

Variant FCC Test Report

Report No.: RF170327C09A

FCC ID: UK7-DW5A

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Test Date: Oct. 12, 2017 ~ Oct. 19, 2017

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Applicant: Fossil Group, Inc.

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Release Control Record

Issue No.	Description	Date Issued
RF170327C09A	Original Release	Oct. 26, 2017

1 Certificate of Conformity

Product: Smart Watch

Sample Status: Production Unit

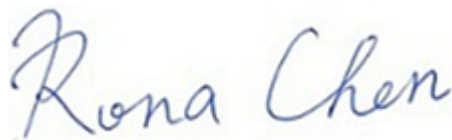
Applicant: Fossil Group, Inc.

Test Date: Oct. 12, 2017 ~ Oct. 19, 2017

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

This report is issued as a supplementary report to BV CPS report no.: RF170327C09. This report shall be used by combining with its original report.

Prepared by :



Date:

Oct. 26, 2017

Rona Chen / Specialist

Approved by :



Date:

Oct. 26, 2017

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 -0.04 dB at 0.49766 MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	N/A	Refer to Note
15.247(a)(1)(iii)	Dwell Time on Each Channel	N/A	Refer to Note
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note
15.247(b)	Maximum Peak Output Power	N/A	Refer to Note
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -2.84 dB at 33.78 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note: Only Radiated Emissions and AC Power Conducted Emission tests had been performed for the addendum. Refer to original report for other test data.

2.1 Measurement Uncertainty

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

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	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	2.0153 dB
	200 MHz ~1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart Watch
Status of EUT	Production Unit
Power Supply Rating	5.0 Vdc (Wireless Charger) 3.8 Vdc (Li-ion battery)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Antenna Type	Loop antenna
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. This report is issued as a supplementary report to BV CPS report no.: RF170327C09. The difference compared with original report is changing antenna and appearance. Therefore, only Radiated Emissions and AC Power Conducted Emission tests had been performed in this report.
2. There are 2 configurations for the EUT which listed as below.

Sample	Antenna Gain (dBi)	Difference
A	-2.34	The models are different in the appearance and antenna only.
B	-4.91	

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

3.2 Description of Test Modes

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

Note:

1. For Radiated emission test, pre-tested GFSK, $\pi/4$ -DQPSK, 8DPSK modulation type and found 8DPSK was the worse, therefore chosen for the final test and presented in the test report.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

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 Technology	Modulation Type	Packet Type
A, B	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

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 Technology	Modulation Type	Packet Type
A, B	0 to 78	78	FHSS	8DPSK	DH5

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 Technology	Modulation Type	Packet Type
A, B	0 to 78	78	FHSS	8DPSK	DH5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	5 Vdc	Karl Lee
RE $<$ 1G	25 deg. C, 65 % RH	5 Vdc	Karl Lee
PLC	25 deg. C, 65 % RH	5 Vdc	Getaz Yang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

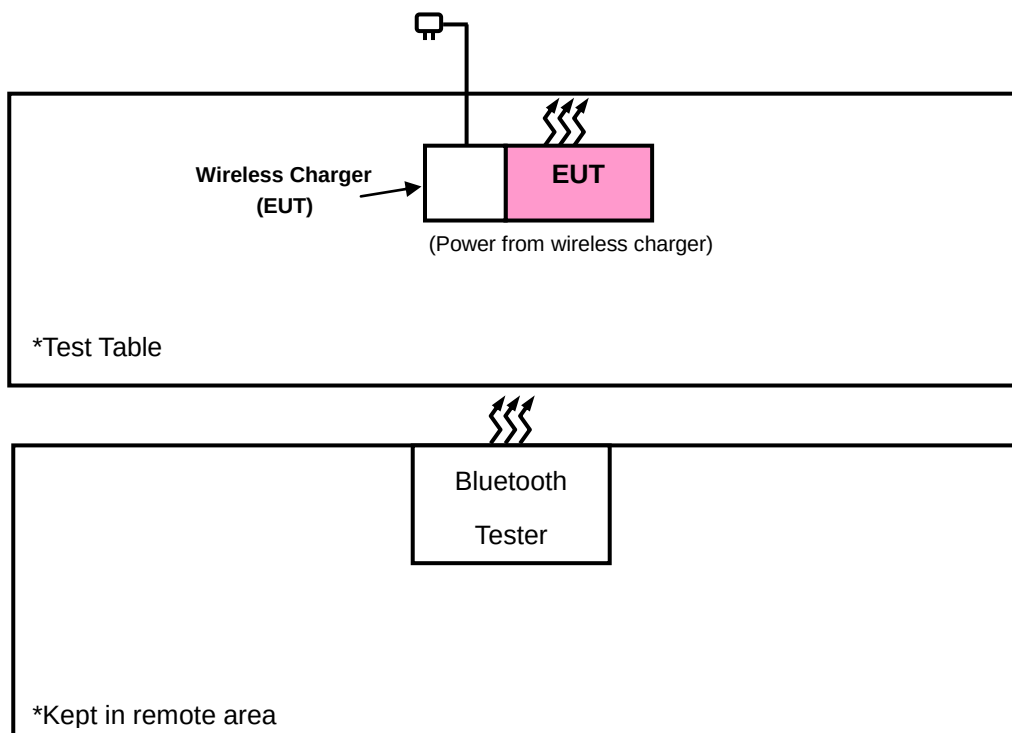
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Adapter	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

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

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)

FCC Public Notice DA 00-705

ANSI C63.10-2013

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

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

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 Agilent Technologies	N9038A	MY52260177	Jul. 05, 2017	Jul. 04, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 16, 2016	Dec. 15, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 29, 2016	Dec. 28, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 17, 2017	Apr. 16, 2018
Bluetooth Tester	CBT	100980	Jun. 28, 2017	Jun. 27, 2019
Loop Antenna	HLA 6121	45745	May 19, 2017	May 18, 2018
Preamplifier Agilent	310N	187226	Jun. 23, 2017	Jun. 22, 2018
Preamplifier Agilent	83017A	MY39501357	Jun. 23, 2017	Jun. 22, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 23, 2017	Jun. 22, 2018
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Designation Number is TW0011. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC7450I-1.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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:

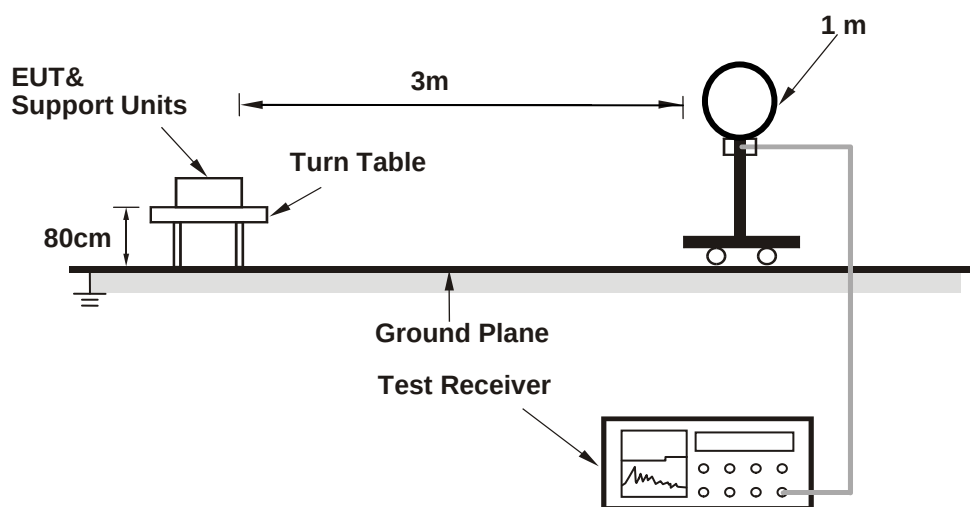
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

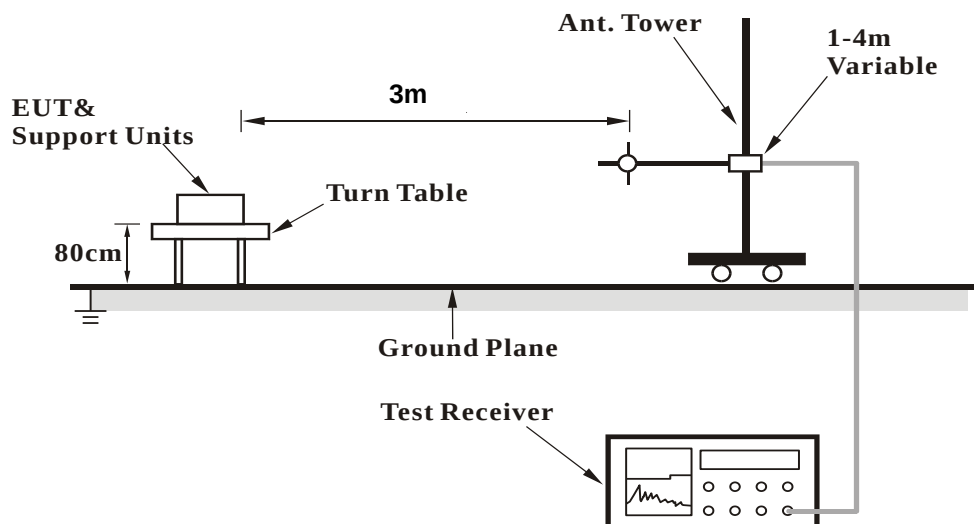
No deviation.

4.1.5 Test Set Up

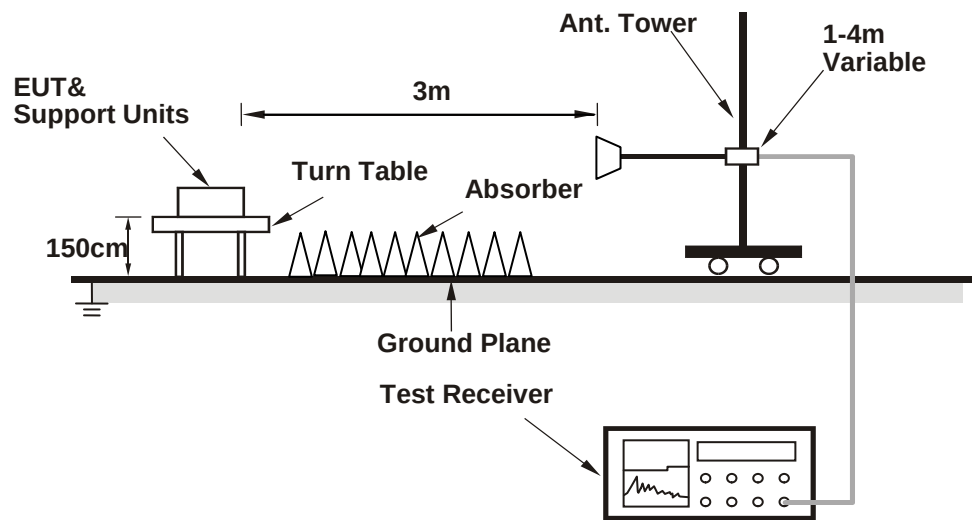
<Radiated emission below 30 MHz>



<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

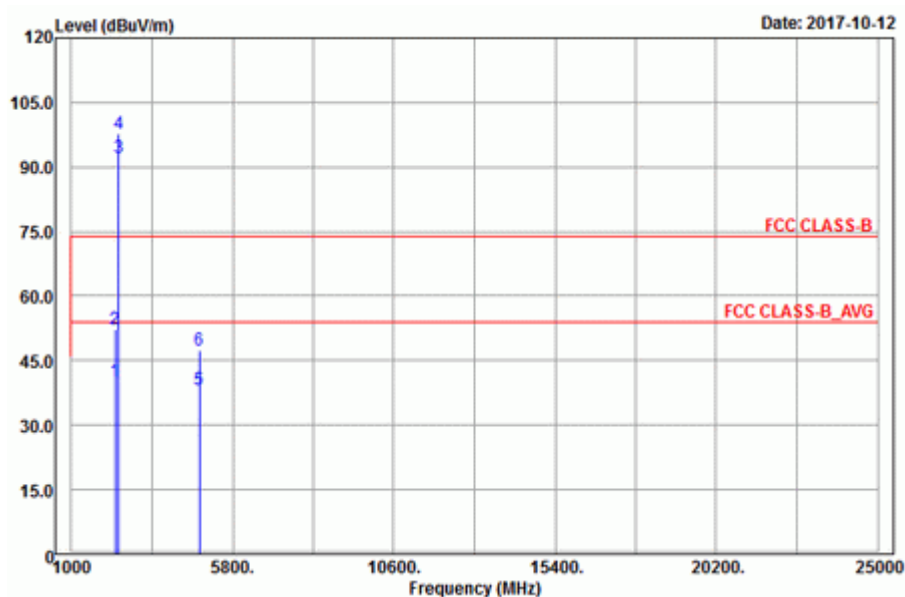
Above 1 GHz Data:

8DPSK

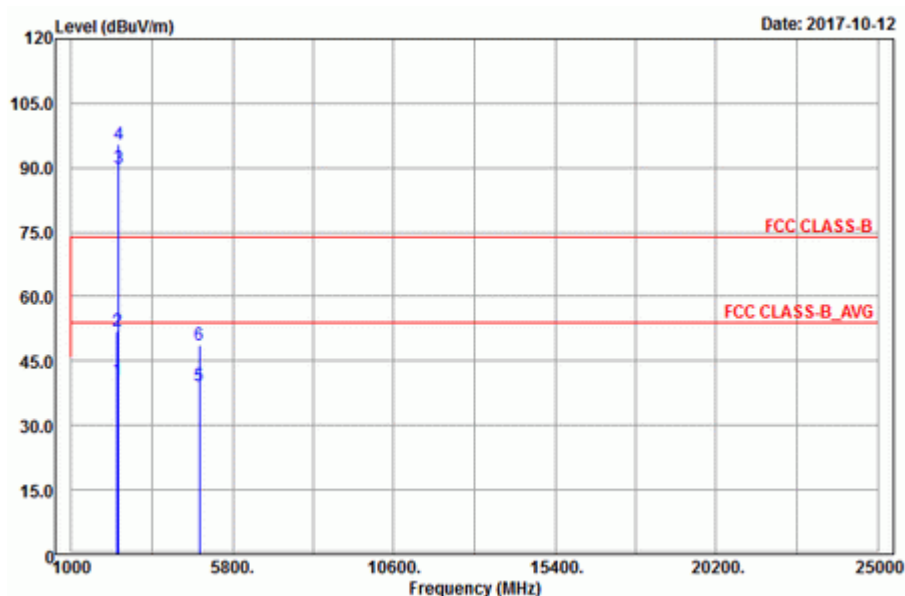
Mode A

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	Karl Lee

Horizontal



Vertical



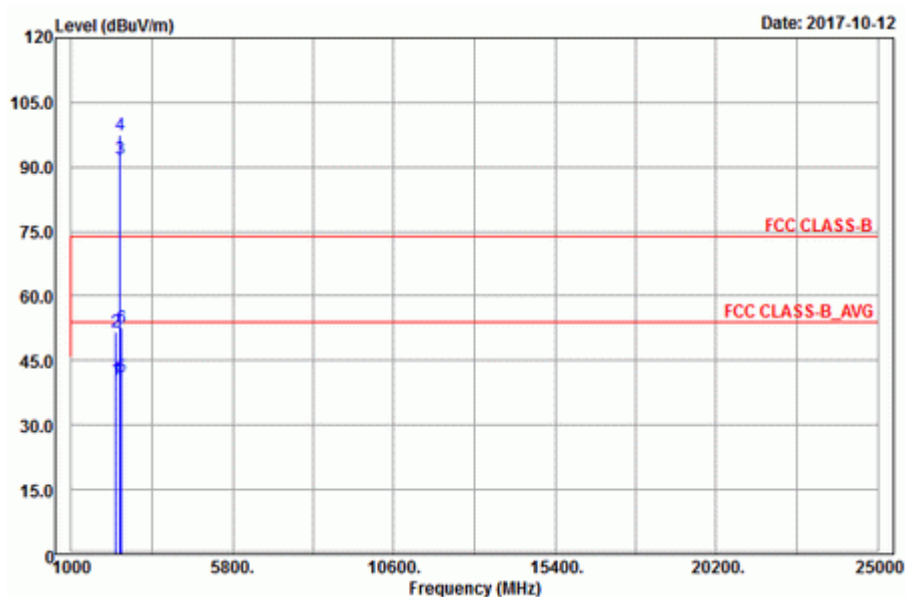
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2310.99	40.37	38.89	54	-13.63	31.71	5.3	35.53	166	347	Average
2310.99	52.34	50.86	74	-21.66	31.71	5.3	35.53	166	347	Peak
2402	92.07	90.34			31.8	5.4	35.47	166	347	Average
2402	97.62	95.89			31.8	5.4	35.47	166	347	Peak
4804	38.29	30.2	54	-15.71	33.96	8.25	34.12	105	36	Average
4804	47.51	39.42	74	-26.49	33.96	8.25	34.12	105	36	Peak
Antenna 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
2370.66	40.45	38.79	54	-13.55	31.78	5.37	35.49	107	356	Average
2370.66	51.96	50.3	74	-22.04	31.78	5.37	35.49	107	356	Peak
2402	90.07	88.34			31.8	5.4	35.47	107	356	Average
2402	95.55	93.82			31.8	5.4	35.47	107	356	Peak
4804	39.37	31.28	54	-14.63	33.96	8.25	34.12	121	180	Average
4804	48.66	40.57	74	-25.34	33.96	8.25	34.12	121	180	Peak

Remarks:

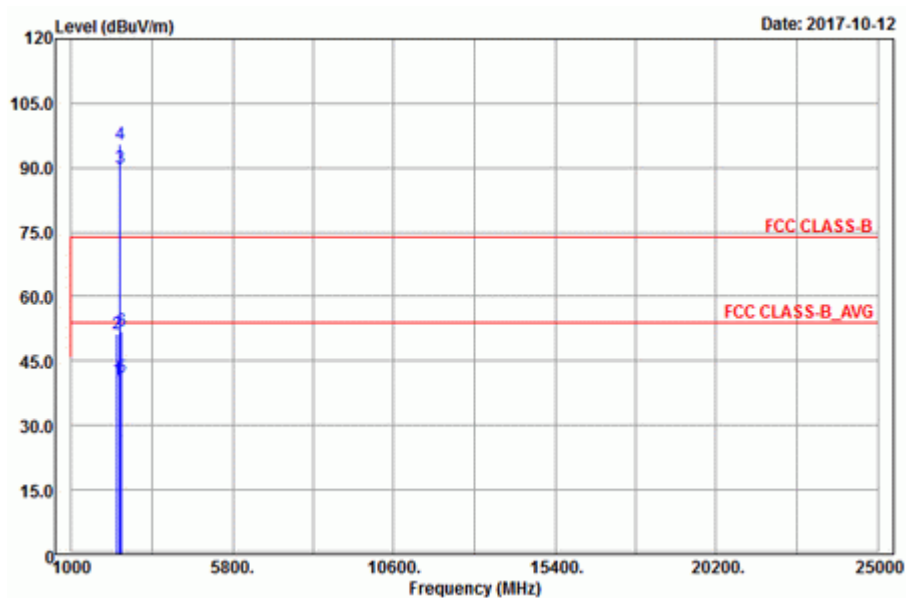
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 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	Karl Lee

Horizontal



Vertical



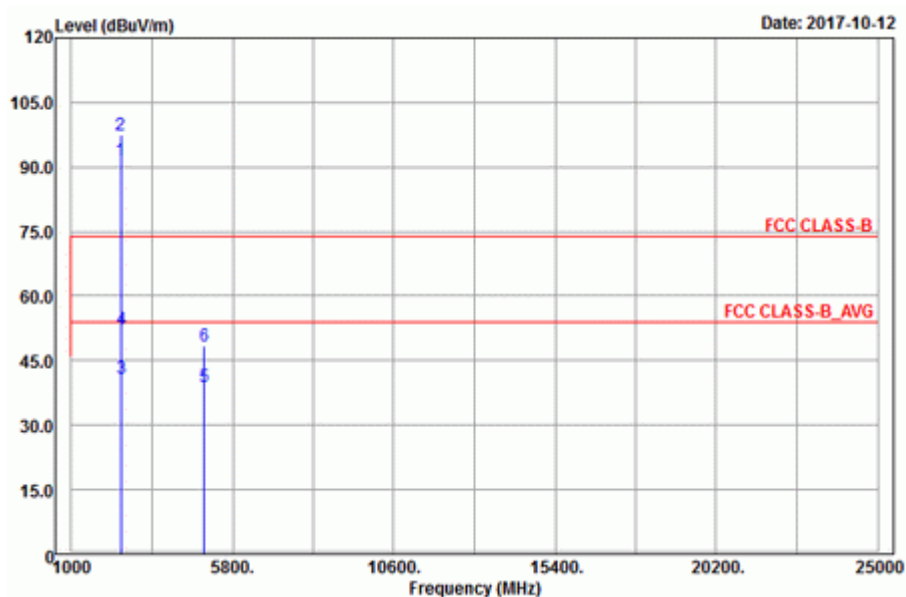
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2327.01	40.54	39.03	54	-13.46	31.73	5.3	35.52	166	347	Average
2327.01	51.77	50.26	74	-22.23	31.73	5.3	35.52	166	347	Peak
2441	91.76	89.89			31.85	5.46	35.44	166	347	Average
2441	97.48	95.61			31.85	5.46	35.44	166	347	Peak
2487.92	41.04	39.03	54	-12.96	31.9	5.53	35.42	166	347	Average
2487.92	52.51	50.5	74	-21.49	31.9	5.53	35.42	166	347	Peak
Antenna 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
2365.17	40.47	38.83	54	-13.53	31.76	5.37	35.49	107	356	Average
2365.17	51.3	49.66	74	-22.7	31.76	5.37	35.49	107	356	Peak
2441	89.9	88.03			31.85	5.46	35.44	107	356	Average
2441	95.6	93.73			31.85	5.46	35.44	107	356	Peak
2487.8	41.04	39.03	54	-12.96	31.9	5.53	35.42	107	356	Average
2487.8	52	49.99	74	-22	31.9	5.53	35.42	107	356	Peak

Remarks:

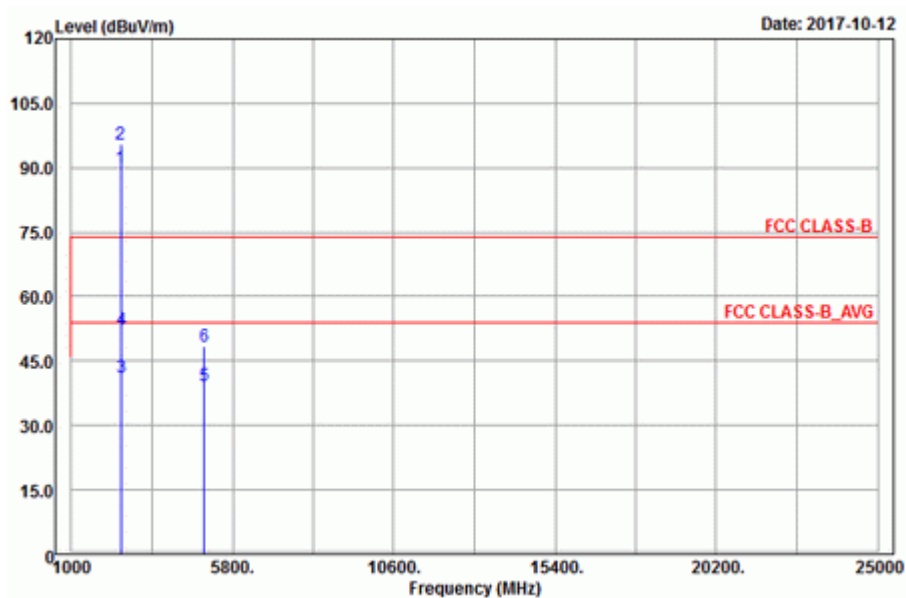
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

Horizontal



Vertical



Antenna 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	91.63	89.67			31.88	5.5	35.42	166	347	Average
2480	97.32	95.36			31.88	5.5	35.42	166	347	Peak
2497.16	40.99	38.97	54	-13.01	31.9	5.53	35.41	166	347	Average
2497.16	52.46	50.44	74	-21.54	31.9	5.53	35.41	166	347	Peak
4960	38.96	30.69	54	-15.04	33.99	8.29	34.01	177	254	Average
4960	48.28	40.01	74	-25.72	33.99	8.29	34.01	177	254	Peak
Antenna 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	89.85	87.89			31.88	5.5	35.42	107	356	Average
2480	95.51	93.55			31.88	5.5	35.42	107	356	Peak
2496.68	41.06	39.04	54	-12.94	31.9	5.53	35.41	107	356	Average
2496.68	52.23	50.21	74	-21.77	31.9	5.53	35.41	107	356	Peak
4960	39.15	30.88	54	-14.85	33.99	8.29	34.01	127	196	Average
4960	48.33	40.06	74	-25.67	33.99	8.29	34.01	127	196	Peak

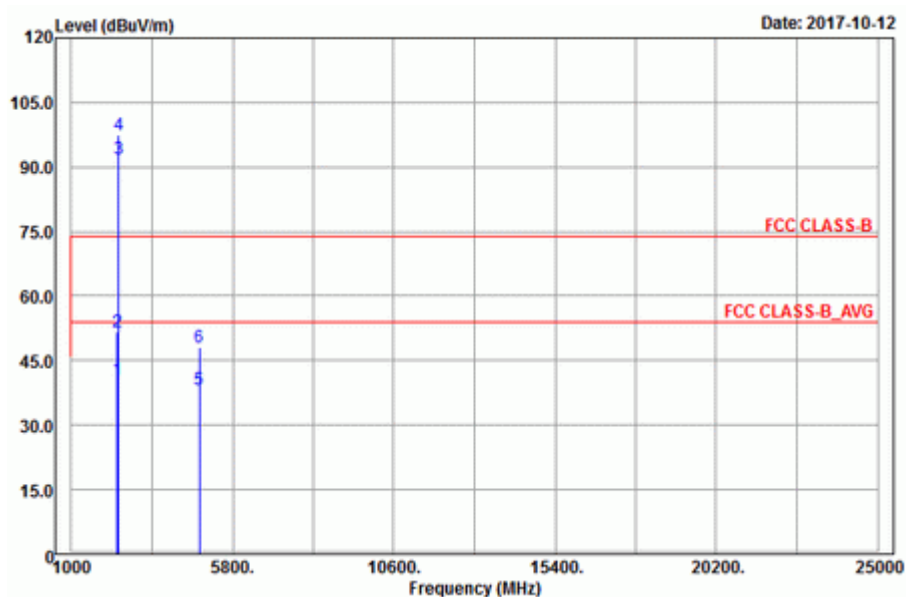
Remarks:

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

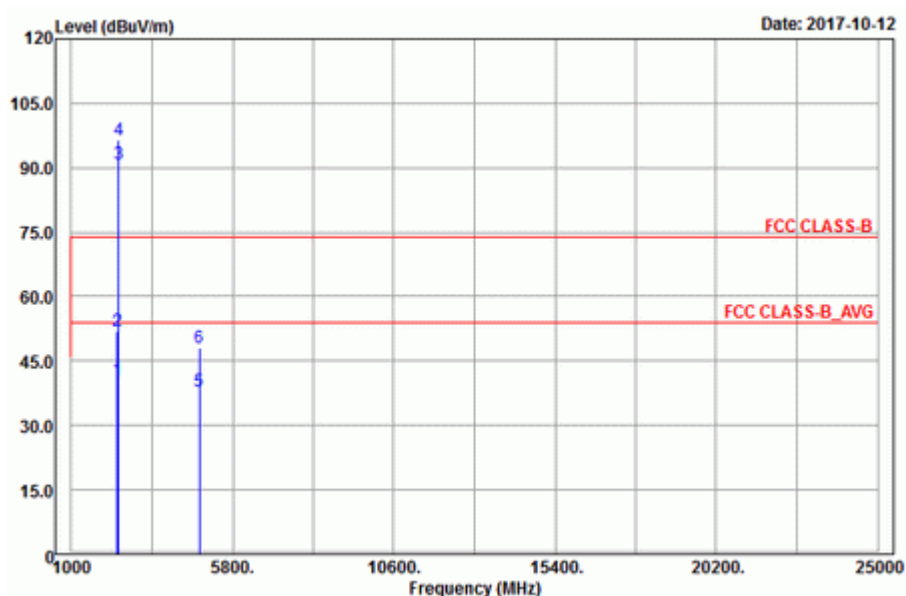
Mode B

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	Karl Lee

Horizontal



Vertical



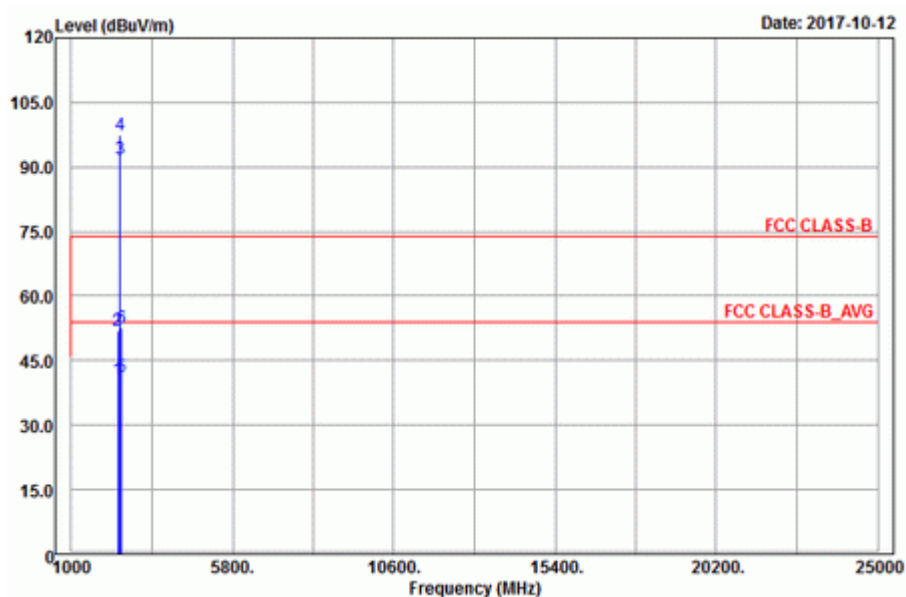
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2364.36	40.43	38.79	54	-13.57	31.76	5.37	35.49	269	338	Average
2364.36	51.71	50.07	74	-22.29	31.76	5.37	35.49	269	338	Peak
2402	91.81	90.08			31.8	5.4	35.47	269	338	Average
2402	97.34	95.61			31.8	5.4	35.47	269	338	Peak
4804	38.1	30.01	54	-15.9	33.96	8.25	34.12	127	165	Average
4804	47.99	39.9	74	-26.01	33.96	8.25	34.12	127	165	Peak
Antenna 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
2375.79	40.6	38.94	54	-13.4	31.78	5.37	35.49	174	2	Average
2375.79	51.93	50.27	74	-22.07	31.78	5.37	35.49	174	2	Peak
2402	91.02	89.29			31.8	5.4	35.47	174	2	Average
2402	96.52	94.79			31.8	5.4	35.47	174	2	Peak
4804	37.86	29.77	54	-16.14	33.96	8.25	34.12	160	149	Average
4804	48.02	39.93	74	-25.98	33.96	8.25	34.12	160	149	Peak

Remarks:

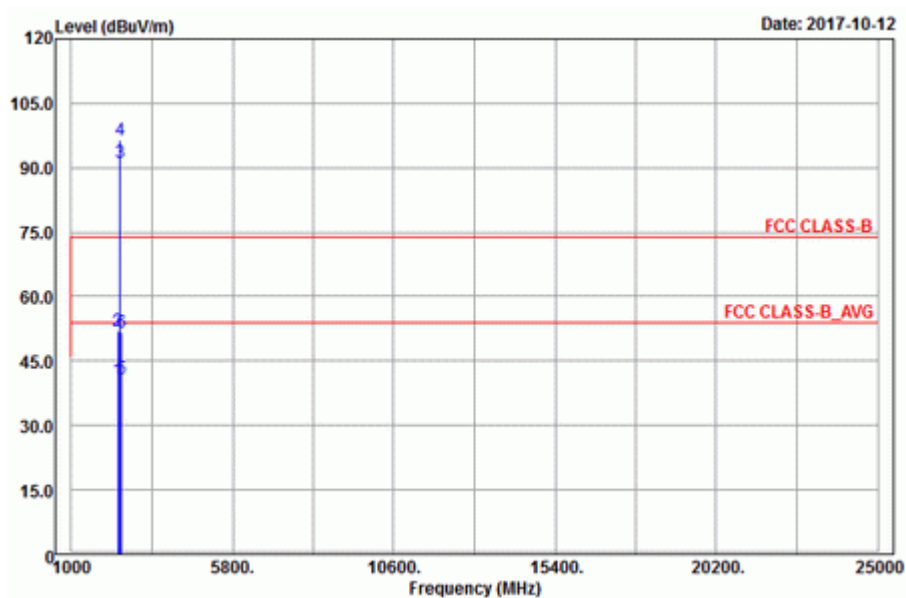
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 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	Karl Lee

Horizontal



Vertical



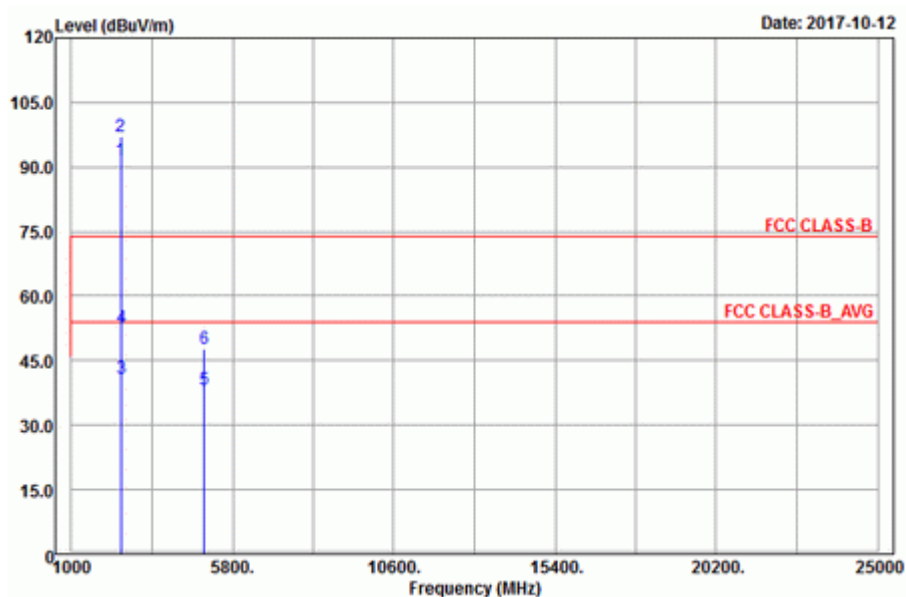
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.83	40.39	38.66	54	-13.61	31.8	5.4	35.47	269	338	Average
2389.83	51.83	50.1	74	-22.17	31.8	5.4	35.47	269	338	Peak
2441	92.02	90.15			31.85	5.46	35.44	269	338	Average
2441	97.45	95.58			31.85	5.46	35.44	269	338	Peak
2499.32	41.04	39.02	54	-12.96	31.9	5.53	35.41	269	338	Average
2499.32	52.58	50.56	74	-21.42	31.9	5.53	35.41	269	338	Peak
Antenna 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
2381.28	40.41	38.72	54	-13.59	31.78	5.4	35.49	174	2	Average
2381.28	52.14	50.45	74	-21.86	31.78	5.4	35.49	174	2	Peak
2441	91.09	89.22			31.85	5.46	35.44	174	2	Average
2441	96.62	94.75			31.85	5.46	35.44	174	2	Peak
2485.96	40.96	38.97	54	-13.04	31.88	5.53	35.42	174	2	Average
2485.96	51.66	49.67	74	-22.34	31.88	5.53	35.42	174	2	Peak

Remarks:

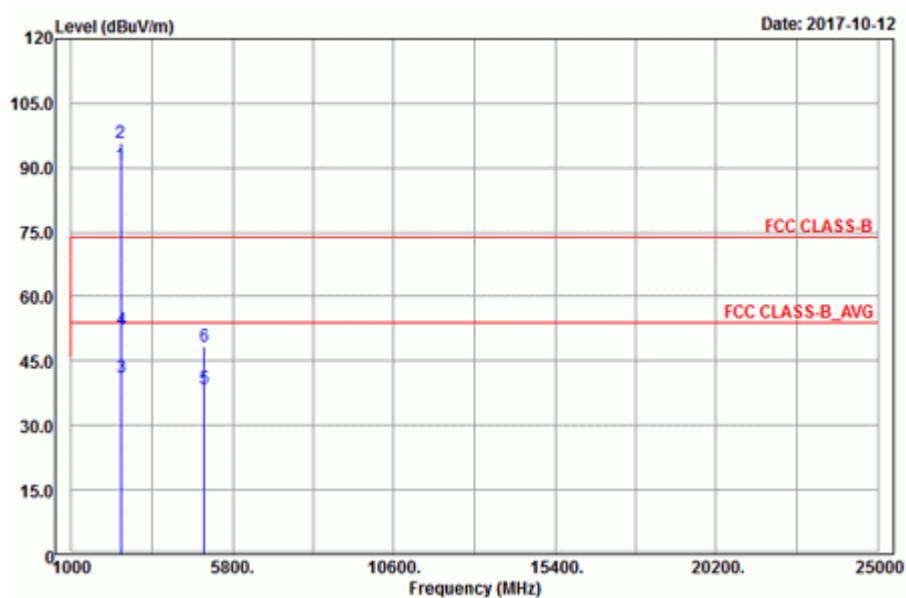
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamplifier Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

Horizontal



Vertical



Antenna 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	91.56	89.6			31.88	5.5	35.42	269	338	Average
2480	97.03	95.07			31.88	5.5	35.42	269	338	Peak
2483.76	40.98	39.02	54	-13.02	31.88	5.5	35.42	269	338	Average
2483.76	52.63	50.67	74	-21.37	31.88	5.5	35.42	269	338	Peak
4960	38.27	30	54	-15.73	33.99	8.29	34.01	143	218	Average
4960	47.75	39.48	74	-26.25	33.99	8.29	34.01	143	218	Peak
Antenna 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	90.45	88.49			31.88	5.5	35.42	174	2	Average
2480	95.95	93.99			31.88	5.5	35.42	174	2	Peak
2495.68	41.06	39.04	54	-12.94	31.9	5.53	35.41	174	2	Average
2495.68	52.45	50.43	74	-21.55	31.9	5.53	35.41	174	2	Peak
4960	38.6	30.33	54	-15.4	33.99	8.29	34.01	153	118	Average
4960	48.34	40.07	74	-25.66	33.99	8.29	34.01	153	118	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:

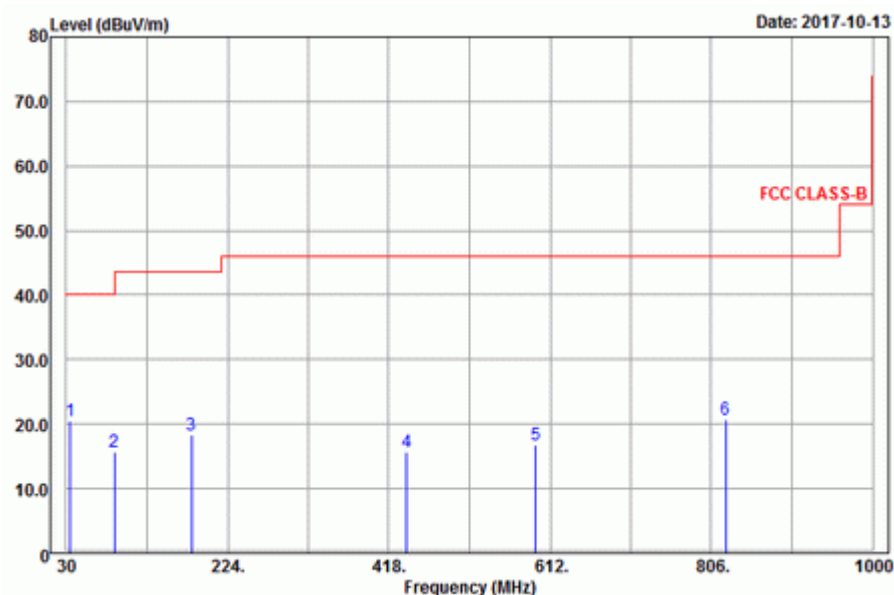
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

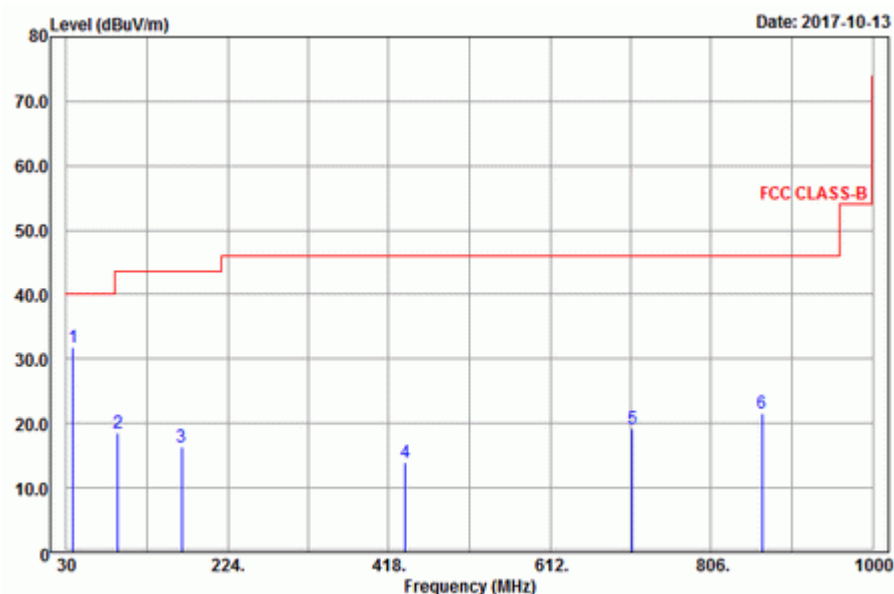
Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

Horizontal



Vertical



Antenna 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
34.32	20.44	40.11	40	-19.56	11.83	0.74	32.24	184	251	Peak
88.05	15.71	36.46	43.5	-27.79	9.95	1.11	31.81	159	136	Peak
180.39	18.38	39.27	43.5	-25.12	9.74	1.61	32.24	128	201	Peak
439.3	15.8	30.06	46	-30.2	15.41	2.49	32.16	100	134	Peak
594.7	16.87	28.34	46	-29.13	17.85	2.87	32.19	126	125	Peak
822.9	20.72	28.6	46	-25.28	20.68	3.38	31.94	196	128	Peak
Antenna 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
38.1	31.84	50.38	40	-8.16	12.95	0.74	32.23	148	224	Peak
92.1	18.54	38.33	43.5	-24.96	10.92	1.11	31.82	196	128	Peak
168.51	16.37	38.03	43.5	-27.13	9.06	1.52	32.24	131	107	Peak
437.9	13.9	28.17	46	-32.1	15.4	2.49	32.16	193	323	Peak
710.9	19.28	28.88	46	-26.72	19.39	3.11	32.1	160	128	Peak
867	21.58	28.61	46	-24.42	21.22	3.44	31.69	173	245	Peak

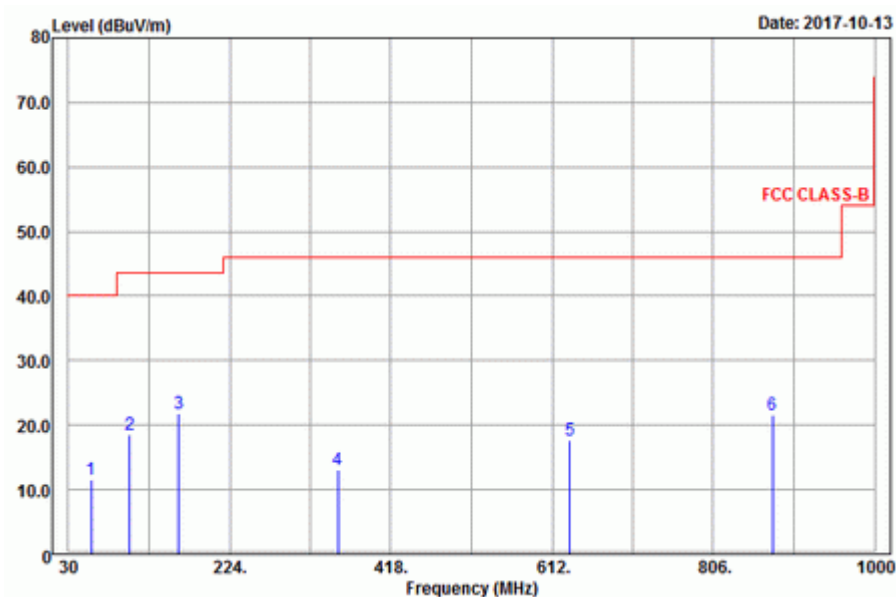
Remarks:

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

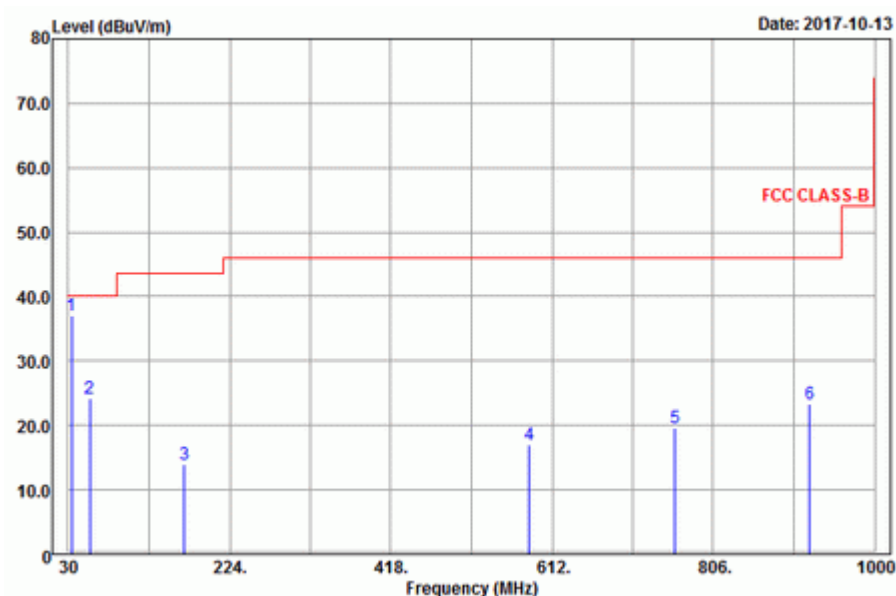
Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

Horizontal



Vertical



Antenna 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
57.81	11.63	29.28	40	-28.37	13.68	0.9	32.23	134	216	Peak
103.44	18.49	37.08	43.5	-25.01	12.39	1.28	32.26	161	127	Peak
162.84	21.87	43.76	43.5	-21.63	8.85	1.52	32.26	129	340	Peak
353.9	13.09	28.71	46	-32.91	14.27	2.19	32.08	167	254	Peak
633.9	17.7	28.69	46	-28.3	18.24	2.93	32.16	130	223	Peak
877.5	21.6	28.42	46	-24.4	21.31	3.49	31.62	148	113	Peak
Antenna 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
33.78	37.16	56.83	40	-2.84	11.83	0.74	32.24	124	321	Peak
55.65	24.13	41.32	40	-15.87	14.14	0.9	32.23	132	334	Peak
169.86	13.93	35.56	43.5	-29.57	9.09	1.52	32.24	195	284	Peak
584.9	17.06	28.73	46	-28.94	17.71	2.82	32.2	127	153	Peak
759.9	19.68	28.68	46	-26.32	19.91	3.22	32.13	100	108	Peak
922.3	23.39	29.61	46	-22.61	21.57	3.53	31.32	196	118	Peak

Remarks:

1. 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	ESCS 30	100288	Aug. 17, 2017	Aug. 16, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 08, 2017	Sep. 07, 2018
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 17, 2017	Jan. 16, 2018
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 02, 2017	Aug. 01, 2018
Software ADT	BV ADT_Conc_ V7.3.7.3	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 2.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

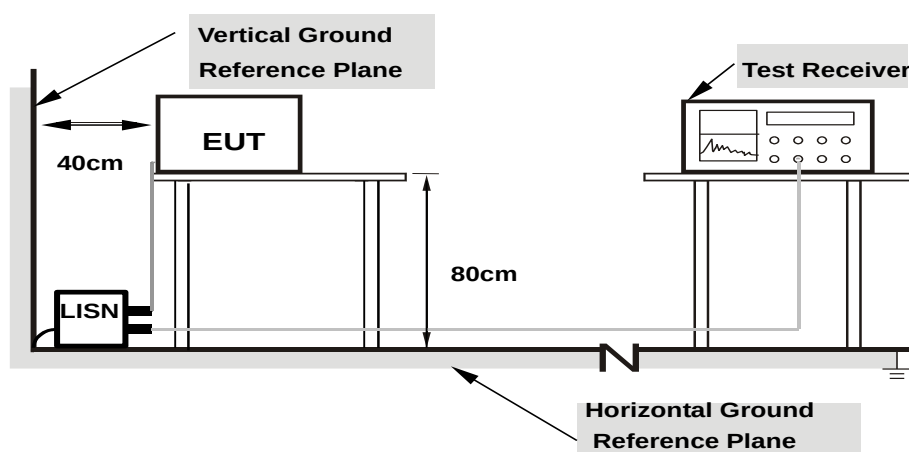
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling 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: All modes of operation were investigated and the worst-case emissions are reported.

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

CONDUCTED WORST-CASE DATA : 8DPSK

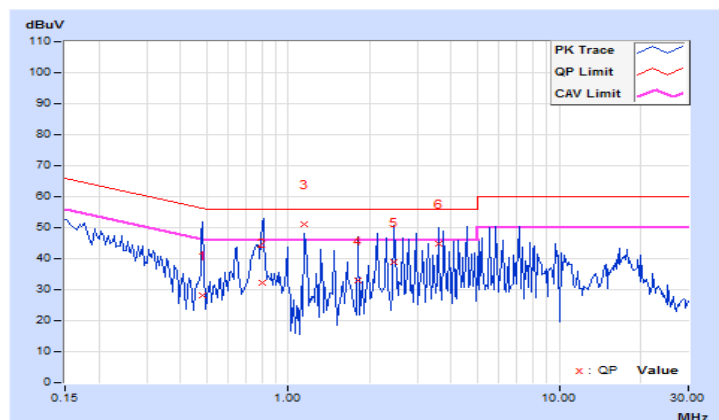
Mode A

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	Getaz Yang	Test Date	2017/10/19

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	0.48203	10.31	17.73	12.26	28.04	22.57	56.30	46.30	-28.26	-23.73
2	0.80625	10.37	21.82	11.36	32.19	21.73	56.00	46.00	-23.81	-24.27
3	1.14844	10.41	40.53	33.81	50.94	44.22	56.00	46.00	-5.06	-1.78
4	1.81250	10.38	22.60	13.01	32.98	23.39	56.00	46.00	-23.02	-22.61
5	2.46875	10.39	28.64	13.06	39.03	23.45	56.00	46.00	-16.97	-22.55
6	3.59766	10.45	34.27	9.22	44.72	19.67	56.00	46.00	-11.28	-26.33

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

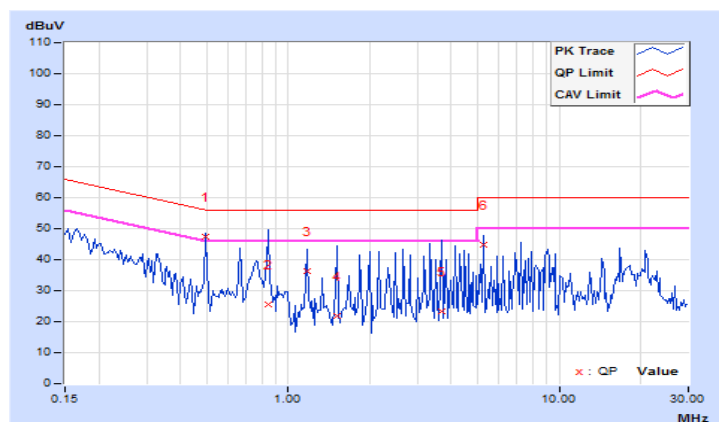


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/10/19

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	0.49375	10.33	36.98	31.84	47.31	42.17	56.10	46.10	-8.79	-3.93
2	0.84531	10.33	15.30	7.84	25.63	18.17	56.00	46.00	-30.37	-27.83
3	1.16797	10.34	25.79	9.12	36.13	19.46	56.00	46.00	-19.87	-26.54
4	1.50781	10.37	11.31	2.96	21.68	13.33	56.00	46.00	-34.32	-32.67
5	3.66406	10.57	12.79	12.42	23.36	22.99	56.00	46.00	-32.64	-23.01
6	5.27344	10.58	34.33	3.93	44.91	14.51	60.00	50.00	-15.09	-35.49

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



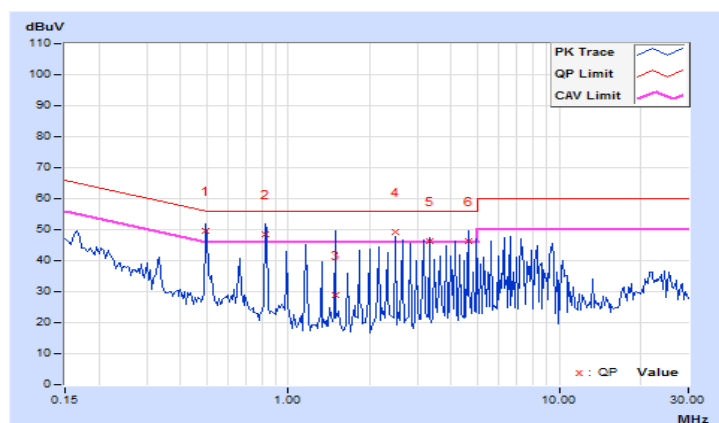
Mode B

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	Getaz Yang	Test Date	2017/10/19

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	0.49766	10.31	39.48	35.69	49.79	46.00	56.04	46.04	-6.25	-0.04
2	0.82578	10.38	38.21	33.79	48.59	44.17	56.00	46.00	-7.41	-1.83
3	1.49609	10.39	18.52	30.76	28.91	41.15	56.00	46.00	-27.09	-4.85
4	2.48828	10.39	39.04	26.31	49.43	36.70	56.00	46.00	-6.57	-9.30
5	3.32031	10.44	35.83	9.46	46.27	19.90	56.00	46.00	-9.73	-26.10
6	4.62891	10.48	35.78	32.99	46.26	43.47	56.00	46.00	-9.74	-2.53

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

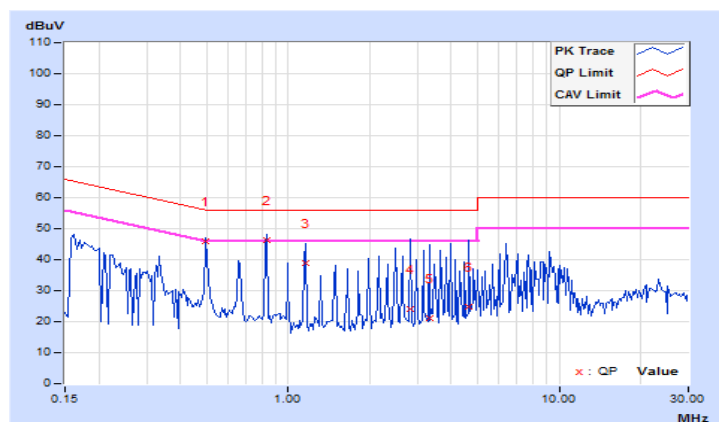


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/10/19

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	0.49766	10.33	35.65	32.88	45.98	43.21	56.04	46.04	-10.06	-2.83
2	0.82969	10.33	36.03	26.67	46.36	37.00	56.00	46.00	-9.64	-9.00
3	1.15625	10.34	28.60	32.99	38.94	43.33	56.00	46.00	-17.06	-2.67
4	2.82031	10.49	13.48	2.66	23.97	13.15	56.00	46.00	-32.03	-32.85
5	3.31641	10.54	10.74	27.59	21.28	38.13	56.00	46.00	-34.72	-7.87
6	4.66016	10.59	14.39	21.96	24.98	32.55	56.00	46.00	-31.02	-13.45

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 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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

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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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