



FCC Test Report

Report No: FCS202309066W01

Issued for

Applicant:	Ningbo Tonwel Audio Co., Ltd
Address:	No.28, Xiyi Road, Jiangshan Town, Yinzhou, Ningbo, China
Product Name:	ACTIVE SPEAKER
Brand Name:	N/A
Model Name:	MLS900
Series Model:	N/A
FCC ID:	2AIQW-MLS900-A
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.....: Ningbo Tonwel Audio Co., Ltd
Address.....: No.28, Xiyi Road, Jiangshan Town, Yinzhou, Ningbo, China
Manufacture's Name.....: Ningbo Tonwel Audio Co., Ltd
Address.....: No.28, Xiyi Road, Jiangshan Town, Yinzhou, Ningbo, China

Product Description

Product Name.....: ACTIVE SPEAKER
Brand Name.....: N/A
Model Name.....: MLS900
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 19, 2023 ~ Sep 22, 2023

Date of Issue.....: Sep 22, 2023

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 22, 2023	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 (b)(2)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)	6dB Bandwidth	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--
15.247 (e)	Power Spectral Density	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	$\pm 4.31 \text{ dB}$
9	PSD	$\pm 1.24 \text{ dB}$
10	Occupied bandwidth	$\pm 0.3 \text{ dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	ACTIVE SPEAKER
Trade Name	N/A
Model Name	MLS900
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Operation frequency	2402MHz-2480MHz
Modulation:	GFSK
Channel number	40 CH
Transmitter rate:	1MHz
Power Supply	AC 100-240V 50/60Hz
Battery	N/A
Report number	FCS202309066W01
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.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
...	...	...	...	...	...	...	...
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

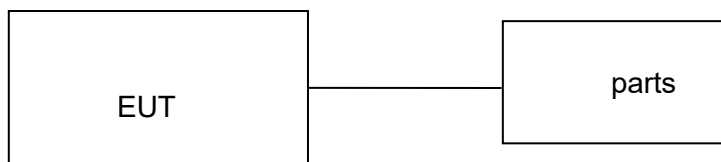
3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	N/A	PCB Antenna	N/A	1.06	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

 Zgmicro Bluetooth Authentication Tool v2.3.9 - CE/FCC/NCC/MIC

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

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	2023.08.29	2024.08.28
Signal Analyzer	R&S	FSV40-N	FCS-E012	2023.08.29	2024.08.28
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2023.08.29	2024.08.28
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2023.08.29	2024.08.28
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2023.08.29	2024.08.28
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2023.08.29	2024.08.28
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2023.08.29	2024.08.28
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2023.08.29	2024.08.28
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2023.08.29	2024.08.28
Temperature & Humidity	HTC-1	victor	FCS-E005	2023.08.29	2024.08.28
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	2023.08.29	2024.08.28
LISN	R&S	ENV216	FCS-E007	2023.08.29	2024.08.28
LISN	ETS	3810/2NM	FCS-E009	2023.08.29	2024.08.28
Temperature & Humidity	HTC-1	victor	FCS-E008	2023.08.29	2024.08.28
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	2023.08.29	2024.08.28
Spectrum Analyzer	Agilent	E4447A	MY50180039	2023.08.29	2024.08.28
Spectrum Analyzer	R&S	FSV-40	101499	2023.08.29	2024.08.28
Power Sensor	Agilent	UX2021XA	FCS-E021	2023.08.29	2024.08.28
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 Emissionlimit (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.

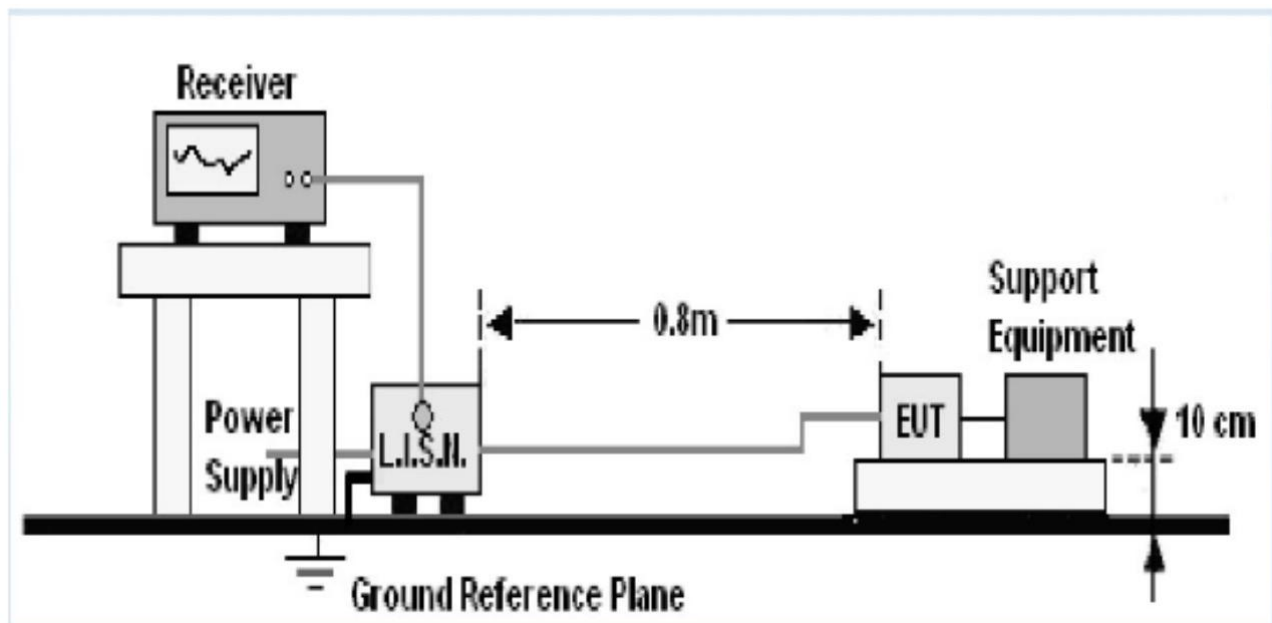
3.2 TEST PROCEDURE

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

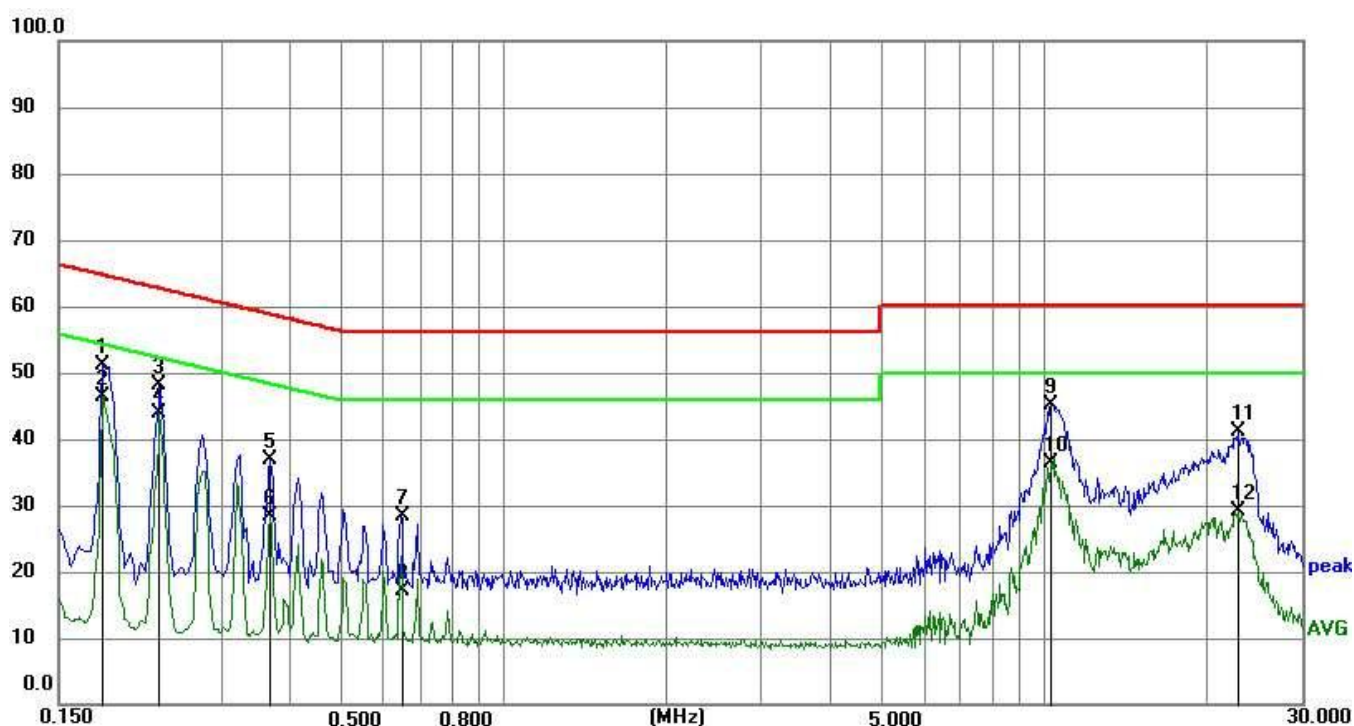
- a. The EUT was 0.1 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of 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



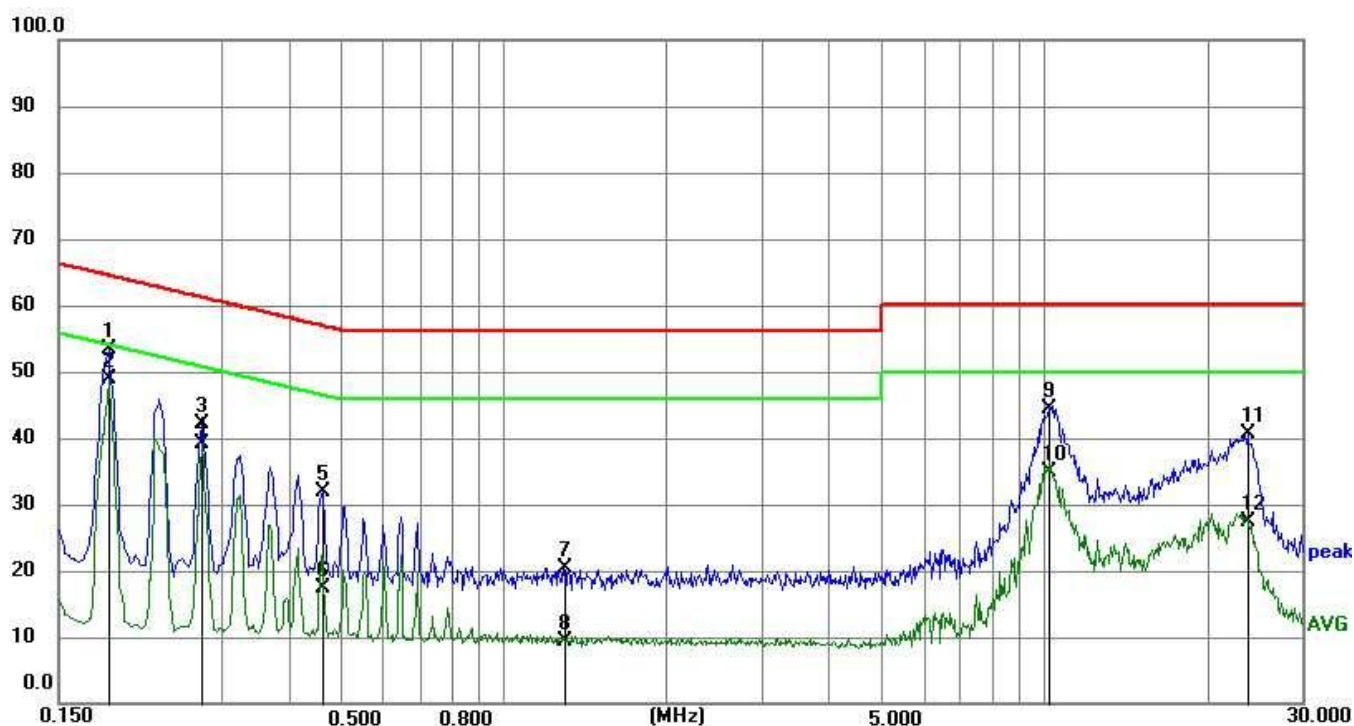
3.4 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	AC 120V/60Hz
Result:	L	Result:	Pass



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1815	40.94	10.10	51.04	64.42	13.38	peak
2	*	0.1815	36.19	10.10	46.29	54.42	8.13	AVG
3		0.2310	38.16	10.06	48.22	62.41	14.19	peak
4		0.2310	33.89	10.06	43.95	52.41	8.46	AVG
5		0.3704	26.80	10.02	36.82	58.49	21.67	peak
6		0.3704	18.29	10.02	28.31	48.49	20.18	AVG
7		0.6450	18.37	9.99	28.36	56.00	27.64	peak
8		0.6450	7.09	9.99	17.08	46.00	28.92	AVG
9		10.3334	35.35	9.80	45.15	60.00	14.85	peak
10		10.3334	26.59	9.80	36.39	50.00	13.61	AVG
11		22.8750	31.16	9.93	41.09	60.00	18.91	peak
12		22.8750	19.16	9.93	29.09	50.00	20.91	AVG

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK(worst mode)	Test Voltage:	AC 120V/60Hz
Result:	N	Result:	Pass



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1860	43.21	10.06	53.27	64.21	10.94	peak
2	*	0.1860	38.83	10.06	48.89	54.21	5.32	AVG
3		0.2760	32.11	10.04	42.15	60.94	18.79	peak
4		0.2760	29.06	10.04	39.10	50.94	11.84	AVG
5		0.4650	21.76	10.01	31.77	56.60	24.83	peak
6		0.4650	7.38	10.01	17.39	46.60	29.21	AVG
7		1.2930	10.46	9.98	20.44	56.00	35.56	peak
8		1.2930	-0.54	9.98	9.44	46.00	36.56	AVG
9		10.1940	34.60	9.81	44.41	60.00	15.59	peak
10		10.1940	25.08	9.81	34.89	50.00	15.11	AVG
11		23.8065	30.68	9.98	40.66	60.00	19.34	peak
12		23.8065	17.40	9.98	27.38	50.00	22.62	AVG

Remark:

1. All readings are Quasi-Peak and Average values

4. 6DB 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: 100kHz

VBW: 300kHz

Detector Mode: AVG

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

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100KHz For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Bandwidth : approximately $3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto

4.3 Test setup

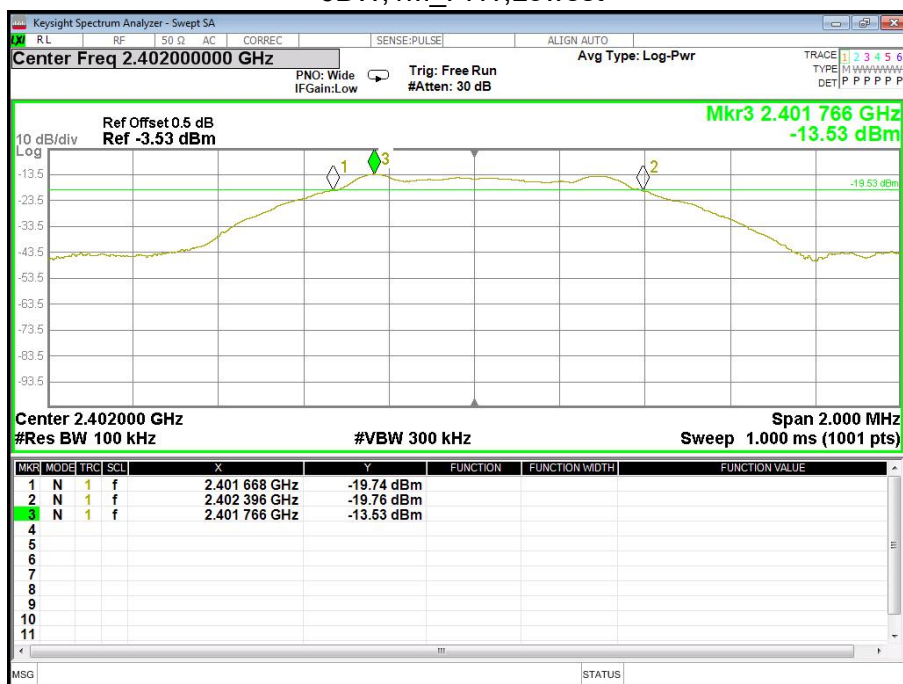


4.4 Test results

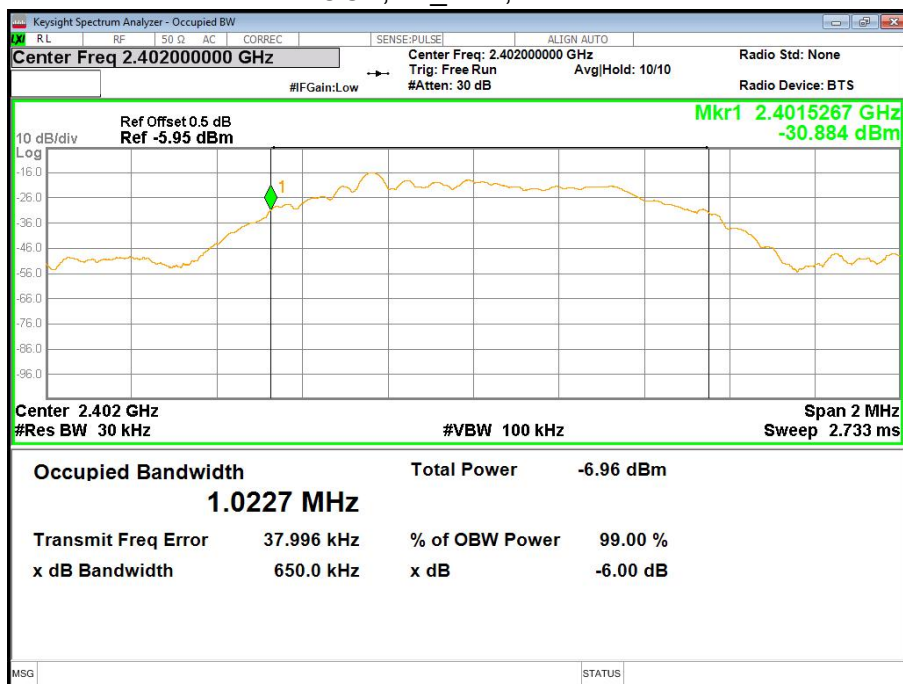
TestMode	Channel (MHz)	6dB Bandwidth (MHz)	99% Bandwidth(MHz)	Limit [MHz]	Verdict
Lowest	2402MHz	0.728	1.023	0.5	Pass
Middle	2440MHz	0.714	1.032	0.5	Pass
Highest	2480MHz	0.690	1.024	0.5	Pass

4.5 Original Test Data

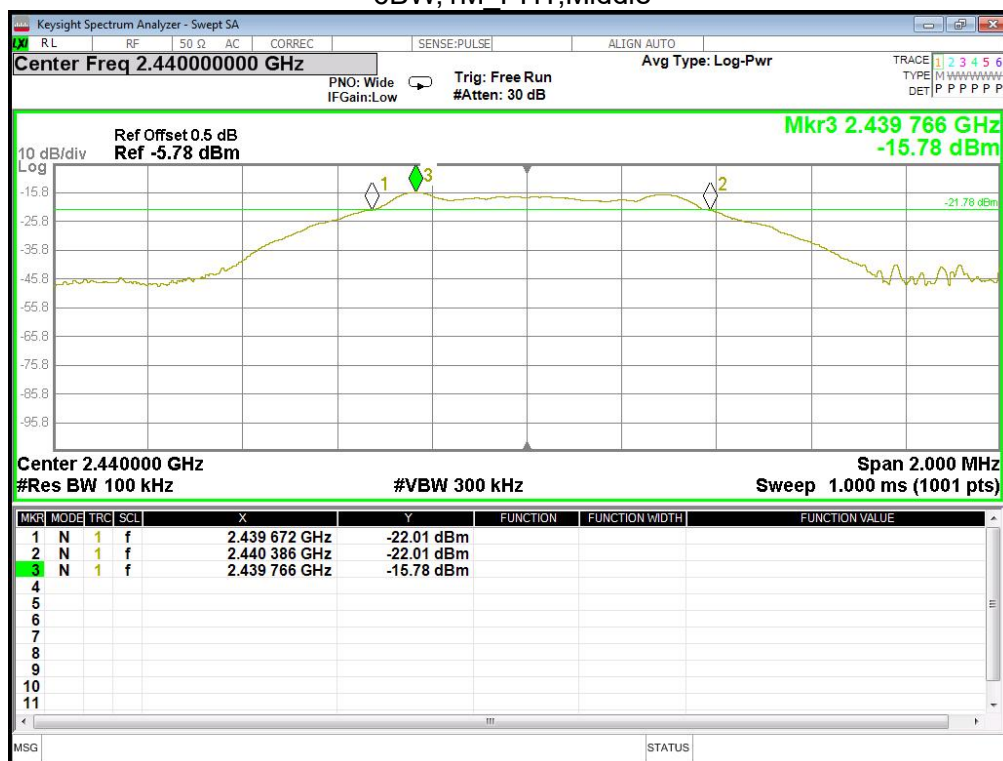
6BW,1M_PHY,Lowest



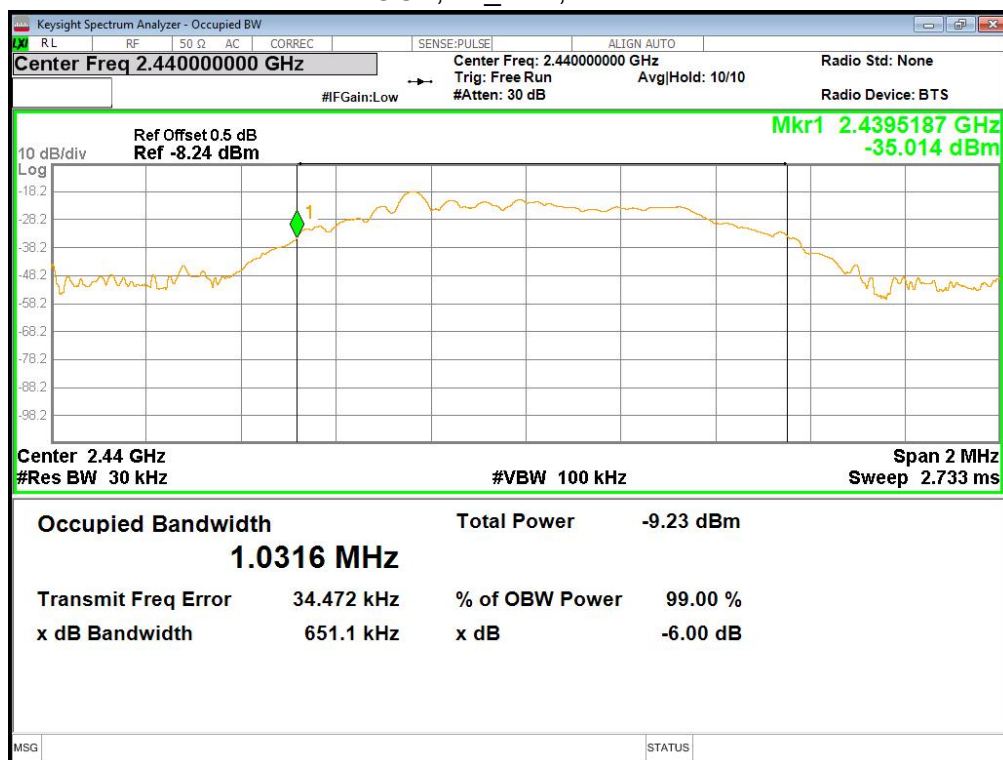
OCB,1M_PHY,Lowest



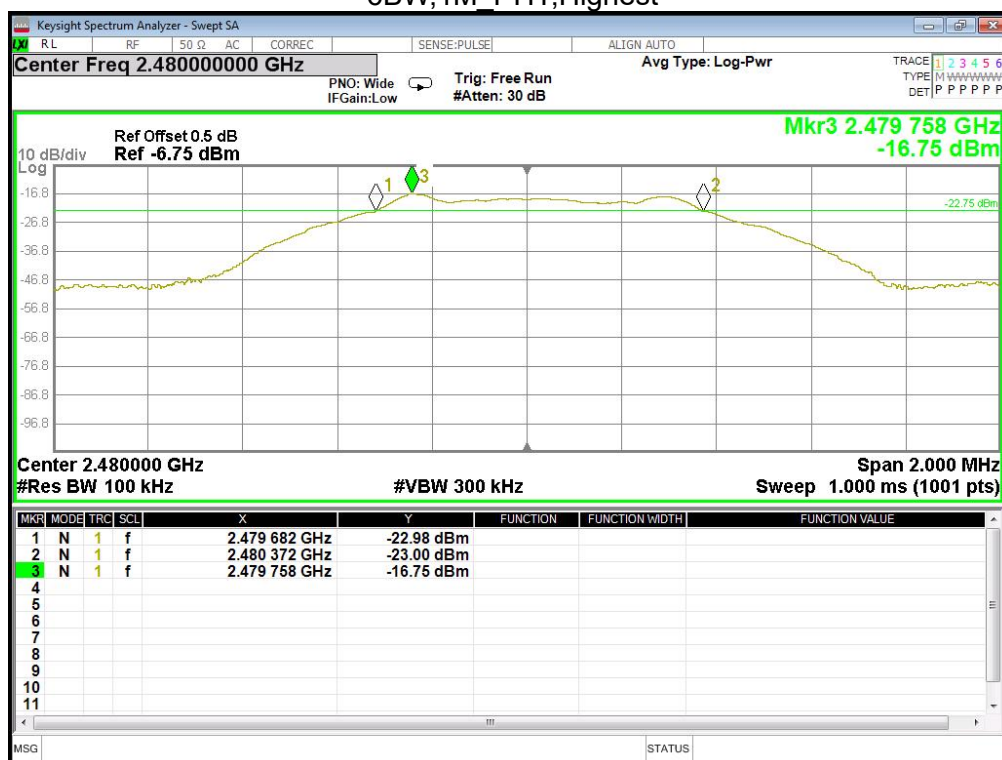
6BW,1M_PHY,Middle



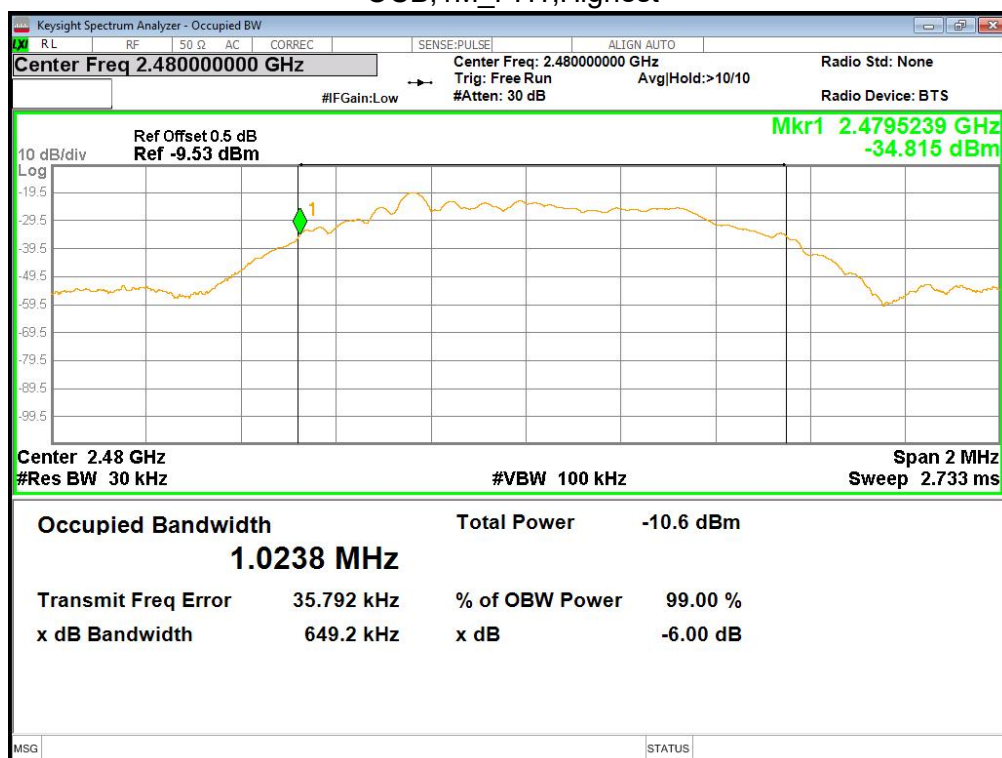
OCB,1M_PHY,Middle



6BW,1M_PHY,Highest



OCB,1M_PHY,Highest



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

5.2 TEST PROCEDURE

- (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



5.4 TEST RESULTS

TestMode	Channel (MHz)	Result (dBm)	Limit (dBm)	Verdict
Lowest	2402MHz	4.277	30	Pass
Middle	2440MHz	5.342	30	Pass
Highest	2480MHz	5.455	30	Pass

Low



Middle



High



6. BAND EDGE AND SPURIOUS(CONDUCTED)

6.1 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.

6.2 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

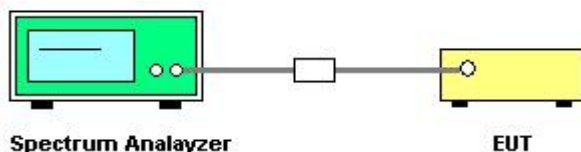
(3) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(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

6.3 TEST SETUP

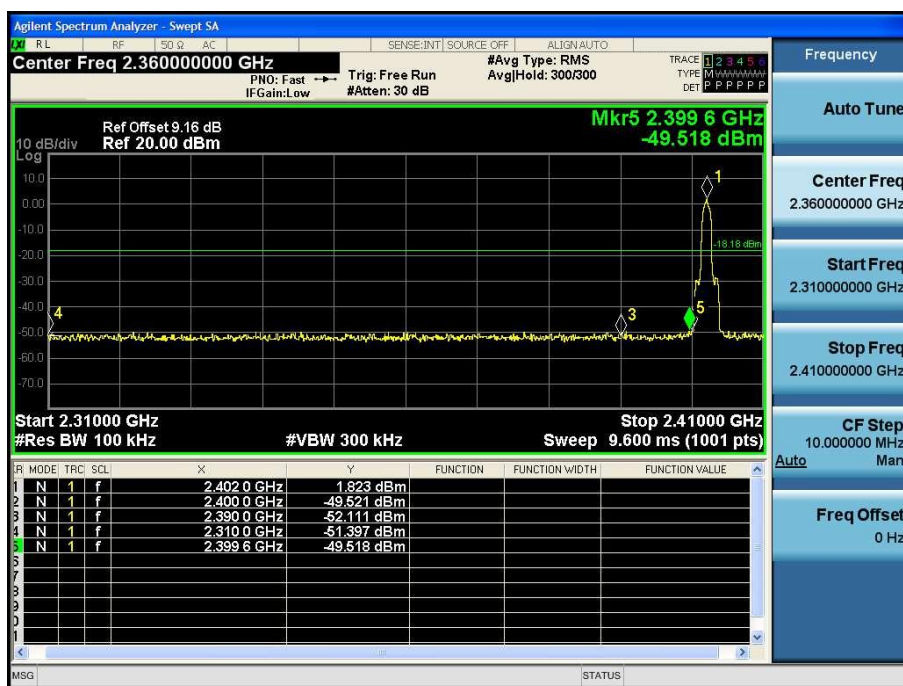


6.4 TEST RESULTS

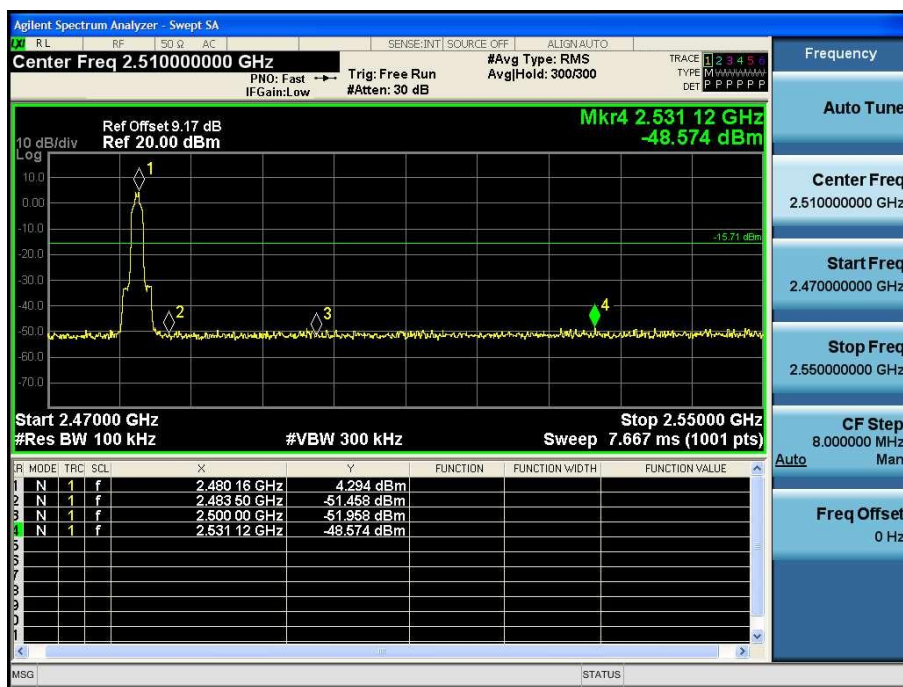
Eut set mode	CH or Frequency	Result
GFSK	CH1	Pass
	CH40	Pass

6.5 Original test data

CH1 2402MHZ



CH40 2480MHZ

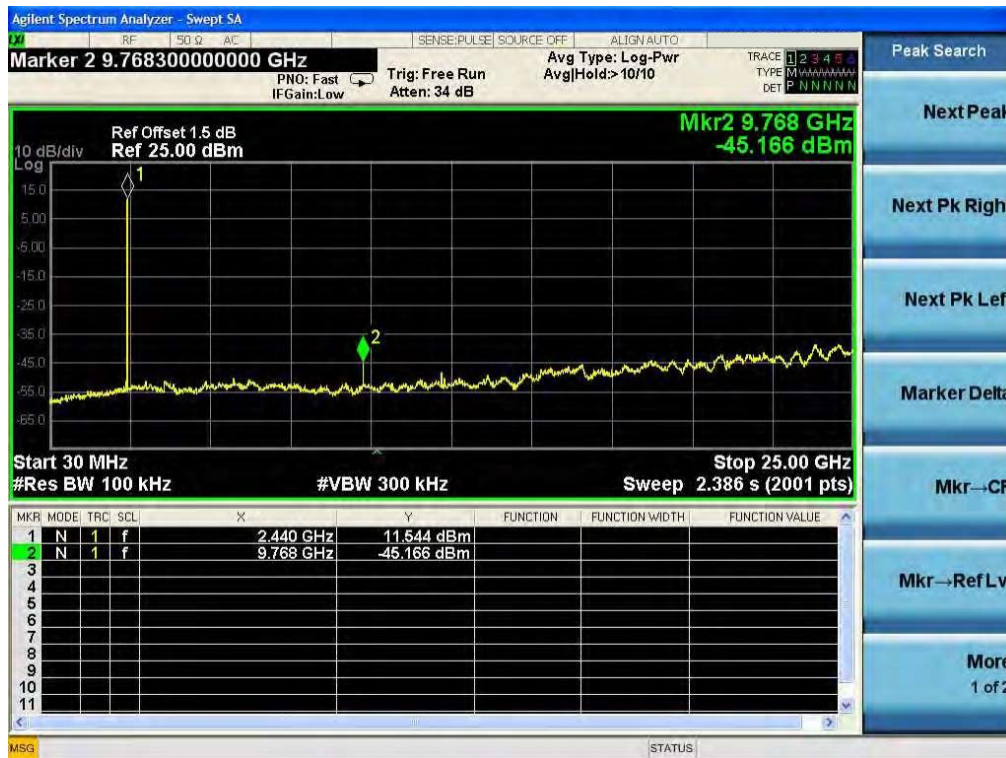


Spurious emissions

Low Channel 30MHz-25GHz



Middle Channel 30MHz-25GHz



High Channel 30MHz-25GHz



7. POWER SPECTRAL DENSITY

7.1 LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

7.2 TEST PROCEDURE

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

(2) Set the spectrum analyzer as follows:

Center frequency	DTS Channel center frequency
RBW:	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5 times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude level within the RBW

(4) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.3 TEST SETUP

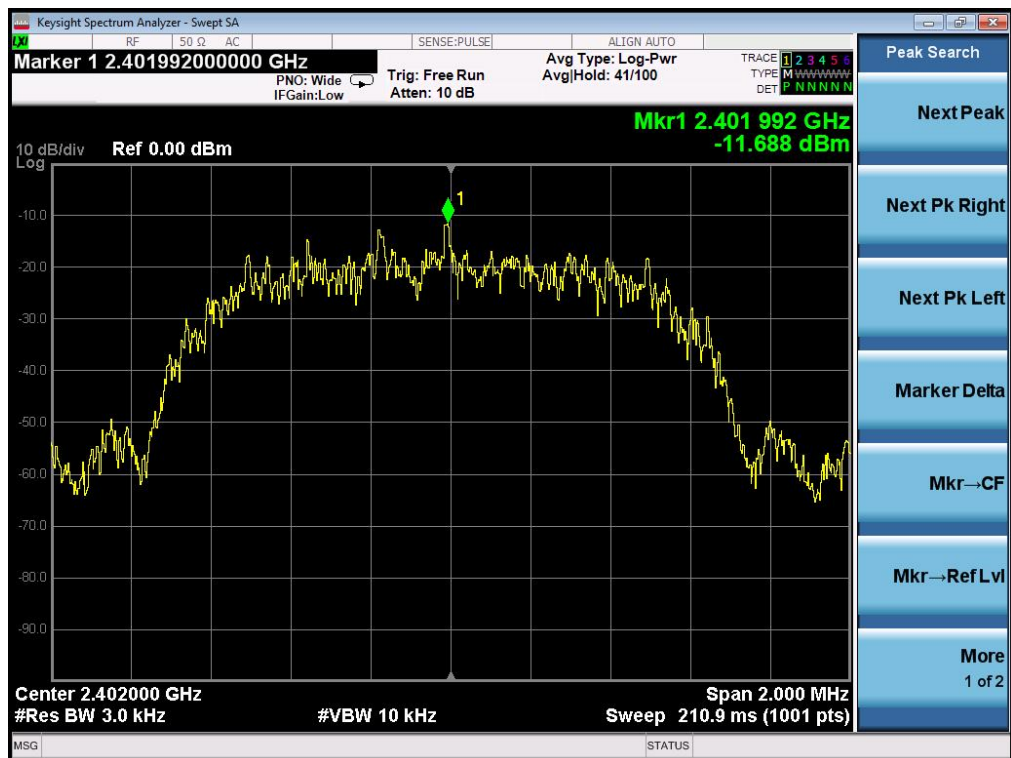


7.4 TEST RESULTS

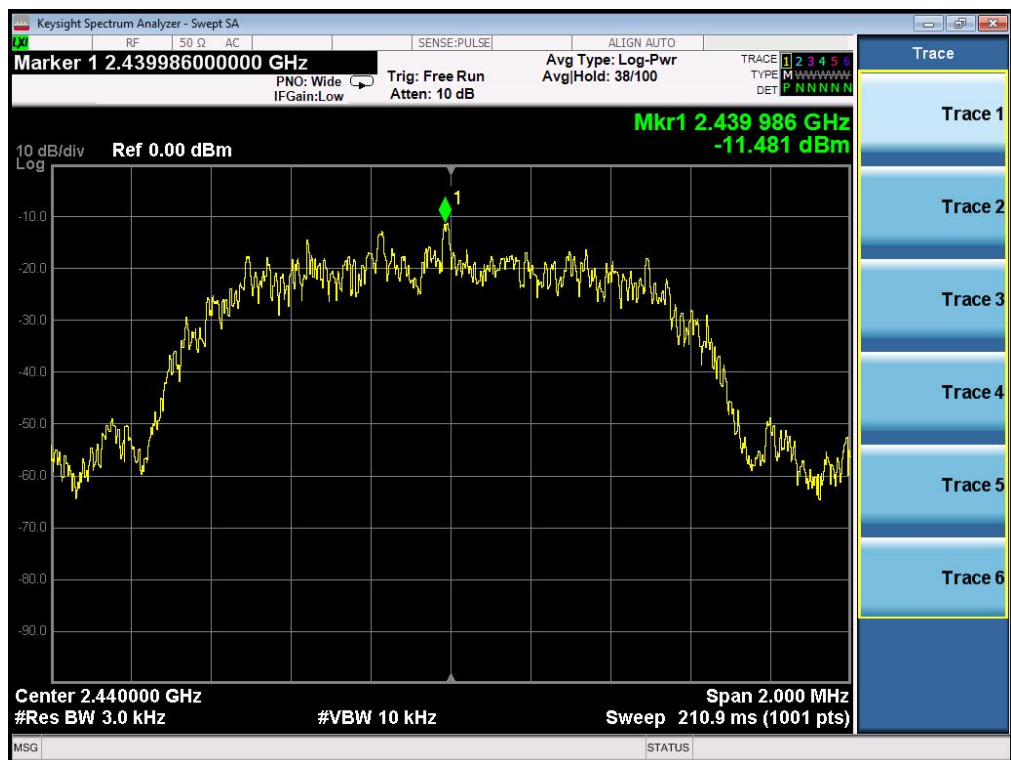
TestMode	Channel (MHz)	Result (dBm/3KHz)	Limit (dBm/3KHz)	Verdict
GFSK	2402MHz	-11.688	8	Pass
GFSK	2440MHz	-11.481	8	Pass
GFSK	2480MHz	-9.568	8	Pass

7.5 original test data

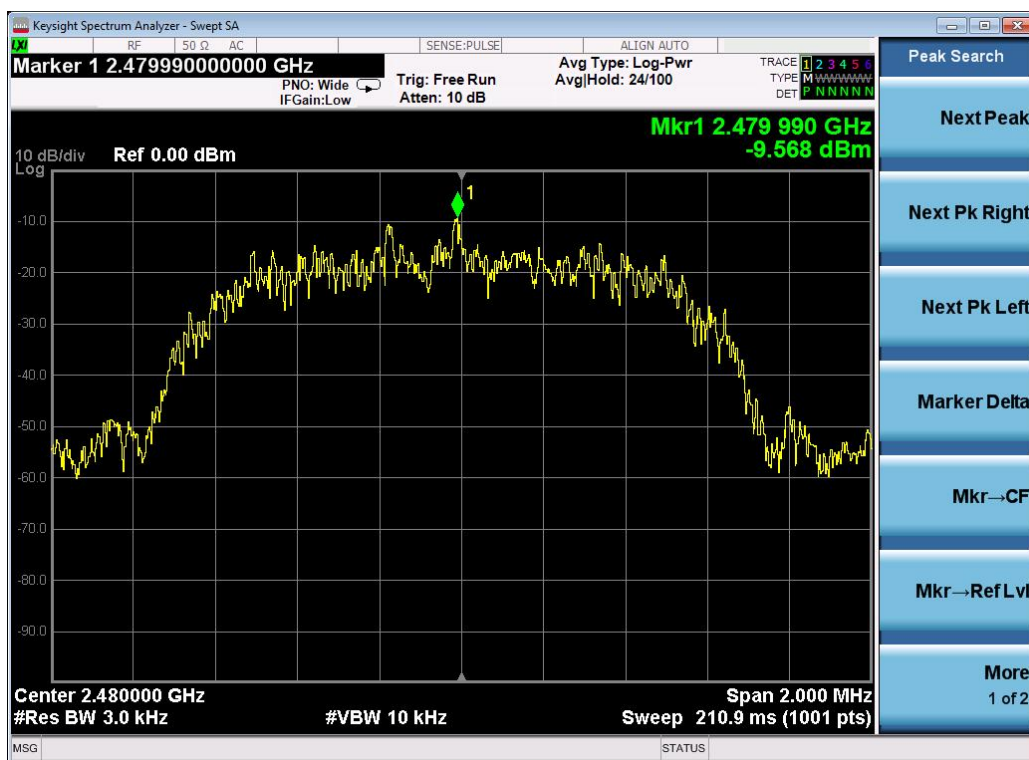
GFSK-2402MHz



GFSK-2440MHz



GFSK-2480MHz



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

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz Upper Band Edge: 2479 to 2500 MHz
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

8.2 TEST PROCEDURE

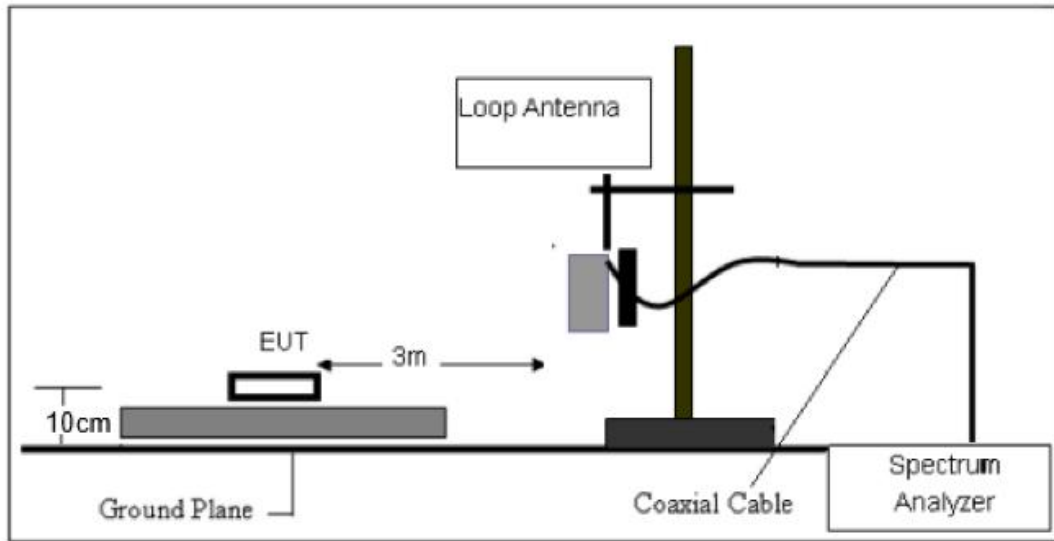
- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

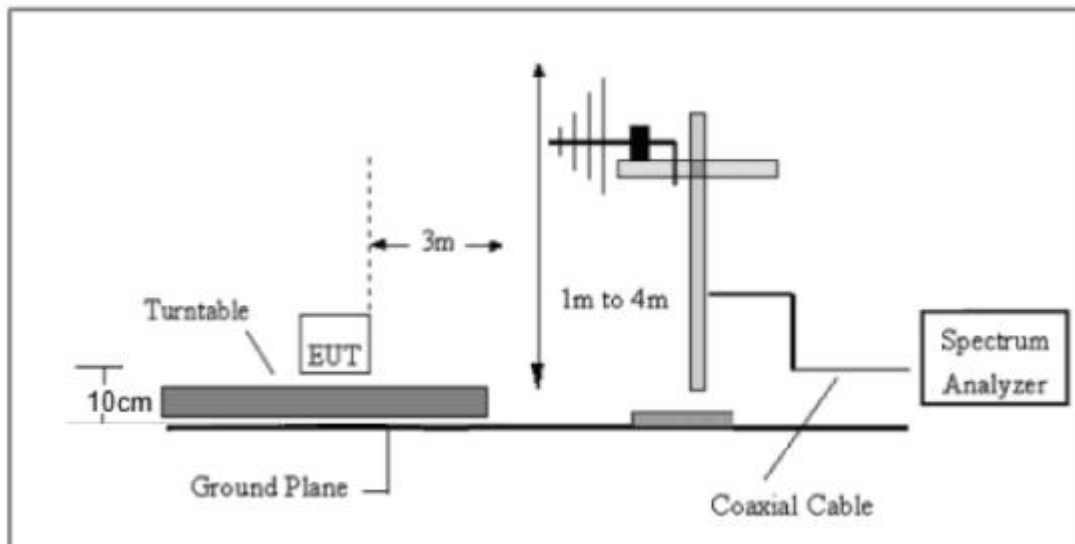
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

8.3 TESTSETUP

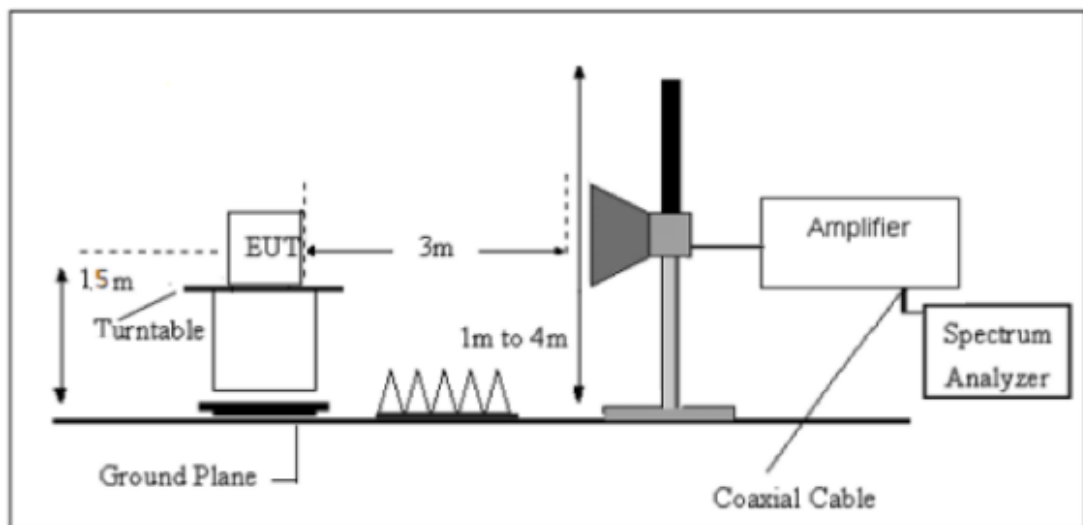
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



8.4 TEST RESULTS

(9KHz-30MHz)

Temperature:	22.7°C	Relative Humidity:	61%
Test Voltage:	AC 120V/60Hz	Test Mode:	GFSK

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
--	--	--	--	--	PASS
--	--	--	--	--	PASS

Note:

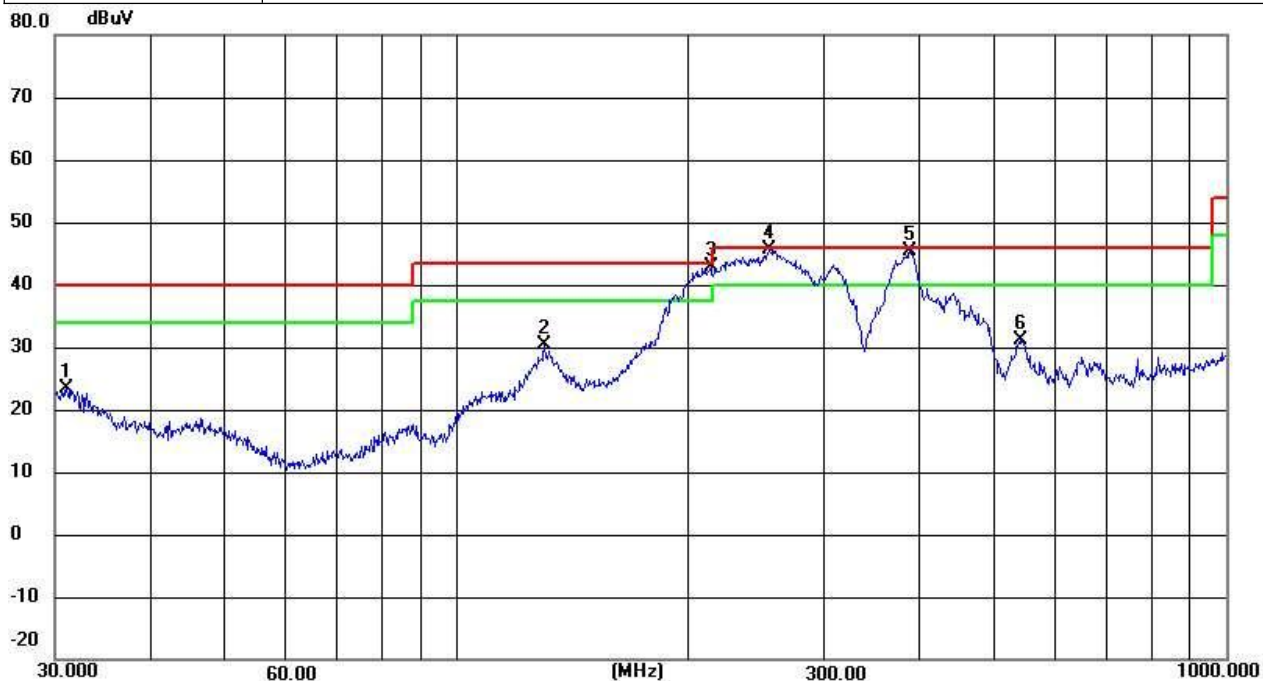
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

(30MHZ-1000MHZ)

Temperature:	24.7°C	Relative Humidity:	61%
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	GFSK		



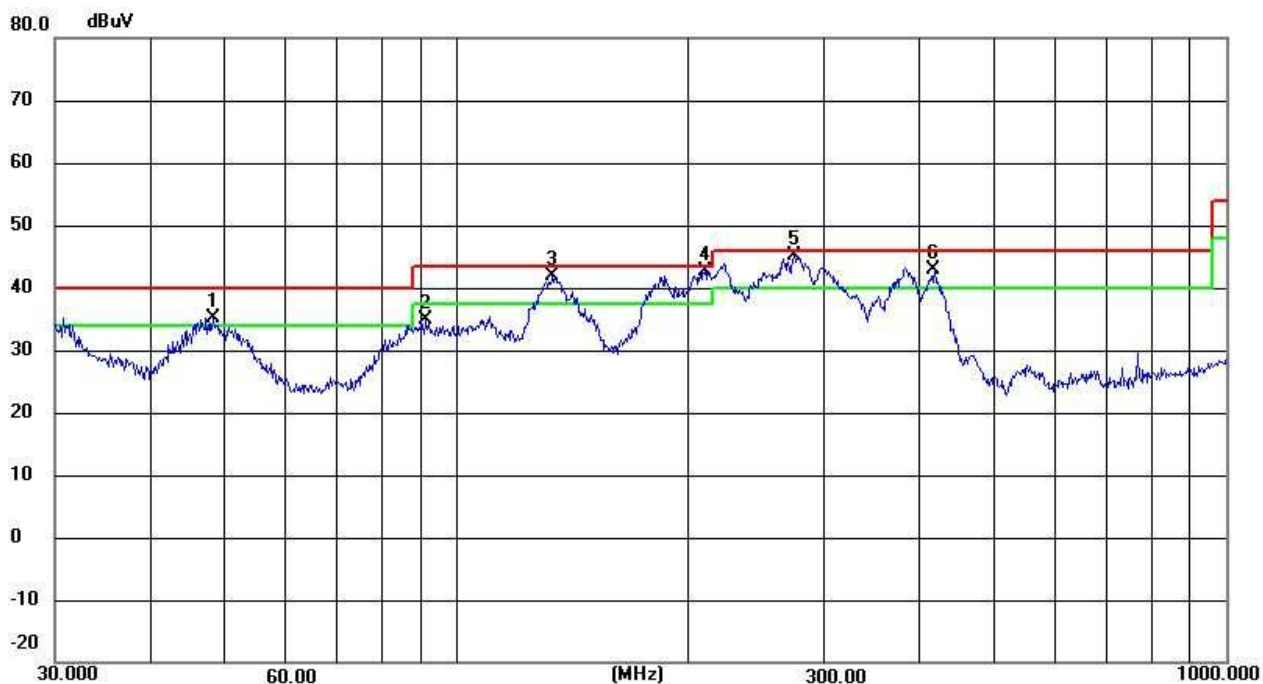
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.0704	31.47	-8.06	23.41	40.00	-16.59	QP
2	129.9225	62.58	-32.27	30.31	43.50	-13.19	QP
3	213.7632	75.00	-32.19	42.81	43.50	-0.69	QP
4	254.7281	77.72	-32.15	45.57	46.00	-0.43	QP
5	387.9920	77.30	-32.01	45.29	46.00	-0.71	QP
6	539.4773	62.98	-31.85	31.13	46.00	-14.87	QP

Note: 1. Margin = Result (Result =Reading + Factor)-Limit

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Temperature:	22.7°C	Relative Humidity:	61%
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	GFSK		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	48.1625	52.19	-17.03	35.16	40.00	-4.84	QP
2	91.1744	67.24	-32.28	34.96	43.50	-8.54	QP
3	133.1510	74.09	-32.27	41.82	43.50	-1.68	QP
4	210.0481	74.84	-32.19	42.65	43.50	-0.85	QP
5	274.1938	77.33	-32.13	45.20	46.00	-0.80	QP
6	417.6409	74.77	-31.98	42.79	46.00	-3.21	QP

Note: 1. Margin = Result (Result = Reading + Factor) – Limit
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

ABOVE 1GHZ
LOW CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	38.41	31.78	8.60	32.09	46.70	74.00	-27.30	Vertical
7206.00	32.56	36.15	11.65	32.00	48.36	74.00	-25.64	Vertical
9608.00	32.12	37.95	14.14	31.62	52.59	74.00	-21.41	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	42.92	31.78	8.60	32.09	51.21	74.00	-22.79	Horizontal
7206.00	34.42	36.15	11.65	32.00	50.22	74.00	-23.78	Horizontal
9608.00	31.65	37.95	14.14	31.62	52.12	74.00	-21.88	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	27.01	31.78	8.60	32.09	35.30	54.00	-18.70	Vertical
7206.00	21.12	36.15	11.65	32.00	36.92	54.00	-17.08	Vertical
9608.00	20.13	37.95	14.14	31.62	40.60	54.00	-13.40	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	31.37	31.78	8.60	32.09	39.66	54.00	-14.34	Horizontal
7206.00	23.37	36.15	11.65	32.00	39.17	54.00	-14.83	Horizontal
9608.00	19.95	37.95	14.14	31.62	40.42	54.00	-13.58	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

MIDDLE CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	35.91	31.85	8.67	32.12	44.31	74.00	-29.69	Vertical
7320.00	30.90	36.37	11.72	31.89	47.10	74.00	-26.90	Vertical
9760.00	30.64	38.35	14.25	31.62	51.62	74.00	-22.38	Vertical
12200.00	*					74.00		Vertical
14640.00	*					74.00		Vertical
4880.00	39.91	31.85	8.67	32.12	48.31	74.00	-25.69	Horizontal
7320.00	32.54	36.37	11.72	31.89	48.74	74.00	-25.26	Horizontal
9760.00	29.93	38.35	14.25	31.62	50.91	74.00	-23.09	Horizontal
12200.00	*					74.00		Horizontal
14640.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	24.99	31.85	8.67	32.12	33.39	54.00	-20.61	Vertical
7320.00	19.75	36.37	11.72	31.89	35.95	54.00	-18.05	Vertical
9760.00	18.92	38.35	14.25	31.62	39.90	54.00	-14.10	Vertical
12200.00	*					54.00		Vertical
14640.00	*					54.00		Vertical
4880.00	29.07	31.85	8.67	32.12	37.47	54.00	-16.53	Horizontal
7320.00	21.83	36.37	11.72	31.89	38.03	54.00	-15.97	Horizontal
9760.00	18.53	38.35	14.25	31.62	39.51	54.00	-14.49	Horizontal
12200.00	*					54.00		Horizontal
14640.00	*					54.00		Horizontal

HIGH CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	39.09	31.93	8.73	32.16	47.59	74.00	-26.41	Vertical
7440.00	33.01	36.59	11.79	31.78	49.61	74.00	-24.39	Vertical
9920.00	32.52	38.81	14.38	31.88	53.83	74.00	-20.17	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	43.74	31.93	8.73	32.16	52.24	74.00	-21.76	Horizontal
7440.00	34.92	36.59	11.79	31.78	51.52	74.00	-22.48	Horizontal
9920.00	32.11	38.81	14.38	31.88	53.42	74.00	-20.58	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	27.71	31.93	8.73	32.16	36.21	54.00	-17.79	Vertical
7440.00	21.59	36.59	11.79	31.78	38.19	54.00	-15.81	Vertical
9920.00	20.55	38.81	14.38	31.88	41.86	54.00	-12.14	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	32.15	31.93	8.73	32.16	40.65	54.00	-13.35	Horizontal
7440.00	23.90	36.59	11.79	31.78	40.50	54.00	-13.50	Horizontal
9920.00	20.44	38.81	14.38	31.88	41.75	54.00	-12.25	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

8.5 RADIATED BAND EDGE DATA

Remark: All restriction band have been tested, and only the worst case is shown in report

Low CH (GFSK)

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	39.87	27.59	5.38	30.18	42.66	74.00	-31.34	Horizontal
2400.00	56.22	27.58	5.39	30.18	59.01	74.00	-14.99	Horizontal
2390.00	40.13	27.59	5.38	30.18	42.92	74.00	-31.08	Vertical
2400.00	57.94	27.58	5.39	30.18	60.73	74.00	-13.27	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	31.10	27.59	5.38	30.18	33.89	54.00	-20.11	Horizontal
2400.00	42.16	27.58	5.39	30.18	44.95	54.00	-9.06	Horizontal
2390.00	30.83	27.59	5.38	30.18	33.62	54.00	-20.38	Vertical
2400.00	43.52	27.58	5.39	30.18	46.31	54.00	-7.69	Vertical

High CH(GFSK)

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	41.61	27.53	5.47	29.93	44.68	74.00	-29.32	Horizontal
2500.00	41.36	27.55	5.49	29.93	44.47	74.00	-29.53	Horizontal
2483.50	41.95	27.53	5.47	29.93	45.02	74.00	-28.98	Vertical
2500.00	42.07	27.55	5.49	29.93	45.18	74.00	-28.82	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	33.89	27.53	5.47	29.93	36.96	54.00	-17.04	Horizontal
2500.00	32.32	27.55	5.49	29.93	35.43	54.00	-18.57	Horizontal
2483.50	34.85	27.53	5.47	29.93	37.92	54.00	-16.08	Vertical
2500.00	31.99	27.55	5.49	29.93	35.10	54.00	-18.90	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 RESULT

The antennas used for this product are PCB Antenna and no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.06dBi.

*****END OF THE REPORT*****