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## FCC PART 90

### 136-174 MHz VHF PORTABLE REPORT

|                             |                                                                        |
|-----------------------------|------------------------------------------------------------------------|
| <b>APPLICANT</b>            | VERTEX STANDARD USA, INC.                                              |
|                             | 8000 WEST SUNRISE BLVD.<br>FT. LAUDERDALE FL 33322 USA                 |
| <b>FCC ID</b>               | AXI11373020                                                            |
| <b>MODEL NUMBER</b>         | EVX-261-D0-5                                                           |
| <b>PRODUCT DESCRIPTION</b>  | VHF 2 WAY PORTABLE TANSCEIVER                                          |
| <b>STANDARD APPLIED</b>     | CFR 47 Part 90                                                         |
| <b>DATE SAMPLE RECEIVED</b> | 6/29/2016                                                              |
| <b>FINAL TEST DATE</b>      | 9/01/2016                                                              |
| <b>TESTED BY</b>            | Cory Leverett                                                          |
| <b>APPROVED BY</b>          | Sid Sanders                                                            |
| <b>TEST RESULTS</b>         | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL |

| Report Number        | Version Number | Description                      | Issue Date |
|----------------------|----------------|----------------------------------|------------|
| 1235AUT16TestReport_ | Rev1           | Initial Issue                    | 8/16/16    |
|                      | Rev2           | Added A2LA Accredited Symbol     | 8/18/16    |
|                      | Rev3           | Updated Freq Stability Tech Data | 9/06/16    |

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



Testing Cert. # 0955.01

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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 and was selected by the customer.
- ☐ 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 requirements.



Testing Cert. # 0955.01

I attest that the necessary measurements were made at:

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



**Tested by:** \_\_\_\_\_

Name and Title: Cory Leverett, Project Manager/Testing Technician

**Date: 9/ 06/ 2016**



**Reviewed and approved by:** \_\_\_\_\_

Name and Title: Sid Sanders, Engineer

**Date: 9/ 06/ 16**

## GENERAL INFORMATION

### EUT Specification

|                                    |                                                                                                |
|------------------------------------|------------------------------------------------------------------------------------------------|
| <b>EUT Description</b>             | VHF 2 WAY PORTABLE TANSCEIVER                                                                  |
| <b>FCC ID</b>                      | AXI11373020                                                                                    |
| <b>Model Number</b>                | EVX-261-D0-5                                                                                   |
| <b>Operating Frequency</b>         | 136 – 174 MHz                                                                                  |
| <b>Test Frequencies</b>            | 150.8500, 158.5500, 173.3875MHz,                                                               |
| <b>Type of Emission</b>            | 11K0F3E, 7K60F1D, 7K60F1E ,7K60FXD,<br>7K60FXE, 7K60F1W                                        |
| <b>Modulation</b>                  | FM                                                                                             |
| <b>EUT Power Source</b>            | <input type="checkbox"/> 110–120Vac/50– 60Hz                                                   |
|                                    | <input type="checkbox"/> DC Power 12V                                                          |
|                                    | <input checked="" 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 type="checkbox"/> Mobile                                                                |
|                                    | <input checked="" type="checkbox"/> Portable                                                   |
| <b>Test Conditions</b>             | The temperature was 26° C with a relative humidity of 50%.                                     |
| <b>Revision History to the EUT</b> | None                                                                                           |
| <b>Test Exercise</b>               | The EUT was placed in continuous transmit mode.                                                |
| <b>Applicable Standards</b>        | ANSI/TIA 603-D:2010, FCC CFR 47 Part 90                                                        |
| <b>Test Facility</b>               | <b>Timco Engineering Inc.</b><br><b>849 NW State Road 45</b><br><b>Newberry, FL 32669 USA.</b> |

## TEST REPORT SUMMARY

| Rule Part No.                                    | Scope of Work                            | Status<br>Pass/ Fail/ NA |
|--------------------------------------------------|------------------------------------------|--------------------------|
| Part 2.1033(c)(8),<br>Part 2.1046(a), Part<br>90 | RF Power Output                          | Pass                     |
| Part 2.1033(c) (4)<br>Part 2.1047(a)(6)          | Modulation Characteristics               | Pass                     |
| 2.1049(c),<br>90.210                             | Emission Mask and Occupied<br>Bandwidths | Pass                     |
| 2.1051(a), 90.210                                | Antenna Conducted Emissions              | Pass                     |
| 2.1053, Part 90.210                              | Field Strength Spurious Emissions        | Pass                     |
| Part 2.1055, Part<br>90.213                      | Frequency Stability                      | Pass                     |
| Part 90.214                                      | Transient Frequency Behavior             | Pass                     |

## TEST PROCEDURE

**Power Line Conducted Interference:** The procedure used was in accordance with test procedures detailed in the standard list above, using a 50uH LISN. Both lines were observed with the EUT 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 spectrum analyzer.

**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 in accordance with test procedures detailed in the standard list above, using a Rohde & Schwarz – EMI test receiver. 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.

## **MODULATION CHARACTERISTICS**

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

### **Test Requirements:**

#### **Method of Measurement:**

**Part 2.1033(c)**

**Part 90.209**

**Part 90.207**

**Part 2.1033(c) (4)** Type of Emission: 11K0F3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 2500$$

$$K = 1$$

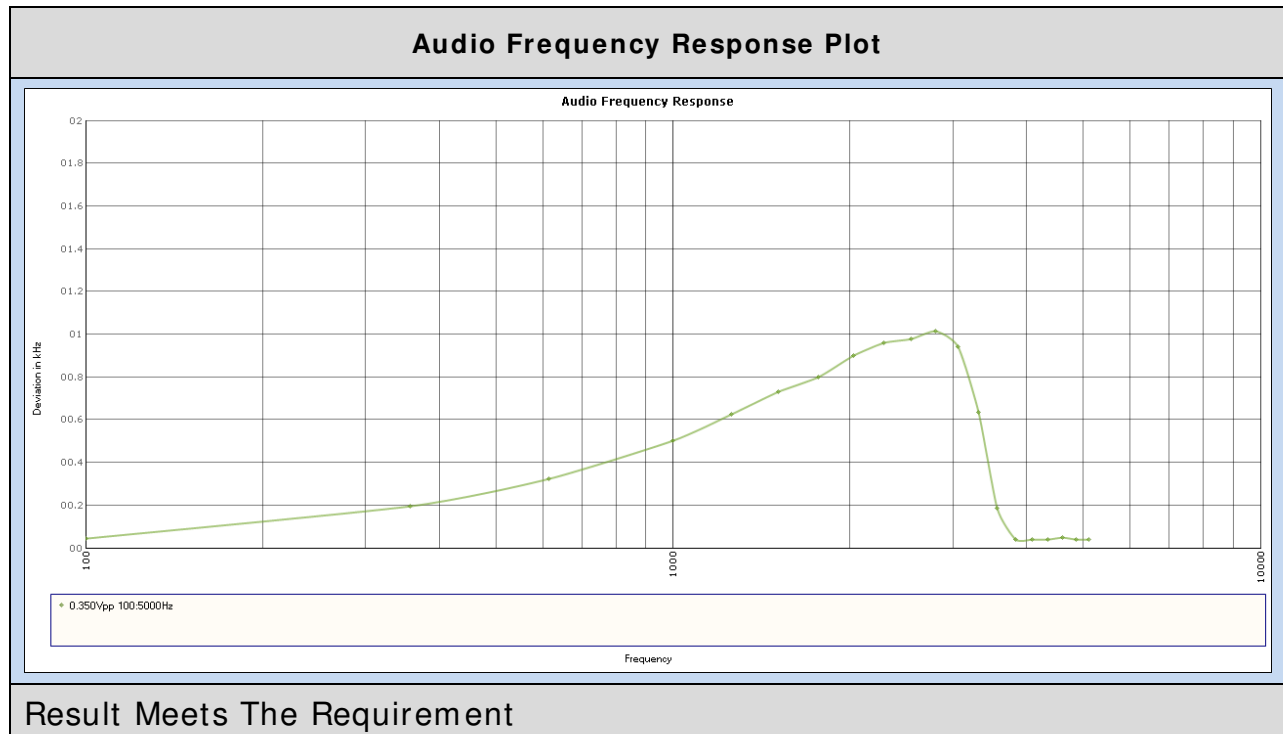
$$B_n = 2(3000) + 2(2500) = 11.0k$$

**Part 2.1033(c) (4)** Type of Emission: 7K60F1D, 7K60F1E, 7K60F1W, 7K60FXE, 7K60FXD

Digital functions comply with DMR (Digital Mobile Radio).

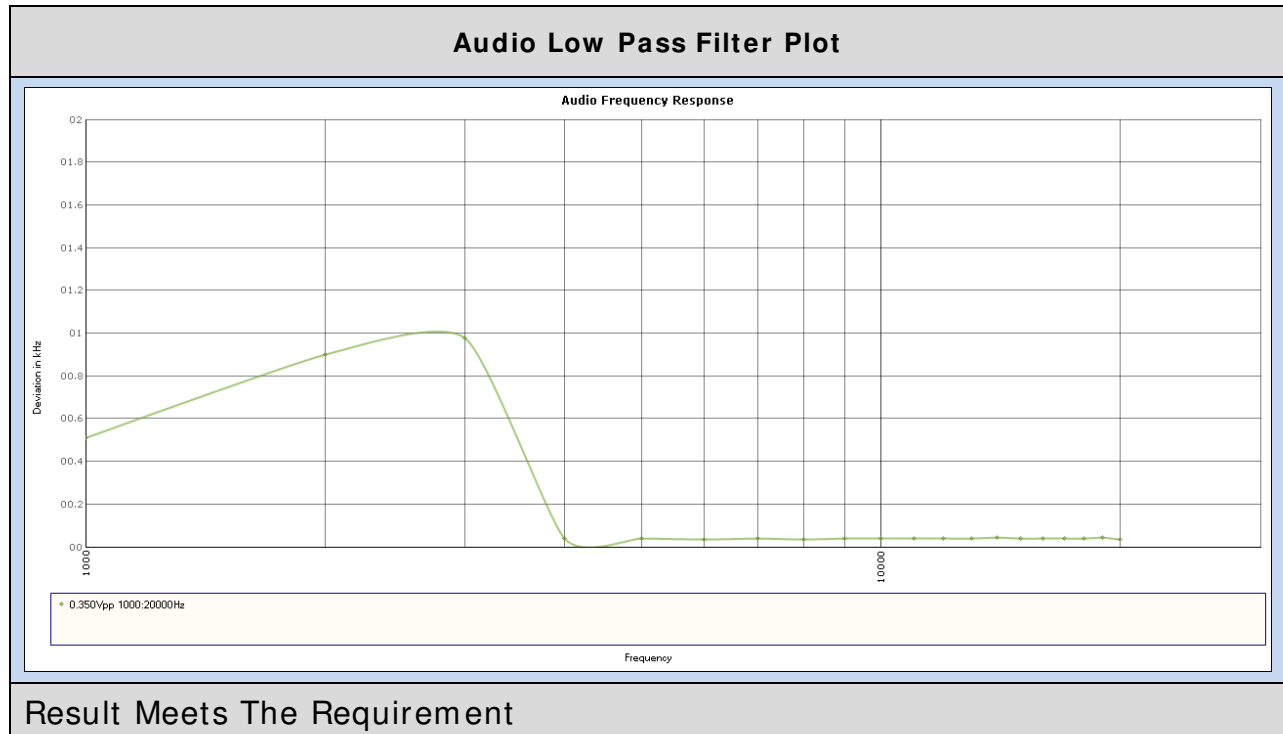
## Audio frequency response

The audio frequency response was measured in accordance with test procedures detailed in the standard list above. 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.



## VOICE MODULATED COMMUNICATION EQUIPMENT

**Part 2.1047(a):** 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.



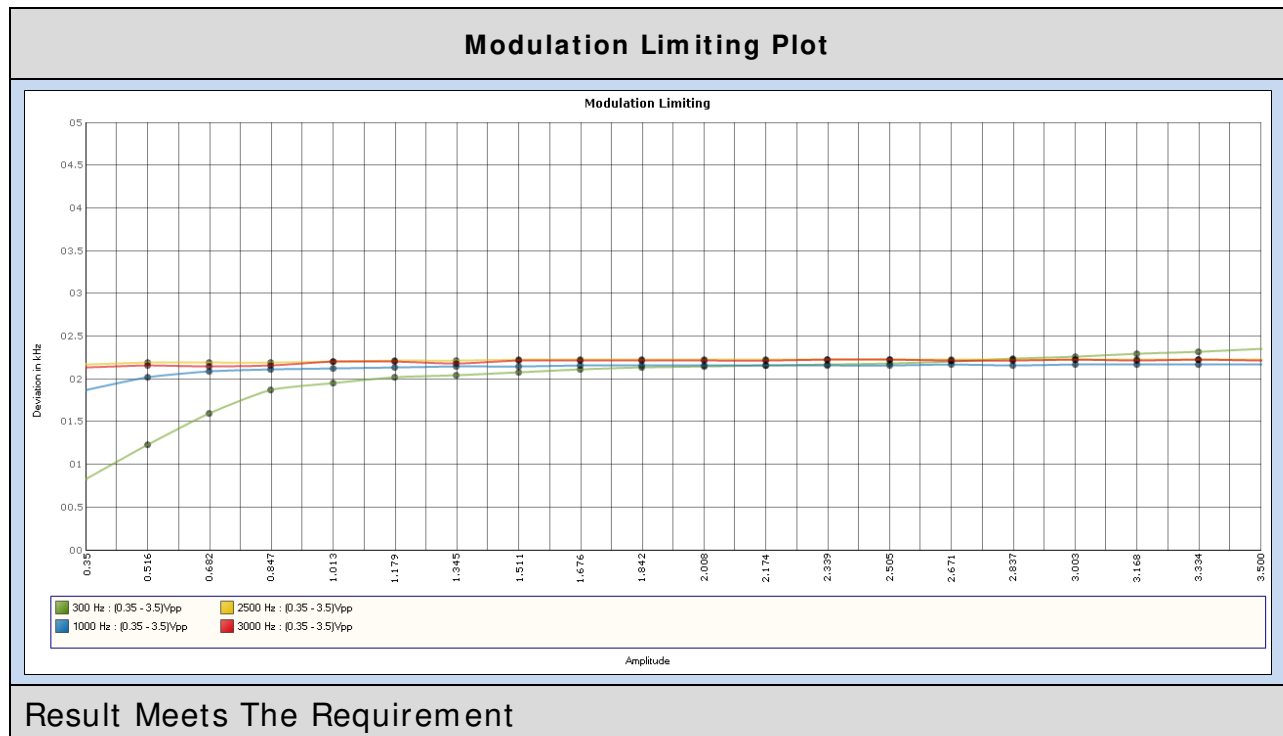
## AUDIO INPUT VERSUS MODULATION

**Rule Part No.:** Part 2.1047(b) & 90

### 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 test procedures detailed in the standard list above. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

### Test data:



## RF POWER OUTPUT

**Rule Part No.:** Part 2.1046(a), Part 90

**Test Requirements:** Manufacturer's Specification

**Method of Measurement:** RF power is measured by using a spectrum analyzer connected to the rf output connector through a 50 Ohm attenuator and cable. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

**Test Setup Diagram:**



**Test Data: Analog Mode Power Output Measurement Table**

| Tuned Freq. MHz | Power Output |       |       |       |
|-----------------|--------------|-------|-------|-------|
|                 | High         |       | Low   |       |
|                 | dBm          | Watts | dBm   | Watts |
| 150.8500        | 37.01        | 5.02  | 28.83 | 0.76  |
| 158.5500        | 36.89        | 4.89  | 29.67 | 0.93  |
| 173.3875        | 36.89        | 4.89  | 29.35 | 0.86  |

**Test Data: Digital Mode Power Output Measurement Table**

| Tuned Freq. MHz | Power Output |       |       |       |
|-----------------|--------------|-------|-------|-------|
|                 | High         |       | Low   |       |
|                 | dBm          | Watts | dBm   | Watts |
| 150.8500        | 37.02        | 5.04  | 28.95 | 0.79  |
| 158.5500        | 36.87        | 4.86  | 29.65 | 0.92  |
| 173.3875        | 36.88        | 4.88  | 29.31 | 0.85  |

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

FOR HIGH POWER SETTING INPUT POWER: (7.40V) (2.0A) = 14.8Watts

FOR LOW POWER SETTING INPUT POWER: (7.40V) (0.4A) = 2.96 Watts

## 99% OCCUPIED BANDWIDTH

### Part 2.1049(c) EMISSION BANDWIDTH:

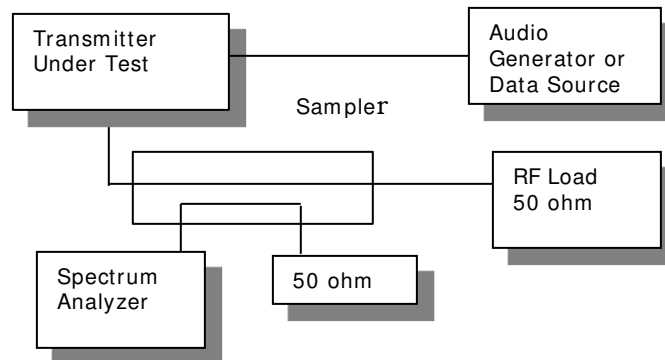
#### Part 90.210(d) **Emission Mask D - 12.5 kHz channel BW equipment.**

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27 (f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

**Method of Measurement:** Were in accordance with test procedures detailed in the standard list above.

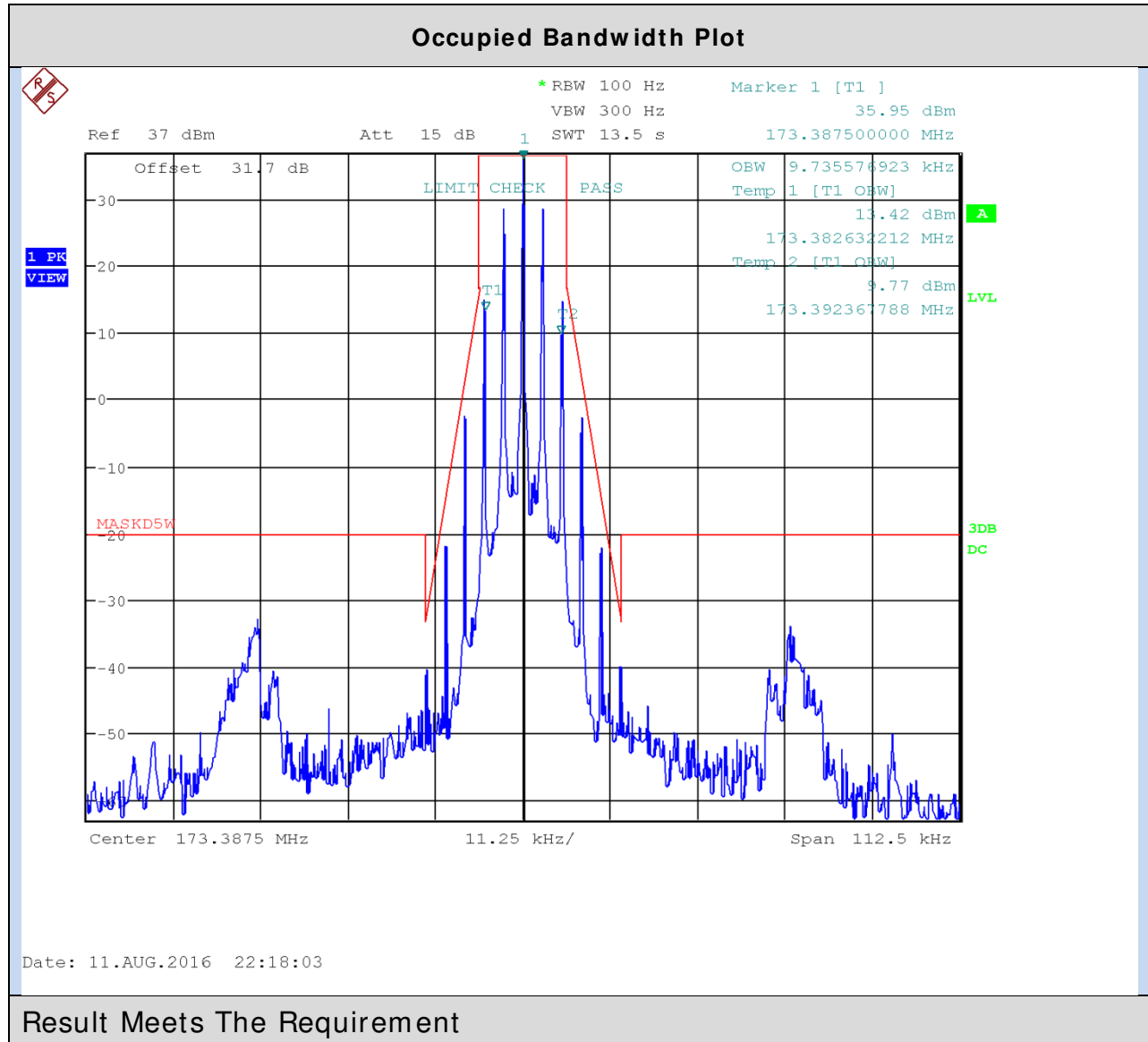
#### Test Setup Diagram:



#### Note:

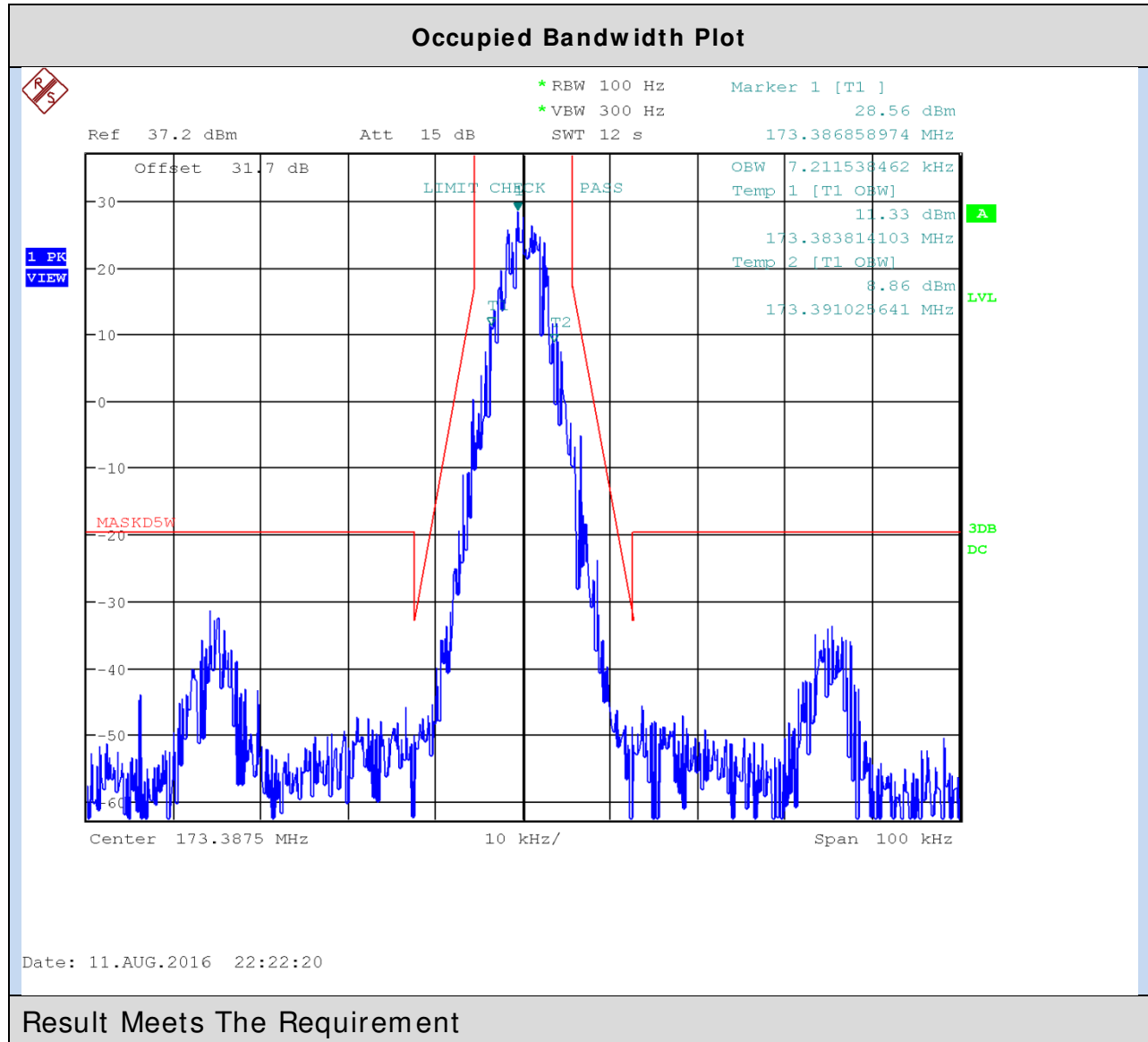
## 99% OCCUPIED BANDWIDTH

Test Data: 11K0F3E Mask D



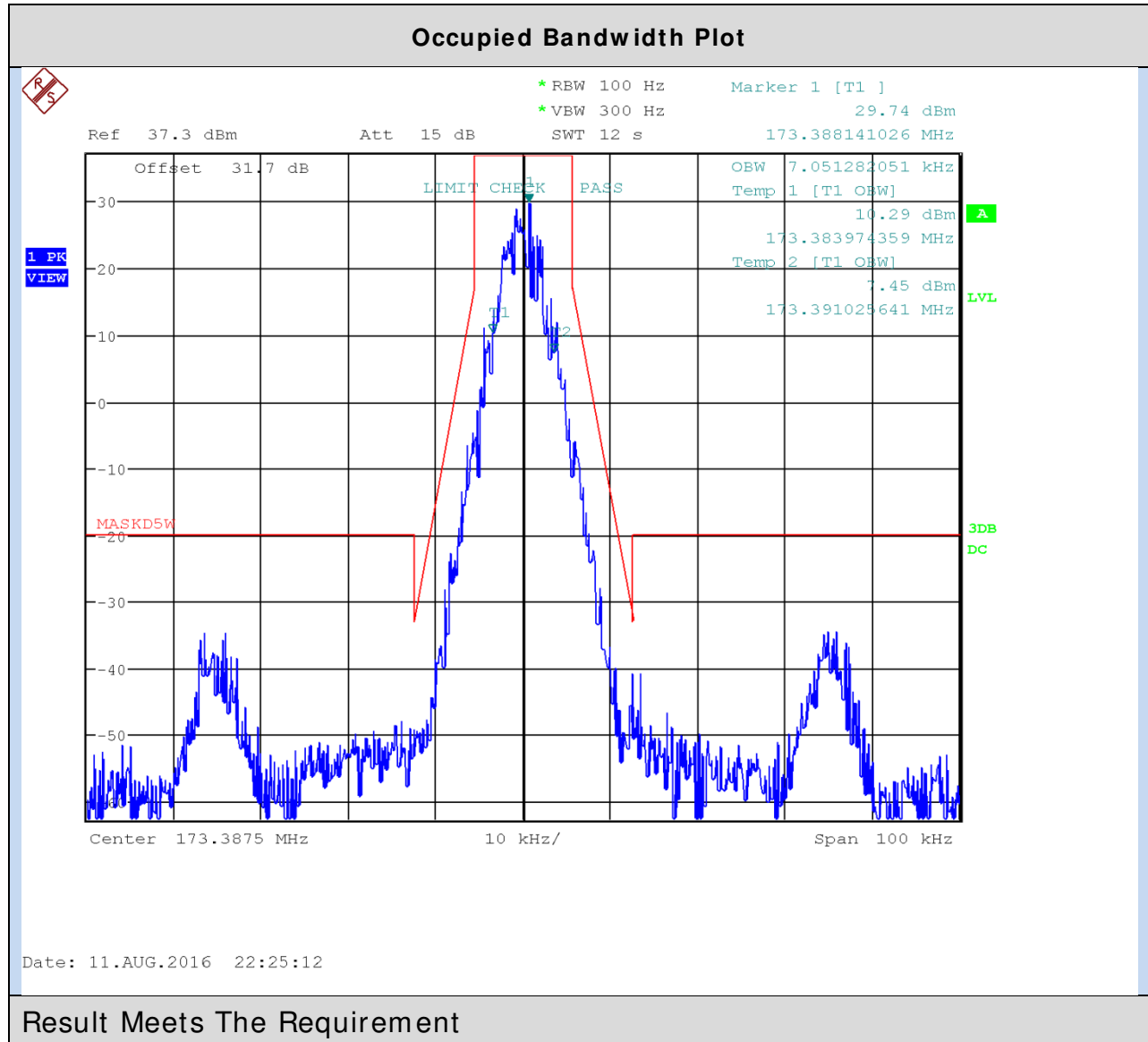
## 99% OCCUPIED BANDWIDTH

Test Data: 7K60F1D/ 7K60F1E Mask D



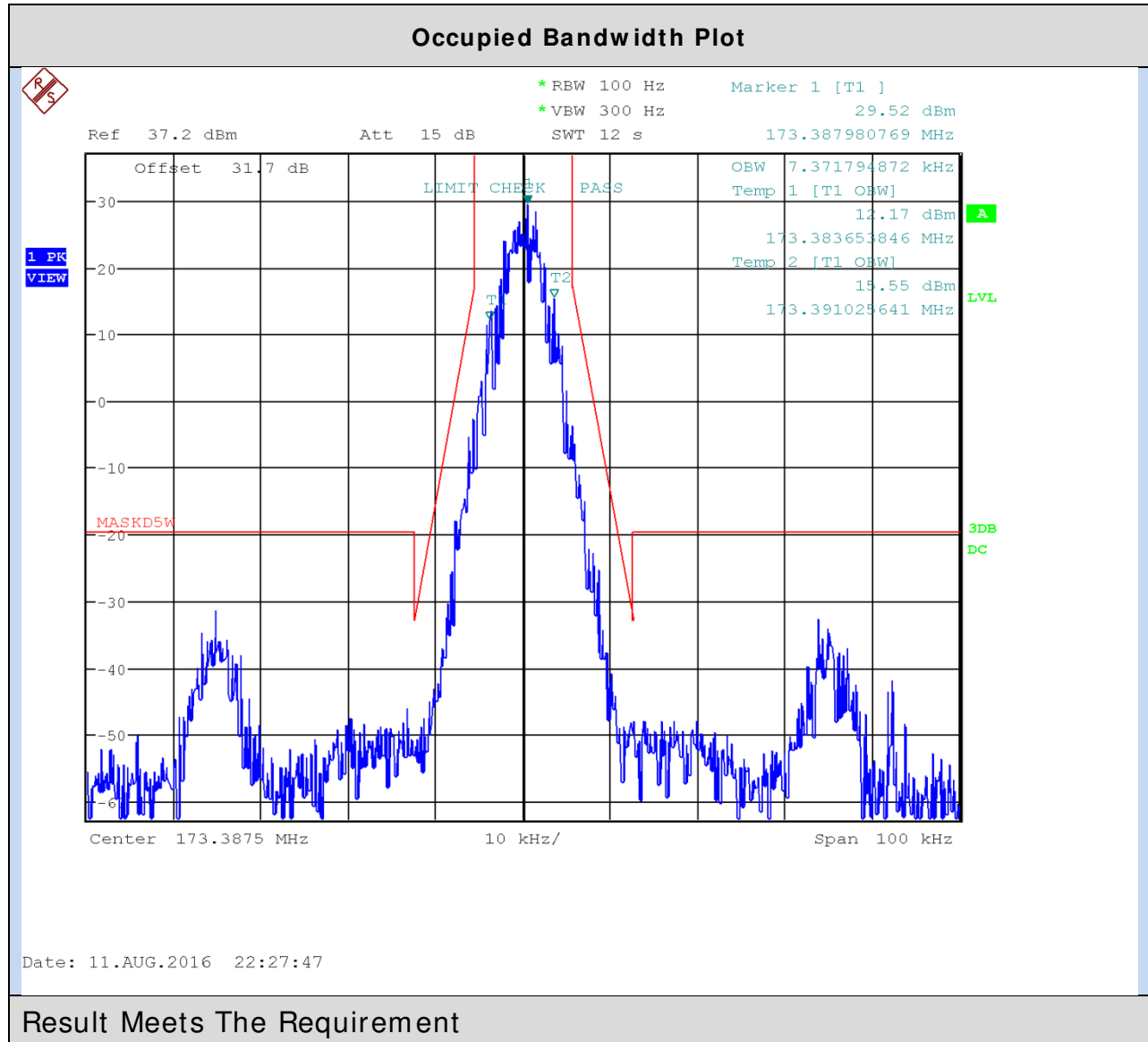
## 99% OCCUPIED BANDWIDTH

Test Data: 7K60FXE/ FXD Mask D



## 99% OCCUPIED BANDWIDTH

Test Data: 7K60F1W Mask D



## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

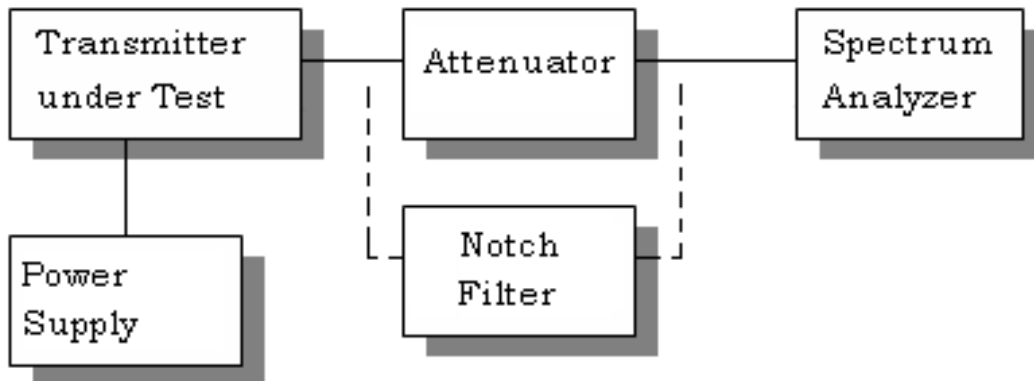
**Rule Part No.:** Part 2.1051(a), Part 90.210

### Requirements:

$$12.5 \text{ kHz Channel Spacing} = 50 + 10 \log (P) = 57.01 \text{ dBc}$$

**Method of Measurement:** For Analog modulations the carrier was modulated using a 2.5 KHz tone at a level 16 dB above the level required for 60% modulation with a 1 KHz tone. For Digital modulations the carrier is modulated as specified by the manufacturer. The spectrum was scanned from the lowest frequency generated to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard test procedures detailed in the standard list above.

### Method of Measuring Conducted Spurious Emissions



## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**Note:** All modes of modulation were tested; the Results shown are for the worst case modulation 11K0F3E

### Test Data: High Power Low end of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 37.01     | 5.02  | 57.01  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 150.85    | 0     | 0.0    |
|              | 301.70    | 83.0  | 26.0   |
|              | 452.55    | 94.9  | 37.9   |
|              | 603.40    | 102.9 | 45.9   |
|              | 754.25    | 100.5 | 43.5   |
| *            | 905.10    | 104.8 | 47.8   |
| *            | 1055.95   | 93.7  | 36.7   |
| *            | 1206.80   | 91.0  | 34.0   |
| *            | 1357.65   | 94.4  | 37.4   |
| *            | 1508.50   | 94.2  | 37.2   |
|              |           |       |        |

\* Indicates Noise Floor

### Test Data: Low Power Low end of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 28.83     | 0.76  | 48.83  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 150.85    | 0     | 0.0    |
|              | 301.70    | 79.6  | 30.7   |
|              | 452.55    | 87.8  | 39.0   |
| *            | 603.40    | 89.0  | 40.2   |
|              | 754.25    | 88.1  | 39.3   |
| *            | 905.10    | 87.7  | 38.9   |
| *            | 1055.95   | 88.0  | 39.1   |
| *            | 1206.80   | 89.0  | 40.2   |
| *            | 1357.65   | 89.0  | 40.2   |
| *            | 1508.50   | 88.7  | 39.9   |
|              |           |       |        |

\* Indicates Noise Floor

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

### Test Data: High Power Middle of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 36.89     | 4.89  | 56.89  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 158.55    | 0     | 0.0    |
|              | 317.10    | 83.0  | 26.1   |
|              | 475.65    | 104.0 | 47.1   |
|              | 634.20    | 106.4 | 49.5   |
| *            | 792.75    | 109.9 | 53.0   |
| *            | 951.30    | 116.9 | 60.0   |
| *            | 1109.85   | 110.9 | 54.0   |
| *            | 1268.40   | 111.4 | 54.5   |
| *            | 1426.95   | 115.3 | 58.4   |
| *            | 1585.50   | 116.9 | 60.0   |
|              |           |       |        |

\* Indicates Noise Floor

### Test Data: Low Power Middle of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 29.67     | 0.93  | 49.67  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 158.55    | 0     | 0.0    |
|              | 317.10    | 84.6  | 35.0   |
| *            | 475.65    | 101.2 | 51.5   |
| *            | 634.20    | 104.7 | 55.0   |
| *            | 792.75    | 104.7 | 55.0   |
| *            | 951.30    | 105.3 | 55.6   |
| *            | 1109.85   | 106.0 | 56.3   |
| *            | 1268.40   | 106.0 | 56.3   |
| *            | 1426.95   | 105.5 | 55.8   |
| *            | 1585.50   | 105.6 | 55.9   |
|              |           |       |        |

\* Indicates Noise Floor

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

### Test Data: High Power High End of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 36.89     | 4.89  | 56.89  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 173.3875  | 0     | 0.0    |
|              | 346.7750  | 89.0  | 32.1   |
|              | 520.1625  | 105.7 | 48.8   |
|              | 693.5500  | 118.9 | 62.0   |
| *            | 866.9375  | 118.9 | 62.0   |
| *            | 1040.3250 | 117.5 | 60.6   |
| *            | 1213.7125 | 117.2 | 60.3   |
| *            | 1387.1000 | 113.7 | 56.8   |
| *            | 1560.4875 | 118.4 | 61.5   |
| *            | 1733.8750 | 118.9 | 62.0   |
|              |           |       |        |

\* Indicates Noise Floor

### Test Data: low Power High End of Band

|              | dBm       | Watts | Limit  |
|--------------|-----------|-------|--------|
| Power Output | 29.35     | 0.86  | 49.35  |
|              |           |       |        |
|              | Frequency | dBc   | Margin |
|              | 173.3875  | 0     | 0.0    |
|              | 346.7750  | 93.6  | 44.2   |
|              | 520.1625  | 103.0 | 53.6   |
|              | 693.5500  | 103.0 | 53.6   |
| *            | 866.9375  | 99.2  | 49.8   |
| *            | 1040.3250 | 98.8  | 49.4   |
| *            | 1213.7125 | 104.4 | 55.0   |
| *            | 1387.1000 | 107.1 | 57.7   |
| *            | 1560.4875 | 107.1 | 57.7   |
| *            | 1733.8750 | 106.9 | 57.5   |
|              |           |       |        |

\* Indicates Noise Floor

## RESULTS: PASS

## FIELD STRENGTH OF SPURIOUS EMISSIONS

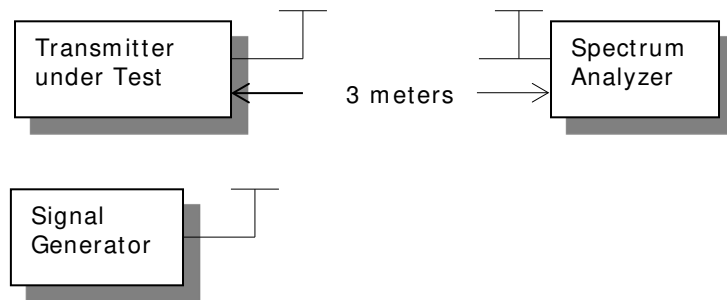
**Rule Parts. No.:** Part 2.1053

### Requirements:

$$12.5\text{kHz Channel Spacing} = 50 + 10\log(\text{OP}) = \text{dBc}$$

**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 in accordance with test procedures detailed in the standard list above 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:



**Note:** The following results are from the worst case modulation for all modes of operation and all of the test frequencies.

### Test Data: High Power High End of Band

| Emission Frequency (MHz) | Power Mode    | Power Output (dBm)  | Power Output (Watts) | FCC Requirement dB | Bandwidth - BW - kHz |
|--------------------------|---------------|---------------------|----------------------|--------------------|----------------------|
| 173.38                   | Hi            | 36.89               | 4.89                 | 56.89              | 12.50                |
| Emission Frequency (MHz) | Ant. Polarity | Below Carrier (dBc) |                      | Margin             |                      |
| 346.78                   | V             | 78.85               |                      | 21.96              |                      |
| 520.16                   | V             | 93.46               |                      | 36.57              |                      |
| 693.55                   | V             | 103.00              |                      | 46.11              |                      |
| 866.94                   | V             | 107.66              |                      | 50.77              |                      |
| 1,040.33                 | V             | 97.17               |                      | 40.28              |                      |
| 1,213.71                 | V             | 98.27               |                      | 41.38              |                      |
| 1,387.10                 | H             | 97.62               |                      | 40.73              |                      |
| 1,560.49                 | H             | 98.21               |                      | 41.32              |                      |
| 1,733.88                 | H             | 95.25               |                      | 38.36              |                      |

### Results Meet Requirements

## FREQUENCY STABILITY

**Rule Parts. No.:** Part 2.1055, Part 90.213

**Requirements:** Temperature range requirements: -30 to +50° C.  
Voltage Variation +, -15%  
±2.5 PPM

**Method of Measurements:** Were in accordance with test procedures detailed in the standard list above.

### Test Data: High End of Band

| Temperature      | Frequency<br>MHz | Cycles | PPM    |
|------------------|------------------|--------|--------|
| 25°C (reference) | <b>173.38753</b> |        |        |
| -30°C            | 173.387425       | -105   | -0.606 |
| -20°C            | 173.387515       | -15    | -0.087 |
| -10°C            | 173.387528       | -2     | -0.012 |
| 0°C              | 173.387519       | -11    | -0.063 |
| 10°C             | 173.38751        | -20    | -0.115 |
| 20°C             | 173.387524       | -6     | -0.035 |
| 30°C             | 173.387522       | -8     | -0.046 |
| 40°C             | 173.387515       | -15    | -0.087 |
| 50°C             | 173.387517       | -13    | -0.075 |
|                  |                  |        |        |
| Battery Voltage  | Frequency        | Cycles | PPM    |
| -15%             | 173.38753        | 0      | 0.000  |
| 15%              | 173.38753        | 0      | 0.000  |

### Results Meet Requirements

## TRANSIENT FREQUENCY BEHAVIOR

### Part 90.214 Transient Frequency Behavior

**REQUIREMENTS:** Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies within the maximum frequency difference limits during the time intervals indicated:

| Time Intervals | Maximum frequency difference | All Equipment |             |
|----------------|------------------------------|---------------|-------------|
|                |                              | 150-174 MHz   | 421-512 MHz |

#### Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels

|         |                |         |         |
|---------|----------------|---------|---------|
| $t_1^4$ | $\pm 25.0$ kHz | 5.0 ms  | 10.0 ms |
| $t_2$   | $\pm 12.5$ kHz | 20.0 ms | 25.0 ms |
| $t_3^4$ | $\pm 25.0$ kHz | 5.0 ms  | 10.0 ms |

#### Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels

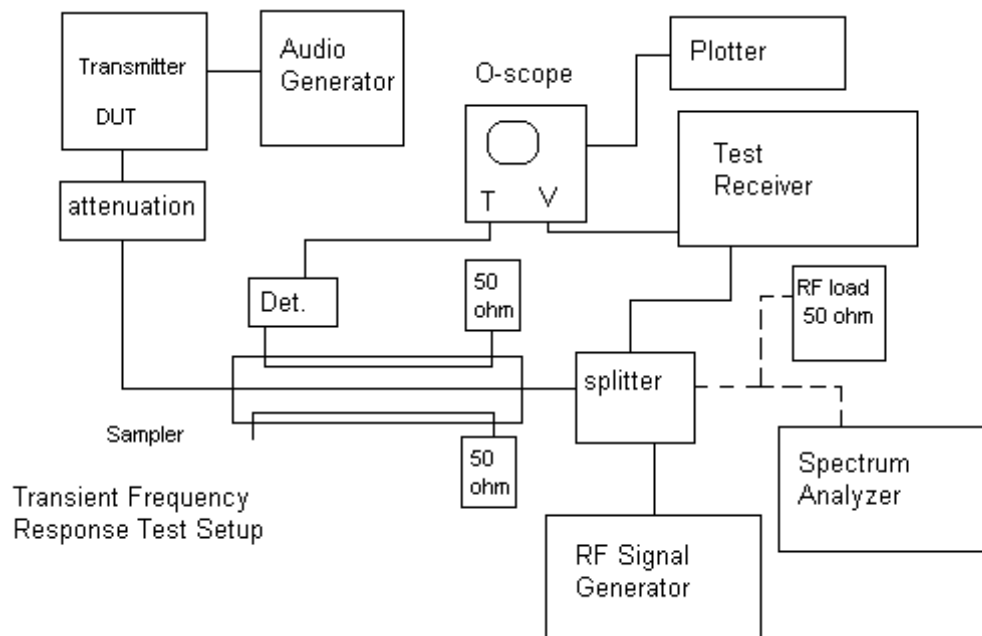
|         |                |         |         |
|---------|----------------|---------|---------|
| $t_1^4$ | $\pm 12.5$ kHz | 5.0 ms  | 10.0 ms |
| $t_2$   | $\pm 6.25$ kHz | 20.0 ms | 25.0 ms |
| $t_3^4$ | $\pm 12.5$ kHz | 5.0 ms  | 10.0 ms |

#### Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels

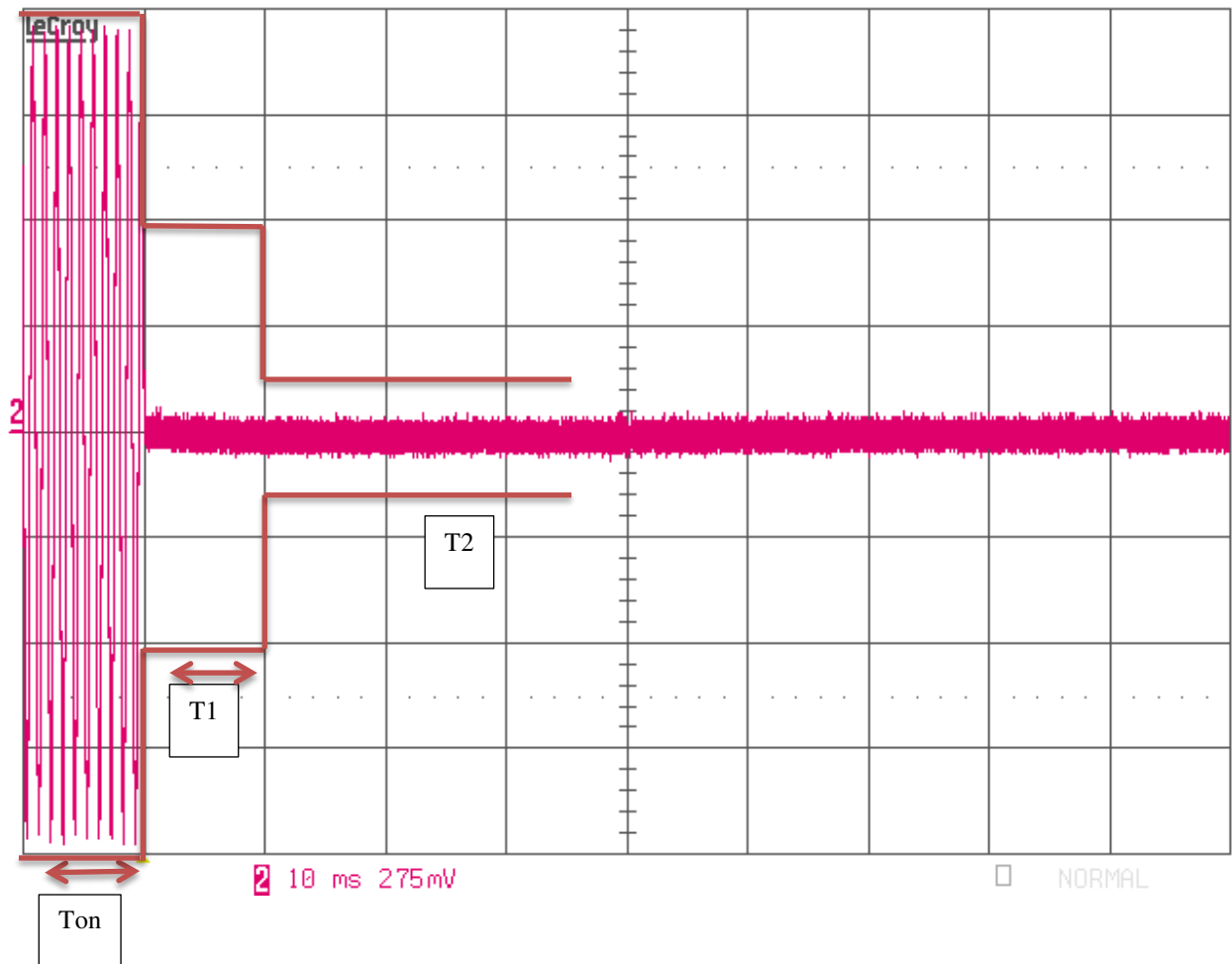
|         |                 |         |         |
|---------|-----------------|---------|---------|
| $t_1^4$ | $\pm 6.25$ kHz  | 5.0 ms  | 10.0 ms |
| $t_2$   | $\pm 3.125$ kHz | 20.0 ms | 25.0 ms |
| $t_3^4$ | $\pm 6.25$ kHz  | 5.0 ms  | 10.0 ms |

**TEST PROCEEDURE:** Was in accordance with test procedures detailed in the standard list above, the levels were set as follows:

1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above, the transient frequency behavior was observed and recorded.



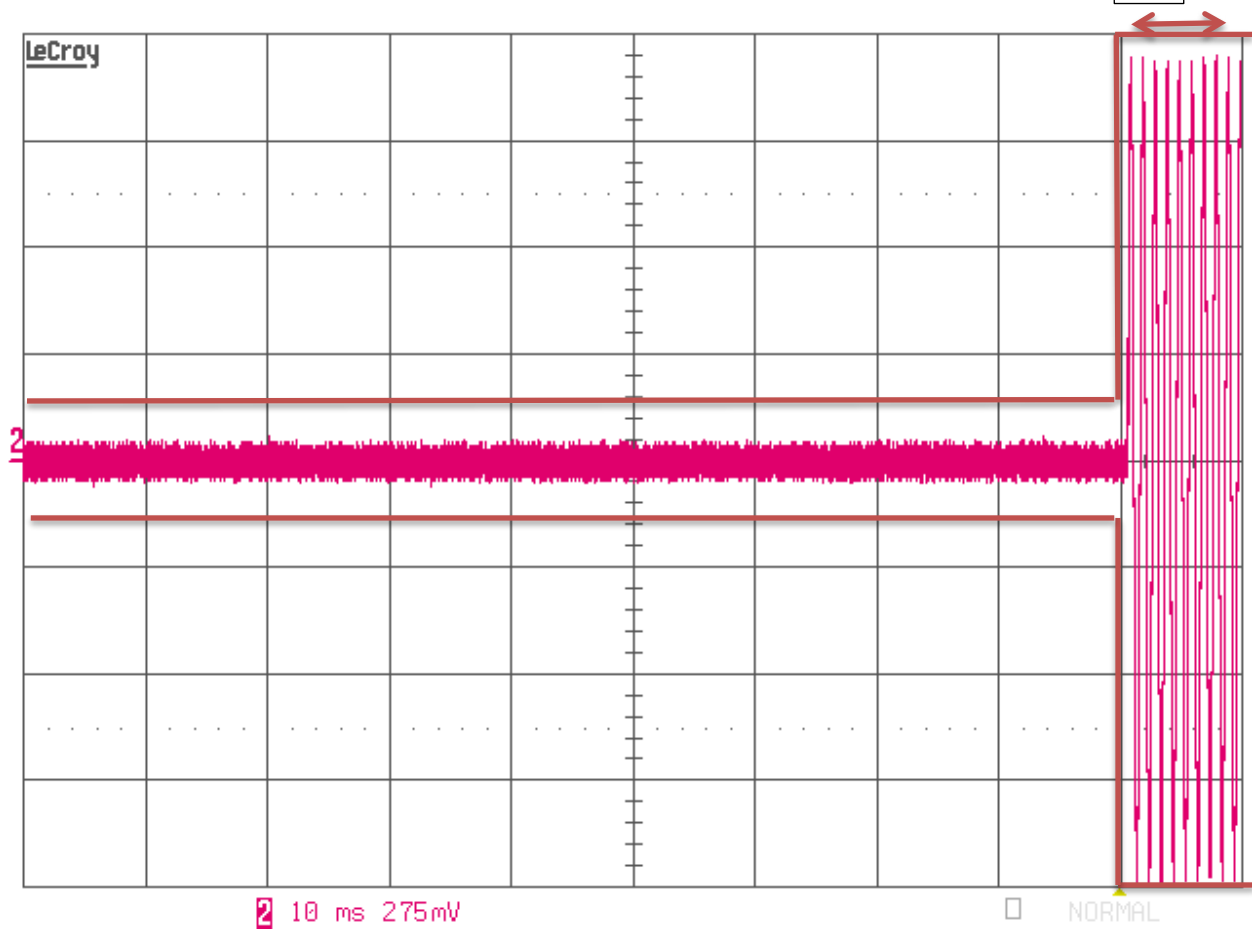
## Test Data: Turn On



**Results Meet Requirements**

**Test Data: Turn Off**

T3



**Results Meet Requirements**

## EQUIPMENT LIST

| Device                                 | Manufacturer         | Model   | Serial Number     | Cal/ Char Date | Due Date |
|----------------------------------------|----------------------|---------|-------------------|----------------|----------|
| 12 Volt Power Supply                   | Astron               | RS-12A  | 9312779           | NA             | NA       |
| Antenna: Biconical 1096 Chamber        | Eaton                | 94455-1 | 1096              | 07/14/15       | 07/14/17 |
| Antenna: Biconical 1057                | Eaton                | 94455-1 | 1057              | 11/18/15       | 11/18/17 |
| Antenna: Log-Periodic 1122             | Electro-Metrics      | LPA-25  | 1122              | 07/14/15       | 07/14/17 |
| Antenna: Log-Periodic 1243             | Eaton                | 96005   | 1243              | 02/09/16       | 02/09/18 |
| Temperature Chamber LARGE              | Tenney Engineering   | TTRC    | 11717-7           | 08/19/14       | 08/19/16 |
| AC Voltmeter                           | HP                   | 400FL   | 2213A14728        | 10/24/15       | 10/24/17 |
| Digital Multimeter                     | Fluke                | 77      | 35053830          | 10/21/15       | 10/21/17 |
| Bi-Directional Coupler - 30MHz to 2GHz | HP                   | 778D    | 1144A01731 (# 46) | 09/15/15       | 09/15/17 |
| Frequency Counter Large Chamber        | HP                   | 5352B   | 2632A00165        | 07/01/15       | 07/01/17 |
| Sweep/Signal Generator                 | Anritsu              | 68369B  | 985112            | 10/28/15       | 10/28/17 |
| Antenna: Double-Ridged Horn/ETS Horn 2 | ETS-Lindgren Chamber | 3117    | 00041534          | 02/25/15       | 02/25/17 |
| Software: Field Strength Program       | Timco                | N/A     | Version 4.0       | NA             | NA       |
| Antenna: Active Loop                   | ETS-Lindgren         | 6502    | 00062529          | 11/18/15       | 11/18/17 |
| RF Power Meter                         | Boonton              | 4531    | 11793             | 04/08/16       | 04/08/18 |
| Hygro-Thermometer                      | Extech               | 445703  | 0602              | 06/30/15       | 06/30/17 |
| RF Combiner                            | Edison Elect.        | M530    |                   | 05/18/15       | 05/18/17 |
| Type K J Thermometer                   | Martel               | 303     | 080504494         | 10/26/15       | 10/26/17 |
| Attenuator N 30dB 20W DC-4G            | CLASS III            | 34078   | M3933/10-5 (# 76) | 05/19/15       | 05/19/17 |

|                                               |                 |                               |                                                |          |          |
|-----------------------------------------------|-----------------|-------------------------------|------------------------------------------------|----------|----------|
| Modulation Analyzer                           | HP              | 8901A                         | 3050A05856                                     | 04/16/15 | 04/16/17 |
| Attenuator N 30dB 150W DC-6G                  | Narda           | 769-30                        | 10267                                          | 06/26/15 | 06/26/17 |
| EMI Test Receiver R & S ESU 40 Chamber        | Rohde & Schwarz | ESU 40                        | 100320                                         | 04/01/16 | 04/01/18 |
| Signal Generator HP 8648C                     | HP              | 8648C                         | 3623A02898                                     | 02/08/16 | 02/08/18 |
| Waverunner Digital Scope                      | LeCroy          | LT364L                        | 00543                                          | 10/23/15 | 10/23/17 |
| Coaxial Cable - Chamber 3 cable set (Primary) | Micro-Coax      | Chamber 3 cable set (Primary) | KMKM-0244-00;<br>KMKM-0670-00;<br>KFKF-0198-00 | 12/05/15 | 12/05/17 |
| Function Generator                            | Standford       | DS340                         | 25200                                          | 02/02/16 | 02/02/18 |
| Tunable Notch Filter 100-350 MHz              | Eagle           | 220BFBF                       | 100-350 MHz (# 43)                             | 07/01/15 | 07/01/17 |
| Bore-sight Antenna Positioning Tower          | Sunol Sciences  | TLT2                          | N/A                                            | NA       | NA       |
| Chamber                                       | Panashield      | 3M                            | N/A                                            | 4/25/16  | 12/31/17 |

**\* EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

## MEASUREMENT UNCERTAINTY

### State of the measurement uncertainty - 160419

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 – 4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

| Test Items                                     | Measurement Uncertainty | Notes |
|------------------------------------------------|-------------------------|-------|
| RF Conducted Power                             | $\pm 1.4\text{dB}$      | (1)   |
| RF Antenna Conducted Emissions                 | $\pm 2.4\text{ dB}$     | (1)   |
| Maximum Deviation                              | $\pm 1.3\%$             | (1)   |
| Occupied Bandwidth                             | $\pm 2.5\%$             | (1)   |
| Adjacent Channel Power                         | $\pm 1.5\text{dB}$      | (1)   |
| Frequency Stability                            | $\pm 69.5\text{ Hz}$    | (1)   |
| Transmitter power Radiated Substitution Method | $\pm 4.0\text{ dB}$     | (1)   |
| Transmitter Transient Frequency Response       | $\pm 2.0\text{ dB}$     | (1)   |

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .

## END OF REPORT