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APPLICANT: COBRA ELECTRONICS CORPORATION

FCC ID: BBOPR3000

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GENERAL INFORMATION REQUIRED  
FOR CERTIFICATION

2.1033(c)(1)(2) COBRA ELECTRONICS CORPORATION will manufacture the  
FCCID: BBOPR3000 GMRS/FRS COMBINATION  
TRANSCEIVER in quantity, for use under FCC RULES  
PART 95.

COBRA ELECTRONICS CORPORATION  
6500 WEST CORTLAND STREET  
CHICAGO, IL 60707

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 Authorized Bandwidth 20.0 kHz

2.1033(c)(5) GMRS Frequency Range:	1. 462.5500	13. 462.7000
95.621	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 12.5 kHz

2.1033(c)(5) FRS Frequency Range:	1. 462.5625	8. 467.5625
95.627	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 6.0 V, and the transmitter properly  
adjusted the RF output measures:

GMRS - .8 Watts

FRS - .33 Watts

2.1033(c)(6)(7) Power Output shall not exceed 0.50 Watts effective  
95.639 radiated power. Power will automatically switch for  
95.640 GMRS or FRS operation.

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

FOR LOW POWER SETTING INPUT POWER: (6.0V)(.210A) = 1.26 Watts  
FOR HIGH POWER SETTING INPUT POWER: (6.0V)(.600A) = 3.60 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.

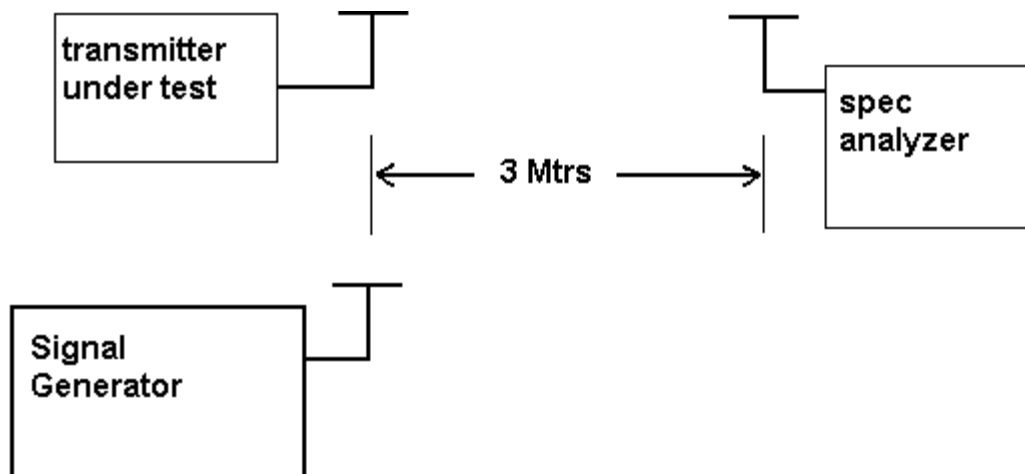
2.1033(c)(11) A photograph or a drawing of the equipment  
identification label is included as exhibit No. 1.

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 S2



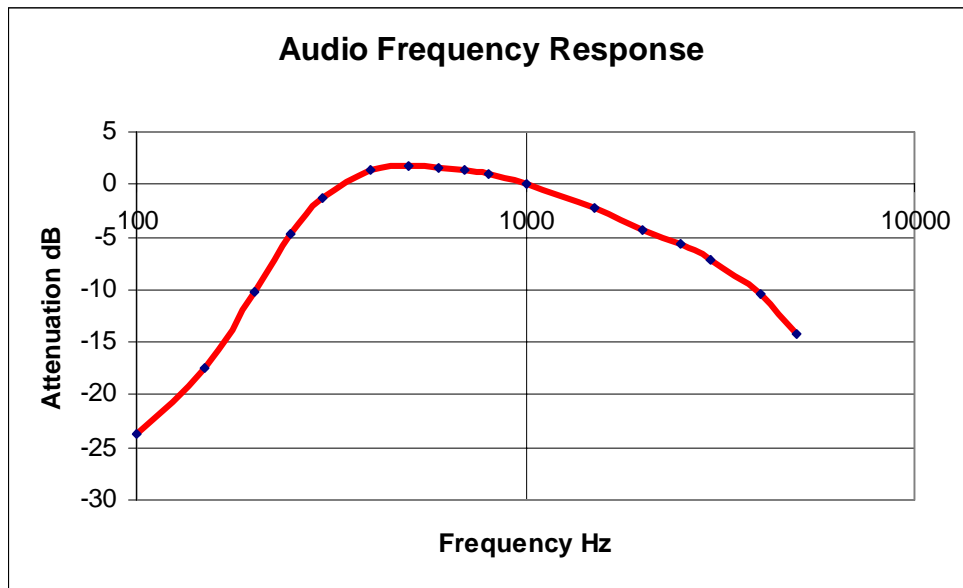
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2.1047(a)(b)      Modulation characteristics:

**AUDIO FREQUENCY RESPONSE**

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown below.

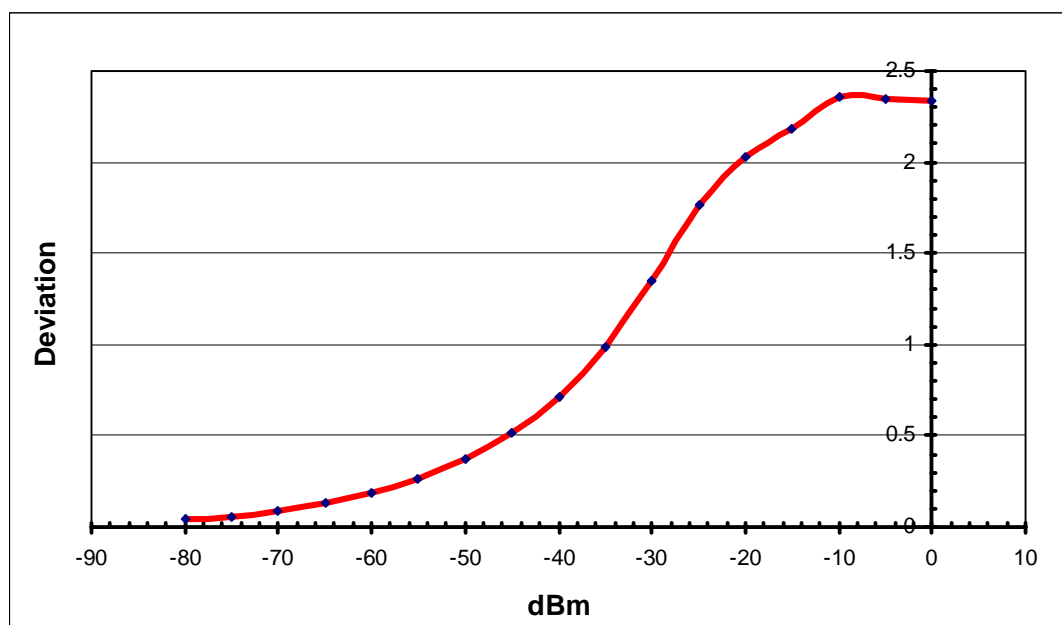
The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured. See plot below.



2.1047(b)      Audio input versus modulation

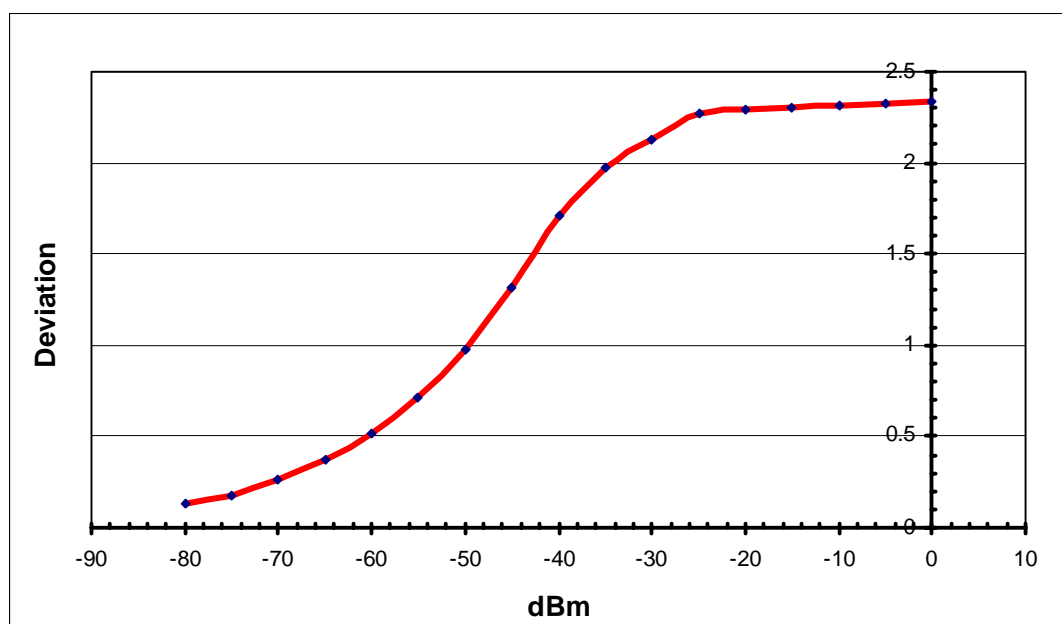
The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

MODULATION LIMITING PLOT - 300 Hz



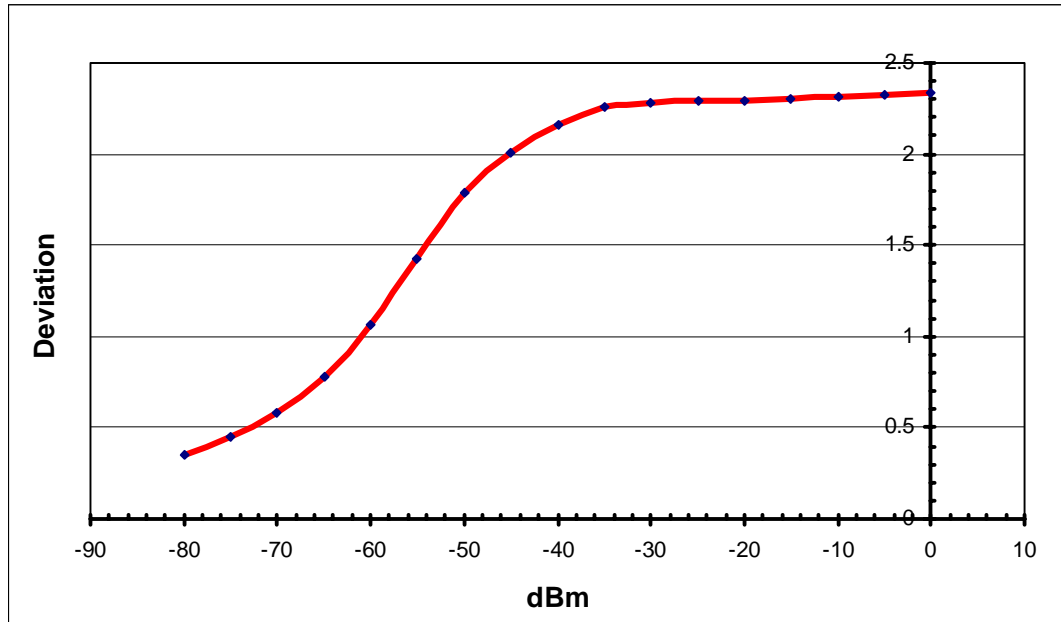
300Hz

MODULATION LIMITING PLOT - 1000 Hz



1000Hz

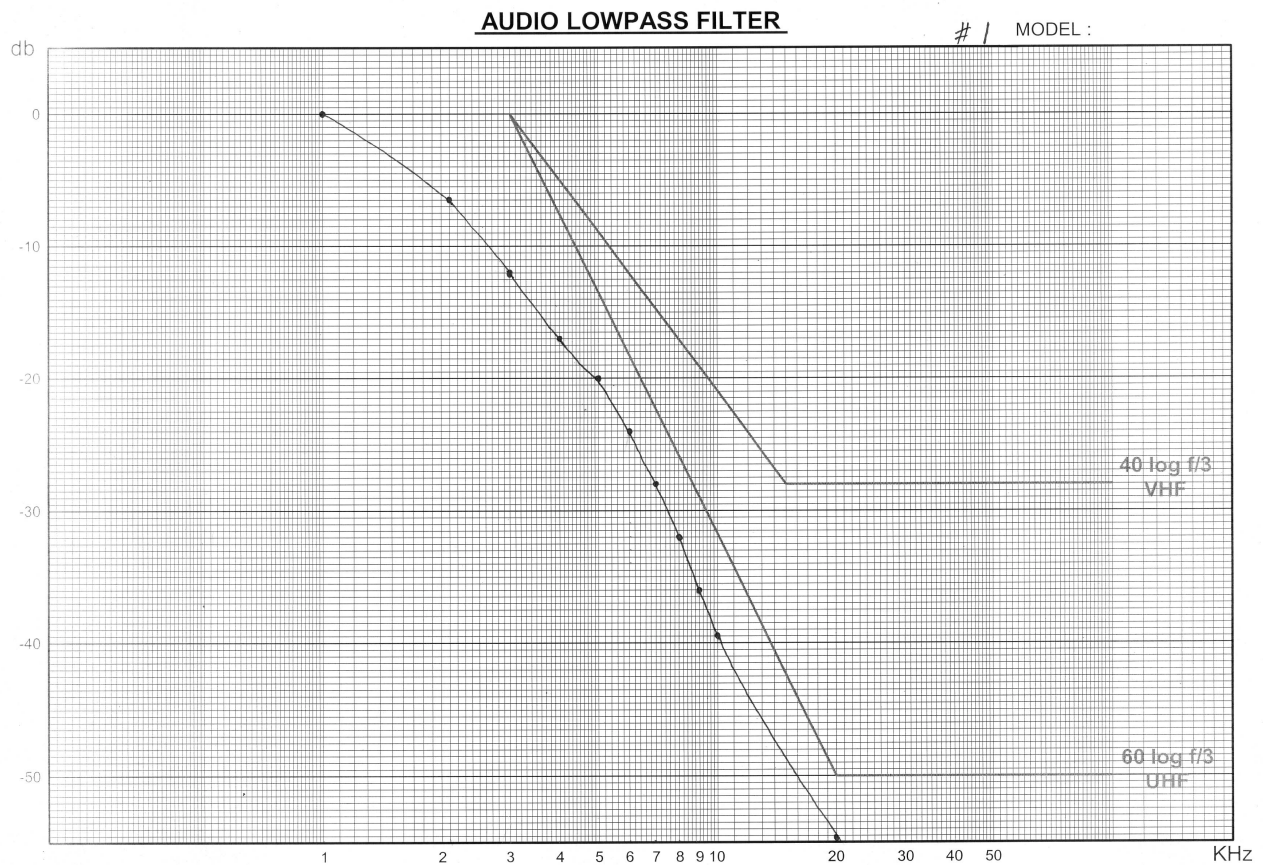
MODULATION LIMITING PLOT - 2500 Hz



2500Hz

95.637

Post Limiter Filter Each GMRS transmitter, except a mobile station transmitter with a power of 2.5 Watts 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 1 kHz. See below.



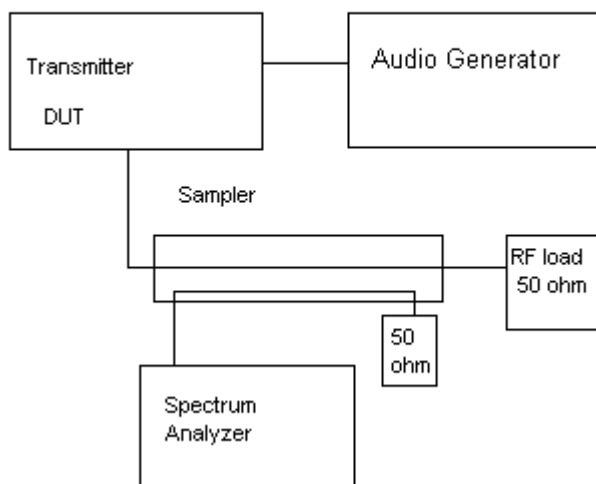


2.1049 Occupied bandwidth:

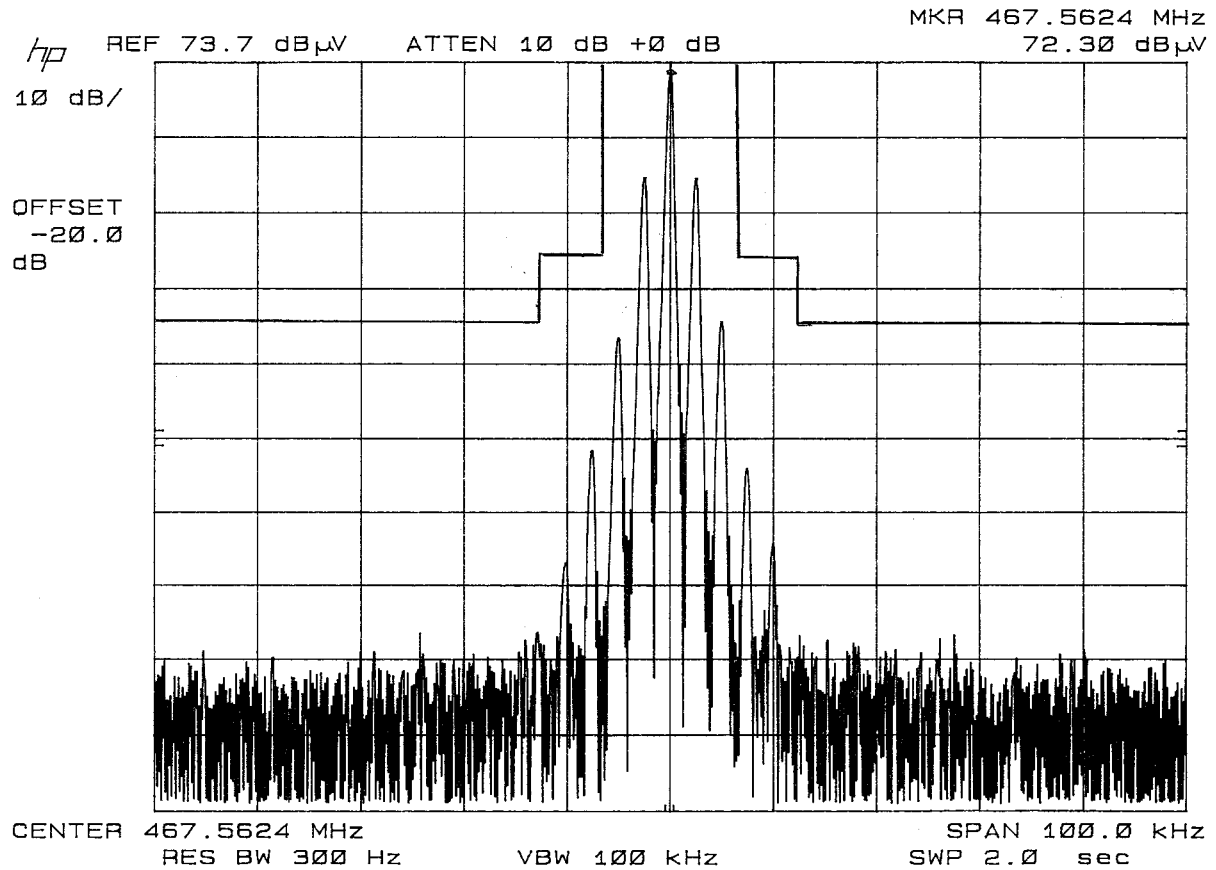
95.635(b)(1)(3)(7)

At least 25 dB 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 35 dB 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.

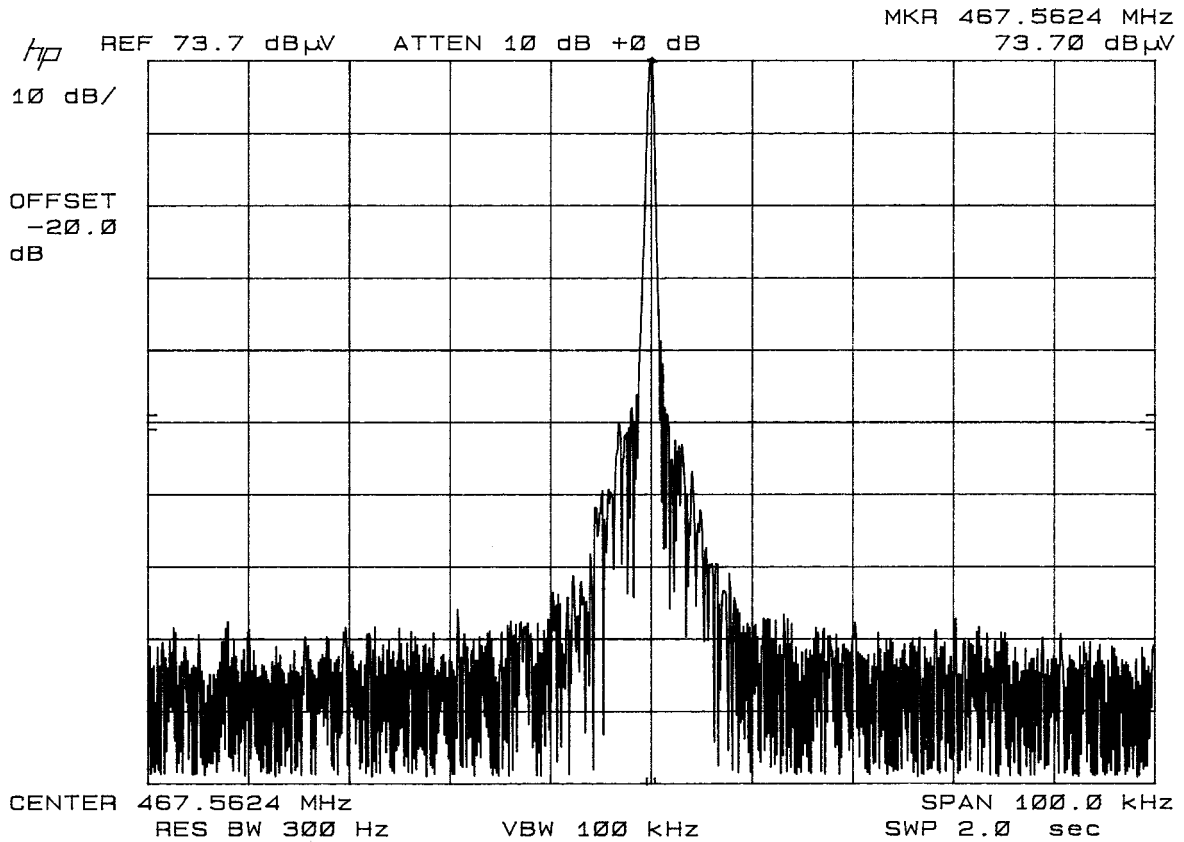
#### Occupied BW Test Equipment Setup



# OCCUPIED BANDWIDTH PLOT

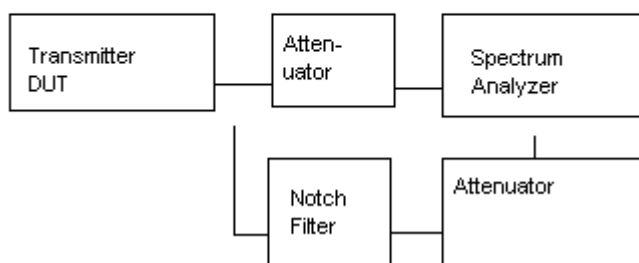


# OCCUPIED BANDWIDTH CW PLOT



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 scanned from 30 MHz to at least the 10th harmonic of the fundamental.

Spurious Emissions 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.

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:  $43 + 10\log(.8) = 42$  dB

TEST DATA (GMRS):

Emission Frequency MHz	Field Strength dBuV/m	dB below carrier	dBm	Margin dB
462.70	126.20	0.00	29	0.00
925.40	73.4	53	-24	11
1,388.20	72	54	-25	12
1,850.90	75	51	-22	9
2,313.70	73	53	-24	11
2,776.40	69	57	-28	15
3,239.10	77	49	-20	7
3,701.90	71	55	-26	13
4,164.60	63	63	-34	21
4,627.40	69	57	-28	15

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 TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

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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: FRS:  $43 + 10\log(.33) = 38.2$  dB

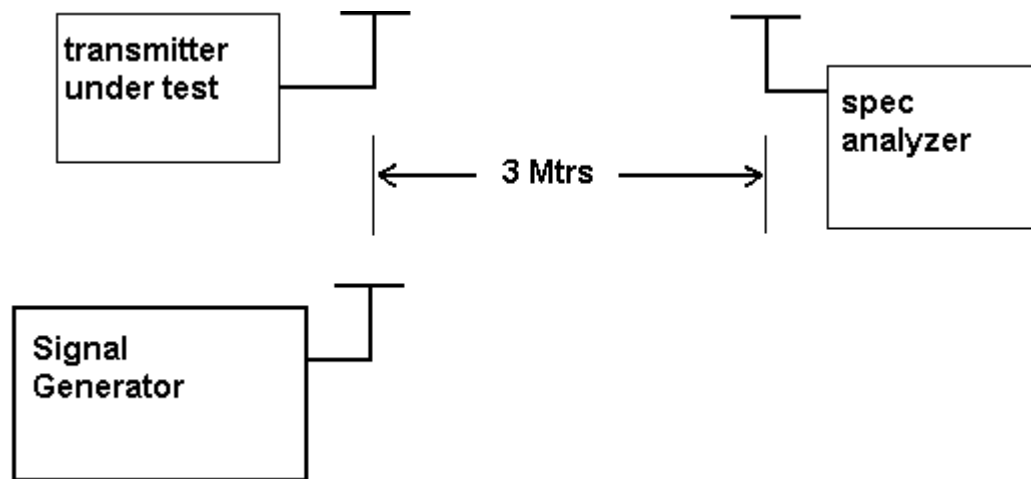
TEST DATA (FRS):

Emission Frequency MHz	Field Strength dBuV/m	dB below carrier	dBm	Margin dB
467.50	122.50	0.00	25.2	0.00
935.10	74	49	-24	10.8
1,402.70	72	51	-26	12.8
1,870.30	79	44	-19	5.8
2,337.90	73	50	-25	11.8
2,805.40	67	56	-31	17.8
3,273.00	73	50	-25	11.8
3,740.60	69	54	-29	15.8
4,208.20	64	59	-34	20.8
4,675.80	63	60	-35	21.8

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 TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

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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.

2.1055  
95.621(b)

#### Frequency stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00025%, 2.5 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.

Readings were also taken at the end point of the battery voltage of 6.0 VDC.

#### MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.724 823

TEMPERATURE C	FREQUENCY MHz	PPM
REFERENCE_____	462.724 823	00.00
-30C_____	462.723 69	-2.45
-20C_____	462.724 308	-1.11
-10C_____	462.725 091	0.58
0C_____	462.725 095	0.59
10C_____	462.725 055	0.50
20C_____	462.724 885	0.13
30C_____	462.724 781	-0.09
40C_____	462.724 762	-0.13
50C_____	462.725 06	0.51

BATT. %	BATT. DATA	VOLTS	BATT. PPM
end pt	462.724 806	5.1	-0.04

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -2.45 to +0.59 ppm. The maximum frequency variation with voltage was -0.04.

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.



## EMC Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 12/22/99	12/22/02
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower Spectrum Analyzer (Tan)	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector (Tan)	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter (Tan)	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower Spectrum Analyzer (Blue)	HP	8568B	2928A04729	CHAR 10/22/01	10/22/03
X	RF Preselector (Blue)	HP	85685A	2848A18049 2926A00983	CHAR 10/22/01	10/22/03
X	Quasi-Peak Adapter (Blue)	HP	85650A	2811A01279	CHAR 10/22/01	10/22/03
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CHAR 3/15/00	3/15/02
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CHAR 10/16/01	10/16/03
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 11/24/00	11/24/03
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 12/19/01	12/19/03
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/21/01	3/21/03
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03

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	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/16/01	3/16/03
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
	Multimeter	Fluke	FLUKE-77-3	79510405	CAL 9/26/01	9/26/03
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/03
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
X	Temp/Humidity gauge	EXTech	44577F	E000901	CHAR 1/22/02	1/22/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
	Signal Generator	HP	8640B	2308A21464	CAL 11/15/01	11/15/03
	Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
	Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/03

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	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
	High Pas Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
	Frequency Counter	HP	5385A	3242A07460	CHAR 12/11/01	12/11/03
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03
	Egg Timer	Unk			CHAR 8/31/01	8/31/03
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		2/1/02	2/1/04
	Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/04
	Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
	Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
	Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04