# FCC PART 15C

# IC RSS-210, ISSUE 8, DEC 2010

# TEST AND MEASUREMENT REPORT

For

## Q-Track Corporation

2223 Drake Avenue SW, 1st Floor,

Huntsville, Alabama 35805, USA

**FCC ID: VJ3-QT-640-TAG**
**IC: 10503A-TXTAG640**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Real-Time Location System |

| | |
|---|---|
| **Test Engineers:** | Bo Li |
| **Report Number:** | R1306144-15C |
| **Report Date:** | 2013-09-23 |
| **Reviewed By:** | Victor Zhang<br>EMC/RF Lead |
| **Prepared By:** | Bay Area Compliance Laboratories Corp.<br>1274 Anvilwood Avenue,<br>Sunnyvale, CA 94089, USA<br>Tel: (408) 732-9162<br>Fax: (408) 732-9164 |

# TABLE OF CONTENTS

## DOCUMENT REVISION HISTORY

| Revision Number | Report Number | Description of Revision | Date of Revision |
|---|---|---|---|
| 0 | R1306144-15C | Original Report | 2013-09-23 |

# 1 General Description

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

This test and measurement report was prepared on behalf of *Q-Track Corporation* and their product, Model: *QT640, FCC ID: VJ3-QT-640-TAG; IC: 10503A-TXTAG640 w*hich will henceforth be referred to as the EUT "Equipment Under Test." The EUT is Real-Time Location System (RTLS).

## 1.2 Mechanical Description of EUT

The EUT measures approximately 7 cm (L) x 5.7cm (W) x 4 cm (H) and weighs 145g.

*The data gathered are from a production sample provided by the manufacturer. Serial number: 640F1045#50 assigned by Q-Track.*

## 1.3 Objective

This report is prepared on behalf of *Q-Track Corporation* in accordance with Part 15, Subpart C of the Federal Communication Commission's rules – Causing Equipment Standards for Digital Apparatus and RSS-210, Issue 8 of the Canadian Department of Industry rules.

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

No Related Submittals.

## 1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All tests were performed at Bay Area Compliance Laboratories Corp.

## 1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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 CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB 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 Corp.

## 1.7 Test Facility

Bay Area Compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025:2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminaires and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea ( Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

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

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have 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 test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

# 2 System Test Configuration

## 2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in an operating mode to represent worst-case results during the final qualification test.

## 2.2 EUT Exercise Software

N/A

## 2.3 Equipment Modifications

No modifications were made to the EUT.

## 2.4 Special Accessories

No special equipment was used during testing.

## 2.5 Local Support Equipment

| Manufacturers | Descriptions | Models | Serial Numbers |
|---|---|---|---|
| - | - | - | - |

## 2.6 EUT Internal Configuration Details

| Manufacturers | Descriptions | Models | Serial Numbers |
|---|---|---|---|
| The Q-Track Corporation | Main PCB Board | Q0129 | 109 |

## 2.7 Power Supply and Line Filters

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| V-INFINITY | AC/DC Power Adapter | ETSA050360UD | ETSA050360UDC-P5P-SZ |
| Q-TRACK | Charger | QT-654 | - |

# 3 Summary of Test Results

| FCC/IC Rules | Descriptions of Test | Result (s) |
|---|---|---|
| FCC §2.1093<br>IC RSS-102 | RF Exposure | Compliant |
| FCC §15.203<br>IC RSS-Gen §7.1.2 | Antenna Requirements | Compliance |
| FCC §15.207<br>IC RSS-Gen §7.2.4 | Conducted Emissions | N/A |
| FCC §15.209<br>IC RSS-210 §A2.2<br>RSS-Gen §7.2.5 | Radiated Emissions | Compliance |
| IC RSS-Gen §4.6.1 | 99% Emission Bandwidth | Compliant |
| IC RSS-Gen §4.10 & §6.1 | Receiver spurious emissions | Compliant |

Note: N/A, The EUT is battery powered during operating mode, conducted emissions is not required.

# 4 FCC §2.1093 & IC RSS-102 - RF Exposure

## 4.1 Applicable Standard

**According to FCC KDB 447498 D01, Appendix A:**

SAR Test Exclusion Thresholds for 100 MHz-6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distance are illustrated in the following Table:

| MHz | 5 | 10 | 15 | 20 | 25 | mm |
|---|---|---|---|---|---|---|
| 150 | 39 | 77 | 116 | 155 | 194 | SAR Test Exclusion Threshold (mW) |
| 300 | 27 | 55 | 82 | 110 | 137 | |
| 450 | 22 | 45 | 67 | 89 | 112 | |
| 835 | 16 | 33 | 49 | 66 | 82 | |
| 900 | 16 | 32 | 47 | 63 | 79 | |
| 1500 | 12 | 24 | 37 | 49 | 61 | |
| 1900 | 11 | 22 | 33 | 44 | 54 | |
| 2450 | 10 | 19 | 29 | 38 | 48 | |
| 3600 | 8 | 16 | 24 | 32 | 40 | |
| 5200 | 7 | 13 | 20 | 26 | 33 | |
| 5400 | 6 | 13 | 19 | 26 | 32 | |
| 5800 | 6 | 12 | 19 | 25 | 31 | |

According to IC RSS-102, section 2.5.1 Exemption from Routine Evaluation Limits–SAR Evaluation

SAR evaluation is required if the separation distance between the user and the radiating element of the device is less than or equal to 20 cm, except when the device operates as follows:

- from 3 kHz up to 1 GHz inclusively, and with output power (i.e. the higher of the conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 200 mW for general public use and 1000 mW for controlled use;
- above 1 GHz and up to 2.2 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 100 mW for general public use and 500 mW for controlled use;
- above 2.2 GHz and up to 3 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use;
- above 3 GHz and up to 6 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 10 mW for general public use and 50 mW for controlled use.

## 4.2 Results

The field strength of TX frequency at 30 meter distance is 26.18 dBuV, The EIRP is equal to –49.05 dBm. Therefore; SAR measurement is not required for this device.

# 5 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Requirements

## 5.1 Applicable Standard

According to FCC §15.203 & IC RSS-Gen §7.1.2, 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.

b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

## 5.2 Result

The EUT consists of an internal Ferrite Loopstick Antenna with antenna gain of much less than 6 dBi, which cannot be modified by end-users.

Please refer to the EUT pictures for detail.

# 6 FCC §15.209 & IC RSS-210 §A2.2, RSS-Gen §7.2.5 – Radiated Emissions

## 6.1 Applicable Standard

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (micro volts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 Note 2 | 3 |
| 88 - 216 | 150 Note 2 | 3 |
| 216 - 960 | 200 Note 2 | 3 |
| Above 960 | 500 | 3 |

Note 2: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to RSS-210 A2.2

Devices using this band shall comply with one of the following limits:

(a) The total input power to the final radio frequency stage shall not exceed 100 milliwatts, and the total length of transmission line, antenna and ground lead (if used) shall not exceed 3 meters; or

(b) The field strength of radiated emissions shall not exceed 250 microvolts/m measured at 30 meters.

(c) Transmitters that employ a leaky coaxial cable as a radiating antenna may meet the field strength limit of 15 microvolts/m, as measured at a distance of 47715/(frequency in kHz) meters (equivalent to wavelength/(2π)) from the coaxial cable.

(d) Emissions outside of this band shall be attenuated by at least 20 dB below the mean transmitter output power, or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

According to RSS-Gen 7.2.5 Transmitter Spurious Emission Limits
Spurious emissions from licence-exempt transmitters shall comply with the field strength limits shown below. Additionally, the level of any transmitter spurious emission shall not exceed the level of the transmitter's fundamental emission.

**Table 5: General Field Strength Limits for Transmitters at Frequencies Above 30 MHz**

| Frequency (MHz) | Field Strength (microvolt/m at 3 metres) |
|---|---|
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960 | 500 |

**Note:** Transmitting devices are not permitted in Table 1 bands or, unless stated otherwise, in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz).

**Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

| Frequency | Field Strength (microvolts/m) | Magnetic H-Field (microamperes/m) | Measurement Distance (metres) |
|---|---|---|---|
| 9-490 kHz | 2,400/F (F in kHz) | 2,400/377F (F in kHz) | 300 |
| 490-1,705 kHz | 24,000/F (F in kHz) | 24,000/377F (F in kHz) | 30 |
| 1.705-30 MHz | 30 | N/A | 30 |

**Note:** The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

## 6.2 Test Setup

The radiated emissions tests were performed in the 10-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15 Subpart C and RSS-210 limits.

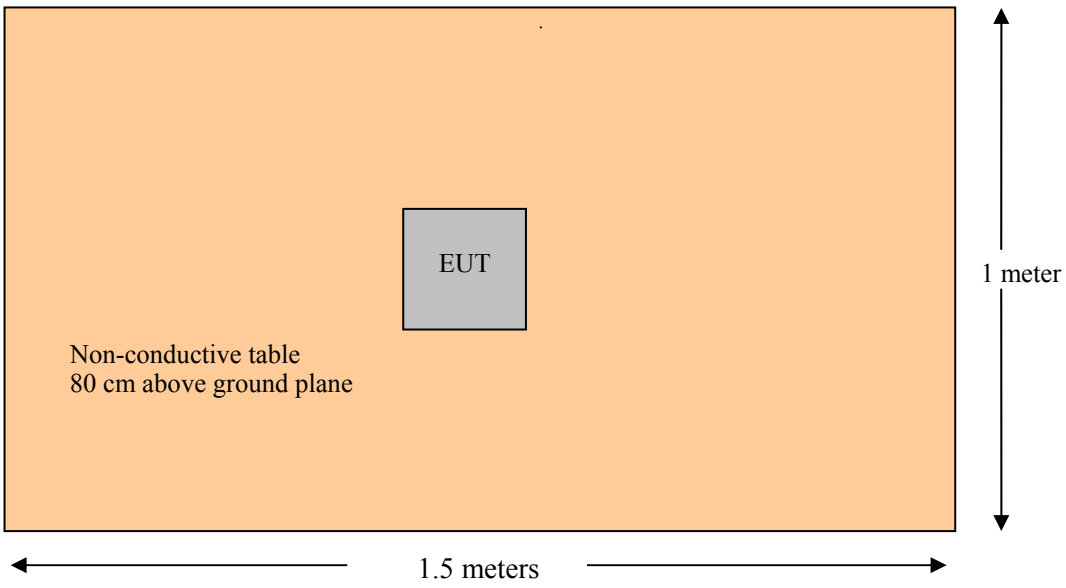
## 6.3 Test Procedure

For the radiated emissions test, the EUT host was battery powered.

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

The EUT is set 3 meter (above 1GHz) and 10 meter (below 1GHz) away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## 6.4 Test Setup Block Diagram




## 6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

Margin = Corrected Amplitude - Limit

## 6.6 Test Equipment List and Details

| Manufacturer | Description | Model No. | Serial No. | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|
| Hewlett Packard | Pre-amplifier | 8447D | 2944A07030 | 2013-04-09 | 1 year |
| Rohde & Schwarz | EMI Test Receiver | ESCI 1166.5950K03 | 100044 | 2013-04-23 | 1 year |
| Sunol Science Corp | System Controller | SC99V | 122303-1 | N/R | N/R |
| Sunol Science Corp | Combination Antenna | JB3 | A020106-1 | 2013-06-17 | 1 year |
| COM-POWER | Active Loop Antenna | AL-130 | 17043 | 2012-06-06 | 2 year |
| Agilent | PSA Series Spectrum Analyzer | E4440A | MY44303352 | 2012-10-16 | 1 year |

***Statement of Traceability: BACL*** *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

## 6.7 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 º C |
| **Relative Humidity:** | 42 % |
| **ATM Pressure:** | 101.79 kPa |

*The testing was performed by Bo Li on 2013-08-26 in chamber 1.*

## 6.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC 15.209 radiated emissions limits, and had the worst margin of:

| **Mode: AM Stand Alone Transmitting** | | | |
|---|---|---|---|
| **Margin (dB)** | **Frequency (MHz)** | **Polarization (Horizontal/Vertical)** | **Range** |
| -0.96 | 1.055 | - | 9 kHz – 1000 MHz |

*Note¹: All emission levels were on the noise floor or20 dB below of the limit.*

## 6.9 Radiated Emissions Test Result Data

### 1) Radiated Emission at 10 meters, 9 kHz–30 MHz

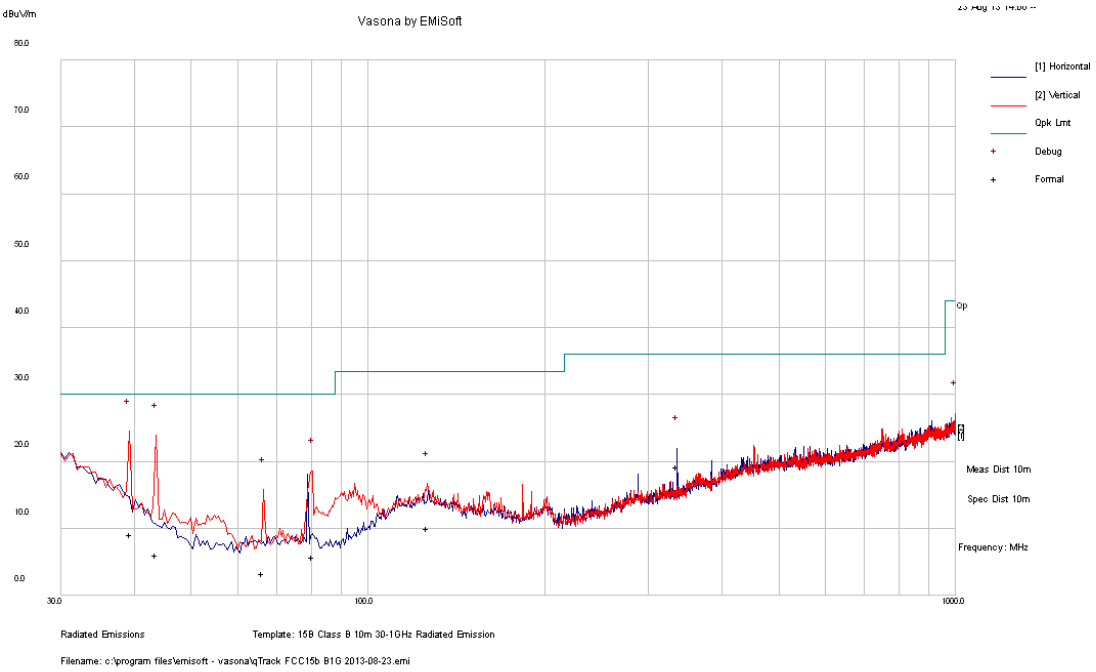
| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Distance Factor (dB) | Cord. Reading (dBµV/m) | FCC/IC | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) |
| 1.055 | 39.99 | 0 | 100 | - | 10.8 | 0.1 | 24.71[1] | 26.18 | 27.14 | -0.96 |
| - | - | - | - | - | - | - | | - | - | Note[2] |

Note: 1.055 MHz is the fundamental frequency

Note[1]: Limit under FCC15.209 for below 30MHz, Frequency in 0.490-1.705 MHz, Field strength is 24000/F(kHz) microvolt's/meter, measurement distance is 30 meters. We measured with 1,2,3,5 and 10 meters. The average distance correction factor is calculated based on the measurement. The calculated factor is 51.79xLog (D2/D1).

Note[2]: All other emissions were on the noise floor or 20 dB below of the limit.

### 2) Radiated Emission at 10 meters, 30 MHz–1000 MHz




| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Test Antenna | | Turntable Azimuth (degrees) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | Height (cm) | Polarity (H/V) | | | |
| 706.807 | 14.53 | 133 | V | 142 | 36 | -21.47 |
| 704.75025 | 14.52 | 221 | V | 112 | 36 | -21.48 |
| 712.92225 | 14.78 | 116 | V | 102 | 36 | -21.22 |
| 35.7785 | 9.49 | 280 | V | 54 | 30 | -20.51 |
| 42.24 | 4.90 | 222 | V | 95 | 30 | -25.10 |
| 111.1605 | 6.82 | 190 | V | 224 | 33.5 | -26.68 |
| 993.501 | 17.91 | 171 | V | 150 | 44 | -26.09 |

# 7 IC RSS-Gen §4.6.1 - 99% Occupied Bandwidth

## 7.1 Applicable Standard

(1) As per RSS-GEN §4.6.1 standard, When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

(2) The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

(3) The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

(4) The span between the two recorded frequencies is the occupied bandwidth.

## 7.2 Test Equipment List and Details

| Manufacturer | Description | Model No. | Serial No. | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|
| Hewlett Packard | Pre-amplifier | 8447D | 2944A07030 | 2013-04-09 | 1 year |
| Rohde & Schwarz | EMI Test Receiver | ESCI 1166.5950K03 | 100044 | 2013-04-23 | 1 year |
| Sunol Science Corp | System Controller | SC99V | 122303-1 | N/R | N/R |
| Sunol Science Corp | Combination Antenna | JB3 | A020106-1 | 2013-06-17 | 1 year |
| COM-POWER | Active Loop Antenna | AL-130 | 17043 | 2012-6-6 | 2 year |
| Agilent | PSA Series Spectrum Analyzer | E4440A | MY44303352 | 2012-10-16 | 1 year |

**** Statement of Traceability:*** *BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST*

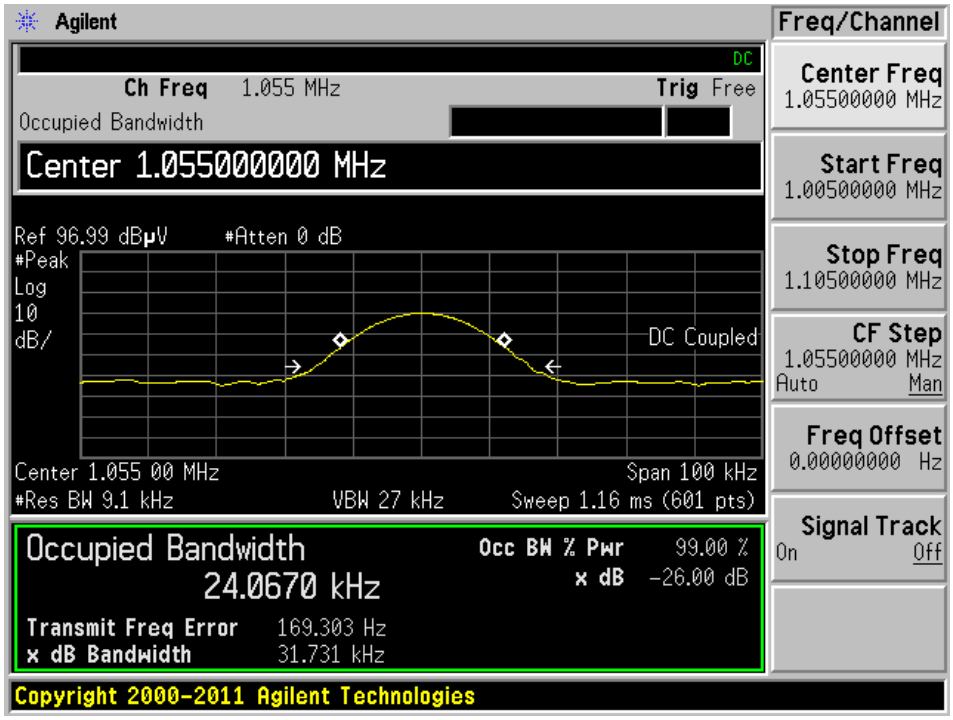
## 7.3 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 26 °C |
| **Relative Humidity:** | 45 % |
| **ATM Pressure:** | 101.7 kPa |

*The testing was performed by Bo Li on 2013-08-23 in 5 meters chamber 3.*

## 7.4 Test Results

| Frequency (MHz) | 99% Channel Bandwidth (kHz) |
|---|---|
| 1.055 | 24.0670 |



# 8 IC RSS-GEN §6.1 - Receiver Spurious Radiated Emissions

## 8.1 Applicable Standard

According to IC RSS-Gen §6.1, receiver spurious emission shall not exceed the radiated limits shown in the table below:

**Table 2: Radiated Limits of Receiver Spurious Emissions**

| Frequency (MHz) | Field Strength (microvolts/m at 3 metres)* |
|---|---|
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960 | 500 |

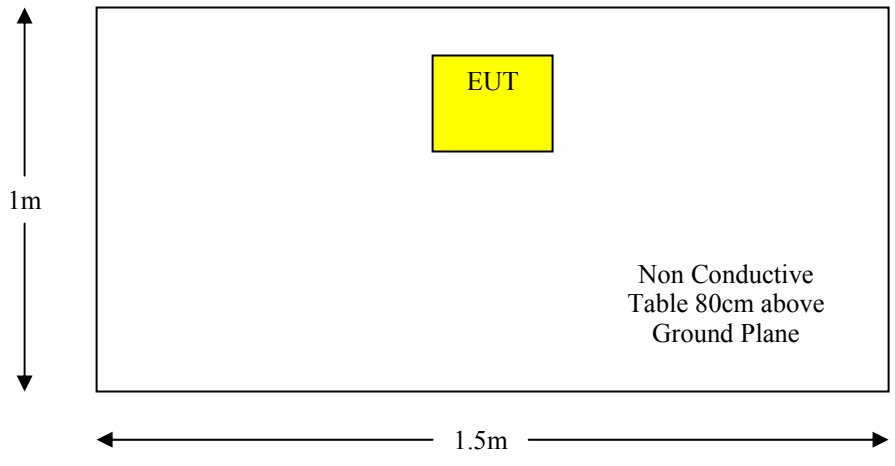
## 8.2 Test Setup

The radiated emissions tests were performed in the 5-meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

## 8.3 Test Setup Block Diagram



### 8.4 Test Procedure

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

All data was recorded in the peak detection mode. Quasi-peak readings were performed only when an emission was found to be marginal (within -4 dB of specification limits).

### 8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

Margin = Corrected Amplitude - Class B Limit

### 8.6 Test Equipment List and Details

| Manufacturers | Descriptions | Models | Serial Numbers | Calibration Dates | Calibration Interval |
|---|---|---|---|---|---|
| Hewlett Packard | Pre-amplifier | 8447D | 2944A07030 | 2013-04-09 | 1 year |
| Rohde & Schwarz | EMI Test Receiver | ESCI 1166.5950K03 | 100044 | 2013-04-23 | 1 year |
| Sunol Science Corp | System Controller | SC99V | 122303-1 | N/R | N/R |
| Sunol Science Corp | Combination Antenna | JB3 | A020106-3 | 2013-06-18 | 1 year |
| HP | Pre-amplifier | 8449B | 3147A00400 | 2013-02-04 | 1 year |
| Agilent | PSA Series Spectrum Analyzer | E4440A | MY44303352 | 2012-10-16 | 1 year |
| A.R.A Inc. | Horn antenna | DRG-118/A | 1132 | 2013-01-29 | 1 year |

***Statement of Traceability:*** **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

## 8.7 Test Environmental conditions

| | |
|---|---|
| **Temperature:** | 23 º C |
| **Relative Humidity:** | 44 % |
| **ATM Pressure:** | 101.68 kPa |

*The testing was performed by Kong Her in on 2013-08-23 at Chamber 1.*

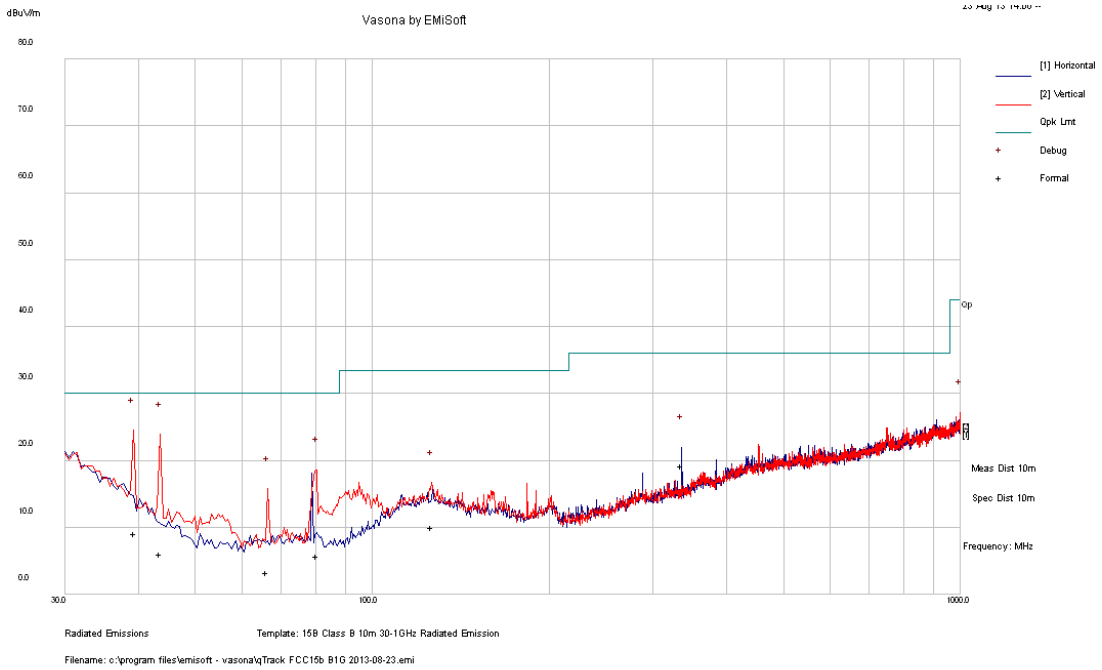
## 8.8 Summary of Test Results

According to the recorded data, the EUT complied with RSS-GEN limits, and had the worst margin reading of:

| **Mode: 30 MHz to 1 GHz** | | | |
|---|---|---|---|
| **Margin (dB)** | **Frequency (MHz)** | **Polarization (Horizontal/Vertical)** | **Range (MHz)** |
| -16.77 | 335.9953 | Horizontal | 30-1000 |

## 8.9 Radiated Spurious Emissions Test Plots and Data

### 30-1000 MHz measured at 10 meters distance




| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Test Antenna | | Turntable Azimuth (degrees) | Limit (dBµV/m) | Margin (dB) | Detector (PK/QP) |
|---|---|---|---|---|---|---|---|
| | | Height (cm) | Polarity (H/V) | | | | |
| 335.9953 | 19.23 | 298 | H | 348 | 36 | -16.77 | QP |
| 39.4145 | 9.13 | 303 | V | 244 | 30 | -20.87 | QP |
| 126.0203 | 10.04 | 347 | V | 298 | 33.5 | -23.46 | QP |
| 43.5445 | 5.98 | 221 | V | 324 | 30 | -24.02 | QP |
| 80.66 | 5.76 | 319 | V | 58 | 30 | -24.24 | QP |
| 66.29175 | 3.34 | 186 | V | 216 | 30 | -26.66 | QP |