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**APPLICANT:** COBRA ELECTRONICS CORPORATION

**FCC ID:** BBOPR560

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GENERAL INFORMATION REQUIRED  
FOR CERTIFICATION

2.1033(c)(1)(2) COBRA ELECTRONICS CORPORATION will manufacture the  
FCCID: BBOPR560 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 4.

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 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 12.5KHz

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 6V, and the transmitter properly  
adjusted the RF output measures:

GMRS - 1.0 Watt ERP, SUBSTITUTION METHOD  
FRS - 0.5 Watt ERP, SUBSTITUTION METHOD

2.1033(c)(6)(7) No GMRS shall exceed 50 Watts carrier power  
95.639 (a)(1)

95.639 (d) No FRS unit, under any condition of modulation, shall  
95.649 exceed 0.500W effective radiated power (ERP). There  
can be no provisions for increasing the power or  
varying the power.

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

FOR LOW POWER SETTING INPUT POWER: (6.0V)(.580A) = 3.48 Watts  
FOR HIGH POWER SETTING INPUT POWER: (6.0V)(.740A) = 4.44 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 2 of this report. The block  
diagrams are included as EXHIBIT 1 of this  
report.

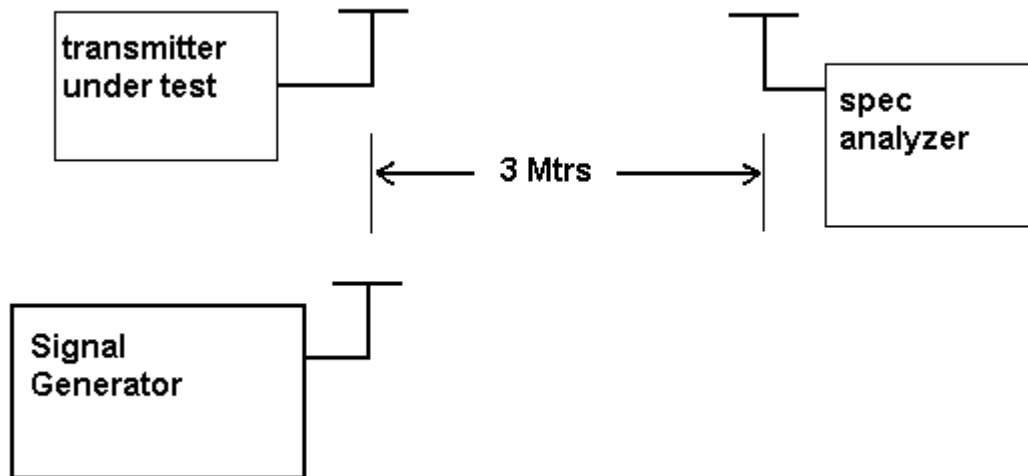
2.1033(c)(11) A photograph or a drawing of the equipment  
identification label is included as EXHIBIT 4.

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 7-8.

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



2.1047(a)(b)      Modulation characteristics:

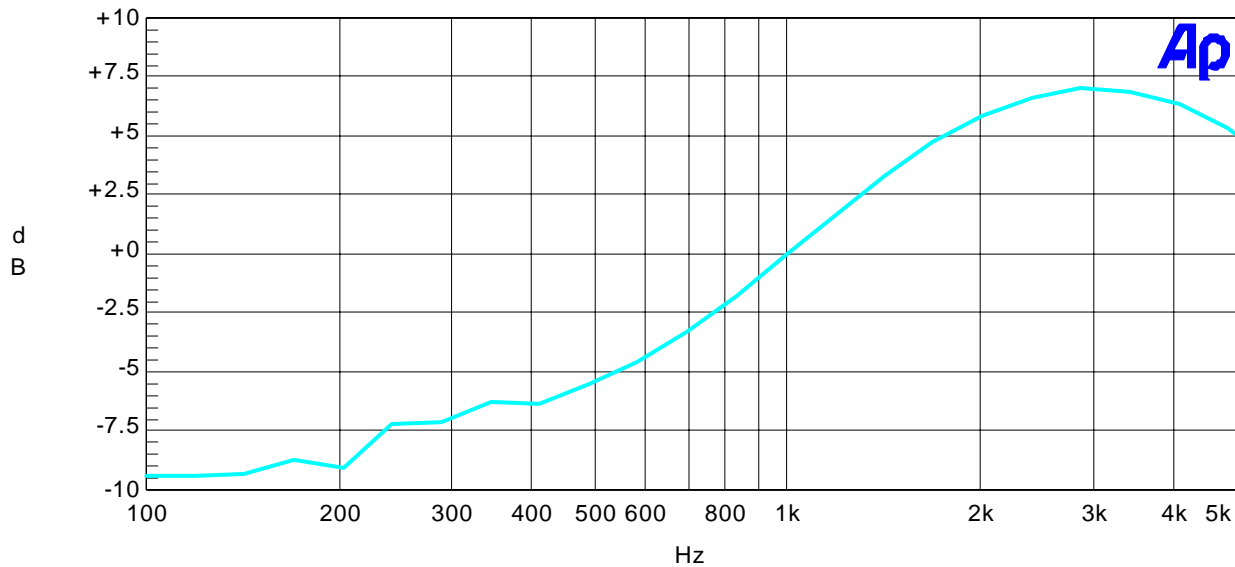
AUDIO FREQUENCY RESPONSE

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

TIMCO Engineering Inc :17 MAY 90 11:20:29

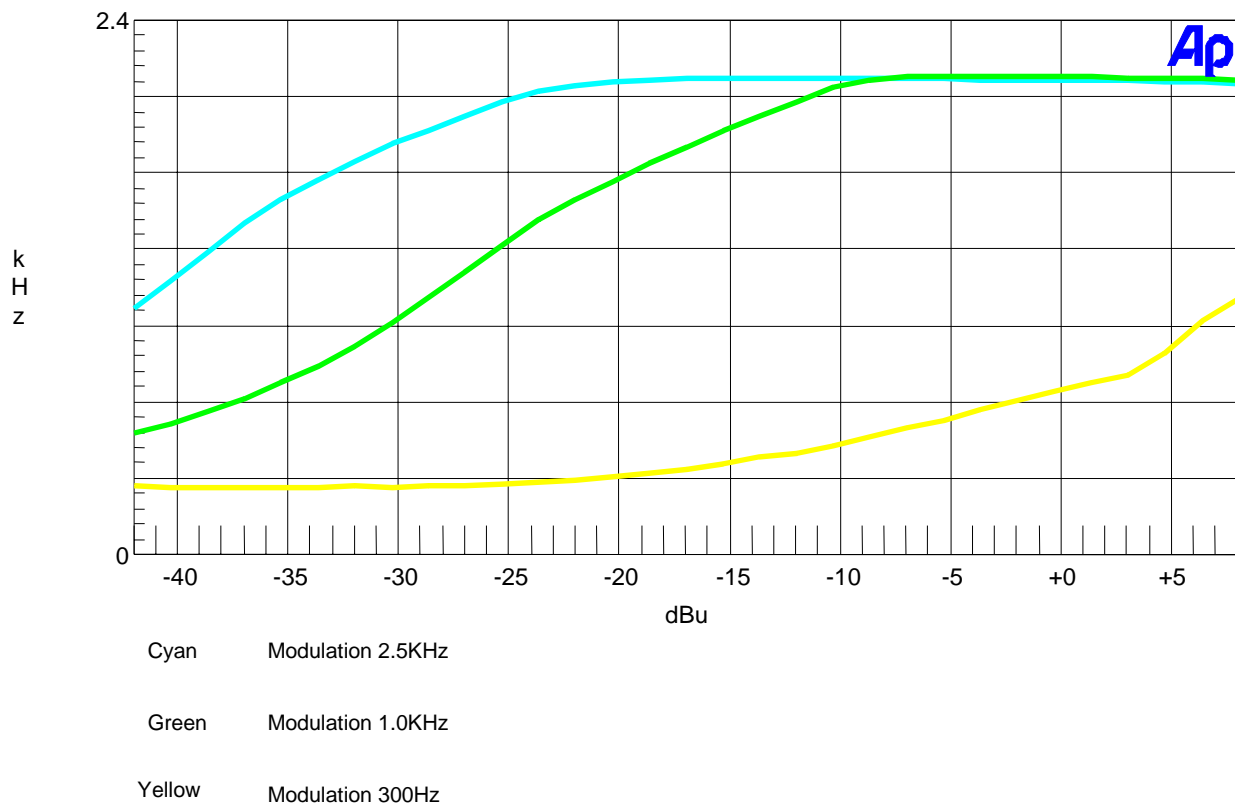
09/30/03 09:45:27



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 3000 Hz. See below.

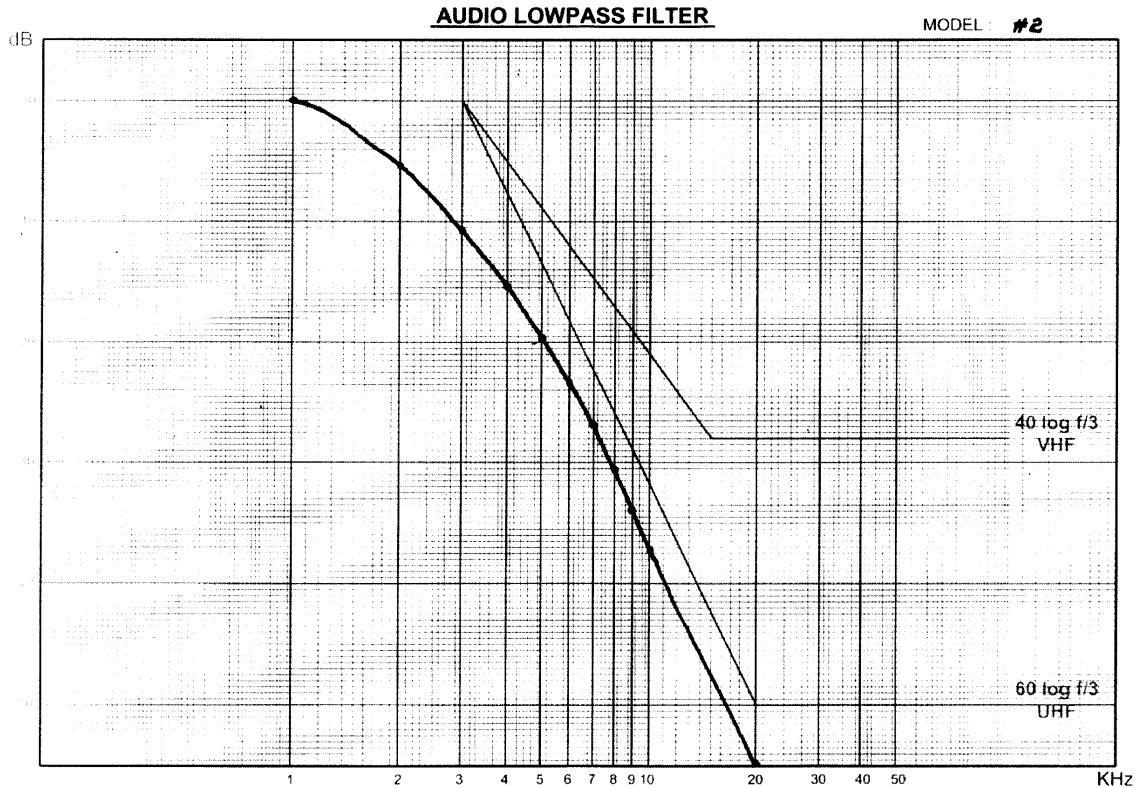
#### MODULATION LIMITING PLOT

Modulation Limiting: 2.5KHz, 1.0KHz, 300Hz



95.637

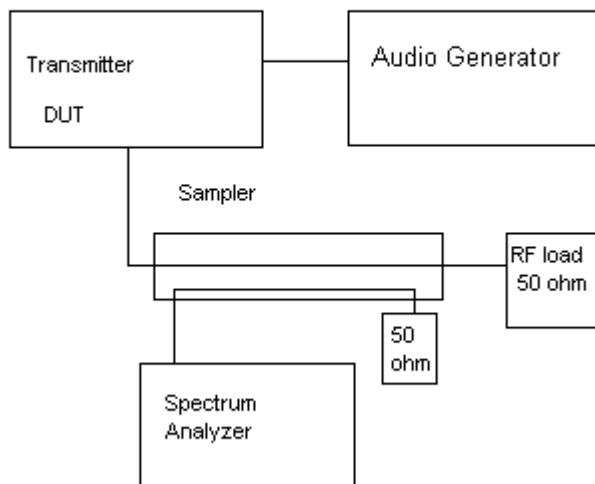
Post Limiter Filter Each GMRS transmitter, except a mobile station transmitter with a power of 2.5Watts or less, must be equipped with an audio low pass filter. At any frequency between 3 & 20 kHz the filter must have an attenuation of  $60 \log (f/3)$  greater than the attenuation at 1KHz. See below.



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 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 the following plot.

Occupied BW Test Equipment Setup

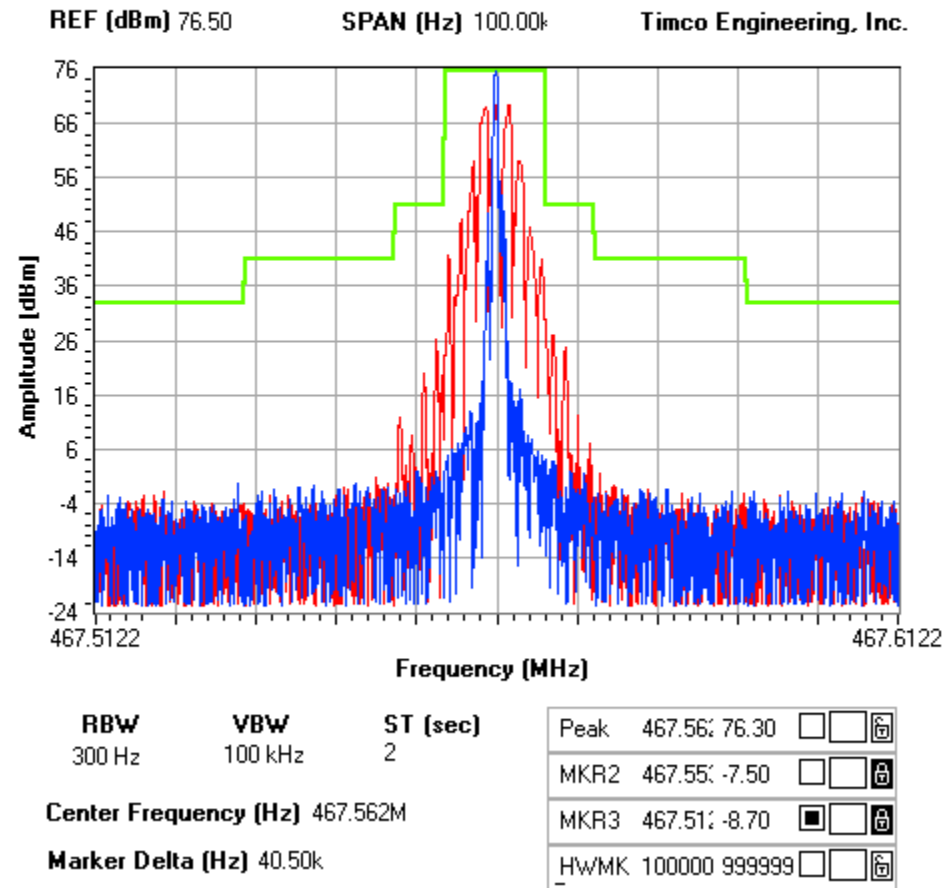




# OCCUPIED BANDWIDTH PLOT

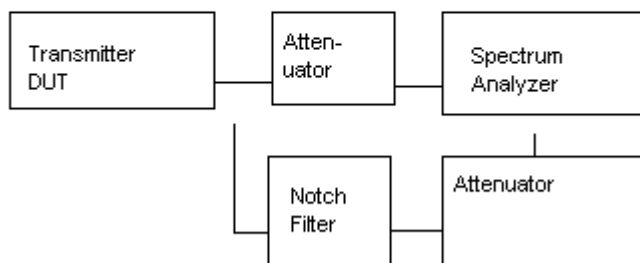
## NOTES:

FCC 95.635 Mask (1) (3) (7)



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 0.4 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

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 C63.4-1992.

REQUIREMENTS: GMRS:  $43 + 10\log(1) = 43$  dB

TEST DATA (GMRS):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
462.70	V	30.0	0	-1.46	0.00
925.30	V	-29.7	0	-1.32	59.56
1388.00	V	-25.2	1.1	-4.99	57.63
1850.70	V	-43.4	1.2	-5.24	75.98
2313.40	V	-18.4	1.25	-6.70	52.39
2776.10	H	-24.9	1.3	-7.20	59.34
3238.80	V	-29.9	1.4	-7.40	64.44
3701.50	V	-12.5	1.4	-7.50	47.14
4164.40	H	-12.5	1.45	-7.60	47.19
4627.20	V	-16.2	1.5	-8.30	51.54

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

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 C63.4-1992.

REQUIREMENTS: FRS:  $43 + 10\log(.5) = 40$  dB

TEST DATA (FRS):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
467.50	V	27.00	0	-1.46	0
935.10	V	-29.70	0	-1.32	58.02
1402.60	V	-27.60	1.1	-4.99	58.49
1870.10	V	-36.10	1.2	-5.24	67.14
2337.70	V	-20.90	1.25	-6.7	53.35
2805.20	H	-33.00	1.3	-7.2	65.9
3272.70	V	-17.10	1.4	-7.4	50.1
3740.30	V	-12.70	1.4	-7.5	45.8
4207.90	H	-25.30	1.45	-7.6	58.45
4675.50	V	-14.30	1.5	-8.3	48.1

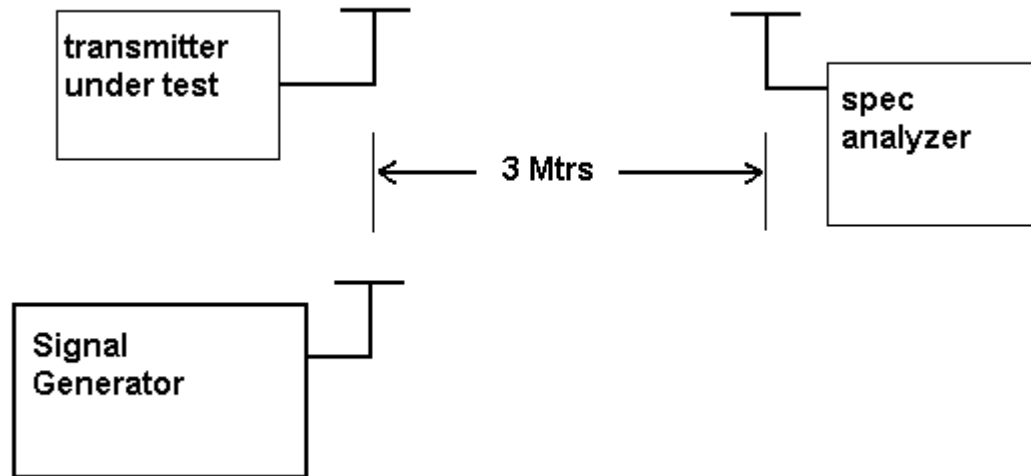
METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at 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 0.0005%, 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.

Readings were also taken at battery end point.

#### MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.562 500

TEMPERATURE C	FREQUENCY MHz	PPM
REFERENCE	462.562 500	0.00
-30C	462.561 823	-1.46
-20C	462.562 784	0.61
-10C	462.563 34	1.82
0C	462.563 603	2.38
10C	462.563 458	2.07
20C	462.562 976	1.03
30C	462.462 534	0.07
40C	462.562 168	-0.72
50C	462.562 212	-0.62

BATT. %	BATT. DATA	VOLTS	BATT. PPM
-15%	462.562 954	5.1	0.98

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	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
Biconnical Antenna	Electro- Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 4/15/03	4/15/05
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
LISN	Electro- Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
LISN	Electro- Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
Log-Periodic Antenna	Eaton	96005	1243	CAL 5/8/03	5/8/05
Log-Periodic Antenna	Electro- Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
Log-Periodic Antenna	Electro- Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
Log-Periodic Antenna	Electro- Metrics	LPA-30	409	CAL 3/4/03	3/4/05
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Modulation Meter	Boonton	8220	10901AB	CAL 4/15/03	4/15/05

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Oscilloscope	Tektronix	2230	300572	CAL 7/3/03	7/3/05
Silver Tower Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03