FCC RF Test Report

APPLICANT : Quectel Wireless Solutions Co., Ltd.

EQUIPMENT: Wi-Fi & Bluetooth Module

BRAND NAME : Quectel MODEL NAME : FCU743R

FCC ID : XMR2024FCU743R

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : Jun. 21, 2024 ~ Jul. 08, 2024

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

JasonJia

Approved by: Jason Jia





Report No.: FR460512B

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 1 of 44

Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

TABLE OF CONTENTS

REV	ISION	I HISTORY	3
SUN	/MAR	Y OF TEST RESULT	4
1	GENE	RAL DESCRIPTION	5
	1.1	Applicant	5
	1.2	Manufacturer	5
	1.3	Product Feature of Equipment Under Test	5
	1.4	Product Specification of Equipment Under Test	5
	1.5	Modification of EUT	6
	1.6	Testing Location	6
	1.7	Test Software	6
	1.8	Applicable Standards	7
2	TEST	CONFIGURATION OF EQUIPMENT UNDER TEST	8
	2.1	Carrier Frequency Channel	8
	2.2	Test Mode	9
	2.3	Connection Diagram of Test System	.10
	2.4	Support Unit used in test configuration and system	.10
	2.5	EUT Operation Test Setup	.10
	2.6	Measurement Results Explanation Example	.11
3	TEST	RESULT	.12
	3.1	6dB and 99% Bandwidth Measurement	
	3.2	Output Power Measurement	.19
	3.3	Power Spectral Density Measurement	.20
	3.4	Conducted Band Edges and Spurious Emission Measurement	.27
	3.5	Radiated Band Edges and Spurious Emission Measurement	.36
	3.6	AC Conducted Emission Measurement	.40
	3.7	Antenna Requirements	.42
4	LIST	OF MEASURING EQUIPMENT	.43
5	MEAS	SUREMENT UNCERTAINTY	.44
APF	PENDI	X A. CONDUCTED TEST RESULTS	
APF	PENDI	X B. AC CONDUCTED EMISSION TEST RESULT	
APF	PENDI	X C. RADIATED SPURIOUS EMISSION	
APF	PENDI	X D. DUTY CYCLE PLOTS	
APF	PENDI	X E. SETUP PHOTOGRAPHS	

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 2 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No. : FR460512B

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR460512B	Rev. 01	Initial issue of report	Jul. 24, 2024

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 3 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

Report No. : FR460512B

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	-	Pass	-
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 10.96 dB at 2483.54 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.68 dB at 0.15 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.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 4 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

Report No.: FR460512B

1 General Description

1.1 Applicant

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Report No.: FR460512B

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	Wi-Fi & Bluetooth Module			
Brand Name	Quectel			
Model Name FCU743R				
FCC ID	XMR2024FCU743R			
SN	Conducted: E1M24DD05000036 Conduction: E1M24DD05000013 Radiation: E1M24DD05000036			
HW Version	R1.0			
SW Version	NA			
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: 5.99 dBm (0.0040 W)			
Maximum Output Fower to Antenna	BLE 2Mbps: 6.23 dBm (0.0042 W)			
99% Occupied Bandwidth	BLE 1Mbps: 1.031 MHz			
39 % Occupied Baildwidth	BLE 2Mbps :2.054 MHz			
Antenna Type / Gain	Dipole Antenna type with gain 0.2 dBi			
Type of Modulation	Bluetooth LE : GFSK			

 Sporton International Inc. (ShenZhen)
 Page Number
 : 5 of 44

 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 24, 2024

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

FCC ID: XMR2024FCU743R Report Template No.: BU5-FR15CBT4.0 Version 2.0

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Report No.: FR460512B

Test Firm	Sporton International Inc. (ShenZhen)				
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595				
	Sporton Site No.	FCC Designation No.	FCC Test Firm		
Test Site No.	oporton one no.	1 00 Designation No.	Registration No.		
	CO01-SZ TH01-SZ	CN1256	421272		

Test Firm	Sporton International Inc. (ShenZhen)				
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985				
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.		
	03CH01-SZ	CN1256	421272		

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

 Sporton International Inc. (ShenZhen)
 Page Number
 : 6 of 44

 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 24, 2024

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

FCC ID: XMR2024FCU743R Report Template No.: BU5-FR15CBT4.0 Version 2.0

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.

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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 7 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

Report No.: FR460512B

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	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 8 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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 (Y 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	Conducted Mode 1: Bluetooth Link + WLAN Link (2.4G) + Powered from Test Jig				
Emission					
Remark: For	Radiated Test Cases, The tests were performed with Test Jig.				

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 9 of 44

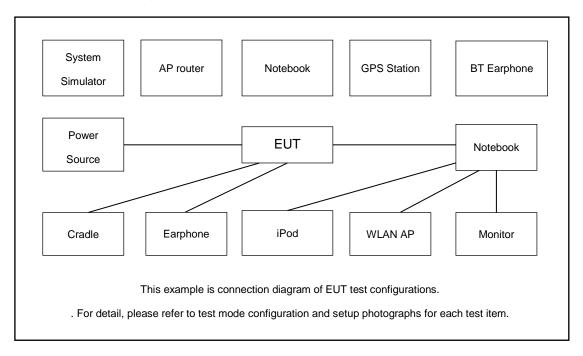
Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

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

Report No.: FR460512B

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	NOTE BOOK	DELL	3400	FCC DoC	NI/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	lopd	apple	MC69029/A	N/A	N/A	N/A
4.	Test Jig	Quectel	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 WLAN AP under large package sizes transmission.

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 10 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.5 dB and 10dB attenuator.

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

= 4.5 + 10 = 14.5 (dB)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 11 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

Report No.: FR460512B

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.

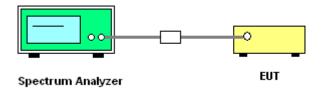
3.1.2 Measuring Instruments

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



Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 12 of 44

Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

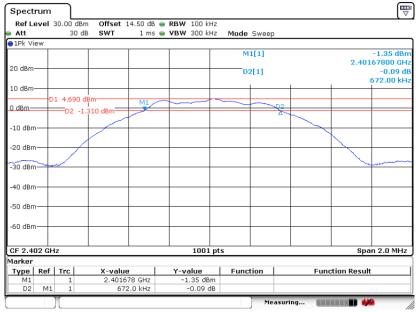
Report No.: FR460512B

3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

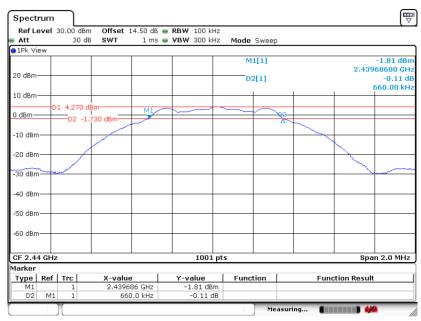
BLE 1Mbps

6 dB Bandwidth Plot on Channel 00



Date: 21.JUN.2024 10:39:25

6 dB Bandwidth Plot on Channel 19



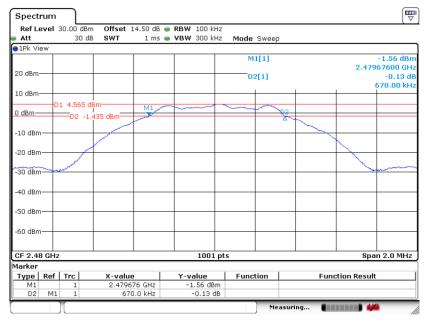
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Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 13 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

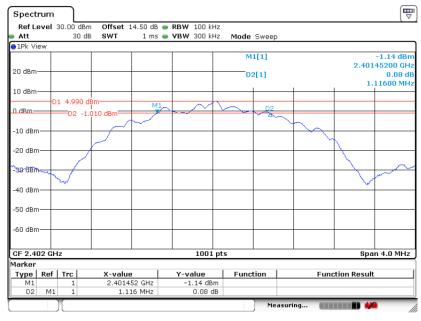
6 dB Bandwidth Plot on Channel 39



Date: 21.JUN.2024 10:45:16

BLE 2Mbps

6 dB Bandwidth Plot on Channel 00



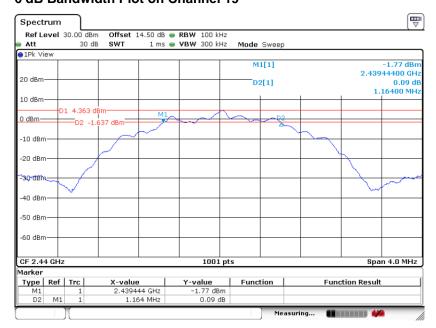
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Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 14 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

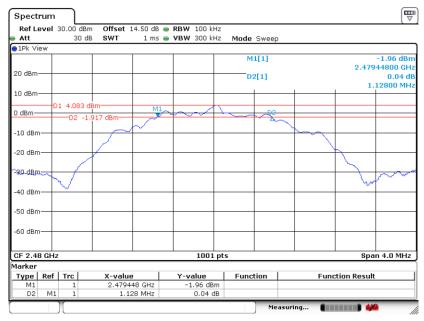
Report No.: FR460512B

6 dB Bandwidth Plot on Channel 19



Date: 21.JUN.2024 10:54:32

6 dB Bandwidth Plot on Channel 39



Date: 21.JUN.2024 10:57:28

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 15 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

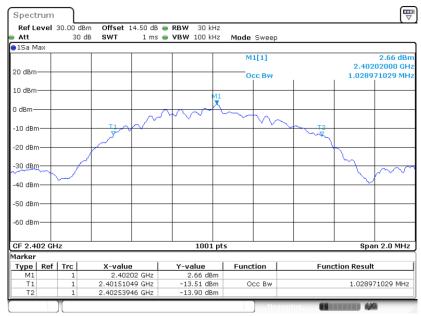
Report No.: FR460512B

3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

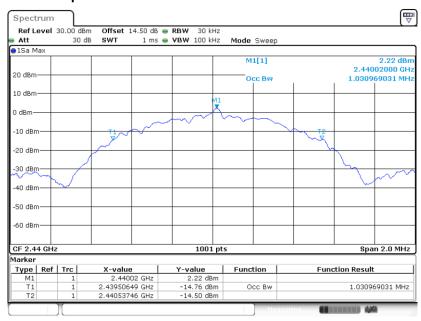
BLE 1Mbps

99% Occupied Bandwidth Plot on Channel 00



Date: 21.JUN.2024 10:37:47

99% Occupied Bandwidth Plot on Channel 19



Date: 21.JUN.2024 10:42:08

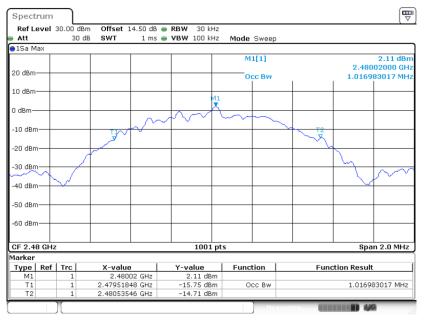
Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 16 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

FCC RF Test Report

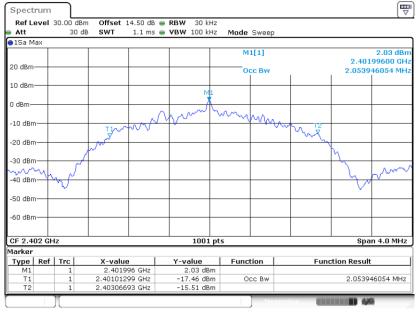
99% Occupied Bandwidth Plot on Channel 39



Date: 21.JUN.2024 10:45:01

BLE 2Mbps

99% Occupied Bandwidth Plot on Channel 00



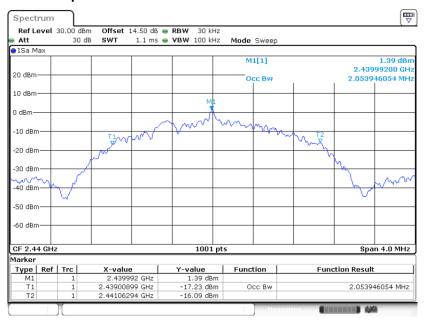
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 17 of 44 Report Issued Date: Jul. 24, 2024 Report Version : Rev. 01

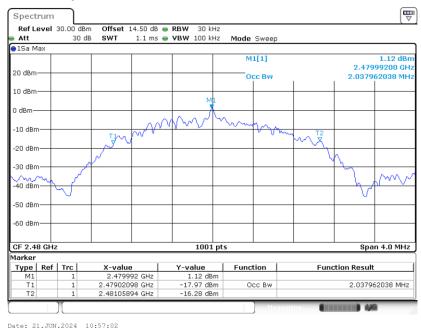
Report No.: FR460512B

99% Occupied Bandwidth Plot on Channel 19



Date: 21.JUN.2024 10:54:12

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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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 18 of 44

Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

Report No.: FR460512B

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.

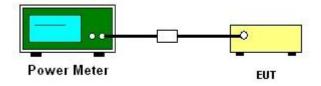
3.2.2 Measuring Instruments

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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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 19 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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.
- 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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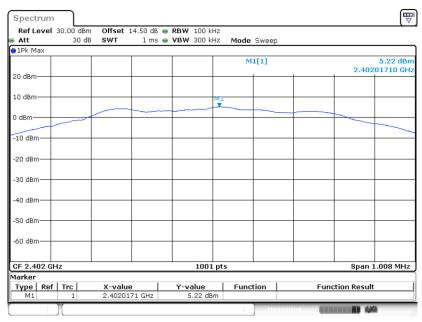
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 20 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

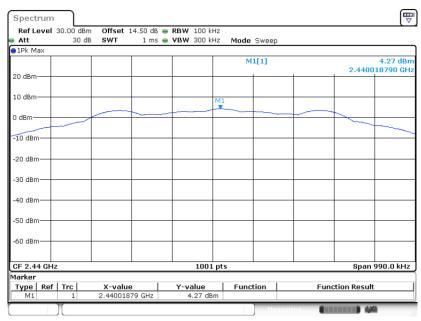
BLE 1Mbps

PSD 100kHz Plot on Channel 00



Date: 21.JUN.2024 10:40:22

PSD 100kHz Plot on Channel 19



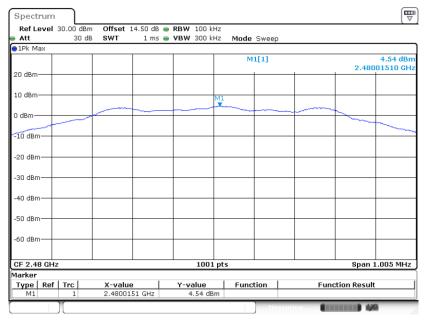
Date: 21.JUN.2024 10:43:10

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Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

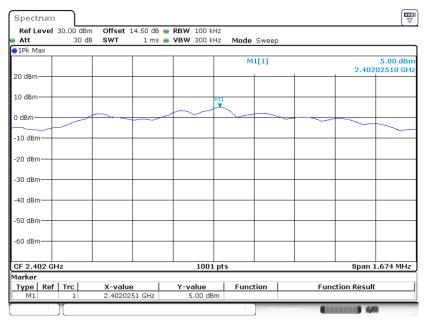
PSD 100kHz Plot on Channel 39



Date: 21.JUN.2024 10:46:13

BLE 2Mbps

PSD 100kHz Plot on Channel 00



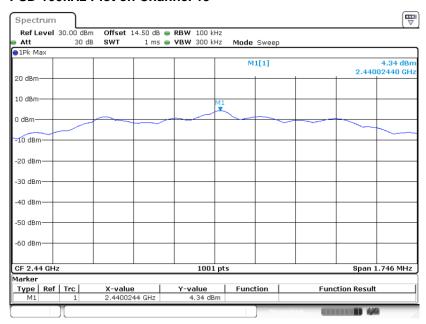
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Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

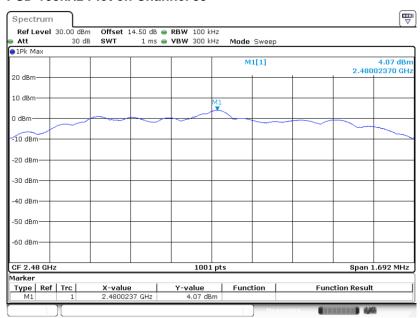
Report No.: FR460512B

PSD 100kHz Plot on Channel 19



Date: 21.JUN.2024 10:55:18

PSD 100kHz Plot on Channel 39



Date: 21.JUN.2024 10:58:05

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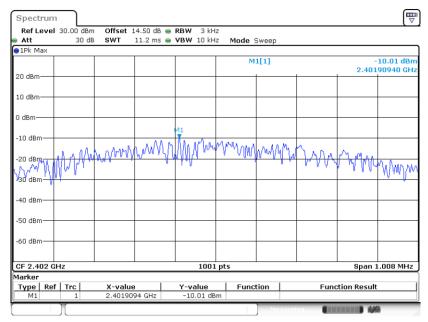
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 23 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

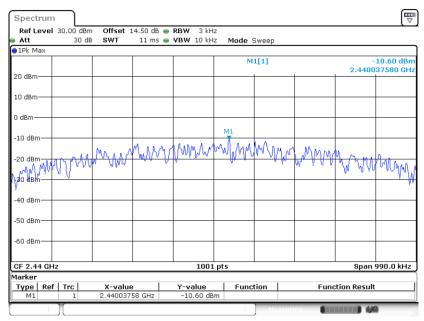
BLE 1Mbps

PSD 3kHz Plot on Channel 00



Date: 21.JUN.2024 10:39:41

PSD 3kHz Plot on Channel 19



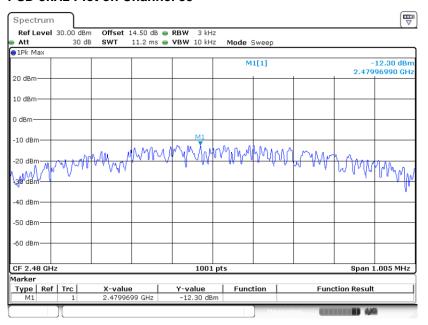
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 24 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

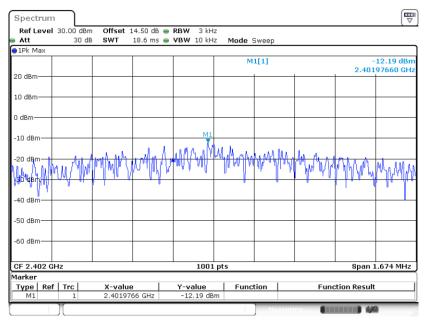
PSD 3kHz Plot on Channel 39



Date: 21.JUN.2024 10:45:49

BLE 2Mbps

PSD 3kHz Plot on Channel 00



Date: 21.JUN.2024 10:49:34

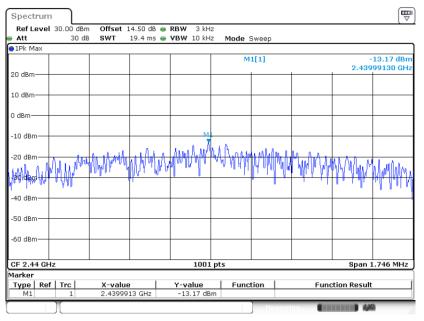
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 25 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

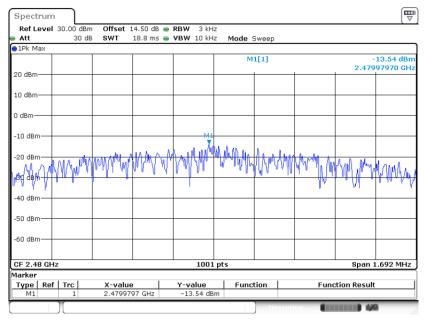
FCC RF Test Report

PSD 3kHz Plot on Channel 19



Date: 21.JUN.2024 10:54:50

PSD 3kHz Plot on Channel 39



Date: 21.JUN.2024 10:57:47

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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 26 of 44 Report Issued Date: Jul. 24, 2024 Report Version : Rev. 01

Report No.: FR460512B

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.

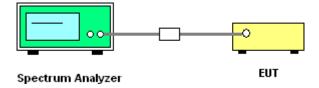
3.4.2 Measuring Instruments

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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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 27 of 44

Report Issued Date : Jul. 24, 2024

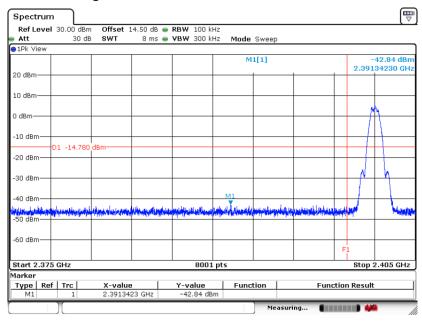
Report Version : Rev. 01

Report No.: FR460512B

3.4.5 Test Result of Conducted Band Edges Plots

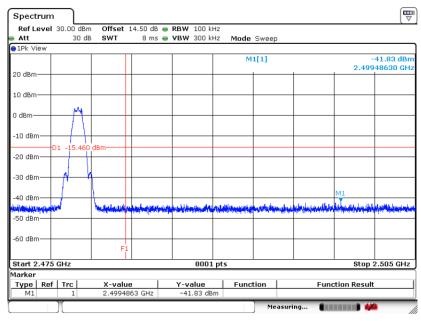
BLE 1Mbps

Low Band Edge Plot on Channel 00



Date: 21.JUN.2024 10:41:25

High Band Edge Plot on Channel 39



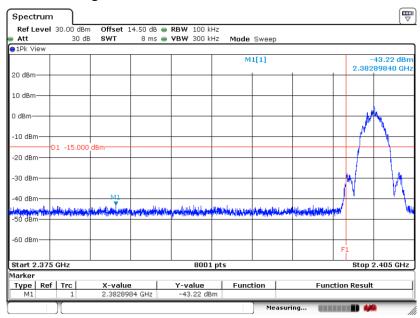
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 28 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

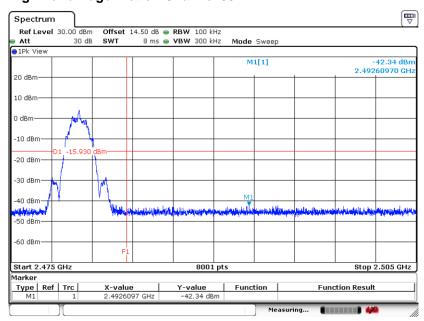
BLE 2Mbps

Low Band Edge Plot on Channel 00



Date: 21.JUN.2024 10:53:42

High Band Edge Plot on Channel 39



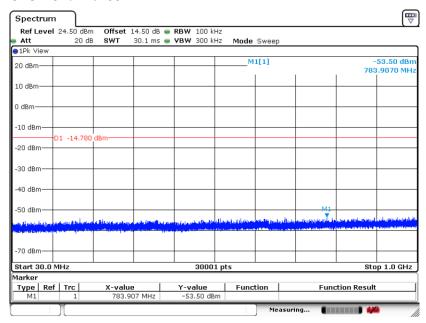
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 29 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

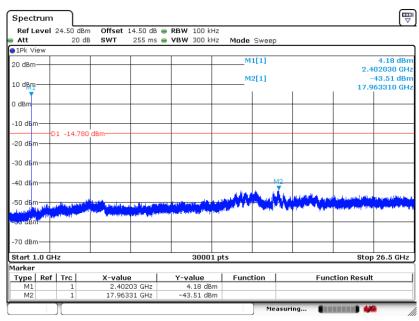
3.4.6 Test Result of Conducted Spurious Emission Plots

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



Date: 21.JUN.2024 10:40:41

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



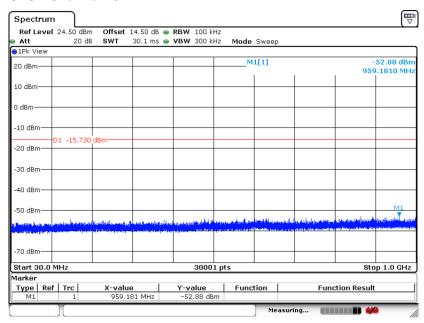
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 30 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

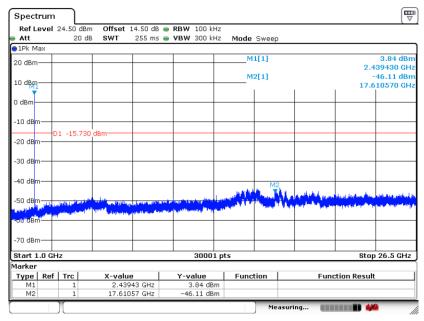
Report No.: FR460512B

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



Date: 21.JUN.2024 10:43:34

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



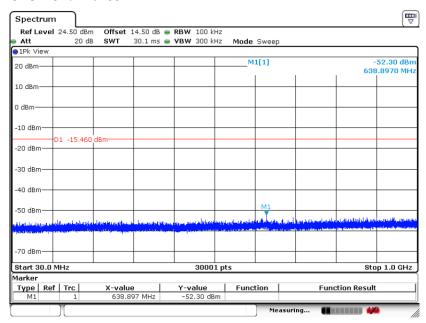
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 31 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

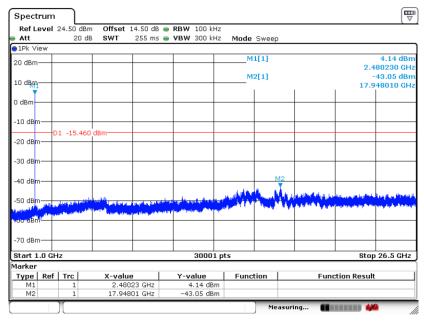
Report No.: FR460512B

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



Date: 21.JUN.2024 10:47:58

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



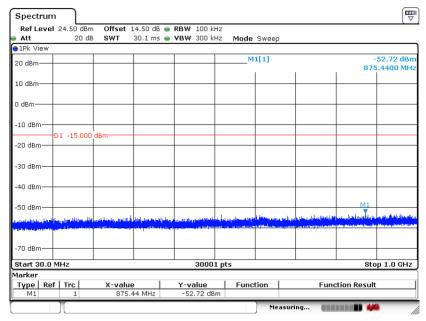
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 32 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

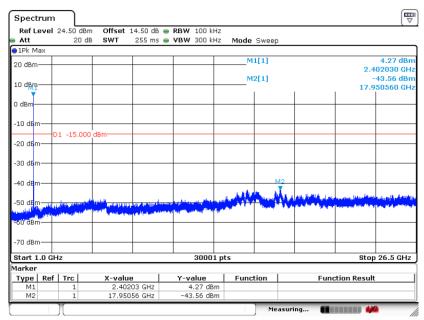
Report No.: FR460512B

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



Date: 21.JUN.2024 10:51:04

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



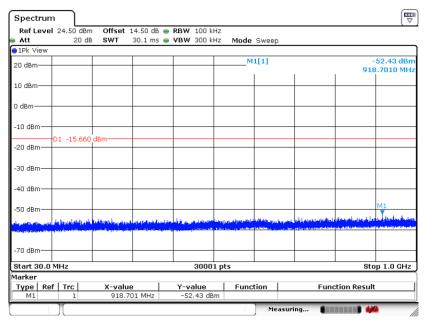
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 33 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

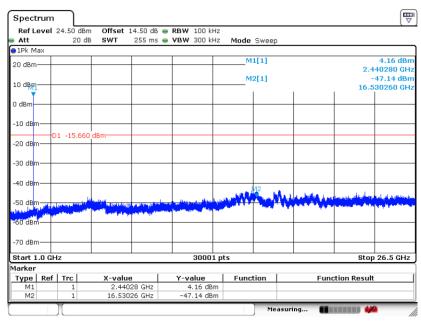
Report No.: FR460512B

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



Date: 21.JUN.2024 10:55:49

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



Date: 21.JUN.2024 10:56:32

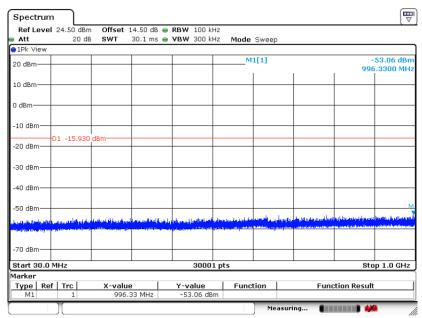
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 34 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

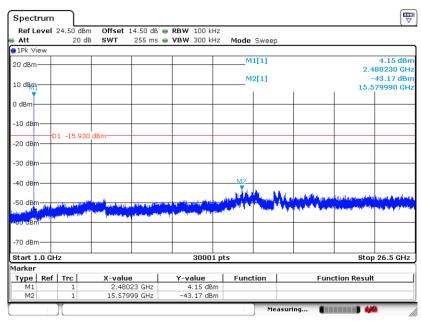
Report No.: FR460512B

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



Date: 21.JUN.2024 10:58:26

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



Date: 21.JUN.2024 10:58:43

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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 35 of 44

Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

Report No.: FR460512B

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.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 36 of 44

Report Issued Date : Jul. 24, 2024

Report Version : Rev. 01

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

Report No.: FR460512B

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.
- 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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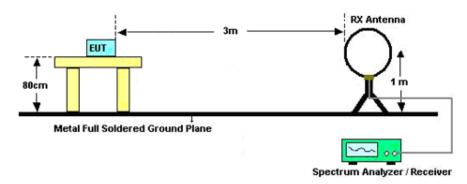
FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 37 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

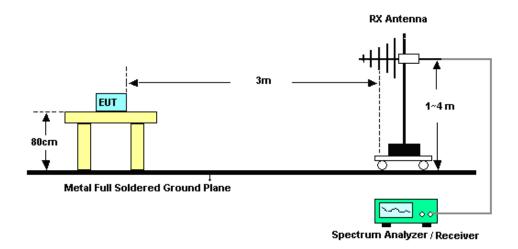
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3.5.4 Test Setup

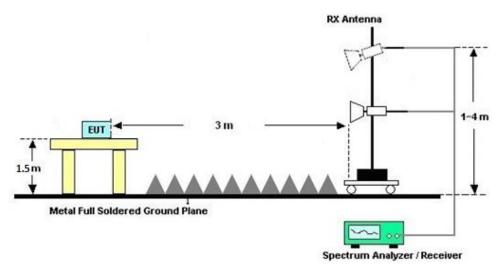
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 38 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

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.

Report No.: FR460512B

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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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Page Number

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

: 39 of 44

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 (dBμV)					
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

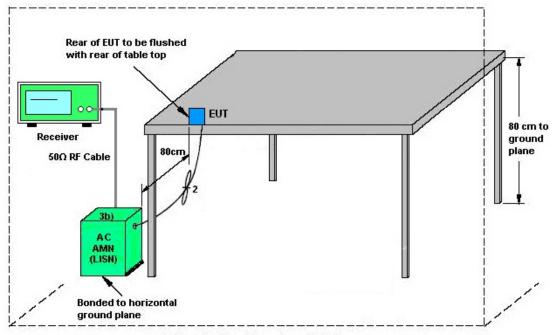
- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other 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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FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 40 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

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.

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 41 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

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

Non-standard antenna connector 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.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 42 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Jun. 21, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Jun. 21, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 21, 2023	Jun. 21, 2024	Aug. 20, 2024	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY522601 85	20Hz~26.5GHz	Dec. 27, 2023	Jul. 02, 2024~ Jul. 03, 2024	Dec. 26, 2024	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY551502 13	10Hz~44GHz	Jul. 07, 2023	Jul. 02, 2024~ Jul. 03, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Jul. 02, 2024~ Jul. 03, 2024	Jul. 27, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Oct. 24, 2023	Jul. 02, 2024~ Jul. 03, 2024	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 08, 2023	Jul. 02, 2024~ Jul. 03, 2024	Jul. 07, 2024	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 09, 2024	Jul. 02, 2024~ Jul. 03, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 09, 2024	Jul. 02, 2024~ Jul. 03, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1943528	1GHz~18GHz	Oct. 18, 2023	Jul. 02, 2024~ Jul. 03, 2024	Oct. 17, 2024	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 05	0.5GHz~26.5Gh z	Oct. 18, 2023	Jul. 02, 2024~ Jul. 03, 2024	Oct. 17, 2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 07, 2023	Jul. 02, 2024~ Jul. 03, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	Oct. 18, 2023	Jul. 02, 2024~ Jul. 03, 2024	Oct. 17, 2024	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jul. 02, 2024~ Jul. 03, 2024	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jul. 02, 2024~ Jul. 03, 2024	NCR	Radiation (03CH01-SZ)
EMI Test Receiver	R&S	ESR7	102261	9kHz~7GHz	Apr. 09, 2024	Jul. 08, 2024	Apr. 08, 2025	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Jul. 08, 2024	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Jul. 08, 2024	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	APC	AFV-S-600	F11905001 3	N/A	Oct. 18, 2023	Jul. 08, 2024	Oct. 17, 2024	Conduction (CO01-SZ)

NCR: No Calibration Required

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 43 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

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

Test Item	Uncertainty				
Conducted Spurious Emission & Bandedge	±1.34 dB				
Occupied Channel Bandwidth	±0.012 MHz				
Conducted Power	±1.34 dB				
Conducted Power Spectral Density	±1.32 dB				
Frequency	±1.3 Hz				

<u>Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)</u>

Measuring Uncertainty for a Level of Confidence	2.5 dB
of 95% (U = 2Uc(y))	2.5 uB

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

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

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

Measuring Uncertainty for a Level of Confidence	
of 95% (U = 2Uc(y))	4.2 dB

<u>Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)</u>

- 1		
	Measuring Uncertainty for a Level of Confidence	5.0 dB
	of 95% (U = 2Uc(y))	3.0 QB

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

Measuring Uncertainty for a Level of Confidence	4.3 dB
of 95% (U = 2Uc(y))	

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

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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number : 44 of 44
Report Issued Date : Jul. 24, 2024
Report Version : Rev. 01

Report No.: FR460512B

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

Appendix A. Conducted Test Results

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R Page Number

: A1 of A1

Report Number : FR460512B

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Pi Shun	Temperature:	21~25	°C
Test Date:	2024/6/21	Relative Humidity:	51~54	%

TEST RESULTS DATA 6dB and 99% Occupied Bandwidth

Mod.	Data Rate		CH.	Freq. Occu (MHz) BV (MH		6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.029	0.672	0.50	Pass
BLE	1Mbps	1	19	2440	1.031	0.660	0.50	Pass
BLE	1Mbps	1	39	2480	1.017	0.670	0.50	Pass

TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	N⊤x	CH.	Freq. (MHz)	Peak Conducte d Power (dBm)	Power Setting	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	5.99	Default	30.00	0.20	6.19	36.00	Pass
BLE	1Mbps	1	19	2440	5.72	Default	30.00	0.20	5.92	36.00	Pass
BLE	1Mbps	1	39	2480	5.51	Default	30.00	0.20	5.71	36.00	Pass

TEST RESULTS DATA Average Power Table

Mod.	Data Rate	N⊤x	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	Power Setting	Conducte d Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	2.01	4.70	Default	30.00	0.20	4.90	36.00	Pass
BLE	1Mbps	1	19	2440	2.01	4.20	Default	30.00	0.20	4.40	36.00	Pass
BLE	1Mbps	1	39	2480	2.01	4.00	Default	30.00	0.20	4.20	36.00	Pass

TEST RESULTS DATA Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz) DG (dBi)		Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	5.22	-10.01	0.20	8.00	Pass
BLE	1Mbps	1	19	2440	4.27	-10.60	0.20	8.00	Pass
BLE	1Mbps	1	39	2480	4.54	-12.30	0.20	8.00	Pass

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

Report Number : FR460512B

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Pi Shun	Temperature:	21~25	°C
Test Date:	2024/6/21	Relative Humidity:	51~54	%

TEST RESULTS DATA 6dB and 99% Occupied Bandwidth

Mod.	Data Rate	N⊤×	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.054	1.116	0.50	Pass
BLE	2Mbps	1	19	2440	2.054	1.164	0.50	Pass
BLE	2Mbps	1	39	2480	2.038	1.128	0.50	Pass

TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	N⊤×	CH.	Freq. (MHz)	Peak Conducte d Power (dBm)	Power Setting	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE5.0	2Mbps	1	0	2402	6.23	Default	30.00	0.20	6.43	36.00	Pass
BLE5.0	2Mbps	1	19	2440	5.98	Default	30.00	0.20	6.18	36.00	Pass
BLE5.0	2Mbps	1	39	2480	5.72	Default	30.00	0.20	5.92	36.00	Pass

TEST RESULTS DATA Average Power Table

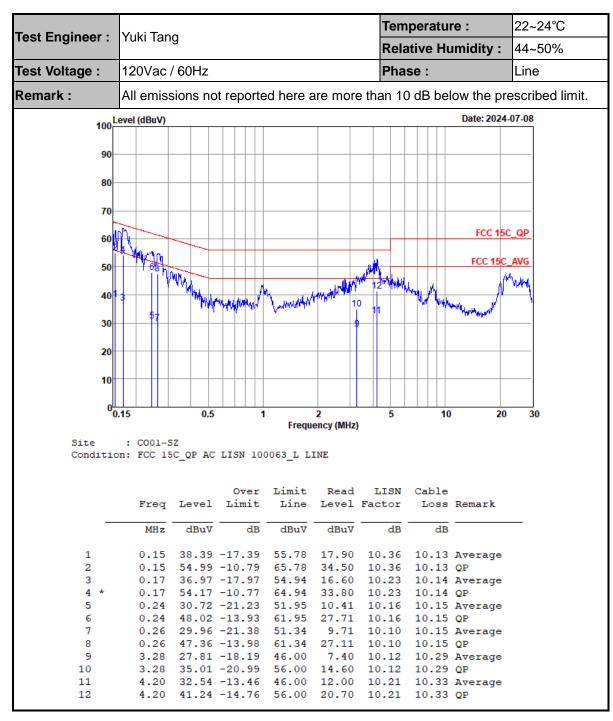
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	Power Setting	Conducte d Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	4.77	5.10	Default	30.00	0.20	5.30	36.00	Pass
BLE	2Mbps	1	19	2440	4.77	4.50	Default	30.00	0.20	4.70	36.00	Pass
BLE	2Mbps	1	39	2480	4.77	4.20	Default	30.00	0.20	4.40	36.00	Pass

TEST RESULTS DATA Peak Power Density

Mod.	Data Rate	N⊤x	СН.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	5.00	-12.19	0.20	8.00	Pass
BLE	2Mbps	1	19	2440	4.34	-13.17	0.20	8.00	Pass
BLE	2Mbps	1	39	2480	4.07	-13.54	0.20	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: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R

Took Fundinger	Vulsi Tan	_				Tem	peratui	re:	22~24°C
Test Engineer :	Yuki Tan	g				Rela	ative Hu	ımidity :	44~50%
Test Voltage :	120Vac	[/] 60Hz				Pha	se:		Neutral
Remark :	All emiss	sions no	t reporte	ed here a	are more	e than 10	dB bel	ow the pr	escribed limit.
100°	Level (dBuV)							Date: 2024	-07-08
90-									
80-									
70									
60								FCC 150	C_QP
								FCC 15C	AVG
50	₩ 6₩,7₩					wW.			
40	81	(^^\	Note Market Mark	\	Walter Brief	TO THE PARTY	"Marthur		₩ ^_
		W MAN	(at _{syl} yeddydd)) YWWWWW	NICONITY I	111	May follow	Many Market Mark	Ψ
30	5 7								
20)					
20									
10									
00	0.15	0.5	1		2	5	10	20	30
Site.				Frequ	ency (MHz))			
Site Condition	: CO01-S on: FCC 15		LISN 10	0063_N N	EUTRAL				
				Limit			Cable		
	Freq	Level	Limit	Line	Level	Tile	T.Ogg	Remark	
_						ractor	1000		
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15	37.68	-18.28	55.96	17.40	dB	dB	Average	
2 *	0.15 0.15	37.68 55.28	-18.28 -10.68	55.96 65.96	17.40 35.00	dB 10.15 10.15	dB 10.13 10.13	QP	
2 *	0.15 0.15 0.16	37.68 55.28 36.54	-18.28 -10.68 -18.71	55.96 65.96 55.25	17.40 35.00 16.00	dB 10.15 10.15 10.40	dB 10.13 10.13 10.14	QP Average	_
2 * 3 4	0.15 0.15 0.16 0.16	37.68 55.28 36.54 54.54	-18.28 -10.68 -18.71 -10.71	55.96 65.96 55.25 65.25	17.40 35.00 16.00 34.00	dB 10.15 10.15 10.40 10.40	dB 10.13 10.13 10.14 10.14	QP Average QP	_
2 * 3 4 5	0.15 0.15 0.16 0.16 0.22	37.68 55.28 36.54 54.54 26.38	-18.28 -10.68 -18.71 -10.71 -26.63	55.96 65.96 55.25 65.25 53.01	17.40 35.00 16.00 34.00 6.00	dB 10.15 10.15 10.40 10.40 10.23	dB 10.13 10.13 10.14 10.14 10.15	QP Average QP Average	
2 * 3 4	0.15 0.15 0.16 0.16 0.22	37.68 55.28 36.54 54.54 26.38 47.58	-18.28 -10.68 -18.71 -10.71 -26.63	55.96 65.96 55.25 65.25 53.01 63.01	17.40 35.00 16.00 34.00 6.00 27.20	dB 10.15 10.15 10.40 10.40 10.23 10.23	dB 10.13 10.13 10.14 10.14 10.15 10.15	QP Average QP Average QP	
2 * 3 4 5 6	0.15 0.15 0.16 0.16 0.22 0.22	37.68 55.28 36.54 54.54 26.38 47.58 24.76	-18.28 -10.68 -18.71 -10.71 -26.63 -15.43 -25.83	55.96 65.96 55.25 65.25 53.01 63.01 50.59	17.40 35.00 16.00 34.00 6.00 27.20 4.21	dB 10.15 10.15 10.40 10.40 10.23 10.23	dB 10.13 10.13 10.14 10.14 10.15 10.15	QP Average QP Average QP Average	
2 * 3 4 5 6 7	0.15 0.15 0.16 0.16 0.22 0.22 0.29 0.29	37.68 55.28 36.54 54.54 26.38 47.58 24.76 42.46 23.59	-18.28 -10.68 -18.71 -10.71 -26.63 -15.43 -25.83 -18.13 -22.41	55.96 65.96 55.25 65.25 53.01 63.01 50.59 60.59 46.00	17.40 35.00 16.00 34.00 6.00 27.20 4.21 21.91 3.20	dB 10.15 10.40 10.40 10.23 10.23 10.40 10.40 10.23	dB 10.13 10.13 10.14 10.15 10.15 10.15 10.15	QP Average QP Average QP Average QP Average	
2 * 3 4 5 6 7 8 9	0.15 0.15 0.16 0.16 0.22 0.22 0.29 0.29 0.99	37.68 55.28 36.54 54.54 26.38 47.58 24.76 42.46 23.59 34.59	-18.28 -10.68 -18.71 -10.71 -26.63 -15.43 -25.83 -18.13 -22.41 -21.41	55.96 65.96 55.25 65.25 53.01 63.01 50.59 60.59 46.00 56.00	17.40 35.00 16.00 34.00 6.00 27.20 4.21 21.91 3.20 14.20	dB 10.15 10.15 10.40 10.23 10.23 10.40 10.40 10.23 10.23	dB 10.13 10.13 10.14 10.15 10.15 10.15 10.15 10.16 10.16	QP Average QP Average QP Average QP Average QP Average QP	
2 * 3 4 5 6 7 8 9	0.15 0.15 0.16 0.16 0.22 0.22 0.29 0.29 0.99 0.99	37.68 55.28 36.54 54.54 26.38 47.58 24.76 42.46 23.59 34.59 33.57	-18.28 -10.68 -18.71 -10.71 -26.63 -15.43 -25.83 -18.13 -22.41 -21.41	55.96 65.96 55.25 65.25 53.01 63.01 50.59 60.59 46.00 56.00 46.00	17.40 35.00 16.00 34.00 6.00 27.20 4.21 21.91 3.20 14.20 12.79	dB 10.15 10.15 10.40 10.23 10.23 10.40 10.40 10.23 10.23	dB 10.13 10.13 10.14 10.15 10.15 10.15 10.15 10.16 10.16	QP Average QP Average QP Average QP Average QP Average QP Average	

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 : Zhaohui Liang

| Relative Humidity : 50% | Temperature : 20-22°C |

Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 4	2400-2483.5	1	Bluetooth-LE	00	2402	1Mbps	-	-
Mode 5	2400-2483.5	1	Bluetooth-LE	19	2440	1Mbps		-
Mode 6	2400-2483.5	1	Bluetooth-LE	39	2480	1Mbps	-	-
Mode 7	2400-2483.5	1	Bluetooth-LE	00	2402	2Mbps	-	-
Mode 8	2400-2483.5	1	Bluetooth-LE	19	2440	2Mbps	-	-
Mode 9	2400-2483.5	1	Bluetooth-LE	39	2480	2Mbps	-	-
Mode 9	2400-2483.5	1	Bluetooth-LE_LF	39	2480	2Mbps	-	LF

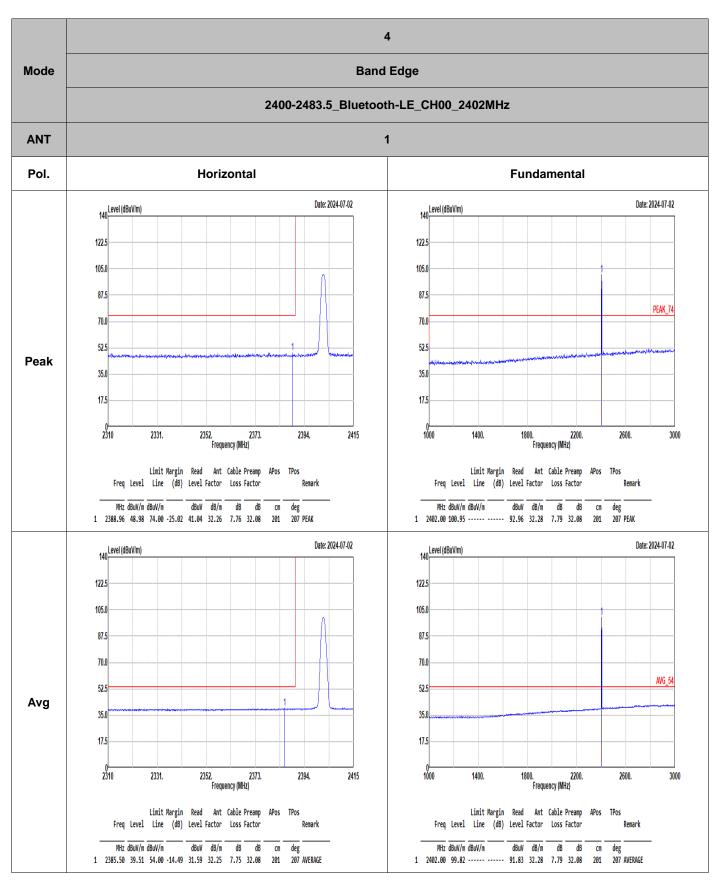
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
4	Bluetooth-LE	00	2385.50	39.51	54.00	-14.49	Н	AVERAG E	Pass	Band Edge
4	Bluetooth-LE	00	4804.00	45.80	74.00	-28.20	Η	Peak	Pass	Harmonic
5	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
5	Bluetooth-LE	19	7320.00	48.03	74.00	-25.97	Н	Peak	Pass	Harmonic
6	Bluetooth-LE	39	2483.62	39.85	54.00	-14.15	Н	AVERAG E	Pass	Band Edge
6	Bluetooth-LE	39	7440.00	47.65	74.00	-26.35	V	Peak	Pass	Harmonic
7	Bluetooth-LE	00	2389.17	40.72	54.00	-13.28	Н	AVERAG E	Pass	Band Edge
7	Bluetooth-LE	00	4804.00	45.62	74.00	-28.38	Η	Peak	Pass	Harmonic
8	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
8	Bluetooth-LE	19	7320.00	46.53	74.00	-27.47	Н	Peak	Pass	Harmonic
9	Bluetooth-LE	39	2483.54	43.04	54.00	-10.96	Н	AVERAG E	Pass	Band Edge
9	Bluetooth-LE	39	7440.00	47.83	74.00	-26.17	V	Peak	Pass	Harmonic
9	Bluetooth-LE	39	839.95	32.63	46.00	-13.37	Н	Peak	Pass	LF

Sporton International Inc. (ShenZhen)

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CC RF Test Report No.: FR460512B



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R

Report No.: FR460512B Mode **Band Edge** 2400-2483.5_Bluetooth-LE_CH00_2402MHz **ANT** Pol. Vertical **Fundamental** Date: 2024-07-02 140 Level (dBuV/m) Date: 2024-07-02 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK 74 70.0 70.0 52.5 52.5 **Peak** 35.0 35.0 17.5 17.5 2310 1000 2352. 2373. Frequency (MHz) 00. 2200. Frequency (MHz) 2415 3000 Limit Margin Read Ant Cable Preamp APos TPos Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Freq Level Line (dB) Level Factor Loss Factor MHz dBuV/m dBuV/m dBuV dB/m dB dB deg MHz dBuV/m dBuV/m dBuV dB/m dB dB cm cm deg 1 2332.79 48.98 74.00 -25.02 41.32 32.13 7.60 32.07 340 360 PEAK 1 2402.00 97.53 ----- 89.54 32.28 7.79 32.08 340 360 PEAK Date: 2024-07-02 Date: 2024-07-02 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG 54 52.5 52.5 Avg 35.0 35.0 17.5 17.5 2310 1000 Frequency (MHz) Frequency (MHz) Limit Margin Read Ant Cable Preamp APos TPos Limit Margin Read Ant Cable Preamp APos TPos

MHz dBuV/m dBuV/m

Freq Level Line (dB) Level Factor Loss Factor

1 2379.62 39.23 54.00 -14.77 31.34 32.24 7.73 32.08 340

dBuV dB/m dB dB

deg

360 AVERAGE

CM

dBuV dB/m dB dB

Freq Level Line (dB) Level Factor Loss Factor

1 2402.00 96.49 ----- 88.50 32.28 7.79 32.08

MHz dBuV/m dBuV/m

360 AVERAGE

cm deg

340

Mode Harmonic 2400-2483.5_Bluetooth-LE_CH00_2402MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-02 Date: 2024-07-02 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_74 PEAK_74 70.0 70.0 **Peak** 52.5 52.5 35.0 35.0 Avg 17.5 17.5 3000 0<u></u> 3000 9000, 12000. Frequency (MHz) 9000. 12000. Frequency (MHz) 18000 6000. 18000 Limit Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB cm deg 1 4804.00 45.80 74.00 -28.20 51.49 34.82 11.07 51.58 1 4804.00 45.29 74.00 -28.71 50.98 34.82 11.07 51.58 -- Peak

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R

5 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH19_2440MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-02 140 Level (dBuV/m) Date: 2024-07-02 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_74 PEAK_74 70.0 70.0 52.5 52.5 **Peak** 35.0 Avg 17.5 17.5 3000 3000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor deg deg -- Peak MHz dBuV/m dBuV/m dB dBuV dB/m dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB CM CM 1 4880.00 45.74 74.00 -28.26 51.34 34.85 11.10 51.55 1 4880.00 45.27 74.00 -28.73 50.87 34.85 11.10 51.55 -- Peak 2 7320.00 48.03 74.00 -25.97 49.77 36.33 13.09 51.16 2 7320.00 47.46 74.00 -26.54 49.20 36.33 13.09 51.16 -- Peak -- Peak

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: XMR2024FCU743R

Report No.: FR460512B 6 Mode **Band Edge** 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Horizontal **Fundamental** Date: 2024-07-02 140 Level (dBuV/m) Date: 2024-07-02 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_BE_74 70.0 70.0 52.5 52.5 **Peak** 35.0 35.0 17.5 17.5 Z. 2492. Frequency (MHz) 2480 1000 00. 2200. Frequency (MHz) 2500 3000 Limit Margin Read Ant Cable Preamp APos TPos Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Freq Level Line (dB) Level Factor Loss Factor MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2484.10 49.01 74.00 -24.99 40.76 32.47 7.88 32.10 183 202 PEAK 1 2480.00 100.42 ----- 92.19 32.46 7.87 32.10 183 202 PEAK Date: 2024-07-02 Date: 2024-07-02 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG BE 54 AVG 54 52.5 52.5 Avg 35.0 35.0 17.5 17.5 2480 1000 Frequency (MHz) Frequency (MHz)

MHz dBuV/m dBuV/m

Limit Margin Read Ant Cable Preamp APos TPos

dBuV dB/m dB dB

1 2483.62 39.85 54.00 -14.15 31.61 32.46 7.88 32.10 183 202 AVERAGE

deg

cm

Freq Level Line (dB) Level Factor Loss Factor

Freq Level Line (dB) Level Factor Loss Factor

1 2480.00 99.42 ----- 91.19 32.46 7.87 32.10 183

MHz dBuV/m dBuV/m

Limit Margin Read Ant Cable Preamp APos TPos

dBuV dB/m dB dB

202 AVERAGE

cm deg

Report No.: FR460512B 6 Mode **Band Edge** 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Vertical **Fundamental** Date: 2024-07-02 140 Level (dBuV/m) Date: 2024-07-02 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_BE_74 PEAK 74 70.0 70.0 52.5 52.5 **Peak** 35.0 35.0 17.5 17.5 2480 Frequency (MHz) 1000 00. 2200. Frequency (MHz) 2500 3000 Limit Margin Read Ant Cable Preamp APos TPos Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Freq Level Line (dB) Level Factor Loss Factor MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2484.64 49.44 74.00 -24.56 41.19 32.47 7.88 32.10 306 340 PEAK 1 2480.00 97.98 ----- 89.75 32.46 7.87 32.10 306 340 PEAK Date: 2024-07-02 Date: 2024-07-02 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG BE 54 AVG 54 52.5 52.5 Avg 35.0 35.0 17.5 17.5

MHz dBuV/m dBuV/m

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2480

2484.

Frequency (MHz)

Limit Margin Read Ant Cable Preamp APos TPos

dBuV dB/m dB dB

cm deg

340 AVERAGE

Freq Level Line (dB) Level Factor Loss Factor

1 2485.08 39.64 54.00 -14.36 31.39 32.47 7.88 32.10 306

Freq Level Line (dB) Level Factor Loss Factor

1 2480.00 96.93 ----- 88.70 32.46 7.87 32.10

MHz dBuV/m dBuV/m

Frequency (MHz)

Limit Margin Read Ant Cable Preamp APos TPos

dBuV dB/m dB dB

1000

340 AVERAGE

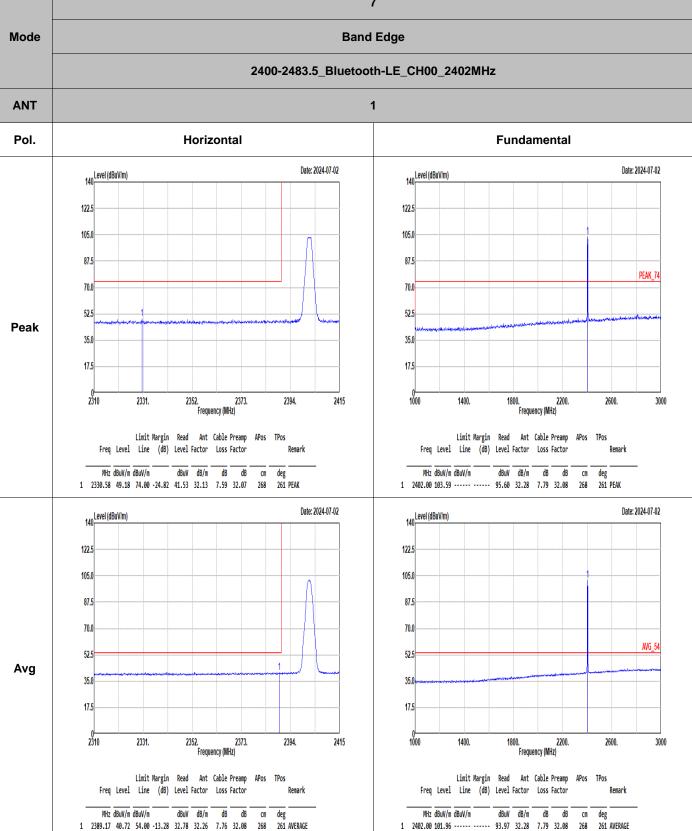
cm deg

306

6 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-02 140 Level (dBuV/m) Date: 2024-07-02 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_74 PEAK_74 70.0 70.0 52.5 52.5 **Peak** 35.0 35.0 Avg 17.5 17.5 3000 3000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor deg deg -- Peak MHz dBuV/m dBuV/m dB dBuV dB/m dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm CM 1 4960.00 46.13 74.00 -27.87 51.62 34.88 11.14 51.51 1 4960.00 46.43 74.00 -27.57 51.92 34.88 11.14 51.51 -- Peak 2 7440.00 46.70 74.00 -27.30 48.54 36.38 12.97 51.19 2 7440.00 47.65 74.00 -26.35 49.49 36.38 12.97 51.19 -- Peak -- Peak

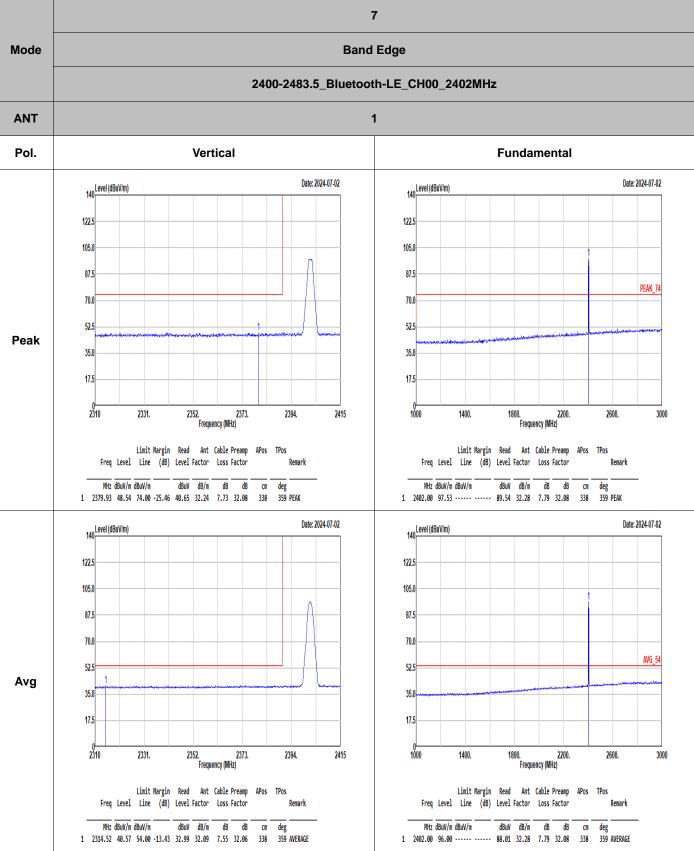
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FCC RF Test Report Report No.: FR460512B 7



Sporton International Inc. (ShenZhen)

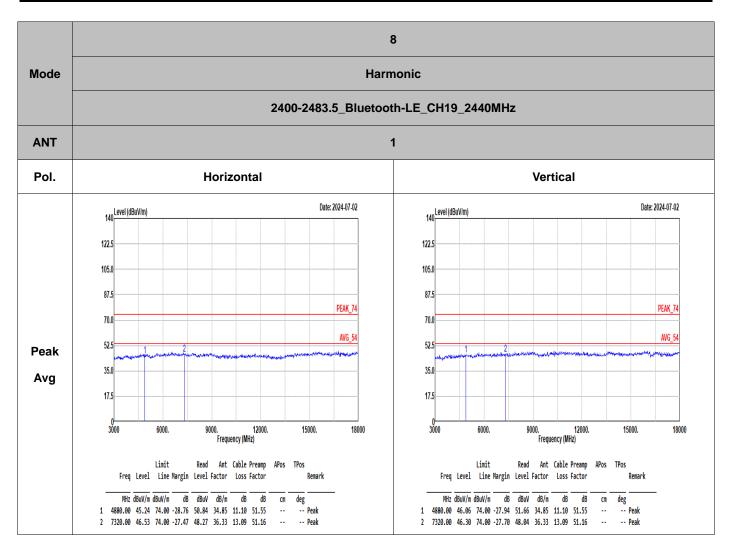
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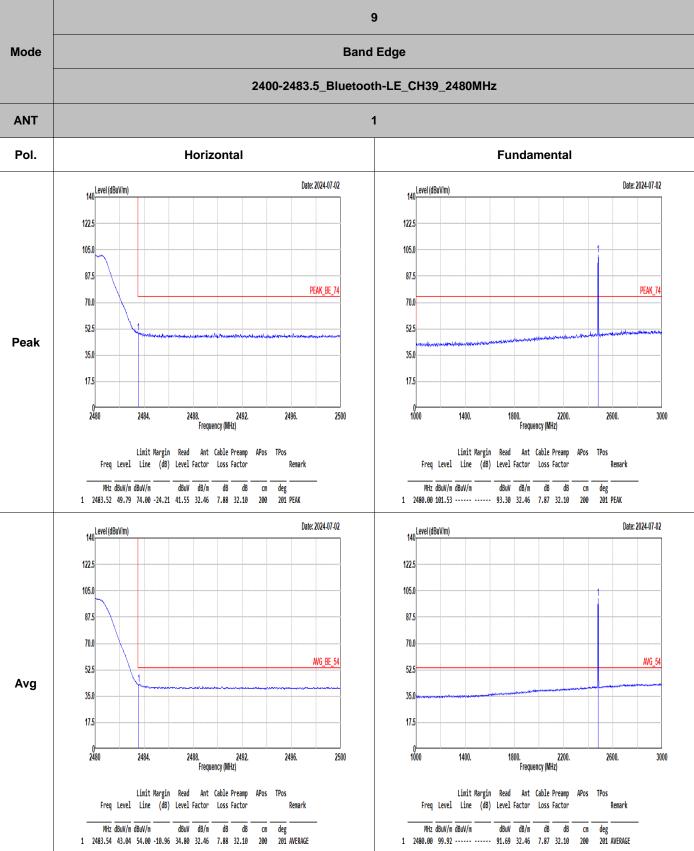
7 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH00_2402MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-02 Date: 2024-07-02 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_74 PEAK_74 70.0 70.0 **Peak** 52.5 52.5 35.0 35.0 Avg 17.5 17.5 3000 0<u></u> 3000 9000, 12000. Frequency (MHz) 9000. 12000. Frequency (MHz) 18000 6000. 18000 Limit Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB cm deg 1 4804.00 45.62 74.00 -28.38 51.31 34.82 11.07 51.58 1 4804.00 45.49 74.00 -28.51 51.18 34.82 11.07 51.58 -- Peak

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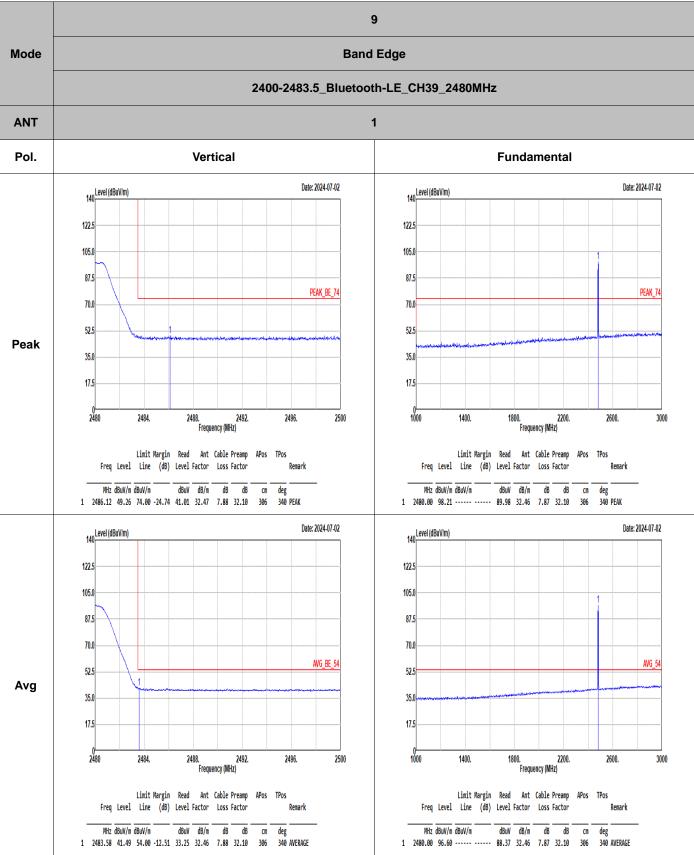


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Report No.: FR460512B 9



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9 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-03 140 Level (dBuV/m) Date: 2024-07-03 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_74 PEAK_74 70.0 70.0 52.5 52.5 **Peak** 35.0 Avg 17.5 17.5 3000 3000 7600. 12200. 16800. Frequency (MHz) 21400. 26000 7600. 12200. 16800. Frequency (MHz) 21400. 26000 Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor deg deg -- Peak MHz dBuV/m dBuV/m dB dBuV dB/m dB dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm CM 1 4960.00 46.26 74.00 -27.74 51.75 34.88 11.14 51.51 1 4960.00 46.61 74.00 -27.39 52.10 34.88 11.14 51.51 -- Peak 2 7440.00 46.83 74.00 -27.17 48.67 36.38 12.97 51.19 2 7440.00 47.83 74.00 -26.17 49.67 36.38 12.97 51.19 -- Peak -- Peak

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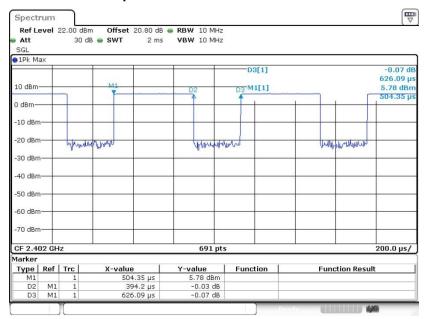
9 Mode LF 2400-2483.5_Bluetooth-LE_LF_CH39_2480MHz **ANT** Pol. Horizontal Vertical Date: 2024-07-02 Date: 2024-07-02 80 Level (dBuV/m) 80 Level (dBuV/m) FCC CLASS-B FCC CLASS-B 70.0 60.0 60.0 50.0 50.0 40.0 40.0 30.0 30.0 QP/ 20.0 20.0 **Peak** 224. 418. 612. Frequency (MHz) 806. 224. . 612. Frequency (MHz) 806. Limit Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor deg -- Peak -- Peak -- Peak MHz dBuV/m dBuV/m dB dBuV deg -- Peak MHz dBuV/m dBuV/m dB/m dB dBuV dB/m dB CM CM ---44.55 17.56 40.00 -22.44 31.03 16.50 1.23 31.20 154.16 17.57 43.50 -25.93 29.98 16.42 2.25 31.08 304.51 20.59 46.00 -25.41 28.83 19.51 3.14 30.89 50.37 17.21 40.00 -22.79 32.81 14.30 1.30 31.20 -- Peak -- Peak 278.32 22.95 46.00 -23.05 31.60 19.24 3.01 30.90 416.06 23.85 46.00 -22.15 28.62 22.26 3.67 30.70 -- Peak -- Peak -- Peak 683.78 26.47 46.00 -19.53 27.41 25.20 4.69 30.83 -- Peak 558.65 28.39 46.00 -17.61 30.15 24.98 4.26 31.00 839.95 32.63 46.00 -13.37 32.07 26.42 5.20 31.06 956.35 30.77 46.00 -15.23 29.02 27.17 5.58 31.00 -- Peak -- Peak 749.74 30.31 46.00 -15.69 30.43 25.90 4.93 30.95 935.01 30.57 46.00 -15.43 29.05 27.01 5.51 31.00

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Appendix D. Duty Cycle Plots

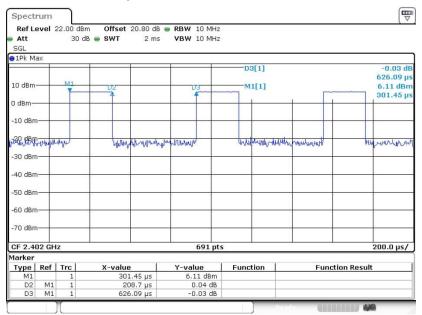
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	62.96	0.3942	2.537	3kHz
Bluetooth LE 2Mbps	33.33	0.2087	4.792	10kHz

Bluetooth LE 1Mbps



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Bluetooth LE 2Mbps



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