

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com



Test Report

Product Name: FRS/GMRS TRANSCEIVER

FCC ID: BBOPR990

Applicant:

**COBRA ELECTRONICS CORPORATION
6500 WEST CORTLAND STREET
CHICAGO, IL 60707**

Date Receipt: JULY 12, 2004

Date Tested: JULY 23, 2004

APPLICANT: CCOBRA ELECTRONIC CORPORATION

FCC ID: BBPR990

REPORT #: C\COBRA\1072AUT4\1072AUT4TestReport

COVER SHEET

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EXHIBITS INCLUDED:

CONFIDENTIALITY LETTER
BLOCK DIAGRAM
SCHEMATICS
PARTS LIST
USERS MANUAL
LABEL SAMPLE
LABEL LOCATION
EXTERNAL PHOTOGRAPHS
INTERNAL PHOTOGRAPHS
ALIGNMENT PROCEDURE
OPERATIONAL DESCRIPTION
TEST SET UP PHOTOGRAPHS

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GENERAL INFORMATION REQUIRED FOR CERTIFICATION

2.1033(c)(1)(2) COBRA ELECTRONICS CORPORATION will manufacture the
FCCID: BBOPR990 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 in the exhibits.

2.1033(c) (4) Type of Emission: 11K0F3E
95.631

$B_n = 2M + 2DK$

$M = 3000$

$D = 2500$

$B_n = 2(3000) + 2(2500) = 11.0K$

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. 462.7500
	5. 462.6000	17. 462.7500
	6. 462.6125	18. 462.7000
	7. 462.6250	19. 462.6250
	8. 462.6375	20. 462.6500
	9. 462.6500	21. 462.6750
	10. 462.6625	22. 462.7000
	11. 462.6750	23. 462.7250
	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

2.1033(c)(6)(7) 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.

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

POWER INPUT

FINAL AMPLIFIER ONLY

High

Vce = 6 VDC

Ice = 0.710 A.

Pin = 4.26 Watts

Low

Vce = 6 VDC

Ice = 0.590 A.

Pin = 3.54 Watts

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included in the exhibits.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram and block diagram are included in the exhibits.

2.1033(c)(11) A photograph or a drawing of the equipment identification label is included in the exhibits.

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.

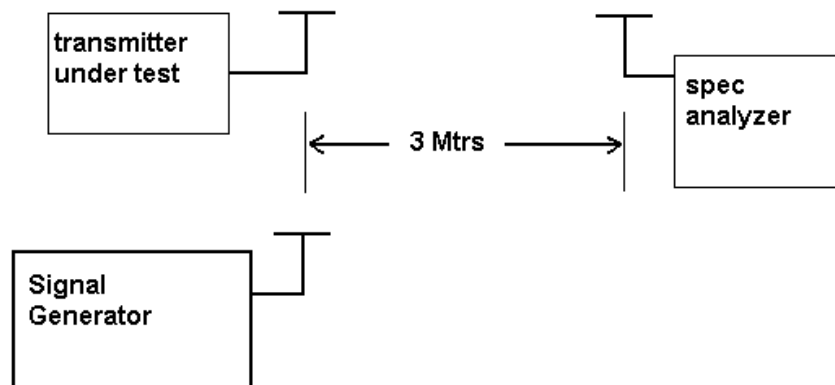
2.1033(c)(13) Digital modulation is not allowed.

2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

2.10311c)(6)(7) RF power is measured by the substitution method as outlined in TIA/EIA - 603. With a nominal battery voltage of 6.0 V, and the transmitter properly adjusted the RF output measures:

GMRS - .286 Watts

FRS - .233 Watts



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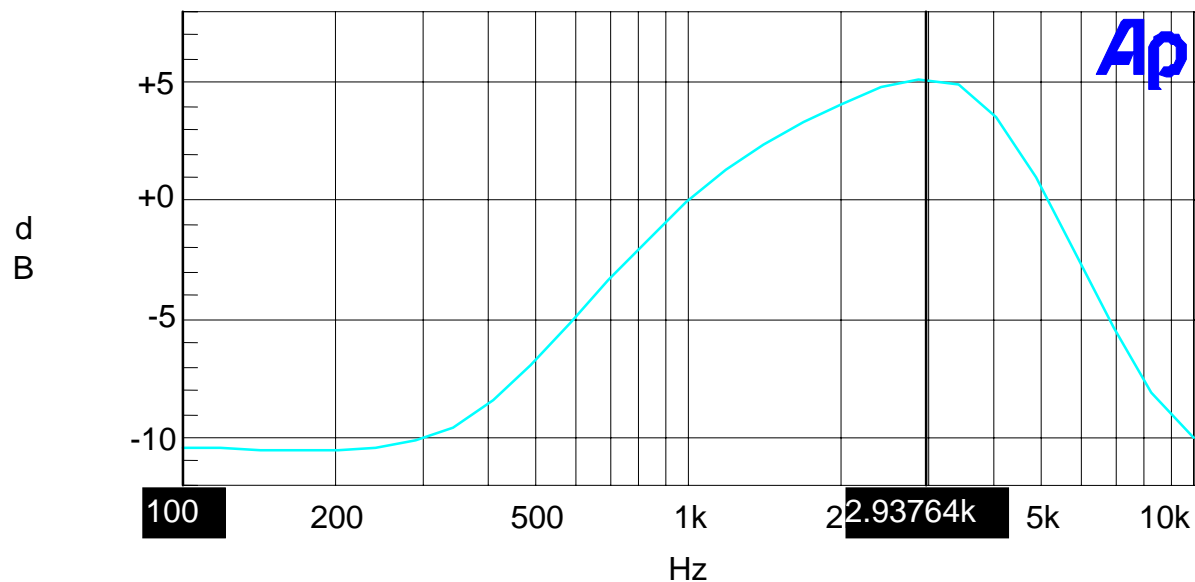
2.1047(a)(b)

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.

1072AUT4 Audio Frequency Response



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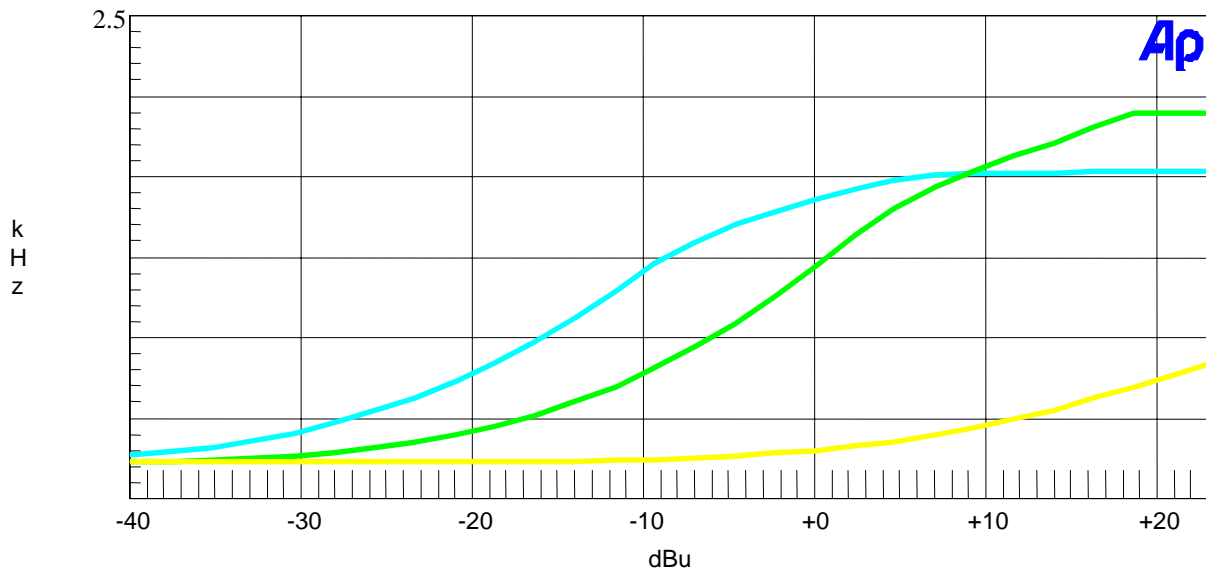
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2.1047(b) Audio input versus modulation

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 the plot below.

1072AUT4 Modulation Limiting

2.5k blue, 1k green, 300Hz yellow



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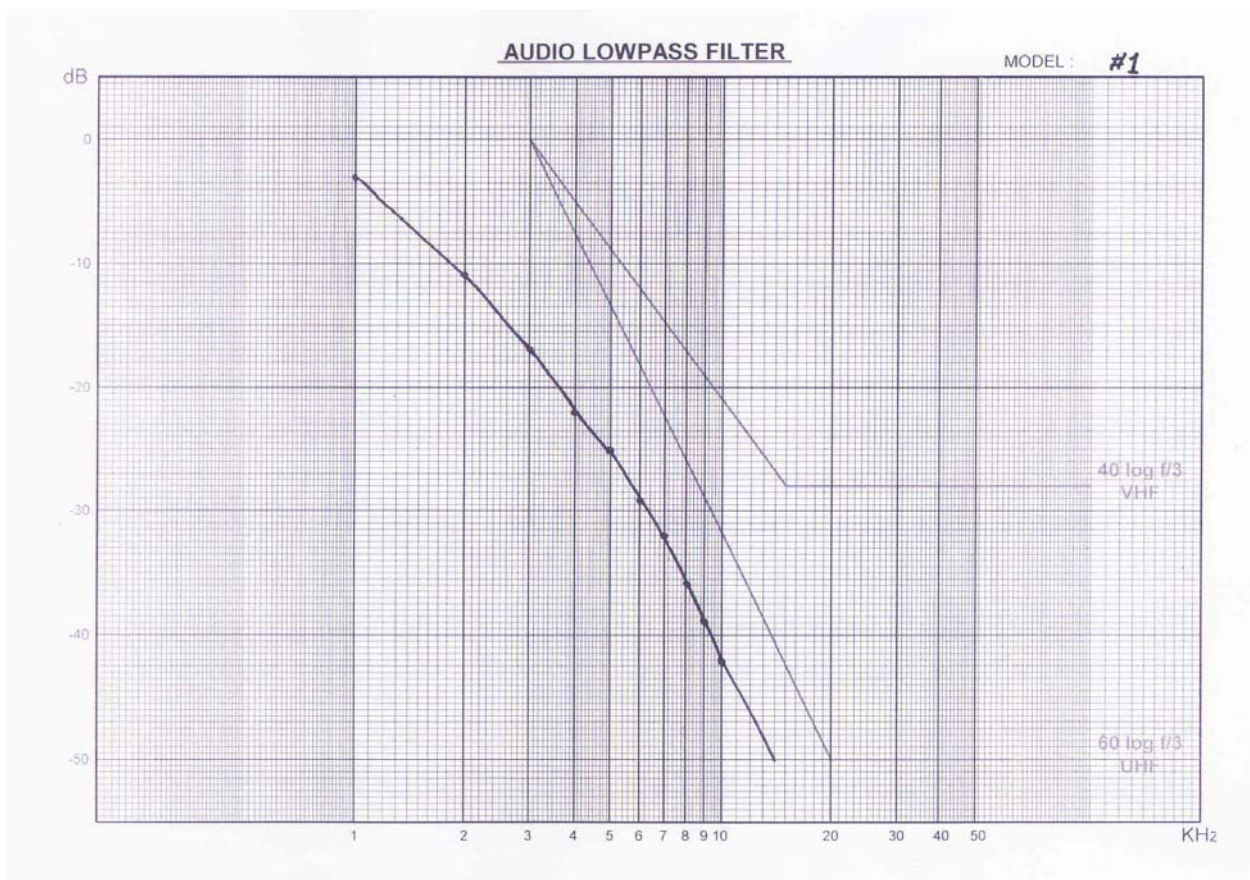
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95.637

Post Limiter Filter Plot

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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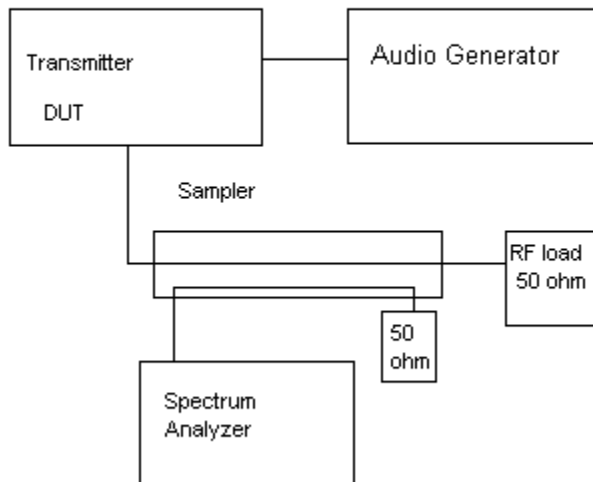
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2.1049 Occupied bandwidth:

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 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 plot on the next page.

Occupied BW Test Equipment Setup



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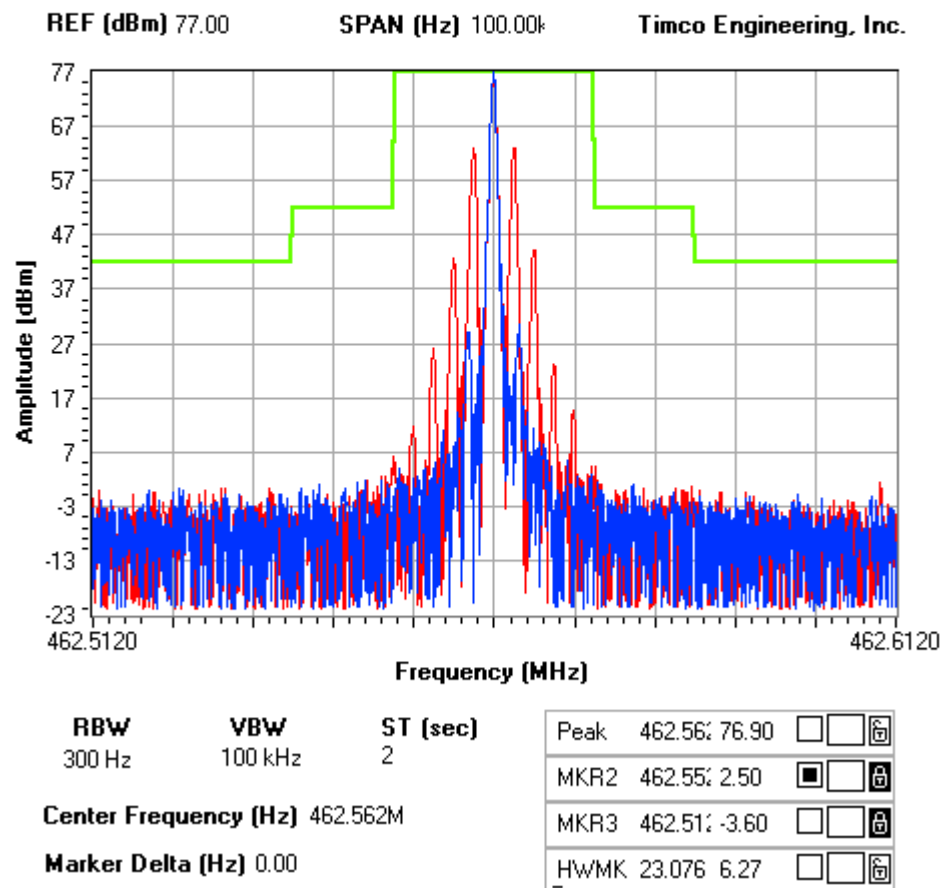
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OCCUPIED BANDWIDTH PLOT

NOTES:

1072aut4 occupied bandwidth

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



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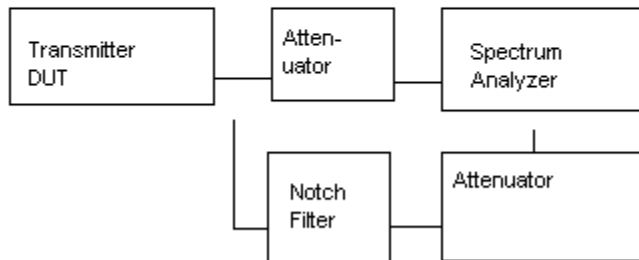
2.1051 Spurious emissions at antenna terminals(conducted):
The following data shows the level of conducted Spurious responses at the antenna terminal. The test Procedure used was TIA/EIA 603 S2.2.13 with the exception that the emissions were recorded in dBc. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental.

NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

2.1051 Not Applicable, no antenna terminal allowed.

Method of Measuring Conducted Spurious Emissions

Spurious Emissions at
Antenna Terminals



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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.

TEST DATA:

GMRS: $43 + 10\log(.286) = 37.56 \text{ dB}$

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
462.70	V	25.06	0	-0.5008	0
925.40	V	-13.90	0	-0.8548	39.314
1388.20	V	-33.80	1.07764	4.5028	54.934
1850.90	H	-21.30	1.17018	5.16054	41.8688
2313.70	H	-23.60	1.26274	6.25384	43.1681
2776.40	H	-37.30	1.32764	7.07112	56.1157
3239.10	H	-20.90	1.37391	7.39346	39.4397
3701.90	H	-22.10	1.42019	7.55	40.5294
4164.60	V	-33.30	1.46646	7.81336	51.5123
4627.40	V	-22.30	1.52548	8.19712	40.1876

TEST DATA:

FRS: $43 + 10\log(.233) = 36.67$

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
467.50	V	24.20	0	-0.52	0
935.10	V	-17.10	0	-0.9712	41.7512
1402.70	V	-33.50	1.08054	4.5608	53.6997
1870.30	V	-27.00	1.17406	5.17218	46.6819
2337.90	V	-26.20	1.26758	6.33128	44.8163
2805.40	V	-31.20	1.33054	7.09432	49.1162
3272.00	V	-28.20	1.3773	7.4138	45.8435
3740.60	V	-26.80	1.42406	7.55	44.3541
4208.20	H	-27.50	1.47082	7.88312	44.7677
4675.80	V	-32.00	1.53516	8.13904	49.0761

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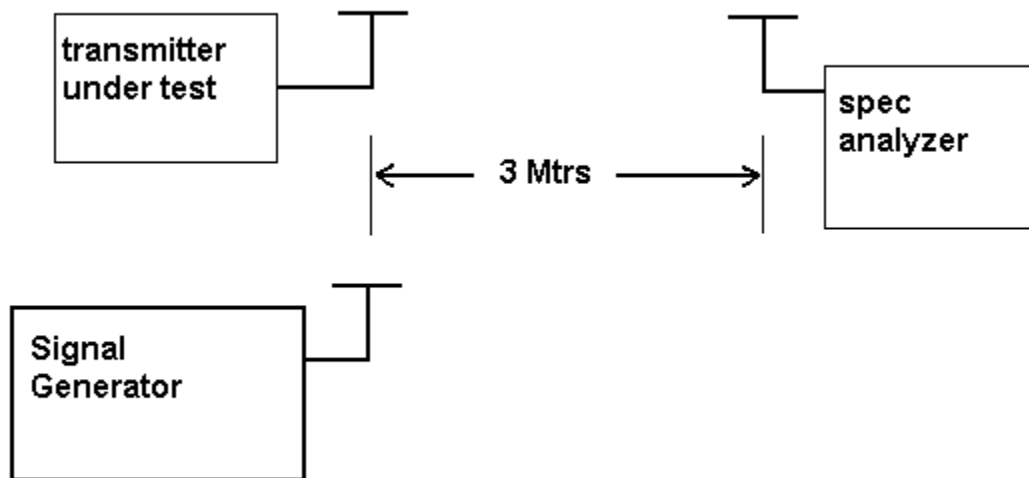
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Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

* Appropriate antenna raised from 1 to 4 M.

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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2.1055
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° 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° 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° C.

Readings were also taken at plus and minus 15% of the battery voltage of 6.0 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.562 244

TEMPERATURE C	FREQUENCY MHz	PPM
REFERENCE	462.462 244	00.00
-30C	462.562 806	+ 1.21
-20C	462.561 162	- 2.34
-10C	462.561 22	- 2.21
0C	462.561 698	- 1.18
10C	462.562 835	+ 1.28
20C	462.562 65	+ 0.88
30C	462.562 335	+ 0.20
40C	462.562 101	- 0.31
50C	462.562 178	- 0.14

	VOLTS	Batt. Data	Batt. PPM
-15%	5.10	462.562 192	-0.11

RESULTS OF MEASUREMENTS: The test results indicate the EUT meets the requirements for both GMRS and 2.5ppm requirements for a FRS.

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EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
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	2620A00294	CAL 4/27/04	4/27/06
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

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