

## **Certification Exhibit**

**FCC ID: YJ4CSAG200**

**FCC Rule Part: 15.247**

**ACS Project Number: 14-0047**

Manufacturer: Consert, Inc.  
Model: CSAG200-1.0

## **RF Exposure**

**General Information:**

Applicant: Consert, Inc.  
 Device Category: Mobile  
 Environment: General Population/Uncontrolled Exposure

The CSAG200-1.0 Consert Stand Alone Gateway (SAG) is a device that acts as a multi-conduit data transmission controller for a load management system. It provides remote control and indication for the Consert Device Controller (DC) and radio thermostats via backhaul wireless network.

In addition to the integrated 2.4 GHz Zigbee radio (802.15.4), the CSAG200-1.0 Consert Stand Alone Gateway (SAG) contains a pre-approved Novatel Wireless Inc. Model E396 (FCC ID: PKRNVWE396) cellular modem.

**Technical Information:****Table 1: Technical Information (Including Collocated Transmitter)**

|                                           | <b>Consert, Inc.<br/>Model CSAG200-1.0 (EUT)<br/>FCC ID: YJ4CSAG200</b> | <b>Novatel Wireless Inc.<br/>Model E396 (Module)<br/>FCC ID: PKRNVWE396</b> |
|-------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <b>Antenna Type</b>                       | Inverted-F PCB Trace                                                    | Pulse W3554 High Efficiency Wideband LTE Dipole Antenna                     |
| <b>Antenna Gain</b>                       | 0 dBi                                                                   | 850 Band: 1.73 dBi<br>1700 Band: 2.64 dBi<br>1900 Band: 2.26 dBi            |
| <b>Conducted Power*</b>                   | 62.5 mW                                                                 | 850 Band: 2013.7 mW<br>1700 Band: 287.1 mW<br>1900 Band: 1199.5 mW          |
| <b>Source-based Time-averaged Power**</b> | 62.5 mW                                                                 | 850 Band: 503.5 mW<br>1700 Band: 287.1 mW<br>1900 Band: 299.9 mW            |
| <b>Maximum EIRP**</b>                     | 62.5 mW                                                                 | 850 Band: 749.74 mW<br>1700 Band: 527.27 mW<br>1900 Band: 504.63 mW         |
| <b>Maximum ERP**</b>                      | 38.1 mW                                                                 | 850 Band: 456.99 mW<br>1700 Band: 321.39 mW<br>1900 Band: 307.59 mW         |

\* Power provided for FCC ID: PKRNVWE396 is power as measured in the original certification report. Worst case from all modes.

\*\* Source-based Time-averaged power for GPRS/EDGE for 850/1900. Not applicable for AWS 1700 band.

**Source-Based Time-Averaging (FCC ID: PKRNVWE396)**

The FCC ID: PKRNVWE396 modem has a declared 25% source-based time-averaged duty factor for GPRS/EDGE (Cat 10 (Max 2 UL TX Slots)) operation. The purpose of evaluating compliance for maximum permissible exposure, the maximum conducted output power level was corrected by a factor of 0.25 or 6dB to account for the source-based time-averaging.

Corrected Output Power Level 850 = 2.0137W \* 0.25 = 0.503W = 27.02dBm

Corrected Output Power Level 1900 = 1.1995W \* 0.25 = 0.300W = 24.77dBm

**MPE Calculation**

The Power Density ( $\text{mW}/\text{cm}^2$ ) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density (in appropriate units, e.g.  $\text{mW}/\text{cm}^2$ )

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

**Table 2: MPE Calculation (Including Collocated Transmitter)**

| MPE Calculator for Mobile Equipment<br>Limits for General Population/Uncontrolled Exposure* |                     |                                                 |                  |                    |                       |               |                                           |
|---------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------|------------------|--------------------|-----------------------|---------------|-------------------------------------------|
| Transmit Frequency (MHz)                                                                    | Radio Power (dBm)** | Power Density Limit ( $\text{mW}/\text{cm}^2$ ) | Radio Power (mW) | Antenna Gain (dBi) | Antenna Gain (mW eq.) | Distance (cm) | Power Density ( $\text{mW}/\text{cm}^2$ ) |
| 2440                                                                                        | 17.96               | 1.000                                           | 62.52            | 0                  | 1.000                 | 20            | 0.012                                     |
| 848.8                                                                                       | 27.02               | 0.566                                           | 503.50           | 1.73               | 1.489                 | 20            | 0.149                                     |
| 1712.4                                                                                      | 24.58               | 1.000                                           | 287.08           | 2.64               | 1.837                 | 20            | 0.105                                     |
| 1909.8                                                                                      | 24.77               | 1.000                                           | 299.92           | 2.26               | 1.683                 | 20            | 0.100                                     |

\*\* Source-based Time-averaged power for GPRS/EDGE for 850/1900. Not applicable for AWS 1700 band or 2.4 GHz Zigbee radio.

**Summation of Power Densities – Simultaneous Transmissions**

This device contains (2) transmitters which are collocated and can operate simultaneously; therefore the maximum permissible exposure (MPE) is determined by the summation of MPE ratios. The limit is such that the summation of MPE ratios is  $\leq 1.0$ .

The summation of MPE ratios is as follows:

E396 Modem Operating in the 850 Band:

802.15.4 MPE Ratio + E396 850 MPE Ratio

$(0.012 / 1.000) + (0.149 / 0.566) = (0.012) + (0.263) = 0.275$

$0.275 < 1$

E396 Modem Operating in the 1700 Band:

802.15.4 MPE Ratio + E396 850 MPE Ratio

$(0.012 / 1.000) + (0.105 / 1.000) = (0.012) + (0.105) = 0.117$

$0.117 < 1$

E396 Modem Operating in the 1900 PCS Band:

802.15.4 MPE Ratio + E396 1900 MPE Ratio

$(0.012 / 1.000) + (0.100 / 1.000) = (0.012) + (0.100) = 0.112$

$0.112 < 1$