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# FCC PART 73.801
# LOW POWER FM BROADCAST STATIONS (LPFM)
# TEST REPORT

| | |
|---|---|
| **APPLICANT** | 305 Broadcast LLC |
| | 1315 NW 98 Ct. Suite 10 |
| | Miami, FL 33172 USA |
| **FCC ID** | ODKETG150IS |
| **MODEL NUMBER** | ETG 150 |
| **PRODUCT DESCRIPTION** | 150W EXCITER |
| **DATE SAMPLE RECEIVED** | 10/17/2011 |
| **DATE TESTED** | 11/3/2011 |
| **TESTED BY** | Joe Scoglio |
| **APPROVED BY** | Mario R. de Aranzeta |
| **TEST RESULTS** | ☒ PASS ☐ FAIL |

| Report Number | Version Number | Description | Issue Date |
|---|---|---|---|
| 2401UT11TestReport.doc | Rev.1 | Initial Issue | 11/30/2011 |

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**

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## GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

### Summary

The device under test does:

☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

### Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669


**Authorized Signatory Name:**

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

**Date:** 11/3/11

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## GENERAL INFORMATION

### DUT Specification

| | |
|---|---|
| **DUT Description** | 150W EXCITER |
| **FCC ID** | ODKETG1501IS |
| **Model Number** | ETG 150 |
| **Operating Frequency** | 88 – 108 MHz |
| **Type of Emission** | 180KF3E |
| **Modulation** | FM |
| **Output power** | 150 Watts/10 Watts |
| **DUT Power Source** | ☒ 110–220Vac/50– 60Hz |
| | ☐ DC Power 12V |
| | ☐ Battery Operated Exclusively |
| **Test Item** | ☐ Prototype |
| | ☒ Pre-Production |
| | ☐ Production |
| **Type of Equipment** | ☒ Fixed |
| | ☐ Mobile |
| | ☐ Portable |
| **Test Conditions** | 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** | ANSI/TIA 603-C:2004, FCC CFR 47 Part 90 |
| **Test Facility** | Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. |

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# TEST RESULTS SUMMARY

| | Rule Part No. | Pass/Fail |
|---|---|---|
| Power Output Rating | 2.1046, 73.267(b)(2) | Pass |
| Audio Frequency Response | 2.1047(a)(b) | Pass |
| Audio Input vs Modulation | 201047(b), 73 | Pass |
| Occupied Bandwidth | 2.1049(c), 73.317 (b-d) | Pass |
| Spurious Emissions at Antenna Terminals (Conducted) | 2.1051(a) | Pass |
| Field Strength of Spurious Emissions | 2.1053 | Pass |
| Frequency Stability | 2.1055, 73 | Pass |

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## EQUIPMENT LIST

| Device | Manufacturer | Model | Serial Number | Cal/ Char Date | Due Date |
|---|---|---|---|---|---|
| 3-Meter Semi-Anechoic Chamber | Panashield | N/A | N/A | Listed 5/10/10 | 5/10/12 |
| AC Voltmeter | HP | 400FL | 2213A14499 | CAL 6/12/11 | 6/12/13 |
| Antenna: Active Loop | ETS-Lindgren | 6502 | 00062529 | CAL 9/23/10 | 9/23/12 |
| Antenna: Passive Loop | EMC Test Systems | EMCO 6512 | 9706-1211 | CAL. 12/1/09 | 12/2/11 |
| Frequency Counter | HP | 5385A | 2730A03025 | CAL 8/17/11 | 8/17/13 |
| Hygro-Thermometer | Extech | 445703 | 0602 | CAL 6/15/11 | 6/15/13 |
| Modulation Analyzer | HP | 8901A | 3435A06868 | CAL 7/18/11 | 7/18/13 |
| Digital Multimeter | Fluke | FLUKE-77 | 35053830 | CAL 9/9/11 | 9/9/13 |
| Analyzer Tan Tower Preamplifier | HP | 8449B-H02 | 3008A00372 | CAL 11/21/09 | 11/21/11 |
| Analyzer Tan Tower Quasi-Peak Adapter | HP | 85650A | 3303A01690 | CAL 11/22/09 | 11/22/11 |
| Analyzer Tan Tower RF Preselector | HP | 85685A | 3221A01400 | CAL 11/21/09 | 11/21/11 |
| Analyzer Tan Tower Spectrum Analyzer | HP | 8566B Opt 462 | 3138A07786 3144A20661 | CAL 11/24/09 | 11/24/11 |
| Temperature Chamber | Tenney Engineering | TTRC | 11717-7 | CHAR 4/25/10 | 4/25/12 |
| Antenna | ETS | 3117 | 41534 | 9/22/2010 | 9/22/2012 |
| Antenna | Electro metrics | LPA-25 | 1122 | 5/04/2011 | 5/04/2013 |
| Antenna | Electro metrics | BIA-25 | 1171 | 1/15/2010 | 1/15/2012 |

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## TEST PROCEDURE

**Power Line Conducted Interference:** The procedure used was ANSI/TIA 603-C: 2004, using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**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 peak 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 $10^{th}$ 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 ANSI/TIA 603-C: 2004, 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.

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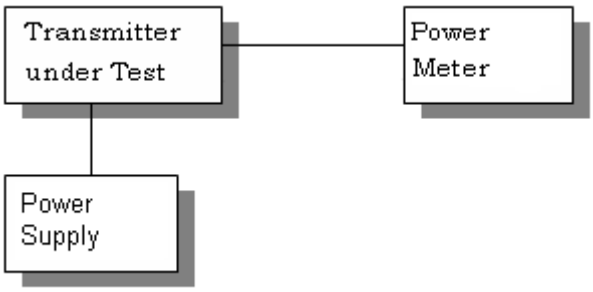
## RF POWER OUTPUT

**Rule Part No.:** Part 2.1046, Part 73.267 (b)(2)

**Test Requirements:**

**Method of Measurement:** RF power is measured by direct method power using ANSI/TIA 603-C: 2004

**Test Setup Diagram:**




**Test Data:**

OUTPUT POWER: HIGH – 150 Watts
LOW - 10 Watts

DC INPUT POWER Vds = 37.2 V
Ids = 5.7 A
Watts = 212 W

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## MODULATION CHARACTERISTICS

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

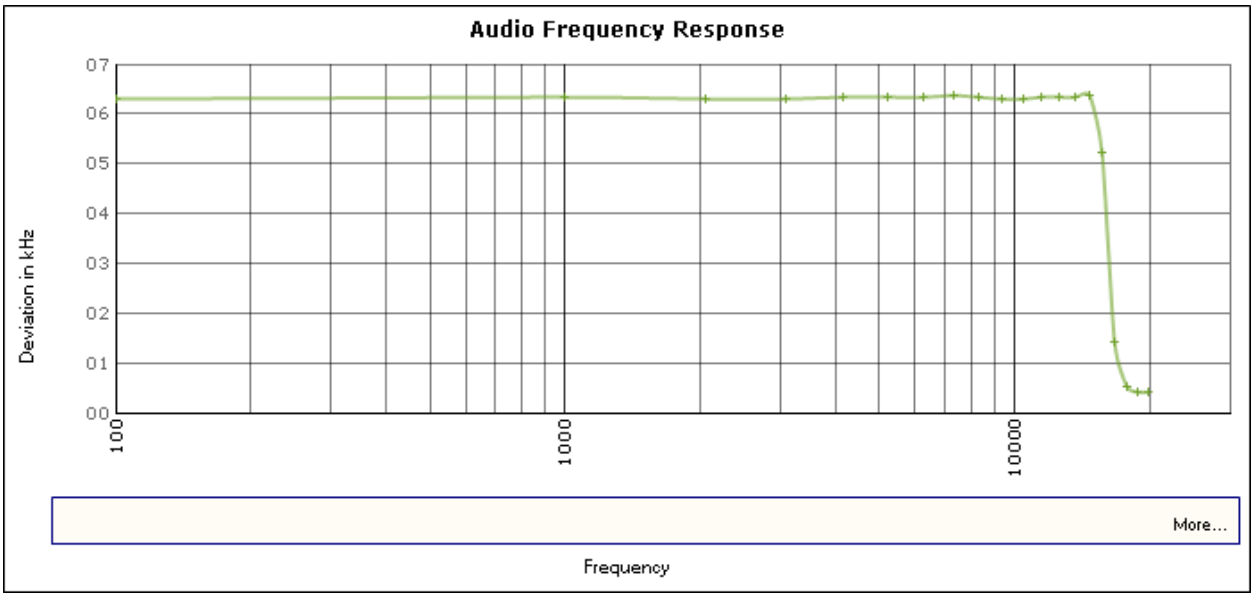
**Test Requirements:**

**Method of Measurement:**

**Audio frequency response**

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. The audio frequency response curve is shown below.

**AUDIO FREQUENCY RESPONSE PLOT**

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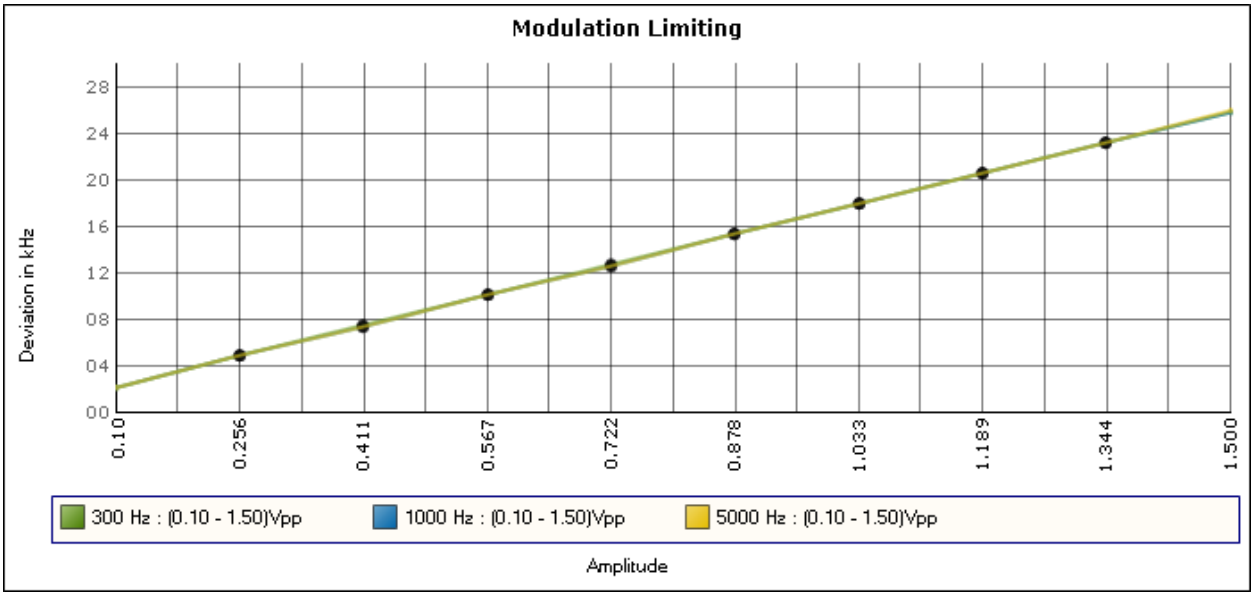
## AUDIO INPUT VERSUS MODULATION

**Rule Part No.:** Part 2.1047(b) & 73

**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 ANSI/TIA 603-C: 2004. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

**Test data:**

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## OTHER MODULATION CHARACTERISTICS

**Part 2.1033(c) (4)** Type of Emission: 180KF3E

Bn = 2M + 2DK
M = 15000
D = 24 kHz (Peak Deviation)
K = 1
Bn = 2(15k) + 2(75k)(1) = 180K

ALLOWED AUTHORIZED BANDWIDTH = 200 kHz.

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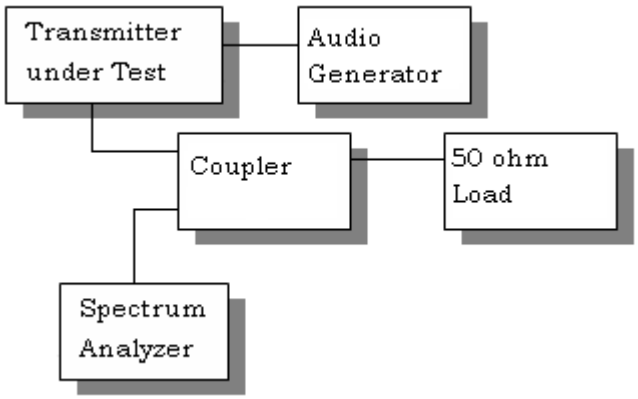
## OCCUPIED BANDWIDTH

**Part 2.1049(c)** EMISSION BANDWIDTH:
**Part 73.317(b-d)**

Any emission appearing on the frequency removed from the carrier between 120kHz and 240kHz inclusive must be attenuated at least 25 dB below the level of the un-modulated carrier. Compliance with this requirement will be deemed to show occupied bandwidth to be 240kHz or less. Any emission appearing on the frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the un-modulated carrier. Any emission appearing on the frequency removed from the carrier by more than 600 kHz must be attenuated at least 43 + 10 Log(P) dB below the level of the un-modulated carrier, or 80 dB, whichever is the lesser attenuation.

**Method of Measurement: ANSI / TIA 603-C: 2004**

**Test Setup Diagram:**




REQUIREMENT: PART 73: 200 kHz EMISSION BANDWIDTH.

**Test Data:** See the plots below

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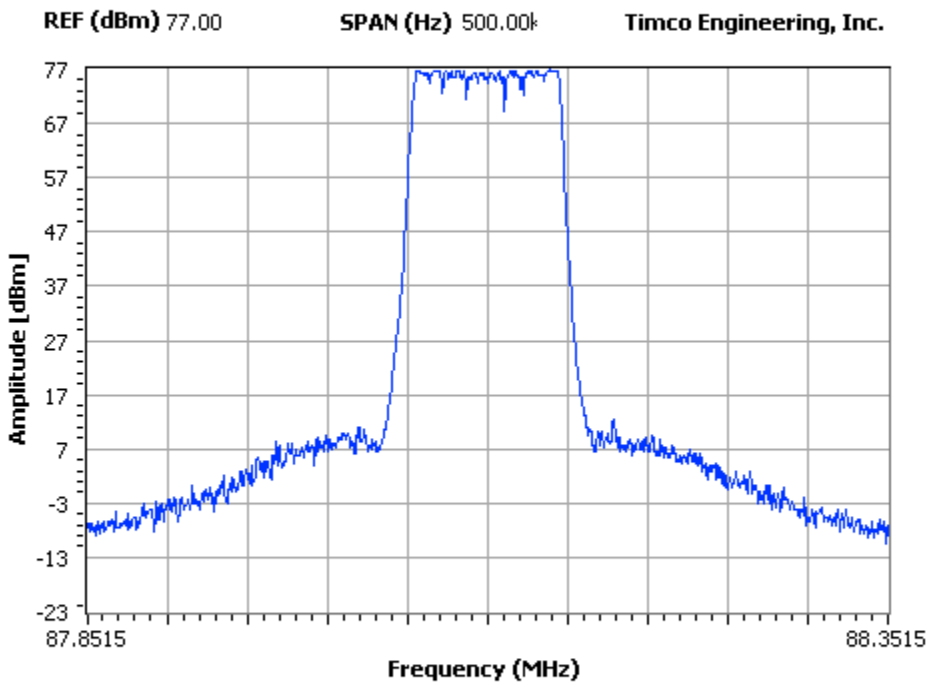
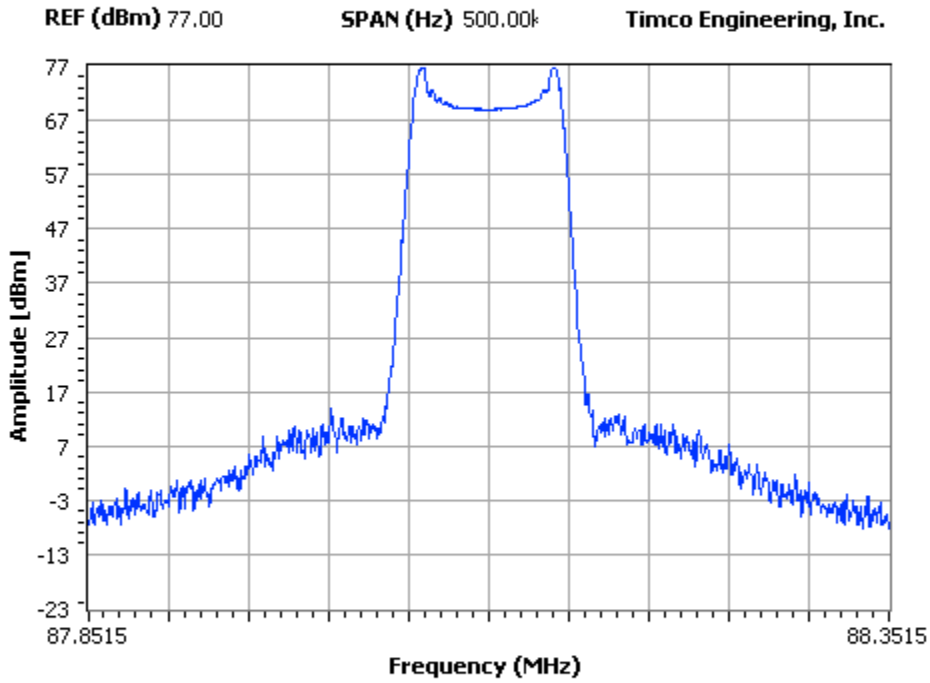
## OCCUPIED BANDWIDTH PLOT (50 Hz)

**NOTES:**
50 Hz



## OCCUPIED BANDWIDTH PLOT (1 kHz)

**NOTES:**
1 kHz




| RBW | VBW | ST (sec) |
|---|---|---|
| 3 kHz | 100 kHz | 100m |

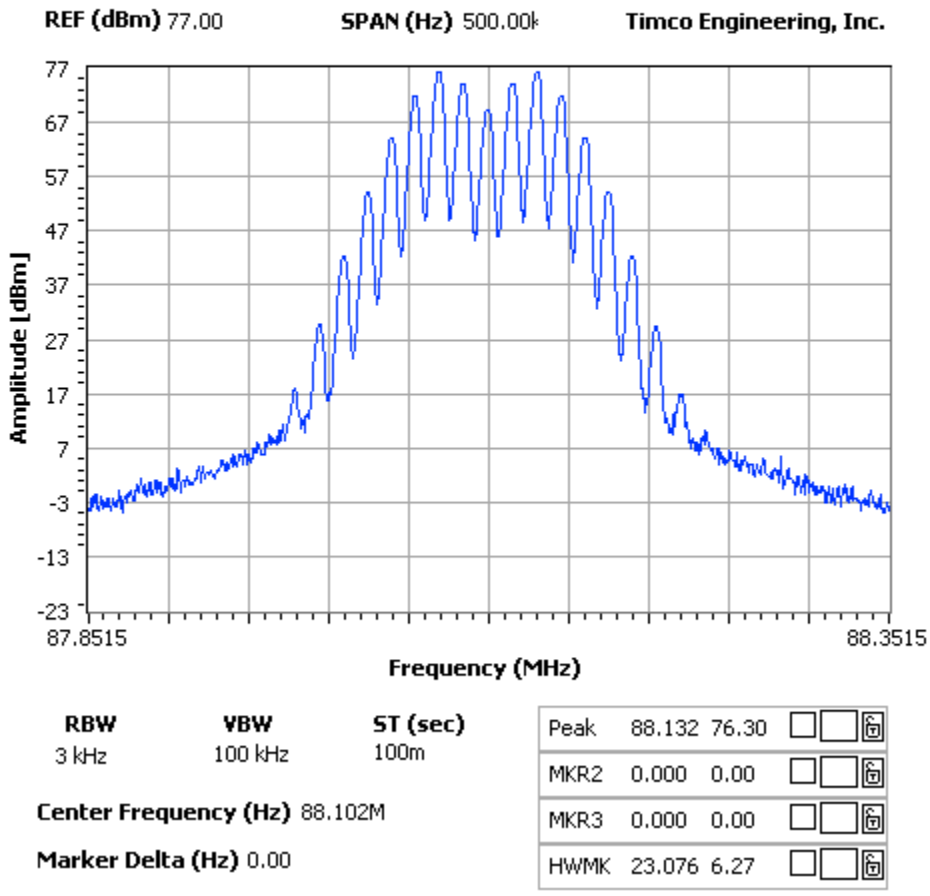
**Center Frequency (Hz)** 88.102M

**Marker Delta (Hz)** 0.00

| | | |
|---|---|---|
| Peak | 88.142 | 76.80 |
| MKR2 | 0.000 | 0.00 |
| MKR3 | 0.000 | 0.00 |
| HWMK | 23.076 | 6.27 |

## OCCUPIED BANDWIDTH PLOT (15 kHz)

**NOTES:**
15 kHz



## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**Rule Part No.:** Part 2.1051(a)

Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using 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 ANSI/TIA-603-C-2004.

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

**43 + 10log(150) = 64.7 dB**
**43 + 10log(10) = 53 dB**

**Test Data:**

| TF HIGH POWER | EF | dB below carrier | | TF LOW POWER | EF | dB below carrier |
|---|---|---|---|---|---|---|
| 88.1 | 88.1 | 0 | | 88.1 | 88.1 | 0 |
| | 176.2 | 68.5 | | | 176.2 | 63.7 |
| | 246.3 | 95.1 | | | 246.3 | 99.7 |
| | 352.4 | 104.7 | | | 352.4 | 110.2 |
| | 440.5 | 101.1 | | | 440.5 | 110.3 |
| | 528.6 | 105.7 | | | 528.6 | 111.2 |
| | 616.7 | 88.5 | | | 616.7 | 104.8 |
| | 704.8 | 100.9 | | | 704.8 | 110.8 |
| | 792.9 | 97.6 | | | 792.9 | 98.1 |
| | 881 | 89.6 | | | 881 | 98.1 |

| TF HIGH POWER | EF | dB below carrier | | TF LOW POWER | EF | dB below carrier |
|---|---|---|---|---|---|---|
| 98.1 | 98.1 | 0 | | 98.1 | 98.1 | 0 |
| | 196.2 | 112.1 | | | 196.2 | 104.4 |
| | 294.3 | 99.1 | | | 294.3 | 105.5 |
| | 392.4 | 112.9 | | | 392.4 | 113.4 |
| | 490.5 | 115.6 | | | 490.5 | 112.6 |
| | 588.6 | 106.5 | | | 588.6 | 113.5 |
| | 686.7 | 107.6 | | | 686.7 | 112.3 |
| | 784.8 | 107.9 | | | 784.8 | 112.8 |
| | 882.9 | 93.9 | | | 882.9 | 103.9 |
| | 981 | 97.2 | | | 981 | 112.3 |

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**TEST DATA CONT'D.**

| TF HIGH POWER | EF | dB below carrier | | TF LOW POWER | EF | dB below carrier |
|---|---|---|---|---|---|---|
| 107.9 | 107.9 | 0 | | 107.9 | 107.9 | 0 |
| | 215.8 | 100.9 | | | 215.8 | 105.1 |
| | 323.7 | 93.2 | | | 323.7 | 100.2 |
| | 431.6 | 112.3 | | | 431.6 | 105.9 |
| | 539.5 | 106.6 | | | 539.5 | 110.6 |
| | 647.4 | 104.9 | | | 647.4 | 107.1 |
| | 755.3 | 102.7 | | | 755.3 | 102.8 |
| | 863.2 | 98.2 | | | 863.2 | 91.4 |
| | 971.1 | 103.8 | | | 971.1 | 103.8 |
| | 1079 | 109.1 | | | 1079 | 108.8 |

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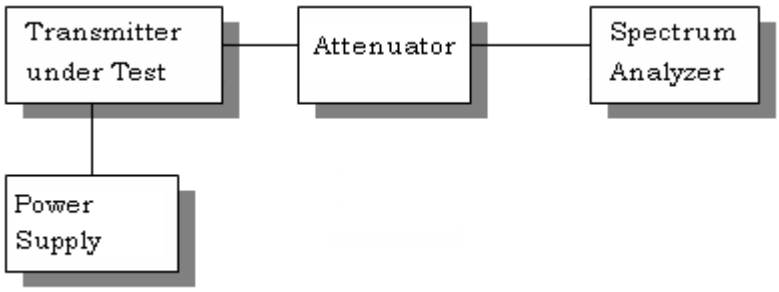
## Method of Measuring Conducted Spurious Emissions

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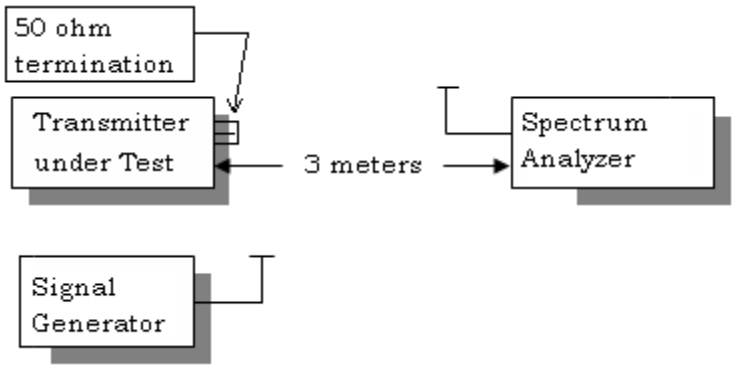
## FIELD STRENGTH OF SPURIOUS EMISSIONS

**Rule Parts. No.:** Part 2.1053

**Requirements:** Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least 43 + 10log(P) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

**43 + 10log(150) = 64.7 dB**
**43 + 10log(10) = 53 dB**

**Test Setup Diagram:**




**Test Data:**

High Power / Low Power

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) | | Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|---|---|---|---|---|---|---|
| 88.10 | V | 0 | | 88.10 | V | 0 |
| 176.20 | H | 128.3 | | 176.20 | H | 107.0 |
| 264.30 | H | 124.7 | | 264.30 | V | 105.9 |
| 352.40 | V | 110.2 | | 352.40 | H | 77.2 |
| 440.50 | V | 119.9 | | 440.50 | V | 91.4 |
| 528.60 | H | 123.1 | | 528.60 | V | 82.4 |
| 616.70 | H | 119.1 | | 616.70 | H | 70.4 |
| 704.80 | V | 121.9 | | 704.80 | V | 70.6 |
| 792.90 | H | 121.6 | | 792.90 | V | 72.4 |
| 881.00 | H | 103.6 | | 881.00 | H | 66.1 |

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TEST DATA CONT'D.

| HIGH POWER | | | | LOW POWER | | |
|---|---|---|---|---|---|---|
| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) | | Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
| 98.10 | V | 0 | | 98.10 | V | 0 |
| 196.20 | V | 117.1 | | 196.20 | H | 92.4 |
| 294.30 | H | 109.8 | | 294.30 | H | 88.6 |
| 392.40 | V | 122.1 | | 392.40 | V | 80.0 |
| 490.50 | H | 127.1 | | 490.50 | H | 96.6 |
| 588.60 | H | 114.2 | | 588.60 | H | 66.9 |
| 686.70 | V | 112.8 | | 686.70 | H | 78.8 |
| 784.80 | V | 122.0 | | 784.80 | H | 78.3 |
| 882.90 | V | 105.5 | | 882.90 | H | 68.3 |
| 981.00 | V | 119.7 | | 981.00 | V | 72.5 |

| HIGH POWER | | | | LOW POWER | | |
|---|---|---|---|---|---|---|
| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) | | Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
| 107.90 | V | 0 | | 107.90 | V | 0 |
| 215.80 | H | 129.1 | | 215.80 | H | 102.2 |
| 323.70 | V | 112.2 | | 323.70 | H | 90.4 |
| 431.60 | V | 111.7 | | 431.60 | V | 85.3 |
| 539.50 | H | 117.2 | | 539.50 | H | 93.6 |
| 647.40 | H | 107.6 | | 647.40 | H | 76.4 |
| 755.30 | H | 101.8 | | 755.30 | V | 71.0 |
| 863.20 | H | 98.3 | | 863.20 | H | 78.0 |
| 971.10 | V | 111.6 | | 971.10 | V | 82.9 |
| 1079.00 | V | 0 | | | | 91.5 |

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## FREQUENCY STABILITY

**Rule Parts. No.:** Part 2.1055, Part 73

**Requirements:** Temperature and voltage tests were performed to verify that the frequency remains within the 2000Hz, specification limit.

The test was conducted as follows: The transmitter was placed in the temperature chamber at 25º C and allowed to stabilize for one hour. The temperature was then reduced to -30º C after which the transmitter was again allowed to stabilize for one hour. The transmitter was ON continuously because that is how it is used 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 + 50º C.

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

**Test Data:**

| **Assigned Frequency (Ref. Frequency) (MHz)** | | |
|---|---|---|
| **Temperature (ºC)** | **Frequency (MHz)** | **Frequency Stability (PPM)** |
| -30 | 98.100002 | -0.06 |
| -20 | 98.100000 | -0.08 |
| -10 | 98.100021 | 0.13 |
| 0 | 98.099995 | -0.13 |
| +10 | 98.099997 | -0.11 |
| +20 | 98.100008 | 0.00 |
| +30 | 98.100004 | -0.04 |
| +40 | 98.099996 | -0.12 |
| +50 | 98.099991 | -0.17 |

| **Assigned Frequency (Ref. Frequency) (MHz)** | | |
|---|---|---|
| **Battery %** | **Frequency (MHz)** | **Frequency Stability (PPM)** |
| -15% | 98.100008 | 0 |
| 0 | 98.100008 | 0 |
| +15% | 98.100008 | 0 |

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