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## FCC Part 90 Mobile UHF Repeater Test Report

|                      |                                                                        |
|----------------------|------------------------------------------------------------------------|
| APPLICANT            | RITRON, INC.                                                           |
|                      | 505 West Carmel Dr.<br>PO Box 1998<br>Carmel IN 46032-7564 USA         |
| FCC ID               | AIERIT44-465                                                           |
| MODEL NUMBER         | RLR-465DMR, RLR-465NX                                                  |
| PRODUCT DESCRIPTION  | UHF-DIGITAL REPEATER                                                   |
| DATE SAMPLE RECEIVED | 03/6/2018                                                              |
| FINAL TEST DATE      | 04/02/2018                                                             |
| TESTED BY            | Franklin Rose                                                          |
| APPROVED BY          | Tim Royer                                                              |
| TEST RESULTS         | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL |

| Report Number      | Version Number | Description                        | Issue Date |
|--------------------|----------------|------------------------------------|------------|
| 330UT18TestReport_ | Rev1           | Initial Issue                      | 04/05/2018 |
| 330UT18TestReport_ | Rev2           | Added description of model numbers | 04/12/2018 |

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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.

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: Franklin Rose, Project Manager/Testing Technician

**Date: 04/02/2018**



### Reviewed and approved by:

Name and Title: Tim Royer, Engineer

**Date: 4/6/2018**

## GENERAL INFORMATION

### EUT Specification

|                                |                                                                                                                                     |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT Description</b>         | UHF-DIGITAL REPEATER                                                                                                                |
| <b>FCC ID</b>                  | AIERIT44-465                                                                                                                        |
| <b>Model Number</b>            | RLR-465DMR, RLR-465NX                                                                                                               |
| <b>Operating Frequency</b>     | 450 – 454 MHz,<br>456 – 462.5375 MHz,<br>462.7375 – 467.5375 MHz,<br>467.7375 - 470 MHz                                             |
| <b>Test Frequencies</b>        | 451.025, 453.975, 456.025, 462.5125, 462.7625,<br>467.5125, 467.7625, 469.975 MHz                                                   |
| <b>Type of Emission</b>        | 4K00F1E (NXDN Voice), 4K00F1D (NXDN Data),<br>4K00F2D (NXDN CW ID), 7K60FXE (DMR Voice),<br>7K60FXD (DMR Data), 6K40F2D (DMR CW ID) |
| <b>Modulation</b>              | FM                                                                                                                                  |
| <b>EUT Power Source</b>        | <input type="checkbox"/> 110–120Vac/50– 60Hz                                                                                        |
|                                | <input checked="" type="checkbox"/> DC Power (13.8 V)                                                                               |
|                                | <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>       | N                                                                                                                                   |
| <b>Test Conditions</b>         | The temperature was 26°C<br>Relative humidity of 50%.                                                                               |
| <b>Modification to the EUT</b> | The EUT was modified for transmitter testing by the manufacturer. See attestation letter.                                           |
| <b>Test Exercise</b>           | The EUT was placed in continuous transmit and was operated in “Test Mode” for digital emissions tests.                              |
| <b>Applicable Standards</b>    | ANSI/TIA 603-E:2016, ANSI C63.26, FCC CFR 47 Part 2, Part 90                                                                        |
| <b>Test Facility</b>           | <b>Timco Engineering Inc. at 849 NW State Road 45<br/>Newberry, FL 32669 USA.<br/>Designation #: US1070</b>                         |

## DIFFERENCES IN MODEL NUMBERS

Ritron Inc. has two model numbers included with this filing; the repeater is set up to handle on voice channel in a 6.25 kHz channel while operating as an RLR-465NX or two voice channels in a 12.5 kHz channel while operating as an RLR-465DMR.

## RESULTS SUMMARY

| Rule Part No.                                 | Test Item                                                 | Results     |
|-----------------------------------------------|-----------------------------------------------------------|-------------|
| FCC Part 2.1046(a), 90.205(h)                 | RF Power Output                                           | <b>PASS</b> |
| 2.1033(c)(4), 90.210(b)(5)                    | Modulation Characteristics                                | <b>PASS</b> |
| 2.1047(a)(b)                                  | Audio Frequency Response and Low Filter                   | N/A         |
| 2.1047(b)                                     | Audio Input Vs Modulation                                 | N/A         |
| 2.1049 (c), 90.210(e)(1), (2);<br>(d)(1), (2) | Occupied Bandwidth, Out-of-Block<br>Emissions (Mask D, E) | <b>PASS</b> |
| 2.1051(a), 90.210(e)(3); (d)(3)               | Spurious Emissions at Antenna Terminals                   | <b>PASS</b> |
| 2.1053(a), 90.210(e)(3); (d)(3)               | Field Strength of Spurious Emissions                      | <b>PASS</b> |
| 2.1055(a)(2), 90.213                          | Frequency Stability < 1 ppm                               | <b>PASS</b> |
| 90.214                                        | Transient Frequency Response                              | N/A         |

## Test Channel Plan

| Preprogrammed Ch. No. | Frequency   | Emission / Signal                    |
|-----------------------|-------------|--------------------------------------|
| 0                     | 460.025 MHz | CW only                              |
| 1                     | 451.025 MHz | 4K00F1E, 4K00F1D / NXDN Voice & Data |
| 2                     | 460.025 MHz | 4K00F1E, 4K00F1D / NXDN Voice & Data |
| 3                     | 469.975 MHz | 4K00F1E, 4K00F1D / NXDN Voice & Data |
| 4                     | 451.025 MHz | 7K60FXE, 7K60FXD / DMR Voice & Data  |
| 5                     | 460.025 MHz | 7K60FXE, 7K60FXD / DMR Voice & Data  |
| 6                     | 469.975 MHz | 7K60FXE, 7K60FXD / DMR Voice & Data  |
| 7                     | 451.025 MHz | 4K00F2D / NXDN CW ID                 |
| 8                     | 460.025 MHz | 4K00F2D / NXDN CW ID                 |
| 9                     | 469.975 MHz | 4K00F2D / NXDN CW ID                 |
| A                     | 451.025 MHz | 6K40F2D / DMR CW ID                  |
| b                     | 460.025 MHz | 6K40F2D / DMR CW ID                  |
| C                     | 469.975 MHz | 6K40F2D / DMR CW ID                  |

## **EUT INFORMATION**

### **Manufacturer Specified Power Level ("High" & "Low")**

EUT employs an input voltage-to-output power regulation method, as well as programming software-controlled continuously variable power output. For testing, this software was used for power adjustments, while maintaining a constant supply of 13.8 VDC. The manufacturer specifies "High Power" shall refer to 10 W RF Output power, and "Low Power" shall refer to 2 W RF Output power.

### **Testing Not Applicable to Digital-Only Devices**

The following tests depend on a sinusoidal tone transmitted in an FM (frequency modulated) signal. The EUT is not capable of analog FM signal, or digital emulation of an FM signal. To perform Audio Frequency Response, Low Pass Filter Response, Modulation Limiting, and Transient Frequency Response testing depends on the ability to generate FM. Therefore, the following tests have been deemed "Not Applicable."

## **AUDIO FREQUENCY RESPONSE & LOW PASS FILTER RESPONSE**

**FCC Rule Parts:** FCC Part 2.1047(a)

**Method of Measurement:** ANSI/TIA-603-E

**RESULT:** Digital emissions only, Not Applicable

## **AUDIO INPUT VERSUS MODULATION**

**FCC Rule Parts:** FCC Part 2.1047(b)

**Method of Measurement:** ANSI/TIA-603-E

**RESULT:** Digital emissions only, Not Applicable

### **Testing Not Applicable to Continuous Transmitting Devices**

Transient Frequency Response testing depends on the ability to "key up" the transmitter. In normal operation the EUT continuously transmits all received signals, and has no method to "key up". Therefore, the following tests have been deemed "Not Applicable."

## **TRANSIENT FREQUENCY RESPONSE**

**FCC Rule Parts:** FCC Part 90.214

**Method of Measurement:** ANSI/TIA-603-E

**RESULT:** Non-Keying Transmitter, Not Applicable

## RF POWER OUTPUT

**FCC Rule Parts:** FCC Part 2.1046(a), 90.205(h), 90.307(c), 90.309 Table C

(h) *450-470 MHz.* (1) The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2. Applicants requesting an ERP in excess of that listed in table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

**TABLE 2—450-470 MHz—MAXIMUM ERP/REFERENCE HAAT FOR A SPECIFIC SERVICE AREA RADIUS**

|                                       | Service area radius (km) |     |      |      |      |      |                 |                 |                 |                 |
|---------------------------------------|--------------------------|-----|------|------|------|------|-----------------|-----------------|-----------------|-----------------|
|                                       | 3                        | 8   | 13   | 16   | 24   | 32   | 40 <sup>4</sup> | 48 <sup>4</sup> | 64 <sup>4</sup> | 80 <sup>4</sup> |
| Maximum ERP (w) <sup>1</sup>          | 2                        | 100 | 2500 | 2500 | 2500 | 2500 | 2500            | 2500            | 2500            | 2500            |
| Up to reference HAAT (m) <sup>3</sup> | 15                       | 15  | 15   | 27   | 63   | 125  | 250             | 410             | 950             | 2700            |

<sup>1</sup>Maximum ERP indicated provides for a 39 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig. 29 (See §73.699, Fig. 10 b).

<sup>2</sup>Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 39 dBu.

<sup>4</sup>Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 39 dBu.

(i) *470-512 MHz.* Power and height limitations are specified in §§90.307 and 90.309.

### **§90.307 Protection criteria.**

The tables and figures listed in §90.309 shall be used to determine the effective radiated power (ERP) and antenna height of the proposed land mobile base station and the ERP for the associated control station (control station antenna height shall not exceed 31 meters (100 feet) above average terrain (AAT)).

(c) Mobile units and control stations operating on the frequencies available for land mobile use in any given urbanized area shall afford protection to co-channel and adjacent channel television stations in accordance with the values set forth in table C in §90.309 and paragraph (d) of this section except for channel 15 in New York, NY, and Cleveland, OH, and channel 16 in Detroit, MI, where protection will be in accordance with the values set forth in table D in §90.309 and paragraph (d) of this section.

## RF POWER OUTPUT

**Test Requirements:** Manufacturer Specified Limit: 10 W High, 2 W Low

**Method of Measurement:** ANSI/TIA-603-E

Test Data: Power Measurement Table

| Peak Output Power |       |       |       |      |
|-------------------|-------|-------|-------|------|
| Tuned Freq. MHz   | dBm   |       | Watts |      |
|                   | High  | Low   | High  | Low  |
| 451.0250          | 39.99 | 32.97 | 9.98  | 1.98 |
| 453.9750          | 39.99 | 33.02 | 9.98  | 2.00 |
| 456.0250          | 40.00 | 33.00 | 10.00 | 2.00 |
| 462.5125          | 40.00 | 33.00 | 10.00 | 2.00 |
| 462.7625          | 39.99 | 33.00 | 9.98  | 2.00 |
| 467.5125          | 39.99 | 33.02 | 9.98  | 2.00 |
| 467.7625          | 39.99 | 33.04 | 9.98  | 2.01 |
| 469.9750          | 40.02 | 33.00 | 10.05 | 2.00 |

## Part 2.1033 (c)(8) DC Input into Final Amplifier

INPUT POWER: (13.8 V) (3.0 A) = **41.4 Watts**

**Result: Meets Requirements**

## MODULATION CHARACTERISTICS, NXDN & DMR SIGNALS

**FCC Rule Parts:** Part 2.1033(c)(4), 90.210(b)(5)

### STANDARD CHANNEL SPACING/BANDWIDTH

| Frequency band (MHz) | Channel spacing (kHz) | Authorized bandwidth (kHz) |
|----------------------|-----------------------|----------------------------|
| 406-512 <sup>2</sup> | <sup>1</sup> 6.25     | <sup>136</sup> 20/11.25/6  |

<sup>1</sup>For stations authorized on or after August 18, 1995.

<sup>2</sup>Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

<sup>3</sup>Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of §90.203(j)(3).

<sup>6</sup>Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of §90.221.

### 4K00F1E (NXDN Voice), 4K00F1D (NXDN Data) Bandwidth Calculation

$$B_n = 2(f_d + f_m)$$

$$B_n = 2(1.05 + 0.95) = 4.0 \text{ kHz}$$

Where:

$f_m$  = modulating frequency, kHz  
 $f_d$  = deviation, kHz

**RESULT: 90.210(b)(5) Necessary Bandwidth for 4K00F1E/F1D = 4.00 kHz**

### 7K60FXE (DMR Voice), 7K60FXD (DMR Data) Bandwidth Calculation

$$B_n = (R/\log_2 S) + (2 \cdot D \cdot K)$$

$$B_n = (9600/2) + (2 \cdot 3.024 \cdot 0.463) = 7.60 \text{ kHz}$$

Where:

R = baud rate (9600)  
D = deviation kHz (3.024 kHz)  
S = signaling states (4)  
K = constant (0.463)

**RESULT: 90.210(b)(5) Necessary Bandwidth for 7K60FXE/FXD = 7.60 kHz**

## **MODULATION CHARACTERISTICS, CW SIGNAL**

### **4K00F2D (CW ID) Bandwidth Calculation**

$$\begin{aligned} B_n &= 2(f_d + f_m) \\ B_n &= 2(1.3 + 0.7) = \mathbf{4.0 \text{ kHz}} \end{aligned}$$

*Where:*

$f_m$  = modulating frequency, kHz  
 $f_d$  = deviation, kHz

**RESULT: 90.210(b)(5) Necessary Bandwidth for 4K00F2D = 4.00 kHz**

### **6K40F2D (CW ID) Bandwidth Calculation**

$$\begin{aligned} B_n &= 2(f_d + f_m) \\ B_n &= 2(2.5 + 0.7) = \mathbf{6.4 \text{ kHz}} \end{aligned}$$

*Where:*

$f_m$  = modulating frequency, kHz  
 $f_d$  = deviation, kHz

**RESULT: 90.210(b)(5) Necessary Bandwidth for 6K40F2D = 6.40 kHz**

## OCCUPIED BANDWIDTH 99 % / OUT-OF-BLOCK EMISSIONS

**FCC Rule Parts:** 2.1049 (c), 90.210(e)(1), (2); (d)(1), (2)

**Requirements:** (d) Emission Mask D—12.5 kHz channel bandwidth 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 removed 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.

(e) Emission Mask E—6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

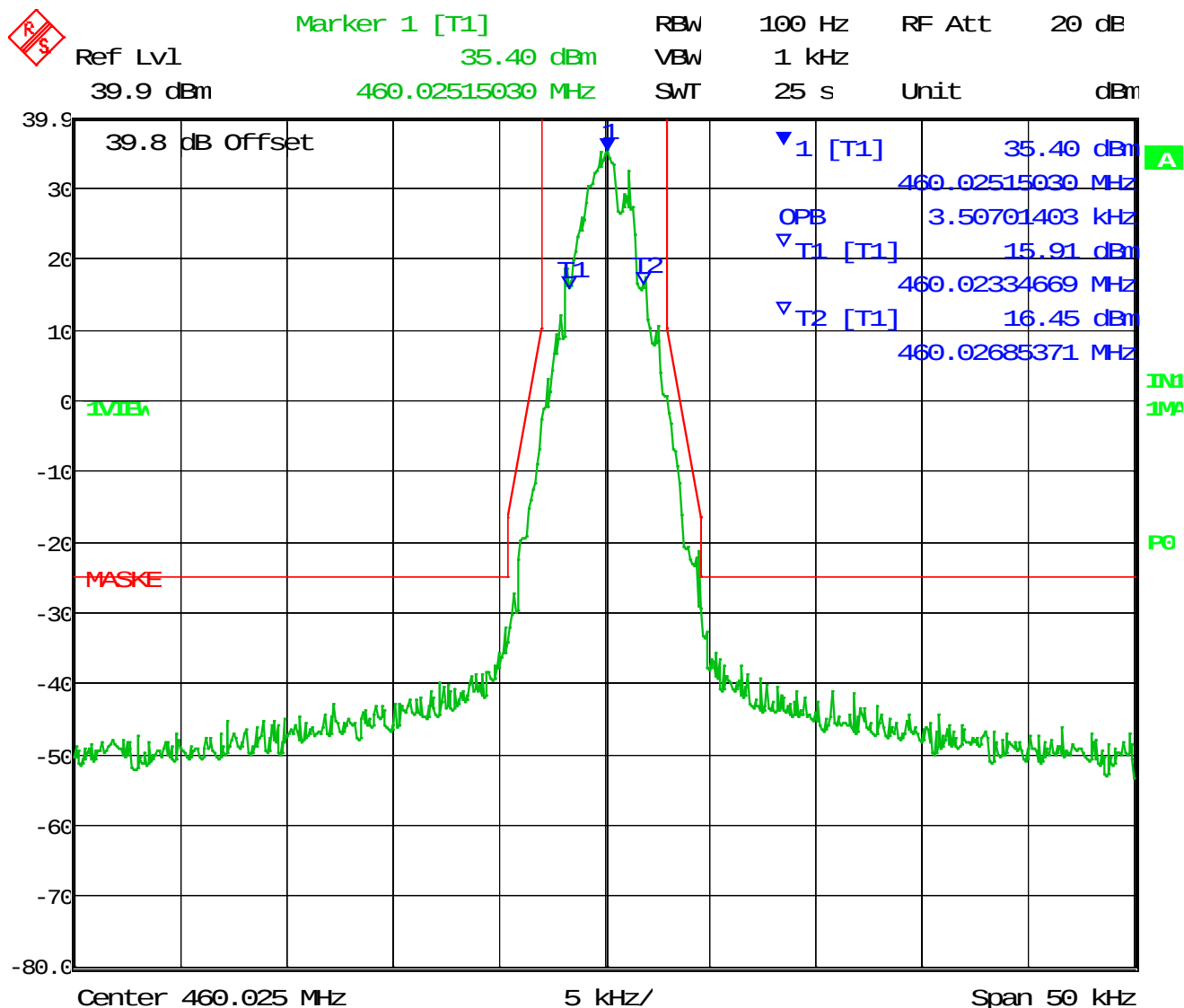
(1) On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ : Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3 \text{ kHz})$  or  $55 + 10 \log (P)$  or 65 dB, whichever is the lesser attenuation.

**Method of Measurement:** ANSI/TIA-603-E

# OCCUPIED BANDWIDTH 99 %

Test Data: 4K00F1E/4K00F1D (NXDN Voice & Data)



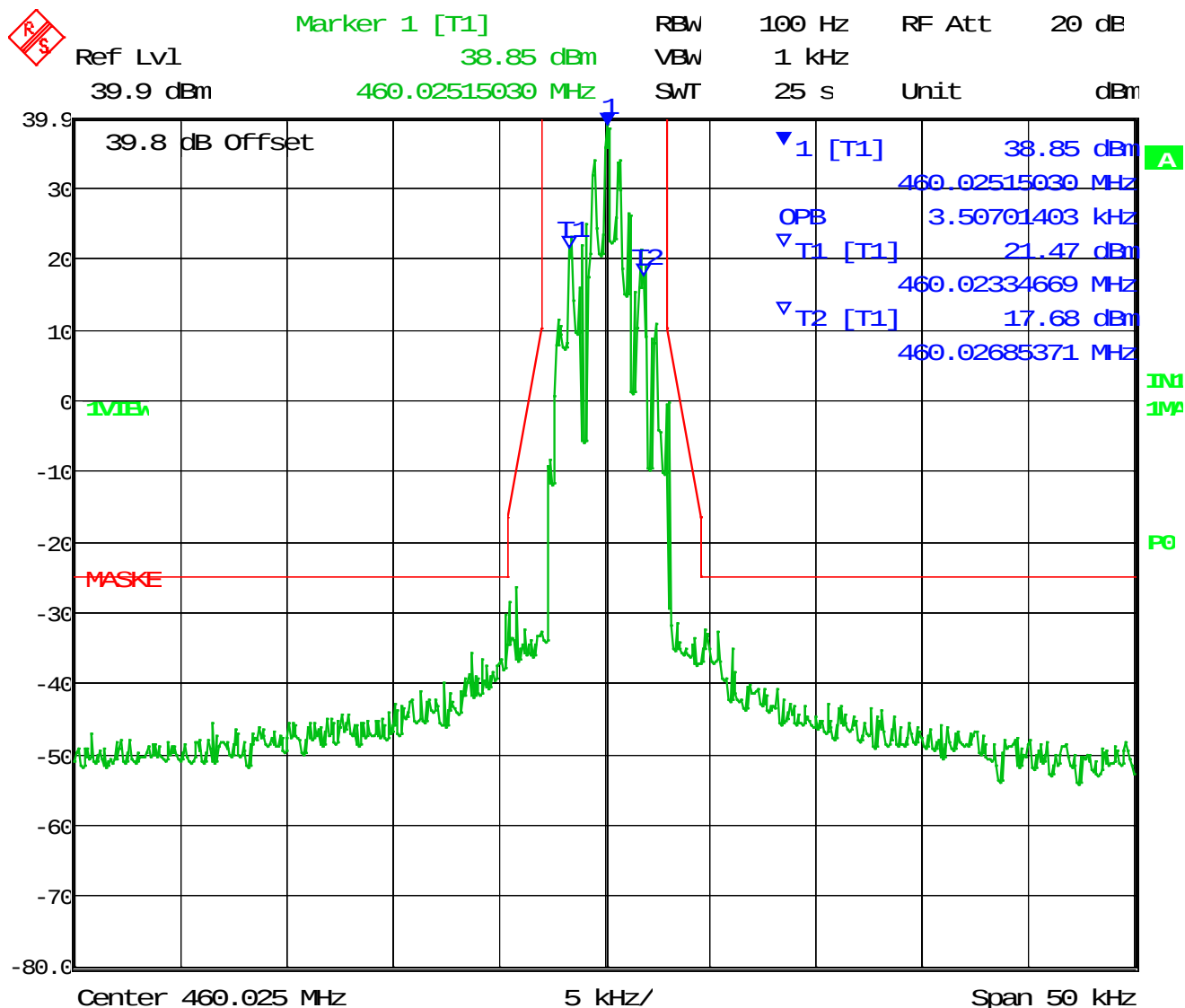
Date: 1.JAN.1997 00:53:15

99 % OBW = 3.51 kHz



# OCCUPIED BANDWIDTH 99 %

Test Data: 4K00F2D (CW ID)

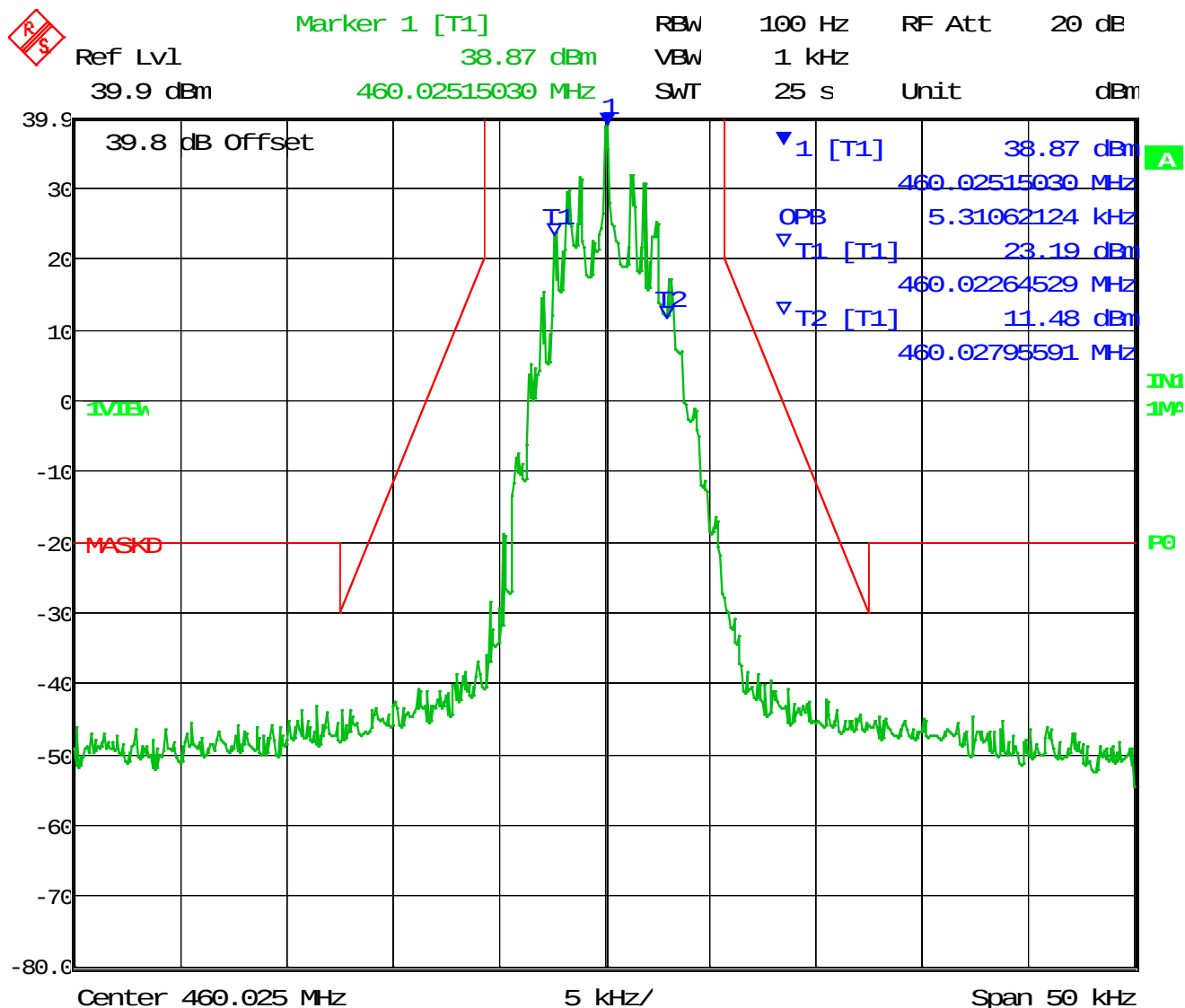


Date: 1.JAN.1997 04:05:05

99 % OBW = 3.51 kHz

# OCCUPIED BANDWIDTH 99 %

Test Data: 6K40F2D (CW ID)



Date: 1.JAN.1997 01:18:19

99 % OBW = 5.31 kHz

Result: Meets Requirements

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**FCC Rule Parts:** FCC Part 2.1051(a), 90.210(e)(3); (d)(3)

**Requirements:** (d)(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.

### Peak Output Power Limits, Mask D (12.5 kHz Signals)

| Tuned Freq. MHz | dBm   |       | Watts |      | Limit (dBm) |        |
|-----------------|-------|-------|-------|------|-------------|--------|
|                 | High  | Low   | High  | Low  | High        | Low    |
| 451.0250        | 39.99 | 32.97 | 9.98  | 1.98 | -20.00      | -20.00 |
| 453.9750        | 39.99 | 33.02 | 9.98  | 2.00 | -20.00      | -20.00 |
| 456.0250        | 40.00 | 33.00 | 10.00 | 2.00 | -20.00      | -20.00 |
| 462.5125        | 40.00 | 33.00 | 10.00 | 2.00 | -20.00      | -20.00 |
| 462.7625        | 39.99 | 33.00 | 9.98  | 2.00 | -20.00      | -20.00 |
| 467.5125        | 39.99 | 33.02 | 9.98  | 2.00 | -20.00      | -20.00 |
| 467.7625        | 39.99 | 33.04 | 9.98  | 2.01 | -20.00      | -20.00 |
| 469.9750        | 40.02 | 33.00 | 10.05 | 2.00 | -20.00      | -20.00 |

(e)(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10 \log (P)$  or 65 dB, whichever is the lesser attenuation.

### Peak Output Power Limits, Mask E (6.25 kHz Signals)

| Tuned Freq. MHz | dBm   |       | Watts |      | Limit (dBm) |        |
|-----------------|-------|-------|-------|------|-------------|--------|
|                 | High  | Low   | High  | Low  | High        | Low    |
| 451.0250        | 39.99 | 32.97 | 9.98  | 1.98 | -25.00      | -25.00 |
| 453.9750        | 39.99 | 33.02 | 9.98  | 2.00 | -25.00      | -25.00 |
| 456.0250        | 40.00 | 33.00 | 10.00 | 2.00 | -25.00      | -25.00 |
| 462.5125        | 40.00 | 33.00 | 10.00 | 2.00 | -25.00      | -25.00 |
| 462.7625        | 39.99 | 33.00 | 9.98  | 2.00 | -25.00      | -25.00 |
| 467.5125        | 39.99 | 33.02 | 9.98  | 2.00 | -25.00      | -25.00 |
| 467.7625        | 39.99 | 33.04 | 9.98  | 2.01 | -25.00      | -25.00 |
| 469.9750        | 40.02 | 33.00 | 10.05 | 2.00 | -24.98      | -25.00 |

The more strict limit shall be applied to spurious emissions testing.

More strict limit of 90.210(e)(3); (d)(3) = Mask E, -25 dBm

**Method of Measurement:** ANSI/TIA-603-E

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 451.025 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 39.99 | 9.98    | -25         |
| Low Power (dBm)  | 32.97 | 1.98    | -25         |

| HIGH POWER    |  |          |            |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 451.025  | 0.00       | 0.00        | 39.99      | 0.00        |
| 2nd Harmonic  |  | 902.050  | -33.12     | 8.12        | -42.82     | 17.82       |
| 3rd Harmonic  |  | 1353.075 | -42.47     | 17.47       | -45.79     | 20.79       |
| 4th Harmonic  |  | 1804.100 | -40.65     | 15.65       | -41.69     | 16.69       |
| 5th Harmonic  |  | 2255.125 | -31.18     | 6.18        | -35.47     | 10.47       |
| 6th Harmonic  |  | 2706.150 | -39.01     | 14.01       | -38.32     | 13.32       |
| 7th Harmonic  |  | 3157.175 | -35.71     | 10.71       | -40.21     | 15.21       |
| 8th Harmonic  |  | 3608.200 | -48.41     | 23.41       | -49.48     | 24.48       |
| 9th Harmonic  |  | 4059.225 | -47.59     | 22.59       | -47.65     | 22.65       |
| 10th Harmonic |  | 4510.250 | -37.83     | 12.83       | -52.23     | 27.23       |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 453.975 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 39.99 | 9.98    | -25         |
| Low Power (dBm)  | 33.02 | 2.00    | -25         |

|               |  |          |            |             | HIGH POWER |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 453.975  | 0.00       | 0.00        | 39.99      | 0.00        |            |             |
| 2nd Harmonic  |  | 907.950  | -33.04     | 8.04        | -42.76     | 17.76       |            |             |
| 3rd Harmonic  |  | 1361.925 | -42.37     | 17.37       | -45.77     | 20.77       |            |             |
| 4th Harmonic  |  | 1815.900 | -40.62     | 15.62       | -41.60     | 16.60       |            |             |
| 5th Harmonic  |  | 2269.875 | -31.17     | 6.16        | -35.38     | 10.38       |            |             |
| 6th Harmonic  |  | 2723.850 | -38.99     | 13.99       | -38.24     | 13.24       |            |             |
| 7th Harmonic  |  | 3177.825 | -35.70     | 10.70       | -40.11     | 15.11       |            |             |
| 8th Harmonic  |  | 3631.800 | -48.39     | 23.39       | -49.39     | 24.39       |            |             |
| 9th Harmonic  |  | 4085.775 | -47.54     | 22.54       | -47.55     | 22.55       |            |             |
| 10th Harmonic |  | 4539.750 | -37.76     | 12.76       | -52.13     | 27.13       |            |             |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 456.025 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 40.00 | 10.00   | -25         |
| Low Power (dBm)  | 33.00 | 2.00    | -25         |

|               |  |          |            |             | HIGH POWER |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 456.025  | 0.00       | 0.00        | 40.00      | 0.00        |            |             |
| 2nd Harmonic  |  | 912.050  | -33.05     | 8.05        | -42.78     | 17.78       |            |             |
| 3rd Harmonic  |  | 1368.075 | -42.39     | 17.39       | -45.76     | 20.76       |            |             |
| 4th Harmonic  |  | 1824.100 | -40.63     | 15.63       | -41.64     | 16.64       |            |             |
| 5th Harmonic  |  | 2280.125 | -31.15     | 6.15        | -35.39     | 10.39       |            |             |
| 6th Harmonic  |  | 2736.150 | -38.91     | 13.91       | -38.24     | 13.24       |            |             |
| 7th Harmonic  |  | 3192.175 | -35.68     | 10.68       | -40.21     | 15.21       |            |             |
| 8th Harmonic  |  | 3648.200 | -48.36     | 23.36       | -49.48     | 24.48       |            |             |
| 9th Harmonic  |  | 4104.225 | -47.51     | 22.51       | -47.57     | 22.57       |            |             |
| 10th Harmonic |  | 4560.250 | -37.80     | 12.80       | -52.17     | 27.17       |            |             |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.5125 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 40.00 | 10.00   | -25         |
| Low Power (dBm)  | 33.00 | 2.00    | -25         |

| HIGH POWER    |  |          |            |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 462.513  | 0.00       | 0.00        | 40.00      | 0.00        |
| 2nd Harmonic  |  | 925.025  | -33.03     | 8.03        | -42.76     | 17.76       |
| 3rd Harmonic  |  | 1387.538 | -42.37     | 17.37       | -45.75     | 20.75       |
| 4th Harmonic  |  | 1850.050 | -40.62     | 15.62       | -41.61     | 16.61       |
| 5th Harmonic  |  | 2312.563 | -31.17     | 6.17        | -35.44     | 10.44       |
| 6th Harmonic  |  | 2775.075 | -38.95     | 13.95       | -38.27     | 13.27       |
| 7th Harmonic  |  | 3237.588 | -35.63     | 10.63       | -40.12     | 15.12       |
| 8th Harmonic  |  | 3700.100 | -48.36     | 23.36       | -49.47     | 24.47       |
| 9th Harmonic  |  | 4162.613 | -47.50     | 22.50       | -47.55     | 22.55       |
| 10th Harmonic |  | 4625.125 | -37.81     | 12.81       | -52.22     | 27.22       |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.7625 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 39.99 | 9.98    | -25         |
| Low Power (dBm)  | 33.00 | 2.00    | -25         |

|               |  |          |            |             | HIGH POWER |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 462.763  | 0.00       | 0.00        | 39.99      | 0.00        |            |             |
| 2nd Harmonic  |  | 925.525  | -33.07     | 8.07        | -42.73     | 17.73       |            |             |
| 3rd Harmonic  |  | 1388.288 | -42.39     | 17.39       | -45.77     | 20.77       |            |             |
| 4th Harmonic  |  | 1851.050 | -40.63     | 15.63       | -41.66     | 16.66       |            |             |
| 5th Harmonic  |  | 2313.813 | -31.12     | 6.12        | -35.38     | 10.38       |            |             |
| 6th Harmonic  |  | 2776.575 | -38.94     | 13.94       | -38.30     | 13.30       |            |             |
| 7th Harmonic  |  | 3239.338 | -35.67     | 10.67       | -40.19     | 15.19       |            |             |
| 8th Harmonic  |  | 3702.100 | -48.33     | 23.33       | -49.45     | 24.45       |            |             |
| 9th Harmonic  |  | 4164.863 | -47.52     | 22.52       | -47.57     | 22.57       |            |             |
| 10th Harmonic |  | 4627.625 | -37.76     | 12.76       | -52.16     | 27.16       |            |             |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.5125 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 39.99 | 9.98    | -25         |
| Low Power (dBm)  | 33.02 | 2.00    | -25         |

|               |  |          |            |             | HIGH POWER |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 467.513  | 0.00       | 0.00        | 39.99      | 0.00        |            |             |
| 2nd Harmonic  |  | 935.025  | -28.55     | 3.55        | -53.42     | 28.42       |            |             |
| 3rd Harmonic  |  | 1402.538 | -47.19     | 22.19       | -52.75     | 27.75       |            |             |
| 4th Harmonic  |  | 1870.050 | -42.20     | 17.20       | -46.44     | 21.44       |            |             |
| 5th Harmonic  |  | 2337.563 | -41.94     | 16.94       | -42.78     | 17.78       |            |             |
| 6th Harmonic  |  | 2805.075 | -41.41     | 16.41       | -33.60     | 8.60        |            |             |
| 7th Harmonic  |  | 3272.588 | -44.74     | 19.74       | -34.30     | 9.30        |            |             |
| 8th Harmonic  |  | 3740.100 | -50.29     | 25.29       | -33.96     | 8.96        |            |             |
| 9th Harmonic  |  | 4207.613 | -54.29     | 29.29       | -52.72     | 27.72       |            |             |
| 10th Harmonic |  | 4675.125 | -39.97     | 14.97       | -48.65     | 23.65       |            |             |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.7625 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 39.99 | 9.98    | -25         |
| Low Power (dBm)  | 33.04 | 2.01    | -25         |

| HIGH POWER    |  |          |            |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 467.763  | 0.00       | 0.00        | 39.99      | 0.00        |
| 2nd Harmonic  |  | 935.525  | -33.06     | 8.06        | -42.73     | 17.73       |
| 3rd Harmonic  |  | 1403.288 | -42.38     | 17.38       | -45.72     | 20.72       |
| 4th Harmonic  |  | 1871.050 | -40.58     | 15.58       | -41.68     | 16.68       |
| 5th Harmonic  |  | 2338.813 | -31.13     | 6.13        | -35.45     | 10.45       |
| 6th Harmonic  |  | 2806.575 | -38.97     | 13.97       | -38.24     | 13.24       |
| 7th Harmonic  |  | 3274.338 | -35.64     | 10.64       | -40.16     | 15.16       |
| 8th Harmonic  |  | 3742.100 | -48.36     | 23.36       | -49.40     | 24.40       |
| 9th Harmonic  |  | 4209.863 | -47.56     | 22.56       | -47.60     | 22.60       |
| 10th Harmonic |  | 4677.625 | -37.77     | 12.77       | -52.17     | 27.17       |

\* Indicates Noise Floor of Measurement

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 469.975 MHz

|                  | (dBm) | (Watts) | Limit (dBm) |
|------------------|-------|---------|-------------|
| High Power (dBm) | 40.02 | 10.05   | -24.98      |
| Low Power (dBm)  | 33.00 | 2.00    | -25         |

| HIGH POWER    |  |          |            |             | LOW POWER  |             |
|---------------|--|----------|------------|-------------|------------|-------------|
| Frequency     |  |          | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| (fundamental) |  | 469.975  | 0.00       | 0.00        | 40.02      | 0.00        |
| 2nd Harmonic  |  | 939.950  | -29.87     | 4.89        | -50.23     | 25.23       |
| 3rd Harmonic  |  | 1409.925 | -52.34     | 27.36       | -51.25     | 26.25       |
| 4th Harmonic  |  | 1879.900 | -43.92     | 18.94       | -44.79     | 19.79       |
| 5th Harmonic  |  | 2349.875 | -38.34     | 13.36       | -37.37     | 12.37       |
| 6th Harmonic  |  | 2819.850 | -36.94     | 11.96       | -32.27     | 7.27        |
| 7th Harmonic  |  | 3289.825 | -49.59     | 24.61       | -44.55     | 19.55       |
| 8th Harmonic  |  | 3759.800 | -51.23     | 26.25       | -54.66     | 29.66       |
| 9th Harmonic  |  | 4229.775 | -57.78     | 32.80       | -52.20     | 27.20       |
| 10th Harmonic |  | 4699.750 | -59.40     | 34.42       | -60.92     | 35.92       |

\* Indicates Noise Floor of Measurement

**Result: Meets Requirements**

## FIELD STRENGTH OF SPURIOUS EMISSIONS

**FCC Rule Parts:** FCC Part 2.1053(a), 90.210(e)(3), (d)(3)

**More strict limit of 90.210(e)(3), (d)(3) = Mask E, -25 dBc**

**Method of Measurement:** ANSI C63.26

**Note:** The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from the lowest frequency generated internally to at least the tenth harmonic of the fundamental. This test was conducted in accordance with the standard listed 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. The measurements below represent the worst case of all the frequencies tested.

**Note:** The six (6) highest emissions or more of each worst-case settings of the EUT are represented below. Emissions 20 dB below the limit are not required to be reported.

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 451.025 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 451.02                | 35.45                    | 24.47                | V                | 0.67           | 13.35                    | 38.49                   | -58.89    | -25.00      | 33.89        |
| 451.02                | 87.48                    | 23.62                | H                | 1.12           | 10.20                    | 34.94                   | -62.43    | -25.00      | 37.43        |
| 451.02                | 214.01                   | 23.86                | V                | 1.66           | 10.80                    | 36.32                   | -61.06    | -25.00      | 36.06        |
| 451.02                | 344.87                   | 23.48                | H                | 2.12           | 14.10                    | 39.70                   | -57.68    | -25.00      | 32.68        |
| 451.02                | 902.05                   | 39.59                | H                | 3.54           | 21.90                    | 65.03                   | -32.35    | -25.00      | 7.35         |
| 451.02                | 902.05                   | 36.25                | V                | 3.54           | 21.90                    | 61.69                   | -35.69    | -25.00      | 10.69        |
| 451.02                | 1353.07                  | 17.51                | H                | 4.32           | 28.74                    | 50.57                   | -46.80    | -25.00      | 21.80        |
| 451.02                | 1353.07                  | 14.09                | V                | 4.32           | 28.74                    | 47.15                   | -50.22    | -25.00      | 25.22        |
| 451.02                | 1804.10                  | 16.57                | H                | 5.11           | 30.34                    | 52.02                   | -45.36    | -25.00      | 20.36        |
| 451.02                | 1804.10                  | 12.80                | V                | 5.11           | 30.34                    | 48.25                   | -49.13    | -25.00      | 24.13        |
| 451.02                | 2255.13                  | 19.39                | H                | 5.69           | 31.26                    | 56.34                   | -41.04    | -25.00      | 16.04        |
| 451.02                | 2255.13                  | 14.91                | V                | 5.69           | 31.26                    | 51.86                   | -45.52    | -25.00      | 20.52        |
| 451.02                | 2706.15                  | 16.06                | H                | 6.20           | 32.49                    | 54.75                   | -42.63    | -25.00      | 17.63        |
| 451.02                | 2706.15                  | 14.76                | V                | 6.20           | 32.49                    | 53.45                   | -43.93    | -25.00      | 18.93        |
| 451.02                | 3157.18                  | 15.14                | H                | 6.72           | 32.76                    | 54.62                   | -42.75    | -25.00      | 17.75        |
| 451.02                | 3157.18                  | 15.86                | V                | 6.72           | 32.76                    | 55.34                   | -42.03    | -25.00      | 17.03        |
| 451.02                | 3608.20                  | 19.09                | H                | 7.15           | 33.12                    | 59.36                   | -38.02    | -25.00      | 13.02        |
| 451.02                | 3608.20                  | 18.69                | V                | 7.15           | 33.12                    | 58.96                   | -38.42    | -25.00      | 13.42        |
| 451.02                | 4059.23                  | 19.57                | H                | 7.61           | 33.38                    | 60.56                   | -36.81    | -25.00      | 11.81        |
| 451.02                | 4059.23                  | 19.17                | V                | 7.61           | 33.38                    | 60.16                   | -37.21    | -25.00      | 12.21        |
| 451.02                | 4510.25                  | 17.94                | H                | 8.06           | 33.91                    | 59.91                   | -37.47    | -25.00      | 12.47        |
| 451.02                | 4510.25                  | 19.71                | V                | 8.06           | 33.91                    | 61.68                   | -35.70    | -25.00      | 10.70        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 453.975 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 453.98                | 57.52                    | 23.39                | H                | 0.89           | 8.49                     | 32.77                   | -64.61    | -25.00      | 39.61        |
| 453.98                | 115.82                   | 25.55                | V                | 1.23           | 10.20                    | 36.98                   | -60.40    | -25.00      | 35.40        |
| 453.98                | 206.41                   | 23.23                | V                | 1.63           | 10.86                    | 35.72                   | -61.66    | -25.00      | 36.66        |
| 453.98                | 414.10                   | 23.74                | H                | 2.32           | 16.61                    | 42.67                   | -54.70    | -25.00      | 29.70        |
| 453.98                | 907.95                   | 38.50                | H                | 3.55           | 22.30                    | 64.35                   | -33.03    | -25.00      | 8.03         |
| 453.98                | 907.95                   | 36.62                | V                | 3.55           | 22.30                    | 62.47                   | -34.91    | -25.00      | 9.91         |
| 453.98                | 1361.93                  | 12.20                | V                | 4.33           | 28.69                    | 45.22                   | -52.16    | -25.00      | 27.16        |
| 453.98                | 1361.93                  | 12.89                | H                | 4.33           | 28.69                    | 45.91                   | -51.47    | -25.00      | 26.47        |
| 453.98                | 1815.90                  | 13.26                | V                | 5.11           | 30.48                    | 48.85                   | -48.53    | -25.00      | 23.53        |
| 453.98                | 1815.90                  | 13.85                | H                | 5.11           | 30.48                    | 49.44                   | -47.94    | -25.00      | 22.94        |
| 453.98                | 2269.88                  | 14.52                | V                | 5.71           | 31.35                    | 51.58                   | -45.80    | -25.00      | 20.80        |
| 453.98                | 2269.88                  | 14.07                | H                | 5.71           | 31.35                    | 51.13                   | -46.25    | -25.00      | 21.25        |
| 453.98                | 2723.85                  | 15.15                | V                | 6.22           | 32.45                    | 53.82                   | -43.56    | -25.00      | 18.56        |
| 453.98                | 2723.85                  | 16.02                | H                | 6.22           | 32.45                    | 54.69                   | -42.69    | -25.00      | 17.69        |
| 453.98                | 3177.82                  | 14.66                | V                | 6.75           | 32.72                    | 54.13                   | -43.25    | -25.00      | 18.25        |
| 453.98                | 3177.82                  | 14.35                | H                | 6.75           | 32.72                    | 53.82                   | -43.56    | -25.00      | 18.56        |
| 453.98                | 3631.80                  | 18.32                | V                | 7.17           | 33.16                    | 58.65                   | -38.73    | -25.00      | 13.73        |
| 453.98                | 3631.80                  | 18.26                | H                | 7.17           | 33.16                    | 58.59                   | -38.79    | -25.00      | 13.79        |
| 453.98                | 4085.77                  | 18.26                | V                | 7.64           | 33.39                    | 59.29                   | -38.09    | -25.00      | 13.09        |
| 453.98                | 4085.77                  | 17.82                | H                | 7.64           | 33.39                    | 58.85                   | -38.53    | -25.00      | 13.53        |
| 453.98                | 4539.75                  | 18.98                | V                | 8.08           | 33.97                    | 61.03                   | -36.35    | -25.00      | 11.35        |
| 453.98                | 4539.75                  | 18.54                | H                | 8.08           | 33.97                    | 60.59                   | -36.79    | -25.00      | 11.79        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 456.025 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 456.02                | 82.04                    | 24.65                | V                | 1.09           | 9.01                     | 34.75                   | -62.62    | -25.00      | 37.62        |
| 456.02                | 112.28                   | 23.71                | H                | 1.21           | 10.10                    | 35.02                   | -62.36    | -25.00      | 37.36        |
| 456.02                | 323.08                   | 23.35                | H                | 2.09           | 13.80                    | 39.24                   | -58.14    | -25.00      | 33.14        |
| 456.02                | 371.80                   | 23.89                | V                | 2.22           | 14.90                    | 41.01                   | -56.37    | -25.00      | 31.37        |
| 456.02                | 912.05                   | 38.28                | V                | 3.56           | 22.71                    | 64.55                   | -32.83    | -25.00      | 7.83         |
| 456.02                | 912.05                   | 36.18                | H                | 3.56           | 22.71                    | 62.45                   | -34.93    | -25.00      | 9.93         |
| 456.02                | 1368.07                  | 14.98                | H                | 4.33           | 28.65                    | 47.96                   | -49.41    | -25.00      | 24.41        |
| 456.02                | 1368.07                  | 12.73                | V                | 4.33           | 28.65                    | 45.71                   | -51.66    | -25.00      | 26.66        |
| 456.02                | 1824.10                  | 13.54                | H                | 5.11           | 30.58                    | 49.23                   | -48.15    | -25.00      | 23.15        |
| 456.02                | 1824.10                  | 14.29                | V                | 5.11           | 30.58                    | 49.98                   | -47.40    | -25.00      | 22.40        |
| 456.02                | 2280.13                  | 18.05                | H                | 5.72           | 31.41                    | 55.18                   | -42.20    | -25.00      | 17.20        |
| 456.02                | 2280.13                  | 14.36                | V                | 5.72           | 31.41                    | 51.49                   | -45.89    | -25.00      | 20.89        |
| 456.02                | 2736.15                  | 15.30                | H                | 6.23           | 32.42                    | 53.95                   | -43.42    | -25.00      | 18.42        |
| 456.02                | 2736.15                  | 15.56                | V                | 6.23           | 32.42                    | 54.21                   | -43.16    | -25.00      | 18.16        |
| 456.02                | 3192.18                  | 15.62                | H                | 6.77           | 32.69                    | 55.08                   | -42.30    | -25.00      | 17.30        |
| 456.02                | 3192.18                  | 15.28                | V                | 6.77           | 32.69                    | 54.74                   | -42.64    | -25.00      | 17.64        |
| 456.02                | 3648.20                  | 18.91                | H                | 7.18           | 33.19                    | 59.28                   | -38.10    | -25.00      | 13.10        |
| 456.02                | 3648.20                  | 18.40                | V                | 7.18           | 33.19                    | 58.77                   | -38.61    | -25.00      | 13.61        |
| 456.02                | 4104.23                  | 19.45                | H                | 7.65           | 33.40                    | 60.50                   | -36.87    | -25.00      | 11.87        |
| 456.02                | 4104.23                  | 18.07                | V                | 7.65           | 33.40                    | 59.12                   | -38.25    | -25.00      | 13.25        |
| 456.02                | 4560.25                  | 19.97                | H                | 8.09           | 34.01                    | 62.07                   | -35.31    | -25.00      | 10.31        |
| 456.02                | 4560.25                  | 18.27                | V                | 8.09           | 34.01                    | 60.37                   | -37.01    | -25.00      | 12.01        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 462.5125 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBuV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBuV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 462.51                | 127.80                   | 23.97                | H                | 1.28           | 12.44                    | 37.69                   | -59.69    | -25.00      | 34.69        |
| 462.51                | 135.71                   | 24.25                | V                | 1.32           | 14.44                    | 40.01                   | -57.37    | -25.00      | 32.37        |
| 462.51                | 253.85                   | 23.83                | H                | 1.94           | 12.20                    | 37.97                   | -59.41    | -25.00      | 34.41        |
| 462.51                | 414.10                   | 24.06                | V                | 2.32           | 16.61                    | 42.99                   | -54.38    | -25.00      | 29.38        |
| 462.51                | 925.03                   | 38.82                | H                | 3.58           | 23.70                    | 66.10                   | -31.28    | -25.00      | 6.28         |
| 462.51                | 925.03                   | 39.11                | V                | 3.58           | 23.70                    | 66.39                   | -30.99    | -25.00      | 5.99         |
| 462.51                | 1387.54                  | 12.84                | V                | 4.35           | 28.54                    | 45.73                   | -51.65    | -25.00      | 26.65        |
| 462.51                | 1387.54                  | 13.66                | H                | 4.35           | 28.54                    | 46.55                   | -50.83    | -25.00      | 25.83        |
| 462.51                | 1850.05                  | 13.92                | V                | 5.11           | 30.88                    | 49.91                   | -47.47    | -25.00      | 22.47        |
| 462.51                | 1850.05                  | 13.86                | H                | 5.11           | 30.88                    | 49.85                   | -47.53    | -25.00      | 22.53        |
| 462.51                | 2312.56                  | 15.12                | V                | 5.76           | 31.62                    | 52.50                   | -44.88    | -25.00      | 19.88        |
| 462.51                | 2312.56                  | 15.10                | H                | 5.76           | 31.62                    | 52.48                   | -44.90    | -25.00      | 19.90        |
| 462.51                | 2775.07                  | 15.07                | V                | 6.28           | 32.45                    | 53.80                   | -43.58    | -25.00      | 18.58        |
| 462.51                | 2775.07                  | 18.09                | H                | 6.28           | 32.45                    | 56.82                   | -40.56    | -25.00      | 15.56        |
| 462.51                | 3237.59                  | 15.41                | V                | 6.80           | 32.68                    | 54.89                   | -42.48    | -25.00      | 17.48        |
| 462.51                | 3237.59                  | 17.24                | H                | 6.80           | 32.68                    | 56.72                   | -40.65    | -25.00      | 15.65        |
| 462.51                | 3700.10                  | 17.97                | V                | 7.22           | 33.19                    | 58.38                   | -39.00    | -25.00      | 14.00        |
| 462.51                | 3700.10                  | 18.15                | H                | 7.22           | 33.19                    | 58.56                   | -38.82    | -25.00      | 13.82        |
| 462.51                | 4162.61                  | 18.49                | V                | 7.71           | 33.39                    | 59.59                   | -37.79    | -25.00      | 12.79        |
| 462.51                | 4162.61                  | 18.53                | H                | 7.71           | 33.39                    | 59.63                   | -37.75    | -25.00      | 12.75        |
| 462.51                | 4625.13                  | 18.49                | V                | 8.14           | 33.98                    | 60.61                   | -36.77    | -25.00      | 11.77        |
| 462.51                | 4625.13                  | 18.31                | H                | 8.14           | 33.98                    | 60.43                   | -36.95    | -25.00      | 11.95        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 462.7625 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBuV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBuV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 462.76                | 49.89                    | 24.14                | V                | 0.82           | 11.23                    | 36.19                   | -61.19    | -25.00      | 36.19        |
| 462.76                | 107.31                   | 23.48                | H                | 1.19           | 10.37                    | 35.04                   | -62.34    | -25.00      | 37.34        |
| 462.76                | 292.31                   | 23.66                | V                | 2.08           | 13.80                    | 39.54                   | -57.84    | -25.00      | 32.84        |
| 462.76                | 356.41                   | 23.60                | H                | 2.14           | 14.96                    | 40.70                   | -56.68    | -25.00      | 31.68        |
| 462.76                | 925.53                   | 39.22                | H                | 3.58           | 23.65                    | 66.45                   | -30.93    | -25.00      | 5.93         |
| 462.76                | 925.53                   | 39.83                | V                | 3.58           | 23.65                    | 67.06                   | -30.32    | -25.00      | 5.32         |
| 462.76                | 1388.29                  | 12.64                | H                | 4.35           | 28.53                    | 45.52                   | -51.86    | -25.00      | 26.86        |
| 462.76                | 1388.29                  | 14.31                | V                | 4.35           | 28.53                    | 47.19                   | -50.19    | -25.00      | 25.19        |
| 462.76                | 1851.05                  | 13.52                | H                | 5.11           | 30.89                    | 49.52                   | -47.86    | -25.00      | 22.86        |
| 462.76                | 1851.05                  | 15.48                | V                | 5.11           | 30.89                    | 51.48                   | -45.90    | -25.00      | 20.90        |
| 462.76                | 2313.81                  | 15.82                | H                | 5.76           | 31.63                    | 53.21                   | -44.17    | -25.00      | 19.17        |
| 462.76                | 2313.81                  | 15.81                | V                | 5.76           | 31.63                    | 53.20                   | -44.18    | -25.00      | 19.18        |
| 462.76                | 2776.57                  | 14.98                | H                | 6.28           | 32.45                    | 53.71                   | -43.67    | -25.00      | 18.67        |
| 462.76                | 2776.57                  | 14.62                | V                | 6.28           | 32.45                    | 53.35                   | -44.03    | -25.00      | 19.03        |
| 462.76                | 3239.34                  | 14.48                | H                | 6.80           | 32.68                    | 53.96                   | -43.41    | -25.00      | 18.41        |
| 462.76                | 3239.34                  | 15.40                | V                | 6.80           | 32.68                    | 54.88                   | -42.49    | -25.00      | 17.49        |
| 462.76                | 3702.10                  | 19.00                | H                | 7.22           | 33.19                    | 59.41                   | -37.96    | -25.00      | 12.96        |
| 462.76                | 3702.10                  | 18.09                | V                | 7.22           | 33.19                    | 58.50                   | -38.87    | -25.00      | 13.87        |
| 462.76                | 4164.86                  | 18.52                | H                | 7.71           | 33.39                    | 59.62                   | -37.76    | -25.00      | 12.76        |
| 462.76                | 4164.86                  | 18.33                | V                | 7.71           | 33.39                    | 59.43                   | -37.95    | -25.00      | 12.95        |
| 462.76                | 4627.63                  | 18.42                | H                | 8.14           | 33.97                    | 60.53                   | -36.85    | -25.00      | 11.85        |
| 462.76                | 4627.63                  | 18.33                | V                | 8.14           | 33.97                    | 60.44                   | -36.94    | -25.00      | 11.94        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 467.5125 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 467.51                | 118.81                   | 23.60                | H                | 1.24           | 10.56                    | 35.40                   | -61.97    | -25.00      | 36.97        |
| 467.51                | 168.94                   | 23.92                | V                | 1.51           | 15.41                    | 40.84                   | -56.53    | -25.00      | 31.53        |
| 467.51                | 247.44                   | 24.22                | V                | 1.86           | 11.74                    | 37.82                   | -59.56    | -25.00      | 34.56        |
| 467.51                | 330.77                   | 23.74                | H                | 2.09           | 13.80                    | 39.63                   | -57.74    | -25.00      | 32.74        |
| 467.51                | 935.03                   | 42.02                | H                | 3.59           | 23.40                    | 69.01                   | -28.37    | -25.00      | 3.37         |
| 467.51                | 935.03                   | 41.71                | V                | 3.59           | 23.40                    | 68.70                   | -28.68    | -25.00      | 3.68         |
| 467.51                | 1402.54                  | 14.03                | V                | 4.36           | 28.45                    | 46.84                   | -50.53    | -25.00      | 25.53        |
| 467.51                | 1402.54                  | 17.29                | H                | 4.36           | 28.45                    | 50.10                   | -47.27    | -25.00      | 22.27        |
| 467.51                | 1870.05                  | 12.78                | V                | 5.11           | 30.92                    | 48.81                   | -48.57    | -25.00      | 23.57        |
| 467.51                | 1870.05                  | 13.90                | H                | 5.11           | 30.92                    | 49.93                   | -47.45    | -25.00      | 22.45        |
| 467.51                | 2337.56                  | 15.10                | V                | 5.79           | 31.82                    | 52.71                   | -44.67    | -25.00      | 19.67        |
| 467.51                | 2337.56                  | 14.59                | H                | 5.79           | 31.82                    | 52.20                   | -45.18    | -25.00      | 20.18        |
| 467.51                | 2805.07                  | 15.95                | V                | 6.32           | 32.49                    | 54.76                   | -42.62    | -25.00      | 17.62        |
| 467.51                | 2805.07                  | 15.03                | H                | 6.32           | 32.49                    | 53.84                   | -43.54    | -25.00      | 18.54        |
| 467.51                | 3272.59                  | 15.82                | V                | 6.82           | 32.65                    | 55.29                   | -42.08    | -25.00      | 17.08        |
| 467.51                | 3272.59                  | 16.10                | H                | 6.82           | 32.65                    | 55.57                   | -41.80    | -25.00      | 16.80        |
| 467.51                | 3740.10                  | 18.25                | V                | 7.27           | 33.14                    | 58.66                   | -38.72    | -25.00      | 13.72        |
| 467.51                | 3740.10                  | 18.51                | H                | 7.27           | 33.14                    | 58.92                   | -38.46    | -25.00      | 13.46        |
| 467.51                | 4207.61                  | 18.32                | V                | 7.75           | 33.32                    | 59.39                   | -37.99    | -25.00      | 12.99        |
| 467.51                | 4207.61                  | 18.72                | H                | 7.75           | 33.32                    | 59.79                   | -37.59    | -25.00      | 12.59        |
| 467.51                | 4675.13                  | 18.90                | V                | 8.17           | 33.89                    | 60.96                   | -36.41    | -25.00      | 11.41        |
| 467.51                | 4675.13                  | 18.77                | H                | 8.17           | 33.89                    | 60.83                   | -36.54    | -25.00      | 11.54        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 467.7625 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 467.76                | 65.96                    | 23.77                | V                | 0.96           | 6.10                     | 30.83                   | -66.55    | -25.00      | 41.55        |
| 467.76                | 146.88                   | 23.97                | H                | 1.38           | 16.18                    | 41.53                   | -55.85    | -25.00      | 30.85        |
| 467.76                | 424.36                   | 23.92                | H                | 2.36           | 17.70                    | 43.98                   | -53.40    | -25.00      | 28.40        |
| 467.76                | 437.18                   | 23.50                | H                | 2.39           | 16.38                    | 42.27                   | -55.10    | -25.00      | 30.10        |
| 467.76                | 935.53                   | 42.31                | H                | 3.59           | 23.40                    | 69.30                   | -28.08    | -25.00      | 3.08         |
| 467.76                | 935.53                   | 42.10                | H                | 3.59           | 23.40                    | 69.09                   | -28.29    | -25.00      | 3.29         |
| 467.76                | 1403.29                  | 19.07                | H                | 4.37           | 28.44                    | 51.88                   | -45.50    | -25.00      | 20.50        |
| 467.76                | 1403.29                  | 13.93                | V                | 4.37           | 28.44                    | 46.74                   | -50.64    | -25.00      | 25.64        |
| 467.76                | 1871.05                  | 13.05                | H                | 5.11           | 30.93                    | 49.09                   | -48.29    | -25.00      | 23.29        |
| 467.76                | 1871.05                  | 14.35                | V                | 5.11           | 30.93                    | 50.39                   | -46.99    | -25.00      | 21.99        |
| 467.76                | 2338.81                  | 15.75                | H                | 5.79           | 31.83                    | 53.37                   | -44.01    | -25.00      | 19.01        |
| 467.76                | 2338.81                  | 14.94                | V                | 5.79           | 31.83                    | 52.56                   | -44.82    | -25.00      | 19.82        |
| 467.76                | 2806.57                  | 15.00                | H                | 6.32           | 32.48                    | 53.80                   | -43.58    | -25.00      | 18.58        |
| 467.76                | 2806.57                  | 14.87                | V                | 6.32           | 32.48                    | 53.67                   | -43.71    | -25.00      | 18.71        |
| 467.76                | 3274.34                  | 15.54                | H                | 6.82           | 32.65                    | 55.01                   | -42.36    | -25.00      | 17.36        |
| 467.76                | 3274.34                  | 14.79                | V                | 6.82           | 32.65                    | 54.26                   | -43.11    | -25.00      | 18.11        |
| 467.76                | 3742.10                  | 18.47                | H                | 7.27           | 33.13                    | 58.87                   | -38.51    | -25.00      | 13.51        |
| 467.76                | 3742.10                  | 18.09                | V                | 7.27           | 33.13                    | 58.49                   | -38.89    | -25.00      | 13.89        |
| 467.76                | 4209.86                  | 18.80                | H                | 7.75           | 33.32                    | 59.87                   | -37.51    | -25.00      | 12.51        |
| 467.76                | 4209.86                  | 18.20                | V                | 7.75           | 33.32                    | 59.27                   | -38.11    | -25.00      | 13.11        |
| 467.76                | 4677.63                  | 18.56                | H                | 8.17           | 33.89                    | 60.62                   | -36.75    | -25.00      | 11.75        |
| 467.76                | 4677.63                  | 19.91                | V                | 8.17           | 33.89                    | 61.97                   | -35.40    | -25.00      | 10.40        |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 469.975 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Meter Reading (dBUV) | Antenna Polarity | Coax Loss (dB) | Correction Factor (dB/m) | Field Strength (dBUV/m) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------------------|------------------|----------------|--------------------------|-------------------------|-----------|-------------|--------------|
| 469.98                | 48.53                    | 24.37                | V                | 0.80           | 11.64                    | 36.81                   | -60.56    | -25.00      | 35.56        |
| 469.98                | 61.33                    | 23.74                | H                | 0.92           | 7.10                     | 31.76                   | -65.62    | -25.00      | 40.62        |
| 469.98                | 344.87                   | 24.06                | H                | 2.12           | 14.10                    | 40.28                   | -57.10    | -25.00      | 32.10        |
| 469.98                | 417.95                   | 23.29                | V                | 2.33           | 17.20                    | 42.82                   | -54.55    | -25.00      | 29.55        |
| 469.98                | 939.95                   | 41.31                | H                | 3.59           | 23.60                    | 68.50                   | -28.88    | -25.00      | 3.88         |
| 469.98                | 939.95                   | 41.38                | V                | 3.59           | 23.60                    | 68.57                   | -28.81    | -25.00      | 3.81         |
| 469.98                | 1409.93                  | 14.75                | V                | 4.38           | 28.39                    | 47.52                   | -49.86    | -25.00      | 24.86        |
| 469.98                | 1409.93                  | 20.74                | H                | 4.38           | 28.39                    | 53.51                   | -43.87    | -25.00      | 18.87        |
| 469.98                | 1879.90                  | 12.91                | V                | 5.11           | 30.94                    | 48.96                   | -48.42    | -25.00      | 23.42        |
| 469.98                | 1879.90                  | 14.21                | H                | 5.11           | 30.94                    | 50.26                   | -47.12    | -25.00      | 22.12        |
| 469.98                | 2349.88                  | 15.32                | V                | 5.80           | 31.92                    | 53.04                   | -44.33    | -25.00      | 19.33        |
| 469.98                | 2349.88                  | 16.60                | H                | 5.80           | 31.92                    | 54.32                   | -43.05    | -25.00      | 18.05        |
| 469.98                | 2819.85                  | 15.21                | V                | 6.33           | 32.43                    | 53.97                   | -43.41    | -25.00      | 18.41        |
| 469.98                | 2819.85                  | 15.44                | H                | 6.33           | 32.43                    | 54.20                   | -43.18    | -25.00      | 18.18        |
| 469.98                | 3289.82                  | 14.25                | V                | 6.83           | 32.63                    | 53.71                   | -43.66    | -25.00      | 18.66        |
| 469.98                | 3289.82                  | 15.40                | H                | 6.83           | 32.63                    | 54.86                   | -42.51    | -25.00      | 17.51        |
| 469.98                | 3759.80                  | 18.58                | V                | 7.29           | 33.13                    | 59.00                   | -38.38    | -25.00      | 13.38        |
| 469.98                | 3759.80                  | 17.73                | H                | 7.29           | 33.13                    | 58.15                   | -39.23    | -25.00      | 14.23        |
| 469.98                | 4229.77                  | 18.05                | V                | 7.77           | 33.33                    | 59.15                   | -38.23    | -25.00      | 13.23        |
| 469.98                | 4229.77                  | 19.66                | H                | 7.77           | 33.33                    | 60.76                   | -36.62    | -25.00      | 11.62        |
| 469.98                | 4699.75                  | 18.56                | V                | 8.19           | 33.88                    | 60.63                   | -36.75    | -25.00      | 11.75        |
| 469.98                | 4699.75                  | 18.66                | H                | 8.19           | 33.88                    | 60.73                   | -36.65    | -25.00      | 11.65        |

**Result: Meets Requirements**

## FREQUENCY STABILITY

FCC Rule Parts: FCC Part 2.1055(a)(2), 90.213

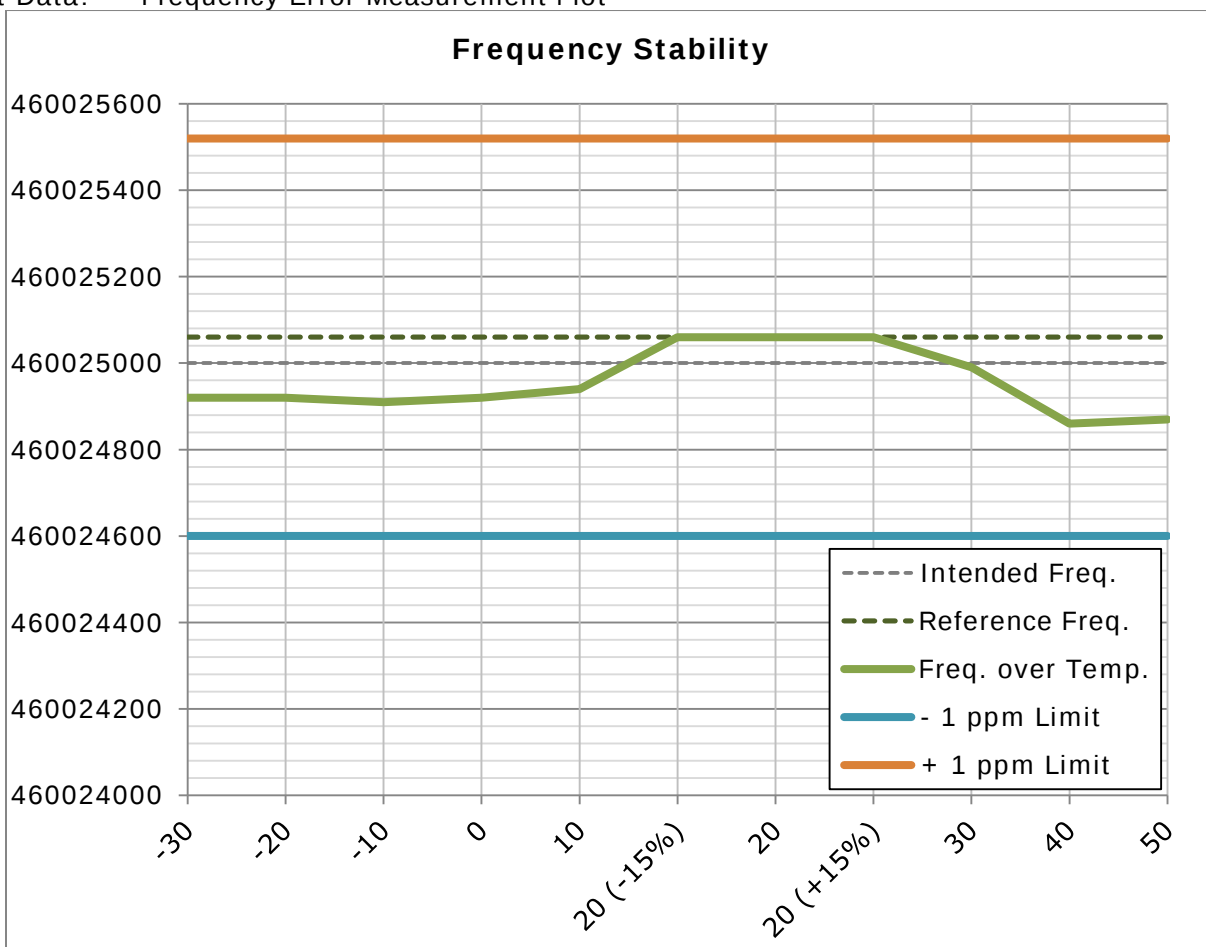
[Parts per million (ppm)]

| Frequency range (MHz) | Fixed and base stations | Mobile stations           |                              |
|-----------------------|-------------------------|---------------------------|------------------------------|
|                       |                         | Over 2 watts output power | 2 watts or less output power |
| 421-512               | 7 11 14 <sub>2.5</sub>  | 8 <sub>5</sub>            | 8 <sub>5</sub>               |

<sup>8</sup>In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

Method of Measurements: ANSI/TIA 603-E

Test Data: Frequency Error Measurement Plot



## FREQUENCY STABILITY

Test Data: Frequency Error Measurement Table

| 460.02500 MHz High Power (Worst-case Settings) |                        |                         |                                   |                |
|------------------------------------------------|------------------------|-------------------------|-----------------------------------|----------------|
| Limit:                                         |                        | 1 ppm                   |                                   |                |
| Temperature (°C)                               | Supplied Voltage (VDC) | Intended Frequency (Hz) | Measured Reference Frequency (Hz) | Deviation (Hz) |
| 20°C (reference)                               | 13.8                   | 460025000               | 460025060                         | -60            |

| @ 20°C (reference)   |                        |                |                |       |
|----------------------|------------------------|----------------|----------------|-------|
| Supplied Voltage (%) | Supplied Voltage (VDC) | Frequency (Hz) | Deviation (Hz) | PPM   |
| -15%                 | 11.73                  | 460025060      | 0              | 0.000 |
| 15%                  | 15.87                  | 460025060      | 0              | 0.000 |

| Temperature (°C) | Supplied Voltage (VDC) | Frequency (Hz) | Deviation (Hz) | PPM   |
|------------------|------------------------|----------------|----------------|-------|
| 50               | 13.8                   | 460024870      | 190.00000      | 0.413 |
| 40               | 13.8                   | 460024860      | 200.00000      | 0.435 |
| 30               | 13.8                   | 460024990      | 70.00000       | 0.152 |
| 20               | 13.8                   | 460025060      | 0.00000        | 0.000 |
| 10               | 13.8                   | 460024940      | 120.00000      | 0.261 |
| 0                | 13.8                   | 460024920      | 140.00000      | 0.304 |
| -10              | 13.8                   | 460024910      | 150.00000      | 0.326 |
| -20              | 13.8                   | 460024920      | 140.00000      | 0.304 |
| -30              | 13.8                   | 460024920      | 140.00000      | 0.304 |

**RESULT: Meets Requirements**

## STATEMENT OF MEASUREMENT UNCERTAINTY

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 Frequency Accuracy                                                 | $\pm 49.5$ Hz           | (1)   |
| RF Conducted Power                                                    | $\pm 0.93$ dB           | (1)   |
| Conducted spurious emission of transmitter valid up to 40GHz          | $\pm 1.86$ dB           |       |
| Occupied Bandwidth                                                    | $\pm 2.65$ %            |       |
| Audio Frequency Response                                              | $\pm 1.86$ dB           |       |
| Modulation limiting                                                   | $\pm 1.88$ %            |       |
| Radiated RF Power                                                     | $\pm 1.4$ dB            |       |
| Maximum frequency deviation:<br>Within 300 Hz and 6kHz of audio freq. | $\pm 1.88$ %            |       |
| Within 6kHz and 25kHz of audio Freq.                                  | $\pm 2.04$ %            |       |
| Rad Emissions Sub Meth up to 26.5GHz                                  | $\pm 2.14$ dB           |       |
| Adjacent channel power                                                | $\pm 1.47$ dB           | (1)   |
| Transient Frequency Response                                          | $\pm 1.88$ %            |       |
| Temperature                                                           | $\pm 1.0$ °C            | (1)   |
| Humidity                                                              | $\pm 5.0$ %             |       |

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

## EMC EQUIPMENT LIST

| Device                                       | Manufacturer       | Model                        | Serial Number                             | Cal/Char Date | Due Date |
|----------------------------------------------|--------------------|------------------------------|-------------------------------------------|---------------|----------|
| Coaxial Cable - BMBM-0065-01 Black DC-2G     | Belden             |                              | BMBM-0065-01                              | 07/18/16      | 07/18/18 |
| Antenna: Biconical 1096                      | Eaton              | 94455-1                      | 1096                                      | 08/01/17      | 08/01/19 |
| Antenna: Log-Periodic 1122                   | Electro-Metrics    | LPA-25                       | 1122                                      | 07/26/17      | 07/26/19 |
| Temperature Chamber LARGE                    | Tenney Engineering | TTRC                         | 11717-7                                   | 09/01/16      | 09/01/18 |
| Frequency Counter Small Chamber              | HP                 | 5385A                        | 3242A07460                                | 08/22/17      | 08/22/19 |
| Coaxial Cable - Chamber 3 cable set (backup) | Micro-Coax         | Chamber 3 cable set (backup) | KMKM-0244-02 ; KMKM-0670-01; KFKF-0197-00 | N/A           | N/A      |
| CHAMBER                                      | Panashield         | 3M                           | N/A                                       | 04/25/16      | 5/31/18  |
| Antenna: Double-Ridged Horn/ETS Horn 2       | ETS-Lindgren       | 3117                         | 00041534                                  | 03/01/17      | 03/01/19 |
| Software: Field Strength Program             | Timco              | N/A                          | Version 4.10.7.0                          | N/A           | N/A      |
| Antenna: Passive Loop                        | EMCO               | 6512                         | 9706-1211                                 | 07/26/17      | 07/26/19 |
| Type K J Thermometer                         | Martel             | 303                          | 080504494                                 | 11/02/17      | 11/02/19 |
| EMI Test Receiver R & S ESIB 40              | Rohde & Schwarz    | ESIB 40                      | 100274                                    | 08/18/16      | 08/18/18 |
| EMI Test Receiver R & S ESU 40               | Rohde & Schwarz    | ESU 40                       | 100320                                    | 04/01/16      | 04/01/19 |
| Attenuator N 20dB 20W DC-12G                 | Narda              | 768-20-SP                    | 155                                       | 07/10/17      | 07/10/19 |
| Attenuator N 20dB 20W DC-12G                 | Narda              | 768-20-SP                    | 344                                       | 07/10/17      | 07/10/19 |
| Attenuator N 30dB 100W DC-6G                 | Pasternack         | PE7214-30                    | #109                                      | 05/24/17      | 05/24/19 |
| Attenuator BNC 10dB DC-2G                    | MiniCircuits       | HAT-10+                      | #54                                       | 07/14/17      | 07/14/19 |
| Bore-sight Antenna Positioning Tower         | Sunol Sciences     | TLT2                         | N/A                                       | N/A           | N/A      |
| Tunable Notch Filter 250-850 MHz             | Eagle              | TNF-200                      | 250-850 MHz (#19)                         | 11/19/17      | 11/19/19 |
| Terminator N 20W DC-18G                      | Narda              | 8205                         | #14                                       | 04/06/17      | 04/06/19 |

### \*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

## END OF TEST REPORT