

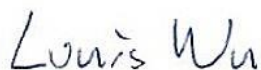


FCC RADIO TEST REPORT

FCC ID : HLZA20001
Equipment : Tablet PC
Brand Name : acer
Model Name : A20001
Marketing Name : EUT110-11A, EUT110A-11A
Applicant : Acer Incorporated
8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist.,
New Taipei City 22181, Taiwan (R.O.C)
Manufacturer : Acer Incorporated
8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist.,
New Taipei City 22181, Taiwan (R.O.C)
Standard : FCC Part 15 Subpart C §15.247

The product was received on Dec. 07, 2020 and testing was started from Dec. 08, 2020 and completed on Dec. 28, 2020. We, Sporton International Inc. EMC & Wireless Communications Laboratory, 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 test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description.....	5
1.1 Product Feature of Equipment Under Test.....	5
1.2 Modification of EUT	5
1.3 Testing Location	5
1.4 Applicable Standards.....	5
2 Test Configuration of Equipment Under Test	6
2.1 Carrier Frequency Channel	6
2.2 Test Mode.....	7
2.3 Connection Diagram of Test System.....	8
2.4 Support Unit used in test configuration and system	8
2.5 EUT Operation Test Setup	9
2.6 Measurement Results Explanation Example.....	9
3 Test Result.....	10
3.1 6dB and 99% Bandwidth Measurement	10
3.2 Output Power Measurement.....	15
3.3 Power Spectral Density Measurement	16
3.4 Conducted Band Edges and Spurious Emission Measurement	21
3.5 Radiated Band Edges and Spurious Emission Measurement	26
3.6 AC Conducted Emission Measurement.....	30
3.7 Antenna Requirements.....	32
4 List of Measuring Equipment	33
5 Uncertainty of Evaluation.....	35
Appendix A. Conducted Test Results	
Appendix B. AC Conducted Emission Test Result	
Appendix C. Radiated Spurious Emission	
Appendix D. Radiated Spurious Emission Plots	
Appendix E. Duty Cycle Plots	
Appendix F. Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FR0N2651B	01	Initial issue of report	Mar. 05, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)(3)	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	Under limit 6.77 dB at 93.450 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 4.86 dB at 0.549 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Yimin Ho



1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, and GNSS.

Product Specification subjective to this standard		
Antenna Type	WLAN: PIFA Antenna	
	Bluetooth: PIFA Antenna	
	GPS / Glonass: PIFA Antenna	
Antenna information		
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	2.32

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH05-HY, CO05-HY, 03CH07-HY

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

FCC designation No.: TW1190

1.4 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 v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.



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	-	-

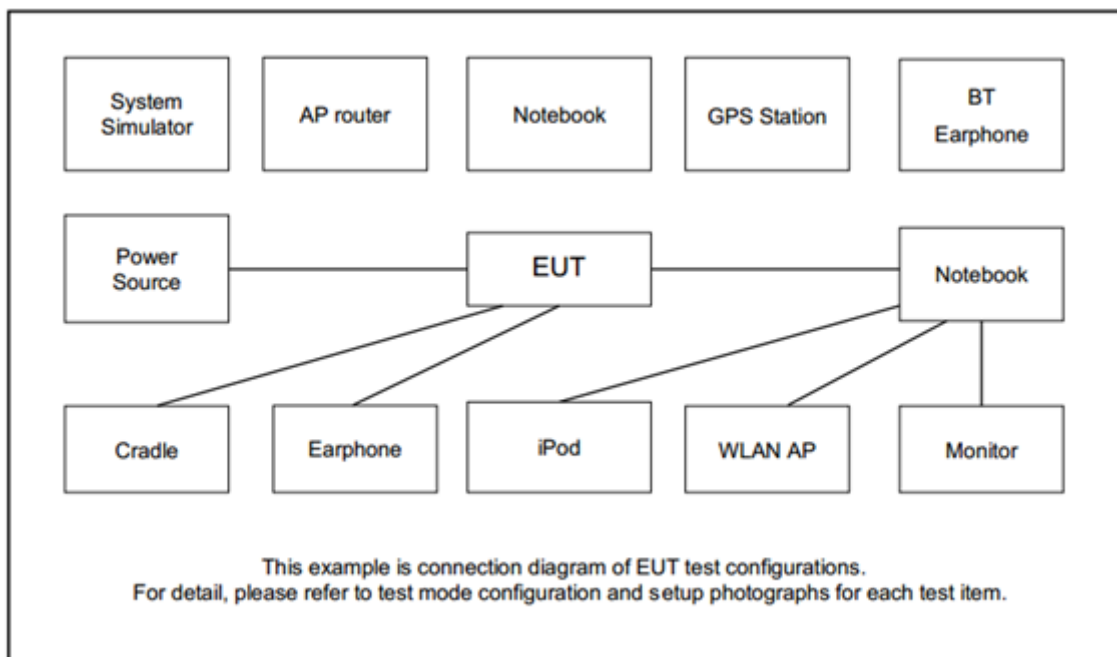
2.2 Test Mode

- 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), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.
- 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
Conducted Test Cases	Bluetooth – LE / GFSK
	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
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (2.4GHz) Link + Earphone + USB Cable (Charging from Adapter) + H-Pattern + SD Card

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
3.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
4.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A



2.5 EUT Operation Test Setup

The RF test items 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.

2.6 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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

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.

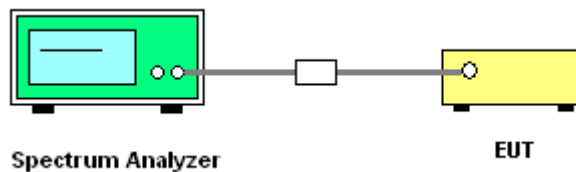
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
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) $\geq 3 * RBW$.
6. Measure and record the results in the test report.

3.1.4 Test Setup

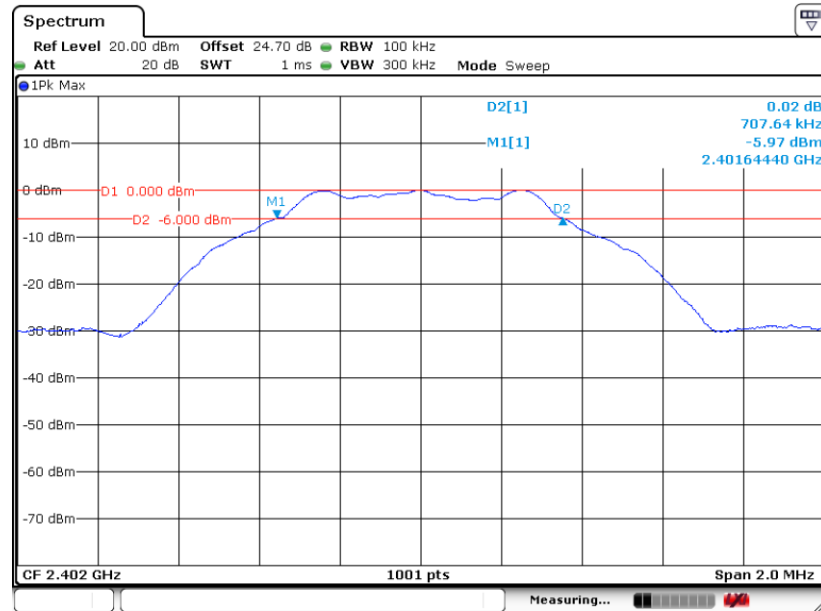




3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

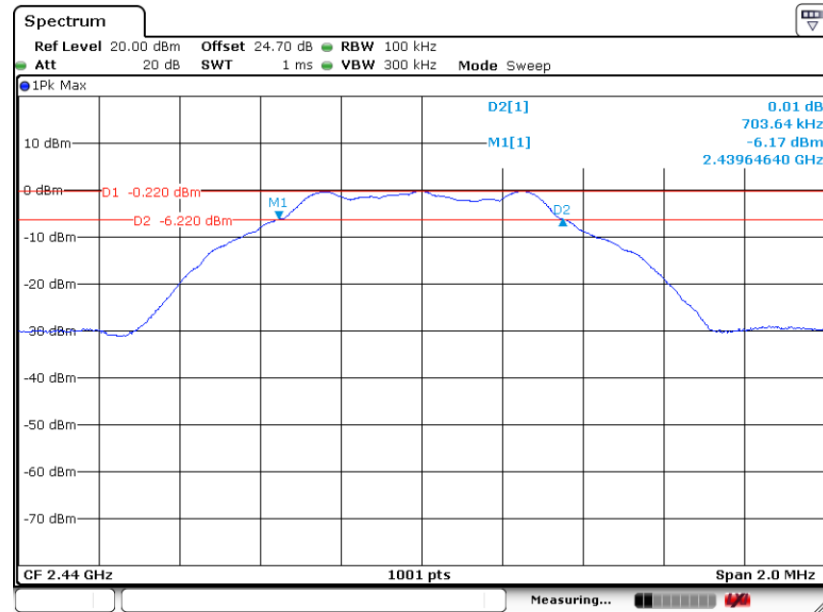
6 dB Bandwidth Plot on Channel 00



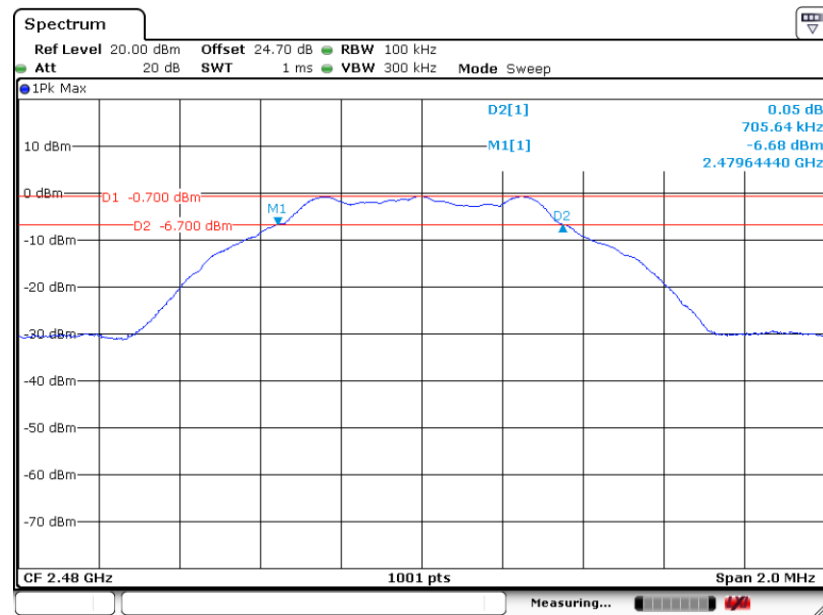
Date: 14.DEC.2020 14:34:18



6 dB Bandwidth Plot on Channel 19



6 dB Bandwidth Plot on Channel 39

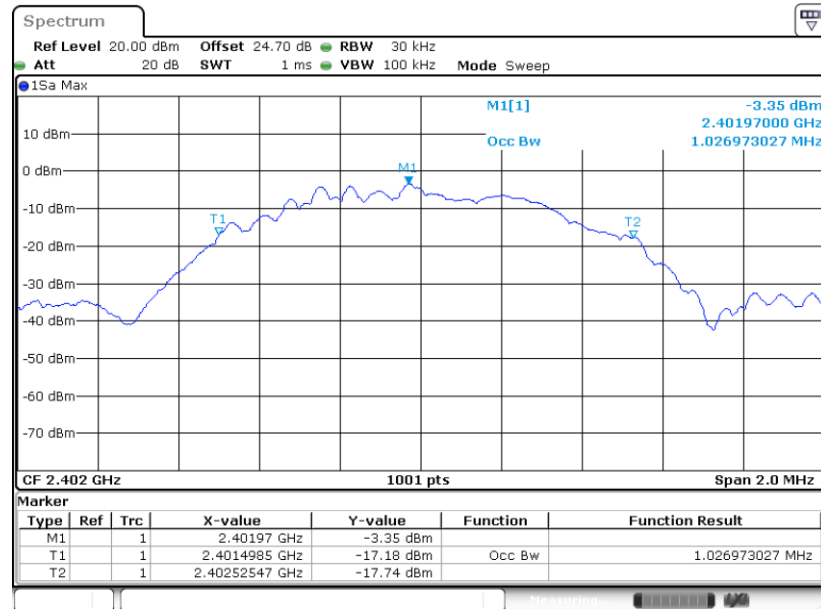




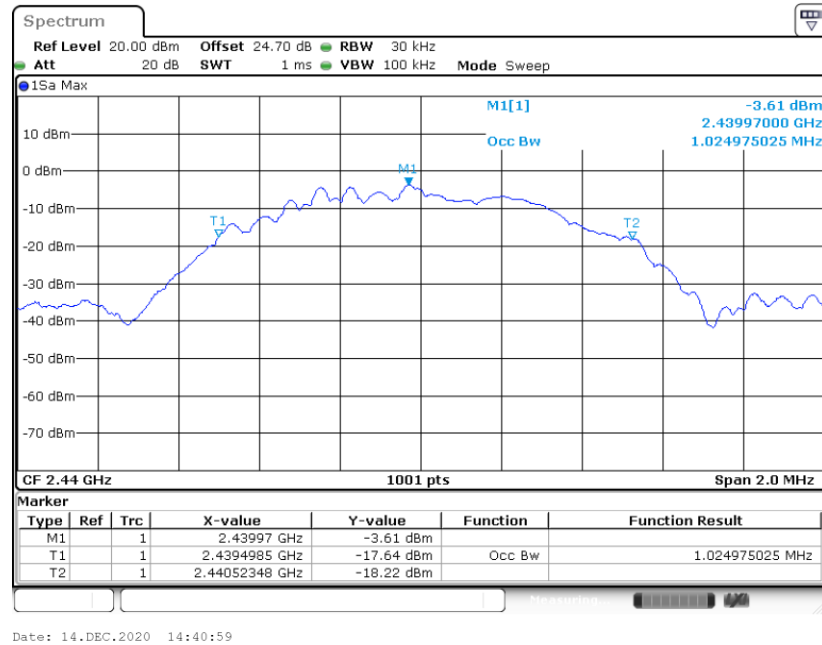
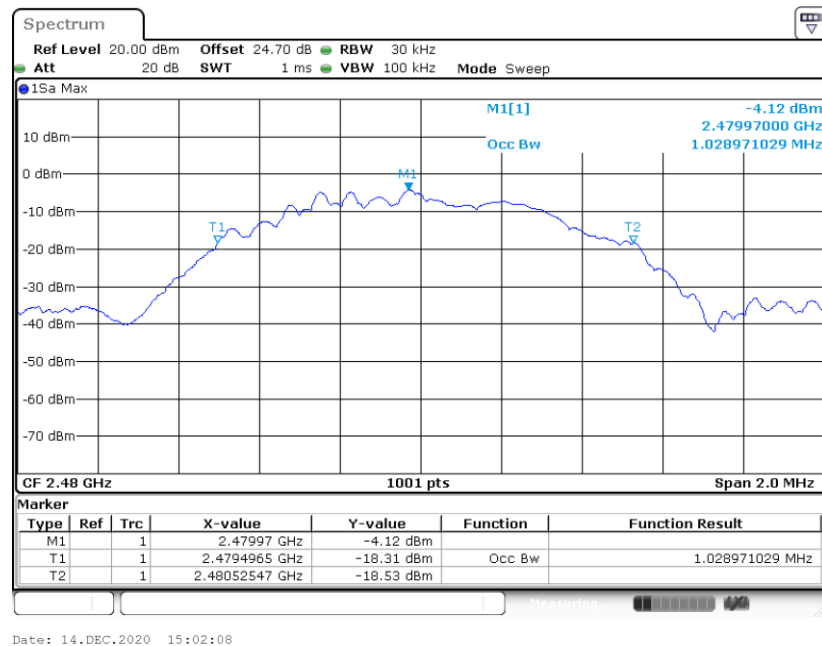
3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

99% Bandwidth Plot on Channel 00



Date: 14.DEC.2020 14:35:51

**99% Occupied Bandwidth Plot on Channel 19****99% Occupied Bandwidth Plot on Channel 39**

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 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.

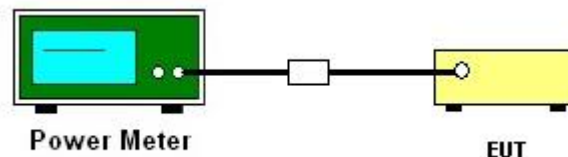
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

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.

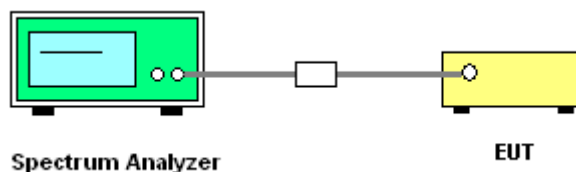
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
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



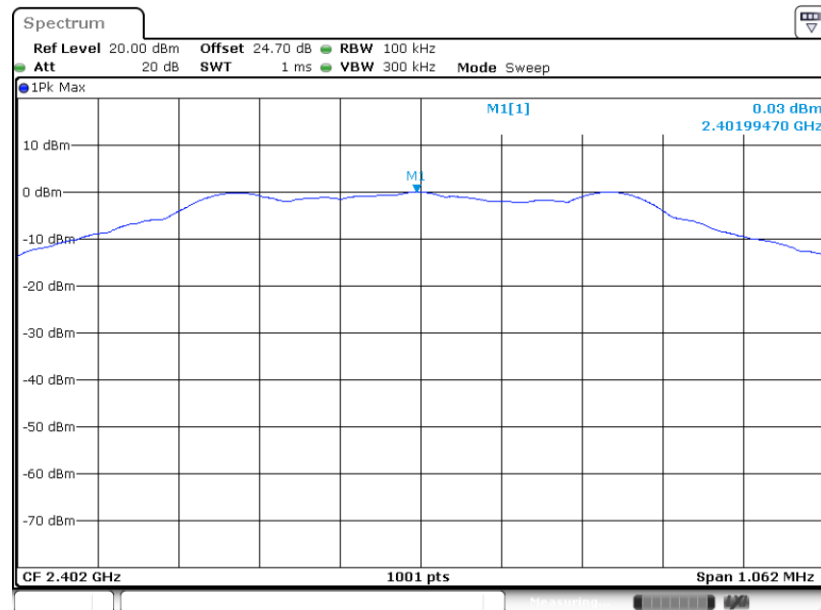
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

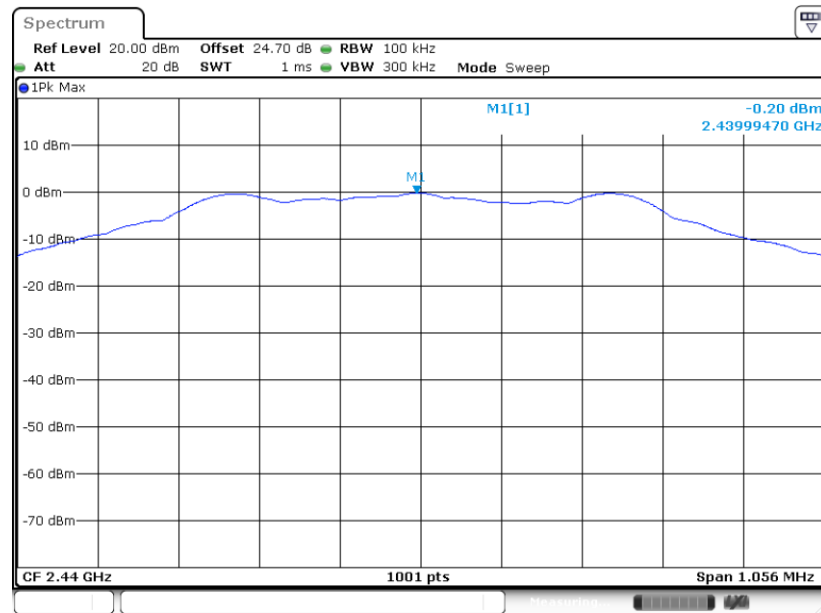


3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00

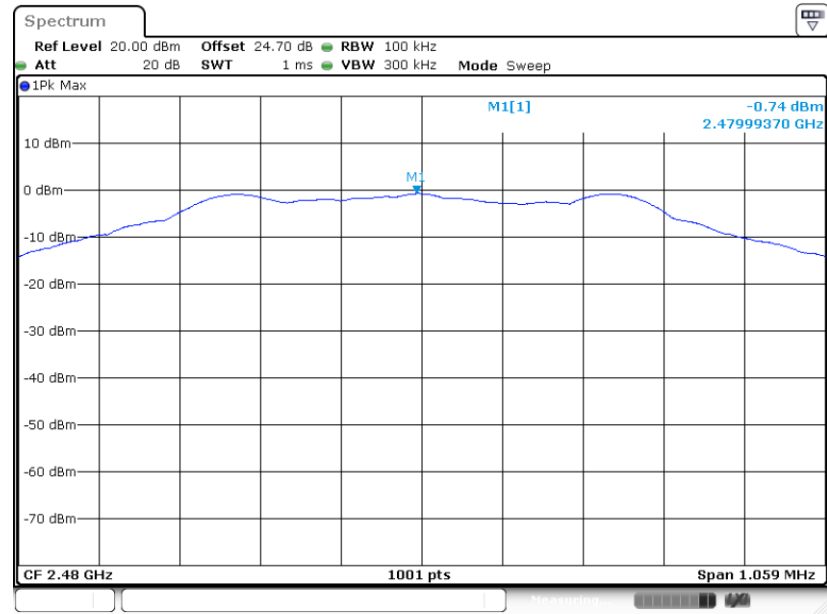


PSD 100kHz Plot on Channel 19





PSD 100kHz Plot on Channel 39



Date: 14.DEC.2020 15:00:57



Spectrum

Ref Level 20.00 dBm Offset 24.70 dB RBW 3 kHz
Att 20 dB SWT 11.8 ms VBW 10 kHz Mode Sweep

1Pk Max

M1[1] -14.64 dBm
2.40197980 GHz

M1

CF 2.402 GHz 1001 pts Span 1.062 MHz

Spectrum

Ref Level 20.00 dBm Offset 24.70 dB RBW 3 kHz
 Att 20 dB SWT 11.8 ms VBW 10 kHz Mode Sweep

1Pk Max

M1[1] -14.91 dBm
 2.43998000 GHz

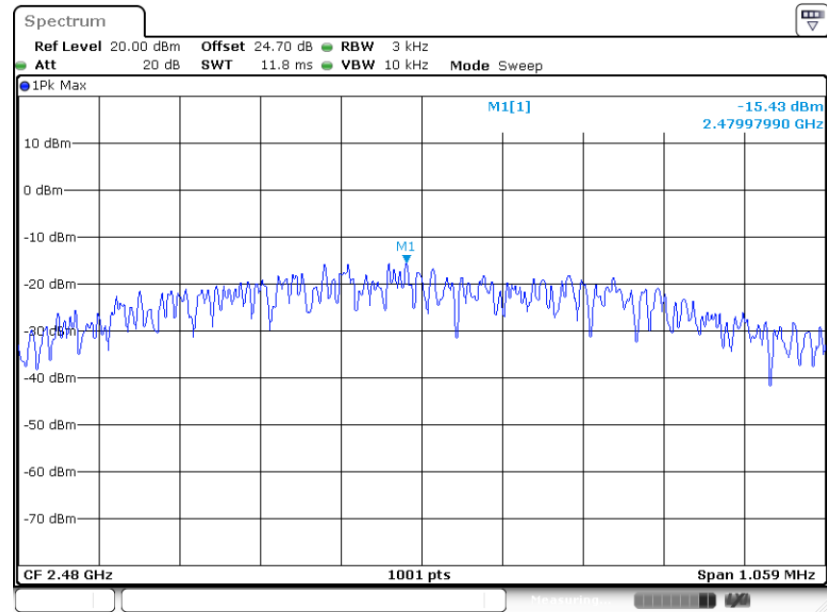
M1

CF 2.44 GHz 1001 pts Span 1.056 MHz

Date: 14.DEC.2020 14:39:16



PSD 3kHz Plot on Channel 39



Date: 14.DEC.2020 15:00:21

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.

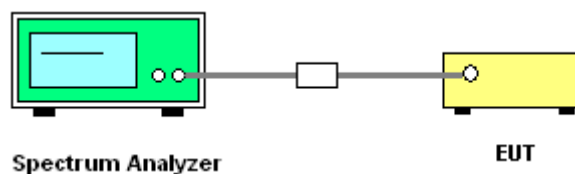
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedure

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
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.

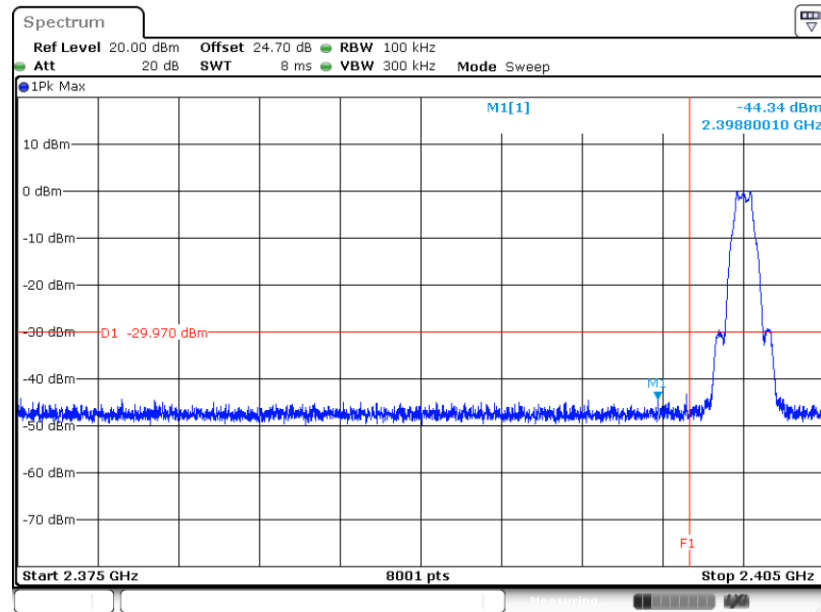
3.4.4 Test Setup





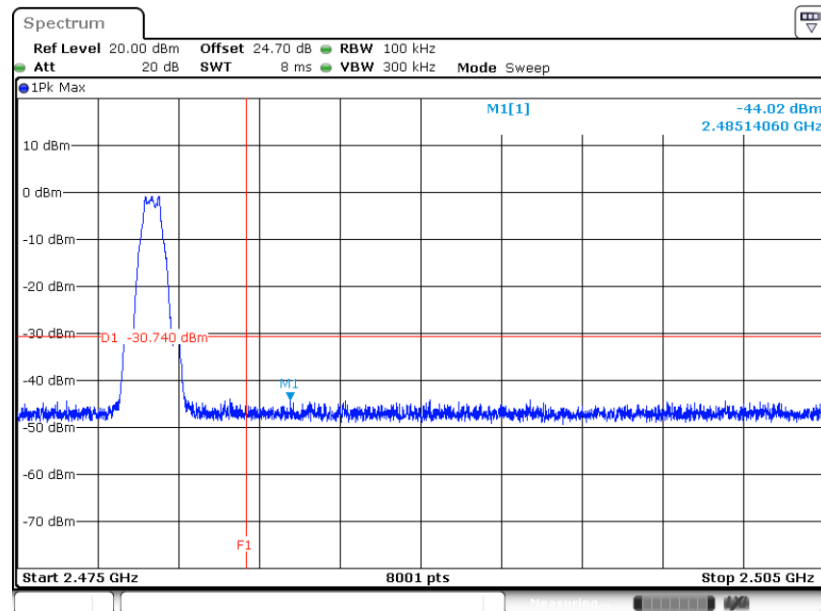
3.4.5 Test Result of Conducted Band Edges Plots

Low Band Edge Plot on Channel 00



Date: 14.DEC.2020 14:35:06

High Band Edge Plot on Channel 39

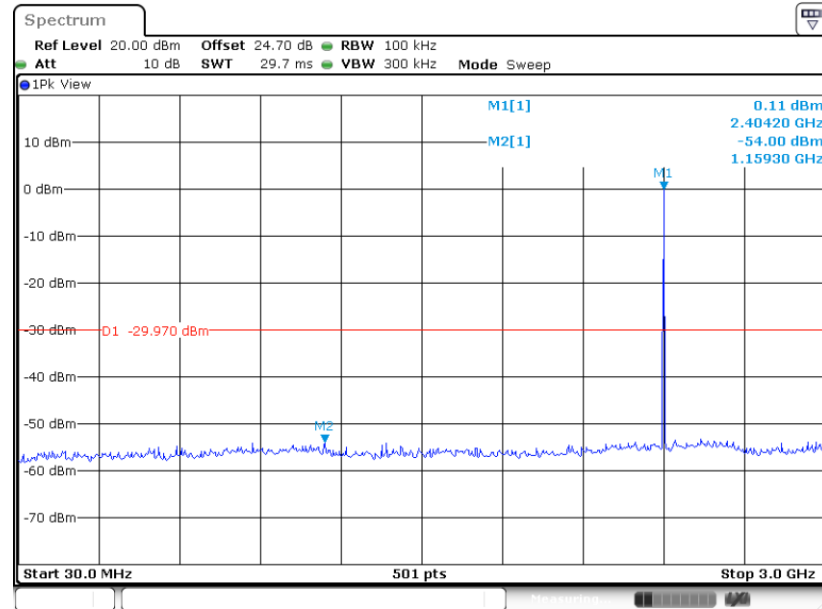


Date: 14.DEC.2020 15:01:10



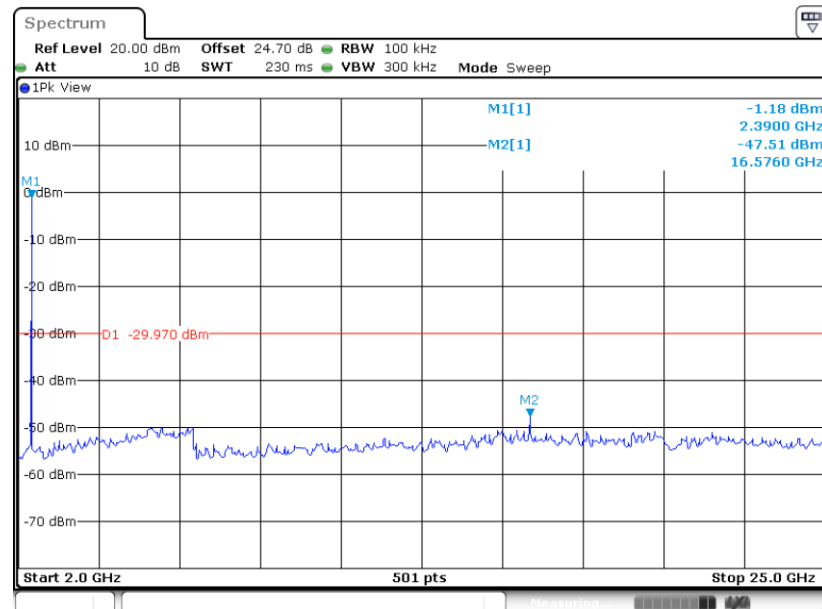
3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



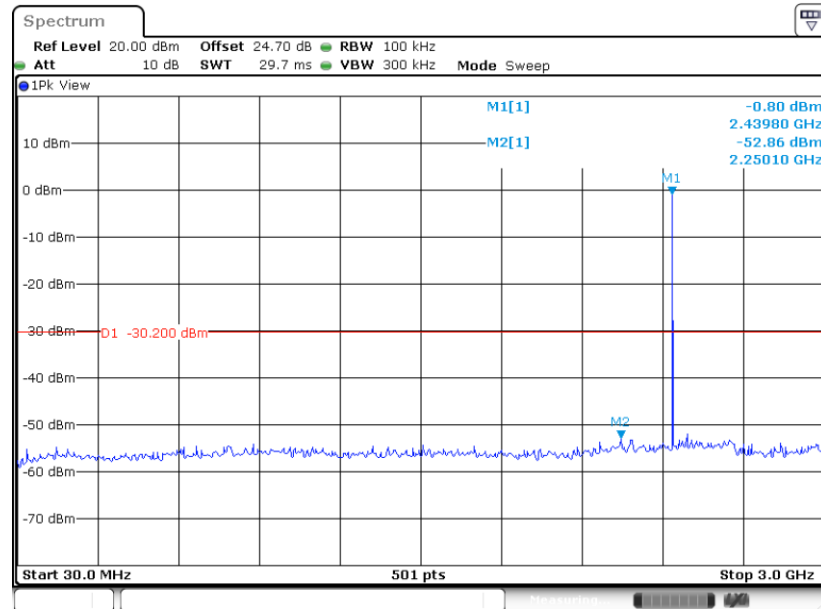
Date: 14.DEC.2020 14:35:20

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



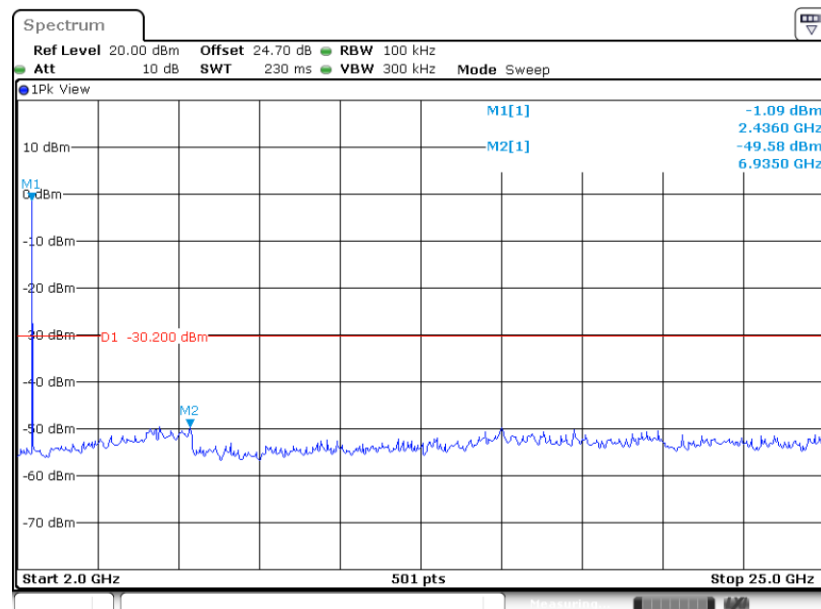
Date: 14.DEC.2020 14:35:39

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



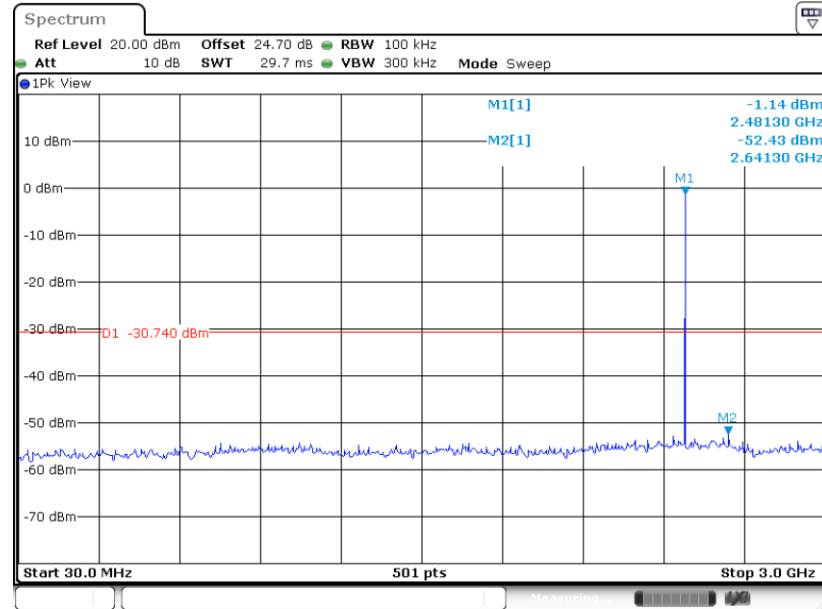
Date: 14.DEC.2020 14:40:25

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



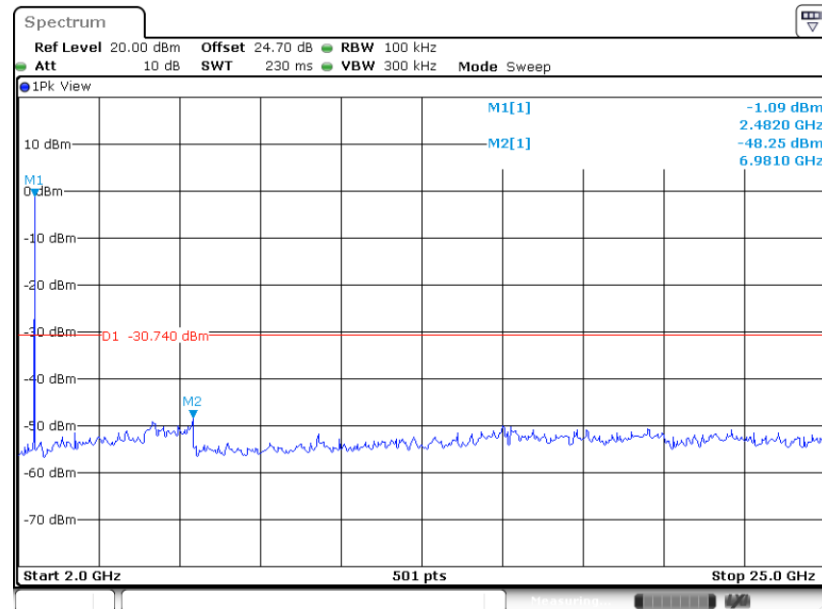
Date: 14.DEC.2020 14:40:39

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 14.DEC.2020 15:01:45

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 14.DEC.2020 15:01:57

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

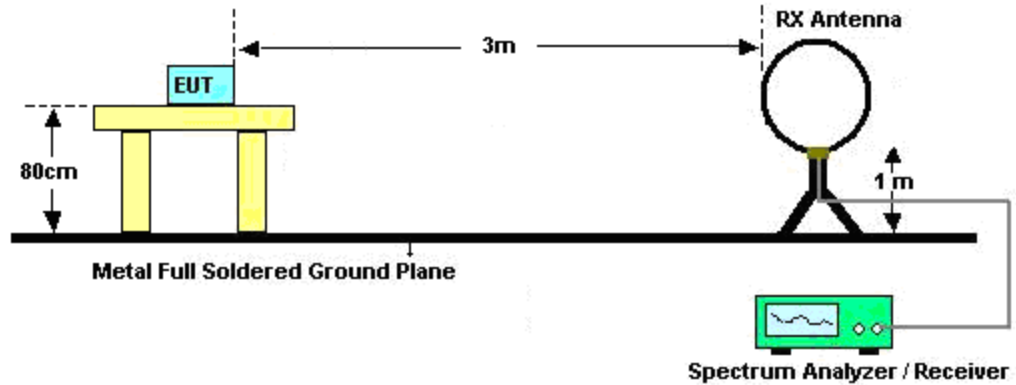
See list of measuring equipment of this test report.

3.5.3 Test Procedures

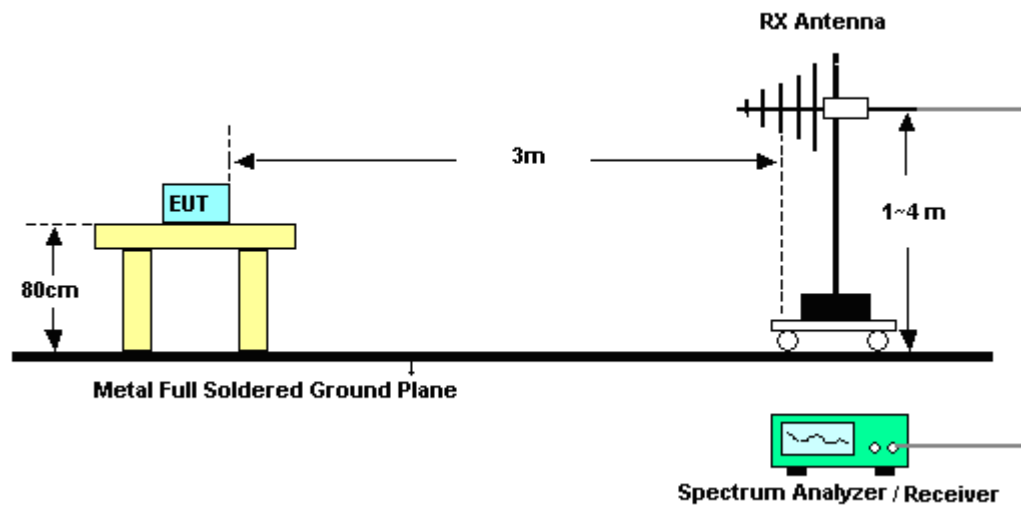
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, 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

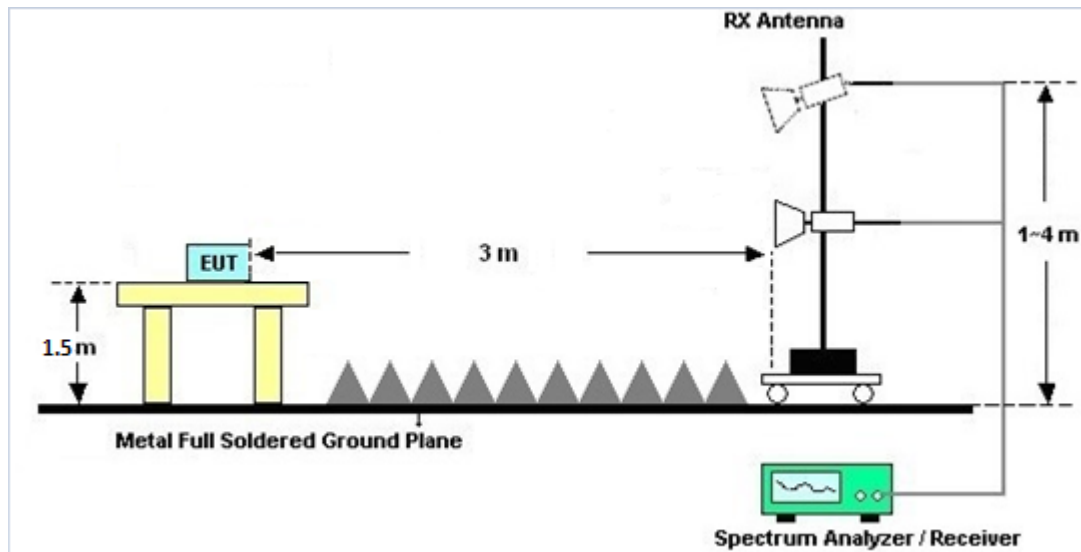
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test 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 C and D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.6 AC Conducted Emission Measurement

3.6.1 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 (dB μ V)	
	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.

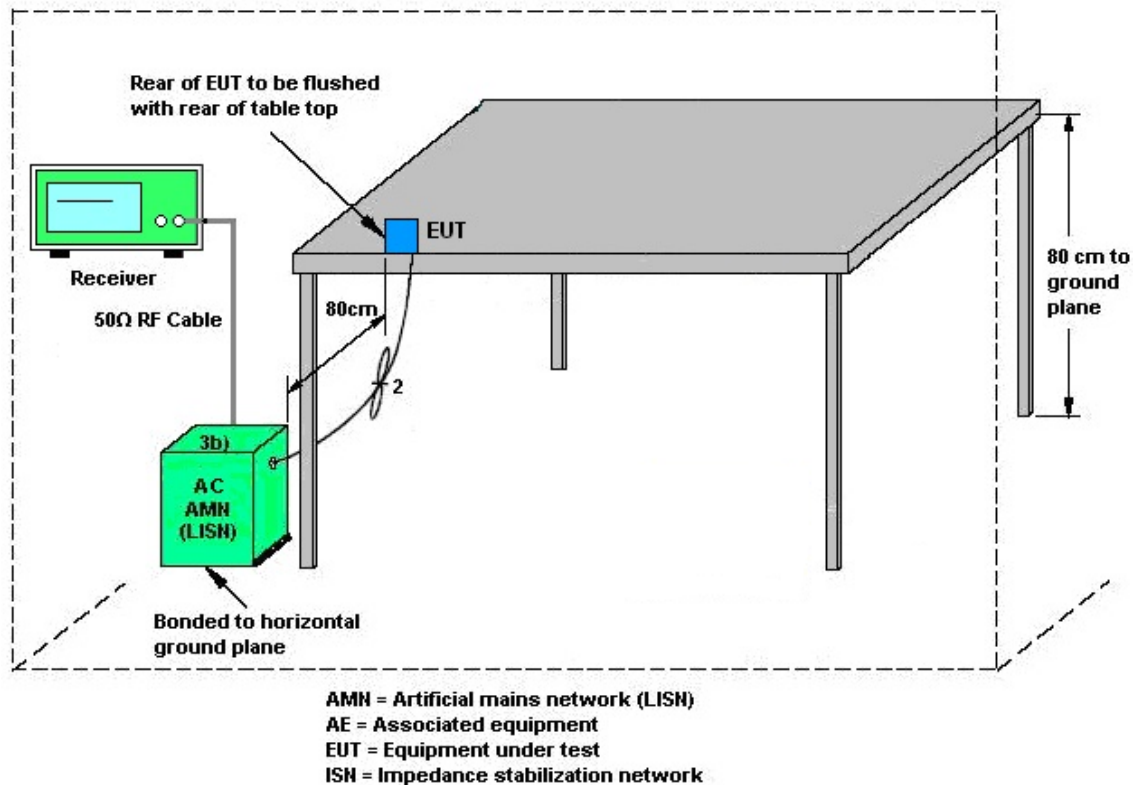
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 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.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	Dec. 12, 2020~ Dec. 28, 2020	Jul. 13, 2021	Radiation (03CH07-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	35419 & 03	30MHz~1GHz	Apr. 29, 2020	Dec. 12, 2020~ Dec. 28, 2020	Apr. 28, 2021	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 01, 2020	Dec. 12, 2020~ Dec. 28, 2020	Nov. 30, 2021	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA91702 51	18GHz~40GHz	Dec. 02, 2020	Dec. 12, 2020~ Dec. 28, 2020	Dec. 01, 2021	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A (MXE)	MY53290053	20Hz~26.5GHz	May 21, 2020	Dec. 12, 2020~ Dec. 28, 2020	May 20, 2021	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Jun. 09, 2020	Dec. 12, 2020~ Dec. 28, 2020	Jun. 08, 2021	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 19, 2020	Dec. 12, 2020~ Dec. 28, 2020	May 18, 2021	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz~18GHz	Apr. 23, 2020	Dec. 12, 2020~ Dec. 28, 2020	Apr. 22, 2021	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Oct. 31, 2020	Dec. 12, 2020~ Dec. 28, 2020	Oct. 30, 2021	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 15, 2020	Dec. 12, 2020~ Dec. 28, 2020	Jun. 14, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2,80 1606/2	18GHz~40GHz	Feb. 25, 2020	Dec. 12, 2020~ Dec. 28, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4, MY28655/4	9kHz~30MHz	Feb. 25, 2020	Dec. 12, 2020~ Dec. 28, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 25, 2020	Dec. 12, 2020~ Dec. 28, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	1GHz~18GHz	Feb. 25, 2020	Dec. 12, 2020~ Dec. 28, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801606/2	9KHz ~ 40GHz	N/A	Dec. 12, 2020~ Dec. 28, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Dec. 12, 2020~ Dec. 28, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Dec. 12, 2020~ Dec. 28, 2020	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB249 5	N/A	N/A	Dec. 12, 2020~ Dec. 28, 2020	N/A	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	N/A	N/A	N/A	Dec. 12, 2020~ Dec. 28, 2020	N/A	Radiation (03CH07-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Dec. 08, 2020~ Dec. 14, 2020	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO10	10MHz~6GHz	Dec. 23, 2019	Dec. 08, 2020~ Dec. 14, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz ~ 40GHz	Jul. 22, 2020	Dec. 08, 2020~ Dec. 14, 2020	Jul. 21, 2021	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW200302	N/A	Mar. 17, 2020	Dec. 08, 2020~ Dec. 14, 2020	Mar. 16, 2021	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Dec. 14, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 11, 2020	Dec. 14, 2020	Sep. 10, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Dec. 14, 2020	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	Dec. 14, 2020	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Dec. 14, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Dec. 14, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Dec. 14, 2020	Jan. 01, 2021	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% ($U = 2Uc(y)$)	2.3
---	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
---	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.3
---	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0
---	-----

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Eason Huang	Temperature:	21~25	°C
Test Date:	2020/12/8~2020/12/14	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	1.027	0.708	0.50	Pass
BLE	1Mbps	1	19	2440	1.025	0.704	0.50	Pass
BLE	1Mbps	1	39	2480	1.029	0.706	0.50	Pass

TEST RESULTS DATA **Average Power Table**

Mod.	Data Rate	NtX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	1.10	30.00	2.32	3.42	36.00	Pass
BLE	1Mbps	1	19	2440	0.80	30.00	2.32	3.12	36.00	Pass
BLE	1Mbps	1	39	2480	0.30	30.00	2.32	2.62	36.00	Pass

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	0.03	-14.64	2.32	8.00	Pass
BLE	1Mbps	1	19	2440	-0.20	-14.91	2.32	8.00	Pass
BLE	1Mbps	1	39	2480	-0.74	-15.43	2.32	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



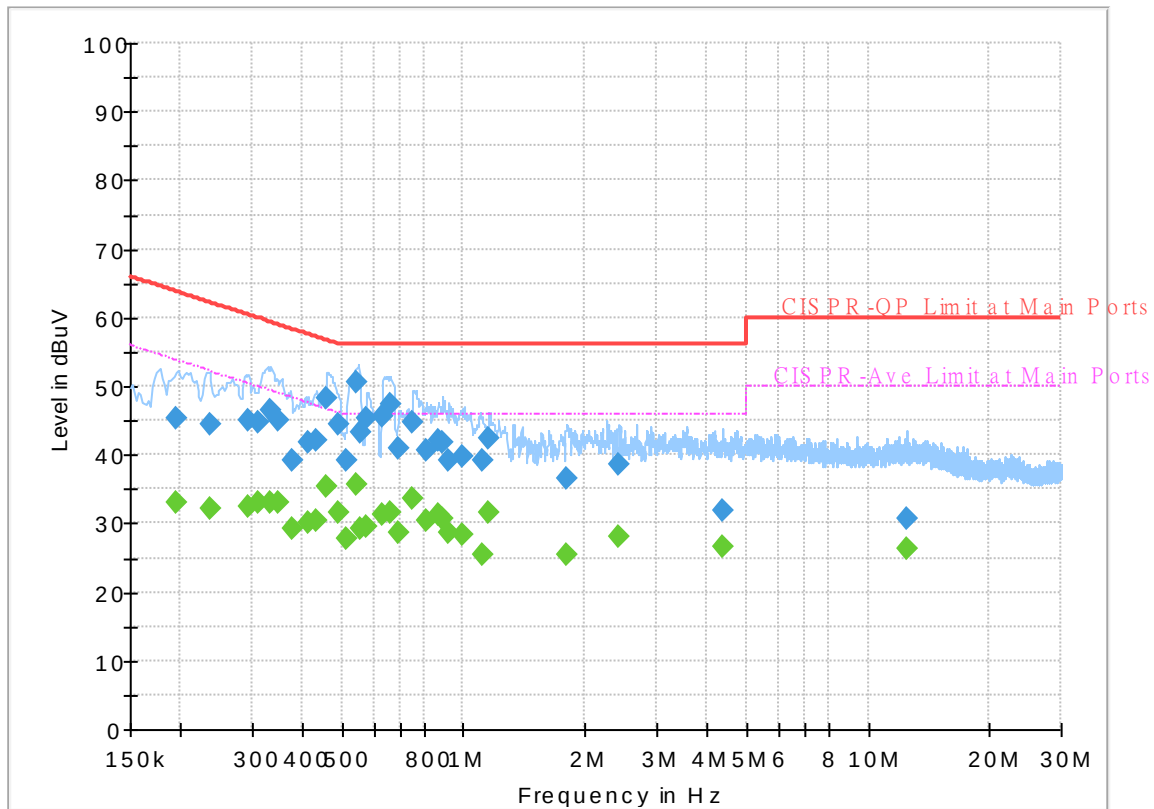
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Howard Huang	Temperature :	24~26°C
		Relative Humidity :	40~50%

EUT Information

Report NO : 0N2651
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



Final_Result

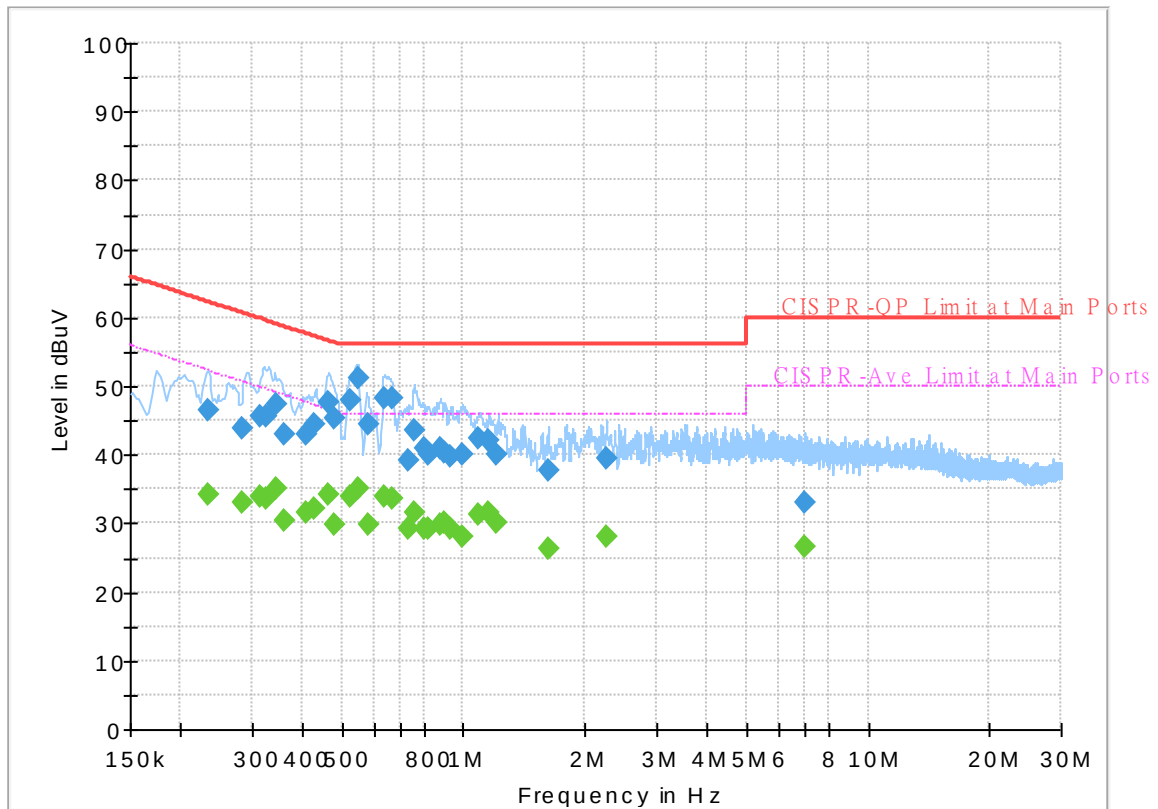
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.195360	---	33.00	53.81	20.81	L1	OFF	19.6
0.195360	45.43	---	63.81	18.38	L1	OFF	19.6
0.236670	---	32.23	52.21	19.98	L1	OFF	19.5
0.236670	44.33	---	62.21	17.88	L1	OFF	19.5
0.292830	---	32.60	50.44	17.84	L1	OFF	19.5
0.292830	44.94	---	60.44	15.50	L1	OFF	19.5
0.312270	---	32.97	49.91	16.94	L1	OFF	19.5
0.312270	44.88	---	59.91	15.03	L1	OFF	19.5
0.332790	---	33.15	49.38	16.23	L1	OFF	19.5
0.332790	46.56	---	59.38	12.82	L1	OFF	19.5
0.350250	---	32.92	48.96	16.04	L1	OFF	19.5
0.350250	45.16	---	58.96	13.80	L1	OFF	19.5
0.379500	---	29.30	48.29	18.99	L1	OFF	19.5
0.379500	39.30	---	58.29	18.99	L1	OFF	19.5
0.411180	---	30.13	47.62	17.49	L1	OFF	19.5
0.411180	41.83	---	57.62	15.79	L1	OFF	19.5
0.435210	---	30.52	47.15	16.63	L1	OFF	19.5
0.435210	42.06	---	57.15	15.09	L1	OFF	19.5
0.460590	---	35.34	46.68	11.34	L1	OFF	19.5
0.460590	48.17	---	56.68	8.51	L1	OFF	19.5
0.487860	---	31.58	46.20	14.62	L1	OFF	19.5

0.487860	44.32	---	56.20	11.88	L1	OFF	19.5
0.512250	---	27.73	46.00	18.27	L1	OFF	19.5
0.512250	39.21	---	56.00	16.79	L1	OFF	19.5
0.546000	---	35.76	46.00	10.24	L1	OFF	19.6
0.546000	50.62	---	56.00	5.38	L1	OFF	19.6
0.554820	---	29.14	46.00	16.86	L1	OFF	19.6
0.554820	43.14	---	56.00	12.86	L1	OFF	19.6
0.575250	---	29.45	46.00	16.55	L1	OFF	19.6
0.575250	45.38	---	56.00	10.62	L1	OFF	19.6
0.631500	---	31.40	46.00	14.60	L1	OFF	19.6
0.631500	45.60	---	56.00	10.40	L1	OFF	19.6
0.660750	---	31.70	46.00	14.30	L1	OFF	19.6
0.660750	47.42	---	56.00	8.58	L1	OFF	19.6
0.689820	---	28.67	46.00	17.33	L1	OFF	19.6
0.689820	40.95	---	56.00	15.05	L1	OFF	19.6
0.751110	---	33.67	46.00	12.33	L1	OFF	19.6
0.751110	44.78	---	56.00	11.22	L1	OFF	19.6
0.807540	---	30.49	46.00	15.51	L1	OFF	19.6
0.807540	40.61	---	56.00	15.39	L1	OFF	19.6
0.870000	---	31.27	46.00	14.73	L1	OFF	19.6
0.870000	42.15	---	56.00	13.85	L1	OFF	19.6
0.890250	---	30.68	46.00	15.32	L1	OFF	19.6
0.890250	41.70	---	56.00	14.30	L1	OFF	19.6
0.917250	---	28.68	46.00	17.32	L1	OFF	19.6
0.917250	39.28	---	56.00	16.72	L1	OFF	19.6
0.999690	---	28.42	46.00	17.58	L1	OFF	19.6
0.999690	39.79	---	56.00	16.21	L1	OFF	19.6
1.108500	---	25.57	46.00	20.43	L1	OFF	19.6
1.108500	39.23	---	56.00	16.77	L1	OFF	19.6
1.154940	---	31.69	46.00	14.31	L1	OFF	19.6
1.154940	42.40	---	56.00	13.60	L1	OFF	19.6
1.806180	---	25.53	46.00	20.47	L1	OFF	19.7
1.806180	36.51	---	56.00	19.49	L1	OFF	19.7
2.429430	---	28.18	46.00	17.82	L1	OFF	19.7
2.429430	38.60	---	56.00	17.40	L1	OFF	19.7
4.386750	---	26.50	46.00	19.50	L1	OFF	19.7
4.386750	31.87	---	56.00	24.13	L1	OFF	19.7
12.415740	---	26.31	50.00	23.69	L1	OFF	20.1
12.415740	30.74	---	60.00	29.26	L1	OFF	20.1

EUT Information

Report NO : 0N2651
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.234240	---	34.10	52.30	18.20	N	OFF	19.6
0.234240	46.47	---	62.30	15.83	N	OFF	19.6
0.285000	---	32.99	50.67	17.68	N	OFF	19.6
0.285000	43.88	---	60.67	16.79	N	OFF	19.6
0.314250	---	33.81	49.86	16.05	N	OFF	19.6
0.314250	45.53	---	59.86	14.33	N	OFF	19.6
0.326310	---	33.66	49.55	15.89	N	OFF	19.6
0.326310	45.59	---	59.55	13.96	N	OFF	19.6
0.343500	---	35.13	49.12	13.99	N	OFF	19.6
0.343500	47.27	---	59.12	11.85	N	OFF	19.6
0.361500	---	30.39	48.69	18.30	N	OFF	19.6
0.361500	43.03	---	58.69	15.66	N	OFF	19.6
0.407760	---	31.63	47.69	16.06	N	OFF	19.6
0.407760	42.95	---	57.69	14.74	N	OFF	19.6
0.428820	---	32.30	47.28	14.98	N	OFF	19.6
0.428820	44.58	---	57.28	12.70	N	OFF	19.6
0.464460	---	34.15	46.61	12.46	N	OFF	19.6
0.464460	47.56	---	56.61	9.05	N	OFF	19.6
0.480390	---	29.80	46.33	16.53	N	OFF	19.6
0.480390	45.19	---	56.33	11.14	N	OFF	19.6
0.523500	---	33.98	46.00	12.02	N	OFF	19.6

0.523500	47.88	---	56.00	8.12	N	OFF	19.6
0.549420	---	35.10	46.00	10.90	N	OFF	19.6
0.549420	51.14	---	56.00	4.86	N	OFF	19.6
0.579750	---	29.84	46.00	16.16	N	OFF	19.6
0.579750	44.37	---	56.00	11.63	N	OFF	19.6
0.640230	---	33.98	46.00	12.02	N	OFF	19.6
0.640230	48.32	---	56.00	7.68	N	OFF	19.6
0.665250	---	33.67	46.00	12.33	N	OFF	19.6
0.665250	48.18	---	56.00	7.82	N	OFF	19.6
0.730230	---	29.28	46.00	16.72	N	OFF	19.6
0.730230	39.28	---	56.00	16.72	N	OFF	19.6
0.759750	---	31.44	46.00	14.56	N	OFF	19.6
0.759750	43.48	---	56.00	12.52	N	OFF	19.6
0.797280	---	29.33	46.00	16.67	N	OFF	19.6
0.797280	40.95	---	56.00	15.05	N	OFF	19.6
0.820680	---	29.32	46.00	16.68	N	OFF	19.6
0.820680	40.15	---	56.00	15.85	N	OFF	19.6
0.879000	---	29.81	46.00	16.19	N	OFF	19.6
0.879000	40.99	---	56.00	15.01	N	OFF	19.6
0.897180	---	30.00	46.00	16.00	N	OFF	19.6
0.897180	40.29	---	56.00	15.71	N	OFF	19.6
0.928500	---	29.13	46.00	16.87	N	OFF	19.6
0.928500	39.66	---	56.00	16.34	N	OFF	19.6
0.993750	---	28.22	46.00	17.78	N	OFF	19.6
0.993750	40.16	---	56.00	15.84	N	OFF	19.6
1.093470	---	31.25	46.00	14.75	N	OFF	19.6
1.093470	42.39	---	56.00	13.61	N	OFF	19.6
1.153770	---	31.47	46.00	14.53	N	OFF	19.6
1.153770	42.13	---	56.00	13.87	N	OFF	19.6
1.212000	---	30.00	46.00	16.00	N	OFF	19.6
1.212000	40.02	---	56.00	15.98	N	OFF	19.6
1.625100	---	26.41	46.00	19.59	N	OFF	19.7
1.625100	37.76	---	56.00	18.24	N	OFF	19.7
2.253750	---	28.08	46.00	17.92	N	OFF	19.7
2.253750	39.38	---	56.00	16.62	N	OFF	19.7
6.957150	---	26.62	50.00	23.38	N	OFF	19.9
6.957150	32.95	---	60.00	27.05	N	OFF	19.9



Appendix C. Radiated Spurious Emission

Test Engineer :	Jesse Wang, Stan Hsieh, Ken Wu, Nick Yu	Temperature :	21 ~ 23°C
		Relative Humidity :	49 ~ 53%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preampl Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2376.675	52.94	-21.06	74	38.49	31.87	17.99	35.41	107	276	P	H
		2386.125	43.59	-10.41	54	29.09	31.9	18.01	35.41	107	276	A	H
	*	2402	96.11	-	-	81.6	31.9	18.03	35.42	107	276	P	H
	*	2402	95.57	-	-	81.06	31.9	18.03	35.42	107	276	A	H
													H
		2358.93	52.3	-21.7	74	37.92	31.83	17.95	35.4	386	353	P	V
		2381.61	43.42	-10.58	54	28.96	31.87	18	35.41	386	353	A	V
	*	2402	93.17	-	-	78.66	31.9	18.03	35.42	386	353	P	V
	*	2402	92.6	-	-	78.09	31.9	18.03	35.42	386	353	A	V
													V
BLE CH 19 2440MHz		2312.66	52.5	-21.5	74	38.29	31.73	17.86	35.38	100	300	P	H
		2386.72	43.54	-10.46	54	29.04	31.9	18.01	35.41	100	300	A	H
	*	2440	95.19	-	-	80.35	32.2	18.07	35.43	100	300	P	H
	*	2440	94.66	-	-	79.82	32.2	18.07	35.43	100	300	A	H
		2487.82	52.26	-21.74	74	36.99	32.6	18.12	35.45	100	300	P	H
		2489.99	44.44	-9.56	54	29.17	32.6	18.12	35.45	100	300	A	H
		2339.4	52.91	-21.09	74	38.6	31.8	17.91	35.4	357	251	P	V
		2382.8	43.48	-10.52	54	29.02	31.87	18	35.41	357	251	A	V
	*	2440	93.23	-	-	78.39	32.2	18.07	35.43	357	251	P	V
	*	2440	92.75	-	-	77.91	32.2	18.07	35.43	357	251	A	V
		2487.75	52.88	-21.12	74	37.61	32.6	18.12	35.45	357	251	P	V
		2490.62	44.59	-9.41	54	29.32	32.6	18.12	35.45	357	251	A	V



BLE CH 39 2480MHz	*	2480	94.85	-	-	79.71	32.47	18.12	35.45	120	301	P	H
	*	2480	94.33	-	-	79.19	32.47	18.12	35.45	120	301	A	H
		2487.88	53.56	-20.44	74	38.29	32.6	18.12	35.45	120	301	P	H
		2494.32	44.36	-9.64	54	29.09	32.6	18.13	35.46	120	301	A	H
													H
													H
	*	2480	90.63	-	-	75.49	32.47	18.12	35.45	347	253	P	V
	*	2480	90.22	-	-	75.08	32.47	18.12	35.45	347	253	A	V
		2490.44	54.02	-19.98	74	38.75	32.6	18.12	35.45	347	253	P	V
		2490.88	44.36	-9.64	54	29.09	32.6	18.12	35.45	347	253	A	V
													V
													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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	38.38	-35.62	74	51.5	34	11.82	58.94	100	0	P	H
													H
													H
													H
		4804	37.89	-36.11	74	51.01	34	11.82	58.94	100	0	P	V
													V
													V
													V
BLE CH 19 2440MHz		4880	38.44	-35.56	74	51.07	34.1	12.02	58.75	100	0	P	H
		7320	40.36	-33.64	74	47.76	35.6	14.48	57.48	100	0	P	H
													H
													H
		4880	39.16	-34.84	74	51.79	34.1	12.02	58.75	100	0	P	V
		7320	40.3	-33.7	74	47.7	35.6	14.48	57.48	100	0	P	V
													V
													V
BLE CH 39 2480MHz		4882	39.57	-34.43	74	52.19	34.1	12.02	58.74	100	0	P	H
		7323	40.67	-33.33	74	48.07	35.6	14.48	57.48	100	0	P	H
													H
													H
		4882	38.69	-35.31	74	51.31	34.1	12.02	58.74	100	0	P	V
		7323	40.9	-33.1	74	48.3	35.6	14.48	57.48	100	0	P	V
													V
													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	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		45.66	29.35	-10.65	40	41.91	16.29	1.14	29.99	-	-	P	H
		93.45	36.73	-6.77	43.5	50	15.08	1.62	29.97	100	0	P	H
		199.83	34.85	-8.65	43.5	47.43	14.97	2.38	29.93	-	-	P	H
		843.2	31.64	-14.36	46	27.42	28.52	4.95	29.25	-	-	P	H
		937	32.06	-13.94	46	26.11	29.51	5.22	28.78	-	-	P	H
		959.4	32.89	-13.11	46	25.84	30.41	5.29	28.65	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
		44.04	31.82	-8.18	40	43.5	17.2	1.12	30	100	0	P	V
		93.45	33.17	-10.33	43.5	46.44	15.08	1.62	29.97	-	-	P	V
		196.86	29.06	-14.44	43.5	41.68	14.95	2.36	29.93	-	-	P	V
		873.3	31.3	-14.7	46	26.53	28.85	5.03	29.11	-	-	P	V
		910.4	31.69	-14.31	46	26.65	28.82	5.15	28.93	-	-	P	V
		953.8	33.34	-12.66	46	26.33	30.42	5.27	28.68	-	-	P	V
													V
													V
													V
													V
													V
												V	
												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	Peak or Average
H/V	Horizontal or Vertical



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

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		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. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path 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) + Path 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 D. Radiated Spurious Emission Plots

Test Engineer :	Jesse Wang, Stan Hsieh, Ken Wu, Nick Yu	Temperature :	21 ~ 23°C
		Relative Humidity :	49 ~ 53%

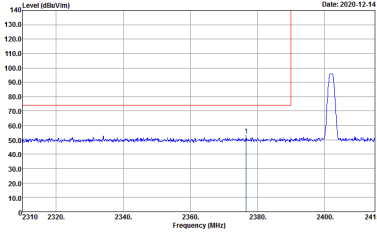
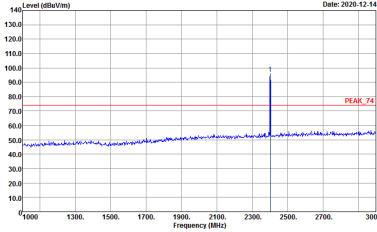
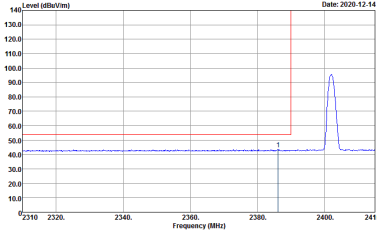
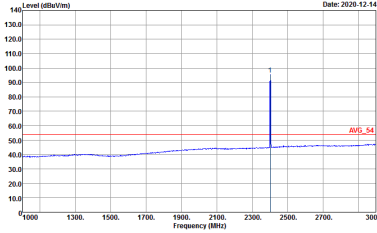
Note symbol

-L	Low channel location
-R	High channel location



2.4GHz 2400~2483.5MHz

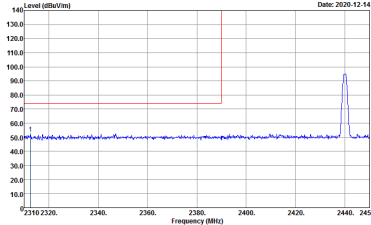
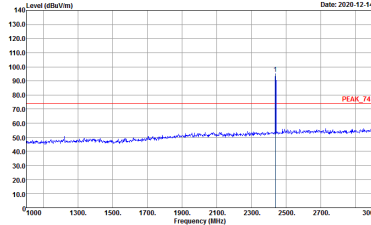
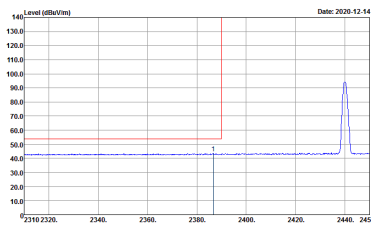
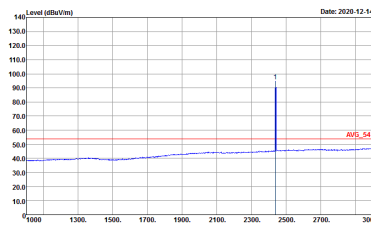
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK, BE_74 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : S	 Site : 03CH07-HY Condition : PEAK, 74 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : S
Avg.	 Site : 03CH07-HY Condition : AVG, BE_54 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : S	 Site : 03CH07-HY Condition : AVG, 54 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : S

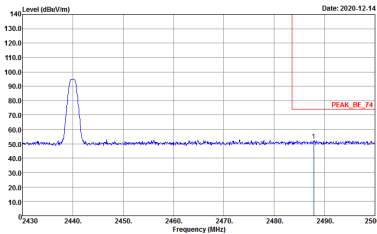
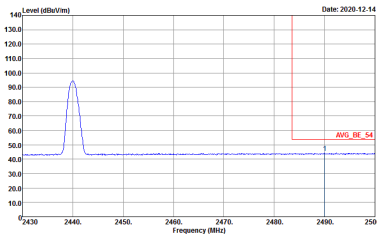


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : S	Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : S
Avg	Site : 03CH07-HY Condition : AVG_BE_34 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : S	Site : 03CH07-HY Condition : AVG_34 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : S

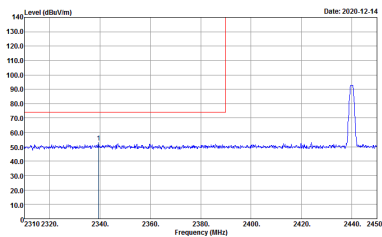
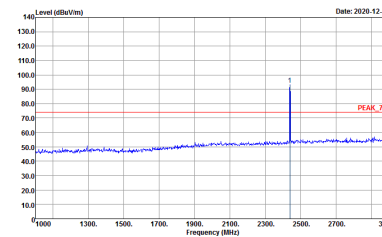
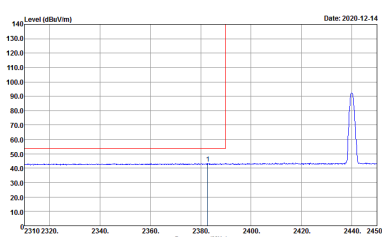
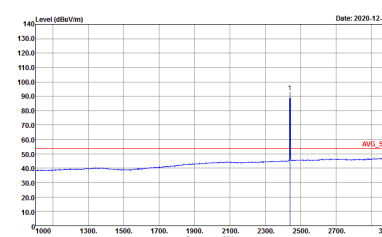


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_24 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6	 Site : 03CH07-HY Condition : PEAK_24 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6
Avg.	 Site : 03CH07-HY Condition : AVG_BE_24 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6	 Site : 03CH07-HY Condition : AVG_24 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6

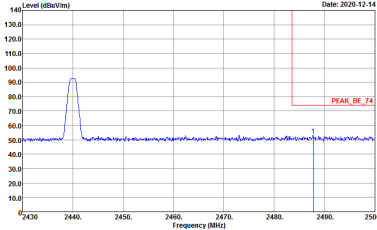
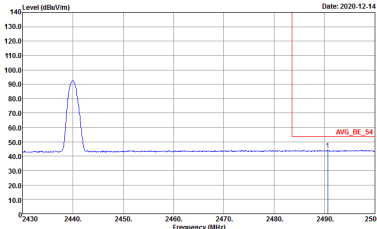


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6	Left blank
Avg.	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 6	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : 6	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : 6
Avg.	 Site : 03CH07-HY Condition : AVG_BE_34 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : 6	 Site : 03CH07-HY Condition : AVG_34 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : 6



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00070962 VERTICAL Detector : Peak Project : 0N2651 Mode : 6	Left blank
Avg.	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00070962 VERTICAL Detector : Peak Project : 0N2651 Mode : 6	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 7	Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 7
Avg.	Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 7	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 0N2651 Mode : 7



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 0N2651 Mode : 7	Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 0N2651 Mode : 7
Avg.	Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 0N2651 Mode : 7	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 0N2651 Mode : 7



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : 03CH07-4Y Condition : PEAK_24.3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : FR0N2651 Mode : S	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : 03CH07-4Y Condition : PEAK_24.3m HF_ANT_00075962 VERTICAL Detector : Peak Project : FR0N2651 Mode : S

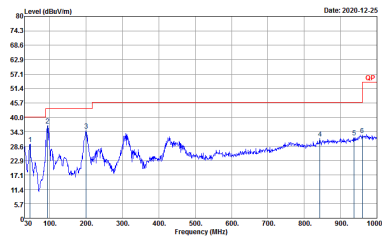
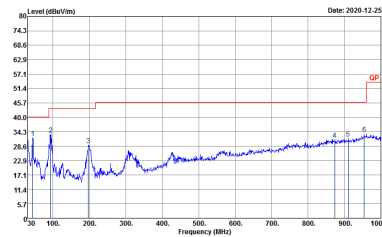


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : 03CH07-011 Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : FR0N2651 Mode : G	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : 03CH07-011 Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : FR0N2651 Mode : G



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : ESCH07-011 Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : ON2651 Mode : 7	Level (dBuV/m) Date: 2020-12-17 Frequency (MHz) Site : ESCH07-011 Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : ON2651 Mode : 7

Emission below 1GHz
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH02-497 Condition : QP 3m LF-ANT-35419(6) HORIZONTAL Detector : Peak Project : 0N2651 Mode : 8	 Site : 03CH02-497 Condition : QP 3m LF-ANT-35419(6) VERTICAL Detector : Peak Project : 0N2651 Mode : 8



Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
Bluetooth - LE	60.8	380	2.63	3kHz	2.16

