

FCC Test Report

Report No.: FDBDBO-WTW-P20120314

Test Model: ECX-2000

Series Model: ECX-2000 Series, ECX-2XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
("X" can be 0-9, A-Z or blank for marketing purposes)

Received Date: Dec. 14, 2020

Test Date: Dec. 14 to 20, 2020

Issued Date: Jan. 5, 2021

Applicant: Vecow Co., Ltd.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 418586 / TW1078



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Release Control Record

Issue No.	Description	Date Issued
FDBDBO-WTW-P20120314	Original release.	Jan. 5, 2021

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003: 2016 Issue 6, updated Apr. 2019 Class A

ANSI C63.4:2014

FCC Clause	ICES-003 Clause	Test Item	Result/Remarks	Verdict
15.107	6.1	Conducted Emissions at mains ports	Minimum passing Class A margin is -18.10 dB at 3.57969 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class A margin is -0.95 dB at 154.00 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class A margin is -14.01 dB at 2310.02 MHz	Pass

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.48 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	Fanless Embedded System
Brand	Vecow
Test Model	ECX-2000
Series Model	ECX-2000 Series, ECX-2XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX ("X" can be 0-9, A-Z or blank for marketing purposes)
Model Difference	Marketing Differentiation
Sample Status	Engineering sample
Operating Software	Windows 10
Power Supply Rating	DC from Adapter
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT uses following adapter.

Brand	FSP
Model	FSP180-AABN3
Input Power	100-240Vac, 2.3A, 50-60Hz
Output Power	24Vdc, 7.5A, 180.0W
Power Line	AC 3Pin Non-shielded DC (1.5m) with one ferrite core.

3.2 Features of EUT

1. 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.
2. The EUT was configured with the following key components:

Components	Brand	Model	Specification
CPU	Intel	I7-10700TE	2.0GHz
RAM	Vecow	VMD4NIS-08G00C	8GB DDR4 3200 W/T SODIMM
RAM	Vecow	VMD4NIS-16G00C	16GB DDR4 3200 W/T SODIMM
SSD	-	-	2.5" SATA SSD 3ME4 128GB

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

1. The EUT consumed power from AC adapter, which designed with AC power supply of 100-240Vac, 50-60Hz.
For radiated emission evaluation, 120Vac/ 60Hz (for FCC Part 15) and 230Vac/ 50Hz (fo EN 50155 & EN 50121-3-2) had been covered during the pre-test. The worst radiated emission data was found at **120Vac/ 60Hz** and recorded in the applied test report.
2. Test modes are presented in the report as below.

Mode	Test Condition	Input Power
Conducted emission & Radiated emission tests		
1	Full system (DVI: 1920*1080, 60Hz + DP: 3840*2160, 60Hz)	120Vac/ 60Hz

3.4 Test Program Used and Operation Descriptions

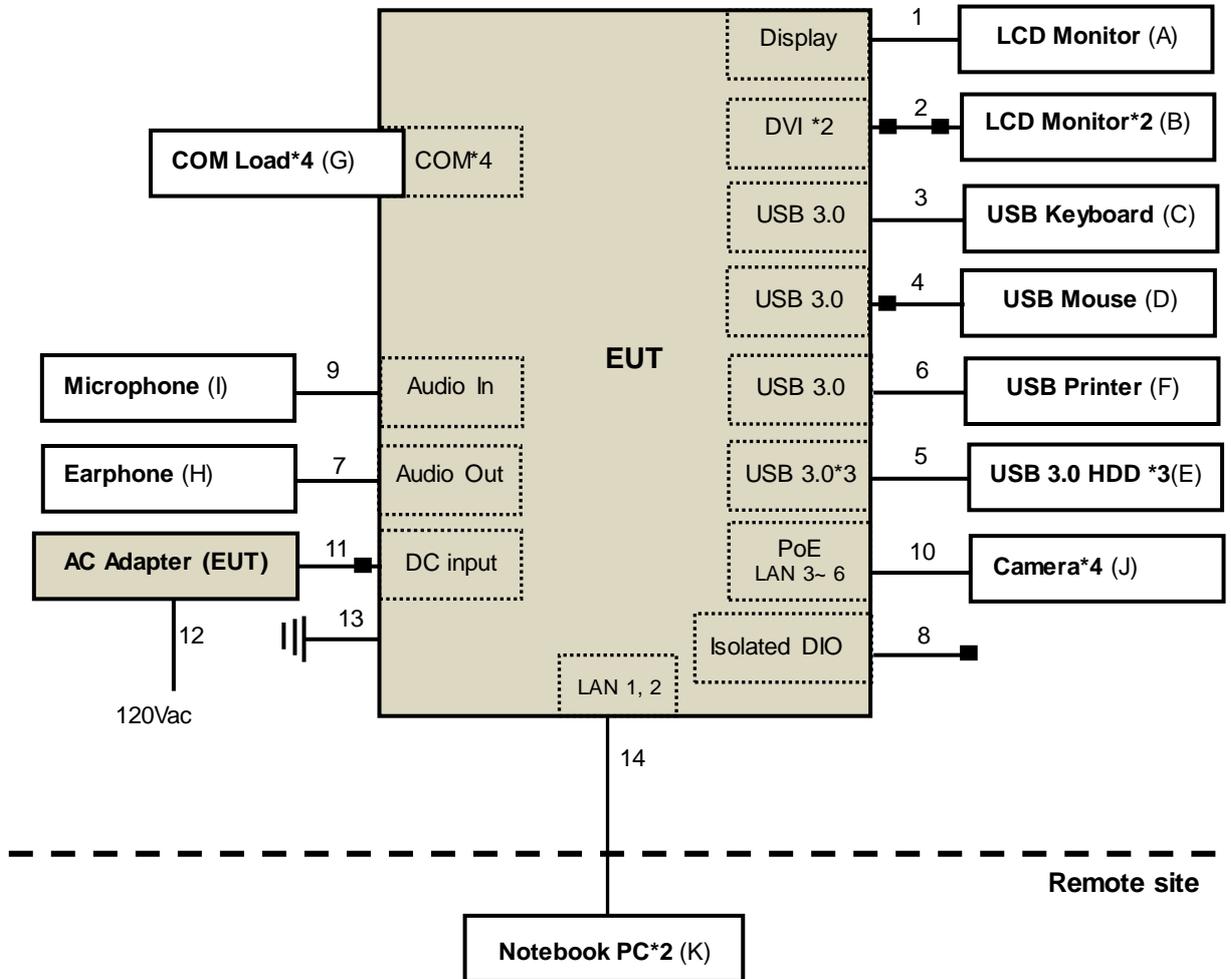
- a. Turned on the power of all equipment.
- b. EUT ran a test program to enable all functions.
- c. EUT read and wrote messages from/to SSD and ext. HDDs.
- d. EUT sent and received messages to/from Notebook PCs (kept in a remote area) via two UTP LAN cables.
- e. EUT sent "H" messages to ext. LCD Monitors. Then they displayed "H" messages on their screens simultaneously.
- f. EUT sent 1kHz audio signal to earphone.
- g. EUT sent messages to printer and printer printed them out.
- h. Cameras captured video image to LCD Monitors via EUT.
- i. Steps c-h 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 2.0GHz, 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.	LCD Monitor	ASUS	MG28U	H1LMTF041254	FCC DoC Approved	Provided by Lab
B.	24" LCD MONITOR	DELL	U2410	CN082WXD728720CC0UHL	FCC DoC Approved	Provided by Lab
	24" LCD MONITOR	DELL	U2410	CN082WXD728720CC0LGL	FCC DoC Approved	Provided by Lab
C.	USB KEYBOARD	Dell	KB216t	CN-0W33XP-LO300-7CL-1909	FCC DoC Approved	Provided by Lab
D.	USB Mouse	Microsoft	1113	9170528318308	FCC DoC Approved	Provided by Lab
E.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXM1E1532Z4Z	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WX61A45JRXLf	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WX61A45JR2YK	FCC DoC Approved	Provided by Lab
F.	Printer	HP	Officejet pro 251dw	N/A	B94SDGOB1191	Provided by Lab
G.	COM Load*4	N/A	N/A	N/A	N/A	Supplied by client
H.	EARPHONE	KWORLD	G13	N/A	N/A	Provided by Lab
I.	MICROPHONE	N/A	N/A	N/A	N/A	Provided by Lab
J.	PoE Camera*4	N/A	MBL030A-ORZ0310	N/A	N/A	Supplied by client
K.	Notebook PC	SONY	SVS151A12P	275548477001024	FCC DoC Approved	Provided by Lab
	Notebook PC	LENOVO	T480	PF1EZSAW	FCC DoC Approved	Provided by Lab

Note:

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

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Display cable	1	2.0	Y	0	Provided by Lab
2.	DVI cable	2	1.8	Y	2	Provided by Lab
3.	USB cable	1	1.8	Y	0	Provided by Lab
4.	USB cable	1	1.8	Y	1	Provided by Lab
5.	USB cable	3	1.0	Y	0	Provided by Lab
6.	USB cable	1	1.5	Y	0	Provided by Lab
7.	Audio cable	1	2.0	N	0	Provided by Lab
8.	Signal cable	1	1.5	N	0	Provided by Lab
9.	Audio cable	1	2.0	N	0	Provided by Lab
10.	LAN cable	4	3.0	N	0	Provided by Lab (RJ45, Cat.5e)
11.	DC power	1	1.5	N	1	Supplied by client
12.	AC power cord	1	1.8	N	0	Provided by Lab
13.	GND cable	1	1.8	N	0	Provided by Lab
14.	LAN cable	2	10	N	0	Provided by Lab (RJ45, Cat.5e)

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

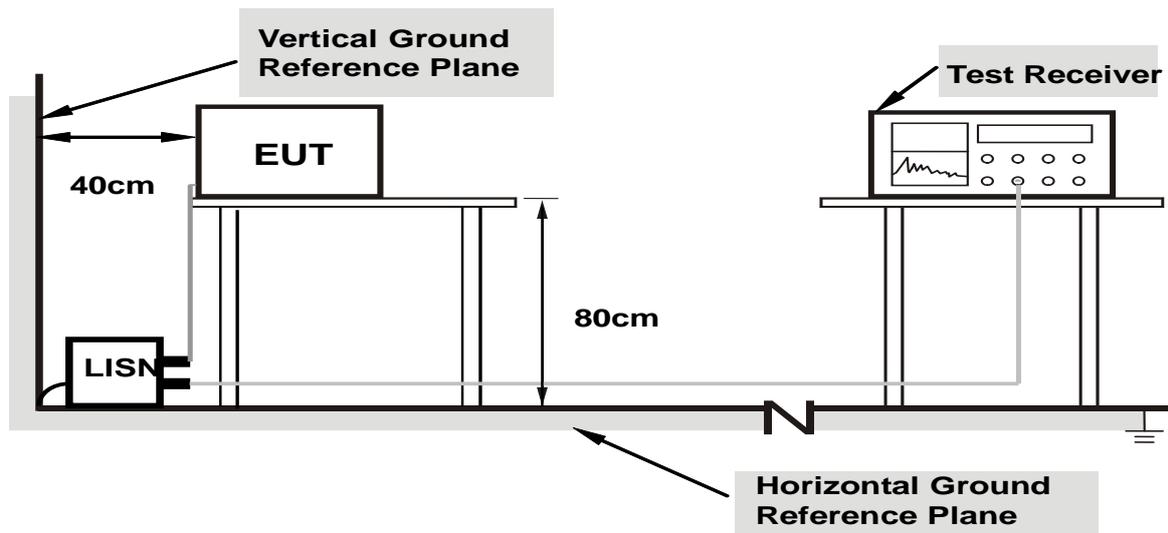
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ Test Receiver	ESR3	102414	Jan. 13, 2020	Jan. 12, 2021
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	Jun. 10, 2020	Jun. 9, 2021
LISN With Adapter (for EUT)	101197	NA	Jun. 10, 2020	Jun. 9, 2021
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Dec. 2, 2020	Dec. 1, 2021
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2020	May 13, 2021
SCHWARZBECK Artificial Mains Network (for EUT)	NNLK 8121	8121-808	Apr. 10, 2020	Apr. 9, 2021
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 12, 2020	Feb. 11, 2021
LYNICS Terminator (For ROHDE & SCHWARZ LISN)	0900510	E1-011484	May 26, 2020	May 25, 2021

Note: 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. (Conduction 10)
 3. The VCCI Site Registration No. C-11852.
 4. Tested Date: Dec. 14, 2020

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.

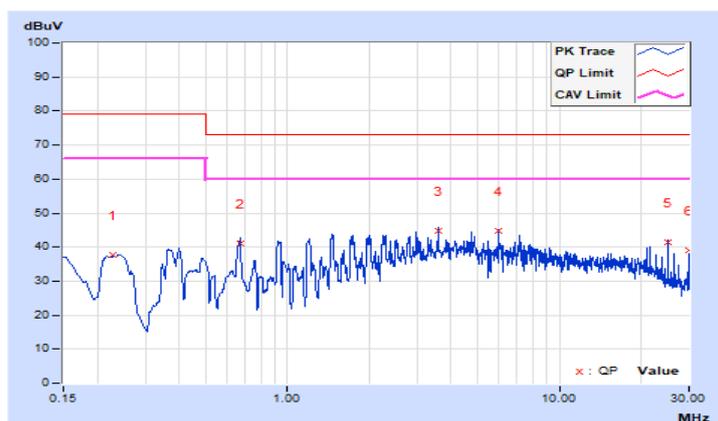
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 76%RH
Tested by	John Liao	Test Date	2020/12/14
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	0.22792	9.71	27.99	26.22	37.70	35.93	79.00	66.00	-41.30	-30.07
2	0.66817	9.73	31.20	26.35	40.93	36.08	73.00	60.00	-32.07	-23.92
3	3.59360	9.82	34.92	26.72	44.74	36.54	73.00	60.00	-28.26	-23.46
4	5.97384	9.85	34.95	27.52	44.80	37.37	73.00	60.00	-28.20	-22.63
5	25.14165	10.14	31.29	26.87	41.43	37.01	73.00	60.00	-31.57	-22.99
6	29.88178	10.22	28.95	26.11	39.17	36.33	73.00	60.00	-33.83	-23.67

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

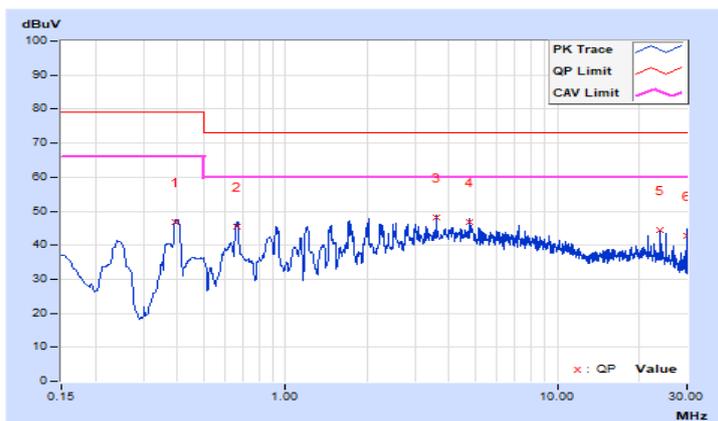


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	21°C, 76%RH
Tested by	John Liao	Test Date	2020/12/14
Test Mode	Mode 1		

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	0.39465	9.71	37.00	32.37	46.71	42.08	79.00	66.00	-32.29	-23.92
2	0.66035	9.73	35.86	29.92	45.59	39.65	73.00	60.00	-27.41	-20.35
3	3.57969	9.82	38.20	32.08	48.02	41.90	73.00	60.00	-24.98	-18.10
4	4.78253	9.84	36.90	29.63	46.74	39.47	73.00	60.00	-26.26	-20.53
5	23.90968	10.11	34.23	31.02	44.34	41.13	73.00	60.00	-28.66	-18.87
6	29.88178	10.14	32.52	25.67	42.66	35.81	73.00	60.00	-30.34	-24.19

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 (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
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5		

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
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54		

- 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

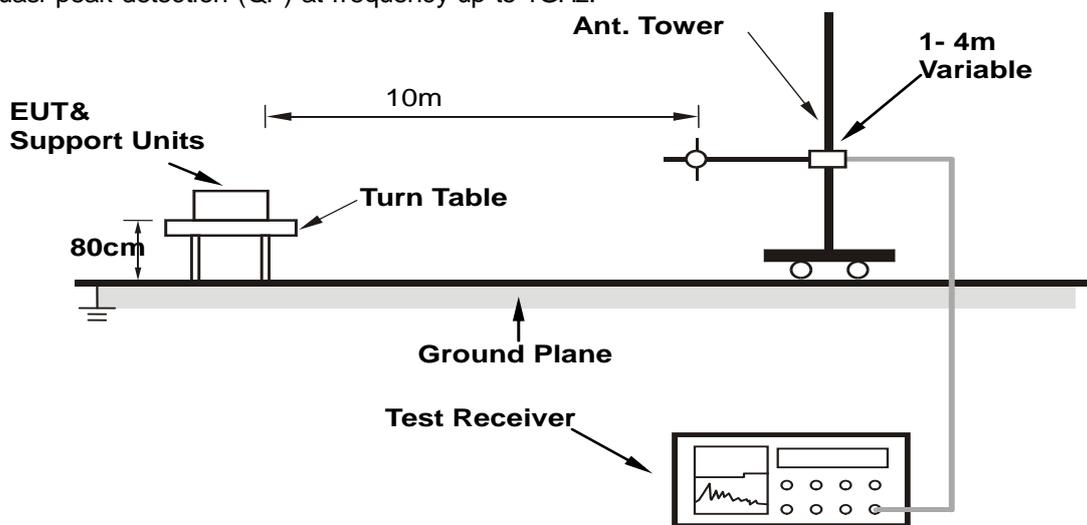
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100027	May 19, 2020	May 18, 2021
Schwarzbeck Bilog Antenna	VULB9168	9168-303	Nov. 5, 2020	Nov. 4, 2021
Agilent Preamplifier	8447D	2944A08119	Feb. 19, 2020	Feb. 18, 2021
ADT. Turn Table	TT100	0205	NA	NA
ADT. Tower	AT100	0205	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
ADT RF Switches BOX	EMH-011	1001	Oct. 23, 2020	Oct. 22, 2021
Pacific RF cable With 5dB PAD	8D	CABLE-ST2-01	Oct. 23, 2020	Oct. 22, 2021

- Note:
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. 2.
 3. The VCCI Site Registration No. R-10237.
 4. Tested Date: Dec. 18, 2020

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.

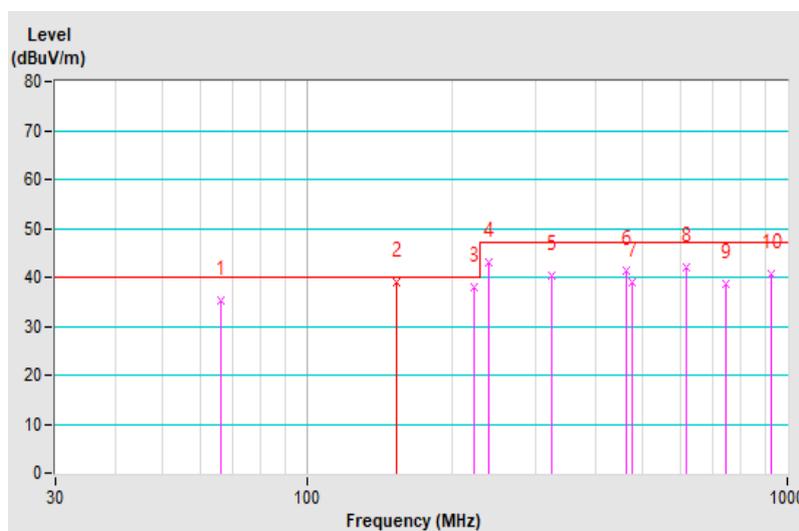
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested By	ED. Lin	Environmental Conditions	20.0°C, 83.0%RH
Test Mode	Mode 1	Test Date	2020/12/18

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	66.39	35.33 QP	40.00	-4.67	4.00 H	89	46.63	-11.30
2	154.00	39.05 QP	40.00	-0.95	4.00 H	257	47.92	-8.87
3	222.68	38.11 QP	40.00	-1.89	4.00 H	177	49.65	-11.54
4	239.78	42.99 QP	47.00	-4.01	3.07 H	356	52.99	-10.00
5	324.35	40.38 QP	47.00	-6.62	2.14 H	284	47.11	-6.73
6	462.25	41.38 QP	47.00	-5.62	2.14 H	255	45.37	-3.99
7	475.00	39.07 QP	47.00	-7.93	2.52 H	23	42.86	-3.79
8	616.00	42.06 QP	47.00	-4.94	1.79 H	23	42.68	-0.62
9	742.75	38.65 QP	47.00	-8.35	1.00 H	22	36.65	2.00
10	924.25	40.78 QP	47.00	-6.22	1.48 H	286	35.08	5.70

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

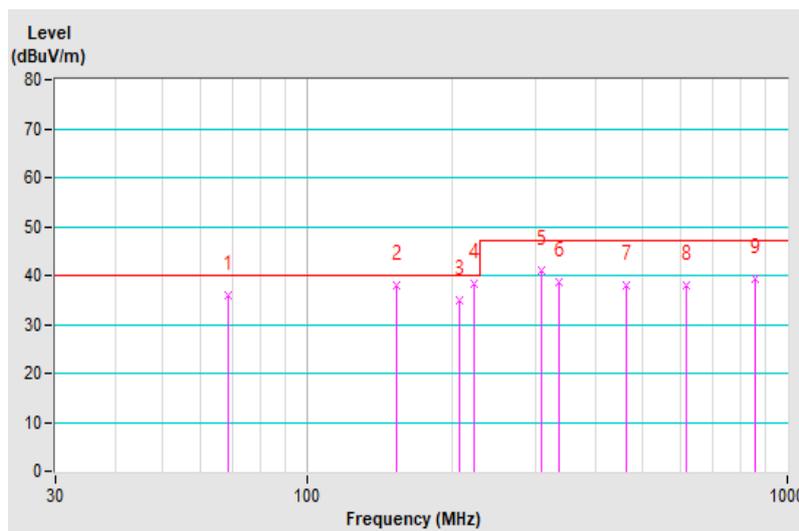


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested By	ED. Lin	Environmental Conditions	20.0°C, 83.0%RH
Test Mode	Mode 1	Test Date	2020/12/18

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	68.42	35.93 QP	40.00	-4.07	1.27 V	16	47.78	-11.85
2	154.00	38.12 QP	40.00	-1.88	1.00 V	108	46.99	-8.87
3	208.34	35.05 QP	40.00	-4.95	1.00 V	272	47.06	-12.01
4	222.46	38.14 QP	40.00	-1.86	1.00 V	296	49.67	-11.53
5	307.77	41.03 QP	47.00	-5.97	1.00 V	354	48.35	-7.32
6	335.40	38.72 QP	47.00	-8.28	1.00 V	23	45.30	-6.58
7	462.61	37.88 QP	47.00	-9.12	2.36 V	23	41.86	-3.98
8	616.61	37.99 QP	47.00	-9.01	3.08 V	213	38.60	-0.61
9	856.00	39.38 QP	47.00	-7.62	1.77 V	263	35.05	4.33

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

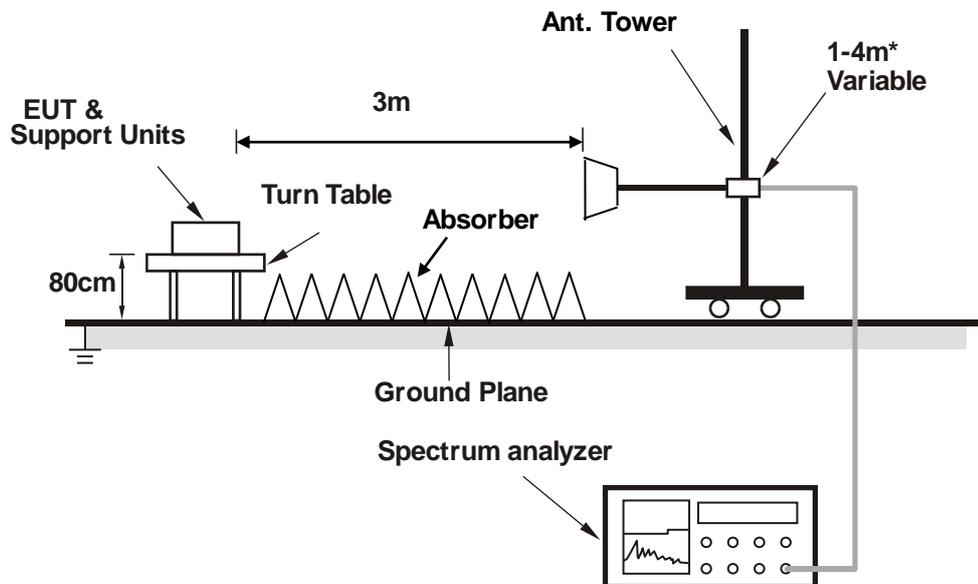
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	Jun. 23, 2020	Jun. 22, 2021
Agilent Preamplifier	8449B	3008A01292	Feb. 20, 2020	Feb. 19, 2021
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2020	Feb. 19, 2021
EMCI Preamplifier	EMC184045B	980235	Feb. 20, 2020	Feb. 19, 2021
ETS Preamplifier	3117-PA	00215857	Nov. 23, 2020	Nov. 22, 2021
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 22, 2020	Nov. 21, 2021
EMCO Horn Antenna	3115	6714	Nov. 22, 2020	Nov. 21, 2021
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
KIK + WOKEN RF cable With 3/4dB PAD	K1K50-UP0279-K1K50 -3000+WC01	Cable-CH10(3m) -04 +Cable-CH10-03	Jul. 9, 2020	Jul. 8, 2021
MICRO-TRONICS Notch filter	BRC50703-01	010	May 29, 2020	May 28, 2021
MICRO-TRONICS Band Pass Filter	BRM17690	005	May 29, 2020	May 28, 2021

- Note:
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 VCCI Site Registration No. G-10427
 4. Tested Date: Dec. 20, 2020

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.

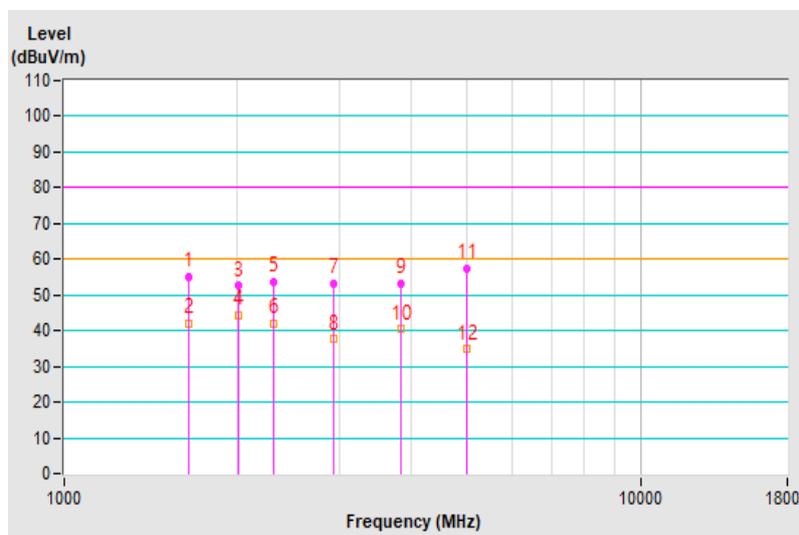
7.4 Test Results

Frequency Range	1GHz ~ 10GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kobe Lu	Environmental Conditions	23.0°C, 66.0%RH
Test Mode	Mode 1	Test Date	2020/12/20

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	1641.33	54.92 PK	80.00	-25.08	1.45 H	243	58.53	-3.61
2	1641.33	42.16 AV	60.00	-17.84	1.45 H	243	45.77	-3.61
3	2002.15	52.49 PK	80.00	-27.51	1.00 H	191	55.09	-2.60
4	2002.15	44.46 AV	60.00	-15.54	1.00 H	191	47.06	-2.60
5	2309.85	53.68 PK	80.00	-26.32	2.06 H	255	55.38	-1.70
6	2309.85	41.91 AV	60.00	-18.09	2.06 H	255	43.61	-1.70
7	2940.97	53.07 PK	80.00	-26.93	1.39 H	233	53.03	0.04
8	2940.97	37.61 AV	60.00	-22.39	1.39 H	233	37.57	0.04
9	3850.05	53.25 PK	80.00	-26.75	1.25 H	164	50.20	3.05
10	3850.05	40.43 AV	60.00	-19.57	1.25 H	164	37.38	3.05
11	4993.73	57.44 PK	80.00	-22.56	1.00 H	360	53.44	4.00
12	4993.73	34.80 AV	60.00	-25.20	1.00 H	360	30.80	4.00

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

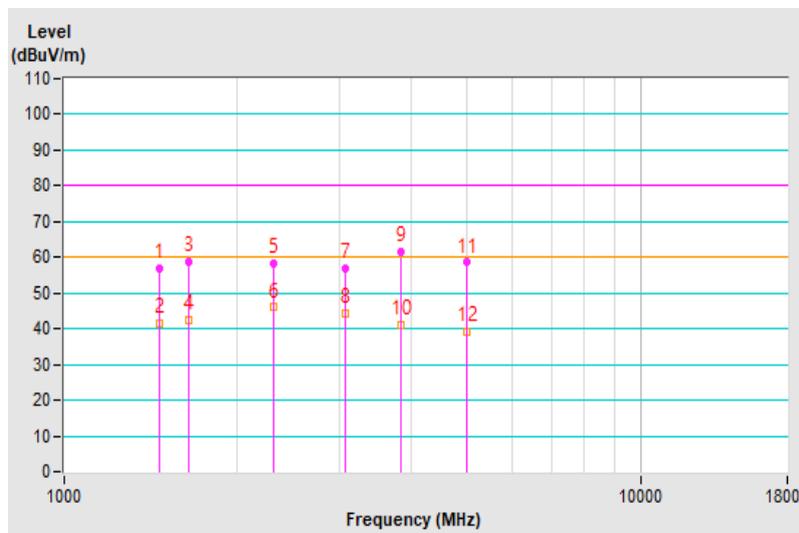


Frequency Range	1GHz ~ 10GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Tested By	Kobe Lu	Environmental Conditions	23.0°C, 66.0%RH
Test Mode	Mode 1	Test Date	2020/12/20

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	1460.28	57.09 PK	80.00	-22.91	1.00 V	138	61.54	-4.45
2	1460.28	41.49 AV	60.00	-18.51	1.00 V	138	45.94	-4.45
3	1644.30	58.64 PK	80.00	-21.36	1.04 V	213	62.24	-3.60
4	1644.30	42.49 AV	60.00	-17.51	1.04 V	213	46.09	-3.60
5	2310.02	58.33 PK	80.00	-21.67	1.93 V	228	60.02	-1.69
6	2310.02	45.99 AV	60.00	-14.01	1.93 V	228	47.68	-1.69
7	3079.95	57.07 PK	80.00	-22.93	1.00 V	325	56.39	0.68
8	3079.95	44.27 AV	60.00	-15.73	1.00 V	325	43.59	0.68
9	3849.88	61.73 PK	80.00	-18.27	1.78 V	360	58.67	3.06
10	3849.88	41.20 AV	60.00	-18.80	1.78 V	360	38.14	3.06
11	4989.48	58.62 PK	80.00	-21.38	1.20 V	344	54.63	3.99
12	4989.48	39.23 AV	60.00	-20.77	1.20 V	344	35.24	3.99

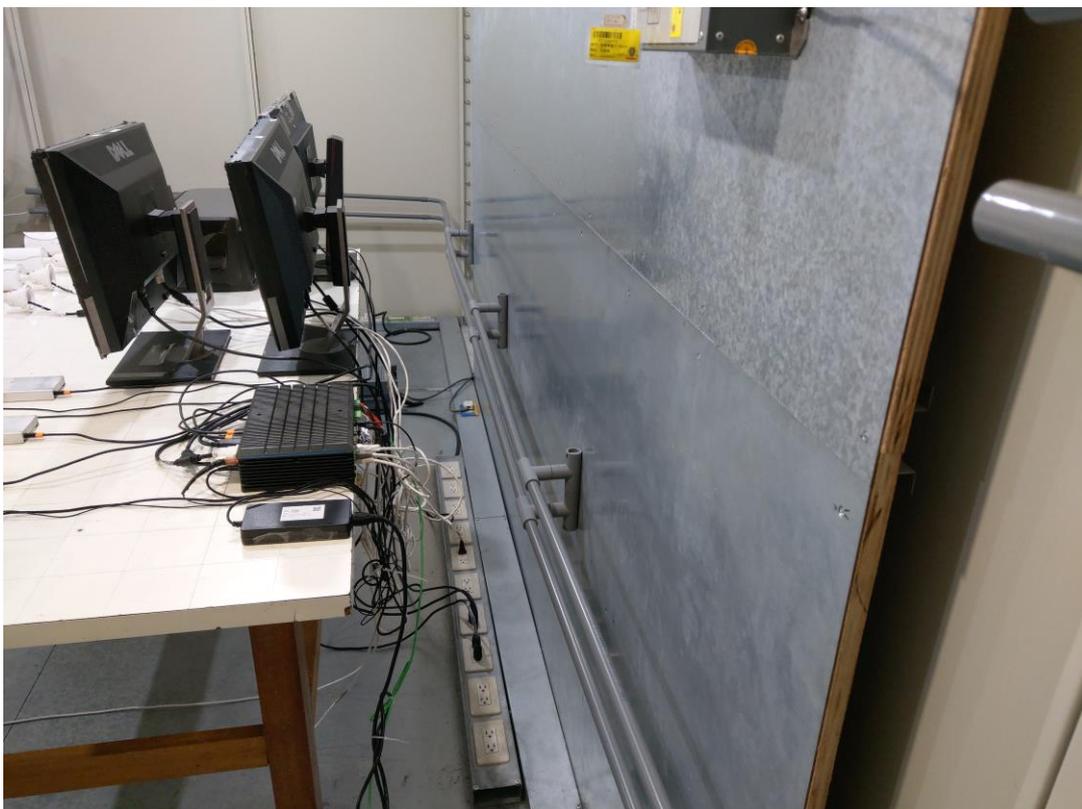
Remarks:

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

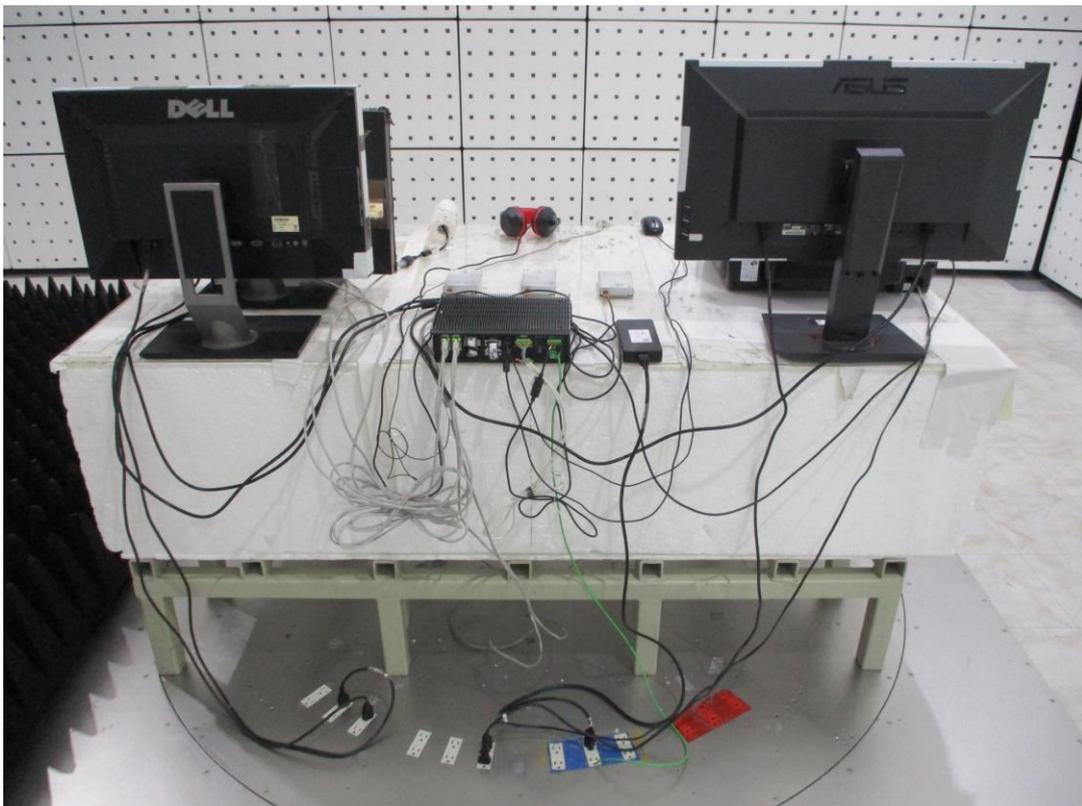
8.1 Conducted Emissions at Mains Ports



8.2 Radiated Emissions up to 1 GHz



8.3 Radiated Emissions above 1 GHz



Appendix – Information of 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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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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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