FCC RF Test Report

APPLICANT : Cardo Systems, Ltd.

EQUIPMENT : 509 UCS EDGE

BRAND NAME : Cardo Systems, Ltd.

MODEL NAME : UCSE

FCC ID : Q95ER31

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : May 31, 2024 ~ Jun. 19, 2024

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.: FR442306B

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
FR442306B	Rev. 01	Initial issue of report	Sep. 05, 2024

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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 3.94 dB at 2484.40 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.41 dB at 0.437 MHz
3.7	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 509 UCS EDGE			
Brand Name	Cardo Systems, Ltd.		
Model Name	UCSE		
FCC ID	Q95ER31		
SN Code	Conducted: 5M4113A037 Conduction: 5M4113a085 Radiation: 5M4113A035		
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: -14.07 dBm (0.00004 W)		
Maximum Output Fower to Antenna	BLE 2Mbps: -14.23 dBm (0.00004 W)		
99% Occupied Bandwidth	BLE 1Mbps:1.04MHz		
39 % Occupied Baildwidth	BLE 2Mbps:2.07MHz		
Antenna Type / Gain	BLE: Chip Antenna type / 2.21 dBi		
Type of Modulation Bluetooth LE : GFSK			

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1.5 Modification of EUT

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

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 Road, Kunshan Economic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China				
	TEL: +86-512-57900158				
	Charten Site No.	ECC Decignation No.	FCC Test Firm		
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.		
rest site No.	CO01-KS 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
3.	CO01-KS	AUDIX	E3	6.2009-8-24

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:

- 1. 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	2420	30	2462
2400-2483.5 MHz	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14 15 16	2430	35	2472
[2432	36	2474
		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: 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 (Z 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				
rest item	Bluetooth – LE / GFSK				
	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps				
	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps				
Conducted	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps				
TCs	Mode 4: Bluetooth Tx CH00_2402 MHz _BLE 2Mbps				
	Mode 5: Bluetooth Tx CH19_2440 MHz _BLE 2Mbps				
Mode 6: Bluetooth Tx CH39_2480 MHz _BLE 2Mbps					
Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps					
	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps				
Radiated	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps				
TCs Mode 4: Bluetooth Tx CH00_2402 MHz _BLE 2Mbps					
Mode 5: Bluetooth Tx CH19_2440 MHz _BLE 2Mbps					
	Mode 6: Bluetooth Tx CH39_2480 MHz _BLE 2Mbps				
AC					
Conducted	Mode 1: BT Link + USB Cable (Charging from adaptor)				
Emission	Emission				
Remark: For Radiated Test Cases, The tests were performance with Notebook.					

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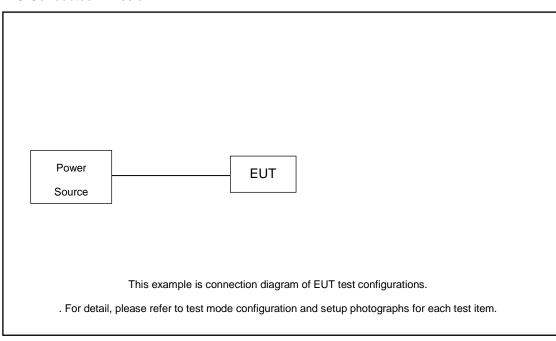
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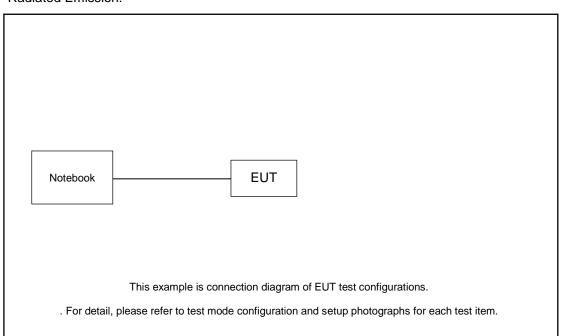
Report Template No.: BU5-FR15CBT4.0 Version 2.0

2.3 Connection Diagram of Test System

AC Conducted Emission:



Radiated Emission:



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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.	Phone	OPPO	R17	N/A	N/A	N/A
2.	Notebook	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.

For AC power line conducted emissions, the EUT was set to connect with the phone under large package sizes transmission.

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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 5.30 dB.

 $Offset(dB) = RF \ cable \ loss(dB).$ = 5.30 (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.

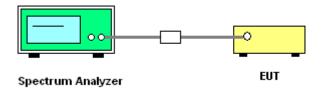
3.1.2 Measuring Instruments

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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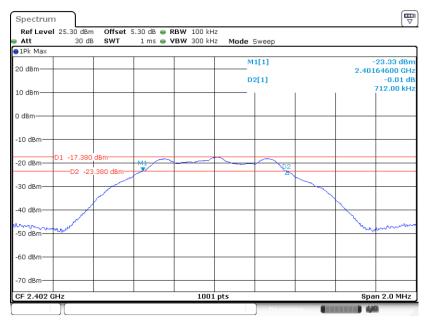
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3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

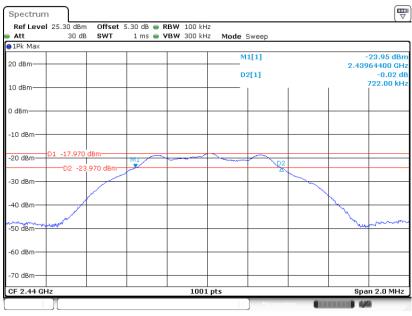
BLE 1Mbps

6 dB Bandwidth Plot on Channel 00



Date: 1.JUN.2024 15:03:11

6 dB Bandwidth Plot on Channel 19



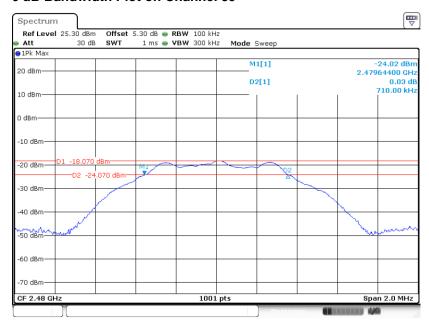
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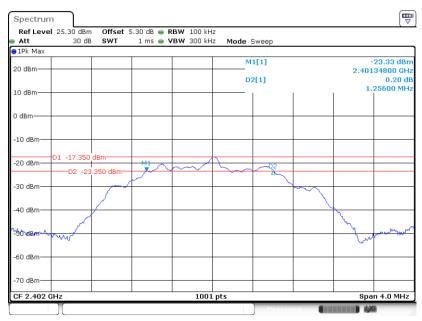
6 dB Bandwidth Plot on Channel 39



Date: 1.JUN.2024 15:08:18

BLE 2Mbps

6 dB Bandwidth Plot on Channel 00



Date: 1.JUN.2024 15:11:04

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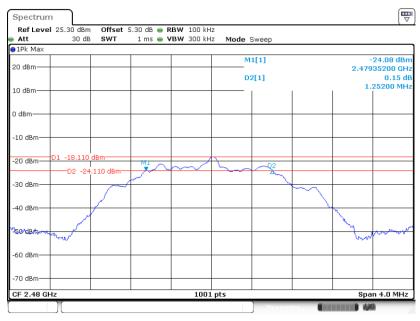
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6 dB Bandwidth Plot on Channel 19



Date: 1.JUN.2024 15:13:42

6 dB Bandwidth Plot on Channel 39



Date: 1.JUN.2024 15:18:22

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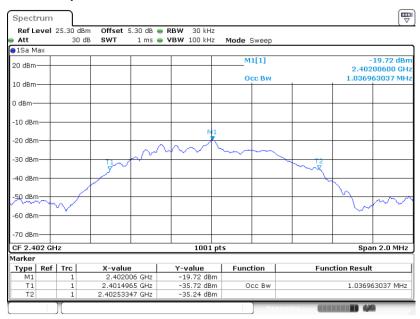
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3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

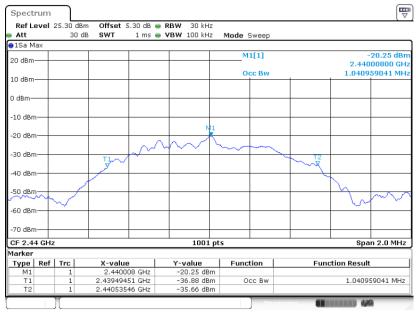
BLE 1Mbps

99% Occupied Bandwidth Plot on Channel 00



Date: 1.JUN.2024 15:05:00

99% Occupied Bandwidth Plot on Channel 19



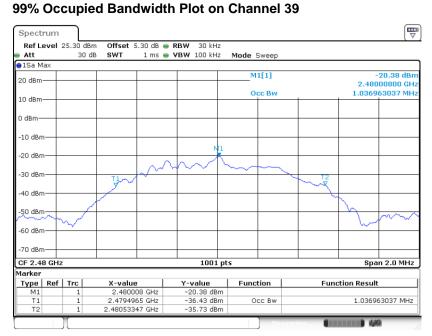
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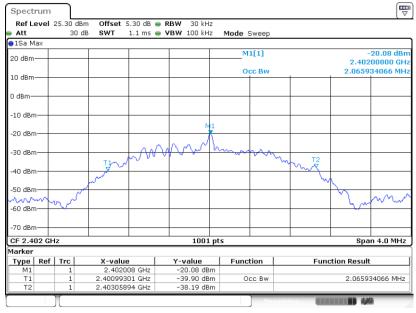
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Date: 1.JUN.2024 15:10:06

BLE 2Mbps

99% Occupied Bandwidth Plot on Channel 00



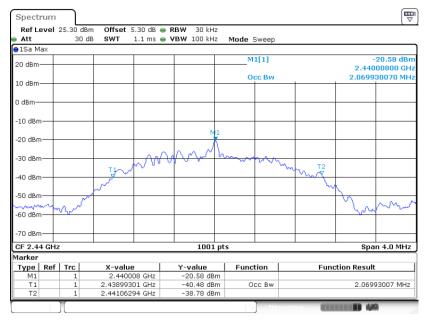
Date: 1.JUN.2024 15:12:52

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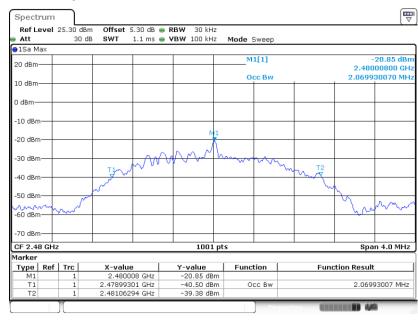
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99% Occupied Bandwidth Plot on Channel 19



Date: 1.JUN.2024 15:15:12

99% Occupied Bandwidth Plot on Channel 39



Date: 1.JUN.2024 15:17:49

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.

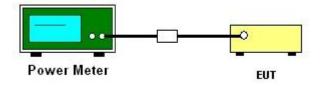
3.2.2 Measuring Instruments

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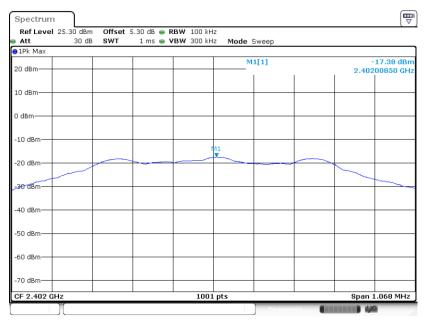
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3.3.6 Test Result of Power Spectral Density Plots (100kHz)

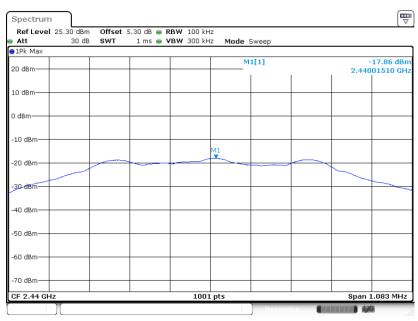
BLE 1Mbps

PSD 100kHz Plot on Channel 00



Date: 1.JUN.2024 15:03:50

PSD 100kHz Plot on Channel 19

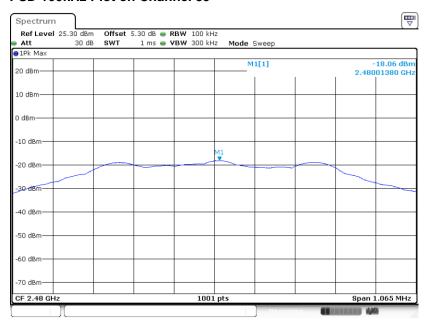


Date: 1.JUN.2024 15:06:54

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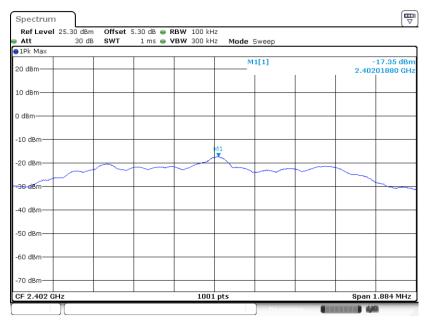
PSD 100kHz Plot on Channel 39



Date: 1.JUN.2024 15:08:56

BLE 2Mbps

PSD 100kHz Plot on Channel 00

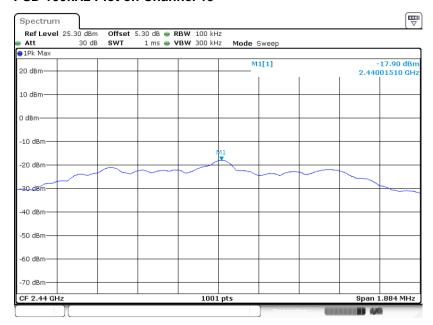


Date: 1.JUN.2024 15:11:42

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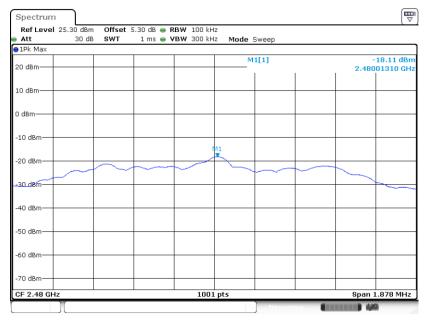
Report No.: FR442306B

PSD 100kHz Plot on Channel 19



Date: 1.JUN.2024 15:14:21

PSD 100kHz Plot on Channel 39



Date: 1.JUN.2024 15:19:00

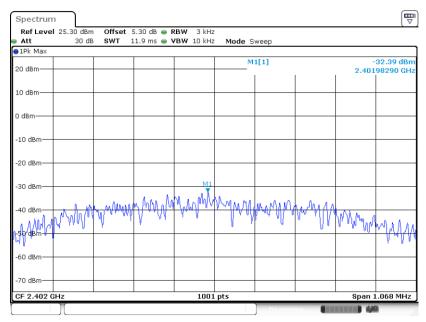
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3.3.7 Test Result of Power Spectral Density Plots (3kHz)

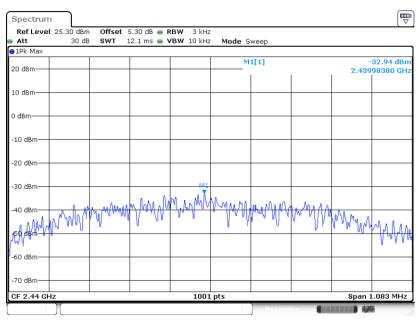
BLE 1Mbps

PSD 3kHz Plot on Channel 00



Date: 1.JUN.2024 15:03:31

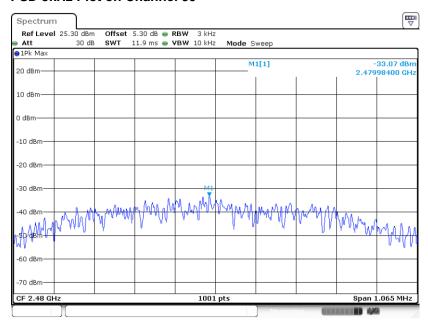
PSD 3kHz Plot on Channel 19



Date: 1.JUN.2024 15:06:34

Report Template No.: BU5-FR15CBT4.0 Version 2.0

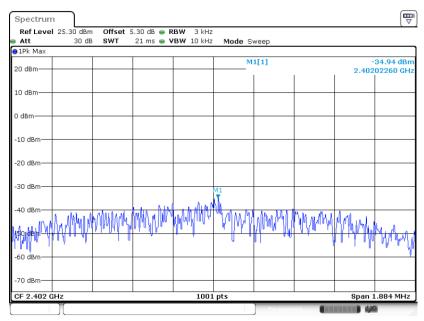
PSD 3kHz Plot on Channel 39



Date: 1.JUN.2024 15:08:37

BLE 2Mbps

PSD 3kHz Plot on Channel 00



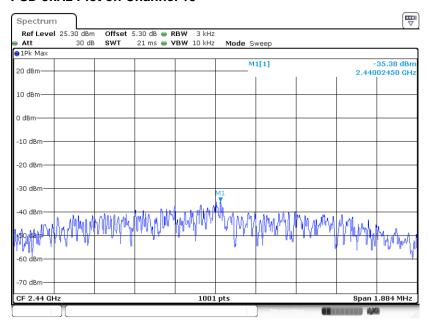
Date: 1.JUN.2024 15:11:23

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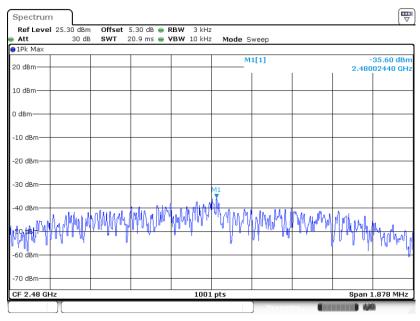
Report No.: FR442306B

PSD 3kHz Plot on Channel 19



Date: 1.JUN.2024 15:14:02

PSD 3kHz Plot on Channel 39



Date: 1.JUN.2024 15:18:41

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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.

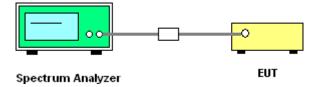
3.4.2 Measuring Instruments

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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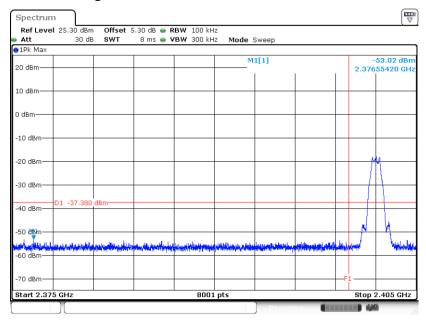
 FCC ID: Q95ER31
 Report Version
 : Rev. 01

Report Template No.: BU5-FR15CBT4.0 Version 2.0

3.4.5 Test Result of Conducted Band Edges Plots

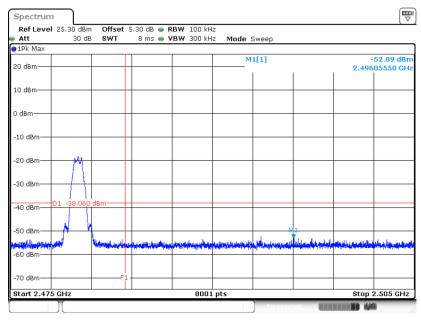
BLE 1Mbps

Low Band Edge Plot on Channel 00



Date: 1.JUN.2024 15:04:09

High Band Edge Plot on Channel 39



Date: 1.JUN.2024 15:09:16

FCC ID: Q95ER31

Report Issued Date : Sep. 05, 2024
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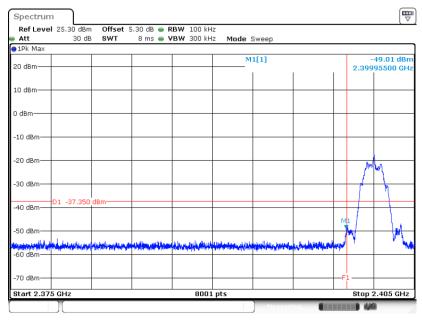
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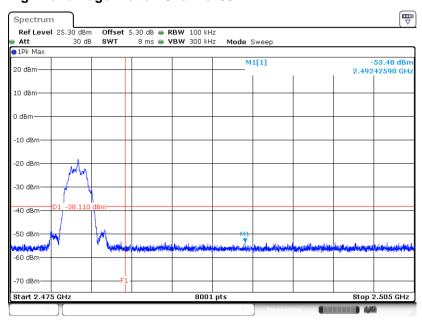
BLE 2Mbps

Low Band Edge Plot on Channel 00



Date: 1.JUN.2024 15:12:01

High Band Edge Plot on Channel 39



Date: 1.JUN.2024 15:19:19

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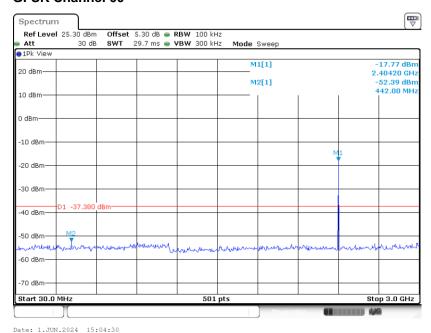
Report Issued Date : Sep. 05, 2024

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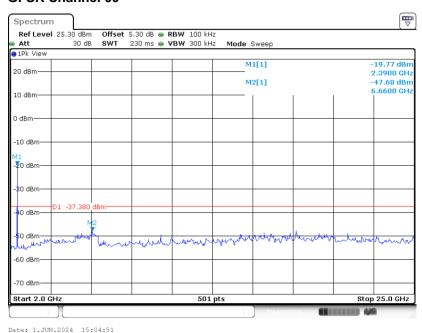
Report No.: FR442306B

3.4.6 Test Result of Conducted Spurious Emission Plots

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



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

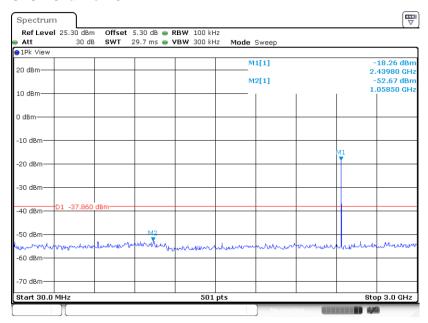


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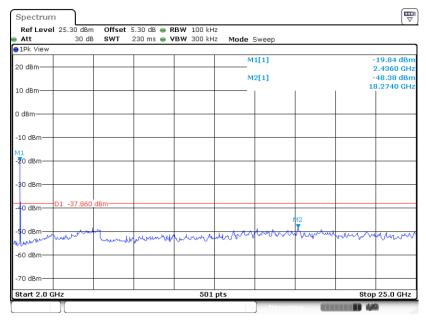
Report No.: FR442306B

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



Date: 1.JUN.2024 15:07:15

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



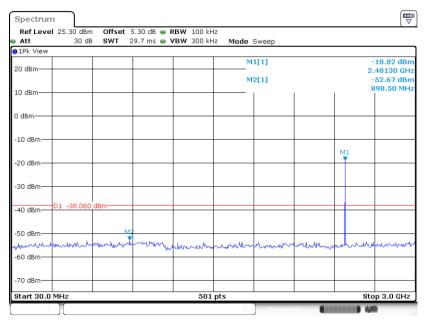
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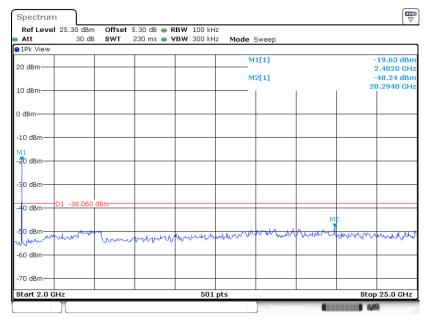
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Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 1.JUN.2024 15:09:37

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



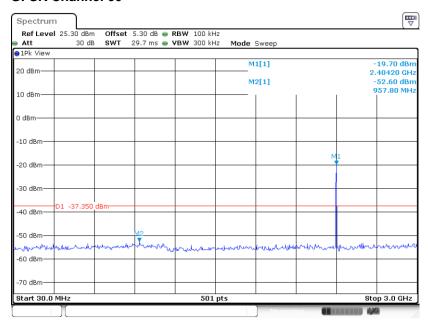
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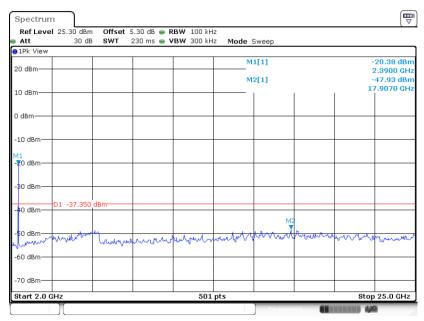
Report No.: FR442306B

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 00



Date: 1.JUN.2024 15:12:22

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 00



Date: 1.JUN.2024 15:12:43

FCC ID: Q95ER31

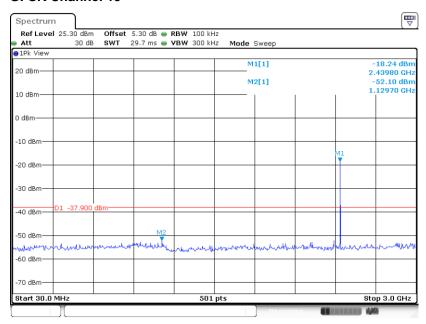
Sporton International Inc.(Kunshan)Page NumberTEL: +86-512-57900158Report Issued

Report Issued Date : Sep. 05, 2024 Report Version : Rev. 01

Report Template No.: BU5-FR15CBT4.0 Version 2.0

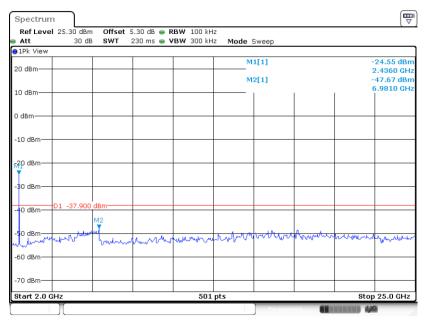
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Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 19



Date: 1.JUN.2024 15:14:42

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 19



Date: 1.JUN.2024 15:15:03

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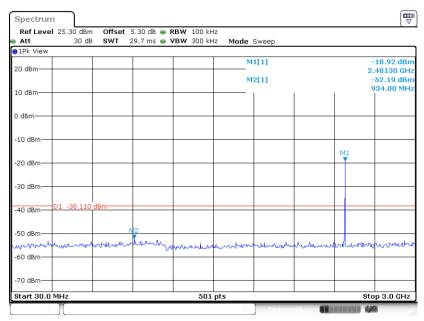
TEL: +86-512-57900158 Report Issued Date : Sep. 05, 2024 FCC ID: Q95ER31 Report Version : Rev. 01

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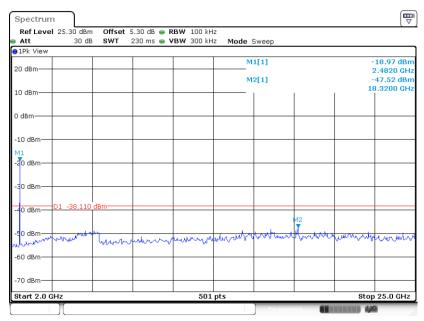
Page Number

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 39



Date: 1.JUN.2024 15:19:41

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps GFSK Channel 39



Date: 1.JUN.2024 15:20:01

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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

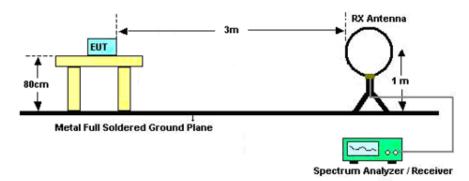
- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get 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.
- 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 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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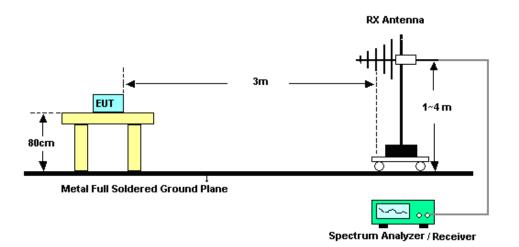
Report Template No.: BU5-FR15CBT4.0 Version 2.0

3.5.4 Test Setup

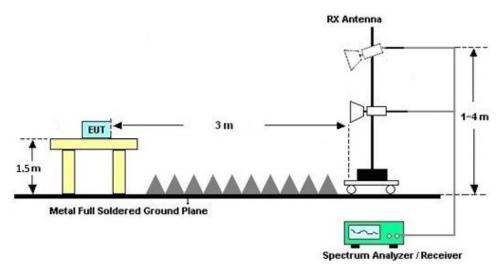
For radiated emissions below 30MHz



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 C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

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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.

Eroquency of emission (MUz)	Conducted	limit (dΒμV)
Frequency of emission (MHz)	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

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

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.
- 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.

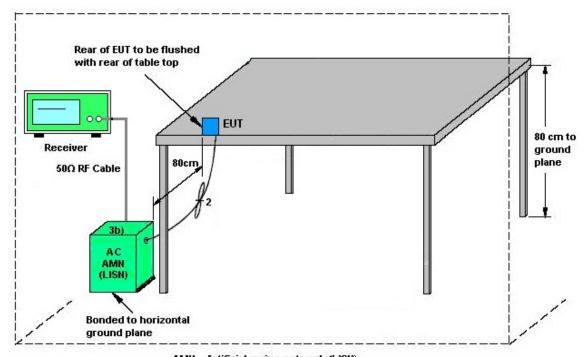
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3.6.4 Test Setup



AMN = Artificial mains network (LISN) AE = Associated equipment

EUT = Equipment under test

ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

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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.

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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, 2024	May 31, 2024	Jan. 01, 2025	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY602421 26	10Hz-44GHz	Oct. 11, 2023	May 31, 2024	Oct. 10, 2024	Radiation (03CH06-KS)
Loop Antenna	R&S HFH2-Z2E		101125	9kHz~30MHz	Sep. 11, 2023	May 31, 2024	Sep. 10, 2024	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	59915	30MHz-1GHz	Aug. 19, 2023	May 31, 2024	Aug. 18, 2024	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 11, 2024	May 31, 2024	Apr. 10, 2025	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 06, 2024	May 31, 2024	Jan. 05, 2025	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	372171	9KHz ~1GHZ	Jan. 02, 2024	May 31, 2024	Jan. 01, 2025	Radiation (03CH06-KS)
Amplifier	EM	EM18G40GA	060728	18~40GHz	Jan. 02, 2024	May 31, 2024	Jan. 01, 2025	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2082395	1Ghz-18Ghz	Jan. 02, 2024	May 31, 2024	Jan. 01, 2025	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY532703 19	500MHz~26.5G Hz	Oct. 11, 2023	May 31, 2024	Oct. 10, 2024	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	May 31, 2024	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 31, 2024	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 31, 2024	NCR	Radiation (03CH06-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr 18, 2024	Jun. 19, 2024	Apr 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jun. 19, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr 18, 2024	Jun. 19, 2024	Apr 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jun. 19, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV30	101338	10Hz~30GHz	Jan. 05, 2024	Jun. 01, 2024	Jan. 04, 2025	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Jun. 01, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu MA2411B 0917070 300MHz~40GH z Jan. 02, 2024 Ju		Jun. 01, 2024	Jan. 01, 2025	Conducted (TH01-KS)			
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Jun. 01, 2024	Jan. 01, 2025	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 AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.84 dB
of 95% (U = 2Uc(y))	2.04 UB

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 UB

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

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

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

Measuring Uncertainty for a Level of Confidence	5.18 dB
of 95% (U = 2Uc(y))	5.16 UB

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

Measuring Uncertainty for a Level of Confidence	5.38 dB
of 95% (U = 2Uc(y))	5.36 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:	2024/6/1	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	1.04	0.71	0.50	Pass
BLE	1Mbps	1	19	2440	1.04	0.72	0.50	Pass
BLE	1Mbps	1	39	2480	1.04	0.71	0.50	Pass

TEST RESULTS DATA

Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	power setting	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	4.00	-14.07	30.00	2.21	-11.86	36.00	Pass
BLE	1Mbps	1	19	2440	4.00	-14.56	30.00	2.21	-12.35	36.00	Pass
BLE	1Mbps	1	39	2480	4.00	-14.53	30.00	2.21	-12.32	36.00	Pass

TEST RESULTS DATA Average Power Table (Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
BLE	1Mbps	1	0	2402	2.08	-17.86	4
BLE	1Mbps	1	19	2440	2.08	-18.53	4
BLE	1Mbps	1	39	2480	2.08	-18.49	4

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	-17.38	-32.39	2.21	8.00	Pass
BLE	1Mbps	1	19	2440	-17.86	-32.94	2.21	8.00	Pass
BLE	1Mbps	1	39	2480	-8.06	-33.07	2.21	8.00	Pass

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

Report Number : FR442306B

Bluetooth Low Energy

BLE2M-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	2Mbps	1	0	2402	2.07	1.26	0.50	Pass
BLE	2Mbps	1	19	2440	2.07	1.26	0.50	Pass
BLE	2Mbps	1	39	2480	2.07	1.25	0.50	Pass

TEST RESULTS DATA

Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	power setting	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	4.00	-14.23	30.00	2.21	-12.02	36.00	Pass
BLE	2Mbps	1	19	2440	4.00	-14.48	30.00	2.21	-12.27	36.00	Pass
BLE	2Mbps	1	39	2480	4.00	-14.31	30.00	2.21	-12.10	36.00	Pass

TEST RESULTS DATA

Average Power Table (Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
BLE	2Mbps	1	0	2402	4.89	-17.26	4
BLE	2Mbps	1	19	2440	4.89	-17.73	4
BLE	2Mbps	1	39	2480	4.89	-17.59	4

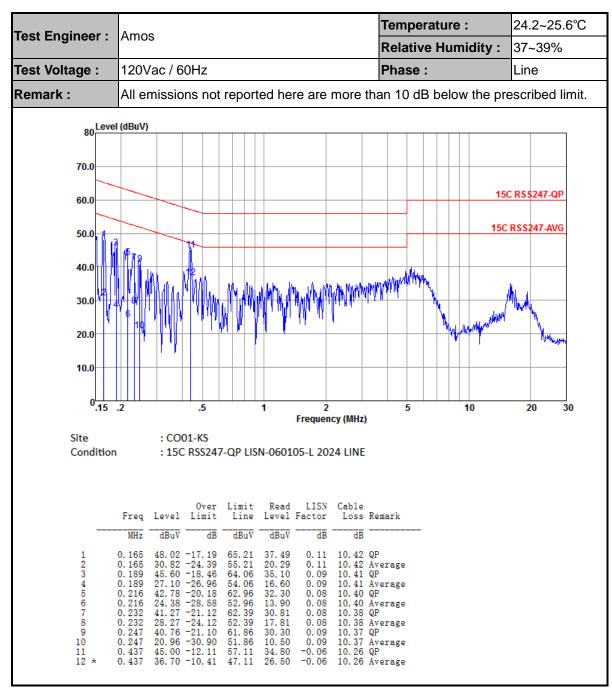
TEST RESULTS DATA

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	2Mbps	1	0	2402	-17.35	-34.94	2.21	8.00	Pass
BLE	2Mbps	1	19	2440	-17.90	-35.38	2.21	8.00	Pass
BLE	2Mbps	1	39	2480	-18.11	-35.60	2.21	8.00	Pass

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

Appendix B. AC Conducted Emission Test Results



TEL: +86-512-57900158 FCC ID: Q95ER31



Toot Engineer :	Amaa		Temperature :	24.2~25.6°C	
Test Engineer :	Amos		Relative Humidity :	37~39%	
Test Voltage :	120Vac / 60Hz		Phase :	Neutral	
Remark :	All emissions not re	oorted here are more th	an 10 dB below the pr	escribed limit.	
80 Level	(dBuV)				
80					
70.0					
60.0			15	C RSS247-QP	
_			450	DCC247 AVG	
50.0	67		190	RSS247-AVG	
40.0					
-	ALL III AM AMTA KA	عساسين الماييات		JH44.	
30.0			ANNUAL TANK	7	
20.0		And a character la la .	The property of the control of the c	*\underset	
10.0	71 '			"	
10.0					
0.15	.2 .5	1 2	5 10	20 30	
Site	: CO01-KS	Frequency (MHz)			
Condition		LISN-060105-N 2024 NEUTI	RAL		
		mit Read LISN Cable ine Level Factor Loss R	emark		
	MHz dBuV dB d	BuV dBuV dB dB			
2 3 * 4 5 6	0.160 31.44 -24.03 55 0.197 46.34 -17.42 63 0.197 30.74 -23.02 53 0.213 43.79 -19.31 63 0.213 28.39 -24.71 53	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	verage P verage P		
10	0. 227 43. 04 -19. 53 62 0. 227 30. 07 -22. 50 52 0. 266 40. 81 -20. 44 61 0. 266 27. 11 -24. 14 51 0. 452 36. 00 -20. 85 56	25 30.50 -0.05 10.36 Q 25 16.80 -0.05 10.36 A	verage P verage		

Note:

- 1. Level(dB μ V) = Read Level(dB μ V) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB μ V) Limit Line(dB μ V)

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Appendix C Radiated Spurious Emission Test Data

Test Engineer :	Jerry Xu	Relative Humidity :	41~42%
rest Engineer.	Jeny Au	Temperature :	22~23 ℃

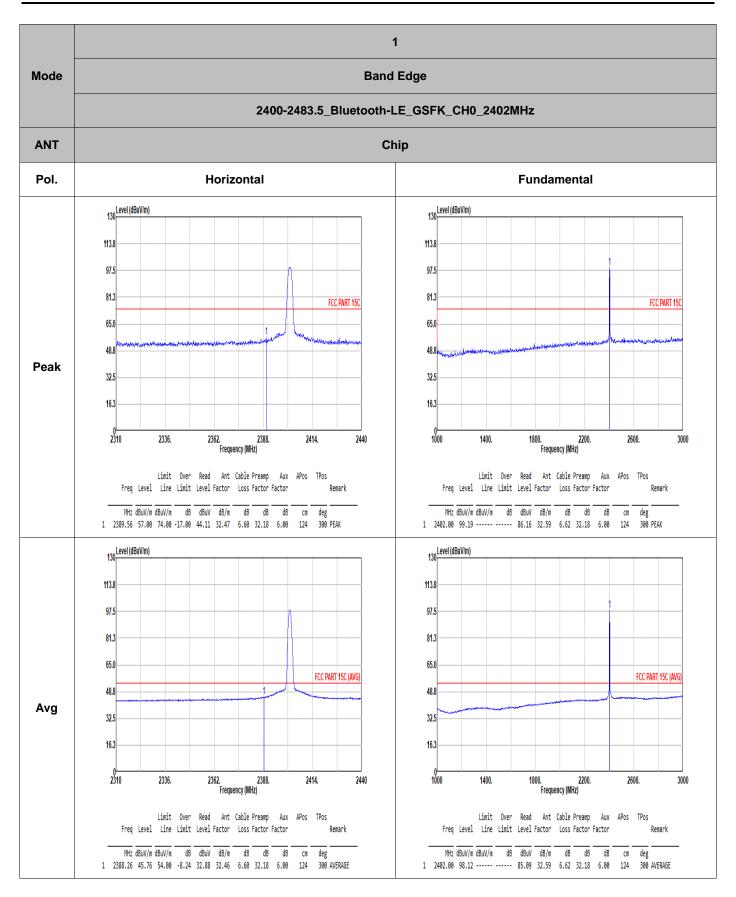
Radiated Spurious Emission Test Modes

_	•							
Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	Chip	Bluetooth-LE_GSFK	0	2402	1Mbps	-	-
Mode 2	2400-2483.5	Chip	Bluetooth-LE_GSFK	19	2440	1Mbps		-
Mode 3	2400-2483.5	Chip	Bluetooth-LE_GSFK	39	2480	1Mbps	-	-
Mode 4	2400-2483.5	Chip	Bluetooth-LE_GSFK	0	2402	2Mbps	-	-
Mode 5	2400-2483.5	Chip	Bluetooth-LE_GSFK	19	2440	2Mbps	-	-
Mode 6	2400-2483.5	Chip	Bluetooth-LE_GSFK	39	2480	2Mbps	-	-

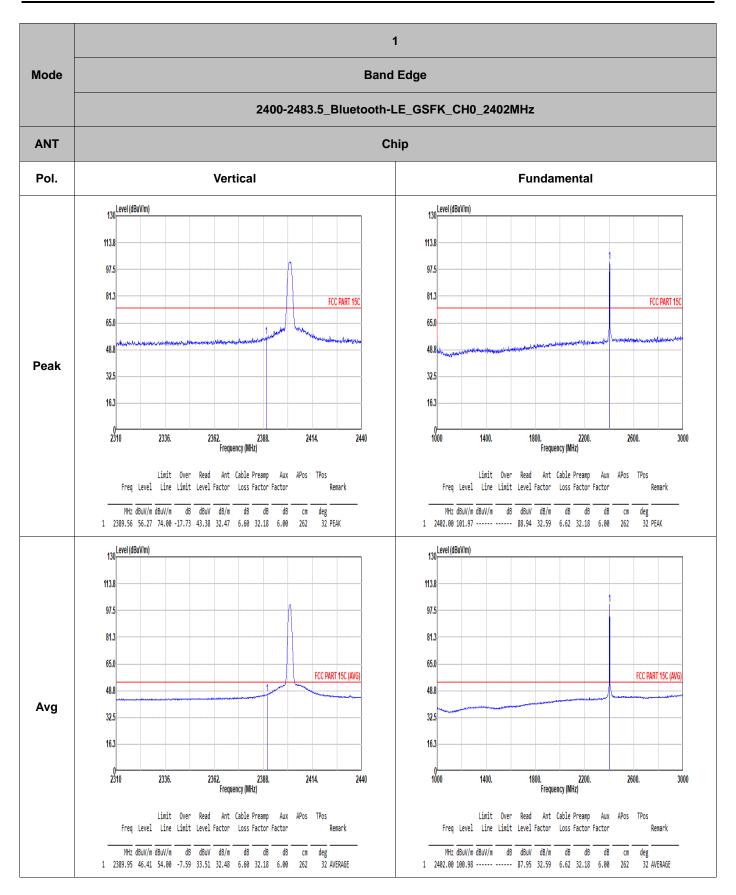
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE_GSFK	0	2389.95	46.41	54.00	-7.59	V	AVERAGE	Pass	Band Edge
1	Bluetooth-LE_GSFK	0	4804.00	41.92	74.00	-32.08	Н	PEAK	Pass	Harmonic
2	Bluetooth-LE_GSFK	19	2490.34	45.00	54.00	-9.00	Н	AVERAGE	Pass	Band Edge
2	Bluetooth-LE_GSFK	19	7320.00	44.63	74.00	-29.37	V	PEAK	Pass	Harmonic
3	Bluetooth-LE_GSFK	39	2483.80	48.73	54.00	-5.27	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE_GSFK	39	7440.00	44.28	74.00	-29.72	Н	PEAK	Pass	Harmonic
4	Bluetooth-LE_GSFK	0	2389.82	49.23	54.00	-4.77	V	AVERAGE	Pass	Band Edge
4	Bluetooth-LE_GSFK	0	4804.00	42.35	74.00	-31.65	V	PEAK	Pass	Harmonic
5	Bluetooth-LE_GSFK	19	2486.38	45.85	54.00	-8.15	V	AVERAGE	Pass	Band Edge
5	Bluetooth-LE_GSFK	19	7320.00	45.37	74.00	-28.63	V	PEAK	Pass	Harmonic
6	Bluetooth-LE_GSFK	39	2484.40	50.06	54.00	-3.94	V	AVERAGE	Pass	Band Edge
6	Bluetooth-LE_GSFK	39	7440.00	44.06	74.00	-29.94	Н	PEAK	Pass	Harmonic

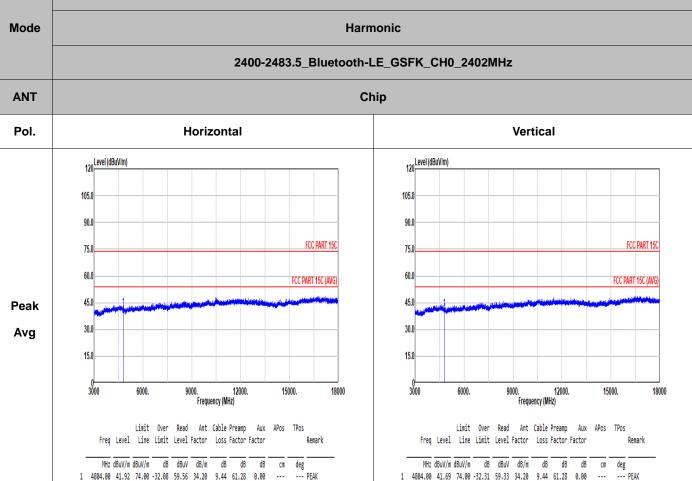
Sporton International Inc.(Kunshan)
TEL: +86-512-57900158
FCC ID: Q95ER31



TEL: +86-512-57900158 FCC ID: Q95ER31



Report No. : FR442306B



TEL: +86-512-57900158 FCC ID: Q95ER31



2 Mode Band Edge - L 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz Chip **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 15 FCC PART 150 65.0 65.0 48.8 48.8 Peak 32.5 32.5 16.3 16.3 1000 2310 z. 2388. Frequency (MHz) 2336. 2440 3000 2362. 1400. Frequency (MHz) Limit Over Read Ant Cable Preamp Aux APos TPos Limit Over Read Ant Cable Preamp Aux APos TPos Remark 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 deg 1 2373.05 55.02 74.00 -18.98 42.35 32.28 6.58 32.19 6.00 120 1 2440.00 104.34 ----- 91.44 32.44 6.67 32.21 6.00 120 130 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 v. 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 CM 1 2389.69 44.48 54.00 -9.52 31.58 32.48 6.60 32.18 6.00 120 1 2440.00 103.38 ----- 90.48 32.44 6.67 32.21 6.00 0 AVERAGE

TEL: +86-512-57900158 FCC ID: Q95ER31

2 Mode Band Edge - R 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz **ANT** Chip Pol. Horizontal **Fundamental** 130 Level (dBuV/m) 113.8 97.5 81.3 FCC PART 150 65.0 48.8 Peak Blank 32.5 16.3 0<u>--</u> 2440 2464. 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 2498.92 55.73 74.00 -18.27 42.53 32.69 6.75 32.24 6.00 120 0 PEAK 130 Level (dBuV/m) 113.8 97.5 81.3 65.0 FCC PART 15C (AVG) 48.8 Blank Avg 32.5 16.3 2440 2464. 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB

1 2490.34 45.00 54.00 -9.00 31.86 32.64 6.74 32.24 6.00 120

dB cm

0 AVERAGE

TEL: +86-512-57900158 FCC ID: Q95ER31



2 Mode Band Edge - L 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz Chip **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 150 FCC PART 150 65.0 65.0 48.8 48.8 Peak 32.5 32.5 16.3 16.3 1000 2310 z. 2388. Frequency (MHz) 3000 2336. 2440 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 cm deg 1 2361.48 55.36 74.00 -18.64 42.85 32.14 6.56 32.19 6.00 100 100 PEAK 1 2440.00 100.09 ----- 87.19 32.44 6.67 32.21 6.00 100 100 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 2. 2388. Frequency (MHz) 1400. 2200. 2336. 2362. 2414. 2440 1800. 2600. 3000 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 MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB CM deg 1 2440.00 99.02 ----- 86.12 32.44 6.67 32.21 6.00 1 2384.75 44.44 54.00 -9.56 31.61 32.42 6.60 32.19 6.00 100 100 AVERAGE 100 100 AVERAGE

TEL: +86-512-57900158 FCC ID: Q95ER31

2 Mode Band Edge - R 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz **ANT** Chip Pol. Vertical **Fundamental** 130 Level (dBuV/m) 113.8 97.5 81.3 FCC PART 15C 65.0 48.8 Peak Blank 32.5 16.3 0<u>--</u> 2440 2464. 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 2485.24 55.57 74.00 -18.43 42.45 32.61 6.74 32.23 6.00 100 100 PEAK 130 Level (dBuV/m) 113.8 97.5 81.3 65.0 FCC PART 15C (AVG) 48.8 Blank Avg 32.5 16.3 2440 2464, 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB

1 2487.16 44.83 54.00 -9.17 31.71 32.62 6.74 32.24 6.00 100 100 AVERAGE

dB cm deg

TEL: +86-512-57900158 FCC ID: Q95ER31

2 Mode Harmonic 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz **ANT** Chip Pol. Horizontal Vertical 120 Level (dBuV/m) 120 Level (dBuV/m) 90.0 90.0 FCC PART 15C FCC PART 150 75.0 75.0 60.0 60.0 FCC PART 15C (AVG) FCC PART 15C (AVG) 45.0 45.0 Peak 30.0 30.0 Avg 15.0 15.0 0 3000 3000 6000. 15000. 18000 6000. 15000. 18000 12000. 12000. Frequency (MHz) 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 Lime Limit Level Factor Loss Factor Factor | MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg | 1 4888.00 41.22 74.00 -32.78 58.77 34.14 9.53 61.22 0.00 --- --- PEAK MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg

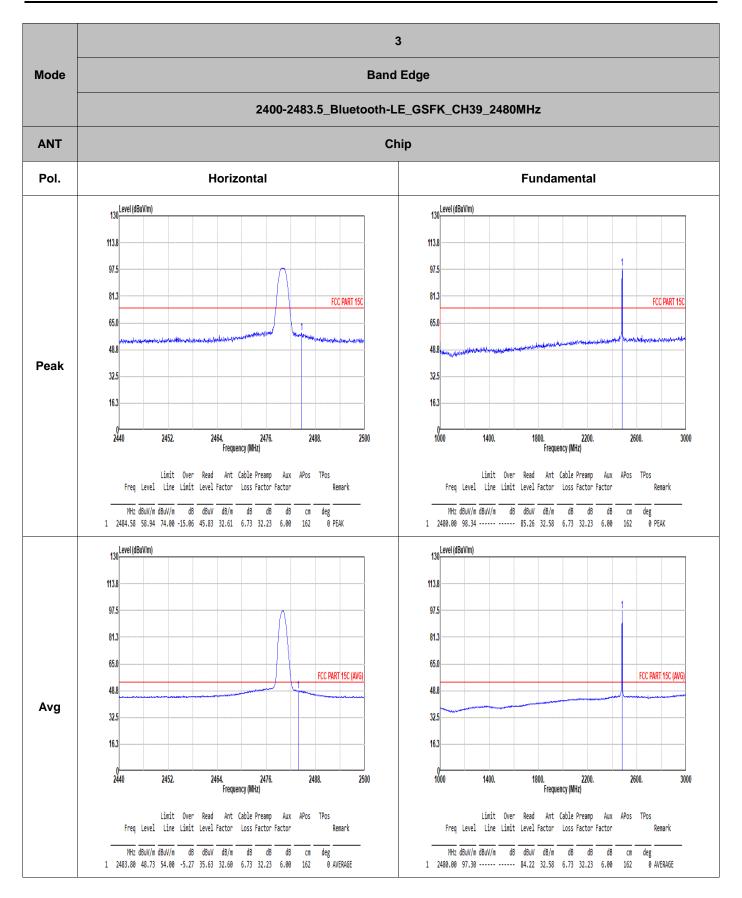
2 7320.00 44.01 74.00 -29.99 57.37 35.70 11.69 60.75 0.00 --- --- PEAK

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1 4880.00 41.22 74.00 -32.78 58.77 34.14 9.53 61.22 0.00

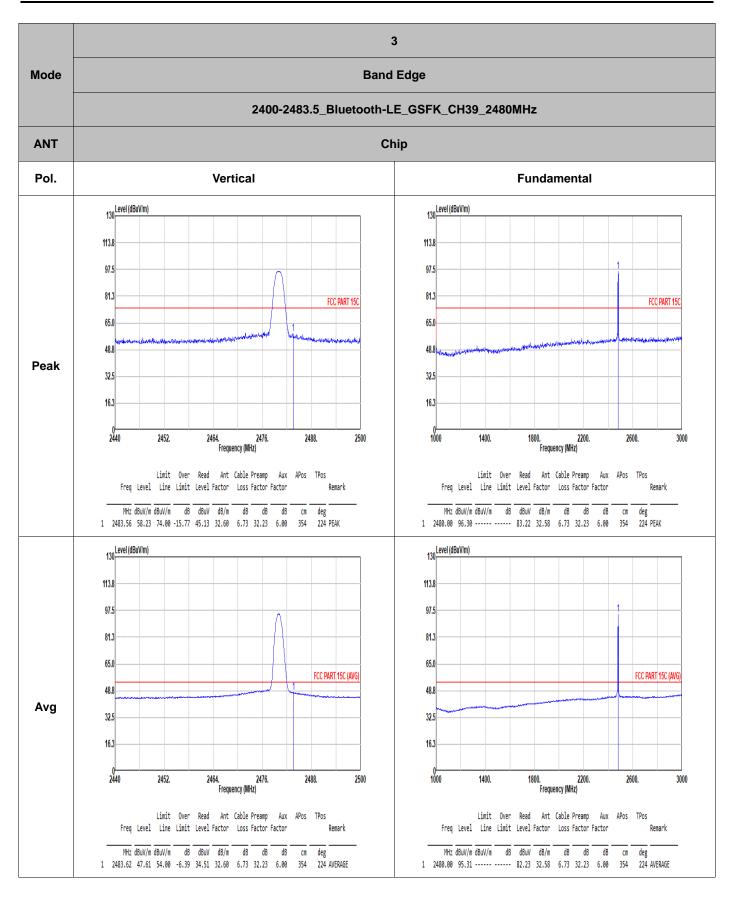
2 7320.00 44.63 74.00 -29.37 57.99 35.70 11.69 60.75 0.00

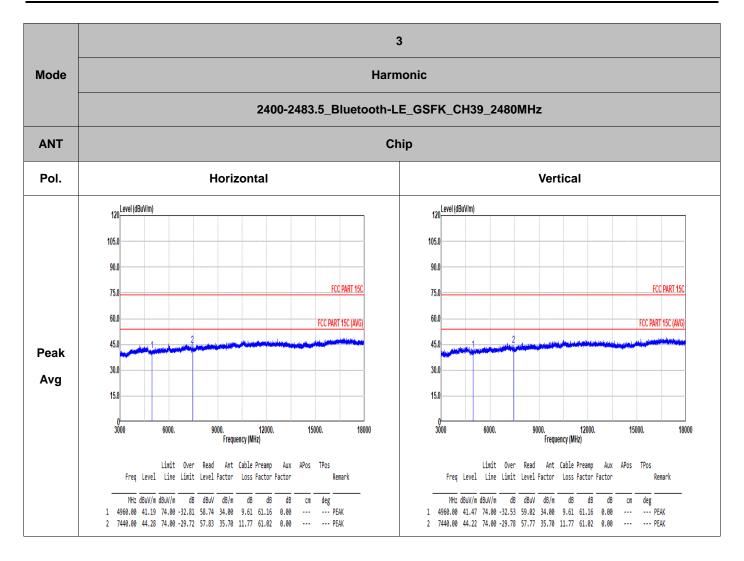
Report No.: FR442306B



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SPORTON LAB. FCC RF Test Report

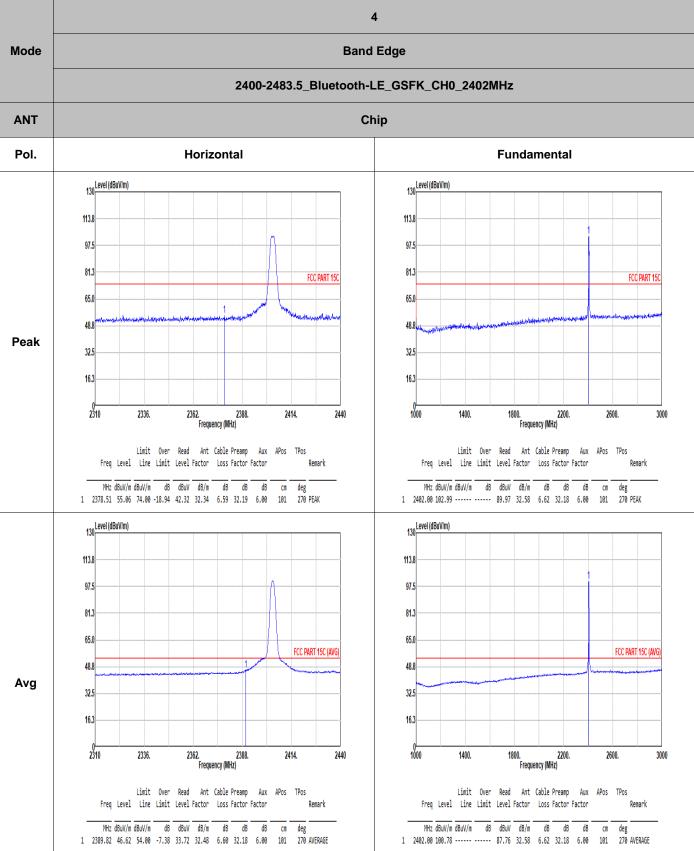




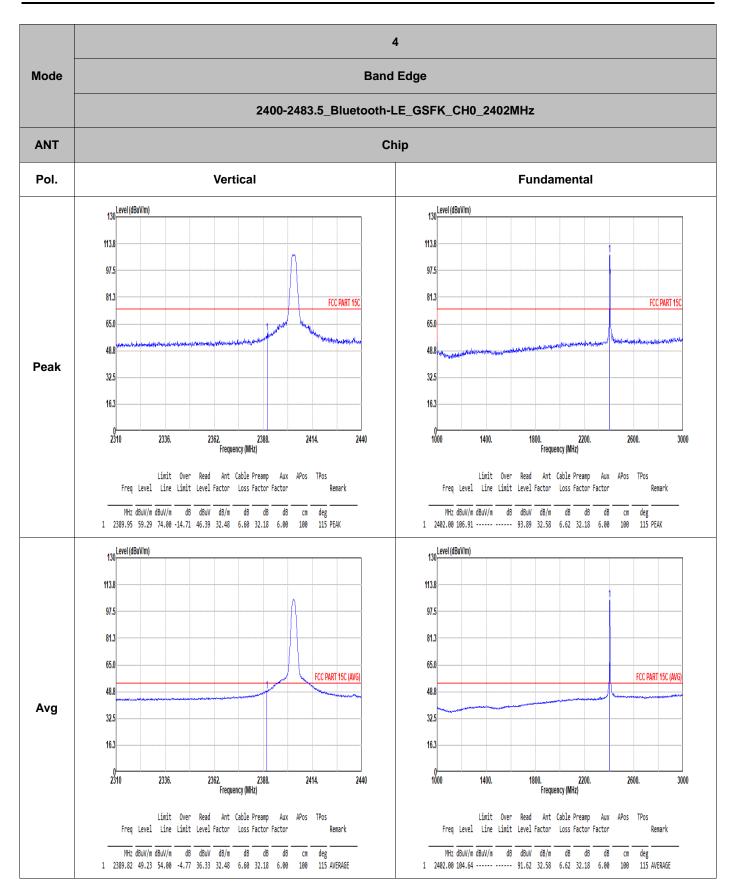
TEL: +86-512-57900158 FCC ID: Q95ER31

FCC RF Test Report

Report No.: FR442306B

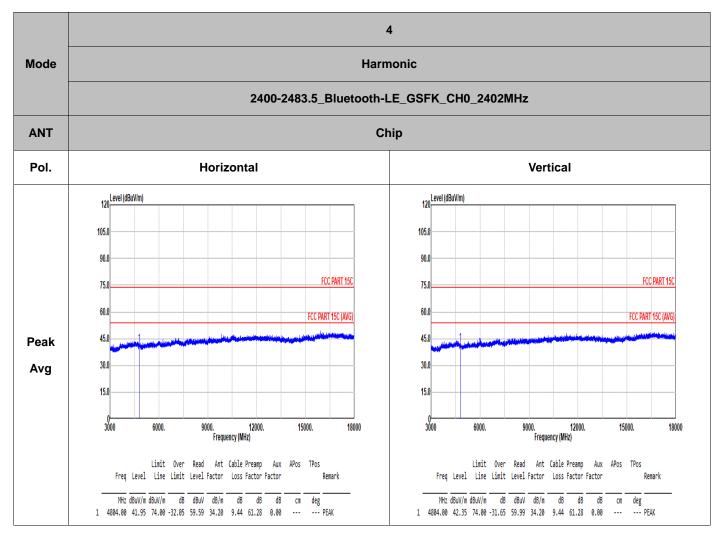


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SPORTON LAB. FCC RF Test Report



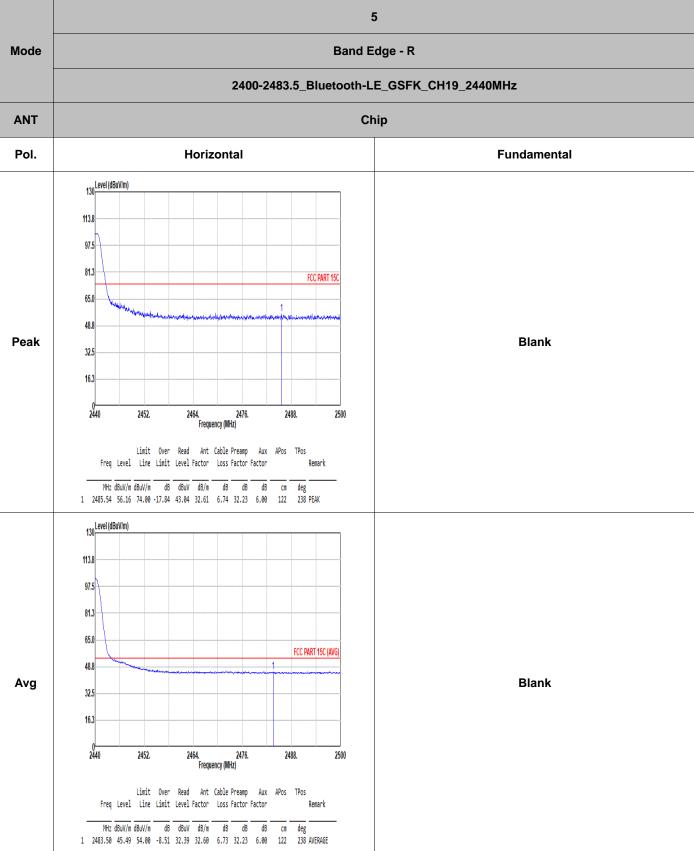
TEL: +86-512-57900158 FCC ID: Q95ER31



5 Mode Band Edge - L 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz Chip **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 15 FCC PART 150 65.0 65.0 48.8 48.8 Peak 32.5 32.5 16.3 16.3 1000 2310 2362. 2388. Frequency (MHz) 3000 2336. 2440 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 cm deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB 1 2357.19 55.52 74.00 -18.48 43.07 32.09 6.55 32.19 6.00 122 238 PEAK 1 2440.00 104.70 ----- 91.80 32.44 6.67 32.21 6.00 122 238 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 (AV) FCC PART 15C (AVG 48.8 Avg 32.5 32.5 16.3 16.3 2310 1000 0. 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 2440.00 102.38 ----- 89.48 32.44 6.67 32.21 6.00 122 238 AVERAGE 1 2388.39 45.51 54.00 -8.49 32.63 32.46 6.60 32.18 6.00 122 238 AVERAGE

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Report No.: FR442306B



TEL: +86-512-57900158 FCC ID: Q95ER31



5 Mode Band Edge - L 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz Chip **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 15 FCC PART 150 65.0 65.0 48.8 48.8 Peak 32.5 32.5 16.3 16.3 1000 2310 z. 2388. Frequency (MHz) 2336. 3000 2362. 2440 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 2350.43 54.96 74.00 -19.04 42.61 32.01 6.54 32.20 6.00 100 139 PEAK 1 2440.00 108.69 ----- 95.79 32.44 6.67 32.21 6.00 100 139 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 (AV FCC PART 15C (AVG 48.8 Avg 32.5 32.5 16.3 16.3 2310 1000 v. 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 2440.00 106.53 ----- 93.63 32.44 6.67 32.21 6.00 100 139 AVERAGE 1 2386.96 45.57 54.00 -8.43 32.71 32.44 6.60 32.18 6.00 100 139 AVERAGE

TEL: +86-512-57900158 FCC ID: Q95ER31

5 Mode Band Edge - R 2400-2483.5_Bluetooth-LE_GSFK_CH19_2440MHz **ANT** Chip Pol. Vertical **Fundamental** 130 Level (dBuV/m) 113.8 97.5 81.3 FCC PART 150 65.0 48.8 Peak Blank 32.5 16.3 0<u>--</u> 2440 2464. 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 2496.40 55.62 74.00 -18.38 42.43 32.68 6.75 32.24 6.00 100 139 PEAK 130 Level (dBuV/m) 113.8 97.5 81.3 65.0 FCC PART 15C (AVG) 48.8 Blank Avg 32.5 16.3 2440 2464, 2476. Frequency (MHz) 2452. 2488. 2500 Limit Over Read Ant Cable Preamp Aux APos TPos Freq Level Lime Limit Level Factor Loss Factor Factor Remark

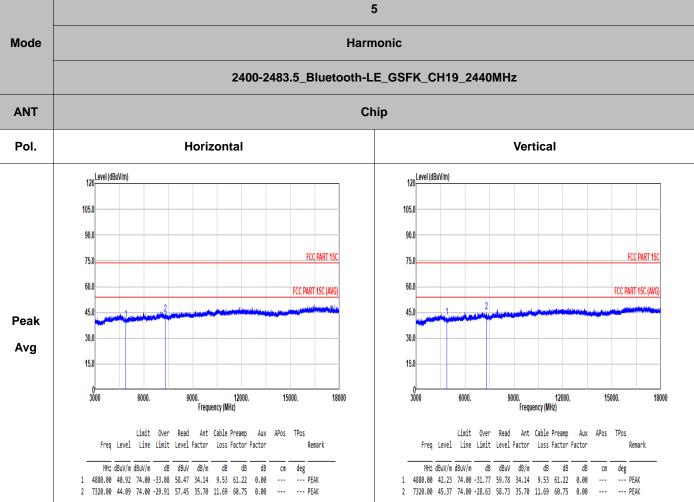
MHz dBuV/m dBuV/m dB dBuV dB/m dB dB

1 2486.38 45.85 54.00 -8.15 32.73 32.62 6.74 32.24 6.00 100 139 AVERAGE

dB cm deg

TEL: +86-512-57900158 FCC ID: Q95ER31

FCC RF Test Report Report No.: FR442306B



TEL: +86-512-57900158 FCC ID: Q95ER31



6 Mode **Band Edge** 2400-2483.5_Bluetooth-LE_GSFK_CH39_2480MHz Chip **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 150 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 2495.92 56.30 74.00 -17.70 43.11 32.68 6.75 32.24 6.00 100 115 PEAK 1 2480.00 92.05 ----- 78.97 32.58 6.73 32.23 6.00 100 115 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 0. 2200. Frequency (MHz) 4. 2476. Frequency (MHz) 1400. 2452. 2464. 2488. 2500 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 1 2480.00 89.46 ----- 76.38 32.58 6.73 32.23 6.00 100 115 AVERAGE 1 2483.74 46.73 54.00 -7.27 33.63 32.60 6.73 32.23 6.00 100 115 AVERAGE

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6 Mode **Band Edge** 2400-2483.5_Bluetooth-LE_GSFK_CH39_2480MHz Chip **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 48.8 Peak 32.5 32.5 16.3 16.3 0<u>--</u> 2440 1000 4. 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 2483.50 60.28 74.00 -13.72 47.18 32.60 6.73 32.23 6.00 100 145 PEAK 1 2480.00 98.51 ----- 85.43 32.58 6.73 32.23 6.00 100 145 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 4. 2476. Frequency (MHz) 1400. 2452. 2464. 2488. 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 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 2484.40 50.06 54.00 -3.94 36.95 32.61 6.73 32.23 6.00 100 145 AVERAGE 1 2480.00 96.16 ----- 83.08 32.58 6.73 32.23 6.00

6 Mode Harmonic 2400-2483.5_Bluetooth-LE_GSFK_CH39_2480MHz **ANT** Chip Pol. Horizontal Vertical 120 Level (dBuV/m) 120 Level (dBuV/m) 90.0 90.0 FCC PART 15C FCC PART 150 75.0 75.0 60.0 60.0 FCC PART 15C (AVG) FCC PART 15C (AVG) 45.0 45.0 Peak 30.0 30.0 Avg 15.0 15.0 0 3000 3000 6000. 15000. 18000 6000. 15000. 18000 12000. 12000. Frequency (MHz) Frequency (MHz)

Limit Over Read Ant Cable Preamp Aux APos TPos

Freq Level Lime Limit Level Factor Loss Factor Factor

| MHz dBuV/m dBuV/m d8 dBuV dB/m dB dB dB cm deg | 1 4960.00 41.47 74.00 -32.53 59.02 34.00 9.61 61.16 0.00 --- --- PEAK

2 7440.00 44.06 74.00 -29.94 57.61 35.70 11.77 61.02 0.00 --- --- PEAK

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dB dB

cm deg

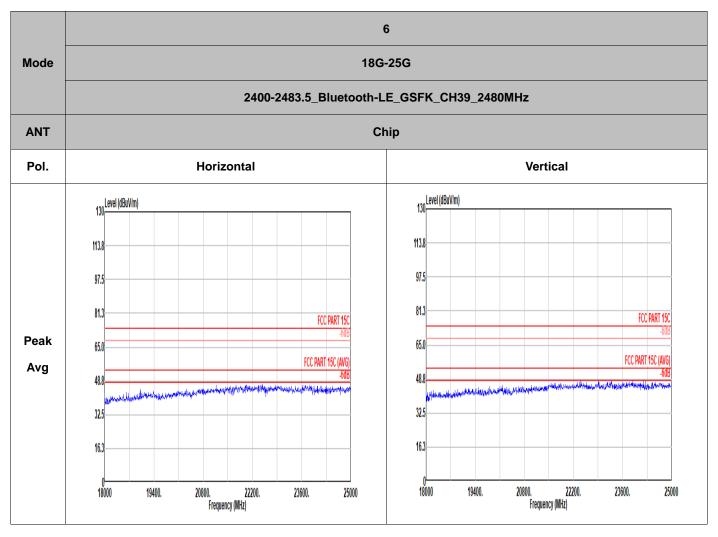
Freq Level Lime Limit Level Factor Loss Factor Factor

1 4960.00 40.86 74.00 -33.14 58.41 34.00 9.61 61.16 0.00

2 7440.00 43.98 74.00 -30.02 57.53 35.70 11.77 61.02 0.00

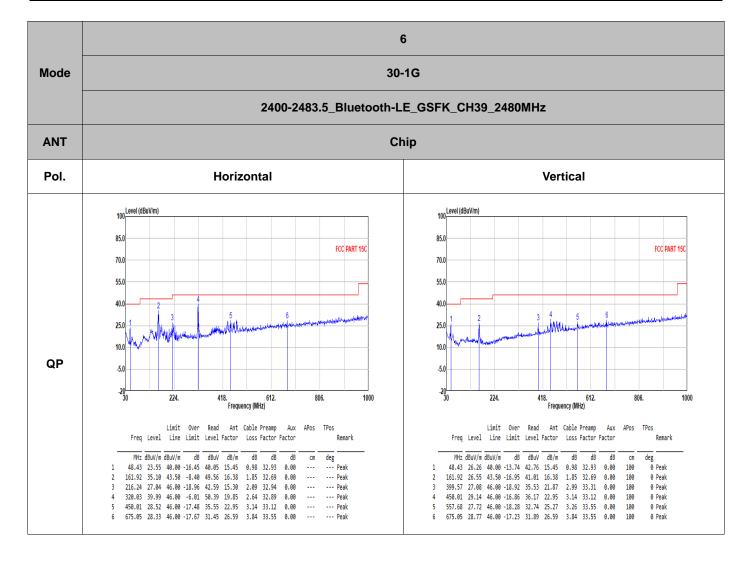
MHz dBuV/m dBuV/m dB dBuV dB/m

FCC RF Test Report Report No.: FR442306B



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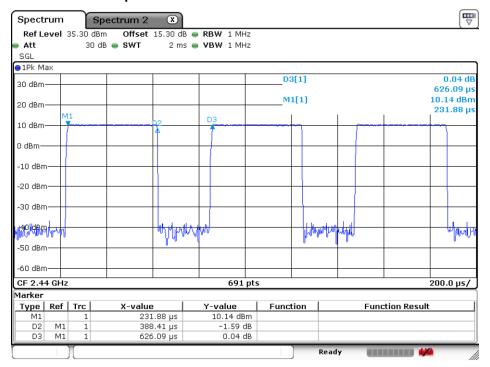


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Appendix D. Duty Cycle Plots

Band	Band Duty Cycle(%)		1/T(kHz)	VBW Setting	
Bluetooth LE 1Mbps	62.04	0.388	2.575	2.7KHz	
Bluetooth LE 2Mbps	32.41	0.203	4.929	5.1KHz	

Bluetooth LE 1Mbps



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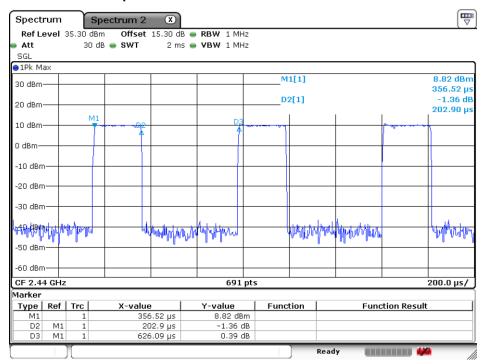
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Bluetooth LE 2Mbps



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