Global United Technology Services Co., Ltd.

Report No: GTSE11100084901

FCC REPORT (Bluetooth)

Applicant:	GIO MOBILE S.A. DE C.V.
Address of Applicant:	Coruna #125 Col.Alamos, Mexico City, Mexico

Equipment Under Test (EUT)

Product Name:	GMGB100
Model No.:	GMGB100
Trade Name	Skyworth
FCC ID:	Z44GMGB100
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2010
Date of sample receipt:	Oct. 14 , 2011
Date of Test:	Oct. 17 to 21, 2011
Date of report issued:	Oct. 22, 2011
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Stephen Guo
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	*Oct. 22, 2011*	*Original*

Prepared by: Collin.He ***Date:*** *Oct. 22, 2011*

Project Engineer

Reviewed by: Hans.Hu ***Date:*** *Oct. 22, 2011*

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	PASS
AC Power Line Conducted Emission	15.207	PASS
Conducted Peak Output Power	15.247 (b)(1)	PASS
20dB Occupied Bandwidth	15.247 (a)(1)	PASS
Carrier Frequencies Separation	15.247 (a)(1)	PASS
Hopping Channel Number	15.247 (a)(1)	PASS
Dwell Time	15.247 (a)(1)	PASS
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List (7 July 2002)	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.247(d)	PASS

Remark:

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	GIO MOBILE S.A. DE C.V.
Address of Applicant:	Coruna #125 Col.Alamos, Mexico City, Mexico
Manufacturer/Factory:	Skyworth Wireless Technology Co., Ltd.
Address of Manufacturer/Factory	Unit A Rm 3A01, Skyworth Bldg, Gaoxin Ave 1S, Nanshan District, Shenzhen, China

5.2 General Description of E.U.T.

Product Name:	GMGB100
Model No.:	GMGB100
Trade Name：	Skyworth
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, Pi/4QPSK, 8DPSK
Antenna Type:	Integral
Antenna gain:	0dBi
Power supply:	Type: 3.7V 800mAh 2.9*6Wh Voltage:DC 3.7V
AC adapter:	Model No:GMGB 105 Input: AC 100-240V 50/60Hz 150mA Output: DC 5V 500mA

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

5.3 Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	45 % RH
Atmospheric Pressure:	1050 mbar
Test mode:	
Bluetooth mode	Keep the EUT in transmitting mode with modulation.

5.4 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.

● **Industry Canada (IC)**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.

5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China Tel: 0755-27798480 Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Test Instruments list

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 30 2011	Mar. 29 2012
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 04 2011	Jul. 03 2012
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 26 2011	Feb. 25 2012
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 30 2011	June 29 2012
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2011	Mar. 29 2012
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	Apr. 01 2011	Mar. 31 2012
9	Coaxial Cable	GTS	N/A	GTS211	Apr. 01 2011	Mar. 31 2012
9	Coaxial cable	GTS	N/A	GTS210	Apr. 01 2011	Mar. 31 2012
11	Coaxial Cable	GTS	N/A	GTS212	Apr. 01 2011	Mar. 31 2012
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 04 2011	Jul. 03 2012
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 04 2011	Jul. 03 2012
14	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Apr. 01 2011	Mar. 31 2012
15	Band filter	Amindeon	82346	GTS219	Apr. 01 2011	Mar. 31 2012
16	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	May 11 2011	May 11 2012
17	Signal Generator	Rohde & Schwarz	SML03	GTS236	May 11 2011	May 11 2012
18	Temp. Humidity/ Barometer	Oregon Scientific	BA-888	GTS248	May 11 2011	May 11 2012
19	D.C. Power Supply	Instek	PS-3030	GTS232	NA	NA
20	Splitter	Agilent	11636B	GTS237	May 11 2011	May 11 2012

Conducted Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS252	Jul. 04 2011	Jul. 03 2012
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 04 2011	Jul. 03 2012
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 04 2011	Jul. 03 2012
4	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 04 2011	Jul. 03 2012
5	Coaxial Cable	GTS	N/A	GTS227	Apr. 01 2011	Mar. 31 2012
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

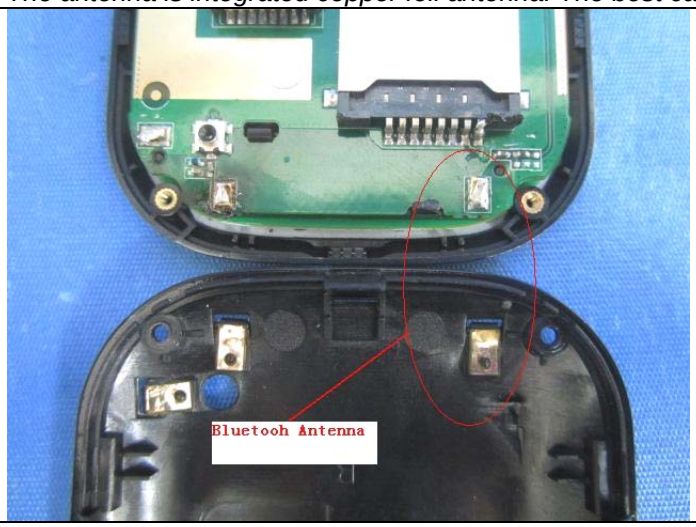
6.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

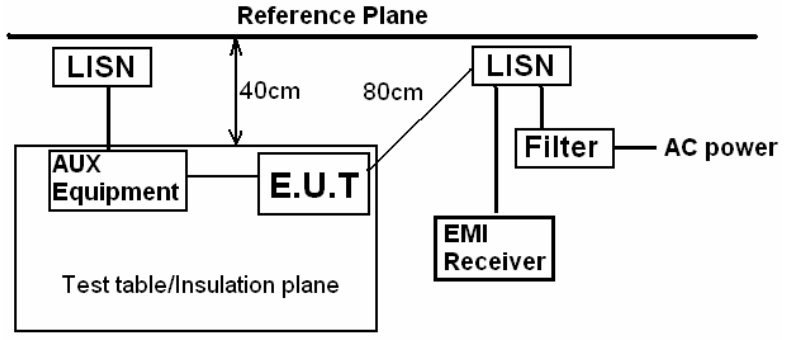
15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
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.

E.U.T Antenna:	

The antenna is integrated copper foil antenna. The best case gain of the antenna is 0dBi.

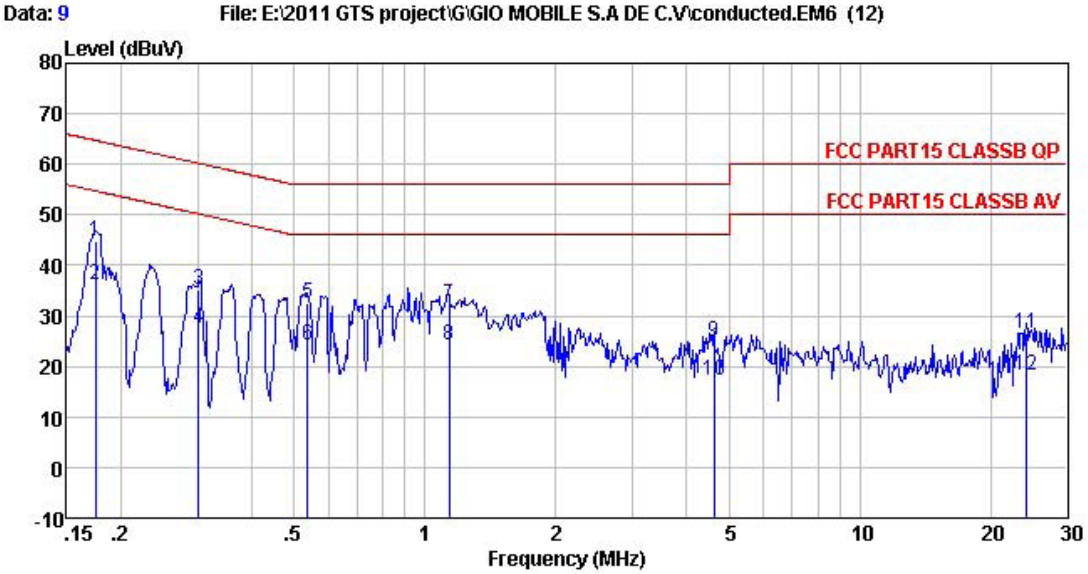


6.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4: 2009
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Result:

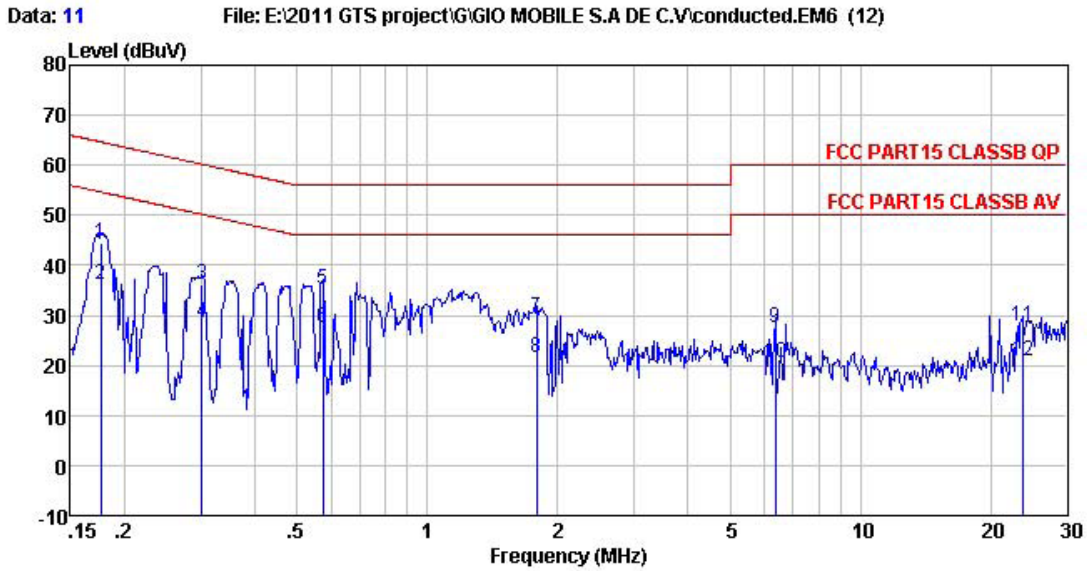
Line:



Condition : FCC PART15 CLASSB QP LISN(2011) LINE
Job No. : 849RF
Test Mode : Bluetooth mode
Test Engineer: Osccar

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.175	43.93	0.67	0.10	44.70	64.72	-20.02	QP
2	0.175	35.49	0.67	0.10	36.26	54.72	-18.46	Average
3	0.302	34.37	0.61	0.10	35.08	60.19	-25.11	QP
4	0.302	26.97	0.61	0.10	27.68	50.19	-22.51	Average
5	0.538	31.96	0.55	0.10	32.61	56.00	-23.39	QP
6	0.538	23.59	0.55	0.10	24.24	46.00	-21.76	Average
7	1.135	31.64	0.46	0.10	32.20	56.00	-23.80	QP
8	1.135	23.49	0.46	0.10	24.05	46.00	-21.95	Average
9	4.622	24.36	0.31	0.10	24.77	56.00	-31.23	QP
10	4.622	16.67	0.31	0.10	17.08	46.00	-28.92	Average
11	24.142	26.19	0.12	0.21	26.52	60.00	-33.48	QP
12	24.142	17.85	0.12	0.21	18.18	50.00	-31.82	Average

Neutral:



Condition : FCC PART15 CLASSB QP LISN(2011) NEUTRAL
Job No. : 849RF
Test Mode : Bluetooth mode
Test Engineer: Osccar

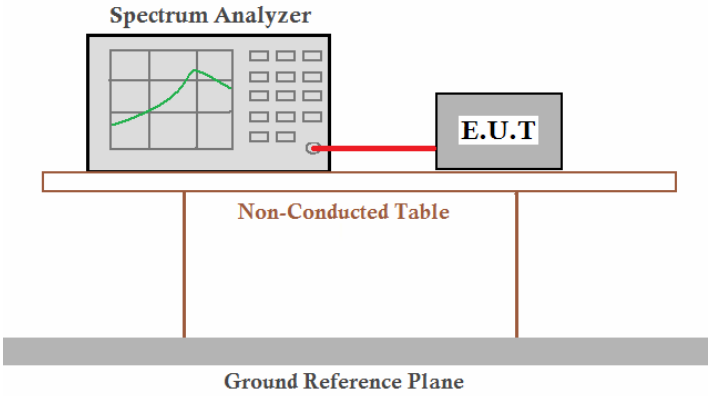
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.176	43.77	0.67	0.10	44.54	64.68	-20.14	QP
2	0.176	35.54	0.67	0.10	36.31	54.68	-18.37	Average
3	0.302	35.57	0.61	0.10	36.28	60.19	-23.91	QP
4	0.302	27.89	0.61	0.10	28.60	50.19	-21.59	Average
5	0.573	34.63	0.54	0.10	35.27	56.00	-20.73	QP
6	0.573	26.89	0.54	0.10	27.53	46.00	-18.47	Average
7	1.790	29.17	0.41	0.10	29.68	56.00	-26.32	QP
8	1.790	21.15	0.41	0.10	21.66	46.00	-24.34	Average
9	6.352	27.18	0.27	0.13	27.58	60.00	-32.42	QP
10	6.352	20.14	0.27	0.13	20.54	50.00	-29.46	Average
11	23.636	27.55	0.13	0.21	27.89	60.00	-32.11	QP
12	23.636	20.67	0.13	0.21	21.01	50.00	-28.99	Average

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

6.3 Conducted Peak Output Power

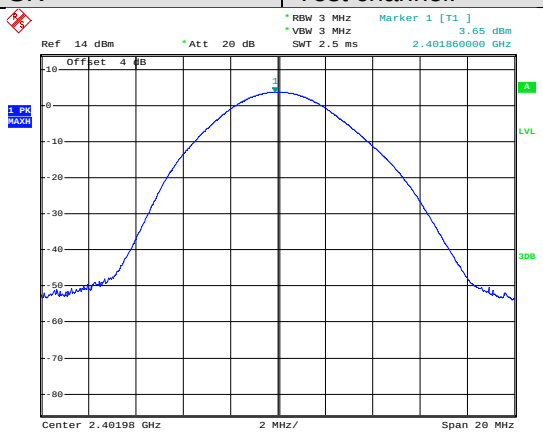
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=3MHz, VBW=3MHz, Detector=Peak
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	3.65	30.00	Pass
Middle	2.01	30.00	Pass
Highest	0.81	30.00	Pass
Pi/4QPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.67	30.00	Pass
Middle	-0.02	30.00	Pass
Highest	-1.27	30.00	Pass
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.66	30.00	Pass
Middle	0.03	30.00	Pass
Highest	-1.26	30.00	Pass

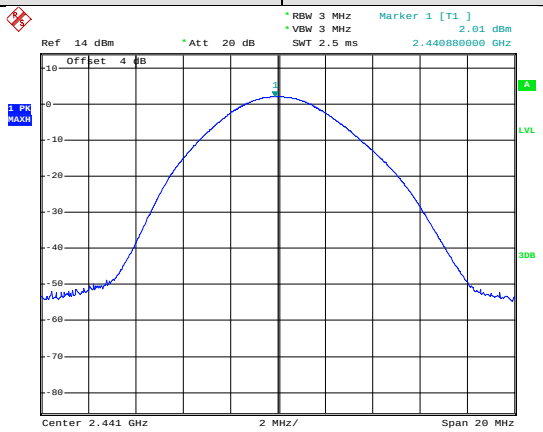
Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest



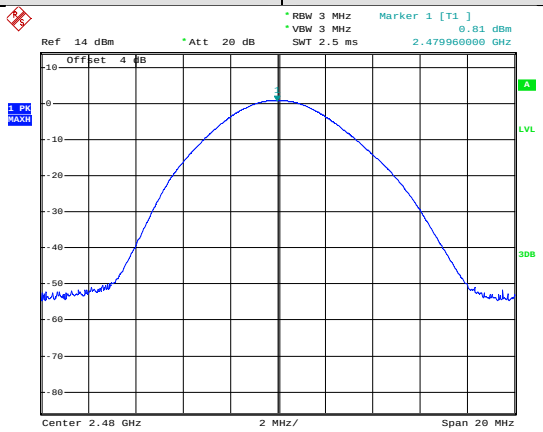
Date: 18.OCT.2011 09:20:17

Test mode:	GFSK	Test channel:	Middle



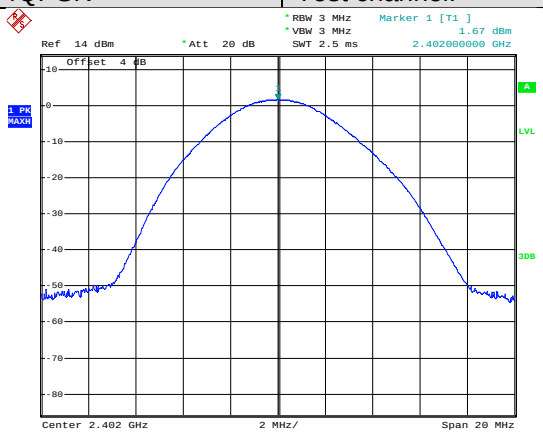
Date: 18.OCT.2011 09:29:14

Test mode:	GFSK	Test channel:	Highest



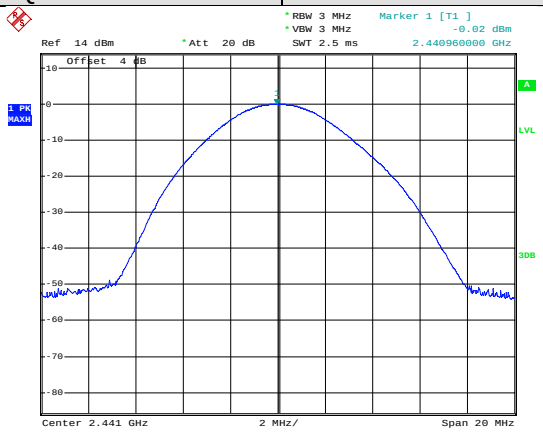
Date: 18.OCT.2011 09:35:53

Test mode:	Pi/4QPSK	Test channel:	Lowest



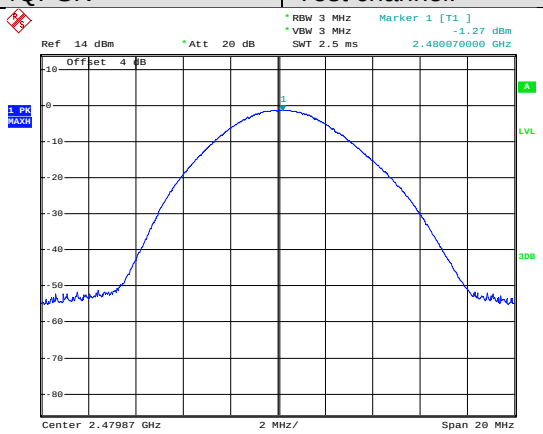
Date: 18.OCT.2011 10:00:25

Test mode:	Pi/4QPSK	Test channel:	Middle



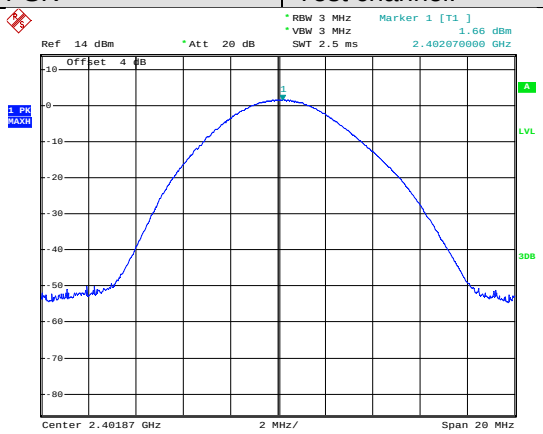
Date: 18.OCT.2011 09:56:27

Test mode:	Pi/4QPSK	Test channel:	Highest



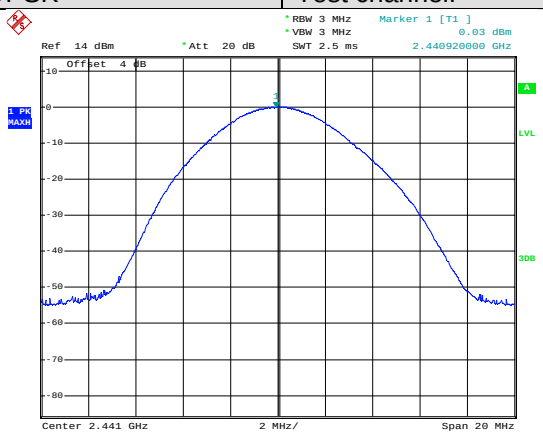
Date: 18.OCT.2011 09:46:10

Test mode:	8DPSK	Test channel:	Lowest



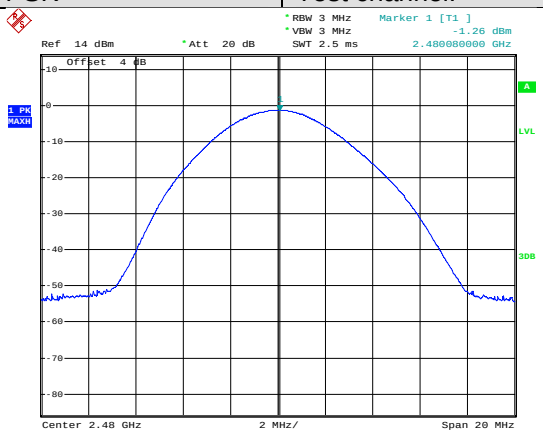
Date: 18.OCT.2011 10:08:05

Test mode:	8DPSK	Test channel:	Middle



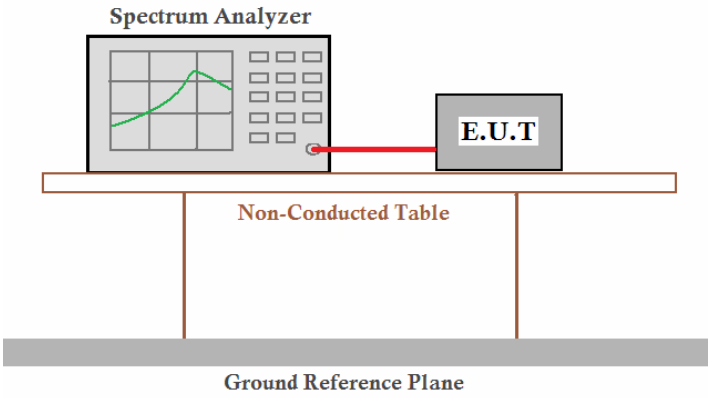
Date: 18.OCT.2011 10:14:11

Test mode:	8DPSK	Test channel:	Highest



Date: 18.OCT.2011 10:19:41

6.4 20dB Occupy Bandwidth

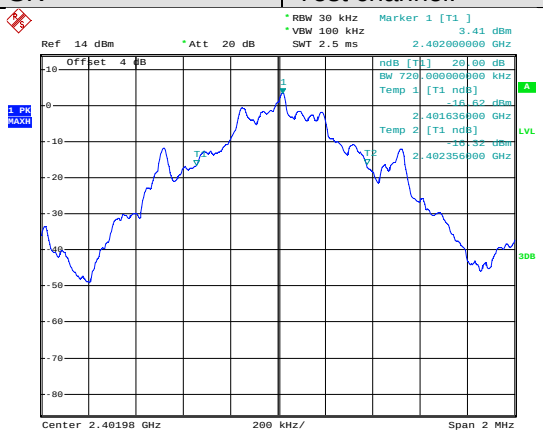
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=30KHz, VBW=100KHz,detector=Peak
Limit:	NA
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Test channel	20dB Occupy Bandwidth (KHz)		
	GFSK	Pi/4QPSK	8DPSK
Lowest	720	1116	1196
Middle	724	1120	1200
Highest	724	1120	1200

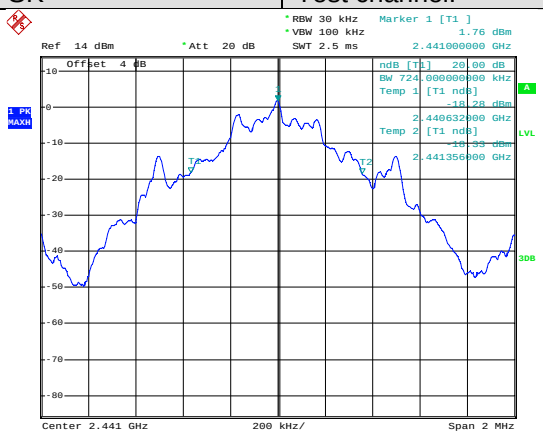
Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest



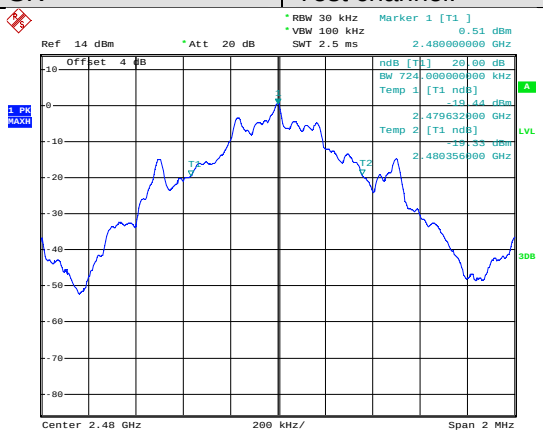
Date: 18.OCT.2011 09:20:56

Test mode:	GFSK	Test channel:	Middle



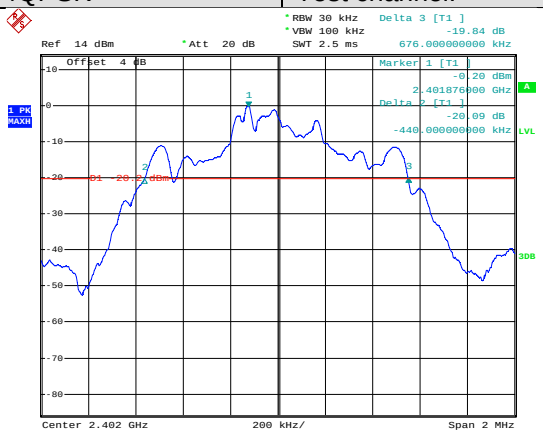
Date: 18.OCT.2011 09:29:47

Test mode:	GFSK	Test channel:	Highest



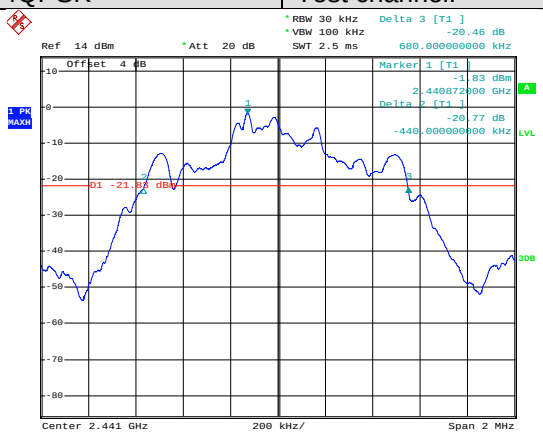
Date: 18.OCT.2011 09:36:32

Test mode:	Pi/4QPSK	Test channel:	Lowest



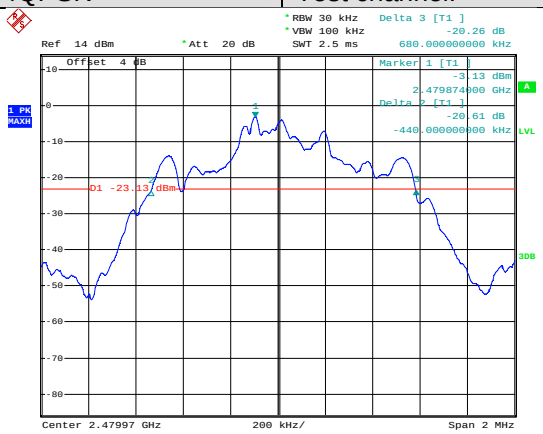
Date: 18.OCT.2011 10:01:22

Test mode:	Pi/4QPSK	Test channel:	Middle



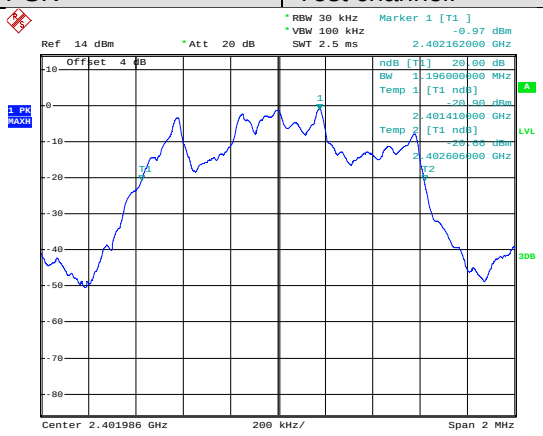
Date: 18.OCT.2011 09:57:14

Test mode:	Pi/4QPSK	Test channel:	Highest



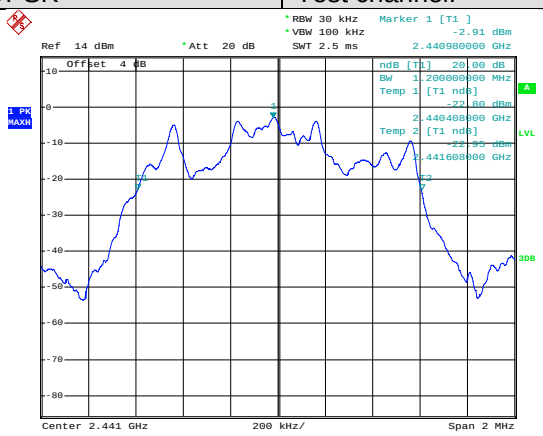
Date: 18.OCT.2011 09:48:34

Test mode:	8DPSK	Test channel:	Lowest



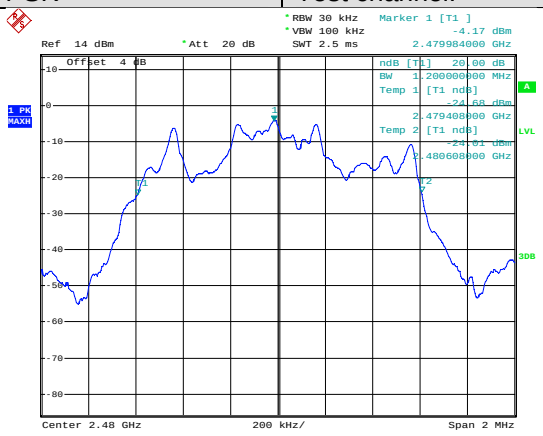
Date: 18.OCT.2011 10:09:19

Test mode:	8DPSK	Test channel:	Middle



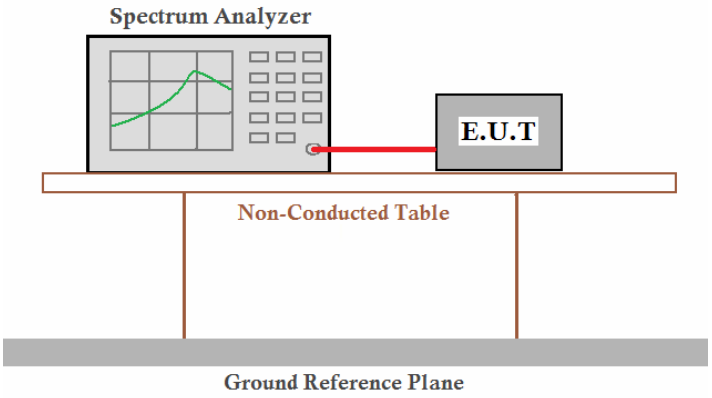
Date: 18.OCT.2011 10:14:42

Test mode:	8DPSK	Test channel:	Highest



Date: 18.OCT.2011 10:20:07

6.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

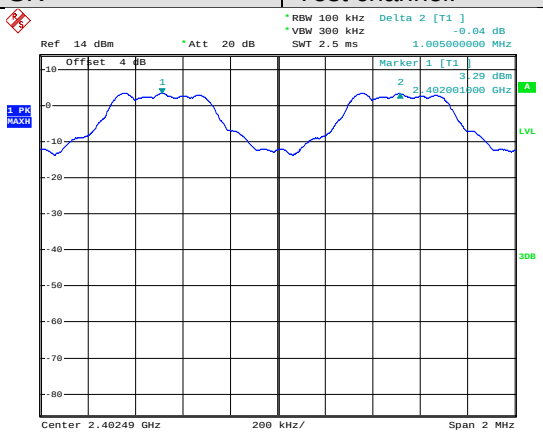
Measurement Data			
GFSK mode			
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1005	*482.7*	Pass
Middle	1004	*482.7*	Pass
Highest	1016	*482.7*	Pass
Pi/4QPSK mode			
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1004	*746.7*	Pass
Middle	1000	*746.7*	Pass
Highest	1008	*746.7*	Pass
8DPSK mode			
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1008	*800.0*	Pass
Middle	1004	*800.0*	Pass
Highest	1012	*800.0*	Pass

Note: According to section 6.4,

Mode	*20dB bandwidth (KHz) (worse case)*	*Limit (KHz) (Carrier Frequencies Separation)*
GFSK	*724*	*482.7*
PI/4QPSK	*1120*	*746.7*
8DPSK	*1200*	*800.0*

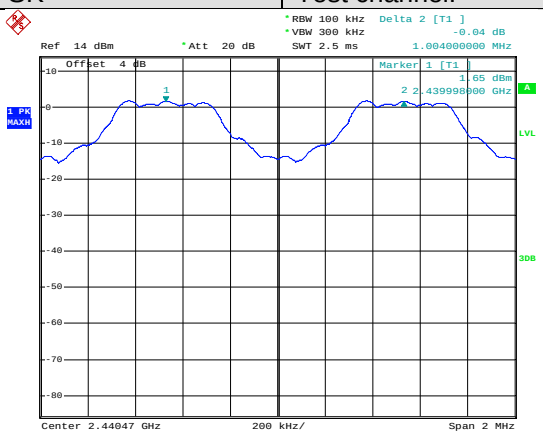
Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest



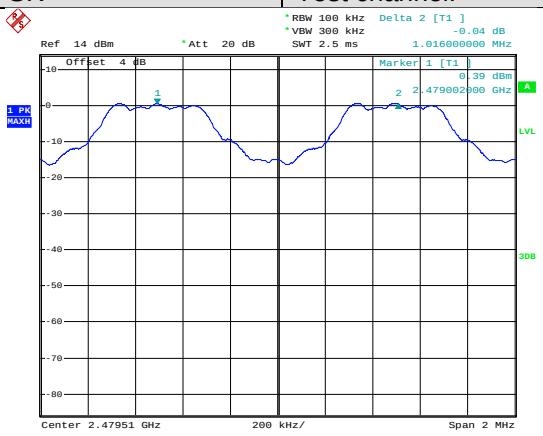
Date: 18.OCT.2011 09:28:49

Test mode:	GFSK	Test channel:	Middle



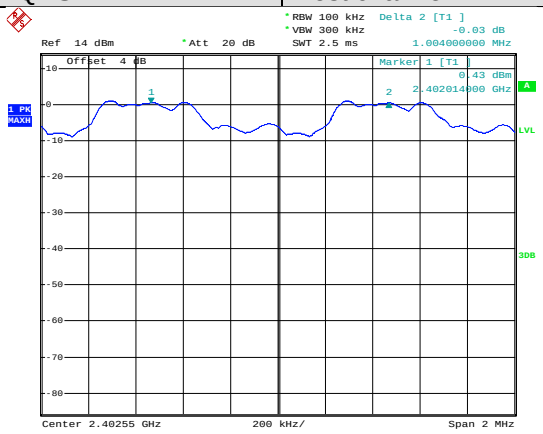
Date: 18.OCT.2011 09:35:21

Test mode:	GFSK	Test channel:	Highest



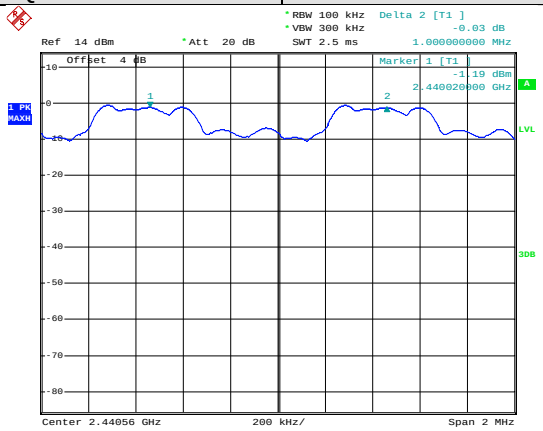
Date: 18.OCT.2011 09:45:35

Test mode:	Pi/4QPSK	Test channel:	Lowest



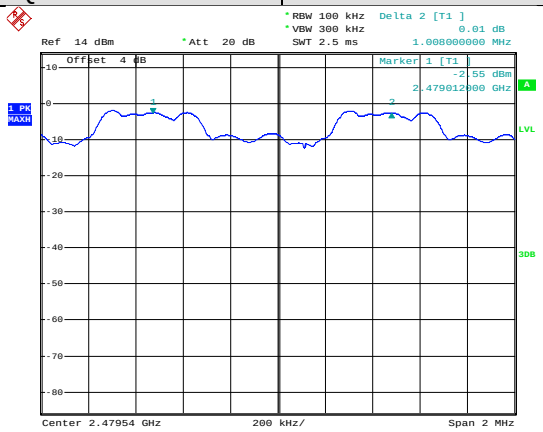
Date: 18.OCT.2011 10:07:38

Test mode:	Pi/4QPSK	Test channel:	Middle



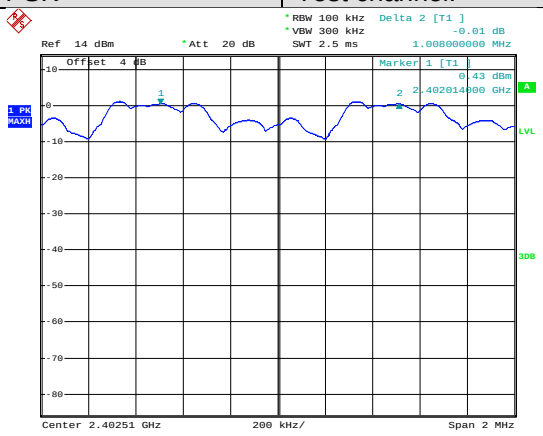
Date: 18.OCT.2011 09:59:48

Test mode:	Pi/4QPSK	Test channel:	Highest



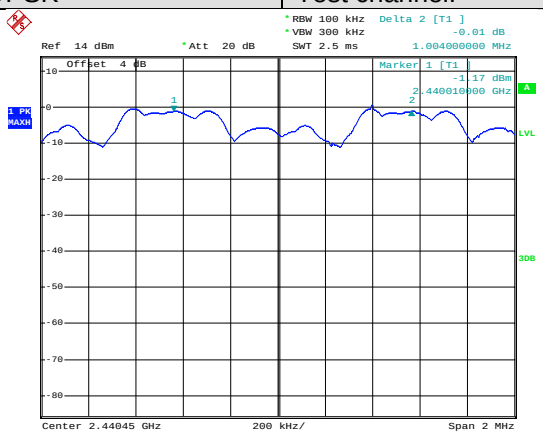
Date: 18.OCT.2011 09:55:15

Test mode:	8DPSK	Test channel:	Lowest



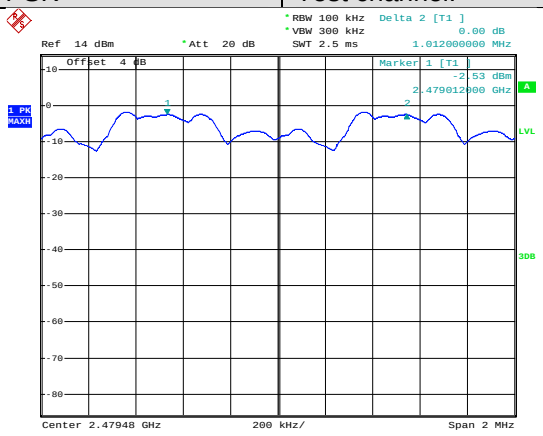
Date: 18.OCT.2011 10:13:43

Test mode:	8DPSK	Test channel:	Middle



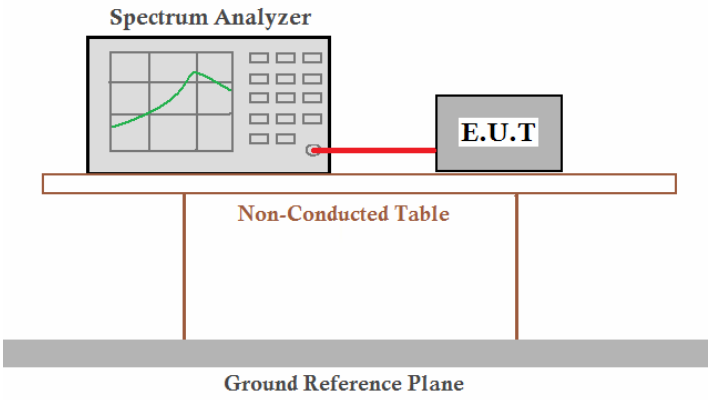
Date: 18.OCT.2011 10:17:22

Test mode:	8DPSK	Test channel:	Highest



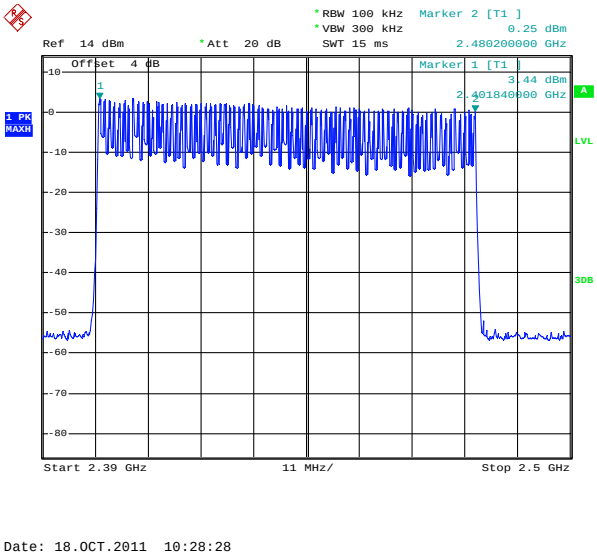
Date: 18.OCT.2011 10:24:39

6.6 Hopping Channel Number

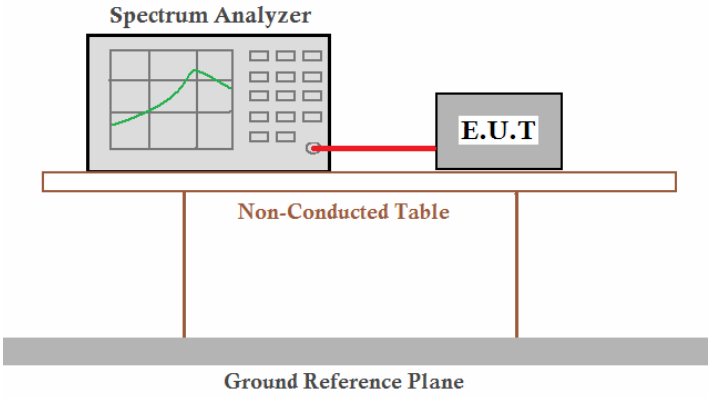
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=100KHz, VBW=300KHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15channels
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data		
Mode	Hopping channel numbers	Limit
GFSK, Pi/4QPSK, 8DPSK	79	15

Test plot as follows



6.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test mode:	Hopping transmitting with all kind of modulation.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Mode	Packet	Dwell time (second)	Limit (second)
GFSK	DH1	0.1232	0.4
	DH3	0.2632	0.4
	DH5	0.3101	0.4
Pi/4QPSK	2-DH1	0.1232	0.4
	2-DH3	0.2632	0.4
	2-DH5	0.3101	0.4
8DPSK	3-DH1	0.1232	0.4
	3-DH3	0.2632	0.4
	3-DH5	0.3101	0.4

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

The lowest channel (2402MHz), middle channel (2441MHz), highest channel (2480MHz) as below

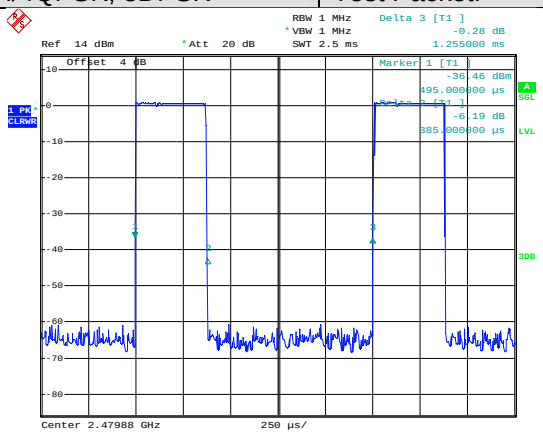
DH1 time slot=0.382 (ms)*(1600/ (2*79))*31.6=123.2ms

DH3 time slot=1.652(ms)*(1600/ (4*79))*31.6= 263.2ms

DH5 time slot=2.916(ms)*(1600/ (6*79))*31.6=310.1ms

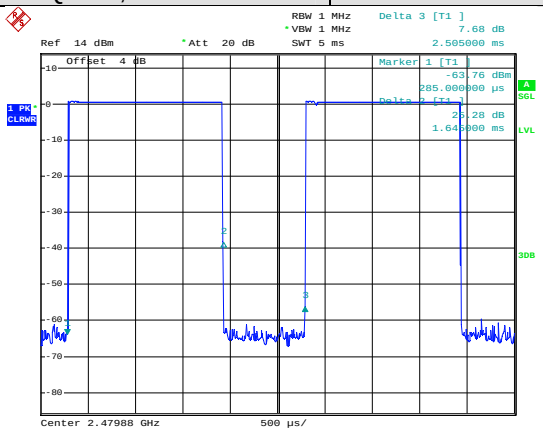
Test plot as follows

Test mode:	GFSK, Pi/4QPSK, 8DPSK	Test Packet:	DH1, 2-DH1, 3-DH1



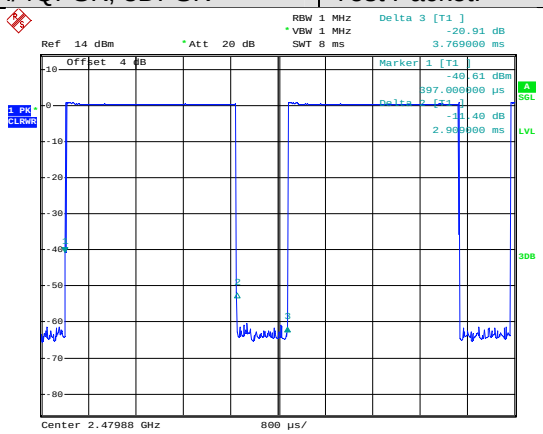
Date: 18.OCT.2011 10:25:48

Test mode:	GFSK, Pi/4QPSK, 8DPSK	Test Packet:	DH3, 2-DH3, 3-DH3



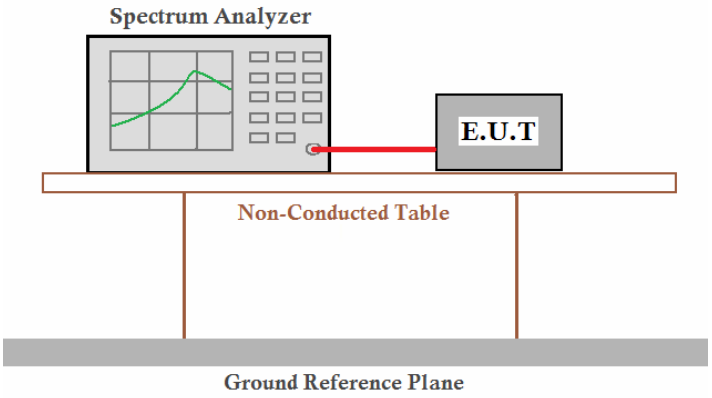
Date: 18.OCT.2011 10:26:26

Test mode:	GFSK, Pi/4QPSK, 8DPSK	Test Packet:	DH5, 2-DH5, 3-DH5



Date: 18.OCT.2011 10:27:02

6.8 Band Edge

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Receiver setup:	RBW=100KHz, VBW=300KHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

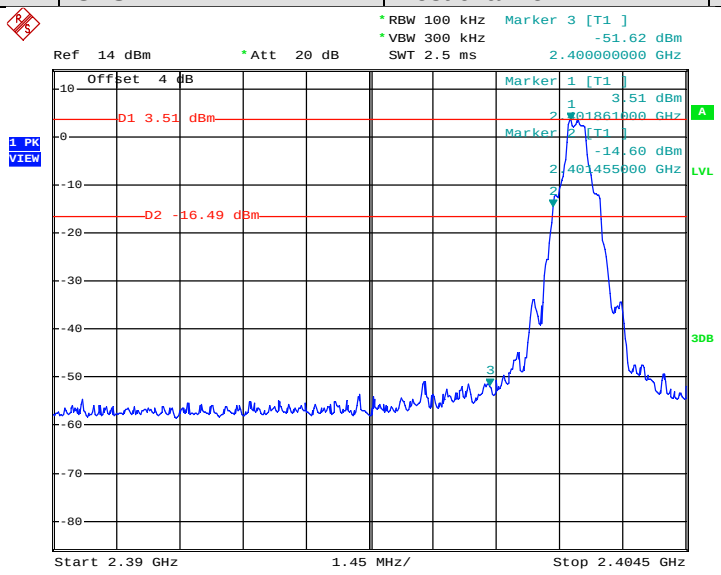
Remark:

During test the item, Pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.

Test plot as follows:

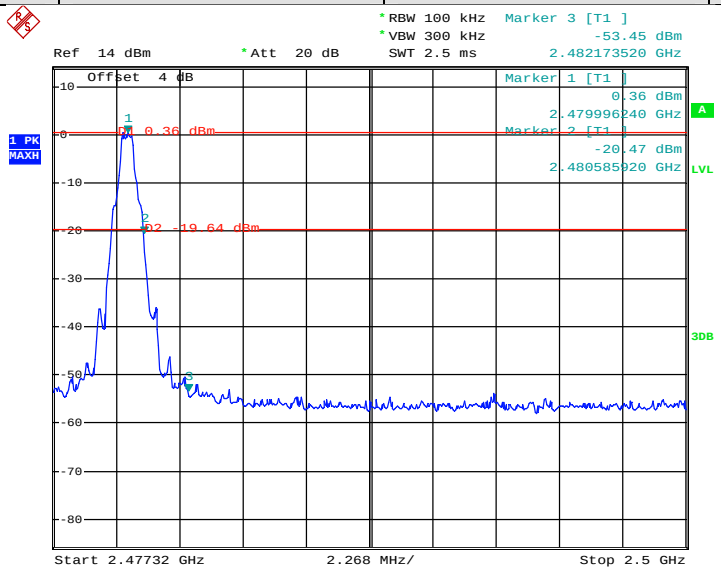
Hopping off:

Worse case mode:	GFSK	Test channel:	Lowest



Date: 18.OCT.2011 09:25:54

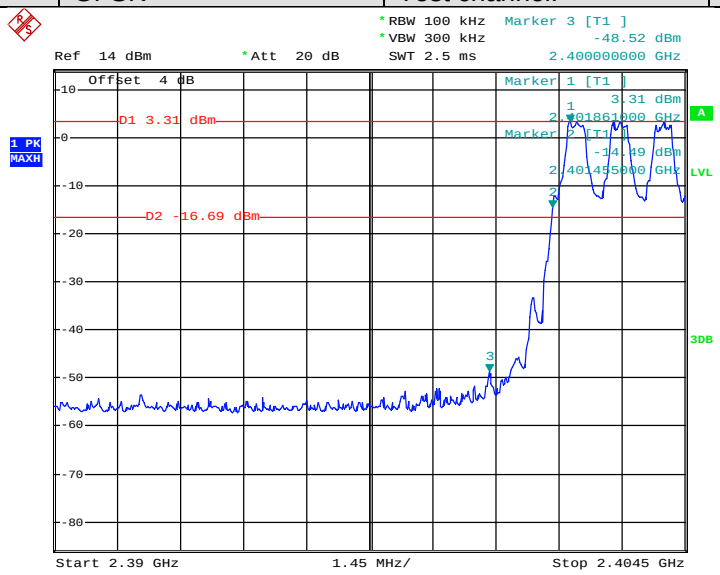
Worse case mode:	GFSK	Test channel:	Highest



Date: 18.OCT.2011 09:40:37

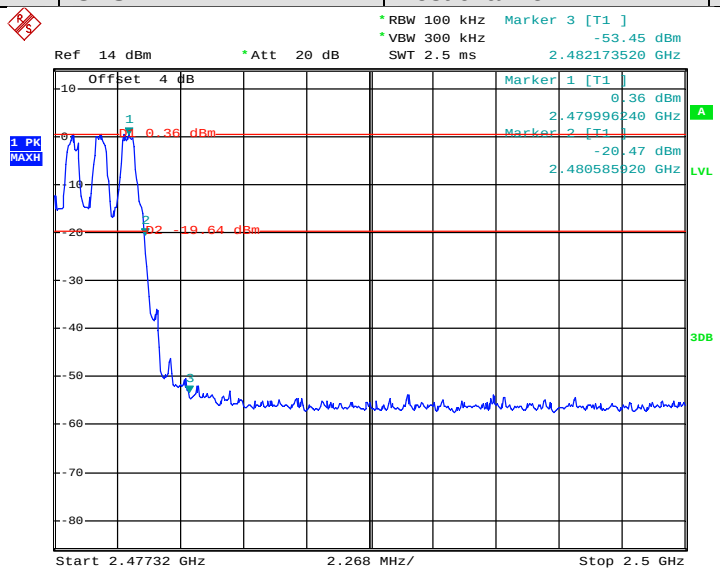
Hopping on:

Worse case mode:	GFSK	Test channel:	Lowest



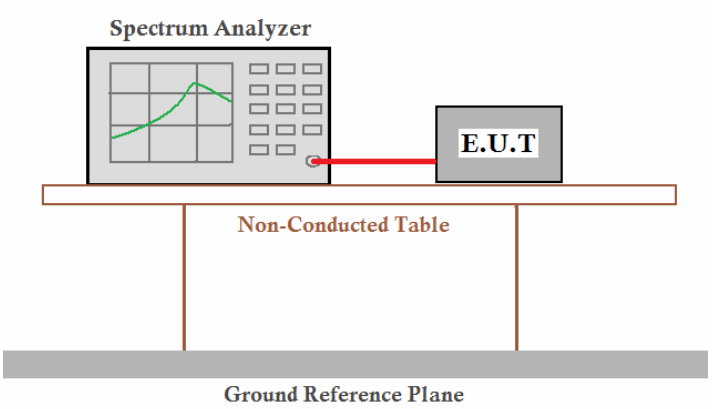
Date: 18.OCT.2011 09:27:20

Worse case mode:	GFSK	Test channel:	Highest



Date: 18.OCT.2011 09:41:00

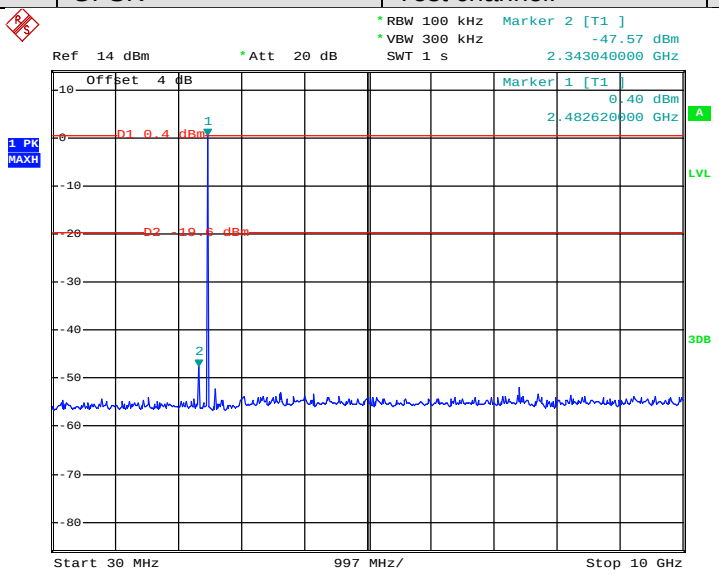
6.9 RF Antenna Conducted spurious emissions

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2009 and KDB DA00-705
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

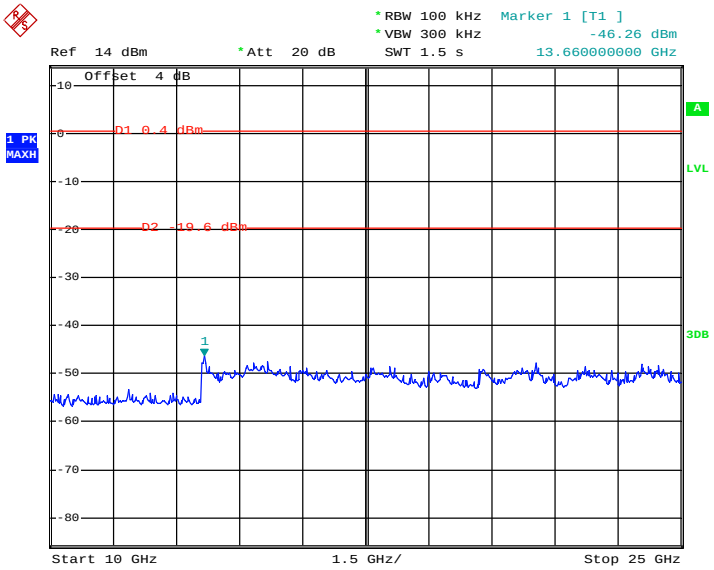
Remark:

During test the item, Pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.

Worse case mode:	GFSK	Test channel:	Lowest

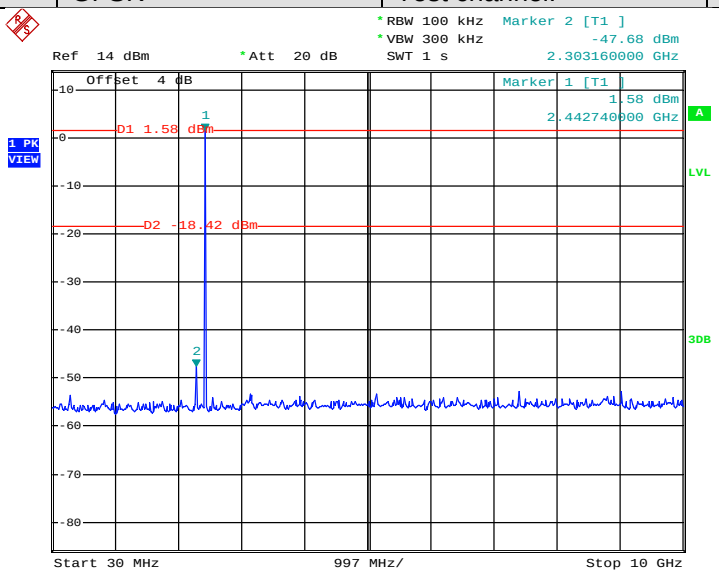


Date: 18.OCT.2011 09:43:31

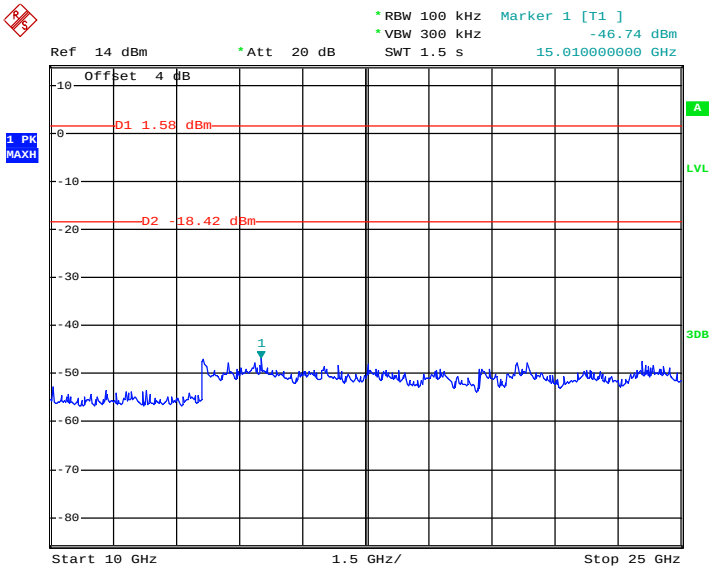


Date: 18.OCT.2011 09:43:54

Worse case mode:	GFSK	Test channel:	Middle

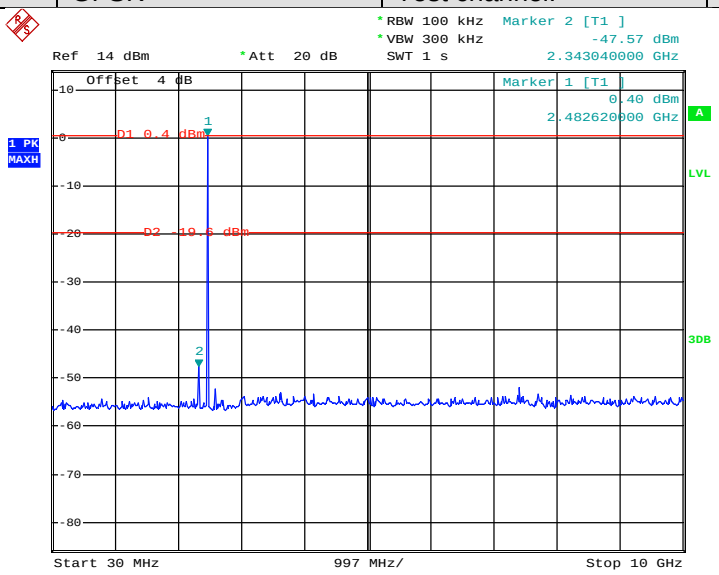


Date: 18.OCT.2011 09:31:22

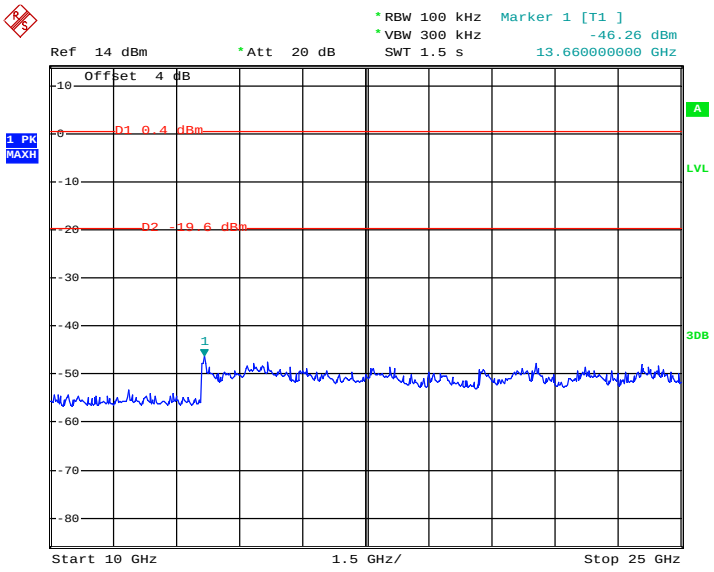


Date: 18.OCT.2011 09:31:36

Worse case mode:	GFSK	Test channel:	Highest



Date: 18.OCT.2011 09:43:31



Date: 18.OCT.2011 09:43:54

6.10 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:

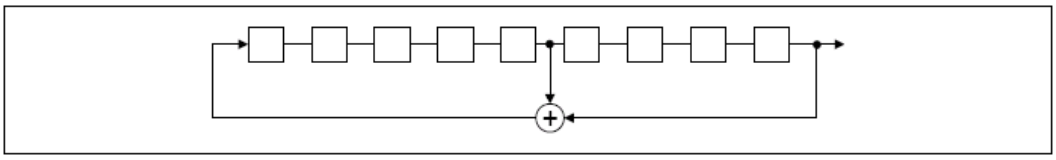
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

EUT Pseudorandom Frequency Hopping Sequence

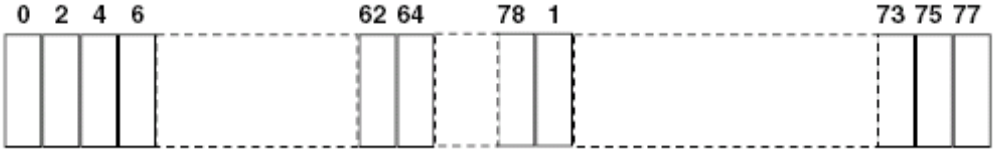
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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

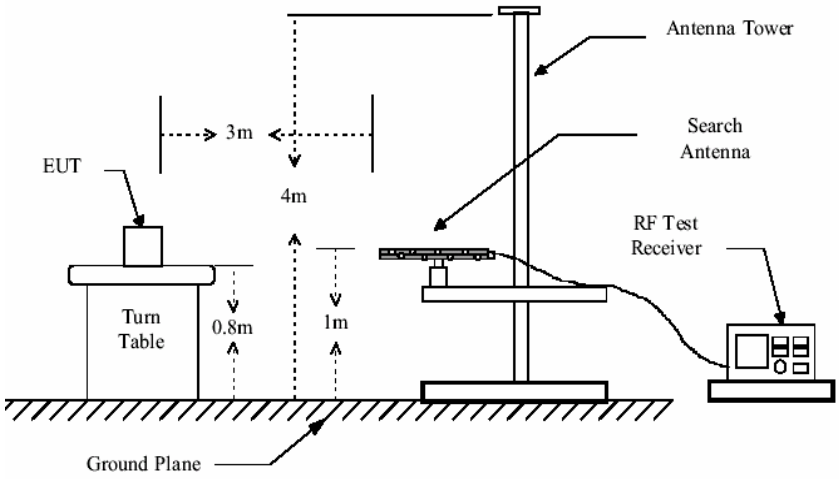
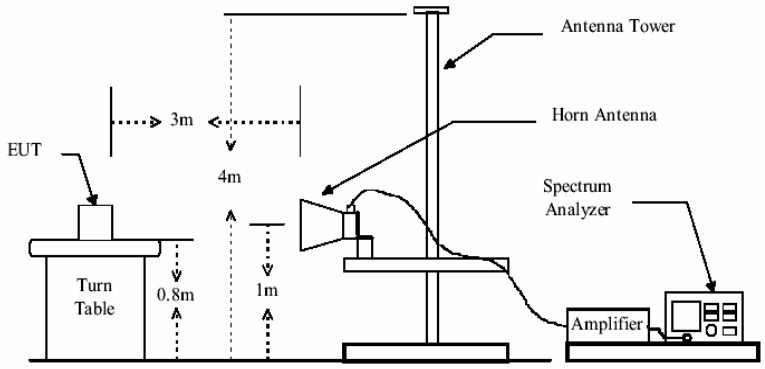
An example of Pseudorandom Frequency Hopping Sequence as follow:



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.

6.11 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2009</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
</td></tr>
</table>

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Note:
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

6.11.1 Transmitter emission

Below 1GHz

Worst case:	Middle Channel

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
32.979	46.84	14.76	0.61	32.23	29.98	40.00	-10.02	Vertical
53.131	44.59	14.87	0.68	31.99	28.15	40.00	-11.85	Vertical
78.139	48.49	11.33	0.93	31.83	28.92	40.00	-11.08	Vertical
167.824	39.65	9.73	1.62	32.08	18.92	43.50	-24.58	Vertical
490.745	35.57	17.10	2.39	31.66	23.40	46.00	-22.60	Vertical
909.667	35.31	24.35	3.35	31.47	31.54	46.00	-14.46	Vertical
35.749	36.97	11.64	0.63	32.20	17.04	40.00	-22.96	Horizontal
55.609	43.66	13.10	0.69	31.97	25.48	40.00	-14.52	Horizontal
82.938	48.54	8.03	0.99	31.79	25.77	40.00	-14.23	Horizontal
153.200	40.95	10.34	1.53	32.00	20.82	43.50	-22.68	Horizontal
487.315	36.37	19.51	2.38	31.71	26.55	46.00	-19.45	Horizontal
912.862	35.83	25.18	3.35	31.47	32.89	46.00	-13.11	Horizontal

Above 1GHz

Worse case mode:	GFSK	Test channel:	Lowest	Remark:	Peak

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
4804	9.36	34.25	41.53	50.17	52.25	74.00	-21.75	Vertical
7206	11.42	35.84	39.48	45.22	53.00	74.00	-21.00	Vertical
9608	13.39	37.99	37.56	41.86	55.68	74.00	-18.32	Vertical
12010	16.45	39.10	39.09	40.00	56.46	74.00	-17.54	Vertical
14412				---		74.00		Vertical
16814				---		74.00		Vertical
4804	9.36	34.25	41.53	48.79	50.87	74.00	-23.13	Horizontal
7206	11.42	35.84	39.48	43.86	51.64	74.00	-22.36	Horizontal
9608	13.39	37.99	37.56	40.39	54.21	74.00	-19.79	Horizontal
12010	16.45	39.10	39.09	38.46	54.92	74.00	-19.08	Horizontal
14412				---		74.00		Horizontal
16814				---		74.00		Horizontal

Worse case mode:	GFSK	Test channel:	Lowest	Remark:	Average

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
4804	9.36	34.25	41.53	29.64	31.72	54.00	-22.28	Vertical
7206	11.42	35.84	39.48	26.34	34.12	54.00	-19.88	Vertical
9608	13.39	37.99	37.56	24.51	38.33	54.00	-15.67	Vertical
12010	16.45	39.10	39.09	24.12	40.58	54.00	-13.42	Vertical
14412				---		54.00		Vertical
16814				---		54.00		Vertical
4804	9.36	34.25	41.53	28.11	30.19	54.00	-23.81	Horizontal
7206	11.42	35.84	39.48	24.85	32.63	54.00	-21.37	Horizontal
9608	13.39	37.99	37.56	22.88	36.70	54.00	-17.30	Horizontal
12010	16.45	39.10	39.09	22.39	38.85	54.00	-15.15	Horizontal
14412				---		54.00		Horizontal
16814				---		54.00		Horizontal

Remark

”---“ means that the emission level is too low to be measured

Worse case mode:	GFSK	Test channel:	Middle	Remark:	Peak

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
4882	10.57	34.35	40.33	47.04	51.63	74.00	-22.37	Vertical
7323	11.85	36.12	39.18	44.28	53.07	74.00	-20.93	Vertical
9764	13.89	38.03	37.94	40.41	54.39	74.00	-19.61	Vertical
12205	17.95	39.23	39.30	37.77	55.65	74.00	-18.35	Vertical
14646					---	74.00		Vertical
17087					---	74.00		Vertical
4882	10.57	34.35	40.33	46.00	50.59	74.00	-23.41	Horizontal
7323	11.85	36.12	39.18	43.40	52.19	74.00	-21.81	Horizontal
9764	13.89	38.03	37.94	39.56	53.54	74.00	-20.46	Horizontal
12205	17.95	39.23	39.30	37.99	55.87	74.00	-18.13	Horizontal
14646					---	74.00		Horizontal
17087					---	74.00		Horizontal

Worse case mode:	GFSK	Test channel:	Middle	Remark:	Average

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
4882	10.57	34.35	40.33	28.95	33.54	54.00	-20.46	Vertical
7323	11.85	36.12	39.18	26.40	35.19	54.00	-18.81	Vertical
9764	13.89	38.03	37.94	24.69	38.67	54.00	-15.33	Vertical
12205	17.95	39.23	39.30	22.53	40.41	54.00	-13.59	Vertical
14646					---	54.00		Vertical
17087					---	54.00		Vertical
4882	10.57	34.35	40.33	28.05	32.64	54.00	-21.36	Horizontal
7323	11.85	36.12	39.18	25.63	34.42	54.00	-19.58	Horizontal
9764	13.89	38.03	37.94	23.92	37.90	54.00	-16.10	Horizontal
12205	17.95	39.23	39.30	21.80	39.68	54.00	-14.32	Horizontal
14646					---	54.00		Horizontal
17087					---	54.00		Horizontal

Remark

”---“ means that the emission level is too low to be measured

Worse case mode:	GFSK	Test channel:	Highest	Remark:	Peak

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
4960	10.73	34.45	40.18	44.73	49.73	74.00	-24.27	Vertical
7440	12.35	36.68	38.85	43.50	53.68	74.00	-20.32	Vertical
9920	14.24	38.08	37.78	40.38	54.92	74.00	-19.08	Vertical
12400	17.55	39.34	37.48	37.09	56.50	74.00	-17.50	Vertical
14880					---	74.00		Vertical
17360					---	74.00		Vertical
4960	10.73	34.45	40.18	43.49	48.49	74.00	-25.51	Horizontal
7440	12.35	36.68	38.85	42.28	52.46	74.00	-21.54	Horizontal
9920	14.24	38.08	37.78	39.05	53.59	74.00	-20.41	Horizontal
12400	17.55	39.34	37.48	37.38	56.79	74.00	-17.21	Horizontal
14880					---	74.00		Horizontal
17360					---	74.00		Horizontal

Worse case mode:	GFSK	Test channel:	Highest	Remark:	Average

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
4960	10.43	34.45	41.03	31.59	35.44	54.00	-18.56	Vertical
7440	12.72	37.37	40.01	26.13	36.21	54.00	-17.79	Vertical
9920	14.24	38.08	37.78	24.66	39.20	54.00	-14.80	Vertical
12400	17.55	39.34	37.48	22.09	41.50	54.00	-12.50	Vertical
14880					---	54.00		Vertical
17360					---	54.00		Vertical
4960	10.43	34.45	41.03	30.39	34.24	54.00	-19.76	Horizontal
7440	12.72	37.37	40.01	24.72	34.80	54.00	-19.20	Horizontal
9920	14.24	38.08	37.78	23.17	37.71	54.00	-16.29	Horizontal
12400	17.55	39.34	37.48	20.48	39.89	54.00	-14.11	Horizontal
14880					---	54.00		Horizontal
17360					---	54.00		Horizontal

Remark

"---" means that the emission level is too low to be measured

6.11.2 Band edge (Radiated Emission)

Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak

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	6.02	29.76	39.75	51.14	47.17	74.00	-26.83	Horizontal
2400	6.22	30.03	38.87	52.81	50.19	74.00	-23.81	Horizontal
2390	6.02	29.76	39.75	52.48	48.51	74.00	-25.49	Vertical
2400	6.22	30.03	38.87	54.11	51.49	74.00	-22.51	Vertical

Test mode:	Transmitting	Test channel:	Lowest	Remark:	Average

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	6.02	29.76	39.75	30.63	26.66	54.00	-27.34	Horizontal
2400	6.22	30.03	38.87	34.15	31.53	54.00	-22.47	Horizontal
2390	6.02	29.76	39.75	31.87	27.9	54.00	-26.10	Vertical
2400	6.22	30.03	38.87	35.35	32.73	54.00	-21.27	Vertical

Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak

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
2483.50	6.34	30.32	39.53	53.35	50.48	74.00	-23.52	Horizontal
2500.00	6.36	30.37	39.65	50.14	47.22	74.00	-26.78	Horizontal
2483.50	6.34	30.32	39.53	54.55	51.68	74.00	-22.32	Vertical
2500.00	6.36	30.37	39.65	51.30	48.38	74.00	-25.62	Vertical

Test mode:	Transmitting	Test channel:	Highest	Remark:	Average

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
2483.50	6.34	30.32	39.53	35.74	32.87	54.00	-21.13	Horizontal
2500.00	6.36	30.37	39.65	32.26	29.34	54.00	-24.66	Horizontal
2483.50	6.34	30.32	39.53	36.78	33.91	54.00	-20.09	Vertical
2500.00	6.36	30.37	39.65	33.31	30.39	54.00	-23.61	Vertical