

RF Exposure / MPE Calculation

No.	14854382S
Customer	Murata Manufacturing Co., Ltd.
Description of EUT	Communication Module
Model Number of EUT	2CX
FCC ID	VPYLBEE5QG2CX

Murata Manufacturing Co., Ltd. declares that Model: 2CX 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 “2CX” 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 Low Energy 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

$P =$ 9.66 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.

$G =$ 0.948 Numerical Antenna gain; equal to -0.23 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00182 \text{ mW/cm}^2$

[Bluetooth (BR/EDR) 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

$P =$ 7.59 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.

$G =$ 0.948 Numerical Antenna gain; equal to -0.23 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00143 \text{ mW/cm}^2$

[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 1 mW/cm² uncontrolled exposure limit. The Friis formula used was:

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

Where

$P =$ 44.66 mW (Maximum average output power)

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

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

$G =$ 1.462 Numerical Antenna gain; equal to 1.65 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.01299 \text{ mW/cm}^2$

[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

$P =$ 28.00 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.

$G =$ 1.297 Numerical Antenna gain; equal to 1.13 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00723 \text{ mW/cm}^2$

[WLAN 6 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

$P =$ 27.99 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.

$G =$ 0.769 Numerical Antenna gain; equal to -1.14 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00428 \text{ mW/cm}^2$

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

$$\begin{aligned} S &= 0.00723 \text{ mW/cm}^2 + 0.00182 \text{ mW/cm}^2 \\ &= 0.00905 \text{ mW/cm}^2 \end{aligned}$$

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

$$\begin{aligned} S &= 0.00723 \text{ mW/cm}^2 + 0.00143 \text{ mW/cm}^2 \\ &= 0.00866 \text{ mW/cm}^2 \end{aligned}$$

Therefore, if WLAN (6 GHz band) and Bluetooth (BTLE) transmit simultaneously,

$$\begin{aligned} S &= 0.00428 \text{ mW/cm}^2 + 0.00182 \text{ mW/cm}^2 \\ &= 0.0061 \text{ mW/cm}^2 \end{aligned}$$

Therefore, if WLAN (6 GHz band) and Bluetooth (BR/EDR) transmit simultaneously,

$$\begin{aligned} S &= 0.00428 \text{ mW/cm}^2 + 0.00143 \text{ mW/cm}^2 \\ &= 0.00571 \text{ mW/cm}^2 \end{aligned}$$