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## RF Exposure Evaluation Report

|                            |                                                 |
|----------------------------|-------------------------------------------------|
| <b>APPLICANT</b>           | CRESCEND TECHNOLOGIES, LLC                      |
|                            | 140 E. State Parkway<br>SCHAUMBURG IL 60173 USA |
| <b>FCC ID</b>              | CWWP2RTK450                                     |
| <b>IC</b>                  | 7291A-P2RTK450                                  |
| <b>MODEL NUMBER</b>        | P2-RTK-450                                      |
| <b>PRODUCT DESCRIPTION</b> | 25W ONE-WAY AMPLIFIER                           |
| <b>STANDARD APPLIED</b>    | CFR 47 Part 2.1091                              |
| <b>PREPARED BY</b>         | Sid Sanders                                     |

We, TIMCO ENGINEERING, INC. would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and meets the requirements.

The attached report shall not be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

## GENERAL REMARKS

### Attestations

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

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

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



**Authorized Signatory Name:**

Sid Sanders

Engineering Project Manager

**Date: 5/7/2015**

# RF Exposure Requirements

## General information

Device type: 25W ONE-WAY AMPLIFIER

Devices that operate under Part 90 of this chapter are subject to RF exposure evaluation prior to equipment authorization or use.

## Antenna

The manufacturer does not specify an antenna, but a typical antenna has a gain of 0 dBi.

| Configuration | Antenna p/n | Type | Max. Gain (dBi) |
|---------------|-------------|------|-----------------|
| Fixed mounted | Any         | omni | 0               |
|               |             |      |                 |

## Operating configuration and exposure conditions:

The conducted output power is shown in the table below. Typical use qualifies for a maximum duty cycle factor of 100%.

Operation: A typical installation consists of an antenna system with a 10 meter coaxial cable of the type RG 213/ U type which has a loss as follows;

Nom. Attenuation for RG 213/U:

| Frequency<br>MHz | Attenuation per 100ft.<br>dB |
|------------------|------------------------------|
| 1                | .27                          |
| 10               | .55                          |
| 50               | 1.3                          |
| 100              | 1.9                          |
| 200              | 2.7                          |
| 400              | 4.1                          |
| 700              | 6.5                          |
| 900              | 7.6                          |
| 1000             | 8.0                          |
| 4000             | 21.5                         |

## MPE Calculation:

The minimum separation distance is calculated as follows:

|                                                  |                                                  |
|--------------------------------------------------|--------------------------------------------------|
| $E(V/m) = \frac{\sqrt{30 \times P \times G}}{d}$ | Power density: $P_d(mW/cm^2) = \frac{E^2}{3770}$ |
|--------------------------------------------------|--------------------------------------------------|

The limit for general uncontrolled exposure environment is shown in FCC rule Part 1.11310, Table 1.

**Minimum Separation Distance for Mobile or Fixed Devices  
General Population/Uncontrolled Exposure**

**Insert values in yellow highlighted boxes to determine Minimum Separation Distance**

|               |      |                    |               |                  |          |         |
|---------------|------|--------------------|---------------|------------------|----------|---------|
| Max Power     | 25   | W                  | <i>equals</i> | Max Power        | 25000    | mW      |
| Duty Cycle    | 100  | %                  | <i>equals</i> | Duty Factor      | 1        | numeric |
| Antenna Gain  | 3    | dBi                | <i>equals</i> | Gain numeric     | 1.995262 | numeric |
| Coax Loss     | 1.5  | dB                 |               | Gain - Coax Loss | 1.412538 | numeric |
| Power Density | 0.31 | mW/cm <sup>2</sup> |               |                  |          |         |
| Frequency     | 470  | MHz                |               |                  |          |         |

**Enter power Density from the chart to the right**

**Rule Part 1.1310, Table 1**

| Frequency range | Power der          | Enter this value   |
|-----------------|--------------------|--------------------|
| MHz             | mW/cm <sup>2</sup> | mW/cm <sup>2</sup> |
| 0.3-1.34        | 100                | 100                |
| 1.34-30         | 180/f <sup>2</sup> | 0.0                |
| 30-300          | 0.2                | 0.2                |
| 300-1,500       | f/1500             | 0.3                |
| 1,500-100,000   | 1                  | 1                  |

f = frequency in MHz

**Minimum Separation Distance**

**95 cm**

**0.95 m**

Minimum Separation in Inches      37.45576 Inches

Applicant: CRESCEND TECHNOLOGIES, LLC

FCC ID: CWWP2-RTK-450

Report: C:\CRESCEND\_CWW\820AUT15\820AUT15TestReport.docx