Lab Code: 200707-0

# FCC PART 15.247
# TEST REPORT

For

## Grandstream Networks, Inc.

5F, Bldg. #1, No.2 Kefa Road, Science & Technology Park,

Shenzhen, Guangdong, China

## FCC ID: YZZGXP2200

| Report Type: | Product Name: |
|---|---|
| Original Report | Wireless IP Phone |

| | |
|---|---|
| **Test Engineer:** | Jimmy Xiao |
| **Report Number:** | RSZ120919011-00 |
| **Report Date:** | 2012-09-27 |
| **Reviewed By:** | Suny Sun<br>EMC Engineer |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Shenzhen)<br>6/F, the 3rd Phase of WanLi Industrial Building,<br>ShiHua Road, FuTian Free Trade Zone<br>Shenzhen, Guangdong, China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc*'s product, model number: *GXP2200 (FCC ID: YZZGXP2200)* or the "EUT" in this report was a *IP Phone,* which was measured approximately: 18.8 cm (L) x 21.0 cm (W) x 8.5 cm (H), rated input voltage: DC 12.0V from adapter or PoE.

Adapter information:
Model: SFF1200150A1BY
Input: AC 100-240 V, 50/60 Hz, 0.4A
Output: DC 12.0V, 1.5A

** All measurement and test data in this report was gathered from production sample serial number: 1209011 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2012-09-19.*

## Objective

This test report is prepared on behalf of *Grandstream Networks, Inc* 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 15B JBC submission with FCC ID: YZZGXP2200.

## 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

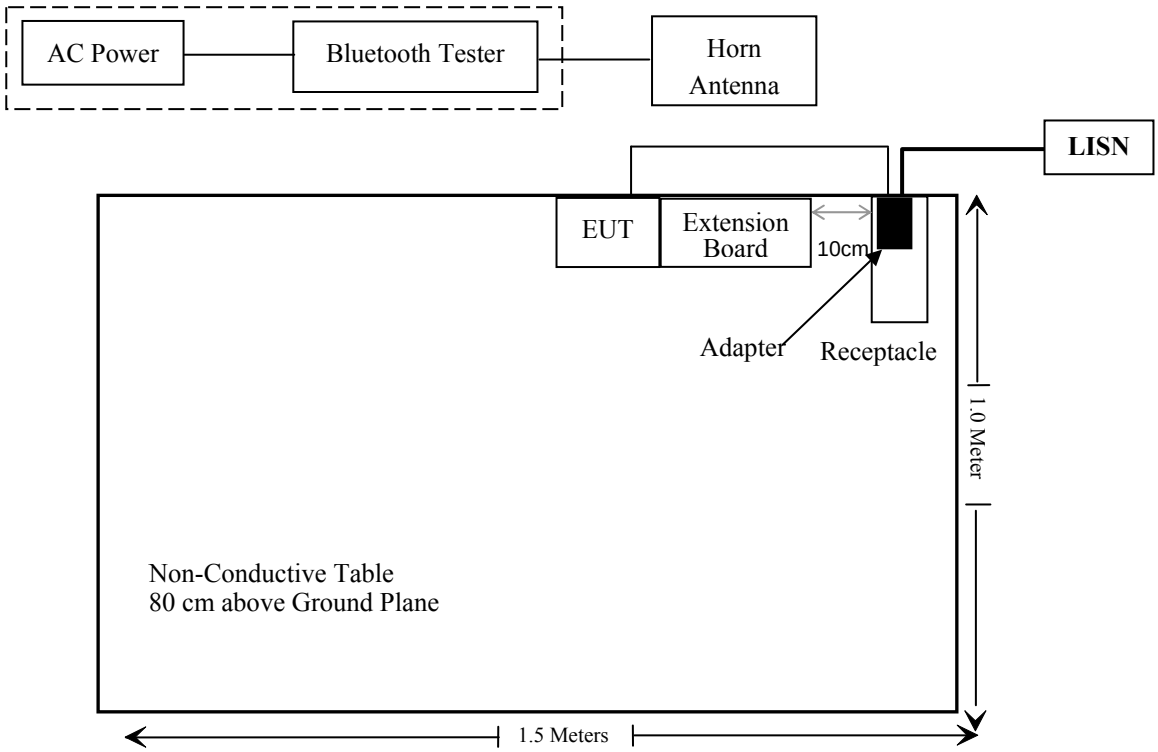
| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| TESCOM | Bluetooth Tester | TC-3000B | 3000B650083 |
| Grandstream | Extension Board | GXP2200EXT | / |

## External I/O Cable

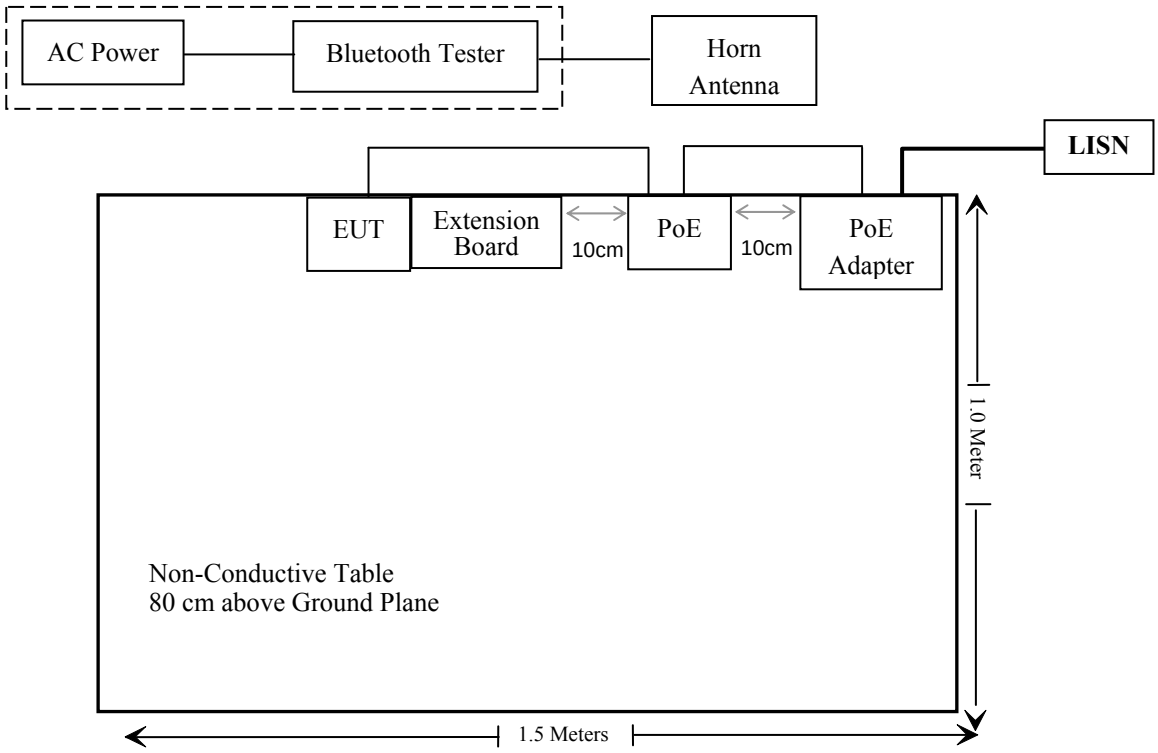
| Cable Description | Length (m) | From/Port | To |
|---|---|---|---|
| Unshielded Detachable RJ45 Cable | 0.2 | EUT | Extension Board |
| Unshielded Detachable RJ45 Cable | 1.8 | EUT | PoE |
| Unshielded Detachable DC Power Cable | 2.6 | EUT | EUT Adapter |
| Unshielded Detachable DC Power Cable | 1.8 | PoE | PoE Adapter |

## Block Diagram of Test Setup

Powered by adapter




Powered by PoE



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| §15.247 (i), §2.1091 | 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) & §2.1091 - 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. $mW/cm^2$)
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)

| Frequency (MHz) | Antenna Gain | | Conducted Power | | Evaluation Distance (cm) | Power Density ($mW/cm^2$) | MPE Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|---|
| | (dBi) | (numeric) | (dBm) | (mW) | | | |
| 2441 | 2 | 1.58 | -0.39 | 0.914 | 20 | 0.0002896 | 1.0 |

**Result:** The device meets MPE FCC limit at 20 cm distance.

# 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 arranement for bluetooth, which was permanently attached and the gain was 2 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

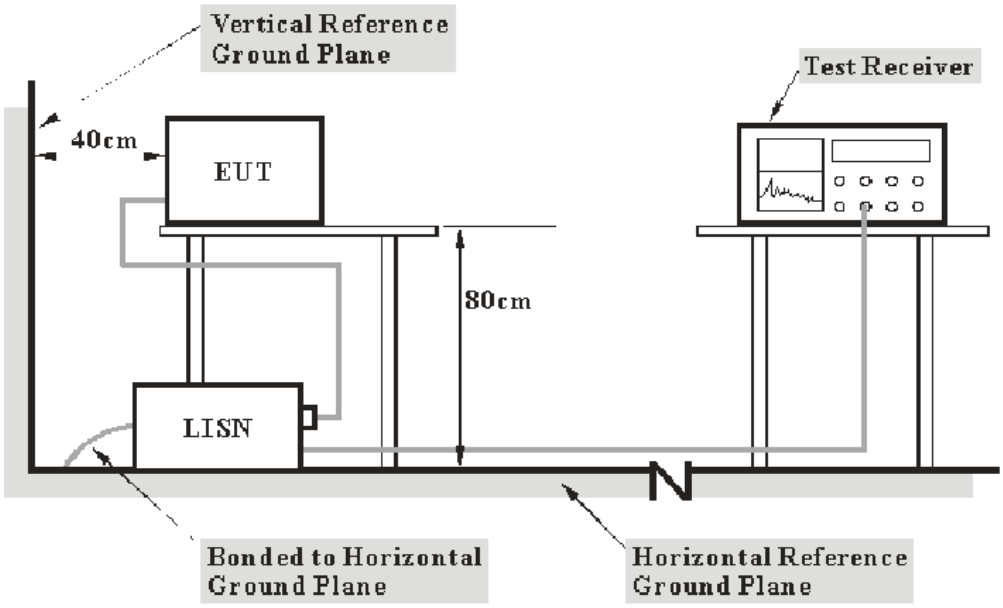
FCC §15.207

## 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 peripherals was 10 cm

The receptacle was connected to a 120 VAC/60 Hz power source for AC adapter power supply.

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

## 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:

| ***Frequency Range*** | ***IF B/W*** |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Procedure

During the conducted emission test, the receptacle was connected to the LISN for AC power supply and the PoE adapter was connected to the LISN for PoE power supply.

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 Laboratories Corp. (Shenzhen) attests that all calibrations have been performed using suitable standards traceable to national primary standards and international system of units (SI).

## 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:

Correction Factor = LISN VDF + Cable Loss + 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:

Margin = Limit – 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:

**2.54 dB** at **0.490 MHz** in the **Line** conducted mode

## Test Data

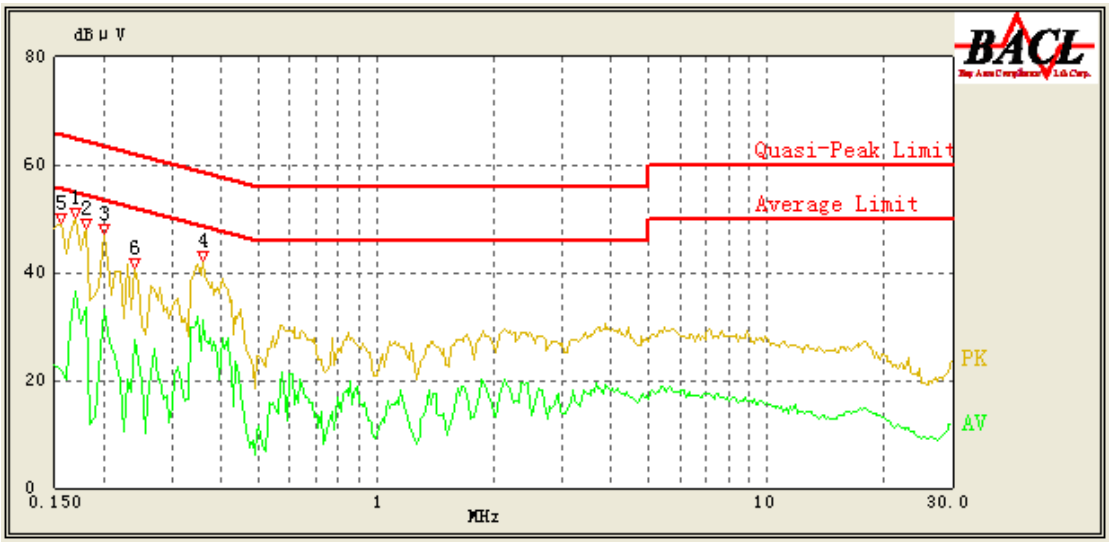
### Environmental Conditions

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

*The testing was performed by Jimmy Xiao on 2012-09-26.*

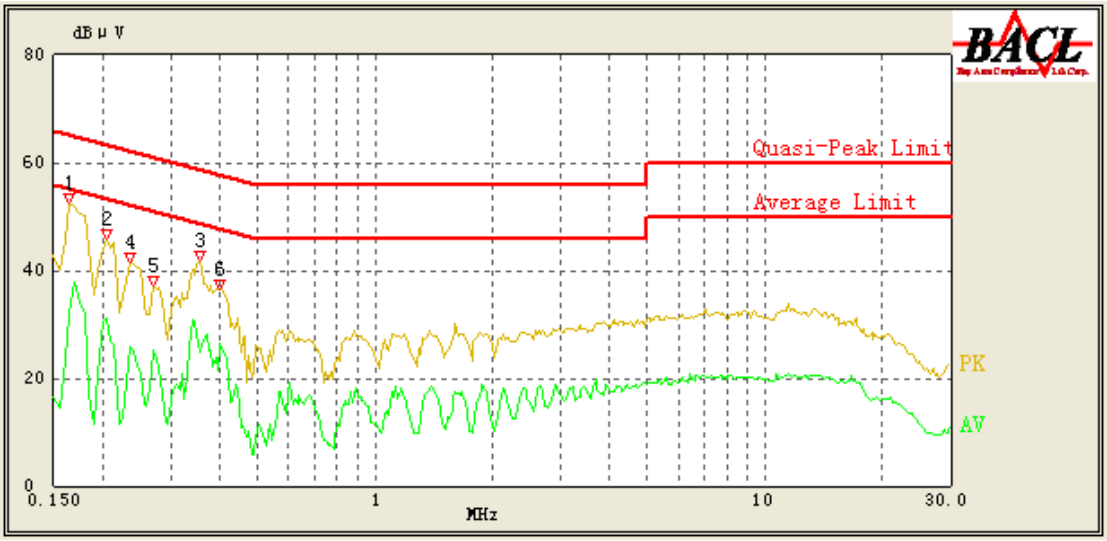
*EUT operation mode: Charging & Transmitting (Powered by adapter)*

### AC 120 V, 60 Hz, Line:




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 0.360 | 31.14 | 10.26 | 50.00 | 18.86 | Ave. |
| 0.360 | 41.08 | 10.26 | 60.00 | 18.92 | QP |
| 0.170 | 36.47 | 10.27 | 55.43 | 18.96 | Ave. |
| 0.170 | 44.31 | 10.27 | 65.43 | 21.12 | QP |
| 0.200 | 33.17 | 10.27 | 54.57 | 21.40 | Ave. |
| 0.180 | 33.50 | 10.27 | 55.14 | 21.64 | Ave. |
| 0.200 | 42.93 | 10.27 | 64.57 | 21.64 | QP |
| 0.180 | 43.32 | 10.27 | 65.14 | 21.82 | QP |
| 0.155 | 43.76 | 10.27 | 65.86 | 22.10 | QP |
| 0.240 | 38.76 | 10.26 | 63.43 | 24.67 | QP |
| 0.240 | 27.65 | 10.26 | 53.43 | 25.78 | Ave. |
| 0.155 | 21.86 | 10.27 | 55.86 | 34.00 | Ave. |

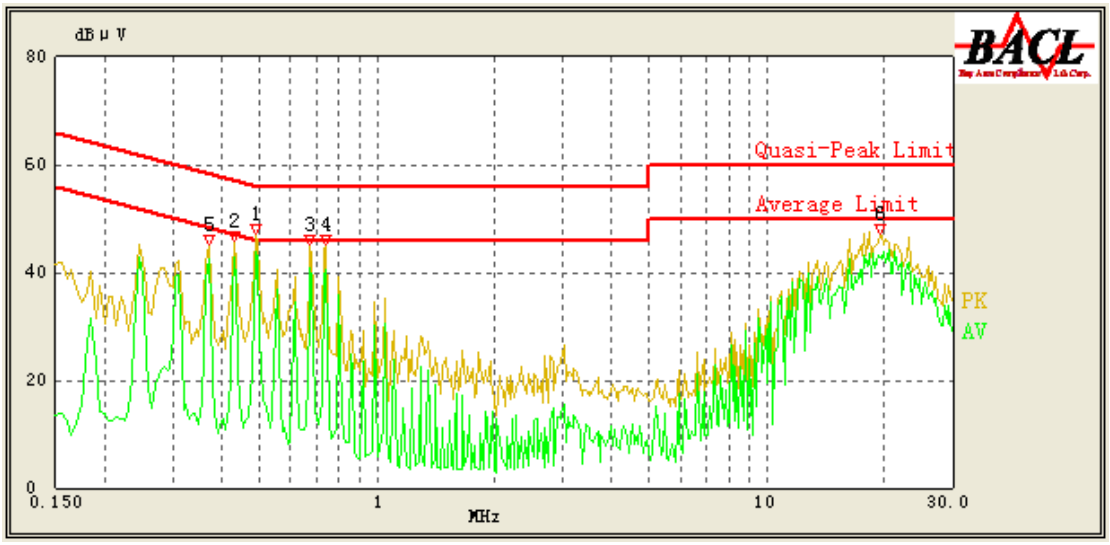
**AC 120V, 60 Hz, Neutral:**




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 0.165 | 44.22 | 10.24 | 65.57 | 21.35 | QP |
| 0.400 | 26.55 | 10.25 | 48.86 | 22.31 | Ave. |
| 0.205 | 31.24 | 10.24 | 54.43 | 23.19 | Ave. |
| 0.355 | 36.83 | 10.25 | 60.14 | 23.31 | QP |
| 0.165 | 31.95 | 10.24 | 55.57 | 23.62 | Ave. |
| 0.400 | 34.29 | 10.25 | 58.86 | 24.57 | QP |
| 0.355 | 24.68 | 10.25 | 50.14 | 25.46 | Ave. |
| 0.235 | 36.84 | 10.25 | 63.57 | 26.73 | QP |
| 0.205 | 36.97 | 10.24 | 64.43 | 27.46 | QP |
| 0.270 | 25.10 | 10.25 | 52.57 | 27.47 | Ave. |
| 0.235 | 25.96 | 10.25 | 53.57 | 27.61 | Ave. |
| 0.270 | 34.02 | 10.25 | 62.57 | 28.55 | QP |

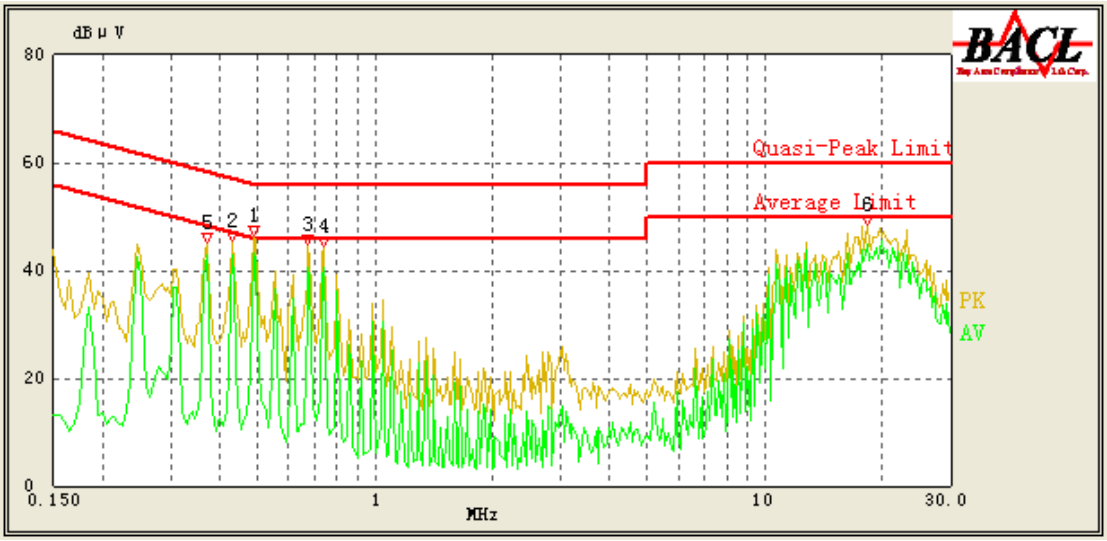
*EUT operation mode: Charging & Transmitting (Powered by PoE)*

**AC 120 V, 60 Hz, Line:**




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 0.490 | 43.75 | 10.24 | 46.29 | 2.54 | Ave. |
| 0.675 | 40.99 | 10.22 | 46.00 | 5.01 | Ave. |
| 0.430 | 42.93 | 10.25 | 48.00 | 5.07 | Ave. |
| 0.740 | 40.38 | 10.21 | 46.00 | 5.62 | Ave. |
| 0.370 | 42.56 | 10.25 | 49.71 | 7.15 | Ave. |
| 19.460 | 42.80 | 12.43 | 50.00 | 7.20 | Ave. |
| 0.490 | 45.62 | 10.24 | 56.29 | 10.67 | QP |
| 0.675 | 43.00 | 10.22 | 56.00 | 13.00 | QP |
| 0.430 | 44.38 | 10.25 | 58.00 | 13.62 | QP |
| 0.740 | 42.29 | 10.21 | 56.00 | 13.71 | QP |
| 19.465 | 45.76 | 12.43 | 60.00 | 14.24 | QP |
| 0.370 | 43.92 | 10.25 | 59.71 | 15.79 | QP |

**AC 120V, 60 Hz, Neutral:**




| Frequency (MHz) | Corrected Amplitude (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Detector (PK/Ave./QP) |
|---|---|---|---|---|---|
| 0.490 | 43.06 | 10.25 | 46.29 | 3.23 | Ave. |
| 0.430 | 42.78 | 10.26 | 48.00 | 5.22 | Ave. |
| 18.245 | 44.74 | 12.27 | 50.00 | 5.26 | Ave. |
| 0.675 | 40.49 | 10.22 | 46.00 | 5.51 | Ave. |
| 0.740 | 40.39 | 10.21 | 46.00 | 5.61 | Ave. |
| 0.370 | 42.70 | 10.26 | 49.71 | 7.01 | Ave. |
| 0.490 | 45.03 | 10.25 | 56.29 | 11.26 | QP |
| 18.245 | 47.49 | 12.27 | 60.00 | 12.51 | QP |
| 0.675 | 43.07 | 10.22 | 56.00 | 12.93 | QP |
| 0.740 | 42.42 | 10.21 | 56.00 | 13.58 | QP |
| 0.430 | 44.25 | 10.26 | 58.00 | 13.75 | QP |
| 0.370 | 44.06 | 10.26 | 59.71 | 15.65 | QP |

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

## Applicable Standard

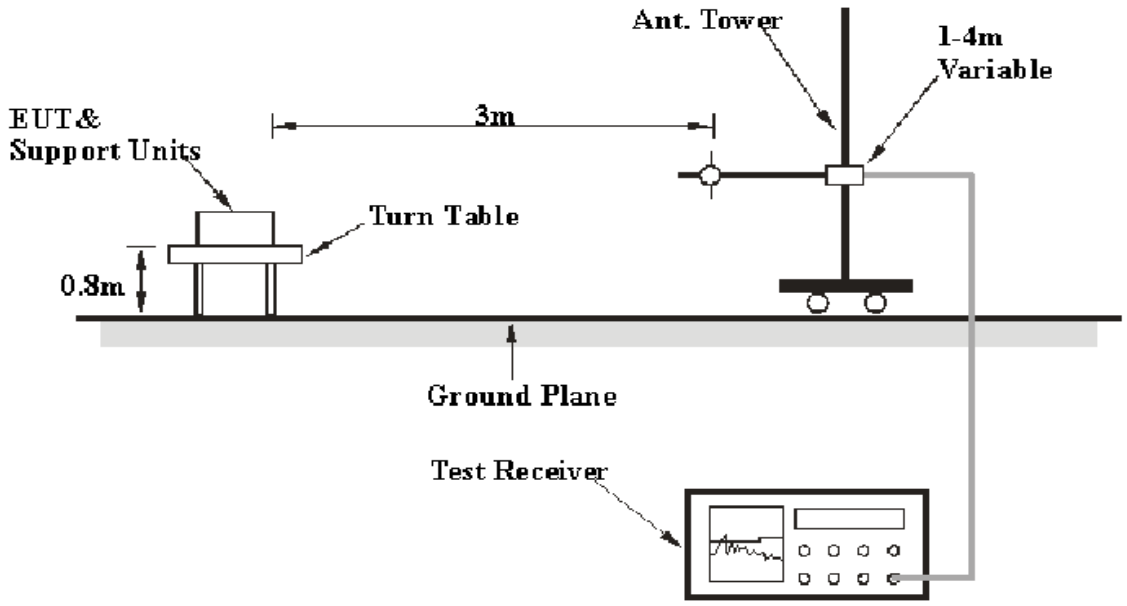
FCC §15.205; §15.209; §15.247(d)

## 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 peripherals was 10 cm

The receptacle 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:

| ***Frequency Range*** | ***RBW*** | ***Video B/W*** | ***Detector*** |
|---|---|---|---|
| 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 receptacle 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:

Corrected Factor = Antenna Factor + Cable Loss- Amplifier Gain
Corrected Amplitude = Meter Reading + Corrected Factor

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:

Margin = Limit - Corrected Amplitude

## 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 |
| 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 |
| Rohde & Schwarz | Auto test Software | EMC32 | V6.30 | - | - |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed using suitable standards traceable to national primary standards and international system of units (SI).

## Test Results Summary

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

**3.1 dB** at **622.1 MHz** in the **Vertical** polarization

## Test Data

### Environmental Conditions

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

*The testing was performed by Jimmy Xiao on 2012-09-25.*

*EUT operation mode: Transmitting*

**30 MHz ~25 GHz:**

(Scan with GFSK, π/4-DQPSK, 8-DPSK, the worst case is BDR Mode (GFSK)

| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Correction 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) |
| Low Channel (2402 MHz) | | | | | | | | | |
| 2402.0 | 93.53 | PK | 23 | 1.1 | H | 6.1 | 99.63 | / | / |
| 2402.0 | 57.48 | Ave. | 23 | 1.1 | H | 6.1 | 63.58 | / | / |
| 2402.0 | 90.19 | PK | 354 | 1.2 | V | 6.1 | 96.29 | / | / |
| 2402.0 | 55.63 | Ave. | 354 | 1.2 | V | 6.1 | 61.73 | / | / |
| 622.1 | 49.1 | QP | 150 | 1.2 | V | -6.6 | 42.5 | 46 | 3.5* |
| 4804.0 | 49.19 | PK | 38 | 1.1 | V | 12.4 | 61.59 | 74.00 | 12.41 |
| 4804.0 | 28.38 | Ave. | 38 | 1.1 | V | 12.4 | 40.78 | 54.00 | 13.22 |
| 9608.0 | 17.19 | Ave. | 79 | 1.1 | H | 19.3 | 36.49 | 54.00 | 17.51 |
| 7206.0 | 17.82 | Ave. | 167 | 1.2 | V | 16.6 | 34.42 | 54.00 | 19.58 |
| 9608.0 | 31.19 | PK | 79 | 1.1 | H | 19.3 | 50.49 | 74.00 | 23.51 |
| 7206.0 | 32.29 | PK | 167 | 1.2 | V | 16.6 | 48.89 | 74.00 | 25.11 |
| 2496.2 | 21.22 | Ave. | 16 | 1.5 | H | 7.2 | 28.42 | 54.00 | 25.58 |
| 2358.6 | 21.63 | Ave. | 112 | 1.0 | H | 5.5 | 27.13 | 54.00 | 26.87 |
| 2327.3 | 21.52 | Ave. | 224 | 1.1 | V | 5.5 | 27.02 | 54.00 | 26.98 |
| 2496.2 | 35.04 | PK | 16 | 1.5 | H | 7.2 | 42.24 | 74.00 | 31.76 |
| 2358.6 | 35.82 | PK | 112 | 1.0 | H | 5.5 | 41.32 | 74.00 | 32.68 |
| 2327.3 | 35.63 | PK | 224 | 1.1 | V | 5.5 | 41.13 | 74.00 | 32.87 |
| Middle Channel (2441 MHz) | | | | | | | | | |
| 2441.0 | 94.81 | PK | 74 | 1.1 | H | 7.2 | 102.01 | / | / |
| 2441.0 | 52.54 | Ave. | 74 | 1.1 | H | 7.2 | 59.74 | / | / |
| 2441.0 | 90.45 | PK | 112 | 1.2 | V | 6.8 | 97.25 | / | / |
| 2441.0 | 47.14 | Ave. | 112 | 1.2 | V | 6.8 | 53.94 | / | / |
| 622.1 | 48.6 | QP | 170 | 1.2 | V | -6.6 | 42.0 | 46 | 4.0 |
| 4882.0 | 27.69 | Ave. | 321 | 1.1 | V | 12.5 | 40.19 | 54.00 | 13.81 |
| 4882.0 | 46.93 | PK | 321 | 1.1 | V | 12.5 | 59.43 | 74.00 | 14.57 |
| 9764.0 | 17.22 | Ave. | 69 | 1.4 | V | 19.4 | 36.62 | 54.00 | 17.38 |
| 7323.0 | 17.69 | Ave. | 58 | 1.3 | V | 16.49 | 34.18 | 54.00 | 19.82 |
| 9764.0 | 32.37 | PK | 69 | 1.4 | V | 19.4 | 51.77 | 74.00 | 22.23 |
| 7323.0 | 32.11 | PK | 58 | 1.3 | V | 16.49 | 48.6 | 74.00 | 25.4 |
| 2389.0 | 22.13 | Ave. | 35 | 1.0 | H | 6.1 | 28.23 | 54.00 | 25.77 |
| 2495.6 | 21.34 | Ave. | 225 | 1.2 | V | 6.8 | 28.14 | 54.00 | 25.86 |
| 2490.2 | 20.03 | Ave. | 87 | 1.3 | H | 7.2 | 27.23 | 54.00 | 26.77 |
| 2389.0 | 36.06 | PK | 35 | 1.0 | H | 6.1 | 42.16 | 74.00 | 31.84 |
| 2490.2 | 34.77 | PK | 87 | 1.3 | H | 7.2 | 41.97 | 74.00 | 32.03 |
| 2495.6 | 34.13 | PK | 225 | 1.2 | V | 6.8 | 40.93 | 74.00 | 33.07 |

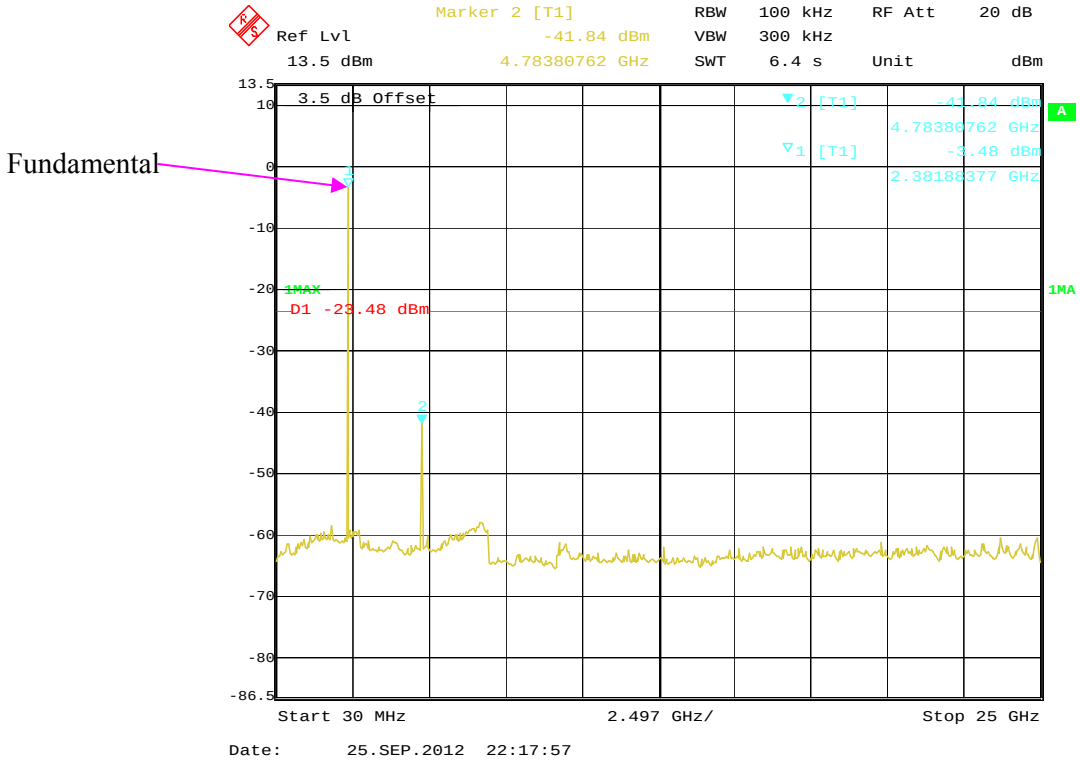
| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Correction Factor (dB) | Corrected Amplitude (dBuV/m) | FCC Part 15.247 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBµV) | Detector (PK/QP/Ave.) | | Height (m) | Polar (H/V) | | | Limit (dBuV/m) | Margin (dB) |
| High Channel(2480 MHz) | | | | | | | | | |
| 2480.0 | 94.21 | PK | 57 | 1.2 | H | 7.2 | 101.41 | / | / |
| 2480.0 | 52.08 | Ave. | 57 | 1.2 | H | 7.2 | 59.28 | / | / |
| 2480.0 | 88.56 | PK | 224 | 1.1 | V | 6.8 | 95.36 | / | / |
| 2480.0 | 48.13 | Ave. | 224 | 1.1 | V | 6.8 | 54.93 | / | / |
| 622.1 | 49.5 | QP | 210 | 1.4 | V | -6.6 | 42.9 | 46 | 3.1* |
| 4960.0 | 48.09 | PK | 175 | 1.2 | H | 12.5 | 60.59 | 74.00 | 13.41 |
| 4960.0 | 27.24 | Ave. | 175 | 1.2 | H | 12.5 | 39.74 | 54.00 | 14.26 |
| 9920.0 | 18.03 | Ave. | 36 | 1.4 | V | 19.4 | 37.43 | 54.00 | 16.57 |
| 2483.5 | 46.94 | PK | 28 | 1.2 | H | 7.2 | 54.14 | 74.00 | 19.86 |
| 2483.5 | 26.34 | Ave. | 28 | 1.2 | H | 7.2 | 33.54 | 54.00 | 20.46 |
| 7440.0 | 17.45 | Ave. | 225 | 1.3 | H | 15.9 | 33.35 | 54.00 | 20.65 |
| 9920.0 | 32.06 | PK | 36 | 1.4 | V | 19.4 | 51.46 | 74.00 | 22.54 |
| 2495.6 | 21.73 | Ave. | 68 | 1.1 | V | 6.8 | 28.53 | 54.00 | 25.47 |
| 7440.0 | 32.08 | PK | 225 | 1.3 | H | 15.9 | 47.98 | 74.00 | 26.02 |
| 2315.3 | 21.47 | Ave. | 135 | 1.3 | H | 5.5 | 26.97 | 54.00 | 27.03 |
| 2495.6 | 35.81 | PK | 68 | 1.1 | V | 6.8 | 42.61 | 74.00 | 31.39 |
| 2315.3 | 34.98 | PK | 135 | 1.3 | H | 5.5 | 40.48 | 74.00 | 33.52 |

**Note:** *within measurement uncertainty.

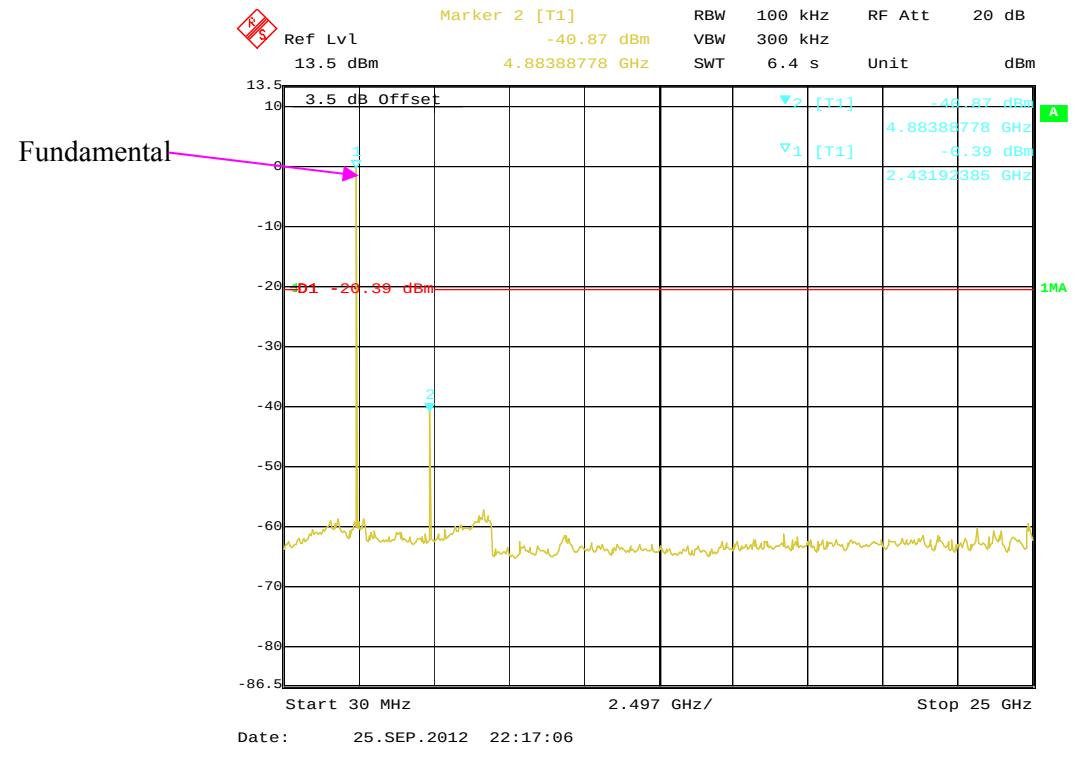
## Conducted spurious emissons at antenna port

### BDR (GFSK)

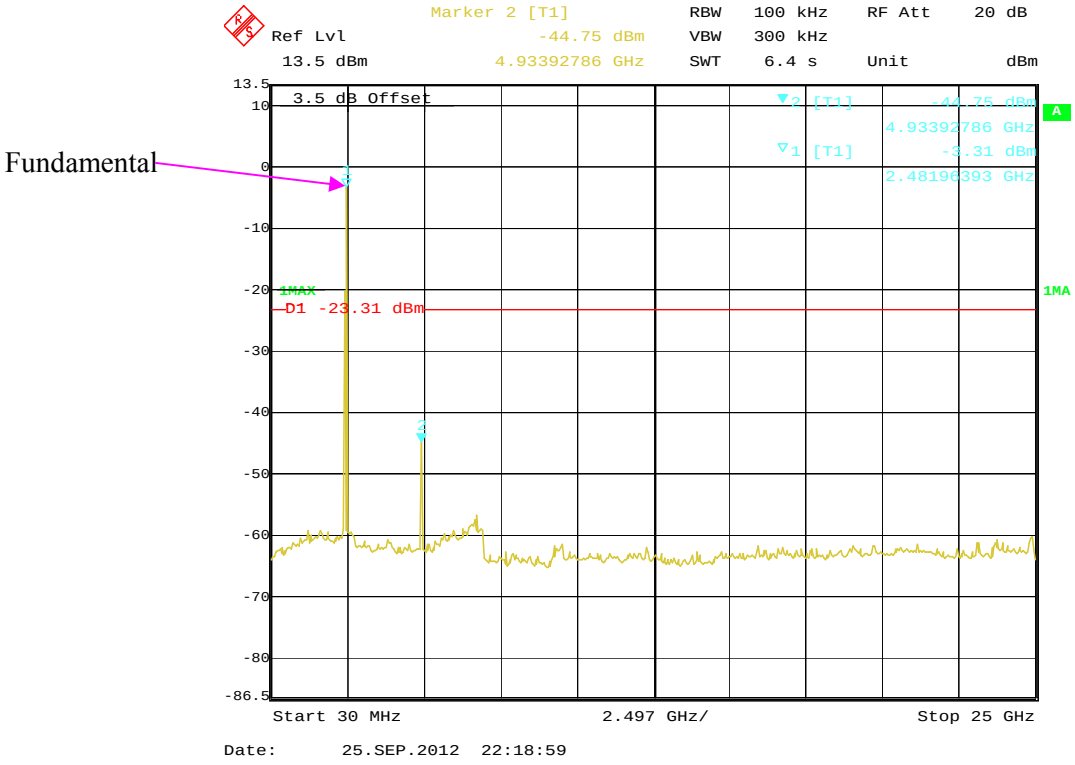
#### Low Channel




#### Middle Channel

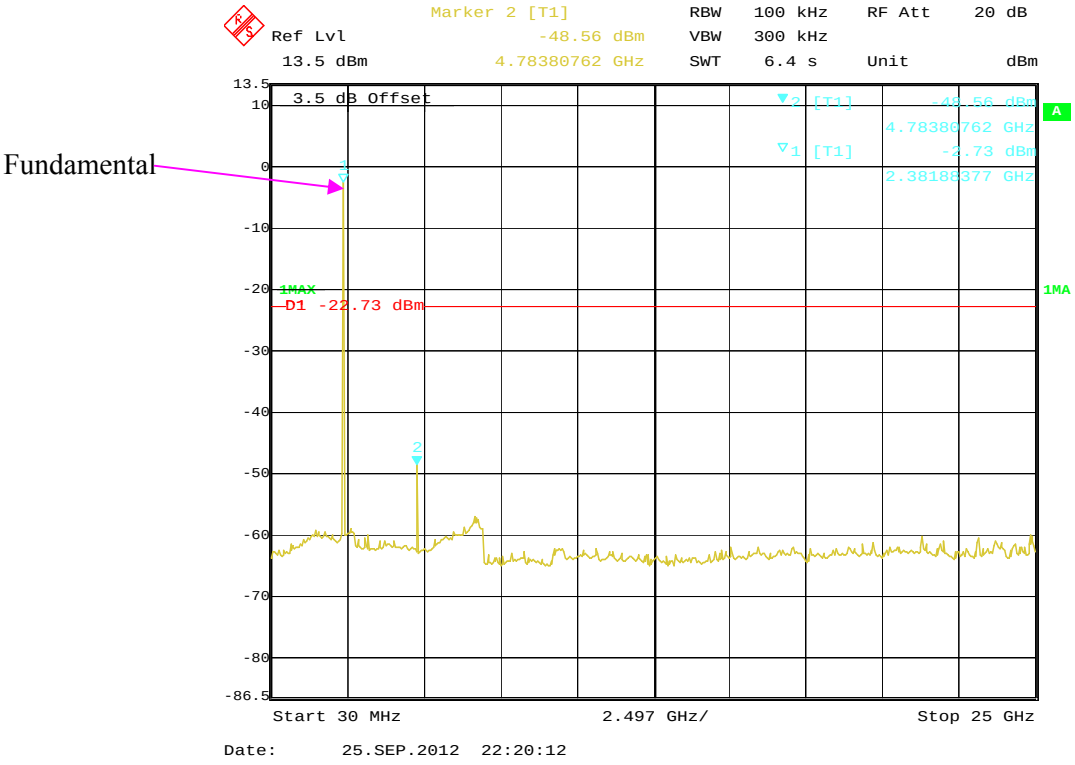


**High Channel**

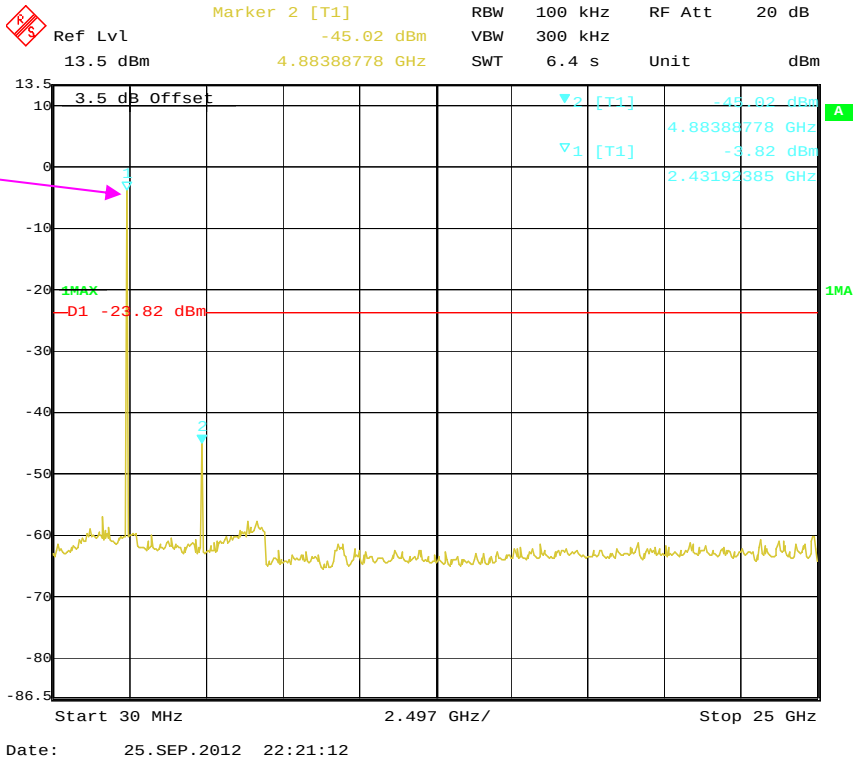



**EDR (π/4-DQPSK)**

**Low Channel**

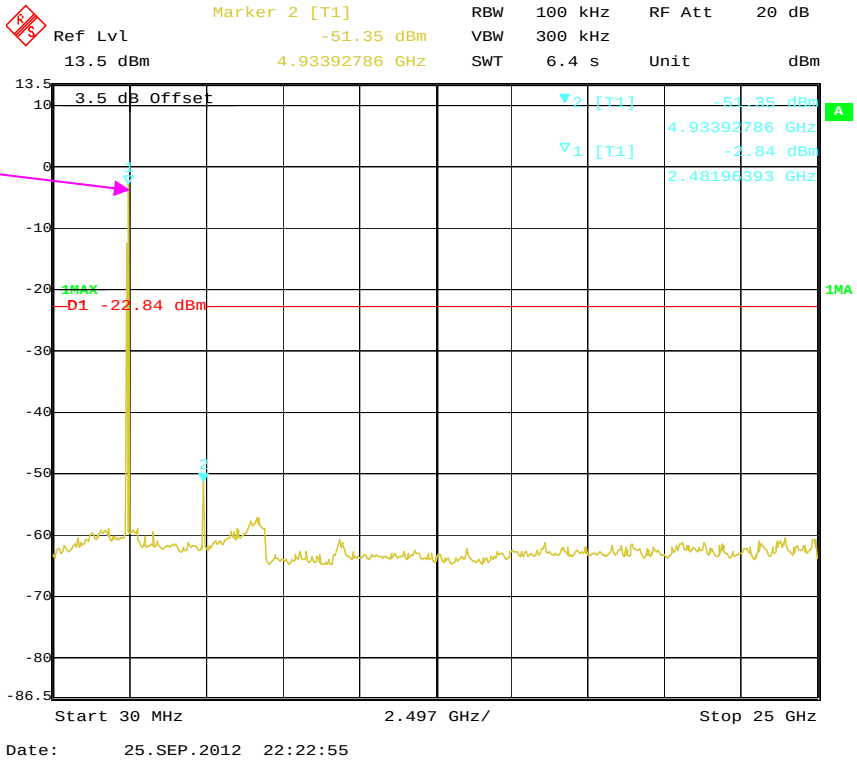


## Middle Channel




Fundamental

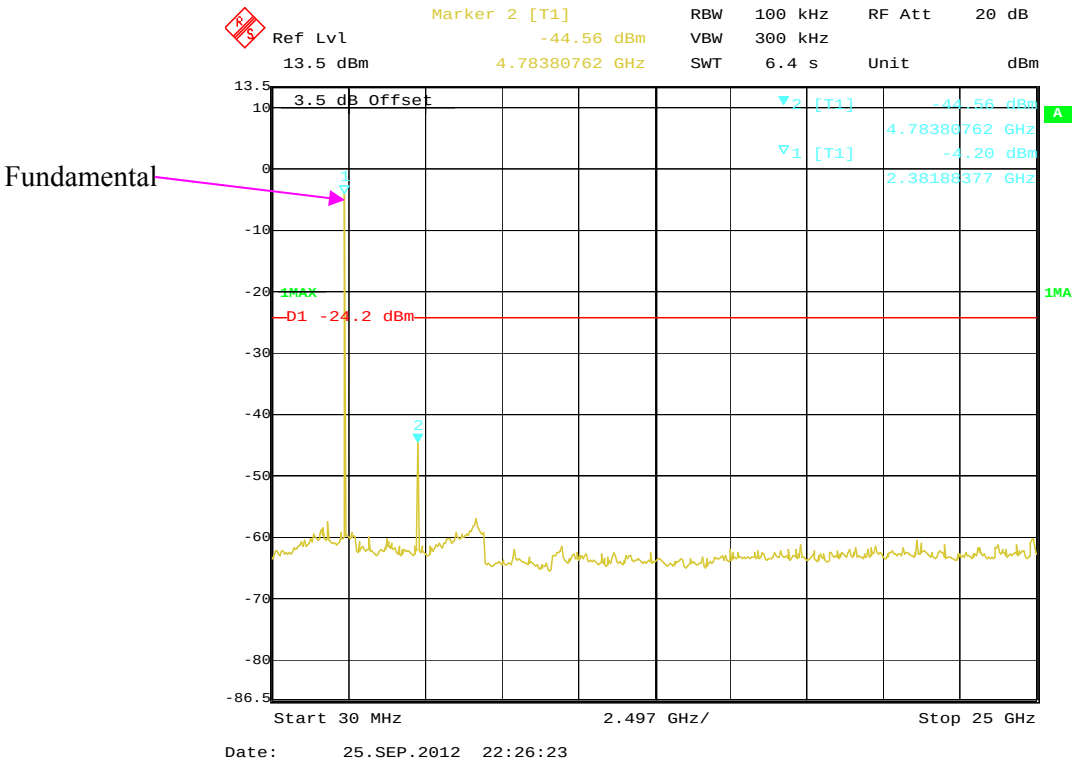
## High Channel



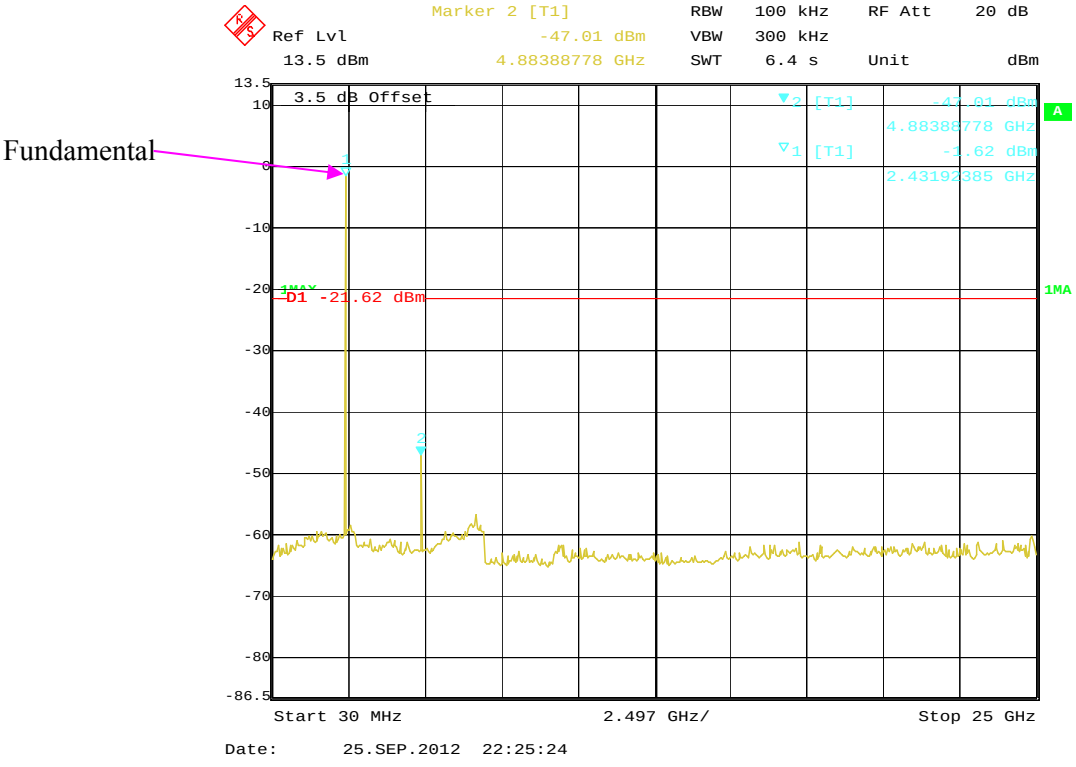

Fundamental

**EDR (8DPSK)**

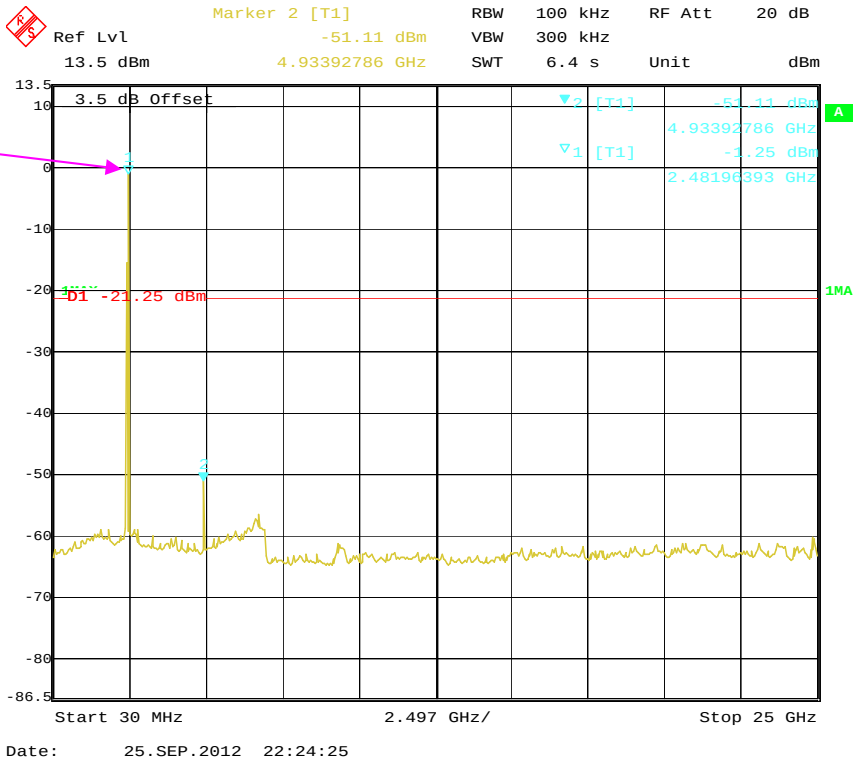
**Low Channel**




**Middle Channel**



## High Channel




Fundamental

# FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

## Applicable Standard

Frequency hopping systems shall have hoping 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 | EMI Test Receiver | ESCI | 101122 | 2012-08-08 | 2013-08-07 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

** The testing was performed by Jimmy Xiao on 2012-09-26.*

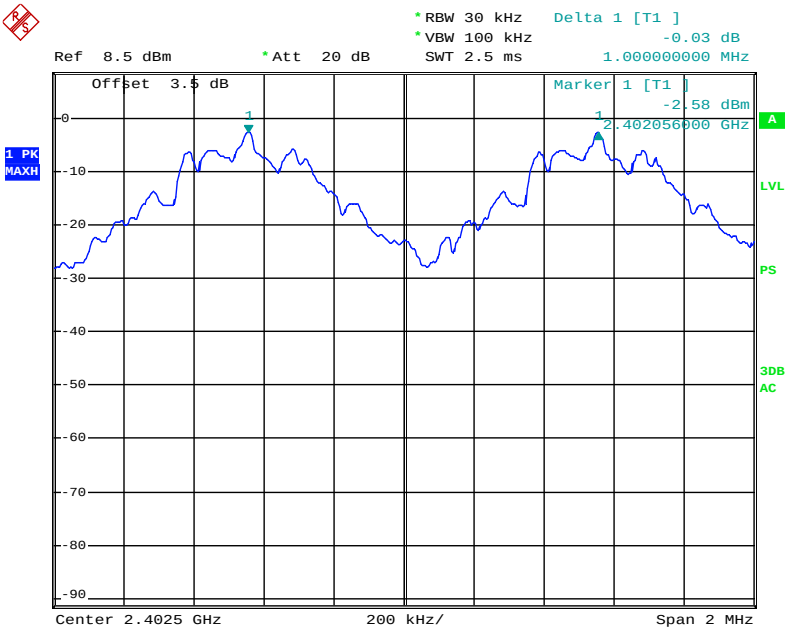
*EUT operation mode: Transmitting*

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

| Mode | Channel | Frequency (MHz) | Channel Separation (MHz) | ≥Limit (MHz) | Result |
|---|---|---|---|---|---|
| BDR (GFSK) | Low | 2402 | 1.000 | 0.616 | Pass |
| | Adjacent | 2403 | | | |
| | Middle | 2441 | 1.000 | 0.616 | Pass |
| | Adjacent | 2442 | | | |
| | High | 2480 | 1.000 | 0.616 | Pass |
| | Adjacent | 2479 | | | |
| EDR (π/4-DQPSK) | Low | 2402 | 1.000 | 0.829 | Pass |
| | Adjacent | 2403 | | | |
| | Middle | 2441 | 1.000 | 0.829 | Pass |
| | Adjacent | 2442 | | | |
| | High | 2480 | 1.000 | 0.829 | Pass |
| | Adjacent | 2479 | | | |
| EDR (8DPSK) | Low | 2402 | 1.004 | 0.848 | Pass |
| | Adjacent | 2403 | | | |
| | Middle | 2441 | 1.004 | 0.859 | Pass |
| | Adjacent | 2442 | | | |
| | High | 2480 | 1.000 | 0.856 | Pass |
| | Adjacent | 2479 | | | |

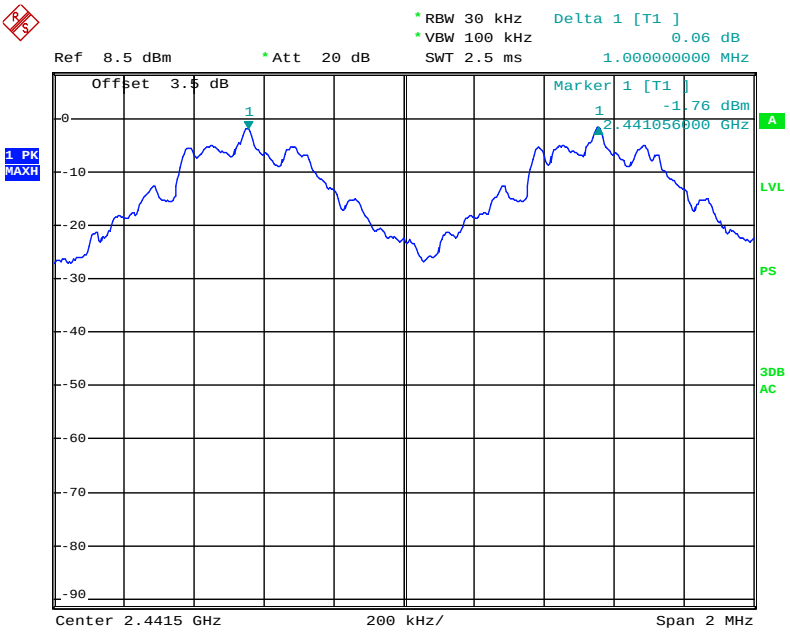
Note: Limit = 20 dB bandwidth *2/3

## BDR (GFSK): Low Channel



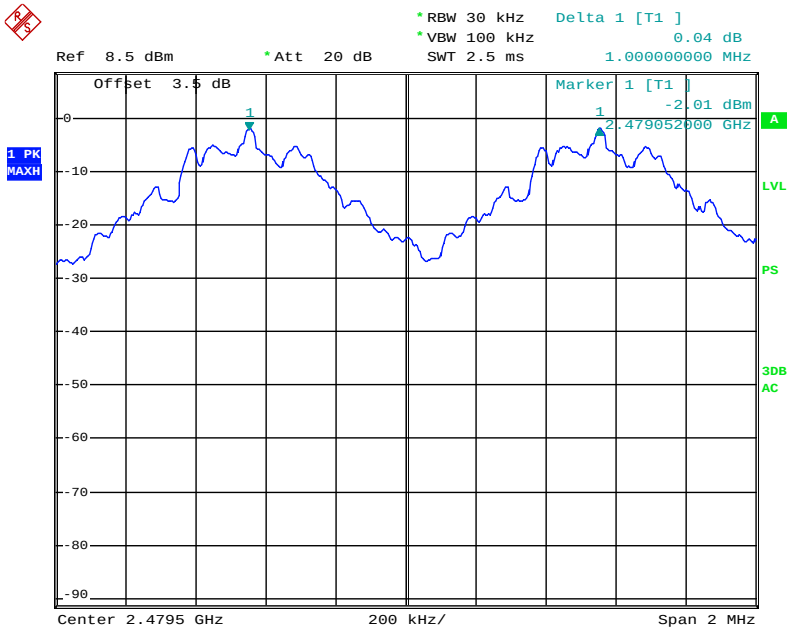

Date: 26.SEP.2012 20:55:58

## BDR (GFSK): Middle Channel



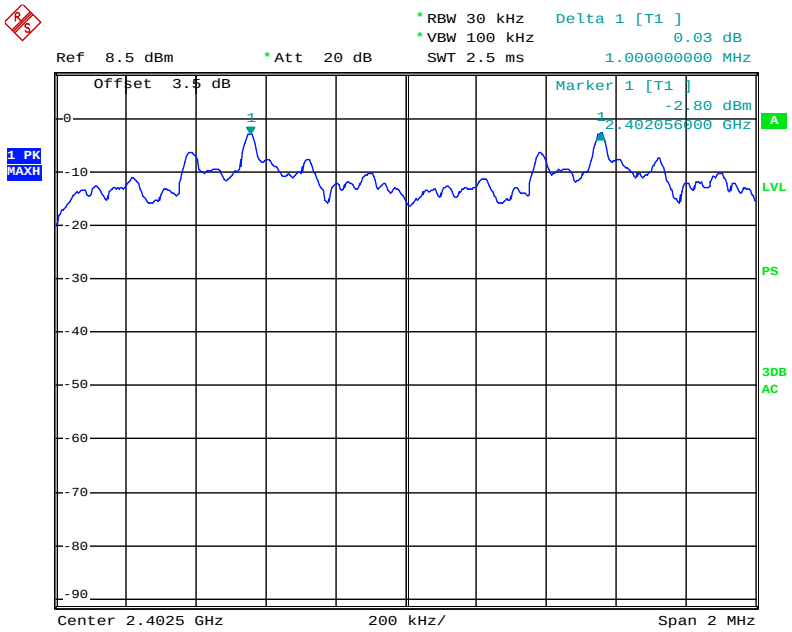

Date: 26.SEP.2012 20:56:44

## BDR (GFSK): High Channel



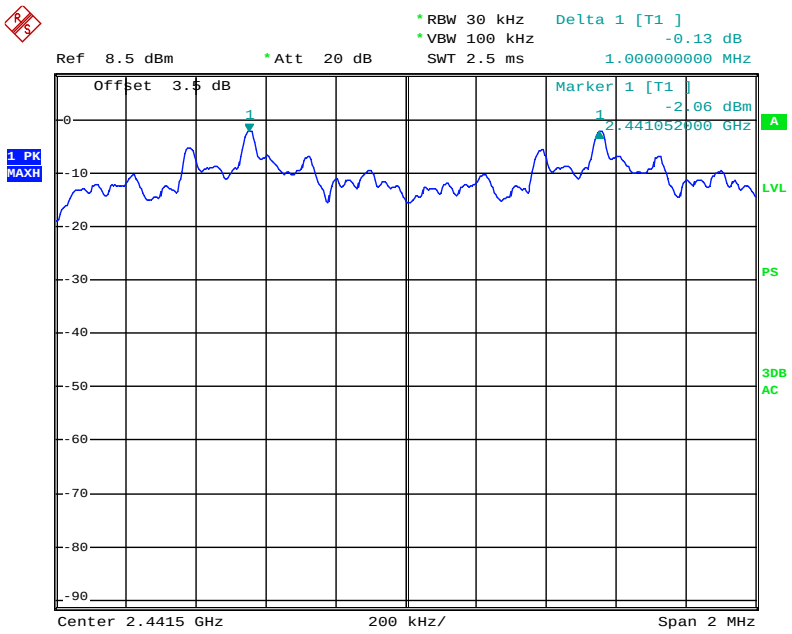

Date: 26.SEP.2012 20:57:32

## EDR (π/4-DQPSK): Low Channel



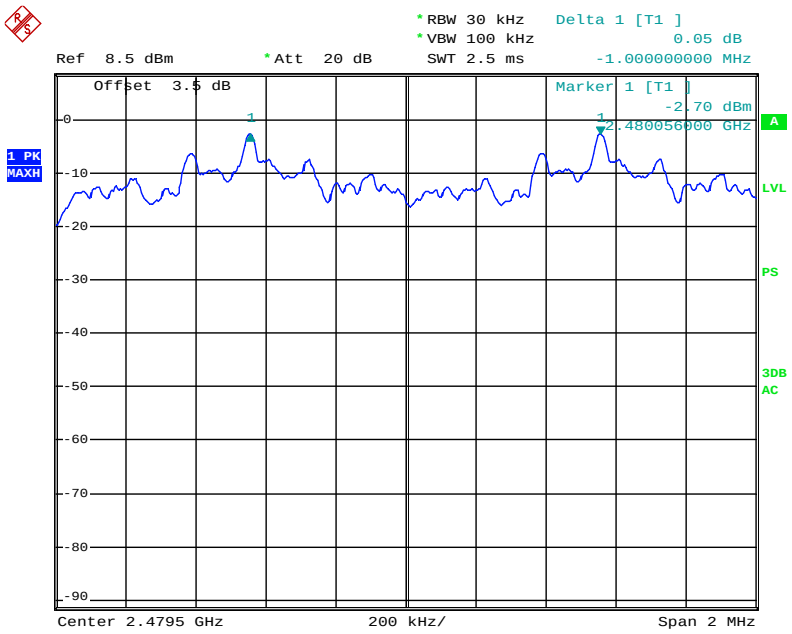

Date: 26.SEP.2012 21:29:57

## EDR (π/4-DQPSK): Middle Channel



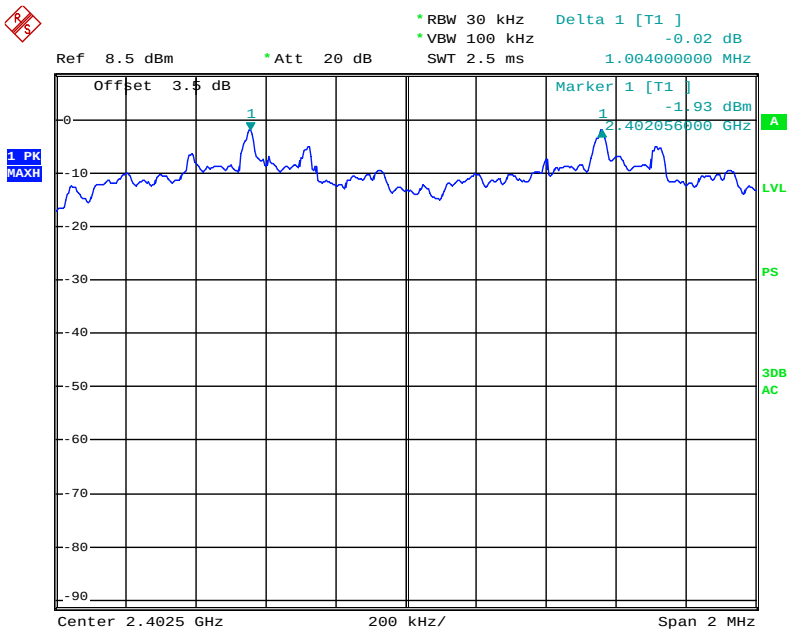

Date: 26.SEP.2012 21:32:17

## EDR (π/4-DQPSK): High Channel



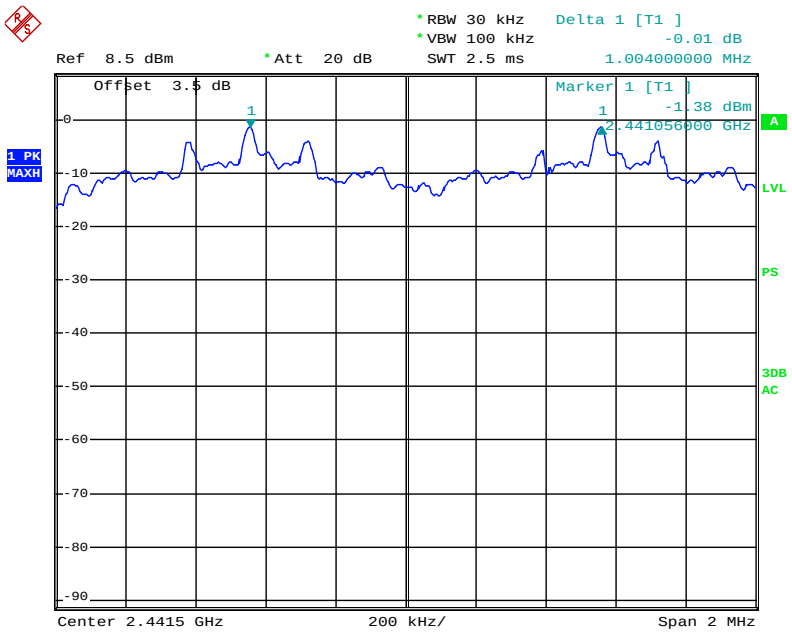

Date: 26.SEP.2012 21:34:59

## EDR (8DPSK): Low Channel



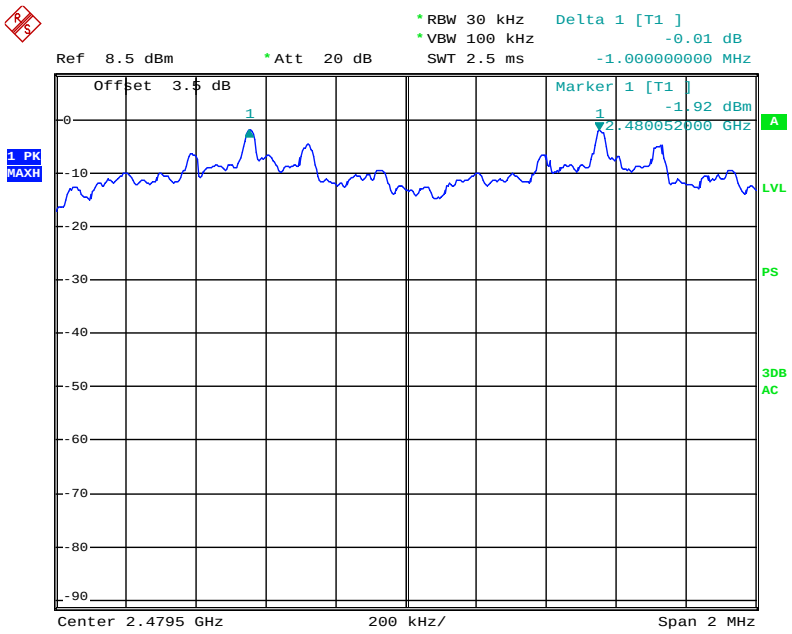

Date: 26.SEP.2012 21:54:19

## EDR (8DPSK): Middle Channel




Date: 26.SEP.2012 21:57:36

## EDR (8DPSK): High Channel




Date: 26.SEP.2012 22:00:58

# 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 | EMI Test Receiver | ESCI | 101122 | 2012-08-08 | 2013-08-07 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

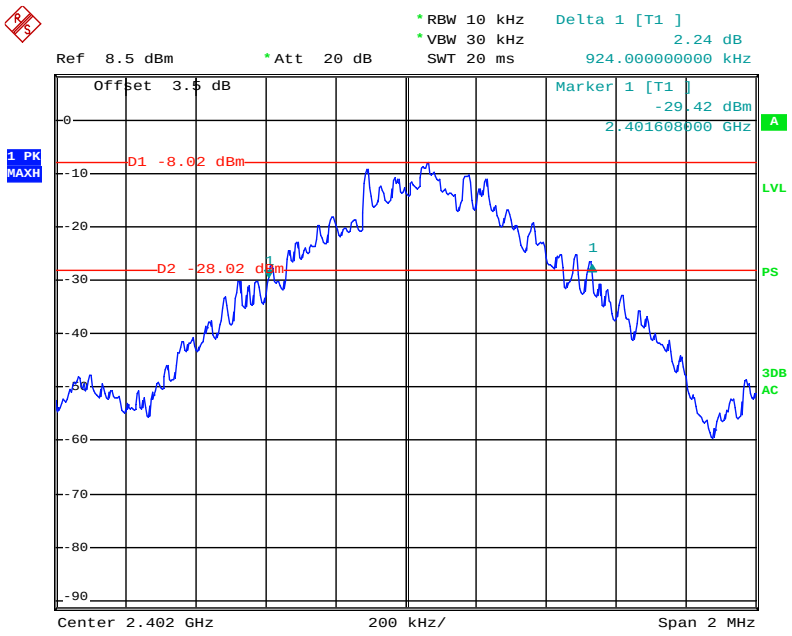
** The testing was performed by Jimmy Xiao on 2012-09-26.*

*EUT operation mode: Transmitting*

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

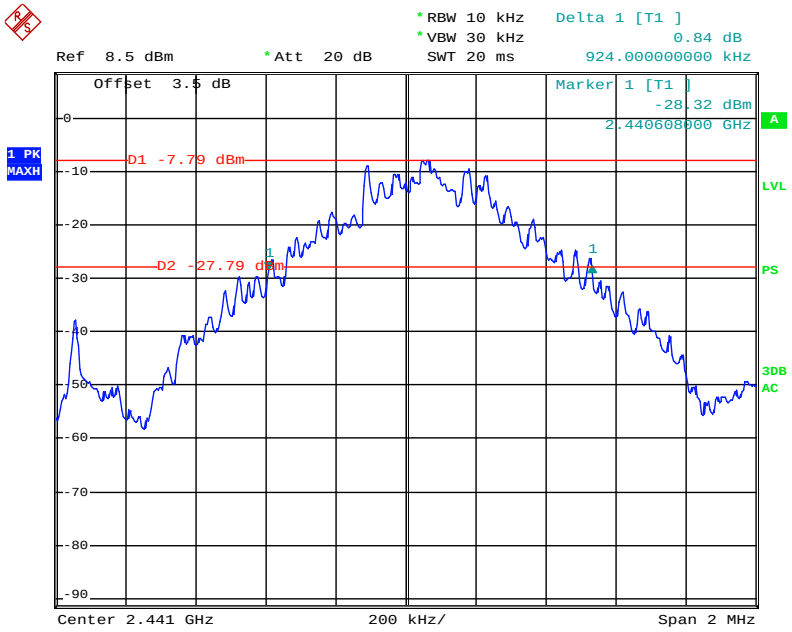
| Mode | Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---|---|---|---|
| BDR (GFSK) | Low | 2402 | 0.924 |
| | Middle | 2441 | 0.924 |
| | High | 2480 | 0.924 |
| EDR (π/4-DQPSK) | Low | 2402 | 1.244 |
| | Middle | 2441 | 1.244 |
| | High | 2480 | 1.244 |
| EDR (8DPSK) | Low | 2402 | 1.272 |
| | Middle | 2441 | 1.288 |
| | High | 2480 | 1.284 |

**BDR (GFSK): Low Channel**



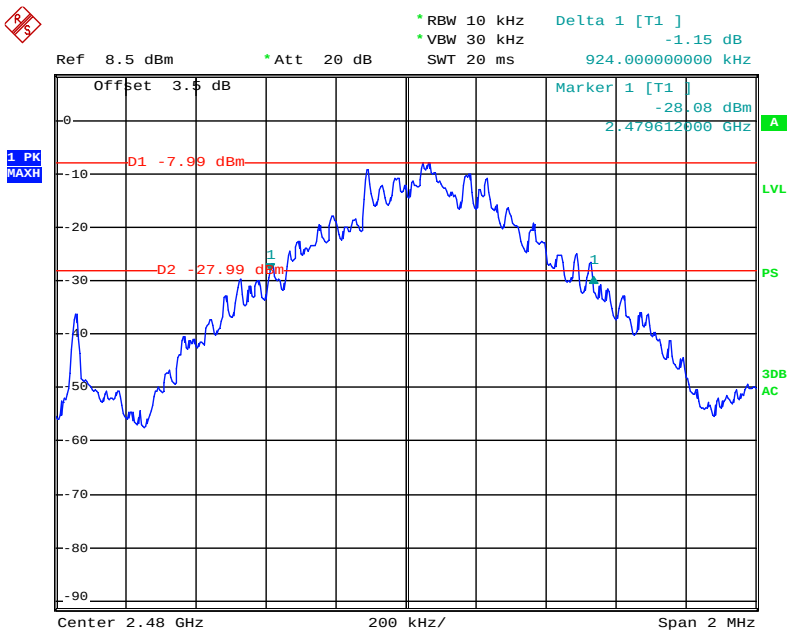

Date: 26.SEP.2012 20:50:24

## BDR (GFSK): Middle Channel



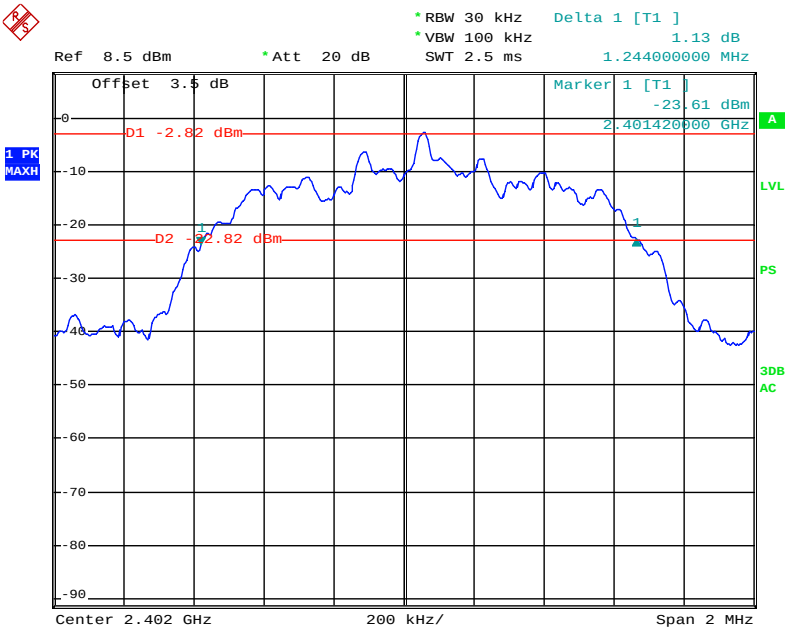

Date: 26.SEP.2012 20:52:30

## BDR (GFSK): High Channel



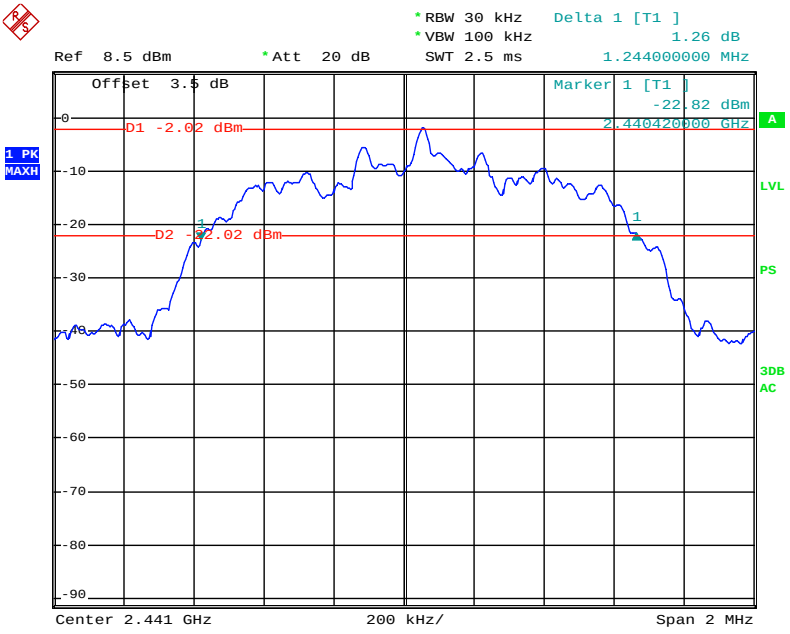

Date: 26.SEP.2012 20:54:26

## EDR (π/4-DQPSK): Low Channel



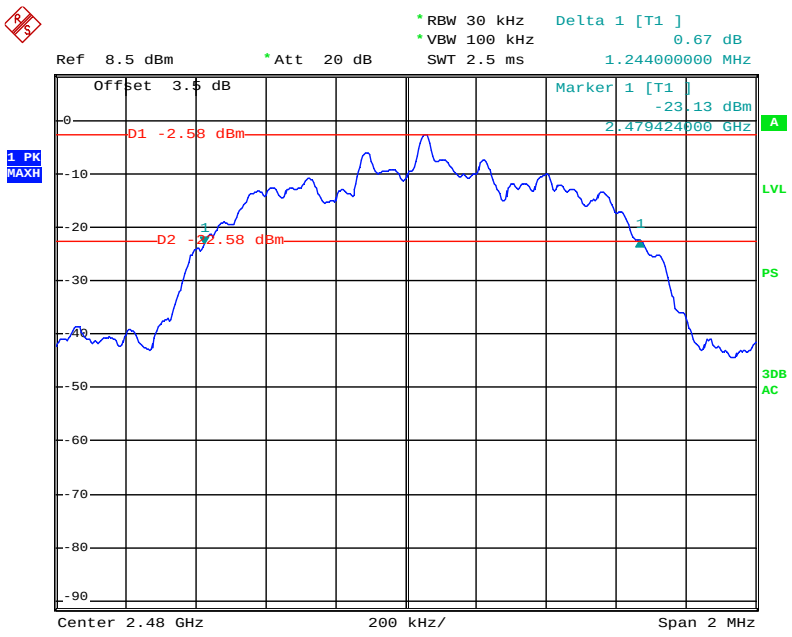

Date: 26.SEP.2012 21:28:18

## EDR (π/4-DQPSK): Middle Channel



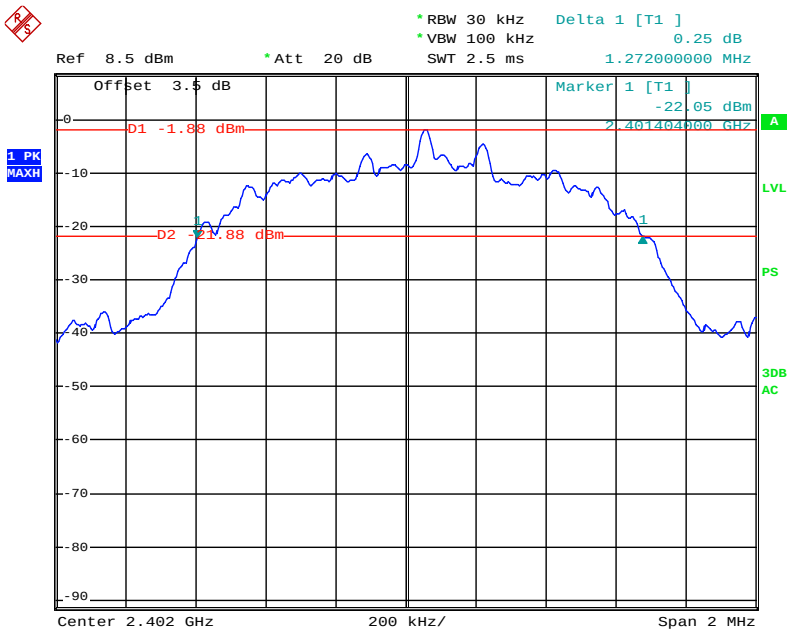

Date: 26.SEP.2012 21:31:00

## EDR (π/4-DQPSK): High Channel



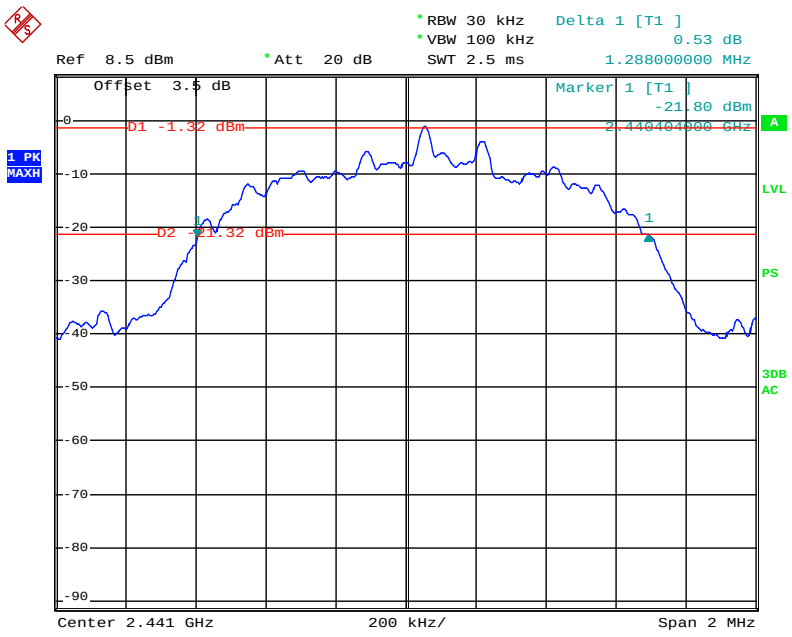

Date: 26.SEP.2012 21:33:48

## EDR (8DPSK): Low Channel



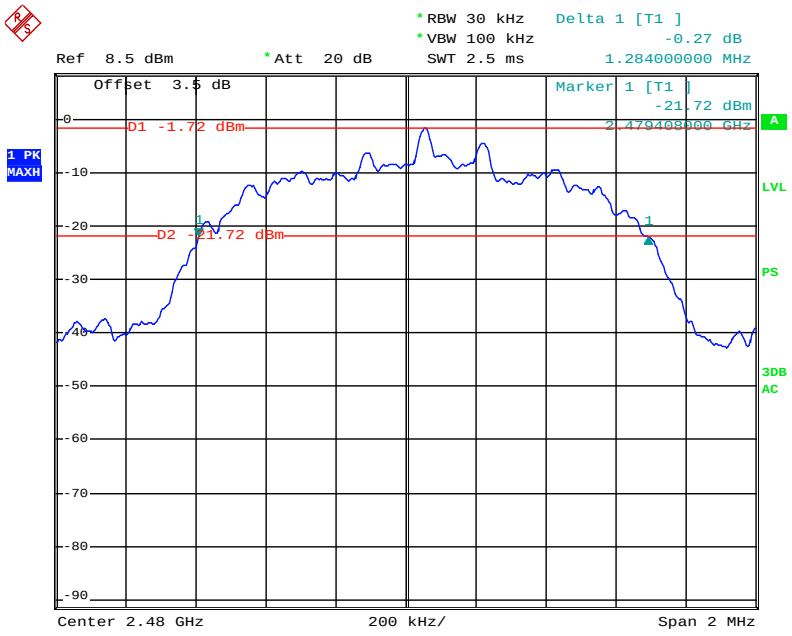

Date: 26.SEP.2012 21:53:15

## EDR (8DPSK): Middle Channel




Date: 26.SEP.2012 21:55:27

## EDR (8DPSK): High Channel




Date: 26.SEP.2012 21:59:59

# 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 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

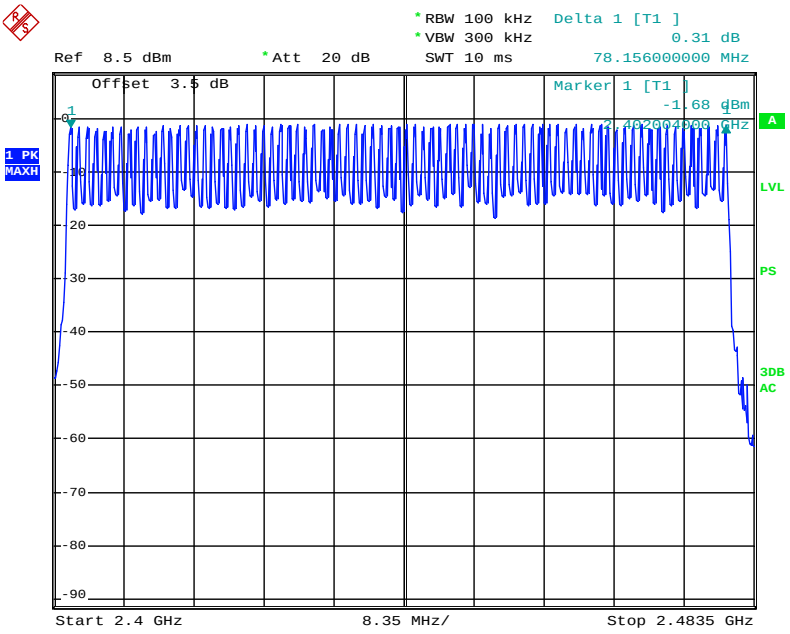
*The testing was performed by Jimmy Xiao on 2012-09-26.*

*EUT operation mode: Transmitting*

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

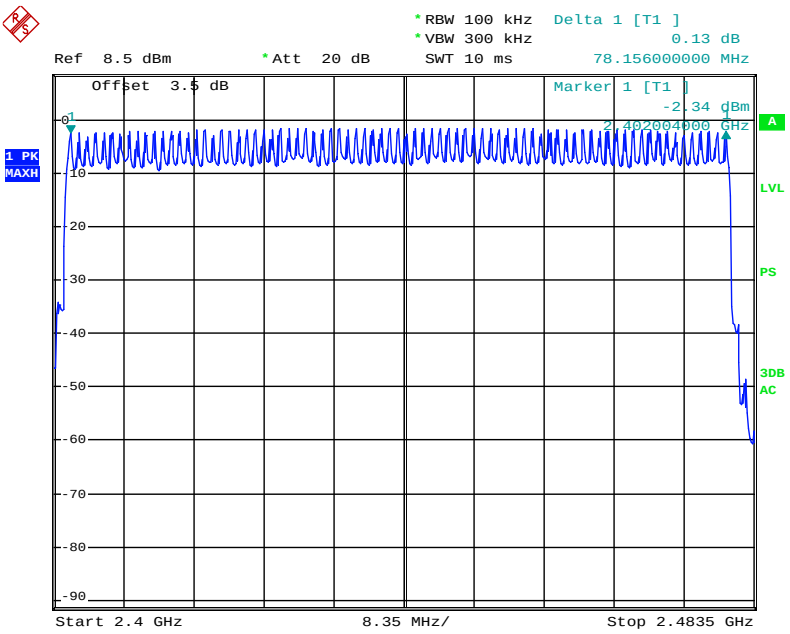
| Mode | Frequency Range (MHz) | Number of Hopping Channel (CH) | Limit (CH) |
|---|---|---|---|
| BDR (GFSK) | 2402-2480 | 79 | ≥15 |
| EDR (π/4-DQPSK) | 2402-2480 | 79 | ≥15 |
| EDR (8DPSK) | 2402-2480 | 79 | ≥15 |

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



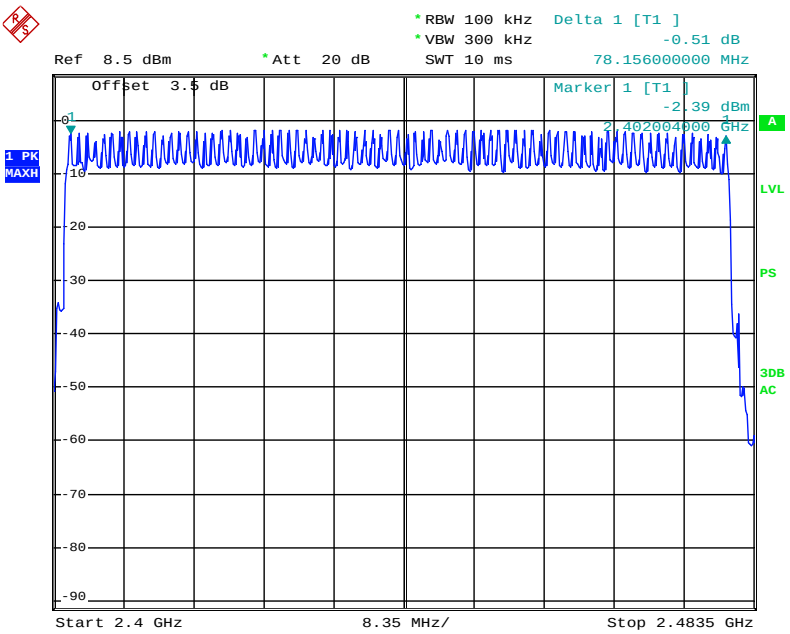

Date: 26.SEP.2012 20:35:07

## EDR (π/4-DQPSK): Number of Hopping Channels




Date: 26.SEP.2012 21:08:30

## (8DPSK): Number of Hopping Channels




Date: 26.SEP.2012 21:44:54

# 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*hope 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 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

*The testing was performed by Jimmy Xiao on 2012-09-26*

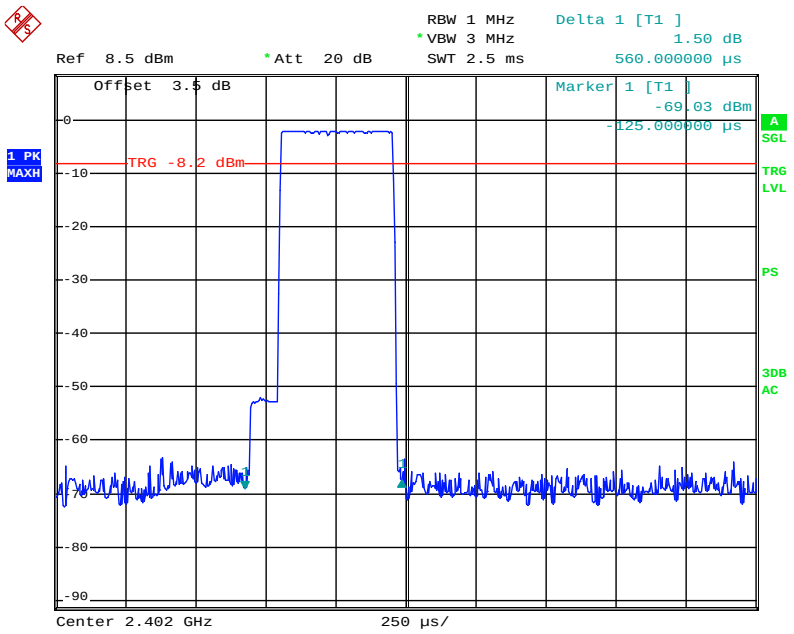
*EUT operation mode: Transmitting*

*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 | 0.560 | 0.179 | 0.4 | Pass |
| | | Middle | 0.545 | 0.174 | 0.4 | Pass |
| | | High | 0.550 | 0.176 | 0.4 | Pass |
| | | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S | | | | |
| | DH 3 | Low | 1.848 | 0.296 | 0.4 | Pass |
| | | Middle | 1.832 | 0.293 | 0.4 | Pass |
| | | High | 1.840 | 0.294 | 0.4 | Pass |
| | | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S | | | | |
| | DH 5 | Low | 3.096 | 0.330 | 0.4 | Pass |
| | | Middle | 3.084 | 0.329 | 0.4 | Pass |
| | | High | 3.120 | 0.333 | 0.4 | Pass |
| | | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S | | | | |
| EDR (π/4-DQPSK) | DH 1 | Low | 0.554 | 0.177 | 0.4 | Pass |
| | | Middle | 0.560 | 0.179 | 0.4 | Pass |
| | | High | 0.560 | 0.179 | 0.4 | Pass |
| | | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S | | | | |
| | DH 3 | Low | 2.144 | 0.343 | 0.4 | Pass |
| | | Middle | 2.168 | 0.347 | 0.4 | Pass |
| | | High | 2.144 | 0.343 | 0.4 | Pass |
| | | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S | | | | |
| | DH 5 | Low | 3.420 | 0.365 | 0.4 | Pass |
| | | Middle | 3.420 | 0.365 | 0.4 | Pass |
| | | High | 3.444 | 0.367 | 0.4 | Pass |
| | | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S | | | | |
| EDR (8DPSK) | DH 1 | Low | 0.564 | 0.180 | 0.4 | Pass |
| | | Middle | 0.560 | 0.179 | 0.4 | Pass |
| | | High | 0.556 | 0.178 | 0.4 | Pass |
| | | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S | | | | |
| | DH 3 | Low | 2.168 | 0.347 | 0.4 | Pass |
| | | Middle | 2.152 | 0.344 | 0.4 | Pass |
| | | High | 2.176 | 0.348 | 0.4 | Pass |
| | | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S | | | | |
| | DH 5 | Low | 3.420 | 0.365 | 0.4 | Pass |
| | | Middle | 3.468 | 0.370 | 0.4 | Pass |
| | | High | 3.432 | 0.366 | 0.4 | Pass |
| | | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S | | | | |

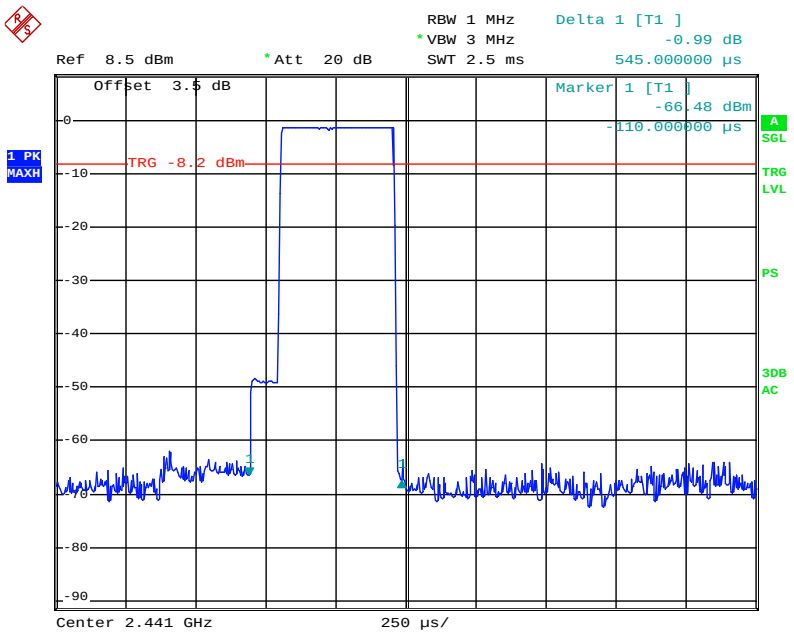
**BDR (GFSK):**

**Pulse time, Low Channel, DH1**



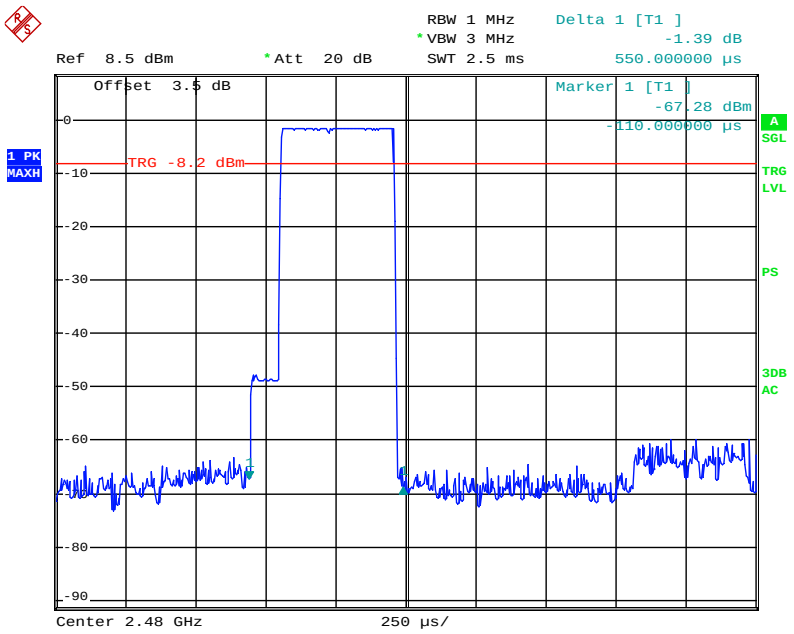

Date: 26.SEP.2012 20:37:26

**Pulse time, Middle Channel, DH1**



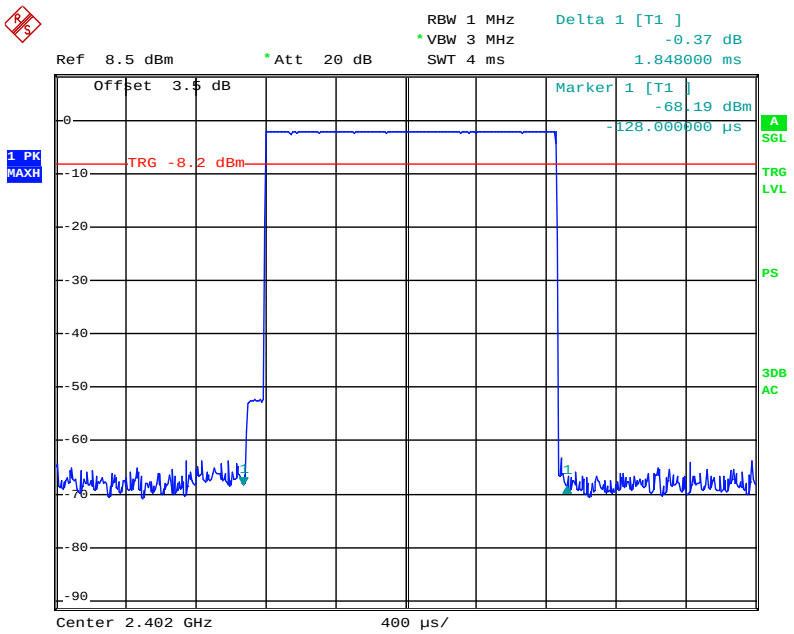

Date: 26.SEP.2012 20:38:17

## Pulse time, High Channel, DH1



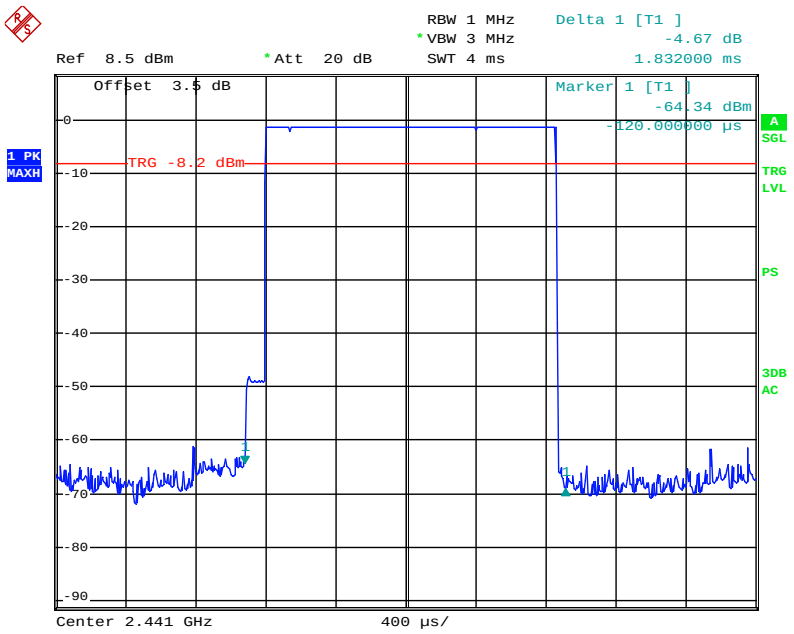

Date: 26.SEP.2012 20:38:40

## Pulse time, Low Channel, DH3



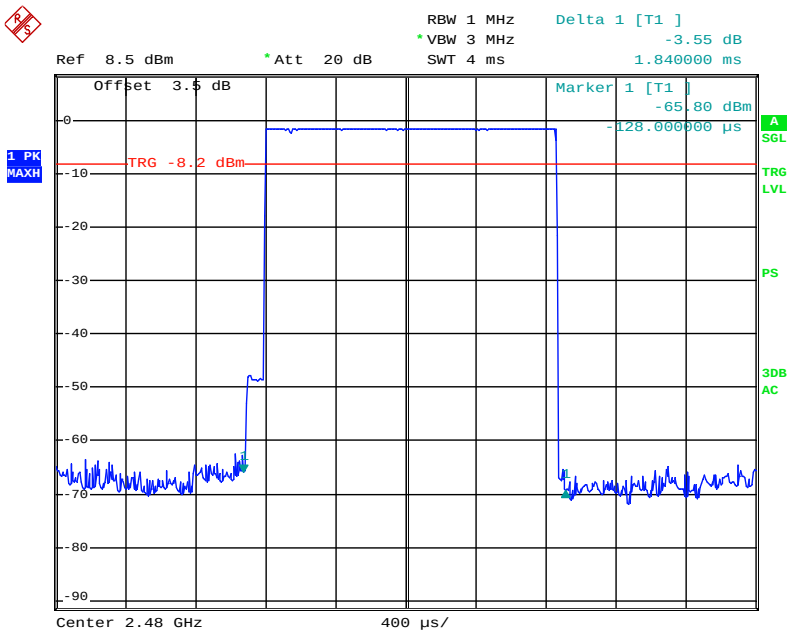

Date: 26.SEP.2012 20:43:49

## Pulse time, Middle Channel, DH3



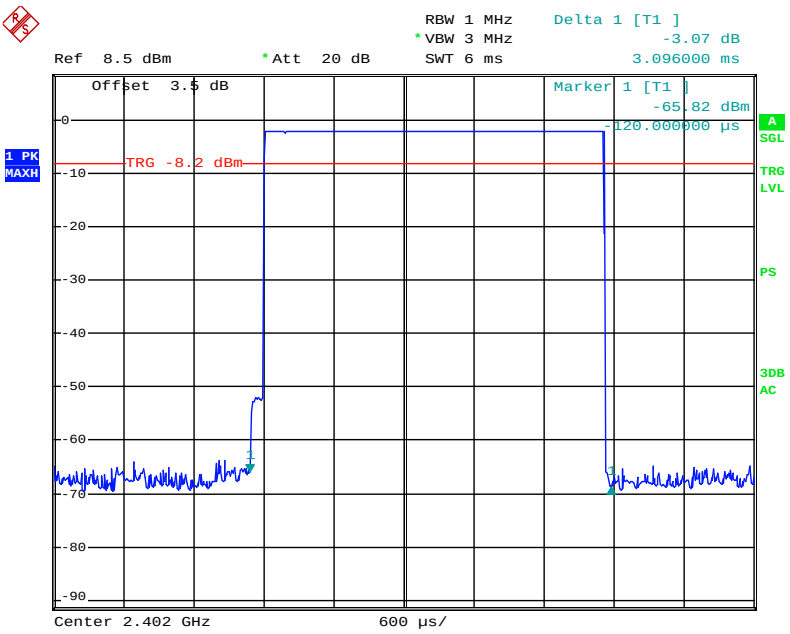

Date: 26.SEP.2012 20:43:21

## Pulse time, High Channel, DH3



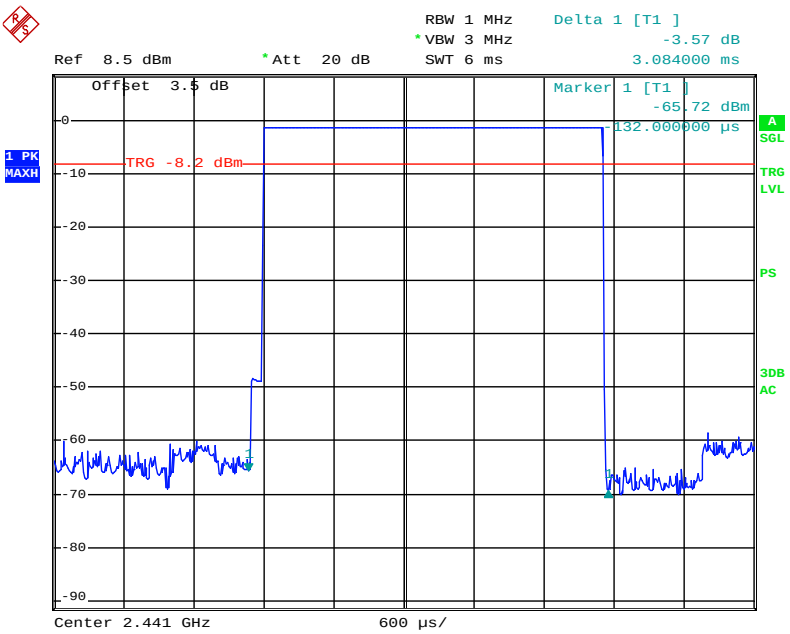

Date: 26.SEP.2012 20:42:08

## Pulse time, Low Channel, DH5



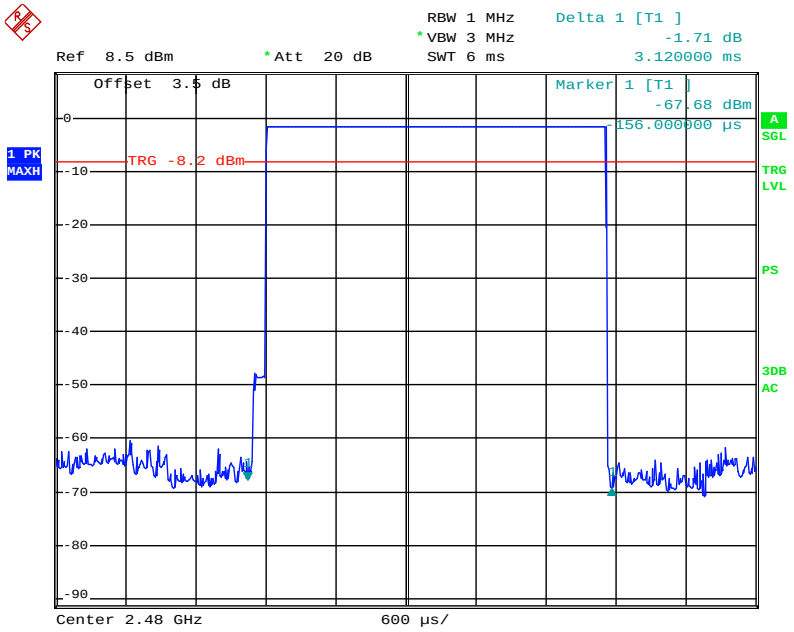

Date: 26.SEP.2012 20:44:30

## Pulse time, Middle Channel, DH5




Date: 26.SEP.2012 20:46:47

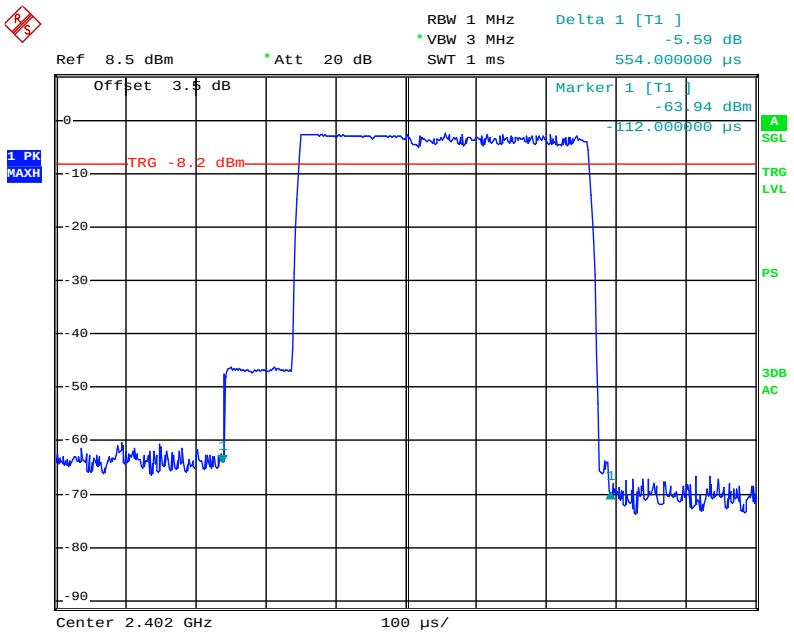
**Pulse time, High Channel, DH5**




Date: 26.SEP.2012 20:47:12

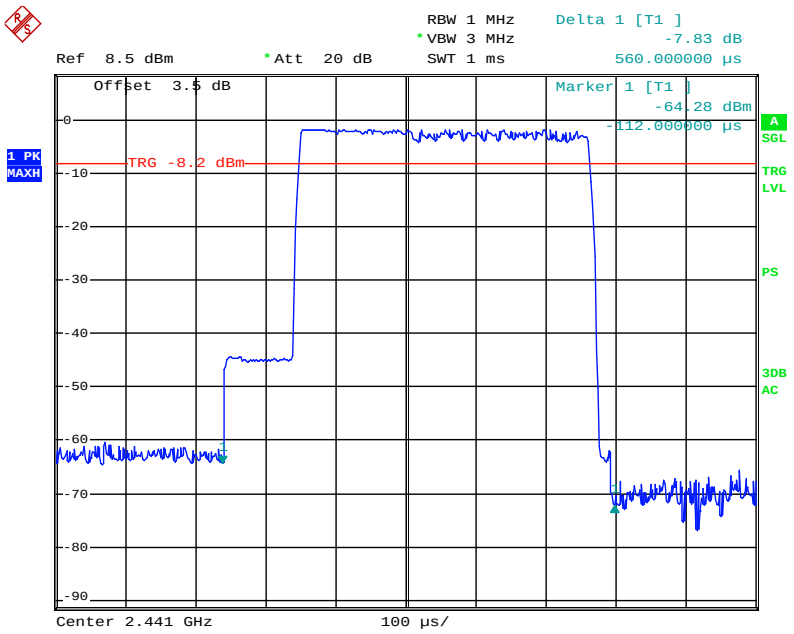
**EDR (π/4-DQPSK):**

**Pulse time, Low Channel, DH1**



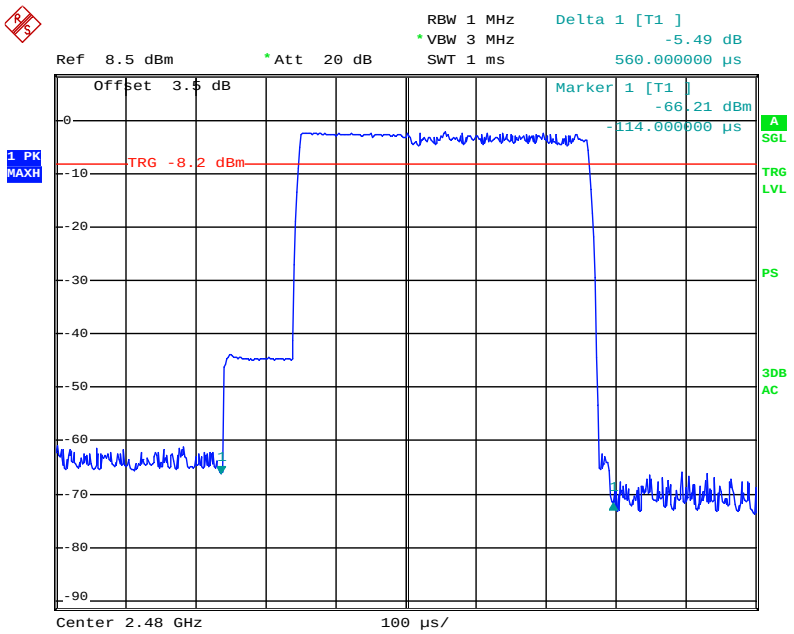

Date: 26.SEP.2012 21:10:54

## Pulse time, Middle Channel, DH1



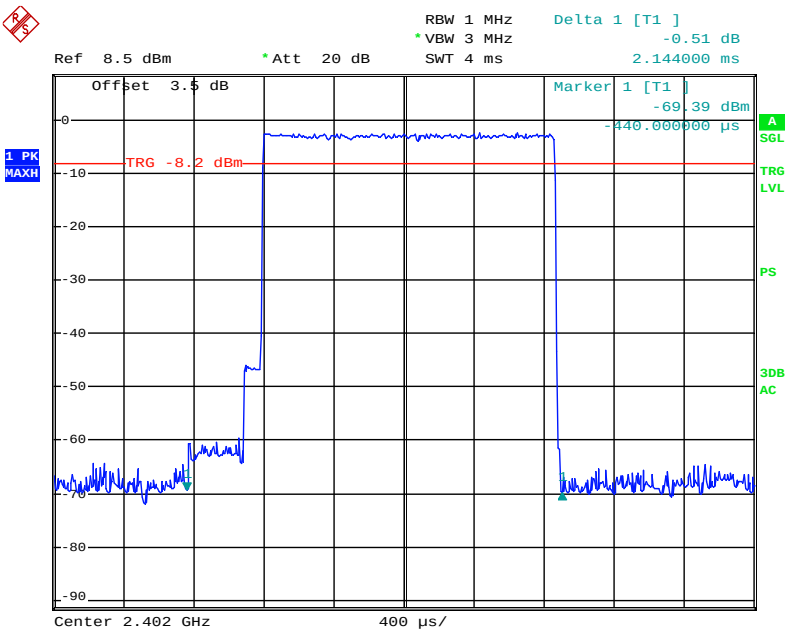

Date: 26.SEP.2012 21:11:30

## Pulse time, High Channel, DH1



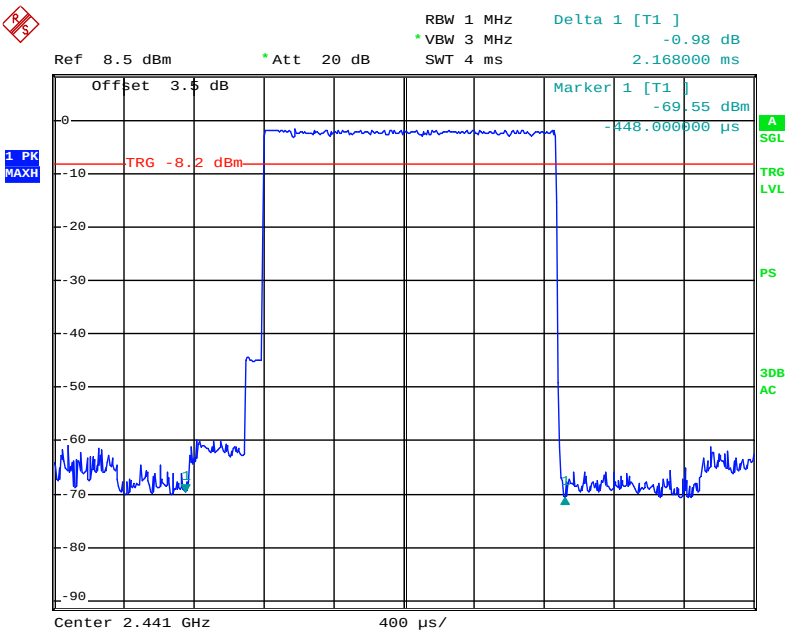

Date: 26.SEP.2012 21:12:06

## Pulse time, Low Channel, DH3



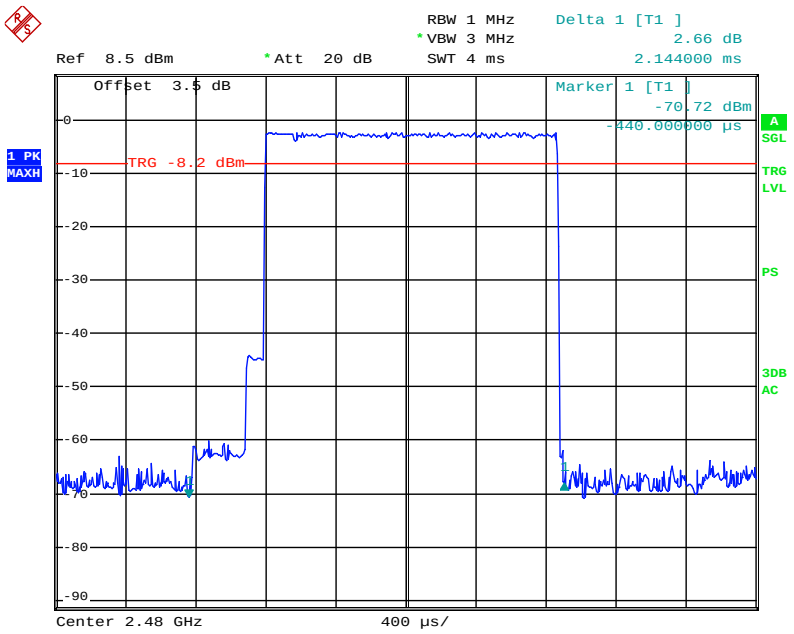

Date: 26.SEP.2012 21:25:48

## Pulse time, Middle Channel, DH3



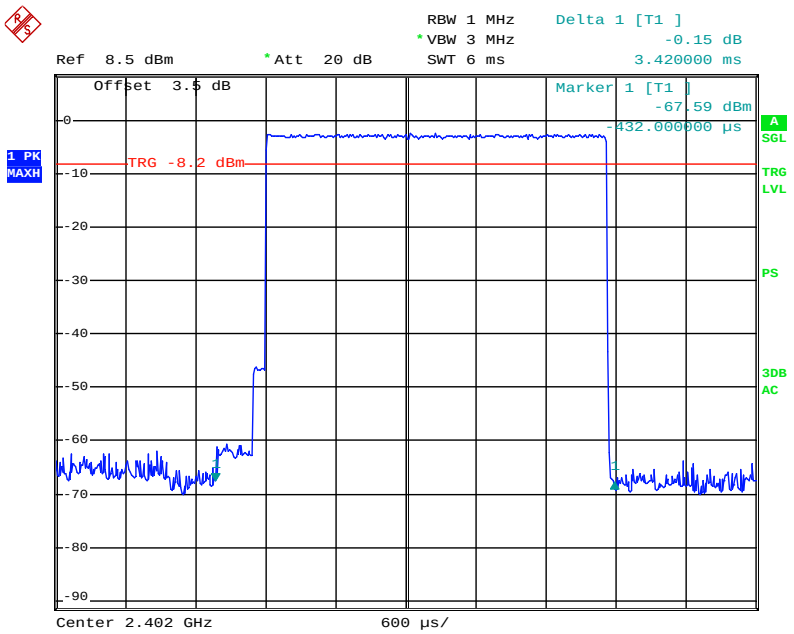

Date: 26.SEP.2012 21:25:21

## Pulse time, High Channel, DH3



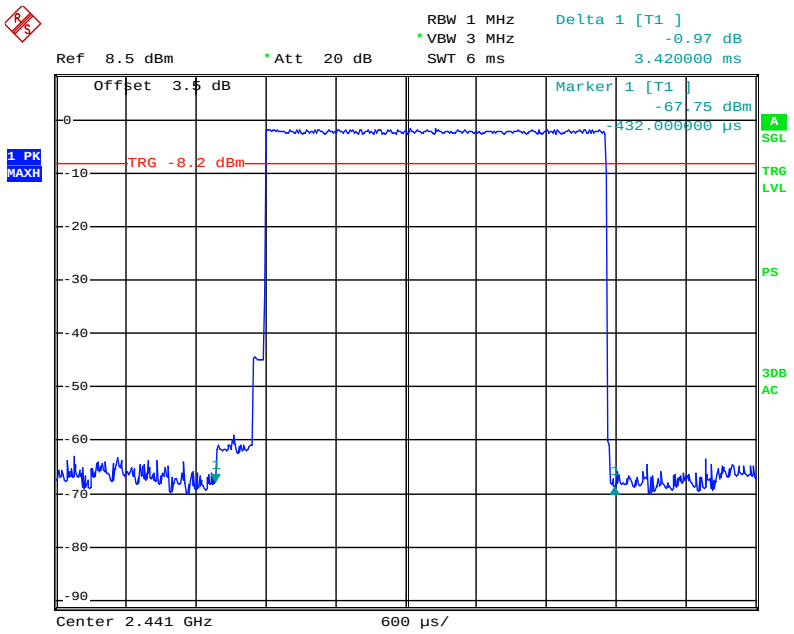

Date: 26.SEP.2012 21:24:39

## Pulse time, Low Channel, DH5



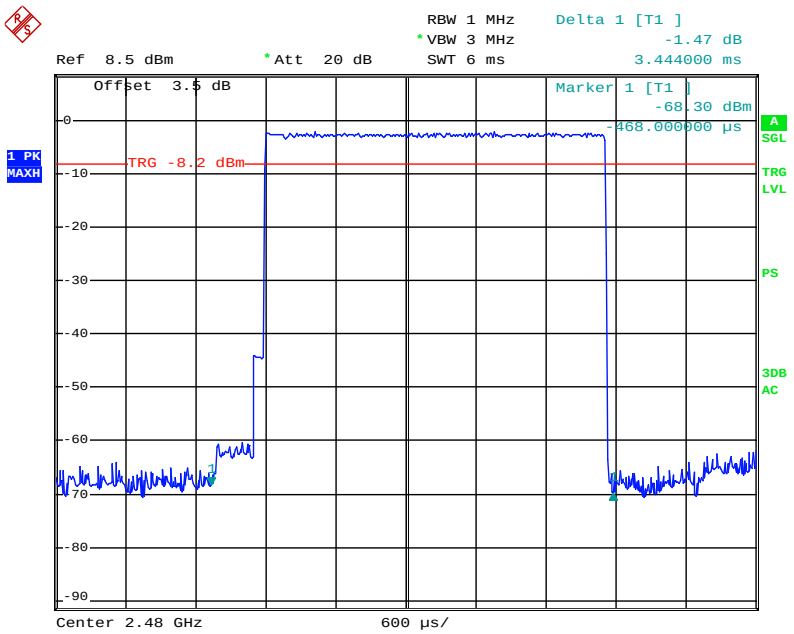

Date: 26.SEP.2012 21:22:18

## Pulse time, Middle Channel, DH5




Date: 26.SEP.2012 21:22:47

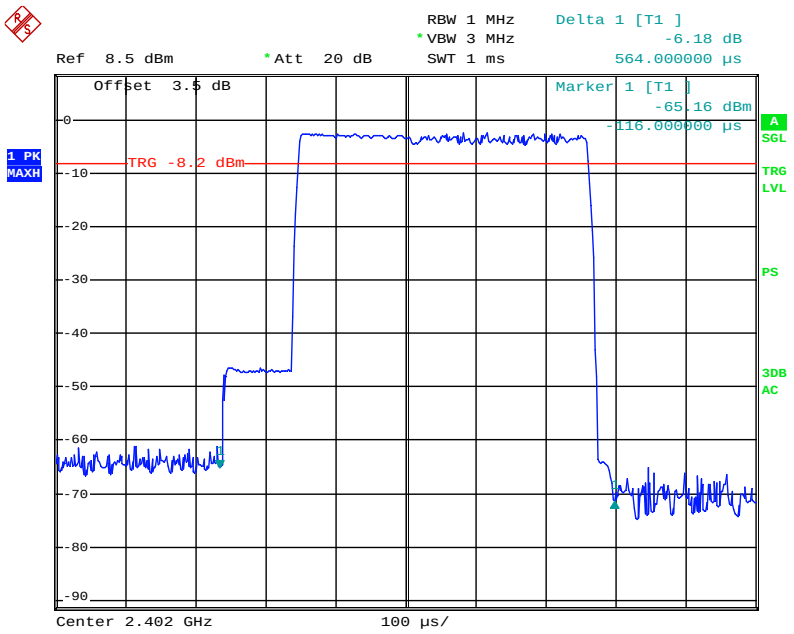
## Pulse time, High Channel, DH5




Date: 26.SEP.2012 21:23:22

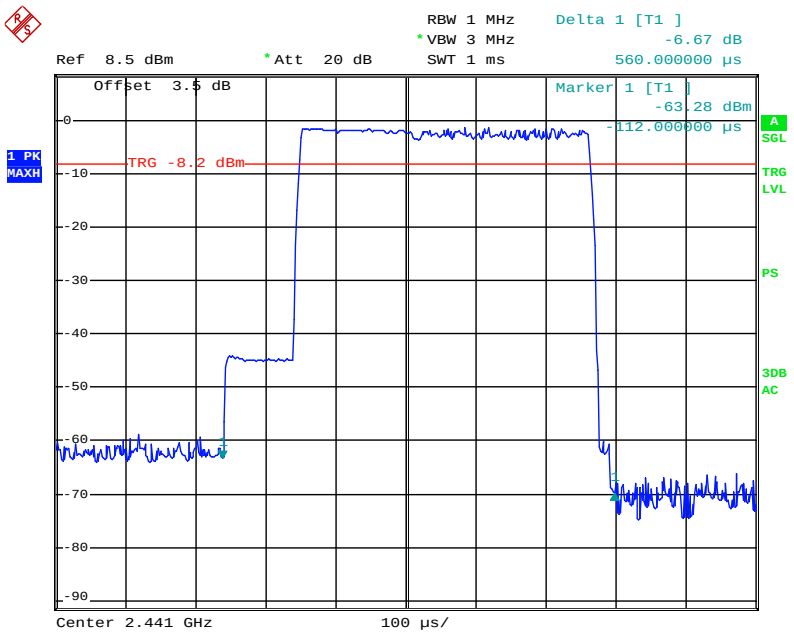
**EDR (8DPSK):**

**Pulse time, Low Channel, DH1**



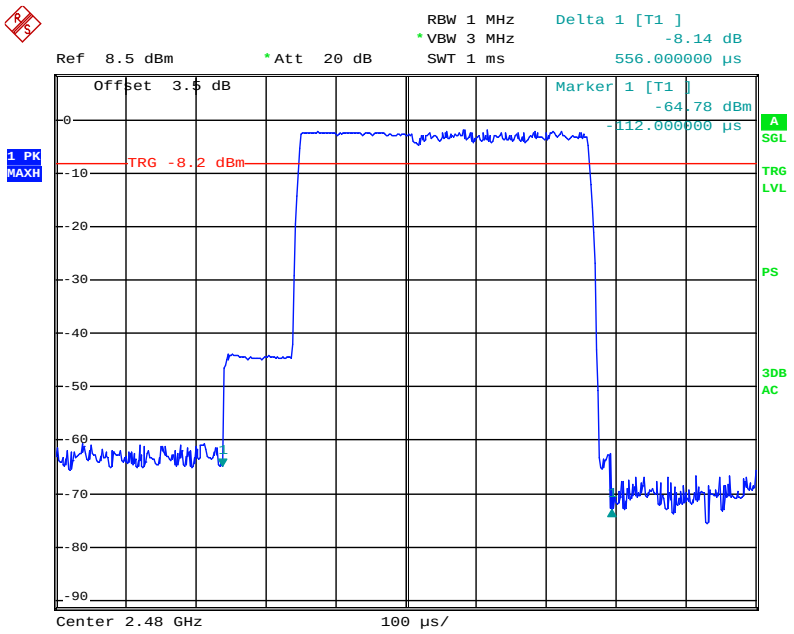

Date: 26.SEP.2012 21:45:46

**Pulse time, Middle Channel, DH1**



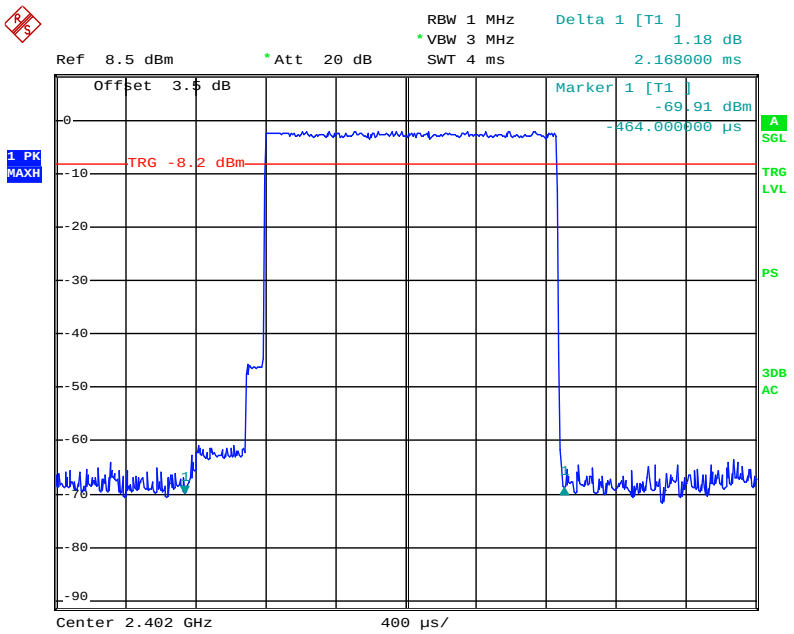

Date: 26.SEP.2012 21:46:16

## Pulse time, High Channel, DH1



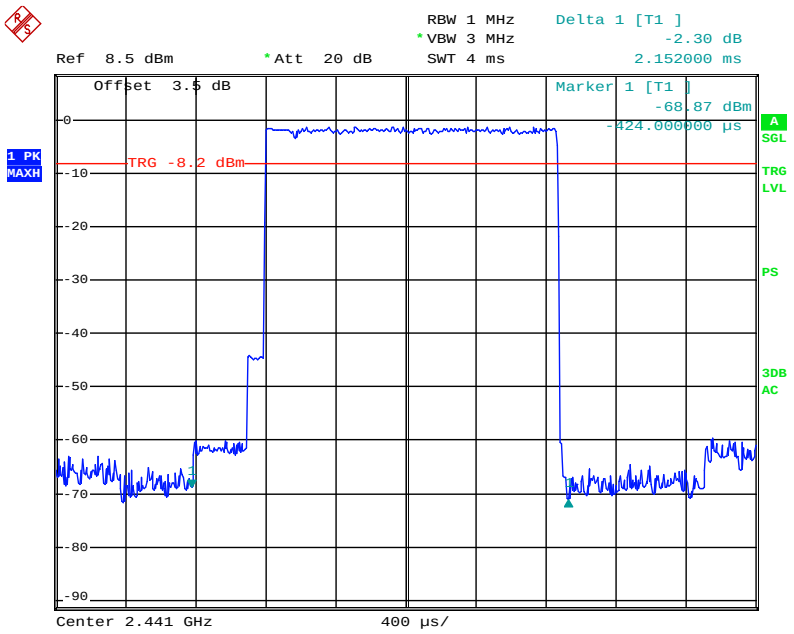

Date: 26.SEP.2012 21:47:24

## Pulse time, Low Channel, DH3



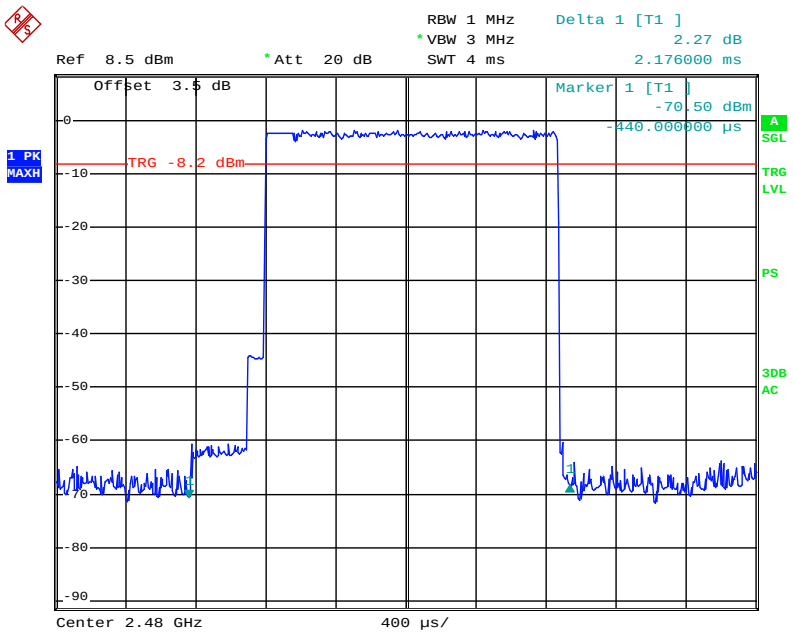

Date: 26.SEP.2012 21:49:24

## Pulse time, Middle Channel, DH3



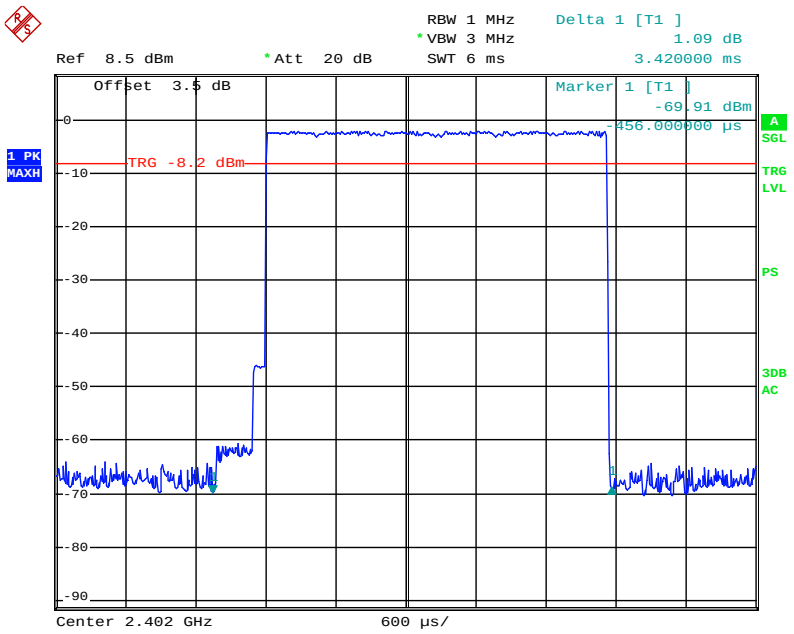

Date: 26.SEP.2012 21:48:41

## Pulse time, High Channel, DH3



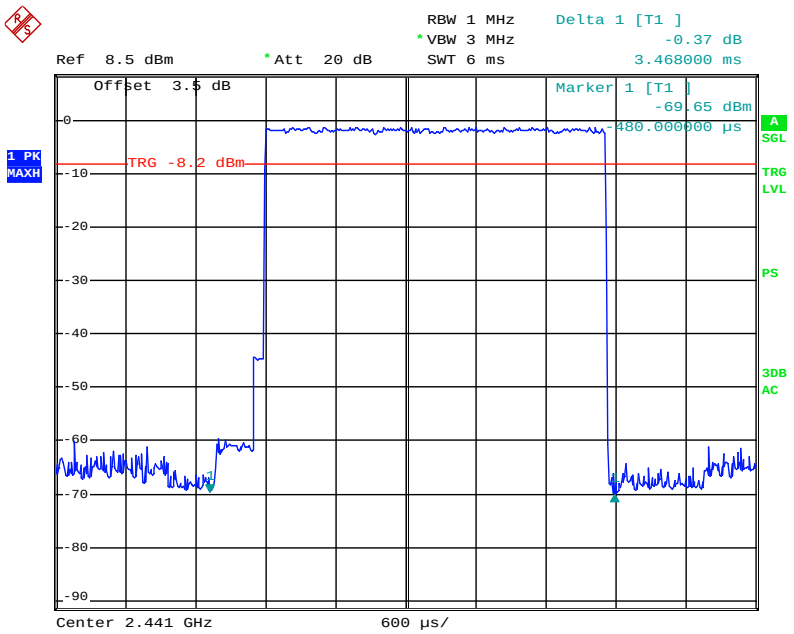

Date: 26.SEP.2012 21:48:08

## Pulse time, Low Channel, DH5



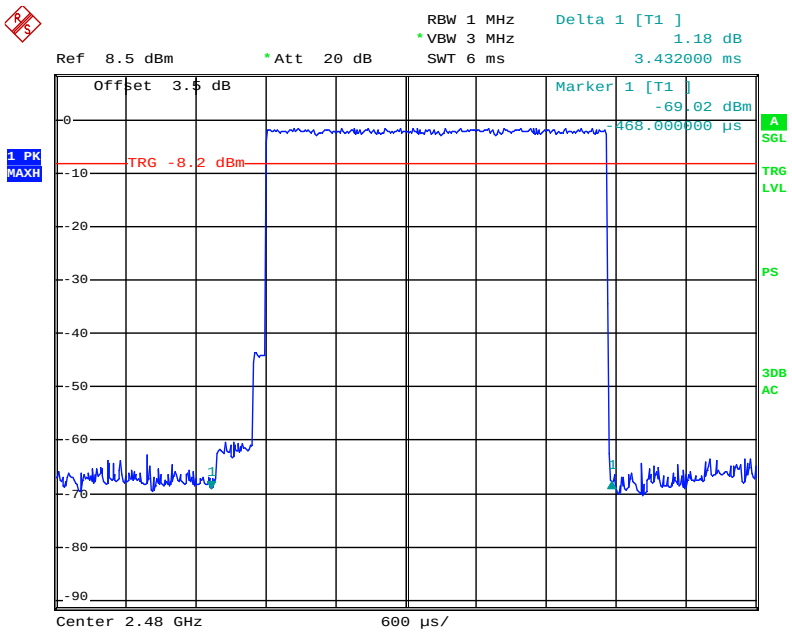

Date: 26.SEP.2012 21:50:34

## Pulse time, Middle Channel, DH5




Date: 26.SEP.2012 21:51:06

## Pulse time, High Channel, DH5




Date: 26.SEP.2012 21:51:38

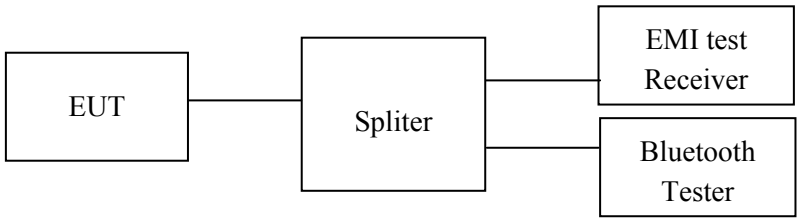
# FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

## Applicable Standard

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

## Test Procedure

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




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101122 | 2012-08-08 | 2013-08-07 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

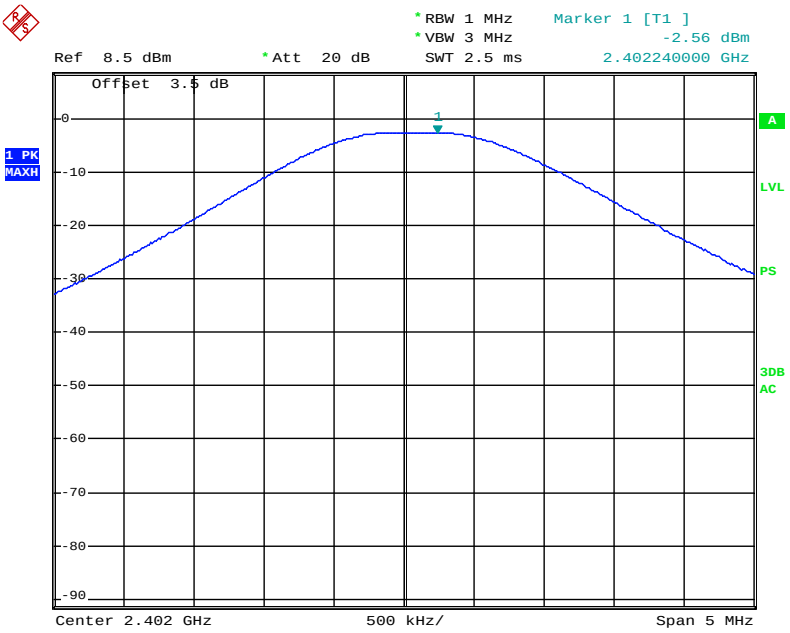
*The testing was performed by Jimmy Xiao on 2012-09-03.*

*EUT operation mode: Transmitting*

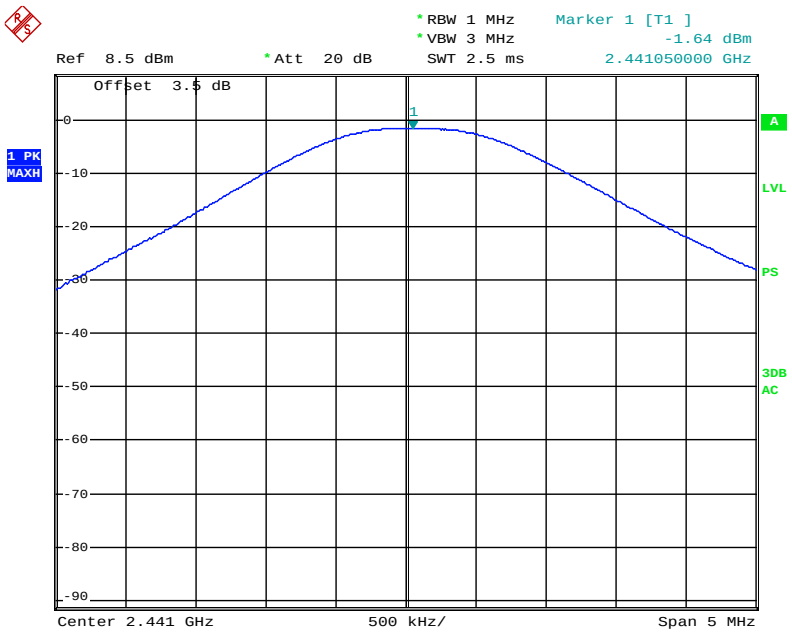
*Test Result: Compliance. Please refer to following tables and plots*

| Mode | Channel | Frequency (MHz) | Conducted Output Power | | Limit (mW) |
|---|---|---|---|---|---|
| | | | (dBm) | (mW) | |
| BDR (GFSK) | Low | 2402 | -2.56 | 0.555 | 1000 |
| | Middle | 2441 | -1.64 | 0.685 | 1000 |
| | High | 2480 | -1.90 | 0.646 | 1000 |
| EDR (π/4-DQPSK) | Low | 2402 | -2.09 | 0.618 | 1000 |
| | Middle | 2441 | -1.31 | 0.740 | 1000 |
| | High | 2480 | -1.84 | 0.655 | 1000 |
| EDR (8DPSK) | Low | 2402 | -0.96 | 0.802 | 1000 |
| | Middle | 2441 | -0.39 | 0.914 | 1000 |
| | High | 2480 | -0.77 | 0.838 | 1000 |

**BDR (GFSK): Low Channel**

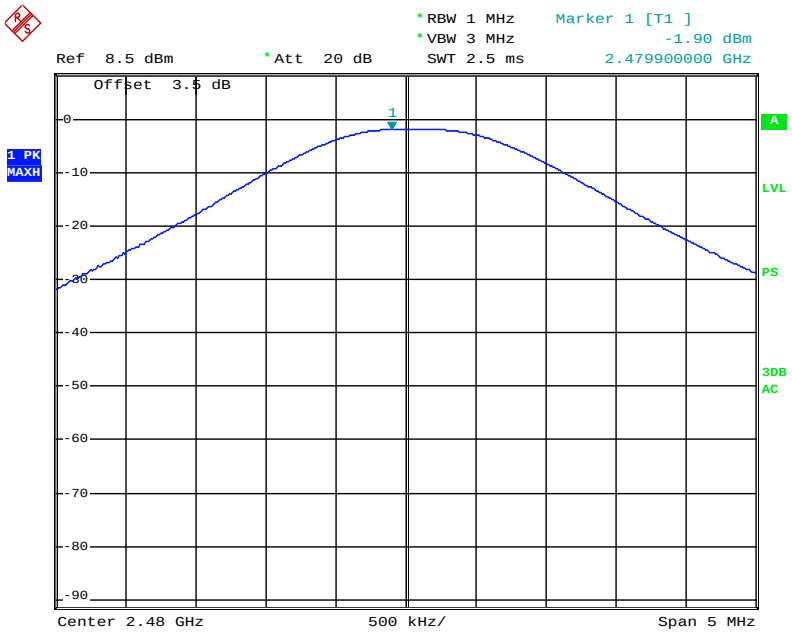


## BDR (GFSK): Middle Channel



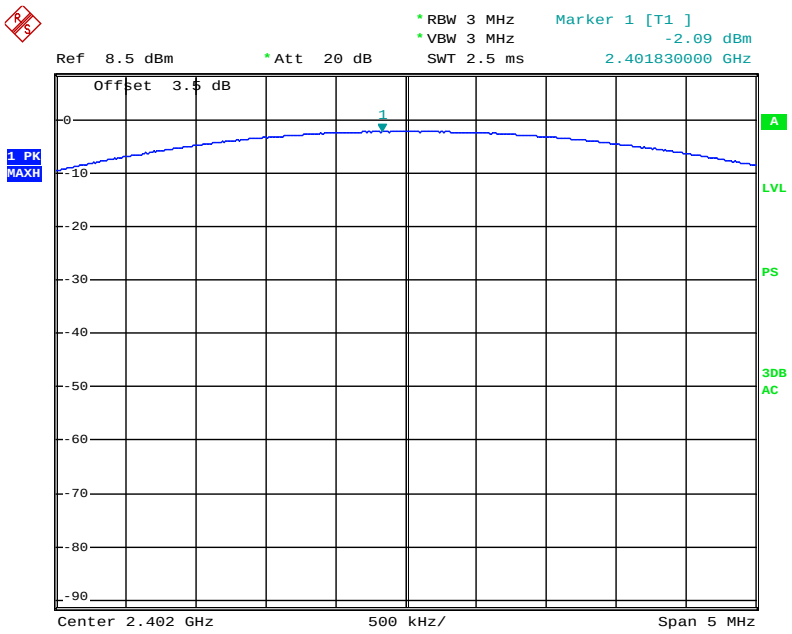

Date: 26.SEP.2012 21:02:00

## BDR (GFSK): High Chanel



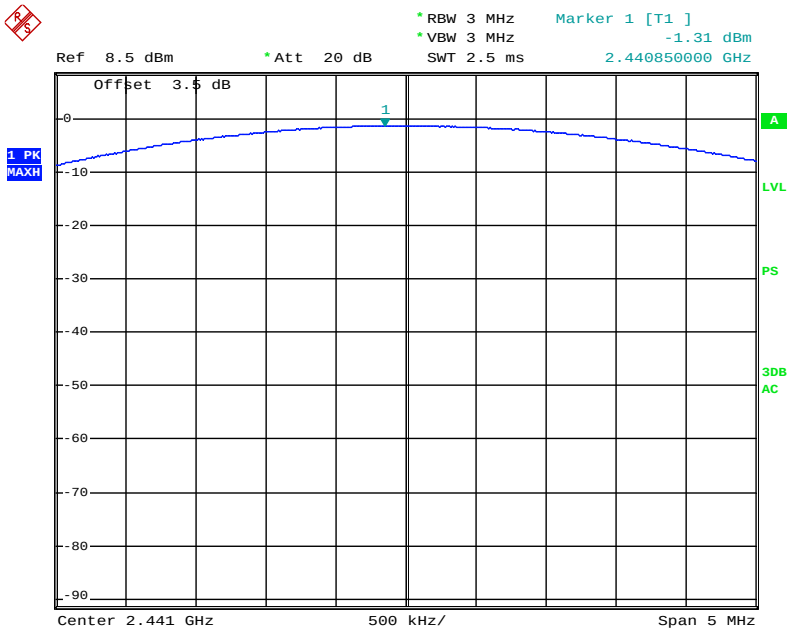

Date: 26.SEP.2012 21:01:05

## EDR(π/4-DQPSK): Low Channel



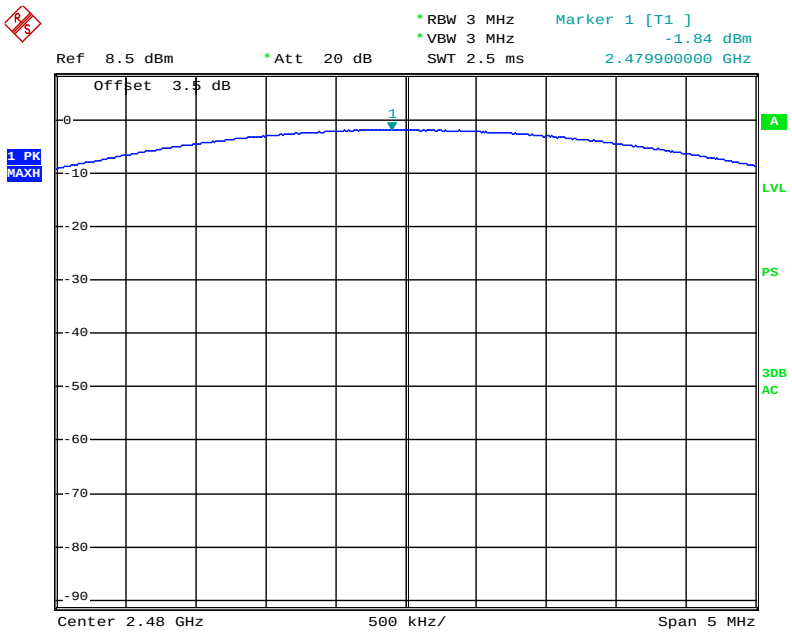

Date: 26.SEP.2012 21:36:07

## EDR(π/4-DQPSK): Middle Channel



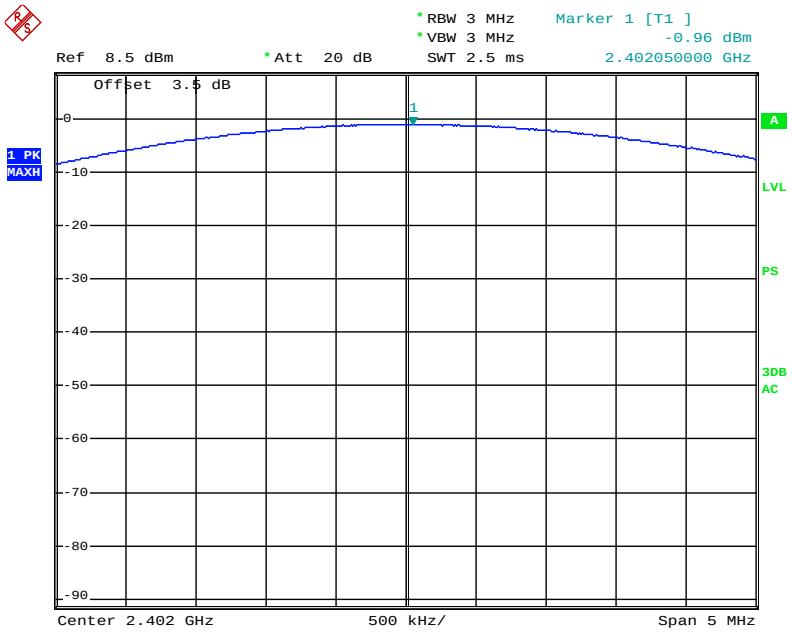

Date: 26.SEP.2012 21:37:15

## EDR(π/4-DQPSK): High Chanel



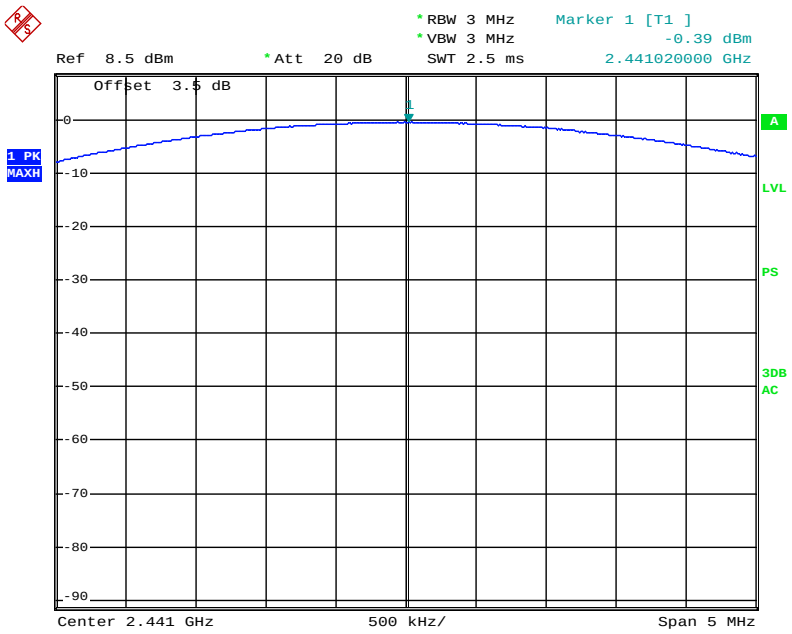

Date: 26.SEP.2012 21:37:37

## EDR(8DPSK): Low Channel



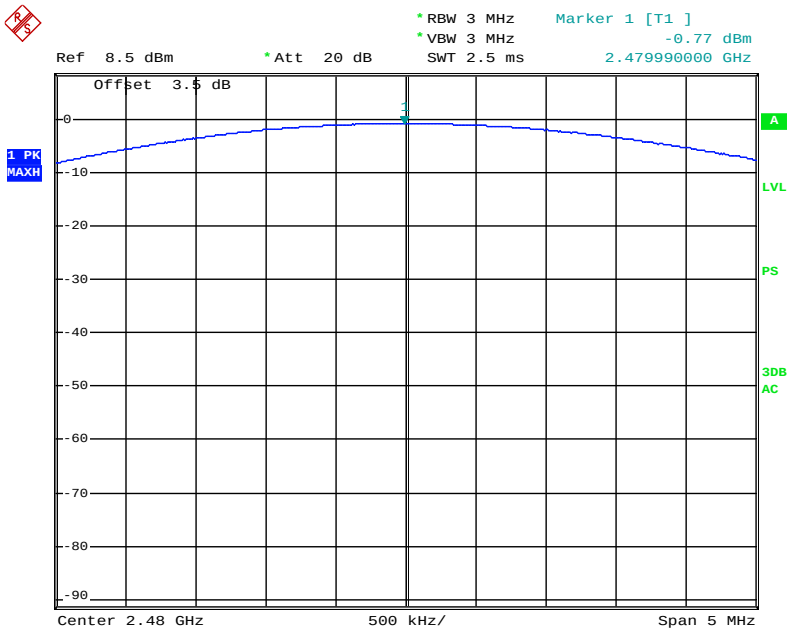

Date: 26.SEP.2012 22:01:43

## EDR(8DPSK): Middle Channel




Date: 26.SEP.2012 22:03:14

## EDR(8DPSK): High Chanel




Date: 26.SEP.2012 22:03:47

# FCC §15.247(d) - BAND EDGES TESTING

## Applicable Standard

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

## Test Procedure

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

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101122 | 2012-08-08 | 2013-08-07 |
| 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 using suitable standards traceable to national primary standards and international system of units (SI).

## Test Data

### Environmental Conditions

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

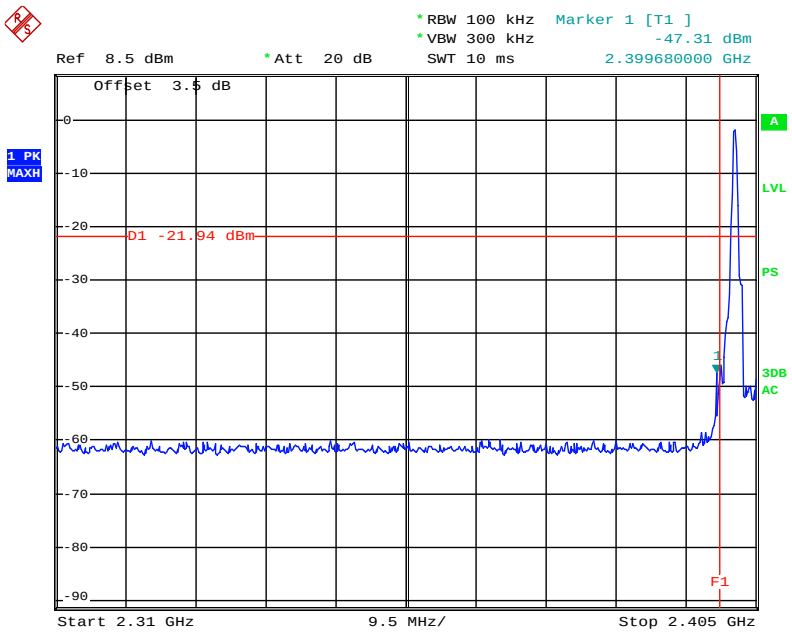
*The testing was performed by Jimmy Xiao on 2012-09-26.*

*EUT operation mode: Transmitting*

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

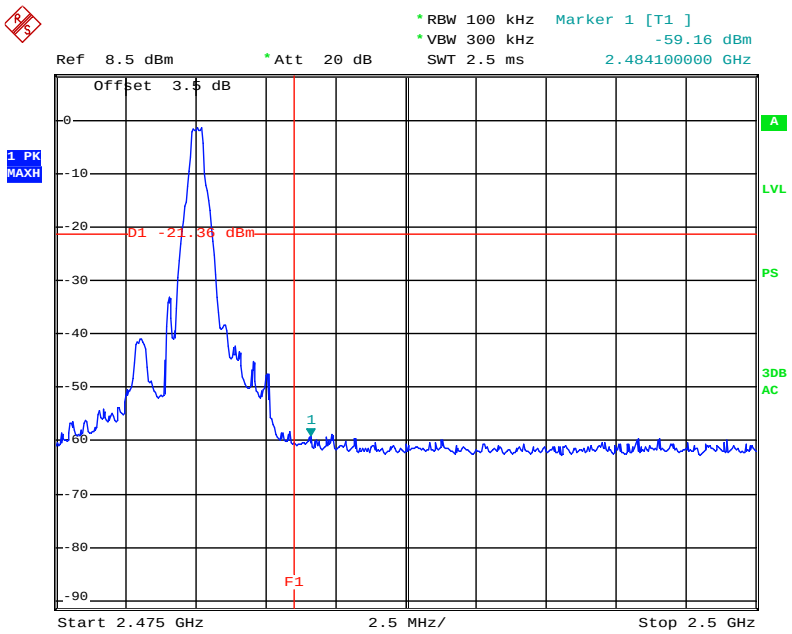
| Mode | Frequency (MHz) | Delta Peak to Band Emission (dBc) | Limit (dBc) |
|---|---|---|---|
| BDR (GFSK) | 2399.68 | 45.37 | ＞20 |
| | 2484.10 | 57.80 | ＞20 |
| EDR (π/4-DQPSK) | 2399.87 | 41.59 | ＞20 |
| | 2483.55 | 53.60 | ＞20 |
| EDR (8DPSK) | 2399.87 | 41.44 | ＞20 |
| | 2483.55 | 54.42 | ＞20 |

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



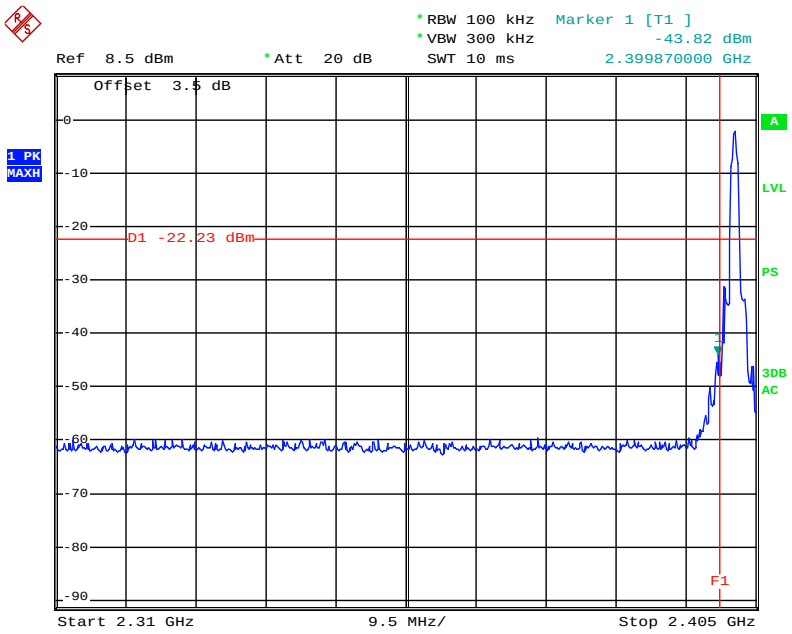

Date: 26.SEP.2012 20:58:52

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



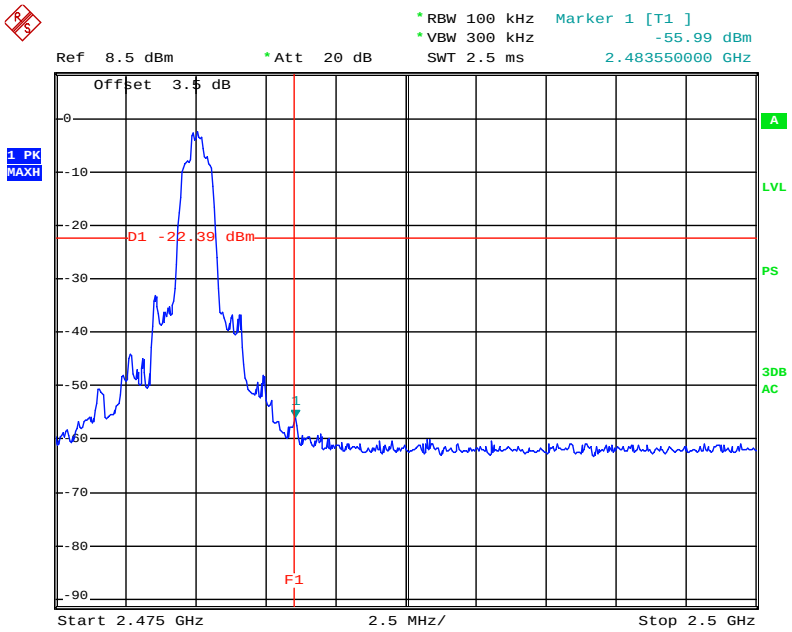

Date: 26.SEP.2012 21:00:17

## EDR (π/4-DQPSK): Band Edge-Left Side



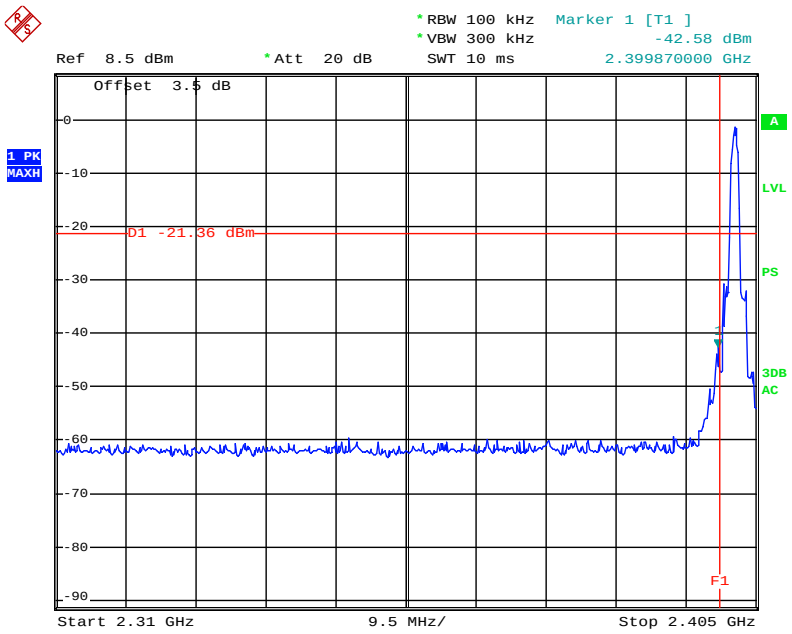

Date: 26.SEP.2012 21:40:34

## EDR (π/4-DQPSK): Band Edge-Right Side



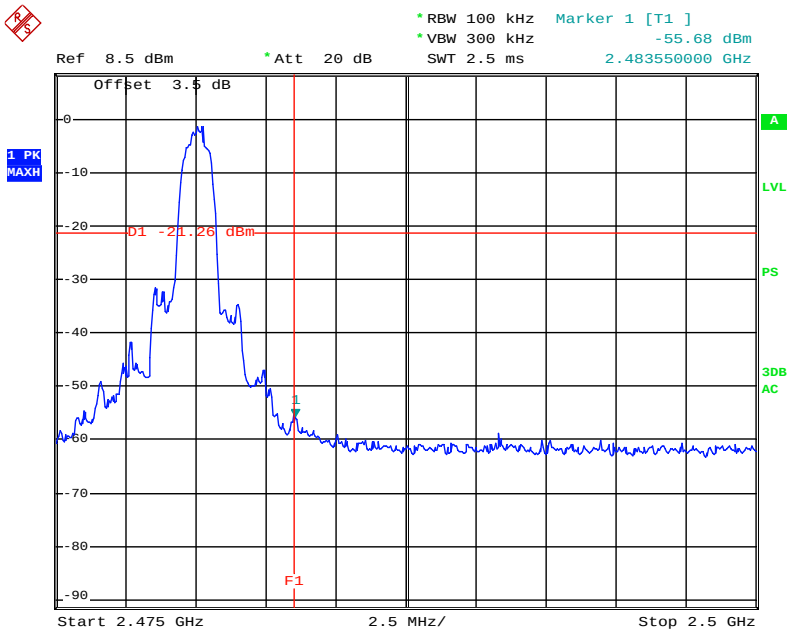

Date: 26.SEP.2012 21:38:59

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




Date: 26.SEP.2012 22:05:45

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




Date: 26.SEP.2012 22:04:59

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