



FCC Test Report

Report No: FCS202209031W01

Issued for

Applicant:	Shenzhen Shi FuXinQingYuan Technology Co., Ltd.
Address:	Shenzhen Shi Longgangqu Bantianjiedao Bantianshequ liyuanxincun 93hao1001
Product Name:	Wireless Sleep
Brand Name:	MMUSS
Model Name:	MBL100
Series Model:	N/A
FCC ID:	2A8PT-MBL100
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name.....: Shenzhenshi FuXinQingYuan Technology Co., Ltd.

Address.....: Shenzhenshi Longgangqu Bantianjiedao Bantianshequ liyuanxincun 93hao1001

Manufacture's Name.....: Shenzhenshi FuXinQingYuan Technology Co., Ltd.

Address.....: Shenzhenshi Longgangqu Bantianjiedao Bantianshequ liyuanxincun 93hao1001

Product Description

Product Name.....: Wireless Sleep

Brand Name.....: MMUSS

Model Name.....: MBL100

Series Model.....: N/A

Test Standards.....: FCC Rules and Regulations Part 15 Subpart C, Section 247

Test Procedure.....: ANSI C63.10:2013

This device described above has been tested by Flux Compliance Service Laboratory, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....:

Date (s) of performance of tests.: Sep 9, 2022 ~ Sep 14, 2022

Date of Issue.....: Sep 15, 2022

Test Result.....: Pass

Tested by : Scott shen
(Scott Shen)

Reviewed by : Duke Qian
(Duke Qian)

Approved by : Jack Wang
(Jack Wang)



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Revision History

Rev.	Issue Date	Effect Page	Contents
00	Sep 15, 2022	N/A	N/A

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247, Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247 (b)(2)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(iii)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(iii)	Dwell Time	PASS	--
15.247(a)(1)	20dB Bandwidth 99% Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
Laboray Accreditations	
FCC Test Firm Registration Number: 514908 CNAS Number: L15566 Designation number: CN0127 A2LA accreditation number: 5545.01 ISED Number: 25801	

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.71 \text{ dB}$
2	Unwanted Emissions, conducted	$\pm 2.988 \text{ dB}$
3	Conducted Emission (9KHz-150KHz)	$\pm 4.13 \text{ dB}$
4	All emissions radiated (9KHz -30MHz)	$\pm 3.1 \text{ dB}$
5	Conducted Emission (150KHz-30MHz)	$\pm 4.74 \text{ dB}$
6	All emissions,radiated(<1G) 30MHz-1000MHz	$\pm 5.2 \text{ dB}$
7	All emissions,radiated 1GHz -18GHz	$\pm 4.66 \text{ dB}$
8	All emissions,radiated 18GHz -40GHz	$\pm 4.31 \text{ dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Wireless Sleep
Trade Name	MMUSS
Model Name	MBL100
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Operation frequency	2402MHz-2480MHz
Modulation:	GFSK
Channel number	79 CH
Transmitter rate:	1MHz
Power Supply	DC 5V 1A
Battery	DC 3.7V
Report number	FCS202209031W01
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	N/A	PCB Antenna	N/A	-0.58	Antenna

2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Block diagram of EUT configuration for test



Test software: the



The test software was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

No.	Test model description
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Hopping GFSK

Note:

1. All the test modes can be supply by battery, only the result of the worst case recorded in the report. GFSK mode is worst mode.
2. For radiated emission, 3 axis were chosen for testing for each applicable mode.
3. The EUT used fully charge battery when tested.
4. During the test, the dutycycle>98%, the test voltage was tuned from 85% to 115% of the Nominal rate supply votage, and found that the worst case was the nominal rated supply condition, So the report just shows that condition's data

2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
1	Adapter	XIOAMI	MDY-11-EB	N/A	this adapter is for testing only in repor

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.4 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2022.01.27	2023.01.26
Signal Analyzer	R&S	FSV40-N	FCS-E012	2022.01.27	2023.01.26
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2022.01.27	2023.01.26
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2022.01.27	2023.01.26
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2022.01.27	2023.01.26
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2022.01.27	2023.01.26
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2022.01.27	2023.01.26
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2022.01.27	2023.01.26
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2022.01.27	2023.01.26
Temperature & Humidity	HTC-1	victor	FCS-E005	2022.01.27	2023.01.26
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2022.01.27	2023.01.26
LISN	R&S	ENV216	FCS-E007	2022.01.27	2023.01.26
LISN	ETS	3810/2NM	FCS-E009	2022.01.27	2023.01.26
Temperature & Humidity	HTC-1	victor	FCS-E008	2022.01.27	2023.01.26
Testing Software	EZ-EMC(Ver.EMC-CON 3A1.1)				

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2022.01.27	2023.01.26
Spectrum Analyzer	Agilent	E4447A	MY50180039	2022.01.27	2023.01.26
Spectrum Analyzer	R&S	FSV-40	101499	2022.01.27	2023.01.26
Power Sensor	Agilent	UX2021XA	FCS-E021	2022.01.27	2023.01.26
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

3 CONDUCTED EMISSION MEASUREMENT

3.1 LIMIT

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

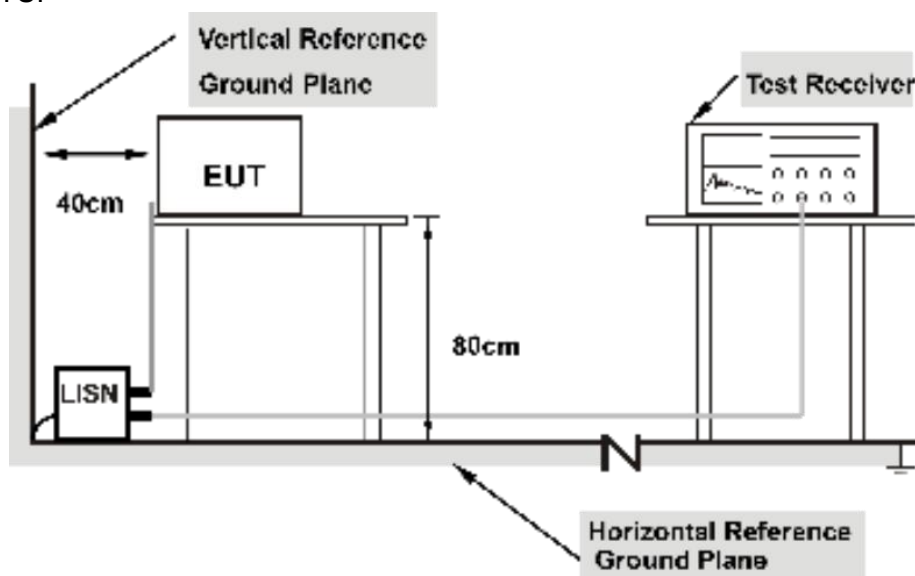
3.2 TEST PROCEDURE

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP

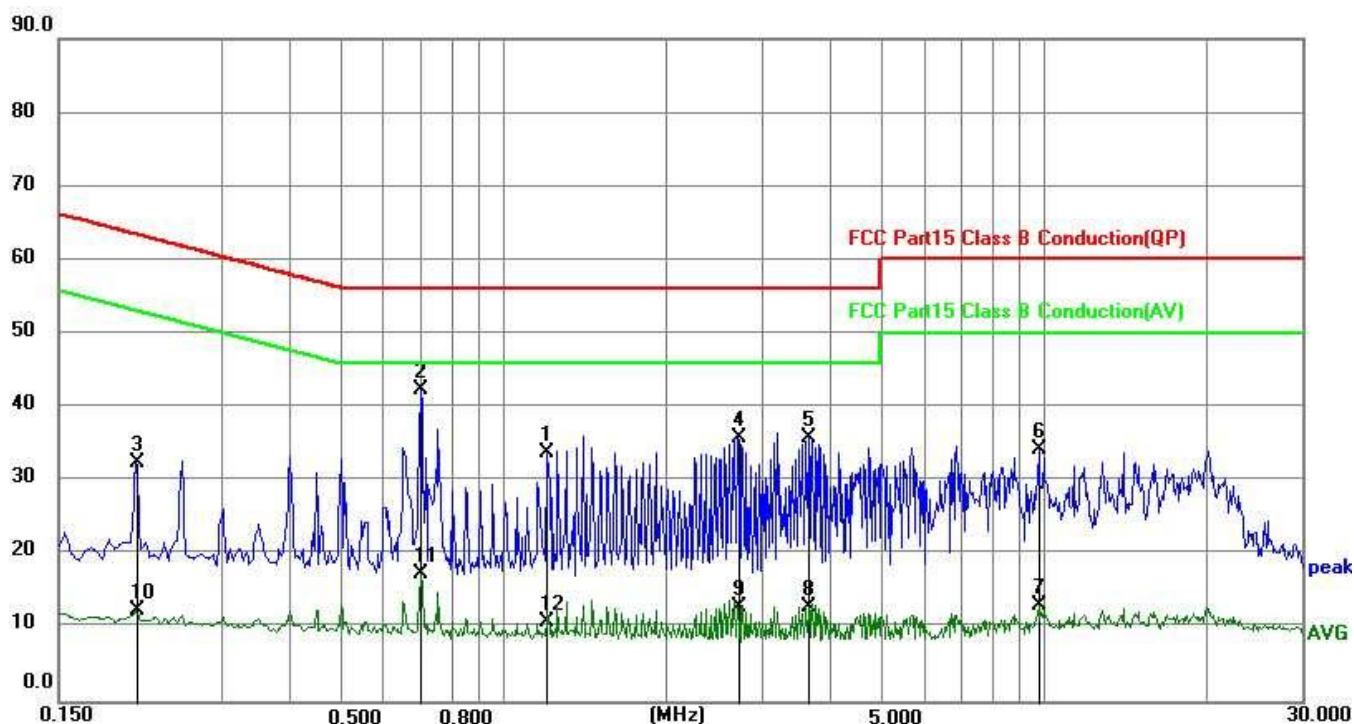


Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

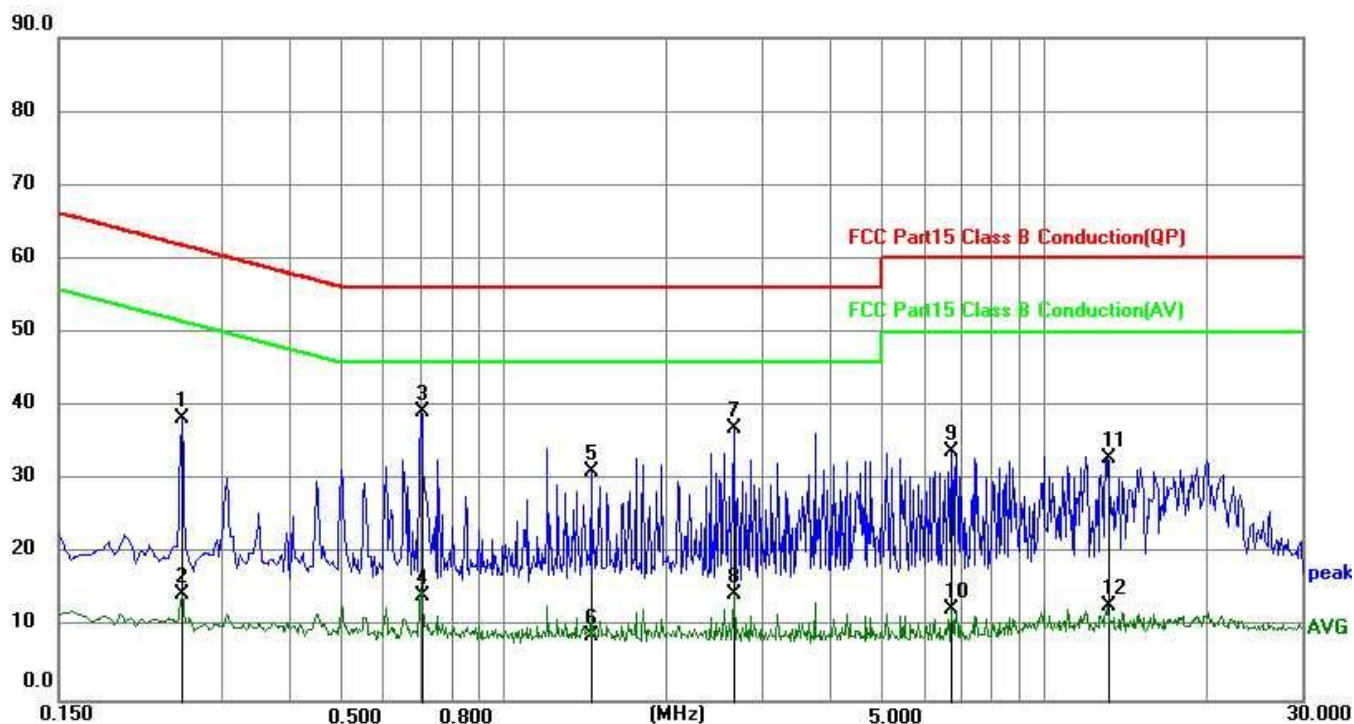
3.4 TEST RESULTS

Temperature:	25℃	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	DC 5V by adapter
Result:	L	Result:	Pass



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	1.2028	24.33	9.57	33.90	56.00	22. 10	QP
2	0.7034	32.88	9.56	42.44	56.00	13.56	AVG
3	0.2085	22.94	9.53	32.47	63.26	30.79	QP
4	2.7150	26.36	9.58	35.94	56.00	20.06	AVG
5	3.6735	26.33	9.59	35.92	56.00	20.08	QP
6	9.7575	24.68	9.63	34.31	60.00	25.69	AVG
7	9.7575	3.53	9.63	13. 16	50.00	36.84	QP
8	3.6735	3.35	9.59	12.94	46.00	33.06	AVG
9	2.7150	3.32	9.58	12.90	46.00	33. 10	QP
10	0.2085	2.88	9.53	12.41	53.26	40.85	AVG
11	0.7034	7.91	9.56	17.47	46.00	28.53	QP
12	1.2028	1.23	9.57	10.80	46.00	35.20	AVG

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	DC 5V by adapter
Result:	N	Result:	Pass



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2535	28.86	9.54	38.40	61.64	23.24	QP
2	0.2535	4.97	9.54	14.51	51.64	37.13	AVG
3	0.7035	29.75	9.56	39.31	56.00	16.69	QP
4	0.7035	4.74	9.56	14.30	46.00	31.70	AVG
5	1.4550	21.50	9.57	31.07	56.00	24.93	QP
6	1.4550	-0.75	9.57	8.82	46.00	37.18	AVG
7	2.6655	27.52	9.60	37.12	56.00	18.88	QP
8	2.6655	4.92	9.60	14.52	46.00	31.48	AVG
9	6.7380	24.05	9.73	33.78	60.00	26.22	QP
10	6.7380	2.79	9.73	12.52	50.00	37.48	AVG
11	13.0740	23.09	9.80	32.89	60.00	27.11	QP
12	13.0740	3.07	9.80	12.87	50.00	37.13	AVG

Remark:

1. All readings are Quasi-Peak and Average values

4. 20 DB BANDWIDTH

4.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247a(1)	20dB bandwidth	N/A	2400-2483.5

4.2 Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows

RBW: 30kHz

VBW: 100kHz

Detector Mode: PEAK

Sweep time: auto

Trace mode Max hold

(3) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3 Test setup

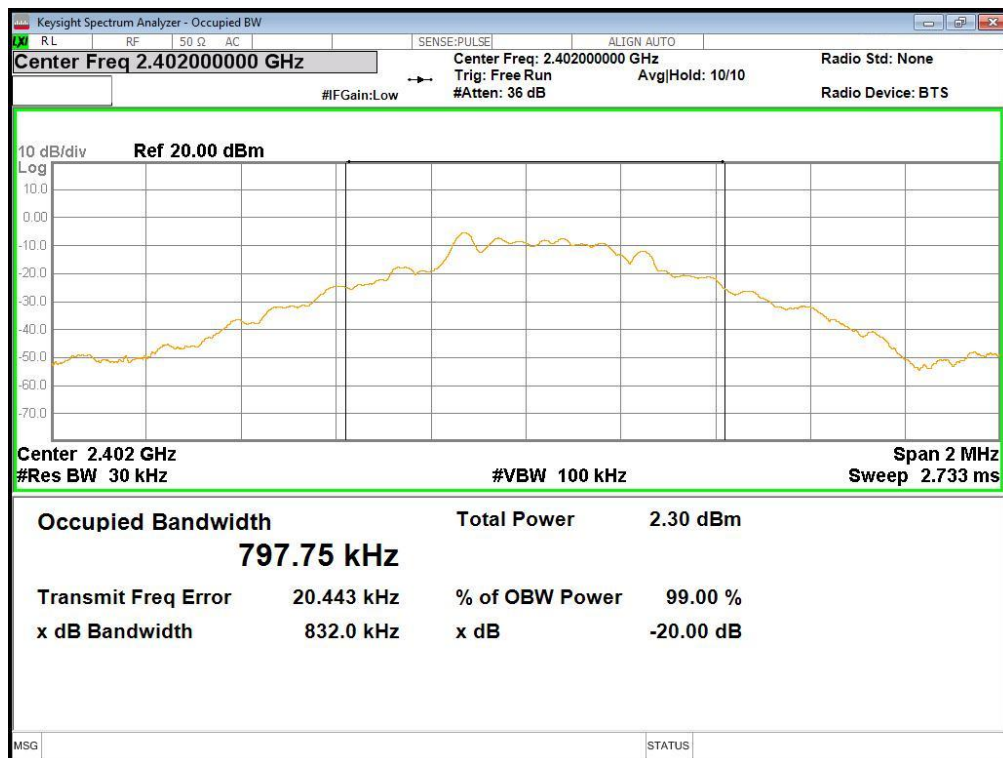


4.4 Test results

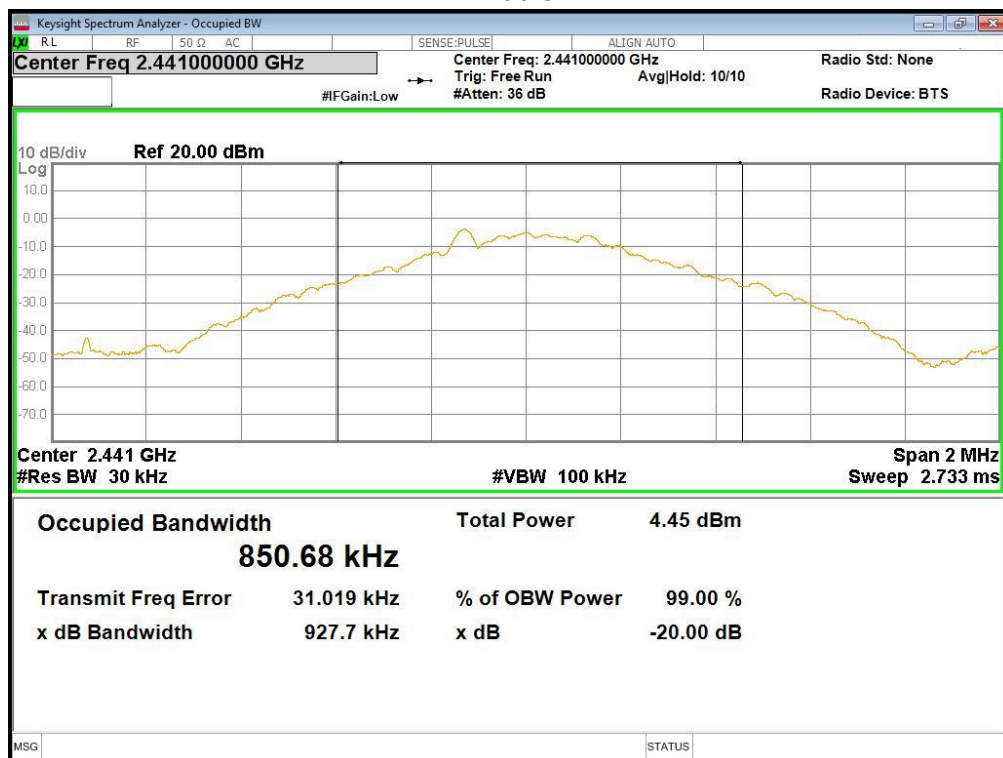
TestMode	Channel (MHz)	20dB Bandwidth (KHz)	Verdict
Lowest	2402MHz	832.0	Pass
Middle	2441MHz	927.7	Pass
Highest	2480MHz	972.5	Pass

4.5 Original Test Data

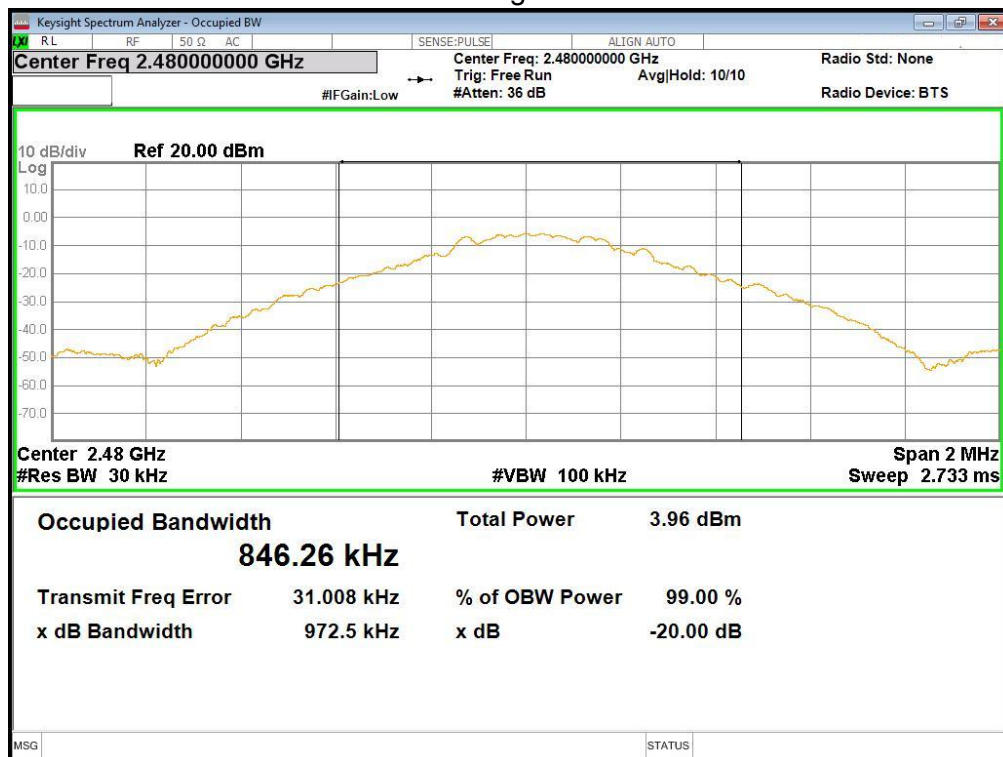
Low



Middle



High



5. CONDUCTED OUTPUT POWER

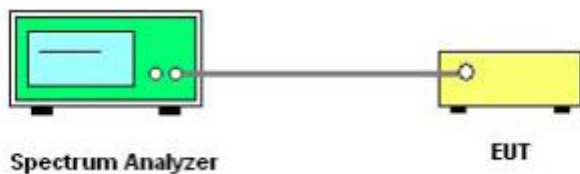
5.1 LIMIT

FCC Part 15 Subpart C			
Section	Test Item	Limit	Frequency Range
15.247(b)(3)	Peak output power	Power <1W(30dBm)	2400-2483.5

§§

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:
RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz)
RBW=3MHz, VBW=8MHz, Detector=Peak (If 20dB BW > 1 MHz)
- (3) The EUT was set to continuously transmitting in the max power during the test.

5.3 TEST SETUP



5.5 TEST RESULTS

TestMode	Channel (MHz)	Result (dBm)	Limit (dBm)	Verdict
Lowest	2402MHz	-4.36	21	Pass
Middle	2441MHz	-2.819	21	Pass
Highest	2480MHz	-3.510	21	Pass

Low



Middle



High



6 NUMBER OF HOPPING CHANNEL

6.1 LIMIT

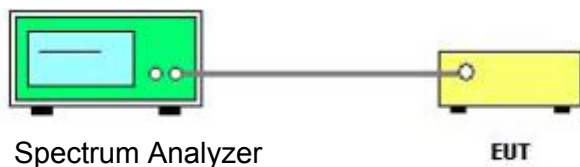
FCC Part 15.247, Subpart C RSS-247 Issue 2				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii) RSS-247	Number of Hopping Channel	>15	2400-2483.5	PASS

6.2 TEST PROCEDURE

a The EUT was directly connected to the spectrum analyzer and antenna output port as shown in the block diagram below.

b Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto

5.3 TEST SETUP

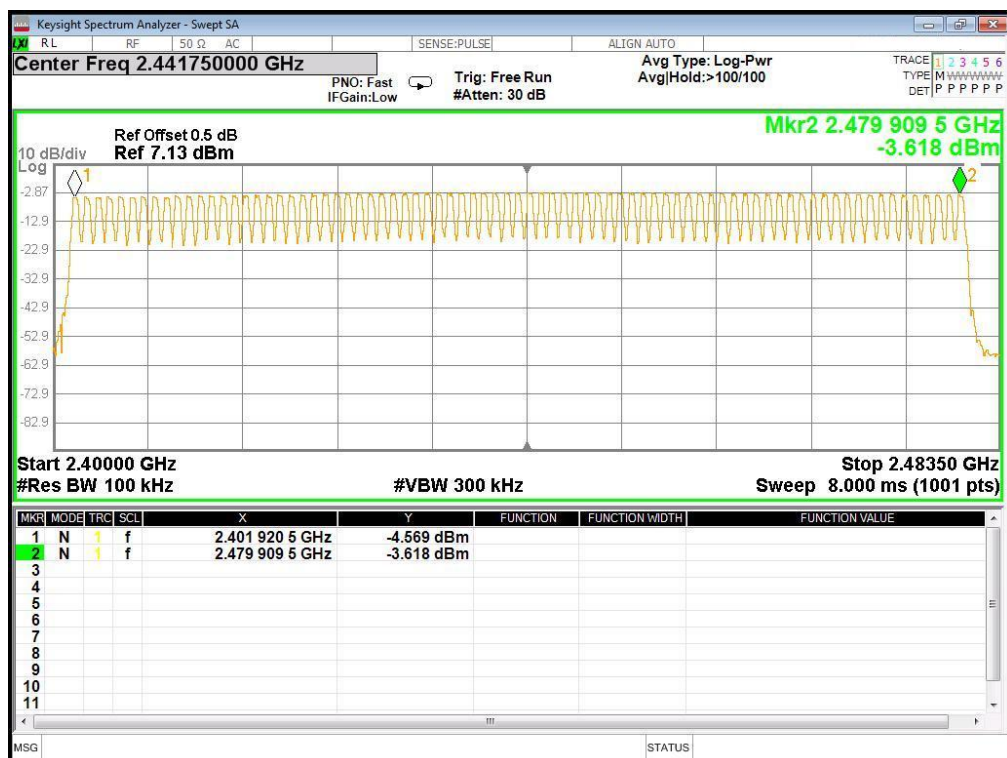


6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	Hopping Mode -GFSK Mode	Test Voltage:	DC 3.7V



7. BAND EDGE AND SPURIOUS(CONDUCTED)

7.1 LIMIT

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

7.2 TEST PROCEDURE

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

Center frequency	DTS Channel center frequency
RBW:	100kHz
VBW:	300kHz
Span	1.5times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

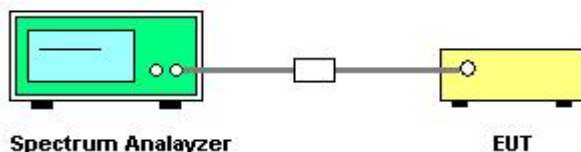
(3) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

RBW:	100kHz
VBW:	300kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{span}/\text{RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

7.3 TEST SETUP

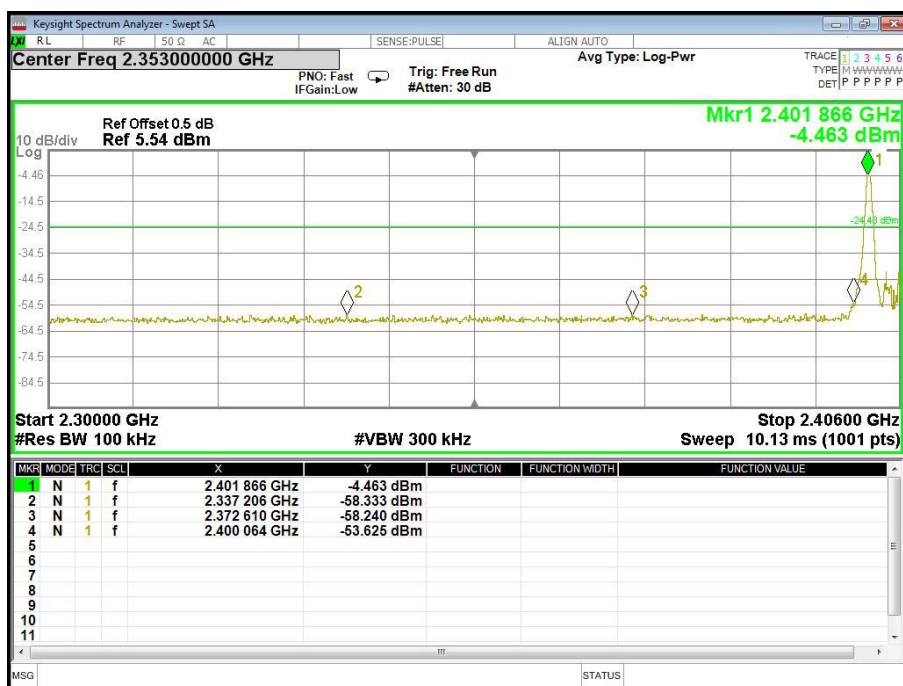


7.4 TEST RESULTS

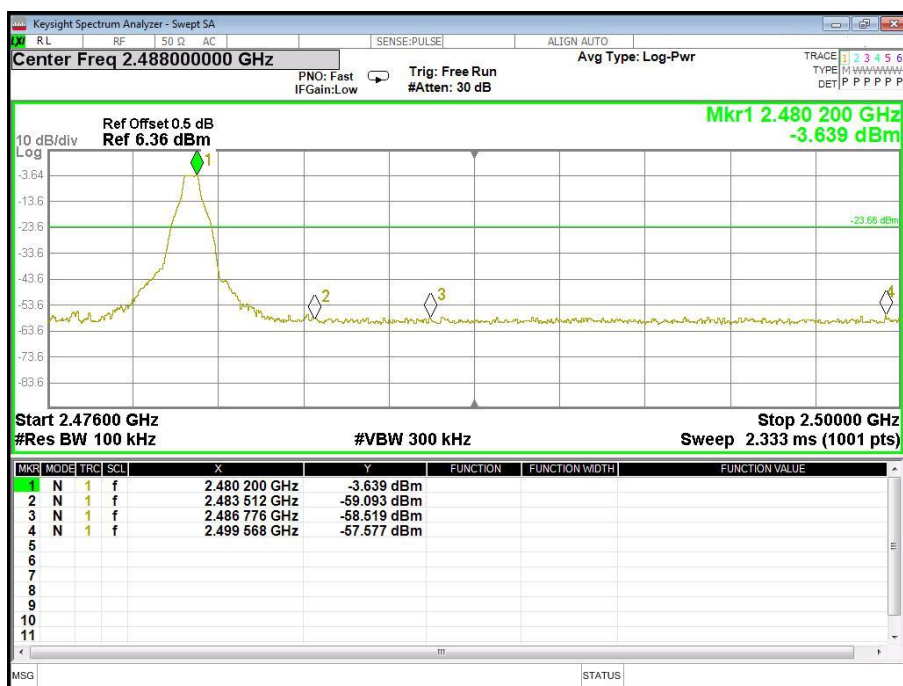
Eut set mode	CH or Frequency	Result
GFSK	CH1	Pass
	CH79	Pass

7.5 Original test data

CH1 2402MHZ

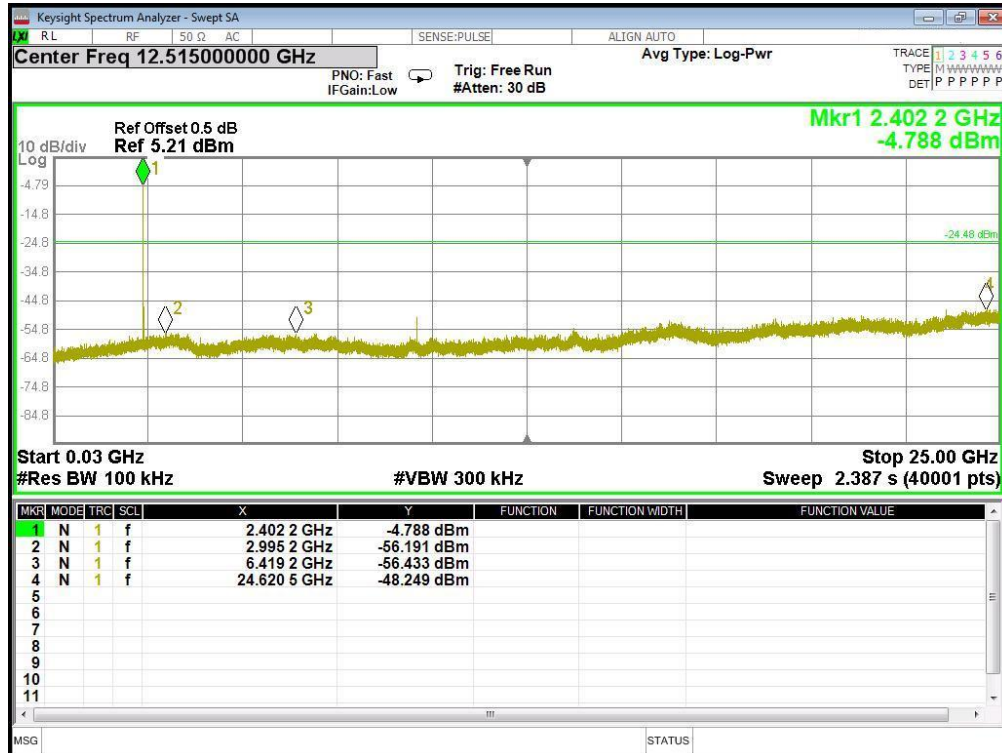


CH79 2480MHZ

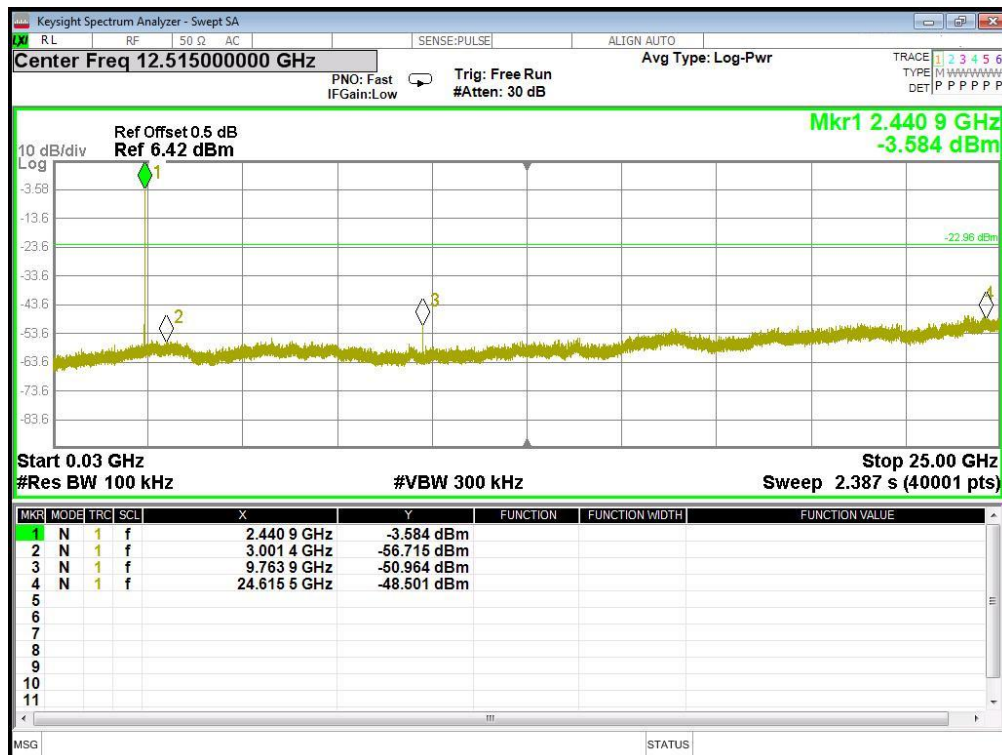


Spurious emissions

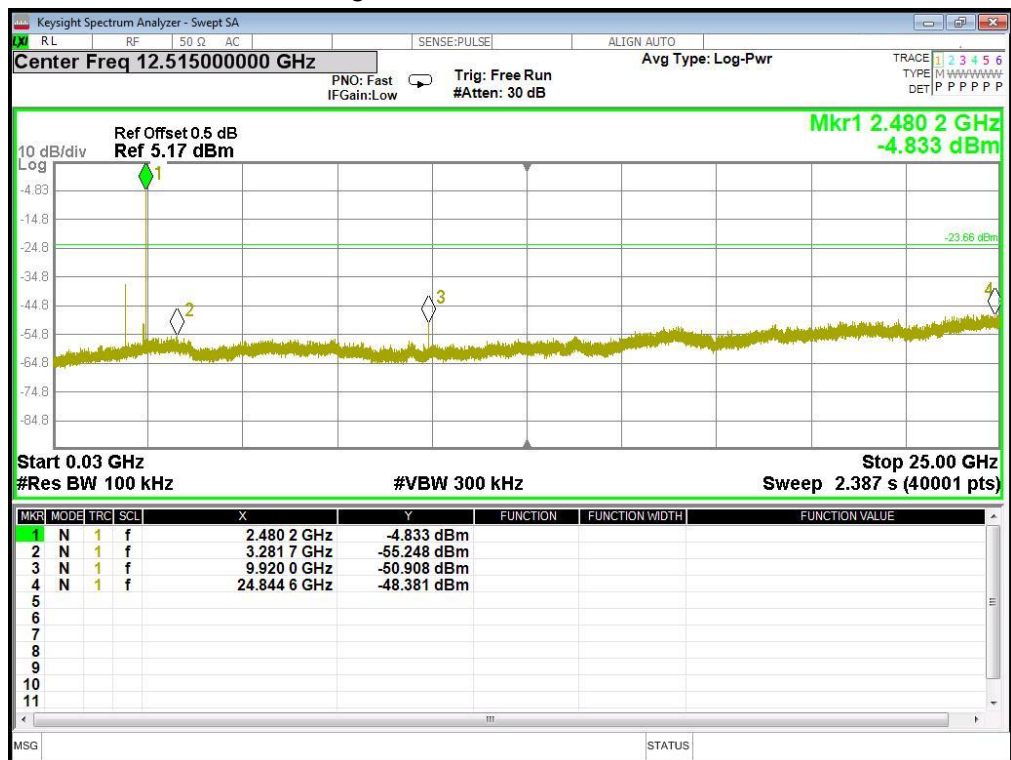
Low Channel 30MHz-25GHz



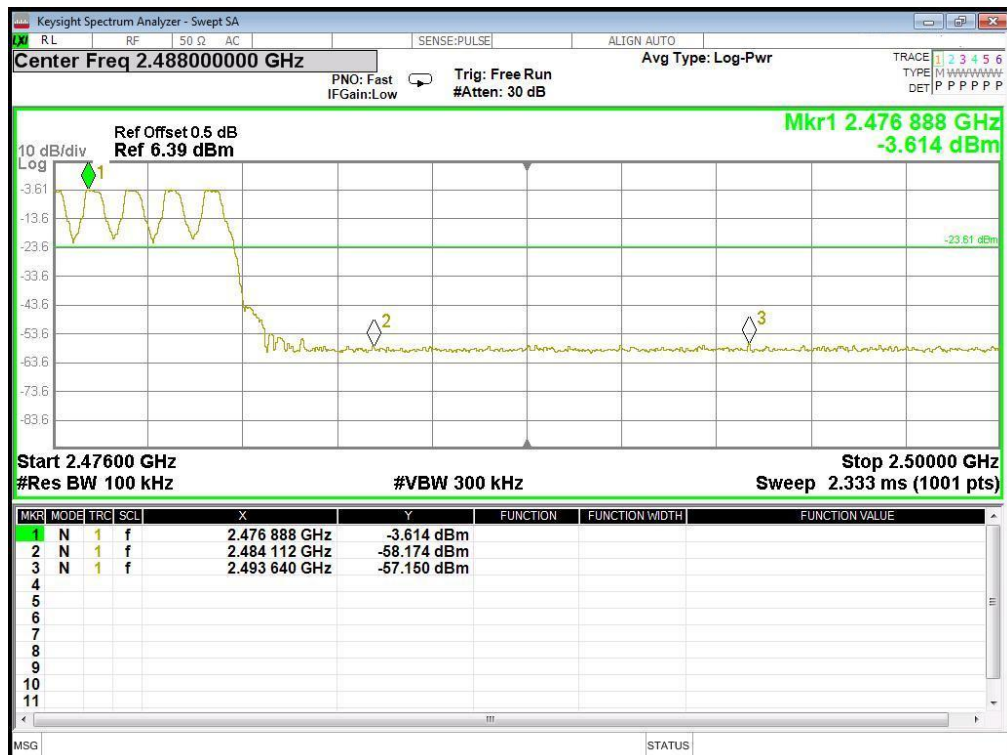
Middle Channel 30MHz-25GHz



High Channel 30MHz-25GHz



7.6 For Hopping Band edge



8. RADIATED EMISSION MEASUREMENT

8.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz