



Elliott Tech, LLC

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# RF Exposure Exhibit

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**Reference: 776-91-RF Exposure Exhibit.docx**

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**\*Note: Documentation illustrating the duty cycles and coincidence of operation will be provided with FCC formal compliance testing results.**

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## RF EXPOSURE EXHIBIT

The Specific Absorption Rate (SAR) is a measure of the heating value of radiated Radio Frequency (RF) energy on human tissue, and thus effectively evaluates the biological safety of low-power transmitters in close proximity to the human body. The FCC exposure evaluation expresses these RF exposure limits in terms of SAR. The purpose of this exhibit is to describe why SAR testing is not necessary for the NCS Personal Alert Sentry (PAS) device.

There exist three FCC classifications for wireless devices: fixed, mobile, and portable. Fixed devices are permanently located with an antenna affixed to a structure and are not required for SAR testing. Mobile devices are used 20 cm or more from the body and portable devices are used within 20 cm of the body. Although the PAS will likely be carried within 20 cm of the body in normal operation, is only able to transmit by active button press (when held in the hand), and therefore should be considered a mobile device as opposed to a portable device.

The PAS device operates in the ISM band and transmits using GFSK modulation with a unity gain antenna, frequency hopping from 902.5 MHz to 927.5 MHz with less than a 400ms dwell time as regulated by the FCC (15.247). The output power is 900mW with a maximum transmit duty cycle of 38% (transmitter is only active 38ms at most in any 100ms window). Applying this duty cycle reduces the output transmit power to 342mW.

Although this transmit power is clearly above the 65.57mW output power threshold required for SAR testing, we do not believe that SAR testing is necessary for the PAS device. First and foremost, this is a personal safety device; under normal operation it only transmits in the event of an emergency in which an alert button press is required. Furthermore, there is no audible feedback from the device and therefore offers no incentive for use around the head. Realistically, the device will only transmit once/twice in the lifetime of the product if even at all. In the event of an alert transmission, the PAS device must be secured in the palm of the hand and initiated with a finger triggering the button on the top of the device. Even when sending an alert, the transmitter will only remain on for a very brief period of time. In the worst case, the PAS will transmit for 38ms (in a 272ms window) three times in order to completely send the alert packet.

In addition, KDB 447498 D01, Item 4, Section C, Part iii (1) reads: "Hand SAR is required for hand-held and hand-operated devices with output power  $> 1000 \cdot [f(\text{GHz})]^{-0.5}$  mW that are





designed with the hand operating closer than 5 cm from the antenna during normal use." Therefore, our output power (900mW) must be less than:  $1000 \cdot [0.915 \text{ GHz}]^{-0.5} = 1.045 \text{ W}$ . Our device clearly does not need Hand SAR testing as our transmit output power is less than the aforementioned threshold.

Due to the minimal expected usage of the device as well as the brevity of the actual transmit in the unlikely event on an alert; we do not believe SAR testing is necessary for the NCS PAS device.