

RF Exposure / MPE Calculation

No. : 12804674H-A-R1
Applicant : DENSO Corporation
Type of Equipment : Control Box
Model No. : DNNS097
 *WLAN (2.4 GHz band) and Bluetooth 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.

[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 $S = 0.00380 \text{ mW/cm}^2$

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Bluetooth part]

Low Energy

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

$P =$ 0.81 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 cm (Separation distance)

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

BDR/EDR (Reference)

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

$P =$ 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 cm (Separation distance)

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

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

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

$= 0.00388 \text{ mW/cm}^2$

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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124