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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
447498 D01 General RF Exposure Guidance v06 // RSS-102 Issue 5	7 Nov 2019

1.3 Procedure

Using measurement or other source of peak power, and considering the intended application, 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 Calculation

This is a personal rideable battery-powered scooter transportation device. It uses two wireless radios to operate; a Bluetooth Low Energy radio and a pre-approved cellular data modem module supporting WCDMA+LTE, on bands between 699 to 1910 MHz, at 0.25 W power, with 5 Mbps data rate. The BTLE radio interacts with the users smart phone app. The cell modem communicates with the scooter management/accounting system with transaction and position data; there is no bulk data streaming involved (no audio or video).

These radios are co-located on a single circuit board. The BTLE radio antenna is etched on the main board with gain estimated at 0 dBi. The cell modem antenna is a separate small printed antenna connected with about 3cm of cable. Direct contact with either antenna is prevented by the plastic enclosure built for outdoor use.

The user engages use of the scooter via personal smartphone then operates it by gripping the handlebars and pressing on the throttle button. Closest operating position is when activating the horn or throttle button with a measured spacing of 5.5 cm to circuit board edge of 2.4 GHz radio. Closest point for the cellular antenna (small printed antenna separate from main board) is 5.9 cm.

Table 1.4.1 Power Calculation for Exposure, 2.4 GHz Radio (Highest frequency 2.480 GHz)

Measured EIRP Radiated Power mW	Restated as EIRP dBm	Source Duty Cycle Factor dB	Antenna Gain dBi	Calculated Average EIRP dBm	EIRP In Linear Terms mW
0.04	-14	0	0.0	-14	0.04

Table 1.4.2 Power Calculation for Exposure, Cellular Modem Radio (Highest frequency 1.910 GHz)					
Reported EIRP Radiated Power mW	Restated as EIRP dBm	Source Duty Cycle Factor dB	Antenna Gain dBi	Calculated Average EIRP dBm	EIRP In Linear Terms mW
250	24	-3**	0	21	

**This is a highly conservative worse-case figure assumed in place of more exact measurement.

Bluetooth radio, antenna 55 mm from throttle button:

Applicable requirement: KDB 447498 Clause 4.3.1 Section 1

Calculation (max power including tune up tolerance = 0.04 mW):

$$[(0.04 \text{ mW})/(55 \text{ mm})] \cdot [\sqrt{2.480_{\text{GHz}}}] = 0.0011$$

$$0.0011 \leq 3.0 \quad \text{Represents } (0.0011/3) = 0.04\% \text{ of allowed exposure.}$$

Cellular radio, antenna 59 mm from throttle button:

$$[(125 \text{ mW})/(59 \text{ mm})] \cdot [\sqrt{1.910_{\text{GHz}}}] = 2.93$$

$$2.93 \leq 3.0 \quad \text{Represents } (2.93/3) = 97.7\% \text{ of allowed exposure.}$$

The composite exposure is: $0.04\% + 97.7\% = 97.74\%$

Therefore, the device meets the applicable permissible SAR exemption requirements.

Signed:



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