# **FCC RF Test Report**

APPLICANT : Cardo Systems, Ltd.

**EQUIPMENT**: SC EDGE REMOTE CONTROL

BRAND NAME : Cardo Systems, Ltd.

MODEL NAME : SC EDGE REMOTE CONTROL

FCC ID : Q95ER33

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : Feb. 17, 2025 ~ Feb. 18, 2025

We, Sporton International Inc. (Kunshan), 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. (Kunshan), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia





Report No.: FR4D2602

# Sporton International Inc. (Kunshan)

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

Sporton International Inc.(Kunshan)

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# **REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D2602	Rev. 01	Initial issue of report	Feb. 28, 2025

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#### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report only	-
3.2	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.18 dB at 2483.56 MHz
-	15.207	AC Conducted Emission	15.207(a)	Pass	Not Connect to the AC mains
3.6	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

#### **Conformity Assessment Condition:**

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or
  in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of
  non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

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# 1 General Description

### 1.1 Applicant

Cardo Systems, Ltd.

101 E. Park Blvd, Suite 600, Plano TX, 75074 USA

#### 1.2 Manufacturer

Cardo Systems, Ltd.

101 E. Park Blvd, Suite 600, Plano TX, 75074 USA

### 1.3 Product Feature of Equipment Under Test

	Product Feature					
Equipment	SC EDGE REMOTE CONTROL					
Brand Name	Cardo Systems, Ltd.					
Model Name	SC EDGE REMOTE CONTROL					
FCC ID	Q95ER33					
SN Code	Conducted / Radiation: SQ4389Q295					
HW Version	1					
SW Version	1					
EUT Stage	Identical Prototype					

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

# 1.4 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	BLE 1Mbps: -7.77 dBm (0.0002 W)			
99% Occupied Bandwidth	BLE 1Mbps:1.07MHz			
Antenna Type / Gain	Printed Antenna type with gain 0 dBi			
Type of Modulation	Bluetooth LE : GFSK			

#### 1.5 Modification of EUT

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

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# 1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)						
	No. 1098, Pengxi North	n Road, Kunshan Econom	ic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China						
	TEL: +86-512-57900158						
	Sporton Sito No	ECC Designation No.	FCC Test Firm				
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.				
	03CH06-KS TH01-KS	CN1257	314309				

#### 1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	SPORTON	FCC 15C-15E Test Tools Ver10.0_210607	10.0
2.	03CH06-KS	AUDIX	E3	210616

# 1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

#### Remark:

- All test items were verified and recorded according to the standards and without any deviation during the test.
- 2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

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# 2 Test Configuration of Equipment Under Test

# 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (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 10 11	2420	30	2462
2400-2483.5 MHz		2422	31	2464
		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	-	-

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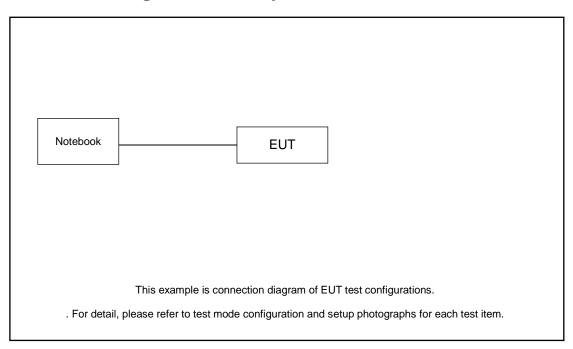
#### 2.2 Test Mode

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). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

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
rest item	Bluetooth – LE / GFSK
Conducted	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps
TCs	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps
ICS	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps
Radiated	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps
110.010.00	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps
Remark: For	Radiated Test Cases, The tests were performance with Notebook.

### 2.3 Connection Diagram of Test System



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# 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	N/A	N/A	N/A	N/A	N/A
2.	Test Jig	N/A	N/A	N/A	N/A	N/A

# 2.5 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

#### 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 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.

 $Offset = RF \ cable \ loss$ .

Following shows an offset computation example with cable loss 0.60 dB.

$$Offset(dB) = RF \ cable \ loss(dB).$$
  
= 0.60 (dB)

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#### 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.

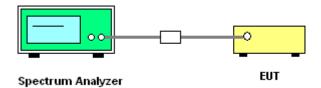
#### 3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.1.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 11.8
- 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% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
- 6. Measure and record the results in the test report.

#### 3.1.4 Test Setup



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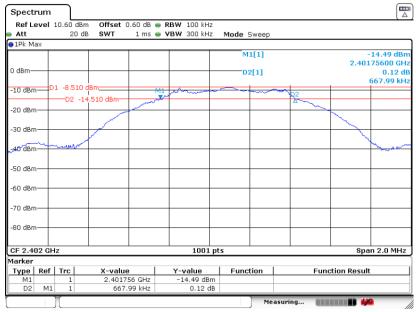
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#### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

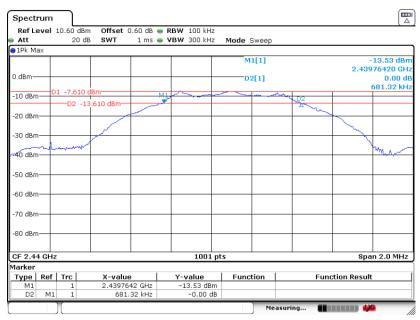
#### **BLE 1Mbps**

#### 6 dB Bandwidth Plot on Channel 00



Date: 18.FEB.2025 04:40:16

#### 6 dB Bandwidth Plot on Channel 19



Date: 18.FEB.2025 04:52:03

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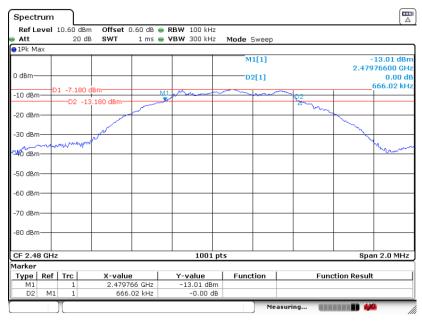
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#### 6 dB Bandwidth Plot on Channel 39



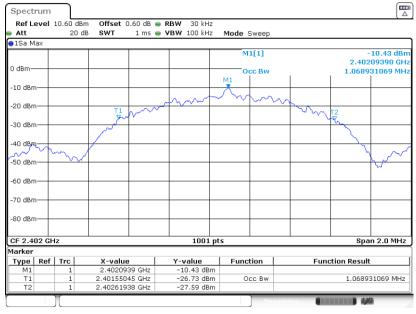
Date: 18.FEB.2025 05:00:06

#### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

#### BIF 1Mbps

#### 99% Occupied Bandwidth Plot on Channel 00



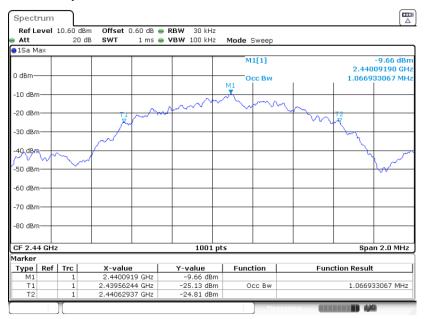
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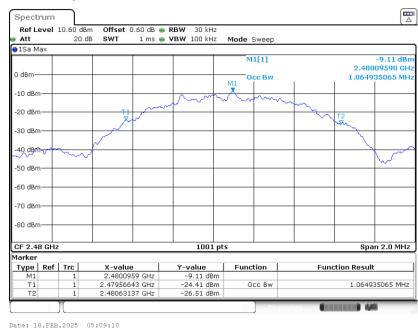
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#### 99% Occupied Bandwidth Plot on Channel 19



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#### 99% Occupied Bandwidth Plot on Channel 39



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

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#### 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.

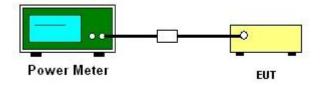
#### 3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.2.3 Test Procedures

- The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1
   Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
- 2. The RF output of EUT was connected to the power meter 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. 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.

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#### 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.

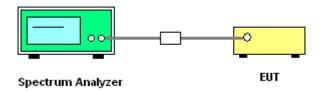
#### 3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.3.3 Test Procedures

- The testing follows Measurement Procedure of ANSI C63.10-2013 clause 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.

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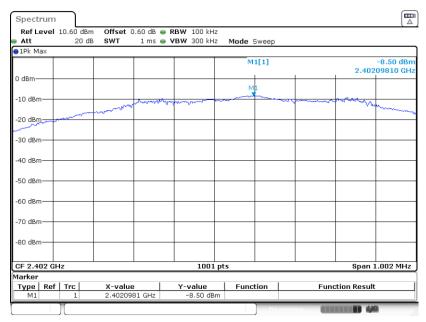
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#### 3.3.6 Test Result of Power Spectral Density Plots (100kHz)

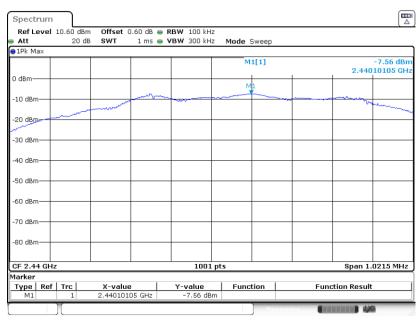
#### **BLE 1Mbps**

#### PSD 100kHz Plot on Channel 00



Date: 18.FEB.2025 04:41:55

#### PSD 100kHz Plot on Channel 19

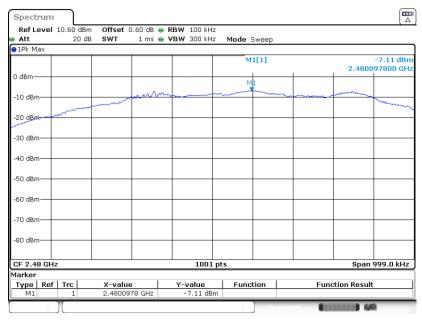


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#### PSD 100kHz Plot on Channel 39

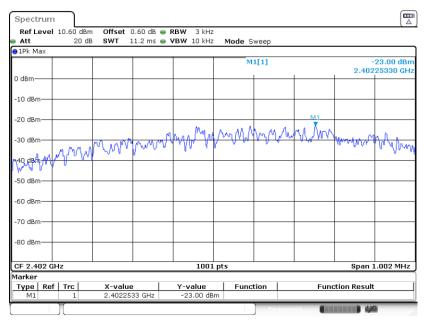


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#### 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

#### **BLE 1Mbps**

#### PSD 3kHz Plot on Channel 00



Date: 18.FEB.2025 04:40:59

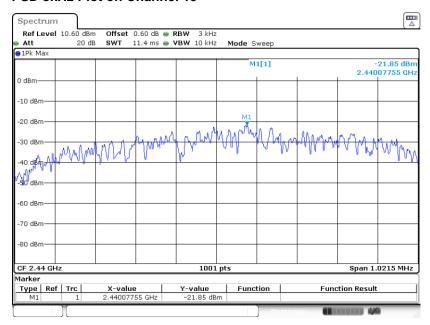
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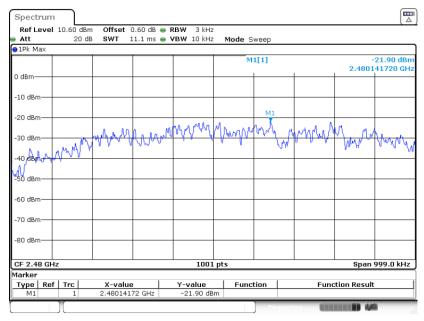
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#### **PSD 3kHz Plot on Channel 19**



Date: 18.FEB.2025 04:53:17

#### PSD 3kHz Plot on Channel 39



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#### 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.

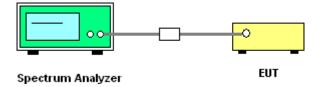
#### 3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.4.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 11.13
- 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



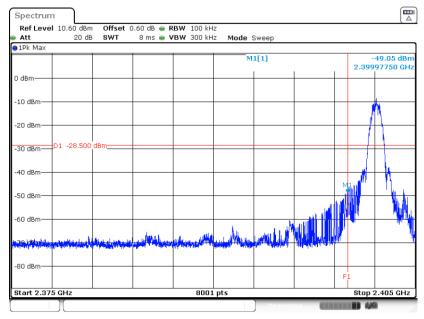
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#### 3.4.5 Test Result of Conducted Band Edges Plots

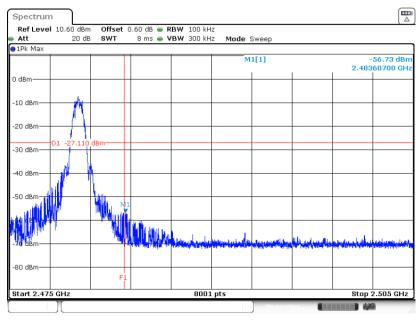
#### **BLE 1Mbps**

#### Low Band Edge Plot on Channel 00



#### Date: 18.FEB.2025 04:42:54

#### **High Band Edge Plot on Channel 39**



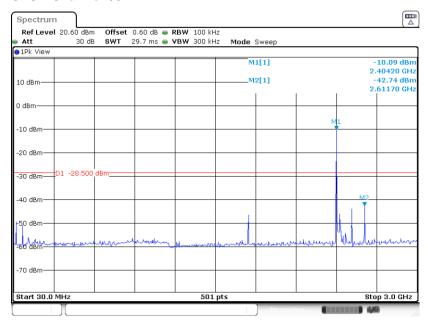
Date: 18.FEB.2025 05:03:07

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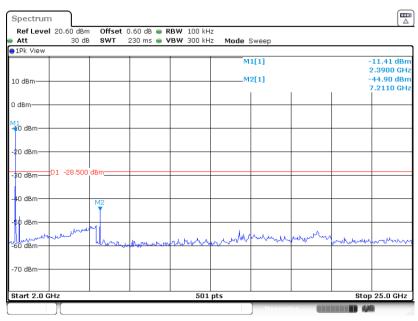
#### 3.4.6 Test Result of Conducted Spurious Emission Plots

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



#### Date: 18.FEB.2025 04:46:14

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



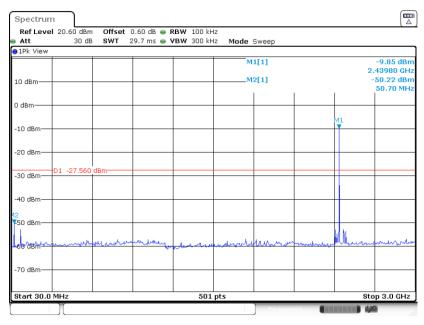
Date: 18.FEB.2025 04:47:40

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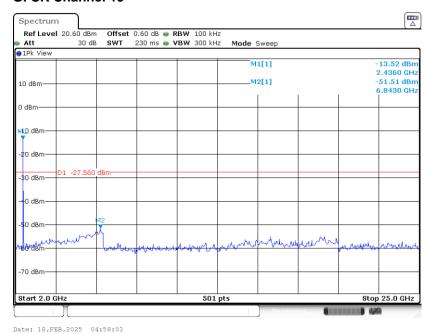
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# Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



#### Date: 18.FEB.2025 04:57:35

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

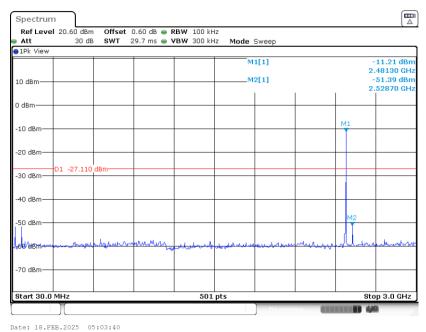


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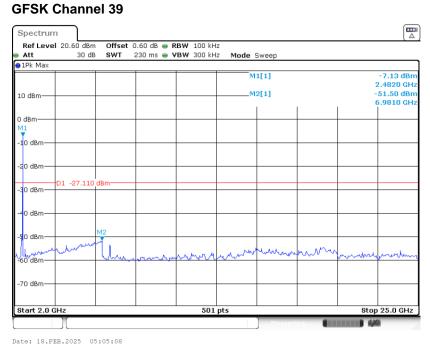
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# Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



# Conducted Spurious Emission Plot on Bluetooth LE 1Mbps



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# 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	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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#### 3.5.3 Test Procedures

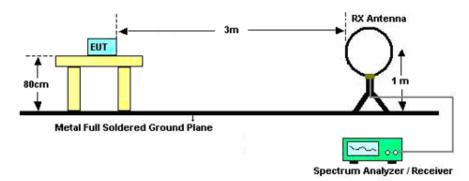
- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get 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.
- The EUT was set 3 meters from the interference receiving antenna, which was mounted on the 4. 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.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than 7. peak 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  $f \ge 1$  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.

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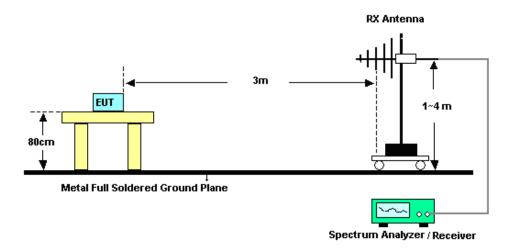
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#### 3.5.4 Test Setup

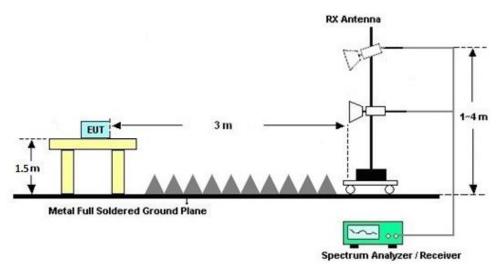
#### For radiated emissions below 30MHz



#### For radiated emissions from 30MHz to 1GHz



#### For radiated emissions above 1GHz



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#### 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.

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There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

#### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

#### 3.5.7 Duty Cycle

Please refer to Appendix C.

# 3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix B.

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### 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.

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# 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY564000 23	3Hz~8.5GHz;M ax 30dBm	Jan. 02, 2025	Feb. 17, 2025	Jan. 01, 2026	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY574710 84	10Hz-44GHz	Jul. 04, 2024	Feb. 17, 2025	Jul. 03, 2025	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Feb. 17, 2025	Sep. 07, 2025	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	59913	30MHz-1GHz	Sep. 03, 2024	Feb. 17, 2025	Sep. 02, 2025	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 11, 2024	Feb. 17, 2025	Apr. 10, 2025	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101116	18GHz~40GHz	Oct. 22, 2024	Feb. 17, 2025	Oct. 21, 2025	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	380827	9KHz ~1GHZ	Jul. 04, 2024	Feb. 17, 2025	Jul. 03, 2025	Radiation (03CH06-KS)
Amplifier	EM	EM18G40GA	060728	18~40GHz	Jan. 03, 2025	Feb. 17, 2025	Jan. 02, 2026	Radiation (03CH06-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 03, 2025	Feb. 17, 2025	Jan. 02, 2026	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY572801 19	500MHz~26.5G Hz	Oct. 09, 2024	Feb. 17, 2025	Oct. 08, 2025	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Feb. 17, 2025	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 17, 2025	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 17, 2025	NCR	Radiation (03CH06-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 10, 2024	Feb. 18, 2025	Oct. 09, 2025	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GH z	Jan. 02, 2025	Feb. 18, 2025	Jan. 01, 2026	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2025	Feb. 18, 2025	Jan. 01, 2026	Conducted (TH01-KS)

NCR: No Calibration Required

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# 5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

#### **Uncertainty of Conducted Measurement**

Conducted Spurious Emission & Bandedge	±2.22 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.50 dB
Conducted Power Spectral Density	±0.90 dB
Frequency	±0.04 ppm

#### Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	3.30 dB
of 95% (U = 2Uc(y))	3.30 db

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

Measuring Uncertainty for a Level of Confidence	6.06 dB
of 95% (U = 2Uc(y))	0.00 UB

#### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.18 dB
---	---------

#### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence	5.38 dB		
of 95% (U = 2Uc(y))	3.36 ub		

----- THE END -----

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# **Appendix A. Conducted Test Results**

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#### **Bluetooth Low Energy**

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2025/2/18	Relative Humidity:	40~51	%

#### BLE1M-Ant1

# 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	1.07	0.67	0.50	Pass
BLE	1Mbps	1	19	2440	1.07	0.68	0.50	Pass
BLE	1Mbps	1	39	2480	1.06	0.67	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	-9.77	30.00	0.00	-9.77	36.00	Pass
BLE	1Mbps	1	19	2440	-8.82	30.00	0.00	-8.82	36.00	Pass
BLE	1Mbps	1	39	2480	-7.77	30.00	0.00	-7.77	36.00	Pass

### TEST RESULTS DATA

#### <u>Average Power Table</u> (Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	16.13	-10.32
BLE	1Mbps	1	19	2440	16.13	-8.92
BLE	1Mbps	1	39	2480	16.13	-7.87

Note: The Power setting is default.

# 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	-8.50	-23.00	0.00	8.00	Pass
BLE	1Mbps	1	19	2440	-7.56	-21.85	0.00	8.00	Pass
BLE	1Mbps	1	39	2480	-7.11	-21.90	0.00	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 :	Jerry Xu	Relative Humidity :	41~42%
	Jeny Au	Temperature :	22~23°C

# **Radiated Spurious Emission Test Modes**

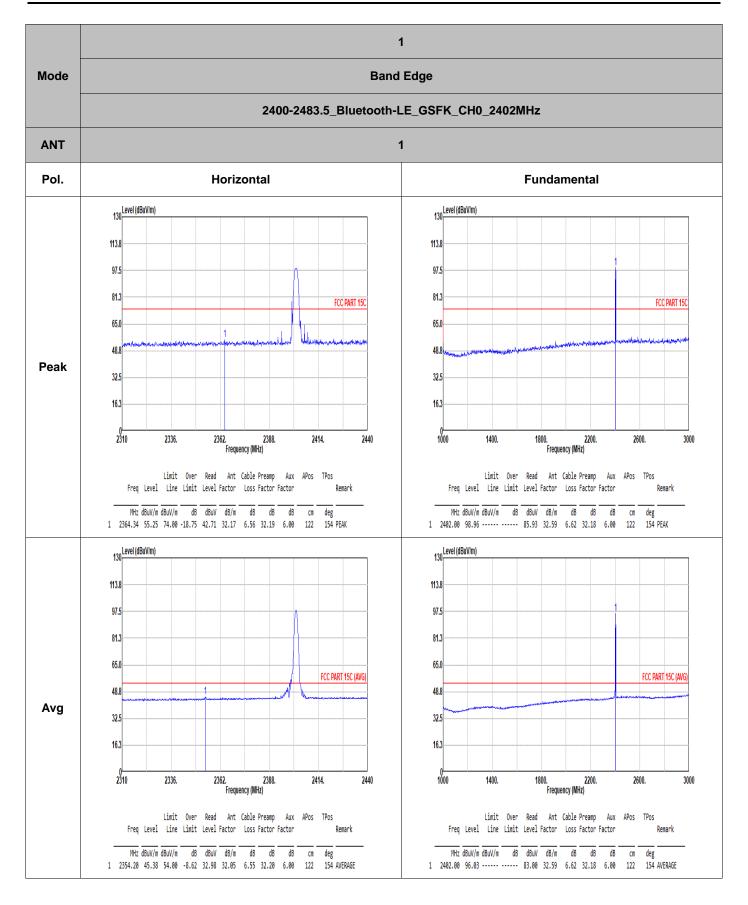
Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	1	Bluetooth-LE_GSFK	0	2402	1Mbps	-	-
Mode 2	2400-2483.5	1	Bluetooth-LE_GSFK	19	2440	1Mbps	-	-
Mode 3	2400-2483.5	1	Bluetooth-LE_GSFK	39	2480	1Mbps	-	-

# Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE_GSFK	0	2354.20	45.69	54.00	-8.31	V	AVERAGE	Pass	Band Edge
1	Bluetooth-LE_GSFK	0	7207.50	59.54	67.92	-8.38	٧	Peak	Pass	Harmonic
2	Bluetooth-LE_GSFK	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE_GSFK	19	12201.00	60.16	74.00	-13.84	Τ	Peak	Pass	Harmonic
3	Bluetooth-LE_GSFK	39	2483.56	49.82	54.00	-4.18	V	AVERAGE	Pass	Band Edge
3	Bluetooth-LE_GSFK	39	12402.00	60.56	74.00	-13.44	Н	Peak	Pass	Harmonic

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1 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE\_GSFK\_CH0\_2402MHz **ANT** Pol. Vertical **Fundamental** 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 65.0 65.0 48.8 Peak 32.5 32.5 16.3 16.3 1000 2310 2388. Frequency (MHz) 2440 1400. 3000 2336. 2362. Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Remark Freq Level Line Limit Level Factor Loss Factor Factor Freq Level Line Limit Level Factor Loss Factor Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB 1 2383.58 55.18 74.00 -18.82 42.38 32.40 6.59 32.19 6.00 100 176 PEAK 1 2402.00 95.08 ----- 82.05 32.59 6.62 32.18 6.00 100 176 PEAK 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 65.0 65.0 FCC PART 15C (AVG FCC PART 15C (AVG 48.8 Avg 32.5 32.5 16.3 16.3 2310 1000 υ. 2200. Frequency (MHz) 2. 2388. Frequency (MHz) 1400. 2336. 2362. 2414. 2440 1800. 2600. 3000 Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Line Limit Level Factor Loss Factor Factor Remark Freq Level Line Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB CM deg 1 2402.00 93.18 ----- 80.15 32.59 6.62 32.18 6.00 1 2354.20 45.69 54.00 -8.31 33.29 32.05 6.55 32.20 6.00 100 176 AVERAGE

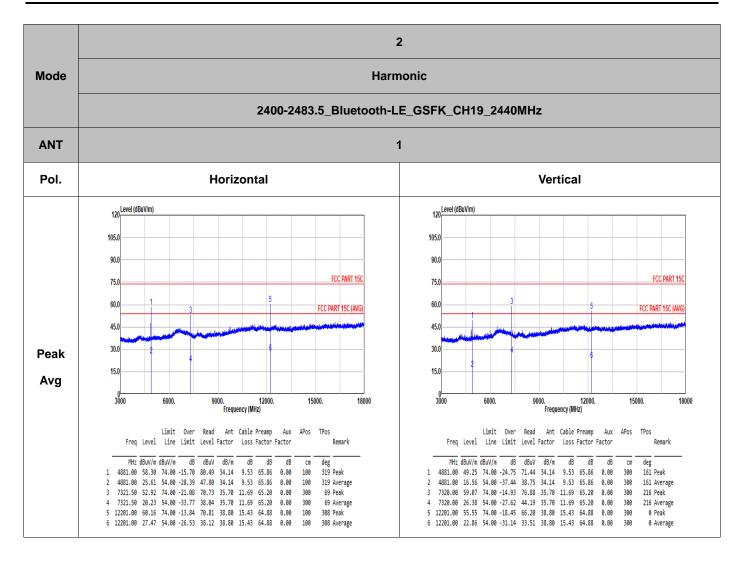
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1 Mode Harmonic 2400-2483.5\_Bluetooth-LE\_GSFK\_CH0\_2402MHz **ANT** Pol. Horizontal Vertical 120 Level (dBuV/m) 120 Level (dBuV/m) 105.0 105.0 90.0 90.0 FCC PART 150 75.0 75.0 60.0 60.0 FCC PART 15C (AVG 45.0 45.0 30.0 30.0 Peak 15.0 15.0 Avg 3000 3000 6000. 15000. 18000 6000. 12000. 15000. 18000 Frequency (MHz) Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Line Limit Level Factor Loss Factor Factor Remark Freq Level Line Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB dB 4803.00 51.96 74.00 -22.04 74.30 34.20 9.44 65.98 0.00 deg 70 Peak MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB dB 4804.50 52.88 74.00 -21.12 75.20 34.20 9.45 65.97 0.00 cm 100 deg 267 Peak 4803.00 19.27 54.00 -34.73 41.61 34.20 9.44 65.98 0.00 70 Average 4804.50 20.19 54.00 -33.81 42.51 34.20 9.45 65.97 0.00 267 Average 7206.00 61.02 72.86 -11.84 78.62 35.60 11.65 64.85 0.00 9609.00 48.88 72.86 -23.98 64.85 36.90 13.56 66.43 0.00 --- Peak --- Peak 5988.00 44.27 67.92 -23.65 64.15 35.35 10.57 65.80 0.00 7207.50 59.54 67.92 -8.38 77.14 35.60 11.65 64.85 0.00 --------- Peak --- Peak 5 12009.00 56.15 74.00 -17.85 67.10 38.71 15.28 64.94 0.00 332 Peak 5 12012.00 54.00 74.00 -20.00 64.95 38.71 15.28 64.94 0.00 127 Peak 6 12009.00 23.46 54.00 -30.54 34.41 38.71 15.28 64.94 0.00 332 Average  $6 \quad 12012.00 \quad 21.31 \quad 54.00 \quad -32.69 \quad 32.26 \quad 38.71 \quad 15.28 \quad 64.94 \quad 0.00$ 127 Average

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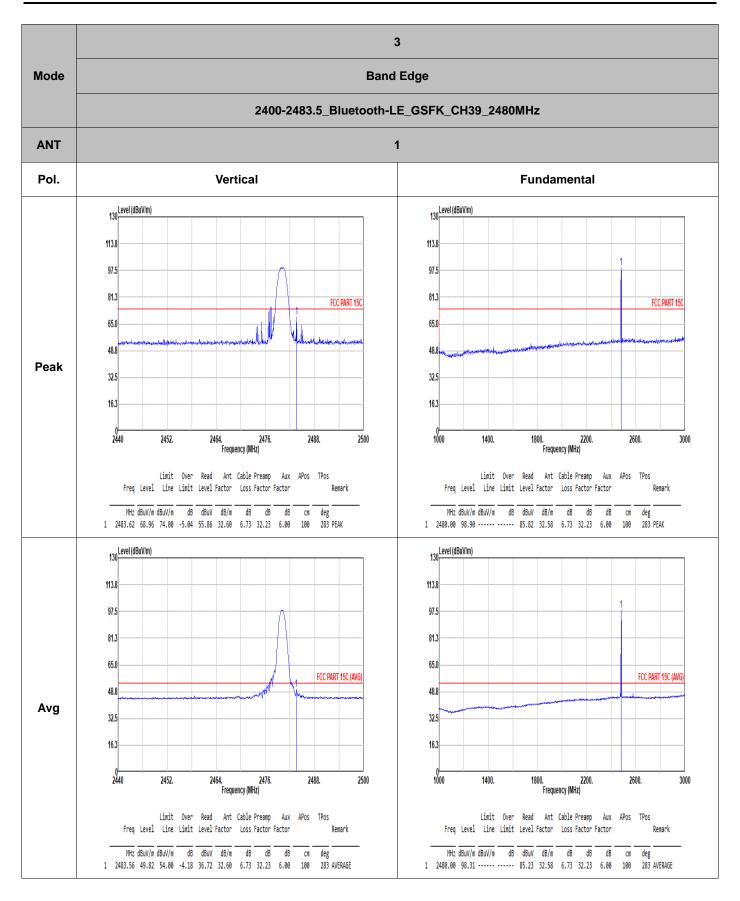
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3 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE\_GSFK\_CH39\_2480MHz 1 **ANT** Pol. Horizontal **Fundamental** 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 65.0 65.0 48.8 48.8 Peak 32.5 32.5 16.3 16.3 0<u>--</u> 2440 1000 →. 2476. Frequency (MHz) 2452. 3000 2500 1400. Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Remark Freq Level Line Limit Level Factor Loss Factor Factor Freq Level Line Limit Level Factor Loss Factor Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB 1 2483.68 66.29 74.00 -7.71 53.19 32.60 6.73 32.23 6.00 101 179 PEAK 1 2480.00 97.73 ----- 84.65 32.58 6.73 32.23 6.00 101 179 PEAK 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 65.0 65.0 FCC PART 15C (AVG FCC PART 15C (AVG 48.8 Avg 32.5 32.5 16.3 16.3 0<u>--</u> 2440 1000 2452. 4. 2476. Frequency (MHz) 2488. 1400. 2464. 2500 1800. 2200. 2600. 3000 Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Freq Level Line Limit Level Factor Loss Factor Factor Remark Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB CM deg CM 1 2480.00 95.50 ----- 82.42 32.58 6.73 32.23 6.00 1 2483.50 48.29 54.00 -5.71 35.19 32.60 6.73 32.23 6.00 101 179 AVERAGE

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3 Mode Harmonic 2400-2483.5\_Bluetooth-LE\_GSFK\_CH39\_2480MHz 1 **ANT** Pol. Horizontal Vertical 120 Level (dBuV/m) 120 Level (dBuV/m) 105.0 105.0 90.0 90.0 FCC PART 150 FCC PART 15C 75.0 75.0 60.0 60.0 FCC PART 15C (AVG) 45.0 45.0 30.0 Peak 30.0 15.0 15.0 Avg 3000 6000. 15000. 12000. 18000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Line Limit Level Factor Loss Factor Factor Limit Over Read Ant Cable Preamp Aux APos TPos Remark Freq Level Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB 4960.50 53.75 74.00 -20.25 75.88 34.00 9.61 65.74 0.00 cm 278 deg 0 Peak MHz dBuV/m dBuV/m dB dBuV dB/m dB dB deg 4959.00 53.61 74.00 -20.39 75.75 34.00 9.61 65.75 0.00 4959.00 20.92 54.00 -33.08 43.06 34.00 9.61 65.75 0.00 100 318 Peak 4960.50 21.06 54.00 -32.94 43.19 34.00 9.61 65.74 0.00 0 Average 100 318 Average 7441.50 54.39 74.00 -19.61 72.48 35.70 11.78 65.57 0.00 7441.50 21.70 54.00 -32.30 39.79 35.70 11.78 65.57 0.00 300 300 37 Peak 37 Average 7441.50 47.70 74.00 -26.30 65.79 35.70 11.78 65.57 0.00 --- Peak 4 12402.00 60.56 74.00 -13.44 71.01 38.80 15.58 64.83 0.00 330 Peak 5 12399.00 58.48 74.00 -15.52 68.93 38.80 15.58 64.83 0.00 100 149 Peak 5 12402.00 27.87 54.00 -26.13 38.32 38.80 15.58 64.83 0.00 100 330 Average  $6 \ \ 12399.00 \ \ 25.79 \ \ 54.00 \ \ -28.21 \ \ \ 36.24 \ \ \ 38.80 \ \ 15.58 \ \ 64.83 \ \ \ 0.00$ 149 Average

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3 Mode 18G-25G 2400-2483.5\_Bluetooth-LE\_GSFK\_CH39\_2480MHz ANT 1 Pol. Horizontal Vertical 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 15C Peak 65.0 65.0 FCC PART 15C (AVG) FCC PART 15C (AVG) Avg 48.8 48.8 32.5 32.5 16.3 16.3

25000

23600.

18000

19400.

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18000

19400.

22200.

Frequency (MHz)

20800. 22200. Frequency (MHz)

23600.

25000

3 Mode 30M-1G 2400-2483.5\_Bluetooth-LE\_GSFK\_CH39\_2480MHz **ANT** 1 Pol. Horizontal Vertical 67.5 67.5 55.0 55.0 42.5 42.5 18 marchalanda barahalahada Peak 418. 612. Frequency (MHz) Limit Over Read Ant Cable Preamp Freq Level Lime Limit Level Factor Loss Factor Limit Over Read Ant Cable Preamp Freq Level Lime Limit Level Factor Loss Factor TPos Remark Remark 
 NHz
 dBuV/m
 dBuV/m
 dB
 dBuV
 dB/m

 130.88
 23.28
 43.59-20.22
 36.66
 17.54

 419.94
 33.28
 46.00
 -9.57
 46.93
 19.14

 4419.94
 33.28
 46.00
 -12.72
 39.92
 22.46

 540.22
 31.32
 46.00
 -14.68
 35.57
 24.61

 737.13
 30.99
 46.00
 -14.05
 30.83
 27.95

 863.23
 31.95
 46.00
 -14.05
 29.37
 29.59
 dB dB 1.74 32.06 2.66 32.30 3.13 32.21 3.54 32.40 4.13 31.92 4.46 31.47 deg
-- Peak
-- Peak
-- Peak
-- Peak
-- Peak
-- Peak deg -- Peak dB dB
1.19 32.07
1.97 32.07
2.37 31.88
2.94 32.05
3.60 32.38
4.22 31.73 -- Peak -- Peak -- Peak -- Peak -- Peak

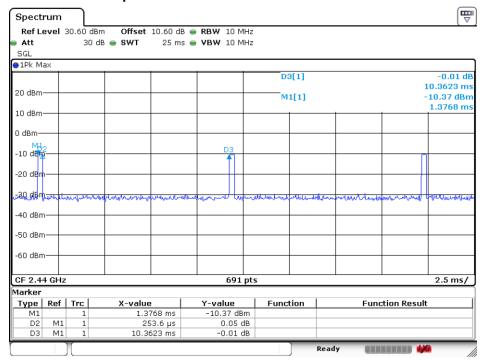
Note: For the above frequencies which fall in the non-restricted frequency band, the limit is 100kHz-PSD down 20dB.

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# Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting	
Bluetooth LE 1Mbps	2.45	0.254	3.943	4kHz	

#### **Bluetooth LE 1Mbps**



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