Lab Code: 200167-0

FCC PART 95
TEST AND MEASUREMENT REPORT

For

Midland Radio Corporation

5900 Parretta Drive, Kansas City, Missouri 64120, USA

FCC ID: MMAGXT950

Report Type:	**Product Type:**
Class II Permissive Change	GMRS/FRS Portable Transceiver

Test Engineer:	Greeman Chen
Report Number:	R0903204-95
Report Date:	2009-03-31
Reviewed By:	Boni Baniqued Sr. RF Engineer
Prepared By: **(66)**	Bay Area Compliance Laboratories Corp. (BACL) 1274 Anvilwood Ave. Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732 9164

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DOCUMENT REVISION HISTORY

Revision #	Report Number	Description of Revision	Date of Revision
0	R0903204-95	Original	2009-03-31

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report has been prepared on behalf of Midland Radio Corporation and their product, model: GXT1000/GXT1050*, FCCID: MMAGXT950 or the EUT (Equipment Under Test) as referred to in the rest of this report is a GMRS/FRS two way radio.

The GXT1000/1050 GMRS radio is a self-contained transceiver unit with integral antenna intended for use as a general communication tool. It is designed to operate on all 50 channels allocated by the FCC for the licensed FRS & GMRS. This model also features a CTCSS system with 38 pre-defined, DCS System with 104 pre-fined, user selectable sub-audible tones for channel quieting. The useable range, while dependent upon terrain and other radio propagation principles, is typically five miles. The GXT1000/1050 uses the maximum transmit power allowed to help ensure the maximum communication range.

Features include: 50 FRS, GMRS Channels with 38 CTCSS codes, 104 DCS Code, Receive Volume Control, Channel Monitor, Page and LCD Display. The unit is equipped with an external Headset option connector and 6V Ni-MH battery pack.

Item	Content
Modulation	FM
Frequency Band	FRS: 462.55 ~ 467.7125 MHz GMRS: 462.55 ~ 462.7125 MHz 462.55 ~ 462.7125 MHz
Power Source	4 AA Alkaline or 6V NiMH battery pack
Normal Operation	Face-held and Body-worn (Belt Clip)

1.2 Mechanical Description

Dimensions (L*W*H)	200 mm(L) × 64 mm(W) × 43 mm(H)
Weight	230 g

** The test data gathered are from typical production sample, model: GXT1050, sample ID: 72295, serial number: 91131653 assigned by BACL.*

Model: GXT1000 *Model:GXT1050*

Additional photos in Exhibit C

**Please See Declaration of similarities for model differentiation.*

1.3 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 manufacturer declares that they made modification to the existing model GXT950 to make new model GXT1000 and GXT1050. Refer to Permissive Change Declaration from the manufacturer.

The objective is to determine compliance with the permissive change rules in section 2.1043; rules and limits for this device including:

- Output Power Output
- Occupied Bandwidth/Emission Mask
- Radiated Spurious Emissions

1.4 Related Submittal(s)/Grant(s)

The original model GXT950/GXT900 was tested in Bay Area Compliance Laboratories Corp. with FCC ID: MMAGXT950.

Please refer to original report number R0802076-95 for other FCC Part 95 radio tests which include Modulation Characteristics, Spurious Emissions at Antenna Terminals and Frequency Stability.

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, 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.

1.6 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 $\pm$2.0 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.

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

1.7 Test Facility

The test site used by Bay Area Compliance Laboratories Corp. to collect radiated and conducted emission measurement data is located at their facility in Sunnyvale, California 94089, USA.

The test site at Bay Area Compliance Laboratories 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 and Article 8 of the VCCI regulations. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference have the reports on file and are listed under FCC file 31040/SIT 1300F2, IC registration number: 3062A, and VCCI Registration No.: C-1298 and R-1234. 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-603-C.

The final qualification test was performed with test software provided by the manufacturer.

2.2 Block Diagram

Please refer to Exhibit D.

2.3 Equipment Modifications

No modifications were made to the EUT.

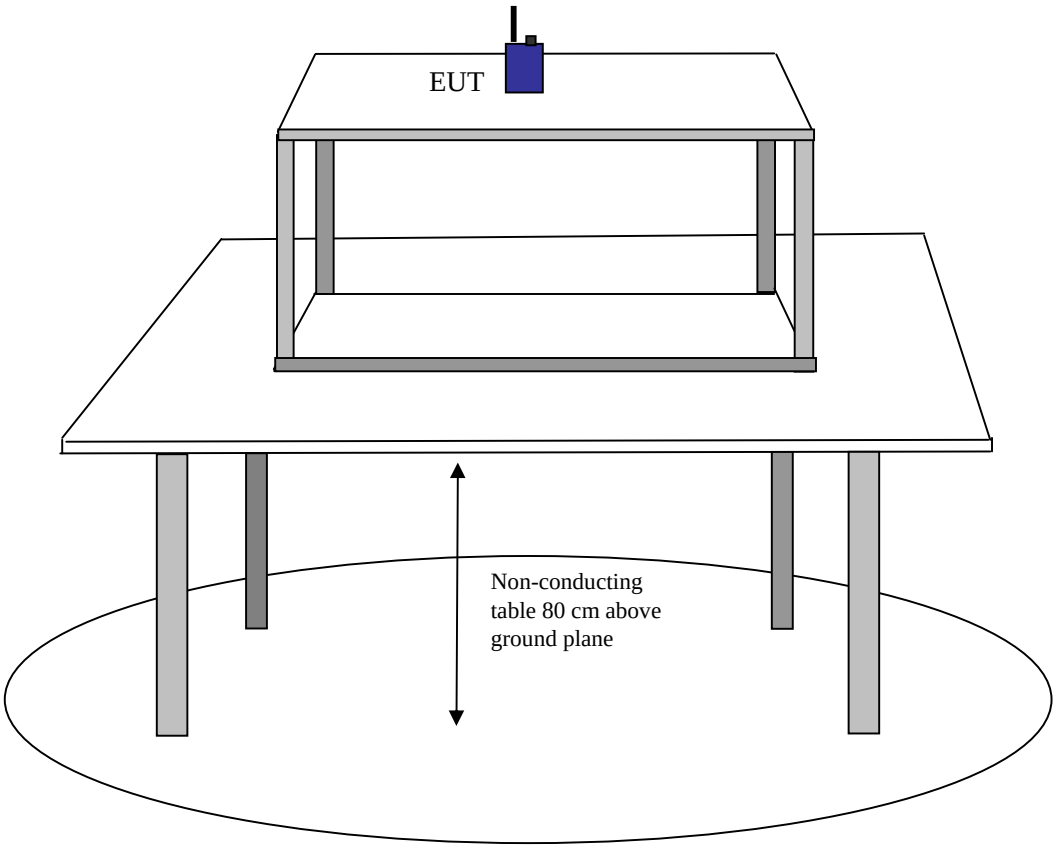
2.4 Local Support Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers
HP	DC Power Supply	6236B	2003A05705
Midland	AC/DC Adapter	U093030D	3H20 E124946

2.5 Interface Ports and Cabling

Cable Description	Length (ft)	From	To
BNC Audio cable	3 ft	EUT	HP8920A

2.6 Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§ 2.1046 ; § 95.639	RF Output Power	Compliant
§ 2.1047, §95.637	Modulation Characteristics	N/A *
§ 2.1049; § 95.633 & § 95.635	Occupied Bandwidth/Emission Mask	Compliant
§ 2.1051, § 95.635	Spurious Emissions at Antenna Terminals	N/A *
§ 2.1053, § 95.635	Field Strength of Spurious Radiation	Compliant
§ 2.1055 § 95.621; § 95.627	Frequency stability vs. temperature Frequency stability vs. voltage	N/A *
§ 2.1093	RF Exposure	Compliant (Please refer to SAR report)

N/A *-- Refer to the original report R0802076-95, FCC ID: MMAGXT950

4 §2.1046, §95.639 – MAXIMUM TRANSMITTER POWER

4.1 Applicable Standard

Part 95.639 (a) No GMRS transmitter, under any condition of modulation, shall exceed:
(1) 50 W Carrier power (average TP during one unmodulated RF cycle) when transmitting emission type A1D, F1D, G1D, A3E, F3E or G3E.
(2) 50 W 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 W Effective Radiated Power (ERP).

4.2 Test Procedure

TIA-603-C clause 2.2.17.2

4.3 Test Equipment List and Details

Manufacturers	Descriptions	Model Numbers	Serial Numbers	Calibration Due dates
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3 / S006628	2009-04-23
Sunol Science Corp	System Controller	SC99V	113005-1	NA
Agilent	Analyzer, Spectrum	E4446A	US44300386	2009-05-19
Sonoma Instrument	Pre-Amplifier (10 kHz~ 2.5 GHz)	317	260407	2009-04-29
HP	Signal Generator	83650B	3614A00276	2009-05-28

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

4.4 Environmental Conditions

Temperature:	21.7 °C
Relative Humidity:	29 %
ATM Pressure:	102.1 kPa

** The testing was performed by Greeman Chen on 2009-03-27.*

4.5 Test Results

Indicated		Table Azimuth (degrees)	Test Antenna		Substitution				Absolute Level (dBm)	FCC Part 95	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polar. (H/ V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Gain Cord.	Cable Loss (dB)		Limit (dBm)	Margin (dB)
FRS CH-4											
462.6375	103.37	180	1.3	V	462.6375	25.87	0	0.22	25.65	27	-1.35
FRS CH-11											
467.6375	103.92	260	1.2	V	467.6375	25.42	0	0.22	25.20	27	-1.80
GMRS CH-4											
462.6375	112.14	245	1.3	V	462.6375	36.79	0	0.22	36.57	47	-10.43

5 §2.1049, §95.633 AND §95.335 - OCCUPIED BANDWIDTH AND EMISSION MASK

5.1 Applicable Standards

CFR 47 § 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.

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

§ 95.635 (b)

(b) The power of each unwanted emission shall be less than TP as specified in the applicable paragraphs listed in the following table:

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).

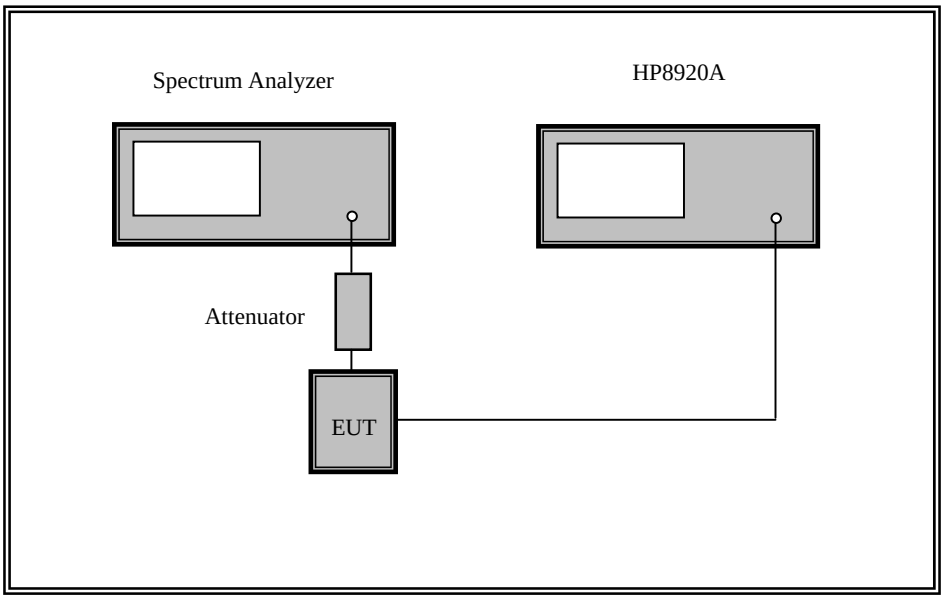
(1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.
(3) At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.
(7) At least 43 + 10 log10 (T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

5.2 Test Procedure

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

Audio signal level set at 16dB higher than required to produce 50% modulation.

5.3 Setup Block Diagram



5.4 Test Equipment List and Details

Manufacturers	Equipment Descriptions	Model Numbers	Serial Numbers	Calibration Due Dates
Agilent	Analyzer, Spectrum	E4446A	US44300386	2009-05-19
HP	RF Communication Test Set	HP8920A	3438A05338	2010-03-20

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

5.5 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	45 %
ATM Pressure:	101.9 kPa

** The testing was performed by Greeman Chen on 2009-04-03*

5.6 Test Results

According to CFR47 § 2.201 & § 2.202,

Bn = 2M + 2DK;

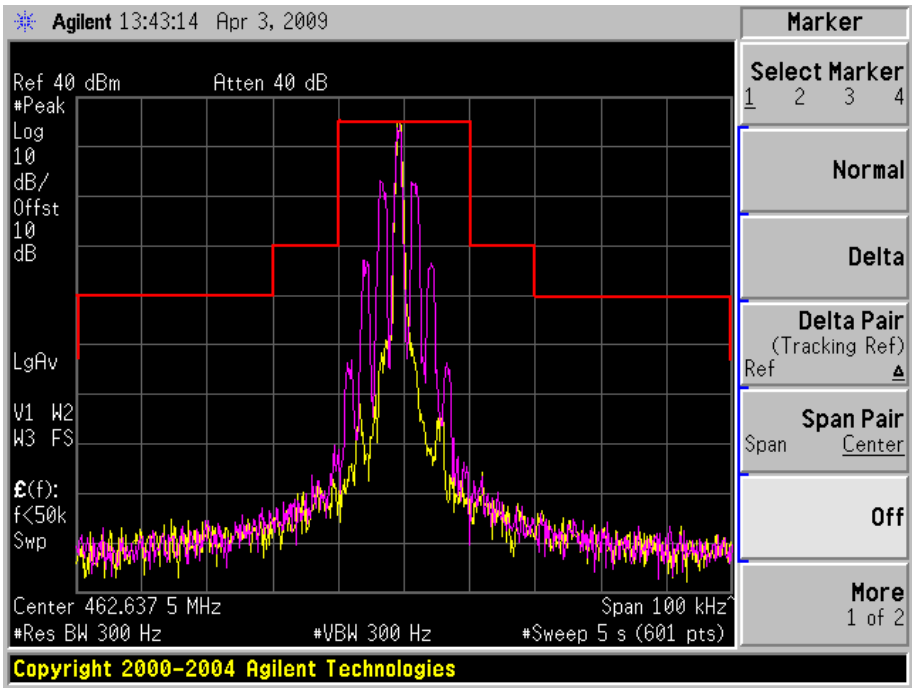
Where: M = 3000; D = 2.5 k; K = 1

Bn = 2(3000) + 2(2500) = 11 kHz

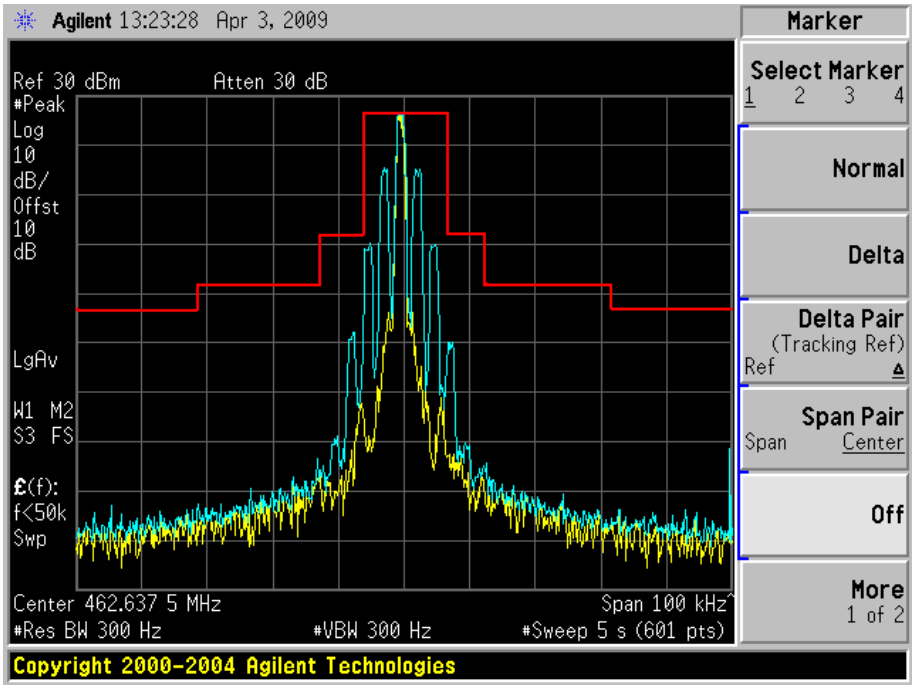
Type of Emission: 11k0F3E

Emission Mask

GMRS CH - 4



FRS CH - 4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1 of 2
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6 §2.1053 and §95.635 - SPURIOUS RADIATED EMISSIONS

6.1 Applicable Standards

CFR47 §2.1053 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 log10 (T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

6.2 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 (TX power in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

6.3 Test Equipment List and Details

Manufacturers	Equipment Descriptions	Model Numbers	Serial Numbers	Calibration Due Dates
HP	Pre-Amplifier (1 ~ 26.5 GHz)	8449B	3008A1978	2009-10-21
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3 / S006628	2009-04-23
Sunol Science Corp	System Controller	SC99V	113005-1	NA
Antenna Research Associates, Inc.	Horn Antenna	DRG-118/A	1132	2009-08-07
Agilent	Analyzer, Spectrum	E4446A	US44300386	2009-05-19
Sonoma Instrument	Pre-Amplifier (10 kHz~ 2.5 GHz)	317	260407	2009-04-29
HP	Signal Generator	83650B	3614A00276	2009-05-28

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

6.4 Environmental Conditions

Temperature:	21.7 °C
Relative Humidity:	29 %
ATM Pressure:	102.1 kPa

** The testing was performed by Greeman Chen on 2009-03-27.*

6.5 Test Results

GMRS CH - 4 (462.6375 MHz)

Indicated		Azimuth (degree)	Antenna		Substitution				Absolute Level (dBm)	FCC Part 95	
Frequency (MHz)	S.A. Amplitude (dBuV)		Height (m)	Polar. (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
925.28	52.10	0	1.35	V	925.28	-19.30	0	0.23	-19.53	-13	-6.53
1387.91	79.42	227	1.58	V	1387.91	-30.76	8	0.32	-23.08	-13	-10.08
925.28	48.13	61	1.2	H	925.28	-24.51	0	0.23	-24.74	-13	-11.74
1850.55	69.80	327	1.15	V	1850.55	-35.71	9.2	0.38	-26.89	-13	-13.89
1387.91	74.56	286	1.51	H	1387.91	-35.02	8	0.32	-27.34	-13	-14.34
1850.55	67.00	251	1.22	H	1850.55	-38.72	9.2	0.38	-29.90	-13	-16.90

FRS CH - 4 (462.6375 MHz)

Indicated		Azimuth (degree)	Antenna		Substitution				Absolute Level (dBm)	FCC Part 95	
Frequency (MHz)	S.A. Amplitude (dBuV)		Height (m)	Polar. (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
925.28	51.05	180	1	V	925.28	-20.35	0	0.23	-20.58	-13	-7.58
1850.55	71.68	322	1.59	V	1850.55	-33.83	9.2	0.38	-25.01	-13	-12.01
925.28	46.77	57	1.27	H	925.28	-25.87	0	0.23	-26.10	-13	-13.10
1850.55	70.39	251	1.24	H	1850.55	-35.33	9.2	0.38	-26.51	-13	-13.51
1387.91	68.24	226	1.56	V	1387.91	-41.94	8	0.32	-34.26	-13	-21.26
1387.91	63.49	286	1.50	H	1387.91	-46.09	8	0.32	-38.41	-13	-25.41

FRS CH -11 (467.6375 MHz)

Indicated		Azimuth (degree)	Antenna		Substitution				Absolute Level (dBm)	FCC Part 95	
Frequency (MHz)	S.A. Amplitude (dBuV)		Height (m)	Polar. (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
935.28	32.40	181	1.77	V	935.28	-38.97	0	0.24	-39.21	-13	-26.21
935.28	32.99	59	1.24	H	935.28	-39.52	0	0.24	-39.76	-13	-26.76
1870.55	53.80	328	1.56	V	1870.55	-50.99	9	0.38	-42.37	-13	-29.37
1402.90	58.12	278	1.47	H	1402.90	-50.98	8	0.32	-43.30	-13	-30.30
1402.90	57.51	229	1.57	V	1402.90	-52.73	8	0.32	-45.05	-13	-32.05
1870.55	51.15	248	1.25	H	1870.55	-53.91	9	0.38	-45.29	-13	-32.29