

EN22XX EchoStream® Mobile Duress Pendant Series Transceiver Calculation of SAR Test Exclusion Threshold

Operation Condition:

The product has four radio transmission states: STANDBY, SINGLE ALARM, TRACKING, and REPEATED ALARM. Table 1 shows the worse-case on-time for each transmitter in the different states (see Operational Description for on-time calculations).

Table 1: Worse-Case Transmitter On-Time for Each Transmitter in Various States.

Product State	Worst Case Transmitter On-Time in 360 seconds	
	EchoStream 902.4 - 927.6 MHz (sec)	Bluetooth Low Energy (BLE) 2402, 2426, and 2480 MHz (sec)
STANDBY	0.130	0.0034
SINGLE ALARM	0.713	0.240
TRACKING	0.130	0.214
REPEATED ALARM	35.52	0.584

The REPEATED ALARM state is the worse-case transmitter on-time over a 360 second for each transmitter. The worst-case duty cycle is fixed by design and allows Source Based Time-Average derating of the exposure.

Worst Case SBTA Factor for 2400-2483 MHz = $0.584/360 \times 100\% = 0.162\%$

Worst Case SBTA Factor for 902.4-927.6 MHz = $35.52/360 \times 100\% = 9.9\%$

The worst-case separation between the transmitter antenna and operator of 6.5 mm is maintained by the transmitter enclosure as shown in Figure 1.

SAR Exclusion Threshold Calculation:

The product could be worn as a neck pendant, on the belt clip, placed in a pocket or mounted for fixed position signaling; the following analysis shows the SBTA SAR power threshold.

1-g SAR Exclusion Power¹:

$$= (6.5 \text{ mm}/20 \text{ mm}) \times (60/\text{SQRT}(f \text{ (GHz)})) \text{ mW} = 12.6 \text{ mW}$$

(where $f = 2.402 \text{ GHz}$)

$$= (6.5 \text{ mm}/20 \text{ mm}) \times (60/\text{SQRT}(f \text{ (GHz)})) \text{ mW} = 20.5 \text{ mW}$$

(where $f = 0.9024 \text{ GHz}$)

Product SBTA Power Calculation³

For the 2400.0-2483.5 MHz transmitter,

Maximum RF Power⁴: = 7.7 mW

SBTA Power (w +10% tuneup) = 0. 00162 x 7.7 mW x 1.1 = 0.014 mW

For the 902.4-927.8 MHz transmitter,

Maximum RF Power²: = 77.8 mW

SBTA Power (w +10% tuneup) = 0. 099 x 77.8 mW x 1.1 = 8.5 mW

SAR Exemption Calculation

0.014 mW < 12.6 mW → Exempt from SAR testing in 2400-2483 MHz band

8.5 mW < 20.5 mW → Exempt from SAR testing in 902-928 MHz band

Conclusion:

SAR evaluation not required for this product.

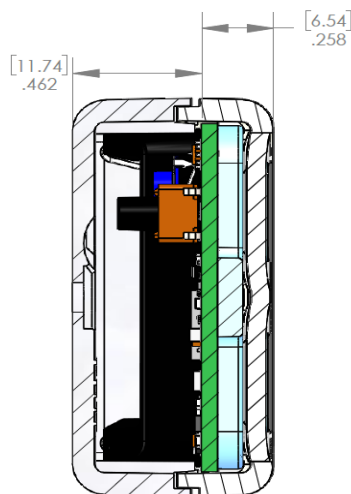


Figure 1: Cross section of the EN22XX EchoStream[®] Mobile Duress Pendant Series Transmitters.

¹447498 D01 General RF Exposure Guidance v06, footnote 30

²See NCEE Report R20200701-21-E2B DTS, page 9.

³See 47 CFR § 2.1091(d)(2)

⁴See NCEE Report R20200701-21-E1A DSS, page 9.