

FCC Test Report

Report No.: FV180116D03

Test Model: EVS-1110-MXM1070

Series Model: EVS-1010-MXM1050

Received Date: Jan. 16, 2018

Test Date: Apr. 3 ~ 9, 2018

Issued Date: May 18, 2018

Applicant: Vecow Co., Ltd.

Address: 12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674
Taiwan (R. O. C.)

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

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(R.O.C.)

**FCC Registration/
Designation Number:** 418586 / TW1078



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Release Control Record

Issue No.	Description	Date Issued
FV180116D03	Original release.	May 18, 2018

1 Certificate of Conformity

Product: EVS-1000

Brand: Vecow

Test Model: EVS-1110-MXM1070

Series Model: EVS-1010-MXM1050

Sample Status: Engineering Sample

Applicant: Vecow Co., Ltd.

Test Date: Apr. 3 ~ 9, 2018

Standards: 47 CFR FCC Part 15, Subpart B, Class A
ICES-003:2016 Issue 6, Class A
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 :

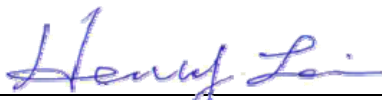


Date:

May 18, 2018

Annie Chang / Senior Specialist

Approved by :



Date:

May 18, 2018

Henry Lai / Director

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, Class A

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 A margin is -23.91 dB at 16.58213 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class A margin is -3.55 dB at 74.52 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class A margin is -12.85 dB at 2492.52 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 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	Frequency	Expended Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.89 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.97 dB
	6GHz ~ 18GHz	5.13 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 Vecow Co., Ltd., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	EVS-1000
Brand	Vecow
Test Model	EVS-1110-MXM1070
Series Model	EVS-1010-MXM1050
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	Windows 7
Power Supply Rating	Refer to note as below
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. The EUT has following models and interfaces.

Model	Outer appearance	Interface
EVS-1110-MXM1070		<ul style="list-style-type: none"> ✧ DC input ✧ COM*3 ✧ USB 3.0*6 ✧ Mic. in ✧ Line out ✧ DIO*2 ✧ LAN*2 (10/100/1000Mbps) ✧ DP *6 (resolution Up to 4096 x 2304 @ 60Hz) ✧ DVI-D (resolution Up to 1920 x 1200 @ 60Hz) ✧ VGA (resolution Up to 1920 x 1200 @ 60Hz) ✧ DC output (to FAN)
EVS-1010-MXM1050		<ul style="list-style-type: none"> ✧ DC input ✧ COM*4 ✧ USB 3.0*6 ✧ Mic. in ✧ Line out ✧ DIO*2 ✧ LAN*2 (10/100/1000Mbps) ✧ DP *6 (resolution Up to 4096 x 2304 @ 60Hz) ✧ DVI-D (resolution Up to 1920 x 1200 @ 60Hz) ✧ VGA (resolution Up to 1920 x 1200 @ 60Hz)

2. The EUT was configured with the following key components:

EUT	Components	Brand	Model	specification
EVS-1110-MXM1070	CPU	Intel CORE™ i7	i7-6700TE	2.4GHz
	RAM	Kingston	KVR21S15S8/8	16GB (8G*2)
	SSD	innodisk	3MG2-P	2.5" SATA SSD 64GB
EVS-1010-MXM1050	CPU	Intel CORE™ i7	i7-6700TE	2.4GHz
	RAM	Kingston	KVR24S17S8/8	16GB (8G*2)
	SSD	innodisk	3MG2-P	2.5" SATA SSD 64GB

3. The EUT uses following adapter.

Brand	MW
Model	GST280A24
Input Power	100-240Vac, 50/60Hz, 4.5A (AC 3-Pin)
Output Power	24V, 11.67A, 280.08W Max.
Power Line	Non-shielded DC (1m) with one ferrite core

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

1. The EUT consumed DC power from AC adapter, which designed with AC power supply of 100-240Vac, 50/60Hz.
For radiated emission evaluation, 230Vac/50Hz (for EN 50155), 120Vac/60Hz (for FCC Part 15) had been covered during the pre-test. The worst data was found at **230Vac/50Hz** and recorded in the applied test report.
2. EUT has been pre-tested under following test modes, and test Pre-test mode 2 was the worst case for final test.

Pre-test Mode	Pre-test Model	Test Condition
1	EVS-1110-MXM1070	Full system + Display*6 (4096 x 2304, 60Hz) + DVI-D (1920 x 1080, 60Hz)
2	EVS-1110-MXM1070	Full system + Display*6 (4096 x 2304, 60Hz) + VGA (1920 x 1080, 60Hz)
3	EVS-1010-MXM1050	Full system + Display*6 (4096 x 2304, 60Hz) + VGA (1920 x 1080, 60Hz)

3. Test modes are presented in the report as below.

Mode	Test Condition	Input Power
Conducted emission test		
1	Full system + Display*6 (4096 x 2304, 60Hz) + VGA (1920 x 1080, 60Hz)	120Vac/ 60Hz
Radiated emission test		
1	Full system + Display*6 (4096 x 2304, 60Hz) + VGA (1920 x 1080, 60Hz)	230Vac/ 50Hz

3.4 Test Program Used and Operation Descriptions

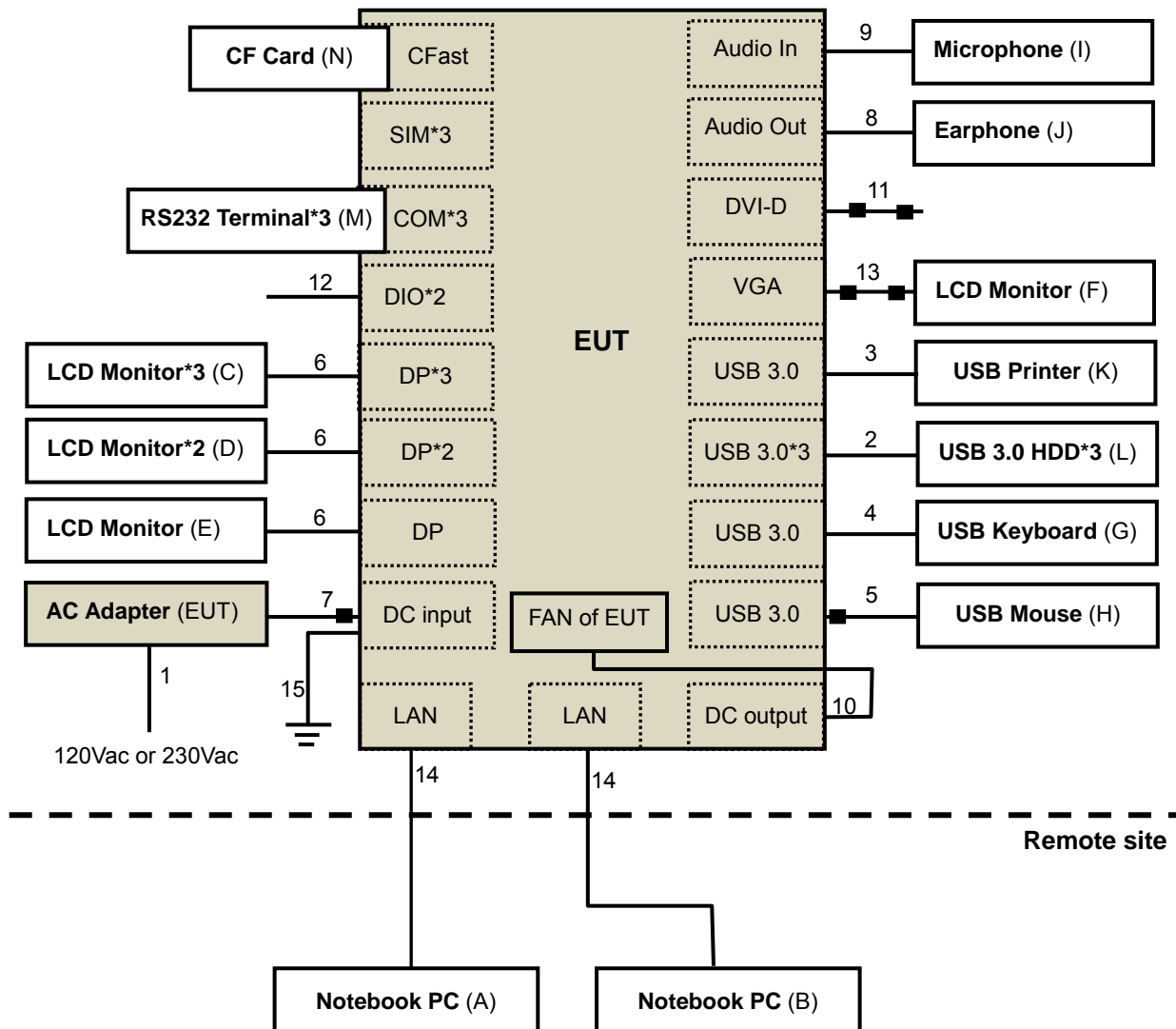
- a. Turned on the power of all equipment.
- b. EUT ran a test program to enable all functions.
- c. EUT read and wrote messages from/to card reader, SSD and ext. HDDs.
- d. EUT sent and received messages to/from Notebook PCs (kept in a remote area) via two UTP LAN cables (10m each).
- e. EUT sent "H" messages to ext. LCD Monitors. Then they displayed "H" patterns on their screens simultaneously.
- f. EUT sent 1kHz audio signal to earphone.
- g. EUT sent messages to printer and printer printed them out.
- h. Steps c-g were repeated.

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 2.4GHz, provided by Vecow Co., Ltd., 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



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook PC	ASUS	PU401L	ECNXBC012528528	FCC DoC Approved	Provided by Lab
B.	Notebook PC	SONY	SVS151A12P	275548477001024	FCC DoC Approved	Provided by Lab
C.	LCD Monitor	ASUS	MG28U	H1LMTF041254	FCC DoC Approved	Provided by Lab
	LCD Monitor	ASUS	MG28UQ	H8LMTF147974	FCC DoC Approved	Provided by Lab
	LCD Monitor	ASUS	MG28UQ	H8LMTF147978	FCC DoC Approved	Provided by Lab
D.	LCD Monitor	Dell	S2817Q	CN-0GD45P-74445-72 4-104M	FCC DoC Approved	Provided by Lab
	LCD Monitor	Dell	S2817Q	CN-0GD45P-74445-72 4-116M	FCC DoC Approved	Provided by Lab
E.	LCD Monitor	HP	HP Z24s	6CM5172L58	FCC DoC Approved	Provided by Lab
F.	LCD Monitor	DELL	U2410	CN082WDXD728720CC 0LGL	FCC DoC Approved	Provided by Lab
G.	USB Keyboard	Dell	KB216t	CN-0W33XP-LO300-7 CL-1917	FCC DoC Approved	Provided by Lab
H.	USB Mouse	Microsoft	1113	9170528318047	FCC DoC Approved	Provided by Lab
I.	MICROPHONE	Labtec	mic-333	N/A	N/A	Provided by Lab
J.	EARPHONE	PHILIPS	SBC HL145	N/A	N/A	Provided by Lab
K.	USB PRINTER	HP	HP Officejet Pro 251dw	N/A	N/A	Provided by Lab
L.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WX51E940FMSW	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WX61A45JRKA9	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	DELL	Power Vault RD1000	40GWZD1	FCC DoC Approved	Provided by Lab
M.	RS232 Terminal *3	N/A	N/A	N/A	N/A	Supplied by client
N.	CF Card	INNODISK	CFast 3ME	S0011505080100003	N/A	Supplied by client

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC power cord	1	1.8	N	0	Provided by Lab
2.	USB cable	3	0.47	Y	0	Provided by Lab
3.	USB cable	1	1.5	Y	0	Provided by Lab
4.	USB cable	1	1.8	Y	0	Provided by Lab
5.	USB cable	1	1.8	Y	1	Provided by Lab
6.	DP cable	6	1.8	Y	2	Provided by Lab
7.	DC cable	1	1	N	1	Supplied by client
8.	Audio cable	1	1	N	0	Provided by Lab
9.	Audio cable	1	2.2	N	0	Provided by Lab
10.	DC cable	1	0.2	N	0	Supplied by client
11.	DVI cable	1	1.8	Y	2	Provided by Lab
12.	DIO cable	2	1	N	0	Supplied by client
13.	VGA cable	1	1.8	Y	2	Provided by Lab
14.	LAN cable (Cat. 5e)	2	10	N	0	Provided by Lab
15.	GND cable	1	1	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

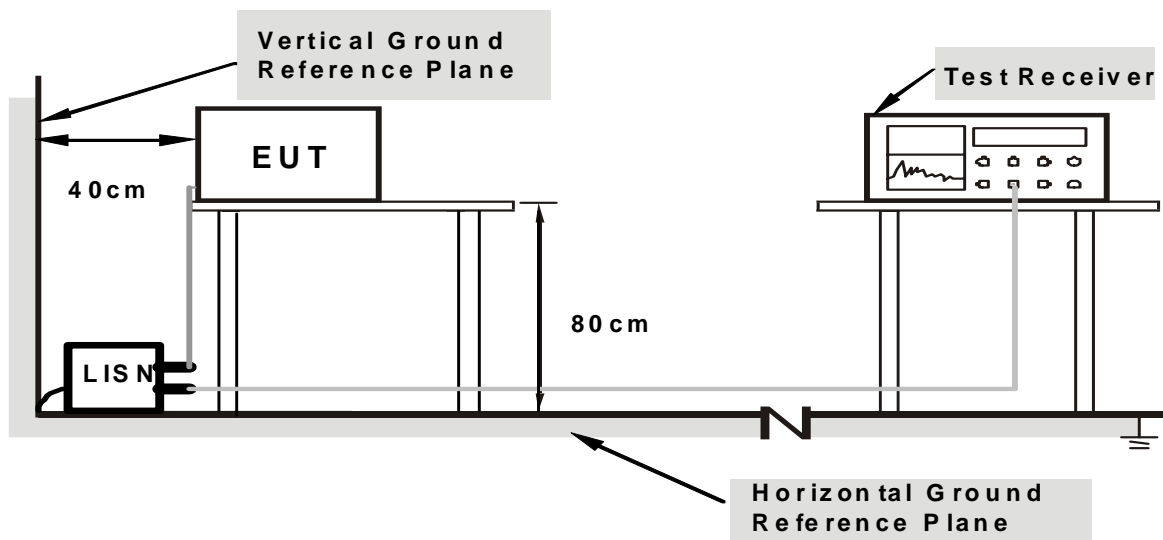
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100290	Dec. 19, 2017	Dec. 18, 2018
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 06, 2017	Dec. 05, 2018
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 06, 2017	Dec. 05, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Nov. 03, 2017	Nov. 02, 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-C09.01	Feb. 21, 2018	Feb. 20, 2019
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	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. 9.
 3. The VCCI Site Registration No. C-1312.
 4. Tested Date: Apr. 3, 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 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.

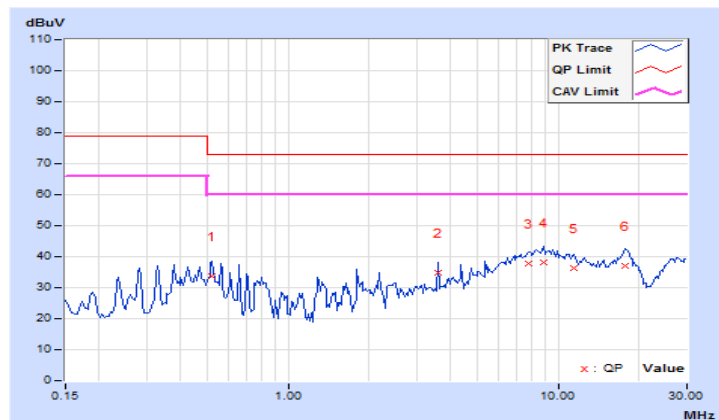
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	22°C, 78%RH
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	0.52109	10.17	23.39	19.07	33.56	29.24	73.00	60.00	-39.44	-30.76
2	3.58594	10.44	24.23	23.02	34.67	33.46	73.00	60.00	-38.33	-26.54
3	7.77734	10.60	27.33	22.85	37.93	33.45	73.00	60.00	-35.07	-26.55
4	8.81241	10.63	27.41	22.68	38.04	33.31	73.00	60.00	-34.96	-26.69
5	11.49619	10.73	25.49	19.53	36.22	30.26	73.00	60.00	-36.78	-29.74
6	17.76182	11.02	26.05	18.85	37.07	29.87	73.00	60.00	-35.93	-30.13

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

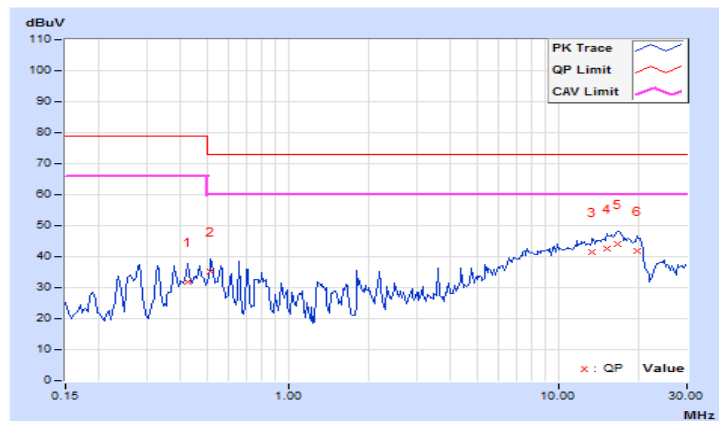


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	22°C, 78%RH
Tested by	Kobe Lu		
Test Mode	Mode 1		

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	0.42734	10.17	21.55	17.69	31.72	27.86	79.00	66.00	-47.28	-38.14
2	0.51719	10.18	25.13	20.96	35.31	31.14	73.00	60.00	-37.69	-28.86
3	13.42588	10.73	30.59	23.26	41.32	33.99	73.00	60.00	-31.68	-26.01
4	15.17197	10.78	31.70	24.66	42.48	35.44	73.00	60.00	-30.52	-24.56
5	16.58213	10.82	33.11	25.27	43.93	36.09	73.00	60.00	-29.07	-23.91
6	19.50010	10.91	30.77	22.24	41.68	33.15	73.00	60.00	-31.32	-26.85

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

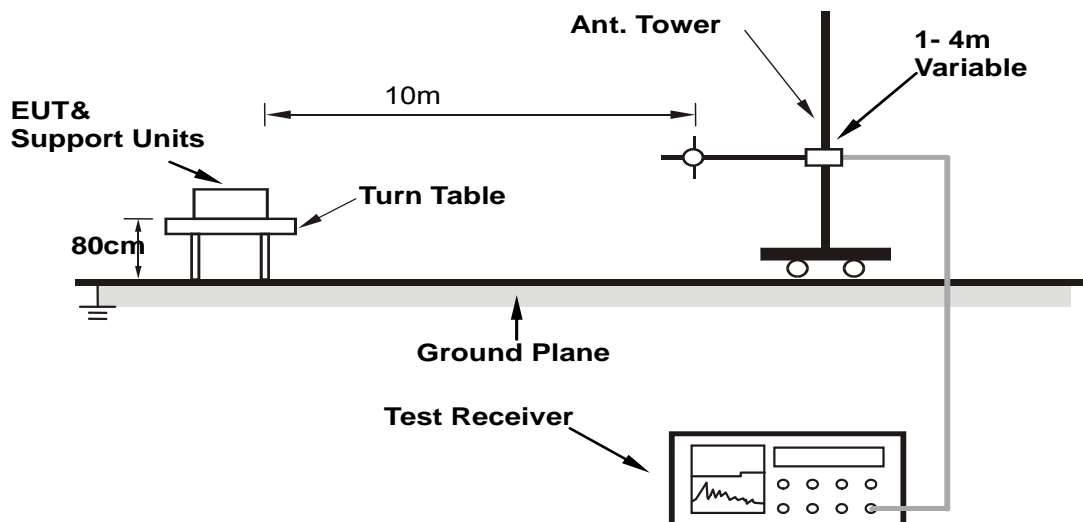
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100412	Sep. 1, 2017	Aug. 31, 2018
Schwarzbeck BILOG Antenna	VULB9168	9168-479	Dec. 14, 2017	Dec. 13, 2018
Agilent Preamplifier	8447D	2944A08312	Feb. 21, 2018	Feb. 20, 2019
CT Turn Table	TT100	CT-0055	NA	NA
CT Tower	AT100	CT-0055	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
ADT RF Switches BOX	EM-H-01-1	1002	Sep. 21 2017	Sep. 20, 2018
WOKEN RF cable With 5dB PAD	8D	CABLE-ST6-01	Sep. 21 2017	Sep. 20, 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 Open Site No. 6.
 3. The VCCI Site Registration No. R-728.
 4. Tested Date: Apr. 9, 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 below 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.



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

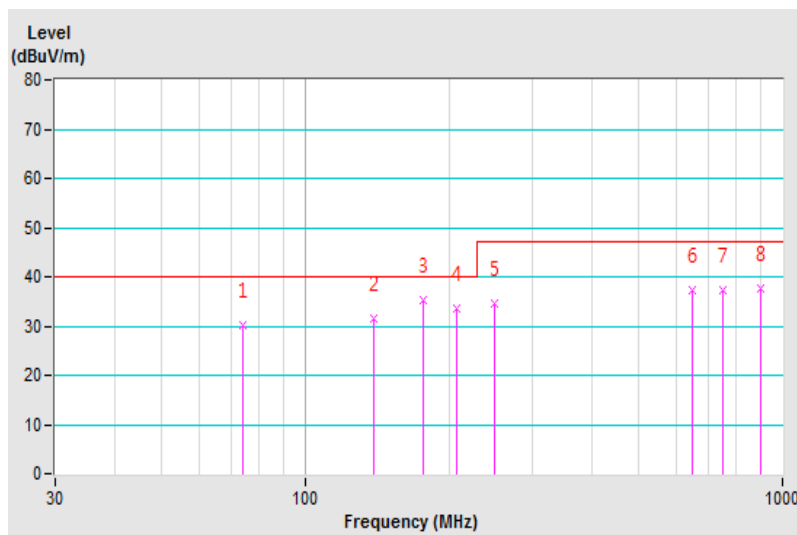
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	ED. Lin	Environmental Conditions	23°C, 69%RH
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	74.22	30.02 QP	40.00	-9.98	4.00 H	153	40.55	-10.53
2	139.72	31.42 QP	40.00	-8.58	4.00 H	251	39.56	-8.14
3	176.32	35.22 QP	40.00	-4.78	4.00 H	312	43.59	-8.37
4	207.43	33.59 QP	40.00	-6.41	3.23 H	20	44.01	-10.42
5	249.55	34.65 QP	47.00	-12.35	3.12 H	327	42.79	-8.14
6	648.25	37.29 QP	47.00	-9.71	1.51 H	270	36.92	0.37
7	750.25	37.17 QP	47.00	-9.83	1.21 H	204	34.90	2.27
8	900.25	37.59 QP	47.00	-9.41	1.00 H	236	33.14	4.45

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

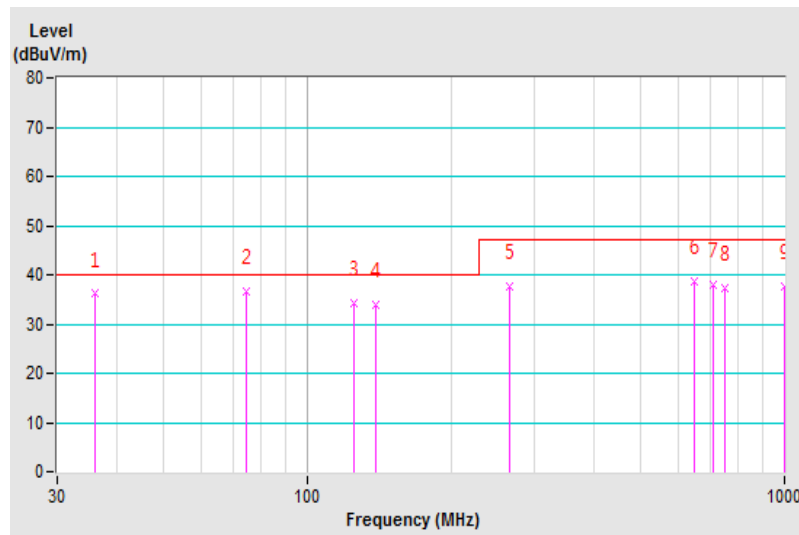


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	ED. Lin	Environmental Conditions	23°C, 69%RH
Test Mode	Mode 1		

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	36.09	36.10 QP	40.00	-3.90	1.00 V	4	45.29	-9.19
2	74.52	36.45 QP	40.00	-3.55	1.63 V	241	47.06	-10.61
3	125.39	34.18 QP	40.00	-5.82	1.00 V	4	43.71	-9.53
4	139.11	33.95 QP	40.00	-6.05	1.00 V	259	42.17	-8.22
5	264.85	37.69 QP	47.00	-9.31	2.02 V	52	45.18	-7.49
6	648.25	38.56 QP	47.00	-8.44	2.86 V	207	38.19	0.37
7	707.50	37.94 QP	47.00	-9.06	4.00 V	41	36.96	0.98
8	749.50	37.27 QP	47.00	-9.73	1.48 V	233	35.00	2.27
9	999.00	37.69 QP	47.00	-9.31	4.00 V	248	32.48	5.21

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 Peak: 80	Avg: 54 Peak: 74	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000			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 (μ V/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

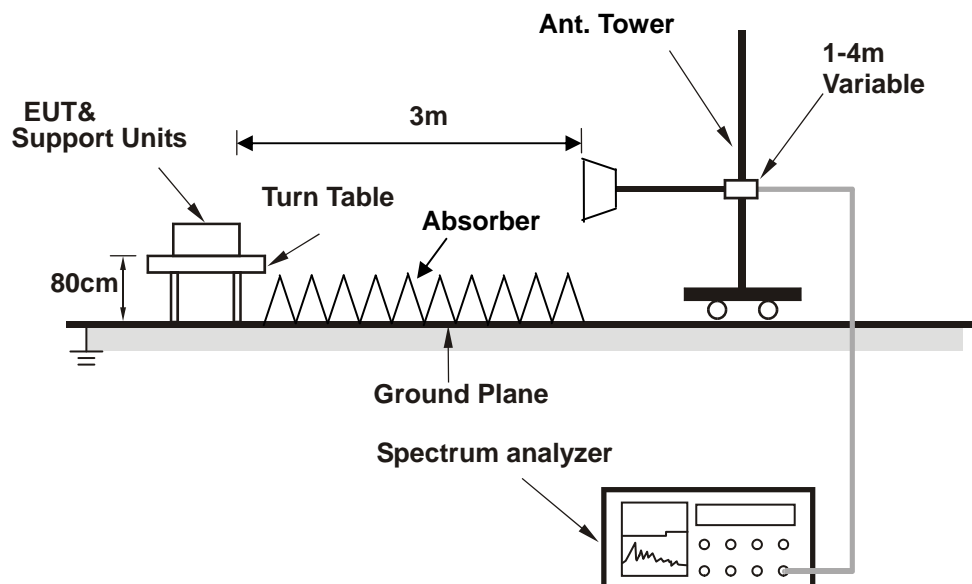
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	Jun. 1, 2017	May 31, 2018
Agilent Test Receiver	N9038A	MY51210137	Jun. 23, 2017	Jun. 22, 2018
Agilent Preamplifier	8449B	3008A01292	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	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	6714	Dec. 12, 2017	Dec. 11, 2018
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH10-3.6m	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 test was performed in Chamber No. 10.
 3. The Industry Canada Reference No. IC 7450E-11.
 4. The VCCI Site Registration No. G-10427
 5. Tested Date: Apr. 3, 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.



* :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.

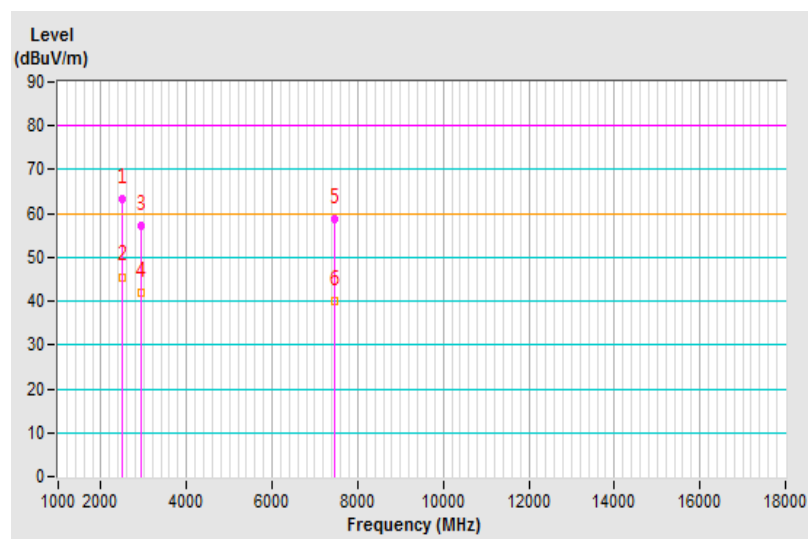
7.4 Test Results

Frequency Range	1GHz ~ 12GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Kobe Lu	Environmental Conditions	23°C, 67%RH
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	2494.84	63.19 PK	80.00	-16.81	2.43 H	195	64.54	-1.35
2	2494.84	45.53 AV	60.00	-14.47	2.43 H	195	46.88	-1.35
3	2940.97	57.29 PK	80.00	-22.71	2.38 H	131	57.46	-0.17
4	2940.97	41.82 AV	60.00	-18.18	2.38 H	131	41.99	-0.17
5	7470.59	58.60 PK	80.00	-21.40	2.03 H	294	49.03	9.57
6	7470.59	40.12 AV	60.00	-19.88	2.03 H	294	30.55	9.57

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

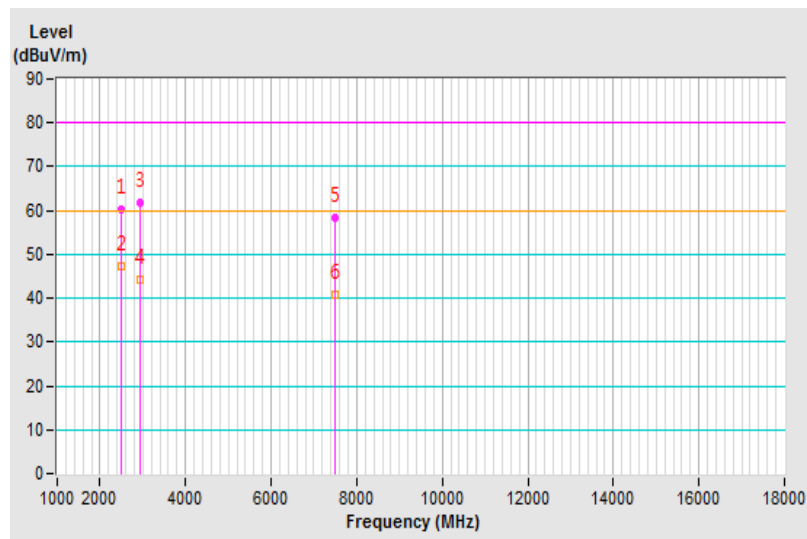


Frequency Range	1GHz ~ 12GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested by	Kobe Lu	Environmental Conditions	23°C, 67%RH
Test Mode	Mode 1		

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	2492.52	60.17 PK	80.00	-19.83	1.46 V	20	61.54	-1.37
2	2492.52	47.15 AV	60.00	-12.85	1.46 V	20	48.52	-1.37
3	2941.40	61.90 PK	80.00	-18.10	2.53 V	195	62.07	-0.17
4	2941.40	44.13 AV	60.00	-15.87	2.53 V	195	44.30	-0.17
5	7484.41	58.28 PK	80.00	-21.72	2.64 V	290	48.72	9.56
6	7484.41	40.76 AV	60.00	-19.24	2.64 V	290	31.20	9.56

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

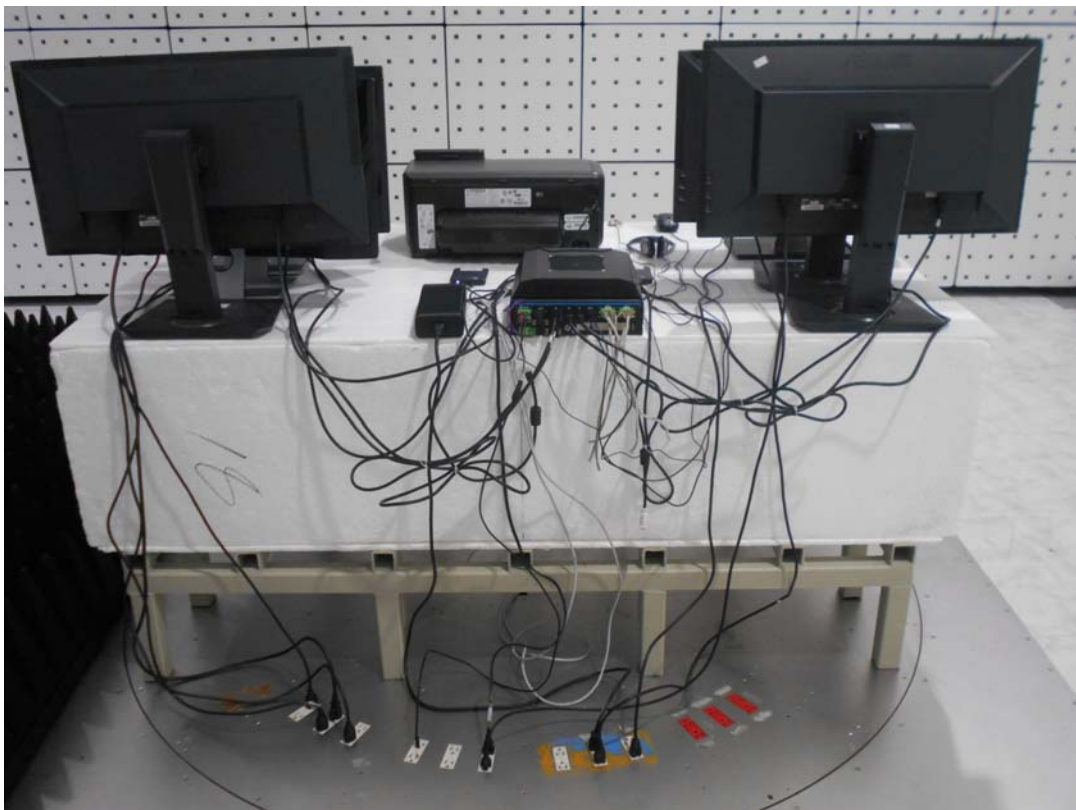
8.1 Conducted Emissions at Mains Ports



8.2 Radiated Emissions up to 1 GHz



8.3 Radiated Emissions above 1 GHz



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:

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Web Site: www.bureauveritas-adt.com

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

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