




## **Exhibit: RF Exposure – FCC**

Report File #: -000

Client	Utility Associates, Inc.	
Product	Smart Holster Sensor (Model: HS01)	
Standard(s)	FCC KDB 447498:2015	

## RF Exposure – FCC

The device is intended for use on extremities (wrists) and the minimum separation distance from the radiating structure to any part of the body or extremity of a user is 5 mm as stated by the manufacturer during normal operation.

The EUT contains a 1.363 MHz transmitter and a modularly certified 2400 – 2483.5 MHz DTS transmitter.

## General SAR test exclusion guidance:

As per FCC KDB 447498 Section 4.3.1 a), the 1-g SAR Test Exclusion Threshold for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm is determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] [\sqrt{f_{\text{(GHz)}}}] \leq 3.0$$

Where:

$f_{\text{(GHz)}}$  is the RF channel transmit frequency in GHz

As per FCC KDB 447498 Section 4.3.1b) For 100 MHz to 6 GHz and *test separation distances*  $> 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following

$$\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f_{\text{(MHz)}}/150)]\} \text{ mW, for 100 MHz to 1500 MHz}$$

As per FCC KDB 447498 Section 4.3.1 c) the Threshold for frequencies below 100 MHz, at test separation distances  $\leq 50$  mm is determined by:

$$\frac{1}{2} [1 + \log(100/f_{\text{(MHz)}})] * \text{Threshold in Section 4.3.1 b) 1)}$$


## SAR Calculations: 1.363 MHz transmitter

The EUT does not have an antenna port. The field was measured at 1 m with a loop antenna; the fundamental frequency falls to the noise floor when measured with a largedistance. The raw measure value is 37.58 dBuV.

The final field strength is given by

$$\begin{aligned} E \text{ (dBuV/m)} &= \text{Received Signal} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amp Gain} + 51.5 \\ &= 37.58 \text{ dBuV} - 6.65 + 0.118 - 33.74 + 51.5 \\ &= 48.81 \text{ dBuV/m} \end{aligned}$$

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The Effective Isotropic Radiate Power in dBm is given by:

$$\text{E.I.R.P (dBm)} = \text{E (dBuV/m)} - 104.77 + 20\log(d)$$

where d is in meter.

Therefore, for a 1 m measurement distance:

$$\text{E.I.R.P (dBm)} = 48.81 - 104.77 + 20\log(1) = -55.96 \text{ dBm } (2.53 \times 10^{-6} \text{ mW})$$

Peak E.I.R.P was measured to be  $2.53 \times 10^{-6} \text{ mW}$ .

As per FCC KDB 447498 Section 4.3.1 a) the power allowed with numerical threshold of 3 and at a separation distance of 50 mm and 100 MHz is:

$$[P (\text{mW}) / 50 \text{ mm}] \cdot [\sqrt{0.1 \text{ GHz}}] = 3.0$$

$$P(@50 \text{ mm}) = 474.3 \text{ mW}$$

As per FCC KDB 447498 Section 4.3.1 c)2) the power allowed is  
 $\frac{1}{2} [1 + \log(100/1.363)] * 474.3 = 679.6 \text{ mW}$

The measured peak E.I.R.P of  $2.53 \times 10^{-6} \text{ mW}$  is below the power allowed for a 1.363 MHz transmitter. SAR Exclusion Threshold condition is met with peak E.I.R.P.

### Simultaneous Transmission SAR Calculations

As per FCC 2.1093 (d)(2): The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body.

Simultaneous transmission is evaluated as per FCC KDB 447498 Section 4.3.2. The equation used is:


$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg, for test separation distances } \leq 50 \text{ mm};$$

where  $x = 7.5$  for 1-g SAR.

The 1.363 MHz transmitter have a Peak E.I.R.P of  $2.53 \times 10^{-6} \text{ mW}$  and the 2.4 GHz transmitter (FCC ID: HSW2832) have a maximum power of 1.216 mW.

### For 1.363 MHz Transmitter

$$(2.53 \times 10^{-6} \text{ mW} / 5 \text{ mm}) \cdot (\sqrt{0.001363/7.5}) = 2.5 \times 10^{-9} \text{ W/kg}$$

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**For 2.4 GHz transmitter**

$$(1.216 \text{ mW/5}) * (\sqrt{2.4835/7.5}) = 0.05 \text{ W/kg}$$

The sum of the 1-g SAR  $0.05 \text{ W/kg} + 2.5 \times 10^{-9} \text{ W/kg} = 0.05 \text{ W/kg}$  which is less than  $0.08 \text{ W/kg}$ .