FCC RADIO TEST REPORT

FCC ID	**:**	**2AP65-7225**
Equipment	**:**	**Digital Media Receiver**
Model Name	**:**	**P5B83L**
Applicant	**:**	**Lindland LLC** **9121 Anson Way, Ste. 200, Raleigh, NC 27615**
Standard	**:**	**FCC Part 15 Subpart C §15.247**

The testing was completed on Jul. 14, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.

This report contains data that were produced under subcontract by accredited Sporton laboratory located in Taiwan.
Sporton Lab in Taiwan is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No.TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Eric Shih

NVLAP TESTING
NVLAP LAB CODE 600156-0

Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR842408-01B	01	Initial issue of report	Jul. 30, 2018
FR842408-01B	02	Revising the description of applicable standards in section 1.5 and test results in section 3.5.5.	Aug. 28, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.247(a)(2)	6dB Bandwidth	Pass
3.1	2.1049	99% Occupied Bandwidth	Reporting only
3.2	15.247(b)(3)	Peak Output Power	Pass
3.3	15.247(e)	Power Spectral Density	Pass
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	Pass
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	Pass
3.6	15.203 & 15.247(b)	Antenna Requirement	Pass

Reviewed by: Joseph Lin

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	P5B83L
FCC ID	2AP65-7225
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth LE

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel (37 hopping + 3 advertising channel)
Maximum Output Power to Antenna	Ant. 1: 4.14 dBm (0.0026 W) Ant. 2: 3.93 dBm (0.0025 W)
99% Occupied Bandwidth	Ant. 1: 1.03MHz Ant. 2: 1.04MHz
Antenna Type / Gain	Ant. 1: Fixed Internal Antenna type with gain 2.97 dBi Ant. 2: Fixed Internal Antenna type with gain 1.36 dBi
Type of Modulation	Bluetooth LE : GFSK

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	TH01-SZ	251365

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	577730

Note: The test site complies with ANSI C63.4 2014 requirement.

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

2.2 Test Mode

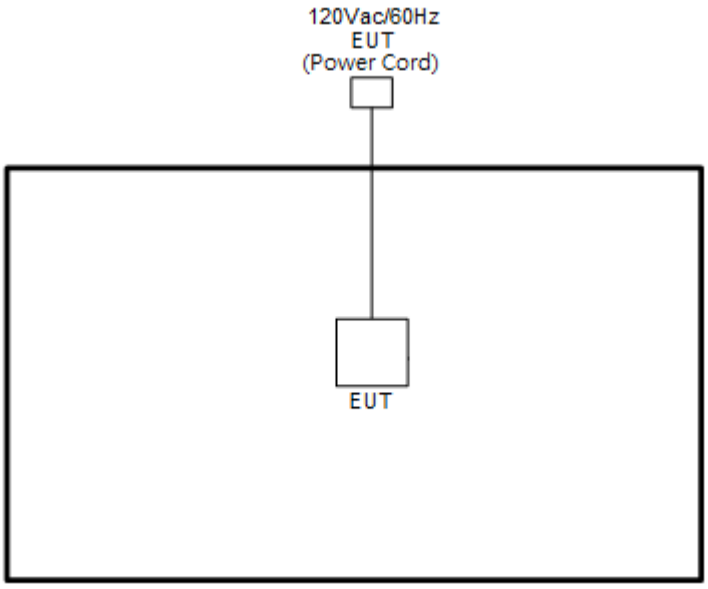
a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth – LE / GFSK
Conducted Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps

2.3 Connection Diagram of Test System

<Bluetooth – LE Tx Mode>



2.4 EUT Operation Test Setup

The RF test items, utility “CMD” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

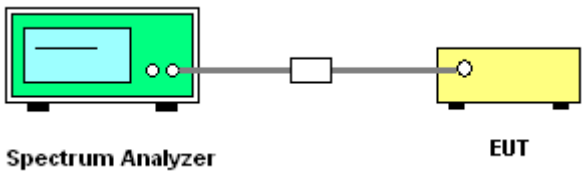
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
6. Measure and record the results in the test report.

3.1.4 Test Setup

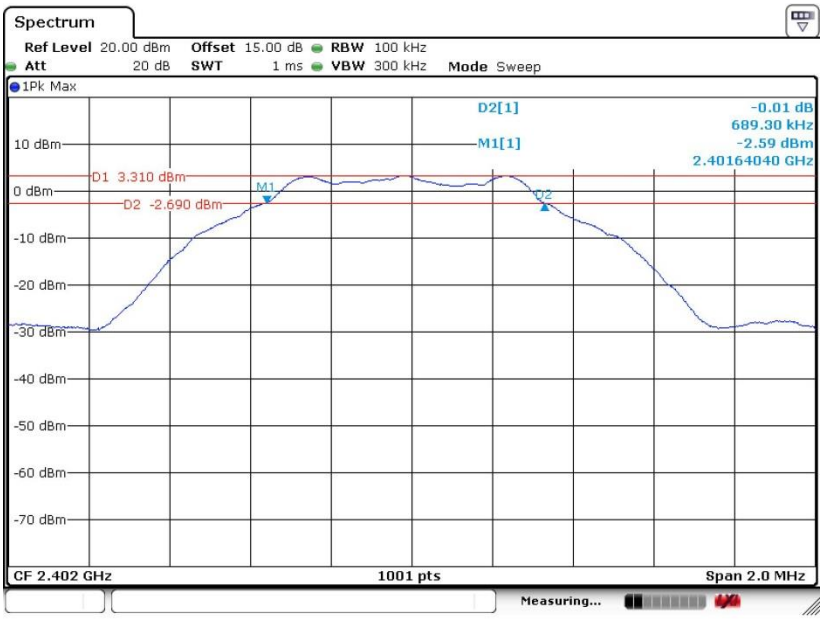


3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

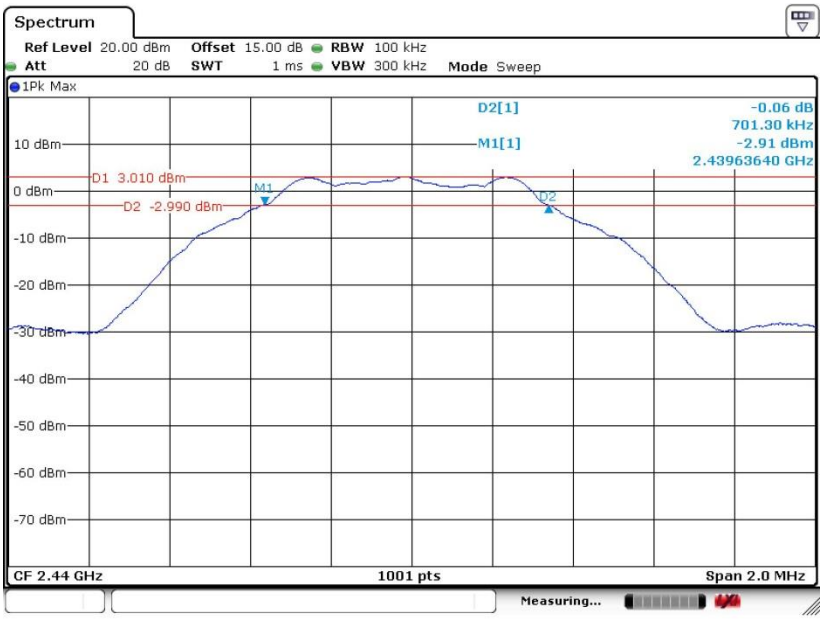
<Ant. 1>

6 dB Bandwidth Plot on Channel 00



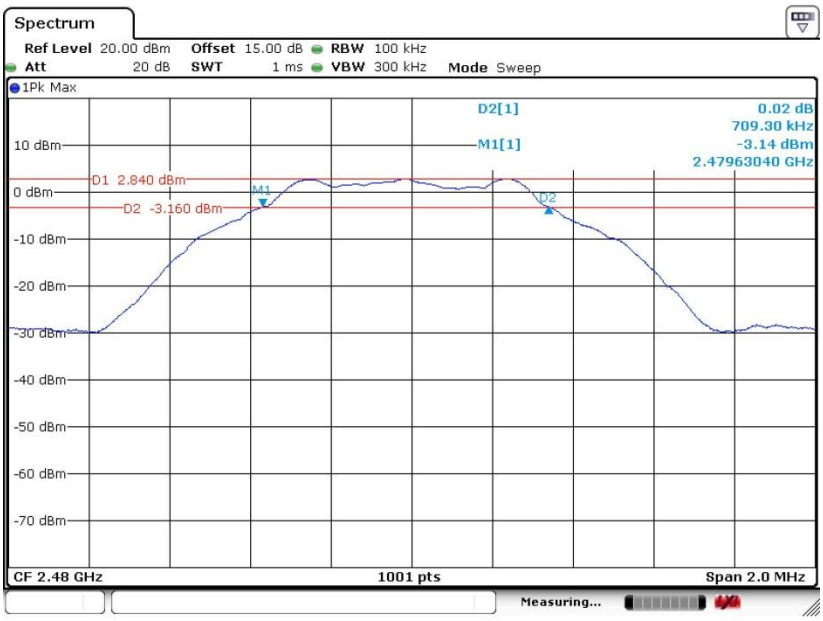
Date: 28.JUN.2018 14:20:03

6 dB Bandwidth Plot on Channel 19



Date: 28.JUN.2018 14:31:27

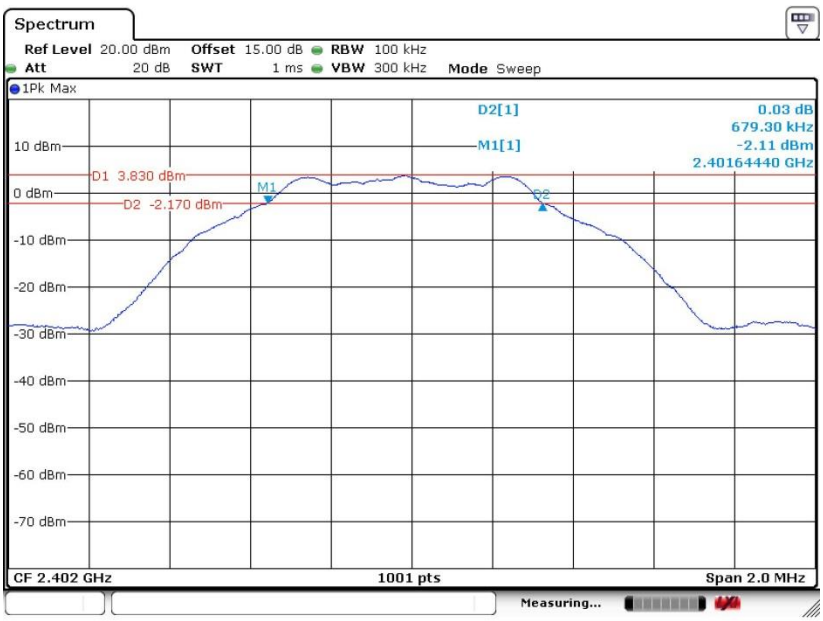
6 dB Bandwidth Plot on Channel 39



Date: 28.JUN.2018 14:42:36

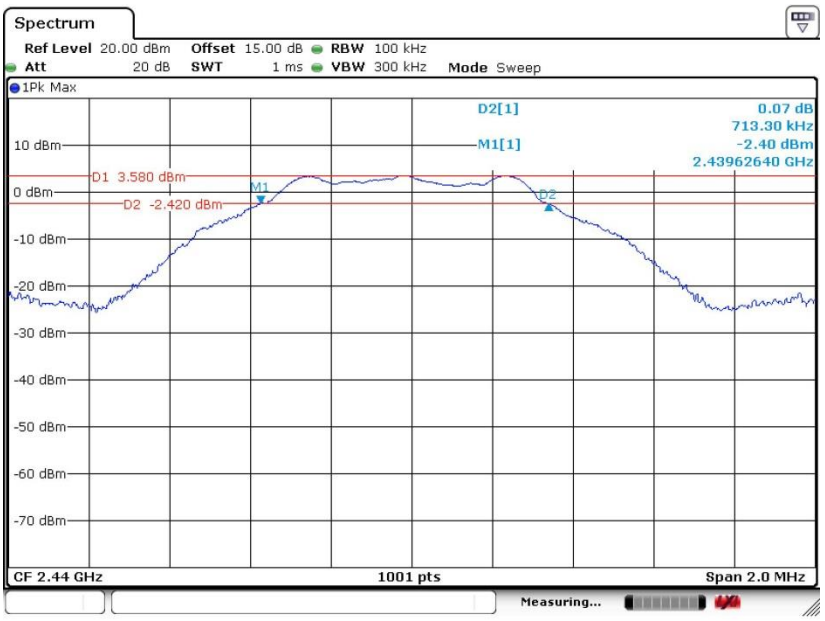
<Ant. 2>

6 dB Bandwidth Plot on Channel 00



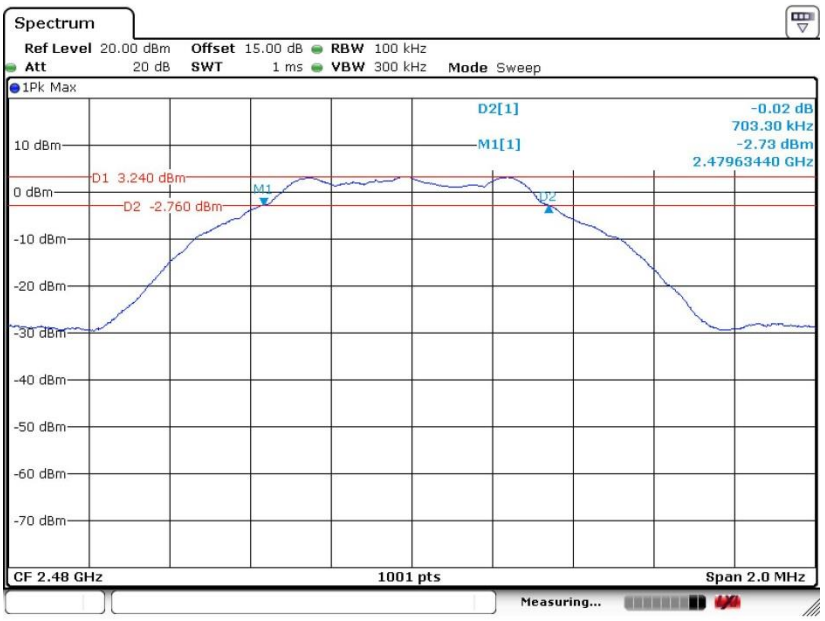
Date: 28.JUN.2018 17:33:10

6 dB Bandwidth Plot on Channel 19



Date: 28.JUN.2018 17:37:52

6 dB Bandwidth Plot on Channel 39



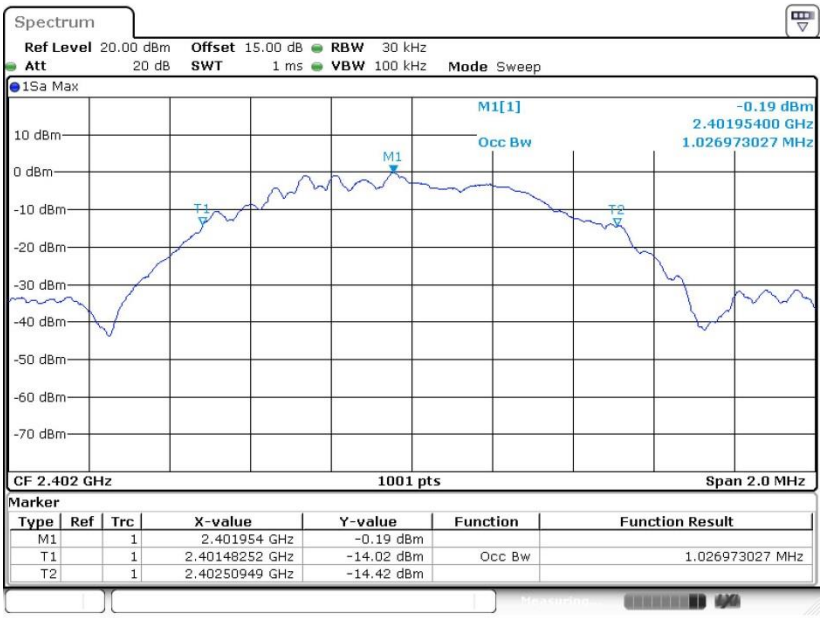
Date: 28.JUN.2018 17:45:00

3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

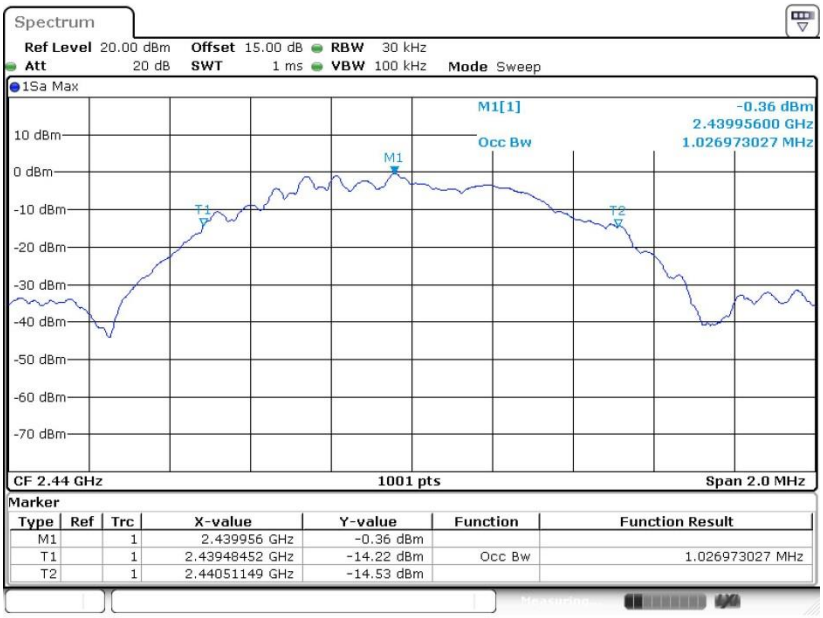
<Ant. 1>

99% Bandwidth Plot on Channel 00



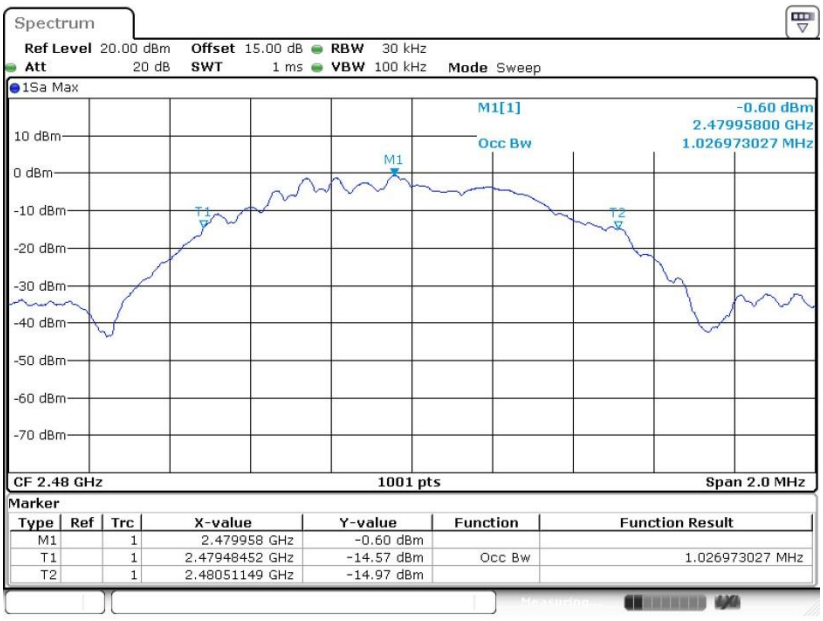
Date: 28.JUN.2018 14:21:32

99% Occupied Bandwidth Plot on Channel 19



Date: 28.JUN.2018 14:34:45

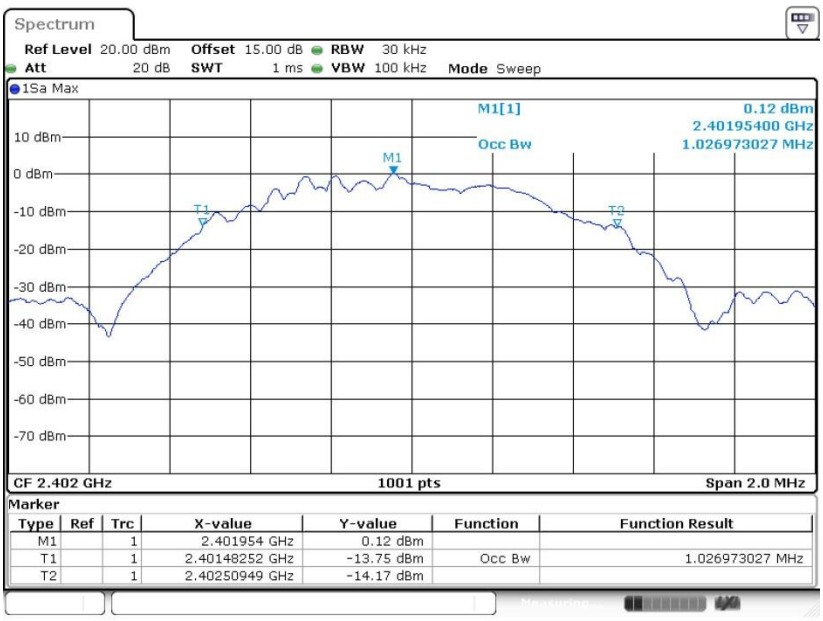
99% Occupied Bandwidth Plot on Channel 39



Date: 28.JUN.2018 14:44:01

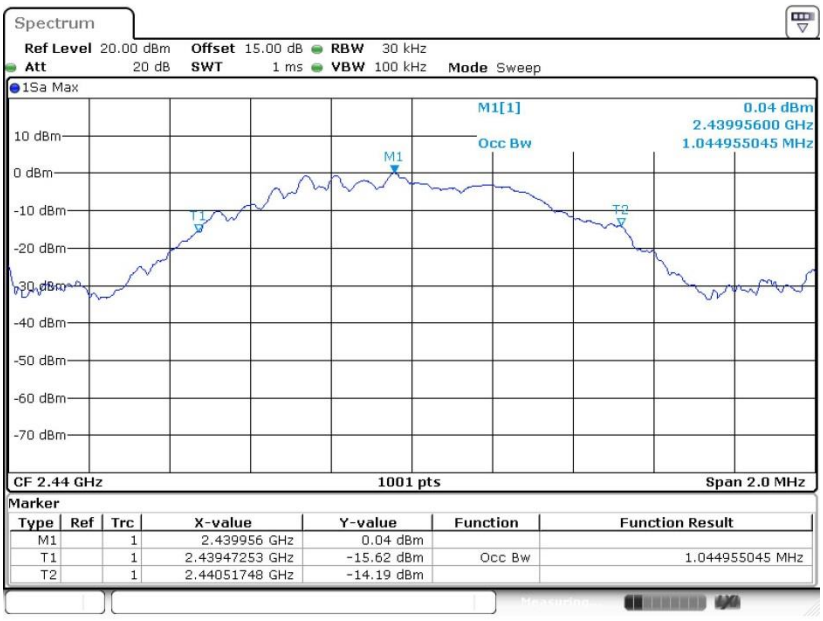
<Ant. 2>

99% Bandwidth Plot on Channel 00



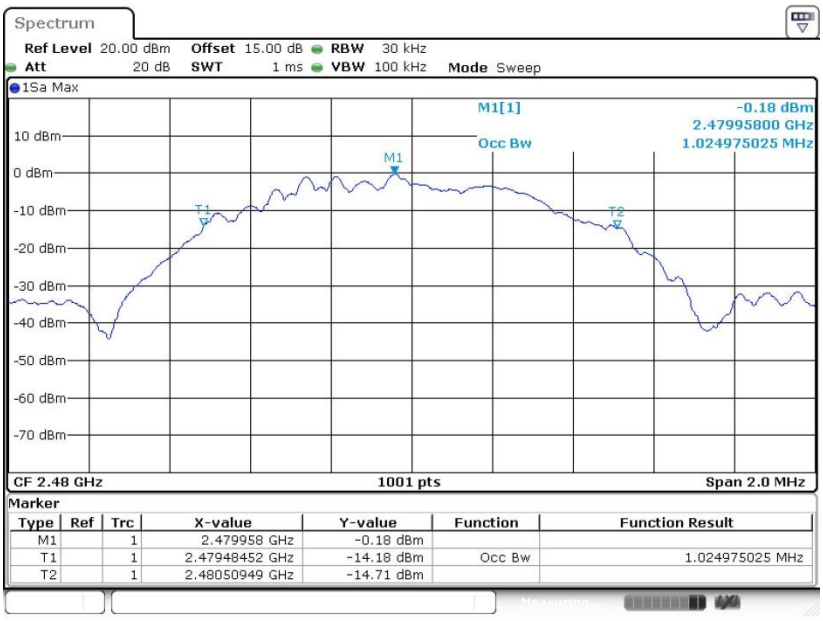
Date: 28.JUN.2018 17:35:44

99% Occupied Bandwidth Plot on Channel 19



Date: 28.JUN.2018 17:40:08

99% Occupied Bandwidth Plot on Channel 39



Date: 28.JUN.2018 17:47:06

Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

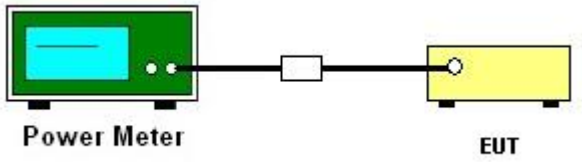
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Peak Power, the testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.3 PKPM1 Peak power meter method.
2. For Average Power, the testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.2.3.1 Method AVGPM.
3. The RF output of EUT was connected to the power meter by RF cable and attenuator.
4. The path loss was compensated to the results for each measurement.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

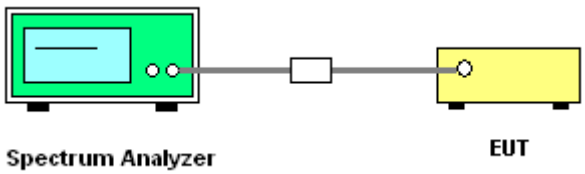
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



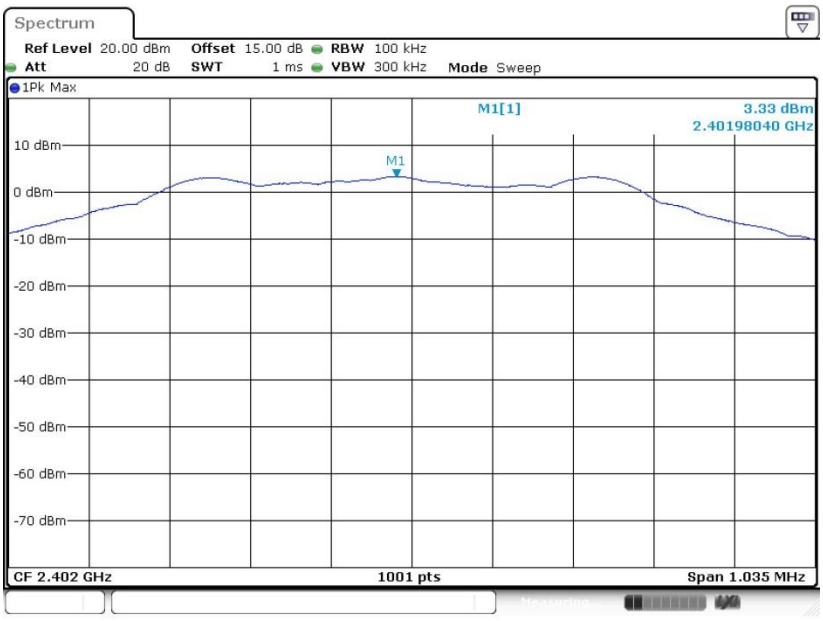
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

3.3.6 Test Result of Power Spectral Density Plots (100kHz)

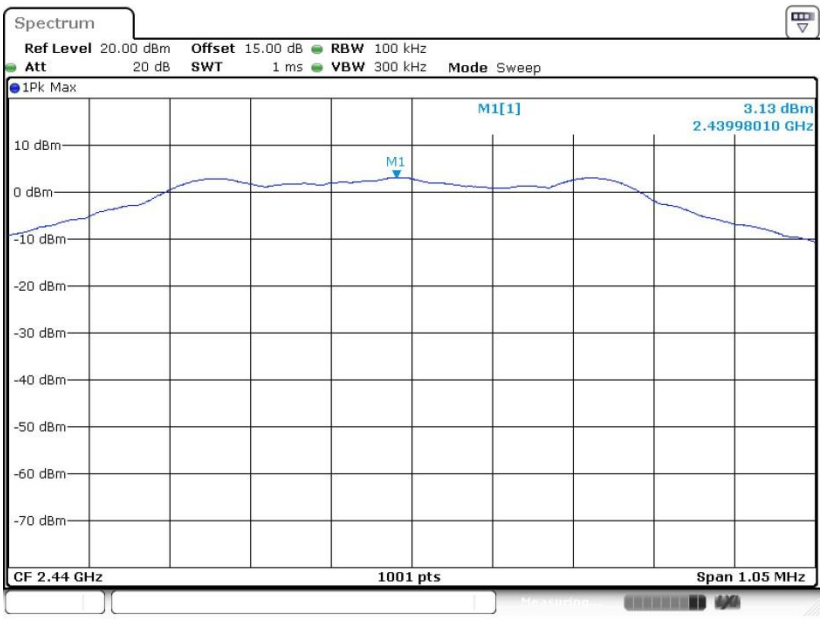
<Ant. 1>

PSD 100kHz Plot on Channel 00



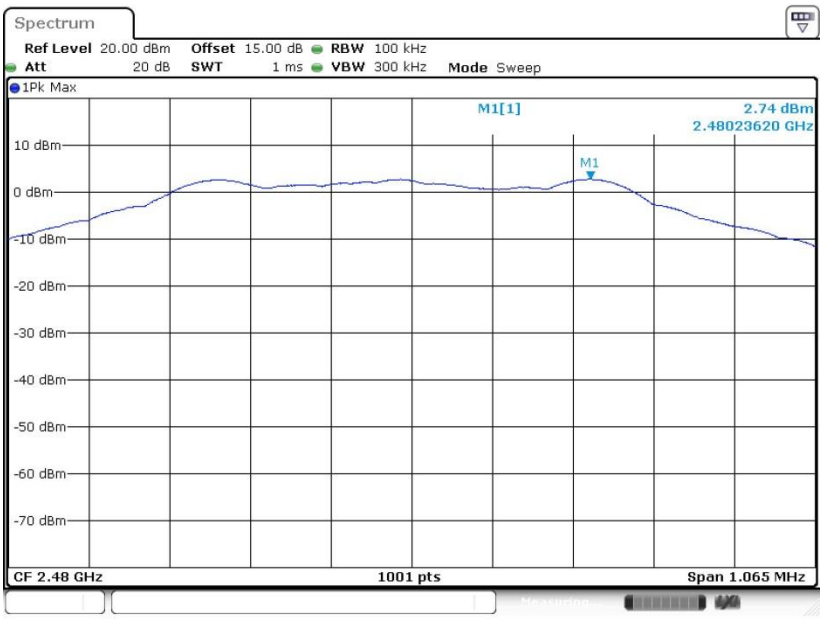
Date: 28.JUN.2018 14:20:28

PSD 100kHz Plot on Channel 19



Date: 28.JUN.2018 14:33:52

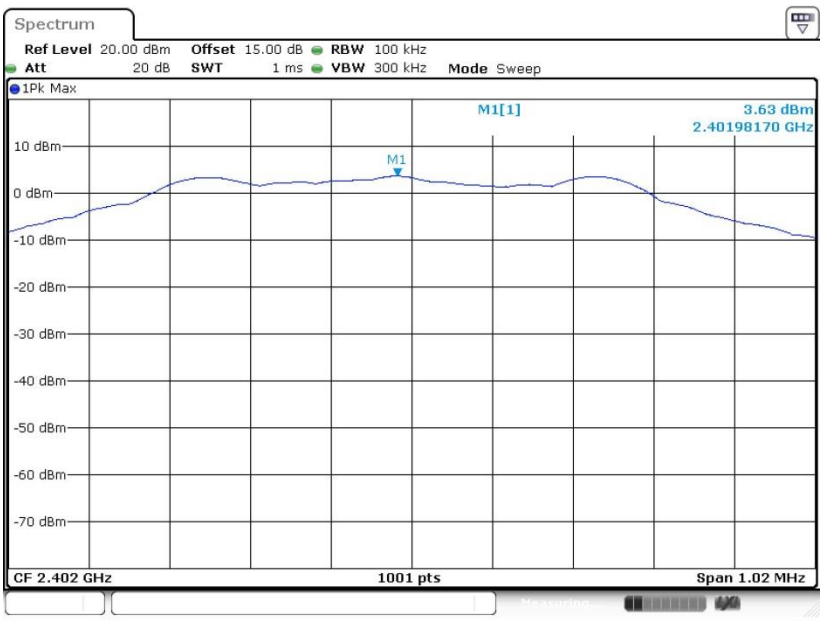
PSD 100kHz Plot on Channel 39



Date: 28.JUN.2018 14:43:02

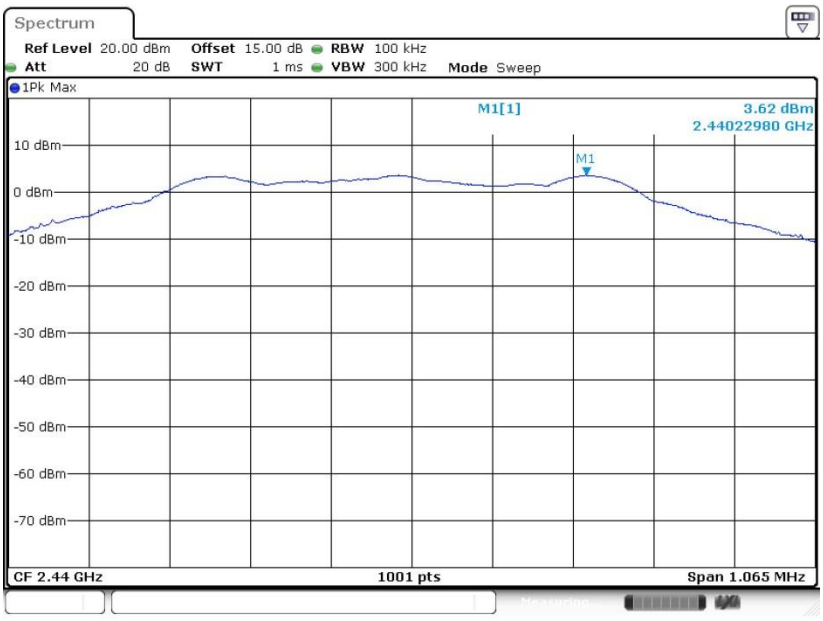
<Ant. 2>

PSD 100kHz Plot on Channel 00



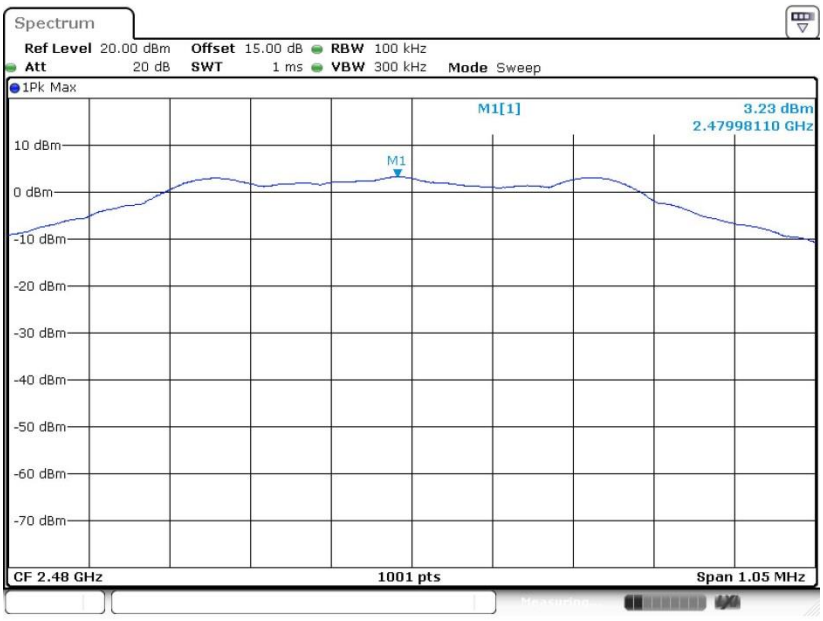
Date: 28.JUN.2018 17:34:25

PSD 100kHz Plot on Channel 19



Date: 28.JUN.2018 17:38:31

PSD 100kHz Plot on Channel 39

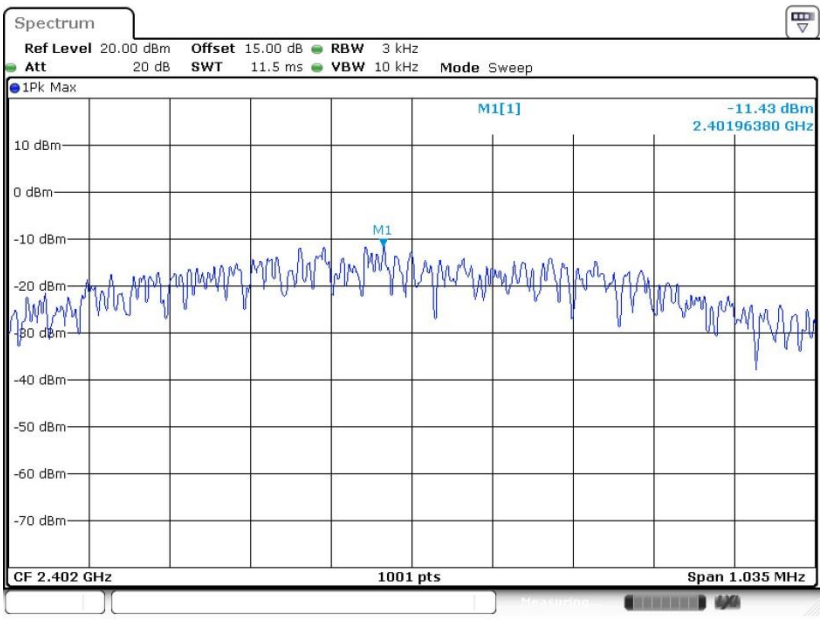


Date: 28.JUN.2018 17:45:49

3.3.7 Test Result of Power Spectral Density Plots (3kHz)

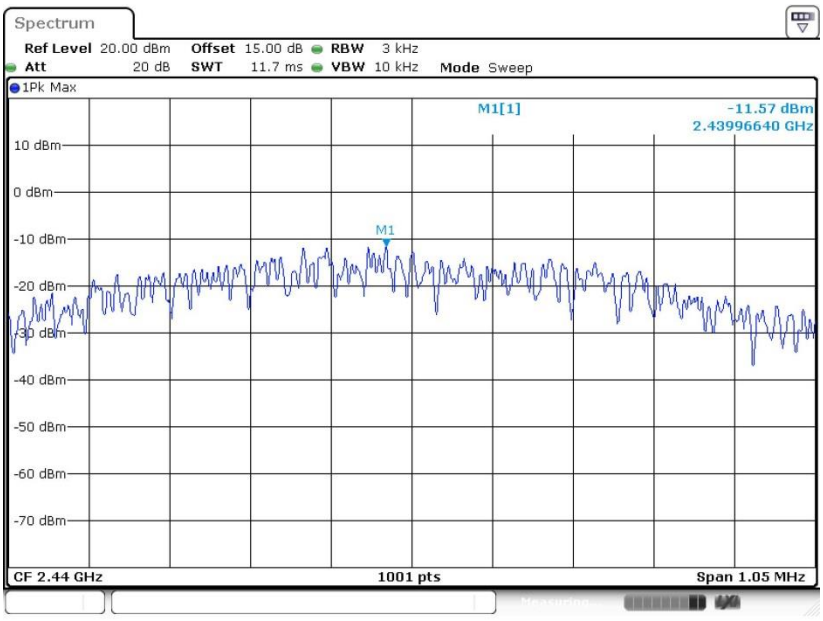
<Ant. 1>

PSD 3kHz Plot on Channel 00



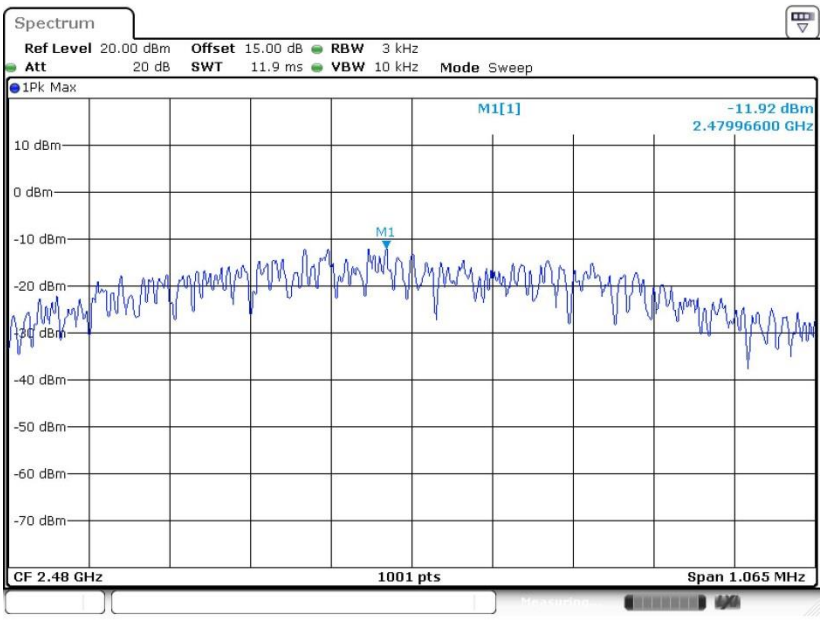
Date: 28.JUN.2018 14:20:11

PSD 3kHz Plot on Channel 19



Date: 28.JUN.2018 14:33:02

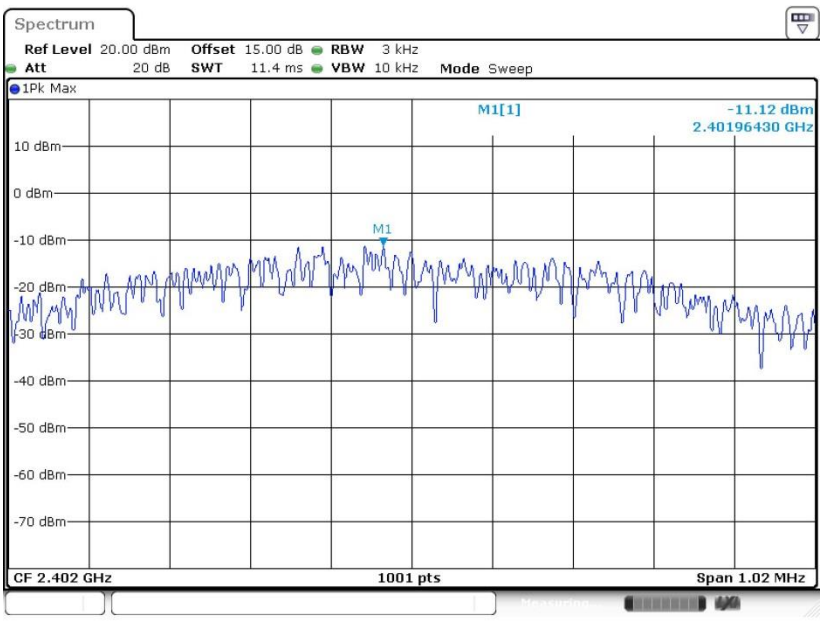
PSD 3kHz Plot on Channel 39



Date: 28.JUN.2018 14:42:45

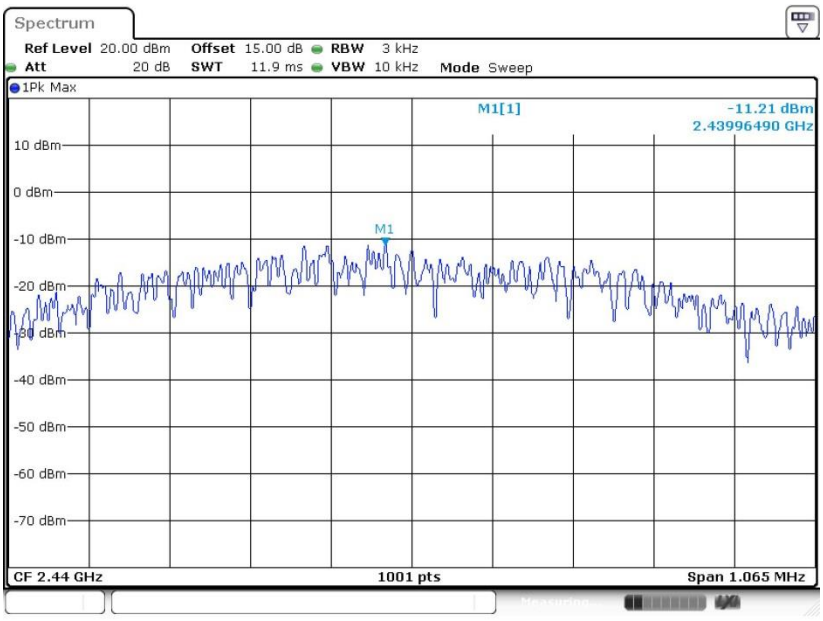
<Ant. 2>

PSD 3kHz Plot on Channel 00



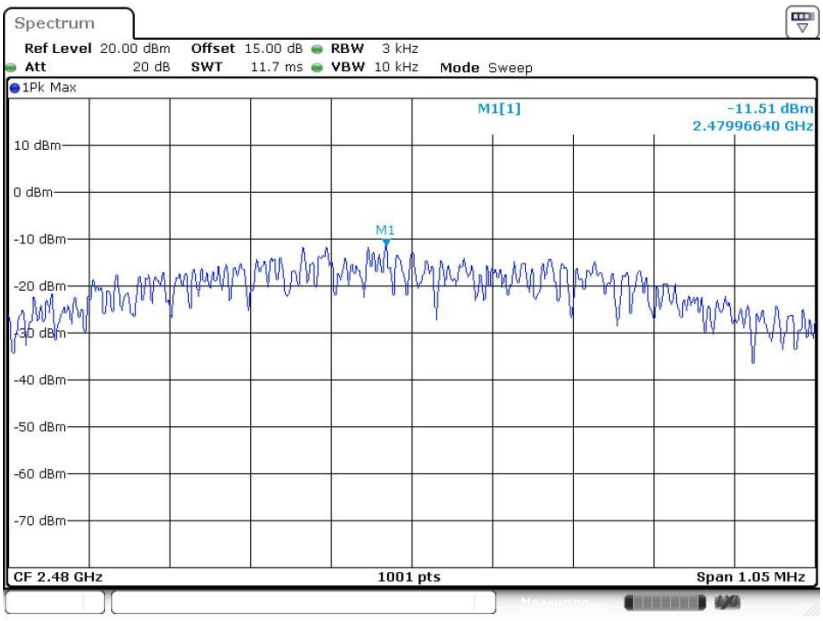
Date: 28.JUN.2018 17:33:25

PSD 3kHz Plot on Channel 19



Date: 28.JUN.2018 17:38:13

PSD 3kHz Plot on Channel 39



Date: 28.JUN.2018 17:45:24

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

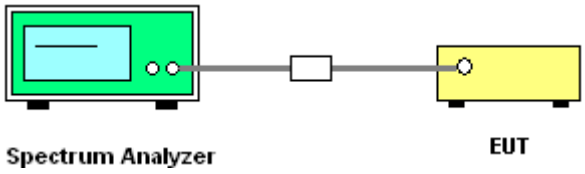
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

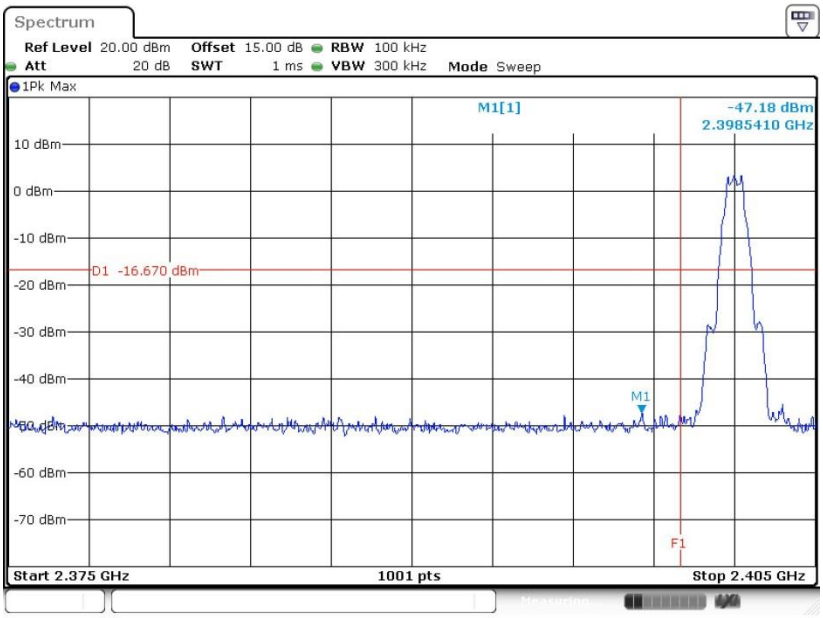
3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges Plots

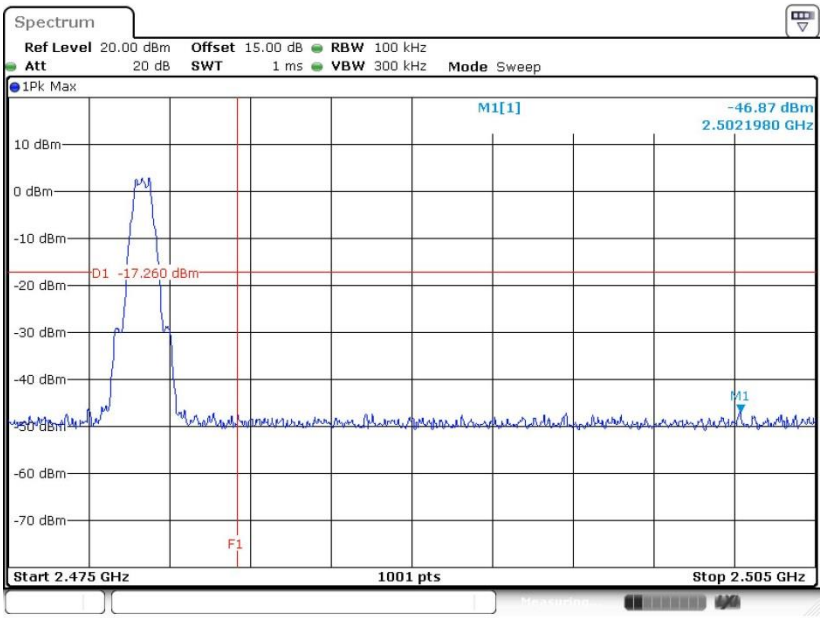
<Ant. 1>

Low Band Edge Plot on Channel 00



Date: 28.JUN.2018 14:20:41

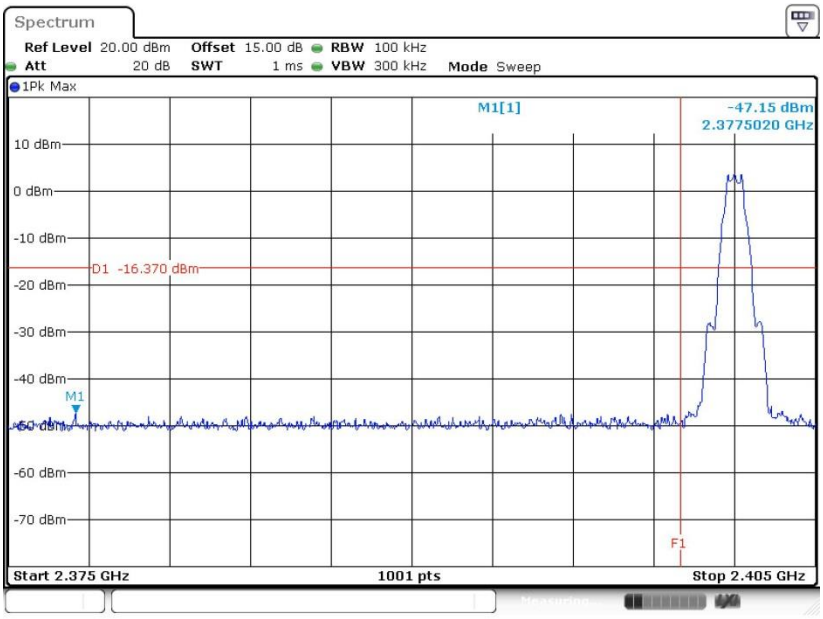
High Band Edge Plot on Channel 39



Date: 28.JUN.2018 14:43:16

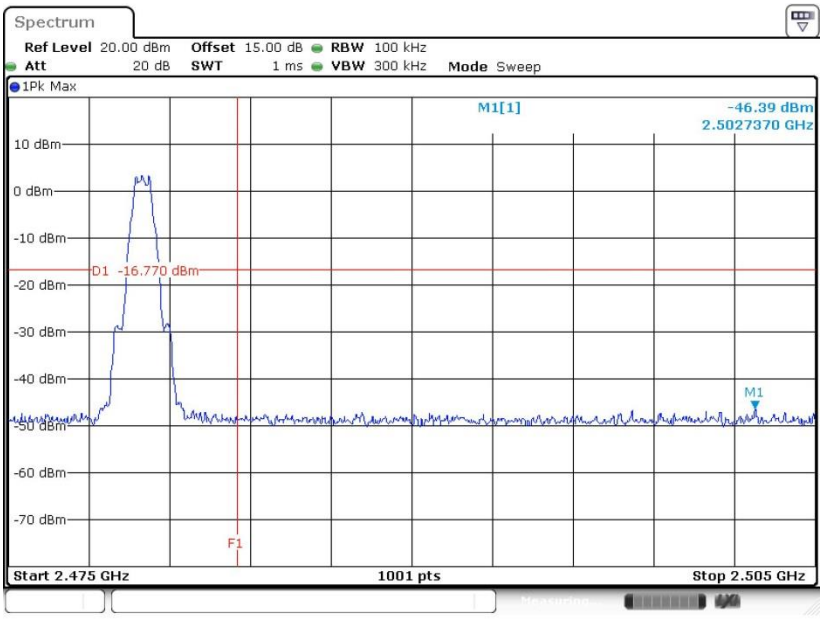
<Ant. 2>

Low Band Edge Plot on Channel 00



Date: 28.JUN.2018 17:34:50

High Band Edge Plot on Channel 39



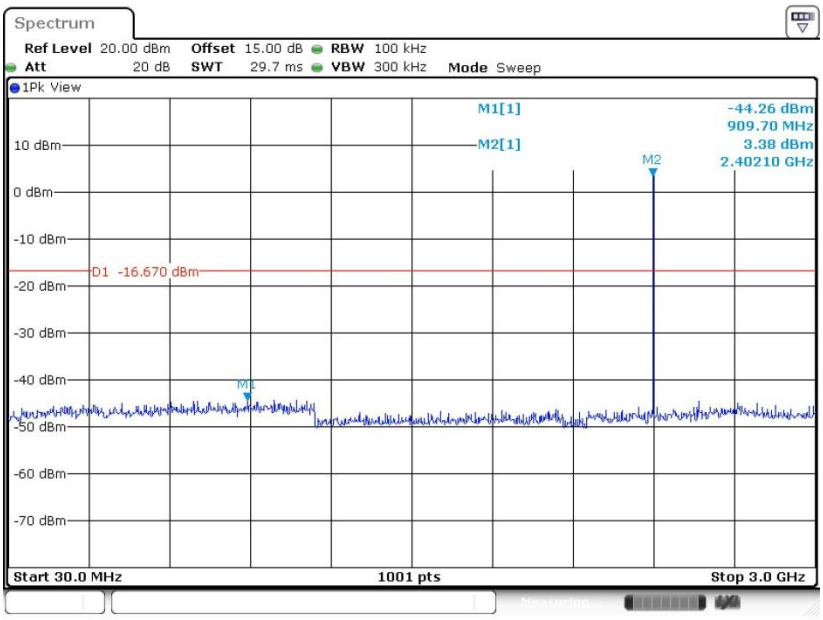
Date: 28.JUN.2018 17:46:20

3.4.6 Test Result of Conducted Spurious Emission Plots

<Ant. 1>

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

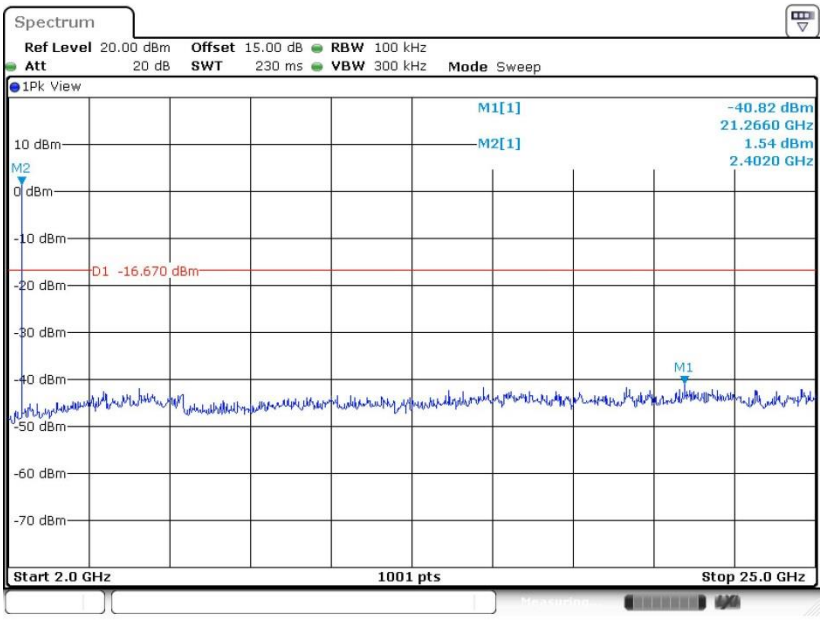
GFSK Channel 00



Date: 28.JUN.2018 14:28:35

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

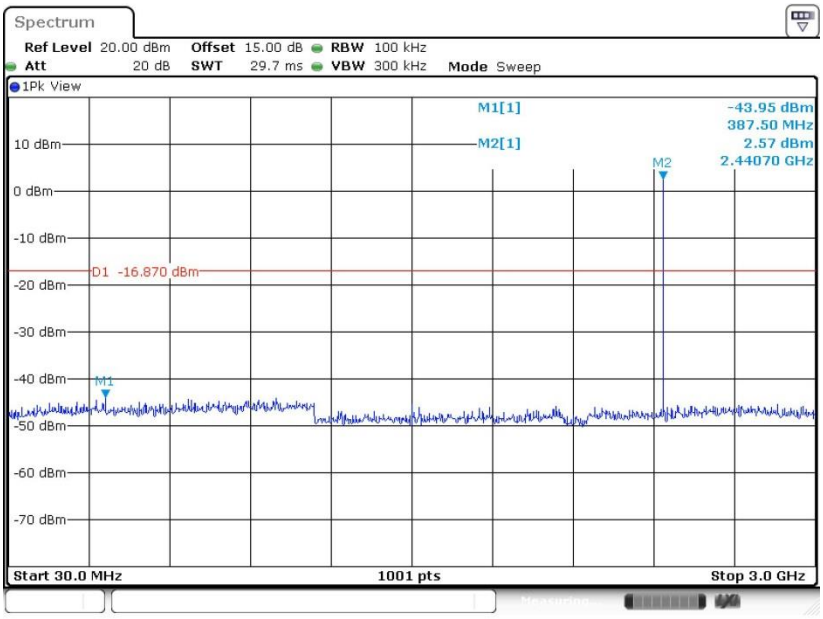
GFSK Channel 00



Date: 28.JUN.2018 14:26:08

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

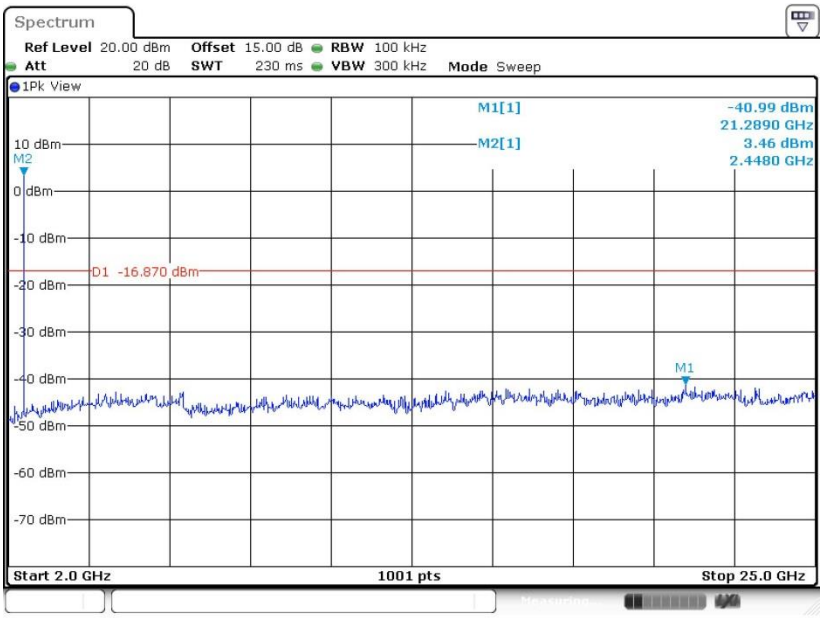
GFSK Channel 19



Date: 28.JUN.2018 14:34:03

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

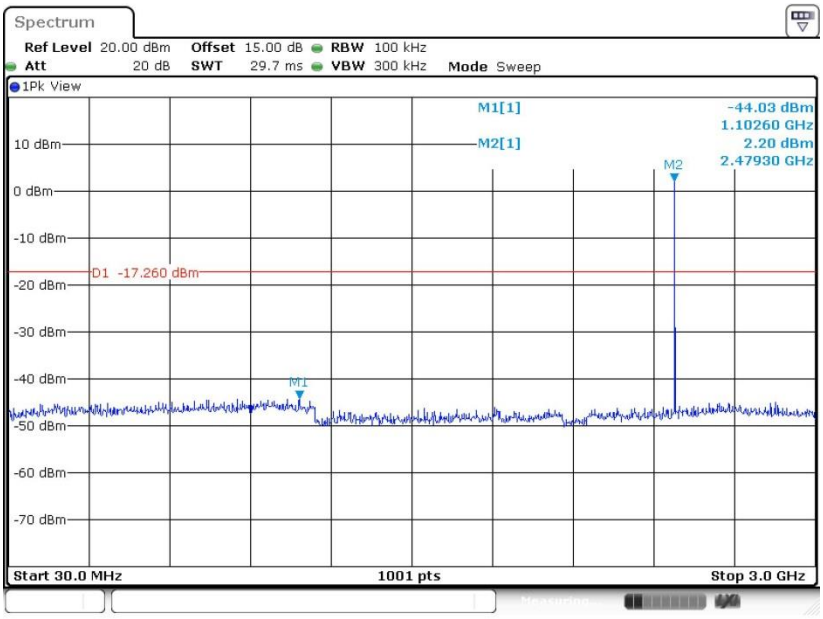
GFSK Channel 19



Date: 28.JUN.2018 14:34:11

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

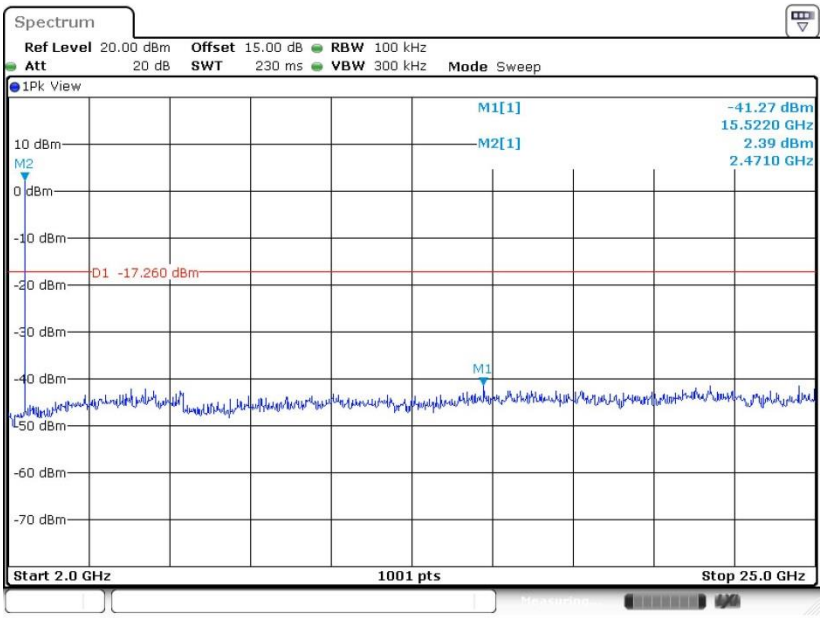
GFSK Channel 39



Date: 28.JUN.2018 14:43:27

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39

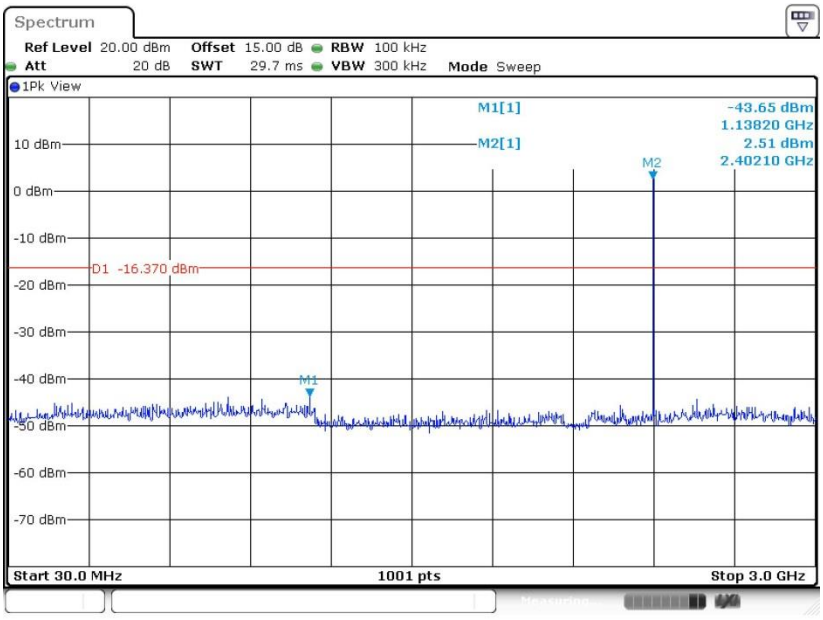


Date: 28.JUN.2018 18:57:46

<Ant. 2>

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

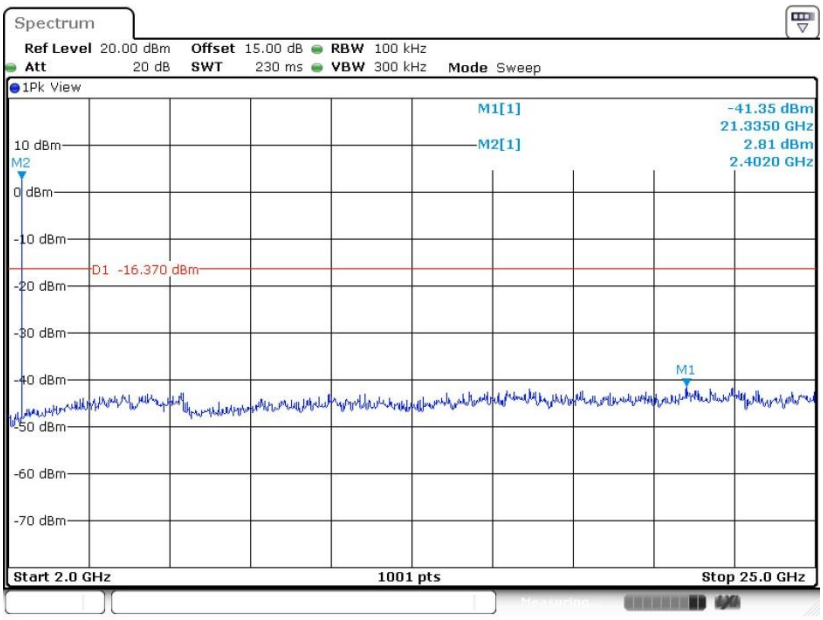
GFSK Channel 00



Date: 28.JUN.2018 18:55:19

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

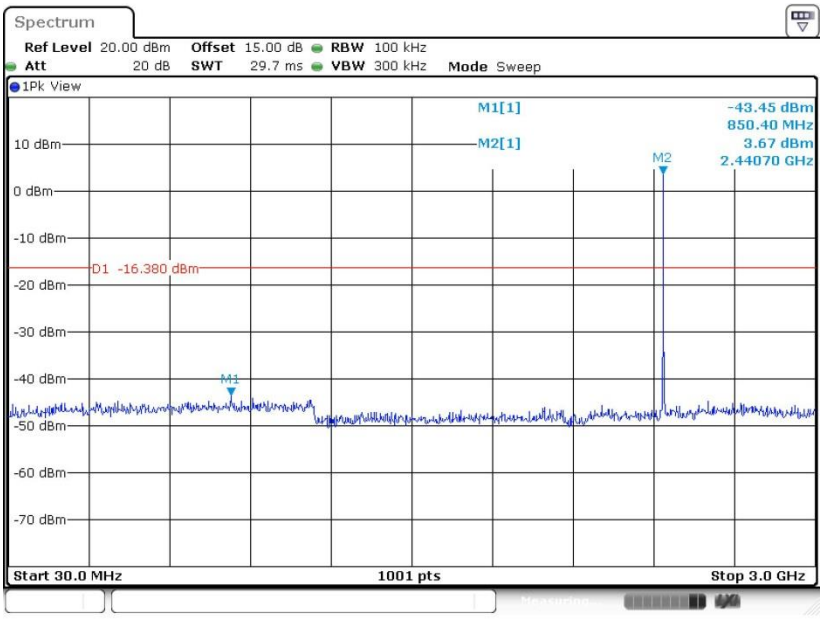
GFSK Channel 00



Date: 28.JUN.2018 17:35:10

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

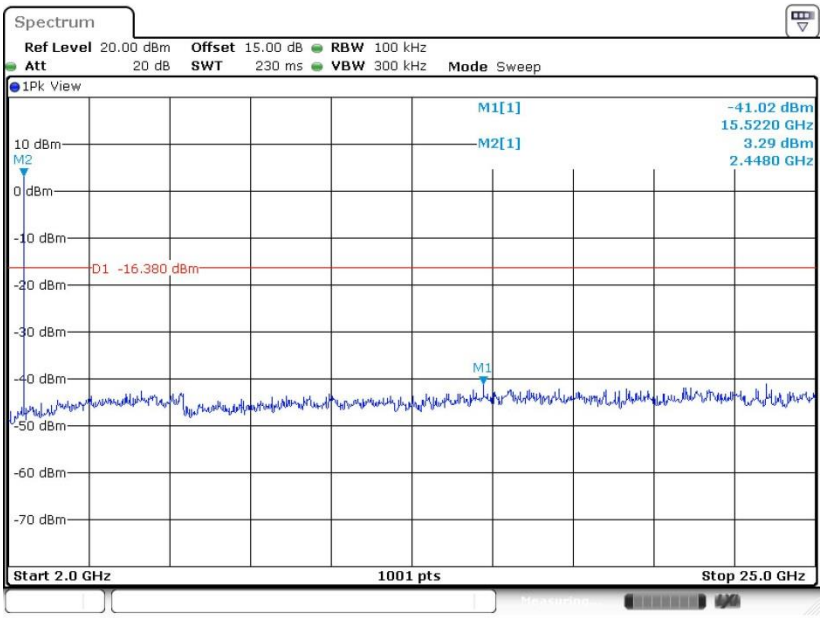
GFSK Channel 19



Date: 28.JUN.2018 17:38:42

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

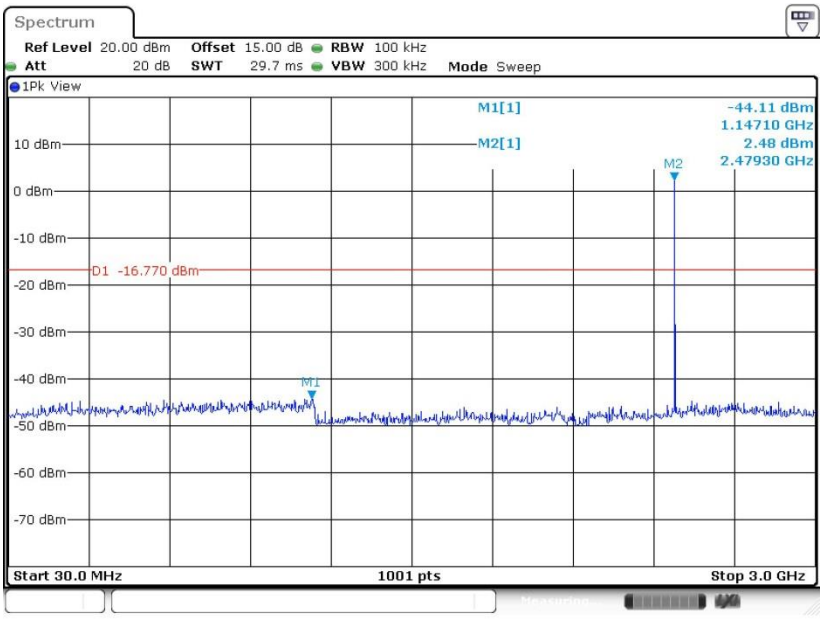
GFSK Channel 19



Date: 28.JUN.2018 17:38:51

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

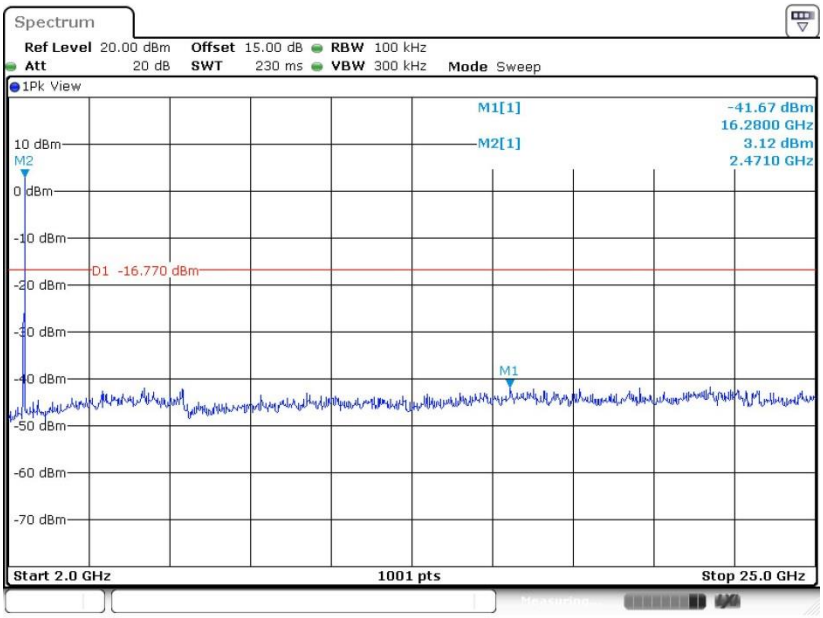
GFSK Channel 39



Date: 28.JUN.2018 17:46:34

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39



Date: 28.JUN.2018 17:46:42

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (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

3.5.2 Measuring Instruments

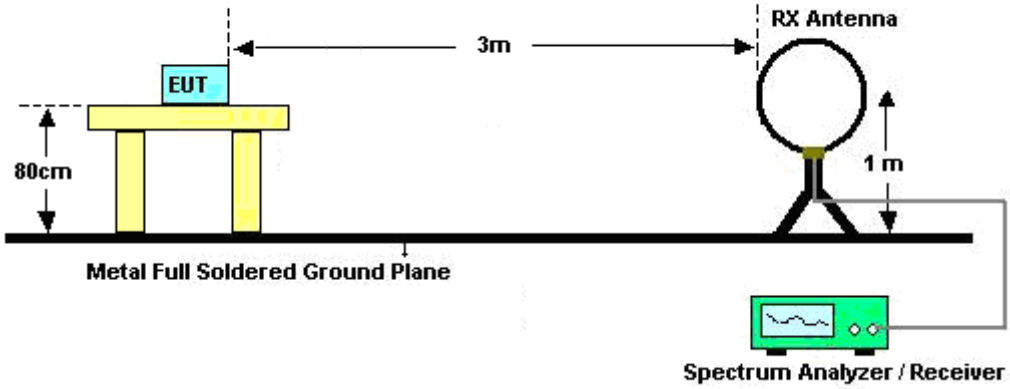
See list of measuring equipment of this test report.

3.5.3 Test Procedures

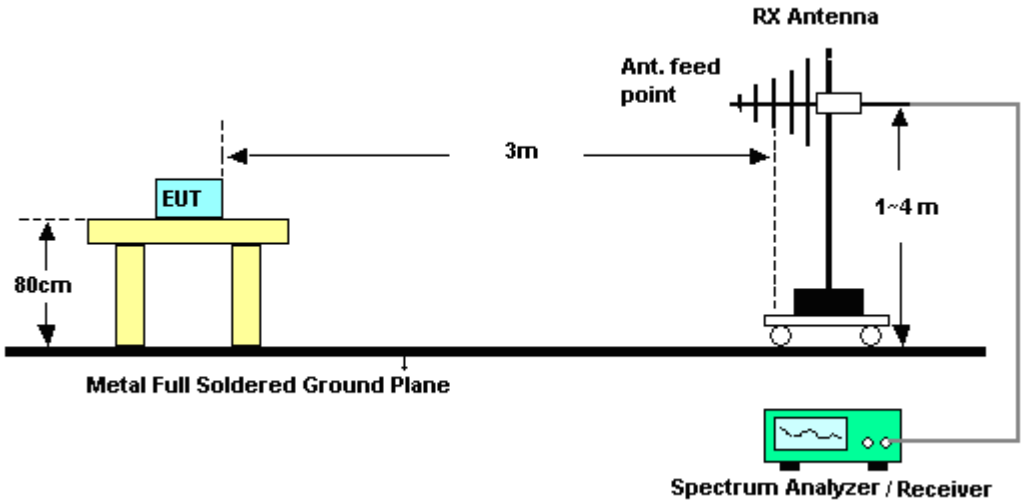
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

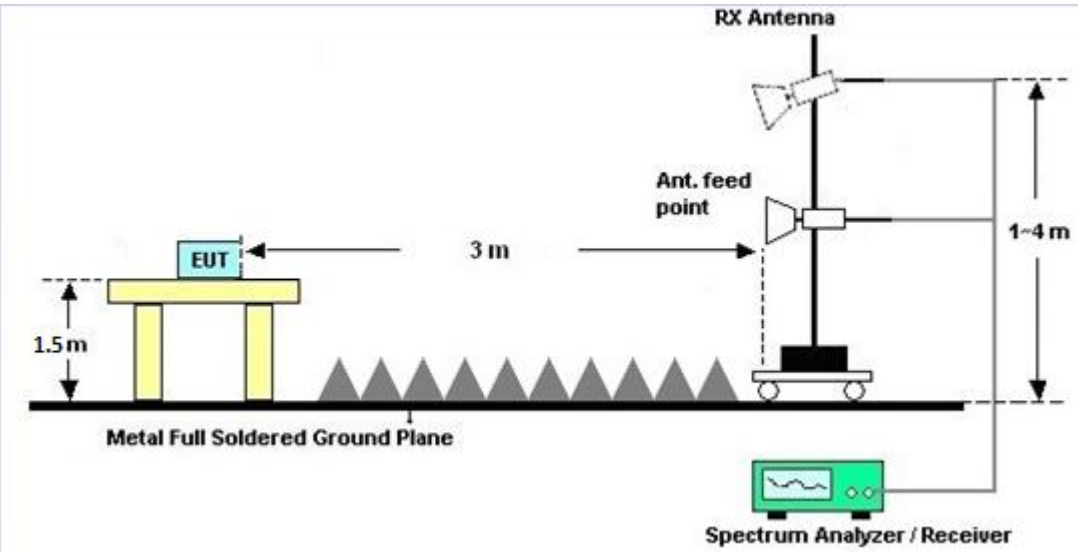
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.6 Antenna Requirements

3.6.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101400	9kHz~40GHz	Dec. 26, 2017	Jun. 13, 2018 ~ Jun. 28, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	Jun. 13, 2018 ~ Jun. 28, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Jun. 13, 2018 ~ Jun. 28, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Jun. 13, 2018 ~ Jun. 28, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	Jun. 17, 2018 ~ Jul. 14, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	Jun. 17, 2018 ~ Jul. 14, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	Jun. 17, 2018 ~ Jul. 14, 2018	May 13, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug. 29, 2017	Jun. 17, 2018 ~ Jul. 14, 2018	Aug. 28, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Jun. 17, 2018 ~ Jul. 14, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Apr. 20 2018	Jun. 17, 2018 ~ Jul. 14, 2018	Apr. 19, 2019	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct.19, 2017	Jun. 17, 2018 ~ Jul. 14, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Jun. 17, 2018 ~ Jul. 14, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 27, 2017	Jun. 17, 2018 ~ Jul. 14, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 19, 2018	Jun. 17, 2018 ~ Jul. 14, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Jun. 17, 2018 ~ Jul. 14, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 17, 2018 ~ Jul. 14, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 17, 2018 ~ Jul. 14, 2018	NCR	Radiation (03CH04-SZ)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.1**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.9**

Appendix A. Test Result of Conducted Test Items

<Ant. 1>

Test Engineer:	Sam zheng	Temperature:	21~25	°C
Test Date:	2018/06/13 ~ 2018/06/28	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.03	0.69	0.50	Pass
BLE	1Mbps	1	19	2440	1.03	0.70	0.50	Pass
BLE	1Mbps	1	39	2480	1.03	0.71	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	3.71	30.00	2.97	6.68	36.00	Pass
BLE	1Mbps	1	19	2440	4.14	30.00	2.97	7.11	36.00	Pass
BLE	1Mbps	1	39	2480	4.05	30.00	2.97	7.02	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.21	3.22
BLE	1Mbps	1	19	2440	2.21	3.61
BLE	1Mbps	1	39	2480	2.21	3.50

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	3.33	-11.43	2.97	8.00	Pass
BLE	1Mbps	1	19	2440	3.13	-11.57	2.97	8.00	Pass
BLE	1Mbps	1	39	2480	2.74	-11.92	2.97	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.

<Ant. 2>

Test Engineer:	Sam zheng	Temperature:	21~25	°C
Test Date:	2018/6/28	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.03	0.68	0.50	Pass
BLE	1Mbps	1	19	2440	1.04	0.71	0.50	Pass
BLE	1Mbps	1	39	2480	1.02	0.70	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	3.49	30.00	1.36	4.85	36.00	Pass
BLE	1Mbps	1	19	2440	3.78	30.00	1.36	5.14	36.00	Pass
BLE	1Mbps	1	39	2480	3.93	30.00	1.36	5.29	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.21	3.01
BLE	1Mbps	1	19	2440	2.21	3.26
BLE	1Mbps	1	39	2480	2.21	3.47

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	3.63	-11.12	1.36	8.00	Pass
BLE	1Mbps	1	19	2440	3.62	-11.21	1.36	8.00	Pass
BLE	1Mbps	1	39	2480	3.23	-11.51	1.36	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.

Appendix B. Radiated Spurious Emission

Test Engineer :	Vikki Peng	Temperature :	22~25°C
		Relative Humidity :	48~52%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2340.345	52.57	-21.43	74	48.75	27.75	4.66	28.59	368	21	P	H
		2374.89	42.95	-11.05	54	38.99	27.72	4.72	28.48	368	21	A	H
	*	2402	100.38	-	-	96.26	27.7	4.78	28.36	368	21	P	H
	*	2402	99.67	-	-	95.55	27.7	4.78	28.36	368	21	A	H
		2372.475	52.21	-21.79	74	48.25	27.72	4.72	28.48	130	346	P	V
		2388.645	42.92	-11.08	54	38.92	27.7	4.78	28.48	130	346	A	V
	*	2402	99.18	-	-	95.06	27.7	4.78	28.36	130	346	P	V
	*	2402	98.42	-	-	94.3	27.7	4.78	28.36	130	346	A	V
BLE CH 19 2440MHz		2359.7	52.78	-21.22	74	48.91	27.74	4.72	28.59	368	21	P	H
		2333.94	42.82	-11.18	54	39.09	27.77	4.66	28.7	368	21	A	H
	*	2440	101.15	-	-	96.91	27.66	4.82	28.24	368	21	P	H
	*	2440	100.44	-	-	96.2	27.66	4.82	28.24	368	21	A	H
		2489.43	53.3	-20.7	74	48.85	27.61	4.85	28.01	368	21	P	H
		2499.51	43.74	-10.26	54	39.18	27.61	4.85	27.9	368	21	A	H
		2389.1	53.1	-20.9	74	49.1	27.7	4.78	28.48	146	346	P	V
		2387.28	42.84	-11.16	54	38.84	27.7	4.78	28.48	146	346	A	V
	*	2440	100.74	-	-	96.5	27.66	4.82	28.24	146	346	P	V
	*	2440	99.87	-	-	95.63	27.66	4.82	28.24	146	346	A	V
		2494.61	52.68	-21.32	74	48.12	27.61	4.85	27.9	146	346	P	V
		2495.31	43.57	-10.43	54	39.01	27.61	4.85	27.9	146	346	A	V

BLE CH 39 2480MHz	*	2480	101.47	-	-	97	27.63	4.85	28.01	193	74	P	H
	*	2480	100.65	-	-	96.18	27.63	4.85	28.01	193	74	A	H
		2484.08	53.97	-20.03	74	49.5	27.63	4.85	28.01	193	74	P	H
		2483.52	46.59	-7.41	54	42.12	27.63	4.85	28.01	193	74	A	H
	*	2480	100.9	-	-	96.43	27.63	4.85	28.01	138	345	P	V
	*	2480	100.19	-	-	95.72	27.63	4.85	28.01	138	345	A	V
		2489.04	53.94	-20.06	74	49.49	27.61	4.85	28.01	138	345	P	V
		2483.52	45.98	-8.02	54	41.51	27.63	4.85	28.01	138	345	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE Ant	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		4804	41.41	-32.59	74	62.36	31.72	5.55	58.22	197	219	P	H
		4804	40.33	-33.67	74	61.28	31.72	5.55	58.22	151	300	P	V
BLE CH 19 2440MHz		4880	39.64	-34.36	74	60.21	31.88	5.65	58.1	164	214	P	H
		7320	45.27	-28.73	74	58.94	36.94	7.26	57.87	168	98	P	H
		4880	40.32	-33.68	74	60.89	31.88	5.65	58.1	150	258	P	V
		7320	46.32	-27.68	74	59.99	36.94	7.26	57.87	195	309	P	V
BLE CH 39 2480MHz		4960	39.58	-34.42	74	59.5	32.08	5.96	57.96	178	95	P	H
		7440	45.47	-28.53	74	58.39	37.4	7.17	57.49	184	278	P	H
		4960	39.94	-34.06	74	59.86	32.08	5.96	57.96	118	289	P	V
		7440	45.83	-28.17	74	58.75	37.4	7.17	57.49	178	273	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		30.97	25.27	-14.73	40	32.54	24.43	0.27	31.97	-	-	P	H
		99.84	21.12	-22.38	43.5	35.48	16.3	1.06	31.72	-	-	P	H
		210.42	31.35	-12.15	43.5	45.73	15.3	1.63	31.31	201	0	P	H
		395.69	24.83	-21.17	46	32.06	21.8	2.16	31.19	-	-	P	H
		436.43	25.21	-20.79	46	31.55	22.67	2.26	31.27	-	-	P	H
		681.84	30.11	-15.89	46	31.94	26.53	2.89	31.25	-	-	P	H
		30	24.33	-15.67	40	31.15	24.9	0.25	31.97	-	-	P	V
		76.56	20.67	-19.33	40	38.43	13.27	0.82	31.85	-	-	P	V
		99.84	23.83	-19.67	43.5	38.19	16.3	1.06	31.72	-	-	P	V
		202.66	32.38	-11.12	43.5	46.78	15.3	1.62	31.32	100	214	P	V
		510.15	27.06	-18.94	46	31.66	24.17	2.46	31.23	-	-	P	V
		623.64	28.92	-17.08	46	31.4	26.01	2.76	31.25	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2369.64	52.29	-21.71	74	48.33	27.72	4.72	28.48	389	19	P	H
		2388.54	43.31	-10.69	54	39.31	27.7	4.78	28.48	389	19	A	H
	*	2402	100.74	-	-	96.62	27.7	4.78	28.36	389	19	P	H
	*	2402	100.06	-	-	95.94	27.7	4.78	28.36	389	19	A	H
		2380.35	53.3	-20.7	74	49.34	27.72	4.72	28.48	129	345	P	V
		2371.53	43.04	-10.96	54	39.08	27.72	4.72	28.48	129	345	A	V
	*	2402	99.41	-	-	95.29	27.7	4.78	28.36	129	345	P	V
	*	2402	98.63	-	-	94.51	27.7	4.78	28.36	129	345	A	V
BLE CH 19 2440MHz		2357.46	52.52	-21.48	74	48.65	27.74	4.72	28.59	371	14	P	H
		2366.56	43.05	-10.95	54	39.07	27.74	4.72	28.48	371	14	A	H
	*	2440	101.05	-	-	96.81	27.66	4.82	28.24	371	14	P	H
	*	2440	100.22	-	-	95.98	27.66	4.82	28.24	371	14	A	H
		2497.13	52.85	-21.15	74	48.29	27.61	4.85	27.9	371	14	P	H
		2499.65	43.52	-10.48	54	38.96	27.61	4.85	27.9	371	14	A	H
		2314.9	52.52	-21.48	74	48.77	27.79	4.66	28.7	110	343	P	V
		2388.96	42.94	-11.06	54	38.94	27.7	4.78	28.48	110	343	A	V
	*	2440	100.87	-	-	96.63	27.66	4.82	28.24	110	343	P	V
	*	2440	100.1	-	-	95.86	27.66	4.82	28.24	110	343	A	V
		2485.93	53.5	-20.5	74	49.03	27.63	4.85	28.01	110	343	P	V
		2485.44	43.53	-10.47	54	39.06	27.63	4.85	28.01	110	343	A	V

BLE CH 39 2480MHz	*	2480	101.54	-	-	97.07	27.63	4.85	28.01	392	14	P	H
	*	2480	100.83	-	-	96.36	27.63	4.85	28.01	392	14	A	H
		2484.24	53.67	-20.33	74	49.2	27.63	4.85	28.01	392	14	P	H
		2483.52	46.33	-7.67	54	41.86	27.63	4.85	28.01	392	14	A	H
	*	2480	101.15	-	-	96.68	27.63	4.85	28.01	115	345	P	V
	*	2480	100.32	-	-	95.85	27.63	4.85	28.01	115	345	A	V
		2489.52	53.47	-20.53	74	49.02	27.61	4.85	28.01	115	345	P	V
		2483.52	46.16	-7.84	54	41.69	27.63	4.85	28.01	115	345	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		4804	41.31	-32.69	74	62.26	31.72	5.55	58.22	151	219	P	H
		4804	40.4	-33.6	74	61.35	31.72	5.55	58.22	178	97	P	V
BLE CH 19 2440MHz		4880	39.17	-34.83	74	59.74	31.88	5.65	58.1	150	258	P	H
		7320	45.19	-28.81	74	58.86	36.94	7.26	57.87	152	309	P	H
		4880	40.69	-33.31	74	61.26	31.88	5.65	58.1	164	214	P	V
		7320	45.2	-28.8	74	58.87	36.94	7.26	57.87	168	336	P	V
BLE CH 39 2480MHz		4960	38.83	-35.17	74	58.75	32.08	5.96	57.96	118	289	P	H
		7440	45.3	-28.7	74	58.22	37.4	7.17	57.49	158	273	P	H
		4960	38.83	-35.17	74	58.75	32.08	5.96	57.96	120	269	P	V
		7440	46.06	-27.94	74	58.98	37.4	7.17	57.49	184	278	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		31.94	24.46	-15.54	40	32.18	23.96	0.29	31.97	-	-	P	H
		100.81	22.19	-21.31	43.5	36.49	16.36	1.06	31.72	-	-	P	H
		211.39	31.26	-12.24	43.5	45.64	15.3	1.63	31.31	201	0	P	H
		486.87	26.25	-19.75	46	31.38	23.72	2.39	31.24	-	-	P	H
		702.21	29.78	-16.22	46	31.38	26.73	2.93	31.26	-	-	P	H
		828.31	32.48	-13.52	46	31.72	28.73	3.21	31.18	-	-	P	H
		30	25.63	-14.37	40	32.45	24.9	0.25	31.97	-	-	P	V
		98.87	24.65	-18.85	43.5	39.17	16.17	1.05	31.74	-	-	P	V
		202.66	32.72	-10.78	43.5	47.12	15.3	1.62	31.32	100	0	P	V
		462.62	26.13	-19.87	46	31.86	23.21	2.33	31.27	-	-	P	V
		609.09	28.59	-17.41	46	31.25	25.88	2.72	31.26	-	-	P	V
		886.51	33.16	-12.84	46	31.79	29.19	3.35	31.17	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix C. Radiated Spurious Emission Plots

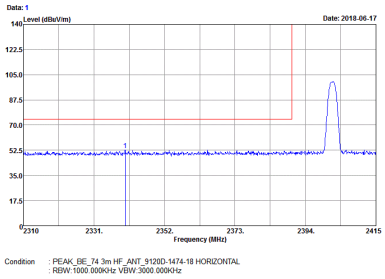
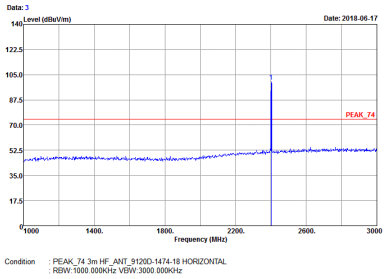
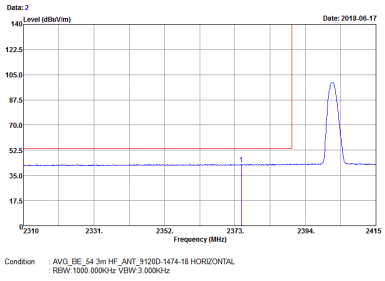
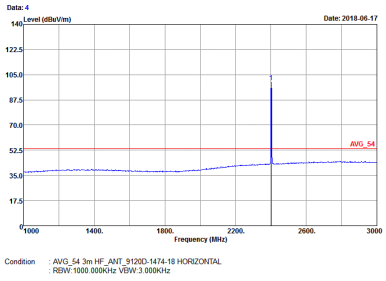
Test Engineer :	Vikki Peng	**Temperature :**	22~25°C
		Relative Humidity :	48~52%

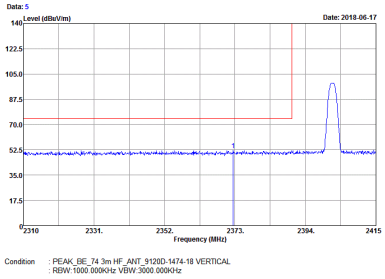
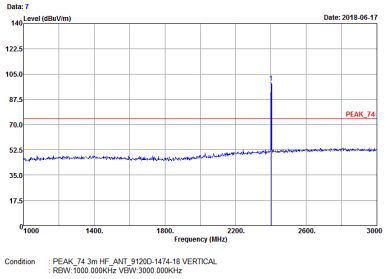
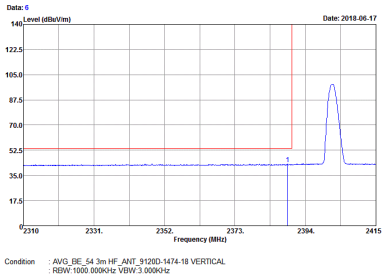
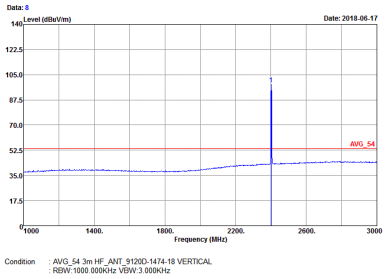
Note symbol

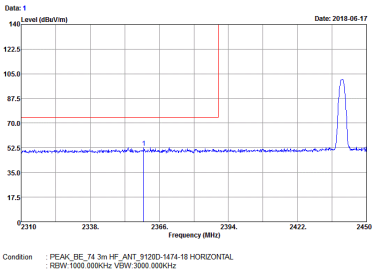
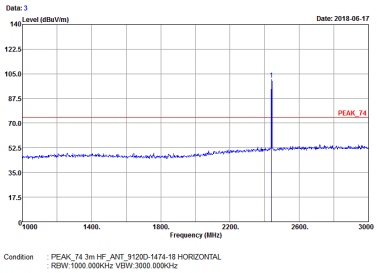
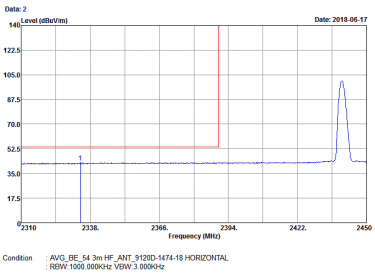
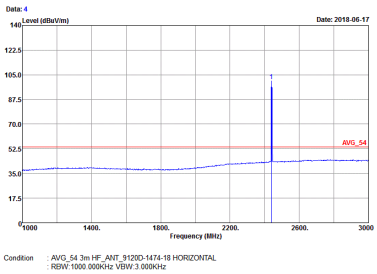
-L	**Low channel location**
-R	**High channel location**

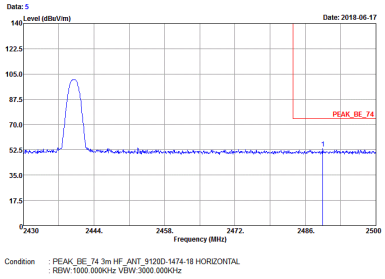
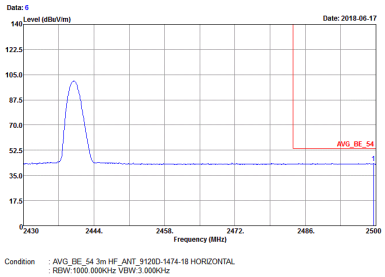
2.4GHz 2400~2483.5MHz

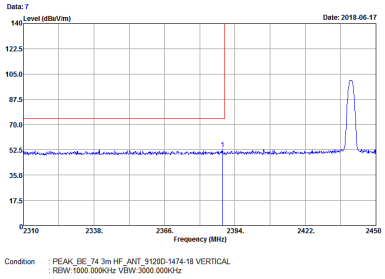
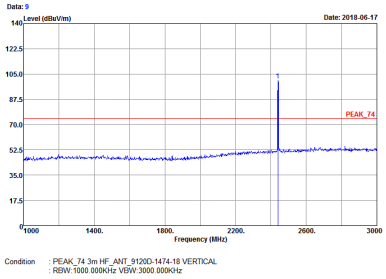
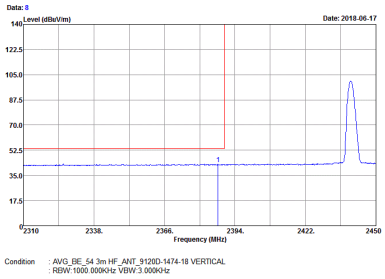
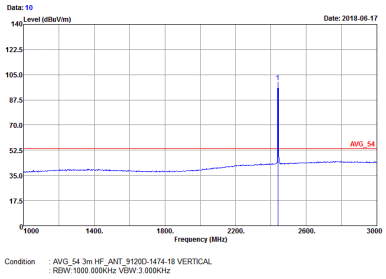
BLE (Band Edge @ 3m)

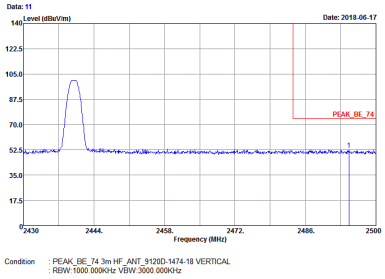
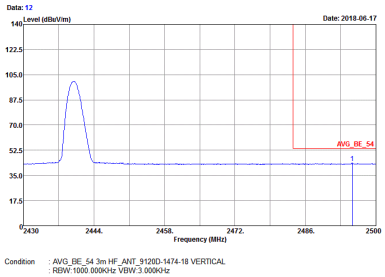
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz -L	
1	Horizontal	Fundamental
Peak		
Avg.		

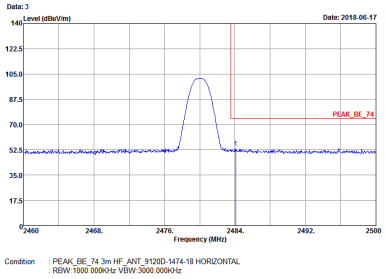
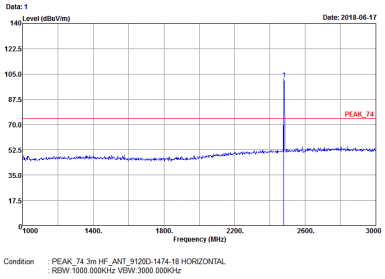
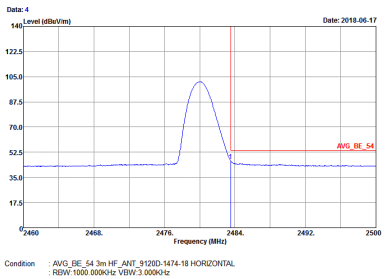
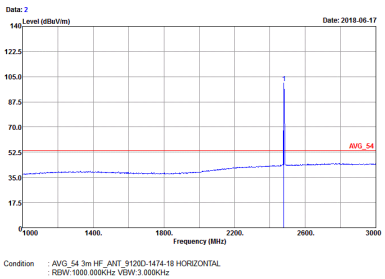
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz - L	
1	Vertical	Fundamental
Peak		
Avg		

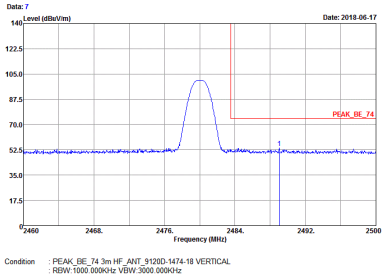
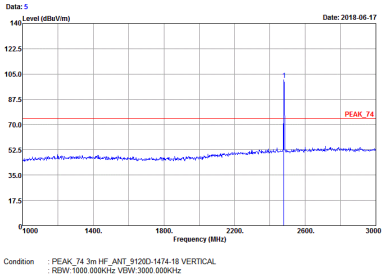
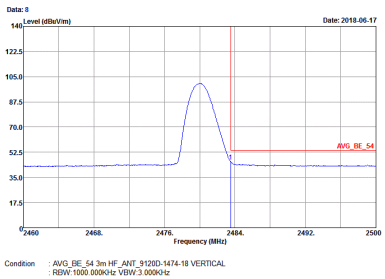
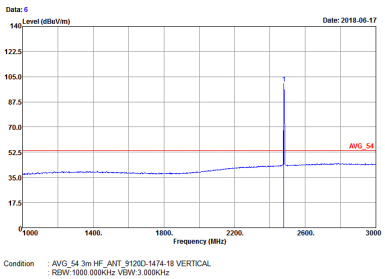
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz -L	
1	Horizontal	Fundamental
Peak		
Avg.		

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

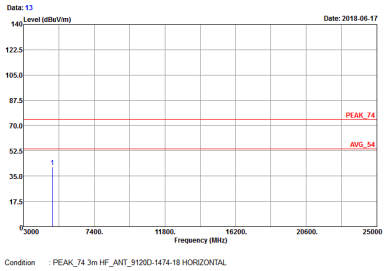
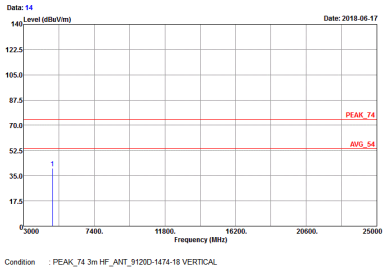
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

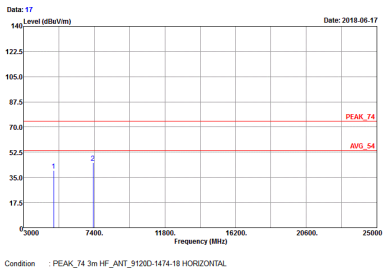
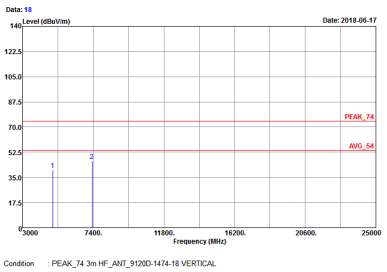
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

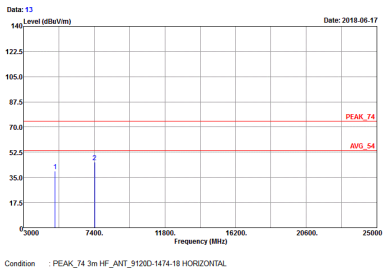
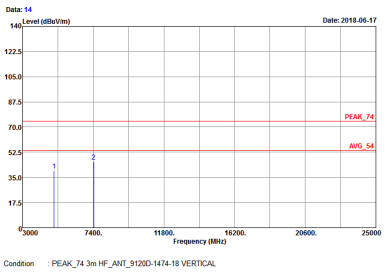
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

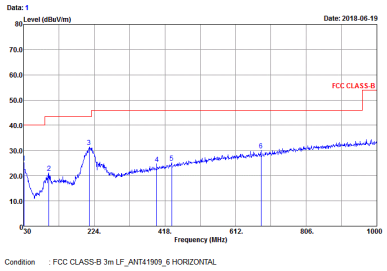
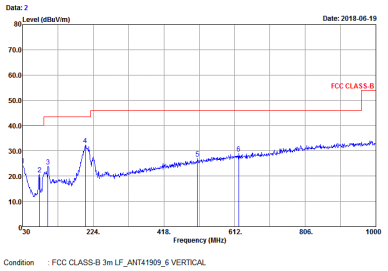
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.		

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 HORIZONTAL	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 VERTICAL

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 HORIZONTAL	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 VERTICAL

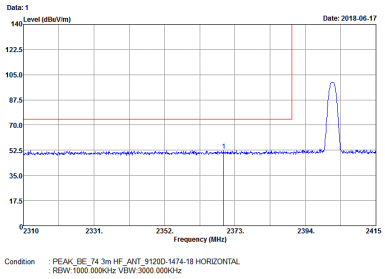
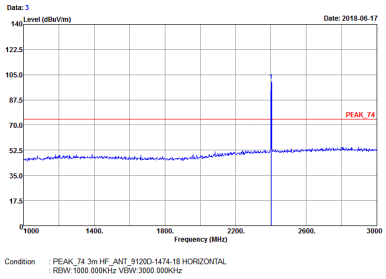
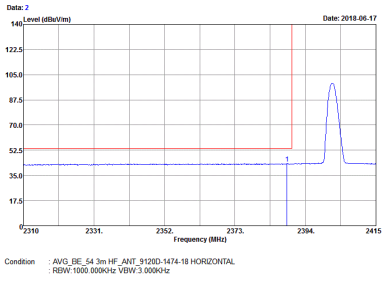
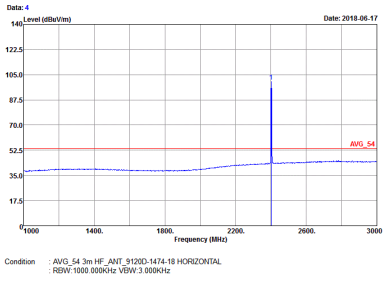
Emission below 1GHz

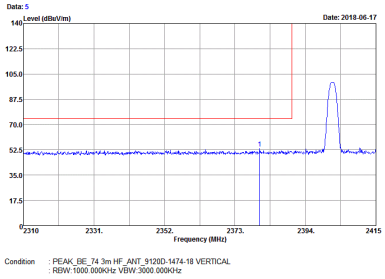
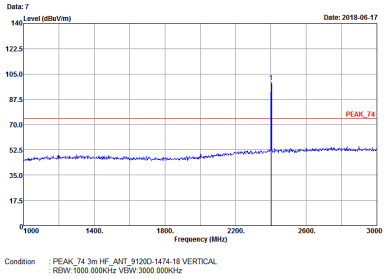
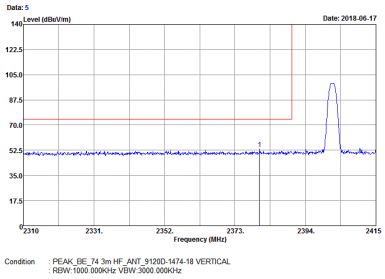
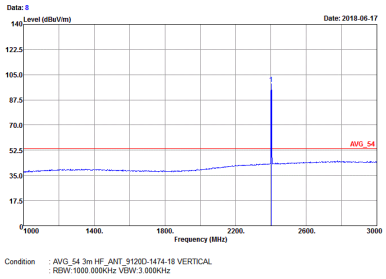
2.4GHz BLE (LF)

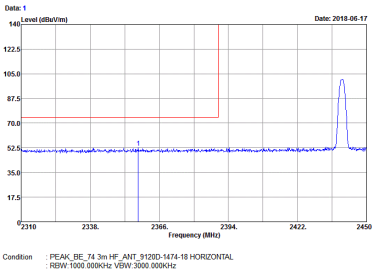
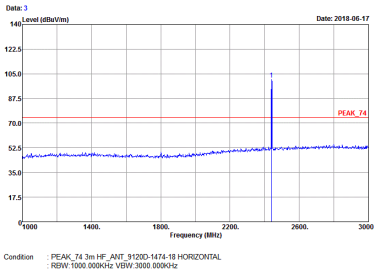
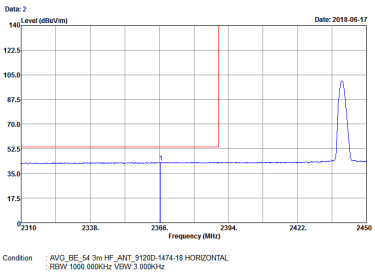
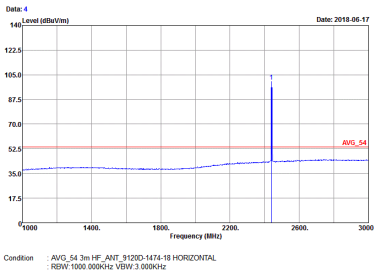
BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
QP / Peak		

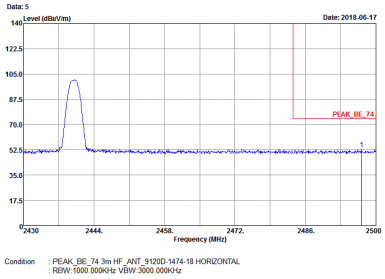
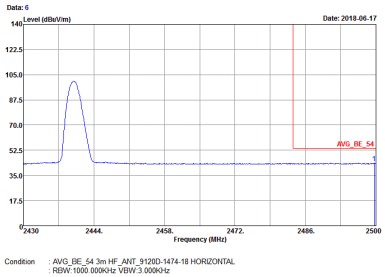
2.4GHz 2400~2483.5MHz

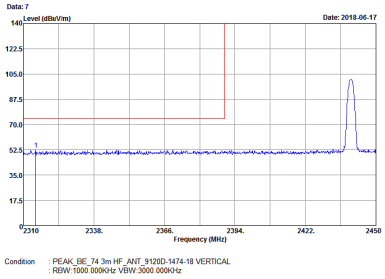
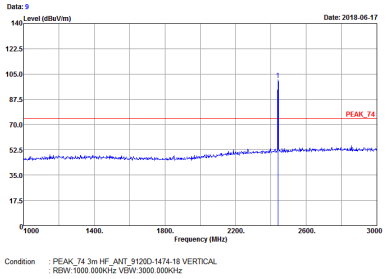
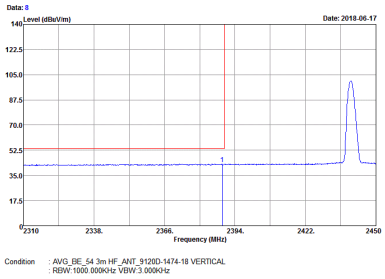
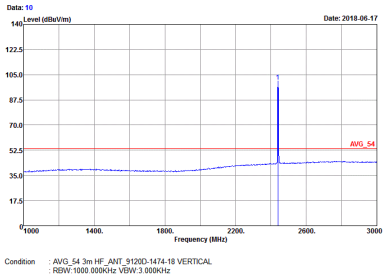
BLE (Band Edge @ 3m)

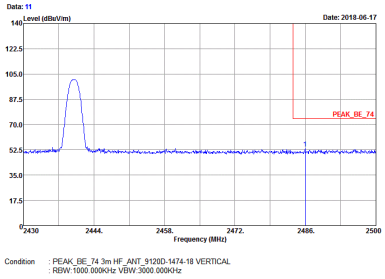
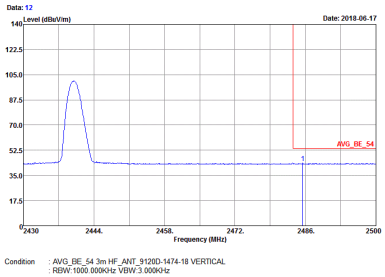
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
2	Horizontal	Fundamental
Peak		
Avg.		

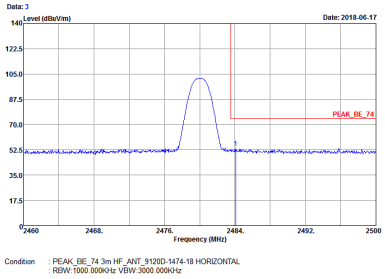
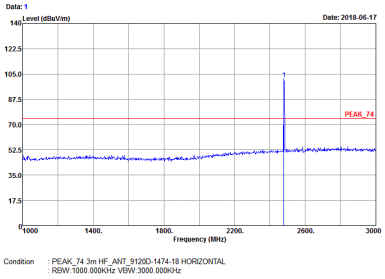
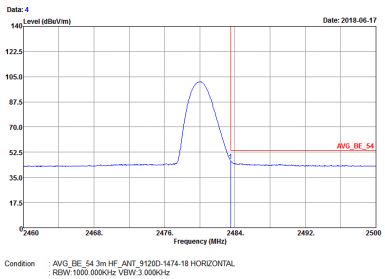
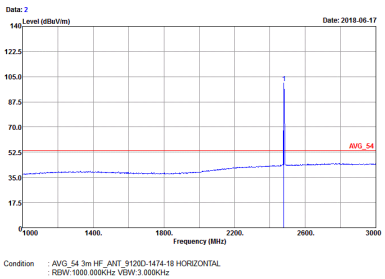
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
2	Vertical	Fundamental
Peak		
Avg		

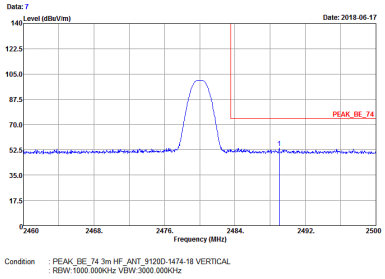
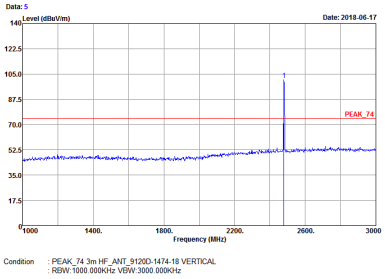
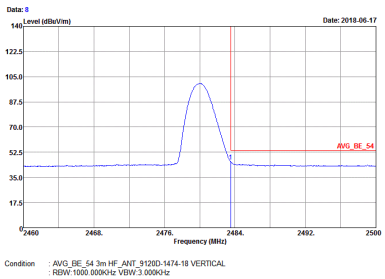
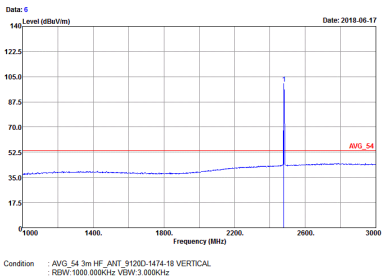
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
2	Horizontal	Fundamental
Peak		
Avg.		

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
2	Vertical	Fundamental
Peak		
Avg.		

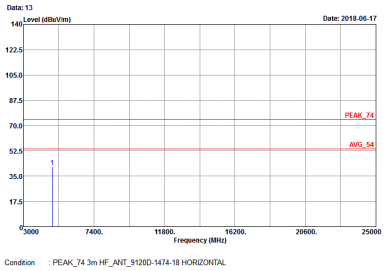
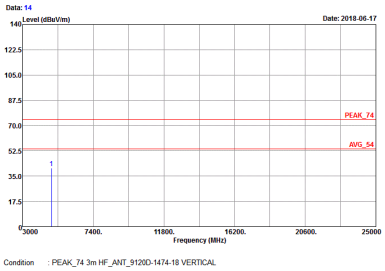
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

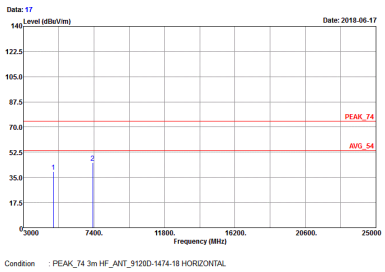
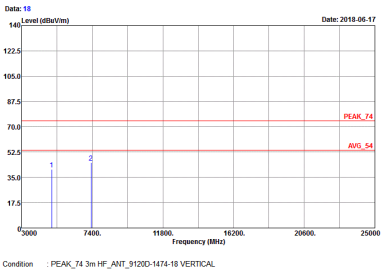
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
2	Horizontal	Fundamental
Peak		
Avg.		

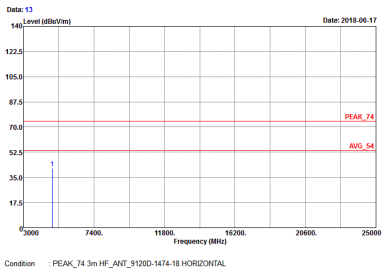
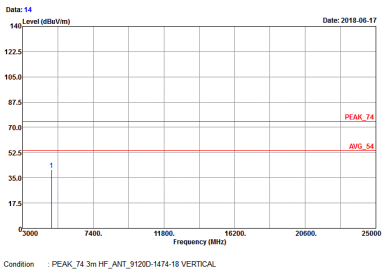
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
2	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

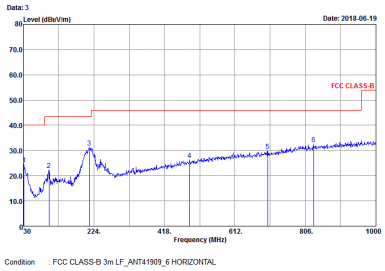
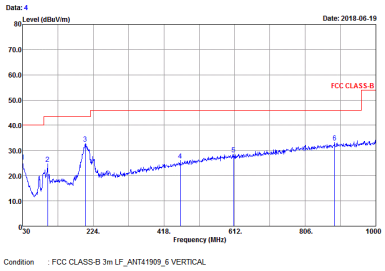
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH00 2402MHz	
2	Horizontal	Vertical
Peak		

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
2	Horizontal	Vertical
Peak	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 HORIZONTAL	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 VERTICAL

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
2	Horizontal	Vertical
Peak	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 HORIZONTAL	 Condition : PEAK_74 3m HF_ANT_9120D-1474-18 VERTICAL

Emission below 1GHz

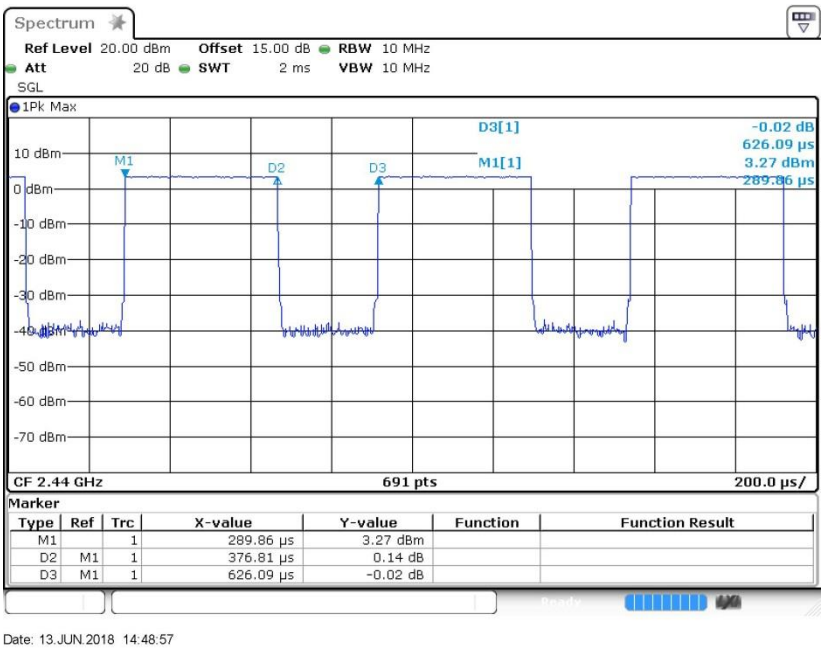
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
2	Horizontal	Vertical
QP / Peak		

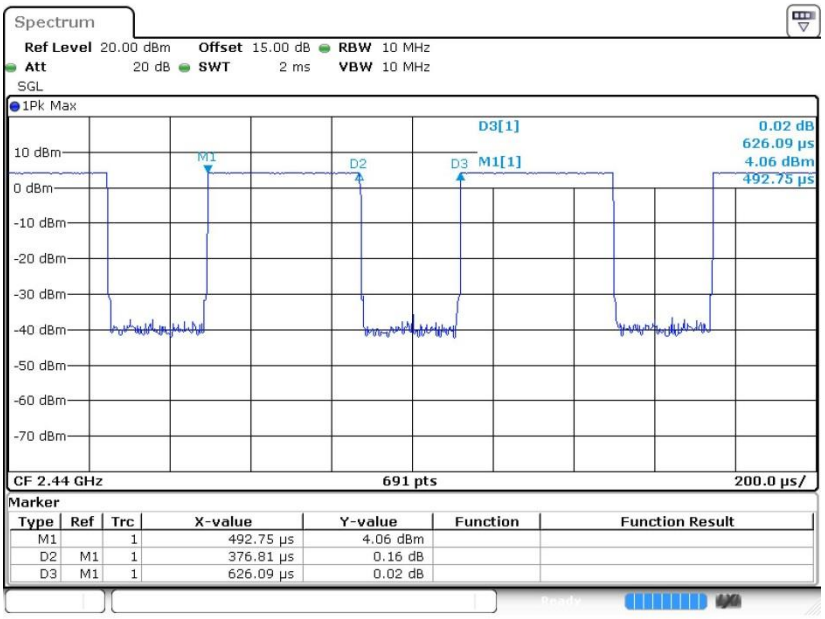
Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
1	Bluetooth - LE	60.18	0.377	2.65	3KHz	2.21
2	Bluetooth - LE	60.18	0.377	2.65	3KHz	2.21

<Ant. 1>



<Ant. 2>



Date: 13.JUN.2018 15:57:26

Appendix E. External Subcontractors to Perform Testing Data

The test report as below presents all the conduction emission test data performed by the subcontracted Sporton laboratory located in Taiwan.

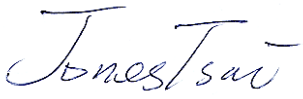
FCC RADIO TEST REPORT

FCC ID	**:**	**2AP65-7225**
Equipment	**:**	**Digital Media Receiver**
Model Name	**:**	**P5B83L**
Applicant	**:**	**Lindland LLC** **9121 Anson Way, Ste. 200, Raleigh, NC 27615**
Standard	**:**	**FCC Part 15 Subpart C §15.247**

The testing was completed on Jul. 14, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Jones Tsai

SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR842408-01A	01	Initial issue of report	Jul. 30, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.207	AC Conducted Emission	Pass
3.2	15.203 & 15.247(b)	Antenna Requirement	Pass

Reviewed by: Joseph Lin

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	P5B83L
FCC ID	2AP65-7225
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth LE

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel (37 hopping + 3 advertising channel)
Antenna Type / Gain	Ant. 1: Fixed Internal Antenna type with gain 2.97 dBi Ant. 2: Fixed Internal Antenna type with gain 1.36 dBi
Type of Modulation	Bluetooth LE : GFSK

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz),

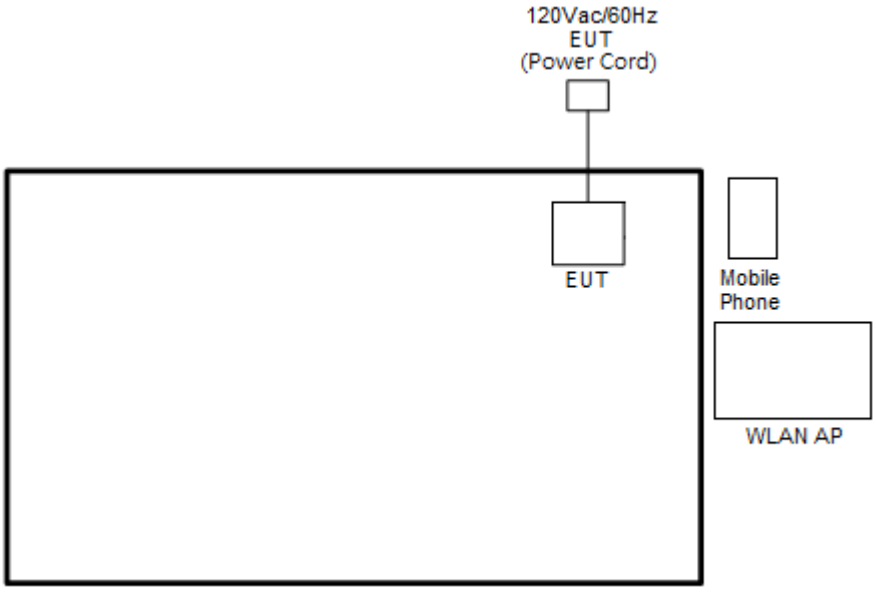
b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

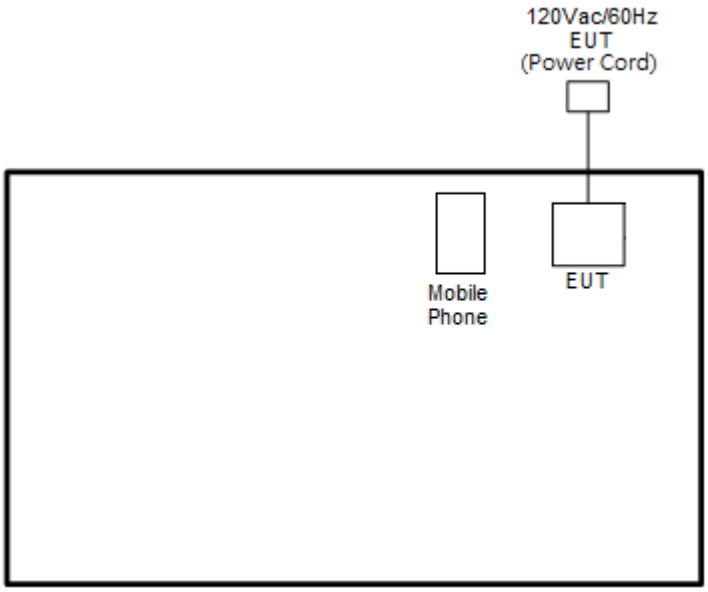
Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth – LE / GFSK
AC Conducted Emission	Mode 1: WLAN (2.4Gz) Link + MP3 + AC Charging Mode 2: Bluetooth Link + AC Charging
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode for Playing MP3>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Mobile Phone	Apple	A1687	FCC DoC	Shielded, 1.0 m	N/A

3 Test Result

3.1 AC Conducted Emission Measurement

3.1.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

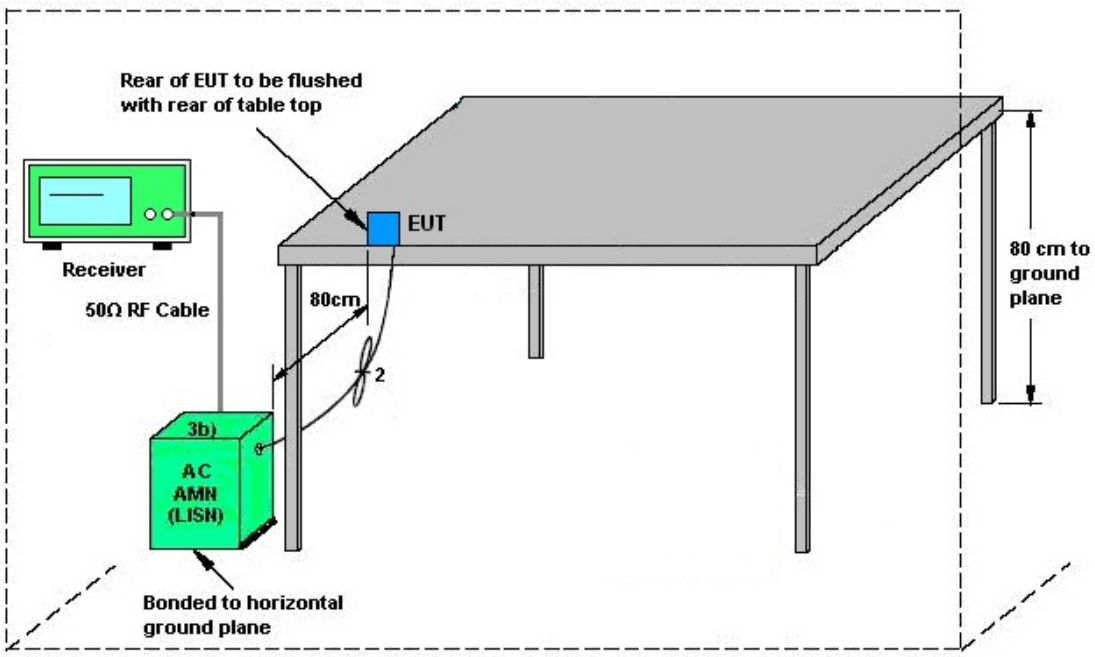
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2 Antenna Requirements

3.2.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 13, 2018~ Jul. 13, 2018	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	3.6GHz	Dec. 08, 2017	Jun. 13, 2018~ Jul. 13, 2018	Dec. 07, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Jun. 13, 2018~ Jul. 13, 2018	Nov. 29, 2018	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jun. 13, 2018~ Jul. 13, 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Jun. 13, 2018~ Jul. 13, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Jun. 13, 2018~ Jul. 13, 2018	Jan. 02, 2019	Conduction (CO05-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7**

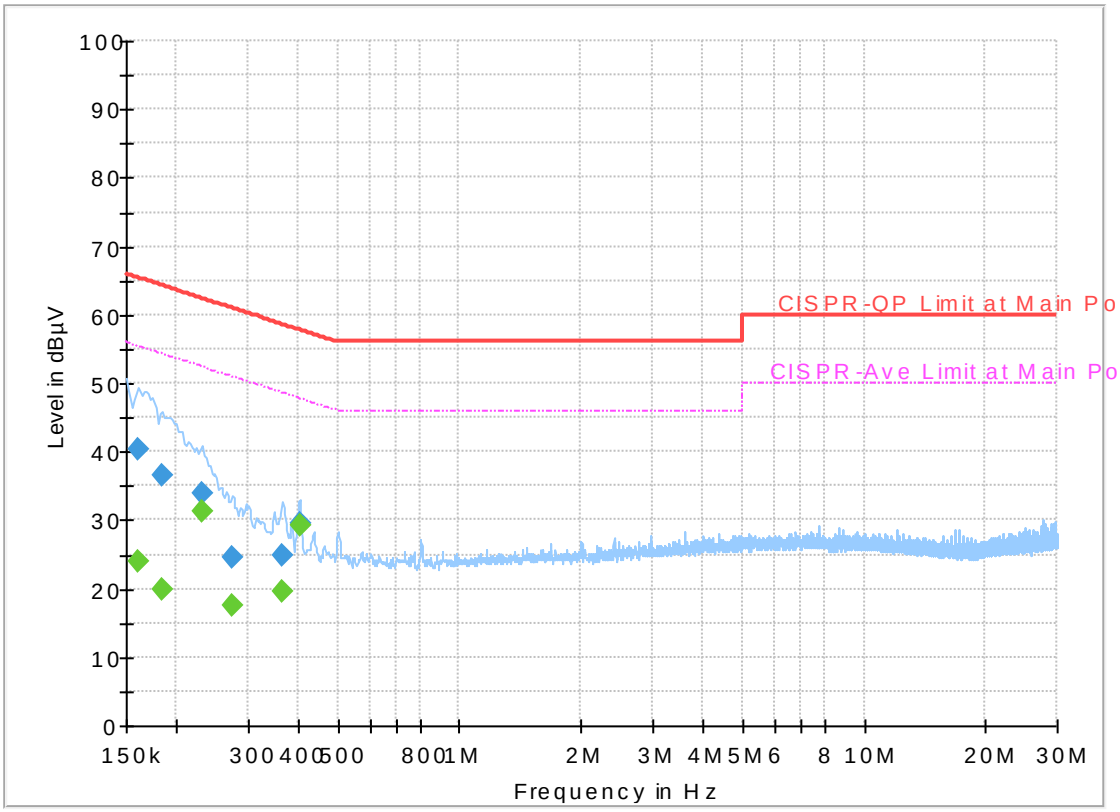
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Kai-Chun Chu	**Temperature :**	25~27℃
		Relative Humidity :	50~52%

EUT Information

Report NO :	842408-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



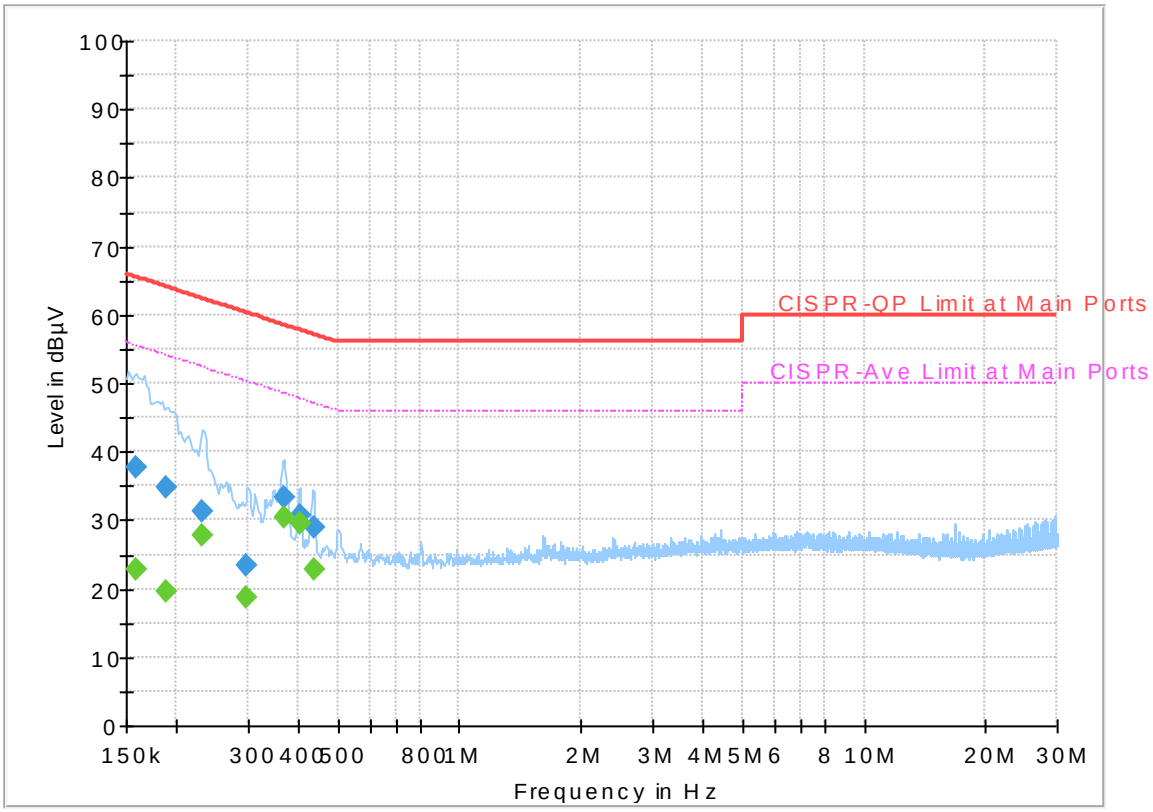
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	23.88	55.40	31.52	L1	OFF	19.5
0.161250	40.25	---	65.40	25.15	L1	OFF	19.5
0.183750	---	19.77	54.31	34.54	L1	OFF	19.5
0.183750	36.64	---	64.31	27.67	L1	OFF	19.5
0.231000	---	31.26	52.41	21.15	L1	OFF	19.5
0.231000	33.77	---	62.41	28.64	L1	OFF	19.5
0.273750	---	17.41	51.00	33.59	L1	OFF	19.5
0.273750	24.63	---	61.00	36.37	L1	OFF	19.5
0.363750	---	19.56	48.64	29.08	L1	OFF	19.5
0.363750	24.93	---	58.64	33.71	L1	OFF	19.5
0.402000	---	29.32	47.81	18.49	L1	OFF	19.5
0.402000	29.41	---	57.81	28.40	L1	OFF	19.5

EUT Information

Report NO :	842408-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	22.67	55.52	32.85	N	OFF	19.5
0.159000	37.62	---	65.52	27.90	N	OFF	19.5
0.188250	---	19.72	54.11	34.39	N	OFF	19.5
0.188250	34.76	---	64.11	29.35	N	OFF	19.5
0.231000	---	27.83	52.41	24.58	N	OFF	19.5
0.231000	31.33	---	62.41	31.08	N	OFF	19.5
0.298500	---	18.59	50.28	31.69	N	OFF	19.5
0.298500	23.30	---	60.28	36.98	N	OFF	19.5
0.368250	---	30.52	48.54	18.02	N	OFF	19.5
0.368250	33.35	---	58.54	25.19	N	OFF	19.5
0.402000	---	29.54	47.81	18.27	N	OFF	19.5
0.402000	30.66	---	57.81	27.15	N	OFF	19.5
0.435750	---	22.94	47.14	24.20	N	OFF	19.5
0.435750	28.87	---	57.14	28.27	N	OFF	19.5

THE END