THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

THRU

Test Report

Product Name: GMRS/FRS Combination

MODEL NO:LXT110

FCC ID:MMALXT110

Applicant:

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

Date Receipt: 11/30/2007

Date Tested: 12/10/2007

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

TABLE OF CONTENTS LIST

APPLICANT: Midland Radio Corporation.
FCC ID :MMALXT110

TEST REPORT

EXHIBITS CONTAINING:

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

GENERAL INFORMATION REQUIRED
FOR CERTIFICATION

2.1033 (c) (1) (2) MidLand Radio Corporation. will manufacture

the FCCID: MMALXT110 GMRS/FRS COMBINATION TRANSCEIVER in quantity, for use under FCC RULES PART 95A&B.
MidLand Radio Corporation.
5900 Parretta Drive,
Kansas City, MO64120

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 : 10K9F3E
95.631

Bn = 2M + 2DK
M = 3000
D = 2.450k
Bn =2(3000) + 2(2450) = 10.9k

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. 467.5500
5. 462.6000 17. 467.5750
6. 462.6125 18. 467.6000
7. 462.6250 19. 467.6250
8. 462.6375 20. 467.6500
9. 462.6500 21. 467.6750
10. 462.6625 22.467.7000
11. 462.6750 23. 467.7250
12. 462.6875

FRS Authorized Bandwidth:11.25kHz

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

1. 462.5625 8. 467.5625
2. 462.5875 9. 467.5875
3. 462.6125 10. 467.6125
4. 462.6375 11. 467.6375
5. 462.6625 12. 467.6625
6. 462.6875 13. 467.6875
7. 462.7125 14. 467.7125 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 4.5 V, and the transmitter properly adjusted the RF output measures:
power supply : Alkaline battery 1.5V * 3(4.5VDC)

GMRS (HIGH) – 0.175 Watts
FRS - 0.271 Watts

THRU Lab & Engineering.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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: (4.5V)(0.350A)=1.58 Watts
FOR FRS POWER SETTING INPUT POWER: (4.5V)(0.320A)=1.44 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.

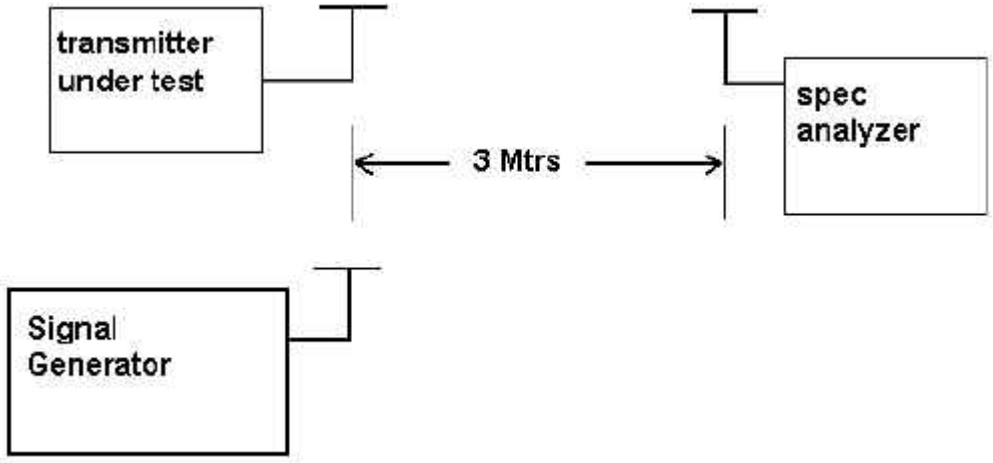
2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.

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.



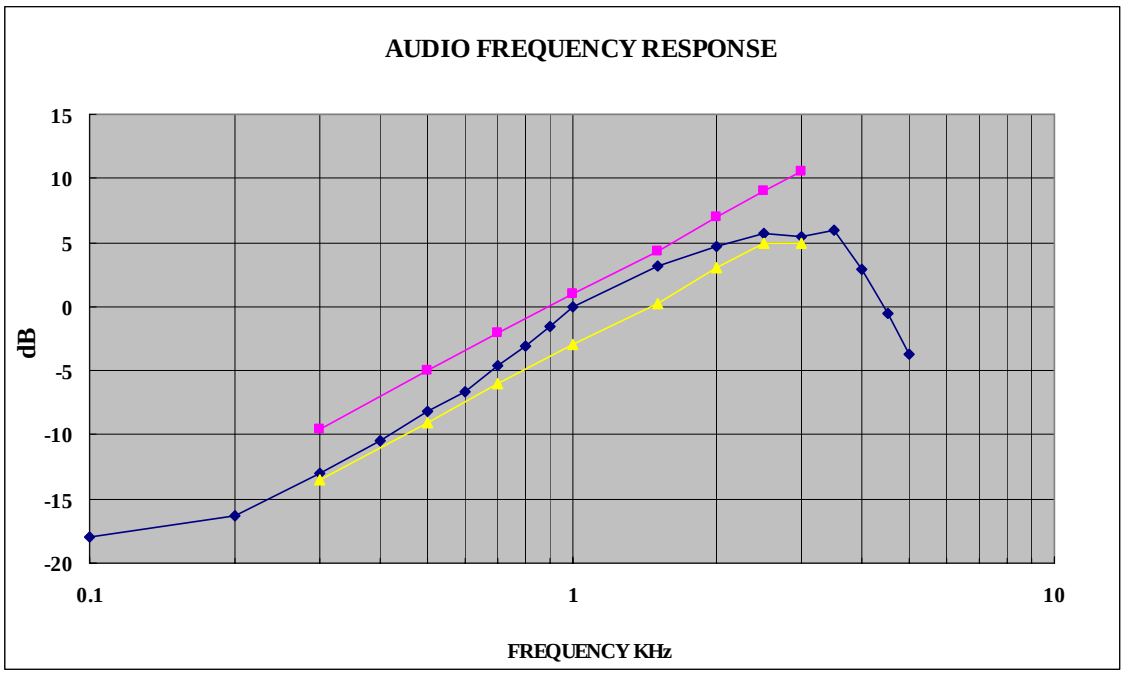
THRU Lab & Engineering.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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 FRQUENCY RESPONSE PLOT GOES HERE

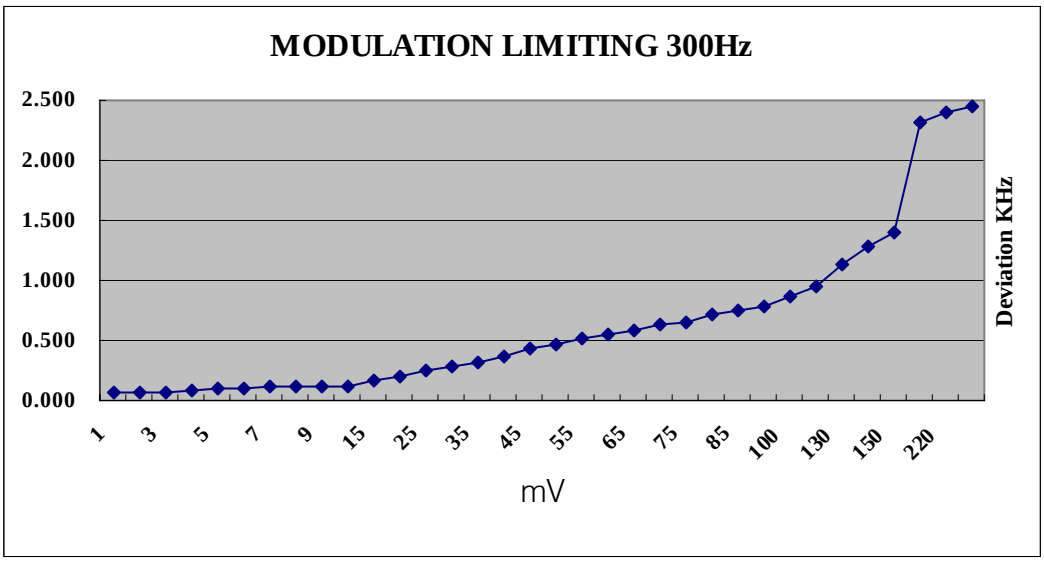


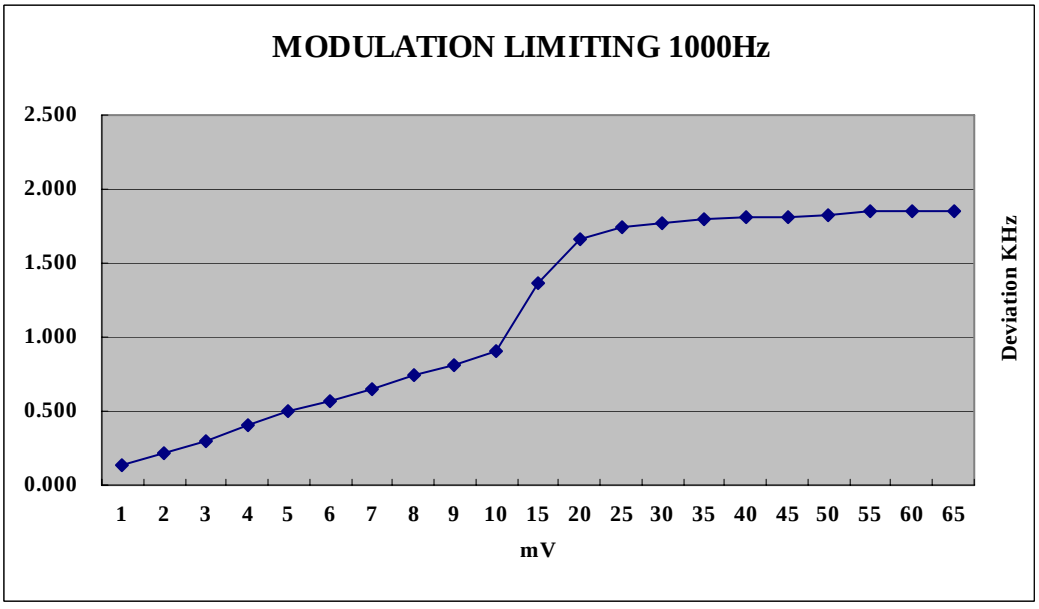
THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

2.1047 (b) Audio input versus modulation

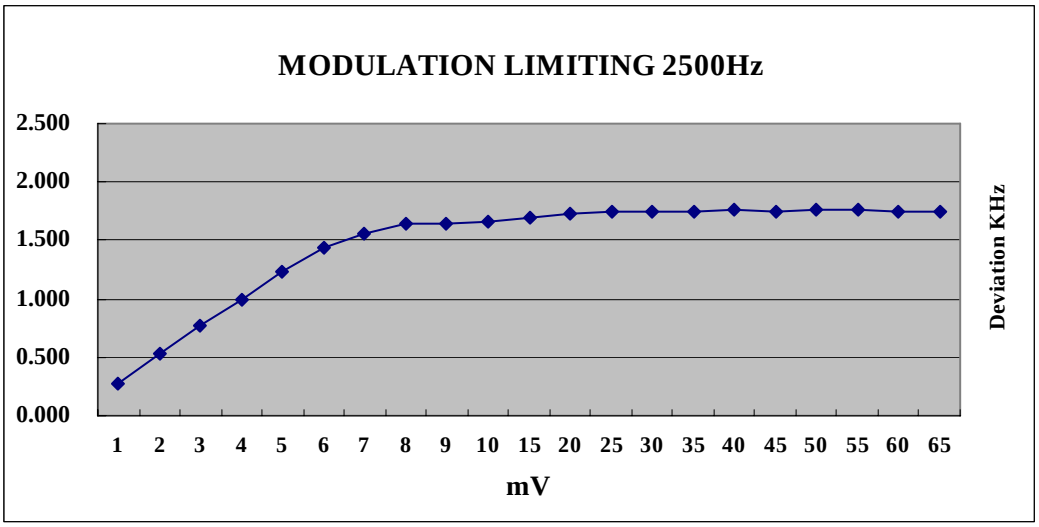
The audio input level needed for a particular per-percentage of modulation was measured in accor – dance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequent-cies of 300, 1000, and 2500 Hz. See Pages 4 and 5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

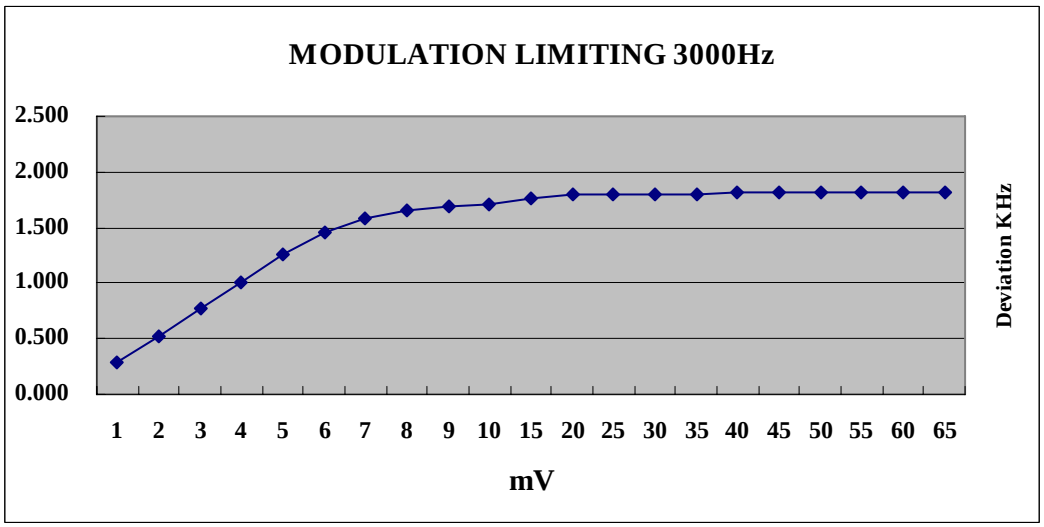




THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net



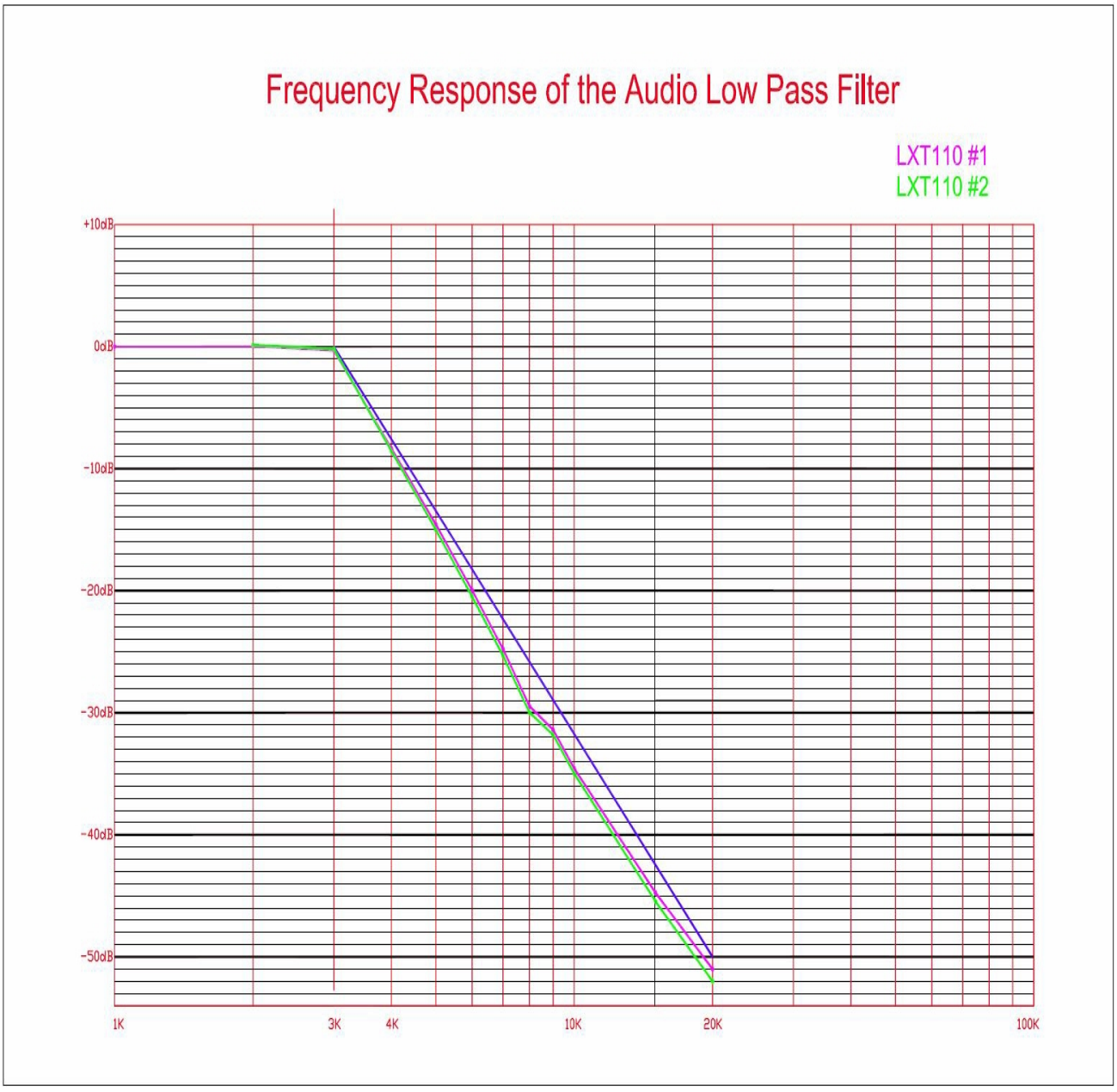


THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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 60log (f/3) greater than the attenuation at 1KHz. See below.



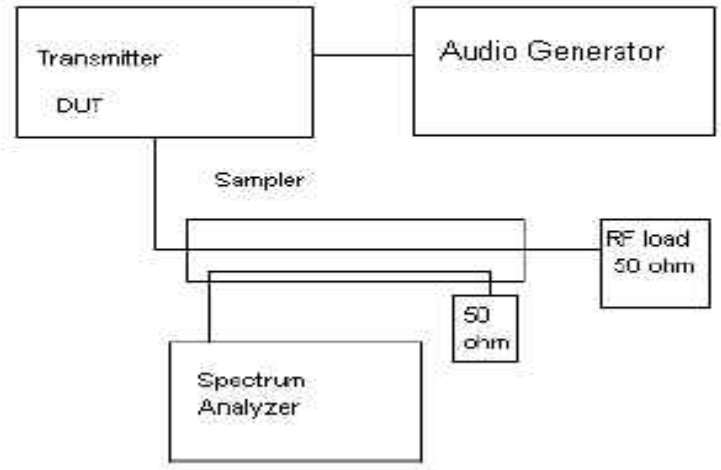
APPLICANT : Midland Radio Corporation.
FCC ID : MMALXT110
REPORT :THRU-712005

THRU Lab & Engineering.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

2.1049 Occupied bandwidth :
95.635 (b) (1) (3) (7)

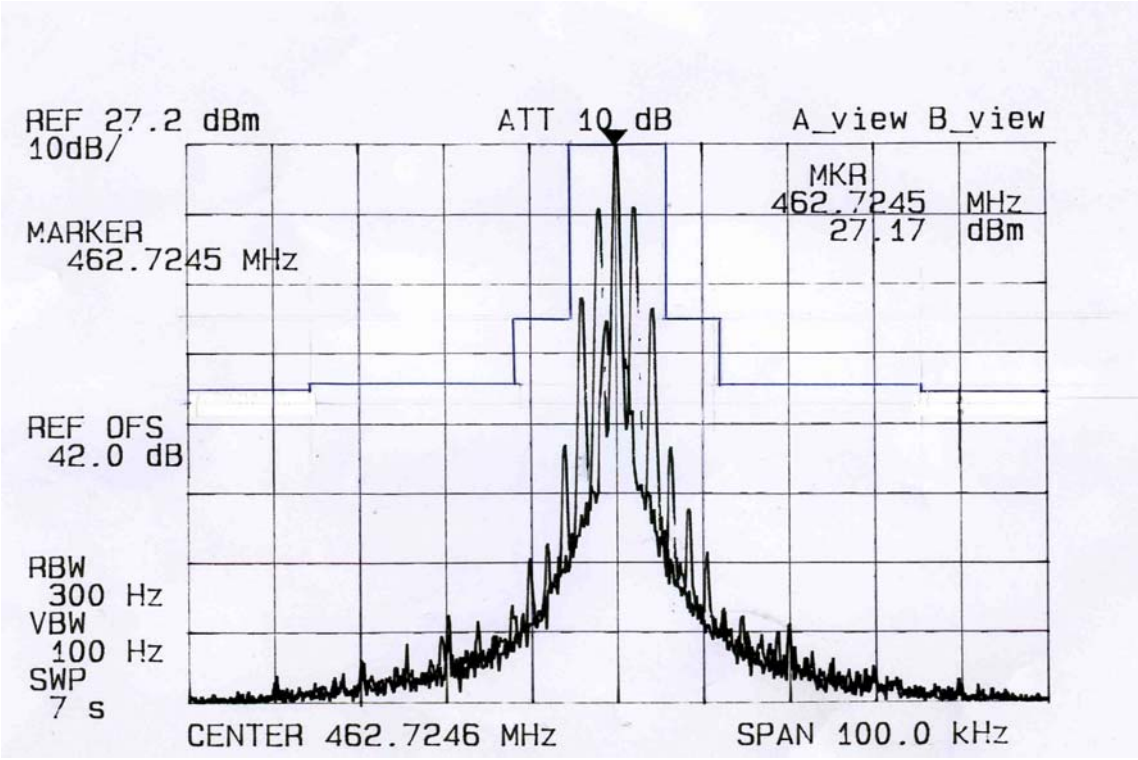
At least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50%up to and including 100% of the authorized bandwidth. At least 35dBon any frequency removed from the center of the authorized BW by more than 100% up to and including 250% of the authorized BW. At lease 43+log10(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

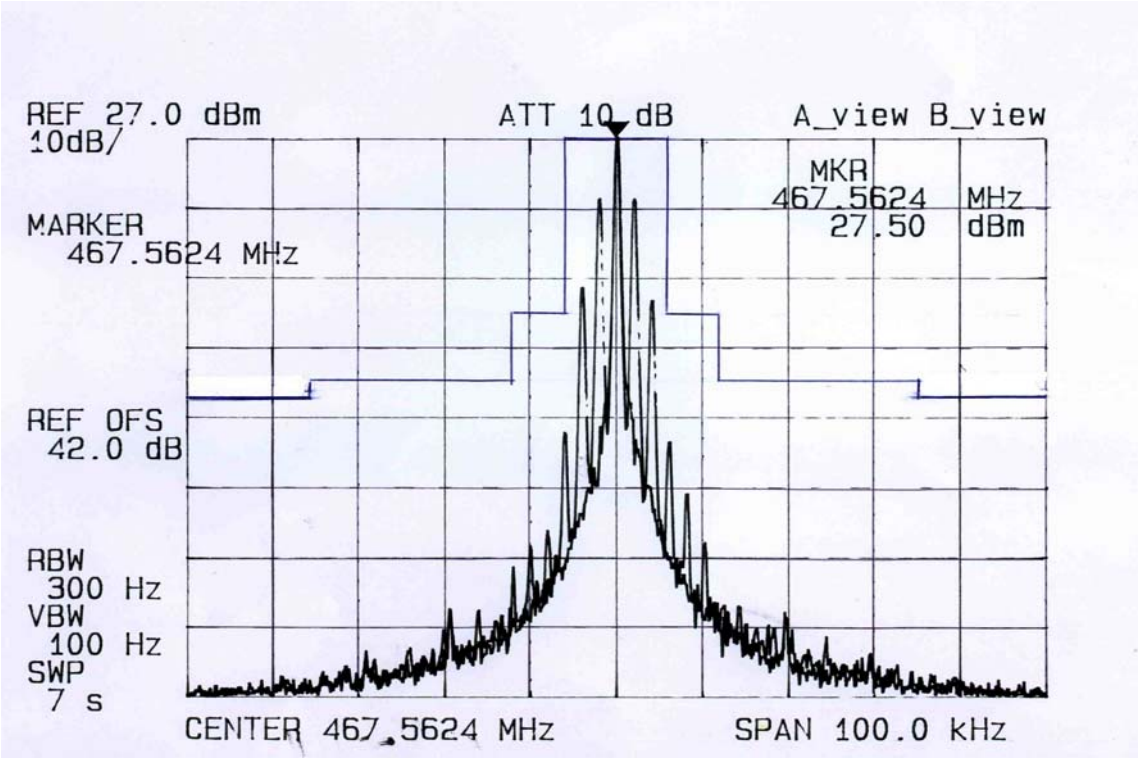


THRU Lab & Engineering.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

22ch



8ch



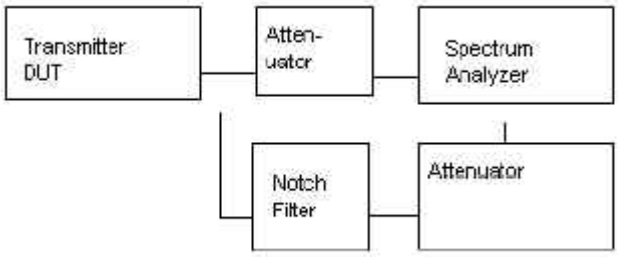
THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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.

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

2.1053
95.635 (b) (7)

UNWANTED RADIATION

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

REQUIREMENTS: GMRS (HIGH): 43 + 10log(0.1750) = 35.43dB

Frequency	dBc	Margin	dBm
462.5500	0	0	0
925.1000	56.91	21.48	-34.48
1387.6500	55.42	19.99	-32.99
1850.2000	48.96	13.53	-26.53
2312.7500	38.44	3.01	-16.01
2775.3000	54.18	18.75	-31.75
3237.8500	44.76	9.33	-22.33
3700.4000	41.42	5.99	-18.99
4162.9500	47.62	12.19	-25.19
4625.5000	48.72	13.29	-26.29

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

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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 10^{th} harmonic of The fundamental. This test was conducted per ANSI C63.4 – 2003.

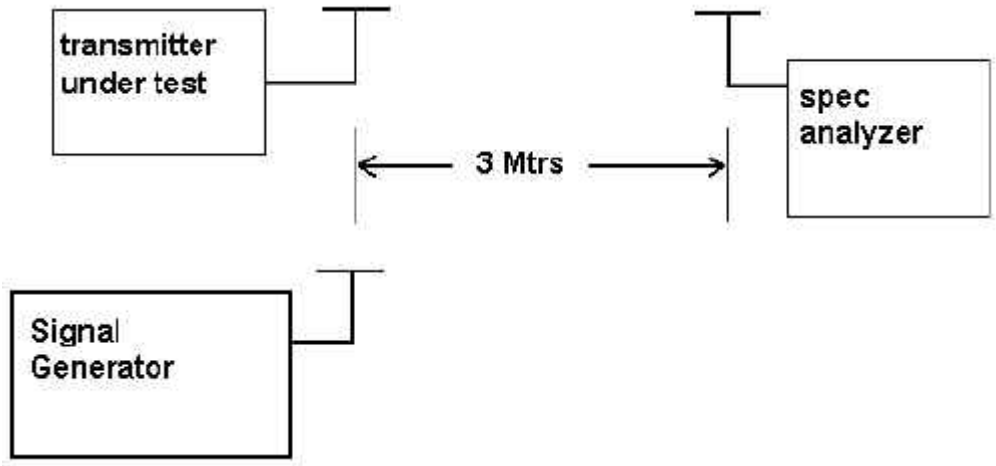
REQUIREMENTS: FRS: 43 + 10log(0.2710) = 37.33dB

Frequency	dBc	Margin	dBm
467.5625	0	0	0
935.1250	58.41	21.08	-34.08
1402.6875	55.15	17.82	-30.82
1870.2500	50.59	13.26	-26.26
2337.8125	40.67	3.34	-16.34
2805.3750	54.82	17.49	-30.49
3272.9375	43.98	6.65	-19.65
3740.5000	42.95	5.62	-18.62
4208.0625	50.38	13.05	-26.05
4675.6250	49.33	12.00	-25.00

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

THRU Lab & Engineering.
477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground

on a rotatable platform.

* Appropriate antenna raised from 1 to 4 M.

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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 acssigned channel frequency was considered to be the reference frequency. The temperature was then reduced to – 30 degress C after which the transmitter was again allowed to stabi-lize 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.

Reading were also taken at the end point of the battery voltage of 4.5 V/dc

MEASUREMENT DATA:

REFERENCE VOTAGE (V DC)	4.5	REFERENCE FREQUENCY (MHz)	462.72500
TEMPERATURE	FREQUENCY(MHz)	PPM	LIMIT(ppm)
-30	462.72526	0.56	5.0
-20	462.72550	1.08	2.5
-10	462.72587	1.88	2.5
0	462.72588	1.90	2.5
10	462.72522	0.48	2.5
20	462.72507	0.16	2.5
30	462.72482	-0.38	2.5
40	462.72489	-0.24	2.5
50	462.72529	0.62	2.5
+15% Battery : 5.17V	462.72533	0.70	2.5
-15% Battery : 3.82V	462.72531	0.67	2.5

Note: This EUT meets the frequency stability requirement for a FRS: +/-2.5ppm over temp range of -20 degress 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.

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun
Kyunggi-Do,469-803, Korea
T820318835092F820318835169 email thrukang@kornet.net

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	Preamplifer	Hewlett Packard	8447F	2805A02570	2008.05.28	☐
8	Preamplifer	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	☐