## **FCC RF Test Report**

APPLICANT : Motorola Mobility LLC EQUIPMENT : Mobile Cellular Phone

BRAND NAME : Motorola

MODEL NAME : XT2423-6, XT2423-1

FCC ID : IHDT56AP1

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : Oct. 25, 2023 ~ Nov. 03, 2023

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.: FR3O1717B

## 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)

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## **REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3O1717B	Rev. 01	Initial issue of report	Nov. 13, 2023

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#### SUMMARY OF TEST RESULT

Report Section	FCC Rule Description		Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report only	-
3.2	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.86 dB at 41.64 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.34 dB at 14.29 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.
- The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

#### Disclaimer:

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

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## 1 General Description

## 1.1 Applicant

#### **Motorola Mobility LLC**

222 W. Merchandise Mart Plaza, Chicago IL 60654, USA

#### 1.2 Manufacturer

#### **Motorola Mobility LLC**

222 W. Merchandise Mart Plaza, Chicago IL 60654, USA

### 1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	Mobile Cellular Phone			
Brand Name	Motorola			
Model Name	XT2423-6, XT2423-1			
FCC ID	IHDT56AP1			
IMEI Code	Conducted: 357674240009184/357674240013756 Conduction: 357674240008665/357674240013236 Radiation: 357674240008525/357674240013095 for Sample 1 359598830011649/359598830013363 for Sample 2			
HW Version	DVT2			
SW Version	UTA34.66			
EUT Stage	Identical Prototype			

#### Remark:

- 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- 2. The two model names are only for market segment purpose, there is no other difference.
- 3. There are two samples under test, sample 1 is 1<sup>st</sup> source, sample 2 is 2<sup>nd</sup> source, the main difference are shown as below table and the detailed differences could be referred to the XT2423-6, XT2423-1\_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we choose sample 1 to perform full test and the sample 2 verify the RSE worst case.

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## 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 Bower to Antonna	BLE 1Mbps: 3.04 dBm (0.0020 W)		
Carrier Frequency of Each Channel  Maximum Output Power to Antenna	BLE 2Mbps: 3.03 dBm (0.0020 W)		
99% Occupied Bandwidth	BLE 1Mbps: 1.025 MHz		
99 % Occupied Bandwidth	BLE 2Mbps: 2.054 MHz		
Antenna Type / Gain	PIFA Antenna type with gain -4.5 dBi		
Type of Modulation	Bluetooth LE : GFSK		

### 1.5 Modification of EUT

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

## 1.6 Specification of Accessory

	Accessories Information					
AC Adapter 1(US)	Brand Name	Motorola(Salcomp)	Model Name	MC-201L		
AC Adapter 1(EU)	Brand Name	Motorola(Salcomp)	Model Name	MC-202L		
AC Adapter 1(UK)	Brand Name	Motorola(Salcomp)	Model Name	MC-203L		
AC Adapter 1(AR)	Brand Name	Motorola(Salcomp)	Model Name	MC-206L		
AC Adapter 1(AU)	Brand Name	Motorola(Salcomp)	Model Name	MC-205L		
AC Adapter 2(US)	Brand Name	Motorola(Chenyang)	Model Name	MC-201L		
AC Adapter 2(EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-202L		
AC Adapter 2(AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-206L		
AC Adapter 3(US)	Brand Name	Motorola(AOHAI)	Model Name	MC-201L		
AC Adapter 3(EU)	Brand Name	Motorola(AOHAI)	Model Name	MC-202L		
AC Adapter 3(UK)	Brand Name	Motorola(AOHAI)	Model Name	MC-203L		
AC Adapter 3(AR)	Brand Name	Motorola(AOHAI)	Model Name	MC-206L		
AC Adapter 3(AU)	Brand Name	Motorola(AOHAI)	Model Name	MC-205L		
Battery 1	Brand Name	Motorola(ATL)	Model Name	QF50		
Battery 2	Brand Name	Motorola(sunwoda)	Model Name	QF50		
USB Cable 1	Brand Name	Motorola(Juwei)	Model Name	JWUB1614-T03H		
USB Cable 2	Brand Name	Motorola(saibao)	Model Name	STN-A128A		

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## 1.7 Testing Location

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

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Test Firm	Sporton International Inc. (ShenZhen)					
Test Site Location	Shenzhen, 518055 Peop	le's Republic of China	vei Village, Xili, Nanshan,			
	Sporton Site No.	FCC Designation No.	FCC Test Firm			
Test Site No.	Sporton Site No.	rec besignation No.	Registration No.			
	CO01-SZ TH01-SZ	CN1256	421272			

Test Firm	Sporton International Inc. (ShenZhen)			
Test Site Location		uilding 1, No. 2, Tengfeng of et, Baoan District, Shenzhe s Republic of China	• •	
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.	
	03CH01-SZ	CN1256	421272	

## 1.8 Test Software

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

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## 1.9 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			
Toot 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 CH00_2402 MHz_BLE 2Mbps			
	Mode 5: Bluetooth Tx CH19_2440 MHz_BLE 2Mbps			
	Mode 6: Bluetooth Tx CH39_2480 MHz_BLE 2Mbps			
	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps			
	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps			
Radiated	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps			
TCs	Mode 4: Bluetooth Tx CH00_2402 MHz_BLE 2Mbps			
	Mode 5: Bluetooth Tx CH19_2440 MHz_BLE 2Mbps			
	Mode 6: Bluetooth Tx CH39_2480 MHz_BLE 2Mbps			
AC				
Conducted	Mode 1: GSM 850 Idle + Bluetooth Link + Adapter 2 + USB Cable 1 + Battery 1 + Earpho			
Emission				
Remark: For R	Remark: For Radiated Test Cases, The tests were performance with Adapter 1, Earphone 1,and USB Cable1			

RSE Co-location	
BLE CH39 1Mbps TX + LTE Band13 Link	

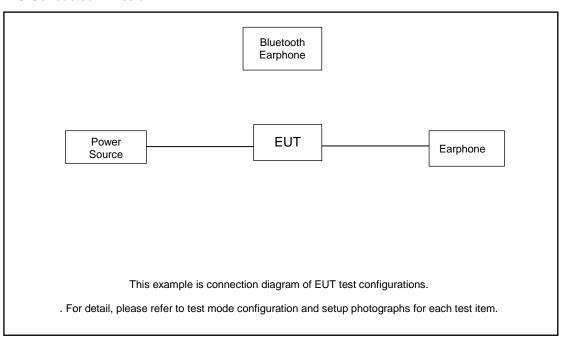
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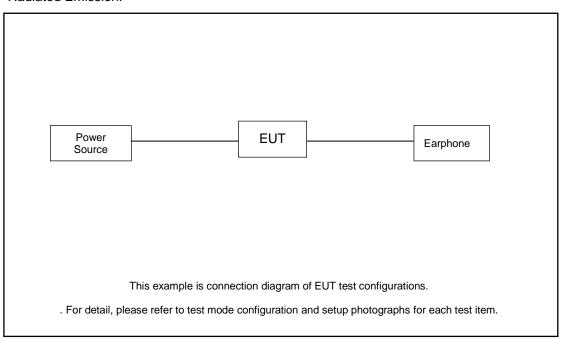
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## 2.3 Connection Diagram of Test System

#### 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(LTE)	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Base Station	Anritsu	MT8821C	N/A	N/A	N/A
3.	Earphone	apple	DCAY1V-A900FZJW3-000	N/A	N/A	N/A
4.	Earphone	sony	MT755	N/A	Fcc DoC	N/A
5.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
6.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m

## 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 13.60 dB and 10dB attenuator.

 $Offset(dB) = RF \ cable \ loss(dB) + attenuator \ factor(dB).$ = 13.60 + 10 = 23.60 (dB)

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### 3 Test Result

#### 3.1 6dB and 99% Bandwidth Measurement

#### 3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

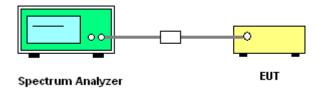
#### 3.1.2 Measuring Instruments

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

#### 3.1.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 11.8
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
- 5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
- 6. Measure and record the results in the test report.

#### 3.1.4 Test Setup



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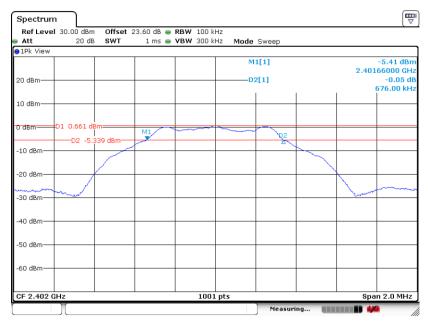
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#### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

#### **BLE 1Mbps:**

#### 6 dB Bandwidth Plot on Channel 00



Date: 26.0CT.2023 16:25:08

#### 6 dB Bandwidth Plot on Channel 19



Date: 26.0CT.2023 16:26:55

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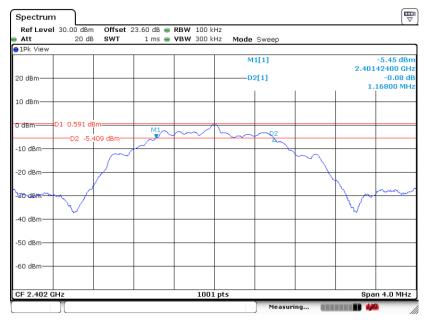
#### 6 dB Bandwidth Plot on Channel 39



Date: 26.0CT.2023 16:28:27

#### **BLE 2Mbps:**

#### 6 dB Bandwidth Plot on Channel 00



Date: 26.0CT.2023 16:09:16

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#### 6 dB Bandwidth Plot on Channel 19



Date: 26.0CT.2023 16:11:57

#### 6 dB Bandwidth Plot on Channel 39



Date: 26.0CT.2023 16:14:28

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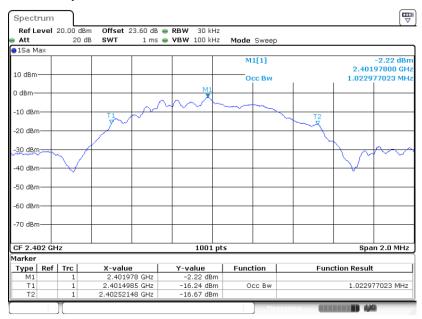
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#### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

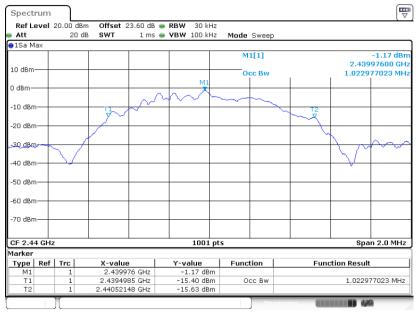
#### **BLE 1Mbps:**

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



Date: 26.0CT.2023 16:24:57

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



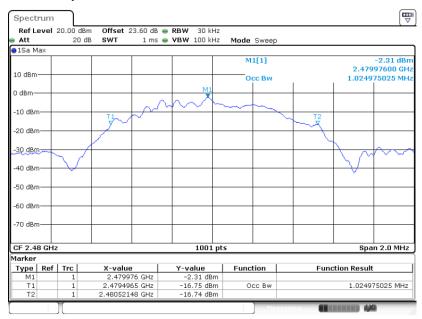
Date: 26.0CT.2023 16:26:45

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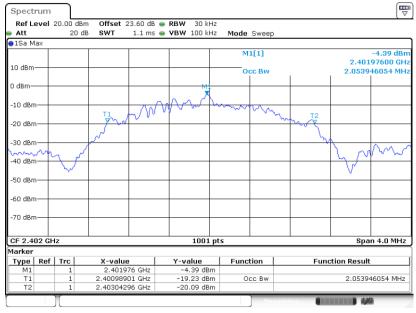
#### 99% Occupied Bandwidth Plot on Channel 39



Date: 26.0CT.2023 16:28:16

#### **BLE 2Mbps:**

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



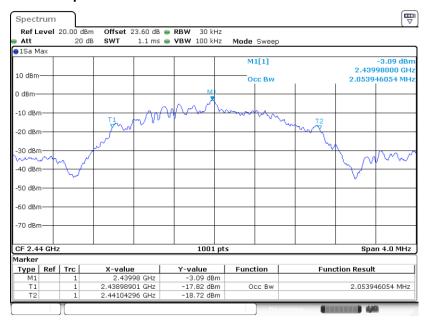
Date: 26.0CT.2023 16:11:16

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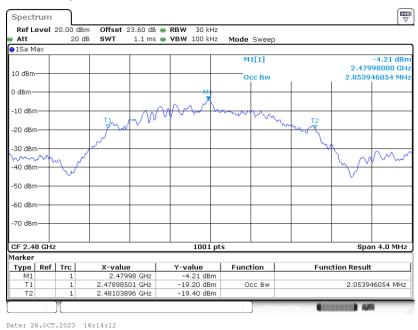
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#### 99% Occupied Bandwidth Plot on Channel 19



Date: 26.0CT.2023 16:11:36

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



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

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### 3.2 Output Power Measurement

#### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

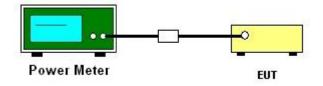
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

- The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1
   Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Measure the conducted output power and record the results in the test report.

#### 3.2.4 Test Setup



#### 3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

#### 3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

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### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

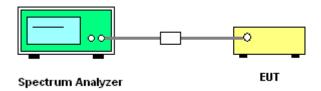
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

- The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
- 5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
- 6. Measure and record the results in the test report.
- 7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Sporton International Inc. (ShenZhen)

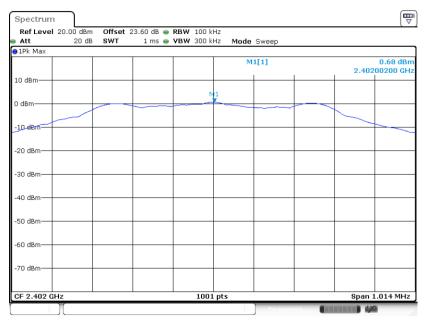
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 21 of 45
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### 3.3.6 Test Result of Power Spectral Density Plots (100kHz)

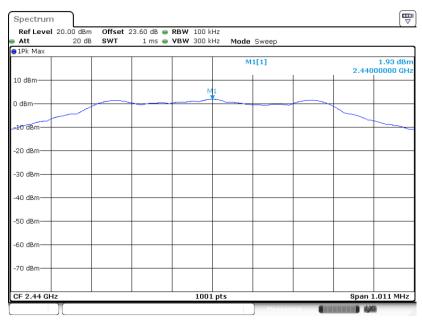
### BLE 1Mbps:

#### PSD 100kHz Plot on Channel 00



Date: 26.0CT.2023 16:25:34

#### PSD 100kHz Plot on Channel 19

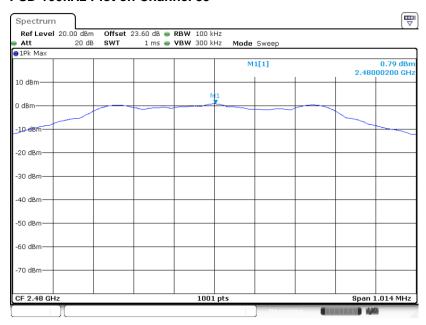


Date: 26.0CT.2023 16:27:23

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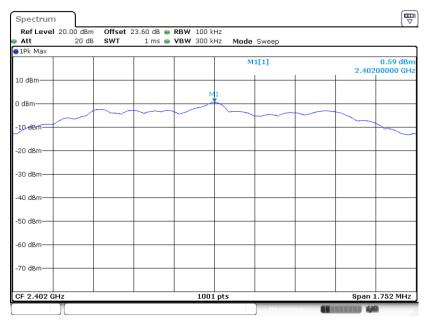
#### PSD 100kHz Plot on Channel 39



Date: 26.0CT.2023 16:28:58

#### **BLE 2Mbps:**

#### PSD 100kHz Plot on Channel 00



Date: 26.0CT.2023 16:09:45

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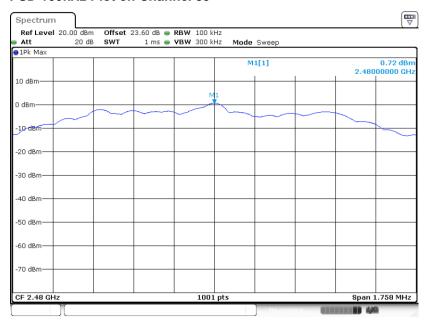
Report No.: FR3O1717B

#### **PSD 100kHz Plot on Channel 19**



Date: 26.0CT.2023 16:12:28

#### PSD 100kHz Plot on Channel 39



Date: 26.0CT.2023 16:14:55

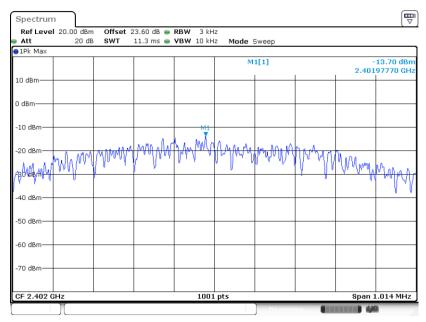
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 24 of 45
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#### 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

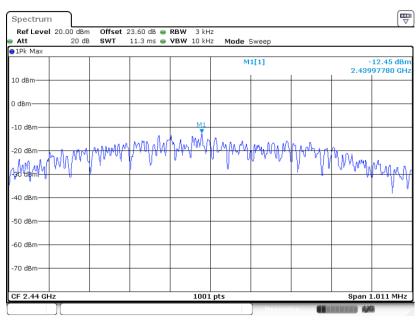
#### **BLE 1Mbps:**

#### PSD 3kHz Plot on Channel 00



#### Date: 26.0CT.2023 16:25:18

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

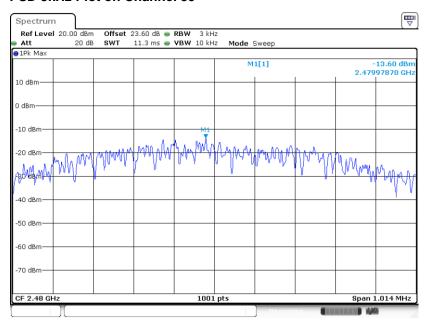


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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 25 of 45
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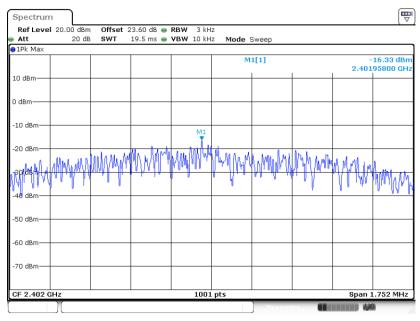
#### PSD 3kHz Plot on Channel 39



Date: 26.0CT.2023 16:28:42

#### **BLE 2Mbps:**

#### PSD 3kHz Plot on Channel 00

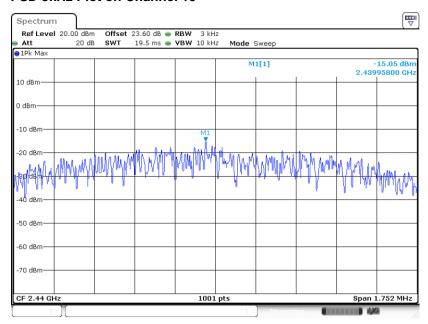


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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 26 of 45
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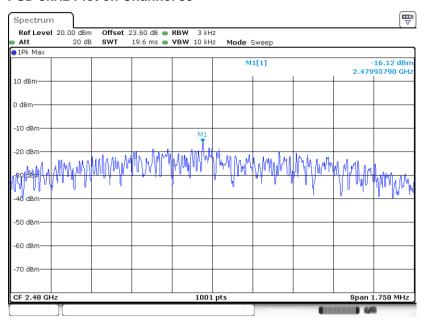
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:12:12

#### PSD 3kHz Plot on Channel 39



Date: 26.0CT.2023 16:14:38

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### 3.4 Conducted Band Edges and Spurious Emission Measurement

#### 3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

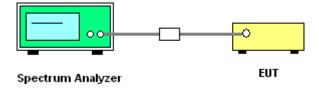
#### 3.4.2 Measuring Instruments

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

#### 3.4.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 11.13
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

#### 3.4.4 Test Setup



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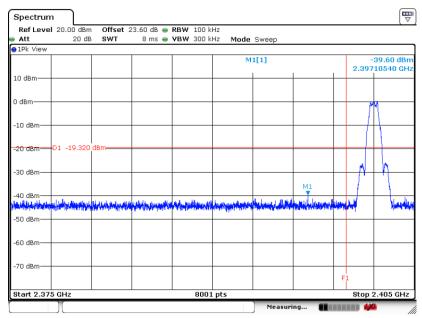
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 28 of 45
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### 3.4.5 Test Result of Conducted Band Edges Plots

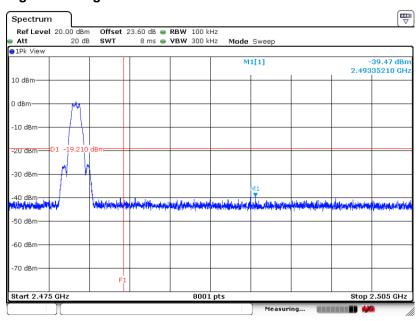
#### **BLE 1Mbps:**

#### Low Band Edge Plot on Channel 00



#### Date: 26.0CT.2023 16:26:19

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



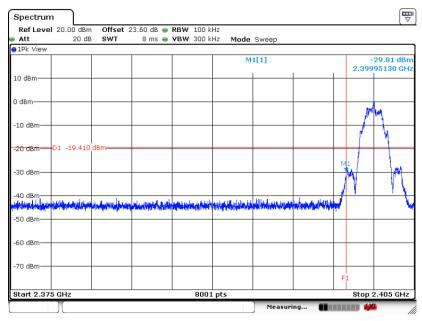
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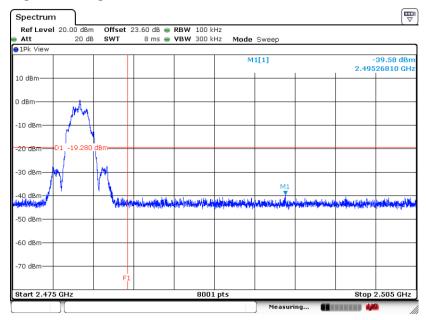
#### **BLE 2Mbps:**

#### Low Band Edge Plot on Channel 00



Date: 26.0CT.2023 16:10:44

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



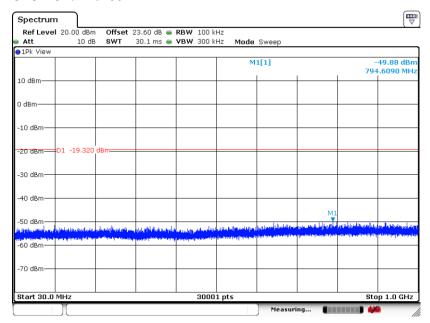
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TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1 Page Number : 30 of 45
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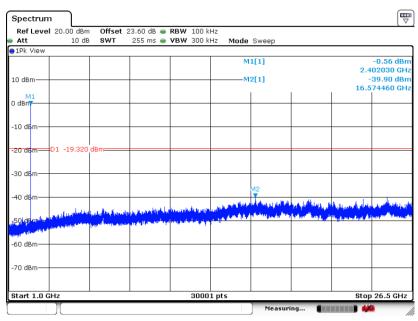
#### 3.4.6 Test Result of Conducted Spurious Emission Plots

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



Date: 26.0CT.2023 16:25:51

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



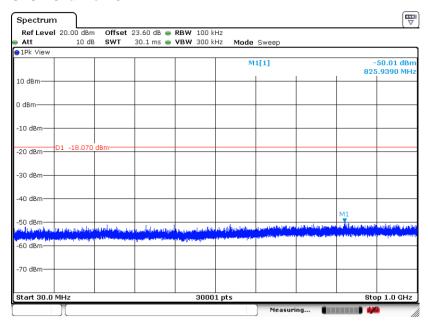
Date: 26.0CT.2023 16:26:06

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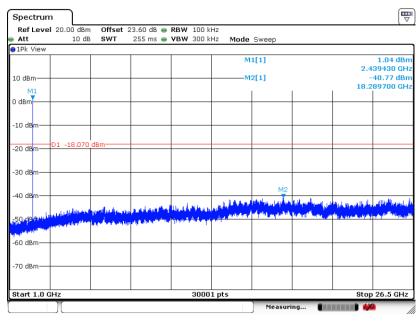
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:27:38

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



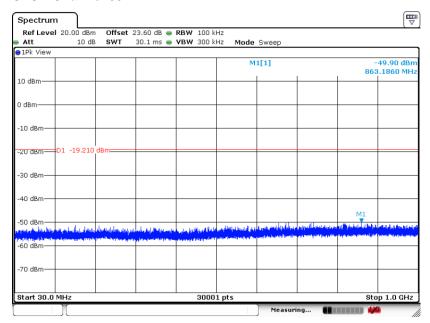
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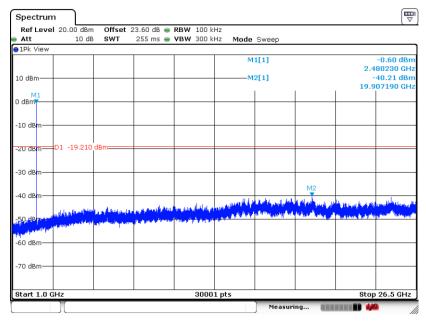
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:29:15

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



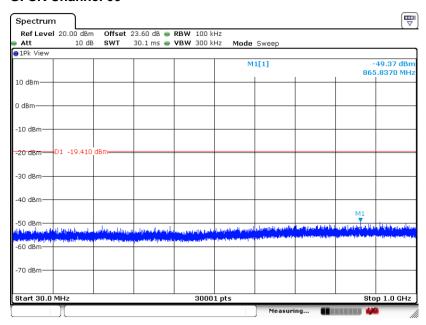
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Sporton International Inc. (ShenZhen)

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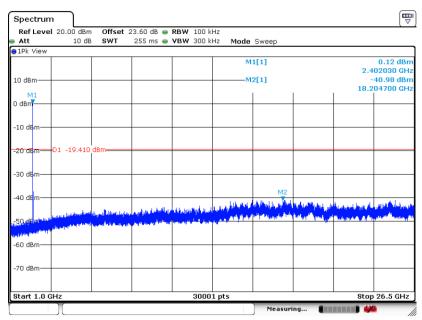
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:10:03

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



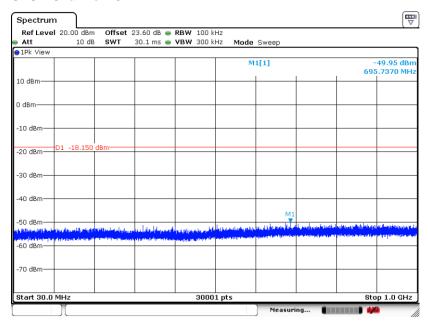
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Sporton International Inc. (ShenZhen)

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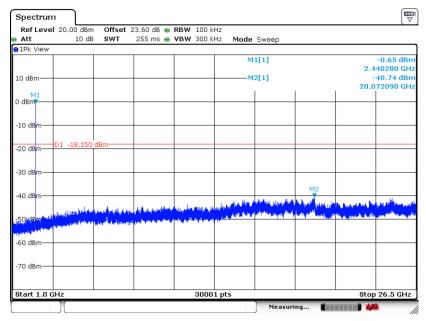
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:20:21

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



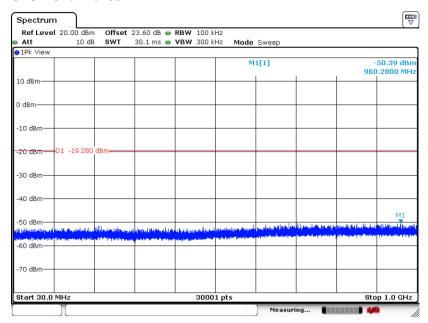
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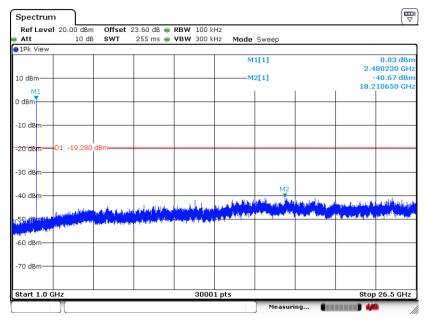
Report No.: FR3O1717B

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



Date: 26.0CT.2023 16:19:24

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



Date: 26.0CT.2023 16:19:40

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## 3.5 Radiated Band Edges and Spurious Emission Measurement

#### 3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance		
(MHz)	(microvolts/meter)	(meters)		
0.009 - 0.490	2400/F(kHz)	300		
0.490 – 1.705	24000/F(kHz)	30		
1.705 – 30.0	30	30		
30 – 88	100	3		
88 – 216	150	3		
216 - 960	200	3		
Above 960	500	3		

#### 3.5.2 Measuring Instruments

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

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#### 3.5.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
- 3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 5. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
- 7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \ge 1$  GHz for peak measurement. For average measurement:
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

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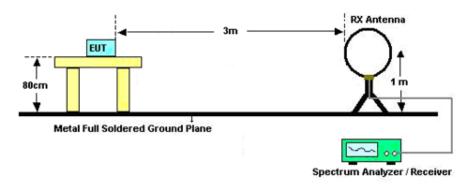
Page Number

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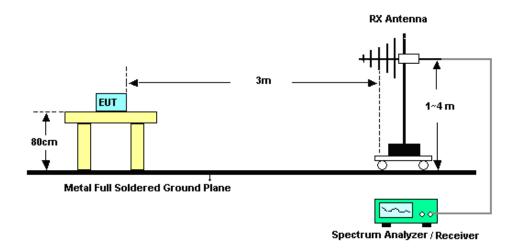
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### 3.5.4 Test Setup

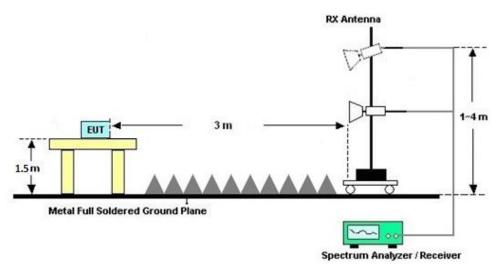
#### For radiated emissions below 30MHz



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



#### For radiated emissions above 1GHz



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#### 3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

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

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

Please refer to Appendix 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			

<sup>\*</sup>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.

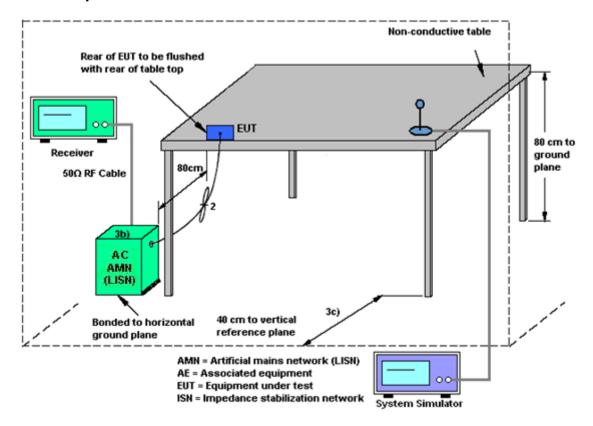
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#### 3.6.4 Test Setup



#### 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. 26, 2022	Oct. 25, 2023~ Nov. 03, 2023	Dec. 25, 2023	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY551502 13	10Hz~44GHz	Jul. 07, 2023	Oct. 25, 2023~ Nov. 03, 2023	Jul. 06, 2024	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Oct. 25, 2023~ Nov. 03, 2023	Jul. 27, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Oct. 24, 2023	Oct. 25, 2023~ Nov. 03, 2023	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 08, 2023	Oct. 25, 2023~ Nov. 03, 2023	Jul. 07, 2024	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08,2023	Oct. 25, 2023~ Nov. 03, 2023	Apr. 07,2024	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 04, 2023	Oct. 25, 2023~ Nov. 03, 2023	Apr. 03,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1943528	1GHz~18GHz	Oct. 18,2023	Oct. 25, 2023~ Nov. 03, 2023	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 05	0.5GHz~26.5Ghz	Oct. 18,2023	Oct. 25, 2023~ Nov. 03, 2023	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 07, 2023	Oct. 25, 2023~ Nov. 03, 2023	Jul. 06, 2024	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	Oct. 18,2023	Oct. 25, 2023~ Nov. 03, 2023	Oct. 17,2024	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Oct. 25, 2023~ Nov. 03, 2023	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Oct. 25, 2023~ Nov. 03, 2023	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 06, 2023	Oct. 30, 2023	Jul. 05, 2024	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Oct. 30, 2023	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Oct. 30, 2023	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000 891	100Vac~250Vac	Jul. 07, 2023	Oct. 30, 2023	Jul. 06, 2024	Conduction (CO01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Oct. 26, 2023	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	Oct. 26, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	Oct. 26, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Thermo meter	Anymetre	JR593	#7	- 10℃ ~ 50℃ 10%RH~99%RH	Apr. 08, 2023	Oct. 26, 2023	Apr. 07, 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 Conducted Emission Measurement (150 kHz ~ 30 MHz)</u>

Measuring Uncertainty for a Level of Confidence	2.7 dB
of 95% (U = 2Uc(y))	2.7 dB

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence	4.3 dB
of 95% (U = 2Uc(y))	-110 dB

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

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# **Appendix A. Conducted Test Results**

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### Appendix A. Test Result of Conducted Test Items

Report Number : FR3O1717B

Test Engineer:	Zhang Jiang	Temperature:	21~25	ç
Test Date:	2023/10/26	Relative Humidity:	51~54	%

#### TEST RESULTS DATA 6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	СН.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.023	0.676	0.50	Pass
BLE	1Mbps	1	19	2440	1.023	0.674	0.50	Pass
BLE	1Mbps	1	39	2480	1.025	0.676	0.50	Pass

# TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	<b>N</b> TX	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	1.83	30.00	-4.50	-2.67	36.00	Pass
BLE	1Mbps	1	19	2440	3.04	30.00	-4.50	-1.46	36.00	Pass
BLE	1Mbps	1	39	2480	1.95	30.00	-4.50	-2.55	36.00	Pass

# TEST RESULTS DATA Average Power Table (Report only)

Mod.	Data Rate	<b>N</b> TX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	2.15	1.60	30.00	-4.50	-2.90	36.00	Pass
BLE	1Mbps	1	19	2440	2.15	2.80	30.00	-4.50	-1.70	36.00	Pass
BLE	1Mbps	1	39	2480	2.15	1.60	30.00	-4.50	-2.90	36.00	Pass

# TEST RESULTS DATA Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	0.68	-13.70	-4.50	8.00	Pass
BLE	1Mbps	1	19	2440	1.93	-12.45	-4.50	8.00	Pass
BLE	1Mbps	1	39	2480	0.79	-13.60	-4.50	8.00	Pass

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

Report Number : FR3O1717B

#### TEST RESULTS DATA 6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.054	1.168	0.50	Pass
BLE	2Mbps	1	19	2440	2.054	1.168	0.50	Pass
BLE	2Mbps	1	39	2480	2.054	1.172	0.50	Pass

# TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	1.65	30.00	-4.50	-2.85	36.00	Pass
BLE	2Mbps	1	19	2440	3.03	30.00	-4.50	-1.47	36.00	Pass
BLE	2Mbps	1	39	2480	1.82	30.00	-4.50	-2.68	36.00	Pass

# TEST RESULTS DATA Average Power Table (Report only)

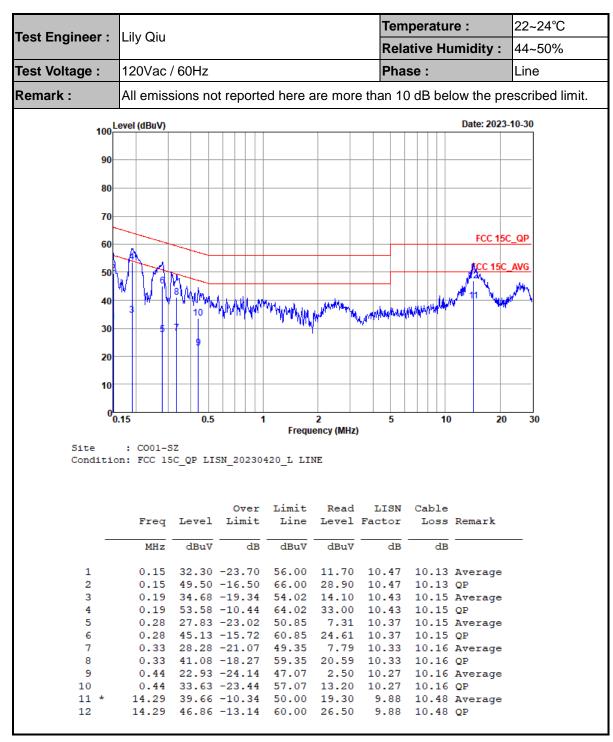
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	5.00	1.50	30.00	-4.50	-3.00	36.00	Pass
BLE	2Mbps	1	19	2440	5.00	2.70	30.00	-4.50	-1.80	36.00	Pass
BLE	2Mbps	1	39	2480	5.00	1.50	30.00	-4.50	-3.00	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	2Mbps	1	0	2402	0.59	-16.33	-4.50	8.00	Pass
BLE	2Mbps	1	19	2440	1.85	-15.05	-4.50	8.00	Pass
BLE	2Mbps	1	39	2480	0.72	-16.12	-4.50	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**



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Toot Engineer	Lily Oir				Tem	peratui	re:	22~24°C
Test Engineer :	Lily Wiu				Rela	ative Hu	ımidity :	44~50%
Test Voltage :	120Vac / 60H	Ηz			Pha	se:		Neutral
Remark :	All emissions	not reporte	ed here a	are more	e than 10	dB bel	ow the pre	escribed limit.
400	evel (dBuV)						Date: 2023-	10-30
100								
90								
80								
70								
	$\downarrow$							
60							FCC 15C	_QP
_							FCC 15C	ΔVG
50	24	_				البروريا ير	MAN TO THE TANK	.46
40	v 1 1 4 1 6 mm	JANA MARANAMA	Margh Made	MAKAPUL.	J. L. J. Address of World	Company .	11 14	
40)	17   Y   14 17	1, 3, 10, 14		, it	# "   "			<b>"</b>
30								
		7						
20								
10								
10								
00.	15	0.5 1		2	5	10	20	30
0.	.13	0.5		ency (MHz)	_	10	20	30
Site Conditio	: CO01-SZ n: FCC 15C_QP	LISN 20230	420 N NE	UTRAL				
	_	-	_					
		Over	Limit	Read	LISN	Cable		
	Freq Lev	rel Limit			Factor		Remark	
_	MHz di	BuV dB	dBuV	dBuV	dB	dB		
1	0.19 27	21 -26.72	53 93	6 69	10 37	10 15	Average	
2		71 -18.22						
3		27 -24.33		6.80			Average	
4	0.25 39.	77 -21.83	61.60	19.30	10.32	10.15	QP	
5		54 -24.26		5.09			Average	
6		94 -21.86			10.29			
7		.07 -22.94					Average	
8		.17 -18.84		16.80		10.16		
9		41 -18.59					Average	
10 11		.71 -18.29 .67 -12.33				10.16		
12 *		.07 -12.33				10.47		
				,				

#### Note:

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

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## **Appendix C. Radiated Spurious Emission Test Data**

Toot Engineer	Hua Cong Liona	Relative Humidity :	48~49%
Test Engineer :	Hua Cong Liang	Temperature :	24-25℃

## **Radiated Spurious Emission Test Modes**

Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	5	Bluetooth-LE_GSFK	00	2402	1Mbps		-
Mode 2	2400-2483.5	5	Bluetooth-LE_GSFK	19	2440	1Mbps	-	-
Mode 3	2400-2483.5	5	Bluetooth-LE_GSFK	39	2480	1Mbps	-	-
Mode 4	2400-2483.5	5	Bluetooth-LE_GSFK	00	2402	2Mbps	-	-
Mode 5	2400-2483.5	5	Bluetooth-LE_GSFK	39	2480	2Mbps	-	-
Mode 6	2400-2483.5	5	Bluetooth-LE_GSFK	39	2480	1Mbps	-	LF
Mode 7	Co-location	5	Bluetooth-LE_GSFK + Band 13	39	2480	1Mbps	-	-
Mode 8	2400-2483.5	5	Bluetooth-LE_GSFK	39	2480	1Mbps	-	Sample2

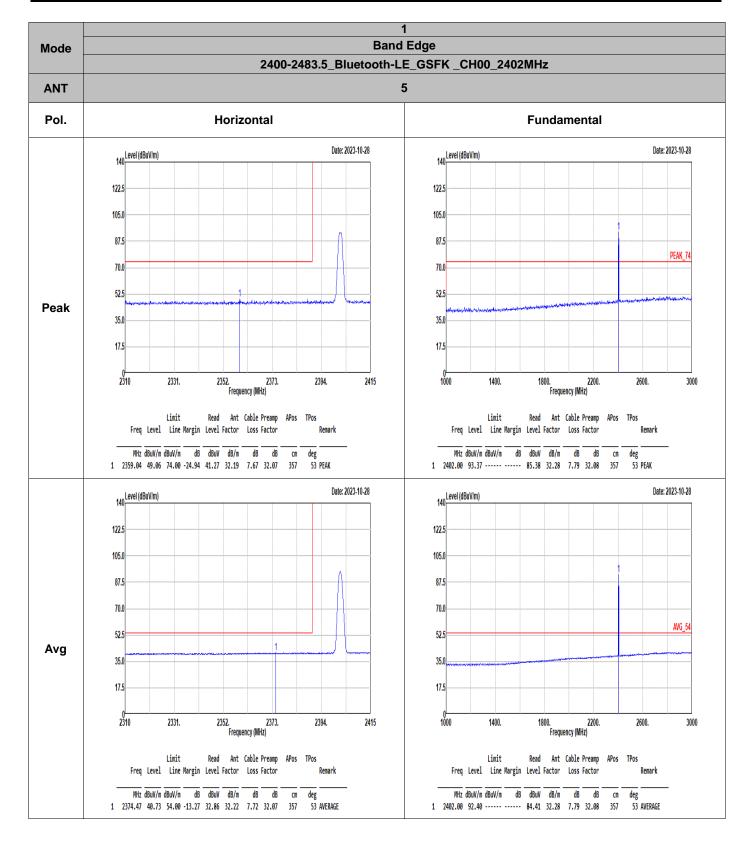
## Summary of each worse mode

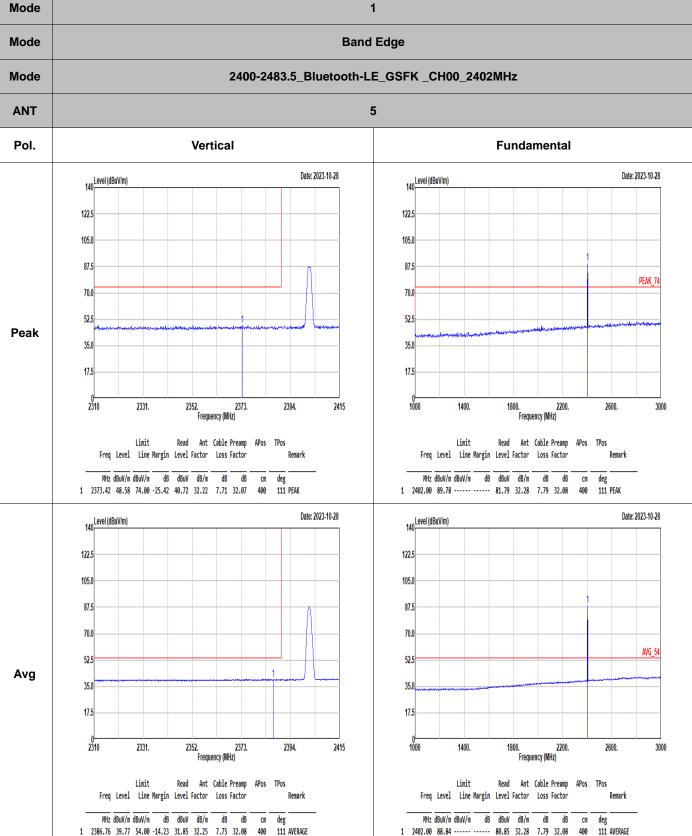
Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE_GSFK	00	2374.47	40.73	54.00	-13.27	Н	AVERAGE	Pass	Band Edge
1	Bluetooth-LE_GSFK	00	4804.00	45.20	74.00	-28.80	Н	Peak	Pass	Harmonic
2	Bluetooth-LE_GSFK	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE_GSFK	19	7320.00	47.70	74.00	-26.30	V	Peak	Pass	Harmonic
3	Bluetooth-LE_GSFK	39	2484.18	42.13	54.00	-11.87	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE_GSFK	39	7440.00	46.93	74.00	-27.07	Н	Peak	Pass	Harmonic
4	Bluetooth-LE_GSFK	00	2373.42	40.99	54.00	-13.01	Н	AVERAGE	Pass	Band Edge
4	Bluetooth-LE_GSFK	00	-	-	-	-	-	-	-	Harmonic
5	Bluetooth-LE_GSFK	39	2484.06	42.09	54.00	-11.91	Н	AVERAGE	Pass	Band Edge
5	Bluetooth-LE_GSFK	39	-	-	-	-	-	-	-	Harmonic
6	Bluetooth-LE_GSFK	39	41.64	32.14	40	-7.86	V	Peak	Pass	LF
7	Bluetooth-LE_GSFK	39	2483.96	41.07	54.00	-12.93	Н	AVERAGE	Pass	Band Edge
7	Bluetooth-LE_GSFK	39	7440.00	46.76	74.00	-27.24	V	Peak	Pass	Harmonic
8	Bluetooth-LE_GSFK	39	2484.12	40.33	54.00	-13.67	Н	AVERAGE	Pass	Band Edge
8	Bluetooth-LE_GSFK	39	7440.00	46.87	74.00	-27.13	V	Peak	Pass	Harmonic

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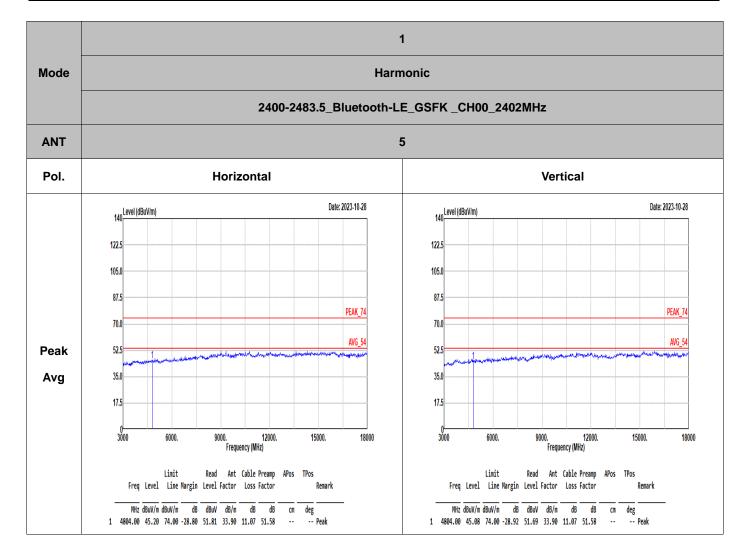
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: IHDT56AP1

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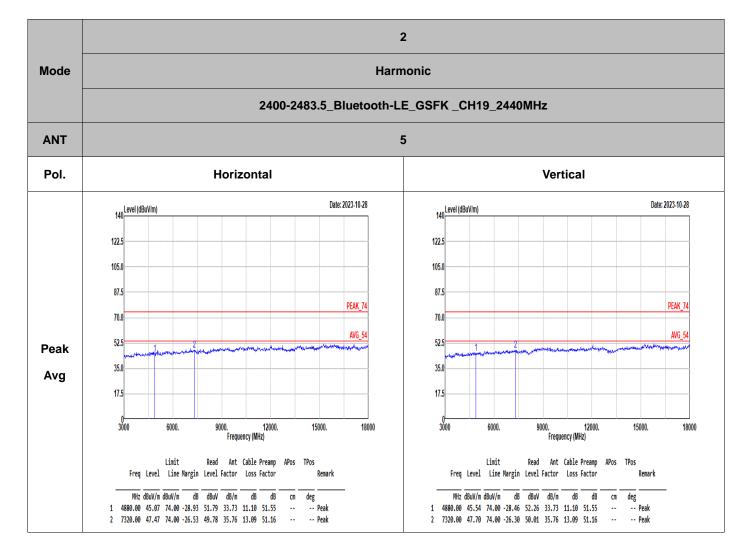




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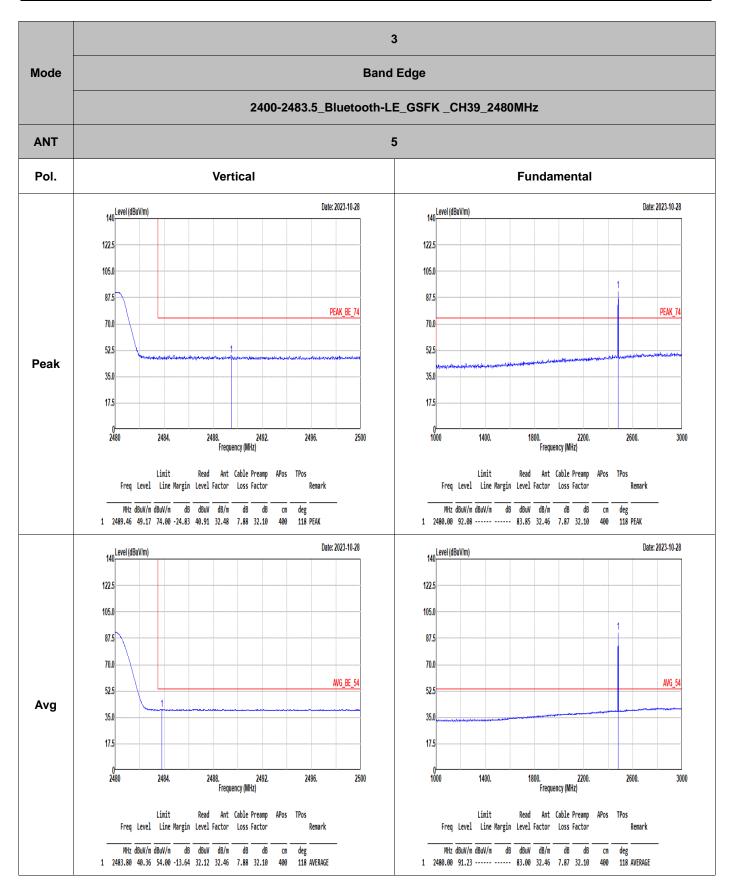


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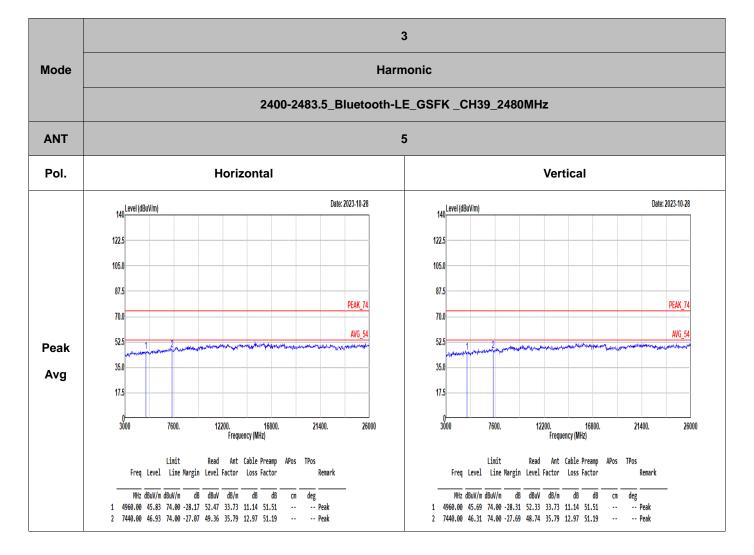


3 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE\_GSFK \_CH39\_2480MHz **ANT** 5 Pol. Horizontal **Fundamental** Date: 2023-10-28 Date: 2023-10-28 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_74 PEAK BE 74 70.0 70.0 52.5 52.5 **Peak** 35.0 35.0 17.5 17.5 0 2480 1000 2484. 2496. 2500 1400. 2600. 3000 Frequency (MHz) Frequency (MHz) Read Ant Cable Preamp APos TPos Read Ant Cable Preamp APos TPos Limit 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 MHz dBuV/m dBuV/m dB dBuV dB/m dB dB 1 2485.76 50.45 74.00 -23.55 42.20 32.47 7.88 32.10 377 145 PEAK 1 2480.00 95.16 ----- 86.93 32.46 7.87 32.10 377 Date: 2023-10-28 140 Level (dBuV/m) Date: 2023-10-28 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 52.5 52.5 Avg 35.0 35.0 17.5 17.5 1000 B. 2492. Frequency (MHz) 2484. 2496. 2500 1400. 2600. 3000 Frequency (MHz) 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 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 2484.18 42.13 54.00 -11.87 33.88 32.47 7.88 32.10 377 145 AVERAGE 1 2480.00 94.15 ----- 85.92 32.46 7.87 32.10 377 145 AVERAGE

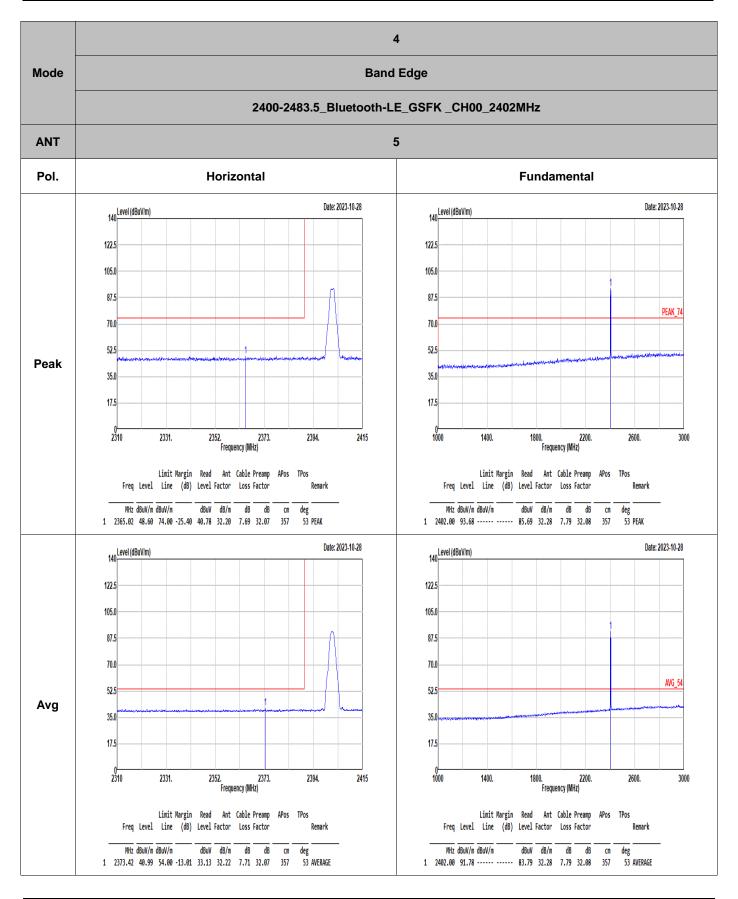
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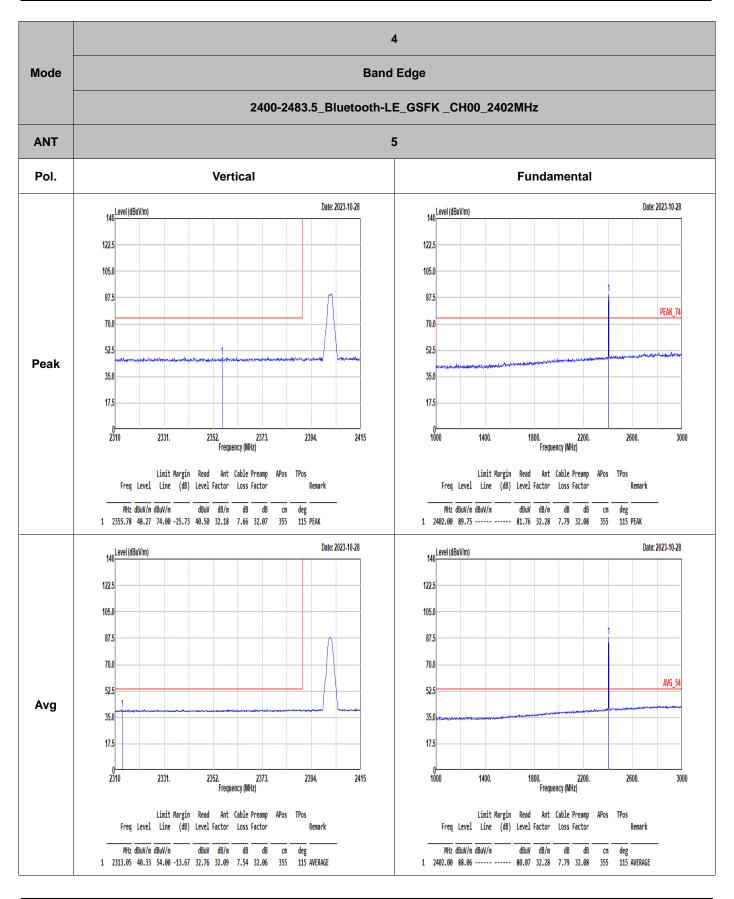
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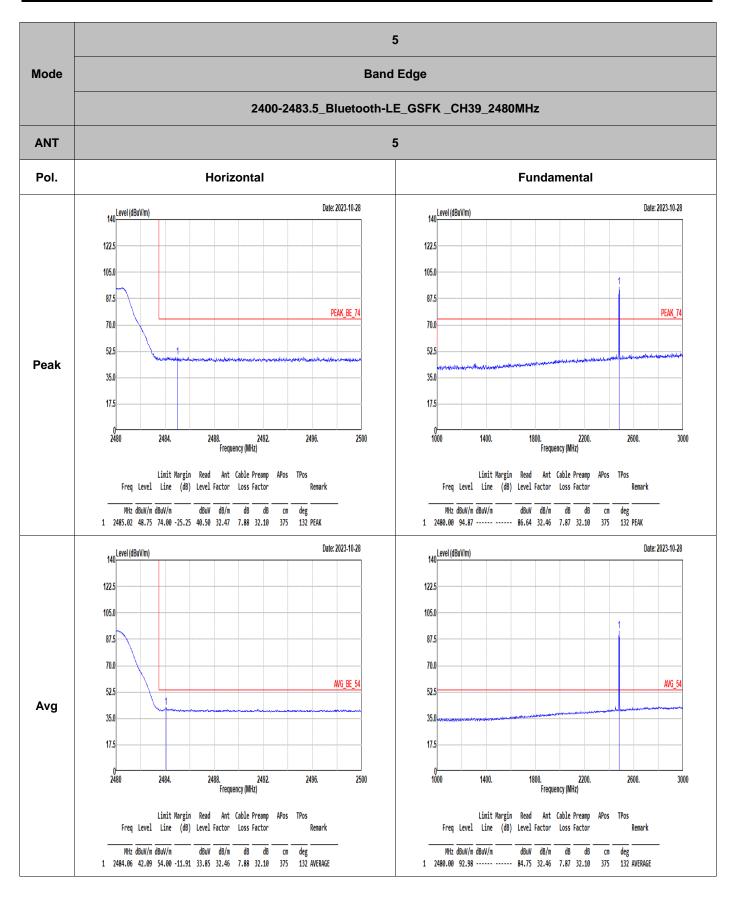
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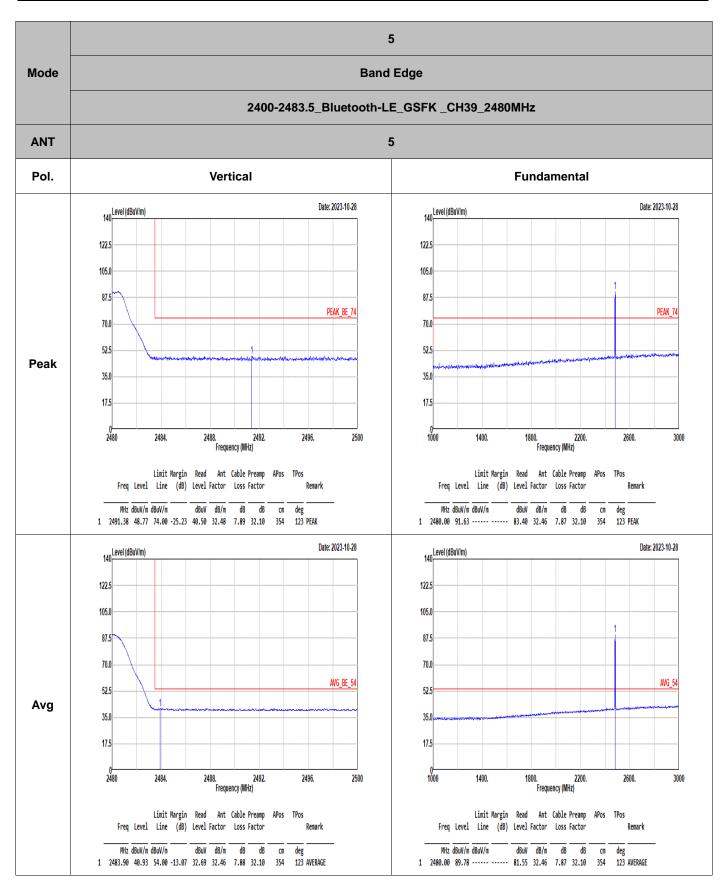
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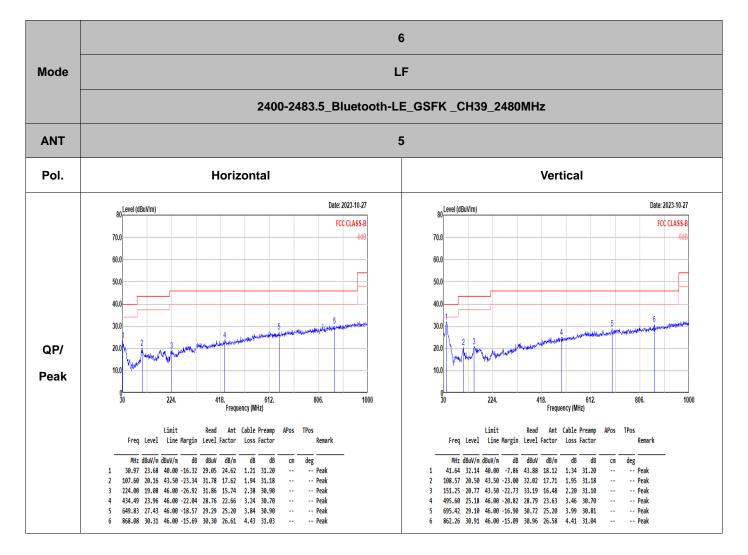
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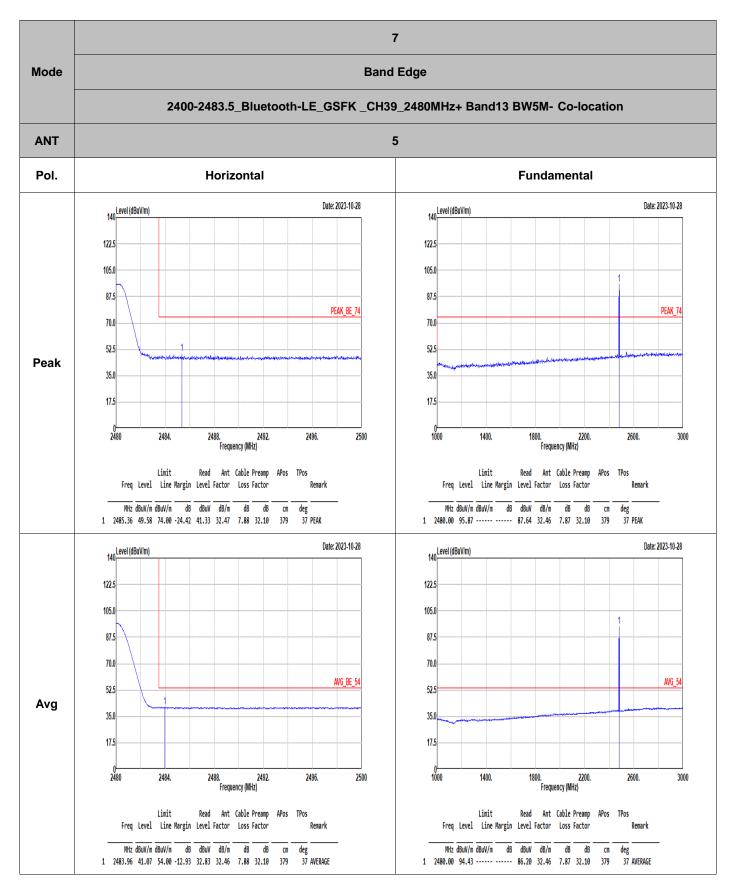
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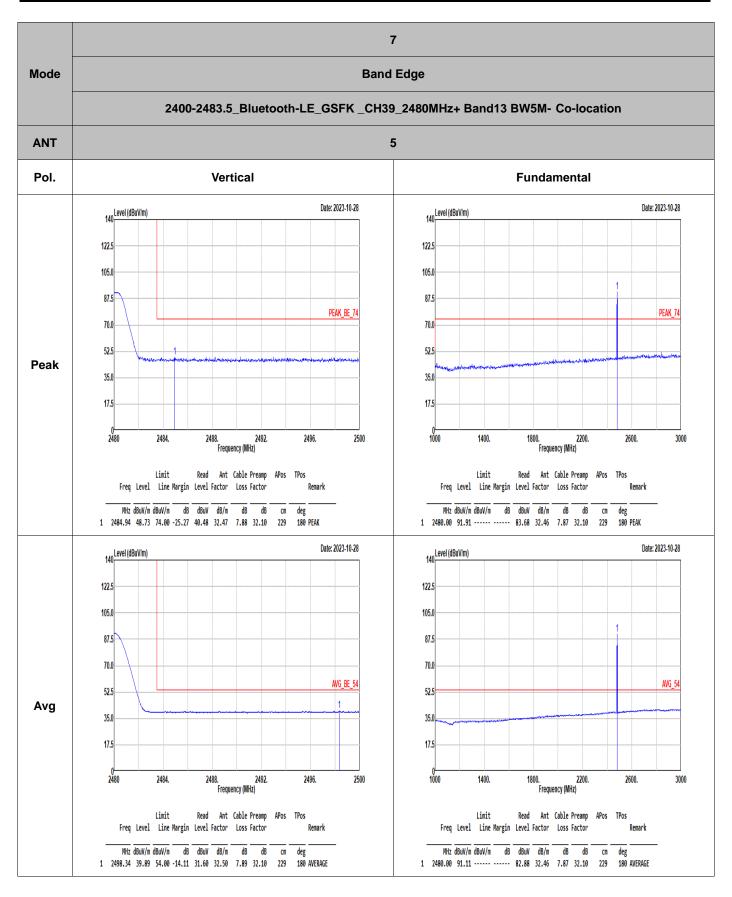


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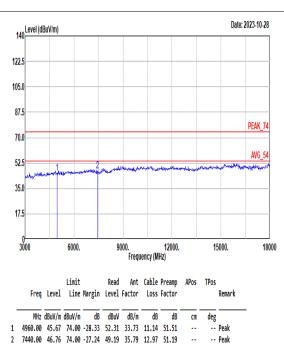
Mode Harmonic

2400-2483.5\_Bluetooth-LE\_GSFK\_CH39\_2480MHz+ Band13 BW5M- Co-location

ANT 5

Pol. Horizontal Vertical

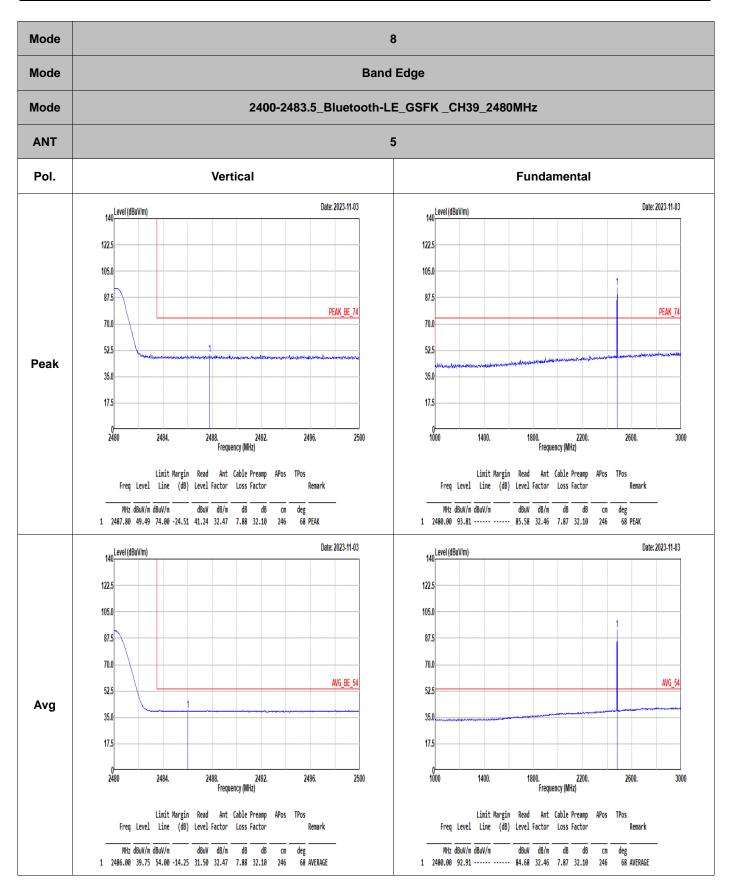
#### 140 Level (dBuV/m) Date: 2023-10-28 105.0 87.5 PEAK\_74 70.0 52.5 Peak 35.0 Avg 17.5 3000 6000. 9000. 12000. Frequency (MHz) 15000. 18000 Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB dB deg 1 4960.00 45.46 74.00 -28.54 52.10 33.73 11.14 51.51 -- Peak 2 7440.00 46.32 74.00 -27.68 48.75 35.79 12.97 51.19



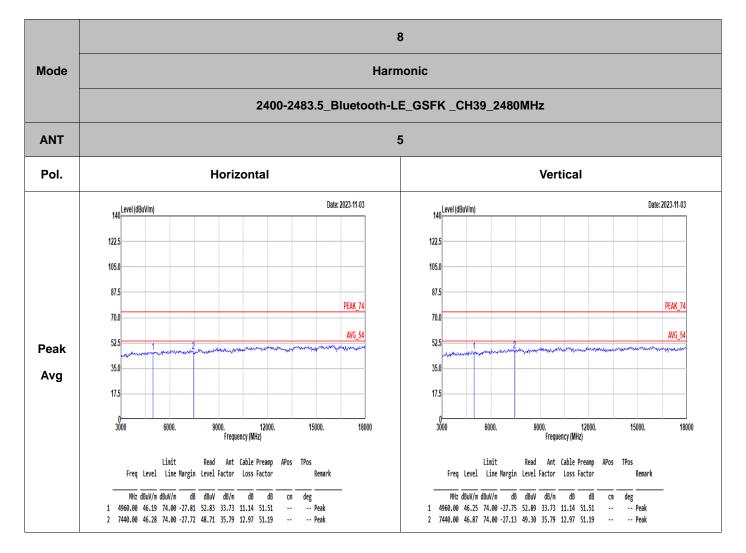
Mode **Band Edge** 2400-2483.5\_Bluetooth-LE\_GSFK \_CH39\_2480MHz ANT Pol. Horizontal **Fundamental** Date: 2023-11-03 140 Level (dBuV/m) Date: 2023-11-03 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 PEAK\_BE\_74 PEAK\_74 70.0 52.5 52.5 Peak 35.0 35.0 17.5 17.5 0 2480 1000 2484. 2496 1400. 1800. 2600. 3000 2488. 2492. 2500 2200 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 Remark Freq Level Line (dB) Level Factor Loss Factor Remark MHz dBuV/m dBuV/m dBuV dB/m dB dB dBuV dB/m dB dB deg MHz dBuV/m dBuV/m cm deg 1 2483.96 50.25 74.00 -23.75 42.01 32.46 7.88 32.10 372 46 PEAK 1 2480.00 96.56 ----- 88.33 32.46 7.87 32.10 372 46 PEAK Date: 2023-11-03 Date: 2023-11-03 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 70.0 70.0 52.5 52.5 Avg 35.0 17.5 17.5 2480 1000 2484. B. 2492. Frequency (MHz) 0. 2200. Frequency (MHz) 3000 2500 Limit Margin Read Ant Cable Preamp APos TPos Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Remark Freq Level Line (dB) Level Factor Loss Factor dBuV dB/m dB dB cm deg MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg MHz dBuV/m dBuV/m 1 2484.12 40.33 54.00 -13.67 32.08 32.47 7.88 32.10 372 46 AVERAGE 1 2480.00 95.49 ----- 87.26 32.46 7.87 32.10 372 46 AVERAGE

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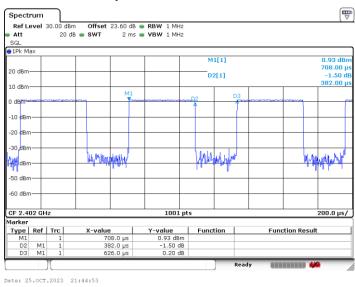
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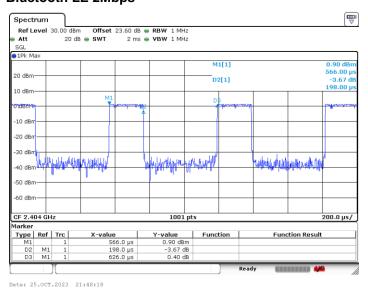
## Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	61.02	0.382	2.618	3KHz
Bluetooth LE 2Mbps	31.63	0.198	5.051	10KHZ

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



#### Bluetooth LE 2Mbps



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