

RF Exposure Analysis

FCC ID: 2AEA1-VTB1

Analysis for FCC portable use

Standalone SAR test exclusion considerations are defined in KDB 447498D01 (v05r02) Chapter 4.3.1 where the 1-g head or body and 10-g extremity SAR exclusion threshold is defined by the following formula:

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

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

For the VTB module the maximum conducted output power is 8.0 dBm (6.3mW).

Applying the above data using the given KDB 447498 D01 formula, and minimum separation distance of 5mm, the following results:

$(6.3\text{mW} / 5 \text{ mm}) \times \sqrt{2.43 \text{ GHz}} = 1.96$ (i.e.: ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR)

This demonstrates the VTB module meets the criteria for 1-g head/ body and 10-g extremity SAR test exemption.

Analysis for FCC mobile use

For mobile usage at >20cm the following equation applies:

$$S = \text{EIRP} / 4 \pi R^2$$

Where:

S = Power density

EIRP = Effective Isotropic Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna (safe operating distance)

Power Density Requirement

From FCC Rule Part 1.1310 Table 1 - Limits for General Population/
Uncontrolled Exposure for 2.4GHz

$$S = 1.0 \text{ mW/cm}^2$$

For VTB module:

$$P = 6.3\text{mW}$$

$$G = 1.0\text{Bi max} = \times 1.26$$

$$\text{EIRP} = P \times G = 7.93\text{mW}$$

Calculation:

$$S = \text{EIRP} / 4 \pi R^2$$

$$S = 7.93 / (12.56 \times 20^2)$$

$$S = 7.93 / (5024)$$

$$S = 0.0016$$

This demonstrates the VTB module meets the requirement of $S = 1.0 \text{ mW/cm}^2$ for >20cm module usage.

Conclusion

The VTB module can be used in products for Portable or Mobile usage.

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