

**FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT**

**For**

**CDM Miami Inc**

**3100 NW 72nd Ave., Unit 118, Miami FL 33122**

**E.U.T.: GSM Cell Phone**

**Model Name: LAVORUM, ULTRA, STAR, MEGA, MINI X PAD, HYPER, LUX,  
BOOM, MIO, STILO, IDEA**

**Brand Name: OLA, FUN, COLA, DOLA**

**FCC ID: ZZRTM3458**

**Report Number: NTC1311477F-2**

**Test Date(s): November 11 2013 to December 16 2013**

**Report Date(s): December 17, 2013**

**Prepared by**

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**Approved & Authorized Signer**

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**Sunm Lv / Q.A. Director**

**Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan NTC Co., Ltd. The test results referenced from this report are relevant only to the sample tested.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test

This is a GSM cell phone with Bluetooth and WIFI functions. It's power by internal 3.7V rechargeable Li-lithium battery, and also can be charged by external adapter. For more details features, please refer to User's Manual.

Manufacturer	: Shenzhen Baili Yongxing Technologe Co., Ltd.
Address	: 5F, Building 10 East, Heng Mingzhu Ind Park, Tongfuyu Ind Zone, ShaJing St., Bao'an Dist., Shenzhen, China
Frequency:	: Cellular Band: 824.2-848.8MHz (TX) 869.2-893.8MHz(RX) PCS Band: 1850.2-1909.8MHz (TX) 1930.2-1989.8MHz(RX) WIFI: 2412-2462MHz, Bluetooth: 2402-2480MHz
Modulation	: GMSK for GSM/PCS DSSS, OFDM for WIFI GFSK, $\pi/4$ -DQPSK, 8DPSK for Bluetooth
Antenna Type	: PIFA
Antenna Gain	: 0.6dBi (peak) for Cellular Band 1.6dBi (peak) for PCS Band 2.3dBi (peak) for WIFI and Bluetooth band
Power Supply	: Li-lithium Battery 3.7V Input : AC 100-240V 50/60Hz 0.1A(Adapter) Output :DC 5V 500mA Model: US77002
Model name	: LAVERUM, ULTRA, STAR, MEGA, MINI X PAD, HYPER, LUX, BOOM, MIO, STILO, IDEA
Model difference	: All models are the same except appearance color, model name and trademark, we prepare LAVERUM for test.
Remark	: This measurement and test report only pertains to the Bluetooth portion of the EUT. For measurement and test results to the GSM and WIFI functions please refer to report number NTC1311477F, NTC1311477F-2.

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## Technical Specification

### For Bluetooth function

Number of Channel	: 79
Channel space	: 1MHz
Date Rate	: 1Mbps, 2Mbps, 3Mbps
Max RF Output Power	: 3.02dBm
Bluetooth Version	: 2.1+EDR

## **1.2 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: ZZRTM3458 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 (2009) 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**

None

## **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 9743-1.

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,  $\pi/4$ -DQPSK, 8DPSK were tested.

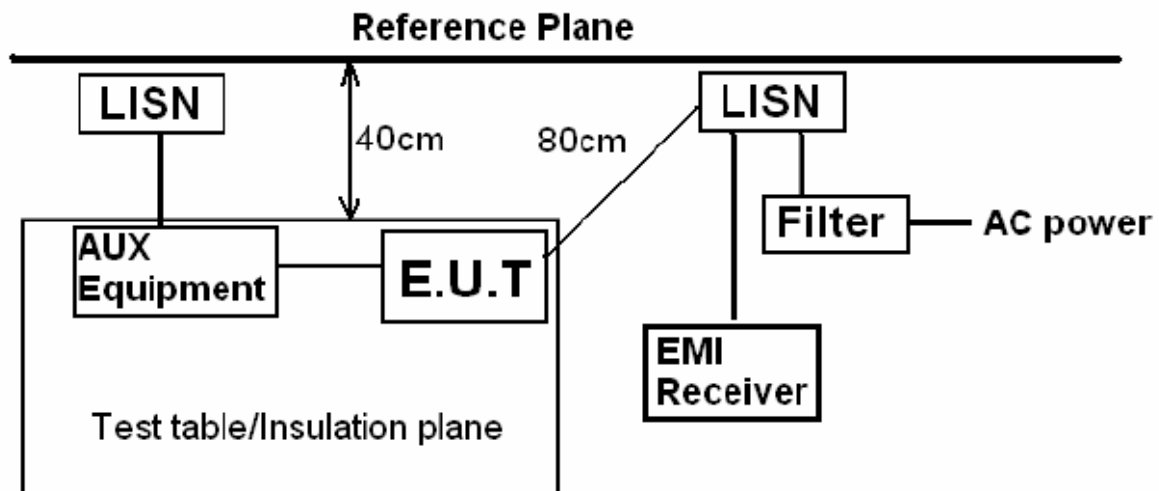
### **2.4 EUT Exercise**

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

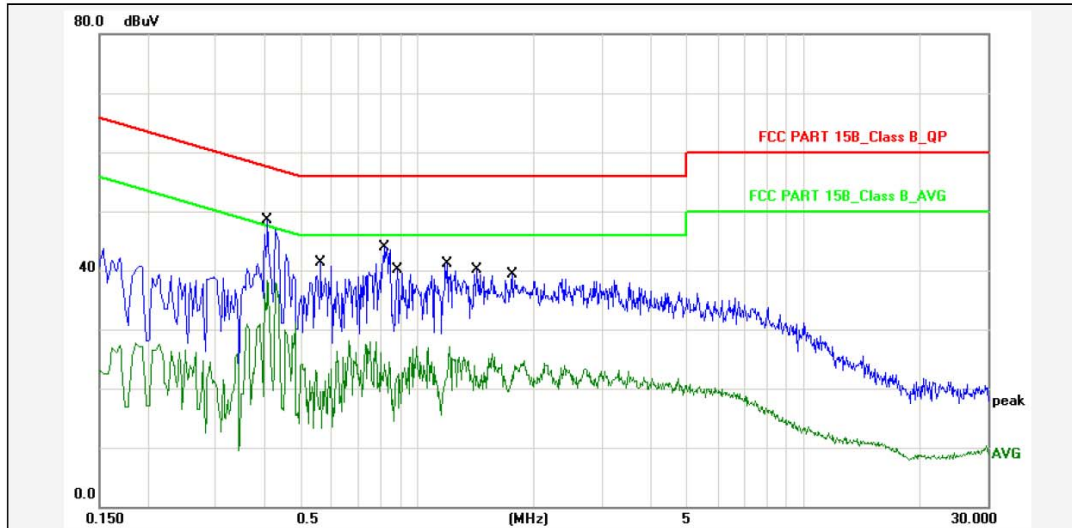
Please refer to following plots.



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Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2013-12-16 9:54:28



Report No.:	LAVORUM	Phase:	L1
Test Standard:	FCC PART 15B_Class B_QP	Temp.( )/Hum.(%)	22(C) / 54 %
Test item:	Conducted Emission	Power Rating:	AC 120V/60Hz
Applicant:	CDM Miami Inc	Test Engineer:	Sance
Product:	GSM Cell Phone		
Model No.:	LAVORUM		
Test Mode:	BT Mode		
Remark:			

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4100	10.80	34.80	45.60	57.65	-12.05	QP	P	
2	0.4100	10.80	24.30	35.10	47.65	-12.55	AVG	P	
3	0.5620	10.80	26.50	37.30	56.00	-18.70	QP	P	
4	0.5620	10.80	14.30	25.10	46.00	-20.90	AVG	P	
5	0.8180	10.80	29.00	39.80	56.00	-16.20	QP	P	
6	0.8800	10.80	11.60	22.40	46.00	-23.60	AVG	P	
7	1.1939	10.80	27.30	38.10	56.00	-17.90	QP	P	
8	1.1939	10.80	12.50	23.30	46.00	-22.70	AVG	P	
9	1.4260	10.80	26.40	37.20	56.00	-18.80	QP	P	
10	1.4260	10.80	9.90	20.70	46.00	-25.30	AVG	P	
11	1.7540	10.80	24.60	35.40	56.00	-20.60	QP	P	
12	1.7540	10.80	10.00	20.80	46.00	-25.20	AVG	P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

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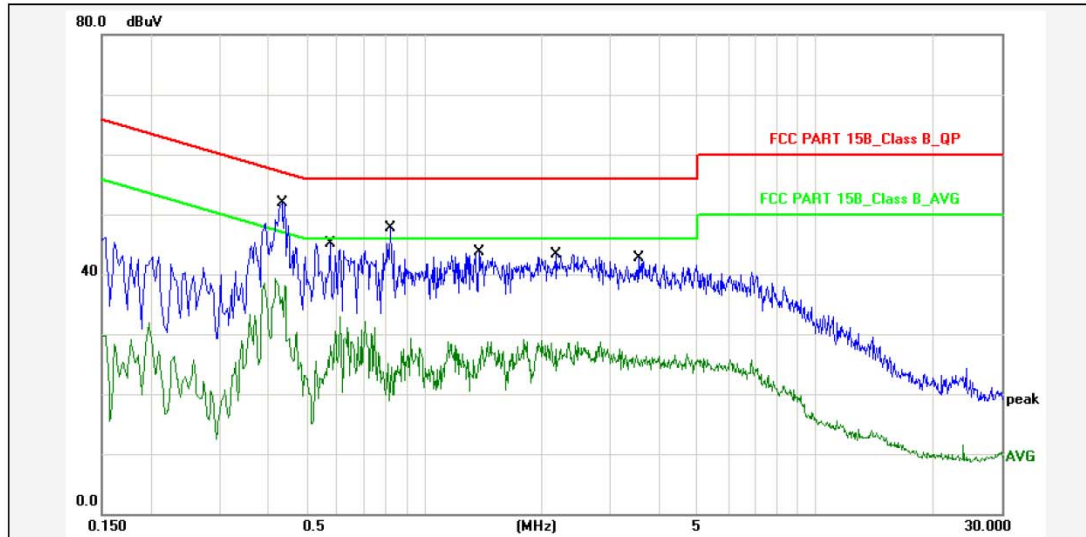
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Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Conduction

Test Time: 2013-12-16 9:57:31



Report No.: LAVORUM

Test Standard: FCC PART 15B\_Class B\_QP

Test item: Conducted Emission

Phase: N

Applicant: CDM Miami

Temp.( )/Hum.(%): 22(C) / 54 %

Product: GSM Cell Phone

Power Rating: AC 120V/60Hz

Model No.: LAVORUM

Test Engineer: Sance

Test Mode: BT Mode

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4339	10.80	37.10	47.90	57.18	-9.28	QP	P	
2	0.4339	10.80	26.40	37.20	47.18	-9.98	AVG	P	
3	0.5780	10.80	31.30	42.10	56.00	-13.90	QP	P	
4	0.5780	10.80	20.00	30.80	46.00	-15.20	AVG	P	
5	0.8180	10.80	32.90	43.70	56.00	-12.30	QP	P	
6	0.8180	10.80	18.30	29.10	46.00	-16.90	AVG	P	
7	1.3860	10.80	29.50	40.30	56.00	-15.70	QP	P	
8	1.3860	10.80	15.90	26.70	46.00	-19.30	AVG	P	
9	2.1699	10.80	29.70	40.50	56.00	-15.50	QP	P	
10	2.1699	10.80	16.10	26.90	46.00	-19.10	AVG	P	
11	3.5380	10.80	29.00	39.80	56.00	-16.20	QP	P	
12	3.5380	10.80	13.70	24.50	46.00	-21.50	AVG	P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

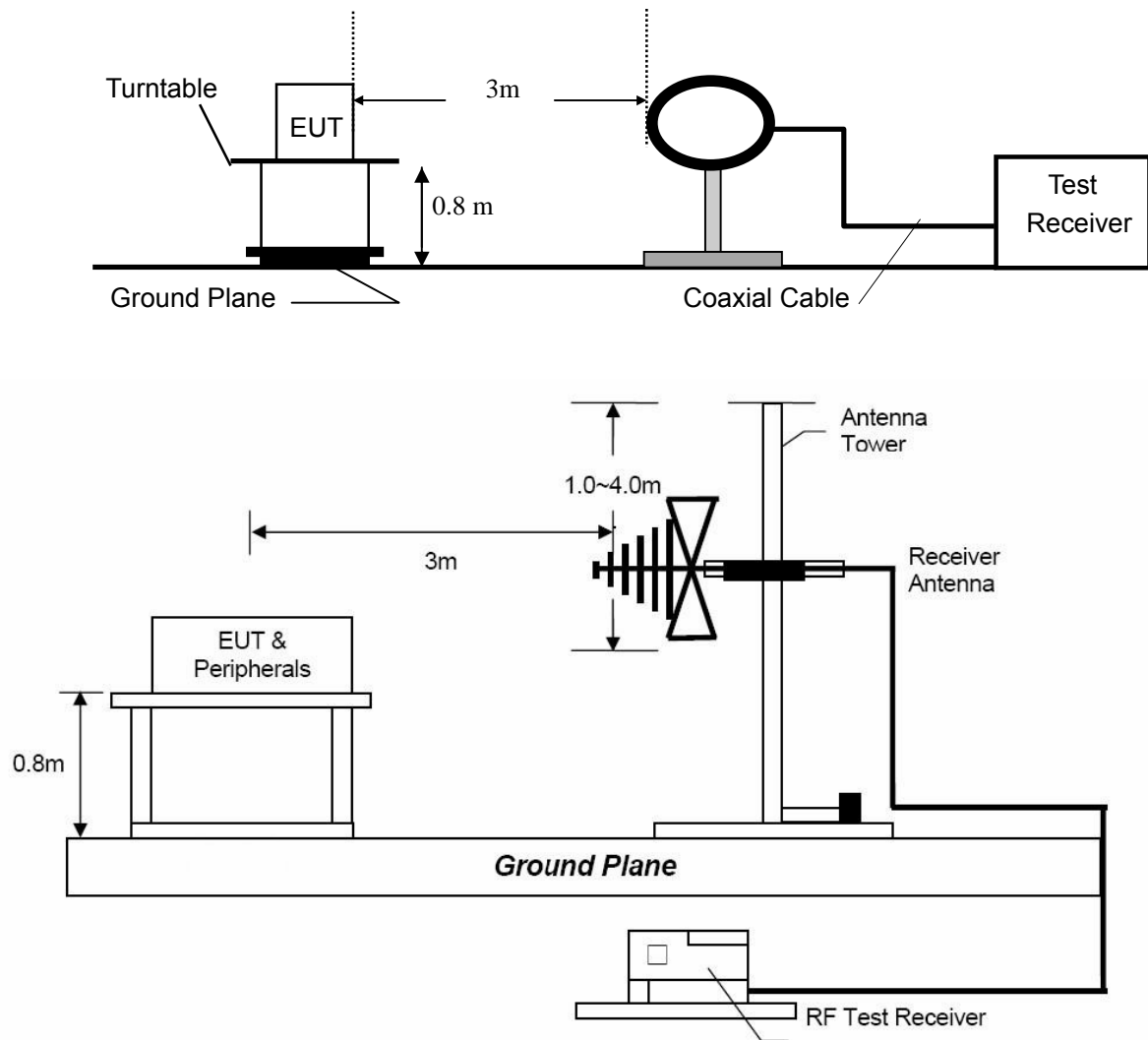
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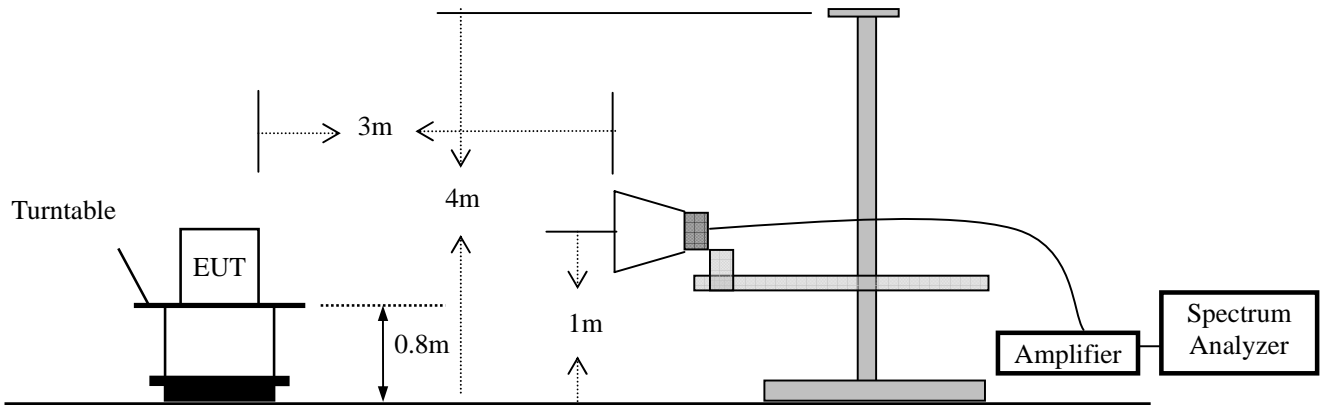
## 4. Radiated Emission Test

### 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

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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)
		$\mu\text{V/m}$
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) $\mu\text{V}$  = 20 log Emission level  $\mu\text{V/m}$   
 (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  
Test Result: PASS  
Measured Distance: 3m  
Test Date : December 16, 2013

Temperature : 22 °C  
Humidity : 54 %  
Test By: Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
60.0700	V	19.96	40.00	-20.04	QP
215.2700	V	22.70	43.50	-20.80	QP
312.2700	V	23.58	46.00	-22.42	QP
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
167.7400	H	21.60	43.50	-21.90	QP
335.5500	H	24.96	46.00	-21.04	QP
400.5400	H	25.81	46.00	-20.19	QP
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Other emissions are lower than 20dB below the allowable limit.

**Note:** (1) Quasi-Peak detector is used except for others stated.  
(2) Emission Level= Reading level + Correction Factor  
(3) Measurement uncertainty :  $\pm 3.7$ dB.

Modulation: GFSK (the worst case)  
(Low Frequency: 2402MHz)  
Operation Mode: TX Mode (Low) Test Date : December 16, 2013  
Frequency Range: 1-25GHz Temperature : 22 °C  
Test Result: PASS Humidity : 54 %  
Measured Distance: 3m Test By: Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4804	V	56.32	42.13	74.00	54.00	-17.68	-11.87
7206	V	57.69	43.53	74.00	54.00	-16.31	-10.47
9608	V	57.23	43.50	74.00	54.00	-16.77	-10.50
12010	V	56.18	42.89	74.00	54.00	-17.82	-11.11
4804	H	54.20	41.66	74.00	54.00	-19.80	-12.34
7206	H	57.27	44.32	74.00	54.00	-16.73	-9.68
9608	H	59.65	45.81	74.00	54.00	-14.35	-8.19
12010	H	56.80	42.76	74.00	54.00	-17.20	-11.24

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 + Correction Factor  
(3) Measurement uncertainty :  $\pm 3.7$ dB



Modulation: GFSK (the worst case)  
(Mid Frequency: 2441MHz)  
Operation Mode: TX Mode (Mid) Test Date : December 16, 2013  
Frequency Range: 1-25GHz Temperature : 22 °C  
Test Result: PASS Humidity : 54 %  
Measured Distance: 3m Test By: Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4882	V	53.73	40.83	74.00	54.00	-20.27	-13.17
7323	V	52.65	39.02	74.00	54.00	-21.35	-14.98
9764	V	52.18	39.67	74.00	54.00	-21.82	-14.33
12205	V	54.34	40.31	74.00	54.00	-19.66	-13.69
4882	H	53.29	40.34	74.00	54.00	-20.71	-13.66
7323	H	55.27	41.22	74.00	54.00	-18.73	-12.78
9764	H	54.11	40.46	74.00	54.00	-19.89	-13.54
12205	H	52.73	39.88	74.00	54.00	-21.27	-14.12

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 + Correction Factor  
(3) Measurement uncertainty :  $\pm 3.7$ dB

Modulation:	GFSK (the worst case) (High Frequency: 2480MHz)		
Operation Mode:	TX Mode (High)	Test Date :	December 16, 2013
Frequency Range:	1-25GHz	Temperature :	22 °C
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4960	V	53.54	40.13	74.00	54.00	-20.46	-13.87
7440	V	52.70	39.21	74.00	54.00	-21.30	-14.79
9920	V	53.73	40.07	74.00	54.00	-20.27	-13.93
12400	V	54.40	41.15	74.00	54.00	-19.60	-12.85
4960	H	54.68	40.98	74.00	54.00	-19.32	-13.02
7440	H	52.88	39.84	74.00	54.00	-21.12	-14.16
9920	H	55.06	41.22	74.00	54.00	-18.94	-12.78
12400	H	54.53	41.56	74.00	54.00	-19.47	-12.44

**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 + Correction Factor
  - (3) Measurement uncertainty :  $\pm 3.7\text{dB}$

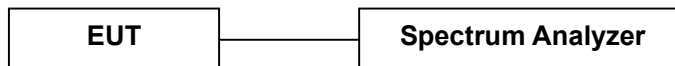
## 5. Channel Separation test

### 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)

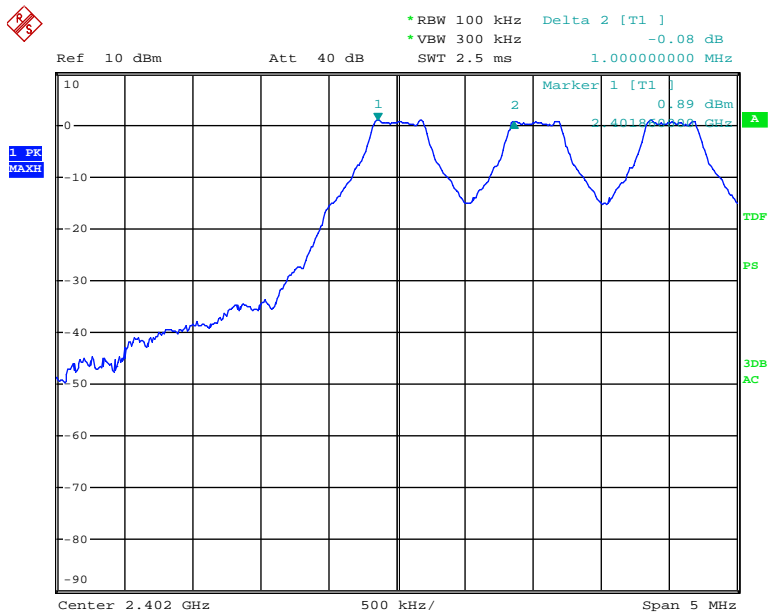


### 5.3 Measurement Results

Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Sance	Test Date :	December 02, 2013
Temperature :	22 °C	Humidity :	46 %
Test Result:	PASS		

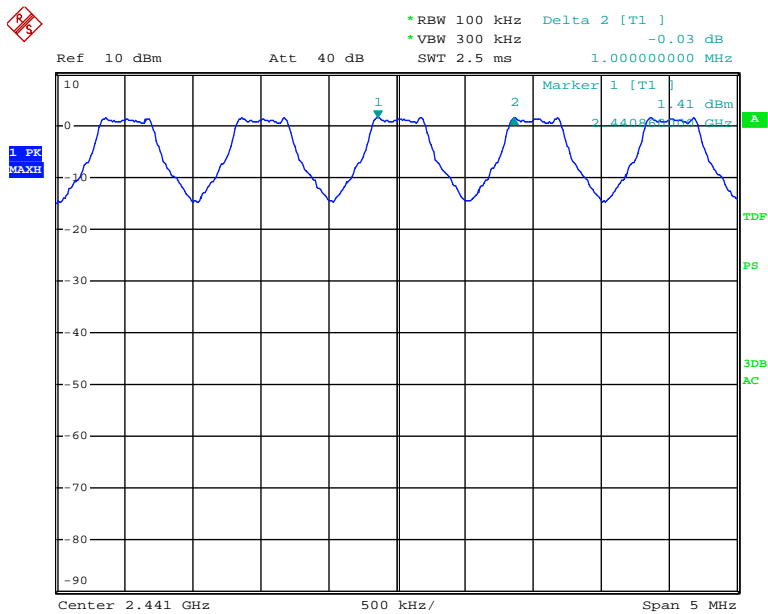
Channel number	Channel frequency (MHz)	Separation Read Value (KHz)	Separation Limit (KHz)
GFSK			
Lowest	2402	1000	>746.7
Middle	2441	1000	>746.7
Highest	2480	1000	>746.7
$\pi/4$ -DQPSK			
Lowest	2402	1000	>920
Middle	2441	1000	>920
Highest	2480	1000	>920
8DPSK			
Lowest	2402	1000	>926.7
Middle	2441	1000	>926.7
Highest	2480	1000	>926.7

GFSK Lowest Channel



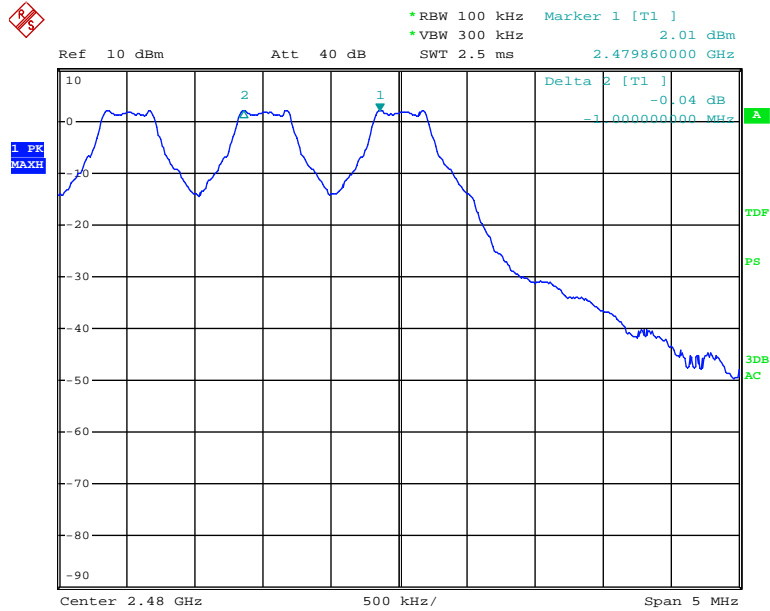
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GFSK Middle Channel



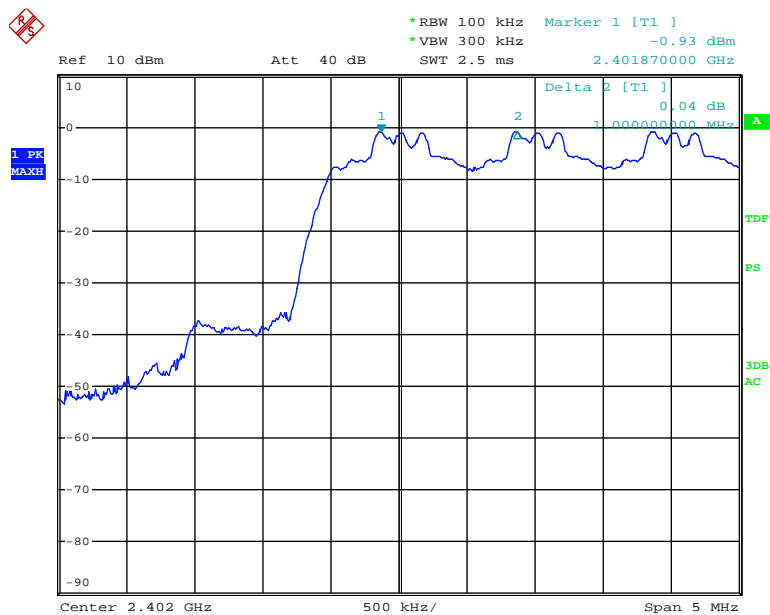
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## GFSK Highest Channel



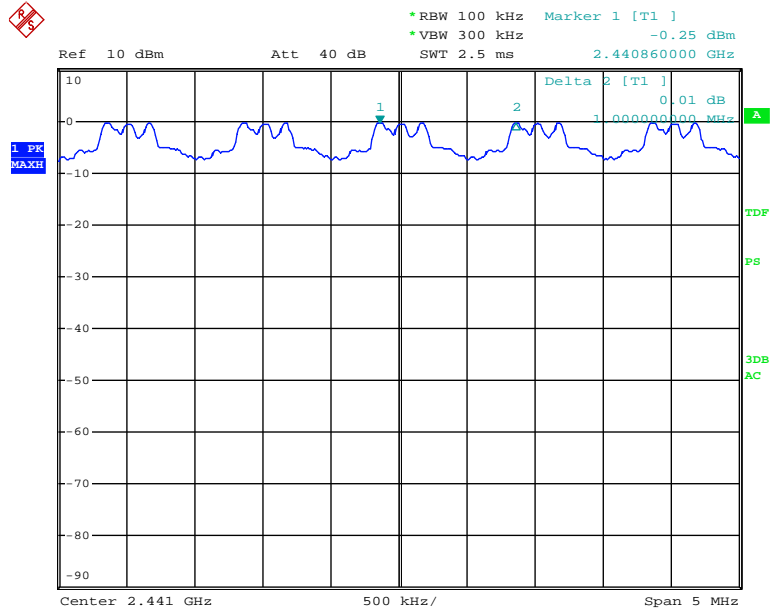
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## $\pi/4$ -DQPSK Lowest Channel



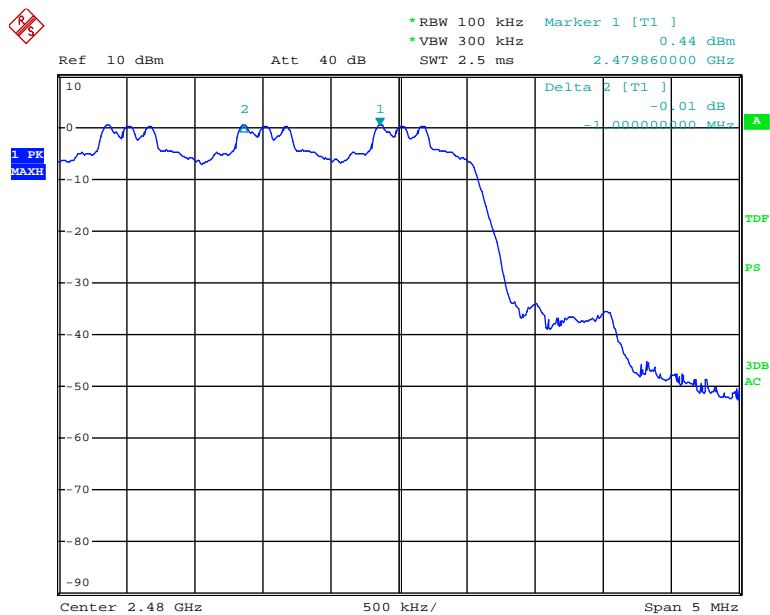
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### $\pi/4$ -DQPSK Middle Channel



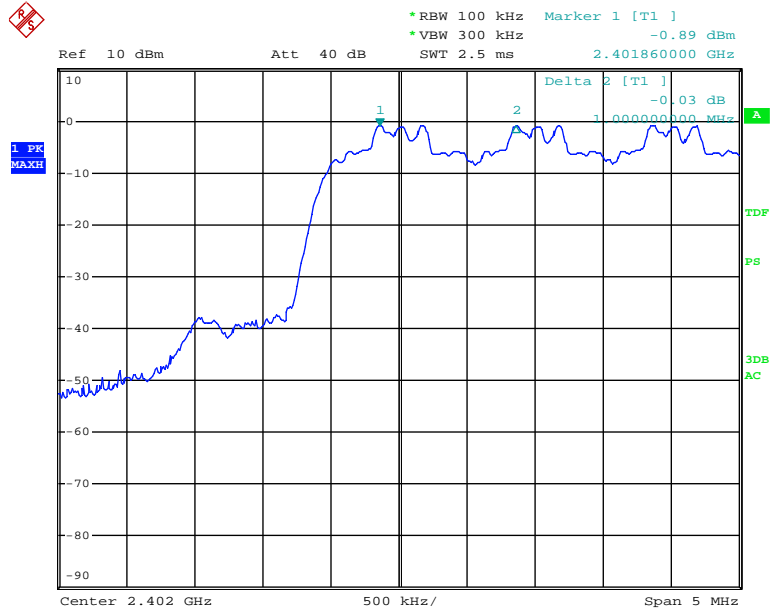
Date: 2.DEC.2013 10:22:02

### $\pi/4$ -DQPSK Highest Channel



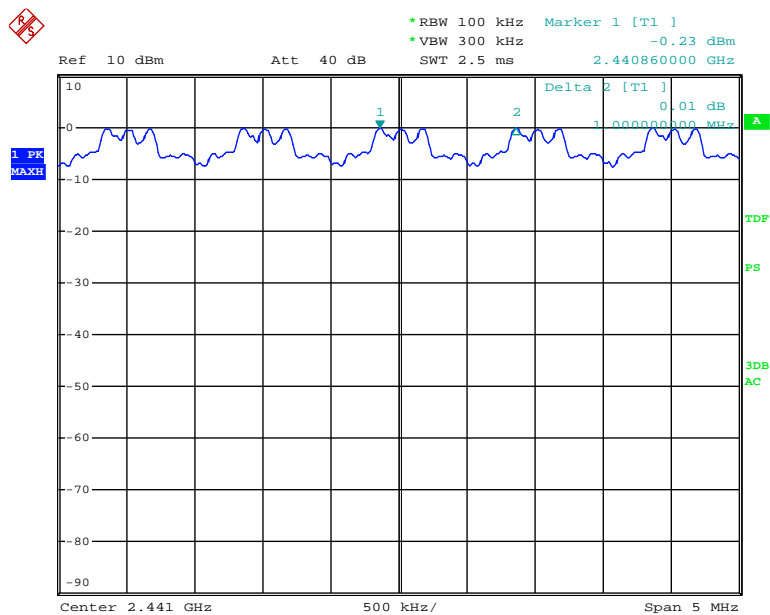
Date: 2.DEC.2013 10:24:22

## 8DPSK Lowest Channel



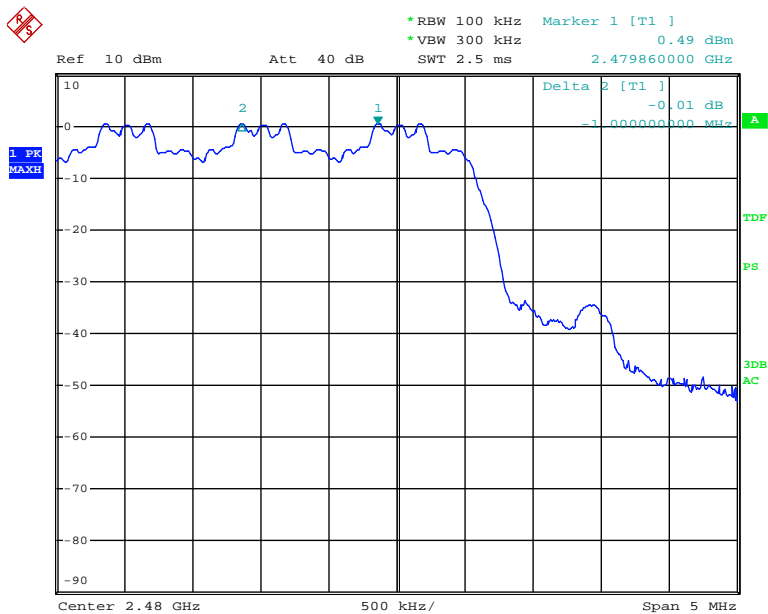
Date: 2.DEC.2013 10:27:07

## 8DPSK Middle Channel



Date: 2.DEC.2013 10:30:51

8DPSK Highest Channel



Date: 2.DEC.2013 10:34:18



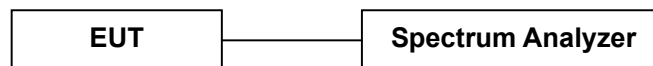
## 6. 20dB Bandwidth

### 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)



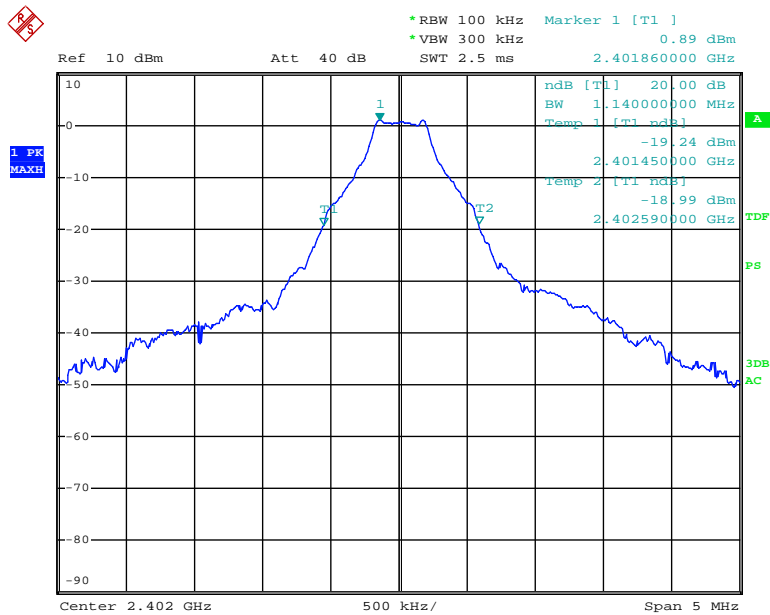
### 6.3 Measurement Results

Refer to attached data chart.

Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Sance	Test Date :	December 02, 2013
Temperature :	22 °C	Humidity :	46 %
Test Result:	PASS		

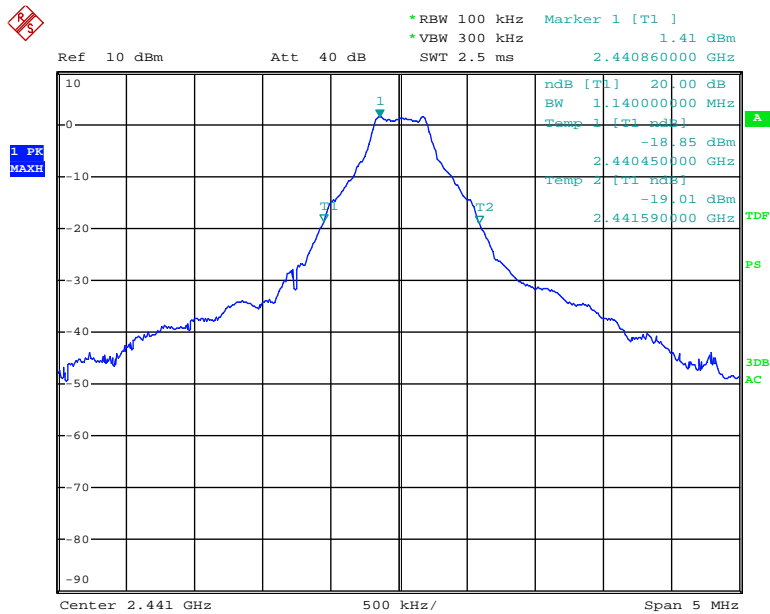
Channel frequency (MHz)	20dB Down BW(kHz)
GFSK	
2402	1140
2441	1140
2480	1140
$\pi/4$ -DQPSK	
2402	1360
2441	1360
2480	1350
8DPSK	
2402	1370
2441	1380
2480	1370

GFSK Lowest Channel



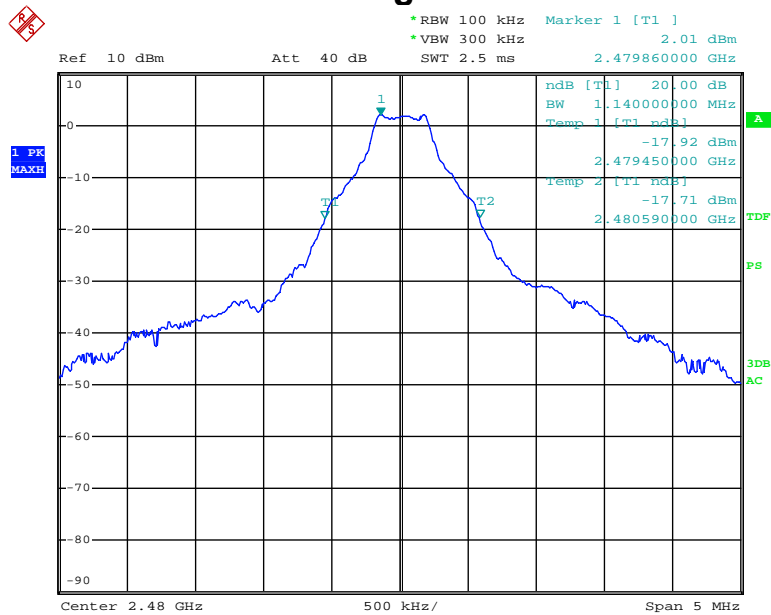
Date: 2.DEC.2013 10:06:52

GFSK Middle Channel



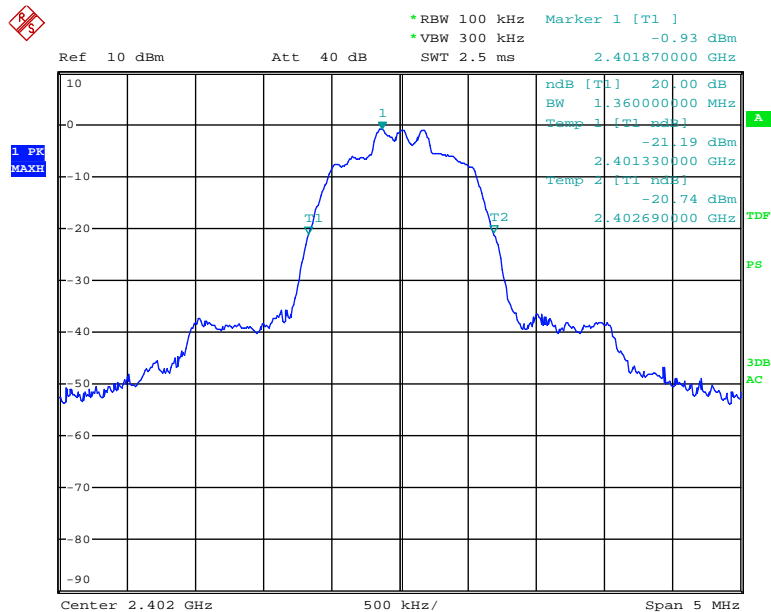
Date: 2.DEC.2013 10:10:36

## GFSK Highest Channel



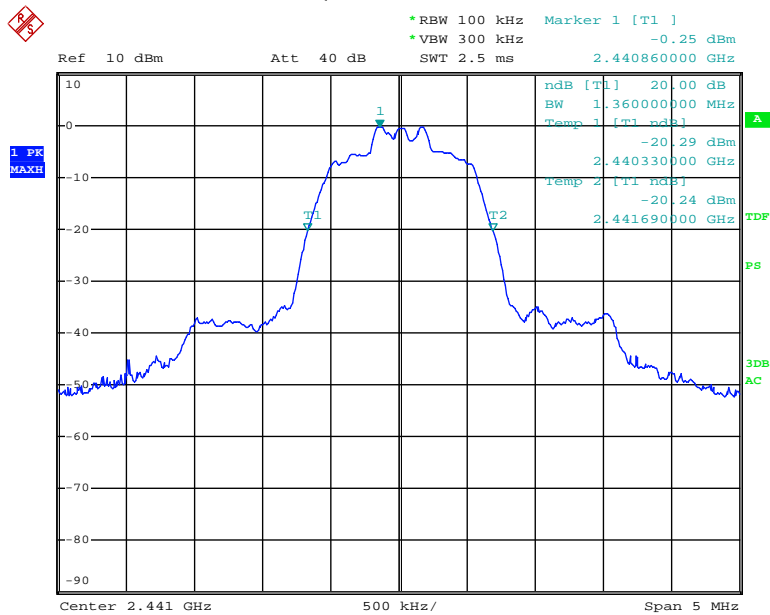
Date: 2.DEC.2013 10:14:10

## $\pi/4$ -DQPSK Lowest Channel



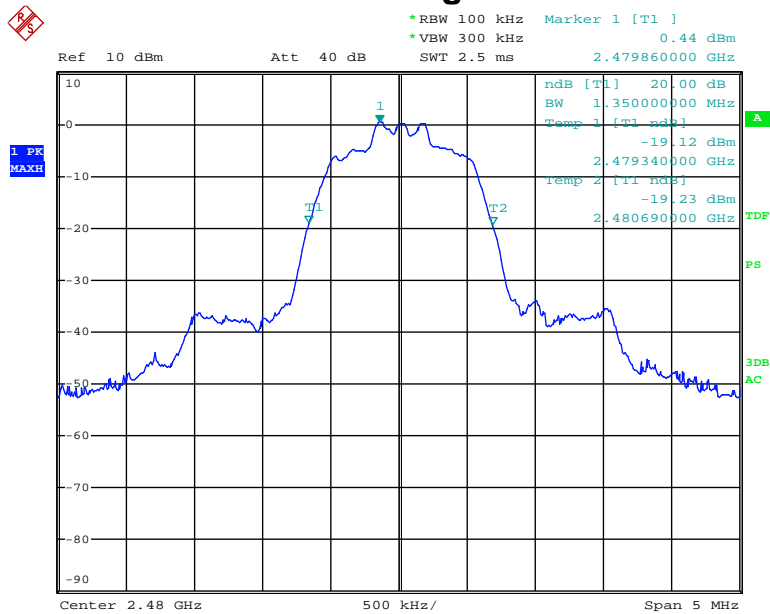
Date: 2.DEC.2013 10:16:18

$\pi/4$ -DQPSK Middle Channel



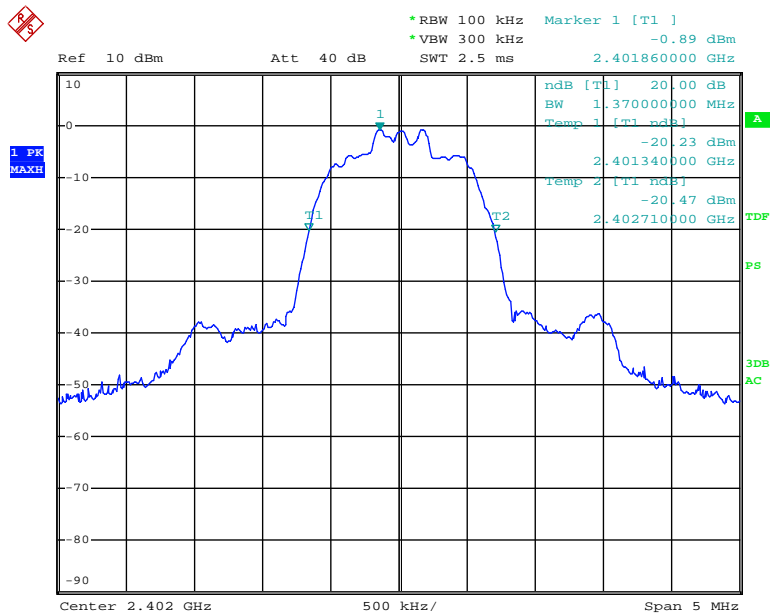
Date: 2.DEC.2013 10:19:28

$\pi/4$ -DQPSK Highest Channel



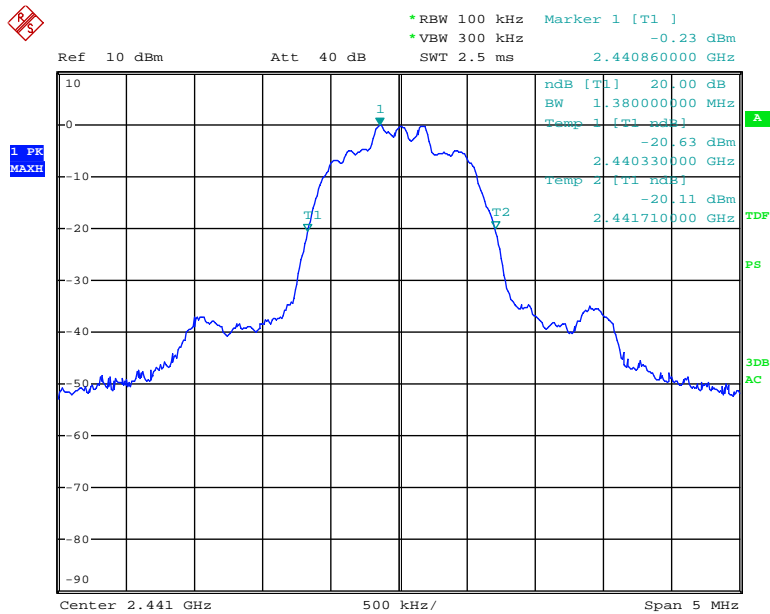
Date: 2.DEC.2013 10:22:56

8DPSK Lowest Channel



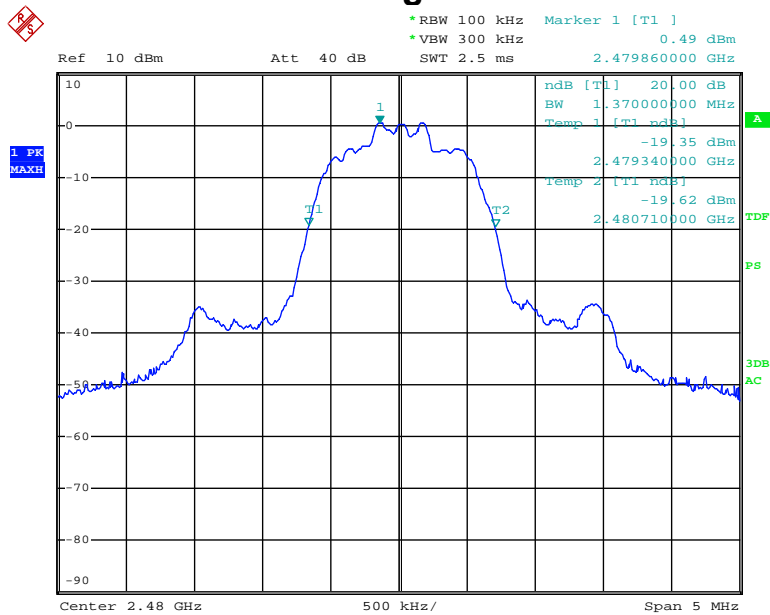
Date: 2.DEC.2013 10:25:18

8DPSK Middle Channel



Date: 2.DEC.2013 10:28:25

8DPSK Highest Channel



Date: 2.DEC.2013 10:32:22

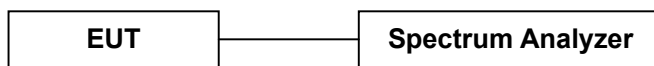
## 7. Hopping Channel Number

### 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)

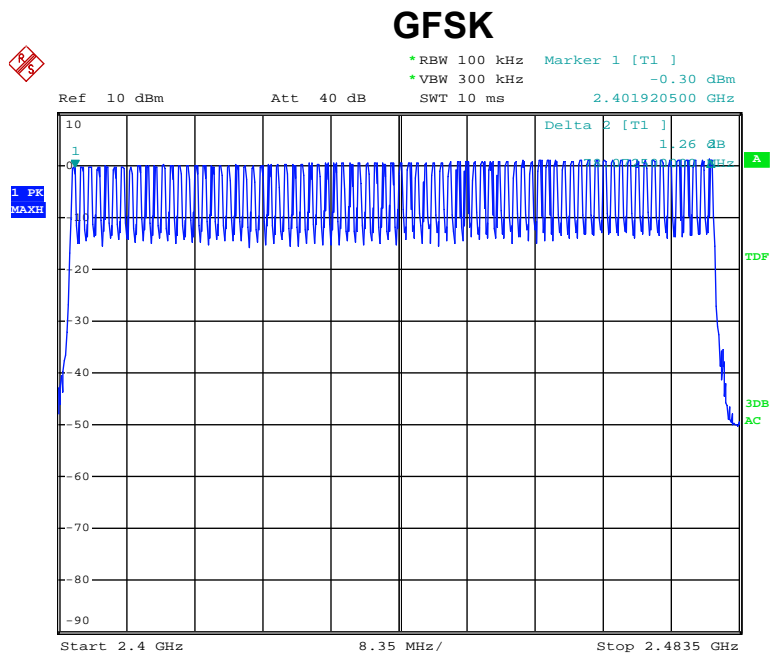


### 7.3 Measurement Results

Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RBW:	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test By:	Sance	Test Date :	December 02, 2013
Temperature :	22 °C	Humidity :	46 %
Test Result:	PASS		

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

The worst case: GFSK



Date: 2.DEC.2013    11:51:10



## 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

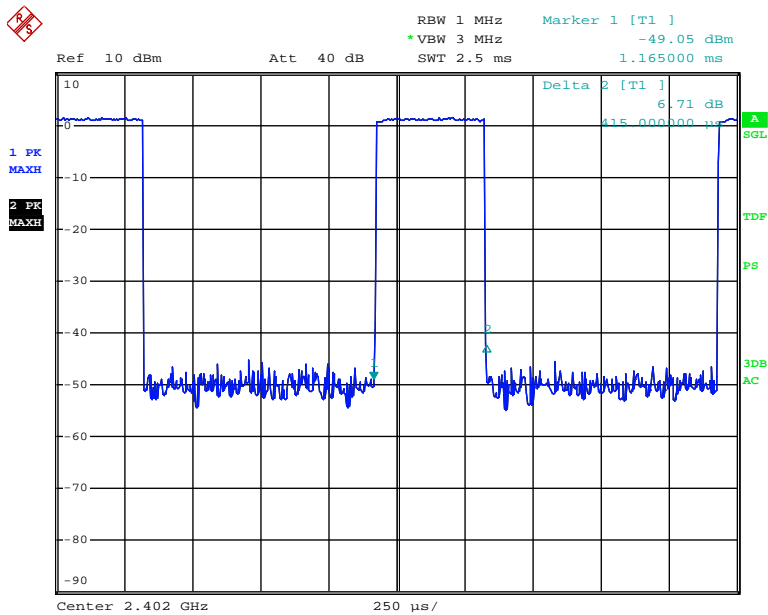
The maximum number of hopping channels in 31.6s (0.4s/Channel x 79 Channel)

Refer to attached data chart.

Modulation :	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RBW :	1MHz	VBW :	3MHz
Spectrum Detector:	PK	Test Result:	PASS
Test By:	Sance	Test Date :	December 02, 2013
Temperature :	22 °C	Humidity :	46 %

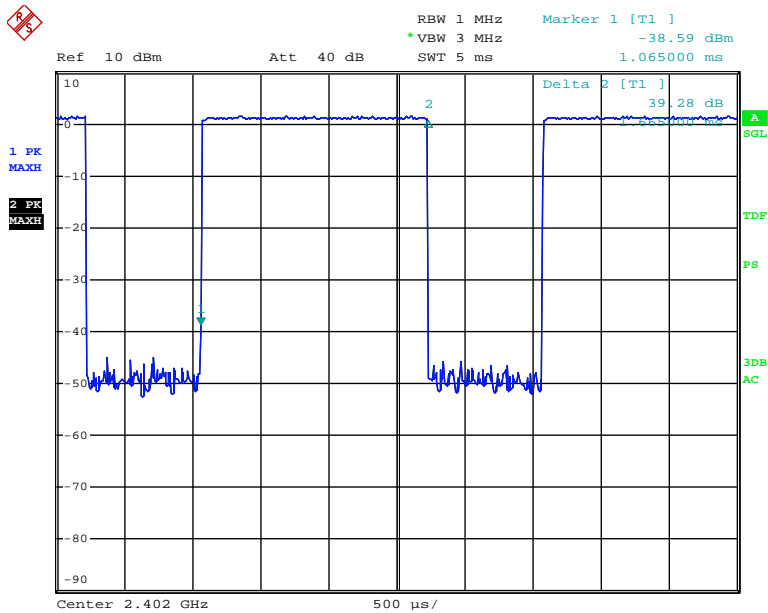
Packet	Frequency (MHz)	Result (msec)	Limit (msec)
GFSK			
DH1	2402	$0.415(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 132.8$	400
DH3	2402	$1.665(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 266.4$	400
DH5	2402	$2.925(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 312.0$	400
$\pi/4$ -DQPSK			
2-DH1	2402	$0.420(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 134.4$	400
2-DH3	2402	$1.680(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 268.8$	400
2-DH5	2402	$2.925(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 312.0$	400
8DPSK			
3-DH1	2402	$0.420(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 134.4$	400
3-DH3	2402	$1.680(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 268.8$	400
3-DH5	2402	$2.940(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 315.7$	400

GFSK DH1



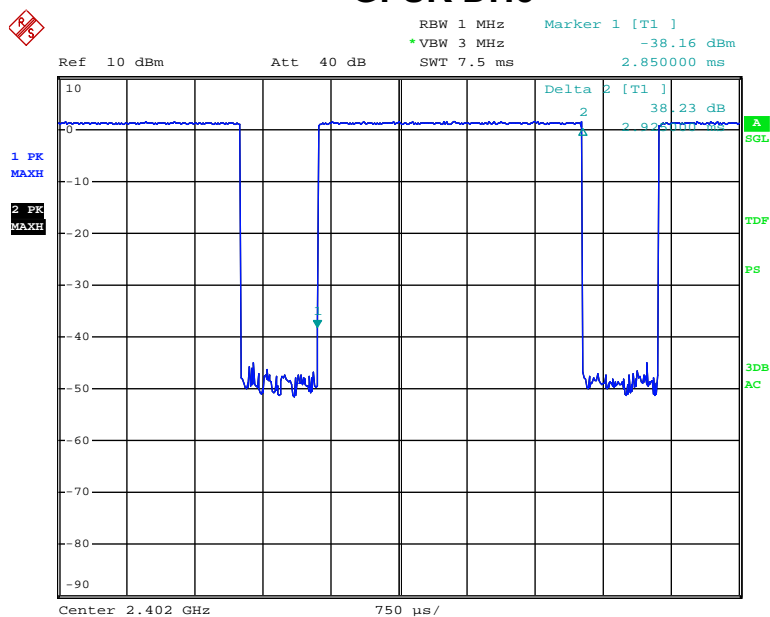
Date: 2.DEC.2013 10:58:55

GFSK DH3



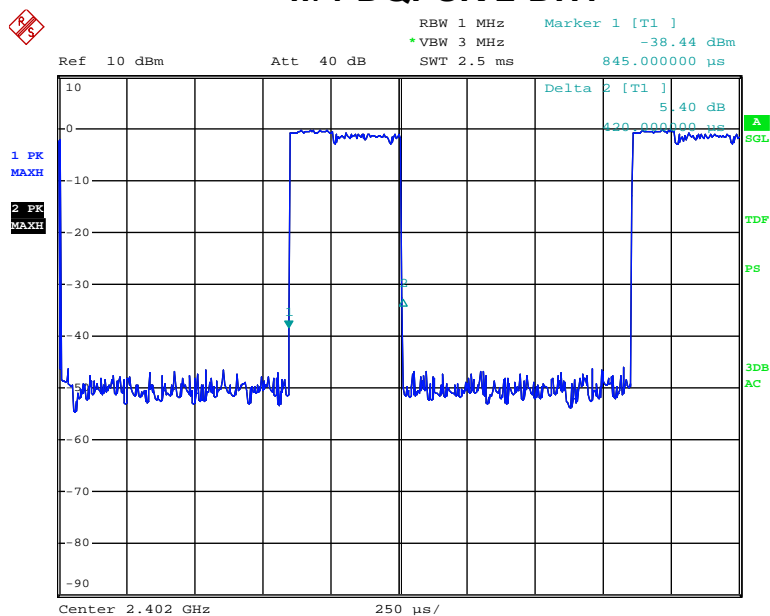
Date: 2.DEC.2013 10:59:27

## GFSK DH5



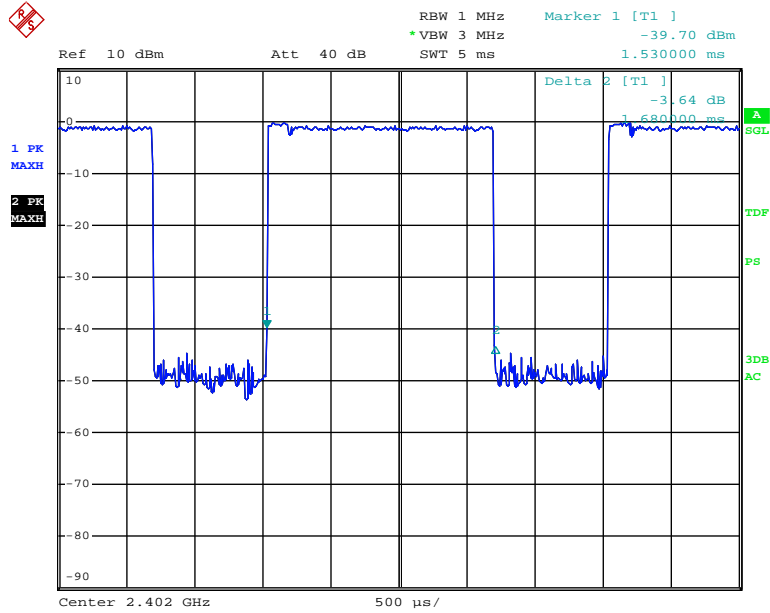
Date: 2.DEC.2013 11:00:04

## $\pi/4$ -DQPSK 2-DH1



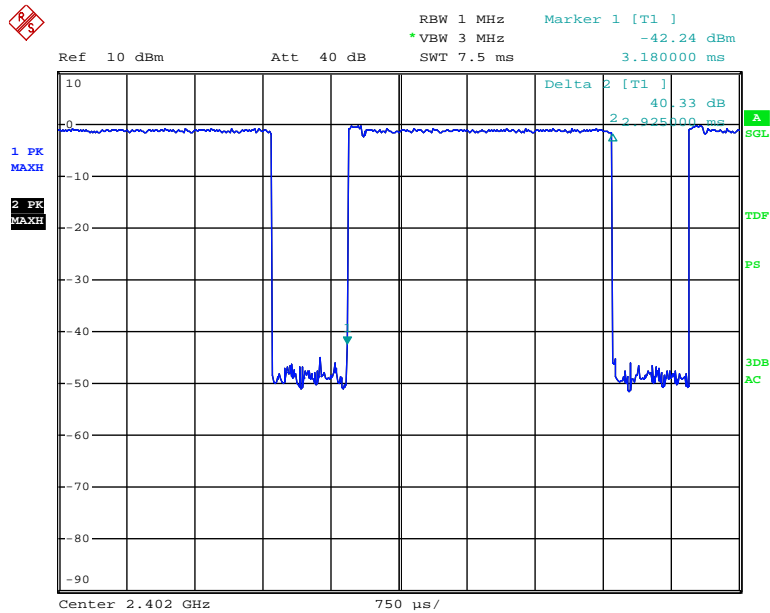
Date: 2.DEC.2013 11:00:34

### $\pi/4$ -DQPSK 2-DH3



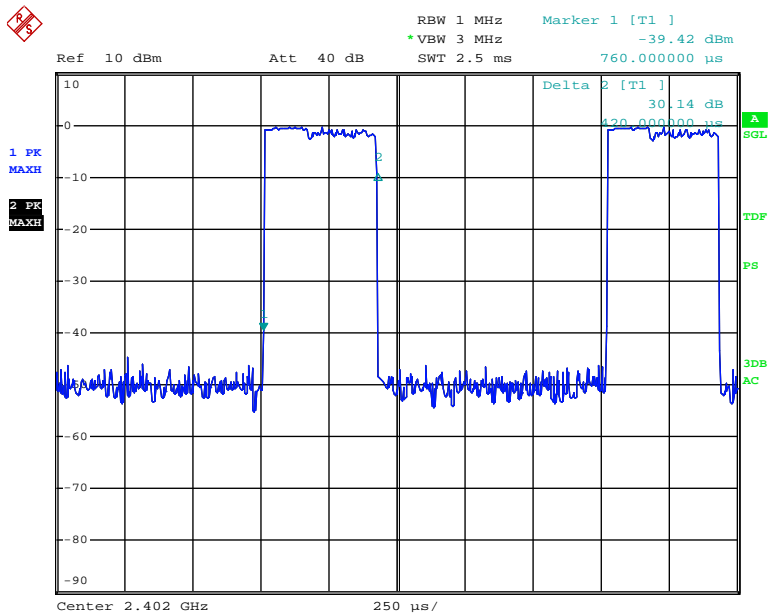
Date: 2.DEC.2013 11:01:16

### $\pi/4$ -DQPSK 2-DH5



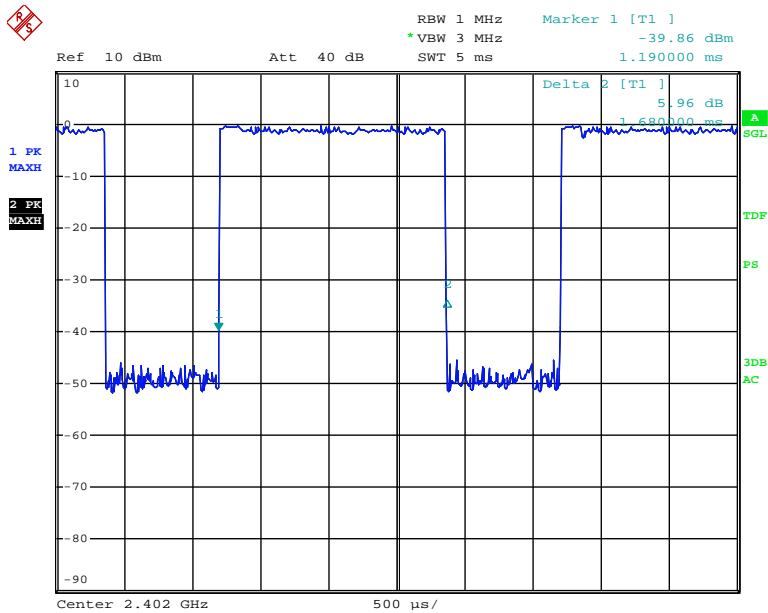
Date: 2.DEC.2013 11:01:55

8DPSK 3-DH1



Date: 2.DEC.2013 11:02:32

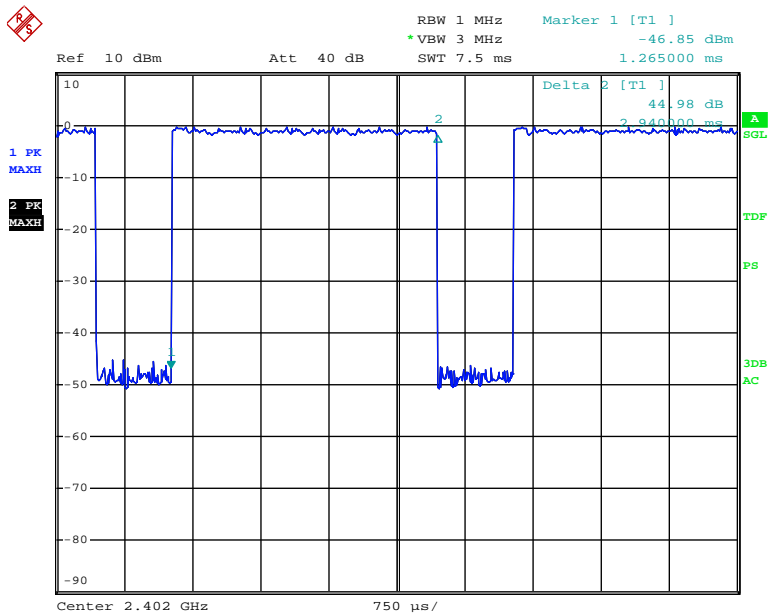
8DPSK 3-DH3



Date: 2.DEC.2013 11:02:58



8DPSK 3-DH5



Date: 2.DEC.2013 11:03:23

## 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.

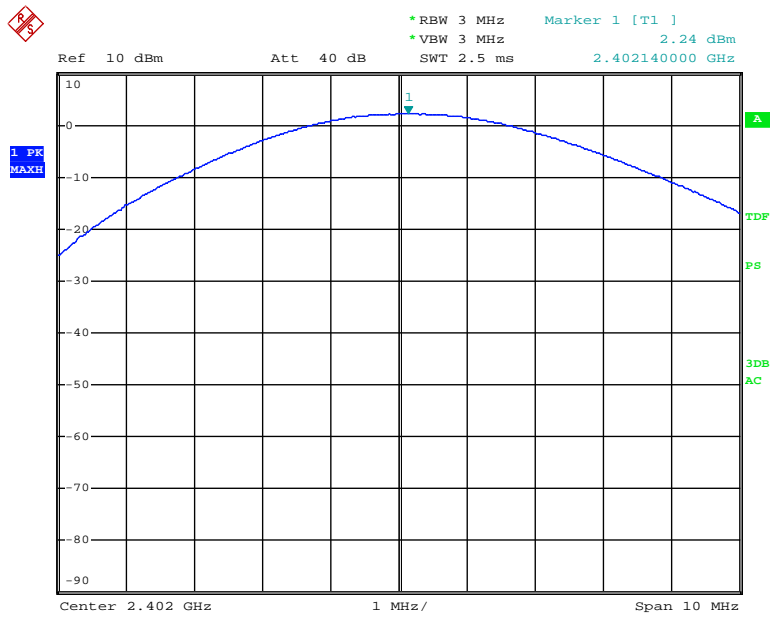
### 9.2 Measurement Results

Refer to attached data chart.

Modulation :	GFSK, $\pi/4$ -DQPSK, 8DPSK		
RBW :	3MHz	VBW :	3MHz
Spectrum Detector:	PK	Test Date :	December 02, 2013
Test By:	Sance	Test Result:	PASS
Temperature :	22 °C	Humidity :	46 %

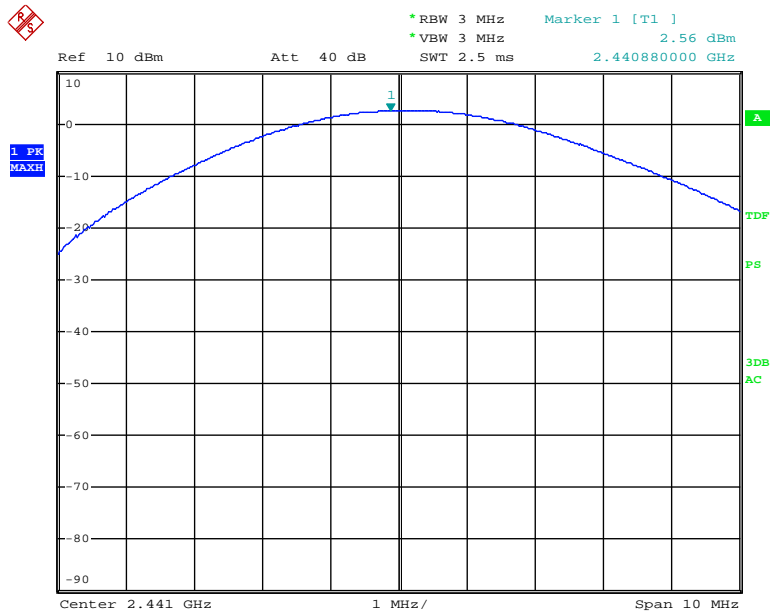
Channel Frequency (MHz)	Cable Loss dB	Peak Power output(mW)	Peak Power output(dBm)	Peak Power Limit(dBm)	Pass/Fail
GFSK					
2402.00	1.5	1.68	2.24	21	PASS
2441.00	1.5	1.80	2.56	21	PASS
2480.00	1.5	2.01	3.02	21	PASS
$\pi/4$ -DQPSK					
2402.00	1.5	1.04	0.15	21	PASS
2441.00	1.5	1.29	1.09	21	PASS
2480.00	1.5	1.27	1.05	21	PASS
8DPSK					
2402.00	1.5	1.04	0.17	21	PASS
2441.00	1.5	1.14	0.57	21	PASS
2480.00	1.5	1.28	1.07	21	PASS

GFSK Lowest Channel



Date: 2.DEC.2013 11:21:37

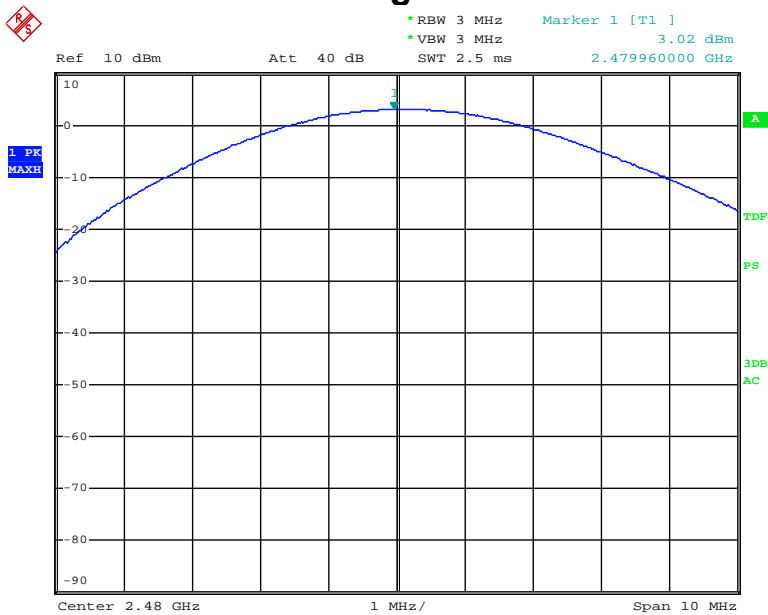
GFSK Middle Channel



Date: 2.DEC.2013 11:24:10

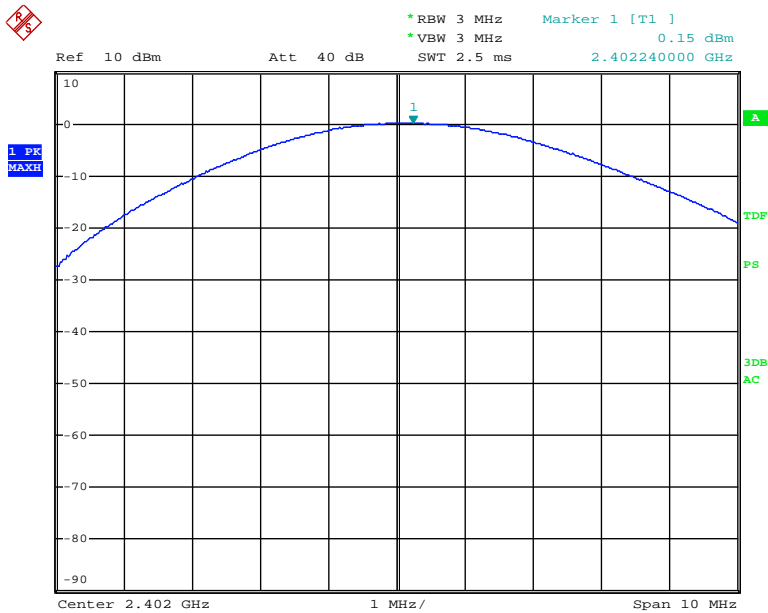


GFSK Highest Channel



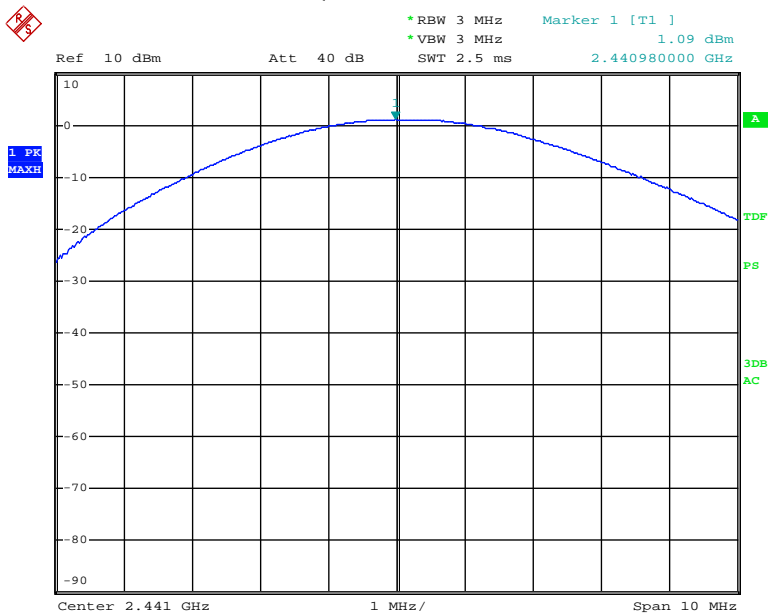
Date: 2.DEC.2013 11:26:59

$\pi/4$ -DQPSK Lowest Channel



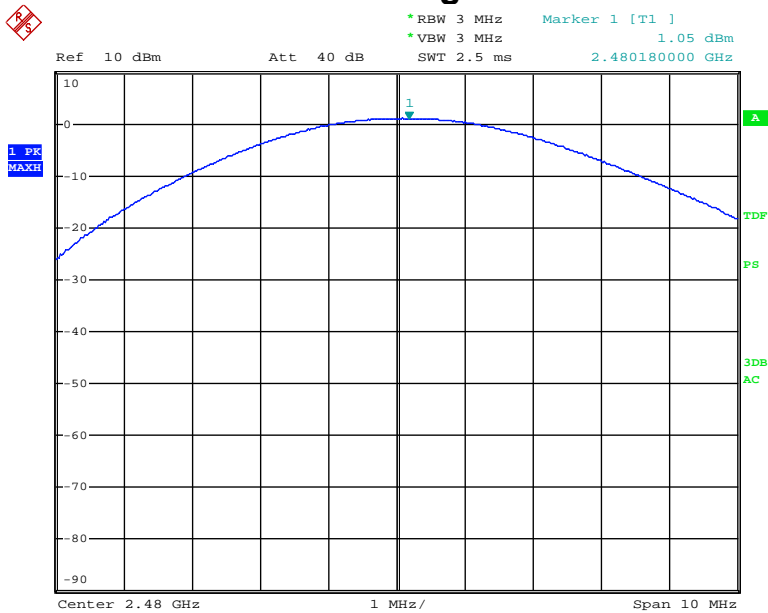
Date: 2.DEC.2013 11:22:16

$\pi/4$ -DQPSK Middle Channel



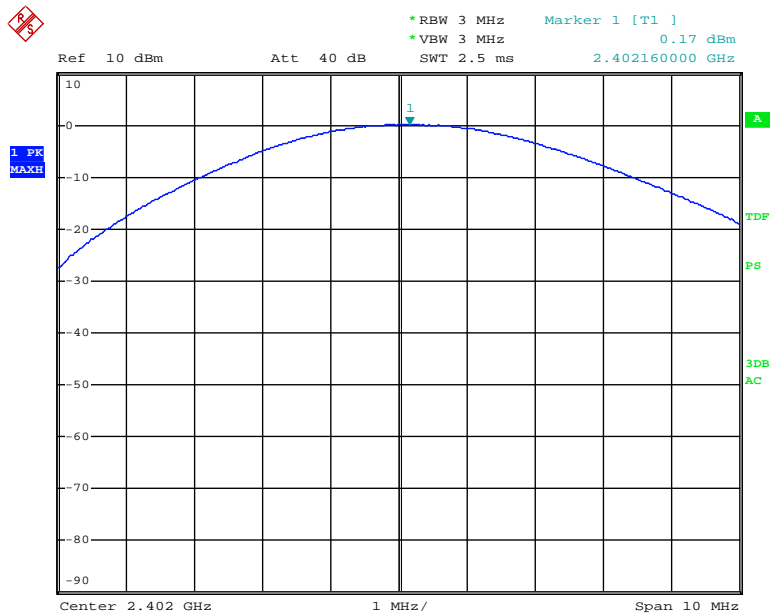
Date: 2.DEC.2013 11:23:49

$\pi/4$ -DQPSK Highest Channel



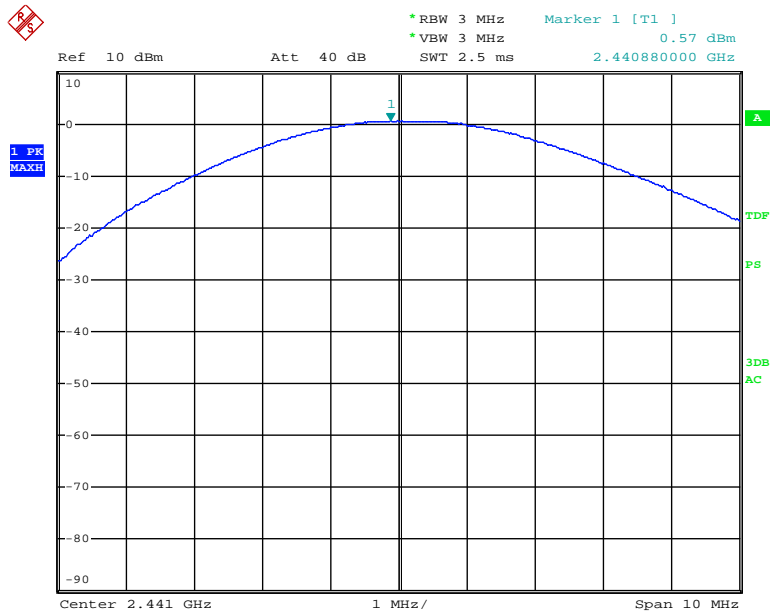
Date: 2.DEC.2013 11:24:48

8DPSK Lowest Channel



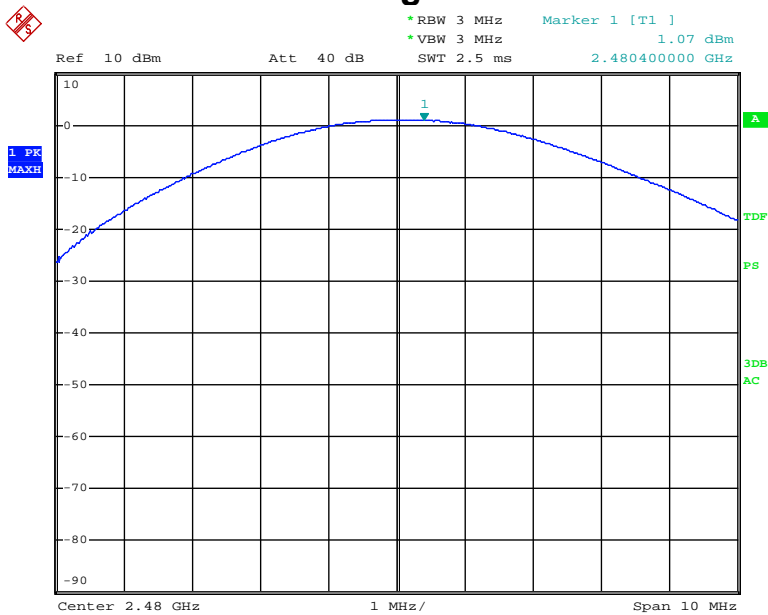
Date: 2.DEC.2013 11:22:38

8DPSK Middle Channel



Date: 2.DEC.2013 11:23:28

8DPSK Highest Channel



Date: 2.DEC.2013 11:26:42

## 10. Band Edge

### 10.1 Measurement Procedure

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

- (1) For RF Conducted: The transmitter output is connected to spectrum analyzer. The resolution bandwidth is set to 100KHz, and the video bandwidth set to 300KHz.
- (2) For Radiated Emission: Same as 4.2 Radiated Emission Measurement procedure.

### 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.

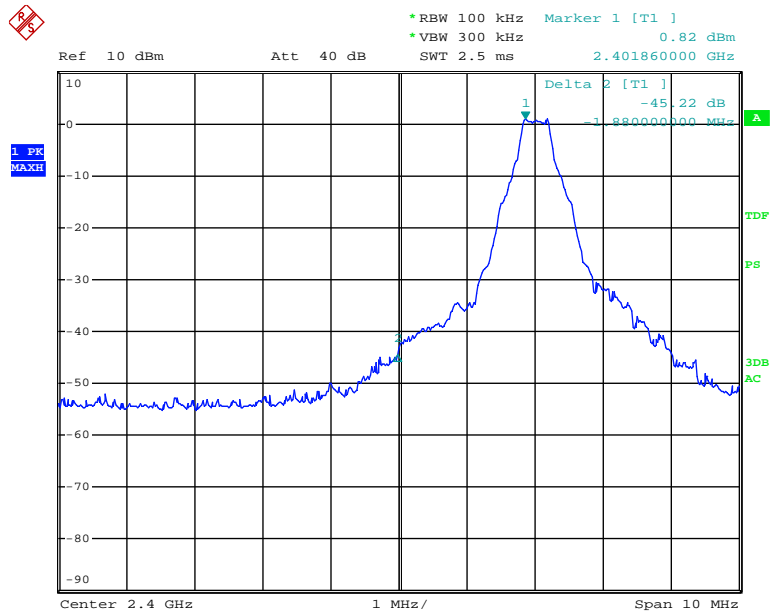
### 10.3 Measurement Results

Please see below test table and plots.  
For Radiated Emission  
The worst case: GFSK

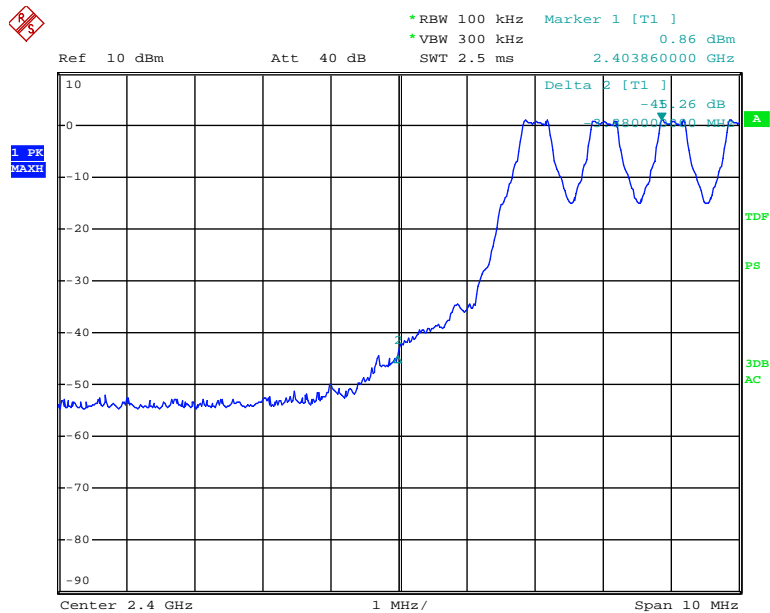
Frequency (MHz)	Polarity	Level		Limited		Margin		Result
		PK	AV	PK	AV	PK	AV	
GFSK								
2399.560	H	51.98	38.64	74.00	54.00	-22.02	-15.36	PASS
2399.560	V	46.02	38.90	74.00	54.00	-27.98	-15.10	PASS
2483.620	H	43.17	31.28	74.00	54.00	-30.83	-22.72	PASS
2483.720	V	42.33	30.17	74.00	54.00	-31.67	-23.83	PASS

For RF Conducted

GFSK Lowest Channel

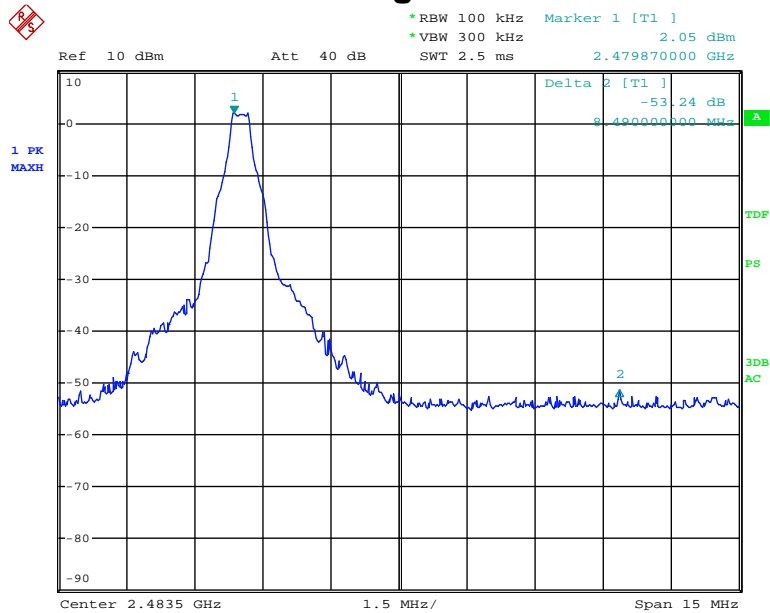


Date: 2.DEC.2013 10:36:58

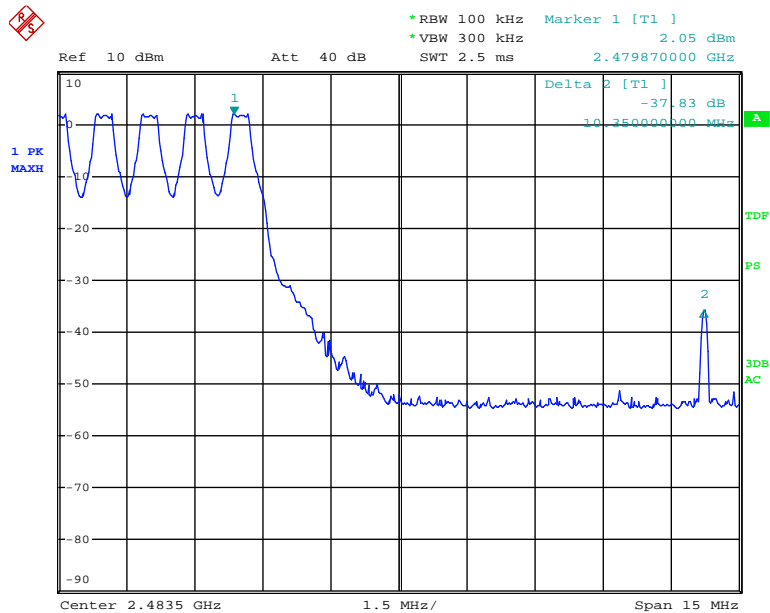


Date: 2.DEC.2013 10:39:14

GFSK Highest Channel

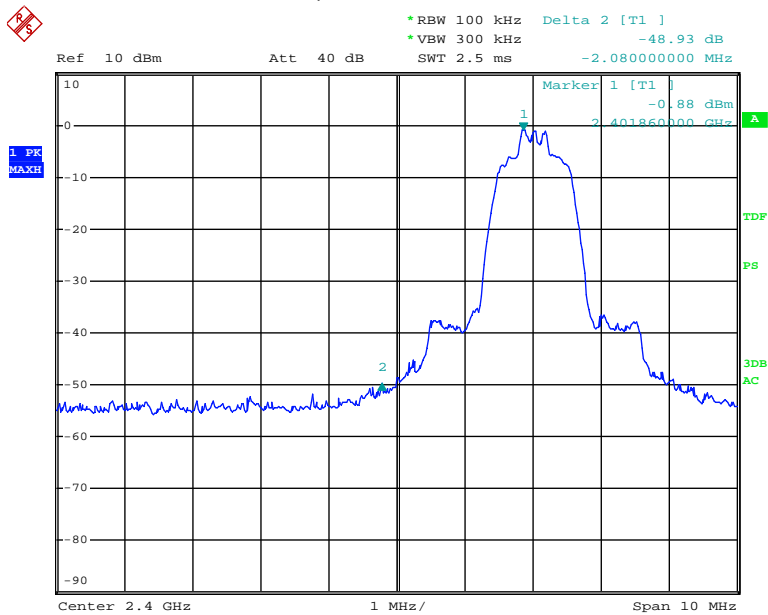


Date: 2.DEC.2013 10:47:15

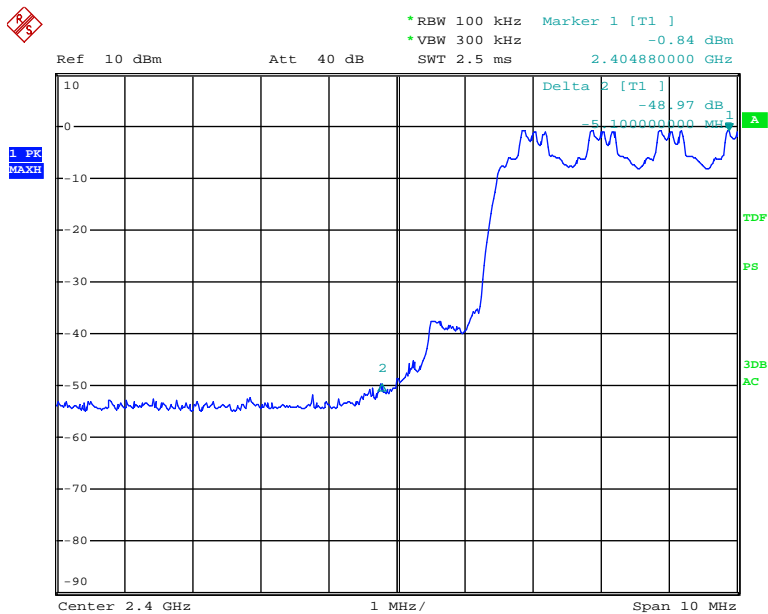


Date: 2.DEC.2013 10:48:21

$\pi/4$ -DQPSK Lowest Channel



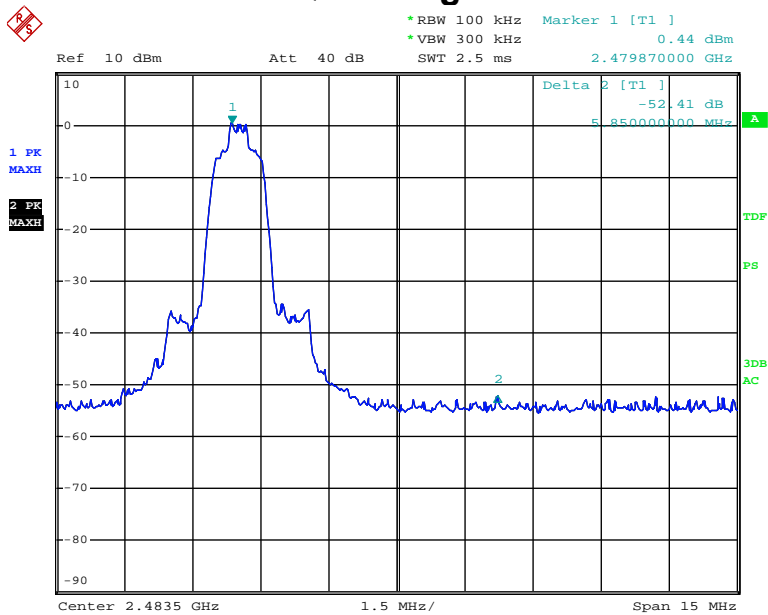
Date: 2.DEC.2013 10:40:36



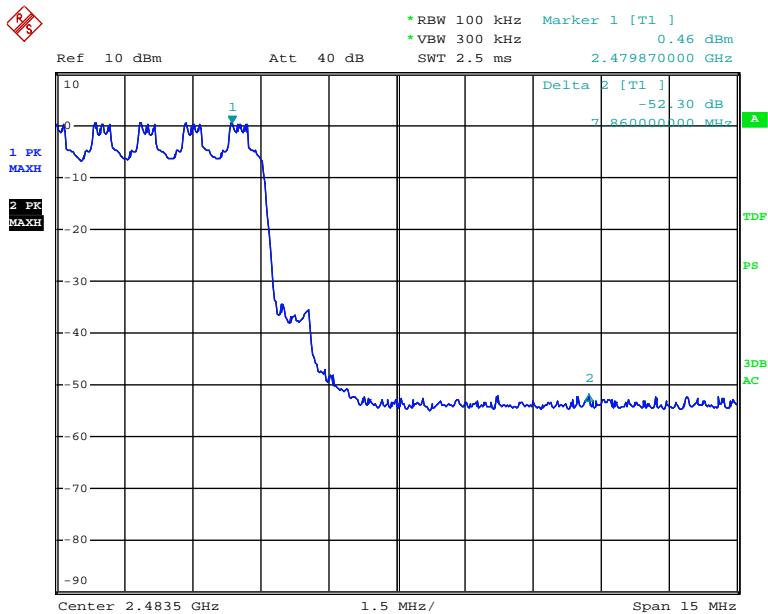
Date: 2.DEC.2013 10:42:36



$\pi/4$ -DQPSK Highest Channel

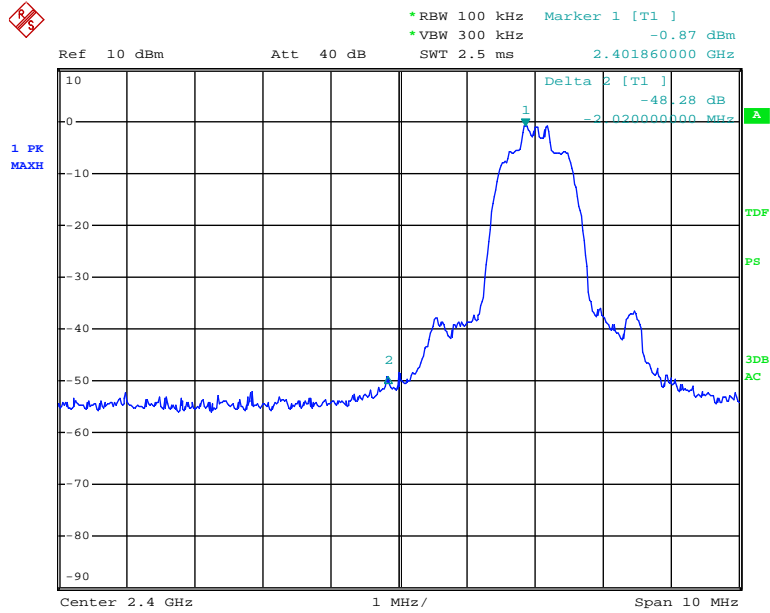


Date: 2.DEC.2013 10:50:46

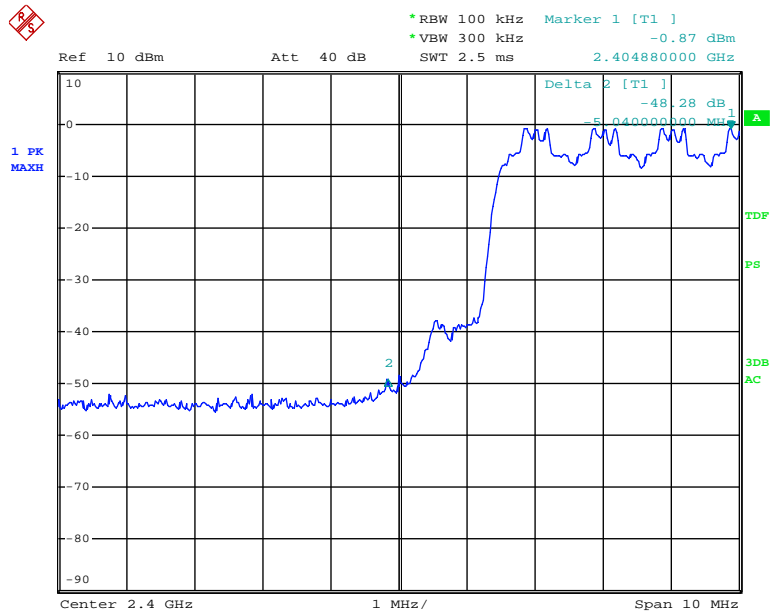


Date: 2.DEC.2013 10:52:52

## 8DPSK Lowest Channel

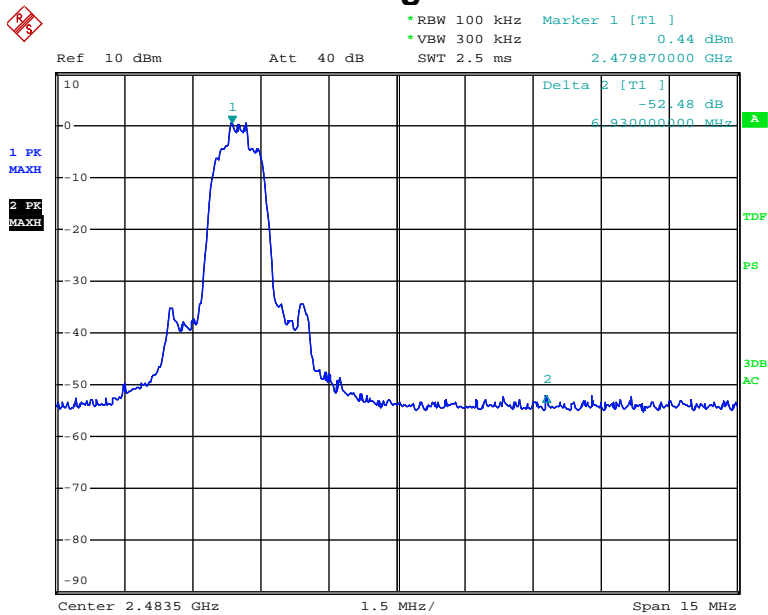


Date: 2.DEC.2013 10:43:50

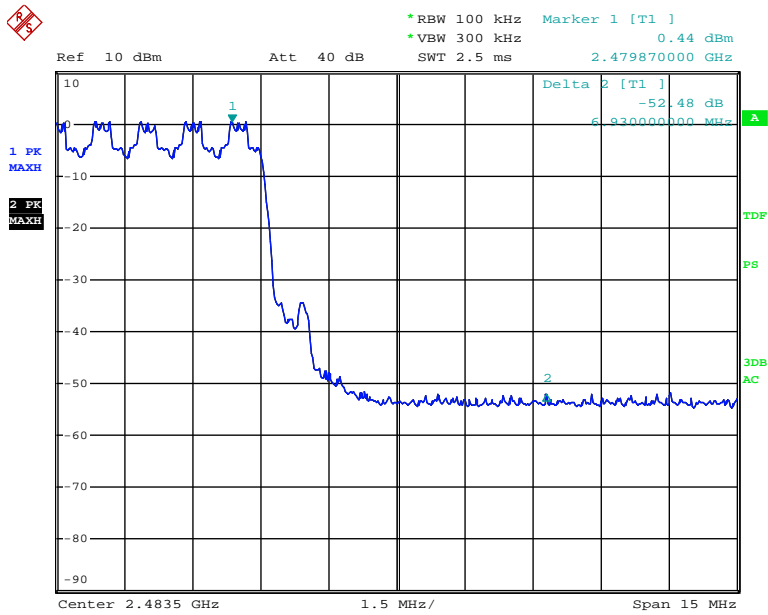


Date: 2.DEC.2013 10:45:32

8DPSK Highest Channel



Date: 2.DEC.2013 10:55:04



Date: 2.DEC.2013 10:57:45

## 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 PIFA antenna that no antenna other than that furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 2.3dBi. So, the antenna is consider meet the requirement.

## 12. Conducted Spurious Emissions

### 12.1 Measurement Procedure

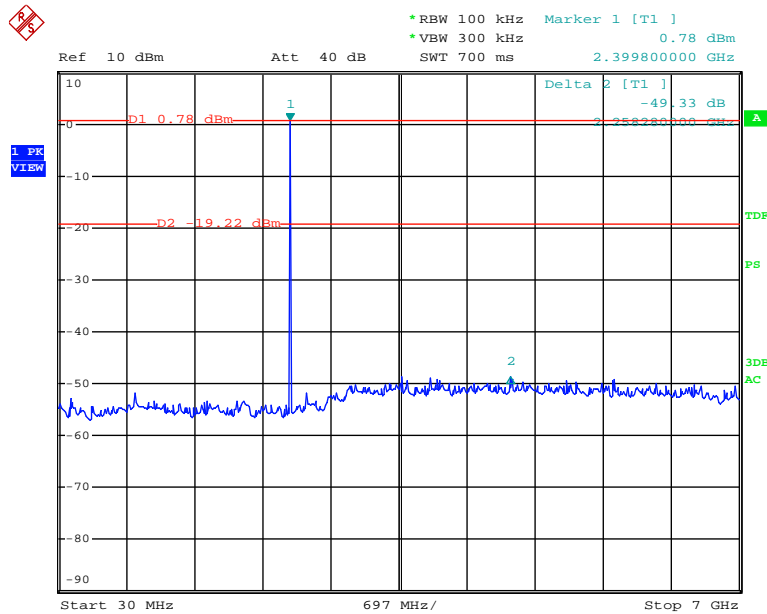
Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

The transmitter output is connected to spectrum analyzer. All spurious emission and up to 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.

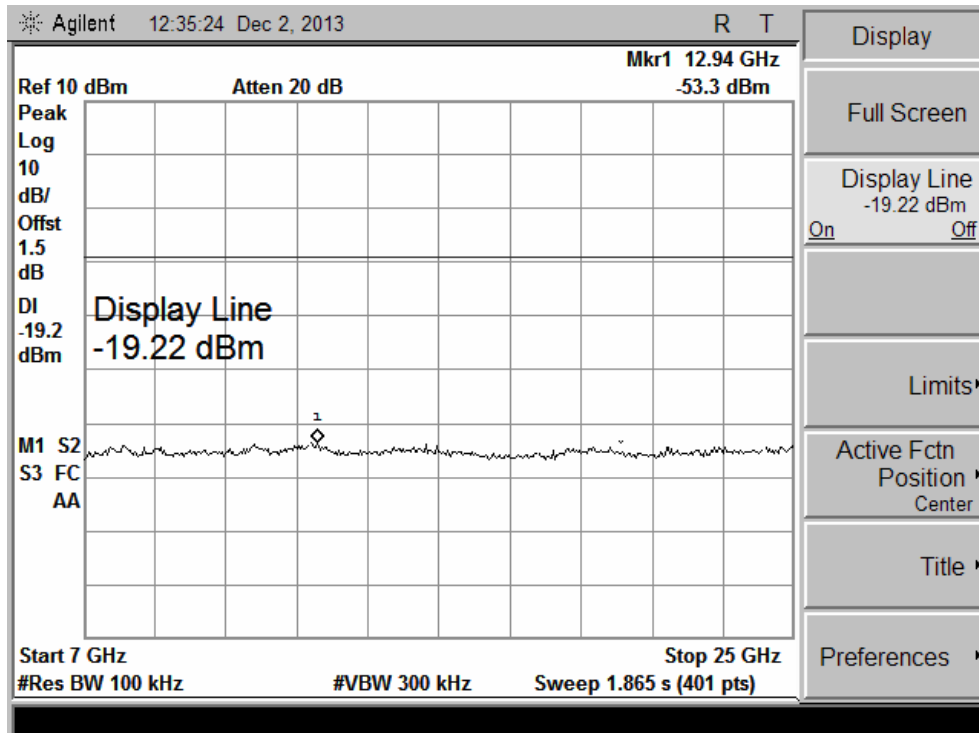
### 12.2 Measurement Results

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

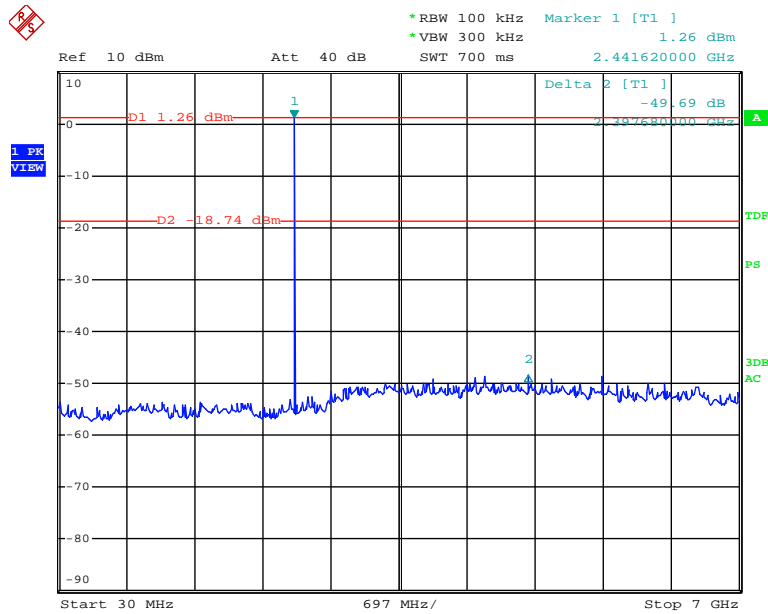
## GFSK Lowest Channel



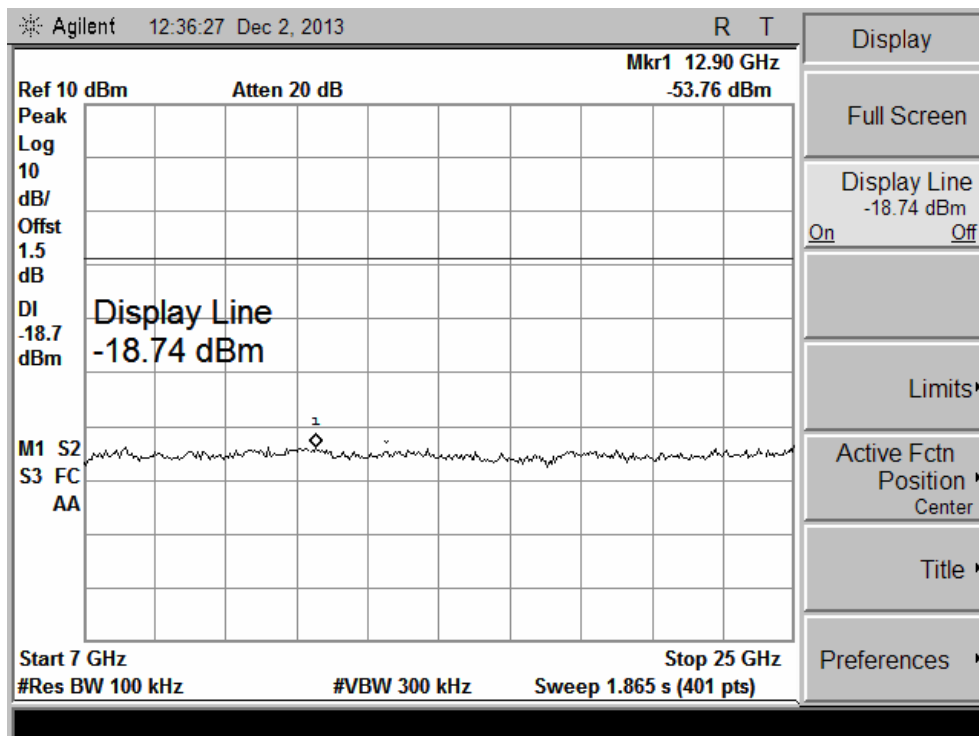
Date: 2.DEC.2013 11:12:13



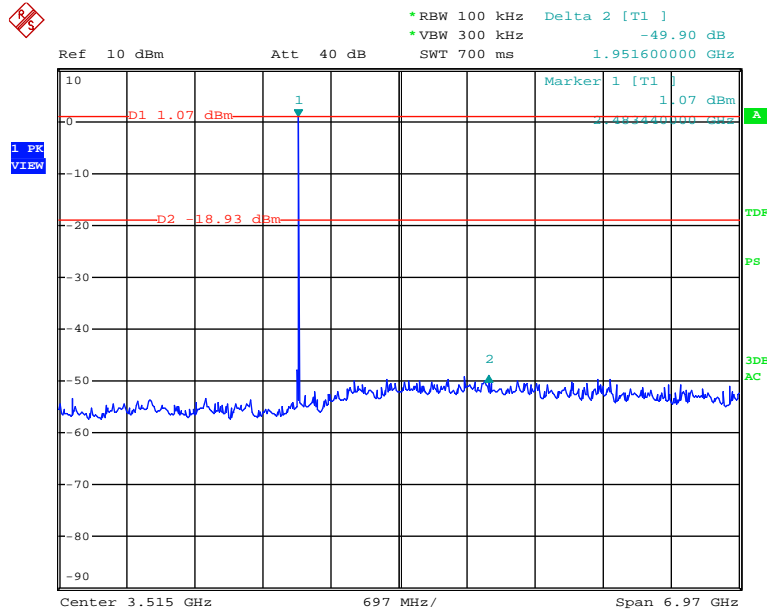
## GFSK Middle Channel



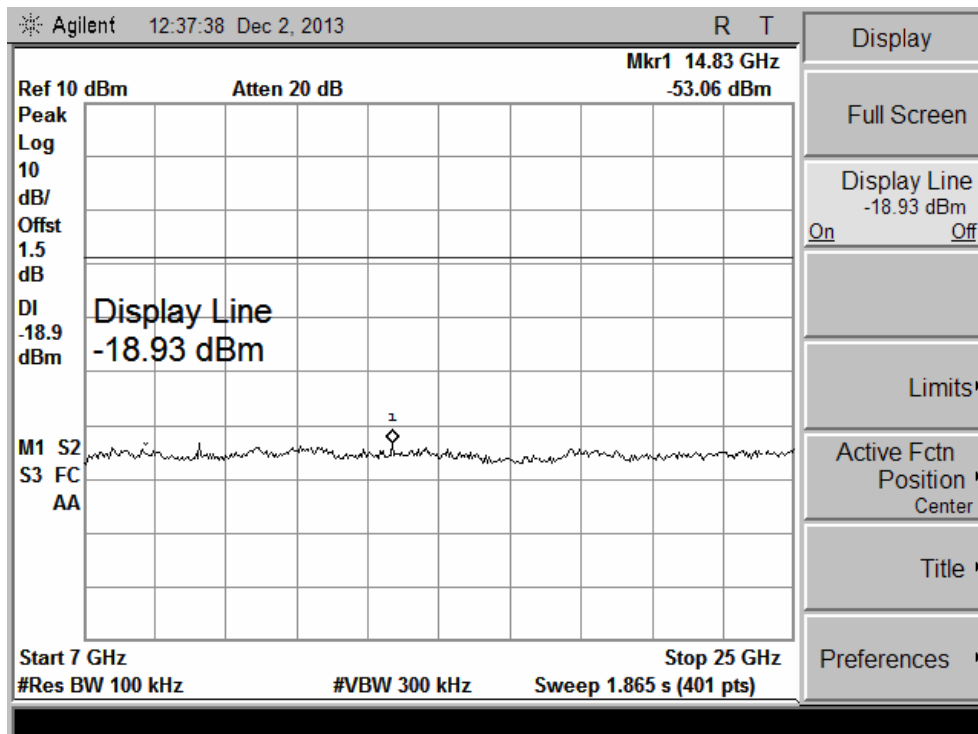
Date: 2.DEC.2013 11:13:33



## GFSK Highest Channel



Date: 2.DEC.2013 11:14:56





### 13. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	Nov.05, 2013	Nov.04, 2014
Antenna	Schwarzbeck	VULB9162	9162-010	Nov. 28, 2013	Nov. 27, 2014
Positioning Controller	UC	UC 3000	N/A	N/A	N/A
Color Monitor	SUNSCO	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. 05, 2013	Nov. 04, 2014
Cable	Huber+Suhner	CIL02	N/A	Nov. 05, 2013	Nov. 04, 2014
Power Amplifier	HP	HP 8447D	1145A00203	Nov. 05, 2013	Nov. 04, 2014
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	Oct. 24, 2013	Oct. 23, 2014
Horn Antenna	COM-Power	AH-118	071078	Nov. 17, 2013	Nov. 16, 2014
Loop antenna	Daze	ZA30900A	0708	Oct.16, 2013	Oct.15, 2014
Spectrum Analyzer	Agilent	E4408B	MY414407D	Apr. 29, 2013	Apr. 28, 2014
Pre-Amplifier	Agilent	8449B	3008A02964	Apr.19, 2013	Apr.18, 2014
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	Nov. 09, 2013	Nov. 08, 2014

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