

FCC PART 15.247
TEST REPORT

For

b mobile HK Limited

G/F, 144 UN CHAU STREET, SHAM SHUI PO, KOWLOON, HONG KONG

FCC ID: ZSW-W130

Report Type: Original Report	Product Type: GSM/GPRS/EDGE/WCDMA Mobile Phone
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Report Number: RSZ120810001-00B	
Report Date: 2012-09-17	
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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 *b mobile HK Limited*'s product, model number: *W130 (FCC ID: ZSW-W130)* or the "EUT" in this report was a GSM/GPRS/EDGE/WCDMA MobilePhone, which was measured approximately: 11.1 cm (L) x 4.7 cm (W) x 1.6 cm (H), rated input voltage: DC 3.7 V Li-ion battery or DC 5V charging from adapter.

Adapter Information:

Input: AC 100-240V, 50/60Hz, 200mA

Output: DC 5V, 500mA

** All measurement and test data in this report was gathered from production sample serial number: 1208032 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2012-08-10.*

Objective

This test report is prepared on behalf of *b mobile HK Limited* 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 22H&24E PCE and Part 15B JBP submissions with FCC ID: ZSW-W130.

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 tester.

Equipment Modifications

No modification was made to the EUT tested.

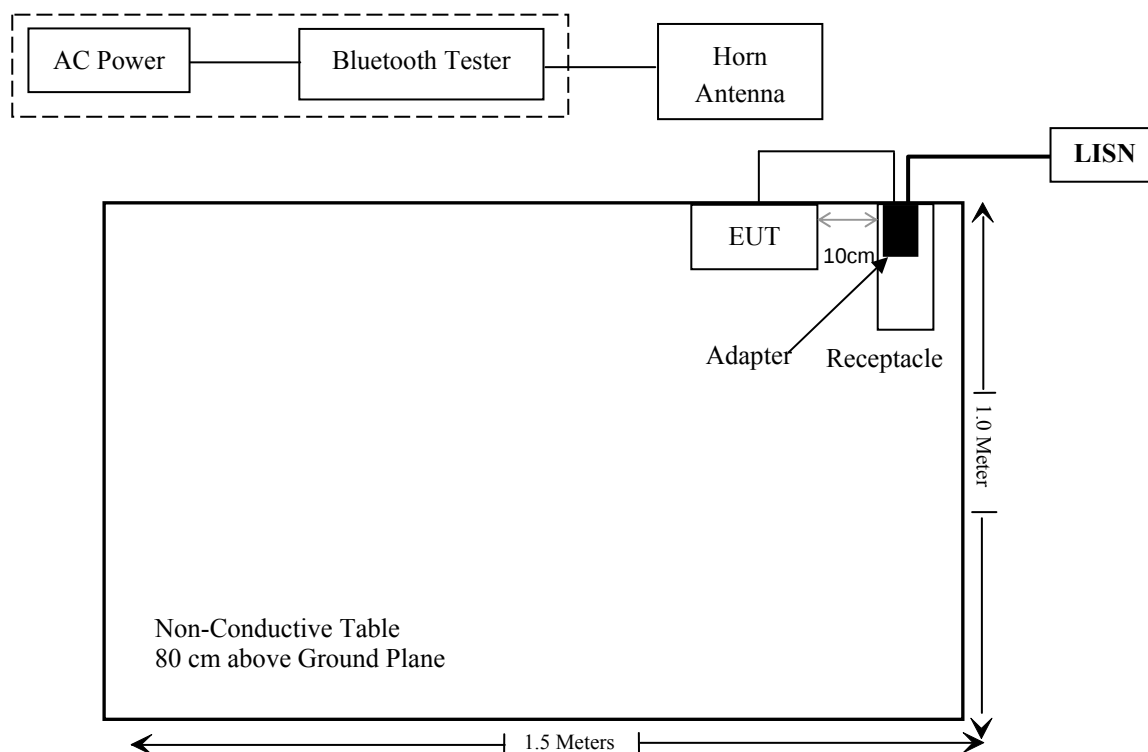
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
TESCOM	Bluetooth Tester	TC-3000B	3000B650083

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Detachable USB Cable	1.0	EUT	Adapter

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	Compliance
§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

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

Applicable Standard

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	SAR not required: <u>Unlicensed only</u> - when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed - when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas - when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 SAR required: Licensed & Unlicensed antenna pairs with SAR to peak location separation ratio ≥ 0.3 ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	When there is no simultaneous transmission – - output ≤ 60 f: SAR not required - output > 60 f: stand-alone SAR required When there is simultaneous transmission – <u>Stand-alone SAR not required when</u> - output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas - output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas - output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> When stand-alone SAR is required - test SAR on highest output channel for each wireless mode and exposure condition - if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures	
Jaw, Mouth and Nose	<u>Flat phantom SAR required</u> - when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues - position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations	When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

- 1) GSM can transmit simultaneously with Bluetooth.
- 2) The distance between BT and GSM antenna is $1.6\text{cm} < 2.5\text{cm}$. The max output power of Bluetooth antenna is $(5.02\text{dBm}) 3.177\text{mW} < P_{\text{Ref}}(12\text{mW})$ and the maximum SAR of GSM is $1.118\text{W/kg} < 1.2\text{W/kg}$. According to KDB648474, stand-alone SAR is not required for BT antenna and simultaneous SAR evaluation is not required for Bluetooth with GSM.
- 3) P_{Ref} is defined as the maximum conducted power available at the antenna according to source-based time-averaging requirements of Section 2.1093(d)(5).

Result: The SAR measurement is exempt.

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 PIFA antenna arrangement for bluetooth, which was permanently attached and the gain was 0 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

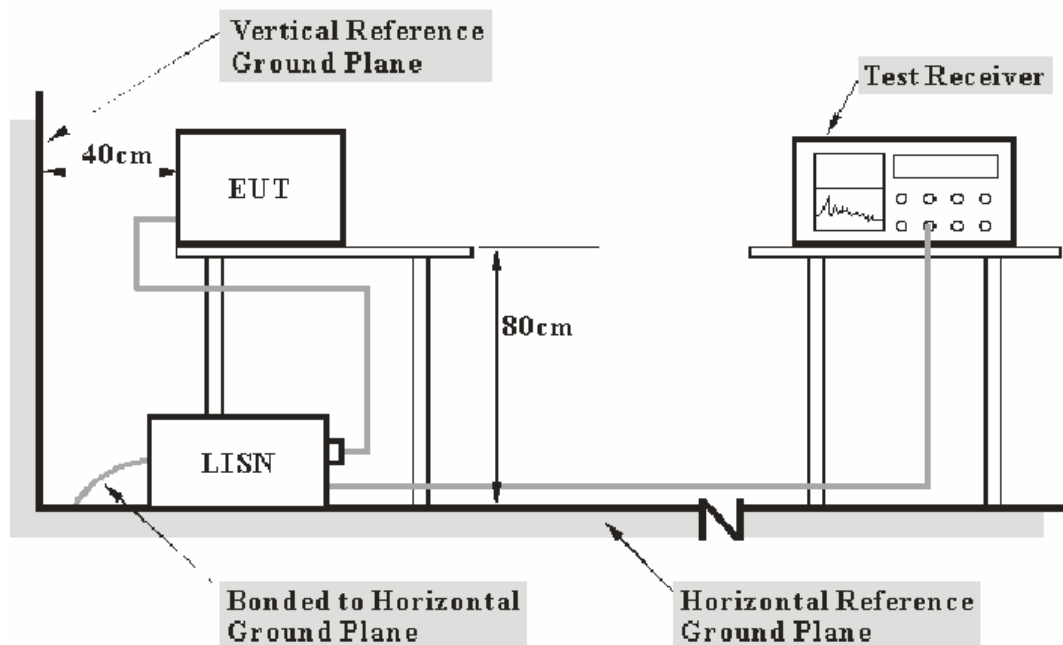
FCC §15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

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.

EUT Setup



- Note:** 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.4-2009. The related limit was specified in FCC Part 15.207.

The spacing between the relevant peripherals was 10 cm.

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 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	Pulse limiter	ESH3Z2	DE25985	2012-07-08	2013-07-07
BACL	CE Test software	BACL-CE	V1.0	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Pulse Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Pulse Limiter Attenuation}$$

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 7 dB 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 Part 15.207, with the worst margin reading of:

18.07 dB at 1.730 MHz in the Neutral conducted mode

Test Data

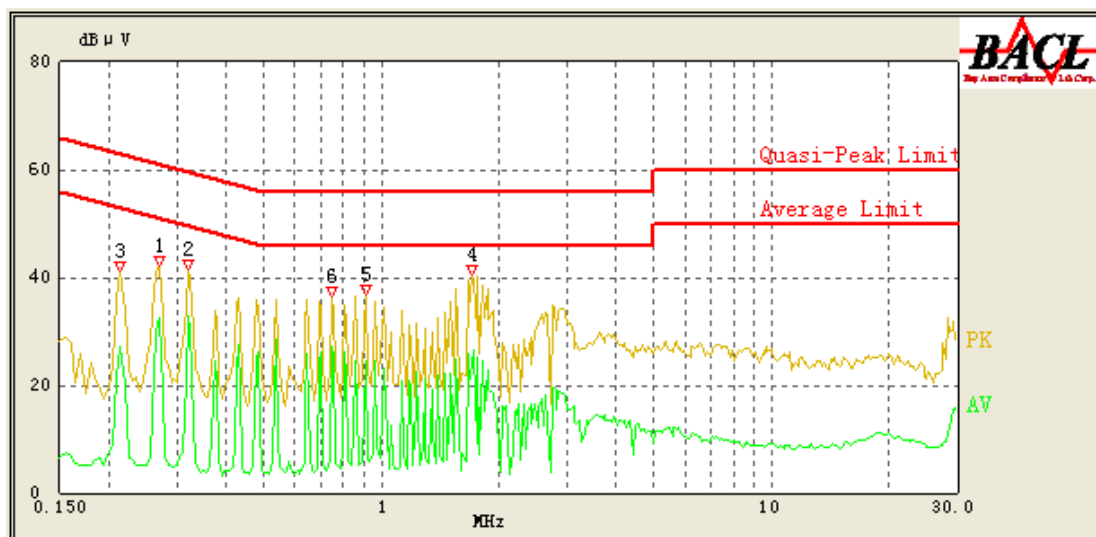
Environmental Conditions

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

The testing was performed by Jimmy Xiao on 2012-09-14.

EUT operation mode: Charging & Transmitting

AC 120 V, 60 Hz, Line:



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.320	32.99	10.26	51.14	18.15	Ave.
0.750	27.16	10.21	46.00	18.84	Ave.
1.715	36.37	10.19	56.00	19.63	QP
0.270	32.46	10.26	52.57	20.11	Ave.
0.910	35.01	10.18	56.00	20.99	QP
0.750	34.41	10.21	56.00	21.59	QP
0.910	24.37	10.18	46.00	21.63	Ave.
0.270	40.55	10.26	62.57	22.02	QP
1.715	23.83	10.19	46.00	22.17	Ave.
0.320	38.32	10.26	61.14	22.82	QP
0.215	38.01	10.27	64.14	26.13	QP
0.215	27.08	10.27	54.14	27.06	Ave.

AC 120V, 60 Hz, Neutral:

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
1.730	27.93	10.19	46.00	18.07	Ave.
0.165	44.95	10.24	65.57	20.62	QP
0.325	29.42	10.25	51.00	21.58	Ave.
0.165	33.23	10.24	55.57	22.34	Ave.
0.270	30.18	10.25	52.57	22.39	Ave.
1.730	33.58	10.19	56.00	22.42	QP
0.325	38.39	10.25	61.00	22.61	QP
0.270	39.49	10.25	62.57	23.08	QP
1.075	22.70	10.17	46.00	23.30	Ave.
1.075	31.01	10.17	56.00	24.99	QP
0.215	38.32	10.24	64.14	25.82	QP
0.215	25.23	10.24	54.14	28.91	Ave.

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

Applicable Standard

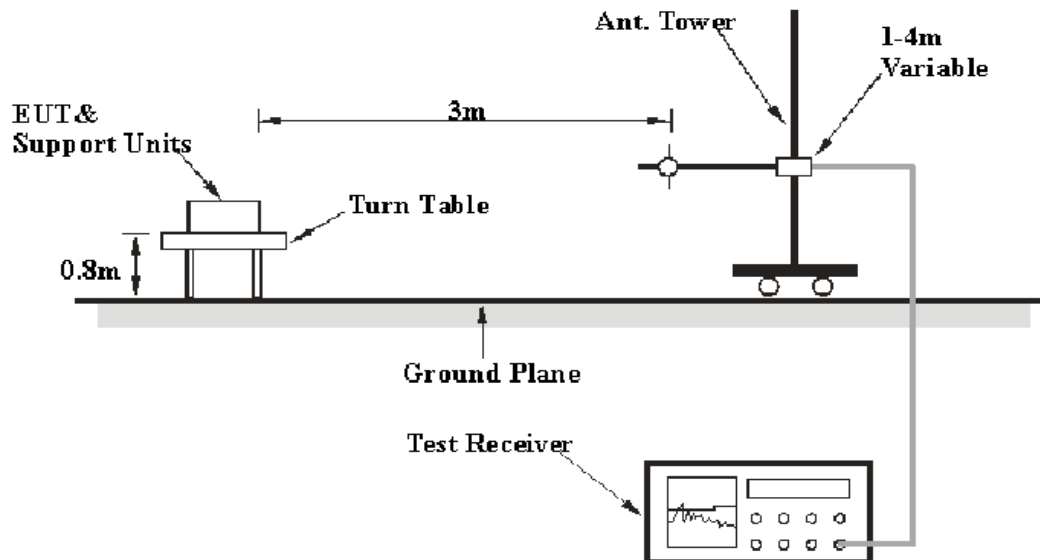
FCC §15.205; §15.209; §15.247(d)

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



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.

The spacing between the relevant peripherals was 10 cm.

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 radiated emissions, 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 -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:

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 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	1937A01057	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2011-11-17	2012-11-16
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2012-11-27
SUPER ULTRA	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
Agilent	Spectrum Analyzer	8564E	3943A01781	2012-04-12	2013-04-11
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2011-10-14	2012-10-13
R&S	Auto test Software	EMC32	V6.30	-	-

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

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:

9.54 dB at 9764.0 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

The testing was performed by Jimmy Xiao on 2012-08-14.

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	
	Reading (dBuV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
Low Channel (2402 MHz)									
2402.0	80.74	PK	23	1.1	H	6.13	86.87	/	/
2402.0	41.29	Ave.	23	1.1	H	6.13	47.42	/	/
2402.0	86.91	PK	354	1.2	V	6.13	93.04	/	/
2402.0	44.58	Ave.	354	1.2	V	6.13	50.71	/	/
9608.0	44.53	PK	79	1.1	V	19.28	63.81	74	10.19
7206.0	46.31	PK	167	1.2	V	17.06	63.37	74	10.63
9608.0	23.43	Ave.	79	1.1	V	19.28	42.71	54	11.29
7206.0	24.93	Ave.	167	1.2	V	17.06	41.99	54	12.01
4804.0	49.31	PK	38	1.1	V	12.40	61.71	74	12.29
4804.0	27.53	Ave.	38	1.1	V	12.40	39.93	54	14.07
2496.3	21.47	Ave.	16	1.5	H	7.21	28.68	54	25.32
2386.2	22.06	Ave.	112	1.0	V	6.13	28.19	54	25.81
2344.8	21.41	Ave.	224	1.1	V	5.48	26.89	54	27.11
2386.2	36.72	PK	112	1.0	V	6.13	42.85	74	31.15
2496.3	34.69	PK	16	1.5	H	7.21	41.90	74	32.10
2344.8	35.93	PK	224	1.1	V	5.48	41.41	74	32.59
Middle Channel (2441 MHz)									
2441.0	78.92	PK	74	1.1	H	7.21	86.13	/	/
2441.0	40.51	Ave.	74	1.1	H	7.21	47.72	/	/
2441.0	85.49	PK	112	1.2	V	6.81	92.30	/	/
2441.0	43.69	Ave.	112	1.2	V	6.81	50.50	/	/
9764.0	45.06	PK	69	1.4	V	19.40	64.46	74	9.54
9764.0	24.53	Ave.	69	1.4	V	19.40	43.93	54	10.07
7323.0	45.06	PK	58	1.3	V	16.49	61.55	74	12.45
4882.0	48.58	PK	321	1.1	V	12.46	61.04	74	12.96
7323.0	24.53	Ave.	58	1.3	V	16.49	41.02	54	12.98
4882.0	27.32	Ave.	321	1.1	V	12.46	39.78	54	14.22
2491.7	21.22	Ave.	225	1.2	V	6.81	28.03	54	25.97
2358.7	21.41	Ave.	35	1.0	H	5.48	26.89	54	27.11
2368.2	20.59	Ave.	87	1.3	V	5.48	26.07	54	27.93
2491.7	34.98	PK	225	1.2	V	6.81	41.79	74	32.21
2358.7	35.29	PK	35	1.0	H	5.48	40.77	74	33.23
2368.2	34.84	PK	87	1.3	V	5.48	40.32	74	33.68

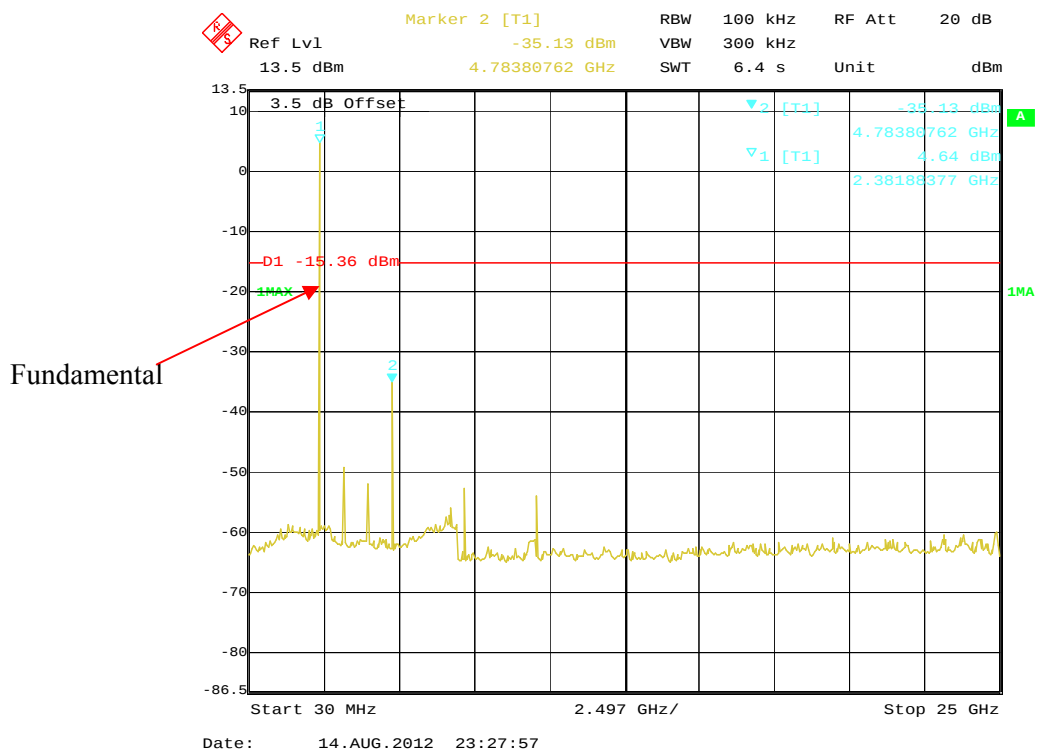
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBuV/m)	FCC Part 15.247	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
High Channel (2480 MHz)									
2480.0	81.95	PK	57	1.2	H	7.21	89.16	/	/
2480.0	41.65	Ave.	57	1.2	H	7.21	48.86	/	/
2480.0	84.41	PK	224	1.1	V	6.81	91.22	/	/
2480.0	42.95	Ave.	224	1.1	V	6.81	49.76	/	/
9920.0	22.43	Ave.	36	1.4	H	19.38	41.81	54	12.19
4960.0	48.41	PK	175	1.2	V	12.50	60.91	74	13.09
9920.0	40.98	PK	36	1.4	H	19.38	60.36	74	13.64
4960.0	27.08	Ave.	175	1.2	V	12.50	39.58	54	14.42
7440.0	21.02	Ave.	225	1.3	H	15.90	36.92	54	17.08
7440.0	37.61	PK	225	1.3	H	15.90	53.51	74	20.49
2483.6	22.26	Ave.	28	1.2	V	6.81	29.07	54	24.93
2491.7	20.54	Ave.	68	1.1	H	7.21	27.75	54	26.25
2323.4	21.21	Ave.	135	1.3	H	5.48	26.69	54	27.31
2483.6	37.61	PK	28	1.2	V	6.81	44.42	74	29.58
2323.4	35.33	PK	135	1.3	H	5.48	40.81	74	33.19
2491.7	32.34	PK	68	1.1	H	7.21	39.55	74	34.45

Note: Below 1GHz, the data which below 20 dB to the limit was not recorded.

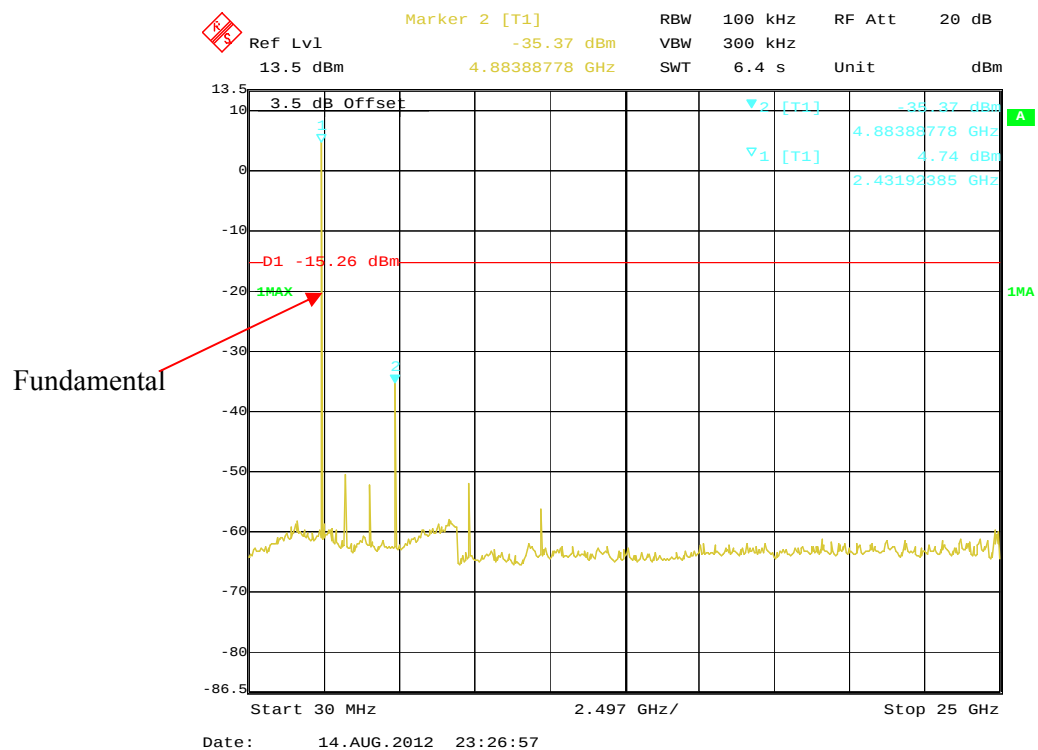
Conducted spurious emissions at antenna port

BDR (GFSK)

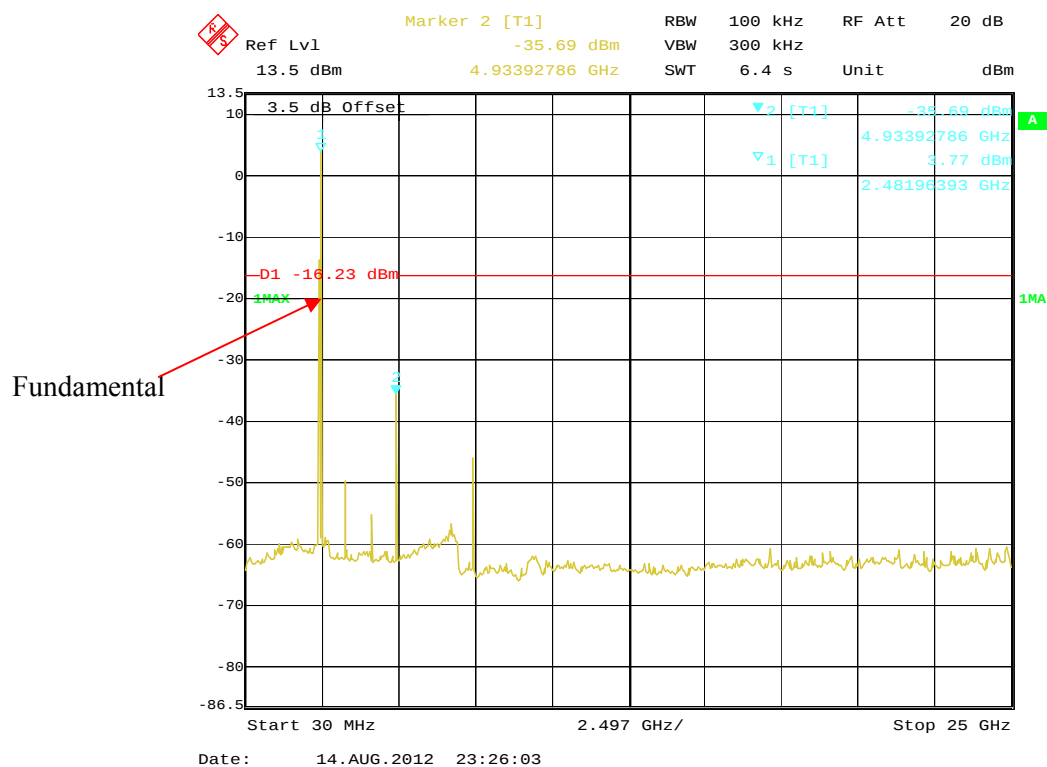
Low Channel



Middle Channel

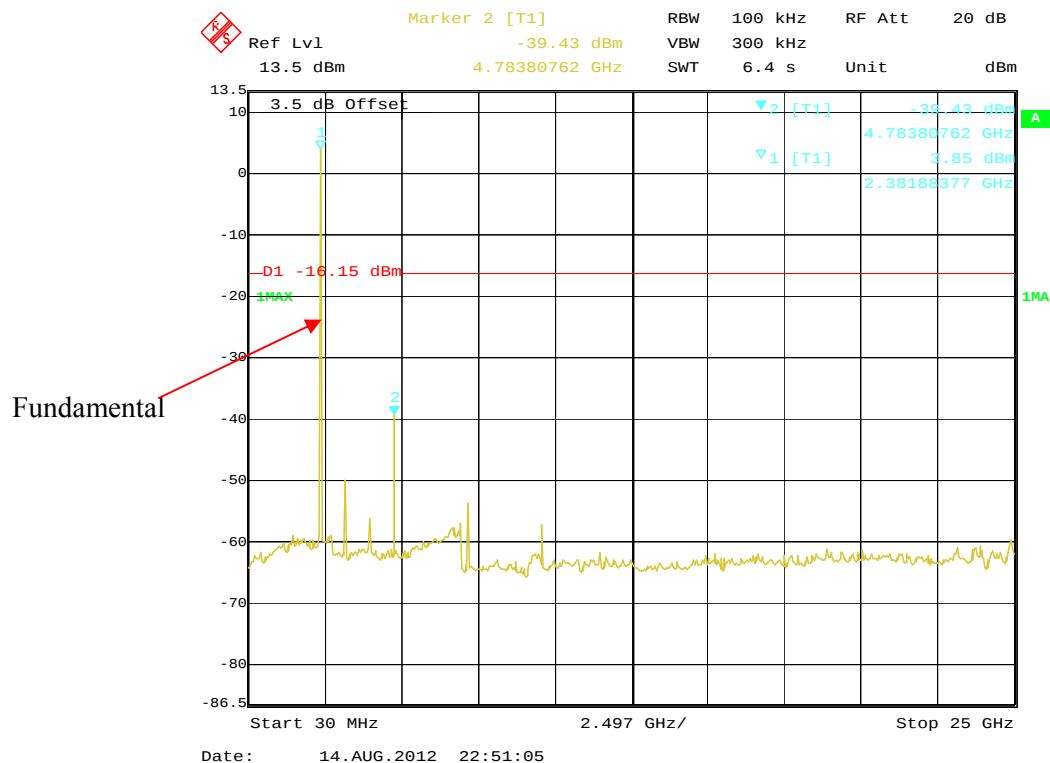


High Channel

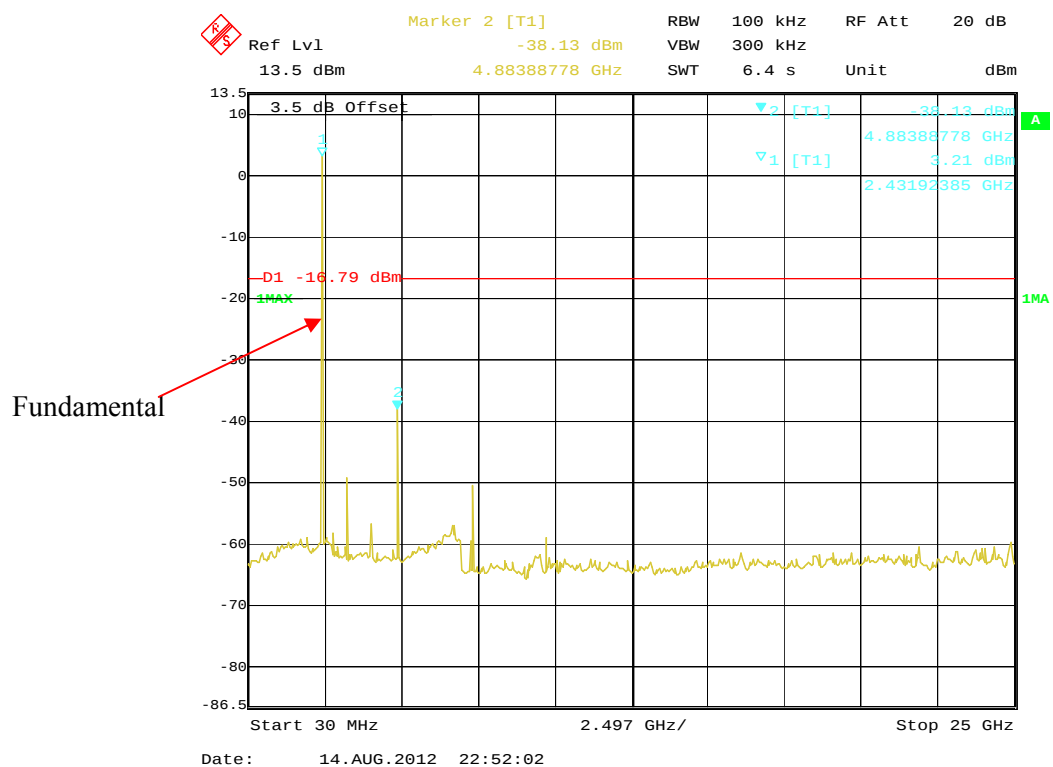


EDR ($\pi/4$ -DQPSK)

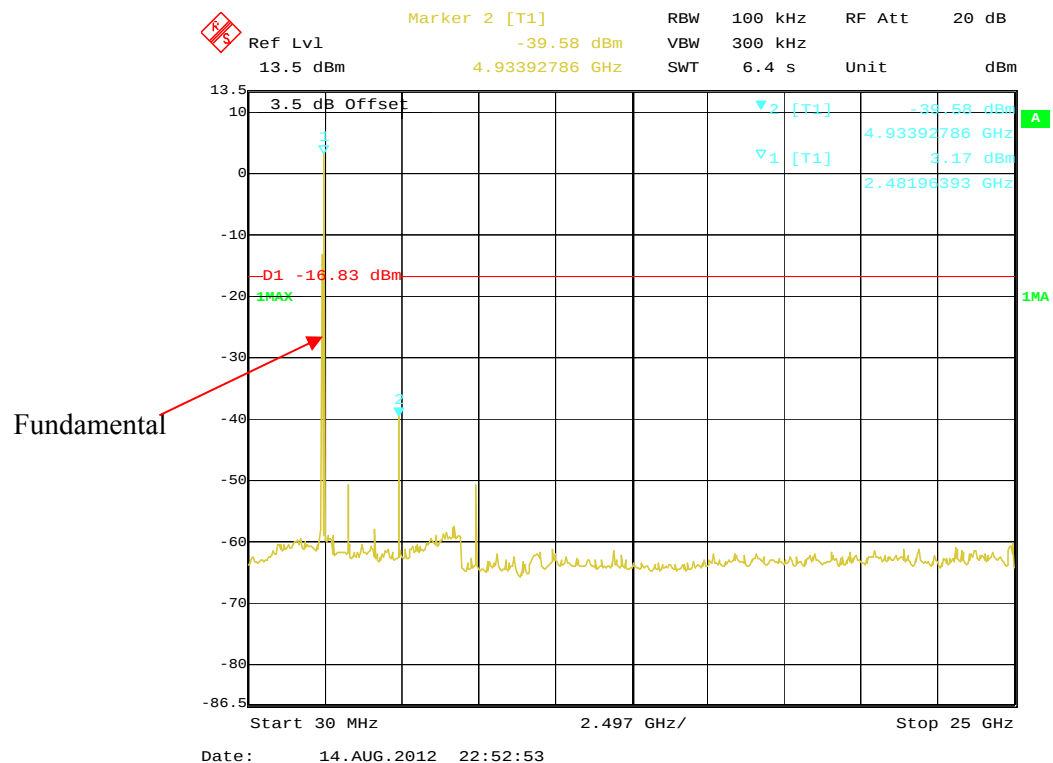
Low Channel



Middle Channel

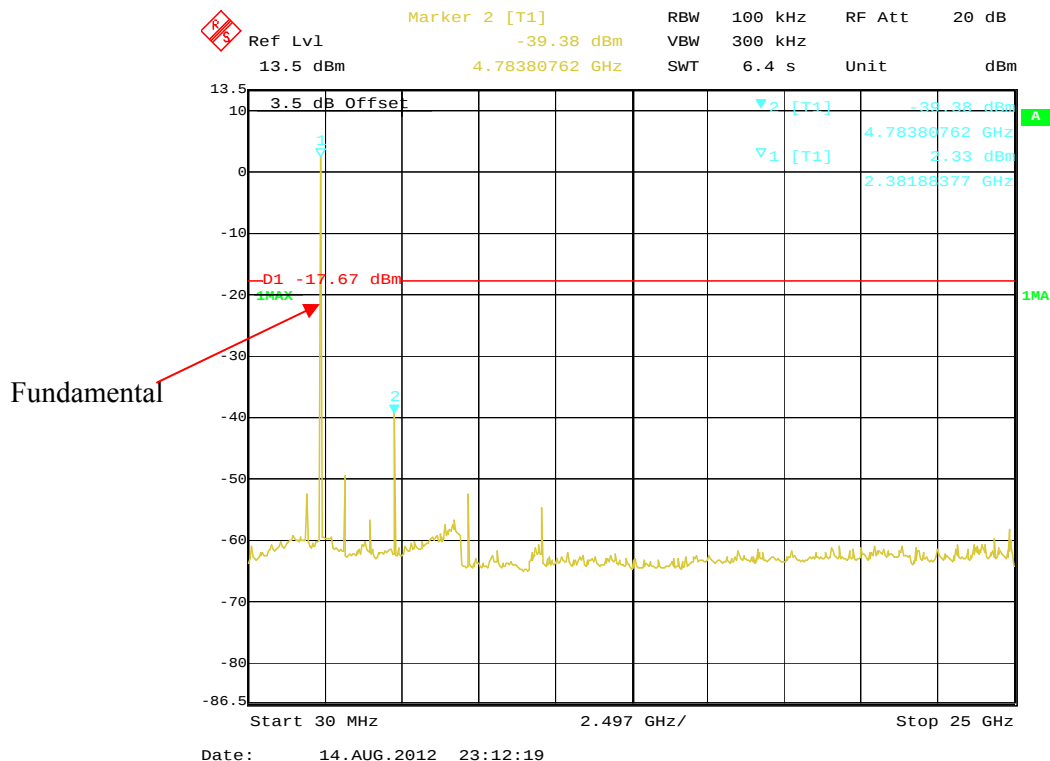


High Channel

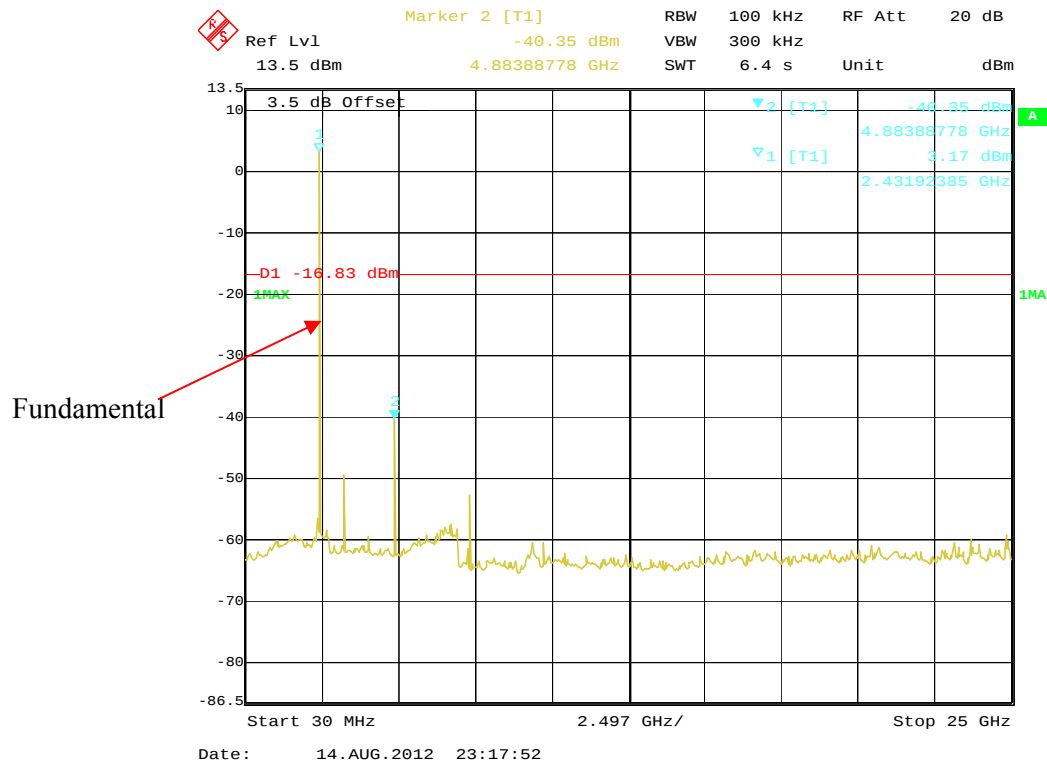


EDR (8DPSK)

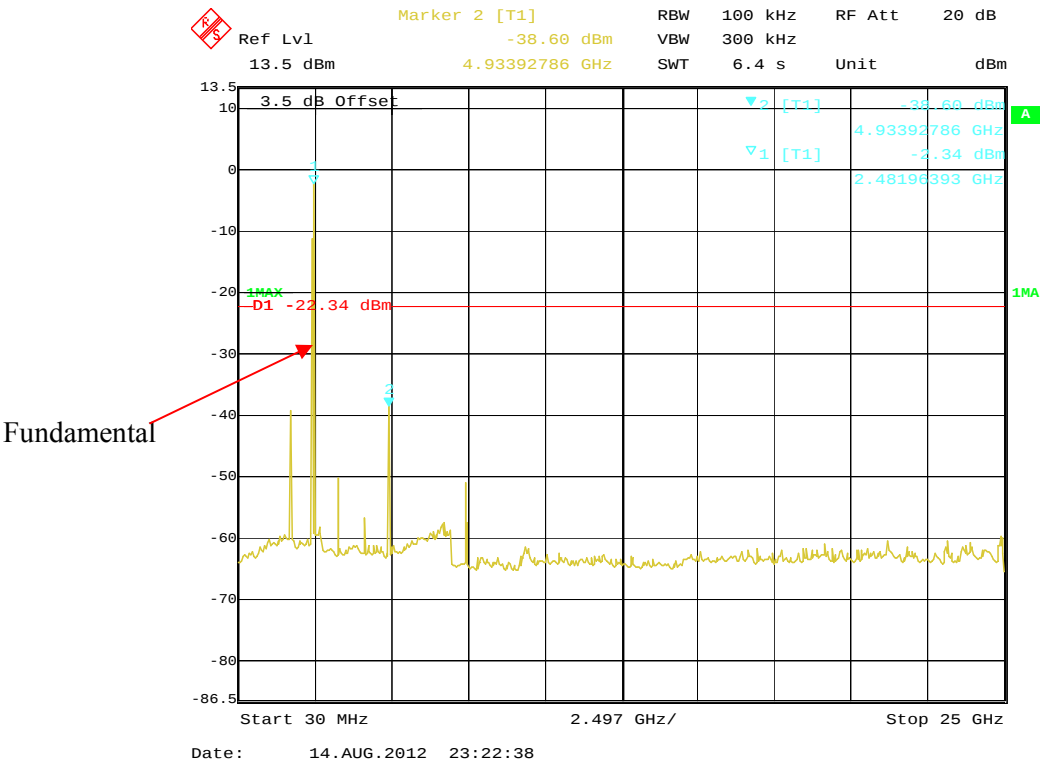
Low Channel



Middle Channel



High Channel



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, RBW of spectrum was set at 30 kHz, 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	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

* The testing was performed by Jimmy Xiao on 2012-08-14.

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	0.679	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.679	Pass
	Adjacent	2442			
	High	2480	1.002	0.679	Pass
	Adjacent	2479			
EDR ($\pi/4$ -DQPSK)	Low	2402	1.002	0.764	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.759	Pass
	Adjacent	2442			
	High	2480	1.002	0.759	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.002	0.839	Pass
	Adjacent	2403			
	Middle	2441	1.010	0.833	Pass
	Adjacent	2442			
	High	2480	1.006	0.836	Pass
	Adjacent	2479			

Note: Limit = 20 dB bandwidth *2/3

Ref Lvl 23.5 dBm
Delta 1 [T1] 0.08 dB
RBW 30 kHz
VBW 100 kHz
SWT 6 ms
RF Att 30 dB
Unit dBm

3.5 dB Offset

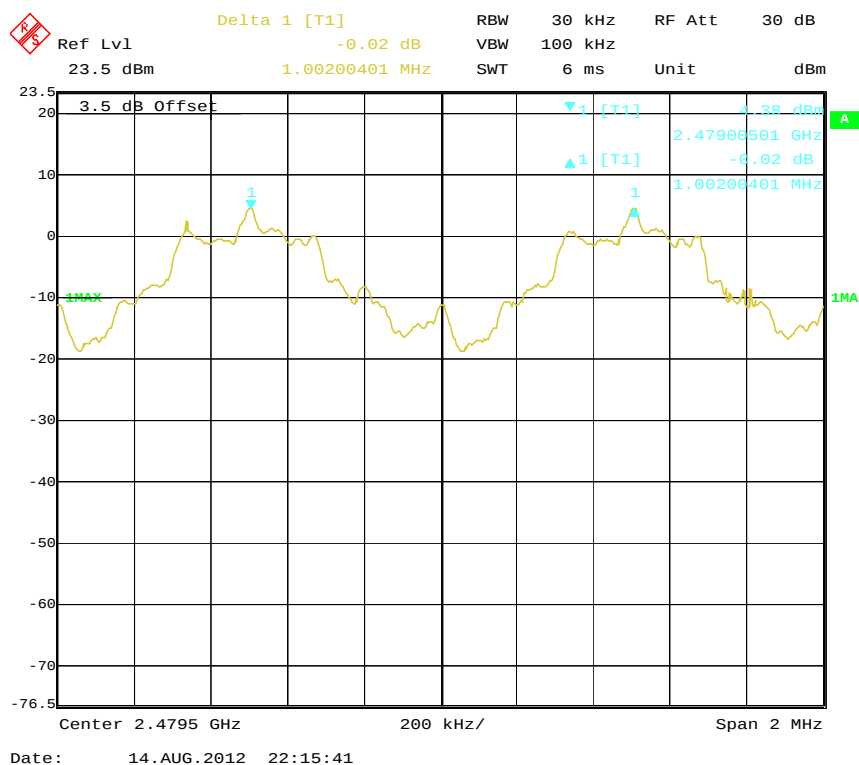
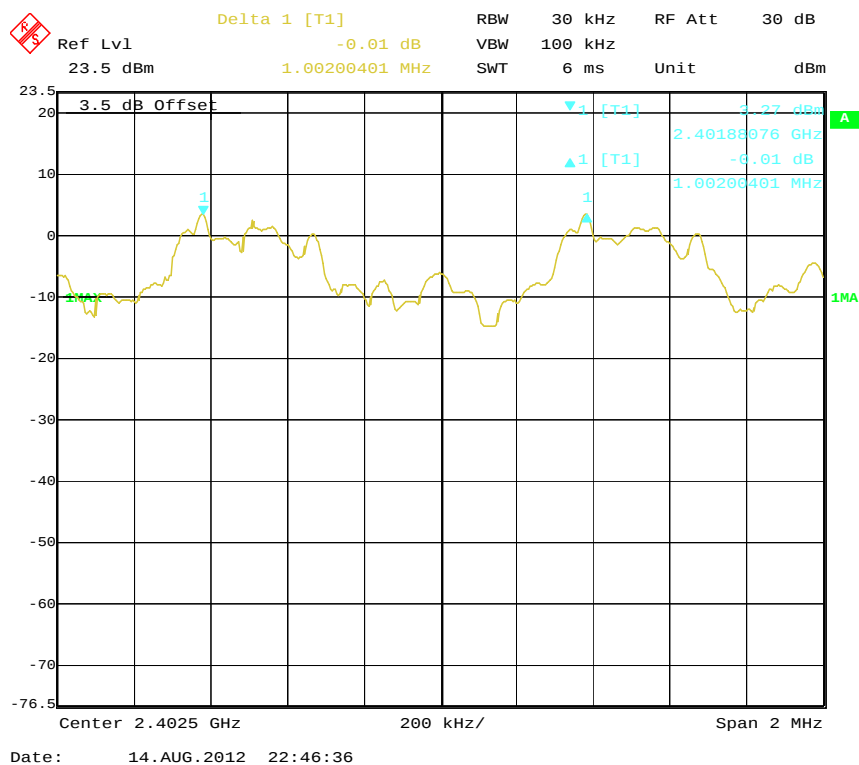
1 [T1] 0.08 dB
1 [T1] 0.08 dB
1 [T1] 0.08 dB

1MAX 1MA

Center 2.4025 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 22:13:20

[illegible]

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

Ref Lvl 23.5 dBm
Delta 1 [T1] -0.00 dB
1.00200401 MHz

RBW 30 kHz
VBW 100 kHz
SWT 6 ms
RF Att 30 dB
Unit dBm

3.5 dB Offset

23.5
20
10
0
-10
-20
-30
-40
-50
-60
-70
-76.5

Center 2.4415 GHz
200 kHz/
Span 2 MHz

1 [T1] 2.44088976 GHz
1 [T1] 1.00200401 MHz
1 [T1] 3.10 dBm
1 [T1] -0.00 dB

1MAX 1MA

Ref Lvl 23.5 dBm Delta 1 [T1] -0.05 dB RBW 30 kHz RF Att 30 dB

23.5 dBm 1.00200401 MHz SWT 6 ms Unit dBm

3.5 dB Offset

2.47888976 GHz -0.05 dB 1.00200401 MHz

Center 2.4795 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 22:48:35

Ref Lvl 21.5 dBm Delta 1 [T1] -0.01 dB RBW 30 kHz RF Att 30 dB

21.5 3.5 dB Offset 1 [T1] 0.78 dBm 2.40184968 GHz 1 [T1] -0.01 dB 1.00200401 MHz

1MAX 1MAX

Center 2.4025 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 23:14:14

Ref Lvl 23.5 dBm Delta 1 [T1] -2.10 dB RBW 30 kHz RF Att 30 dB

23.5 dBm 1.01002004 MHz SWT 6 ms Unit dBm

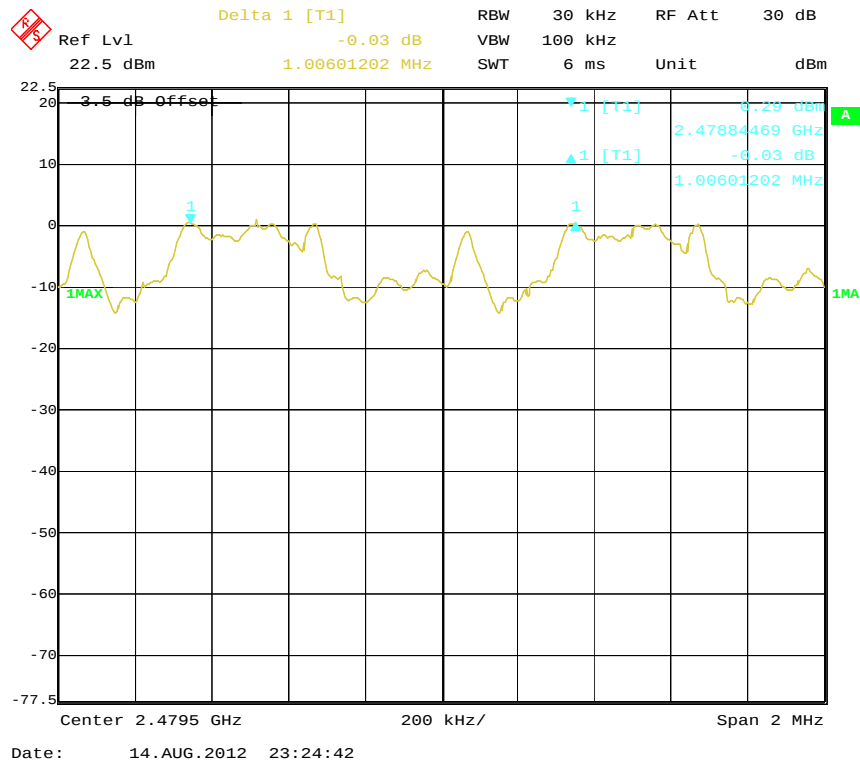
3.5 dB Offset

2.44983667 GHz -2.10 dB 1.01002004 MHz

Center 2.4415 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 23:19:25

EDR (8DPSK): High Channel



FCC §15.247(a) (1) – 20 dB EMISSION 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 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	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

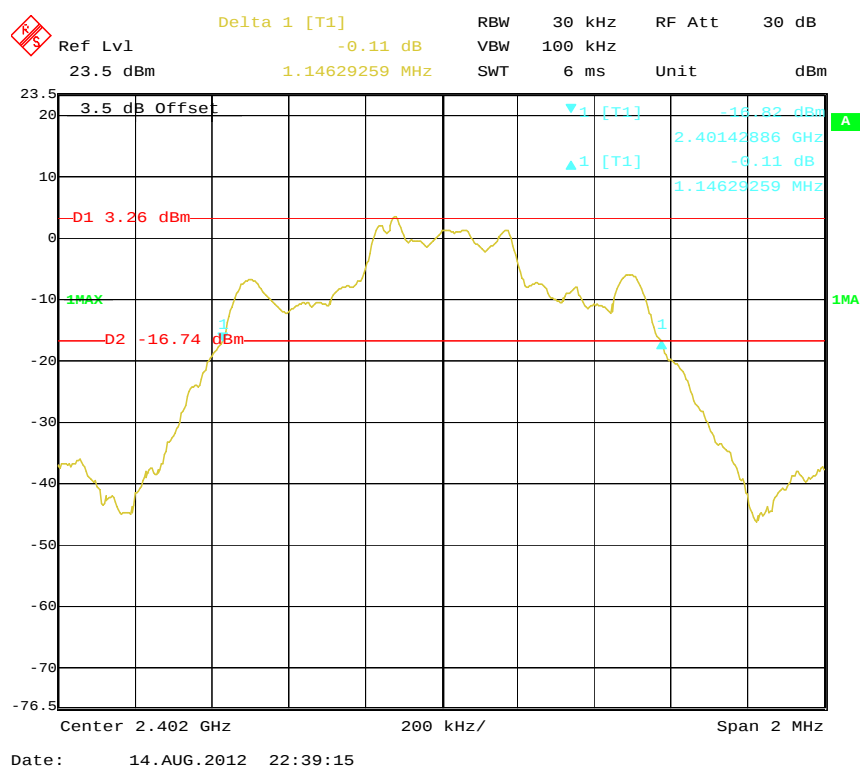
* The testing was performed by Jimmy Xiao on 2012-08-14.

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	1.018
	Middle	2441	1.018
	High	2480	1.018
EDR ($\pi/4$ -DQPSK)	Low	2402	1.146
	Middle	2441	1.138
	High	2480	1.138
EDR (8DPSK)	Low	2402	1.258
	Middle	2441	1.250
	High	2480	1.254

BDR (GFSK): Low Channel



Ref Lvl 23.5 dBm Delta 1 [T1] 1.27 dB RBW 30 kHz RF Att 30 dB
 23.5 dBm 1.13827655 MHz SWT 6 ms Unit dBm

3.5 dB Offset

D1 3.26 dBm

D2 -16.74 dBm

1 [T1] -17.41 dBm

1 [T1] 3.27 dBm

1 [T1] 1.13827655 MHz

Center 2.441 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 22:40:57

Delta 1 [T1] 0.90 dB RBW 30 kHz RF Att 30 dB

Ref Lvl 23.5 dBm 1.13827655 MHz SWT 6 ms Unit dBm

3.5 dB Offset

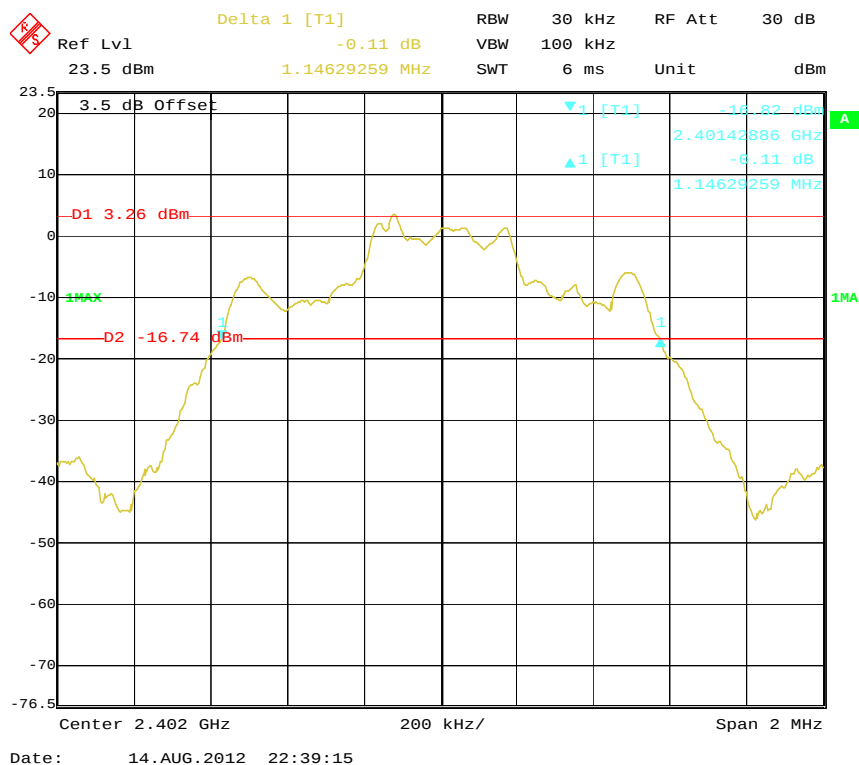
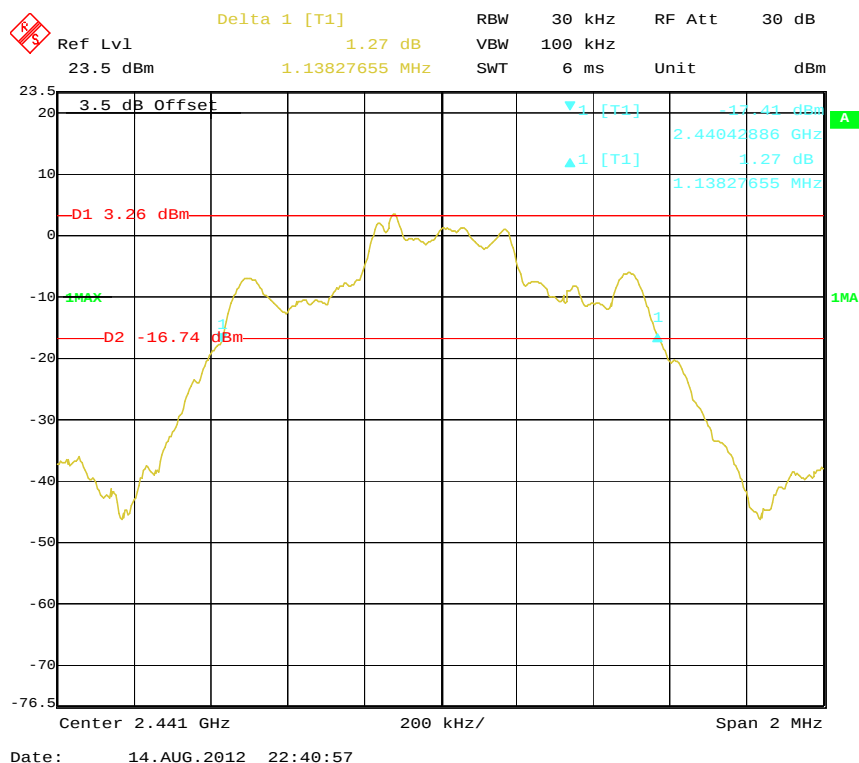
D1 2.8 dBm

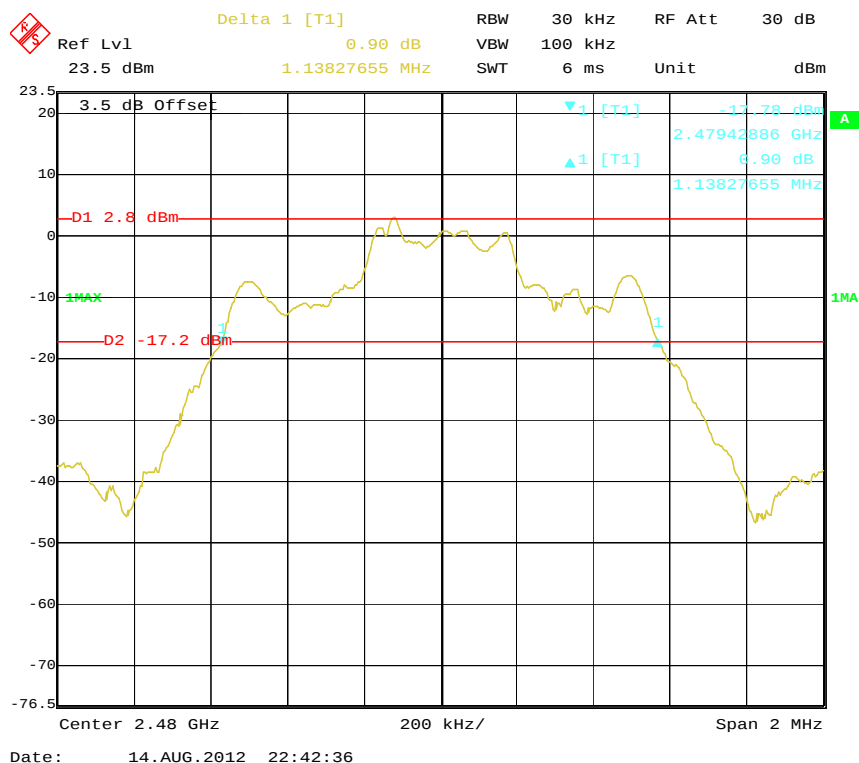
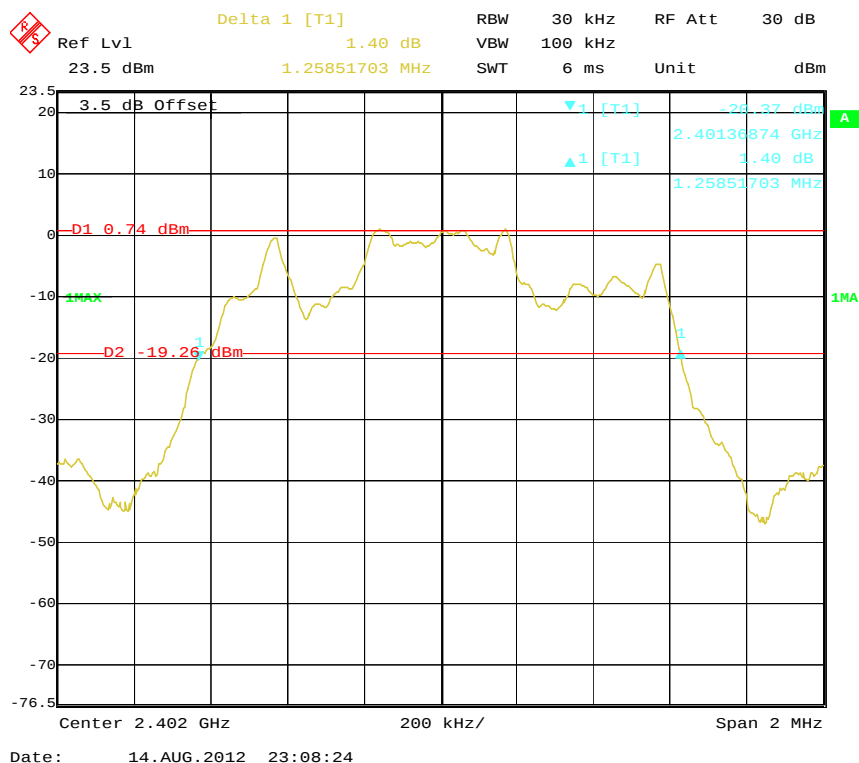
D2 -17.2 dBm

1 [T1] 2.47942886 GHz 0.90 dB 1.13827655 MHz

Center 2.48 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 22:42:36

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

EDR ($\pi/4$ -DQPSK): High Channel**EDR (8DPSK): Low Channel**

Delta 1 [T1]

Ref Lvl 0.49 dB

RBW 30 kHz RF Att 30 dB

21.5 dBm 1.25050100 MHz

SWT 6 ms Unit dBm

3.5 dB Offset

-19.51 dBm

2.44037675 GHz

0.49 dB

1.25050100 MHz

D1 0.64 dBm

D2 -19.36 dBm

1MAX

1 [T1]

Center 2.441 GHz

200 kHz/

Span 2 MHz

Date: 14.AUG.2012 23:15:51

Delta 1 [T1] 0.81 dB
 RBW 30 kHz RF Att 30 dB
 Ref Lvl 23.5 dBm 1.25450902 MHz
 VBW 100 kHz
 SWT 6 ms Unit dBm

3.5 dB Offset
 -26.36 dBm
 2.47937275 GHz
 0.81 dB
 1.25450902 MHz
 -20 dBm
 -19.65 dBm
 -10 MAX
 -20
 -30
 -40
 -50
 -60
 -70
 -76.5
 Center 2.48 GHz 200 kHz/ Span 2 MHz

Date: 14.AUG.2012 23:20:19

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	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

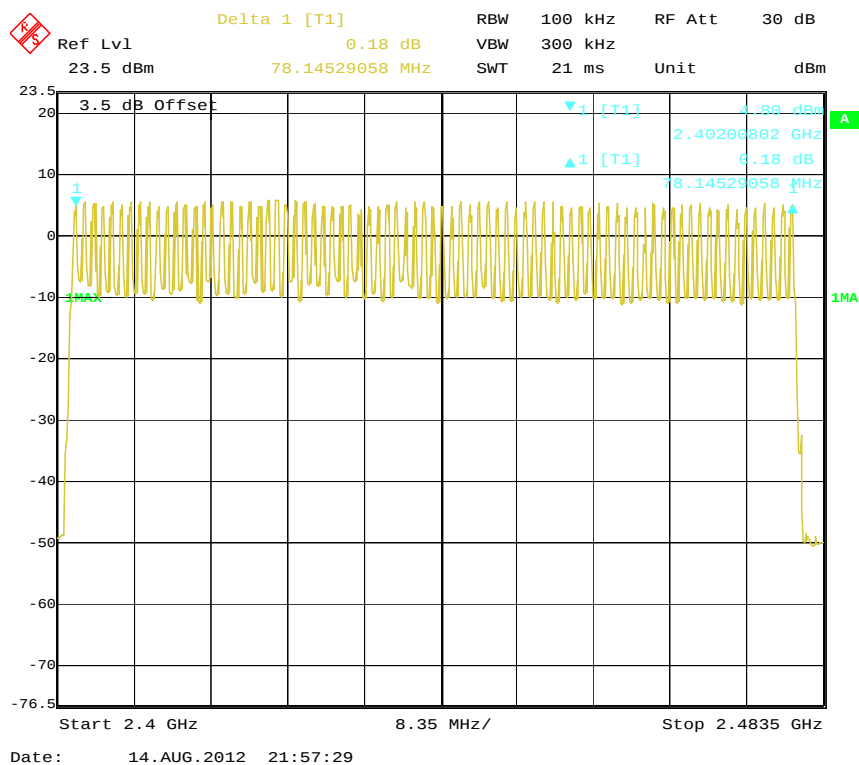
The testing was performed by Jimmy Xiao on 2012-08-14.

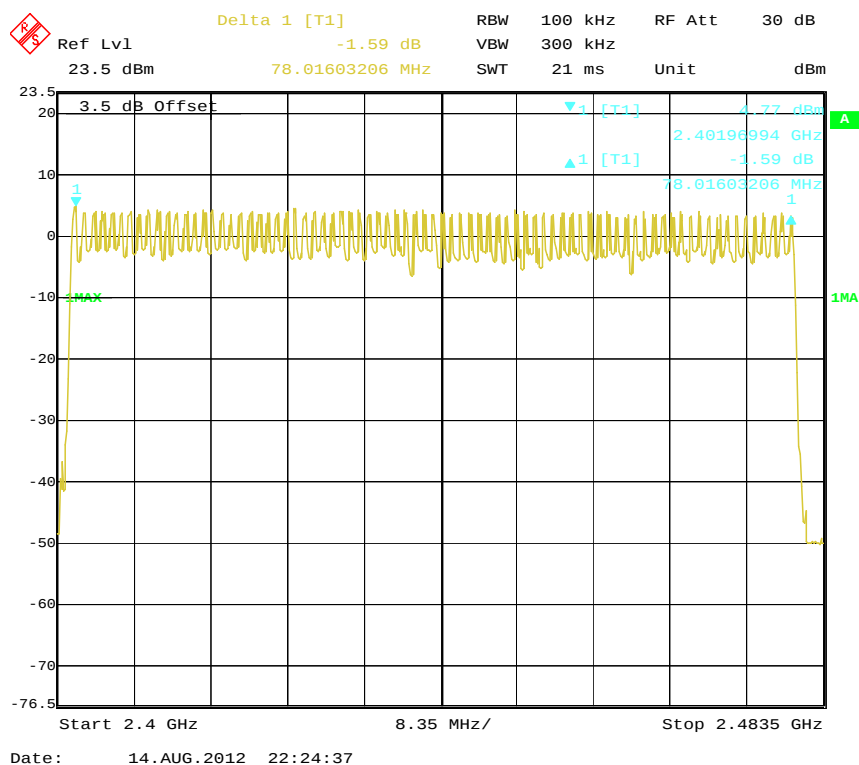
EUT operation mode: Transmitting

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

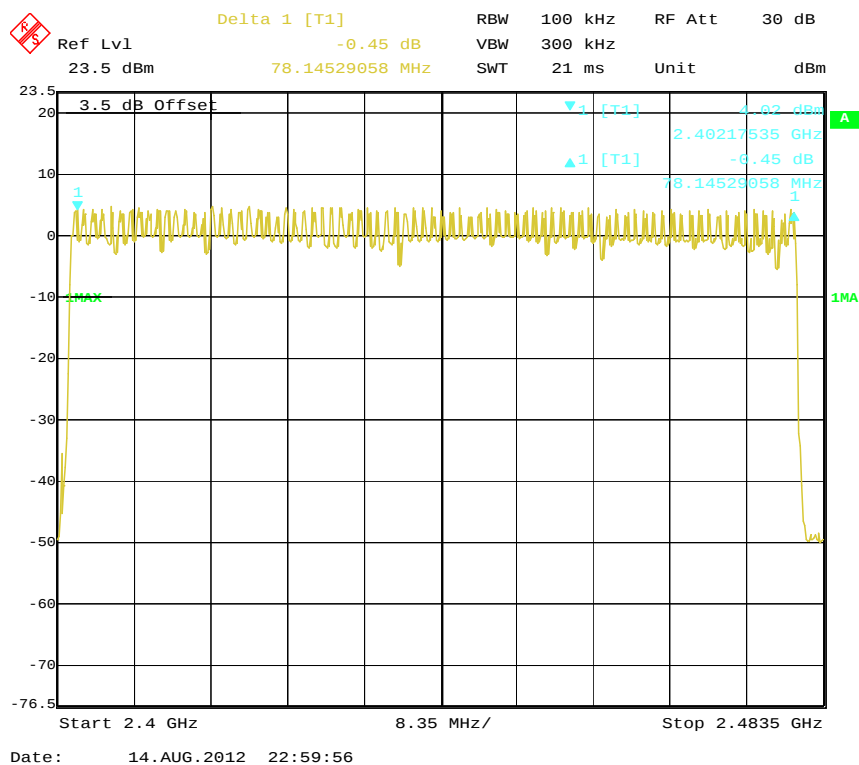
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2402-2480	79	≥15
EDR (π/4-DQPSK)	2402-2480	79	≥15
EDR (8DPSK)	2402-2480	79	≥15

BDR (GFSK): Number of Hopping Channels



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

EDR (8DPSK): Number of Hopping Channels



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	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data**Environmental Conditions**

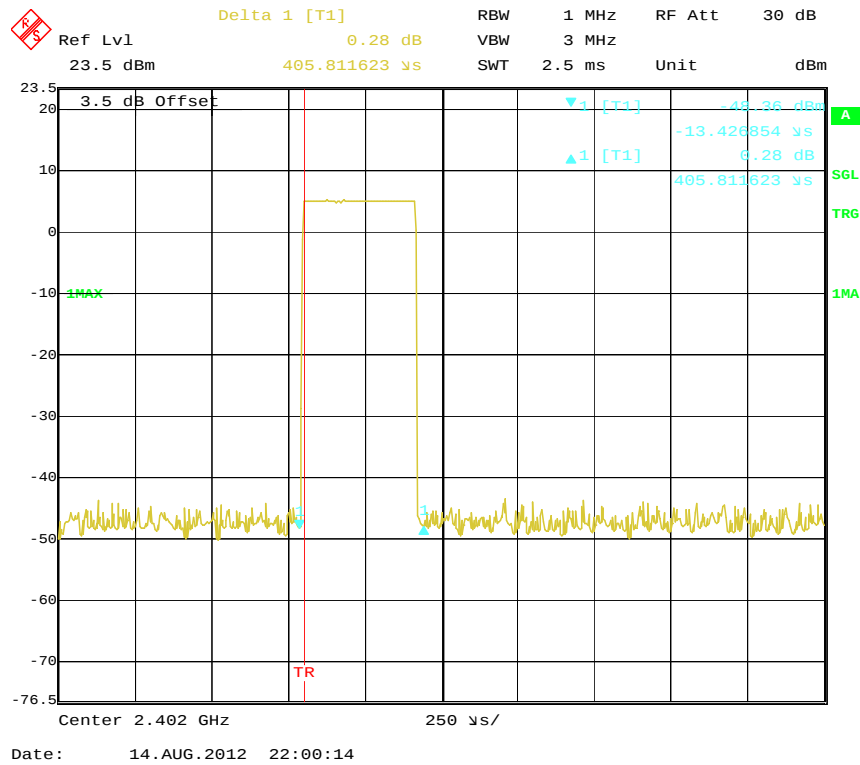
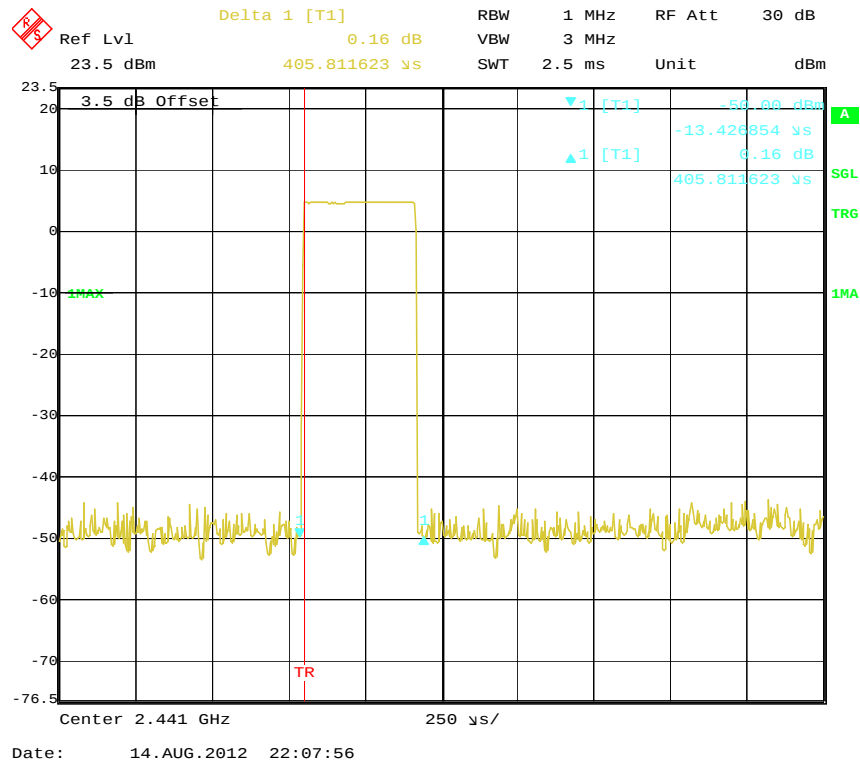
Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

The testing was performed by Jimmy Xiao on 2012-08-14.

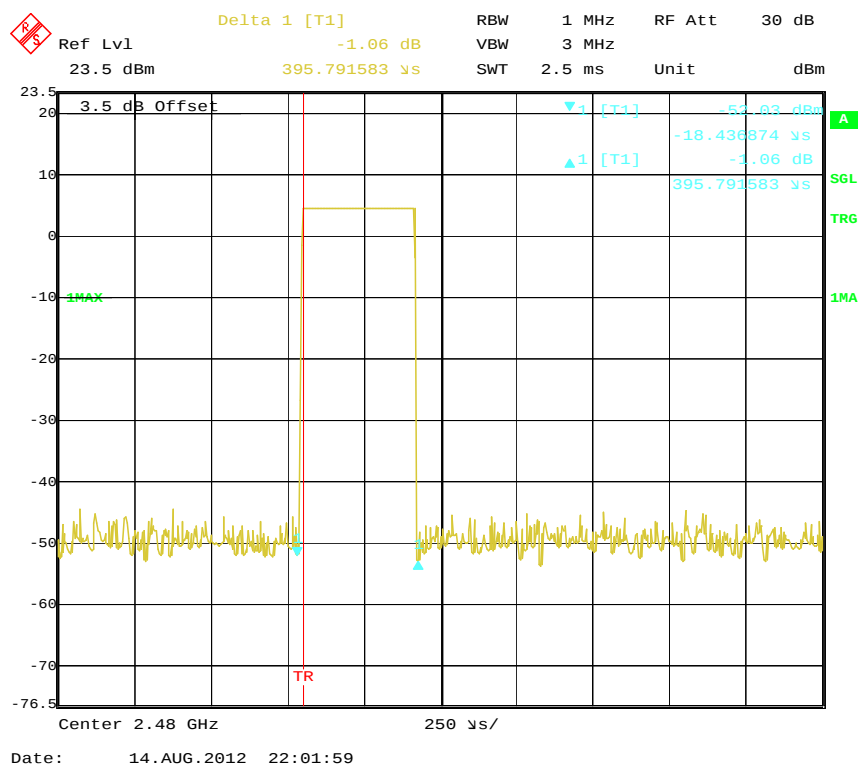
EUT operation mode: Transmitting

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

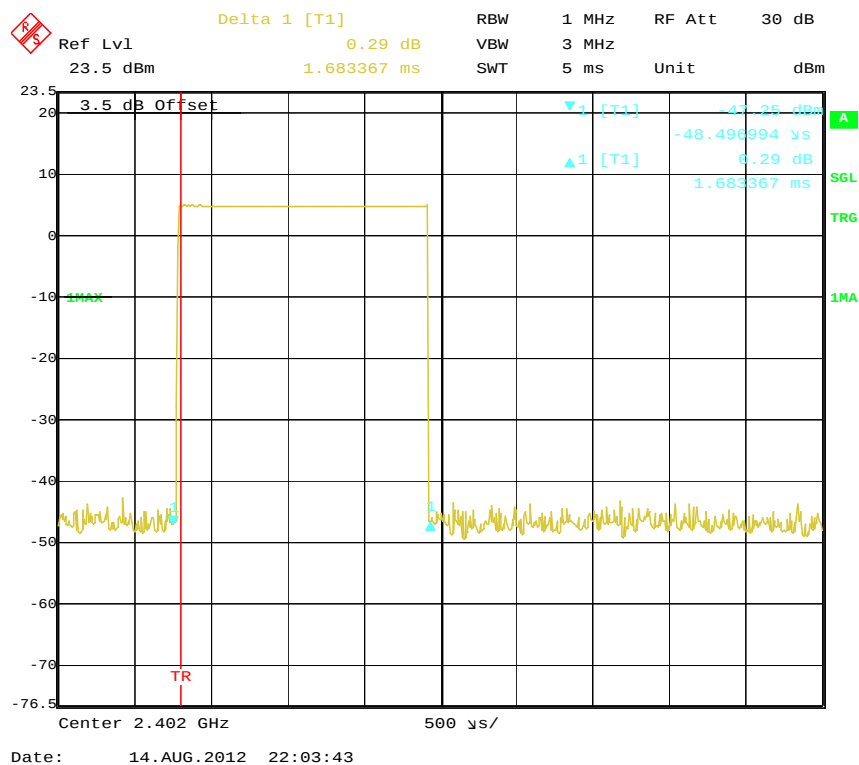
Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.406	0.130	0.4	Pass
		Middle	0.406	0.130	0.4	Pass
		High	0.396	0.127	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.683	0.269	0.4	Pass
		Middle	1.713	0.274	0.4	Pass
		High	1.713	0.274	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.026	0.323	0.4	Pass
		Middle	3.006	0.321	0.4	Pass
		High	2.966	0.316	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR ($\pi/4$ -DQPSK)	DH 1	Low	0.416	0.133	0.4	Pass
		Middle	0.406	0.130	0.4	Pass
		High	0.406	0.130	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.683	0.269	0.4	Pass
		Middle	1.683	0.269	0.4	Pass
		High	1.683	0.269	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	3.006	0.321	0.4	Pass
		Middle	3.066	0.327	0.4	Pass
		High	3.026	0.323	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	DH 1	Low	0.401	0.128	0.4	Pass
		Middle	0.416	0.133	0.4	Pass
		High	0.426	0.136	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.693	0.271	0.4	Pass
		Middle	1.683	0.269	0.4	Pass
		High	1.723	0.276	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.966	0.316	0.4	Pass
		Middle	3.046	0.325	0.4	Pass
		High	2.946	0.314	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

BDR (GFSK):**Pulse time, Low Channel, DH1****Pulse time, Middle Channel, DH1**

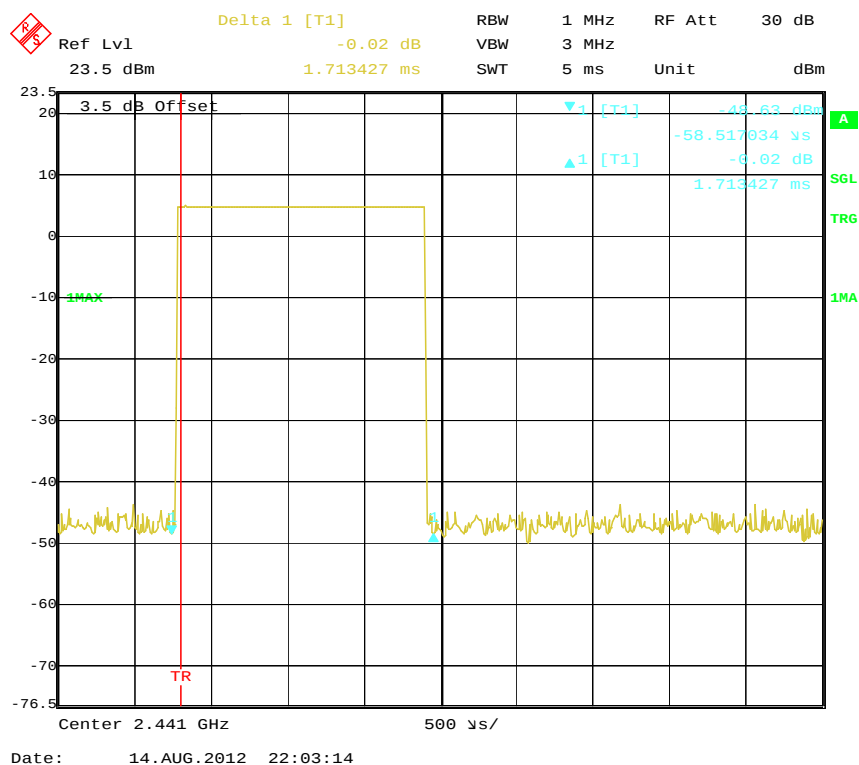
Pulse time, High Channel, DH1



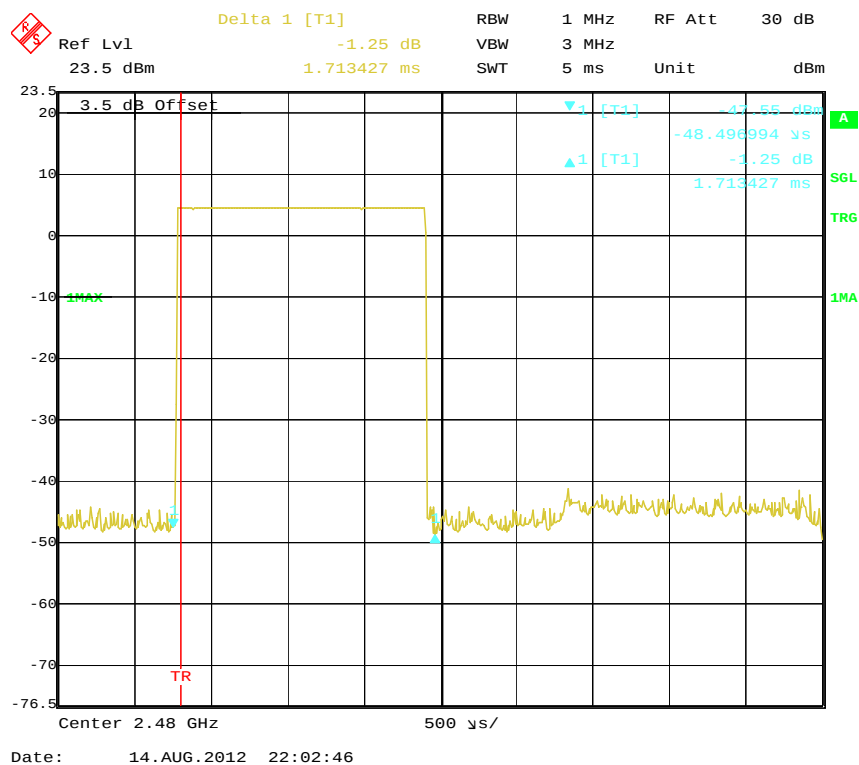
Pulse time, Low Channel, DH3



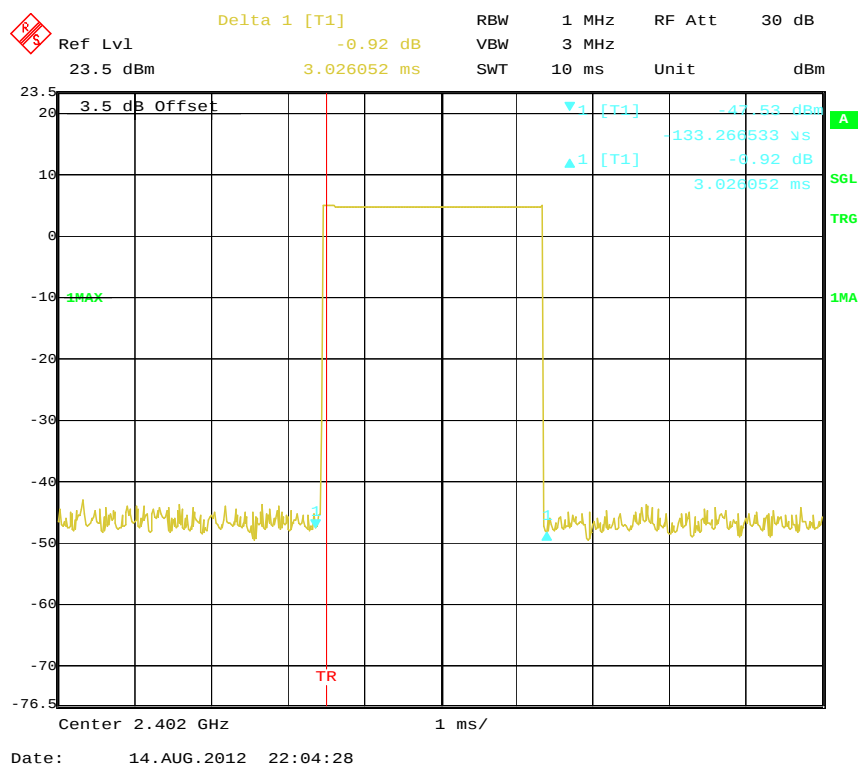
Pulse time, Middle Channel, DH3



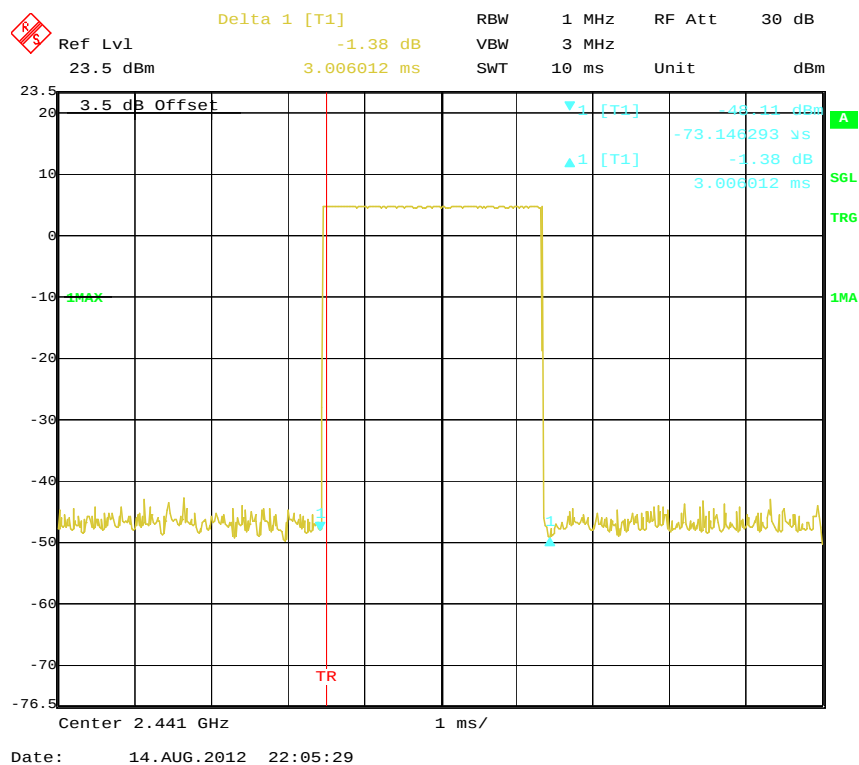
Pulse time, High Channel, DH3



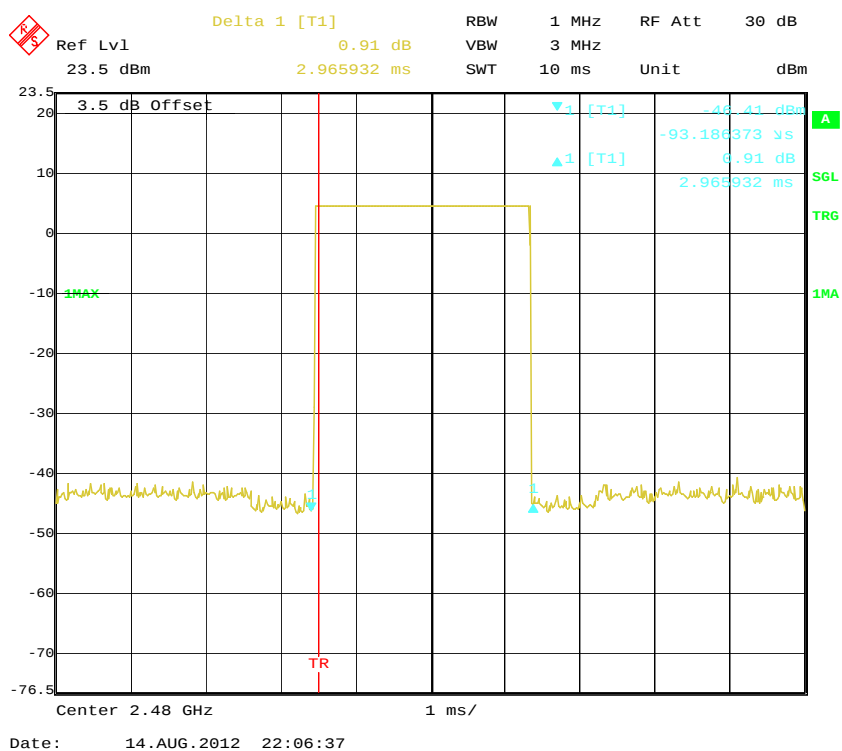
Pulse time, Low Channel, DH5



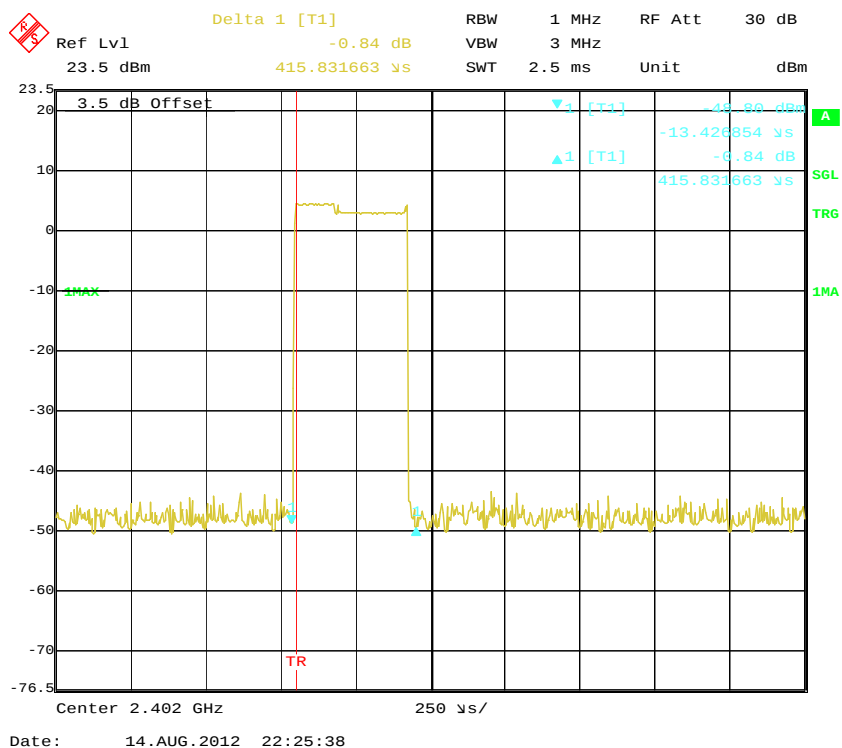
Pulse time, Middle Channel, DH5



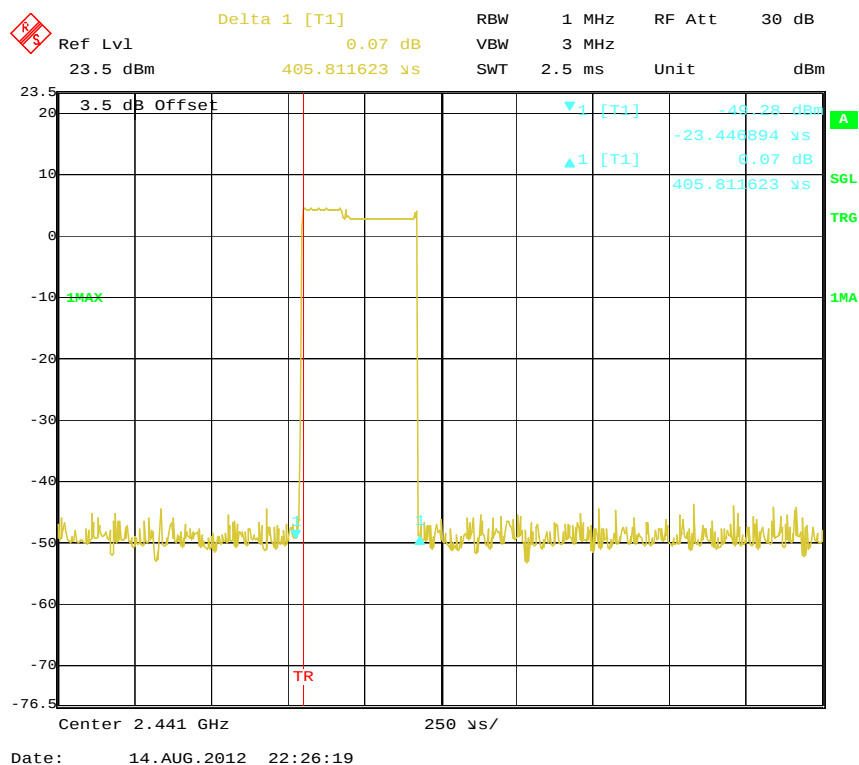
Pulse time, High Channel, DH5

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

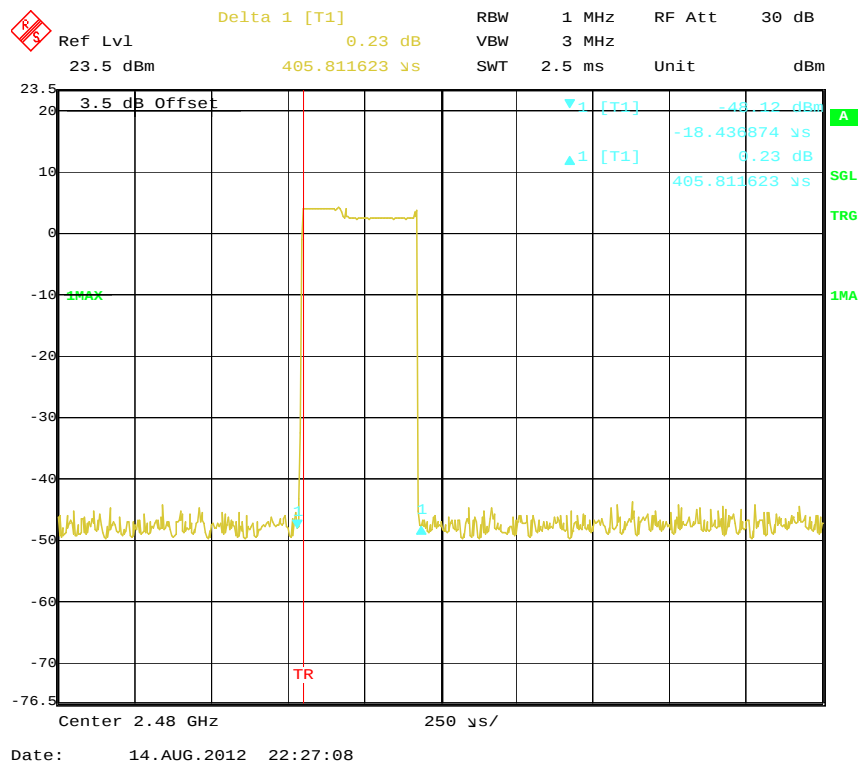
Pulse time, Low Channel, DH1



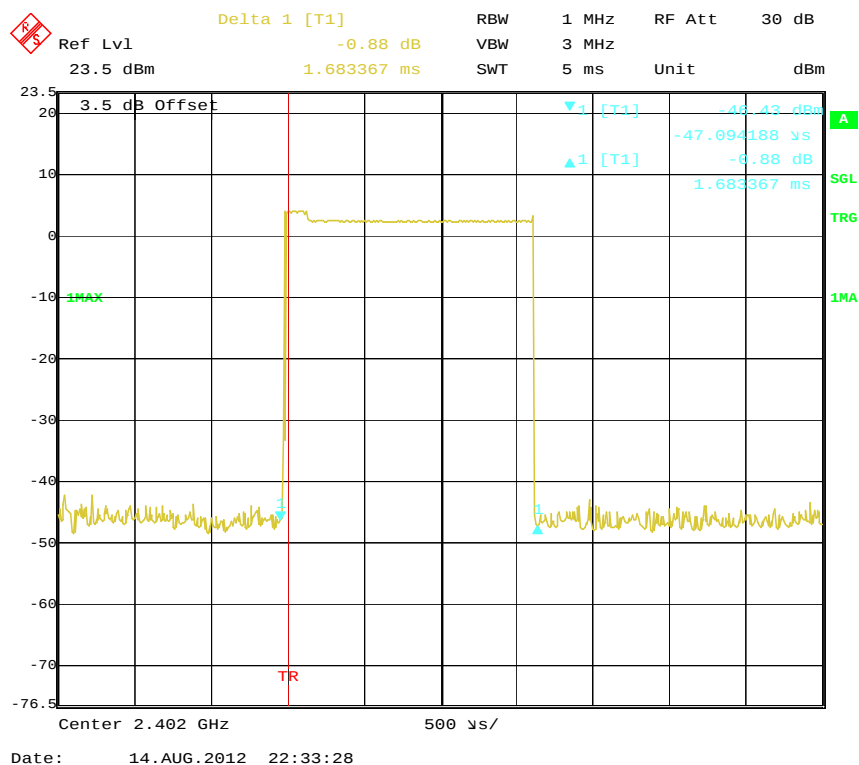
Pulse time, Middle Channel, DH1



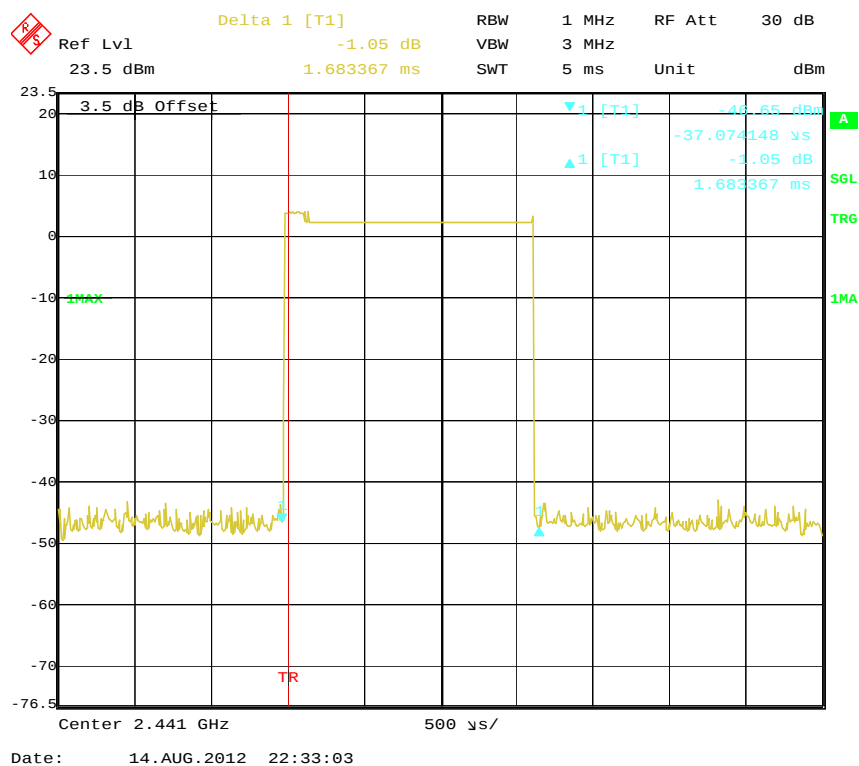
Pulse time, High Channel, DH1



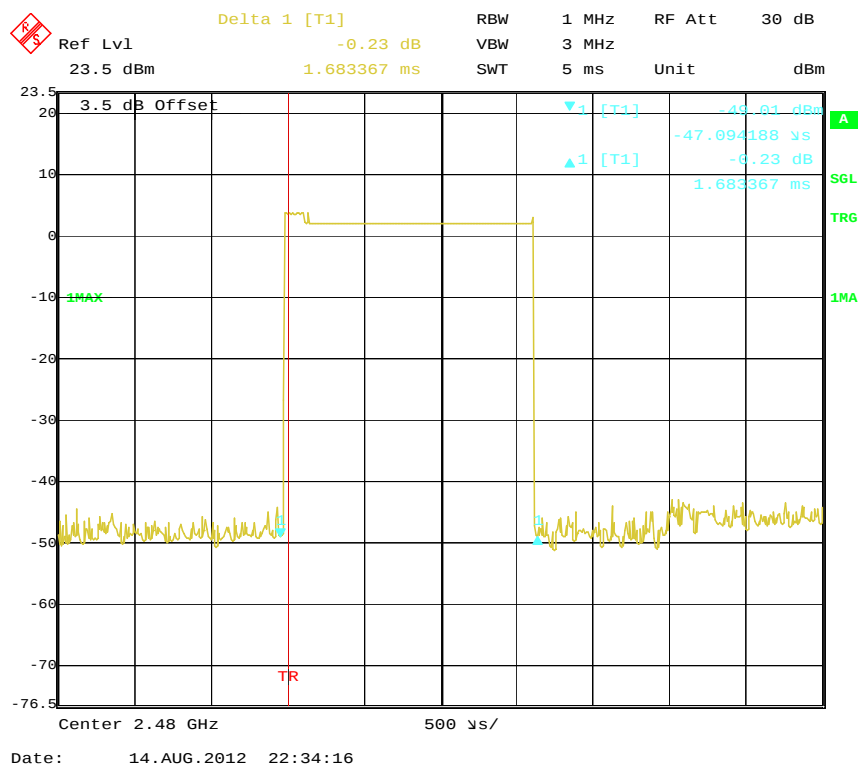
Pulse time, Low Channel, DH3



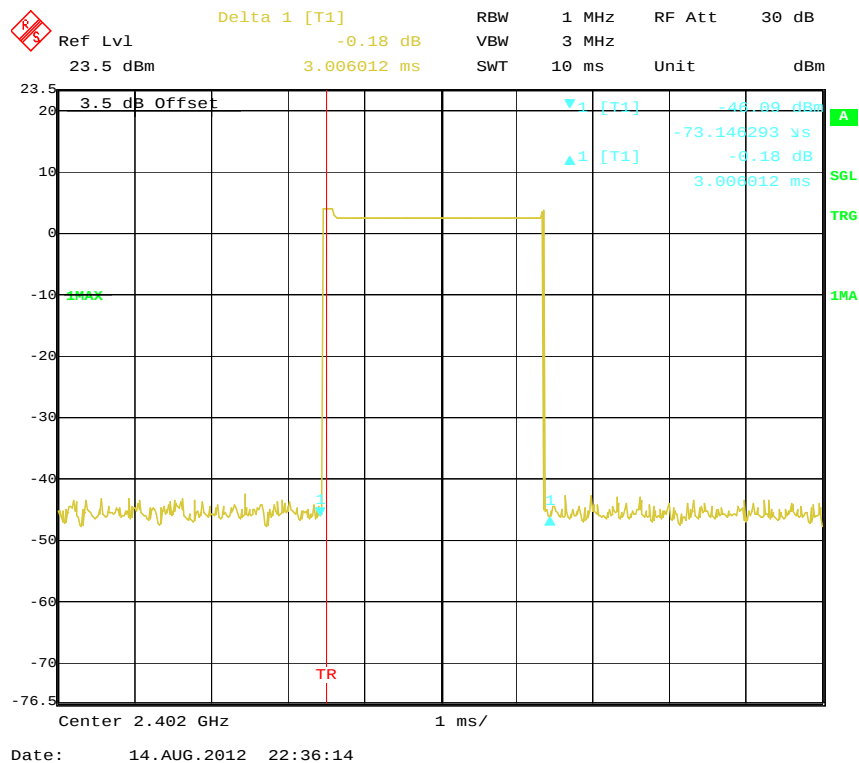
Pulse time, Middle Channel, DH3



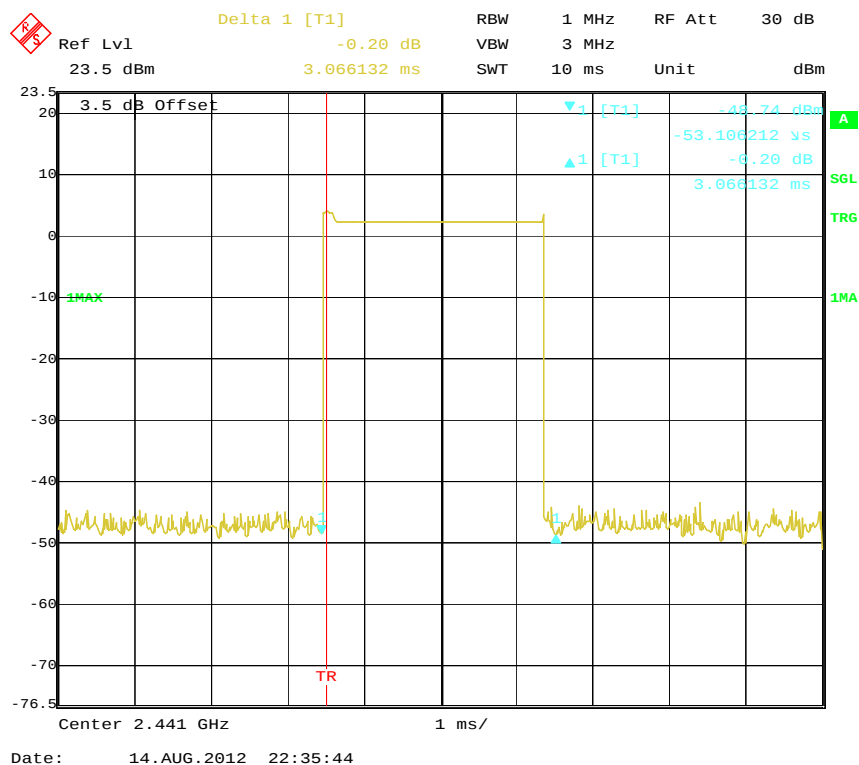
Pulse time, High Channel, DH3



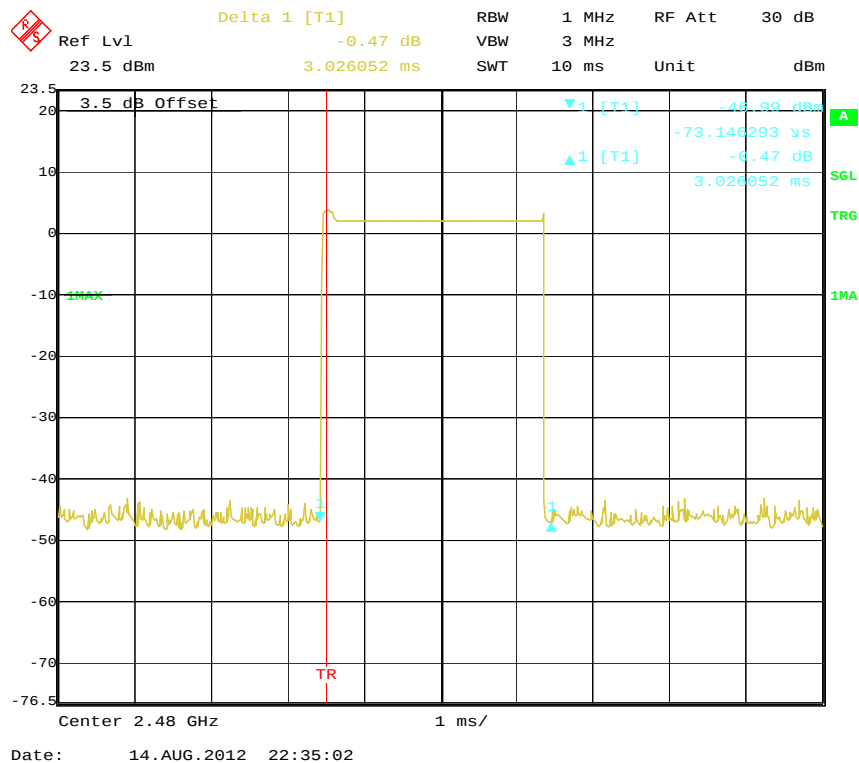
Pulse time, Low Channel, DH5



Pulse time, Middle Channel, DH5

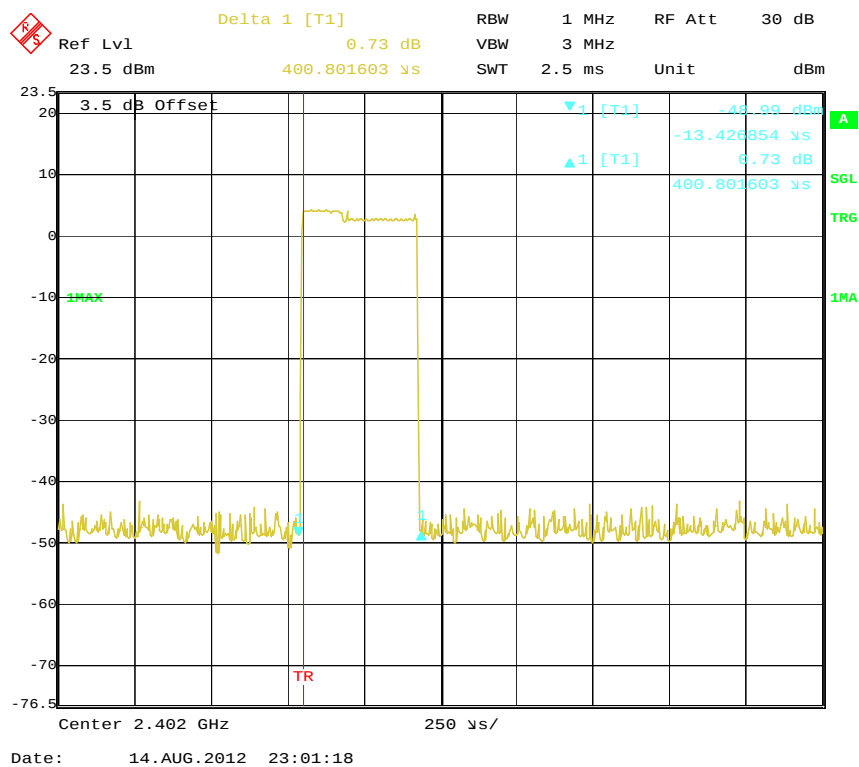


Pulse time, High Channel, DH5

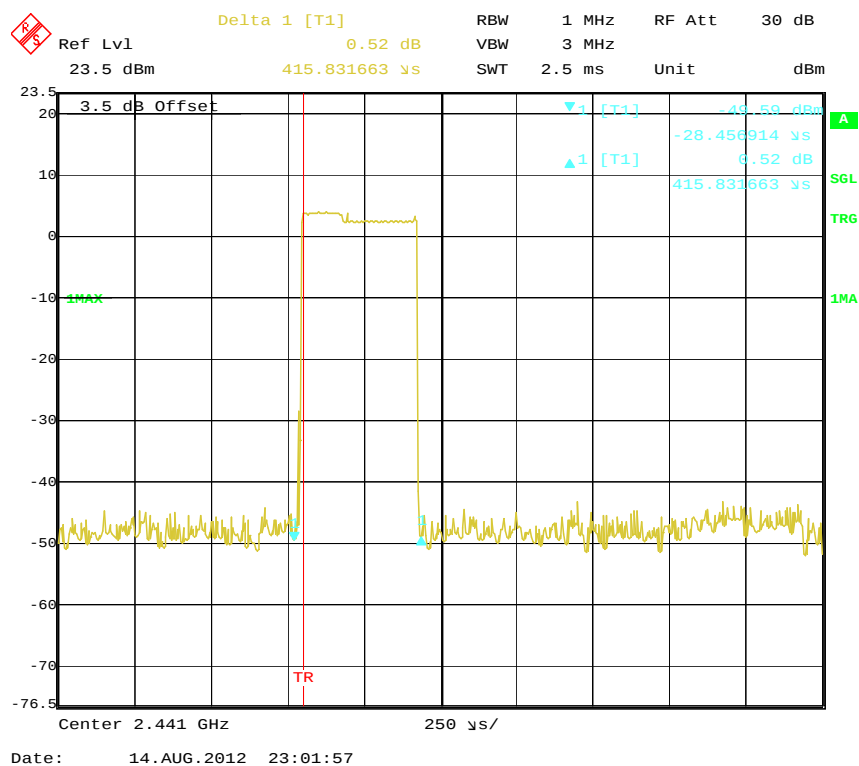


EDR (8DPSK):

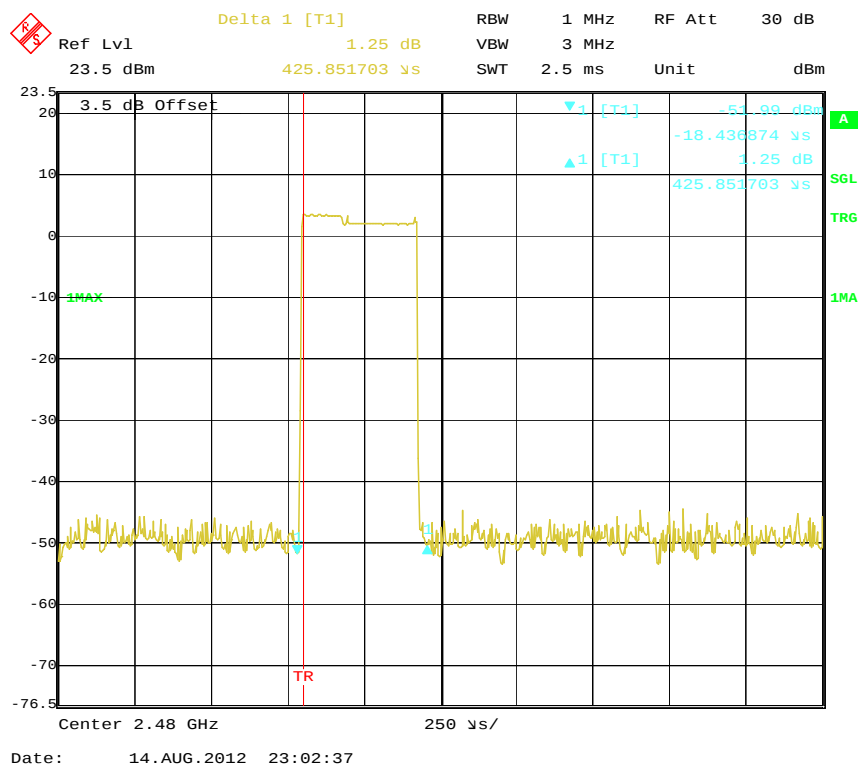
Pulse time, Low Channel, DH1



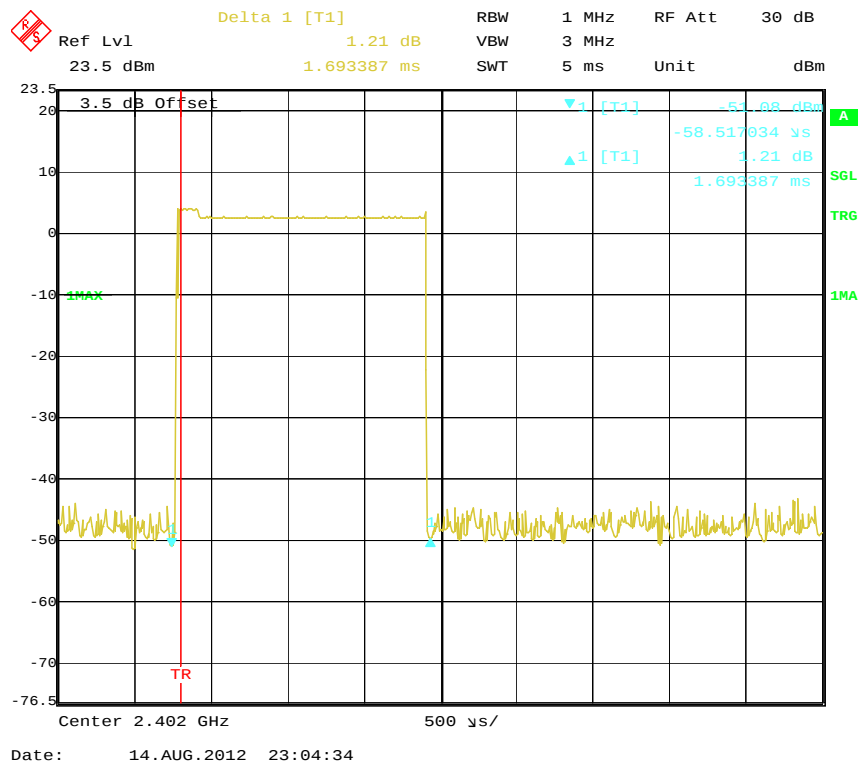
Pulse time, Middle Channel, DH1



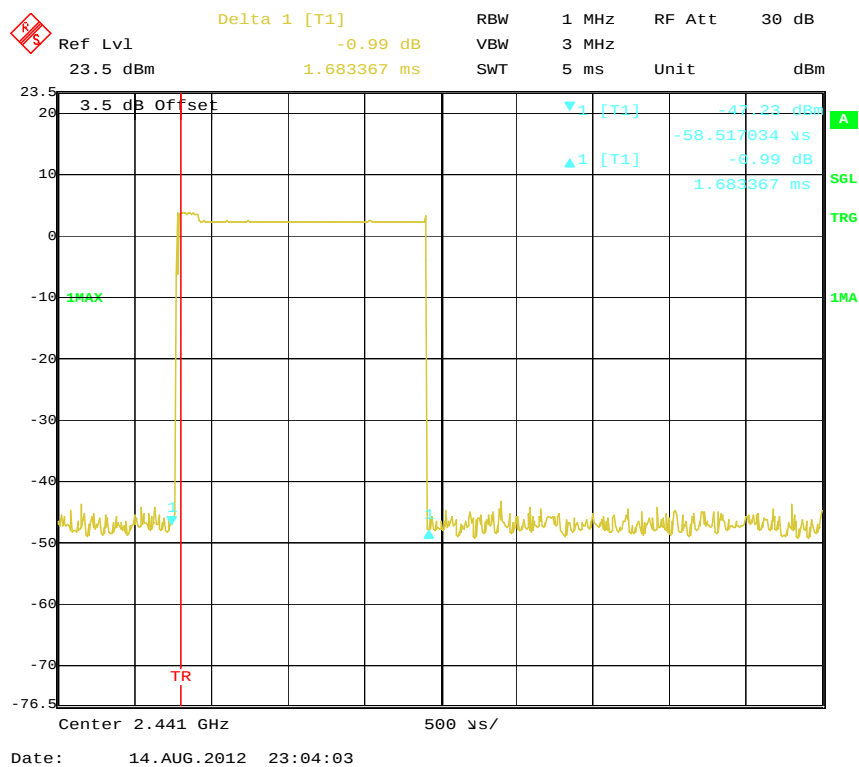
Pulse time, High Channel, DH1



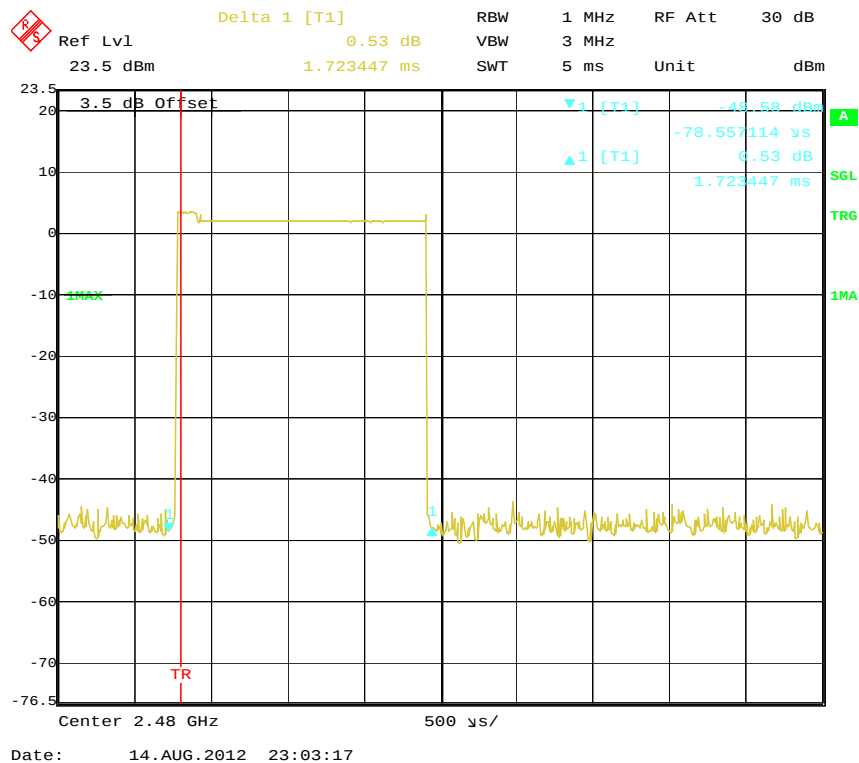
Pulse time, Low Channel, DH3



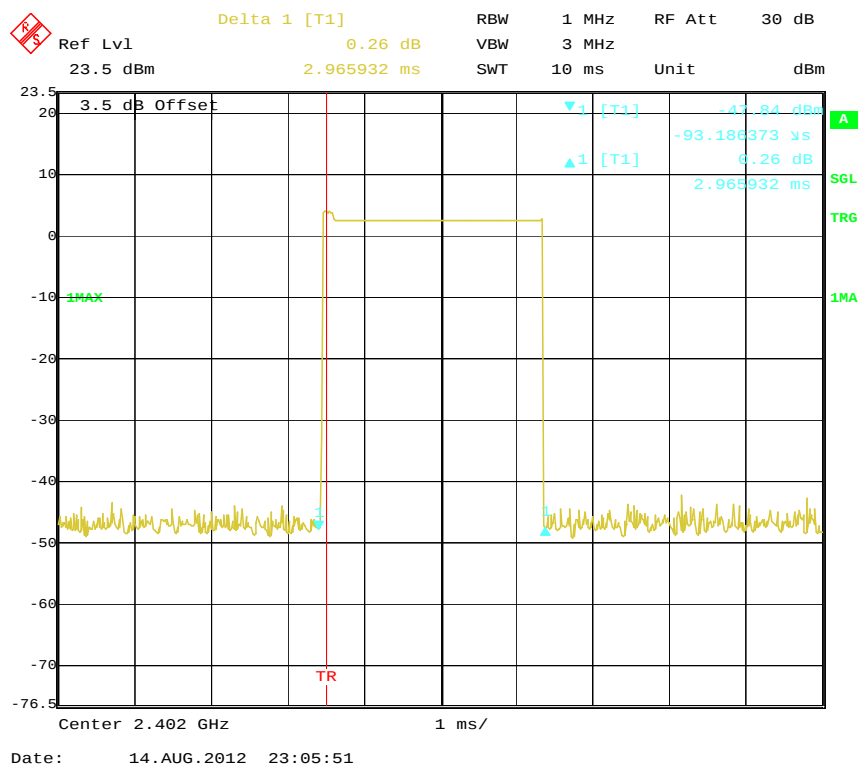
Pulse time, Middle Channel, DH3



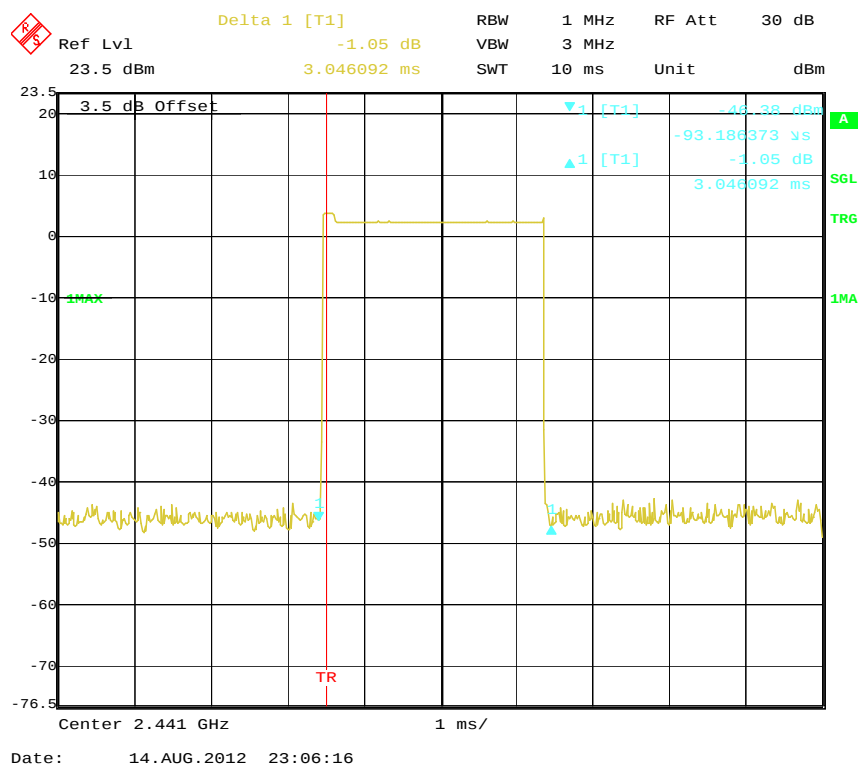
Pulse time, High Channel, DH3



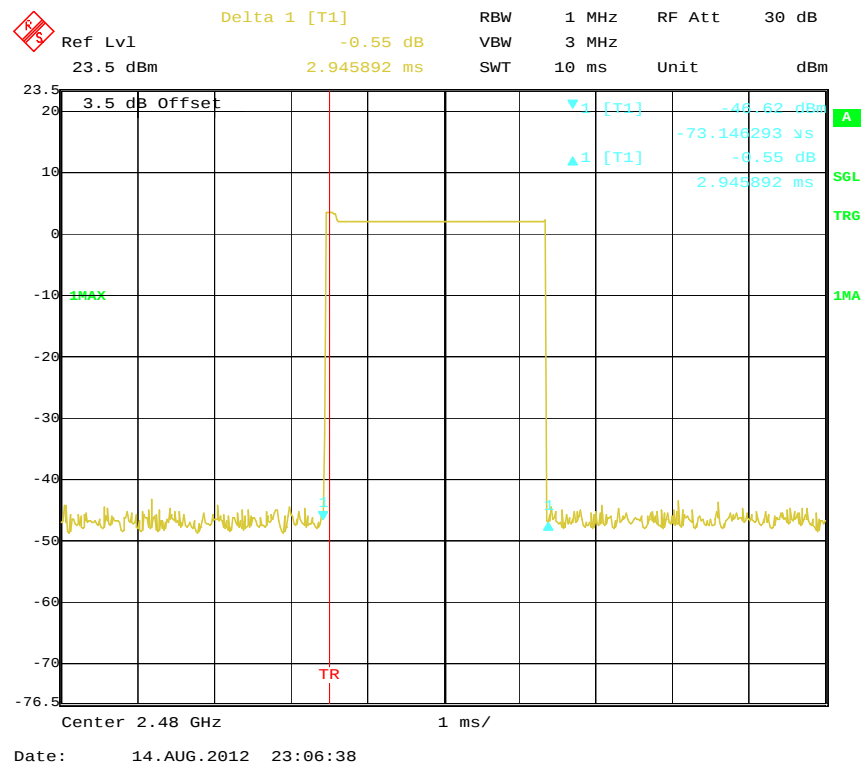
Pulse time, Low Channel, DH5



Pulse time, Middle Channel, DH5



Pulse time, High Channel, DH5



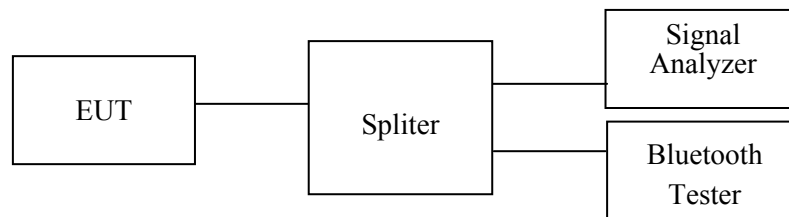
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

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

Test Procedure

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	100 kPa

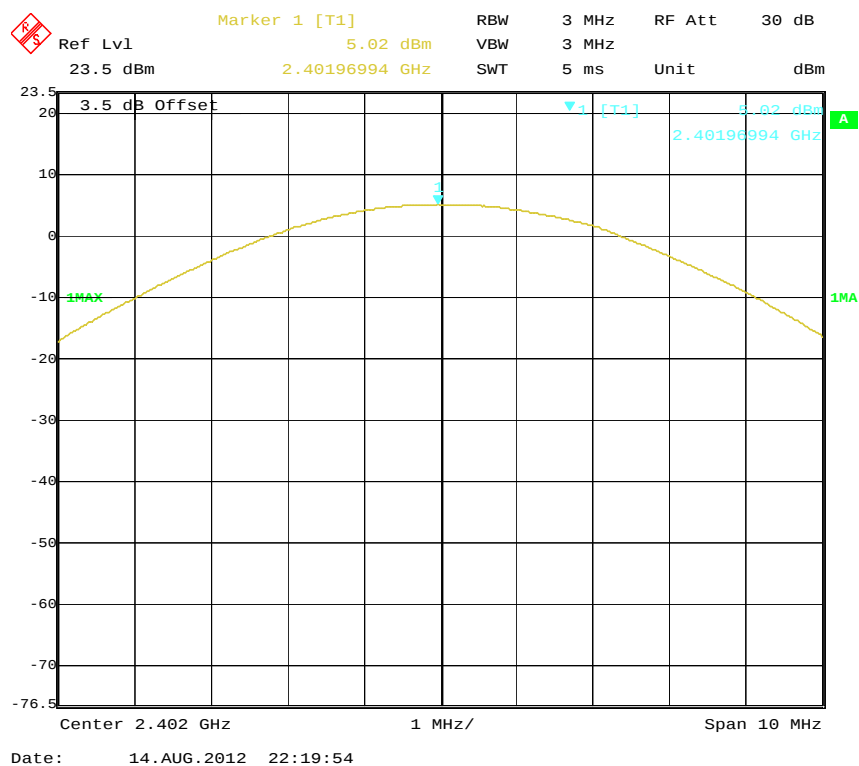
The testing was performed by Jimmy Xiao on 2012-08-14.

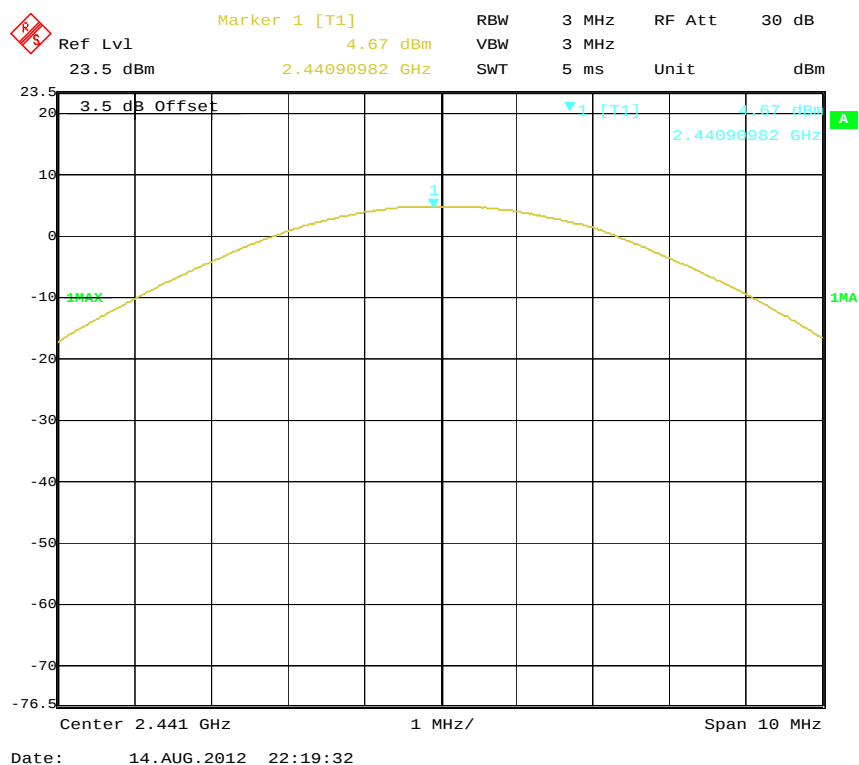
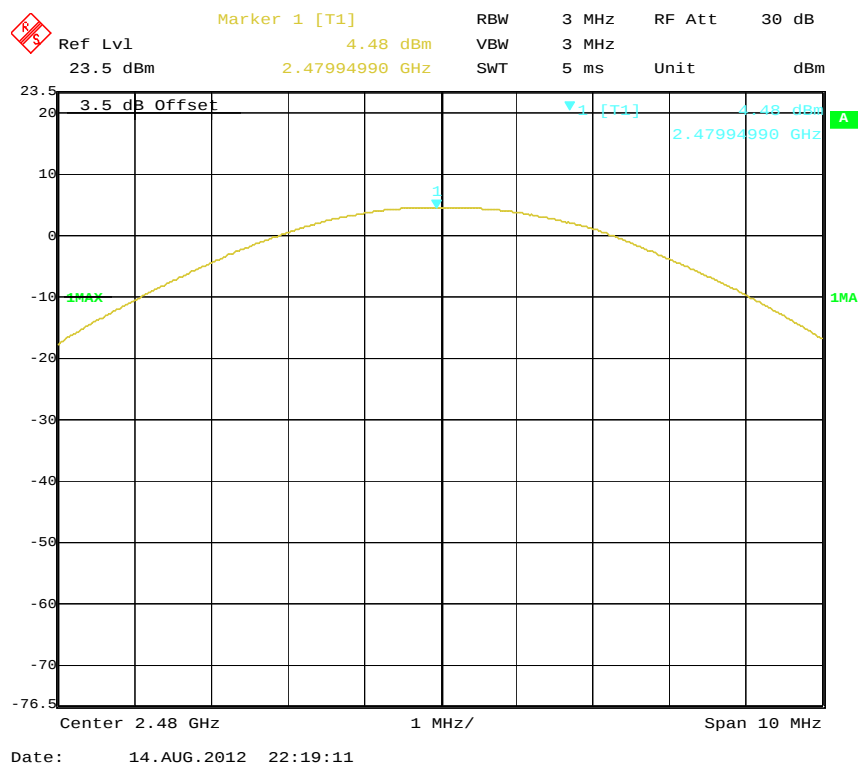
EUT operation mode: Transmitting

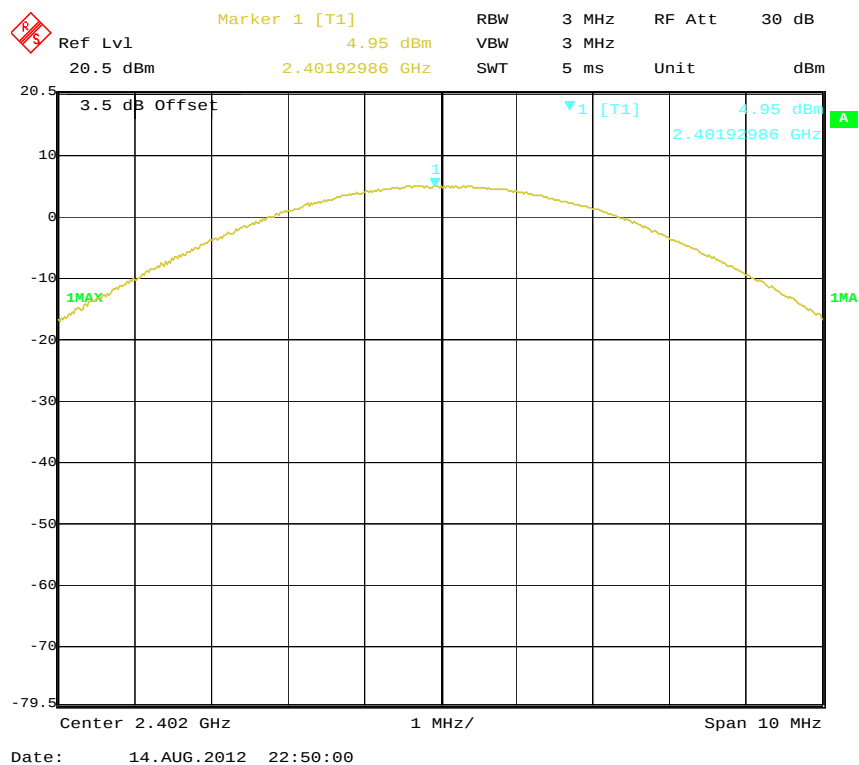
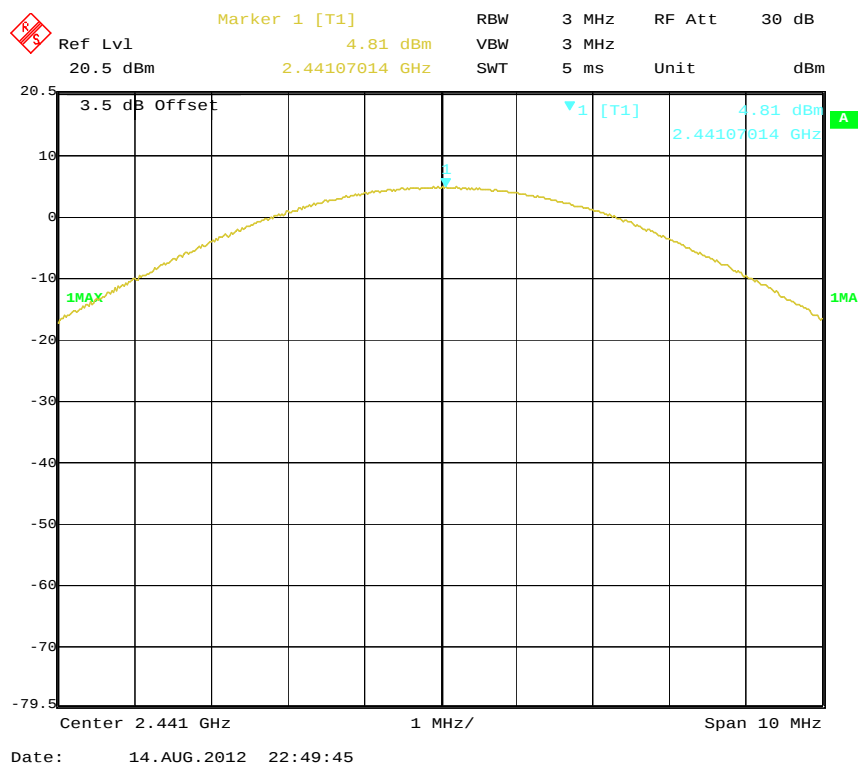
Test Result: Compliance. Please refer to following tables and plots

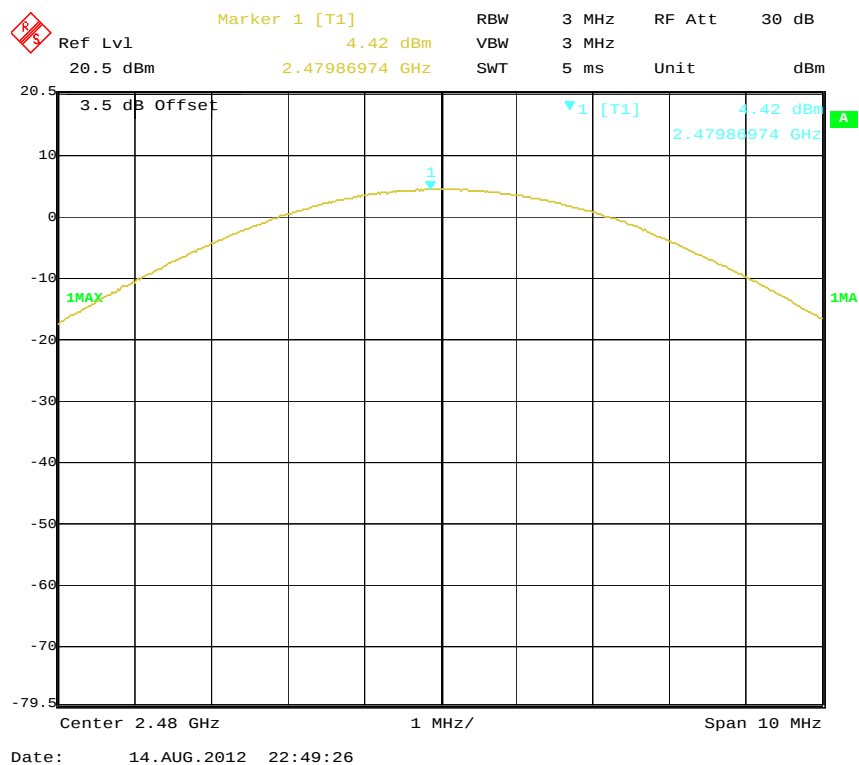
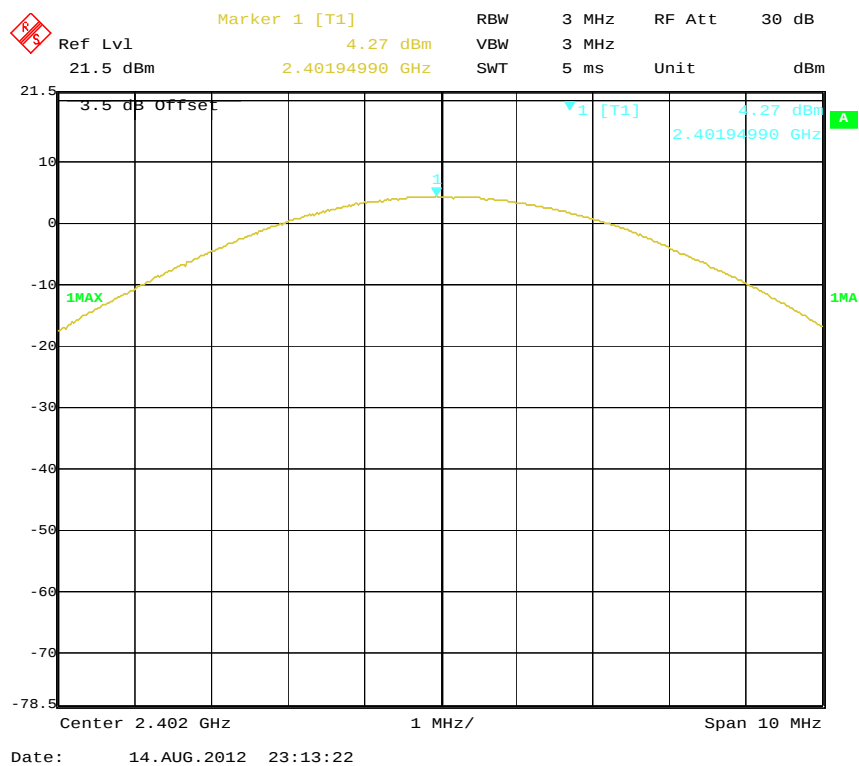
Mode	Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	5.02	3.177	1000
	Middle	2441	4.67	2.931	1000
	High	2480	4.48	2.805	1000
EDR ($\pi/4$ -DQPSK)	Low	2402	4.95	3.126	1000
	Middle	2441	4.81	3.027	1000
	High	2480	4.42	2.767	1000
EDR (8DPSK)	Low	2402	4.27	2.673	1000
	Middle	2441	4.01	2.518	1000
	High	2480	3.74	2.366	1000

BDR (GFSK): Low Channel

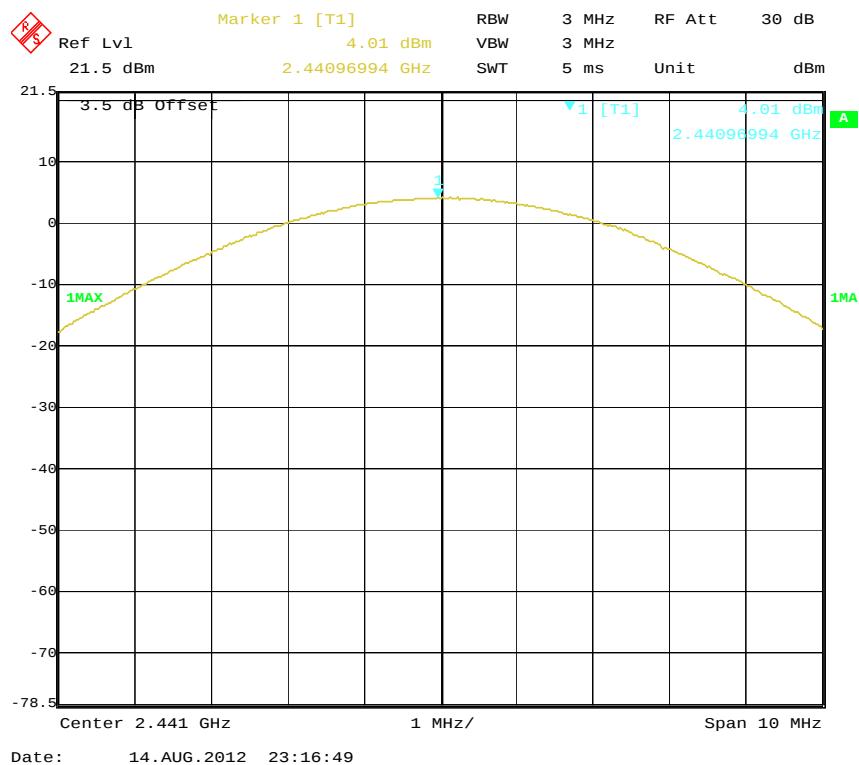


BDR (GFSK): Middle Channel**BDR (GFSK): High Chanel**

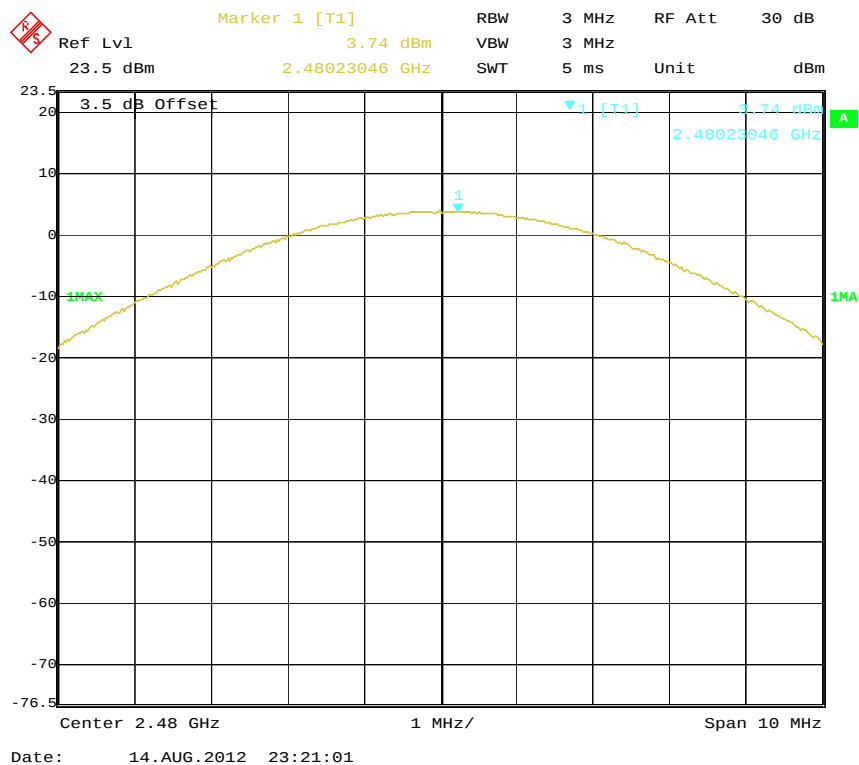
EDR($\pi/4$ -DQPSK): Low ChannelEDR($\pi/4$ -DQPSK): Middle Channel

EDR($\pi/4$ -DQPSK): High Chanel**EDR(8DPSK): Low Channel**

EDR(8DPSK): Middle Channel



EDR(8DPSK): High Channel



FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
TESCOM	Bluetooth Tester	TC-3000B	3000B650083	2011-12-07	2012-12-06

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

Test Data**Environmental Conditions**

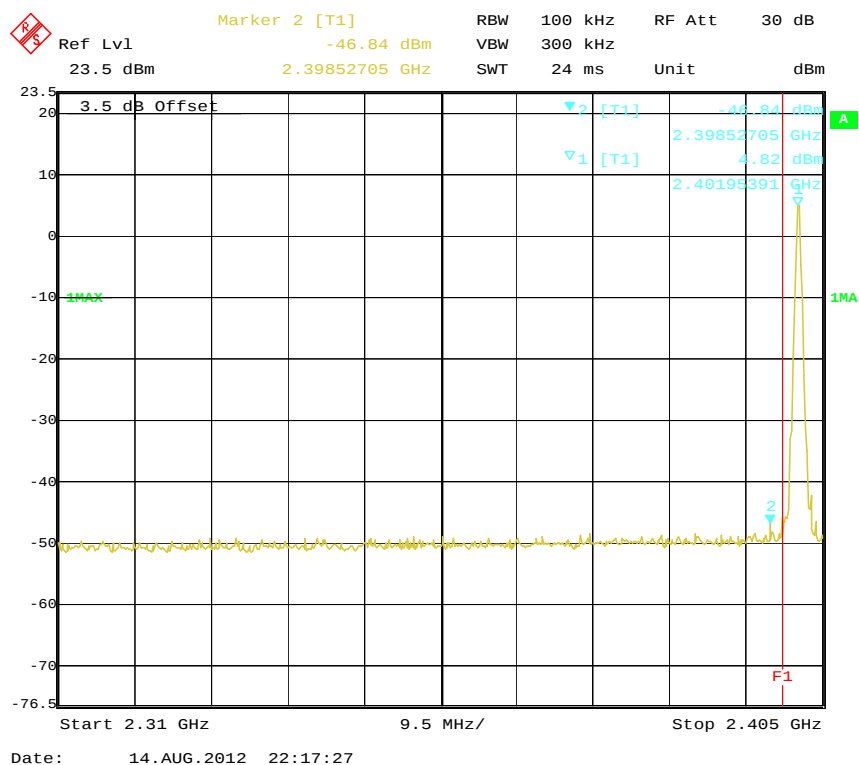
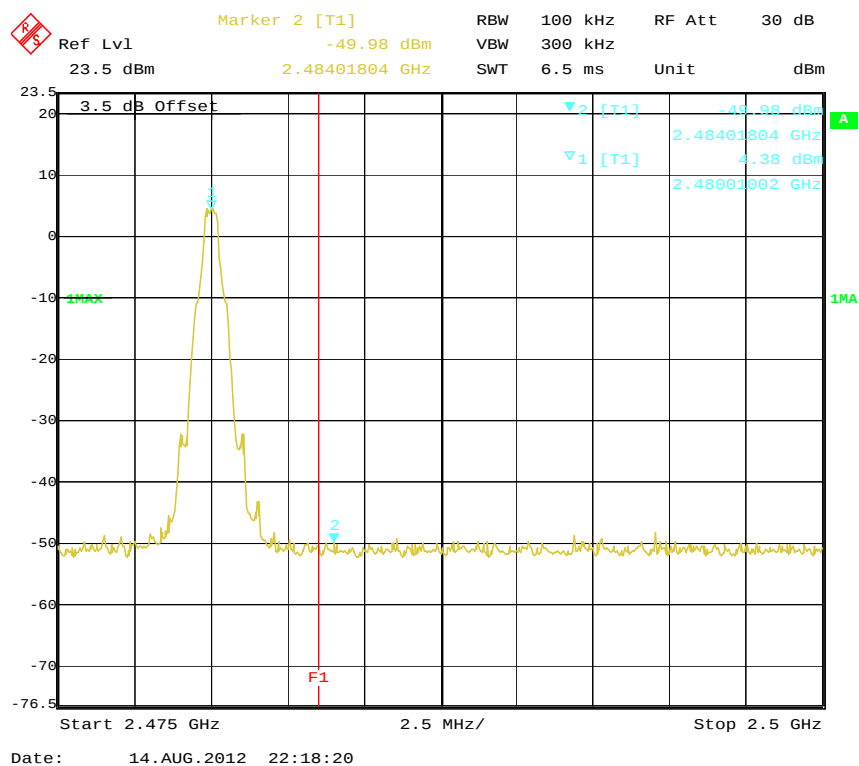
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100 kPa

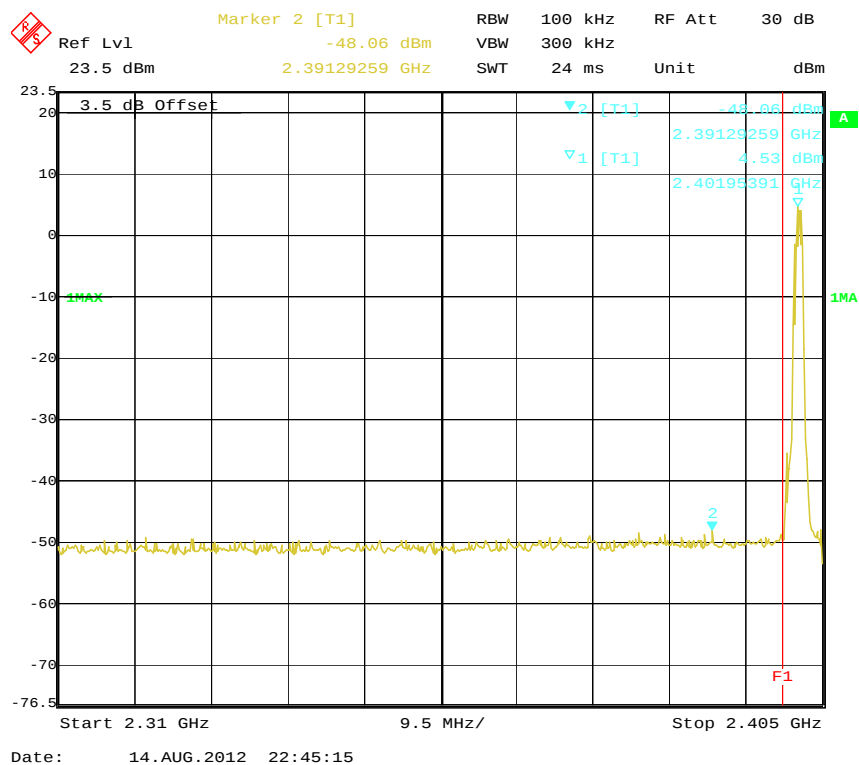
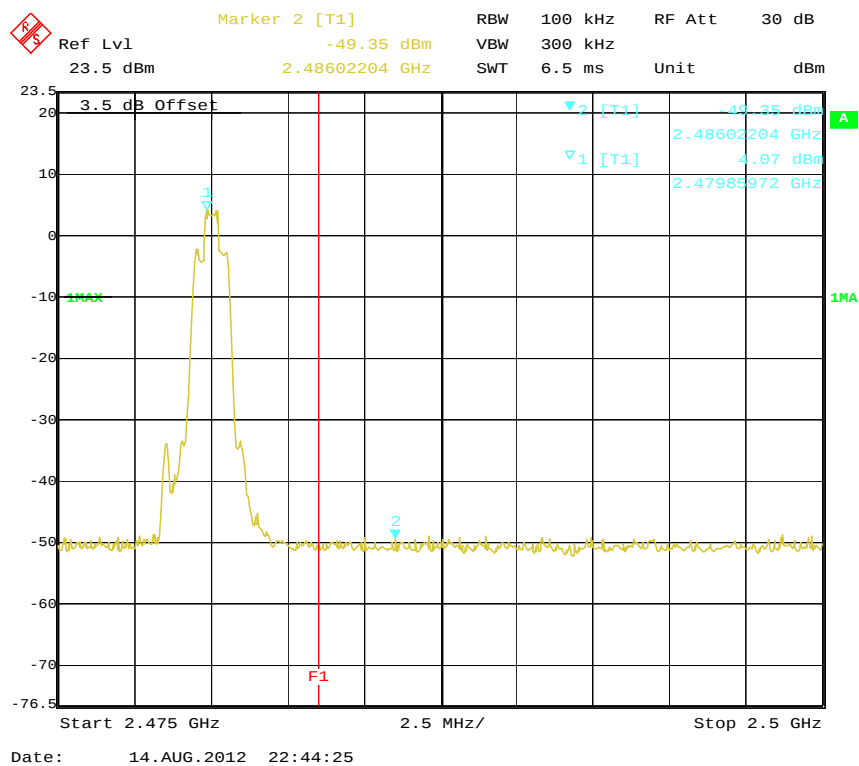
The testing was performed by Jimmy Xiao on 2012-08-14.

EUT operation mode: Transmitting

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

Mode	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)
BDR (GFSK)	2398.53	51.66	>20
	2484.02	54.36	>20
EDR ($\pi/4$ -DQPSK)	2391.25	52.59	>20
	2486.02	53.42	>20
EDR (8DPSK)	2385.77	51.73	>20
	2490.28	52.45	>20

BDR (GFSK): Band Edge-Left Side**BDR (GFSK): Band Edge-Right Side**

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

Ref Lvl 23.5 dBm

Marker 2 [T1] -47.84 dBm

RBW 100 kHz

VBW 300 kHz

RF Att 30 dB

Unit dBm

SWT 24 ms

Start 2.31 GHz

9.5 MHz/

Stop 2.405 GHz

Date: 14.AUG.2012 23:10:36

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