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: MARINE TRANSCEIVER

FCC ID: MMARG2

Applicant:

MIDLAND RADIO CORPORATION
1120 CLAY STREET
NORTH KANSAS CITY MO. 64116

Date Receipt: OCTOBER 26, 2004

Date Tested: NOVEMBER 15, 2004

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FCC ID: MMARG2

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EXHIBITS INCLUDING:

BLOCK DIAGRAM
SCHEMATIC
PARTS LIST
USERS MANUAL
LABEL SAMPLE
LABEL LOCATION
EXTERNAL PHOTOGRAPHS
INTERNAL PHOTOGRAPHS
OPERATIONAL DESCRIPTION
TUNING PROCEDURE
TEST SET UP PHOTOGRAPHS

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GENERAL_INFORMATION

2.1033(c) MIDLAND RADIO CORPORATION will sell the FCC ID: MMARG2 VHF Marine transmitter in quantity, for use under FCC RULES PART 80.

2.1033(c) **TECHNICAL_DESCRIPTION**

(4) Type of Emission: 16K0G3E/16K0F3E

Bn = 2M + 2DK
M = 3000
D = 4.6KHz (Peak Deviation)
K = 1
Bn = 2(3.0K) + 2(4.6K)(1) = 6.0K + 10.0 = 16.0K

80.205 (a) ALLOWED AUTHORIZED BANDWIDTH = 20.00KHz.

(5) Type of Emission: 16K0G3E/16K0F3E

Bn = 2M + 2DK
M = 3000
D = 4.6KHz (Peak Deviation)
K = 1
Bn = 2(3.0K) + 2(4.6K)(1) = 6.0K + 10.0 = 16.0K

FOR DSC ALLOWED AUTHORIZED BANDWIDTH = 20.00KHz.

2.1033(c)(6) Frequency Range: 156.025 – 157.425 MHz

2.1033(c)(7) Power Range and Controls: There is a user Power switch for High/Low Power. Maximum Output Power Rating: High 25 Watts, Low 1 Watt into a 50 ohm resistive load.

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

POWER INPUT (CHANNEL 1)
FINAL AMPLIFIER ONLY

High	Low
Vce = 12 VDC	Vce = 12 VDC
Ice = 4.38 A	Ice = 0.88 A
Pin = 52.56 Watts	Pin = 10.56 Watts

POWER INPUT (CHANNEL 88)
FINAL AMPLIFIER ONLY

High	Low
Vce = 12 VDC	Vce = 12 VDC
Ice = 4.32 A	Ice = 0.87 A
Pin = 51.84 Watts	Pin = 10.44 Watts

Function of each electron tube or semiconductor device or other active circuit device is included in the parts list exhibit.

2.1033(c)(9) Complete Circuit Diagrams: The circuit diagrams and block diagrams are included.

2.1033(c)(10) Instruction book. The instruction manual is included.

2.1033(c)(11) Tune-up procedure. The tune-up procedure is included.

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

2.1033(c)(11) Digital modulation. This unit does NOT use digital modulation.

The data required by 2.1046 through 2.1055 is submitted below.

2.1046(a)
80.215 (e)(1) **RF_power_output.**

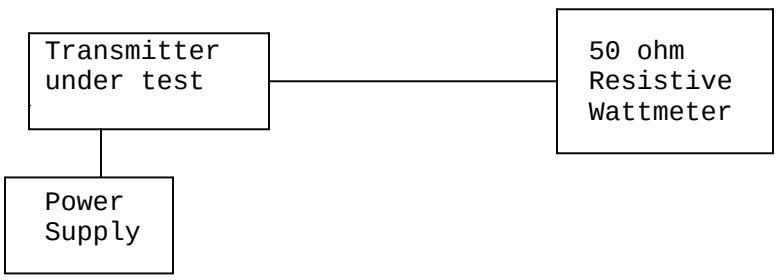
RF power is measured by connecting a 50 ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

OUTPUT POWER: HIGH: 25 W CONDUCTED
LOW: 1 W CONDUCTED

80.911 (d)(5) For primary supply voltages, measured in accordance with the procedures in this paragraph, greater than 11.5 volts, but less than 12.6 volts, the required transmitter output power shall be equal or greater than the value calculated below

P = 4.375(v) – 35.313 (For 12V this equals 17.2W)

METHOD OF MEASURING RF POWER OUTPUT



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TECHNICAL DATA:

80.203 (b)	**External Controls:** The transmitter is capable of changing frequency between 156.05 – 157.425 MHz by external control. The available channels are shown in the User Manual description Channel List. These channels are preprogrammed by the manufacturer and change of frequency is inaccessible to the station operator.
80.203 (c)	Five minutes continuous transmission test. The antenna was connected to a dummy load and the radio was locked in a transmit PTT mode. An external timer digital clock was used to observe the duration of the un-modulated transmission. The transmitter turned off and the radio went to receive mode at 4 minutes, 58 seconds as displayed by the external digital clock.
80.203 (n)	This radio complies with the requirement for DSC capability in the 156 – 162 MHz band and in accordance with 80.225.
80.873; 80.956	Transmitter G3E emission capability: The transmitter was connected to 50 ohm resistive wattmeter and the frequency was set to 156.300 and to 156.800 MHz. With normal modulation, the output power displayed was 25 Watts at the high power setting and 1 watt at low power setting, consistent with previous measurements. The transmitter has been demonstrated to be capable, with normal operating voltages applied, of delivering 25 watts of carrier power into a 50 ohm resistive load over the specified frequencies.
80.911 (a)	80.956 G3E Transmissions: This radio is capable of G3E emission on 156.300 and 156.800 MHz
80.911 (c)	With 13.6 VDC applied and with the radio connected to a 50 ohm resistive wattmeter, the output power was measured at 156.300 and 156.800 MHz with a measured reading of 25 Watts under normal speech modulation.
80.911 (d)(2)	80.959 With the power supply set to 13.6 VDC, and the output of the transmitter terminated in a 50 ohm matching artificial load, the transmitter output power was monitored over a 10 minute continuous operational period while in full power. The output power varied from the nominal 25 Watts output power to 24.8 Watts output power

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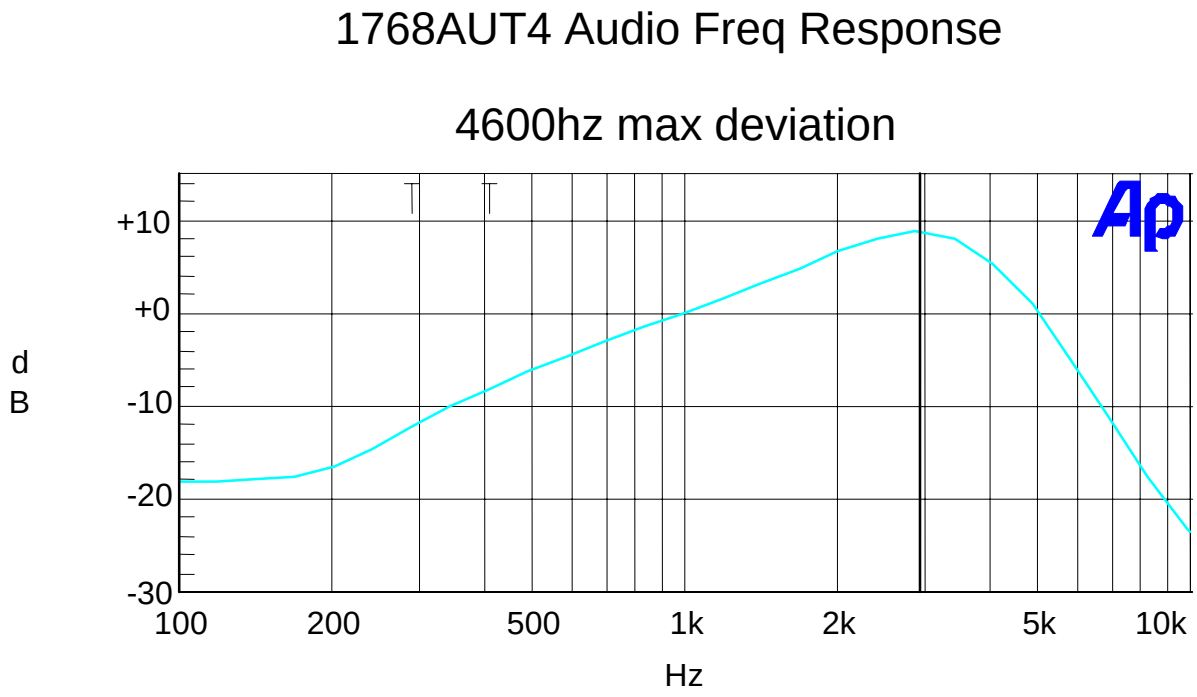
2.1047(a) **Voice Modulation characteristics:**

(b) **AUDIO_FREQUENCY_RESPONSE**
See the following plot.



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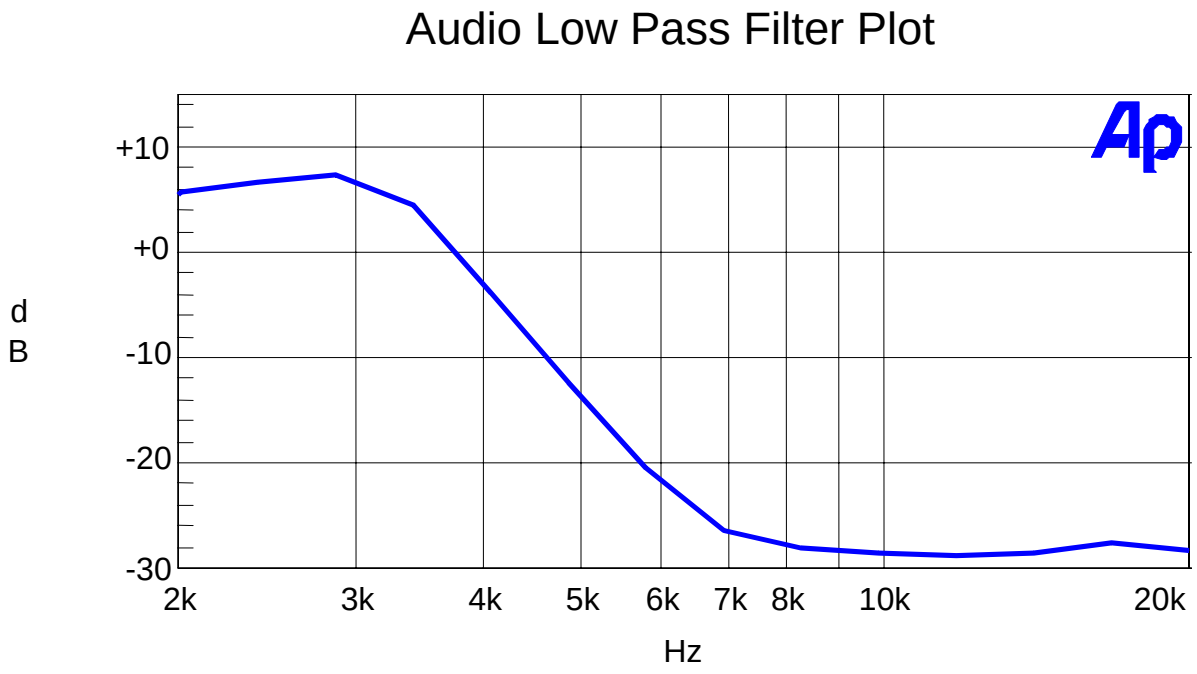
2.1047(a) **AUDIO_LOW_PASS_FILTER**

The audio low pass filter shown in the following plot.



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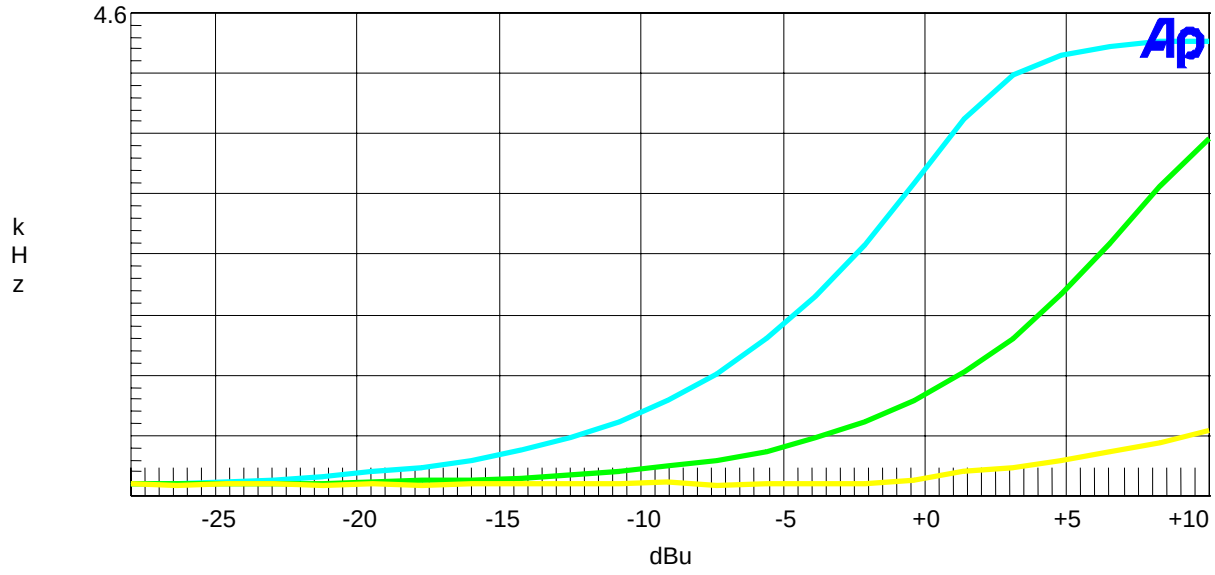
2.1047(b) **Audio input versus modulation**
80.213 (d) A plot of the audio input versus deviation is shown in the following plots.

1768AUT4 Modulation Limiting

2.5k blue 1k green 300hz yellow



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2.1049(c) **Occupied bandwidth:**

80.213 (b)

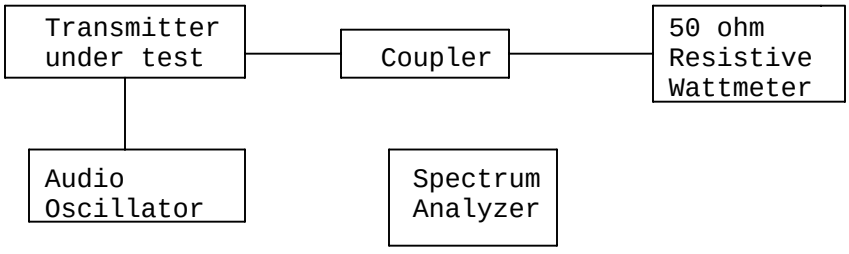
Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned frequency 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



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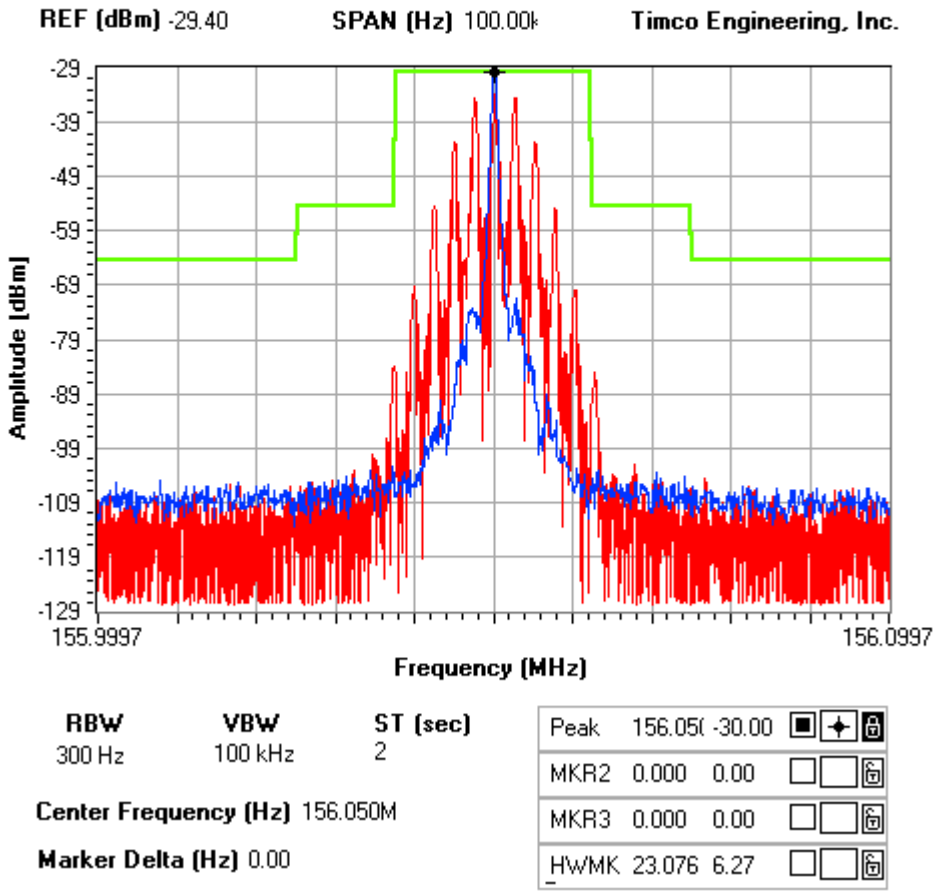
OCCUPIED BANDWIDTH PLOT

NOTES:
1768aut4 occupied bandwidth

FCC 90.210 Mask B



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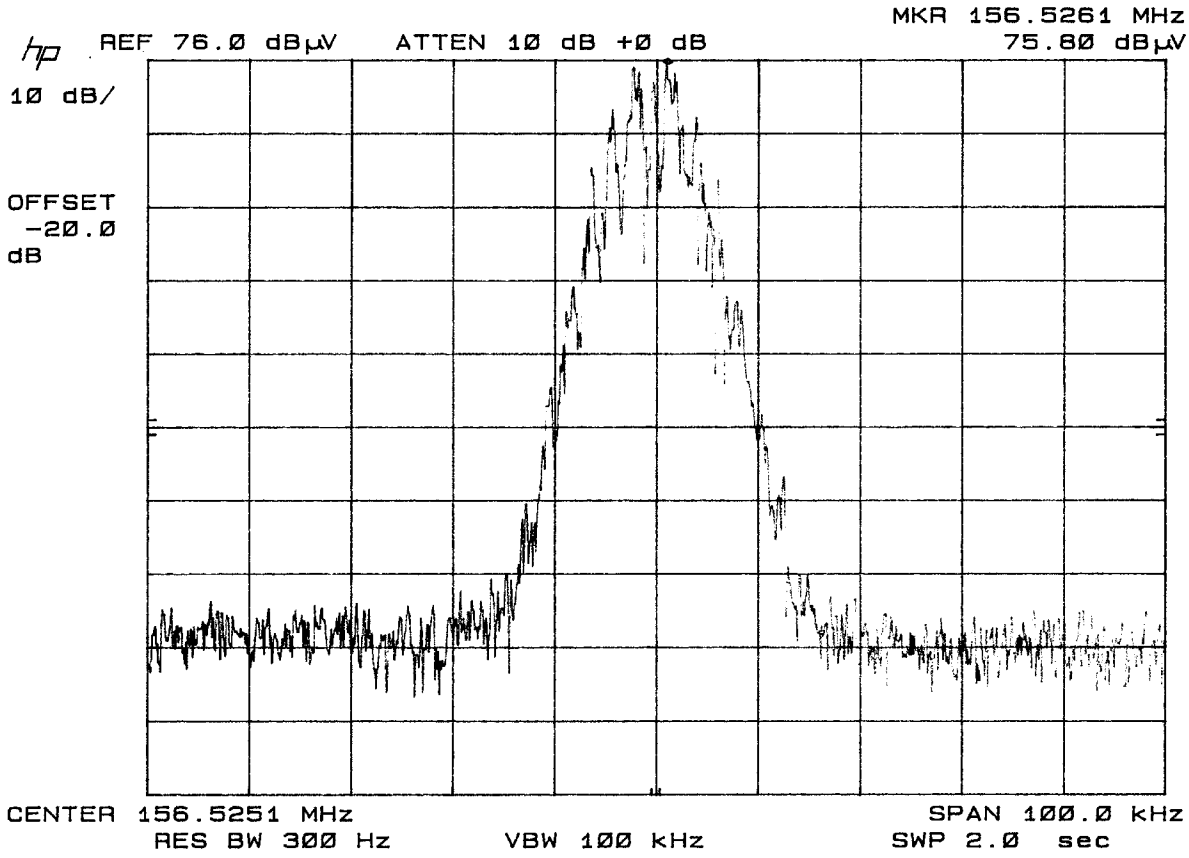
OCCUPIED BANDWIDTH PLOT
DISTRESS CALL



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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.

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

HIGH: 43 + 10log(25) = 57
LOW: 43 + 10log(1) = 43

TF LOW POWER	EF	dB below carrier	TF HIGH POWER	EF	dB below carrier
156.1	156.1	0.0	156.1	156.1	0.0
	312.2	84.5		312.2	86.1
	468.3	89.4		468.3	85.3
	624.4	91.5		624.4	89.5
	780.5	90.0		780.5	85.8
	936.6	89.4		936.6	83.3
	1092.7	90.4		1092.7	87.4
	1248.8	87.8		1248.8	86.6
	1404.9	89.4		1404.9	87.9
	1561.0	86.9		1561.0	86.5

TF LOW POWER	EF	dB below carrier	TF HIGH POWER	EF	dB below carrier
157.4	157.4	0.0	157.4	157.4	0.0
	314.8	84.3		314.8	86.8
	472.2	88.3		472.2	93.2
	629.6	89.3		629.6	88.8
	787.0	92.8		787.0	85.9
	944.4	89.7		944.4	84.0
	1101.8	92.9		1101.8	87.6
	1259.2	89.5		1259.2	87.0
	1416.6	86.8		1416.6	88.3
	1574.0	88.0		1574.0	87.4

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Method of Measuring Conducted Spurious Emissions

METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 STATE ROAD 45, NEWBERRY FLORIDA 32669.

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2.1053(a) **Field_strength_of_spurious_emissions:**

NAME OF TEST: RADIATED SPURIOUS EMISSIONS (156.1 MHz)

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

HIGH: 43 + 10log(25) = 57
LOW: 43 + 10log(1) = 43

TEST DATA (HIGH):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
156.10	H	44.20	0	-0.21	0
312.20	H	-54.20	0	-1.25	99.44
468.30	H	-56.50	0	-0.52	101.01
624.40	H	-48.50	0	-0.26	92.75
780.50	H	-51.10	0	-1.03	96.12
936.60	V	-49.90	0	-0.99	94.88
1092.70	V	-59.70	1.02	3.32	101.39
1248.80	V	-60.80	1.05	3.94	101.9
1404.90	V	-53.70	1.08	4.57	94.2
1561.00	V	-56.30	1.11	4.97	96.43

TEST DATA (LOW):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
156.10	H	30.30	0	-0.21	0
312.20	H	-55.00	0	-1.25	86.34
468.30	H	-62.70	0	-0.52	93.31
624.40	H	-46.40	0	-0.26	76.75
780.50	H	-47.20	0	-1.03	78.32
936.60	H	-52.20	0	-0.99	83.28
1092.70	V	-59.50	1.02	3.32	87.29
1248.80	V	-60.10	1.05	3.94	87.3
1404.90	V	-53.50	1.08	4.57	80.1
1561.00	V	-57.30	1.11	4.97	83.53

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2.1053(a) **Field_strength_of_spurious_emissions:**

NAME OF TEST: RADIATED SPURIOUS EMISSIONS (157.4 MHz)

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

HIGH: 43 + 10log(25) = 57
LOW: 43 + 10log(1) = 43

TEST DATA (HIGH):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
157.40	H	44.20	0	-0.2	0
314.80	H	-57.30	0	-1.25	102.55
472.20	H	-54.50	0	-0.54	99.04
629.60	H	-45.20	0	-0.23	89.43
787.00	V	-46.50	0	-1.08	91.58
944.40	H	-52.70	0	-1.08	97.78
1101.80	H	-50.80	1.02	3.36	92.46
1259.20	H	-54.40	1.05	3.99	95.46
1416.60	H	-62.40	1.08	4.62	102.86
1574.00	H	-56.20	1.11	4.99	96.32

TEST DATA (LOW):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
157.40	H	30.20	0	-0.2	0
314.80	H	-60.10	0	-1.25	91.35
472.20	H	-62.50	0	-0.54	93.04
629.60	H	-45.30	0	-0.23	75.53
787.00	H	-44.20	0	-1.08	75.28
944.40	V	-47.90	0	-1.08	78.98
1101.80	H	-50.90	1.02	3.36	78.56
1259.20	V	-59.80	1.05	3.99	86.86
1416.60	V	-54.70	1.08	4.62	81.16
1574.00	H	-58.20	1.11	4.99	84.32

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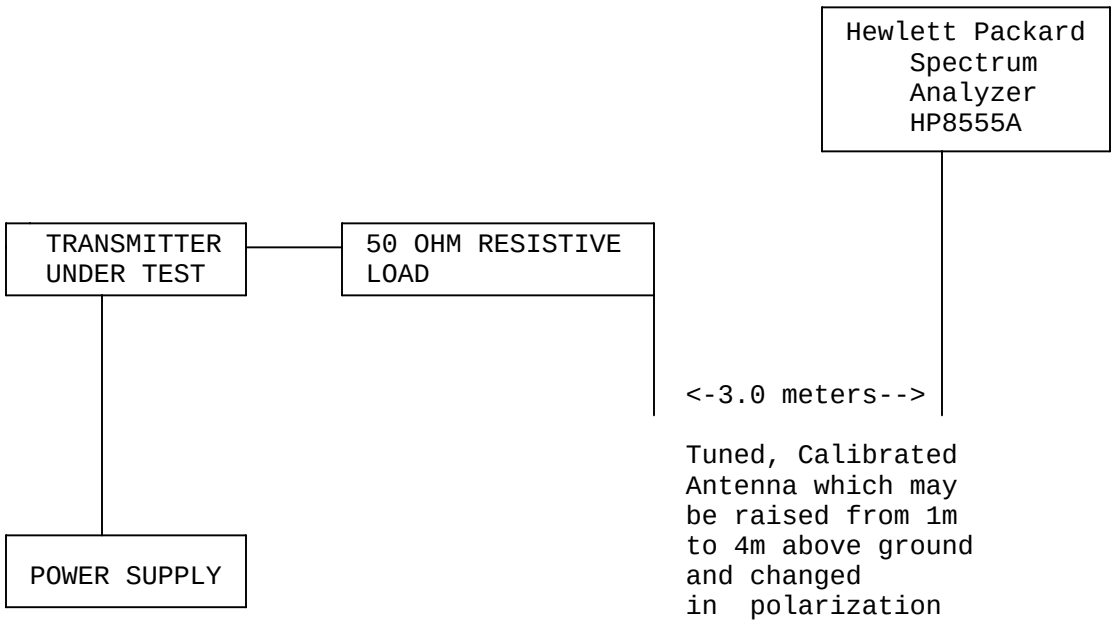
Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

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.

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Frequency stability:

2.1055(a)(2)
80.209 (a)

Temperature and voltage tests were performed to verify that the frequency remains within the .0010%, 10.0ppm specification limit, for 20kHz spacing. 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 sec 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 minus 15% of the battery voltage, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 157.424 832 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE	157.424 832	0.00
-30	157.423 443	- 8.82
-20	157.424 281	- 3.50
-10	157.424 7	- 0.84
0	157.424 932	+ 0.64
+10	157.424 947	+ 0.73
+20	157.424 832	0.00
+30	157.424 693	- 0.88
+40	157.424 654	- 1.13
+50	157.424 816	- 0.10

BATT	%BATT. DATA	VOLTS	BATT. PPM
-15%	157.424 832	10.20	0.00

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

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MPE CALCULATION

Calculation Results

Average Power at the Antenna	12.500 watts
Antenna Gain in dBi	2.20 dBi
Distance to the Area of Interest	1.00 mtr
Frequency of Operation	156.500 MHz
Are Ground Reflections Calculated?	No
Estimated RF Power Density	0.1975 mw/cm^2

	Controlled Environment	**Uncontrolled Environment**
Maximum Permissible Exposure (MPE)	1.00 mw/cm^2	0.21 mw/cm^2
Distance to Compliance From Center of Antenna	40 cm	1.0 mtr
Does the Area of Interest Appear to be in Compliance?	yes	yes

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EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 9/23/03	9/23/05
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 9/23/03	9/23/05
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 9/23/03	9/23/05
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 9/23/03	9/23/05
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
Blue Tower RF Preselector	HP	85685A	2620A00294	CAL 4/27/04	4/27/06
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 3/22/04	3/22/06
Silver Tower RF Preselector	HP	85685A	2926A00983	CAL 3/22/04	3/22/06
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 3/22/04	3/22/06
Silver Tower Preamplifier	HP	8449B	3008A01075	CAL 3/22/04	3/22/06
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
Biconnical Antenna	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
BiconiLog Antenna	EMCO	3143	9409-1043	No Cal Required	
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06
Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05
Log-Periodic	Eaton	96005	1243	CAL	5/8/05

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Antenna				5/8/03	
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	CAL 9/26/02	9/26/05
Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 2/17/03	2/17/05
Horn Antenna *(at 3 meters)	Electro-Metrics	EM-6961	6246	CAL 3/31/03	3/31/05
Horn Antenna *(at 10 meters)	Electro-Metrics	EM-6961	6246	CAL 6/4/03	6/4/05
Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
Harmonic Mixer with Horn Antenna	Oleson Microwave Labs	M08HW/A	F30425-1	CHAR 4/25/03	4/25/05
Harmonic Mixer with Horn Antenna	Oleson Microwave Labs	M12HW/A	E30425-1	CHAR 4/25/03	4/25/05
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
LISN	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 7/16/04	7/16/06
Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 7/16/04	7/16/06
Oscilloscope	Tektronix	2230	300572	CAL 7/3/03	7/3/05
System One	Audio Precision	System One	SYS1-45868	CHAR 4/25/02	4/25/04
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
AC Voltmeter	HP	400FL	2213A14499	CAL 7/19/04	7/19/06
AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
Multimeter	Fluke	FLUKE-77-3	79510405	CHAR 9/26/01	9/26/03
Peak Power Meter	HP	8900C	2131A00545	CAL 7/2/03	7/2/05
Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 7/2/03	7/2/05
Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05
Power Sensor	HP	478A	72129	CAL 4/15/03	4/15/05
Power Meter And Sensor	Bird	4421-107 & 4022	0166 & 0218	CAL 4/16/03	4/16/05
Digital Thermometer	Fluke	2166A	42032	CAL 7/19/04	7/19/06
Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
Thermometer	Extech	4028	14871-2	CAL 3/7/03	3/7/05
Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
Frequency Counter	HP	5352B	2632A00165	CAL 8/3/04	8/3/06
Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	Out of Service
Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
Signal Generator	HP	8640B	2308A21464	CAL 8/26/04	8/26/06
Sweep Generator	Wiltron	6648	101009	CAL 4/15/03	4/15/05
Sweep Generator	Wiltron	6669M	007005	CAL 3/3/03	3/3/05
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Modulation Meter	Boonton	8220	10901AB	CAL 4/15/05	4/15/05
Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	Out of Service
BandReject Filter	Lorch	5BR4-	Z1	CHAR	4/17/05

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
	Microwave	2400/60-N		4/17/03	
BandReject Filter	Lorch Microwave	6BR6-2442/300-N	Z1	CHAR 4/17/03	4/17/05
BandReject Filter	Lorch Microwave	5BR4-10525/900-S	Z1	CHAR 4/12/03	4/12/05
Notch Filter	Lorch Microwave	5BRX-850/X100-N	AD-1	CHAR 4/17/03	4/17/05
High Pass Filter	Unk	3768(5)-400	041	CHAR 12/17/02	12/17/04
High Pass Filter	Microlab	HA-10N		CHAR 11/17/02	11/17/04
High Pass Filter	Microlab	HA-20N		CHAR 12/17/02	12/17/04
Audio Oscillator	HP	653A	832-00260	CHAR 12/1/02	12/1/04
Audio Generator	B&K Precision	3010	8739686	CHAR 12/1/02	12/1/04
Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	Out of Service
Frequency Counter	HP	5385A	3242A07460	CAL 3/7/03	3/7/05
Amplifier	HP	11975A	2738A01969	No Cal Required	
Egg Timer	Unk			CHAR 2/1/02	2/1/04
Measuring Tape-20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		CHAR 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
Injection Probe	Fischer Custom Communications	F-120-9A	270	CAL 6/1/01	6/1/03
Power Line Coupling/Decoupling Network	Fischer Custom Communications	FCC-801-M2-16A	01048	CAL 8/29/01	8/29/03
Power Line	Fischer Custom	FCC-801-M3-	01060	CAL	8/29/03

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Coupling/Decoupling Network	Communications	16A		8/29/01	
VHF/UHF Current Probe	Fischer Custom Communications	F-52	130	CAL 8/30/01	8/30/03
Passive Impedance Adapter	Fischer Custom Communications	FCC-801-150-50-CDN	01117 & 01118	CAL 8/29/01	8/29/03
Radiating Field Coil	Fischer Custom Communications	F-1000-4-8/9/10-L-1M	9859	CAL 10/15/98	10/15/00
EMC Immunity Test System	Keytek	CEMASTER	9810210	CAL 2/1/02	2/1/04
Compliance Test System - AC Power Source	California Instruments	1251RP	L05865	CAL 2/25/04	2/25/06
Compliance Test System - PACS-1 Module	California Instruments	PACS-1	X71484	CAL 2/25/04	2/25/06
Isotropic Field Probe	Amplifier Research	FP5000	22839		
Isotropic Field Probe	Amplifier Research	FP5000	300103		
Capacitor Clamp	Keytek	CM-CCL	9811359	No Cal Required	
Amplifier	Amplifier Research	10W1000B	23117	No Cal Required	
Field Monitor	Amplifier Research	FM5004	22288	No Cal Required	
ELF Meter	F. W. Bell	4060	Not Serialized		Out of Service
Standard Gain Horn 1.0-2.4 GHz	Polarad	CA-L	235	No Cal Required	
Standard Gain Horn 2.14-4.34 GHz	Polarad	CA-S	203	No Cal Required	
Standard Gain Horn 3.95-5.85 GHz	Scientific-Atlanta Inc.	11A-3.9	8448CG	No Cal Required	
Standard Gain Horn 8.2-12.5 GHz	Systron Donner	DBG-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 18.0-26.3 GHz	Systron Donner	DBE-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 26.5-40.2 GHz	Systron Donner	DBD-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 40.0-60.0 GHz	ATM	19-443-6R	Not Serialized	No Cal Required	
Double-Ridged Horn	EMCO	3116	9011-2145		Out of

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Antenna					Service
Standard Gain Horn 12.4-18.0 GHz	ATM	62-442-6	D262108-01	No Cal Required	
Standard Gain Horn 5.85-8.2 GHz	ATM	137-442-2	D261908-01	No Cal Required	
AC Voltmeter	HP	400F	0950A05433	CAL 8/13/03	8/13/05
RF Power Amplifier	Ophir RF	5150F	1041 'X1'	No Cal Required	
Electric Field Sensor	Amplifier Research	FP6001	302504		
Electric Field Sensor	Amplifier Research	FP6001	302510	CAL 6/1/04	6/1/06
Surge Generator	Com-Power Corporation	SG-168	25802	CAL 2/27/04	2/27/06
RF Power Amplifier	Ophir RF, Inc.	5150F	1041	CHAR 10/31/03	10/31/05
3-Meter Anechoic Chamber	Panashield	N/A	N/A	Listed 5/12/04	5/11/07
Digital Multimeter	Fluke	77III	79510408	CAL 7/19/04	7/19/06
Open-Frame Tower Spectrum Analyzer	HP	8566B/85662A	2627A03154/2648A14276	CAL 7/9/04	7/9/06
Open-Frame Tower RF Preselector	HP	85685A	3107A01282	CAL 7/9/04	7/9/06
Open-Frame Tower Quasi-Peak Adapter	HP	85650A	2046A00305	CAL 7/9/04	7/9/06
Signal Generator	HP	8648C	3847A04696	CAL 9/27/04	9/27/06