1601 North A.W. Grimes Blvd., Suite B
Round Rock, TX 78665
e-mail: info@ptitest.com
(512) 244-3371   Fax: (512) 244-1846

1.0 Maximum Permissible Exposure Evaluation (Supplements the test report.)

The measured power is considered for the intended use of the device and resulting RF exposure to the user.

1.2 Criteria

Section Reference	Date
KDB 447498 D01 Mobile Portable RF Exposure v05r01 // RSS-102 Issue 5, Notice 2013 DRS0911	7 Aug 2015

1.3 Procedure

Using the measurements of peak power and duty cycle, determine the permissible exposure level, applicability of exclusion, or whether additional exposure tests (SAR) are indicated. When applicable justify conclusion for selected exposure level and separation distance.

1.4 Justification

The antenna is located to the side and parallel to the touch screen of the device. The touch screen covers the antenna preventing direct contact. Using the modeling software design source, the antenna is measured to be below the thickness of the touch screen by 3 mm. See photo of antenna location below, being the green circuit board extending beyond the metal enclosure of the device.
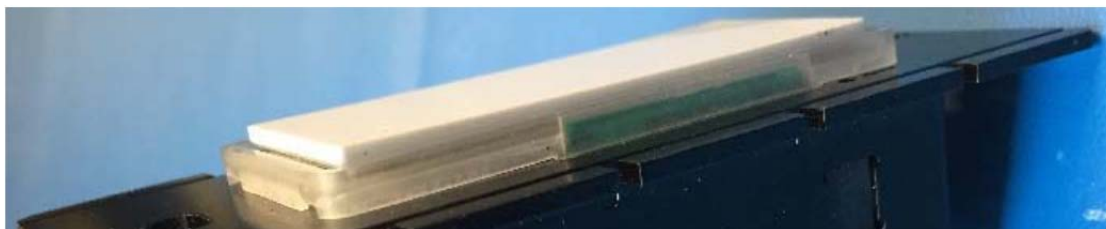
Side View – Antenna Position Relative to Touch Screen Visible

1.5 Power to Exposure Calculation

Two half-duplex radios are considered; that is they share the same antenna but cannot transmit at the same time. The highest operating frequencies are 2462 MHz and 2480 MHz. Power is determined from the measured conducted power, adjusted by source duty cycle factor, and with antenna gain added. SAR exemption method was applied.

The highest peak RF source, the WiFi radio, transmits for 2.01 ms * 1 packet (lowest data rate, largest packet, worst-case) every 15 seconds. This produces a source duty cycle factor of $10\text{Log}_{10}(0.00201/15) = -38.7$ dB.

Professional Testing (EMI) Inc.

Table 1.5.1 Power Calculation for Exposure, Radio WiFi

Measured Conducted Power (Peak Detection) mW	Restated Peak Power dBm	Source Duty Cycle Factor dB	Calculated Average EIRP dBm	Antenna Gain dBi	Total Peak EIRP dBm	EIRP In Linear Terms mW
145.9	21.64	-38.7	-17.06	3.0	-14.1	0.039

Table 1.5.2 Power Calculation for Exposure, Radio Bluetooth Low Energy

Measured Conducted Power (Peak Detection) mW	Restated Peak Power dBm	Source Duty Cycle Factor dB	Calculated Average EIRP dBm	Antenna Gain dBi	Total Peak EIRP dBm	EIRP In Linear Terms mW
3.91	5.92	-19.57*	-13.65	3.0	-10.65	0.086

*Based on accumulated dwell time 1.103 ms in 100 ms.

1.6   FCC, SAR Exemption Calculation – 3.0 Criteria

1.6.1   Radio: WiFi

Calculation (max power including tune up tolerance = 0.039 mW:

$$[(0.039 \text{ mW})/(3 \text{ mm})] \cdot [\sqrt{2.462} \text{ (GHz)}] = 0.02$$

$0.02 \leq 3.0$ (As percent of total: $0.02 / 3.0 = 0.7\%$)

1.6.2   Radio: Bluetooth Low Energy

Calculation (max power including tune up tolerance = 0.086:

$$[(0.086 \text{ mW})/(3 \text{ mm})] \cdot [\sqrt{2.480} \text{ (GHz)}] = 0.045$$

$0.045 \leq 3.0$ (As percent of total: $0.045 / 3.0 = 1.5\%$)

1.6.3   Summing the Result

Summing the two sources in worse-case operation yields:

$0.7\% + 1.5\% = 2.2\%$ of exposure limit.

Therefore, the device meets the FCC SAR exemption requirements.

1.7   IC, SAR Exemption – Clause 2.5.1 Criteria

Summing the two sources in worse-case operation (transmitting within the same general time frame) yields:

0.039 mW + 0.086 mW = 0.125 mW

Professional Testing (EMI) Inc.

This device meets the SAR Evaluation Exemption criteria in RSS-102 Clause 2.5.1, Table 1, row 2450 MHz, based on the output power being less than 4 mW and distance ≤ 5 mm.

Signed:

Eric Lifsey

***