



FCC PART 95
TEST AND MEASUREMENT REPORT

For

Midland Radio Corporation

5900 Parretta Drive,
 Kansas City, MO 64120, USA

FCC ID: MMAGXT2000
Model: GXT2000, GXT2050

Report Type: Original Report	Product Type: FRS/GMRS Handheld 2-Way Radio
<p>Test Engineer: <u>Lionel Lara</u> </p> <p>Report Number: <u>R1205185-95</u></p> <p>Report Date: <u>2012-06-20</u></p> <p>Reviewed By: <u>RF/EMC Lead</u> </p> <p style="text-align: center;">Victor Zhang</p> <p style="text-align: center;">Bay Area Compliance Laboratories Corp. (BACL) 1274 Anvilwood Avenue, Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732 9164</p>	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*” (Rev.3)

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	5
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	5
1.2	MECHANICAL DESCRIPTION	5
1.3	OBJECTIVE.....	5
1.4	RELATED SUBMITTAL(S)/GRANT(S)	5
1.5	TEST METHODOLOGY	6
1.6	MEASUREMENT UNCERTAINTY	6
1.7	TEST FACILITY	6
2	SYSTEM TEST CONFIGURATION.....	7
2.1	JUSTIFICATION.....	7
2.2	EUT EXERCISE SOFTWARE.....	7
2.3	EQUIPMENT MODIFICATIONS	7
2.4	SPECIAL EQUIPMENT	7
2.5	LOCAL SUPPORT EQUIPMENT	7
2.6	INTERNAL CONFIGURATION.....	7
2.7	EXTERNAL I/O CABLING LIST AND DETAILS	7
2.8	LOCAL SUPPORT EQUIPMENT POWER SUPPLY AND LINE FILTERS	7
3	SUMMARY OF TEST RESULTS.....	8
4	FCC §2.1093 - RF EXPOSURE INFORMATION	9
4.1	APPLICABLE STANDARDS	9
4.2	RESULT.....	9
5	FCC §2.1046 & §95.639 – RF OUTPUT POWER.....	10
5.1	APPLICABLE STANDARD	10
5.2	TEST PROCEDURE	10
5.3	TEST EQUIPMENT LIST AND DETAILS	10
5.4	TEST ENVIRONMENTAL CONDITIONS.....	10
5.5	TEST RESULTS	11
6	FCC §2.1047 & §95.637 - MODULATION CHARACTERISTICS.....	12
6.1	APPLICABLE STANDARD	12
6.2	TEST PROCEDURE	12
6.3	TEST EQUIPMENT LIST AND DETAILS	12
6.4	TEST ENVIRONMENTAL CONDITIONS.....	12
6.5	TEST RESULTS	13
7	FCC §2.1049, §95.633 & §95.635 – OCCUPIED BANDWIDTH & EMISSION MASK	15
7.1	APPLICABLE STANDARDS	15
7.2	TEST PROCEDURE	15
7.3	TEST EQUIPMENT LIST AND DETAILS	15
7.4	TEST ENVIRONMENTAL CONDITIONS.....	16
7.5	TEST RESULTS	16
8	FCC §2.1051 & §95.635 – SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	19
8.1	APPLICABLE STANDARDS	19
8.2	TEST PROCEDURE	19
8.3	TEST EQUIPMENT LIST AND DETAILS	19
8.4	TEST ENVIRONMENTAL CONDITIONS.....	19
8.5	TEST RESULTS	20

9	FCC §2.1053 & §95.635 – SPURIOUS RADIATED EMISSIONS	22
9.1	APPLICABLE STANDARDS	22
9.2	TEST PROCEDURE	22
9.3	TEST EQUIPMENT LIST AND DETAILS	23
9.4	TEST ENVIRONMENTAL CONDITIONS.....	23
9.5	TEST RESULTS	24
10	FCC §2.1055, §95.621 & §95.626 – FREQUENCY STABILITY	25
10.1	APPLICABLE STANDARD.....	25
10.2	TEST PROCEDURE	25
10.3	TEST EQUIPMENT LIST AND DETAILS	25
10.4	TEST ENVIRONMENTAL CONDITIONS.....	25
10.5	TEST RESULTS	26
11	EXHIBIT A - FCC ID LABELING REQUIREMENTS.....	27
11.1	FCC ID LABEL REQUIREMENT	27
11.2	FCC ID LABEL CONTENTS	27
11.3	FCC ID LABEL LOCATION.....	28
12	EXHIBIT B – TEST SETUP PHOTOGRAPHS.....	29
12.1	RADIATED EMISSIONS BELOW 1 GHZ – FRONT VIEW	29
12.2	RADIATED EMISSIONS BELOW 1 GHZ – REAR VIEW	29
12.3	RADIATED EMISSIONS ABOVE 1 GHZ – FRONT VIEW	30
12.4	RADIATED EMISSIONS ABOVE 1 GHZ – REAR VIEW	30
13	EXHIBIT C- EUT PHOTOS	31
13.1	EUT FRONT VIEW	31
13.2	EUT BACK VIEW.....	31
13.3	EUT SIDE VIEW 1.....	32
13.4	EUT SIDE VIEW 2.....	32
13.5	EUT TOP VIEW.....	33
13.6	EUT BOTTOM VIEW	33
13.7	EUT BOTTOM VIEW (BATTERY OFF).....	34
13.8	EUT OPEN VIEW	34
13.9	EUT INTERIOR PCB TOP VIEW	35
13.10	EUT INTERIOR PCB BOTTOM VIEW.....	35
13.11	EUT BATTERY VIEW.....	36
13.12	EUT CHARGER TOP VIEW.....	36
13.13	EUT AC/DC ADAPTER VIEW.....	37
13.14	EUT HEADSET VIEW.....	37

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1205185-95	Original Report	2012-06-20

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Midland Radio Corporation* and their product *FCC ID: MMAGXT2000*, model: *GXT2000*, *GXT2050* or the "EUT" as referred to in this report. The EUT is a two way radio operating in FRS/GMRS bands:

Specifications	
Modulation	FM
Frequency Band	FRS: 467.5625-467.7125 MHz FRS/GMRS: 462.5625-462.7125 MHz GMRS: 462.5500 -462.7250 MHz
Power Source	7.4 V 1200mAh Rechargeable Li-polymer Battery Pack
Normal Operation	Face-held and Body-worn (Belt Clip)

1.2 Mechanical Description

The EUT measures approximately 6 cm (L) x 3.5 cm (W) x 20.5 cm (H) and weights approximately 328.5g.

The data gathered are from a typical production sample provided by the manufacturer, serial number: 1201000045 for conducted tests and serial number: 1201000055 for the radiated tests.

1.3 Objective

This type approval report is prepared on behalf of *Midland Radio* 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 and frequency stability.

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 parts:

Part 95A: General Mobile Radio Service (GMRS)

Part 95B: Family Radio Service (FRS)

Applicable Standards: TIA 603-C,

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.

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 ± 2.0 dB for Conducted Emissions tests and ± 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

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 C63.4-2003, 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 TIA-603-C.

2.2 EUT Exercise Software

N/A

2.3 Equipment Modifications

The transmitting antenna was removed and an SMA connector was soldered to the EUT used in the conducted testing.

2.4 Special Equipment

N/A

2.5 Local Support Equipment

Manufacturers	Description	Model	Serial Numbers
BK Precision	DC Power Supply	1621A	D185052265

2.6 Internal Configuration

Manufacturers	Description	Model	Serial Numbers
Midland Radio Corporation	PCB	GXT2000_X0	-

2.7 External I/O Cabling List and Details

Cable Description	Length (m)	From	To
RF cable	< 1	EUT	Spectrum Analyzer

2.8 Local Support Equipment Power Supply and Line Filters

Manufacturers	Description	Model	Serial Numbers
Sunny Computer Technology Co., Ltd.	Switching Adpater	SYS1460-1105	-
Midland Radio Corporation	Desktop Charger	18CVP13	-

3 Summary of Test Results

FCC Rules	Description of Test	Result
§2.1047, §95.637	Modulation Characteristics	Compliant
§2.1053, §95.635	Field Strength of Spurious Radiation	Compliant
§2.1046, §95.639	RF Output Power	Compliant
§2.1049, §95.633, §95.635	Occupied Bandwidth & Emission Mask	Compliant
§2.1051, §95.635	Spurious Emissions at Antenna Terminals	Compliant
§2.1055, §95.621, §95.626	Frequency stability	Compliant
§2.1093	RF Exposure	Compliant ^{Note 1}

Note 1: Please refer to SAR report, report number: R1205185-SAR.

4 FCC §2.1093 - RF Exposure Information

4.1 Applicable Standards

FCC §2.1093

4.2 Result

This is a portable device which requires SAR testing; refer to the separate SAR report No.: R1205185-SAR for detailed results.

5 FCC §2.1046 & §95.639 – RF Output Power

5.1 Applicable Standard

According to FCC §2.1046, and §95.639,

No GMRS transmitter, under any condition of modulation, shall exceed:

50 Watt (47dBm) Carrier power (average TP during one unmodulated RF cycle) when transmitting emission type A1D, F1D, G1D, A3E, F3E or G3E.

50 Watt (47dBm) peak envelope TP when transmitting emission type H1D, J1D, R1D, H3E, J3E or R3E.

(d) No FRS unit, under any condition of modulation, shall exceed 0.500 Watt (27dBm) effective radiated power (ERP).

5.2 Test Procedure

TIA-603-C clause 2.2.17.2

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

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
BK Precision	DC Power Supply	1621A	D185052265	-

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

5.4 Test Environmental Conditions

Temperature:	23 ° C
Relative Humidity:	58 %
ATM Pressure:	102.1 kPa

The testing was performed by Lionel Lara on 2012-06-01 in the RF Site.

5.5 Test Results

Conducted Output Power:

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (Watt)	Limit (Watt)
FRS				
1	462.5625	26.42	0.44	0.5
7	462.7125	26.20	0.42	0.5
14	467.7125	26.56	0.45	0.5
GMRS				
1	462.5625	36.17	4.14	50
7	462.7125	36.24	4.21	50
15	462.5500	36.12	4.09	50
18	462.6250	36.06	4.04	50
22	462.7250	36.18	4.15	50

ERP:

Indicated		Table Azimuth (degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Part 95A/B	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polar (H/ V)	Frequency (MHz)	Level (dBm)	Antenna Gain	Cable Loss (dB)		Limit (dBm)	Margin (dB)
GMRS CH-7											
462.7125	105.66	229	107	H	462.7125	34.83	0	0.6	34.23	47	-12.77
FRS CH-14											
467.7125	96.78	100	144	V	467.7125	26.27	0	0.6	25.67	27	-1.33

6 FCC §2.1047 & §95.637 - Modulation Characteristics

6.1 Applicable Standard

FCC §2.1047(d) and §95.637.

(a) A GMRS transmitter that transmits emission types F1D, G1D, or G3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5 kHz, and the audio frequency response must not exceed 3.125 kHz.

(b) Each GMRS transmitter, except a mobile station transmitter with a power output of 2.5 W or less, must automatically prevent a greater than normal audio level from causing overmodulation. The transmitter also must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.631 (without filtering.) The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least $60 \log_{10}(f/3)$ dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

6.2 Test Procedure

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

TIA-603-C section 2.2.3, 2.2.6

6.3 Test Equipment List and Details

Manufacturer	Equipment Description	Models	Serial Numbers	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
BK Precision	DC Power Supply	1621A	D185052265	N/R
HP	RF Communications Test Set	8920A	3438A05338	2012-06-04
Agilent	Function Generator	33220A	MY43004878	2011-07-02

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

6.4 Test Environmental Conditions

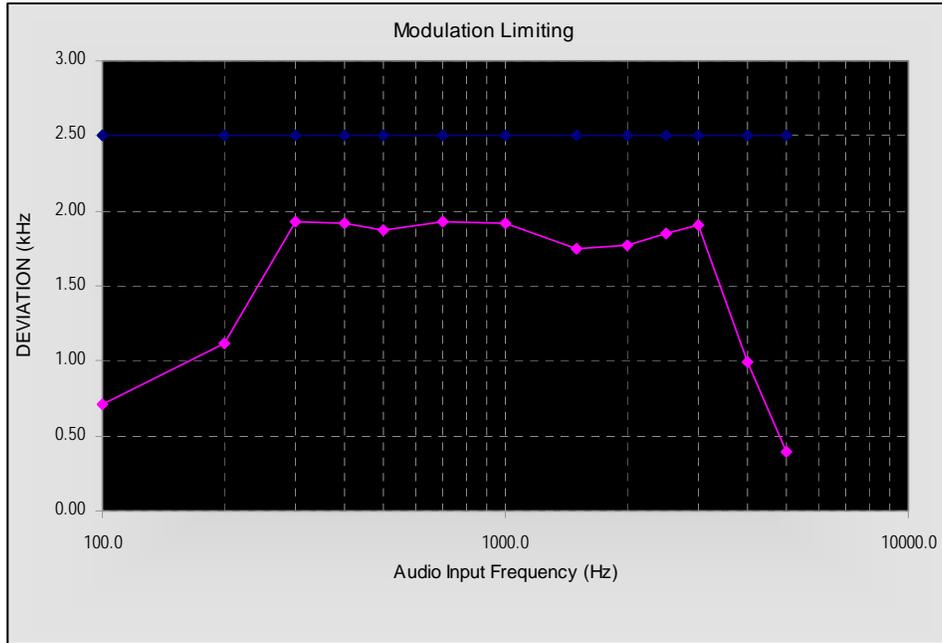
Temperature:	21 ° C
Relative Humidity:	58 %
ATM Pressure:	101.4 kPa

The testing was performed by Lionel Lara on 2012-06-07 at the RF Site.

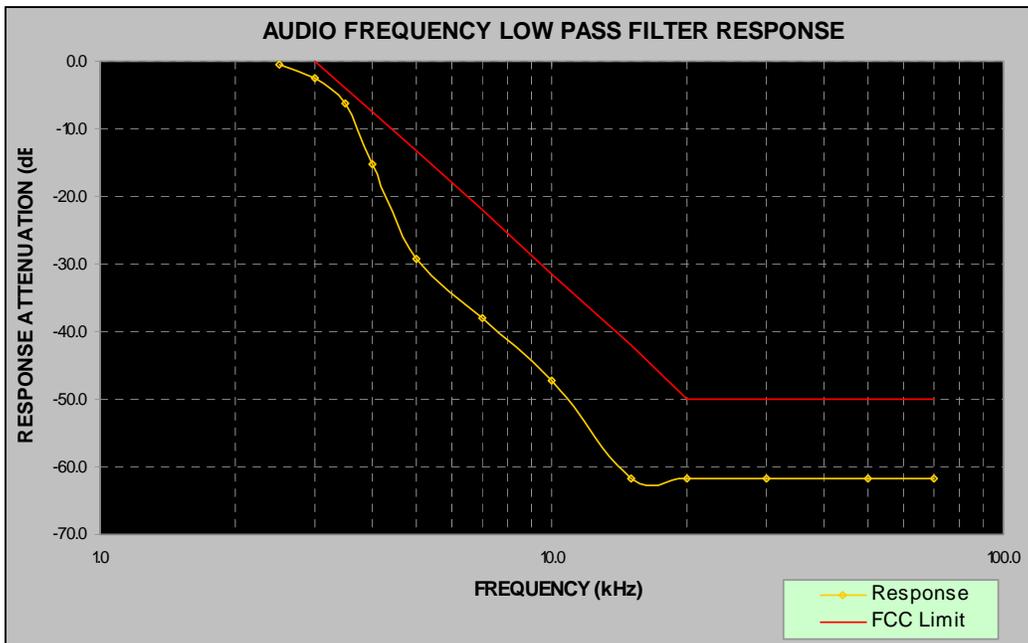
6.5 Test Results

Please refer to the plots.

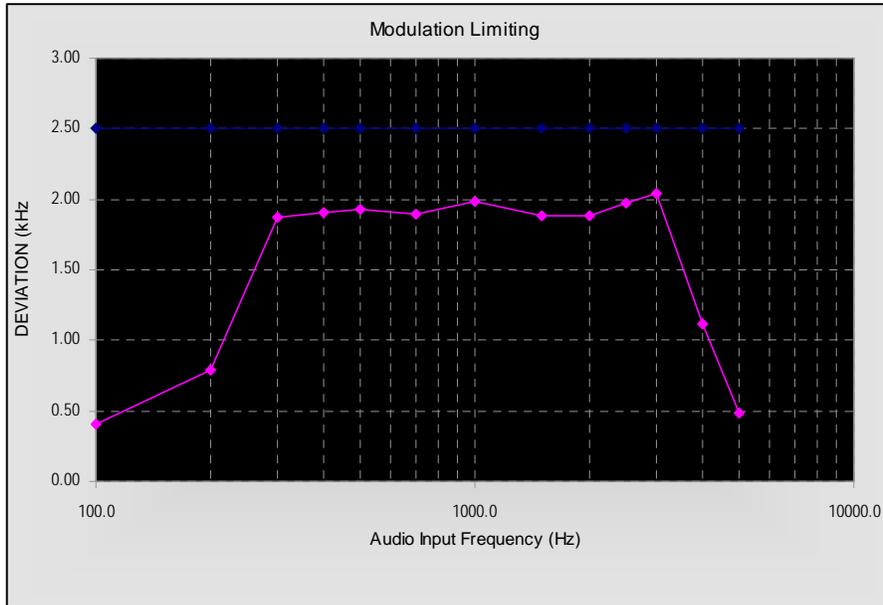
GMRS Frequency Deviation



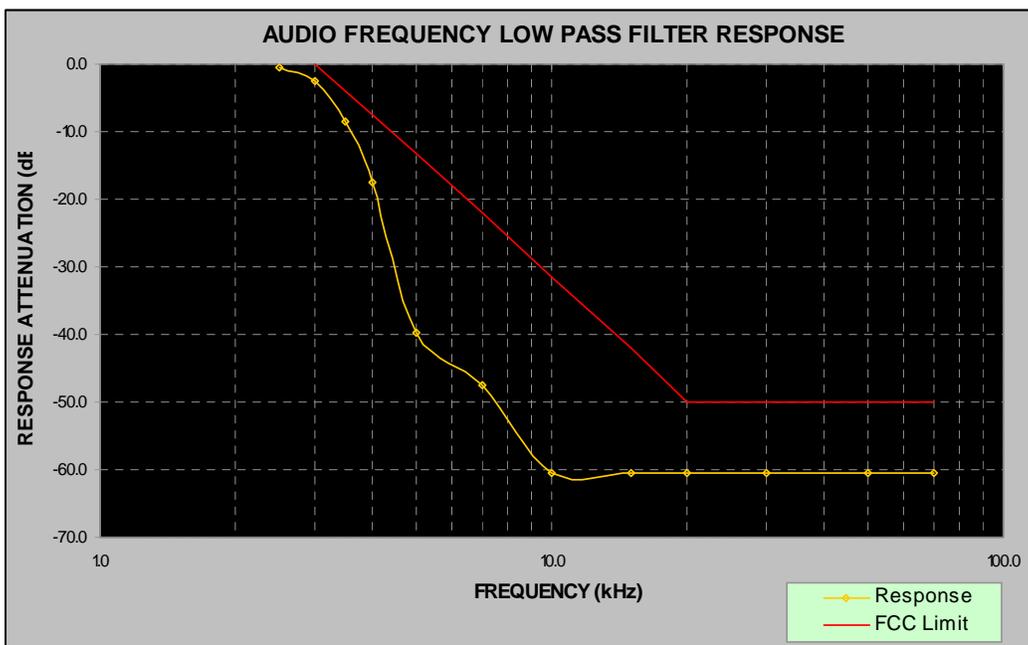
Frequency Response of Audio Low Pass Filter



FRS Frequency Deviation



Frequency Response of Audio Low Pass Filter



7 FCC §2.1049, §95.633 & §95.635 – Occupied Bandwidth & Emission Mask

7.1 Applicable Standards

FCC §2.1049 and §95.633 (a) (c).

- (a) The authorized bandwidth (maximum permissible bandwidth of a transmission) for emission type H1D, J1D, R1D, H3E, J3E or R3E is 4 kHz. The authorized bandwidth for emission type A1D or A3E is 8 kHz. The authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20 kHz.

The authorized bandwidth for emission type F3E or F2D transmitted by a FRS unit is 12.5 kHz.

Transmitter	Emission type	Applicable paragraphs (b)
GMRS	A1D, A3E, F1D, G1D, F3E, G3E with filtering	(1), (3), (7).
	A1D, A3E, F1D, G1D, F3E, G3E without filtering	(5), (6), (7).
	H1D, J1D, R1D, H3E, J3E, R3E	(2), (4), (7).
FRS	F3E with filtering	(1), (3), (7).

(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.

(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.

(7) At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

7.2 Test Procedure

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

7.3 Test Equipment List and Details

Manufacturer	Equipment Description	Models	Serial Numbers	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
BK Precision	DC Power Supply	1621A	D185052265	N/R
HP	RF Communications Test Set	8920A	3438A05338	2012-06-04

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

7.4 Test Environmental Conditions

Temperature:	21 ° C
Relative Humidity:	58 %
ATM Pressure:	101.4 kPa

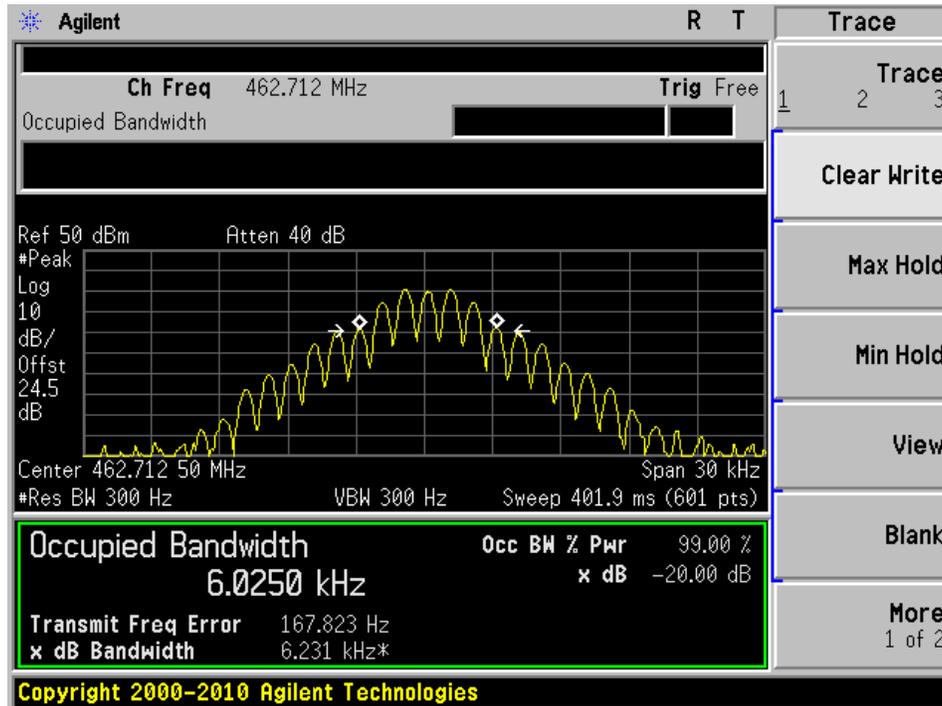
The testing was performed by Lionel Lara on 2012-06-07 in RF Site

7.5 Test Results

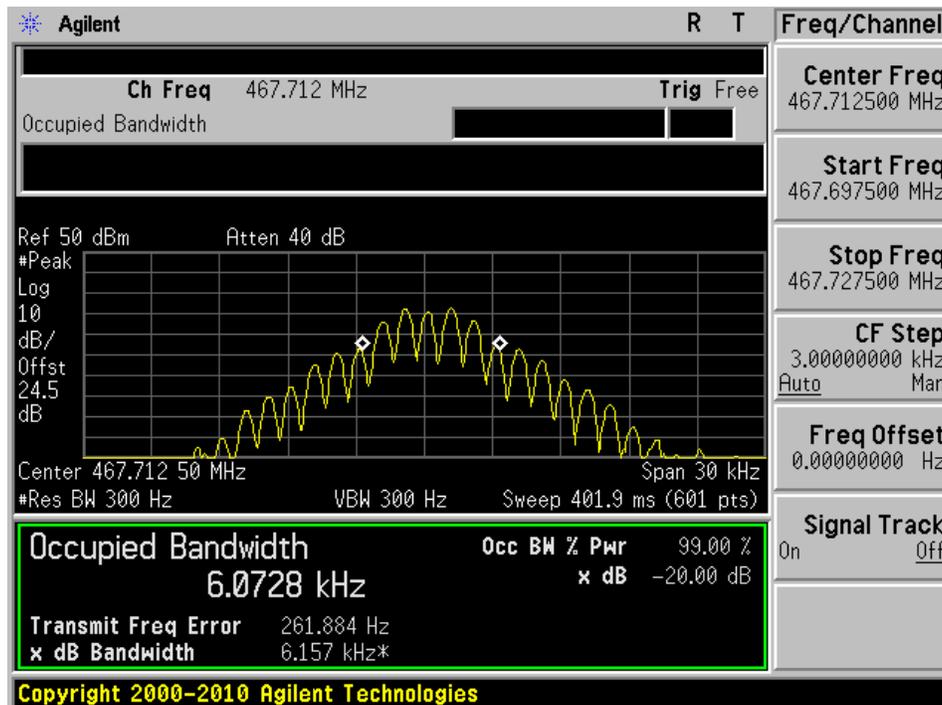
Please refer to the following plots.

Occupied Bandwidth

GMRS, CH 7

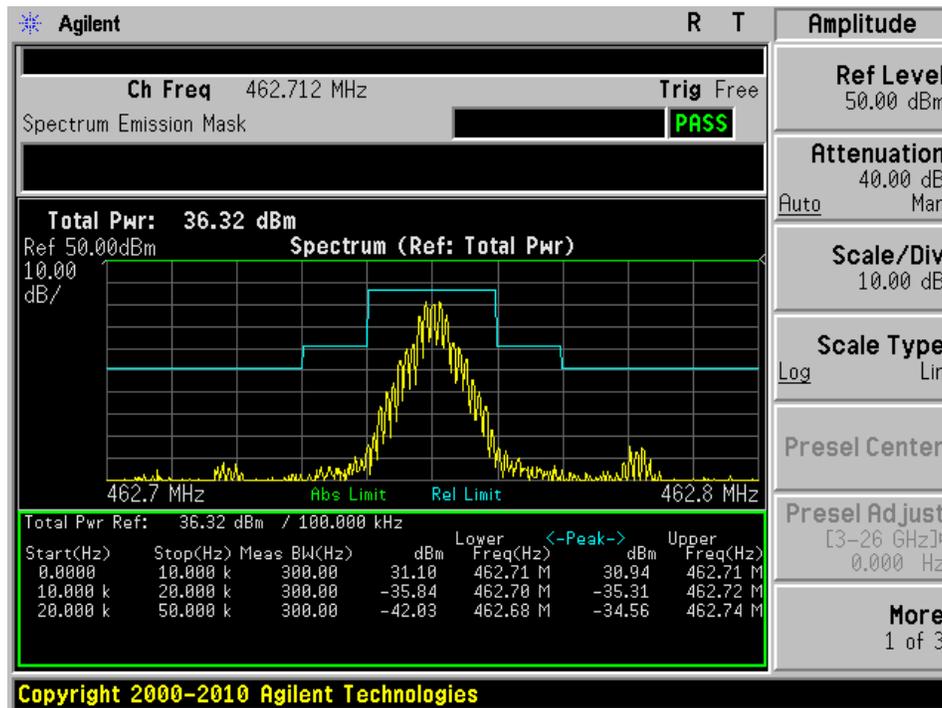


FRS, CH 14

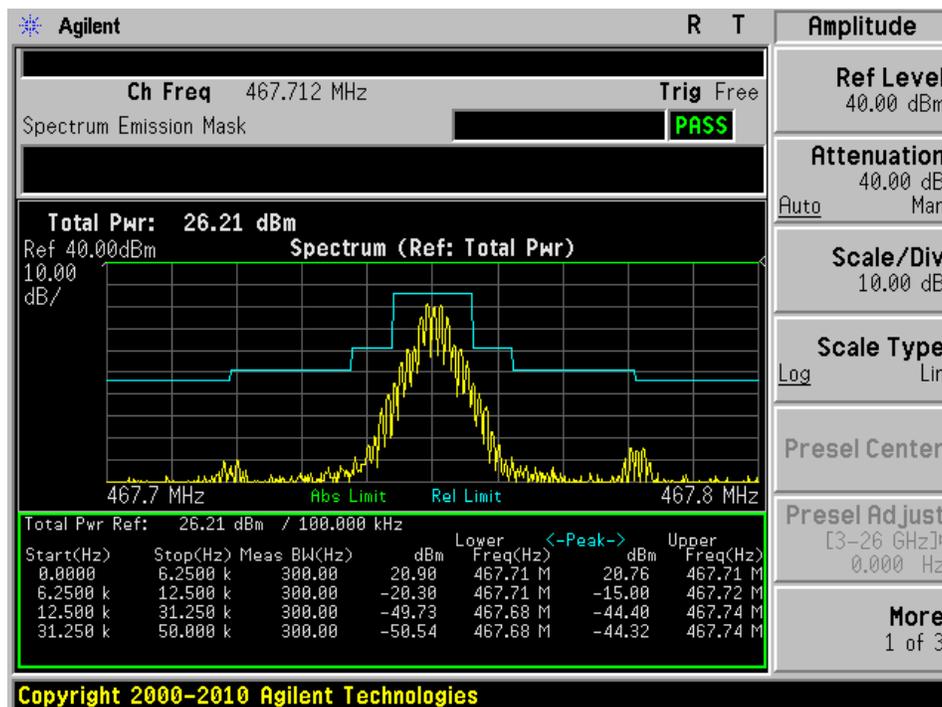


Emission Mask

GMRS, CH 7



FRS, CH 14



8 FCC §2.1051 & §95.635 – Spurious Emissions at Antenna Terminals

8.1 Applicable Standards

FCC §2.1051 and §95.635.

Transmitter	Emission type	Applicable paragraphs (b)
GMRS	A1D, A3E, F1D, G1D, F3E, G3E with filtering	(1), (3), (7).
	A1D, A3E, F1D, G1D, F3E, G3E without filtering	(5), (6), (7).
	H1D, J1D, R1D, H3E, J3E, R3E	(2), (4), (7).
FRS	F3E with filtering	(1), (3), (7).

(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.

(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.

(7) At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

8.2 Test Procedure

TIA 603-C Clause 2.2.13

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

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
BK Precision	DC Power Supply	1621A	D185052265	-

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

8.4 Test Environmental Conditions

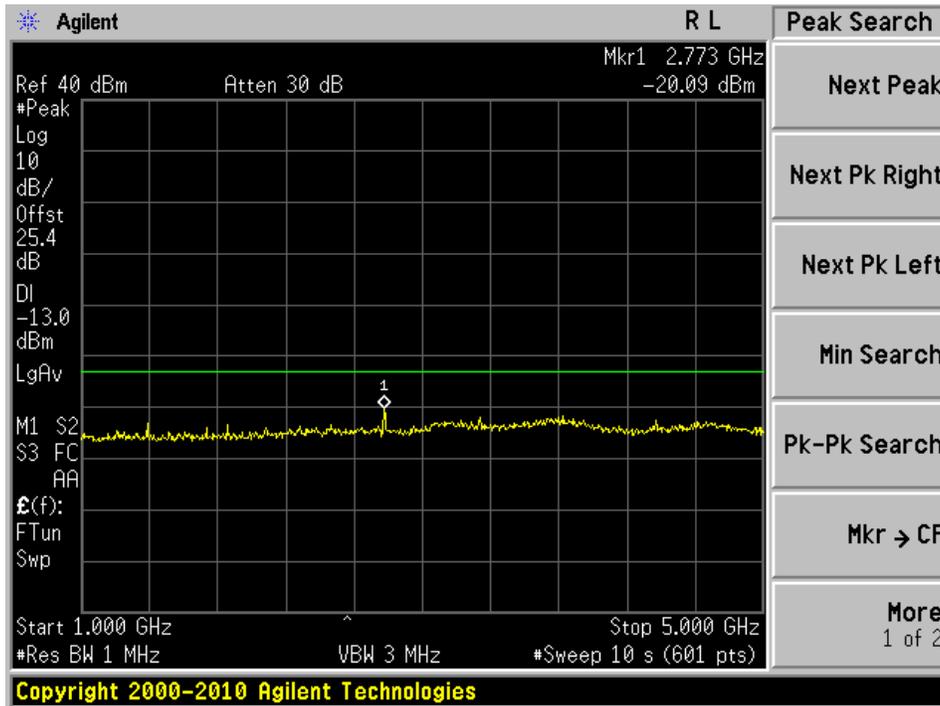
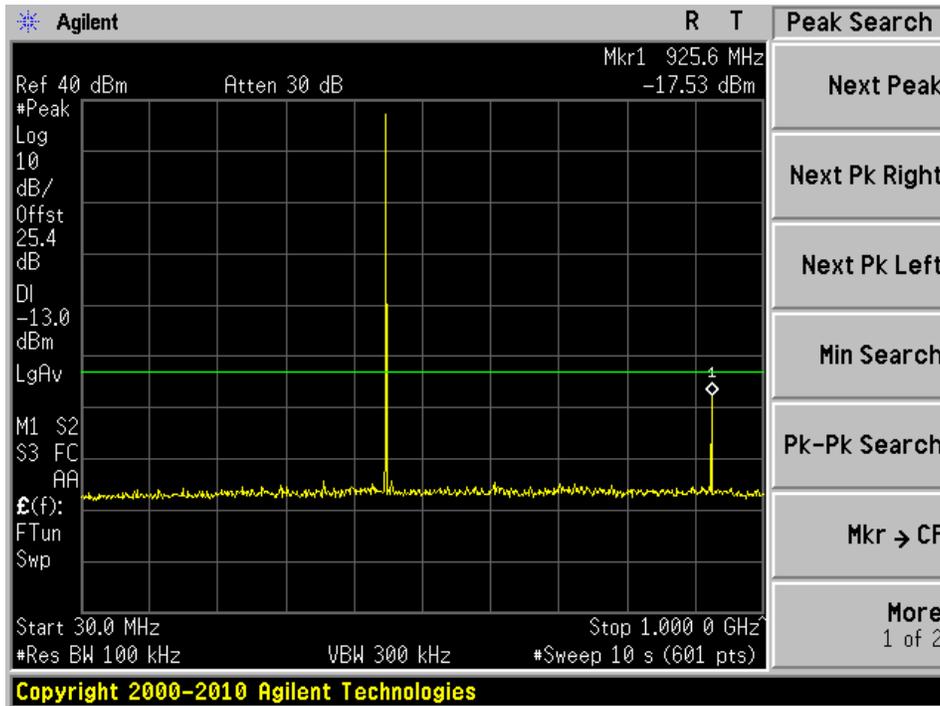
Temperature:	23 °C
Relative Humidity:	58 %
ATM Pressure:	102.1 kPa

The testing was performed by Lionel Lara on 2012-06-01 in the RF Site.

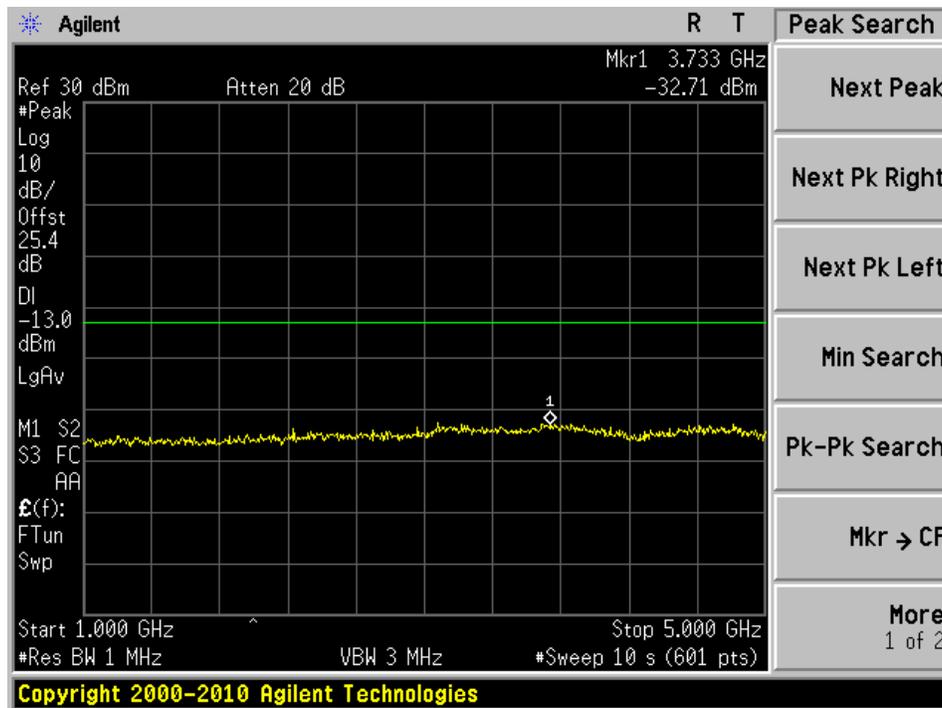
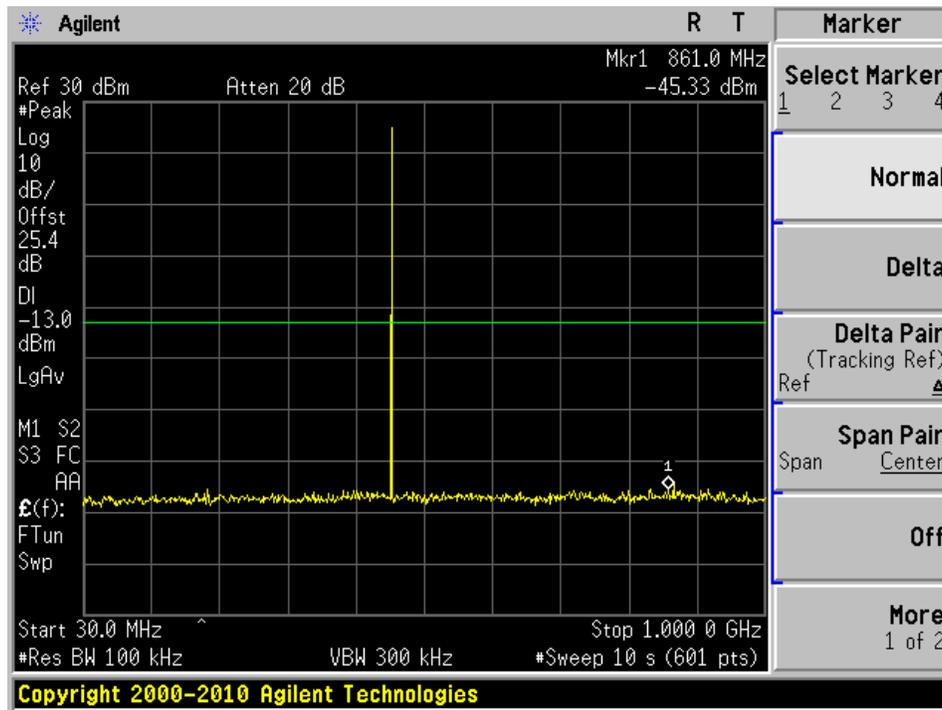
8.5 Test Results

Please refer to the following plots.

GMRS, CH7



FRS, CH14



9 FCC §2.1053 & §95.635 – Spurious Radiated Emissions

9.1 Applicable Standards

FCC §2.1051 and §95.635.

Transmitter	Emission type	Applicable paragraphs (b)
GMRS	A1D, A3E, F1D, G1D, F3E, G3E with filtering	(1), (3), (7).
	A1D, A3E, F1D, G1D, F3E, G3E without filtering	(5), (6), (7).
	H1D, J1D, R1D, H3E, J3E, R3E	(2), (4), (7).
FRS	F3E with filtering	(1), (3), (7).

(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.

(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.

(7) At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

9.2 Test Procedure

TIA/EIA 603-C Clause 2.2.12

The transmitter was placed on a 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 = $43 + 10 \log_{10}(\text{power out in Watts})$

9.3 Test Equipment List and Details

Manufacturer	Type	Model	Serial Number	Calibration Date
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
Agilent	Pre-amplifier	8447D	2944A06639	2011-06-09
HP	Signal Generator	83650B	3614A00276	2010-06-21 ^{Note 1}
HP	Pre-amplifier	8449B	3147A00400	2012-02-03
EMCO	Horn Antenna	3115	9511-4627	2011-10-03
Sunol Sciences	Horn antenna	DRH-118	A052704	2012-02-24
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09 ¹

Note 1: Based on a two year calibration cycle.

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

9.4 Test Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	58 %
ATM Pressure:	101.8 kPa

The testing was performed by Lionel Lara on 2012-06-06 in 5m chamber 3.

9.5 Test Results

GMRS, CH 7

Indicated		Turntable Azimuth Degree	Test Antenna		Substitution					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBm)		Height (cm)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Antenna Gain Cord.	Cable Loss (dB)	Absolute Level (dBm)		
925.425	64.61	196	115	H	925.425	-40.75	0	1	-41.75	-13	-28.75
925.425	69.88	334	139	V	925.425	-35.48	0	1	-36.48	-13	-23.48
1388.138	57.44	2	218	H	1388.138	-32.55	8.1	1.34	-25.79	-13	-12.79
1388.138	60.42	330	156	V	1388.138	-29.57	7.98	1.34	-22.93	-13	-9.93
2313.562	64.9	190	109	H	2313.562	-22.05	9.38	1.4	-14.07	-13	-1.07
2313.562	63.92	36	130	V	2313.562	-23.03	9.41	1.4	-15.02	-13	-2.02
6477.975	42.9	260	207	H	6477.975	-34.13	11.75	2.34	-24.72	-13	-11.72
6477.975	43.23	114	132	V	6477.975	-33.8	11.61	2.34	-24.53	-13	-11.53

FRS, CH 14

Indicated		Turntable Azimuth Degree	Test Antenna		Substitution					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBm)		Height (cm)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Antenna Gain Cord.	Cable Loss (dB)	Absolute Level (dBm)		
935.425	62.22	227	122	H	935.425	-43.14	0	1	-44.14	-13	-31.14
935.425	63.72	14	100	V	935.425	-41.64	0	1	-42.64	-13	-29.64
1403.088	42.04	336	162	H	1403.088	-47.88	8.1	1.34	-41.12	-13	-28.12
1403.088	47.09	145	151	V	1403.088	-42.83	7.98	1.34	-36.19	-13	-23.19
1870.8	49.62	198	179	H	1870.8	-37.49	8.48	1.34	-30.35	-13	-17.35
1870.8	49.63	214	166	V	1870.8	-37.48	8	1.34	-30.82	-13	-17.82
2338.512	45.13	179	152	H	2338.512	-41.56	9.38	1.4	-33.58	-13	-20.58
2338.512	46.02	37	174	V	2338.512	-40.67	9.41	1.4	-32.66	-13	-19.66

10 FCC §2.1055, §95.621 & §95.626 – Frequency Stability

10.1 Applicable Standard

FCC §2.1055, §95.621 (b), §95.627 (b)

§95.621 (b) Each GMRS transmitter for mobile station, small base station and control station operation must be maintained within a frequency tolerance of 0.0005%. Each GMRS transmitter for base station (except small base), mobile relay station or fixed station operation must be maintained within a frequency tolerance of 0.00025%.

§95.626 (b) Each FRS unit must be maintained within a frequency tolerance of 0.00025%.

10.2 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 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.

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
BK Precision	DC Power Supply	1621A	D185052265	N/R
Tenney	Environmental Chamber	TUJR	27445-06	2011-07-08

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

10.4 Test Environmental Conditions

Temperature:	21 ° C
Relative Humidity:	55 %
ATM Pressure:	101.8 kPa

The testing was performed by Lionel Lara on 2012-06-04 in the RF Site.

10.5 Test Results**GMRS, CH 7**

Reference Frequency 462.7125 MHz, Limit : 0.0005% or 5 PPM			
Environment Conditions		Frequency Measure with Time Elapsed	
Temperature (°C)	Power supplied (Vdc)	Measured Frequency (MHz)	Error (PPM)
Frequency Stability vs. Temperature			
50	7.4	462.71217	-0.71319
40	7.4	462.71217	-0.71319
30	7.4	462.71233	-0.3674
20	7.4	462.712	-1.08058
10	7.4	462.712	-1.08058
0	7.4	462.71183	-1.44798
-10	7.4	462.71217	-0.71319
-20	7.4	462.71183	-1.44798
-30	7.4	462.71233	-0.3674
Frequency Stability vs. Voltage			
20	8.48	462.71233	-0.3674
20	6.32	462.712	-1.08058

FRS, CH 14

Reference Frequency 467.7125 MHz, Limit : 0.00025% or 2.5 PPM			
Environment Conditions		Frequency Measure with Time Elapsed	
Temperature (°C)	Power supplied (Vdc)	Measured Frequency (MHz)	Error (PPM)
Frequency Stability vs. Temperature			
50	7.4	467.71233	-0.36347
40	7.4	467.7118	-1.49665
30	7.4	467.71167	-1.77459
20	7.4	467.71233	-0.36347
10	7.4	467.7118	-1.49665
0	7.4	467.712	-1.06903
-10	7.4	467.71233	-0.36347
-20	7.4	467.71233	-0.36347
-30	7.4	467.71167	-1.77459
Frequency Stability vs. Voltage			
20	8.48	467.71167	-1.77459
20	6.32	467.71167	-1.77459