Lab Code: 200707-0

# FCC PART 15.247

# EMI MEASUREMENT AND TEST REPORT

For

## COMSYSTEMS (IWC GROUP)

3888 Mannix Dr.#318,Naples, FL, 34114,USA

**FCC ID: UQKCOM101080906B**

October 30, 2006

| **This Report Concerns:** ☒ Original Report | **Equipment Type:** Wireless Earphone For Motorcycle Helmet (Base) |
|---|---|
| **Test Engineer:** | Deny Xiong |
| **Report No.:** | RSZ06101102 |
| **Test Date:** | October 25, 2006 |
| **Reviewed By:** | EMC Engineer: Boni Baniqued |
| **Prepared By:** | Bay Area Compliance Laboratory Corp. (Shenzhen)<br>6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008 |

## TABLE OF CONTENTS

# GENERAL INFORMATION

## Product Description for Equipment Under Test (EUT)

The *COMSYSTEMS (IWC GROUP)*'s product, model number: COM101 or the "EUT" as referred to in this report is a *Wireless Earphone For Motorcycle Helmet (Base)*, which measures approximately: 6.6 cm L x 5.6 cm W x 1.1 cm H, rated input voltage: Battery 3.7V.

** The test data gathered are from production sample, serial number: 0610007. Provided by the manufacturer, we receive the EUT on 2006-10-11.*

## Objective

This Type approval report is prepared on behalf of *COMSYSTEMS (IWC GROUP)* 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, 15.209 and 15.247 rules.

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

No related submittal(s).

## 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 Laboratory 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 Laboratory 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 518038, P.R.China.

Test site at Bay Area Compliance Laboratory 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 04, 2004. 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 and Industrial Canada registration test site No.: 5500A. 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 Laboratory 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/ts/htdocs/210/214/scopes/2007070.htm

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

## EUT Exercise Software

The exercise software is Bluetest.

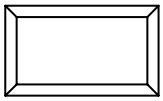
## Special Accessories

The special Accessories were provided by Bay Area Compliance Laboratory Corp. (Shenzhen).

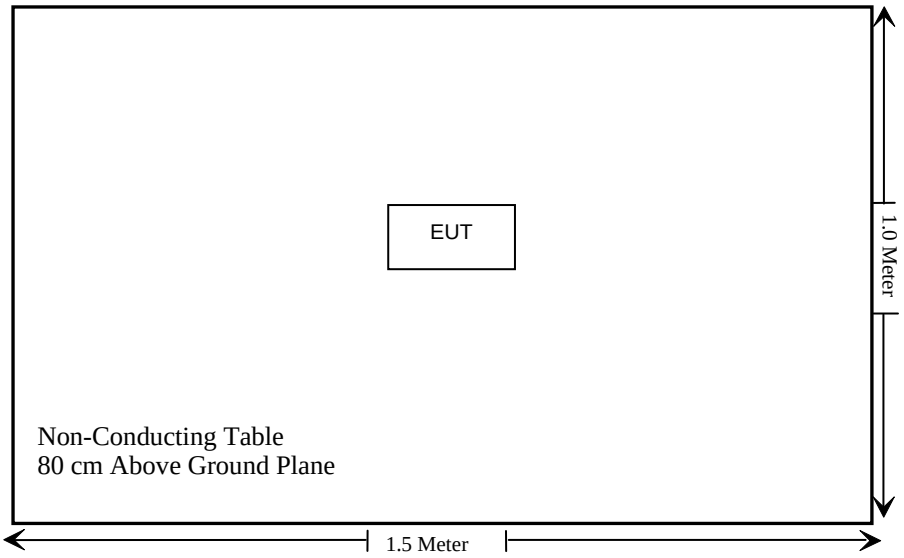
## Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

## Configuration of Test Setup




## Block Diagram of Test Setup



# SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST | RESULT |
|---|---|---|
| §15.247 (b) | RF Exposure | Compliant |
| §15.203 | Antenna Requirement | Compliant |
| §15.205 | Restricted Band | Compliant |
| §15.205, §15.209, §15.247(d) | Radiated Emission | Compliant |
| §15.247 (a)(1) | 20 dB Bandwidth | Compliant |
| §15.247(a)(1) | Channel Separation Test | Compliant |
| §15.247(a)(1)(iii) | Dwell Time | Compliant |
| §15.247(a)(1)(iii) | Number of hopping channel | Compliant |
| §15.247(b)(1) | Peak Output Power | Compliant |
| §15.247(d) | Band edges testing | Compliant |

# §15.203 - ANTENNA REQUIREMENT

## Standard Applicable

According to § 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.

And according to § 15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## Antenna Connector Construction

The EUT has a permanently attached antenna which, in accordance to the above sections, is considered sufficient to comply with the provisions of these sections. Please see EUT photo for details.

**Result:** Compliance.

# §15.205, §15.209, §15.247 - RADIATED EMISSION

## Applicable Standard

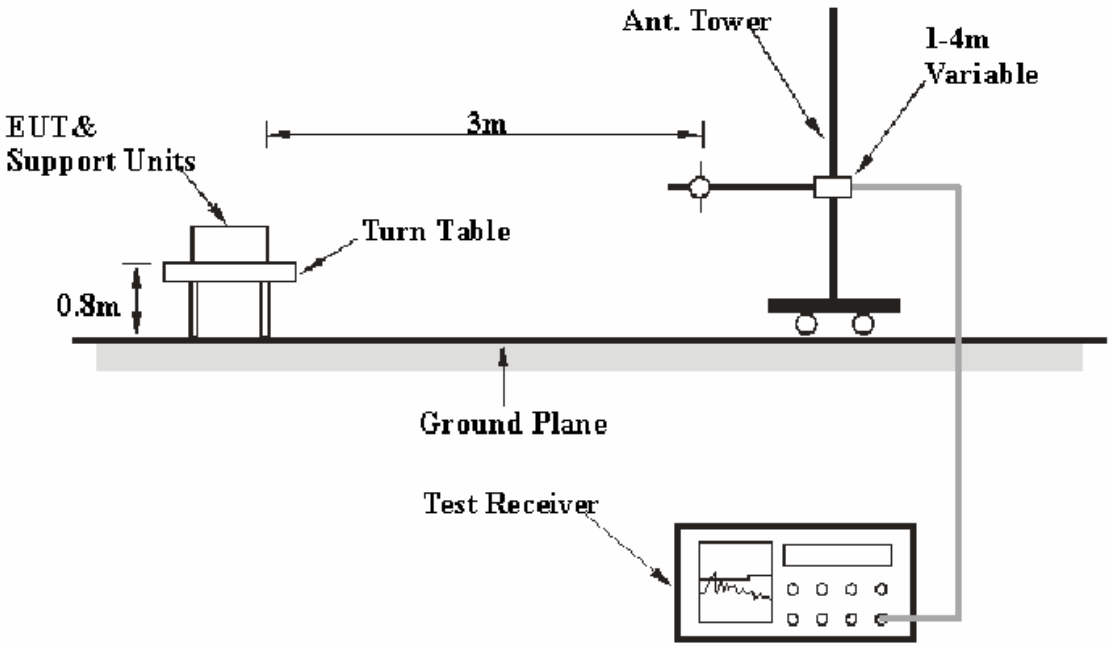
According to FCC §15.247 (d)

## 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 Laboratory Corp. (Shenzhen) is ±4.0 dB.

## EUT Setup




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

## 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*** |
|---|---|---|
| 30MHz – 1000 MHz | 100 kHz | 300 kHz |
| 1000 MHz – 25 GHz | 1 MHz | 3 MHz |

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| A.H. System | Horn Antenna | SAS-200/571 | 135 | 2006-4-28 | 2007-4-28 |
| HP | Amplifier | HP8447D | 2944A09795 | 2006-8-17 | 2007-8-17 |
| HP | Preamplifier | 8449B | 3008A00277 | 2006-8-17 | 2007-8-17 |
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019 | 2005-11-10 | 2006-11-10 |
| Rohde&Schwarz | EMI Test Receiver | ESCI | 100035 | 2006-8-17 | 2007-8-17 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-1 | 2006-4-28 | 2007-4-28 |

*** 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

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

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Meter Reading + Antenna Loss + Cable Loss- Amplifier Gain

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

Margin = Cord. Amp. - Limit

## Test Results Summary

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

**-10.12 dB** at **7215 MHz** in the **Vertical** polarization: Low Channel
**-11.13 dB** at **4880 MHz** in the **Vertical** polarization: Middle Channel
**-10.20 dB** at **9916 MHz** in the **Vertiical** polarization: High Channel
**17.6 dB** at **454.662425 MHz** in the **Horizontal** polarization: 30MHz-1000MHz

## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 25 ° C |
| Relative Humidity: | 52% |
| ATM Pressure: | 1009mbar |

*The testing was performed by Deny Xiong on 2006-10-24.*

*Test Mode: Transmitting (Low Channel)*

| Frequency | Meter Reading | Detector | Direction | Height | Polar | Antenna Factor | Cable loss | Amplifier Gain | Cord. Amp. | FCC Part 15.247 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | PK/QP/AV | Degree | Meter | H / V | dB/m | dB | dB | dBuV/m | Limit dBuV/m | Margin dB | Remarks |
| Low Channel | | | | | | | | | | | | |
| 2405 | 98.83 | PK | 20 | 1.2 | H | 27.4 | 3.61 | 35.0 | 94.84 | | | Fundamental |
| 2405 | 59.83 | AV | 263 | 1.4 | H | 27.4 | 3.61 | 35.0 | 55.84 | | | Fundamental |
| 2405 | 97.67 | PK | 18 | 1.6 | V | 27.4 | 3.61 | 35.0 | 93.68 | | | Fundamental |
| 2405 | 59.67 | AV | 45 | 1.0 | V | 27.4 | 3.61 | 35.0 | 55.68 | | | Fundamental |
| 7215 | 37.67 | AV | 90 | 1.2 | V | 35.4 | 4.51 | 33.7 | 43.88 | 54 | -10.12 | Harmonic |
| 4810 | 41.17 | AV | 180 | 1.6 | V | 31.3 | 4.64 | 33.4 | 43.71 | 54 | -10.29 | Harmonic |
| 4810 | 40.17 | AV | 270 | 1.6 | H | 31.3 | 4.64 | 33.4 | 42.71 | 54 | -11.29 | Harmonic |
| 9620 | 33.67 | AV | 238 | 1.5 | H | 37.6 | 5.35 | 34.1 | 42.52 | 54 | -11.48 | Harmonic |
| 9620 | 33.37 | AV | 158 | 1.3 | V | 37.6 | 5.35 | 34.1 | 42.22 | 54 | -11.78 | Harmonic |
| 7215 | 35.67 | AV | 261 | 1.0 | H | 35.4 | 4.51 | 33.7 | 41.88 | 54 | -12.12 | Harmonic |
| 4810 | 58.17 | PK | 250 | 1.0 | V | 31.3 | 4.64 | 33.4 | 60.71 | 74 | -13.29 | Harmonic |
| 4810 | 56.33 | PK | 49 | 1.2 | H | 31.3 | 4.64 | 33.4 | 58.87 | 74 | -15.13 | Harmonic |
| 7215 | 50.0 | PK | 180 | 1.0 | V | 35.4 | 4.51 | 33.7 | 56.21 | 74 | -17.79 | Harmonic |
| 7215 | 48.83 | PK | 180 | 1.3 | H | 35.4 | 4.51 | 33.7 | 55.04 | 74 | -18.96 | Harmonic |
| 9620 | 45.67 | PK | 158 | 1.3 | V | 37.6 | 5.35 | 34.1 | 54.52 | 74 | -19.48 | Harmonic |
| 9620 | 44.83 | PK | 158 | 1.6 | H | 37.6 | 5.35 | 34.1 | 53.68 | 74 | -20.32 | Harmonic |

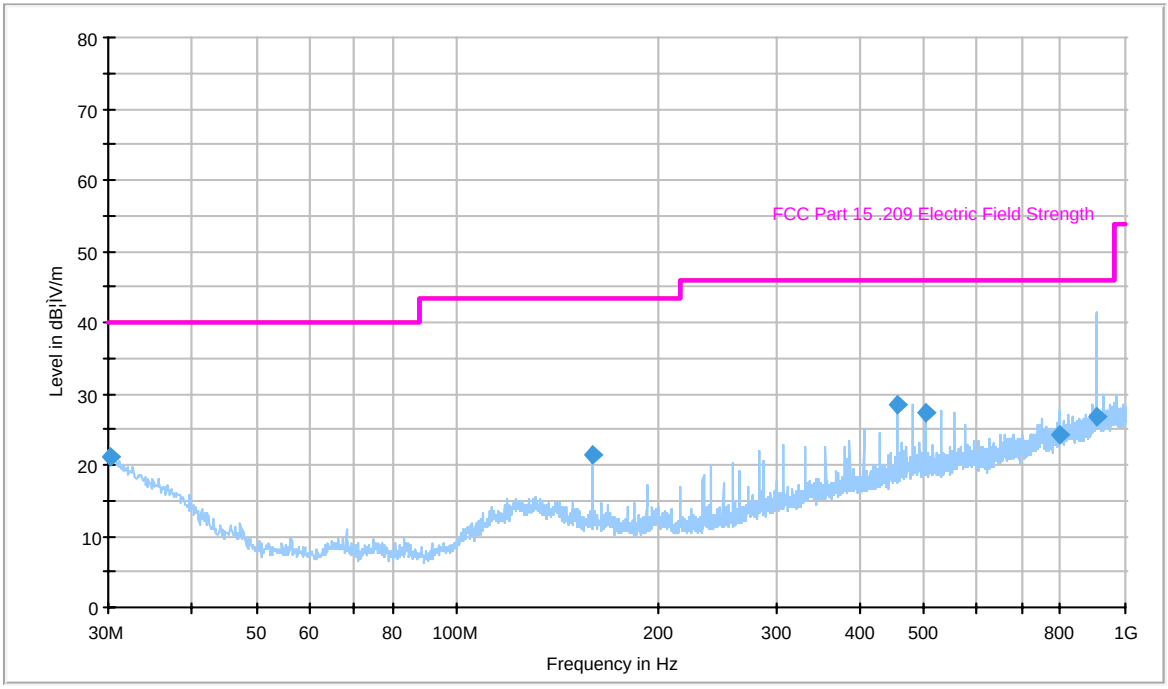
*Test Mode: Transmitting: (Middle Channel)*

| Frequency | Meter Reading | Detector | Direction | Height | Polar | Antenna Factor | Cable loss | Amplifier Gain | Cord. Amp. | FCC Part 15.247 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | PK/QP/AV | Degree | Meter | H / V | dB/m | dB | dB | dBuV/m | Limit dBuV/m | Margin dB | Remarks |
| Middle Channel | | | | | | | | | | | | |
| 2440 | 97.5 | PK | 197 | 1.6 | H | 27.4 | 3.61 | 35.0 | 93.51 | | | Fundamental |
| 2440 | 59.5 | AV | 197 | 1.6 | H | 27.4 | 3.61 | 35.0 | 55.51 | | | Fundamental |
| 2440 | 94.83 | PK | 182 | 1.2 | V | 27.4 | 3.61 | 35.0 | 90.84 | | | Fundamental |
| 2440 | 58.67 | AV | 182 | 1.2 | V | 27.4 | 3.61 | 35.0 | 54.68 | | | Fundamental |
| 4880 | 40.33 | AV | 180 | 1.6 | V | 31.3 | 4.64 | 33.4 | 42.87 | 54 | -11.13 | Harmonic |
| 7320 | 36.17 | AV | 45 | 1.0 | H | 35.3 | 4.75 | 33.7 | 42.52 | 54 | -11.48 | Harmonic |
| 4880 | 39.5 | AV | 109 | 1.2 | H | 31.3 | 4.64 | 33.4 | 42.04 | 54 | -11.96 | Harmonic |
| 7320 | 53.03 | PK | 90 | 1.2 | V | 35.3 | 4.75 | 33.7 | 59.38 | 74 | -14.62 | Harmonic |
| 4880 | 56.17 | PK | 45 | 1.0 | V | 31.3 | 4.64 | 33.4 | 58.71 | 74 | -15.29 | Harmonic |
| 4880 | 55.0 | PK | 109 | 1.2 | H | 31.3 | 4.64 | 33.4 | 57.54 | 74 | -16.46 | Harmonic |
| 9760 | 46.83 | PK | 256 | 1.5 | H | 38.2 | 5.77 | 34.1 | 56.7 | 74 | -17.30 | Harmonic |
| 7320 | 50.17 | PK | 180 | 1.0 | H | 35.3 | 4.75 | 33.7 | 56.52 | 74 | -17.48 | Harmonic |
| 9760 | 46.0 | PK | 130 | 1.3 | V | 38.2 | 5.77 | 34.1 | 55.87 | 74 | -18.13 | Harmonic |
| 7320 | 39.0 | AV | 90 | 1.2 | V | 35.3 | 4.75 | 33.7 | 45.35 | 54 | -8.65 | Harmonic |
| 9760 | 34.5 | AV | 256 | 1.5 | H | 38.2 | 5.77 | 34.1 | 44.37 | 54 | -9.63 | Harmonic |
| 9760 | 34.33 | AV | 130 | 1.3 | V | 38.2 | 5.77 | 34.1 | 44.2 | 54 | -9.80 | Harmonic |

*Test Mode: Transmitting (High Channel)*

| Frequency | Meter Reading | Detector | Direction | Height | Polar | Antenna Factor | Cable loss | Amplifier Gain | Cord. Amp. | FCC Part 15.247 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | PK/QP/AV | Degree | Meter | H / V | dB/m | dB | dB | dBuV/m | Limit dBuV/m | Margin dB | Remarks |
| High Channel | | | | | | | | | | | | |
| 2479 | 96.67 | PK | 197 | 1.6 | H | 27.4 | 3.61 | 35.0 | 92.68 | | | Fundamental |
| 2479 | 59.33 | AV | 197 | 1.6 | H | 27.4 | 3.61 | 35.0 | 55.34 | | | Fundamental |
| 2479 | 94.5 | PK | 182 | 1.2 | V | 27.4 | 3.61 | 35.0 | 90.51 | | | Fundamental |
| 2479 | 58.33 | AV | 182 | 1.2 | V | 27.4 | 3.61 | 35.0 | 54.34 | | | Fundamental |
| 9916 | 34.67 | AV | 259 | 1.2 | V | 38.0 | 5.23 | 34.1 | 43.8 | 54 | -10.20 | Harmonic |
| 9916 | 34.5 | AV | 147 | 1.6 | H | 38.0 | 5.23 | 34.1 | 43.63 | 54 | -10.37 | Harmonic |
| 4958 | 40.33 | AV | 180 | 1.6 | V | 32.0 | 4.55 | 33.4 | 43.48 | 54 | -10.52 | Harmonic |
| 7437 | 36.45 | AV | 45 | 1.0 | H | 35.3 | 4.75 | 33.7 | 42.8 | 54 | -11.20 | Harmonic |
| 4958 | 37.5 | AV | 109 | 1.2 | H | 32.0 | 4.55 | 33.4 | 40.65 | 54 | -13.35 | Harmonic |
| 4958 | 56.0 | PK | 45 | 1.0 | V | 32.0 | 4.55 | 33.4 | 59.15 | 74 | -14.85 | Harmonic |
| 7437 | 50.67 | PK | 90 | 1.2 | V | 35.3 | 4.75 | 33.7 | 57.02 | 74 | -16.98 | Harmonic |
| 9916 | 47.33 | PK | 259 | 1.2 | V | 38.0 | 5.23 | 34.1 | 56.46 | 74 | -17.54 | Harmonic |
| 7437 | 49.33 | PK | 180 | 1.0 | H | 35.3 | 4.75 | 33.7 | 55.68 | 74 | -18.32 | Harmonic |
| 9916 | 45.83 | PK | 147 | 1.6 | H | 38.0 | 5.23 | 34.1 | 54.96 | 74 | -19.04 | Harmonic |
| 4958 | 50.17 | PK | 109 | 1.2 | H | 32.0 | 4.55 | 33.4 | 53.32 | 74 | -20.68 | Harmonic |
| 7437 | 38.17 | AV | 90 | 1.2 | V | 35.3 | 4.75 | 33.7 | 44.52 | 54 | -9.48 | Harmonic |

*Test Mode: Transmitting (30MHz-1000MHz)*




| Frequency (MHz) | Quasi Peak (dB µ V/m) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) | Margin (dB) | Limit (dB µ V/m) |
|---|---|---|---|---|---|---|---|
| 30.130588 | 21.1 | 374.0 | H | 339.0 | -5.4 | -18.9 | 40.0 |
| 159.500000 | 21.4 | 254.0 | H | 119.0 | 0.4 | -22.1 | 43.5 |
| 454.662425 | 28.4 | 101.0 | H | 0.0 | -7.4 | -17.6 | 46.0 |
| 503.811100 | 27.2 | 187.0 | H | 0.0 | -6.8 | -18.8 | 46.0 |
| 798.746000 | 24.3 | 124.0 | H | 6.0 | -1.7 | -21.7 | 46.0 |
| 907.275600 | 26.8 | 398.0 | H | 319.0 | 0.5 | -19.2 | 46.0 |

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

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde&Schwarz | EMI Test Receiver | ESCI | 100035 | 2006-8-17 | 2007-8-17 |

*** 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

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.

Limit

FCC Part 15, Subpart C Section 15.247(a)(1). 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.

| FREQUENCY RANGE (MHz) | Limit (kHz) |
|---|---|
| 902-928 | >25kHz or the 20dB bandwidth |
| 2400-2483.5 | >25kHz or two-thirds of the 20dB bandwidth |
| 5725-5850 | >25kHz or the 20dB bandwidth |

## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 27 °C |
| Relative Humidity: | 50 % |
| ATM Pressure: | 1009 mbar |

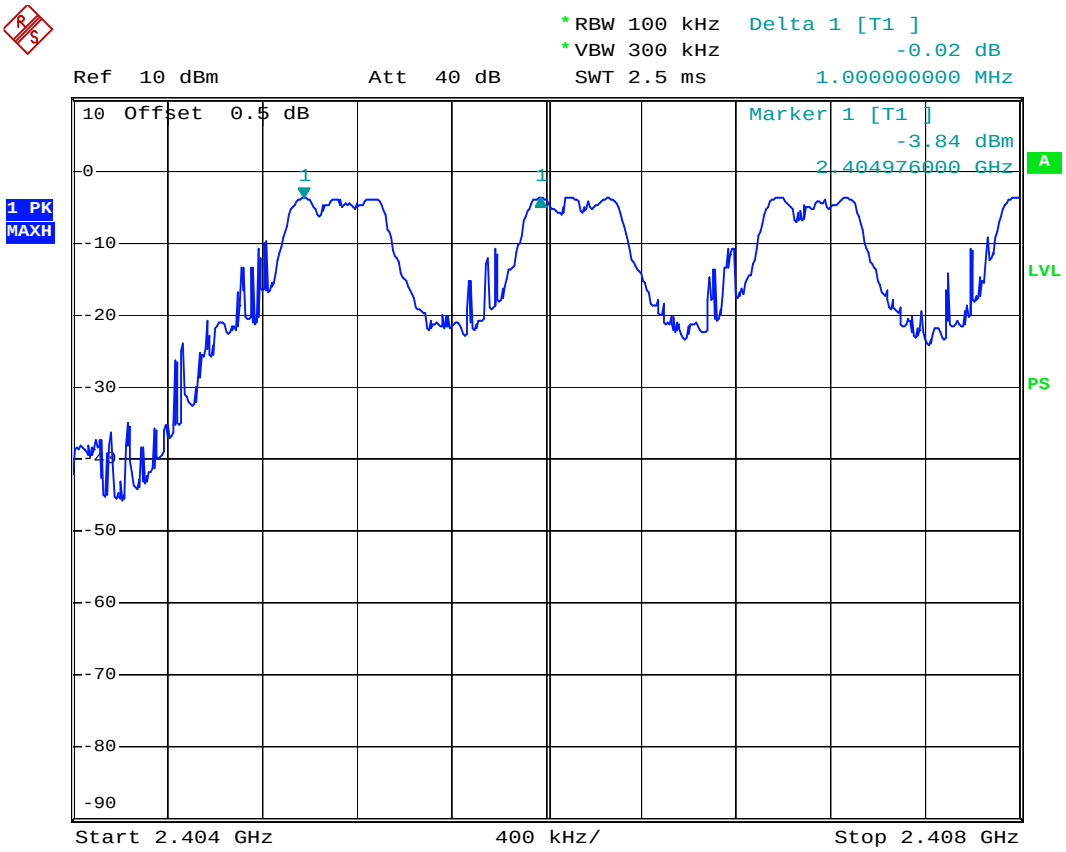
*The testing was performed by Deny Xiong on 2006-10-25.*

**Test Result:** Pass

*Test mode: Transmitting*

| Channel | Channel Frequency (MHz) | Channel Separation (KHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low Channel | 2405 | 1000 | 826.67 | Pass |
| Adjacency Channel | 2406 | | | |
| Mid Channel | 2440 | 1008 | 800.00 | Pass |
| Adjacency Channel | 2441 | | | |
| High Channel | 2479 | 2010 | 746.67 | Pass |
| Adjacency Channel | 2477 | | | |

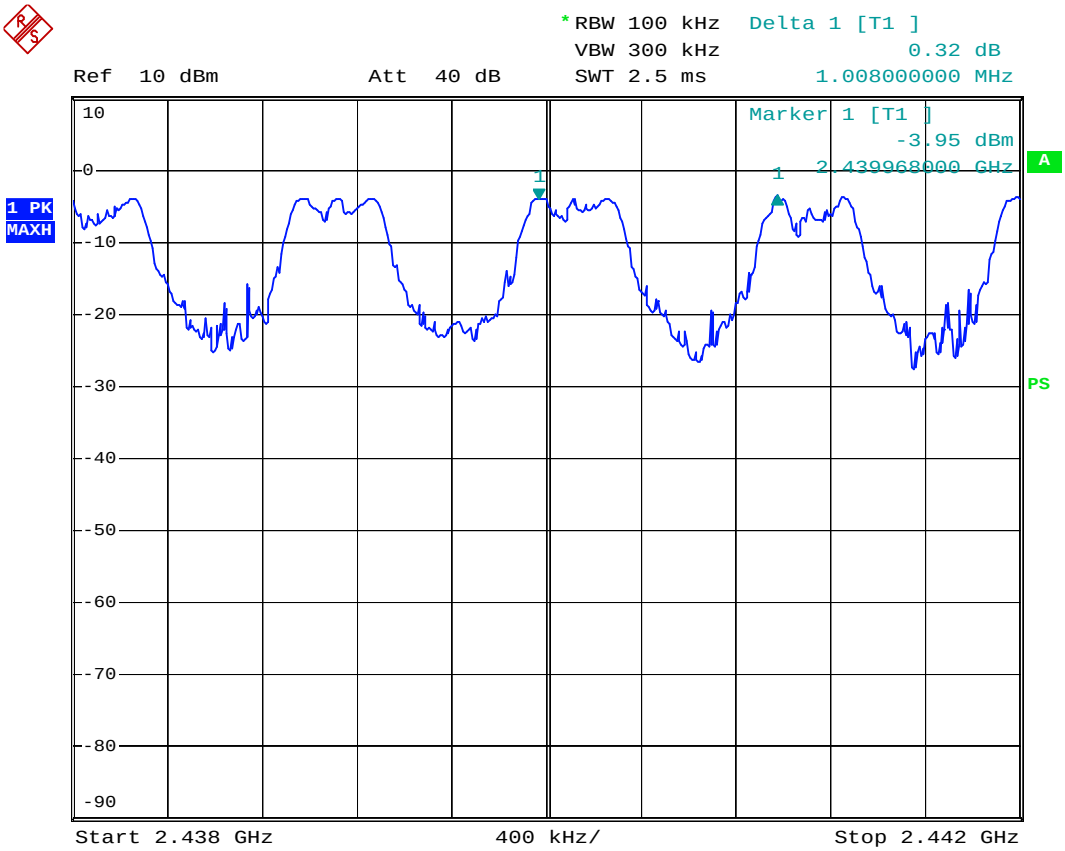
Low channel:




M/N:COM101(base) channel separation low channel

Date: 25.OCT.2006 13:04:08

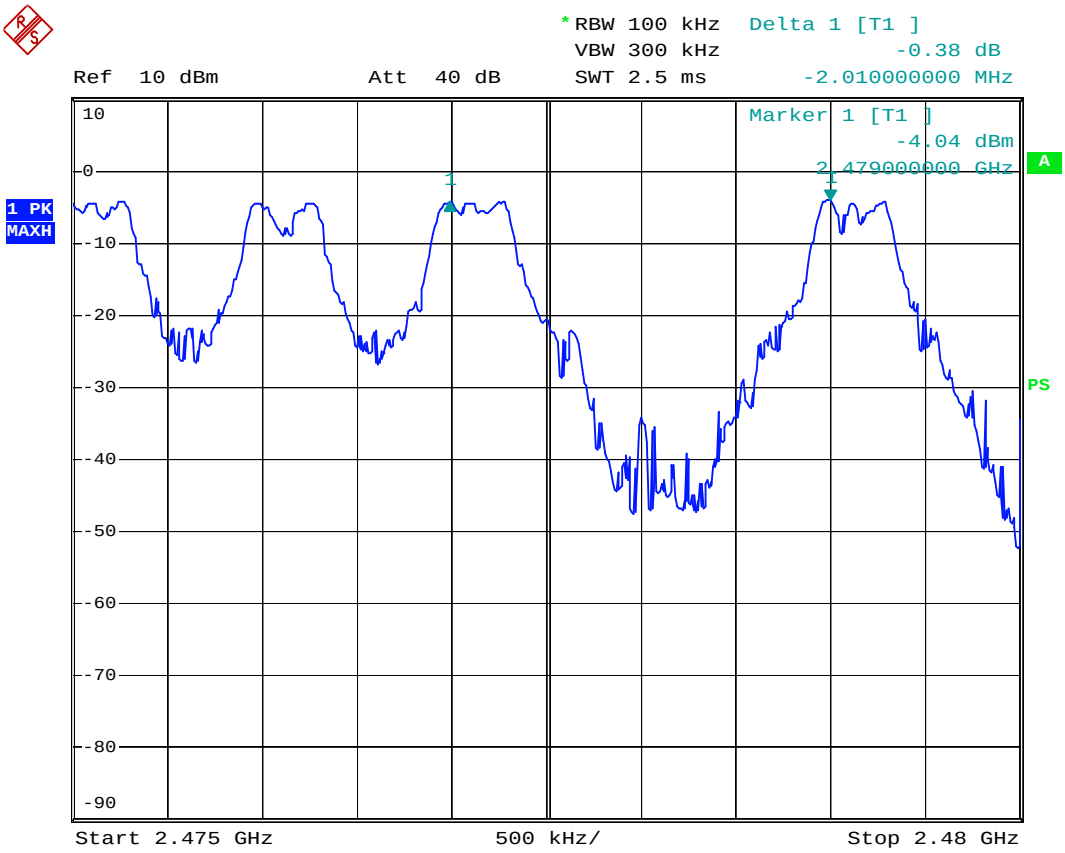
Middle channel




M/N:COM101(base) channel separation middle channel

Date: 25.OCT.2006 13:15:53

High channel




M/N:COM101(base) channel separation high channel

Date: 25.OCT.2006 13:17:50

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

## Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde&Schwarz | EMI Test Receiver | ESCI | 100035 | 2006-8-17 | 2007-8-17 |

*** 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

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: | 53% |
| ATM Pressure: | 1009mbar |

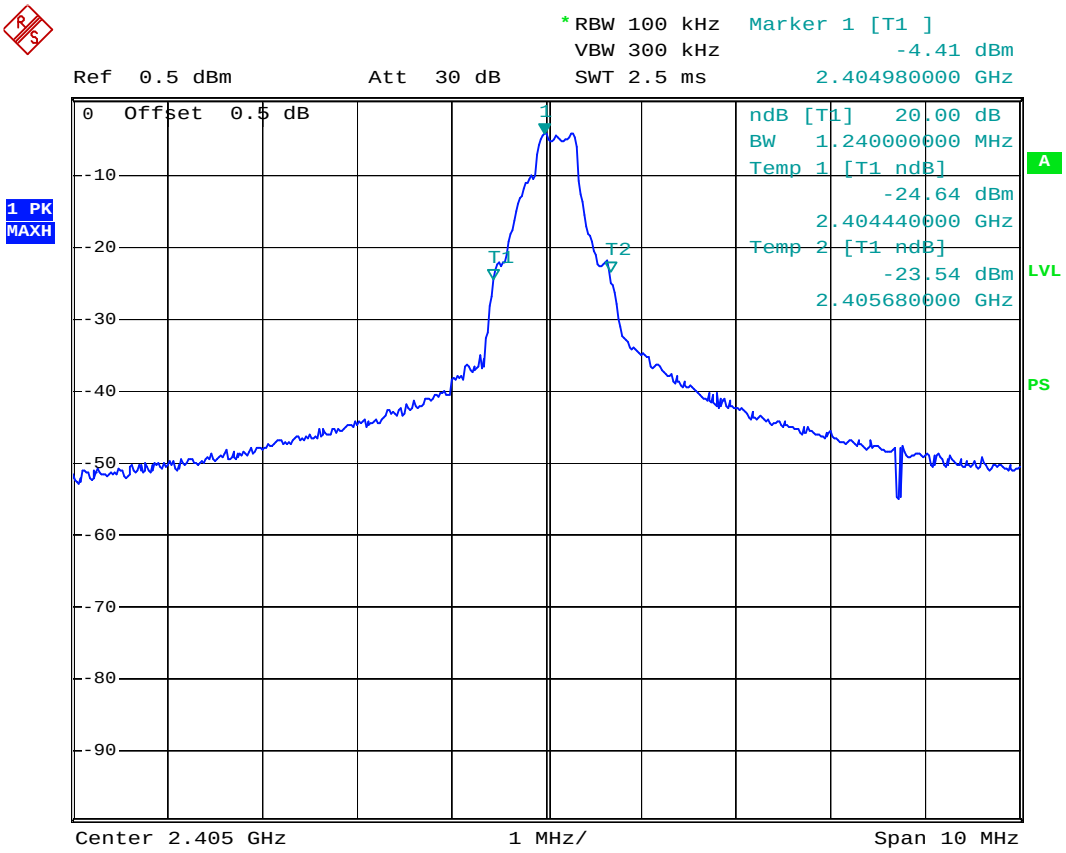
*The testing was performed by Deny Xiong on 2006-10-25.*

*Test Mode: Transmitting*

| Channel | Channel Frequency (MHz) | 20dB Bandwidth (kHz) | Result |
|---|---|---|---|
| Low Channel | 2405 | 1240 | Pass |
| Middle Channel | 2440 | 1200 | Pass |
| High Channel | 2479 | 1120 | Pass |

**Test Result:** Pass

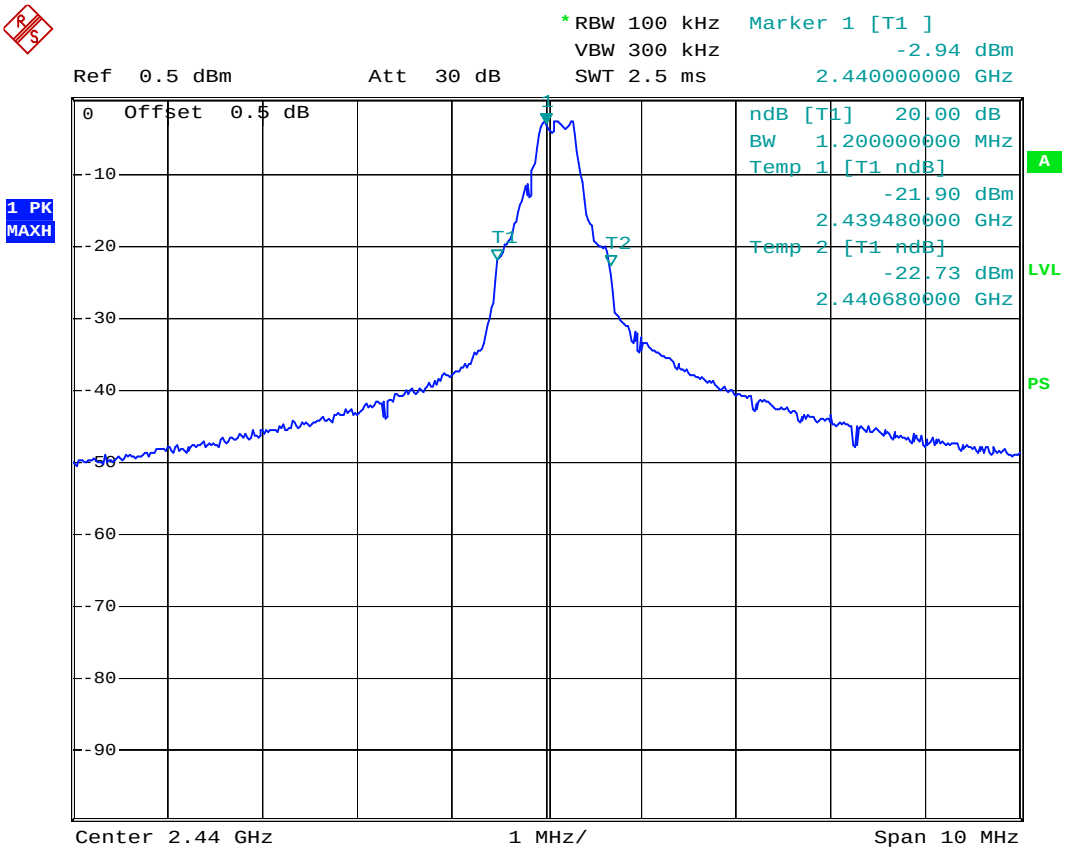
Low channel




M/N:COM101(base) 20dB Bandwidth low channel

Date: 25.OCT.2006 12:31:28

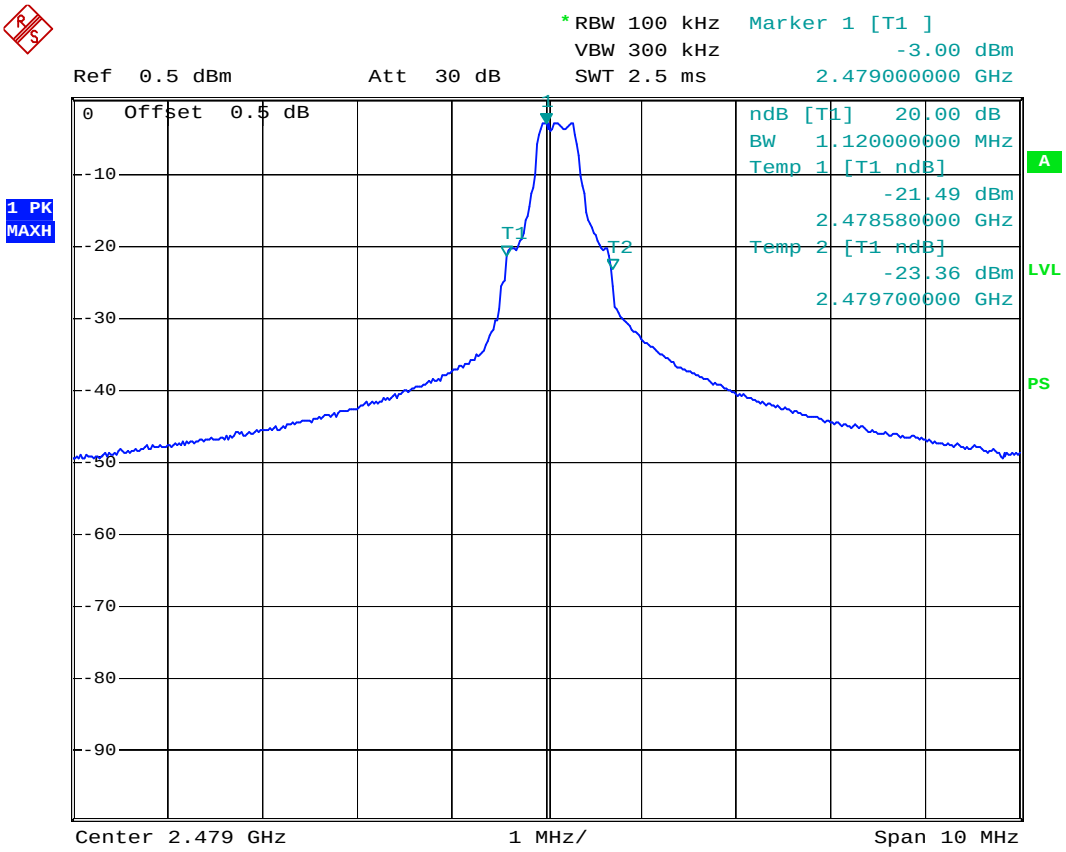
Middle channel




M/N:COM101(base) 20dB Bandwidth middle channel

Date: 25.OCT.2006 12:44:03

High channel




M/N:COM101(base) 20dB Bandwidth high channel

Date: 25.OCT.2006 12:48:29

# §15.247(a) (1) (iii)-NUMBER 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 | 2006-8-17 | 2007-8-17 |

*** 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

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 transmitting mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

## Test Data

### Environmental Conditions

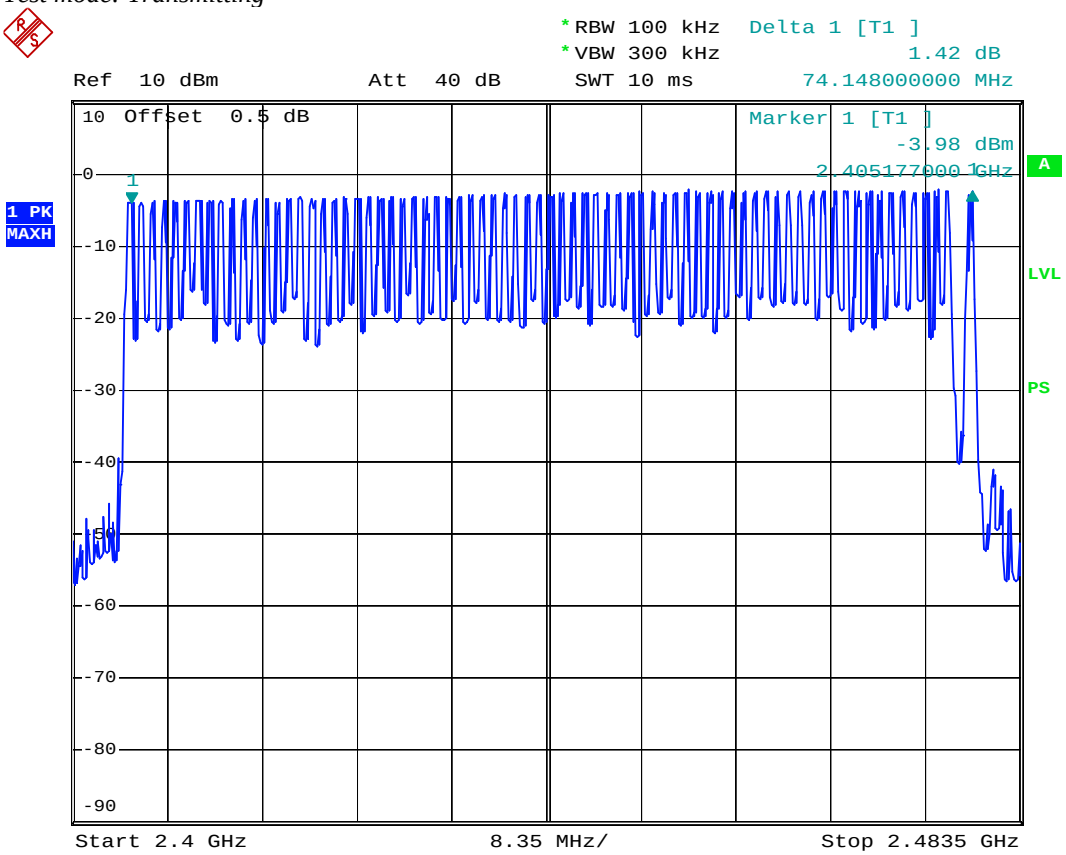
| | |
|---|---|
| Temperature: | 27 °C |
| Relative Humidity: | 50 % |
| ATM Pressure: | 1009 mbar |

*The testing was performed by Deny Xiong on 2006-10-25.*

| Frequency Range | Number of Hopping Channel (CH) | Limit (CH) |
|---|---|---|
| 2400 to 2483.5 MHz | 74 | >15 |

**Test Result:** Pass

*Test mode: Transmitting*




M/N:COM101(base) Quantity of hopping channel

Date: 25.OCT.2006 12:59:23

# §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 | 2006-8-17 | 2007-8-17 |

*** 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

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 False was get from single sweep. In addition, the time of single Pluses was tested.

Limit

FCC Part 15, Subpart C Section 15.247.

| FREQUENCY RANGE (MHz) | LIMIT (ms) | | |
|---|---|---|---|
| | 20dB bandwidth <250kHz (50 Channel) | 20dB bandwidth >250kHz (50 Channel) | 20dB bandwidth <1 MHz (74 Channel) |
| 902-928 | N/A | N/A | N/A |
| 2400-2483.5 | N/A | N/A | 29.6s |
| 5725-5850 | N/A | N/A | N/A |

Dwell Time= time slot length * hope rate/ number of hopping channels * 29.6s
Hop rate=1600/s

## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 27 °C |
| Relative Humidity: | 50 % |
| ATM Pressure: | 1009 mbar |

*The testing was performed by Deny Xiong on 2006-10-25.*

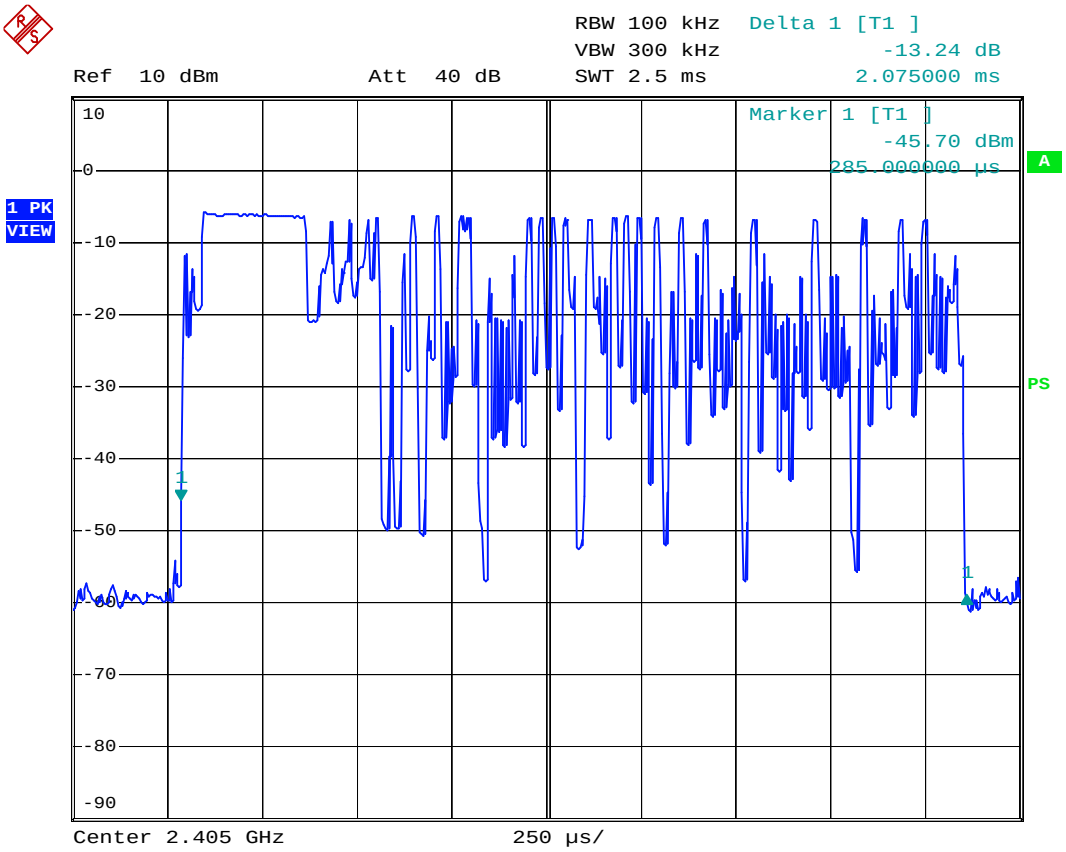
**Test Result:** Pass

*Test mode: Transmitting*

| Channel | Pulse wide (msec) | Unmber of Hopping Channel in 0.4x No.CH Period | Dwell time (sec) | Limit (sec) | Result |
|---|---|---|---|---|---|
| Low Channel | 2.075 | 70 | 0.14525 | 0.4 | Pass |
| Mid Channel | 2.080 | 70 | 0.1456 | 0.4 | Pass |
| High Channel | 2.105 | 70 | 0.14735 | 0.4 | Pass |

Low channel

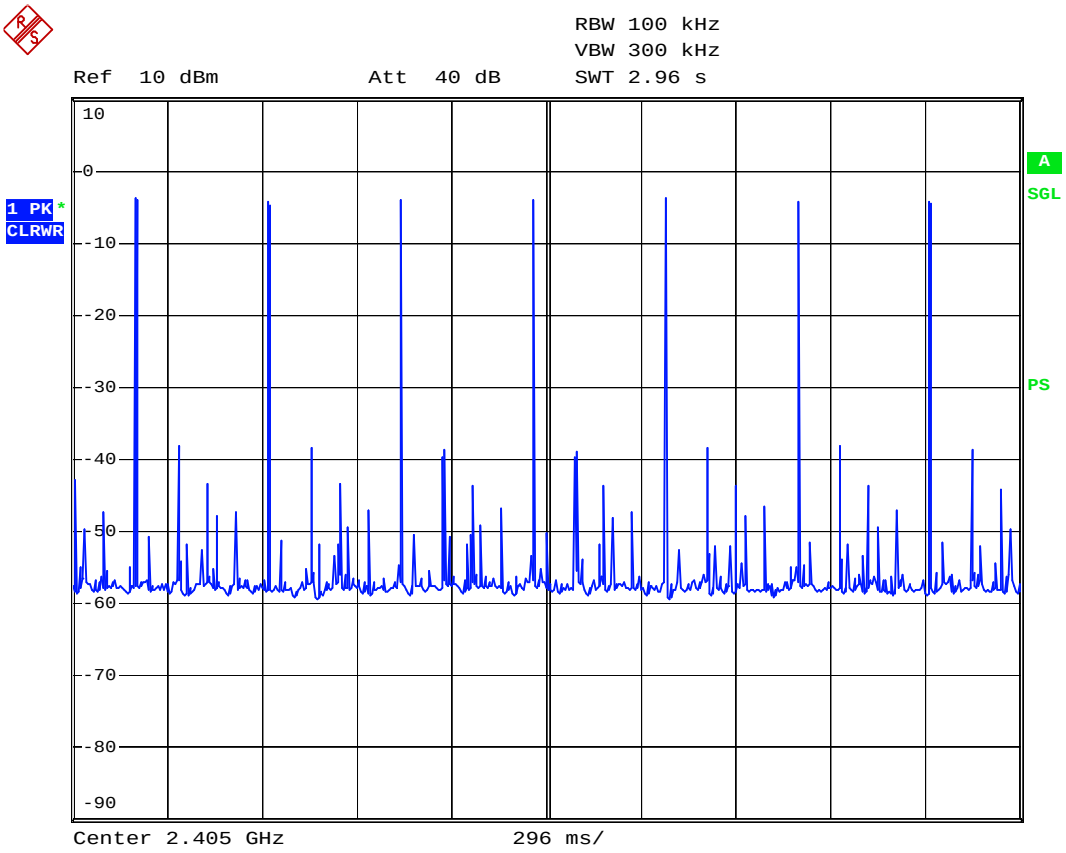
Pulse of Low Channel:




M/N:COM101(base) pulse of low channel

Date: 25.OCT.2006 14:44:46

No. Pulse of Low Channel:

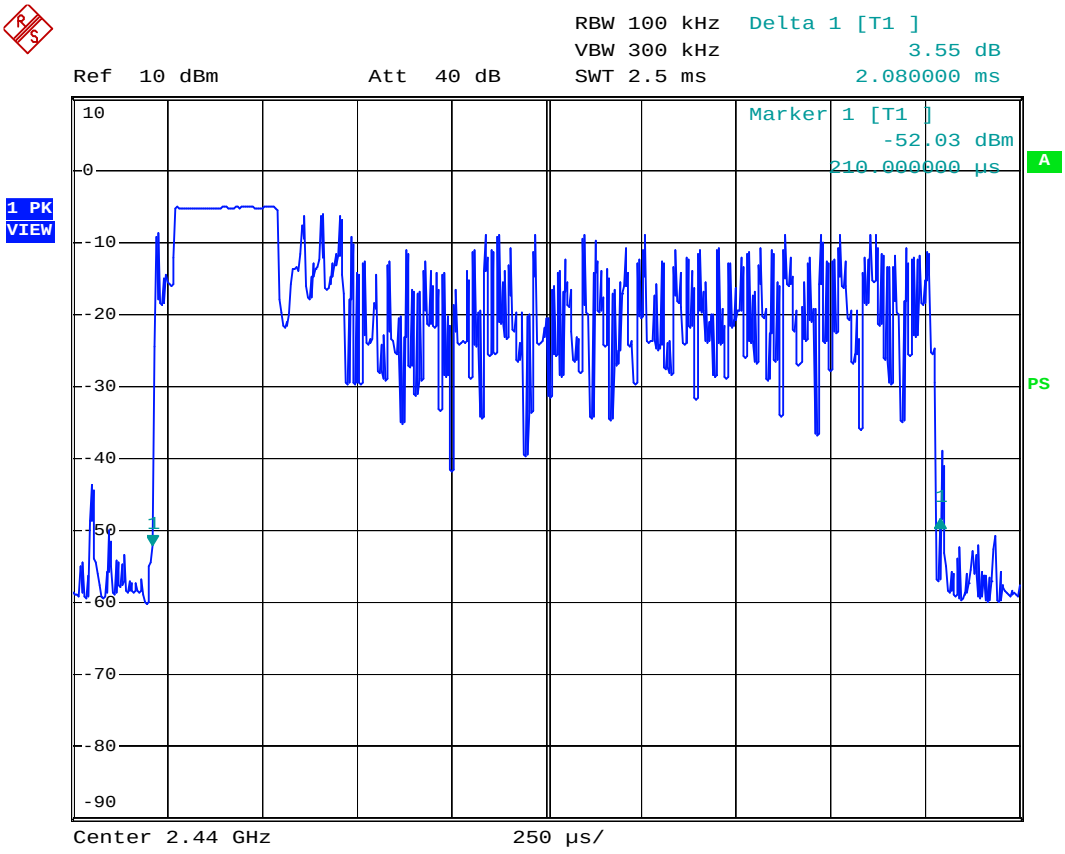



M/N:COM101(base) No of pulse low channel

Date: 25.OCT.2006 16:03:37

Middle channel

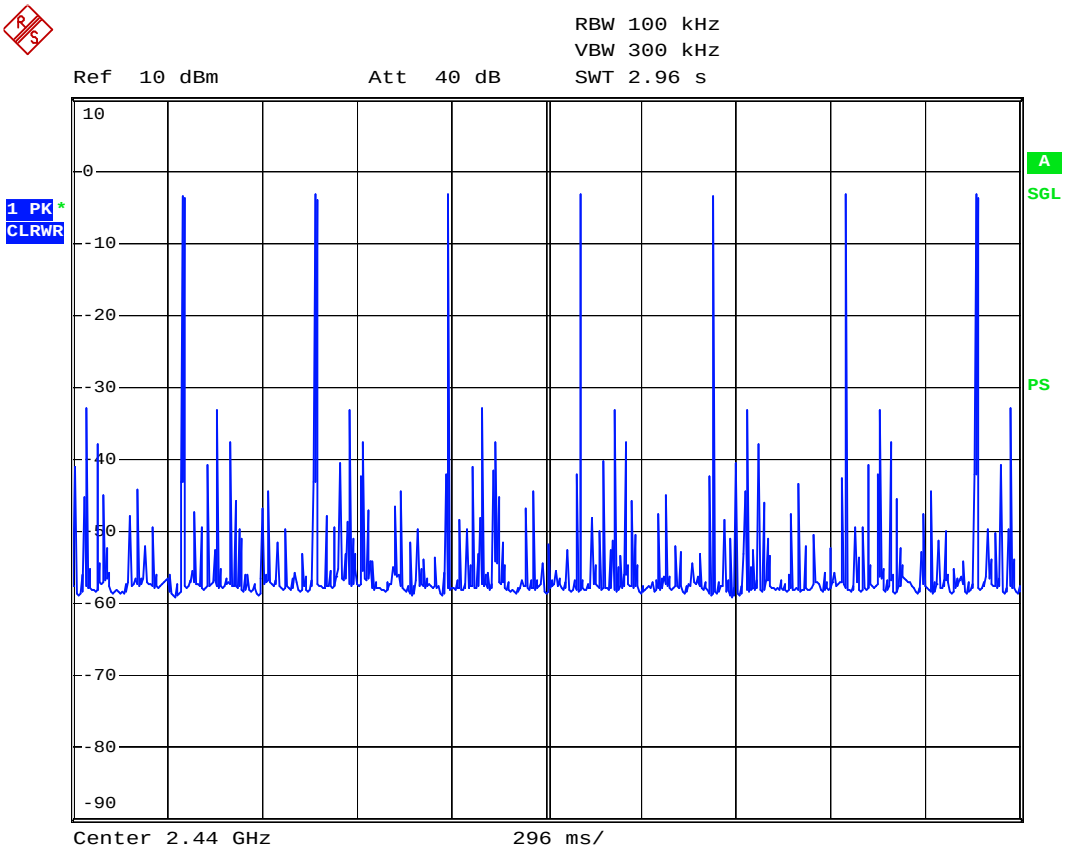
Pulse of Middle Channel:




M/N:COM101(base) pulse of middle channel

Date: 25.OCT.2006 13:37:44

No. Pulse of Middle Channel:

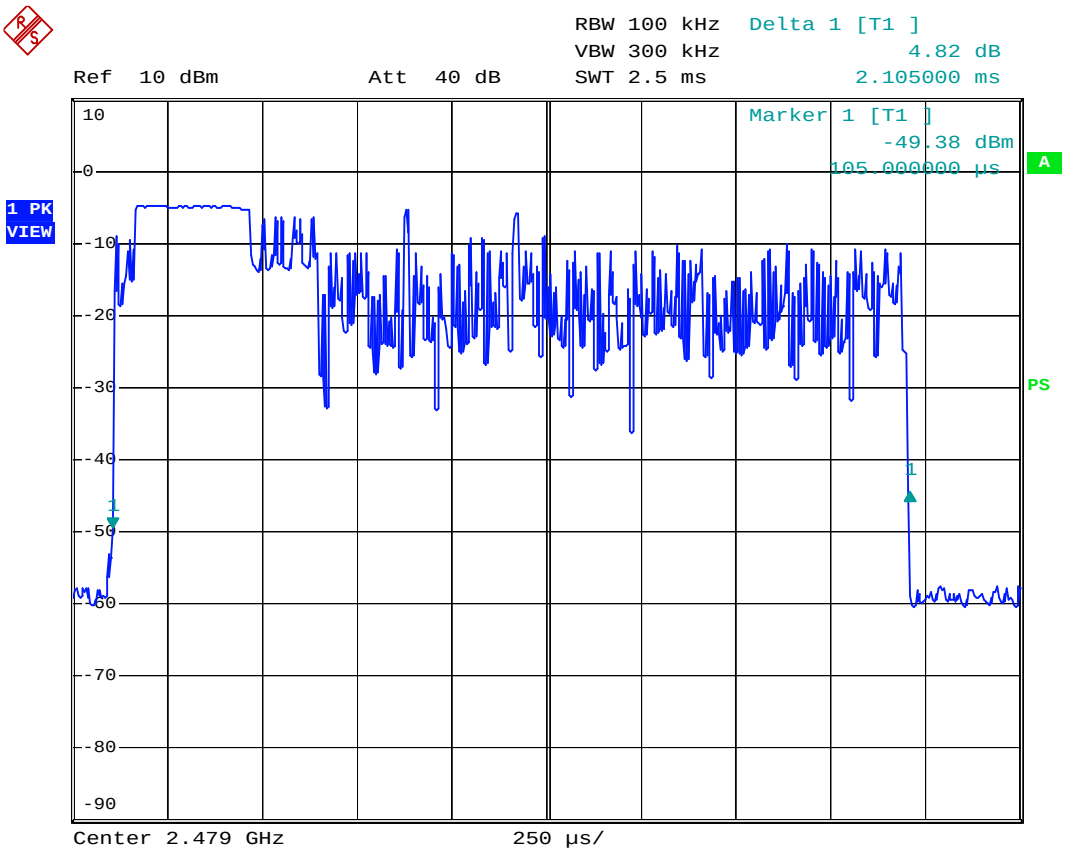



M/N:COM101(base) No of pulse middle channel

Date: 25.OCT.2006 16:04:42

High channel

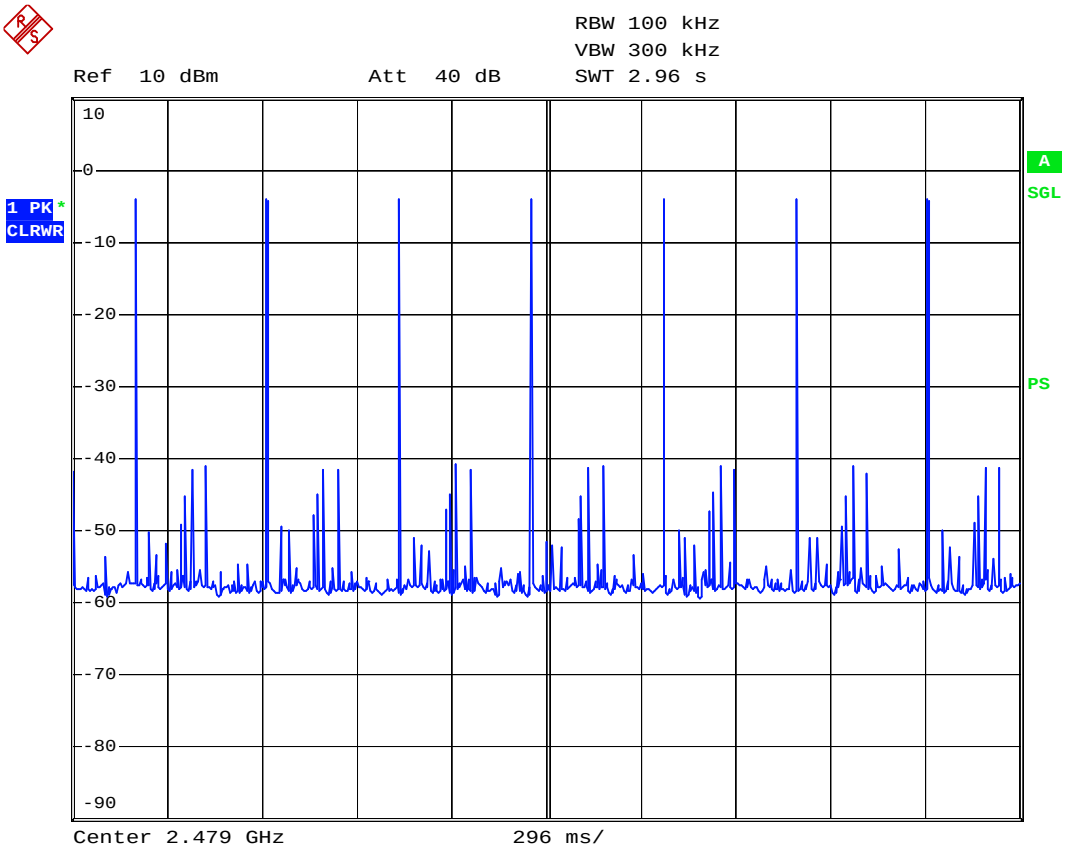
Pulse of High Channel:




M/N:COM101(base) pulse of high channel

Date: 25.OCT.2006 13:35:18

No. Pulse of High Channel:




M/N:COM101(base) No of pulse high channel

Date: 25.OCT.2006 16:05:12

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

## Applicable Standard

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

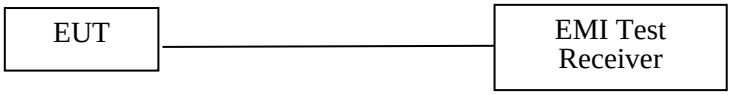
## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde&Schwarz | EMI Test Receiver | ESCI | 100035 | 2006-8-17 | 2007-8-17 |

*** 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

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




## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 25 ° C |
| Relative Humidity: | 53% |
| ATM Pressure: | 1009mbar |

*The testing was performed by Deny Xiong on 2006-10-25.*

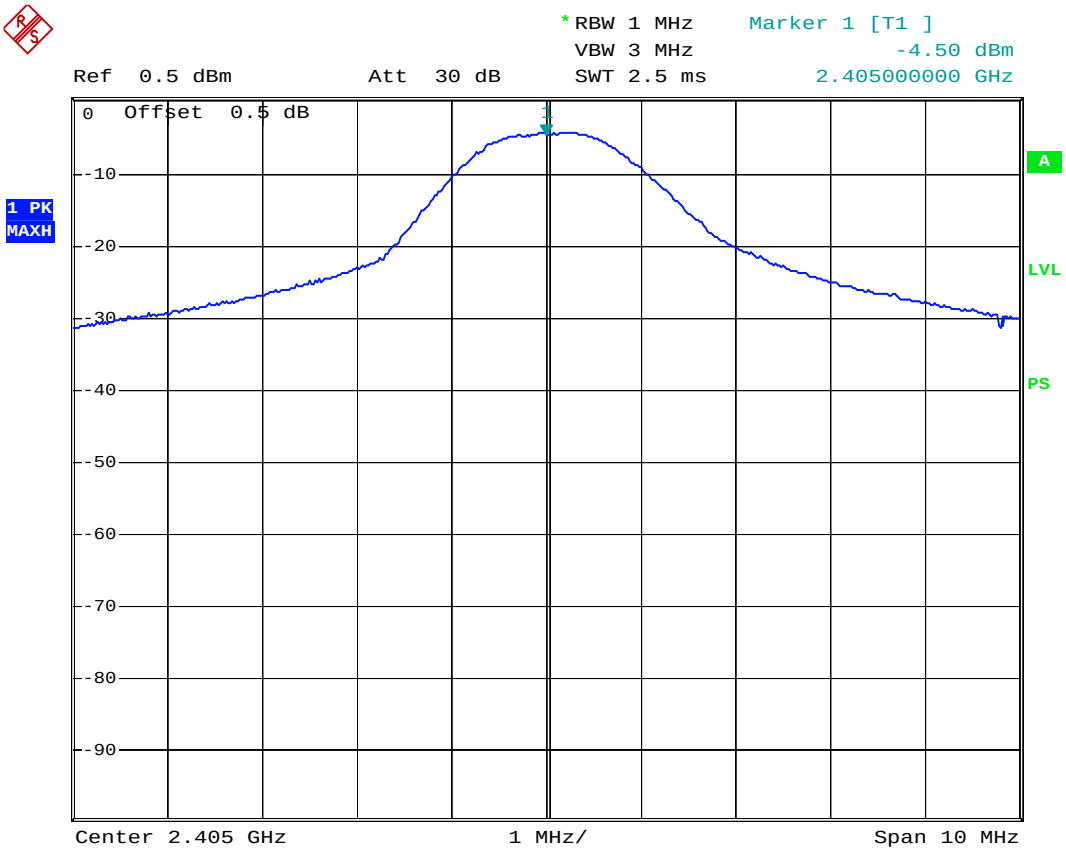
*Test mode: Transmitting*

| Channel | Channel Frequency (MHz) | Power Output | | Limit (w) |
|---|---|---|---|---|
| | | (dBm) | (w) | |
| Low Channel | 2405 | -4.50 | 0.00035 | 0.125 |
| Middle Channel | 2440 | -2.72 | 0.00053 | 0.125 |
| High Channel | 2479 | -2.99 | 0.00050 | 0.125 |

**Test Result:** Pass

Please refer to the following plots.

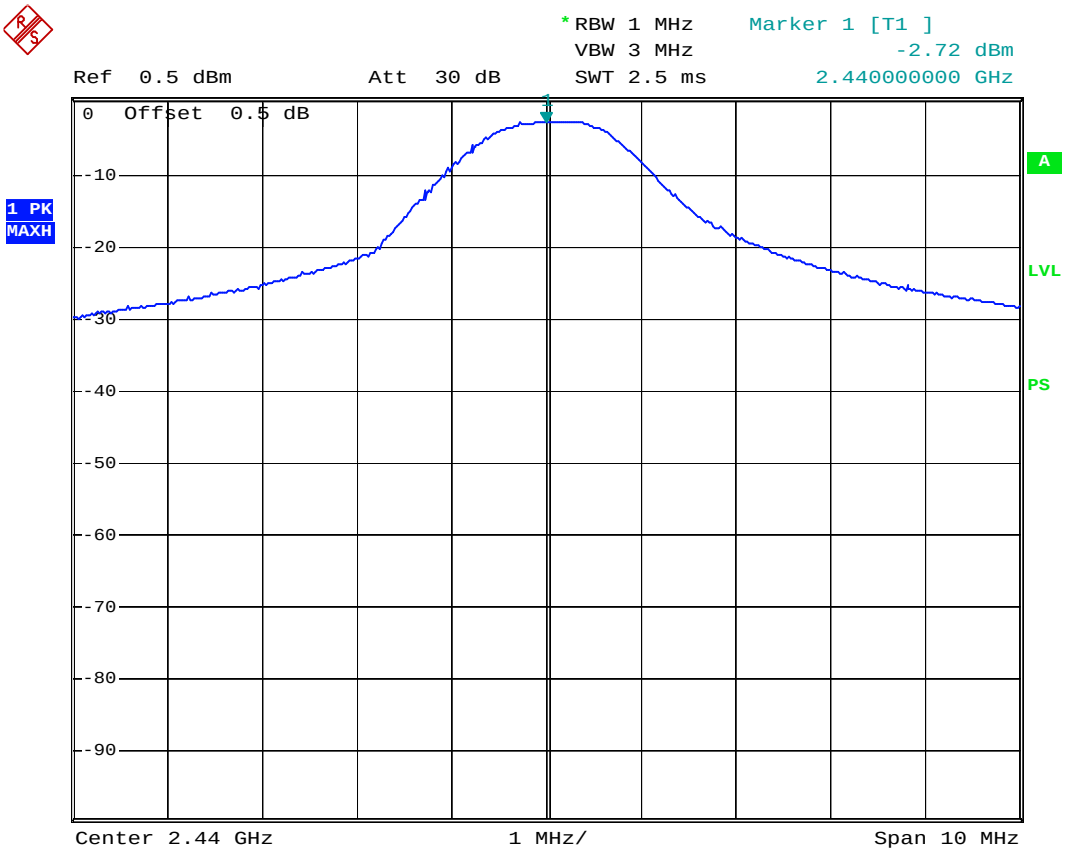
Low channel




M/N:COM101(base) output power low channel

Date: 25.OCT.2006 12:36:42

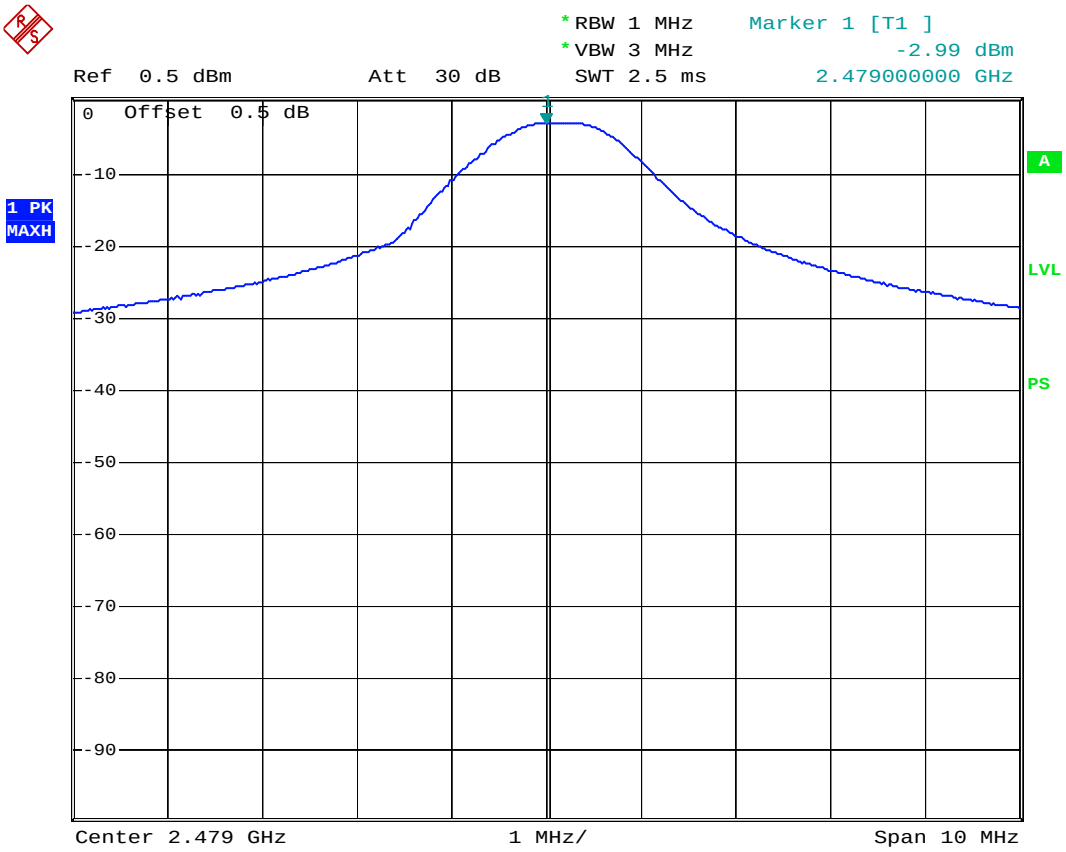
Middle channel




M/N:COM101(base) output power middle channel

Date: 25.OCT.2006 12:42:28

High channel




M/N:COM101(base) output power high channel

Date: 25.OCT.2006 12:51:15

# §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 | 2006-8-17 | 2007-8-17 |

*** 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

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 its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency 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 100kHz 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 Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 18 °C |
| Relative Humidity: | 53 % |
| ATM Pressure: | 1009mbar |

*The testing was performed by Deny Xiong on 2006-10-25.*

*Test Mode: Transmitting*

| Frequency (MHz) | Reading (dBuV/m) | Antenna Factor (dB/m) | Cable loss (dB) | Amplifier (dB) | Correct Amplitude (dBuV/m) | Limit (dBuV/m) | Margin |
|---|---|---|---|---|---|---|---|
| 2399.9 | 50.23 | 27.4 | 3.61 | 35.0 | 46.24 | 54 | -7.76 |
| 2483.6 | 46.38 | 27.4 | 3.61 | 35.0 | 42.39 | 54 | -11.61 |

**Test Result:** Pass