Lab Code: 200167-0

FCC PART 90
IC RSS-119, ISSUE 10, APRIL 2010
IC RSS-310, ISSUE 2, JULY 2007

TEST AND MEASUREMENT REPORT

For

Teltronic S.A.U.

Poligono Malpica, Calle F Oeste,
50057 Zaragoza, Spain

FCC ID: WT7PTRKTHTT500800
IC: 8624A-PTHTT800
Model: HTT-500 806-870 MHz

Report Type:	**Product type:**
Original Report	Digital Handheld Terminal

Test Engineer:	Jack Liu
Report Number:	R1010252-90
Report Date:	2010-11-15
Reviewed By:	Victor Zhang RF Lead
Prepared By: (84)	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94085, U.S.A. Tel: (408) 732-9162 Fax: (408) 732 9164 www.baclcorp.com

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1010252-90	Original report	2010-11-15

1. General Information

1.1 Product Description for Equipment under Test (EUT)

The report has been prepared on behalf of Teltronic S.A.U. and their product FCC ID: WT7PTRKTHTT500800, IC: 8624A-PTHTT800, model: HTT-500 806~870 MHz or the EUT as referred to in the rest of this report. The EUT is a Digital handheld terminal with GPS receiver.

The EUT is an 806~869 MHz Transceiver that operates under FCC Part 90 and IC RSS-119.

Specifications	
TX Frequency Band	806~824 MHz 851~869 MHz
Emission designator	20K0D7E, 20K0D7D, 20K0D7W, 20K0Q7E, 20K0Q7D, 20K0Q7W
Modulation	π/4-DQPSK TDMA 4 slots
RF Output Power	1 Watts
RF Channel Spacing	25 kHz (Spectrum Efficiency 6.25 kHz) Note 1
Necessary / authorized Bandwidth	20 kHz
Power Supply	7.4 Vdc Li-Pol battery

***Note 1*:**

"TETRA access scheme is TDMA with 4 physical channels per carrier. The channel bandwidth is 25 kHz. As a result, the equipment meets a spectrum efficiency standard of one voice channel per 6.25 kHz of channel bandwidth.
Modulation is π/4-DQPSK with 18Ksym/sec. This modulation is based on transmitting two bits per symbol, so the data rate on each sub-carrier is 9000 bits/sec (higher than 4800 bits per second per 6.25 kHz of channel bandwidth)."

1.2 Mechanical Description

The EUT measures approximately 16cm (L) x 6cm (W) x 4cm (H) and weighs 397.5g with battery, 297.5g without battery.

The test data gathered are from production sample. Serial number: R1010252-1 provided by the BACL.

1.3 Objective

This Type approval report is prepared on behalf of *Teltronic S.A.U.* in accordance with Part 90 of the Federal Communication Commissions rules and Industry Canada RSS-119 Issue 10, April 2010 and Industry Canada RSS-310 Issue 2, Julyl 2007 (for GPS receiver only).

1.4 Related Submittal(s)/Grant(s)

None.

1.5 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 individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards:TIA603-C and ANSI 63.4-2003, American National Standard for Method 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 by Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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 NIS 81, 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.

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

1.7 Test Facility

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 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/ts/htdocs/210/214/scopes/2001670.htm

2 System Test Configuration

2.1 Justification

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

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 Equipment Modifications

No modifications were made to the EUT.

2.3 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
IBM	Laptop	T41	00416
Dell	Laptop	PP18L	17899297525

2.4 Internal Configuration

Manufacturer	Description	Model No.	Serial No.
Teltronic S.A.U.	Main Board	F072001	-
Teltronic S.A.U.	MMI Board	F072002	-
Teltronic S.A.U.	GPS Board	F072004	-

2.5 Local Support Equipment Power Supply and Line Filters

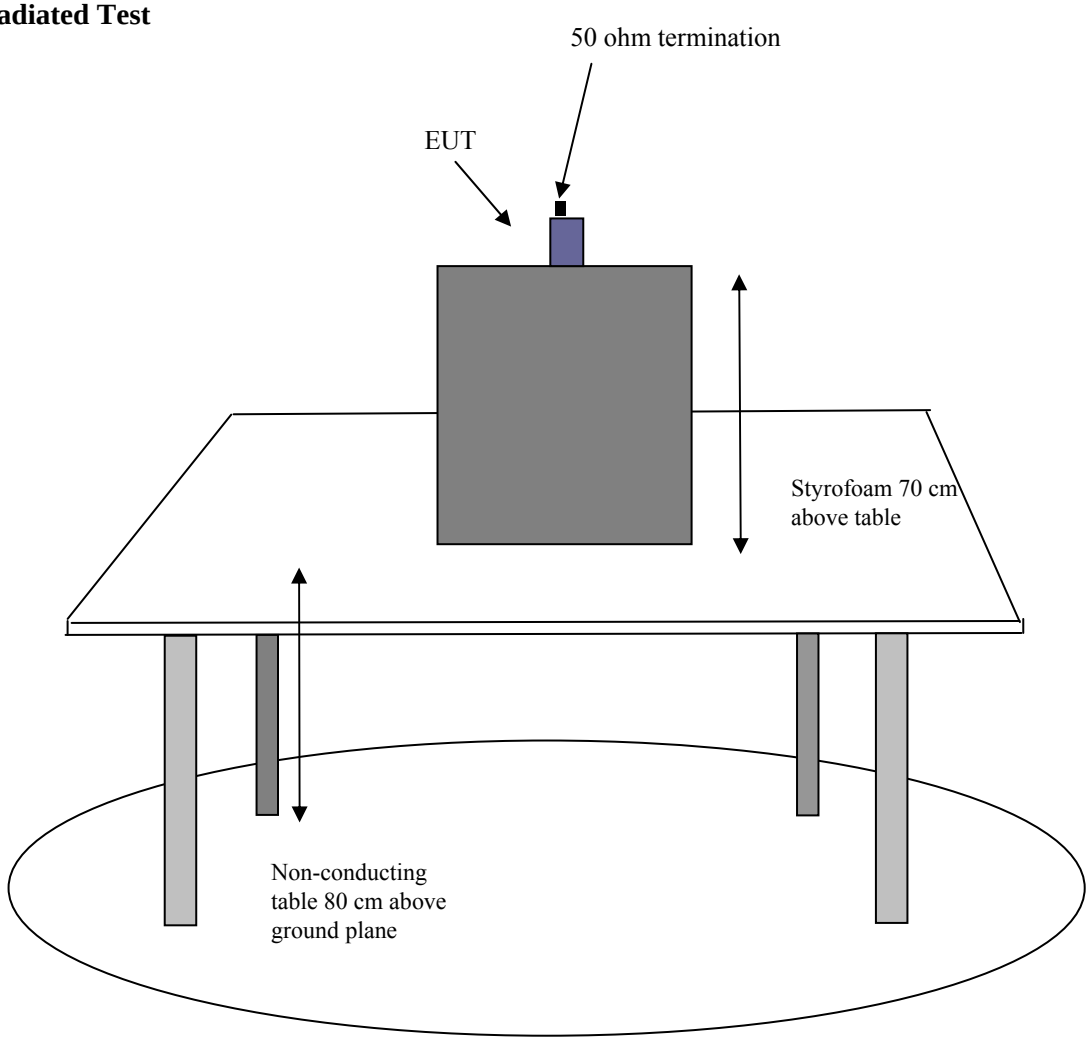
Manufacturer	Description	Model	Serial Number
-	-	-	-

2.6 Interface Ports and Cabling

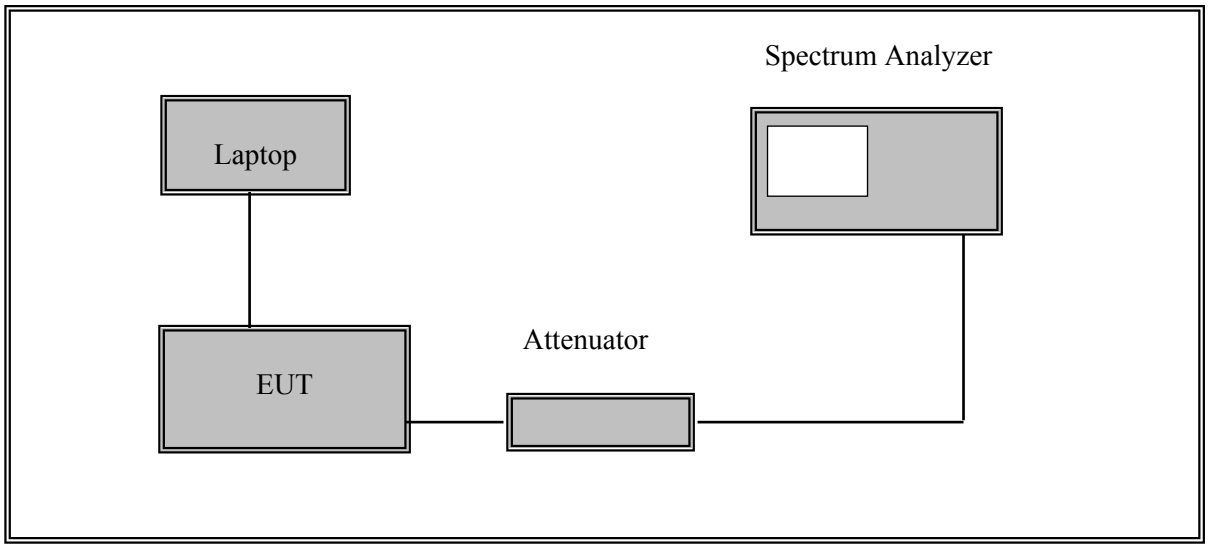
Cable Description	Length (m)	From	To
USB to Serial Port cable	>1.0	Laptop USB port	EUT Serial Port

2.7 Test Setup Block Diagram

Radiated Test



Conducted Test



3 Summary of Test Results

FCC and IC Rules	Description of Test	Result
FCC§1.1310, §2.1093 IC RSS-102	RF Exposure	Compliant
FCC§2.1046, §90.205 IC RSS-119 §5.4	RF Output Power	Compliant
FCC§2.1047, §90.207 IC RSS-119 §5.2	Modulation Characteristics, Audio Frequency Response and Audio Filter Response	Compliant
FCC §2.1049,§90.210 IC RSS-119 §5.5	Occupied Bandwidth and Emission Mask	Compliant
FCC §2.1051, §90.210 IC RSS-119 §5.8	Spurious Emissions at Antenna Terminals	Compliant
FCC §2.1055, § 90.213 IC RSS-119 §5.3	Frequency stability	Compliant
FCC §2.1053, §90.210 IC RSS-119 §5.8	Field strength of spurious radiation	Compliant
FCC § 90.214 IC RSS-119 §5.9	Transient Frequency Behavior	N/A [1]
IC RSS-119 §5.11 RSS-310 §3.1	Receiver Spurious Emission	Compliant

Note [1]: Not Applicable

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

4.1 Applicable Standards

FCC §2.1093 & IC RSS-102

4.2 Result

This is a portable device which required SAR testing; refer to the separate SAR report No.: R1010252-SAR for detail results.

5 FCC §2.1046, §90.205 & IC RSS-119 §5.4 – Conducted Output Power

5.1 Applicable Standard

According to FCC §2.1046, and §90.205, *806–824 MHz, 851–869 MHz, 896–901 MHz and 935–940 MHz.* Power and height limitations are specified in §90.635

According to IC RSS-119 §5.4, the output power should be within ± 1.0 dB of the manufacture's rated power.

5.2 Test Procedure

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

Spectrum Analyzer Setting:

RBW	Video BW
100 kHz	300 kHz

5.3 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Jack Liu on 2010-10-25 ~ 2010-10-27.

5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09

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

5.5 Test Result

Test Mode: Transmitting

806~824 MHz:

Power Level	Channel Spacing (kHz)	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (Watt)
High	25 kHz	806.1	29.42	0.875
	25 kHz	815	29.31	0.853
	25 kHz	823.9	29.28	0.847
Low	25 kHz	806.1	11.13	0.0130
	25 kHz	815	11.15	0.0130
	25 kHz	823.9	11.10	0.0129

851~869 MHz:

Power Level	Channel Spacing (kHz)	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (Watt)
High	25 kHz	851.1	30.23	1.054
	25 kHz	860	30.17	1.040
	25 kHz	868.9	29.94	0.986
Low	25 kHz	851.1	12.04	0.0160
	25 kHz	860	12.04	0.0160
	25 kHz	868.9	11.82	0.0152

6 FCC §2.1047, §90.207 & IC RSS-119 §5.2 – Modulation Characteristic

6.1 Applicable Standard

FCC §2.1047 & §90.207:

(a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
(b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

IC RSS-119 §5.2

Equipment that operates in frequency bands other than 746-770 MHz and 794-800 MHz may employ any type of modulation. The type of modulation used shall be reported.

6.2 Test Procedure

Test Method: TIA/EIA-603-C 2.2.3

6.3 Test Result

Please refer to the hereinafter plots.

Transimtter Low Pass Filter

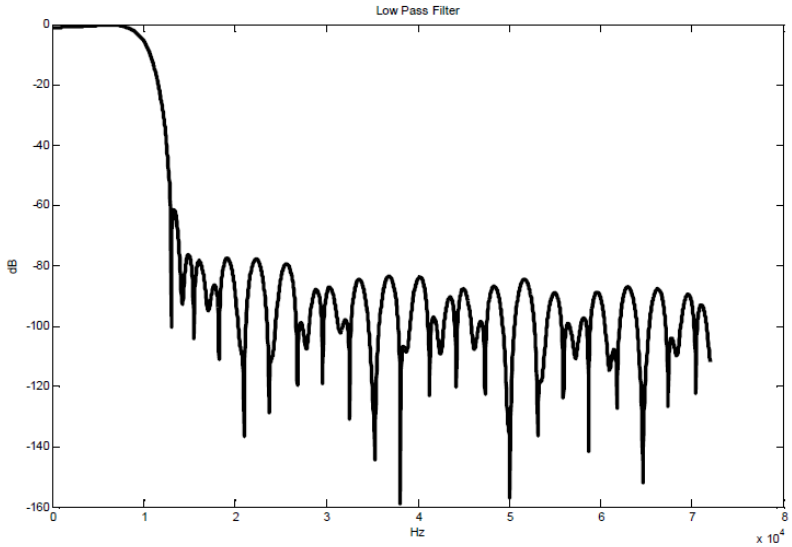
Type of Emission: 20K0Q7E, 20K0Q7D, 20K0Q7W, 20K0D7E, 20K0D7D, 20K0D7W
The modulation used is π/4-shifted Differential Quaternary Phase Shift Keying (π/4-DQPSK), with a modulation rate of 18k symbol/sec. (36k bit/sec).

A root-raised-cosine filter (RRC) is used as transmitting and receiving filter in this digital communication system to perform matched filtering.
The combined response of two such filters is that of the raised-cosine filter.
The raised-cosine filter is a filter frequently used for pulse-shaping in digital modulation known for its ability to minimize intersymbol interference (ISI).

The access scheme is TDMA with 4 physical channels per carrier.

The following graph is the transfer function of the aforementioned filter.

Plot provided by manufacturer.



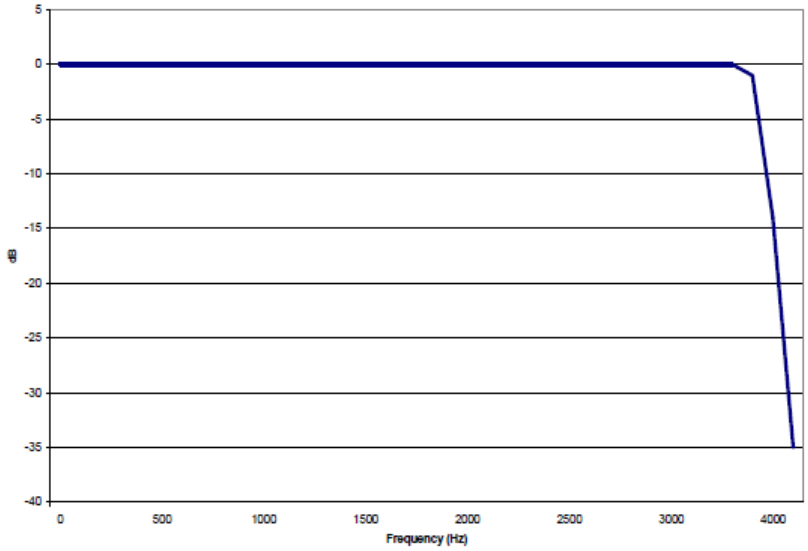
Audio Low Pass Filter

The modulation is limited by data characteristics and its filters.

In the previous section, the phase and quadrature branches (I and Q) are filtered with a root-raised-cosine filter (RRC) with a symbol rate of 18k symbol/sec. After that, the signal is pi/4 DQPSK modulated (see the plot in the previous section).

Signal processing is carried out using a ST Microelectronics STw5093 codec that contains the following low pass filter.

Plot provided by manufacturer.



7 FCC §2.1049, §90.209, §90.210 & IC RSS-119 §5.5– Occupied Bandwidth & Emission Mask

7.1 Applicable Standard

FCC §90.209

b(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table.

Standard Channel Spacing/Bandwidth

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 25[2]		
25–50	20	20
72–76	20	20
150–174	17.5	1,320/11.25/6
216–220[5]	6.25	20/11.25/6
220–222	5	4
406–512[2]	16.25	1,320/11.25/6
806–809/851–854	12.5	20
809–824/854–869	25	20
896–901/935–940	12.5	13.6
902–928[4]		
929–930	25	20
1427–1432[5]	12.5	12.5
[3]2450–2483.5[2]		
Above 2500		

FCC §2.1049, §90.210

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10\log(P)$ dB

The resolution bandwidth was 100Hz or greater for measuring up to 250 kHz from the edge of the authorized frequency segment, and 30 kHz or greater for measuring more than 250 kHz from the authorized frequency segment.

IC RSS-119 §5.5

5.5.7 The bands 821-824/866-869 MHz are to be used only for public safety purposes; the channelling plan is given in SRSP-502.

5.5.8 Voice input to an FM transmitter may use the spectrum mask with audio filter if it is equipped with suitable filters to be used for the audio signal only and not for other purposes. Other modulations must comply with the masks without audio filter.

5.5.9 See the relevant SRSPs for the operating frequency of the equipment channelling plan.

Emission Mask G. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fdin kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (fd/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

7.2 Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band ±50 KHz from the carrier frequency.

7.3 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Jack Liu on 2010-10-25 ~ 2010-10-27.

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09

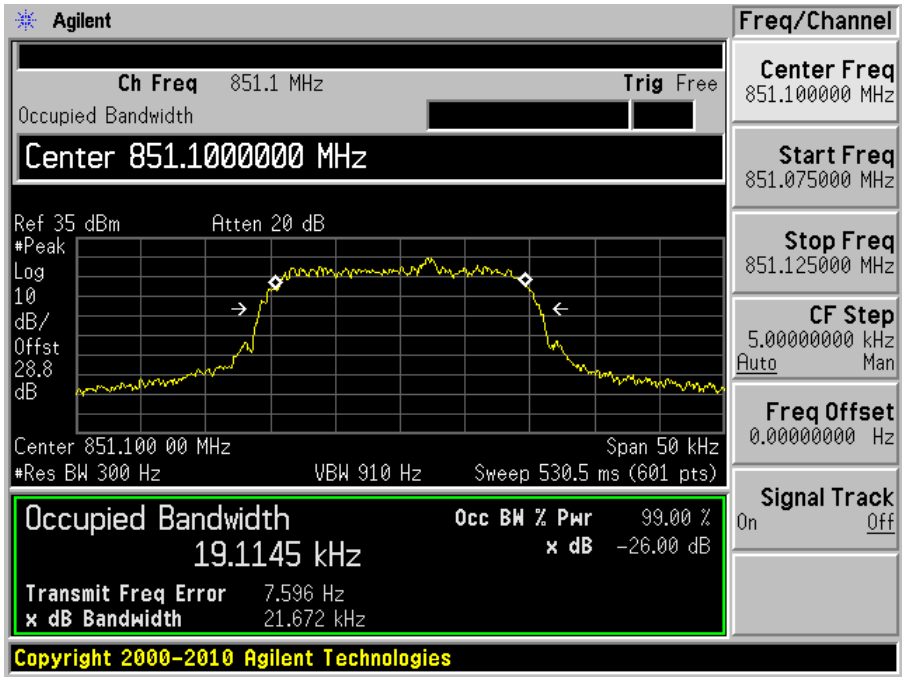
Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.5 Test Result

Please refer to the plots below.

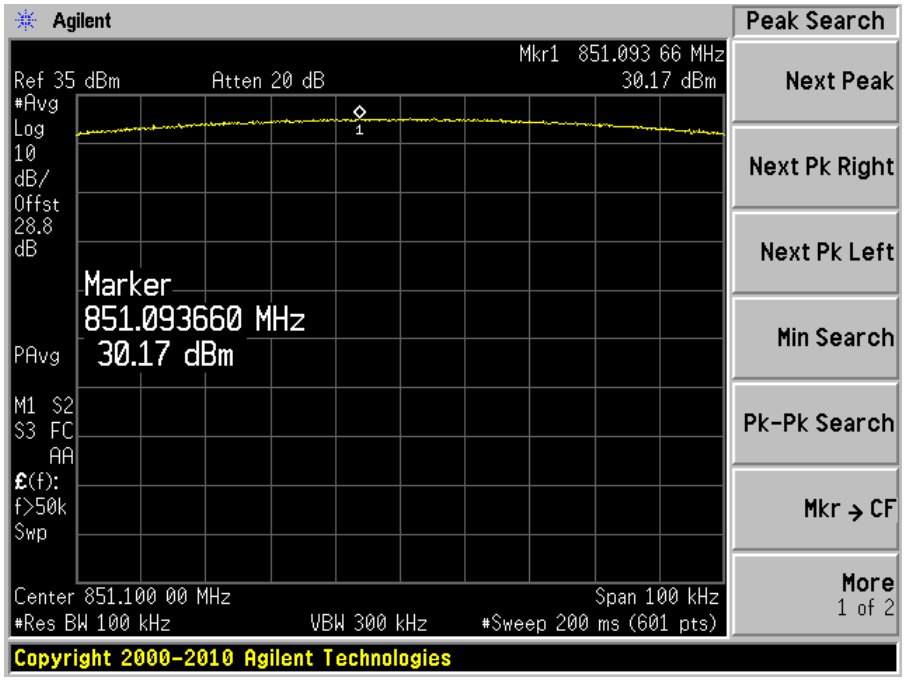
Occupied Bandwidth

High Power Low Channel – 851.1 MHz

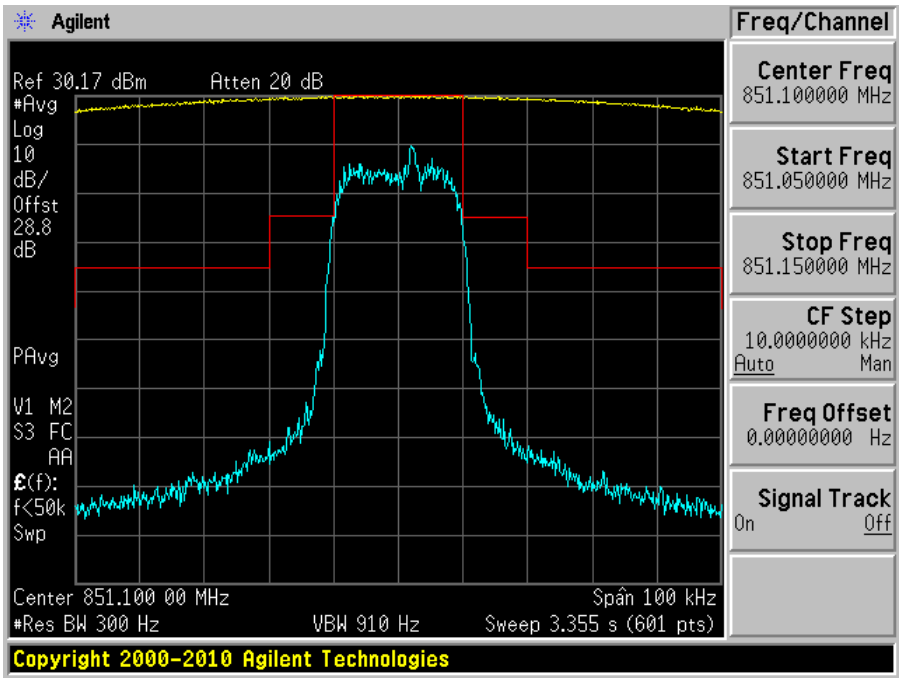


Emission Mask

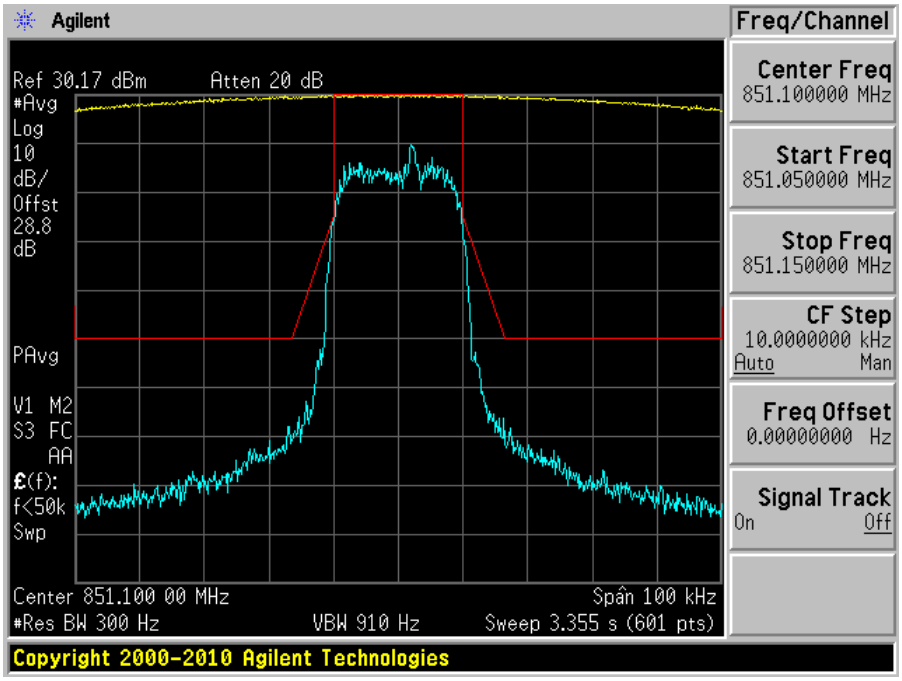
Reference Power



High Power Middle Channel Spacing



Mask B



Mask G

8 FCC §2.1051, §90.210 & IC RSS-119 §5.8 - Spurious Emissions at Antenna Terminals

8.1 Applicable Standard

FCC §2.1051and §90.210 (25 kHz bandwidth and 20 kHz bandwith)

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

43+10log (P)

IC RSS-119 §5.8

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

8.3 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Jack Liu on 2010-10-25 ~ 2010-10-27.

8.4 Test Equipment List and Details

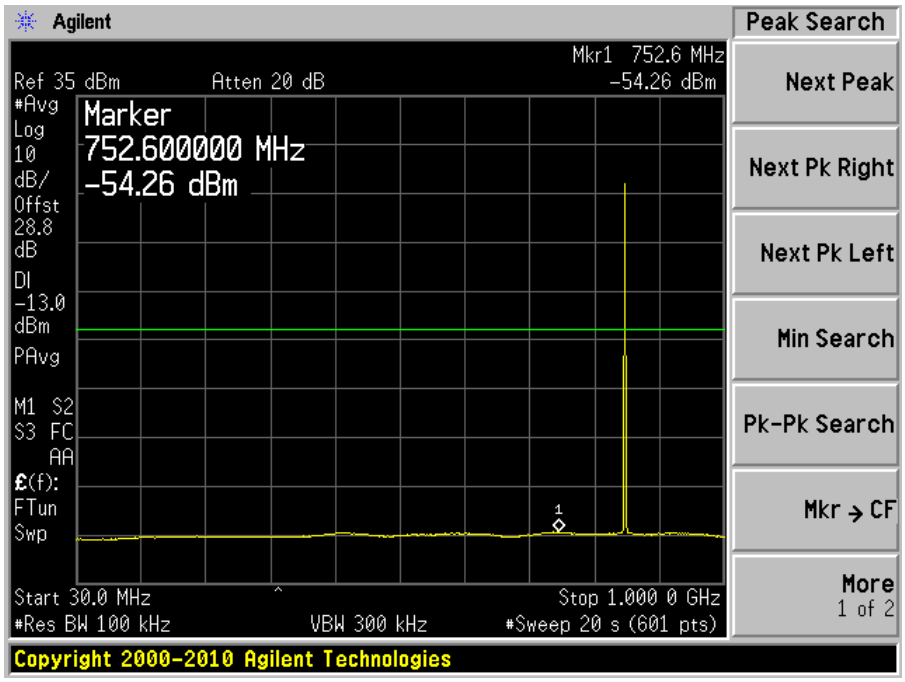
Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09

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

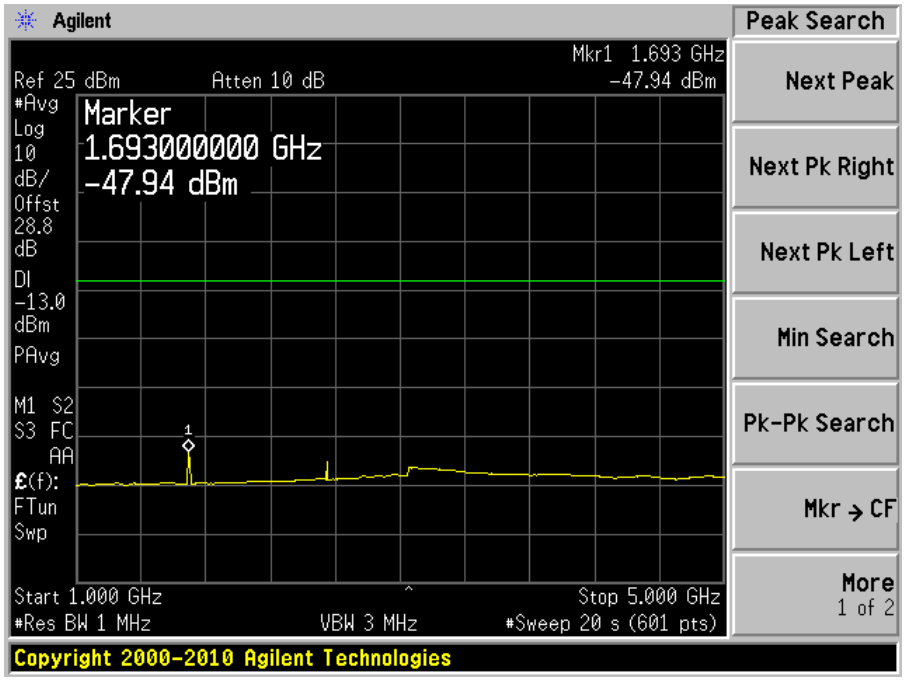
8.5 Test Results

Please refer to the hereinafter plots.

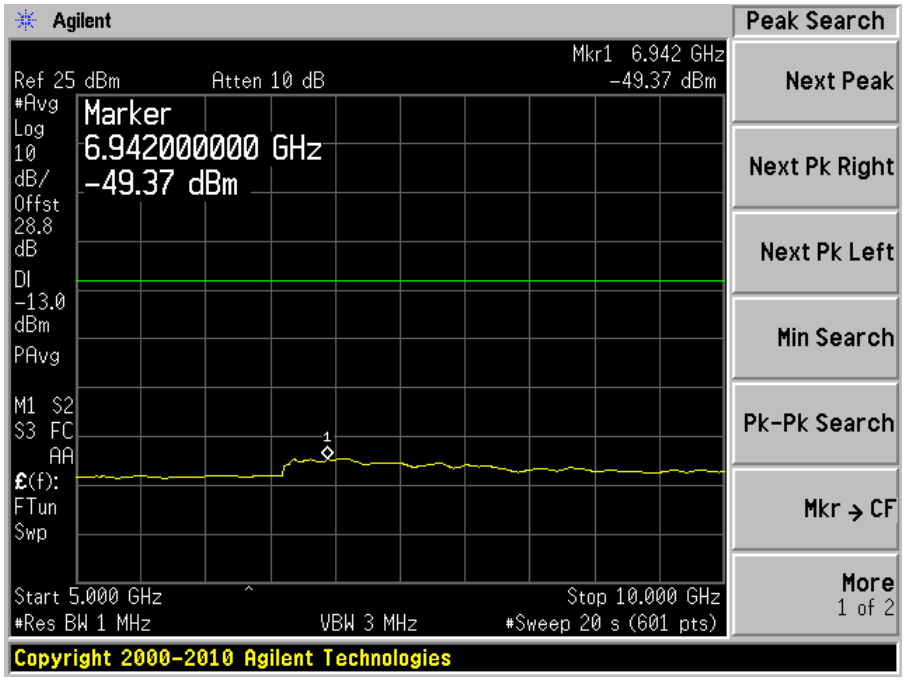
Worst case: Low channel High Power



30 MHz to 1 GHz



1 GHz to 5 GHz



5 GHz to 10 GHz

9 FCC §2.1055 (d), §90.213 & IC RSS-119 §5.3- Frequency Stability

9.1 Applicable Standard

FCC §2.1055 (d), §90.213

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Minimum Frequency Stability

[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25–50	20	20	50
72–76	5		50
150–174	[5,11]5	[6]5	[4,6]50
216–220	1.0		1.0
220–222[12]	0.1	1.5	1.5
421–512	[7,11,14]2.5	[8]5	[8]5
806–809	[14]1.0	1.5	1.5
809–824	[14]1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14]0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928[13]	2.5	2.5	2.5
929–930	1.5		
935–940	0.1	1.5	1.5
1427–1435	[9]300	300	300
Above 2450[10]			

[14]Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

IC RSS-119 §5.3

Frequency Band (MHz)	Authorized Bandwidth (kHz)	Frequency Stability (ppm)		
		Base/Fixed	Mobile Station	
			>2 watts	≤ 2 watts
27.41-28 and 29.7-50	20	20	20	50
72-76	20	5	20	50
138-174	20	5	5	5
	11.25	2.5	5	5
	6.25	1	2	5
217-218 and 219-220	11.25	1	5	5
220-222 (Note 1)	4	0.1	1.5	1.5
406.1-430 and 450-470 (Note 5)	20	2.5	5	5
	11.25	1.5	2.5	2.5
	6.25	0.5	1	1
764-776 and 794-806 (Note 2)	for all authorized bandwidths	0.1 for narrowband	0.4 for narrowband (Note 3)	0.4 for narrowband (Note 3)
		1 for wideband	1.25 for wideband (Note 4)	1.25 for wideband (Note 4)
806-821/851-866 and 821-824/866-869 (Note 5)	20	1.5	2.5	2.5
	11.25	1	1.5	1.5
896-901/935-940 (Note 5)	13.6	0.1	1.5	1.5
929-930/931-932	20	1.5	N/A	N/A
928-929/952-953 and 932-932.5/941-941.5	20	1.5	N/A	N/A
	11.25	1	3 for remote station	N/A
896-901/935-940	13.6	0.1	1.5	1.5
932.5-935/941.5-944	20	2.5	N/A	N/A
	11.25	2.5	N/A	N/A

Note 5: Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

9.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to the Spectrum Analyzer via feed-through attenuators. The 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 Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 110% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

9.3 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Jack Liu on 2010-10-25 ~ 2010-10-27.

9.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09
ESPEC	Oven, Temperature	ESL-4CA	18010	N/A

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

9.5 Test Result

High Power, Middle Channel 815 MHz, 806~824 MHz Band:

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (Vdc)	Temperature (°C)				
Frequency vs. Temperature					
7.4	50	815	814.999888	-0.137423313	± 1.5
7.4	40	815	814.999907	-0.114110429	± 1.5
7.4	30	815	815.00002	0.024539877	± 1.5
7.4	20	815	815.000077	0.094478528	± 1.5
7.4	10	815	815.000185	0.226993865	± 1.5
7.4	0	815	815.000183	0.224539877	± 1.5
7.4	-10	815	815.000145	0.17791411	± 1.5
7.4	-20	815	815.000173	0.212269939	± 1.5
7.4	-30	815	815.000168	0.20613497	± 1.5
Frequency vs. Voltage					
8.4	20	815	815.000072	0.088343558	± 1.5
6.3	20	815	815.000058	0.071165644	± 1.5

High Power, Middle Channel 860 MHz, 851~869 MHz Band:

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (Vdc)	Temperature (^{o}C)				
Frequency vs. Temperature					
7.4	50	860	859.999865	-0.15698	± 1.5
7.4	40	860	859.999905	-0.11047	± 1.5
7.4	30	860	860.000013	0.015116	± 1.5
7.4	20	860	860.000083	0.096512	± 1.5
7.4	10	860	860.000188	0.218605	± 1.5
7.4	0	860	860.0002	0.232558	± 1.5
7.4	-10	860	860.00015	0.174419	± 1.5
7.4	-20	860	860.00018	0.2093021	± 1.5
7.4	-30	860	860.00016	0.1860465	± 1.5
Frequency vs. Voltage					
8.4	20	860	860.000083	0.096512	± 1.5
6.3	20	860	860.000062	0.072093	± 1.5

10 FCC §2.1053, §90.210 & IC RSS-119 §5.8 – Field Strength of Spurious Radiation

10.1 Applicable Standard

FCC §2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. and §90.210(b),(d): Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

IC RSS-119 §5.8

10.2 Test Procedure

The transmitter was placed on a Styrofoam with wooden turntable, and it was normal transmitting with 50ohm termination 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 test was performed by placing the EUT on 3-orthogonal axis.

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

Remove the EUT and replace it with 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.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

10.3 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Kevin Li on 2010-10-25 ~ 2010-10-27.

10.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2010-05-10

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

10.5 Test Result

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Antenna Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	-	-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more than 20 dB below the limit.

11 FCC §90.214 & IC RSS-119 §5.9 - Transient Frequency Behavior

11.1 Applicable Standard

FCC §90.214: Transmitters designed to operate in the 150–174 MHz and 421–512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

11.2 Test Results

Not Applicable

12 IC RSS-119 §5.11 & IC RSS-310 §3.1 Receiver Spurious Radiated Emissions

12.1 Applicable Standard

IC RSS-119 §5.11, IC RSS-310 §3.1 and RSS-Gen §6

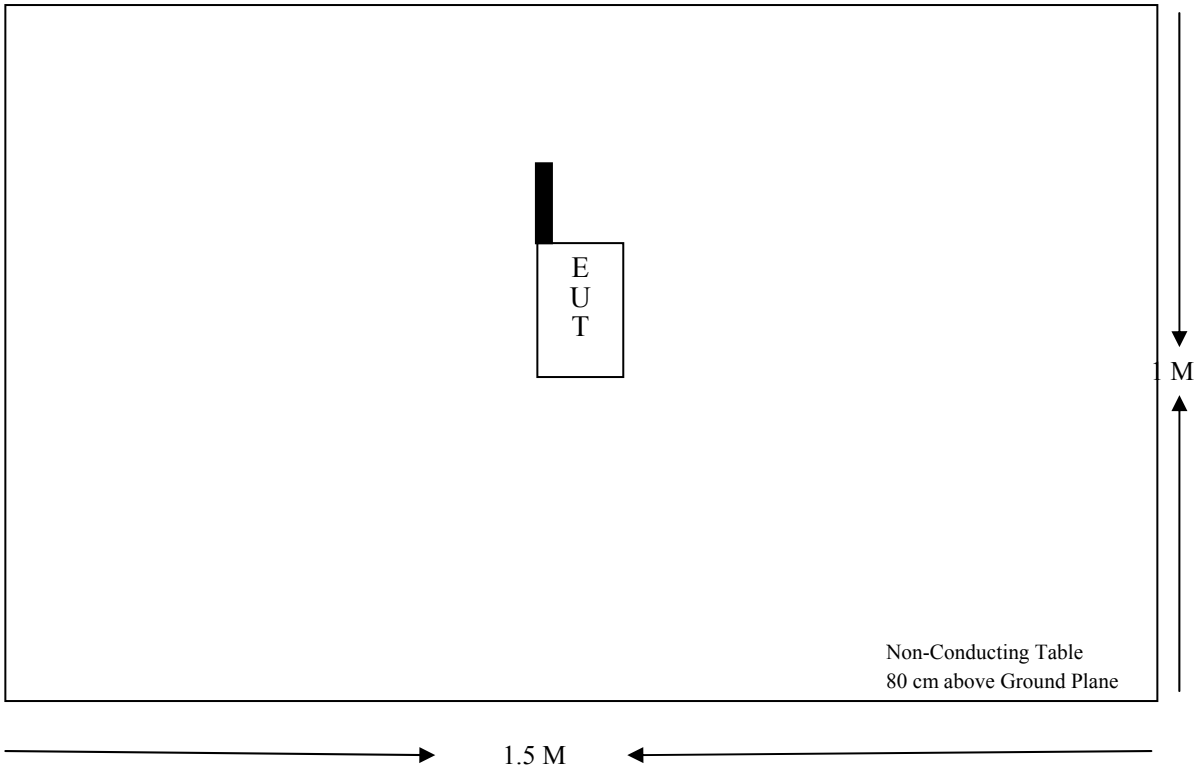
The following receiver spurious emission limits shall be complied with:
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

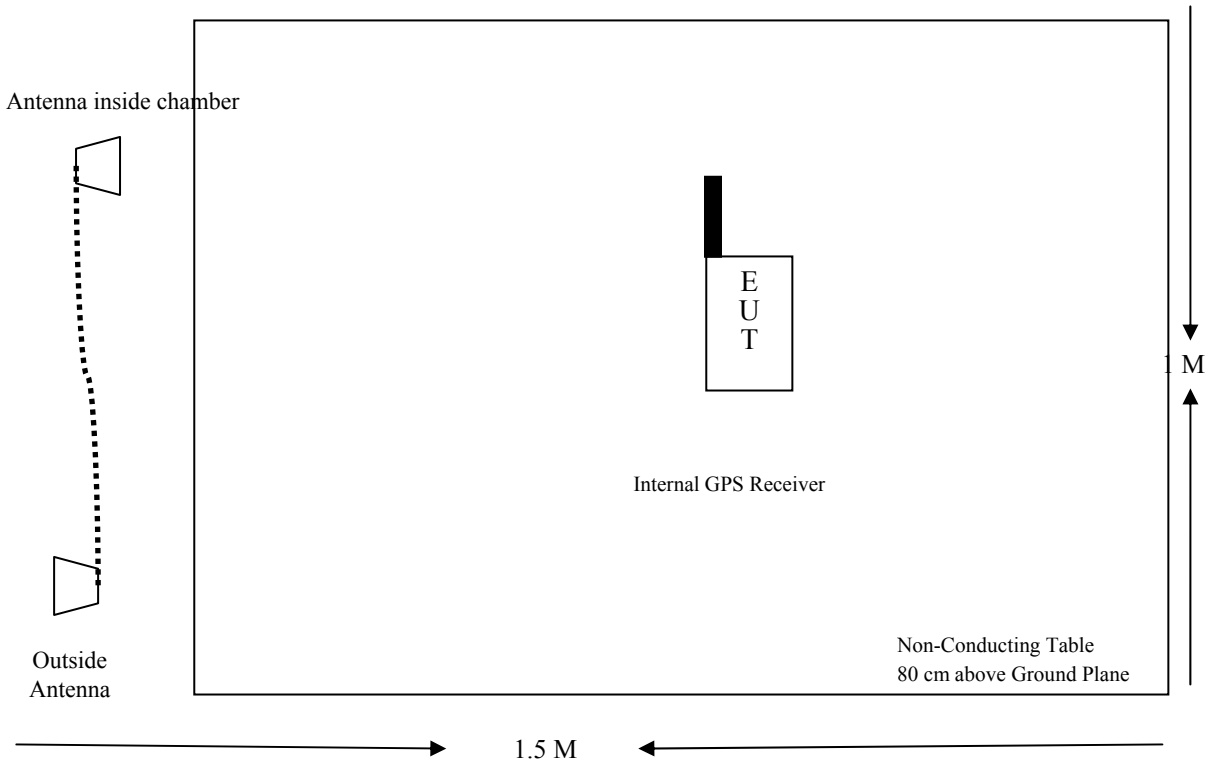
Frequency (MHz)	Field Strength Microvolts/m at 3 meters
	Receivers
30-88	100
88-216	150
216-960	200
Above 960	500

12.2 Test Block Diagram

RX Spurious Emissions



GPS Receiver Spurious Emissions



12.3 Test Equipment Lists and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2010-05-10

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

12.4 Test Environmental Conditions

Temperature:	18~24 °C
Relative Humidity:	40~55 %
ATM Pressure:	101.3~102.3 kPa

The testing was performed by Kevin Li on 2010-10-25 ~ 2010-10-27.

12.5 Test Procedure

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

12.6 Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - 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 emissions are 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

12.7 Summary of Test Results

According to the test data, the EUT complied RSS Gen, with the worst margins from the limit listed below:

RX Spurious Emission:
Measure at 3 Meters (30 MHz – 1 GHz)

Model: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Test Range**
-21.46	30.912	Horizontal	30 MHz-1 GHz

Measure at 3 Meters (Above 1 GHz)

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Test Range**
-	-	-	1 GHz – 6 GHz

GPS Receiver Spurious Emission:

Measure at 3 Meters (30 MHz – 1 GHz)

Model: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Test Range**
-0.83	869.8604	Vertical	30 MHz-1 GHz

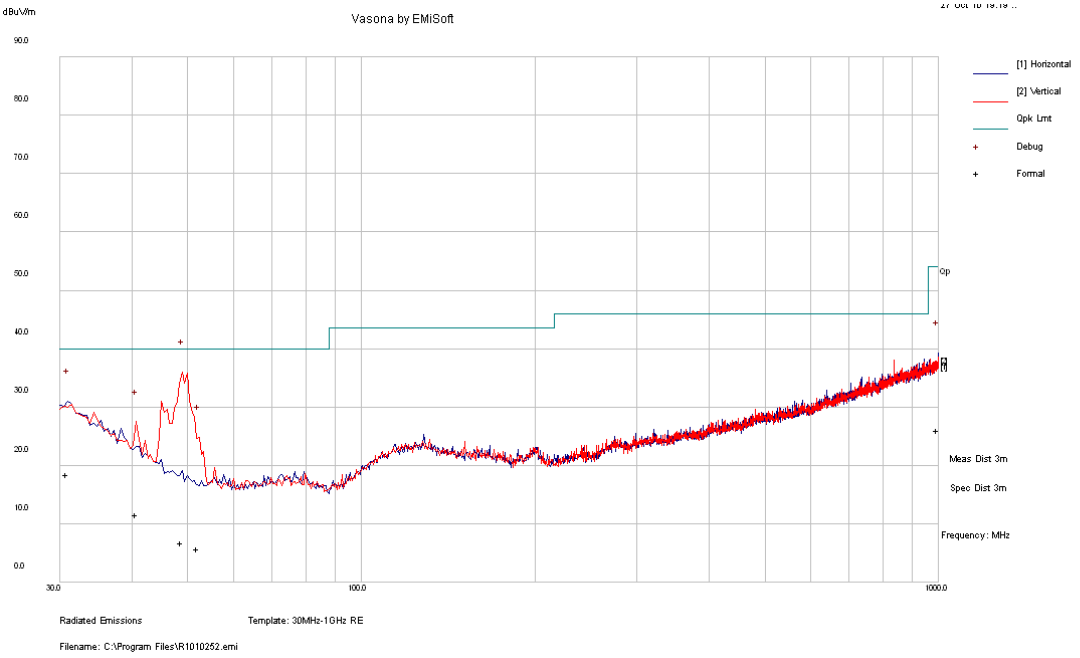
Measure at 3 Meters (Above 1 GHz)

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Test Range**
-	-	-	1 GHz – 6 GHz

12.8 Radiated Spurious Emissions Plot & Data

RX Spurious Emissions:

Measured at 3 Meter Distance (30 MHz – 1 GHz)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30.912	18.54	113	H	211	40	-21.46
997.02	26.09	356	H	23	54	-27.91
40.793	11.52	262	V	291	40	-28.48
48.777	6.74	307	V	176	40	-33.26
52.1065	5.73	274	V	245	40	-34.27

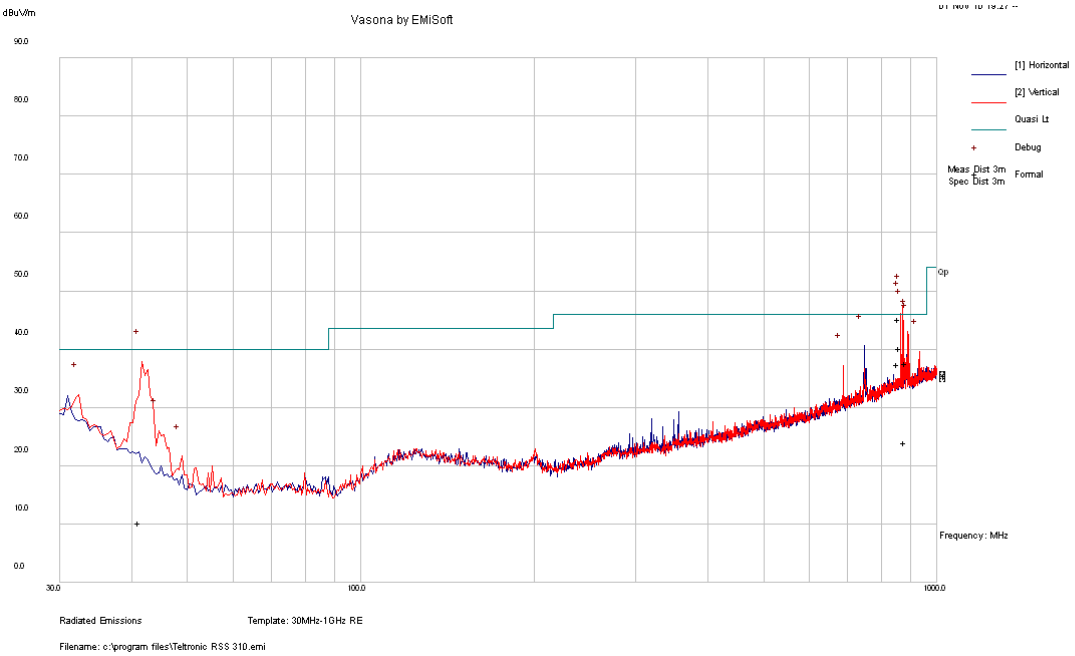
Measured at 3 Meter Distance (1 GHz – 6 GHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more than 20 dB below the limit.

GPS Receiver Spurious Emissions:

Measured at 3 Meter Distance (30 MHz – 1 GHz)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
869.86040	45.17	100	V	117	46	-0.83
873.28610	40.10	111	V	91	46	-5.90
893.13700	37.58	127	V	0	46	-8.42
864.57480	37.48	134	V	163	46	-8.52
890.09290	23.93	393	V	99	46	-22.07
41.69064	10.14	102	V	206	40	-29.86

Measured at 3 Meter Distance (1 GHz – 6 GHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more than 20 dB below the limit.