RF Exposure / MPE Calculation

No.	:	12608632H-A
Applicant	:	MITSUBISHI ELECTRIC CORPORATION SANDA WORKS
Type of Equipment	:	Display Audio
Model No.	:	R1 LOW
FCC ID	:	UJHR1LOW
		*WLAN 2.4 GHz and Bluetooth Low Energy Part

MITSUBISHI ELECTRIC CORPORATION SANDA WORKS declares that Model: R1 LOW 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 "R1 LOW" 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.

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

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

Where

P = 16.69 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 = 3.428 Numerical Antenna gain; equal to 5.35dBi

r = 20 cm (Separation distance)

Power Density Result ***S*** **= 0.01138 mW/cm^2**

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

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Reference:

[Bluetooth Low Energy part (WiFi / BLE module: QCA6574AU)]

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

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

Where

P = 0.64 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 = 1.449 Numerical Antenna gain; equal to 1.61 dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.00018 mW/cm^2**

Reference:

[Bluetooth Low Energy part (BLE chip: CC2640R2F)]

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

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

Where

P = 1.02 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 = 1.449 Numerical Antenna gain; equal to 1.61 dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.00029 mW/cm^2**

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

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

Where

P = 0.55 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 = 1.449 Numerical Antenna gain; equal to 1.61 dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.00016 mW/cm^2**

Therefore, if WLAN 2.4GHz and Bluetooth Low Energy (WiFi / BLE module: QCA6574AU) transmit simultaneously,
S=0.01138 mW/cm^2 + 0.00018 mW/cm^2
=0.01156 mW/cm^2

Therefore, if WLAN 2.4GHz and Bluetooth transmit simultaneously,
S=0.01138 mW/cm^2 + 0.00016 mW/cm^2
=0.01154 mW/cm^2

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

* Bluetooth Low Energy (BLE chip: CC2640R2F) and WiFi / BLE module do not transmit simultaneously.