

FCC SAR Exemption Calculation

The Brilliant Smart Dimmer Switch is mounted in a user's wall in a standard electrical box, just like a traditional light switch. A user can control the load connected to their Smart Dimmer Switch by touching the surface of the switch. When a user touches the switch, the antenna will transmit. The closest distance is determined from the closest point on the surface that a user can touch to the transmitting antenna on the PCB.

In order to determine the separation distance between the antenna and the outer surface of the device, the plastic enclosure, pressure sensitive adhesive (PSA), and the PCB need to be taken into account. The thickness of the plastic enclosure is 4.55mm. A PSA of thickness 0.25mm is applied, and then the PCB of thickness 1.1mm is added. The PSA allows the PCB to be adhered to the plastic enclosure. Given these values, the distance between the outer surface and antenna is a total of 5.9mm. Considering that the PSA will be compressed, the distance will be closer to 5.75mm. In the worst case of no PSA being added, the smallest separation distance will be 5.65mm.

Using the worst-case separation distance and the equation described in KDB 447498 D01 General RF Exposure Guidance v06 4.3.1 (shown below), we see that the Smart Dimmer Switch is below the limit.

Frequency = 2.44GHz

Max Power of Channel = 4.05dBm = 2.5409727055mW

Minimum Distance = 5.65mm

Power and distance are rounded to the nearest mW and mm before calculation.

The result is rounded to one decimal place for comparison.

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

$$\left(\frac{3\text{mW}}{6\text{mm}} \right) \times \sqrt{2.44 \text{ GHz}} = 0.8$$

$0.8 \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g}$