

FCC Test Report

Report No.: FD190611D12

Test Model: SMX-200

Series Model: SMX-2XXXXXXXXXXXXXXXXX
(“X” can be 0-9, A-Z or blank for marketing purpose)

Received Date: Jun. 11, 2019

Test Date: Jun. 17 to 18, 2019

Issued Date: Aug. 28, 2019

Applicant: Vecow Co., Ltd.

Address: 3F., No.10, Jiankang Rd., Zhonghe Dist., New Taipei City 23586, Taiwan

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

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

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



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Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information	6
3.1 Description of EUT	6
3.2 Features of EUT	6
3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode	6
3.4 Test Program Used and Operation Descriptions	6
3.5 Primary Clock Frequencies of Internal Source	6
4 Configuration and Connections with EUT	7
4.1 Connection Diagram of EUT and Peripheral Devices	7
4.2 Configuration of Peripheral Devices and Cable Connections	7
5 Conducted Emissions at Mains Ports	8
5.1 Limits	8
5.2 Test Instruments	8
5.3 Test Arrangement	9
5.4 Test Results	10
6 Radiated Emissions up to 1 GHz	12
6.1 Limits	12
6.2 Test Instruments	12
6.3 Test Arrangement	13
6.4 Test Results	14
7 Pictures of Test Arrangements	16
7.1 Conducted Emissions at Mains Ports	16
7.2 Radiated Emissions up to 1 GHz	17
Appendix – Information of the Testing Laboratories	18

Release Control Record

Issue No.	Description	Date Issued
FD190611D12	Original release.	Aug. 28, 2019

1 Certificate of Conformity

Product: Mini PCIe 4-port Isolated RS-232/422/485 Serial Card

Brand: Vecow

Test Model: SMX-200

Series Model: SMX-2XXXXXXXXXXXXXXXXX
("X" can be 0-9, A-Z or blank for marketing purpose)

Sample Status: Engineering sample

Applicant: Vecow Co., Ltd.

Test Date: Jun. 17 to 18, 2019

Standards: 47 CFR FCC Part 15, Subpart B, Class A
ICES-003: 2016 Issue 6, updated Apr. 2019 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:** Aug. 28, 2019
Vivian Chen / Specialist

Approved by :  , **Date:** Aug. 28, 2019
Jim Hsiang / Associate Technical Manager

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	AC Power Line Conducted Emissions	Minimum passing Class A margin is -17.92 dB at 15.09247 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class A margin is -4.62 dB at 174.94 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	EUT's highest frequency is below 108 MHz	N/A

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.
3. N/A: Not Applicable

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	2.77 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.01 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	Mini PCIe 4-port Isolated RS-232/422/485 Serial Card
Brand	Vecow
Test Model	SMX-200
Series Model	SMX-2XXXXXXXXXXXXXXXXXX (“X” can be 0-9, A-Z or blank for marketing purpose)
Model Difference	For marketing purpose
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	DC power from IPC
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT is a Mini PCIe 4-port Isolated RS-232/422/485 Serial Card and installed in IPC during the test.
2. The EUT maximum data rate is 921.6kbps.

3.2 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.

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

The EUT is consumes power from IPC which designed with AC power of rating 100-240Vac, 50/60Hz. For radiated emission evaluation, 230Vac/50Hz (EN 50121-3-2), 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. Then the other test items were tested at 120Vac/60Hz.

3.4 Test Program Used and Operation Descriptions

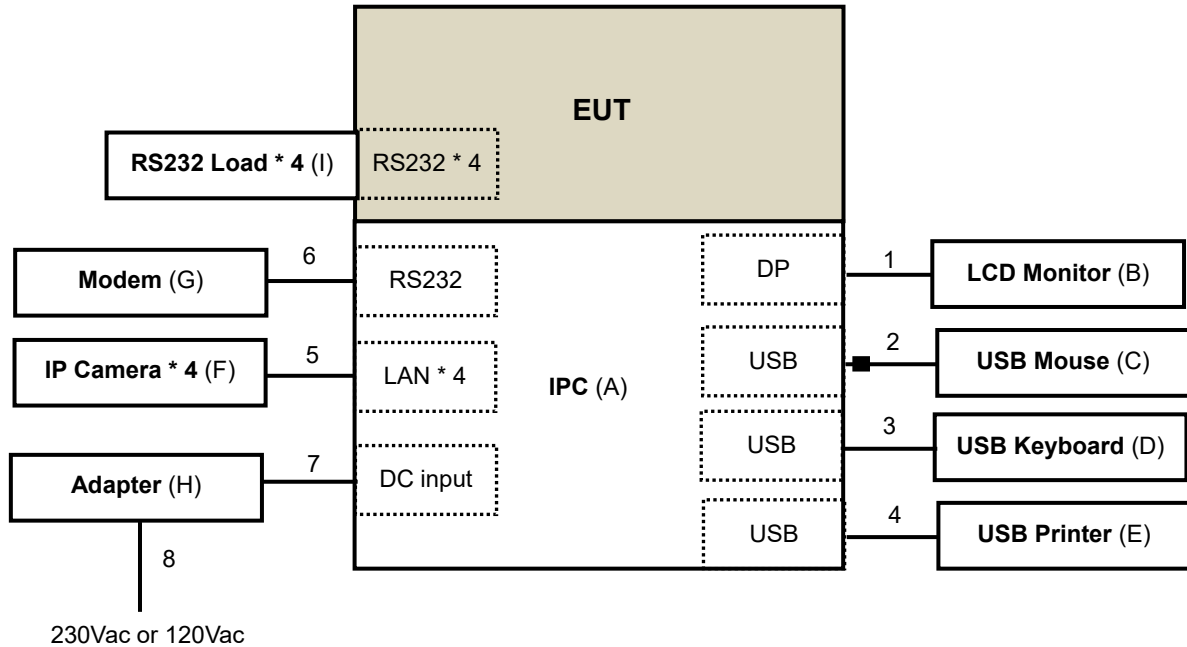
- a. Installed the EUT into IPC.
- b. Turned on the power of all equipment.
- c. IPC ran a test program to enable all functions.
- d. IPC read and wrote messages from/to HDD.
- e. IP camera ping IPC via EUT with four UTP LAN cables.
- f. IPC sent “H” messages to monitor then displayed “H” messages on its screen.
- g. IPC sent messages to printer and printer printed them out.
- h. IPC sent messages to modem.
- 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 921.6kbps, 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.	IPC	Vecow	RCS-9000	N/A	N/A	Supplied by client
B.	LCD Monitor	ASUS	MG28UQ	J1LMTF114786	N/A	Provided by Lab
C.	USB Mouse	Microsoft	1113	9170528318292	FCC DoC Approved	Provided by Lab
D.	USB Keyboard	Dell	KB216t	CN-0W33XP-LO300-7CL-1908	FCC DoC Approved	Provided by Lab
E.	Printer	HP	Officejet pro 251dw	CN55FCV019	N/A	Provided by Lab
F.	IP Camera * 4	N/A	A301RZ-0309P	WXF1E84H2ASN	FCC DoC Approved	Supplied by client
G.	Modem	ACEEX	1414	0206026747	IFAXDM1414	Provided by Lab
H.	Adapter	Seasonic	SSA-1201-24	N/A	N/A	Supplied by client
I.	RS232 Load * 4	N/A	N/A	N/A	N/A	Supplied by client

Note:

- All power cords of the above support units are non-shielded (1.8m).
- The rating of support unit H is as follows:
AC I/P: 100-240Vac, 2A, 50/60Hz
DC O/P: 24V/5A, 120W Max

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DP cable	1	1.8	Y	0	Provided by Lab
2.	USB cable	1	1.8	Y	1	Provided by Lab
3.	USB cable	1	1.8	Y	0	Provided by Lab
4.	USB cable	1	1.5	Y	0	Provided by Lab
5.	LAN cable (Cat.5e)	4	1.5	N	0	Provided by Lab
6.	RS232 cable	1	1.5	Y	0	Provided by Lab
7.	DC power	1	1.0	N	0	Supplied by client
8.	AC power cord	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

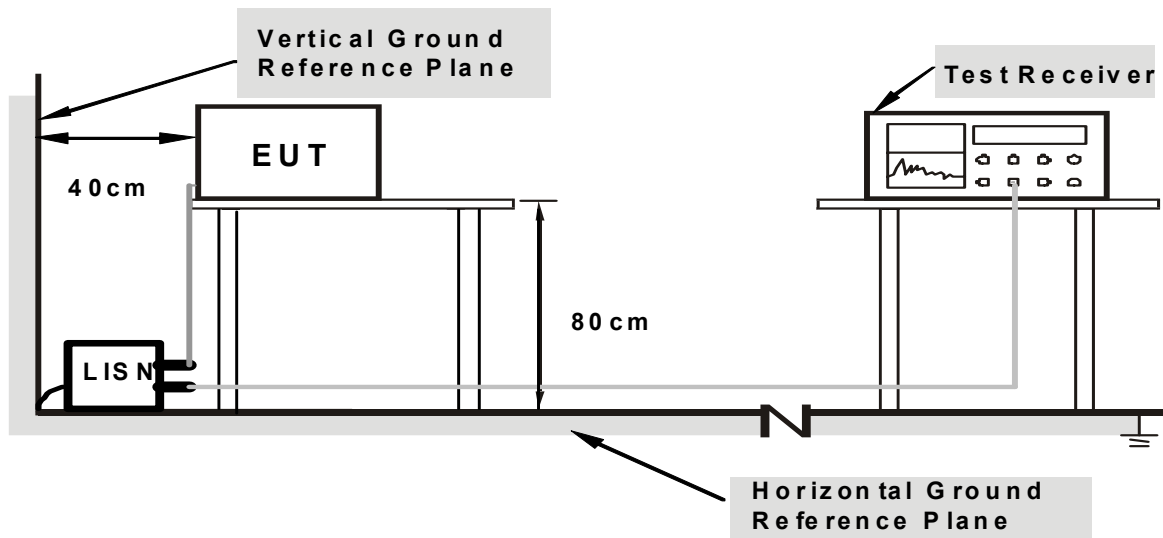
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	838251/021	Nov. 1, 2018	Oct. 31, 2019
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 9, 2019	May 8, 2020
LISN With Adapter(for EUT)	101195	N/A	May 9, 2019	May 8, 2020
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 26, 2018	Jul. 25, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2019	May 13, 2020
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK 8121	8121-808	Mar. 15, 2019	Mar. 14, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C03-01	Sep. 18, 2018	Sep. 17, 2019
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 25, 2019	Jan. 24, 2020
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 25, 2019	Jan. 24, 2020
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter(for TV EUT)	100220	NA	Nov. 21, 2018	Nov. 20, 2019

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. 3.
3. The VCCI Site Registration No. C-10274.
4. Tested Date: Jun. 17, 2019

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.

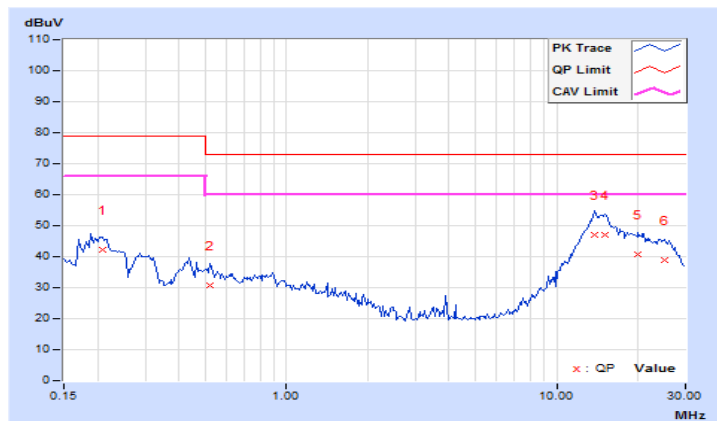
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25°C, 71%RH
Tested by	John Liao		
Test Mode	With System		

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	0.20859	9.61	32.76	22.30	42.37	31.91	79.00	66.00	-36.63	-34.09
2	0.52109	9.64	20.99	12.30	30.63	21.94	73.00	60.00	-42.37	-38.06
3	13.85156	9.89	37.30	31.30	47.19	41.19	73.00	60.00	-25.81	-18.81
4	15.16406	9.90	37.21	31.95	47.11	41.85	73.00	60.00	-25.89	-18.15
5	19.97656	9.93	30.79	24.65	40.72	34.58	73.00	60.00	-32.28	-25.42
6	24.98047	9.94	28.96	21.38	38.90	31.32	73.00	60.00	-34.10	-28.68

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

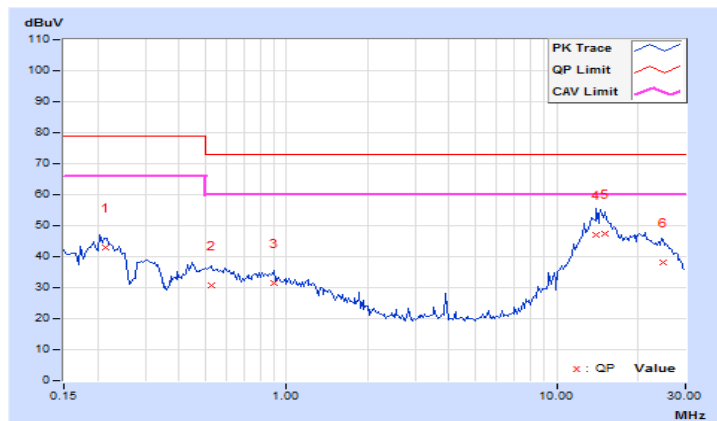


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25°C, 71%RH
Tested by	John Liao		
Test Mode	With System		

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	0.21482	9.60	33.23	21.65	42.83	31.25	79.00	66.00	-36.17	-34.75
2	0.52500	9.62	21.02	13.02	30.64	22.64	73.00	60.00	-42.36	-37.36
3	0.89491	9.65	21.65	14.05	31.30	23.70	73.00	60.00	-41.70	-36.30
4	14.01946	9.91	37.12	31.12	47.03	41.03	73.00	60.00	-25.97	-18.97
5	15.09247	9.92	37.62	32.16	47.54	42.08	73.00	60.00	-25.46	-17.92
6	24.71484	10.01	28.03	21.85	38.04	31.86	73.00	60.00	-34.96	-28.14

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

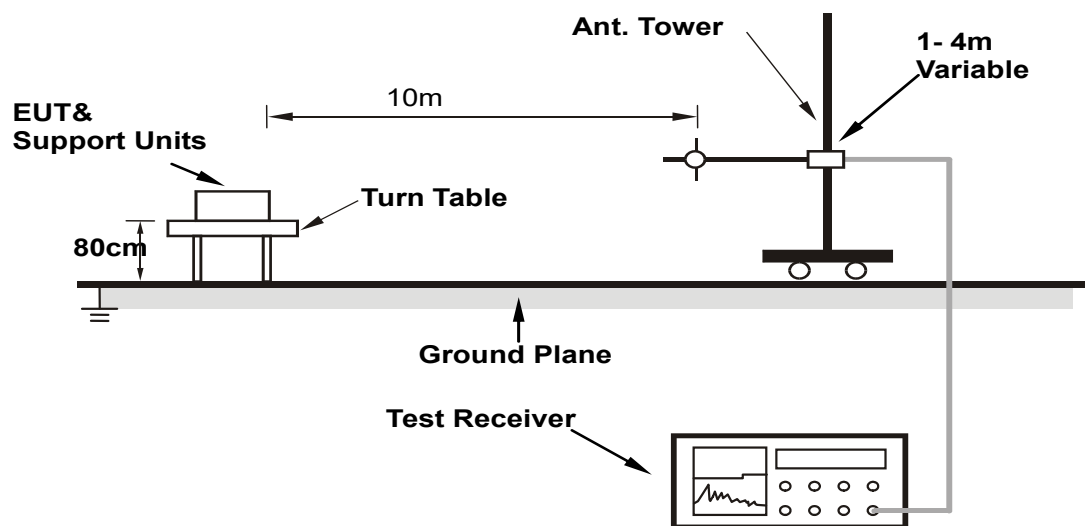
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100612	Nov. 26, 2018	Nov. 25, 2019
SCHAFFNER BILOG Antenna	CBL6111D	22263	Nov. 23, 2018	Nov. 22, 2019
Sonoma Preamplifier	310N	352922	Feb. 19, 2019	Feb. 18, 2020
ADT. Turn Table	TT100	0401	NA	NA
ADT. Tower	AT100	0401	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
ADT RF Switches BOX	EMH-011	08004	Mar. 26, 2019	Mar. 25, 2020
WOKEN RF cable With 5dB PAD	8D	CABLE-ST4-01	Mar. 26, 2019	Mar. 25, 2020

- 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. 4.
 3. The VCCI Site Registration No. R-11038.
 4. Tested Date: Jun. 18, 2019

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.

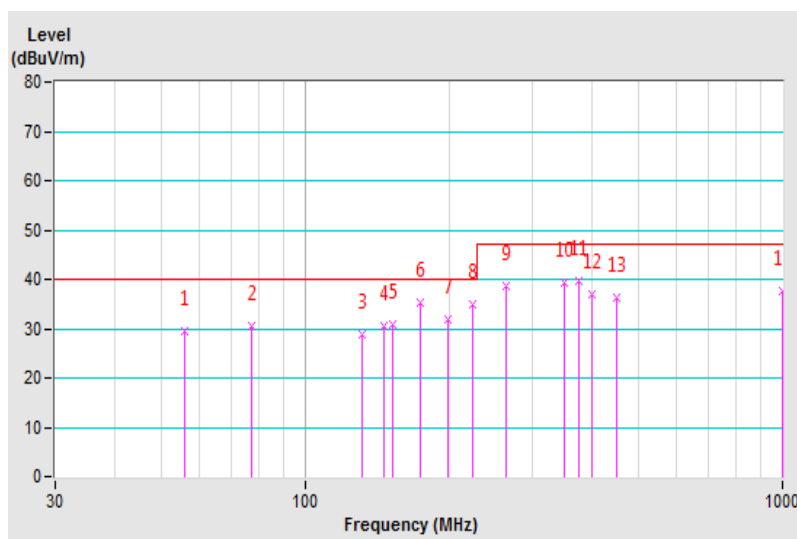
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Adam Chen	Environmental Conditions	30°C, 61%RH
Test Mode	With System		

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	55.96	29.59 QP	40.00	-10.41	4.00 H	188	49.36	-19.77
2	77.39	30.45 QP	40.00	-9.55	4.00 H	113	48.74	-18.29
3	132.07	28.73 QP	40.00	-11.27	4.00 H	52	42.61	-13.88
4	145.91	30.48 QP	40.00	-9.52	4.00 H	215	44.42	-13.94
5	153.09	30.75 QP	40.00	-9.25	4.00 H	290	45.08	-14.33
6	174.94	35.38 QP	40.00	-4.62	4.00 H	136	50.84	-15.46
7	199.54	31.79 QP	40.00	-8.21	4.00 H	172	47.11	-15.32
8	225.01	34.81 QP	40.00	-5.19	4.00 H	347	49.39	-14.58
9	264.53	38.49 QP	47.00	-8.51	3.52 H	347	50.65	-12.16
10	350.00	39.17 QP	47.00	-7.83	2.60 H	233	49.73	-10.56
11	375.01	39.64 QP	47.00	-7.36	2.18 H	124	49.62	-9.98
12	400.00	36.85 QP	47.00	-10.15	2.03 H	197	45.87	-9.02
13	450.02	36.28 QP	47.00	-10.72	1.93 H	228	44.13	-7.85
14	999.36	37.57 QP	47.00	-9.43	1.00 H	134	33.93	3.64

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

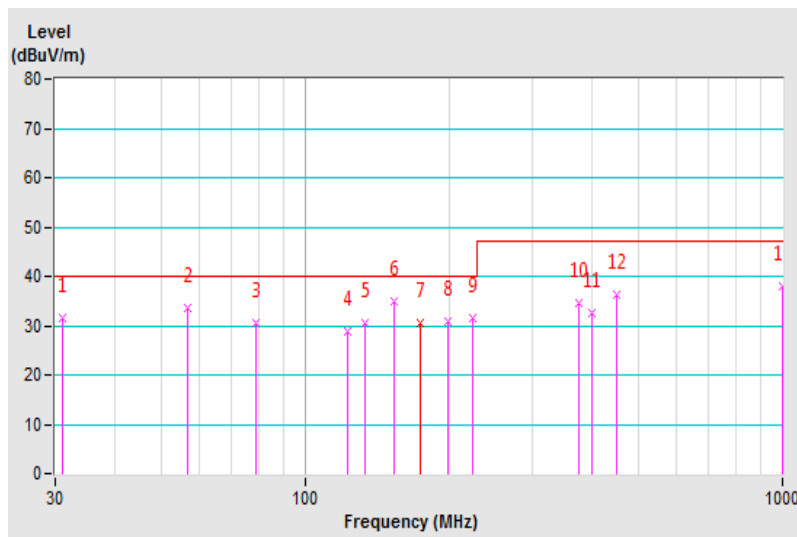


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Adam Chen	Environmental Conditions	30°C, 61%RH
Test Mode	With System		

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	30.97	31.48 QP	40.00	-8.52	1.32 V	152	39.75	-8.27
2	56.91	33.64 QP	40.00	-6.36	1.52 V	103	53.55	-19.91
3	79.15	30.56 QP	40.00	-9.44	1.73 V	250	48.60	-18.04
4	122.86	28.93 QP	40.00	-11.07	1.00 V	71	43.01	-14.08
5	133.48	30.35 QP	40.00	-9.65	1.00 V	151	44.14	-13.79
6	153.24	34.83 QP	40.00	-5.17	1.00 V	37	49.17	-14.34
7	175.01	30.47 QP	40.00	-9.53	1.00 V	15	45.92	-15.45
8	199.17	30.79 QP	40.00	-9.21	1.00 V	106	46.12	-15.33
9	224.98	31.60 QP	40.00	-8.40	1.00 V	207	46.19	-14.59
10	375.00	34.59 QP	47.00	-12.41	1.00 V	310	44.58	-9.99
11	400.01	32.61 QP	47.00	-14.39	3.44 V	358	41.63	-9.02
12	450.02	36.23 QP	47.00	-10.77	1.00 V	183	44.08	-7.85
13	999.84	37.98 QP	47.00	-9.02	1.55 V	128	34.34	3.64

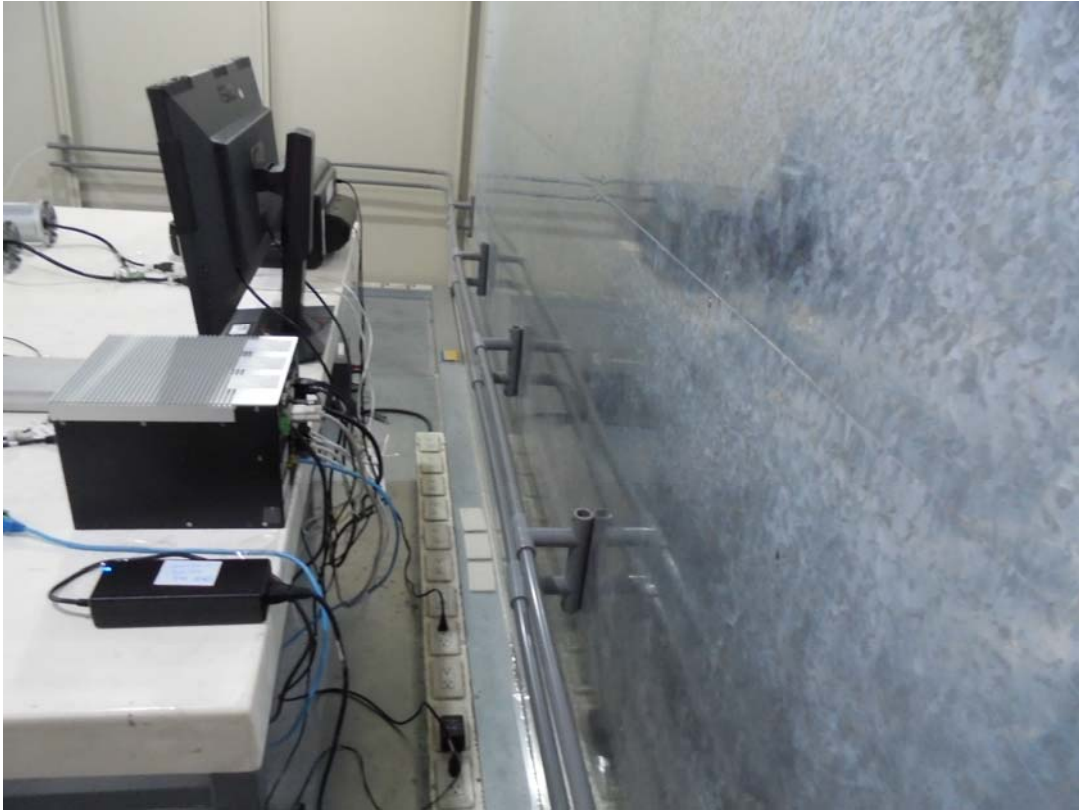
Remarks:

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 Pictures of Test Arrangements

7.1 Conducted Emissions at Mains Ports



7.2 Radiated Emissions up to 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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Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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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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