

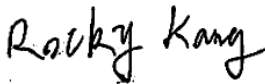

# FCC PART 15.247 TEST REPORT

For

## Hytera Communications Corporation Ltd.

HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen, China

**FCC ID: YAMX1PU2**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Digital Portable Radio
<b>Test Engineer:</b> Rocky Kang	
<b>Report Number:</b> RSZ130508003-00A	
<b>Report Date:</b> 2013-06-18	
<b>Reviewed By:</b> RF Leader	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Hytera Communications Corporation Ltd.*'s product, model number: *X1p U(2)* (FCC ID: *YAMX1PU2*) or the "EUT" in this report was a *Digital Portable Radio*, which was measured approximately: 21.0 cm (L) x 6.1 cm (W) x 2.4 cm (H), rated with input voltage: DC 7.4V battery.

*\* All measurement and test data in this report was gathered from production sample serial number: 1305031 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-05-08.*

### Objective

This test report is prepared on behalf of *Hytera Communications Corporation Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209 and 15.247 rules.

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

FCC Part 90 TNF submissions with FCC ID: *YAMX1PU2*.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

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### Description of Test Configuration

The system was configured for testing in a testing mode which was controlled by bluetooth test software.

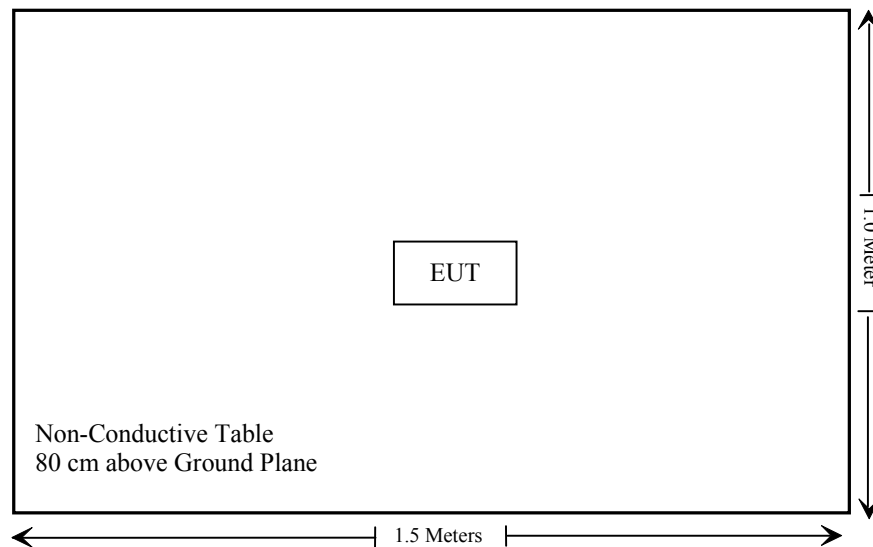
### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

CSR Blue Test 3

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Not Applicable
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliance
§15.247(a)(1)	20 dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band edges	Compliance

Not Applicable: the EUT is powered by battery.

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## **FCC §15.247 (i) & §2.1093 – RF EXPOSURE**

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### **Applicable Standard**

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v05

### **Result**

According to FCC KDB 447498 D01 General RF Exposure Guidance v05 generic portable criteria

The distance between antenna and test point is 5 mm

The Max output power: 1.143 mW

According to the Appendix A of KDB 447498, the exclusion thresholds for 2450 MHz is 10 mW

### **Conclusion:**

The time-averaged output power is 1.143 mW < the exclusion thresholds is 10 mW

Stand-alone SAR evaluation is not required.

The other RF exposure data please refer to the SAR report, report No.: RSZ130508003-20A.

**FCC §15.203 – ANTENNA REQUIREMENT**

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**Applicable Standard**

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

**Antenna Connector Construction**

The EUT has an integrated antenna arrangement for bluetooth, which was permanently attached, the antenna gain is -0.5dBi, fulfill the requirement of this section. Please refer to the internal photos.

**Result:** Compliance.



## **FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS**

### **Applicable Standard**

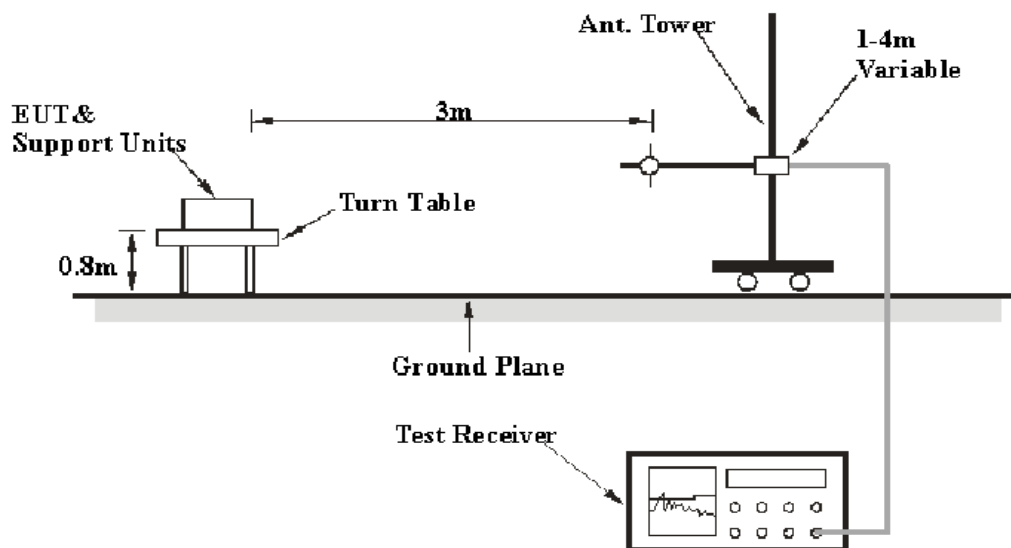
FCC §15.205; §15.209; §15.247(d)

### **Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) will not be taken into consideration for the test data recorded in the report

### **EUT Setup**



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\begin{aligned}\text{Corrected Factor} &= \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} \\ \text{Corrected Amplitude} &= \text{Meter Reading} + \text{Corrected Factor}\end{aligned}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2012-11-24	2013-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
SUPER ULTRA	Amplifier	ZVA-213+	N/A	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2010-10-14	2013-10-13

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Results Summary**

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

**12.46 dB at 7206 MHz in the Vertical polarization**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25°C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

*EUT operation mode: Transmitting*

**30 MHz ~25 GHz:** (Scan with GFSK,  $\pi/4$ -DQPSK, 8-DPSK, the worst case is BDR Mode (GFSK))

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBuV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
2402	83.54	PK	98	1.5	H	6.13	89.67	/	/
2402	39.22	Ave.	98	1.5	H	6.13	45.35	/	/
2402	82.48	PK	154	1.3	V	6.13	88.61	/	/
2402	37.57	Ave.	154	1.3	V	6.13	43.70	/	/
7206	24.48	Ave.	213	1.4	V	17.06	41.54	54.00	12.46
9608	20.68	Ave.	181	1.7	V	19.28	39.96	54.00	14.04
7206	43.14	PK	213	1.4	V	17.06	60.20	74.00	14.20
4804	21.33	Ave.	137	1.5	H	12.40	33.73	54.00	20.27
9608	33.09	PK	181	1.7	V	19.28	52.37	74.00	21.63
2496	23.50	Ave.	240	1.4	V	7.59	31.09	54.00	22.91
2331	23.54	Ave.	225	1.6	H	5.48	29.02	54.00	24.98
4804	36.52	PK	137	1.5	H	12.40	48.92	74.00	25.08
2489	20.67	Ave.	113	1.5	H	7.21	27.88	54.00	26.12
2496	37.37	PK	240	1.4	V	7.59	44.96	74.00	29.04
2489	33.78	PK	113	1.5	H	7.21	40.99	74.00	33.01
2331	34.35	PK	225	1.6	H	5.48	39.83	74.00	34.17
Middle Channel (2441 MHz)									
2441	84.24	PK	159	1.6	H	7.21	91.45	/	/
2441	39.36	Ave.	159	1.6	H	7.21	46.57	/	/
2441	83.48	PK	324	1.4	V	7.21	90.69	/	/
2441	37.48	Ave.	324	1.4	V	7.21	44.69	/	/
7323	43.20	PK	105	1.5	V	16.49	59.69	74.00	14.31
7323	22.54	Ave.	105	1.5	V	16.49	39.03	54.00	14.97
9764	19.44	Ave.	153	1.6	V	19.29	38.73	54.00	15.27
9764	35.54	PK	153	1.6	V	19.29	54.83	74.00	19.17
4882	20.66	Ave.	127	1.4	V	12.46	33.12	54.00	20.88
2497	23.29	Ave.	138	1.5	H	7.59	30.88	54.00	23.12
2487	21.77	Ave.	174	1.6	H	7.21	28.98	54.00	25.02
2357	23.43	Ave.	172	1.5	V	5.48	28.91	54.00	25.09
4882	35.05	PK	127	1.4	V	12.46	47.51	74.00	26.49
2497	37.19	PK	138	1.5	H	7.59	44.78	74.00	29.22
2487	36.78	PK	174	1.6	H	7.21	43.99	74.00	30.01
2357	32.92	PK	172	1.5	V	5.48	38.40	74.00	35.60

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBuV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
2480	83.93	PK	190	1.2	H	7.21	91.14	/	/
2480	41.82	Ave.	190	1.2	H	7.21	49.03	/	/
2480	80.19	PK	217	1.3	V	7.21	87.40	/	/
2480	38.92	Ave.	217	1.3	V	7.21	46.13	/	/
7440	24.50	Ave.	253	1.5	H	15.90	40.40	54.00	13.60
9920	19.36	Ave.	110	1.6	H	19.38	38.74	54.00	15.26
4960	20.19	Ave.	201	1.6	V	12.50	32.69	54.00	21.31
9920	33.27	PK	110	1.6	H	19.38	52.65	74.00	21.35
7440	34.21	PK	253	1.5	H	15.90	50.11	74.00	23.89
2484	22.15	Ave.	137	1.3	H	7.21	29.36	54.00	24.64
2380	22.48	Ave.	56	1.6	H	6.13	28.61	54.00	25.39
4960	35.90	PK	201	1.6	V	12.50	48.40	74.00	25.60
2498	20.26	Ave.	224	1.4	H	7.59	27.85	54.00	26.15
2484	38.13	PK	137	1.3	H	7.21	45.34	74.00	28.66
2380	36.24	PK	56	1.6	H	6.13	42.37	74.00	31.63
2498	34.11	PK	224	1.4	H	7.59	41.70	74.00	32.30

**FCC §15.247(a) (1)-CHANNEL SEPARATION TEST****Applicable Standard**

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

**Test Procedure**

1. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace
3. Measure the channel separation.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25°C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

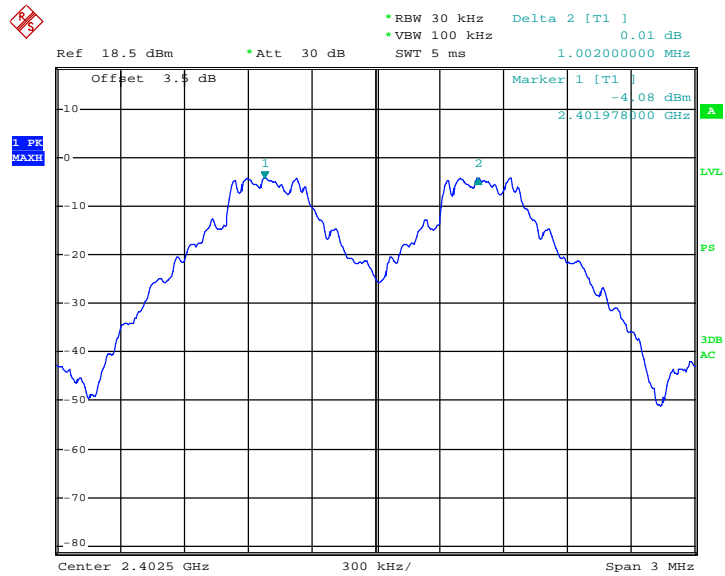
*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	$\geq$ Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.002	0.632	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.635	Pass
	Adjacent	2442			
	High	2480	1.008	0.635	Pass
	Adjacent	2479			
EDR ( $\pi/4$ -DQPSK)	Low	2402	1.002	0.832	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.893	Pass
	Adjacent	2442			
	High	2480	1.002	0.872	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.002	0.851	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.851	Pass
	Adjacent	2442			
	High	2480	1.002	0.851	Pass
	Adjacent	2479			

Note: Limit = 20 dB bandwidth \*2/3

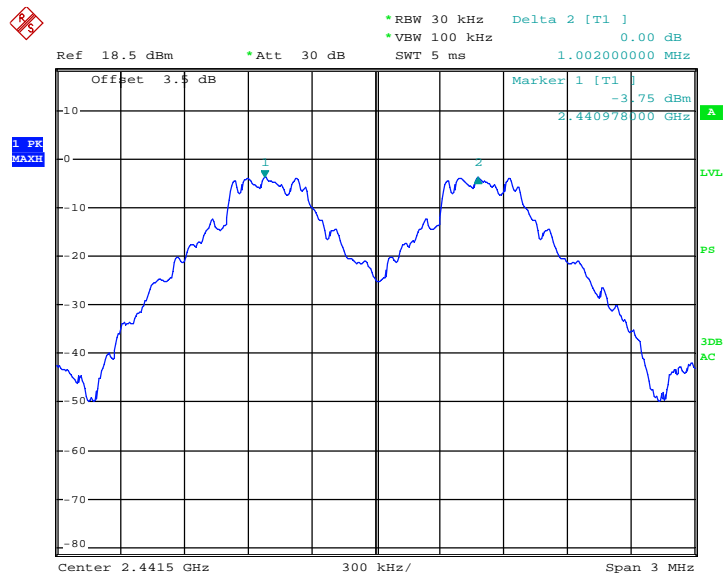
### BDR (GFSK): Low Channel



EUT

Date: 8.JUN.2013 16:57:00

### BDR (GFSK): Middle Channel

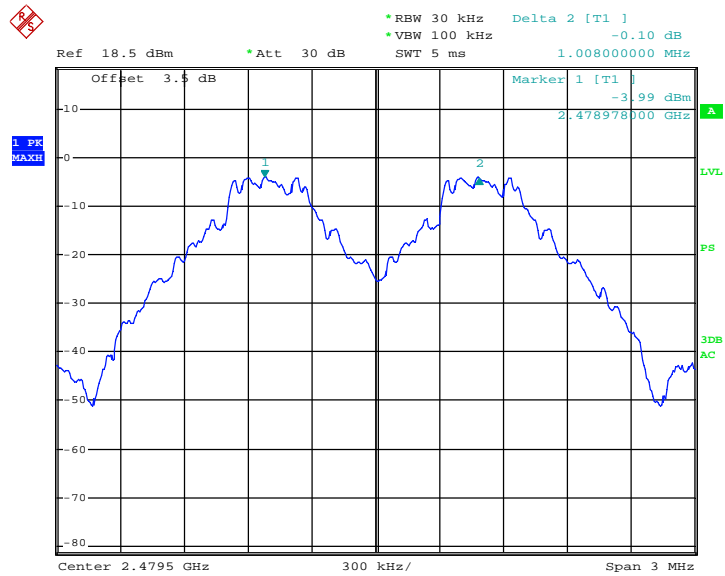


EUT

Date: 8.JUN.2013 16:58:18



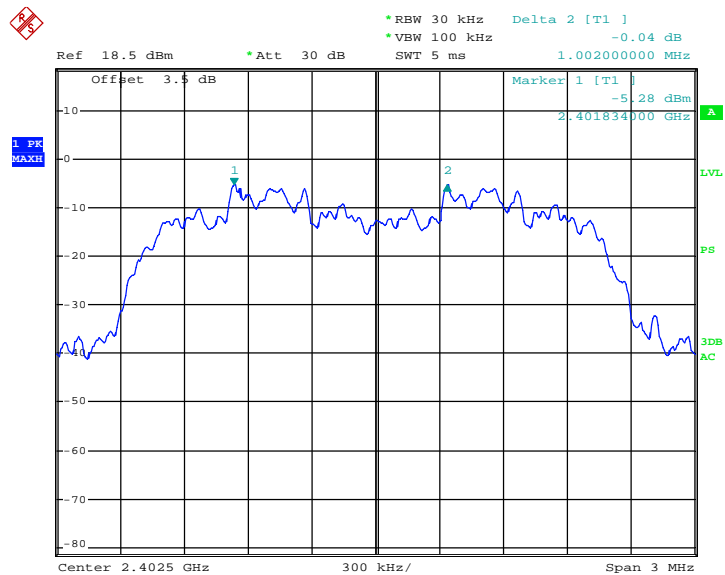
### BDR (GFSK): High Channel



EUT

Date: 8.JUN.2013 16:59:12

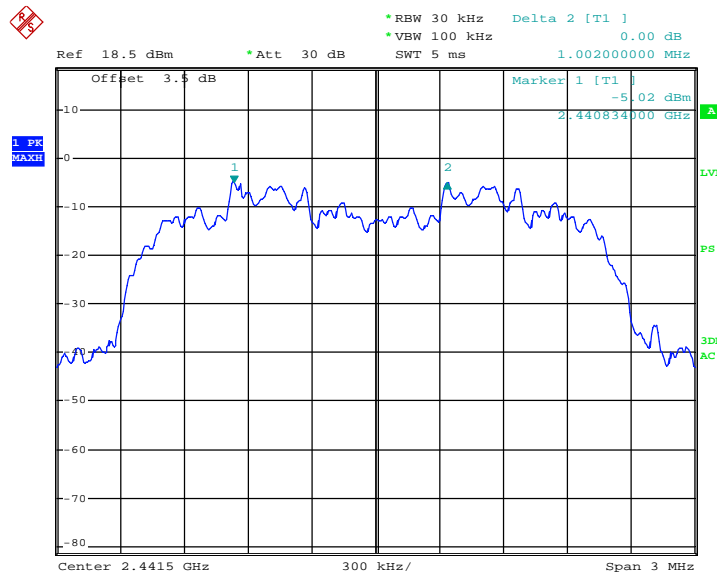
### EDR ( $\pi/4$ -DQPSK): Low Channel



EUT

Date: 8.JUN.2013 17:02:38

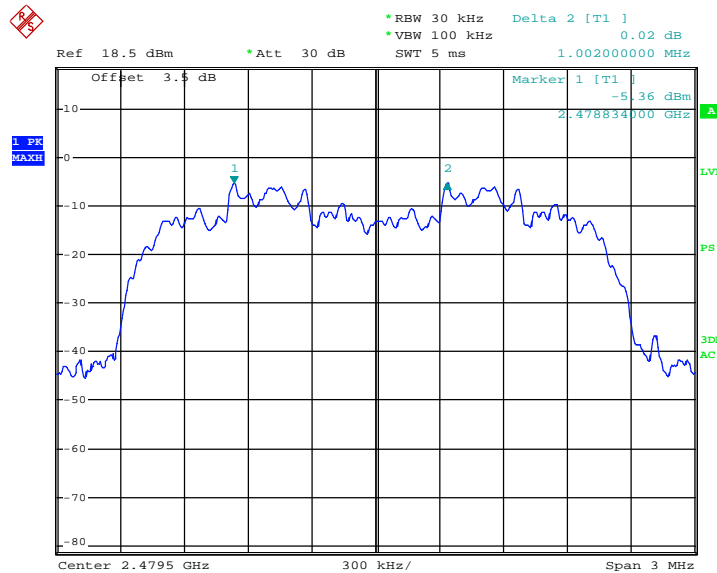
### EDR ( $\pi/4$ -DQPSK): Middle Channel



EUT

Date: 8.JUN.2013 17:01:46

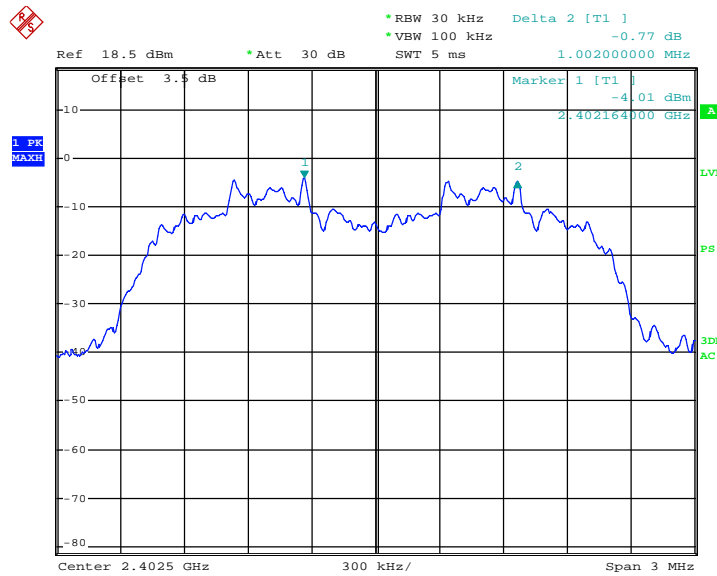
### EDR ( $\pi/4$ -DQPSK): High Channel



EUT

Date: 8.JUN.2013 17:00:50

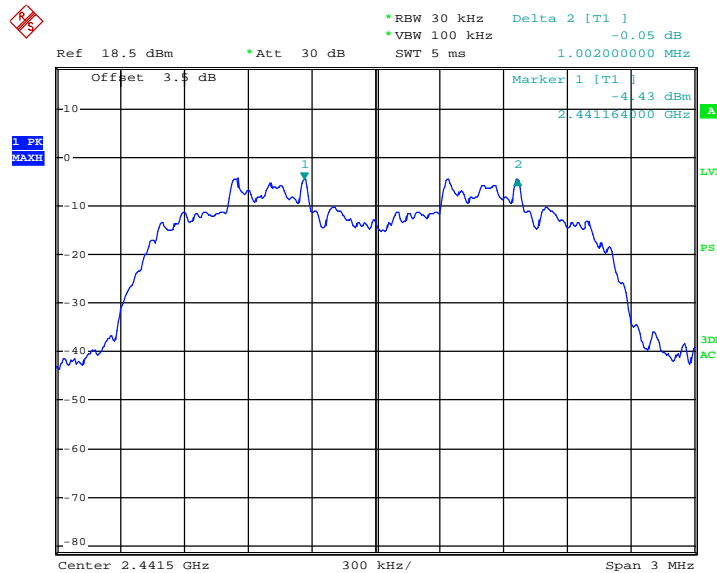
### EDR (8DPSK): Low Channel



EUT

Date: 8.JUN.2013 17:03:37

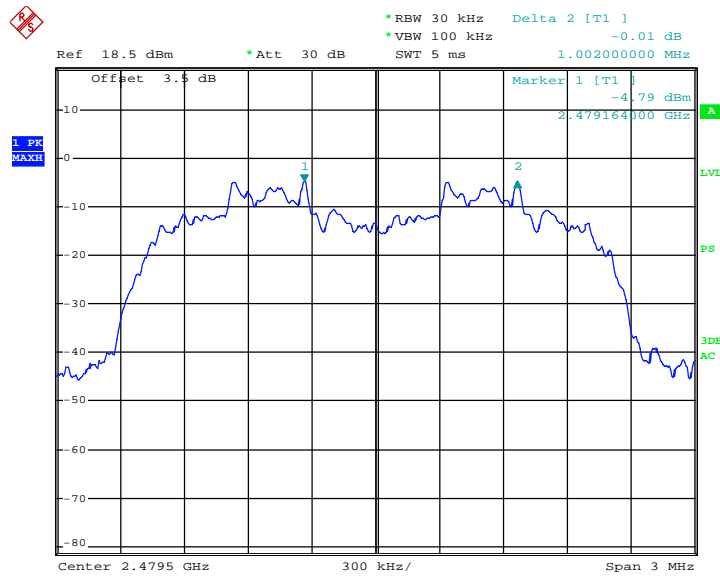
### EDR (8DPSK): Middle Channel



EUT

Date: 8.JUN.2013 17:04:39

### EDR (8DPSK): High Channel



EUT

Date: 8.JUN.2013 17:05:27

**FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH****Applicable Standard**

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

**Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.948
	Middle	2441	0.952
	High	2480	0.952
EDR ( $\pi/4$ -DQPSK)	Low	2402	1.248
	Middle	2441	1.340
	High	2480	1.308
EDR (8DPSK)	Low	2402	1.276
	Middle	2441	1.276
	High	2480	1.276

Ref 18.5 dBm      \*Att 30 dB      Delta 2 0.94 dB      948.00000000 kHz

Offset 3.5 dB      OBW856.00000000 kHz      Marker 1 [T1 ]      -29.70 dBm      A

2.401524000 GHz      Temp 1 [T1 OBW]      -25.54 dBm      LVL

2.401568000 GHz      Temp 2 [T1 OBW]      -29.71 dBm      PS

2.402424000 GHz      Tc2      3D6

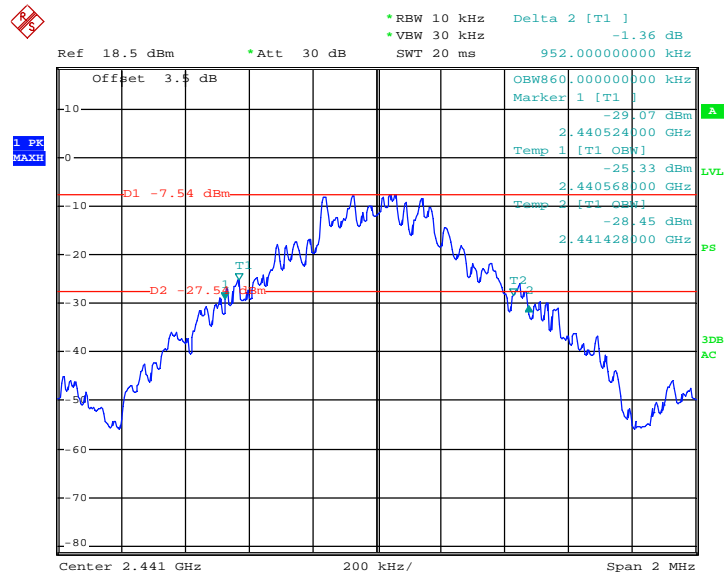
D1 -7.86 dBm      D2 -27.86 dBm      AC

Center 2.402 GHz      200 kHz/      Span 2 MHz

1 PK MAXH

Date: 8.JUN.2013 16:53:14

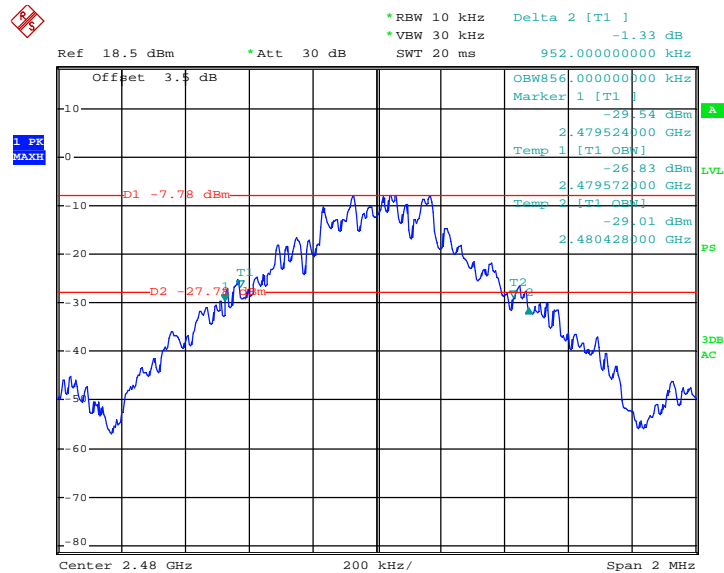
BDR (GFSK): Middle Channel



EUT

Date: 8.JUN.2013 16:51:11

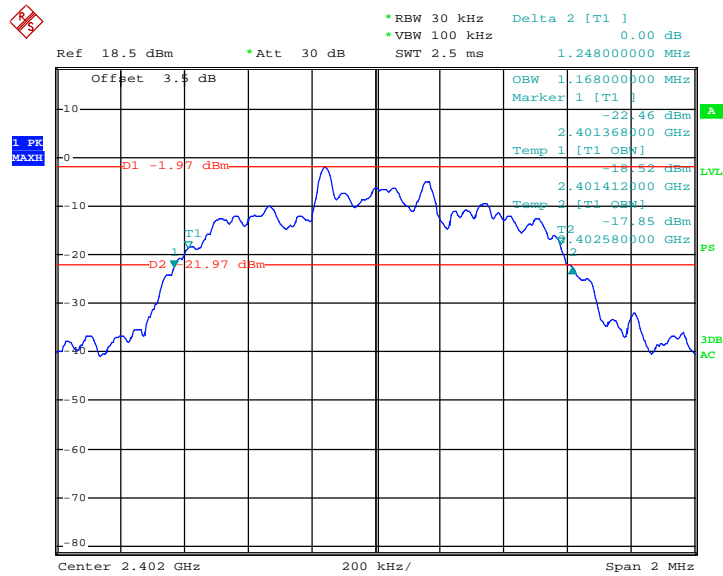
BDR (GFSK): High Channel



EUT

Date: 8.JUN.2013 16:48:53

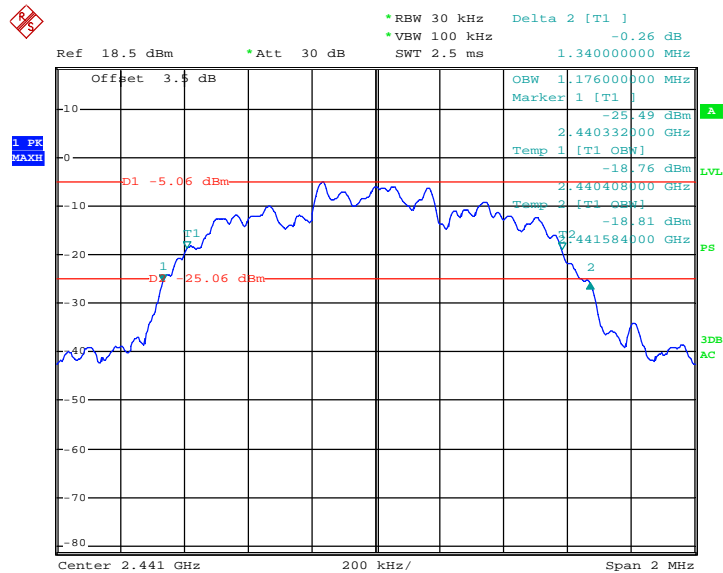
### EDR ( $\pi/4$ -DQPSK): Low Channel



EUT

Date: 8.JUN.2013 16:42:09

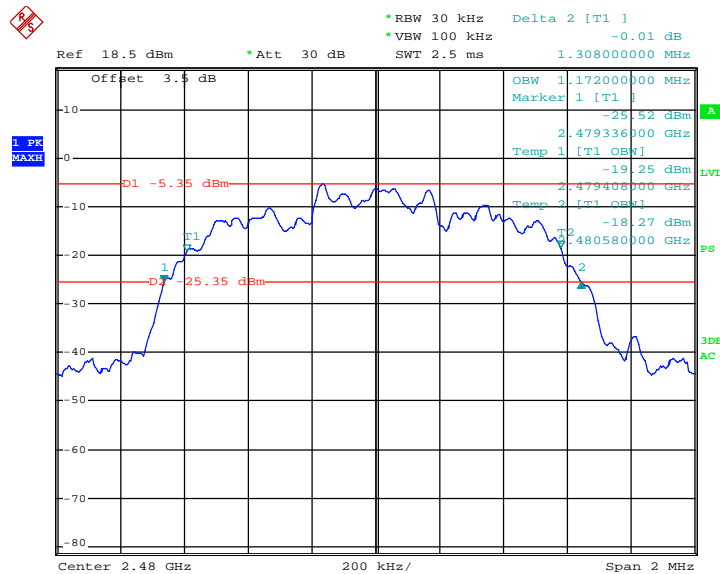
### EDR ( $\pi/4$ -DQPSK): Middle Channel



EUT

Date: 8.JUN.2013 16:43:38



EDR ( $\pi/4$ -DQPSK): High Channel

EUT

Date: 8.JUN.2013 16:45:12

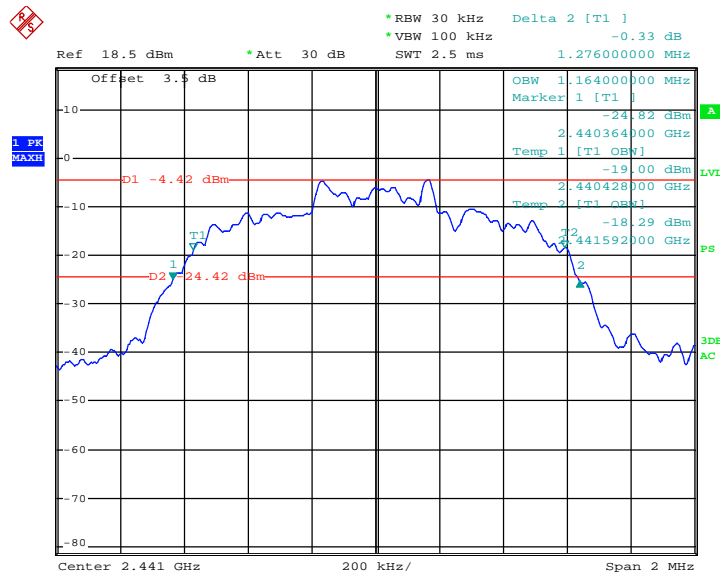
## EDR (8DPSK): Low Channel



EUT

Date: 8.JUN.2013 16:40:16

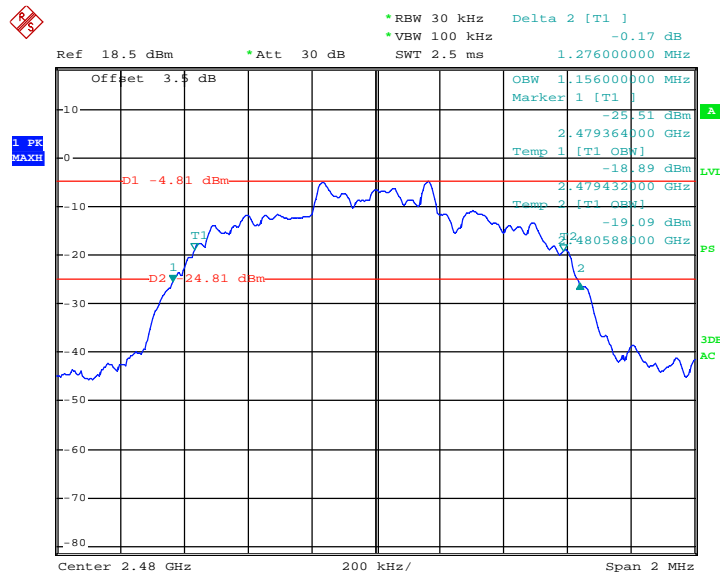
## EDR (8DPSK): Middle Channel



EUT

Date: 8.JUN.2013 16:38:54

## EDR (8DPSK): High Channel



EUT

Date: 8.JUN.2013 16:37:11

**FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST****Applicable Standard**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

**Test Procedure**

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the max-hold function record the quantity of the channel.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

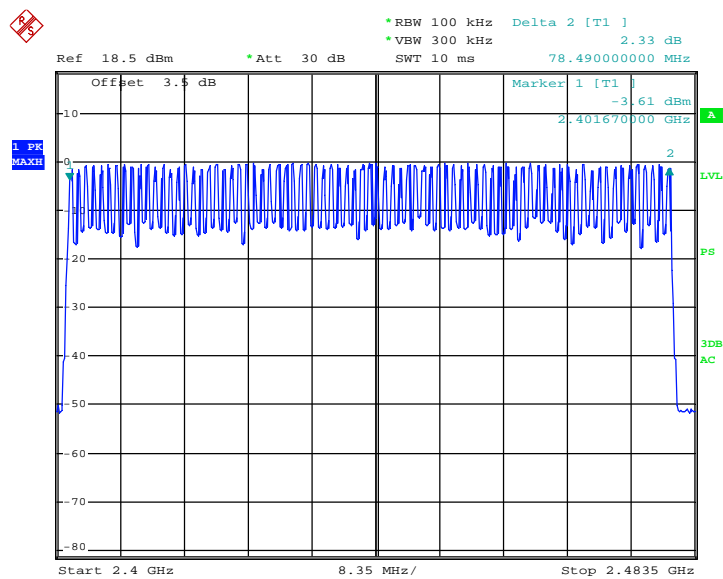
Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

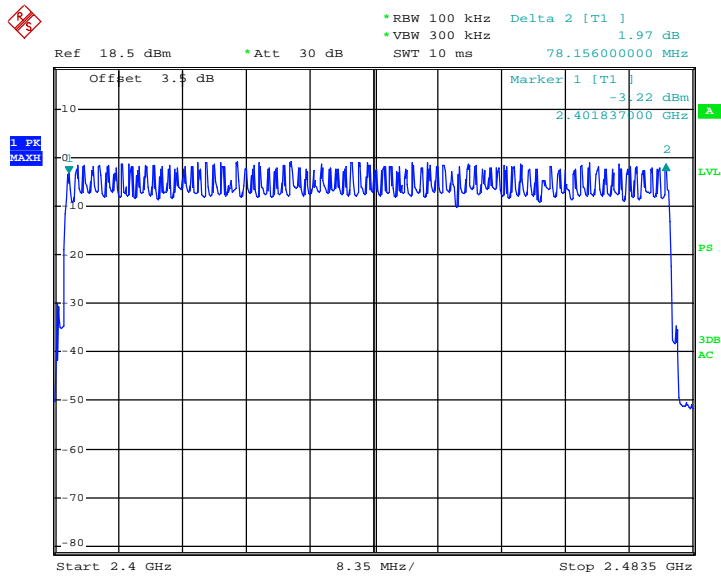
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

**BDR (GFSK): Number of Hopping Channels**

EUT

Date: 8.JUN.2013 17:25:30

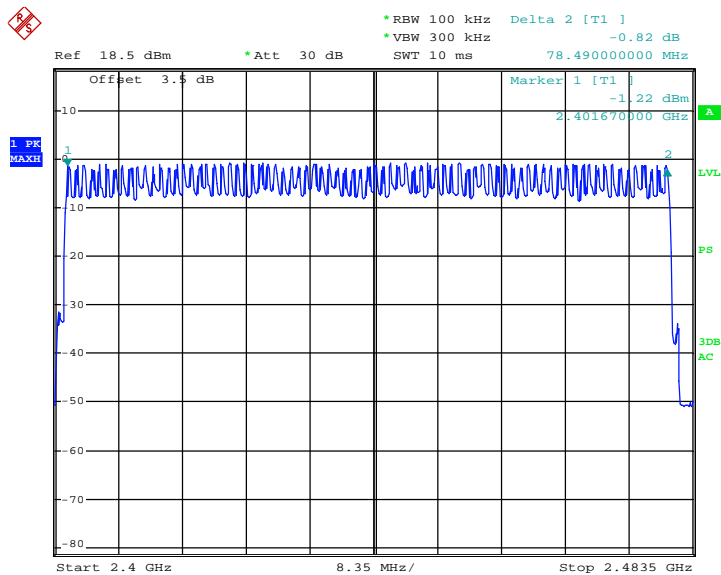
### EDR ( $\pi/4$ -DQPSK): Number of Hopping Channels



EUT

Date: 8.JUN.2013 17:17:55

### EDR (8DPSK): Number of Hopping Channels



EUT

Date: 8.JUN.2013 17:23:13

**FCC §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME)****Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

**Test Procedure**

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell time = Pulse time\*hop rate/number of hopping channels\*31.6S

Hop rate=1600/S

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

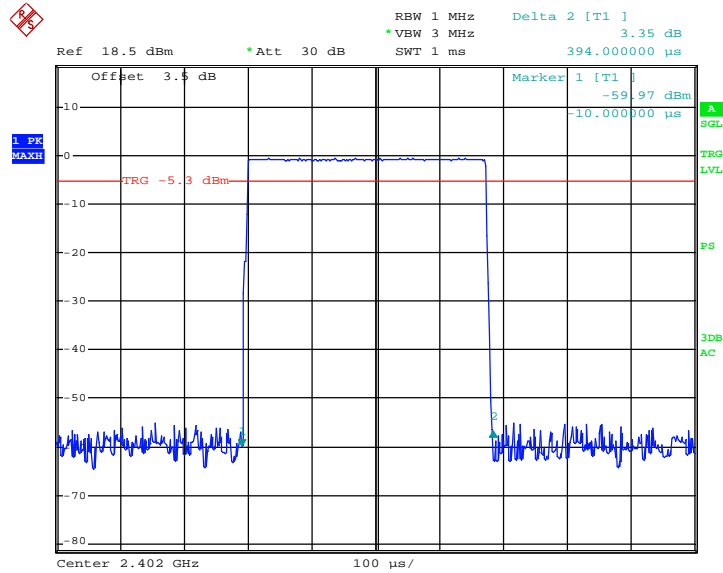
*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.394	0.126	0.4	Pass
		Middle	0.394	0.126	0.4	Pass
		High	0.394	0.126	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.666	0.267	0.4	Pass
		Middle	1.666	0.267	0.4	Pass
		High	1.666	0.267	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.916	0.311	0.4	Pass
		Middle	2.916	0.311	0.4	Pass
		High	2.916	0.311	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR ( $\pi/4$ -DQPSK)	DH 1	Low	0.398	0.127	0.4	Pass
		Middle	0.398	0.127	0.4	Pass
		High	0.398	0.127	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.670	0.267	0.4	Pass
		Middle	1.670	0.267	0.4	Pass
		High	1.670	0.267	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.930	0.313	0.4	Pass
		Middle	2.930	0.313	0.4	Pass
		High	2.930	0.313	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	DH 1	Low	0.398	0.127	0.4	Pass
		Middle	0.400	0.128	0.4	Pass
		High	0.400	0.128	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.666	0.267	0.4	Pass
		Middle	1.666	0.267	0.4	Pass
		High	1.666	0.267	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.916	0.311	0.4	Pass
		Middle	2.920	0.312	0.4	Pass
		High	2.930	0.313	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

**BDR (GFSK):**

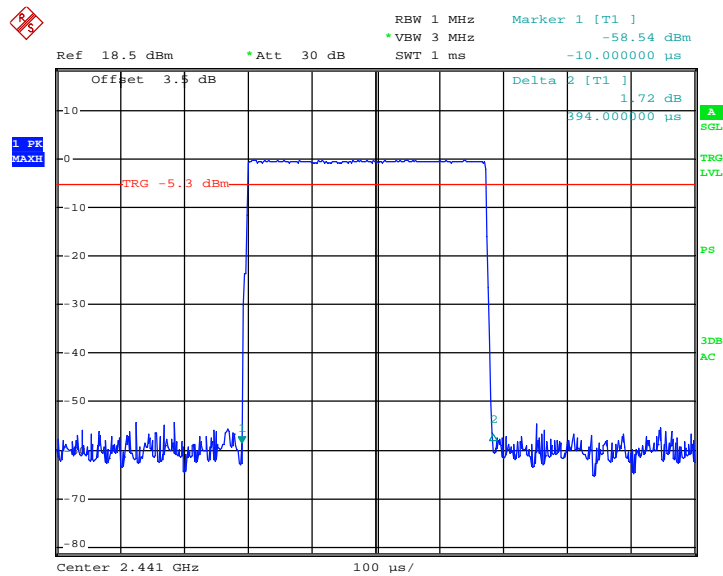
**Pulse time, Low Channel, DH1**



EUT

Date: 8.JUN.2013 17:28:33

**Pulse time, Middle Channel, DH1**

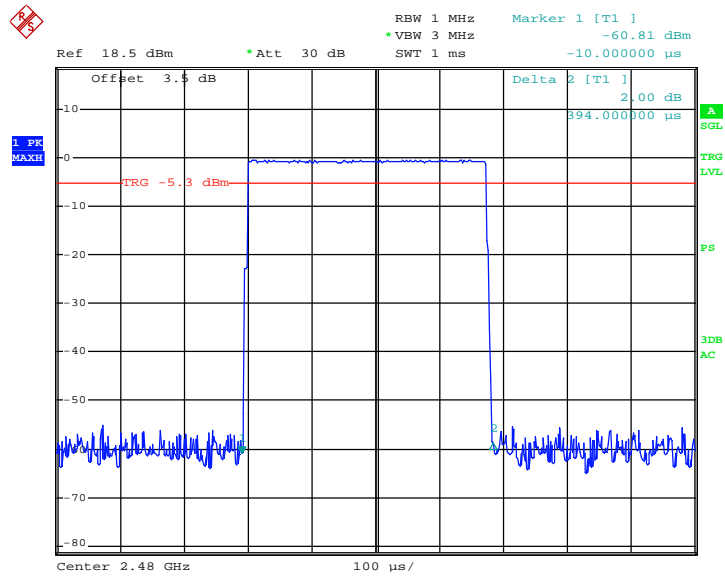


EUT

Date: 8.JUN.2013 17:29:30



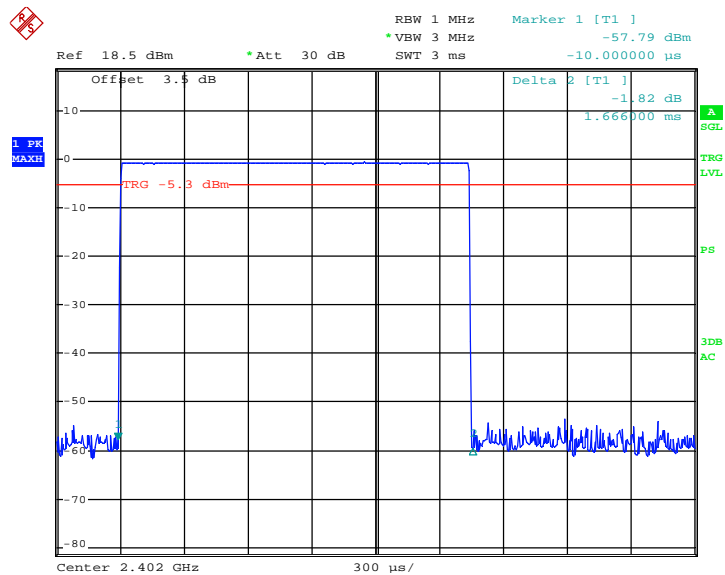
### Pulse time, High Channel, DH1



EUT

Date: 8.JUN.2013 17:29:48

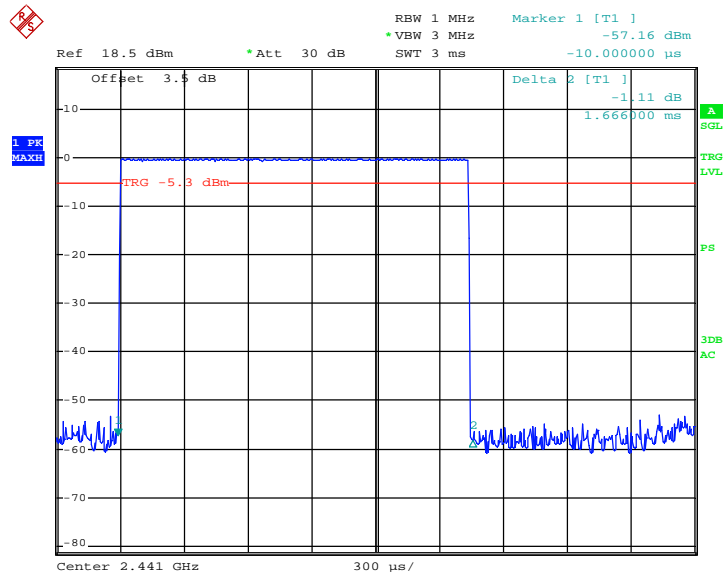
### Pulse time, Low Channel, DH3



EUT

Date: 8.JUN.2013 17:31:54

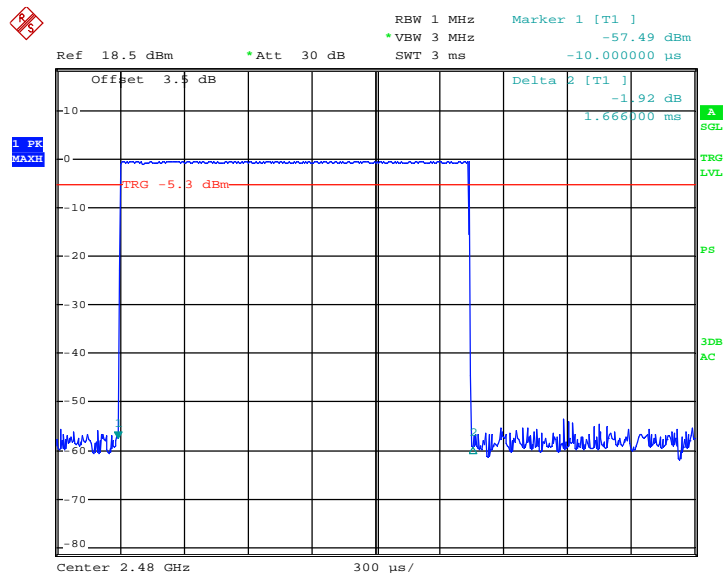
### Pulse time, Middle Channel, DH3



EUT

Date: 8.JUN.2013 17:31:08

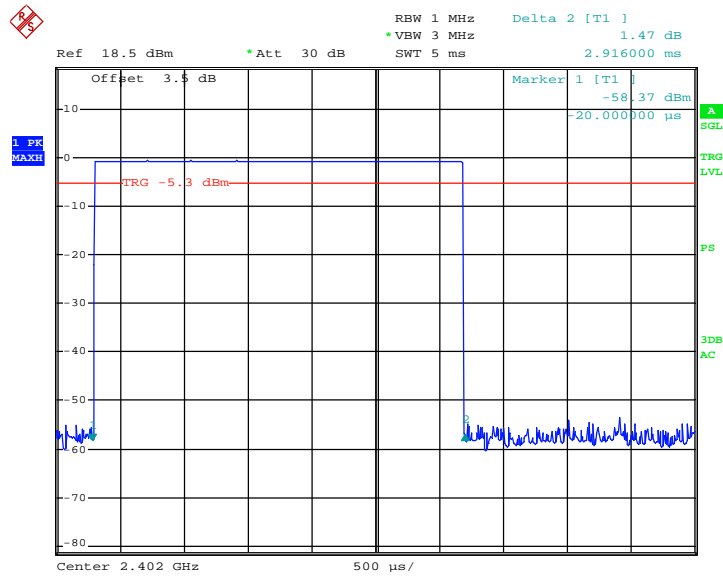
### Pulse time, High Channel, DH3



EUT

Date: 8.JUN.2013 17:30:46

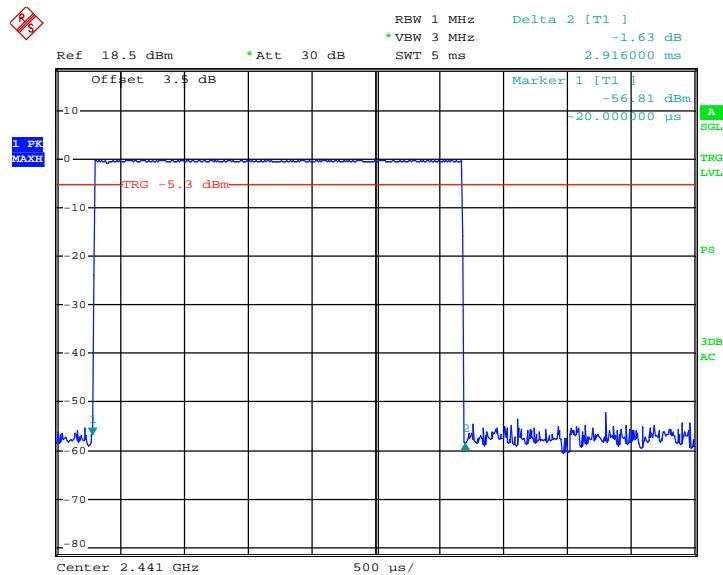
### Pulse time, Low Channel, DH5



EUT

Date: 8.JUN.2013 17:32:36

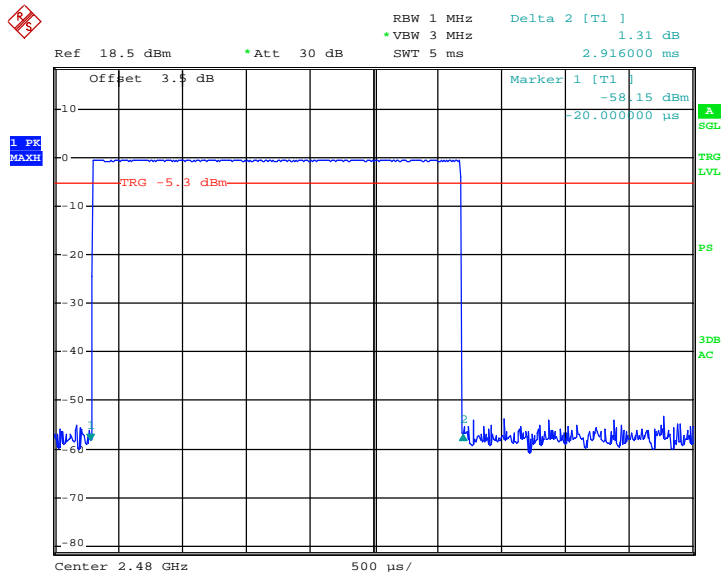
### Pulse time, Middle Channel, DH5



EUT

Date: 8.JUN.2013 17:32:55

### Pulse time, High Channel, DH5

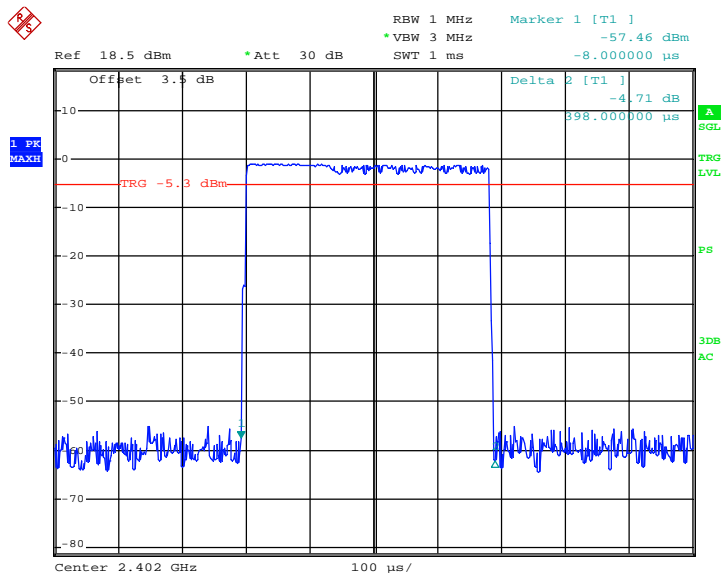


EUT

Date: 8.JUN.2013 17:33:12

### EDR ( $\pi/4$ -DQPSK):

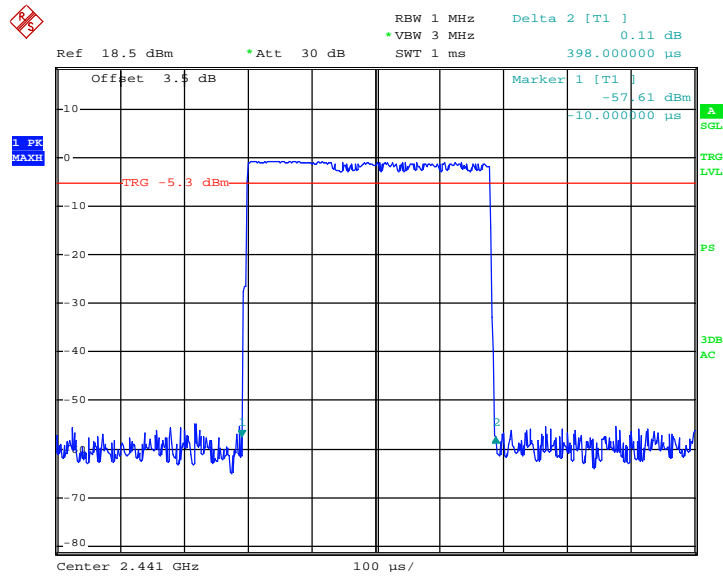
### Pulse time, Low Channel, DH1



EUT

Date: 8.JUN.2013 17:35:23

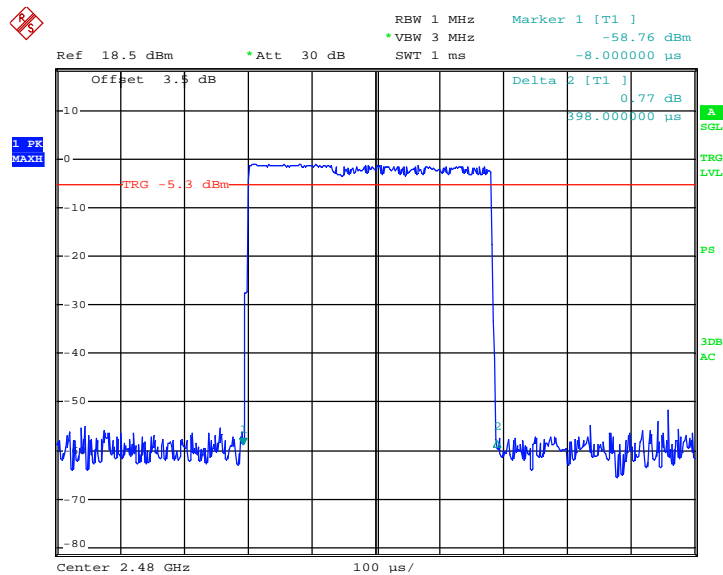
### Pulse time, Middle Channel, DH1



EUT

Date: 8.JUN.2013 17:34:55

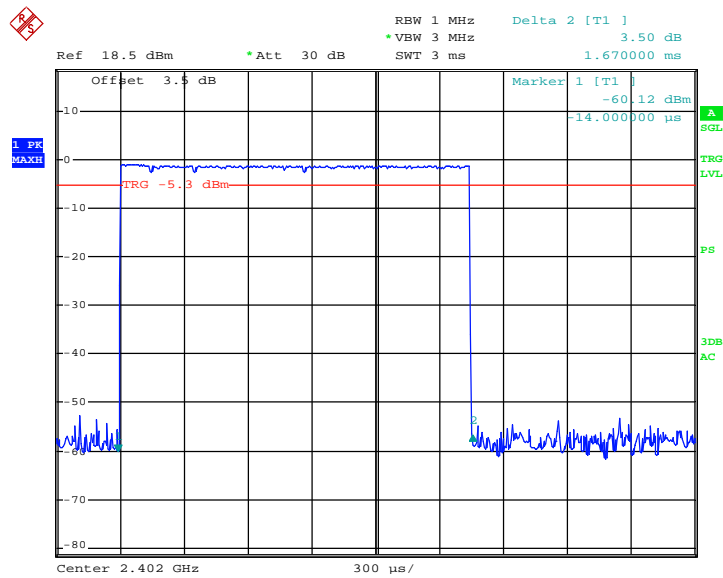
### Pulse time, High Channel, DH1



EUT

Date: 8.JUN.2013 17:34:13

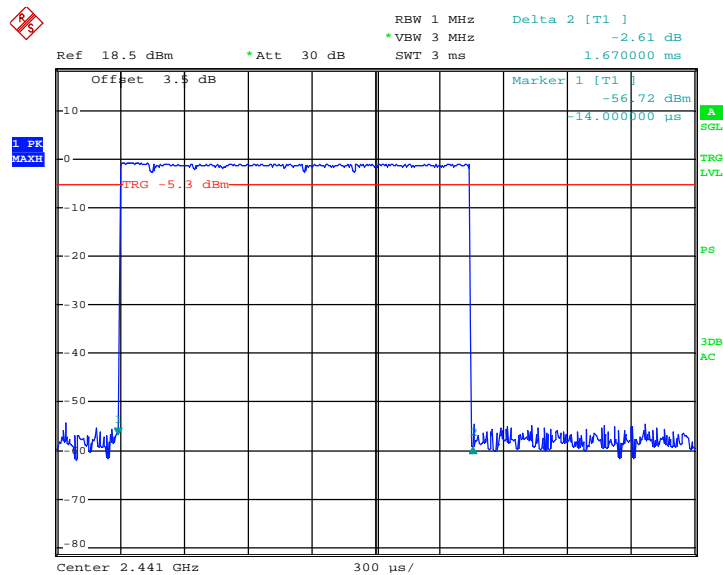
### Pulse time, Low Channel, DH3



EUT

Date: 8.JUN.2013 17:36:00

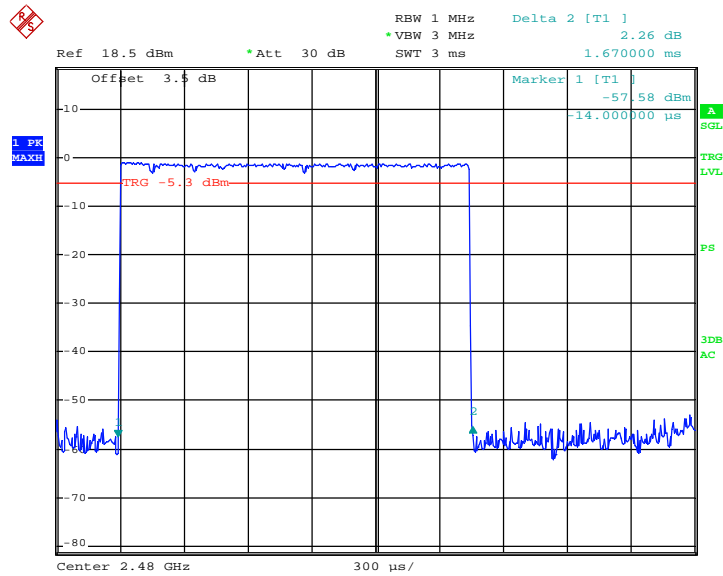
### Pulse time, Middle Channel, DH3



EUT

Date: 8.JUN.2013 17:36:22

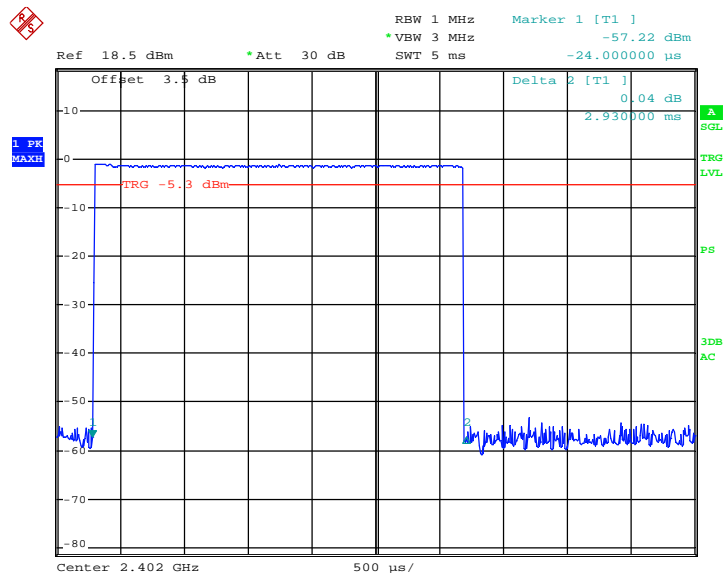
### Pulse time, High Channel, DH3



EUT

Date: 8.JUN.2013 17:36:43

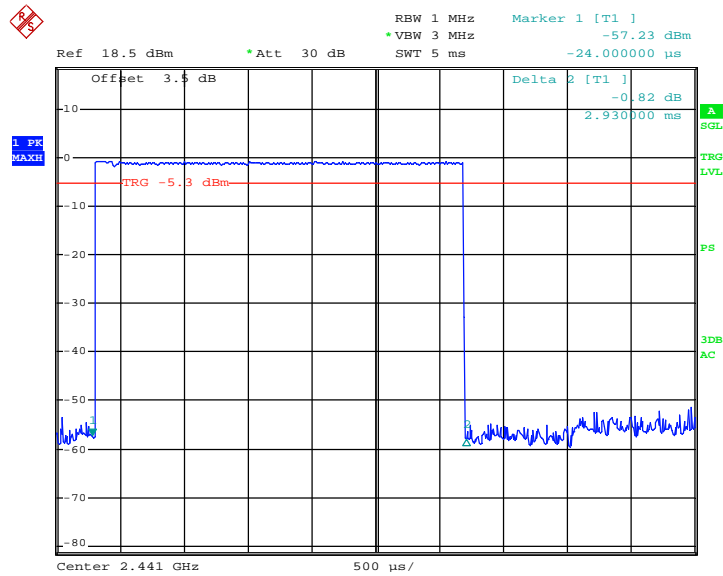
### Pulse time, Low Channel, DH5



EUT

Date: 8.JUN.2013 17:37:57

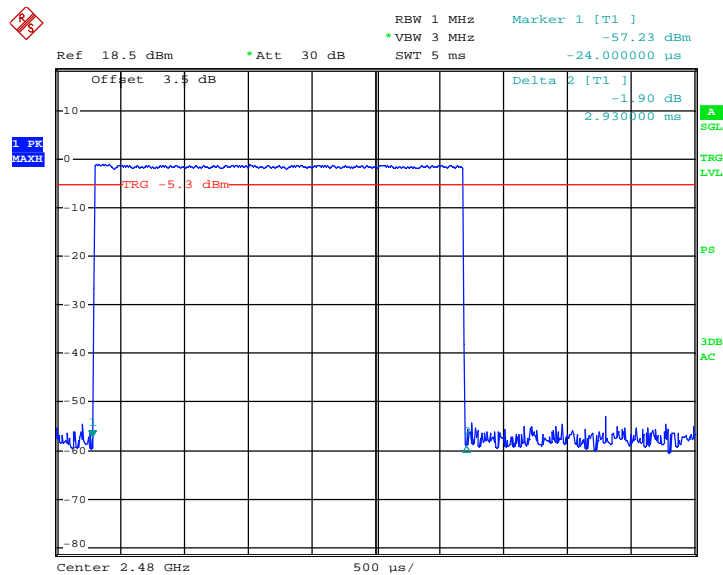
### Pulse time, Middle Channel, DH5



EUT

Date: 8.JUN.2013 17:37:44

### Pulse time, High Channel, DH5



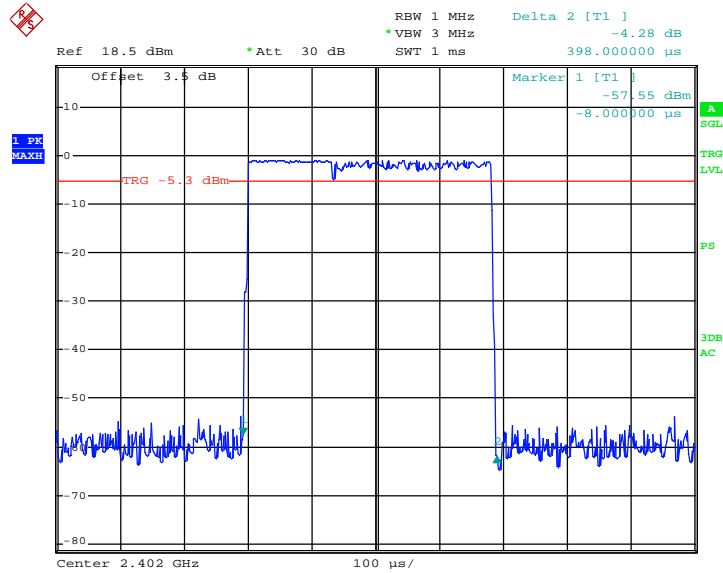
EUT

Date: 8.JUN.2013 17:37:28



**EDR (8DPSK):**

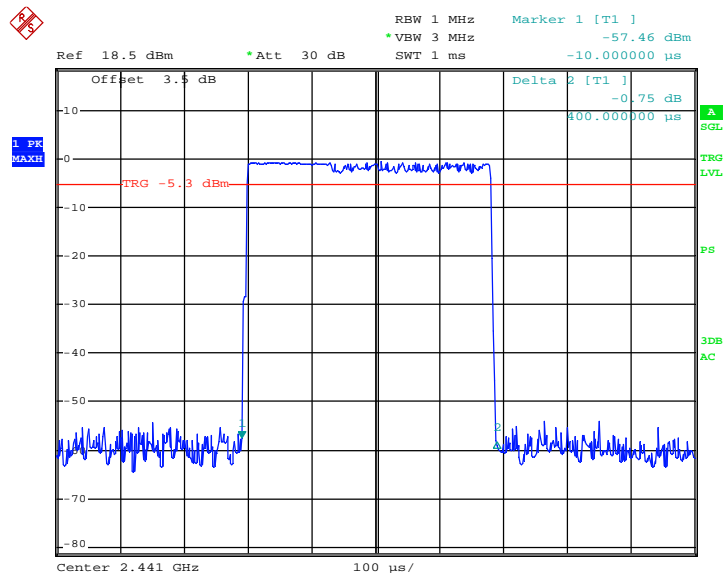
**Pulse time, Low Channel, DH1**



EUT

Date: 8.JUN.2013 17:38:40

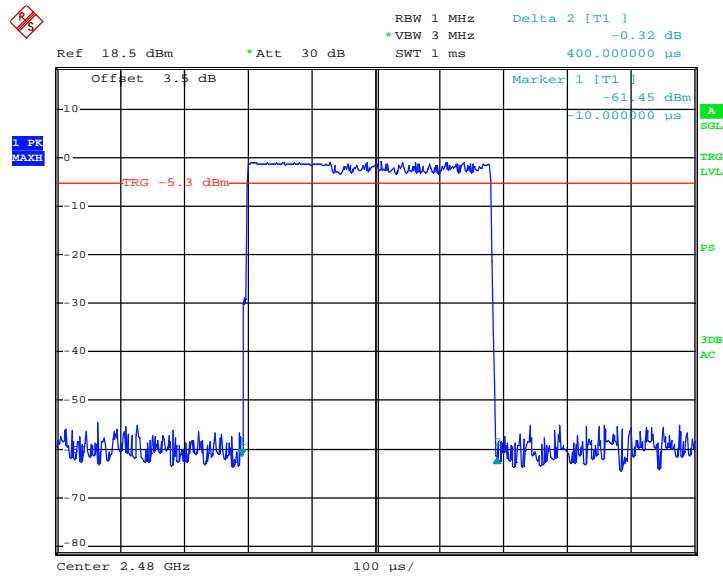
**Pulse time, Middle Channel, DH1**



EUT

Date: 8.JUN.2013 17:39:08

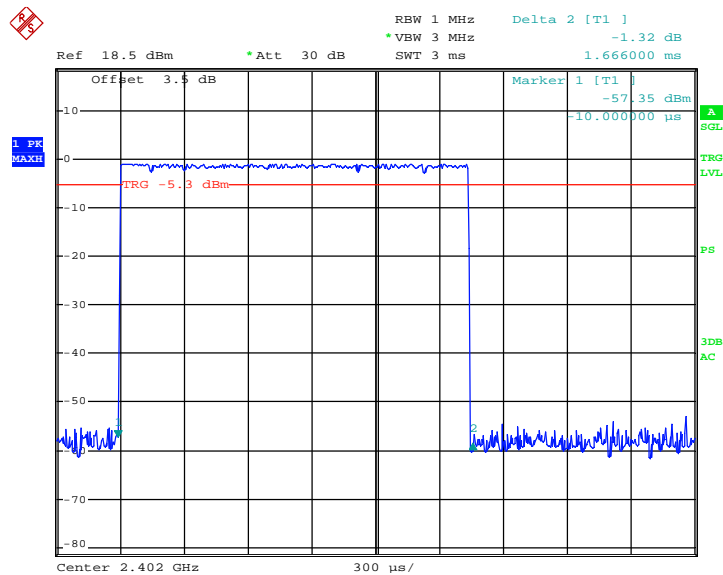
### Pulse time, High Channel, DH1



EUT

Date: 8.JUN.2013 17:39:28

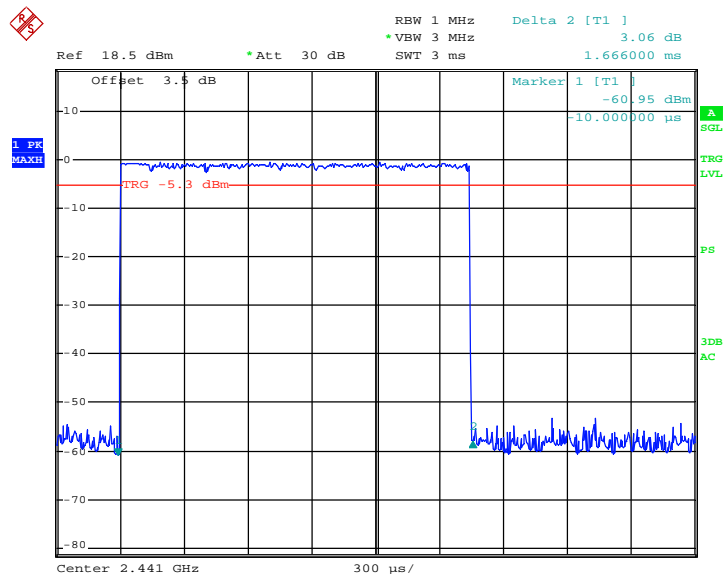
### Pulse time, Low Channel, DH3



EUT

Date: 8.JUN.2013 17:40:44

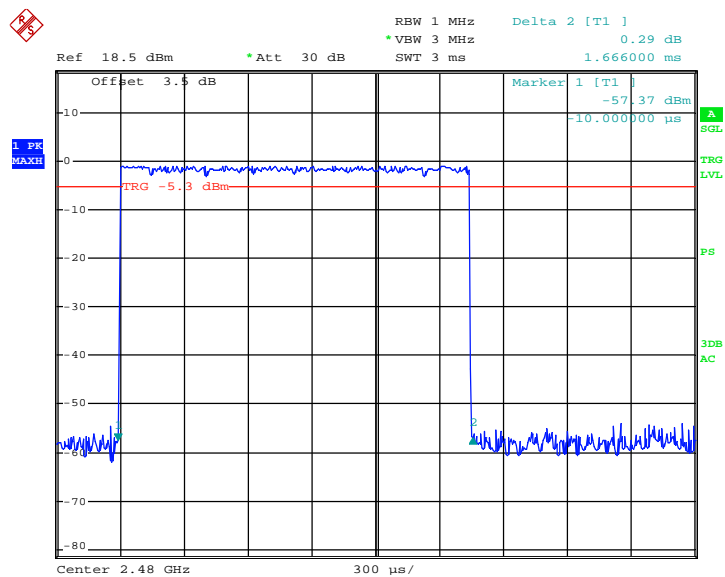
### Pulse time, Middle Channel, DH3



EUT

Date: 8.JUN.2013 17:40:27

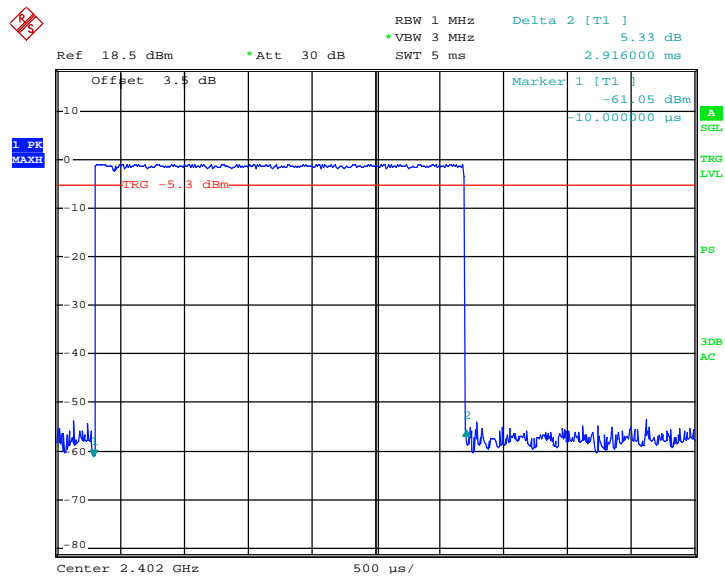
### Pulse time, High Channel, DH3



EUT

Date: 8.JUN.2013 17:40:09

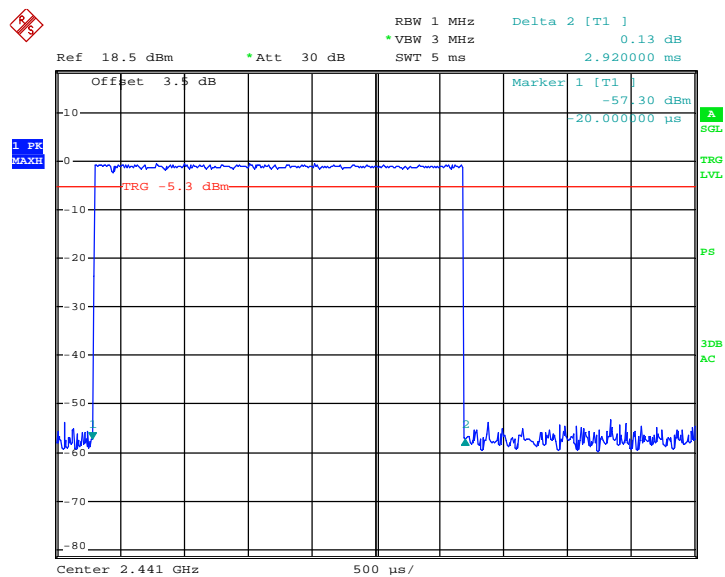
### Pulse time, Low Channel, DH5



EUT

Date: 8.JUN.2013 17:41:19

### Pulse time, Middle Channel, DH5



EUT

Date: 8.JUN.2013 17:41:58

Ref 18.5 dBm      \* Att 30 dB      RBW 1 MHz      Delta 2 [T1]      -4.09 dB  
 \* VBW 3 MHz      SWT 5 ms      2.930000 ms

Offset 3.5 dB      Marker 1 [T1]      -55.20 dBm      -20.000000 μs

1 PK MAXH      TRG -5.3 dBm      TRG LVL      PS      3DB AC

Center 2.48 GHz      500 μs/

Date: 8.JUN.2013 17:42:28

**FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT****Applicable Standard**

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

**Test Procedure**

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI test receiver.
3. Add a correction factor to the display.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

<b>Temperature:</b>	26°C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

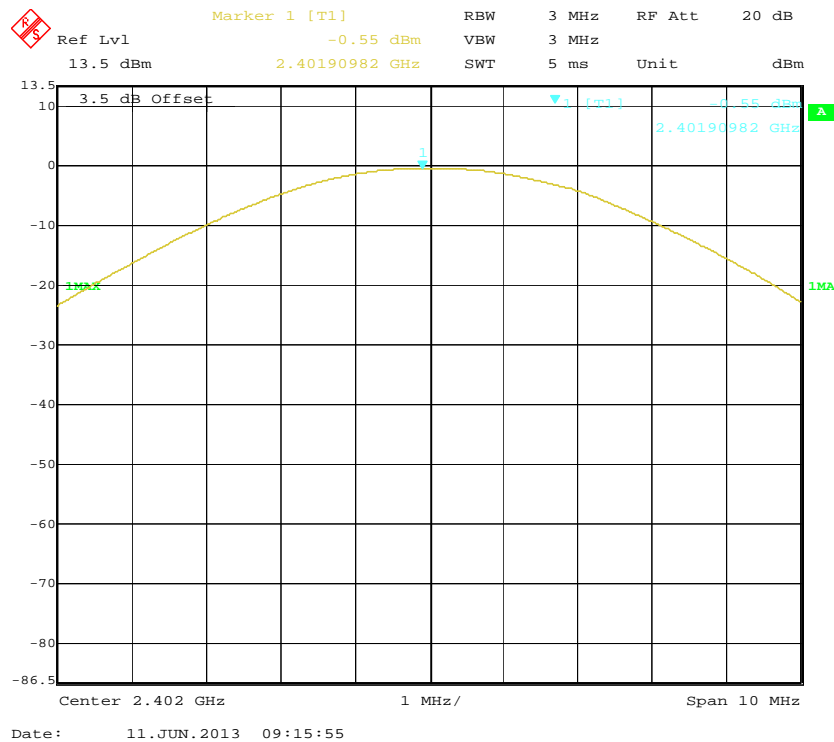
*The testing was performed by Rocky Kang on 2013-06-11.*

*EUT operation mode: Transmitting*

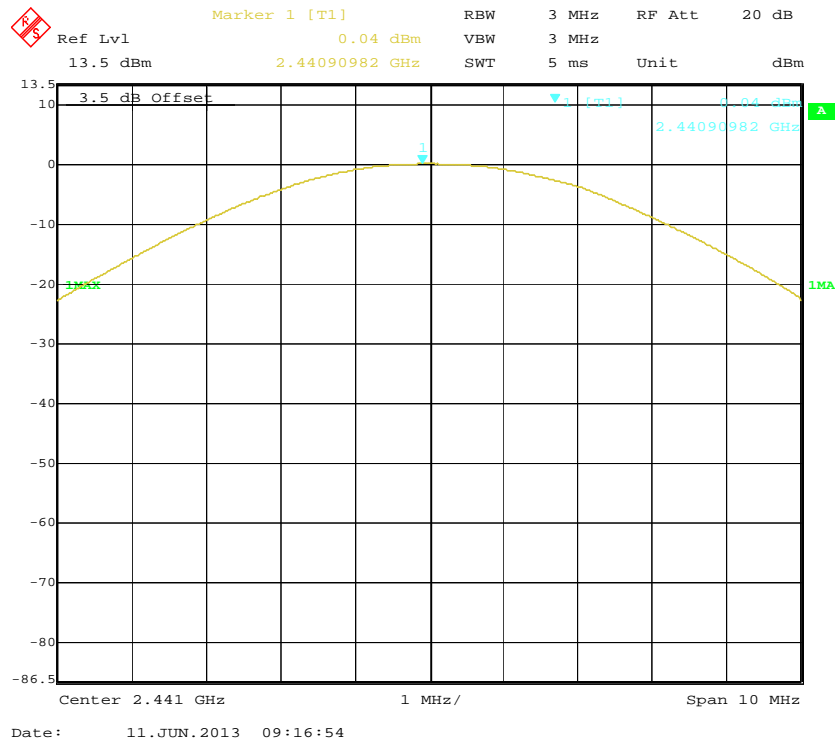
*Test Result: Compliance. Please refer to following tables and plots*

Mode	Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	-0.55	0.881	1000
	Middle	2441	0.04	1.009	1000
	High	2480	0.54	1.132	1000
EDR ( $\pi/4$ -DQPSK)	Low	2402	-0.82	0.828	1000
	Middle	2441	-0.31	0.931	1000
	High	2480	0.26	1.062	1000
EDR (8DPSK)	Low	2402	-0.57	0.877	1000
	Middle	2441	-0.03	0.993	1000
	High	2480	0.58	1.143	1000

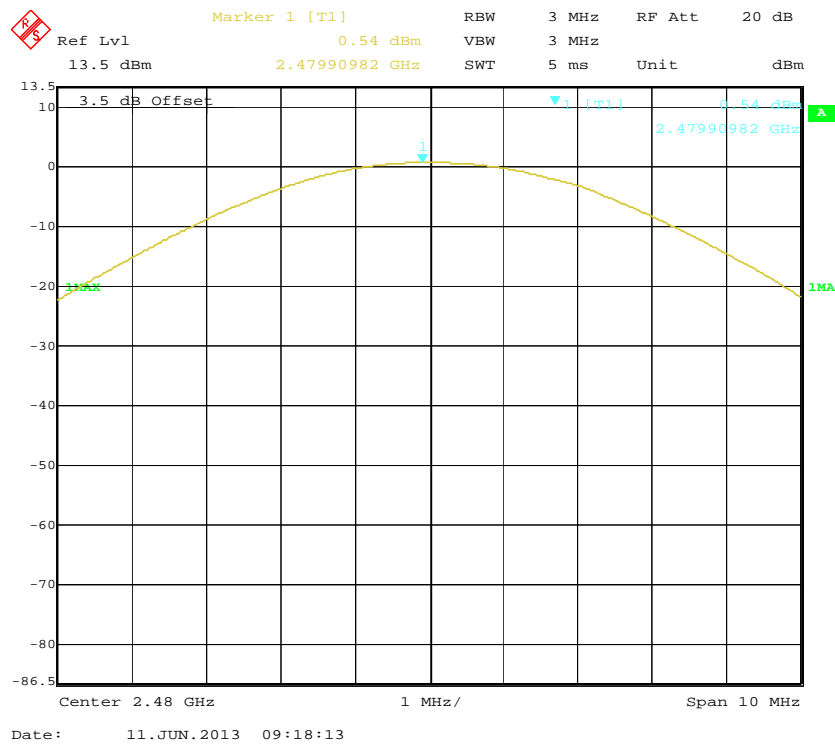
## BDR (GFSK): Low Channel



### BDR (GFSK): Middle Channel

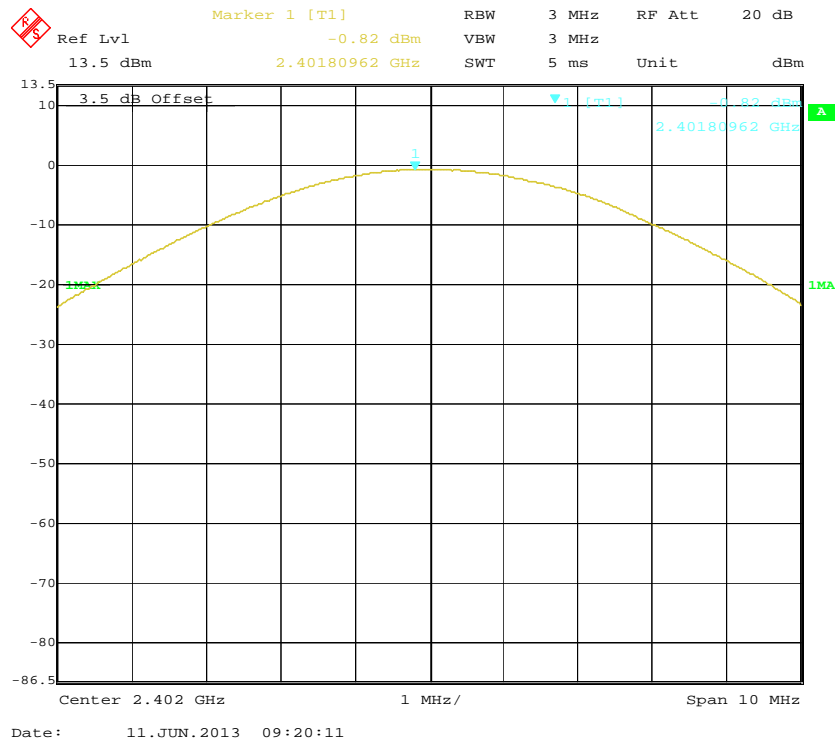


### BDR (GFSK): High Channel

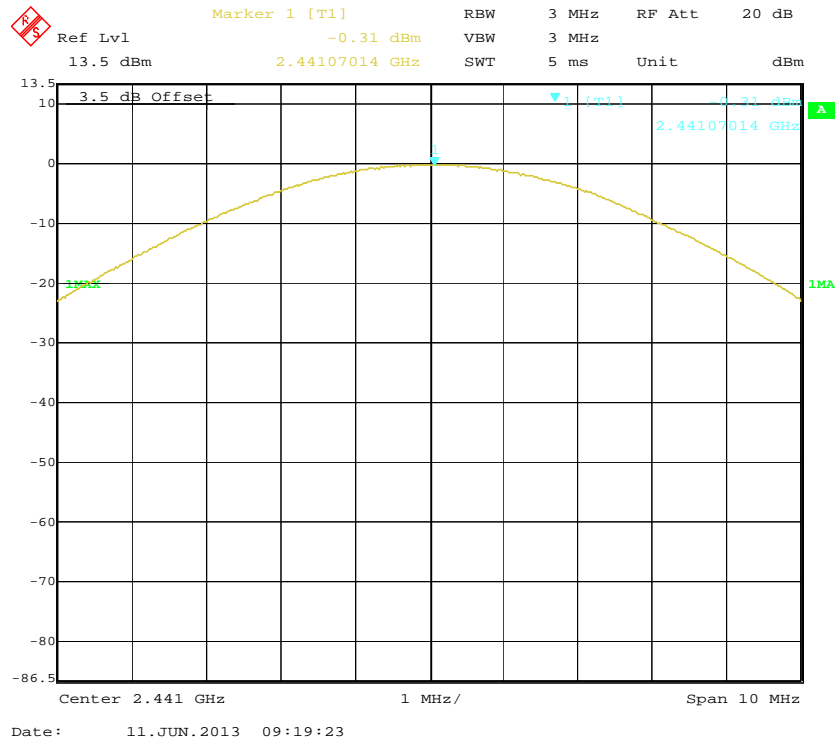




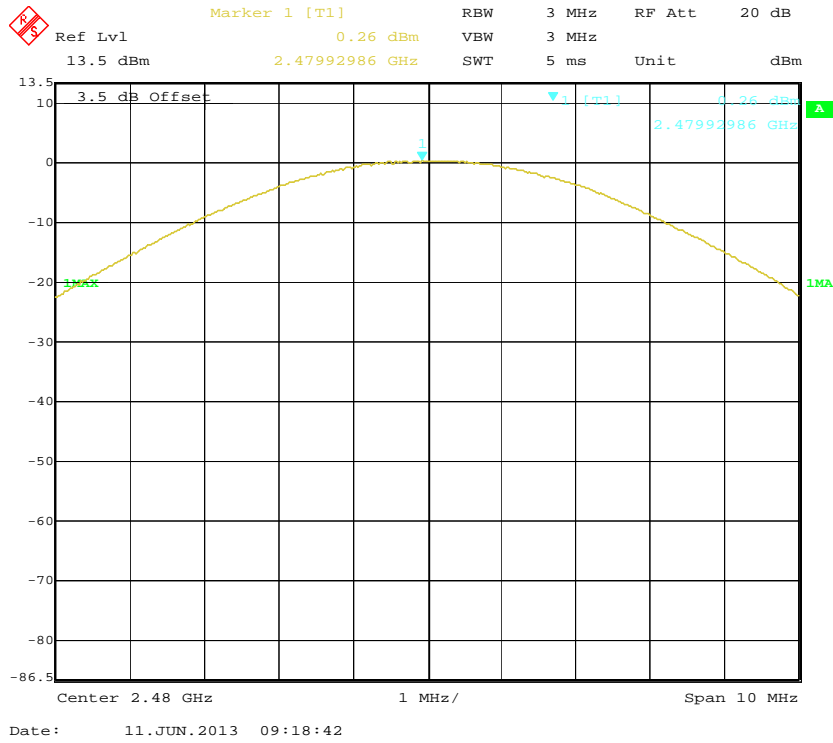
### EDR( $\pi/4$ -DQPSK): Low Channel



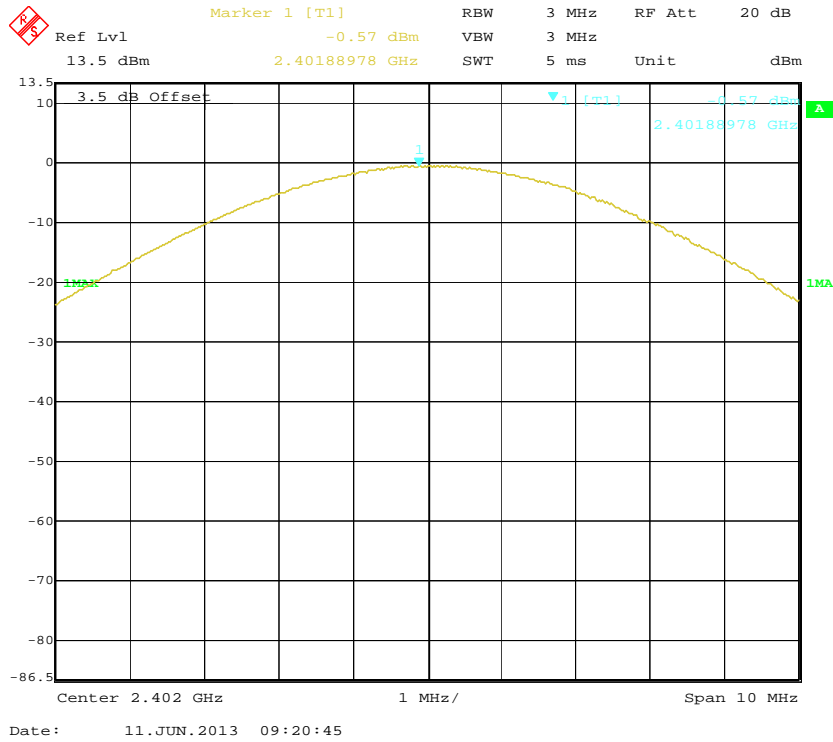
### EDR( $\pi/4$ -DQPSK): Middle Channel



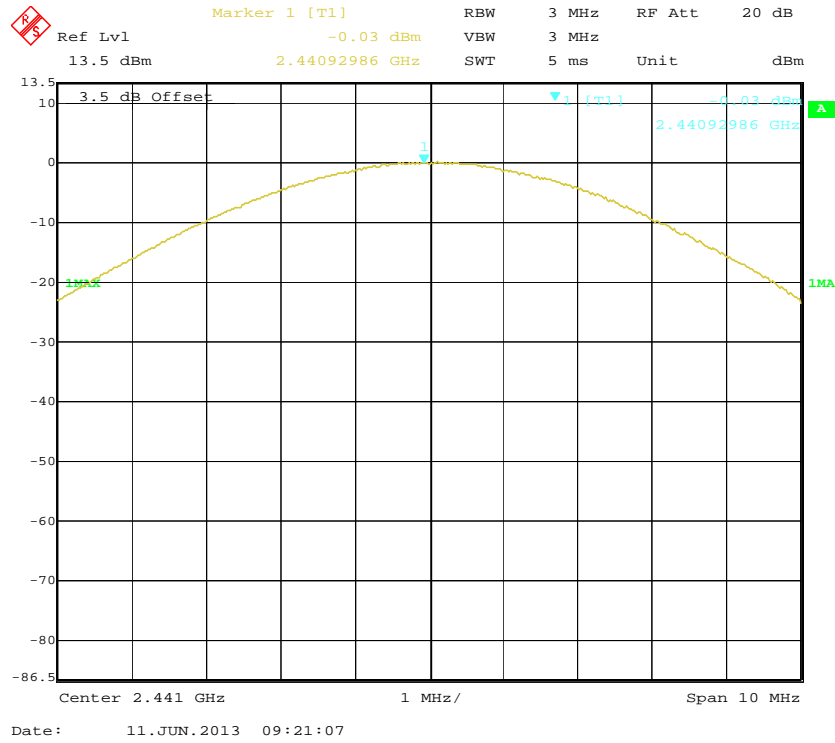
### EDR( $\pi/4$ -DQPSK): High Channel



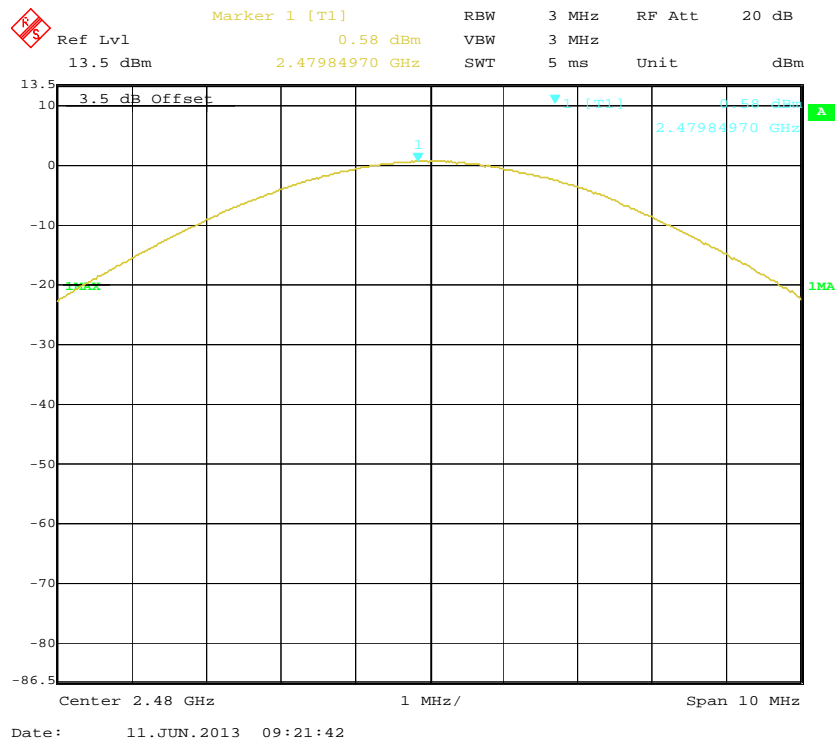
### EDR(8DPSK): Low Channel



### EDR(8DPSK): Middle Channel



### EDR(8DPSK): High Channel



## FCC §15.247(d) - BAND EDGES TESTING

### Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

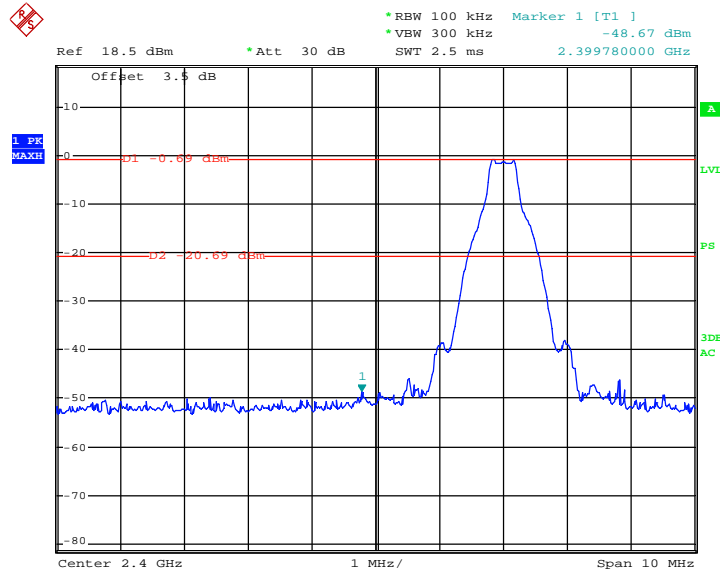
Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

*The testing was performed by Rocky Kang on 2013-06-08.*

*EUT operation mode: Transmitting*

Test Result: Compliance. Please refer to following tables and plots

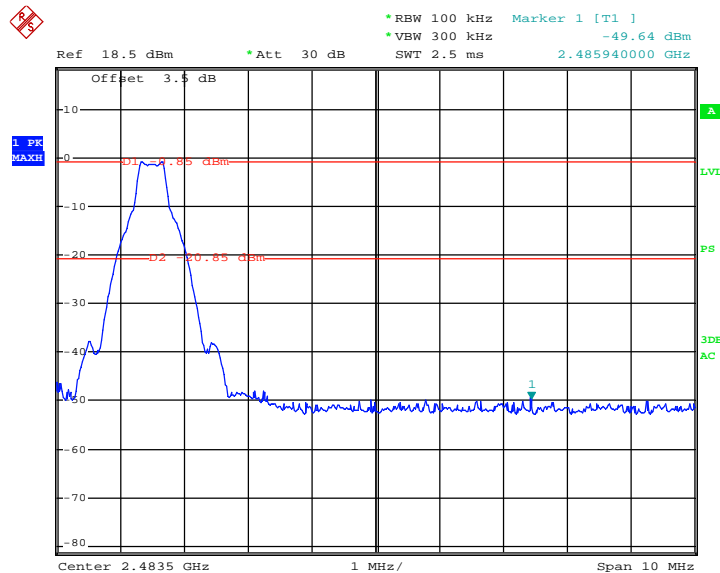
### BDR (GFSK): Band Edge-Left Side



EUT

Date: 8.JUN.2013 17:12:00

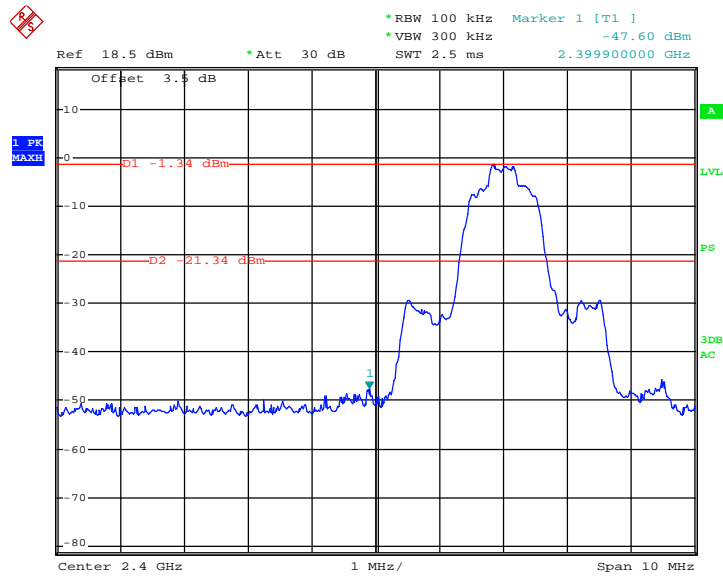
### BDR (GFSK): Band Edge-Right Side



EUT

Date: 8.JUN.2013 17:13:17

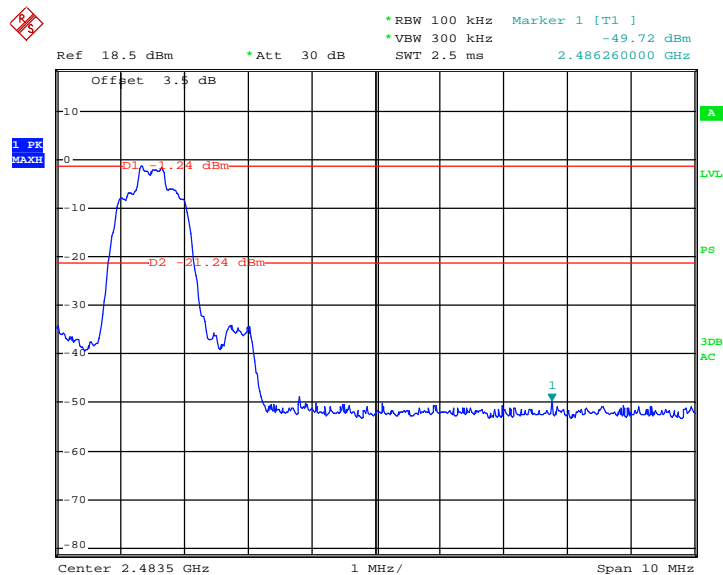
### EDR ( $\pi/4$ -DQPSK): Band Edge-Left Side



EUT

Date: 8.JUN.2013 17:11:02

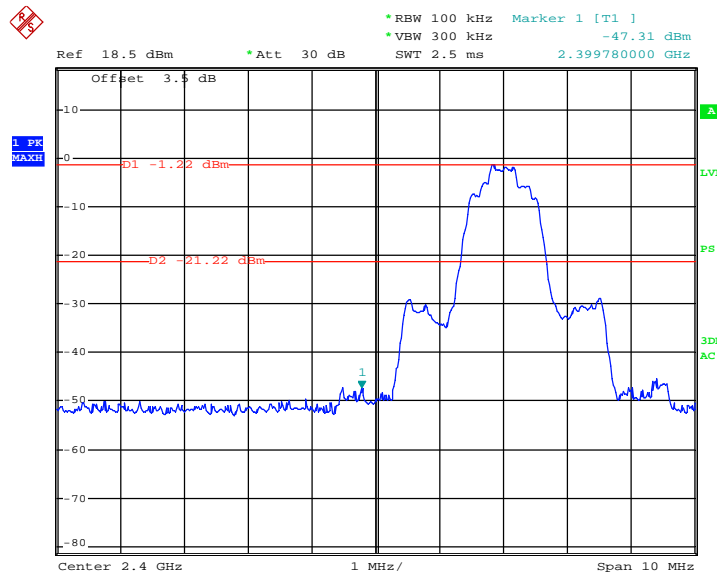
### EDR ( $\pi/4$ -DQPSK): Band Edge-Right Side



EUT

Date: 8.JUN.2013 17:10:10

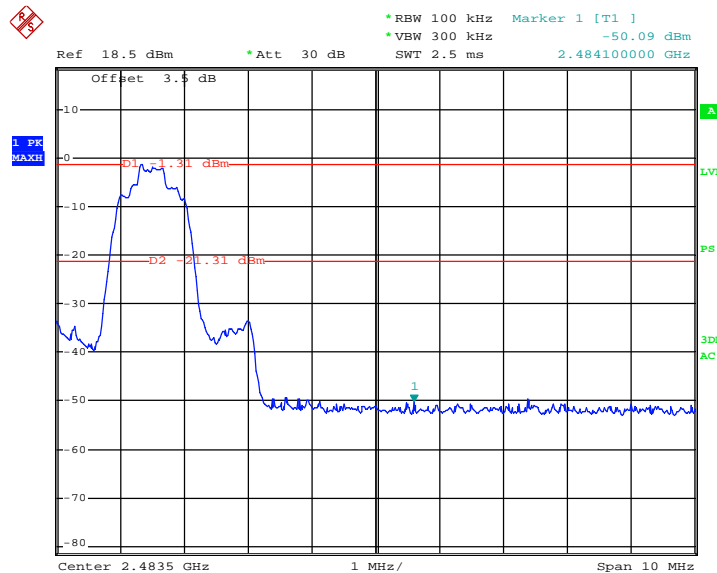
### EDR (8DPSK): Band Edge-Left Side



EUT

Date: 8.JUN.2013 17:08:03

### BDR (8DPSK): Band Edge-Right Side



EUT

Date: 8.JUN.2013 17:09:21

\*\*\*\*\* END OF REPORT \*\*\*\*\*