FCC PART 15 SUBPART C MEASURMENT AND TEST REPORT

For

Gemlink Ltd.

Unit 7-12, 6/F., Sterling Center, 11 Cheung Yue Street, Cheung Sha Wan, Hong Kong

E.U.T.: Bluetooth Receiver and Adapter

Model Name: IAB13B, B-13, B-2013

Brand Name: iLIVE, CAWA

FCC ID: HDO2013BT

Report Number: NTC1302177F

Test Date(s): February 05, 2013 to February 27, 2013

Report Date(s): February 27, 2013

Prepared by

Dongguan NTC Co., Ltd.

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Prepared By	Approved & Authorized Signer
Rose Hu / Engineer	Sunm Lv / Q.A. Director

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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

The Gemlink Ltd.'s product, model name: IAB13B is a Bluetooth Receiver and Adapter, it's powered by DC 3.7V internal Li-ion Battery or DC 5V powered by USB Port. For more details features, please refer to User's Manual.

Manufacturer	:	Gemlink Ltd.
Address	:	Unit 7-12, 6/F., Sterling Center, 11 Cheung Yue Street, Cheung Sha Wan, Hong Kong
Frequency:	:	2402-2480MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Number of Channel	:	79
Channel space	:	1MHz
Max RF Output Power	:	-0.76dBm (0.84mW)
Antenna Type	:	Integral
Antenna Gain	:	0dBi
Power Supply	:	DC 3.7V internal Battery, AC 120V 60Hz(PC input)
Model name	:	IAB13B, B-13, B-2013
Note:	:	These models are the same except trade mark, model number and color.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: HDO2013BT filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rule.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003) and DA 00-705. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

Notebook PC	:	Manufacturer: IBM Corporation M/N: R50e S/N: L3-HZNGO P/N: 1834KDC
Adapter	:	Manufacturer: IBM Corporation M/N: 08K8210 Input: AC100-240V 50/60Hz 0.5-1.0A Output: DC 16V 4.5A

1.6 Test Facility and Location

Listed by FCC, August 02, 2011
The Certificate Registration Number is 665078.

Listed by Industry Canada, July 01, 2011
The Certificate Registration Number is 46405-9743.

Dongguan NTC Co., Ltd.

Building D, Gaosheng Science and Technology Park,
Hongtu Road, Nancheng District, Dongguan City,
Guangdong Province, China

1.7 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.247(a)(1)	Channel Separation test	Compliant
§15.247(a)(1)	20dB Bandwidth	Compliant
§15.247(a)(1)(iii)	Hopping Channel Number	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(b)	Max Peak output Power test	Compliant
§15.247(d)	Band edge test	Compliant
§15.207 (a)	AC Power Conducted Emission	Compliant
§15.247(d),§15.209, §15.205	Radiated Emission	Compliant
§15.203	Antenna Requirement	Compliant
§15.247(d)	Conducted Spurious Emission	Compliant

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

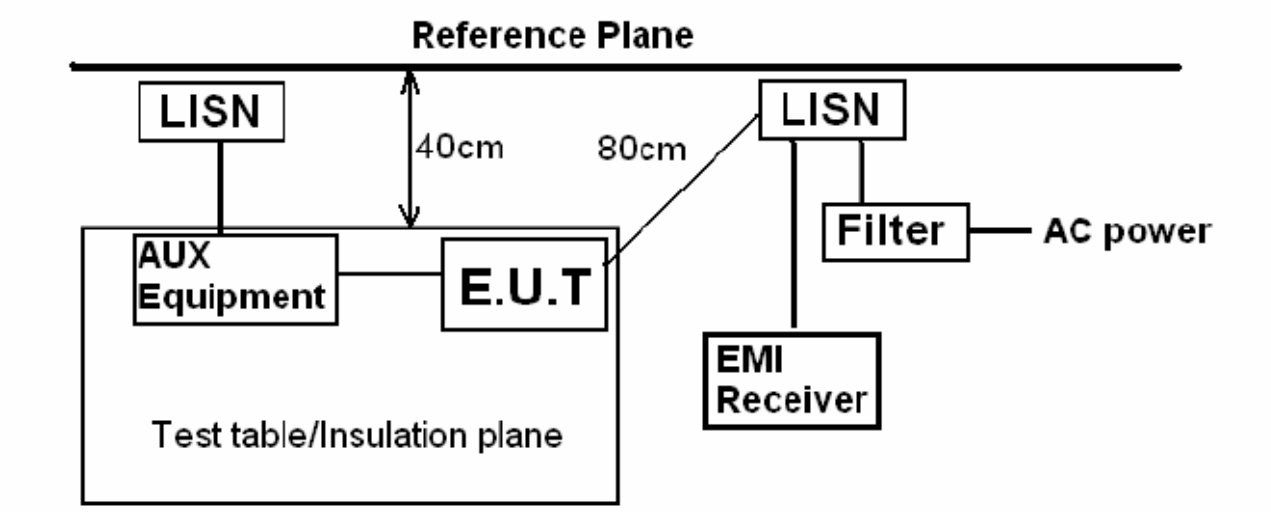
The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and normal mode is programmed. The Lowest, middle and highest channel were chosen for testing, and all packets DH1, DH3 and DH5 mode in all modulation type GFSK, π/4-DQPSK, 8DPSK were tested.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: BT Mode

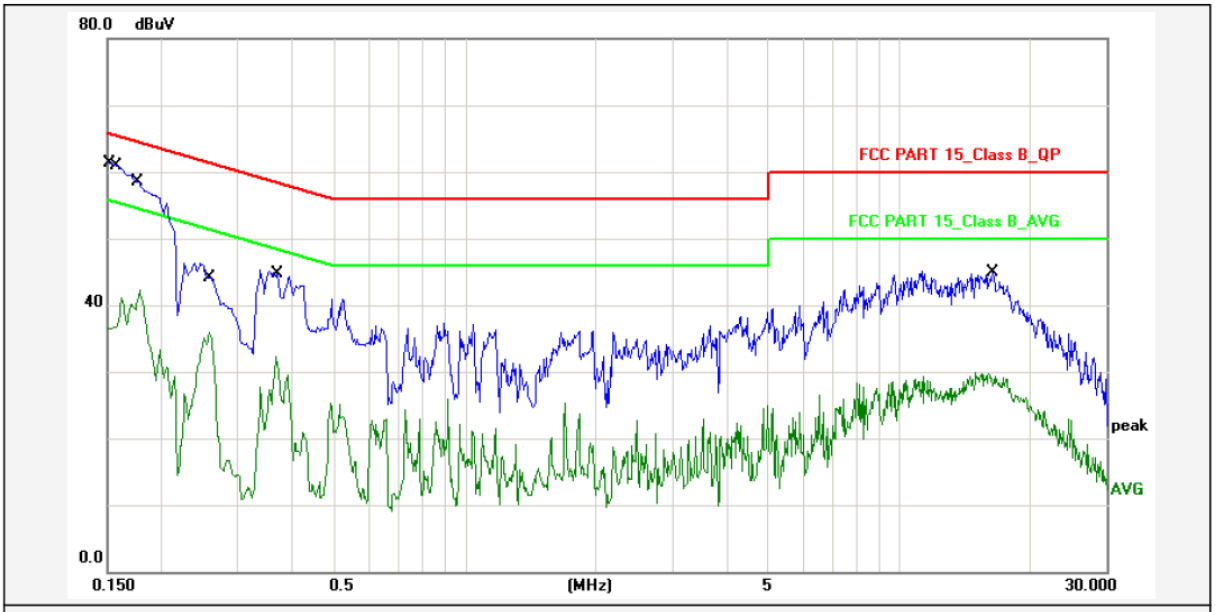
3.3 Measurement Results

Please refer to following plots.

Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Conduction

Test Time: 2013-2-27 9:59:52



Report No.:	**IAB13B**		
Test Standard:	**FCC PART 15_Class B_QP**		
Test item:	**Conducted Emission**	**Phase:**	**L1**
Applicant:	**Gemlink**	**Temp.( )/Hum.(%):**	**26(C) / 58 %**
Product:	**Bluetooth Receiver and Adapter**	**Power Rating:**	**AC 120V/60Hz**
Model No.:	**IAB13B**	**Test Engineer:**	**Infen**

Test Mode: **BT Mode**

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	10.80	46.88	57.68	65.78	-8.10	QP	P	
2	0.1539	10.80	25.79	36.59	55.78	-19.19	AVG	P	
3	0.1590	10.80	44.82	55.62	65.51	-9.89	QP	P	
4	0.1590	10.80	30.29	41.09	55.51	-14.42	AVG	P	
5	0.1780	10.80	42.61	53.41	64.57	-11.16	QP	P	
6	0.1780	10.80	31.42	42.22	54.57	-12.35	AVG	P	
7	0.2580	10.80	30.24	41.04	61.49	-20.45	QP	P	
8	0.2580	10.80	25.13	35.93	51.49	-15.56	AVG	P	
9	0.3660	10.80	27.95	38.75	58.59	-19.84	QP	P	
10	0.3660	10.80	21.58	32.38	48.59	-16.21	AVG	P	
11	16.4019	10.80	28.15	38.95	60.00	-21.05	QP	P	
12	16.4019	10.80	18.87	29.67	50.00	-20.33	AVG	P	

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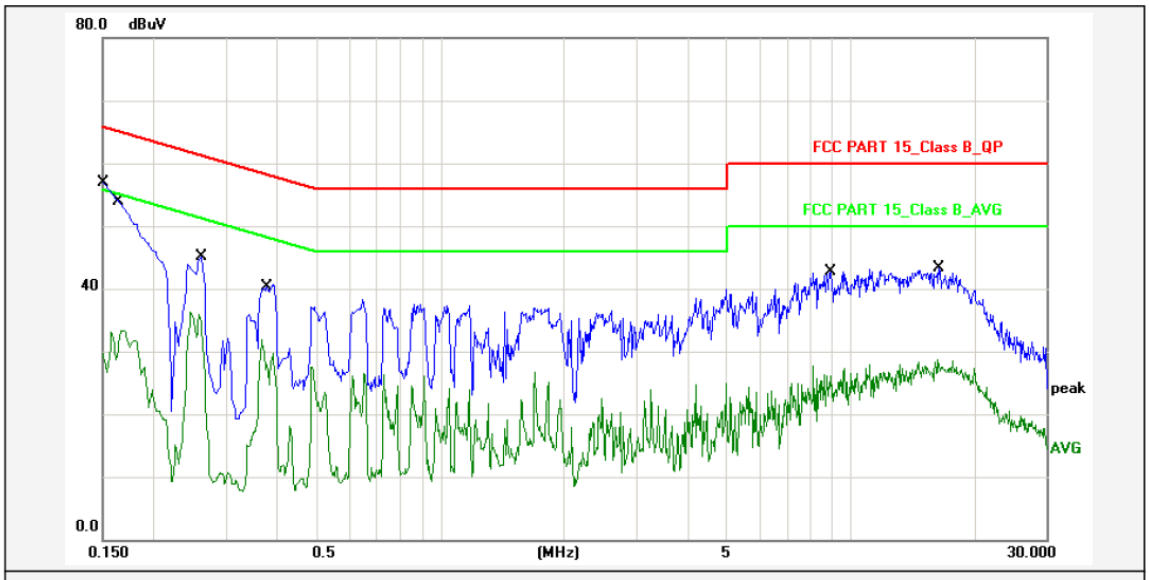
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Conduction

Test Time: 2013-2-27 9:58:09



Report No.: IAB13B
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission **Phase:** N
Applicant: Gemlink **Temp.( )/Hum.(%):** 26(C) / 58 %
Product: Bluetooth Receiver and Adapter **Power Rating:** AC 120V/60Hz
Model No.: IAB13B **Test Engineer:** Infen

Test Mode: BT Mode
Remark:

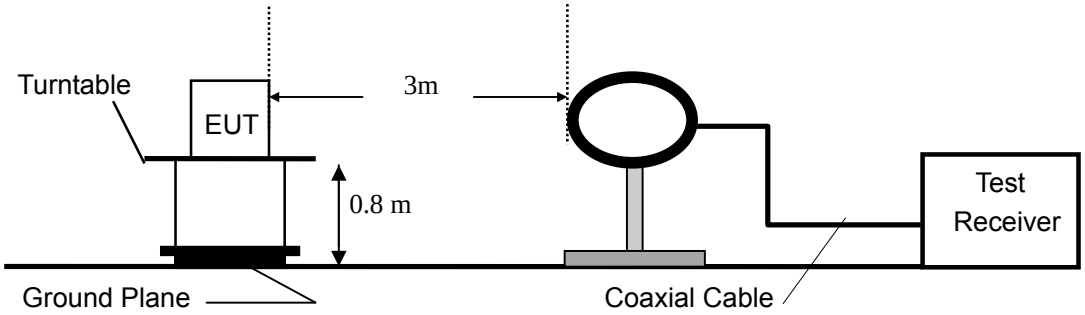
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	10.80	42.04	52.84	65.99	-13.15	QP	P	
2	0.1500	10.80	18.96	29.76	55.99	-26.23	AVG	P	
3	0.1660	10.80	39.10	49.90	65.15	-15.25	QP	P	
4	0.1660	10.80	22.59	33.39	55.15	-21.76	AVG	P	
5	0.2620	10.80	30.58	41.38	61.36	-19.98	QP	P	
6	0.2620	10.80	25.17	35.97	51.36	-15.39	AVG	P	
7	0.3780	10.80	26.05	36.85	58.32	-21.47	QP	P	
8	0.3780	10.80	21.09	31.89	48.32	-16.43	AVG	P	
9	8.9179	10.80	25.01	35.81	60.00	-24.19	QP	P	
10	8.9179	10.80	15.37	26.17	50.00	-23.83	AVG	P	
11	16.4019	10.80	25.42	36.22	60.00	-23.78	QP	P	
12	16.4019	10.80	17.81	28.61	50.00	-21.39	AVG	P	

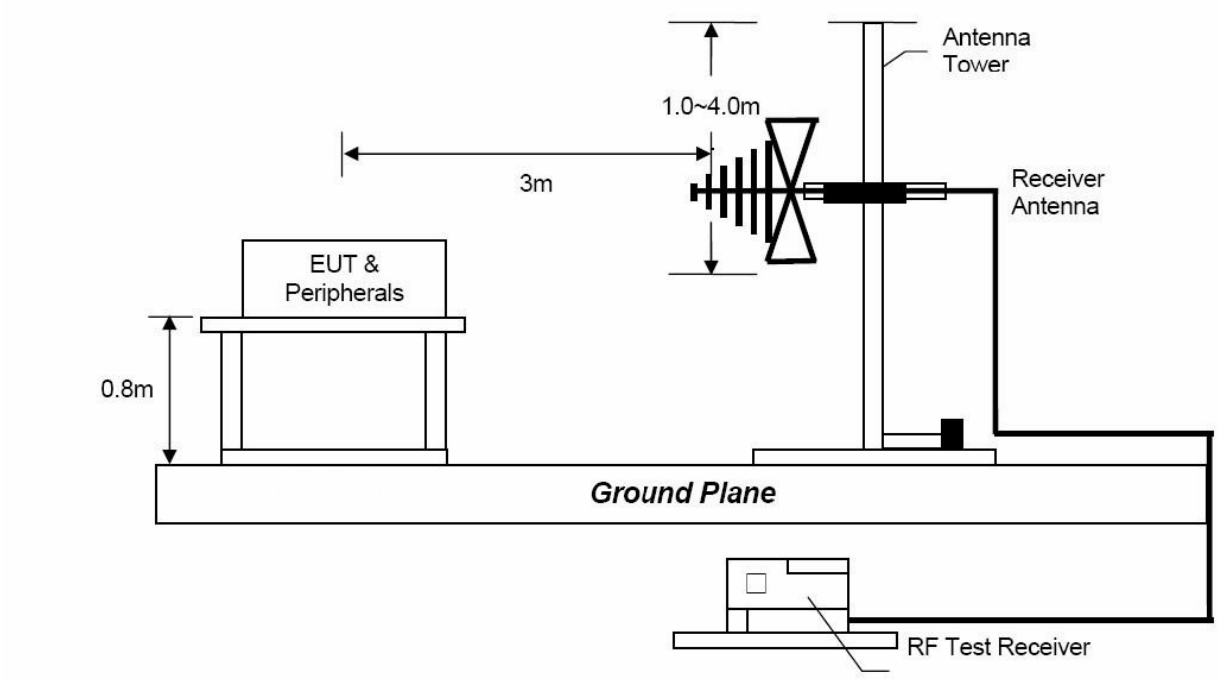
Note: Level=Reading+Factor.
Margin=Limit-Level.

4. Radiated Emission Test

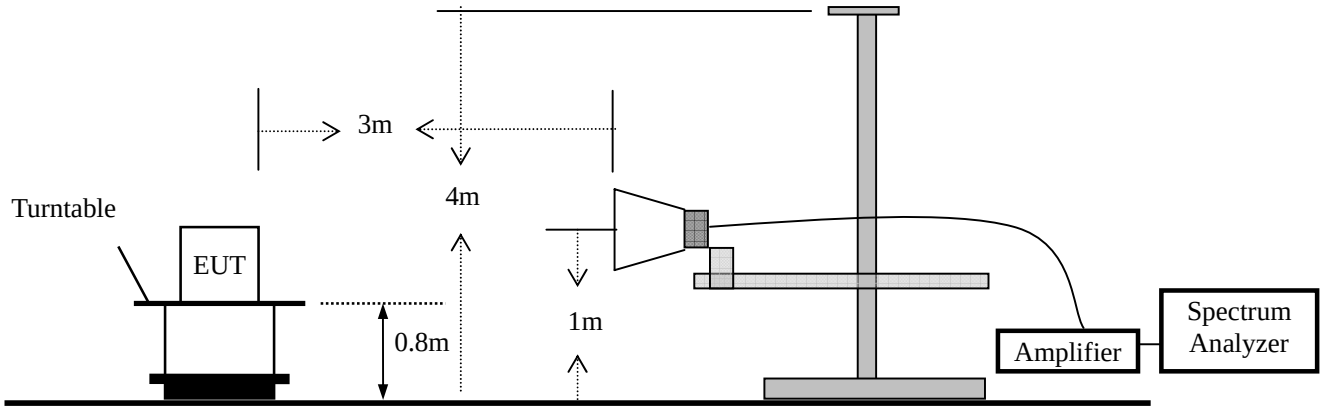
4.1 Test SET-UP (Block Diagram of Configuration)

4.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz





4.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



4.2 Measurement Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. 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 height of antenna 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.

4.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209) μV/m
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(kHz)
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

Remark：(1) Emission level (dB)μV = 20 log Emission level μV/m
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

4.4 Measurement Results

Operation Mode:	TX		
Frequency Range:	9KHz~1GHz	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %
Measured Distance:	3m	Test By:	Infen
Test Date :	February 06, 2013		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
127.0000	V	28.70	43.50	-14.80	QP
168.7100	V	28.20	43.50	-15.30	QP
402.4800	V	32.00	46.00	-14.00	QP
529.5500	V	33.10	46.00	-12.90	QP
656.6200	V	37.20	46.00	-8.80	QP
699.3000	V	37.70	46.00	-8.30	QP
127.0000	H	33.90	43.50	-9.60	QP
168.7100	H	32.80	43.50	-10.70	QP
254.0700	H	36.60	46.00	-9.40	QP
295.7800	H	36.00	46.00	-10.00	QP
656.6200	H	38.00	46.00	-8.00	QP
699.3000	H	43.00	46.00	-3.00	QP

Other emissions are lower than 10dB below the allowable limit.

Note: (1) Quasi-Peak detector is used except for others stated.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB.

Modulation:	GFSK (the worst case)		
Operation Mode:	TX Mode (Low)	Test Date :	February 06, 2013
Frequency Range:	Above 1GHz	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %
Measured Distance:	3m	Test By:	Infen

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV) PK	Emission Level(dBuV) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4804	V	48.49	41.77	74.00	54.00	-25.51	-12.23
7206	V	49.72	43.50	74.00	54.00	-24.28	-10.50
9608	V	49.45	42.91	74.00	54.00	-24.55	-11.09
12010	V	49.28	42.37	74.00	54.00	-24.72	-11.63
4804	H	49.22	42.26	74.00	54.00	-24.78	-11.74
7206	H	50.39	43.98	74.00	54.00	-23.61	-10.02
9608	H	51.63	43.85	74.00	54.00	-22.37	-10.15
12010	H	49.35	42.18	74.00	54.00	-24.65	-11.82

Other harmonics emissions are lower than 10dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB

Modulation:	GFSK (the worst case)		
Operation Mode:	TX Mode (Mid)	Test Date :	February 06, 2013
Frequency Range:	Above 1GHz	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %
Measured Distance:	3m	Test By:	Infen

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV) PK	Emission Level(dBuV) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4882	V	51.65	44.90	74.00	54.00	-22.35	-9.10
7323	V	50.84	43.92	74.00	54.00	-23.16	-10.08
9764	V	49.82	41.47	74.00	54.00	-24.18	-12.53
12205	V	48.59	42.80	74.00	54.00	-25.41	-11.20
4882	H	52.78	45.58	74.00	54.00	-21.22	-8.42
7323	H	50.97	42.77	74.00	54.00	-23.03	-11.23
9764	H	49.77	43.95	74.00	54.00	-24.23	-10.05
12205	H	48.35	41.34	74.00	54.00	-25.65	-12.66

Other harmonics emissions are lower than 10dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB

Modulation:	GFSK (the worst case)		
Operation Mode:	TX Mode (High)	Test Date :	February 06, 2013
Frequency Range:	Above 1GHz	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %
Measured Distance:	3m	Test By:	Infen

Freq.	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4960	V	52.84	45.55	74.00	54.00	-21.16	-8.45
7440	V	50.93	43.48	74.00	54.00	-23.07	-10.52
9920	V	50.59	43.90	74.00	54.00	-23.41	-10.10
12400	V	49.85	42.25	74.00	54.00	-24.15	-11.75
4960	H	50.55	43.47	74.00	54.00	-23.45	-10.53
7440	H	49.42	42.26	74.00	54.00	-24.58	-11.74
9920	H	50.79	43.08	74.00	54.00	-23.21	-10.92
12400	H	48.26	41.87	74.00	54.00	-25.74	-12.13

Other harmonics emissions are lower than 10dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB

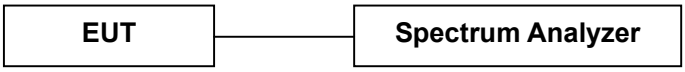
5. Channel Separation test

5.1 Measurement Procedure

Minimum Hopping Channel Carrier Frequency Separation, FCC Rule 15.247(a)(1):

Connect EUT antenna terminal to the spectrum analyzer with a low loss cable, and using the MARKER and Max-Hold function to record the separation of two adjacent channels.

5.2 Test SET-UP (Block Diagram of Configuration)

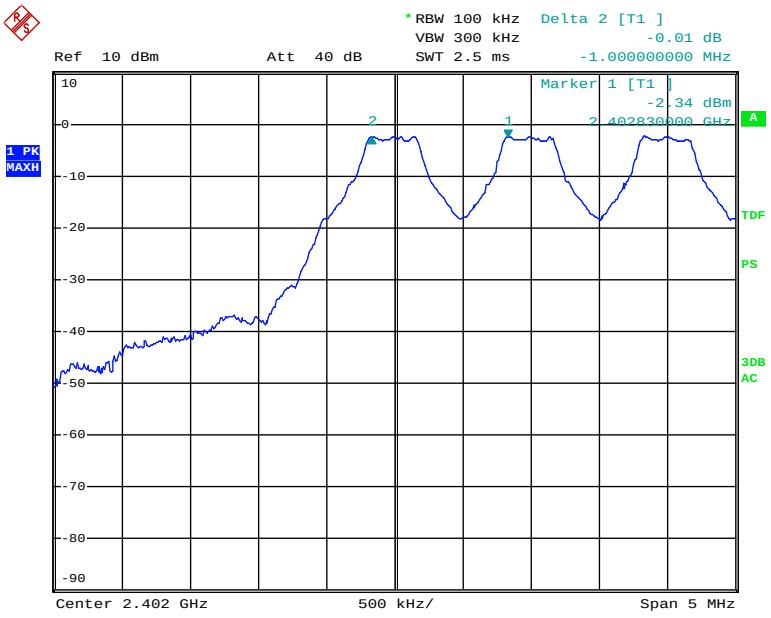


5.3 Measurement Results

Modulation:	GFSK, π/4-DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Infen	Test Date :	February 21, 2013
Temperature :	21 ℃	Humidity :	46 %
Test Result:	PASS		

Channel number	Channel frequency (MHz)	Separation Read Value (KHz)	Separation Limit (KHz)
GFSK			
Lowest	2402	1000	>760
Middle	2441	1000	>760
Highest	2480	1000	>760
π/4-DQPSK			
Lowest	2402	1000	>926.7
Middle	2441	1000	>926.7
Highest	2480	1000	>926.7
8DPSK			
Lowest	2402	1000	>926.7
Middle	2441	1000	>926.7
Highest	2480	1010	>926.7

GFSK Lowest Channel



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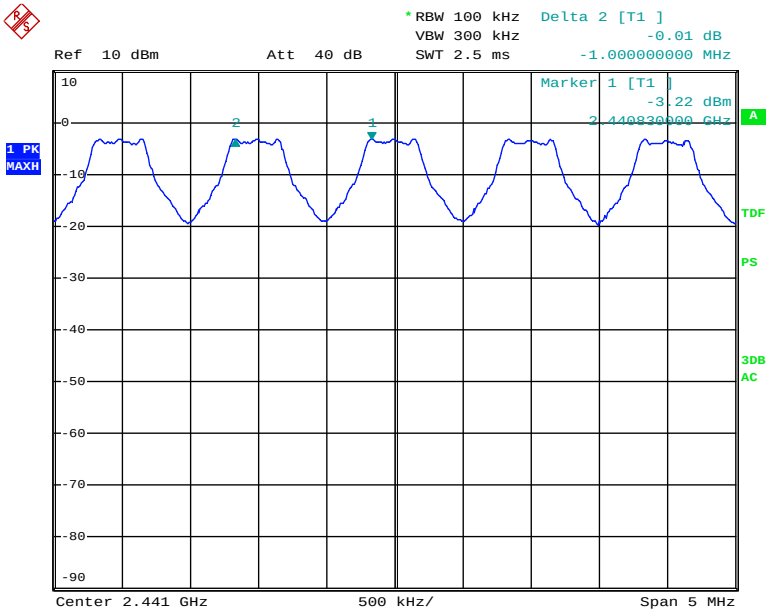
GFSK Middle Channel



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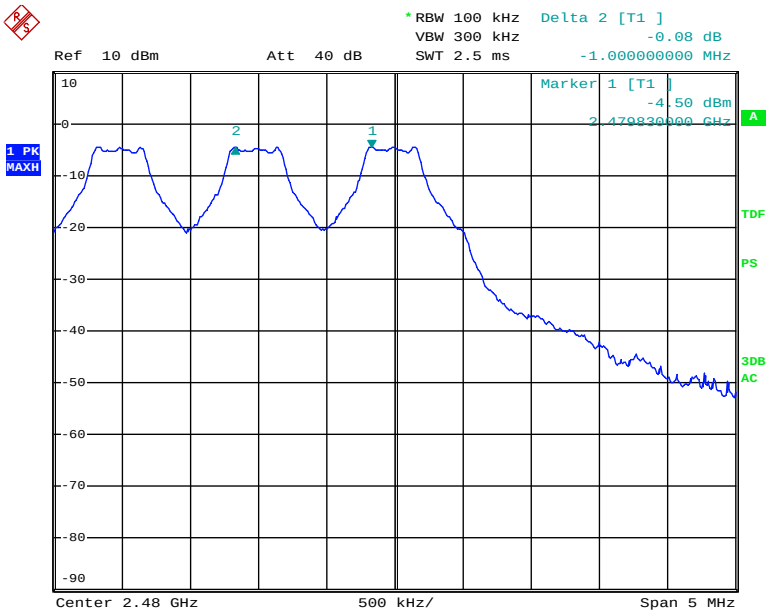
GFSK Highest Channel



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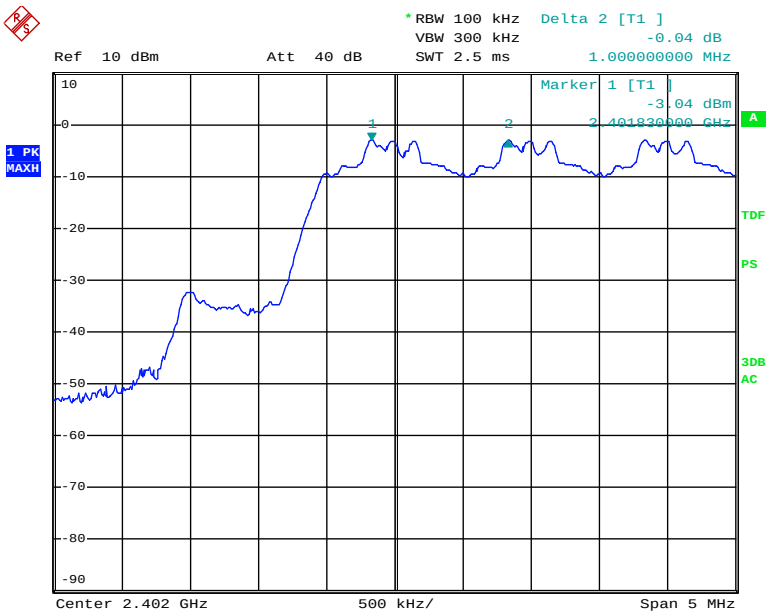
π/4-DQPSK Lowest Channel



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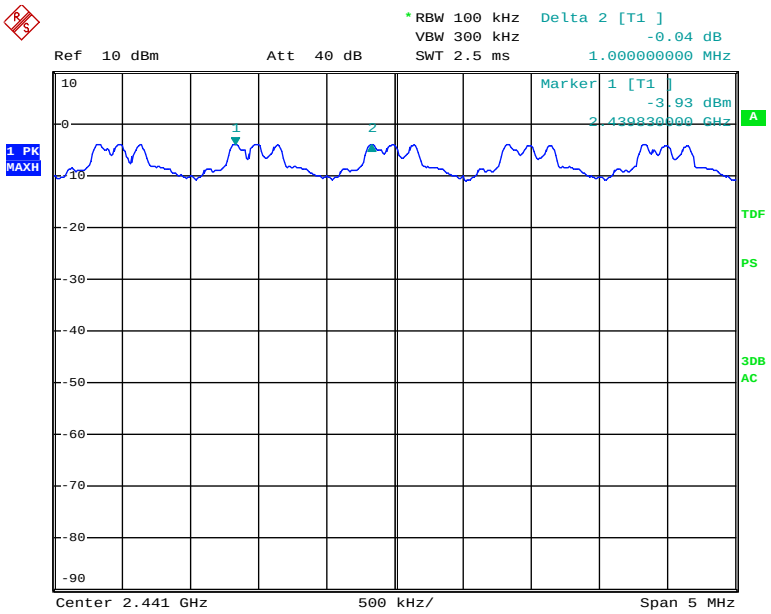
π/4-DQPSK Middle Channel



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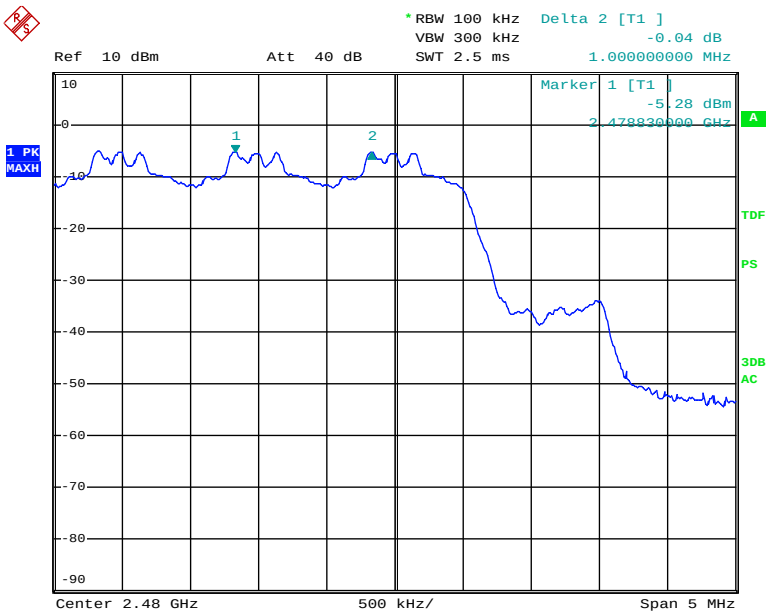
π/4-DQPSK Highest Channel



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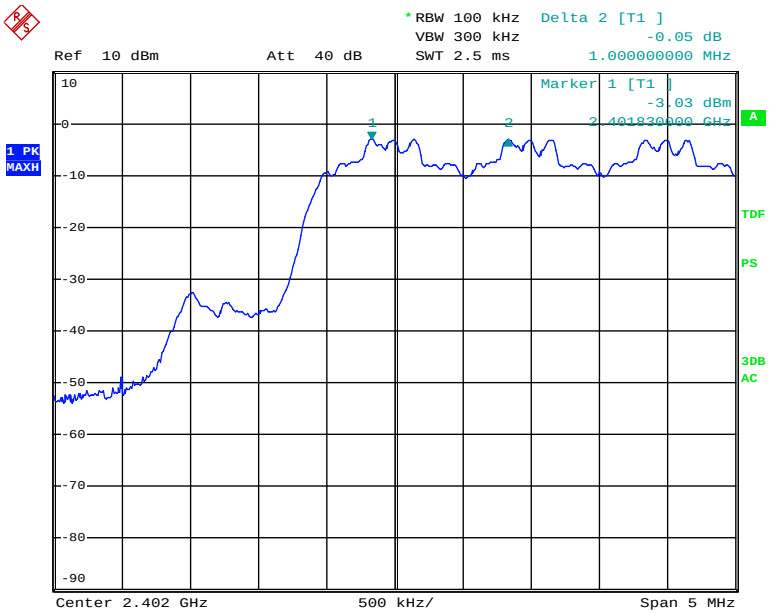
8DPSK Lowest Channel



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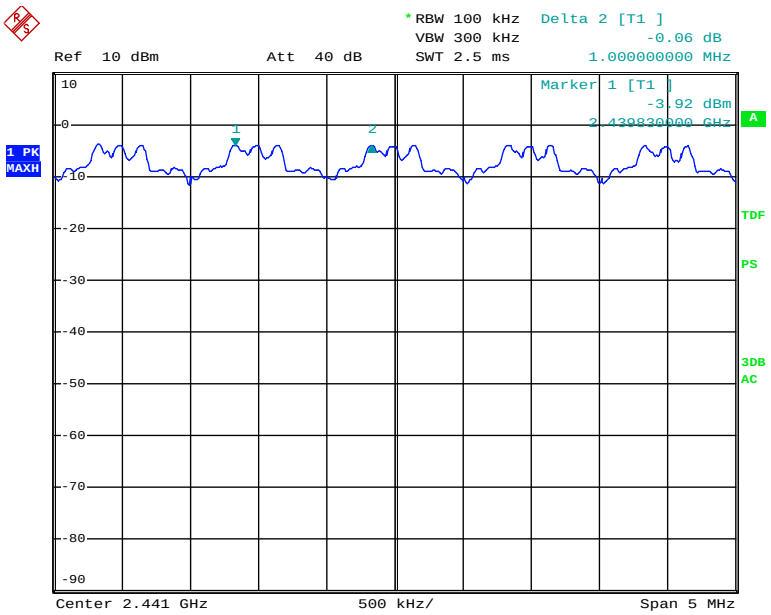
8DPSK Middle Channel



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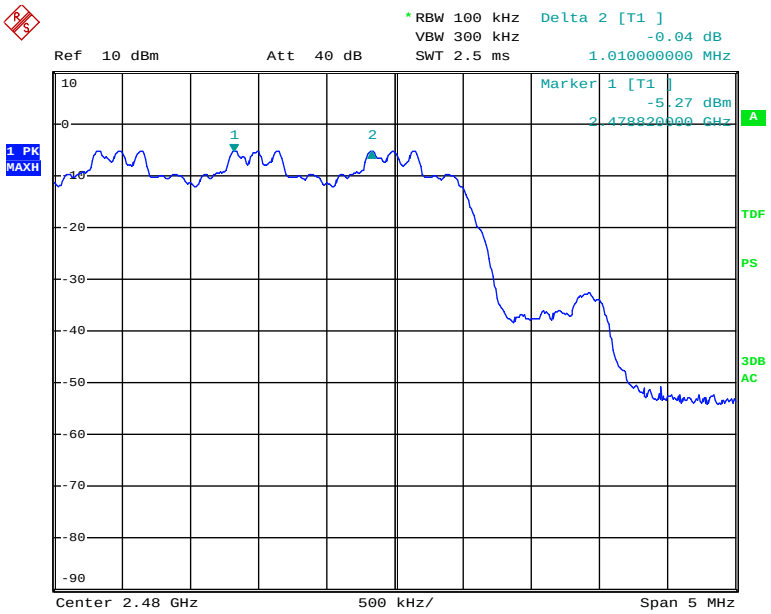
8DPSK Highest Channel



Date: 21.FEB.2013 14:59:27

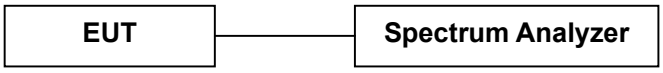
6. 20dB Bandwidth

6.1 Measurement Procedure

Maximum 20dB RF Bandwidth, FCC Rule 15.247(a)(1):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

6.2 Test SET-UP (Block Diagram of Configuration)



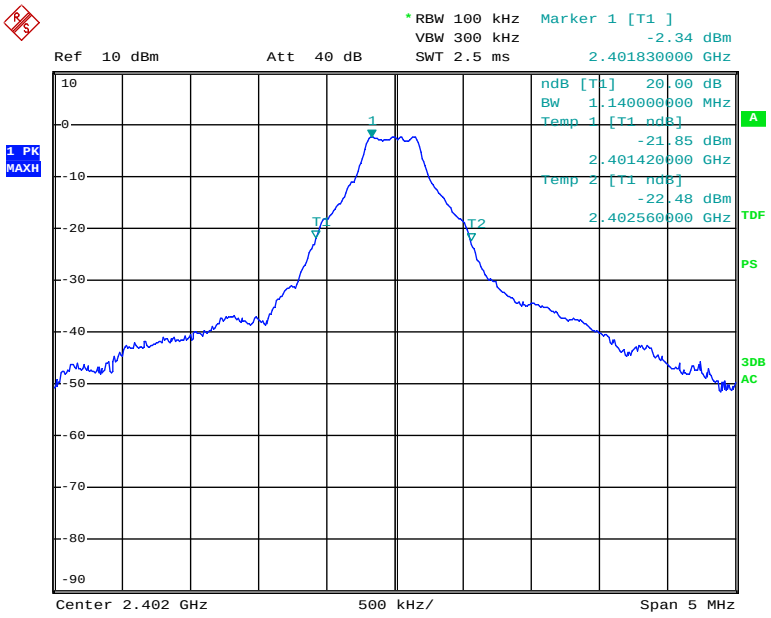
6.3 Measurement Results

Refer to attached data chart.

Modulation:	GFSK, π/4-DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Infen	Test Date :	February 21, 2013
Temperature :	21 ℃	Humidity :	46 %
Test Result:	PASS		

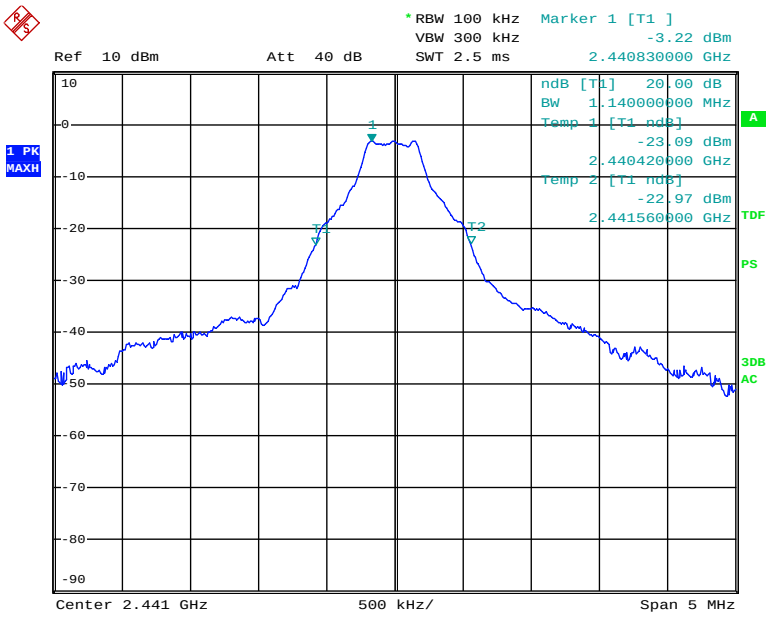
Channel frequency (MHz)	20dB Down BW(kHz)
GFSK	
2402	1140
2441	1140
2480	1140
π/4-DQPSK	
2402	1390
2441	1390
2480	1390
8DPSK	
2402	1390
2441	1390
2480	1390

GFSK Lowest Channel



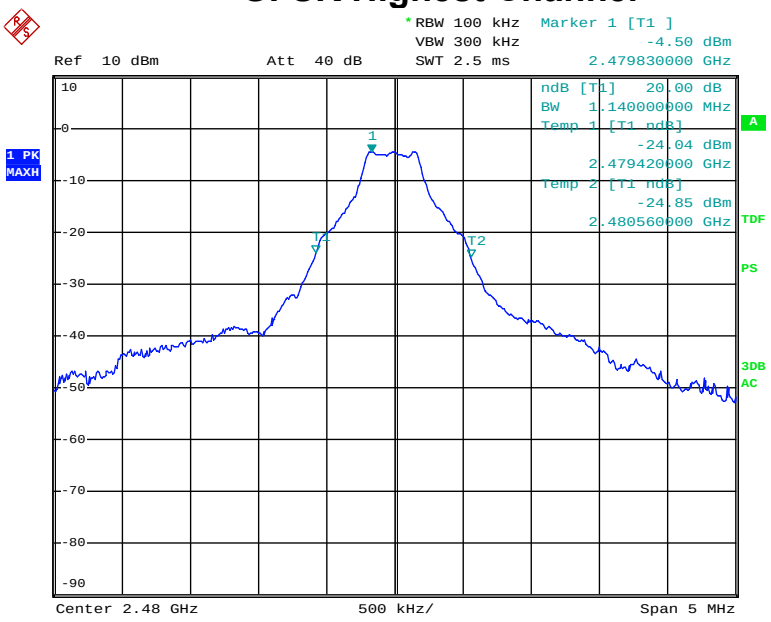
Date: 21.FEB.2013 14:35:37

GFSK Middle Channel



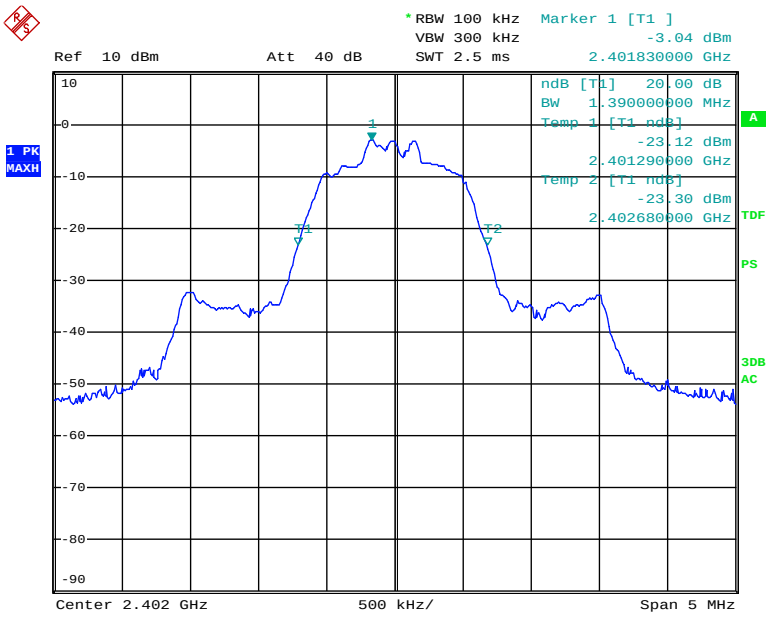
Date: 21.FEB.2013 14:39:00

GFSK Highest Channel



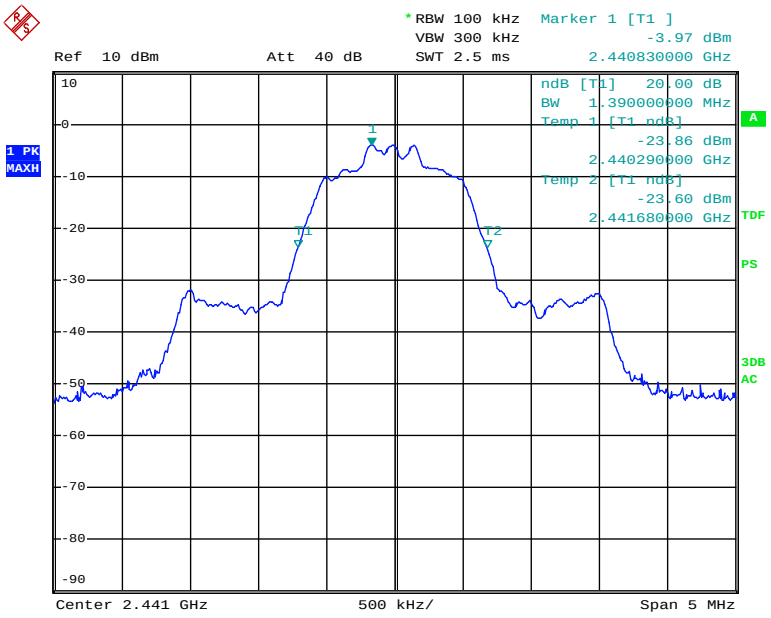
Date: 21.FEB.2013 14:44:07

π/4-DQPSK Lowest Channel



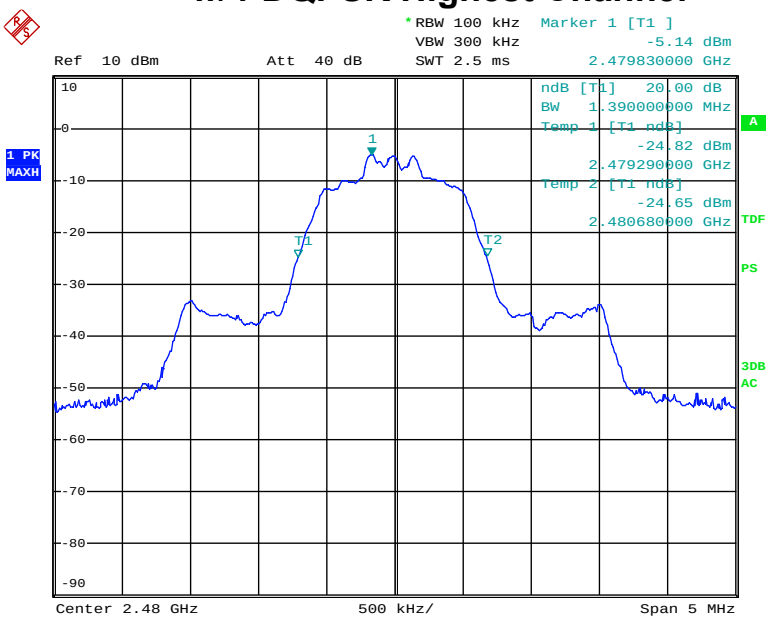
Date: 21.FEB.2013 14:51:30

π/4-DQPSK Middle Channel



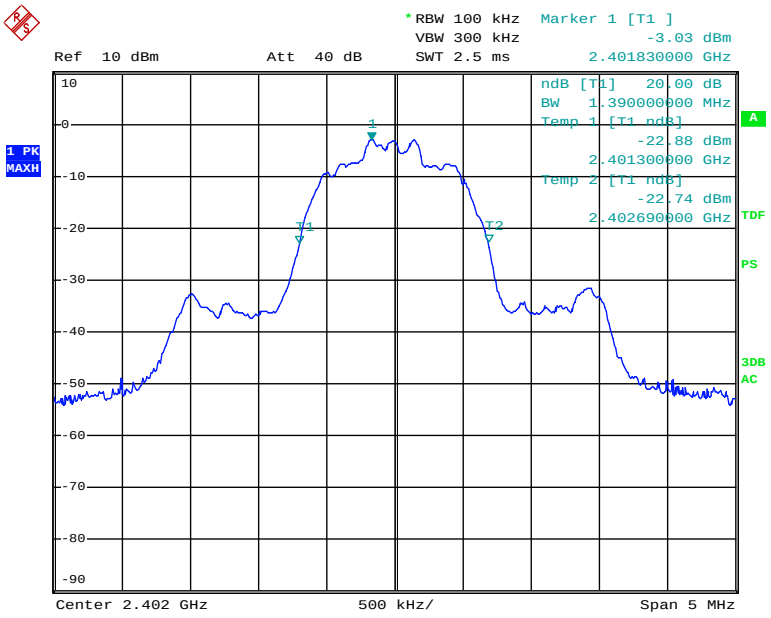
Date: 21.FEB.2013 14:48:11

π/4-DQPSK Highest Channel



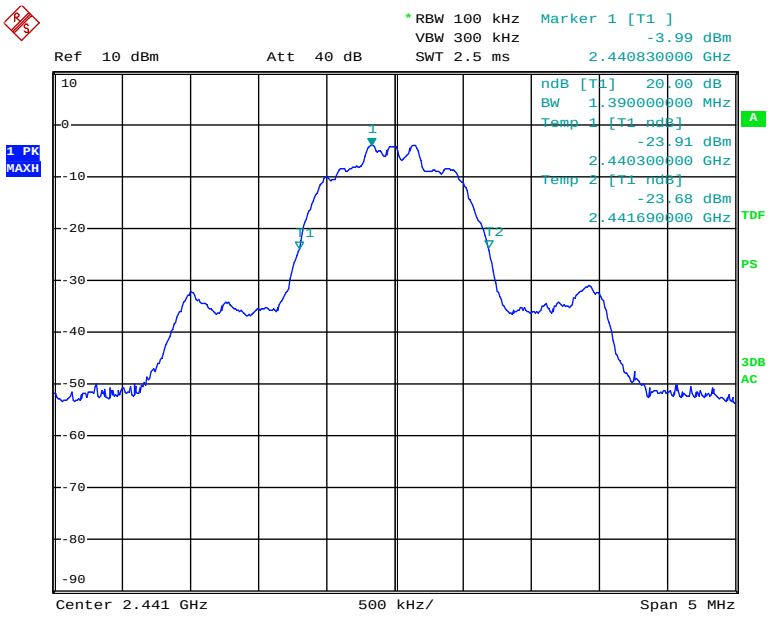
Date: 21.FEB.2013 15:00:10

8DPSK Lowest Channel



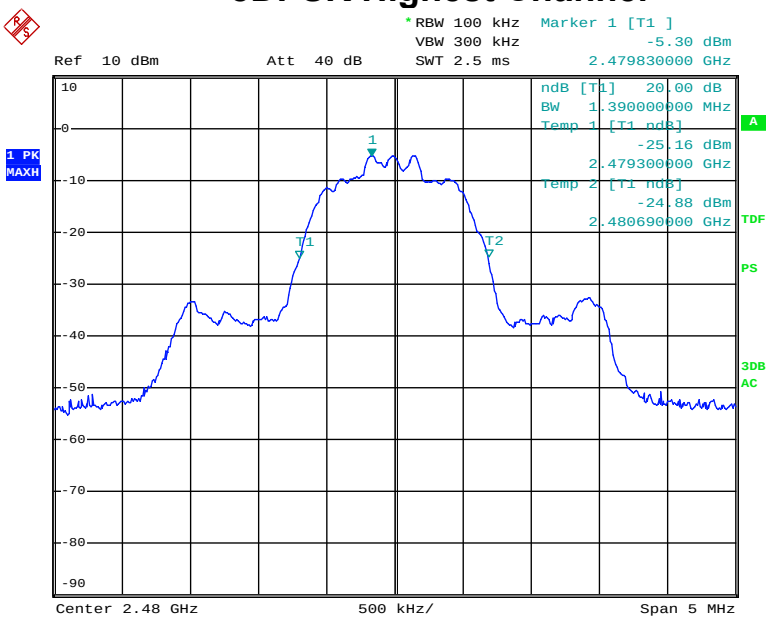
Date: 21.FEB.2013 14:53:50

8DPSK Middle Channel



Date: 21.FEB.2013 14:55:40

8DPSK Highest Channel



Date: 21.FEB.2013 14:58:19

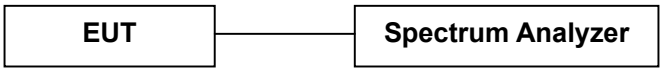
7. Hopping Channel Number

7.1 Measurement Procedure

Minimum Number of Hopping Frequencies, FCC Rule 15.247(a)(1)(iii):

Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum, and the spectrum analyzer set to MAX HOLD readings were taken for 3-5 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

7.2 Test SET-UP (Block Diagram of Configuration)



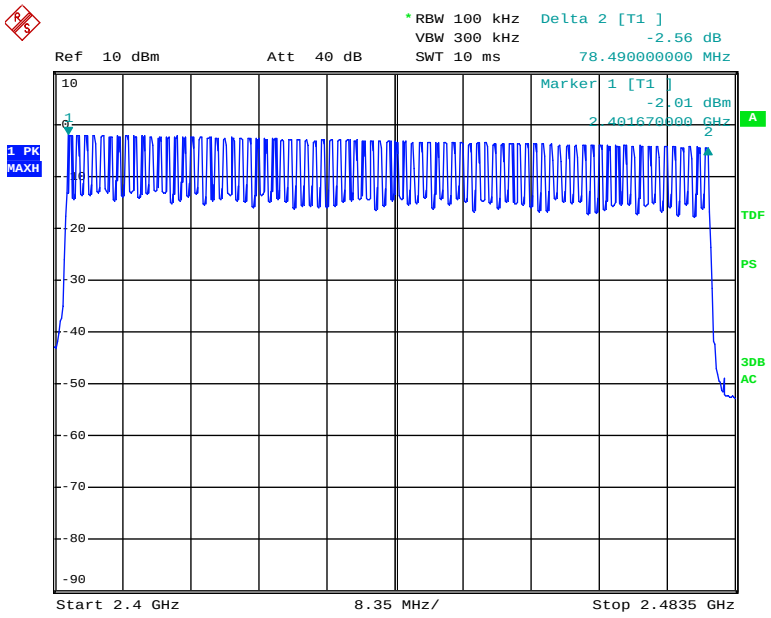
7.3 Measurement Results

Modulation	GFSK, π/4-DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Infen	Test Date :	February 21, 2013
Temperature :	21 ℃	Humidity :	46 %
Test Result:	PASS		

Hopping Channel Frequency Range	Number of Hopping Channels	Limit
2402-2480	79	≥15

The worst case: GFSK

GFSK



Date: 21.FEB.2013 19:11:27

8. Time of Occupancy (Dwell Time)

8.1 Measurement Procedure

Average Channel Occupancy Time, FCC Ref:15.247(a)(1)(iii):

Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
The spectrum analyzer center frequency was set to one of the known hopping channels. The Sweep was set to 10 ms, the SPAN was set to Zero SPAN. The time duration of the transmissions so captured was measured with the Marker Delta function

8.2 Measurement Results

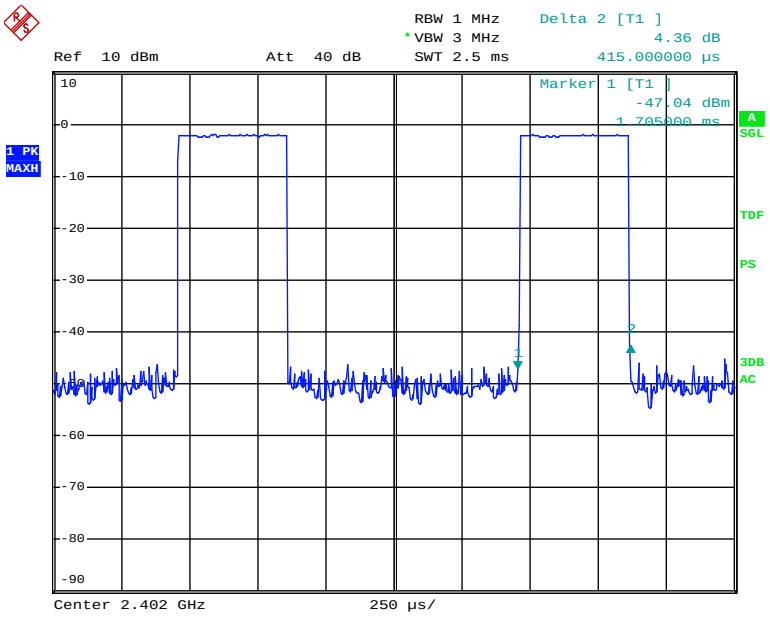
The maximum number of hopping channels in 31.6s (0.4s/Channel x 79 Channel)

Refer to attached data chart.

Modulation :	GFSK, π/4-DQPSK, 8DPSK		
RBW :	1MHz	VBW :	3MHz
Spectrum Detector:	PK	Test By:	Infen
Test Date :	February 21, 2013	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %

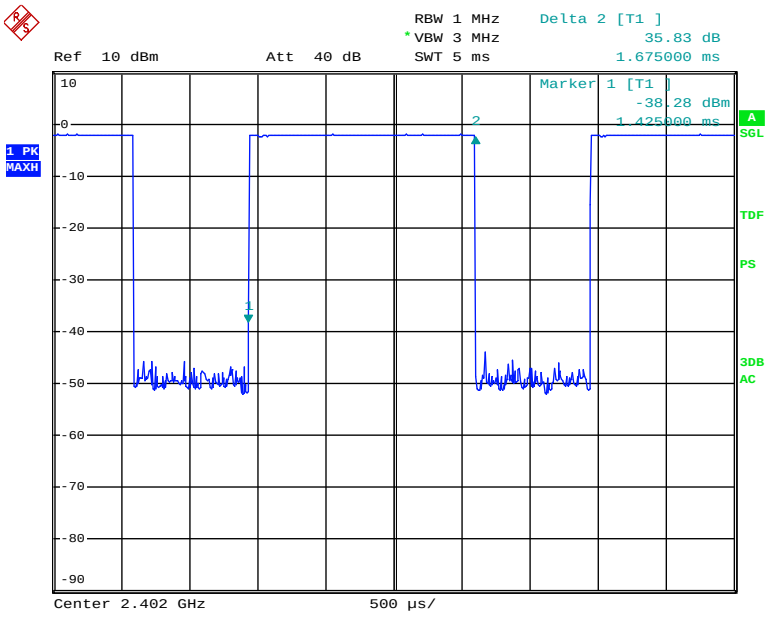
Packet	Frequency (MHz)	Result (msec)	Limit (msec)
GFSK			
DH1	2402	0.415(ms)*(1600/(2*79))*31.6=132.8	400
DH3	2402	1.675(ms)*(1600/(4*79))*31.6=268.0	400
DH5	2402	2.920(ms)*(1600/(6*79))*31.6=311.5	400
π/4-DQPSK			
2-DH1	2402	0.420(ms)*(1600/(2*79))*31.6=134.4	400
2-DH3	2402	1.670(ms)*(1600/(4*79))*31.6=267.2	400
2-DH5	2402	2.915(ms)*(1600/(6*79))*31.6=310.9	400
8DPSK			
3-DH1	2402	0.420(ms)*(1600/(2*79))*31.6=134.4	400
3-DH3	2402	1.680(ms)*(1600/(4*79))*31.6=268.8	400
3-DH5	2402	2.925(ms)*(1600/(6*79))*31.6=312.0	400

GFSK DH1



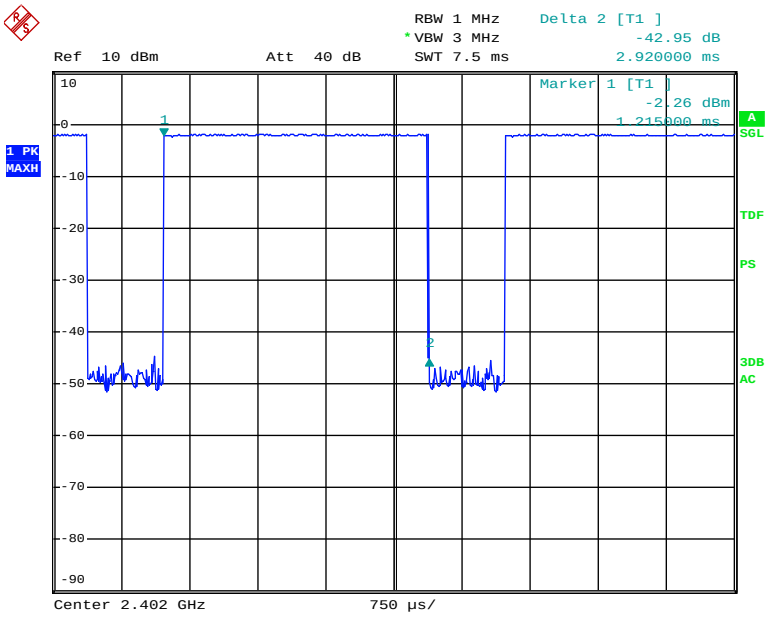
Date: 21.FEB.2013 15:01:15

GFSK DH3



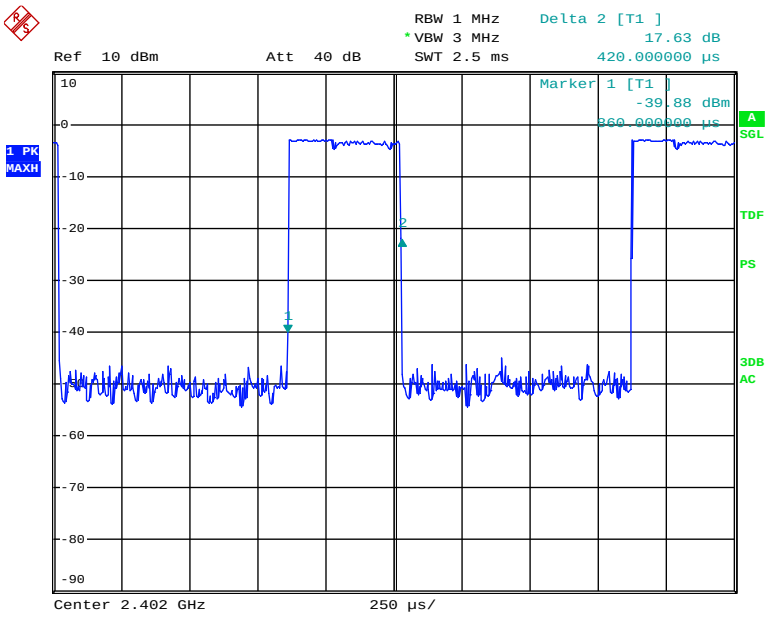
Date: 21.FEB.2013 15:01:35

GFSK DH5



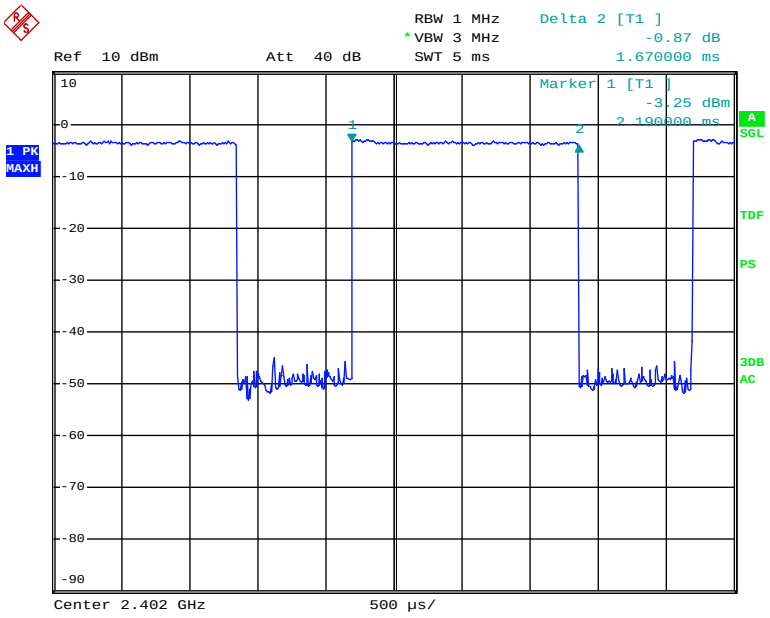
Date: 21.FEB.2013 15:01:51

π/4-DQPSK 2-DH1



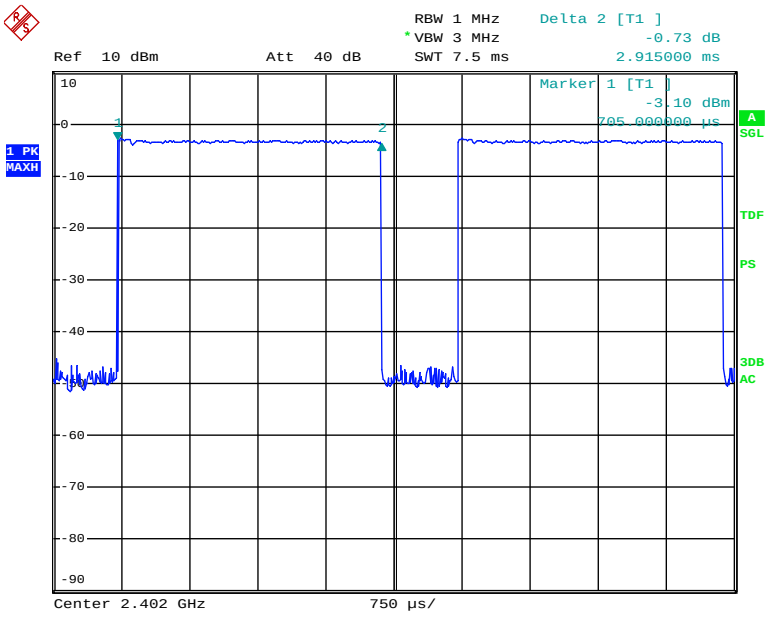
Date: 21.FEB.2013 15:02:13

π/4-DQPSK 2-DH3



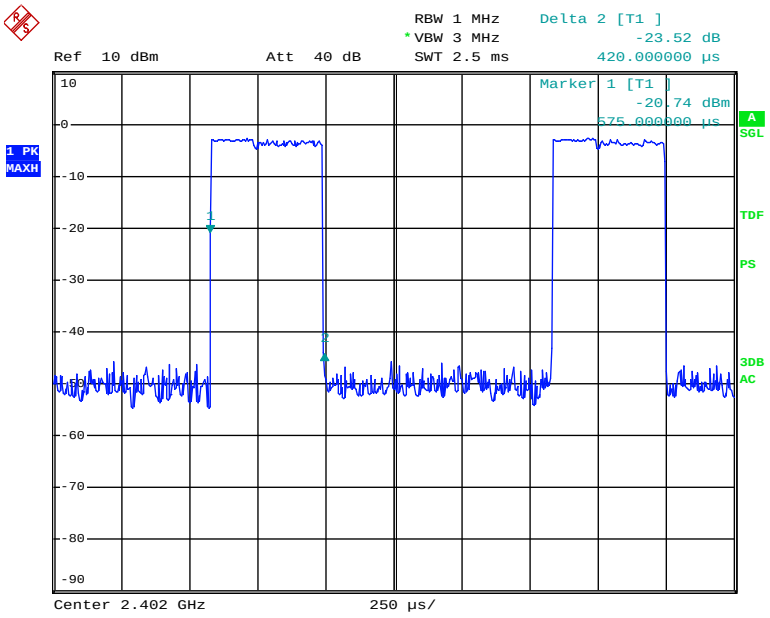
Date: 21.FEB.2013 15:02:36

π/4-DQPSK 2-DH5



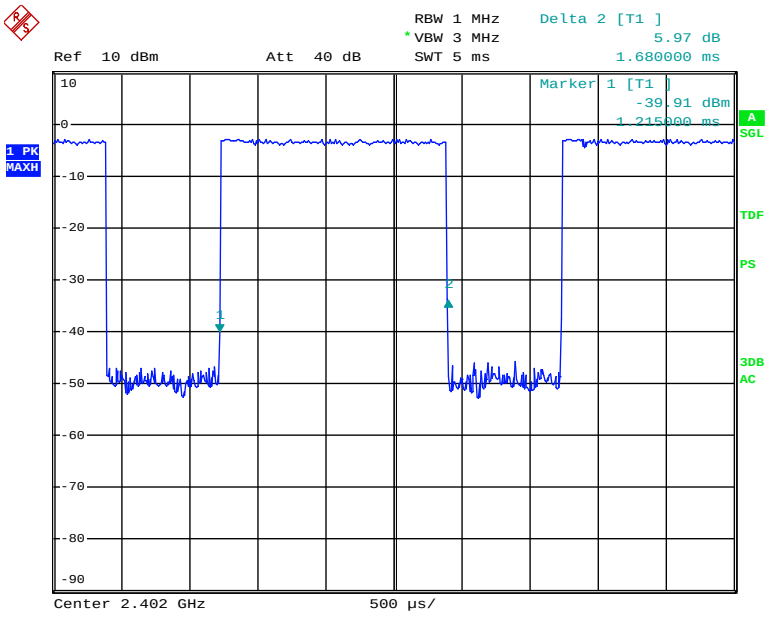
Date: 21.FEB.2013 15:02:53

8DPSK 3-DH1



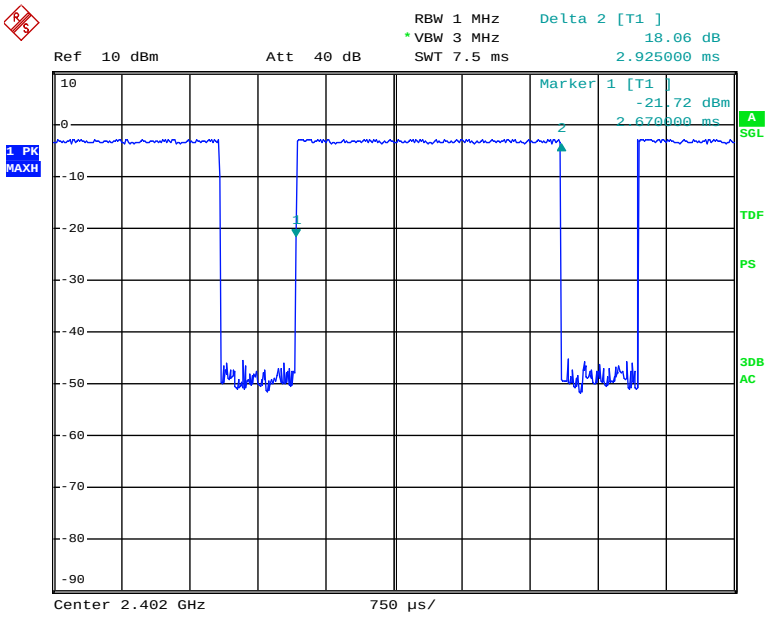
Date: 21.FEB.2013 15:03:16

8DPSK 3-DH3



Date: 21.FEB.2013 15:03:33

8DPSK 3-DH5



Date: 21.FEB.2013 15:03:49

9. MAXIMUM PEAK OUTPUT POWER

9.1 Measurement Procedure

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1):

Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm. Cable loss was considered during this measurement.

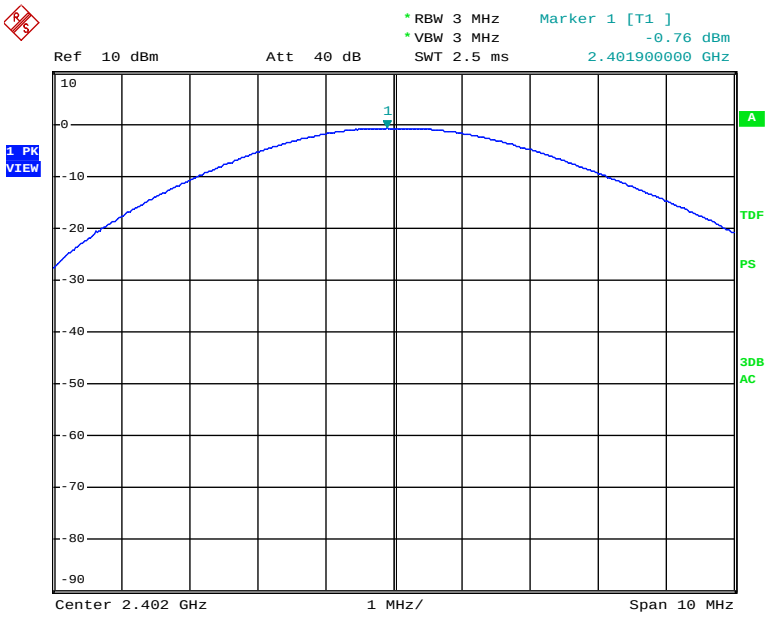
9.2 Measurement Results

Refer to attached data chart.

Modulation :	GFSK, π/4-DQPSK, 8DPSK		
RBW :	3MHz	VBW :	3MHz
Spectrum Detector:	PK	Test Date :	February 21, 2013
Test By:	Infen	Temperature :	21 ℃
Test Result:	PASS	Humidity :	46 %

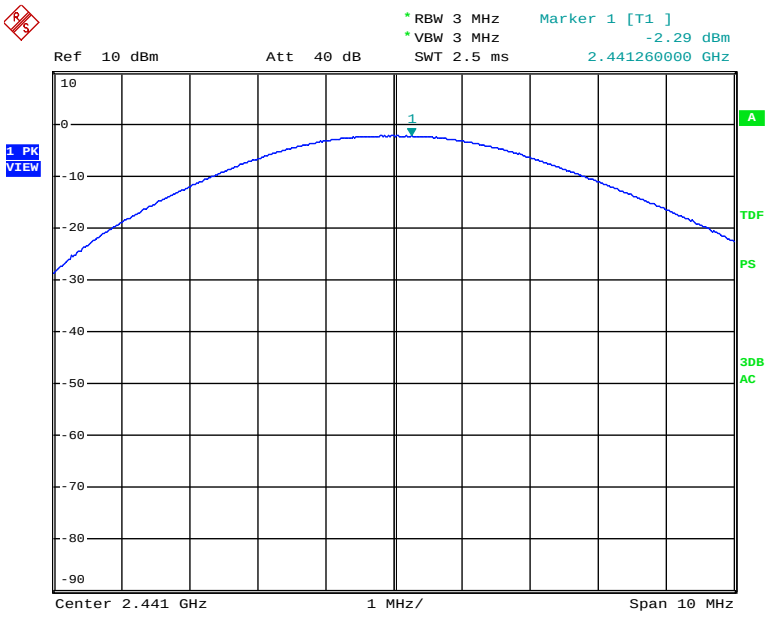
Channel Frequency (MHz)	Cable Loss dB	Peak Power output(mW)	Peak Power output(dBm)	Peak Power Limit(dBm)	Pass/Fail
GFSK					
2402.00	1.5	0.84	-0.76	21	PASS
2441.00	1.5	0.59	-2.29	21	PASS
2480.00	1.5	0.41	-3.84	21	PASS
π/4-DQPSK					
2402.00	1.5	0.68	-1.69	21	PASS
2441.00	1.5	0.51	-2.90	21	PASS
2480.00	1.5	0.36	-4.46	21	PASS
8DPSK					
2402.00	1.5	0.73	-1.34	21	PASS
2441.00	1.5	0.52	-2.80	21	PASS
2480.00	1.5	0.38	-4.22	21	PASS

GFSK Lowest Channel



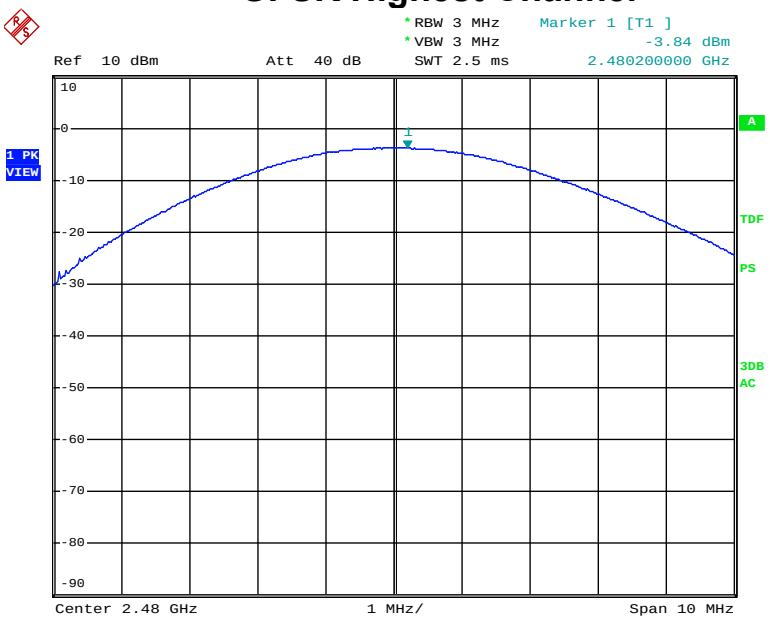
Date: 21.FEB.2013 16:23:25

GFSK Middle Channel



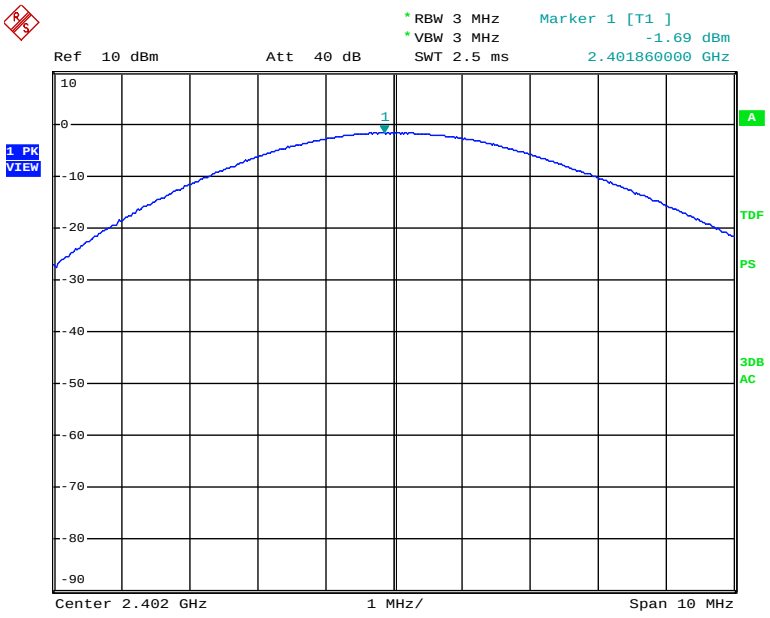
Date: 21.FEB.2013 16:23:49

GFSK Highest Channel



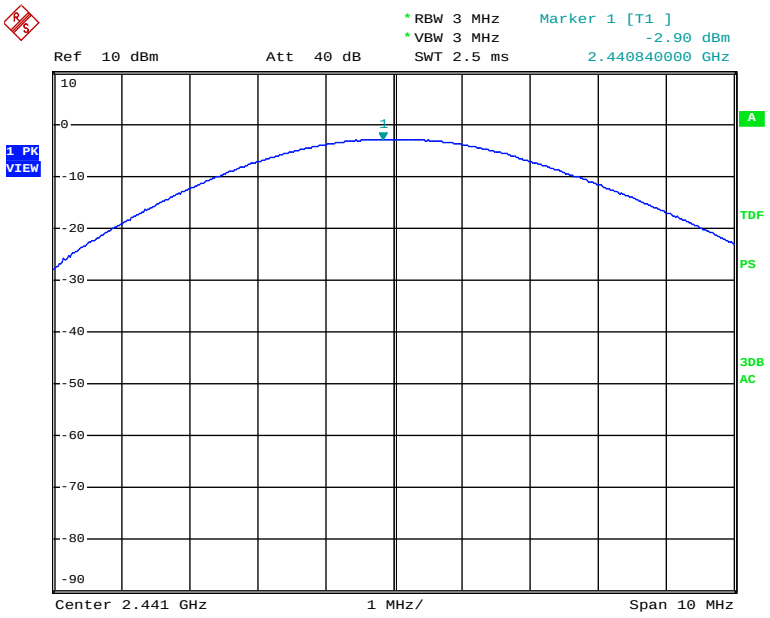
Date: 21.FEB.2013 16:24:18

π/4-DQPSK Lowest Channel



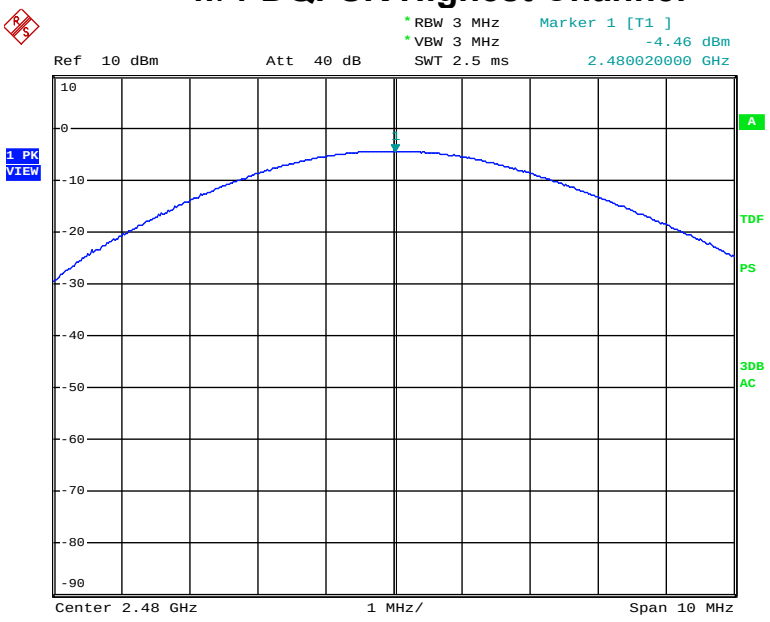
Date: 21.FEB.2013 16:25:32

π/4-DQPSK Middle Channel



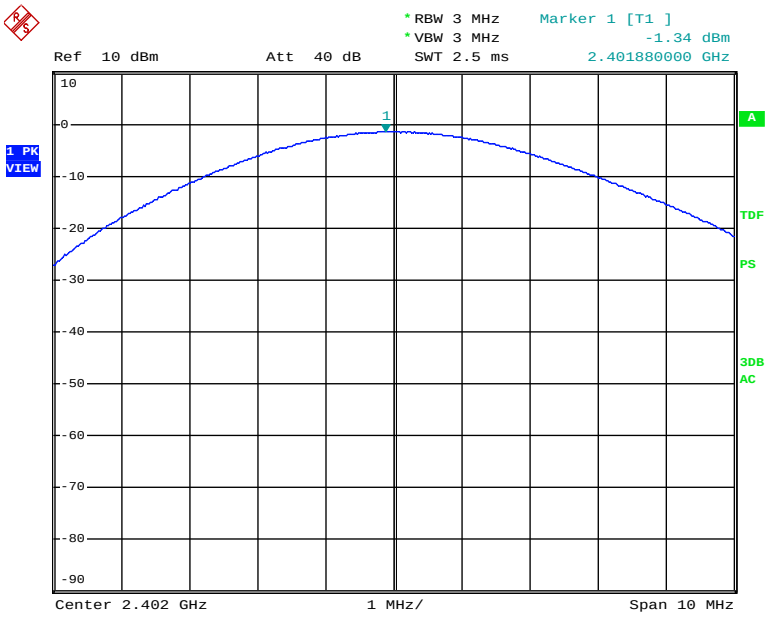
Date: 21.FEB.2013 16:26:13

π/4-DQPSK Highest Channel



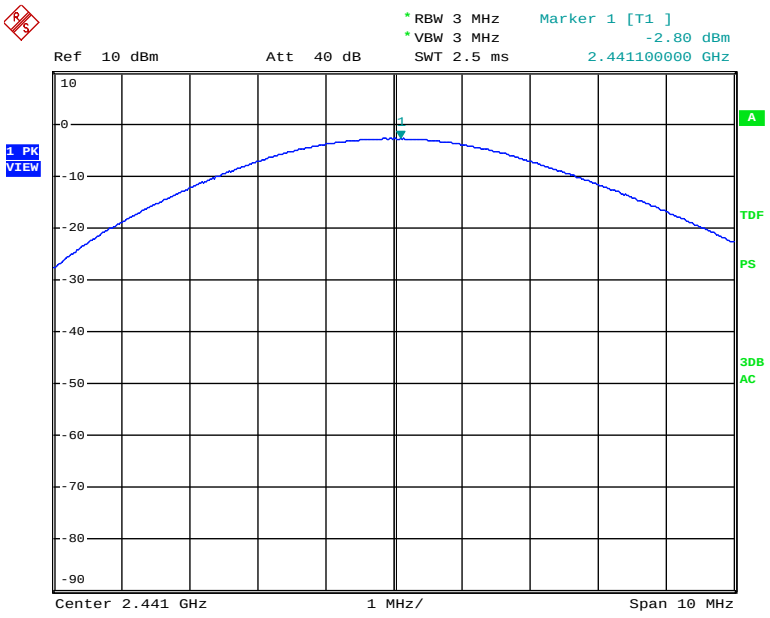
Date: 21.FEB.2013 16:26:33

8DPSK Lowest Channel



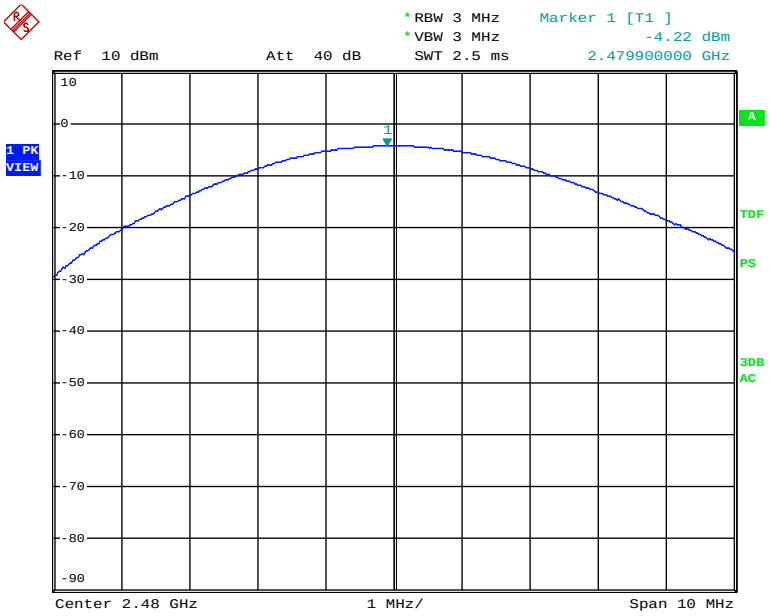
Date: 21.FEB.2013 16:27:10

8DPSK Middle Channel



Date: 21.FEB.2013 16:27:45

8DPSK Highest Channel



Date: 21.FEB.2013 16:28:14

10. Band Edge

10.1 Measurement Procedure

Out of Band Conducted Emissions, FCC Rule 15.247(d):

The transmitter output is connected to spectrum analyzer. The resolution bandwidth is set to100KHz, and the video bandwidth set to 300KHz.

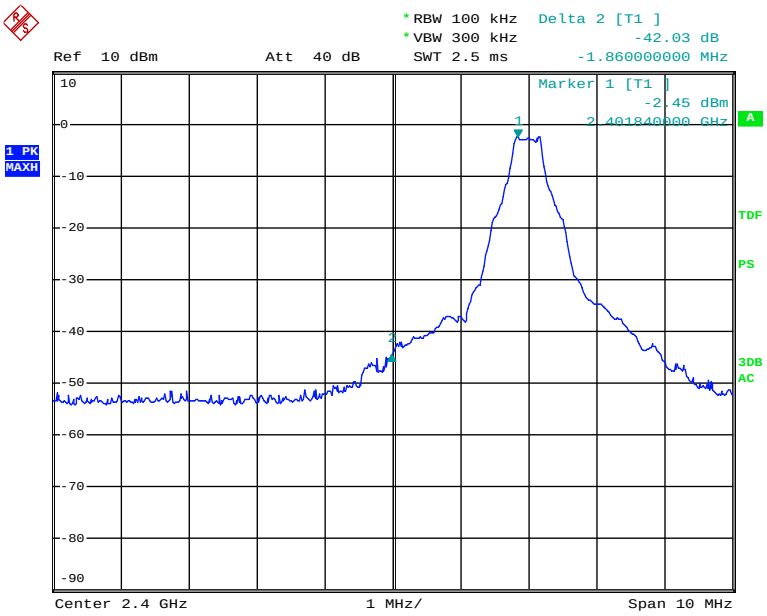
10.2 Limit

15.247(d)In any 100KHz 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 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

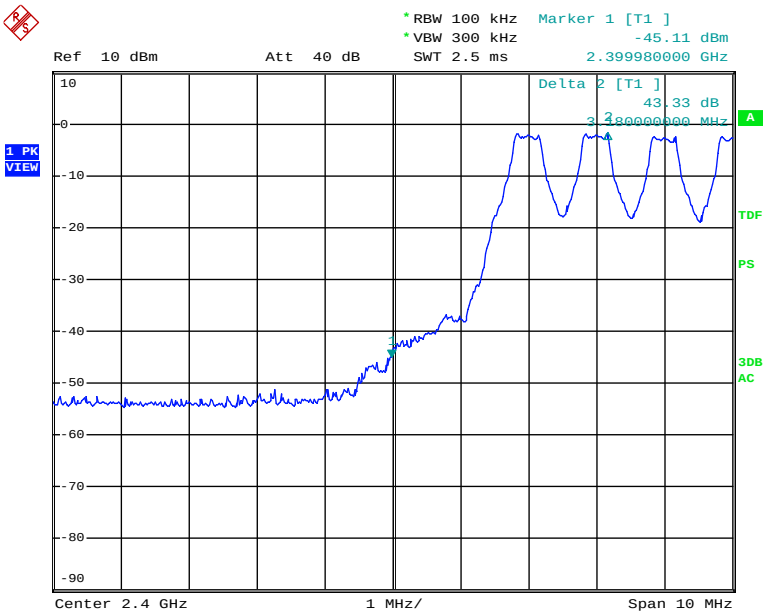
10.3 Measurement Results

Please refer to following plots.

GFSK Lowest Channel

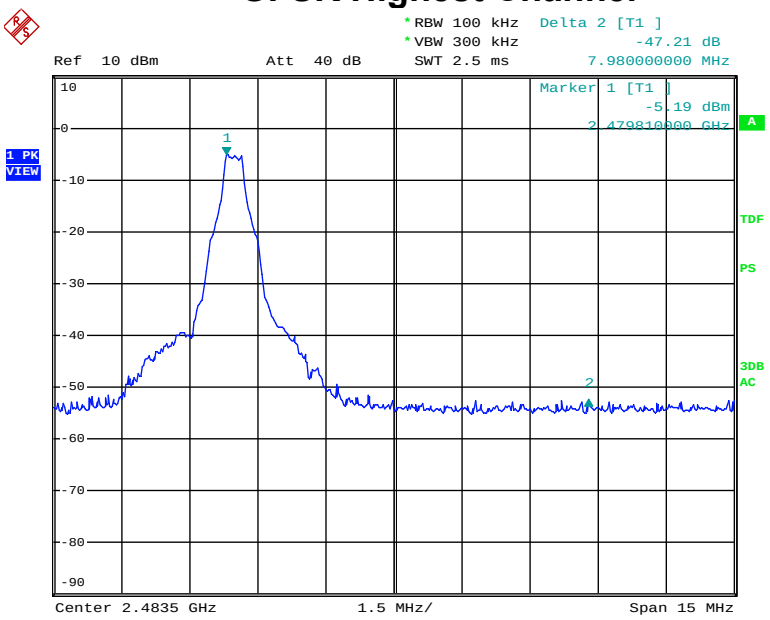


Date: 21.FEB.2013 15:48:56

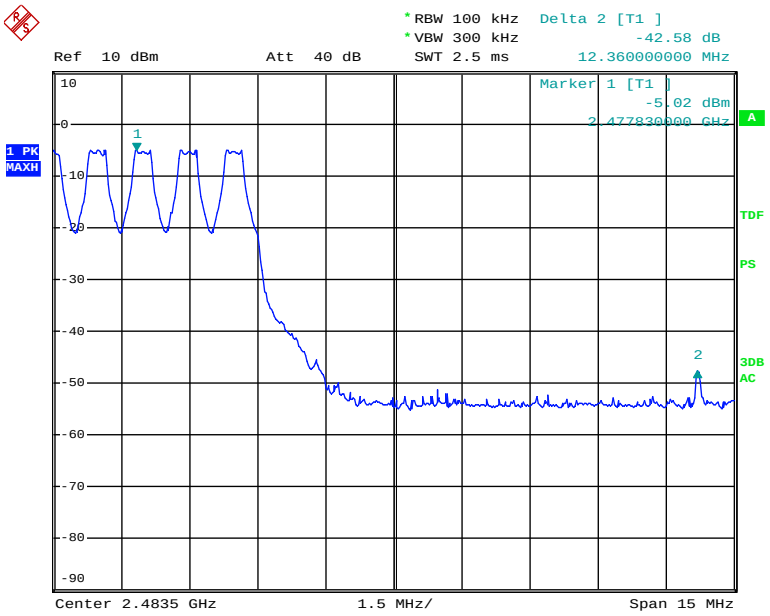


Date: 21.FEB.2013 15:34:10

GFSK Highest Channel

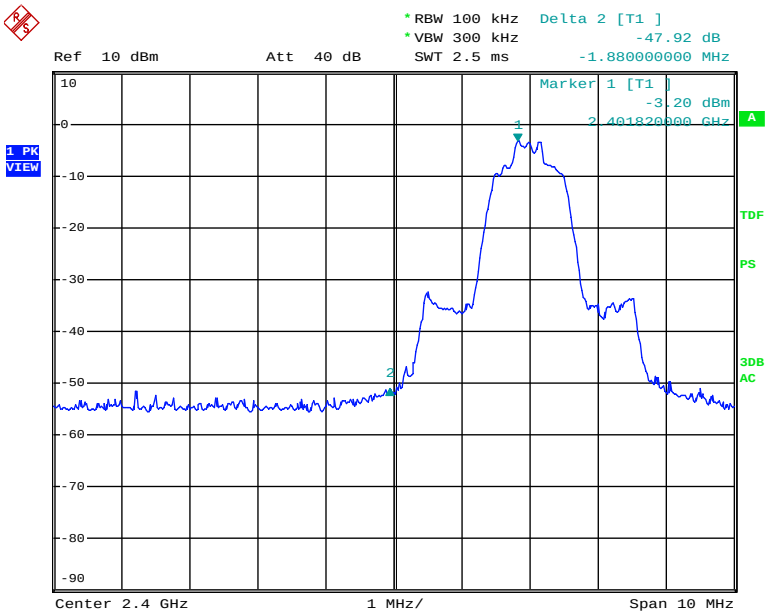


Date: 21.FEB.2013 16:14:57

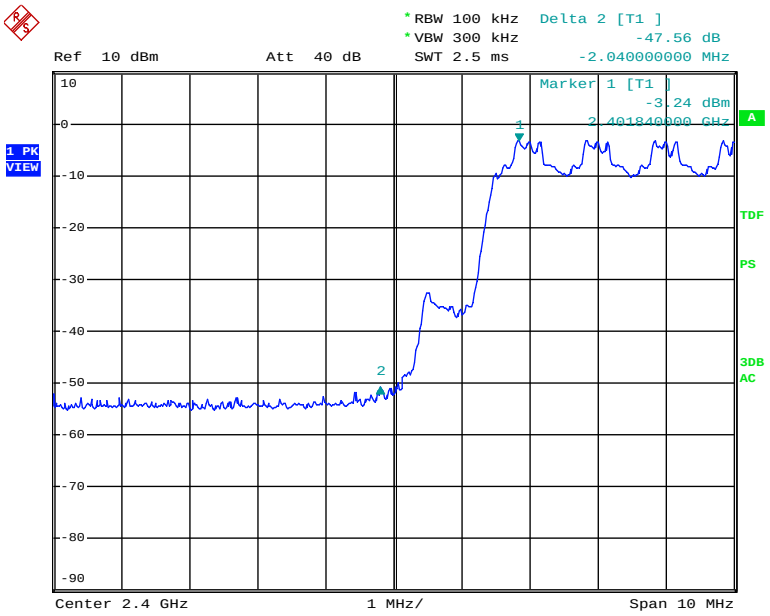


Date: 21.FEB.2013 16:21:09

π/4-DQPSK Lowest Channel

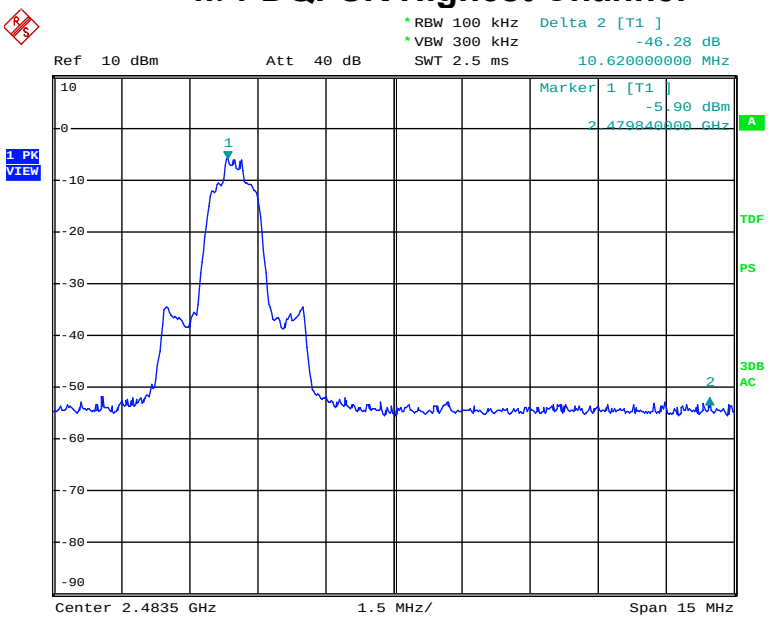


Date: 21.FEB.2013 15:50:29

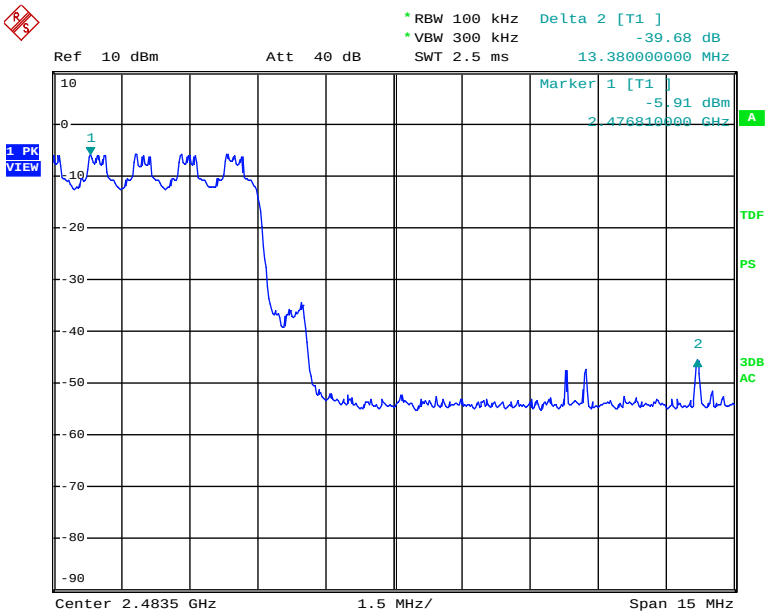


Date: 21.FEB.2013 15:52:44

π/4-DQPSK Highest Channel

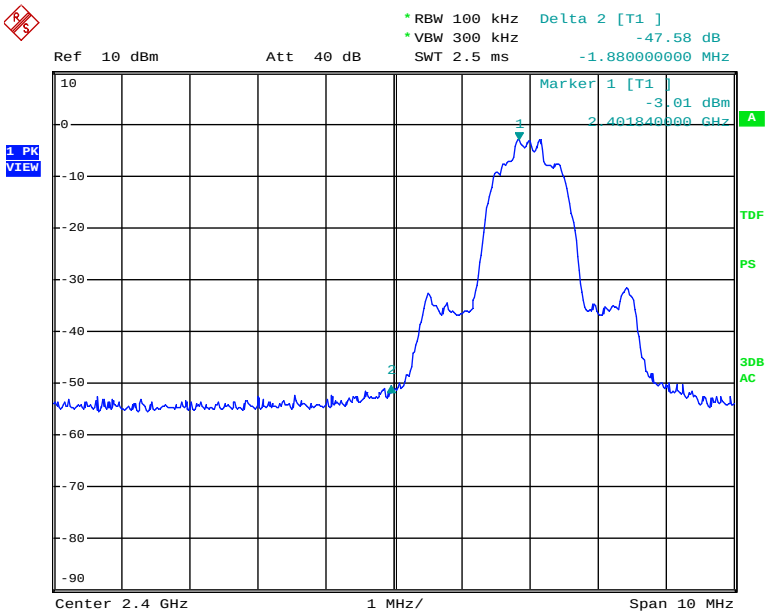


Date: 21.FEB.2013 16:03:57

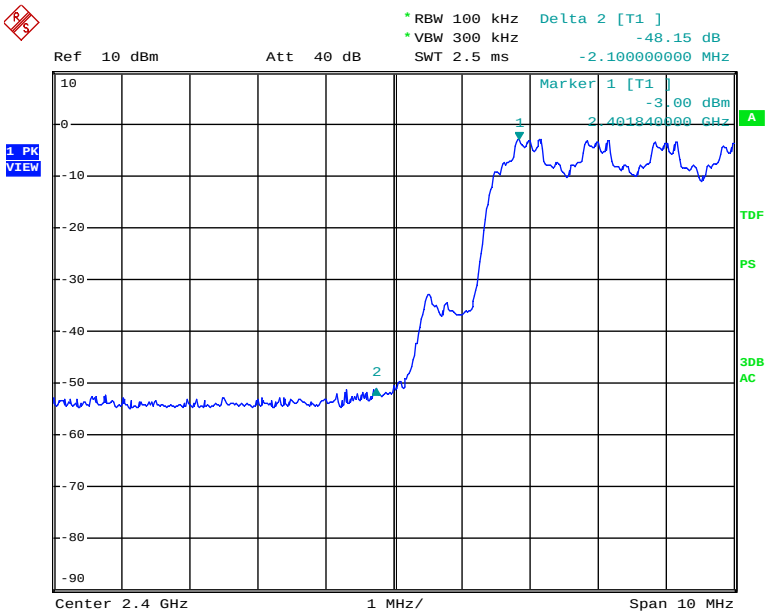


Date: 21.FEB.2013 16:09:20

8DPSK Lowest Channel

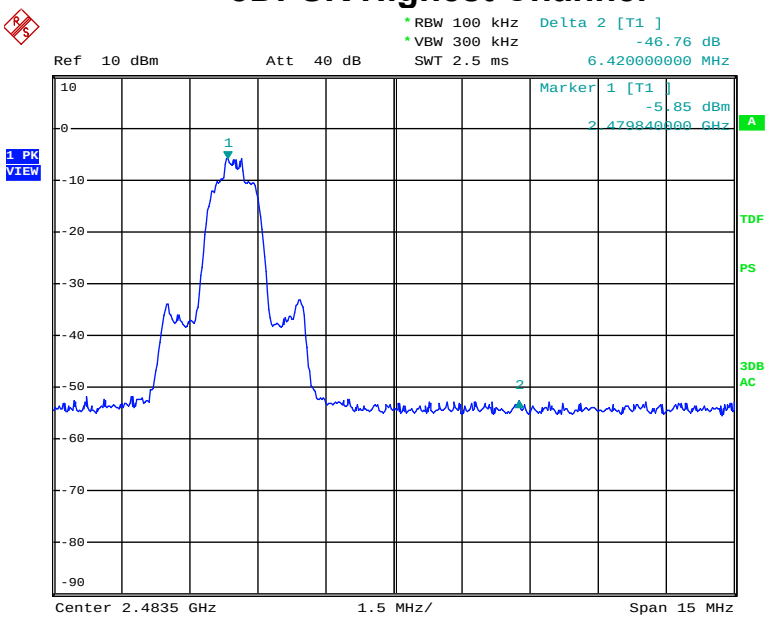


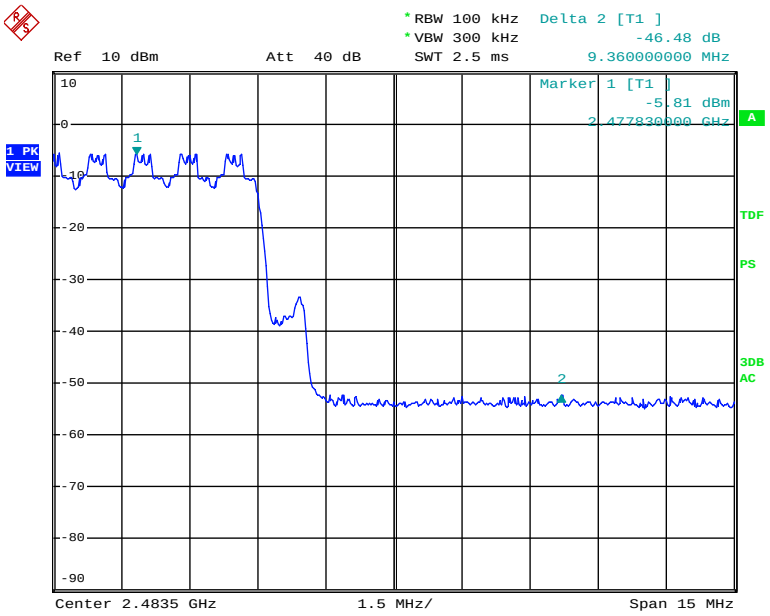
Date: 21.FEB.2013 15:54:37



Date: 21.FEB.2013 15:57:45

8DPSK Highest Channel





11. Antenna Application

11.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

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.
Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

11.2 Measurement Results

The antenna is integrated on the main PCB and no consideration of replacement, and the best case gain of the antenna is 0dBi. So, the antenna is consider meet the requirement.

12. Conducted Spurious Emissions

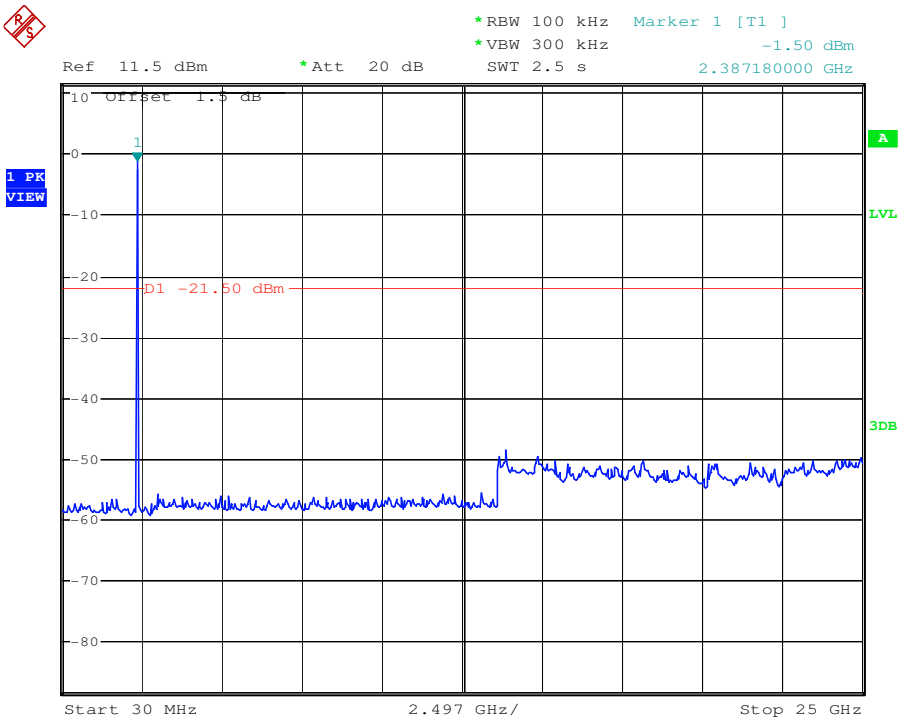
12.1 Measurement Procedure

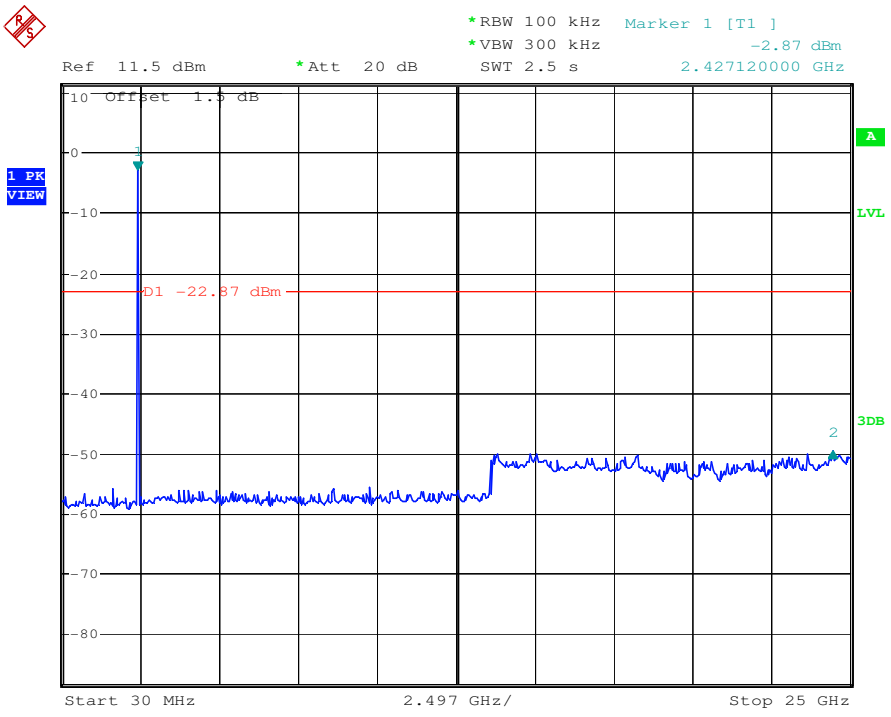
Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

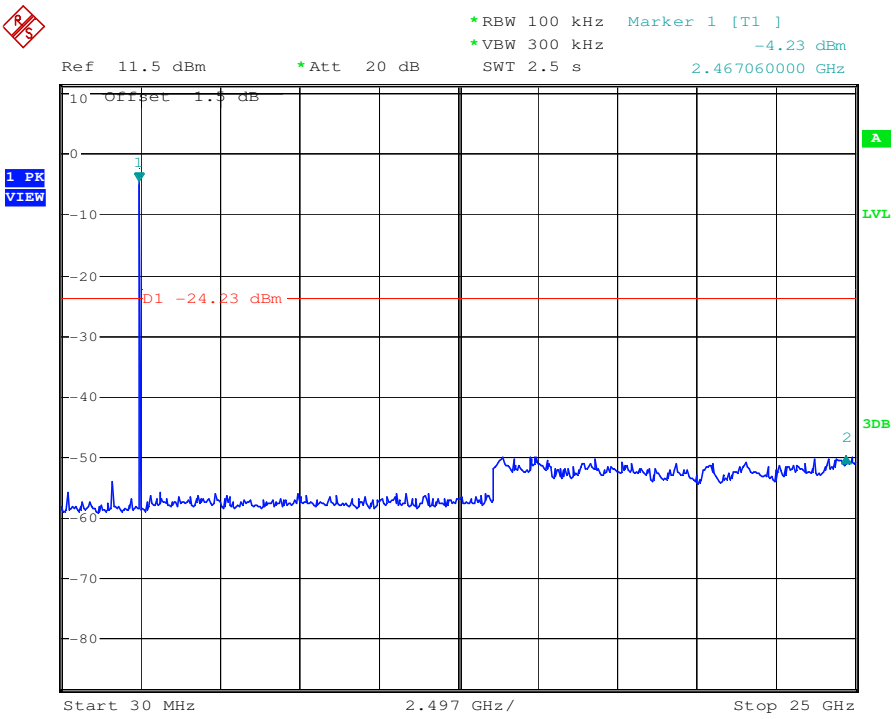
The transmitter output is connected to spectrum analyzer. All spurious emission and up tp the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband.

12.2. Measurement Results

Please refer to following plots, the worst case (GFSK) was shown.


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-1.50 dBm
2.387180000 GHz
Ref 11.5 dBm
*Att 20 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -21.50 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-2.87 dBm
2.427120000 GHz
Ref 11.5 dBm
*Att 20 dB
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -22.87 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
Marker 1 [T1]
*VBW 300 kHz
-4.23 dBm
Ref 11.5 dBm
*Att 20 dB
SWT 2.5 s
2.467060000 GHz
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
D1 -24.23 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

13. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	Nov. 25, 2012	Nov. 24, 2013
Antenna	Schwarzbeck	VULB9162	9162-010	Nov. 28, 2012	Nov. 27, 2013
Positioning Controller	UC	UC 3000	N/A	N/A	N/A
Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A
Single Phase Power Line Filter	SAEMC	PF201A-32	110210	N/A	N/A
3 Phase Power Line Filter	SAEMC	PF401A-200	110318	N/A	N/A
DC Power Filter	SAEMC	PF301A-200	110245	N/A	N/A
Cable	Huber+Suhner	CBL2-NN-1M	22390001	Nov. 09, 2012	Nov. 08, 2013
Cable	Huber+Suhner	CIL02	N/A	Nov. 09, 2012	Nov. 08, 2013
Power Amplifier	HP	HP 8447D	1145A00203	Nov. 09, 2012	Nov. 08, 2013
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	Oct.24, 2012	Oct.23, 2013
Horn Antenna	EMCO	3117	00062558	Oct. 19, 2012	Oct. 18, 2013
Loop antenna	Daze	ZA30900A	0708	Oct.16, 2012	Oct.15, 2013
Spectrum Analyzer	Rohde&Schwarz	ESU	100005	May 25, 2012	May 24, 2013
Pre-Amplifier	Agilent	8449B	3008A02964	Dec. 19, 2012	Dec. 18, 2013
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	Nov. 09, 2012	Nov. 08, 2013