

THRU Lab & Engineering.

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

Kyunggi-Do, 469-803, Korea

T820318835092F820318835169 email thrukang@kornet.net



Test Report

Product Name: GMRS/FRS Combination

FCC ID: PDHGMRS500SLK

Applicant:

TTI Tech Co., Ltd.

**TTI House, 163-4, Poi-dong
Kangnam-ku, Seoul, Korea. 135-260**

Date Receipt: 01/24/2006

Date Tested: 03/17/2006

APPLICANT : TTI Tech Co., Ltd.

FCC ID : PDHGMRS500SLK

REPORT : THRU-602001

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FCC ID : PDHGMRS500SLK

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EXHIBITS CONTAINING:

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GENERAL INFORMATION REQUIRED
FOR CERTIFICATION

2.1033 (c) (1) (2) TTI Tech Co., Ltd. will manufacture the FCCID: PDHGMRS500SLK GMRS/FRS COMBINATION TRANSCEIVER in quantity, for use under FCC RULES PART 95A&B.
TTI Tech Co., Ltd.
TTI House, 163-4, Poi-dong
Kangnam-ku, Seoul, Korea. 135-260

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

$B_n = 2M + 2DK$
 $M = 3000$
 $D = 2.25k$
 $B_n = 2(3000) + 2(2250) = 10.5k$
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 outlined in TIA/EIA - 603. With a nominal battery voltage of 3.7 V, and the transmitter properly adjusted the RF output measures:
2.1046(a)

GMRS (HIGH) - 0.962 Watts
GMRS (LOW) - 0.366 Watts
FRS - 0.430 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: $(3.7 \text{ V})(.980\text{A}) = 3.63 \text{ Watts}$

FOR GMRS LOW POWER SETTING INPUT POWER : $(3.7 \text{ V})(.410\text{A}) = 1.52 \text{ Watts}$

FOR FRS POWER SETTING INPUT POWER : $(3.7\text{V})(.420\text{A}) = 1.55 \text{ Watts}$

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.

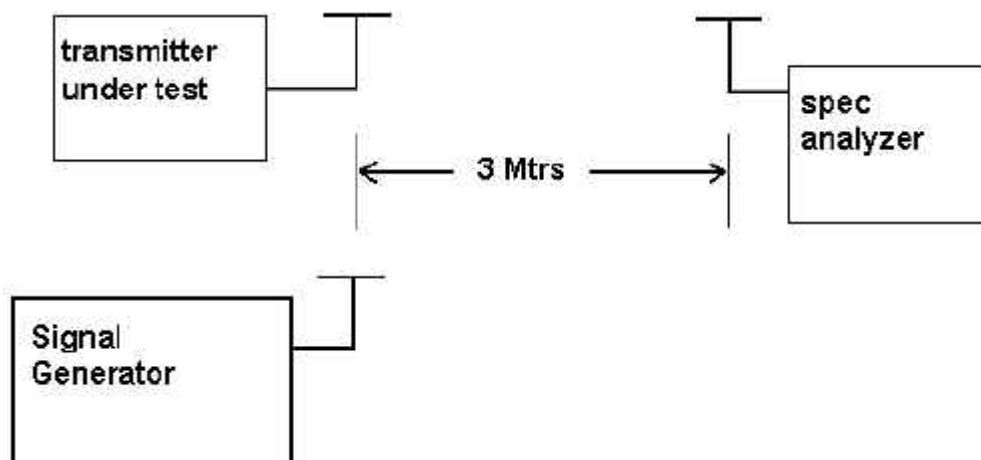
2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.

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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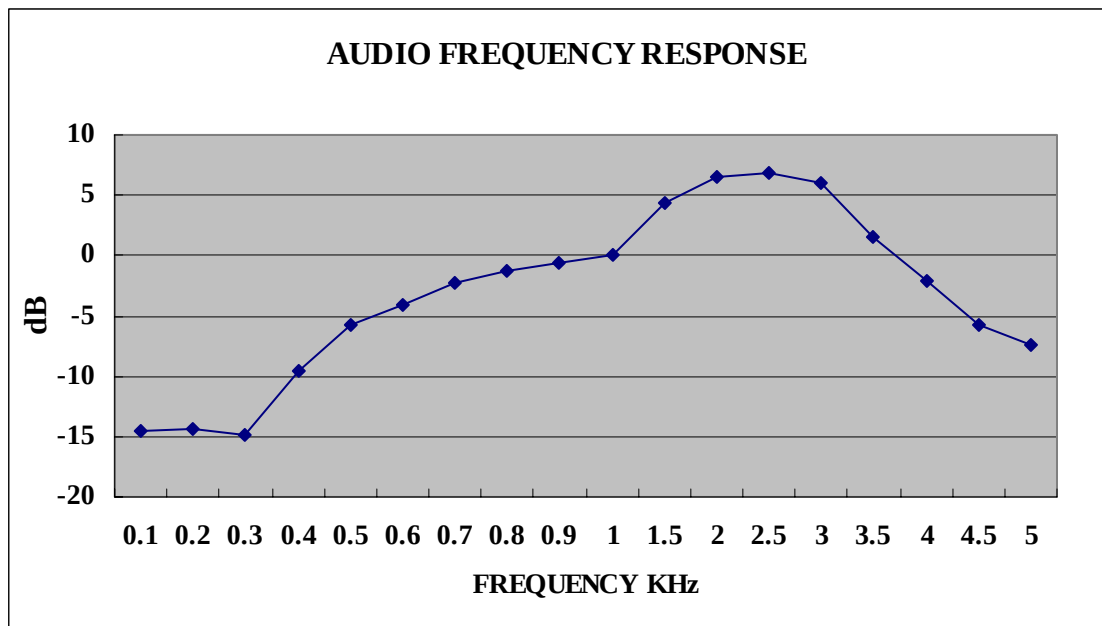
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2.1047 (a) (b) Modulation characteristics :

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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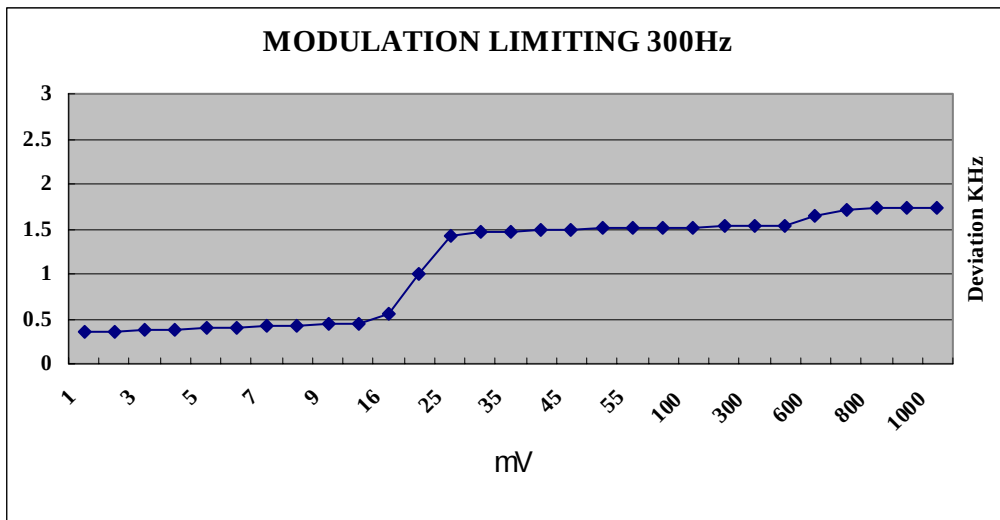
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2.1047 (b)

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.

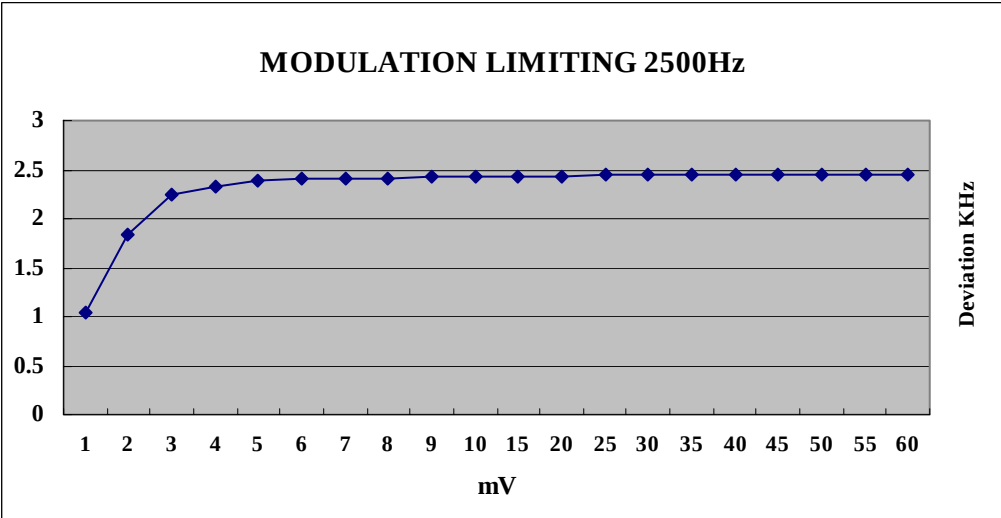
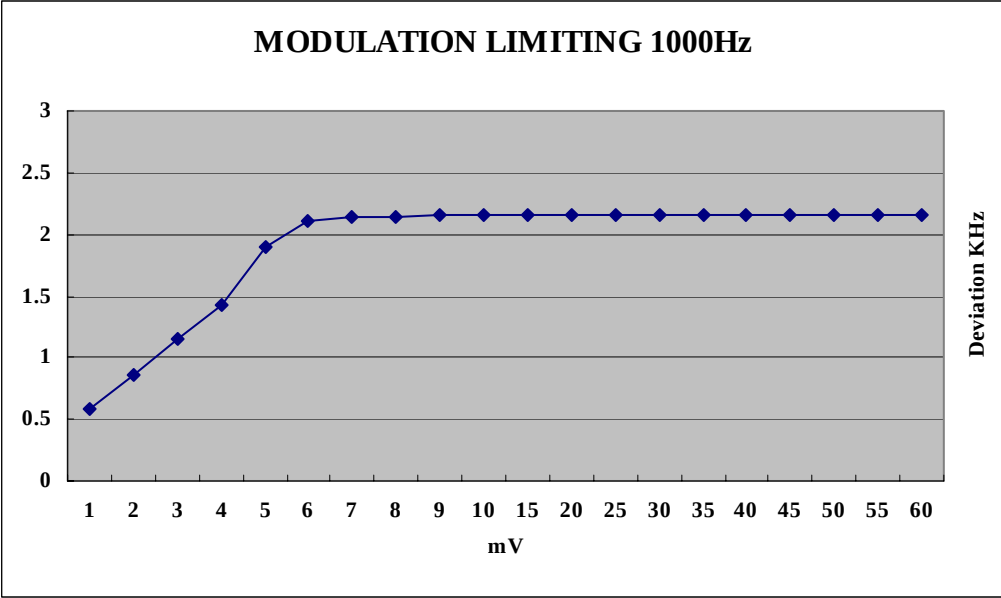


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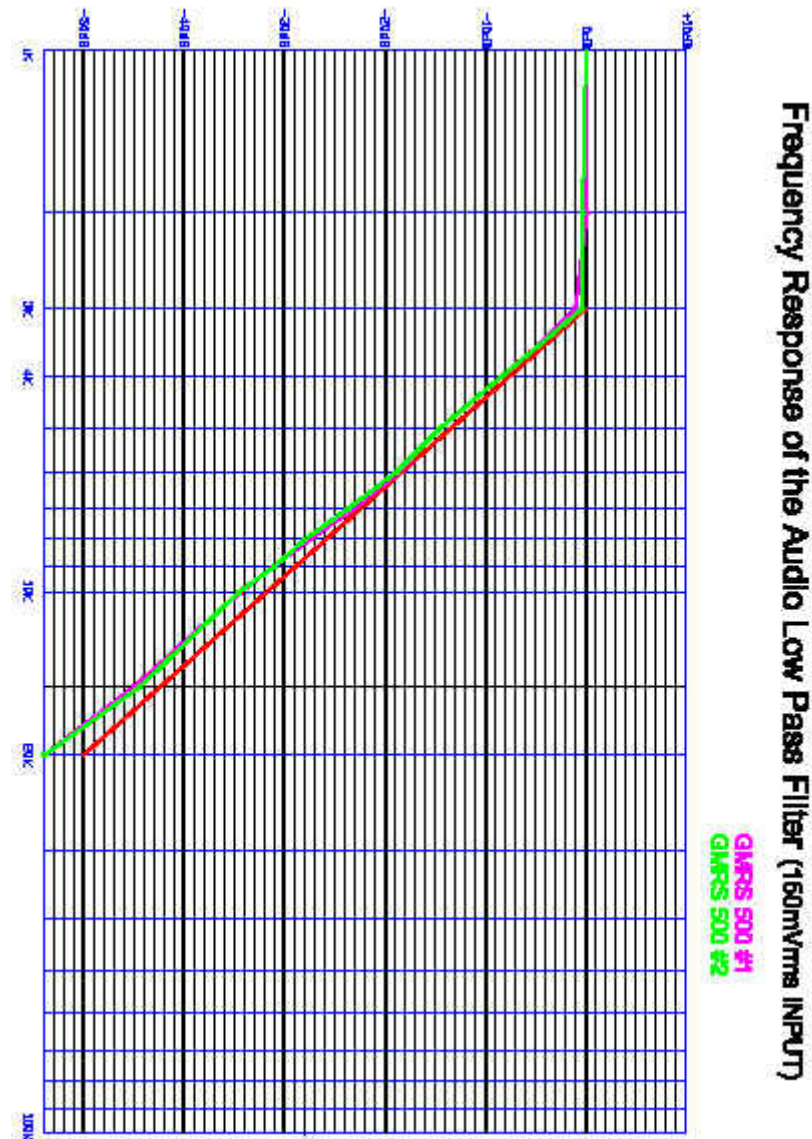
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AUDIO LOW PASS FILTER GRAPH

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.



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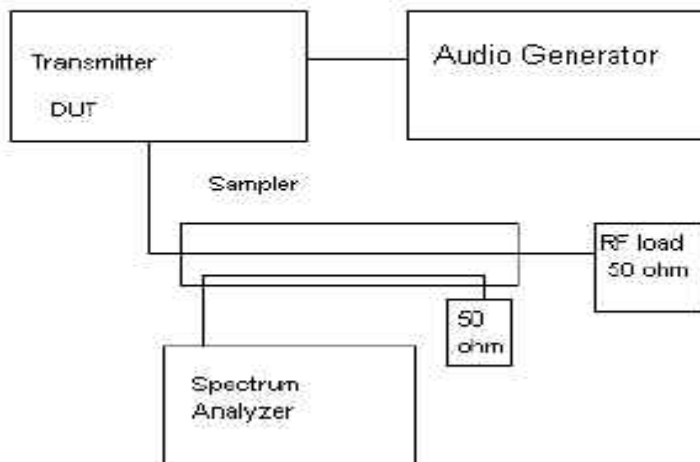
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2.1049 Occupied bandwidth :

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 2 pages.

Occupied BW Test Equipment Setup

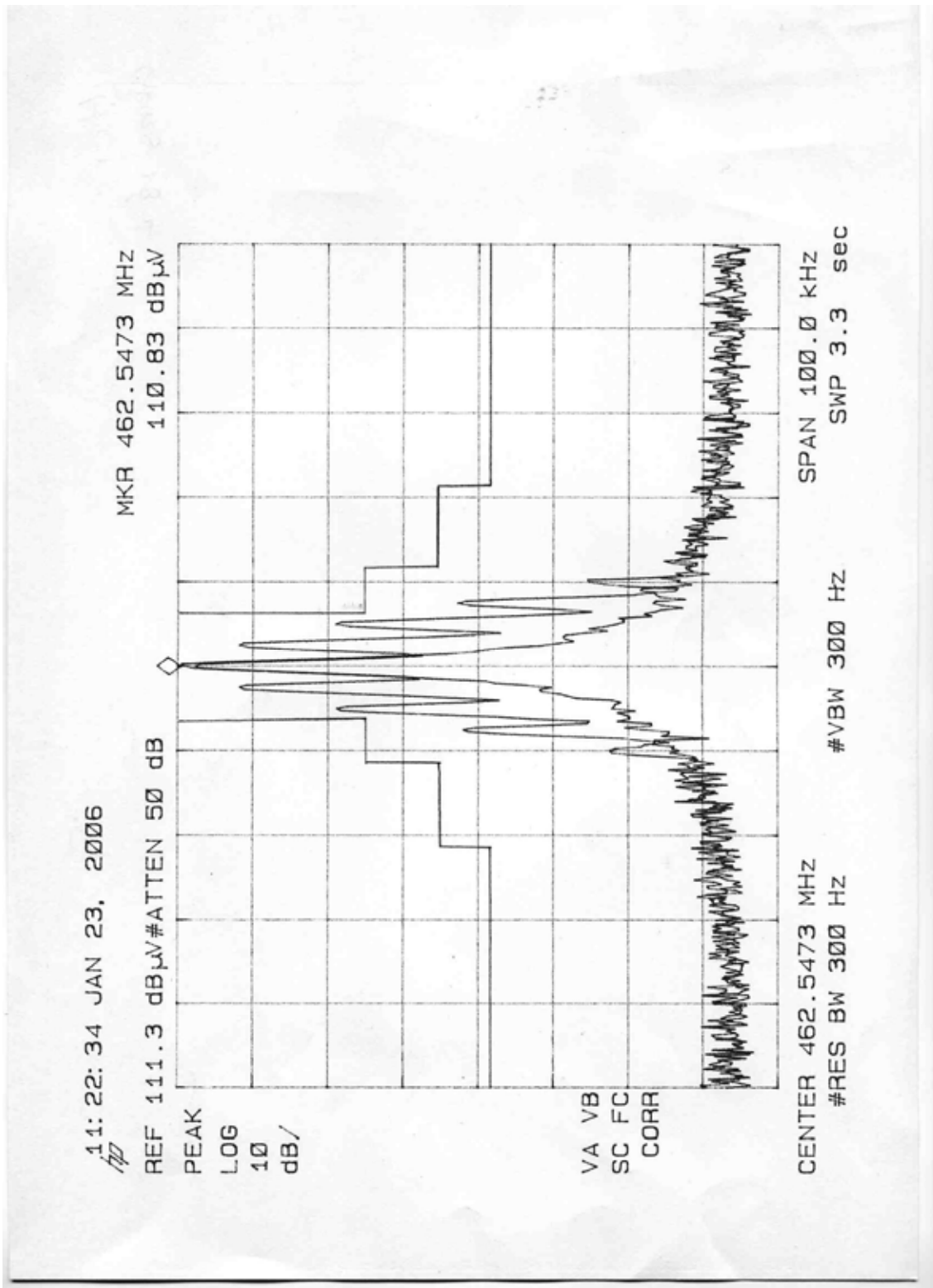


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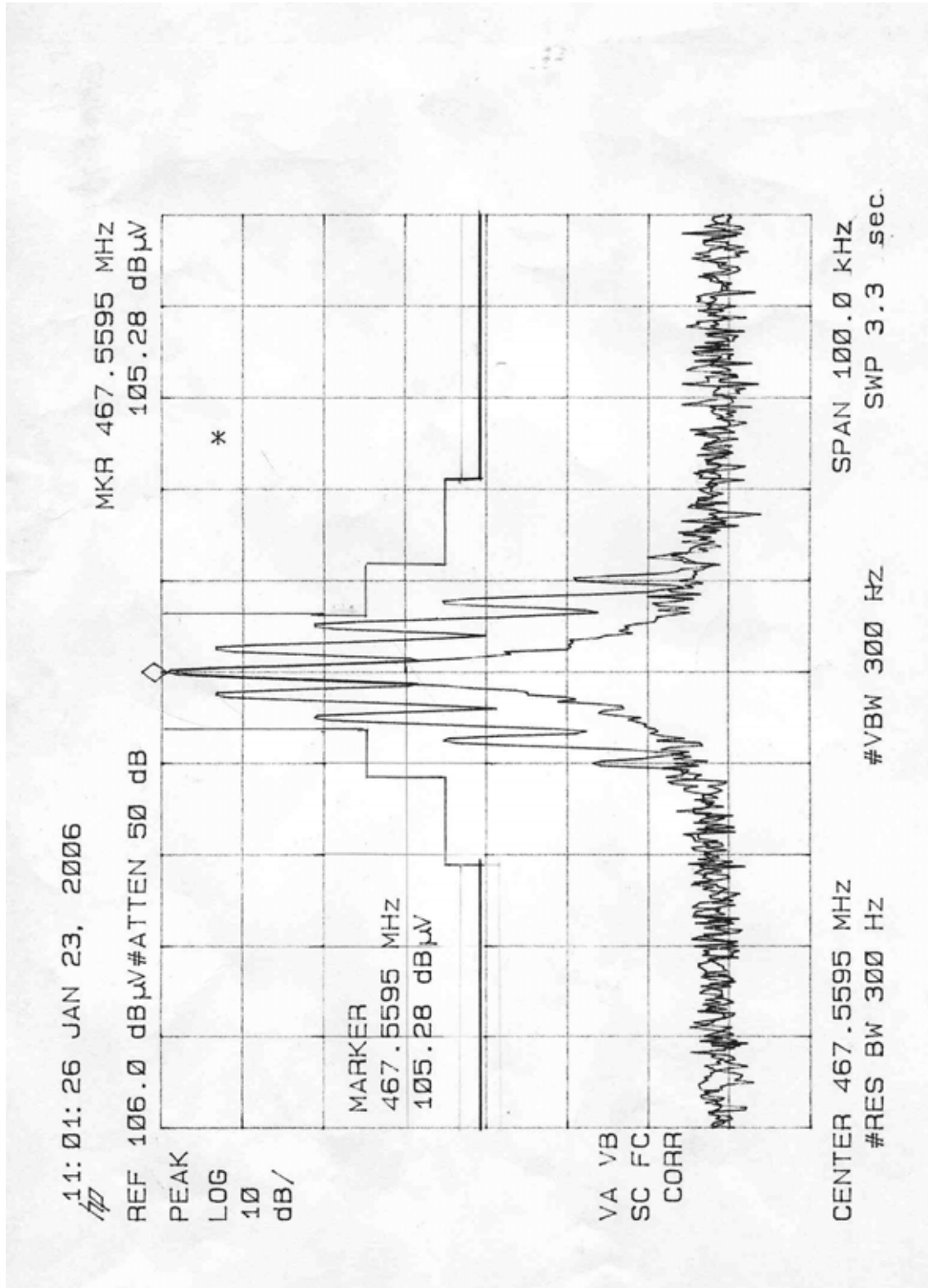
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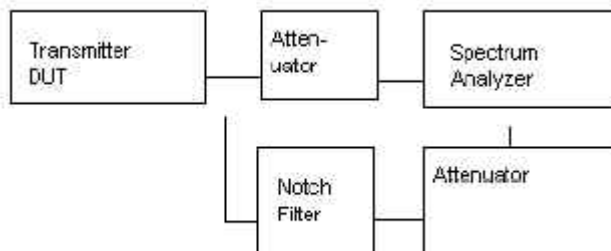
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2.1051 Spurious emissions at antenna terminals (conducted) :

The following data shows the level of conducted spurious responses at the antenna terminal. The test procedure used was 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.

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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): $43 + 10\log(0.962) = 42.83175\text{dB}$

(LOW) : $43 + 10\log(0.366) = 38.634810\text{dB}$

GMRS-High				GMRS-Low			
Frequency	dBc	Margin	dBm	Frequency	dBc	Margin	dBm
462.5500	0	0		462.5500	0	0	
925.1000	58.71	15.88	-28.88	925.1000	52.91	14.28	-27.28
1387.6500	61.12	18.29	-31.29	1387.6500	62.92	24.29	-37.29
1850.2000	64.56	21.73	-34.73	1850.2000	58.66	20.03	-33.03
2312.7500	55.14	12.31	-25.31	2312.7500	57.64	19.01	-32.01
2775.3000	67.68	24.85	-37.85	2775.3000	63.78	25.15	-38.15
3237.8500	66.06	23.23	-36.23	3237.8500	62.46	23.83	-36.83
3700.4000	66.72	23.89	-36.89	3700.4000	63.42	24.79	-37.79
4162.9500	72.72	29.89	-42.89	4162.9500	59.62	20.99	-33.99
4625.5000	67.32	24.49	-37.49	4625.5000	62.72	24.09	-37.09

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: $43 + 10\log(0.430) = 39.33468\text{dB}$

FRS			
Frequency	dBc	Margin	dBm
467.5625	0	0	
935.1250	53.51	14.18	-27.18
1402.6875	64.65	25.32	-38.32
1870.2500	60.89	21.56	-34.56
2337.8125	63.27	23.94	-36.94
2805.3750	68.52	29.19	-42.19
3272.9375	63.28	23.95	-36.95
3740.5000	68.55	29.22	-42.22
4208.0625	68.88	29.55	-42.55
4675.6250	61.23	21.90	-34.90

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, Yaju-Up, Yaju-Gun, Kyunggi-Do, 469-803, Korea

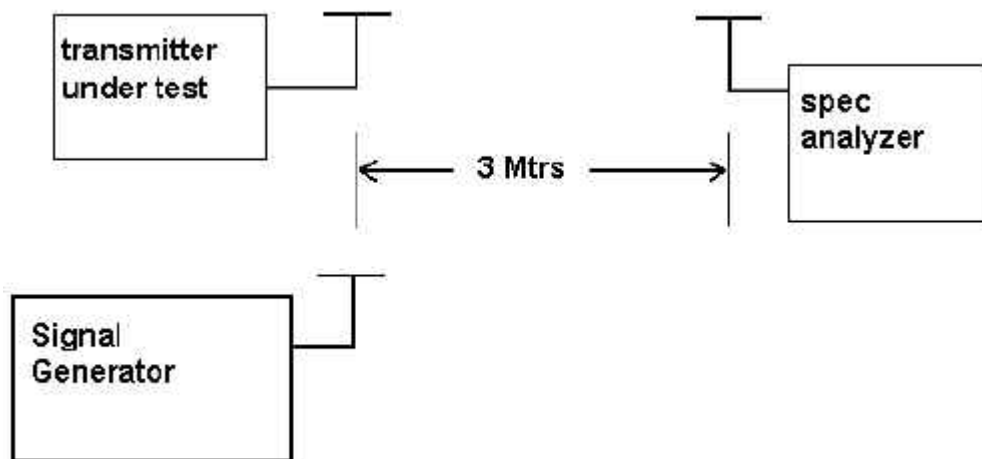
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Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

* Appropriate antenna raised from 1 to 4 M.

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Test Equipment List

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.
1	Test Receiver	Rohde & Schwarz	ESVS10	830489/001	2006.04.23
2	Test Receiver	Rohde & Schwarz	ESHS 10	825832/014	2006.08.25
3	Test Receiver	Rohde & Schwarz	ESVS 10	826008/014	2006.05.24
4	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2006.04.23
5	Spectrum Display	Hewlett Packard	85662A	2542A12429	2006.04.23
6	Quasi-peak Adapter	Hewlett Packard	85650A	2521A00887	2006.04.23
7	RF Preselector	Hewlett Packard	85685A	2648A00504	2006.04.23
8	Preamplifier	Hewlett Packard	8449B	3008A00375	2006.04.23
9	Preamplifier	Hewlett Packard	8447F	3113A05367	2006.04.23
10	Preamplifier	Hewlett Packard	8447F	2805A02570	2006.12.12
	Preamplifier	A.H. Systems	PAM-0118	164	2007.01.17
11	Biconical Antenna	Eaton Corp.	94455-1	0977	2006.04.01
12	Biconical Antenna	EMCO	3104C	9111-2468	2006.06.07
13	Log Periodic Antenna	EMCO	3146	2051	2006.04.01
14	Log Periodic Antenna	EMCO	3146	8901-2320	2006.03.28
15	Horn Antenna	A.H. Systems	SAS-571	414	2006.03.17
	Horn Antenna	A.H. Systems	SAS-571	781	2007.01.07
16	Loop Antenna	Rohde & Schwarz	HFH2- Z2.335.4711.52	826532/006	2006.01.31
17	Dipole Antenna	Rohde & Schwarz	VHAP	574	2006.12.12
18	Dipole Antenna	Rohde & Schwarz	VHAP	575	2006.12.12
19	Dipole Antenna	Rohde & Schwarz	UHAP	546	2006.12.12

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20	Dipole Antenna	Rohde & Schwarz	UHAP	547	2006.12.12
21	Signal Generator	Rohde & Schwarz	SMS	872165/100	2006.04.23
22	Signal Generator	Rohde & Schwarz	SMX	825459/030	2006.05.20
23	Spectrum Monitor	Rohde & Schwarz	EZM	862304/007	None
24	Panorama Monitor	Rohde & Schwarz	EPN	883707/207	None
25	Spectrum Analyzer	Advantest Corp.	R3261C	61720208	2006.04.23
26	Spectrum Analyzer	Hewlett Packard	8591A	3205A02641	2007.01.27
27	LISN	EMCO	3825/2	9111-1912	2006.12.12
28	LISN	Solar	8012-50-R-24	8379121	2006.04.25
29	LISN	Kyoritsu	KNW-242	8-923-2	2006.04.25
30	Plotter	Hewlett Packard	7475A	2210A02802	None
31	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2006.04.23
32	Frequency Counter	Tektronic	CMC251	TW52489	2006.04.23
33	Temperature & Humidity Chamber	TABAI EZPEC CORP.	MC711P	112000492	2006.0827
34	Antenna Mast	EMCO	1070-3	9109-1617	None
35	Turn Table	EMCO	1080-1,2	9203-1762	None
36	Positioning Controller	EMCO	1090	9111-1054	
37	Antenna Power Supply	Rohde & Schwarz	HZ-9	920127	None
38	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	881052	None
39	Coaxial Take-up Reel	EMCO	100817	9109-1684	None

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