

FCC DoC Test Report

Report No.: FD151207C34 R1

Test Model: MC74-HW

Received Date: Dec. 8, 2015

Test Date: Dec. 21 ~ 29, 2015

Issued Date: Apr. 8, 2016

Applicant: Cisco Systems, Inc.

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

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LAB CODE: 200836-0



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A D T

Release Control Record

Issue No.	Description	Date Issued
FD151207C34	Original release.	Jan. 4, 2016
FD151207C34 R1	Separate the test setup photo to another file.	Apr. 8, 2016

1 Certificate of Conformity

Product: UC Phone

Brand: CISCO

Test Model: MC74-HW

Sample Status: Engineering sample

Applicant: Cisco Systems, Inc.

Test Date: Dec. 21 ~ 29, 2015

Standards: 47 CFR FCC Part 15, Subpart B, Class B
ICES-003:2012 Issue 5, Class B
ANSI C63.4:2014

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 : Annie Chang, **Date:** Apr. 8, 2016
Annie Chang / Senior Specialist

Approved by : Henry Lai, **Date:** Apr. 8, 2016
Henry Lai / Director

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2012 Issue 5, Class B

ANSI C63.4:2014

FCC Clause	ICES-003 Clause	Test Item	Result/Remarks	Verdict
15.107	6.1	AC Power Line Conducted Emissions	Minimum passing Class B margin is -4.78 dB at 0.18516 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -4.56 dB at 173.25 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -11.02 dB at 2067.07 MHz	Pass

Note: There is no deviation to the applied test methods and requirements covered by the scope of this report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

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	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.78 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73 dB
Radiated Emissions above 1 GHz	Above 1GHz	3.36 dB

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 Cisco Systems, Inc., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	UC Phone
Brand	CISCO
Test Model	MC74-HW
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Form Adapter or PoE
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. The EUT is a VoIP PHONE with following interfaces:

- ◆ USB (Console)
- ◆ USB
- ◆ Audio out (3.5mm)
- ◆ LAN x2(10/100/1000Mbps)

2. The EUT uses following adapter.

Brand	CUI INC
Model	6A-181WP12
Input Power	100-240Vac, 50-60Hz, 0.6A
Output Power	12Vdc, 1.5A
Power Line	AC 2-Pin, Non-shielded DC cable (1.6m) with one ferrite core

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

EUT has been pre-tested under following test modes, and test mode 1 was the worst case for final test.

Mode	Test Condition
1	Handset Mode + Adapter + LAN 1Gbps
2	Handset Mode + PoE + LAN 1Gbps
3	Handfree Mode + Adapter + LAN 1Gbps
4	Handfree Mode + PoE + LAN 1Gbps
5	3.5mm Handset Mode + Adapter + LAN 1Gbps
6	3.5mm Handset Mode + PoE + LAN 1Gbps
7	USB Handset Mode + Adapter + LAN 1Gbps
8	USB Handset Mode + PoE + LAN 1Gbps
9	WiFi Ping Mode + Adapter
10	BT Link Mode + Adapter
11	BT Link Mode +PoE
12	Handset Mode + Adapter + LAN 100Mbps
13	Handset Mode + Adapter + LAN 10Mbps

Test modes are presented in the report as below.

Mode	Test Condition
Conducted emission test	
1	Handset Mode + Adapter + LAN 1Gbps + 120Vac, 60Hz
8	USB Handset Mode + PoE + LAN 1Gbps + 120Vac, 60Hz
9	WiFi Ping Mode + Adapter + 120Vac, 60Hz
Radiated emission test	
1	Handset Mode + Adapter + LAN 1Gbps + 120Vac, 60Hz
8	USB Handset Mode + PoE + LAN 1Gbps + DC 48V
9	WiFi Ping Mode + Adapter + 120Vac, 60Hz

3.4 Test Program Used and Operation Descriptions

- Turned on the power of all equipment.
- Notebook PC (kept in a remote area) ran a test program to enable all functions.
- Notebook PC (kept in a remote area) sent and received messages to/ from Notebook PC (kept in a remote area) via EUT & PoE Hub with four UTP LAN cables.
- Notebook PC (kept in a remote area) sent messages to EUT and UC Phone (kept in a remote area). Then they displayed it on their screens simultaneously.
- EUT call UC Phone (kept in a remote area).
- EUT sent and received messages to/from Notebook (kept in a remote area) via wireless transmission.
- Repeated steps c-f.

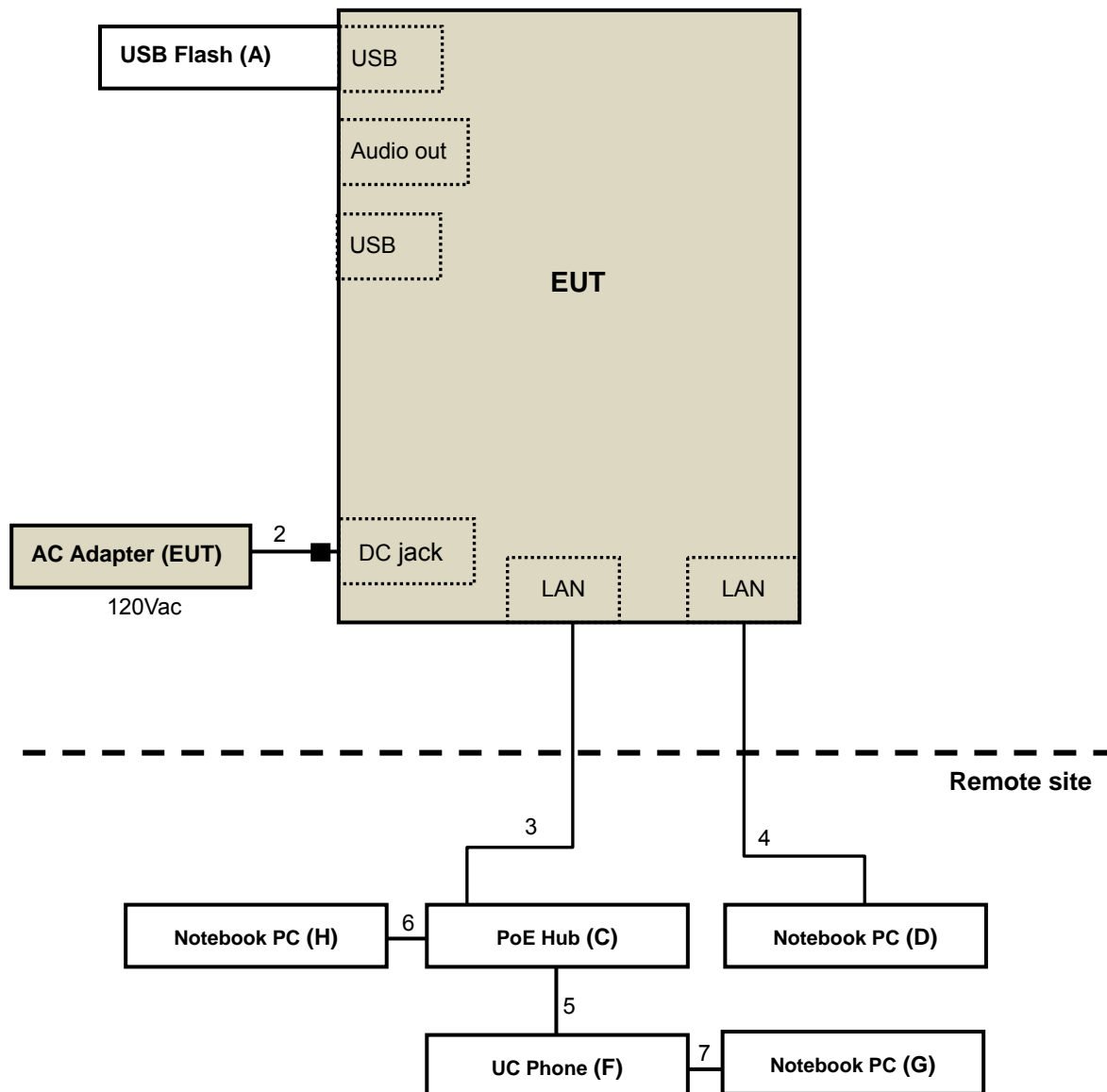
3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 6 GHz, provided by Cisco Systems, Inc., for detailed internal source, please refer to the manufacturer's specifications.

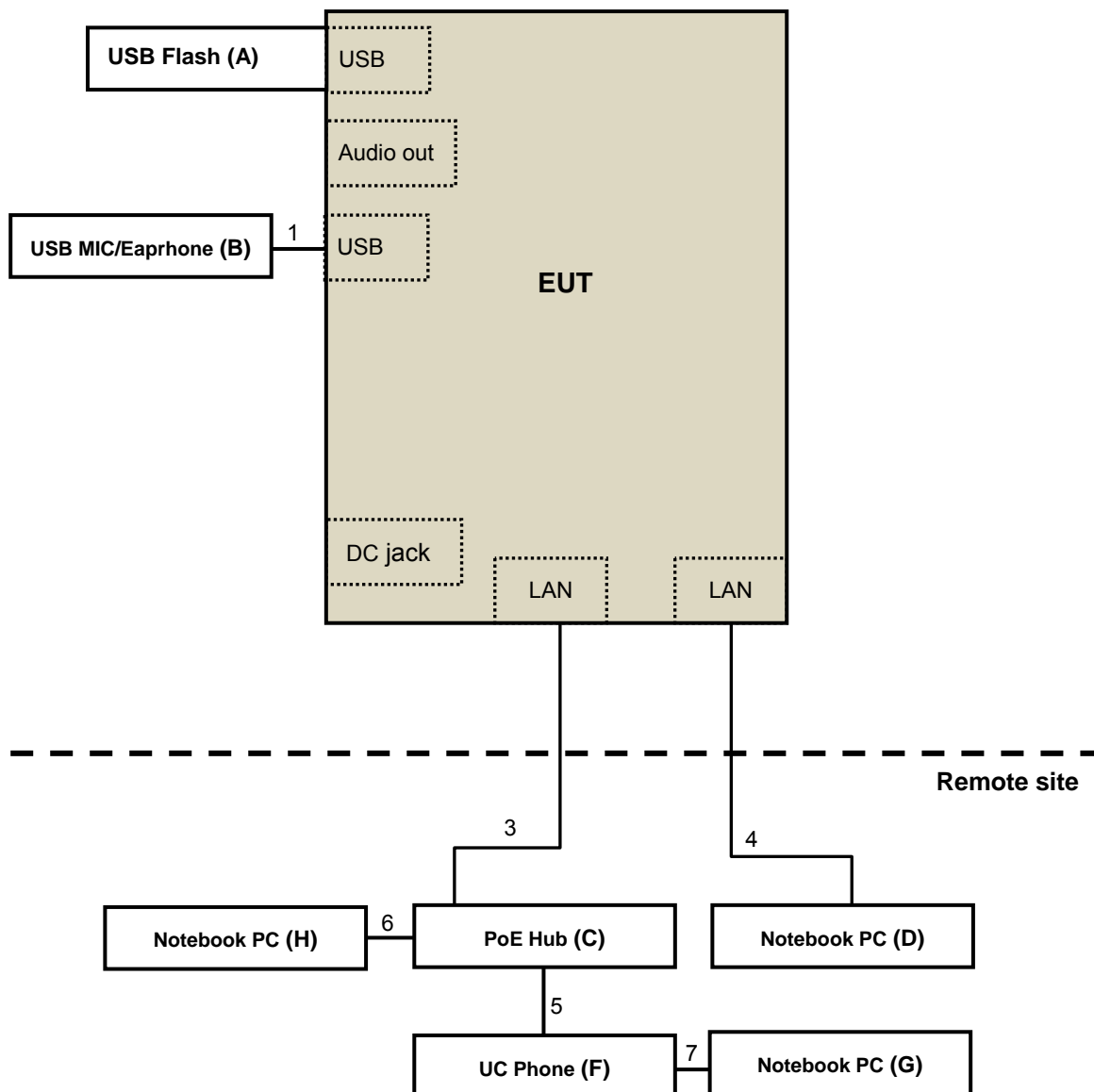
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

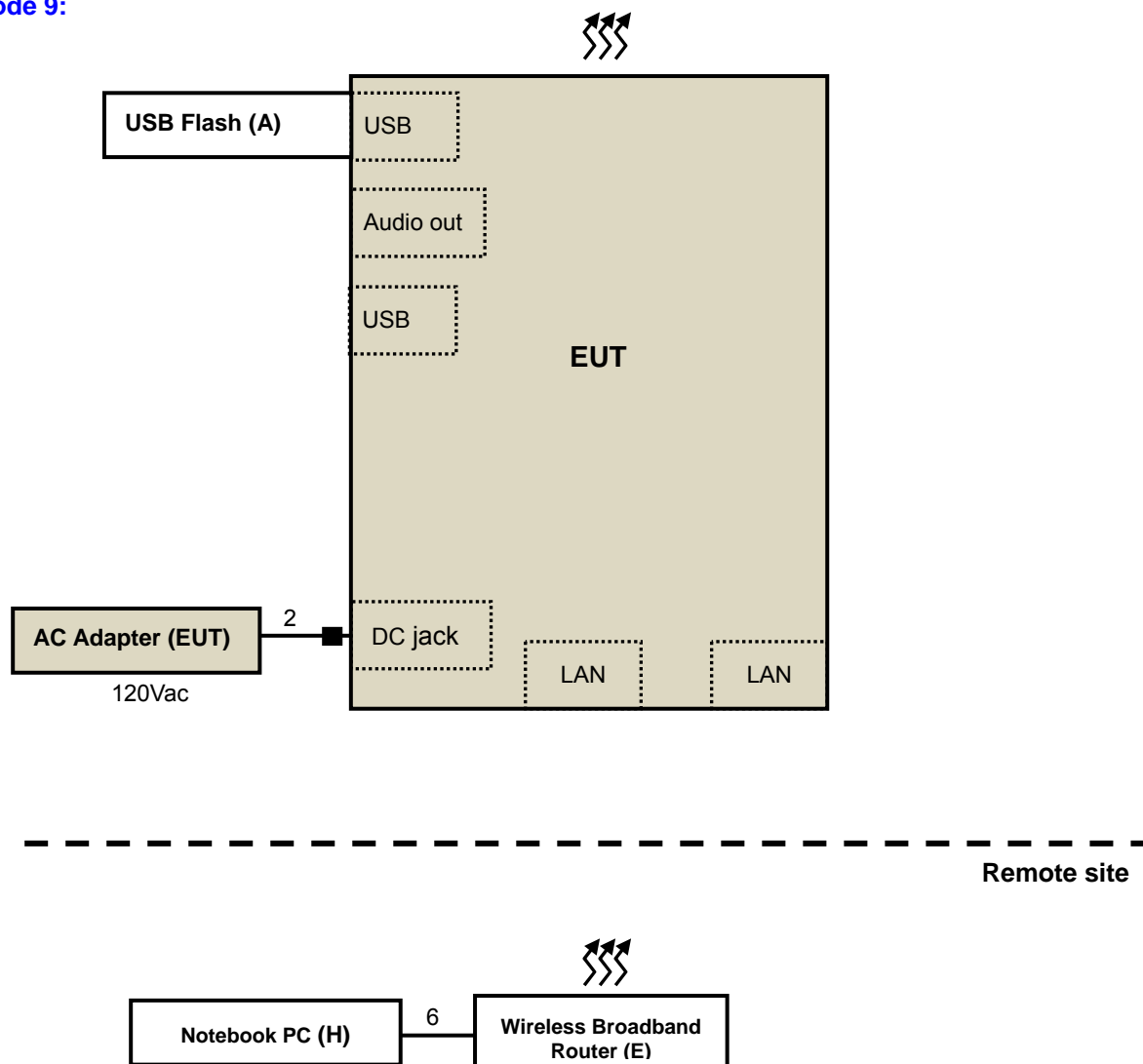
Mode 1:



Mode 8:



Mode 9:



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB 3.0 Flash Drive	HP	v250w	N/A	FCC DoC Approved	Provided by Lab
B.	USB MIC/Eaprhone	N/A	N/A	N/A	N/A	Supplied by client
C.	PoE Hub	CISCO	SG300-10MPP	N/A	N/A	Supplied by client
D.	Notebook PC	DELL	P41G	6BZY242	FCC DoC Approved	Provided by Lab
E.	Wireless Broadband Router	BUFFALO	WHR-G300N-AP	74059085108007	FDI-09101528-0	Provided by Lab
F.	UC Phone	CISCO	MC74-HW	N/A	N/A	Supplied by client
G.	Notebook PC	ASUS	PU401L	ECNXBC012528528	FCC DoC Approved	Provided by Lab
H.	Notebook PC	ASUS	K52D	N/A	N/A	Supplied by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items C~H acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	2	Y	0	Provided by Lab
2.	DC cable	1	1.5	N	1	Supplied by client
3.	LAN cable	1	10	N	0	Provided by Lab
4.	LAN cable	1	10	N	0	Provided by Lab
5.	LAN cable	1	1.8	N	0	Provided by Lab
6.	LAN cable	1	10	N	0	Provided by Lab
7.	LAN cable	1	1.8	N	0	Provided by Lab

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

5 Conducted Emissions at Mains Ports

5.1 Limits

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Test Instruments

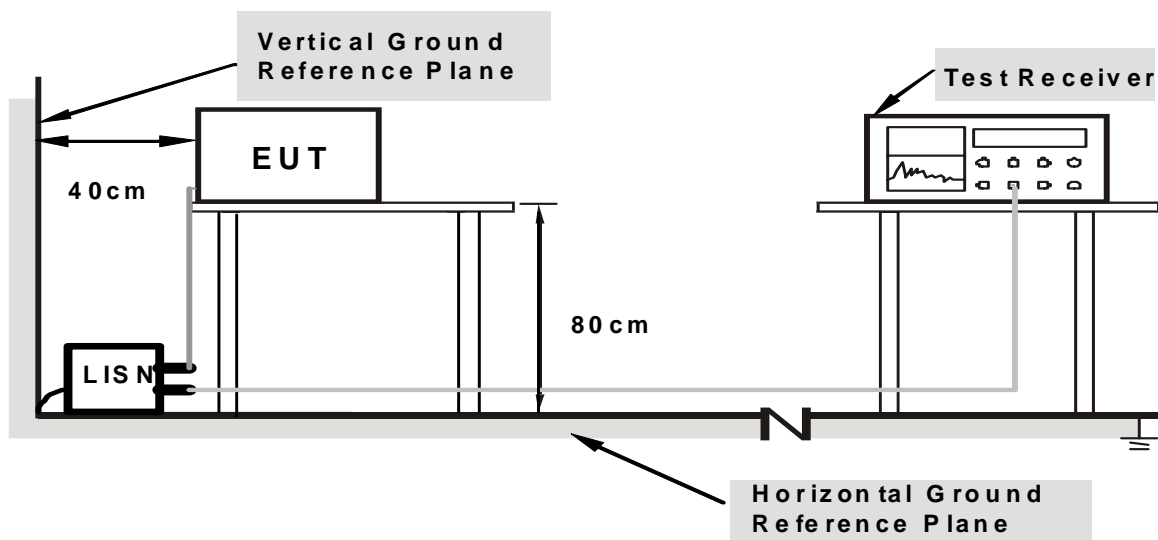
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 01, 2015	Mar. 31, 2016
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	Apr. 27, 2015	Apr. 26, 2016
LISN With Adapter (for EUT)	AD10	C10Ada-002	Apr. 27, 2015	Apr. 26, 2016
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 25, 2015	Nov. 24, 2016
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 06, 2015	May 05, 2016
Software	Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 17, 2015	Feb. 16, 2016
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 19, 2015	May 18, 2016
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 13, 2015	Nov. 12, 2016
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 13, 2015	Nov. 12, 2016

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: Dec. 22 ~ 25, 2015

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 a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs 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: Support units were connected to second LISN.

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

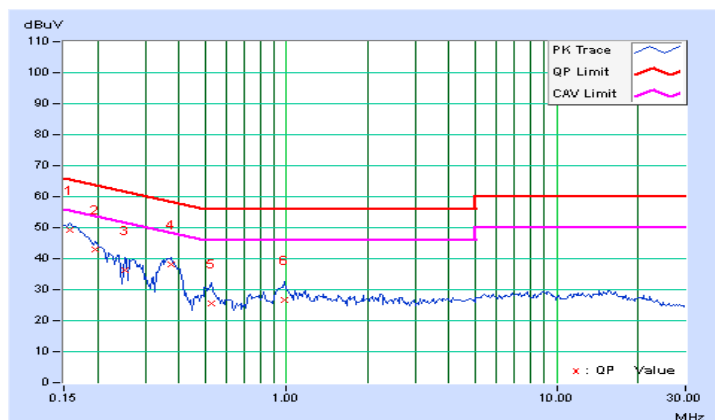
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	22°C, 77%RH
Tested by	ED. Lin		
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	0.15781	9.67	39.58	23.30	49.25	32.97	65.58	55.58	-16.33	-22.61
2	0.19687	9.68	33.33	18.90	43.01	28.58	63.74	53.74	-20.73	-25.16
3	0.25156	9.68	26.80	20.08	36.48	29.76	61.71	51.71	-25.22	-21.94
4	0.37266	9.69	28.33	21.16	38.02	30.85	58.44	48.44	-20.42	-17.59
5	0.52891	9.71	15.71	6.84	25.42	16.55	56.00	46.00	-30.58	-29.45
6	0.97813	9.77	17.07	10.10	26.84	19.87	56.00	46.00	-29.16	-26.13

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

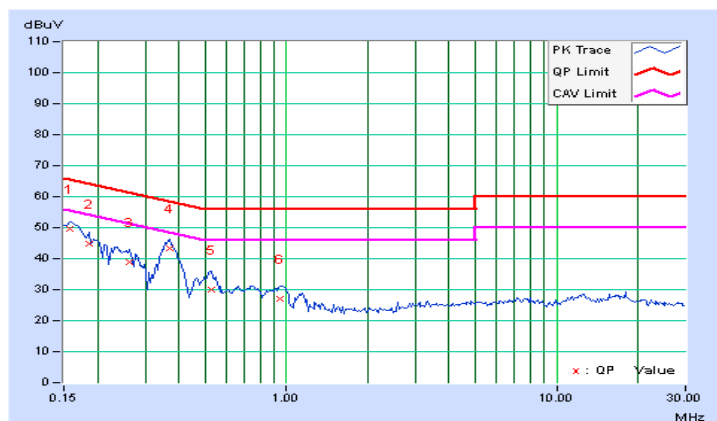


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	27°C, 76%RH
Tested by	ED. Lin		
Test Mode	Mode 1		

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	0.15781	9.72	39.78	24.03	49.50	33.75	65.58	55.58	-16.08	-21.83
2	0.18516	9.73	34.90	17.78	44.63	27.51	64.25	54.25	-19.62	-26.74
3	0.26328	9.73	29.28	19.94	39.01	29.67	61.33	51.33	-22.31	-21.65
4	0.37003	9.74	33.45	26.86	43.19	36.60	58.50	48.50	-15.31	-11.90
5	0.52500	9.75	20.10	12.41	29.85	22.16	56.00	46.00	-26.15	-23.84
6	0.95078	9.79	17.17	10.16	26.96	19.95	56.00	46.00	-29.04	-26.05

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
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3. Margin value = Emission level – Limit value
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5. Emission Level = Correction Factor + Reading Value

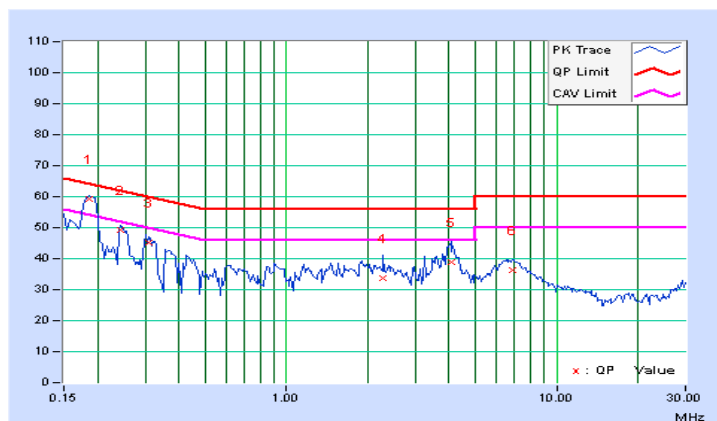


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 85%RH
Tested by	Vincent Chen		
Test Mode	Mode 8		

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	0.18516	9.67	49.46	37.83	59.13	47.50	64.25	54.25	-5.12	-6.75
2	0.24375	9.67	39.70	27.25	49.37	36.92	61.97	51.97	-12.60	-15.05
3	0.31016	9.67	35.50	22.22	45.17	31.89	59.97	49.97	-14.80	-18.08
4	2.26953	9.73	24.09	13.23	33.82	22.96	56.00	46.00	-22.18	-23.04
5	4.05859	9.77	29.05	7.59	38.82	17.36	56.00	46.00	-17.18	-28.64
6	6.84375	9.82	26.37	16.96	36.19	26.78	60.00	50.00	-23.81	-23.22

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

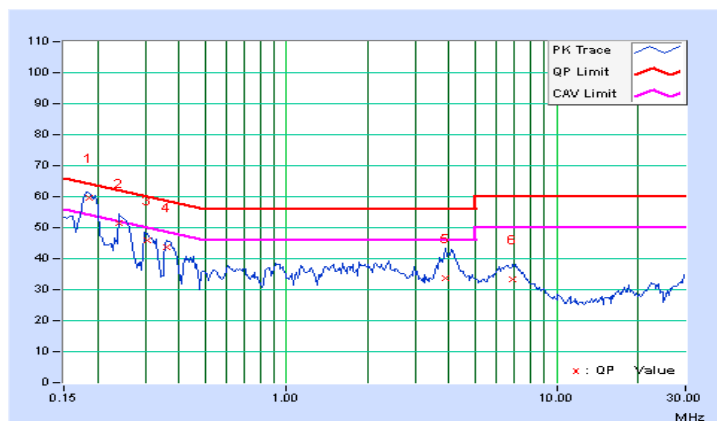


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 85%RH
Tested by	Vincent Chen		
Test Mode	Mode 8		

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	0.18516	9.71	49.76	37.83	59.47	47.54	64.25	54.25	-4.78	-6.71
2	0.23984	9.71	41.83	23.65	51.54	33.36	62.10	52.10	-10.56	-18.74
3	0.30625	9.71	36.16	22.02	45.87	31.73	60.07	50.07	-14.20	-18.34
4	0.36094	9.71	33.91	16.60	43.62	26.31	58.71	48.71	-15.09	-22.40
5	3.86719	9.81	23.91	3.42	33.72	13.23	56.00	46.00	-22.28	-32.77
6	6.91016	9.86	23.33	12.96	33.19	22.82	60.00	50.00	-26.81	-27.18

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

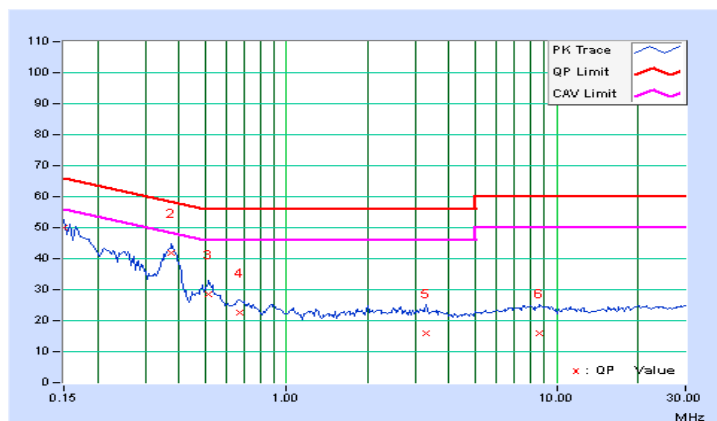


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 85%RH
Tested by	Vincent Chen		
Test Mode	Mode 9		

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	0.15000	9.67	40.25	24.37	49.92	34.04	66.00	56.00	-16.08	-21.96
2	0.37656	9.69	32.32	27.08	42.01	36.77	58.35	48.35	-16.35	-11.59
3	0.51719	9.71	18.69	11.72	28.40	21.43	56.00	46.00	-27.60	-24.57
4	0.67344	9.73	12.90	5.70	22.63	15.43	56.00	46.00	-33.37	-30.57
5	3.30469	9.92	6.09	5.41	16.01	15.33	56.00	46.00	-39.99	-30.67
6	8.66406	10.04	6.04	3.07	16.08	13.11	60.00	50.00	-43.92	-36.89

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

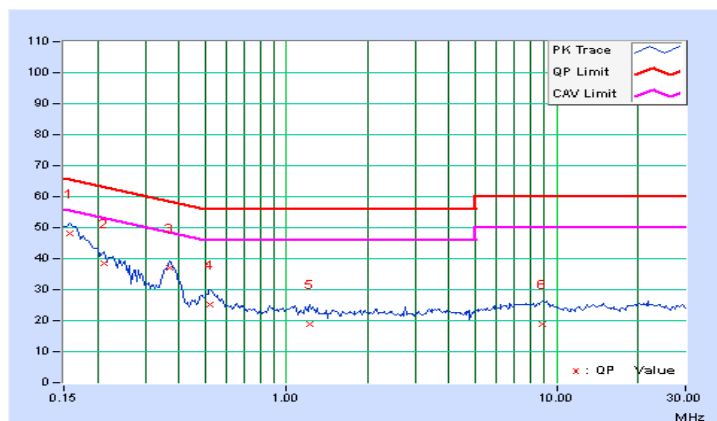


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 85%RH
Tested by	Vincent Chen		
Test Mode	Mode 9		

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	0.15781	9.72	38.34	21.66	48.06	31.38	65.58	55.58	-17.52	-24.20
2	0.21250	9.73	28.71	11.75	38.44	21.48	63.11	53.11	-24.67	-31.63
3	0.36875	9.74	27.44	20.62	37.18	30.36	58.53	48.53	-21.35	-18.17
4	0.52109	9.75	15.27	8.19	25.02	17.94	56.00	46.00	-30.98	-28.06
5	1.21875	9.81	8.91	5.48	18.72	15.29	56.00	46.00	-37.28	-30.71
6	8.88672	10.09	8.96	3.11	19.05	13.20	60.00	50.00	-40.95	-36.80

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 Emissions up to 1 GHz

6.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dBμV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960				
960-1000	49.5	43.5	47	37

Radiated Emissions Limits at 3 meters (dBμV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960				
960-1000	60	54	57.5	47.5

- Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
3. QP detector shall be applied if not specified.

6.2 Test Instruments

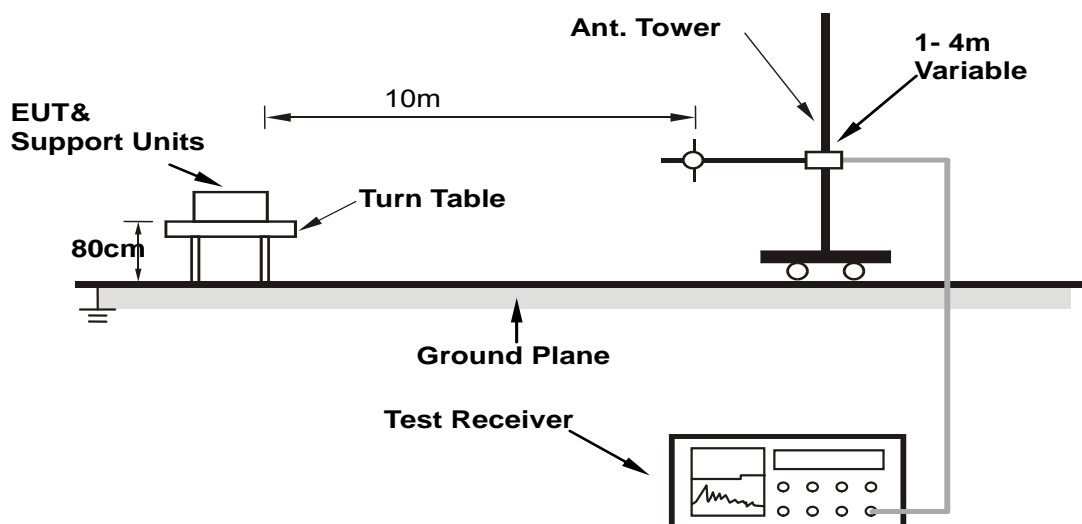
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100744	Apr. 24, 2015	Apr. 23, 2016
Schaffner BILOG Antenna	CBL6111D	22270	Feb. 03, 2015	Feb. 02, 2016
CT Turn Table	TT100	CT-080	NA	NA
CT Tower	AT100	CT-080	NA	NA
Software	Radiated_V7.6.15.9.4	NA	NA	NA
ANRITSU RF Switches	MP59B	N/A	Nov. 20, 2015	Nov. 19, 2016
WOKEN RF cable	8D	CABLE-ST3-01	Nov. 20, 2015	Nov. 19, 2016

- 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 Open Site No. 3.
3. The VCCI Site Registration No. is R-269.
4. The FCC Site Registration No. 90424.
5. Tested Date: Dec. 22 ~ 29, 2015

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.



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

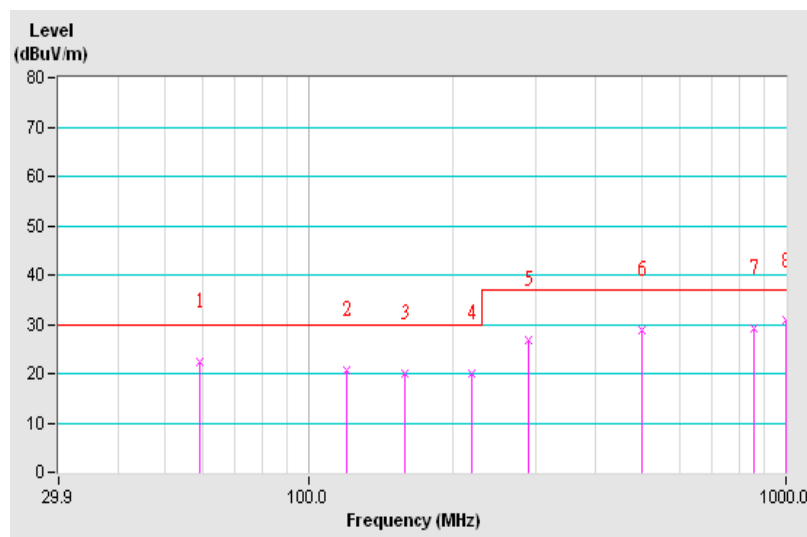
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 79%RH
Tested by	Chinwen Wang		
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	59.15	22.36 QP	30.00	-7.64	4.00 H	19	15.16	7.20
2	120.00	20.72 QP	30.00	-9.28	4.00 H	153	7.16	13.56
3	158.95	19.93 QP	30.00	-10.07	4.00 H	162	7.11	12.82
4	219.35	20.09 QP	30.00	-9.91	4.00 H	307	8.17	11.92
5	288.23	26.76 QP	37.00	-10.24	3.04 H	69	10.79	15.97
6	500.02	28.81 QP	37.00	-8.19	1.90 H	121	7.06	21.75
7	858.25	29.12 QP	37.00	-7.88	1.00 H	258	1.86	27.26
8	999.99	30.69 QP	37.00	-6.31	1.00 H	27	1.20	29.49

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

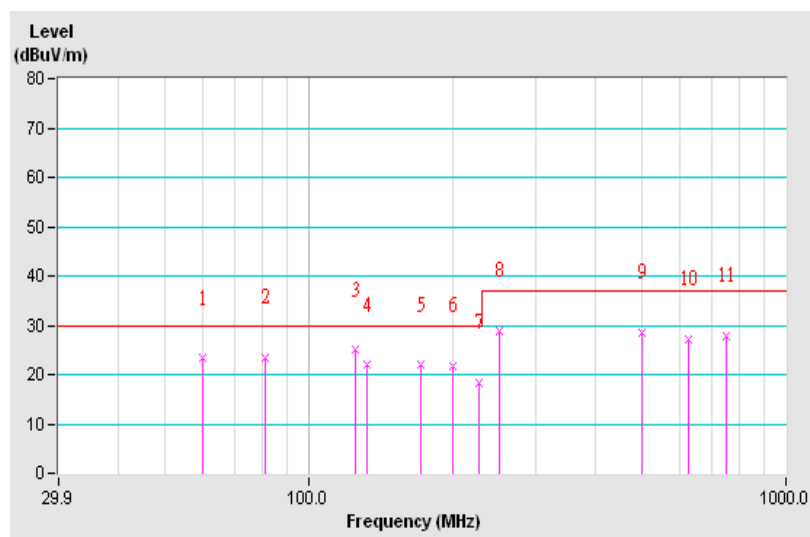


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 79%RH
Tested by	Chinwen Wang		
Test Mode	Mode 1		

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	59.80	23.23 QP	30.00	-6.77	1.40 V	270	15.92	7.31
2	81.03	23.54 QP	30.00	-6.46	1.66 V	140	14.71	8.83
3	125.00	24.99 QP	30.00	-5.01	1.00 V	199	11.46	13.53
4	132.10	21.88 QP	30.00	-8.12	1.00 V	214	8.34	13.54
5	172.15	21.92 QP	30.00	-8.08	1.00 V	51	10.26	11.66
6	199.90	21.79 QP	30.00	-8.21	1.00 V	252	10.37	11.42
7	226.60	18.43 QP	30.00	-11.57	1.00 V	271	5.90	12.53
8	249.99	28.89 QP	37.00	-8.11	1.00 V	19	13.82	15.07
9	500.06	28.55 QP	37.00	-8.45	2.57 V	229	6.80	21.75
10	625.00	27.07 QP	37.00	-9.93	1.39 V	70	2.45	24.62
11	750.00	27.84 QP	37.00	-9.16	1.00 V	136	1.41	26.43

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

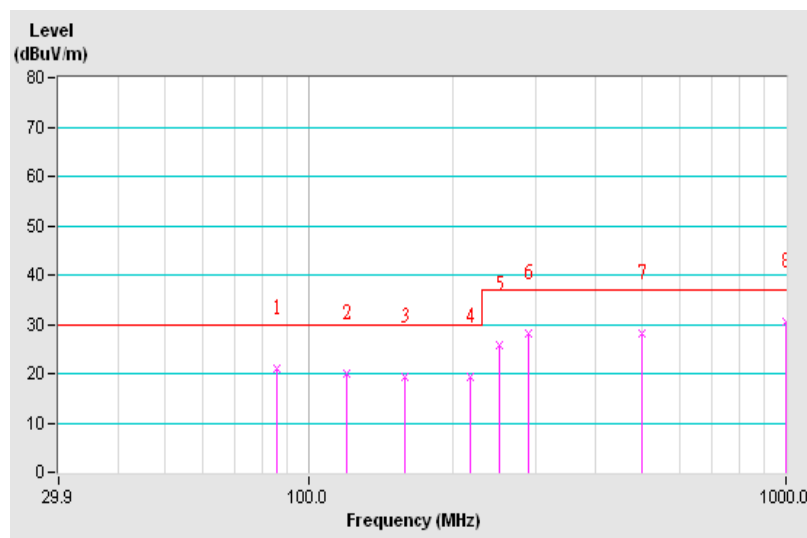


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	DC 48V	Environmental Conditions	25°C, 79%RH
Tested by	Chinwen Wang		
Test Mode	Mode 8		

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	85.75	21.10 QP	30.00	-8.90	4.00 H	31	11.55	9.55
2	120.00	19.95 QP	30.00	-10.05	4.00 H	236	6.39	13.56
3	159.05	19.35 QP	30.00	-10.65	4.00 H	226	6.53	12.82
4	217.50	19.39 QP	30.00	-10.61	4.00 H	147	7.62	11.77
5	249.99	25.87 QP	37.00	-11.13	3.42 H	34	10.80	15.07
6	288.23	28.09 QP	37.00	-8.91	2.95 H	349	12.12	15.97
7	500.02	28.29 QP	37.00	-8.71	1.82 H	247	6.54	21.75
8	999.98	30.58 QP	37.00	-6.42	1.00 H	290	1.09	29.49

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

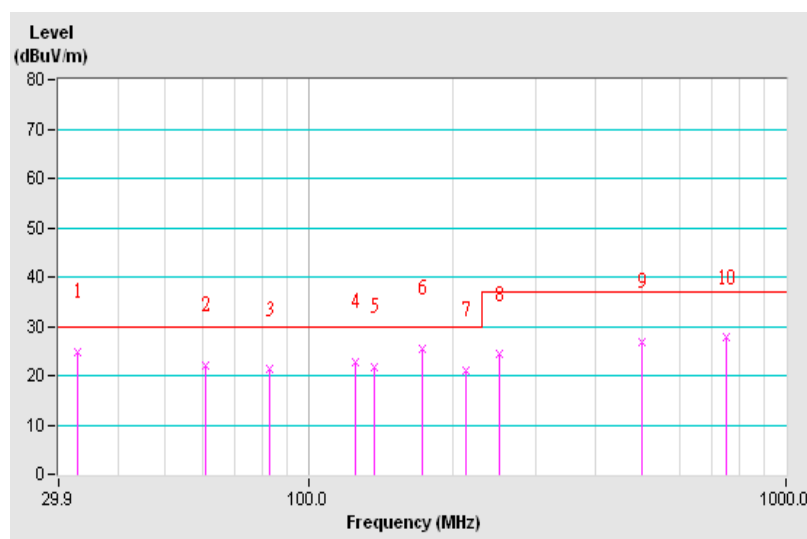


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	DC 48V	Environmental Conditions	25°C, 79%RH
Tested by	Chinwen Wang		
Test Mode	Mode 8		

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	32.80	24.88 QP	30.00	-5.12	1.60 V	161	7.18	17.70
2	60.68	21.98 QP	30.00	-8.02	1.60 V	153	14.78	7.20
3	82.51	21.20 QP	30.00	-8.80	1.70 V	280	12.10	9.10
4	125.00	22.82 QP	30.00	-7.18	1.00 V	251	9.29	13.53
5	137.35	21.62 QP	30.00	-8.38	1.00 V	341	7.97	13.65
6	173.25	25.44 QP	30.00	-4.56	1.00 V	303	13.87	11.57
7	213.00	21.17 QP	30.00	-8.83	1.00 V	159	9.77	11.40
8	249.99	24.29 QP	37.00	-12.71	1.00 V	108	9.22	15.07
9	500.01	26.73 QP	37.00	-10.27	2.28 V	4	4.98	21.75
10	750.00	27.69 QP	37.00	-9.31	3.49 V	242	1.26	26.43

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

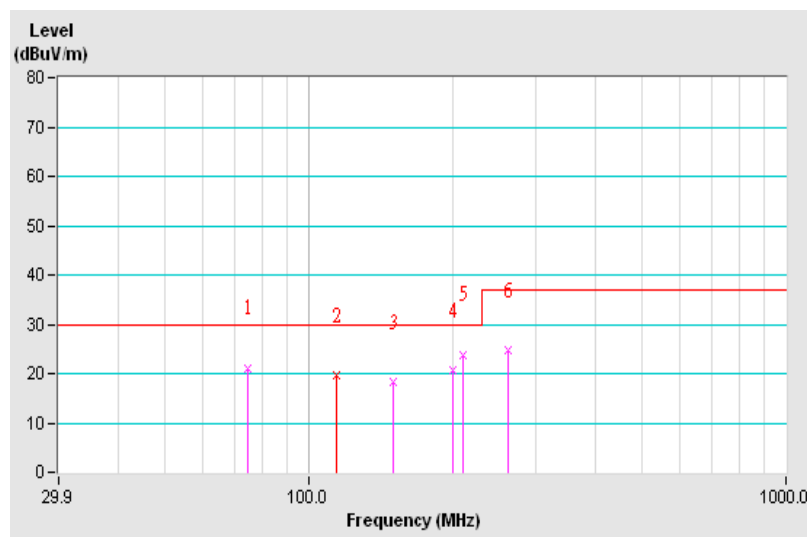


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 72%RH
Tested by	Chinwen Wang		
Test Mode	Mode 9		

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	74.58	21.15 QP	30.00	-8.85	3.86 H	41	13.14	8.01
2	114.50	19.52 QP	30.00	-10.48	4.00 H	274	6.21	13.31
3	150.74	18.16 QP	30.00	-11.84	4.00 H	128	5.08	13.08
4	200.17	20.57 QP	30.00	-9.43	4.00 H	167	9.14	11.43
5	210.10	23.75 QP	30.00	-6.25	4.00 H	297	12.36	11.39
6	261.85	24.58 QP	37.00	-12.42	3.10 H	174	8.67	15.91

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

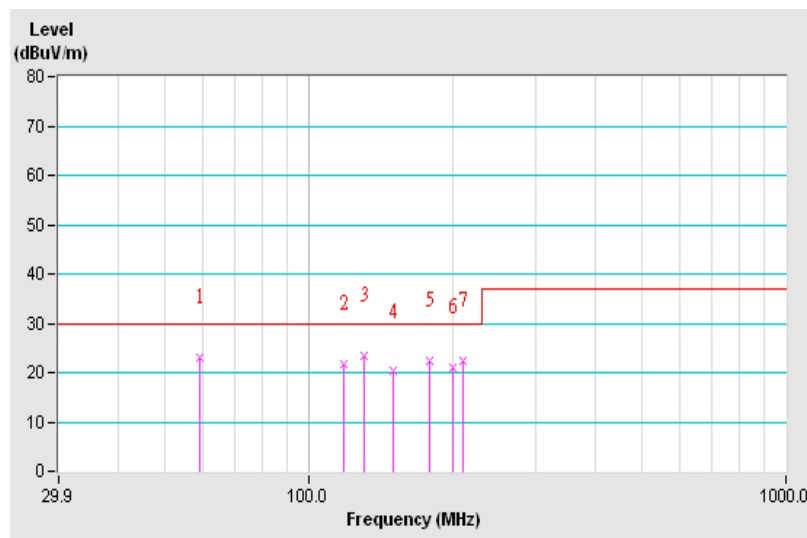


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	16°C, 72%RH
Tested by	Chinwen Wang		
Test Mode	Mode 9		

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	59.00	23.17 QP	30.00	-6.83	1.88 V	152	16.00	7.17
2	118.52	21.74 QP	30.00	-8.26	1.00 V	256	8.17	13.57
3	131.00	23.41 QP	30.00	-6.59	1.00 V	85	9.86	13.55
4	150.55	20.20 QP	30.00	-9.80	1.00 V	196	7.10	13.10
5	179.72	22.41 QP	30.00	-7.59	1.00 V	142	11.14	11.27
6	200.10	21.08 QP	30.00	-8.92	1.00 V	154	9.65	11.43
7	210.17	22.45 QP	30.00	-7.55	1.00 V	22	11.06	11.39

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 Emissions above 1 GHz

7.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
1000-3000	Avg: 49.5	Avg: 43.5	Not defined	Not defined
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

Radiated Emissions Limits at 3 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
1000-3000	Avg: 60	Avg: 54	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000	Peak: 80	Peak: 74	Avg: 60 Peak: 80	Avg: 54 Peak: 74

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

7.2 Test Instruments

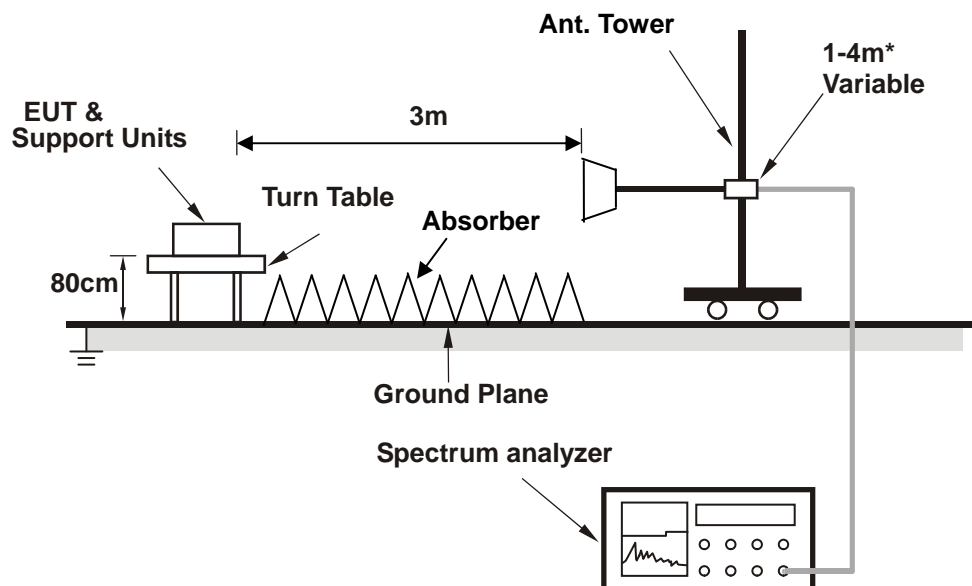
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	May 30, 2015	May 29, 2016
Agilent Test Receiver	N9038A	MY50010135	Jul. 18, 2015	Jul. 17, 2016
Agilent Preamplifier	8449B	3008A02367	Feb. 27, 2015	Feb. 26, 2016
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 01, 2015	Feb. 28, 2016
EMCI Preamplifier	EMC184045B	980235	Mar. 01, 2015	Feb. 28, 2016
Schwarzbeck Horn Antenna	BBHA-9170	212	Feb. 09, 2015	Feb. 08, 2016
EMCO Horn Antenna	3115	9312-4192	Feb. 09, 2015	Feb. 08, 2016
Max Full. Turn Table & Tower	MF7802	MF780208103	NA	NA
Software	Radiated_V8.7.07	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF106-18	Cable-CH7	Aug. 15, 2015	Aug. 14, 2016
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 15, 2015	Aug. 14, 2016

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. 7.
3. The Industry Canada Reference No. IC 7450E-7.
4. The FCC Site Registration No. 127748.
5. The VCCI Site Registration No. G-39.
6. Tested Date: Dec. 21 ~ 25, 2015

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.



* :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.

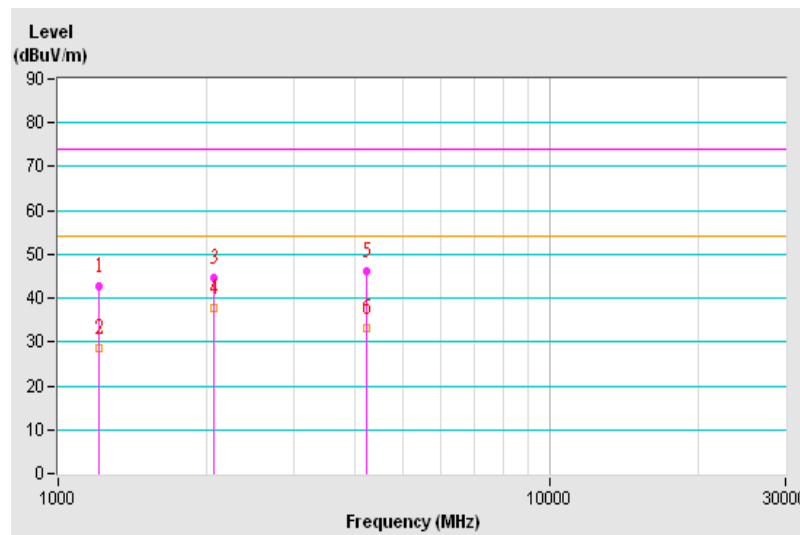
7.4 Test Results

Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
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	1205.76	42.83 PK	74.00	-31.17	2.21 H	30	46.30	-3.47
2	1205.76	28.72 AV	54.00	-25.28	2.21 H	30	32.19	-3.47
3	2067.07	44.46 PK	74.00	-29.54	1.48 H	235	44.74	-0.28
4	2067.07	37.64 AV	54.00	-16.36	1.48 H	235	37.92	-0.28
5	4243.49	46.05 PK	74.00	-27.95	2.46 H	300	41.36	4.69
6	4243.49	33.31 AV	54.00	-20.69	2.46 H	300	28.62	4.69

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

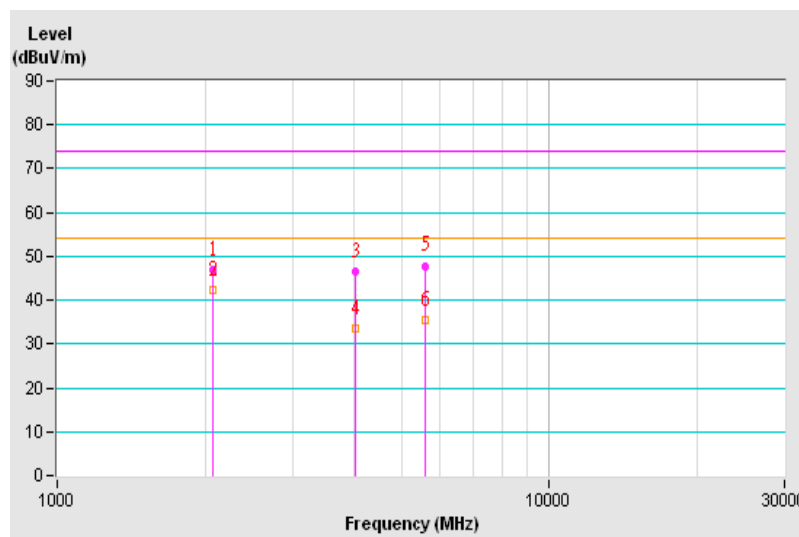


Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
Test Mode	Mode 1		

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	2067.07	46.99 PK	74.00	-27.01	2.47 V	168	47.27	-0.28
2	2067.07	42.28 AV	54.00	-11.72	2.47 V	168	42.56	-0.28
3	4028.09	46.60 PK	74.00	-27.40	1.35 V	360	41.74	4.86
4	4028.09	33.48 AV	54.00	-20.52	1.35 V	360	28.62	4.86
5	5580.69	47.86 PK	74.00	-26.14	1.44 V	40	40.79	7.07
6	5580.69	35.28 AV	54.00	-18.72	1.44 V	40	28.21	7.07

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

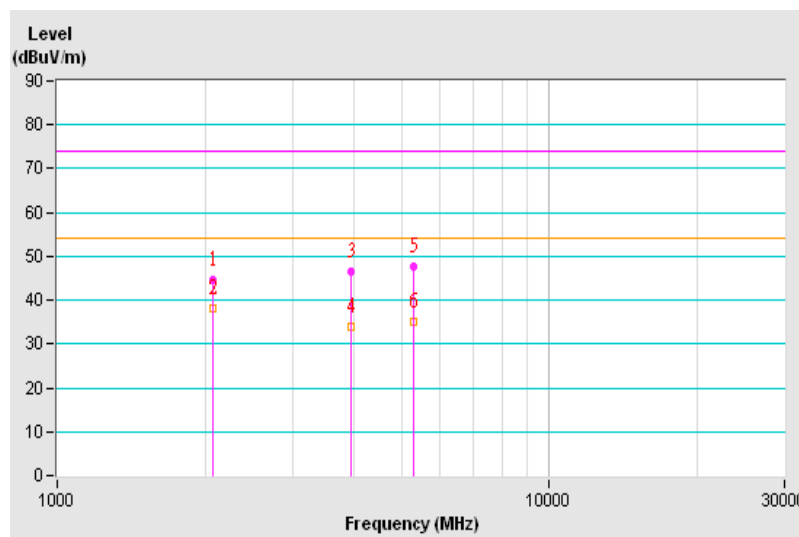


Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	DC 48V	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
Test Mode	Mode 8		

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	2067.07	44.68 PK	74.00	-29.32	2.48 H	248	44.96	-0.28
2	2067.07	38.24 AV	54.00	-15.76	2.48 H	248	38.52	-0.28
3	3952.66	46.61 PK	74.00	-27.39	1.97 H	332	41.66	4.95
4	3952.66	33.97 AV	54.00	-20.03	1.97 H	332	29.02	4.95
5	5308.45	47.66 PK	74.00	-26.34	1.04 H	309	41.01	6.65
6	5308.45	34.95 AV	54.00	-19.05	1.04 H	309	28.30	6.65

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

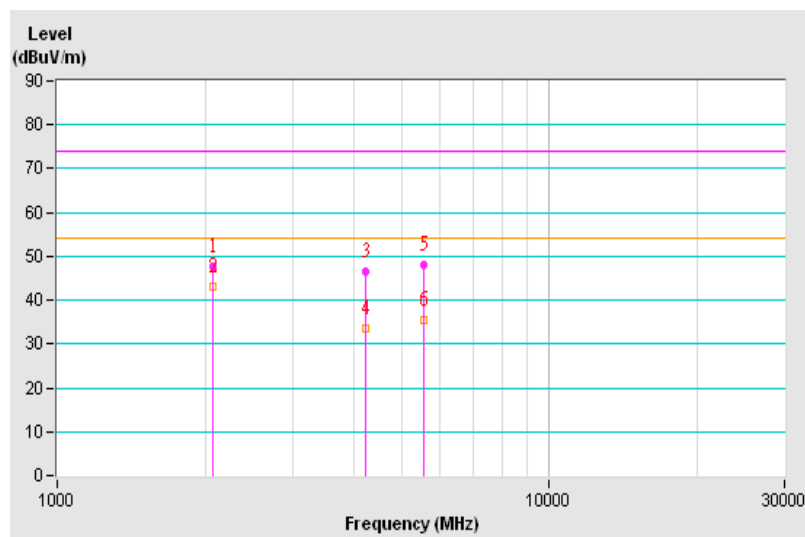


Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	DC 48V	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
Test Mode	Mode 8		

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	2067.07	47.50 PK	74.00	-26.50	2.48 V	214	47.78	-0.28
2	2067.07	42.98 AV	54.00	-11.02	2.48 V	214	43.26	-0.28
3	4228.67	46.66 PK	74.00	-27.34	1.98 V	106	41.93	4.73
4	4228.67	33.63 AV	54.00	-20.37	1.98 V	106	28.90	4.73
5	5558.34	48.13 PK	74.00	-25.87	1.95 V	199	41.05	7.08
6	5558.34	35.41 AV	54.00	-18.59	1.95 V	199	28.33	7.08

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

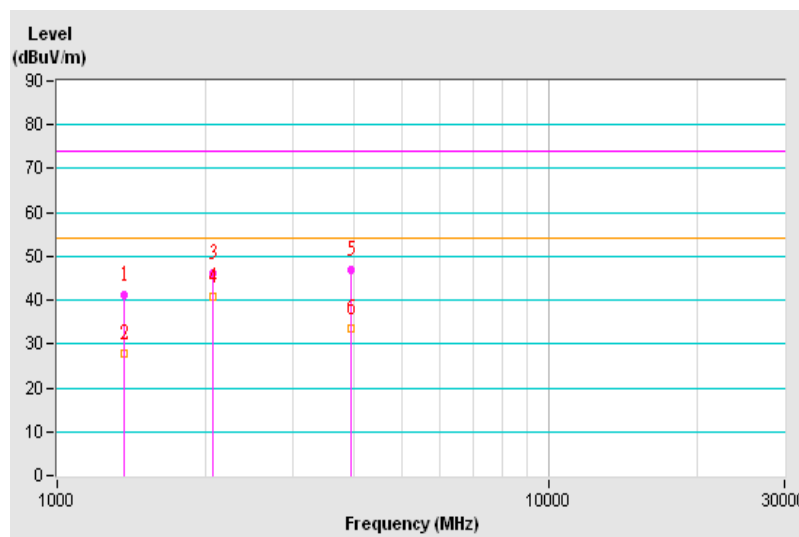


Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
Test Mode	Mode 9		

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	1367.16	41.02 PK	74.00	-32.98	1.22 H	284	43.87	-2.85
2	1367.16	27.77 AV	54.00	-26.23	1.22 H	284	30.62	-2.85
3	2067.08	46.15 PK	74.00	-27.85	1.03 H	158	46.43	-0.28
4	2067.08	40.89 AV	54.00	-13.11	1.03 H	158	41.17	-0.28
5	3955.98	47.00 PK	74.00	-27.00	1.54 H	57	42.05	4.95
6	3955.98	33.56 AV	54.00	-20.44	1.54 H	57	28.61	4.95

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

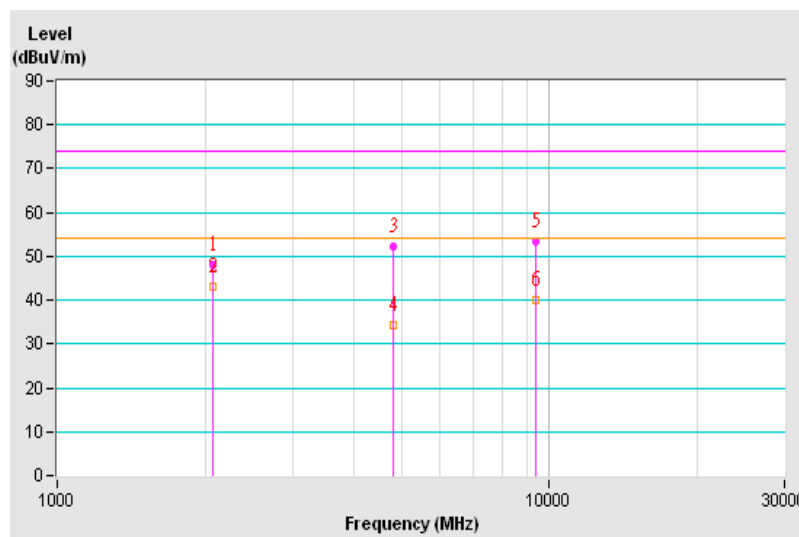


Frequency Range	1GHz ~ 30GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Vincent Chen		
Test Mode	Mode 9		

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	2067.11	47.98 PK	74.00	-26.02	1.25 V	176	48.26	-0.28
2	2067.11	42.97 AV	54.00	-11.03	1.25 V	176	43.25	-0.28
3	4823.84	52.34 PK	74.00	-21.66	1.46 V	216	46.91	5.43
4	4823.84	34.35 AV	54.00	-19.65	1.46 V	216	28.92	5.43
5	9396.01	53.38 PK	74.00	-20.62	1.28 V	108	41.96	11.42
6	9396.01	40.09 AV	54.00	-13.91	1.28 V	108	28.67	11.42

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 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

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.

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

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