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FCC PART 80

TEST REPORT

APPLICANT	UNIDEN AMERICA CORPORATION
	181 N. COUNTRY CLUB ROAD P.O. BOX 580
	LAKE CITY, SC 29560
FCC ID	AMWUT621
MODEL NUMBER	VHF650
PRODUCT DESCRIPTION	VHF MARINE TRANSCEIVER
DATE SAMPLE RECEIVED	1/23/2007
DATE TESTED	2/2/2007
TESTED BY	JOSEPH SCOGLIO
APPROVED BY	MARIO DE ARANZETA
TIMCO REPORT NO.	189AUT7TestReport.doc
TOTAL PAGES	21
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

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STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: Mario de Aranzeta

Signature: <*Mario de Aranzeta*>

Function: Engineer

Date: 2/13/2007

GENERAL INFORMATION

The test results relate only to the items tested.	
DUT Description	VHF MARINE TRANSCEIVER
FCC ID	AMWUT621
Model Number	VHF650
Operating Frequency	156.025-157.425 MHz
No. of Channels	88
Type of Emission	16K0F3E, 16K0G2B
Modulation	FM
DUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable
Antenna	External VHF Antenna
Antenna Connector	S0-239
Test Condition	The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26ºC with a relative humidity of 50%.
Modification to the DUT	None
Test Exercise	The DUT was placed in continuous transmit mode.
Applicable Standards	TIA 603 –C:2004 FCC CFR 47 Part 80
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

TEST PROCEDURES

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI/TIA 603-C:2004 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum TIA 603 receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

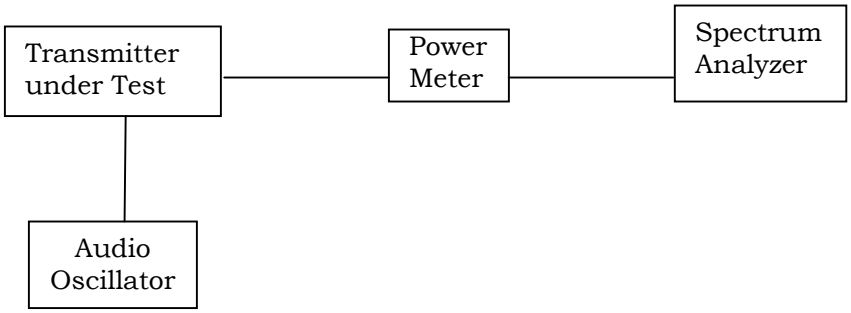
RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), 80.215 (e)(1)

Test Requirements:

Method of Measurement: 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:

Test Setup Diagram:



Test Data:

OUTPUT POWER: HIGH – 25 Watts
LOW - 1 Watt

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(13.8) – 35.313 + 25.0
At no time did the output power exceed the limits.

Part 2.1033 (C)(8) DC Input into the final amplifier

FOR LOW POWER SETTING INPUT POWER: (13.8V)(1.37A) = 18.91 Watts
FOR HIGH POWER SETTING INPUT POWER: (13.8V)(5.10A) = 70.38 Watts

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 (d)(2) 80.959 With the power supply set to 13.8 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

Type of Emission: 16K0F3E

Bn = 2M + 2DK
M = 3000
D = 5 kHz (Peak Deviation)
K = 1
Bn = 2(3K) + 2(5K)(1) = 6.0K + 10K = 16k

80.205 (a) ALLOWED AUTHORIZED BANDWIDTH = 20.00 kHz

Type of Emission: 16K0G2B

Bn = 2M + 2DK
M = 3000
D = 5 kHz (Peak Deviation)
K = 1
Bn = 2(3K) + 2(5K)(1) = 6.0K + 10K = 16k

80.205 (a) ALLOWED AUTHORIZED BANDWIDTH = 20.00 kHz

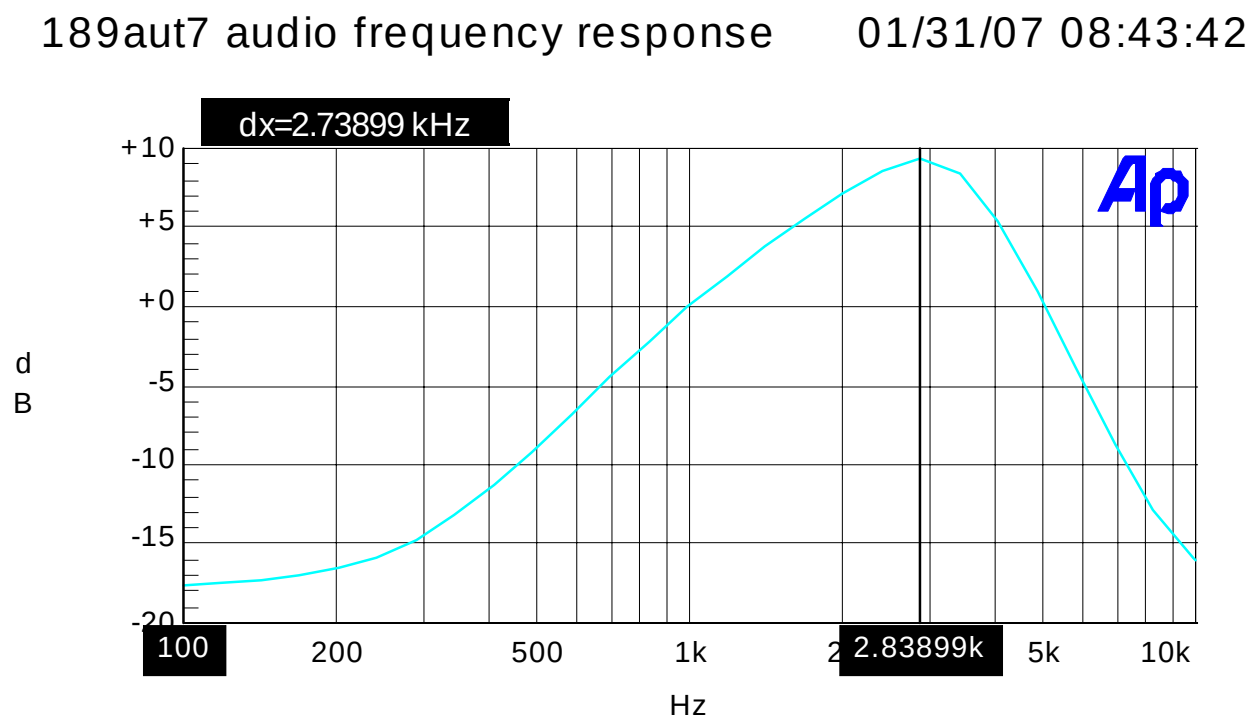
AUDIO FREQUENCY RESPONSE

Rule Part No.: Part 2.1047(a)(b)

Test Requirements:

Method of Measurement:

The audio frequency response was measured in accordance with ANSI/TIA 603-C:2004. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

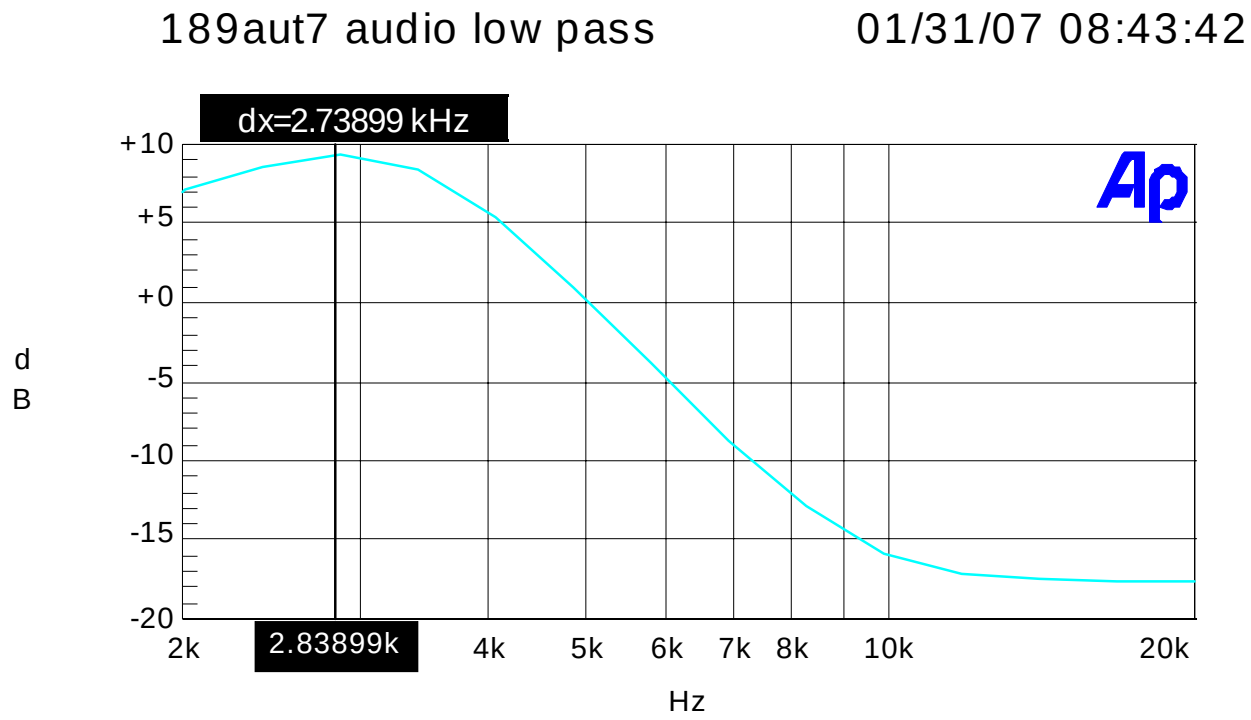


Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

AUDIO LOW PASS FILTER

Part 2.1047(a) Voice modulated communication equipment: For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.



Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

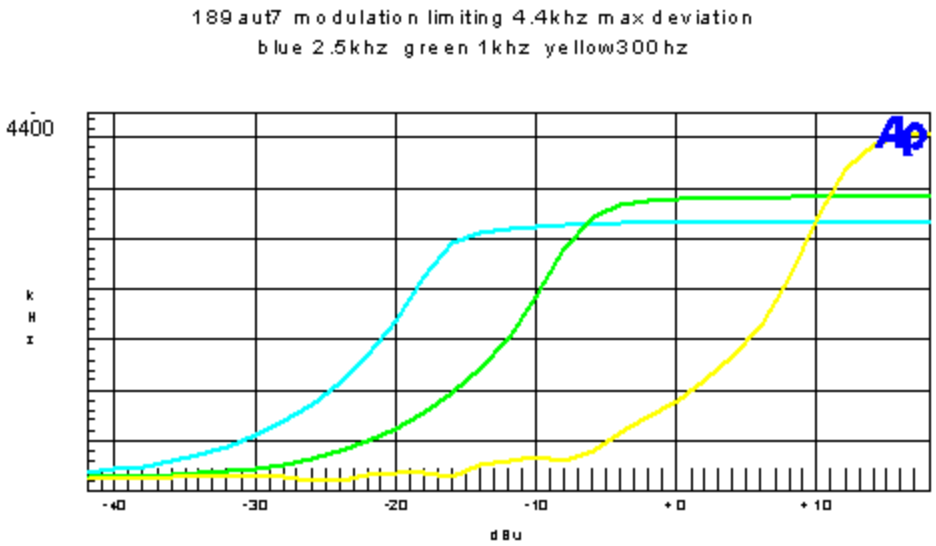
AUDIO INPUT VERSUS MODULATION

Rule Part No.: Part 2.1047(b) & 80.213 (d)

Test Requirements:

Method of Measurement: **Modulation cannot exceed 100%,** 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 shown below. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

Test data:



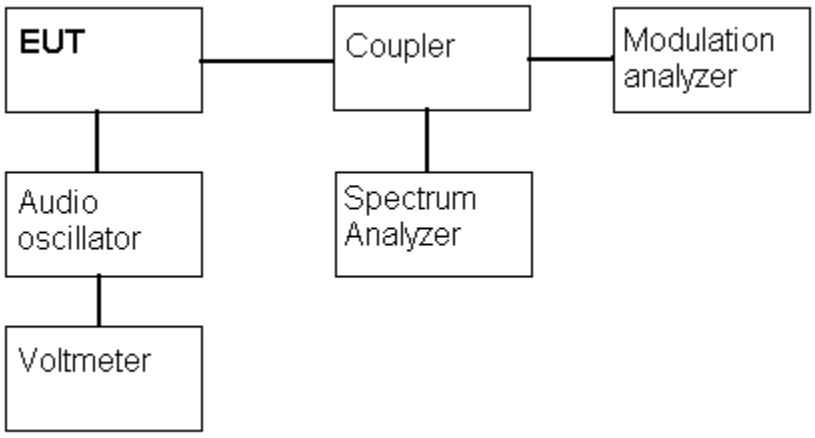
OCCUPIED BANDWIDTH

Part 2.1049(c)

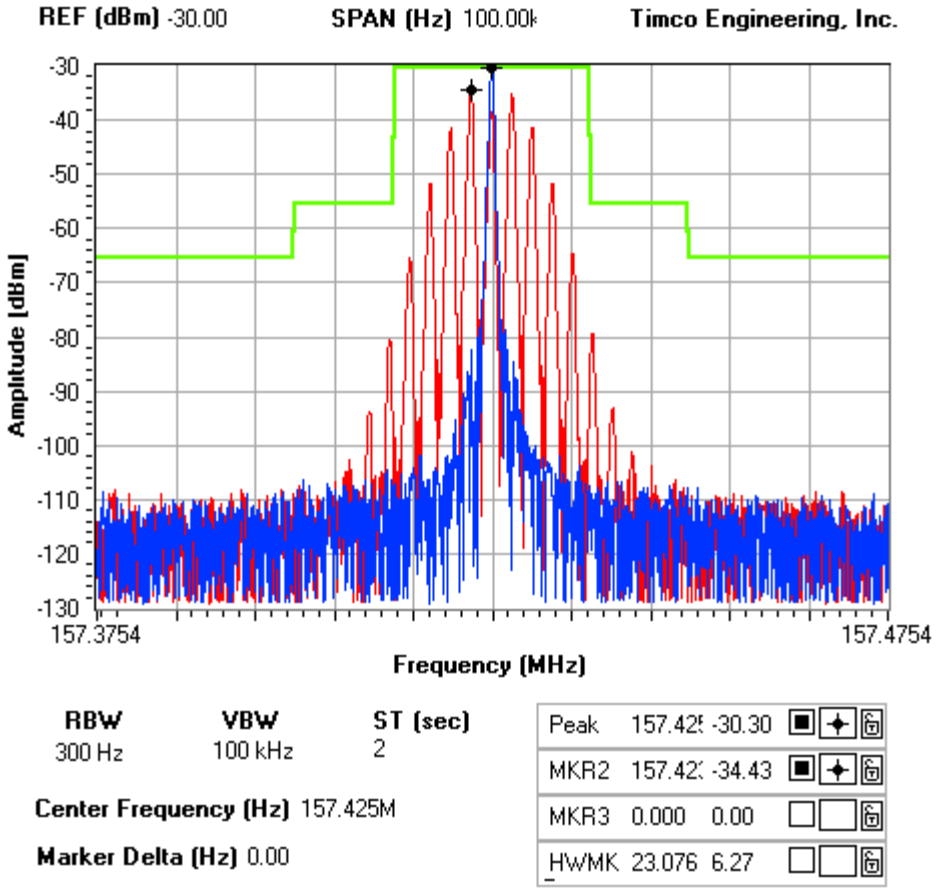
80.213 (b) Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned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

Test procedure: ANSI/TIA 603-C:2004, with the exception that various tones were used.

OCCUPIED BANDWIDTH MEASUREMENT

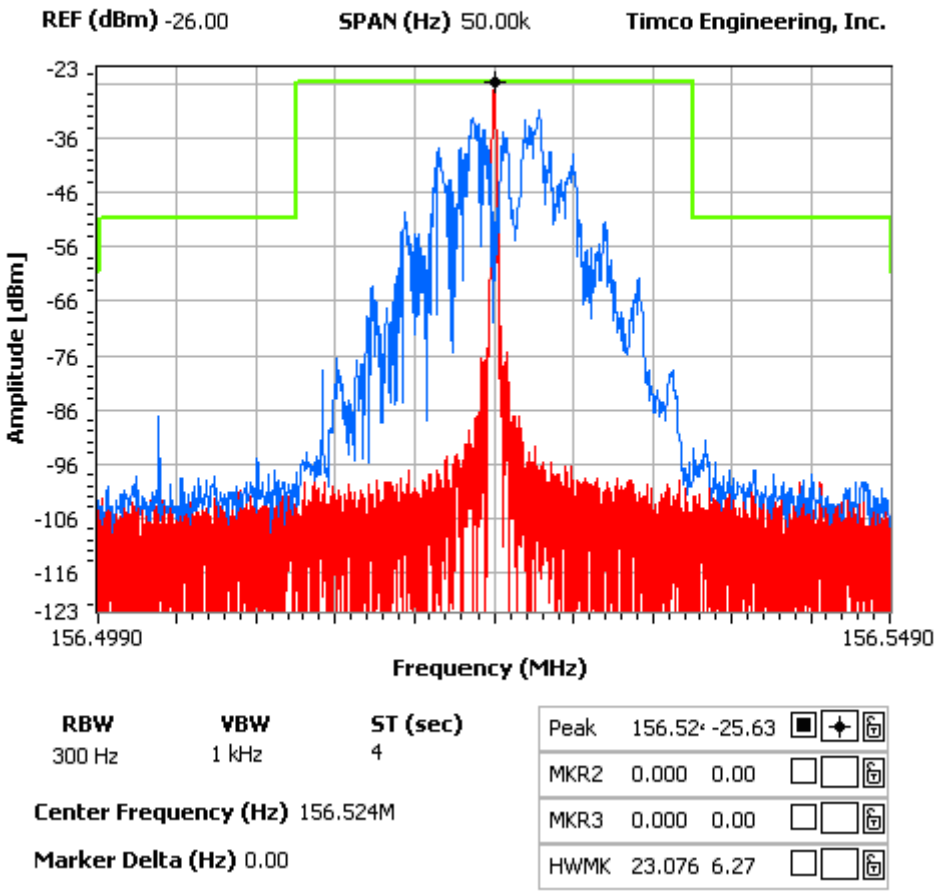


NOTES:
189aut7 occupied bandwidth



NOTES:

189aut6 DSC occupied bandwidth



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a), 80.211

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

Method of Measurement: The carrier was modulated 100% using a 2500 Hz 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 ANSI/TIA 603-C:2004.

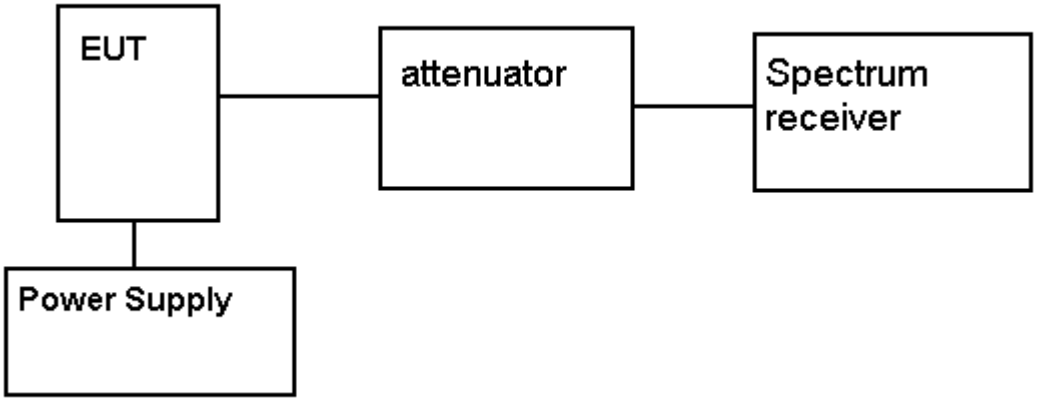
43 + 10log(25) = 57 dB 43 + 10log(1) = 43 dB

Test Data:

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
156.00	156.00	0		156.00	156.00	0
	312.10	74.9			312.10	51.9
	468.10	83.1			468.10	84
	624.20	92.7			624.20	88.4
	780.20	92.9			780.20	90.6
	936.30	105.2			936.30	90.8
	1092.30	109.7			1092.30	98.5
	1248.40	98.7			1248.40	95.3
	1404.40	87.9			1404.40	88.2

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
157.40	157.40	0		157.40	157.40	0
	314.80	73.5			314.80	51.6
	472.20	84.1			472.20	83
	629.70	94.5			629.70	89.3
	787.10	97			787.10	89.1
	944.50	106.4			944.50	91.2
	1101.90	106.5			1101.90	99.8
	1259.40	97.8			1259.40	95.2
	1416.80	86.4			1416.80	89.8
	1574.20	92.2			1574.20	93.9

METHOD OF MEASURING CONDUCTED SPURIOUS EMISSIONS



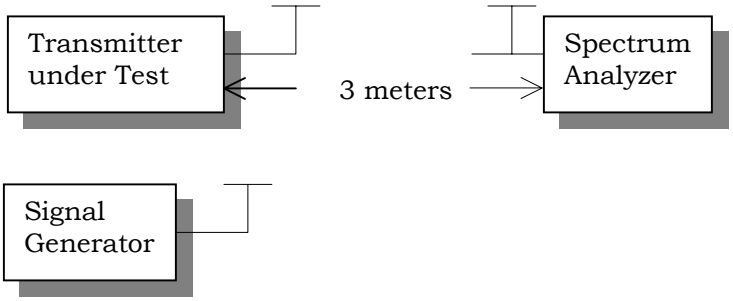
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

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

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 ANSI/TIA 603-C:2004 using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Test Setup Diagram:



Test Data:

High power: **43 + 10log(25) = 57 dB**

Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)		Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
156.00	**156.00**	**V**	**0**		**157.40**	**157.40**	**V**	**0**
	312.10	**H**	**79.15**			**314.80**	**H**	**81.65**
	468.10	**H**	**89.61**			**472.20**	**H**	**90.11**
	624.20	**V**	**90.17**			**629.70**	**V**	**90.07**
	780.20	**V**	**87.66**			**787.10**	**V**	**87.96**
	936.30	**V**	**96.32**			**944.50**	**V**	**96.12**
	1092.30	**H**	**91.48**			**1101.90**	**V**	**94.58**
	1248.40	**V**	**95.59**			**1259.40**	**V**	**90.79**
	1404.40	**H**	**94.00**			**1416.80**	**V**	**88.40**
	1560.50	**V**	**97.86**			**1574.20**	**H**	**96.96**

Test Data:

Low power: **43 + 10log(1) = 43 dB**

Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)		Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
156.00	**156.00**	**V**	**0**		**157.40**	**157.40**	**V**	**0**
	312.10	**H**	**58.45**			**314.80**	**H**	**56.85**
	468.10	**H**	**83.41**			**472.20**	**H**	**85.31**
	624.20	**H**	**84.67**			**629.70**	**H**	**86.17**
	780.20	**V**	**82.76**			**787.10**	**V**	**83.16**
	936.30	**V**	**82.12**			**944.50**	**V**	**83.92**
	1092.30	**V**	**82.88**			**1101.90**	**V**	**83.38**
	1248.40	**V**	**81.79**			**1259.40**	**H**	**83.69**
	1404.40	**V**	**83.50**			**1416.80**	**H**	**84.40**
	1560.50	**V**	**86.16**			**1574.20**	**V**	**86.66**

RADIATED EMISSIONS TEST SET UP PHOTO

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 80.209 (a)

Requirements: 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.

Method of Measurements: ANSI/TIA 603-C:2004.

Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		157.424611
Temperature (°C)	**Frequency (MHz)**	**Frequency Stability (PPM)**
-30	157.426178	9.95
-20	157.426151	9.78
-10	157.425999	8.82
0	157.425663	6.68
+10	157.425261	4.13
+20	157.424744	0.84
+30	157.424420	-1.21
+40	157.424264	-2.20
+50	157.424273	-2.15

Assigned Frequency (Ref. Frequency) (MHz)		157.424611
% Battery	**Frequency (MHz)**	**Frequency Stability (PPM)**
-15%	157.424620	0.06
+15%	157.424625	0.09

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 1/11/06	1/10/09
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/14/05	12/14/07