RF Exposure / MPE Calculation

No.	:	12486442H
Applicant	:	Panasonic Corporation
Type of Equipment	:	Radio Module
Model No.	:	WW18A
FCC ID	:	ACJ9TGWL18A

Panasonic Corporation declares that Model: WW18A 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 "WW18A" 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.

[WWAN 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 = 251.19 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 = 1.306 Numerical Antenna gain; equal to 1.16dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.06527 mW/cm^2**

WW18A contains certified cellular module (FCC ID: ACJ9TGWL18A).
The Radio module and the Wireless module both transmit simultaneously in their respective bands.
Compliance for simultaneous transmission are shown by the following calculations.

Reference:
[WLAN 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 = 100.00 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 = 1.660 Numerical Antenna gain; equal to 2.2 dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.03302 mW/cm^2**

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 = 8.91 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 = 1.524 Numerical Antenna gain; equal to 1.83 dBi

r = 20 cm (Separation distance)

Power Density Result S = **0.00270 mW/cm^2**

Therefore, if WWAN, WLAN and Bluetooth transmit simultaneously,

S = 0.06527 mW/cm^2 + 0.03302 mW/cm^2 + 0.00270 mW/cm^2

0.10099 mW/cm^2

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