

THRU Lab & Engineering.

477-6, Hager-Ri, Yaju-Up, Yaju-Gun

Kyunggi-Do, 469-803, Korea

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THRU

Test Report

Product Name: GMRS/FRS Combination

MODEL NO:GXT775

FCC ID:MMAGXT775

Applicant:

**Midland Radio Corporation.
5900 Parretta Drive, Kansas City,
MO64120**

Date Receipt: 03/07/2008

Date Tested: 03/10/2008

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GENERAL INFORMATION REQUIRED FOR CERTIFICATION

2.1033 (c) (1) (2) MidLand Radio Corporation. will manufacture
the FCCID: MMAGXT775 GMRS/FRS COMBINATION TRANSCEIVER
in quantity, for use under FCC RULES PART 95A&B.
MidLand Radio Corporation.
5900 Parretta Drive,
Kansas City, MO 64120

2.1033 (c) TECHNICAL DESCRIPTION

2.1033 (c) (3) Instruction book. A draft copy of the instruction
manual is included as EXHIBIT 7.

2.1033 (c) (4) Type of Emission : 10K2F3E
95.631
 $B_n = 2M + 2DK$
 $M = 3000$
 $D = 2.147k$
 $B_n = 2(3000) + 2(2147) = 10.2k$

GMRS Authorized Bandwidth : 20.0kHz

2.1033 (c) (5) GMRS Frequency Range: 95.621

1. 462.5500	13. 462.7000
2. 462.5625	14. 462.7125
3. 462.5750	15. 462.7250
4. 462.5875	16. 462.7500
5. 462.6000	17. 462.7500
6. 462.6125	18. 462.6000
7. 462.6250	19. 462.6250
8. 462.6375	20. 462.6500
9. 462.6500	21. 462.6750
10. 462.6625	22. 462.7000
11. 462.6750	23. 462.7250
12. 462.6875	

FRS Authorized Bandwidth: 11.25kHz

2.1033(c)(5) FRS Frequency Range: 95.627

1. 462.5625	8. 462.5625
2. 462.5875	9. 462.5875
3. 462.6125	10. 462.6125
4. 462.6375	11. 462.6375
5. 462.6625	12. 462.6625
6. 462.6875	13. 462.6875
7. 462.7125	14. 462.7125 MHz

2.10311c)(6)(7) RF power is measured by the substitution method as
2.1046(a) outlined in TIA/EIA - 603. With a Alkaline battery
voltage of 6V, and the transmitter properly
adjusted the RF output measures:
power supply : Alkaline battery 1.5V * 4(6VDC)

GMRS (HIGH) - 1.202 Watts

FRS - 0.150 Watts

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2.1033(c)(6)(7) FRS Power Output shall not exceed 0.50 Watts effective

95.639 radiated power. There can be no provisions for

95.649 Increasing the power or varying the power.

2.1033(c)(8) DC Voltages and Current into Final Amplifier:
FINAL AMPLIFIER ONLY

FOR GMRS HIGH POWER SETTING INPUT POWER: $(6.0V)(1.25A)=7.50$ Watts

FOR GMRS LOW POWER SETTING INPUT POWER: $(6.0V)(0.540A)=3.24$ Watts

FOR FRS POWER SETTING INPUT POWER: $(6.0V)(0.510A)=3.06$ Watts

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included as EXHIBIT # 9.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 6 of this report. The block diagrams are included as EXHIBIT 5 of this report.

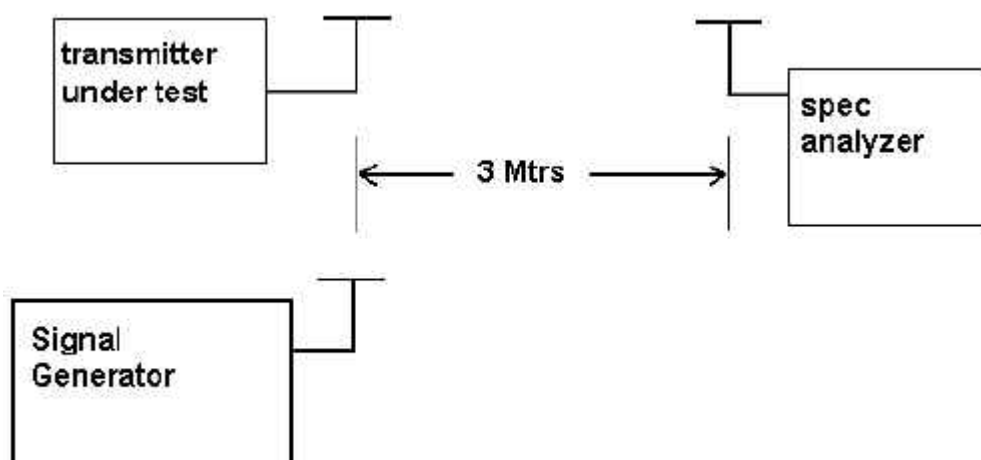
2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.

2.1033(c)(12) Photographs(8"X10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, labels for controls, including any view under shields. See exhibits 3-4.

2.1033(c)(13) Digital modulation is not allowed.

2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

2.1046(a) RF power output. The test procedure used was TIA/EIA-603.



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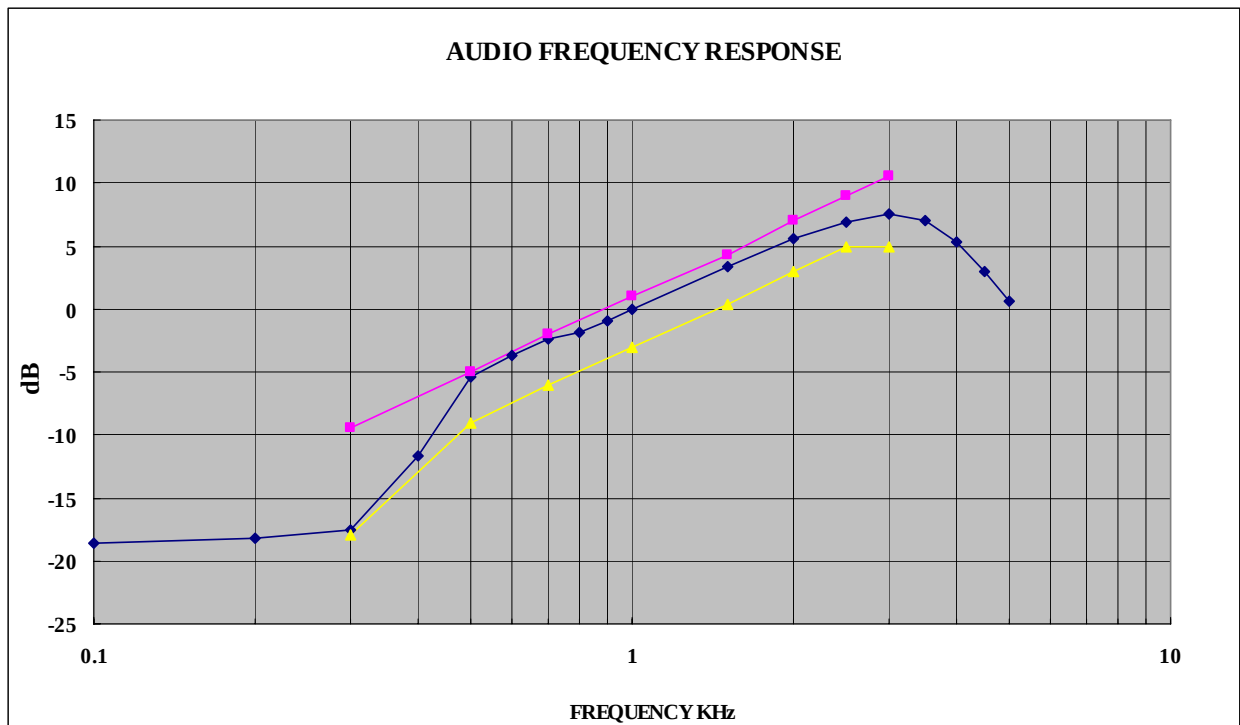
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2.1047 (a) (b) Modulation characteristics :

AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on the next page. The audio signal was fed into a dummy microphone Circuit and into the microphone connector. The Input required to produce 30 percent modulation Level was measured. See plot below.

AUDIO FREQUENCY RESPONSE PLOT GOES HERE



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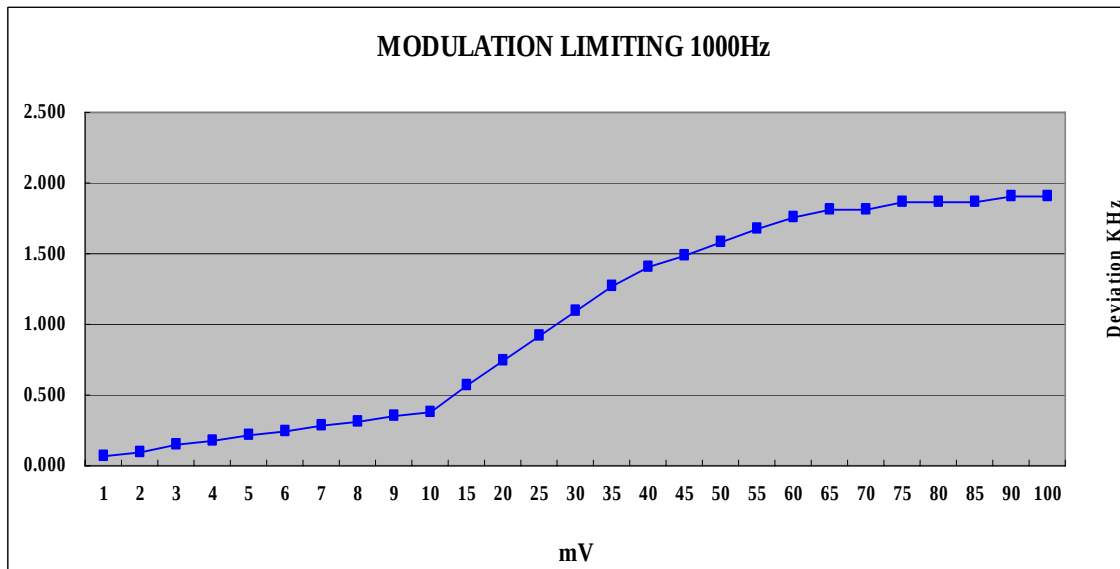
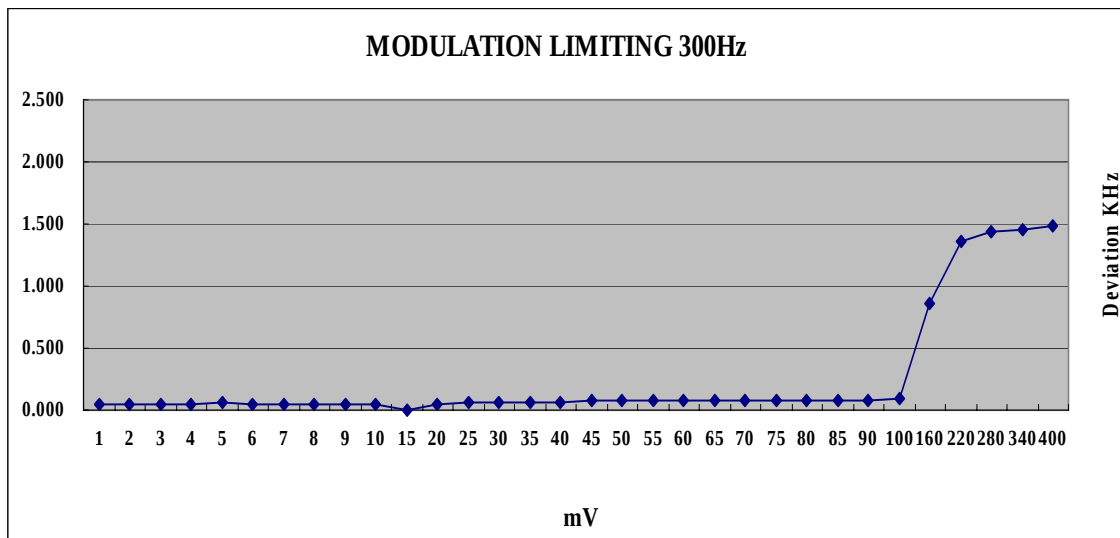
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2.1047 (b)

Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz. See Pages 4 and 5 of report.



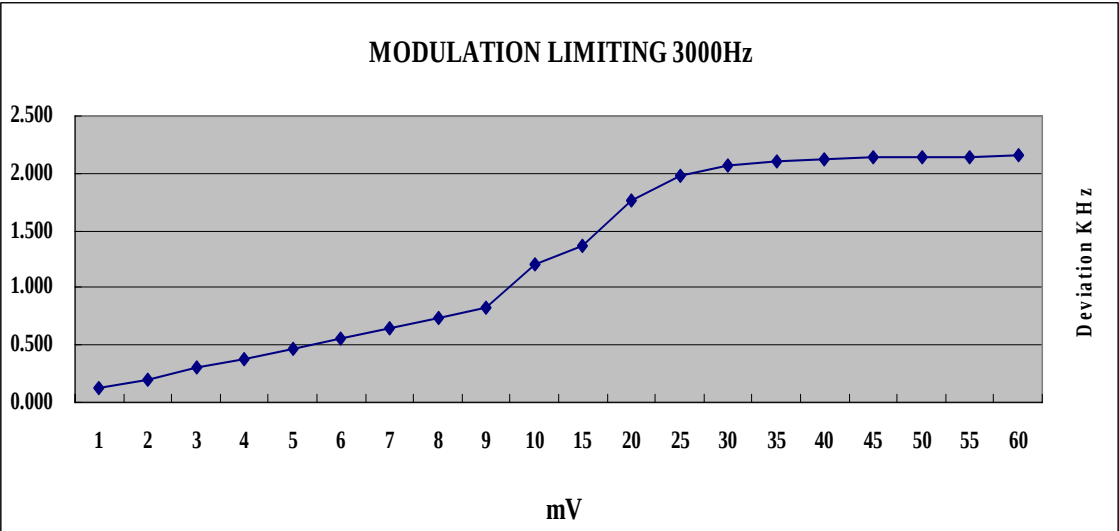
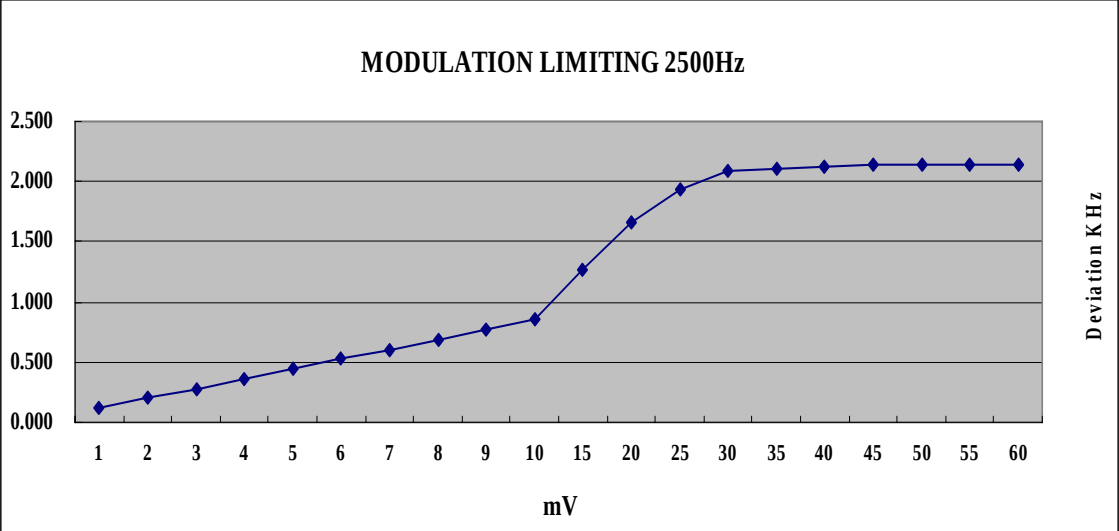
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AUDIO LOW PASS FILTER GRAPH

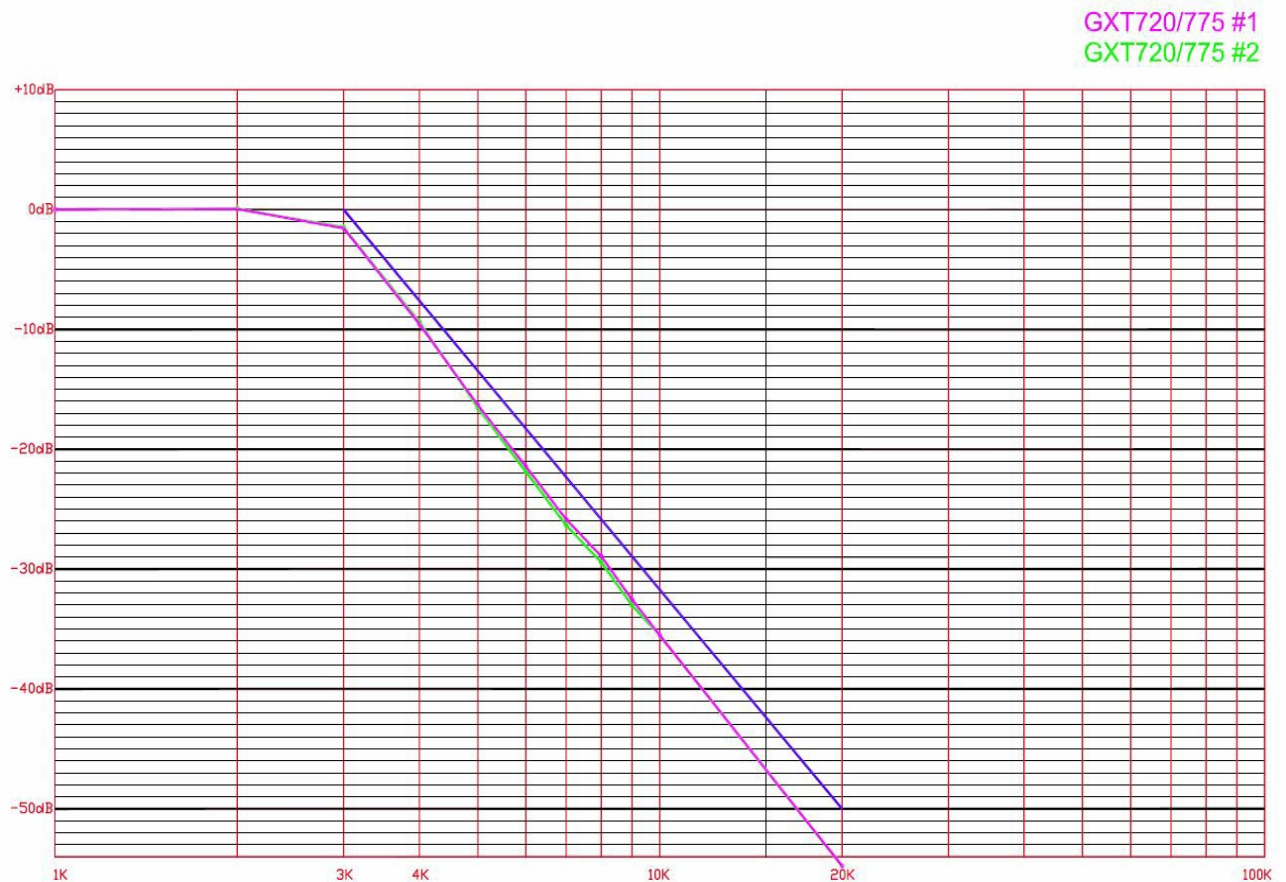
95.637

Post Limiter Filter Each GMRS transmitter, except a Mobile station transmitter with a power of 2.5Watts or less, must be equipped with an audio low pass filter. At any frequency between 3 & 20 kHz the filter must have an attenuation of $60\log(f/3)$ greater than the attenuation at 1KHz. See below.

1. Frequency Response of Audio Low Pass Filter (150mV input)

	2K	3K	4K	5K	6K	7K	8K	9K	10K	15K	20K
#1	0.23	-1.45	-9.52	-16.5	-21.3	-25.8	-28.9	-32.3	-35.1	-46.8	-55.6
#2	-0.17	-1.52	-9.58	-16.6	-21.5	-26.5	-29.5	-33.1	-35.3	-46.5	-55.1

Frequency Response of the Audio Low Pass Filter



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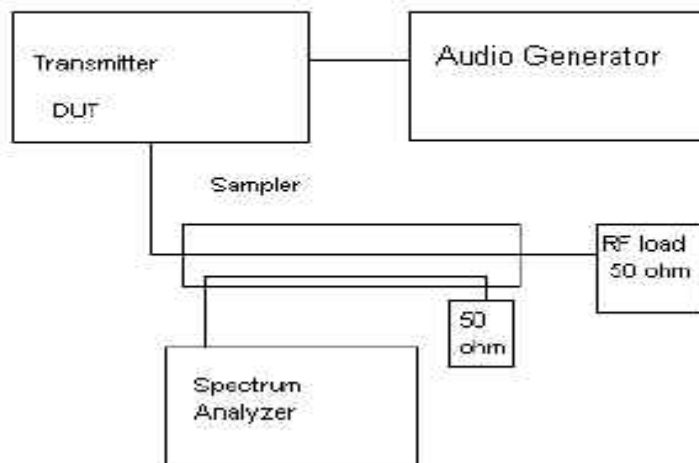
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2.1049 Occupied bandwidth :

95.635 (b) (1) (3) (7)

At least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth. At least 35dB on any frequency removed from the center of the authorized BW by more than 100% up to and including 250% of the authorized BW. At least $43 + \log_{10}(TP)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%. See plots on the next 1 pages.

Occupied BW Test Equipment Setup



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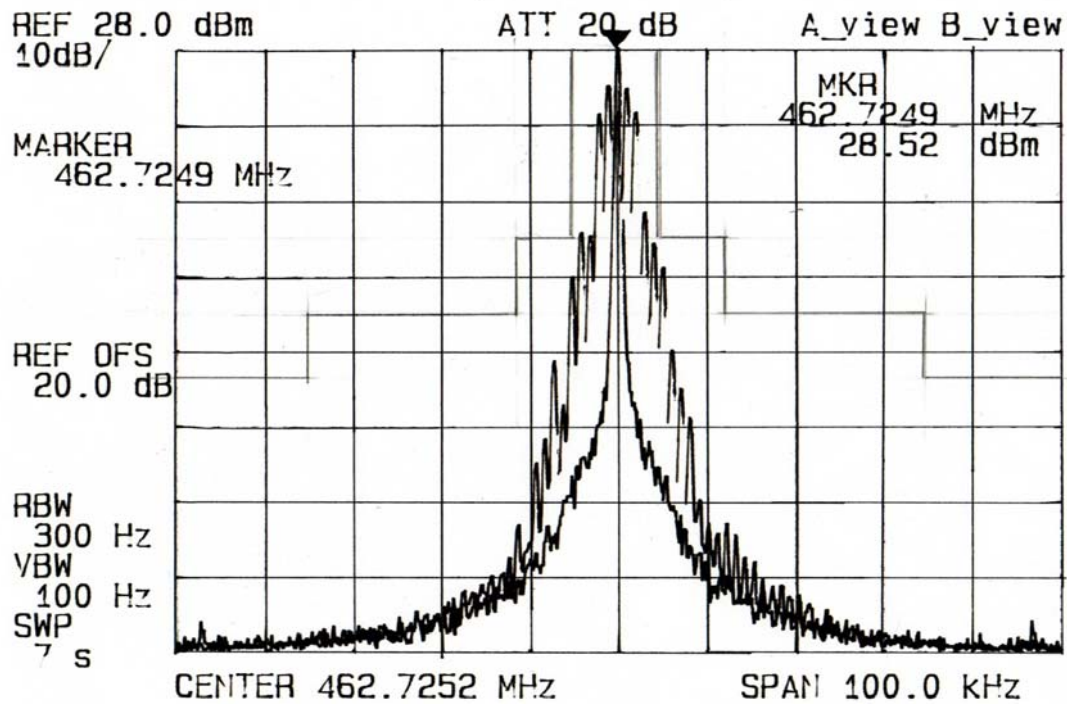
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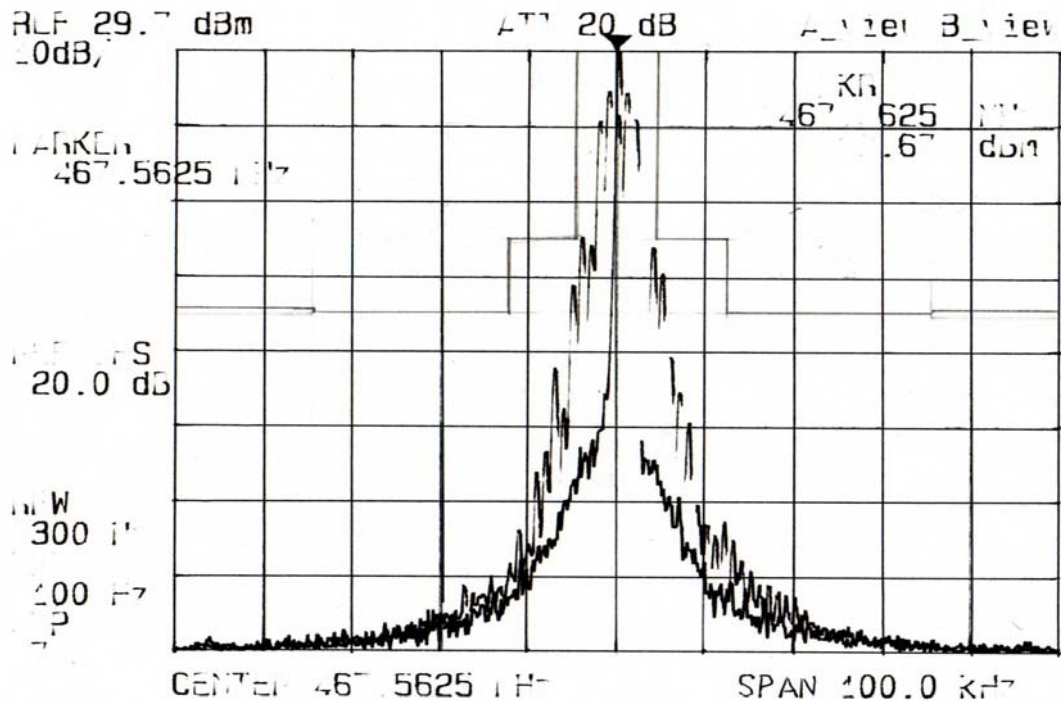
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22ch



8ch



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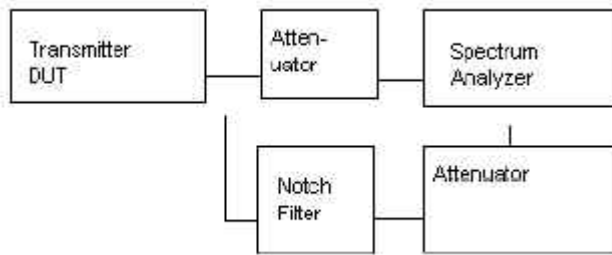
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2.1051 Spurious emissions at antenna terminals (conducted) :

The following data shows the level of conducted spurious responses at the antenna terminal. The test procedure used was TIA/EIA 603 S2.2.13 with the exception that the emissions were recorded in dBc. The spectrum was the fundamental.

spurious Emission at
antenna Terminals



Method of Measuring Conducted Spurious Emissions

2.1051 Spurious emissions at the Antenna Terminals

NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

2.1051 Not Applicable, no antenna terminal allowed.

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2.1053

UNWANTED RADIATION

95.635 (b) (7)

The tabulated Data shows the results of the radiated Field strength emissions test. The spectrum was Scanned from 30 MHz to at least the 10th harmonic of The fundamental. This test was conducted per ANSI C63.4 - 2003.

REQUIREMENTS: GMRS (HIGH): $43 + 10\log(1.2023) = 43.80\text{dB}$

GMRS (LOW): $43 + 10\log(0.1197) = 33.78\text{dB}$

GMRS-High				GMRS-Low			
frequency	dBc	Margin	dBm	frequency	dBc	Margin	dBm
462.7250				462.7250			
925.4500	64.58	20.78	-33.78	925.4500	59.16	25.38	-38.38
1388.1750	62.65	18.85	-31.85	1388.1750	58.83	25.05	-38.05
1850.9000	58.93	15.13	-28.13	1850.9000	57.21	23.43	-36.43
2313.6250	64.31	20.51	-33.51	2313.6250	55.19	21.41	-34.41
2776.3500	61.45	17.65	-30.65	2776.3500	50.93	17.15	-30.15
3239.0750	58.93	15.13	-28.13	3239.0750	49.71	15.93	-28.93
3701.8000	53.95	10.15	-23.15	3701.8000	53.63	19.85	-32.85
4164.5250	61.15	17.35	-30.35	4164.5250	51.83	18.05	-31.05
4627.2500	60.56	16.76	-29.76	4627.2500	50.24	16.46	-29.46

METHOD OF MEASUREMENT : The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of ThruLab & ENGINEERING. located at 477-6, Hager-Ri, Yoju-Up, Yoju-Gun, Kyunggi-Do, 469-803, Korea

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2.1053

UNWANTED RADIATION:

95.635 (b) (7)

The tabulated Data shows the results of the radiated Field strength emissions test. The spectrum was Scanned from 30 MHz to at least the 10th harmonic of The fundamental. This test was conducted per ANSI C63.4 - 2003.

REQUIREMENTS: FRS: $43 + 10 \log(0.1503) = 34.77 \text{ dB}$

FRS			
frequency	dBc	Margin	dBm
467.5625			
935.1250	59.42	24.65	-37.65
1402.6875	59.52	24.75	-37.75
1870.2500	57.67	22.90	-35.90
2337.8125	55.97	21.20	-34.20
2805.3750	55.82	21.05	-34.05
3272.9375	51.22	16.45	-29.45
3740.5000	53.97	19.20	-32.20
4208.0625	54.82	20.05	-33.05
4675.6250	50.23	15.46	-28.46

METHOD OF MEASUREMENT : The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of ThruLab & ENGINEERING. located at 477-6, Hager-Ri, Yoju-Up, Yoju-Gun, Kyunggi-Do, 469-803, Korea

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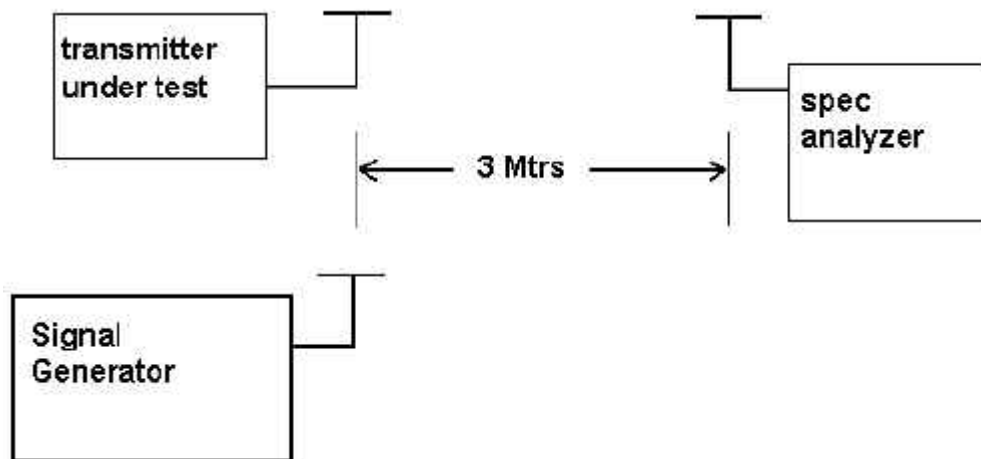
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Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground

on a rotatable platform.

* Appropriate antenna raised from 1 to 4 M.

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2.1055

Frequency stability

95.621 (b)

Temperature and voltage tests were performed to verify that the frequency remains within the 0.0005%, 5 ppm specification limit. The test was conducted as follows : The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to - 30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

MEASUREMENT DATA:

REFERENCE VOTAGE (V DC)	6.0	REFERENCE FREQUENCY (MHz)	462.72500
TEMPERATURE	FREQUENCY(MHz)	PPM	LIMIT(ppm)
-30	462.723524	-3.19	5.0
-20	462.724152	-1.83	2.5
-10	462.724912	-0.19	2.5
0	462.725453	0.98	2.5
10	462.725531	1.15	2.5
20	462.725406	0.88	2.5
30	462.725070	0.15	2.5
40	462.724285	-1.55	2.5
50	462.725007	0.02	2.5
+15% Battery : 6.9V	462.725043	0.09	2.5
-15% Battery : 5.1V	462.725088	0.19	2.5

Note: This EUT meets the frequency stability requirement for a FRS: +/-2.5ppm over temp range of -20 degrees C to + 50 degrees C. It also meets the GMRS frequency stability requirements : +/- 5ppm over the temp range -30 degrees C to +50 degrees C.

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TEST EQUIPMENT LIST

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.	Used
1	Test Receiver	Rohde & Schwarz	ESHS 10	862970/018	2008.05.01	☐
2	Test Receiver	Rohde & Schwarz	ESVS 10	826008/014	2008.06.12	☐
3	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2008.06.13	☒
4	Spectrum Display	Hewlett Packard	85662A	2542A12429	2008.06.13	☒
5	Quasi-peak Adapter	Hewlett Packard	85650A	2521A00887	2008.06.13	☐
6	RF Preselector	Hewlett Packard	85685A	2648A00504	2008.06.13	☐
7	Preamplifier	Hewlett Packard	8447F	2805A02570	2008.05.28	☐
8	Preamplifier	A.H. Systems	PAM-0118	164	2008.05.08	☐
9	Biconical Antenna	Eaton Corp.	94455-1	0977	2008.04.01	☐
10	Biconical Antenna	EMCO	3104C	9111-2468	2008.06.07	☐
11	Log Periodic	EMCO	3146	2051	2008.05.11	☒
12	Horn Antenna	A.H. Systems	SAS-571	414	2008.03.17	☒
13	Loop Antenna	Rohde & Schwarz	HFH2-	826532/006	2009.01.31	☐
14	Dipole Antenna	Rohde & Schwarz	VHAP	574	2008.12.12	☐
15	Dipole Antenna	Rohde & Schwarz	VHAP	575	2008.12.12	☐
16	Dipole Antenna	Rohde & Schwarz	UHAP	546	2008.12.12	☐
17	Dipole Antenna	Rohde & Schwarz	UHAP	547	2008.12.12	☐
18	Signal Generator	Hewlett Packard	8673D	2708A00448	2008.06.12	☒
19	Spectrum Analyzer	Advantest Corp.	R3261C	61720208	2008.06.12	☒
20	LISN	EMCO	3825/2	9111-1912	2008.12.12	☐
21	LISN	Kyoritsu	KNW-242	8-923-2	2009.05.23	☐
22	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2008.05.25	☒
23	Waveform	Hewlett Packard	33120A	US34001190	2008.05.21	☐
24	Audio analyzer	Hewlett Packard	8903B	3011A12915	2008.05.21	☒
25	Digital Oscilloscope	Tektronix	TDS 340A	B012287	2008.06.13	☐

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