

**FCC PART 15.247  
TEST REPORT**

For

**Hytera Communications Corporation Ltd.**

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

**FCC ID: YAMX1PVHF**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Digital Portable Radio
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<b>Report Number:</b> <u>RSZ121203005-00A</u>	
<b>Report Date:</b> <u>2013-03-12</u>	
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\* This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk "★"

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	5
RELATED SUBMITTAL(S)/GRANT(S).....	5
TEST METHODOLOGY .....	5
TEST FACILITY .....	5
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
DESCRIPTION OF TEST CONFIGURATION .....	6
EQUIPMENT MODIFICATIONS .....	6
EUT EXERCISE SOFTWARE .....	6
BLOCK DIAGRAM OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS .....</b>	<b>7</b>
<b>FCC §15.247 (i) &amp; §2.1093 – RF EXPOSURE .....</b>	<b>8</b>
APPLICABLE STANDARD .....	8
RESULT .....	8
<b>FCC §15.203 – ANTENNA REQUIREMENT .....</b>	<b>9</b>
APPLICABLE STANDARD .....	9
ANTENNA CONNECTOR CONSTRUCTION .....	9
<b>FCC §15.205, §15.209 &amp; §15.247(d) – RADIATED EMISSIONS.....</b>	<b>10</b>
APPLICABLE STANDARD .....	10
MEASUREMENT UNCERTAINTY .....	10
EUT SETUP .....	10
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....	11
TEST PROCEDURE .....	11
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	11
TEST EQUIPMENT LIST AND DETAILS.....	12
TEST RESULTS SUMMARY .....	12
TEST DATA .....	12
<b>FCC §15.247(a) (1)-CHANNEL SEPARATION TEST .....</b>	<b>15</b>
APPLICABLE STANDARD .....	15
TEST PROCEDURE .....	15
TEST EQUIPMENT LIST AND DETAILS.....	15
TEST DATA .....	15
<b>FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH.....</b>	<b>22</b>
APPLICABLE STANDARD .....	22
TEST PROCEDURE .....	22
TEST EQUIPMENT LIST AND DETAILS.....	22
TEST DATA .....	22
<b>FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST .....</b>	<b>28</b>
APPLICABLE STANDARD .....	28
TEST PROCEDURE .....	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA .....	28
<b>FCC §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME).....</b>	<b>31</b>

APPLICABLE STANDARD .....	31
TEST PROCEDURE .....	31
TEST EQUIPMENT LIST AND DETAILS.....	31
TEST DATA .....	31
<b>FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT .....</b>	<b>47</b>
APPLICABLE STANDARD .....	47
TEST PROCEDURE .....	47
TEST EQUIPMENT LIST AND DETAILS.....	47
TEST DATA .....	47
<b>FCC §15.247(d) - BAND EDGES TESTING .....</b>	<b>53</b>
APPLICABLE STANDARD .....	53
TEST PROCEDURE .....	53
TEST EQUIPMENT LIST AND DETAILS.....	53
TEST DATA .....	54

## GENERAL INFORMATION

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

The *Hytera Communications Corporation Ltd.*'s product, model number: *XIp VHF (FCC ID: YAMXIPVHF)* or the "EUT" in this report was a *Digital Portable Radio*, which was measured approximately: 12.8 cm (L) x 6.5 cm (W) x 2.5 cm (H), rated input voltage: DC 7.4 V Li-ion battery.

The table is the related accessories list.

Accessory Name		Model	Description
Antenna	Antenna1	AN0140H01	136-145MHz
	Antenna2	AN0148H03	144-154MHz
	Antenna3	AN0158H02	153-164MHz
	Antenna4	AN0168H01	163-174MHz
Battery	Thin Battery	BL1103	Li-ion Battery;7.4V 1100 mAh
	Thicker Battery	BL1809	Li-ion Battery;7.4V 1800 mAh
Body Worn	Belt Clip	PCN005	/
	Portable Charger	CH04L01	/
Earphone	Earphone 1	EWN07	Digital Wireless Covert Earpiece With in-Line Controller (Neckloop Sensor)
	Earphone 2	EWN08	Digital Wireless Covert Earpiece (Flatpack Sensor)
	Earphone 3	EAN19	3-wire Surveillance Earpiece with Transparent Acoustic Tube (Beige)
	Earphone 4	EAN21	3-wire Surveillance Earpiece with Transparent Acoustic Tube(Beige)
	Earphone 5	ESN14	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-01
	Earphone 6	EAN22	Detachable Earpiece with Transparent Acoustic Tube,contains two parts,one is ACN-02,the other is ES-02
	Earphone 7	EHN20	Remote Swivel Earset,contains two parts,one is ACN-02,the other is EH-02
	Earphone 8	EHN21	Remote C-Earset,contains two parts,one is ACN-02,the other is EH-01
	Earphone 9	ACN-02	PTT&MIC cable(for use with Receive-Only Earpiece)
	Earphone 10	EH-01	Receive — Only C Style Earloop(for use with PTT&MIC cable)
	Earphone 11	EH-02	Receive — Only Ajustable Earhook with Swivel Speaker(for use with PTT&MIC cable)
	Earphone 12	ES-02	Receive-Only Earpiece with Transparent Acoustic Tube
	Earphone 13	ES-01	Receiver - Only Earpiece (for use with PTT&MIC cable)
Note: the Manufacturer is Hytera Communications Co., Ltd.			

\* All measurement and test data in this report was gathered from production sample serial number: 1212005 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2012-12-03.

## 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, 15.207, 15.209 and 15.247 rules.

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

FCC Part 90 TNF submissions with FCC ID: YAMX1PVHF.

## 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.

## 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.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

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

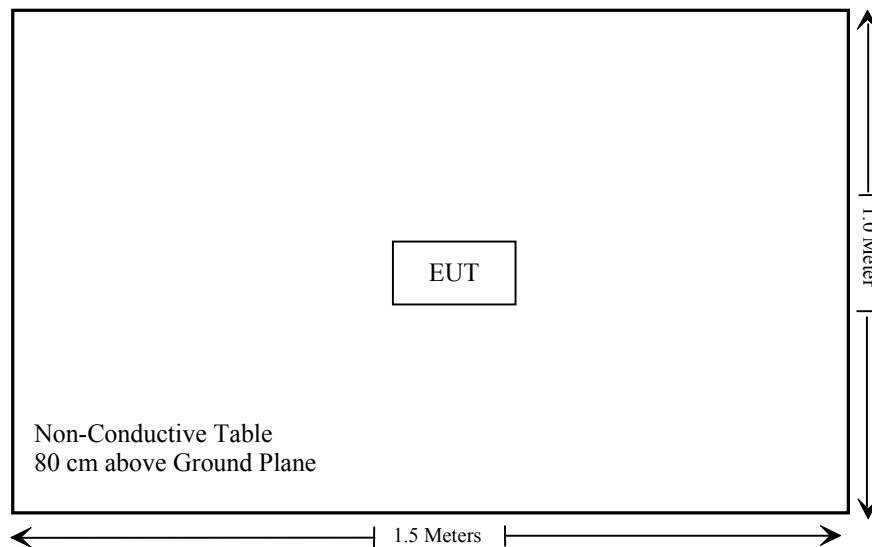
### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

CSR Blue Test 3, version: Release Build.

### 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: 3.05 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 3.05 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.: R1212077-FCC-SAR.



**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)

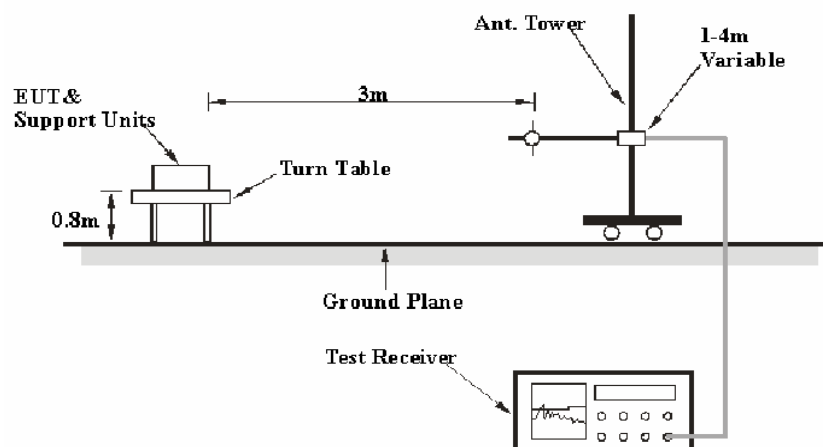
### Measurement Uncertainty

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.

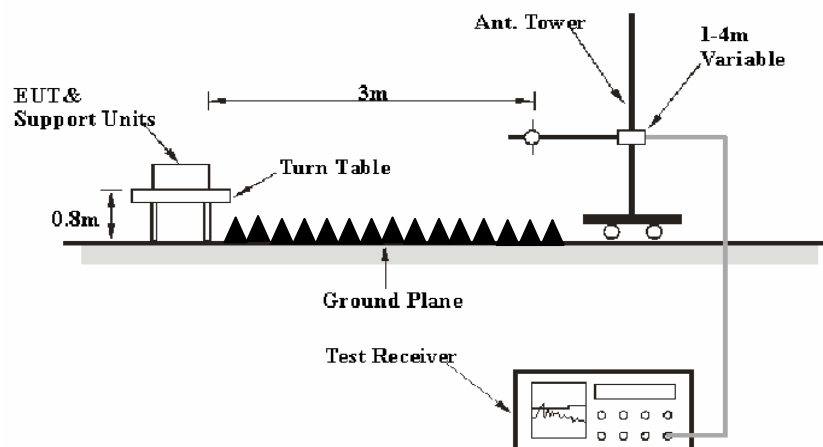
Based on CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB(k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for all the test data recorded in the report.

### EUT Setup

#### Below 1 GHz:



#### Above 1 GHz:



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	2012-08-08	2013-08-07
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
Agilent	Spectrum Analyzer	8564E	3943A01781	2012-05-17	2013-05-16
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 NVLAP 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.

**10.24 dB at 4960.0 MHz in the Vertical polarization**

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

<b>Temperature:</b>	25°C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Tiger Ye on 2012-12-18.*

*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)									
2402.0	86.39	PK	62	1.3	H	6.13	92.52	/	/
2402.0	75.49	Ave.	62	1.3	H	6.13	81.62	/	/
2402.0	89.97	PK	331	1.2	V	6.13	96.10	/	/
2402.0	78.22	Ave.	331	1.2	V	6.13	84.35	/	/
4804.0	31.25	Ave.	45	1.2	V	12.40	43.65	54	10.35
36.2	37.94	QP	313	1.1	V	-11.6	26.34	40	13.66
4804.0	45.26	PK	45	1.2	V	12.40	57.66	74	16.34
9608.0	17.02	Ave.	15	1.3	H	19.28	36.30	54	17.70
7206.0	17.59	Ave.	95	1.2	V	17.06	34.65	54	19.35
9608.0	32.19	PK	15	1.3	H	19.28	51.47	74	22.53
206.1	37.15	QP	104	1.0	V	-16.5	20.65	43.5	22.85
7206.0	33.69	PK	95	1.2	V	17.06	50.75	74	23.25
2489.5	22.87	Ave.	325	1.2	V	6.81	29.68	54	24.32
2355.2	22.91	Ave.	95	1.1	H	5.48	28.39	54	25.61
2364.3	22.91	Ave.	29	1.2	V	5.48	28.39	54	25.61
2489.5	35.16	PK	325	1.2	V	6.81	41.97	74	32.03
2364.3	36.02	PK	29	1.2	V	5.48	41.50	74	32.50
2355.2	35.84	PK	95	1.1	H	5.48	41.32	74	32.68
Middle Channel (2441 MHz)									
2441.0	87.15	PK	99	1.1	H	7.21	94.36	/	/
2441.0	75.91	Ave.	99	1.1	H	7.21	83.12	/	/
2441.0	89.22	PK	25	1.2	V	6.81	96.03	/	/
2441.0	78.36	Ave.	25	1.2	V	6.81	85.17	/	/
4882.0	30.97	Ave.	66	1.3	V	12.46	43.43	54	10.57
36.2	38.74	QP	211	1.1	V	-11.6	27.14	40	12.86
9764.0	18.25	Ave.	5	1.3	H	19.40	37.65	54	16.35
4882.0	44.18	PK	66	1.2	V	12.46	56.64	74	17.36
7323.0	18.22	Ave.	49	1.2	V	16.49	34.71	54	19.29
9764.0	33.69	PK	5	1.3	H	19.40	53.09	74	20.91
206.1	38.52	QP	193	1.0	V	-16.5	22.02	43.5	21.48
7323.0	34.15	PK	49	1.3	V	16.49	50.64	74	23.36
2487.2	22.19	Ave.	33	1.2	V	6.81	29.00	54	25.00
2373.6	23.02	Ave.	91	1.2	V	5.48	28.50	54	25.50
2335.9	21.22	Ave.	44	1.1	H	5.48	26.70	54	27.30
2487.2	35.57	PK	33	1.2	V	6.81	42.38	74	31.62
2373.6	35.99	PK	91	1.2	V	5.48	41.47	74	32.53
2335.9	34.15	PK	44	1.1	H	5.48	39.63	74	34.37

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBuV/m)	FCC Part 15.247/205/209	
	Reading (dBuV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBuV/m)	Margin (dB)
High Channel (2480 MHz)									
2480.0	85.08	PK	77	1.3	H	7.21	92.29	/	/
2480.0	75.16	Ave.	77	1.3	H	7.21	82.37	/	/
2480.0	89.19	PK	49	1.3	V	6.81	96.00	/	/
2480.0	78.85	Ave.	49	1.3	V	6.81	85.66	/	/
4960.0	31.26	Ave.	62	1.2	V	12.50	43.76	54	10.24
36.2	37.62	QP	127	1.1	V	-11.6	26.02	40	13.98
4960.0	46.39	PK	62	1.2	V	12.50	58.89	74	15.11
9920.0	18.97	Ave.	25	1.3	H	19.38	38.35	54	15.65
7440.0	19.03	Ave.	146	1.2	V	15.90	34.93	54	19.07
206.1	39.54	QP	136	1.0	V	-16.5	23.04	43.5	20.46
9920.0	33.57	PK	25	1.3	H	19.38	52.95	74	21.05
2487.1	25.99	Ave.	251	1.1	V	6.81	32.80	54	21.20
7440.0	34.25	PK	146	1.2	V	15.90	50.15	74	23.85
2364.6	24.03	Ave.	155	1.3	V	5.48	29.51	54	24.49
2487.1	39.67	PK	251	1.1	V	6.81	46.48	74	27.52
2332.5	17.87	Ave.	35	1.2	H	5.48	23.35	54	30.65
2364.6	35.68	PK	155	1.3	V	5.48	41.16	74	32.84
2332.5	33.26	PK	35	1.2	H	5.48	38.74	74	35.26

**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	2012-08-08	2013-08-07

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP 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 Tiger Ye on 2012-12-07.

EUT operation mode: Transmitting

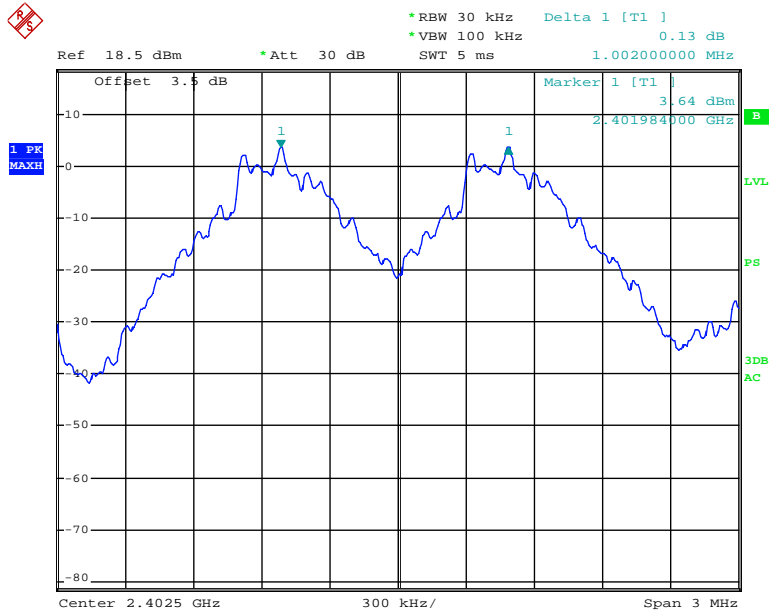
Test Result: Compliance. Please refer to following tables and plots

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	$\geq$ Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.002	0.611	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.611	Pass
	Adjacent	2442			
	High	2480	1.002	0.611	Pass
	Adjacent	2479			
EDR ( $\pi/4$ -DQPSK)	Low	2402	1.002	0.803	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.803	Pass
	Adjacent	2442			
	High	2480	1.002	0.803	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.002	0.805	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.805	Pass
	Adjacent	2442			
	High	2480	1.002	0.805	Pass
	Adjacent	2479			

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

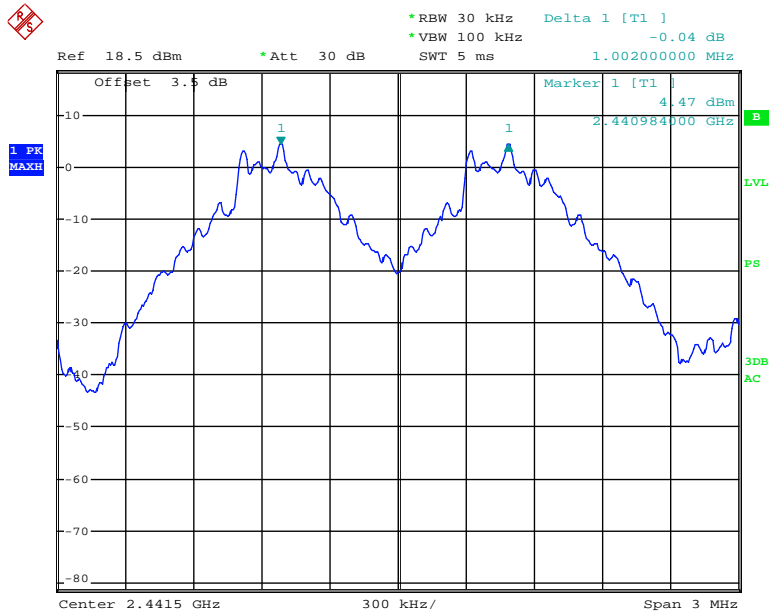


### BDR (GFSK): Low Channel



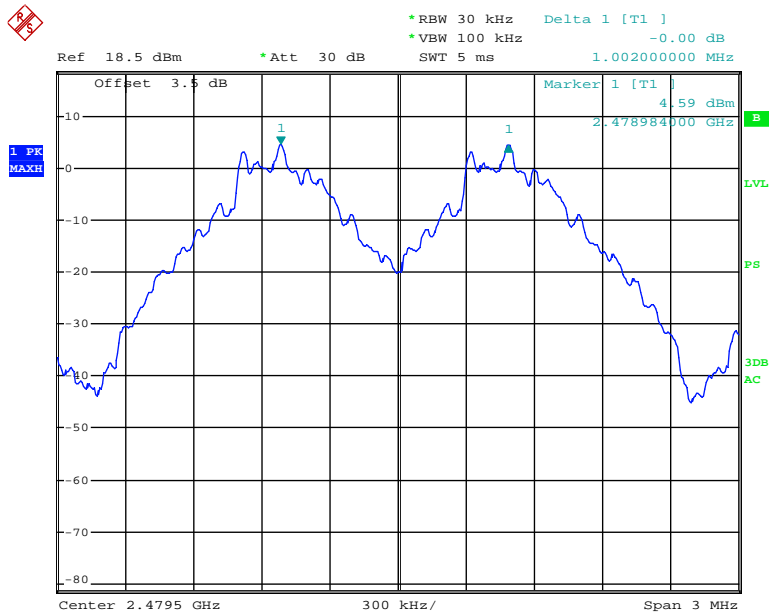
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### BDR (GFSK): Middle Channel



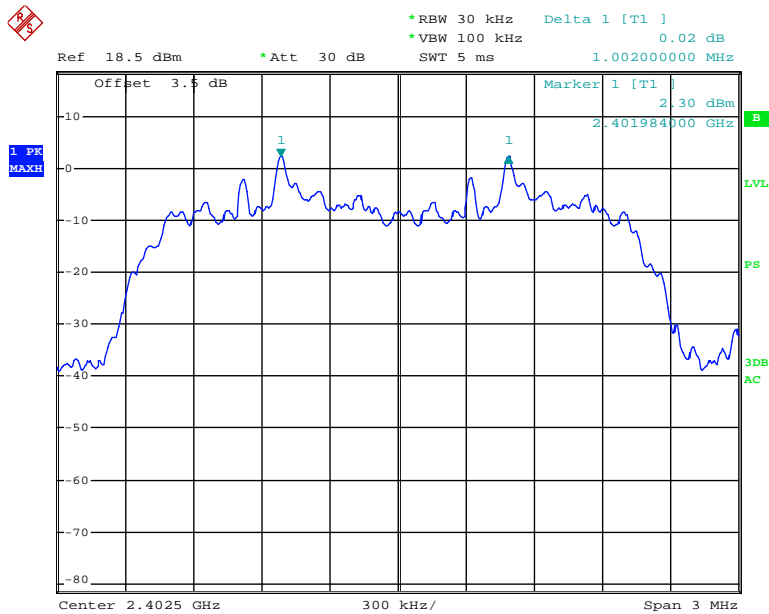
Date: 7.DEC.2012 14:17:06

### BDR (GFSK): High Channel

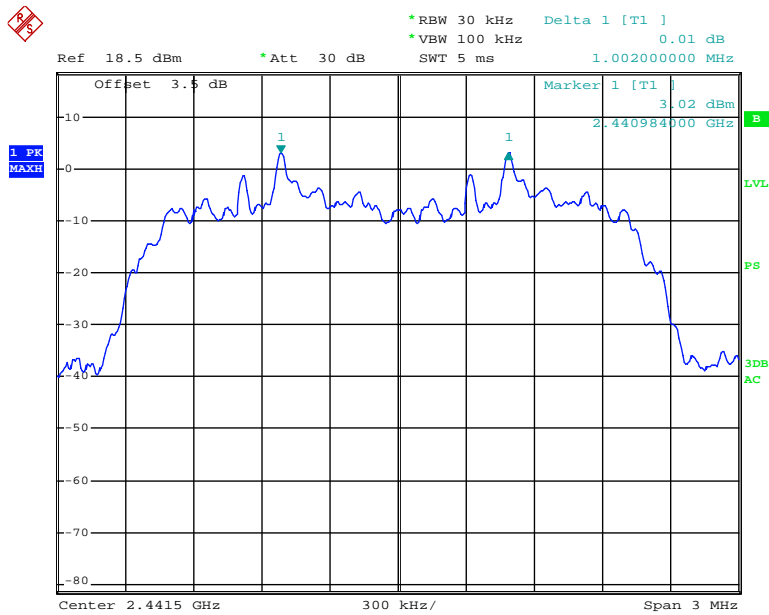


Date: 7.DEC.2012 14:17:54

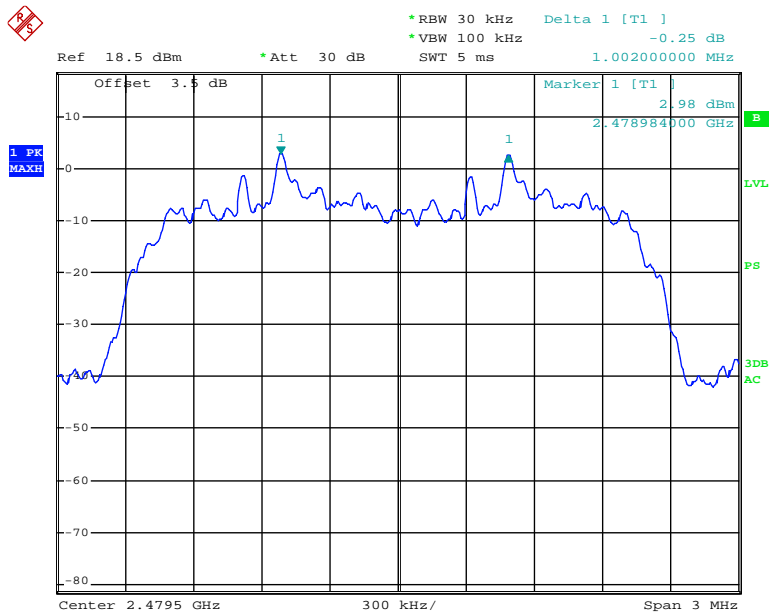
### EDR ( $\pi/4$ -DQPSK): Low Channel



Date: 7.DEC.2012 14:13:53

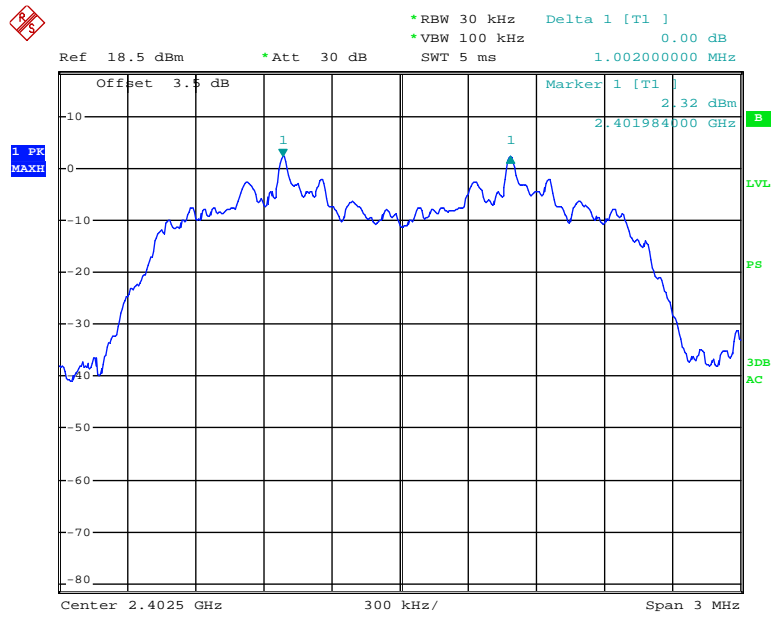
**EDR ( $\pi/4$ -DQPSK): Middle Channel**

Date: 7.DEC.2012 14:12:50

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

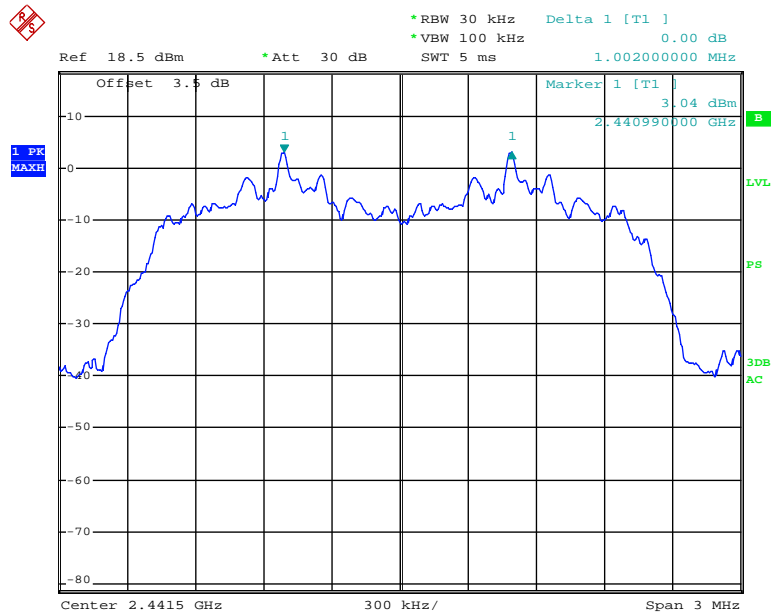
Date: 7.DEC.2012 14:11:53

### EDR (8DPSK): Low Channel



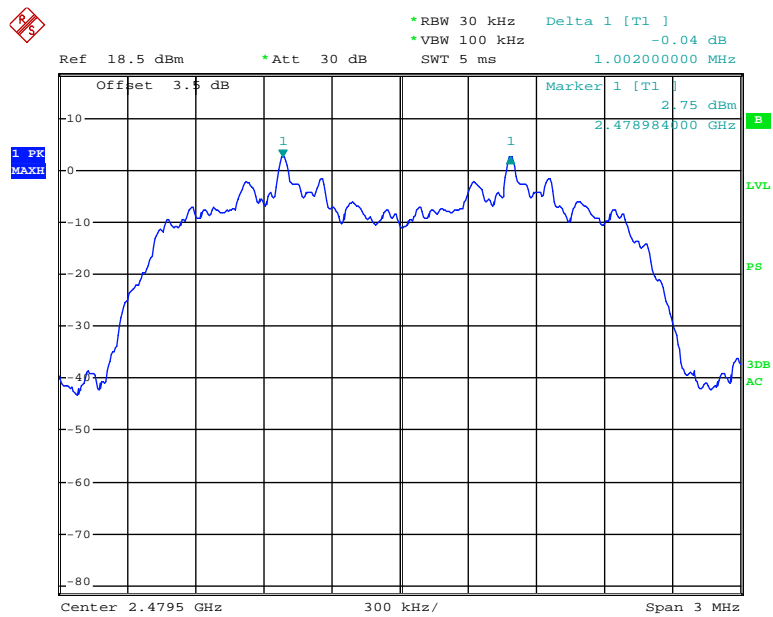
Date: 7.DEC.2012 14:08:29

### EDR (8DPSK): Middle Channel



Date: 7.DEC.2012 14:09:26

### EDR (8DPSK): High Channel



Date: 7.DEC.2012 14:10:27

**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	2012-08-08	2013-08-07

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

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

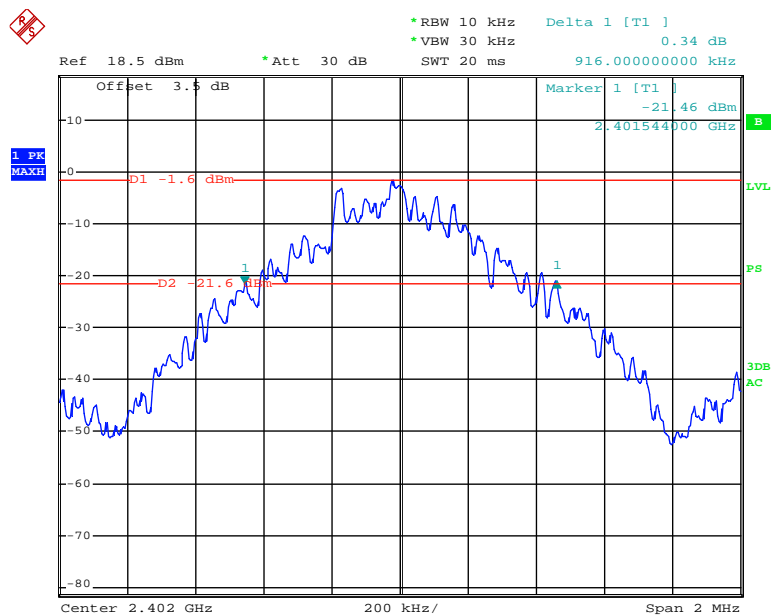
Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

\* The testing was performed by Tiger Ye on 2012-12-07.

EUT operation mode: Transmitting

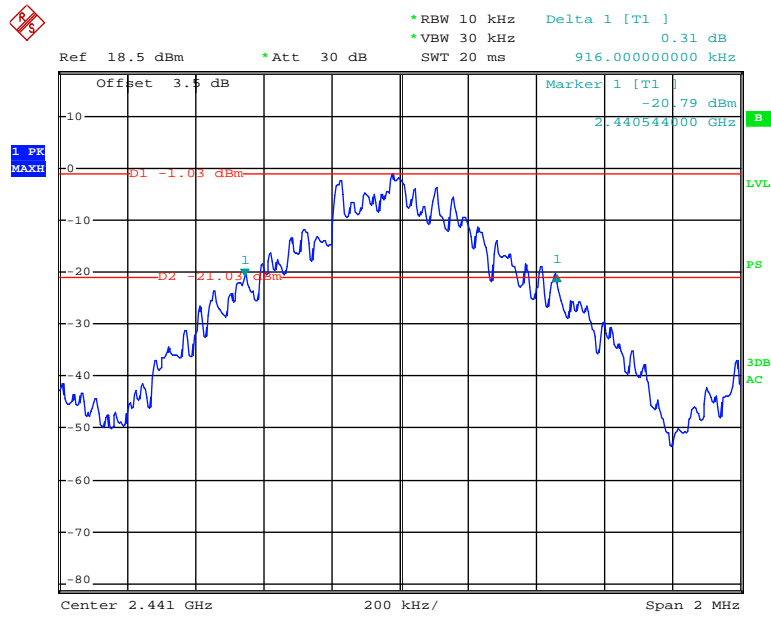
Test Result: Compliance. Please refer to following tables and plots

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.916
	Middle	2441	0.916
	High	2480	0.916
EDR ( $\pi/4$ -DQPSK)	Low	2402	1.204
	Middle	2441	1.204
	High	2480	1.204
EDR (8DPSK)	Low	2402	1.208
	Middle	2441	1.208
	High	2480	1.208

**BDR (GFSK): Low Channel**

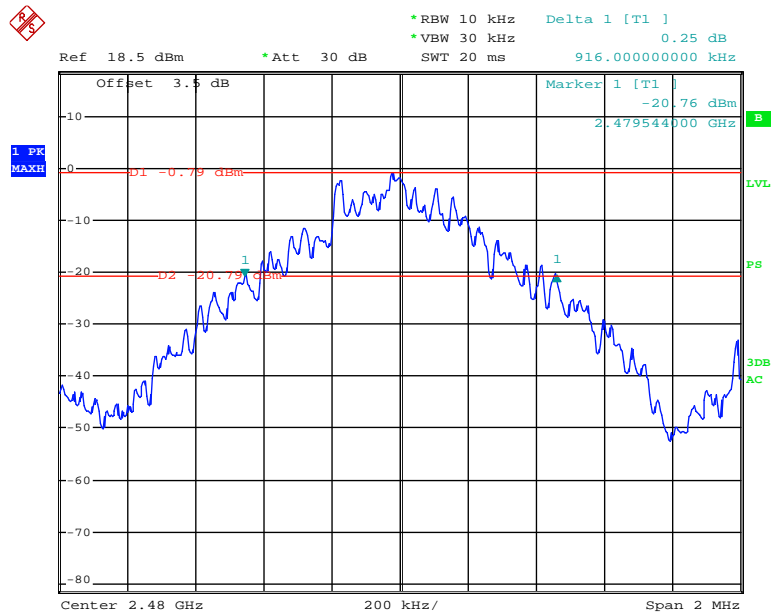
Date: 7.DEC.2012 13:18:18

### BDR (GFSK): Middle Channel



Date: 7.DEC.2012 13:20:09

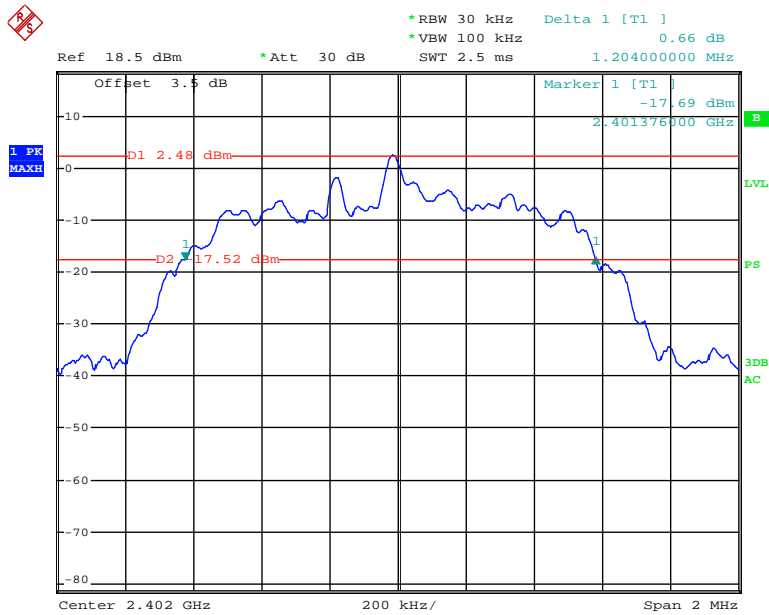
### BDR (GFSK): High Channel



Date: 7.DEC.2012 13:21:04

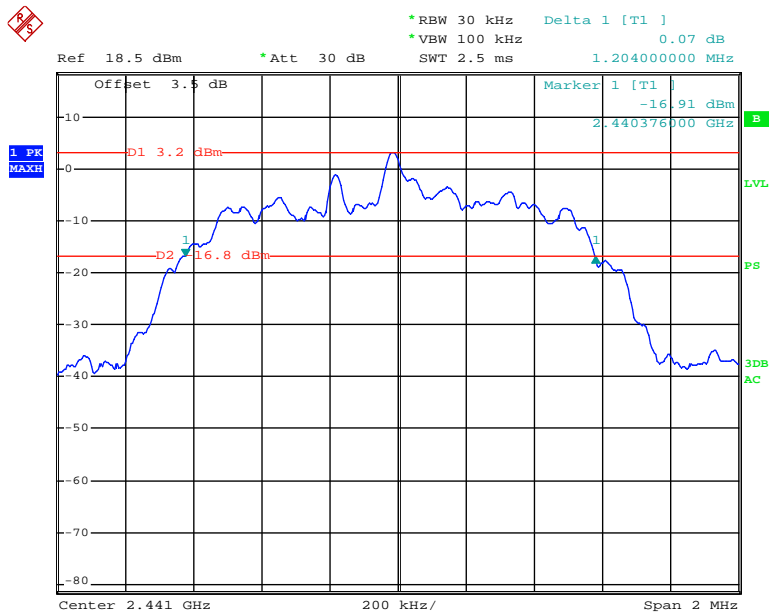


### EDR ( $\pi/4$ -DQPSK): Low Channel



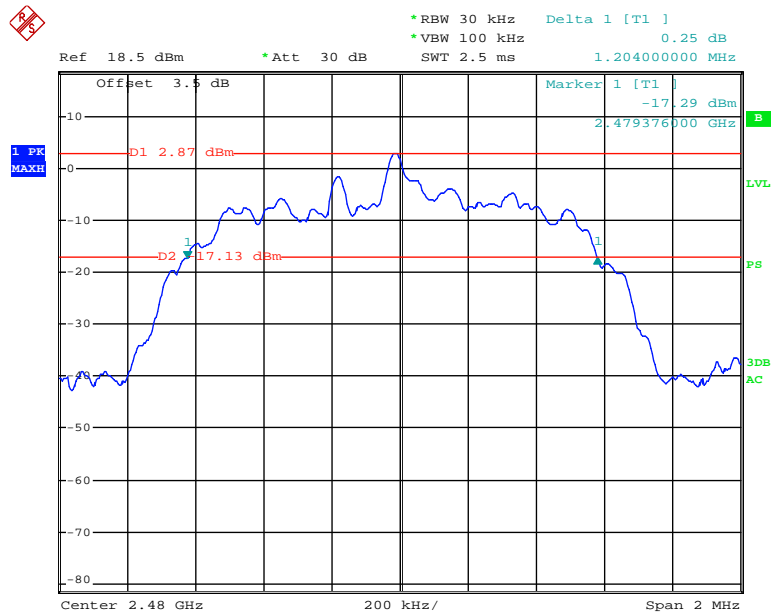
Date: 7.DEC.2012 13:27:44

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



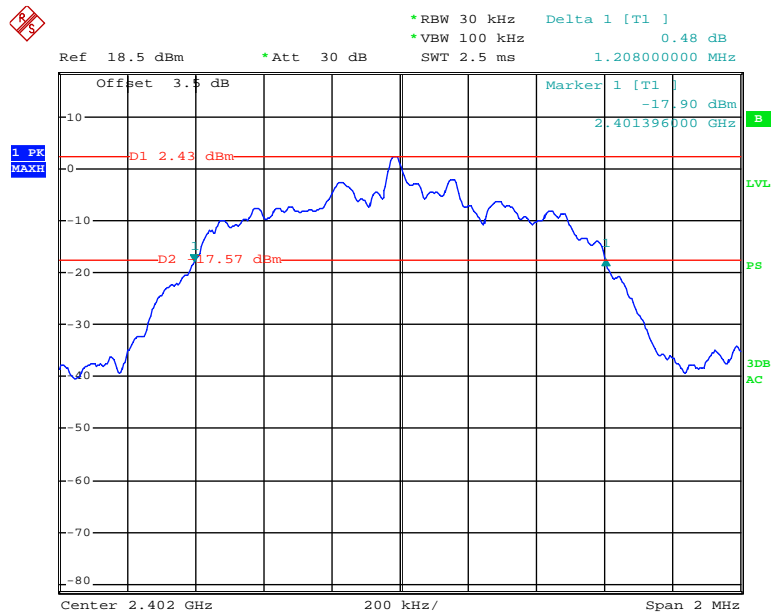
Date: 7.DEC.2012 13:25:57

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



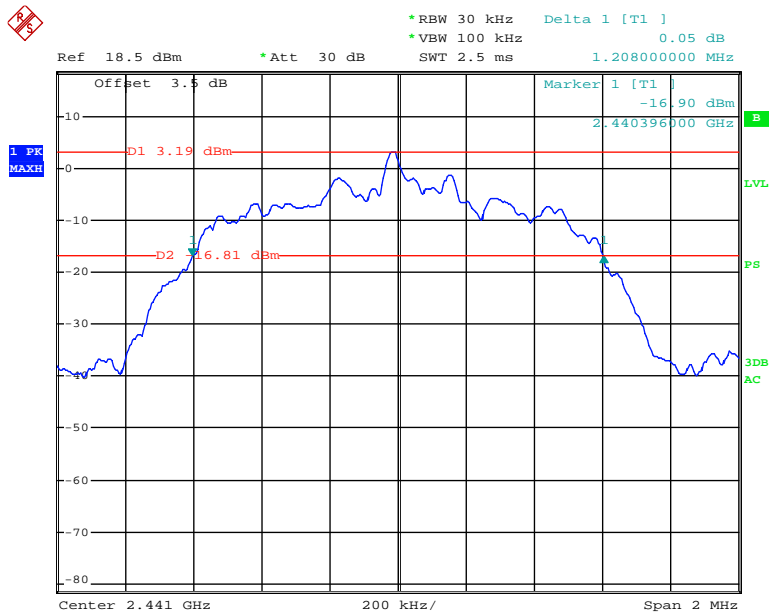
Date: 7.DEC.2012 13:24:16

### EDR (8DPSK): Low Channel



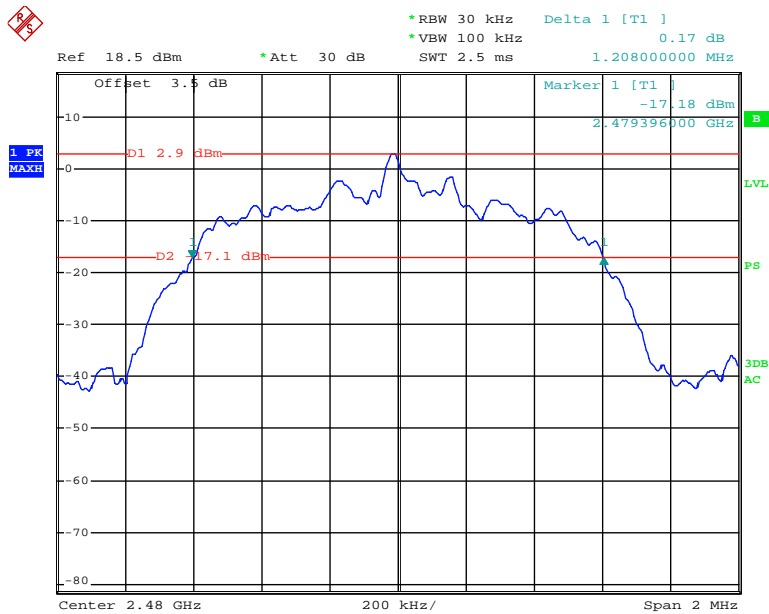
Date: 7.DEC.2012 13:29:27

### EDR (8DPSK): Middle Channel



Date: 7.DEC.2012 13:30:47

### EDR (8DPSK): High Channel



Date: 7.DEC.2012 13:32:32

**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	2012-08-08	2013-08-07

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

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

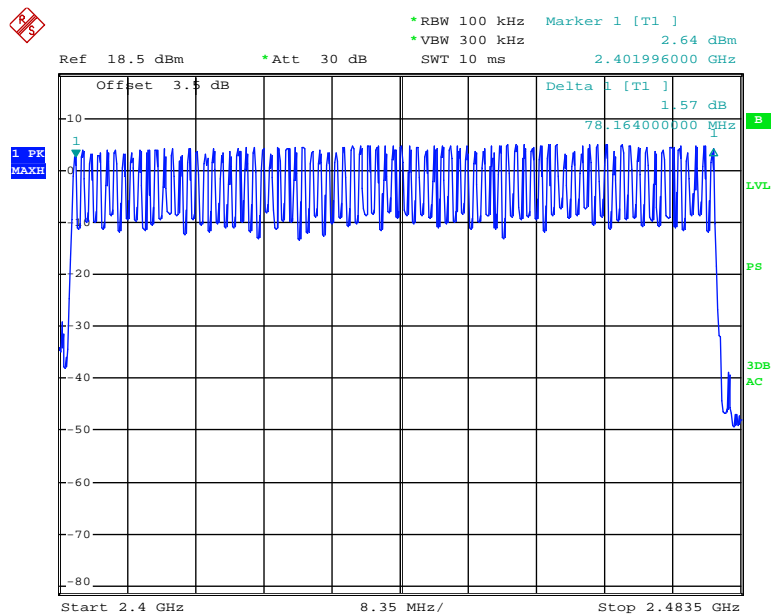
Temperature:	25°C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

*The testing was performed by Tiger Ye on 2012-12-07.*

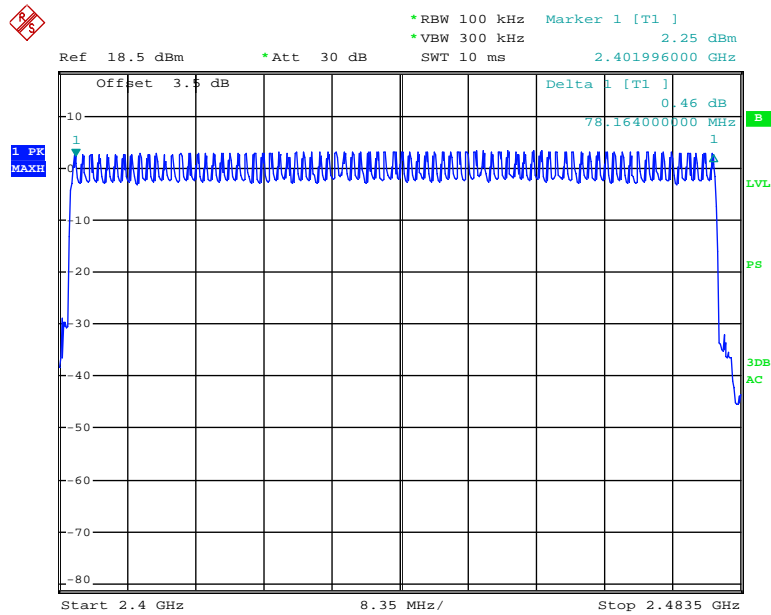
*EUT operation mode: Transmitting*

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

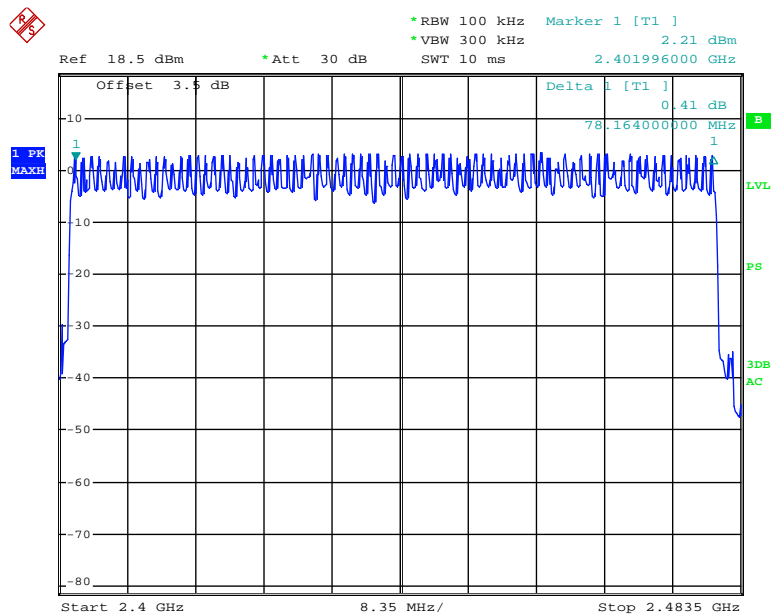
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2402-2480	79	≥15
EDR (π/4-DQPSK)	2402-2480	79	≥15
EDR (8DPSK)	2402-2480	79	≥15

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

Date: 7.DEC.2012 13:51:24

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

Date: 7.DEC.2012 14:04:00

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

Date: 7.DEC.2012 14:06:35

**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	2012-08-08	2013-08-07

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP 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 Tiger Ye on 2012-12-07.*

*EUT operation mode: Transmitting*

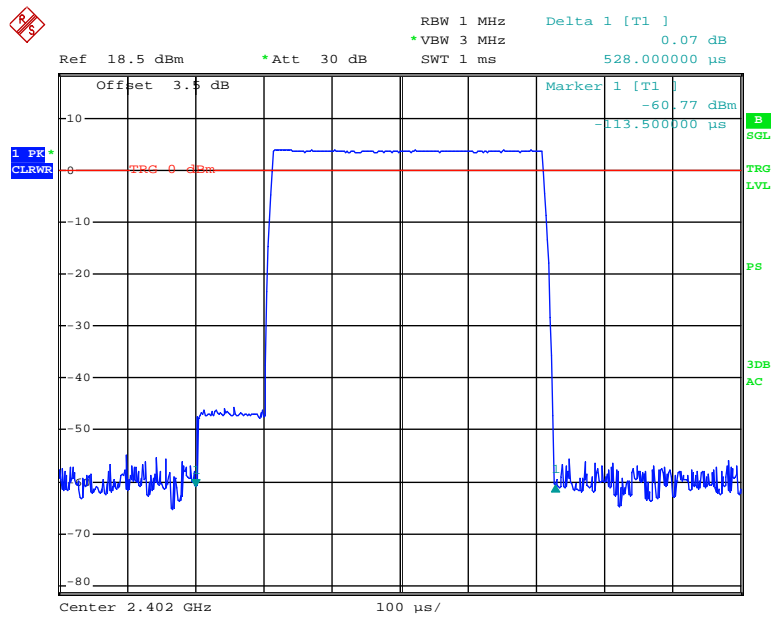
*Test Result: Compliance. Please refer to following tables and plots*

Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.528	0.169	0.4	Pass
		Middle	0.528	0.169	0.4	Pass
		High	0.528	0.169	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.808	0.289	0.4	Pass
		Middle	1.808	0.289	0.4	Pass
		High	1.808	0.289	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.068	0.327	0.4	Pass
		Middle	3.068	0.327	0.4	Pass
		High	3.068	0.327	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR ( $\pi/4$ -DQPSK)	DH 1	Low	0.542	0.173	0.4	Pass
		Middle	0.542	0.173	0.4	Pass
		High	0.542	0.173	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.808	0.289	0.4	Pass
		Middle	1.808	0.289	0.4	Pass
		High	1.808	0.289	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.068	0.327	0.4	Pass
		Middle	3.068	0.327	0.4	Pass
		High	3.068	0.327	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	DH 1	Low	0.542	0.173	0.4	Pass
		Middle	0.542	0.173	0.4	Pass
		High	0.542	0.173	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.808	0.289	0.4	Pass
		Middle	1.808	0.289	0.4	Pass
		High	1.808	0.289	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.088	0.329	0.4	Pass
		Middle	3.088	0.329	0.4	Pass
		High	3.088	0.329	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				



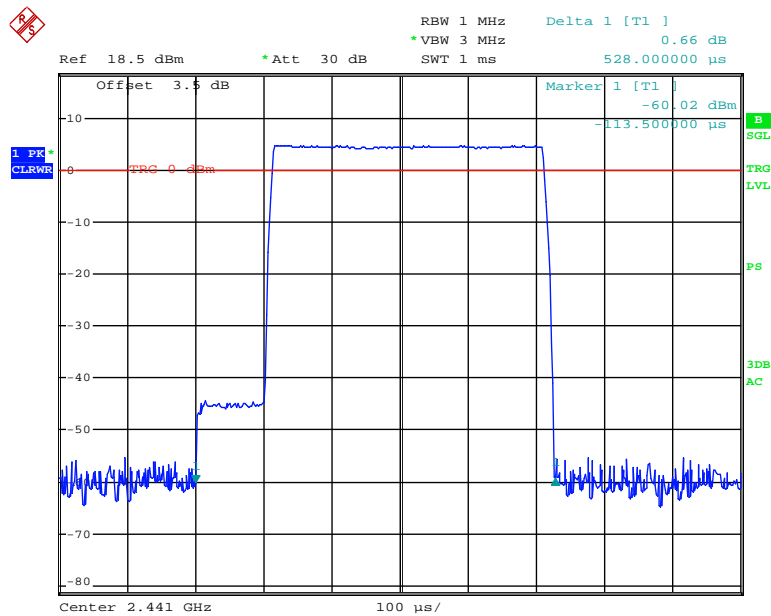
**BDR (GFSK):**

**Pulse time, Low Channel, DH1**



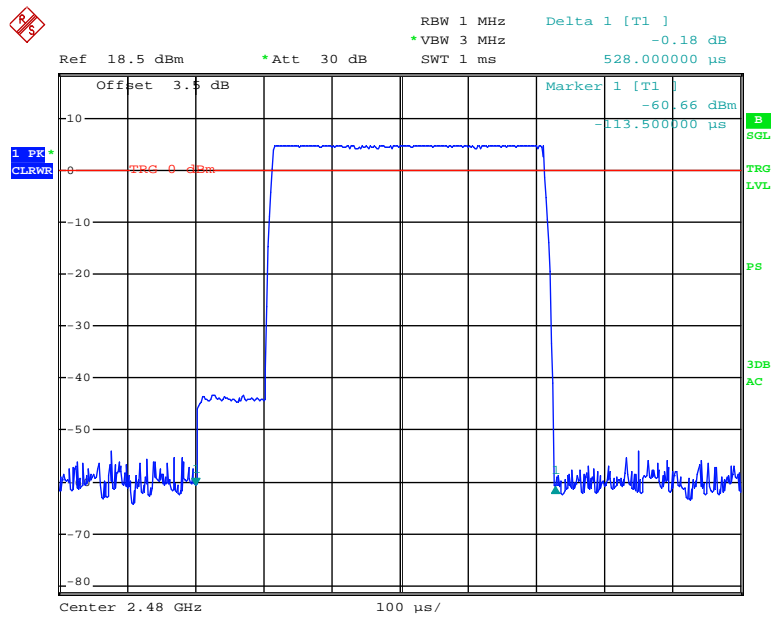
Date: 7.DEC.2012 14:24:36

**Pulse time, Middle Channel, DH1**



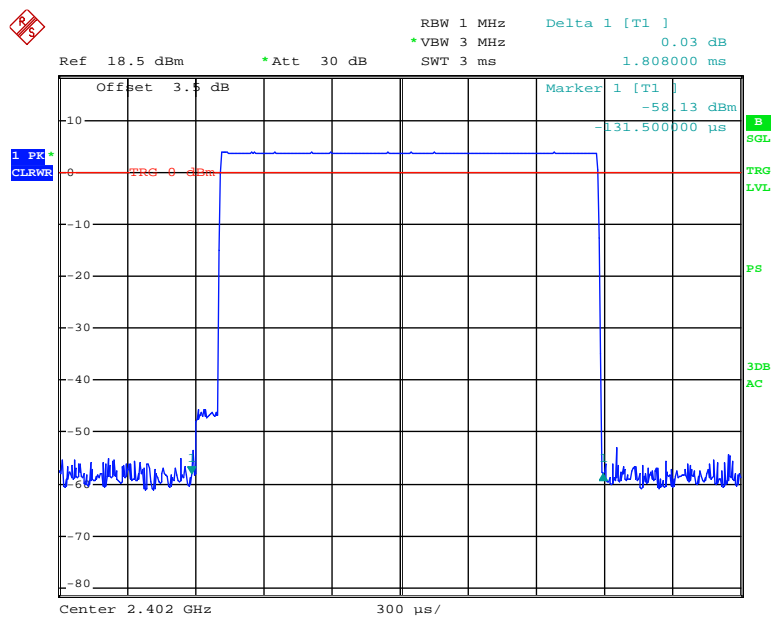
Date: 7.DEC.2012 14:24:15

### Pulse time, High Channel, DH1



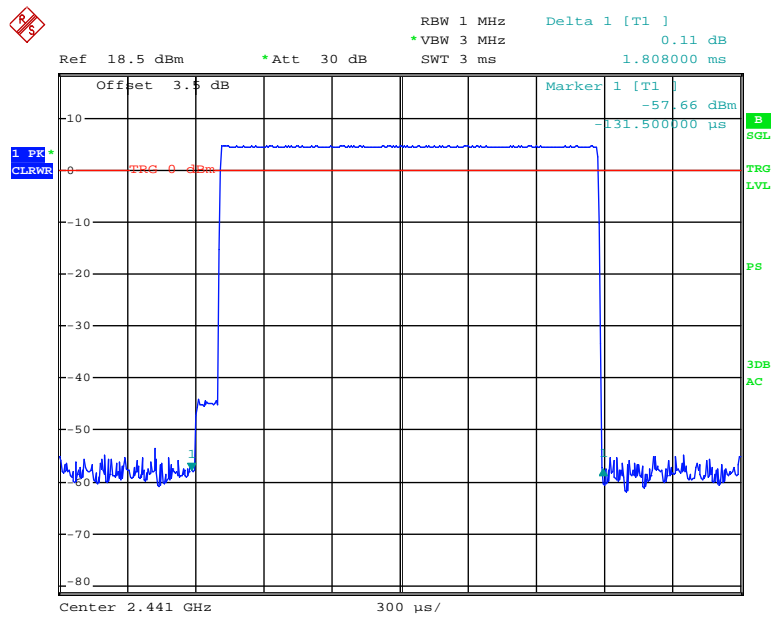
Date: 7.DEC.2012 14:25:20

### Pulse time, Low Channel, DH3



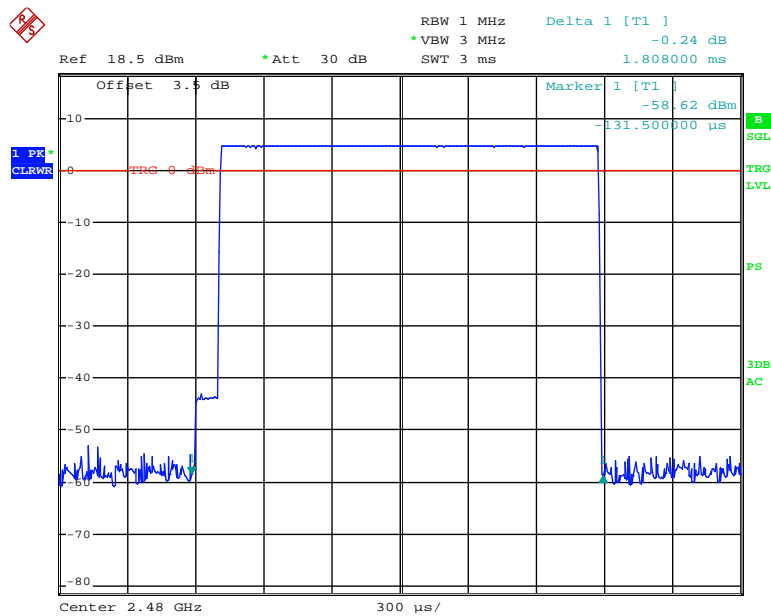
Date: 7.DEC.2012 14:34:13

### Pulse time, Middle Channel, DH3



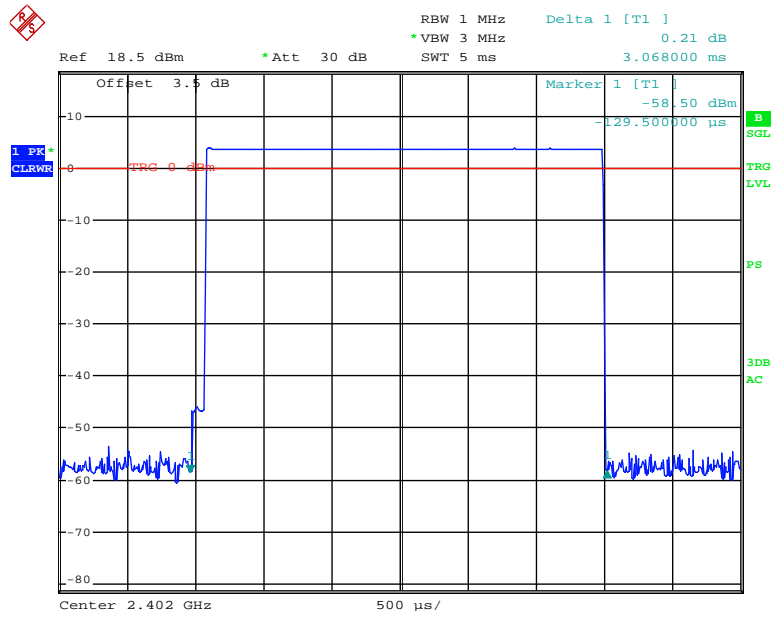
Date: 7.DEC.2012 14:33:58

### Pulse time, High Channel, DH3



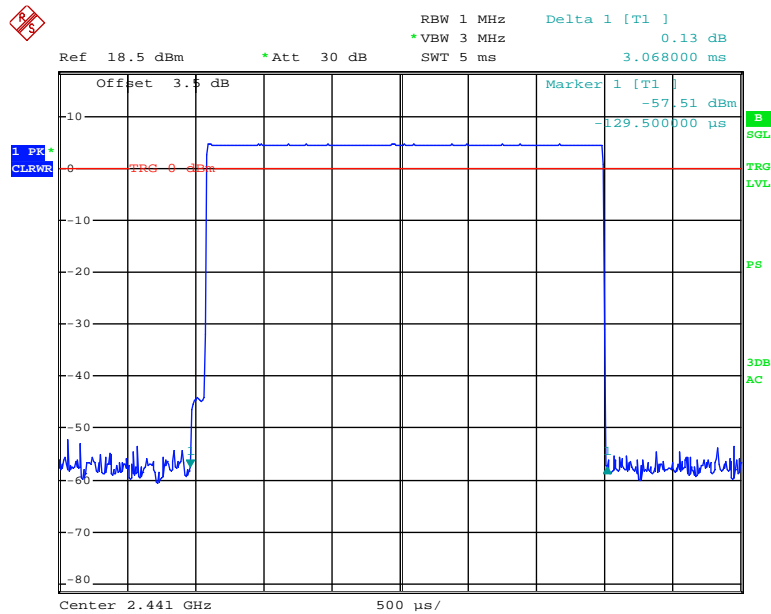
Date: 7.DEC.2012 14:33:12

### Pulse time, Low Channel, DH5



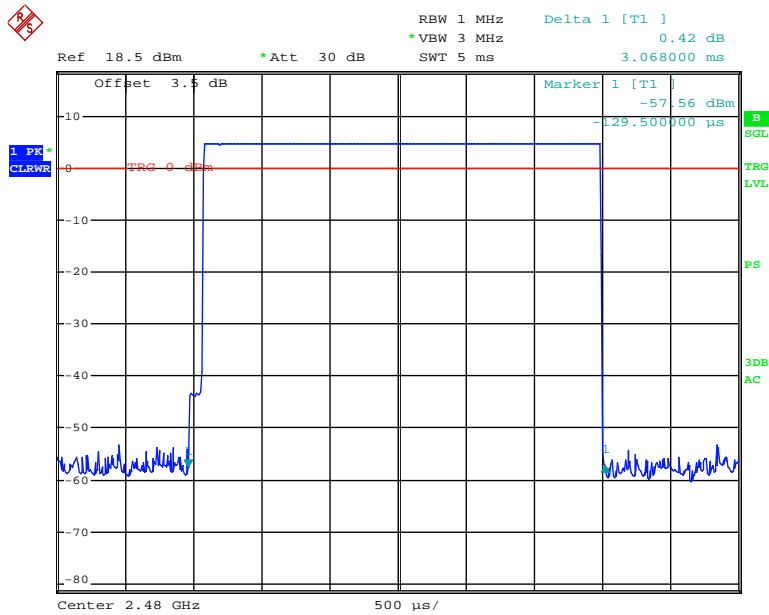
Date: 7.DEC.2012 14:43:46

### Pulse time, Middle Channel, DH5



Date: 7.DEC.2012 14:44:12

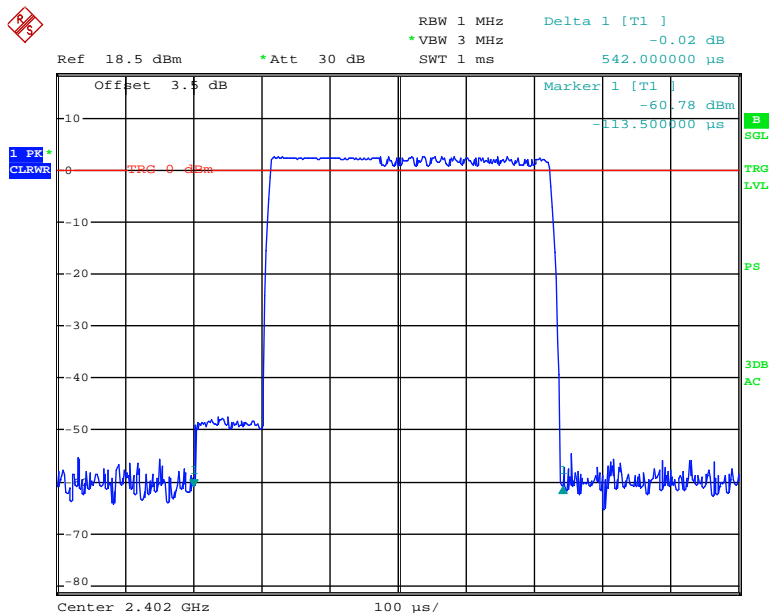
### Pulse time, High Channel, DH5



Date: 7.DEC.2012 14:44:27

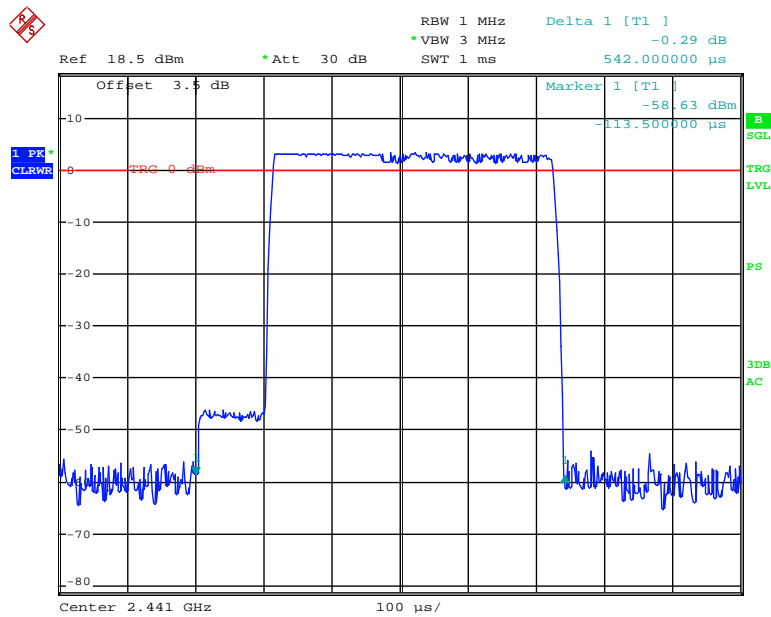
### EDR ( $\pi/4$ -DQPSK):

### Pulse time, Low Channel, DH1



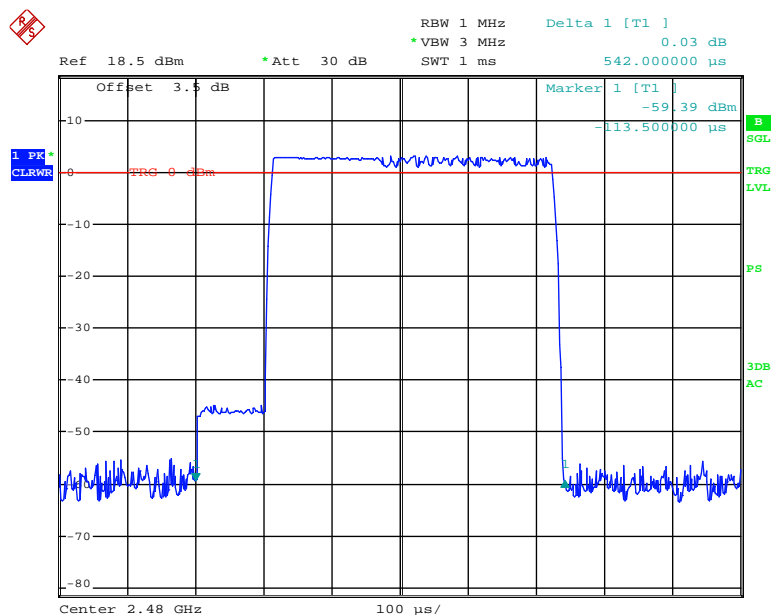
Date: 7.DEC.2012 14:28:14

### Pulse time, Middle Channel, DH1



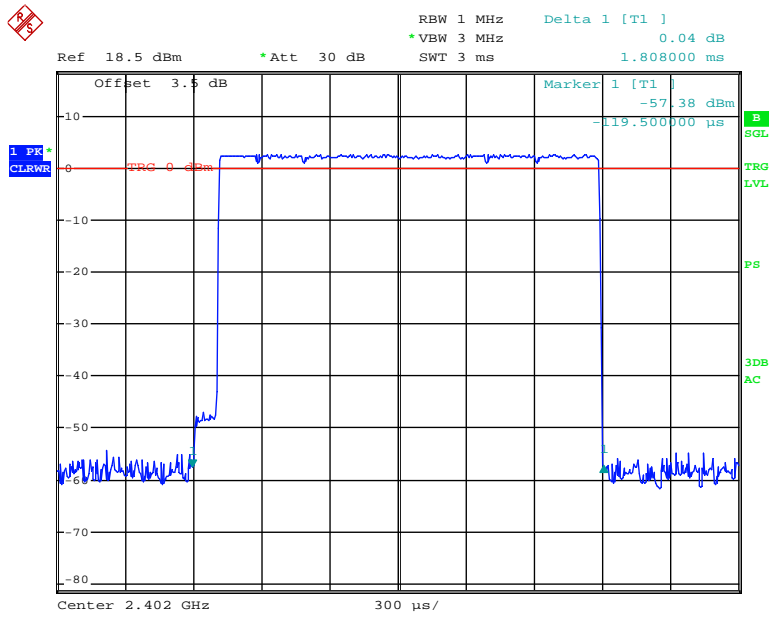
Date: 7.DEC.2012 14:27:54

### Pulse time, High Channel, DH1



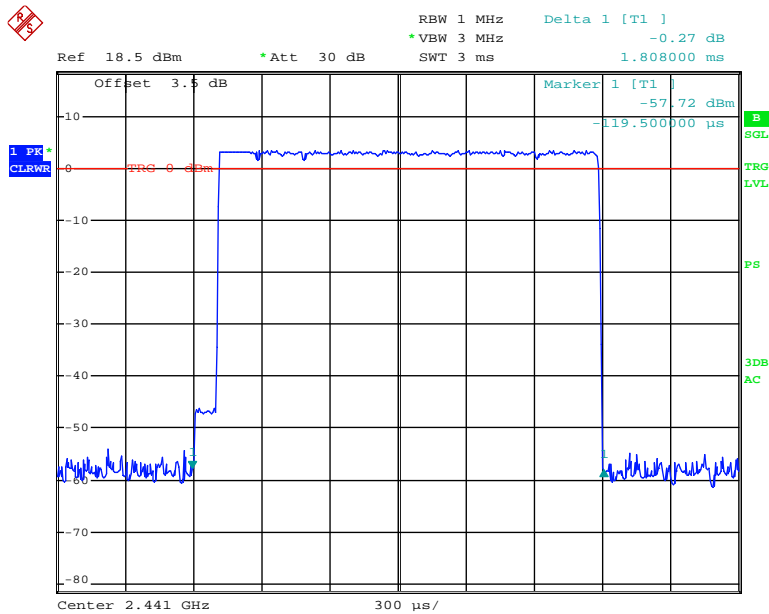
Date: 7.DEC.2012 14:27:26

### Pulse time, Low Channel, DH3



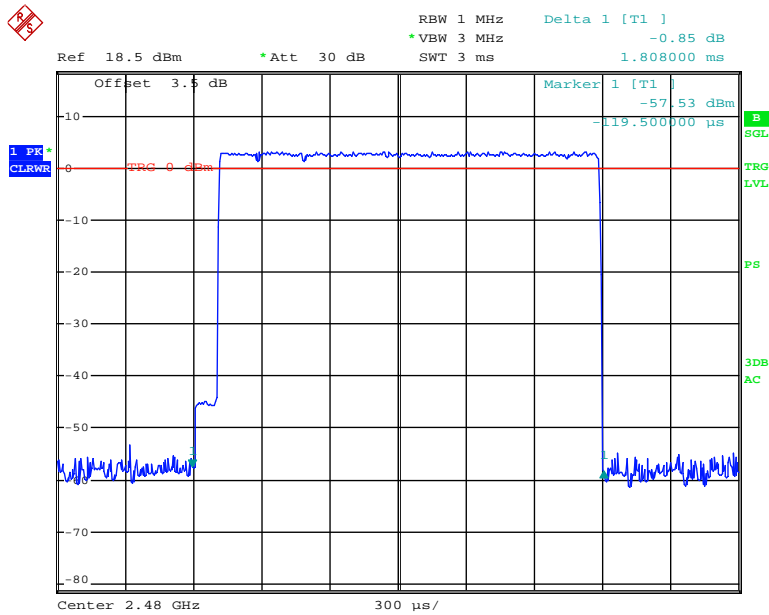
Date: 7.DEC.2012 14:36:53

### Pulse time, Middle Channel, DH3



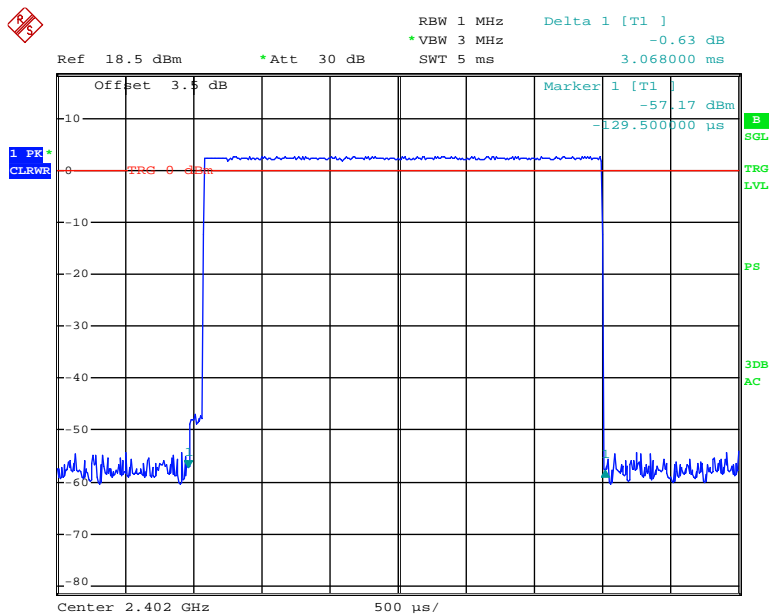
Date: 7.DEC.2012 14:37:14

### Pulse time, High Channel, DH3



Date: 7.DEC.2012 14:37:30

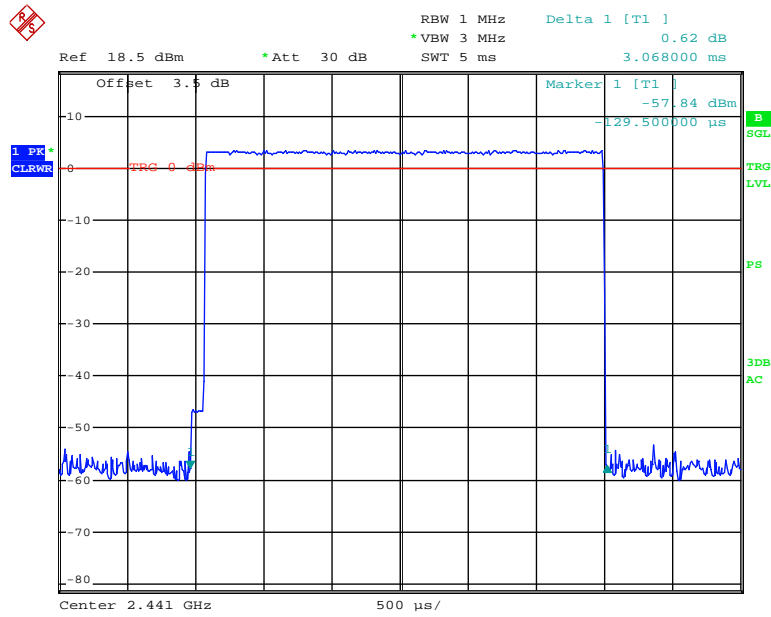
### Pulse time, Low Channel, DH5



Date: 7.DEC.2012 14:43:16

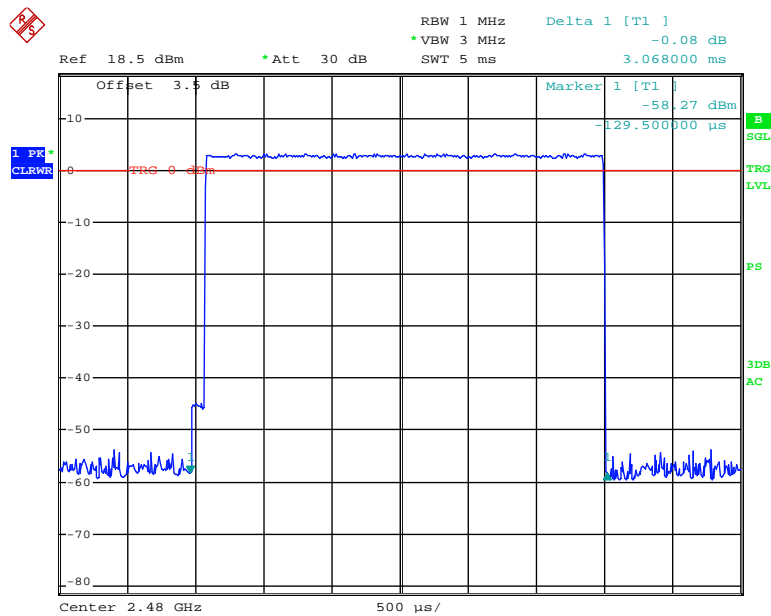


### Pulse time, Middle Channel, DH5



Date: 7.DEC.2012 14:42:57

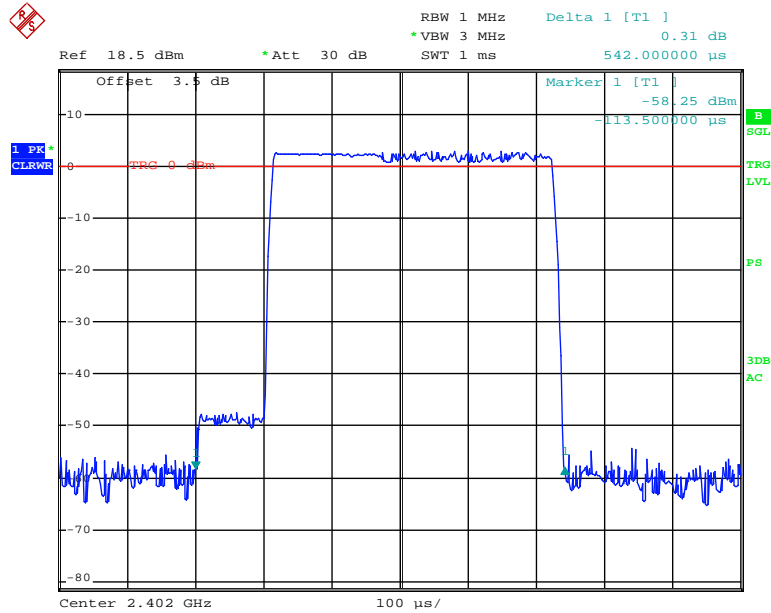
### Pulse time, High Channel, DH5



Date: 7.DEC.2012 14:42:32

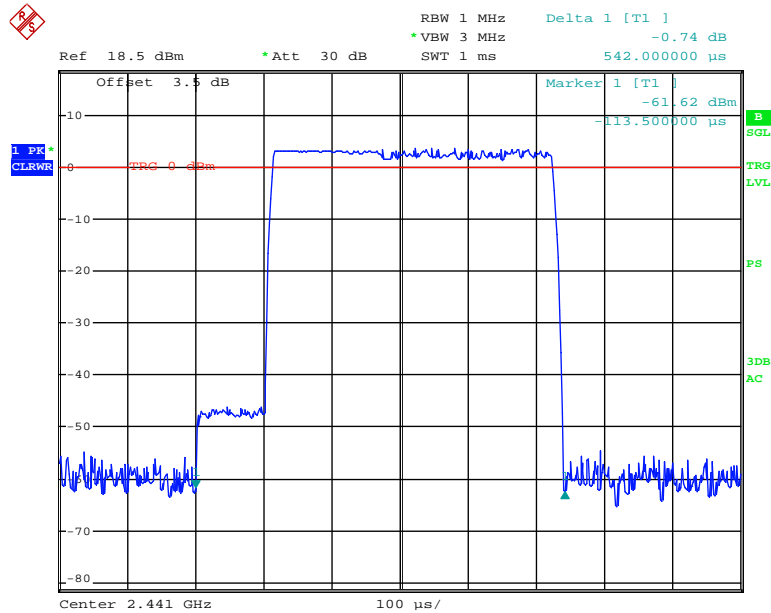
**EDR (8DPSK):**

**Pulse time, Low Channel, DH1**



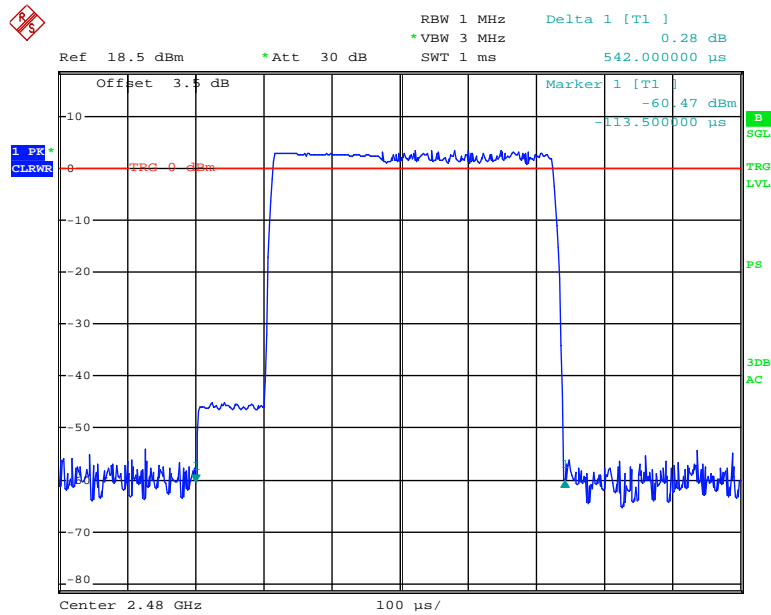
Date: 7.DEC.2012 14:29:56

**Pulse time, Middle Channel, DH1**



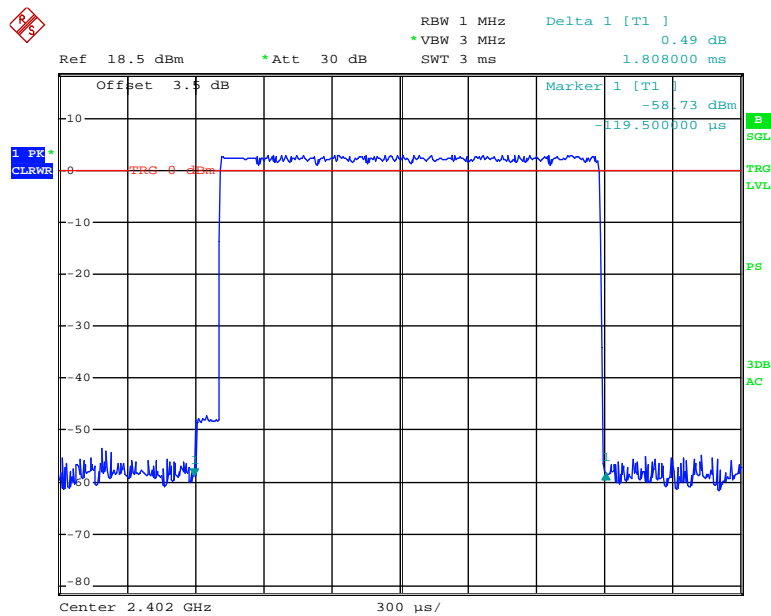
Date: 7.DEC.2012 14:30:40

### Pulse time, High Channel, DH1



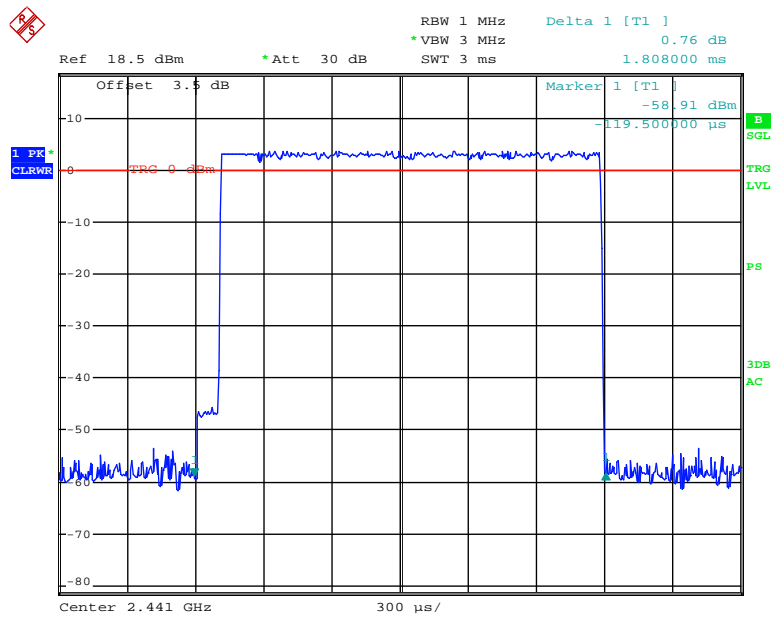
Date: 7.DEC.2012 14:31:24

### Pulse time, Low Channel, DH3



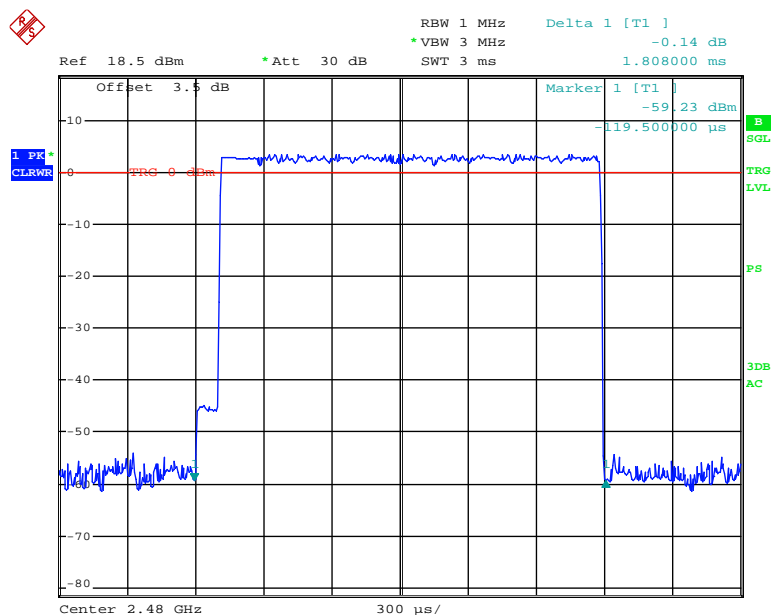
Date: 7.DEC.2012 14:38:51

### Pulse time, Middle Channel, DH3



Date: 7.DEC.2012 14:38:32

### Pulse time, High Channel, DH3



Date: 7.DEC.2012 14:38:05

Offset 3.5 dB

1 PK  
CLRWR

TRG 0 dBm

Center 2.402 GHz 500  $\mu$ s/

RBW 1 MHz  
\*VBW 3 MHz  
SWT 5 ms

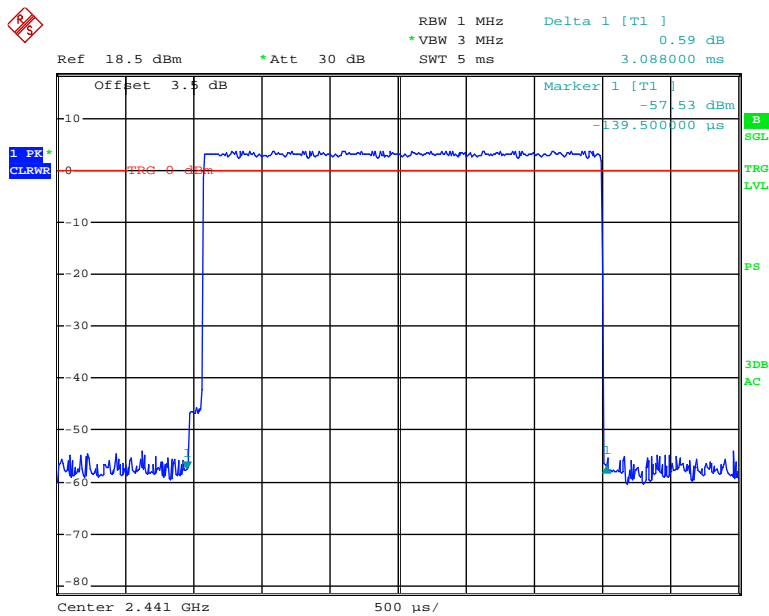
Delta 1 [T1] -0.09 dB  
3.088000 ms

Ref 18.5 dBm \*Att 30 dB

Marker 1 [T1] -58.04 dBm  
-139.500000  $\mu$ s

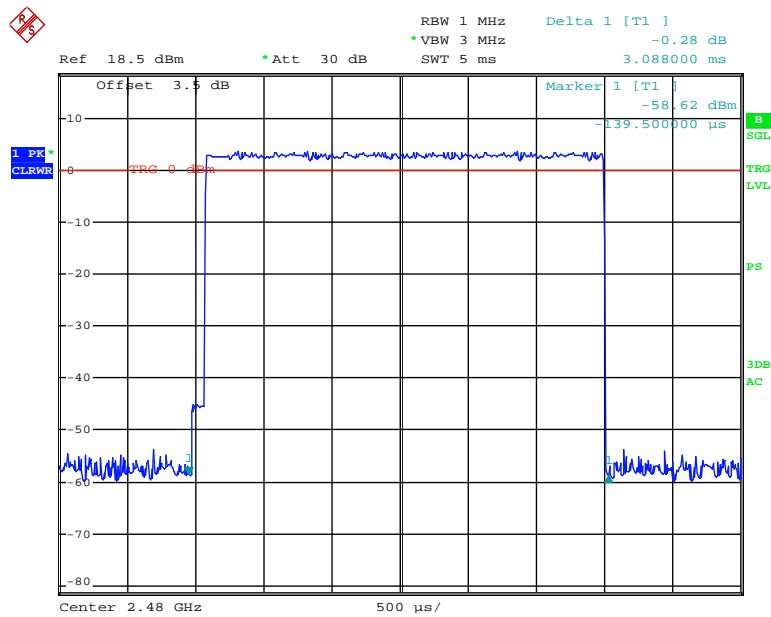
B  
SGL  
TRG  
LVL  
PS  
3DB  
AC

### Pulse time, Middle Channel, DH5



Page 45 of 57

# Pulse time, High Channel, DH5



Date: 7.DEC.2012 14:41:28

**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	EMI Test Receiver	ESCI	101122	2012-08-08	2013-08-07

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP 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

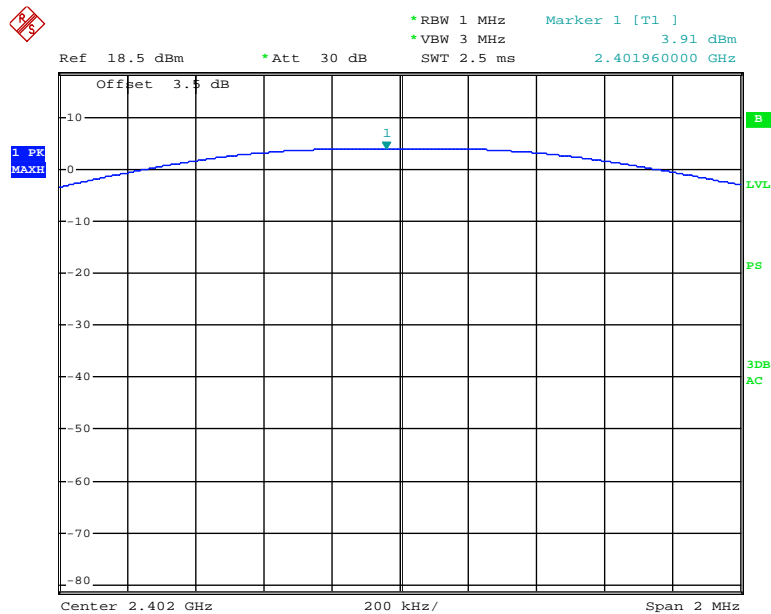
*The testing was performed by Tiger Ye on 2012-12-07.*

*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	3.91	2.46	1000
	Middle	2441	4.74	2.98	1000
	High	2480	4.84	3.05	1000
EDR ( $\pi/4$ -DQPSK)	Low	2402	3.18	2.08	1000
	Middle	2441	3.79	2.39	1000
	High	2480	3.67	2.33	1000
EDR (8DPSK)	Low	2402	3.41	2.19	1000
	Middle	2441	4.12	2.58	1000
	High	2480	4.05	2.54	1000

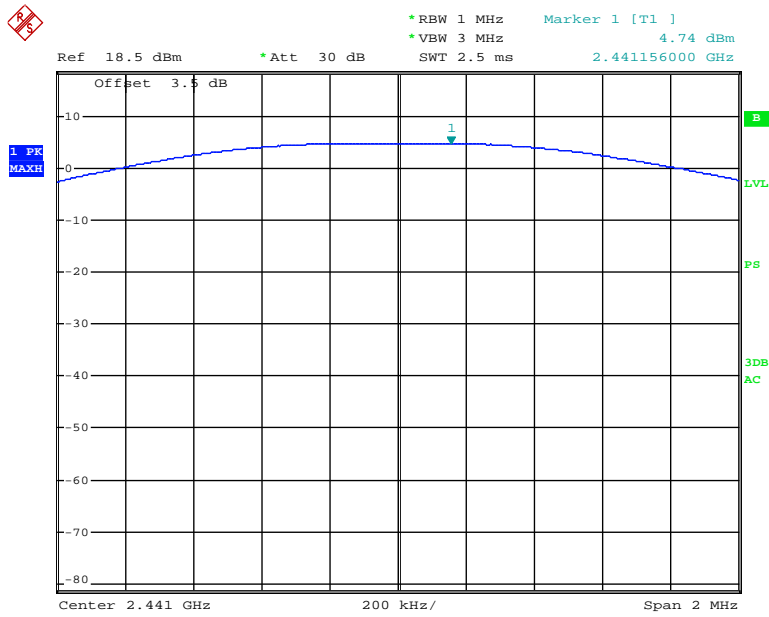
## BDR (GFSK): Low Channel



Date: 7.DEC.2012 13:45:14

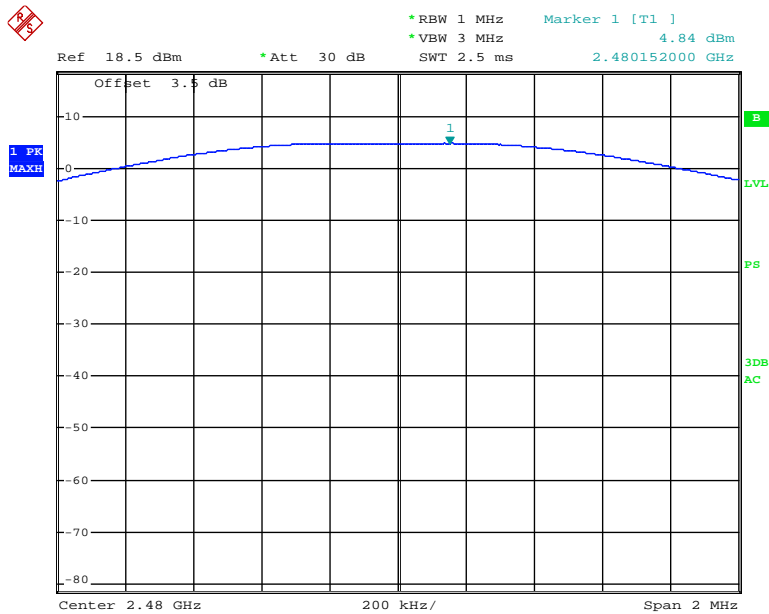


### BDR (GFSK): Middle Channel



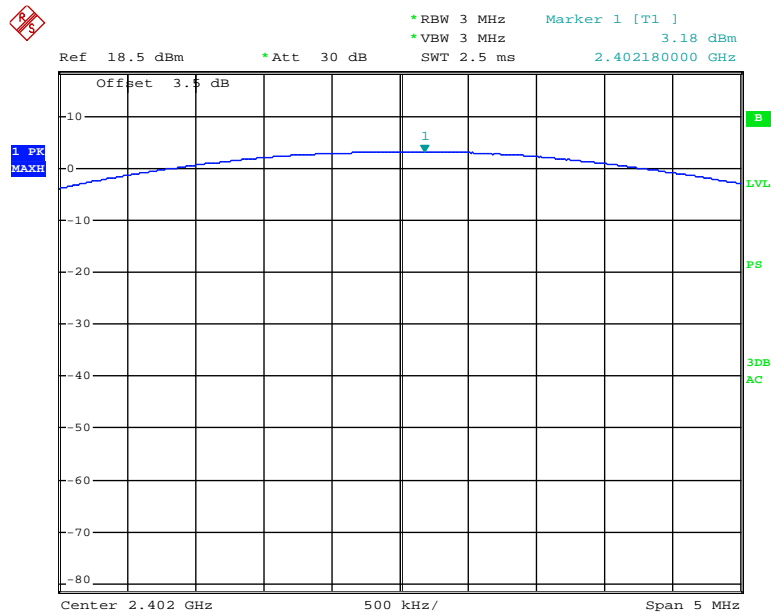
Date: 7.DEC.2012 13:46:32

### BDR (GFSK): High Channel



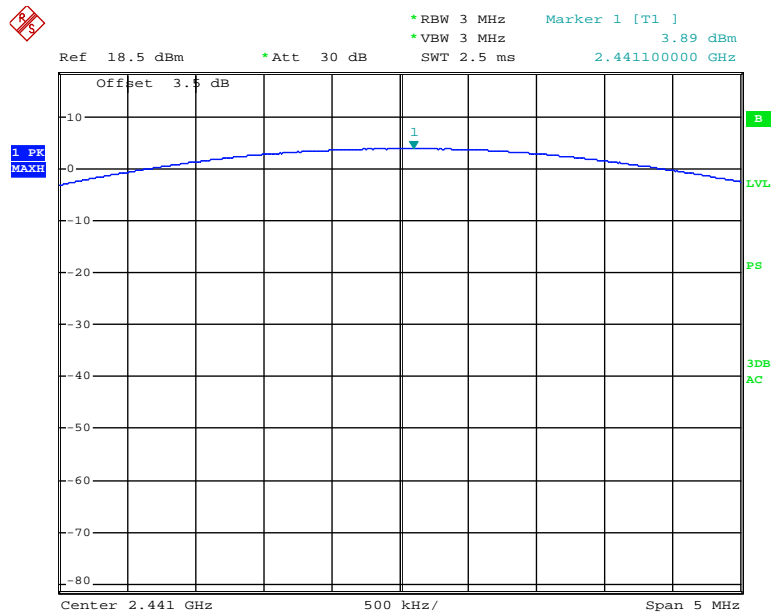
Date: 7.DEC.2012 13:47:50

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



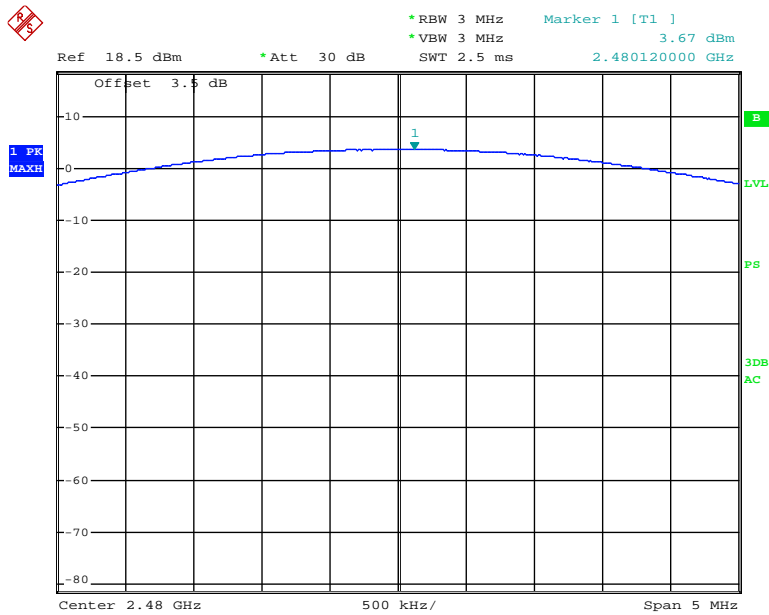
Date: 7.DEC.2012 13:38:42

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



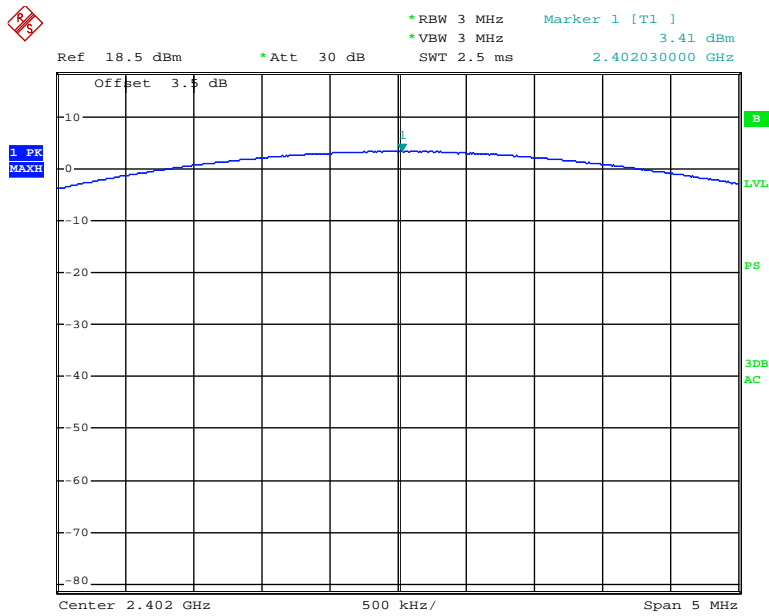
Date: 7.DEC.2012 13:40:13

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



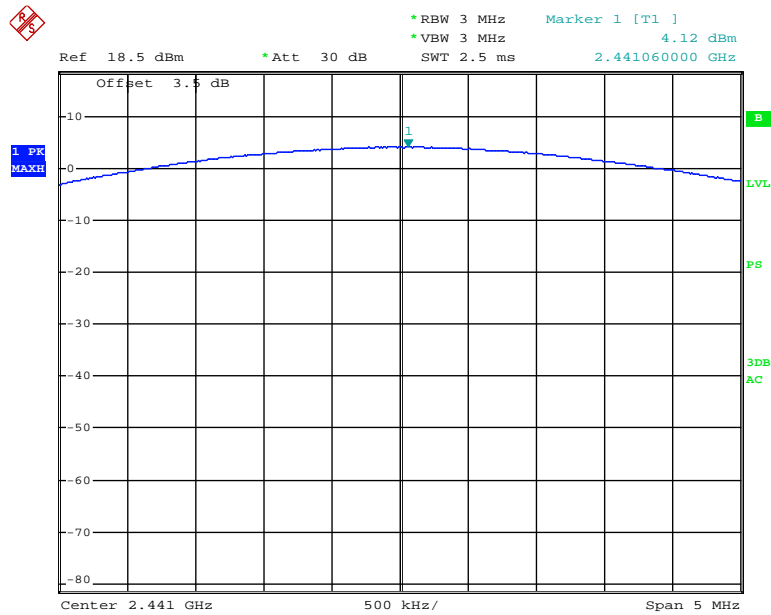
Date: 7.DEC.2012 13:40:46

### EDR(8DPSK): Low Channel



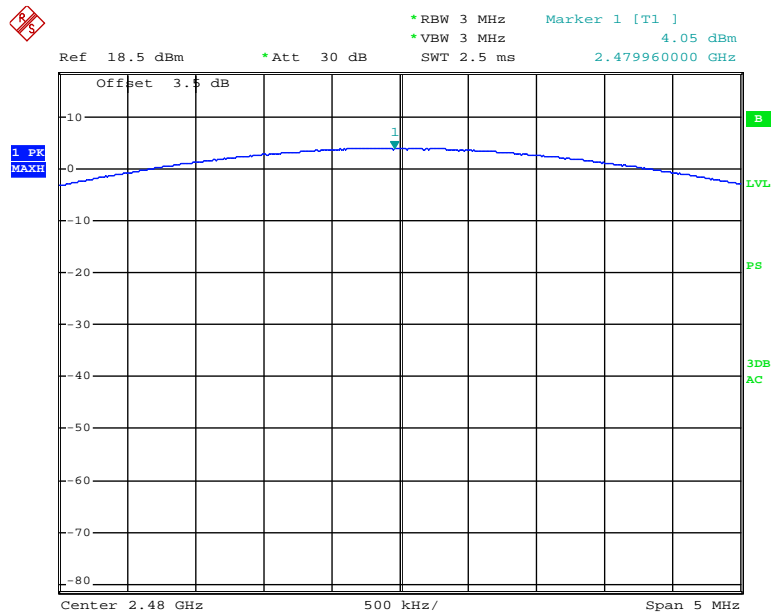
Date: 7.DEC.2012 13:37:46

### EDR(8DPSK): Middle Channel



Date: 7.DEC.2012 13:36:27

### EDR(8DPSK): High Channel



Date: 7.DEC.2012 13:35:53

## 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	2012-08-08	2013-08-07

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP 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

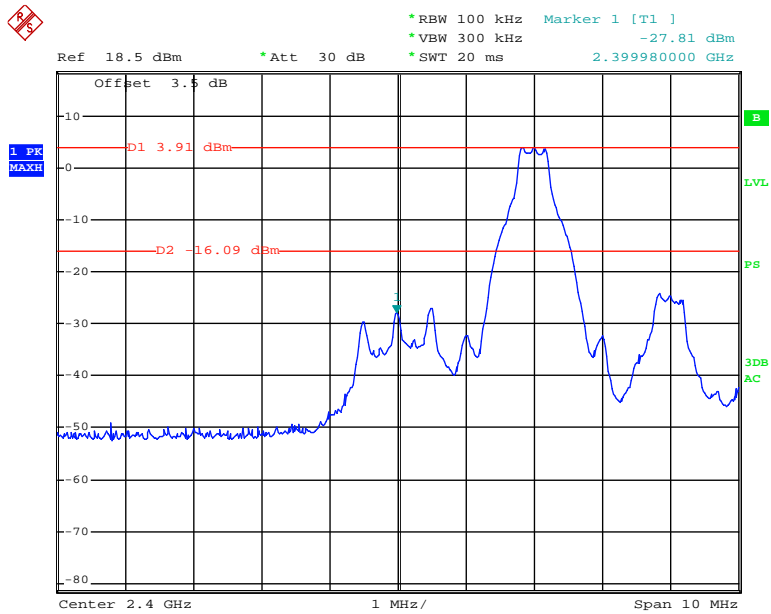
*The testing was performed by Tiger Ye on 2012-12-07.*

*EUT operation mode: Transmitting*

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

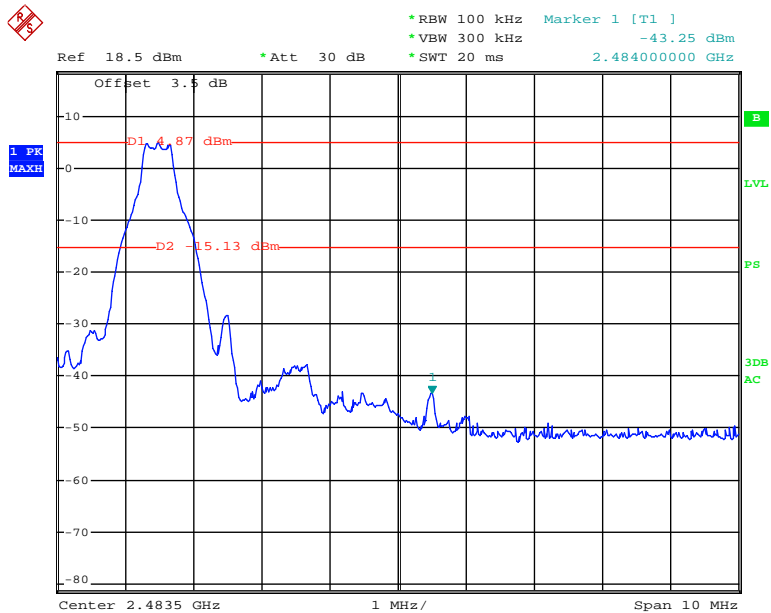
<b>Mode</b>	<b>Frequency band</b>	<b>Delta Peak to Band Emission (dBc)</b>	<b>Limit (dBc)</b>
BDR (GFSK)	Left Band	31.72	≥20
	Right Band	48.12	≥20
EDR ( $\pi/4$ -DQPSK)	Left Band	36.40	≥20
	Right Band	45.04	≥20
EDR (8DPSK)	Left Band	36.60	≥20
	Right Band	44.96	≥20

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



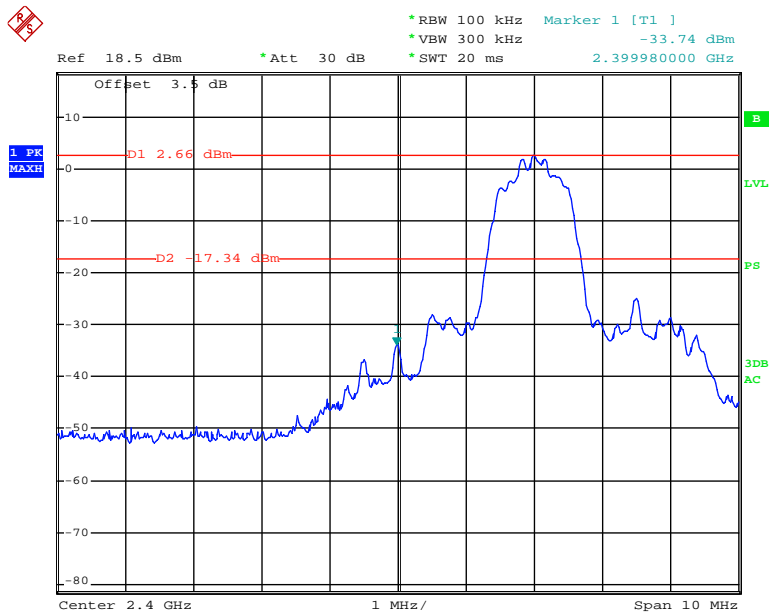
Date: 7.DEC.2012 15:43:23

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



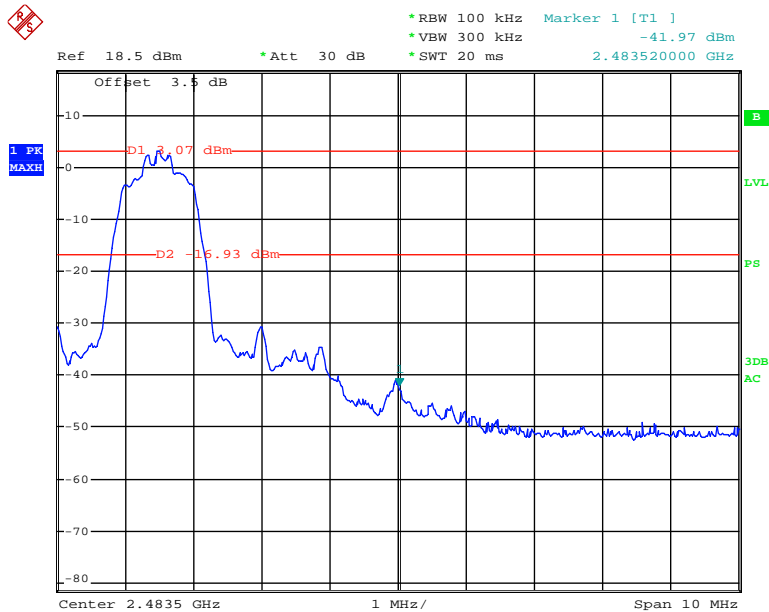
Date: 7.DEC.2012 15:44:30

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



Date: 7.DEC.2012 15:42:21

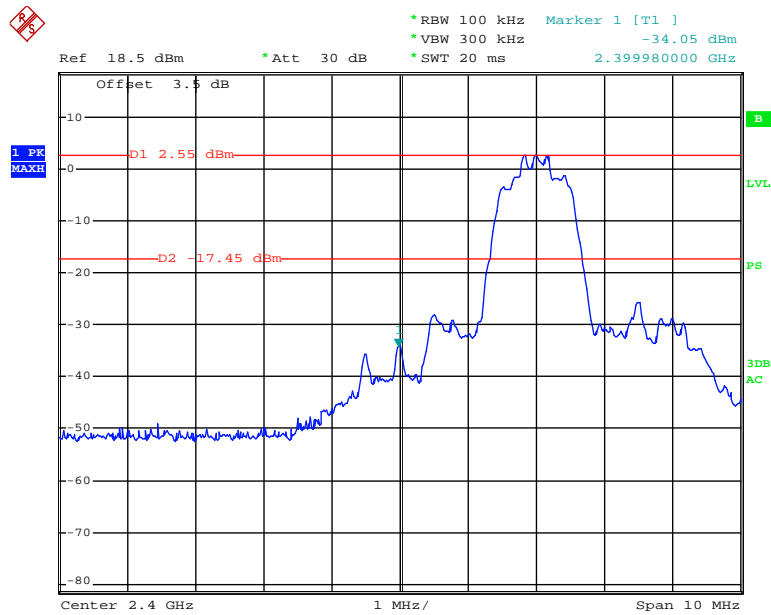
### EDR ( $\pi/4$ -DQPSK): Band Edge-Right Side



Date: 7.DEC.2012 15:41:16

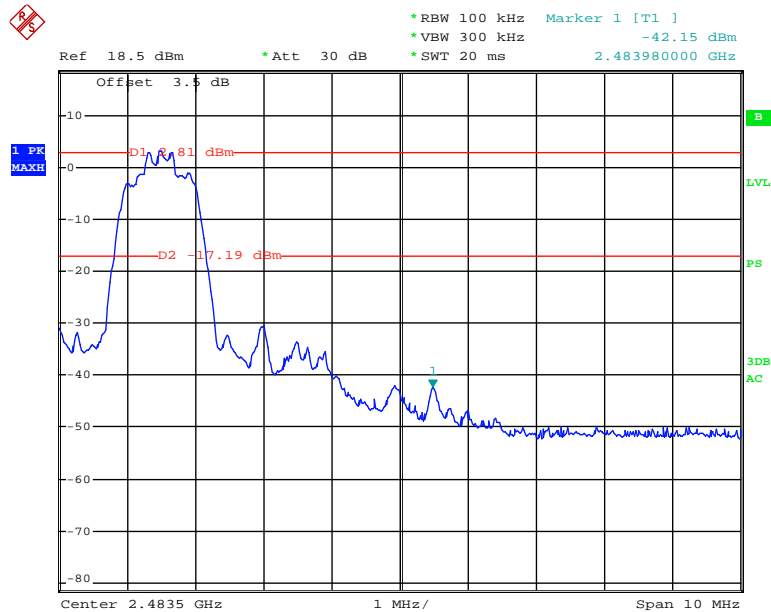


### EDR (8DPSK): Band Edge-Left Side



Date: 7.DEC.2012 15:38:29

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



Date: 7.DEC.2012 15:40:12

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