Lab Code: 200167-0

FCC PART 90
INDUSTRY CANADA RSS-119, ISSUE 9, JUNE 2007
MEASUREMENT AND TEST REPORT

For

FREEWAVE TECHNOLOGIES, INC.

1880 S. Flatiron Ct., Suite F
Boulder, CO 80301

FCC ID: KNY821191151819
IC: 2329B-LRS455

Report Type: ☒ Original Report	**Product Type:** Licensed Band Radio Transceiver
Test Engineer:	James Ma
Report Number:	R0802282
Testing Date(s):	2008-03-03, 2008-03-04, 2008-03-05
Report Date:	2008-03-06
Reviewed By:	Boni Baniqued, Sr. RF Engineer
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TABLE OF CONTENTS

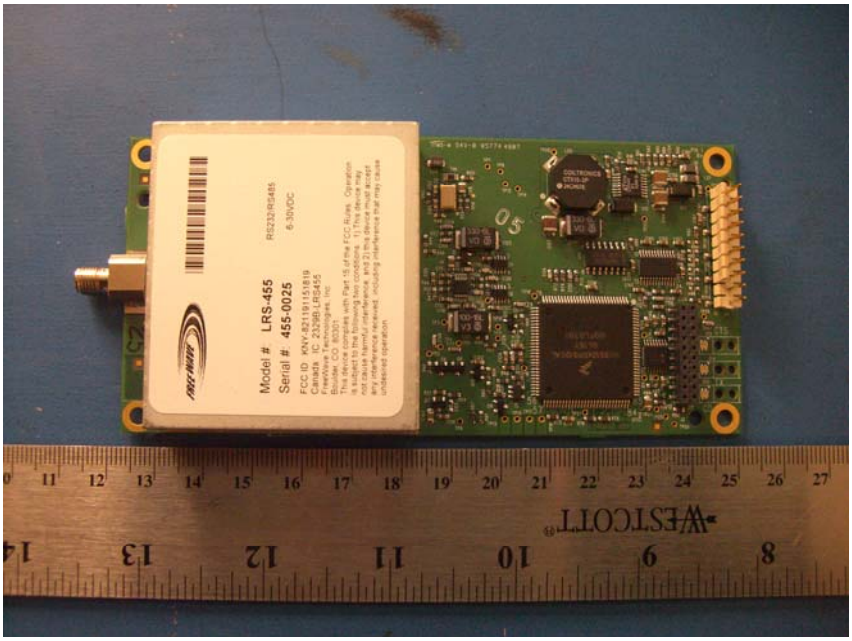
1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This BACL measurement and test report has been prepared on behalf of *FreeWave Technologies, Inc.* and their product model: LRS-455, FCC ID: KNY821191151819, IC: 2329B-LRS544, or the EUT as referred to hereinafter. The equipment under test is a 435-470MHz transceiver designed for industrial use. It has a maximum output power of 2W; the device will operate on a licensed band in a single frequency configuration. The channel bandwidth is 12.5kHz and the channel spacing is 6.25kHz. The device will function with 2 or 4 level GFSK modulation.

EUT Photos

Model: LRS-455



EUT detail photos in exhibit C

1.2 Mechanical Description

The EUT is a PCB designed to be incorporated into an OEM device. The approximate dimensions are 128 mm (L) x 61.8 mm (W) x 19.7 mm (H), and weighs approximately 74.4 g.

** The test data gathered are from a production sample provided by the manufacturer, serial number: 455-0025*

1.3 Objective

This type approval report is prepared on behalf of *FreeWave Technologies, Inc.* – in accordance with Part 2, Subpart J, Part 90 Subpart I of the Federal Communication Commissions rules and Industry Canada RSS-119, Issue 9, June 2007.

The objective is to determine compliance with FCC rules for RF output power, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, frequency stability, and transient frequency behavior.

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

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 parts:

Part 90 Subparts I – Private Land Mobile Radio Services

and

IC RSS-119: Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41-960 MHz.

Applicable Standards: TIA EIA 98-C, TIA/EIA603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, 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/Standards/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

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

The final qualification test was performed with the EUT operating at normal mode.

2.2 Equipment Modifications

No modifications were made to the EUT.

2.3 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Sceptre	AC-DC Power supply	SA-036121A-3	PS-1230APL05

2.4 Local Support Equipment List and Details

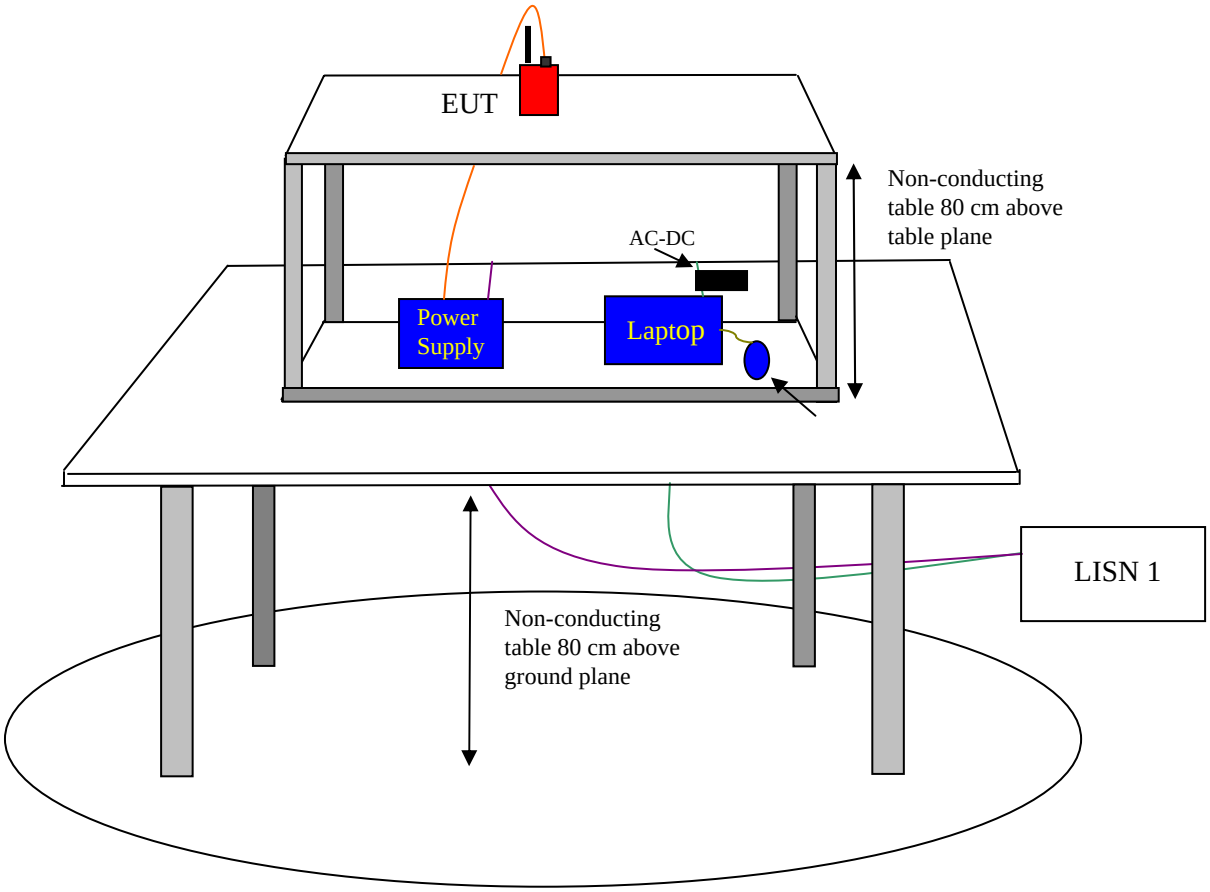
N/A

2.5 Interface Ports and Cabling

Cable Description	Length (M)	From	To
Interface Cable	0.3	DC Power Supply	EUT
Serial Port Cable	0.3	Serial Port of PC	EUT

2.6 Test Setup Block Diagram

2.6.1 Radiated Emission



3 SUMMARY OF TEST RESULTS

FCC Part 90 & RSS-119

FCC/IC Rules	Description of Test	Result	Note
§1.1310 §2.1091 & RSS-102	RF Exposure	Compliant	-
§ 2.1046,§ 90.205 & RSS-119 § 5.4.5	RF Output Power	Compliant	-
§ 2.1049 § 90.210 & RSS-119 §5.5	Occupied Bandwidth & Emissions Mask	Compliant	-
§ 2.1051, § 90.210 RSS-119 §5.8	Spurious Emissions at Antenna Terminals	Compliant	-
§ 2.1053 § 90.210 RSS-119 5.8	Field Strength of Spurious Radiation	Compliant	-
§ 2.1055 § 90.213 RSS-119 §5.3	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant	-
§ 90.214 RSS-119 §5.9	Transient Frequency Behavior	Compliant	-
RSS-119 § 5.11	Receiver Spurious Emissions	Compliant	*Please see report: ETRA80226 for detailed results*

4 §2.1091 & RSS- GEN 5.5 and RSS-102 – RF EXPOSURE

4.1 Applicability

According to §1.1307(b)(1) and §1.1307(b)(2), 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.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of 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

Maximum peak output power at antenna input terminal (dBm):	33.50
Maximum peak output power at antenna input terminal (mW):	2238.72
Prediction distance (cm):	71
Prediction frequency (MHz):	455
Maximum Antenna Gain, typical (dBi):	9.25
Maximum Antenna Gain (numeric):	8.41
Power density of prediction frequency at 71.0 cm (mW/cm^2):	0.297
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.303

4.3 Test Result

The EUT is a PCB device which when situated 71 cm from the general public has a power density of 0.297 mW/cm^2, which is below the uncontrolled limit of 0.303 mW/cm^2.

5 §2.1046, §90.205 & RSS-119 §5.4.5 – RF OUTPUT POWER

5.1 Applicable Standard

According to FCC §2.1046, §90.205 & RSS-119 §5.4.5

5.2 7.2 Test Procedure

Conducted:

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

5.2.1 Environmental Conditions

Temperature:	20.3 ºC
Relative Humidity:	38.3 %
ATM Pressure:	102.5 kPa

** The testing was performed by James Ma on 2008-03-03.*

5.3 7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2007-01-24 (2 yrs)

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

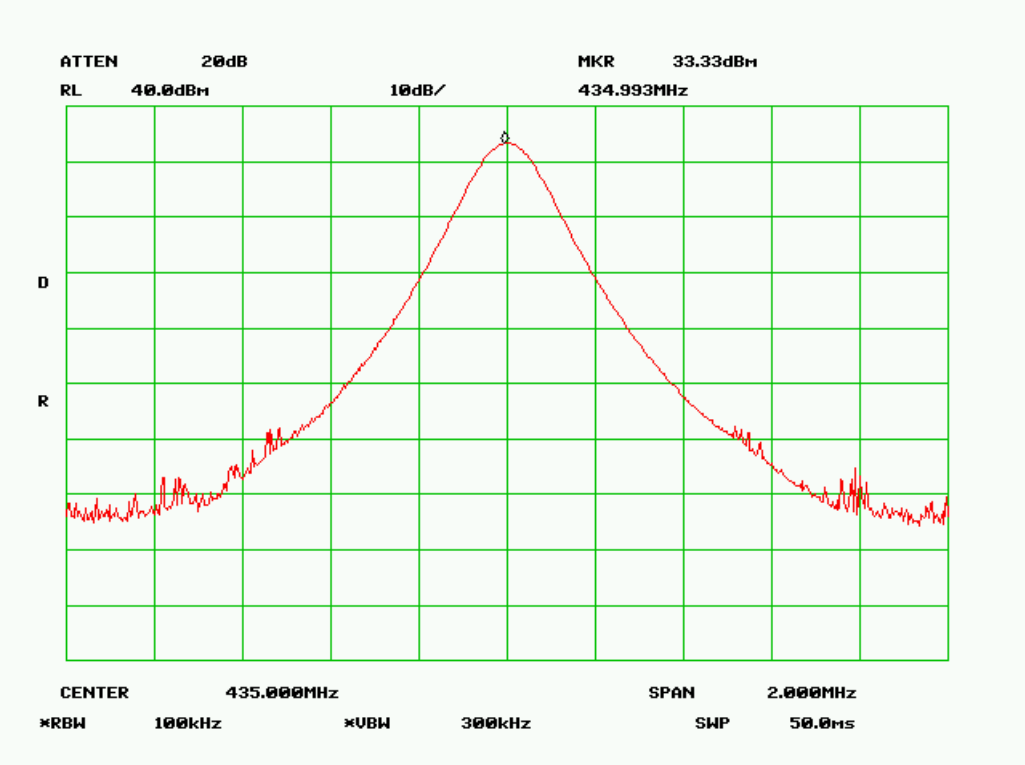
5.4 Test Results

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)
LOW	435.00	33.33	2.15
MID	455.00	33.50	2.24
HIGH	470.00	33.17	2.07

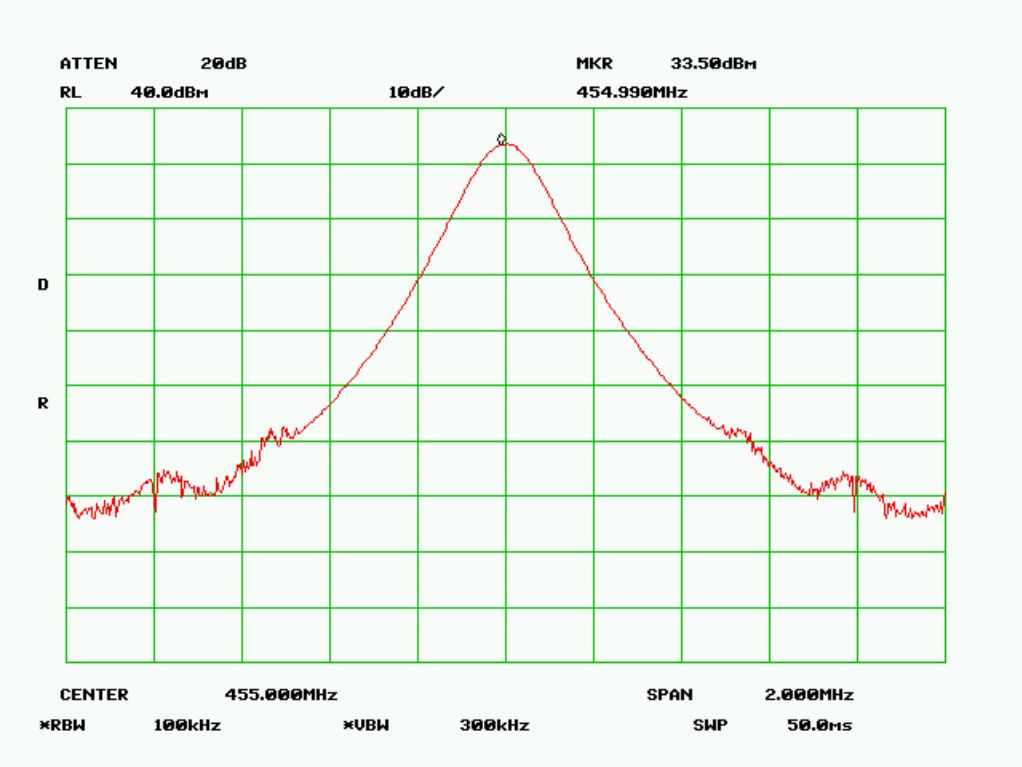
5.5 Test Results

Please refer to the following plots.

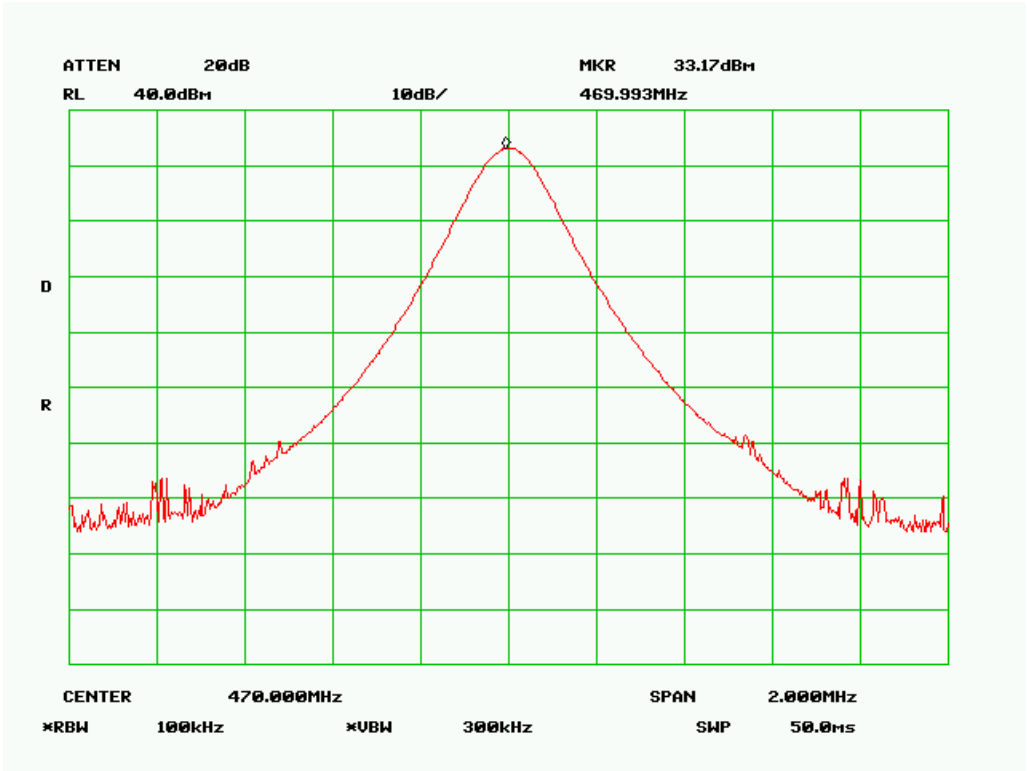
Low Channel



Middle Channel



High Channel



6 §2.1049, & §90.210 & RSS-119 §5.5 - OCCUPIED BANDWIDTH & EMMISON MASK

6.1 Applicable Standard

§2.1049, §90.210
RSS-119 §5.5

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625kHz but no more than 12.5kHz, at least 7.27 (f_d –2.88kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5kHz at least:

50+10logP=50+10log (P) or 70 dB, whichever is the lesser attenuation.

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 + log (P) dB.

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

6.2 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.

6.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by James Ma on 2008-03-04.*

6.4 Test Equipment List and Details

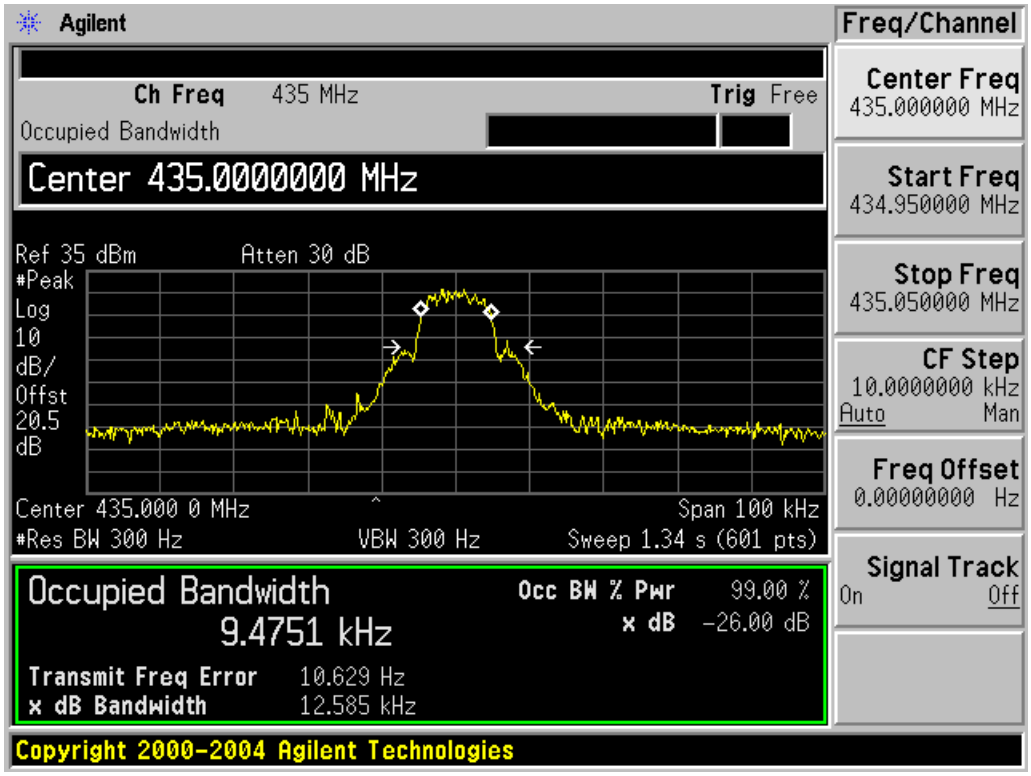
Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2007-01-24 (2 yrs)
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

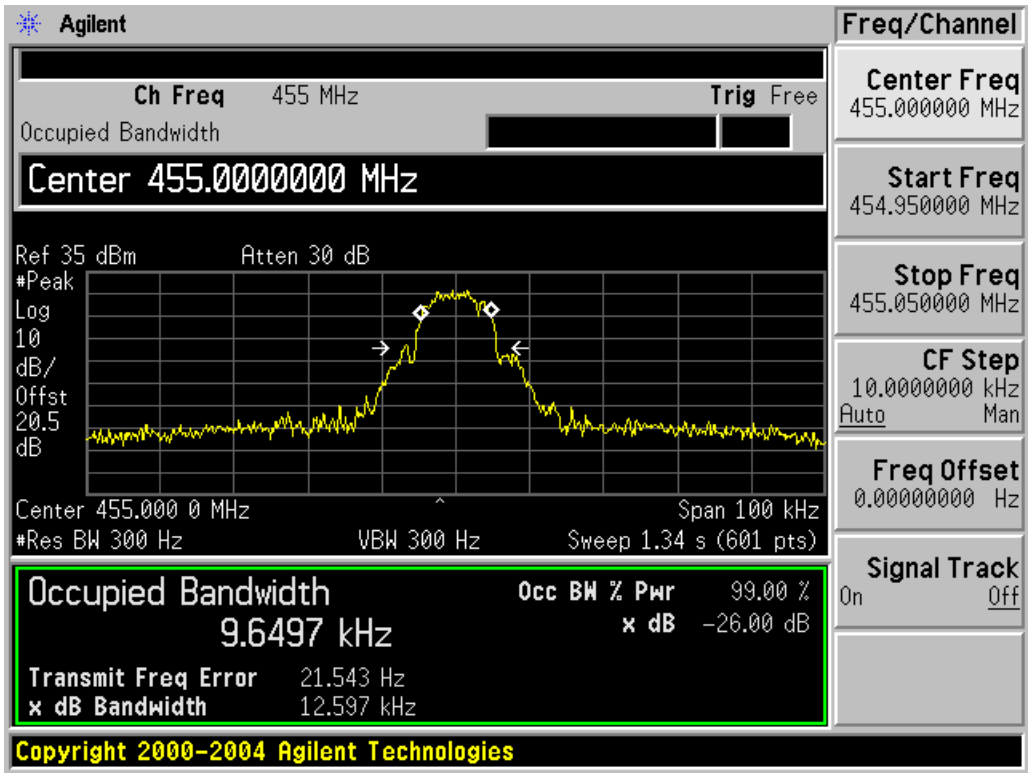
6.5 Test Result

Please refer to the hereinafter plots.

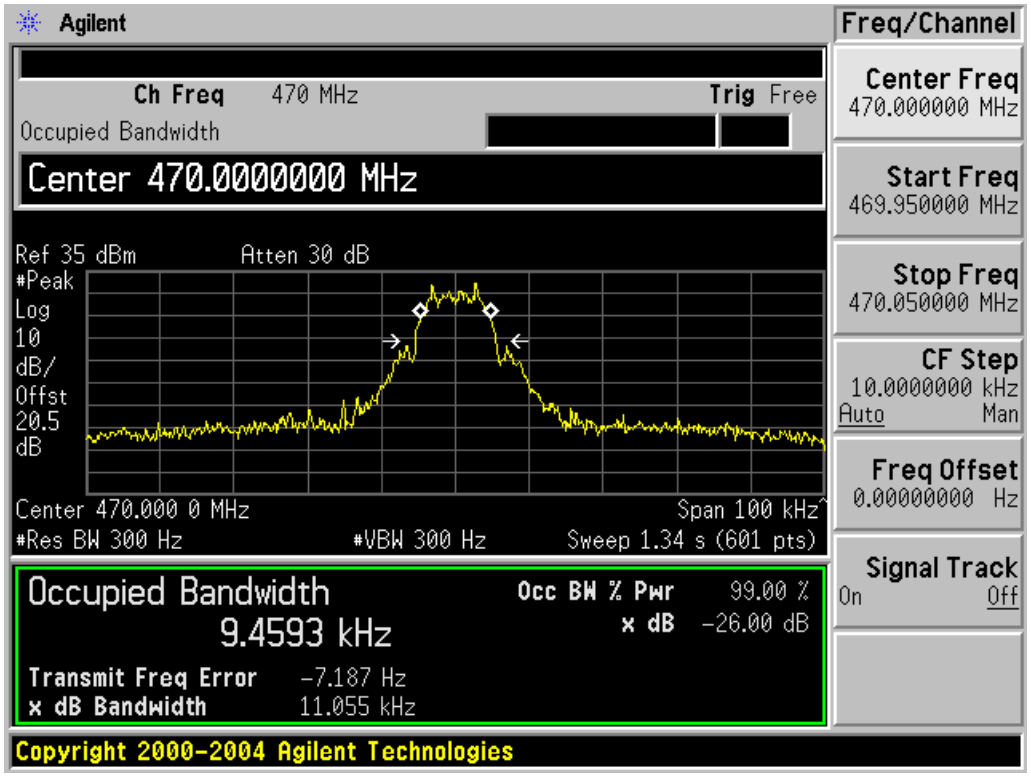
Occupied BW
Low Channel



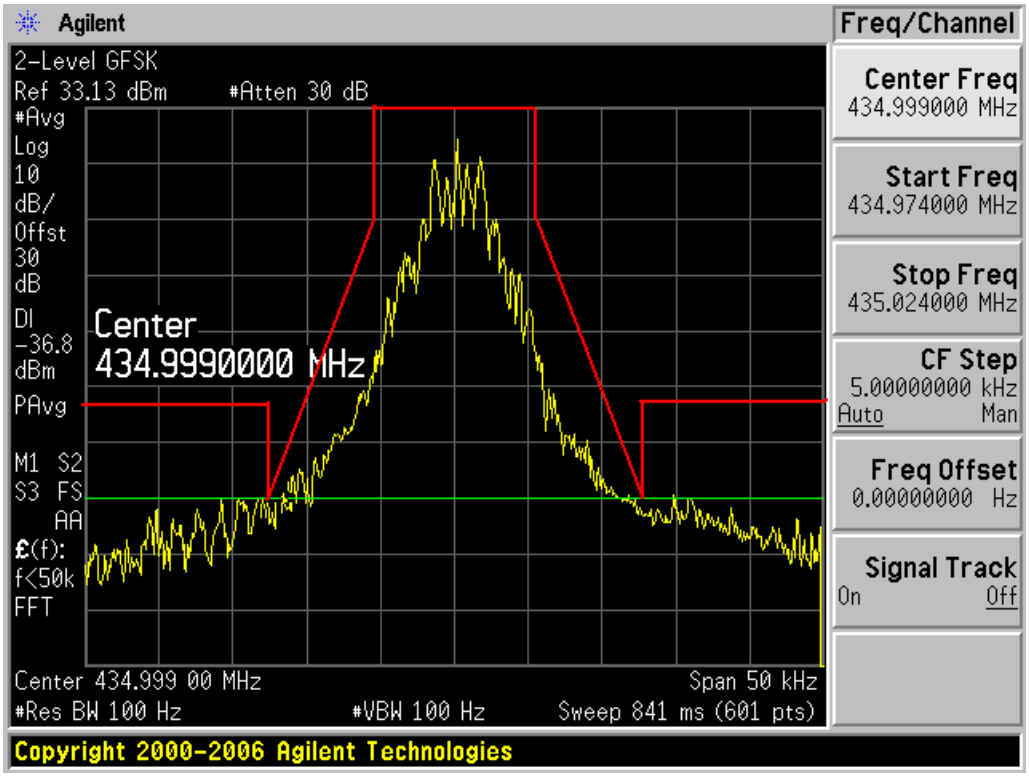
Middle Channel



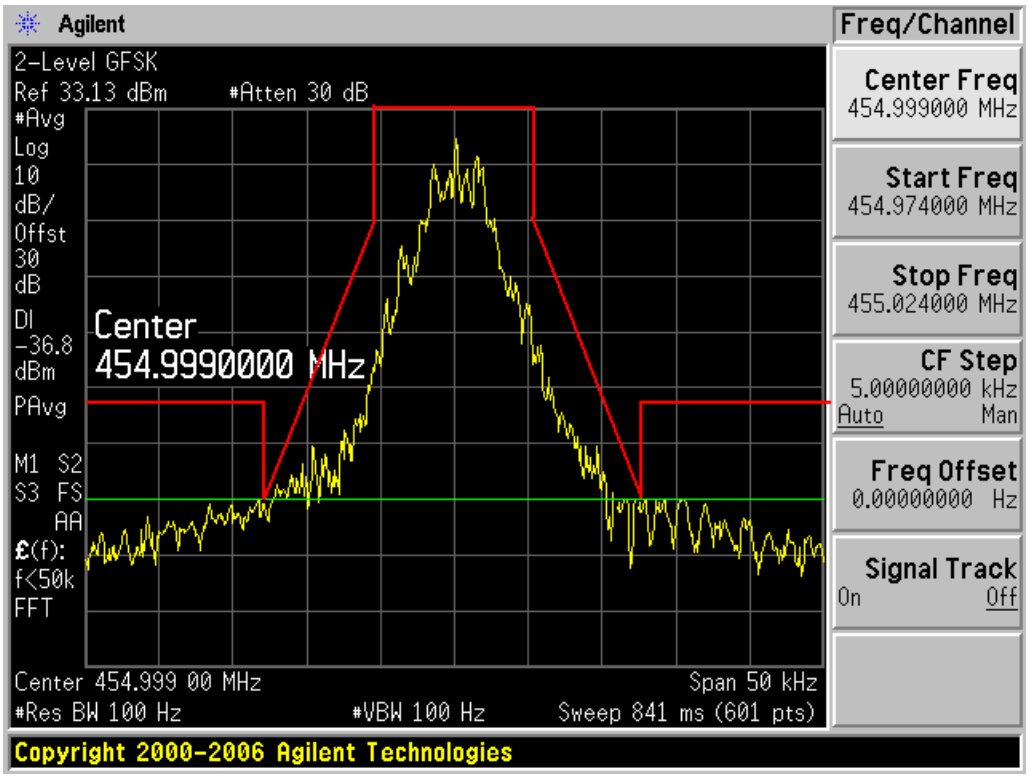
High Channel



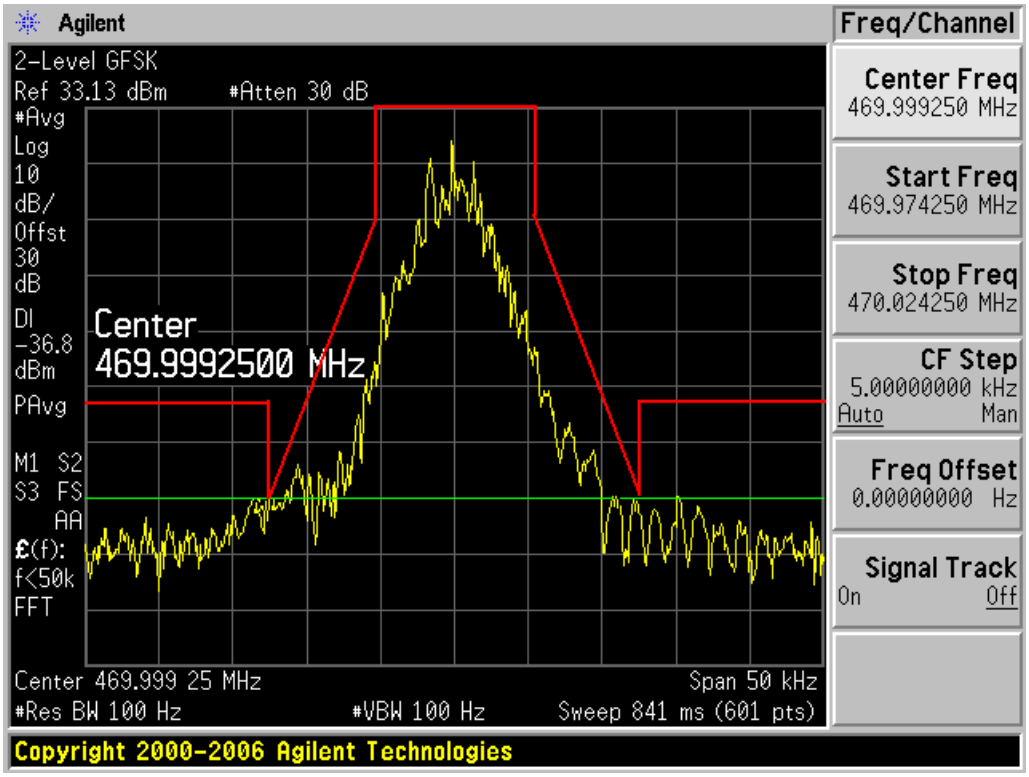
Emissions Mask
Deviation setting = 40 HEX, 2- Level GFSK
Low Channel



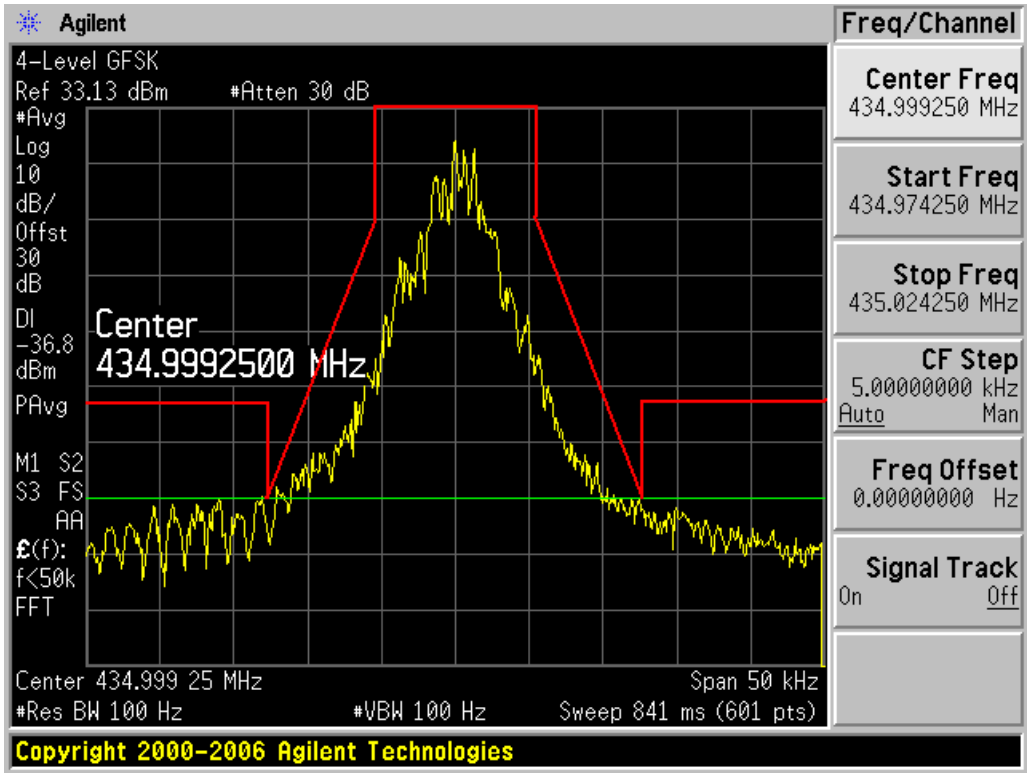
Middle Channel



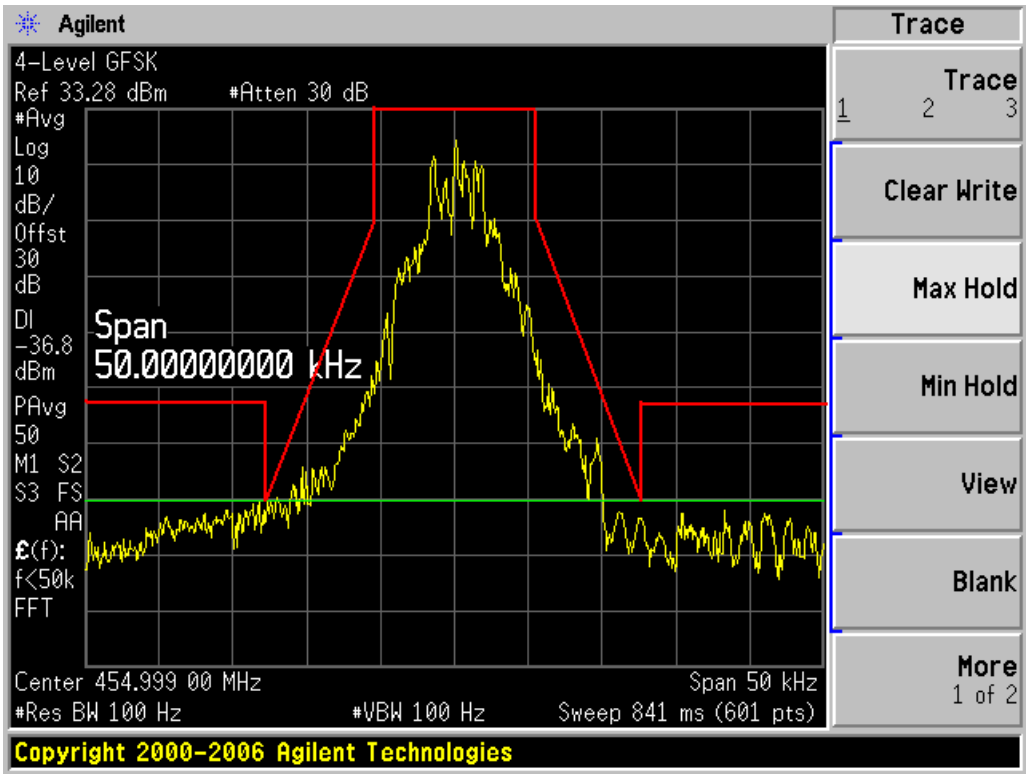
High Channel



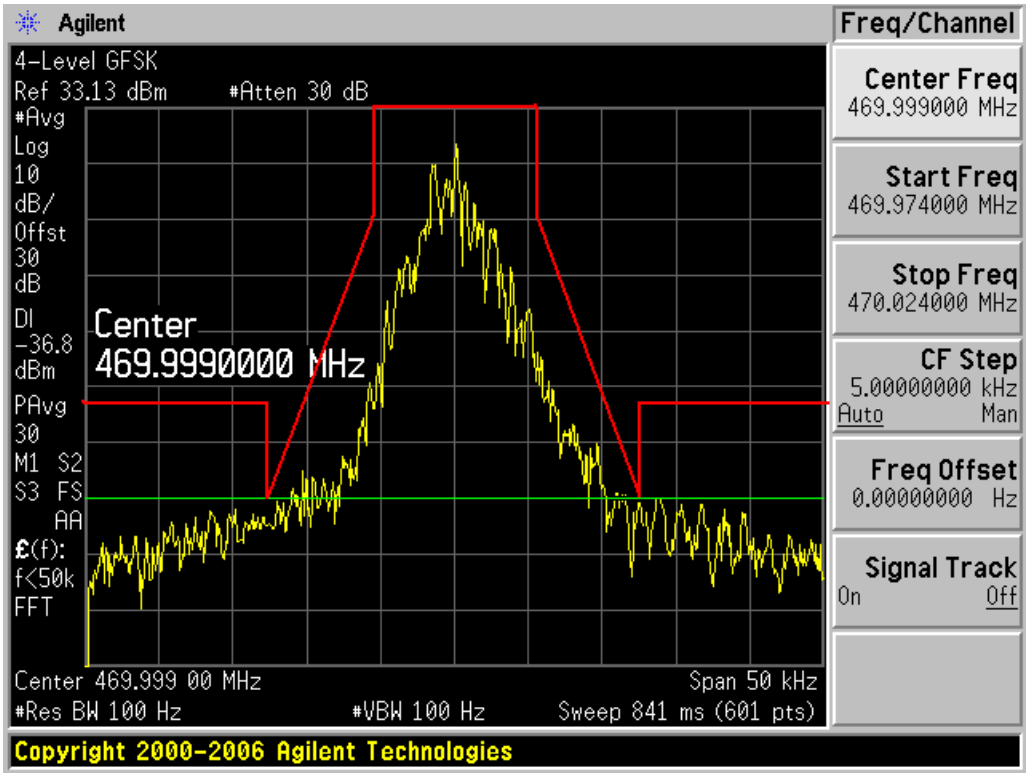
Emissions Mask
Deviation setting = 40 HEX, 4- Level GFSK
Low Channel



Middle Channel



High Channel



7 §2.1051 § 90.210 & RSS-119 §5.8 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standard

Requirements: CFR 47 § 2.1051, § 90.210, & RSS-119 §5.8.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

§90.210 (12.5 kHz bandwidth only)

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5kHz at least:

50+10logP or 70 dB

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

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

43+10log (P)

7.2 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.

7.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by James Ma on 2008-03-04.*

7.4 Test Equipment List and Details

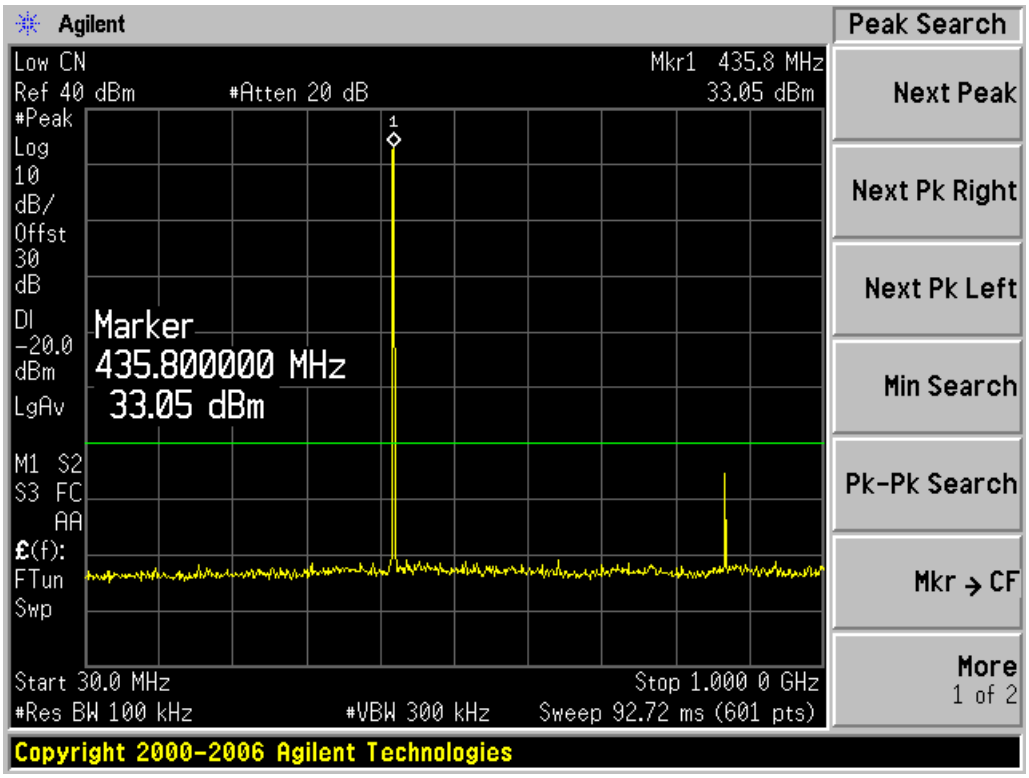
Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

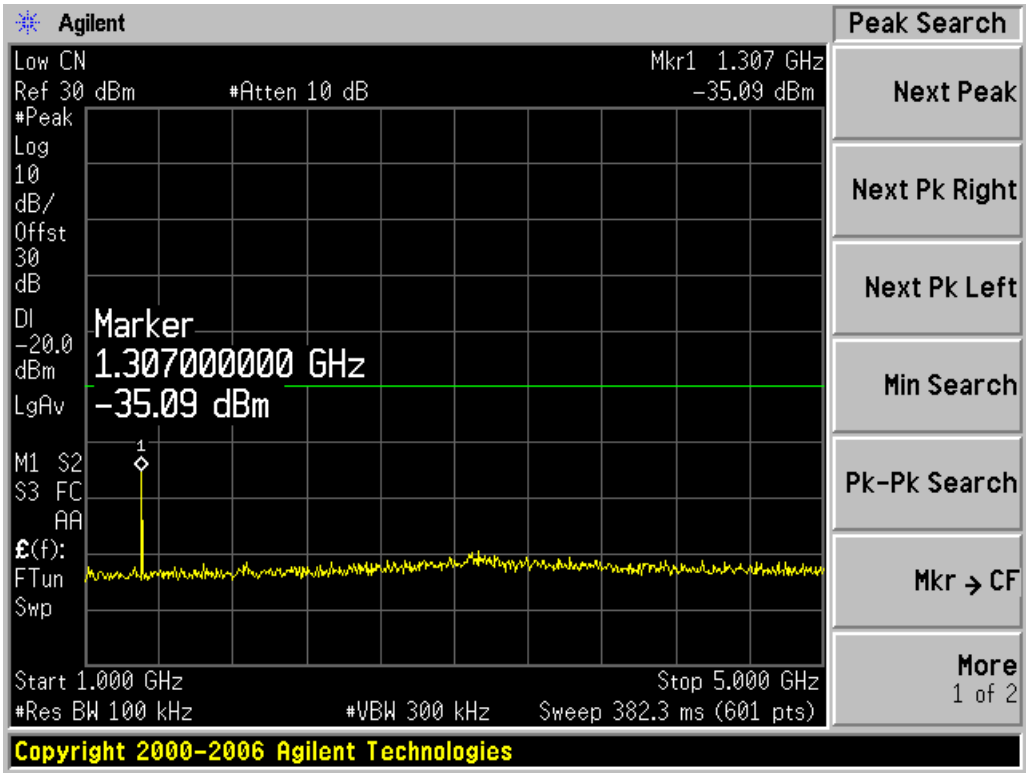
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.5 Test Results

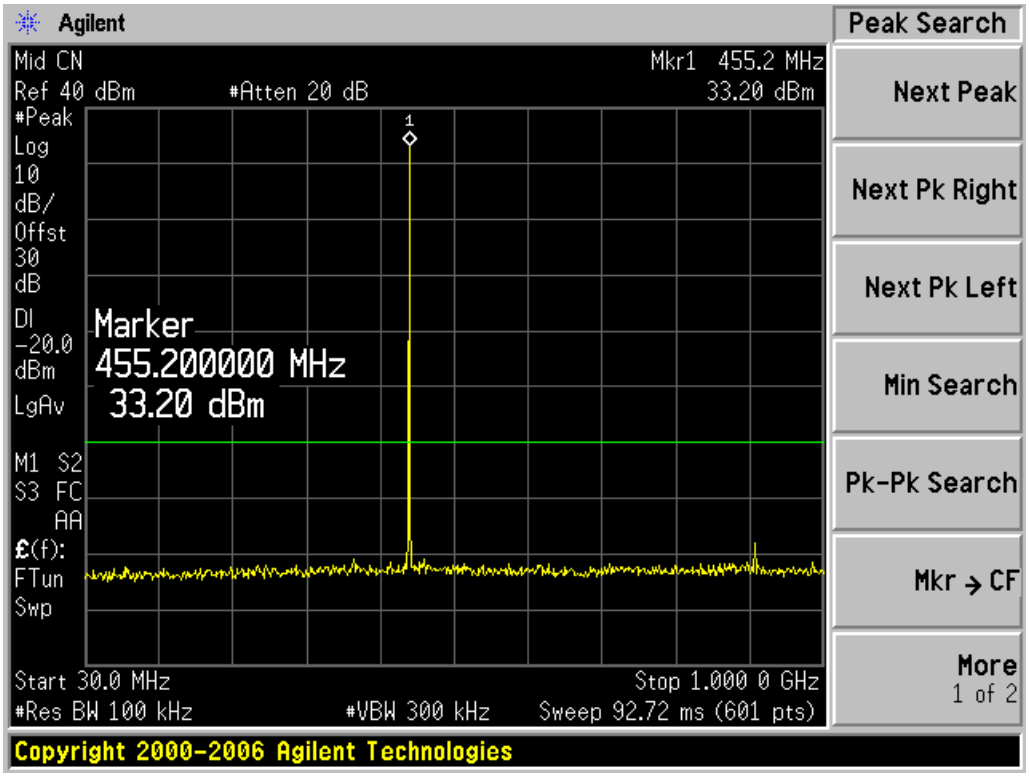
Please refer to the hereinafter plots.

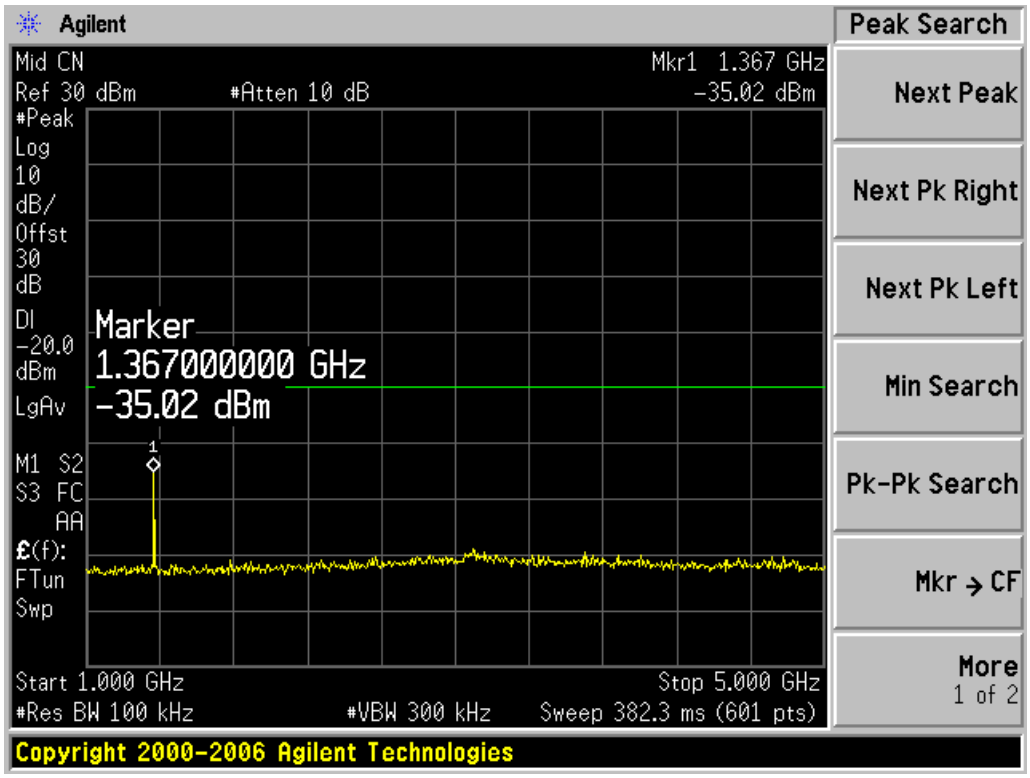
Low Channel


Agilent
Peak Search
Low CN
Mkr1 435.8 MHz
Ref 40 dBm
#Atten 20 dB
33.05 dBm
#Peak
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
LgAv
Marker
435.800000 MHz
33.05 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 92.72 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

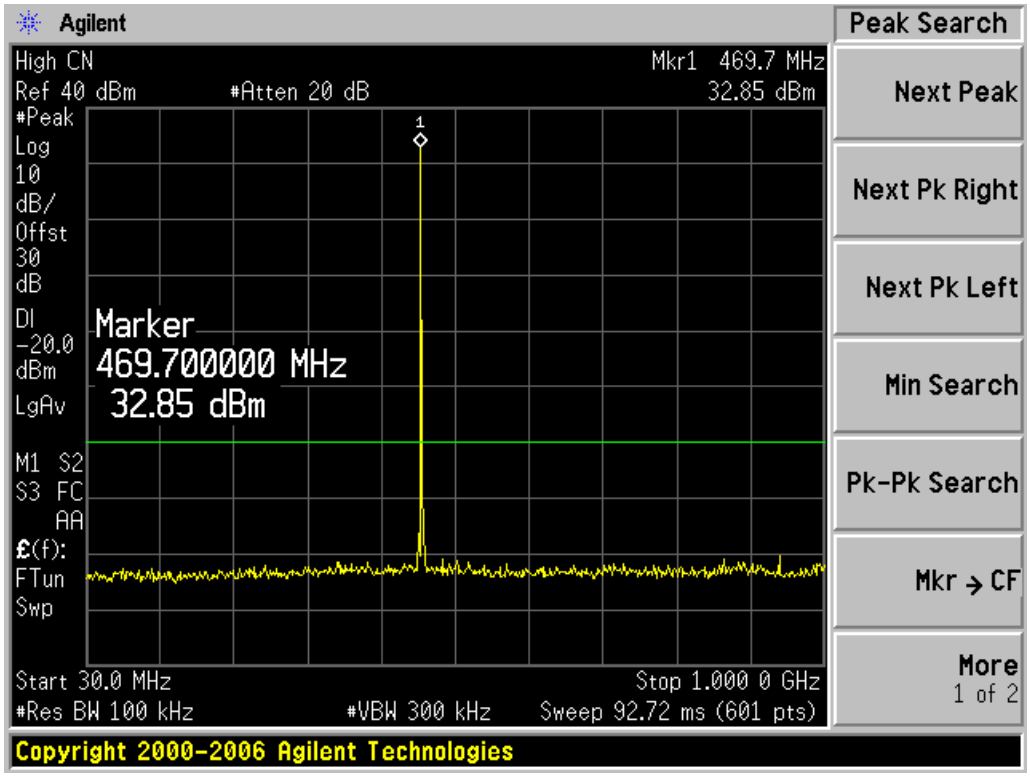

Agilent
Peak Search
Low CN
Mkr1 1.307 GHz
Ref 30 dBm
#Atten 10 dB
-35.09 dBm
#Peak
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
LgAv
Marker
1.307000000 GHz
-35.09 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 382.3 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

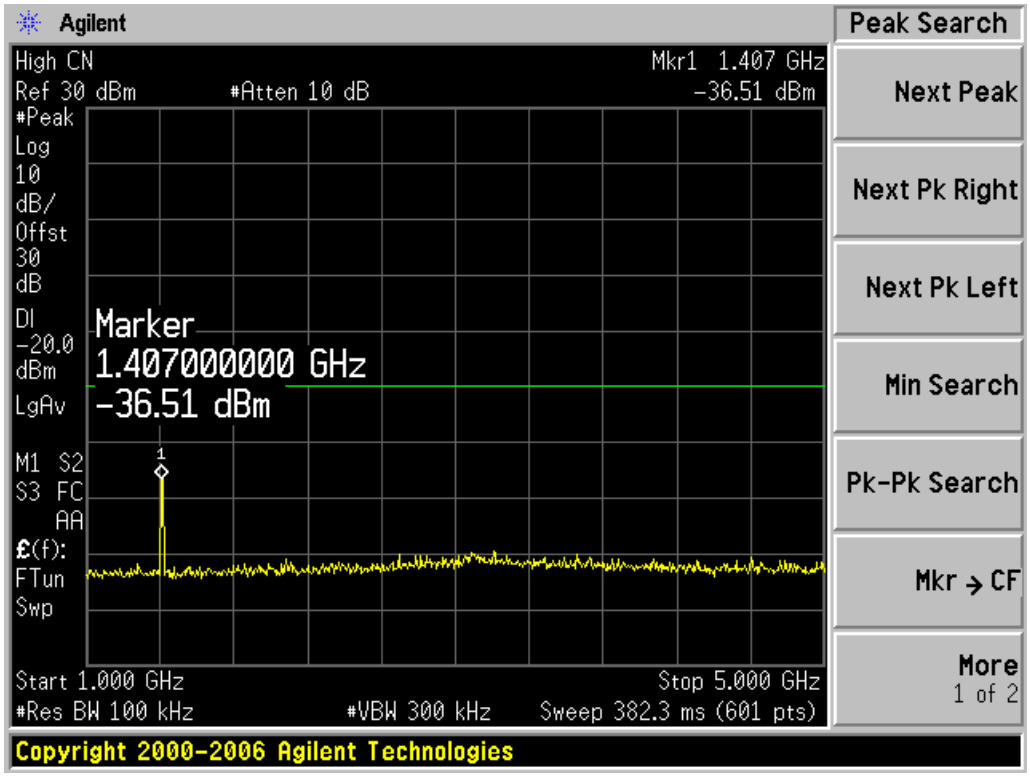
Middle Channel





High Channel





8 §2.1053, §90.210 & RSS-119 5.8 - SPURIOUS RADIATED EMISSIONS

8.1 Applicable Standard

Requirements: CFR 47, § 2.1053.

RSS-119 5.8.

8.2 Test Procedure

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 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 attenuation limit in dB = 50+ 10 Log_{10} (power out in Watts)

Limit (dBm) = Power (dBm) – Spurious attenuation limit (dB)

8.2.1 Environmental Conditions

Temperature:	20.3 ºC
Relative Humidity:	38.3 %
ATM Pressure:	102.5 kPa

** The testing was performed by James Ma on 2008-03-04.*

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26
HP	Amplifier, Pre	8449B	3147A00400	2007-11-02
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2007-06-07
HP	Generator, Signal	83650B	3614A00276	2007-05-18
A.R.A.	Antenna, Horn	DRG-118/A	1132	2007-06-18

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

8.4 Test Result

-12.1 dB at **870 MHz** in the **Vertical** polarization, Low Channel

-18.9 dB at **910 MHz** in the **Vertical** polarization, Middle Channel

-32.0 dB at **1537 MHz** in the **Vertical** polarization, High Channel

Low Channel

Indicated		Table Azimuth Degrees	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (m)	Polar. (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)			
870.0	82.7	160	1.5	V	870.0	-31.3	0	0.8	-32.1	-20	-12.1
870.0	78.9	220	1.5	H	870.0	-32.2	0	0.8	-33.0	-20	-13.0
1537.0	57.6	180	1.5	V	1537.0	-55.3	8.8	1.4	-47.9	-20	-27.9
1537.0	55.1	200	1.7	H	1537.0	-56.7	8.8	1.4	-49.3	-20	-29.3
1305.0	42.2	160	1.8	V	1305.0	-69.8	6.3	1.3	-64.8	-20	-44.8
1305.0	40.5	120	1.5	H	1305.0	-71.4	6.3	1.3	-66.4	-20	-46.4

Middle Channel

Indicated		Table Azimuth Degrees	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (m)	Polar. (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)			
910.0	77.6	180	1.6	V	910.0	-38.1	0	0.8	-38.9	-20	-18.9
910.0	68.3	200	1.8	H	910.0	-45.3	0	0.8	-46.1	-20	-26.1
1537.0	52.4	220	1.2	V	1537.0	-60.5	8.8	1.4	-53.1	-20	-33.1
1537.0	49.7	330	2.0	H	1537.0	-62.1	8.8	1.4	-54.7	-20	-34.7
1365.0	50.6	150	1.3	V	1365.0	-61.7	6.3	1.3	-56.7	-20	-36.7
1365.0	46.4	120	1.5	H	1365.0	-65.5	6.3	1.3	-60.5	-20	-40.5

***High* Channel**

Indicated		Table Azimuth Degrees	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (m)	Polar. (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)			
1537.0	53.5	20	2.0	V	1537.0	-59.4	8.8	1.4	-52.0	-20	-32.0
1537.0	48.7	20	1.0	H	1537.0	-63.1	8.8	1.4	-55.7	-20	-35.7
940.0	58.2	150	1.0	V	940.0	-56.2	0	0.8	-57.0	-20	-37.0
1410.0	45.2	100	1.8	V	1410.0	-67.7	6.3	1.4	-62.8	-20	-42.8
940.0	49.1	180	1.6	H	940.0	-63.5	0	0.8	-64.3	-20	-44.3
1410.0	41.8	120	1.5	H	1410.0	-70.4	6.3	1.4	-65.5	-20	-45.5

9 §2.1055, §90.213 &RSS-119 5.3 – FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055, § 90.213 & RSS-119 §5.3.

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 communication test set 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 communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

9.2.1 Environmental Conditions

Temperature:	20.3 ºC
Relative Humidity:	38.3 %
ATM Pressure:	102.5 kPa

** The testing was performed by James Ma on 2008-03-05.*

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26
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.

9.4 Test Results

Frequency Stability versus Temperature

Condition		Ref Frequency	Measured Freq	Frequency Error	Limit
Voltage (Vdc)	Temperature (C)	MHz	MHz	PPM	PPM
12.0	55	455.00000	454.99916	-1.8462	2.50
12.0	40	455.00000	454.99920	-1.7582	2.50
12.0	20	455.00000	454.99933	-1.4725	2.50
12.0	0	455.00000	454.99940	-1.3187	2.50
12.0	-20	455.00000	454.99957	-0.9451	2.50

Frequency Stability versus Voltage

Condition		Ref Frequency	Measured Freq	Frequency Error	Limit
Voltage (Vdc)	Temperature (C)	MHz	MHz	PPM	PPM
13.2	20	455.00000	454.99935	-1.4286	2.50
10.2	20	455.00000	454.99930	-1.5385	2.50

10 §90.214 & § RSS-119 §5.9- TRANSIENT FREQUENCY BEHAVIOR

10.1 Applicable Standard

§90.214 & §RSS-119 §5.9: 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:

Time intervals[1,2]	Maximum frequency difference[3]	All equipment
		150 to 174 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels		
t_1[4]	±25.0 kHz	5.0 ms
t_2	±12.5 kHz	20.0 ms
t_3[4]	±25.0 kHz	5.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels		
t_1[4]	±12.5 kHz	5.0 ms
t_2	±6.25 kHz	20.0 ms
t_3[4]	±12.5 kHz	5.0 ms

10.2 Test Procedure

TIA/EIA-603-C 2.2.19

10.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by James Ma on 2008-03-05.*

10.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Modulation Analyzer	8901A	2026A00847	2007-04-27
Tektronix	Digital Phosphor Oscilloscope	TDS7104	B020557	2007-02-13 (2 Yrs)
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26
HP	Signal Generator	8648C	3426A01345	2007-10-10

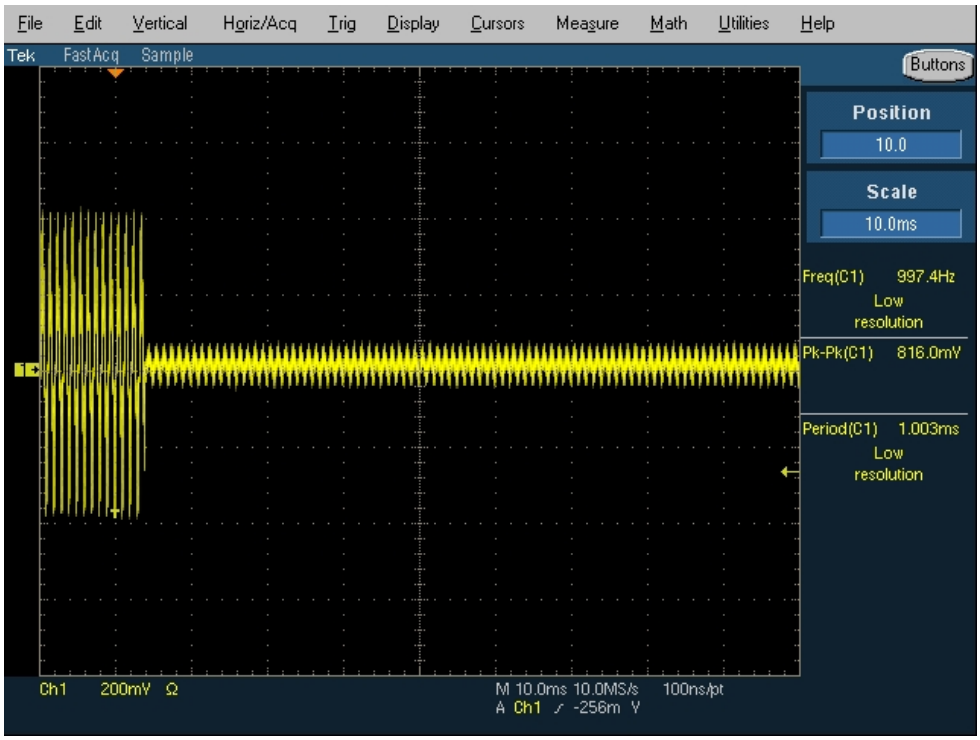
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

10.5 Test Result

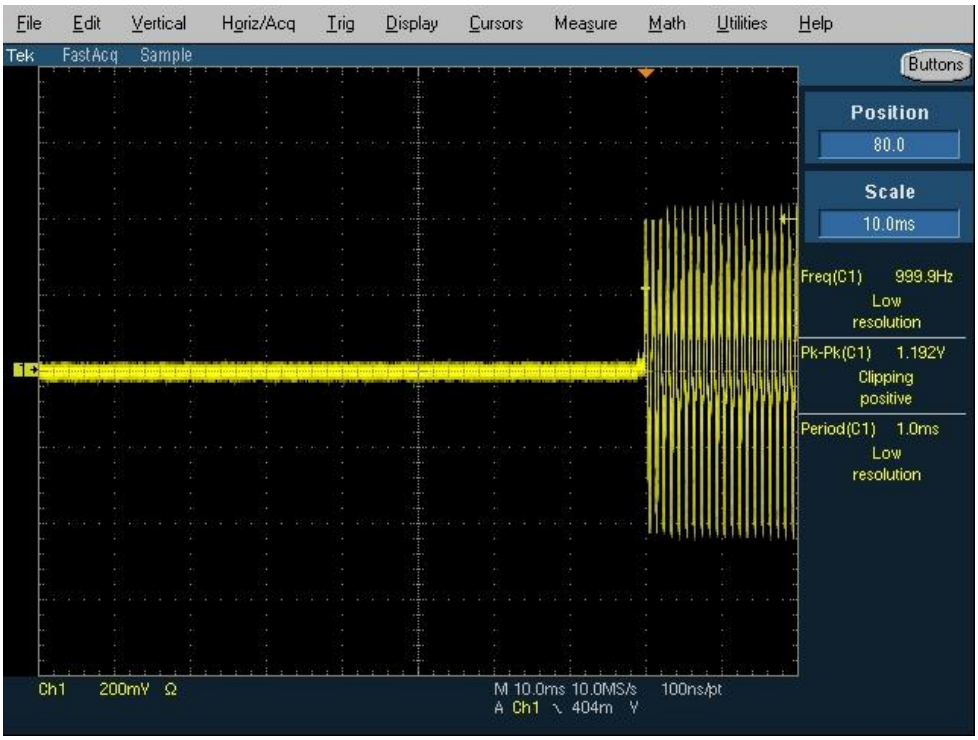
Please refer to the following plots

12.5 kHz Channel Spacing

On Time:



Off Time:



11 EXHIBIT A – FCC AND IC ID LABELING AND WARNING STATEMENT

11.1 FCC § 2.925 Identification of equipment

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term *FCC ID* in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID XXX123. XXX—Grantee Code 123—Equipment Product Code

11.2 IC RSS-Gen § 5.2 Equipment Labels:

IC: XXXXXX-YYYYYYYY Where:

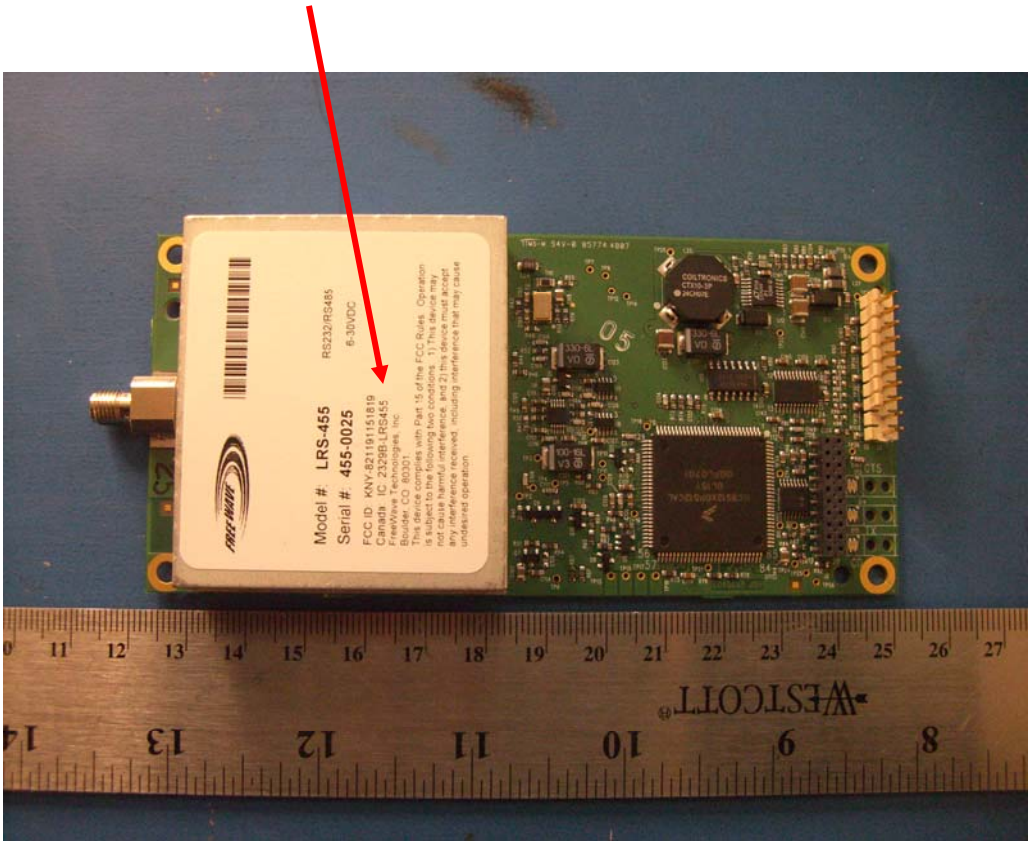
- "XXXXXX-YYYYYYYY" is the certification number
- "XXXXXX" is the Certificate Holder Number (CHN), made of at most 6 alphanumeric characters (A-Z, 0-9), assigned by Industry Canada; and
- "YYYYYYYY" is the Unique Product Number (UPN), made of at most 8 alphanumeric characters (A-Z, 0-9) assigned by the applicant.
- Note 1: The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.
- Note 2: Note 1 shall be conspicuously placed in the equipment user manual.
- Note 3: Permitted alphanumeric characters used in the CHN and UPN are limited to capital letters (A-Z) and digits (0-9). Other characters, such as "#", "/" or "-", shall not be used.

11.3 Specifications: As per RSS GEN 5.2 Equipment Labeling:

Equipment subject to certification under the applicable RSS, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:
(a) the certification number, prefixed by the term “IC:”;
(b) the manufacturer's name, trade name or brand name; and
(c) a model name or number.
Equipment for which a certificate has been issued is not considered certified if it is not properly labeled.
The information on the Canadian label can be combined with the manufacturer’s other labeling requirements.
If the device size is too small to put a label, the label can be included in the user’s manual, upon agreement with Industry Canada.

11.4 Suggested Label Location on EUT

Top View of EUT / Suggested FCC ID Location



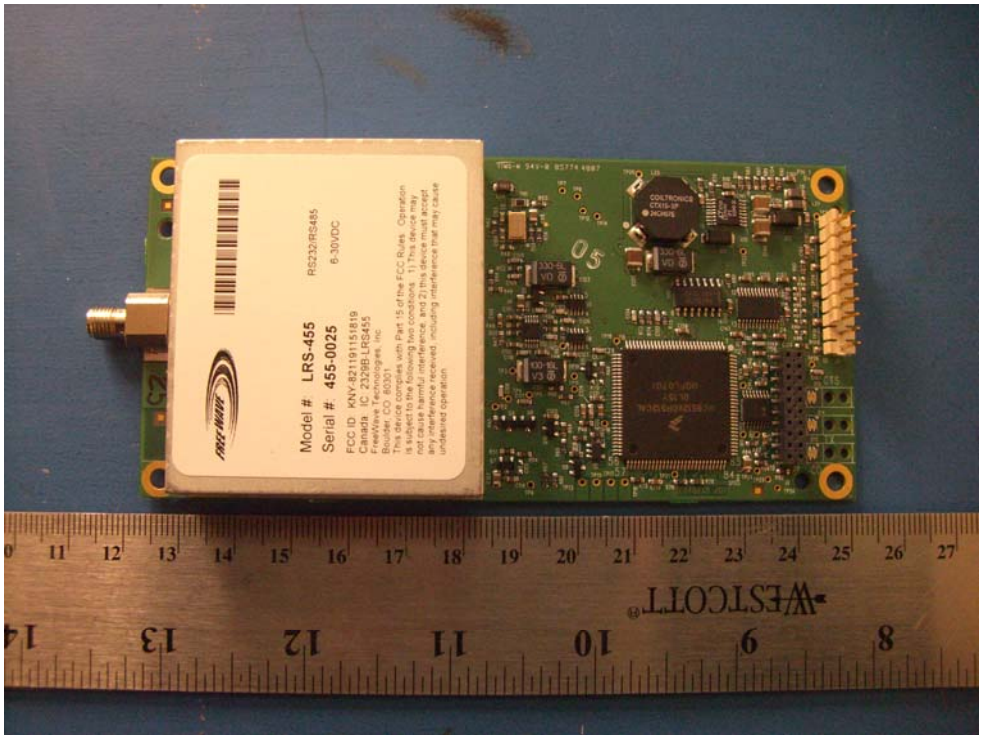
12 EXHIBIT B - TEST SETUP PHOTOGRAPHS

12.1 Radiated Emissions - Front View

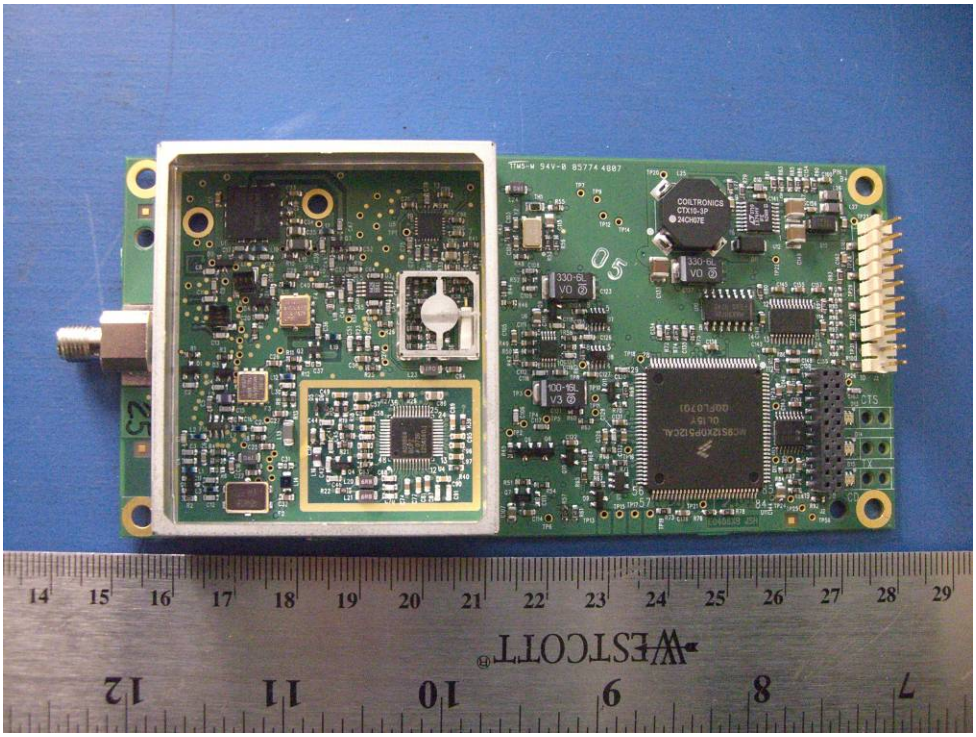
12.2 Radiated Emissions - Rear View

13 EXHIBIT C - EUT PHOTOGRAPHS

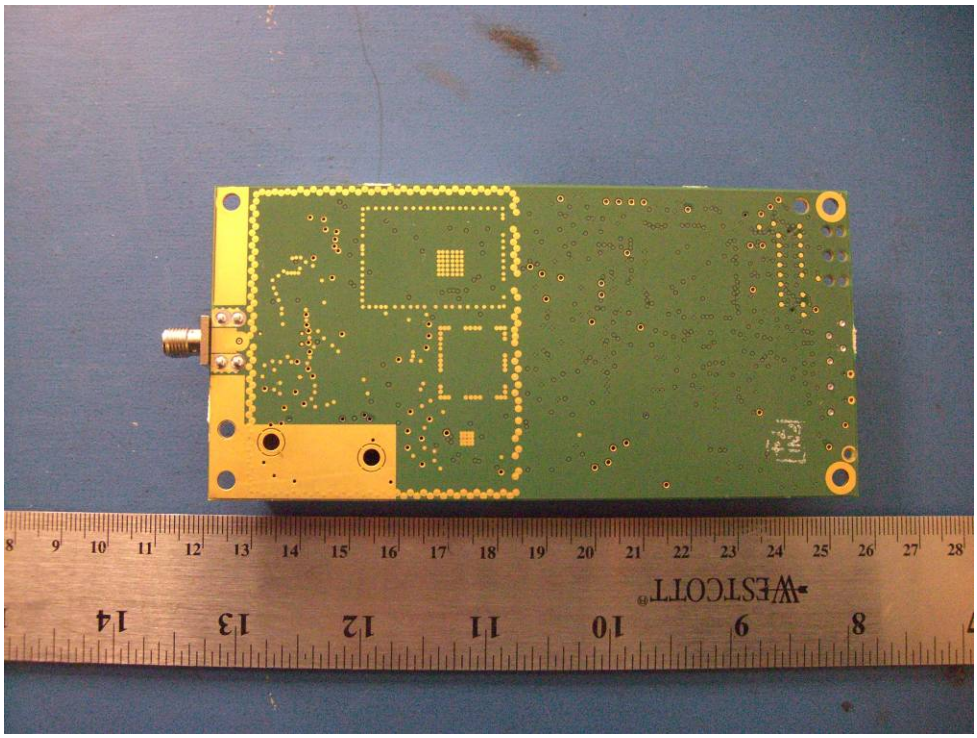
13.1 EUT with Shield on – Front View



13.2 EUT with Shield off – Front View

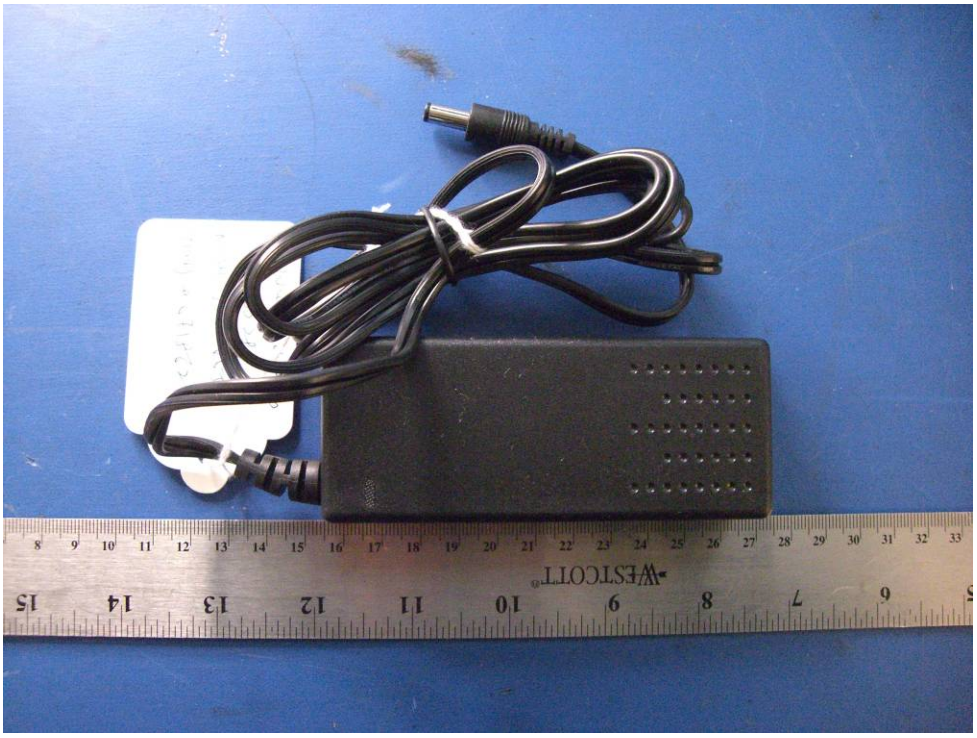


13.3 EUT – Back View

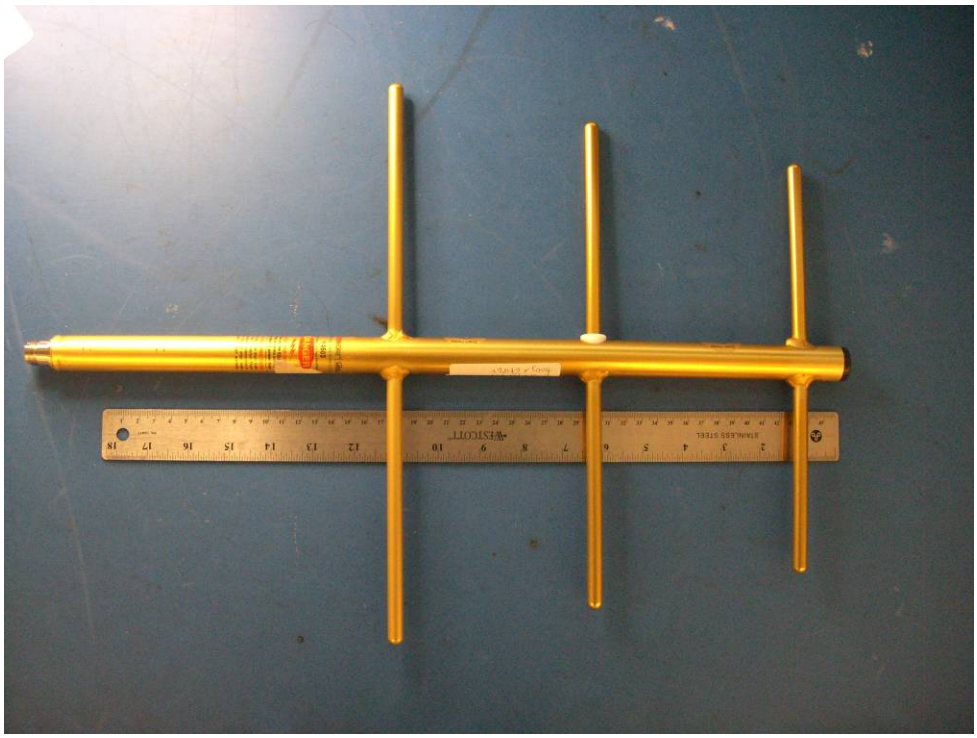


13.4 Power Supply – Front View

13.5 Power Supply- Back View



13.6 Antenna View



******* END REPORT *******