

## 14. RF EXPOSURE

### 14.1. Standard Applicable

According to §2.1093 this is a Portable device.

For The radiation source included into the device the output power is taken from a corresponding RF test report. If needed the output power is converted to source based, time –average out power. Finally the output power is compared to FCC and IC low power SAR evaluation exemption level.

#### FCC SAR test exclusion:

According to KDB 447498 D01 General RF Exposure Guidance v05r02, Appendix A requirement, “The equation and threshold in section 4.3.1 must be applied to determine SAR test exclusion.”

#### 4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.<sup>23</sup> The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.<sup>24</sup>

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR,25 where

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation26
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

#### IC Exemption from Routine Evaluation Limits – SAR Evaluation: RSS 102 Issue 4

SAR evaluation is required if the separation distance between the user and the radiating element of the device is less than or equal to 20 cm, except when the device operates as follows:

above 2.2 GHz and up to 3 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use;

#### 14.2. Measurement Result:

FCC:

| Frequency (MHz) | Max power (dBm) | tune-up tolerance(dB) | Max power (mW) | Min Distance (mm) | Result   | Limit (3.0 @ 1g SAR) |
|-----------------|-----------------|-----------------------|----------------|-------------------|----------|----------------------|
| 2402            | 0.53            | 2                     | 1.790606       | 5.00              | 0.555030 | 3.0                  |
| 2440            | 0.97            | 2                     | 1.981527       | 5.00              | 0.619049 | 3.0                  |
| 2480            | 1.41            | 2                     | 2.192805       | 5.00              | 0.690647 | 3.0                  |

$\text{Max Power(mW)} = 10^{((\text{Max Power(dBm)} + \text{Tune-up tolerance(dB)}) / 10)}$

$\text{Result} = \text{Max Power (mW)} / \text{min. distance(mm)} * \sqrt{f(\text{GHz})}$