

RF Exposure / MPE Calculation

Applicant : Murata Manufacturing Co., Ltd.
Type of Equipment : W-LAN + Bluetooth Module
Model No. : 1PJ
FCC ID : VPYLBEE5ZZ1PJ

Murata Manufacturing Co., Ltd. declares that Model: 1PJ 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 “1PJ with WM-BAC-AT-49 (FCC ID: COF-WMBACAT49)” 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/cm² uncontrolled exposure limit. The Friis formula used was:

$$S = (P * G) / (4 * \pi * r^2)$$

S single : case of single transmission

P : Maximum average output power

Bluetooth : Time average was used for the above value in consideration of 6-minutes time-average

Other than Bluetooth : Burst power average was used for the above value in consideration of worst condition

G : Numerical Antenna gain

r: 20.0 cm

| No | Module model No. | | P(mW) | G | G(dBi) | S single (mW/cm ²) |
|----|------------------|-------------------------------|--------|-------|--------|--------------------------------|
| 1 | WM-BAC-AT-49 | Bluetooth *1) | 4.14 | 1.327 | 1.23 | 0.00109 |
| 2 | WM-BAC-AT-49 | Wireless LAN 2.4 GHz band *2) | 100.00 | 4.159 | 6.19 | 0.08274 |
| 3 | WM-BAC-AT-49 | Wireless LAN 5 GHz band *2) | 49.55 | 3.698 | 5.68 | 0.03646 |
| 4 | 1PJ | Wireless LAN 5 GHz band | 25.70 | 1.225 | 0.88 | 0.00626 |

Note: WM-BAC-AT-49 (FCC ID: COF-WMBACAT49), which transmit simultaneously with 1PJ (FCC ID: VPYLBEE5ZZ1PJ) was referred to the value of the RF Exposure Report (No.: SABERD-WTW-P20110669 R1) for WM-BAC-AT-49 (FCC ID:COF-WMBACAT49).

*1) P (mW) was adapted from the higher value which has the max power between Bluetooth and Bluetooth Low Energy.

*2) The antenna gain and the value P (mW) were adapted from the higher value of Dipole Antenna A and Dipole Antenna B in the RF Exposure Report (No.: SABERD-WTW-P20110669 R1).

Cases of simultaneous transmission

- 1. Bluetooth or Bluetooth Low energy + 2. Wireless LAN 2.4 GHz band + 4. Wireless LAN 5GHz band
- 1. Bluetooth or Bluetooth Low energy + 3. Wireless LAN 5 GHz band + 4. Wireless LAN 5 GHz band

* Worst case

This calculation is

$$S = (P_1 * G_1) + (P_2 * G_2) + (P_4 * G_4) / (4 * \pi * r^2)$$

For: 1PJ with WM-BAC-AT-49 (Bluetooth and Wireless LAN) S = 0.09010 mW /cm²

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