

INTERTEK TESTING SERVICES

RF Exposure

The Equipment Under Test (EUT) is a Heart rate Armband with Bluetooth and ANT+ function operating in 2402-2480MHz. The Bluetooth and ANT+ transmitters share one antenna. The EUT is powered by DC 3.7V by rechargeable battery. For more detail information pls. refer to the user manual.

Standalone SAR evaluation for ANT+ function:

Antenna Type: Integral antenna.

Antenna Gain: 0.0dBi.

Modulation Type: GFSK

The nominal conducted output power specified: -10.0dBm (± 1 dB)

The nominal radiated output power (e.i.r.p) specified: -10.0dBm (± 1 dB)

According to the KDB 447498:

The maximum peak radiated emission for the EUT is 85.5dB μ V/m at 3m in the frequency 2457MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -9.73dBm

which is within the production variation.

The maximum conducted output power specified is -9.0dBm = 0.13mW

The source- based time-averaging conducted output power

= 0.13 * Duty factor mW (where Duty Factor ≤ 1)

= 0.13mW

The SAR Exclusion Threshold Level:

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

= 3.0 * 5 / sqrt(2.457) mW

= 9.57 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.

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Standalone SAR evaluation for Bluetooth function

Antenna Type: Integral Antenna.

Antenna Gain: 0.0dBi.

Modulation Type: GFSK.

The nominal conducted output power specified: 0.0dBm (Tolerance: ± 1.0 dB).

The nominal radiated output power (e.i.r.p) specified: 0.0dBm (Tolerance: ± 1.0 dB)

The maximum conducted output power for the EUT is 0.15dBm in the frequency 2402MHz(stand-alone mode) which is within the production variation.

The minimum conducted output power for the EUT is -0.36dBm in the frequency 2480MHz(Simultaneous transmission) which is within the production variation.

The maximum conducted output power specified is 1.0dBm = 1.26mW

The source- based time-averaging conducted output power

= 1.26 * Duty factor mW (where Duty Factor ≤ 1)

= 1.26mW

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.

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Simultaneous Transmission SAR Evaluation

According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

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

ANT+ SAR Estimation

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	x	SAR(1g) W/kg
-9.0	0.13	5	2.457	7.5	0.005

Bluetooth SAR Estimation

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	x	SAR(1g) W/kg
1.0	1.26	5	2.480	7.5	0.053

The sum of 1-g SAR of all simultaneously transmitting antennas

Bluetooth	ANT+	Summed SAR(1g) W/kg	SAR(1g) Limit W/kg
Max. Scaled SAR(1g) W/kg	Max. Scaled SAR(1g) W/kg		
0.053	0.005	0.058	1.6

Since the sum of 1-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, the EUT is considered to satisfy Simultaneous transmission SAR test exclusion.