FCC PART 15.247 TEST REPORT

Product:	2.0 Multimedia speaker
Model:	ER151
FCC ID:	2ADIBER151
Report No.:	HTT-20141028473F
Issued Date:	Oct. 21, 2014

Issued for:

ShenZhen DongSheng Electronic Technology Co., Ltd
Room 1108A, 11F, ChiWei Building, ShenNan Middle Road, FuTian District, ShenZhen City, GuangDong Province.

Issued By:

Shenzhen HTT Technology Co.,Ltd.
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Tested By: Jack Chen
Jack chen (EMC Engineer)

Approved By: Owen Hu
Owen Hu (Technical Manager)

Note:

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from HTT Technology.

Table of Contents

1.0 General Details

1.1 Test Lab Details

Name :	Global United Technology Services Co., Ltd.
Address:	1, 2 & 2 floors of Xixiang Road, Baoan District, Shenzhen Labor Second Industrial Zone

Site Listed with Federal Communication Commission Registration Number: 600491 For 3m chamber

1.2 Applicant Details

Applicant:	ShenZhen DongSheng Electronic Technology Co., Ltd
Address:	Room 1108A, 11F, ChiWei Building, ShenNan Middle Road, FuTian District, ShenZhen City, GuangDong Province.
Telephone:	0755-83650951
Fax:	0755-83650952

1.3 Description of EUT

Product:	2.0 Multimedia speaker
Brand Name:	EARSON
Model No.:	ER151
Additional Model No.	N.A.
Rating:	DC 3.7V Lithium battery
Bluetooth Version:	2.0+EDR
Modulation Type:	GFSK, Pi/4QDPSK, 8DPSK
Transfer Data Rate	1/2/3 Mbps
Channel Number:	79
Channel spacing:	1 MHz
Operation Frequency	2402 MHz-2480 MHz
Antenna Designation	An integral printed antenna and the maximum gain is 0 dBi
Modes Statement:	N.A.

1.4 Submitted Sample

1 Sample(s)

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSEM	848597/001	Jul. 05. 2015
2	Test Receiver	R&S	ESPI	101318	Jul. 05. 2015
3	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 05. 2015
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 05. 2015
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 05. 2015
6	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 05. 2015
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 05. 2015
8	Amplifier	EM	EM-30180	060538	Jul. 05. 2015
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 05. 2015
10	Power Meter	R&S	NRVS	100696	Jul. 05. 2015
11	Power Sensor (Peak)	R&S	NRV-Z31	0396.0101.19	Jul. 05. 2015

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 05. 2015
2	LISN	R&S	ENV216	101313	Jul. 05. 2015
3	LISN	EMCO	3816/2	00042990	Jul. 05. 2015
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 05. 2015
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 05. 2015

2.2 AE used during the test

Equipment type	Manufacturer	Model	FCC APPROVAL
Notebook	acer	ZQ1A	FCC DOC
N/A			
N/A			
N/A			

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result
Power Line Conducted Emission Test	**15.207(a)**	**PASS**
20dB Channel Bandwidth	**15.247 (a)(1), 15.215(c)**	**PASS**
Maximum Peak Output Power	**15.247(b)(1)**	**PASS**
Carrier Frequency Separation	**15.247 (a)(1)**	**PASS**
Number of Hopping Channels	**15.247(a)(iii)**	**PASS**
Time of Occupancy (Dwell Time)	**15.247(a)(iii)**	**PASS**
Band age Measurement, Spurious Emission Test	**15.247 (d), 15.205 (a), 15.209 (a)**	**PASS**
Antenna Requirement	**15.203**	**PASS**

3.2 Test Standards

FCC Part 15:2013 Subpart C, Paragraph 15.247

FCC Public Notice DA 00-705-Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

4.0 EUT Modification

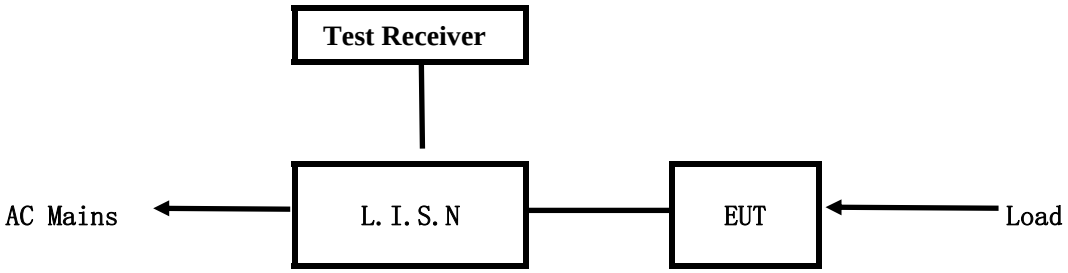
No modification by Shenzhen HTT Technology Co., Ltd.

5.0 Measurement Uncertainty（95% confidence levels, k=2)

No.	Item	MU
1.	Radio Frequency	$\pm 1\times 10^{-9}$
2.	Temperature	±0.1℃
3.	Humidity	±1.0%
4.	RF power, conducted	±0.34dB
5.	Spurious emissions, conducted	±3.70dB
6.	All emissions, radiated	±4.50dB

6. Power Line Conducted Emission Test

6.1 Schematics of the test



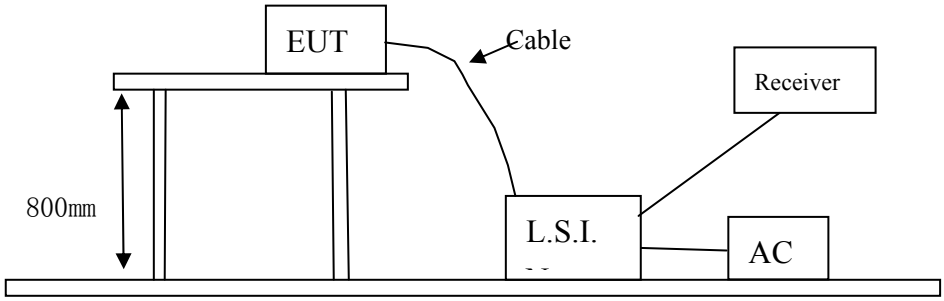
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003.The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003

1) Setup the EUT and simulators as shown on the following

2) Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Please refer to the Section 2

6.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

6.6 Photo documentation of the test set-up

Please refer to the documentation

6.7 Test specification:

Environmental conditions:	Temperature:	23° C	Humidity:	51%	Atmospheric pressure:	103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- Tx mode

6.8 Test result

Min. limit margin 9.66dB at 0.4234MHz

Remarks: 1) According to FCC part 15.207(a)

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

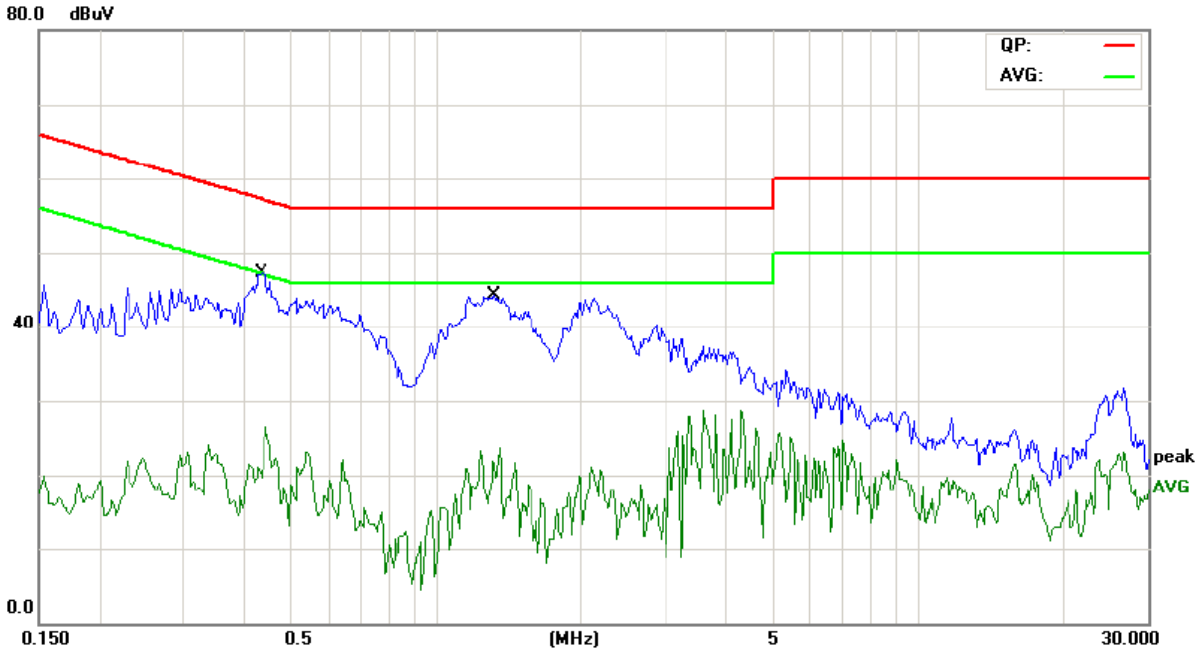
EUT Description: 2.0 Multimedia speaker

Operation Mode: Tx mode

Tested By: Jack chen

Test date: Oct. 25, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Line		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.4350	47.34	34.21	--	--	57.16	47.16
1.3166	44.22	31.65	--	--	56.00	46.00
			--	--		
			--	--		
			--	--		
			--	--		

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

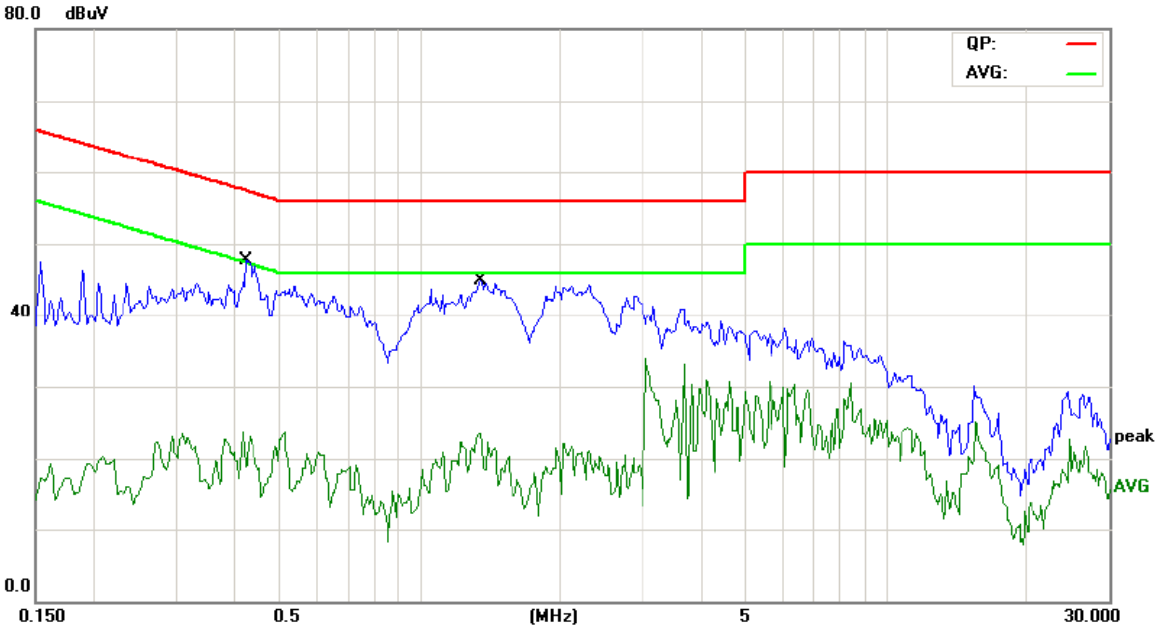
EUT Description: 2.0 Multimedia speaker

Operation Mode: Tx mode

Tested By: Jack chen

Test Data: Oct. 25, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.4234	--	--	47.72	34.66	57.38	47.38
1.3492	--	--	44.92	31.67	56.00	46.00
	--	--				
	--	--				
	--	--				
	--	--				

7.0 20dB Bandwidth Measurement

7.1 Test Equipment

Please refer to the Section 2

7.2 Test Specification:

Environmental conditions: Temperature 24° C Humidity: 52% Atmospheric pressure: 103kPa

7.3 Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

7.4 Test status:

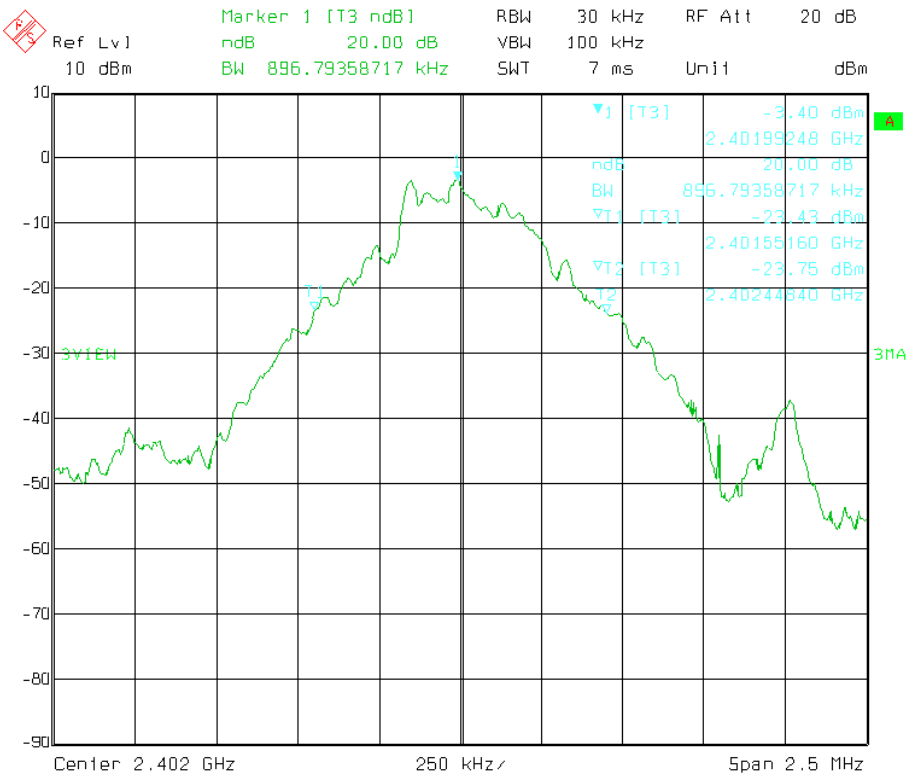
Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

7.5 Test Result:

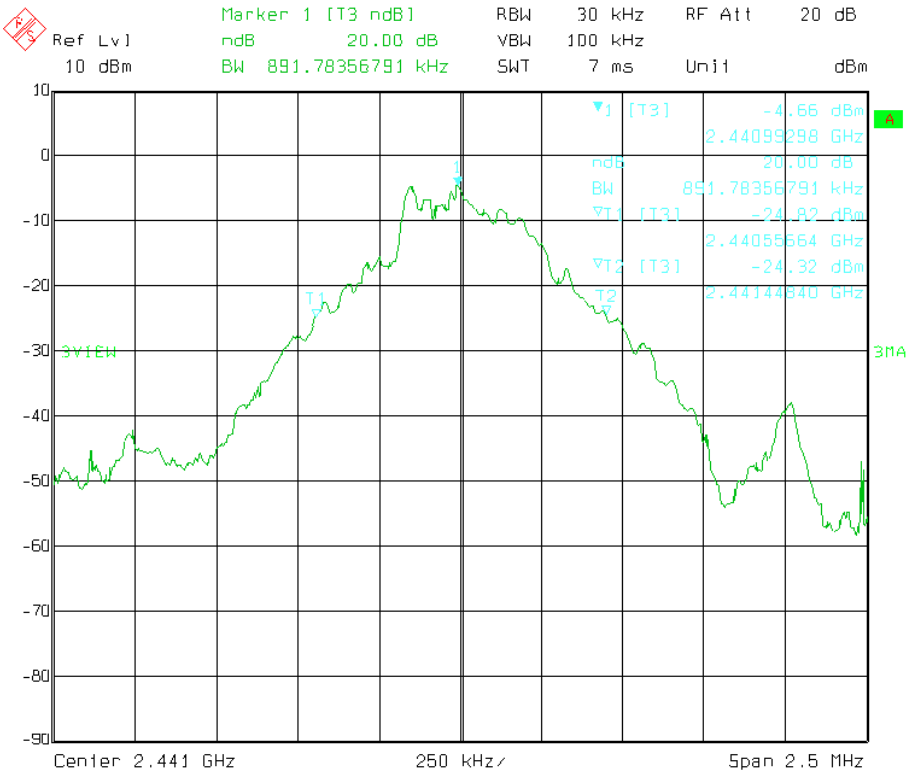
Modulation Type	Channel number	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
GFSK	Low	896.8	---	PASS
	Middle	891.8	---	PASS
	High	891.8	---	PASS
8DPSK	Low	1217.4	---	PASS
	Middle	1212.4	---	PASS
	High	1212.4	---	PASS

Modulation: GFSK

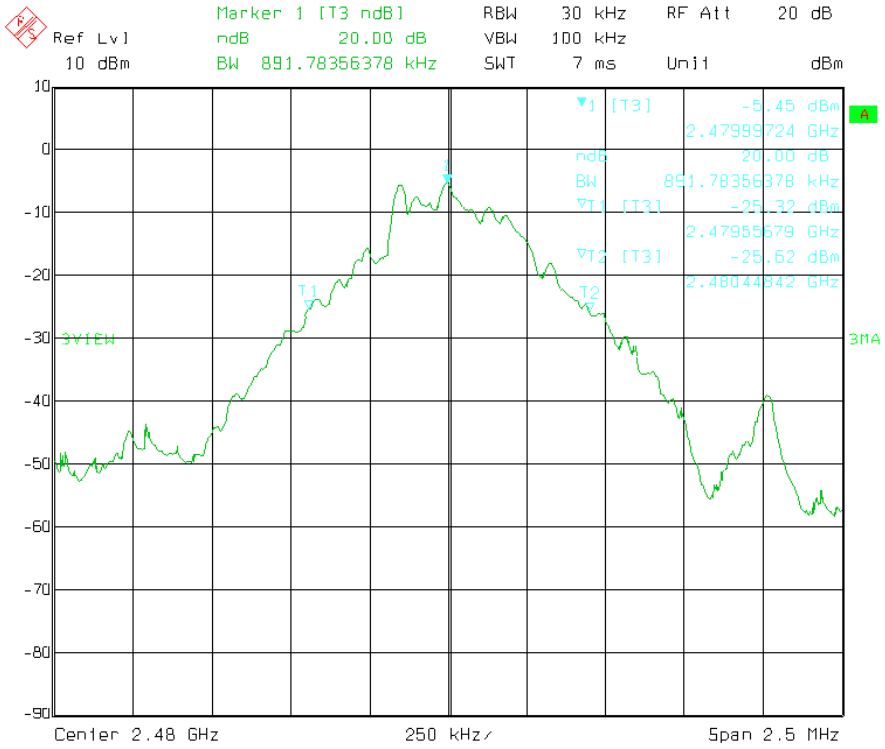
Low channel



Middle channel

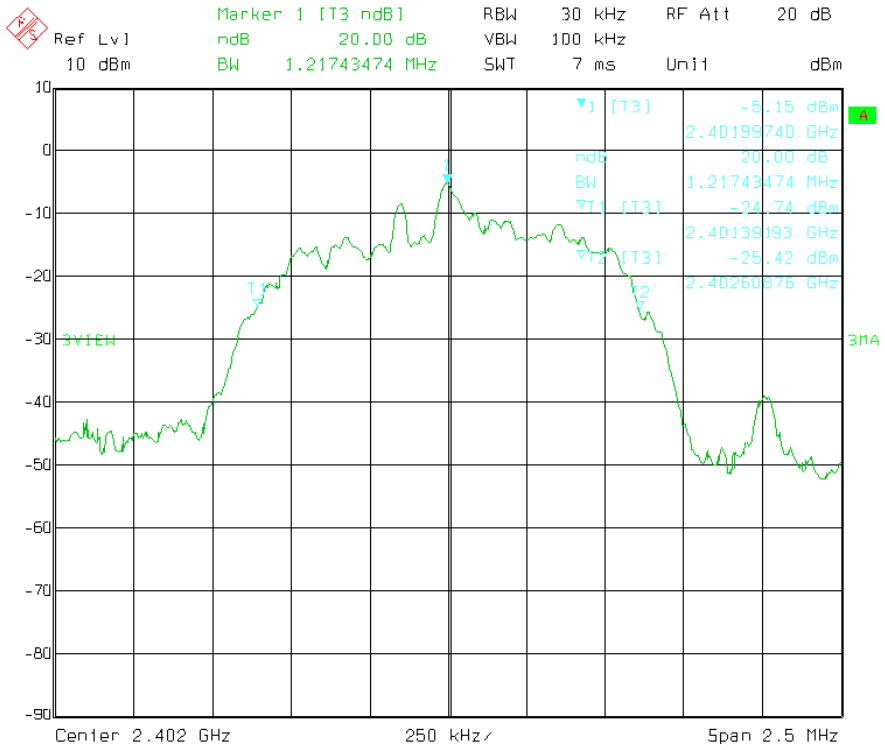


High channel

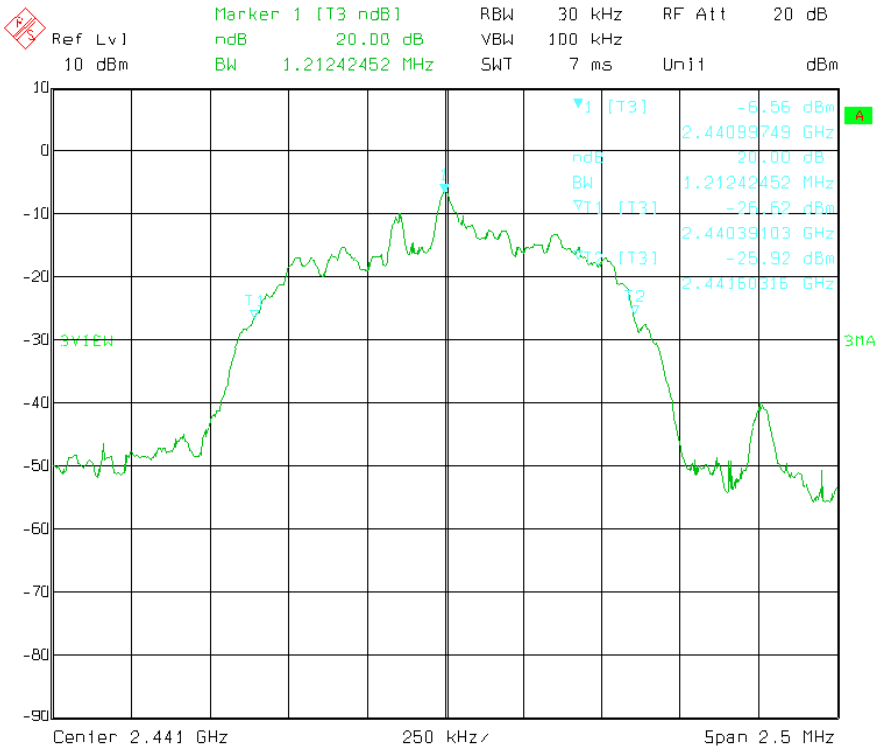


Modulation: 8DPSK

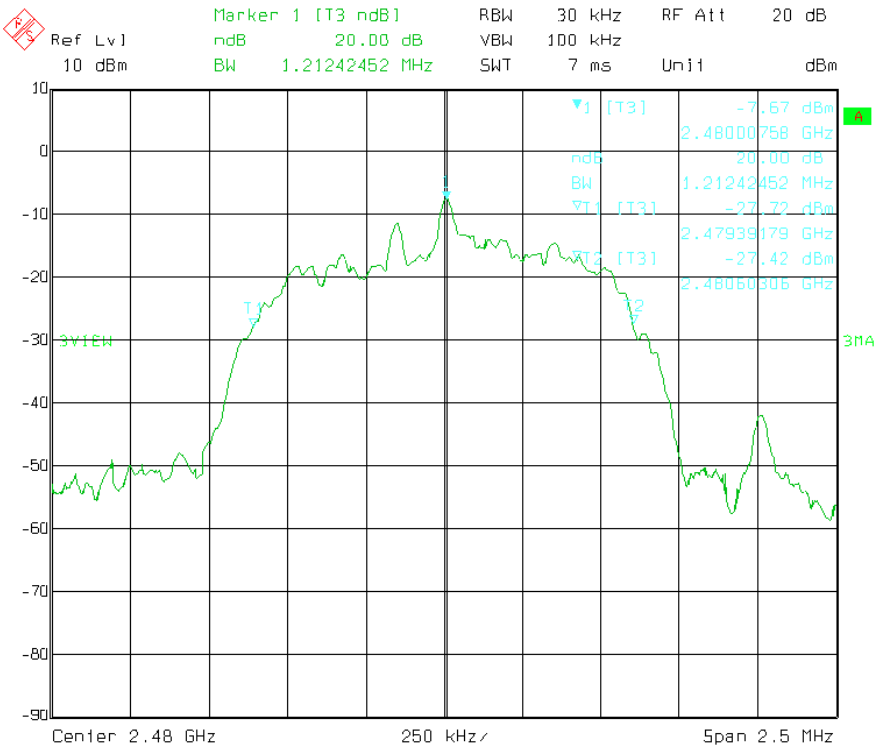
Low channel



Middle channel



High channel



8.0 Maximum Peak Output Power

8.1 Test Equipment

Please refer to the Section 2

8.2 Test specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

8.3 Test Procedure

1) Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2) Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centred on a hopping channel； RBW > the 20 dB bandwidth of the emission being measured； VBW ≥ RBW； Sweep =auto； Detector function = peak； Trace = max hold
3) Measure the highest amplitude appearing on spectral display and record the level to calculate results.
4) Repeat above procedures until all frequencies measured were complete.
5) Peak Power Output = Peak Power Reading + Cable loss + Attenuator

8.4 Limits

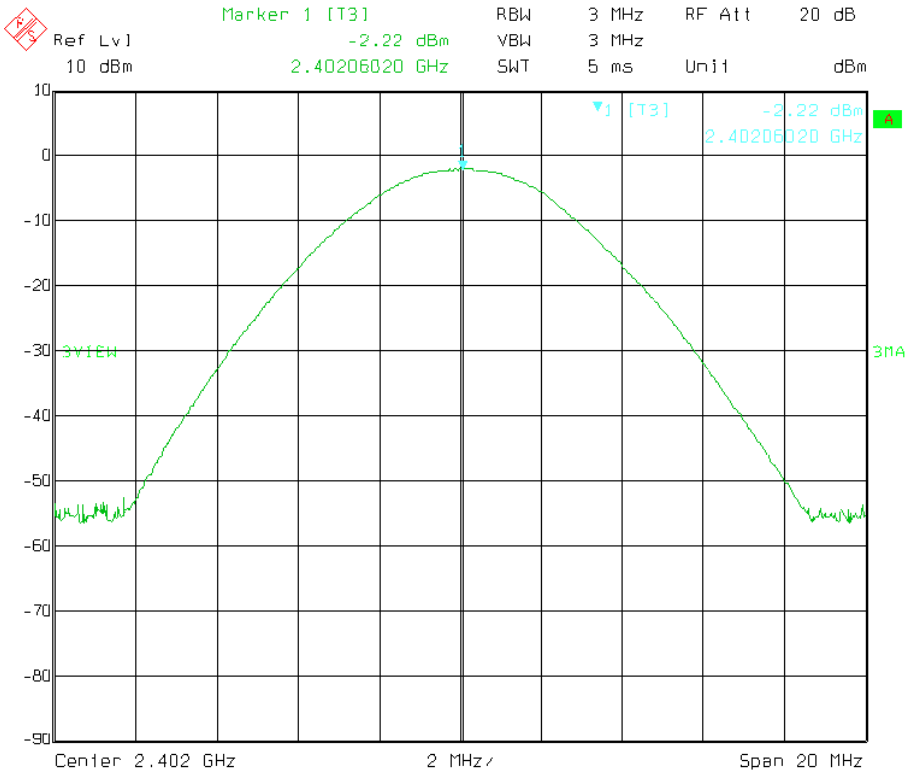
According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125 watts. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.5 Test Result

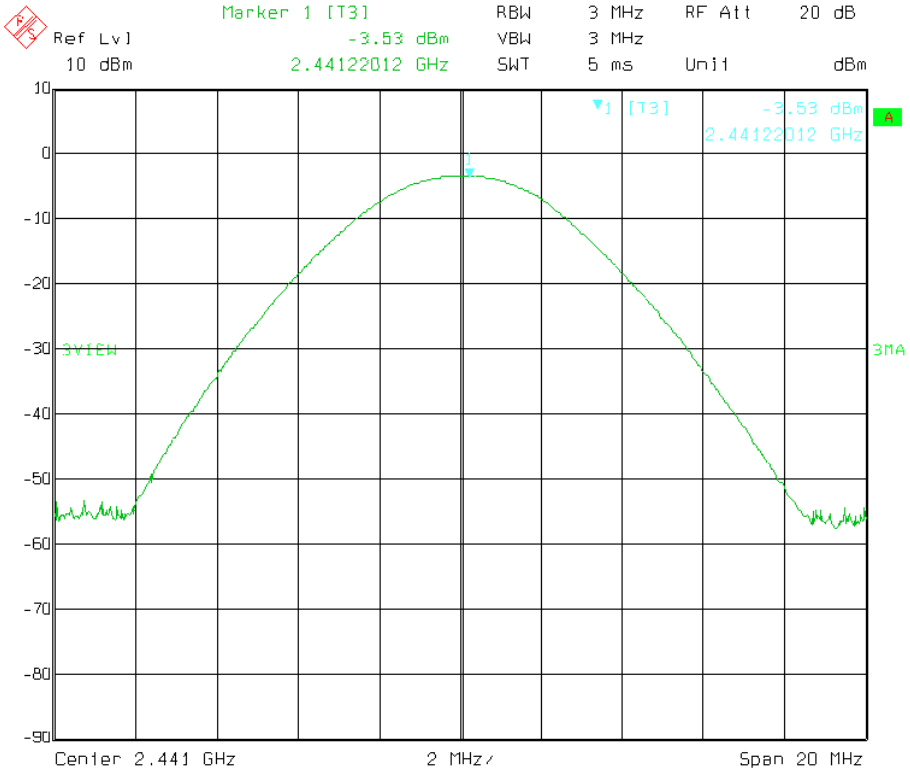
Modulation Type	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (mW)	Peak Power Limit (dBm)	Pass/ Fail
GFSK	2402	-2.22	125	20.97	Pass
	2441	-3.53	125	20.97	Pass
	2480	-4.54	125	20.97	Pass
Pi/4 QDPSK	2402	-3.73	125	20.97	Pass
	2441	-5.15	125	20.97	Pass
	2480	-6.65	125	20.97	Pass
8 DPSK	2402	-3.64	125	20.97	Pass
	2441	-4.88	125	20.97	Pass
	2480	-5.85	125	20.97	Pass

Modulation: GFSK

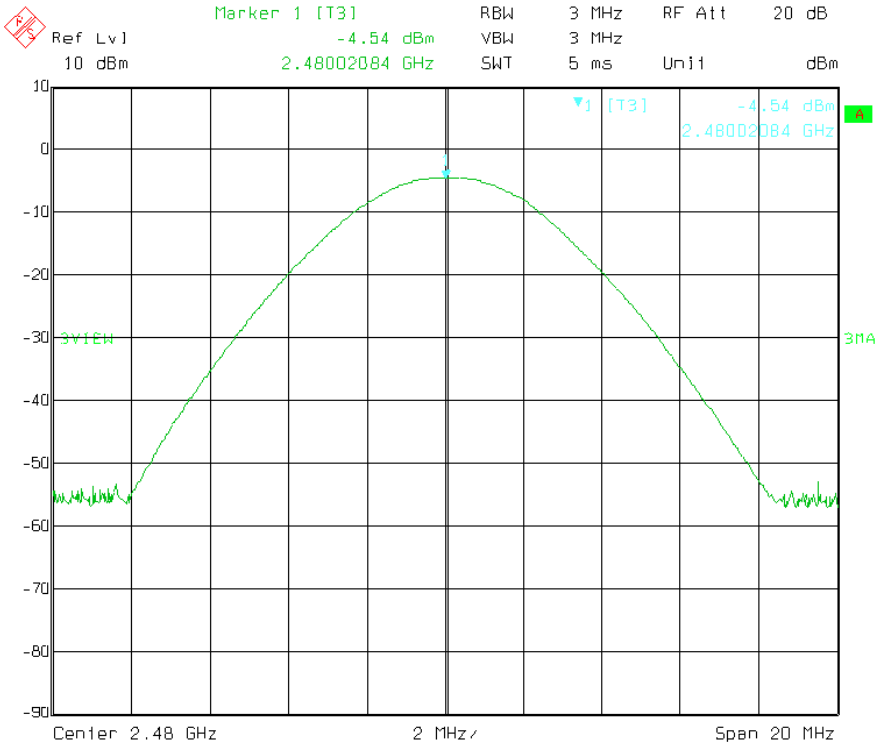
Low channel



Middle channel

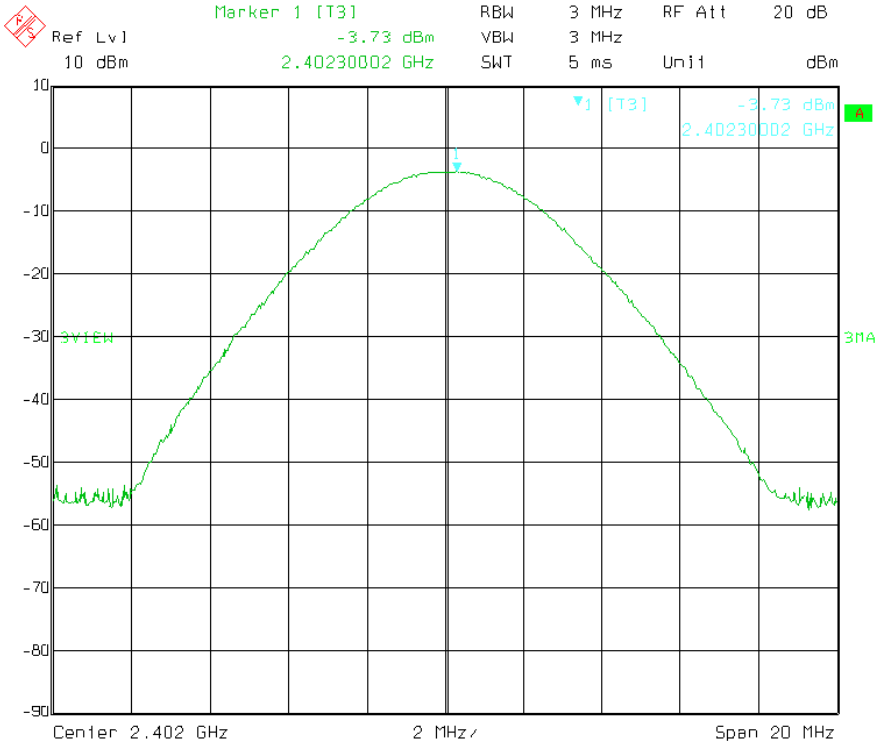


High channel

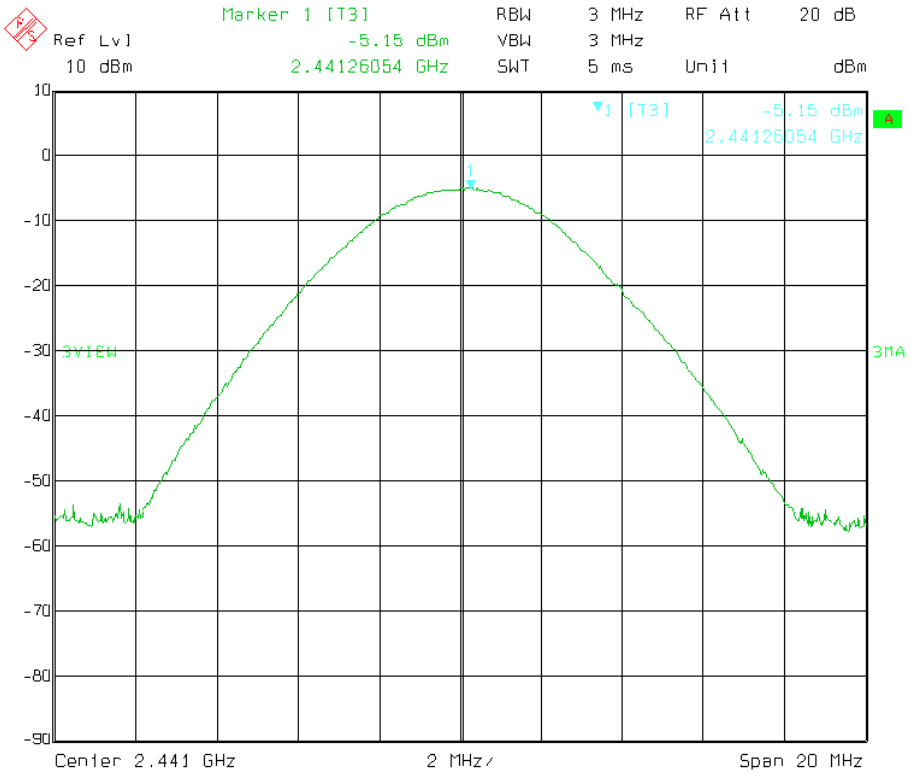


Modulation: Pi/4DQPSK

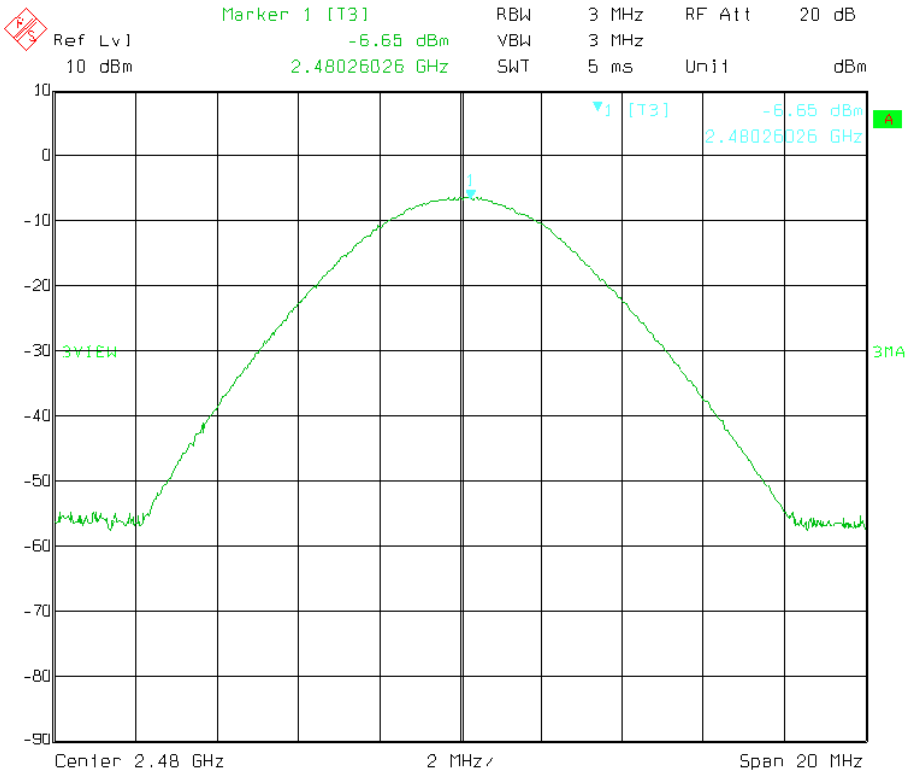
Low channel



Middle channel

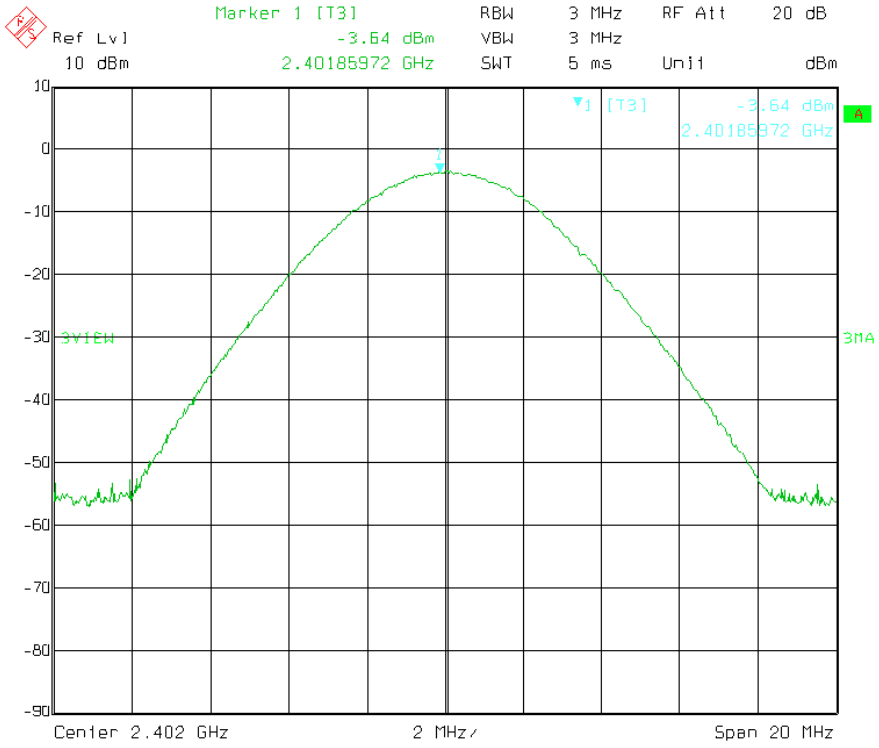


High channel

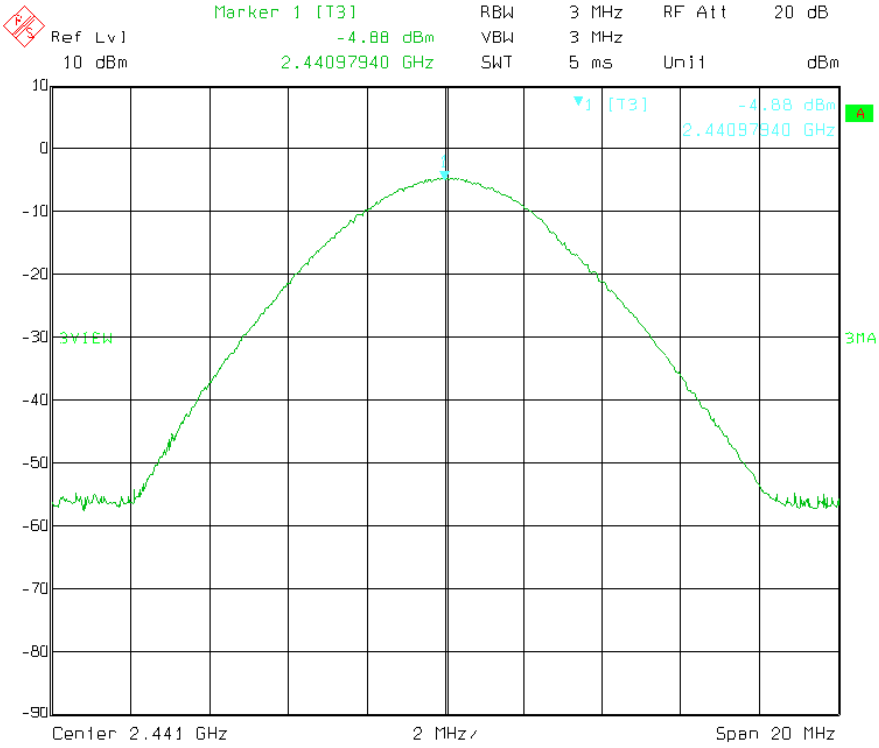


Modulation: 8DPSK

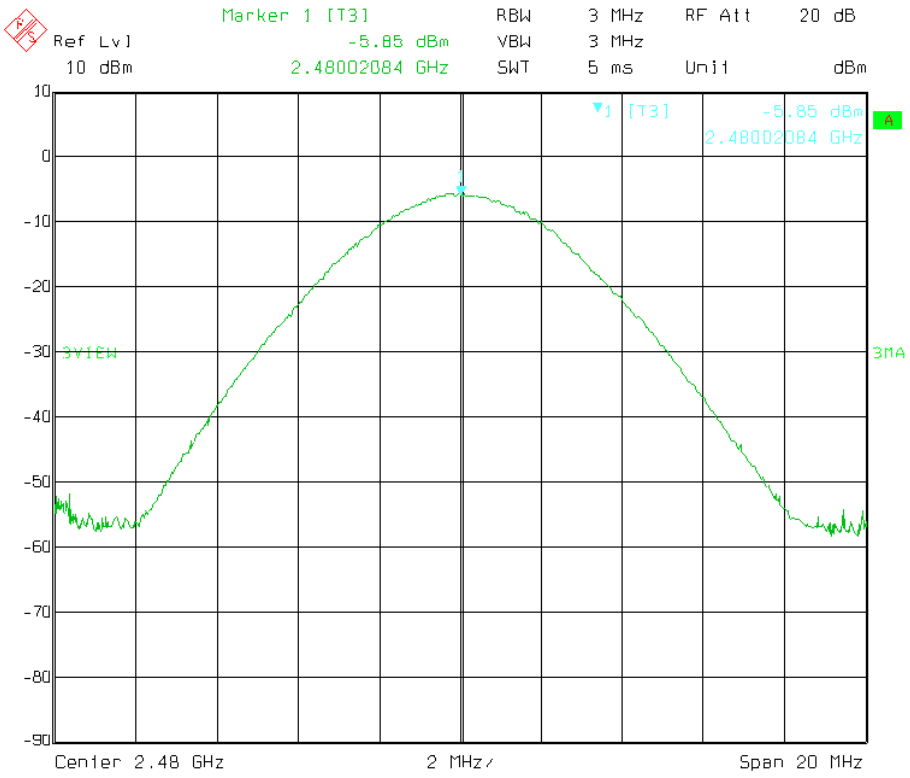
Low channel



Middle channel



High channel



9.0 Carrier Frequency Separation

9.1 Test Equipment

Please refer to the Section 2

9.2 Test specification:

Environmental conditions: Temperature 24° C Humidity: 52% Atmospheric pressure: 103kPa

9.3 Test Procedure

1. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span; Video (or Average) Bandwidth (VBW) ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold

2. Measure the separation between the peaks of the adjacent channels using the marker-delta function.

3. Repeat above procedures until all frequencies measured were complete.

9.4 Limits

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

9.5 Test status:

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

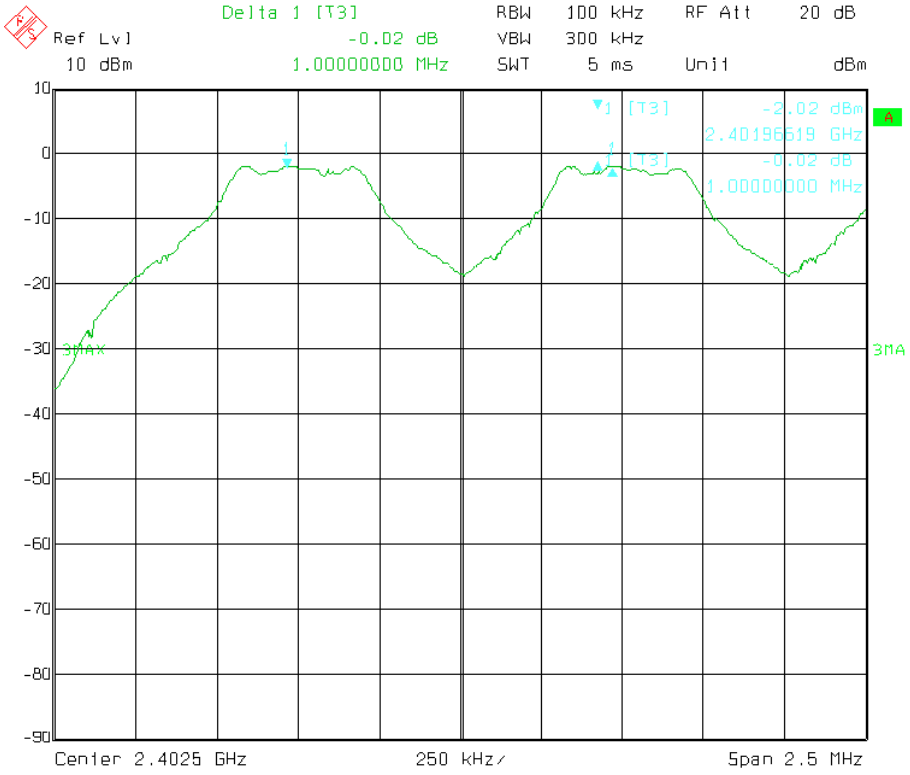
9.6 Test Result

Modulation Type	Channel number	Carrier Frequency Separation	Limit	Pass/ Fail
GFSK	Low	1.000MHz	≥ 25 kHz or two-thirds 20 dB bandwidth	Pass
	Middle	1.000MHz		Pass
	High	1.000MHz		Pass
8DPSK	Low	1.000MHz	≥ 25 kHz or two-thirds 20 dB bandwidth	Pass
	Middle	1.000MHz		Pass
	High	1.000MHz		Pass

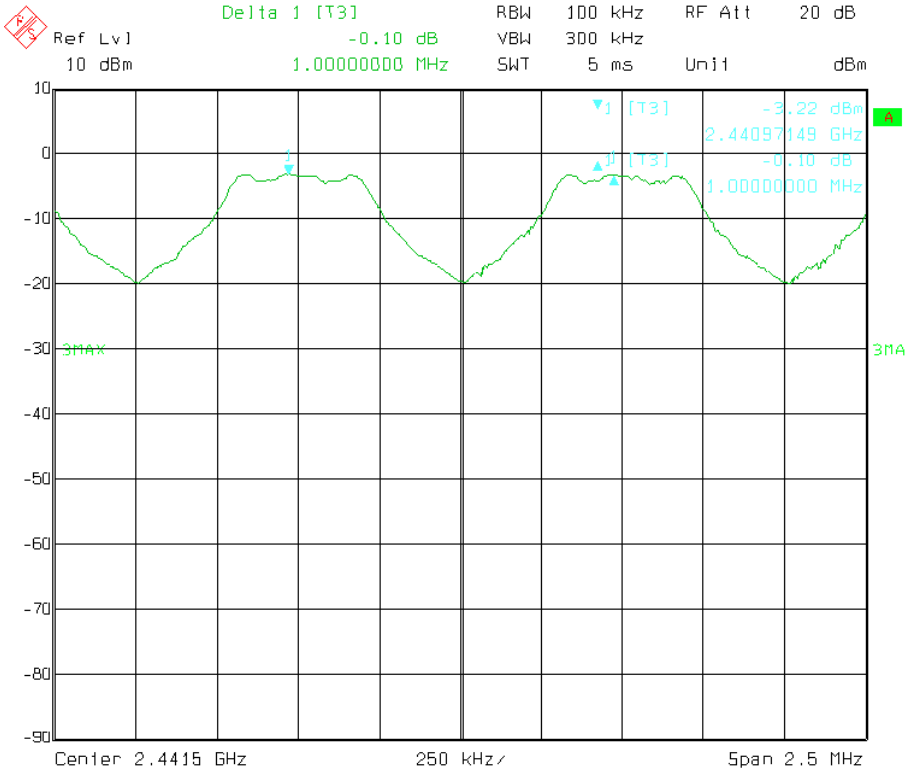
Note: Two-thirds 20 dB bandwidth: GFSK: 597.9 kHz; 8DPSK: 811.6 kHz

Modulation: GFSK

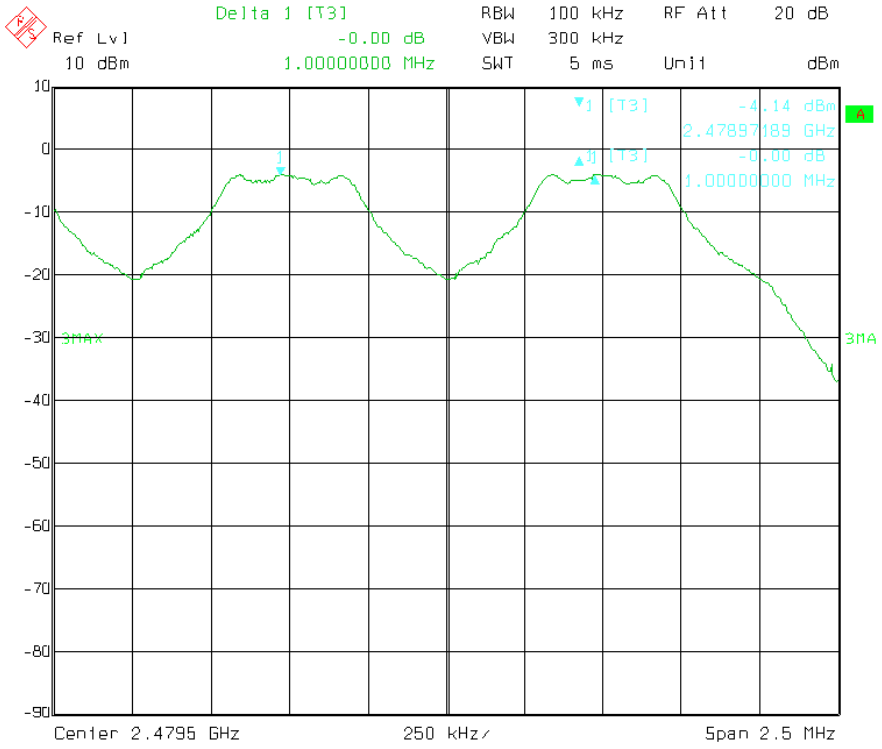
Low channel



Middle channel

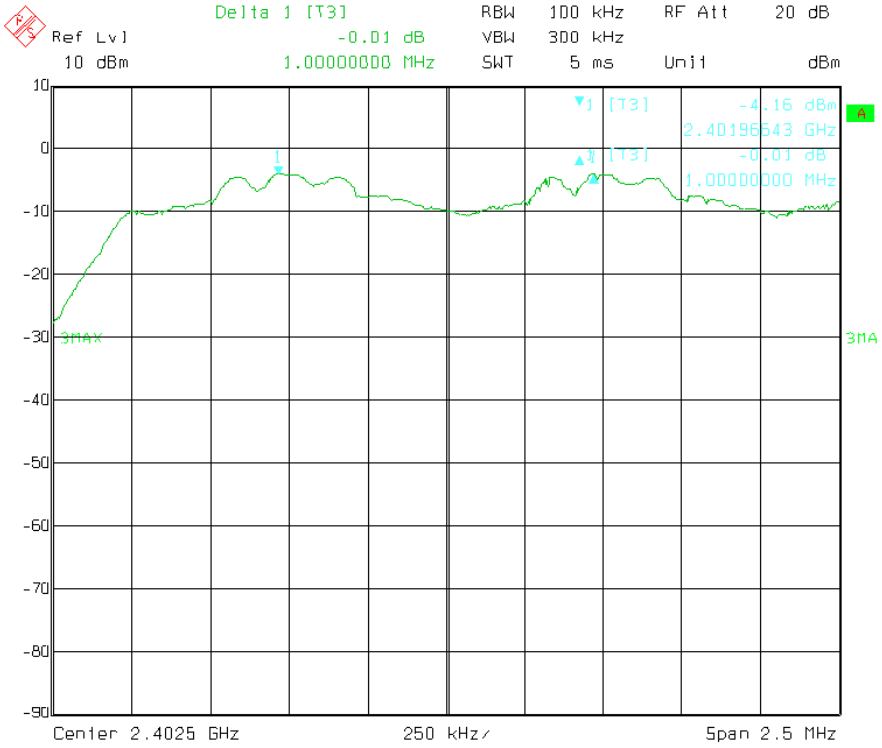


High channel

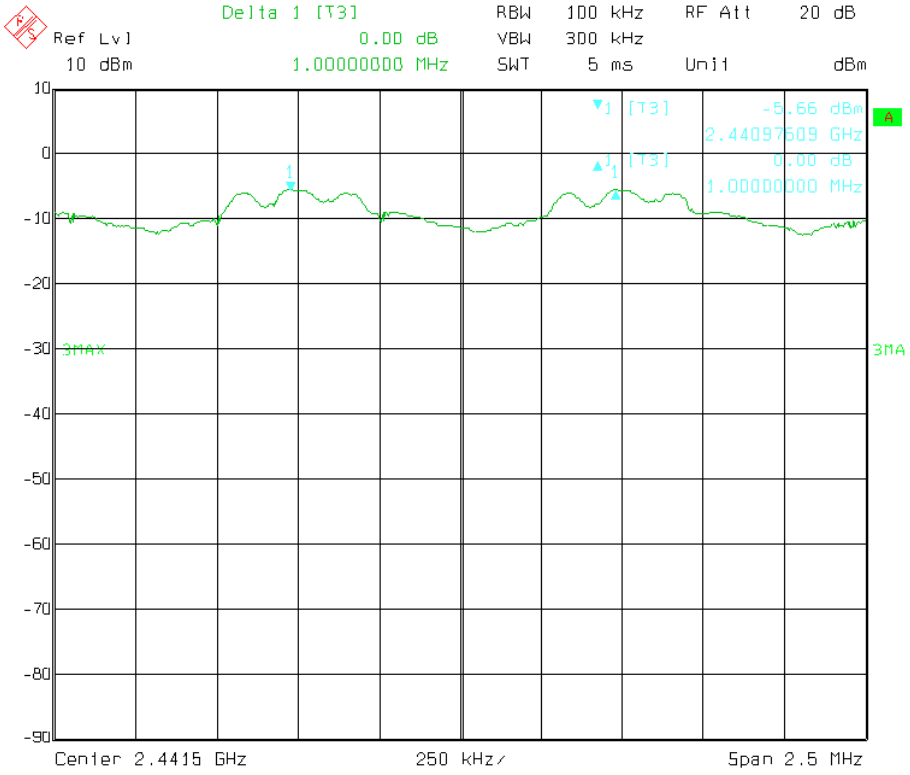


Modulation: 8DPSK

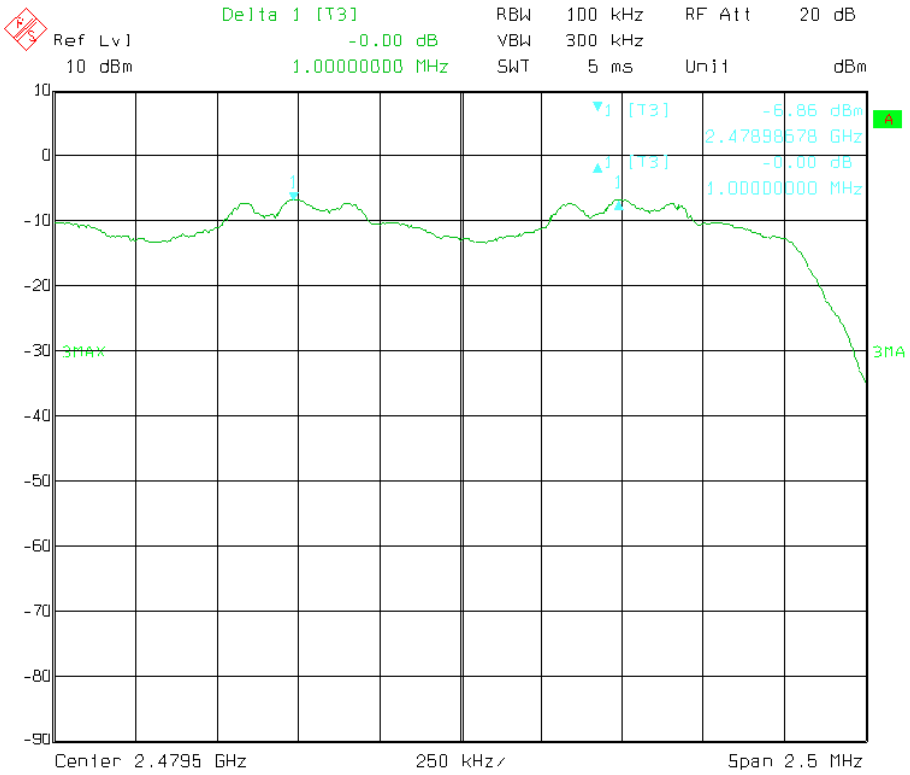
Low channel



Middle channel



High channel



10.0 Number of Hopping Channels

10.1 Test Equipment

Please refer to the Section 2

10.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 51% Atmospheric pressure: 103kPa

10.3 Test Procedure

Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold

10.4 Limits

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

10.5 Test status:

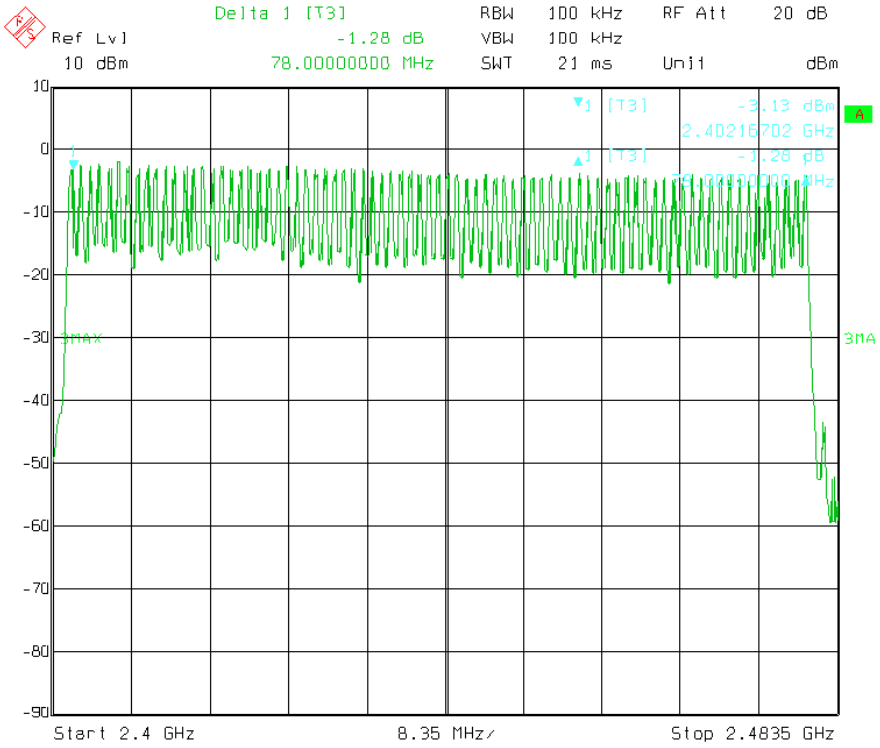
Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

10.6 Test Result

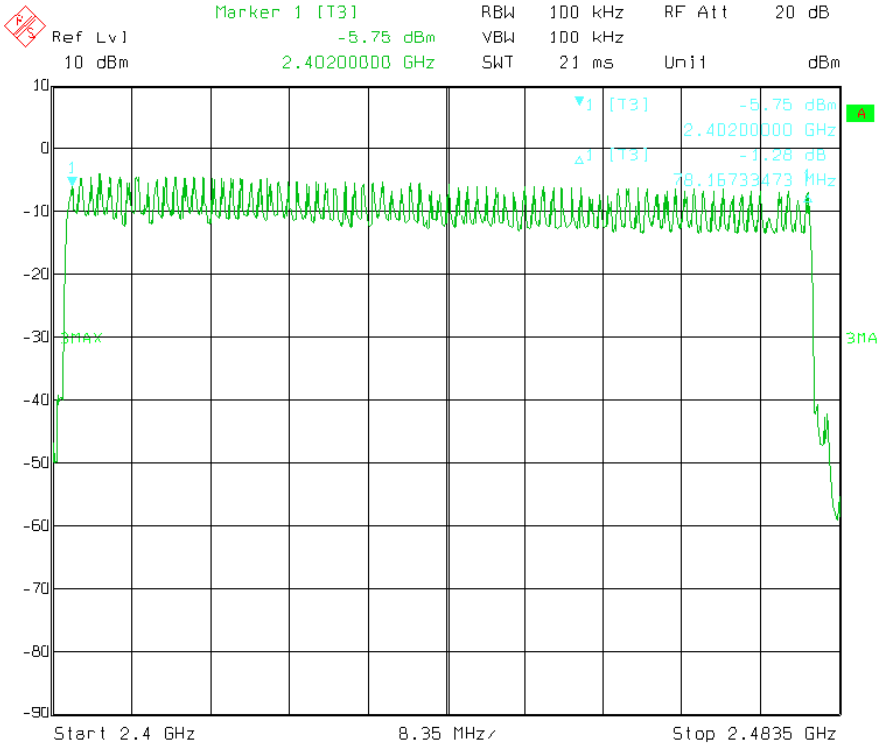
Modulation Type	Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
GFSK	2402-2480MHz	79	≥ 15	Pass
8-DPSK	2402-2480MHz	79	≥ 15	Pass

Test Plot:

Modulation Type: GFSK



Modulation Type: 8DPSK



11.0 Time of Occupancy (Dwell Time)

11.1 Test Equipment

Please refer to the Section 2

11.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

11.3 Test Procedure

Span = zero span, centred on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Detector function = peak; Sweep = as necessary to capture the entire dwell time per hopping channel; Trace = max hold

Measure the dwell time using the marker-delta function.

Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

11.4 Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

11.5 Test status:

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

11.6 Test Result

Modulation Type	Packet	Reading (ms)	Hoping Rate	Actual (s)	Limit (s)
GFSK	DH1	0.555	800hop/s	0.178	0.4
	DH3	1.810	400hop/s	0.290	0.4
	DH5	3.122	266.667hop/s	0.333	0.4
8DPSK	DH1	0.541	800hop/s	0.173	0.4
	DH3	1.810	400hop/s	0.290	0.4
	DH5	3.107	266.667hop/s	0.331	0.4

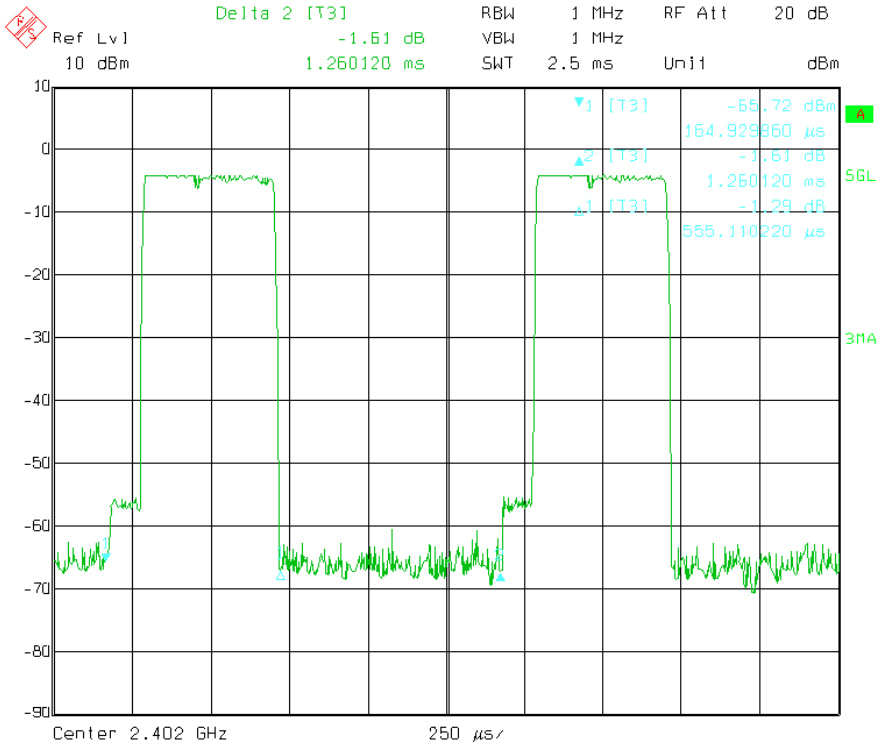
Note: 1) The measurements were conducted in High, Middle, Low channel. The Low channel could represent the character of the other channels, so the low channel measurement was submitted in the report only.

2) Actual = Reading × (Hopping rate / Number of channels) × Test period

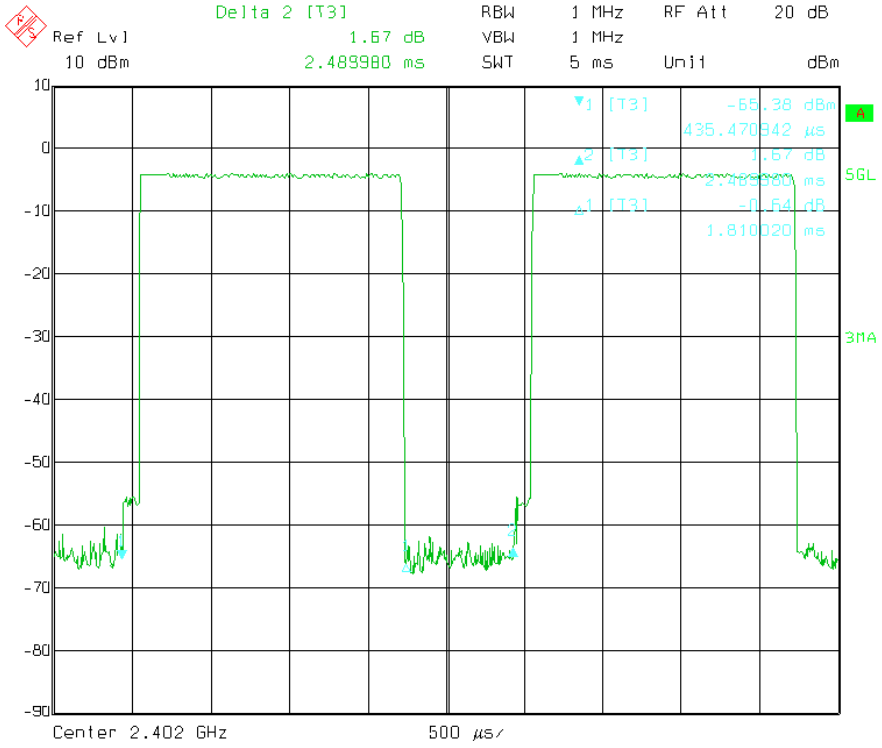
3) The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625μs with 79 channels. A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. So the EUT makes worst case 266.667 hops per second with 79 channels, and the DH5 is the worst case.

Modulation Type: GFSK

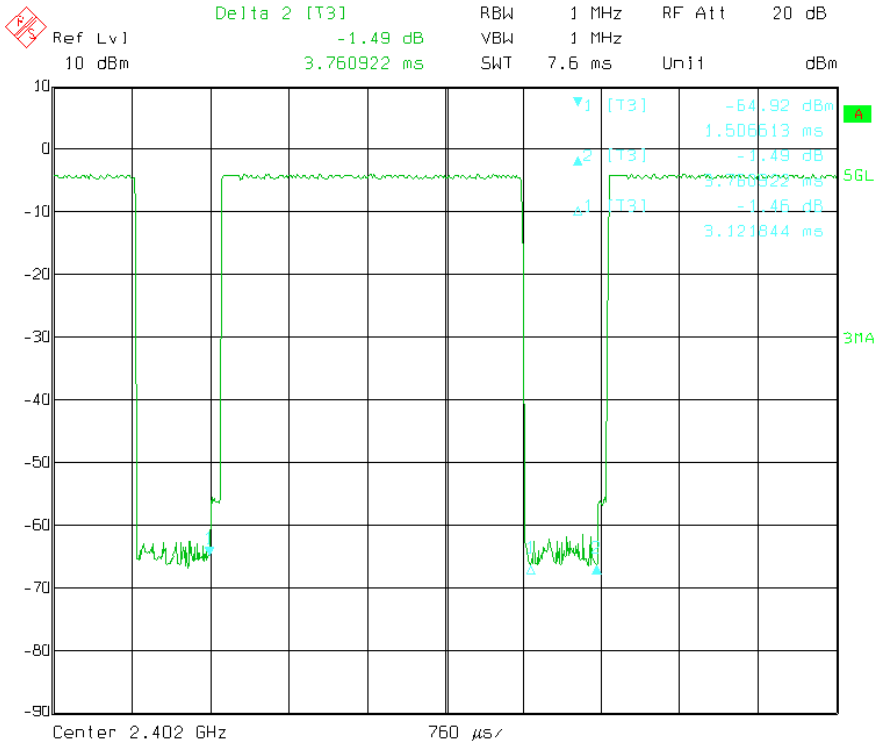
Packet Type: DH1



Packet Type: DH3

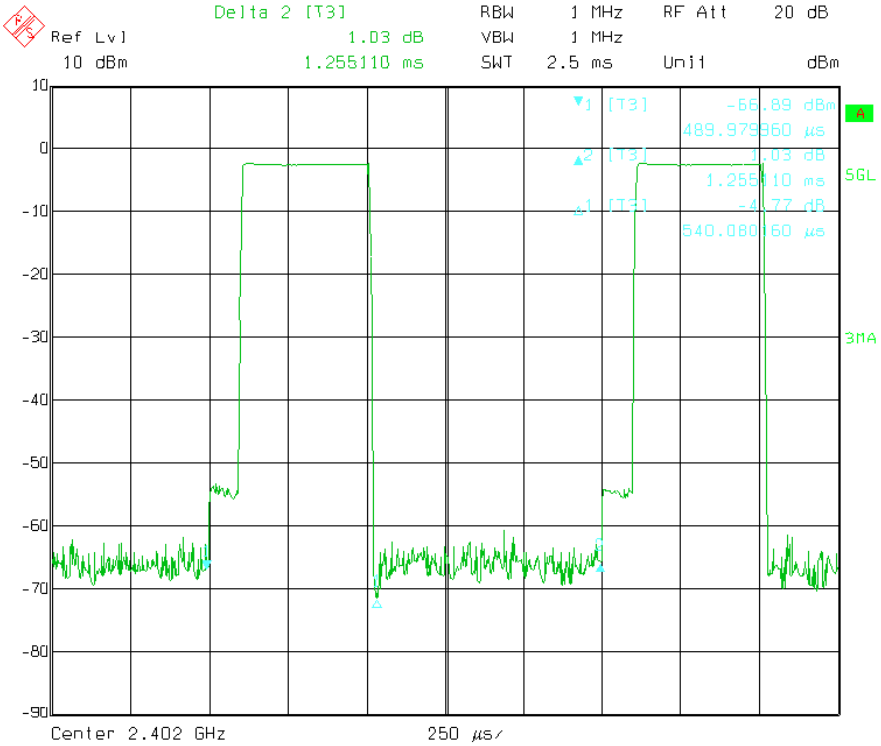


Packet Type: DH5

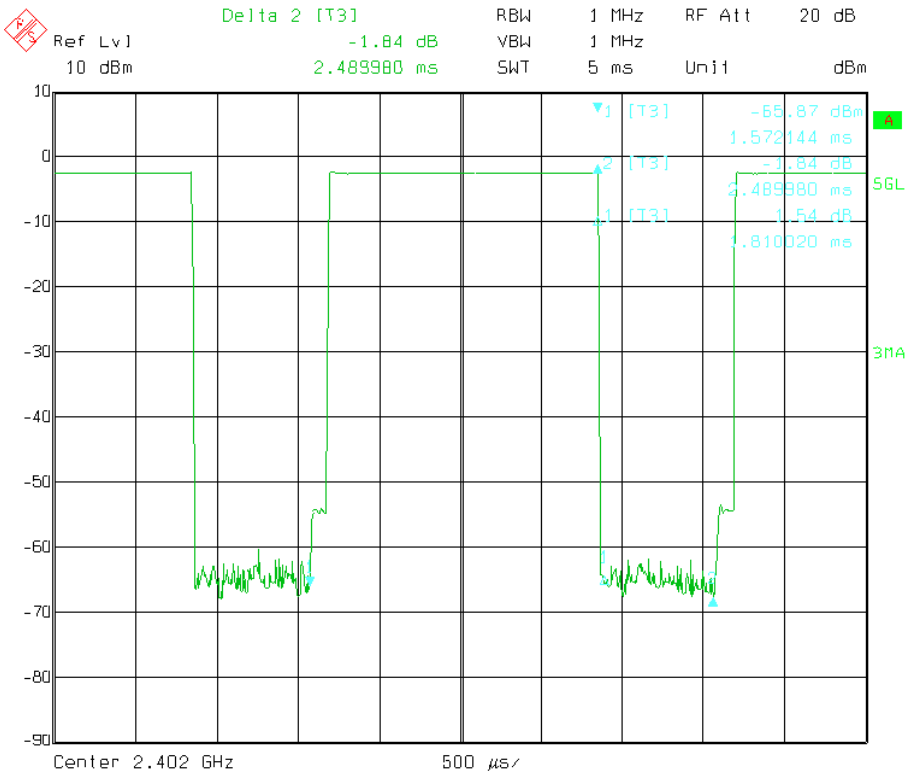


Modulation Type: 8DPSK

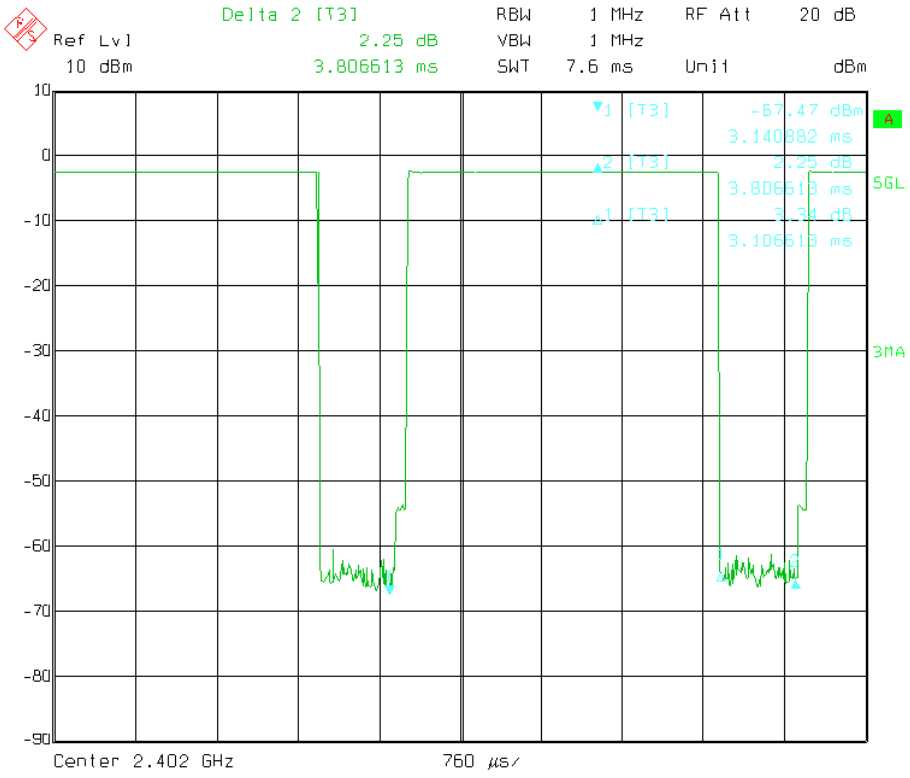
Packet Type: 3-DH1



Packet Type: 3-DH3



Packet Type: 3-DH5



12.0 Band age Measurement

12.1 Test Equipment

Please refer to the Section 2

12.2 Test specification:

Environmental conditions: Temperature 24° C Humidity: 52% Atmospheric pressure: 103kPa

12.3 Test Procedure

For bandage test, the spectrum set as follows: RBW=VBW=100 kHz. Conducted measure method with PK detector is used. For signals allocated in the restricted bands above and below the 2.4-2.483GHz, a radiated measurement is made. (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

12.4 Limit

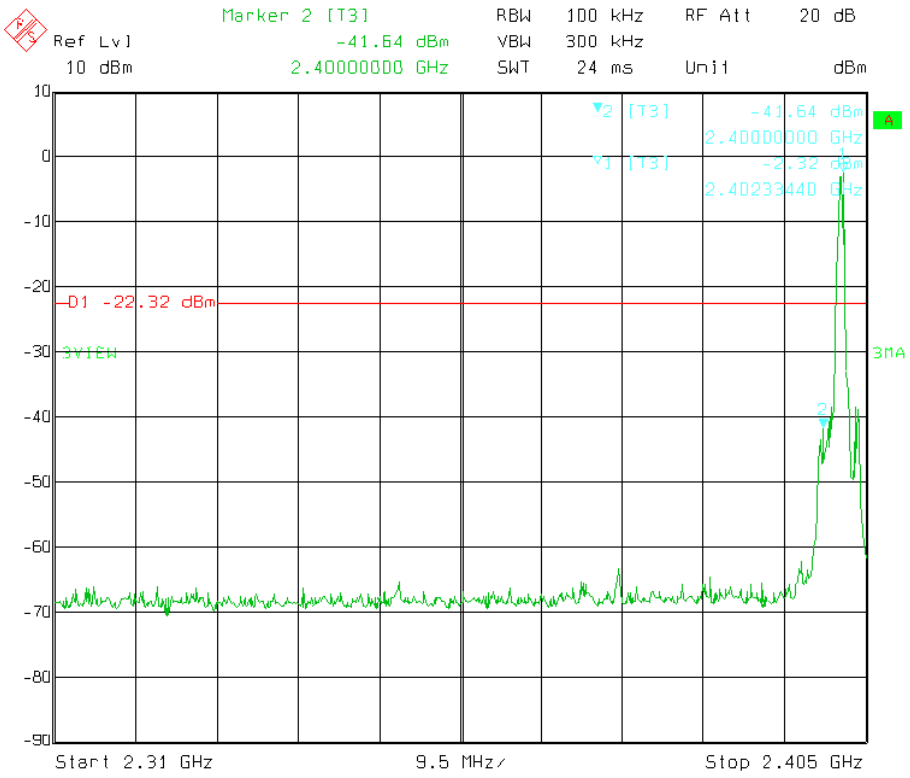
Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

12.5 Test status:

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4-QDPSK and 8-DPSK mode, which indicates that the worst case is 8-DPSK mode, so it is reported GFSK and 8-DPSK mode only.

Modulation: GFSK

EUT operation mode: Keep transmitting in low channel

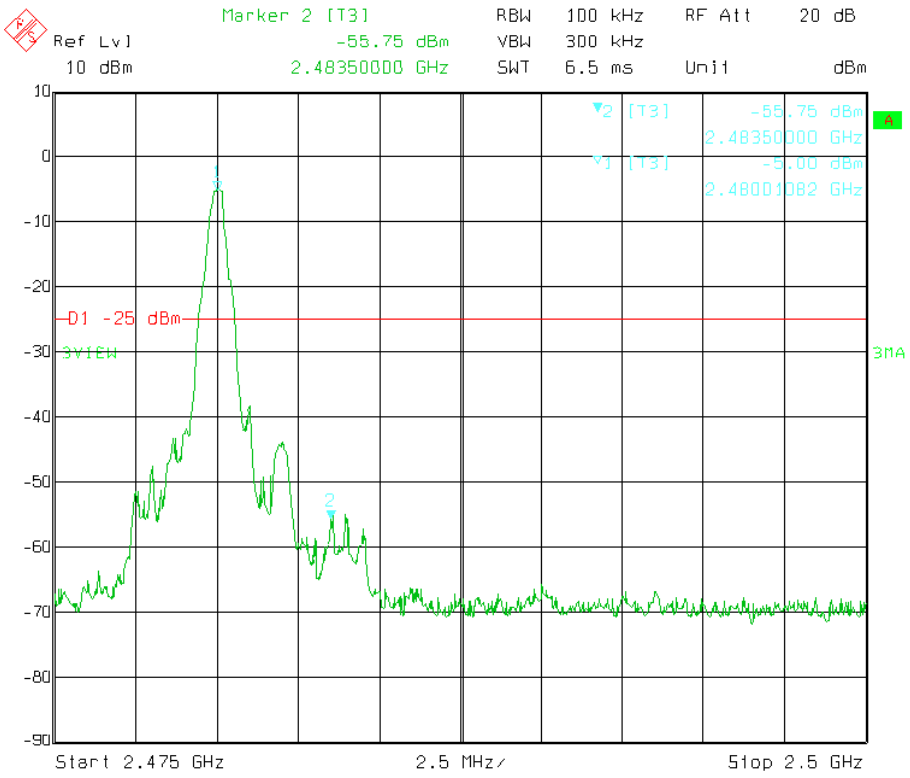


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2310 to 2390 MHz was 45.24dBuV/m@3m at 2353.87MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep transmitting in high channel

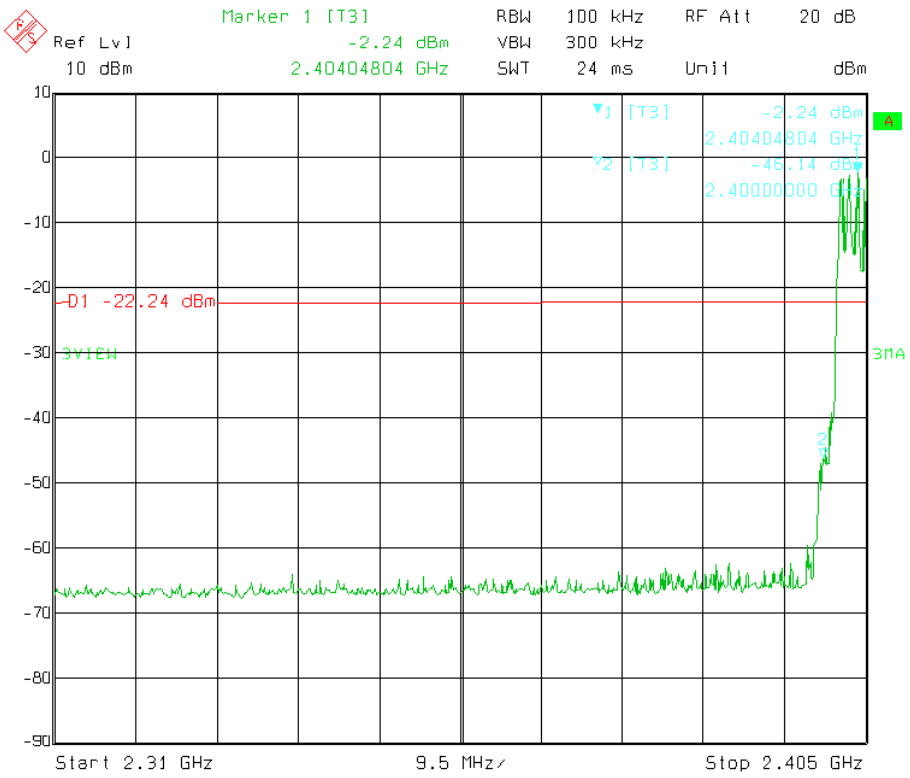


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2483.5 to 2500MHz was 46.48 dBuV/m@3m at 2490.63 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping

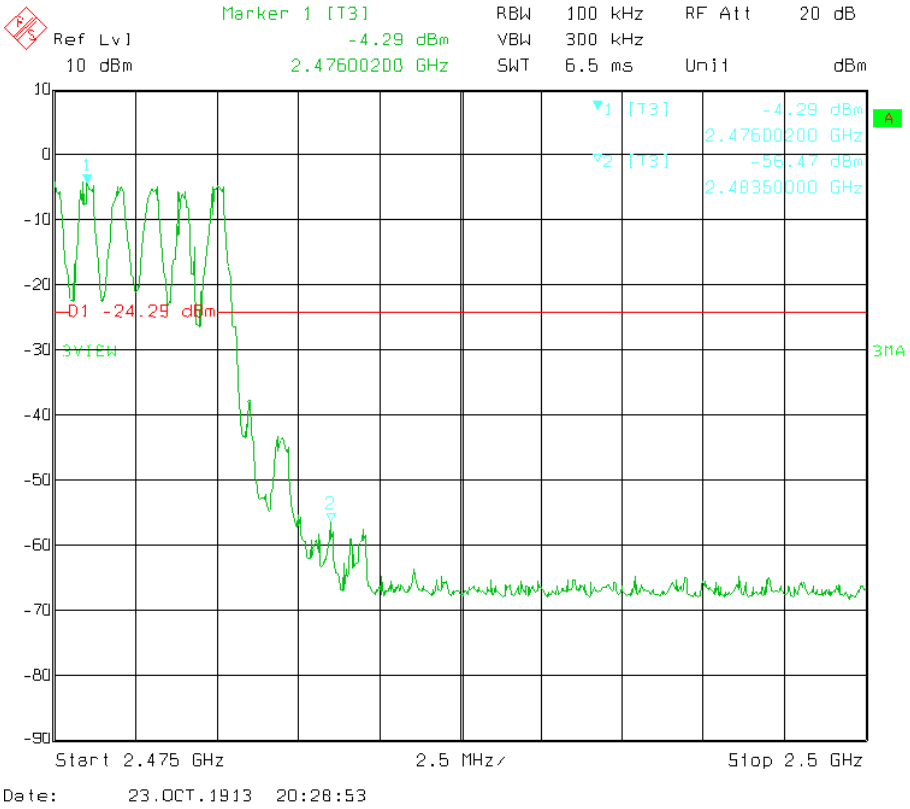


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2310 to 2390 MHz was 45.71 dBuV/m@3m at 2353.87 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping



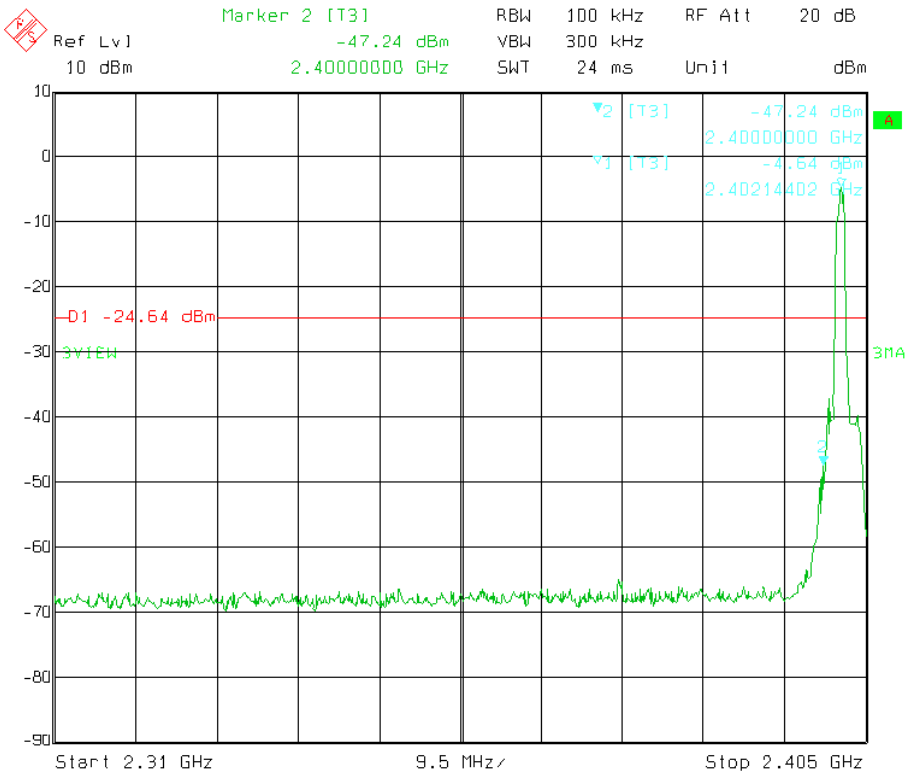
Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2483.5 to 2500MHz was 47.66 dBuV/m@3m at 2490.63 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

Modulation: 8DPSK

EUT operation mode: Keep transmitting in low channel

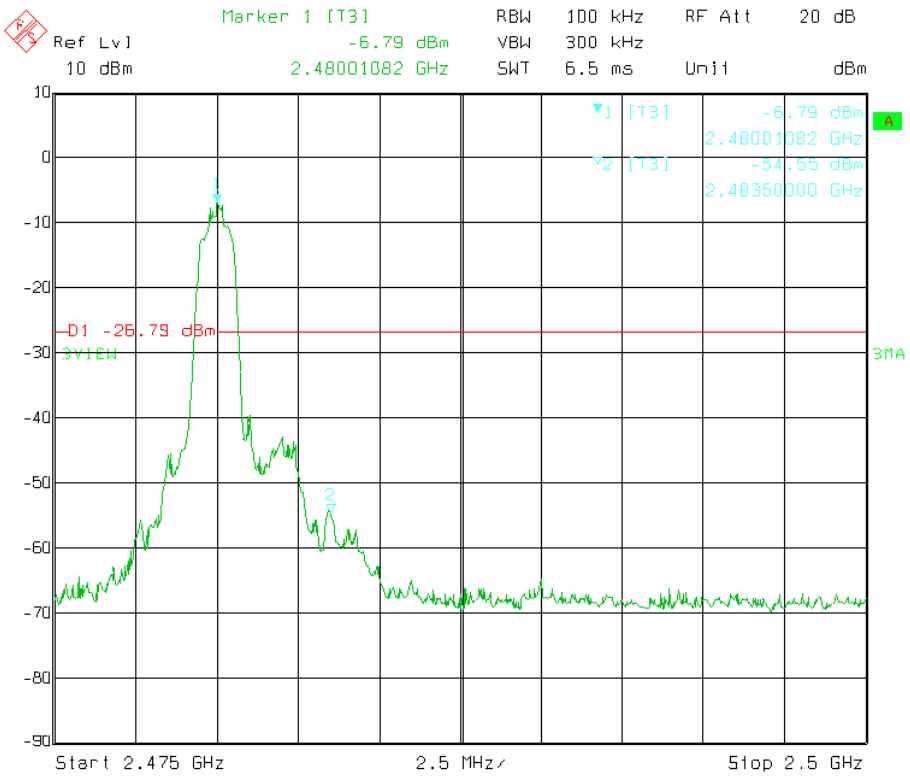


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2310 to 2390 MHz was 45.16 dBuV/m@3m at 2353.87 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep transmitting in high channel

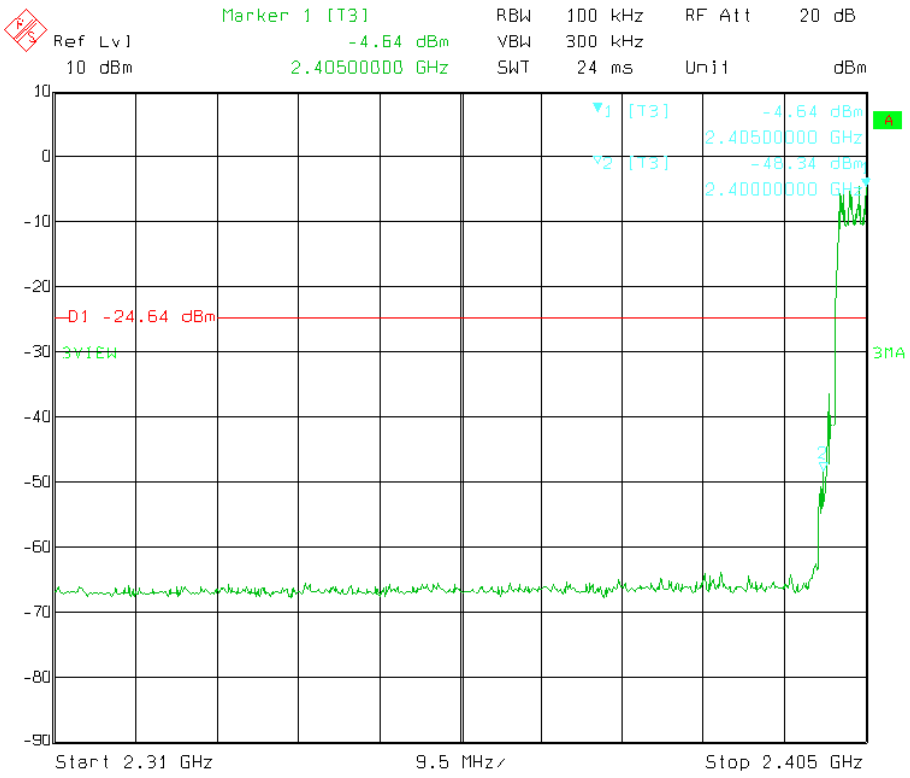


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2483.5 to 2500MHz was 46.36 dBuV/m@3m at 2490.63 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping

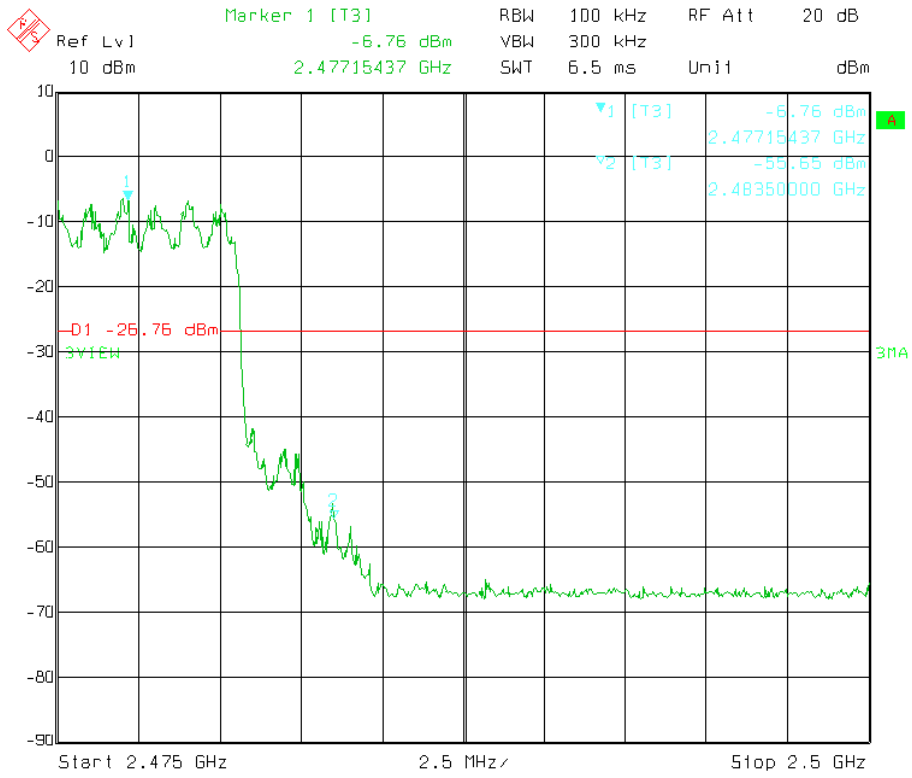


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2310 to 2390 MHz was 46.86 dBuV/m@3m at 2353.87 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping



Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission of restriction band 2483.5 to 2500MHz was 46.82 dBuV/m@3m at 2490.63 MHz, which is less than the Average limit.

3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

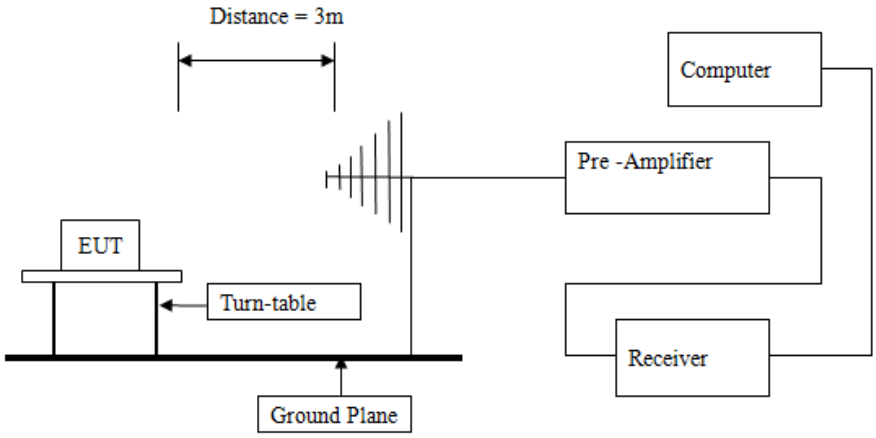
13.0 Spurious Emission Test

13.1 Radiated emissions

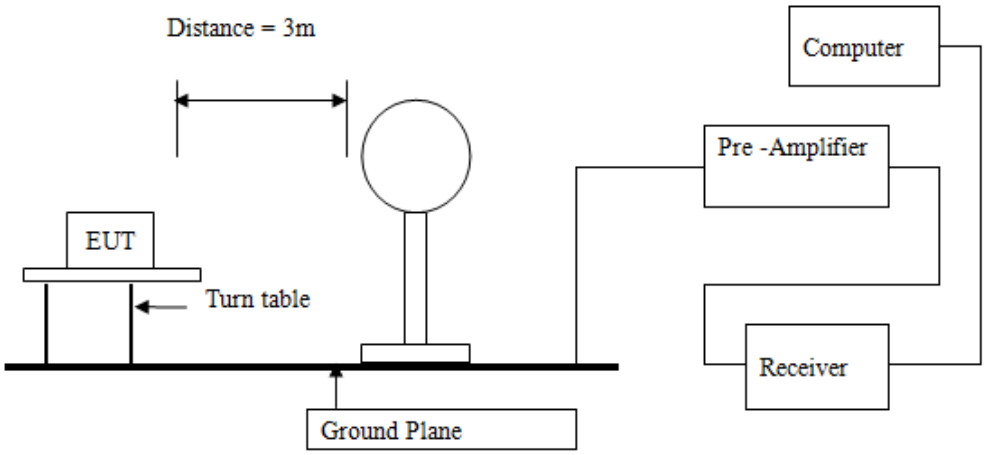
13.1.1 Test Method and test Procedure:

1) The EUT was tested according to ANSI C63.10 –2009.
2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009.
3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5) The antenna polarization: Vertical polarization and Horizontal polarization.

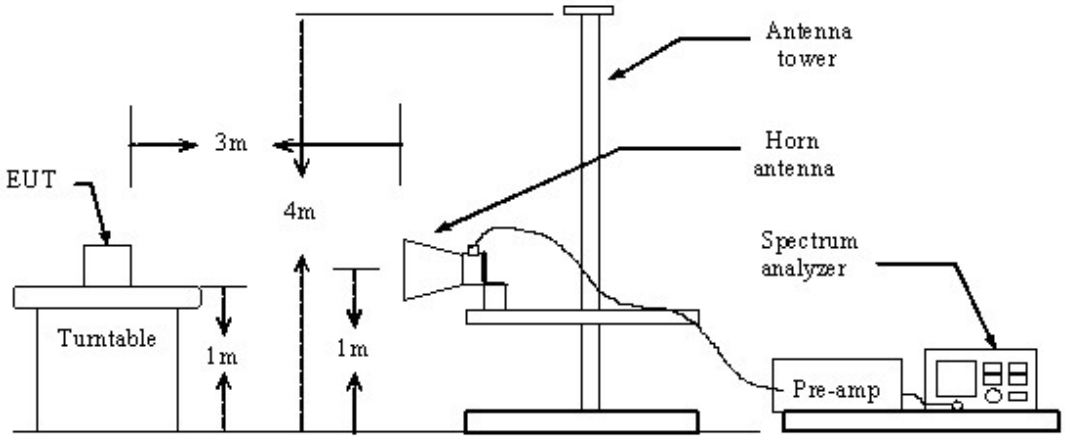
13.1.2 Block diagram of Test setup for frequency 30MHz-1000MHz



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



13.1.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009 and ANSI C63.4-2003.

13.1.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)

2) In the Above Table, the tighter limit applies at the band edges.

3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4) This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

13.1.5 Photo documentation of the test set-up

Please refer to the documentation

13.1.6 Test Equipment:

Please refer to the Section 2

13.1.7 Test specification:

Environmental conditions: Temperature 23° C Humidity: 52% Atmospheric pressure: 103kPa

13.1.8 Test result

A Radiated Emission (9 kHz-30 MHz)

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor

2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Result: Pass

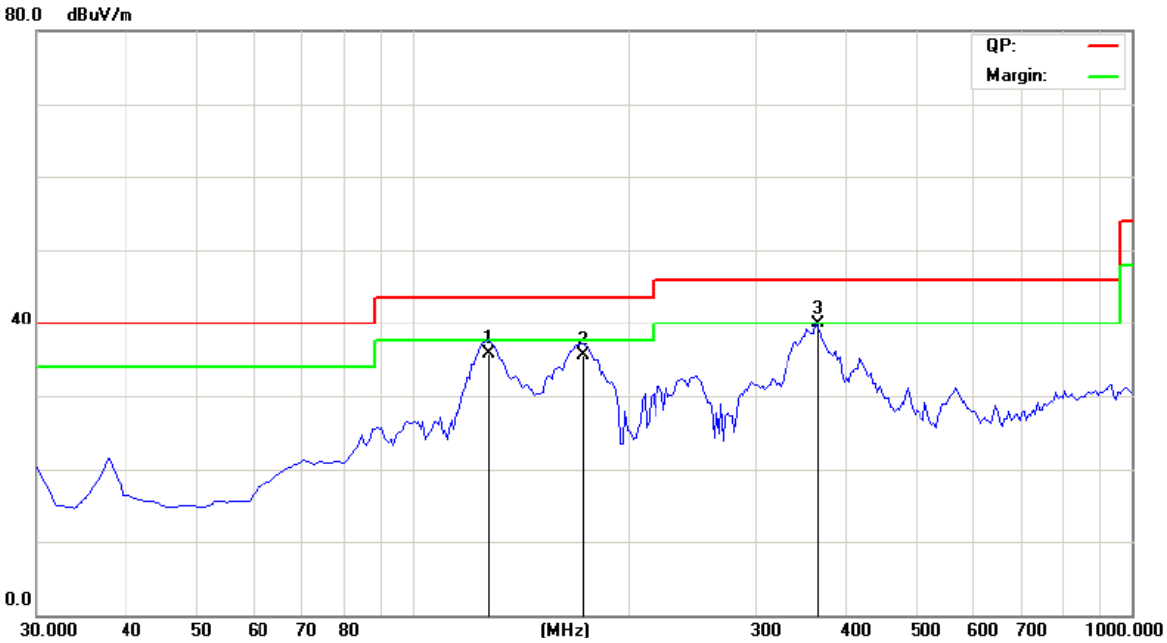
Frequency (MHz)	Level@3m (dB μ V/m)	Limit@3m (dB μ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

B General Radiated Emissions Data

Radiated Emission In Horizontal (30MHz----1000MHz)

Please refer to following diagram for individual

High channel: 2480 MHz

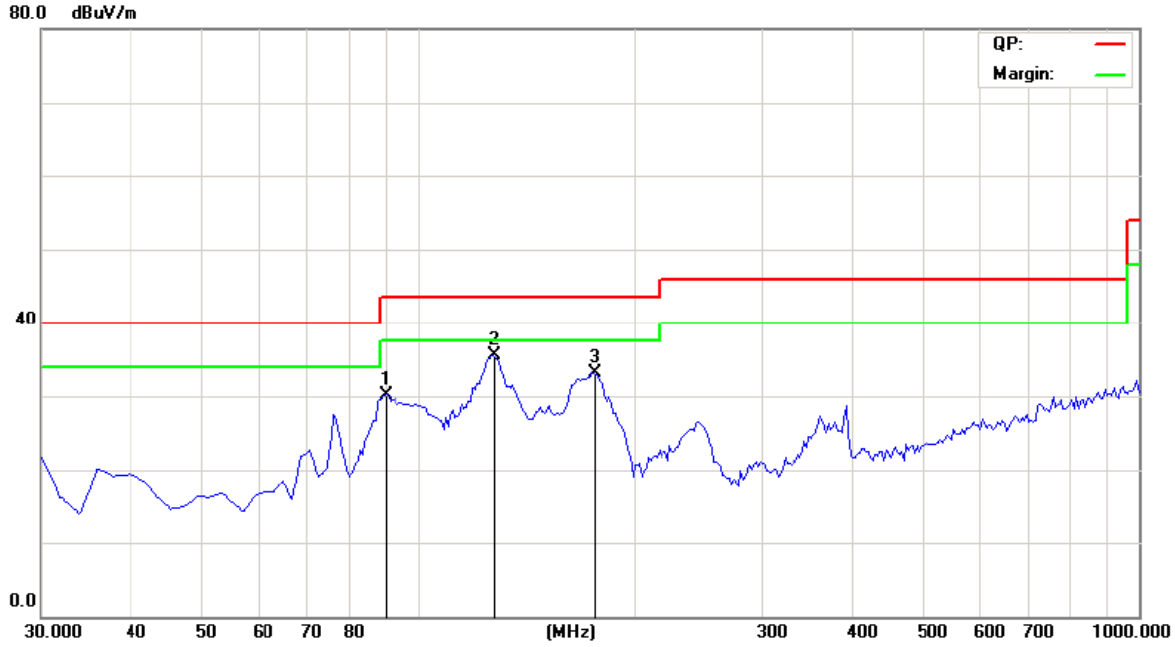


Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
127.1944	35.69	H	43.50
171.9037	35.54	H	43.50
364.3487	39.90	H	46.00
		H	
		H	
		H	

Radiated Emission In Vertical (30MHz----1000MHz)

Please refer to following diagram for individual

High channel: 2480 MHz



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
90.4196	30.20	V	43.50
127.1944	35.45	V	43.50
175.7915	33.16	V	43.50
		V	
		V	
		V	

Note: Measurements were conducted in all three channels (high, middle, low), and the worst case (high channel) was submitted only.

C Fundamental & Harmonics Radiated Emission Data (1000MHz-25000MHz)

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

Modulation Type: GFSK

Low channel: 2402 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level Peak (dBuV/m)	Emission Level AV (dBuV/m)	Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
1304.32	H	51.43	---	-4.21	47.22	---	74.00	54.00	-6.78
4804.00	H	52.26	---	-3.94	48.32	---	74.00	54.00	-5.68
5601.67	H	53.55	---	-2.87	50.68	---	74.00	54.00	-3.32
7206.00	H	49.16	---	0.52	49.68	---	74.00	54.00	-4.32
16814.00	H	43.74	---	6.73	50.47	---	74.00	54.00	-3.53
24020.00	H	42.24	---	8.11	50.35	---	74.00	54.00	-3.65
1302.84	V	53.42	---	-4.21	49.21	---	74.00	54.00	-4.79
4804.00	V	53.46	---	-3.98	49.48	---	74.00	54.00	-4.52
5610.14	V	49.11	---	-2.81	46.30	---	74.00	54.00	-7.7
7206.00	V	46.27	---	0.52	46.79	---	74.00	54.00	-7.21
16814.00	V	43.84	---	6.84	50.68	---	74.00	54.00	-3.32
24020.00	V	42.42	---	8.16	50.58	---	74.00	54.00	-3.42

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

Middle channel: 2441 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1304.32	H	52.25	---	-4.21	48.04	---	74.00	54.00	-5.96
4882.00	H	50.64	---	-3.94	46.70	---	74.00	54.00	-7.3
5601.67	H	51.23	---	-2.87	48.36	---	74.00	54.00	-5.64
7323.00	H	47.26	---	0.57	47.83	---	74.00	54.00	-6.17
17087.00	H	42.65	---	6.79	49.44	---	74.00	54.00	-4.56
24410.00	H	40.55	---	8.16	48.71	---	74.00	54.00	-5.29
1302.84	V	52.98	---	-4.21	48.77	---	74.00	54.00	-5.23
4882.00	V	51.80	---	-3.98	47.82	---	74.00	54.00	-6.18
5610.14	V	51.75	---	-2.81	48.94	---	74.00	54.00	-5.06
7323.00	V	46.63	---	0.57	47.20	---	74.00	54.00	-6.8
17087.00	V	41.46	---	6.79	48.25	---	74.00	54.00	-5.75
24410.00	V	41.88	---	8.16	50.04	---	74.00	54.00	-3.96

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

High channel: 2480 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1304.32	H	50.45	---	-4.21	46.24	---	74.00	54.00	-7.76
4960.00	H	51.53	---	-3.95	47.58	---	74.00	54.00	-6.42
5601.67	H	52.86	---	-2.87	49.99	---	74.00	54.00	-4.01
7440.00	H	43.33	---	0.57	43.9	---	74.00	54.00	-10.1
17360.00	H	40.47	---	6.79	47.26	---	74.00	54.00	-6.74
24800.00	H	38.09	---	8.16	46.25	---	74.00	54.00	-7.75
1302.84	V	52.76	---	-4.21	48.55	---	74.00	54.00	-5.45
4960.00	V	54.23	---	-3.98	50.25	---	74.00	54.00	-3.75
5610.14	V	49.36	---	-2.88	46.48	---	74.00	54.00	-7.52
7440.00	V	46.54	---	0.57	47.11	---	74.00	54.00	-6.89
17360.00	V	39.37	---	6.79	46.16	---	74.00	54.00	-7.84
24800.00	V	41.76	---	8.16	49.92	---	74.00	54.00	-4.08

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

Modulation Type: 8DPSK

Low channel: 2402 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1304.32	H	52.12	---	-4.21	47.91	---	74.00	54.00	-6.09
4804.00	H	53.15	---	-3.94	49.21	---	74.00	54.00	-4.79
5601.67	H	48.64	---	-2.87	45.77	---	74.00	54.00	-8.23
7206.00	H	45.34	---	0.52	45.86	---	74.00	54.00	-8.14
16814.00	H	39.76	---	6.73	46.49	---	74.00	54.00	-7.51
24020.00	H	41.90	---	8.11	50.01	---	74.00	54.00	-3.99
1302.84	V	52.54	---	-4.21	48.33	---	74.00	54.00	-5.67
4804.00	V	51.15	---	-3.98	47.17	---	74.00	54.00	-6.83
5610.14	V	49.35	---	-2.81	46.54	---	74.00	54.00	-7.46
7206.00	V	45.17	---	0.52	45.69	---	74.00	54.00	-8.31
16814.00	V	42.36	---	6.84	49.2	---	74.00	54.00	-4.8
24020.00	V	40.27	---	8.16	48.43	---	74.00	54.00	-5.57

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

Middle channel: 2441 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1304.32	H	52.44	---	-4.21	48.23	---	74.00	54.00	-5.77
4882.00	H	51.37	---	-3.94	47.43	---	74.00	54.00	-6.57
5601.67	H	49.76	---	-2.87	46.89	---	74.00	54.00	-7.11
7323.00	H	45.12	---	0.57	45.69	---	74.00	54.00	-8.31
17087.00	H	41.18	---	6.79	47.97	---	74.00	54.00	-6.03
24410.00	H	40.76	---	8.16	48.92	---	74.00	54.00	-5.08
1302.84	V	52.65	---	-4.21	48.44	---	74.00	54.00	-5.56
4882.00	V	52.60	---	-3.98	48.62	---	74.00	54.00	-5.38
5610.14	V	51.35	---	-2.81	48.54	---	74.00	54.00	-5.46
7323.00	V	48.59	---	0.57	49.16	---	74.00	54.00	-4.84
17087.00	V	42.55	---	6.79	49.34	---	74.00	54.00	-4.66
24410.00	V	39.96	---	8.16	48.12	---	74.00	54.00	-5.88

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

High channel: 2480 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1304.32	H	50.54	---	-4.21	46.33	---	74.00	54.00	-7.67
4960.00	H	51.52	---	-3.95	47.57	---	74.00	54.00	-6.43
5601.67	H	50.38	---	-2.87	47.51	---	74.00	54.00	-6.49
7440.00	H	45.64	---	0.57	46.21	---	74.00	54.00	-7.79
17360.00	H	40.28	---	6.79	47.07	---	74.00	54.00	-6.93
24800.00	H	40.66	---	8.16	48.82	---	74.00	54.00	-5.18
1302.84	V	51.52	---	-4.21	47.31	---	74.00	54.00	-6.69
4960.00	V	50.47	---	-3.98	46.49	---	74.00	54.00	-7.51
5610.14	V	49.54	---	-2.88	46.66	---	74.00	54.00	-7.34
7440.00	V	48.55	---	0.57	49.12	---	74.00	54.00	-4.88
17360.00	V	40.63	---	6.79	47.42	---	74.00	54.00	-6.58
24800.00	V	38.04	---	8.16	46.2	---	74.00	54.00	-7.8

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

14.0 Antenna Requirement

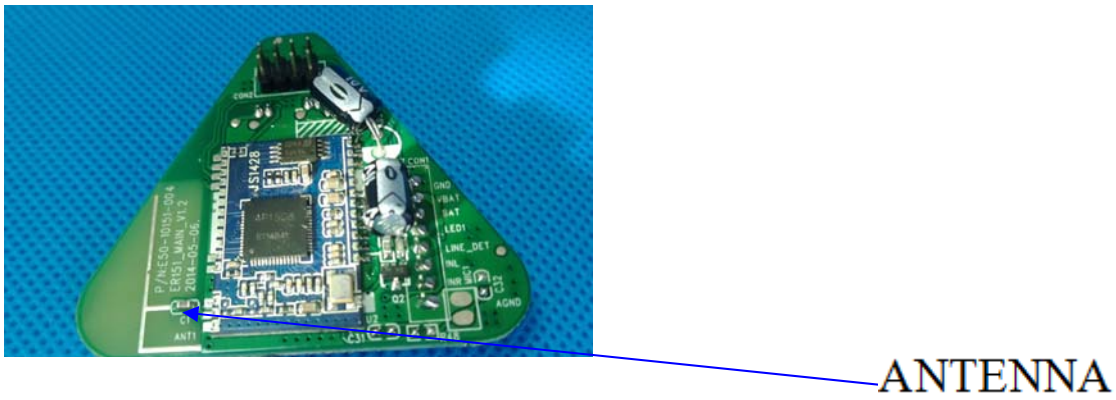
14.1 Standard Applicable

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 transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

14.2 Antenna Specification

According to the manufacturer declared, the EUT has an integral Printed antenna and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



--End of the report--