

**FCC PART 95
EMI MEASUREMENT AND TEST REPORT**

For

Midland Radio Corporation

5900 Parretta Drive
Kansas City, MO 64120

FCC ID: MMA5001Z
Model: 5001z

<p>This Report Concerns: <input checked="" type="checkbox"/> Original Report</p>	<p>Product Type: 40 Channels CB mobile transceiver</p>
<p>Test Engineer:</p>	<p>Dan Corona </p>
<p>Report Number:</p>	<p>R0702122-95</p>
<p>Report Date:</p>	<p>2007-03-08</p>
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Note: This test report is for the customer shown above and their specific product only. 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.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

This Bay Area Compliance Laboratories Corp. test report has been prepared on behalf of Midland Radio Corporation and their product, 5100z (FCCID:MMA5100Z) or the EUT (Equipment Under Test) as referred to in the rest of this report.

The EUT is a 40 channel CB mobile transceiver, the frequency range operated is 26.965-27.405 MHz, the modulation is A3E.

- 40 CB Channels
- 4 Watt Output Power
- X-TRA TALKMic Gain
- 4- Pin Front Panel Mic Connector
- PA Function
- Switchable Noise Blanker (NB)
- Instant Channel 9
- Dimmer Control
- RF Gain
- Automatic Noise Limiter (ANL)
- Push to talk ergonomically designed microphone
- 9 ft coil Mic cord
- Includes mounting bracket/hardware and fused DC power cord

Mechanical Description

The Midland Radio Corporation product, FCCID: MMA5100z, measures approximately 25.6 cm (D) x 5.3 cm (H) x 15.6 cm (W).

* The test data gathered are from typical production sample, serial number: 003# provided by the manufacturer.

EUT Photo



Additional photos in Exhibit C

Objective

This type approval report is prepared on behalf of *Midland Radio Corporation* in accordance with Part 2, Subpart J and Part 95 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, band edge, and conducted and radiated margin.

This report is provided on behalf of *Midland Radio Corporation* for confirmation of regulatory compliance. The manufacturer declares that the model: *5100z* serial number: *003#* 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 95D Citizens Band (CB) Radio Services

Applicable Standards: TIA/EIA 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 ± 2.0 for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BAACL.

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

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 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, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

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.: R-2463 and C-2698. 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 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>.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-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 List and Details

Manufacturer	Description	Model	Serial Number
HP	DC Power Supply	6236B	2003A05705

Interface Ports and Cabling

Cable Description	Length (m)	From	To
Audio cable	0.5	Microphone	EUT

SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§ 2.1047, §95.637	Modulation Characteristics	Compliant
§ 2.1053, § 95.633	Field Strength of Spurious Radiation	Compliant
§ 2.1046 ; § 95.639	RF Output Power	Compliant
§ 2.1049; § 95.633	Occupied Bandwidth	Compliant
§ 2.1051, § 95.635	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a);§ 2.1055 (d) § 95.625	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant

§2.1046, §95.639 – RF OUTPUT POWER

Applicable Standard

CFR47 §2.1046 and §95.639.

§95.639 (c) No CB transmitter, under any condition of modulation, shall exceed:

- (1) 4 W Carrier power when transmitting emission type A1D or A3E;
- (2) 12 W peak envelope TP when transmitting emission type H1D, J1D, R1D, H3E, J3E or R3E.

Each CB transmitter which transmits emission type H3E, J3E or R3E must automatically prevent the TP from exceeding 12 W peak envelope TP or the manufacturer's rated peak envelope TP, whichever is less.

Test Procedure

Conducted:

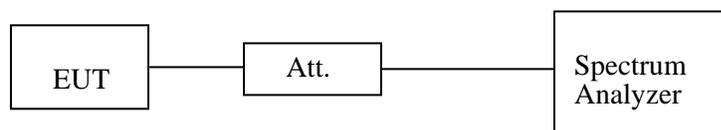
The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Equipment Description	Model Number	Manufacturer	Serial Numbers	Last Calibration
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06

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

Test Setup Diagram



Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* The testing was performed by Dan Corona on 2007-02-22

Test Results

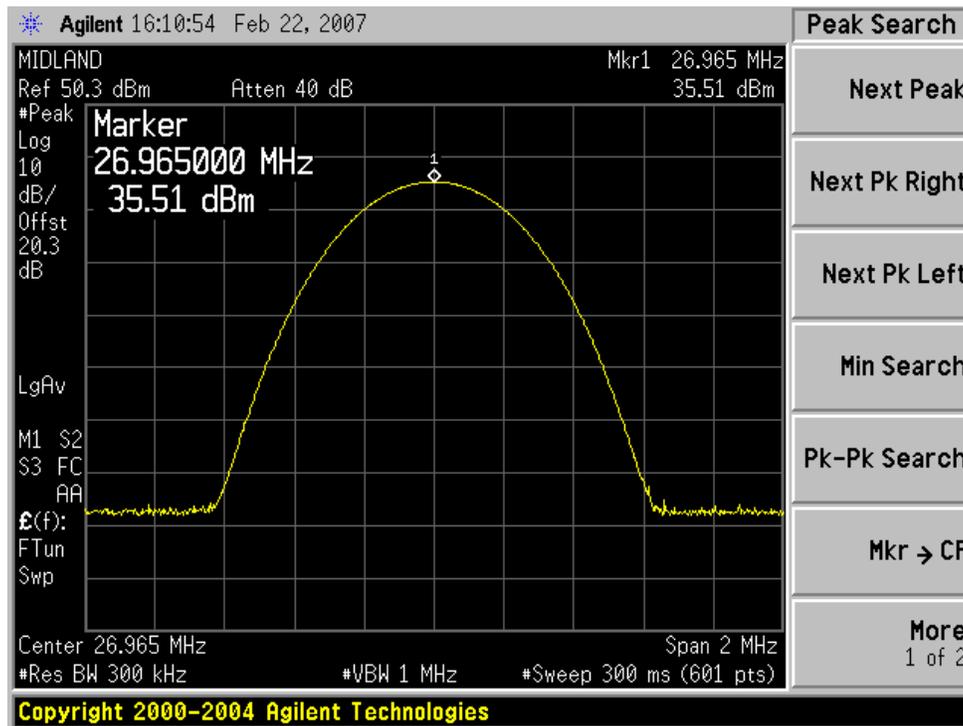
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (Watt)	Limit (Watt)
Low	26.965	35.51	3.556	4
Mid	27.205	35.88	3.873	4
High	27.405	36.00	3.981	4

Description of Available Antenna:

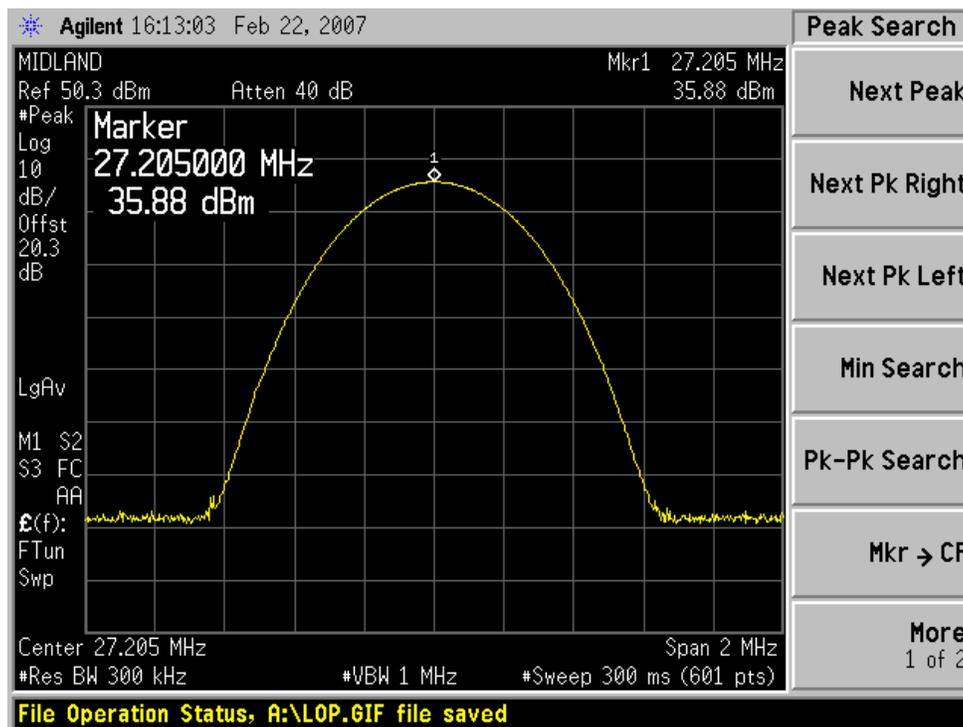
The radio utilizes two types of mobile CB antennas – full-length whip and loaded whip. The maximum gain is -2.15 dBd.

Plots of Conducted Output Power:

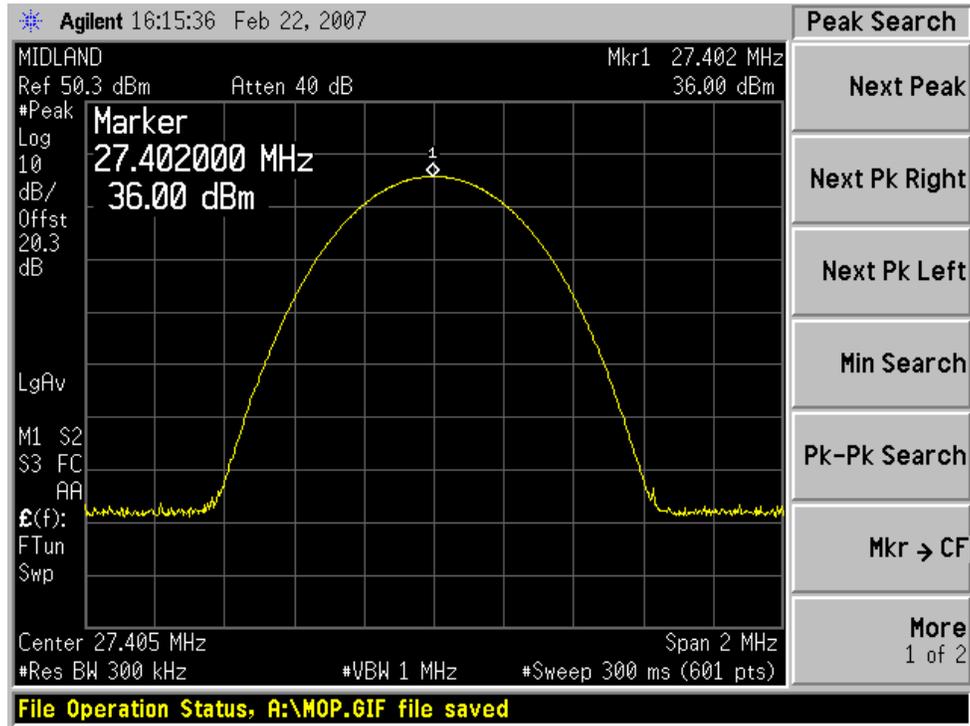
Low Channel



Middle Channel



High Channel



§2.1047 & §95.637 - MODULATION CHARACTERISTICS

Applicable Standard

CFR47 § 2.1047(d) and §95.637.

§95.637 (c) When emission type A3E is transmitted, the modulation must be greater than 85% but must not exceed 100%. Simultaneous amplitude modulation and frequency or phase modulation of a transmitter are not permitted.

(d) When emission type A3E is transmitted by a CB transmitter having a TP of greater than 2.5 W, the CB transmitter must automatically prevent the modulation from exceeding 100%.

(e) Each CB transmitter that transmits emission type H3E, J3E or R3E must be capable of transmitting the upper sideband. The capability of also transmitting the lower sideband is permitted.

Test Procedure

At different modulating frequencies, the output level of the audio generator was varied and the AM deviation level was recorded.

TIA/EIA 603-C section 2.2.3, 2.2.6

Test Equipment List and Details

Equipment Description	Model Number	Manufacturer	Serial Numbers	Last Calibration
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06
Modulation Analyzer	8901A	HP	2026A00847	2006-01-17
Generator	33220A	Agilent	MY43004878	2006-05-18

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

Environmental Conditions

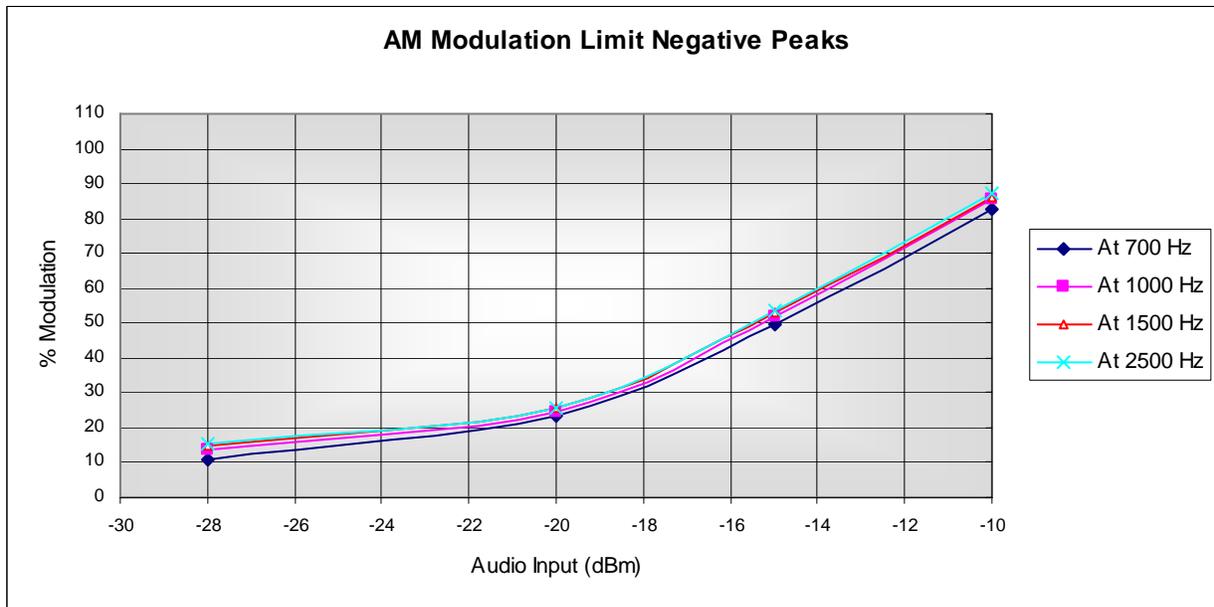
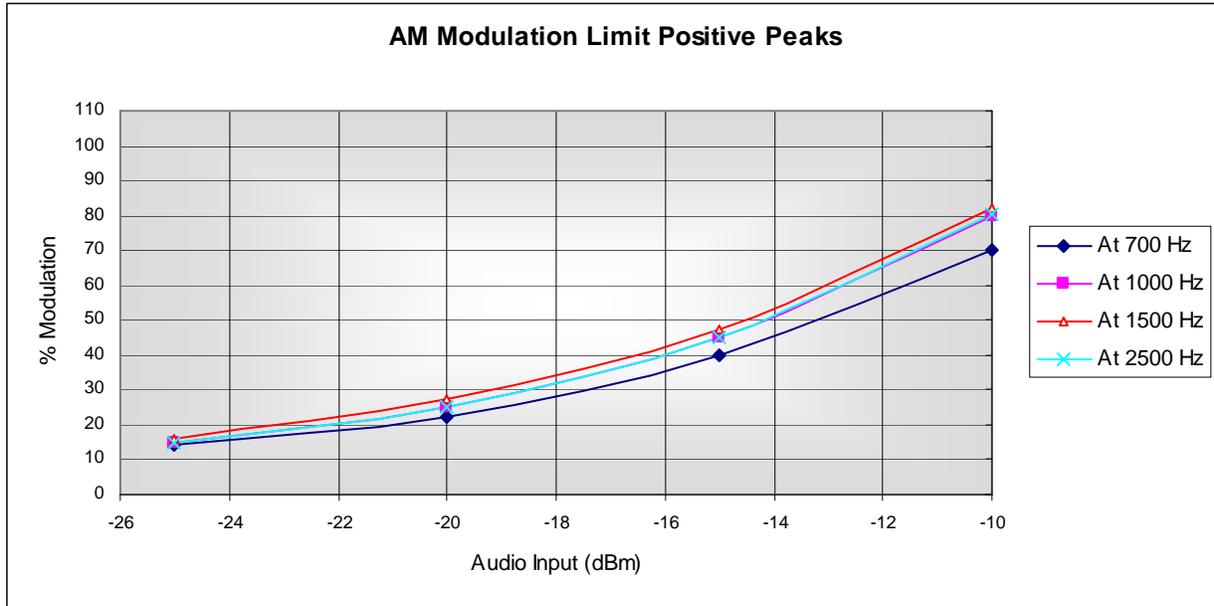
Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* The testing was performed by Dan Coronia on 2007-02-22

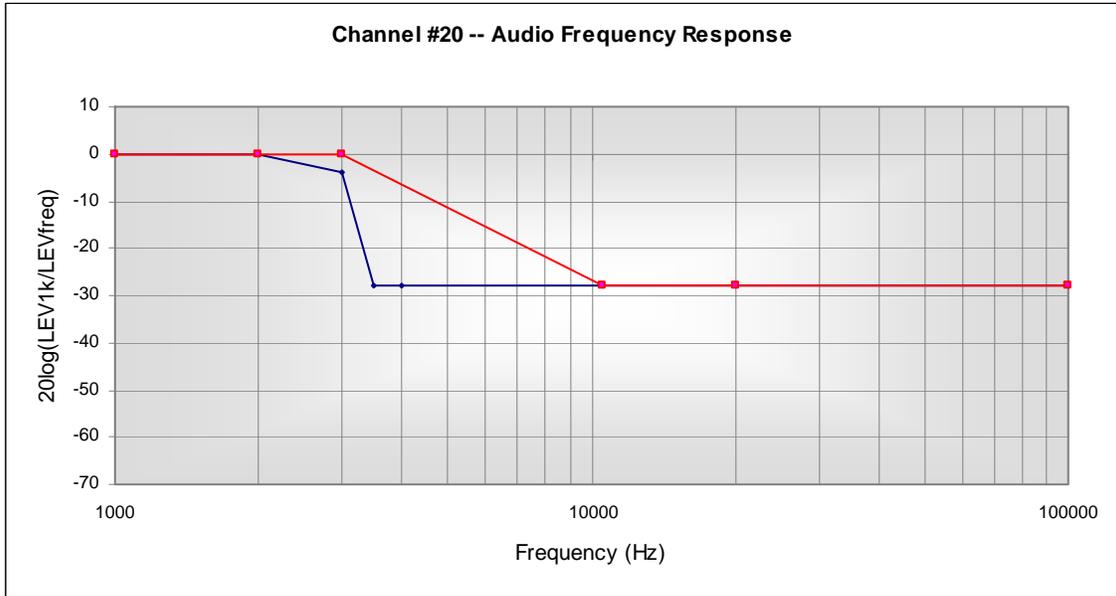
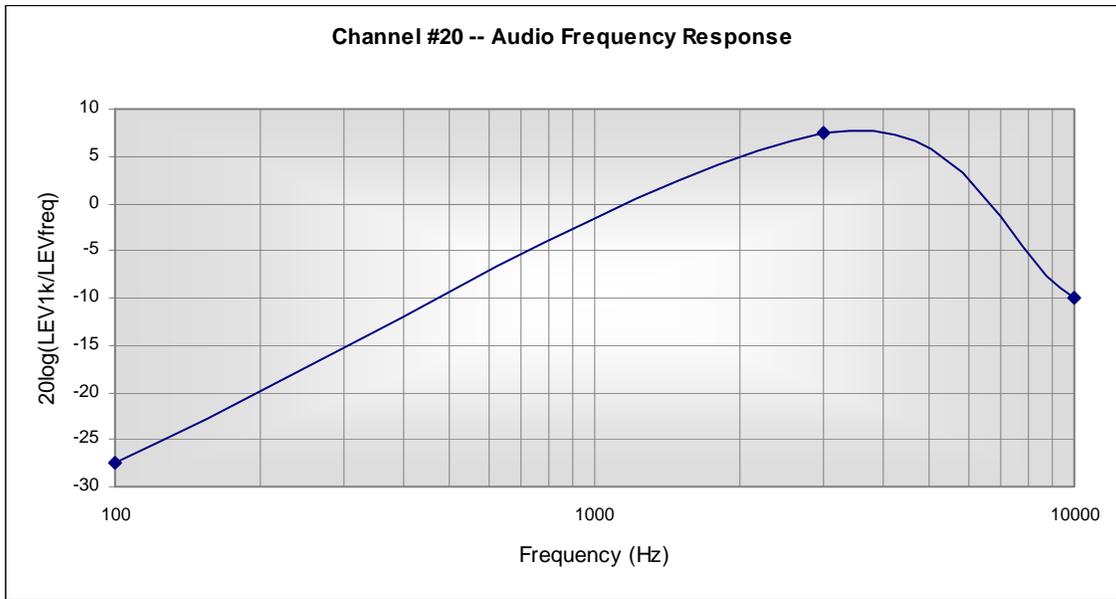
Test Results

No non-compliance noted, please refer to the plots.

Modulation Limiting:



Audio Frequency Response:



§2.1049, §95.633 - OCCUPIED BANDWIDTH

Applicable Standards

CFR 47 § 2.1049 and § 95.633 (a).

The authorized bandwidth for the emission type A3E is 8 kHz.

Test Procedure

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

Test Equipment List and Details

Equipment Description	Model Number	Manufacturer	Serial Numbers	Last Calibration
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06
Modulation Analyzer	8901A	HP	2026A00847	2006-01-17
Generator	33220A	Agilent	MY43004878	2006-05-18

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

Environmental Conditions

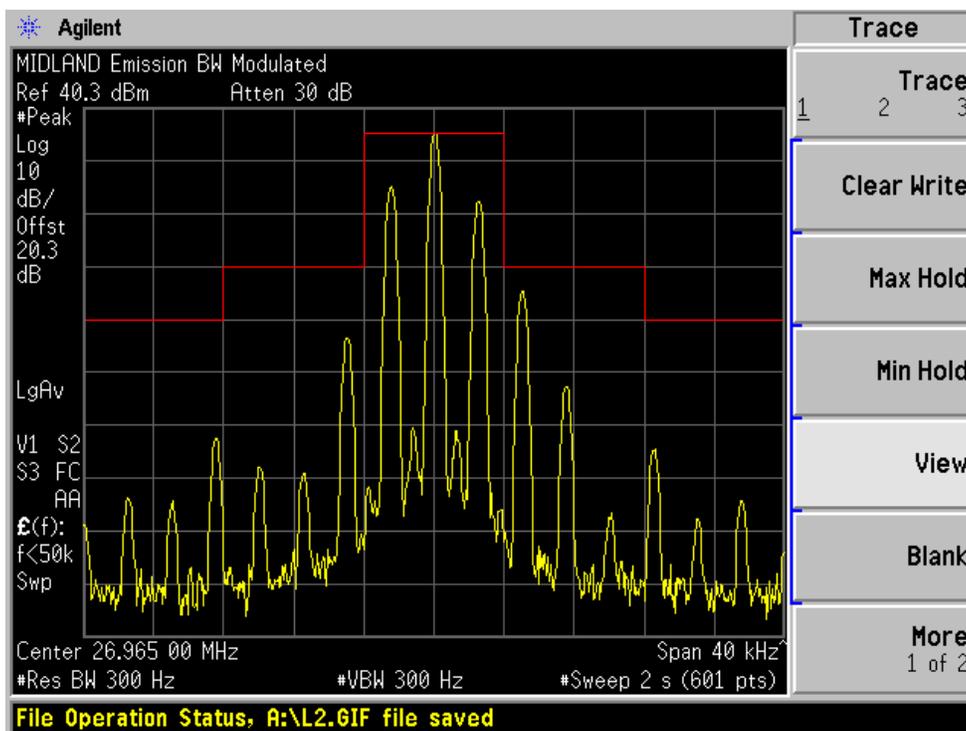
Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* *The testing was performed by Dan Coronia on 2007-02-22*

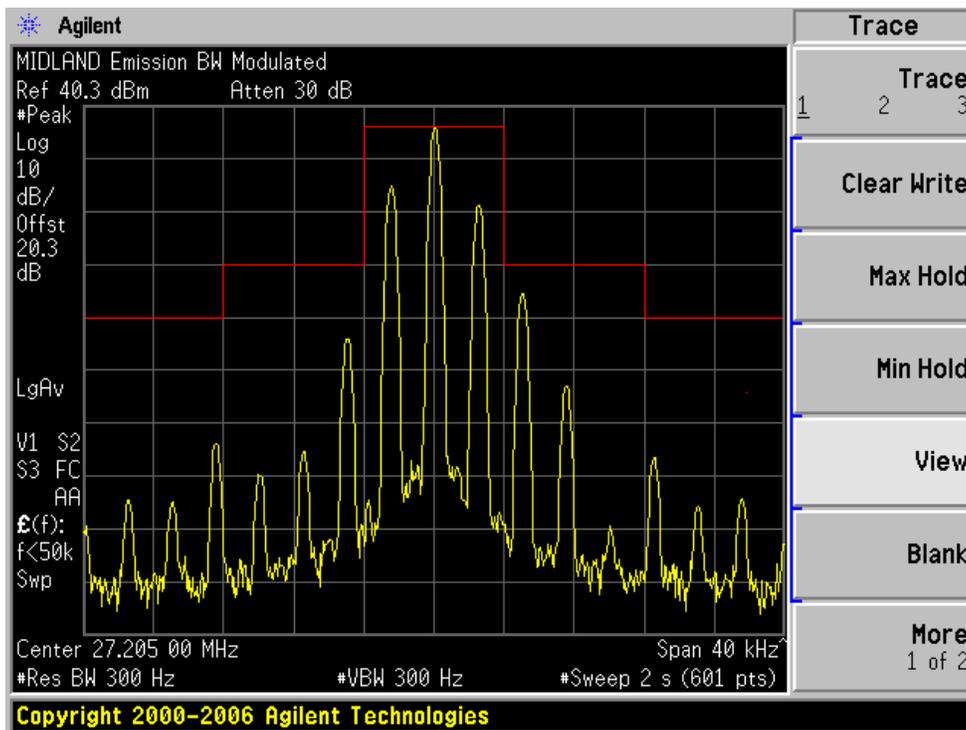
Test Results

No non-compliance noted, please refer to the plots.

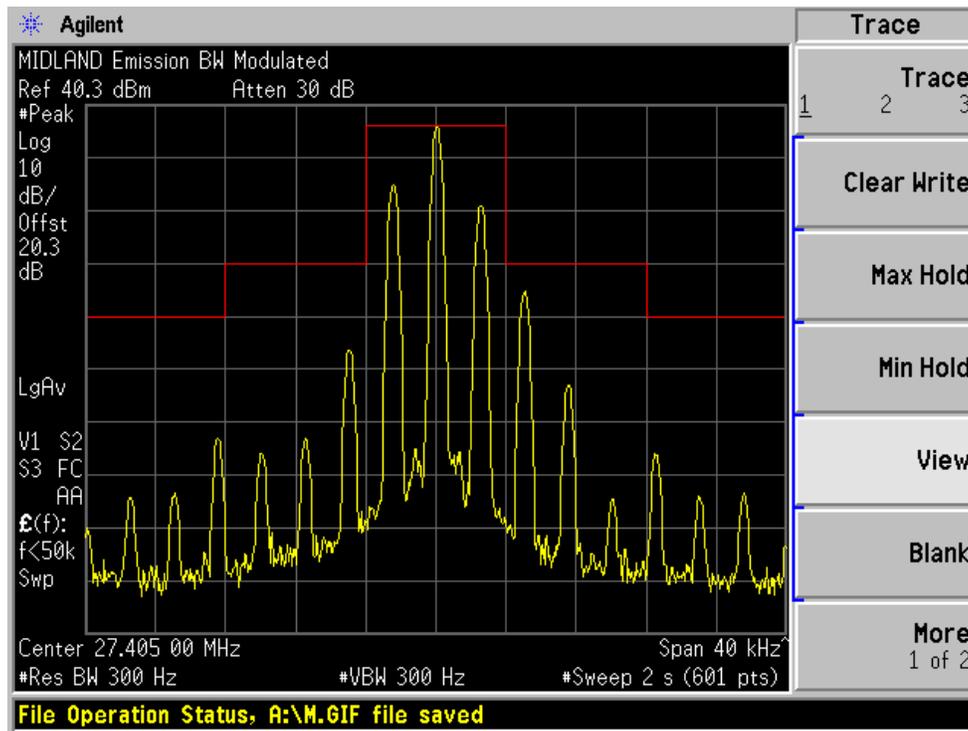
Low Channel



Mid Channel



High Channel



§2.1051, §95.635 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standards

CFR47 §2.1051 and §95.635.

§95.635 b(1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

§95.635 b (3) At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

§95.635 b (8) At least $53 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

§95.635 b (9) At least 60 dB on any frequency twice or greater than twice the fundamental frequency.

Test Procedure

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

TIA/EIA 603-C Clause 2.2.13

Test Equipment List and Details

Equipment Description	Model Number	Manufacturer	Serial Numbers	Last Calibration
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06
Modulation Analyzer	8901A	HP	2026A00847	2006-01-17
Generator	33220A	Agilent	MY43004878	2006-05-18

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

Environmental Conditions

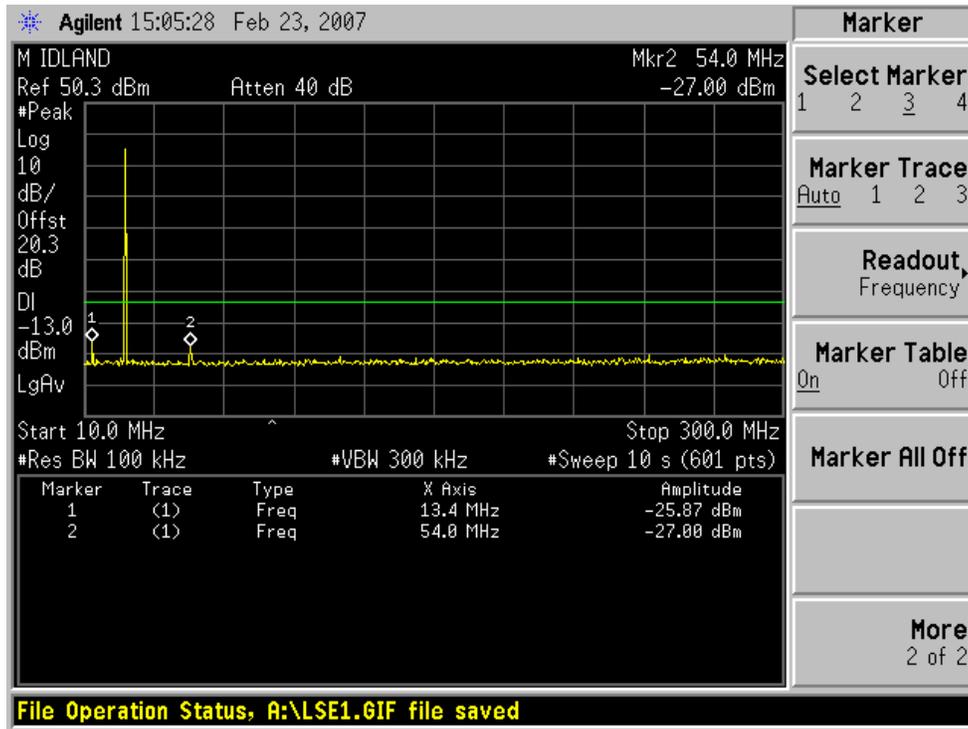
Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* *The testing was performed by Dan Coronia on 2007-02-23*

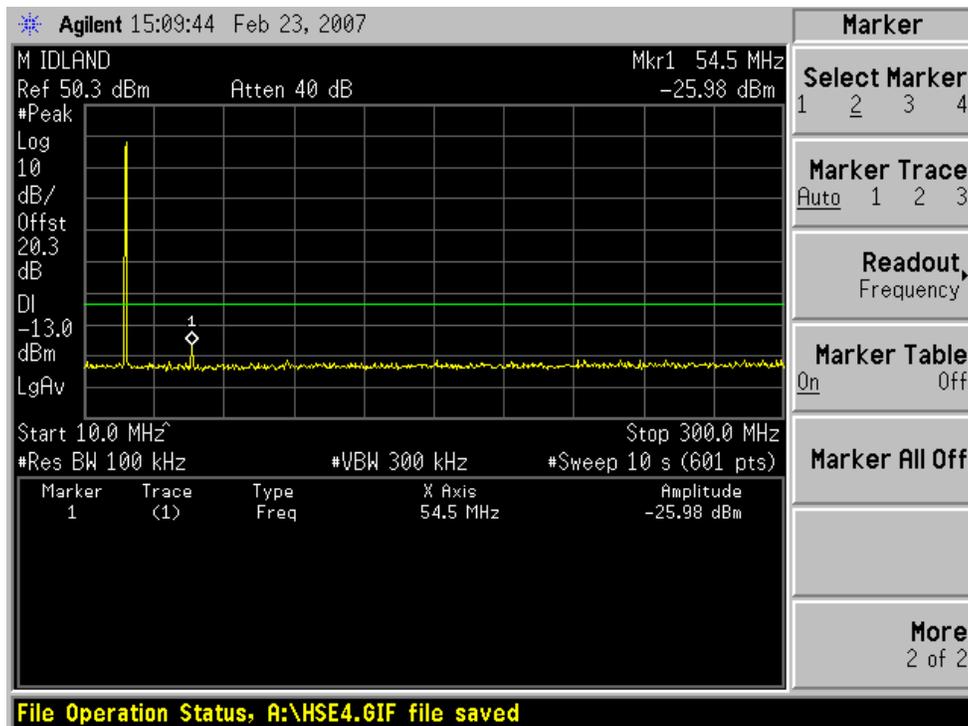
Test Results

No non-compliance noted, please refer to the plots.

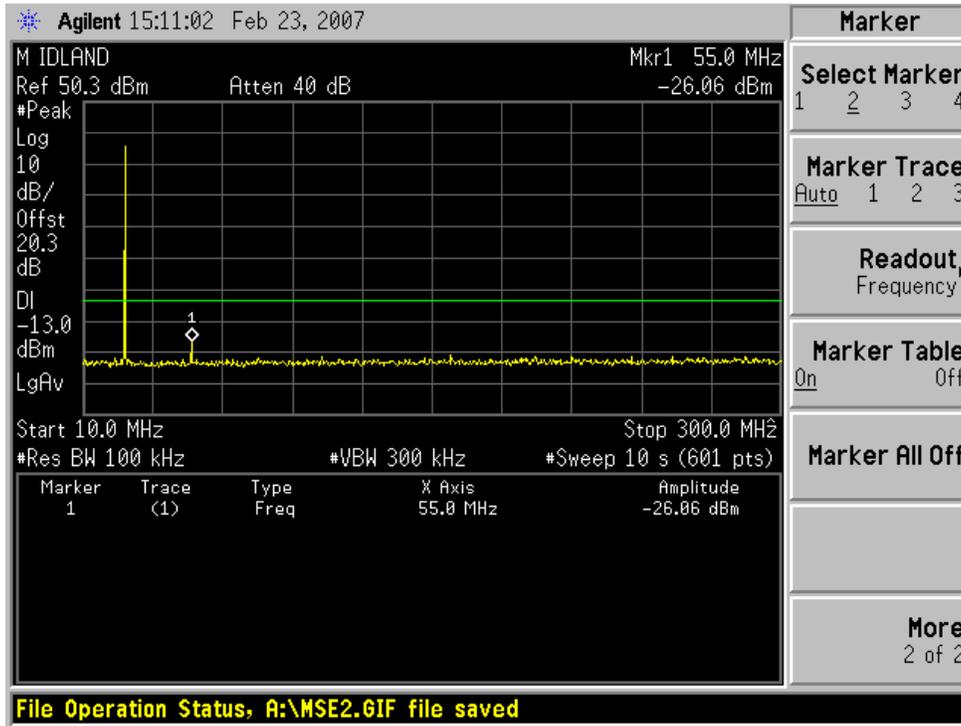
Low Channel



Middle Channel



High Channel



§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standards

CFR47 §2.1051 and §95.635.

§95.635 b(1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

§95.635 b (3) At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

§95.635 b (8) At least $53 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

§95.635 b (9) At least 60 dB on any frequency twice or greater than twice the fundamental frequency.

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.

Spurious emissions in dB = $10 \log(\text{TXpwr in Watts}/0.001)$ – the absolute level

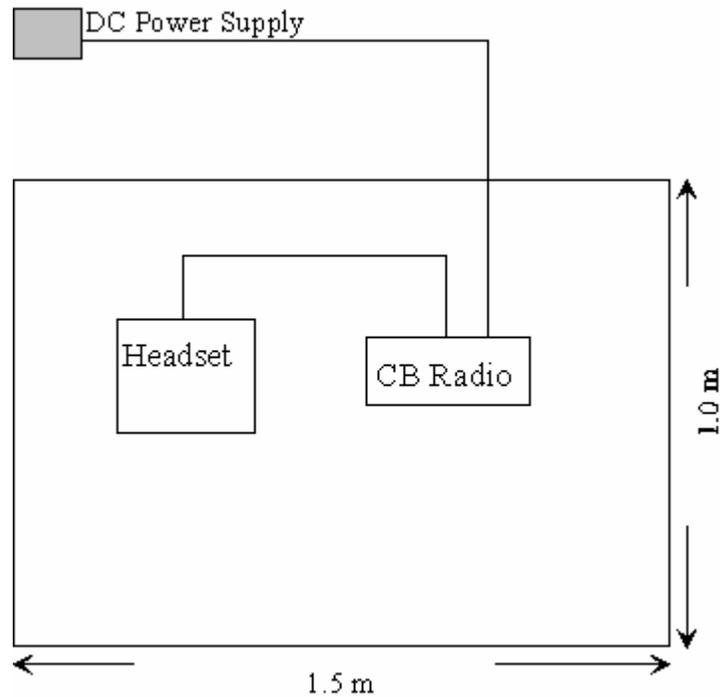
Spurious attenuation limit in dB = $53 + 10 \text{Log}_{10}(\text{power out in Watts})$

Test Equipment List and Details

Equipment Description	Model Number	Manufacturer	Serial Numbers	Last Calibration
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06
Modulation Analyzer	8901A	HP	2026A00847	2006-01-17
Generator	33220A	Agilent	MY43004878	2006-05-18
Antenna, Bi-log	JB1	Sunol	A013105-3	2006-04-26
Pre-amplifier	317	Sonoma Instrument	260407	2006-03-15
Antenna, Dipole	AD-100	Com-Power	2219	2006-04-26

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

Test Setup Diagram



Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* The testing was performed by Dan Corona on 2007-02-23

Test Results

No non-compliance noted.

Low Channel:

Indicated		Table Angle Degree	Antenna Height (m)	Polar H/V	Substitution					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBuV)				Frequency MHz	Level (dBm)	Antenna Gain Correction	Cable Loss (dB)	Absolute Level (dBm)		
134.83	51.56	294	1.5	h	134.83	-41.80	0	0.44	-42.2	-23	-19.2
134.83	53.46	221	1.6	v	134.83	-43.70	0	0.44	-44.1	-23	-21.1
161.79	42.87	288	2.4	v	161.79	-46.00	0	0.46	-46.5	-23	-23.5
80.90	54.95	230	2.6	h	80.90	-47.50	0	0.36	-47.9	-23	-24.9
53.93	50.59	213	2.7	h	53.93	-49.30	0	0.26	-49.6	-23	-26.6
161.79	46.17	112	3.0	h	161.79	-49.30	0	0.46	-49.8	-23	-26.8
80.90	58.50	340	1.3	v	80.90	-51.05	0	0.36	-51.4	-23	-28.4
53.93	53.97	180	1.0	v	53.93	-52.68	0	0.26	-52.9	-23	-29.9
107.86	41.81	293	2.0	h	107.86	-53.80	0	0.39	-54.2	-23	-31.2
107.86	42.27	23	2.4	v	107.86	-54.26	0	0.39	-54.7	-23	-31.7
188.76	40.12	281	2.3	v	188.76	-54.66	0	0.49	-55.2	-23	-32.2
188.76	41.26	180	1.5	h	188.76	-55.80	0	0.49	-56.3	-23	-33.3

Middle Channel:

Indicated		Table Angle Degree	Antenna Height (m)	Polar H/V	Substitution					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBuV)				Frequency MHz	Level (dBm)	Antenna Gain Correction	Cable Loss (dB)	Absolute Level (dBm)		
136.03	52.61	294	1.5	h	136.03	-42.60	0	0.44	-43.0	-23	-20.0
81.62	59.70	340	1.3	v	81.62	-44.41	0	0.36	-44.8	-23	-21.8
136.03	54.52	221	1.6	v	136.03	-44.51	0	0.44	-45.0	-23	-22.0
163.23	43.90	288	2.4	v	163.23	-47.14	0	0.46	-47.6	-23	-24.6
81.62	55.63	230	2.6	h	81.62	-48.48	0	0.36	-48.8	-23	-25.8
54.41	51.20	213	2.7	h	54.41	-50.23	0	0.26	-50.5	-23	-27.5
163.23	46.86	112	3.0	h	163.23	-50.10	0	0.46	-50.6	-23	-27.6
54.41	54.88	180	1.0	v	54.41	-53.91	0	0.26	-54.2	-23	-31.2
108.82	42.60	293	2.0	h	108.82	-54.65	0	0.39	-55.0	-23	-32.0
108.82	43.22	23	2.4	v	108.82	-55.27	0	0.39	-55.7	-23	-32.7
190.44	41.18	281	2.3	v	190.44	-55.68	0	0.49	-56.2	-23	-33.2
190.44	42.30	180	1.5	h	190.44	-56.80	0	0.49	-57.3	-23	-34.3

High Channel:

Indicated		Table Angle Degree	Antenna Height (m)	Polar H/V	Substitution					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBuV)				Frequency MHz	Level (dBm)	Antenna Gain Correction	Cable Loss (dB)	Absolute Level (dBm)		
137.03	54.20	294	1.5	h	137.03	-44.50	0	0.44	-44.9	-23	-21.9
137.03	56.62	221	1.6	v	137.03	-46.92	0	0.44	-47.4	-23	-24.4
164.43	45.13	288	2.4	v	164.43	-48.20	0	0.46	-48.7	-23	-25.7
82.22	57.65	230	2.6	h	82.22	-50.20	0	0.36	-50.6	-23	-27.6
54.81	53.54	213	2.7	h	54.81	-52.10	0	0.26	-52.4	-23	-29.4
164.43	49.23	112	3.0	h	164.43	-52.30	0	0.46	-52.8	-23	-29.8
82.22	61.20	340	1.3	v	82.22	-53.75	0	0.36	-54.1	-23	-31.1
54.81	56.30	180	1.0	v	54.81	-55.04	0	0.26	-55.3	-23	-32.3
109.62	44.65	293	2.0	h	109.62	-56.70	0	0.39	-57.1	-23	-34.1
191.84	43.26	281	2.3	v	191.84	-57.28	0	0.49	-57.8	-23	-34.8
109.62	45.71	23	2.4	v	109.62	-57.76	0	0.39	-58.2	-23	-35.2
191.84	44.62	180	1.5	h	191.84	-58.30	0	0.49	-58.8	-23	-35.8

§2.1055, §95.625 - FREQUENCY STABILITY

Applicable Standard

CFR47 §2.1055, §95.625

§95.625 (b), each CB transmitter must be maintained within a frequency tolerance of 0.005%.

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 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 supply 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

Equipment Description	Model Number	Manufacturer	Serial Number	Calibration Date
Frequency Counter	5342 A	HP	2232A06380	2006-12-12
Spectrum Analyzer	E4446A	Agilent	US443000386	2006-03-06
Temperature Oven	VersaTenn	Tenney	12.222-193	2006-06-27

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

Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	1020 mbar

* *The testing was performed by Dan Coronia on 2007-02-23*

Test Results

No non-compliance noted.

Frequency stability versus temperature:

Reference Frequency : 27.1850 MHz, Limit : 0.005%			
Environment Conditions		Frequency Measure with Time Elapsed	
Temperature (°C)	Power supplied (V DC)	Measured Frequency (MHz)	Error (%)
50	13.8	27.1848	-0.0007
40	13.8	27.1848	-0.0007
30	13.8	27.1849	-0.0004
20	13.8	27.1851	0.0004
10	13.8	27.1851	0.0004
0	13.8	27.1851	0.0004
-10	13.8	27.1852	0.0007
-20	13.8	27.1852	0.0007
-30	13.8	27.1853	0.0007

Frequency Stability versus Voltage:

Reference Frequency : 27.1850 MHz, Limit : 0.005%			
Environment Conditions		Frequency Measure with Time Elapsed	
Temperature (°C)	Power supplied (V DC)	Measured Frequency (MHz)	Error (%)
25	9	27.1851	
25	13.8	27.1851	0.0004
25	16	27.1851	