

FCC RF Test Report

APPLICANT	:	INMUSIC BRANDS INC
EQUIPMENT	:	6" Active Studio Monitor w DSP, BT, App
		8" Active Studio Monitor w DSP, BT, App
BRAND NAME	:	M-Audio
MODEL NAME	:	MA51, MA51***** , FORTY SIXTY, Forty Sixty,
		FORTY SIXTY********, Forty Sixty********.
		("*" can be "0-9", "A-Z", "a-z", blank, "-", "+" or
		any character, symbol, alphanumeric.)
		MA52, MA52*****, FORTY EIGHTY, Forty Eighty,
		FORTY EIGHTY********, Forty Eighty********.
		("*" can be "0-9", "A-Z", "a-z", blank, "-", "+" or
		any character, symbol, alphanumeric.)
FCC ID	:	Y4O-MA52
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Jan. 18, 2024 ~ May 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



Sporton International Inc. (ShenZhen)

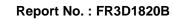
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3D1820B	Rev. 01	Initial issue of report	May 15, 2024
FR3D1820B	Rev. 02	Added conducted power and RSE test data for CH37/38	May 30, 2024



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 0.51 dB at 7320.00 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.65 dB at 0.41 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.



1 General Description

1.1 Applicant

INMUSIC BRANDS INC

200 Scenic View Drive, Suite 201, Cumberland, Rhode Island 02864, United States

1.2 Manufacturer

INMUSIC BRANDS INC

200 Scenic View Drive, Suite 201, Cumberland, Rhode Island 02864, United States

1.3 Product Feature of Equipment Under Test

	Product Feature
Equipment	6" Active Studio Monitor w DSP, BT, App 8" Active Studio Monitor w DSP, BT, App
Brand Name	M-Audio
Model Name	MA51, MA51*****, FORTY SIXTY, Forty Sixty, FORTY SIXTY********, Forty Sixty********. ("*" can be "0-9", "A-Z", "a-z", blank, "-", "+" or any character, symbol, alphanumeric.) MA52, MA52*****, FORTY EIGHTY, Forty Eighty, FORTY EIGHTY********, Forty Eighty********. ("*" can be "0-9", "A-Z", "a-z", blank, "-", "+" or any character, symbol, alphanumeric.)
FCC ID	Y4O-MA52
SN Code	Conducted: A42308263400001 for sample 1 Conduction: A42308263400001 for Sample 1 A42308263300001 for sample 2 Radiation: A42308263400001 for Sample 1 A42308263300001 for sample 2
HW Version	N/A
SW Version	N/A
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. There are two samples under test: sample 1 (MA52) and sample2 (MA51) with different size and some of parts. According to the difference, we choose sample 1 to perform full test and sample 2 to verify the worst case.



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	5.54 dBm (0.0036 W)			
99% Occupied Bandwidth	1.015MHz			
Antenna Type / Gain	FPC Antenna type with gain 2.4 dBi			
Type of Modulation	Bluetooth LE : GFSK			

Note: BLE support 1Mbps data rate only

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								
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.						
	CO01-SZ TH01-SZ	CN1256 421272							
Test Firm	Sporton International Inc. (ShenZhen)								
Test Film		(Onenznen)							
Test Site Location	101, 1st Floor, Block B, E	Building 1, No. 2, Tengfeng 4 et, Baoan District, Shenzhe							
	101, 1st Floor, Block B, E Community, Fuyong Stre Province 518103 People	Building 1, No. 2, Tengfeng 4 et, Baoan District, Shenzhe							



1.7 Test Software

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

1.8 Applicable Standards

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

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

Remark:

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



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	-	-



2.2 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

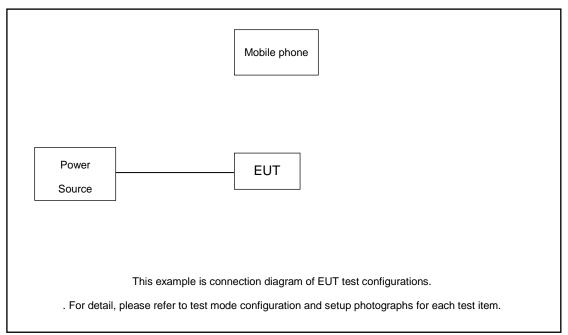
The following summary table is showing all test modes to demonstrate in compliance with the standard.

	Summary table of Test Cases							
Test Item	Data Rate / Modulation							
iest item	Bluetooth – LE / GFSK							
	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE							
Conducted	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE							
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE							
105	Mode 4: Bluetooth Tx CH37_2476 MHz_BLE							
	Mode 5: Bluetooth Tx CH38_2478 MHz_BLE							
	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE							
Radiated	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE							
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE							
105	Mode 4: Bluetooth Tx CH37_2476 MHz_BLE							
	Mode 5: Bluetooth Tx CH38_2478 MHz_BLE							
AC	Mode 1: PT Link with Mehile Dhene/Dlay music) + Dewer Cable 4 for Sample 1							
Conducted	Mode 1: BT Link with Mobile Phone(Play music) + Power Cable 4 for Sample 1							
Emission	Mode 2: BT Link with Mobile Phone(Play music) + Power Cable 4 for Sample 2							
Remark:	Remark:							
1. The wors	t case of conducted emission is mode 1; only the test data of it was reported.							
2. For Radia	ted Test Cases, the tests were performance with power cable 5.							

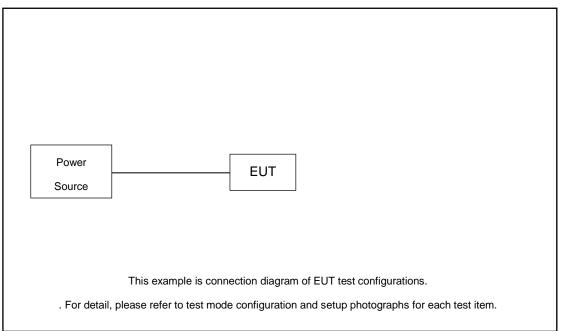


2.3 Connection Diagram of Test System

AC Conducted Emission:



Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile phone	Huawei	MATA9	QISEVA-L09	N/A	N/A



2.5 EUT Operation Test Setup

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

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss 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 2.30 dB and 10dB attenuator.

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

= 2.30 + 10 = 12.30 (dB)



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.
- 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

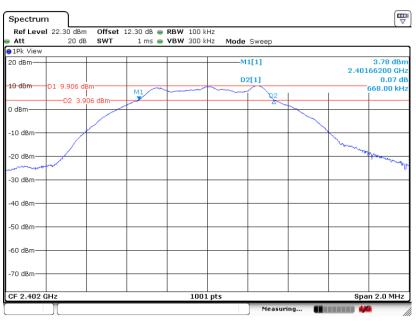


Spectrum Analyzer



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.



6 dB Bandwidth Plot on Channel 00

Date: 31.JAN.2024 12:49:36

6 dB Bandwidth Plot on Channel 19



Date: 31.JAN.2024 12:54:01





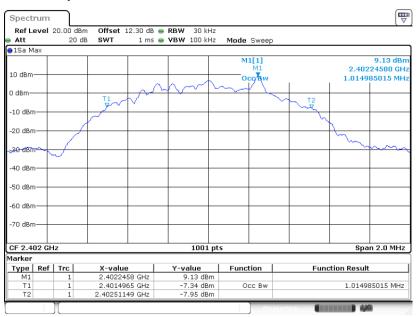
6 dB Bandwidth Plot on Channel 39

Date: 31.JAN.2024 12:55:46



3.1.6 Test Result of 99% Occupied Bandwidth

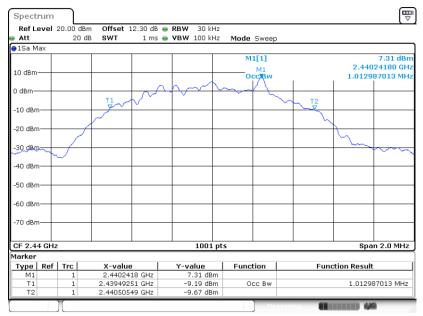
Please refer to Appendix A.



99% Occupied Bandwidth Plot on Channel 00

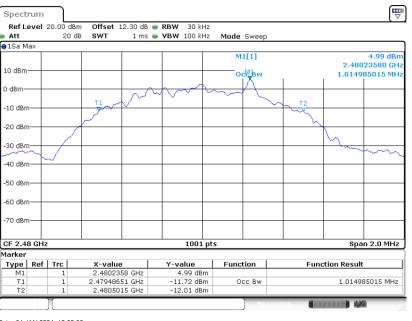
Date: 31.JAN.2024 12:49:07

99% Occupied Bandwidth Plot on Channel 19



Date: 31.JAN.2024 12:53:50





99% Occupied Bandwidth Plot on Channel 39

Date: 31.JAN.2024 12:55:35

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



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 6 dBi.

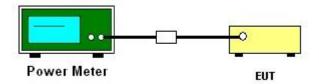
3.2.2 Measuring Instruments

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.



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.

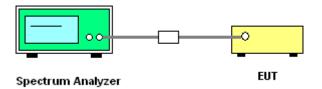
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

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

3.3.4 Test Setup

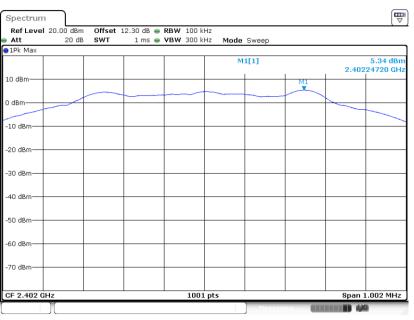


3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



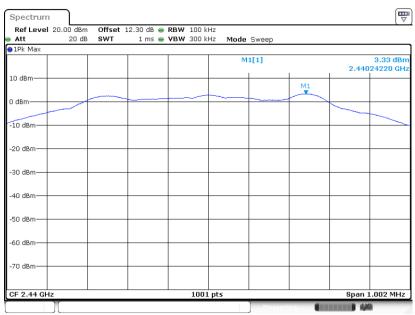
3.3.6 Test Result of Power Spectral Density Plots (100kHz)



PSD 100kHz Plot on Channel 00

Date: 5.FEB.2024 23:19:20

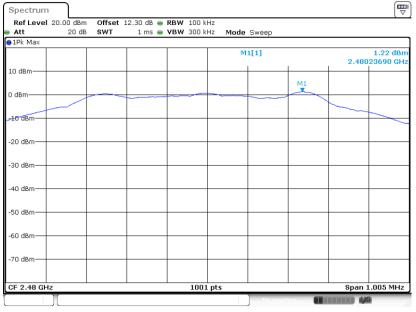
PSD 100kHz Plot on Channel 19



Date: 5.FEB.2024 23:24:10



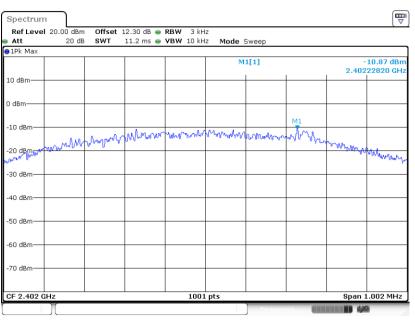
PSD 100kHz Plot on Channel 39



Date: 5.FEB.2024 23:25:55



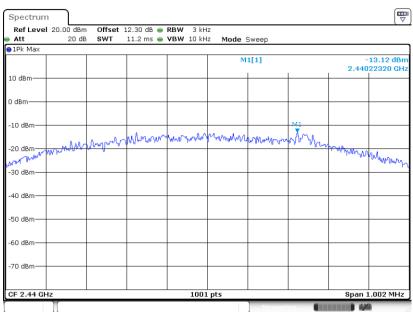
3.3.7 Test Result of Power Spectral Density Plots (3kHz)



PSD 3kHz Plot on Channel 00

Date: 5.FEB.2024 23:18:59

PSD 3kHz Plot on Channel 19



Date: 5.FEB.2024 23:23:52



PSD 3kHz Plot on Channel 39

Spectrum Ref Level 20.00 d	Bm Offset	12.30 dB 👄	RBW 3 kHz					
Att 20			VBW 10 kHz		Sweep			
1Pk Max								
				М	1[1]			15.21 dBm 21890 GHz
10 dBm	_							
0 dBm								
-10 dBm						M1		
-20 dBm	Waymar	Mon	www.	moun	mour	In		
-10 dBm -20 dBm -20 dBm -30 dBm							Mr. Mr. Mr. Mr.	Whenner
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm								
CF 2.48 GHz			1001	pts			Span 1	1.005 MHz
T T					Measur			(A)

Date: 5.FEB.2024 23:25:39



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.

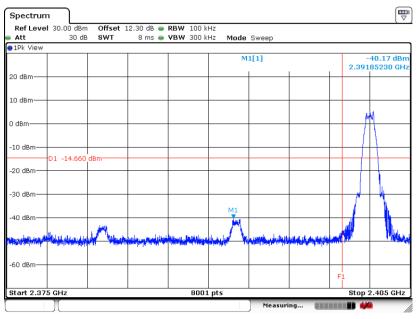
3.4.4 Test Setup





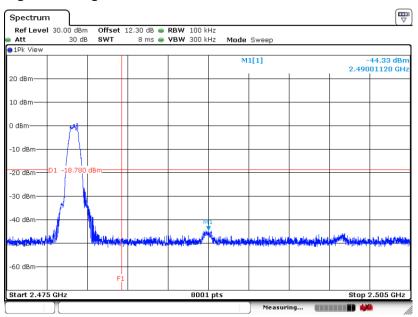
3.4.5 Test Result of Conducted Band Edges Plots





Date: 6.FEB.2024 00:12:29

High Band Edge Plot on Channel 39

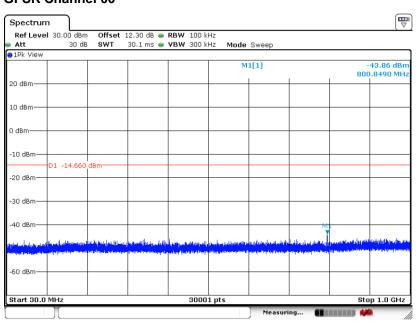


Date: 6.FEB.2024 00:16:52



3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE

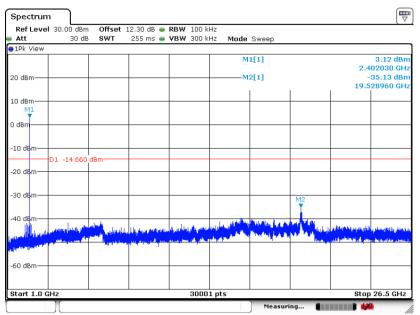


GFSK Channel 00

Date: 6.FEB.2024 00:11:40

Conducted Spurious Emission Plot on Bluetooth LE

GFSK Channel 00

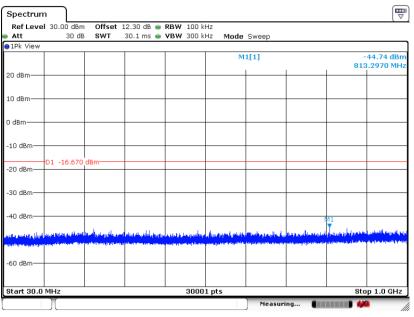


Date: 6.FEB.2024 00:11:56



Conducted Spurious Emission Plot on Bluetooth LE

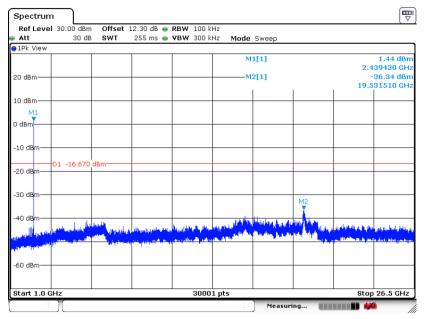
GFSK Channel 19



Date: 6.FEB.2024 00:13:15

Conducted Spurious Emission Plot on Bluetooth LE

GFSK Channel 19



Date: 6.FEB.2024 00:13:33



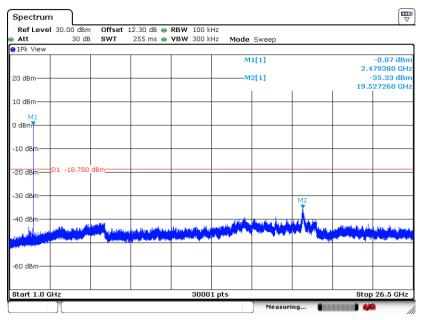
GFSK Channel 39 Spectrum Offset 12.30 dB ● RBW 100 kHz SWT 30.1 ms ● VBW 300 kHz Ref Level 30.00 dBm Att 30 dB Mode Sweep ●1Pk Viev M1[1] 43.59 dBr 826.4240 MH 20 dBm 10 dBm-0 dBm -10 dBm D1 -18.78 -20 dBm--30 dBrr -40 dBm -60 dBm Start 30.0 MHz 30001 pts Stop 1.0 GHz Measuring... .

Conducted Spurious Emission Plot on Bluetooth LE

Date: 6.FEB.2024 00:14:21

Conducted Spurious Emission Plot on Bluetooth LE

GFSK Channel 39



Date: 6.FEB.2024 00:15:56

Sporton International Inc. (ShenZhen) TEL : +86-755-8637-9589 FAX : +86-755-8637-9595 FCC ID: Y4O-MA52



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.



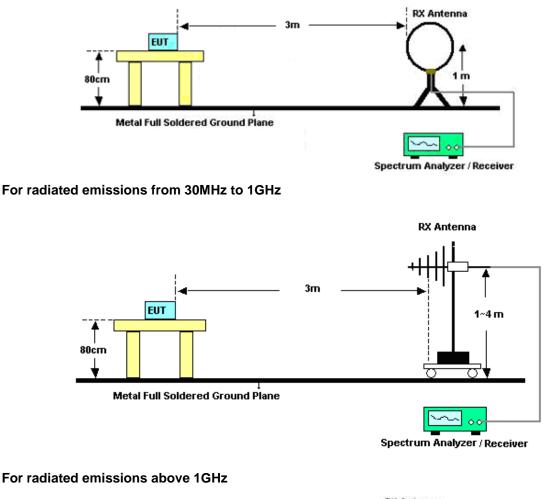
3.5.3 Test Procedures

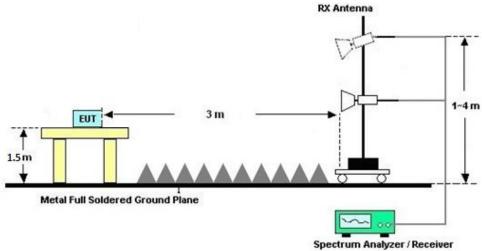
- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get 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.



3.5.4 Test Setup

For radiated emissions below 30MHz





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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.

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.



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.

Frequency of emission (MHz)	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

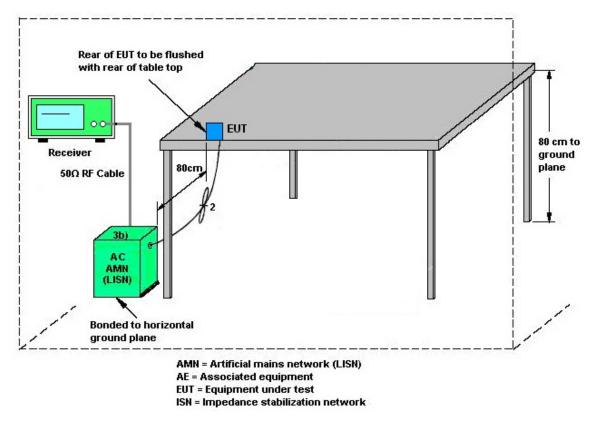
The section 4.0 of List of Measuring Equipment of this test report is used for test.

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.



3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



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.



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	Jan. 18, 2024~ May 29, 2024	Dec. 26, 2024	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY551502 13	10Hz~44GHz	Jul. 07, 2023	Jan. 18, 2024~ May 29, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Jan. 18, 2024~ May 29, 2024	Jul. 27, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Oct. 24, 2023	Jan. 18, 2024~ May 29, 2024	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 08, 2023	Jan. 18, 2024~ May 29, 2024	Jul. 07, 2024	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08, 2023	Jan. 18, 2024~	Apr. 07, 2024	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 07, 2024	May 29, 2024	Apr. 06, 2025	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 04, 2023	Jan. 18, 2024~	Apr. 03, 2024	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 03, 2024	May 29, 2024	Apr. 02, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1943528	1GHz~18GHz	Oct. 18,2023	Jan. 18, 2024~ May 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 05	0.5GHz~26.5Ghz	Oct. 18,2023	Jan. 18, 2024~ May 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 07, 2023	Jan. 18, 2024~ May 29, 2024	Jul. 06, 2024	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	Oct. 18,2023	Jan. 18, 2024~ May 29, 2024	Oct. 17,2024	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 18, 2024~ May 29, 2024	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 18, 2024~ May 29, 2024	NCR	Radiation (03CH01-SZ)
laser range finder	Dingxin Yi	D-40	#01	NA	Oct. 19,2023	Jan. 18, 2024~ May 29, 2024	Oct. 18, 2024	Radiation (03CH01-SZ)
Thermo meter	Anymetre	JR593	#2	- 10℃ ~ 50℃ 10%RH ~ 99%RH	Apr. 12, 2023	Jan. 18, 2024~	Apr. 11, 2024	Radiation (03CH01-SZ)
Thermo meter	Anymetre	JR593	#2	- 10℃ ~ 50℃ 10%RH ~ 99%RH	Apr. 11, 2024	May 29, 2024	Apr. 10, 2025	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 06, 2023	Jan. 31, 2024	Jul. 05, 2024	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Jan. 31, 2024	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Jan. 31, 2024	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000 891	100Vac~250Vac	Jul. 07, 2023	Jan. 31, 2024	Jul. 06, 2024	Conduction (CO01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Jan. 31, 2024~	Apr. 05, 2024	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 05, 2024	May 30, 2024	Apr. 04, 2025	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Jan. 31, 2024~ May 30, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 21, 2023	Jan. 31, 2024~ May 30, 2024	Aug. 20, 2024	Conducted (TH01-SZ)
Thermo meter	Anymetre	JR593	#7	- 10℃ ~ 50℃ 10%RH~99%RH	Apr. 08, 2023	Jan. 31, 2024~	Apr. 07, 2024	Conducted (TH01-SZ)
Thermo meter	Anymetre	JR593	#7	- 10℃ ~ 50℃ 10%RH~99%RH	Apr. 07, 2024	May 30, 2024	Apr. 06, 2025	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	±0.1 MHz
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

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

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

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

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

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

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

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

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 dB

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



Appendix A. Conducted Test Results



Appendix A. Test Result of Conducted Test Items

Test Engineer:	Chen Ran	Temperature:	21~25	°C
Test Date:	2024/1/31~2024/5/30	Relative Humidity:	51~54	%

	<u>TEST RESULTS DATA</u> 6dB and 99% Occupied Bandwidth											
					99%							
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail				
BLE	1Mbps	1	0	2402	1.015	0.668	0.50	Pass				
BLE	1Mbps	1	19	2440	1.013	0.668	0.50	Pass				
BLE	1Mbps	1	39	2480	1.015	0.670	0.50	Pass				

	<u>TEST RESULTS DATA</u> <u>Peak Power Table</u>												
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	5.54	30.00	2.40	7.94	36.00	Pass			
BLE	1Mbps	1	19	2440	3.64	30.00	2.40	6.04	36.00	Pass			
BLE	1Mbps	1	37	2478	3.36	30.00	2.40	5.76	36.00	Pass			
BLE	1Mbps	1	38	2479	1.28	30.00	2.40	3.68	36.00	Pass			
BLE	1Mbps	1	39	2480	1.57	30.00	2.40	3.97	36.00	Pass			

						Avera	RESULTS DATA ge Power Table porting Only)
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	
BLE	1Mbps	1	0	2402	0.65	5.30	
BLE	1Mbps	1	19	2440	0.65	3.30	
BLE	1Mbps	1	37	2478	0.65	3.00	
BLE	1Mbps	1	38	2479	0.65	1.00	
BLE	1Mbps	1	39	2480	0.65	1.20	
Remark:	Power se	etting	is CH00:	4, CH19:2	, CH37:4, CH3	8:2, CH39:4 .	- -

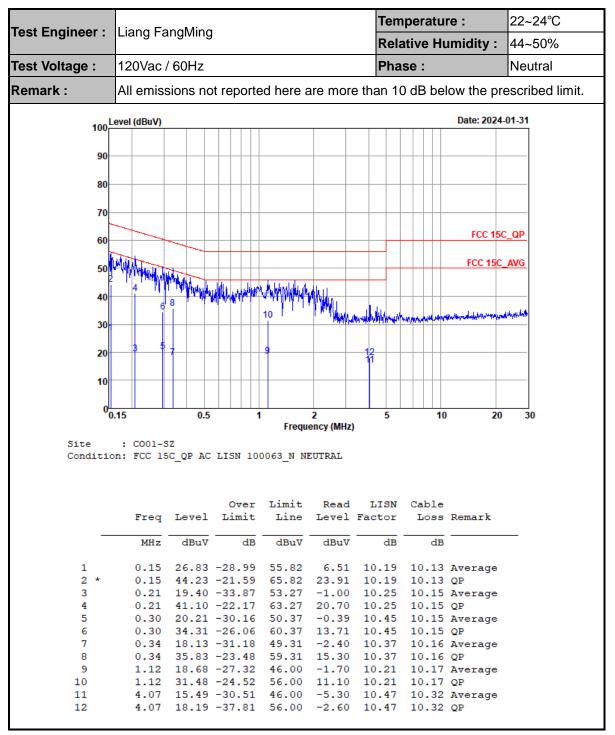
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail	
BLE	1Mbps	1	0	2402	5.34	-10.87	2.40	8.00	Pass	
BLE	1Mbps	1	19	2440	3.33	-13.12	2.40	8.00	Pass	
BLE	1Mbps	1	39	2480	1.22	-15.21	2.40	8.00	Pass	



Appendix B. AC Conducted Emission Test Results

Toot Engineer .		nal lina				Ten	nperatu	ire :	22~24°C			
Test Engineer :	Liang Fa	ngiviing				Rel	ative H	umidity :	: 44~50%			
Test Voltage :	120Vac /	60Hz				Pha	ase :		Line			
Remark :	All emiss	All emissions not reported here are more than 10 dB below the prescribed limit.										
10	Level (dBuV)	.evel (dBuV) Date: 2024-01-31										
9	0											
8	0											
7												
,								500.45				
6	0							FCC 15				
5								FCC 15C	_AVG			
	2 4 1911 W	will - A	Manager	Marken .								
4	0	81.02	18	20	N. MAANY	HOLD HALL						
3	0	[[] 1	4 16		1 10 1 10 1		with marked and	and all all all and a second	2			
2	1 3	191	47	10								
2	U	1	3 15	19								
1	0											
	0											
	0.15	0.5	1		2 ency (MHz)	5	10	20) 30			
Site			1			-	10	20	0 30			
		SZ		Frequ	ency (MHz)	-	10) 20) <u>30</u>			
	: CO01-5	SZ		Frequ	ency (MHz)	-	10) 20) 30			
	: CO01-5	SZ	LISN 10	Frequ	ency (MHz) INE)	10 Cable) 20) 30			
	: CO01-3	SZ	LISN 100 Over	Frequ 0063_L L Limit	ency (MHz) INE Read)	Cable	20 Remark) 30			
	: CO01-3	SZ SC_QP AC	LISN 100 Over	Frequ 0063_L L Limit	ency (MHz) INE Read	LISN Factor	Cable Loss) 30			
	: CO01-3 ion: FCC 13 Freq MHz 0.16	SZ SC_QP AC Level dBuV 21.62	LISN 100 Over Limit dB -33.63	Frequ D0063_L L Limit Line dBuV 55.25	Read Level dBuV 1.20	LISN Factor dB 10.28	Cable Loss dB 10.14	Remark Average) 30			
Condit 1 2	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16	SZ SC_QP AC Level dBuV 21.62 44.72	LISN 100 Over Limit dB -33.63 -20.53	Frequ 0063_L L Limit Line dBuV 55.25 65.25	Read Level dBuV 1.20 24.30	LISN Factor dB 10.28 10.28	Cable Loss dB 10.14 10.14	Average QP) 30 			
Condit 1 2 3 4	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21	SZ SC_QP AC Level dBuV 21.62 44.72 20.30 43.20	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20	Frequ 0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40	Read Level dBuV 1.20 24.30 -0.30 22.60	LISN Factor dB 10.28 10.28 10.45 10.45	Cable Loss dB 10.14 10.14 10.15 10.15	Remark Average QP Average QP]) 30			
Condit 1 2 3 4 5 *	: C001-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.21 0.41	SZ SC_QP AC Level dBuV 21.62 44.72 20.30 43.20 40.99	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65	Frequ 0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40	LISN Factor dB 10.28 10.45 10.45 10.45 10.43	Cable Loss dB 10.14 10.14 10.15 10.15 10.16	Remark Average QP Average QP Average) 30			
Condit 1 2 3 4 5 * 6	: C001-3 ion: FCC 13 Freq MHz 0.16 0.21 0.21 0.21 0.41 0.41	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15	Frequ 0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90	LISN Factor dB 10.28 10.45 10.45 10.45 10.43 10.43	Cable Loss dB 10.14 10.14 10.15 10.15 10.16 10.16	Remark Average QP Average QP Average QP				
Condit 1 2 3 4 5 *	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.21 0.21 0.21 0.21 0.41 0.41 0.43	SZ SC_QP AC Level dBuV 21.62 44.72 20.30 43.20 40.99	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89	Frequ 0063_L L Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64 47.24	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80	LISN Factor dB 10.28 10.28 10.45 10.45 10.45 10.43 10.43 10.39	Cable Loss dB 10.14 10.14 10.15 10.15 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average				
Condit 1 2 3 4 5 * 6 7 8 9	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.46	SZ SC_QP AC Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52	Frequ 0063_L L Limit Line dBuV 55.25 53.40 63.40 47.64 57.64 47.24 57.24 46.71	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70	LISN Factor dB 10.28 10.28 10.45 10.45 10.43 10.43 10.43 10.39 10.39 10.33	Cable Loss dB 10.14 10.15 10.15 10.15 10.16 10.16 10.16 10.16 10.16	Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 * 6 7 8 9 10	: CO01-3 ion: FCC 13 Freq 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.44 0.44	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92	Frequ 0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 47.64 47.64 47.24 57.24 46.71 56.71	Read Level dBuV 1.20 24.30 -0.30 22.60 22.60 25.90 3.80 13.60 1.70 13.30	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 * 6 7 8 9 10 11	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.43 0.44 0.44 0.43 0.43	Level dBuV 21.62 44.72 20.30 43.20 40.99 24.35 34.15 22.19 33.79 21.55	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77	Frequ D0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 47.24 57.64 47.24 57.24 46.71 56.71 46.32	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 1.70 13.30 1.10	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33 10.33 10.33	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average				
Condit 1 2 3 4 5 * 6 7 8 9 10 11 12	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.44 0.43 0.44 0.43 0.44 0.44	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47	Frequ Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64 57.24 46.71 56.71 46.32 56.32	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33 10.33 10.29 10.29	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 5 6 7 8 9 10 11 12 13	: C001-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.43 0.43 0.44 0.44 0.44	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45	UISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55	Frequ Limit Limit dBuV 55.25 65.25 53.40 63.40 47.64 57.64 57.24 46.71 56.71 46.32 56.32 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33 10.29 10.29 10.29 10.19	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 5 6 7 8 9 10 11 12 13 14	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.43 0.46 0.46 0.48 0.48 0.48 0.57 0.57	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 32.19 33.79 21.55 32.85 15.45 31.15	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.52 -22.92 -24.55 -24.85	Frequ D063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64 47.24 46.71 56.71 46.32 56.32 46.00 56.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33 10.33 10.29 10.29 10.29 10.19	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 5 6 7 8 9 10 11 12 13 14 15	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.41 0.43 0.43 0.43 0.43 0.43 0.44 0.43 0.44 0.43 0.46 0.48 0.48 0.57 0.57 0.70	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31	Frequ D0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64 47.24 57.24 46.71 56.71 46.32 56.32 46.00 56.00 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80 -5.30	LISN Factor dB 10.28 10.45 10.45 10.43 10.43 10.39 10.39 10.33 10.33 10.29 10.29 10.29 10.19 9.83	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 5 6 7 8 9 10 11 12 13 14 15 16	: CO01-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.48 0.48 0.48 0.57 0.57 0.70 0.70	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69 29.49	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31 -26.51	Frequ D0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 57.64 47.24 57.24 57.24 46.71 46.32 56.32 46.00 56.00 46.00 56.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80 -5.30 9.50	LISN Factor dB 10.28 10.28 10.45 10.45 10.43 10.33 10.39 10.33 10.33 10.29 10.29 10.29 10.19 10.19 9.83 9.83	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 5 6 7 8 9 10 11 12 13 14 15	: C001-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.48 0.48 0.57 0.57 0.57 0.70 0.70 0.83	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69 29.49 17.95	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31 -26.51 -28.05	Frequ Limit Limit Line dBuV 55.25 53.40 63.40 47.64 57.64 47.24 57.24 46.71 56.71 46.32 56.32 46.00 56.00 46.00 56.00 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80 -5.30 9.50 -2.50	LISN Factor dB 10.28 10.28 10.45 10.45 10.45 10.43 10.39 10.39 10.33 10.33 10.29 10.19 9.83 9.83 10.29	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 * 6 7 8 9 10 11 12 13 14 15 16 17	: C001-3 ion: FCC 13 Freq MHz 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.48 0.48 0.57 0.57 0.57 0.70 0.70 0.83	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69 29.49 17.95 35.15	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31 -26.51 -28.05 -20.85	Frequ Limit Limit Line dBuV 55.25 53.40 63.40 47.64 57.64 47.24 57.24 46.71 56.71 46.32 56.32 46.00 56.00 46.00 56.00 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80 -5.30 9.50 -2.50 14.70	LISN Factor dB 10.28 10.45 10.45 10.45 10.43 10.39 10.39 10.33 10.29 10.19 10.19 9.83 9.83 10.29 10.29 10.29	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 * 6 7 8 9 10 11 12 13 14 15 16 17 18	: CO01-3 ion: FCC 13 Freq 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.43 0.44 0.43 0.44 0.44	Level dBuV 21.62 44.72 20.30 43.20 40.99 46.49 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69 29.49 17.95 35.15	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31 -26.51 -28.05 -20.85 -28.26	Frequ D0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 47.64 47.24 57.24 46.71 56.71 46.32 56.32 46.00 56.00 46.00 56.00 46.00 56.00 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 22.60 25.90 3.80 13.60 1.70 13.30 1.10 12.40 -4.90 10.80 0.530 9.50 -2.50 14.70 -2.60	LISN Factor dB 10.28 10.28 10.45 10.45 10.43 10.39 10.39 10.33 10.33 10.29 10.29 10.19 9.83 9.83 10.29 10.29 10.29 10.29 10.29 10.29 10.29 10.29	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP				
Condit 1 2 3 4 5 * 6 7 8 9 10 11 12 13 14 15 16 17 18 19	: CO01-3 ion: FCC 13 Freq 0.16 0.16 0.21 0.21 0.41 0.43 0.43 0.43 0.43 0.43 0.44 0.43 0.44 0.44	Level dBuV 21.62 44.72 20.30 43.20 40.99 24.35 34.15 22.19 33.79 21.55 32.85 15.45 31.15 14.69 29.49 17.95 35.15 17.74 35.24	LISN 100 Over Limit dB -33.63 -20.53 -33.10 -20.20 -6.65 -11.15 -22.89 -23.09 -24.52 -22.92 -24.77 -23.47 -30.55 -24.85 -31.31 -28.05 -20.85 -20.85 -20.85 -20.85 -20.85 -20.76	Frequ D0063_L L: Limit Line dBuV 55.25 65.25 53.40 63.40 47.64 47.64 47.24 57.24 46.71 56.71 46.32 56.32 46.00 56.00 46.00 56.00 46.00 56.00 46.00	Read Level dBuV 1.20 24.30 -0.30 22.60 20.40 25.90 3.80 1.70 13.30 1.10 12.40 -4.90 10.80 9.50 9.50 9.50 -2.50 14.70 -2.60 14.90	LISN Factor dB 10.28 10.28 10.45 10.45 10.43 10.39 10.39 10.33 10.33 10.33 10.29 10.19 10.19 10.19 10.29 10.29 10.29 10.29 10.29 10.29 10.29 10.29 10.29 10.29	Cable Loss dB 10.14 10.15 10.15 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.16 10.18 10.18	Remark Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP Average QP				





Note:

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



Appendix C Radiated Spurious Emission Test Data

Test Engineer :	Zhaohui Liang	Relative Humidity :	48~49%
rest Engineer.		Temperature :	24-25 ℃

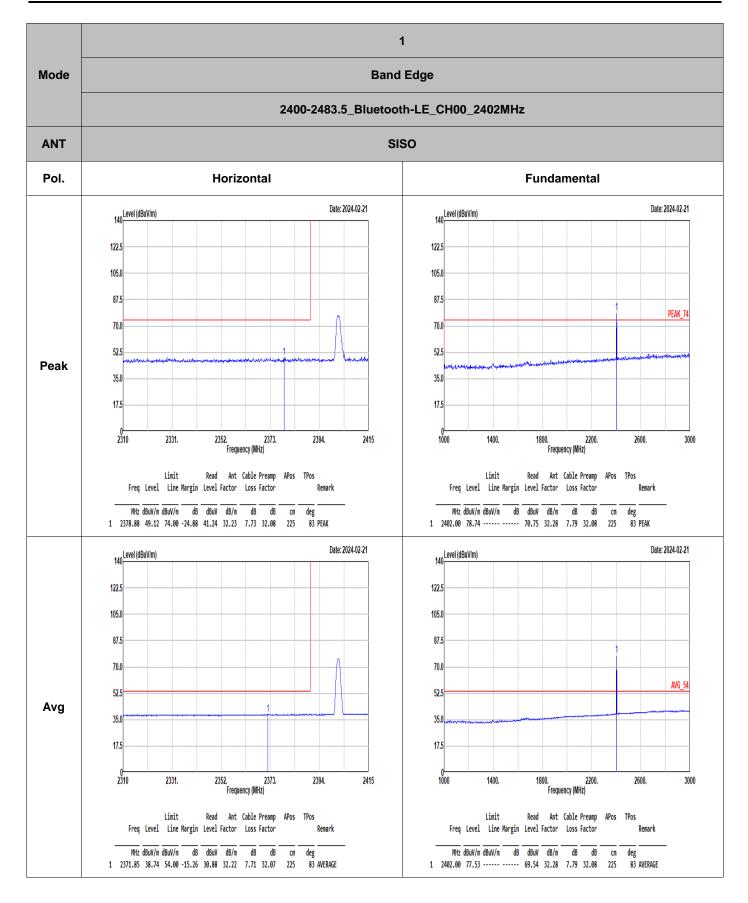
Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Sample	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	1	Bluetooth-LE	00	2402	1Mbps	-	-
Mode 2	2400-2483.5	1	Bluetooth-LE	19	2440	1Mbps	-	-
Mode 3	2400-2483.5	1	Bluetooth-LE	39	2480	1Mbps	-	-
Mode 4	2400-2483.5	1	Bluetooth-LE	19	2440	1Mbps	-	LF
Mode 5	2400-2483.5	2	Bluetooth-LE	19	2440	1Mbps	-	-
Mode 6	2400-2483.5	1	Bluetooth-LE	38	2478	1Mbps	-	-
Mode 7	2400-2483.5	1	Bluetooth-LE	37	2476	1Mbps	-	-

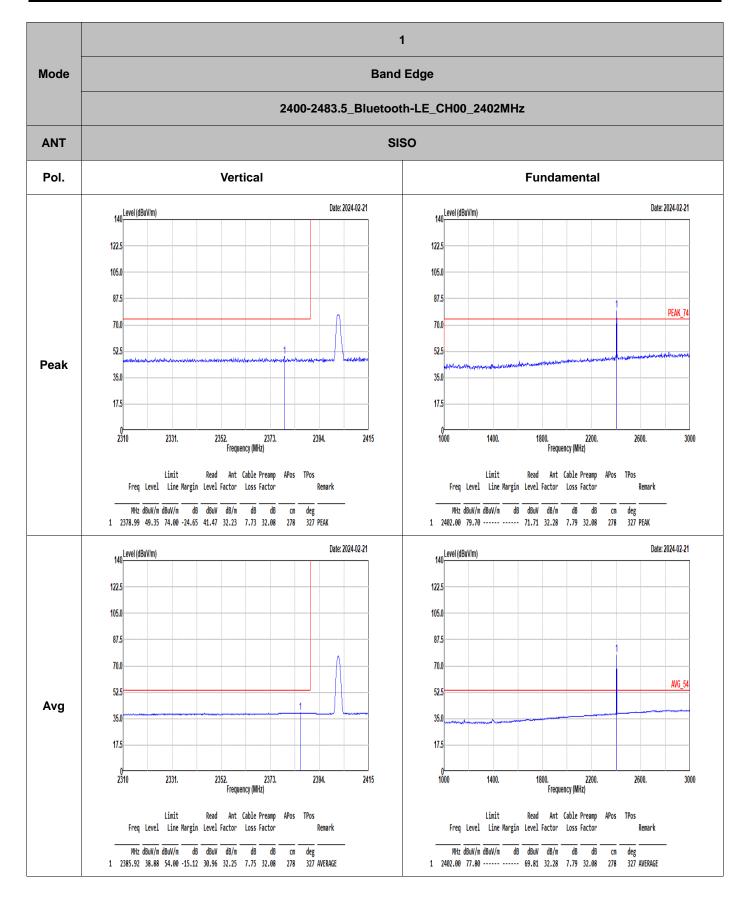
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE	00	2385.92	38.88	54.00	-15.12	V	AVERAGE	Pass	Band Edge
1	Bluetooth-LE	00	4804.00	53.21	54.00	-0.79	н	Average	Pass	Harmonic
2	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE	19	7320.00	53.49	54.00	-0.51	Н	Average	Pass	Harmonic
3	Bluetooth-LE	39	2489.78	39.32	54.00	-14.68	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE	39	4960.00	51.26	54.00	-2.74	V	Average	Pass	Harmonic
4	Bluetooth-LE	19	527.61	35.85	46.00	-10.15	н	Peak	Pass	LF
5	Bluetooth-LE	19	2344.02	50.73	54.00	-3.27	V	AVERAGE	Pass	Band Edge
5	Bluetooth-LE	19	3252.52	51.15	54.00	-2.85	V	Average	Pass	Harmonic
6	Bluetooth-LE	38	2487.90	47.73	54.00	-6.27	V	AVERAGE	Pass	Band Edge
6	Bluetooth-LE	38	4956.00	52.35	54.00	-1.65	V	Average	Pass	Harmonic
7	Bluetooth-LE	37	-	-	-	-	-	-	-	Band Edge
7	Bluetooth-LE	37	4952.00	53.35	54.00	-0.65	V	Average	Pass	Harmonic

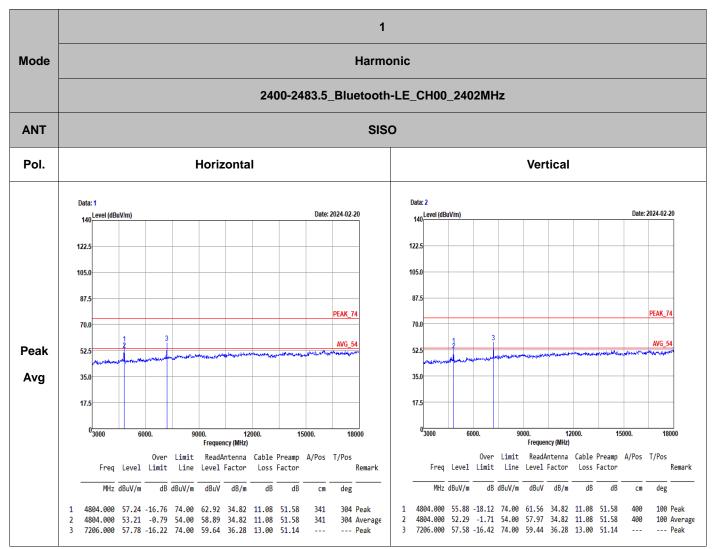






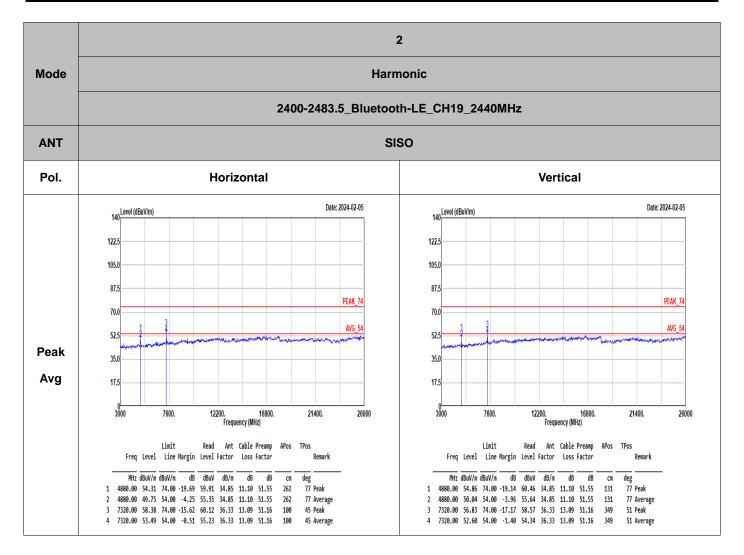




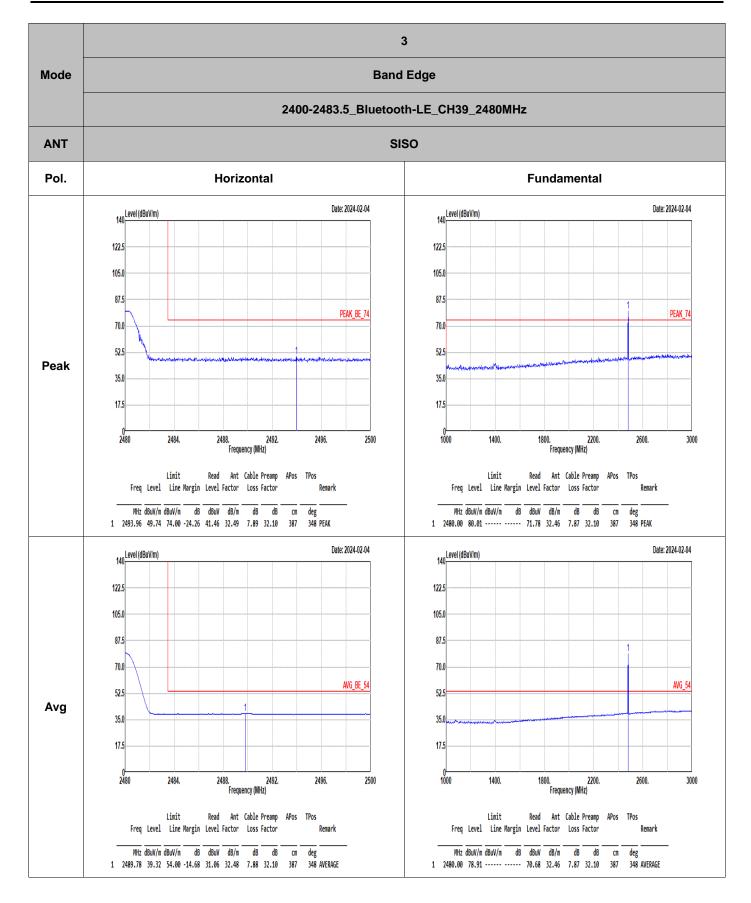


Remark: 7206MHz is harmonics emission which fall in the non-restricted bands, the limit is 20 dB below the highest emission level within the authorized band, test result is PASS.

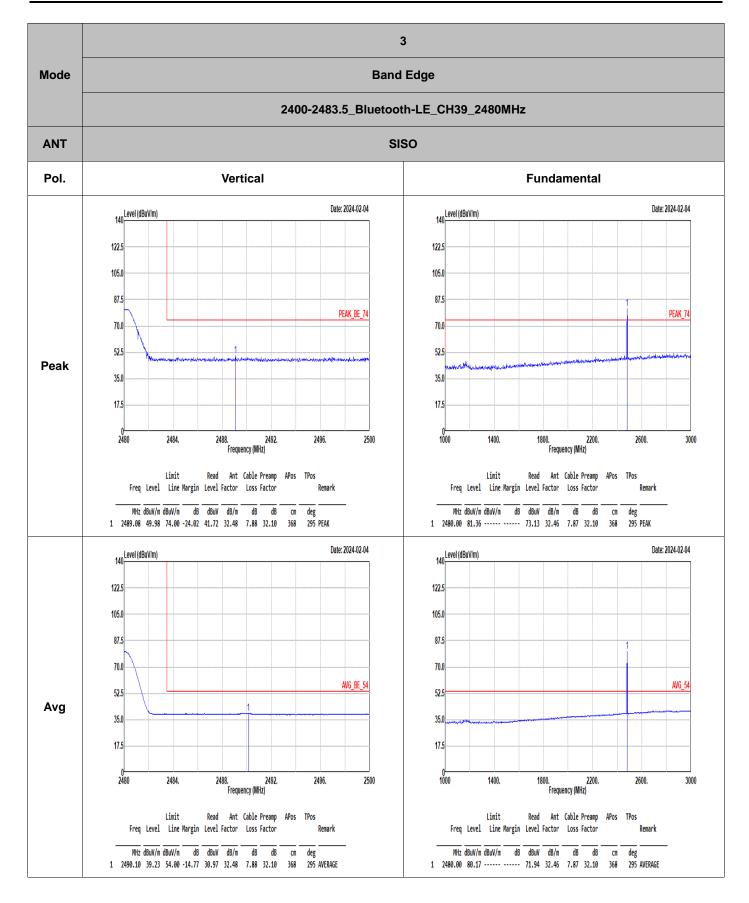




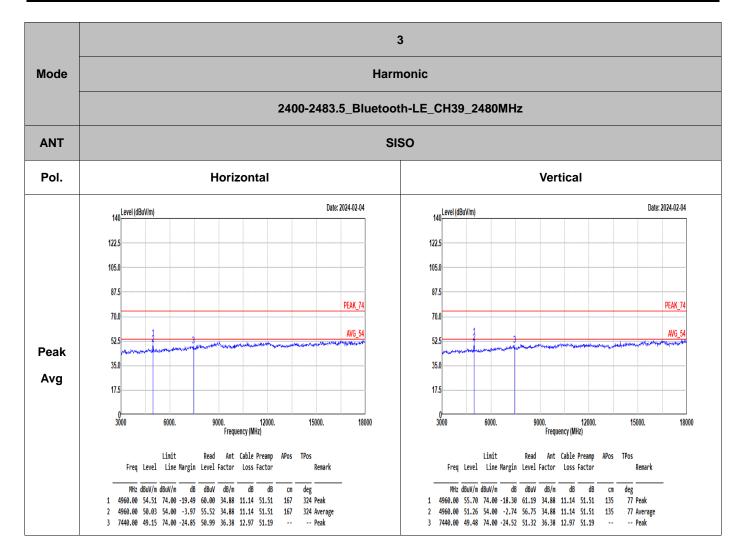




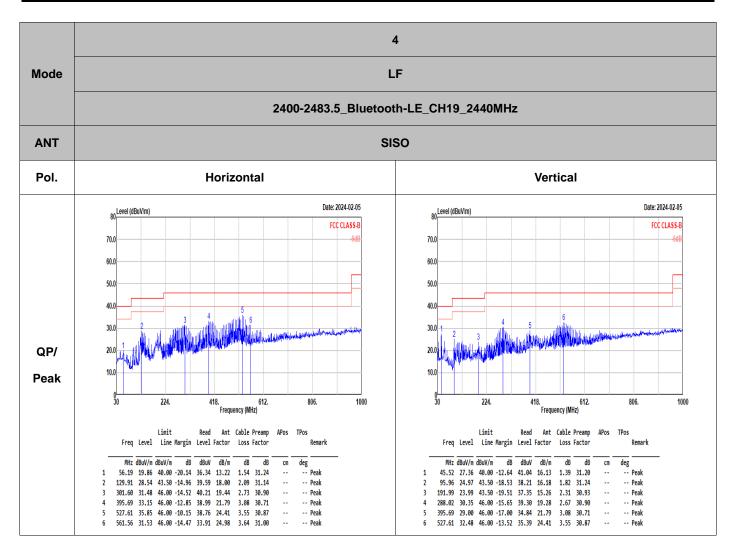




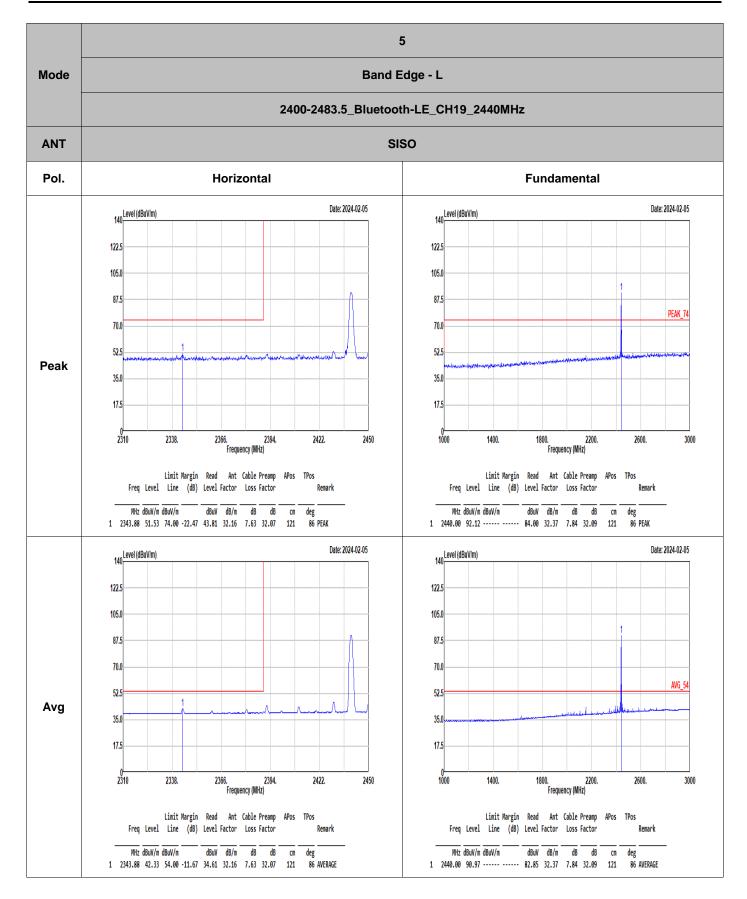




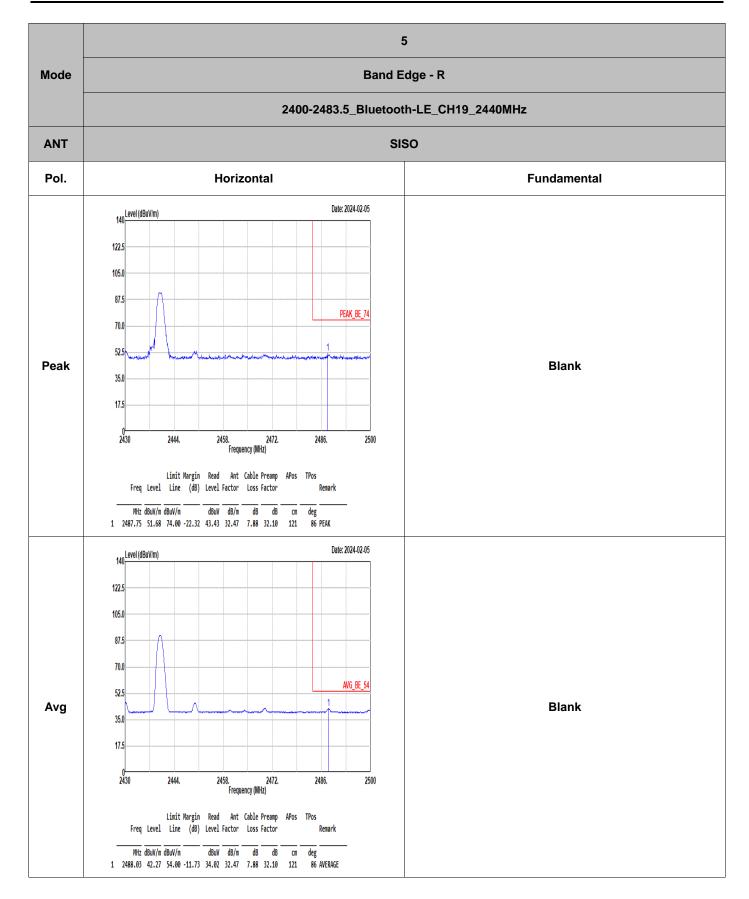




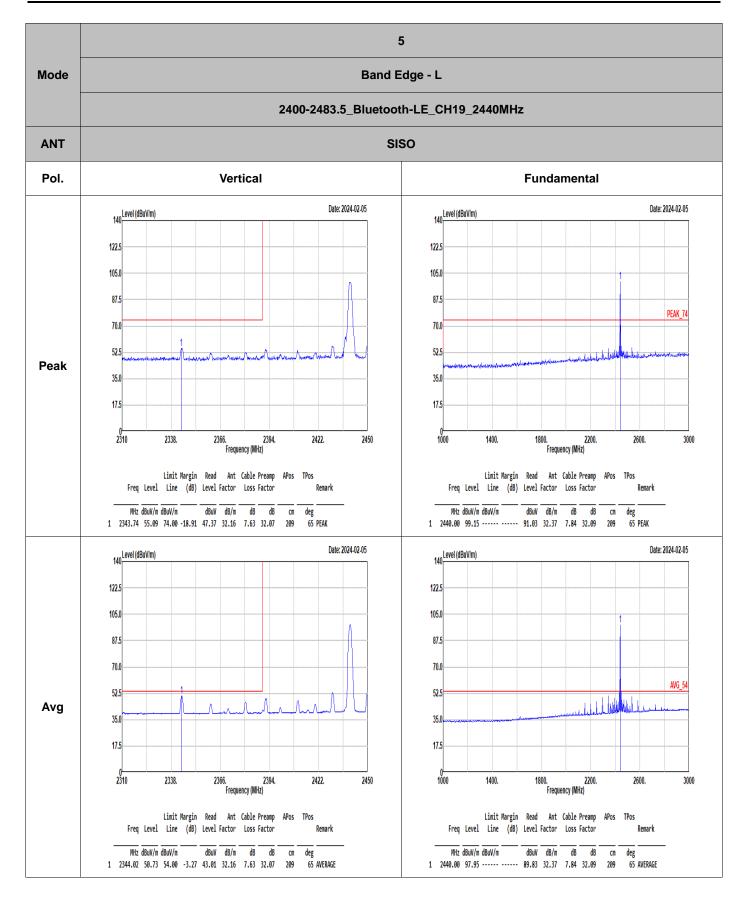




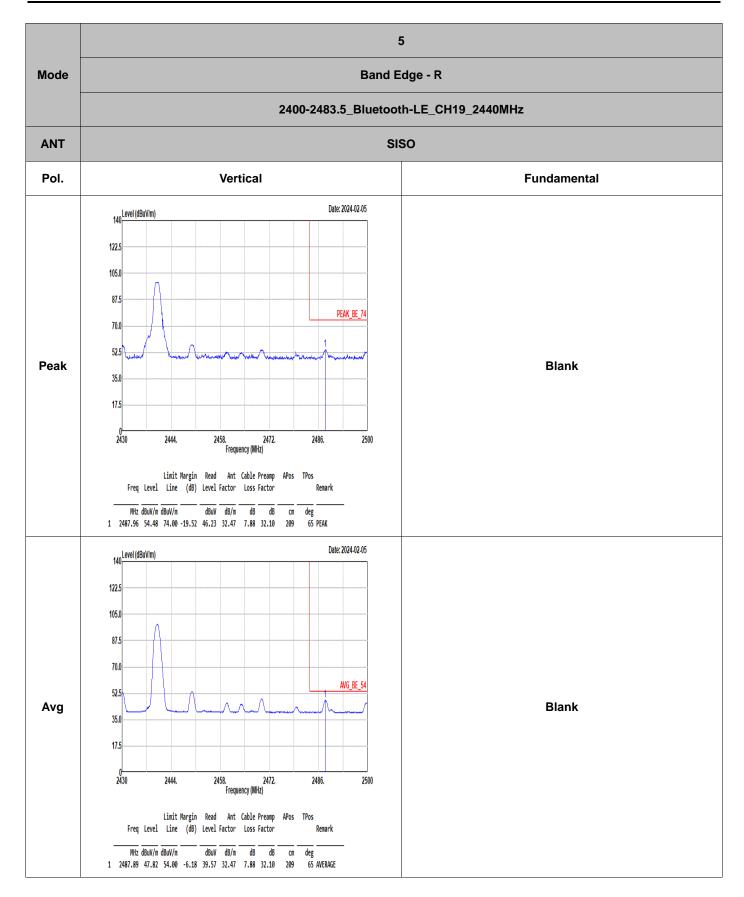




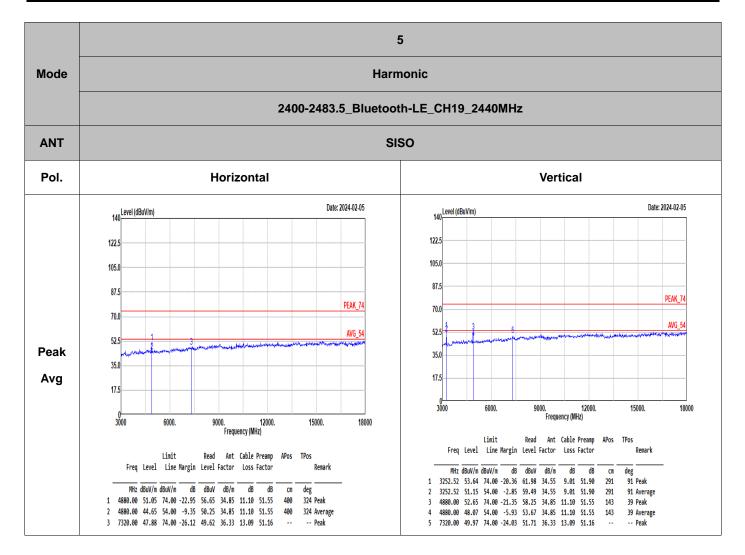




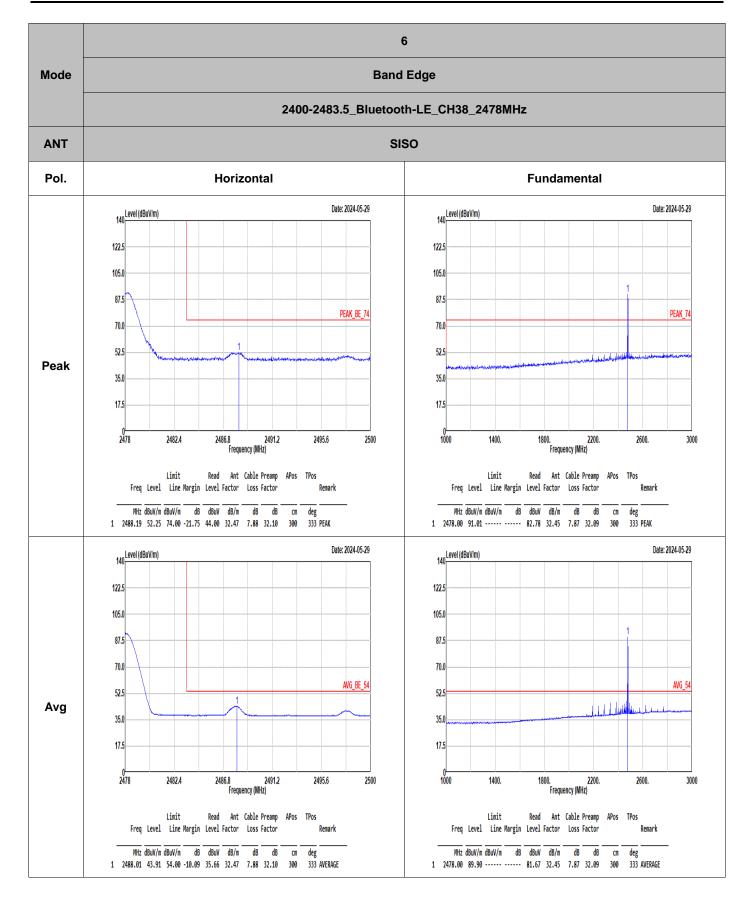




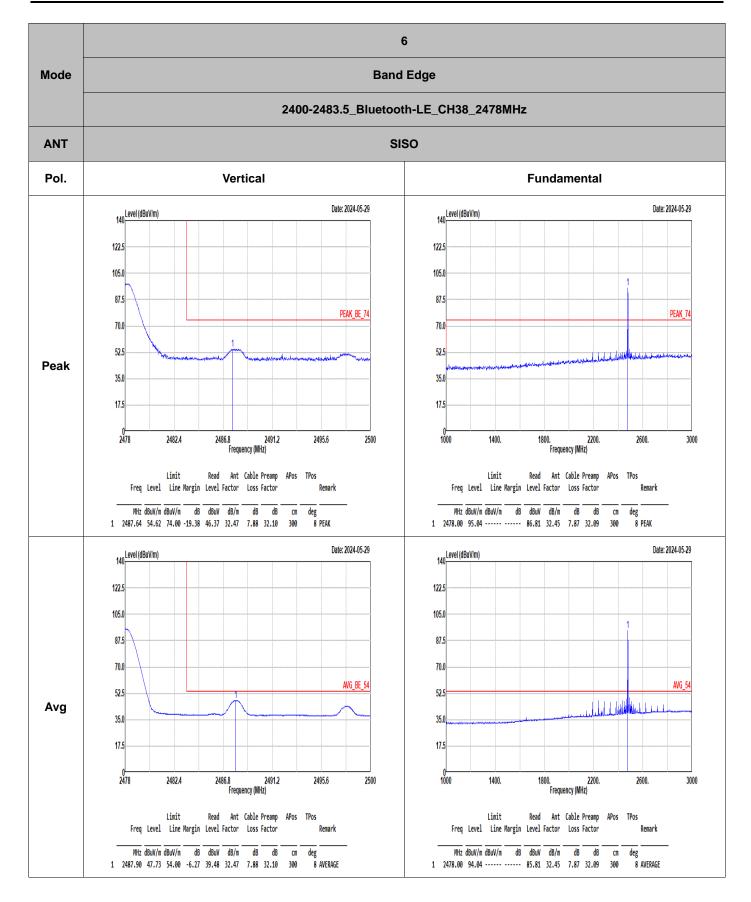




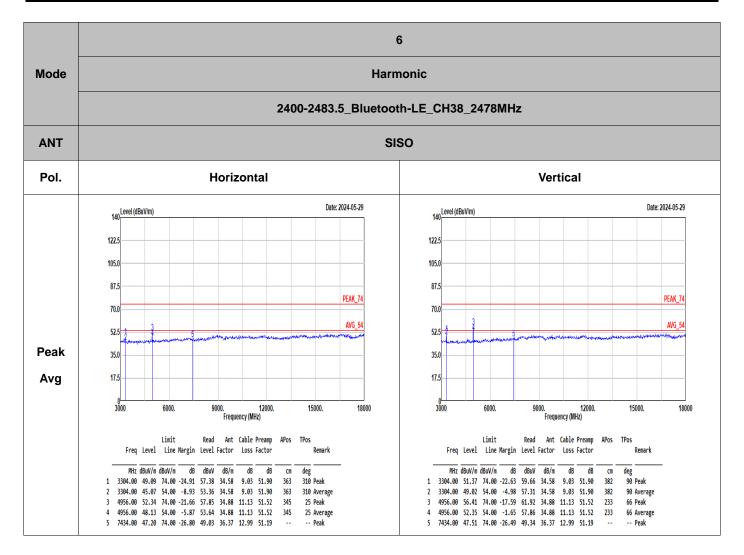




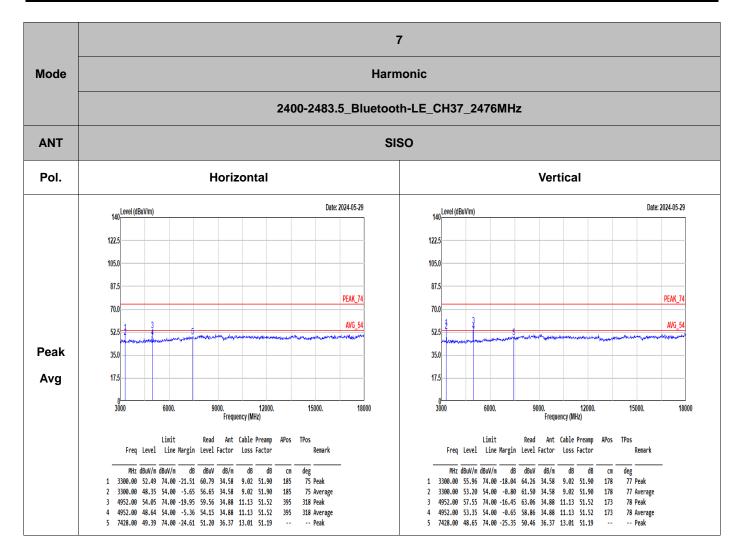














Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps for Sample 1	86.13	2.159	0.463	1KHz
Bluetooth LE 1Mbps for Sample 2	86.4	2.16	0.463	1KHz

For Sample 1:

Bluetooth LE 1Mbps

Ref Le Att SGL		0.00 dBr 35 d	m Offset 12.30 m B e SWT 10 m	dB 🖷 RBW 10 MHz ns VBW 10 MHz			
1Pk M	эх		18 N	28 70			
					M1[1]		6.76 dBn
20 dBm					D2[1]		2.3043 m 0.22 dE
10 dBm			M1	1.000000	DELT		2.1594 m
10 dBm			T	D2 D3	-		
0 dBm-	-						
-10 dBm							
-20 dBm							
20 000			mal	rule		new	Local
-30 dBm	-						1.10
-40 dBm							
-40 aBr							
-50 dBm							
-60 dBrr							
CF 2.4	I GHZ	<u>.</u>		691 p	ts		1.0 ms/
larker		Trc	X-value	Y-value	Function		ion Result
Type M1	Ref	1	2.3043 m			Funct	ion Result
D2	M1	1	2.1594 m				
D3	M1	1	2.5072 m	0.14 dB			

Date: 18.JAN.2024 22:53:37

For Sample 2:

Bluetooth LE 1Mbps

