

CE EMC Test Report

Report No.: CE180319D04

Test Model: EA271U

Model No.: EA271U, EA271U-BK

Received Date: Mar. 19, 2018

Test Date: Mar. 21 ~ 27, 2018

Issued Date: Mar. 28, 2018

Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

Address: 10F., No 230, Liancheng Rd., Zhonghe Dist., New Taipei City 23553, Taiwan

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan



Certificate #4327.01



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the federal government. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	7
2.2 Modification Record	7
3 General Information	8
3.1 Features of EUT	8
3.2 General Description of EUT	8
3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode	9
3.4 Test Program Used and Operation Descriptions	10
4 Configuration and Connections with EUT	11
4.1 Connection Diagram of EUT and Peripheral Devices	11
4.2 Configuration of Peripheral Devices and Cable Connections	12
5 Conducted Emission from the AC Mains Power Port	13
5.1 Limits	13
5.2 Test Instruments	13
5.3 Test Arrangement	14
5.4 Test Results	15
6 Radiated Emission at Frequencies up to 1GHz	27
6.1 Limits	27
6.2 Test Instruments	27
6.3 Test Arrangement	28
6.4 Test Results	29
7 Radiated Emission at Frequencies above 1GHz	35
7.1 Limits	35
7.2 Test Instruments	36
7.3 Test Arrangement	37
7.4 Test Results	38
8 Harmonics Current Measurement	44
8.1 Limits	44
8.2 Classification of Equipment	44
8.3 Test Instruments	44
8.4 Test Arrangement	45
8.5 Test Results	45
9 Voltage Fluctuations and Flicker Measurement	46
9.1 Limits	46
9.2 Test Instruments	46
9.3 Test Arrangement	46
9.4 Test Results	47
10 General Immunity Requirements	48
10.1 Performance Criteria	49

11	Electrostatic Discharge Immunity Test (ESD)	50
11.1	Test Specification	50
11.2	Test Instruments	50
11.3	Test Arrangement	50
11.4	Test Results	52
12	Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)	56
12.1	Test Specification	56
12.2	Test Instruments	56
12.3	Test Arrangement	57
12.4	Test Results	57
13	Electrical Fast Transient/Burst Immunity Test (EFT)	58
13.1	Test Specification	58
13.2	Test Instruments	58
13.3	Test Arrangement	59
13.4	Test Results	59
14	Surge Immunity Test	60
14.1	Test Specification	60
14.2	Test Instruments	60
14.3	Test Arrangement	61
14.4	Test Results	62
15	Immunity to Conducted Disturbances Induced by RF Fields (CS)	63
15.1	Test Specification	63
15.2	Test Instruments	63
15.3	Test Arrangement	64
15.4	Test Results	65
16	Power Frequency Magnetic Field Immunity Test	66
16.1	Test Specification	66
16.2	Test Instruments	66
16.3	Test Arrangement	66
16.4	Test Results	67
17	Voltage Dips and Interruptions	68
17.1	Test Specification	68
17.2	Test Instruments	68
17.3	Test Arrangement	68
17.4	Test Results	69
18	Pictures of Test Arrangements	70
18.1	Conducted Emission from the AC Mains Power Port	70
18.2	Radiated Emission at Frequencies up to 1GHz	72
18.3	Radiated Emission at Frequencies above 1GHz	74
18.4	Harmonics Current, Voltage Fluctuations and Flicker Measurement	76
18.5	Electrostatic Discharge Immunity Test (ESD)	76
18.6	Radio-frequency, Electromagnetic Field Immunity Test (RS)	77
18.7	Electrical Fast Transient/Burst Immunity Test (EFT)	78
18.8	Surge Immunity Test	78
18.9	Conducted Disturbances Induced by RF Fields (CS)	79
18.10	Power Frequency Magnetic Field Immunity Test (PFMF)	79
18.11	Voltage Dips and Interruptions	80
	Appendix – Information on the Testing Laboratories	81

Release Control Record

Issue No.	Description	Date Issued
CE180319D04	Original release.	Mar. 28, 2018

1 Certificate of Conformity

Product: LCD Monitor
Brand: NEC
Test Model: EA271U
Model No.: EA271U, EA271U-BK
Sample Status: Engineering sample
Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.
Test Date: Mar. 21 ~ 27, 2018
Standards: EN 55032:2012 +AC:2013 / EN 55032:2015 +AC:2016, Class B
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55024:2010
EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0
EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2
EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0
EN 61000-4-5:2014 / IEC 61000-4-5:2014 ED. 3.0
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 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Sandra Lin , **Date:** Mar. 28, 2018
Sandra Lin / Specialist

Approved by : Henry Lai , **Date:** Mar. 28, 2018
Henry Lai / Director

2 Summary of Test Results

Emission			
Standard	Test Item	Result/Remarks	Verdict
EN 55032:2012 +AC:2013 / EN 55032:2015 +AC:2016	Conducted emission from the AC mains power port	Minimum passing Class B margin is -12.16 dB at 0.16291 MHz	Pass
	Asymmetric mode conducted emission at telecommunication ports	Without telecom port of the EUT	N/A
	Radiated emission 30-1000 MHz	Minimum passing Class B margin is -4.06 dB at 216.02 MHz	Pass
	Radiated emission above 1GHz	Minimum passing Class B margin is -7.74 dB at 1473.00 MHz	Pass
EN 61000-3-2:2014	Harmonic current emissions	The power consumption of EUT is less than 75W and no limits apply.	Pass
EN 61000-3-3:2013	Voltage fluctuations and flicker	$P_{st} \leq 1.0$ $d_{max} \leq 4\%$ $P_{lt} \leq 0.65$ $d_c \leq 3.3\%$ $T_{max} \leq 500ms$	Pass

Immunity				
EN 55024 Clause	Basic standard	Test Item	Result/Remarks	Verdict
4.2.1	EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharges (ESD)	Performance Criterion B	Pass
4.2.3.2	EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2	Continuous radiated disturbances (RS)	Performance Criterion A	Pass
4.2.2	EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0	Electrical fast transients (EFT)	Performance Criterion A	Pass
4.2.5	EN 61000-4-5:2014 / IEC 61000-4-5:2014 ED. 3.0	Surges	Performance Criterion A	Pass
4.2.3.3	EN 61000-4-6:2014 / IEC 61000-4-6:2013 ED. 4.0	Continuous conducted disturbances (CS)	Performance Criterion A	Pass
4.2.4	EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0	Power-frequency magnetic fields (PFMF)	Performance Criterion A	Pass
4.2.6	EN 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0	Voltage dips and interruptions	Voltage Dips: >95% reduction – 0.5 period, Performance Criterion A 30% reduction – 25 periods, Performance Criterion A Voltage Interruptions: >95% reduction – 250 periods, Performance Criterion B	Pass

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. The above EN/IEC basic standards are applied with latest version if customer has no special requirement.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty (k=2) ($\pm$)	Maximum allowable uncertainty ($\pm$)
Conducted emission from AC mains power port using AMN, 150kHz ~ 30MHz	2.77 dB	3.4 dB (U_{CISPR})
Radiated emission, 30MHz ~ 1GHz	4.26 dB	6.3 dB (U_{CISPR})
Radiated emission, 1GHz ~ 6GHz	5.12 dB	5.2 dB (U_{CISPR})

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Features of EUT

The tests reported herein were performed according to the method specified by TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	LCD Monitor
Brand	NEC
Test Model	EA271U
Model No.	EA271U, EA271U-BK
Model Difference	Marketing difference
Sample Status	Engineering sample
Operating Software	WIN 10
Power Supply	Internal switching power supply Rating: 100-240Vac, 50/60Hz Power Cord: Non-shielded AC cable (1.8m)
Accessory Device	N/A
Data Cable Supplied	Shielded Display cable (1.8m) Shielded HDMI cable (1.8m) Shielded USB type C cable (1.8m)

Note:

1. The EUT is a LCD Monitor and the highest resolution is up to the following specification:

- ◆ HDMI 1 (up to 3840 x 2160, 60Hz)
- ◆ HDMI 2 (up to 3840 x 2160, 30Hz)
- ◆ Display (up to 3840 x 2160, 60Hz)
- ◆ USB type C (up to 3840 x 2160, 60Hz)

2. The EUT has several models which are equipped the following interfaces:

Model No.	Interface	Exterior Color	Difference
EA271U	◆ HDMI 1 in ◆ HDMI 2 in ◆ Display in ◆ USB x4 ◆ USB type C	Black and White	Marketing differentiation
EA271U-BK	◆ Audio out ◆ I/O *2 ◆ GND ◆ AC in	Black and White	

During the test, **model: EA271U & exterior color: black** was selected as the representative one and therefore only its test data was recorded this report.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

1. The EUT was pre-tested under operating and standby condition and the worst emission level was found under **operating condition**.
2. The EUT is designed with AC power supply of 100-240Vac, 50-60Hz.
For radiated emission evaluation, 230Vac/50Hz & 110Vac/60Hz (for EN 55032 & AS/NZS CISPR 32), 120Vac/60Hz (for FCC Part 15), 100Vac/50Hz (for VCCI) had been covered during the pre-test. The worst data was found at **110Vac/60Hz** and recorded in the applied test report.
3. The EUT has been pre-tested under following test modes, and test **Mode 5** was the worst case.

Description			Test Mode									
			1	2	3	4	5	6	7	8	9	10
Interface	Display	3840 x 2160 (60Hz)	V	V	V	V						
	HDMI 1						V					
	HDMI 2	3840 x 2160 (30Hz)						V				
	USB type C	3840 x 2160 (60Hz)							V			
	HDMI 1	1920 x 1080 (60Hz)								V		
	HDMI 1	800 x 600 (60Hz)									V	
	HDMI from DVD: 1080p											V
Setup of Panel	Horizontal (up)		V	V			V	V	V	V	V	V
	Horizontal (down)				V							
	Vertical					V						
Earphone	With		V		V	V	V	V	V	V	V	V
	Without			V								

4. According as per pre-test result and client's requirement, the final test modes were as the following:

Mode	Pre-tested Mode	Color bar signal	Input Power
Conducted emission test			
1	Pre-tested Mode 5	ITU-R BT 1729	230Vac/ 50Hz & 110Vac/ 60Hz
2		ITU-R BT 471-1	
3	Pre-tested Mode 10	ITU-R BT 471-1*	
Radiated emission test			
1	Pre-tested Mode 5	ITU-R BT 1729	110Vac/ 60Hz
2		ITU-R BT 471-1	
3	Pre-tested Mode 10	ITU-R BT 471-1*	
Harmonics, Flicker, Immunity tests			
1	Pre-tested Mode 5	-	230Vac/ 50Hz

*: Selected the worst color bar signal from radiated test.

3.4 Test Program Used and Operation Descriptions

Emission Tests (Harmonic & Flicker Test Excluded):

- a. Turned on the power of all equipments.
- b. PC/ Notebook PC ran a test program to enable all functions.
- c. PC/ Notebook PC read and wrote messages from HDD.
- d. PC read and wrote messages from ext. HDDs via EUT.
- e. PC sent "ITU-R BT 1729 color bars with moving element" messages to EUT, and then displayed them on its screen. **<For Mode 1 >**
- f. PC/ DVD player sent "ITU-R BT 471-1 color bars with moving element" messages to EUT, and then displayed them on its screen. **<For Mode 2 & Mode 3>**
- g. Notebook PC sent messages to its monitor, and then displayed them on its screen.
- h. PC sent messages to printer and printer printed them out.
- i. PC/ DVD Player/ Notebook PC sent audio signal to earphone via EUT.
- j. Steps c-i were repeated.

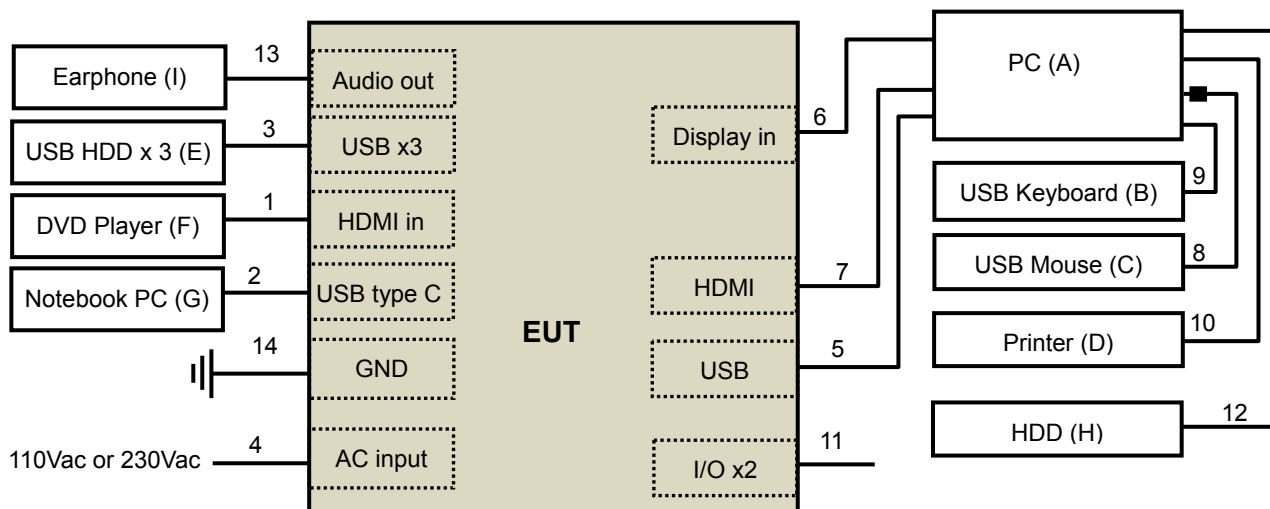
Harmonics, Flicker & Immunity Tests:

- a. Turned on the power of all equipments.
- b. PC ran a test program to enable all functions.
- c. PC read and wrote messages from HDD.
- d. PC read and wrote messages from USB flash drives via EUT.
- e. PC sent "full white screen" messages to EUT, and then they displayed them on their screen.
<for Harmonics, Flicker tests>
- f. PC sent "H" messages to EUT and ext. monitor via EUT, and then they displayed them on their screen.
<for Immunity tests>
- g. PC sent audio signal to internal speakers via EUT.
- h. Steps c-g were repeated.

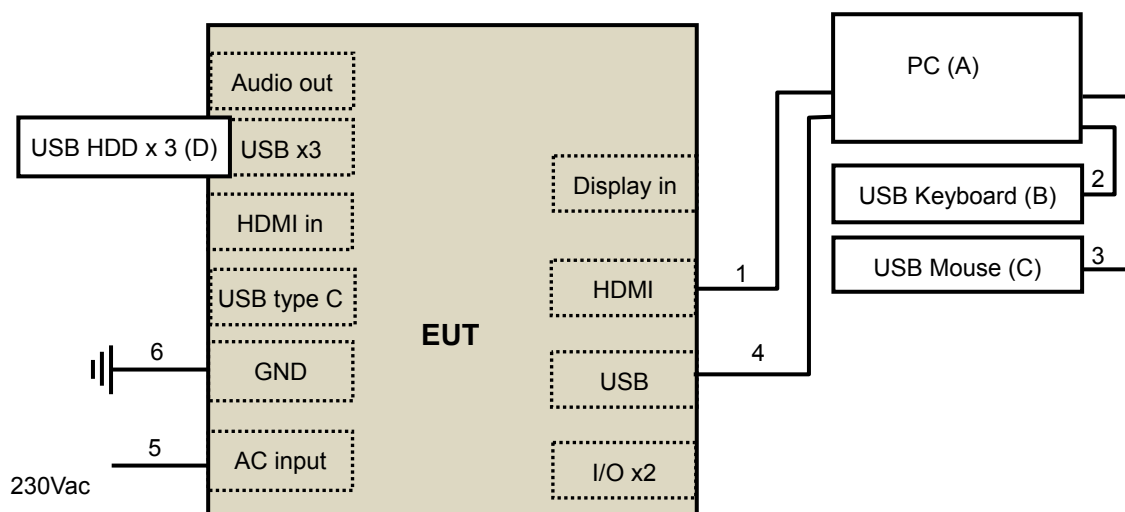
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

Emission tests (Harmonics & Flicker excluded):



Harmonics, Flicker, Immunity tests:



4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests (Harmonics & Flicker excluded):

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PC	Lenovo	90G8	R303YS8R	FCC DoC Approved	Provided by Lab
B.	USB Mouse	Microsoft	1113	9170515896637	FCC DoC Approved	Provided by Lab
C.	USB Keyboard	BTC	5200U	G09302046651	E5XKB5122U	Provided by Lab
D.	Printer	HP	HP Officejet Pro 251dw	CN55FCV013	FCC DoC Approved	Provided by Lab
E.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXM1E1504NEE	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXN1E84F21W	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WX61A45JRECC	FCC DoC Approved	Provided by Lab
F.	DVD	SONY	BDP-S7200	N/A	FCC DoC Approved	Provided by Lab
G.	Notebook PC	DELL	P54G	98HNF72	FCC DoC Approved	Provided by Lab
H.	USB 2.0 Hard Disk	BUFFALO	HD-LBU2	55519210505477	FCC DoC Approved	Provided by Lab
I.	Earphone	PHILIPS	SBC HL150	H2010154	N/A	Supplied by client

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	HDMI cable	1	1.8	Y	0	Supplied by client
2.	USB type C cable	1	1.8	Y	0	Supplied by client
3.	USB cable	3	0.5	Y	0	Provided by Lab
4.	AC power cable	1	1.8	N	0	Supplied by client
5.	USB cable	1	1.5	Y	0	Provided by Lab
6.	Display cable	1	1.8	Y	0	Provided by Lab
7.	HDMI cable	1	1.8	Y	0	Provided by Lab
8.	USB cable	1	1.8	Y	1	Provided by Lab
9.	USB cable	1	1.8	Y	0	Provided by Lab
10.	USB cable	1	1.5	Y	0	Provided by Lab
11.	I/O cable	2	1.8	N	0	Provided by Lab
12.	USB cable	1	1.5	Y	0	Provided by Lab
13.	Audio cable	1	1.5	N	0	Provided by Lab
14.	GND cable	1	1.5	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

Harmonics, Flicker, Immunity tests:

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PC	HP	Elite Desk 800G3	SGH743QCV6	FCC DoC Approved	Provided by Lab
B.	USB Keyboard	HP	Ku-1060	N/A	FCC DoC Approved	Provided by Lab
C.	USB Mouse	DELL	MO56UO	349003983	FCC DoC Approved	Provided by Lab
D.	USB Disk x3	PNY	16G	N/A	FCC DoC Approved	Provided by Lab

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	HDMI cable	1	1.8	Y	0	Supplied by client
2.	USB cable	1	1.8	Y	0	Provided by Lab
3.	USB cable	1	1.8	Y	0	Provided by Lab
4.	USB cable	1	1.9	Y	0	Provided by Lab
5.	AC power cable	1	1.8	N	0	Supplied by client
6.	GND cable	1	1.5	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

5 Conducted Emission from the AC Mains Power Port

5.1 Limits

Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class A limits (dBuV)
0.15 - 0.5	AMN	Quasi-peak / 9kHz	79
0.5 - 30.0			73
0.15 - 0.5		Average / 9kHz	66
0.5 - 30.0			60

Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class B limits (dBuV)
0.15 - 0.5	AMN	Quasi-peak / 9kHz	66 - 56
0.5 - 5			56
5 - 30.0			60
0.15 - 0.5		Average / 9kHz	56 - 46
0.5 - 5			46
5 - 30.0			50

5.2 Test Instruments

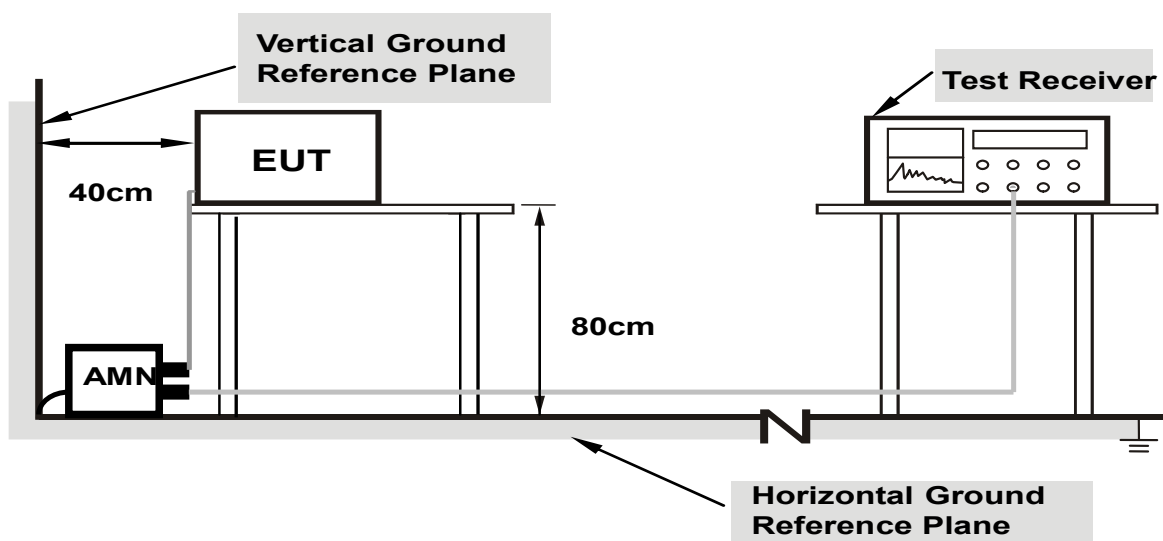
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 10, 2017	Apr. 09, 2018
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 22, 2017	May 21, 2018
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 22, 2017	May 21, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2017	Nov. 22, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 9, 2017	May 8, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2018	Feb. 13, 2019
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 18, 2017	May 17, 2018
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 14, 2017	Nov. 13, 2018
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 14, 2017	Nov. 13, 2018

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Shielded Room No. 10.
 3. The VCCI Site Registration No. C-1852.
 4. Tested Date: Mar. 21, 2018

5.3 Test Arrangement

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through an Artificial Mains Network (AMN). Other support units were connected to the power mains through another AMN. The two AMNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



- Note:**
1. Support units were connected to second AMN.
 2. The distance specified between EUT/AE and other metallic objects is ≥ 0.8 m in the measurement arrangement for table-top EUT.
 3. Cable on the RGP must to be insulated.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

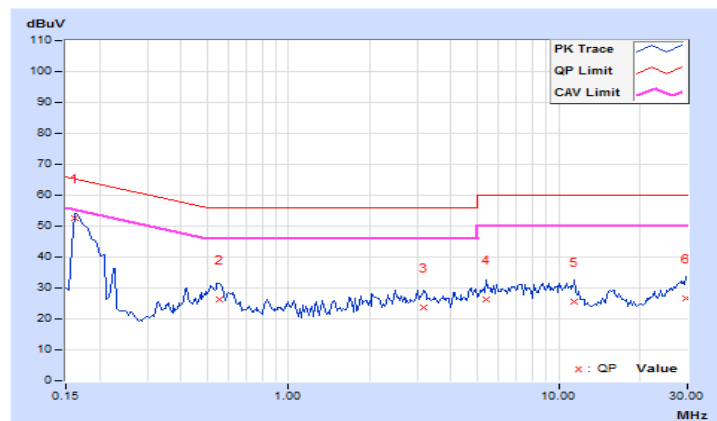
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.66	42.92	29.63	52.58	39.29	65.38	55.38	-12.80	-16.09
2	0.55234	9.71	16.61	7.94	26.32	17.65	56.00	46.00	-29.68	-28.35
3	3.16016	9.82	13.82	6.28	23.64	16.10	56.00	46.00	-32.36	-29.90
4	5.41797	9.86	16.41	10.96	26.27	20.82	60.00	50.00	-33.73	-29.18
5	11.41016	9.95	15.61	9.75	25.56	19.70	60.00	50.00	-34.44	-30.30
6	29.43750	10.17	16.39	6.05	26.56	16.22	60.00	50.00	-33.44	-33.78

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

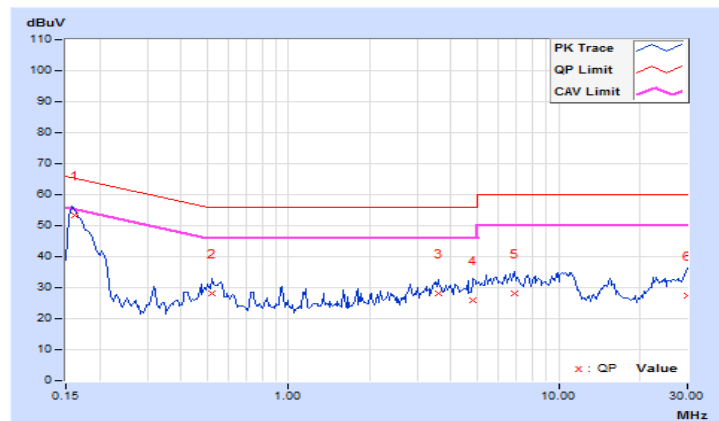


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16291	9.68	43.47	32.15	53.15	41.83	65.31	55.31	-12.16	-13.48
2	0.52109	9.73	18.55	11.80	28.28	21.53	56.00	46.00	-27.72	-24.47
3	3.60156	9.84	18.49	13.25	28.33	23.09	56.00	46.00	-27.67	-22.91
4	4.84375	9.87	15.95	6.30	25.82	16.17	56.00	46.00	-30.18	-29.83
5	6.84375	9.90	18.38	10.28	28.28	20.18	60.00	50.00	-31.72	-29.82
6	29.99872	10.15	17.33	8.18	27.48	18.33	60.00	50.00	-32.52	-31.67

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

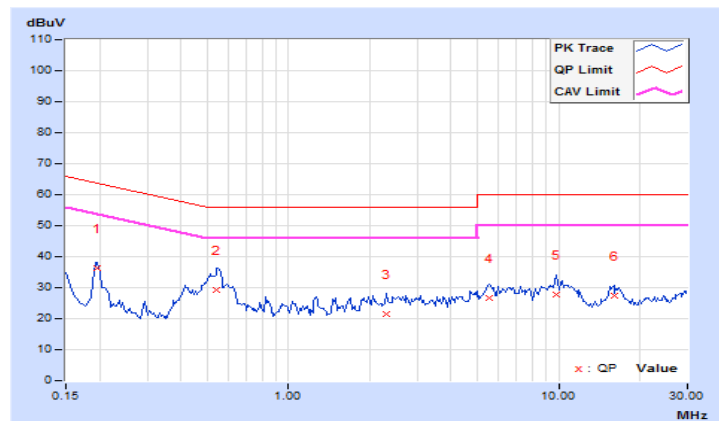


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.66	26.67	21.83	36.33	31.49	63.74	53.74	-27.41	-22.25
2	0.54453	9.71	19.63	11.30	29.34	21.01	56.00	46.00	-26.66	-24.99
3	2.31250	9.80	11.80	5.56	21.60	15.36	56.00	46.00	-34.40	-30.64
4	5.53125	9.86	16.89	11.78	26.75	21.64	60.00	50.00	-33.25	-28.36
5	9.86719	9.94	17.95	12.81	27.89	22.75	60.00	50.00	-32.11	-27.25
6	16.06250	10.00	17.32	12.66	27.32	22.66	60.00	50.00	-32.68	-27.34

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

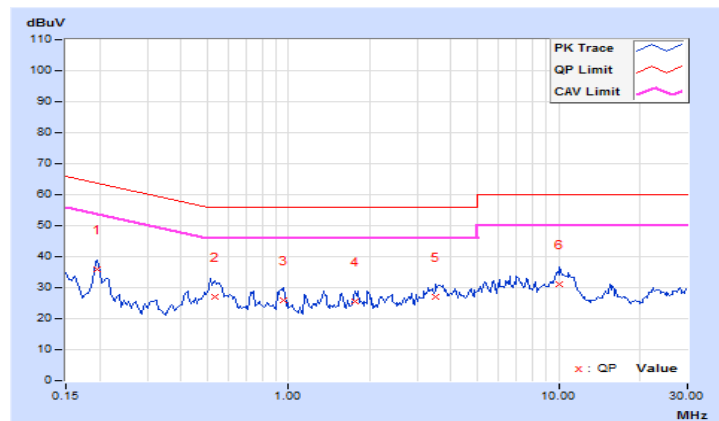


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.68	26.41	21.69	36.09	31.37	63.74	53.74	-27.65	-22.37
2	0.53672	9.73	17.36	8.49	27.09	18.22	56.00	46.00	-28.91	-27.78
3	0.95859	9.76	16.26	8.55	26.02	18.31	56.00	46.00	-29.98	-27.69
4	1.75781	9.80	15.70	8.62	25.50	18.42	56.00	46.00	-30.50	-27.58
5	3.51563	9.84	17.29	11.98	27.13	21.82	56.00	46.00	-28.87	-24.18
6	10.05859	9.96	21.02	15.49	30.98	25.45	60.00	50.00	-29.02	-24.55

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

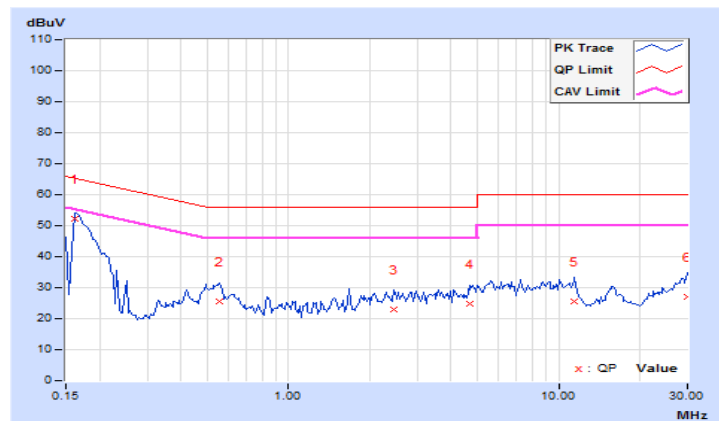


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.66	42.58	28.69	52.24	38.35	65.38	55.38	-13.14	-17.03
2	0.55234	9.71	15.80	7.26	25.51	16.97	56.00	46.00	-30.49	-29.03
3	2.46094	9.81	13.00	7.63	22.81	17.44	56.00	46.00	-33.19	-28.56
4	4.66797	9.84	14.92	7.19	24.76	17.03	56.00	46.00	-31.24	-28.97
5	11.48438	9.95	15.47	9.46	25.42	19.41	60.00	50.00	-34.58	-30.59
6	29.90625	10.18	16.99	6.93	27.17	17.11	60.00	50.00	-32.83	-32.89

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

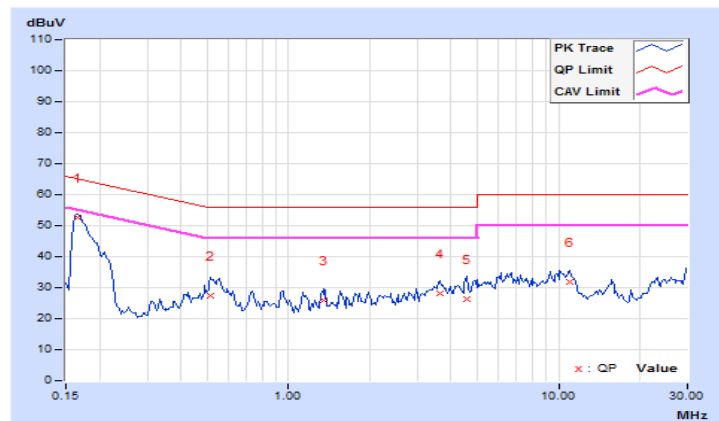


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.68	43.04	32.19	52.72	41.87	65.18	55.18	-12.46	-13.31
2	0.51719	9.73	17.56	10.85	27.29	20.58	56.00	46.00	-28.71	-25.42
3	1.34375	9.78	16.04	8.46	25.82	18.24	56.00	46.00	-30.18	-27.76
4	3.63672	9.84	18.48	13.20	28.32	23.04	56.00	46.00	-27.68	-22.96
5	4.58594	9.86	16.49	8.27	26.35	18.13	56.00	46.00	-29.65	-27.87
6	10.98828	9.97	21.70	16.63	31.67	26.60	60.00	50.00	-28.33	-23.40

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

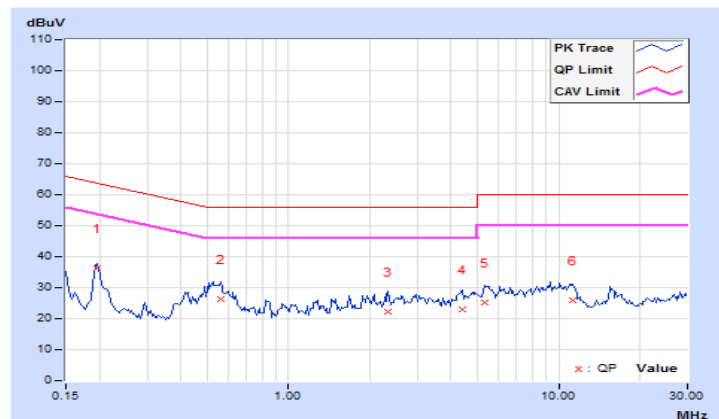


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.66	26.61	21.75	36.27	31.41	63.74	53.74	-27.47	-22.33
2	0.56406	9.71	16.45	8.24	26.16	17.95	56.00	46.00	-29.84	-28.05
3	2.34766	9.81	12.57	6.79	22.38	16.60	56.00	46.00	-33.62	-29.40
4	4.40625	9.84	12.97	5.68	22.81	15.52	56.00	46.00	-33.19	-30.48
5	5.35156	9.85	15.20	9.76	25.05	19.61	60.00	50.00	-34.95	-30.39
6	11.32422	9.95	15.83	10.14	25.78	20.09	60.00	50.00	-34.22	-29.91

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

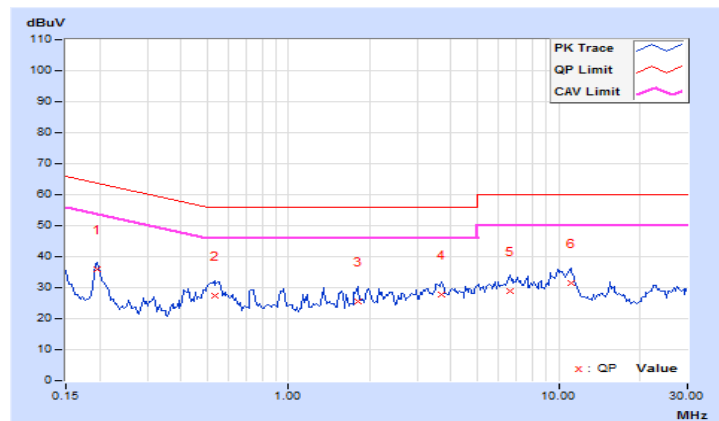


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.68	26.41	21.57	36.09	31.25	63.74	53.74	-27.65	-22.49
2	0.53281	9.73	17.72	10.26	27.45	19.99	56.00	46.00	-28.55	-26.01
3	1.80078	9.80	15.67	8.57	25.47	18.37	56.00	46.00	-30.53	-27.63
4	3.66406	9.84	18.02	12.82	27.86	22.66	56.00	46.00	-28.14	-23.34
5	6.60938	9.90	19.04	12.98	28.94	22.88	60.00	50.00	-31.06	-27.12
6	11.06641	9.98	21.45	16.07	31.43	26.05	60.00	50.00	-28.57	-23.95

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

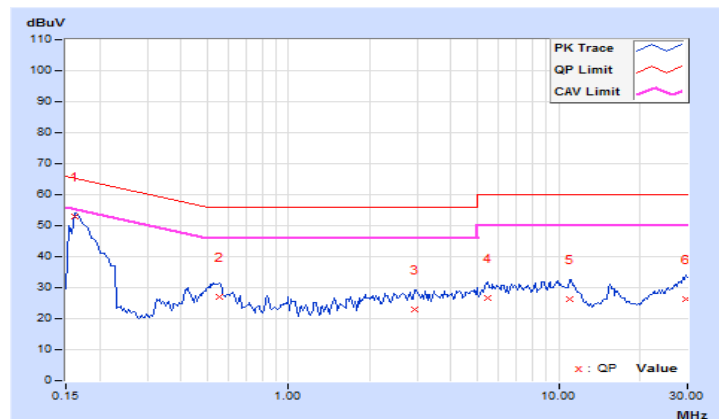


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 3		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.66	43.26	30.15	52.92	39.81	65.38	55.38	-12.46	-15.57
2	0.55234	9.71	17.16	7.72	26.87	17.43	56.00	46.00	-29.13	-28.57
3	2.91797	9.81	13.10	6.91	22.91	16.72	56.00	46.00	-33.09	-29.28
4	5.44531	9.86	16.68	11.26	26.54	21.12	60.00	50.00	-33.46	-28.88
5	10.95703	9.95	16.40	10.85	26.35	20.80	60.00	50.00	-33.65	-29.20
6	29.53906	10.17	16.30	6.47	26.47	16.64	60.00	50.00	-33.53	-33.36

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

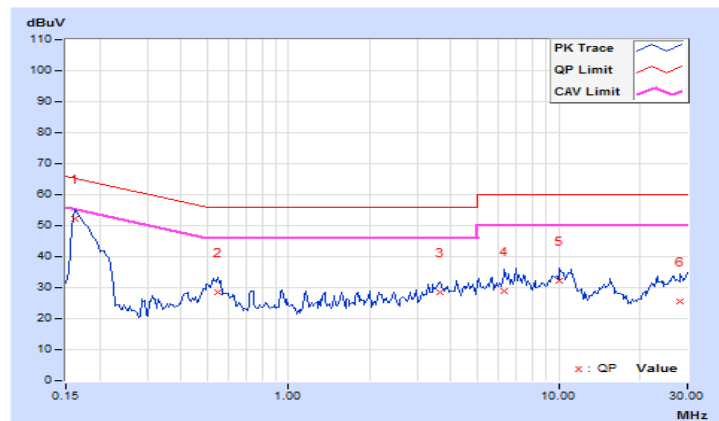


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	110Vac, 60Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 3		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.68	42.68	30.03	52.36	39.71	65.38	55.38	-13.02	-15.67
2	0.54844	9.73	18.66	8.08	28.39	17.81	56.00	46.00	-27.61	-28.19
3	3.63672	9.84	18.68	13.28	28.52	23.12	56.00	46.00	-27.48	-22.88
4	6.32422	9.89	18.91	10.20	28.80	20.09	60.00	50.00	-31.20	-29.91
5	10.00000	9.96	22.11	16.68	32.07	26.64	60.00	50.00	-27.93	-23.36
6	28.20313	10.14	15.55	6.53	25.69	16.67	60.00	50.00	-34.31	-33.33

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

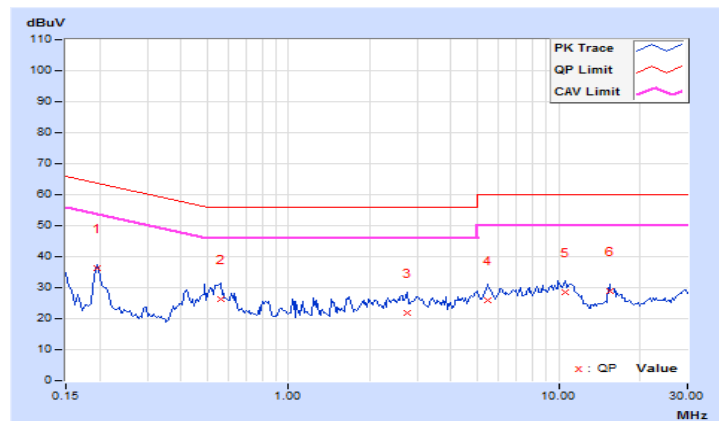


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 3		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.66	26.53	21.63	36.19	31.29	63.74	53.74	-27.55	-22.45
2	0.56016	9.71	16.47	6.89	26.18	16.60	56.00	46.00	-29.82	-29.40
3	2.74609	9.81	11.95	6.19	21.76	16.00	56.00	46.00	-34.24	-30.00
4	5.49219	9.86	16.04	11.14	25.90	21.00	60.00	50.00	-34.10	-29.00
5	10.53125	9.95	18.64	13.54	28.59	23.49	60.00	50.00	-31.41	-26.51
6	15.46484	9.99	18.82	14.94	28.81	24.93	60.00	50.00	-31.19	-25.07

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

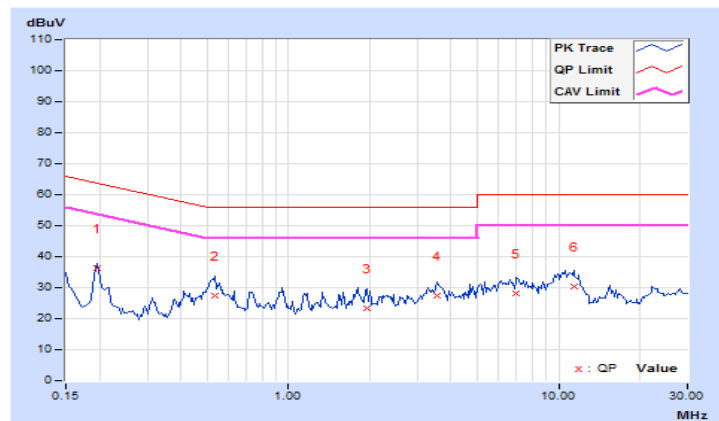


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	21°C, 78%RH, 1007mbar
Tested by	Kobe Lu		
Test Mode	Mode 3		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.68	26.45	21.65	36.13	31.33	63.74	53.74	-27.61	-22.41
2	0.53281	9.73	17.62	10.79	27.35	20.52	56.00	46.00	-28.65	-25.48
3	1.94922	9.81	13.59	6.86	23.40	16.67	56.00	46.00	-32.60	-29.33
4	3.53516	9.84	17.67	12.38	27.51	22.22	56.00	46.00	-28.49	-23.78
5	7.00000	9.90	18.30	12.28	28.20	22.18	60.00	50.00	-31.80	-27.82
6	11.37891	9.98	20.30	14.75	30.28	24.73	60.00	50.00	-29.72	-25.27

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



6 Radiated Emission at Frequencies up to 1GHz

6.1 Limits

For Class A Equipment

Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
30 - 230	10	40
230 - 1000		47
30 - 230	3	50
230 - 1000		57

For Class B Equipment

Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
30 - 230	10	30
230 - 1000		37
30 - 230	3	40
230 - 1000		47

6.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Sonoma Preamplifier	310N	352922	Feb. 20, 2018	Feb. 19, 2019
Sonoma Preamplifier	310N	352921	Feb. 20, 2018	Feb. 19, 2019
Agilent Test Receiver	N9038A	MY50010158	Jul. 1, 2017	Jun. 30, 2018
Agilent Test Receiver	N9038A	MY51210114	Jul. 5, 2017	Jul. 4, 2018
Schwarzbeck Antenna	VULB9168	9168-316	Dec. 11, 2017	Dec. 10, 2018
Schwarzbeck Antenna	VULB9168	9168-317	Dec. 11, 2017	Dec. 10, 2018
Max Full. Turn Table & Tower	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-01.V	Jun. 26, 2017	Jun. 25, 2018
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-02.H	Jun. 26, 2017	Jun. 25, 2018
WOKEN RF cable With 5dB PAD	8D	CABLE-CH8-03.3M	Jun. 26, 2017	Jun. 25, 2018

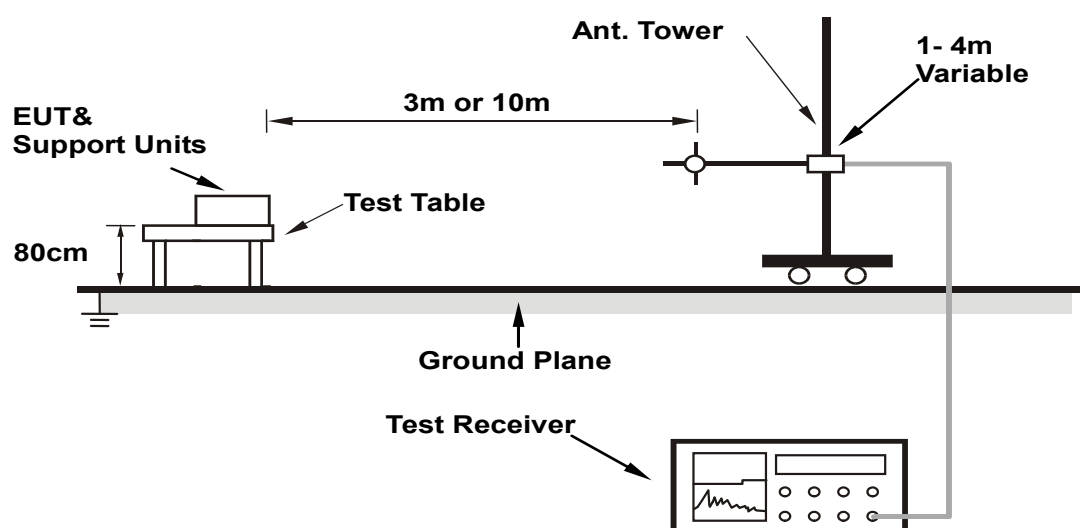
- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber No. 8.
3. The Industry Canada Reference No. IC 7450E-8.
4. The VCCI Site Registration No. R-12946.
5. Tested Date: Mar. 21 ~ 23, 2018

6.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.
- The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must be insulated.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

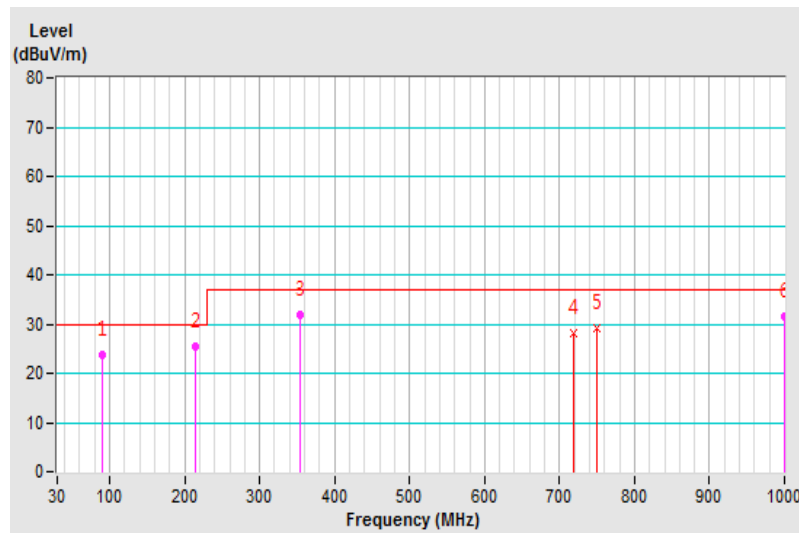
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1010mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	89.67	23.76 QP	30.00	-6.24	3.50 H	84	42.52	-18.76
2	214.12	25.38 QP	30.00	-4.62	2.68 H	193	40.40	-15.02
3	353.34	31.79 QP	37.00	-5.21	1.65 H	121	41.96	-10.17
4	718.75	28.13 QP	37.00	-8.87	1.04 H	31	31.40	-3.27
5	749.66	29.12 QP	37.00	-7.88	3.47 H	350	31.13	-2.01
6	999.74	31.53 QP	37.00	-5.47	1.34 H	35	31.39	0.14

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

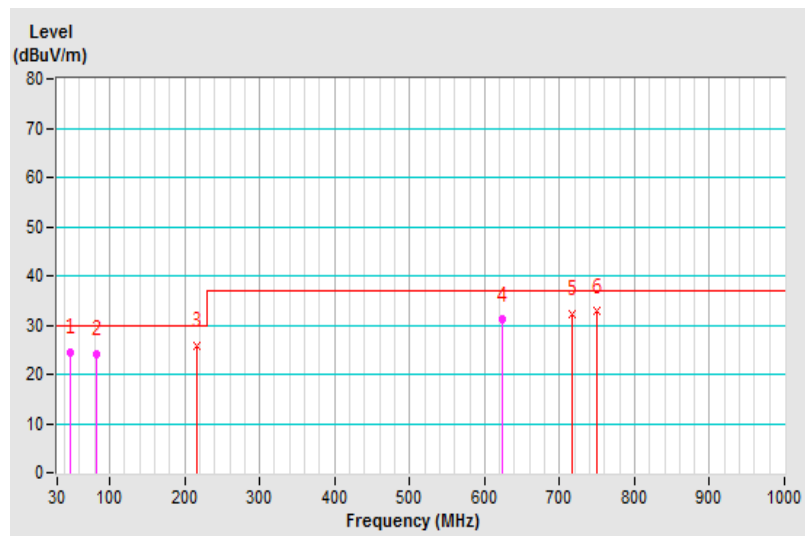


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1010mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	47.92	24.44 QP	30.00	-5.56	2.24 V	121	38.54	-14.10
2	82.12	24.05 QP	30.00	-5.95	3.62 V	33	42.92	-18.87
3	215.78	25.71 QP	30.00	-4.29	1.32 V	59	41.57	-15.86
4	623.38	31.09 QP	37.00	-5.91	3.17 V	268	35.12	-4.03
5	715.82	32.24 QP	37.00	-4.76	3.57 V	247	34.54	-2.30
6	749.72	32.76 QP	37.00	-4.24	2.17 V	100	33.64	-0.88

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

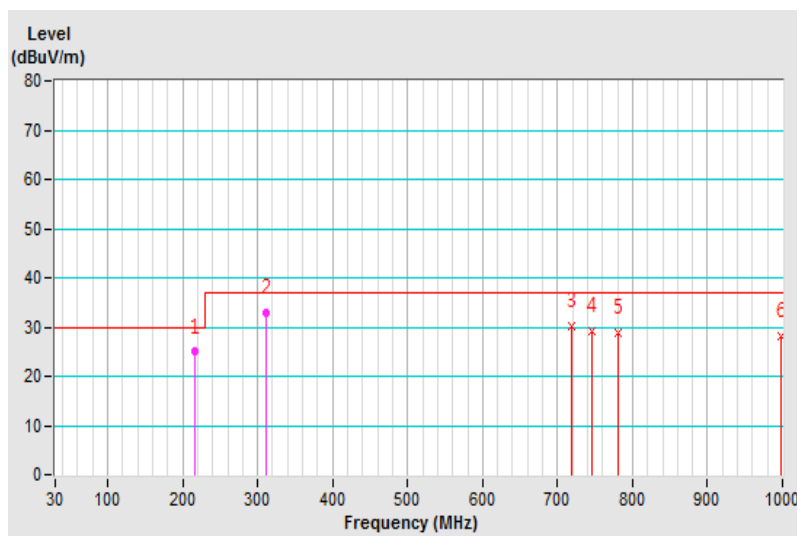


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1007mbar
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	216.00	24.94 QP	30.00	-5.06	3.89 H	70	39.92	-14.98
2	311.66	32.88 QP	37.00	-4.12	2.16 H	330	43.72	-10.84
3	718.94	30.26 QP	37.00	-6.74	1.33 H	44	33.51	-3.25
4	746.81	29.32 QP	37.00	-7.68	1.27 H	46	31.26	-1.94
5	780.61	28.77 QP	37.00	-8.23	1.59 H	69	30.63	-1.86
6	998.67	28.17 QP	37.00	-8.83	2.03 H	73	28.05	0.12

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

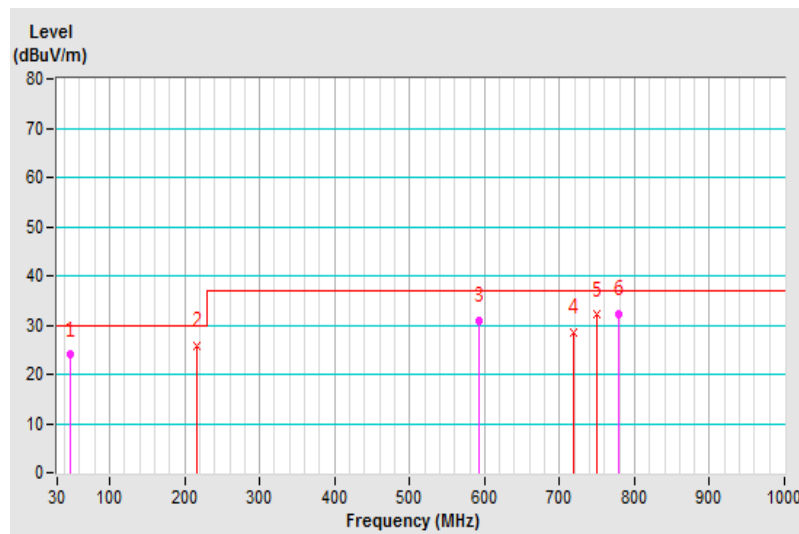


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1007mbar
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.02	23.95 QP	30.00	-6.05	3.13 V	135	38.05	-14.10
2	216.00	25.83 QP	30.00	-4.17	1.27 V	86	41.68	-15.85
3	593.38	30.89 QP	37.00	-6.11	2.24 V	321	35.94	-5.05
4	718.92	28.42 QP	37.00	-8.58	3.18 V	332	30.67	-2.25
5	748.82	32.10 QP	37.00	-4.90	2.17 V	354	33.02	-0.92
6	779.57	32.21 QP	37.00	-4.79	1.93 V	354	33.12	-0.91

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

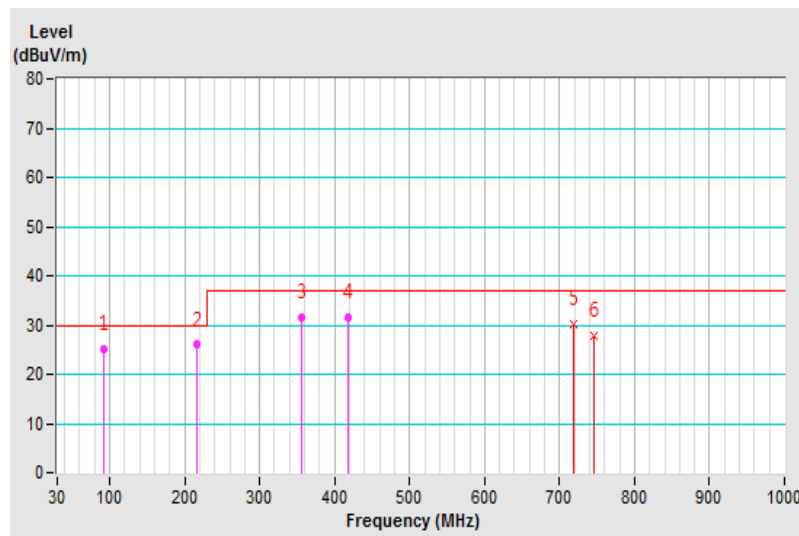


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1007mbar
Test Mode	Mode 3		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	92.13	25.04 QP	30.00	-4.96	3.94 H	118	43.74	-18.70
2	216.02	25.94 QP	30.00	-4.06	3.38 H	263	40.92	-14.98
3	355.00	31.56 QP	37.00	-5.44	2.12 H	213	41.71	-10.15
4	417.47	31.62 QP	37.00	-5.38	1.87 H	290	40.00	-8.38
5	718.91	30.23 QP	37.00	-6.77	1.25 H	41	33.48	-3.25
6	746.81	27.80 QP	37.00	-9.20	3.86 H	358	29.74	-1.94

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

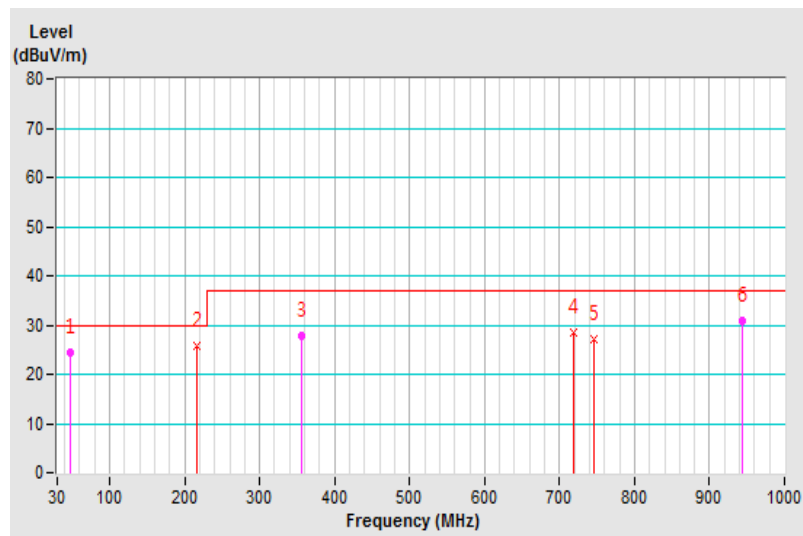


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Harvey Wu	Environmental Conditions	21°C, 73%RH, 1007mbar
Test Mode	Mode 3		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	47.99	24.42 QP	30.00	-5.58	1.13 V	179	38.52	-14.10
2	216.00	25.91 QP	30.00	-4.09	1.72 V	82	41.76	-15.85
3	354.97	27.75 QP	37.00	-9.25	1.00 V	138	38.76	-11.01
4	718.92	28.42 QP	37.00	-8.58	2.14 V	332	30.67	-2.25
5	746.80	27.10 QP	37.00	-9.90	2.00 V	4	28.11	-1.01
6	943.04	30.94 QP	37.00	-6.06	1.83 V	312	29.89	1.05

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



7 Radiated Emission at Frequencies above 1GHz

7.1 Limits

For Class A Equipment

Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
1000 - 3000	3	Average	56
3000 - 6000			60
1000 - 3000		Peak	76
3000 - 6000			80

For Class B Equipment

Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
1000 - 3000	3	Average	50
3000 - 6000			54
1000 - 3000		Peak	70
3000 - 6000			74

Required highest frequency for radiated measurement

EN 55032 Table clause	Highest internal frequency (F_x)	Highest measured frequency
1	$F_x \leq 108 \text{ MHz}$	1 GHz
	$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2 GHz
	$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5 GHz
	$F_x > 1 \text{ GHz}$	5 x F_x up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is highest fundamental frequency generated or used within the EUT or highest frequency at which it operates.

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

7.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	Jun. 1, 2017	May 31, 2018
Agilent Test Receiver	N9038A	MY50010135	Jun. 29, 2017	Jun. 28, 2018
Agilent Preamplifier	8449B	3008A02367	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2018	Feb. 20, 2019
EMCI Preamplifier	EMC184045B	980235	Feb. 22, 2018	Feb. 21, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 1, 2017	Nov. 30, 2018
EMCO Horn Antenna	3115	9312-4192	Dec. 1, 2017	Nov. 30, 2018
Max Full. Turn Table & Tower	MF7802	MF780208103	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF106-18	Cable-CH7-01	Aug. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH7-3.6m	Aug. 14, 2017	Aug. 13, 2018
MICRO-TRONICS Notch filter	BRC50703-01	010	May 31, 2017	May 30, 2018
MICRO-TRONICS Band Pass Filter	BRM17690	005	May 31, 2017	May 30, 2018

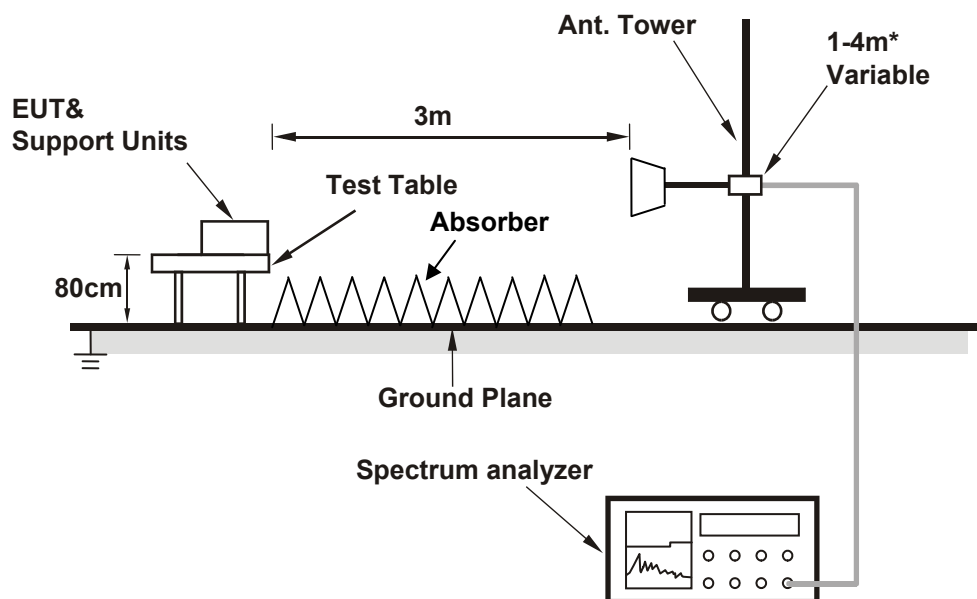
- Notes:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The 3dB beamwidth of the horn antenna is minimum 30 degree (or $w = 1.6m$ at 3m distance) for 1~6 GHz.
 3. The test was performed in Chamber No. 7.
 4. The Industry Canada Reference No. IC 7450E-7.
 5. The VCCI Site Registration No. G-39
 6. Tested Date: Mar. 21, 2018

7.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note:

- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
- The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must be insulated.

* :depends on the EUT height and the antenna 3dB beamwidth both.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

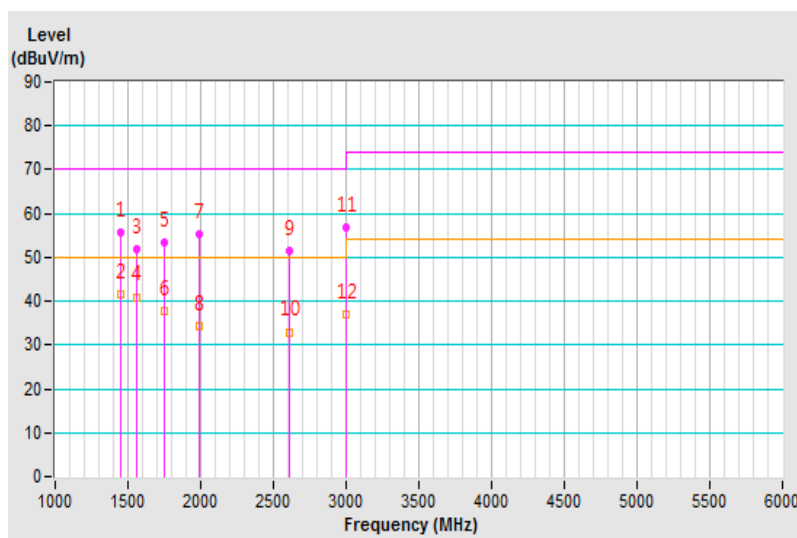
7.4 Test Results

Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1453.35	55.67 PK	70.00	-14.33	1.21 H	229	58.24	-2.57
2	1453.35	41.54 AV	50.00	-8.46	1.21 H	229	44.11	-2.57
3	1562.36	51.78 PK	70.00	-18.22	1.49 H	185	54.98	-3.20
4	1562.36	40.98 AV	50.00	-9.02	1.49 H	185	44.18	-3.20
5	1746.12	53.39 PK	70.00	-16.61	2.31 H	356	55.14	-1.75
6	1746.12	37.66 AV	50.00	-12.34	2.31 H	356	39.41	-1.75
7	1993.66	55.27 PK	70.00	-14.73	2.13 H	191	55.58	-0.31
8	1993.66	34.41 AV	50.00	-15.59	2.13 H	191	34.72	-0.31
9	2612.77	51.61 PK	70.00	-18.39	1.76 H	231	51.47	0.14
10	2612.77	32.95 AV	50.00	-17.05	1.76 H	231	32.81	0.14
11	2998.12	56.96 PK	70.00	-13.04	2.22 H	52	55.45	1.51
12	2998.12	36.91 AV	50.00	-13.09	2.22 H	52	35.40	1.51

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

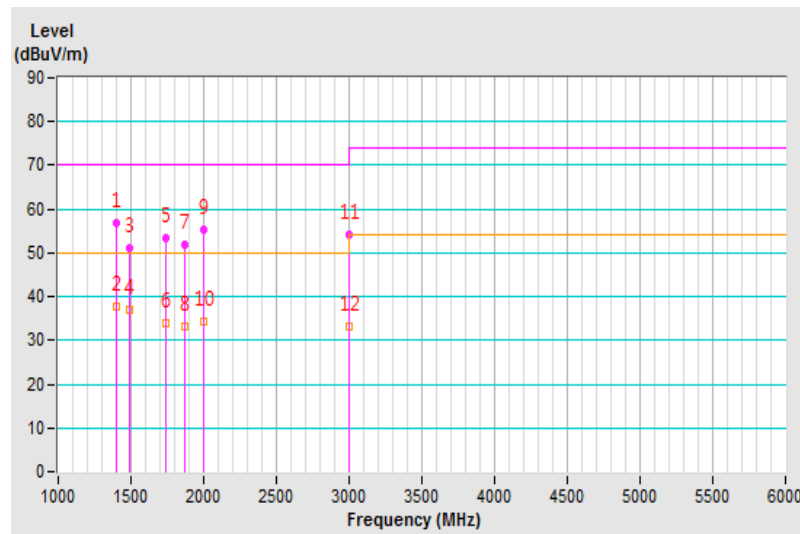


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1402.25	56.95 PK	70.00	-13.05	2.29 V	51	58.93	-1.98
2	1402.25	37.65 AV	50.00	-12.35	2.29 V	51	39.63	-1.98
3	1492.95	51.12 PK	70.00	-18.88	2.12 V	216	54.07	-2.95
4	1492.95	36.95 AV	50.00	-13.05	2.12 V	216	39.90	-2.95
5	1743.95	53.36 PK	70.00	-16.64	2.45 V	354	55.12	-1.76
6	1743.95	33.91 AV	50.00	-16.09	2.45 V	354	35.67	-1.76
7	1868.66	52.01 PK	70.00	-17.99	1.78 V	31	52.60	-0.59
8	1868.66	33.15 AV	50.00	-16.85	1.78 V	31	33.74	-0.59
9	1998.69	55.43 PK	70.00	-14.57	2.23 V	323	55.72	-0.29
10	1998.69	34.19 AV	50.00	-15.81	2.23 V	323	34.48	-0.29
11	2995.31	53.99 PK	70.00	-16.01	1.51 V	142	52.49	1.50
12	2995.31	33.23 AV	50.00	-16.77	1.51 V	142	31.73	1.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

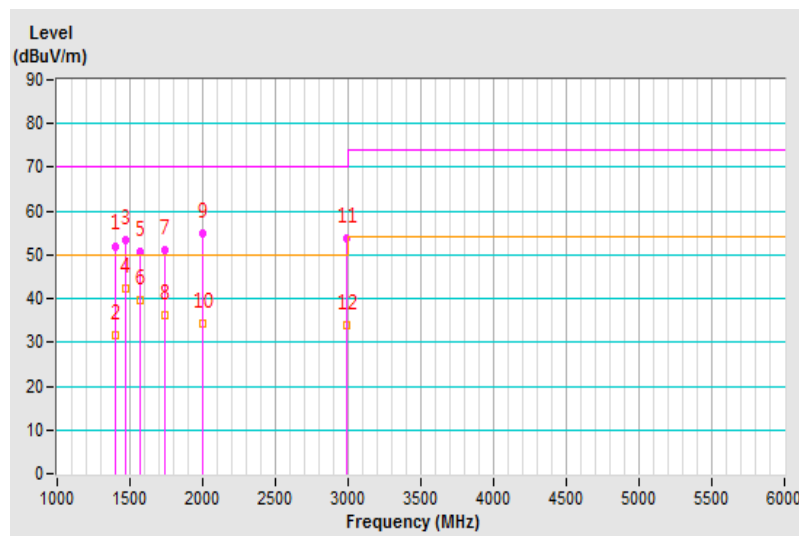


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1398.25	52.05 PK	70.00	-17.95	1.13 H	40	53.99	-1.94
2	1398.25	31.72 AV	50.00	-18.28	1.13 H	40	33.66	-1.94
3	1473.00	53.21 PK	70.00	-16.79	2.54 H	153	55.96	-2.75
4	1473.00	42.26 AV	50.00	-7.74	2.54 H	153	45.01	-2.75
5	1570.00	50.78 PK	70.00	-19.22	1.87 H	176	53.99	-3.21
6	1570.00	39.62 AV	50.00	-10.38	1.87 H	176	42.83	-3.21
7	1743.00	51.10 PK	70.00	-18.90	1.00 H	169	52.89	-1.79
8	1743.00	36.37 AV	50.00	-13.63	1.00 H	169	38.16	-1.79
9	1995.50	55.03 PK	70.00	-14.97	1.62 H	336	55.33	-0.30
10	1995.50	34.41 AV	50.00	-15.59	1.62 H	336	34.71	-0.30
11	2993.75	53.64 PK	70.00	-16.36	1.00 H	156	52.14	1.50
12	2993.75	33.85 AV	50.00	-16.15	1.00 H	156	32.35	1.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

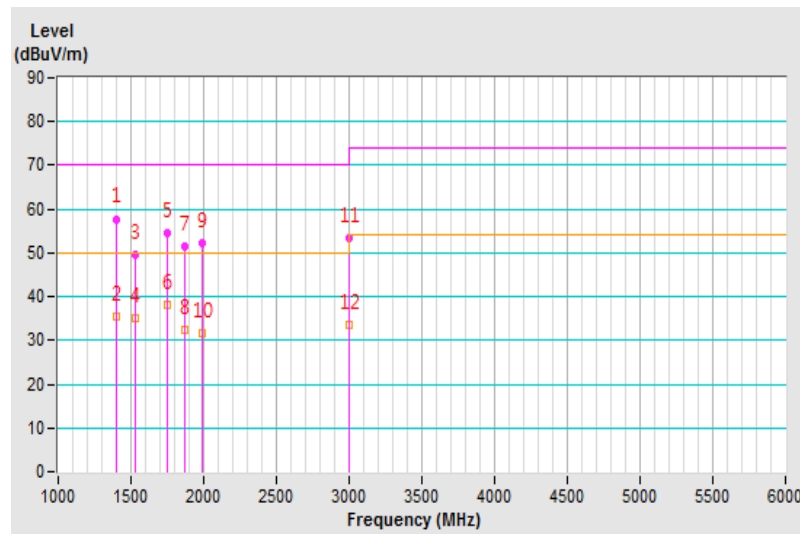


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1400.00	57.75 PK	70.00	-12.25	2.58 V	82	59.70	-1.95
2	1400.00	35.55 AV	50.00	-14.45	2.58 V	82	37.50	-1.95
3	1529.25	49.57 PK	70.00	-20.43	1.83 V	199	52.69	-3.12
4	1529.25	35.10 AV	50.00	-14.90	1.83 V	199	38.22	-3.12
5	1746.00	54.38 PK	70.00	-15.62	2.00 V	12	56.13	-1.75
6	1746.00	37.95 AV	50.00	-12.05	2.00 V	12	39.70	-1.75
7	1865.25	51.40 PK	70.00	-18.60	2.27 V	25	51.99	-0.59
8	1865.25	32.53 AV	50.00	-17.47	2.27 V	25	33.12	-0.59
9	1992.50	52.16 PK	70.00	-17.84	2.86 V	360	52.47	-0.31
10	1992.50	31.73 AV	50.00	-18.27	2.86 V	360	32.04	-0.31
11	2999.50	53.41 PK	70.00	-16.59	2.00 V	171	51.89	1.52
12	2999.50	33.55 AV	50.00	-16.45	2.00 V	171	32.03	1.52

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

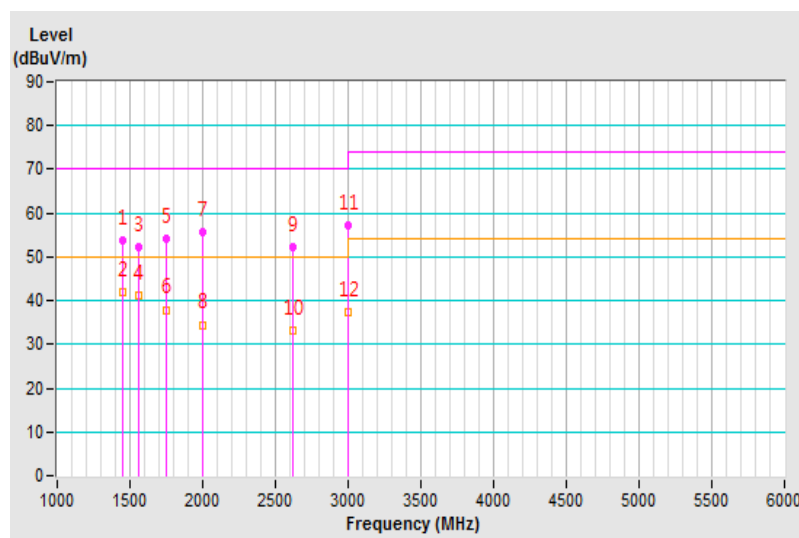


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 3		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1454.50	53.78 PK	70.00	-16.22	1.11 H	221	56.35	-2.57
2	1454.50	42.00 AV	50.00	-8.00	1.11 H	221	44.57	-2.57
3	1560.00	52.12 PK	70.00	-17.88	1.57 H	181	55.32	-3.20
4	1560.00	41.11 AV	50.00	-8.89	1.57 H	181	44.31	-3.20
5	1747.75	54.24 PK	70.00	-15.76	2.13 H	360	55.97	-1.73
6	1747.75	37.94 AV	50.00	-12.06	2.13 H	360	39.67	-1.73
7	1997.25	55.55 PK	70.00	-14.45	2.00 H	193	55.85	-0.30
8	1997.25	34.49 AV	50.00	-15.51	2.00 H	193	34.79	-0.30
9	2617.75	52.31 PK	70.00	-17.69	1.86 H	225	52.16	0.15
10	2617.75	33.06 AV	50.00	-16.94	1.86 H	225	32.91	0.15
11	2999.82	57.13 PK	70.00	-12.87	2.00 H	50	55.61	1.52
12	2999.82	37.49 AV	50.00	-12.51	2.00 H	50	35.97	1.52

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

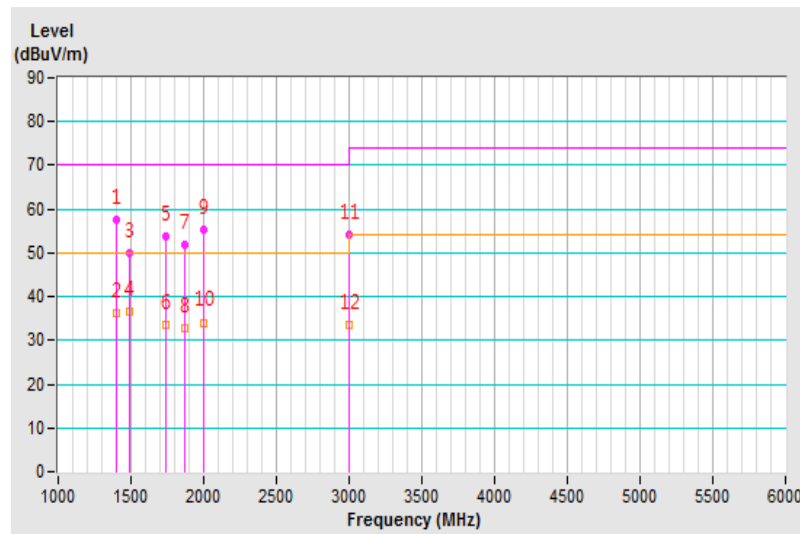


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Harvey Wu	Environmental Conditions	23°C, 71%RH, 1007mbar
Test Mode	Mode 3		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1403.25	57.66 PK	70.00	-12.34	2.24 V	50	59.65	-1.99
2	1403.25	36.32 AV	50.00	-13.68	2.24 V	50	38.31	-1.99
3	1493.75	50.10 PK	70.00	-19.90	2.00 V	209	53.06	-2.96
4	1493.75	36.65 AV	50.00	-13.35	2.00 V	209	39.61	-2.96
5	1744.50	53.65 PK	70.00	-16.35	2.57 V	360	55.41	-1.76
6	1744.50	33.68 AV	50.00	-16.32	2.57 V	360	35.44	-1.76
7	1869.75	51.72 PK	70.00	-18.28	1.74 V	32	52.29	-0.57
8	1869.75	32.84 AV	50.00	-17.16	1.74 V	32	33.41	-0.57
9	1998.75	55.27 PK	70.00	-14.73	2.00 V	330	55.56	-0.29
10	1998.75	34.11 AV	50.00	-15.89	2.00 V	330	34.40	-0.29
11	2996.25	54.11 PK	70.00	-15.89	1.53 V	156	52.60	1.51
12	2996.25	33.54 AV	50.00	-16.46	1.53 V	156	32.03	1.51

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



8 Harmonics Current Measurement

8.1 Limits

Limits for Class A equipment		Limits for Class D equipment		
Harmonic Order n	Max. permissible harmonics current A	Harmonic Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
$15 \leq n \leq 39$	$0.15 \times 15/n$	$15 \leq n \leq 39$	$3.85/n$	$0.15 \times 15/n$
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
$8 \leq n \leq 40$	$0.23 \times 8/n$			

Notes: 1. Class A and Class D are classified according to section 5 of EN 61000-3-2.

2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

8.2 Classification of Equipment

Class A	Class B	Class C	Class D
Balanced three-phase equipment; Household appliances excluding equipment as Class D; Tools excluding portable tools; Dimmers for incandescent lamps; Audio equipment; Equipment not specified in one of the three other classes.	Portable tools; Arc welding equipment which is not professional equipment.	Lighting equipment.	Equipment having a specified power less than or equal to 600 W 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).

8.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Teseq Harmonics - Flicker Test System	Proflin 2105	32A00983 & 1639A01863	Sep. 28, 2017	Sep. 27, 2018
Software	WIN2100	NA	NA	NA

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

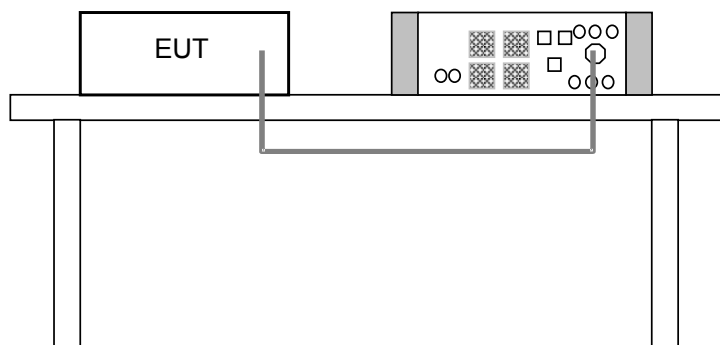
2. The test was performed in EMS Room No. 1.

3. According to IEC 61000-4-7: 2002, the time window shall be synchronized with each group of 10 or 12 cycles (200 ms) for power frequency of 50 or 60Hz.

4. Tested Date: Mar. 23, 2018

8.4 Test Arrangement

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.5 Test Results

Fundamental Voltage/Ampere	229.98Vrms/ 0.273Arms	Power Frequency	50.000Hz
Power Consumption	50.0W	Power Factor	0.830
Enviromental Conditions	26 °C, 55%RH	Tested by	Xun Lee
Test Mode	Mode 1		

- Note:
- Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).
 - According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits. The specified power shall be within +/-10% of the measured power.

9 Voltage Fluctuations and Flicker Measurement

9.1 Limits

Test item	Limit	Note
P_{st}	1.0	P_{st} : short-term flicker severity.
P_{lt}	0.65	P_{lt} : long-term flicker severity.
T_{max} (ms)	500	T_{max} : maximum time duration during the observation period that the voltage deviation $d(t)$ exceeds the limit for d_c .
d_{max} (%)	4	d_{max} : maximum absolute voltage change during an observation period.
d_c (%)	3.3	d_c : maximum steady state voltage change during an observation period.

9.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Teseq Harmonics - Flicker Test System	Proflin 2105	32A00983 & 1639A01863	Sep. 28, 2017	Sep. 27, 2018
Software	WIN2100	NA	NA	NA

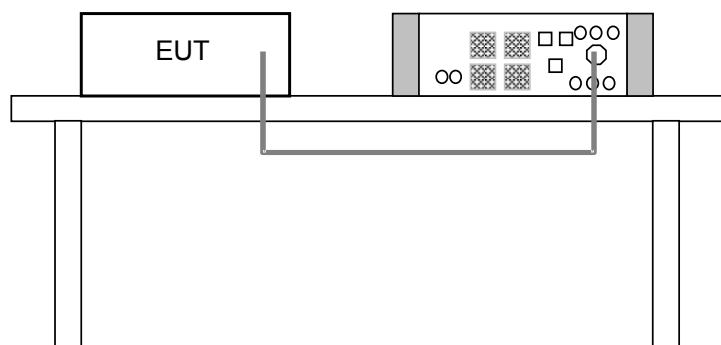
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in EMS Room No. 1.

3. Tested Date: Mar. 23, 2018

9.3 Test Arrangement

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

9.4 Test Results

Fundamental Voltage/Ampere	229.98Vrms / 0.273Arms	Power Frequency	50.000 Hz
Observation (T_p)	10 min.	Power Factor	0.830
Environmental Conditions	26 °C, 55 % RH	Tested by	Xun Lee
Test Mode	Mode 1		

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.064	1.00	Pass
P_{lt}	0.028	0.65	Pass
T_{max} (ms)	0	500	Pass
d_{max} (%)	0	4	Pass
d_c (%)	0	3.3	Pass

Note: (1) P_{st} means short-term flicker indicator.
 (2) P_{lt} means long-term flicker indicator.
 (3) T_{max} means accumulated time value of $d(t)$ with a deviation exceeding 3.3 %.
 (4) d_{max} means maximum relative voltage change.
 (5) d_c means maximum relative steady-state voltage change.

10 General Immunity Requirements

EN 55024:2010, Immunity requirements

Clause	Reference standard	Table	Test specification	Performance Criterion
4.2.1	EN/IEC 61000-4-2 ESD	1.3	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge	B
4.2.3.2	EN/IEC 61000-4-3 RS	1.2	Enclosure port: 80-1000 MHz, 3V/m, 80% AM (1kHz)	A
4.2.2	EN/IEC 61000-4-4 EFT	2.3	Signal ports and telecommunication ports: xDSL equipment: ±0.5kV, 5/50 (T_r/T_h) ns, 100kHz others: ±0.5kV, 5/50 (T_r/T_h) ns, 5kHz	B
		3.3	Input DC power port: ±0.5kV, 5/50 (T_r/T_h) ns, 5kHz	
		4.5	Input AC Power ports: ±1kV, 5/50 (T_r/T_h) ns, 5kHz	
4.2.5	EN/IEC 61000-4-5 Surge	2.2	Signal and telecommunication ports (direct to outdoor cables): 10/700 (5/320) (T_r/T_h) µs w/o primary protectors: ±1kV, or with primary protectors fitted: ±4kV	C
		3.2	Input DC power port (direct to outdoor cables): 1.2/50 (8/20) (T_r/T_h) µs Line to earth: ±0.5kV	B
		4.4	Input AC Power ports: 1.2/50 (8/20) (T_r/T_h) µs, Line to line: ±1kV Line to earth: ±2kV	
4.2.3.3	EN/IEC 61000-4-6 CS	2.1	Signal and telecommunication ports(cable length > 3m): 0.15-80 MHz, 3V, 80% AM (1kHz)	A
		3.1	Input DC power port: 0.15-80 MHz, 3V, 80% AM (1kHz)	
		4.1	Input AC Power ports: 0.15-80 MHz, 3V, 80% AM (1kHz)	
4.2.4	EN/IEC 61000-4-8 PFMF	1.1	Enclosure port: 50 or 60 Hz, 1A/m	A
4.2.6	EN/IEC 61000-4-11 Dips & Interruptions	4.2	Input AC Power ports: Voltage Dips: >95% reduction – 0.5 period 30% reduction – 25 periods	B C
		4.3	Input AC Power ports: Voltage Interruptions: >95% reduction – 250 periods	C

10.1 Performance Criteria

General Performance Criteria

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Particular performance criteria

The particular performance criteria which are specified in the normative annexes of EN 55024 take precedence over the corresponding parts of the general performance criteria. Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

11 Electrostatic Discharge Immunity Test (ESD)

11.1 Test Specification

Basic Standard:	EN/IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: ± 2 , ± 4 , ± 8 kV (Direct) Contact Discharge: ± 2 , ± 4 kV (Direct/Indirect)
Number of Discharge:	Air – Direct: 10 discharges per location (each polarity) Contact – Direct & Indirect: 25 discharges per location (each polarity) and min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

11.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
KeyTek, ESD Simulator	MZ-15/EC	0504259	Oct. 25, 2017	Oct. 24, 2018

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in ESD Room No. 1.
3. Tested Date: Mar. 23, 2018

11.3 Test Arrangement

The discharges shall be applied in two ways:

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, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

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

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with EN/IEC 61000-4-2:

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

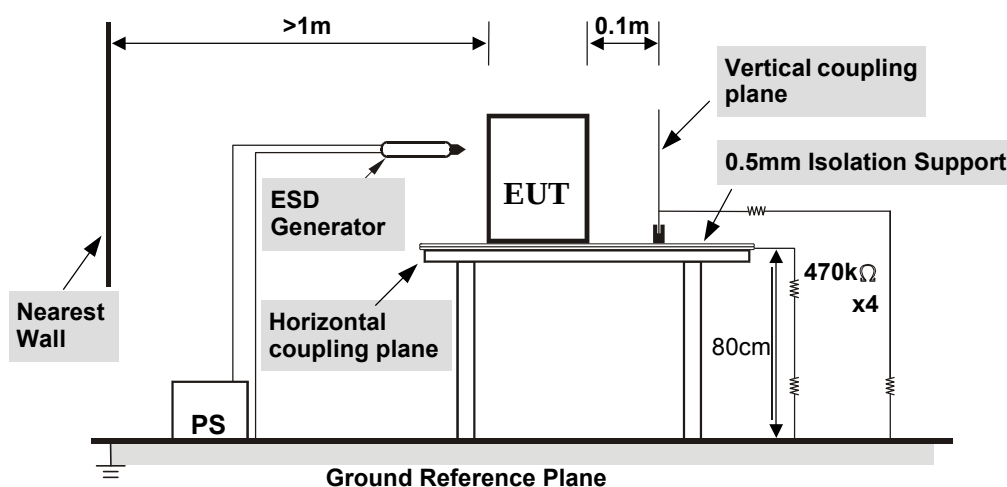


TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN/IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

11.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Environmental conditions	22 °C, 31% RH 1000 mbar	Tested by	Xun Lee

Test Results of Direct Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2	+/-	1, 2	Note 1	NA	A
4	+/-	1, 2	Note 2	NA	B
2, 4, 8	+/-	3-9	NA	Note 1	A

Description of test points of direct application: Please refer to following page for representative mark only.

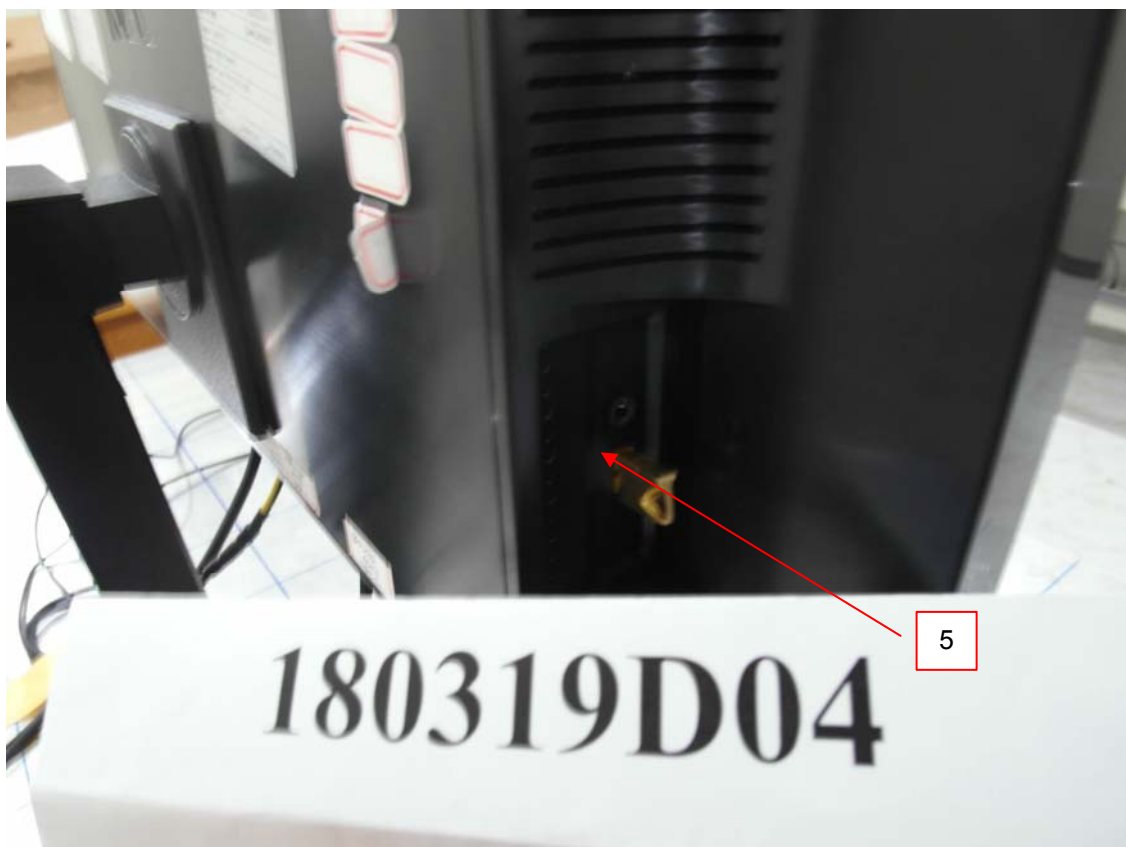
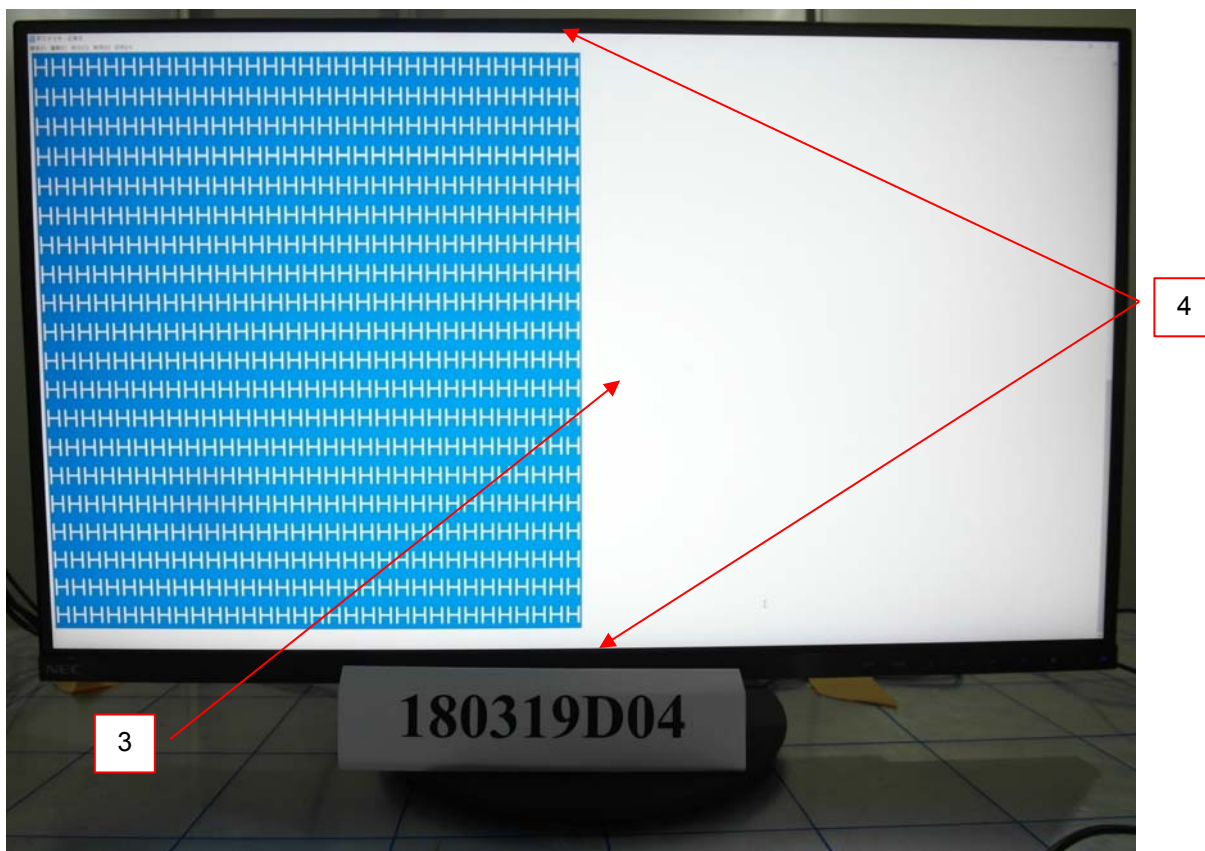
Test Results of Indirect Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	Four Sides	Note 1	Note 1	A

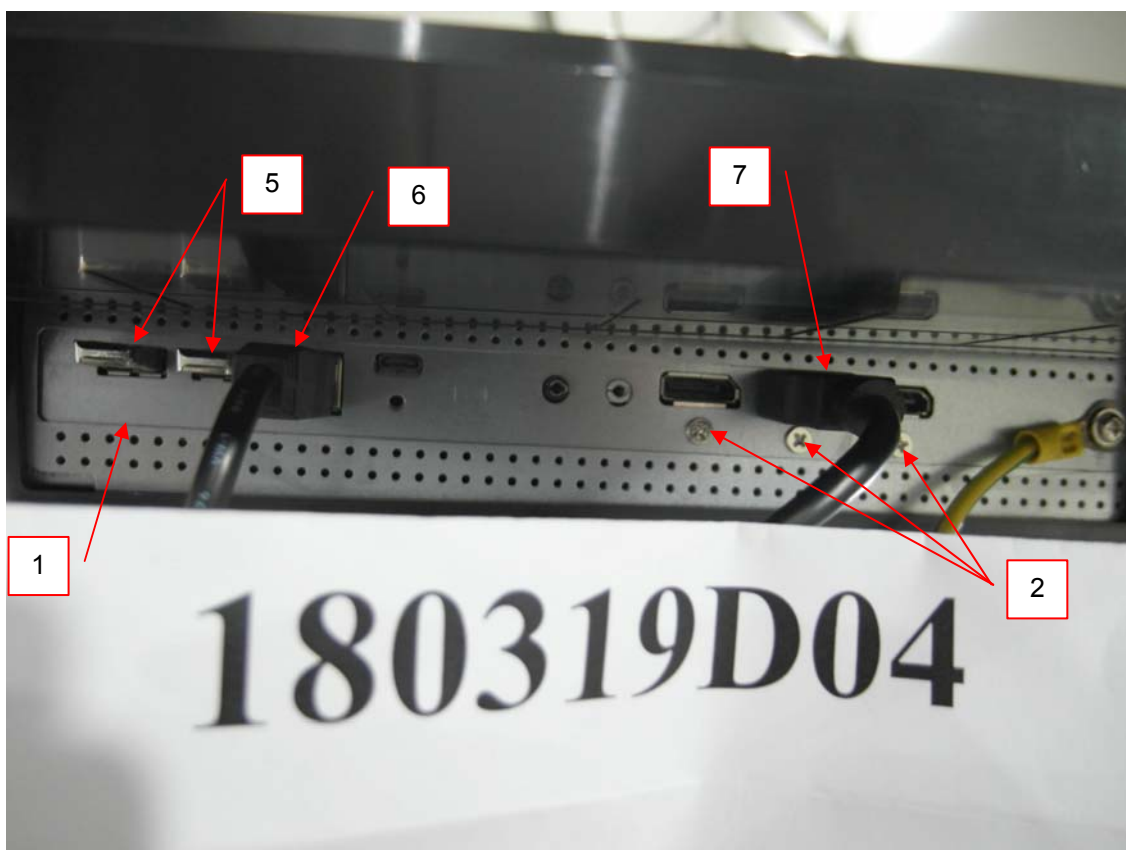
Description of test points of indirect application:

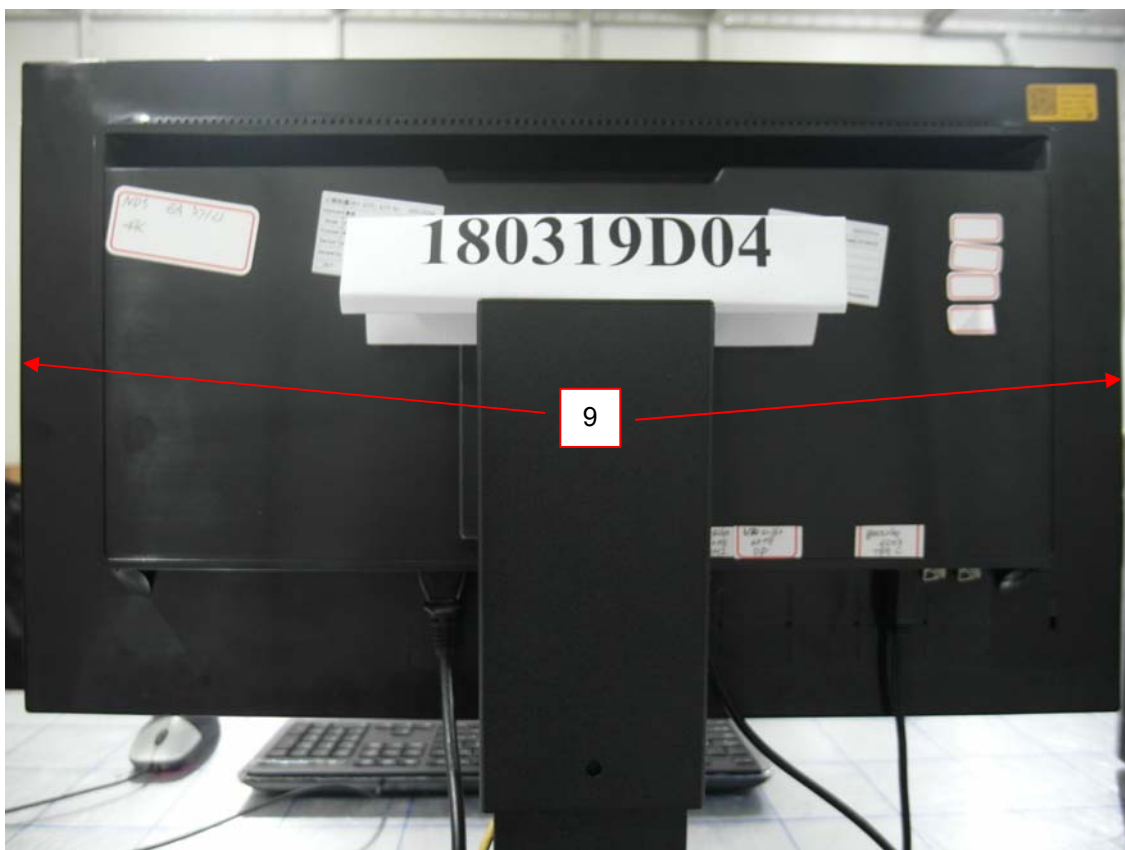
1. Front side 2. Rear side 3. Right side 4. Left side

Note: 1. The EUT function was correct during the test.
2. The image on the screen was disappeared during the test, but self-recoverable after the test.

Description of Test Points







12 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

12.1 Test Specification

Basic Standard:	EN/IEC 61000-4-3
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

12.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
BOONTON Power Meter	4232A	94901	Jul. 18, 2017	Jul. 17, 2018
BOONTON Power Sensor	51011-EMC	32807	Jul. 18, 2017	Jul. 17, 2018
BOONTON Power Sensor	51011-EMC	32832	Jul. 18, 2017	Jul. 17, 2018
TESEQ RF Generator	ITS 6006	37543	May 8, 2017	May 7, 2018
ETS Electric Field Sensor	HI-6105	00217912	Nov. 27, 2017	Nov. 26, 2018
TESTQ Amplifier	AS1860-50	S-5944/1	NA	NA
TESTQ Amplifier	CBA 3G-050	T44345	NA	NA
TESTQ Amplifier	CBA 1G-275	T44344	NA	NA
AR Log-Periodic Antenna	AT5080	312115	NA	NA
Schwarzbeck LOG ANTENNA	Stlp 9149	9149-260	NA	NA
CHANCE MOST Compact Full Anechoic Chamber (7x3x3 m)	N/A	N/A	Jul. 28, 2017	Jul. 27, 2018
Software	RS_V7.6	NA	NA	NA

- Notes:
1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in RS Room No.1.
 3. The transmit antenna was located at a distance of 3 meters from the EUT.
 4. Tested Date: Mar. 26, 2018

12.3 Test Arrangement

The test procedure was in accordance with EN/IEC 61000-4-3.

- The testing was performed in a modified semi-anechoic chamber.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- The field strength level was 3 V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

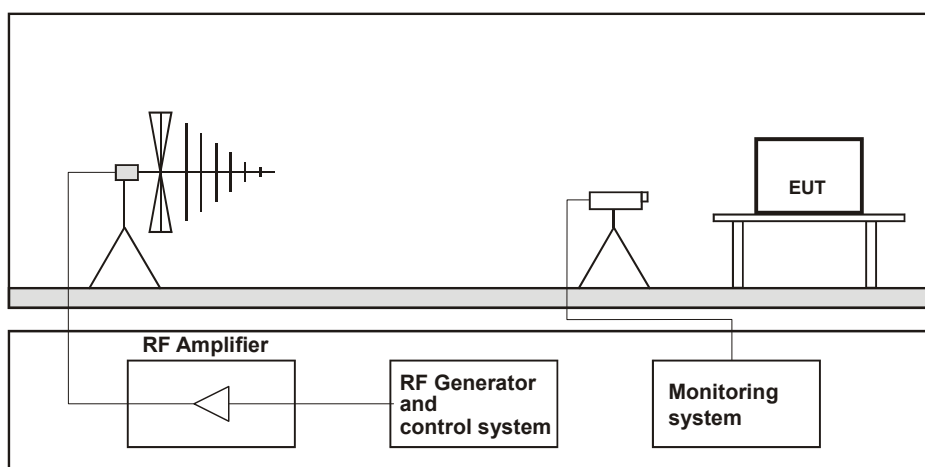


Table-top Equipment

The EUT installed in a representative system as described in section 7 of EN/IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

12.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Environmental conditions	25 °C, 65% RH	Tested by	Xun Lee

Frequency (MHz)	Polarity	Azimuth(°)	Applied Field Strength		Observation	Performance Criterion
			(V/m)	Modulation		
80 -1000	V&H	0	3	80% AM (1kHz)	Note	A
80 -1000	V&H	90	3	80% AM (1kHz)	Note	A
80 -1000	V&H	180	3	80% AM (1kHz)	Note	A
80 -1000	V&H	270	3	80% AM (1kHz)	Note	A

Note: The EUT function was correct during the test.

13 Electrical Fast Transient/Burst Immunity Test (EFT)

13.1 Test Specification

Basic Standard:	EN/IEC 61000-4-4
Test Voltage:	Signal / telecommunication port: N/A Input DC power port: N/A Input AC power port: ± 1 kV
Impulse Repetition Frequency:	xDSL telecommunication port: 100 kHz others: 5 kHz
Impulse Wave Shape:	5/50 ns
Burst Duration:	0.75 ms for 100 kHz Repetition Frequency 15 ms for 5 kHz Repetition Frequency
Burst Period:	300 ms
Test Duration:	1 min.

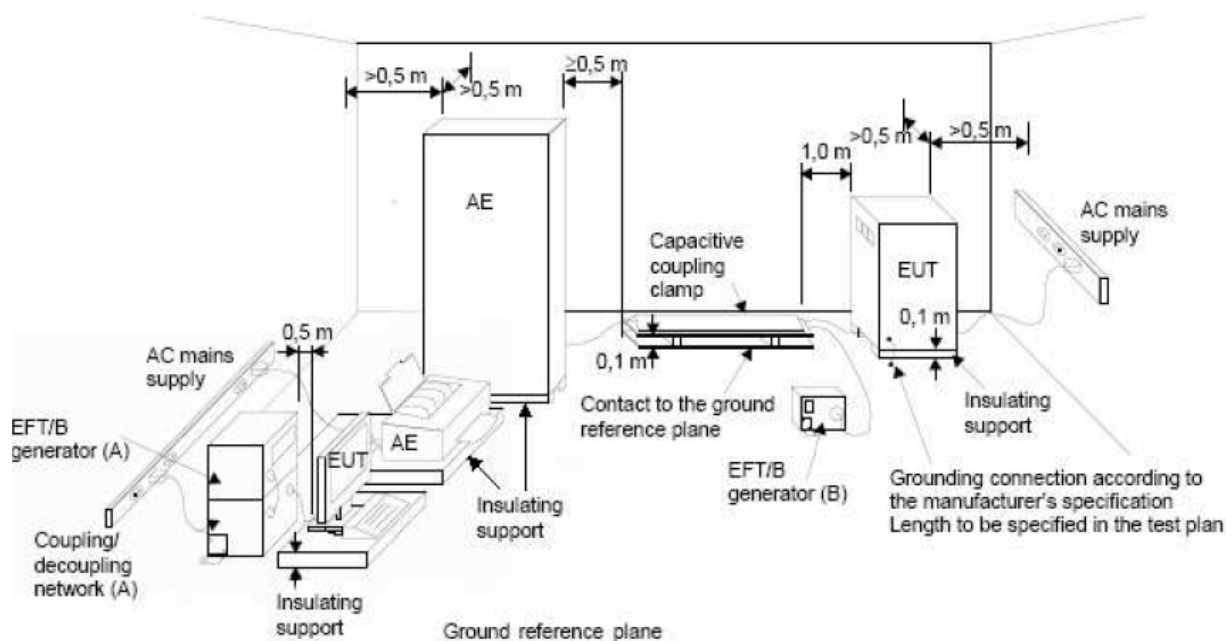
13.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Haefely, EFT Generator	PEFT 4010	154954	Apr. 17, 2017	Apr. 16, 2018
Haefely, Capacitive Clamp	IP4A	155173	Apr. 17, 2017	Apr. 16, 2018

- Notes:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in EFT Room.
 3. Tested Date: Mar. 23, 2018

13.3 Test Arrangement

- Both positive and negative polarity discharges were applied.
- The distance between any coupling devices and the EUT should be 0.5 m for table-top equipment testing, and 1.0 m for floor standing equipment.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with EN/IEC 61000-4-4, 5/50 ns.



NOTE:

- location for supply line coupling
- location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

13.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Enviromental conditions	23 °C, 66% RH	Tested by	Xun Lee

Input AC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
1	L1	+/-	Note	A
1	L2	+/-	Note	A
1	PE	+/-	Note	A
1	L1-L2-PE	+/-	Note	A

Note: The EUT function was correct during the test.

14 Surge Immunity Test

14.1 Test Specification

Basic Standard:	EN/IEC 61000-4-5
Wave-Shape:	Signal / telecommunication port (direct to outdoor cables*): 10/700 μ s Open Circuit Voltage 5/320 μ s Short Circuit Current Input DC power port (direct to outdoor cables*): 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current Input AC power port: 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current
Test Voltage:	Signal and telecommunication ports**: w/o primary protectors: N/A with primary protectors fitted: N/A Input DC power port: Line to earth or ground: N/A Input AC power ports: Line to line: ± 0.5 kV, ± 1 kV Line to earth or ground: ± 0.5 kV, ± 1 kV, ± 2 kV
AC Phase Angle (degree):	0°, 90°, 180°, 270°
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

14.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
TESEQ, Surge Simulator	NSG 3060	1572	May 23, 2017	May 22, 2018
Coupling Decoupling Network	CDN-UTP8	028	Aug. 18, 2017	Aug. 17, 2018
TESEQ Coupling Decoupling Network	CDN HSS-2	41009	May 19, 2017	May 18, 2018
TESEQ Coupling Decoupling Networ	CDN 118-T8	40386	Sep. 14, 2017	Sep. 13, 2018
TESEQ CDN for Unshielded Unsymmetrical Signal & Data Lines	CDN117	40144	Sep. 14, 2017	Sep. 13, 2018

- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS Room No. 2.
3. Tested Date: Mar. 26, 2018

14.3 Test Arrangement

a. Input AC/DC Power ports:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.

b. Signal and telecommunication ports,

- Unshielded unsymmetrical interconnection lines:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.

- Unshielded symmetrical interconnections communication lines:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.

- High speed communications lines

Prior to the test, the correct operation of the port shall be verified; the external connection shall then be removed and the surge applied directly to the port's terminals with no coupling /decoupling network. After the surge, the correct operation of the port shall again be verified.

- Shielded lines:

- Direct application,

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with single or multiple shielded cables.

Rules for application of the surge to shielded lines:

a) Shields grounded at both ends

- The surge injection on the shield.

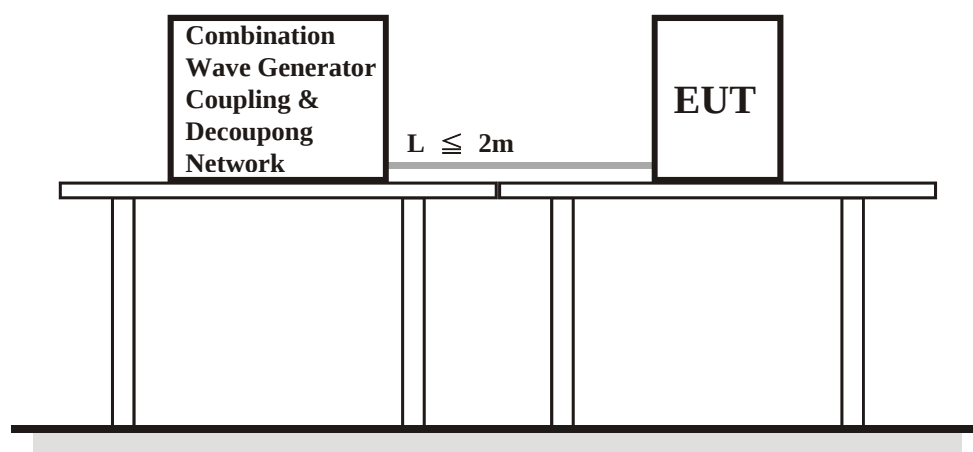
b) Shields grounded at one end

- If in the installation the shield is connected only at the auxiliary equipment, test shall be done in that configuration but with the generator still connected to the EUT side. If cable lengths allow, the cables shall be on insulated supports 0,1 m above the ground plane or cable tray.

For products which do not have metallic enclosures, the surge is applied directly to the shielded cable.

- Alternative coupling method for testing single cables in a multi-shield configuration,

Surges are applied in close proximity to the interconnection cable under test by a wire. The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be the lesser of: the maximum length permitted by the EUT's specification, or 20 m. Where the length exceeds 1 m, excess lengths of cables shall be bundled at the approximate centre of the cables with the bundles 30 cm to 40 cm in length.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

14.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Environmental conditions	26 °C, 62% RH	Tested by	Todd Chang

Input AC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1	L1-L2	+/-	Note	A
0.5, 1, 2	L1-PE	+/-	Note	A
0.5, 1, 2	L2-PE	+/-	Note	A

Note: The EUT function was correct during the test.

15 Immunity to Conducted Disturbances Induced by RF Fields (CS)

15.1 Test Specification

Basic Standard:	EN/IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Voltage Level:	3 V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Dwell Time	3 seconds

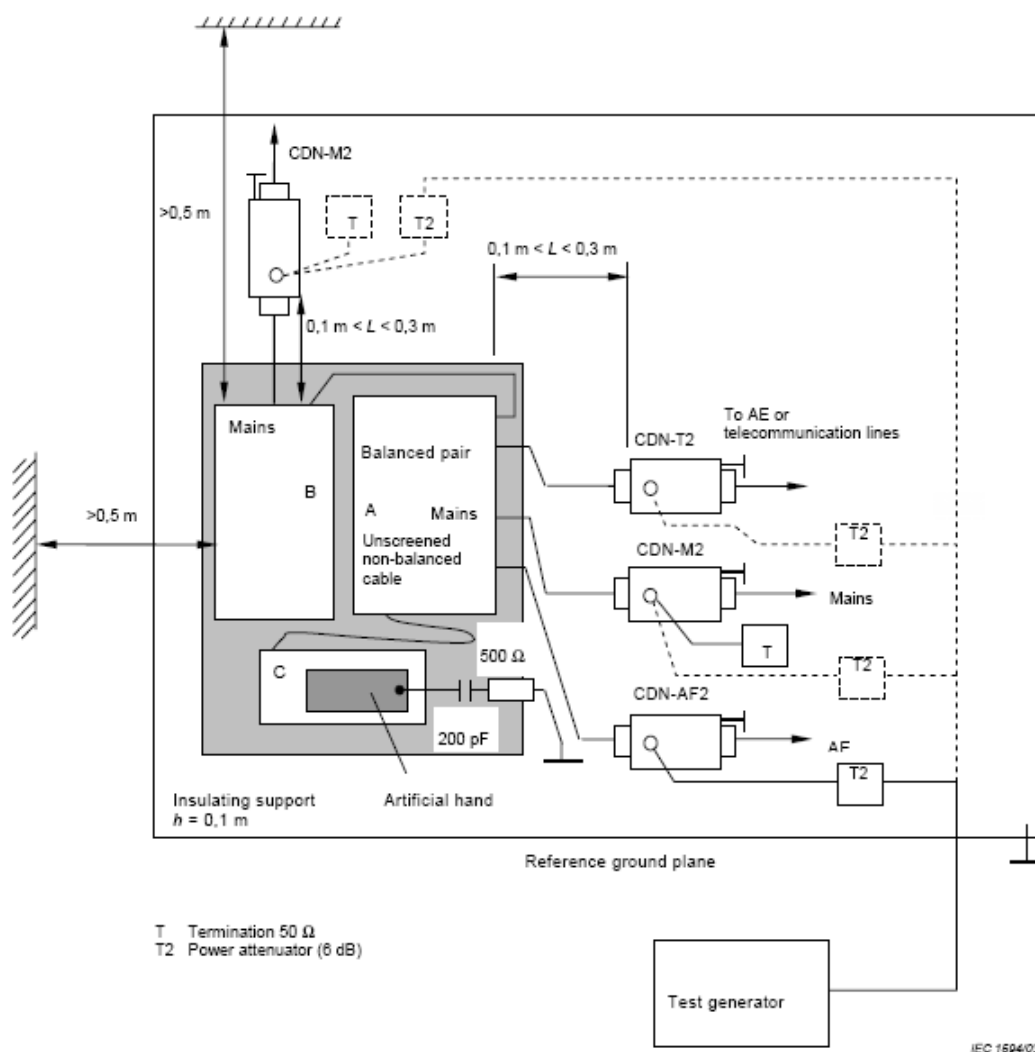
15.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ Signal Generator	SML03	101801	Jan. 8, 2018	Jan. 7, 2019
Digital Sweep Function Generator	8120	984801	NA	NA
AR Power Amplifier	75A250AM1	306331	NA	NA
FCC Coupling Decoupling Network	FCC-801-M2-16A	01047	Jun. 21, 2017	Jun. 20, 2018
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	F-203I-23mm	455	NA	NA
FISCHER CUSTOM COMMUNICATIONS Current Injection Clamp	F-120-9A	361	Jul. 26, 2017	Jul. 25, 2018
B&K Ear Simulator	4185	2553594	NA	NA
EM TEST Coupling Decoupling Network	CDN M1/32A	306508	Jun. 21, 2017	Jun. 20, 2018
TESEQ Coupling Decoupling Network	CDN T800	34428	Jun. 21, 2017	Jun. 20, 2018
FCC Coupling Decoupling Network	FCC-801-T4	02031	Jun. 21, 2017	Jun. 20, 2018
EM TEST Coupling Decoupling Network	CDN T2	306509	Jun. 21, 2017	Jun. 20, 2018
R&S Power Sensor	NRV-Z5	837878/039	Oct. 30, 2017	Oct. 29, 2018
R&S Power Meter	NRVD	837794/040	Oct. 30, 2017	Oct. 29, 2018
TESEQ Coupling Decoupling Network	CDN M232	37702	Jun. 21, 2017	Jun. 20, 2018
TESEQ Coupling Decoupling Network	CDN M332	41258	Jun. 21, 2017	Jun. 20, 2018
TESEQ Coupling Decoupling Network	CDN M332	41256	Jun. 21, 2017	Jun. 20, 2018
TESEQ Coupling Decoupling Network	CDN T400A	28569	Jun. 21, 2017	Jun. 20, 2018
TESEQ Coupling Decoupling Network	CDN T8-10	40376	Jun. 21, 2017	Jun. 20, 2018
Software	CS_V7.4.2	NA	NA	NA

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in CS Room No. 1.
3. Tested Date: Mar. 27, 2018

15.3 Test Arrangement

- The EUT shall be tested within its intended operating and climatic conditions.
- An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- One of the CDNs not used for injection was terminated with 50 ohm, providing only one return path. All other CDNs were coupled as decoupling networks.
- The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.



- Note:**
- The EUT clearance from any metallic obstacles shall be at least 0,5 m.
 - Interconnecting cables (≤ 1 m) belonging to the EUT shall remain on the insulating support.
 - The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

15.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Enviromental conditions	23 °C, 67% RH	Tested by	Chiming Li

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	3	AC Power	CDN-M3	CDN-M1	Note	A

Note: The EUT function was correct during the test.

16 Power Frequency Magnetic Field Immunity Test

16.1 Test Specification

Basic Standard:	EN/IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1 m x 1 m

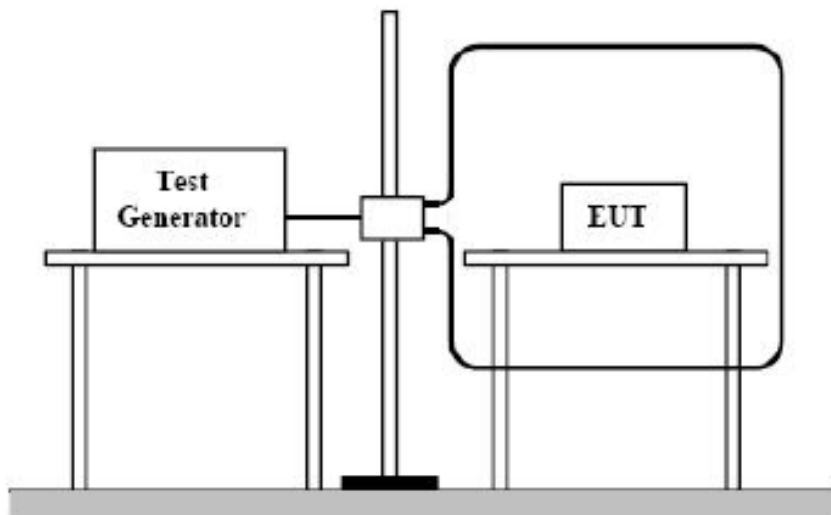
16.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
HAEFELY Magnetic Field Tester	MAG 100	083794-06	NA	NA
COMBINOVA Magnetic Field Meter	MFM10	224	Apr. 17, 2017	Apr. 16, 2018

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in EMS Room No. 1
 3. Tested Date: Mar. 23, 2018

16.3 Test Arrangement

- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.



TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

16.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Environmental conditions	25 °C, 65% RH	Tested by	Xun Lee

Application	Frequency (Hz)	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1	Note	A
Y - Axis	50	1	Note	A
Z - Axis	50	1	Note	A

Note: The EUT function was correct during the test.

17 Voltage Dips and Interruptions

17.1 Test Specification

Basic Standard:	EN/IEC 61000-4-11
Test levels:	Voltage Dips: >95% reduction – 0.5 period 30% reduction – 25 periods Voltage Interruptions: >95% reduction – 250 periods
Interval between Event:	Minimum ten seconds
Sync Angle (degrees):	0° / 180°
Test Cycle:	3 times

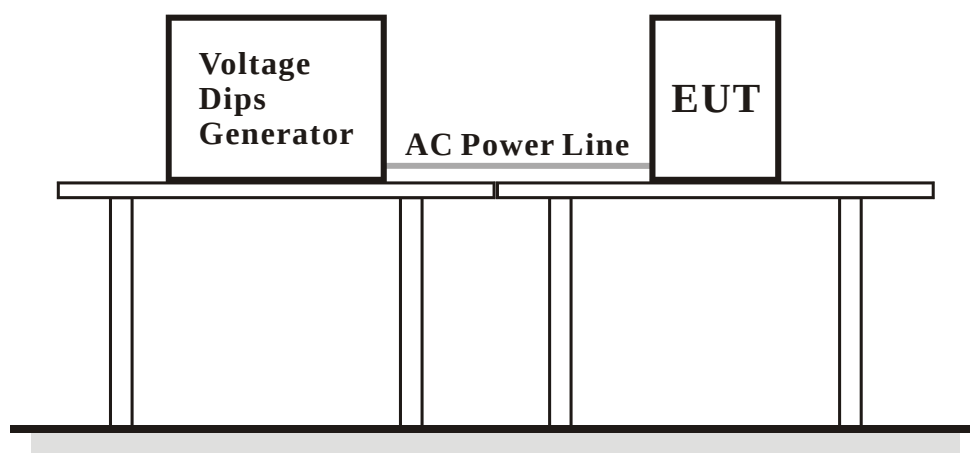
17.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Teseq Immunity Test System	Proflin 2105	1632A00983 & 1639A01863	Sep. 28, 2017	Sep. 27, 2018
Software	WIN2120	NA	NA	NA

- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS Room No. 1.
3. Tested Date: Mar. 23, 2018

17.3 Test Arrangement

The EUT shall be tested for each selected combination of test levels and duration with a sequence of 3 dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at 0 degree crossover point of the voltage waveform.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

17.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz/ 240 Vac, 50 Hz/ 100 Vac, 50 Hz
Environmental conditions	25 °C, 65% RH	Tested by	Xun Lee

Input Power for testing: 230 Vac, 50 Hz (Nominal input Voltage)					
Voltage Reduction (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
>95	0.5	10	3	Note 1	A
30	25	10	3	Note 1	A
>95	250	10	3	Note 2	B

Input Power for testing: 240 Vac, 50 Hz (Maximum rated input voltage)					
Voltage Reduction (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
>95	0.5	10	3	Note 1	A
30	25	10	3	Note 1	A
>95	250	10	3	Note 2	B

Input Power for testing: 100 Vac, 50 Hz (Minimum rated input voltage)					
Voltage Reduction (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
>95	0.5	10	3	Note 1	A
30	25	10	3	Note 1	A
>95	250	10	3	Note 2	B

Note: 1. The EUT function was correct during the test.
 2. The EUT shutdown during the test, but self-recover after the test.

18 Pictures of Test Arrangements

18.1 Conducted Emission from the AC Mains Power Port

Mode 1

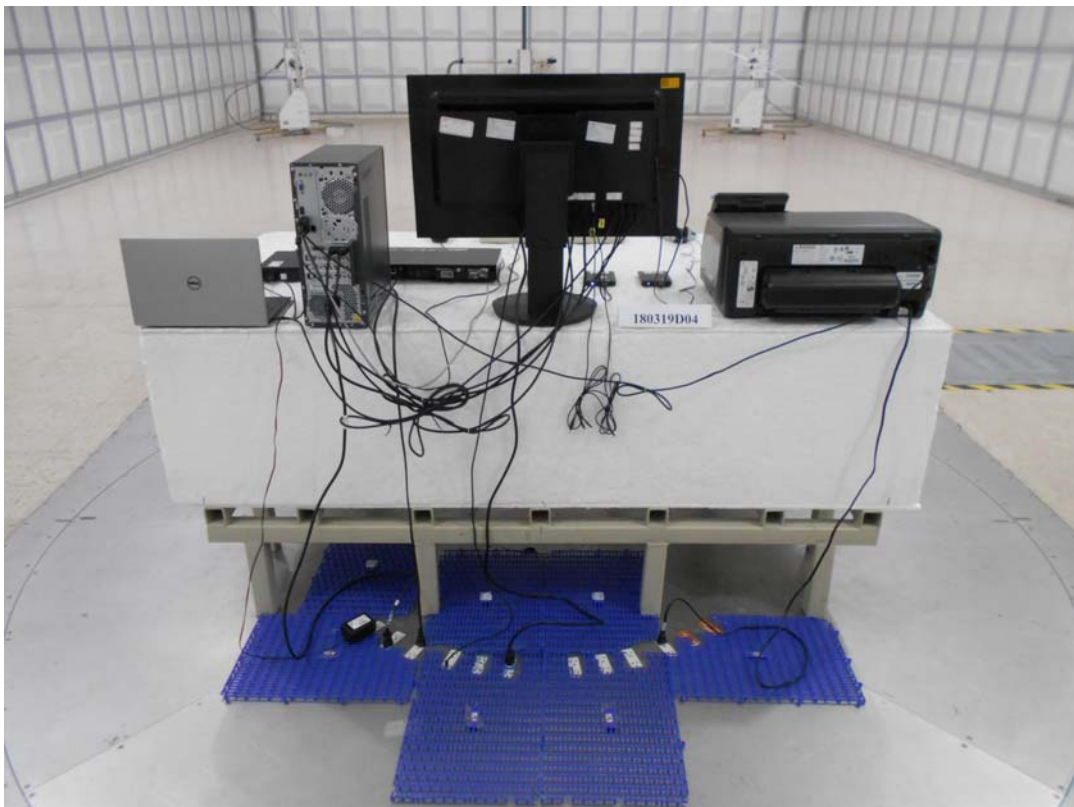


Mode 2 & Mode 3

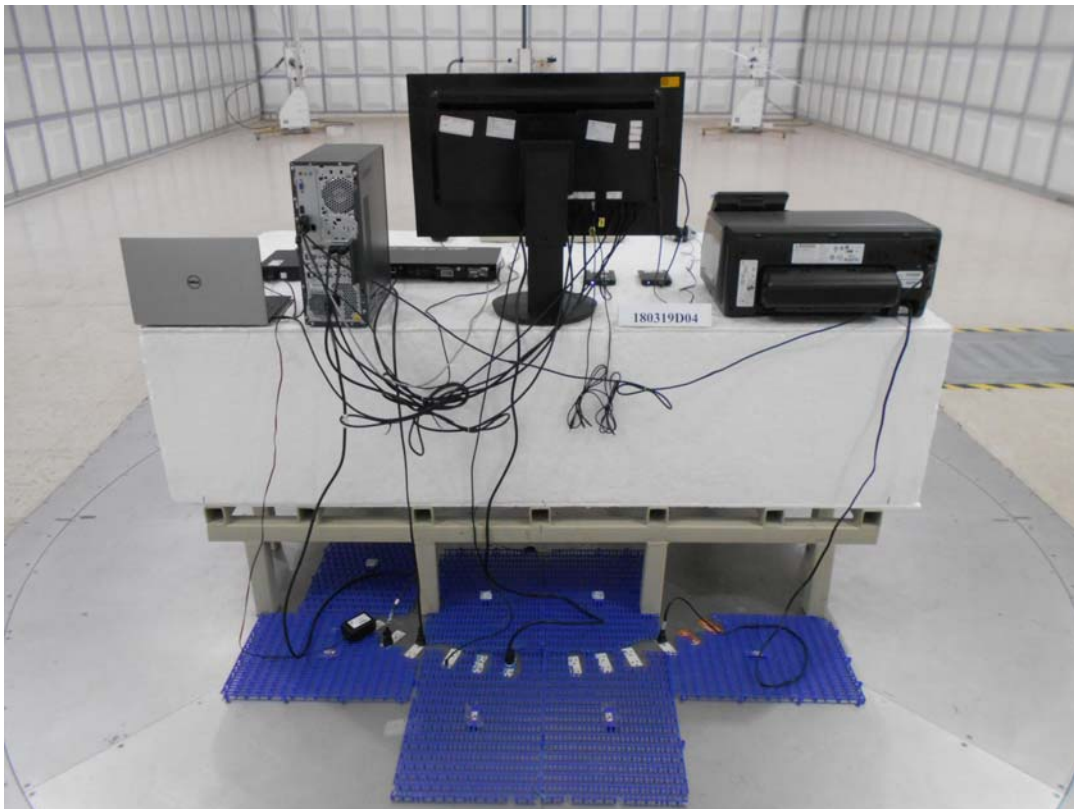


18.2 Radiated Emission at Frequencies up to 1GHz

Mode 1



Mode 2 & Mode 3



18.3 Radiated Emission at Frequencies above 1GHz

Mode 1



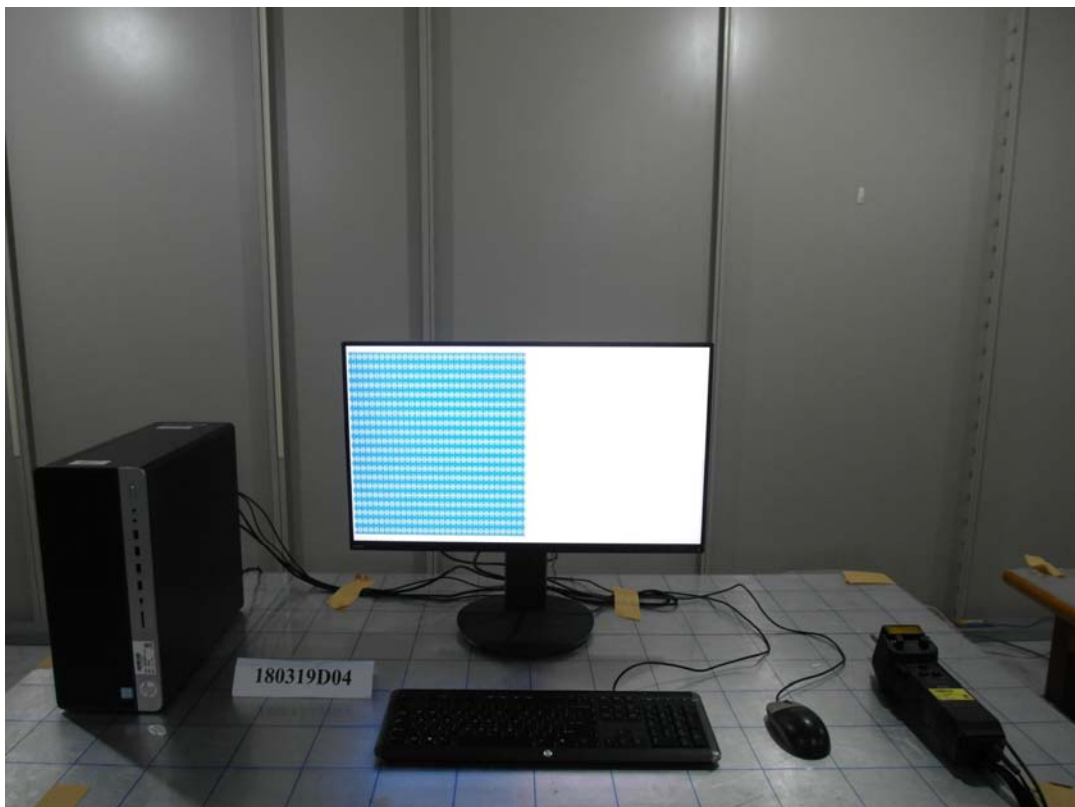
Mode 2 & Mode 3



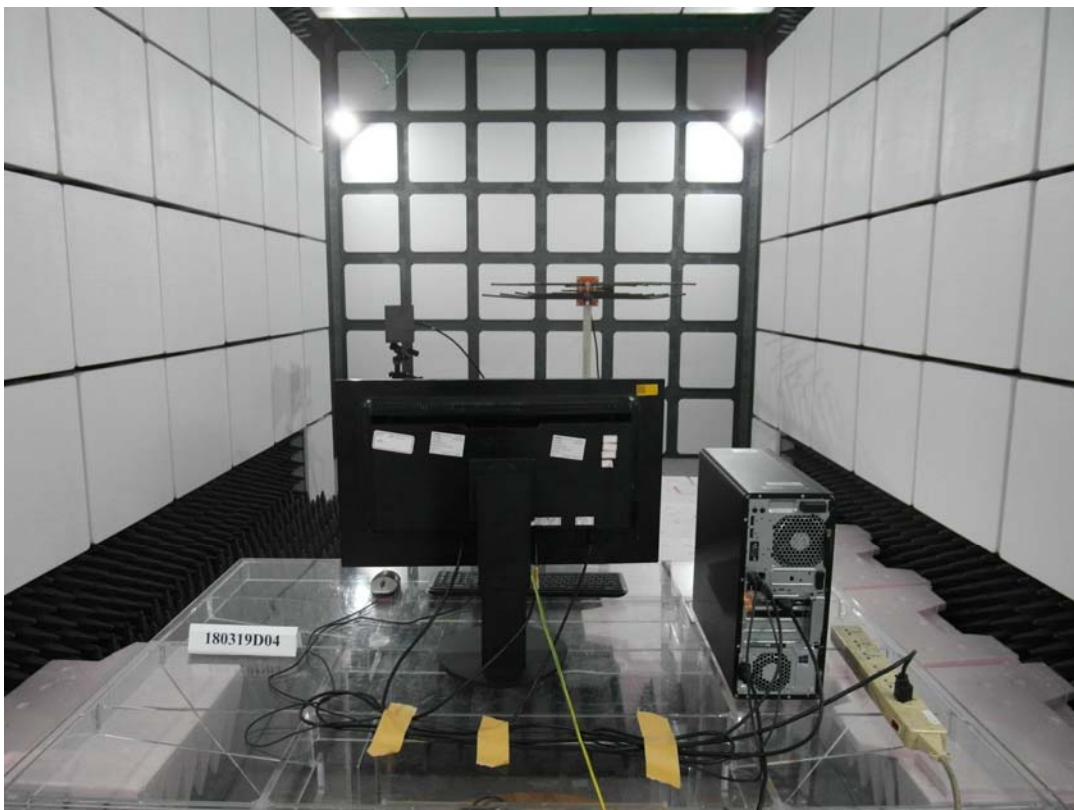
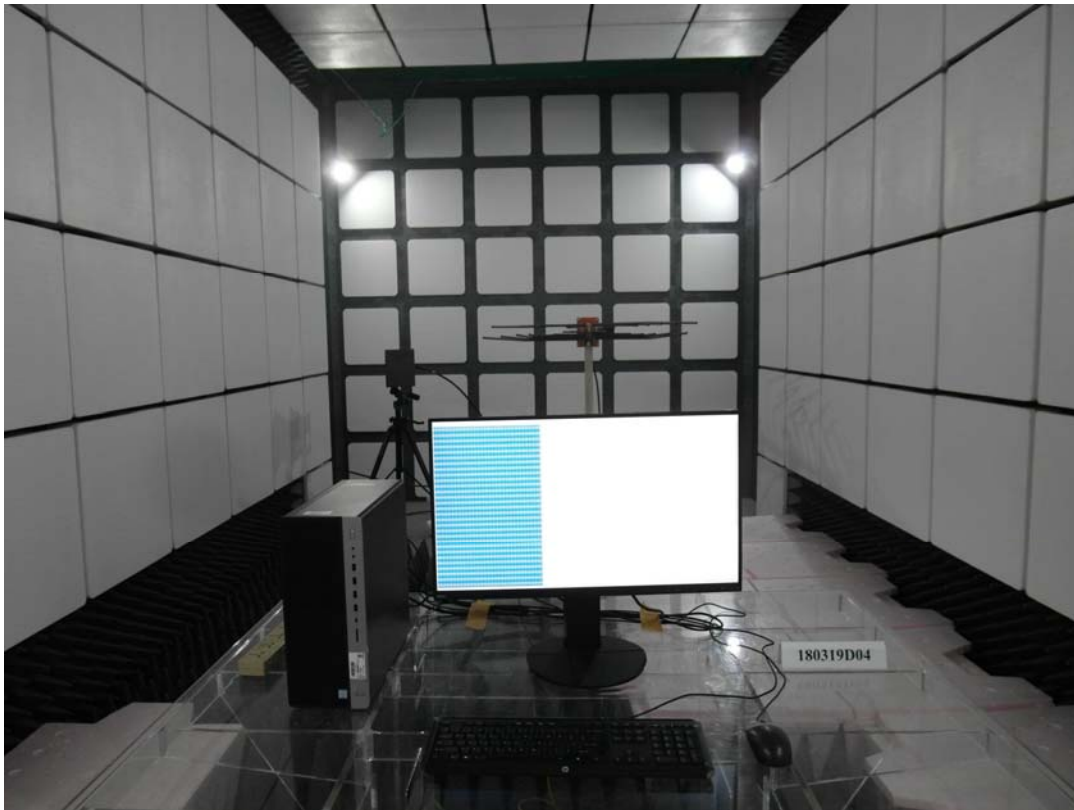
18.4 Harmonics Current, Voltage Fluctuations and Flicker Measurement



18.5 Electrostatic Discharge Immunity Test (ESD)



18.6 Radio-frequency, Electromagnetic Field Immunity Test (RS)



18.7 Electrical Fast Transient/Burst Immunity Test (EFT)

Mains port



18.8 Surge Immunity Test

Mains port



18.9 Conducted Disturbances Induced by RF Fields (CS)

Mains port



18.10 Power Frequency Magnetic Field Immunity Test (PFMF)



18.11 Voltage Dips and Interruptions



Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---