Lab Code: 200707-0

# FCC PART 18

# EMI MEASUREMENT AND TEST REPORT

For

## Whirlpool Microwave Products Development Limited

16/F, Paliburg Plaza, 68 Yee Woo Street, Causeway Bay, Hong Kong

## FCC ID: PR4GET2205Y

| Report Type: | Product Type: |
|---|---|
| Class II Permissive Change | Microwave Oven |

| | |
|---|---|
| **Test Engineer:** | Jack Wang |
| **Report No.:** | RSZ11011151 |
| **Report Date:** | 2011-01-28 |
| **Reviewed By:** | Lisa Zhu<br>EMC Engineer |
| **Prepared By:** | 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 |

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# GENERAL INFORMATION

## Product Description for Equipment Under Test (EUT)

The *Whirlpool Microwave Products Development Limited.*' s model: *YKHMS2040* or the "EUT" as referred to in this report is a *Microwave Oven* which measures approximately 76.0cm (L) x 46.0cm (W) x 45.0cm (H), rated input voltage: AC 120 V/60 Hz.

** All measurement and test data in this report was gathered from production sample serial number: 1101032 (Assigned by BACL, Shenzhen). The EUT was received on 2011-01-11.*

## Objective

The following test report is prepared on behalf of *Whirlpool Microwave Products Development Limited.* in accordance with Part 2, Subpart J, and Part 18, Subparts A, B and C of the Federal Communication Commissions rules and regulations.

The objective of the manufacturer is to determine compliance with FCC Part 18 limits.

This is the C2PC application of the device. The difference between the original device and the current one is as follows:

| Part | Original | New |
|---|---|---|
| Filter | Filter<br>DFCA-2516R-33A44 | Filter board |

For the changes made to the device, conducted emission testing and Radiated emission (30 MHz to 1 GHz) testing were performed.

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

This is a C2PC application. The original application was granted on 2009-04-01.

## Test Methodology

All measurements contained in this report were conducted with MP-5, FCC Methods of Measurements of Radio Noise Emissions from ISM Equipment, February 1986. All measurements were performed at Bay Area Compliance Laboratory Corporation. 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 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 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

# TEST CONFIGURATION

## Justification

The EUT was provided for tests as a stand-alone device. It was prepared for testing in accordance with the manufacturer's instructions. The EUT was operated at maximum (continuous) RF output power. The loads consisted of water in a glass beaker in the amounts specified in the test procedure.

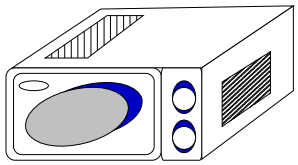
## Equipment Modifications

No modifications were made to the unit tested.

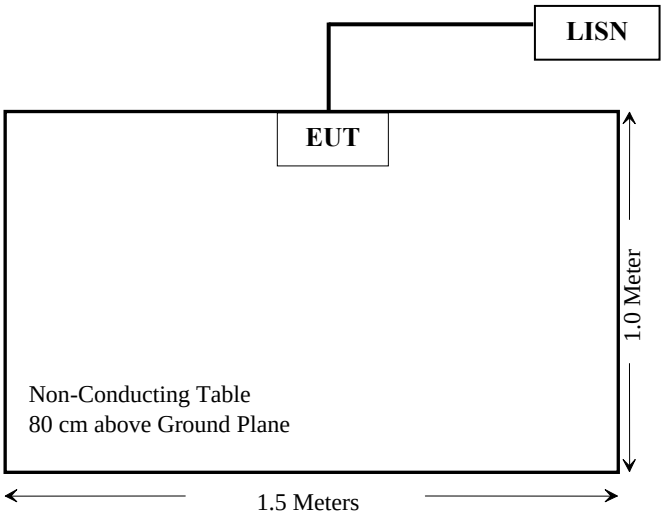
## External Cable List and Details

| Cable Description | Length (m) | From/Port | To |
|---|---|---|---|
| Unshield Detachable Power Cable | 1.05 | EUT | LISN |

## Configuration of Test Setup



## Block Diagram of Test Setup



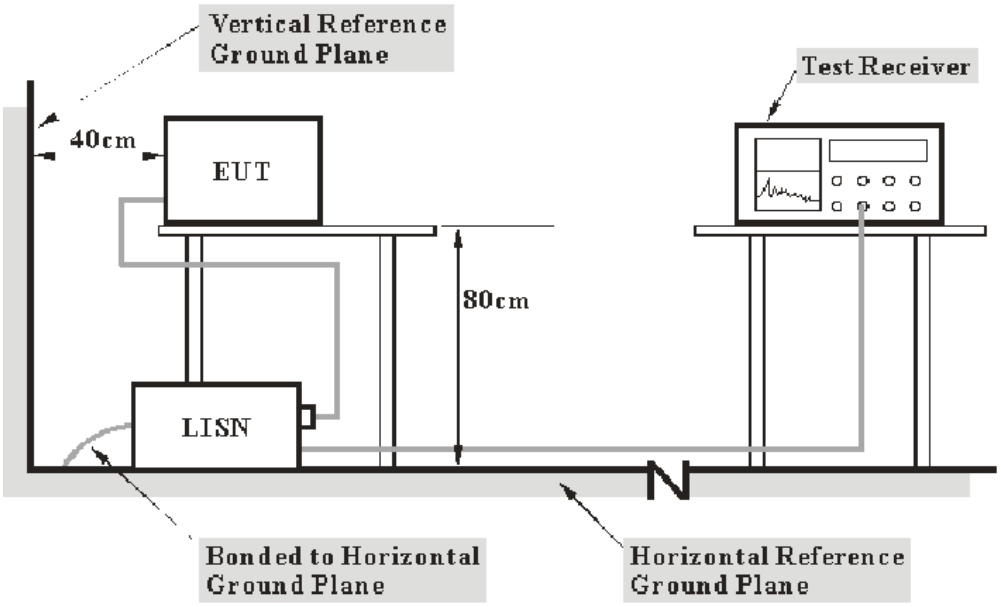
# FCC §18.307 - AC LINE CONDUCTED EMISSIONS

## 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 Laboratories Corp. (Shenzhen) is ±2.4 dB (k=2, 95% level of confidence).

## 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 MP-5: 1986 measurement procedure. Specification used was with the FCC Part 18.307.

The EUT was connected to a 120 VAC/ 60Hz 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:

| ***Frequency Range*** | ***IF B/W*** |
|---|---|
| 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 |

***** Com-Power's LISN were used as the supporting equipment.
*** 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

During the conducted emission test, the EUT power cord 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 18.307, with the worst margin reading of:

**14.56 dB** at **0.150 MHz** in the **Line** conductor mode.

## Test Data

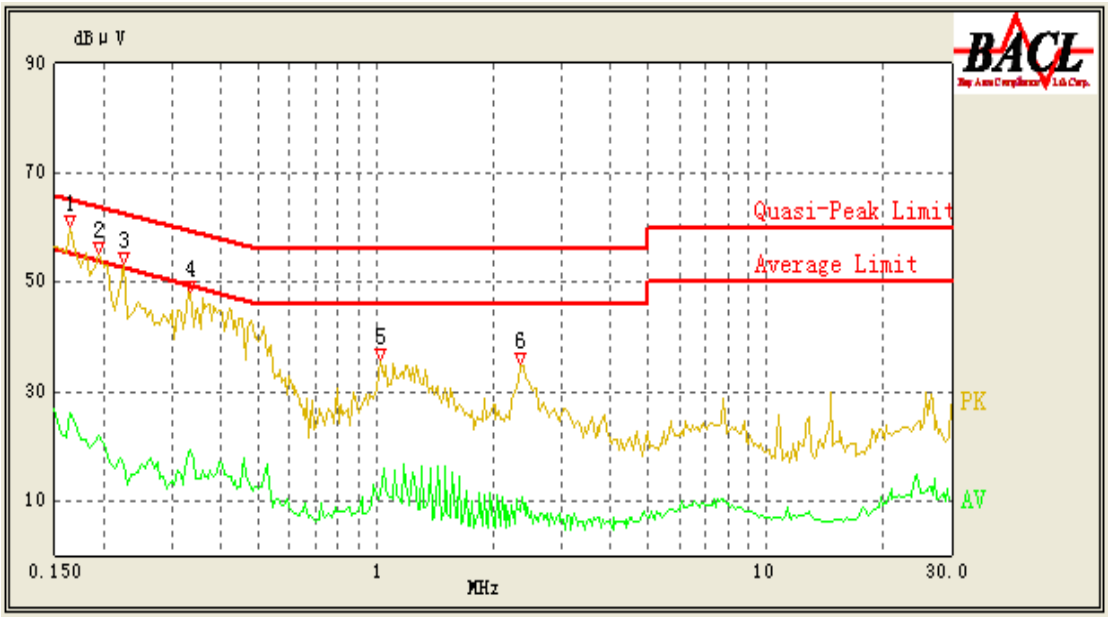
### Environmental Conditions

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

*The testing was performed by Jack Wang on 2011-01-19.*

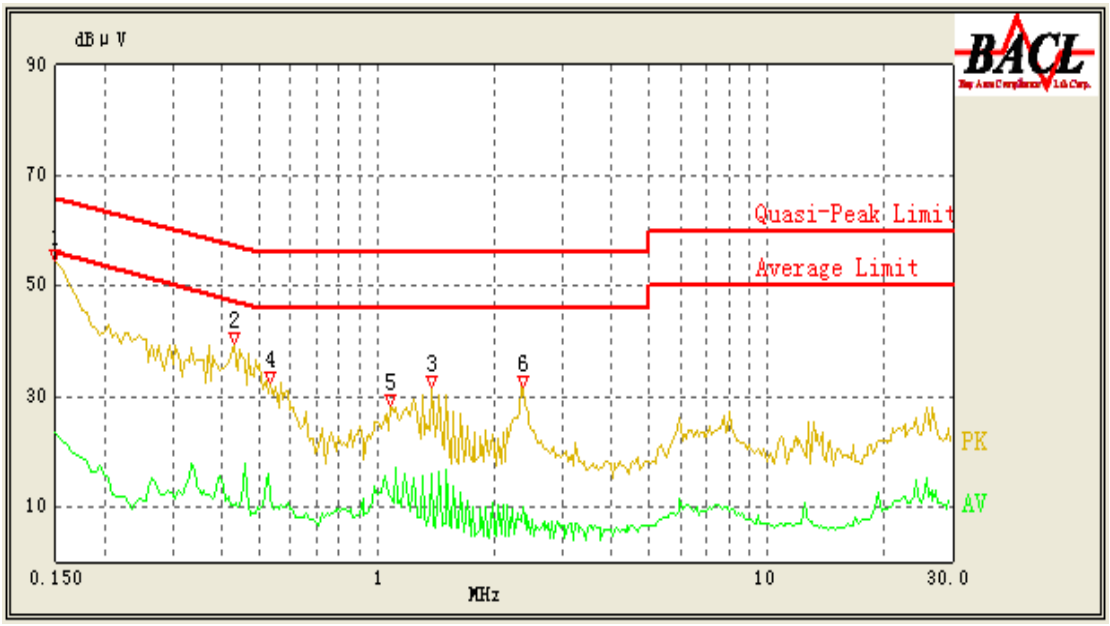
*Test Mode: Running (Max Power)*

**AC 120 Vac/60Hz - Line:**




| Frequency (MHz) | Cord. Result (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Remark (PK/QP/Ave.) |
|---|---|---|---|---|---|
| 0.165 | 47.59 | 10.09 | 65.57 | 17.98 | QP |
| 0.335 | 37.74 | 10.03 | 60.71 | 22.97 | QP |
| 0.195 | 41.37 | 10.07 | 64.71 | 23.34 | QP |
| 0.225 | 37.81 | 10.05 | 63.86 | 26.05 | QP |
| 0.165 | 26.25 | 10.09 | 55.57 | 29.32 | Ave. |
| 2.335 | 25.14 | 10.18 | 56.00 | 30.86 | QP |
| 0.335 | 19.23 | 10.03 | 50.71 | 31.48 | Ave. |
| 0.195 | 21.80 | 10.07 | 54.71 | 32.91 | Ave. |
| 1.030 | 21.02 | 10.10 | 56.00 | 34.98 | QP |
| 1.025 | 10.91 | 10.10 | 46.00 | 35.09 | Ave. |
| 0.225 | 16.86 | 10.05 | 53.86 | 37.00 | Ave. |
| 2.355 | 7.95 | 10.18 | 46.00 | 38.05 | Ave. |

**AC 120 Vac/60Hz – Neutral:**




| Frequency (MHz) | Cord. Result (dBµV) | Correction Factor (dB) | Limit (dBµV) | Margin (dB) | Remark (PK/QP/Ave.) |
|---|---|---|---|---|---|
| 0.150 | 51.44 | 10.10 | 66.00 | 14.56 | QP |
| 0.430 | 35.57 | 10.13 | 58.00 | 22.43 | QP |
| 0.530 | 28.86 | 10.19 | 56.00 | 27.14 | QP |
| 2.365 | 27.47 | 10.18 | 56.00 | 28.53 | QP |
| 1.380 | 26.27 | 10.14 | 56.00 | 29.73 | QP |
| 1.375 | 15.97 | 10.14 | 46.00 | 30.03 | Ave. |
| 1.085 | 23.98 | 10.11 | 56.00 | 32.02 | QP |
| 0.150 | 23.41 | 10.10 | 56.00 | 32.59 | Ave. |
| 0.530 | 12.27 | 10.19 | 46.00 | 33.73 | Ave. |
| 1.080 | 11.64 | 10.11 | 46.00 | 34.36 | Ave. |
| 2.360 | 9.97 | 10.18 | 46.00 | 36.03 | Ave. |
| 0.430 | 10.21 | 10.13 | 48.00 | 37.79 | Ave. |

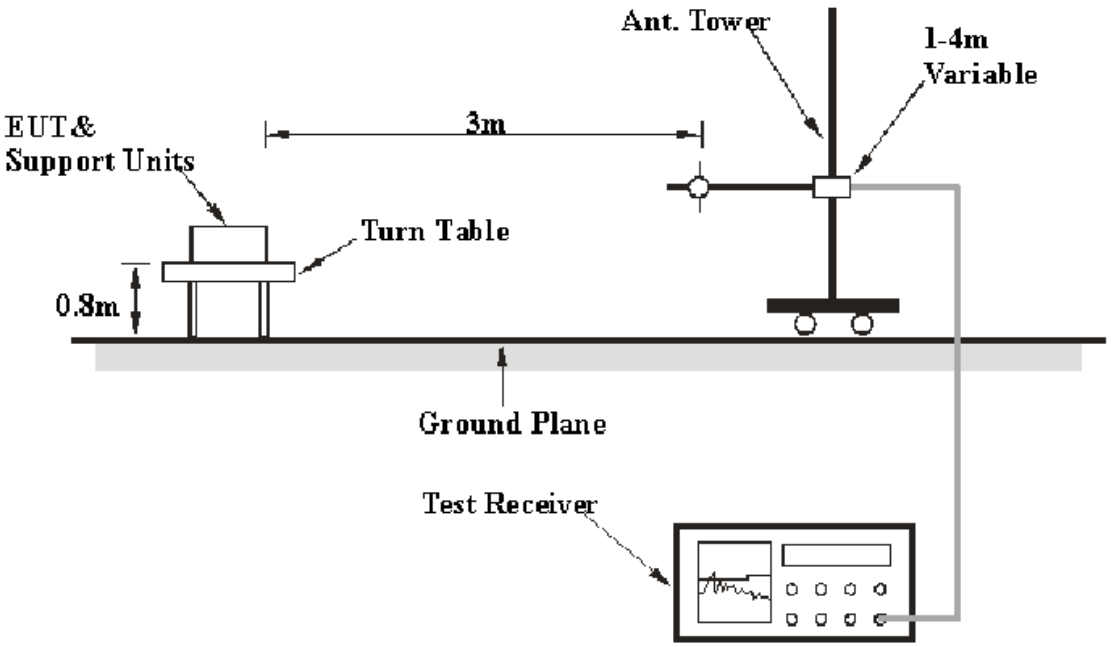
# FCC §18.305 – FIELD STRENGTH

## 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 (k=2, 95% level of confidence).

## EUT Setup




The radiated emission tests were performed in the 3 meters chamber A test site, using the setup accordance with the FCC MP - 5. The specification used was the FCC part 18 limits.

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

## EMI Test Receiver Setup and Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

| ***Frequency Range*** | ***R B/W*** | ***Video B/W*** | ***IF B/W*** |
|---|---|---|---|
| 30 – 1000 MHz | 100 kHz | 300 kHz | 120 kHz |
| Above 1GHz | 1MHz | 10Hz | |

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| HP | Amplifier | HP8447E | 1937A01046 | 2010-08-02 | 2011-08-02 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100035 | 2010-11-24 | 2011-11-23 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-1 | 2010-07-05 | 2011-07-04 |

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

## Test Procedure

For the radiated emissions test, the EUT power cord was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was in the normal (naïve) operating mode during the final qualification test to represent the worst results.

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1 GHz and average detection mode 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 Amplitude = Meter Reading + Antenna Factor + 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 7 dB 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 data in the following table, the EUT complied with the FCC Part 18, with the worst margin reading of:

**11.3 dB** at **260.783750 MHz** in the **Horizontal** polarization, 30 MHz – 1 GHz

## Test Data and Plots

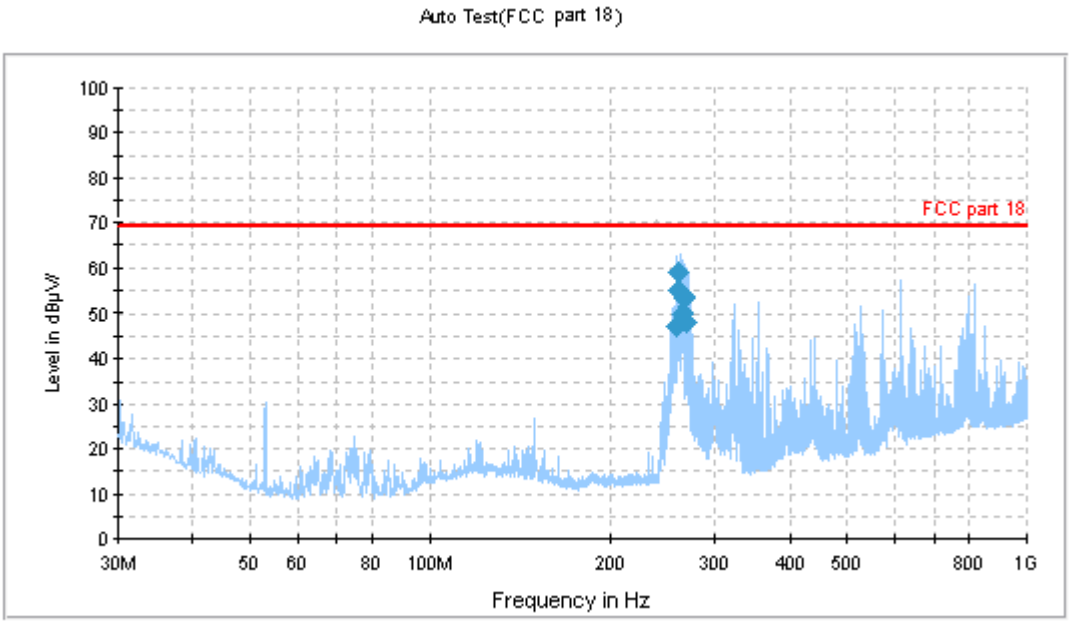
### Environmental Conditions

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

*The testing was performed by Jack Wang on 2011-01-19.*

*Test Mode: Running (Max Power)*

30 MHz-1000 MHz:




| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Antenna Height (cm) | Antenna Polarity (H/V) | Turntable Position (deg) | Correction Factor (dB) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 260.783750 | 59.0 | 241.0 | H | 264.0 | -13.3 | 70.3 | 11.3 |
| 260.053875 | 55.1 | 339.0 | H | 280.0 | -13.3 | 70.3 | 15.2 |
| 265.758500 | 53.4 | 301.0 | H | 245.0 | -13.1 | 70.3 | 16.9 |
| 264.097375 | 50.0 | 101.0 | H | 328.0 | -13.2 | 70.3 | 20.3 |
| 268.903500 | 48.3 | 121.0 | H | 357.0 | -13.1 | 70.3 | 22.0 |
| 258.416500 | 47.3 | 289.0 | H | 230.0 | -13.3 | 70.3 | 23.0 |

*Note: The data above 1 GHz refer to original report.*

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