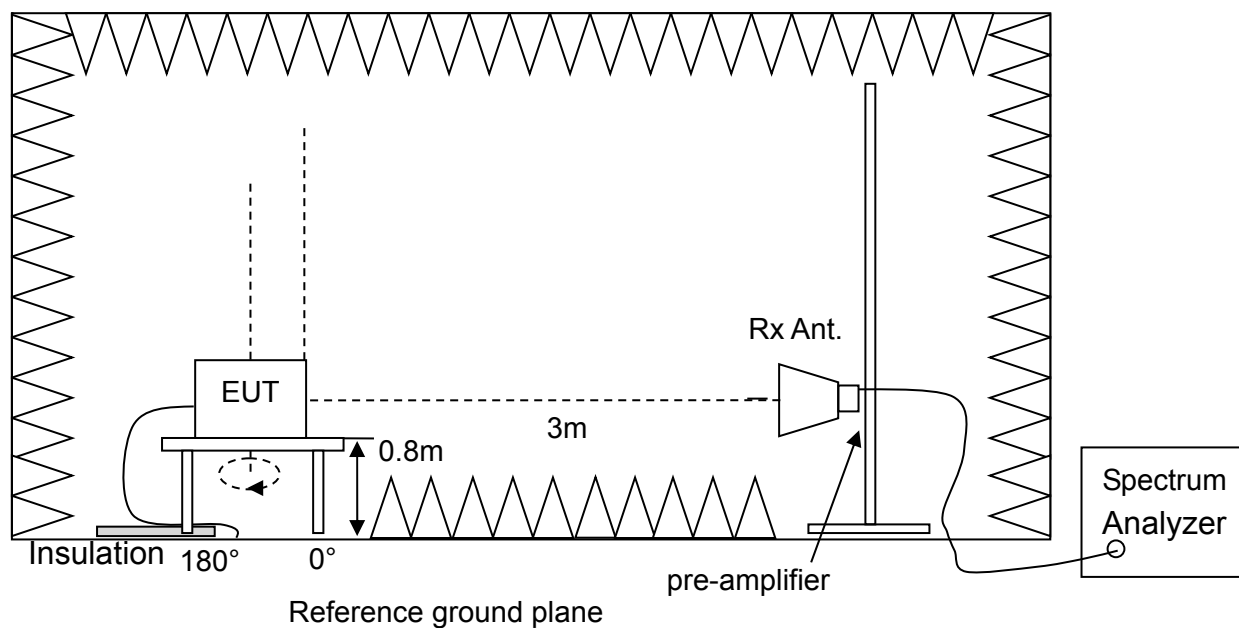
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it should be placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 3 meters 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. For EN 55032, all cables connecting to AE located outside the chamber shall drop directly to, but be insulated from, the RGP (or turntable). The thickness of the insulation shall not be more than 150 mm.
- e. If the 3dB beamwidth of the receiving antenna (minima w is 1.41m 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. Rapidly sweep the signal from 1GHz to the upper frequency of measurement range by using the spectrum through the Maximum-peak detector.
- g. 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.
- h. Then measure each frequency found from step e. by using the spectrum with rotating the EUT to determine the maximum peak and average level.
- i. Record frequency, azimuth angle of the turntable and compare the maximum level with the required limit.
- j. 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



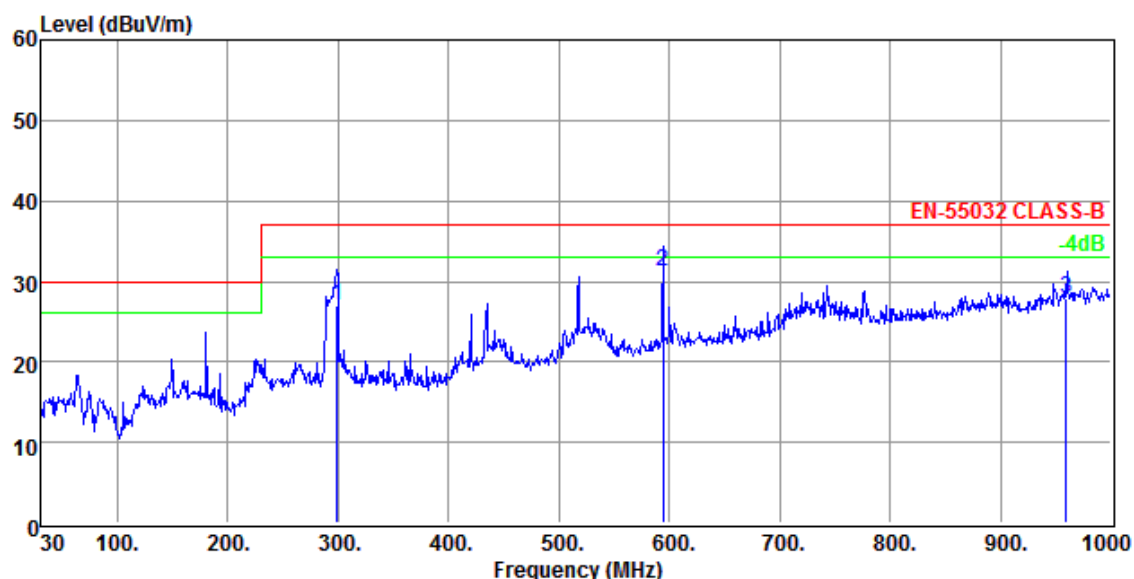
3.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

3.6 Test Results

Radiated Emission Measurement below 1000MHz

Test Mode : Mode 12 **Test Voltage** : 230Vac/50Hz
Test Engineer : Jeffry **Temperature** : 24°C
Humidity : 67%RH **Frequency Range** : 30MHz~1000MHz
IF Bandwidth : 120kHz **Polarization** : Horizontal



	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	299.24	27.04	47.15	-20.11	37.00	-9.96	290	169	HORIZONTAL	QP
2	594.01	31.23	43.31	-12.08	37.00	-5.77	160	151	HORIZONTAL	QP
3	959.97	27.78	35.38	-7.60	37.00	-9.22	104	58	HORIZONTAL	QP

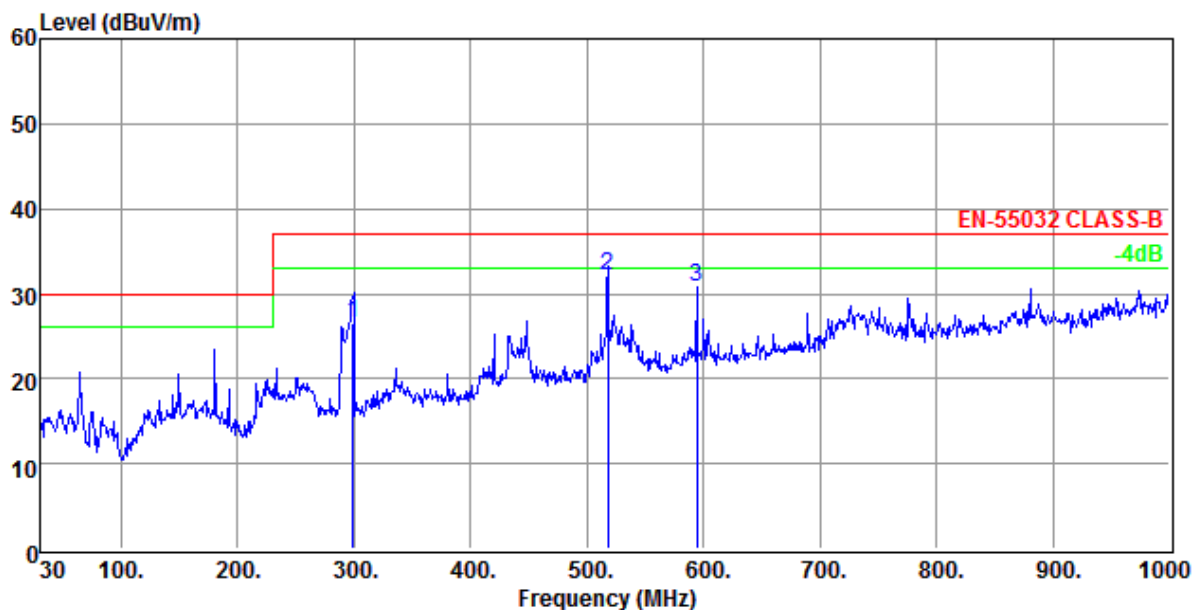
Note:

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.

	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	74.70	22.76	47.61	-24.85	30.00	-7.24	106	247	VERTICAL	QP
2	224.19	19.19	42.77	-23.58	30.00	-10.81	109	303	VERTICAL	QP
3	298.47	29.65	49.34	-19.69	37.00	-7.35	102	315	VERTICAL	QP
4	930.79	31.73	38.74	-7.01	37.00	-5.27	246	125	VERTICAL	QP

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 13 **Test Voltage** : 230Vac/50Hz
Test Engineer : Jeffry **Temperature** : 24°C
Humidity : 67%RH **Frequency Range** : 30MHz~1000MHz
IF Bandwidth : 120kHz **Polarization** : Horizontal

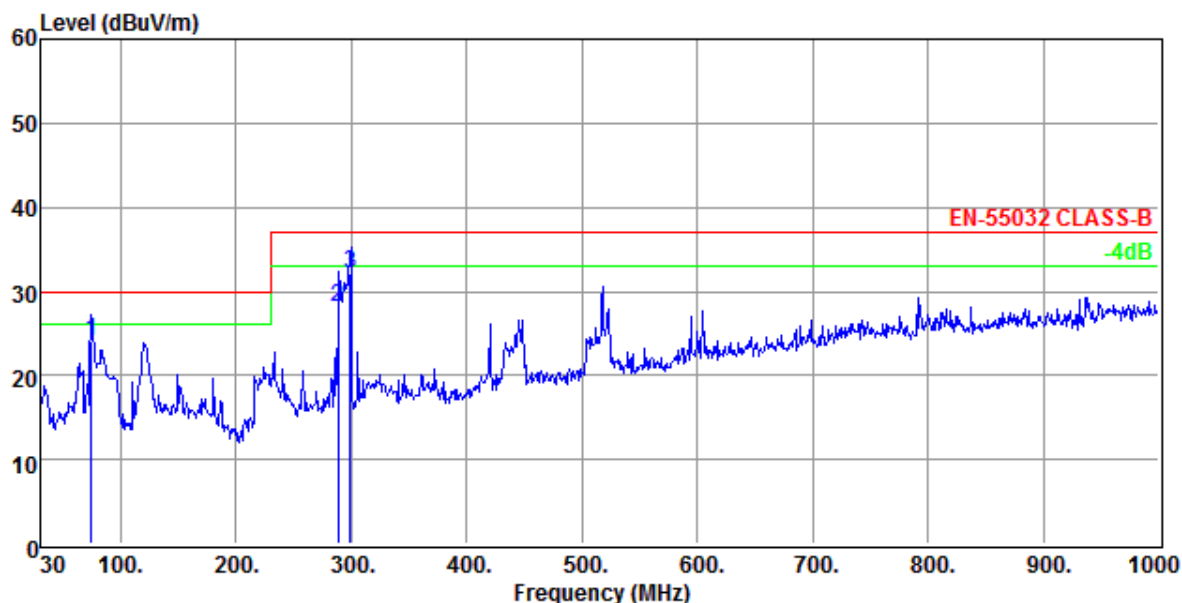


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	299.14	26.52	46.63	-20.11	37.00	-10.48	356	129	HORIZONTAL	QP
2	517.48	32.20	46.28	-14.08	37.00	-4.80	165	283	HORIZONTAL	QP
3	594.00	30.88	42.96	-12.08	37.00	-6.12	166	151	HORIZONTAL	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 13	Test Voltage	: 230Vac/50Hz
Test Engineer	: Jeffry	Temperature	: 24°C
Humidity	: 67%RH	Frequency Range	: 30MHz~1000MHz
IF Bandwidth	: 120kHz	Polarization	: Vertical



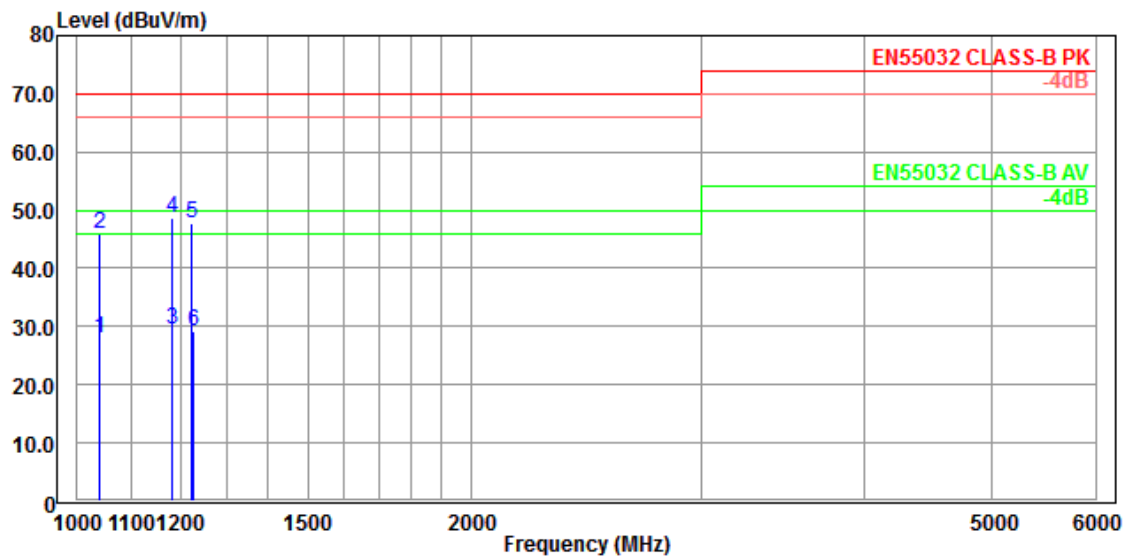
	Freq	Level	Read Level	Factor	Limit Line	Over Limit	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	74.62	24.02	48.84	-24.82	30.00	-5.98	105	284	VERTICAL	QP
2	288.45	28.06	47.89	-19.83	37.00	-8.94	101	325	VERTICAL	QP
3	299.05	32.19	51.88	-19.69	37.00	-4.81	100	311	VERTICAL	QP

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.

Radiated Emission Measurement above 1000MHz

Test Mode : Mode 12 **Test Voltage** : 230Vac/50Hz
Tester : David Wang **Temperature** : 26°C
Humidity : 73%RH **Frequency Range** : 1GHz~6GHz
IF Bandwidth : 1MHz **Polarization** : Horizontal

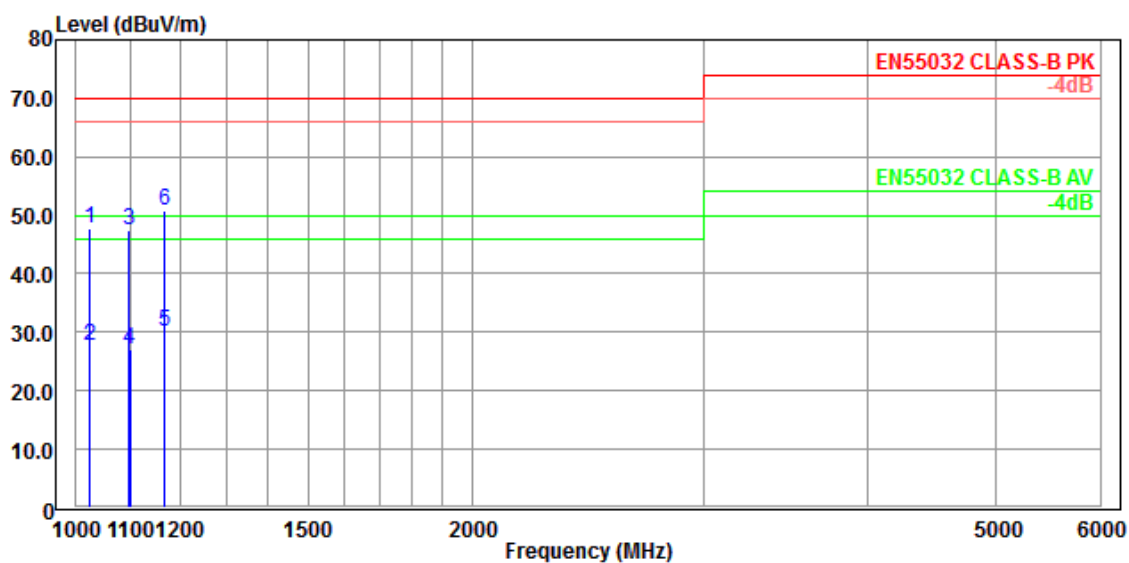


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1040.055	27.93	49.11	-21.18	50.00	-22.07	100	195	Horizontal	Average
2	1041.150	46.00	67.18	-21.18	70.00	-24.00	100	190	Horizontal	Peak
3	1182.780	29.44	50.54	-21.10	50.00	-20.56	100	204	Horizontal	Average
4	1183.240	48.56	69.66	-21.10	70.00	-21.44	100	199	Horizontal	Peak
5	1224.395	47.72	68.80	-21.08	70.00	-22.28	100	227	Horizontal	Peak
6	1225.485	29.09	50.16	-21.07	50.00	-20.91	100	231	Horizontal	Average

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.

Test Mode : Mode 12 **Test Voltage** : 230Vac/50Hz
Tester : David Wang **Temperature** : 26°C
Humidity : 73%RH **Frequency Range** : 1GHz~6GHz
IF Bandwidth : 1MHz **Polarization** : Vertical

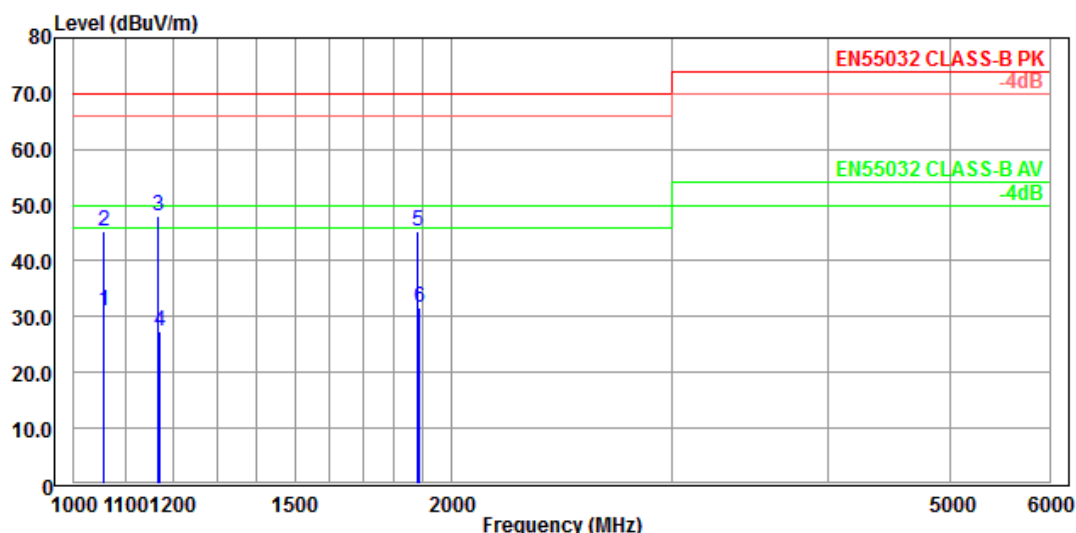


	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1023.125	47.87	69.07	-21.20	70.00	-22.13	100	356	Vertical	Peak
2	1024.345	27.59	48.79	-21.20	50.00	-22.41	100	351	Vertical	Average
3	1097.852	47.40	68.55	-21.15	70.00	-22.60	100	152	Vertical	Peak
4	1098.102	27.22	48.37	-21.15	50.00	-22.78	100	146	Vertical	Average
5	1167.620	30.18	51.30	-21.12	50.00	-19.82	100	180	Vertical	Average
6	1168.122	50.79	71.91	-21.12	70.00	-19.21	100	179	Vertical	Peak

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.

Test Mode : Mode 13 **Test Voltage** : 230Vac/50Hz
Tester : David Wang **Temperature** : 26°C
Humidity : 73%RH **Frequency Range** : 1GHz~6GHz
IF Bandwidth : 1MHz **Polarization** : Horizontal

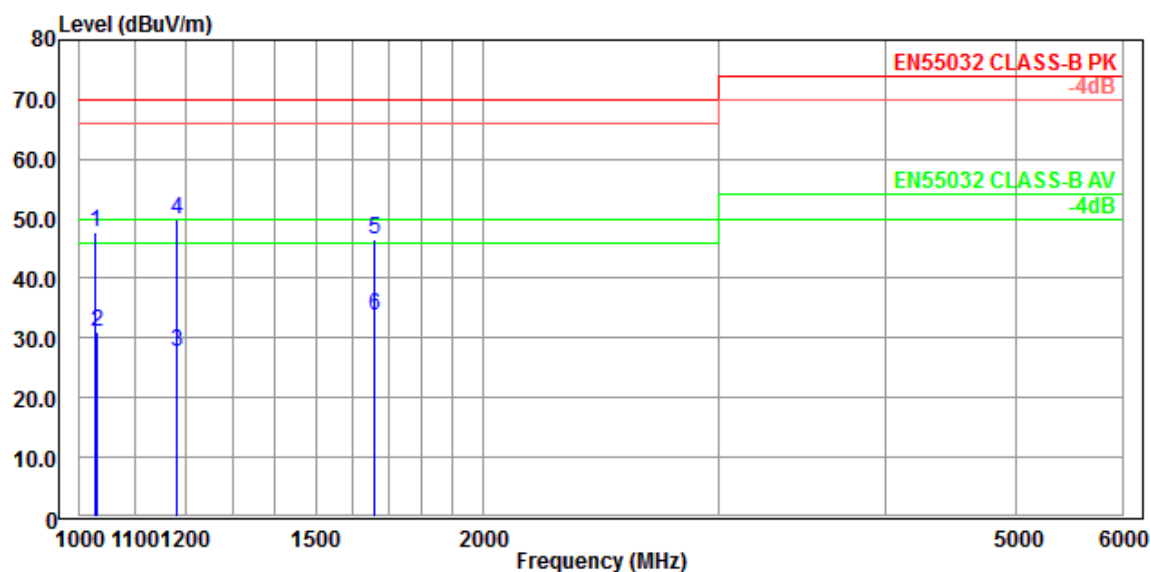


	Freq	Level	Read	Limit	Over	APos	TPos	Pol/Phase	Remark
	MHz	dBuV/m	Level	Factor	Line	Limit			
			dBuV	dB/m	dBuV/m	dB	cm	deg	
1	1054.824	30.92	52.10	-21.18	50.00	-19.08	100	333	Horizontal Average
2	1055.492	45.22	66.40	-21.18	70.00	-24.78	100	339	Horizontal Peak
3	1167.282	47.95	69.07	-21.12	70.00	-22.05	100	123	Horizontal Peak
4	1168.908	27.53	48.65	-21.12	50.00	-22.47	100	127	Horizontal Average
5	1882.144	45.24	63.33	-18.09	70.00	-24.76	100	189	Horizontal Peak
6	1883.260	31.52	49.61	-18.09	50.00	-18.48	100	193	Horizontal Average

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.

Test Mode : Mode 13 **Test Voltage** : 230Vac/50Hz
Tester : David Wang **Temperature** : 26°C
Humidity : 73%RH **Frequency Range** : 1GHz~6GHz
IF Bandwidth : 1MHz **Polarization** : Vertical



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	1028.210	47.71	68.90	-21.19	70.00	-22.29	100	4	Vertical	Peak
2	1029.410	30.91	52.10	-21.19	50.00	-19.09	100	2	Vertical	Average
3	1179.772	27.82	48.92	-21.10	50.00	-22.18	100	161	Vertical	Average
4	1180.366	50.03	71.13	-21.10	70.00	-19.97	100	155	Vertical	Peak
5	1659.160	46.59	66.34	-19.75	70.00	-23.41	100	217	Vertical	Peak
6	1660.732	33.68	53.41	-19.73	50.00	-16.32	100	220	Vertical	Average

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + antenna factor – gain of pre-amplifier.

4. Harmonic Current Emission Measurement

Test Result : **PASS**

4.1 Limits for Emission Measurement

☐ Limits for Class A equipment

Harmonic order (n)	Maximum permissible harmonic current (A)	Harmonic order (n)	Maximum permissible harmonic current (A)
Odd harmonics		Even Harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.3
9	0.40	$8 \leq n \leq 40$	$0.23 \cdot 8/n$
11	0.33		
13	0.21		
$15 \leq n \leq 39$	$0.15 \cdot 15/n$		

☐ Limits for Class B equipment

It shall not exceed the values give in class A multiplied by a factor of 1.5.

☐ Limits for Class C equipment

Harmonic order (n)	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda$ (λ is the circuit power factor)
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3

☒ Limits for Class D equipment

Harmonic order (n)	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
$13 \leq n \leq 39$ (odd harmonics only)	$3.85/n$	See class A

4.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Power Source	California Instrument	5001ix-208/ 56619	Oct. 14, 2016	Oct. 14, 2017
Power Analyzer		PACS-1/ 72398	Oct. 14, 2016	Oct. 14, 2017
Test Software	C.I.	CTS 4/ Ver. 4.11.2	NCR	NCR
TR7 shielded room	ETS. LINDGREN	TR7/ 15353-D	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 classification of the EUT as following:

Class A : - balanced three-phase equipment

- household appliances, excluding equipment identified as class D
- tools, excluding portable tools
- dimmers for incandescent lamps
- audio equipment
- equipments not specified in one of the three other classes

Class B : - portable tools

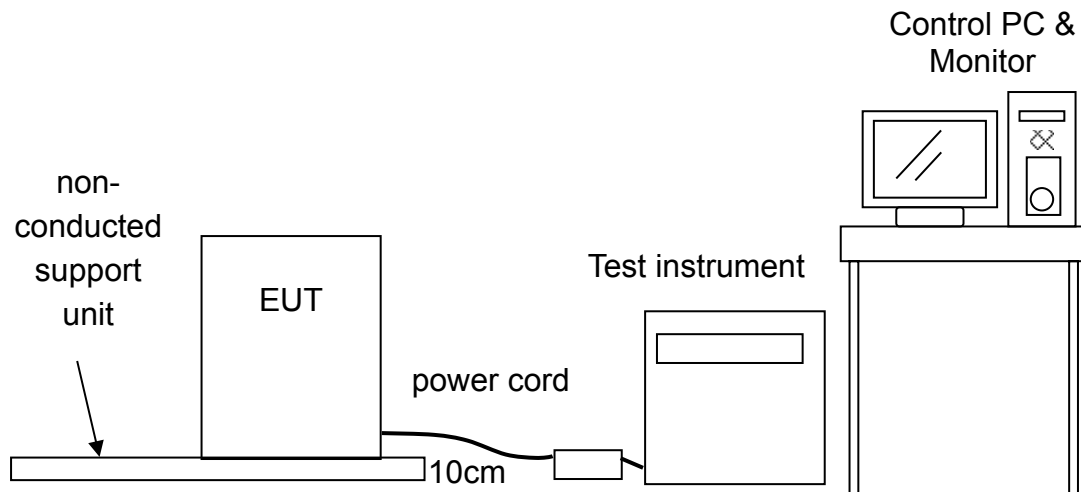
- arc welding equipment which is not professional equipment.

Class C : - lighting equipment

Class D : - Equipment specified power less than or equal to 600W of the following types:

- personal computers and personal computer monitors
 - television receivers
 - refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).
- 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



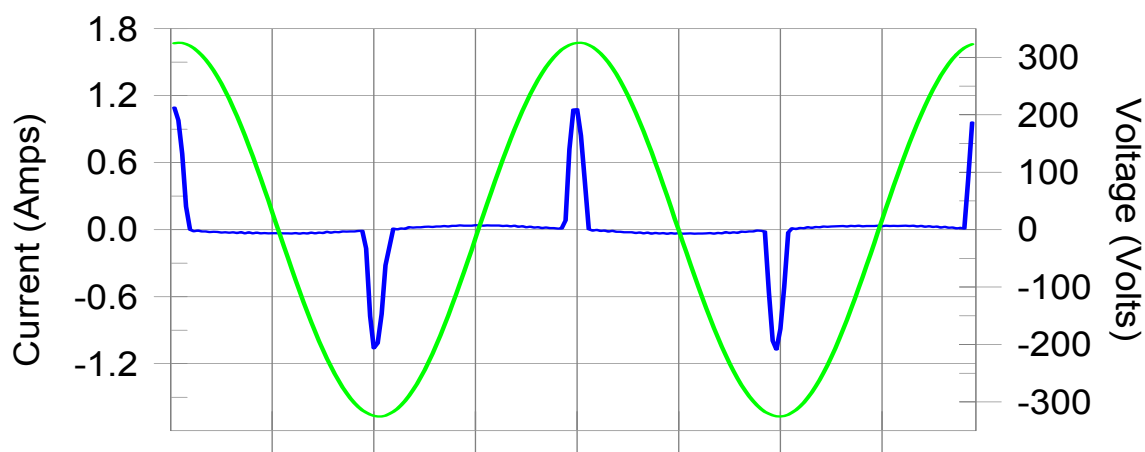
4.5 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

4.6 Test Results

Test Mode : Mode 7
Tester : Eddie
Temperature : 26°C
Humidity : 62%RH

Test Frequency (Hz)	50
Test Voltage (V)	230
Test observation period (Minutes)	10
Reference Current (A)	0.265
Power Factor	0.433
Power (Watt)	25.7
Total Harmonic Current, THC (A)	0.2
Total Harmonic Distortion, THD (%)	86



Note: The EUT power level is below 75.0 Watts and therefore has no defined limits

Test Raw Data:

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.000	N/A	0.002	0.000	N/A	N/L
3	0.106	0.087	N/A	0.109	0.131	N/A	N/L
4	0.001	0.000	N/A	0.001	0.000	N/A	N/L
5	0.101	0.049	N/A	0.104	0.073	N/A	N/L
6	0.001	0.000	N/A	0.001	0.000	N/A	N/L
7	0.094	0.026	N/A	0.096	0.039	N/A	N/L
8	0.001	0.000	N/A	0.001	0.000	N/A	N/L
9	0.084	0.013	N/A	0.086	0.019	N/A	N/L
10	0.001	0.000	N/A	0.001	0.000	N/A	N/L
11	0.074	0.009	N/A	0.075	0.014	N/A	N/L
12	0.001	0.000	N/A	0.001	0.000	N/A	N/L
13	0.062	0.008	N/A	0.063	0.012	N/A	N/L
14	0.001	0.000	N/A	0.001	0.000	N/A	N/L
15	0.050	0.007	N/A	0.051	0.010	N/A	N/L
16	0.001	0.000	N/A	0.001	0.000	N/A	N/L
17	0.039	0.006	N/A	0.040	0.009	N/A	N/L
18	0.001	0.000	N/A	0.001	0.000	N/A	N/L
19	0.028	0.005	N/A	0.029	0.008	N/A	N/L
20	0.000	0.000	N/A	0.001	0.000	N/A	N/L
21	0.018	0.005	N/A	0.019	0.007	N/A	N/L
22	0.000	0.000	N/A	0.001	0.000	N/A	N/L
23	0.010	0.004	N/A	0.011	0.006	N/A	N/L
24	0.000	0.000	N/A	0.000	0.000	N/A	N/L
25	0.005	0.004	N/A	0.005	0.006	N/A	N/L
26	0.000	0.000	N/A	0.000	0.000	N/A	N/L
27	0.005	0.004	N/A	0.005	0.006	N/A	N/L
28	0.000	0.000	N/A	0.000	0.000	N/A	N/L
29	0.007	0.003	N/A	0.008	0.005	N/A	N/L
30	0.000	0.000	N/A	0.000	0.000	N/A	N/L
31	0.009	0.003	N/A	0.009	0.005	N/A	N/L
32	0.000	0.000	N/A	0.000	0.000	N/A	N/L
33	0.009	0.003	N/A	0.009	0.004	N/A	N/L
34	0.000	0.000	N/A	0.000	0.000	N/A	N/L
35	0.008	0.003	N/A	0.009	0.004	N/A	N/L
36	0.000	0.000	N/A	0.000	0.000	N/A	N/L
37	0.007	0.003	N/A	0.007	0.004	N/A	N/L
38	0.000	0.000	N/A	0.000	0.000	N/A	N/L
39	0.005	0.003	N/A	0.006	0.004	N/A	N/L
40	0.000	0.000	N/A	0.000	0.000	N/A	N/L

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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%;
- the voltage change with time, $d(t)$, during a voltage change shall not exceed 3.3% for more than 500ms.
- 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
Power Source	California Instrument	5001ix-208/ 56619	Oct. 14, 2016	Oct. 14, 2017
Power Analyzer		PACS-1/ 72398	Oct. 14, 2016	Oct. 14, 2017
Test Software	C.I.	CTS 4/ Ver. 4.11.2	NCR	NCR
TR7 shielded room	ETS. LINDGREN	TR7/ 15353-D	NCR	NCR

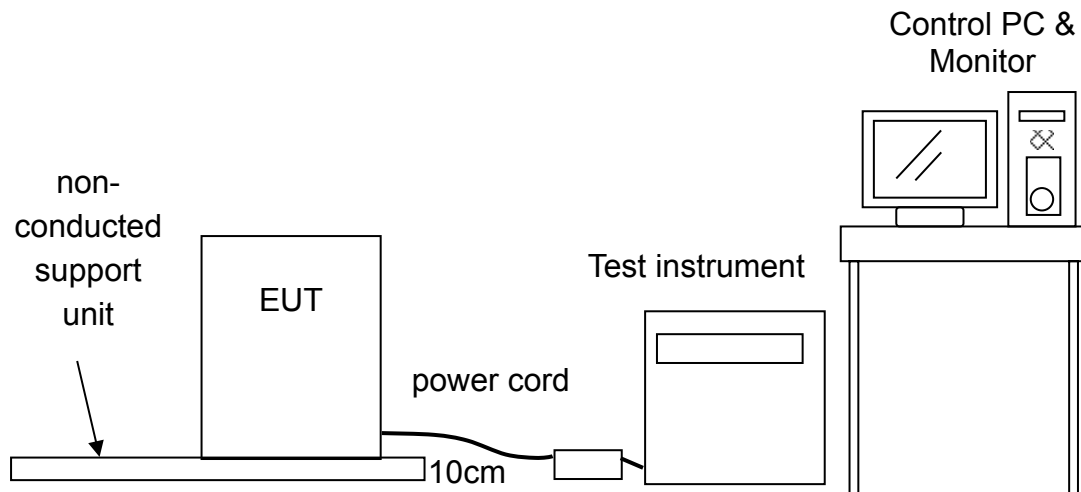
Note:

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 7
Tester : Eddie
Temperature : 26°C
Humidity : 62%RH

TEST FREQ		50 Hz
TEST VOLTS		230 Vac
TEST TIME		10 Minutes
	EUT Data	Limit
d(t)>3.3% (ms)	0	500
d _c (%)	0	3.3
d _{max} (%)	0	4
P _{st} max	0.230	1
P _{lt} max	0.101	0.65

6. Electrostatic Discharge (ESD) Immunity Test

Test Result : PASS

6.1 Specifications of Immunity Test Requirement

Product (Generic) Standard	: EN 55024 as §1.3 described and requirement of manufacturer
Basic Standard	: IEC 61000-4-2
Required Performance	: B
Test Level	: 2 (Contact discharge) 3 (Air discharge)
Discharge Voltage	: Contact → ±2kV, ±4kV (Direct / Indirect discharge) Air → ±2kV, ±4kV, ±8kV (Direct discharge)
Time Interval	: 1 sec. minimum
Number of discharges	: Minimum 50 times at each test point (Contact) Minimum 20 times at each test point (Air)
Test Voltage	: 230Vac/50Hz
Tester	: Scott
Ambient Temperature	: 22°C
Relative Humidity	: 45%
Atmospheric Pressure	: 1008mbar

6.2 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.

6.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Electrostatic Generator	EM TEST	DITO/ V0537100716	July 25, 2016	July 25, 2017
TR8 shielded room	ETS. LINDGREN	TR8/ 15353-C	NCR	NCR

Note:

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

6.4 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.

Special Test Requirements for Information Technology Equipment (ITE)

The discharges shall be applied in two ways as below:

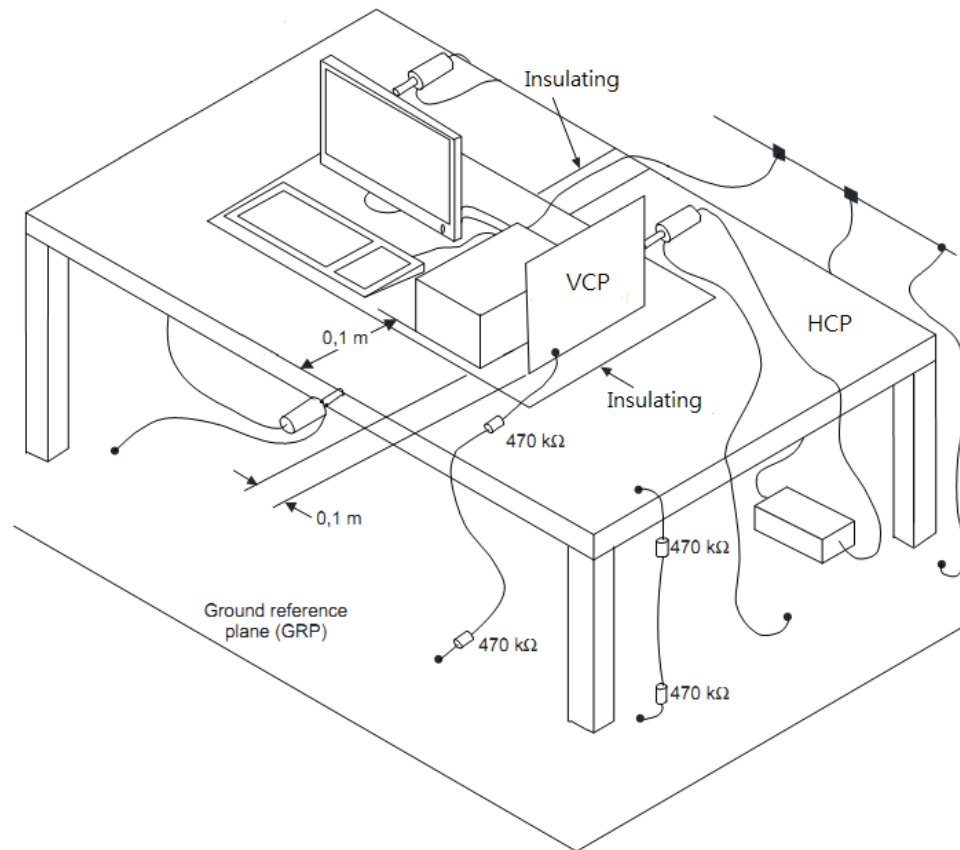
- a. Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, at least 200 indirect discharges shall be applied in the indirect mode (for use of the VCP).

- b. Air discharges at slots and apertures and insulating surfaces:

A minimum of 10 single air discharges shall be applied to the each selected test point.

6.5 Test Configurations



6.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

6.7 Test Results

Test Mode : Mode 7

Discharge Voltage (kV)	Type of discharge	Label for Dischargeable Points	Performance		Result (Pass/Fail)
			Required	Observation	
±2	Contact	No dischargeable point	B	A(1)	Pass
±4	Contact	No dischargeable point	B	A(1)	Pass
±2	Air	No dischargeable point	B	A(1)	Pass
±4	Air	1~8	B	A(1)	Pass
±8	Air	1~8	B	B(2)	Pass
±2	HCP-Bottom	Edge of the HCP	B	A(1)	Pass
±2	VCP-Front	Center of the VCP	B	A(1)	Pass
±2	VCP-Left	Center of the VCP	B	A(1)	Pass
±2	VCP-Back	Center of the VCP	B	A(1)	Pass
±2	VCP-Right	Center of the VCP	B	A(1)	Pass
±4	HCP-Bottom	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.
- (2) The pictures on the display of EUT would flicker while test is performing, it could self-recover after 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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-3
Required Performance	: A
Test Level	: 2
Field Strength	: 3 V/m
Test Frequency Range	: 80MHz ~ 1GHz
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	: Eric Lin
Ambient Temperature	: 23°C
Relative Humidity	: 70%
Atmospheric Pressure	: 1008mbar

7.2 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.

7.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Signal Generator	R&S	SMB 100A / 113868	March 10, 2017	March 10, 2018
Dual Directional Coupler	AR	DC-6180 / 28730	Jan. 18, 2017	Jan. 18, 2018
	AR	DC7205A / 0347145	Dec. 16, 2016	Dec. 16, 2017
Boardband Amplifier	TESEQ	CBA 1G-275 / T4428	NCR	NCR
	R&S	BBA150 / 308785	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 / 336500	Feb. 23, 2017	Feb. 23, 2018
Average Power Sensor	R&S	NRP6AN / 101001	March 13, 2017	March 13, 2018
Test Software	Audix	i2 / V5.160802a	NCR	NCR
TR3 fully-anechoic chamber	ETS. LINDGREN	TR3/ 15353-I	April 7, 2017	April 7, 2018

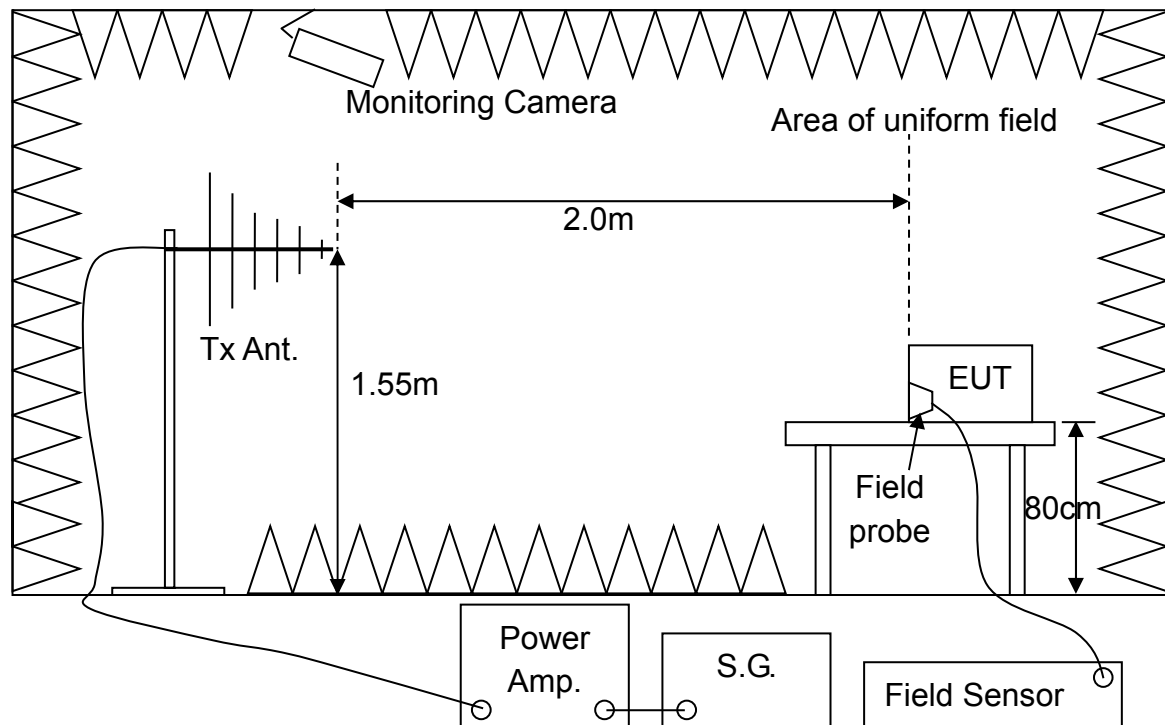
Note:

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.

7.4 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 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 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.

7.5 Test Configurations



7.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

7.7 Test Results

Test Mode : Mode 7

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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-4
Required Performance	: B
Test Level	: 2
Voltage Peak	: <input checked="" type="checkbox"/> ±1kV (on power supply port) <input type="checkbox"/> ±0.5kV (on I/O signal, data and control 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	: Eddie
Ambient Temperature	: 23°C
Relative Humidity	: 60%
Atmospheric Pressure	: 1015mbar

8.2 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.

8.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EFT/Burst Simulator	EMC PARTNER	TRA2000IN6/ 870	May 11, 2017	May 11, 2018
Coupling Clamp	EMC PARTNER	CN-EFT1000/ 532	Aug. 11, 2016	Aug. 11, 2017
Test Software	EMC PARTNER	TEMA/ Ver. 2.05	NCR	NCR
TR7 shielded room	ETS. LINDGREN	TR7/ 15353-D	NCR	NCR

Note:

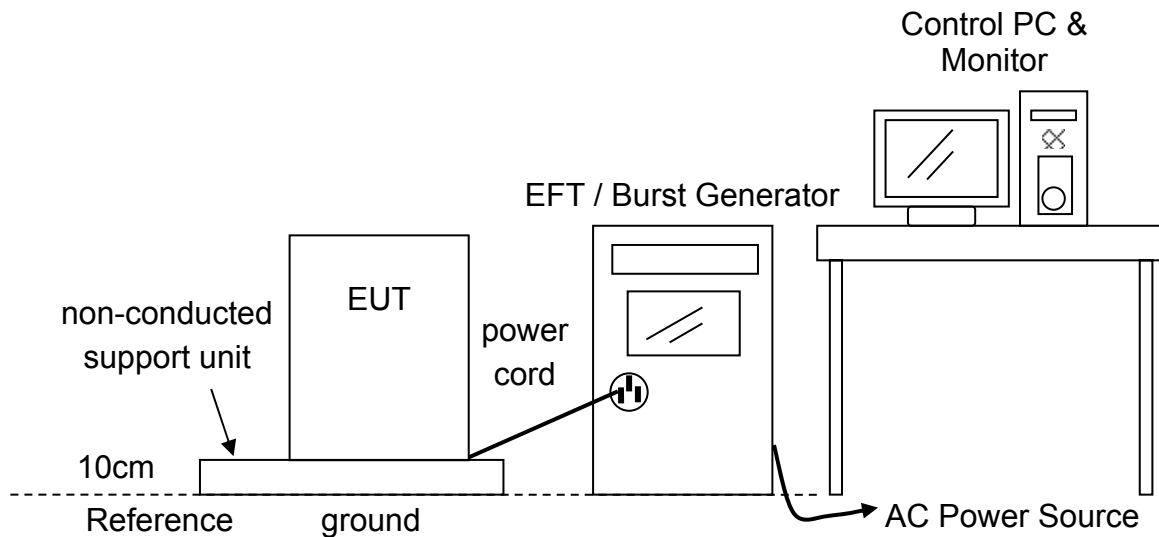
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

8.4 Test Procedures

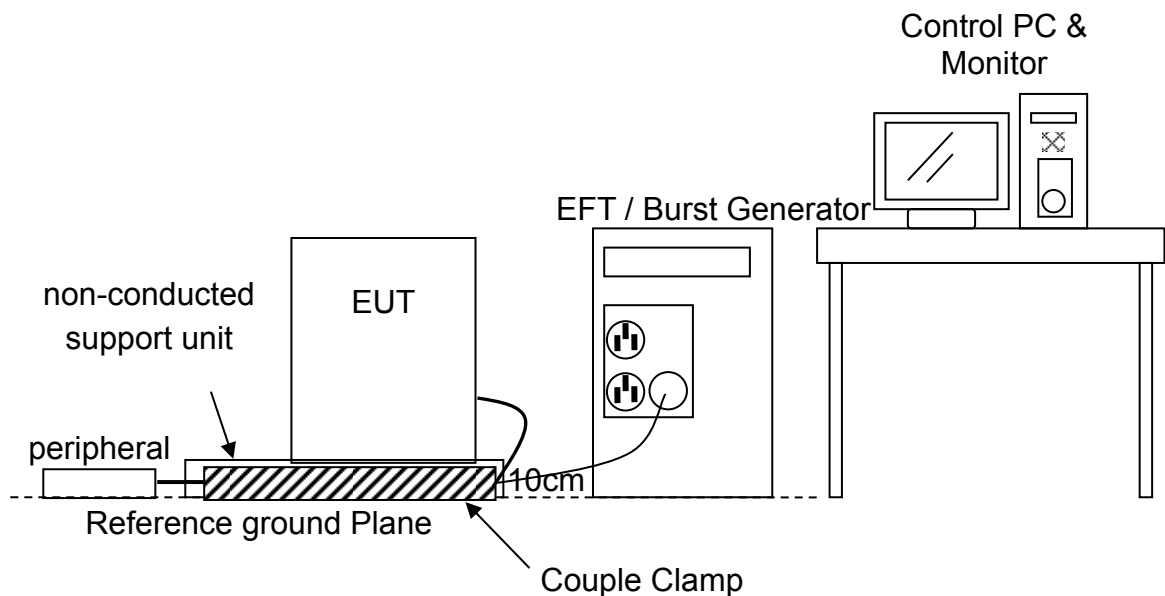
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a non-conducted support with a height 0.1 meters above the ground reference plane. Also the ground 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.

8.5 Test Configurations

Power supply port Test



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



8.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

8.7 Test Results

Test Mode : Mode 7

Injected Line	Voltage Peak (kV)	Injected Method	Performance		Result (Pass/Fail)
			Required	Observation	
L1	±1.0	Direct	B	A(1)	Pass
L2	±1.0	Direct	B	A(1)	Pass
PE	±1.0	Direct	B	A(1)	Pass
L1 - L2 - PE	±1.0	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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-5
Required Performance	: B
Test Level	: <input checked="" type="checkbox"/> 3 (line to line on power supply port) <input checked="" type="checkbox"/> 3 (line to earth (ground) on power supply 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 power supply port) <input checked="" type="checkbox"/> ±0.5kV, ±1kV, ±2kV (line to earth (ground) on power supply port) <input type="checkbox"/> ±0.5kV, ±1kV (on I/O signal, data and control port)
CW Waveform (T_r/T_h)	: 1.2 / 50 μ s (open-circuit voltage) 8 / 20 μ s (short-circuit current)
Phase Angle	: 0°, 90°, 180°, 270°
Repetition Rate	: 1/min. maximum
Number of Test	: at least 5 positive and 5 negative at selected points
Test Voltage	: 230Vac/50Hz
Tester	: Eddie
Ambient Temperature	: 23°C
Relative Humidity	: 60%
Atmospheric Pressure	: 1015mbar

9.2 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.

9.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Surge Simulator	EMC PARTNER	TRA2000IN6/ 870	May 11, 2017	May 11, 2018
Test Software	EMC PARTNER	TEMA/ Ver. 2.05	NCR	NCR
TR7 shielded room	ETS. LINDGREN	TR7/ 15353-D	NCR	NCR

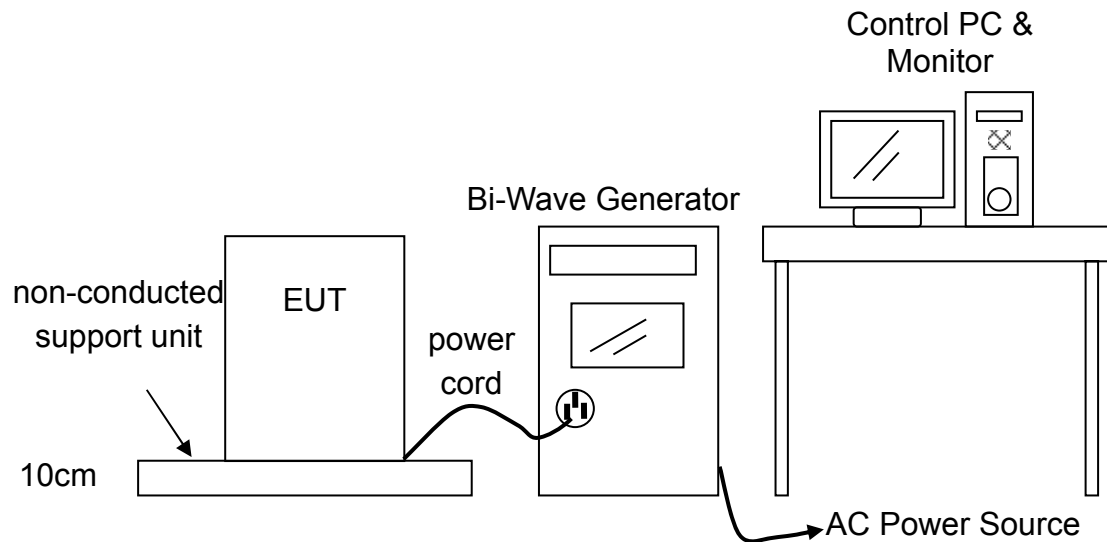
Note:

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

9.4 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.

9.5 Test Configurations



9.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

9.7 Test Results

Test Mode : Mode 7

Coupled Line	Open-circuit Test Voltage (kV)	Performance					Result (Pass/Fail)
		Required	Observation				
			0°	90°	180°	270°	
L1 - PE	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
L2 - PE	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
L1 - L2	±0.5	B	A(1)	A(1)	A(1)	A(1)	Pass
L1 - PE	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
L2 - PE	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
L1 - L2	±1	B	A(1)	A(1)	A(1)	A(1)	Pass
L1 - PE	±2	B	A(1)	A(1)	A(1)	A(1)	Pass
L2 - 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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-6
Required Performance	: A
Test Level	: 2
Voltage Level(e.m.f.)	: 3V (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 power supply 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 I/O signal, data and control port)
Test Voltage	: 230Vac/50Hz
Tester	: Wayne
Ambient Temperature	: 23°C
Relative Humidity	: 60%
Atmospheric Pressure	: 1010mbar

10.2 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.

10.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Signal Generator	R&S	SML03/ 101676	July 16, 2016	July 16, 2017
Dual Directional Coupler	AR	DC2600/ 28834	Jan. 18, 2017	Jan. 18, 2018
Power Amplifier	AR	75A250/ 28845	NCR	NCR
CDN	FCC	<input type="checkbox"/> FCC-801-M2-16A/ 2032	Jan. 18, 2017	Jan. 18, 2018
		<input checked="" type="checkbox"/> FCC-801-M3-16A/ 2060	Jan. 18, 2017	Jan. 18, 2018
		<input type="checkbox"/> FCC-801-M5-16A/ 2020	Nov. 9, 2016	Nov. 9, 2017
	FCC	<input type="checkbox"/> FCC-801-T2/ 2032	Sept. 29, 2016	Sept. 29, 2017
		<input type="checkbox"/> FCC-801-T4-RJ45/ 08031	Sept. 29, 2016	Sept. 29, 2017
		<input type="checkbox"/> NCDN-T8-RJ45/ 06016	Sept. 29, 2016	Sept. 29, 2017
ATTENUATOR	BIRD	300-A-MFN-06/ 37	Oct. 3, 2016	Oct. 3, 2017
EM CLAMP	TESEQ	KEMZ 801A / 38676	Sept. 29, 2016	Sept. 29, 2017
Dual Channel Power Meter	R&S	NRVD/ 100499	Jan. 18, 2017	Jan. 18, 2018
Power Sensor	R&S	URV5-Z2/ 835640/013	Jan. 18, 2017	Jan. 18, 2018
	R&S	URV5-Z2/ 100731	Jan. 18, 2017	Jan. 18, 2018
Test Software	Audix	i2/ V5.10.5	NCR	NCR
AR shielded room	ETS. LINDGREN	AR/ 15353-J	NCR	NCR

Note:

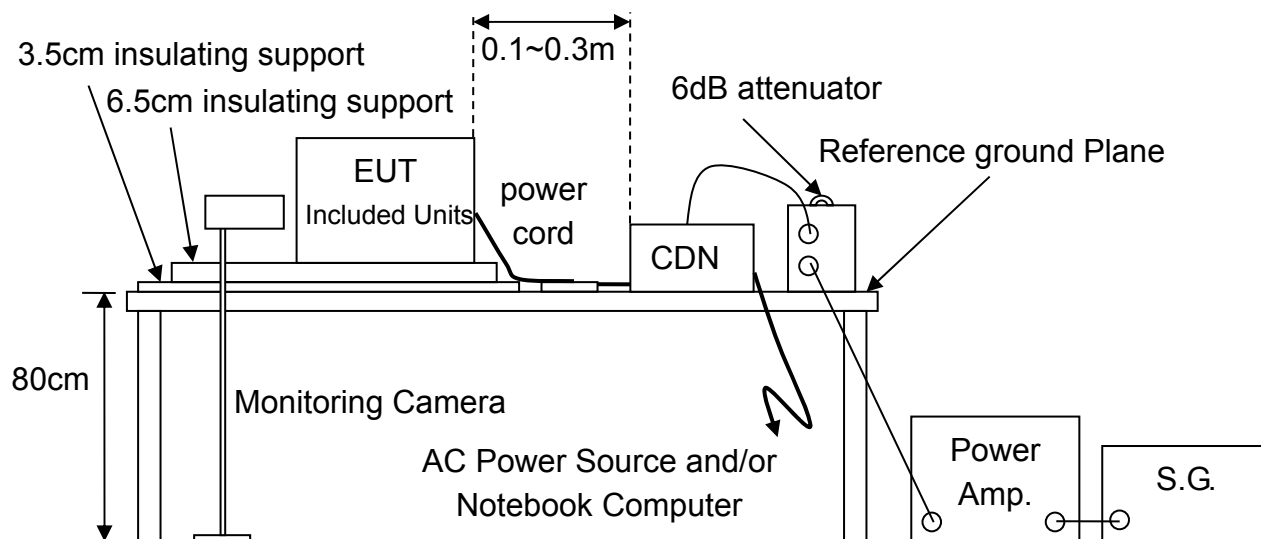
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

10.4 Test Procedures

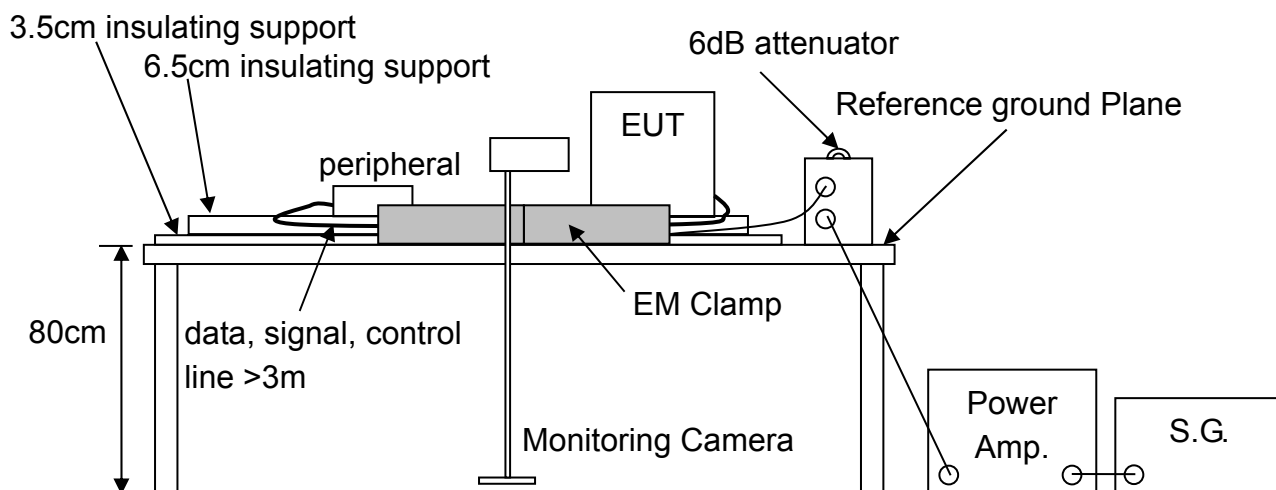
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a non-conducted support with a height 0.1 meters above the ground reference plane. Also the ground 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.

10.5 Test Configurations

Power supply and/or LAN port Test



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



10.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

10.7 Test Results

Test Mode : Mode 7

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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-8
Required Performance	: A
Test Level	: 1
Magnetic Field Strength	: 1 A/m
Power Frequency	: 50 Hz
Test Duration	: 1 min.
Magnetic Field Orientation	: X, Y, Z-axis
Test Voltage	: 230Vac/50Hz
Environment Magnetic Field	: 0.02 A/m (< 0.1 A/m (20dB below the test field))
Tester	: Tevin
Ambient Temperature	: 23°C
Relative Humidity	: 60%
Atmospheric Pressure	: 1010mbar

11.2 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.

11.3 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	June 29 2017	June 29,2018
Coil	FCC	F-1000-4-8-L-1M / 1007	June 29 2017	June 29,2018
Low Frequency Gauss Meter	F.W. BELL	4190 / 1010002	April 19, 2017	April 19, 2018
TR12 Plane Grounding Site	CRC	TR12	NCR	NCR

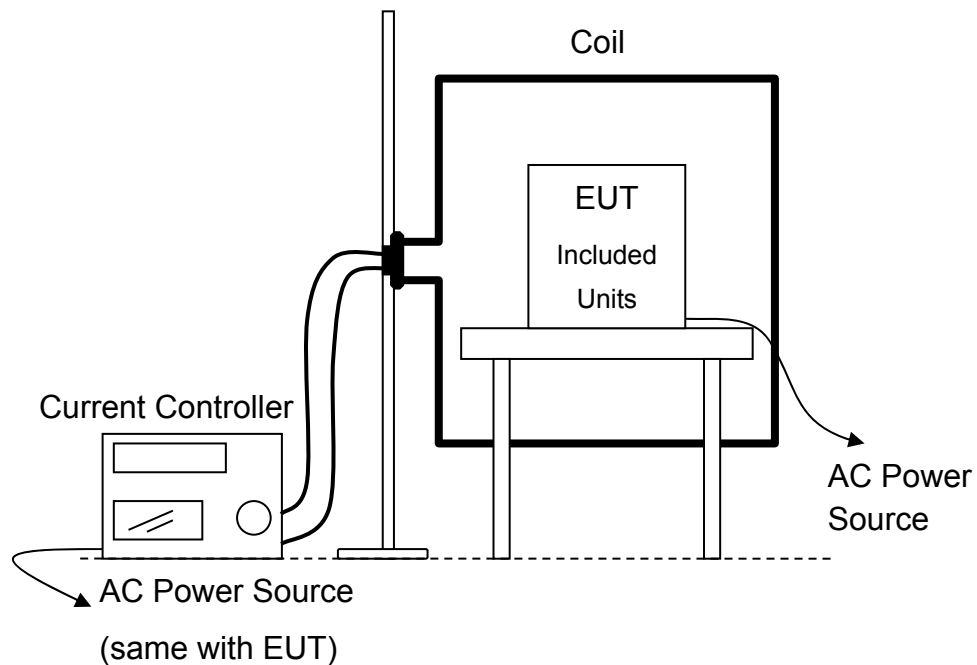
Note:

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

11.4 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 Guass 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.

11.5 Test Configurations



11.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

11.7 Test Results

Test Mode : Mode 7

Magnetic Field Orientation	Magnetic Field (A/m)	Frequency (Hz)	Performance		Result (Pass/Fail)
			Required	Observation	
X-axis	1	50	A	A(1)	Pass
Y-axis	1	50	A	A(1)	Pass
Z-axis	1	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 55024 as §1.3 described
Basic Standard	: IEC 61000-4-11
Required Performance and Test Level	: <input checked="" type="checkbox"/> B for 0% residual voltage dips with 0.5 cycle <input checked="" type="checkbox"/> C for 70% residual voltage dips with 25 cycles <input type="checkbox"/> C for 40% residual voltage dips <input checked="" type="checkbox"/> C for 0% residual voltage interruptions with 250 cycles
Basis Test Voltage Level (U_T)	: 240Vac/50Hz, 100Vac/50Hz
Test Duration	: Maximum 3 dips/interruptions with a sequence
Time interval	: 10s minimum between each test event
Phase Angle of Abrupt Changes	: 0°
Tester	: Eddie
Ambient Temperature	: 23°C
Relative Humidity	: 60%
Atmospheric Pressure	: 1015mbar

12.2 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.

12.3 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Voltage DIP Tester	EMC PARTNER	TRA2000IN6/ 870	May 11, 2017	May 11, 2018
Test Software	EMC PARTNER	TEMA/ Ver. 2.05	NCR	NCR
TR7 shielded room	ETS. LINDGREN	TR7/ 15353-D	NCR	NCR

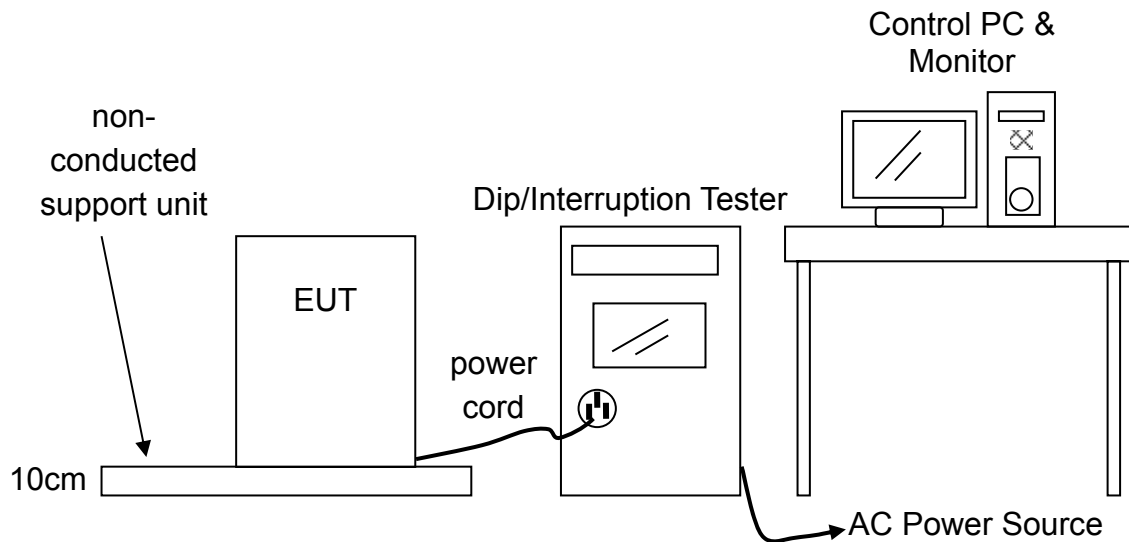
Note:

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

12.4 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.

12.5 Test Configurations



12.6 Photographs of the Test Configurations

Please refer to the Attachment 1 of the present report.

12.7 Test Results

Test Mode : Mode 7

Test Voltage : 100Vac/50Hz

Voltage Dips Test

Test level (% residual voltage)	Reduction Voltage (%)	Duration (cycle)	Performance		Result (Pass/Fail)
			Required	Observation	
0	>95	0.5	B	A(1)	Pass
70	30	25	C	A(1)	Pass

Voltage Interruption Test

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

Observation of Performance during Test

- (1) Normal operation condition specified by manufacturer during the test.
- (2) The EUT shuts down while test is performed, it can be restarted manually after the test.

Test Voltage : 240Vac/50Hz

Voltage Dips Test

Test level (% residual voltage)	Reduction Voltage (%)	Duration (cycle)	Performance		Result (Pass/Fail)
			Required	Observation	
0	>95	0.5	B	A(1)	Pass
70	30	25	C	A(1)	Pass

Voltage Interruption Test

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

Observation of Performance during Test

- (1) Normal operation condition specified by manufacturer during the test.
- (2) The EUT shuts down while test is performed, it can be restarted manually after the test.

Attachment 1

Photographs of the Test Configurations

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1. Conducted Emission Measurement

Mode 12



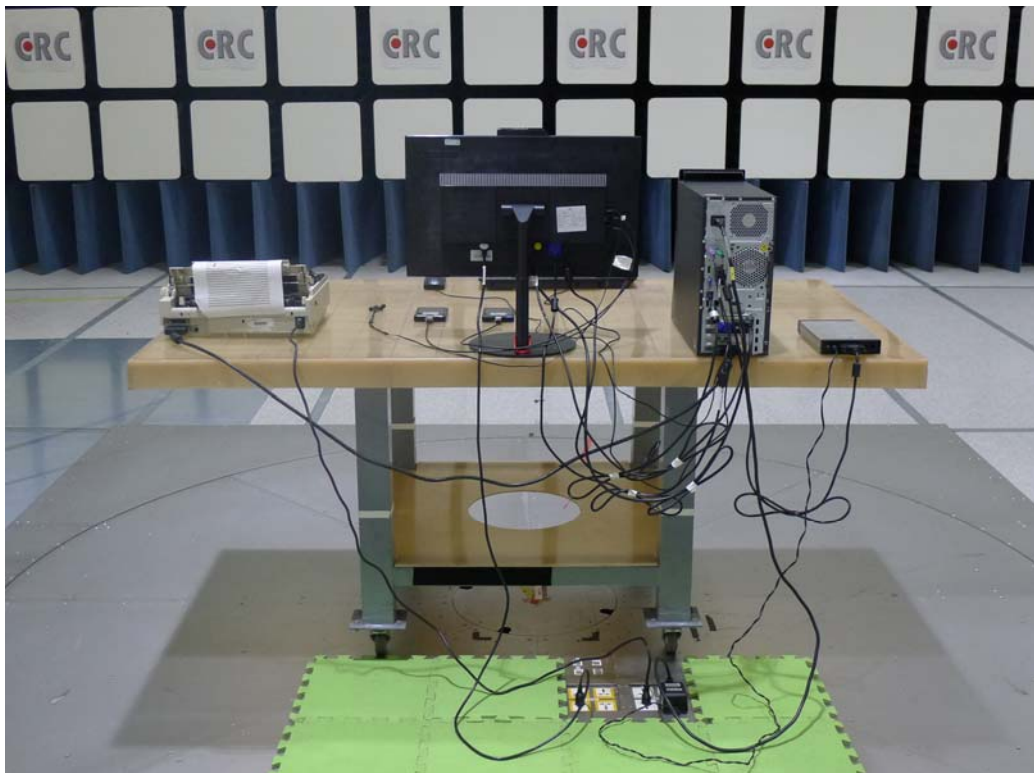
Mode 13



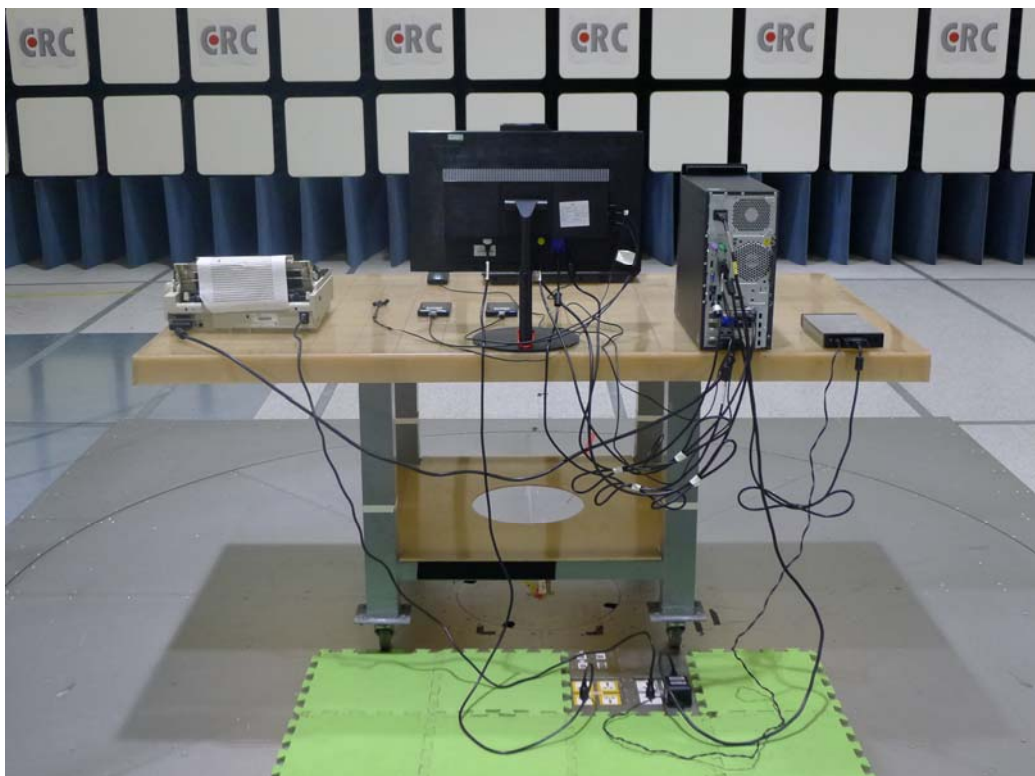
2. Radiated Emission Measurement

Mode 12

Below 1GHz



Mode 13



Above 1GHz

Mode 12



Mode 13



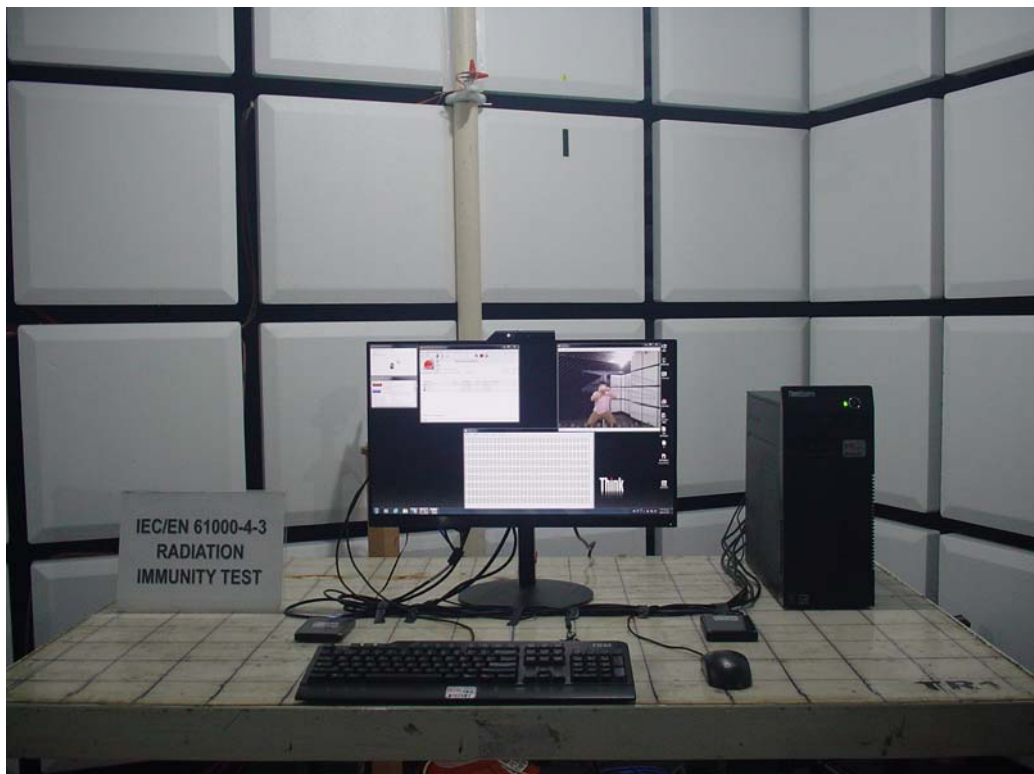
3. Harmonic Current & Voltage Fluctuations Emission Measurement



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

