TEST REPORT

GSM mobile phone
Model No.:X3

Test Standard: FCC CFR Title 47 Part 15C

Test Report Number : EST0910-202R1-F
FCC ID: XUMPREX3

EST COMPLIANCE LABORATORY LIMITED
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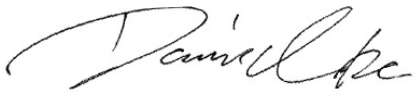
1 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC PART 15 :2008	Section 15.247 (c)	PASS
Conducted Emission	FCC PART 15 :2008	Section 15.207	PASS
Occupied Bandwidth	FCC PART 15 :2008	Section 15.247 (a1)	PASS
Carrier Frequencies Separated	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Hopping Channel Number	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Dwell Time	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Pseudorandom Frequency Hopping Sequence	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Maximum Peak Output Power	FCC PART 15 :2008	Section 15.247(b)(1)	PASS
RF Exposure Compliance Requirement	FCC PART 15 :2008	15.247(b)(4)& TCB Exclusion List (7 July 2002)	PASS
Radiated Emission	FCC PART 15 :2008	Section 15.209，15.247(d)&15.205	PASS*

Date of Test : Oct. 23~27, 2009

Prepared by : 

(Engineer)

Reviewer : 

(Project Manager)

Approved & Authorized Signer : 

2 Contents

3 General Information

3.1 Client Information

Applicant:	LTT Card Services, INC
Address of Applicant:	PO Box 194625 San Juan, Puerto Rico 00919-4625 United State
Manufacturer:	General Electric Communication Limited
Address of Manufacturer:	Unit 1017, Tian An Cyber Times Tower A, Futian District, Shenzhen, China

3.2 General Description of E.U.T.

Product Name:	GSM mobile phone
Model:	X3
Trade Name:	Premier
Number of Channels	79 Channels
Channel Separation	1 MHz
Type of Modulation	FHSS (Frequency Hopping Spread Spectrum); Adaptive Frequency Hopping (AFH) is used.
Dwell time	Per channel is less than 0.4s.
Antenna Type	Integral
Power Supply:	3.7-4.2V /1.5-300mAh DC re-chargeable battery
Charger adaptor:	Input Voltage:100~240V AC Output:5.5V DC 550mA

3.3 Test Location

All tests were sub-contracted. at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory,
No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China. 518057.
Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

3.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP – Lab Code: 200611-0**
  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.
- **ACA**
  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.
- **VCCI**
  The 3m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197 and C-2383 respectively.
  Date of Registration: September 29, 2008. Valid until September 28, 2011
- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**
  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES
- **CNAS (No. CNAS L2929)**
  CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.
- **FCC – Registration No.: 556682**
  SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 556682, Aug. 04, 2005
- **Industry Canada (IC)**
  The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

4 Equipments Used during Test

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (dd-mm-yy)**	**Cal.Due date (dd-mm-yy)**
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	16-06-2008	15-06-2010
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	12-12-2008	11-12-2010
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	18-06-2009	17-06-2010
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0014	12-08-2009	11-08-2010
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	18-06-2009	17-06-2010
7	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0005	12-08-2009	11-08-2010
8	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	12-08-2009	11-08-2010
9	Pre-amplifier (1-18GHz)	Rohde & Schwarz	AFS42-00101 800-25-S-42	SEL0081	18-06-2009	17-06-2010
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002650-30-8P-44	SEL0080	18-06-2009	17-06-2010
11	Band filter	Amindeon	82346	SEL0094	18-06-2009	17-06-2010
12	Spectrum Analyzer	Agilent	E4408B	SEL0097	15-06-2009	14-06-2010

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (dd-mm-yy)**	**Cal.Due date (dd-mm-yy)**
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	N/A	N/A
2	LISN	ETS-LINDGREN	3816/2	SEL0021	18-06-2009	17-06-2010
3	ISN	Rohde & Schwarz	ENY 22 1109	EMC0114	18-06-2009	17-06-2010
4	ISN	Rohde & Schwarz	ENY 41 1110	EMC0115	18-06-2009	17-06-2010
5	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	18-06-2009	17-06-2010
6	Coaxial Cable	SGS	N/A	SEL0024	18-06-2009	17-06-2010

5 Test Results

5.1 E.U.T. test conditions

Operating Environment:

Temperature: 24.0 °C

Humidity: 50 % RH

Atmospheric Pressure: 1010 mbar

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

Test frequency is the lowest channel: 0 channel(2402MHz), middle channel: 38 channel(2441MHz) and highest channel: 78 channel(2480MHz)

5.2 Antenna Requirement

5.2.1 Standard requirement

15.203 requirement:
For intentional device, according to 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.
15.247(c) (1)(i) requirement:
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

5.2.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1dBi.

Test result: The unit does meet the FCC requirements.

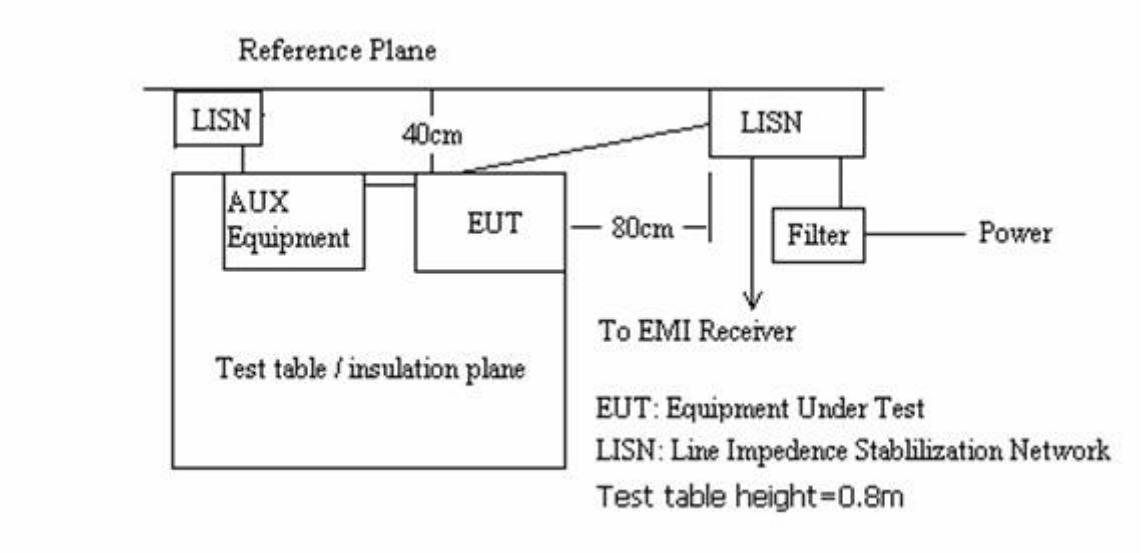
5.3 Conducted Emissions at Mains Terminals 150 kHz to 30MHz

Test Requirement:	FCC Part 15.207
Test Method:	ANSI C63.4
Frequency Range:	150KHz to 30MHz
Detector:	RBW=9KHz VBW=30KHz
	Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit
EUT Operation:	Pre-test the EUT in charging mode

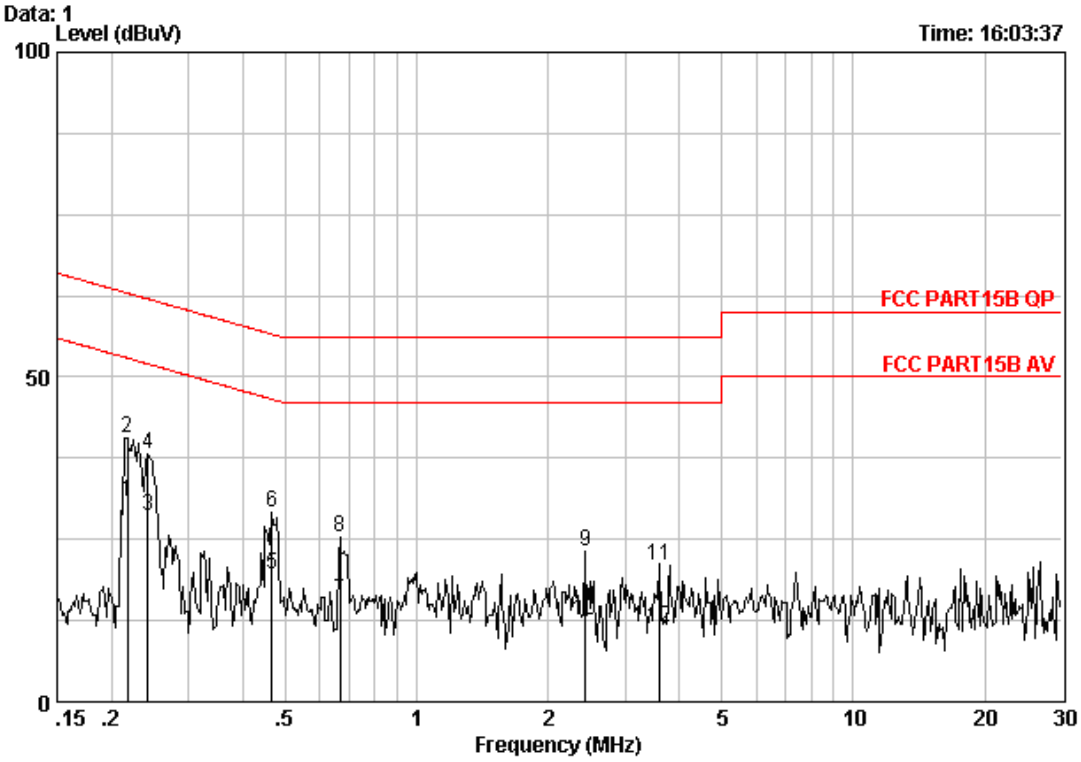
An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Plan View of Test Setup



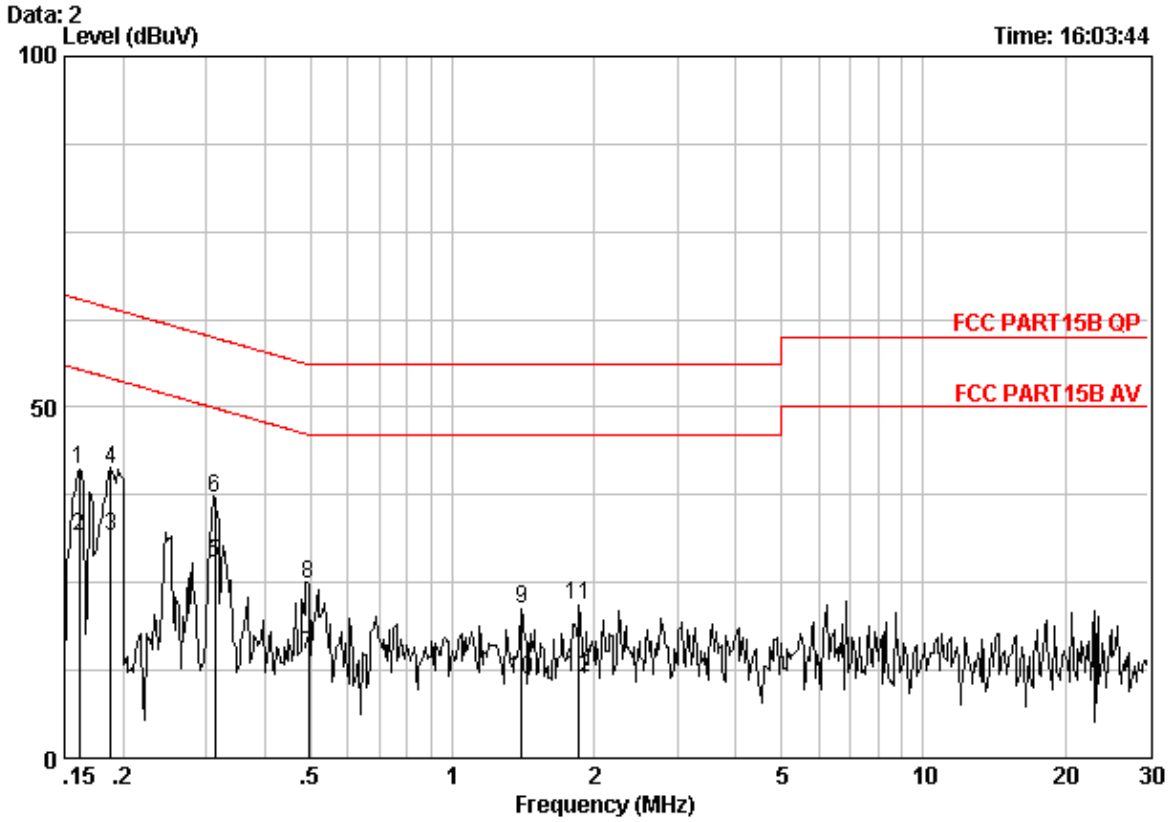
live line:



Site : Shielding Room
Condition : FCC PART15B QP CE LINE

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.21735	0.04	-0.04	30.74	30.74	52.92	-22.18	Average
2	0.21735	0.04	-0.04	40.56	40.56	62.92	-22.36	QP
3	0.24165	0.04	-0.04	28.67	28.67	52.04	-23.37	Average
4	0.24165	0.04	-0.04	38.20	38.20	62.04	-23.84	QP
5	0.46614	0.06	-0.04	19.67	19.69	46.58	-26.90	Average
6	0.46614	0.06	-0.04	29.09	29.11	56.58	-27.47	QP
7	0.66832	0.06	-0.05	15.40	15.41	46.00	-30.59	Average
8	0.66832	0.06	-0.05	25.41	25.42	56.00	-30.58	QP
9	2.435	0.13	-0.07	22.97	23.03	56.00	-32.97	QP
10	2.435	0.13	-0.07	12.55	12.61	46.00	-33.39	Average
11	3.584	0.15	-0.09	21.05	21.12	56.00	-34.88	QP
12	3.584	0.15	-0.09	11.34	11.41	46.00	-34.59	Average

Neutral line:



Site : Shielding Room
Condition : FCC PART15B QP CE NEUTRAL

		Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1		0.16155	0.04	-0.05	41.23	41.23	65.38	-24.15	QP
2		0.16155	0.04	-0.05	31.64	31.63	55.38	-23.75	Average
3		0.18838	0.04	-0.04	31.68	31.68	54.11	-22.43	Average
4		0.18838	0.04	-0.04	41.11	41.11	64.11	-23.00	QP
5	@	0.31328	0.05	-0.04	27.69	27.70	49.88	-22.18	Average
6		0.31328	0.05	-0.04	37.14	37.16	59.88	-22.73	QP
7		0.49411	0.06	-0.04	14.58	14.60	46.10	-31.50	Average
8		0.49411	0.06	-0.04	24.86	24.88	56.10	-31.22	QP
9		1.403	0.10	-0.05	21.20	21.24	56.00	-34.76	QP
10		1.403	0.10	-0.05	11.22	11.27	46.00	-34.73	Average
11		1.858	0.11	-0.06	21.80	21.86	56.00	-34.14	QP
12		1.858	0.11	-0.06	11.37	11.43	46.00	-34.57	Average

Remark: Level = Real Level + Cable loss + LISN factor

TEST RESULTS: The unit does meet the FCC requirements.

5.4 Occupied Bandwidth

Test Requirement: FCC 15.247(a)

Test Method: ANSI C63.4 & DA 00-705

Test Status: Test in fixing operating frequency at lowest, Middle, highest channel.

Test Procedure:

The Transmitter output of EUT was connected to the spectrum analyzer. The 20 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows;

Equipment Mode	Spectrum Analyzer
Detector Function	Peak Mode
RBW	30KHz
VBW	100KHz

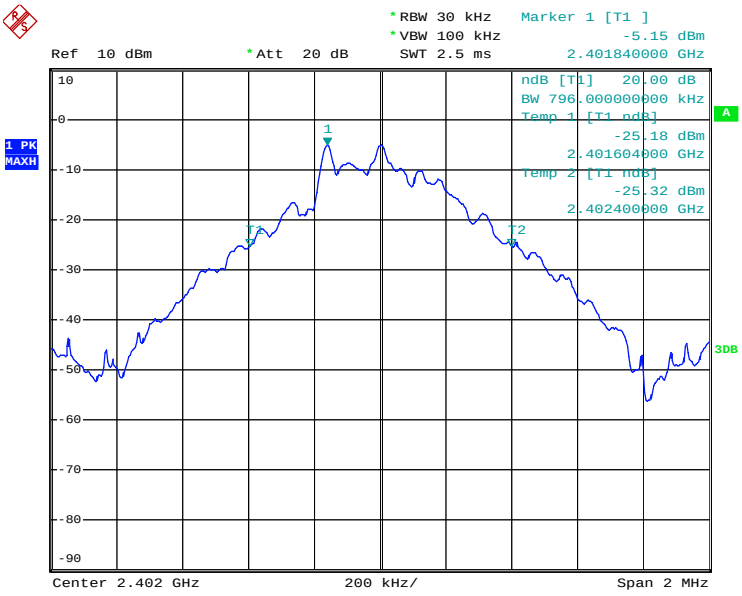
Test result:
20dB Bandwidth

GFSK mode		
Lowest Frequency 2.402GHz	**Middle Frequency** 2.441GHz	**Highest Frequency** 2.480GHz
796KHz	792 KHz	800 KHz
PI/4QPSK mode		
Lowest Frequency 2.402GHz	**Middle Frequency** 2.441GHz	**Highest Frequency** 2.480GHz
1.208MHz	1.224 MHz	1.216 MHz
8DPSK mode		
Lowest Frequency 2.402GHz	**Middle Frequency** 2.441GHz	**Highest Frequency** 2.480GHz
1.208 MHz	1.208 MHz	1.208 MHz

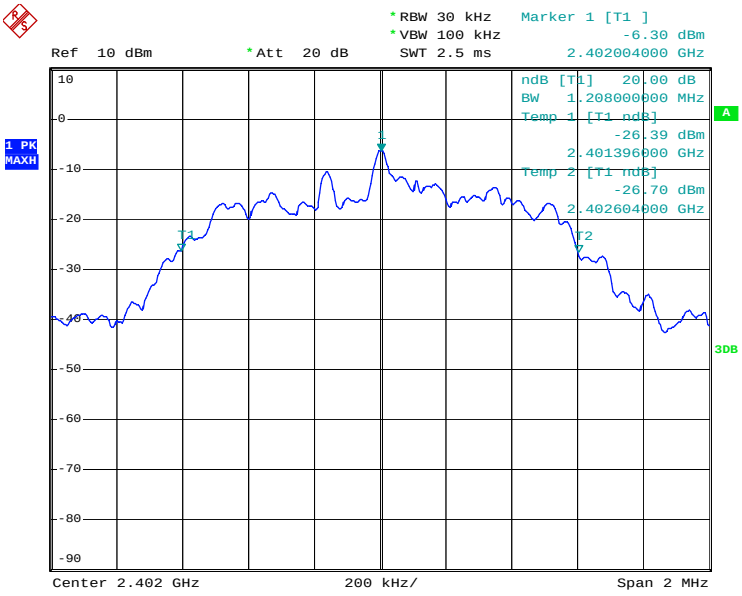
Result plot as follows:

1. Lowest Channel:

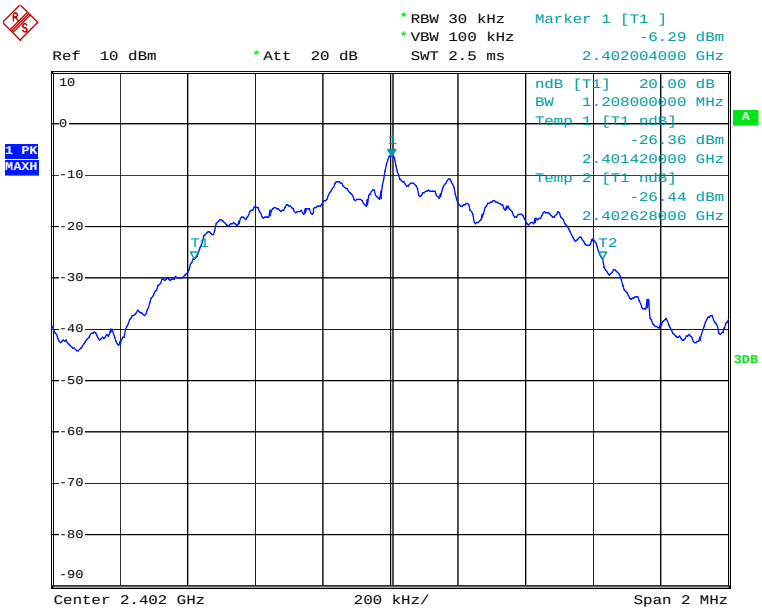
GFSK mode:



PI/4QPSK mode:

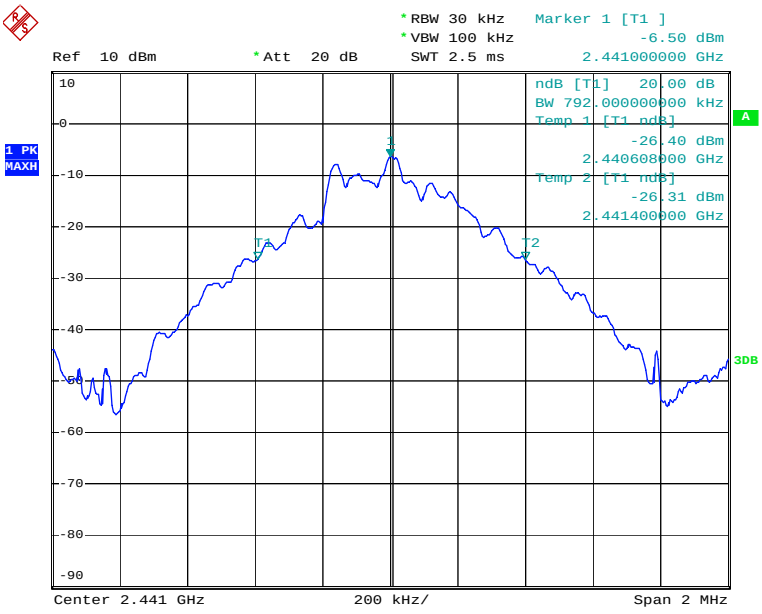


8DPSK mode:

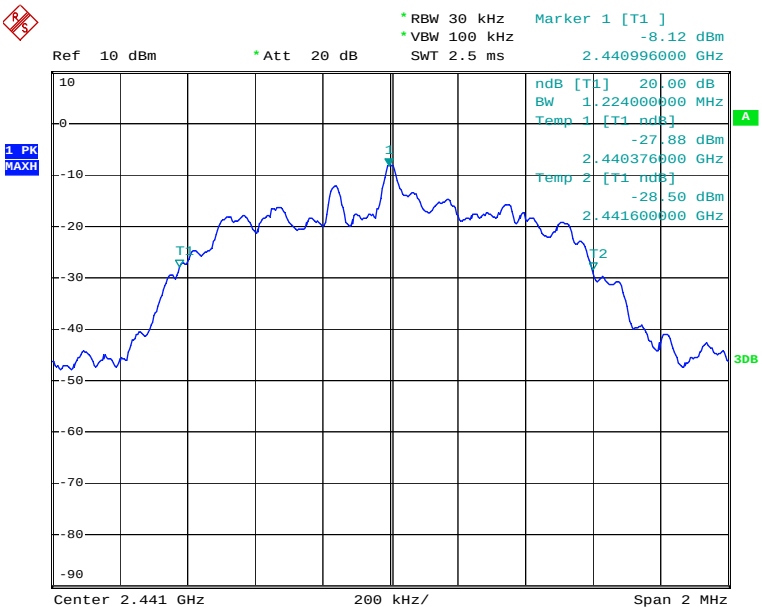


2. Middle Channel:

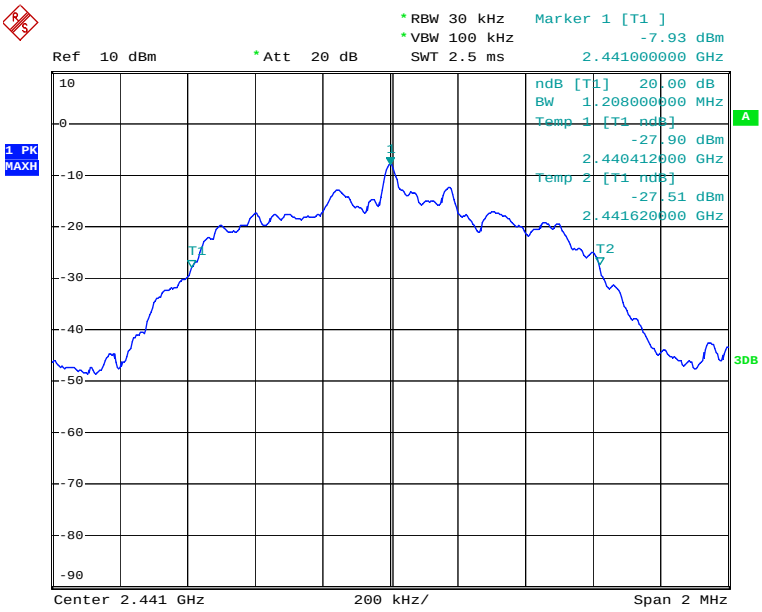
GFSK mode:



PI/4QPSK mode:

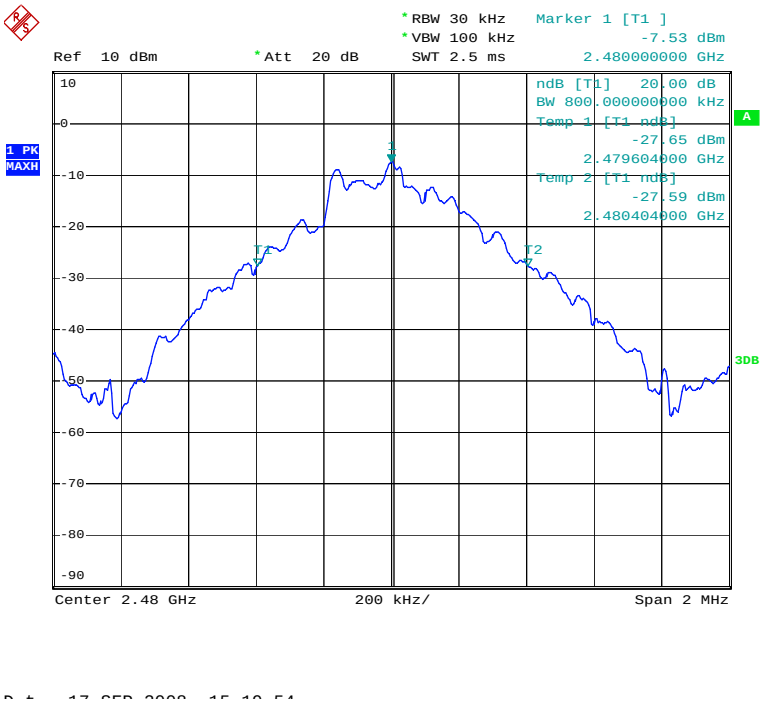


8DPSK mode:

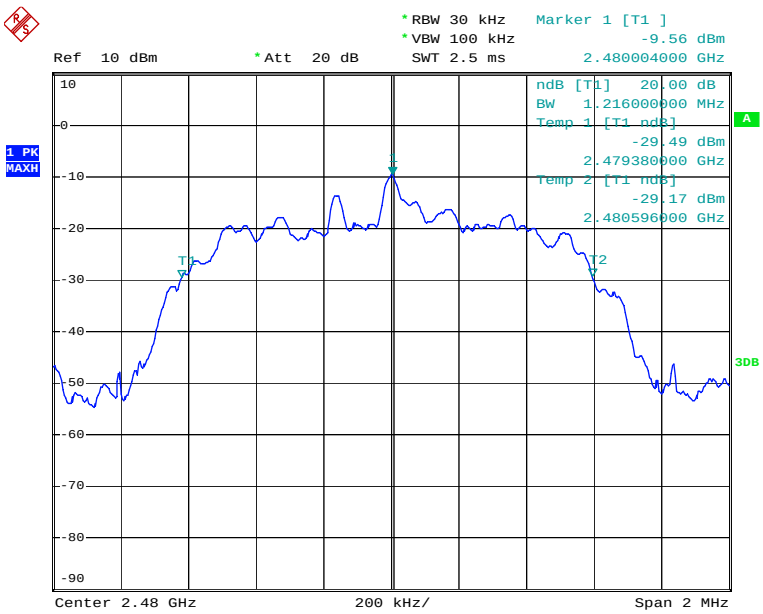


3. Highest Channel：

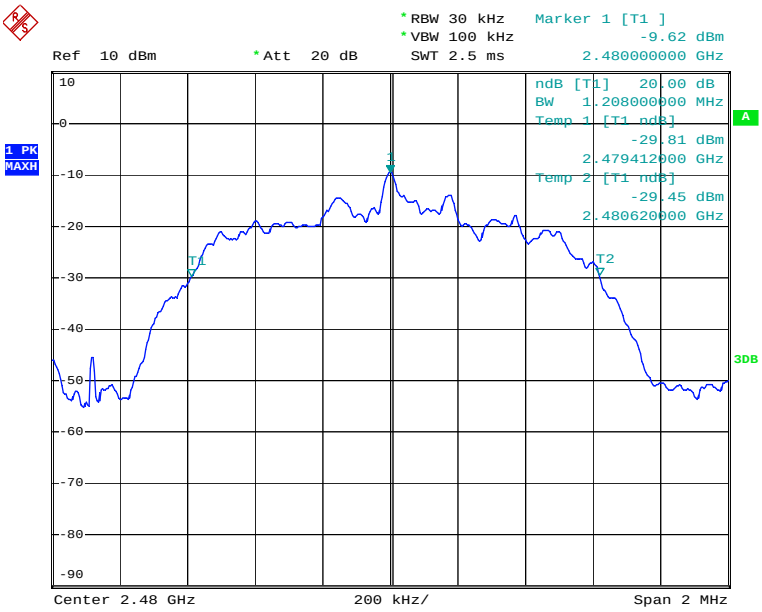
GFSK mode:



PI/4QPSK mode:



8DPSK mode:



Test result: The unit does meet the FCC requirements.

5.5 Carrier Frequencies Separated

Test Requirement: FCC 15.247(a)

Test Method: ANSI C63.4 & DA 00-705

Test requirements: Regulation 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.

Test Status: Test in hopping transmitting operating mode.

Test Procedure:

1 Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.

Equipment mode: Spectrum analyzer

Equipment Mode	Spectrum Analyzer
Detector Function	Peak Mode
RBW	100KHz
VBW	300KHz

2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Test result:

Lowest channel: (2.402 GHz)

	Test mode		
	GFSK	**PI/4QPSK**	**8DPSK**
Carrier Frequencies separated	1.008MHz	0.996MHz	1.002MHz

Middle channel: (2.441GHz)

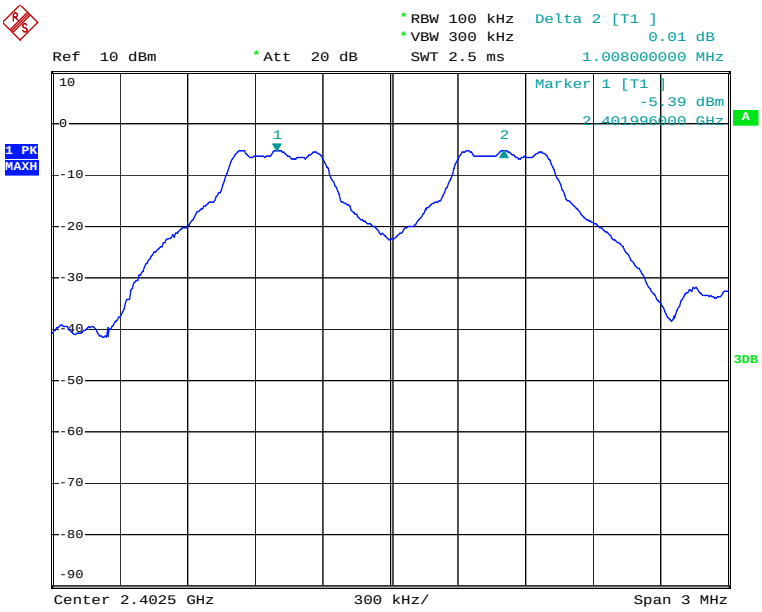
	Test mode		
	GFSK	**PI/4QPSK**	**8DPSK**
Carrier Frequencies separated	0.996MHz	0.996MHz	1.002MHz

Highest channel: (2.480GHz)

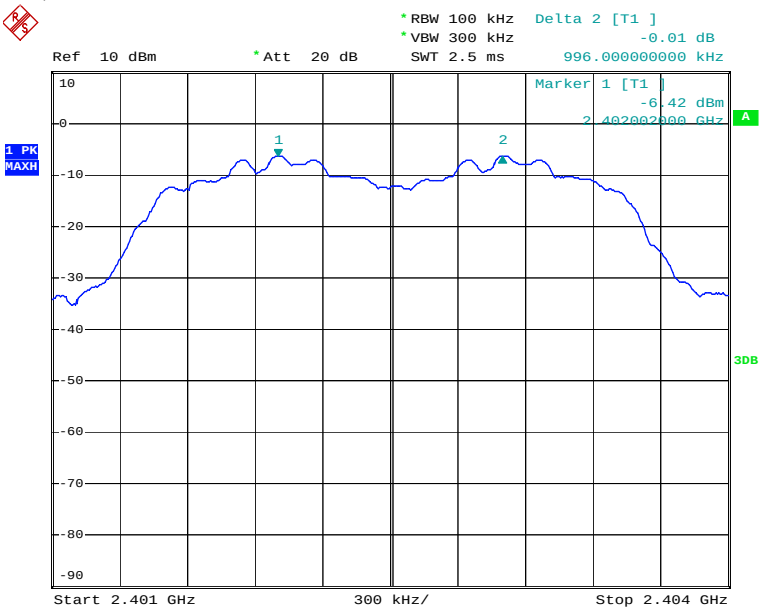
	Test mode		
	GFSK	**PI/4QPSK**	**8DPSK**
Carrier Frequencies separated	0.996MHz	1.002MHz	1.002MHz

1. Lowest Channel:

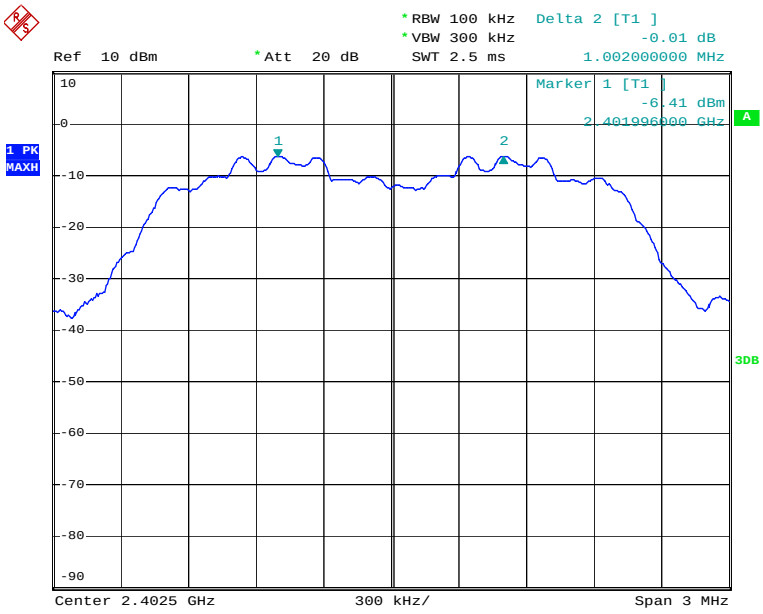
GFSK mode:



PI/4QPSK mode:

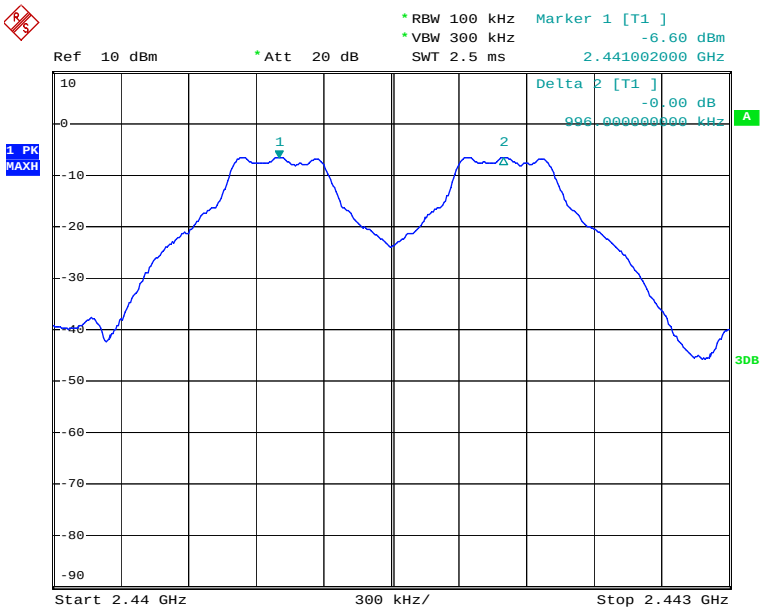


8DPSK mode:

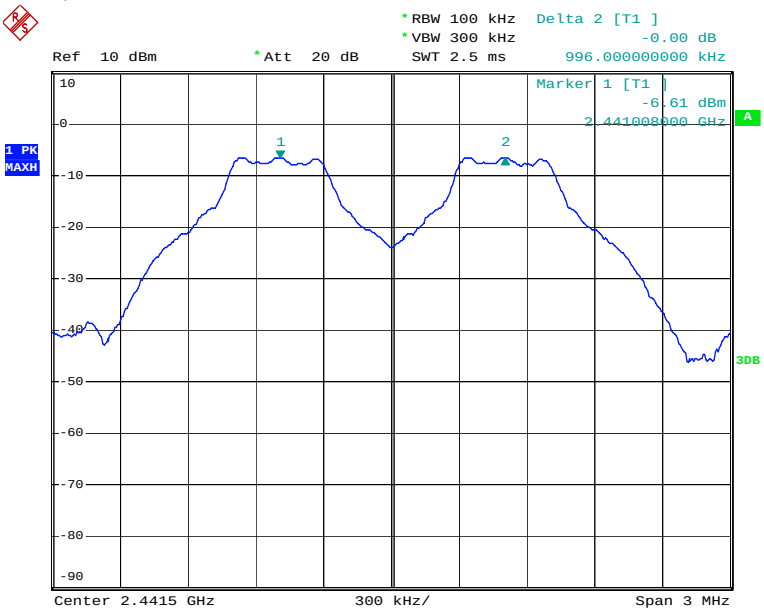


2. Middle Channel:

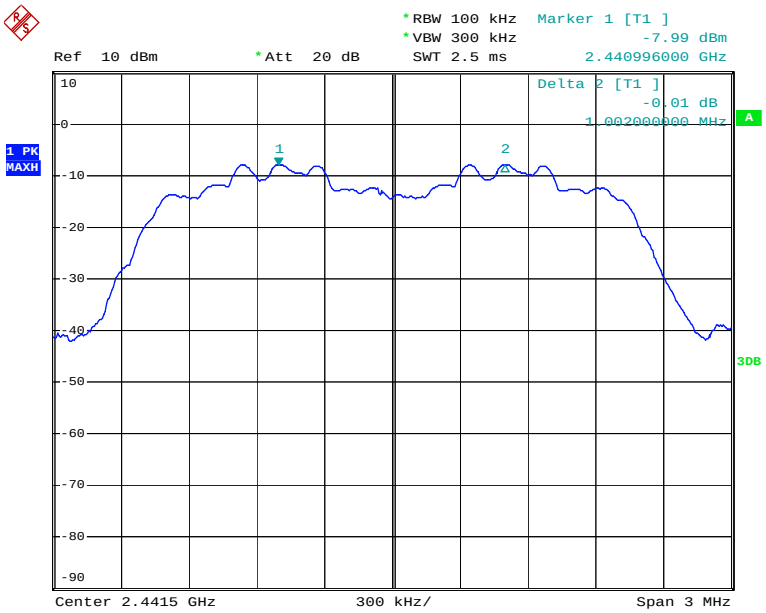
GFSK mode:



PI/4QPSK mode:

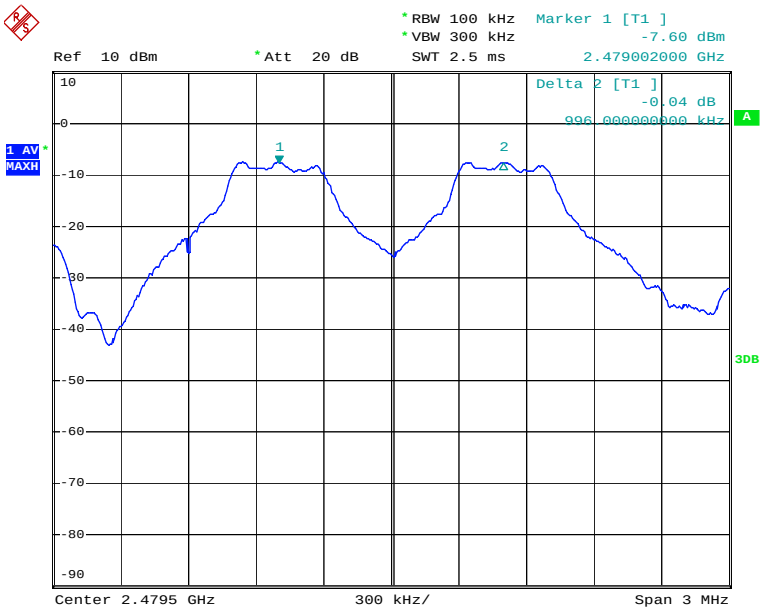


8DPSK mode:

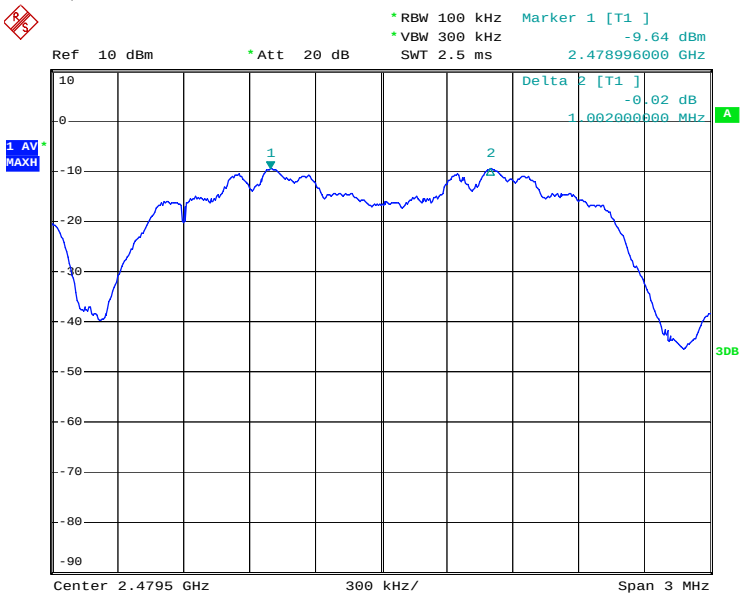


3. Highest Channel:

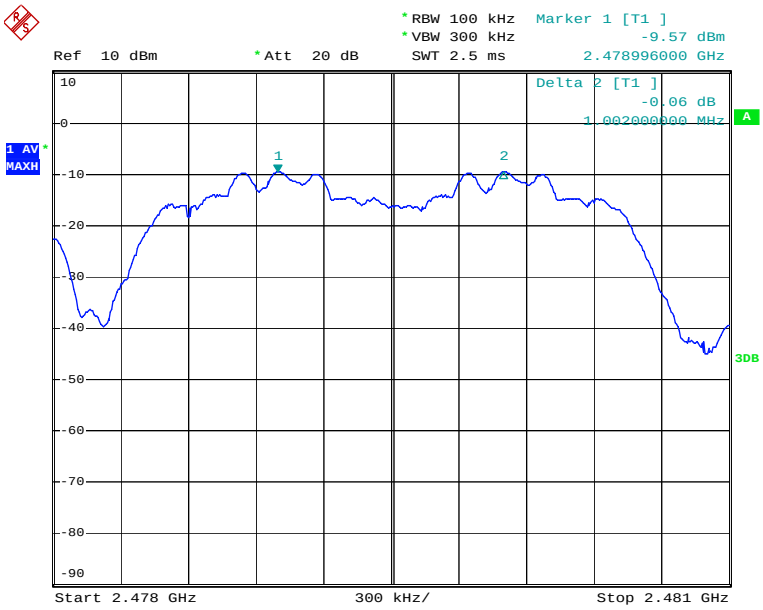
GFSK mode:



PI/4QPSK mode::



8DPSK mode:



Test result: The unit does meet the FCC requirements.

5.6 Hopping Channel Number

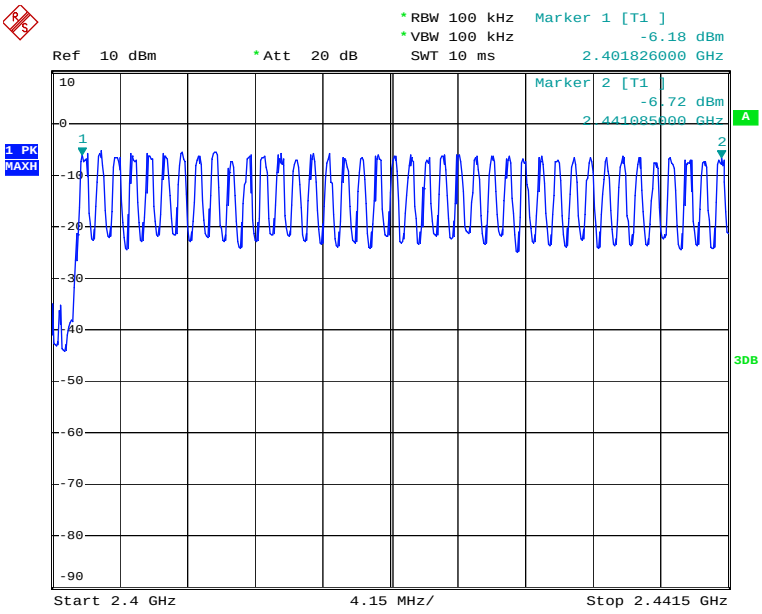
Test Requirement:	FCC 15.247(a)
Test Method:	ANSI C63.4 15.247 & DA 00-705
Requirements:	Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Status:	Test in hopping transmitting operating mode.

Test Procedure:

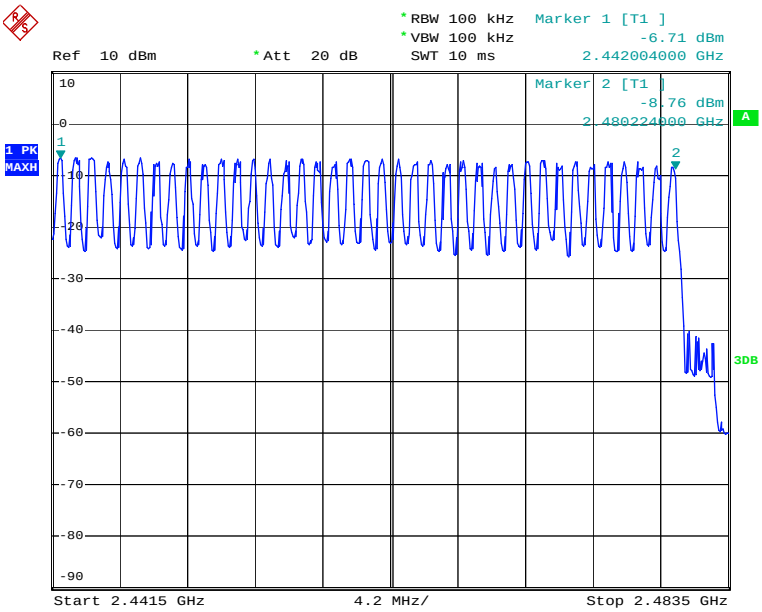
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

Test result: Total channels are 79 channels.

1. Hopping channel numbers (1/2)



2. Hopping channel numbers (2/2)



Test result: The unit does meet the FCC requirements.

5.7 Dwell Time

Test Requirement: FCC 15.247(a)

Test Method: ANSI C63.4 & DA 00-705

Test requirements: Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Status: Test in hopping transmitting operating mode.

Test Procedure:

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: spectrum analyzer, detector function: Peak
   RBW=1MHz, VBW=1MHz, Span=zero.
2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
3. Measure the Dwell Time by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Test Result:

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

1. Lowest channel: (2.402GHz)

   3-DH1 time slot=0.43(ms)*(1600/(2*79))*31.6=137.6ms

   3-DH3 time slot=1.68(ms)*(1600/(4*79))*31.6=268.8ms

   3-DH5 time slot=2.92(ms)*(1600/(6*79))*31.6=311.5ms

2. Middle channel: (2.441GHz)

   3-DH1 time slot=0.43(ms)*(1600/(2*79))*31.6=137.6ms

   3-DH3 time slot=1.68(ms)*(1600/(4*79))*31.6=268.8ms

   3-DH5 time slot=2.94(ms)*(1600/(6*79))*31.6=313.6ms

3. Highest channel: (2.480GHz)

   3-DH1 time slot=0.432(ms)*(1600/(2*79))*31.6=138.24ms

   3-DH3 time slot=1.69(ms)*(1600/(4*79))*31.6=270.4ms

   3-DH5 time slot=2.94(ms)*(1600/(6*79))*31.6=313.6ms

The results are not greater than 0.4 seconds.

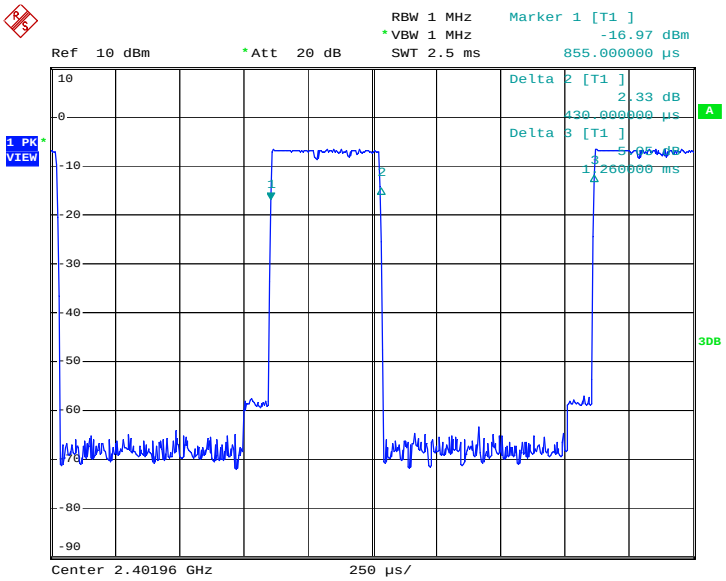
Remark: EUT was tested on EDR mode under 8DPSK modulation. The test sample setting was verified by engineer of Bluetooth chipset supplier of the EUT – Broadcom.

The unit does meet the FCC requirements.

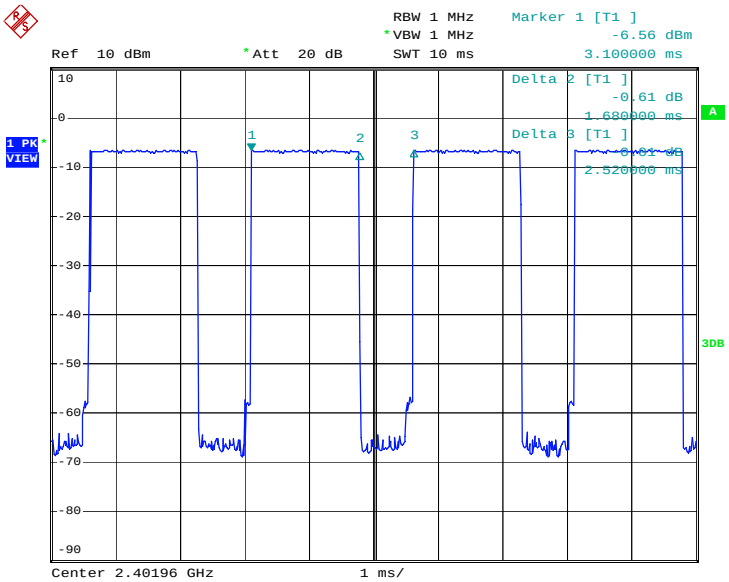
Please refer the graph as below:

1. Lowest channel (2.402 GHz):

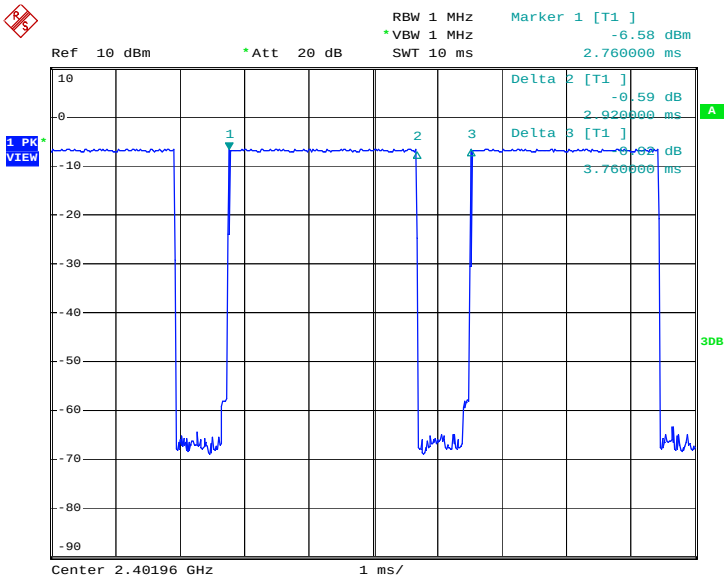
3-DH1



3-DH3:

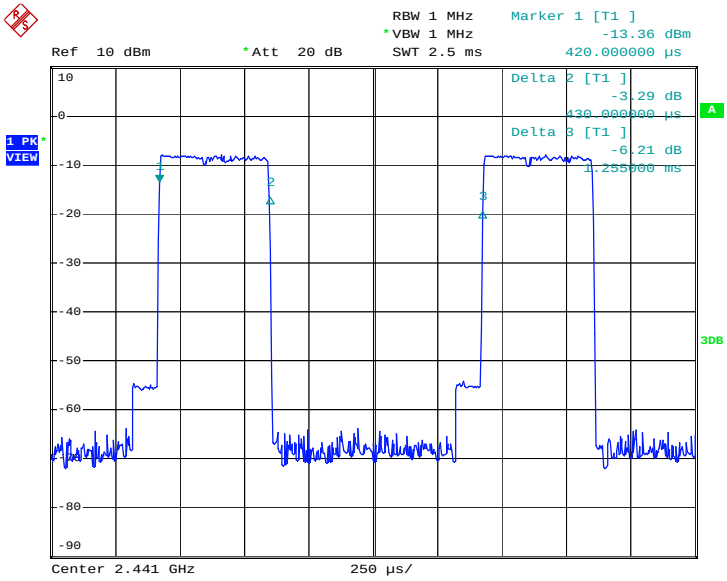


3-DH5:

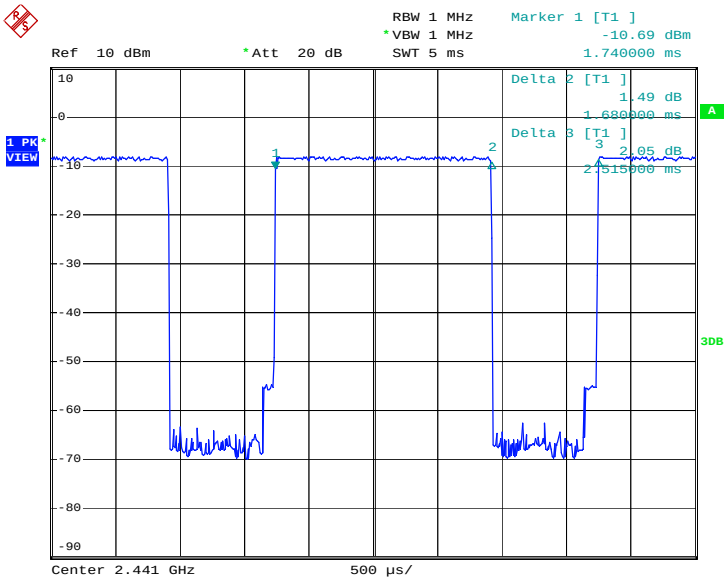


2. Middle channel (2.441 GHz):

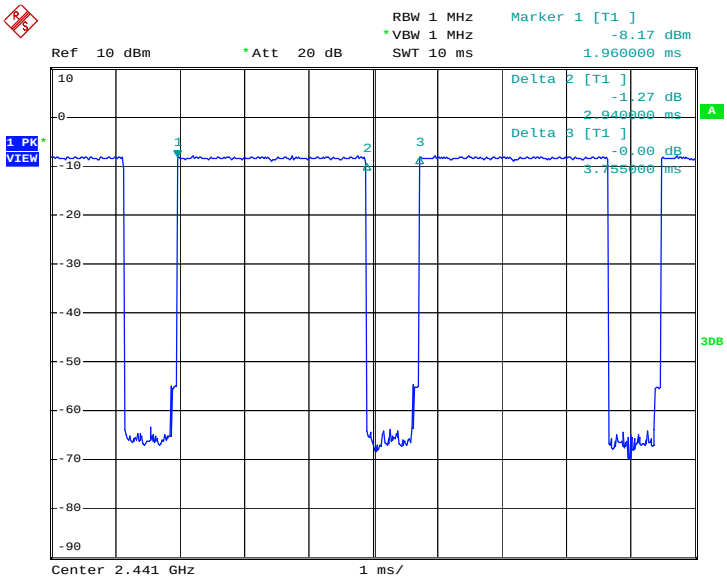
3-DH1



3-DH3:

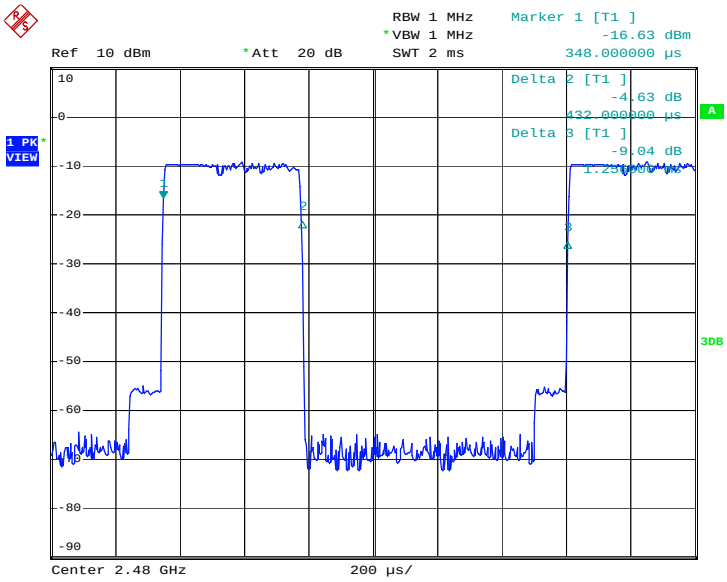

RBW 1 MHz
*VBW 1 MHz
SWT 5 ms
Marker 1 [T1]
-10.69 dBm
1.740000 ms
Ref 10 dBm
*Att 20 dB
Delta 2 [T1]
1.49 dB
1.680000 ms
Delta 3 [T1]
2.05 dB
2.515000 ms
1 PK
VIEW
A
3DB
Center 2.441 GHz
500 µs/

3-DH5:

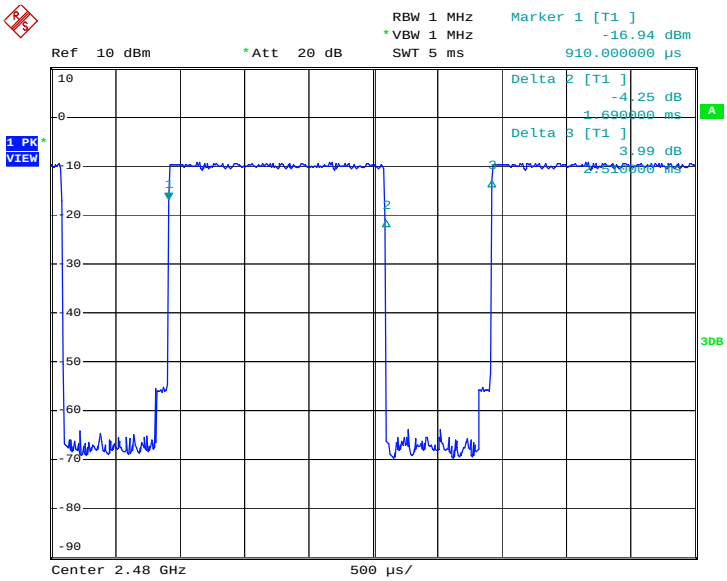

RBW 1 MHz
*VBW 1 MHz
SWT 10 ms
Marker 1 [T1]
-8.17 dBm
1.960000 ms
Ref 10 dBm
*Att 20 dB
Delta 2 [T1]
-1.27 dB
2.940000 ms
Delta 3 [T1]
-0.00 dB
3.755000 ms
1 PK
VIEW
A
3DB
Center 2.441 GHz
1 ms/

2.Highest channel (2.480 GHz):

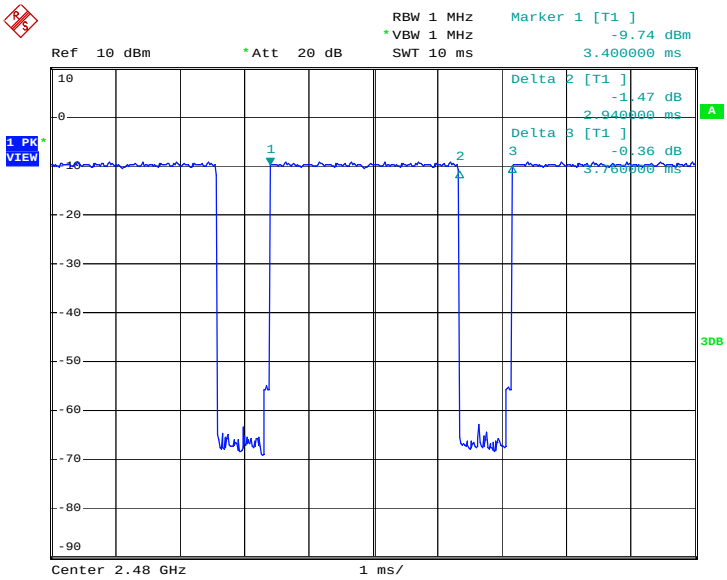
3-DH1



3-DH3:



3-DH5:


RBW 1 MHz
*VBW 1 MHz
SWT 10 ms
Marker 1 [T1]
-9.74 dBm
3.400000 ms
Ref 10 dBm
*Att 20 dB
Delta 2 [T1]
-1.47 dB
2.940000 ms
Delta 3 [T1]
3
-0.36 dB
3.760000 ms
1 PK
VIEW
A
3DB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.48 GHz
1 ms/

5.8 Pseudorandom Frequency Hopping Sequence

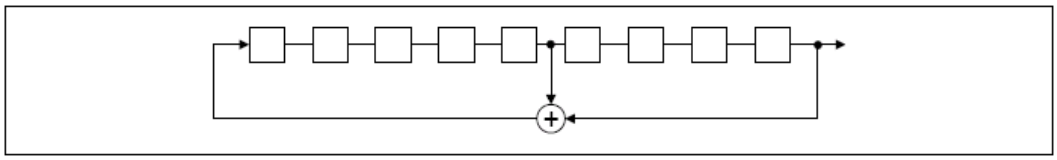
5.8.1 Standard requirement

15.247(a)(1) requirement:
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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

5.8.2 EUT Pseudorandom Frequency Hopping Sequence

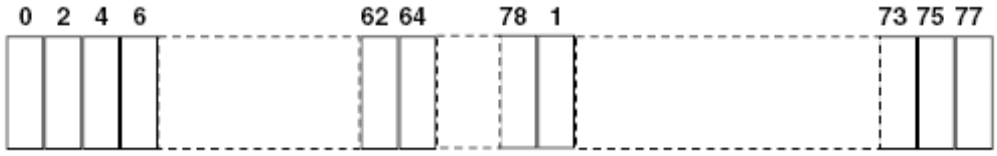
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. and the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

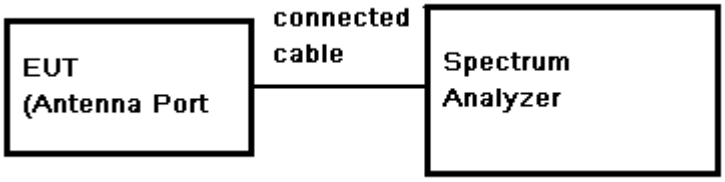


Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

5.9 Maximum Peak Output Power

Test Requirement:	FCC Part 15.247 & DA 00-705
Test Method:	ANSI C63.4 & DA 00-705
Test Limit:	Regulation 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 2400-2483.5 MHz band: 0.125 watts. Refer to the result “Hopping channel number” of this document. The 1 watt (30.0dBm) limit applies.
Test mode:	Test in GFSK mode, PI/4PI/4QPSK mode, and 8DPSK mode
Test Configuration:	



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 10 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

Test Result:

Lowest channel: (2.402GHz)

Test Mode	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
GFSK mode	-5.41	1.2	-4.21	30.00	34.21
PI/4QPSK mode	-6.24	1.2	-5.04	30.00	35.04
8DPSK mode	-6.05	1.2	-4.85	30.00	34.85

Middle channel; (2.441GHz)

Test Mode	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
GFSK mode	-6.63	1.2	-5.43	30.00	35.43
PI/4QPSK mode	-7.67	1.2	-6.47	30.00	36.47
8DPSK mode	-7.52	1.2	-6.32	30.00	36.32

Highest channel: (2.480GHz)

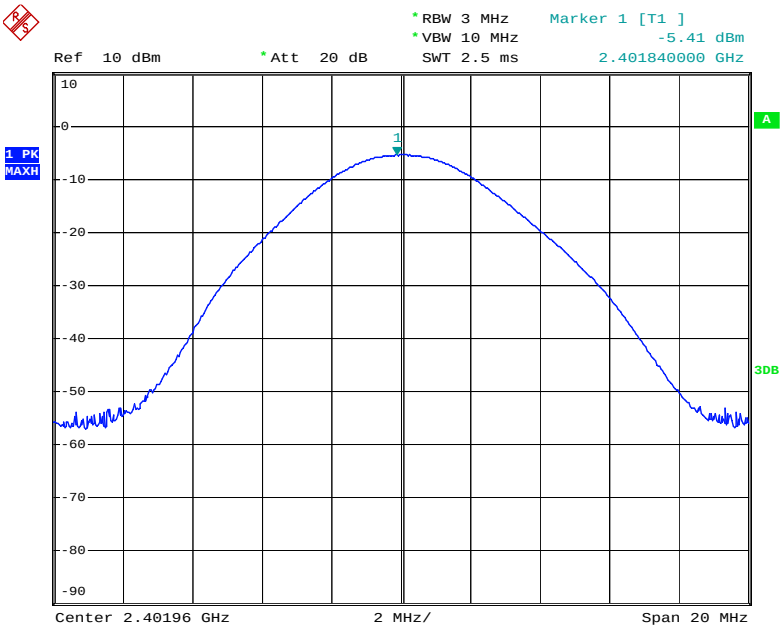
Test Mode	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
GFSK mode	-7.58	1.2	-6.38	30.00	36.38
PI/4QPSK mode	-8.98	1.2	-7.78	30.00	37.78
8DPSK mode	-8.69	1.2	-7.49	30.00	37.49

Test result: The unit does meet the FCC requirements.

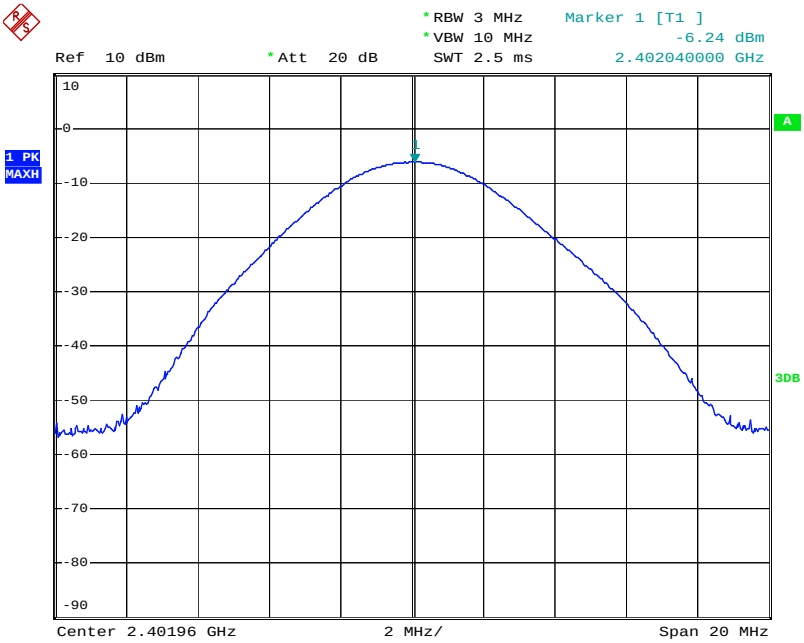
Test result plot as follows:

1. Lowest Channel: (2.402GHz)

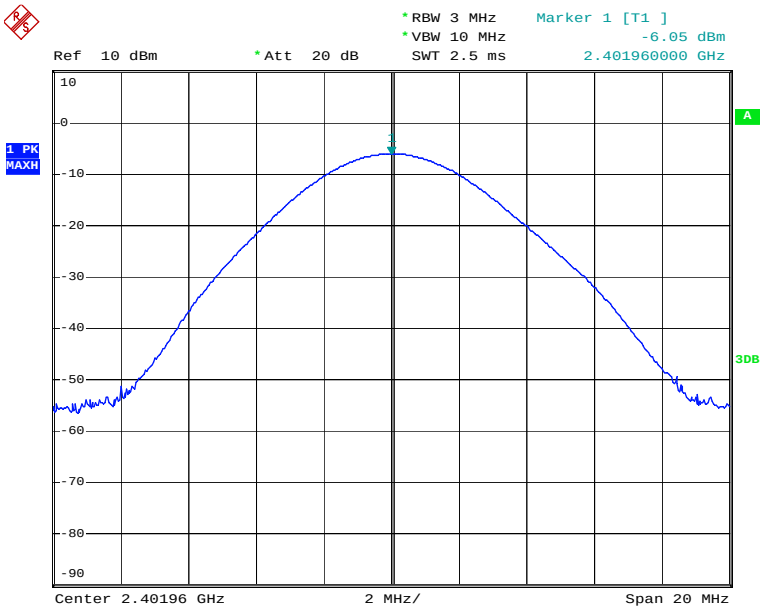
GFSK mode:



PI/4QPSK mode:

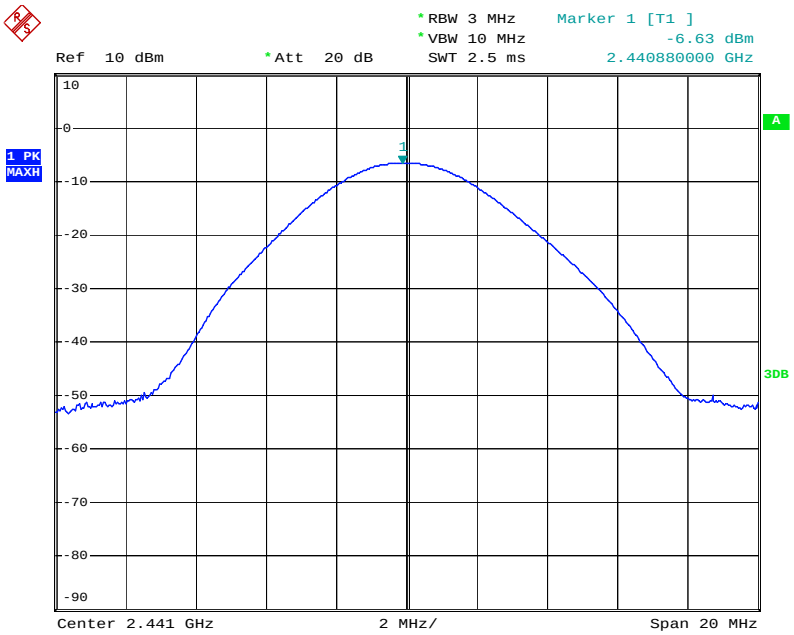


8DPSK mode:

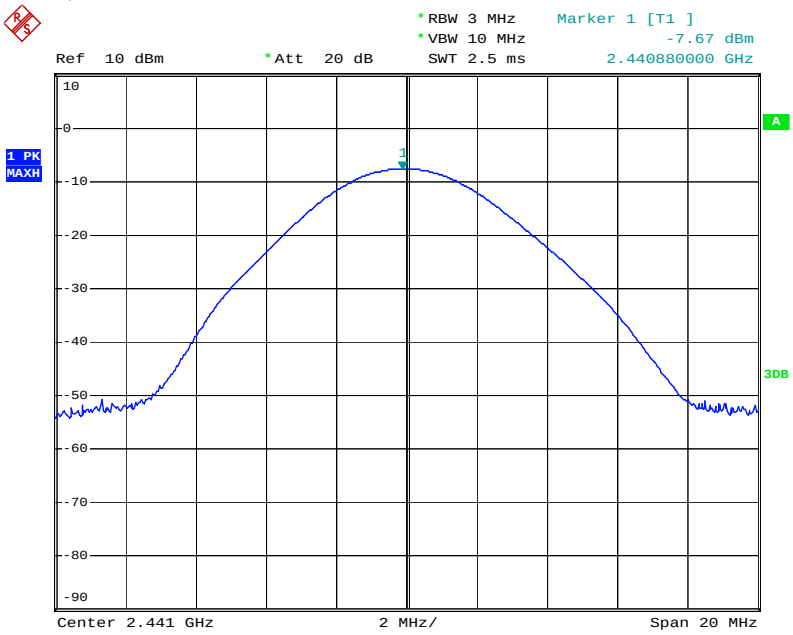


2. Middle Channel: (2.441GHz)

GFSK mode:

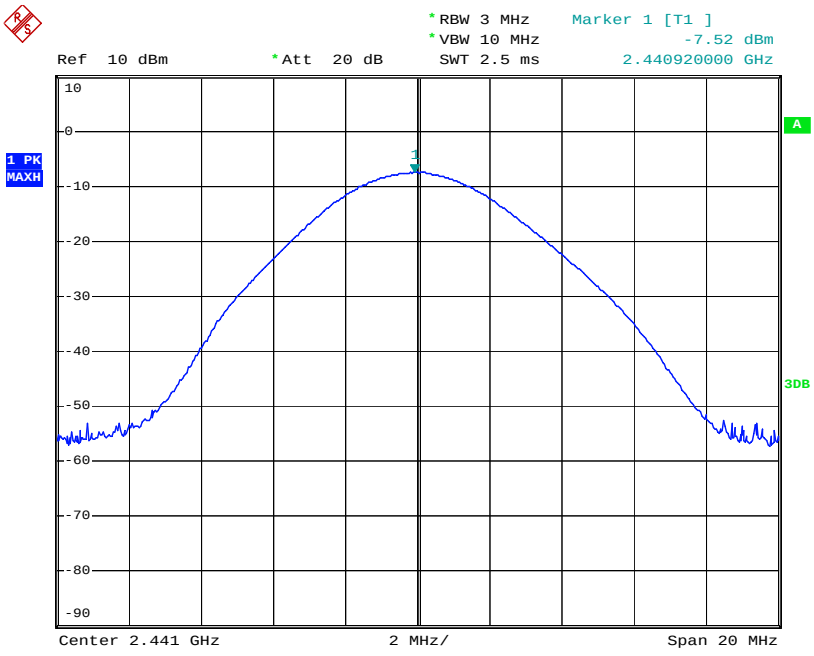


PI/4QPSK mode:



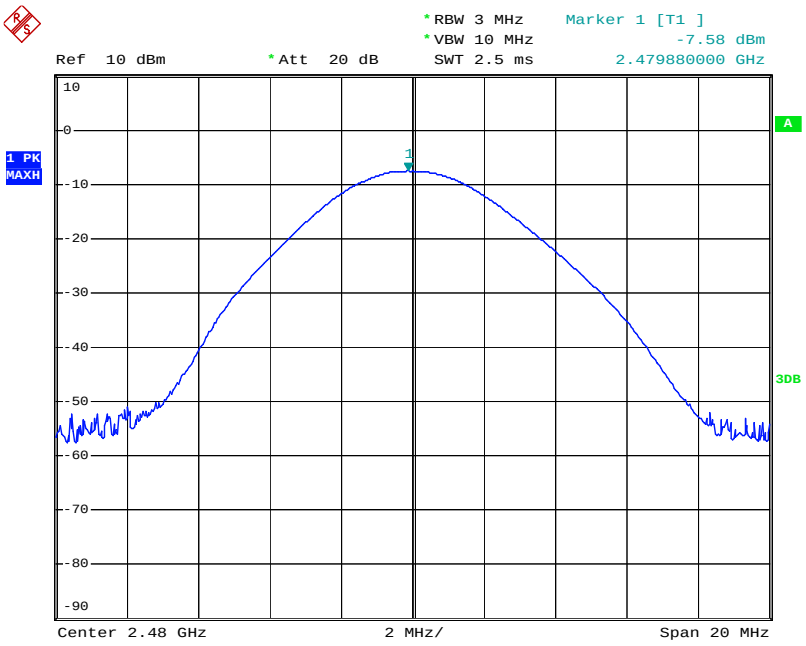
Date: 16.SEP.2008 15:06:22

8DPSK mode:

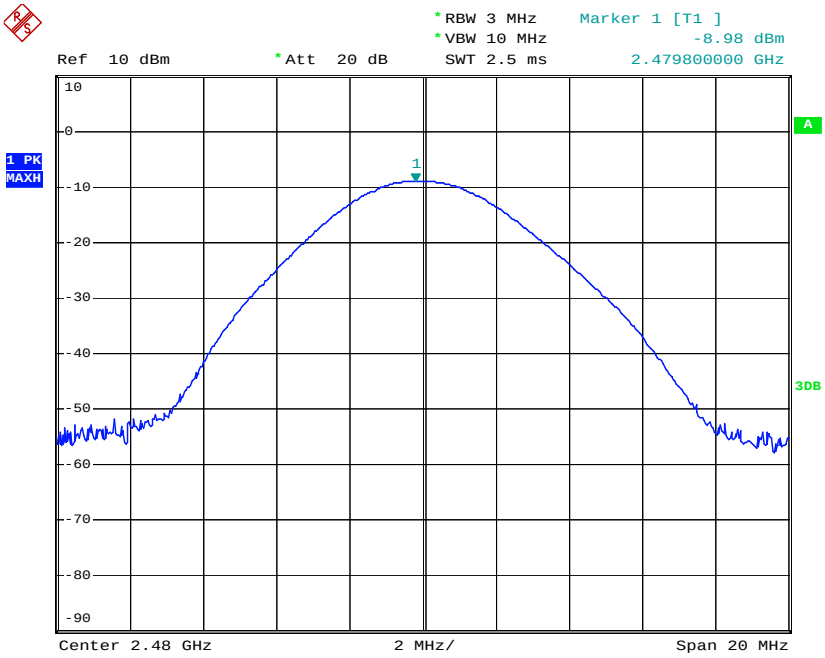


3. Highest Channel: (2.480GHz)

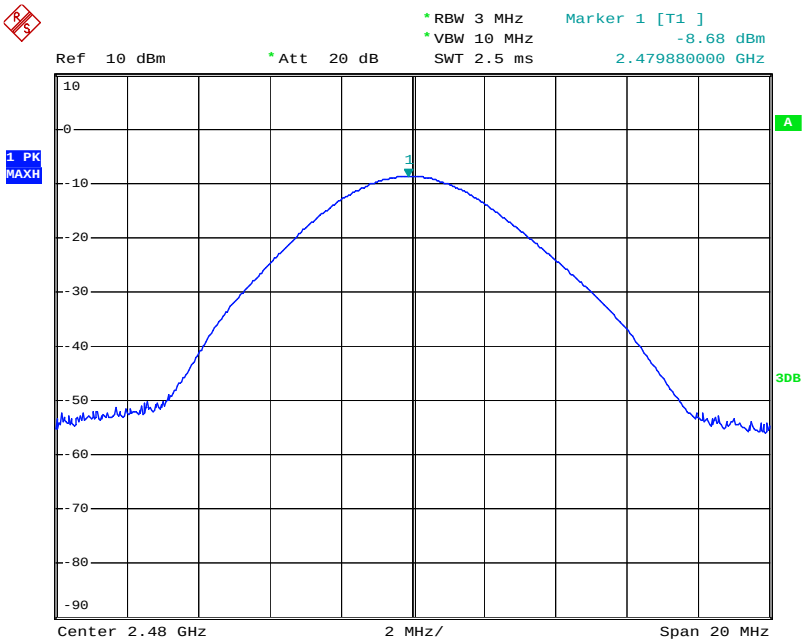
GFSK mode:



PI/4QPSK mode:



8DPSK mode:


*RBW 3 MHz
*VBW 10 MHz
SWT 2.5 ms
Marker 1 [T1]
-8.68 dBm
2.479880000 GHz
Ref 10 dBm
*Att 20 dB
1 PK
MAXH
A
3DB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.48 GHz
2 MHz/
Span 20 MHz

5.10 RF Exposure Compliance Requirement

5.10.1 Standard requirement

15.247(b)(4) requirement:
(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.

TCB Exclusion List (7 July 2002)

Exposure category	low threshold	high threshold
general population	(60/*f*GHz) mW. *d* < 2.5 cm (120/*f*GHz) mW. *d* ≥ 2.5 cm	(900/*f*GHz) mW. *d* < 20 cm
occupational	(375/*f*GHz) mW. *d* < 2.5 cm (900/*f*GHz) mW. *d* ≥ 2.5 cm	(2250/*f*GHz) mW. *d* < 20 cm

5.10.2 EUT RF Exposure

The Max Conducted Peak Output Power is **-4.21dBm(0.379 mW)** in Lowest channel (2.402GHz);
The best case gain of the antenna is 1.00dBi..
1.00dB logarithmic terms convert to numeric result is nearly **1.26**
According to the formula. calculate the EIRP test result:

EIRP= P x G = 0.379 mW x 1.26 = 0.478mW ①
SAR requirement:
S= 60 / f(GHz) = 60/2.402 = 24.98 mW ② ;
① < ②.
So the SAR report is not required.

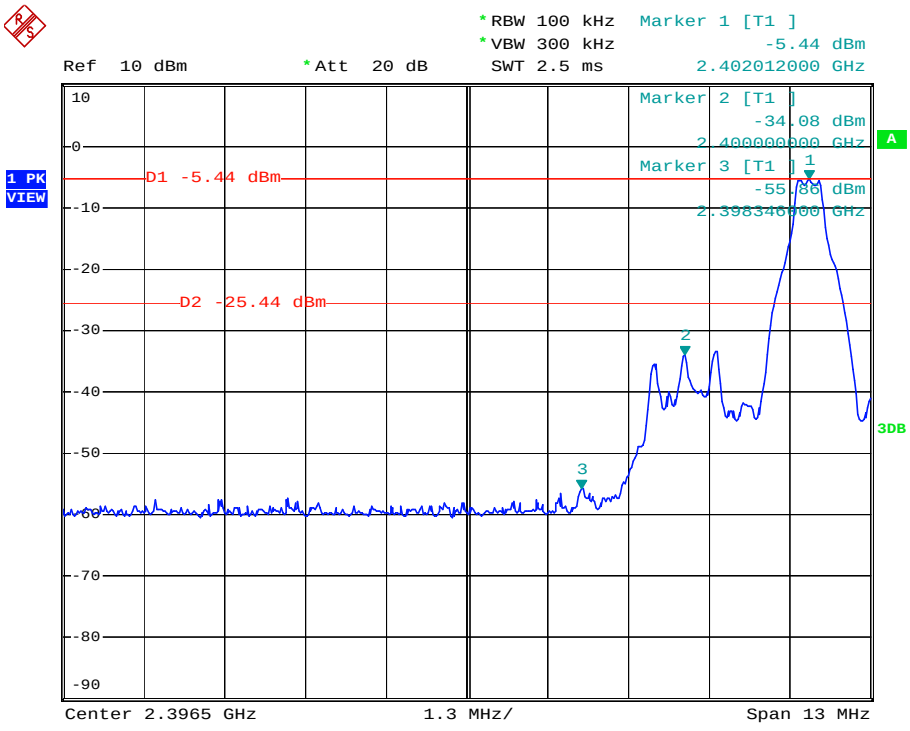
5.11 Band edge

Test Requirement:	FCC 15.247(d)
Test Method:	ANSI C63.4 & DA 00-705
Test Status:	Test lowest channel, highest channel.
Test site:	The transmitter output is connected to spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.
Limit:	15.247(d)In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

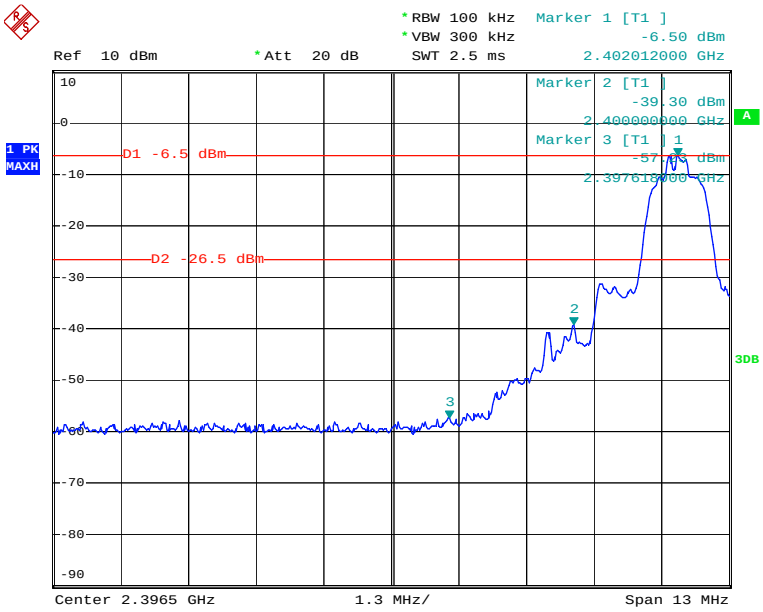
Out-OFF-band spurious emissions-conducted measurement:

1. The lowest channel (2402MHz)

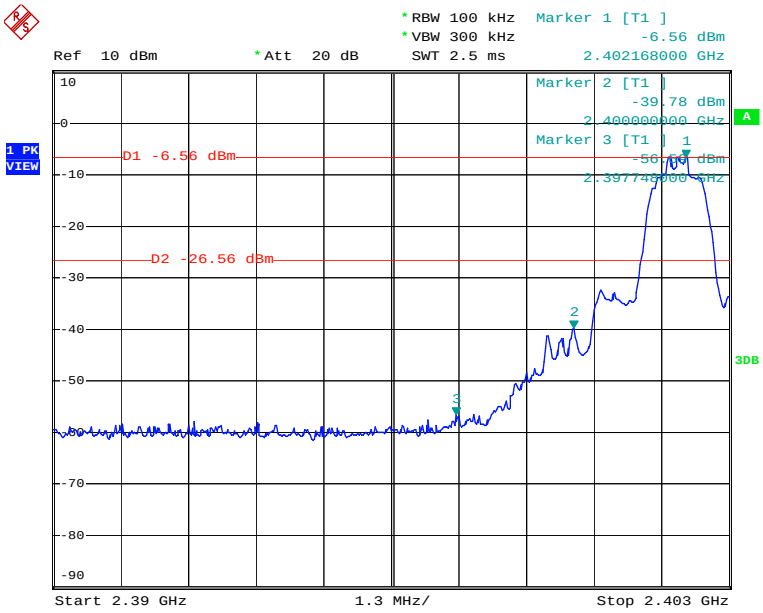
GFSK mode:



PI/4QPSK mode:

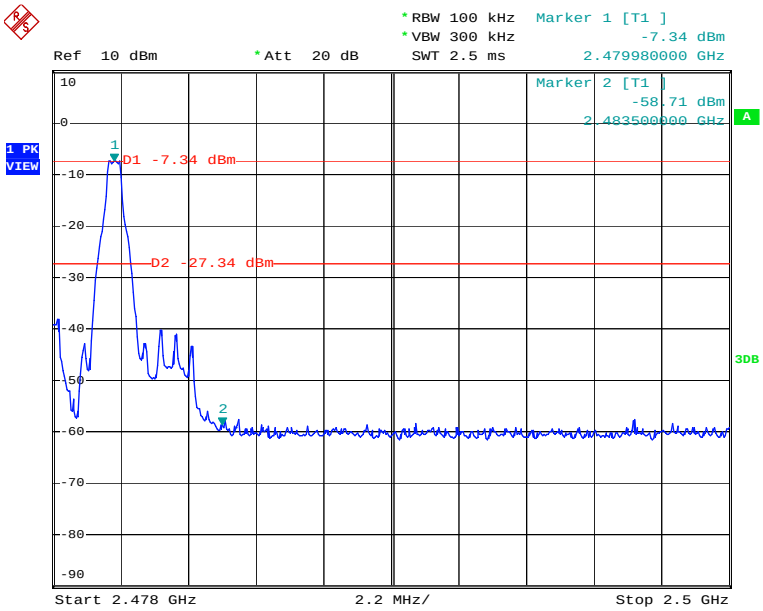


8DPSK mode:

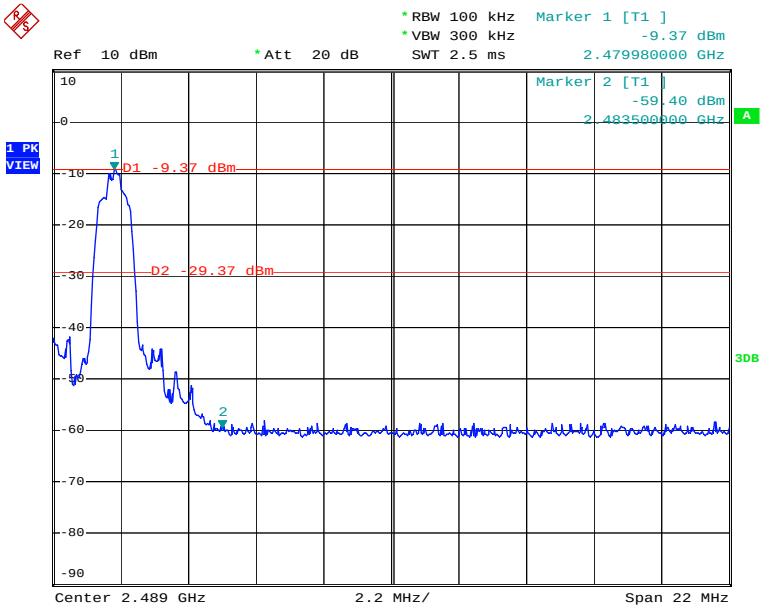


2. The highest channel (2480MHz)

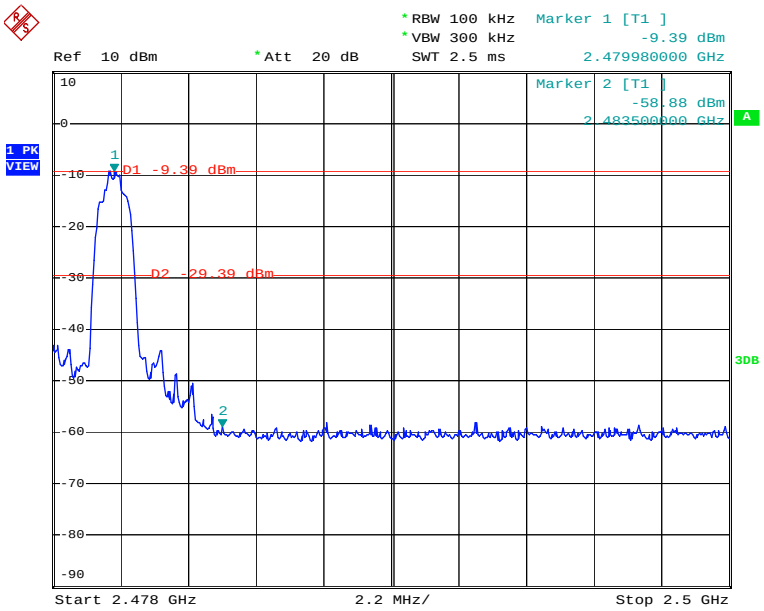
GFSK mode:



PI/4QPSK mode:

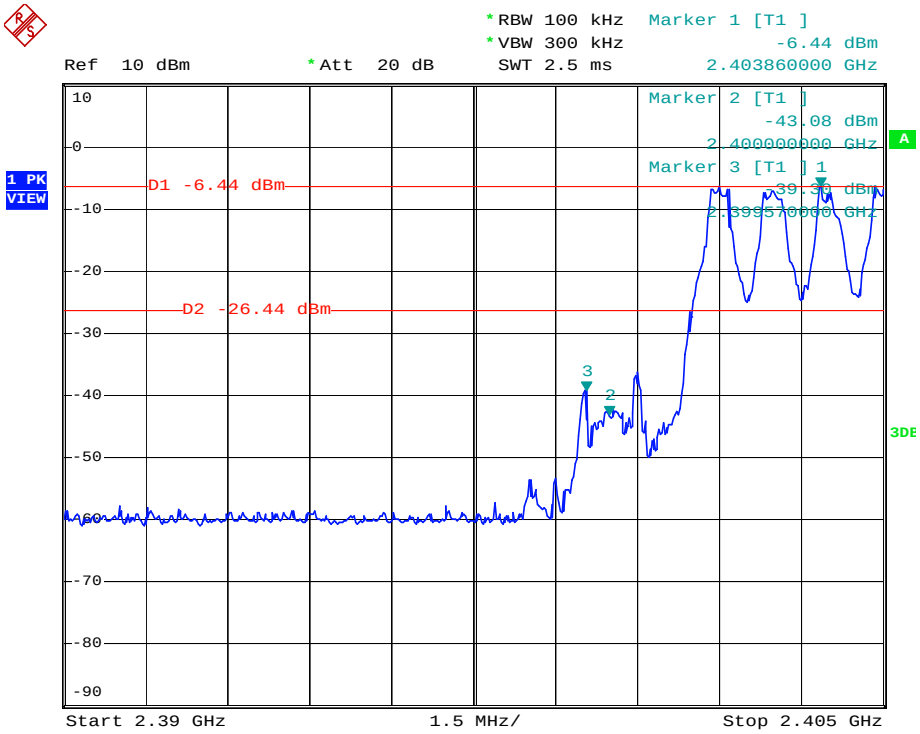


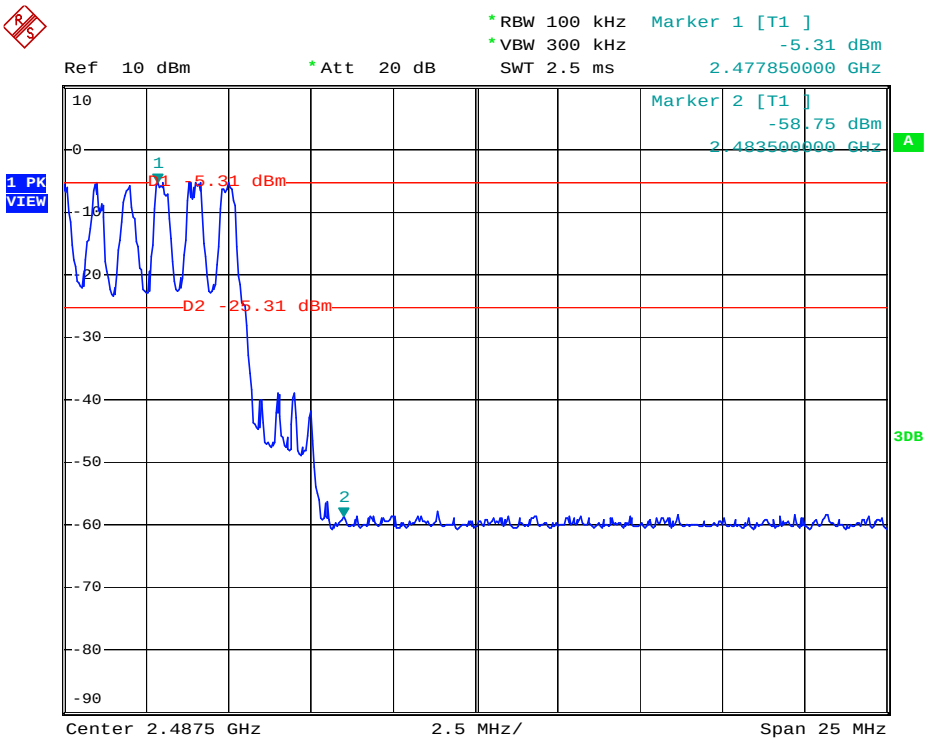
8DPSK mode:



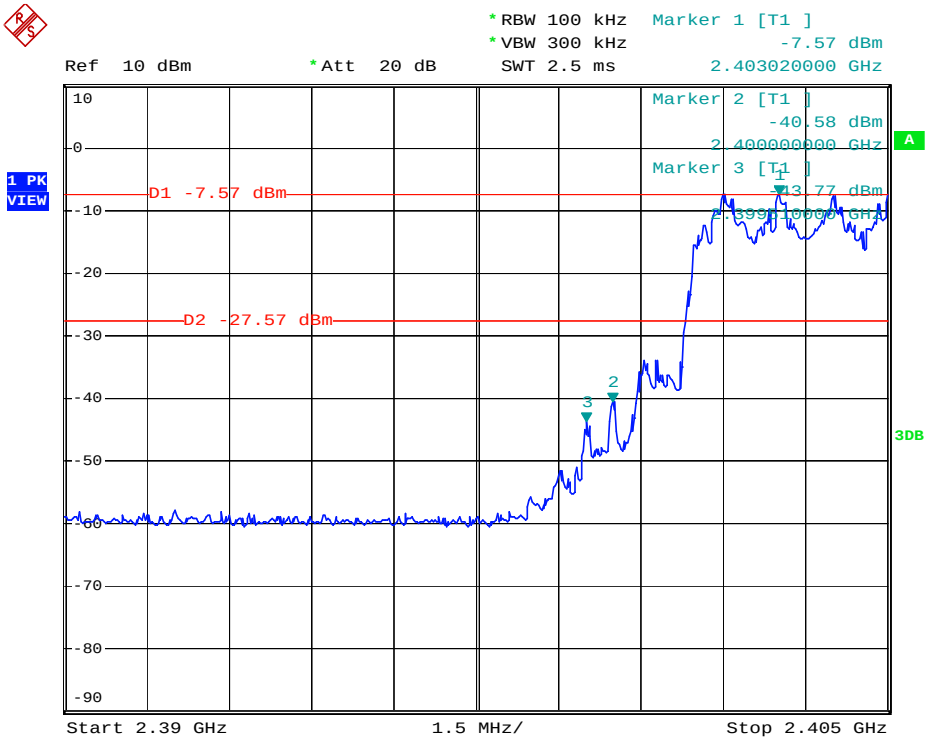
Hopping Mode

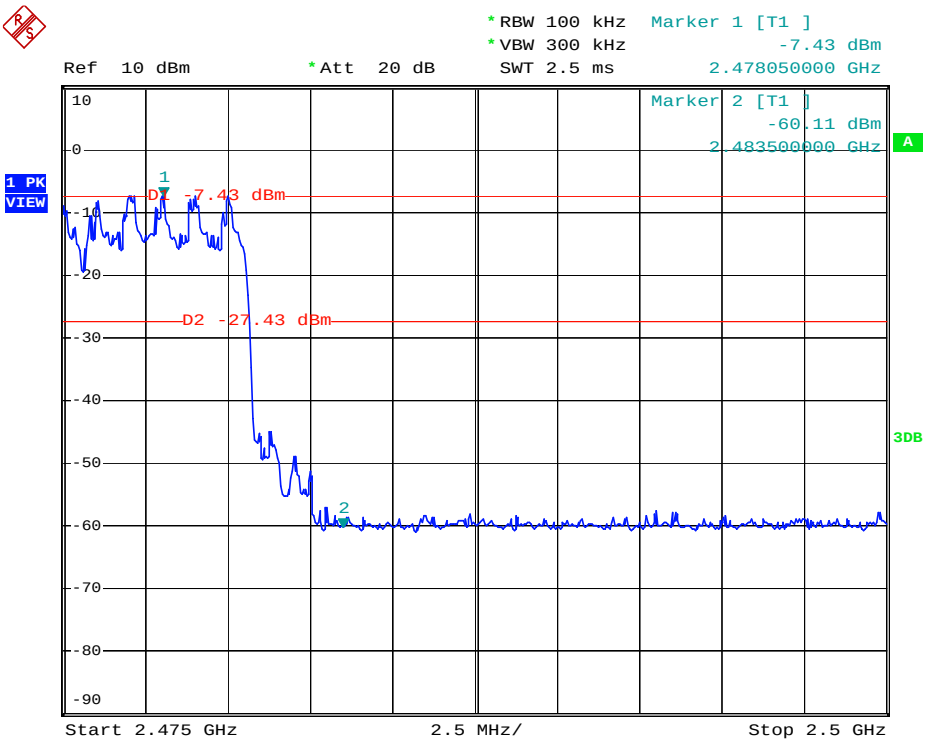
GFSK



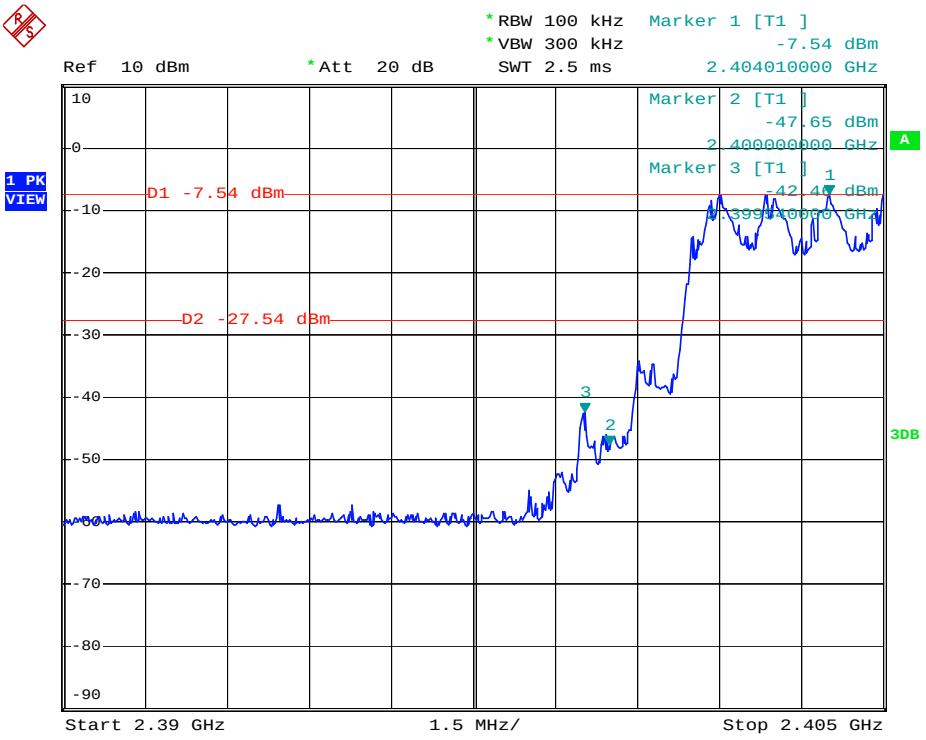

*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-5.31 dBm
2.477850000 GHz
Marker 2 [T1]
-58.75 dBm
2.483500000 GHz
1 PK
VIEW
D1 -5.31 dBm
D2 -25.31 dBm
A
3DB
Center 2.4875 GHz
2.5 MHz/
Span 25 MHz

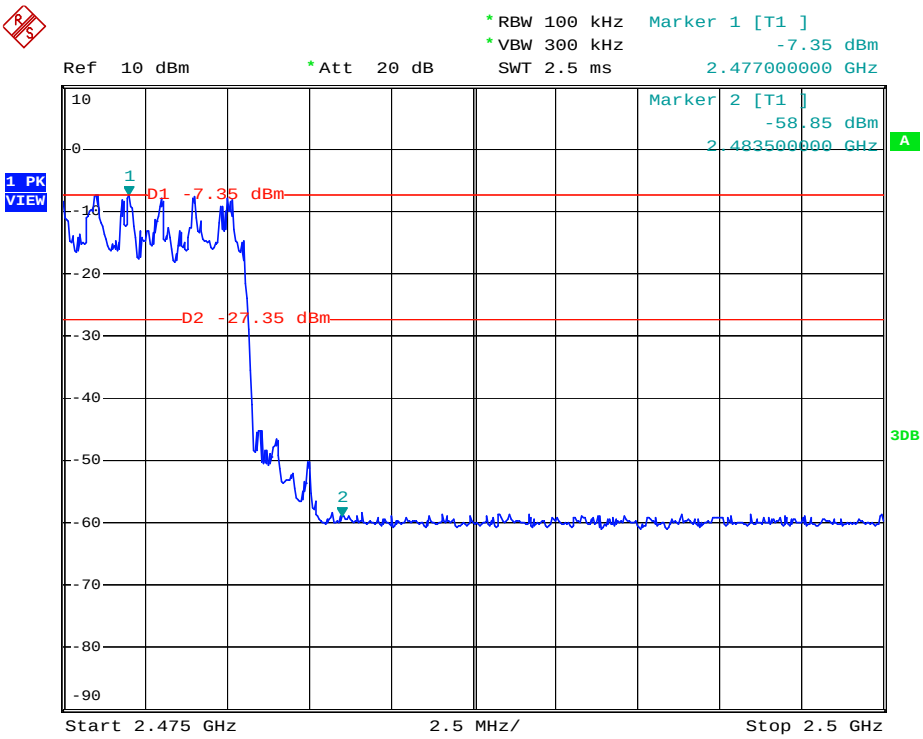
PI/4QPSK


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-7.57 dBm
2.403020000 GHz
Marker 2 [T1]
-40.58 dBm
2.400000000 GHz
Marker 3 [T1]
-13.77 dBm
2.399610000 GHz
1 PK
VIEW
D1 -7.57 dBm
D2 -27.57 dBm
A
3DB
Start 2.39 GHz
1.5 MHz/
Stop 2.405 GHz


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-7.43 dBm
2.478050000 GHz
Marker 2 [T1]
-60.11 dBm
2.483500000 GHz
1 PK
VIEW
A
3DB
D1 -7.43 dBm
D2 -27.43 dBm
Start 2.475 GHz
2.5 MHz/
Stop 2.5 GHz

8DPSK


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-7.54 dBm
2.404010000 GHz
Marker 2 [T1]
-47.65 dBm
2.400000000 GHz
Marker 3 [T1]
1 PK
VIEW
A
3DB
D1 -7.54 dBm
D2 -27.54 dBm
Start 2.39 GHz
1.5 MHz/
Stop 2.405 GHz


*RBW 100 kHz
*VBW 300 kHz
Ref 10 dBm
*Att 20 dB
SWT 2.5 ms
Marker 1 [T1]
-7.35 dBm
2.477000000 GHz
Marker 2 [T1]
-58.85 dBm
2.483500000 GHz
1 PK
VIEW
A
3DB
D1 -7.35 dBm
D2 -27.35 dBm
Start 2.475 GHz
2.5 MHz/
Stop 2.5 GHz

5.12 Radiated Emissions

Test Requirement:	15.247(d),15.209 & 15.205
Test Method:	ANSI C63.4 & DA 00-705
Test Status:	Test lowest channel, Middle, highest channel.
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Test Range	30MHz to 25GHz
	30MHz-1000MHz: RBW=100KHz, VBW=300KHz
	Above 1GHz: PK RBW=1MHz, VBW=3MHz
	Average RBW=1MHz, VBW=10Hz
15.209 Limit:	40.0 dBμV/m between 30MHz & 88MHz
	43.5 dBμV/m between 88MHz & 216MHz
	46.0 dBμV/m between 216MHz & 960MHz
	above 960MHz: Average value Limit 54.0 dBμV/m
	Peak value Limit 74.0 dBμV/m.

Test Configuration:

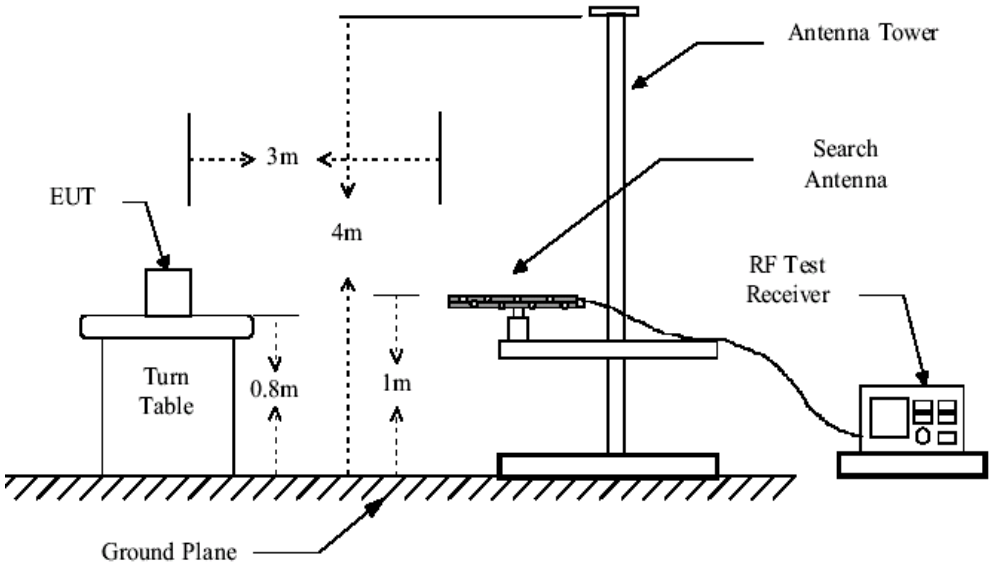


Figure 1. 30MHz to 1GHz radiated emissions test configuration

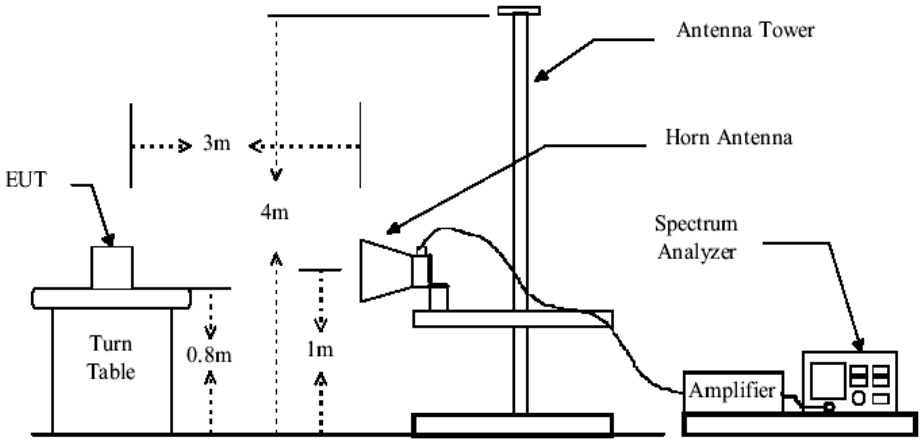


Figure 2. Above 1GHz radiated emissions test configuration

Test Procedure: The procedure used was ANSI Standard C63.4-2001. The receiver was scanned from 30MHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

5.12.1 Radiated emission below 1GHz

Test in bluetooth mode.

Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Quasi-peak Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
43.580	0.68	9.93	28.10	38.03	20.54	40.00	-19.46
56.190	0.80	7.48	28.07	49.73	29.94	40.00	-10.06
98.870	1.19	9.06	27.89	38.01	20.37	43.50	-23.13
117.300	1.25	8.08	27.71	34.94	16.56	43.50	-26.94
242.430	1.64	12.07	26.95	33.51	20.27	46.00	-25.73
610.060	2.72	20.05	27.58	27.46	22.65	46.00	-23.35

Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Quasi-peak Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
56.190	0.80	7.65	28.07	45.18	25.56	40.00	-14.44
98.870	1.19	9.06	27.89	34.03	16.39	43.50	-27.11
241.460	1.63	12.04	26.95	40.82	27.54	46.00	-18.46
374.350	2.13	16.00	27.25	31.25	22.13	46.00	-23.87
625.580	2.75	20.50	27.53	26.92	22.64	46.00	-23.36
873.900	3.51	22.92	26.55	26.40	26.28	46.00	-19.72

5.12.2 Transmitter emission above 1GHz

The lowest channel (2402MHz)

Peak Measurement

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2390.00	2.50	33.58	46.68	70.58	59.98	74.00	-14.02	Vertical
4808.00	2.70	34.04	45.40	67.32	58.66	74.00	-15.34	Vertical
7222.00	3.15	36.29	44.49	64.51	59.46	74.00	-14.54	Vertical
9619.00	3.46	36.99	42.20	60.27	58.52	74.00	-15.48	Vertical
2400.00	2.56	33.75	46.18	70.81	60.94	74.00	-13.06	Horizontal
4808.00	2.70	34.04	45.40	67.51	58.85	74.00	-15.15	Horizontal
7222.00	3.15	36.29	44.49	61.38	56.33	74.00	-17.67	Horizontal
12016.00	3.81	38.80	43.33	58.27	57.55	74.00	-16.45	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2390.00	2.50	33.58	46.68	55.58	45.98	54.00	-8.02	Vertical
4816.25	2.71	34.04	45.40	49.07	40.42	54.00	-13.58	Vertical
7214.50	3.15	36.29	44.49	46.15	41.10	54.00	-12.90	Vertical
9612.75	3.46	36.99	42.20	44.63	42.88	54.00	-11.12	Vertical
2400.00	2.56	33.75	46.18	57.25	47.38	54.00	-6.62	Horizontal
4816.25	2.71	34.04	45.40	48.93	40.28	54.00	-13.72	Horizontal
7214.50	3.15	36.29	44.49	46.32	41.27	54.00	-12.73	Horizontal
12011.00	3.81	38.80	43.33	44.79	44.07	54.00	-9.93	Horizontal

The middle channel (2441MHz)

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2400.00	2.56	33.75	46.18	66.89	57.02	74.00	-16.98	Vertical
4893.00	2.72	34.02	45.42	64.57	55.89	74.00	-18.11	Vertical
7324.00	3.16	36.10	44.39	60.58	55.45	74.00	-18.55	Vertical
12220.00	3.84	38.93	43.59	57.28	56.46	74.00	-17.54	Vertical
2483.50	2.64	33.68	45.89	64.28	54.71	74.00	-19.29	Horizontal
4893.00	2.72	34.02	45.42	63.87	55.19	74.00	-18.81	Horizontal
7324.00	3.16	36.10	44.39	60.19	55.06	74.00	-18.94	Horizontal
9772.00	3.47	37.12	42.06	57.86	56.39	74.00	-17.61	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2400.00	2.56	33.75	46.18	51.27	41.40	54.00	-12.60	Vertical
4882.500	2.72	34.02	45.42	50.22	41.54	54.00	-12.46	Vertical
7333.750	3.16	36.10	44.37	44.33	39.22	54.00	-14.78	Vertical
12209.750	3.84	38.93	43.57	44.49	43.69	54.00	-10.31	Vertical
2483.50	2.64	33.68	45.89	52.75	43.18	54.00	-10.82	Horizontal
4882.500	2.72	34.02	45.42	50.53	41.85	54.00	-12.15	Horizontal
9771.750	3.47	37.12	42.06	42.73	41.26	54.00	-12.74	Horizontal
12209.750	3.84	38.93	43.57	43.69	42.89	54.00	-11.11	Horizontal

The highest channel (2480MHz)

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2483.50	2.64	33.68	45.89	70.25	60.68	74.00	-13.32	Vertical
7443.00	3.18	35.91	44.26	60.24	55.07	74.00	-18.93	Vertical
9925.00	3.49	37.23	41.92	56.37	55.17	74.00	-18.83	Vertical
12407.00	3.86	39.04	43.82	56.87	55.95	74.00	-18.05	Vertical
2500.00	2.65	33.74	45.85	68.97	59.51	74.00	-14.49	Horizontal
7443.00	3.18	35.91	44.26	61.75	56.58	74.00	-17.42	Horizontal
9925.00	3.49	37.23	41.92	58.27	57.07	74.00	-16.93	Horizontal
12407.00	3.86	39.04	43.82	57.46	56.54	74.00	-17.46	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2483.50	2.64	33.68	45.89	54.85	45.28	54.00	-8.72	Vertical
4962.00	2.74	34.01	45.44	47.82	39.13	54.00	-14.87	Vertical
7453.00	3.18	35.88	44.25	48.07	42.88	54.00	-11.12	Vertical
12408.50	3.86	39.04	43.82	44.86	43.94	54.00	-10.06	Vertical
2500.00	2.65	33.74	45.85	52.17	42.71	54.00	-11.29	Horizontal
4962.00	2.74	34.01	45.44	47.94	39.25	54.00	-14.75	Horizontal
7453.00	3.18	35.88	44.25	47.83	42.64	54.00	-11.36	Horizontal
9930.75	3.49	37.23	41.92	41.79	40.59	54.00	-13.41	Horizontal

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor –Preamplifier Factor.

Remark: No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

Remark:

1). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

2). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

3) Pretest the Bluetooth normal mode

Section 15.205 Restricted bands of operation.

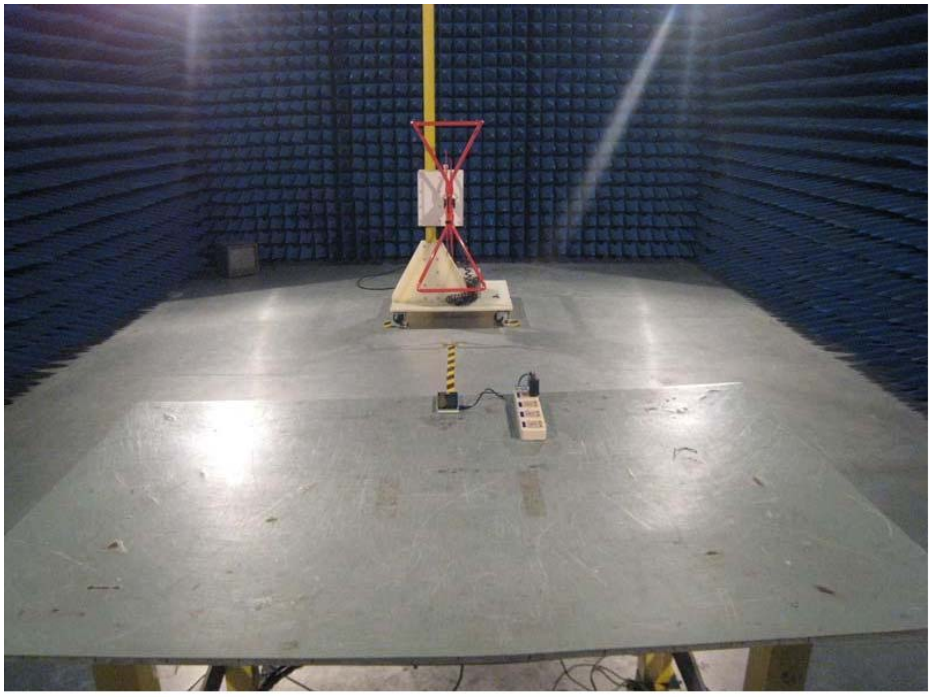
(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

Test result: The unit does meet the FCC requirements.

6 Photographs

6.1 Radiated Spurious Emission Test Setup

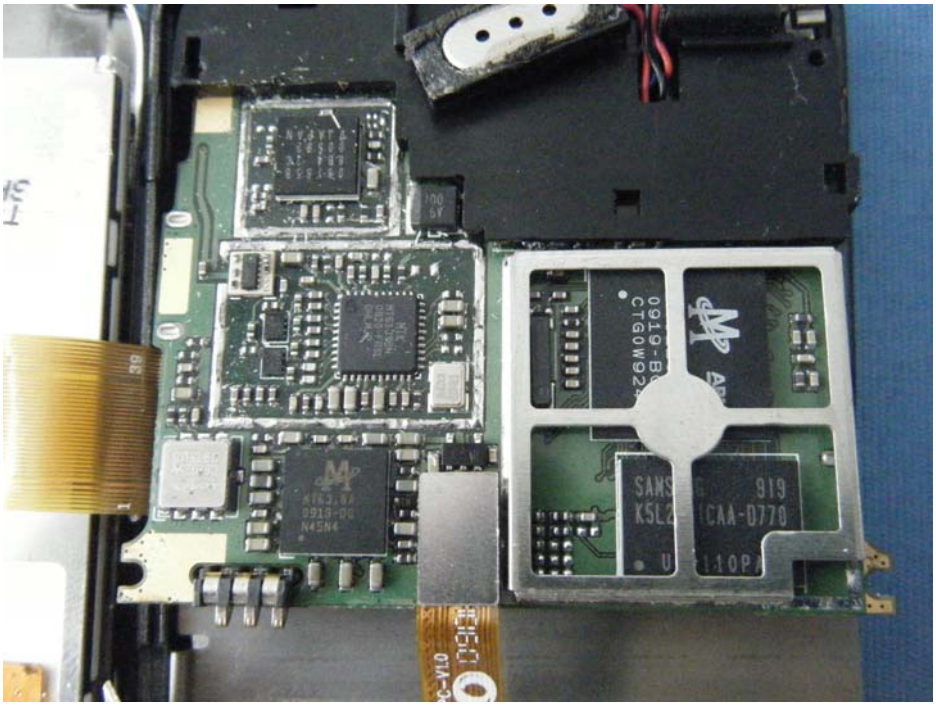


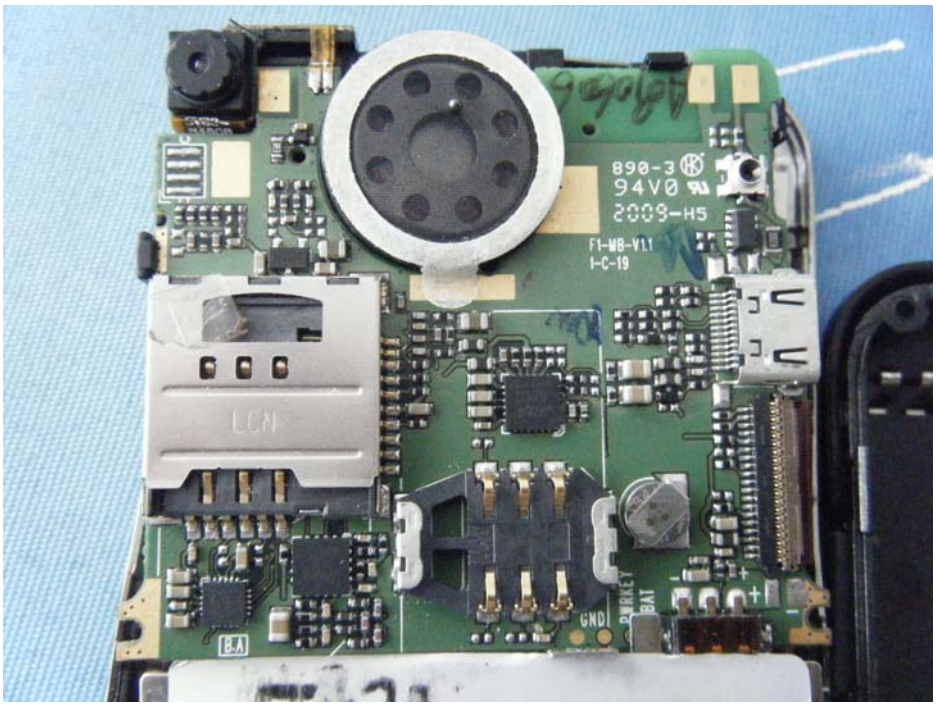
6.2 Conducted Emission Test Setup

6.3 EUT Constructional Details


67 68 69 70 71 72 73 74 75 76 77 78


62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

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