

INTERTEK TESTING SERVICES

RF Exposure

The equipment under test (EUT) is a Clock Radio with Wireless Charging with Bluetooth 5.0 (Dual Mode) function operating in 2402-2480MHz and WPT function operating in 110-215kHz. The EUT is powered by DC 7.4V by rechargeable battery and charged by DC 5V/2A through adapter. For more detail information pls. refer to the user manual.

Bluetooth Version: 5.0 BLE

Modulation Type: GFSK

Antenna Type: Integral antenna.

Antenna Gain: -0.58dBi.

The nominal conducted output power specified: -2.42dBm (+/-3dB).

The nominal radiated output power (e.i.r.p) specified: -3dBm (+/- 3dB).

According to the KDB 447498:

The maximum peak radiated emission for the EUT is 94.3dB μ V/m at 3m in the frequency 2480MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -0.93dBm
which is within the production variation.

The minimum peak radiated emission for the EUT is 90.1dB μ V/m at 3m in the frequency 2402MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -5.13dBm
which is within the production variation.

The maximum conducted output power specified is 0.58dBm = 1.1mW

The source-based time-averaging conducted output power

= 1.1 * Duty factor mW (where Duty Factor \leq 1)

= 1.1 mW

The SAR Exclusion Threshold Level:

= 3.0 * (min. test separation distance, mm) / sqrt(freq. in GHz)

= 3.0 * 5 / sqrt (2.480) mW

= 9.53 mW

Since the source-based time-averaging conducted output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

Bluetooth Version: 5.0 BR/EDR

Modulation Type: GFSK, $\pi/4$ -DQPSK and 8-DPSK

Antenna Type: Integral antenna.

Antenna Gain: -0.58dBi.

The nominal conducted output power specified: -2.42dBm (+/-3dB).

The nominal radiated output power (e.i.r.p) specified: -3dBm (+/- 3dB).

According to the KDB 447498:

The maximum peak radiated emission for the EUT is 94.8dB μ V/m at 3m in the frequency 2480MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -0.43dBm

which is within the production variation.

The minimum peak radiated emission for the EUT is 90.0dB μ V/m at 3m in the frequency 2402MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -5.23dBm

which is within the production variation.

The maximum conducted output power specified is 0.58dBm = 1.1mW

The source-based time-averaging conducted output power

= 1.1 * Duty factor mW (where Duty Factor \leq 1)

= 1.1 mW

The SAR Exclusion Threshold Level:

= 3.0 * (min. test separation distance, mm) / sqrt(freq. in GHz)

= 3.0 * 5 / sqrt (2.480) mW

= 9.53 mW

Since the source-based time-averaging conducted output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

For the simultaneous RF exposure:

When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$, for test separation distances ≤ 50 mm; where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

The maximum conducted output power specified of Bluetooth
 $= -2.42\text{dBm} + 3\text{dBi} = 0.58\text{dBm} = 1.1\text{mW}$

The estimated 1-g SAR value of the Bluetooth transmitter function
 $= [1.1\text{mW}/5\text{mm}] \cdot [2.48^{0.5}/7.5] \text{ W/kg}$
 $= 0.0462\text{W/kg}$

If the sum of ratios for all simultaneously transmitting antennas incorporated in a host device is less than 1, this device fulfills the simultaneous RF exposure of FCC requirement.

For E-field case:

$(\text{SAR value of Bluetooth/SAR limit}) + (\text{Maximum E-field value of WPT/E field limit})^2 = (0.0462/1.6) + (4.5/614)^2 \approx 0.0289 < 1$

For H-field case:

$(\text{SAR value of Bluetooth/SAR limit}) + (\text{Maximum H-field value of WPT/H field limit})^2 = (0.0462/1.6) + (0.463/1.63)^2 \approx 0.1096 < 1$

Note: A separation distance of 20 cm between the user and the Antenna should be maintained.