

Partial FCC Test Report

Report No.: RF180530C08-1

FCC ID: GKR-SHC100

Test Model: QCNFA435

Received Date: May 30, 2018

Test Date: Jul. 12, 2018 ~ Jul. 18, 2018

Issued Date: Jul. 23, 2018

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33383, Taiwan, R.O.C.

FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF180530C08-1	Original Release	Jul. 23, 2018

1 Certificate of Conformity

Product: Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 Type Card

Brand: Qualcomm Atheros

Test Model: QCNFA435

Sample Status: Production Unit

Applicant: COMPAL ELECTRONICS, INC.

Test Date: Jul. 12, 2018 ~ Jul. 18, 2018

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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 RF characteristics under the conditions specified in this report.

Prepared by : Evonne Liu, **Date:** Jul. 23, 2018
Evonne Liu / Specialist

Approved by : Dylan Chiou, **Date:** Jul. 23, 2018
Dylan Chiou / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -12.26 dB at 0.18128 MHz.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.27 dB at 2483.64 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note
---	Occupied Bandwidth Measurement	N/A	Refer to Note
15.247(b)	Conducted Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note: Test items for Conducted Emission / Radiated Emissions and Conducted Power were performed for this report. For other test data, please refer to BV CPS Report No.: RF141008E03-2 R1 for module (Brand: Qualcomm Atheros, Model: QCNFA435).

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:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 Type Card
Brand	Qualcomm Atheros
Test Model	QCNFA435
Status of EUT	Production Unit
Power Supply Rating	3.3 Vdc (host equipment)
Modulation Type	GFSK
Transfer Rate	1 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	40
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
All In One Computer	Compal	SHC-100

2. The antenna information is listed as below.

Ant. No.	Ant. Type	Vendor	Part Number	Antenna Gain (dBi)			
				BT/WLAN 2.4GHz	WLAN 5.15~5.35 GHz	WLAN 5.47~5.725 GHz	WLAN 5.725~5.85 GHz
1	PCB	Nienyi	WLAN Main Antenna: NYS3283 (DC330026I0U)	0.75	-0.76	-0.47	0.13
			WLAN Aux Antenna: NYS3284 (DC330026I1U)	0.59	-0.93	-1.01	-1.96
2	Dipole	Nienyi	WLAN Main Antenna: NYS3285+ NYS3281	1.64	0.91	1.42	0.52
			WLAN Aux Antenna: NYS3285+ NYS3282	0.81	-0.78	-0.47	0.44

3. This device has 2 configurations as below.

Mode A: EUT was chosen antenna no. 1 to test.

Mode B: EUT was chosen antenna no. 2 to test.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE \geq 1G	RE<1G	PLC	
A	√	√	√	-
B	√	√	√	-

Where **RE \geq 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz
PLC: Power Line Conducted Emission

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
A, B	0 to 39	0, 19, 39	GFSK	1

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
A, B	0 to 39	19	GFSK	1

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
A, B	0 to 39	19	GFSK	1

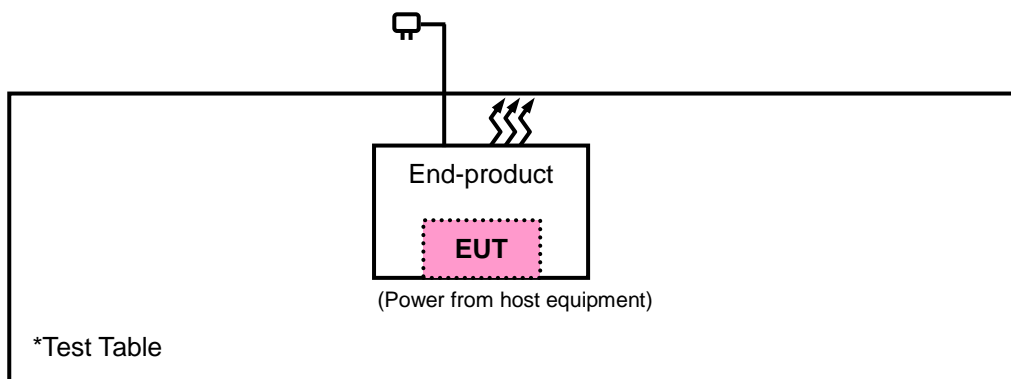
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE \geq 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hsiao
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Harry Hsueh
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyoung Wang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v04

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 17, 2017	Oct. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220207	Dec. 07, 2017	Dec. 06, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Fixed Attenuator Mini-Circuits	BW-N4W5+	PAD-ATT4-01	Jan. 29, 2018	Jan. 28, 2019
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 31, 2018
Bluetooth Tester	CBT	100946	Jul. 29, 2016	Jul. 28, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 20, 2017	Oct. 19, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable	8D-FB	Cable-RF3-04	Oct. 19, 2017	Oct. 18, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	230129/4	Oct. 19, 2017	Oct. 18, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	250723/4	Oct. 19, 2017	Oct. 18, 2018
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- 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 HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. 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 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 below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

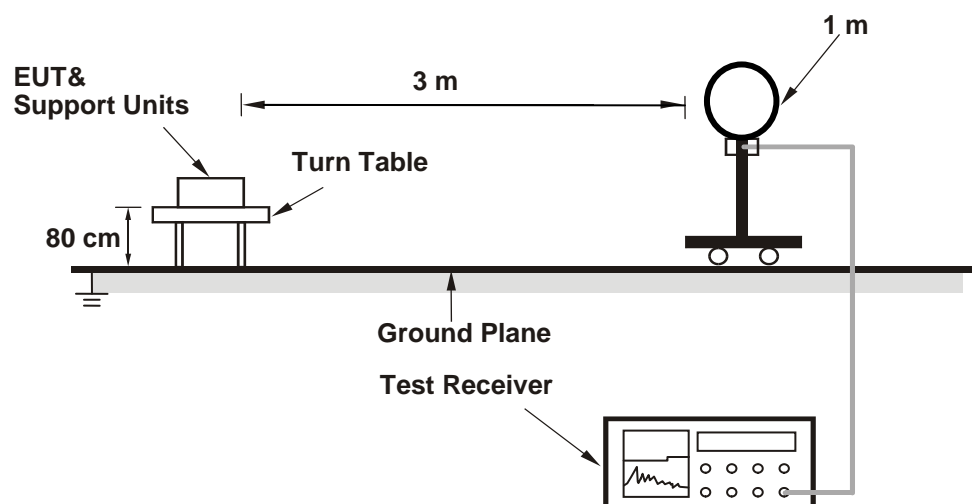
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (RBW = 1 MHz, VBW = 3 MHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

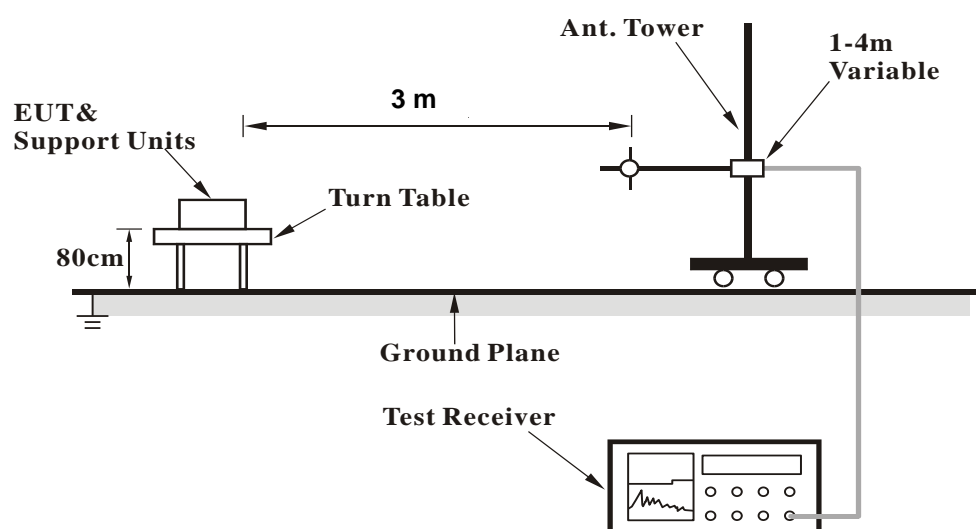
No deviation.

4.1.5 Test Set Up

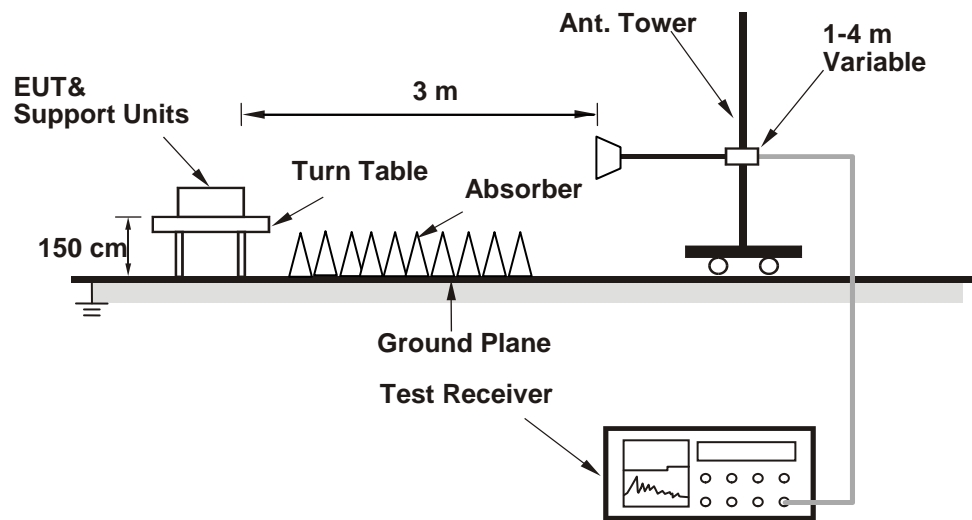
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data:

Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384.7	40.39	38.7	54	-13.61	31.78	5.4	35.49	100	320	Average
2384.7	51.62	49.93	74	-22.38	31.78	5.4	35.49	100	320	Peak
2402	92.25	90.52			31.8	5.4	35.47	100	320	Average
2402	93.42	91.69			31.8	5.4	35.47	100	320	Peak
4804	40.52	32.43	54	-13.48	33.96	8.25	34.12	185	222	Average
4804	46.05	37.96	74	-27.95	33.96	8.25	34.12	185	222	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388.57	40.24	38.53	54	-13.76	31.8	5.4	35.49	200	274	Average
2388.57	51.78	50.07	74	-22.22	31.8	5.4	35.49	200	274	Peak
2402	91.44	89.71			31.8	5.4	35.47	200	274	Average
2402	92.87	91.14			31.8	5.4	35.47	200	274	Peak
4804	40.36	32.27	54	-13.64	33.96	8.25	34.12	135	323	Average
4804	45.66	37.57	74	-28.34	33.96	8.25	34.12	135	323	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384.07	40.39	38.7	54	-13.61	31.78	5.4	35.49	100	320	Average
2384.07	51.51	49.82	74	-22.49	31.78	5.4	35.49	100	320	Peak
2440	92.25	90.4			31.85	5.46	35.46	100	320	Average
2440	93.4	91.55			31.85	5.46	35.46	100	320	Peak
2497.64	40.86	38.84	54	-13.14	31.9	5.53	35.41	100	320	Average
2497.64	51.98	49.96	74	-22.02	31.9	5.53	35.41	100	320	Peak
4880	40.33	32.14	54	-13.67	33.98	8.27	34.06	105	360	Average
4880	47.19	39	74	-26.81	33.98	8.27	34.06	105	360	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382.72	40.47	38.78	54	-13.53	31.78	5.4	35.49	200	274	Average
2382.72	51.42	49.73	74	-22.58	31.78	5.4	35.49	200	274	Peak
2440	91.46	89.61			31.85	5.46	35.46	200	274	Average
2440	92.41	90.56			31.85	5.46	35.46	200	274	Peak
2497.28	41.01	38.99	54	-12.99	31.9	5.53	35.41	200	274	Average
2497.28	52.51	50.49	74	-21.49	31.9	5.53	35.41	200	274	Peak
4880	40.69	32.5	54	-13.31	33.98	8.27	34.06	147	168	Average
4880	47.84	39.65	74	-26.16	33.98	8.27	34.06	147	168	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamplifier Factor
Margin value = Emission level – Limit value
- 2440 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	92.56	90.6			31.88	5.5	35.42	100	320	Average
2480	93.26	91.3			31.88	5.5	35.42	100	320	Peak
2488.64	40.88	38.87	54	-13.12	31.9	5.53	35.42	100	320	Average
2488.64	51.96	49.95	74	-22.04	31.9	5.53	35.42	100	320	Peak
4960	40.84	32.57	54	-13.16	33.99	8.29	34.01	147	7	Average
4960	46.87	38.6	74	-27.13	33.99	8.29	34.01	147	7	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	91.1	89.14			31.88	5.5	35.42	200	274	Average
2480	92.14	90.18			31.88	5.5	35.42	200	274	Peak
2491.4	40.96	38.95	54	-13.04	31.9	5.53	35.42	200	274	Average
2491.4	52.1	50.09	74	-21.9	31.9	5.53	35.42	200	274	Peak
4960	40.97	32.7	54	-13.03	33.99	8.29	34.01	157	333	Average
4960	46.47	38.2	74	-27.53	33.99	8.29	34.01	157	333	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.

Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2356.98	41.21	39.58	54	-12.79	31.76	5.37	35.5	221	111	Average
2356.98	51.25	49.62	74	-22.75	31.76	5.37	35.5	221	111	Peak
2402	89.52	87.79			31.8	5.4	35.47	221	111	Average
2402	90.49	88.76			31.8	5.4	35.47	221	111	Peak
4804	40.27	32.18	54	-13.73	33.96	8.25	34.12	158	207	Average
4804	46	37.91	74	-28	33.96	8.25	34.12	158	207	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376.24	41.12	39.46	54	-12.88	31.78	5.37	35.49	248	176	Average
2376.24	51.15	49.49	74	-22.85	31.78	5.37	35.49	248	176	Peak
2402	94.47	92.74			31.8	5.4	35.47	248	176	Average
2402	95.13	93.4			31.8	5.4	35.47	248	176	Peak
4804	41.1	33.01	54	-12.9	33.96	8.25	34.12	135	322	Average
4804	46.44	38.35	74	-27.56	33.96	8.25	34.12	135	322	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384.97	41.11	39.42	54	-12.89	31.78	5.4	35.49	221	111	Average
2384.97	52.33	50.64	74	-21.67	31.78	5.4	35.49	221	111	Peak
2440	89.02	87.17			31.85	5.46	35.46	221	111	Average
2440	90.08	88.23			31.85	5.46	35.46	221	111	Peak
2487.92	41.59	39.58	54	-12.41	31.9	5.53	35.42	221	111	Average
2487.92	52.6	50.59	74	-21.4	31.9	5.53	35.42	221	111	Peak
4880	40.93	32.74	54	-13.07	33.98	8.27	34.06	157	88	Average
4880	46.2	38.01	74	-27.8	33.98	8.27	34.06	157	88	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2354.28	41.14	39.55	54	-12.86	31.76	5.33	35.5	248	176	Average
2354.28	51.97	50.38	74	-22.03	31.76	5.33	35.5	248	176	Peak
2440	94.85	93			31.85	5.46	35.46	248	176	Average
2440	95.92	94.07			31.85	5.46	35.46	248	176	Peak
2483.64	41.73	39.77	54	-12.27	31.88	5.5	35.42	248	176	Average
2483.64	52.51	50.55	74	-21.49	31.88	5.5	35.42	248	176	Peak
4880	41.05	32.86	54	-12.95	33.98	8.27	34.06	175	346	Average
4880	46.35	38.16	74	-27.65	33.98	8.27	34.06	175	346	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamplifier Factor
Margin value = Emission level – Limit value
- 2440 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	89.14	87.18			31.88	5.5	35.42	221	111	Average
2480	90.01	88.05			31.88	5.5	35.42	221	111	Peak
2493.88	41.55	39.53	54	-12.45	31.9	5.53	35.41	221	111	Average
2493.88	52.1	50.08	74	-21.9	31.9	5.53	35.41	221	111	Peak
4960	41.14	32.87	54	-12.86	33.99	8.29	34.01	157	15	Average
4960	46.75	38.48	74	-27.25	33.99	8.29	34.01	157	15	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	94.6	92.64			31.88	5.5	35.42	248	176	Average
2480	95.12	93.16			31.88	5.5	35.42	248	176	Peak
2483.96	41.72	39.76	54	-12.28	31.88	5.5	35.42	248	176	Average
2483.96	52.63	50.67	74	-21.37	31.88	5.5	35.42	248	176	Peak
4960	40.76	32.49	54	-13.24	33.99	8.29	34.01	147	346	Average
4960	46.34	38.07	74	-27.66	33.99	8.29	34.01	147	346	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.

9 kHz ~ 30 MHz Data:

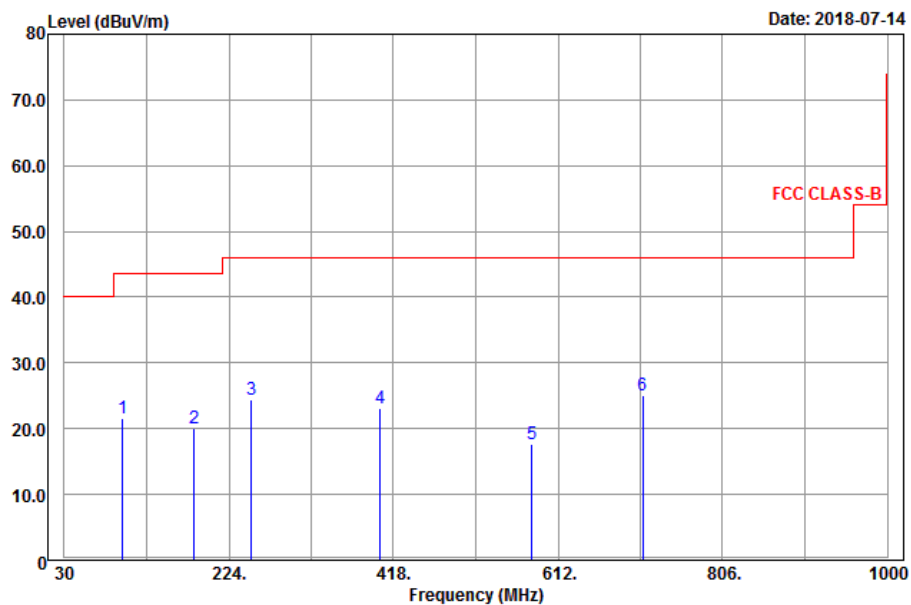
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

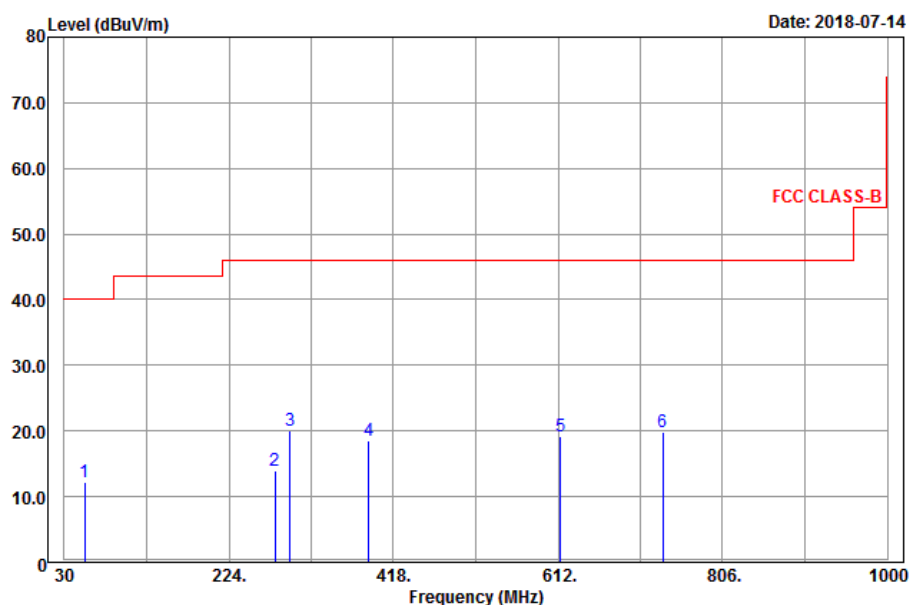
Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
99.12	21.53	40.31	43.5	-21.97	12.15	1.28	32.21	124	19	Peak
183.09	19.98	40.59	43.5	-23.52	10.02	1.61	32.24	157	255	Peak
250.32	24.48	42.41	46	-21.52	12.32	1.85	32.1	200	360	Peak
402.2	23.1	37.96	46	-22.9	15.02	2.34	32.22	140	256	Peak
581.4	17.71	29.44	46	-28.29	17.65	2.82	32.2	100	100	Peak
712.3	24.99	34.58	46	-21.01	19.4	3.11	32.1	157	246	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
54.03	12.16	29.27	40	-27.84	14.22	0.9	32.23	154	203	Peak
278.4	13.97	31.34	46	-32.03	12.72	2.03	32.12	195	9	Peak
296.22	20.11	37.23	46	-25.89	12.98	2.03	32.13	132	3	Peak
388.9	18.48	33.56	46	-27.52	14.77	2.34	32.19	147	77	Peak
615	19.18	30.35	46	-26.82	18.08	2.93	32.18	159	99	Peak
735.4	19.77	29.08	46	-26.23	19.66	3.16	32.13	157	8	Peak

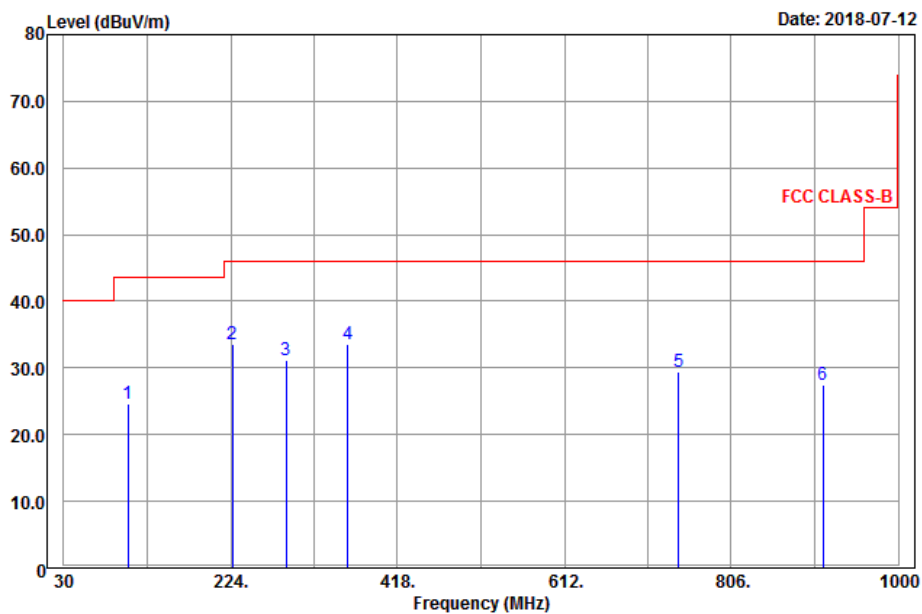
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

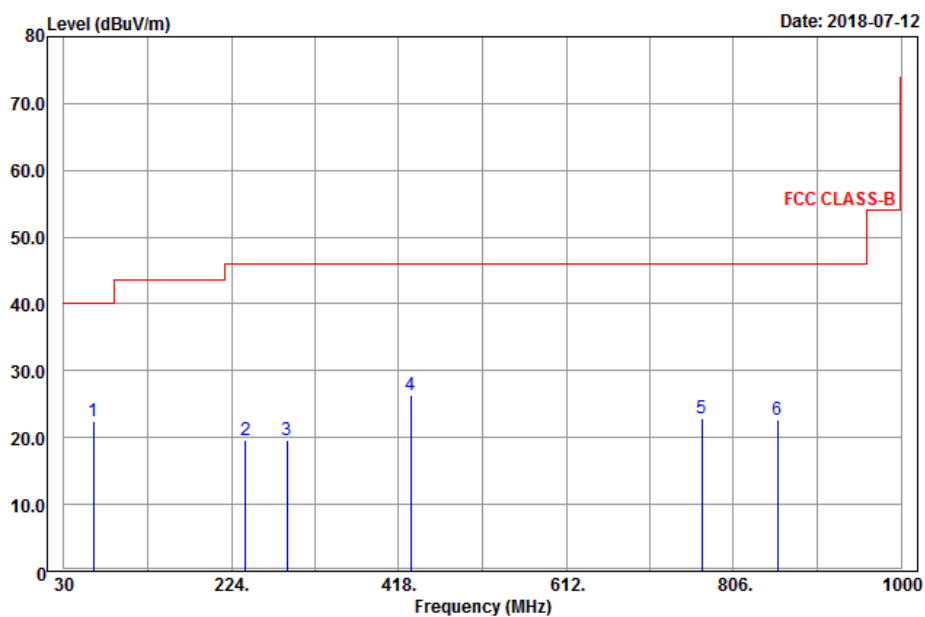
Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
104.52	24.74	43.3	43.5	-18.76	12.42	1.28	32.26	124	136	Peak
225.75	33.61	52.36	46	-12.39	11.59	1.85	32.19	127	77	Peak
288.12	31.24	48.5	46	-14.76	12.84	2.03	32.13	124	202	Peak
360.2	33.56	49.05	46	-12.44	14.35	2.26	32.1	143	33	Peak
744.5	29.45	38.61	46	-16.55	19.76	3.22	32.14	104	19	Peak
912.5	27.57	33.91	46	-18.43	21.52	3.53	31.39	154	195	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.75	22.51	41.49	40	-17.49	12.35	0.9	32.23	167	299	Peak
240.06	19.71	37.89	46	-26.29	12.1	1.85	32.13	124	105	Peak
288.12	19.66	36.92	46	-26.34	12.84	2.03	32.13	117	14	Peak
431.6	26.33	40.75	46	-19.67	15.34	2.41	32.17	154	255	Peak
769	22.79	31.67	46	-23.21	20.01	3.22	32.11	169	230	Peak
857.2	22.77	29.96	46	-23.23	21.12	3.44	31.75	157	24	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

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 HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

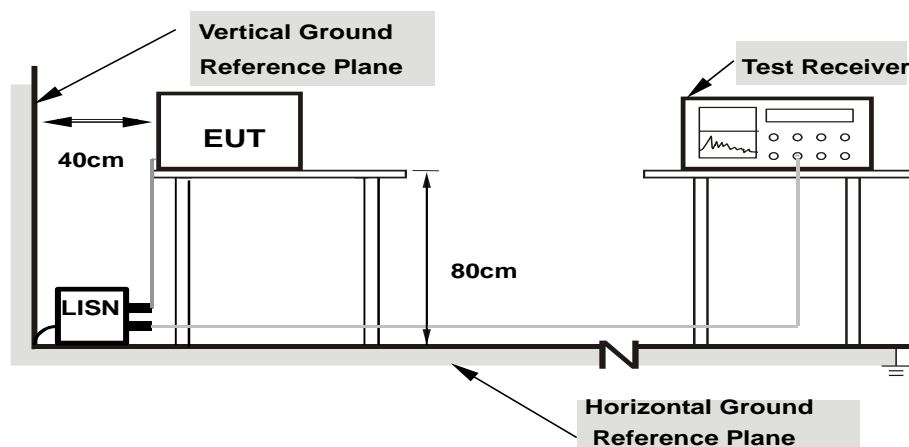
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Condition

Set the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

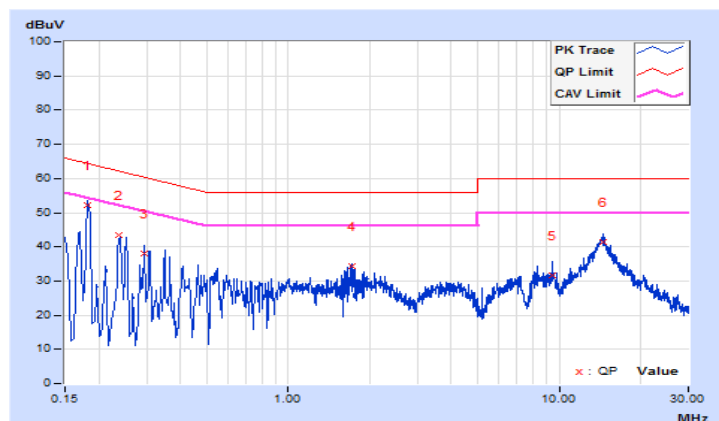
Mode A

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2018/7/18

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	0.18128	9.67	42.50	28.46	52.17	38.13	64.43	54.43	-12.26	-16.30
2	0.23648	9.67	33.68	19.76	43.35	29.43	62.22	52.22	-18.87	-22.79
3	0.29467	9.67	28.54	15.22	38.21	24.89	60.39	50.39	-22.18	-25.50
4	1.71791	9.71	24.61	6.27	34.32	15.98	56.00	46.00	-21.68	-30.02
5	9.44407	9.86	21.65	7.74	31.51	17.60	60.00	50.00	-28.49	-32.40
6	14.51143	9.91	31.40	18.02	41.31	27.93	60.00	50.00	-18.69	-22.07

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

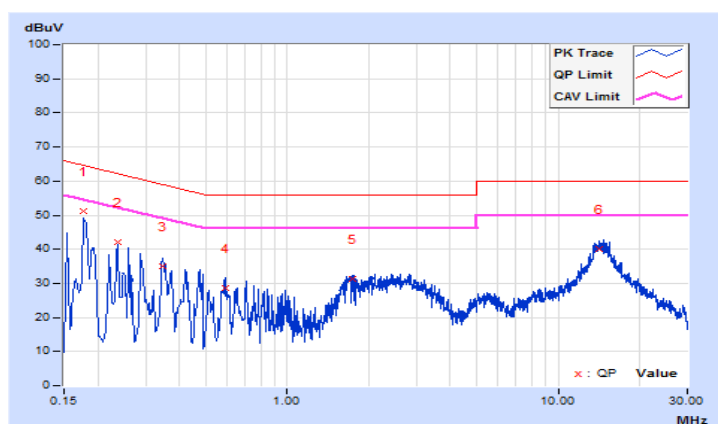


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2018/7/18

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	0.17744	9.68	41.34	28.81	51.02	38.49	64.60	54.60	-13.58	-16.11
2	0.23586	9.68	32.39	19.16	42.07	28.84	62.24	52.24	-20.17	-23.40
3	0.34560	9.68	25.40	13.31	35.08	22.99	59.07	49.07	-23.99	-26.08
4	0.58792	9.68	18.92	6.22	28.60	15.90	56.00	46.00	-27.40	-30.10
5	1.74919	9.71	21.69	5.61	31.40	15.32	56.00	46.00	-24.60	-30.68
6	14.26510	9.95	30.16	17.77	40.11	27.72	60.00	50.00	-19.89	-22.28

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



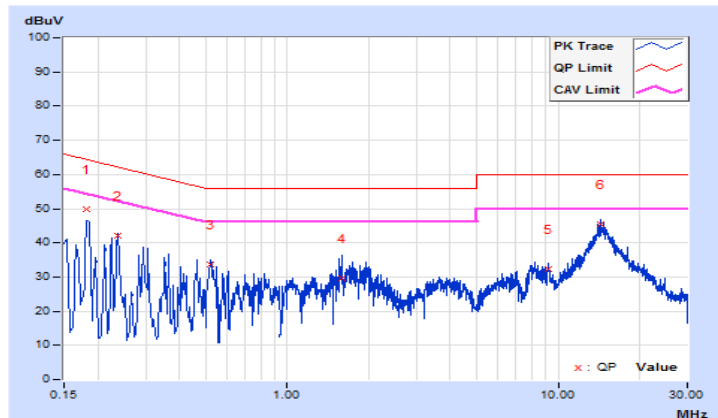
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2018/7/18

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	0.18122	9.67	40.00	25.61	49.67	35.28	64.43	54.43	-14.76	-19.15
2	0.23586	9.67	32.45	19.96	42.12	29.63	62.24	52.24	-20.12	-22.61
3	0.52130	9.67	24.03	11.03	33.70	20.70	56.00	46.00	-22.30	-25.30
4	1.58888	9.70	19.82	3.41	29.52	13.11	56.00	46.00	-26.48	-32.89
5	9.18992	9.86	22.40	8.97	32.26	18.83	60.00	50.00	-27.74	-31.17
6	14.41368	9.91	35.61	21.14	45.52	31.05	60.00	50.00	-14.48	-18.95

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

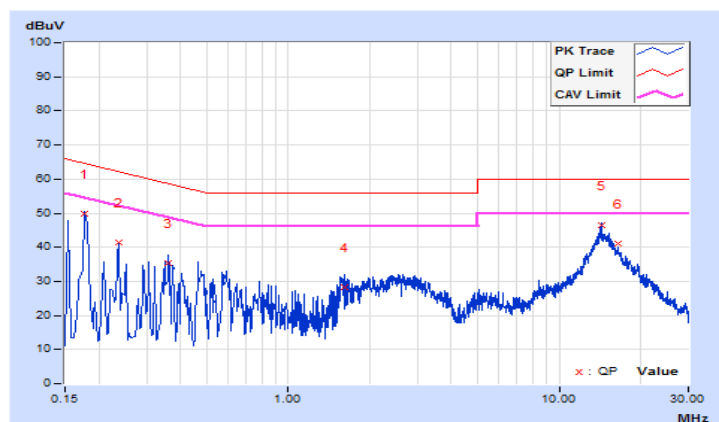


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2018/7/18

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	0.17744	9.68	40.29	25.68	49.97	35.36	64.60	54.60	-14.63	-19.24
2	0.23586	9.68	31.86	19.40	41.54	29.08	62.24	52.24	-20.70	-23.16
3	0.36114	9.68	25.65	11.34	35.33	21.02	58.70	48.70	-23.37	-27.68
4	1.61234	9.70	18.65	3.93	28.35	13.63	56.00	46.00	-27.65	-32.37
5	14.27683	9.95	36.67	21.36	46.62	31.31	60.00	50.00	-13.38	-18.69
6	16.52117	9.99	31.15	15.88	41.14	25.87	60.00	50.00	-18.86	-24.13

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

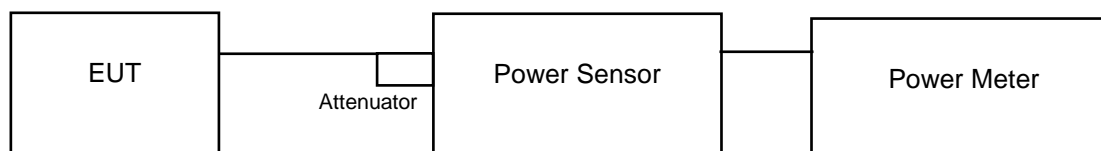


4.3 Conducted Output Power Measurement

4.3.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
0	2402	0.83	30	Pass
19	2440	0.91	30	Pass
39	2480	0.75	30	Pass

5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are 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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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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