

RF Exposure / MPE Calculation

No.	:	12804674H-B-R1
Applicant	:	DENSO Corporation
Type of Equipment	:	Control Box
Model No.	:	DNNS097
		* Bluetooth (Except for Low Energy) part
FCC ID	:	HYQDNNS097

DENSO Corporation declares that Model: DNNS097 complies with FCC radiation exposure requirement specified in the FCC Rule 2.1091 (for mobile).

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided with the “DNNS097” as calculated from (B) Limits for General Population / Uncontrolled Exposure of TABLE 1- LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) of §1.1310 Radiofrequency radiation exposure limits.

[Bluetooth (Except for Low Energy) part]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1 mW/cm^2 uncontrolled exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

$P =$ 0.79 mW (Maximum average output power)

- ☒ Time average was used for the above value in consideration of 6-minutes time-averaging
☐ Burst power average was used for the above value in consideration of worst condition.

$G = 0.513$ Numerical Antenna gain; equal to -2.9 dBi

$$r = 20 \text{ cm (Separation distance)}$$

Power Density Result $S = 0.00008 \text{ mW/cm}^2$

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Reference:**[WLAN (2.4 GHz band) part]**

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1mW/cm² uncontrolled exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

$P =$ 37.24 mW (Maximum average output power)

☐ Time average was used for the above value in consideration of 6-minutes time-averaging

☒ Burst power average was used for the above value in consideration of worst condition.

$G =$ 0.513 Numerical Antenna gain; equal to -2.9dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00380 \text{ mW/cm}^2$

[WLAN (5 GHz band) part]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1mW/cm² uncontrolled exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

$P =$ 21.43 mW (Maximum average output power)

☐ Time average was used for the above value in consideration of 6-minutes time-ave

☒ Burst power average was used for the above value in consideration of worst condit

$G =$ 0.513 Numerical Antenna gain; equal to -2.9 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00219 \text{ mW/cm}^2$

Therefore, if Bluetooth and WLAN (2.4 GHz band) transmit simultaneously,

$$S = 0.00008 \text{ mW/cm}^2 + 0.00380 \text{ mW/cm}^2 \\ = 0.00388 \text{ mW/cm}^2$$

Therefore, if Bluetooth and WLAN (5 GHz band) transmit simultaneously,

$$S = 0.00008 \text{ mW/cm}^2 + 0.00219 \text{ mW/cm}^2 \\ = 0.00227 \text{ mW/cm}^2$$

Even taking into account the tolerance, this device can be satisfied with the limits.

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