THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

Test Report

Product Name: GMRS/FRS Combination

MODEL NO:LXT210

FCC ID:MMALXT210

Applicant:

Midland Radio Corporation.

1120 Clay St. North Kansan City,

MO 64116

Date Receipt:MAR/14/2005

Date Tested: MAR/15/2005

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

TABLE OF CONTENTS LIST

APPLICANT: Midland Radio Corporation.
FCC ID :MMALXT210

TEST REPORT

EXHIBITS CONTAINING:

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

GENERAL INFORMATION REQUIRED
FOR CERTIFICATION

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

the FCCID: MMALXT210 GMRS/FRS COMBINATION TRANSCEIVER in quantity, for use under FCC RULES PART 95.
MidLand Radio Corporation.
1120 Clay St.
North Kansas City, MO 64116

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 : 10K5F3E
95.631

Bn = 2M + 2DK
M = 3000
D = 2.25k
Bn =2(3000) + 2(2250) = 10.5k
GMRS Frequency Range :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:12.5kHz

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 nominal battery voltage of 6 V, and the transmitter properly adjusted the RF output measures:

power supply : Roket batteries (1.5VDC) x 4

GMRS (HIGH) – 0.676 Watts
GMRS (LOW) - 0.417 Watts
FRS - 0.307 Watts

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 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: (6V)(0.410A)=2.46 Watts
FOR GMRS LOW POWER SETTING INPUT POWER: (6V)(0.255A)=1.53 Watts
FOR FRS POWER SETTING INPUT POWER: (6V)(0.250A)=1.5 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.

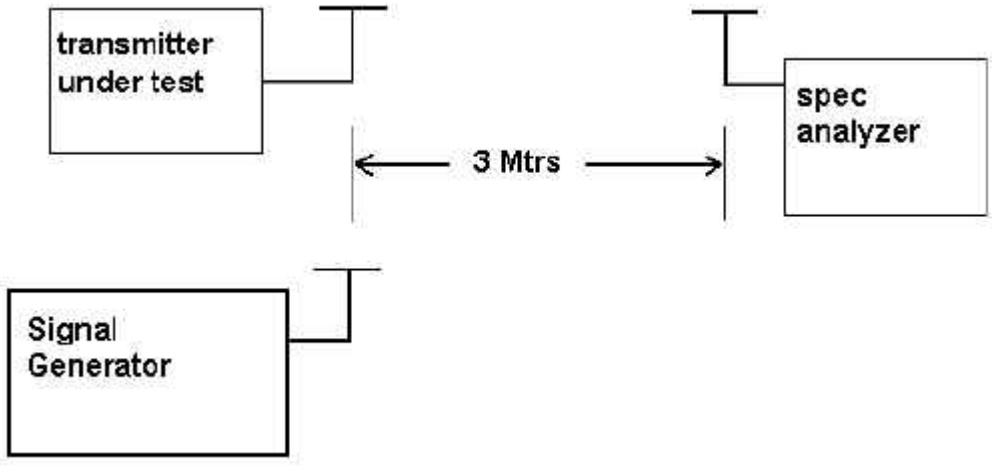
2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.

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.



THRUlab & Engineering.

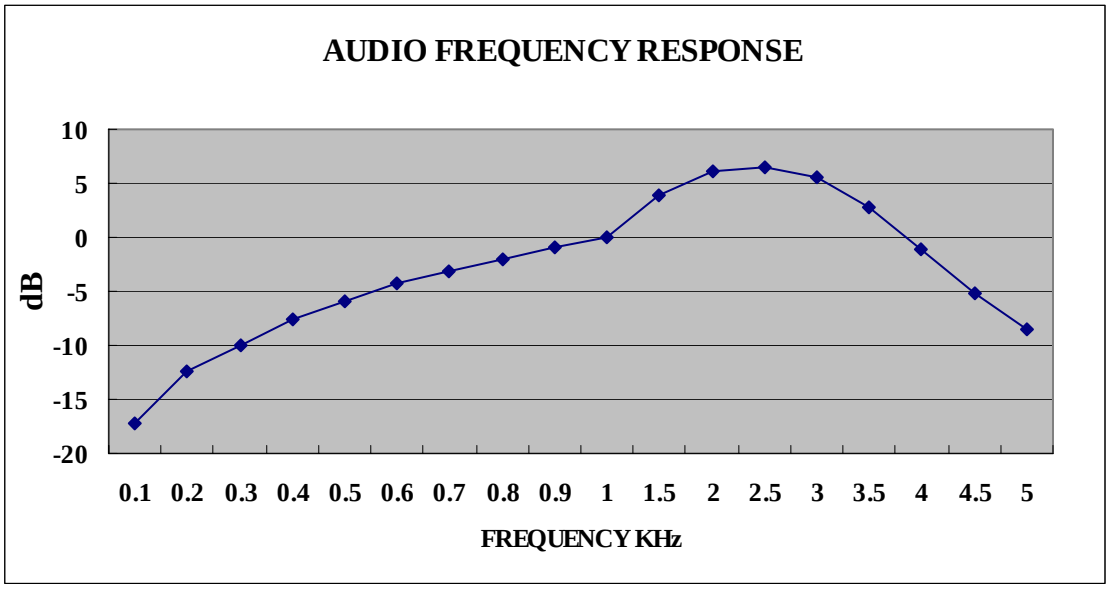
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

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

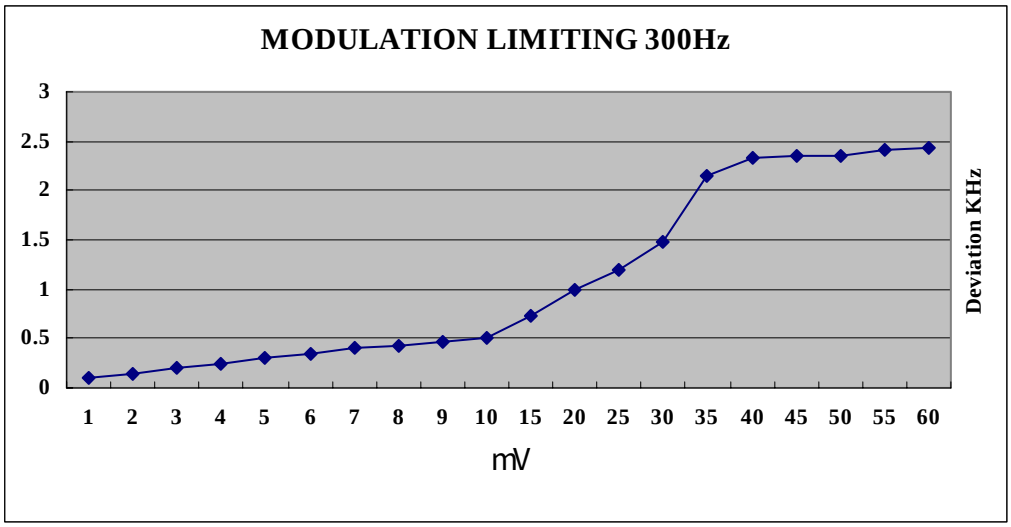


THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

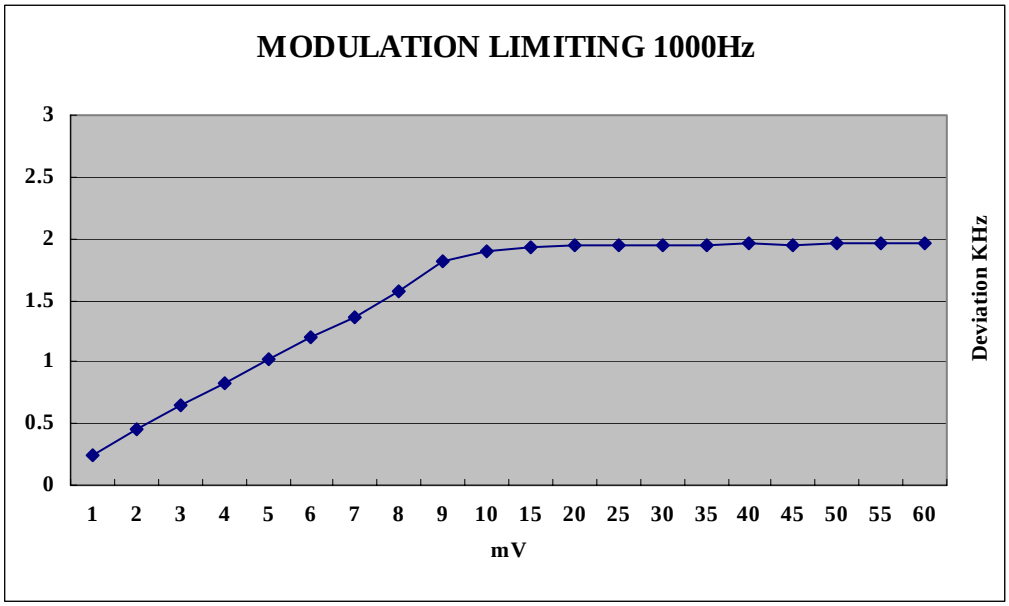
2.1047 (b) Audio input versus modulation

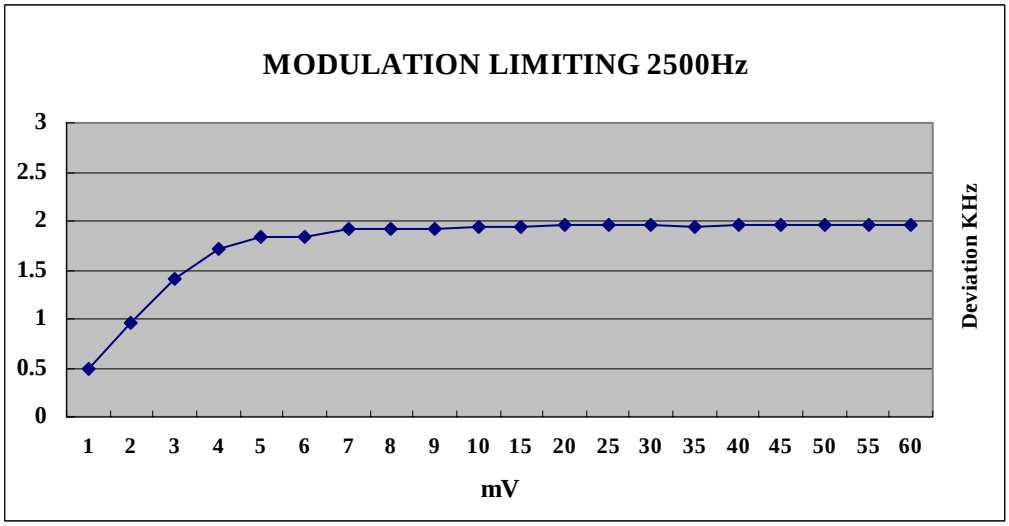
The audio input level needed for a particular per-percentage of modulation was measured in accor – dance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequent-cies of 300, 1000, and 2500 Hz. See Pages 6 and 7 of report.



THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

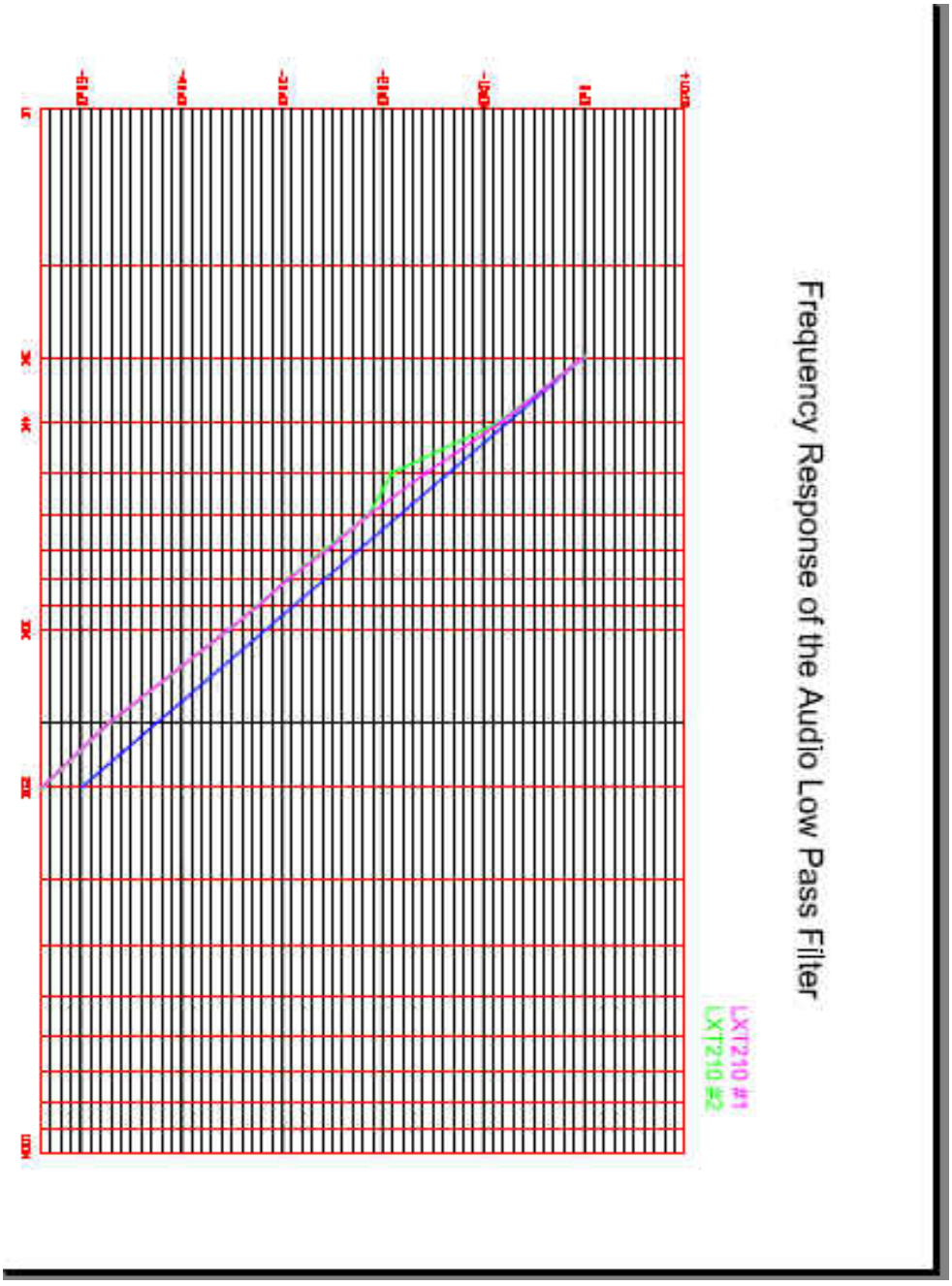




THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

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.

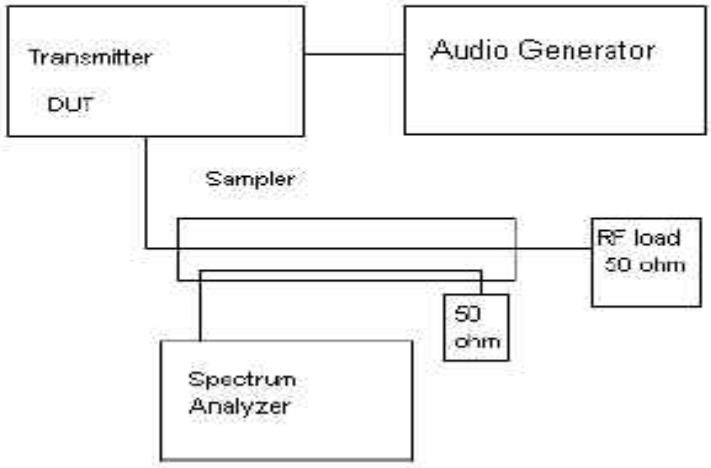


THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

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

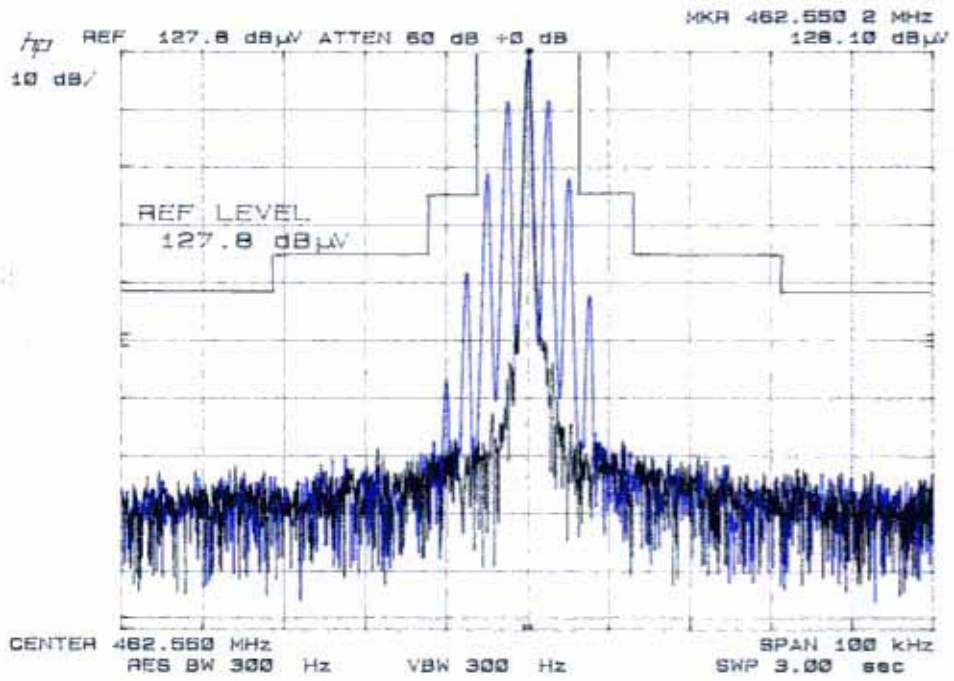
At least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50%up to and including 100% of the authorized bandwidth. At least 35dBon any frequency removed from the center of the authorized BW by more than 100% up to and including 250% of the authorized BW. At lease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

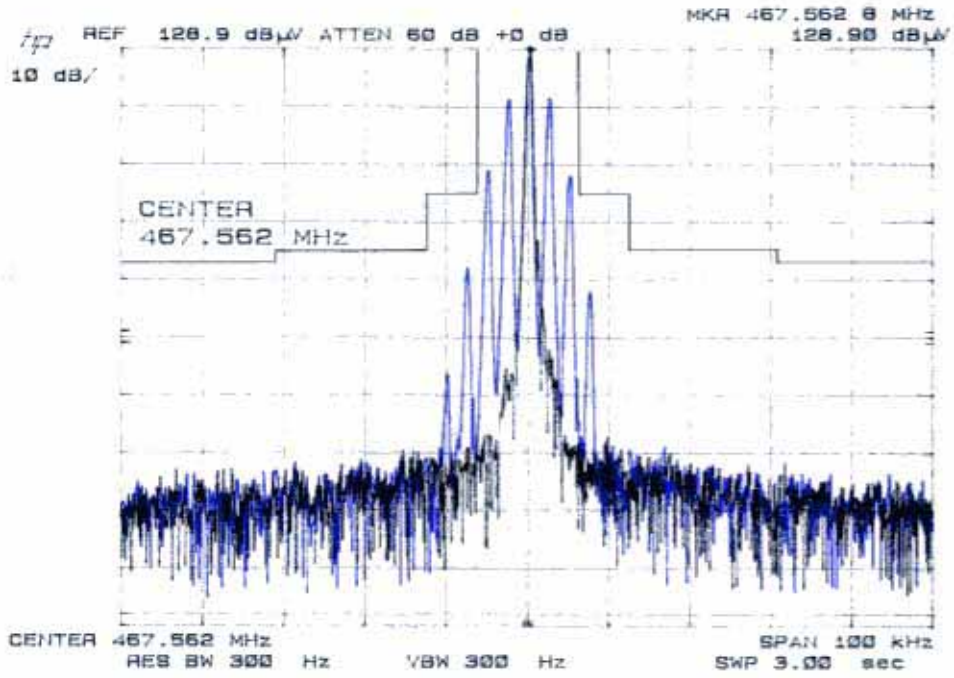


THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

15ch(GMRS)



8ch(FRS)

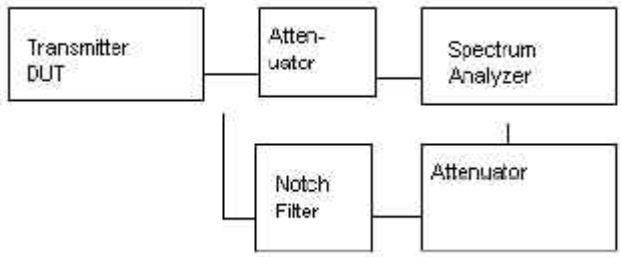


THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

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 TIS/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.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 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 10th harmonic of The fundamental. This test was conducted per ANSI C63.4 – 1992

REQUIREMENTS: GMRS (HIGH): 43 + 10log(0.676) = 41.30107dB

(LOW) : 43 + 10log(0.417) = 39.20107dB

Test Data :	GMRS-	High Power		Test Data :	GMRS -	Low Power
Emission Frequency	ATTN dBc	Margin dB		Emission Frequency	ATTN dBc	Margin dB
462.55	0.00	0.00		462.55	0.00	0.00
925.10	45.15	3.85		925.10	42.85	3.65
1387.65	52.60	11.30		1387.65	52.40	13.20
1850.20	50.87	9.57		1850.20	53.07	13.87
2312.75	48.35	7.05		2312.75	47.75	8.55
2775.30	70.97	29.67		2775.30	65.47	26.27
3237.85	67.20	25.89		3237.85	63.40	24.19
3700.40	62.96	21.66		3700.40	59.66	20.46
4162.95	62.99	21.68		4162.95	60.69	21.48
4625.50	61.21	19.91		4625.50	60.91	21.71

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 389 JeAm-Rhi HyangNam-Myun,HwaSung-Shi,KyoungKi-Do Korea.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 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 – 1992

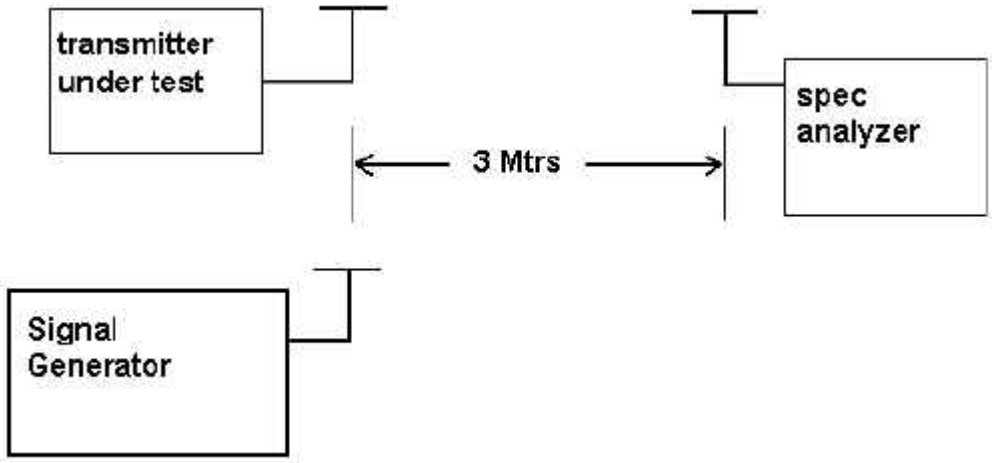
REQUIREMENTS: FRS: 43 + 10log(0.307) = 37.87304dB

Test Data :	FRS	
Emission Frequency	ATTN dBc	Margin dB
467.56	0.00	0.00
935.11	43.55	5.68
1402.67	41.14	3.27
1870.23	59.84	21.96
2337.79	48.19	10.32
2805.34	64.31	26.44
3272.90	62.23	24.36
3740.46	62.81	24.94
4208.01	62.12	24.25
4675.57	60.91	23.03

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 389 JeAm-Rhi HyangNam-Myun,HwaSung-Shi,KyoungKi-Do Korea.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 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.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 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 6 V/dc

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.63750

TEMPERATURE	FREQUENCY(MHz)	ppm	LIMIT(ppm)
REFERENCE	**462.63750**	**0**	
-30	462.63669	-1.75	5.0
-20	462.63704	-0.99	2.5
-10	462.63762	0.26	2.5
0	462.63792	0.91	2.5
10	462.63795	0.97	2.5
20	462.63755	0.11	2.5
30	462.63743	-0.15	2.5
40	462.63724	-0.56	2.5
50	462.63743	-0.15	2.5
END POINT OF BATTERY : 3.1V	462.63734	-0.35	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.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

EMC Equipment List

DEVICE	MODEL	MFGR	SERNO	DUE.CAL
EMI Test Receiver	ESVS 10	Rohde & Schwarz	830489/001	2005.04.07.
Spectrum Analyzer	8566B	Hewlett Packard	2311A02394	2005.04.07.
Spectrum Display	85662A	Hewlett Packard	2542A12429	2005.04.07.
Quasi-Peak Adapter	85650A	Hewlett Packard	2521A00887	2005.04.07.
RF Preselector	85685A	Hewlett Packard	2648A00504	2005.04.07.
Pre-Amplifier	8449B	Hewlett Packard	3008A00375	2005.04.07.
Pre-Amplifier	8447F	Hewlett Packard	3113A05367	2005.04.07.
Spectrum Monitor	EZM	Rohde & Schwarz	862304/007	2005.04.07.
Bico-Antenna	94455-1	Eaton	977	2005.03.17.
Log-Periodic Antenna	3146	EMCO	2051	2005.03.17.
Dipole Antenna	TDA25/1/2	Electro Metrics	176/200/200	2005.03.17.
Horn Antenna	SAS-571	A.H Systems	414	2005.03.17.
Spectrum Analyzer	R3261C	Advantest	71720189	2005.04.07.
LISN	KNW-242	Kyoritsu	8-923-2	2004.07.17.
LISN	8012-50-R-24	Solar	8379121	2004.07.17.
Loop Ant	6507	EMCO	1435	2004.10.06.
Signal Generator	SMS	Rohde & Schwarz	872165/100	2005.04.07.
Modulation Analyzer	8901B	Hewlett Packard	3438A05094	2005.04.07.
Frequency Counter	CMC251	Tektronic	CMC-251TW52489	2005.04.07.
ModulationAnalyzer	HP 8901B	Hewlett Packard	-	2005.07.05
Audio Generatior	Ken AG203	Kenwood	-	2005.07.05
AC Volt Meter	Ldr LMV-182	Leader	-	2005.07.05