

FCC RF Test Report

APPLICANT	: Weifang GoerTek Electronics Co.,Ltd.
EQUIPMENT	: SRH-SA2
BRAND NAME	: SONY
MODEL NAME	: SRH-SA2
FCC ID	: SZGSRHSA2
STANDARD	: FCC Part 15 Subpart C §15.247
CLASSIFICATION	: (DTS) Digital Transmission System
TEST DATE(S)	: Jul. 16, 2024 ~ Jul. 19, 2024

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia



Sporton International Inc. (Kunshan) No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR420222-01	Rev. 01	Initial issue of report	Jul. 24, 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	r 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	nd 15.209(a) & Pass 15.247(d)		Under limit 6.31 dB at 4804.00 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 30.10 dB at 16.226 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

Weifang GoerTek Electronics Co.,Ltd.

Gaoxin 2 Road, Free Trade Zone, Weifang, Shandong, 261205, P.R. China

1.2 Manufacturer

Sony Corporation

1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	SRH-SA2			
Brand Name	SONY			
Model Name	SRH-SA2			
FCC ID	SZGSRHSA2			
SN Code	Conducted: VRZJA0DVT10070 Conduction: VRZJB0DVT22006 Radiation: VRZJB0DVT22005			
HW Version	V03			
SW Version	V29.0			
EUT Stage	Identical Prototype			

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification				
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz			
Number of Channels	40			
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel) nRF: 40 Channel			
Maximum Output Power to Antenna	BLE 1Mbps: 4.06 dBm (0.0025 W) BLE 2Mbps: 4.08 dBm (0.0026 W) nRF 2Mbps: 4.11 dBm (0.0026 W)			
99% Occupied Bandwidth	BLE 1Mbps:1.04MHz BLE 2Mbps:2.04MHz nRF 2Mbps: 2.04 MHz			
Antenna Type / Gain	FPC Antenna type with gain 2 dBi			
Type of Modulation	GFSK			

1.5 Modification of EUT

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





1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)					
	No. 1098, Pengxi North	n Road, Kunshan Econom	ic Development Zone			
Test Site Location	Jiangsu Province 215300 People's Republic of China					
	TEL : +86-512-57900158					
	Sporton Sito No	ECC Designation No	FCC Test Firm			
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.			
lest Site No.	CO01-KS 03CH08-KS TH01-KS	CN1257	314309			

1.7 Test Software

ltem	Site	Manufacturer	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	03CH08-KS	AUDIX	E3	210616
3.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

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

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

Remark:

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



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 (X plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

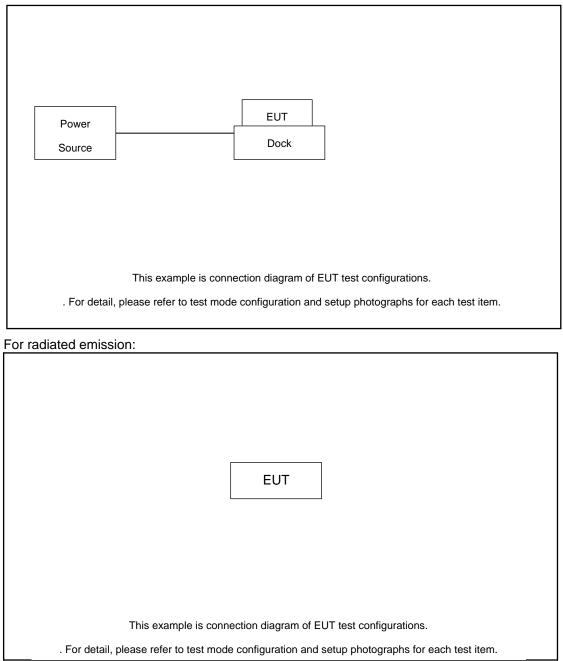
	Summary table of Test Cases				
Toot Kom	Data Rate / Modulation				
Test Item	Bluetooth LE/nRF / GFSK				
	Mode 1: Bluetooth LE Tx CH00_2402 MHz				
	Mode 2: Bluetooth LE Tx CH19_2440 MHz				
Conducted	Mode 3: Bluetooth LE Tx CH39_2480 MHz				
TCs	Mode 4: nRF TX CH00_2402 MHz				
	Mode 5: nRF TX CH19_2440 MHz				
	Mode 6: nRF TX CH39_2480 MHz				
	Mode 1: Bluetooth LE Tx CH00_2402 MHz				
	Mode 2: Bluetooth LE Tx CH19_2440 MHz				
Radiated	Mode 3: Bluetooth LE Tx CH39_2480 MHz				
TCs	Mode 4: nRF TX CH00_2402 MHz				
	Mode 5: nRF TX CH19_2440 MHz				
	Mode 6: nRF TX CH39_2480 MHz				
AC					
Conducted	Mode 1: nRF Link + USB Cable 2 + Connect Dock's Port 1 + Charging on the Dock				
Emission					

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



2.3 Connection Diagram of Test System

AC Conducted Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Model Name	FCC ID	Data Cable	Power Cord
1.	Dock	SRH-SA3	SZGSRHSA3	N/A	N/A
2.	USB Cable	N/A	N/A	N/A	N/A
3.	Adapter	N/A	N/A	N/A	N/A



2.5 EUT Operation Test Setup

For BLE / NRF 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 HMD 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 between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 6.00 dB.

 $Offset(dB) = RF \ cable \ loss(dB).$ = 6.00 (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.

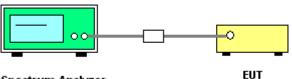
3.1.2 Measuring Instruments

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

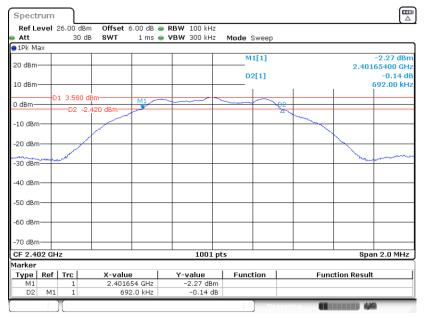


3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

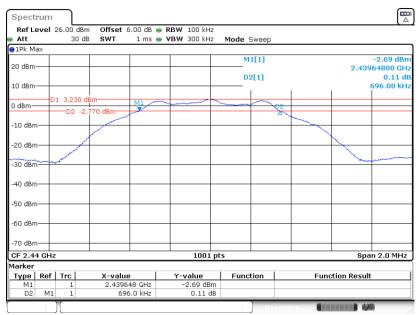
BLE 1Mbps

6 dB Bandwidth Plot on Channel 00



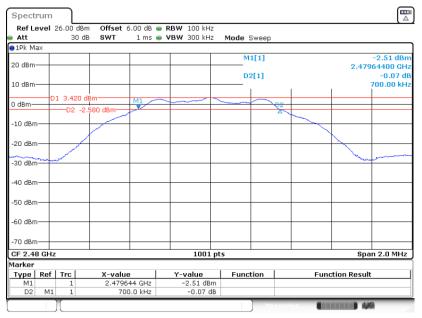
Date: 16.JUL.2024 04:47:04

6 dB Bandwidth Plot on Channel 19



Date: 16.JUL.2024 04:50:04



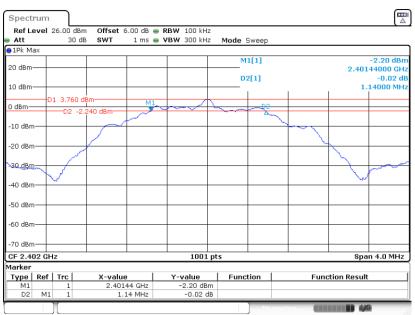


6 dB Bandwidth Plot on Channel 39

Date: 16.JUL.2024 04:52:04

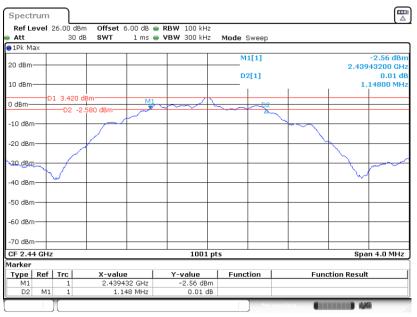
BLE 2Mbps

6 dB Bandwidth Plot on Channel 00



Date: 16.JUL.2024 05:33:48

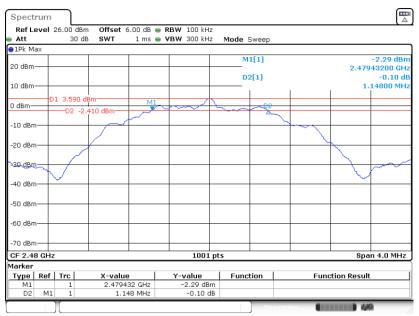




6 dB Bandwidth Plot on Channel 19

Date: 16.JUL.2024 05:36:47

6 dB Bandwidth Plot on Channel 39

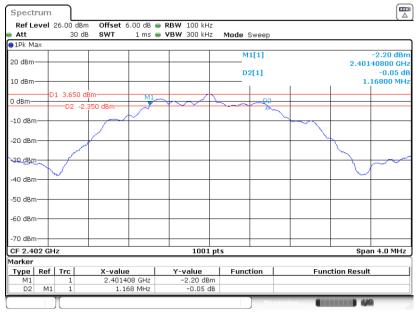


Date: 16.JUL.2024 05:39:02



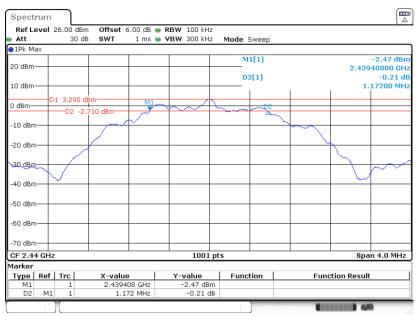
NRF 2Mbps

6 dB Bandwidth Plot on Channel 00



Date: 16.JUL.2024 06:58:25

6 dB Bandwidth Plot on Channel 19



Date: 16.JUL.2024 07:05:29



Ref Lev	el 26.00	dBm Offset DdB SWT		RBW 100 kHz				
1 Att	ال	Jab Swi	1 ms 🖷 '	VBW 300 kHz	Mode Sweep			
20 dBm-					M1[1]			-2.19 dBr 41200 GH
10 dBm					D2[1]			-0.18 d 16800 MH
0 dBm	D1 3.50		M1		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			
-10 dBm—	D2	-2.500 dBm	\checkmark					
-20 dBm—								
-30.dBm-		~					\sum	
-40 dBm—	\bigvee						\bigcirc	\sim
-50 dBm—								
-60 dBm—								
-70 dBm—								
CF 2.48 C	Hz			1001 p	ts		Spa	n 4.0 MHz
1arker Type R	ef Trc	X-valu	e	Y-value	Function	Func	tion Result	
M1	1 M1 1	2.479	412 GHz	-2.19 dBm -0.18 dB	· unocion	. une	and Robult	

6 dB Bandwidth Plot on Channel 39

Date: 16.JUL.2024 07:18:14

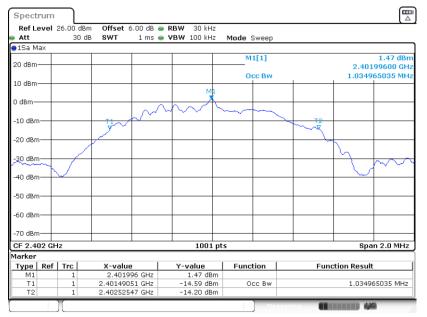


3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

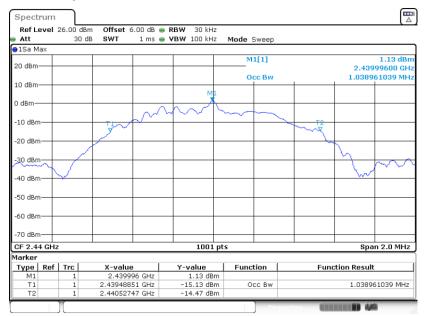
BLE 1Mbps

99% Occupied Bandwidth Plot on Channel 00



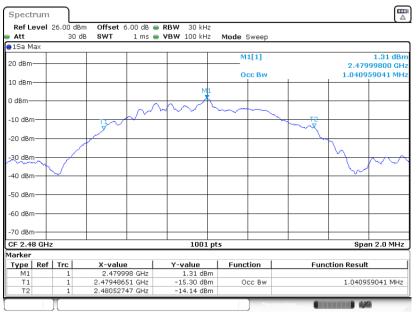
Date: 16.JUL.2024 04:48:51

99% Occupied Bandwidth Plot on Channel 19



Date: 16.JUL.2024 04:51:32



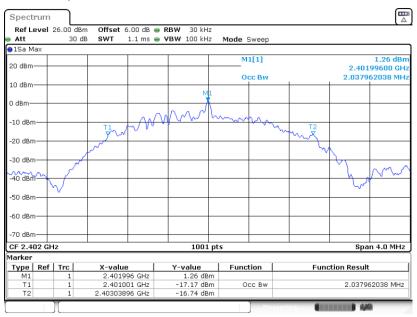


99% Occupied Bandwidth Plot on Channel 39

Date: 16.JUL.2024 04:53:51

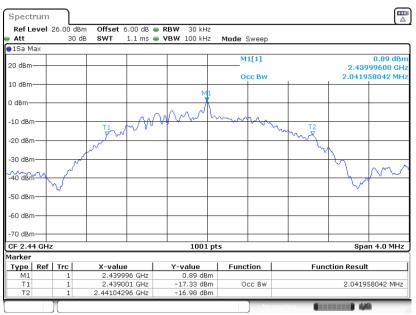
BLE 2Mbps

99% Occupied Bandwidth Plot on Channel 00



Date: 16.JUL.2024 05:35:36

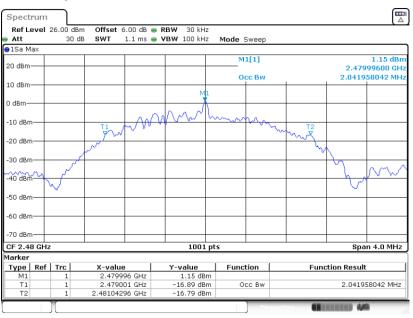




99% Occupied Bandwidth Plot on Channel 19

Date: 16.JUL.2024 05:38:15

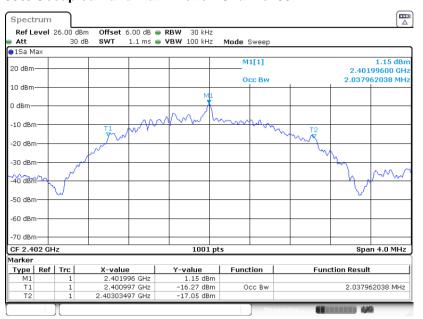
99% Occupied Bandwidth Plot on Channel 39



Date: 16.JUL.2024 05:40:49



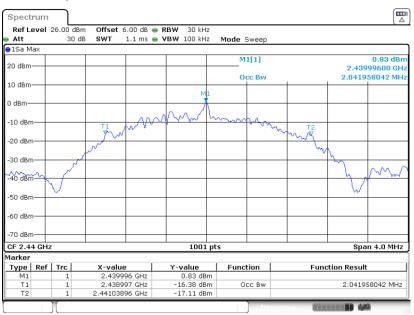
NRF 2Mbps



99% Occupied Bandwidth Plot on Channel 00

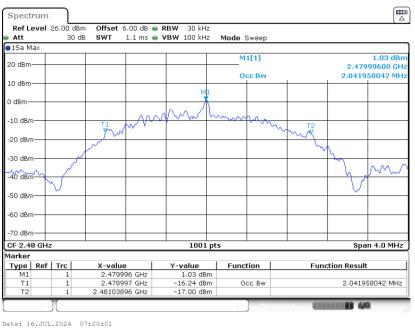
Date: 16.JUL.2024 07:00:12

99% Occupied Bandwidth Plot on Channel 19



Date: 16.JUL.2024 07:06:57





99% Occupied Bandwidth Plot on Channel 39

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.

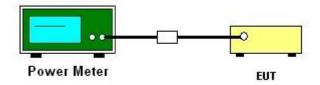
3.2.2 Measuring Instruments

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.

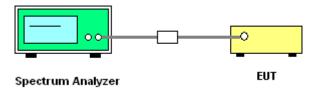
3.3.2 Measuring Instruments

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



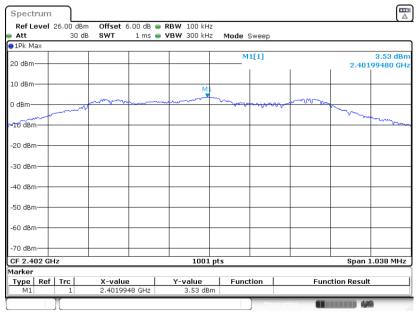
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

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

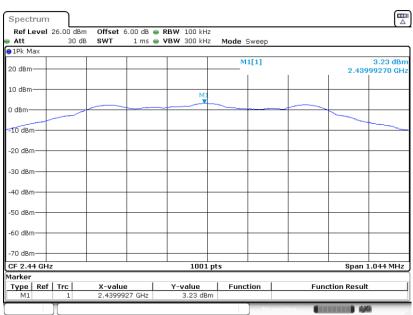
BLE 1Mbps

PSD 100kHz Plot on Channel 00



Date: 16.JUL.2024 04:47:42

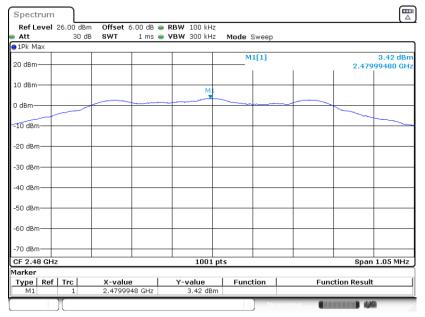
PSD 100kHz Plot on Channel 19



Date: 16.JUL.2024 04:50:42



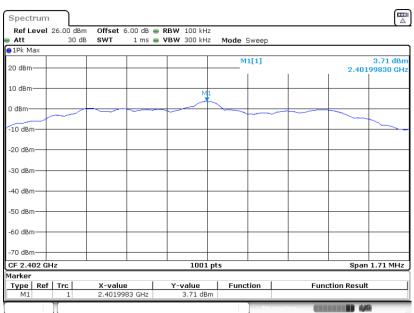
PSD 100kHz Plot on Channel 39



Date: 16.JUL.2024 04:52:42

BLE 2Mbps

PSD 100kHz Plot on Channel 00



Date: 16.JUL.2024 05:34:26

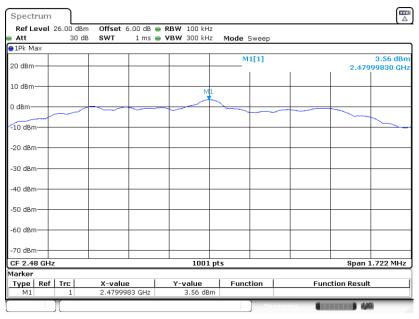


PSD 100kHz Plot on Channel 19

Att 30	dB SWT 1 ms o	VBW 300 kHz	Mode Sweep		
20 dBm			M1[1]		3.37 dBr 9480 GH
LO dBm		м			
) dBm		\rightarrow			
10 dBm					
20 dBm					
30 dBm					
40 dBm					
50 dBm		_			
60 dBm					
-70 dBm					
CF 2.44 GHz		1001 pt	s	Span 1.	722 MHz
larker Type Ref Trc	X-value	Y-value	Function	Function Result	

Date: 16.JUL.2024 05:37:25

PSD 100kHz Plot on Channel 39



Date: 16.JUL.2024 05:39:40



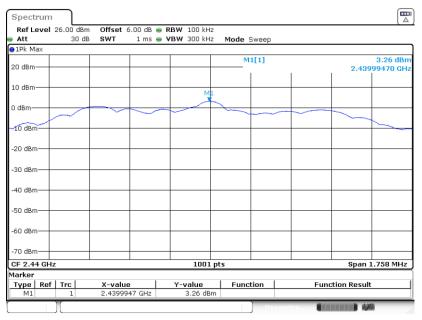
NRF 2Mbps

PSD 100kHz Plot on Channel 00

Ref Level 26.00 dBm Att 30 dB		 RBW 100 kHz VBW 300 kHz 	Mode Sweep	
1Pk Max				
0 dBm			M1[1]	3.60 dE 2.40199300 G
0 dBm		ML		
dBm	~~~	\rightarrow		~
10 dBm				
20 dBm				
30 dBm				
40 dBm				
50 dBm				
50 dBm				
70 dBm		_		
F 2.402 GHz		1001 pt	s	Span 1.752 MH
arker Type Ref Trc M1 1	X-value 2.401993 GHz	Y-value 3.60 dBm	Function	Function Result

Date: 16.JUL.2024 06:59:03

PSD 100kHz Plot on Channel 19



Date: 16.JUL.2024 07:06:07



PSD 100kHz Plot on Channel 39

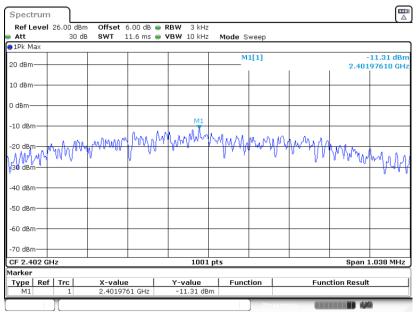
Att 30 d	n Offset 6.00 dB 👄 B SWT 1 ms 👄	VBW 300 kHz	Mode Sweep		
∋1Pk Max					
20 dBm			M1[1]	2.47	3.49 dBn 7999820 GH
10 dBm		M1			
0 dBm					
-10 dBm					
-20 dBm					
-30 dBm					
-40 dBm					
-50 dBm					
-60 dBm					
-70 dBm					
CF 2.48 GHz		1001 pt	s	Spar	1.752 MHz
Marker Type Ref Trc M1 1	X-value 2.4799982 GHz	Y-value 3.49 dBm	Function	Function Resu	ılt

Date: 16.JUL.2024 07:21:39

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

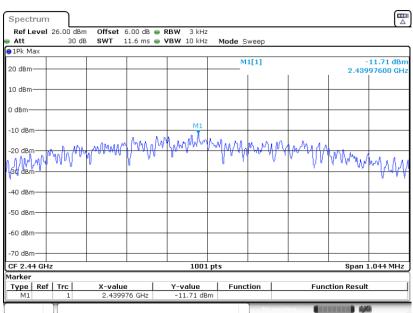
BLE 1Mbps

PSD 3kHz Plot on Channel 00



Date: 16.JUL.2024 04:47:23

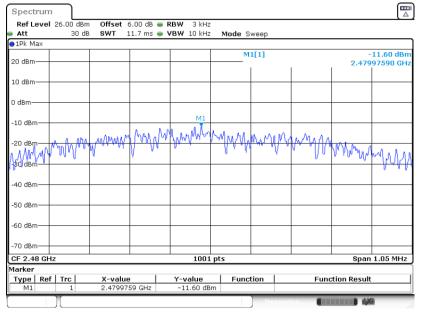
PSD 3kHz Plot on Channel 19



Date: 16.JUL.2024 04:50:23



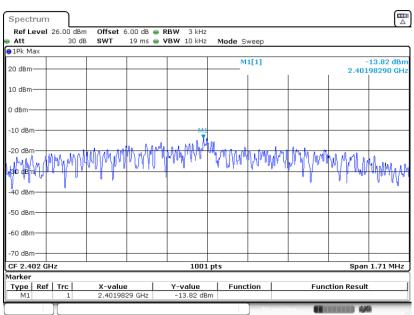
PSD 3kHz Plot on Channel 39



Date: 16.JUL.2024 04:52:24

BLE 2Mbps

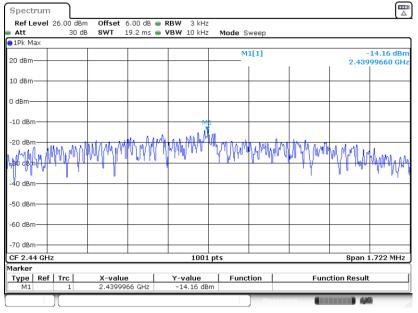
PSD 3kHz Plot on Channel 00



Date: 16.JUL.2024 05:34:07

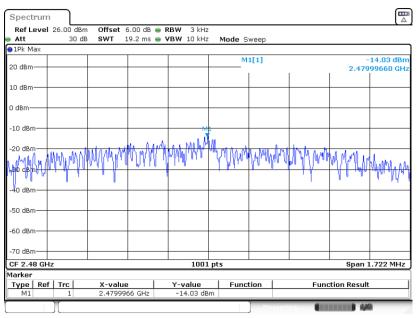


PSD 3kHz Plot on Channel 19



Date: 16.JUL.2024 05:37:06

PSD 3kHz Plot on Channel 39

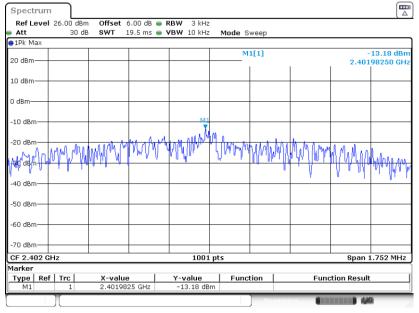


Date: 16.JUL.2024 05:39:21



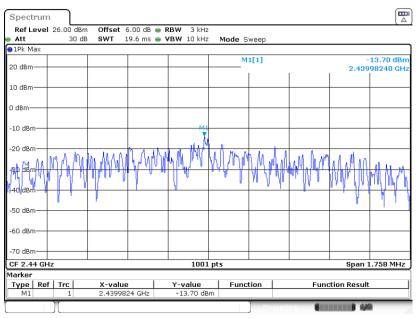
NRF 2Mbps

PSD 3kHz Plot on Channel 00



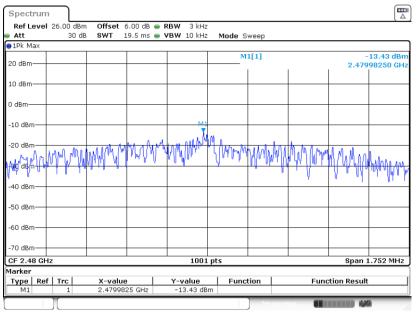
Date: 16.JUL.2024 06:58:44

PSD 3kHz Plot on Channel 19



Date: 16.JUL.2024 07:05:48

PSD 3kHz Plot on Channel 39



Date: 16.JUL.2024 07:18:33



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

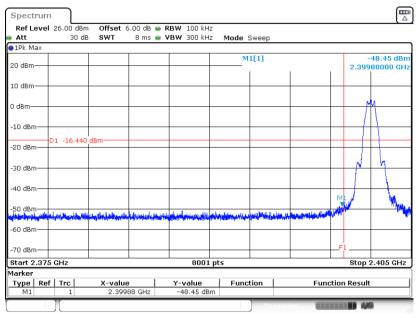




3.4.5 Test Result of Conducted Band Edges Plots

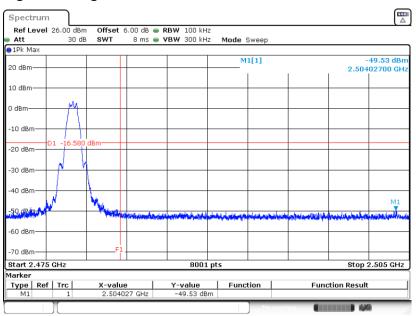
BLE 1Mbps

Low Band Edge Plot on Channel 00



Date: 16.JUL.2024 04:48:01

High Band Edge Plot on Channel 39

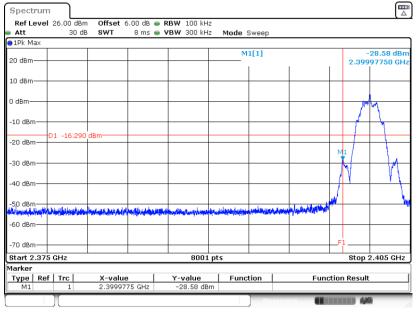


Date: 16.JUL.2024 04:53:01



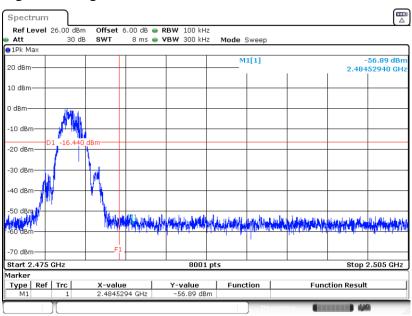
BLE 2Mbps

Low Band Edge Plot on Channel 00



Date: 16.JUL.2024 05:34:45

High Band Edge Plot on Channel 39

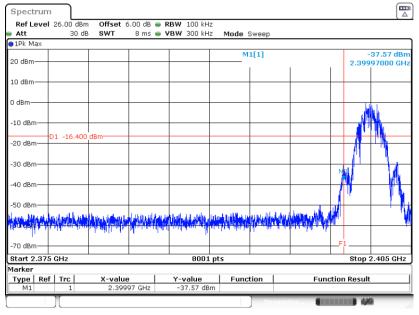


Date: 16.JUL.2024 05:39:59



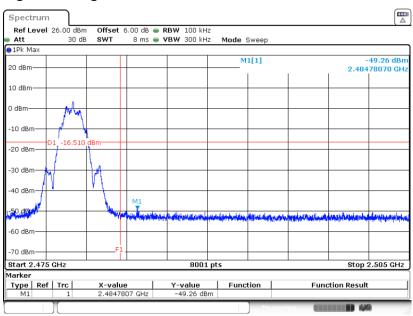
NRF 2Mbps

Low Band Edge Plot on Channel 00



Date: 16.JUL.2024 06:59:22

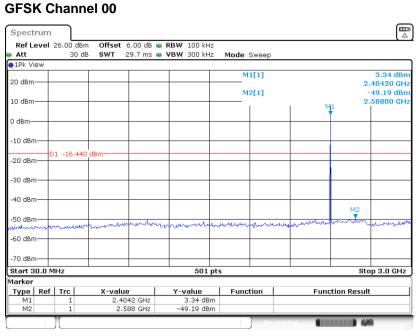
High Band Edge Plot on Channel 39



Date: 16.JUL.2024 07:21:52

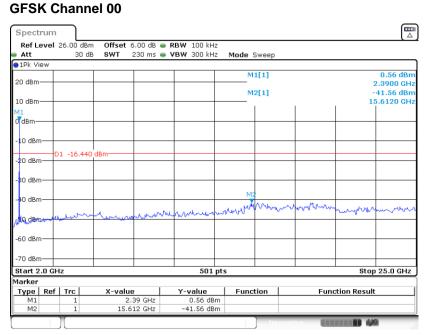
3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps



Date: 16.JUL.2024 04:48:22

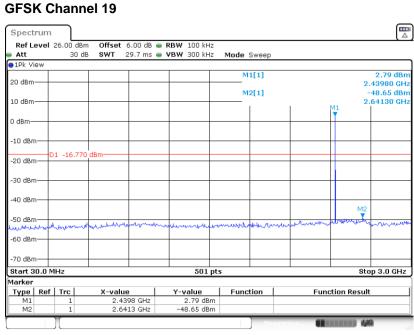
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps



Date: 16.JUL.2024 04:48:42

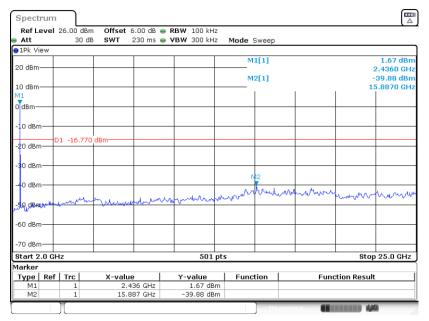


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps



Date: 16.JUL.2024 04:51:03

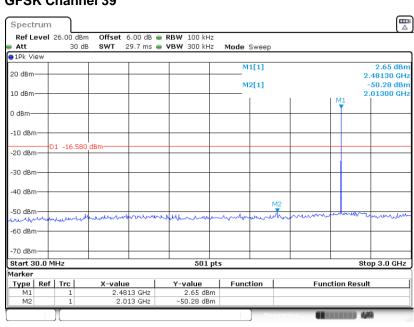
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 16.JUL.2024 04:51:23



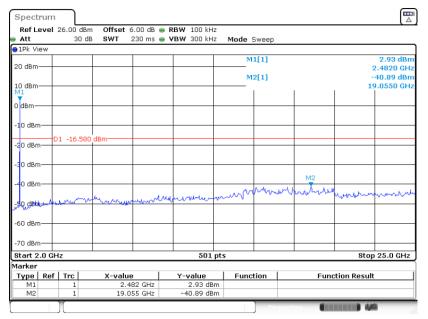
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps



GFSK Channel 39

Date: 16.JUL.2024 04:53:22

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



Date: 16.JUL.2024 04:53:42



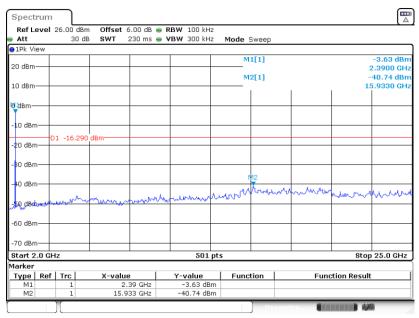
Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

GFSK Channel 00

Ref Level				RBW 100 kHz			
Att	30 0	IB SWT :	29.7 ms 🦷	VBW 300 kHz	Mode Sweep		
1Pk View			1				3.54 dBn
20 dBm					M1[1]		3.54 dBn 2.40420 GH
					M2[1]		-49.51 dBn
							2.96740 GH
						I M_1	
) dBm							
10 dBm						_	
	1 -16.29	l d l m					
20 dBm	1 -10.29	U UBIII					
-30 dBm							
-40 dBm							
							м
-50 dBm		-				mennen	woodenwinder
her with	rund	wenter	m	moundary -	mun	neversion	
-60 dBm							
-70 dBm							
Start 30.0 M	Hz			501 pt	<u> </u>		Stop 3.0 GHz
larker							
Type Ref	Trc	X-value	e	Y-value	Function	Functi	on Result
M1	1		42 GHz	3.54 dBm			
M2	1	2.96	74 GHz	-49.51 dBm			

Date: 16.JUL.2024 05:35:06

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps



GFSK Channel 00

Date: 16.JUL.2024 05:35:26



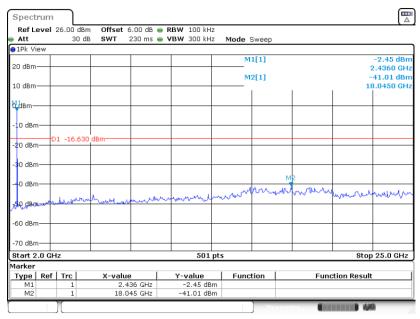
Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

GFSK Channel 19

Ref Level	26.00 dB	m Offset	6.00 dB 🖷	RBW 100 kHz				
Att	30 0	IB SWT	29.7 ms 🥃	VBW 300 kHz	Mode Sweep			
1Pk View								
					M1[1]			2.97 dBn
20 dBm								2.43980 GH
					M2[1]			-49.68 dBn
LO dBm						1	М1	2.35090 GH:
							Ť	
) dBm								
10 dBm								
D	1 -16.63	0_dBm						
20 dBm								
-30 dBm								
40 dBm								
						M2		
50 dBm	1		a materia	mundowner	Mart of the state	Munum	Antro	memer
	Nurthan							
60 dBm								
70 dBm								
Start 30.0 M	IHz			501 pt	s '		S	top 3.0 GHz
larker								
Type Ref	Trc	X-valu	e	Y-value	Function	Func	tion Resu	ılt
M1	1	2.43	98 GHz	2.97 dBm				
M2	1	2.35	09 GHz	-49.68 dBm				

Date: 16.JUL.2024 05:37:46

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

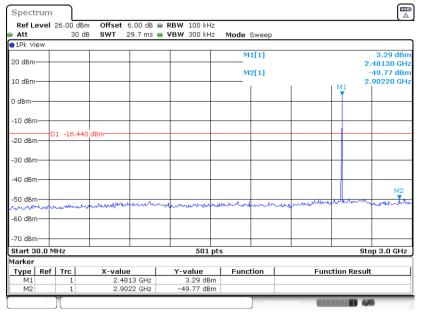


Date: 16.JUL.2024 05:38:06



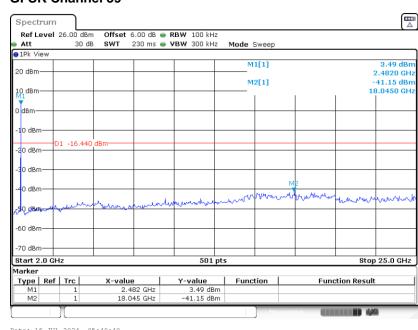
Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

GFSK Channel 39



Date: 16.JUL.2024 05:40:20

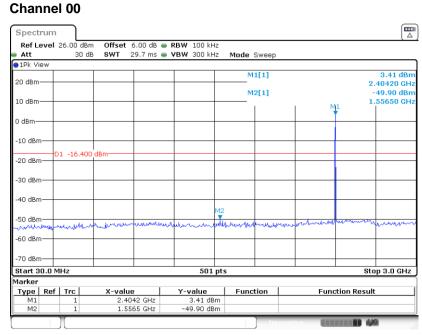
Conducted Spurious Emission Plot on Bluetooth LE 2Mbps



GFSK Channel 39

Date: 16.JUL.2024 05:40:40

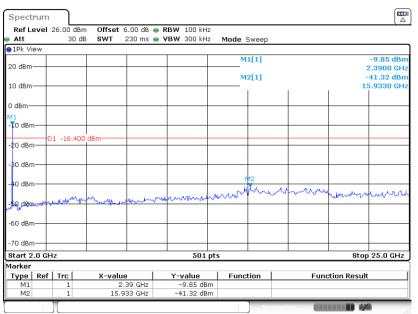
Conducted Spurious Emission Plot on NRF 2Mbps GFSK



Date: 16.JUL.2024 06:59:43

Conducted Spurious Emission Plot on NRF 2Mbps

GFSK Channel 00



Date: 16.JUL.2024 07:00:03



Conducted Spurious Emission Plot on NRF 2Mbps

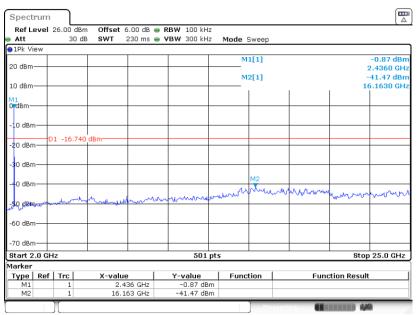
GFSK Channel 19

Ref Level	26.00 d	Bm Offset	6.00 dB 🖷	RBW 100 kHz			(-
Att	30			VBW 300 kHz	Mode Sweep		
1Pk View					· · · · · · · · · · · · · · · · · · ·		
					M1[1]		0.80 dB
20 dBm —							2.43980 GF
					M2[1]		-50.52 dBi
10 dBm						1	2.98520 GH
							M1
0 dBm							
-10 dBm							
	1 -16.7	40 dBm					
-20 dBm							
-30 dBm							
-30 UBIII							
-40 dBm							
-50 dBm							
million	much	mound	mou	men how	newhallower	un marine	Jan Marian
-60 dBm							
-70 dBm							
Start 30.0 N	11.7			501 pt			Stop 3.0 GHz
larker	1112			501 pt	3		atup a.u GH2
Type Ref	Trc	X-value	a 1	Y-value	Function	Euro	ction Result
M1	1		98 GHz	0.80 dBm	runction	Fund	Alon Result
M2	1		52 GHz	-50.52 dBm			

Date: 16.JUL.2024 07:06:28

Conducted Spurious Emission Plot on NRF 2Mbps

GFSK Channel 19



Date: 16.JUL.2024 07:06:48



Conducted Spurious Emission Plot on NRF 2Mbps

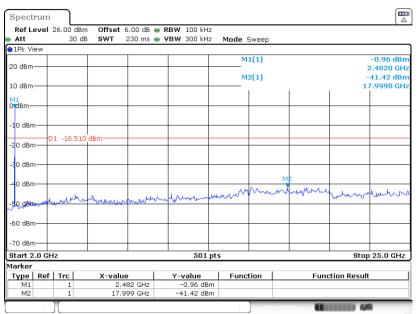
GFSK Channel 39

Ref Level	26.00 d	Bm Offset	6.00 dB 🖷	RBW 100 kHz				
Att	30			VBW 300 kHz	Mode Sweep			
1Pk View		<u>ab 0111 .</u>		TEN COOKIE	Mode Sweep			
20 dBm					M1[1]			3.15 dBm 2.48130 GHz
LO dBm					M2[1]	I		-48.60 dBm 2.64130 GHz
) dBm		_						
10 dBm-								
20 dBm	D1 -16.5	10 dBm						
-30 dBm								
40 dBm							M2	,
50 dBm	num	retendenestive	a maranda	munante	maphim	weither	T	bringhaber
60 dBm								
70 dBm-								
Start 30.0	MHz			501 pt	s		St	op 3.0 GHz
larker								
Type Ref M1		X-value	a I3 GHz	Y-value 3.15 dBm	Function	Fun	ction Resu	It
M1 M2	1		13 GHz	-48.60 dBm				

Date: 16.JUL.2024 07:22:08

Conducted Spurious Emission Plot on NRF 2Mbps

GFSK Channel 39



Date: 16.JUL.2024 07:22:22

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.



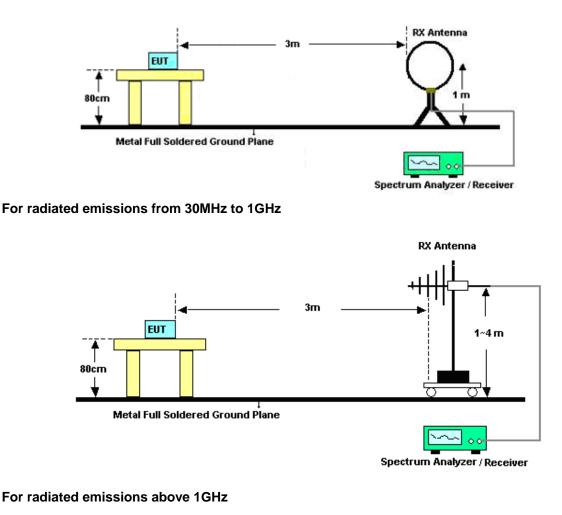
3.5.3 Test Procedures

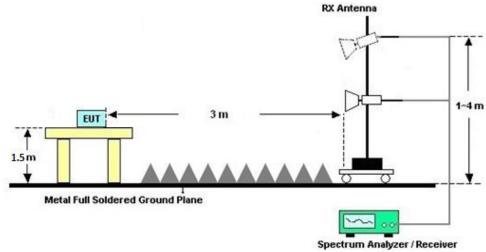
- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get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





Sporton International Inc (Kunshan) TEL : +86-512-57900158 FCC ID: SZGSRHSA2



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

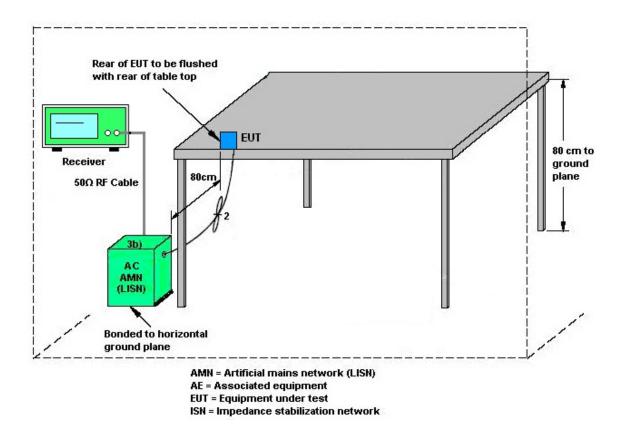
The section 4.0 of List of Measuring Equipment of this test report is used for test.

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
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Jul. 16, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GH z	Jan. 02, 2024	Jul. 16, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Jul. 16, 2024	Jan. 01, 2025	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY564000 23	3Hz~8.5GHz;M ax 30dBm	Jan. 04, 2024	Jul. 17, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Oct. 10, 2023	Jul. 17, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Oct. 10, 2023	Jul. 17, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 12, 2023	Jul. 17, 2024	Aug. 11, 2024	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar. 01, 2024	Jul. 17, 2024	Feb. 28, 2025	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2024	Jul. 17, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2024	Jul. 17, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2024	Jul. 17, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Oct. 10, 2023	Jul. 17, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 04, 2024	Jul. 17, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Jul. 17, 2024	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Jul. 17, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Jul. 17, 2024	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Jul. 19, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jul. 19, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Jul. 19, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jul. 19, 2024	Oct. 10, 2024	Conduction (CO01-KS)

NCR: No Calibration Required



5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Conducted Spurious Emission & Bandedge	±2.26 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.46 dB
Conducted Power Spectral Density	±0.88 dB
Frequency	±0.4 Hz

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

Measuring Uncertainty for a Level of Confidence	2.84 dB
of 95% (U = 2Uc(y))	2.64 uB

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

Measuring Uncertainty for a Level of Confidence	3.30 dB
of 95% (U = 2Uc(y))	3.30 dB

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

Measuring Uncertainty for a Level of Confidence	6.04 dB
of 95% (U = 2Uc(y))	6.04 dB

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

Measuring Uncertainty for a Level of Confidence	5.26 dB
of 95% (U = 2Uc(y))	

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

Measuring Uncertainty for a Level of Confidence	5.04 dB
of 95% (U = 2Uc(y))	5.04 UB

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



Appendix A. Conducted Test Results

Report Number : FR420222-01

Bluetooth Low Energy

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2024/7/16	Relative Humidity:	40~51	%

						6d	TEST	E1M-Ant1 RESULTS 6 Occupie	
N	vlod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
I	BLE	1Mbps	1	0	2402	1.03	0.69	0.50	Pass
I	BLE	1Mbps	1	19	2440	1.04	0.70	0.50	Pass
ł	BLE	1Mbps	1	39	2480	1.04	0.70	0.50	Pass

						-	RESULTS K Power T				
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	4.06	30.00	2.00	6.06	36.00	Pass	
BLE	1Mbps	1	19	2440	3.84	30.00	2.00	5.84	36.00	Pass	
BLE	1Mbps	1	39	2480	4.04	30.00	2.00	6.04	36.00	Pass	

						<u>TEST </u> <u>Avera</u> (Re
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.01	3.89
BLE	1Mbps	1	19	2440	2.01	3.68
BLE	1Mbps	1	39	2480	2.01	3.86

						-	<u>RESULTS</u> Power De		
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	3.53	-11.31	2.00	8.00	Pass
BLE	1Mbps	1	19	2440	3.23	-11.71	2.00	8.00	Pass
BLE	1Mbps	1	39	2480	3.42	-11.60	2.00	8.00	Pass



Bluetooth Low Energy

6dB and 99% Occupied Bandwidth
6dB BW
Mod. Data Rate NTX CH. Freq. Occupied BW (MHz) CHB Pass/Fail (MHz) (MHz) (MHz) Pass/Fail
BLE 2Mbps 1 0 2402 2.04 1.14 0.50 Pass
BLE 2Mbps 1 19 2440 2.04 1.15 0.50 Pass
BLE 2Mbps 1 39 2480 2.04 1.15 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	4.06	30.00	2.00	6.06	36.00	Pass
BLE	2Mbps	1	19	2440	3.84	30.00	2.00	5.84	36.00	Pass
BLE	2Mbps	1	39	2480	4.08	30.00	2.00	6.08	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	2Mbps	1	0	2402	4.77	3.79	
BLE	2Mbps	1	19	2440	4.77	3.71	
BLE	2Mbps	1	39	2480	4.77	3.92	

							RESULTS Power De			
Mod.	Data Rate	Ντx	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	3.71	-13.82	2.00	8.00	Pass	
BLE	2Mbps	1	19	2440	3.37	-14.16	2.00	8.00	Pass	
BLE	2Mbps	1	39	2480	3.56	-14.03	2.00	8.00	Pass	



Bluetooth Low Energy

						6d	TEST	F-Ant1 RESULTS 6 Occupie	<u>DATA</u> d Bandwid
-			1						
	Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
ľ	NRF	2Mbps	1	0	2402	2.04	1.17	0.50	Pass
	NRF	2Mbps	1	19	2440	2.04	1.17	0.50	Pass
	NRF	2Mbps	1	39	2480	2.04	1.17	0.50	Pass

TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	Ντx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
NRF	2Mbps	1	0	2402	4.09	30.00	2.00	6.09	36.00	Pass
NRF	2Mbps	1	19	2440	3.89	30.00	2.00	5.89	36.00	Pass
NRF	2Mbps	1	39	2480	4.11	30.00	2.00	6.11	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)	
NRF	2Mbps	1	0	2402	5.28	3.94	
NRF	2Mbps	1	19	2440	5.28	3.75	
NRF	2Mbps	1	39	2480	5.28	3.92	

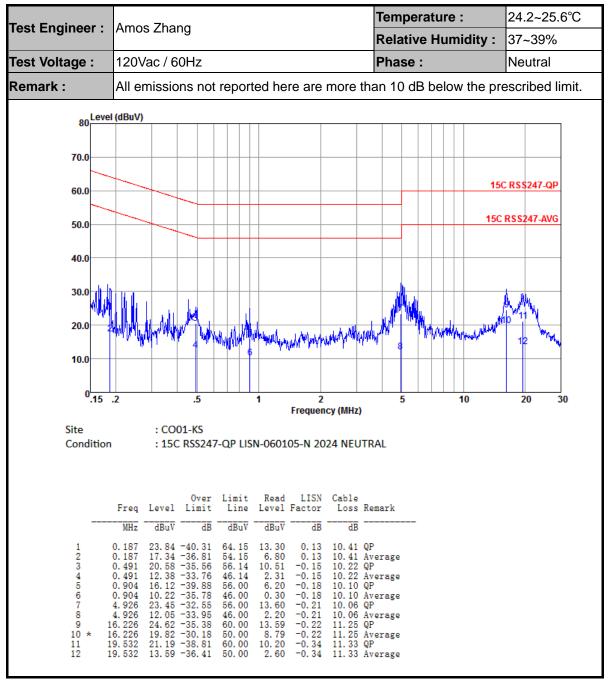
							RESULTS Power De			
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail	
NRF	2Mbps	1	0	2402	3.60	-13.18	2.00	8.00	Pass	
NRF	2Mbps	1	19	2440	3.26	-13.70	2.00	8.00	Pass	
NRF	2Mbps	1	39	2480	3.49	-13.43	2.00	8.00	Pass	



Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amon Zho	20		Temperatu	ıre :	24.2~25.6°C
rest Engineer :	Amos zna	ng		Relative H	umidity :	37~39%
Test Voltage :	120Vac/6	60Hz		Phase :		Line
Remark :	All emissic	ons not repor	ted here are mor	e than 10 dB be	elow the pre	escribed limit.
80	(dBuV)					
80						
70.0						
60.0					150	CRS\$247-QP
					15C	RSS247-AVG
50.0						
40.0						
30.0	 } −					
l Mw					Million march with	
20.0	Multiner and Wei	MW NWWW	and Martin and the starting and a start	have a start	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	12 When w
10.0						
0.15	.2	.5	1 2 Frequency (MI	5 Iz)	10	20 30
Site	: CO	01-KS				
Condition	: 150	CRSS247-QP LIS	N-060105-L 2024 LI	IE		
		Over Limit	Read LISN Cabi	0		
	Freq Level			s Remark		
	MHz dBuV	dB dBuV	dBuV dB	IB		
2	0.189 14.70	-34.06 64.06 -39.36 54.06	19.50 0.09 10.4 4.20 0.09 10.4	1 Average		
4	0.247 14.06	-33.20 61.86 -37.80 51.86 -27.87 56.00	3.60 0.09 10.3	37 Average		
6	0.880 12.53	-37.87 56.00 -33.47 46.00 -32.56 56.00		10 QF 10 Average 16 QP		
8	4.952 14.04	-31.96 46.00 -35.20 60.00	4.20 -0.22 10.0)6 Average		
10 * 1 11 1	6.226 19.90 9.635 21.70	-30.10 50.00 -38.30 60.00	8.90 -0.25 11.5	25 Average		
12 1	9.635 14.40	-35.60 50.00	3.50 -0.43 11.3	3 Average		





Note:

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



Appendix C. Radiated Spurious Emission Test Data

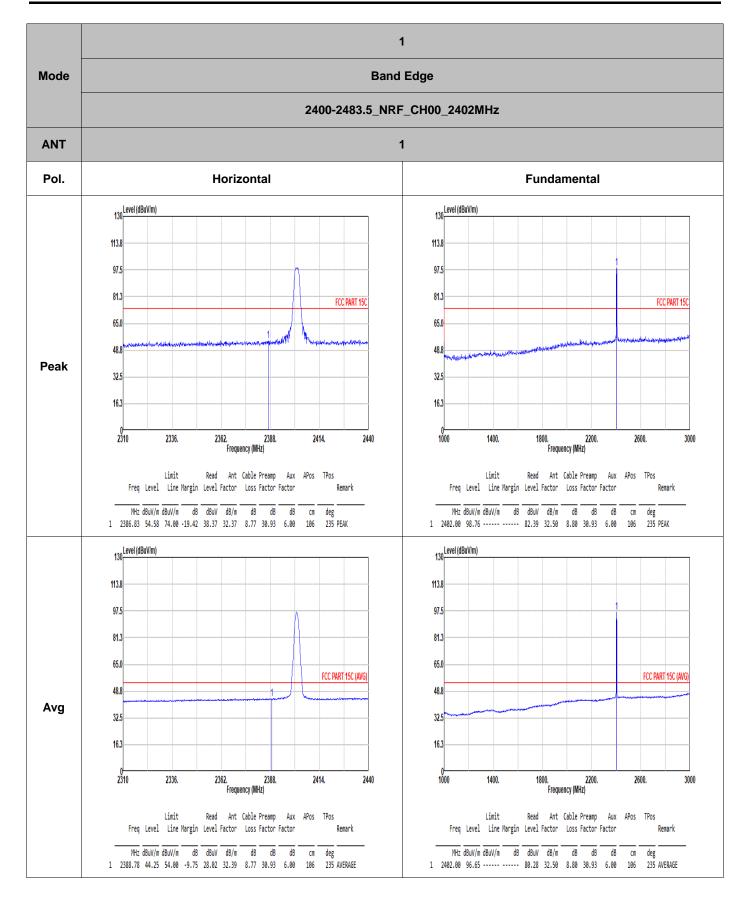
Test Engineer :		Koi Ji			Relative Hun	nidity :	51~53%	
TOST Elig					Temperature	:	25.2~26.5 ℃	
Radiate	d Spuriou	IS Emission	Test Modes					
Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483	.5 1	NRF	00	2402	2Mbps	-	-
Mode 2	2400-2483	.5 1	NRF	19	2440	2Mbps	-	-
Mode 3	2400-2483	.5 1	NRF	39	2480	2Mbps	-	-
Mode 4	2400-2483	.5 1	Bluetooth-LE	00	2402	1Mbps	-	-
Mode 5	2400-2483	.5 1	Bluetooth-LE	19	2440	1Mbps	-	-
Mode 6	2400-2483	.5 1	Bluetooth-LE	39	2480	1Mbps	-	-

Remark: For BLE 2M and nRF mode, the whole testing have assessed only nRF to cover BLE 2M by referring to the higher output power.

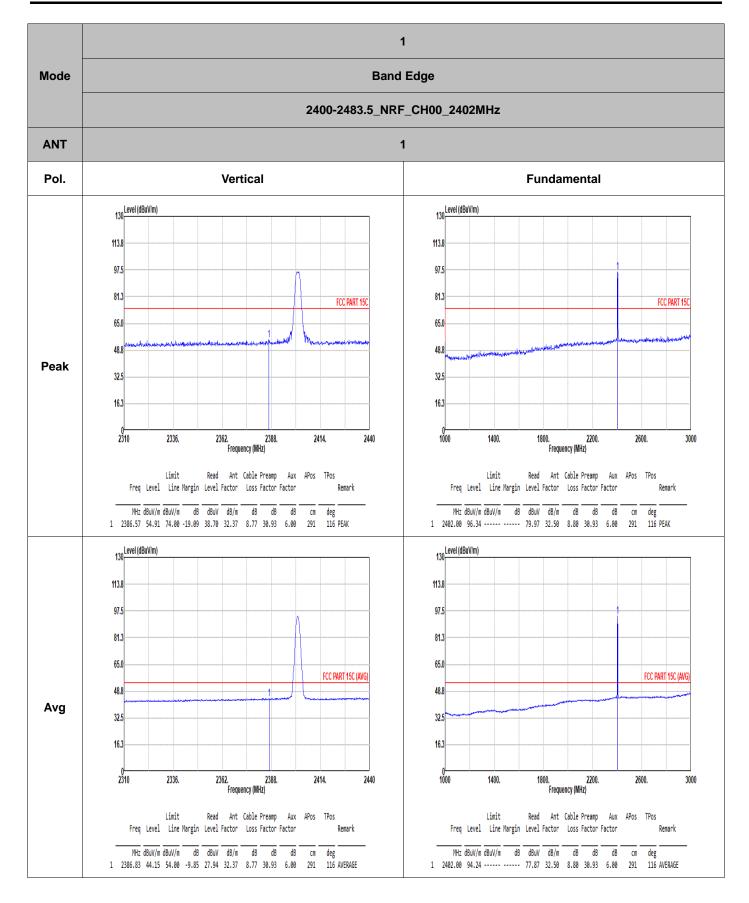
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	NRF	00	2388.78	44.25	54.00	-9.75	Н	AVERAGE	Pass	Band Edge
1	NRF	00	4804.00	47.69	54.00	-6.31	Н	AVERAGE	Pass	Harmonic
2	NRF	19	-	-	-	-	-	-	-	Band Edge
2	NRF	19	4880.00	45.67	54.00	-8.33	V	AVERAGE	Pass	Harmonic
3	NRF	39	2483.68	46.28	54.00	-7.72	Н	AVERAGE	Pass	Band Edge
3	NRF	39	7440.00	43.00	54.00	-11.00	Н	AVERAGE	Pass	Harmonic
4	Bluetooth-LE	00	2386.96	42.78	54.00	-11.22	Н	AVERAGE	Pass	Band Edge
4	Bluetooth-LE	00	4804.00	45.84	54.00	-8.16	V	AVERAGE	Pass	Harmonic
5	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
5	Bluetooth-LE	19	4880.00	46.81	54.00	-7.19	V	AVERAGE	Pass	Harmonic
6	Bluetooth-LE	39	2495.38	42.62	54.00	-11.38	V	AVERAGE	Pass	Band Edge
6	Bluetooth-LE	39	4960.00	39.61	54.00	-14.39	V	AVERAGE	Pass	Harmonic

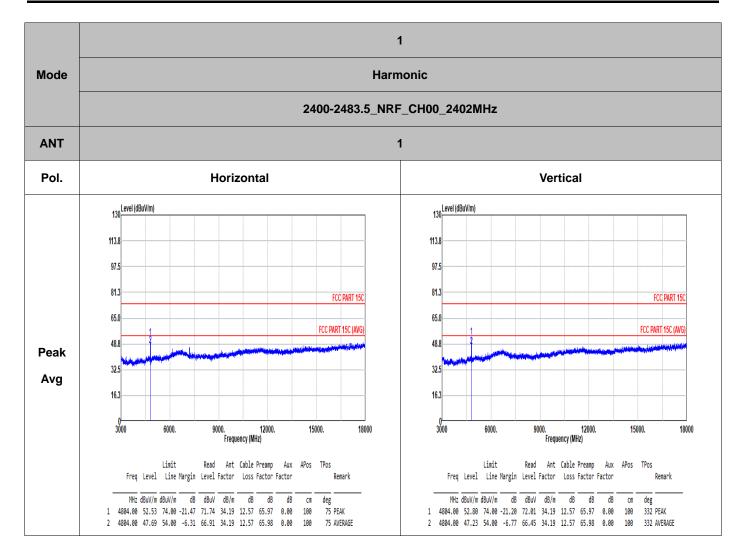




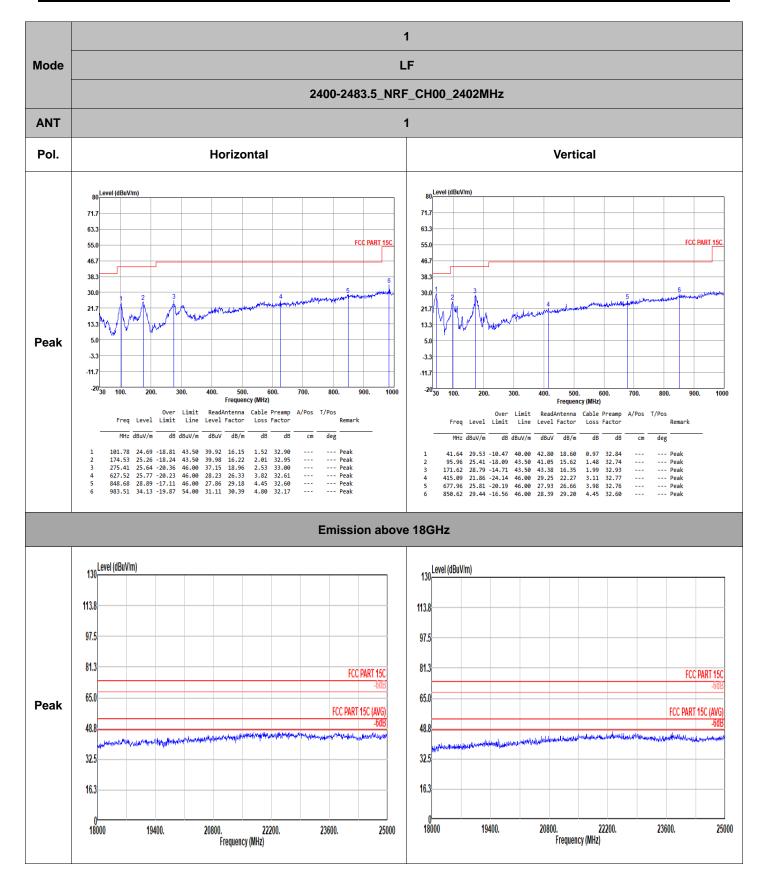




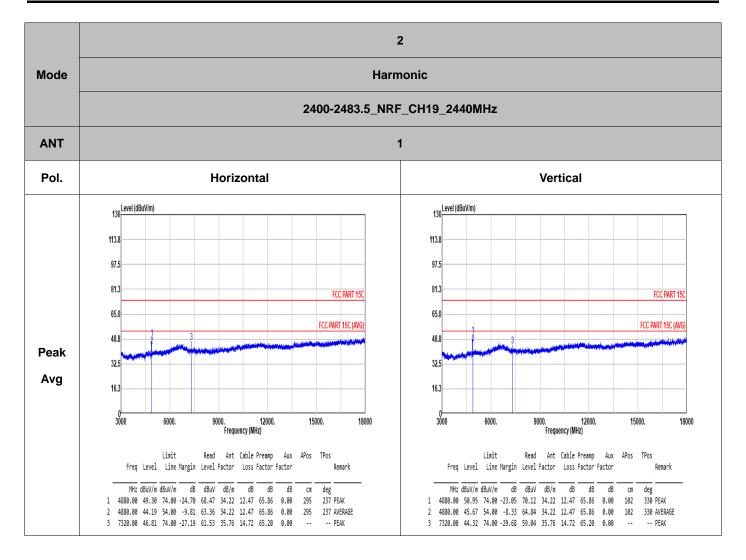




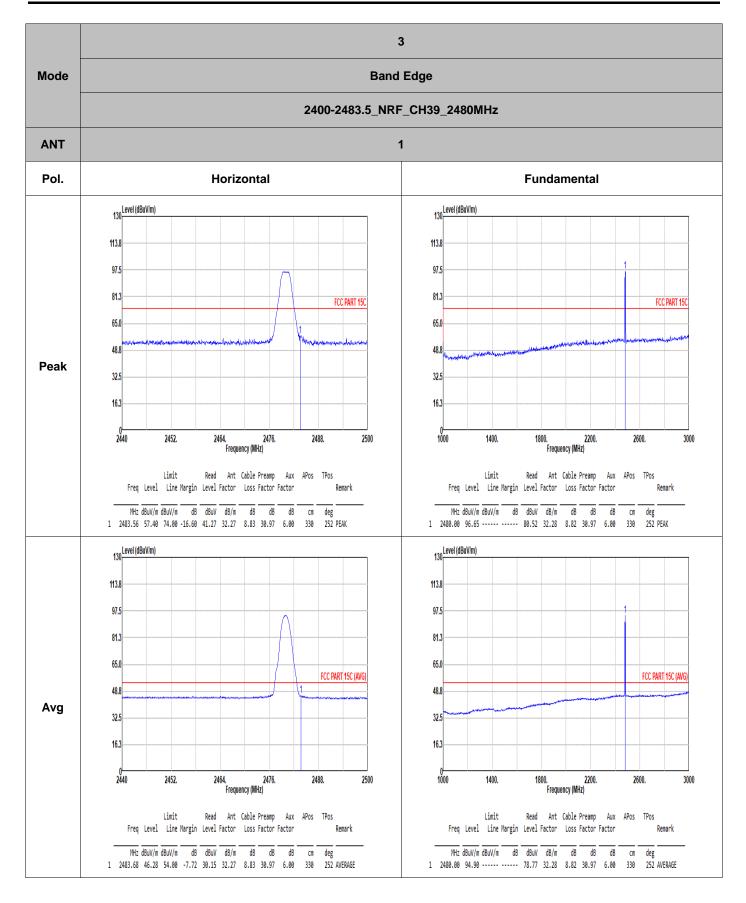




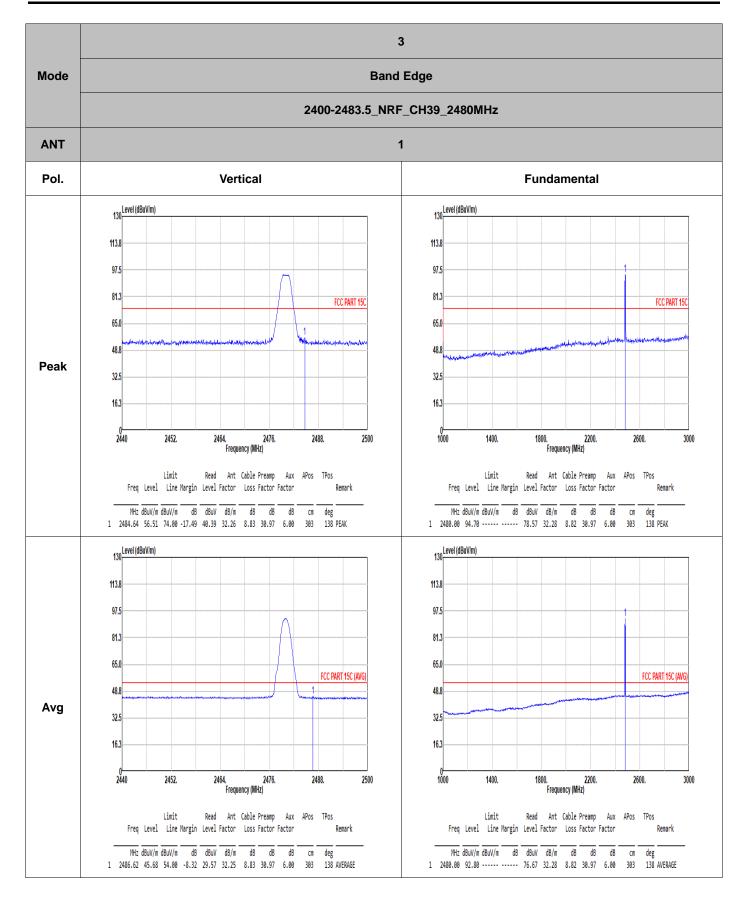




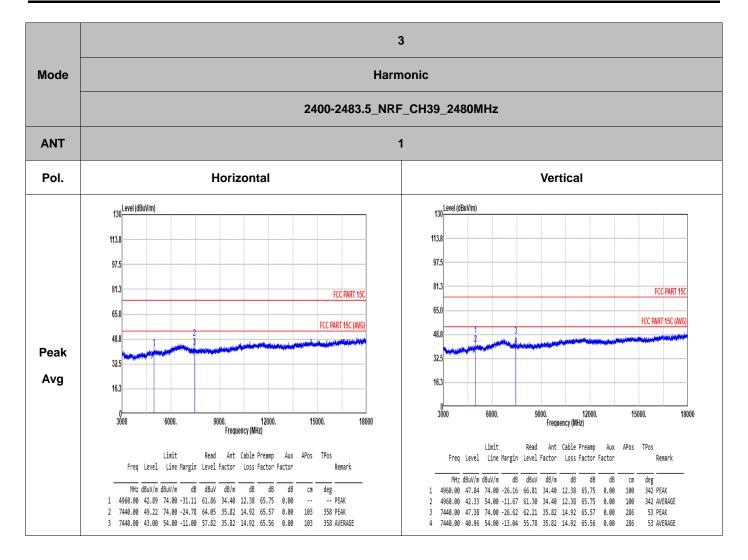




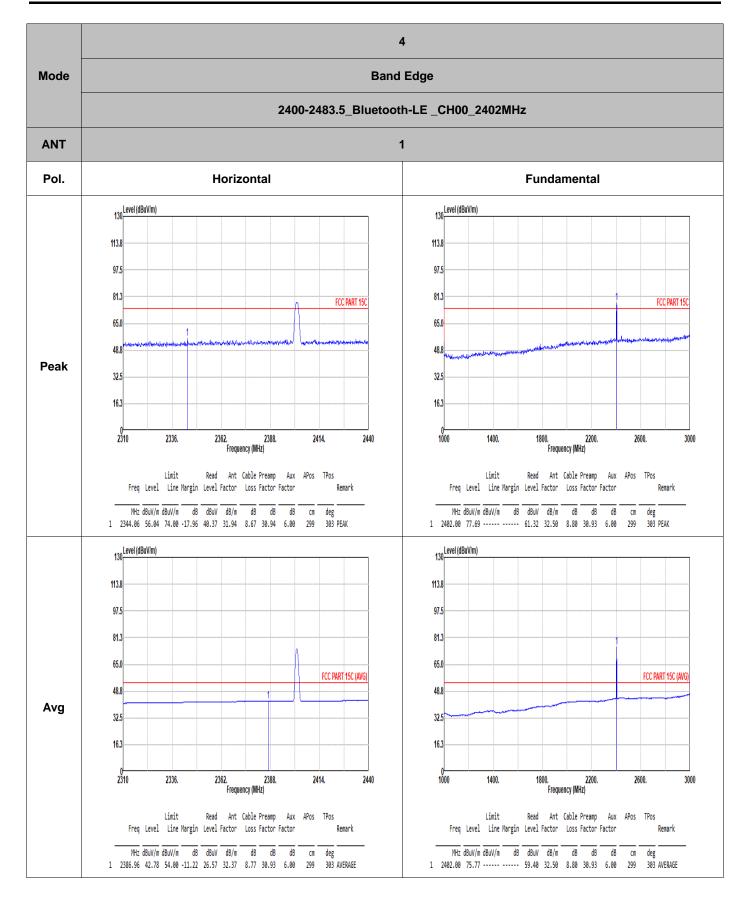




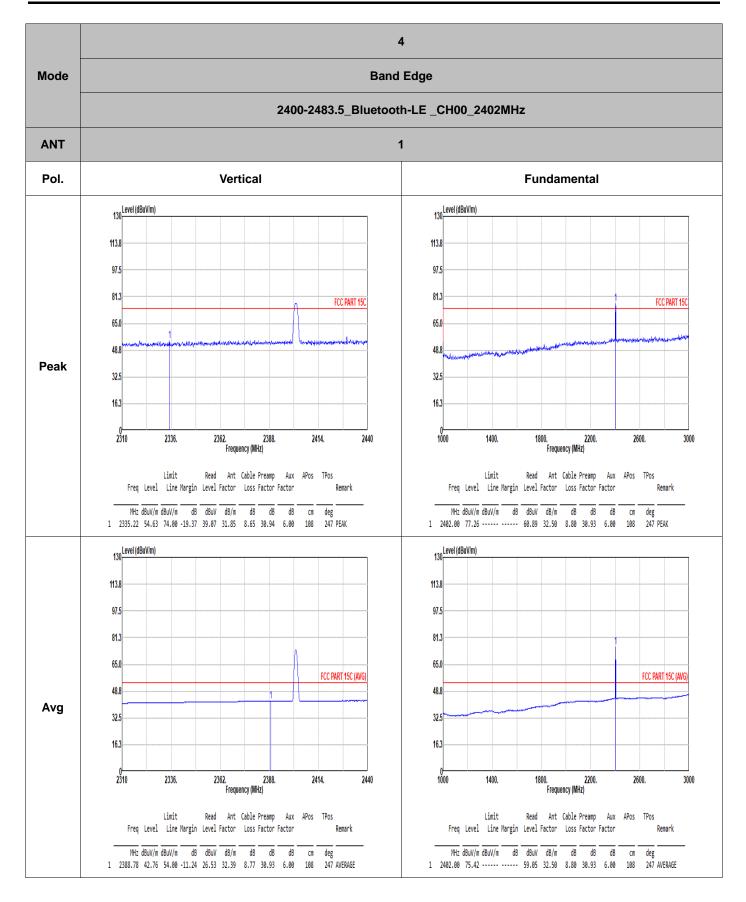




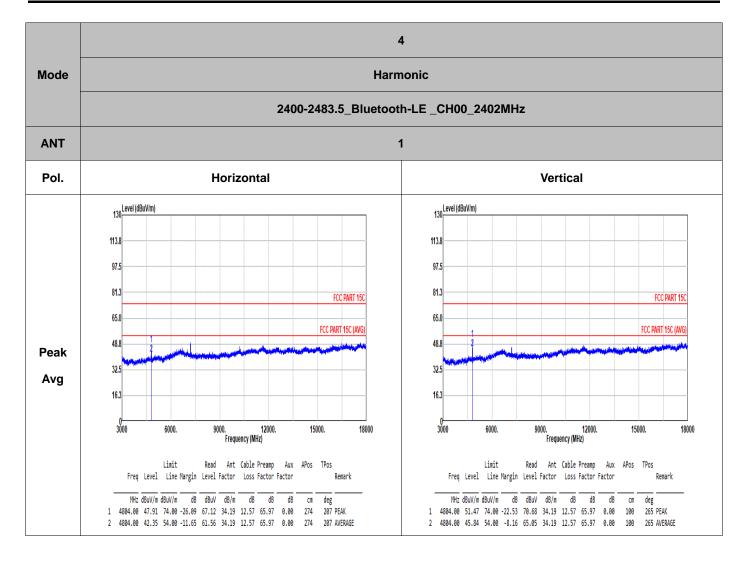




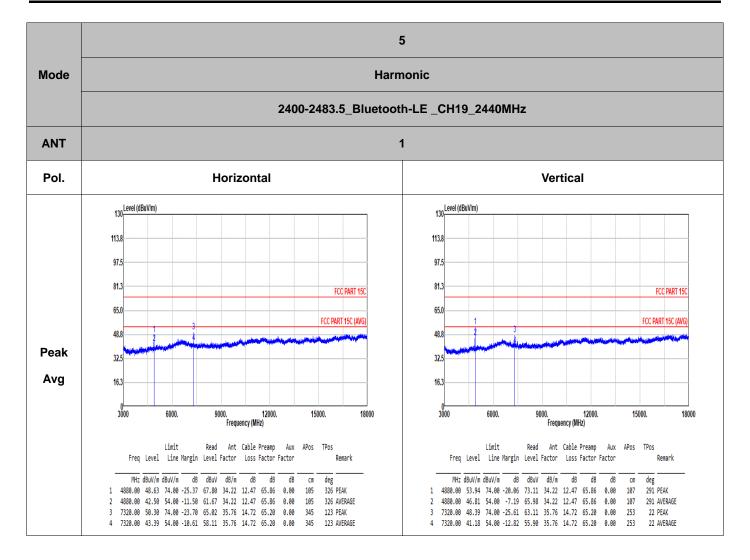




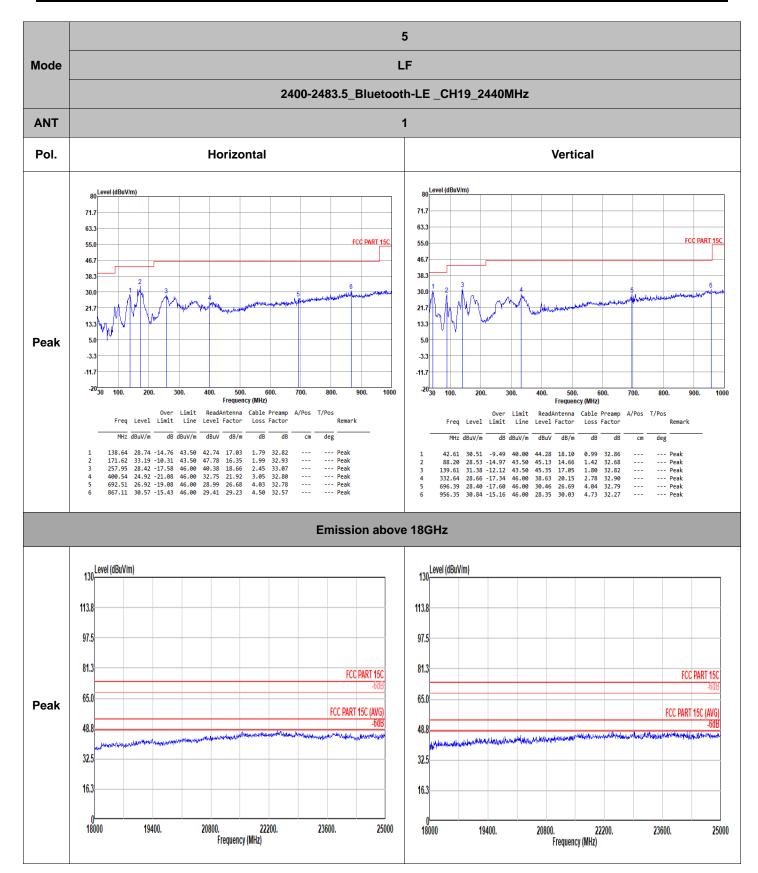




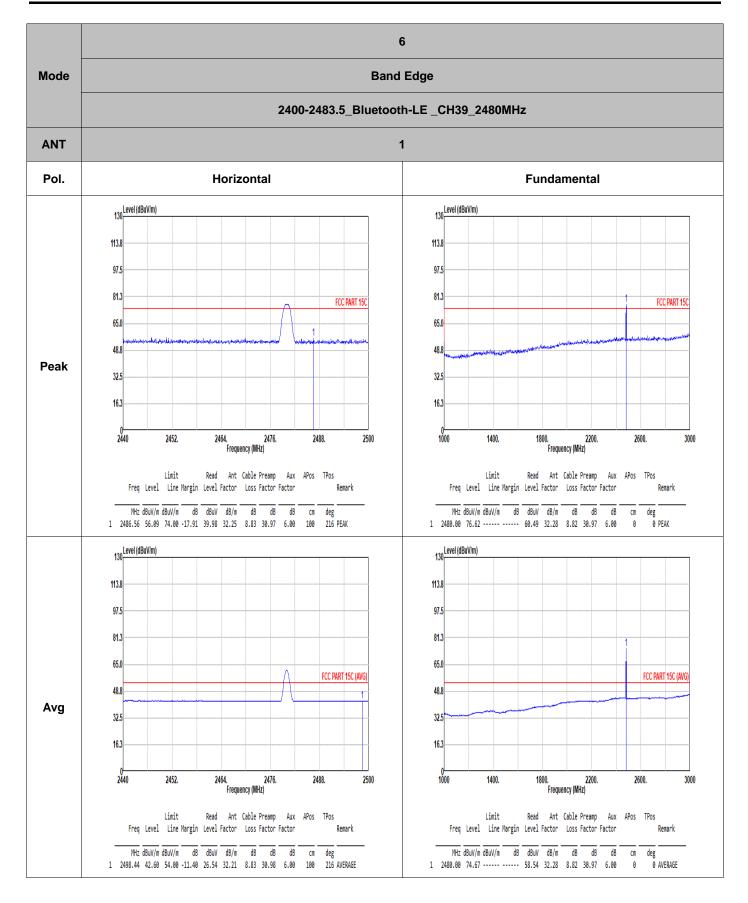




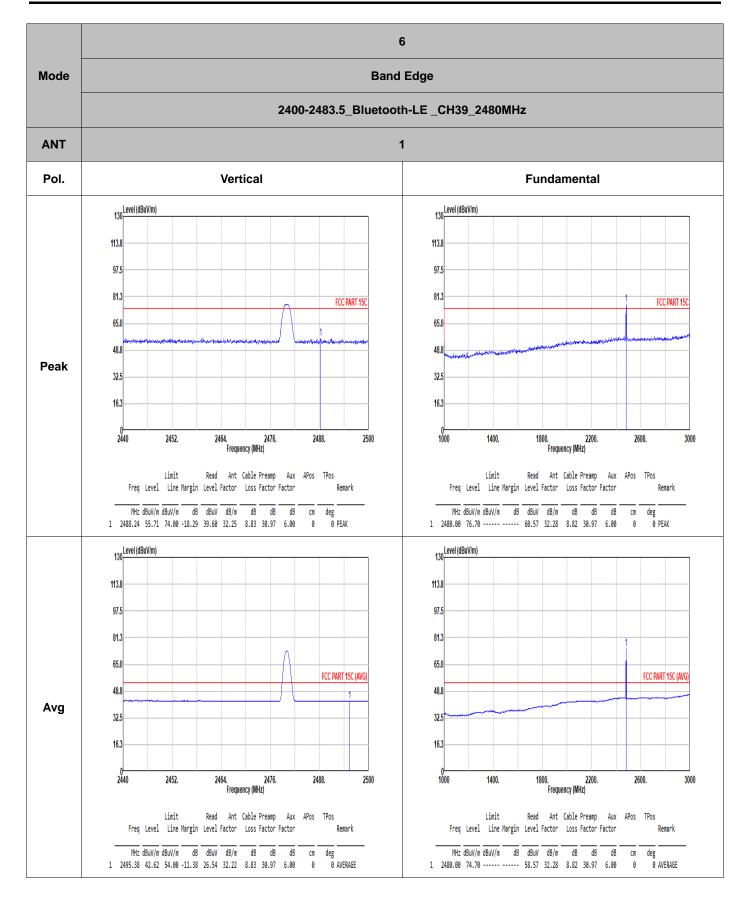




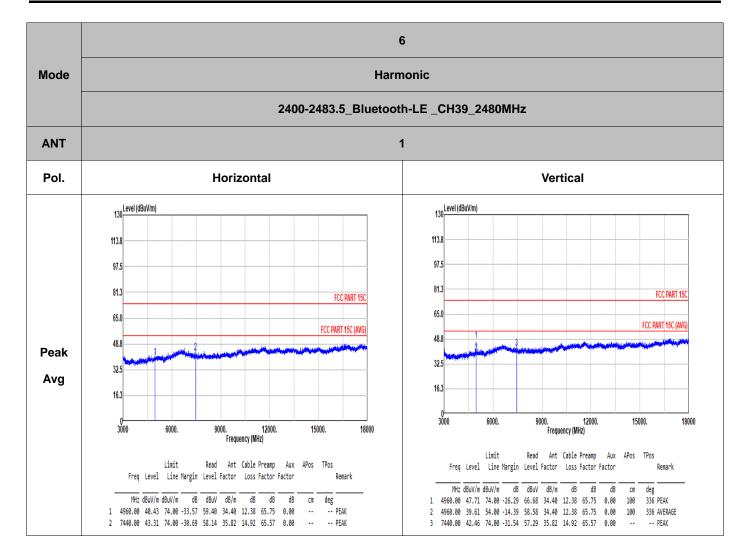














Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
BLE 1Mbps	62.82	0.392	2.551	2.7KHz
nRF	33.227	0.208	4.808	5.1KHz

BLE 1Mbps

13 Spectrum 1 Spectrum	1	Sig Track 106.99 לאיע 201	3∆1	Mkr1 60	0.0 µs dBµV Marke 0 Nc De	er Time 100 μs er Mode ormal elta (Δ) xed	Settings Peak Search Pk Searc Config Propertie
7 0 7 0 7 0 7 0 7 0 7 0 7 0 7 0 7 0 7 0	1	∂2Δ1	3Δ1		Marke	ormal elta (Δ)	Search Pk Searc Config Propertie
7.0 7.0 7.0 7.0 7.0			3Δ1	www.merwhilelay	Fb		
0 0	-AP-14	handfa Nymogenhaans		we want			
					Of	f	Marker Functior
nter 2.402000000 GHz es BW (-6dB) 10 MHz	#Video E	BW 8.0 MHz		Sj Sweep 2.00 ms (1	pan 0 Hz (F	Deita Marker Reset Deita) er Table	Marker- Counter
Marker Table 🔻						On Off	
Mode Trace Scale 1 N 1 t 2 Δ1 1 t (Δ) 3 Δ1 1 t (Δ)	X Y <u>600.0 μs</u> <u>66.48</u> 392.0 μs (Δ) -0.17 624.0 μs (Δ) -1.1		Function Wi	idth Function		arker Settings Diagram I Markers Off	
4 5 6					Ċ	e Markers On Off	

nRF

