

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

SVAT Electronics

4080 Montrose Rd, Niagara Falls, ON, Canada, L2H 1J9

FCC ID: SMHLVTW200P

| | |
|--|--|
| Report Type: Original Report | Product Type: Parent Unit of Melody Digital Audio Monitor system |
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| Report Number: <u>RSZ10100804</u> | |
| Report Date: <u>2010-11-02</u> | |
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The SVAT Electronics's product, model number: LV-TW200P parent unit (FCC ID: SMHLVTW200P) or the "EUT" as referred to in this report is a parent unit of Melody Digital Audio Monitor system, which measures approximately: 11.5 cm (L) x 7.1 cm (W) x 5.7 cm (H), rated input voltage: DC 2.4 V battery or DC 6.0 V adapter.

Adapter information:

Model: GPE038-060030-1;

Input: AC 100-240 V 50/60 Hz 0.1 A;

Output: DC 6.0 V 300 mA.

All measurement and test data in this report was gathered from production sample serial number: 1010005 (Assigned by BACL, Shenzhen). The EUT was received on 2010-10-08.

Objective

This Type approval report is prepared on behalf of SVAT Electronics 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, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules

Related Submittal(s)/Grant(s)

Submitted with the Part of a system FCC ID: SMHLVTW200B

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in 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 November 21, 2007. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the 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 engineering mode which was selected by manufacturer.

Equipment Modifications

No modification was made to the unit tested.

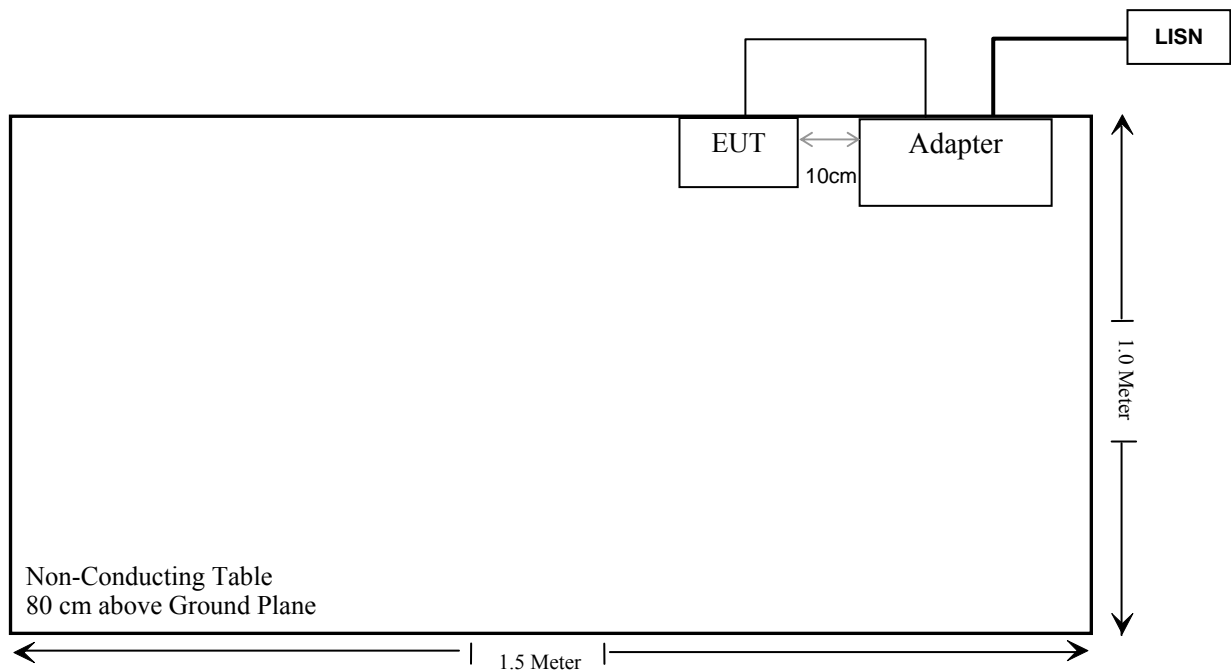
EUT Exercise Software

N/A

External I/O Cable

| Cable Description | Length (m) | From/Port | To |
|--------------------------------------|------------|-----------|-----|
| Unshielded Detachable DC Power Cable | 1.9 | Adapter | EUT |

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|-------------------------------------|----------------------------------|---------------|
| §15.247(i), §1.1307(b)(1) & §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 Spurious Emissions | Compliance |
| §15.247(a)(1) | 20 dB Bandwidth | Compliance |
| §15.247(a)(1) | Channel Separation Test | Compliance |
| §15.247(a)(1)(iii) | Time of Occupancy (Dwell Time) | Compliance |
| §15.247(a)(1)(iii) | Quantity of hopping channel Test | Compliance |
| §15.247(b)(1) | Peak Output Power Measurement | Compliance |
| §15.247(d) | Band Edges | Compliance |

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1093 - RF EXPOSURE

Applicable Standard

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

According to KDB 447498 D01 Mobile Portable RF Exposure v03r03, no SAR required if power is lower than the flowing threshold:

When routine evaluation is required for SAR and the output power is $\leq 60/f(\text{GHz})$ mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is $\leq 60/f(\text{GHz})$ mW or all measured 1-g SAR are < 0.4 W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

Measurement Result:

Max Peak output power:

2482.272 MHz: 21.40 dBm + 0 dBi=21.40 dBm=138.038 mW

$60/f_{\text{GHz}} = 60/2.482272 = 24.2$ mW

Max Peak output power $> 60/f_{\text{GHz}}$

So the SAR measurement is necessary.

Compliance: Please refer to the SAR report

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 monopole antenna connect to RF board, which in accordance to section 15.203, the maximum gain is 0 dBi; please refer to the internal photos.

Result: Compliance.

FCC §15.207(a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

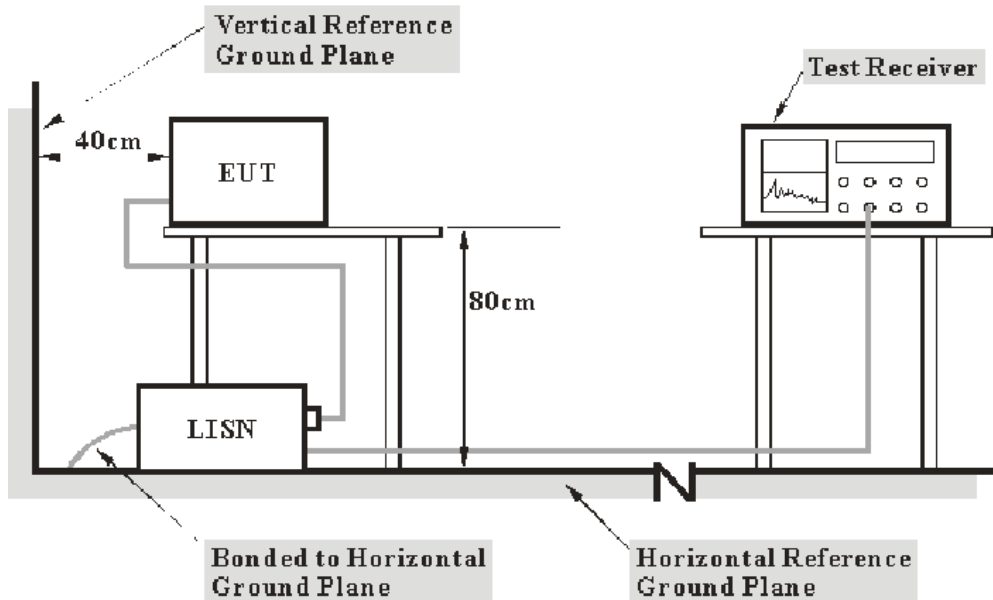
FCC§15.207

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 NIS 81, 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.

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 setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the 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:

| <i>Frequency Range</i> | <i>IF B/W</i> |
|------------------------|---------------|
| 150 kHz – 30 MHz | 9 kHz |

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCS30 | 830245/006 | 2010-03-03 | 2011-03-02 |
| Rohde & Schwarz | L.I.S.N. | ESH2-Z5 | 892107/021 | 2010-03-09 | 2011-03-08 |

* **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.

Test Procedure

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

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

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

Test 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:

13.90 dB at 0.400 MHz in the **Neutral** conductor mode

Test Data

Environmental Conditions

| | |
|---------------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

The testing was performed by Back Huang on 2010-10-31.

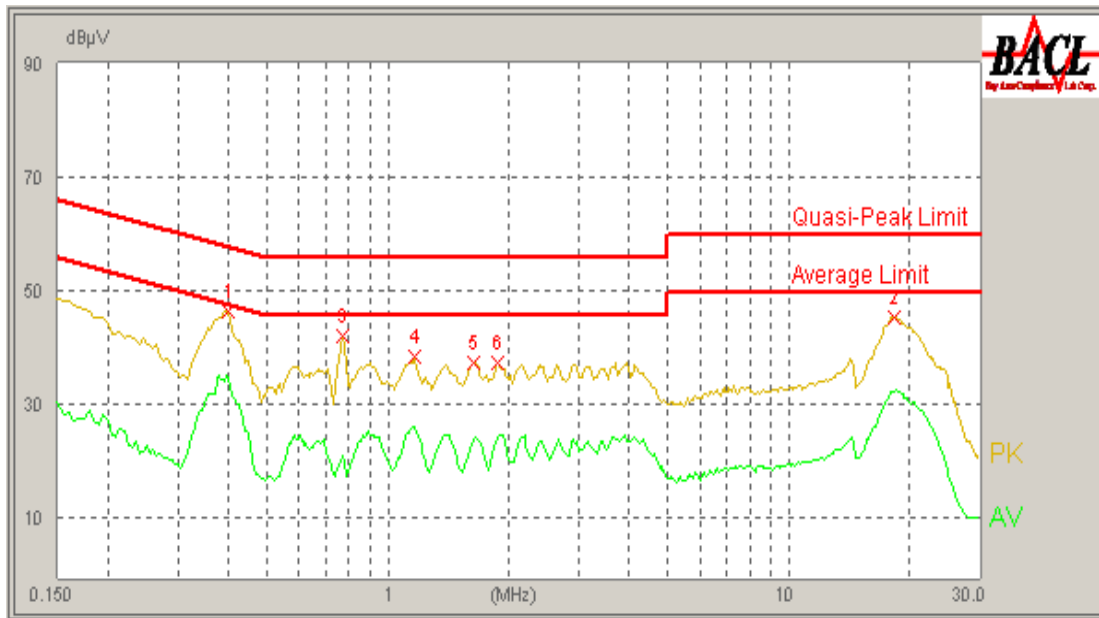
Test mode: Transmitting & charging

AC 120 V / 60 Hz, Line



| Conducted Emissions | | | FCC Part 15.207 | | |
|---------------------|------------------------|---------------------|-----------------|-------------|----------------------|
| Frequency (MHz) | Correction Factor (dB) | Cord. Result (dBµV) | Limit (dBµV) | Margin (dB) | Detector (PK/QP/Ave) |
| 0.390 | 10.00 | 42.33 | 59.14 | 16.81 | QP |
| 0.390 | 10.00 | 32.14 | 49.14 | 17.00 | Ave |
| 18.720 | 10.10 | 29.01 | 50.00 | 20.99 | Ave |
| 0.765 | 10.20 | 33.97 | 56.00 | 22.03 | QP |
| 18.630 | 10.10 | 36.88 | 60.00 | 23.12 | QP |
| 1.130 | 10.10 | 31.91 | 56.00 | 24.09 | QP |
| 0.700 | 10.20 | 31.79 | 56.00 | 24.21 | QP |
| 0.945 | 10.20 | 21.76 | 46.00 | 24.24 | Ave |
| 0.935 | 10.20 | 31.38 | 56.00 | 24.62 | QP |
| 1.135 | 10.10 | 21.36 | 46.00 | 24.64 | Ave |
| 0.700 | 10.20 | 21.18 | 46.00 | 24.82 | Ave |
| 0.775 | 10.20 | 17.59 | 46.00 | 28.41 | Ave |

AC 120 V / 60 Hz, Neutral:



| Conducted Emissions | | | FCC Part 15.207 | | |
|---------------------|------------------------|---------------------|-----------------|-------------|----------------------|
| Frequency (MHz) | Correction Factor (dB) | Cord. Result (dBµV) | Limit (dBµV) | Margin (dB) | Detector (PK/QP/Ave) |
| 0.400 | 10.00 | 34.96 | 48.86 | 13.90 | Ave |
| 0.400 | 10.00 | 42.80 | 58.86 | 16.06 | QP |
| 18.305 | 10.10 | 32.68 | 50.00 | 17.32 | Ave |
| 18.360 | 10.10 | 41.47 | 60.00 | 18.53 | QP |
| 1.165 | 10.10 | 26.41 | 46.00 | 19.59 | Ave |
| 1.160 | 10.10 | 35.13 | 56.00 | 20.87 | QP |
| 1.645 | 10.10 | 24.53 | 46.00 | 21.47 | Ave |
| 1.880 | 10.10 | 24.45 | 46.00 | 21.55 | Ave |
| 1.635 | 10.10 | 33.69 | 56.00 | 22.31 | QP |
| 1.875 | 10.10 | 33.59 | 56.00 | 22.41 | QP |
| 0.775 | 10.20 | 33.51 | 56.00 | 22.49 | QP |
| 0.775 | 10.20 | 21.48 | 46.00 | 24.52 | Ave |

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

Applicable Standard

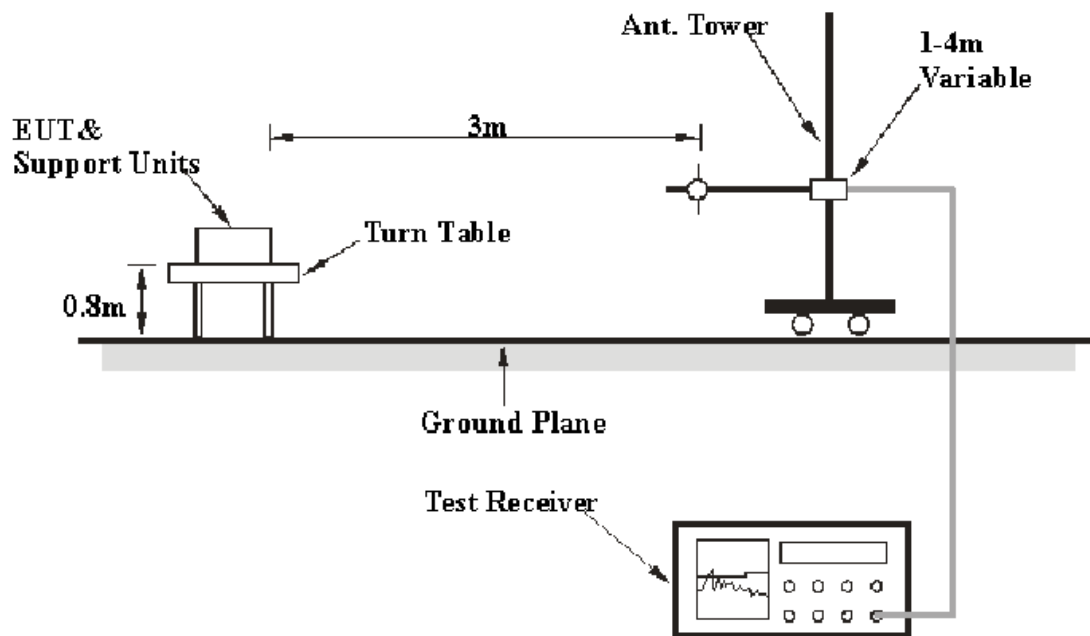
FCC §15.205; §15.209; §15.247(d)

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 NIS 81, 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.

EUT Setup



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.247 limits.

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

The spacing between the 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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|----------|---------------|------------------|----------------------|
| HP | Amplifier | HP8447D | 2944A09795 | 2010-08-02 | 2011-08-02 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-1 | 2010-03-11 | 2011-03-11 |
| HP | Amplifier | 2VA-213+ | T-E27H | 2010-03-08 | 2011-03-08 |
| Sunol Sciences | Horn Antenna | DRH-118 | A052604 | 2010-05-05 | 2011-05-04 |
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019 | 2010-07-08 | 2011-07-08 |

* **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 Procedure

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

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -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 Results Summary

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

Below 1 GHz:

6.4 dB at 35.281750 MHz in the Vertical polarization

Above 1 GHz:

3.52 dB at 4964.54 MHz in the Horizontal polarization (High Channel)

Test Data

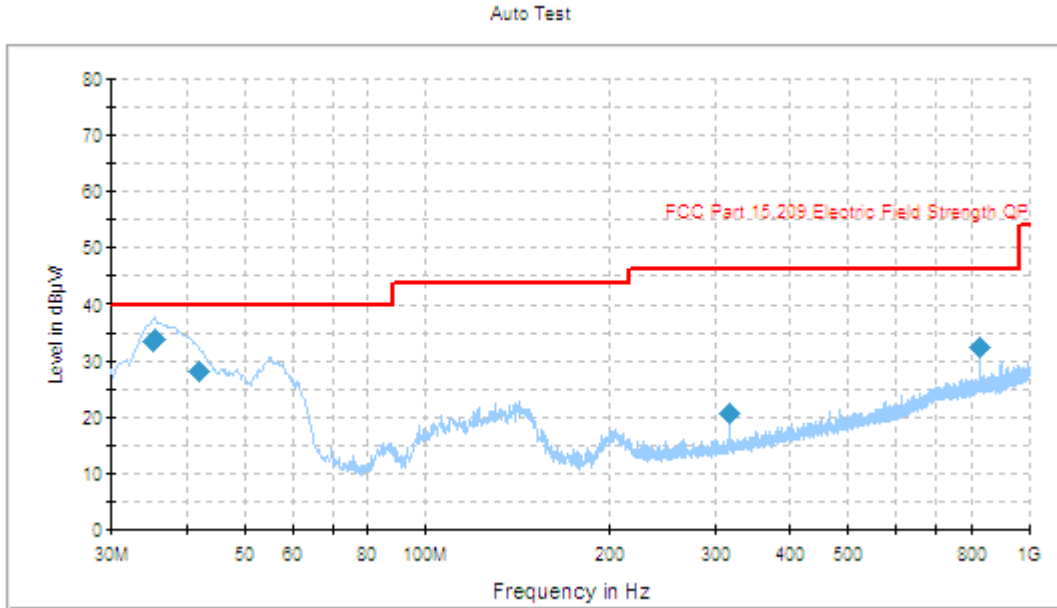
Environmental Conditions

| | |
|---------------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

** The testing was performed by Back Huang on 2010-10-30.*

Test mode: Transmitting & charging (worst case)

Below 1 GHz



| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Test Antenna | | Turntable Position (degree) | Correction Factor (dB) | Limit (dBµV/m) | Margin (dB) |
|-----------------|------------------------------|--------------|----------------|-----------------------------|------------------------|----------------|-------------|
| | | Height (cm) | Polarity (H/V) | | | | |
| 35.281750 | 33.6 | 105.0 | V | 27.0 | -9.0 | 40.0 | 6.4 |
| 42.157500 | 28.2 | 104.0 | V | 0.0 | -13.4 | 40.0 | 11.8 |
| 824.432000 | 32.6 | 104.0 | H | 277.0 | -0.5 | 46.0 | 13.4 |
| 317.362500 | 20.6 | 103.0 | V | 211.0 | -18.0 | 46.0 | 25.4 |

Note: The data which below 20dB to the limit was not recorded.

Above 1 GHz:

| Frequency (MHz) | S.A. Reading (dB μ V) | Detector (PK/QP/Ave) | Direction (Degree) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dB μ V/m) | Part 15.247/209 | |
|--------------------------------------|---------------------------|----------------------|--------------------|--------------|-------------|---------------|-----------------|--------------------|---------------------------|----------------------|-------------|
| | | | | Height (m) | Polar (H/V) | Factor (dB/m) | | | | Limit (dB μ V/m) | Margin (dB) |
| Low Channel (2401.056 MHz) | | | | | | | | | | | |
| 4802.11 | 38.67 | Ave | 160 | 1.2 | H | 34.0 | 4.30 | 26.79 | 50.18 | 54 | 3.82* |
| 7203.17 | 33.77 | Ave | 70 | 1.2 | V | 37 | 5.22 | 26.62 | 49.37 | 54 | 4.63 |
| 7203.17 | 34.24 | Ave | 80 | 1.2 | H | 36.5 | 5.22 | 26.62 | 49.34 | 54 | 4.66 |
| 4802.11 | 36.36 | Ave | 150 | 1.2 | V | 33.8 | 4.30 | 26.79 | 47.67 | 54 | 6.33 |
| 4802.11 | 54.21 | PK | 180 | 1.2 | H | 34.0 | 4.30 | 26.79 | 65.72 | 74 | 8.28 |
| 4802.11 | 53.78 | PK | 180 | 1.2 | V | 33.8 | 4.30 | 26.79 | 65.09 | 74 | 8.91 |
| 7203.17 | 48.64 | PK | 70 | 1.2 | H | 36.5 | 5.22 | 26.62 | 63.74 | 74 | 10.26 |
| 7203.17 | 47.11 | PK | 60 | 1.2 | V | 37 | 5.22 | 26.62 | 62.71 | 74 | 11.29 |
| 1184.53 | 34.53 | Ave | 12 | 1.2 | H | 25.3 | 2.03 | 26.51 | 35.35 | 54 | 18.65 |
| 1184.53 | 33.26 | Ave | 35 | 1.2 | V | 23.8 | 2.03 | 26.51 | 32.58 | 54 | 21.42 |
| 1184.53 | 46.84 | PK | 20 | 1.2 | H | 25.3 | 2.03 | 26.51 | 47.66 | 74 | 26.34 |
| 1184.53 | 45.87 | PK | 20 | 1.2 | V | 23.8 | 2.03 | 26.51 | 45.19 | 74 | 28.81 |
| Middle Channel (2440.800 MHz) | | | | | | | | | | | |
| 4881.60 | 37.81 | Ave | 175 | 1 | H | 33.8 | 4.31 | 26.78 | 49.14 | 54 | 4.86 |
| 7322.40 | 33.61 | Ave | 15 | 1.1 | H | 36.4 | 5.13 | 26.61 | 48.53 | 54 | 5.47 |
| 4881.60 | 36.93 | Ave | 185 | 1.1 | V | 33.6 | 4.31 | 26.78 | 48.06 | 54 | 5.94 |
| 7322.40 | 30.53 | Ave | 10 | 1 | V | 37 | 5.13 | 26.61 | 46.05 | 54 | 7.95 |
| 4881.60 | 54.22 | PK | 180 | 1.2 | H | 33.8 | 4.31 | 26.78 | 65.55 | 74 | 8.45 |
| 4881.60 | 54.31 | PK | 180 | 1.2 | V | 33.6 | 4.31 | 26.78 | 65.44 | 74 | 8.56 |
| 7322.40 | 46.39 | PK | 0 | 1.2 | V | 37 | 5.13 | 26.61 | 61.91 | 74 | 12.09 |
| 7322.40 | 47.41 | PK | 0 | 1 | H | 33.8 | 5.13 | 26.61 | 59.73 | 74 | 14.27 |
| 1220.31 | 31.65 | Ave | 30 | 1 | H | 25.3 | 2.04 | 26.51 | 32.48 | 54 | 21.52 |
| 1448.89 | 31.03 | Ave | 45 | 0 | V | 25.5 | 2.24 | 26.65 | 32.12 | 54 | 21.88 |
| 1220.31 | 45.12 | PK | 45 | 1.2 | H | 25.3 | 2.04 | 26.51 | 45.95 | 74 | 28.05 |
| 1448.89 | 44.05 | PK | 30 | 1 | V | 25.5 | 2.24 | 26.65 | 45.14 | 74 | 28.86 |
| High Channel (2482.272 MHz) | | | | | | | | | | | |
| 4964.54 | 38.23 | Ave | 0 | 1 | H | 34.6 | 4.40 | 26.75 | 50.48 | 54 | 3.52* |
| 4964.54 | 37.06 | Ave | 20 | 1 | V | 34.7 | 4.40 | 26.75 | 49.41 | 54 | 4.59 |
| 7446.82 | 32.78 | Ave | 15 | 1 | V | 37 | 5.25 | 26.59 | 48.44 | 54 | 5.56 |
| 7446.82 | 33.24 | Ave | 0 | 1.1 | H | 36.3 | 5.25 | 26.59 | 48.2 | 54 | 5.8 |
| 4964.54 | 55.33 | PK | 20 | 1.2 | H | 34.6 | 4.40 | 26.75 | 67.58 | 74 | 6.42 |
| 4964.54 | 55.09 | PK | 0 | 1.2 | V | 34.7 | 4.40 | 26.75 | 67.44 | 74 | 6.56 |
| 7446.82 | 45.33 | PK | 10 | 1 | H | 36.3 | 5.25 | 26.59 | 60.29 | 74 | 13.71 |
| 7446.82 | 44.61 | PK | 10 | 1.2 | V | 37 | 5.25 | 26.59 | 60.27 | 74 | 13.73 |
| 1450.9 | 31.87 | Ave | 30 | 1 | H | 26.5 | 2.24 | 26.65 | 33.96 | 54 | 20.04 |
| 1450.9 | 30.26 | Ave | 0 | 1 | V | 25.5 | 2.24 | 26.65 | 31.35 | 54 | 22.65 |
| 1450.9 | 44.45 | PK | 0 | 1.2 | H | 26.5 | 2.24 | 26.65 | 46.54 | 74 | 27.46 |
| 1450.9 | 44.83 | PK | 30 | 1 | V | 25.5 | 2.24 | 26.65 | 45.92 | 74 | 28.08 |

*Within measurement uncertainty.

Spurious Emissions in Restrict Band:

| Frequency (MHz) | S.A. Reading (dB μ V) | Detector (PK/QP/Ave) | Direction (Degree) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dB μ V/m) | Part 15.247/209/205 | |
|-----------------|---------------------------|----------------------|--------------------|--------------|-------------|---------------|-----------------|--------------------|---------------------------|----------------------|-------------|
| | | | | Height (m) | Polar (H/V) | Factor (dB/m) | | | | Limit (dB μ V/m) | Margin (dB) |
| 2487.58 | 31.25 | Ave | 0 | 1 | H | 30.6 | 3.01 | 26.83 | 38.03 | 54 | 15.97 |
| 2385.34 | 31.71 | Ave | 0 | 1 | H | 30.1 | 3.01 | 26.83 | 37.99 | 54 | 16.01 |
| 2385.34 | 30.87 | Ave | 0 | 1 | V | 30.1 | 3.01 | 26.83 | 37.15 | 54 | 16.85 |
| 2487.58 | 30.36 | Ave | 0 | 1 | V | 30.6 | 3.01 | 26.83 | 37.14 | 54 | 16.86 |
| 2487.58 | 43.29 | PK | 10 | 1 | H | 30.6 | 3.01 | 26.83 | 50.07 | 74 | 23.93 |
| 2487.58 | 43.18 | PK | 0 | 1.2 | V | 30.6 | 3.01 | 26.83 | 49.96 | 74 | 24.04 |
| 2385.34 | 43.65 | PK | 20 | 1.2 | H | 30.1 | 3.01 | 26.83 | 49.93 | 74 | 24.07 |
| 2385.34 | 42.83 | PK | 30 | 1.2 | V | 30.1 | 3.01 | 26.83 | 49.11 | 74 | 24.89 |

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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

Test Data

Environmental Conditions

| | |
|--------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

* The testing was performed by Back Huang on 2010-10-28.

Test Result: Compliance.

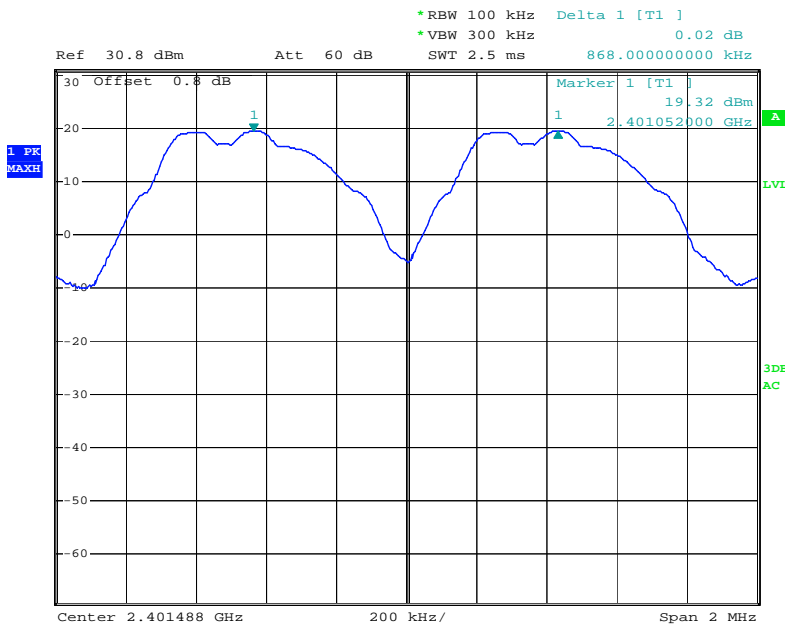
Please refer to following tables and plots

Test Mode: Transmitting

| Channel | Frequency (MHz) | Channel Separation (MHz) | Limit (MHz) | Result |
|----------|-----------------|--------------------------|-------------|--------|
| Low | 2401.056 | 0.868 | 0.440 | Pass |
| Adjacent | 2401.920 | | | |
| Middle | 2440.800 | 0.864 | 0.445 | Pass |
| Adjacent | 2439.936 | | | |
| High | 2482.272 | 0.868 | 0.443 | Pass |
| Adjacent | 2481.408 | | | |

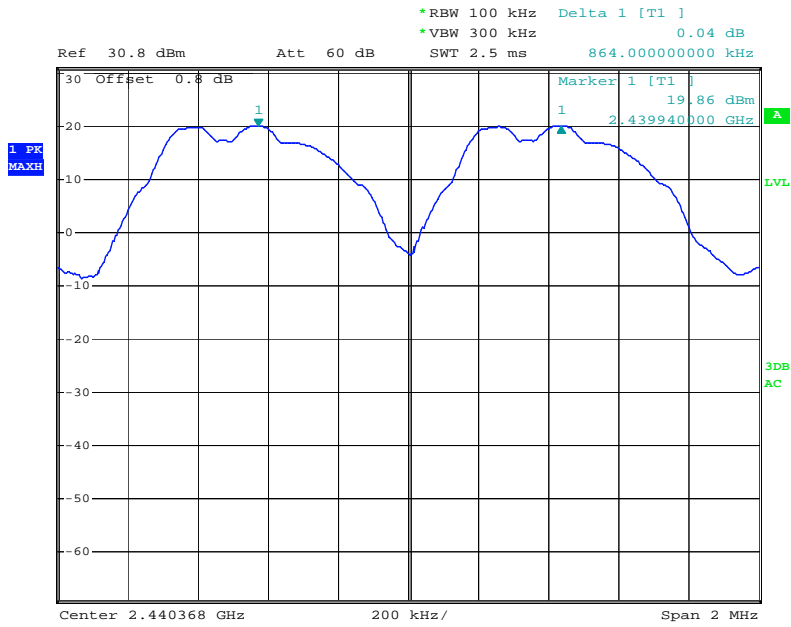
Please refer to the following plots.

Low Channel



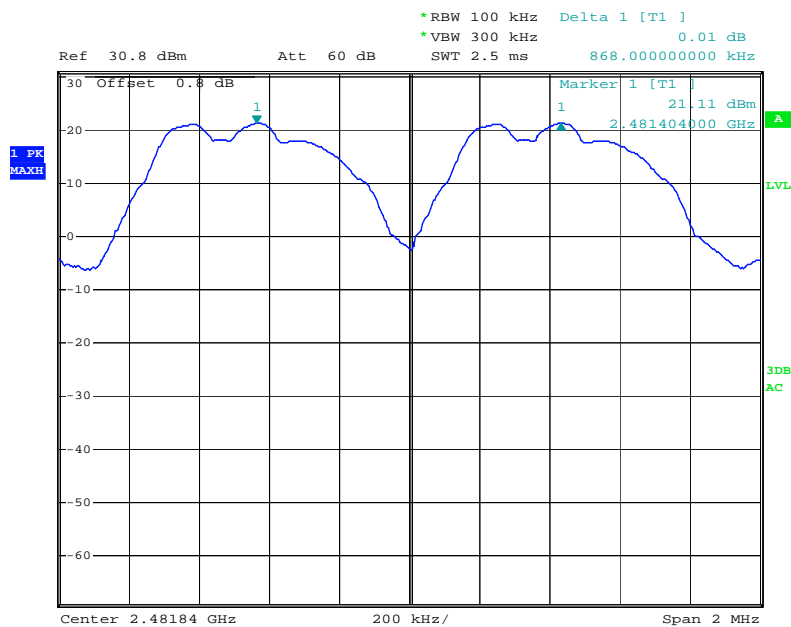
Date: 28.OCT.2010 13:59:58

Middle Channel



Date: 28.OCT.2010 14:10:13

High Channel



Date: 28.OCT.2010 14:20:58

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

Applicable Standard

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

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 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 Data

Environmental Conditions

| | |
|--------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

* *The testing was performed by Back Huang on 2010-10-28.*

Test Result: Compliance.

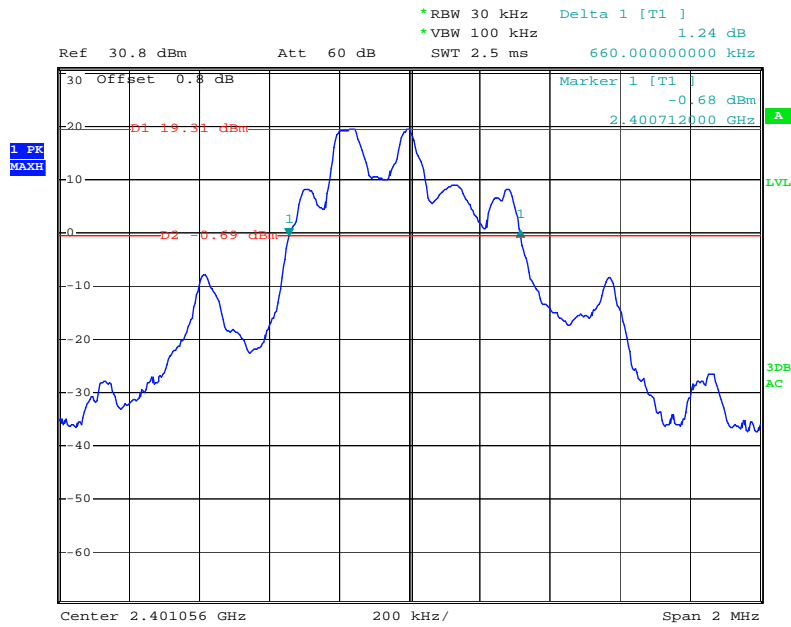
Please refer to following tables and plots

Test Mode: Transmitting

| Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---------|-----------------|-----------------------|
| Low | 2401.056 | 0.660 |
| Middle | 2440.800 | 0.668 |
| High | 2482.272 | 0.664 |

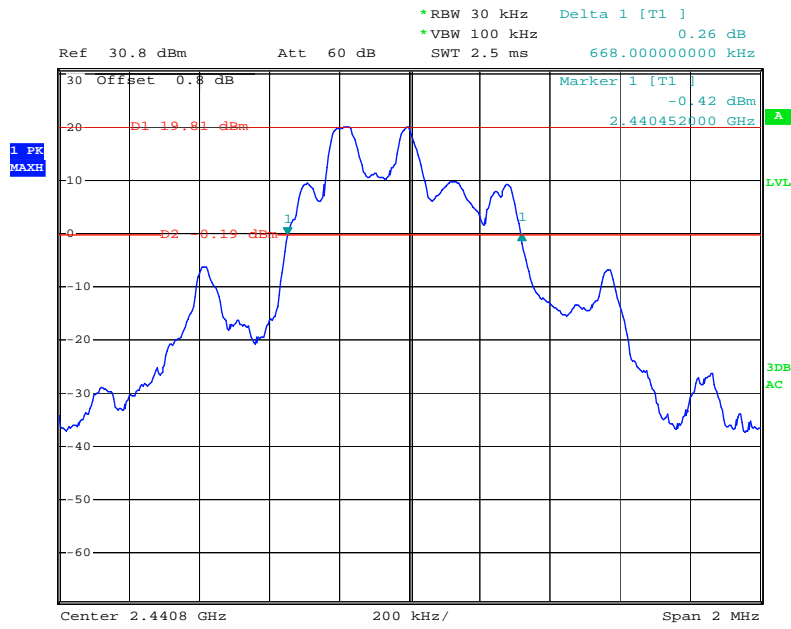
Please refer to the following plots.

Low Channel



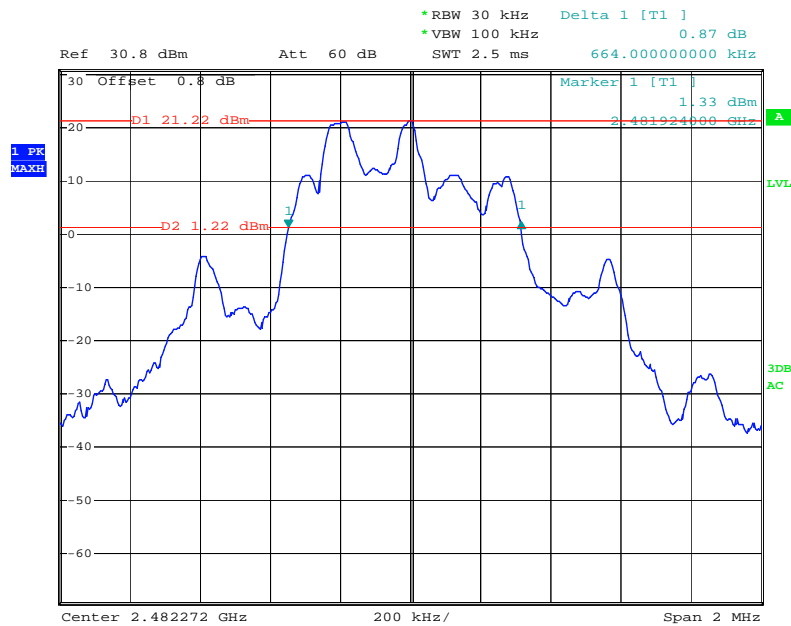
Date: 28.OCT.2010 13:40:07

Middle Channel



Date: 28.OCT.2010 13:43:29

High Channel



Date: 28.OCT.2010 13:47:59

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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 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 Data

Environmental Conditions

| | |
|--------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

The testing was performed by Back Huang on 2010-10-28.

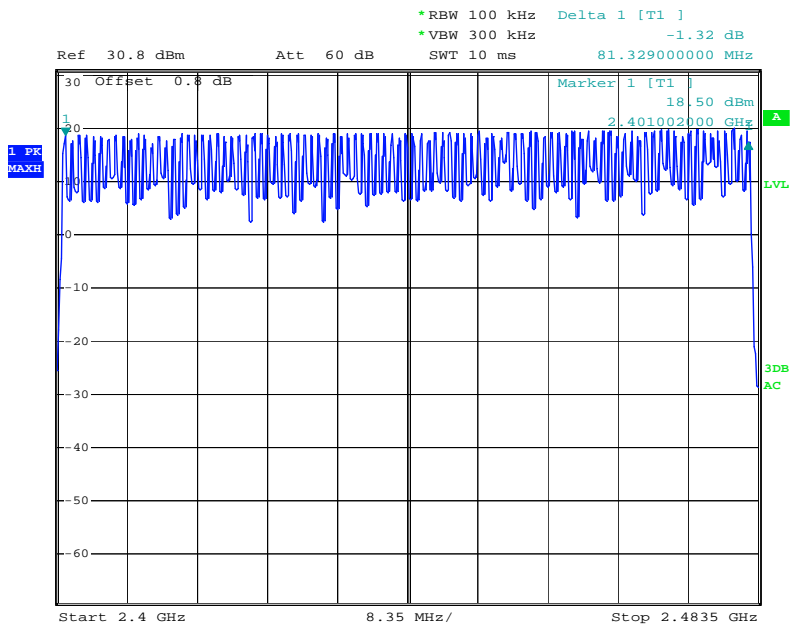
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

| Frequency Range (MHz) | Number of Hopping Channel (CH) | Limit (CH) |
|-----------------------|--------------------------------|------------|
| 2400~2483.5 | 95 | ≥ 15 |

Number of Hopping Channels



Date: 28.OCT.2010 15:17:12

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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---------------------|--------------------|--------------|----------------------|-------------------------|-----------------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 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*(600/2/95)*38S

Test Data

Environmental Conditions

| | |
|---------------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

* *The testing was performed by Back Huang on 2010-10-29.*

Test Result: Compliance.

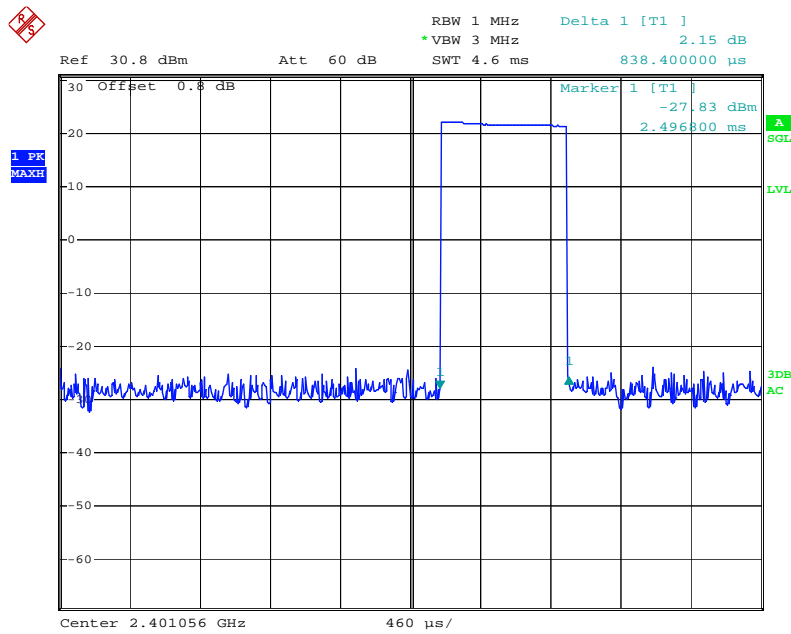
Please refer to following tables and plots

Test Mode: Transmitting

| Channel | Pulse Width (ms) | Dwell Time (s) | Limit (s) | Result |
|--|------------------|----------------|-----------|--------|
| Low | 0.8384 | 0.100608 | 0.4 | Pass |
| Middle | 0.8556 | 0.102672 | 0.4 | Pass |
| High | 0.8464 | 0.101568 | 0.4 | Pass |
| <i>Note:</i> Dwell time= Pulse time*(600/2/95)*38S | | | | |

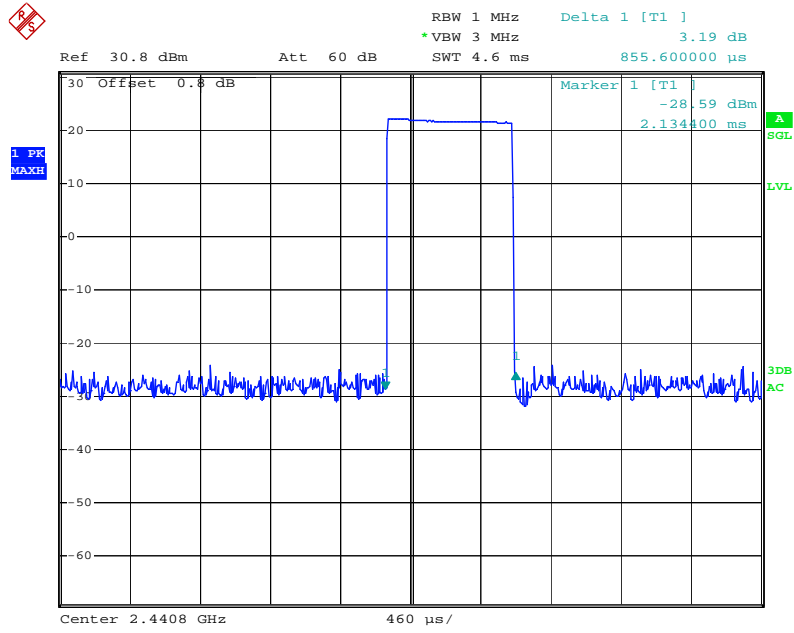
Please refer to the following plots.

Low Channel



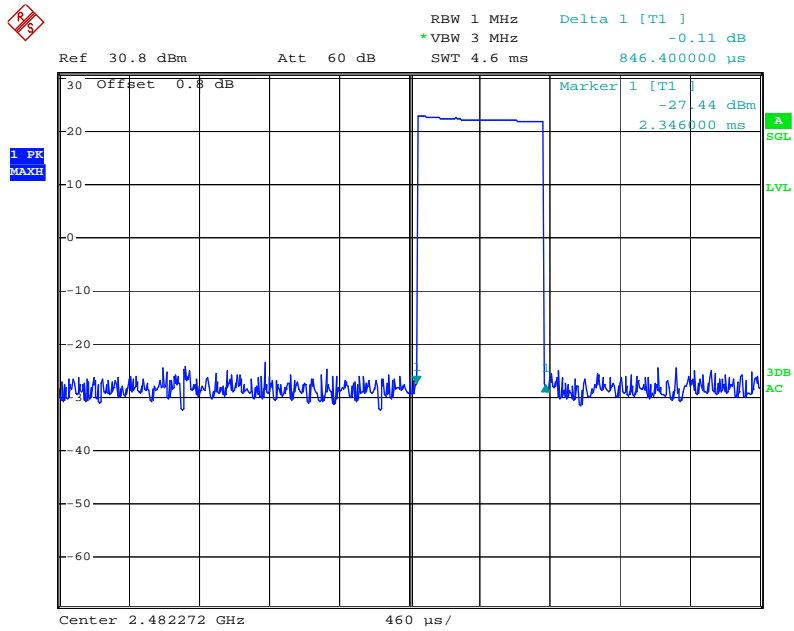
Date: 29.OCT.2010 09:18:37

Middle Channel



Date: 29.OCT.2010 09:21:57

High Channel



Date: 29.OCT.2010 09:24:18

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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 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 Data

Environmental Conditions

| | |
|---------------------------|---------|
| Temperature: | 25 °C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

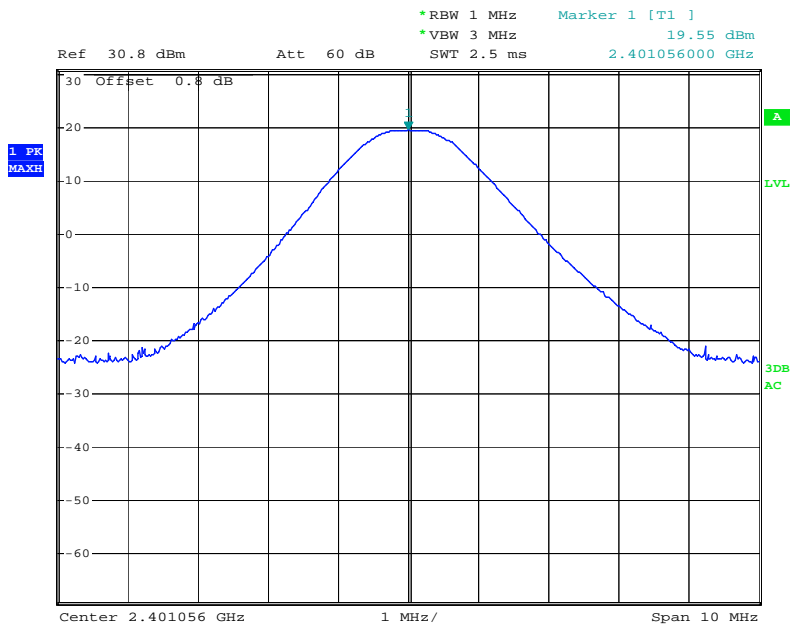
* The testing was performed by Back Huang on 2010-10-28.

Test Result: Compliance.

Test Mode: Transmitting

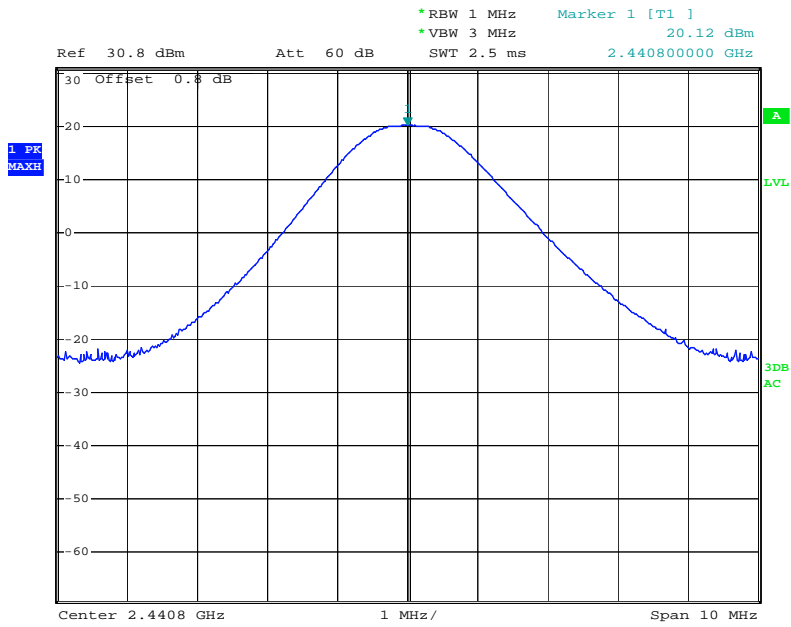
| Channel | Frequency (MHz) | Conducted Output Power | | Limit (mW) |
|---------|-----------------|------------------------|---------|------------|
| | | (dBm) | (mW) | |
| Low | 2401.056 | 19.55 | 90.157 | 1000 |
| Middle | 2440.800 | 20.12 | 102.802 | 1000 |
| High | 2482.272 | 21.40 | 138.038 | 1000 |

Low Channel



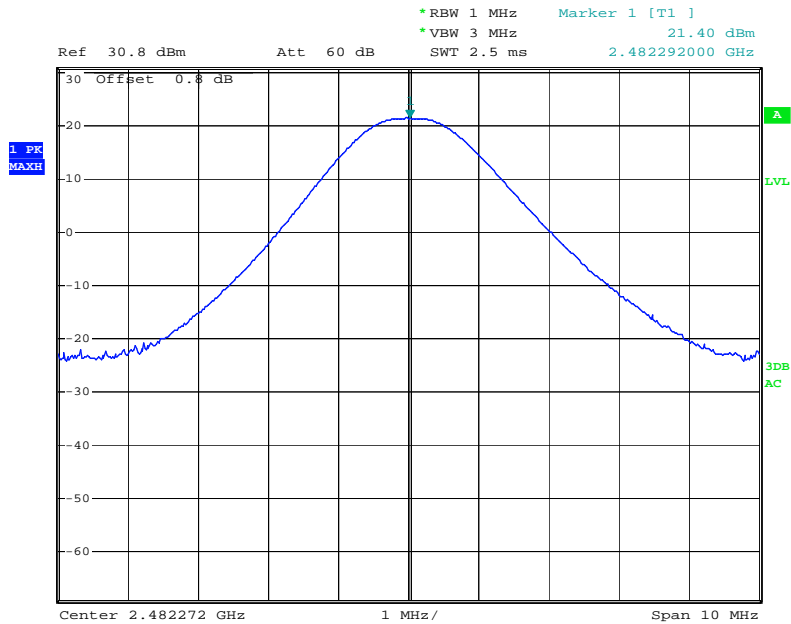
Date: 28.OCT.2010 14:27:47

Middle Channel



Date: 28.OCT.2010 14:28:46

High Chanel



Date: 28.OCT.2010 14:29:55

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 Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2009-11-24 | 2010-11-24 |

* **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 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 both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1 MHz, VBW=3 MHz.
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 Data

Environmental Conditions

| | |
|---------------------------|---------|
| Temperature: | 25 ° C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101 kPa |

**The testing was performed by Back Huang on 2010-11-01*

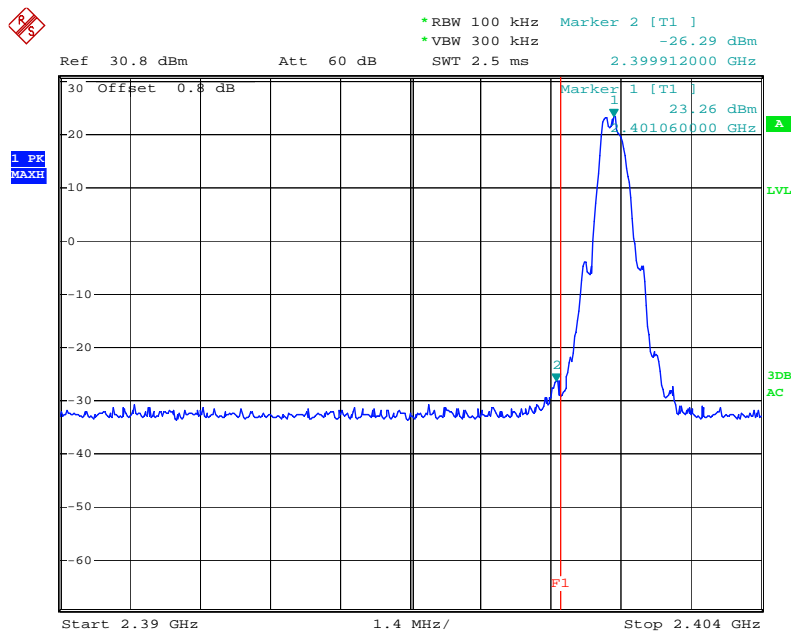
Test Result: Compliance

Please refer to the following table and plots.

Test Mode: Transmitting

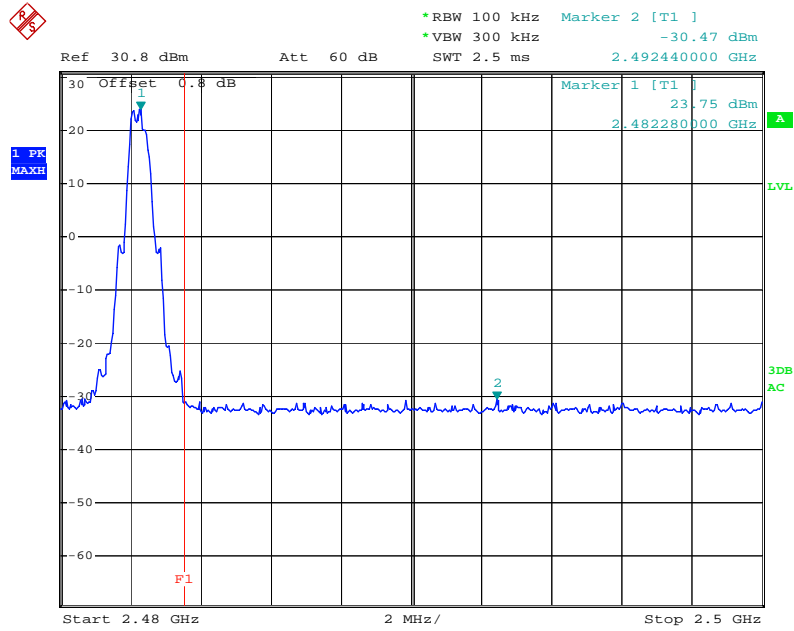
| Frequency (MHz) | Delta Peak to Band Emission (dBc) | Limit (dBc) |
|-----------------|-----------------------------------|-------------|
| 2399.912 | 49.55 | 20 |
| 2492.440 | 54.22 | 20 |

Band Edge: Left Side



Date: 1.NOV.2010 13:33:28

Band Edge: Right Side



Date: 1.NOV.2010 13:42:59

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