



Canada

## **Exhibit: RF Exposure – FCC**

FCC ID: 2AR26-SWIDGETWI100

7169008247FCCRFEXP-001

Client	Swidget
Product	Swidget WIFI/BT module (PNS50E0179)
Standard(s)	FCC Part 15 Subpart 15.247:2019



## RF Exposure – FCC

The device is a mobile device intended to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure and the body of the user or nearby persons.

### General SAR test exclusion guidance:

As per FCC KDB 447498 Section 4.3.1 b), the SAR Test Exclusion Threshold for 100 MHz to 6 GHz at test separation distances > 50 mm is determined by:

- 1) {[Power allowed at *numeric threshold* for 50 mm]} + [(test separation distance – 50 mm)  $(f_{MHz}/150)]} \text{ mW, for 100 MHz to 1500 MHz}$
- 2) {[Power allowed at *numeric threshold* for 50 mm]} + [(test separation distance – 50 mm)\*10]}  $\text{mW, for } > 1500 \text{ MHz and } \leq 6 \text{ GHz}$

Where:

Power allowed at *numeric threshold* for 50 mm (for 1-g SAR) is given by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] [\sqrt{f_{GHz}}] \leq 3.0$$

$$(\text{max power of channel, including tune-up tolerance, mW}) \leq [3.0 / \sqrt{f_{GHz}}] * [\text{min. test separation distance, mm}]$$

$f_{GHz}$  is the RF channel transmit frequency in GHz

### SAR Calculations: 2402 – 2480 MHz DTS transmitter

Power allowed at *numeric threshold* for 50 mm:

$$(\text{max power of channel, including tune-up tolerance, mW}) \leq [3.0 / \sqrt{(2.480 \text{ GHz})}] * [50 \text{ mm}]$$

$$(\text{max power of channel, including tune-up tolerance, mW}) \leq 95.3 \text{ mW}$$

Therefore SAR Exclusion for 200 mm test distance is:

$$\{[\text{Power allowed at } \textit{numeric threshold} \text{ for 50 mm}] + [(\text{test separation distance} - 50 \text{ mm}) * 10]\} \text{ mW, for } > 1500 \text{ MHz and } \leq 6 \text{ GHz}$$

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$$= [95.3 \text{ mW}] + [(200 \text{ mm} - 50 \text{ mm}) * 10]$$

$$= 1596 \text{ mW}$$

The EUT meets the SAR Exclusion Threshold. Peak conducted power of DTS transmitter was measured to be 20.9 mW which is significantly below the 1596mW threshold.

## Radiofrequency Radiation Exposure Evaluation: Portable Devices

Portable devices shall be evaluated for RF radiation exposure according to the provisions of FCC §2.1093 and the MPE guidelines identified in FCC §1.1310.

As per FCC §1.1310 Table 1(B), the limit for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields for General Population/Uncontrolled Exposure in the frequency range of 300 MHz to 1.5 GHz is  $f/1500 \text{ mW/cm}^2$  and in the frequency range of 1.5GHz to 100GHz is  $1.0 \text{ mW/cm}^2$ . Where  $f$  = frequency in MHz.

The power density formula is given by:

$$P_d = (P_{out} * G) / (4 * \pi * R^2)$$

Where,

$P_d$  = Power density in  $\text{mW/cm}^2$

$P_{out}$  = Conducted output power to antenna in mW

$G$  = Numeric Antenna Gain

$\pi$  = 3.1416

$R$  = Separation distance in cm

## MPE Calculation: 2402 – 2480 MHz DTS transmitter

The DTS transmitter has a maximum conducted output power of 13.2 dBm or 20.9 mW and an antenna gain of -1.7 dBi or 0.67 numerically.

For a distance of 20cm, the power density is:

$$P_d = (20.9 \text{ mW} * 0.67) / (4 * 3.1416 * (20 \text{ cm})^2)$$

$$P_d = 0.003 \text{ mW/cm}^2$$

The device passes the requirement. The calculated power density of  $0.003 \text{ mW/cm}^2$  is below the  $1.0 \text{ mW/cm}^2$  limit.