Excellence in Compliance Testing

Certification Exhibit

FCC ID: YKD-25STW4100-019

FCC Rule Part: CFR 47 Part 90, DA 09-2482

ACS Project Number: 13-2037

Manufacturer: L-3 Communications CyTerra Corporation
Model: Range-R 2D

RF Exposure

General Information:

Applicant: L-3 Communications CyTerra Corporation
ACS Project: 13-2037
Environment: General Population/Uncontrolled Exposure

Technical Information:

Antenna Type: Cavity Backed Spiral
Antenna Gain: 1 dBi
Maximum Transmitter Conducted Power (Measured): 14.79 dBm, 30.13 mW
Maximum Transmitter Power (Rated): 15 dBm, 31.6 mW
Maximum System EIRP: 16 dBm, 39.81 mW

Justification for Exclusion

The L-3 CyTerra RANGE-R 2D is a stepped-frequency continuous-wave (SFCW), handheld radar for motion detection of human targets. The RANGE-R 2D cycles through a sequence of frequencies from 3.1 GHz to 3.5 GHz. At each of the frequencies, it transmits a maximum CW power level of 31.6 milliwatts with no modulation. The unit meets the EMMDAR II product specifications described in the FCC waiver DA 09-2482. It transmits on one frequency for 75 microseconds with a rated peak instantaneous power of 31.6 milliwatts, followed by a 17.5-microsecond "off time" between frequency steps. Per the device typical mode operation and the customer appended justification the SAR exclusion can be determined using the parameters below:

Minimum Test Distance : 22 mm
Highest Operating Frequency: 3500 MHz
Maximum System Rated Power: 31.6 mW

Per KDB 447498 D01 General RF Exposure Guidance v05r01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
= (31.6 / 22)*(√3.5)
= 1.44 * 1.87
= 2.7

Based on the results above, the unit meets both body and extremities SAR exclusion requirements.

Appendix

Manufacturer SAR Exclusion Justification

Background Information

Minimum Separation Distance:

Due to the transmit antenna facing opposite of the user in a handheld position the distance between the hand and the surface of the radiating element is approximately 22mm shown in Figure 1.

Figure 1: Location of average hand holding sensor

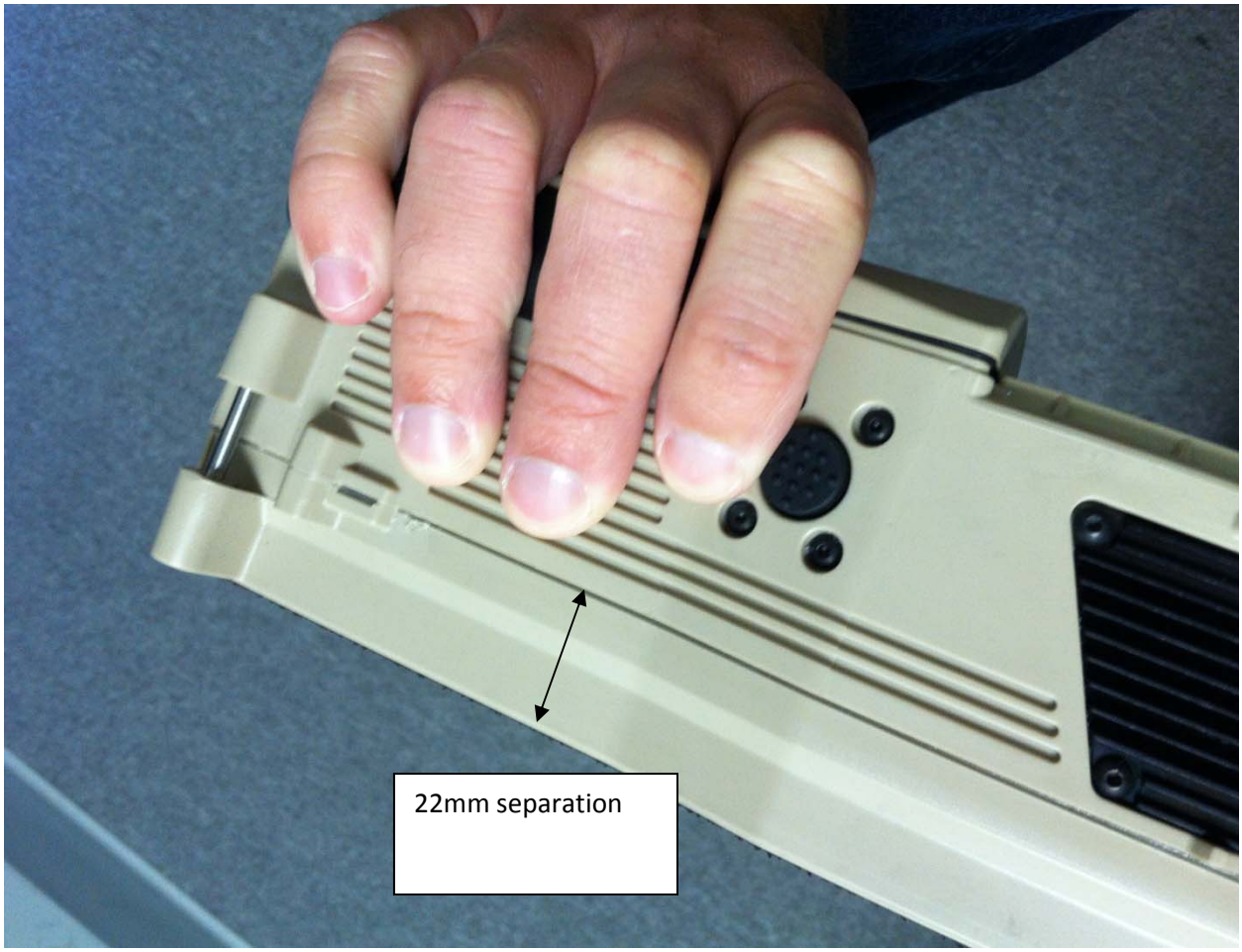

Figure 2: Location of hand on sensor

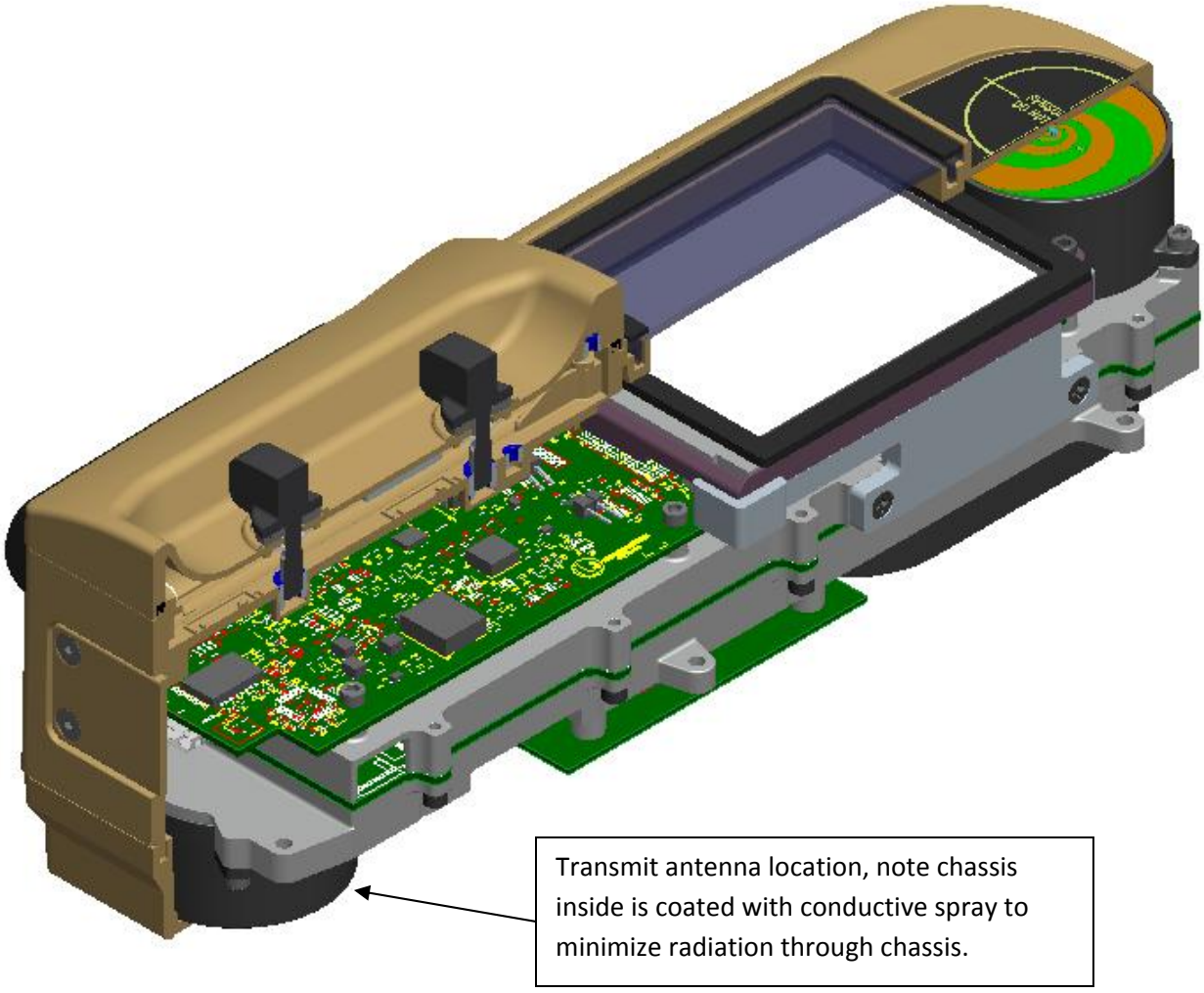

Figure 3: Model of Range-R 2D showing internal parts highlighting location of TX antenna

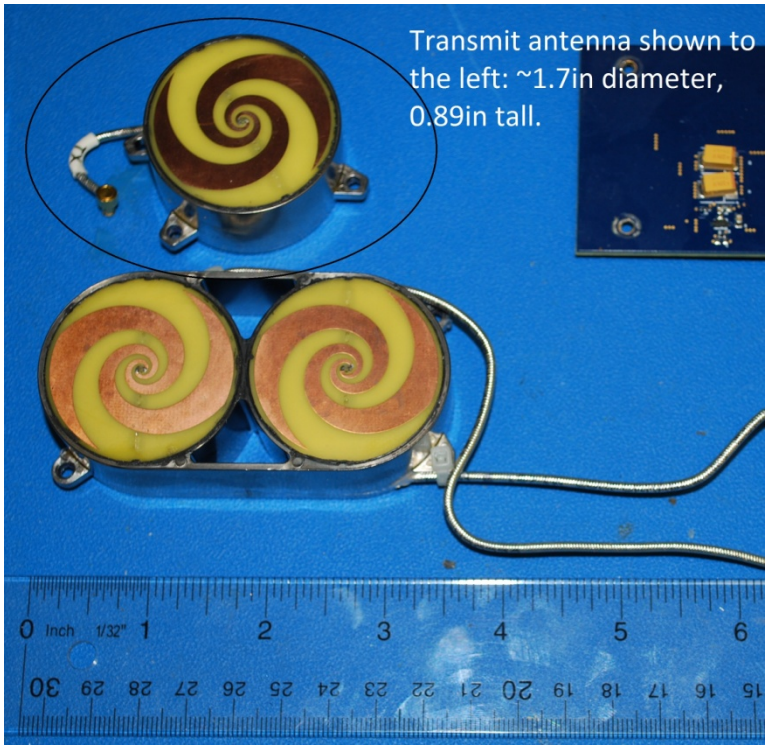

Figure 4: Picture of Transmit antenna

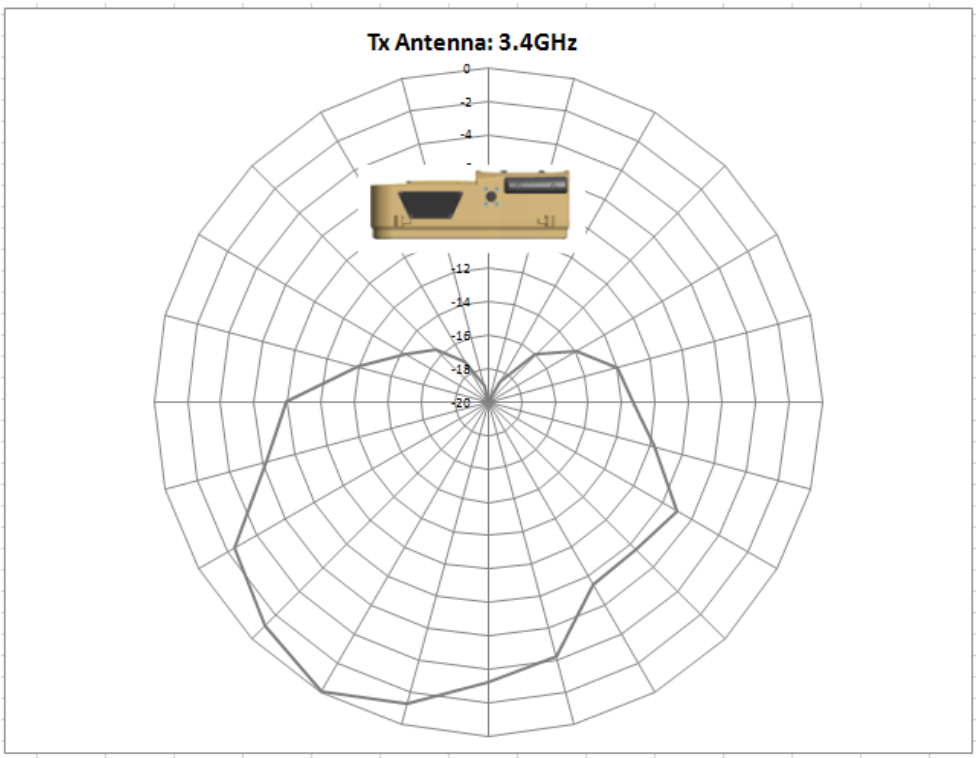

Figure 5: Normalized Plot of measured radiation pattern of Range-R 2D at 3.4GHz. Note maximum radiation is pointed away from the sensor and user.

Calculations

Using the equation listed in 4.3.1.1 of the 447498 D01 General RF Exposure Guidance document for 1g and 10-g extremity SAR exclusion threshold for the calculation below: $\frac{Max\ Channel\ power}{minseparaton} * \sqrt{f}$.

Max Channel Power: 31.6mW. This is an extreme worst case channel power where antenna is pointing away from chassis as shown in Figure 5. The radiation pattern has minimal backlobes, where the hand is located, assume >-10dBc from peak EIRP of 31.6mW. If you consider the average power at any frequency over a 1 second interval is 0.126mW (72.7us channel transmit dwell time at 31.6mW at a repetition rate of 55Hz), using the peak power of 31.6mW for this equation is highly conservative to start with.

Minseparation: 22mm, shown in Figure 1 and 2 using an average size hand.

Max frequency: 3.5 GHz

Threshold value=2.69, less than 3 for 1g SAR and less than 7.5 for 10g SAR.

Using 0.126mW (average power) at 5mm separation at 3.5 GHz yield a threshold value of 0.047. Which is <<3 and 7 for 1g and 10g SAR threshold.

Conclusion

We are within 1g and 10-g SAR test exclusion thresholds, therefore SAR testing is not required.