



## FCC PART 90 TEST AND MEASUREMENT REPORT

For

### Getron System Co., Inc.

#1213, Techcenter SK-Technopark, 190-1 SangdaewonDong JungwonGu,  
Sungnam-Si, Kyunggi-Do, Korea

**FCC ID: W8PGT-150HPN**

|   |   |
|---|---|
| <b>Report Type:</b><br>Original Report  | <b>Product Type:</b><br>Private Communication Transmitter |
| <b>Test Engineer:</b> Victor Zhang  |   |
| <b>Report Number:</b> R0903163-90   |   |
| <b>Report Date:</b> 2009-04-14  |   |
| <b>Reviewed By:</b> Boni Baniquid<br>Sr. RF Engineer  |   |
| <b>Prepared By:</b><br>(66) Bay Area Compliance Laboratories Corp. (BACL)<br>1274 Anvilwood Ave.<br>Sunnyvale, CA 94089<br>Tel: (408) 732-9162<br>Fax: (408) 732 9164 |   |

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government.

\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “\*” (Rev.2)

## TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>GENERAL INFORMATION.....</b>  | <b>5</b>  |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....   | 5         |
| OBJECTIVE .....  | 6         |
| RELATED SUBMITTAL(S)/GRANT(S).....   | 6         |
| TEST METHODOLOGY .....   | 6         |
| MEASUREMENT UNCERTAINTY.....   | 6         |
| TEST FACILITY .....  | 7         |
| <b>SYSTEM TEST CONFIGURATION.....</b>  | <b>8</b>  |
| JUSTIFICATION .....  | 8         |
| BLOCK DIAGRAM.....   | 8         |
| EQUIPMENT MODIFICATIONS .....  | 8         |
| LOCAL SUPPORT EQUIPMENT/DEVICE LIST AND DETAILS.....   | 8         |
| INTERFACE PORTS AND CABLING.....   | 8         |
| <b>SUMMARY OF TEST RESULTS .....</b>   | <b>9</b>  |
| <b>§2.1046 &amp; §90.205 (D) – RF OUTPUT POWER.....</b>  | <b>10</b> |
| APPLICABLE STANDARD .....  | 10        |
| TEST PROCEDURE .....   | 10        |
| TEST EQUIPMENT LIST AND DETAILS.....   | 10        |
| TEST ENVIRONMENTAL CONDITIONS .....  | 11        |
| TEST RESULTS .....   | 11        |
| <b>§2.1049 &amp; §90.210 - OCCUPIED BANDWIDTH, EMISSION MASK .....</b>   | <b>12</b> |
| APPLICABLE STANDARDS.....  | 12        |
| TEST PROCEDURE .....   | 12        |
| TEST EQUIPMENT LIST AND DETAILS.....   | 12        |
| TEST ENVIRONMENTAL CONDITIONS .....  | 13        |
| <b>§2.1051, §90.210 &amp; 90.669 – SPURIOUS EMISSION AT ANTENNA TERMINALS, SUPPRESSION OF INTERFERENCE .....</b> | <b>15</b> |
| APPLICABLE STANDARDS.....  | 15        |
| TEST PROCEDURE .....   | 15        |
| TEST EQUIPMENT LIST AND DETAILS.....   | 15        |
| TEST ENVIRONMENTAL CONDITIONS .....  | 16        |
| TEST RESULTS .....   | 16        |
| <b>§2.1053, §90.210 (B), (D) - FIELD STRENGTH OF SPURIOUS EMISSION, SUPPRESSION OF INTERFERENCE .....</b>        | <b>18</b> |
| APPLICABLE STANDARDS.....  | 18        |
| TEST PROCEDURE .....   | 18        |
| TEST EQUIPMENT LIST AND DETAILS.....   | 18        |
| TEST SETUP BLOCK DIAGRAM .....   | 19        |
| TEST ENVIRONMENTAL CONDITIONS .....  | 19        |
| TEST RESULTS .....   | 20        |
| <b>§2.1055 &amp; §90.213 – FREQUENCY STABILITY, TRANSMITTER FREQUENCY TOLERANCE .....</b>                        | <b>21</b> |
| APPLICABLE STANDARD .....  | 21        |
| TEST PROCEDURE .....   | 21        |
| TEST EQUIPMENT LIST AND DETAILS.....   | 21        |

|   |           |
|---|-----------|
| TEST ENVIRONMENTAL CONDITIONS .....                           | 21        |
| TEST RESULTS .....  | 22        |
| <b>\$2.1091 – RF EXPOSURE .....</b>                           | <b>23</b> |
| APPLICABLE STANDARDS.....                                     | 23        |
| CONCLUSION.....   | 24        |
| <b>EXHIBIT A - FCC ID LABELING AND WARNING STATEMENT.....</b> | <b>25</b> |
| FCC LABEL REQUIREMENT.....                                    | 25        |
| PROPOSED LABEL LOCATION ON EUT .....                          | 25        |
| <b>EXHIBIT B - TEST SETUP PHOTOGRAPHS .....</b>               | <b>26</b> |
| RADIATED EMISSIONS – FRONT VIEW.....                          | 26        |
| RADIATED EMISSIONS – REAR VIEW.....                           | 26        |
| <b>EXHIBIT C - EUT PHOTOGRAPHS.....</b>                       | <b>27</b> |
| EUT – FRONT VIEW.....   | 27        |
| EUT – REAR/PORT VIEW .....                                    | 27        |
| EUT – SIDE VIEW .....   | 28        |
| EUT – ANTENNA VIEW .....                                      | 28        |
| EUT – COVER OFF VIEW .....                                    | 29        |
| EUT – RF BOARD ASSEMBLY FRONT VIEW .....                      | 29        |
| EUT – RF BOARD ASSEMBLY TOP VIEW.....                         | 30        |
| EUT – RF BOARD BOTTOM VIEW.....                               | 30        |
| EUT – DC POWER SUPPLY BOARD FRONT VIEW.....                   | 31        |
| EUT – DC POWER SUPPLY BOARD TOP VIEW .....                    | 31        |

### DOCUMENT REVISION HISTORY

| Revision Number | Report Number | Description of Revision | Date of Revision |
|-----------------|---------------|-------------------------|------------------|
| 0               | R0903163-90   | Original                | 2009-04-14       |

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

This Bay Area Compliance Laboratories Corp. test report has been prepared on behalf of Getron System Co., Inc. and their product, model: *GT-150HPN*, FCC ID: *W8PGT-150PN* or the EUT (Equipment under Test) as referred to in the rest of this report. The EUT is a private communication transmitter. As a transmitting device for wireless call, *GT-150HPN* uses 150MHz channel of the frequency permitted as a private communication network and generates 5 Watt power. Designed as a simplex, light-weight communication device for a private communication network, *GT-150HPN* adopts a way of X-TAL which is highly-reliable and it is designed to be used in buildings, hospitals, hotels, department stores, and factories efficiently.

#### General Specification:

Frequency Range: 150.7125 MHz  
Type of Emission: F2D  
Power Supply: DC 12.5V  
Dimensions: 295 (W) X 265 (H) X 285 (D) mm

*\* The test data gathered are from typical production sample, model: GT-150HPN serial number: B2133 assigned by BACL.*

#### EUT Photo



*Additional photos in Exhibit C*

## Objective

This type approval report is prepared on behalf of *Getron System Co., Inc.* in accordance with Part 2, Subpart J and Part 90 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, and conducted and radiated margin.

This report is provided on behalf of *Getron System Co., Inc.* for confirmation of regulatory compliance. The manufacturer declares that the model: GT-150HPN serial number: B2133 provided for testing is identical in construction and electrical operation with the post production product. Retesting is recommended for any changes to the model that might affect compliance including those with respect to software, circuitries, PCB layout, RF module, features and functionality.

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

No Related Submittals

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 90 – Private land mobile radio services

Applicable Standards: TIA-603-C, ANSI C63.4-2003.

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

## 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 values range from  $\pm 2.0$  for Conducted Emissions tests and  $\pm 4.0$  dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

## Test Facility

The test site used by BACL Corp. to collect measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. 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, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0).



The current scope of accreditations can be found at

<http://ts.nist.gov/Standards/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to TIA-603-C.

The final qualification test was performed with test software provided by the manufacturer.

### Block Diagram

Please refer to Exhibit D.

### Equipment Modifications

No modifications were made to the EUT.

### Local Support Equipment/device List and Details

| Manufacturers | Descriptions                 | Models | Serial Number |
|---------------|------------------------------|--------|---------------|
| Narda         | Attenuator 10dB              | 766-10 | /             |
| Narda         | Attenuator 30dB              | 766-30 | /             |
| Getron        | RS422 POCAG Signal Generator | -      | /             |

### Interface Ports and Cabling

| Cable Description | Length (m) | From | To                |
|-------------------|------------|------|-------------------|
| RF Cable          | 0.5        | EUT  | Spectrum Analyzer |

## SUMMARY OF TEST RESULTS

| FCC Rules                 | Description of Test                    | Results   |
|---------------------------|--|-----------|
| §2.1046, §90.205(d)       | RF Output Power                        | Compliant |
| §2.1047                   | Modulation Characteristics             | NA        |
| §2.1049, §90.209, §90.210 | Occupied Bandwidth, Emission Mask      | Compliant |
| §2.1051, §90.210, §90.669 | Spurious Emission at Antenna Terminals | Compliant |
| §2.1053, §90.210 (b) (d)  | Field Strength of Spurious Emission    | Compliant |
| §2.1055, §90.213          | Frequency Stability                    | Compliant |
| §2.1091                   | RF Exposure                            | Compliant |

## §2.1046 & §90.205 (d) – RF OUTPUT POWER

### Applicable Standard

§2.1046 (b) and §90.205

### Test Procedure

The Transmitter (EUT) was connected to a resistive load coaxial attenuator of normal load impedance and modulated output power was measured by means of on Spectrum Analyzer.

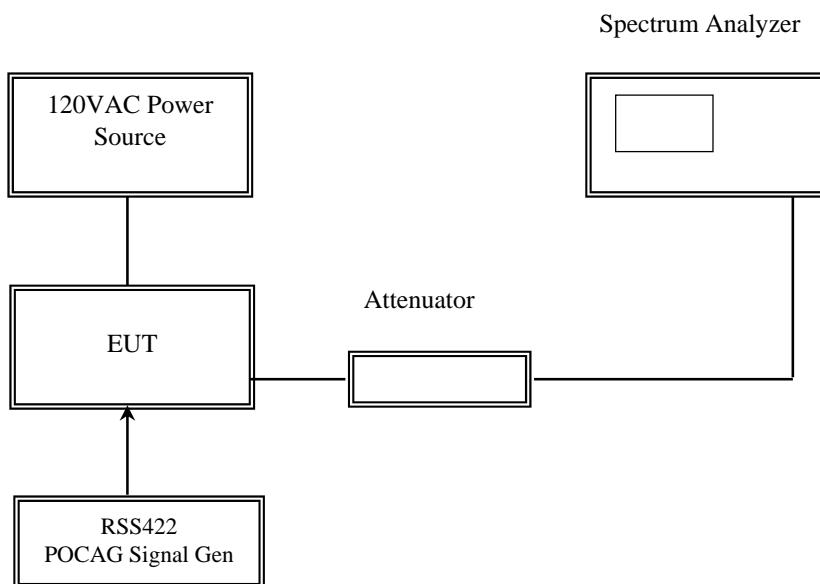
TIA-603-C § 2.2.1

### Test Equipment List and Details

| Manufacturer | Equipment Description | Model Number | Serial Numbers | Calibration Date |
|--------------|-----------------------|--------------|----------------|------------------|
| Agilent      | Spectrum Analyzer     | E4440A       | MY44303352     | 2008-04-28       |

\* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Test Setup Block Diagram



**Test Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23 °C     |
| <b>Relative Humidity:</b> | 47.2 %    |
| <b>ATM Pressure:</b>      | 101.4 kPa |

\* The testing was performed by Victor Zhang on 2009-04-13 in RF Site.

**Test Results**

| <b>Frequency<br/>(MHz)</b> | <b>Final Voltage<br/>(Vdc)</b> | <b>Final Current<br/>(A)</b> | <b>Transmit Output Power</b> |                |
|----------------------------|--------------------------------|------------------------------|------------------------------|----------------|
|                            |                                |                              | <b>(dBm)</b>                 | <b>(Watts)</b> |
| 150.7125                   | 12.11                          | 3.37                         | 36.85                        | 4.841          |

## **§2.1049 & §90.210 - OCCUPIED BANDWIDTH, EMISSION MASK**

### **Applicable Standards**

§2.1049 (c) (4) and §90.210

### **Test Procedure**

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

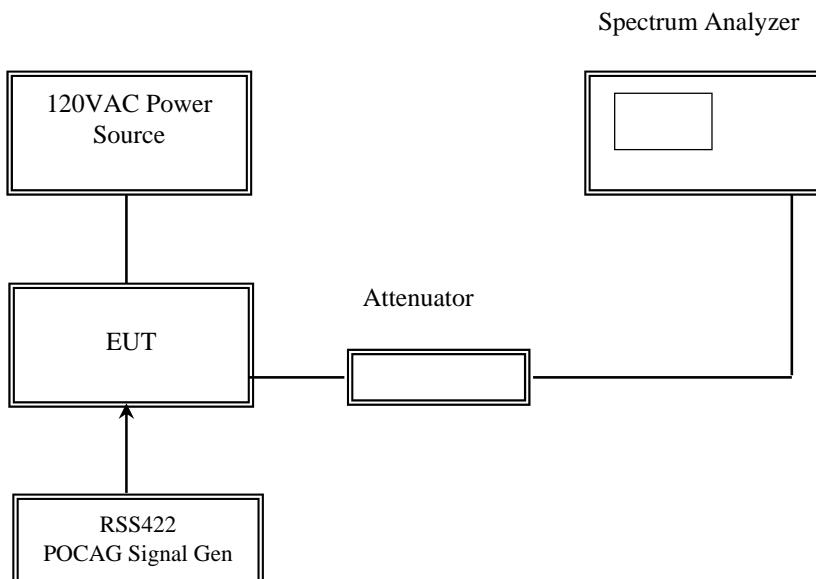
The EUT modulating signal is provided by RS422 POCAG signal generator.

### **Test Equipment List and Details**

| Manufacturer | Equipment Description | Model Number | Serial Numbers | Calibration Date |
|--------------|-----------------------|--------------|----------------|------------------|
| Agilent      | Spectrum Analyzer     | E4440A       | MY44303352     | 2008-04-28       |

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Test Setup Block Diagram**



## Test Environmental Conditions

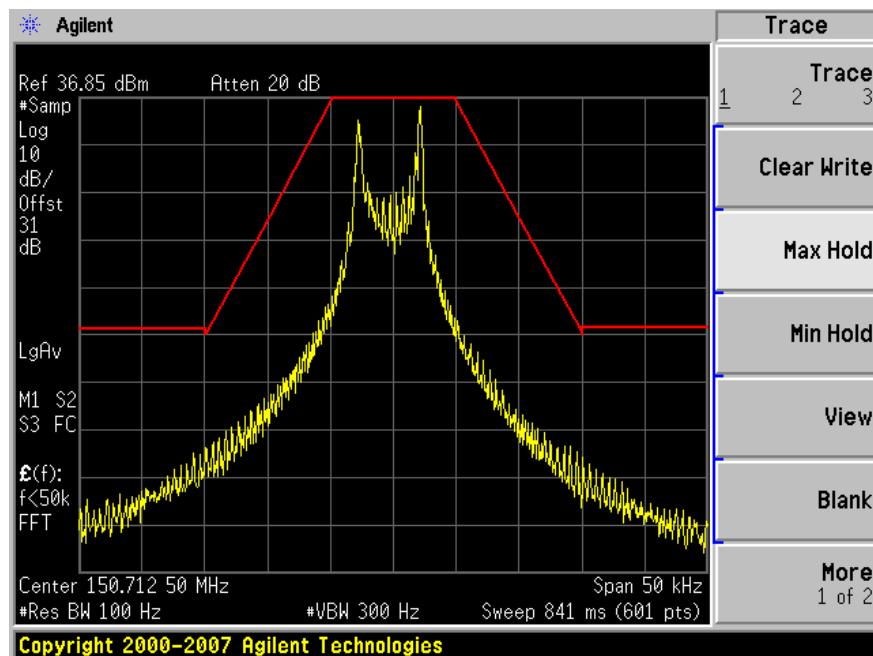
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23 °C     |
| <b>Relative Humidity:</b> | 47.2 %    |
| <b>ATM Pressure:</b>      | 101.4 kPa |

\* The testing was performed by Victor Zhang on 2009-04-13 in RF Site.

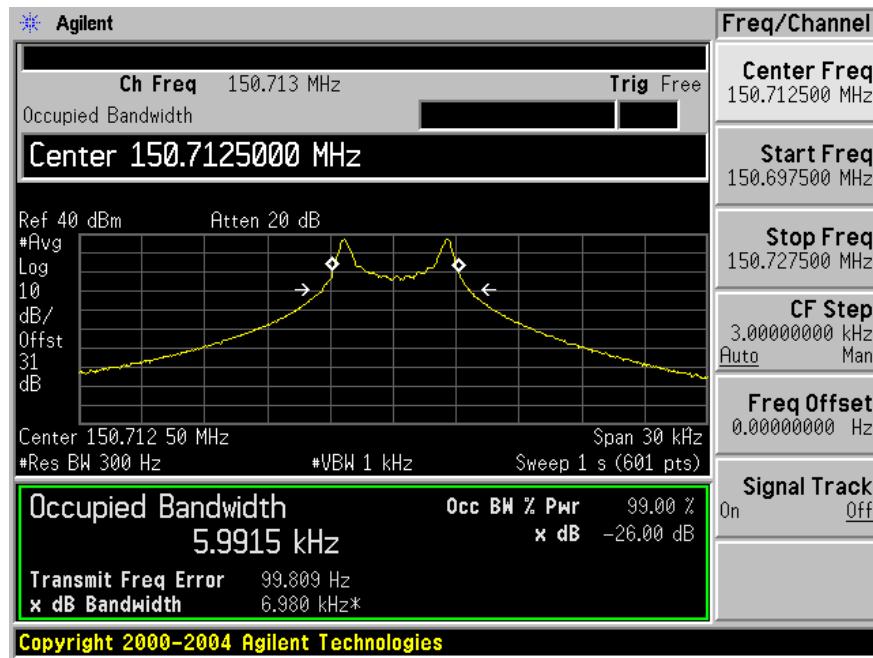
## Test Results

Please refer to the following plots.

Fc = 150.7125 MHz



## Emission Mask



### Occupied Bandwidth

**§2.1051, §90.210 & 90.669 – SPURIOUS EMISSION AT ANTENNA TERMINALS, SUPPRESSION OF INTERFERENCE****Applicable Standards**

§ 2.1051, §90.210 and §90.669

**Test Procedure**

*Conducted:*

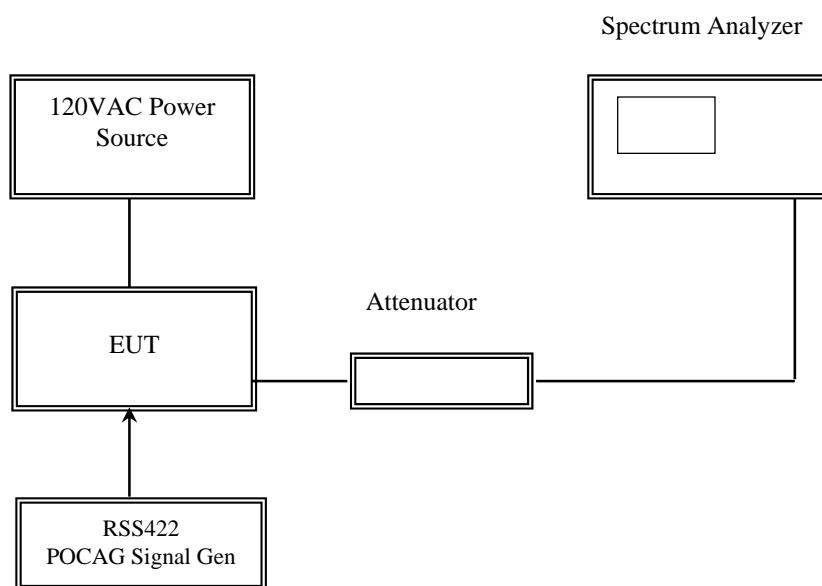
TIA 603-C Clause 2.2.13

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation.

**Test Equipment List and Details**

| Manufacturer | Equipment Description | Model Number | Serial Numbers | Calibration Date |
|--------------|-----------------------|--------------|----------------|------------------|
| Agilent      | Spectrum Analyzer     | E4440A       | MY44303352     | 2008-04-28       |

**\* Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

**Test Setup Block Diagram**

## Test Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23 °C     |
| <b>Relative Humidity:</b> | 47.2 %    |
| <b>ATM Pressure:</b>      | 101.4 kPa |

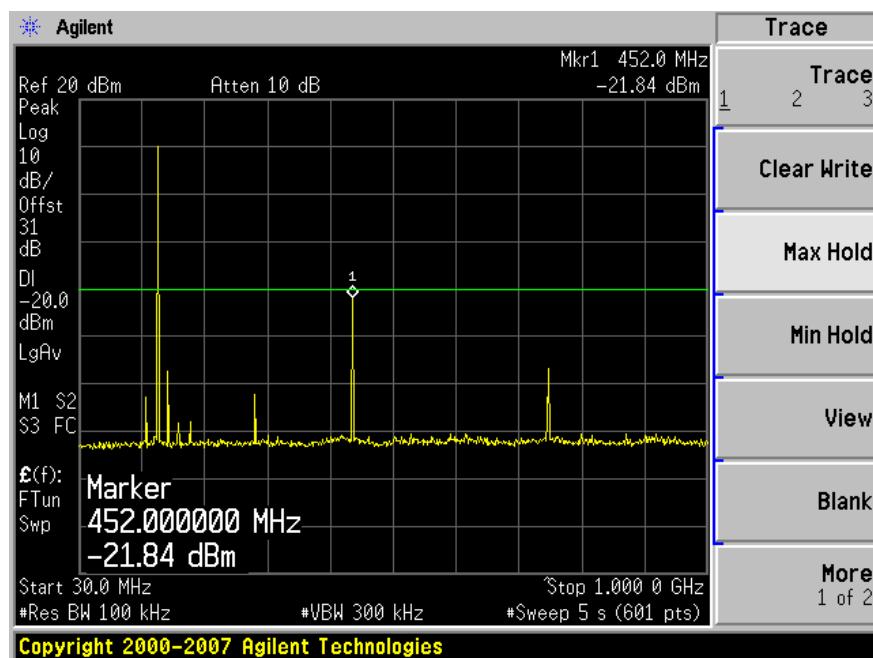
\* The testing was performed by Victor Zhang on 2009-04-13 in RF Site.

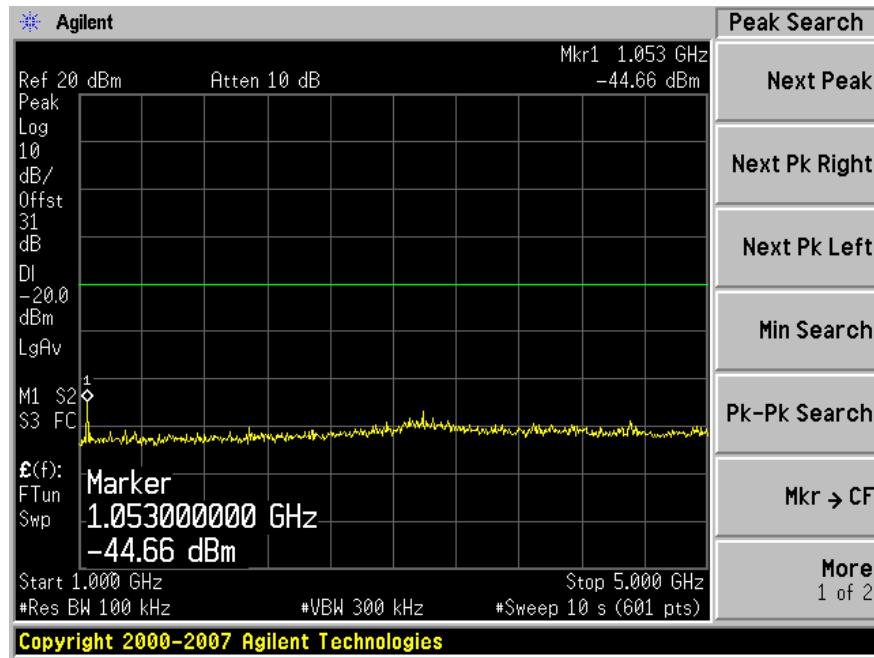
## Test Results

Please refer to the following plots.

Fc: 150.7125 MHz

### 30 MHz to 1GHz



**Above 1GHz**

**§2.1053, §90.210 (b), (d) - FIELD STRENGTH OF SPURIOUS EMISSION,  
SUPPRESSION OF INTERFERENCE****Applicable Standards**

§2.1053 and §90.210.

**Test Procedure**

TIA/EIA 603-C Clause 2.2.12

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

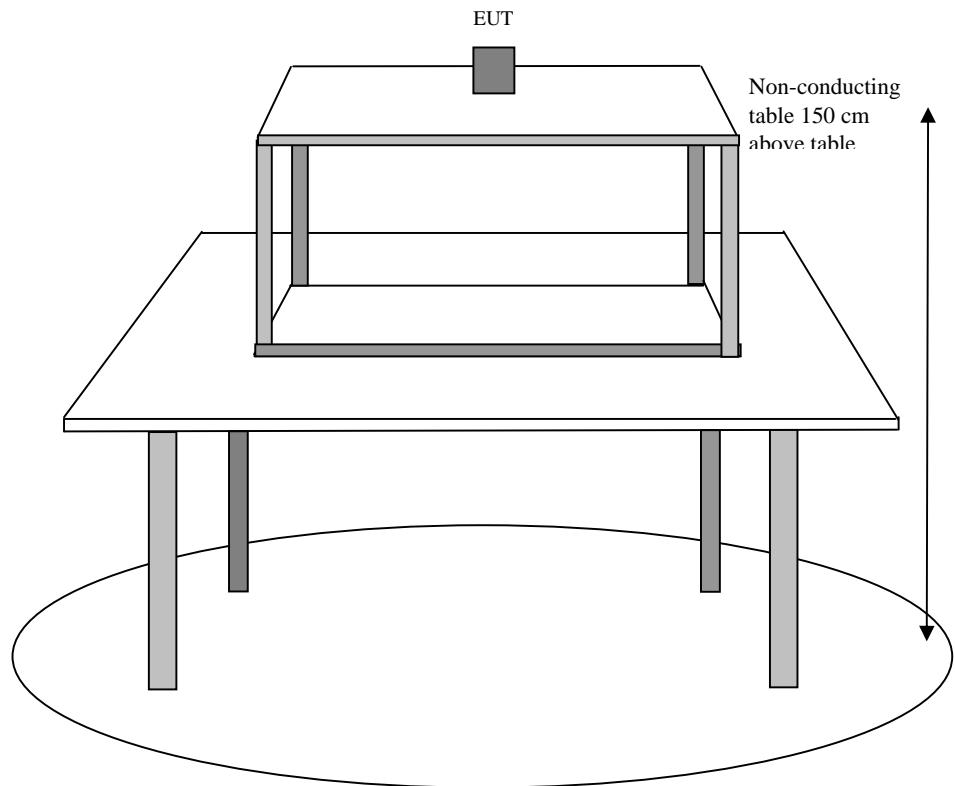
The EUT Removed and replaced with a substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

**Test Equipment List and Details**

| Manufacturers         | Equipment Descriptions      | Models Number | Serial Numbers | Calibration Dates |
|-----------------------|-----------------------------|---------------|----------------|-------------------|
| Agilent               | Spectrum Analyzer           | E4446A        | US44300386     | 2008-05-19        |
| HP                    | Signal Generator            | 83650B        | 3614A00276     | 2008-05-28        |
| Ducommun Technologies | Pre-Amplifier               | 1-18GHz       | 9909297-01R    | 2009-03-04        |
| A. H. Systems         | Horn Antenna                | SAS-200/571   | 261            | 2008-07-01        |
| A.R.A.                | Horn Antenna                | DRG-118/A     | 1132           | 2008-06-18        |
| Agilent               | ESG Vector Signal Generator | E44387C       | MY45092922     | 2009-01-23        |

**Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Test Setup Block Diagram



### Test Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 23 °C     |
| Relative Humidity: | 47.2 %    |
| ATM Pressure:      | 101.4 kPa |

\* The testing was performed by Victor Zhang on 2009-04-13 in 5 Meter Chamber #3.

## Test Results

The worst case reading as follows:

| Transmitting   |                    |   |                 |
|----------------|--------------------|---|-----------------|
| Margin<br>(dB) | Frequency<br>(MHz) | Antenna Polarization<br>(Horizontal/Vertical) | Frequency Range |
| -22.68         | 301.42             | Vertical                                      | 30 MHz to 5 GHz |

| Indicated          |                        | Table<br>Azimuth<br>(degree) | Test Antenna   |                   | Substituted        |                        |                                  |                       |                            | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|------------------------|------------------------------|----------------|-------------------|--------------------|------------------------|----------------------------------|-----------------------|----------------------------|----------------|----------------|
| Frequency<br>(MHz) | S.A.<br>Amp.<br>(dBuV) |                              | Height<br>(cm) | Polarity<br>(H/V) | Frequency<br>(MHz) | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>Cord.<br>(dB) | Cable<br>Loss<br>(dB) | Absolute<br>Level<br>(dBm) |                |                |
| 301.42             | 59.95                  | 250                          | 104            | V                 | 301.42             | -42.57                 | 0                                | 0.11                  | -42.68                     | -20            | -22.68         |
| 301.42             | 57.8                   | 203                          | 114            | H                 | 301.42             | -44.72                 | 0                                | 0.11                  | -44.83                     | -20            | -24.83         |
| 452.141            | 53.97                  | 306                          | 100            | H                 | 452.141            | -47.24                 | 0                                | 0.14                  | -47.38                     | -20            | -27.38         |
| 452.141            | 53.79                  | 153                          | 133            | V                 | 452.141            | -47.42                 | 0                                | 0.14                  | -47.56                     | -20            | -27.56         |
| 602.84             | 55.15                  | 7                            | 102            | V                 | 602.84             | -49.63                 | 0                                | 0.17                  | -49.8                      | -20            | -29.8          |
| 1205.67            | 36.16                  | 320                          | 148            | V                 | 1205.67            | -57.58                 | 6.9                              | 0.29                  | -50.97                     | -20            | -30.97         |
| 1055               | 36.78                  | 31                           | 146            | V                 | 1055               | -57.47                 | 6.3                              | 0.26                  | -51.43                     | -20            | -31.43         |
| 1205.67            | 35.22                  | 137                          | 183            | H                 | 1205.67            | -58.52                 | 6.9                              | 0.29                  | -51.91                     | -20            | -31.91         |
| 1055               | 33.58                  | 150                          | 144            | H                 | 1055               | -60.67                 | 6.3                              | 0.26                  | -54.63                     | -20            | -34.63         |
| 870.775            | 44.09                  | 181                          | 187            | V                 | 870.775            | -55.55                 | 0                                | 0.22                  | -55.77                     | -20            | -35.77         |
| 602.84             | 46.35                  | 4                            | 100            | H                 | 602.84             | -58.43                 | 0                                | 0.17                  | -58.6                      | -20            | -38.6          |
| 753.6              | 41.49                  | 68                           | 206            | V                 | 753.6              | -60.1                  | 0                                | 0.20                  | -60.3                      | -20            | -40.3          |
| 870.775            | 38.91                  | 119                          | 121            | H                 | 870.775            | -60.73                 | 0                                | 0.22                  | -60.95                     | -20            | -40.95         |
| 753.6              | 40.76                  | 308                          | 141            | H                 | 753.6              | -60.83                 | 0                                | 0.20                  | -61.03                     | -20            | -41.03         |

## **§2.1055 & §90.213 – FREQUENCY STABILITY, TRANSMITTER FREQUENCY TOLERANCE**

### **Applicable Standard**

§2.1055 and §90.213.

### **Test Procedure**

Frequency Stability vs. Temperature:

The equipment under test was connected to an external DC power source and the RF output was connected to a frequency counter via feed through attenuators. EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the frequency counter.

Frequency Stability vs. Voltage:

An external variable DC power source was connected to the EUT, The voltage was set to 115%, 100%, and 85% of the nominal operating input voltage, and the frequency output was recorded from the frequency counter.

### **Test Equipment List and Details**

| Manufacturers | Equipment Descriptions | Models Number | Serial Numbers | Calibration Dates |
|---------------|------------------------|---------------|----------------|-------------------|
| Agilent       | Spectrum Analyzer      | E4440A        | MY44303352     | 2008-04-28        |
| Espec         | Temp Chamber           | ESL-4CA       | 18010          | 2008-12-10        |

**Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Test Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 21 °C     |
| Relative Humidity: | 44 %      |
| ATM Pressure:      | 101.7 kPa |

\* The testing was performed by Victor Zhang on 2009-04-09 in RF Site.

## Test Results

### Frequency Stability with Temperature

| Test Condition |                  | Reference Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (ppm) | Limit (ppm) |
|----------------|------------------|---------------------------|--------------------------|-----------------------|-------------|
| Voltage (Vac)  | Temperature (°C) |                           |                          |                       |             |
| 110            | 50               | 150.7125                  | 150.71246                | -0.28531144           | 2.5         |
| 110            | 40               | 150.7125                  | 150.71265                | 1.015177905           | 2.5         |
| 110            | 30               | 150.7125                  | 150.7122                 | -1.97727461           | 2.5         |
| 110            | 20               | 150.7125                  | 150.71241                | -0.62370407           | 2.5         |
| 110            | 10               | 150.7125                  | 150.71246                | -0.25213569           | 2.5         |
| 110            | 0                | 150.7125                  | 150.71261                | 0.716596168           | 2.5         |
| 110            | -10              | 150.7125                  | 150.71259                | 0.610433773           | 2.5         |
| 110            | -20              | 150.7125                  | 150.71263                | 0.849299162           | 2.5         |
| 110            | -30              | 150.7125                  | 150.7123                 | -1.34030024           | 2.5         |

### Frequency Stability with Supply Voltage

| Test Condition |                  | Reference Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (ppm) | Limit (ppm) |
|----------------|------------------|---------------------------|--------------------------|-----------------------|-------------|
| Voltage (Vac)  | Temperature (°C) |                           |                          |                       |             |
| 93.5           | 20               | 150.7125                  | 150.71242                | -0.55735258           | 2.5         |
| 126.5          | 20               | 150.7125                  | 150.71244                | -0.38483868           | 2.5         |

## §2.1091 – RF EXPOSURE

### Applicable Standards

#### § 2.1091

(a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this

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

According to § 1.1310 and § 2.1091 RF exposure is calculated.

#### Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz)                                      | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34   | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30  | 842/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300   | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500   | /                             | /                             | f/1500                              | 30                       |
| 1500-100,000   | /                             | /                             | 1                                   | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

### MPE Prediction

Predication of MPE limit at a given distance

Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

## Conclusion

|  |                                  |
|--|----------------------------------|
| Maximum peak output power at antenna input terminal: | <u>36.85 (dBm)</u>               |
| Maximum peak output power at antenna input terminal: | <u>4841.72 (mW)</u>              |
| Prediction distance:                                 | <u>50 (cm)</u>                   |
| Prediction frequency:                                | <u>150.7125 (MHz)</u>            |
| Antenna Gain (typical):                              | <u>0 (dBi)</u>                   |
| antenna gain:  | <u>1 (numeric)</u>               |
| Power density at predication frequency at 50 cm:     | <u>0.154 (mW/cm<sup>2</sup>)</u> |

MPE limit for uncontrolled exposure at prediction frequency: 0.2 (mW/cm<sup>2</sup>)

The Power density at prediction distance of 50 cm does not exceed the limit 0.2 mW/ cm<sup>2</sup> Therefore, the exposure condition is compliant with FCC Rules.