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**APPLICANT:** COBRA ELECTRONICS CORPORATION

**FCC ID:** BBOHH100

**TEST REPORT:**

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**EXHIBIT CONTAINING:**

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GENERAL INFORMATION REQUIRED  
FOR TYPE ACCEPTANCE

- 2.1033(c) COBRA ELECTRONICS CORPORATION will sell the  
FCC ID: BBOHH100 VHF Marine transmitter in  
quantity, for use under FCC RULES PART 80.
- 2.1033(c) TECHNICAL DESCRIPTION
- (4) Type of Emission: 14K0G3E/14K0F3E For 20KHz  
For 25KHz  
Bn = 2M + 2DK  
M = 3000  
D = 4.0KHz (Peak Deviation)  
K = 1  
Bn = 2(3.0K) + 2(4.0K)(1) = 6.0K + 8.0 = 14.0K
- 80.205(A) ALLOWED AUTHORIZED BANDWIDTH = 20.00KHz.
- 2.1033(c)(5) Frequency Range: 156.025-157.425 MHz
- 2.1033(c)(6) Power Range and Controls: There is a user Power  
switch for High/Low Power.
- 2.1033(c)(8) DC Voltages and Current into Final Amplifier:
- POWER INPUT  
FINAL AMPLIFIER ONLY
- |                  |                  |
|------------------|------------------|
| High             | Low              |
| Vce = 6 VDC      | Vce = 6 VDC      |
| Ice = .960 A.    | Ice = .302       |
| Pin = 5.76 Watts | Pin = 1.82 Watts |
- Function of each electron tube or semiconductor  
device or other active circuit device: - SEE EXHIBIT# 7
- 2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is  
included as EXHIBIT 2. The block diagram is  
included as EXHIBIT 1.
- 2.1033(c)(3) Instruction book. The instruction manual is included  
as EXHIBIT #3.

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2.1033(c) (9) Tune-up procedure. The tune-up procedure is given in EXHIBIT #8.

Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual.

2.1033(c) (13) Digital modulation. This unit does NOT use digital modulation.

The data required by 2.1046 through 2.1055 is submitted below.

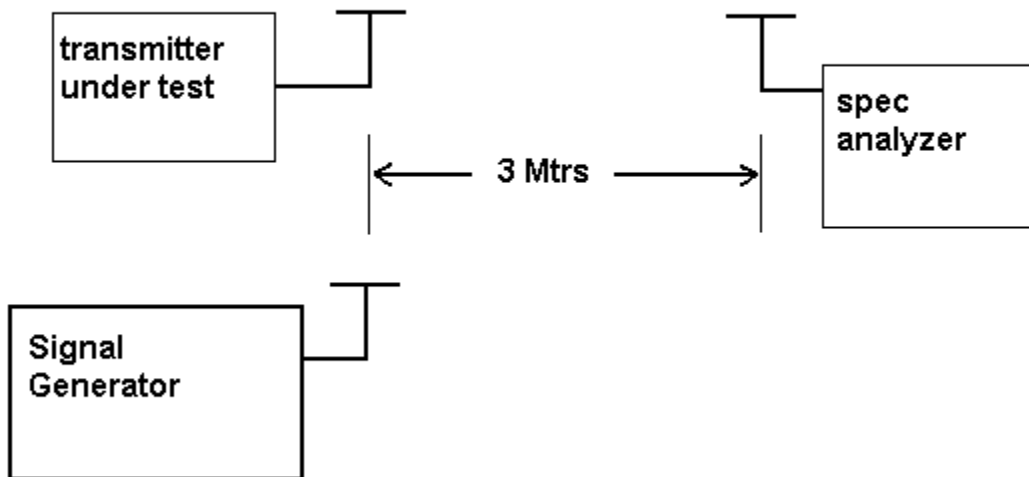
2.1046(a) RF\_power\_output.  
80.215(e)(1)

RF power is measured by connecting the ERP METHOD. With A nominal battery voltage of 9.0V, and the transmitter Properly adjusted the RF output measures:

POWER OUTPUT

OUTPUT POWER: HIGH: .78 Watts ERP  
LOW: .42 Watts ERP

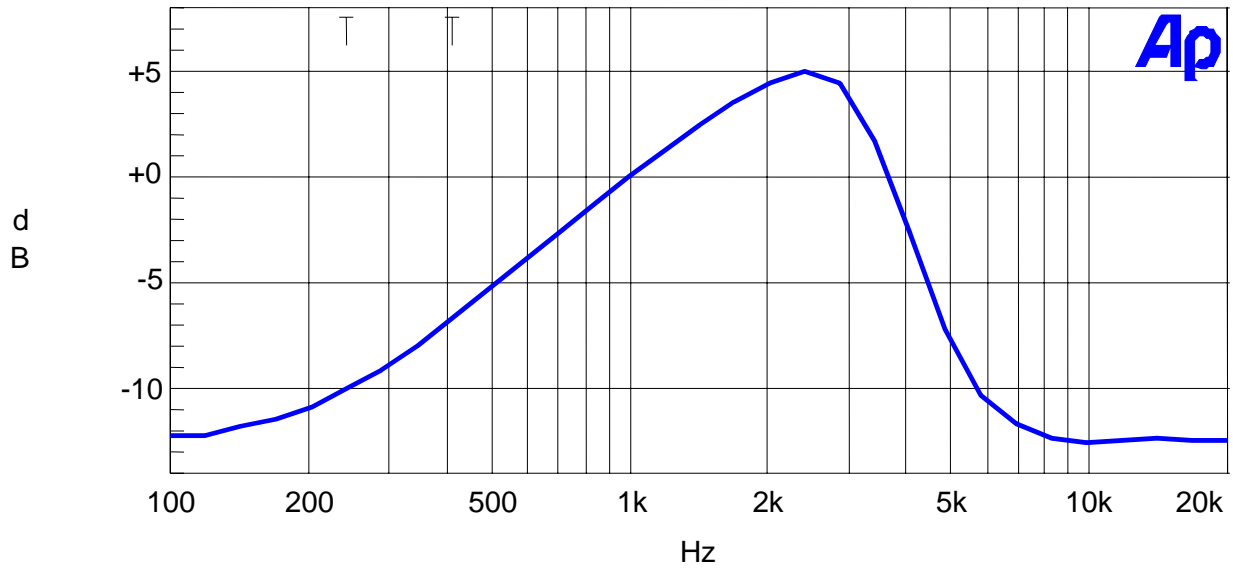
METHOD OF MEASURING RF POWER OUTPUT



2.1047(a) Voice Modulation characteristics:

(b) AUDIO\_FREQUENCY\_RESPONSE

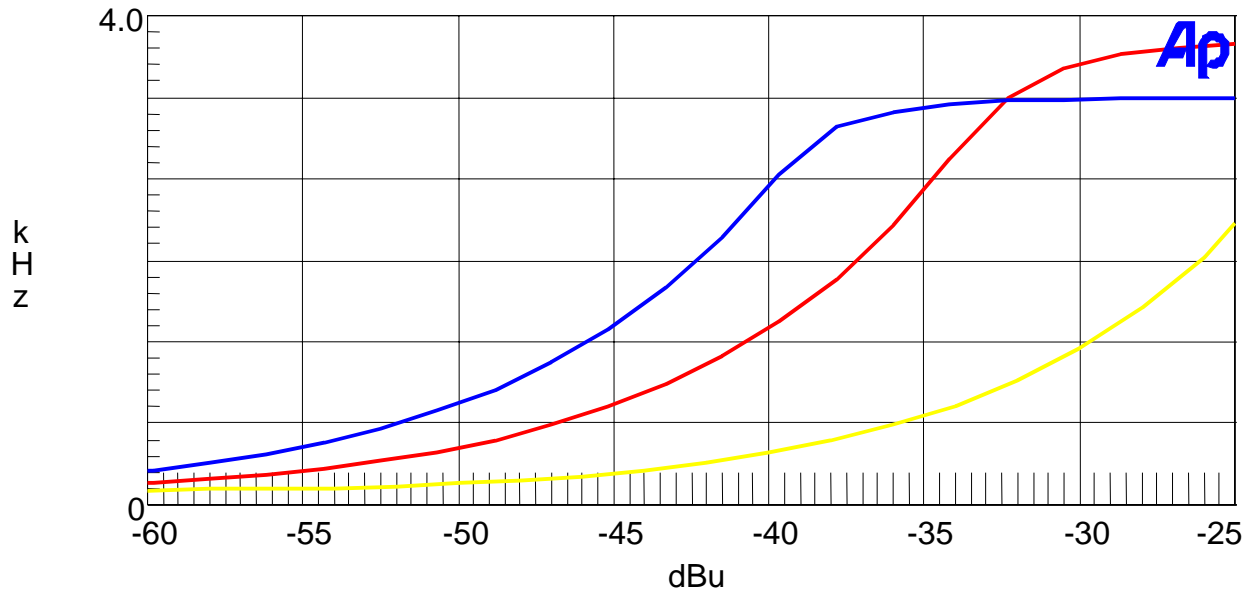
## Audio Frequency Response



2.1047(b)  
80.213(d)

Audio\_input\_versus\_modulation

Modulation Limiting: 2.5 KHz, 1.0 KHz, 300 Hz



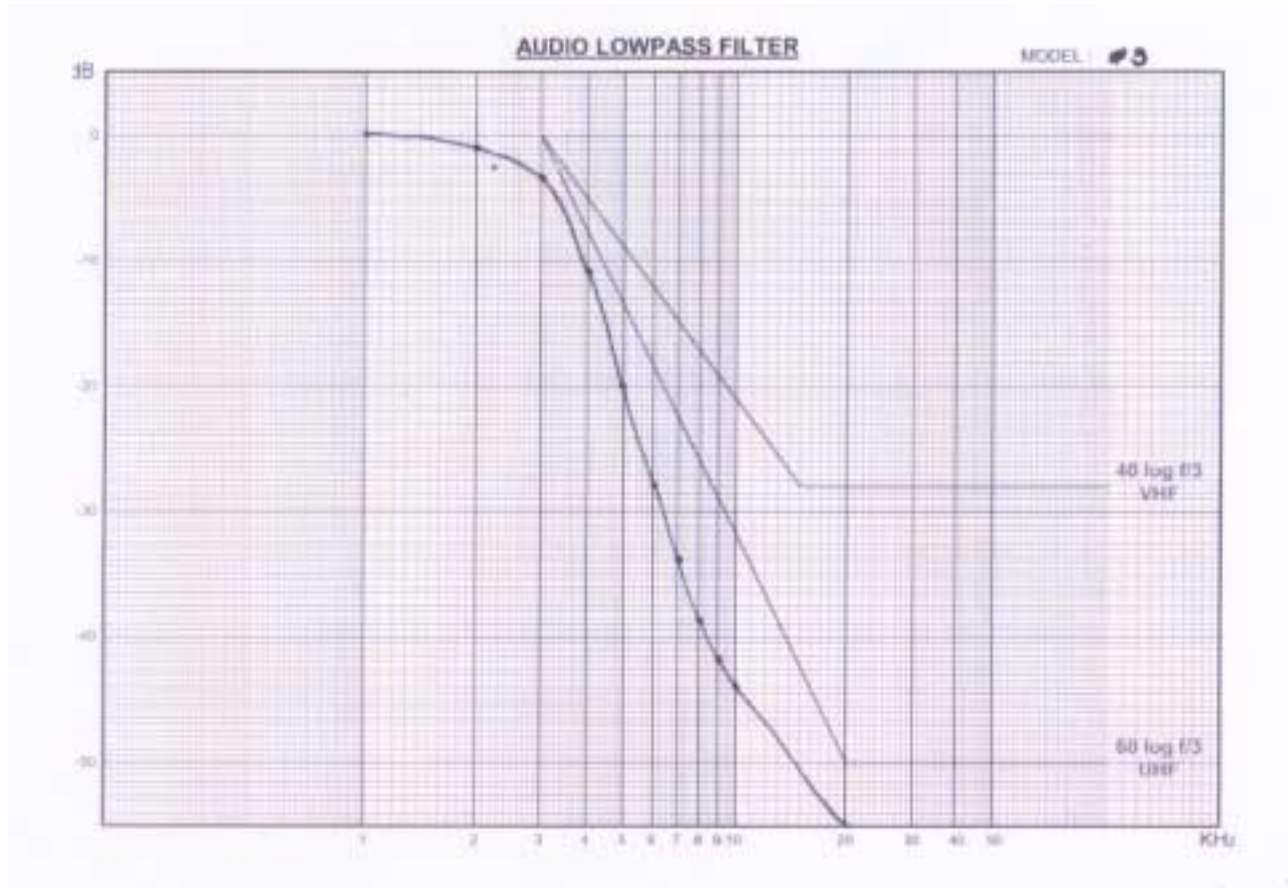
- Blue Modulation 2.5KHz
- Red Modulation 1.0KHz
- Yellow Modulation 300Hz

2.1047(a)

AUDIO LOW PASS FILTER

The audio low pass filter is included and the plot is shown below. Rules 80.213(e) for ship stations with a low pass filter.

**AUDIO LOW PASS FILTER GRAPH**



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2.1049(c) Occupied bandwidth:

80.213(b)

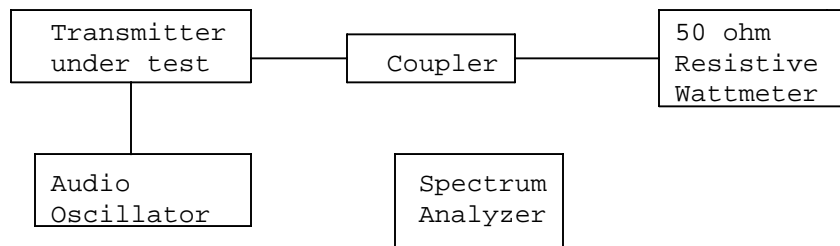
Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least  $43+\log(P)$ dB.

Radiotelephone transmitter with modulation limiter.

Test procedure: TIA/EIA-603 para 2.2.11 , with the exception that various tones were used.

Test procedure diagram

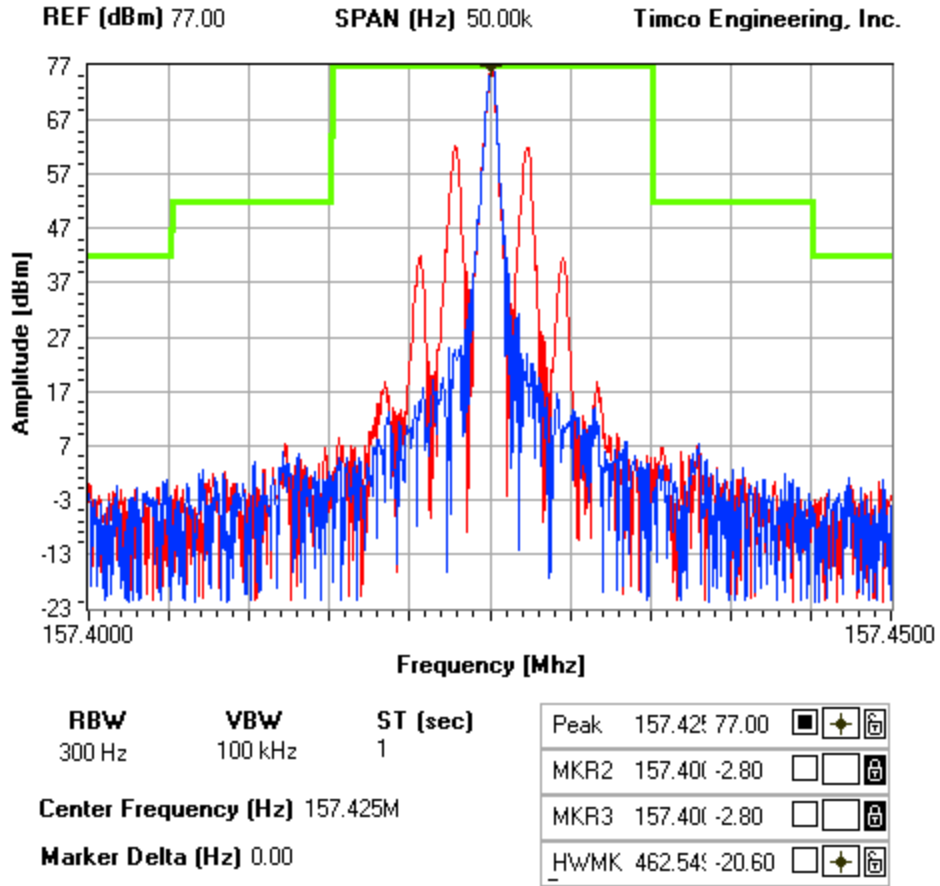
OCCUPIED BANDWIDTH MEASUREMENT



OCCUPIED BANDWIDTH PLOT

NOTES:  
1046AUT3

FCC 80.211 (f)



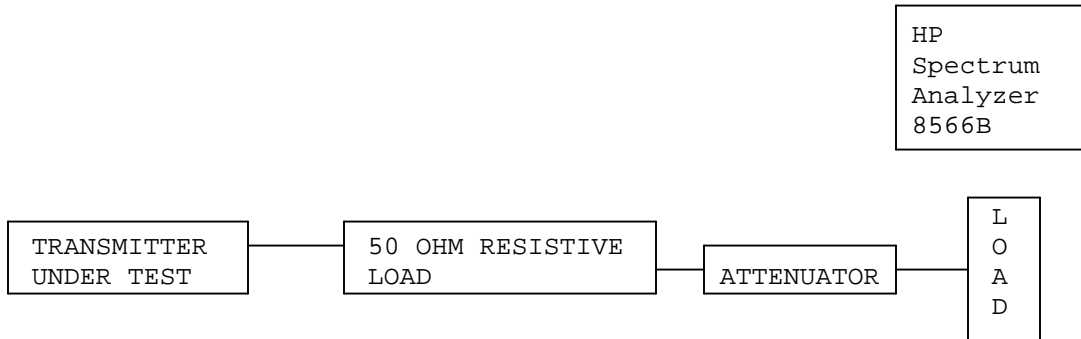


2.1051  
80.211

Spurious emissions at antenna terminals(conducted):

The data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

Method of Measuring Conducted Spurious Emissions



2.1051 Continued

Spurious Emissions at the Antenna Terminals:

Not Applicable - device has a fixed antenna.

2.1053(a) Field strength of spurious emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

TEST DATA:

HIGH POWER 43 + 10log(0.776) = 41.90dB  
 LOW POWER 43 + 10log(0.417) = 39.20dB

| Emission Frequency (MHz) | Polarity Antenna | Corrected EUT Signal Reading (dBm) | Coax Loss | Sub. Ant. | dB Below Carrier (dBc) |
|--------------------------|------------------|------------------------------------|-----------|-----------|------------------------|
| 156                      | V                | 28.9                               | 0         | 0         | 0                      |
| 312                      | H                | -29                                | 0         | -1.22     | 59.12                  |
| 468                      | V                | -44                                | 0         | -1.46     | 74.36                  |
| 624                      | H                | -62                                | 0         | -1.54     | 92.44                  |
| 780                      | V                | -57.9                              | 0         | -1.31     | 88.11                  |
| 936                      | V                | -56.6                              | 0         | -1.33     | 86.83                  |
| 1,092.00                 | V                | -54                                | 1         | -3.54     | 85.44                  |
| 1,240.00                 | V                | -54.8                              | 1         | -4.08     | 86.78                  |
| 1,404.00                 | V                | -59.5                              | 1         | -4.63     | 92.03                  |
| 1,560.00                 | H                | -59.7                              | 1.1       | -5.03     | 92.53                  |

| Emission Frequency (MHz) | Polarity Antenna | Corrected EUT Signal Reading (dBm) | Coax Loss | Sub. Ant. | dB Below Carrier (dBc) |
|--------------------------|------------------|------------------------------------|-----------|-----------|------------------------|
| 156                      | V                | 26.2                               | 0         | 0         | 0                      |
| 312                      | H                | -37.6                              | 0         | -1.22     | 65.02                  |
| 468                      | H                | -51.3                              | 0         | -1.46     | 78.96                  |
| 624                      | H                | -60.1                              | 0         | -1.54     | 87.84                  |
| 780                      | V                | -52.3                              | 0         | -1.31     | 79.81                  |
| 936                      | V                | -56.3                              | 0         | -1.33     | 83.83                  |
| 1,092.00                 | H                | -58.2                              | 1         | -3.54     | 86.94                  |
| 1,240.00                 | V                | -52                                | 1         | -4.08     | 81.28                  |
| 1,404.00                 | H                | -51.3                              | 1         | -4.63     | 81.13                  |
| 1,560.00                 | H                | -59                                | 1.1       | -5.03     | 89.13                  |

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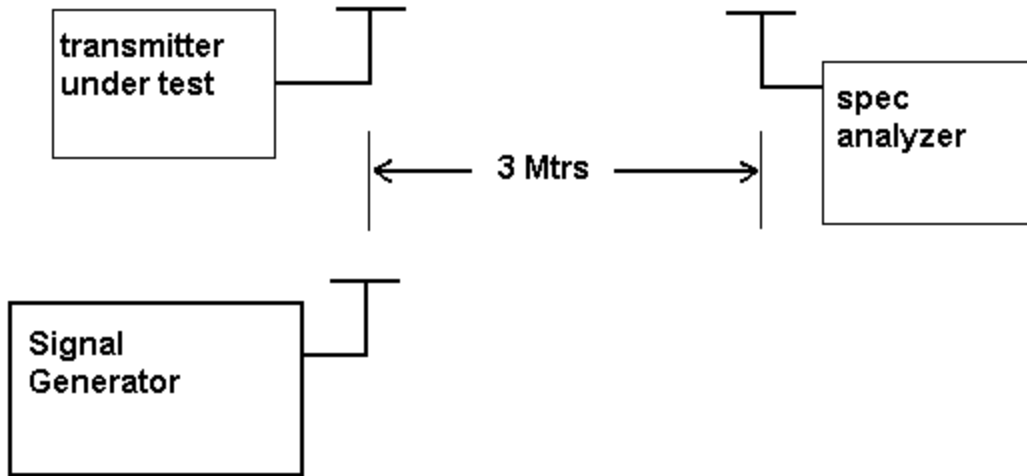
HIGH POWER    43 + 10log(0.776) = 41.90dB  
 LOW POWER     43 + 10log(0.417) = 39.20dB

| Emission Frequency (MHz) | Polarity Antenna | Corrected EUT Signal Reading (dBm) | Coax Loss | Sub. Ant. | dB Below Carrier (dBc) |
|--------------------------|------------------|------------------------------------|-----------|-----------|------------------------|
| 157.4                    | V                | 28.9                               | 0         | 0         | 0                      |
| 314.8                    | H                | -36.3                              | 0         | -1.22     | 66.42                  |
| 472.2                    | V                | -48.5                              | 0         | -1.46     | 78.86                  |
| 629.6                    | H                | -60.2                              | 0         | -1.54     | 90.64                  |
| 787                      | H                | -57.4                              | 0         | -1.31     | 87.61                  |
| 944.5                    | V                | -54.3                              | 0         | -1.33     | 84.53                  |
| 1,101.80                 | V                | -54.1                              | 1         | -3.54     | 85.54                  |
| 1,259.30                 | V                | -52.7                              | 1         | -4.08     | 84.68                  |
| 1,416.00                 | V                | -53                                | 1         | -4.63     | 85.53                  |
| 1,574.00                 | H                | -58.5                              | 1.1       | -5.03     | 91.33                  |

| Emission Frequency (MHz) | Polarity Antenna | Corrected EUT Signal Reading (dBm) | Coax Loss | Sub. Ant. | dB Below Carrier (dBc) |
|--------------------------|------------------|------------------------------------|-----------|-----------|------------------------|
| 157.4                    | V                | 25.9                               | 0         | 0         | 0                      |
| 314.8                    | H                | -42.2                              | 0         | -1.22     | 69.32                  |
| 472.2                    | H                | -57                                | 0         | -1.46     | 84.36                  |
| 629.6                    | H                | -61.9                              | 0         | -1.54     | 89.34                  |
| 787                      | V                | -49.3                              | 0         | -1.31     | 76.51                  |
| 944.5                    | V                | -53.4                              | 0         | -1.33     | 80.63                  |
| 1,101.80                 | H                | -50.2                              | 1         | -3.54     | 78.64                  |
| 1,259.30                 | V                | -52.2                              | 1         | -4.08     | 81.18                  |
| 1,416.00                 | H                | -56.1                              | 1         | -4.63     | 85.63                  |
| 1,574.00                 | H                | -58.7                              | 1.1       | -5.03     | 88.53                  |

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 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 N.W. State Road 45, Newberry, FL 32669.

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground  
on a rotatable platform.

Frequency stability:

2.1055(a)(2)

80.209(a)

Temperature and voltage tests were performed to verify that the frequency remains within the .0010%,10.0 ppm specification limit, for 20kHz spacing. 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 endpoint of the battery voltage of 6 V, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 156.050 000MHz

| TEMPERATURE_C  | FREQUENCY_MHz | PPM  |
|----------------|---------------|------|
| REFERENCE_____ | 156.050 000   | 0.00 |
| -30_____       | 156.050 59    | 3.78 |
| -20_____       | 156.050 382   | 2.45 |
| -10_____       | 156.050 262   | 1.68 |
| 0_____         | 156.050 170   | 1.09 |
| +10_____       | 156.050 060   | 0.38 |
| +20_____       | 156.050 128   | 0.82 |
| +30_____       | 156.050 065   | 0.42 |
| +40_____       | 156.050 146   | 0.94 |
| +50_____       | 156.050 454   | 2.91 |
| Batt. Volts.   | Batt. Data    | PPM  |
| Endpoint 5.1   | 156.050 079   | 0.51 |

RESULTS OF MEASUREMENTS: The test results indicates that the EUT meets the requirements.

## EMC Equipment List

| Device                        | Manufacturer     | Model    | Serial Number            | Cal/Char Date     | Due Date |
|-------------------------------|------------------|----------|--------------------------|-------------------|----------|
| 3/10-Meter OATS               | TEI              | N/A      | N/A                      | Listed<br>3/26/01 | 3/26/04  |
| 3-Meter OATS                  | TEI              | N/A      | N/A                      | Listed<br>1/13/03 | 1/13/06  |
| Audio Generator               | B&K<br>Precision | 3010     | 8739686                  | CHAR<br>12/1/02   | 12/1/04  |
| Audio Oscillator              | HP               | 653A     | 832-00260                | CHAR<br>12/1/02   | 12/1/04  |
| 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<br>2848A18049 | CAL 4/15/03       | 4/15/05  |
| Frequency Counter             | HP               | 5352B    | 2632A00165               | CAL<br>11/28/01   | 11/28/03 |
| Frequency Counter             | HP               | 5382A    | 1620A03535               | CHAR 3/2/01       | 3/2/03   |
| Frequency Counter             | HP               | 5385A    | 2730A03025               | CAL 3/7/03        | 3/7/05   |
| Frequency Counter             | HP               | 5385A    | 3242A07460               | CAL 3/7/03        | 3/7/05   |
| 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<br>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  |
| Peak Power Meter              | HP               | 8900C    | 2131A00545               | CAL 7/2/03        | 7/2/05   |

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|   |   |  |  |  |   |
|---|---|--|--|--|---|
| Power Meter<br>And Sensor<br>Signal<br>Generator<br>Tan Tower<br>Preamplifier<br>Tan Tower<br>Quasi-Peak<br>Adapter<br>Tan Tower RF<br>Preselector<br>Tan Tower<br>Spectrum<br>Analyzer<br>Temperature<br>Chamber | Bird<br>HP<br>HP<br>HP<br>HP<br>HP<br>HP<br>Tenney<br>Engineering | 4421-107 &<br>4022<br>8640B<br>8449B-H02<br>85650A<br>85685A<br>8566B Opt<br>462<br>TTRC | 0166 & 0218<br>2308A21464<br>3008A00372<br>3303A01690<br>3221A01400<br>3138A07786<br>3144A20661<br>11717-7 | CAL 4/16/03<br>CAL 2/15/02<br>CHAR 3/4/01<br>CAL 8/31/01<br>CAL 8/31/01<br>CAL 8/31/01<br>CAL 8/31/01<br>CHAR<br>1/22/02 | 4/16/05<br>2/15/04<br>3/4/03<br>8/31/03<br>8/31/03<br>8/31/03<br>8/31/03<br>1/22/04 |
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