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## FCC PART 87 TEST REPORT

|                             |                                                                        |
|-----------------------------|------------------------------------------------------------------------|
| <b>APPLICANT</b>            | AVIDYNE CORPORATION                                                    |
|                             | 55 OLD BEDFORD ROAD                                                    |
|                             | LINCOLN MASSACHUSETTS 01773-1125USA                                    |
| <b>FCC ID</b>               | RZYIFDXXXV                                                             |
| <b>MODEL NUMBER</b>         | 700-00179-(XXX), 700-00190-(XXX), 700-00182-(XXX), 700-00183-(XXX)     |
| <b>PRODUCT DESCRIPTION</b>  | VHF NAV/COM RADIO                                                      |
| <b>DATE SAMPLE RECEIVED</b> | 2/4/2014                                                               |
| <b>DATE TESTED</b>          | 2/6/2014                                                               |
| <b>REPORT ISSUE DATE</b>    | 2/12/2014                                                              |
| <b>TESTED BY</b>            | Nam Nguyen                                                             |
| <b>APPROVED BY</b>          | Nam Nguyen                                                             |
| <b>TIMCO REPORT NO.</b>     | 178AUT14TestReport.docx                                                |
| <b>TEST RESULTS</b>         | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL |

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

Applicant: AVIDYNE CORPORATION  
FCC ID: RZYIFDXXXV  
Report: A\AVIDYNE\178AUT14\178AUT14TestReport.docx

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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: Nam Nguyen**



**Signature:**

**Function: Engineering Project Manager**

**Date: 2/12/2014**

## REPORT SUMMARY

|                              |                                                  |
|------------------------------|--------------------------------------------------|
| Disclaimer                   | The test results only relate to the item tested. |
| Standards Applied<br>Rule(s) | TIA 603<br>FCC CFR 47 Part 87                    |
| Related Report               | NA                                               |

## TEST ENVIRONMENT

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Test Facility                       | Timco Engineering, Inc. 849 NW State Road 45 Newberry,<br>FL 32669 USA. |
| Test Condition in the<br>laboratory | Temperature: 26°C<br>Relative humidity: 50%<br>Barometric Pressure:     |

## TEST SETUP SUMMARY

|                                    |                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Setup Diagram/<br>Description | The EUT was placed on the turntable per setup per ANSI C63.4: 2003. A test set up photo is provided for clarification. The EUT was placed in continuous transmit mode of operation. |
| Revision History of<br>EUT         | No modification was made to the DUT during testing.                                                                                                                                 |

## GENERAL INFORMATION

|                                                   |                                                                       |
|---------------------------------------------------|-----------------------------------------------------------------------|
| The test results relate only to the items tested. |                                                                       |
| <b>DUT Description</b>                            | VHF NAV/COM RADIO                                                     |
| <b>FCC ID</b>                                     | RZYIFDXXXV                                                            |
| <b>Model Number</b>                               | 700-00179-(XXX), 700-00190-(XXX), 700-00182-(XXX),<br>700-00183-(XXX) |
| <b>Operating Frequency</b>                        | 117.975 – 136.00 MHz                                                  |
| <b>No. of Channels</b>                            | Single                                                                |
| <b>Type of Emission</b>                           | 6K00A3E                                                               |
| <b>Modulation</b>                                 | AM                                                                    |
| <b>DUT Power Source</b>                           | <input type="checkbox"/> 110–120Vac/50– 60Hz                          |
|                                                   | <input checked="" type="checkbox"/> DC Power                          |
|                                                   | <input type="checkbox"/> Battery Operated Exclusively                 |
| <b>Test Item</b>                                  | <input type="checkbox"/> Prototype                                    |
|                                                   | <input checked="" type="checkbox"/> Pre-Production                    |
|                                                   | <input type="checkbox"/> Production                                   |
| <b>Type of Equipment</b>                          | <input type="checkbox"/> Fixed                                        |
|                                                   | <input checked="" type="checkbox"/> Mobile                            |
|                                                   | <input type="checkbox"/> Portable                                     |
| <b>Antenna Connector</b>                          | BNC Connector                                                         |

## EMC EQUIPMENT LIST

| Device                              | Manufacturer               | Model      | Serial Number       | Cal/Char Date | Due Date |
|-------------------------------------|----------------------------|------------|---------------------|---------------|----------|
| 3-Meter Semi-Anechoic Chamber       | Panashield                 | N/A        | N/A                 | 12/31/13      | 12/31/15 |
| EMI Receiver                        | Rohde & Schwarz            | ESU40*     | 100320              | 3/21/13       | 3/21/15  |
| EMI Receiver                        | Rohde & Schwarz            | ESIB40     | 100274              | 3/16/12       | 3/16/14  |
| Coaxial Cable - Chamber 3 cable set | Semiflex                   | N/A        | Chamber 3 cable set | 1/26/13       | 1/26/15  |
| Antenna: Biconnical                 | Eaton                      | 94455-1    | 1057                | 06/14/13      | 06/14/15 |
| Antenna: Log-Periodic               | Eaton                      | 96005      | 1243                | 05/31/13      | 05/31/15 |
| Horn Antenna                        | ETS                        | 3117       | 00041534            | 10/05/12      | 10/05/14 |
| Antenna: Double-Ridged Horn         | Electro-Metrics            | RGA-180    | 2319                | 06/19/12      | 06/19/14 |
| Antenna: Dipole Kit                 | Electro-Metrics            | TDA-30/1-4 | 152                 | 11/01/13      | 11/01/15 |
| Notch Filter                        | Microlab                   | HA-10N     |                     | 6/14/12       | 6/14/14  |
| Tunable Notch Filter                | Eagle Sedona               | 210BFBF    |                     | 9/15/13       | 9/15/15  |
| Synthesized Function Generator      | Stanford Research Systems  | DS345      | 38435               | 6/9/13        | 6/9/15   |
| Modulation Analyzer                 | Agilent Technologies, Inc. | 8901A      | 3050A05856          | 9/26/12       | 9/26/15  |
| Frequency Counter                   | HP                         | 5385A      | 2730A03025          | 08/22/13      | 08/22/15 |
| DC Power Supply                     | Astron                     | VLS-25M    |                     | 03/21/13      | 03/21/15 |
| Digital Multimeter                  | Fluke                      | 77         | 35053830            | 06/20/13      | 06/20/15 |
| Power Meter                         | Boonton Electronics        | 4531       | 11793               | 1/9/13        | 1/9/15   |
| Sensor                              | Boonton                    | 51072A     | 34647               | 01/19/13      | 01/19/15 |
| Temperature Chamber                 | Tenney Engineering         | TTRC       | 11717-7             | 07/03/12      | 07/03/14 |
| Hygro-Thermometer                   | Extech                     | 445703     | 0602                | 06/15/13      | 06/15/15 |

### EMI TEST RECEIVER FIRMWARE VERSION USED

| Manufacturer    | Model  | Receiver Firmware | BIOS Ver  |
|-----------------|--------|-------------------|-----------|
| Rohde & Schwarz | ESU40  | 4.43 SP3          | V5.1-24-3 |
| Rohde & Schwarz | ESIB40 | 4.34.3            | 3.3       |

Applicant: AVIDYNE CORPORATION

FCC ID: RZYIFDXXXV

Report: A\AVIDYNE\178AUT14\178AUT14TestReport.docx

## TEST PROCEDURE

**Power Line Conducted Interference:** The procedure used was ANSI/ TIA 603-D: 2010 using a 50uH LISN. Both lines were observed with the UUT 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<sup>th</sup> 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 C63.4-2003 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum 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

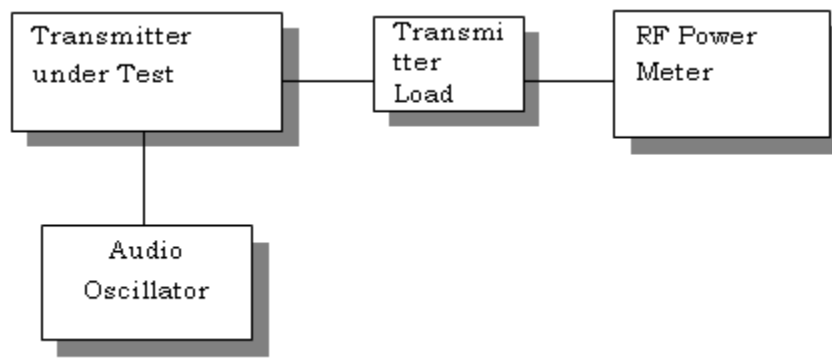
**Rule Part No.:** Part 2.1046(a), Part 87.131

### 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:

For the Device has a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

### Test Setup Diagram:



**Test Data: The RF power of the EUT can be set at 16W, or 10W.**

OUTPUT POWER: For the highest and lowest power setting.

| Tuned Frequency (MHz) | RF POWER (W) |       |
|-----------------------|--------------|-------|
|                       | HI           | LOW   |
| 118.00                | 16.00        | 10.09 |
| 127.00                | 16.07        | 10.07 |
| 136.00                | 16.03        | 10.12 |

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

FOR LOW POWER SETTING INPUT POWER:  $(28V)(4.1A) = 114.8$  Watts

FOR HIGH POWER SETTING INPUT POWER:  $(28V)(5.1A) = 142.8$  Watts

Applicant: AVIDYNE CORPORATION

FCC ID: RZYIFDXXXV

Report: A\AVIDYNE\178AUT14\178AUT14TestReport.docx

## MODULATION CHARACTERISTICS

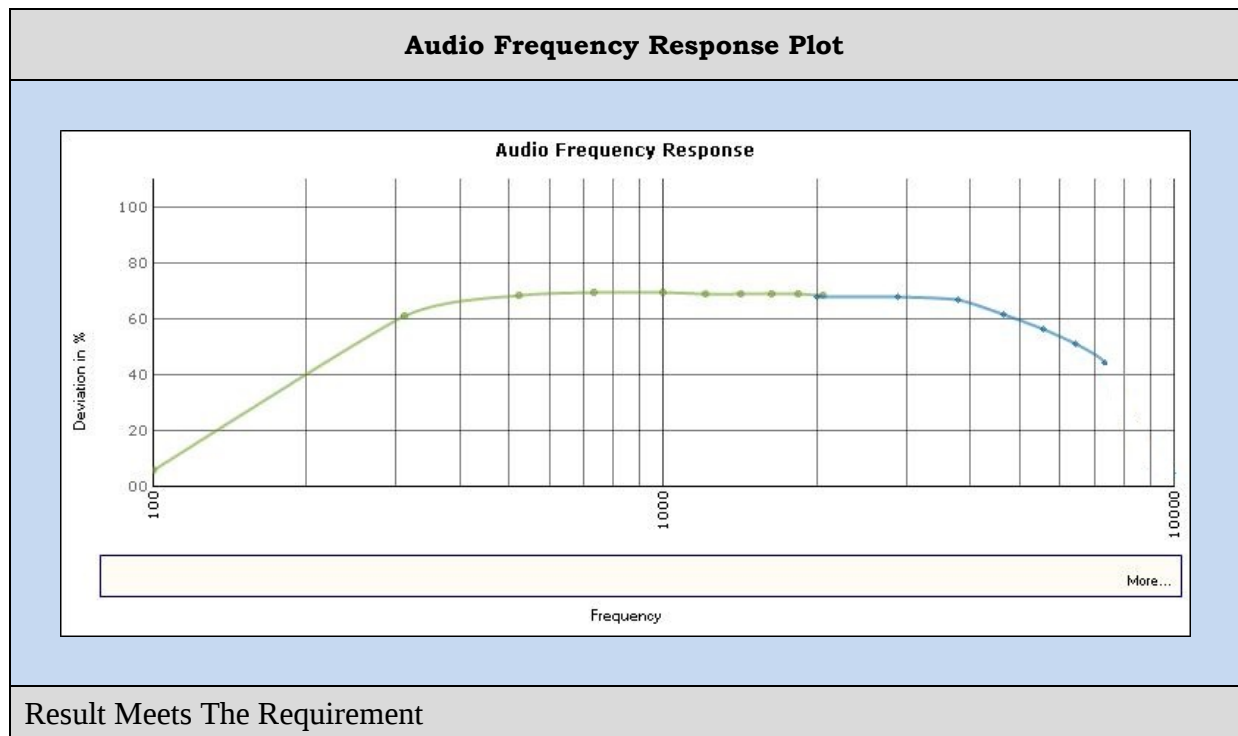
**Rule Part No.:** Part 2.1047(a)(b)

### Test Requirements:

### Method of Measurement:

*Audio frequency response*

The audio frequency response was measured in accordance with ANSI/TIA 603-D: 2010 with the exception that for an AM modulated transmitter the input was varied for a constant modulation of 20%. 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.



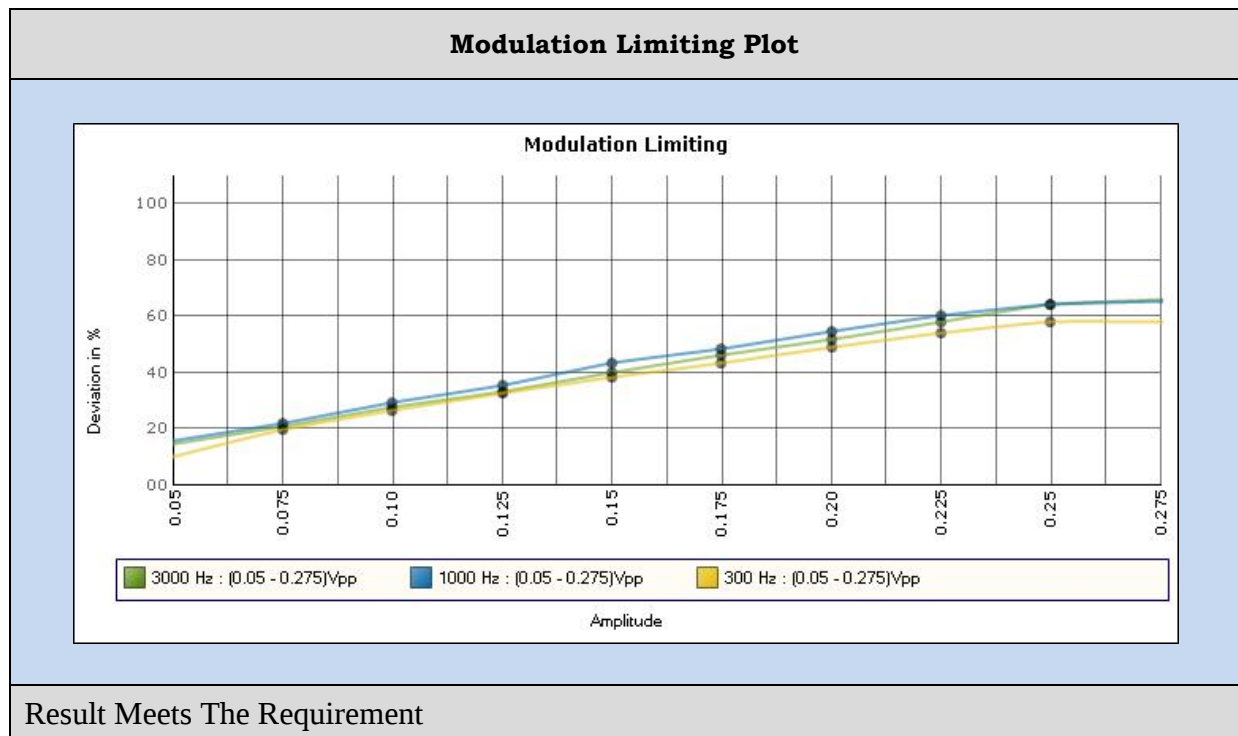
## AUDIO INPUT VERSUS MODULATION

**Rule Part No.:** Part 2.1047(b) & 87.141

### 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-D: 2010. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

### Test data:



## **AUDIO LOW PASS FILTER**

**Rule Part No.:** Part 2.1047(a), Part 87.141(F)

**Test Requirements:**

**Method of Measurement:**

**Test Data:** Not applicable since this rule part is only required for FM modulation.

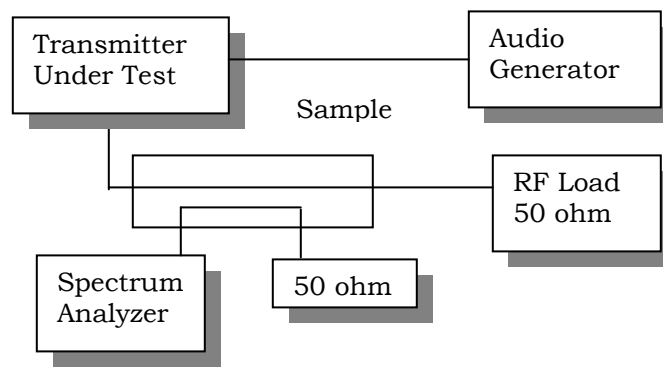
## OCCUPIED BANDWIDTH

**Rule Part No.:** Part 2.1049, Part 87.137

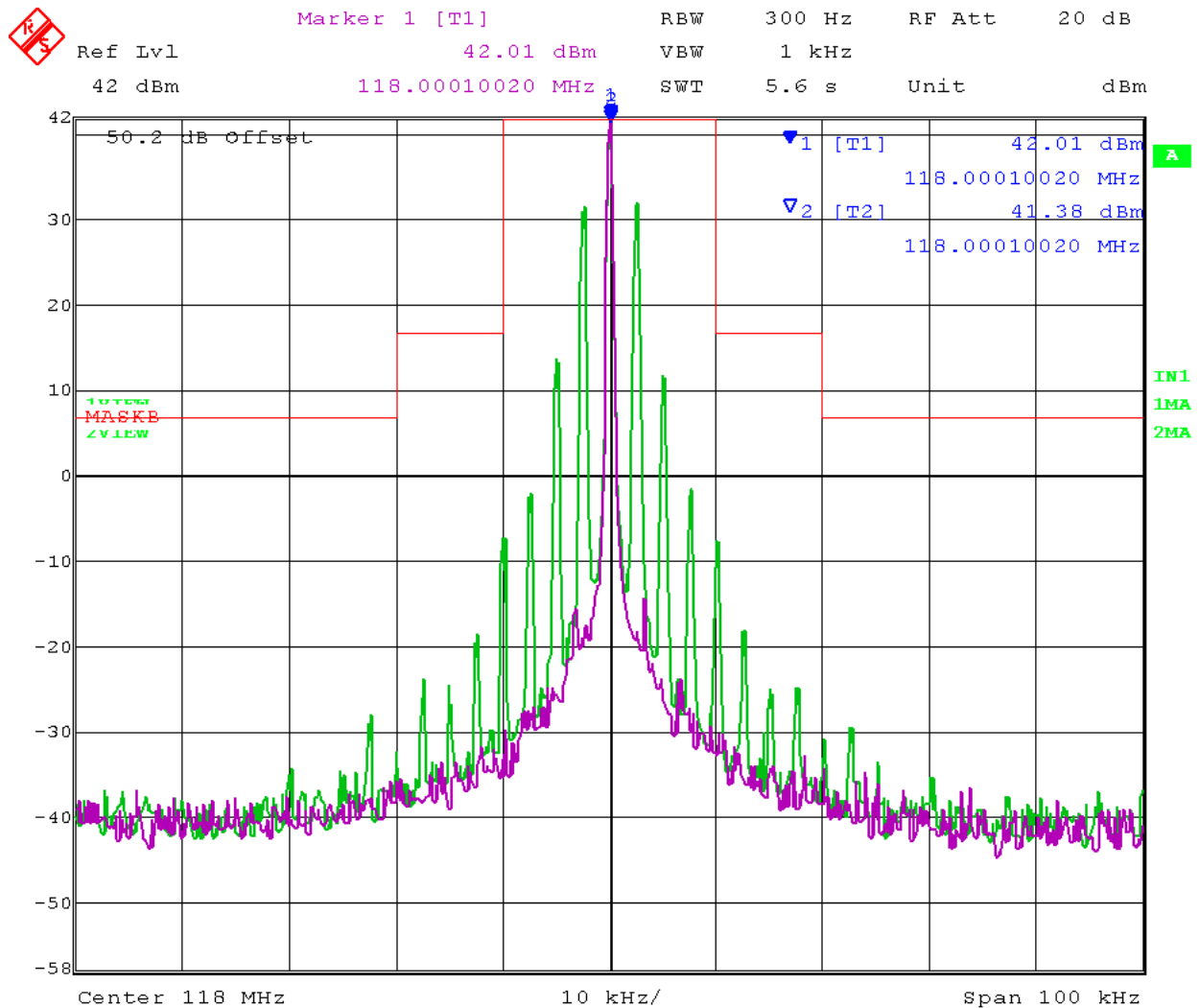
**Test Requirements:** Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 150%: At least 25dB. On any frequency removed from the assigned frequency by more than 150%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least  $43 + 10\log(P)$ dB.

**Method of Measurement:**

**Test Setup Diagram:**

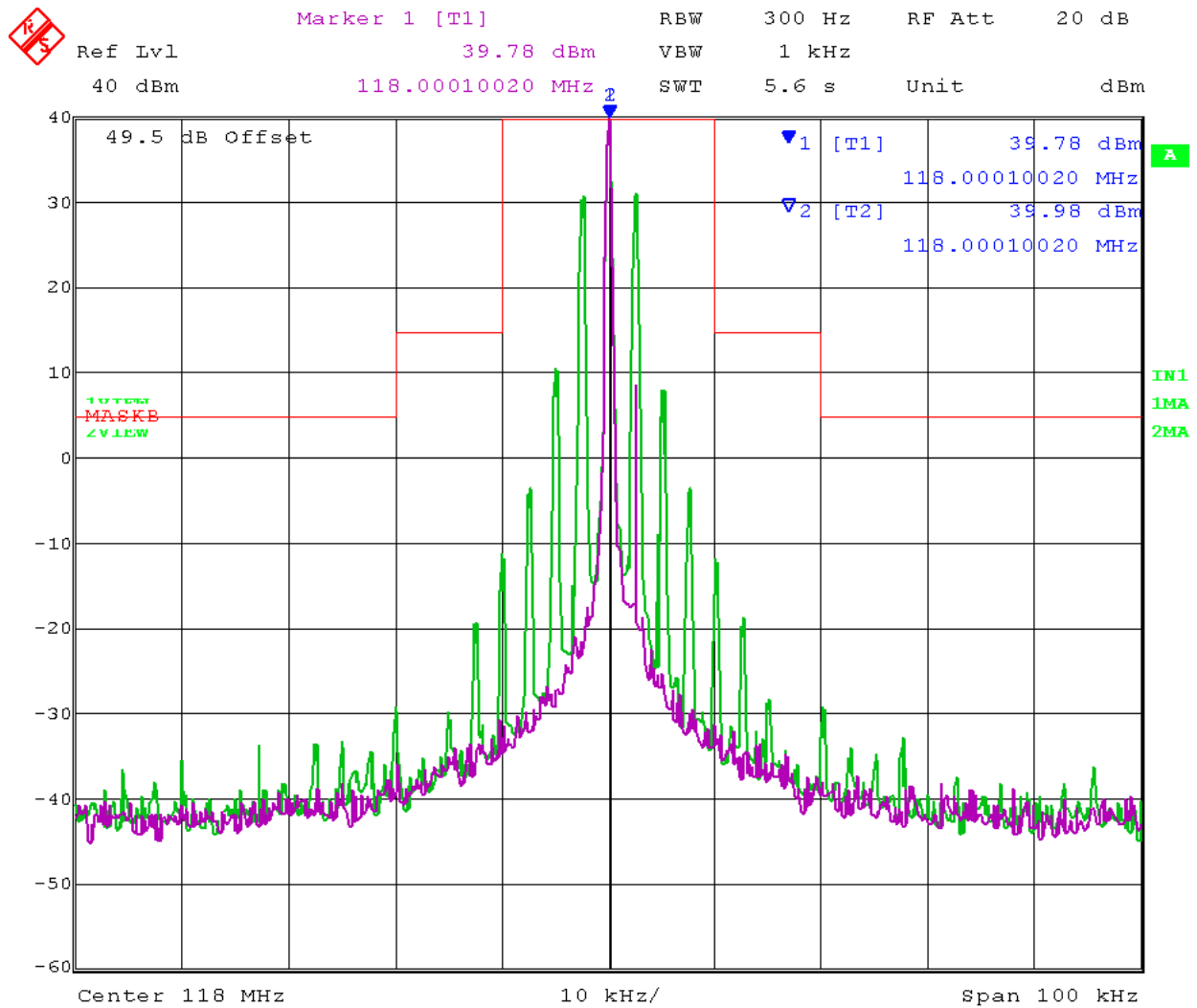


**Test Data:** See the plots below



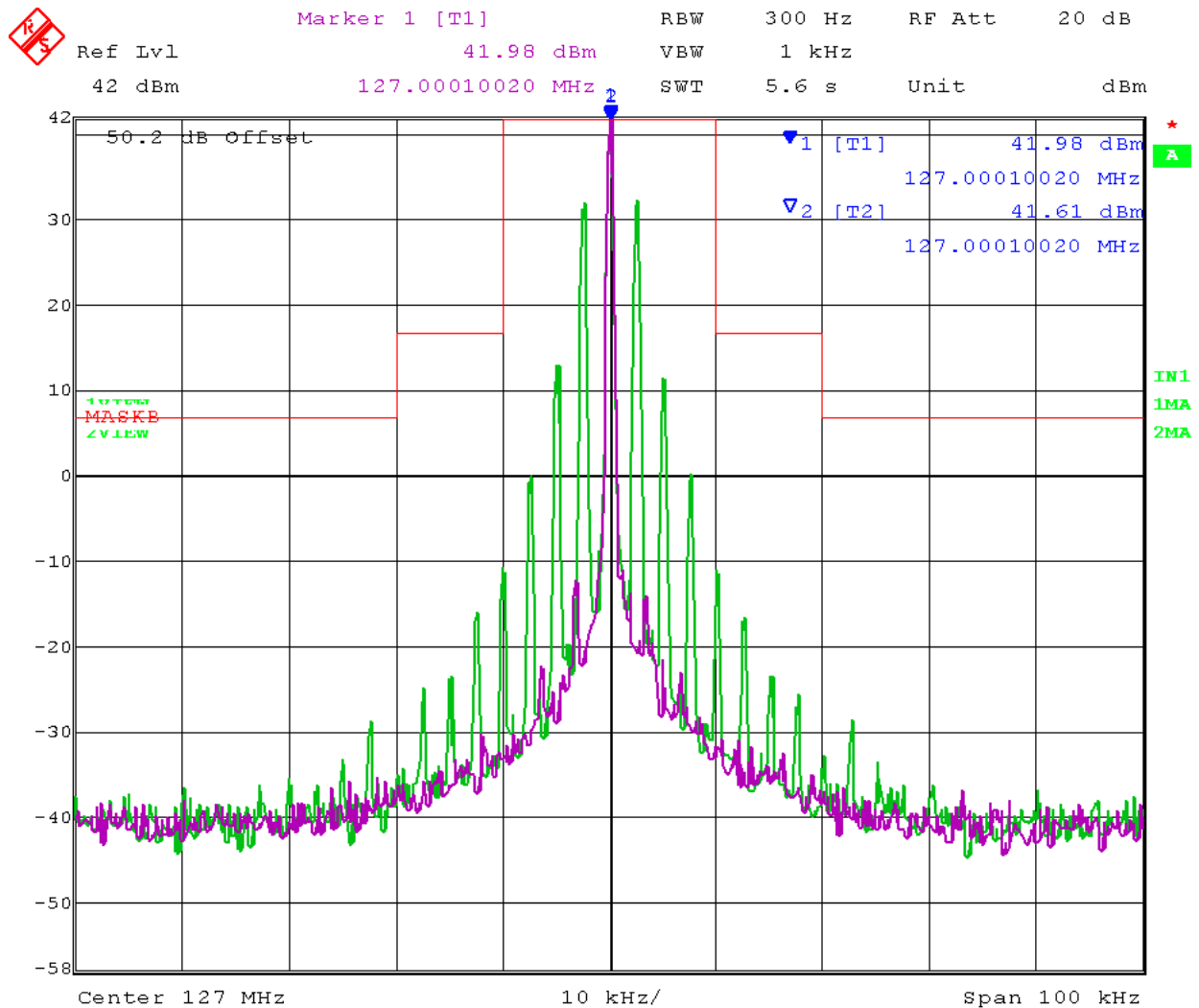
Date: 7.FEB.2014 09:21:14

Figure 1: Occupied Bandwidth – 118 MHz – High Power



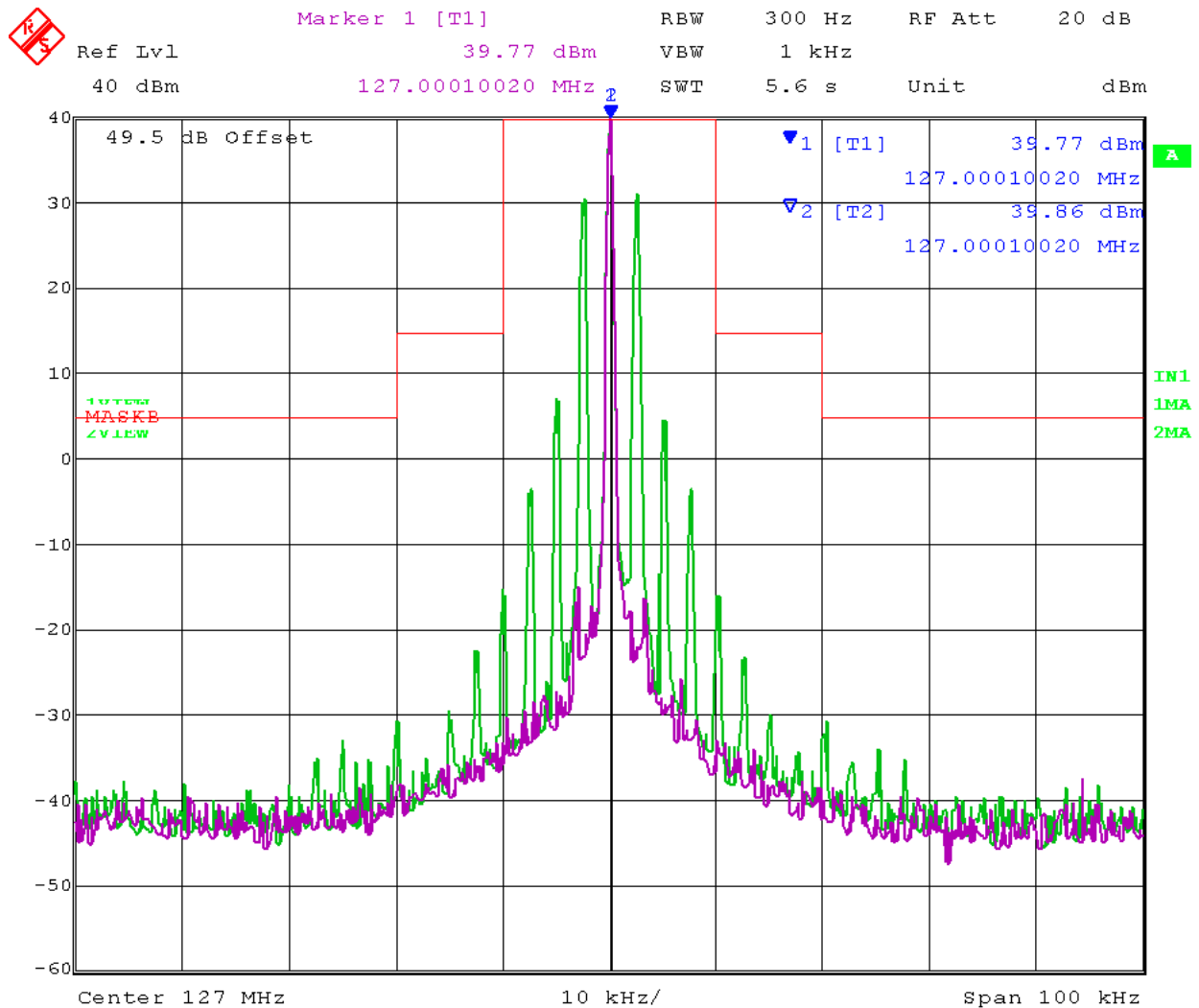
Date: 7.FEB.2014 08:56:22

Figure 2: Occupied Bandwidth – 118 MHz – Low Power



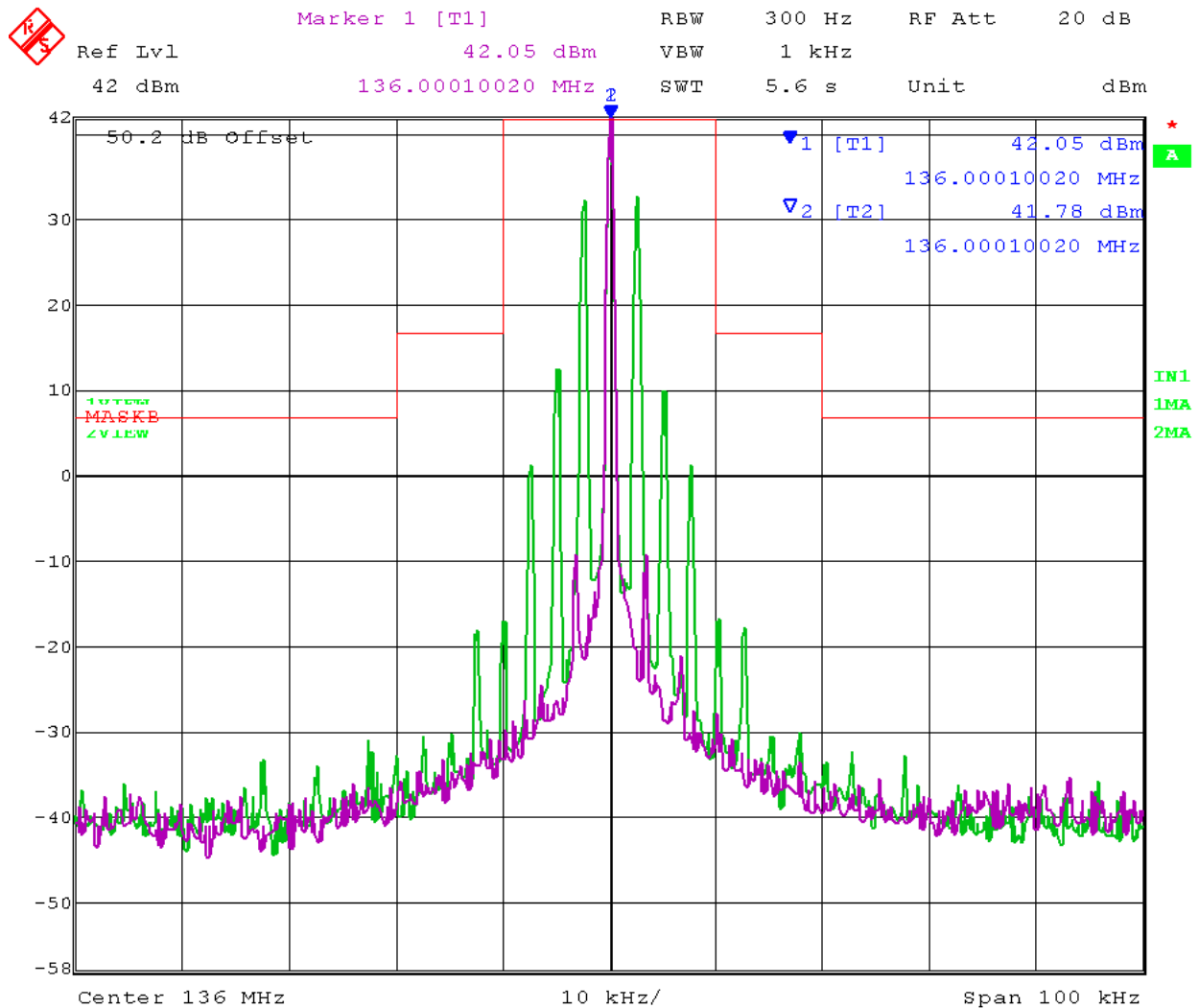
Date: 7.FEB.2014 09:15:20

Figure 3: Occupied Bandwidth – 127 MHz – High Power



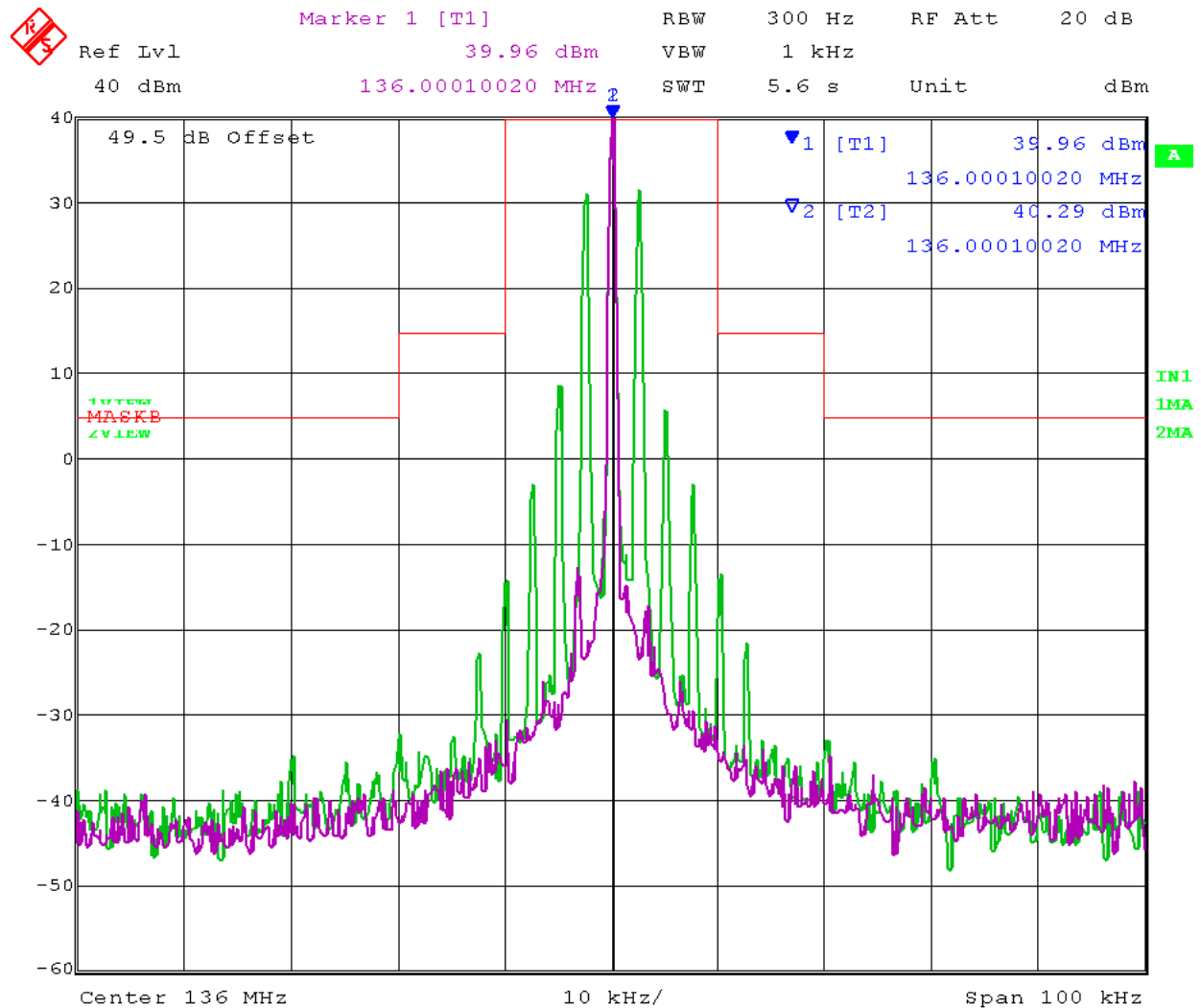
Date: 7.FEB.2014 08:59:55

Figure 4: Occupied Bandwidth – 127 MHz – Low Power



Date: 7.FEB.2014 09:18:00

Figure 5: Occupied Bandwidth – 136 MHz – High Power



Date: 7.FEB.2014 09:04:50

Figure 6: Occupied Bandwidth – 136 MHz – Low Power

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

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

**Requirements:** 25kHz Channel Spacing = 55.05dBc (for 16Watts)  
25kHz Channel Spacing = 53.00dBc (for 10Watts)

**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-D: 2010.

### Test Data:

| TF<br>HIGH POWER | EF      | dB below<br>carrier |  | TF<br>LOW POWER | EF      | dB below<br>carrier |
|------------------|---------|---------------------|--|-----------------|---------|---------------------|
| 118.00           | 236.00  | 74.8                |  | 118.00          | 236.00  | 72.0                |
|                  | 354.00  | 89.5                |  |                 | 354.00  | 89.7                |
|                  | 472.00  | 92.2                |  |                 | 472.00  | 89.3                |
|                  | 590.00  | 92.6                |  |                 | 590.00  | 90.1                |
|                  | 708.00  | 91.4                |  |                 | 708.00  | 88.4                |
|                  | 826.00  | 91.4                |  |                 | 826.00  | 88.5                |
|                  | 944.00  | 90.4                |  |                 | 944.00  | 87.8                |
|                  | 1062.00 | *                   |  |                 | 1062.00 | *                   |
|                  | 1180.00 | *                   |  |                 | 1180.00 | *                   |
|                  |         |                     |  |                 |         |                     |

| TF<br>HIGH POWER | EF      | dB below<br>carrier |  | TF<br>LOW POWER | EF      | dB below<br>carrier |
|------------------|---------|---------------------|--|-----------------|---------|---------------------|
| 127.00           | 254.00  | 77.7                |  | 127.00          | 254.00  | 71.6                |
|                  | 381.00  | 88.3                |  |                 | 381.00  | 85.3                |
|                  | 508.00  | 91.5                |  |                 | 508.00  | 88.5                |
|                  | 635.00  | 91.4                |  |                 | 635.00  | 89.4                |
|                  | 762.00  | 90.4                |  |                 | 762.00  | 87.8                |
|                  | 889.00  | 90.4                |  |                 | 889.00  | 88.8                |
|                  | 1016.00 | *                   |  |                 | 1016.00 | *                   |
|                  | 1143.00 | *                   |  |                 | 1143.00 | *                   |
|                  | 1270.00 | *                   |  |                 | 1270.00 | *                   |
|                  |         |                     |  |                 |         |                     |

\*: There is no emission found.

| <b>TF<br/>HIGH POWER</b> | <b>EF</b> | <b>dB below<br/>carrier</b> |  | <b>TF<br/>LOW POWER</b> | <b>EF</b> | <b>dB below<br/>carrier</b> |
|--------------------------|-----------|-----------------------------|--|-------------------------|-----------|-----------------------------|
| 136.00                   | 272.00    | 80.6                        |  | 136.00                  | 272.00    | 75.6                        |
|                          | 408.00    | 88.3                        |  |                         | 408.00    | 89.8                        |
|                          | 544.00    | 82.2                        |  |                         | 544.00    | 79.9                        |
|                          | 680.00    | 92.4                        |  |                         | 680.00    | 90.1                        |
|                          | 816.00    | 91.8                        |  |                         | 816.00    | 89.2                        |
|                          | 952.00    | 90.8                        |  |                         | 952.00    | 88.7                        |
|                          | 1088.00   | *                           |  |                         | 1088.00   | *                           |
|                          | 1224.00   | *                           |  |                         | 1224.00   | *                           |
|                          | 1360.00   | *                           |  |                         | 1360.00   | *                           |
|                          |           |                             |  |                         |           |                             |

\*: There is no emission found.

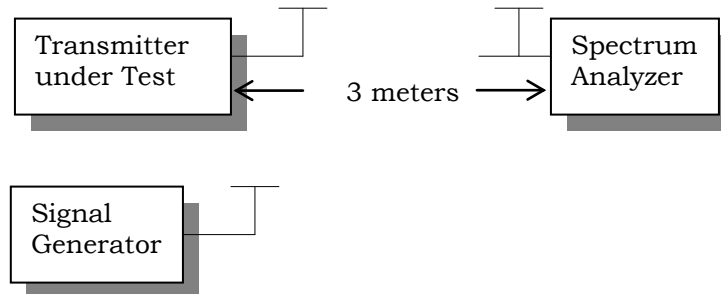
## FIELD STRENGTH OF SPURIOUS EMISSIONS

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

**Test Requirements:** The FCC limits for radiated emissions are the same as previously stated for the conducted emissions.

**Method of Measurements:** The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-D: 2010 using the substitution method.

**Test Setup Diagram:**



**Test Data:**

**High Power**

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 118.00                 | 0             | 0                      |
| 236.00                 | H             | 96.4                   |
| 354.00                 | H             | 94.9                   |
| 472.00                 | V             | 106.6                  |
| 590.00                 | V             | 102.3                  |
| 708.00                 | H             | 104.3                  |
| 826.00                 | V             | 99.6                   |
| 944.00                 | H             | 99.8                   |
| 1062.00                | H/V           | NE                     |
| 1180.00                | H/V           | NE                     |

**Low Power**

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 118.00                 | 0             | 0                      |
| 236.00                 | H             | 93.2                   |
| 354.00                 | H             | 89.9                   |
| 472.00                 | H             | 107.5                  |
| 590.00                 | V             | 101.6                  |
| 708.00                 | H             | 102.1                  |
| 826.00                 | V             | 97.9                   |
| 944.00                 | V             | 96.0                   |
| 1062.00                | H/V           | NE                     |
| 1180.00                | H/V           | NE                     |

NE: There is no emission found.

### High Power

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 127.00                 | 0             | 0                      |
| 254.00                 | V             | 100.9                  |
| 381.00                 | H             | 103.2                  |
| 508.00                 | H             | 103.0                  |
| 635.00                 | H             | 105.9                  |
| 762.00                 | V             | 101.6                  |
| 889.00                 | V             | 101.3                  |
| 1016.00                | H/V           | NE                     |
| 1143.00                | H/V           | NE                     |
| 1270.00                | H/V           | NE                     |

### Low Power

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 127.00                 | 0             | 0                      |
| 254.00                 | V             | 102.5                  |
| 381.00                 | H             | 96.3                   |
| 508.00                 | V             | 103.2                  |
| 635.00                 | V             | 101.4                  |
| 762.00                 | V             | 98.1                   |
| 889.00                 | V             | 98.0                   |
| 1016.00                | H/V           | NE                     |
| 1143.00                | H/V           | NE                     |
| 1270.00                | H/V           | NE                     |

### High Power

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 136.00                 | 0             | 0                      |
| 272.00                 | H             | 98.1                   |
| 408.00                 | H             | 101.8                  |
| 544.00                 | H             | 87.9                   |
| 680.00                 | V             | 103.2                  |
| 816.00                 | V             | 110.4                  |
| 952.00                 | V             | 104.3                  |
| 1088.00                | H/V           | NE                     |
| 1224.00                | H/V           | NE                     |
| 1360.00                | H/V           | NE                     |

### Low Power

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 136.00                 | 0             | 0                      |
| 272.00                 | H             | 99.9                   |
| 408.00                 | H             | 96.0                   |
| 544.00                 | H             | 88.9                   |
| 680.00                 | V             | 97.7                   |
| 816.00                 | H             | 100.7                  |
| 952.00                 | H             | 97.0                   |
| 1088.00                | H/V           | NE                     |
| 1224.00                | H/V           | NE                     |
| 1360.00                | H/V           | NE                     |

NE: There is no emission found.

## FREQUENCY STABILITY

**Rule Parts. No.:** Part 2.1055, Part 87.133

**Requirements:** Temperature range requirements: -30 to +50° C.  
Voltage Variation +, -15%  
±20 PPM

**Method of Measurements:** ANSI/TIA 603-D: 2010

### Test Data:

| Assigned Frequency (Ref. Frequency) (MHz) |                 | 127.000030                |
|-------------------------------------------|-----------------|---------------------------|
| Temperature (°C)                          | Frequency (MHz) | Frequency Stability (PPM) |
| -30                                       | 127.000051      | 0.17                      |
| -20                                       | 127.000061      | 0.24                      |
| -10                                       | 127.000049      | 0.15                      |
| 0                                         | 127.000074      | 0.35                      |
| +10                                       | 127.000067      | 0.29                      |
| +20                                       | 127.000045      | 0.12                      |
| +30                                       | 127.000033      | 0.02                      |
| +40                                       | 127.000059      | 0.23                      |
| +50                                       | 127.000048      | 0.14                      |

| Assigned Frequency (Ref. Frequency) (MHz) |                 |                           |
|-------------------------------------------|-----------------|---------------------------|
| % Battery                                 | Frequency (MHz) | Frequency Stability (PPM) |
| -15%                                      | 127.000037      | 0.06                      |
| 0                                         | 127.000030      | 0.00                      |
| +15%                                      | 127.000041      | 0.09                      |

## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** Part 15.107 Class B

**Requirements:**

| Frequency<br>(MHz) | Quasi Peak Limits<br>(dB $\mu$ V) | Average Limits<br>(dB $\mu$ V) |
|--------------------|-----------------------------------|--------------------------------|
| 0.15 – 0.5         | 66 – 56                           | 56 – 46                        |
| 0.5 – 5.0          | 56                                | 46                             |
| 5.0 – 30           | 60                                | 50                             |

**Test Procedure:** ANSI C63.4-2003. The spectrum was scanned from 0.15 to 30 MHz.

N/A. Operated by 28Vdc battery.