# RF Exposure / MPE Calculation

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|---|---|---|
| No. | : | 12786766H |
| Applicant | : | Panasonic Corporation |
| Type of Equipment | : | WiFi Module |
| Model No. | : | WL17A |
| FCC ID | : | ACJ9TGWL17A |

Panasonic Corporation declares that Model: WL17A 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 "WL17A" 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.

## [2.4 GHz 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

$P$ = 44.67 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.

$G$ = 1.291 Numerical Antenna gain; equal to 1.11dBi

$r$ = 20 cm (Separation distance)

***Power Density Result S =*** **0.01147 mW/cm$^2$**

## [5 GHz 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

$P$ = 39.81 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.

$G$ = 1.862 Numerical Antenna gain; equal to 2.7dBi

$r$ = 20 cm (Separation distance)

***Power Density Result S =*** **0.01475 mW/cm$^2$**

FZ-55 contains certified wireless module (FCC ID: ACJ9TGWL18A).
The WiFi module and the Wireless module both transmit simultaneously.
Compliance for simultaneous transmission are shown by the following calculations.

**Reference:**

**[WL18A module WLAN (SISO) part highest value]**

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$^2$**

**[WL18A module WLAN (MIMO) part highest value]**

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

$P$ = 125.89 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 =*** **0.04157 mW/cm$^2$**

**Reference:**

**[WL18A module Bluetooth part highest value]**

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 WLAN (WL17A), WLAN and Bluetooth (WL18A) transmit simultaneously, the combination to be the maximum is as follows;

< WLAN (WL17A) + WLAN(SISO) + Bluetooth (WL18A) >

**S = 0.01475 mW/cm$^2$ + 0.03302 mW/cm$^2$ + 0.00270 mW/cm$^2$**

**= 0.05047 mW/cm$^2$**

< WLAN (WL17A) + WLAN(MIMO) >

**S = 0.01475 mW/cm$^2$ + 0.04157 mW/cm$^2$**

**= 0.05632 mW/cm$^2$**

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