FCC Test Report

Report No.:	FC190617E03B
FCC ID:	APYHRO00274
Received Date:	July 09, 2019
Test Date:	July 24 to Aug. 30, 2019
Issued Date:	Aug. 30, 2019
Applicant:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City Osaka, 590-8522 Japan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
FCC Registration / Designation Number:	810758 / TW1085 for Test Location (1) 960022 / TW1058 for Test Location (2)

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Release Control Record

Issue No.	Description	Date Issued
FC190617E03B	Original release.	Aug. 30, 2019

1 Certificate of Conformity

Product:	Wireless router
Sample Status:	ENGINEERING SAMPLE
Applicant:	Sharp Corporation
Test Date:	July 24 to Aug. 30, 2019
Standards:	47 CFR FCC Part 15, Subpart B, Class B ICES-003:2016 Issue 6, updated Apr. 2019, 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 : _____ , **Date:** Aug. 30, 2019

Wendy Wu / Specialist

Approved by : _____ , **Date:** Aug. 30, 2019

Ken Lu / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, updated Apr. 2019, 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 -3.22 dB at 0.52500 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -3.03 dB at 125.01 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -6.75 dB at 7234.75 MHz	Pass

Note: 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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.0 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.7 dB
	6GHz ~ 18GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information.

3.1 Description of EUT

Product	Wireless router
Sample Status	ENGINEERING SAMPLE
Operating Software	NA
Power Supply Rating	Refer to Note
Accessory Device	Battery x 1 (Model: UBATIA301AFN2) Cradle with RJ45 x1 (Option, Model: J03W039.02) AC charge and USB Type-C cradle x 1
Data Cable Supplied	NA

Note:

1. The EUT must be supplied one power adapter or Battery as the following table:

Adapter		
Model No.		Spec.
SB-AC19TCPD		Input: 100-240V, 0.7A, 50/60Hz Output: 5V/7V/9V/12V, 3.0A/3.0A/3.0A/2.25A DC output cable (Unshielded, 1.6m)
Battery		
Brand	Model No.	Spec.
NA	UBATIA301AFN2	3.85 Vdc, 4000mAh

3.2 Features of EUT

The tests reported herein were performed according to the method specified by Sharp Corporation., 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

For Conducted Emissions and radiated emission test, the EUT has been pre-tested under following test modes, and test mode E, G, N were the worst case for final test.

Mode	Test Condition					
	Radiated emission					
	Power In	Test Condition	Wireless	WCDMA/LTE	LAN	Arrangement
A	DC 3.85 V	EUT + Battery only	2.4G	WCDMA B2	NA	Horizontal Placement
B	DC 3.85 V	EUT + Battery only	2.4G	WCDMA B2	NA	Vertical Placement
C	DC 3.85 V	EUT + Battery only	2.4G	LTE B4	NA	Side Lying
D	AC 120V/60Hz	EUT + Battery + Adapter	2.4G	WCDMA B2	NA	Horizontal Placement
E	**AC 120V/60Hz**	**EUT + Battery + Cradle + Adapter**	**2.4G**	**WCDMA B2**	**1000 Mbps**	**Horizontal Placement**
F	DC 5 V	EUT + Battery + USB	2.4G	WCDMA B2	NA	Horizontal Placement
G	**AC 120V/60Hz**	**EUT + Battery + Cradle + Adapter**	**2.4G**	**WCDMA B5 (High, Olny Receiver)**	**1000 Mbps**	**Horizontal Placement**
H	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	WCDMA B5 (Middle, Olny Receiver)	1000 Mbps	Horizontal Placement
I	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	WCDMA B5 (Low, Olny Receiver)	1000 Mbps	Horizontal Placement
J	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	LTE B12 (High, Olny Receiver)	1000 Mbps	Horizontal Placement
K	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	LTE B12 (Middle, Olny Receiver)	1000 Mbps	Horizontal Placement
L	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	LTE B12 (Low, Olny Receiver)	1000 Mbps	Horizontal Placement
Mode	Test Condition					
	Conducted Emissions					
	Power In	Test Condition	Wireless	WCDMA/LTE	LAN	Arrangement
M	AC 120V/60Hz	EUT + Battery + Adapter	2.4G	WCDMA B2	NA	Horizontal Placement
N	**AC 120V/60Hz**	**EUT + Battery + Cradle + Adapter**	**2.4G**	**WCDMA B2**	**1000 Mbps**	**Horizontal Placement**
O	DC 5V	EUT + Battery + USB	2.4G	WCDMA B2	NA	Horizontal Placement

NOTE:

1. The test configurations are defined by the applicant requirement.
2. For cellular band between 30 MHz ~ 960 MHz (Including WCDMA Band 5, LTE Band 5, LTE Band 12, LTE Band 17), we chose WCDMA Band 5 and LTE Band 12 to test in Low / Middle / High channels to cover all these bands in this report.

Test mode is presented in the report as below.

Mode	Test Condition					
	Power In	Test Condition	Wireless	WCDMA/4G	LAN	Arrangement
1	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	WCDMA B 2	1000 Mbps	Horizontal Placement
2	AC 120V/60Hz	EUT + Battery + Cradle + Adapter	2.4G	WCDMA B5 (High, Olny Receiver)	1000 Mbps	Horizontal Placement

3.4 Test Program Used and Operation Descriptions

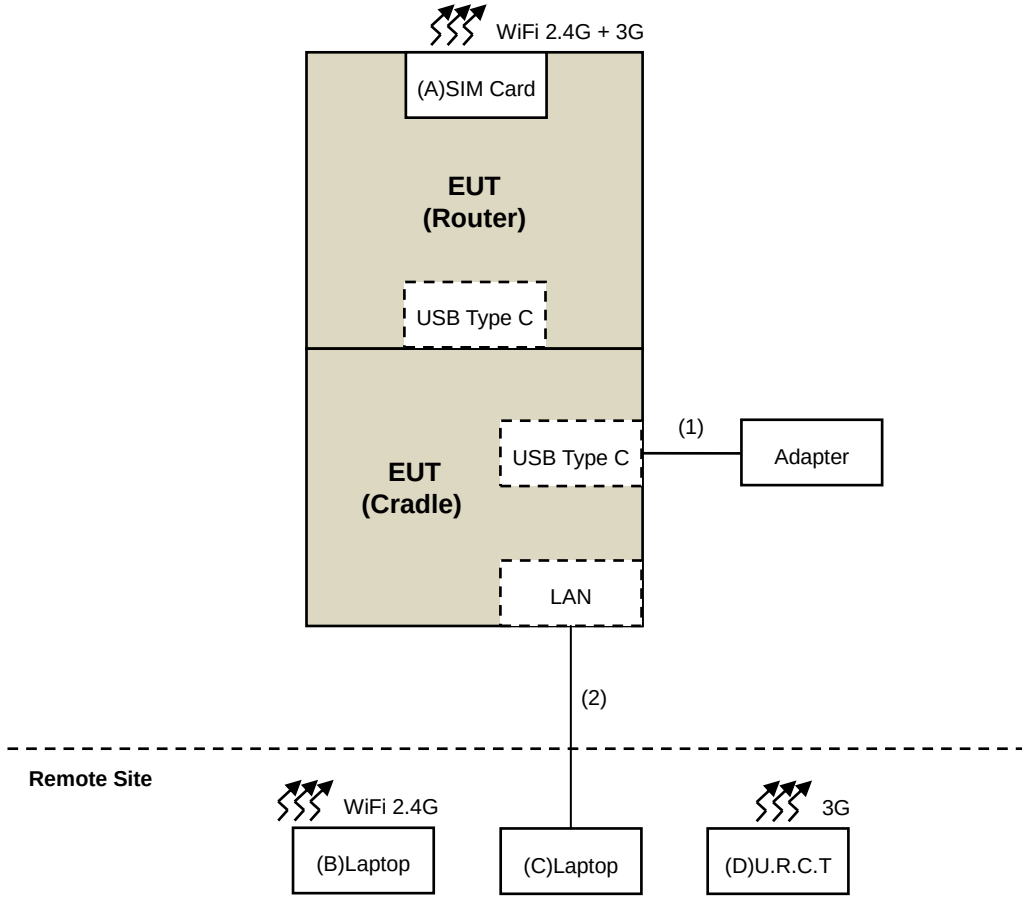
1. Turn on the power of all equipment.
2. Support unit C (Laptop) runs “TfGen.exe” program to communicate with EUT.
3. Support unit B (Laptop) runs “Ping.exe” program to communicate with EUT via WiFi 2.4G.
4. The EUT links support unit D (U.R.C.T) via 3G.

3.5 Primary Clock Frequencies of Internal Source

The EUT is provided by Sharp Corporation., 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.	SIM Card	NA	NA	NA	NA	Provided by Lab
B.	Laptop	DELL	P70F	1KY07L2	FCC DoC	Provided by Lab
C.	Laptop	DELL	PP27L	7YLB32S	FCC DoC	Provided by Lab
D.	U.R.C.T (Universal Radio Communication Tester)	R&S	CMU200	121040	NA	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Power to USB Type C Cable	1	1.6	No	0	Supplied by client
2.	Cat.5e Cable	1	10	No	0	Provided by Lab

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May 15, 2019	May 14, 2020
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 03, 2018	Sep. 02, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV 216	100072	June 12, 2019	June 11, 2020
RF Cable	5D-FB	COACAB-002	Feb. 22, 2019	Feb. 21, 2020
10 dB PAD EMEC	STI02-2200-10	004	Mar. 14, 2019	Mar. 13, 2020
50 ohms Terminator	N/A	EMC-03	Sep. 25, 2018	Sep. 24, 2019
50 ohms Terminator	N/A	EMC-02	Sep. 12, 2018	Sep. 11, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conducted Room C
3 The VCCI Con C Registration No. is C-13611.
4 Tested Date: July 24 to Aug. 30, 2019

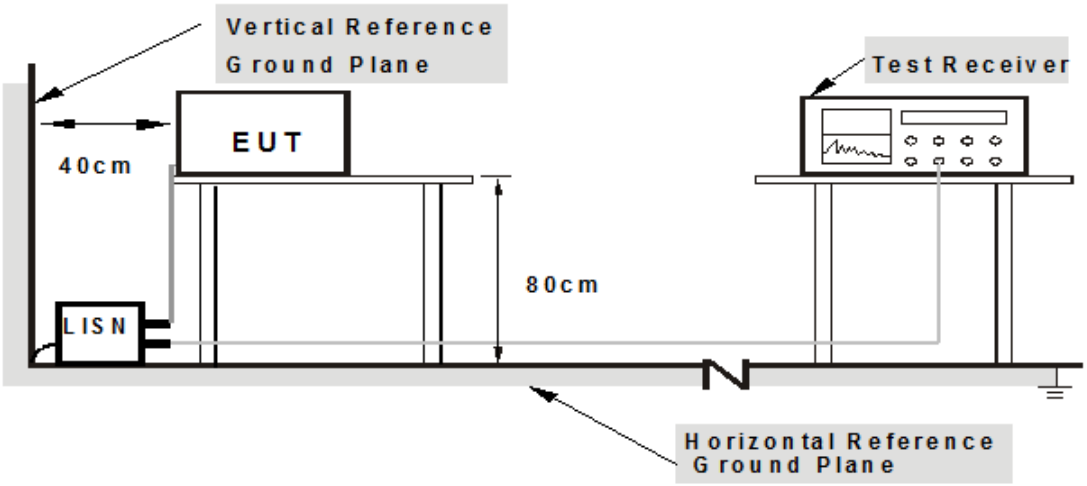
5.3 Test Arrangement

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

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



Note: 1.Support units were connected to second LISN.

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

5.4 Supplementary Information

There is not any deviation from the test standards for the test method.

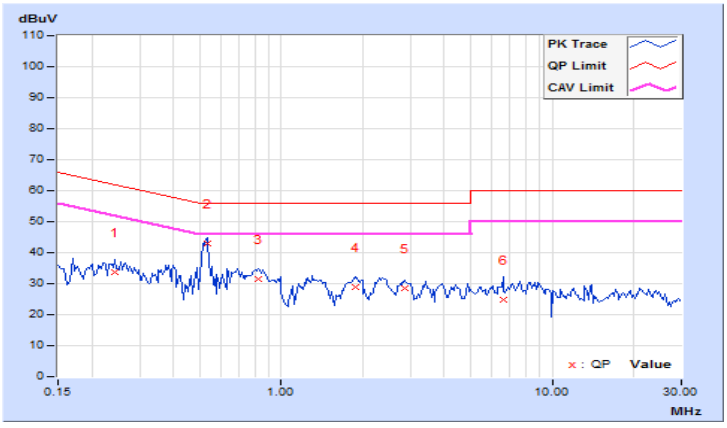
5.5 Test Results (Mode 1)

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 65%RH
Tested by	Leon Wu		
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	0.24375	10.02	23.83	15.87	33.85	25.89	61.97	51.97	-28.12	-26.08
2	0.53281	10.05	32.94	31.39	42.99	41.44	56.00	46.00	-13.01	-4.56
3	0.82188	10.08	21.27	16.64	31.35	26.72	56.00	46.00	-24.65	-19.28
4	1.87500	10.13	18.92	14.53	29.05	24.66	56.00	46.00	-26.95	-21.34
5	2.87500	10.20	18.20	13.14	28.40	23.34	56.00	46.00	-27.60	-22.66
6	6.58984	10.35	14.64	5.80	24.99	16.15	60.00	50.00	-35.01	-33.85

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

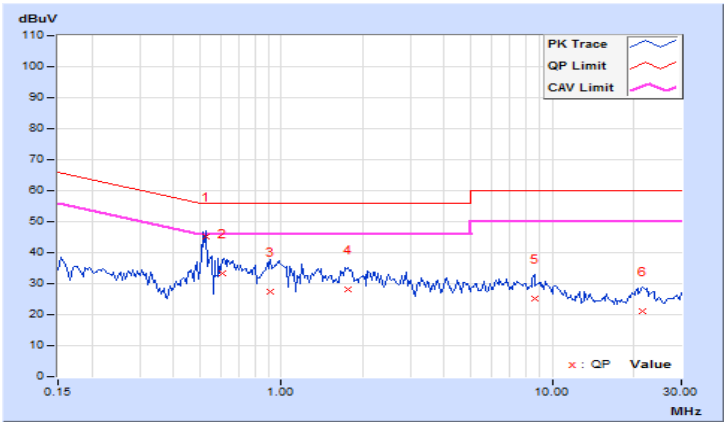


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 65%RH
Tested by	Leon Wu		
Test Mode	Mode 1		

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	**0.52500**	**10.05**	**35.31**	**32.73**	**45.36**	**42.78**	**56.00**	**46.00**	**-10.64**	**-3.22**
2	0.60772	10.05	23.41	20.90	33.46	30.95	56.00	46.00	-22.54	-15.05
3	0.91563	10.07	17.43	10.26	27.50	20.33	56.00	46.00	-28.50	-25.67
4	1.76953	10.11	18.20	13.62	28.31	23.73	56.00	46.00	-27.69	-22.27
5	8.59375	10.34	15.02	7.72	25.36	18.06	60.00	50.00	-34.64	-31.94
6	21.59766	10.67	10.29	1.61	20.96	12.28	60.00	50.00	-39.04	-37.72

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



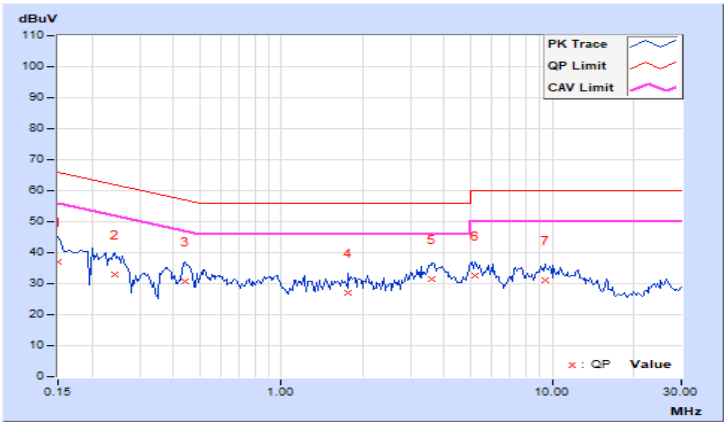
5.6 Test Results (Mode 2)

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 65%RH
Tested by	Bear Lee		
Test Mode	Mode 2		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15000	9.68	27.52	12.24	37.20	21.92	66.00	56.00	-28.80	-34.08
2	0.24375	9.71	23.32	10.44	33.03	20.15	61.97	51.97	-28.94	-31.82
3	0.44297	9.74	21.10	14.98	30.84	24.72	57.01	47.01	-26.17	-22.29
4	1.77344	9.80	17.40	11.14	27.20	20.94	56.00	46.00	-28.80	-25.06
5	3.60938	9.94	21.66	14.76	31.60	24.70	56.00	46.00	-24.40	-21.30
6	5.20703	10.01	22.66	14.98	32.67	24.99	60.00	50.00	-27.33	-25.01
7	9.44141	10.15	20.78	10.98	30.93	21.13	60.00	50.00	-29.07	-28.87

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

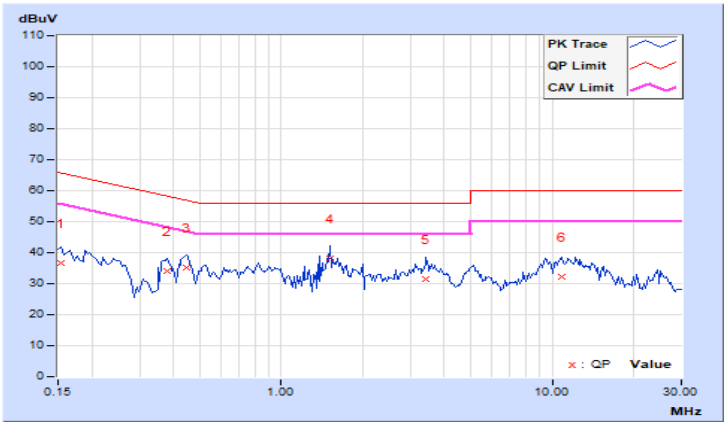


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 65%RH
Tested by	Bear Lee		
Test Mode	Mode 2		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15391	9.73	27.10	13.26	36.83	22.99	65.79	55.79	-28.96	-32.80
2	0.38047	9.78	24.22	18.26	34.00	28.04	58.27	48.27	-24.27	-20.23
3	0.44688	9.78	25.34	20.04	35.12	29.82	56.93	46.93	-21.81	-17.11
4	1.51563	9.87	28.36	21.76	38.23	31.63	56.00	46.00	-17.77	-14.37
5	3.42969	9.97	21.40	17.04	31.37	27.01	56.00	46.00	-24.63	-18.99
6	10.92188	10.26	22.06	8.16	32.32	18.42	60.00	50.00	-27.68	-31.58

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			47	37
960-1000	49.5	43.5		

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			57.5	47.5
960-1000	60	54		

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

6.2 Test Instruments

For Mode 1:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010125	Apr. 11, 2019	Apr. 10, 2020
Test Receiver Agilent	N9038A	MY50010132	July 12, 2019	July 11, 2020
Pre-Amplifier Sonoma	310N	352925	Aug. 27, 2018	Aug. 26, 2019
	310N	352926	Aug. 27, 2018	Aug. 26, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Nov. 22, 2018	Nov. 21, 2019
	VULB 9168	9168-358	Nov. 21, 2018	Nov. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	CHF-001	Sep. 05, 2018	Sep. 04, 2019
	UNAT-5+	CHF-002	Sep. 05, 2018	Sep. 04, 2019
RF Cable	8D-FB	CHFCAB-001-1 CHFCAB-001-3 CHFCAB-001-4	Sep. 17, 2018	Sep. 16, 2019
		CHFCAB-002-1 CHFCAB-002-3 CHFCAB-002-4	Sep. 17, 2018	Sep. 16, 2019
Software BVADT	ADT_Radiated_V 8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber F room
3. The VCCI Site Registration No. is R-13252.
4. Tested Date: July 30, 2019

For Mode 2:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010125	Apr. 11, 2019	Apr. 10, 2020
Test Receiver Agilent	N9038A	MY50010132	July 12, 2019	July 11, 2020
Pre-Amplifier Sonoma	310N	352925	Aug. 26, 2019	Aug. 25, 2020
	310N	352926	Aug. 26, 2019	Aug. 25, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Nov. 22, 2018	Nov. 21, 2019
	VULB 9168	9168-358	Nov. 21, 2018	Nov. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	CHF-001	Sep. 05, 2018	Sep. 04, 2019
	UNAT-5+	CHF-002	Sep. 05, 2018	Sep. 04, 2019
RF Cable	8D-FB	CHFCAB-001-1 CHFCAB-001-3 CHFCAB-001-4	Sep. 17, 2018	Sep. 16, 2019
		CHFCAB-002-1 CHFCAB-002-3 CHFCAB-002-4	Sep. 17, 2018	Sep. 16, 2019
Software BVADT	ADT_Radiated_V 8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

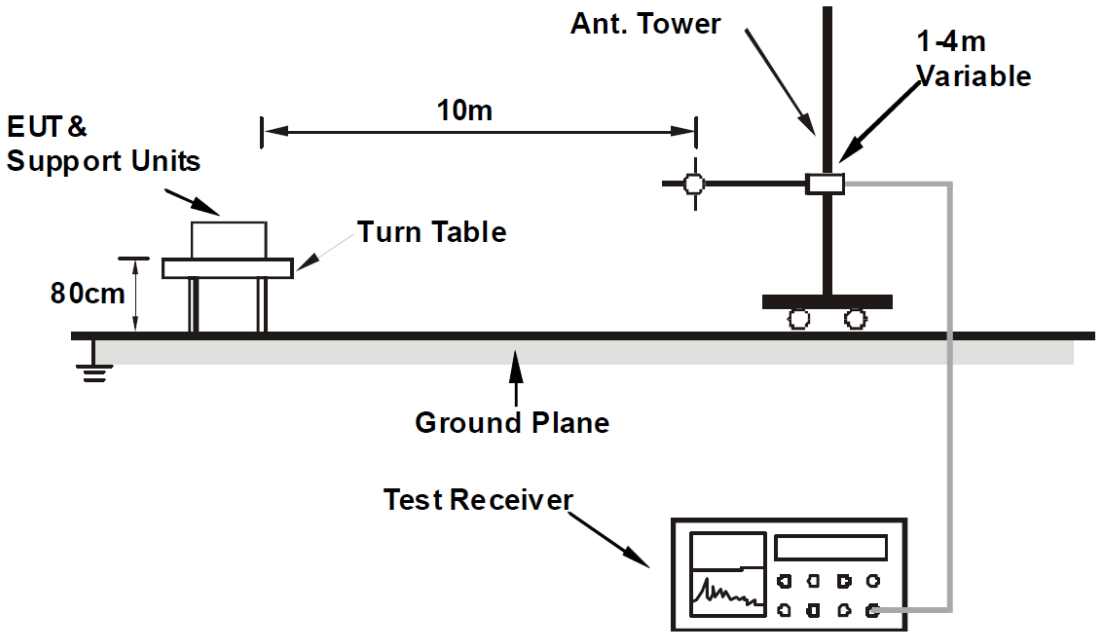
Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber F room
3. The VCCI Site Registration No. is R-13252.
4. Tested Date: Aug. 30, 2019

6.3 Test Arrangement

a. 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.
b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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.
e. 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 Supplementary Information

There is not any deviation from the test standards for the test method.

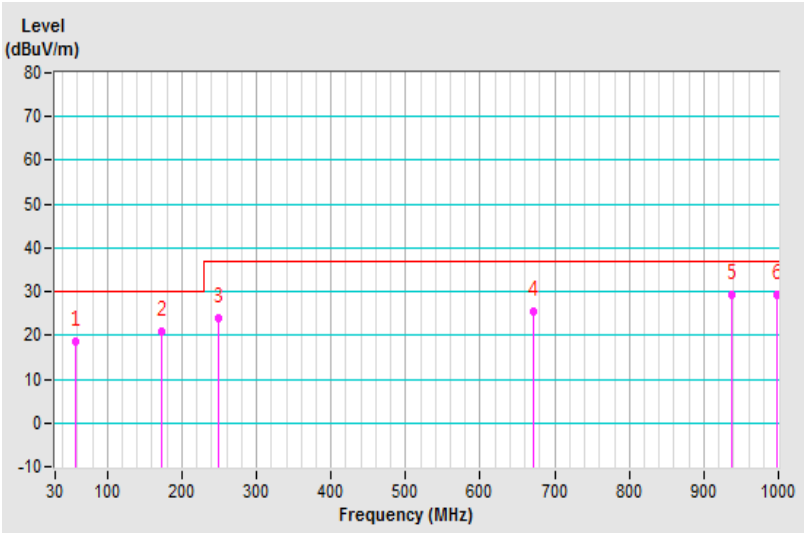
6.5 Test Results (Mode 1)

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 62%RH
Tested by	Darren Lin		
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	57.89	18.43 QP	30.00	-11.57	3.00 H	34	31.85	-13.42
2	173.44	20.72 QP	30.00	-9.28	3.00 H	292	33.82	-13.10
3	250.00	24.06 QP	37.00	-12.94	4.00 H	87	37.09	-13.03
4	671.97	25.34 QP	37.00	-11.66	4.00 H	296	27.81	-2.47
5	938.21	29.22 QP	37.00	-7.78	3.00 H	123	26.17	3.05
6	998.69	29.25 QP	37.00	-7.75	3.68 H	294	25.18	4.07

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

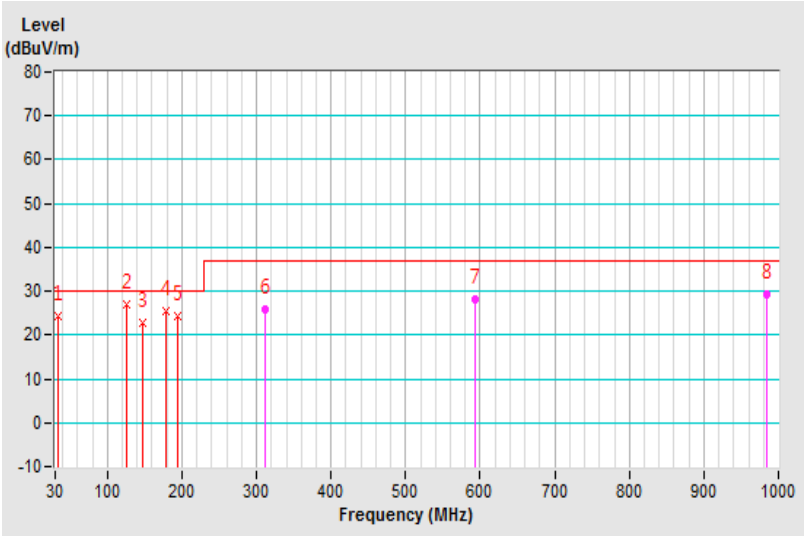


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 62%RH
Tested by	Darren Lin		
Test Mode	Mode 1		

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	34.08	24.33 QP	30.00	-5.67	1.00 V	64	38.32	-13.99
2	**125.01**	**26.97 QP**	**30.00**	**-3.03**	**1.32 V**	**85**	**40.63**	**-13.66**
3	147.37	22.66 QP	30.00	-7.34	1.00 V	103	34.76	-12.10
4	179.23	25.53 QP	30.00	-4.47	1.00 V	254	38.92	-13.39
5	194.03	24.31 QP	30.00	-5.69	1.00 V	251	38.91	-14.60
6	311.01	25.87 QP	37.00	-11.13	1.00 V	267	36.18	-10.31
7	593.98	28.19 QP	37.00	-8.81	4.00 V	8	31.32	-3.13
8	984.26	29.16 QP	37.00	-7.84	2.00 V	8	25.02	4.14

Remarks:

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



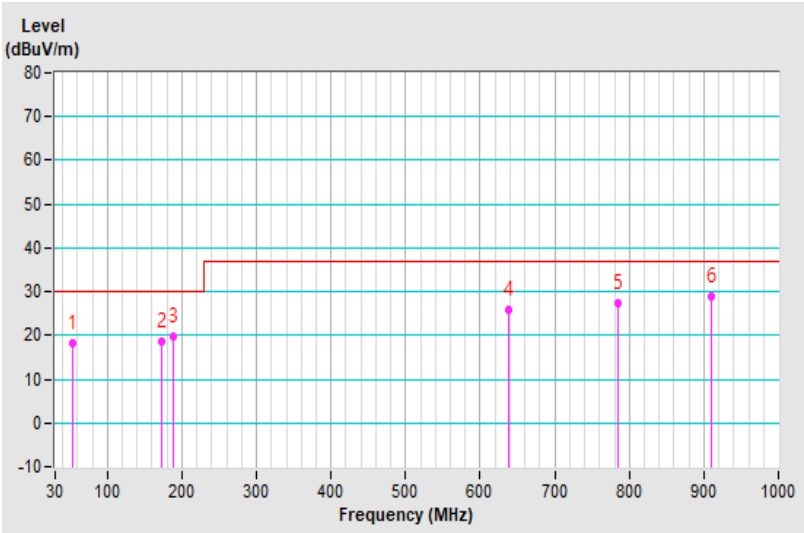
6.6 Test Results (Mode 2)

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 62%RH
Tested by	Pon Tsai		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.33	18.14 QP	30.00	-11.86	4.00 H	166	31.31	-13.17
2	172.40	18.73 QP	30.00	-11.27	3.00 H	326	31.77	-13.04
3	189.08	19.89 QP	30.00	-10.11	4.00 H	134	34.41	-14.52
4	637.97	25.71 QP	37.00	-11.29	2.00 H	32	28.51	-2.80
5	784.13	27.32 QP	37.00	-9.68	1.00 H	46	26.97	0.35
6	909.35	28.92 QP	37.00	-8.08	3.88 H	310	26.33	2.59

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

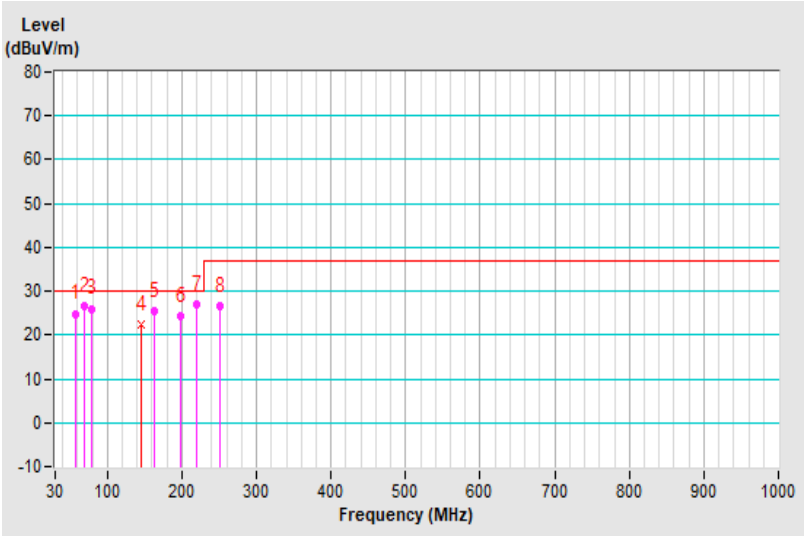


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 62%RH
Tested by	Pon Tsai		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	57.28	24.86 QP	30.00	-5.14	1.00 V	333	38.19	-13.33
2	69.92	26.72 QP	30.00	-3.28	2.00 V	237	41.75	-15.03
3	78.74	26.00 QP	30.00	-4.00	1.00 V	307	43.15	-17.15
4	145.31	22.39 QP	30.00	-7.61	1.00 V	64	34.69	-12.30
5	163.11	25.46 QP	30.00	-4.54	2.00 V	80	37.70	-12.24
6	197.32	24.22 QP	30.00	-5.78	1.00 V	148	38.66	-14.44
7	220.46	26.89 QP	30.00	-3.11	1.06 V	99	41.14	-14.25
8	250.04	26.72 QP	37.00	-10.28	1.00 V	268	39.35	-12.63

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 (dBμV/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 Peak: 69.5	Avg: 43.5 Peak: 63.5	Not defined	Not defined
Above 3000			Not defined	Not defined

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
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 (dBuV/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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010125	Apr. 11, 2019	Apr. 10, 2020
Pre-Amplifier Agilent	8449B	3008A01975	Feb. 21, 2019	Feb. 20, 2020
Horn Antenna SCHWARZBECK	BBHA 9120D	D123	Nov. 25, 2018	Nov. 24, 2019
RF Coaxial Cable	EMC104-SM-SM -11000	170209	Mar. 05, 2019	Mar. 04, 2020
RF Coaxial Cable	EMC104-SM-SM -6000	170207	Mar. 05, 2019	Mar. 04, 2020
RF Coaxial Cable	EMC104-SM-SM -2500	170206	Mar. 05, 2019	Mar. 04, 2020
Software BVADT	ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Fix tool for Boresight antenna tower	BAF-01	5	NA	NA

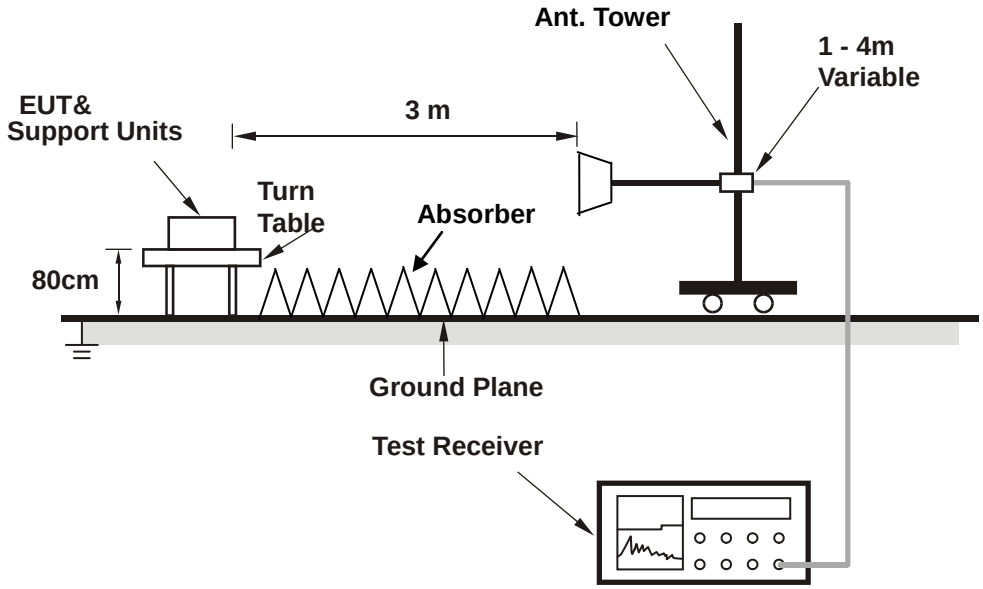
Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber F room
3. Tested Date: July 29 to Aug. 29, 2019

7.3 Test Arrangement

a. 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.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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.
e. The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



The test arrangement is in accordance with ANSI 63.4:2014. For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.4 Supplementary Information

There is not any deviation from the test standards for the test method.

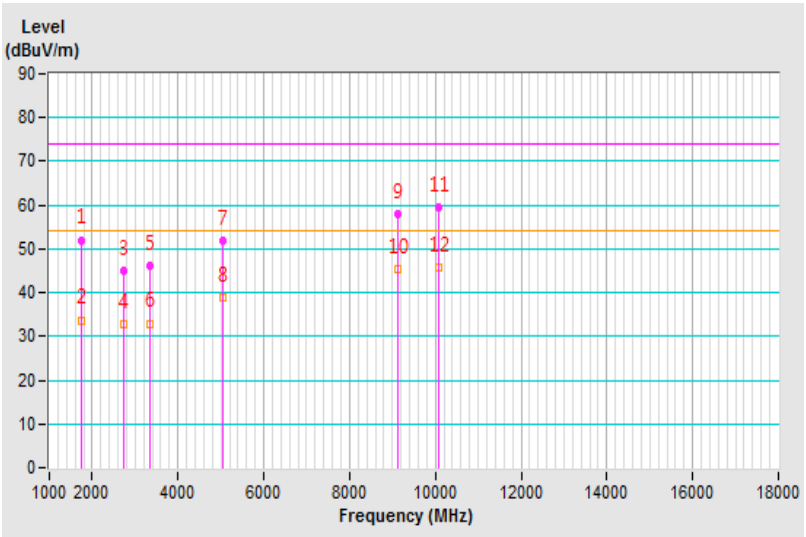
7.5 Test Results (Mode 1)

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 70%RH
Tested by	Darren Lin		
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	1756.88	52.03 PK	74.00	-21.97	1.00 H	140	55.10	-3.07
2	1756.88	33.71 AV	54.00	-20.29	1.00 H	87	36.78	-3.07
3	2745.90	44.91 PK	74.00	-29.09	1.00 H	105	43.29	1.62
4	2745.90	32.64 AV	54.00	-21.36	1.00 H	81	31.02	1.62
5	3360.45	45.96 PK	74.00	-28.04	1.00 H	360	42.34	3.62
6	3360.45	32.95 AV	54.00	-21.05	1.00 H	337	29.33	3.62
7	5059.60	51.74 PK	74.00	-22.26	1.00 H	151	41.98	9.76
8	5059.60	39.04 AV	54.00	-14.96	1.00 H	250	29.28	9.76
9	9114.10	58.11 PK	74.00	-15.89	1.00 H	168	43.15	14.96
10	9114.10	45.40 AV	54.00	-8.60	1.00 H	117	30.44	14.96
11	10083.95	59.50 PK	74.00	-14.50	1.00 H	117	43.75	15.75
12	10083.95	45.80 AV	54.00	-8.20	1.00 H	121	30.05	15.75

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

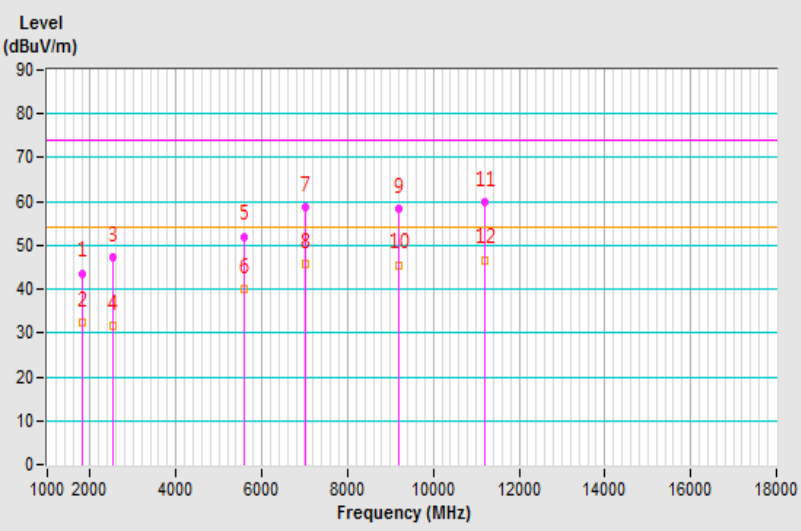


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 70%RH
Tested by	Darren Lin		
Test Mode	Mode 1		

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	1815.10	43.63 PK	74.00	-30.37	1.00 V	313	46.51	-2.88
2	1815.10	32.44 AV	54.00	-21.56	1.00 V	360	35.32	-2.88
3	2521.50	47.31 PK	74.00	-26.69	1.00 V	348	46.57	0.74
4	2521.50	31.54 AV	54.00	-22.46	1.00 V	360	30.80	0.74
5	5581.50	52.05 PK	74.00	-21.95	1.00 V	344	40.02	12.03
6	5581.50	40.09 AV	54.00	-13.91	1.00 V	0	28.06	12.03
7	7023.95	58.62 PK	74.00	-15.38	1.00 V	32	42.06	16.56
8	7023.95	45.68 AV	54.00	-8.32	1.00 V	360	29.12	16.56
9	9199.10	58.49 PK	74.00	-15.51	1.00 V	175	43.41	15.08
10	9199.10	45.56 AV	54.00	-8.44	1.00 V	264	30.48	15.08
11	11198.30	59.81 PK	74.00	-14.19	1.00 V	297	42.23	17.58
12	**11198.30**	**46.69 AV**	**54.00**	**-7.31**	**1.00 V**	**283**	**29.11**	**17.58**

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



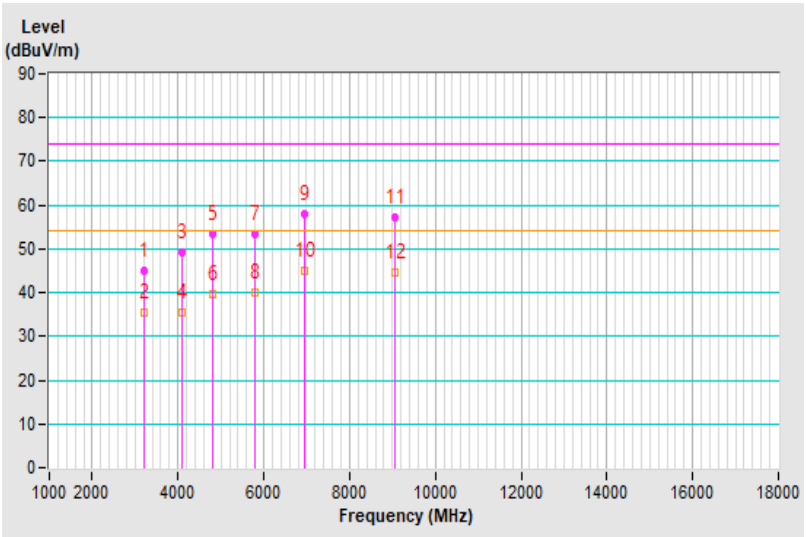
7.6 Test Results (Mode 2)

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 70%RH
Tested by	Jason Huang		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3208.30	45.12 PK	74.00	-28.88	1.00 H	85	42.86	2.26
2	3208.30	35.33 AV	54.00	-18.67	1.00 H	83	33.07	2.26
3	4095.70	49.03 PK	74.00	-24.97	1.00 H	27	42.89	6.14
4	4095.70	35.56 AV	54.00	-18.44	1.00 H	27	29.42	6.14
5	4824.15	53.26 PK	74.00	-20.74	1.00 H	251	44.64	8.62
6	4824.15	39.58 AV	54.00	-14.42	1.00 H	257	30.96	8.62
7	5782.95	53.39 PK	74.00	-20.61	1.00 H	222	42.00	11.39
8	5782.95	40.12 AV	54.00	-13.88	1.00 H	253	28.73	11.39
9	6966.15	58.02 PK	74.00	-15.98	1.00 H	286	42.01	16.01
10	6966.15	44.95 AV	54.00	-9.05	1.00 H	258	28.94	16.01
11	9070.75	57.20 PK	74.00	-16.80	1.00 H	158	43.14	14.06
12	9070.75	44.44 AV	54.00	-9.56	1.00 H	132	30.38	14.06

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

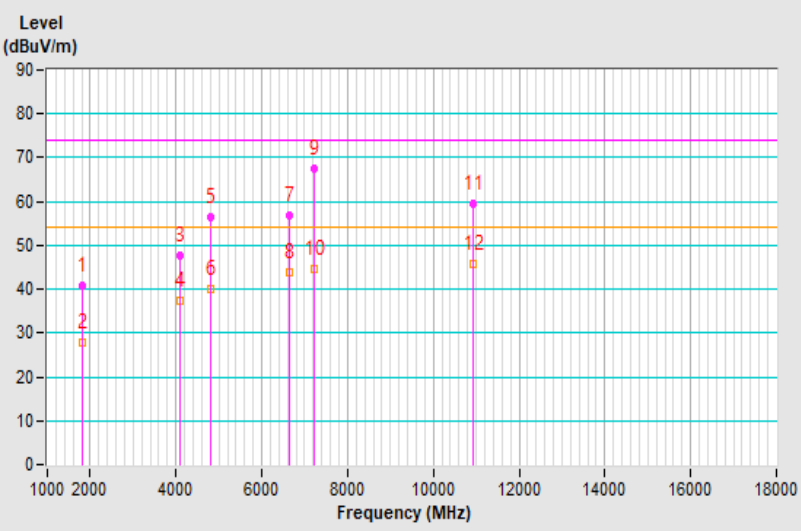


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 70%RH
Tested by	Jason Huang		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1810.90	40.85 PK	74.00	-33.15	1.00 V	25	44.27	-3.42
2	1810.90	27.98 AV	54.00	-26.02	1.00 V	28	31.40	-3.42
3	4086.35	47.79 PK	74.00	-26.21	1.00 V	229	41.65	6.14
4	4086.35	37.52 AV	54.00	-16.48	1.00 V	251	31.38	6.14
5	4824.15	56.39 PK	74.00	-17.61	1.00 V	167	47.77	8.62
6	4824.15	40.03 AV	54.00	-13.97	1.00 V	185	31.41	8.62
7	6657.60	56.83 PK	74.00	-17.17	1.00 V	150	41.85	14.98
8	6657.60	44.00 AV	54.00	-10.00	1.00 V	135	29.02	14.98
9	**7234.75**	**67.43 PK**	**74.00**	**-6.57**	**1.00 V**	**334**	**52.07**	**15.36**
10	7234.75	44.74 AV	54.00	-9.26	1.00 V	337	29.38	15.36
11	10937.35	59.62 PK	74.00	-14.38	1.00 V	207	43.43	16.19
12	10937.35	45.62 AV	54.00	-8.38	1.00 V	210	29.43	16.19

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 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:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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