

# RF Exposure Statement

## Product description

Test item : Communication Robot (WLAN 11b/g)  
 Applicant : Yukai Engineering Inc.  
 Address : 101 Musashiya-Sky bldg., 16-11, Tomihisa-cho, Shinjuku, Tokyo  
 162-0067, Japan  
 Model : YE-RB002G  
 FCC ID : 2AFXT-RB002-W  
 Operating frequency range : 2412 - 2462 MHz  
 TX output power : 23.35 dBm  
 Maximum Antenna Gain : +2.31 dBi  
 Family model : YE-RB002T (The color of case is different.)  
  
 Simultaneous Transmitter : BROADCOM BLUETOOTH MODULE  
 Model : BCM20737S  
 FCC ID : 2AFXT-RB002-B  
 Operating frequency range : 2402 - 2480 MHz  
 TX output power : 2.6 dBm  
 Maximum Antenna Gain : -1.5 dBi

## Maximum Permissible Exposure

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. The criteria of "General Population/ Uncontrolled Exposure" listed in the below table shall be used to evaluate the environmental impact of human exposure to radio-frequency radiation as specified in 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of 2.1093.

### **(A) Limits for Occupational/Controlled Exposure**

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|-----------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| 0.3-3.0               | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30                | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300                | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500              | -                             | -                             | f/300                               | 6                        |
| 1500-100000           | -                             | -                             | 5                                   | 6                        |

### **(B) Limits for General Population/Uncontrolled Exposure**

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|-----------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| 0.3-1.34              | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30               | 842/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                | 61.4                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500              | -                             | -                             | f/500                               | 30                       |
| 1500-100000           | -                             | -                             | 1.0                                 | 30                       |

Note: f = frequency in MHz, \* = Plane-wave equivalent power density

## MPE Calculation method

$$Pd = \frac{P \times G}{4\pi \times d^2}$$

Pd = Power Density [mW/cm<sup>2</sup>]

P = RF output power [mW]

G = EUT antenna gain (numeric)

d = Separation distance between EUT and human body [cm]

From the data of test report, the RF power density can be obtained.

## Calculated result

Exposure Environment : General Population / Uncontrolled Exposure  
 Model : YE-RB002G (WLAN 11b/g)  
 FCC ID : 2AFXT-RB002-W  
 Operating frequency range : 2412 - 2462 MHz

| RF output power |        | EUT antenna gain |           | Distance<br>[cm] | Power Density<br>[mW/cm <sup>2</sup> ] | Limit<br>[mW/cm <sup>2</sup> ] | Result   |
|-----------------|--------|------------------|-----------|------------------|----------------------------------------|--------------------------------|----------|
| [dBm]           | [mW]   | [dBi]            | (numeric) |                  |                                        |                                |          |
| 23.35           | 216.27 | 2.31             | 1.70      | 20               | 0.073143                               | 1.0                            | Complied |

Exposure Environment : General Population / Uncontrolled Exposure  
 Model : BCM20737S (Bluetooth)  
 FCC ID : 2AFXT-RB002-B  
 Operating frequency range : 2402 - 2480 MHz

| RF output power |      | EUT antenna gain |           | Distance<br>[cm] | Power Density<br>[mW/cm <sup>2</sup> ] | Limit<br>[mW/cm <sup>2</sup> ] | Result   |
|-----------------|------|------------------|-----------|------------------|----------------------------------------|--------------------------------|----------|
| [dBm]           | [mW] | [dBi]            | (numeric) |                  |                                        |                                |          |
| 2.60            | 1.82 | -1.50            | 0.71      | 20               | 0.000257                               | 1.0                            | Complied |

Both of YE-RB002G (WLAN 11b/g) and BCM20737S (Bluetooth) can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1 + CPD2/LPD2 + \dots < 1$$

CPD = Calculated Power Density

LPD = Limit of Power Density

Therefore, the worst-case situation is  $0.073143/1 + 0.000257/1 = 0.0734 < 1$ .

This confirmed that this device comply with FCC 1.1310 MPE limit.