FCC RF Test Report

APPLICANT : Guangdong OPPO Mobile

Telecommunications Corp., Ltd.

EQUIPMENT: Mobile Phone

BRAND NAME : OPPO

MODEL NAME : CPH2639

FCC ID : R9C-OP23302

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : Mar. 28, 2024 ~ Mar. 30, 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.: FR431509B

Sporton International Inc. (ShenZhen)

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People's Republic of China

Sporton International Inc. (ShenZhen)

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR431509B	Rev. 01	Initial issue of report	Apr. 26, 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	3.2 15.247(b)(3) Peak Output Pow		≤ 30dBm	Pass	-
3.3	3.3 15.247(e) Power Spect		≤ 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 10.19 dB at 34.85 MHz
3.6 15.207		AC Conducted Emission	15.207(a)	Pass	Under limit 13.50 dB at 0.44 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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Report Template No.: BU5-FR15CBT4.0 Version 2.0

1 General Description

1.1 Applicant

Guangdong OPPO Mobile Telecommunications Corp., Ltd.

NO.18 HaiBin Road, Wusha Village, Chang'an Town, DongGuan City, Guangdong Province, P.R. China

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1.2 Manufacturer

Guangdong OPPO Mobile Telecommunications Corp., Ltd.

NO.18 HaiBin Road, Wusha Village, Chang'an Town, DongGuan City, Guangdong Province, P.R. China

1.3 Product Feature of Equipment Under Test

Product Feature			
Equipment	Mobile Phone		
Brand Name	OPPO		
Model Name	CPH2639		
FCC ID	R9C-OP23302		
IMEI Code	Conducted: 860772070027456/860772070027449 Conduction: 860772070026953/860772070026946 Radiation: 860772070026672/860772070026664		
HW Version	11		
SW Version	ColorOS 14.0.1		
EUT Stage	Production Unit		

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification				
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz			
Number of Channels	40			
Carrier Frequency of Each Channel	40 Channel (37 hopping + 3 advertising channel)			
Maximum Output Power to Antenna	BLE 1Mbps: 7.34 dBm (0.0054 W)			
Maximum Output Power to Antenna	BLE 2Mbps: 7.29 dBm (0.0054 W)			
99% Occupied Bandwidth	BLE 1Mbps: 1.035 MHz			
39 % Occupied Baildwidth	BLE 2Mbps: 2.058 MHz			
Antenna Type / Gain	IFA Antenna type with gain 0.3 dBi			
Type of Modulation	Bluetooth LE : GFSK			

Note: BLE 2Mbps does not support CH00/12/39.

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

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.	•	•	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

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

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1.8 Applicable Standards

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

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

Remark:

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

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2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	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	-	-

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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 (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				
Took Itom	Data Rate / Modulation				
Test 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 CH01_2404 MHz_BLE 2Mbps				
	Mode 5: Bluetooth Tx CH19_2440 MHz_BLE 2Mbps				
	Mode 6: Bluetooth Tx CH38_2478 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 CH01_2404 MHz_BLE 2Mbps				
	Mode 5: Bluetooth Tx CH19_2440 MHz_BLE 2Mbps				
	Mode 6: Bluetooth Tx CH38_2478 MHz_BLE 2Mbps				
AC					
Conducted	Mode 1: GSM 850 Idle + Bluetooth Link + Adapter 1 + USB Cable 1+ Earphone				
Emission					
Remark: For Radiated Test Cases, The tests were performance with Adapter1 , Earphone and USB Cable1					

RSE Co-location	
Bluetooth LE(2 Mbps) CH38_TX + LTE Band 13 link	

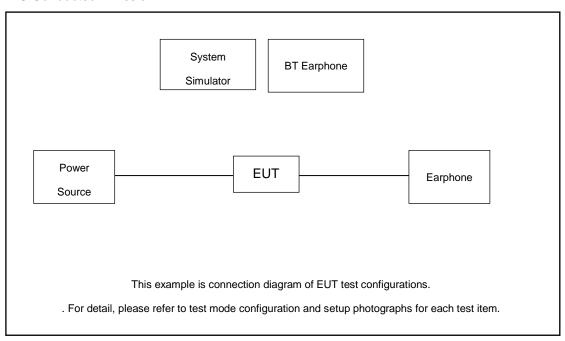
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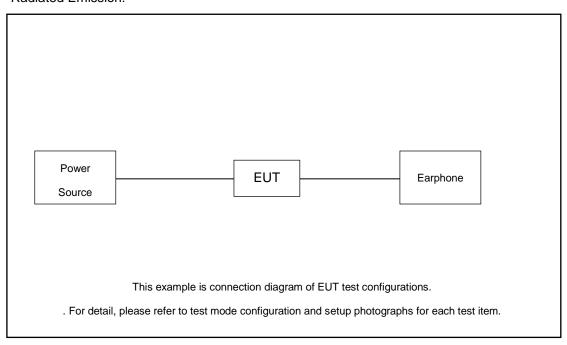
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2.3 Connection Diagram of Test System

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.	Base Station	Anritsu	MT8821C	N/A	N/A	N/A
2.	Base Station(LTE)	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
4.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
5.	Earphone	OPPO	N/A	N/A	Unshielded,1.0m	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.

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 2.20 dB and 10dB attenuator.

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

= 2.20 + 10 = 12.20 (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.

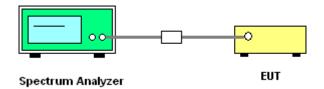
3.1.2 Measuring Instruments

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



3.1.5 Test Result of 6dB &99% Occupied Bandwidth

Please refer to Appendix A.

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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.

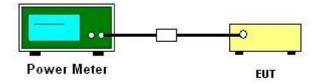
3.2.2 Measuring Instruments

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



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3.2.5 Test Result of Peak Output Power

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	6.62	30.00	0.30	6.92	36.00	Pass
BLE	1Mbps	1	19	2440	7.34	30.00	0.30	7.64	36.00	Pass
BLE	1Mbps	1	39	2480	6.58	30.00	0.30	6.88	36.00	Pass

Peak Conducted **EIRP** EIRP Conducted DG Data Freq. Power Power Pass Mod. NTX CH. Power Rate (MHz) Power Limit (dBi) Limit /Fail (dBm) (dBm) (dBm) (dBm) BLE 2Mbps 2404 6.58 30.00 0.30 6.88 36.00 Pass 7.29 Pass BLE 2Mbps 1 19 2440 30.00 0.30 7.59 36.00 **BLE** 2Mbps 38 2478 6.53 30.00 0.30 6.83 36.00 **Pass**

3.2.6 Test Result of Average Output Power (Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.13	6.20
BLE	1Mbps	1	19	2440	2.13	7.00
BLE	1Mbps	1	39	2480	2.13	6.20

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	2Mbps	1	1	2404	5.13	6.10
BLE	2Mbps	1	19	2440	5.13	6.90
BLE	2Mbps	1	38	2478	5.13	6.10

Note: the duty factor have been compensated to the final results.

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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.

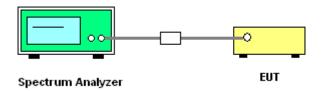
3.3.2 Measuring Instruments

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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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.

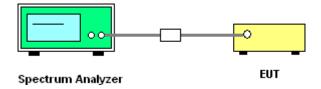
3.4.2 Measuring Instruments

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



3.4.5 Test Result of Conducted Band Edges Plots

Please refer to Appendix A.

3.4.6 Test Result of Conducted Spurious Emission Plots

Please refer to Appendix A.

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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
- 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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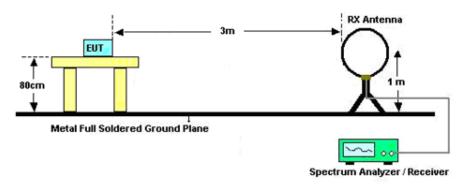
 TEL: +86-755-8637-9589
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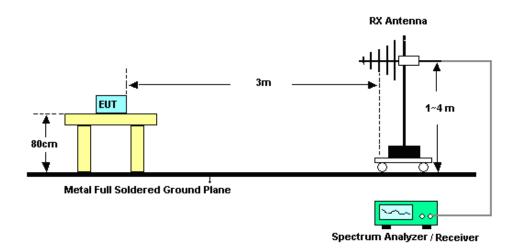
Report No.: FR431509B

3.5.4 Test Setup

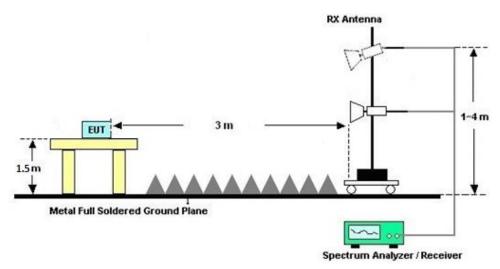
For radiated emissions below 30MHz



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 (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

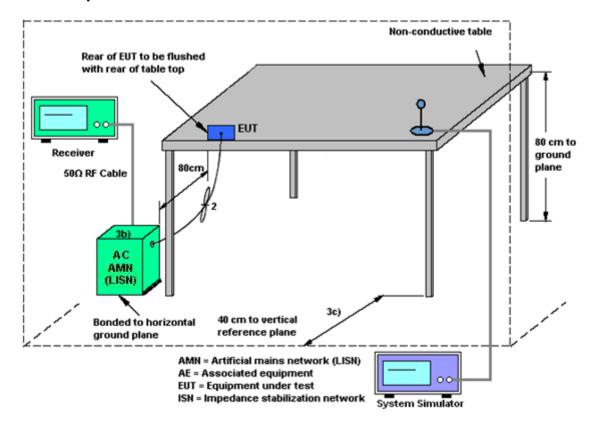
- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other 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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3.6.4 Test Setup



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&SA	Agilent	N9038A	MY522601 85	20Hz~26.5GHz	Dec. 27, 2023	Mar. 29, 2024	Dec. 26, 2024	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY551502 13	10Hz~44GHz	Jul. 07, 2023	Mar. 29, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Mar. 29, 2024	Jul. 27, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Oct. 24, 2023	Mar. 29, 2024	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 08, 2023	Mar. 29, 2024	Jul. 07, 2024	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08,2023	Mar. 29, 2024	Apr. 07,2024	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 04, 2023	Mar. 29, 2024	Apr. 03,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1943528	1GHz~18GHz	Oct. 18,2023	Mar. 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 05	0.5GHz~26.5Gh z	Oct. 18,2023	Mar. 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 07, 2023	Mar. 29, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	Oct. 18,2023	Mar. 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Mar. 29, 2024	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Mar. 29, 2024	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 06, 2023	Mar. 28, 2024	Jul. 05, 2024	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Mar. 28, 2024	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Mar. 28, 2024	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000 891	100Vac~250Vac	Jul. 07, 2023	Mar. 28, 2024	Jul. 06, 2024	Conduction (CO01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Mar. 30, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Mar. 30, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 21, 2023	Mar. 30, 2024	Aug. 20, 2024	Conducted (TH01-SZ)

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

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	20.15
of 95% (U = 2Uc(y))	2.8 dB

<u>Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)</u>

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

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

Measuring Uncertainty for a Level of Confidence	50.10
of 95% (U = 2Uc(y))	5.0 dB

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

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

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

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Appendix A. Conducted Test Results

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Ambient Condition: <u>24-26</u> °C, <u>45-55</u> %RH

Test Date: 2024/3/30 Test Engineer: Chen ZhiQiang

DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant7	2402	0.69	2401.66	2402.34	0.5	PASS
		2440	0.70	2439.65	2440.35	0.5	PASS
		2480	0.69	2479.66	2480.34	0.5	PASS
BLE_2M	Ant7	2404	1.16	2403.42	2404.58	0.5	PASS
		2440	1.16	2439.42	2440.58	0.5	PASS
		2478	1.16	2477.42	2478.58	0.5	PASS

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Test Graphs



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

BLE_1M_Ant7_2480 Spectrum Ref Level 30.00 dBm Att 40 dB Offset 12.04 dB ● RBW 100 kHz SWT 18.9 µs ● VBW 300 kHz Mode Auto FFT -0.35 dBr 2.47965600 GH 5.64 dBr M2[1] 9<mark>9600 G</mark>H 10 dBm -10 dBm -20 dBm -40 dBm -60 dBm 1001 pts Span 4.0 MHz 1arke
 Type
 Ref
 Trc

 M1
 1

 M2
 1

 D3
 M1
 1
 Date: 30.MAR.2024 17:30:52 BLE_2M_Ant7_2404 Spectrum
 Ref Level
 30.00 dBm
 Offset
 12.12 dB
 RBW
 100 kHz

 Att
 40 dB
 SWT
 18.9 µs
 VBW
 300 kHz
 Mode Auto FFT Count 100/100 1Pk View M1[1] 2.40342400 GH 5.62 dBr 20 dBm M2[1] 10 dBm -10 dBm -30 dBm -40 dBm -60 dBm CF 2.404 GHz 1001 pts Span 4.0 MHz X-value 2.403424 GHz 2.403988 GHz 1.156 MHz Y-value -0.28 dBm 5.62 dBm 0.06 dB Type | Ref | Trc | Function **Function Result** M1 M2 D3 Date: 30.MAR.2024 17:32:25

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

BLE_2M_Ant7_2440 Spectrum Ref Level 30.00 dBm Att 40 dB Offset 12.04 dB ● RBW 100 kHz SWT 18.9 µs ● VBW 300 kHz Mode Auto FFT 0.27 dBr 2.43942000 GH 6.23 dBr M2[1] 99200 GH 10 dBm -10 dBm -20 dBm -40 dBm -60 dBm 1001 pts CF 2.44 GF Span 4.0 MHz 1arke
 Type
 Ref
 Trc

 M1
 1

 M2
 1

 D3
 M1
 1
 Date: 30.MAR.2024 17:33:58 BLE_2M_Ant7_2478 Spectrum Ref Level 30.00 dBm Offset 12.04 dB ● RBW 100 kHz
Att 40 dB SWT 18.9 μs ● VBW 300 kHz Mode Auto FFT Count 100/100 1Pk View M1[1] 2.47742000 GH 5.75 dBr 20 dBm M2[1] 10 dBm -10 dBm -30 dBm -40 dBm -60 dBm CF 2.478 GHz 1001 pts Span 4.0 MHz X-value 2.47742 GHz 2.477992 GHz 1.16 MHz Y-value -0.15 dBm 5.75 dBm 0.09 dB Type | Ref | Trc | Function **Function Result** M1 M2 D3

Date: 30.MAR.2024 17:36:15

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Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
BLE_1M		2402	1.031	2401.4925	2402.5235
	Ant7	2440	1.035	2439.4925	2440.5275
		2480	1.035	2479.4885	2480.5235
BLE_2M		2404	2.054	2402.9930	2405.0470
	Ant7	2440	2.058	2438.9890	2441.0470
		2478	2.058	2476.9890	2479.0470

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Test Graphs



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BLE_1M_Ant7_2480 Spectrum Ref Level 30.00 dBm Att 40 dB Count 100/100 Offset 12.04 dB ● RBW 50 kHz SWT 37.9 µs ● VBW 200 kHz Mode Auto FFT 4.28 dBr 2.47997600 GH 1.034965035 MH Occ Bw 10 dBm 0 dBm -10 dBm -20 dBm 40 dBn -50 dBm -60 dBm CF 2.48 GH 1001 pts Marke Y-value 4.28 dBm -10.31 dBm -9.78 dBm Type | Ref | Trc Occ Bw 1.034965035 MHz Date: 30.MAR.2024 17:31:01 BLE_2M_Ant7_2404 Spectrum
 Ref Level
 30.00 dBm
 Offset
 12.12 dB
 RBW
 50 kHz

 Att
 40 dB
 SWT
 37.9 µs
 VBW
 200 kHz
 Mode Auto FFT Count 100/100 1Pk View M1[1] 3.45 dBr 2.40397600 GH 20 dBm 2.053946054 MH 10 dBm 0 dBm--10 dBm -30-dBr -40 dBm -60 dBm CF 2.404 GHz 1001 pts Span 4.0 MHz X-value 2.403976 GHz 2.40299301 GHz 2.40504695 GHz Y-value 3.45 dBm -10.97 dBm -11.34 dBm Type | Ref | Trc | Function **Function Result** Occ Bw 2.053946054 MHz

Date: 30.MAR.2024 17:32:34

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

BLE_2M_Ant7_2440 Spectrum Ref Level 30.00 dBm Att 40 dB Offset 12.04 dB ● RBW 50 kHz SWT 37.9 µs ● VBW 200 kHz Mode Auto FFT 4.08 dBr 2.43997600 GH 2.057942058 MH Occ Bw 10 dBm 0 dBm -10 dBm -20 dBm -40 dBm -60 dBm CF 2.44 GF 1001 pts Marke Type Ref Trc 2.057942058 MHz 2.43898901 GHz 2.44104695 GHz Date: 30.MAR.2024 17:34:07 BLE_2M_Ant7_2478 Spectrum Ref Level 30.00 dBm Att 40 dB Offset 12.04 dB • RBW 50 kHz SWT 37.9 µs • VBW 200 kHz Mode Auto FFT Count 100/100 1Pk View M1[1] 3.61 dBn 2.47797600 GH: 2.057942058 MH: 20 dBm 10 dBm 0 dBm--10 dBm -30 dBr -40 dBm -60 dBm CF 2.478 GHz 1001 pts Span 4.0 MHz Y-value 3.61 dBm -11.13 dBm -11.30 dBm Type | Ref | Trc | X-value 2.477976 GHz 2.47698901 GHz 2.47904695 GHz Function **Function Result** Occ Bw 2.057942058 MHz

Date: 30.MAR.2024 17:36:24

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

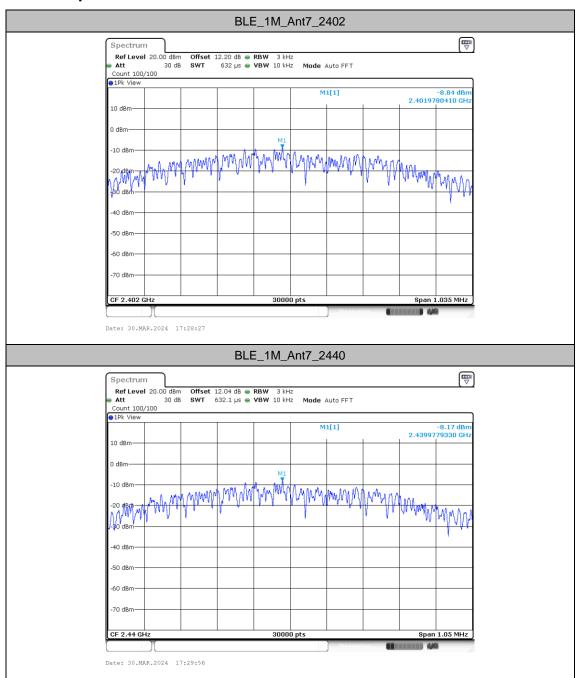
Maximum power spectral density

Test Result

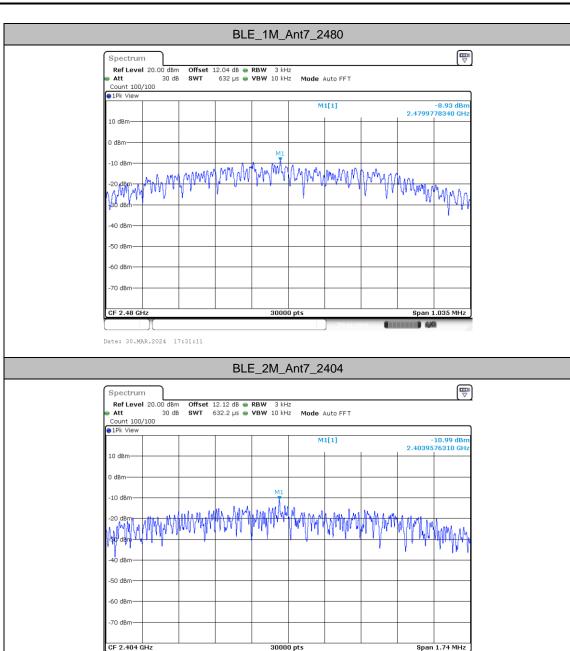
TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M		2402	-8.84	≤8.00	PASS
	Ant7	2440	-8.17	≤8.00	PASS
		2480	-8.93	≤8.00	PASS
BLE_2M		2404	-10.99	≤8.00	PASS
	Ant7	2440	-10.30	≤8.00	PASS
		2478	-10.81	≤8.00	PASS

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

Test Graphs

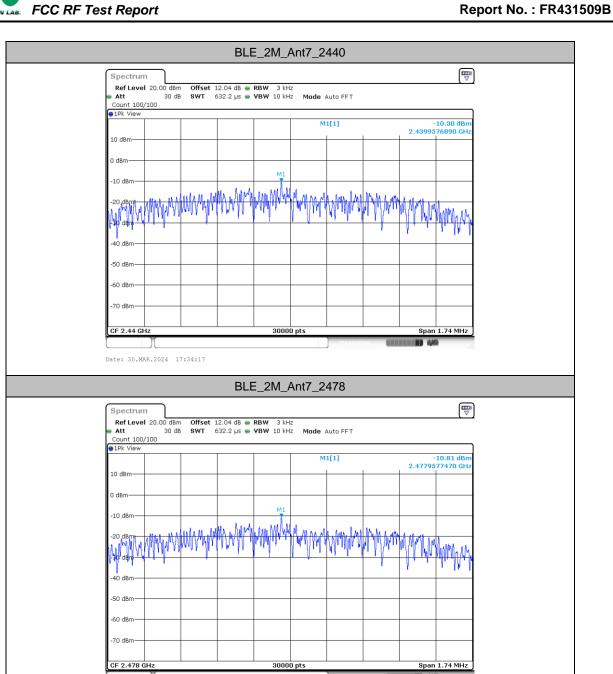


TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302



Date: 30.MAR.2024 17:32:44

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302



Date: 30.MAR.2024 17:36:34

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Reference level measurement

Test Result

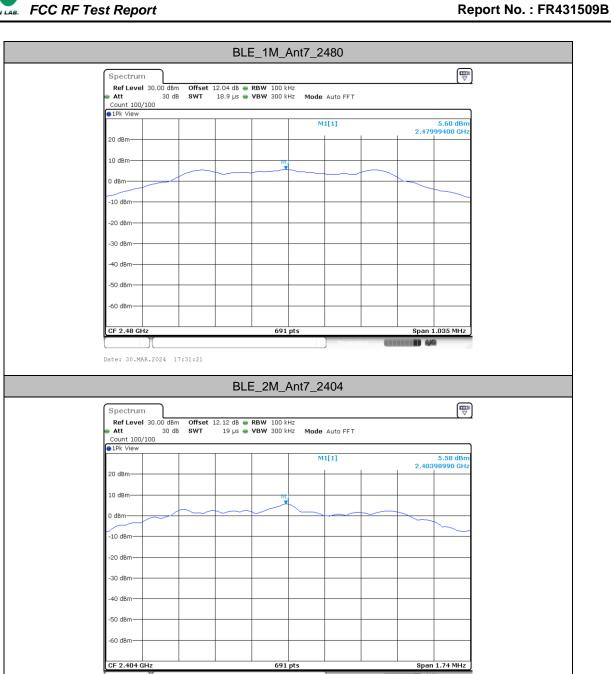
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
		2402	2401.99	5.77
BLE_1M	Ant7	2440	2439.99	6.36
		2480	2479.99	5.60
BLE_2M	Ant7	2404	2403.99	5.58
		2440	2439.99	6.21
		2478	2477.99	5.76

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Test Graphs

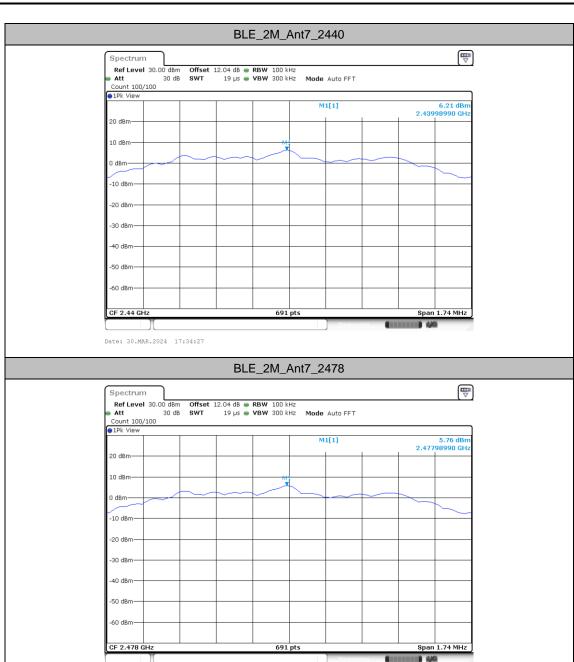


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Date: 30.MAR.2024 17:32:54

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302



Date: 30.MAR.2024 17:36:44

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

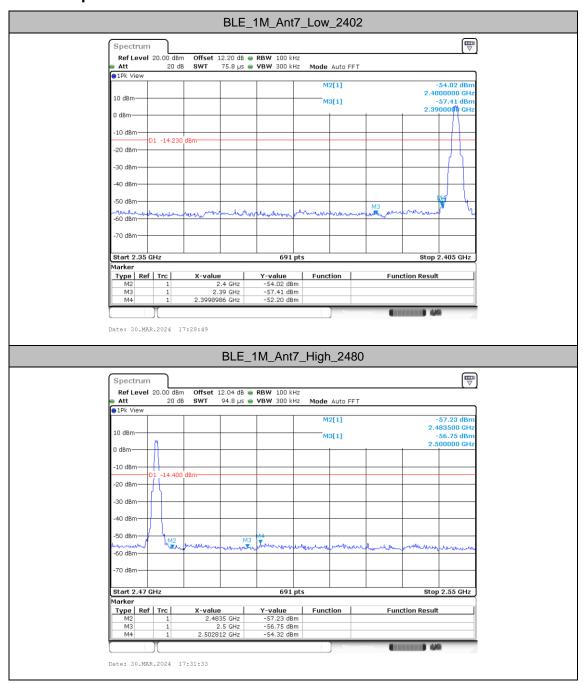
Band edge measurements

Test Result

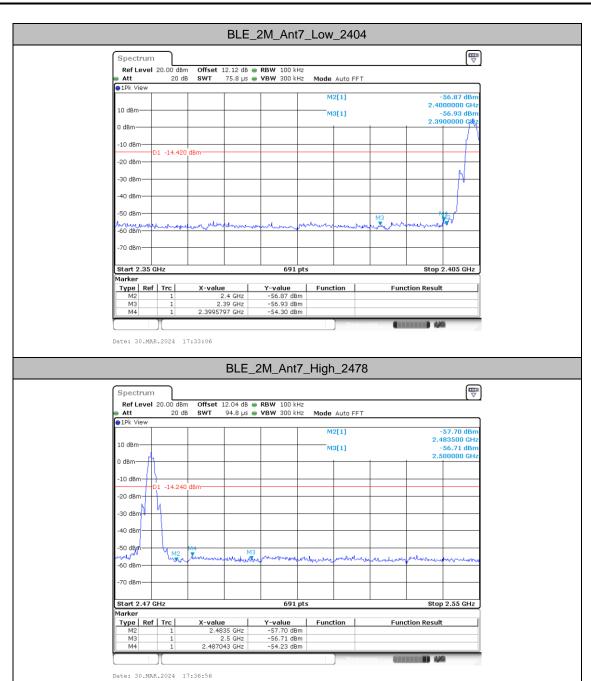
TestMode	Antenna	ChName	Freq	RefLevel	Result	Limit	Vardiet
			(MHz)	[dBm/100KHz]	[dBm/100KHz]	[dBm/100KHz]	Verdict
BLE_1M	Ant7	Low	2402	5.77	-52.2	≤-14.23	PASS
		High	2480	5.60	-54.32	≤-14.4	PASS
BLE_2M	Ant7	Low	2404	5.58	-54.3	≤-14.42	PASS
		High	2478	5.76	-54.23	≤-14.24	PASS

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Test Graphs



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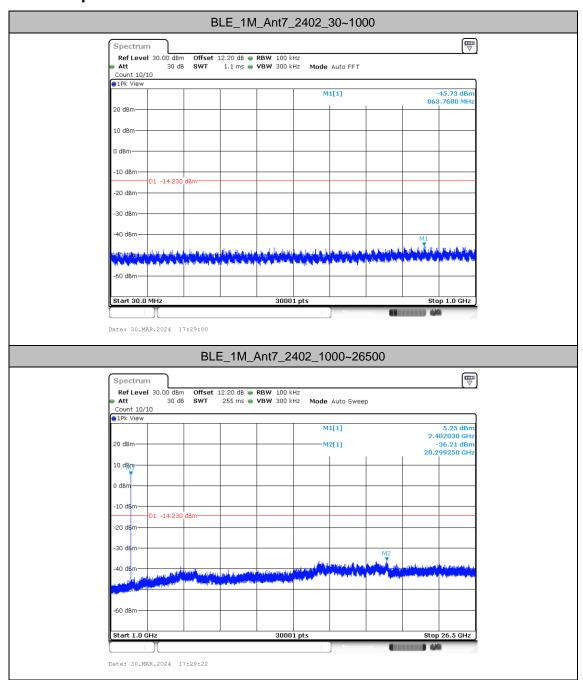
Conducted Spurious Emission

Test Result

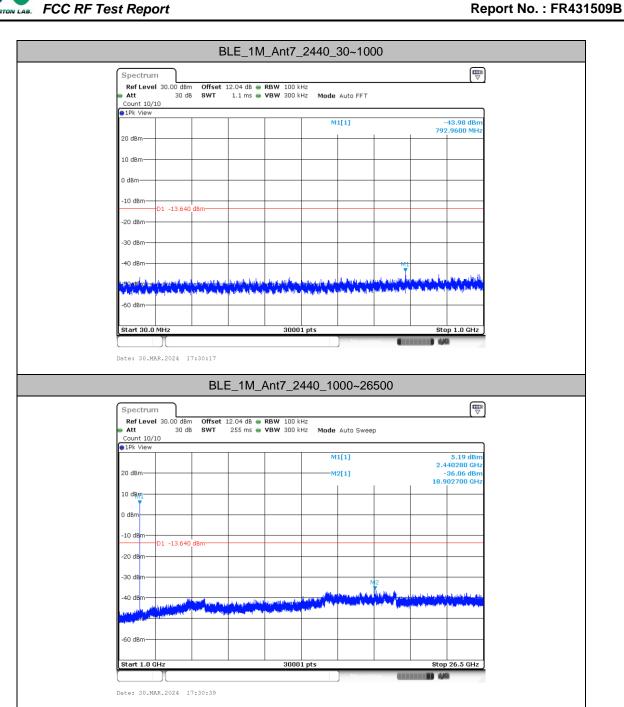
TootMode	Antonna		FreqRange	RefLevel	Result	Limit	\/a nalia4	
TestMode	Antenna	Freq(MHz)	[MHz]	[dBm/100KHz]	[dBm/100KHz]	[dBm/100KHz]	Verdict	
		2402	30~1000	5.77	-45.73	≤-14.23	PASS	
		2402	1000~26500	5.77	-36.21	≤-14.23	PASS	
DIE 1M	Ant7	2440	30~1000	6.36	-43.98	≤-13.64	PASS	
BLE_1M	Anti	2440	1000~26500	6.36	-36.06	≤-13.64	PASS	
		2480	30~1000	5.60	-45.51	≤-14.4	PASS	
			1000~26500	5.60	-36.19	≤-14.4	PASS	
		2404	30~1000	5.58	-45.71	≤-14.42	PASS	
		2404	1000~26500	5.58	-35.96	≤-14.42	PASS	
BLE 2M	Ant7	2440	30~1000	6.21	-45.13	≤-13.79	PASS	
BLE_ZIVI	AIII		1000~26500	6.21	-35.87	≤-13.79	PASS	
			30~1000	5.76	-46.13	≤-14.24	PASS	
			1000~26500	5.76	-35.48	≤-14.24	PASS	

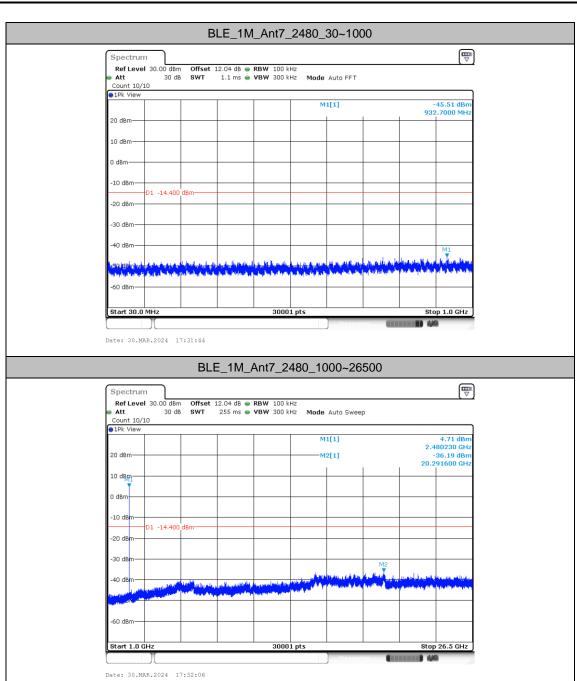
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Test Graphs

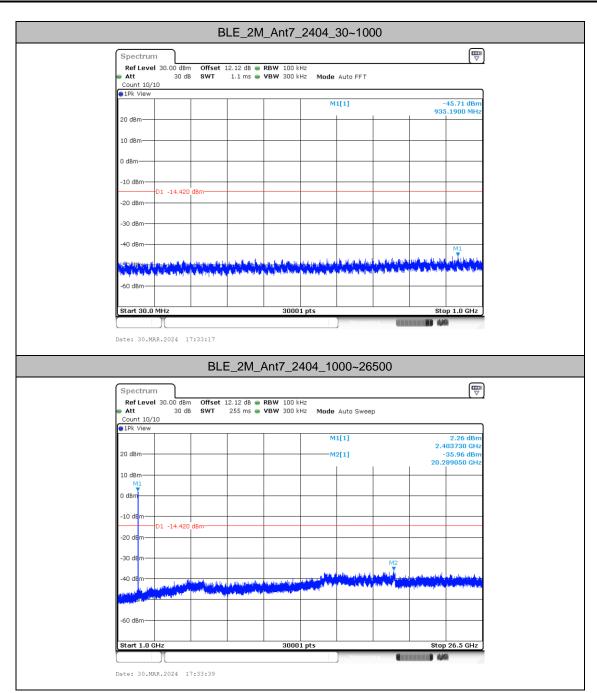


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: A23 of A26



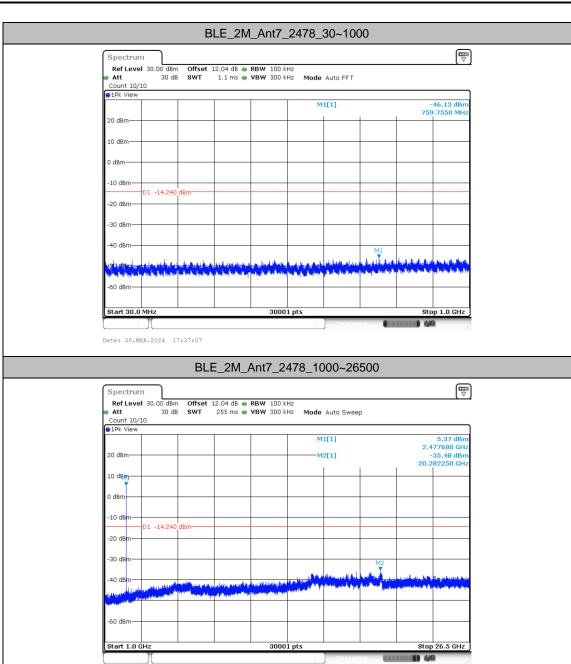
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 Offset
 12.04 dB ● RBW
 100 kHz

 SWT
 1.1 ms ● VBW
 300 kHz
 Mode
 Auto FFT
 20 dBm 0 dBm 01 -13.790 -20 dBm -60 dBm-Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 30.MAR.2024 17:34:37 BLE_2M_Ant7_2440_1000~26500 Spectrum
 Ref Level
 30.00 dBm
 Offset
 12.04 dB
 RBW
 100 kHz

 Att
 30 dB
 SWT
 255 ms
 VBW
 300 kHz
 Mode Auto Sweep Count 10/10 1Pk View M1[1] 3.44 dBr 2.440280 GH 20 dBm -35.87 dBn 20.296700 GH M2[1] 10 dBm 0 dBm -10 dBn D1 -13.790 dBm-30 d 30001 pts Sto

Date: 30.MAR.2024 17:34:59

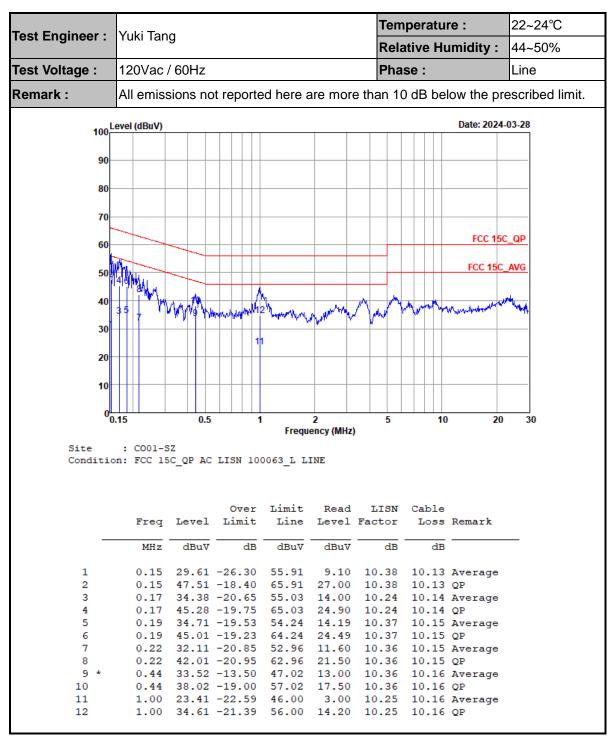
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302 : A25 of A26



Date: 30.MAR.2024 17:37:29

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Appendix B. AC Conducted Emission Test Results



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302

Temperature: 22~24°C Test Engineer: Yuki Tang Relative Humidity: 44~50% Test Voltage: 120Vac / 60Hz Phase: Neutral Remark: All emissions not reported here are more than 10 dB below the prescribed limit. 100 Level (dBuV) Date: 2024-03-28 90 80 70 60 FCC 15C_AVG 40 30 20 10 0<mark>0.15</mark> Frequency (MHz) : CO01-SZ Condition: FCC 15C QP AC LISN 100063 N NEUTRAL Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss Remark MHz dBu∀ dB dBu₹ dBuV dB 0.15 31.58 -24.38 55.96 11.30 10.15 10.13 Average 47.58 -18.38 65.96 27.30 34.14 -21.11 55.25 13.60 2 0.15 10.15 10.13 QP 0.16 10.40 10.14 Average 0.16 46.74 -18.51 65.25 26.20 10.40 10.14 QP 33.72 -20.48 54.20 13.20 10.37 42.92 -21.28 64.20 22.40 10.37 5 10.15 Average 0.19 6 0.19 10.37 10.15 QP 0.41 33.29 -14.44 47.73 13.19 7 * 9.94 10.16 Average 0.41 37.19 -20.54 57.73 17.09 9.94 10.16 QP 8 9 0.98 22.41 -23.59 46.00 2.00 10.25 10.16 Average 0.98 34.11 -21.89 56.00 13.70 10.25 10.16 QP 10 11 5.53 25.13 -24.87 50.00 4.51 10.27 10.35 Average 5.53 32.43 -27.57 60.00 11.81 10.27 10.35 QP

Note:

- 1. Level($dB\mu V$) = Read Level($dB\mu V$) + 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 :	Kuana lia	Relative Humidity :	48~49%
	Kuang Jia	Temperature :	24℃~25℃

Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	0	Bluetooth-LE	00	2402	1Mbps		-
Mode 2	2400-2483.5	0	Bluetooth-LE	19	2440	1Mbps	-	-
Mode 3	2400-2483.5	0	Bluetooth-LE	39	2480	1Mbps	-	-
Mode 4	2400-2483.5	0	Bluetooth-LE	01	2404	2Mbps	-	-
Mode 5	2400-2483.5	0	Bluetooth-LE	38	2478	2Mbps	-	-
Mode 6	2400-2483.5	0	Bluetooth-LE	38	2478	2Mbps	-	LF
Mode 7	2400-2483.5	0	Bluetooth-LE	38	2478	2Mbps	-	-
Mode 7	LTE Band 13 Lin	k					-	-

Summary of each worse mode

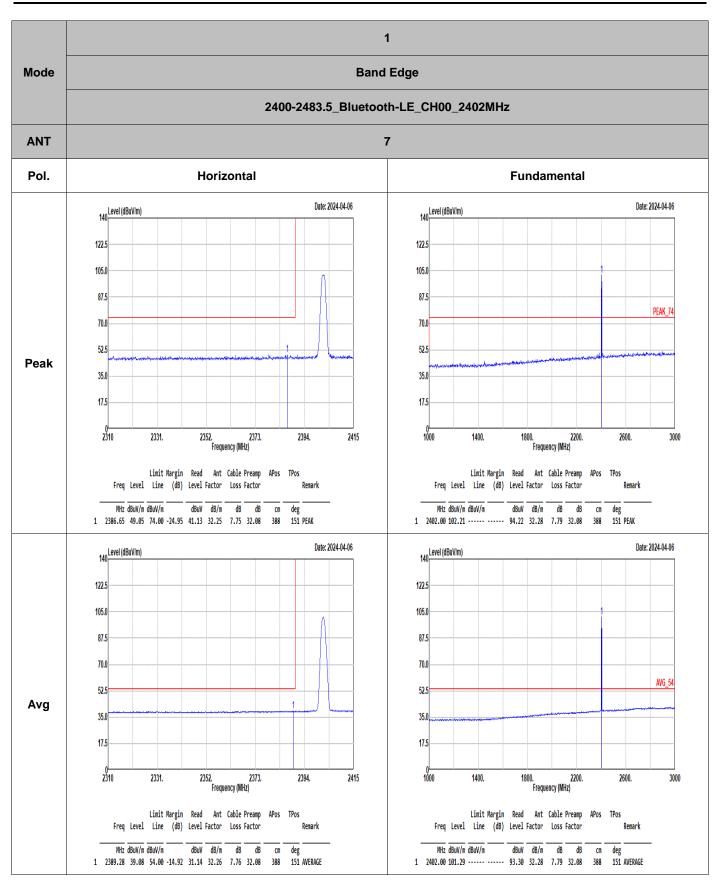
Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE	00	2389.28	39.08	54.00	-14.92	Н	AVERAGE	Pass	Band Edge
1	Bluetooth-LE	00	4804.00	45.82	74.00	-28.18	Н	Peak	Pass	Harmonic
2	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE	19	7320.00	47.84	74.00	-26.16	V	Peak	Pass	Harmonic
3	Bluetooth-LE	39	2484.20	39.82	54.00	-14.18	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE	39	7440.00	47.72	74.00	-26.28	V	Peak	Pass	Harmonic
4	Bluetooth-LE	01	2356.62	40.90	54.00	-13.10	V	AVERAGE	Pass	Band Edge
4	Bluetooth-LE	01	-	-	-	-	-	-	-	Harmonic
5	Bluetooth-LE	38	2485.55	41.49	54.00	-12.51	V	AVERAGE	Pass	Band Edge
5	Bluetooth-LE	38	7434.00	47.26	74.00	-26.74	V	Peak	Pass	Harmonic
6	Bluetooth-LE	38	34.85	29.81	40.00	-10.19	V	Peak	Pass	LF
7	Bluetooth-LE	38	2487.94	41.28	54.00	-12.72	Н	AVERAGE	Pass	Band Edge
7	Bluetooth-LE	38	7434.00	47.22	74.00	-26.78	Н	Peak	Pass	Harmonic

Sporton International Inc. (ShenZhen)

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: C1 of C17



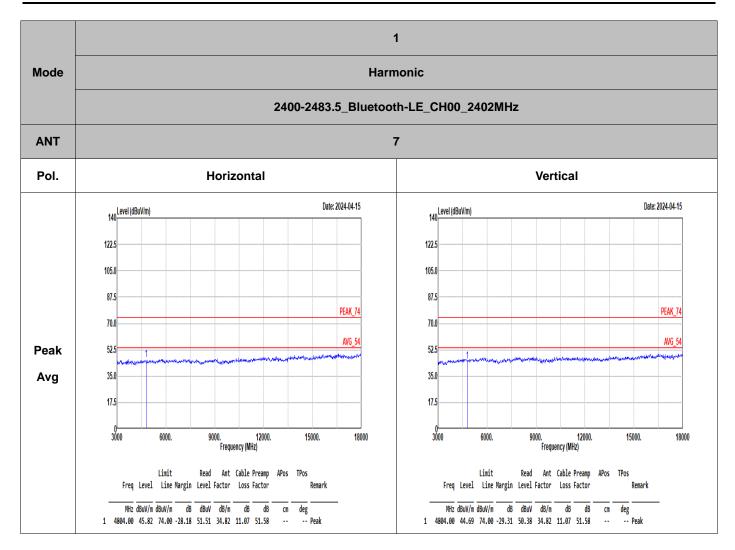




1 **Band Edge** Mode 2400-2483.5_Bluetooth-LE_CH00_2402MHz **ANT** Pol. Vertical **Fundamental** Date: 2024-04-06 Date: 2024-04-06 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK 74 70.0 70.0 52.5 52.5 Peak 35.0 35.0 17.5 17.5 0 1000 52. 2373. Frequency (MHz) 2331. 2415 3000 Frequency (MHz) 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 2382.45 48.69 74.00 -25.31 40.79 32.24 7.74 32.08 395 52 PEAK 1 2402.00 98.01 ----- 90.02 32.28 7.79 32.08 52 PEAK Date: 2024-04-06 Date: 2024-04-06 140 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 2352. Frequency (MHz) 2310 1000 2394. 2415 1400. 2200. 3000 Frequency (MHz) 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 MHz dBuV/m dBuV/m dBuV dB/m dB dB cm 1 2386.76 38.95 54.00 -15.05 31.03 32.25 7.75 32.08 52 AVERAGE 1 2402.00 96.99 ----- 89.00 32.28 7.79 32.08

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2 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH19_2440MHz **ANT** Pol. Horizontal Vertical 140 Level (dBuV/m) Date: 2024-04-15 Date: 2024-04-15 140 Level (dBuV/m) 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 Avg 17.5 17.5 3000 3000 9000. 12000. Frequency (MHz) 9000. 12000. Frequency (MHz) 6000. 15000. 6000. 15000. 18000 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

-- Peak

-- Peak

cm

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

1 4880.00 45.06 74.00 -28.94 50.66 34.85 11.10 51.55

2 7320.00 47.02 74.00 -26.98 48.76 36.33 13.09 51.16

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302 MHz dBuV/m dBuV/m dB dBuV dB/m dB

1 4880.00 45.79 74.00 -28.21 51.39 34.85 11.10 51.55

2 7320.00 47.84 74.00 -26.16 49.58 36.33 13.09 51.16

: C5 of C17

cm deg

-- Peak

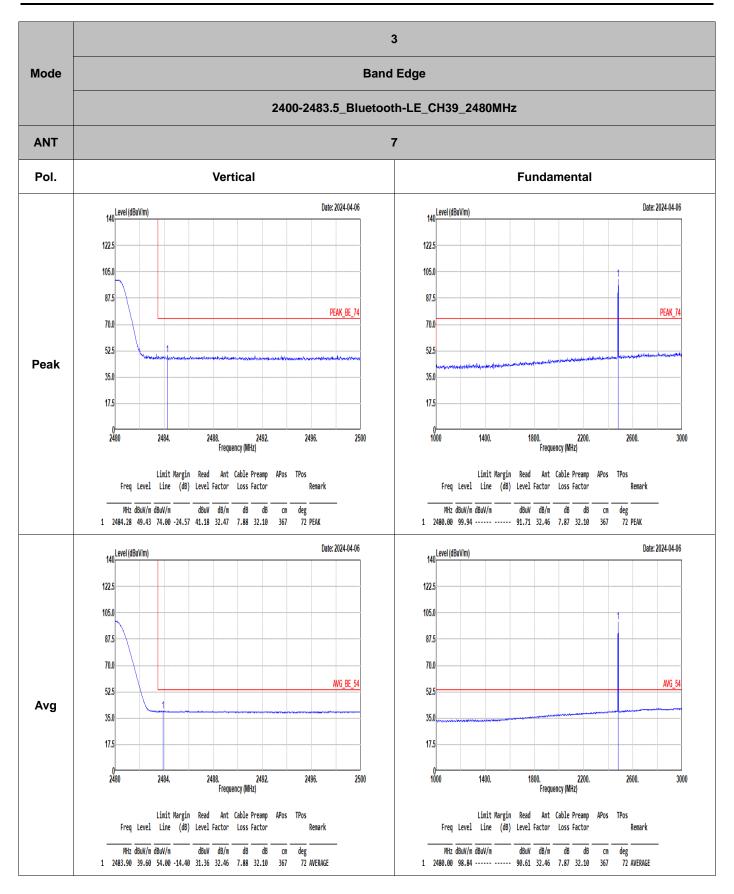
-- Peak



3 **Band Edge** Mode 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Horizontal **Fundamental** Date: 2024-04-06 Date: 2024-04-06 140 Level (dBuV/m) 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 0 1000 2480 R8. 2492. Frequency (MHz) 2484. 3000 Frequency (MHz) 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 2490.06 49.50 74.00 -24.50 41.24 32.48 7.88 32.10 364 157 PEAK 1 2480.00 102.72 ----- 94.49 32.46 7.87 32.10 157 PEAK Date: 2024-04-06 Date: 2024-04-06 140 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 2484. 2500 1400. 2200. 3000 Frequency (MHz) Frequency (MHz) 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 MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2484.20 39.82 54.00 -14.18 31.57 32.47 7.88 32.10 364 157 AVERAGE 1 2480.00 101.62 ----- 93.39 32.46 7.87 32.10

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3 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH39_2480MHz **ANT** Pol. Horizontal Vertical 140 Level (dBuV/m) Date: 2024-04-15 Date: 2024-04-15 140 Level (dBuV/m) 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 Avg 17.5 17.5 3000 3000 9000. 12000. Frequency (MHz) 9000. 12000. Frequency (MHz) 6000. 15000. 6000. 15000. 18000 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

-- Peak

-- Peak

cm

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

1 4960.00 45.96 74.00 -28.04 51.45 34.88 11.14 51.51

2 7440.00 46.93 74.00 -27.07 48.77 36.38 12.97 51.19

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302 MHz dBuV/m dBuV/m dB dBuV dB/m dB

1 4960.00 46.01 74.00 -27.99 51.50 34.88 11.14 51.51

2 7440.00 47.72 74.00 -26.28 49.56 36.38 12.97 51.19

cm deg

-- Peak

-- Peak



4 **Band Edge** Mode 2400-2483.5_Bluetooth-LE_CH01_2404MHz **ANT** Pol. Horizontal **Fundamental** Date: 2024-04-06 Date: 2024-04-06 140 Level (dBuV/m) 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 0 1000 52. 2373. Frequency (MHz) 2331. 3000 Frequency (MHz) 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 deg cm 1 2370.06 48.53 74.00 -25.47 40.69 32.21 7.70 32.07 389 152 PEAK 1 2404.00 102.66 ----- 94.65 32.29 7.80 32.08 152 PEAK Date: 2024-04-06 Date: 2024-04-06 140 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 2352. Frequency (MHz) 2310 1000 2394. 2415 1400. 3000 Frequency (MHz) 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 MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2346.86 40.81 54.00 -13.19 33.08 32.16 7.64 32.07 1 2404.00 100.81 ----- 92.80 32.29 7.80 32.08 152 AVERAGE

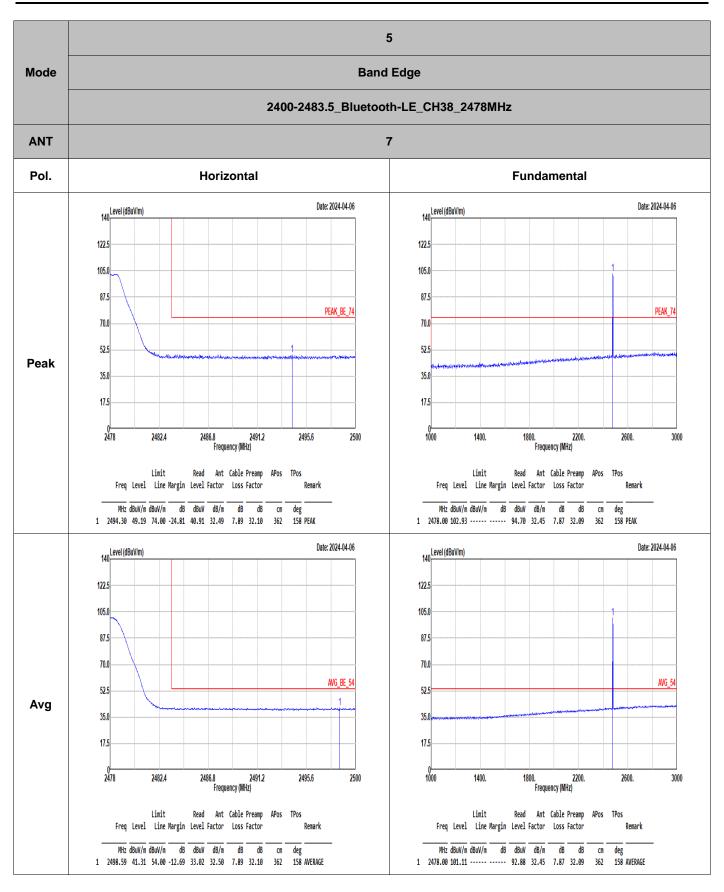
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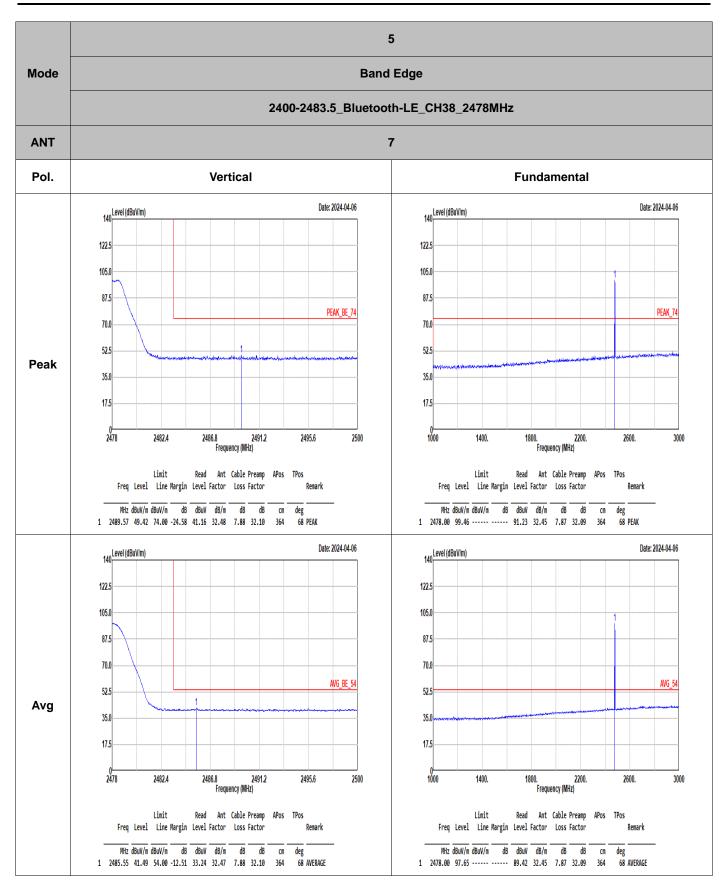
4 **Band Edge** Mode 2400-2483.5_Bluetooth-LE_CH01_2404MHz **ANT** Pol. Vertical **Fundamental** Date: 2024-04-06 Date: 2024-04-06 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK 74 70.0 70.0 52.5 52.5 Peak 35.0 35.0 17.5 17.5 0 1000 52. 2373. Frequency (MHz) 2331. 2394. 3000 Frequency (MHz) 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 2361.56 48.63 74.00 -25.37 40.82 32.20 7.68 32.07 53 PEAK 1 2404.00 98.18 ----- 90.17 32.29 7.80 32.08 53 PEAK Date: 2024-04-06 Date: 2024-04-06 140 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 2352. Frequency (MHz) 2310 1000 2394. 2415 1400. 3000 Frequency (MHz) 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 MHz dBuV/m dBuV/m dBuV dB/m dB dB cm 1 2356.62 40.90 54.00 -13.10 33.12 32.18 7.67 32.07 53 AVERAGE 1 2404.00 96.29 ----- 88.28 32.29 7.80 32.08

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5 Mode Harmonic 2400-2483.5_Bluetooth-LE_CH38_2478MHz **ANT** Pol. Horizontal Vertical 140 Level (dBuV/m) Date: 2024-04-15 Date: 2024-04-15 140 Level (dBuV/m) 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 Avg 17.5 17.5 3000 3000 12200. 16 Frequency (MHz)

12200. 16800. Frequency (MHz)

Read Ant Cable Preamp APos TPos

21400.

deg

-- Peak

-- Peak

cm

26000

7600.

Limit

Freq Level Line Margin Level Factor Loss Factor

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

1 4956.00 45.53 74.00 -28.47 51.04 34.88 11.13 51.52

2 7434.00 47.26 74.00 -26.74 49.09 36.37 12.99 51.19

7600.

Limit

Freq Level Line Margin Level Factor Loss Factor

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

1 4956.00 46.54 74.00 -27.46 52.05 34.88 11.13 51.52

2 7434.00 46.97 74.00 -27.03 48.80 36.37 12.99 51.19

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21400.

-- Peak

-- Peak

cm deg

26000

16800.

Read Ant Cable Preamp APos TPos

6 Mode LF 2400-2483.5_ Bluetooth-LE_CH38_2478MHz **ANT** 7 Pol. Horizontal Vertical Date: 2024-04-07 Date: 2024-04-07 80 Level (dBuV/m) 80 Level (dBuV/m) FCC CLASS-B FCC CLASS-B 60.0 50.0 50.0 40.0 40.0 30.0 30.0 20.0 20.0 QP/Peak 10.0 10.0 224. 806. 1000 224. 612. 806. 1000 Frequency (MHz) Frequency (MHz) Limit Read Ant Cable Preamp Freq Level Line Margin Level Factor Loss Factor Limit Read Ant Cable Preamp Freq Level Line Margin Level Factor Loss Factor TPos TPos Remark Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB 35.82 17.64 40.00 -22.36 25.88 21.68 1.28 31.20
 MHz
 dBuV/m
 dB
 <t deg deg -- Peak -- Peak 152.22 23.13 43.50 -20.37 35.55 16.46 2.21 31.09 -- Peak -- Peak

266.68 27.46 46.00 -18.54 36.15 19.64 315.18 29.98 46.00 -16.02 38.33 19.74

831.22 27.95 46.00 -18.05 28.33 26.35

604.24 24.44 46.00 -21.56 26.74 24.92 3.77 30.99

2.57 30.90

2.78 30.87

4.34 31.07

-- Peak

-- Peak

-- Peak

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302 202.66 22.33 43.50 -21.17 35.45 15.50

647.89 24.74 46.00 -21.26 26.61 25.19

265.71 24.96 46.00 -21.04 33.57 19.72 2.57 30.90

314.21 25.83 46.00 -20.17 34.21 19.72 2.77 30.87

2.28 30.90

3.84 30.90

-- Peak

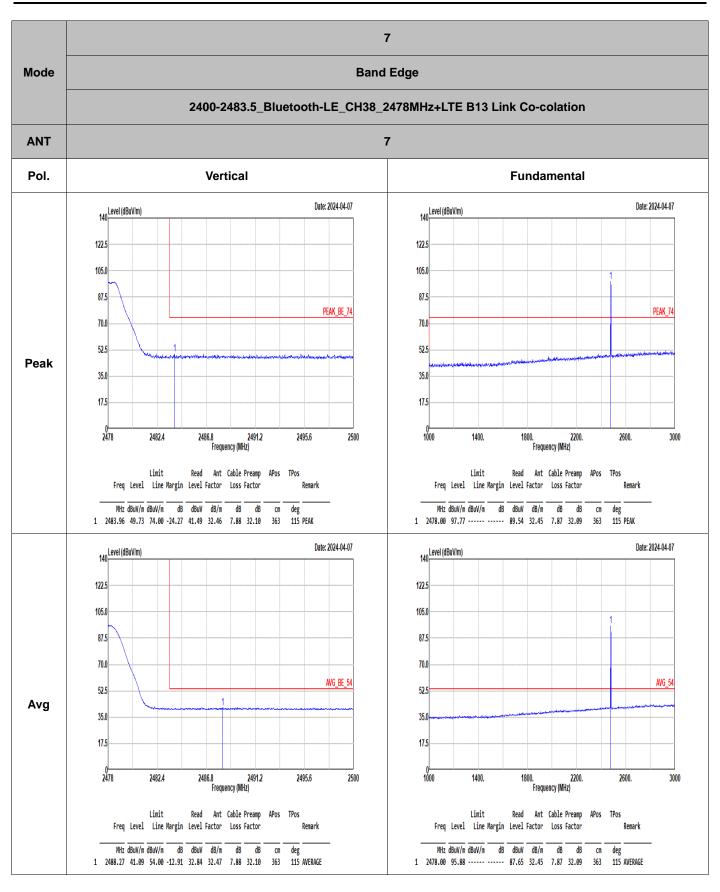
-- Peak

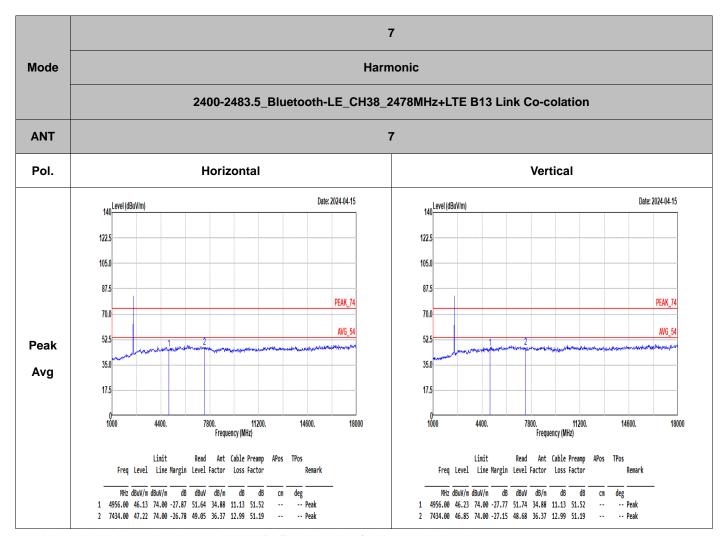


7 **Band Edge** Mode 2400-2483.5_Bluetooth-LE_CH38_2478MHz+LTE B13 Link Co-colation **ANT** Pol. Horizontal **Fundamental** Date: 2024-04-07 Date: 2024-04-07 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK_BE_7 PEAK 74 70.0 70.0 52.5 52.5 Peak 35.0 35.0 17.5 17.5 0 1000 2478 2482.4 2495.6 1400. 3000 Frequency (MHz) Frequency (MHz) Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Limit Freq Level Line Margin Level Factor Loss Factor Remark Freq Level Line Margin Level Factor Loss Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB dB deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm CM deg 1 2497.89 49.31 74.00 -24.69 41.02 32.50 7.89 32.10 364 157 PEAK 1 2478.00 101.90 ----- 93.67 32.45 7.87 32.09 157 PEAK Date: 2024-04-07 Date: 2024-04-07 140 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 AVG_BE_54 52.5 52.5 Avg 35.0 35.0 17.5 17.5 2478 1000 2482.4 2495.6 2500 1400. 2200. 3000 Frequency (MHz) Frequency (MHz) Limit Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos Freq Level Line Margin Level Factor Loss Factor Freq Level Line Margin Level Factor Loss Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm 1 2487.94 41.28 54.00 -12.72 33.03 32.47 7.88 32.10 1 2478.00 100.00 ----- 91.77 32.45 7.87 32.09 157 AVERAGE

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302







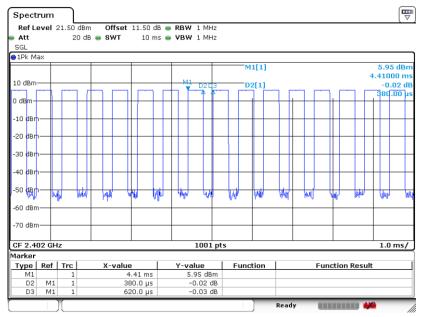
Note: the highest signals over limit is BLE co-location fundamental signal.

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Appendix D. Duty Cycle Plots

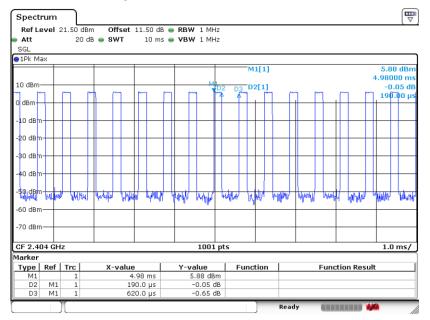
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	61.290	0.38	2.632	3KHz
Bluetooth LE 2Mbps	30.645	0.19	5.263	10KHZ

Bluetooth LE 1Mbps



Date: 29.MAR.2024 13:13:06

Bluetooth LE 2Mbps



Date: 29.MAR.2024 13:18:15

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: R9C-OP23302 : D2 of D2