

FCC PART 15.247

TEST REPORT

For

Xingtel Xiamen Group Co., Ltd.

Xingtel Building, Chuangxin Road, Torch Hi-Tech Industrial District,

Xiamen, Fujian, China

FCC ID: QMHI800

Report Type: Original Report	Product Type: iPhone Complimate
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Report Number: RSZ121009008-00BT	
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* This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk "★"

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Xingtel Xiamen Group Co., Ltd.*'s product, model number: *i-800 (FCC ID: QMHI800)* or the "EUT" in this report was a base unit of *iPhone Complimate*, which was measured approximately: 23.0 cm (L) x 7.0 cm (W) x 7.0 cm (H), rated input voltage: DC 7.5V adapter.

Adapter Information: Switching Power Supply
Manufacturer: Something High Electric (Xiamen) Co., Ltd.
Model: P24075200 US;
Input: AC 100-240V 50/60Hz 0.6A
Output: DC 7.5V 2.0A

**All measurement and test data in this report was gathered from production sample serial number: 1210029 (Assigned by BACL, Shenzhen). The EUT was received on 2012-10-09.*

Objective

This report is prepared on behalf of *Xingtel Xiamen Group Co., 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 15D PUE submissions and FCC Part 15D PUB submission of portable portion with FCC ID: QMHI800

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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 C63.4-2003.

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 an engineering mode which was selected by manufacturer.

EUT Exercise Software

Software: CSR BlueTest3
Version: Release Build

Equipment Modifications

No modification was made to the EUT tested.

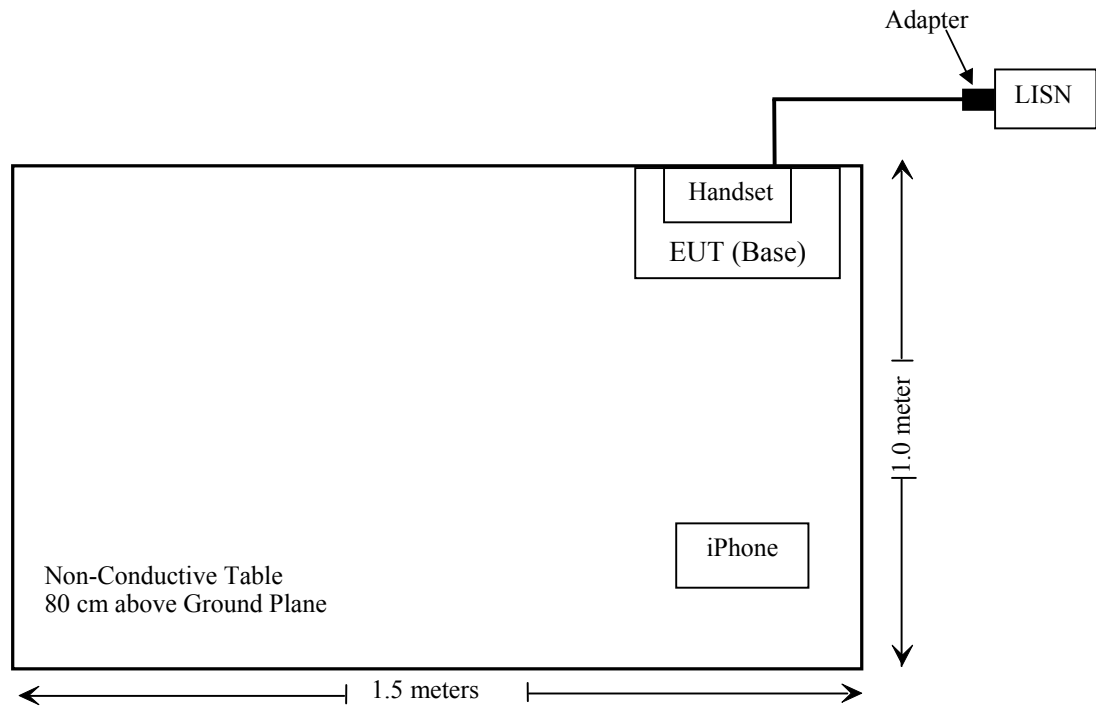
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
-	-	-	-

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detectable DC Power Cable	1.2	EUT	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB 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

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Standard Applicable

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mw/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally **numeric** gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
BDR (GFSK)	2402	0	1	0.34	1.08	20	0.000215	1.0
EDR (π/4-DQPSK)	2402	0	1	-1.21	0.76	20	0.000151	1.0
EDR (8DPSK)	2402	0	1	-1.08	0.78	20	0.000155	1.0

Note: To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

Result: Compliance

FCC §15.203 – ANTENNA REQUIREMENT

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 a PCB antenna connect to bluetooth module, which in accordance to section 15.203, the maximum gain is 0 dBi. Please refer to the internal photos.

Result: Compliance.

Applicable Standard

Measurement Uncertainty

Based on CISPR-16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is 2.4 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.

Vertical Reference Ground Plane

40cm

EUT

80cm

LISN

Test Receiver

Bonded to Horizontal Ground Plane

Horizontal Reference Ground Plane

- The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<u>Frequency Range</u>	<u>IF B/W</u>
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2011-11-24	2012-11-23
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-11-17	2012-11-16
Rohde & Schwarz	Attenuator	ESH3Z2	DE25985	2012-07-08	2013-07-07
BACL	CE Test software	BACL-CE	V1.0	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to 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 Part 15.207, with the worst margin reading of:

10.29 dB at 0.465 MHz in the Neutral conducted mode

Test Data

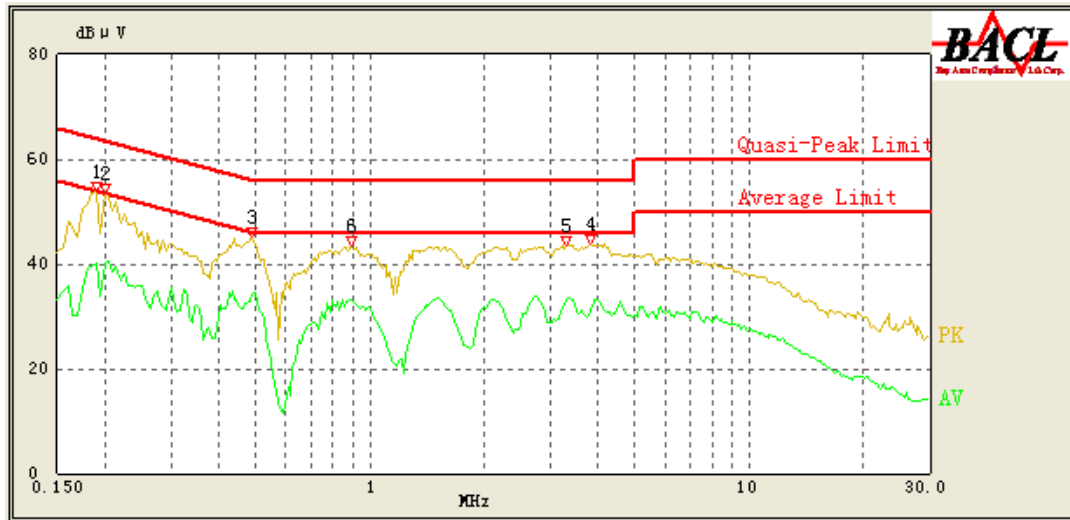
Environmental Conditions

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

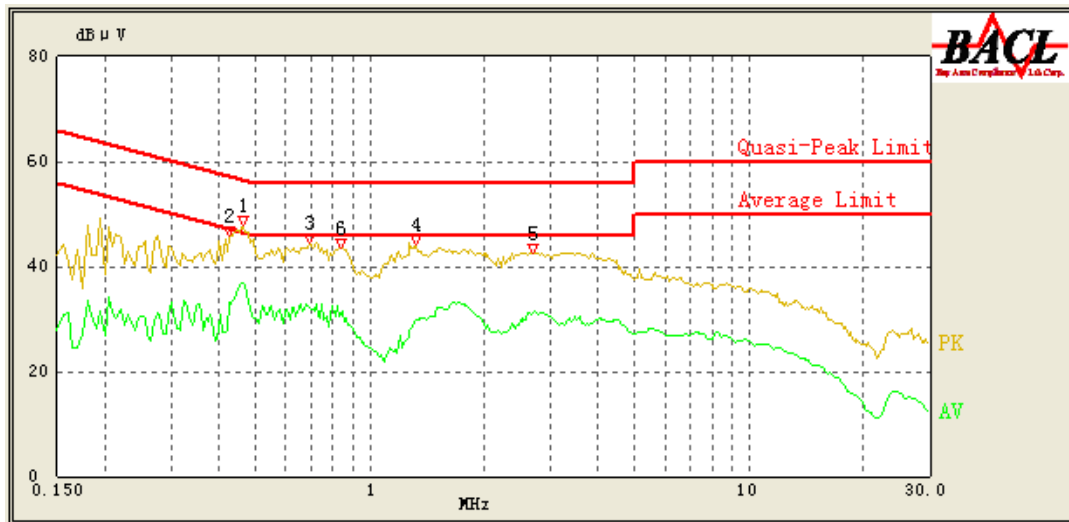
The testing was performed by Tiger Ye on 2012-10-23.

Test Mode: Transmitting

AC 120 V, 60 Hz, Line:



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave.)
0.490	34.03	10.25	46.29	12.26	Ave.
3.315	33.45	10.25	46.00	12.55	Ave.
0.895	33.20	10.19	46.00	12.80	Ave.
0.490	42.70	10.25	56.29	13.59	QP
0.200	40.20	10.27	54.57	14.37	Ave.
3.830	31.25	10.26	46.00	14.75	Ave.
0.190	40.07	10.27	54.86	14.79	Ave.
3.835	37.50	10.26	56.00	18.50	QP
0.190	44.88	10.27	64.86	19.98	QP
3.285	35.93	10.24	56.00	20.07	QP
0.890	35.73	10.19	56.00	20.27	QP
0.200	43.93	10.27	64.57	20.64	QP

AC 120V, 60 Hz, Neutral:

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave.)
0.465	36.71	10.25	47.00	10.29	Ave.
0.465	44.95	10.25	57.00	12.05	QP
0.690	32.27	10.22	46.00	13.73	Ave.
0.845	31.52	10.19	46.00	14.48	Ave.
0.425	33.25	10.25	48.14	14.89	Ave.
2.675	30.92	10.22	46.00	15.08	Ave.
0.690	40.68	10.22	56.00	15.32	QP
0.840	40.49	10.19	56.00	15.51	QP
0.425	42.47	10.25	58.14	15.67	QP
1.325	29.78	10.18	46.00	16.22	Ave.
2.680	38.75	10.22	56.00	17.25	QP
1.330	38.08	10.18	56.00	17.92	QP

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

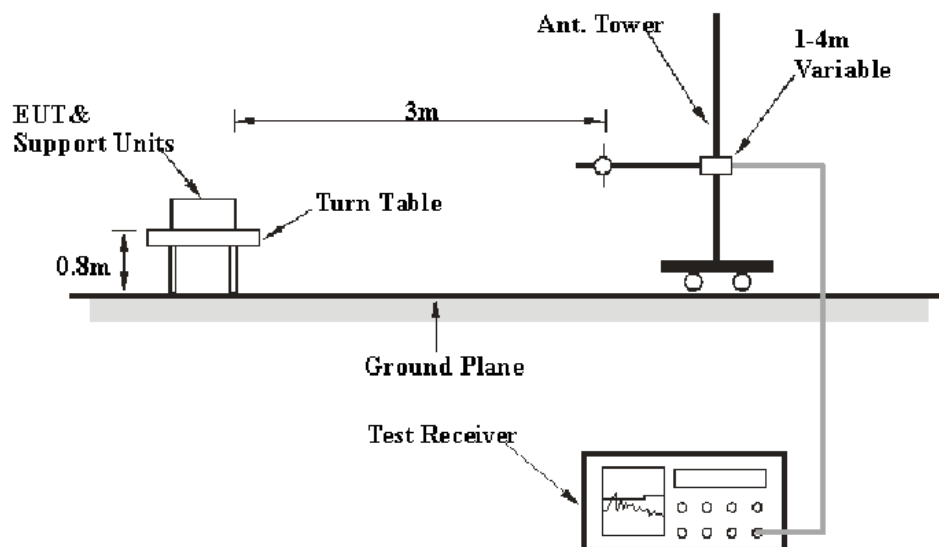
FCC §15.247 (d); §15.209; §15.205;

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



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2003. 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.

The adapter was connected to a 120 VAC/60 Hz power source.

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:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

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 to 1GHz and peak and Average detection modes for frequencies above 1GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2012-08-08	2013-08-07
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2012-11-27
Mini-Circuits	Amplifier	ZVA-213+	N/A	2011-11-24	2012-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
Electro-Mechanics	Horn antenna	3116	9510-2270	2012-10-14	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 traceable to National Primary Standards and International System of Units (SI).

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:

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

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

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

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, with the worst margin reading of:

9.96 dB at 50.1 MHz in the Vertical polarization

Test Data**Environmental Conditions**

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

The testing was performed by Tiger Ye on 2012-10-22.

30 MHz ~ 25 GHzTest mode: Transmitting (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 (dBμV/m)	FCC Part 15.247/15.209/15.205		
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)	Comment
Low Channel (2402 MHz)										
2402	88.73	PK	63	1.30	H	6.13	94.86	/	/	Fund.
2402	76.29	Ave.	63	1.30	H	6.13	82.42	/	/	Fund.
2402	87.63	PK	96	1.20	V	6.13	93.76	/	/	Fund.
2402	75.99	Ave.	96	1.20	V	6.13	82.12	/	/	Fund.
50.1	50.24	QP	13	1.00	V	-20.20	30.04	40.00	9.96	Spurious
189.4	44.16	QP	169	1.40	V	-16.20	27.96	43.50	15.54	Spurious
4804	25.49	Ave.	55	1.20	V	12.40	37.89	54.00	16.11	Harmonic
9608	18.22	Ave.	95	1.30	H	19.28	37.50	54.00	16.50	Harmonic
7206	17.49	Ave.	125	1.20	V	17.06	34.55	54.00	19.45	Harmonic
4804	41.26	PK	55	1.20	V	12.40	53.66	74.00	20.34	Harmonic
9608	33.61	PK	95	1.30	H	19.28	52.89	74.00	21.11	Harmonic
2367.7	25.61	Ave.	91	1.20	V	5.48	31.09	54.00	22.91	Spurious
7206	33.24	PK	125	1.20	V	17.06	50.30	74.00	23.70	Harmonic
2489.3	23.22	Ave.	320	1.10	V	6.81	30.03	54.00	23.97	Spurious
2337.2	23.29	Ave.	77	1.30	H	5.48	28.77	54.00	25.23	Spurious
2489.3	37.81	PK	320	1.10	V	6.81	44.62	74.00	29.38	Spurious
2367.7	38.74	PK	91	1.20	V	5.48	44.22	74.00	29.78	Spurious
2337.2	37.55	PK	77	1.30	H	5.48	43.03	74.00	30.97	Spurious
Middle Channel (2441 MHz)										
2441	88.12	PK	11	1.20	H	7.21	95.33	/	/	Fund.
2441	76.22	Ave.	11	1.20	H	7.21	83.43	/	/	Fund.
2441	87.25	PK	25	1.30	V	6.81	94.06	/	/	Fund.
2441	75.59	Ave.	25	1.30	V	6.81	82.40	/	/	Fund.
50.1	49.15	QP	128	1.10	V	-20.20	28.95	40.00	11.05	Spurious
189.4	42.98	QP	10	1.30	V	-16.20	26.78	43.50	16.72	Spurious
9764	17.55	Ave.	35	1.20	H	19.40	36.95	54.00	17.05	Harmonic
4882	23.97	Ave.	91	1.20	V	12.46	36.43	54.00	17.57	Harmonic
7323	18.15	Ave.	26	1.20	V	16.49	34.64	54.00	19.36	Harmonic
4882	39.65	PK	91	1.20	V	12.46	52.11	74.00	21.89	Harmonic
9764	32.59	PK	35	1.20	H	19.40	51.99	74.00	22.01	Harmonic
2489.5	24.88	Ave.	5	1.10	V	6.81	31.69	54.00	22.31	Spurious
7323	33.26	PK	26	1.20	V	16.49	49.75	74.00	24.25	Harmonic
2367.2	24.18	Ave.	25	1.20	V	5.48	29.66	54.00	24.34	Spurious
2337.7	23.15	Ave.	265	1.30	H	5.48	28.63	54.00	25.37	Spurious
2489.5	39.26	PK	5	1.10	V	6.81	46.07	74.00	27.93	Spurious
2367.2	38.55	PK	25	1.20	V	5.48	44.03	74.00	29.97	Spurious
2337.7	37.59	PK	265	1.30	H	5.48	43.07	74.00	30.93	Spurious

High Channel (2480 MHz)										
2480	87.92	PK	15	1.10	H	7.21	95.13	/	/	Fund.
2480	76.28	Ave.	15	1.10	H	7.21	83.49	/	/	Fund.
2480	87.38	PK	35	1.20	V	6.81	94.19	/	/	Fund.
2480	75.35	Ave.	35	1.20	V	6.81	82.16	/	/	Fund.
50.1	48.12	QP	128	1.10	V	-20.20	27.92	40.00	12.08	Spurious
189.4	43.59	QP	10	1.30	V	-16.20	27.39	43.50	16.11	Spurious
4960	24.26	Ave.	85	1.20	V	12.50	36.76	54.00	17.24	Harmonic
9920	17.27	Ave.	3	1.30	H	19.38	36.65	54.00	17.35	Harmonic
7440	17.81	Ave.	152	1.20	V	15.90	33.71	54.00	20.29	Harmonic
4960	40.39	PK	85	1.20	V	12.50	52.89	74.00	21.11	Harmonic
9920	32.64	PK	3	1.30	H	19.38	52.02	74.00	21.98	Harmonic
2489.3	25.15	Ave.	26	1.20	V	6.81	31.96	54.00	22.04	Spurious
7440	33.25	PK	152	1.20	V	15.90	49.15	74.00	24.85	Harmonic
2337.1	23.58	Ave.	71	1.20	H	5.48	29.06	54.00	24.94	Spurious
2367.7	23.56	Ave.	69	1.20	V	5.48	29.04	54.00	24.96	Spurious
2489.3	39.66	PK	26	1.20	V	6.81	46.47	74.00	27.53	Spurious
2367.7	38.95	PK	69	1.20	V	5.48	44.43	74.00	29.57	Spurious
2337.1	38.22	PK	71	1.20	H	5.48	43.70	74.00	30.30	Spurious

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 20dB 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 20dB 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 Operating mode, radio spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT 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 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 2012-10-23.

Test Result: Compliance.

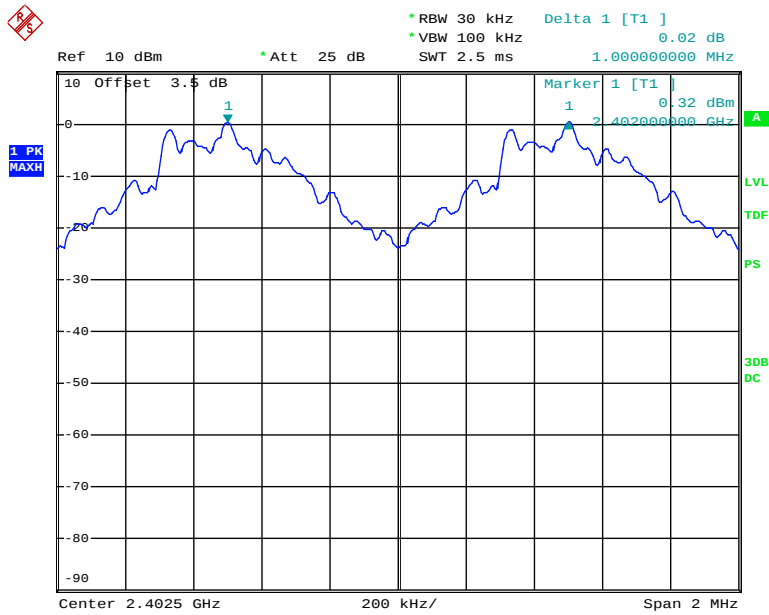
Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.000	0.627	Pass
	Adjacent	2403			
	Middle	2441	1.000	0.627	Pass
	Adjacent	2442			
	High	2480	1.000	0.627	Pass
	Adjacent	2479			
EDR ($\pi/4$-DQPSK)	Low	2402	1.002	0.811	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.811	Pass
	Adjacent	2442			
	High	2480	1.002	0.811	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.002	0.811	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.811	Pass
	Adjacent	2442			
	High	2480	1.002	0.811	Pass
	Adjacent	2479			

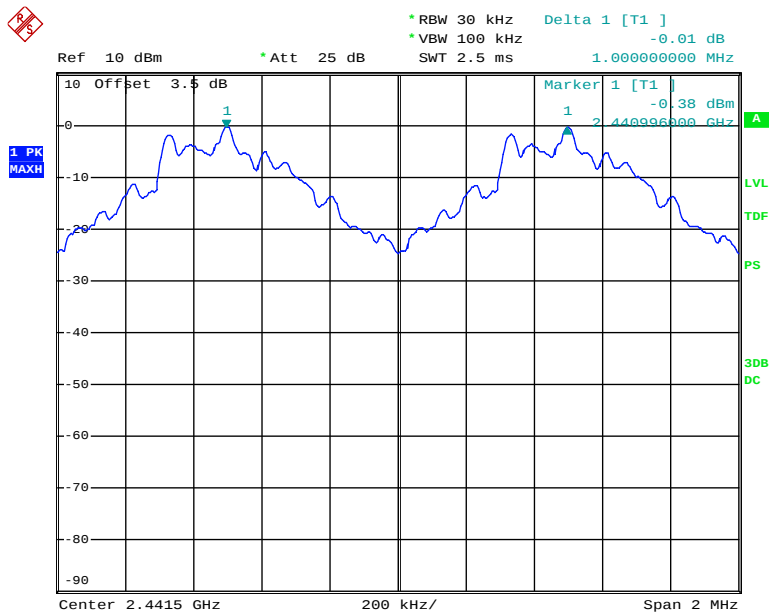
Note: Limit = 20 dB bandwidth *2/3

BDR (GFSK): Low Channel



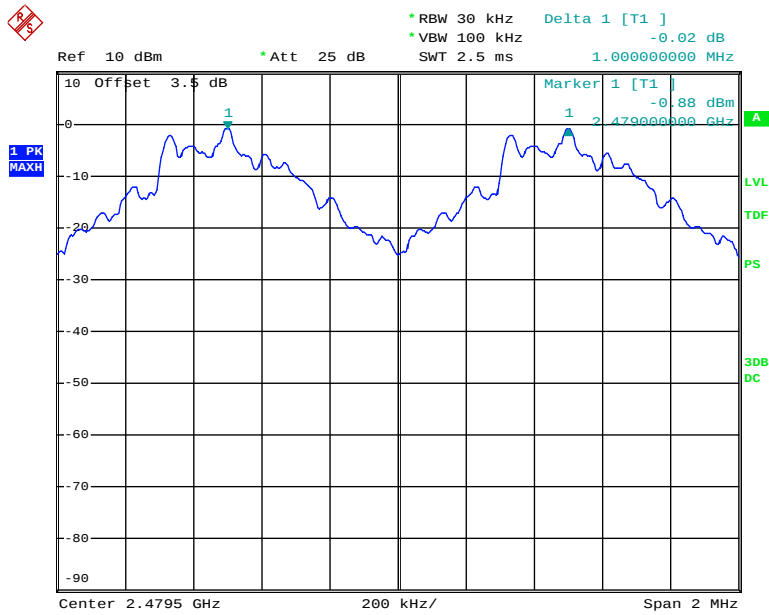
Date: 23.OCT.2012 11:24:49

BDR (GFSK): Middle Channel



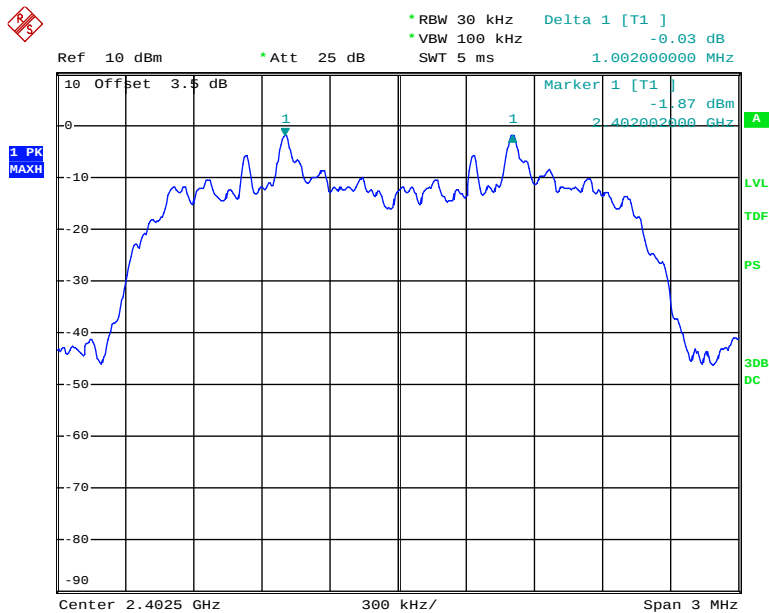
Date: 23.OCT.2012 11:25:57

BDR (GFSK): High Channel



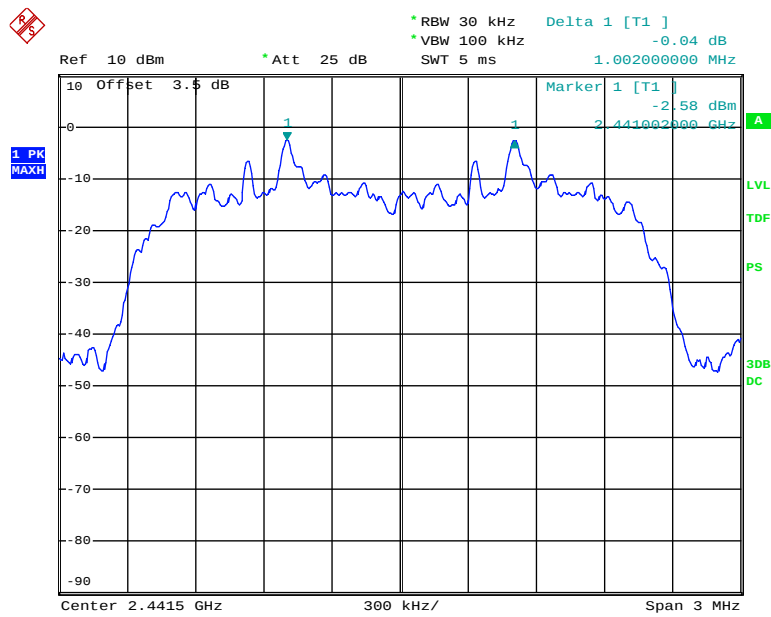
Date: 23.OCT.2012 11:27:21

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



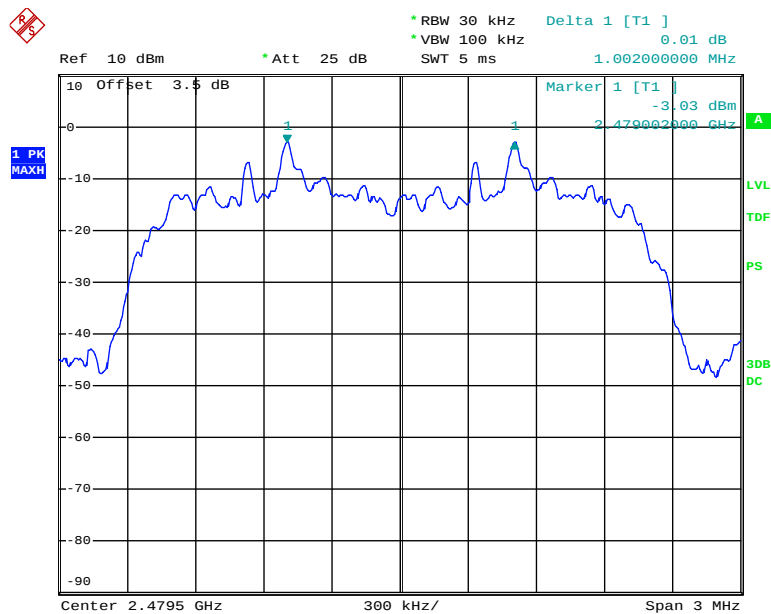
Date: 23.OCT.2012 13:21:37

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



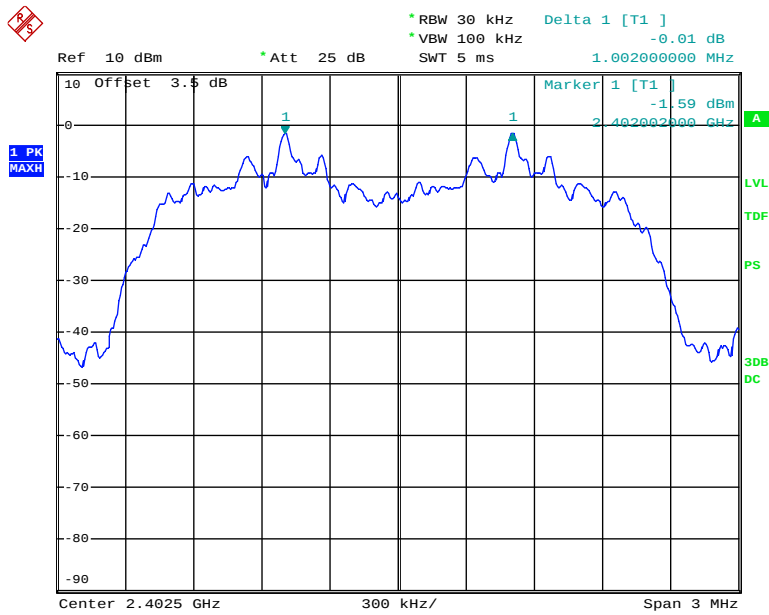
Date: 23.OCT.2012 13:24:18

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



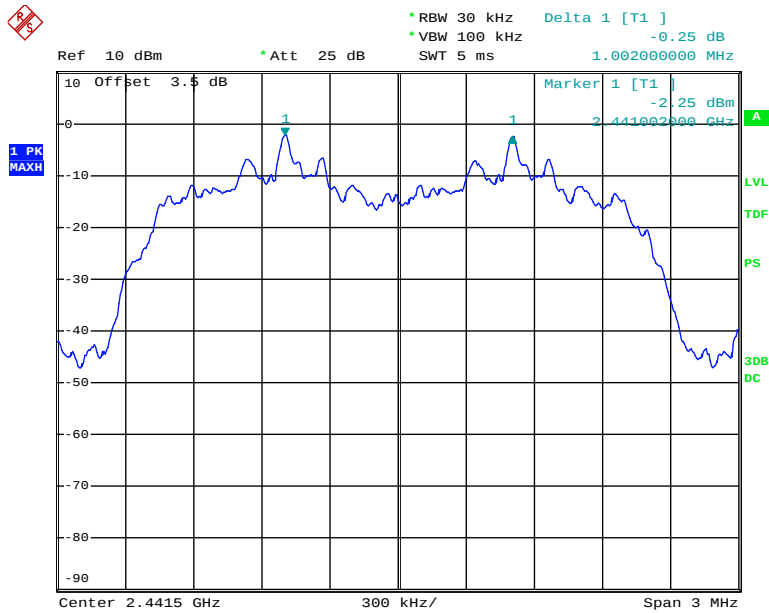
Date: 23.OCT.2012 13:25:24

EDR (8DPSK): Low Channel



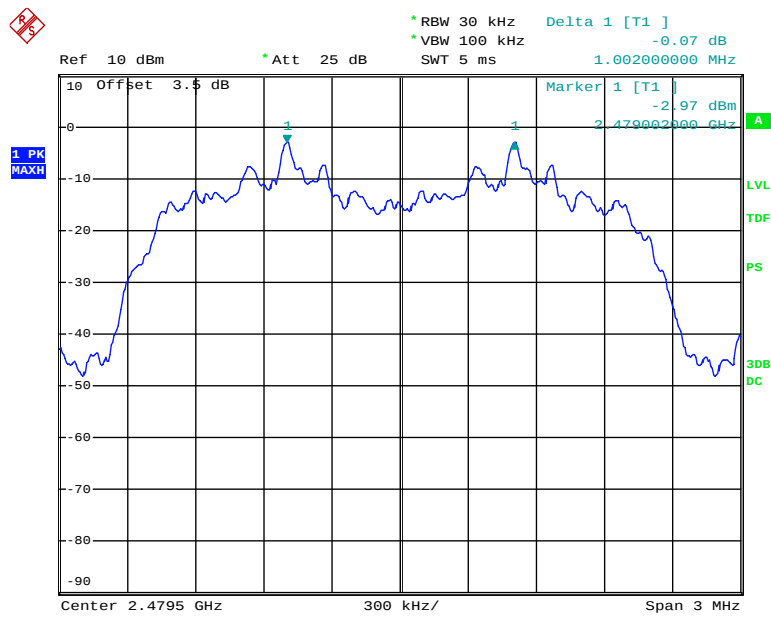
Date: 23.OCT.2012 14:11:00

EDR (8DPSK): Middle Channel



Date: 23.OCT.2012 14:12:20

EDR (8DPSK): High Channel



Date: 23.OCT.2012 14:13:19

FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING

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 125mW.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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 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 2012-10-23.

Test Result: Compliance.

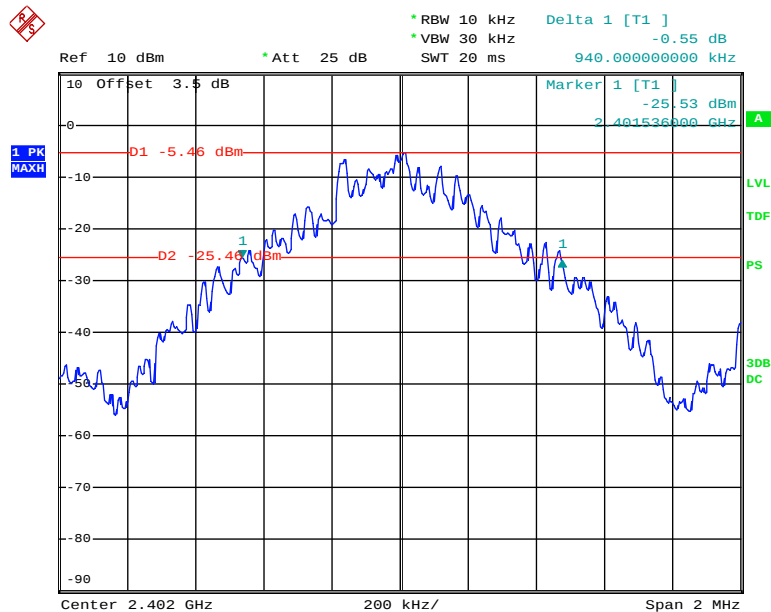
Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.940
	Middle	2441	0.940
	High	2480	0.940
EDR ($\pi/4$-DQPSK)	Low	2402	1.216
	Middle	2441	1.216
	High	2480	1.216
EDR (8DPSK)	Low	2402	1.216
	Middle	2441	1.216
	High	2480	1.216

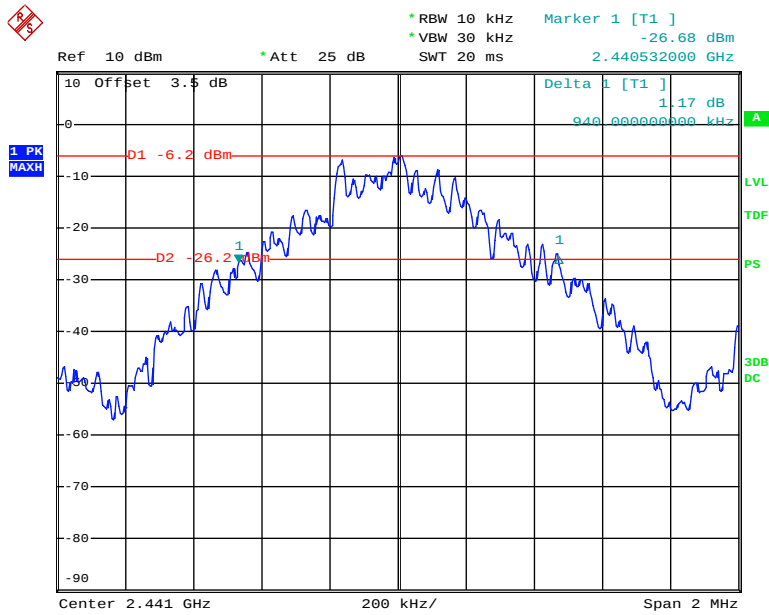
Please refer to the following plots.

BDR (GFSK): Low Channel



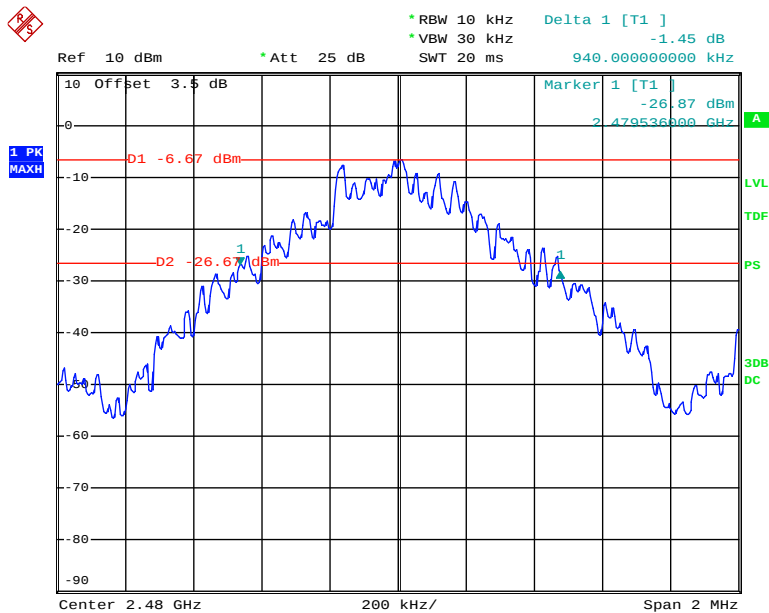
Date: 23.OCT.2012 10:46:46

BDR (GFSK): Middle Channel



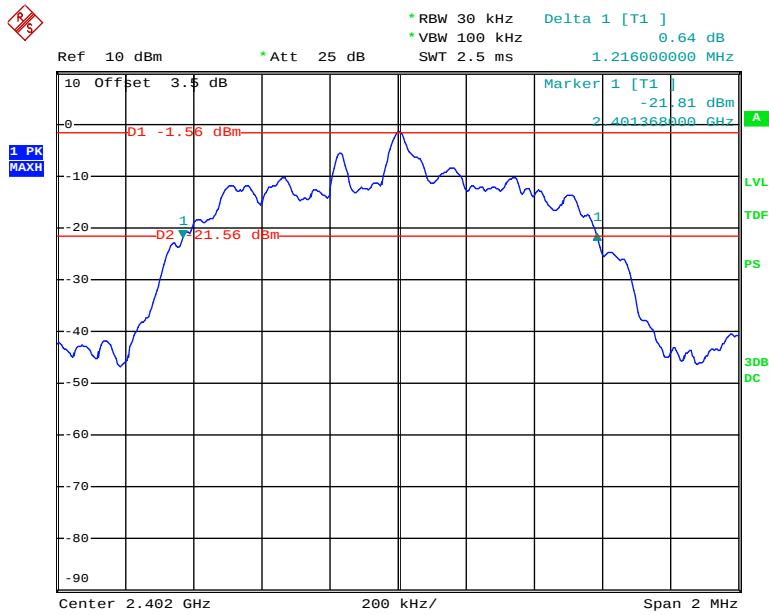
Date: 23.OCT.2012 10:48:14

BDR (GFSK): High Channel



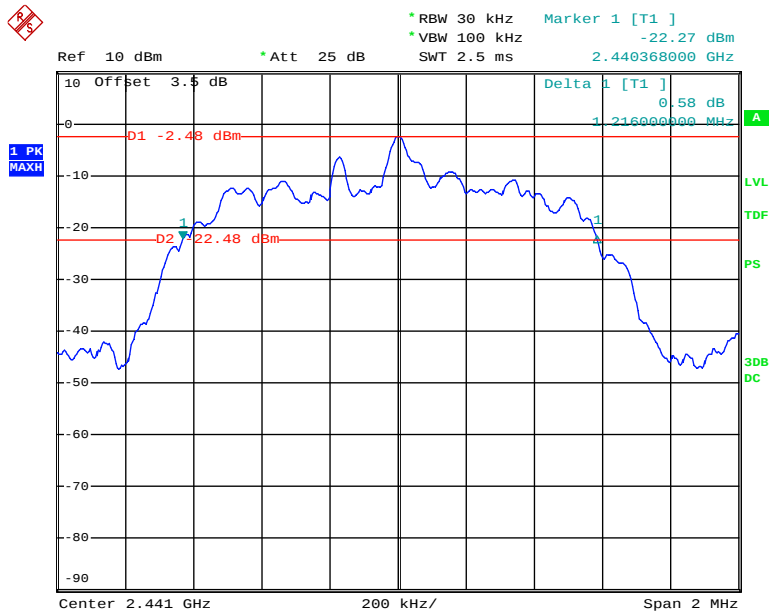
Date: 23.OCT.2012 10:49:57

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



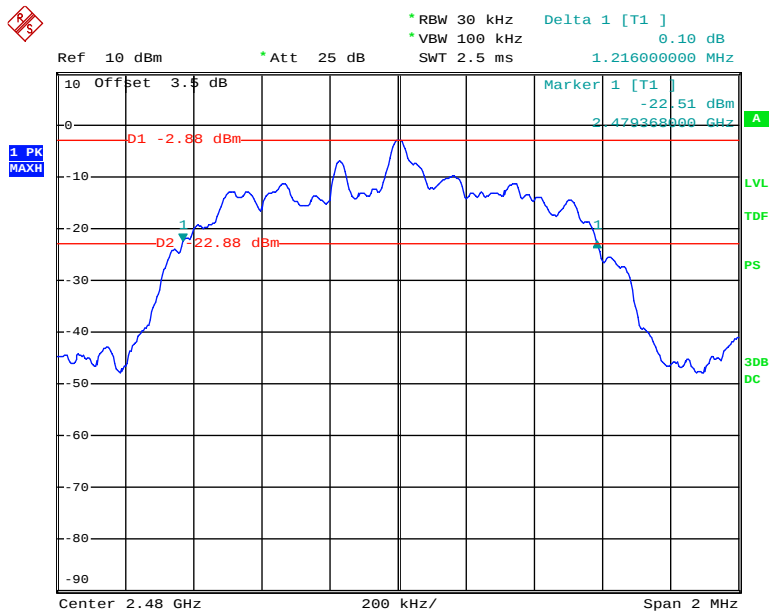
Date: 23.OCT.2012 11:55:21

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



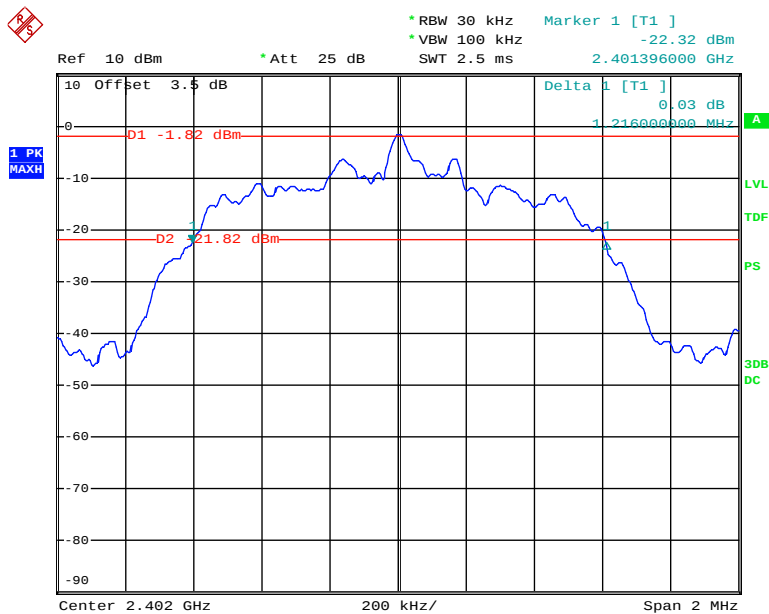
Date: 23.OCT.2012 12:00:32

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



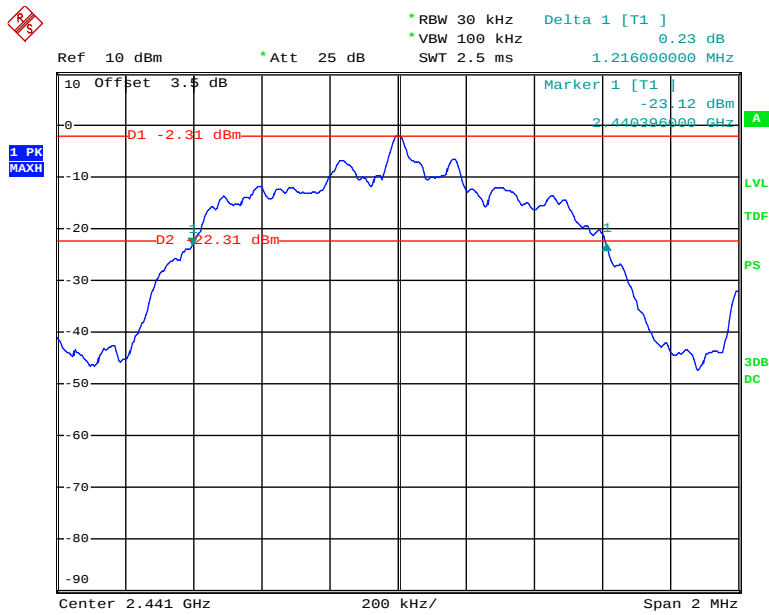
Date: 23.OCT.2012 12:01:56

EDR (8DPSK): Low Channel



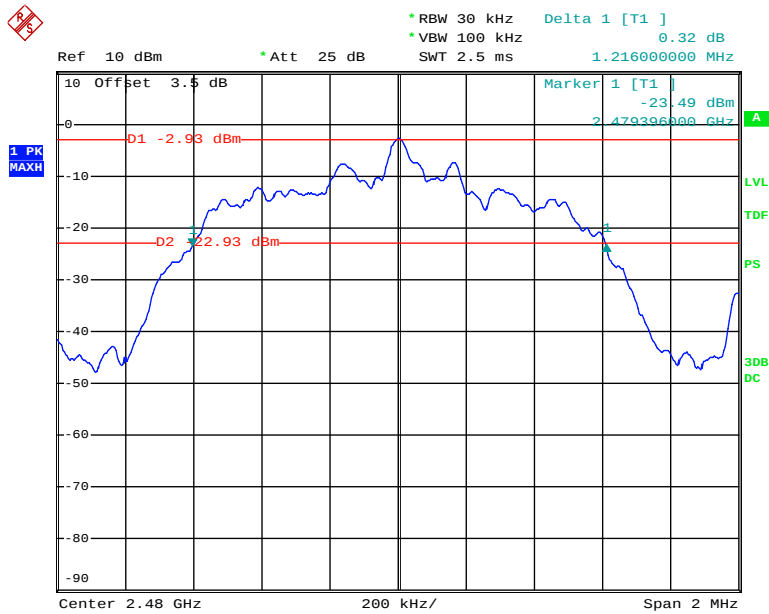
Date: 23.OCT.2012 14:02:25

EDR (8DPSK): Middle Channel



Date: 23.OCT.2012 14:04:09

EDR (8DPSK): High Channel



Date: 23.OCT.2012 14:05:18

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 traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

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

*The testing was performed by Tiger Ye on 2012-10-23.

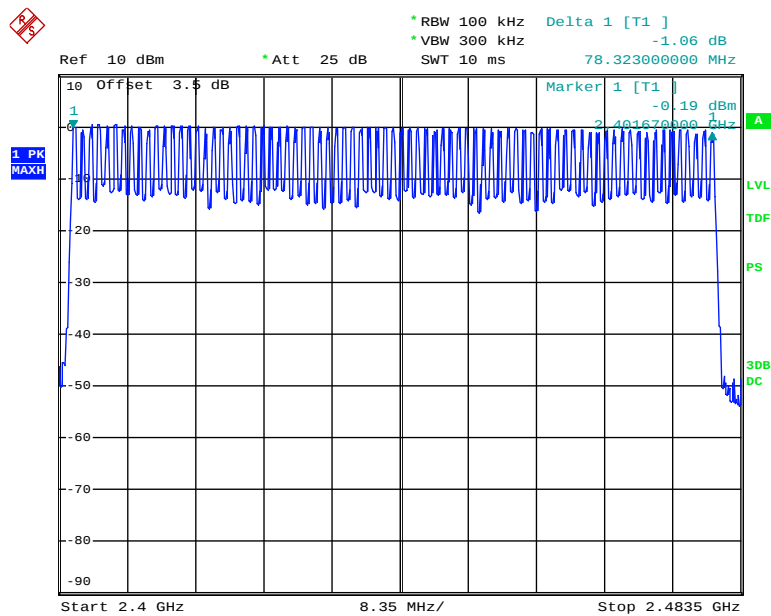
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

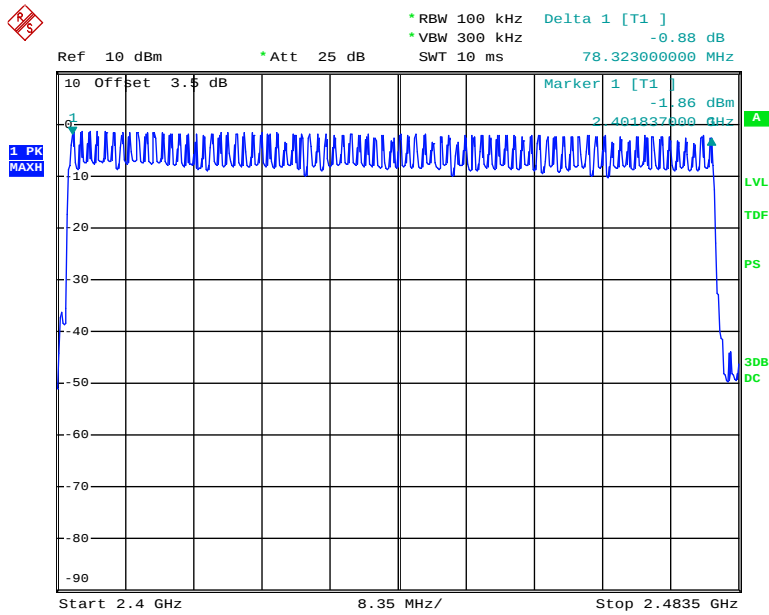
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels



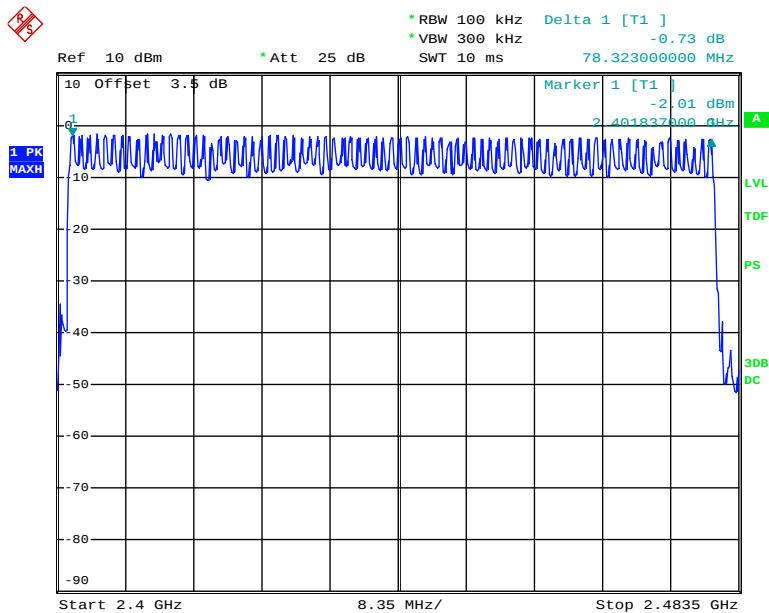
Date: 23.OCT.2012 10:25:41

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



Date: 23.OCT.2012 10:36:30

(8DPSK): Number of Hopping Channels



Date: 23.OCT.2012 10:41:20

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 traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

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

* The testing was performed by Tiger Ye on 2012-10-23.

Test Result: Compliance.

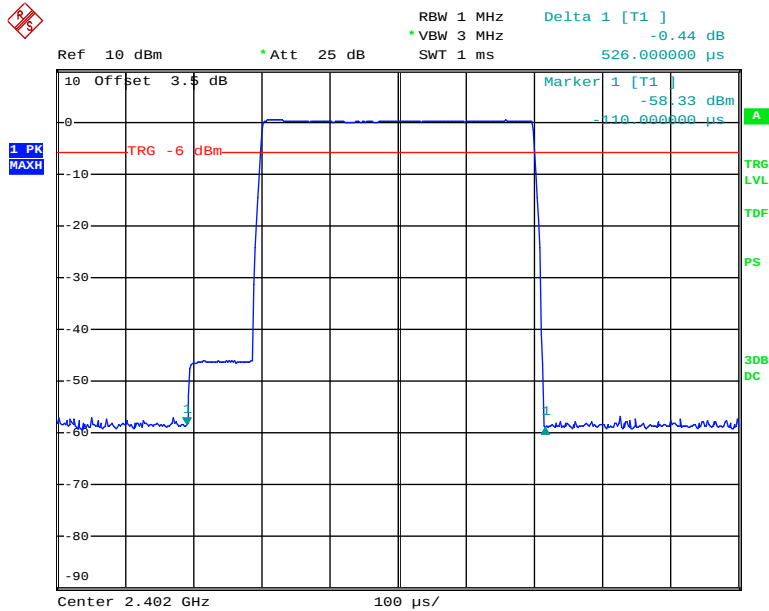
Please refer to following tables and plots

Test Mode: Transmitting

Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.526	0.168	0.4	Pass
		Middle	0.526	0.168	0.4	Pass
		High	0.526	0.168	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.800	0.288	0.4	Pass
		Middle	1.800	0.288	0.4	Pass
		High	1.800	0.288	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.064	0.327	0.4	Pass
		Middle	3.064	0.327	0.4	Pass
		High	3.064	0.327	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR ($\pi/4$ -DQPSK)	DH 1	Low	0.544	0.174	0.4	Pass
		Middle	0.544	0.174	0.4	Pass
		High	0.544	0.174	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.812	0.290	0.4	Pass
		Middle	1.812	0.290	0.4	Pass
		High	1.812	0.290	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.072	0.328	0.4	Pass
		Middle	3.072	0.328	0.4	Pass
		High	3.072	0.328	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	DH 1	Low	0.544	0.174	0.4	Pass
		Middle	0.544	0.174	0.4	Pass
		High	0.544	0.174	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.810	0.290	0.4	Pass
		Middle	1.810	0.290	0.4	Pass
		High	1.810	0.290	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.066	0.327	0.4	Pass
		Middle	3.066	0.327	0.4	Pass
		High	3.066	0.327	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

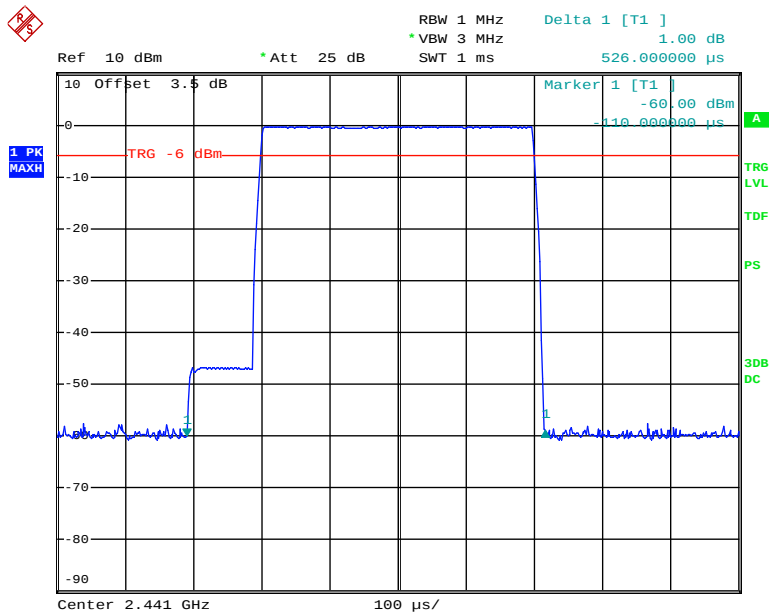
BDR (GFSK):

Pulse time, Low Channel, DH1



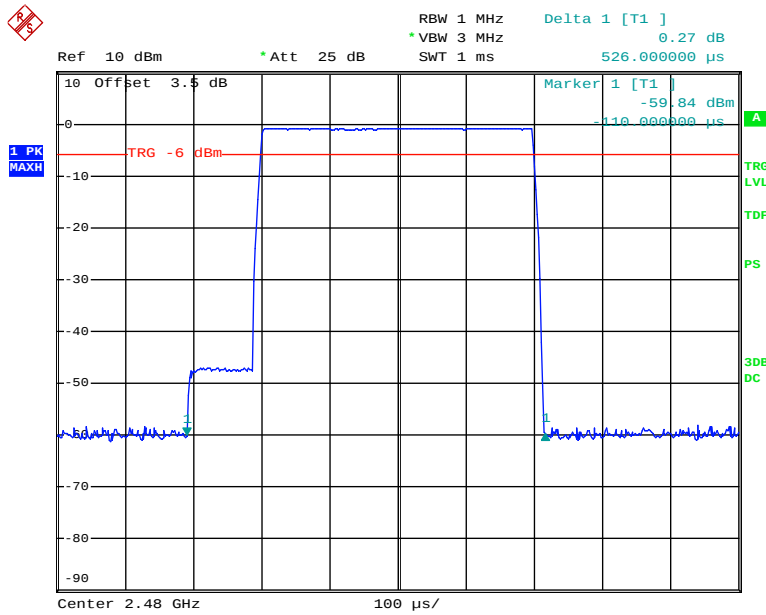
Date: 23.OCT.2012 11:30:06

Pulse time, Middle Channel, DH1



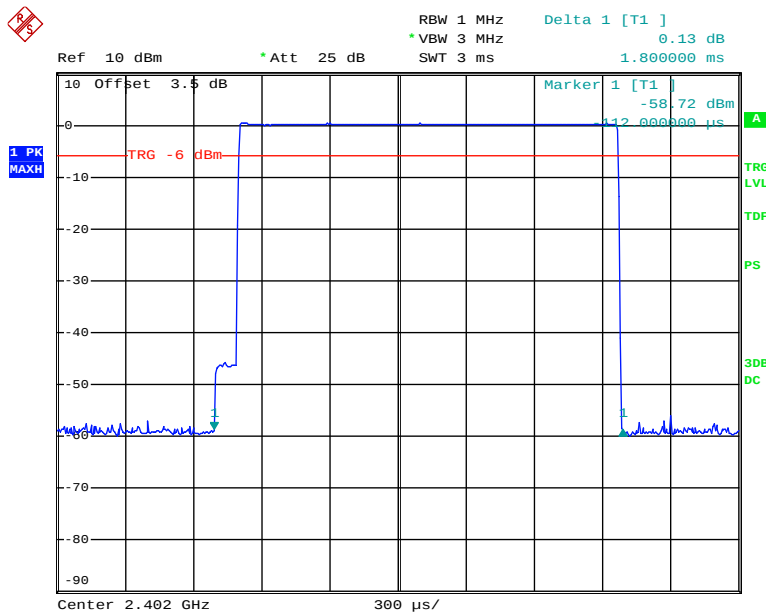
Date: 23.OCT.2012 11:30:40

Pulse time, High Channel, DH1



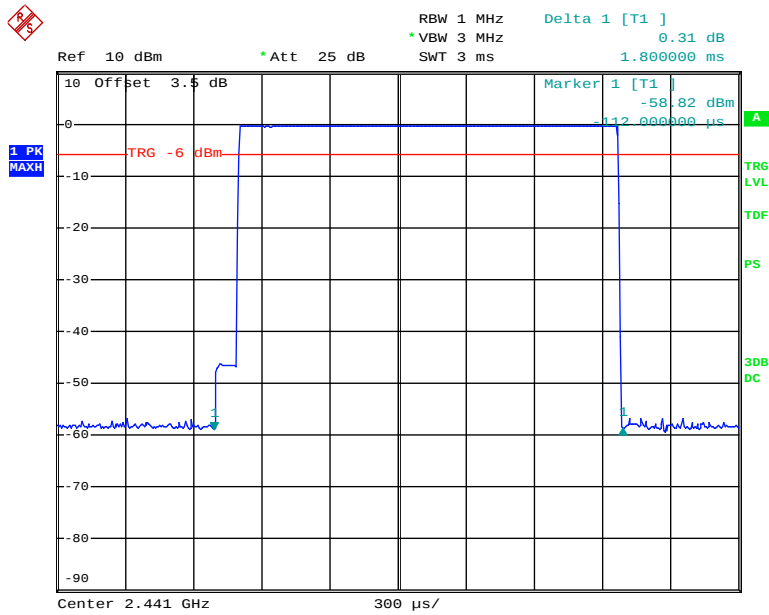
Date: 23.OCT.2012 11:31:43

Pulse time, Low Channel, DH3



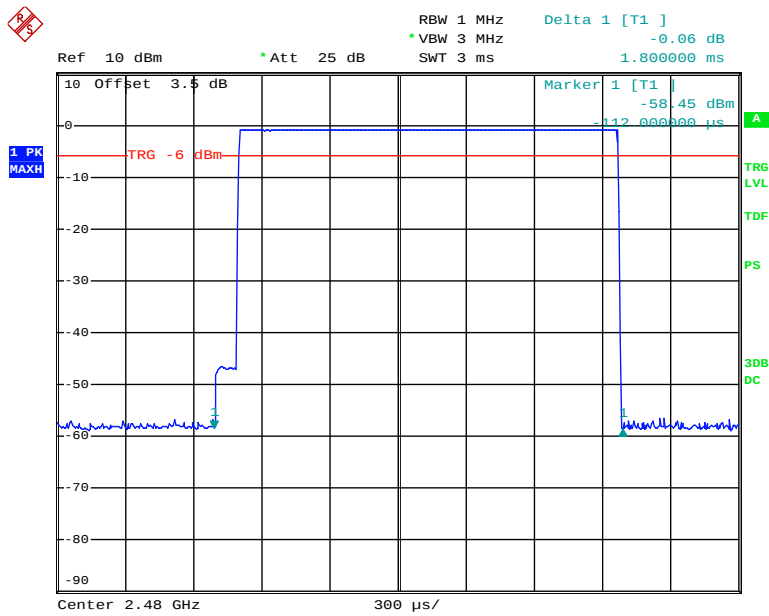
Date: 23.OCT.2012 11:41:35

Pulse time, Middle Channel, DH3



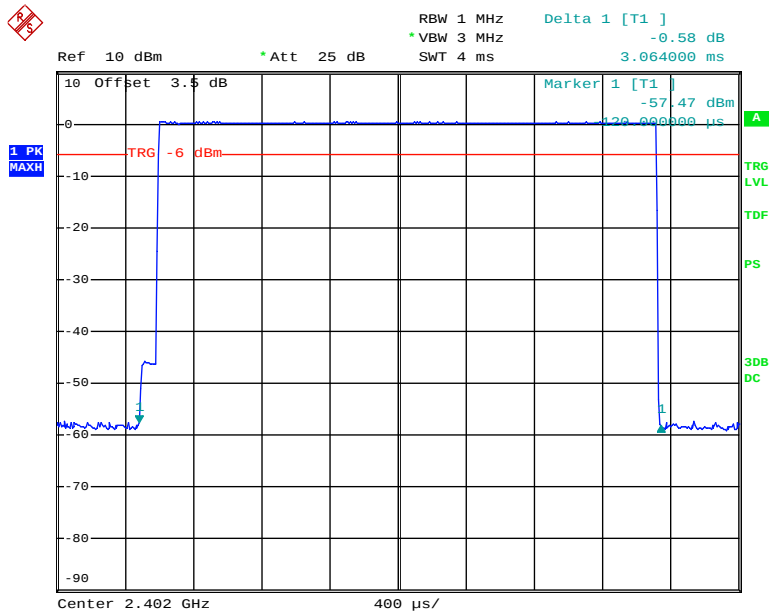
Date: 23.OCT.2012 11:41:10

Pulse time, High Channel, DH3



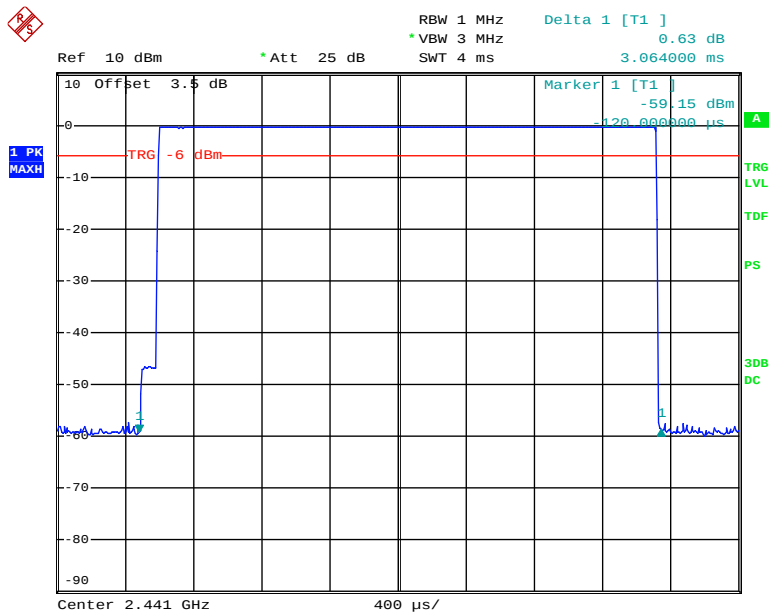
Date: 23.OCT.2012 11:39:24

Pulse time, Low Channel, DH5



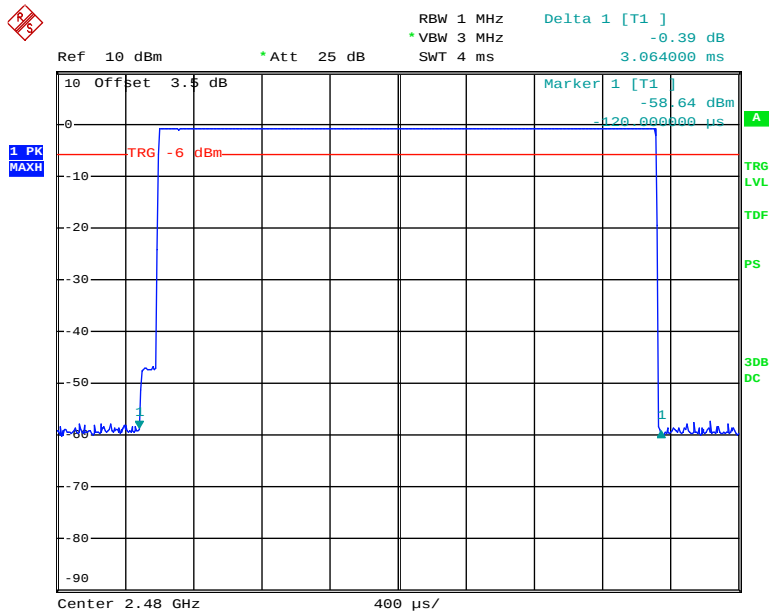
Date: 23.OCT.2012 11:44:47

Pulse time, Middle Channel, DH5



Date: 23.OCT.2012 11:45:16

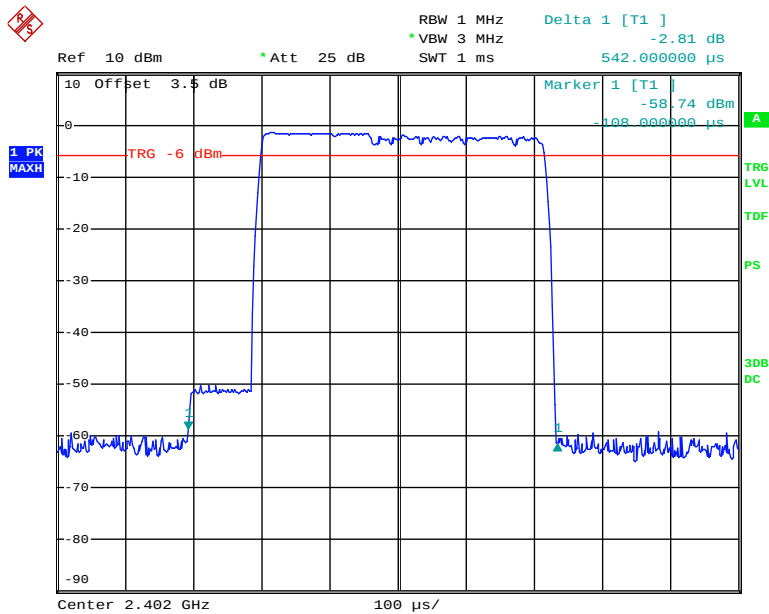
Pulse time, High Channel, DH5



Date: 23.OCT.2012 11:45:37

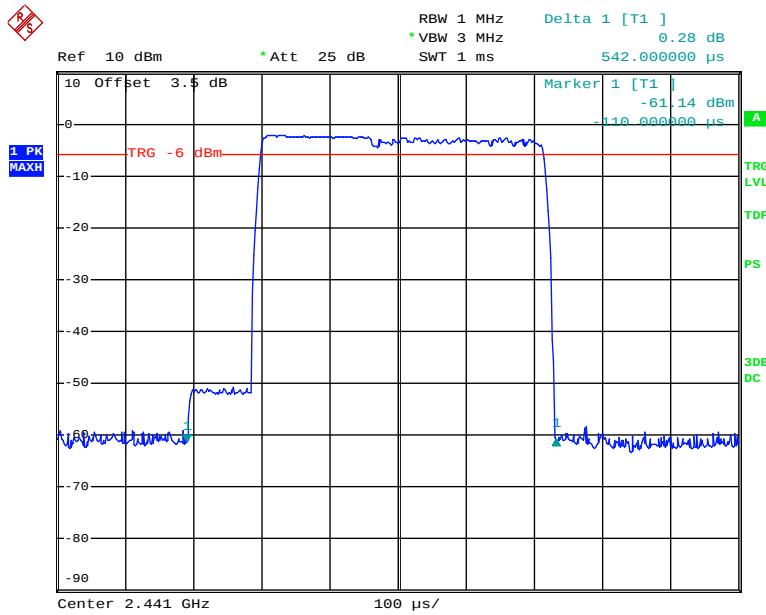
EDR ($\pi/4$ -DQPSK):

Pulse time, Low Channel, DH1



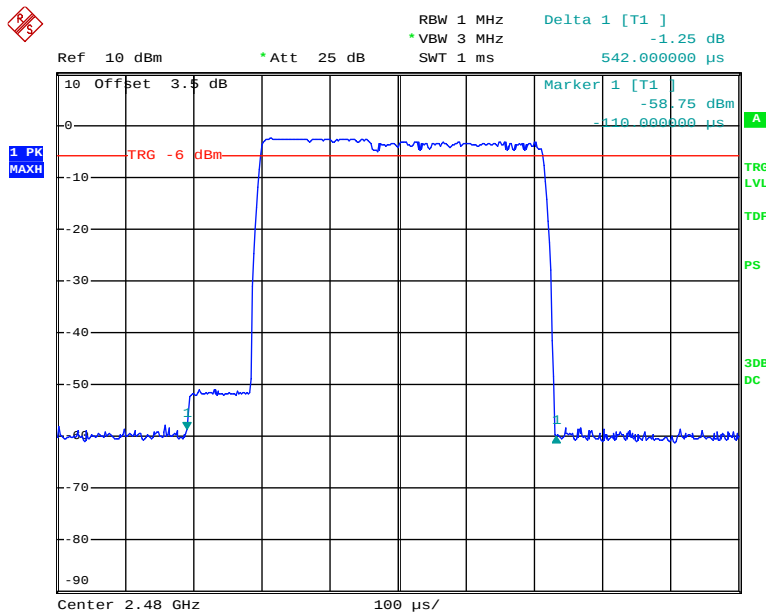
Date: 23.OCT.2012 11:53:37

Pulse time, Middle Channel, DH1



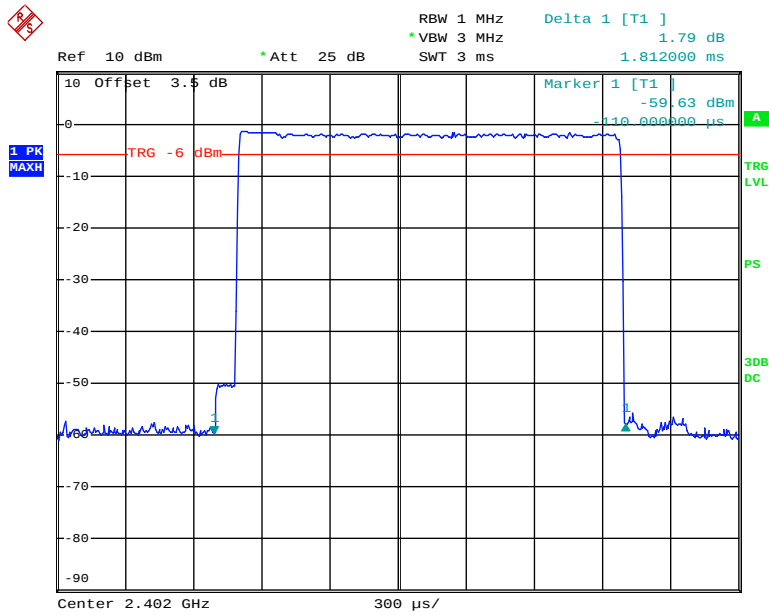
Date: 23.OCT.2012 11:52:48

Pulse time, High Channel, DH1



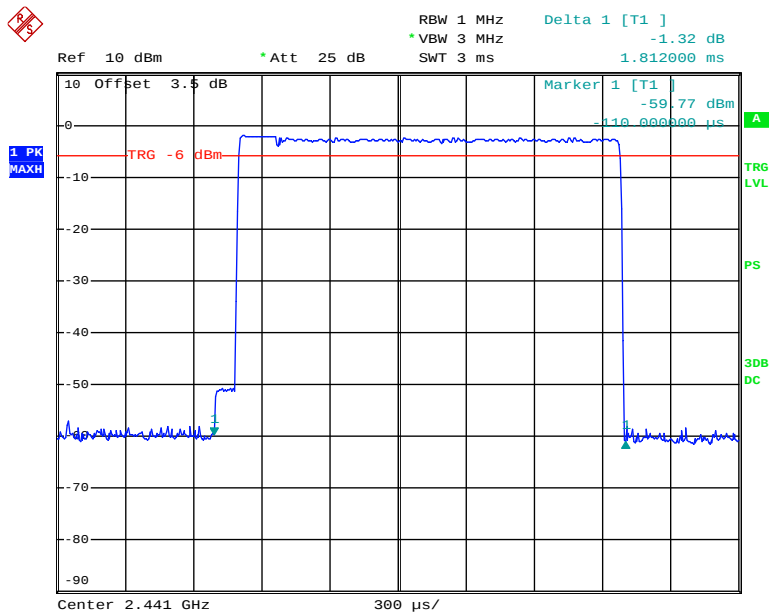
Date: 23.OCT.2012 11:52:32

Pulse time, Low Channel, DH3



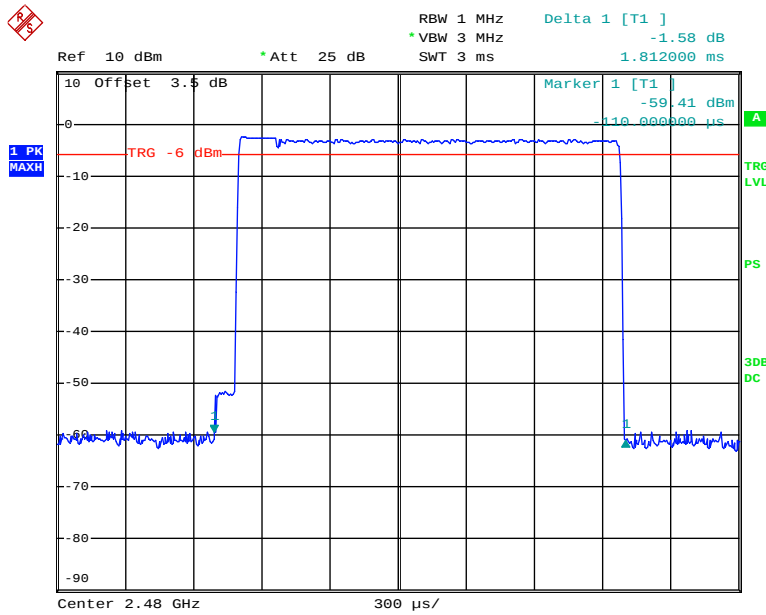
Date: 23.OCT.2012 16:42:45

Pulse time, Middle Channel, DH3



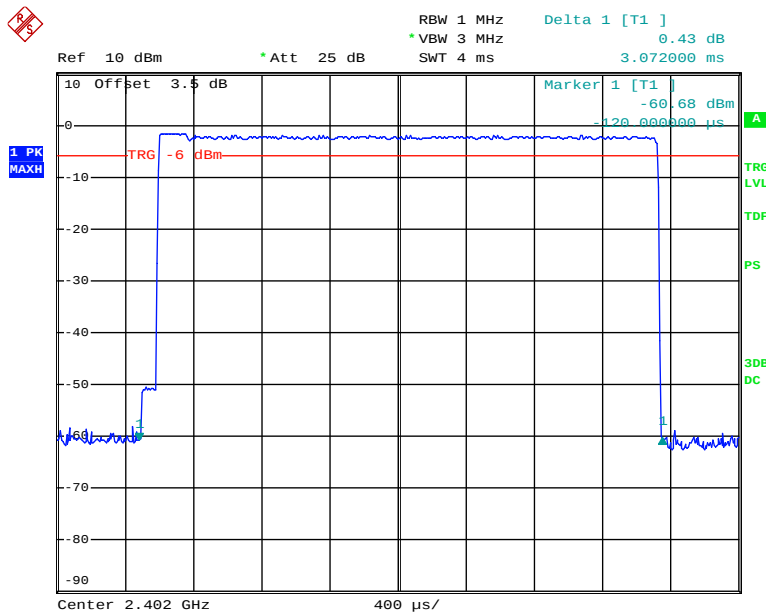
Date: 23.OCT.2012 16:43:15

Pulse time, High Channel, DH3



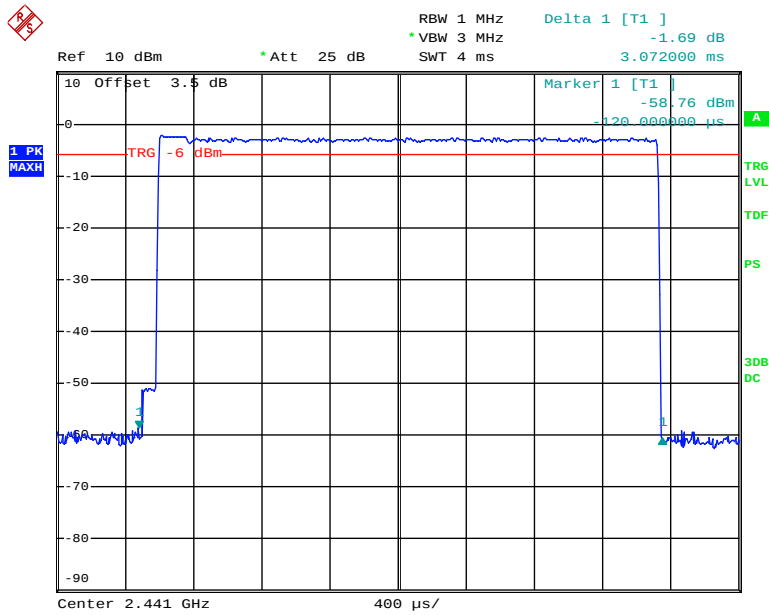
Date: 23.OCT.2012 16:43:37

Pulse time, Low Channel, DH5



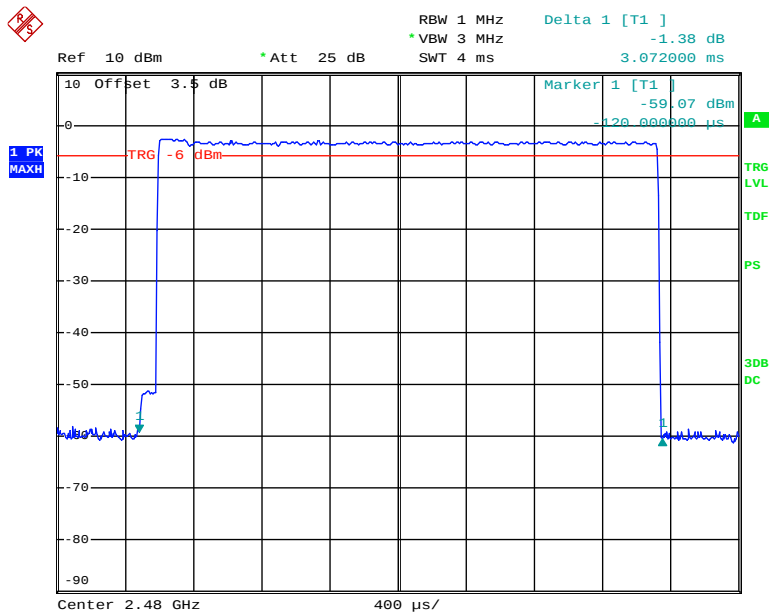
Date: 23.OCT.2012 11:48:55

Pulse time, Middle Channel, DH5



Date: 23.OCT.2012 11:48:38

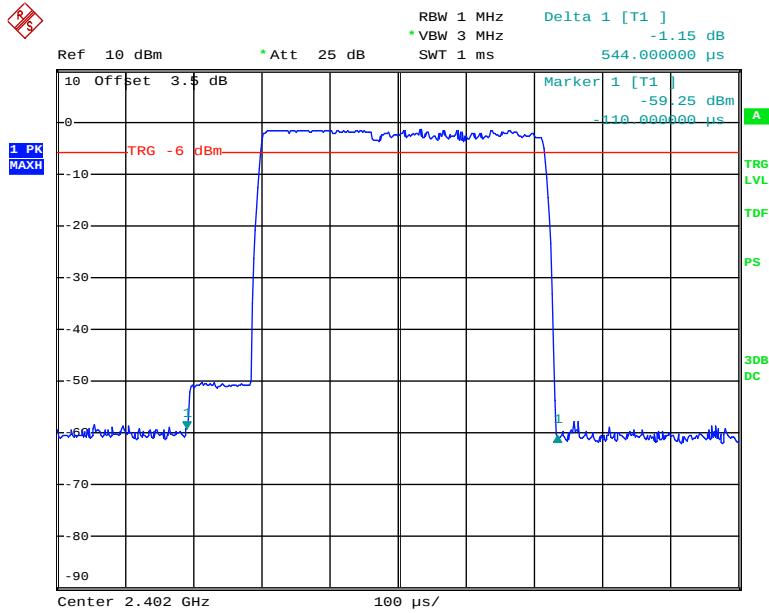
Pulse time, High Channel, DH5



Date: 23.OCT.2012 11:48:09

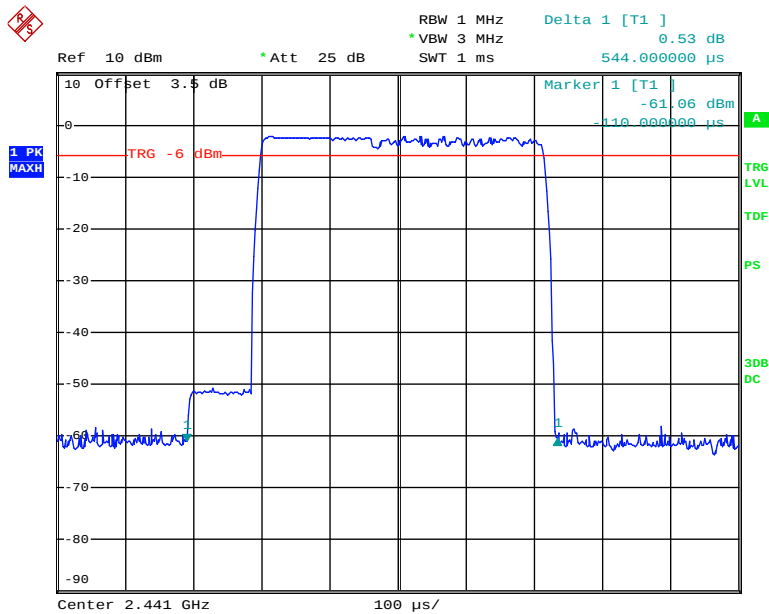
EDR (8DPSK):

Pulse time, Low Channel, DH1



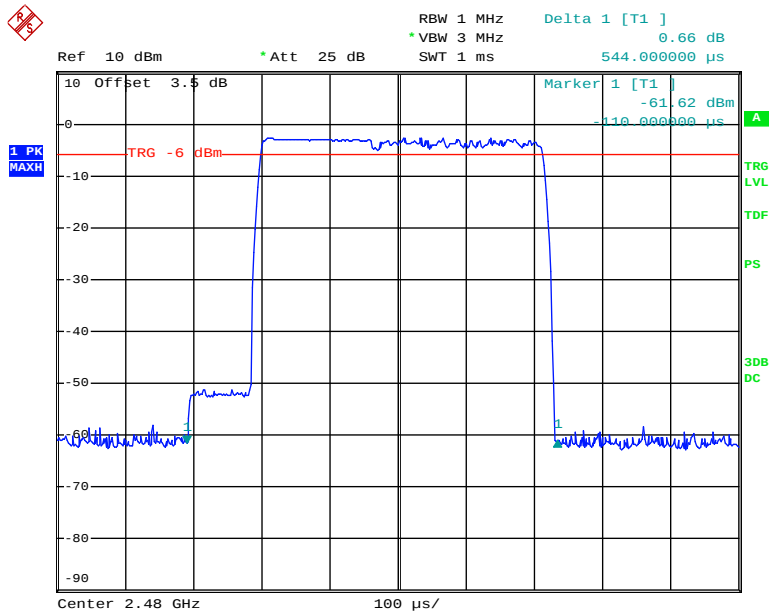
Date: 23.OCT.2012 14:14:59

Pulse time, Middle Channel, DH1



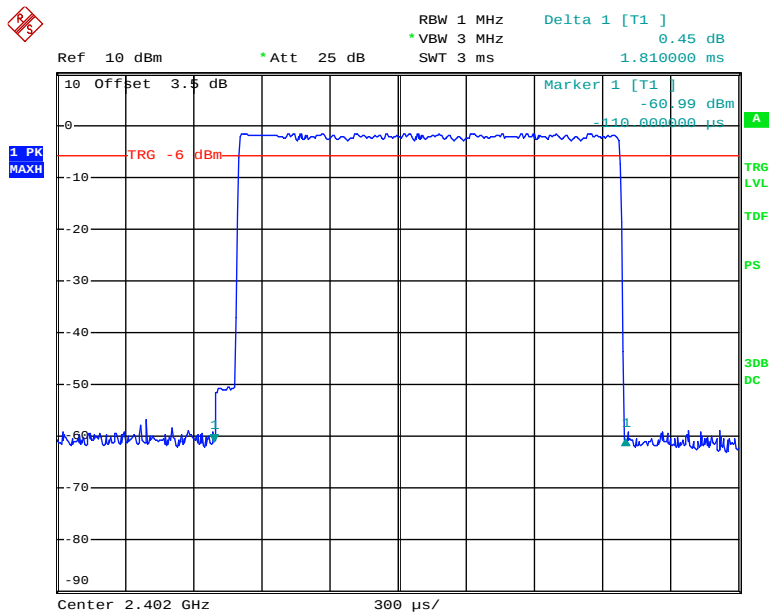
Date: 23.OCT.2012 14:15:34

Pulse time, High Channel, DH1



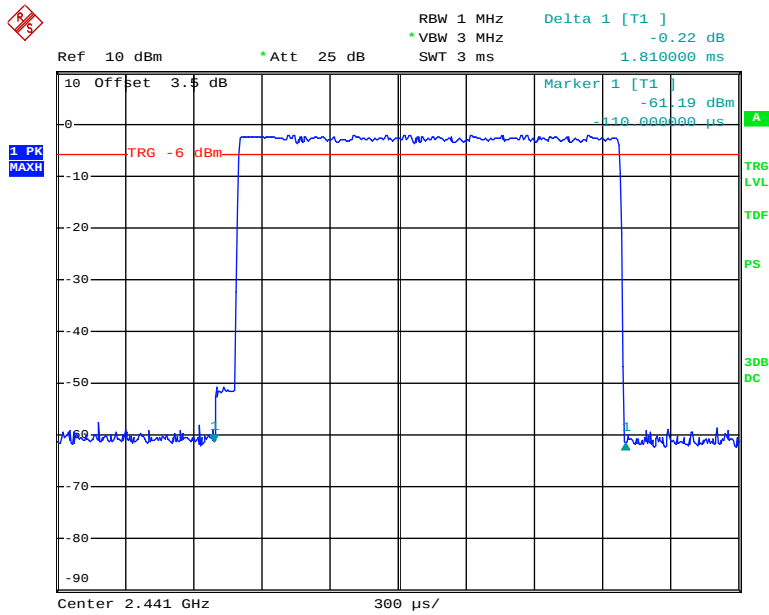
Date: 23.OCT.2012 14:15:53

Pulse time, Low Channel, DH3



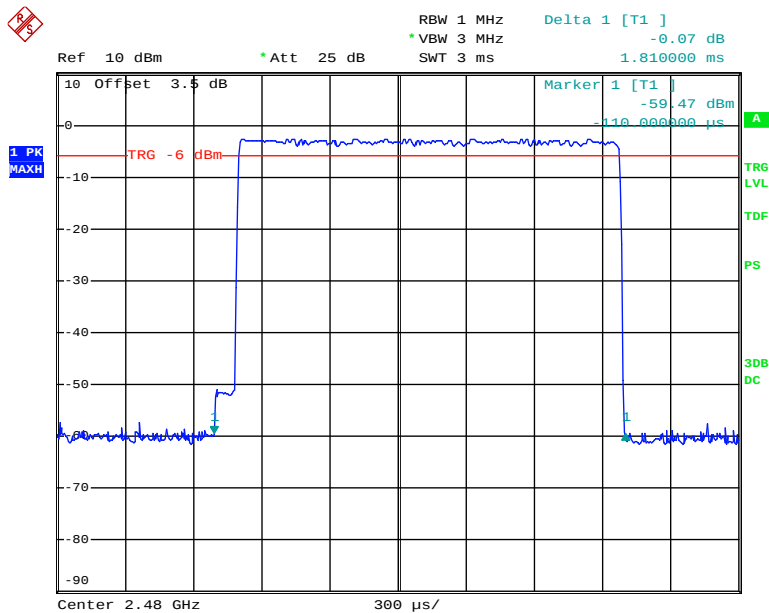
Date: 23.OCT.2012 14:17:26

Pulse time, Middle Channel, DH3



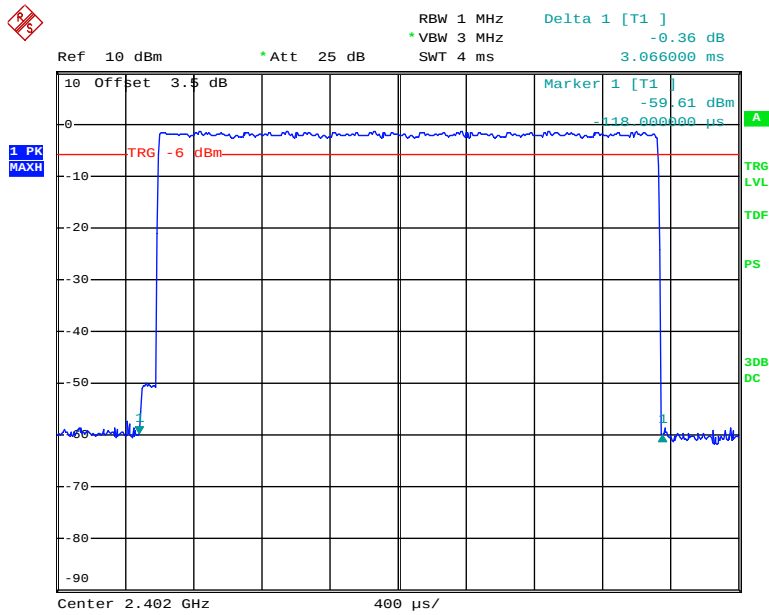
Date: 23.OCT.2012 14:17:03

Pulse time, High Channel, DH3



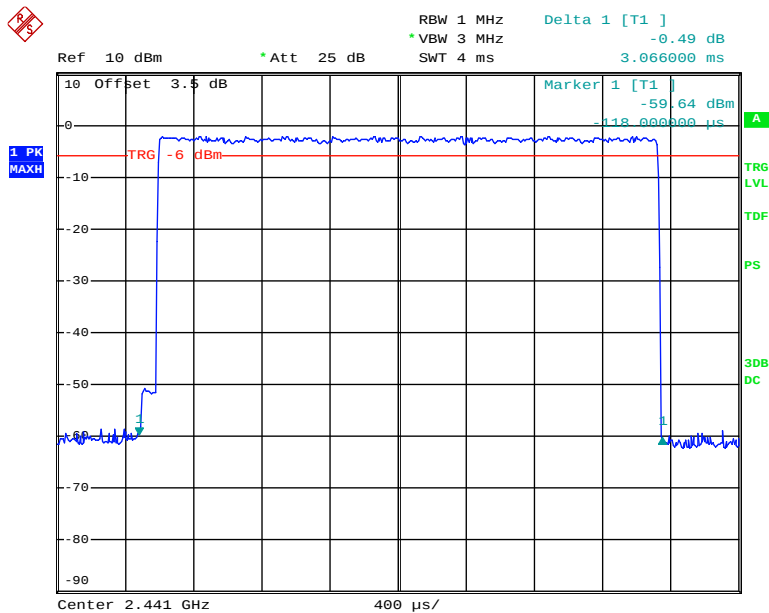
Date: 23.OCT.2012 14:16:38

Pulse time, Low Channel, DH5



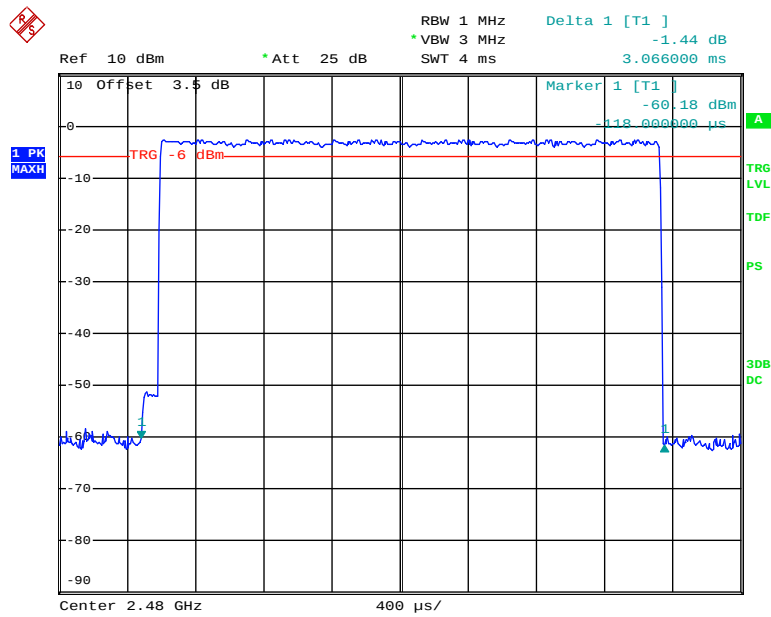
Date: 23.OCT.2012 14:18:30

Pulse time, Middle Channel, DH5



Date: 23.OCT.2012 14:18:51

Pulse time, High Channel, DH5



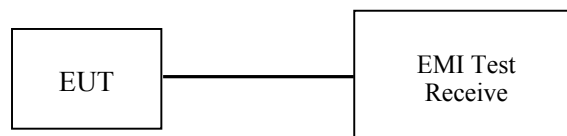
Date: 23.OCT.2012 14:19:07

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. 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 it 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 traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

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

* The testing was performed by Tiger Ye on 2012-10-23.

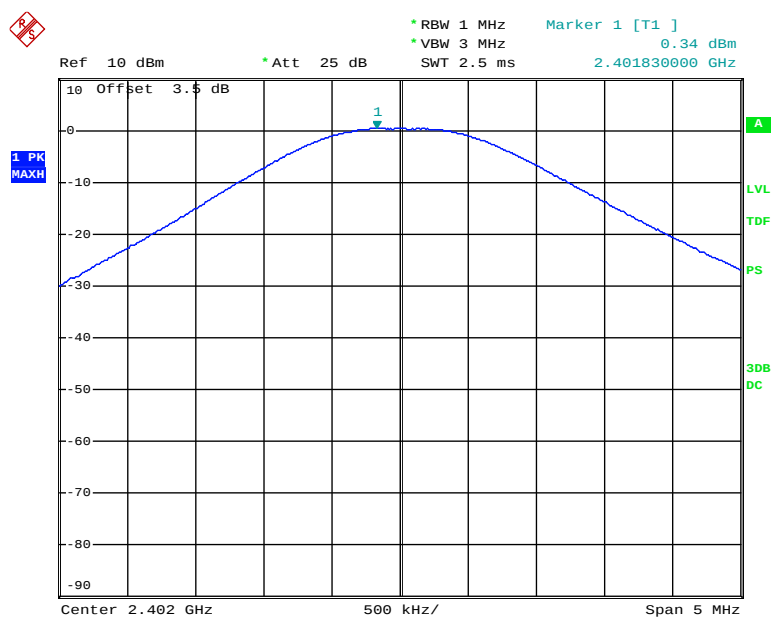
Test Result: Compliance.

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	0.34	1.081	1000
	Middle	2441	-0.32	0.929	1000
	High	2480	-0.80	0.832	1000
EDR ($\pi/4$ -DQPSK)	Low	2402	-1.21	0.757	1000
	Middle	2441	-2.03	0.627	1000
	High	2480	-2.43	0.571	1000
EDR (8DPSK)	Low	2402	-1.08	0.780	1000
	Middle	2441	-1.75	0.668	1000
	High	2480	-2.10	0.617	1000

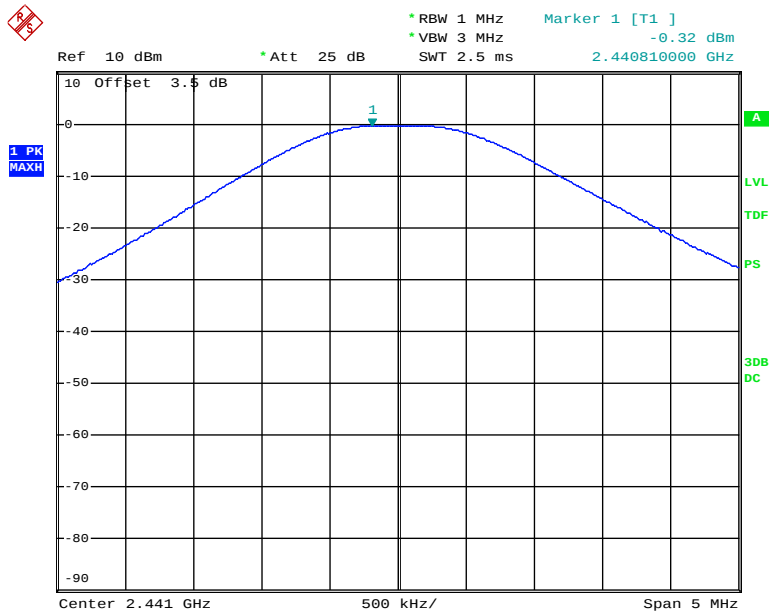
Note: The data above was tested in conducted mode.

BDR (GFSK): Low Channel



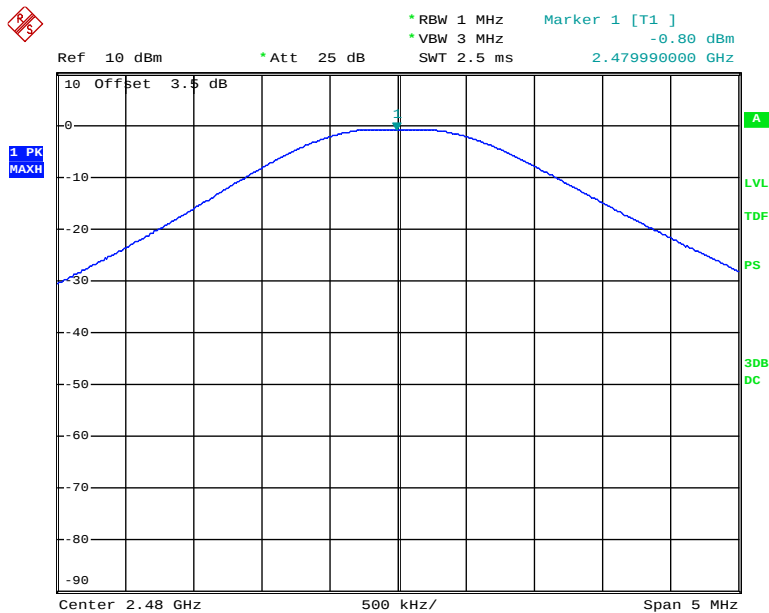
Date: 23.OCT.2012 10:54:40

BDR (GFSK): Middle Channel



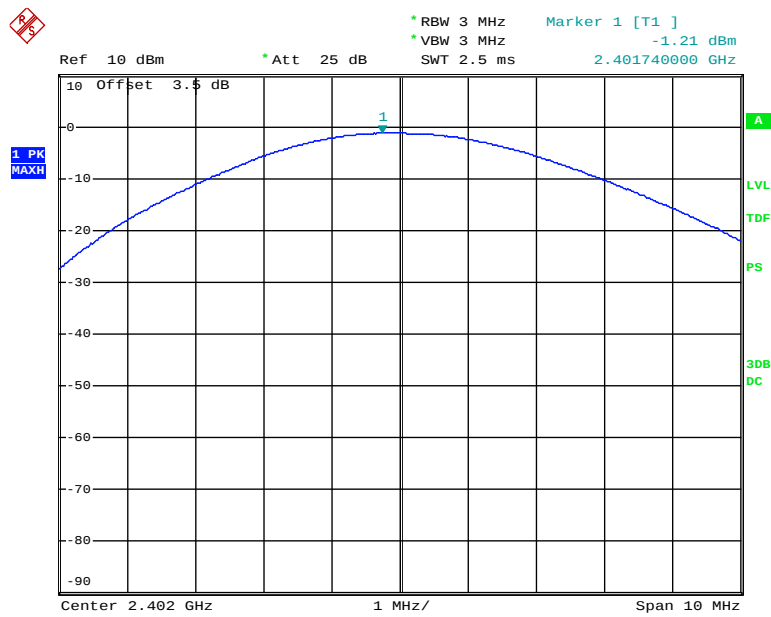
Date: 23.OCT.2012 10:53:58

BDR (GFSK): High Channel



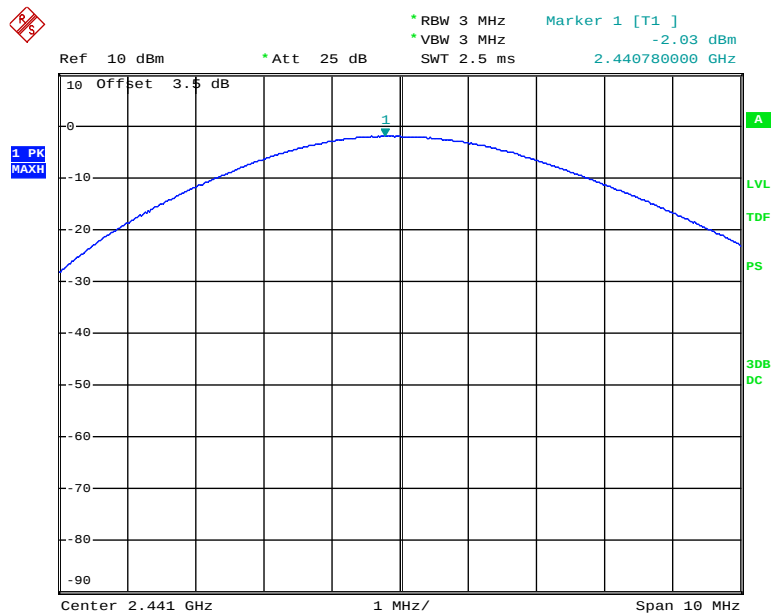
Date: 23.OCT.2012 10:51:11

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



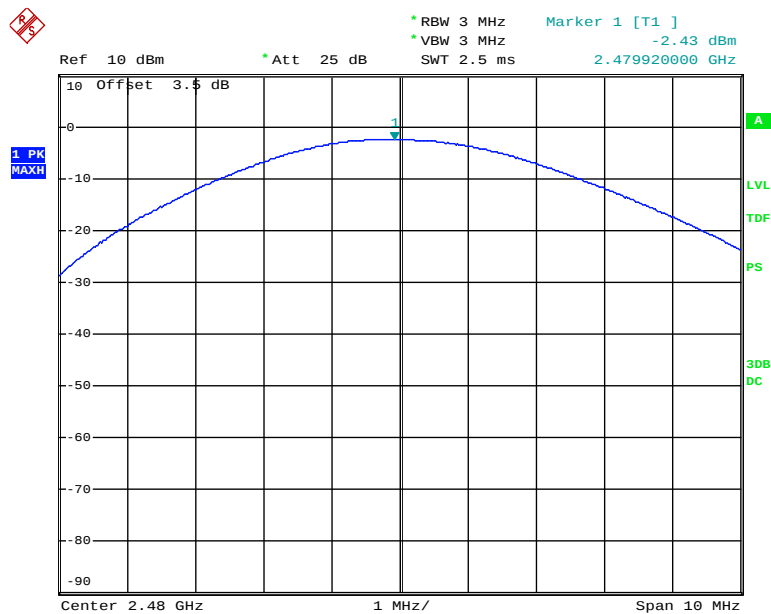
Date: 23.OCT.2012 13:09:14

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



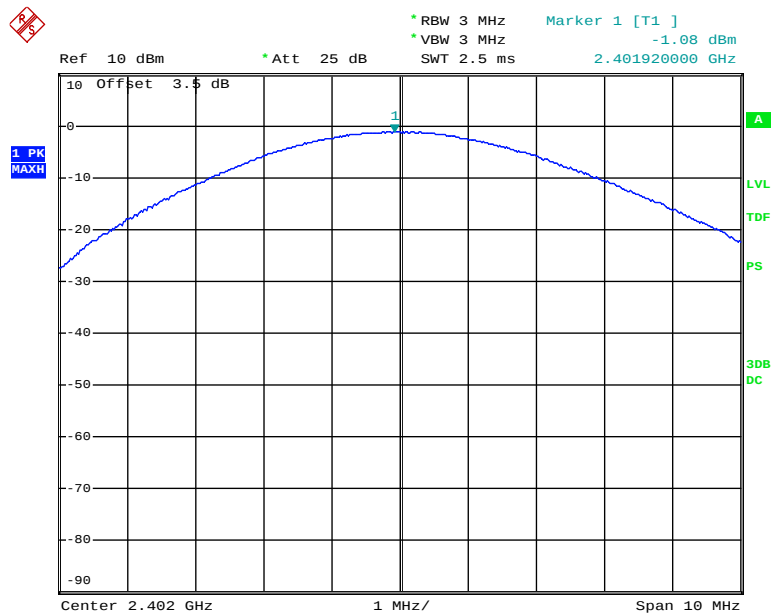
Date: 23.OCT.2012 13:14:57

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



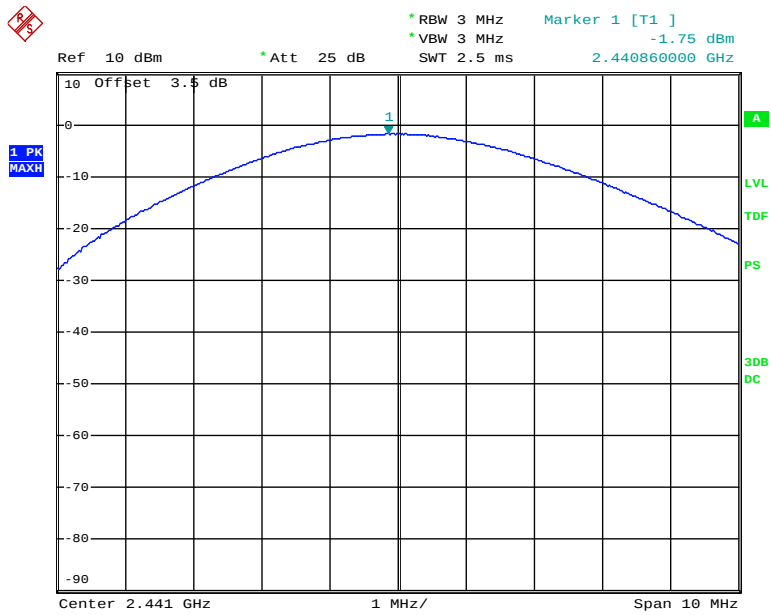
Date: 23.OCT.2012 13:15:29

EDR(8DPSK): Low Channel



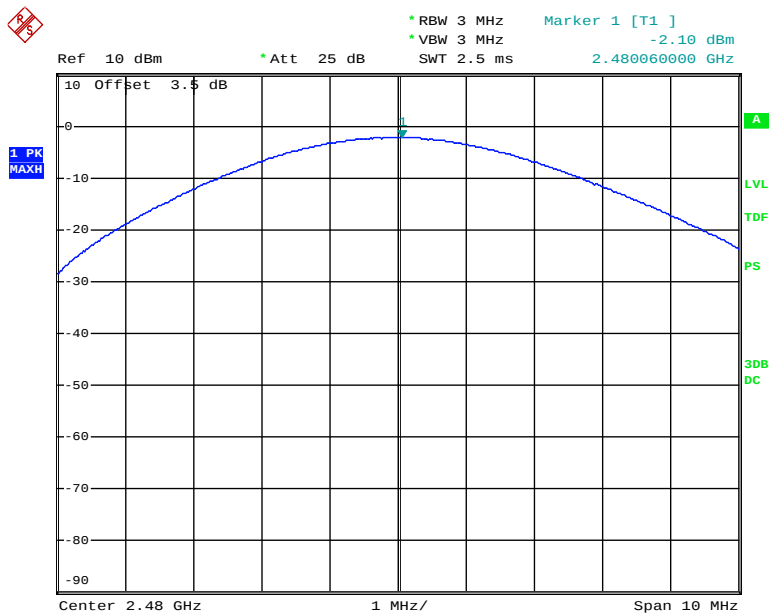
Date: 23.OCT.2012 14:07:25

EDR(8DPSK): Middle Channel



Date: 23.OCT.2012 14:07:02

EDR(8DPSK): High Channel



Date: 23.OCT.2012 14:06:27

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. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in Operating 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 and VBW of spectrum analyzer to 300 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 traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

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

**The testing was performed by Tiger Ye on 2012-10-23.*

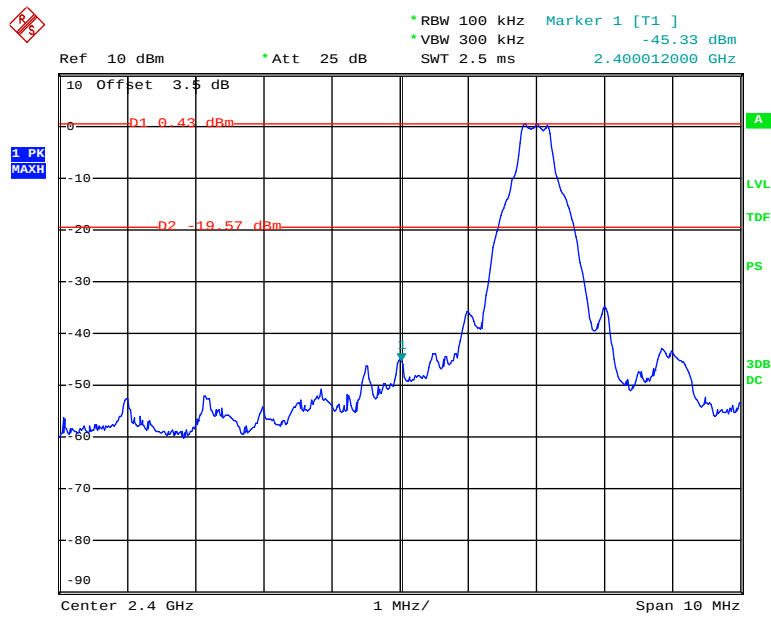
Test Result: Compliance.

Test Mode: Transmitting

Mode	Frequency Band	Delta Peak to Band Emission (dBc)	Limit (dBc)
BDR (GFSK)	Left-band	45.76	>20
	Right-band	47.20	>20
EDR ($\pi/4$ -DQPSK)	Left-band	50.20	>20
	Right-band	48.09	>20
EDR (8DPSK)	Left-band	49.96	>20
	Right-band	45.83	>20

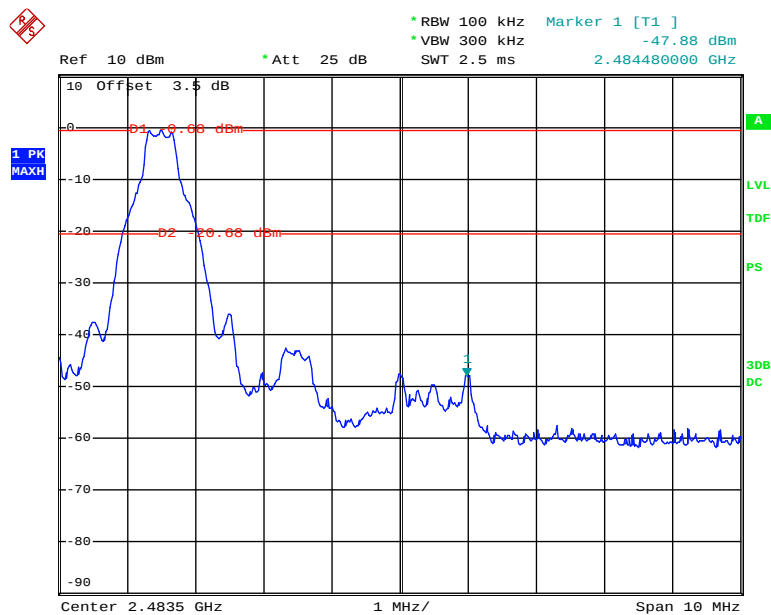
Please refer to follow plots:

BDR (GFSK): Band Edge-Left Side



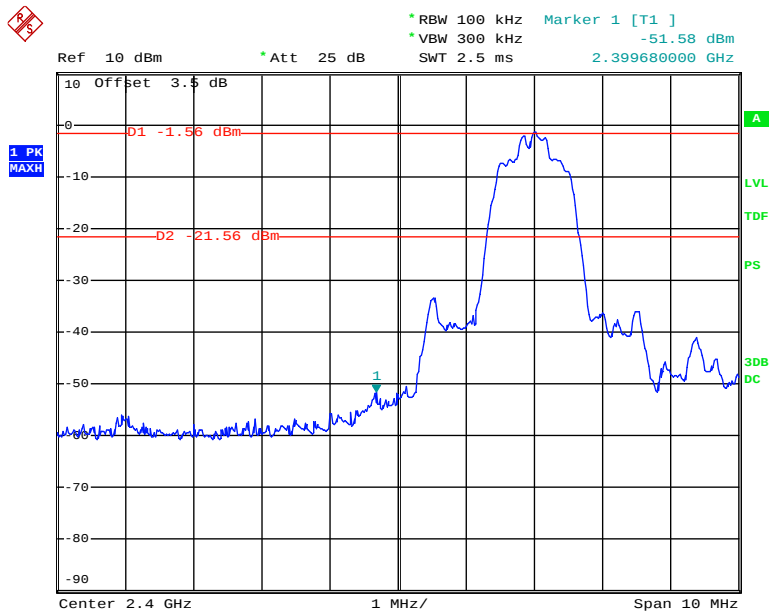
Date: 23.OCT.2012 11:21:04

BDR (GFSK): Band Edge-Right Side



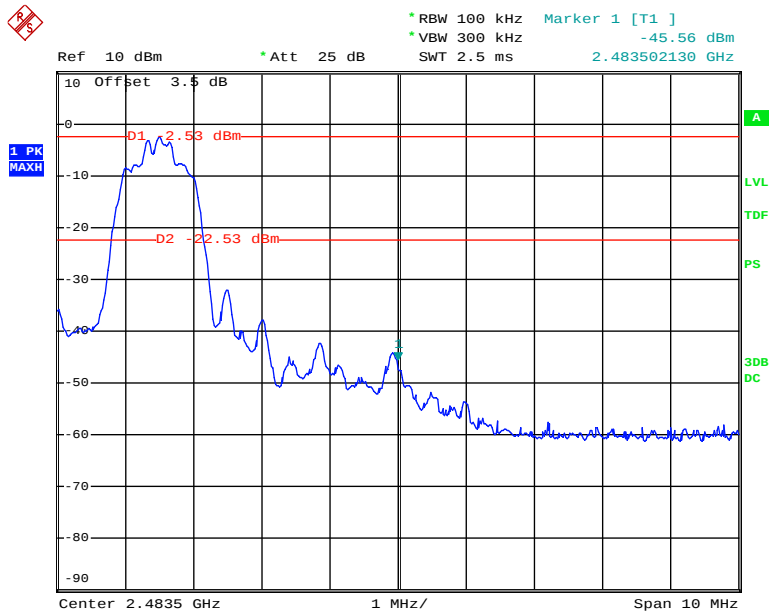
Date: 23.OCT.2012 11:18:13

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



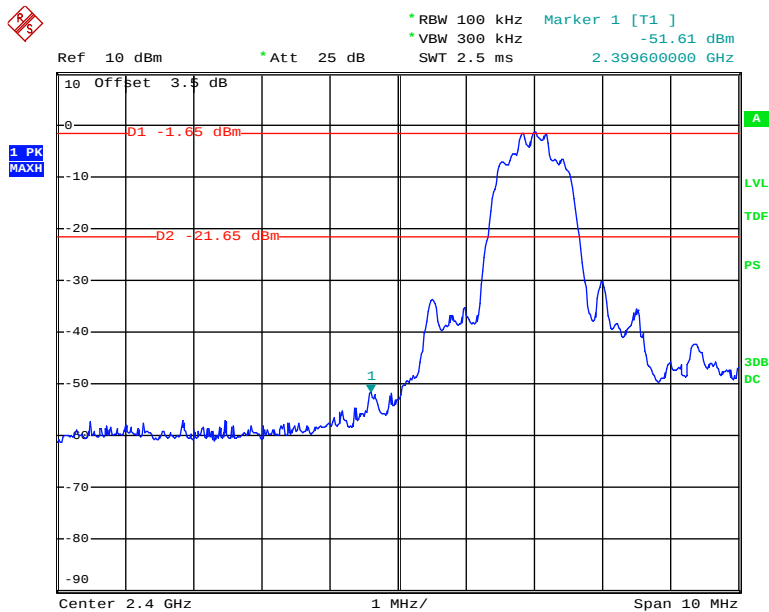
Date: 23.OCT.2012 13:38:44

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



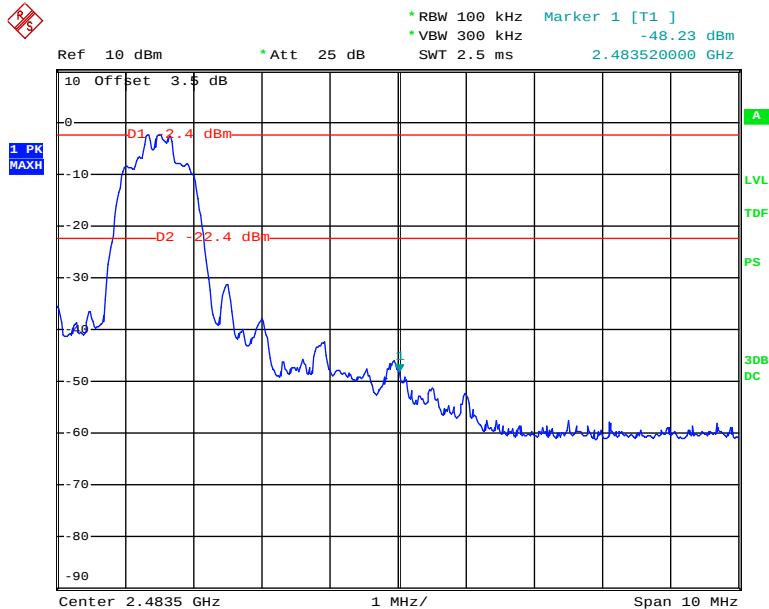
Date: 23.OCT.2012 13:37:25

EDR (8DPSK): Band Edge-Left Side



Date: 23.OCT.2012 13:40:12

BDR (8DPSK): Band Edge-Right Side



Date: 23.OCT.2012 13:41:10

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