

## RF EXPOSURE EVALUATION

### EUT Specification

<b>EUT</b>	HUB
<b>Model Name</b>	HUB-N, HUB-X (X represents the N, C, S, F, etc.)
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> 2.402GHz ~ 2.480GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others(2427-2457MHz)
<b>Device category</b>	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others _____
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	For 2.4G: 81.98dBuV/m (-13.28dBm)(0.047mW) For BLE: -3.92dBm(0.406mW)
<b>Antenna gain</b>	3.5dBi
<b>Evaluation applied</b>	<input type="checkbox"/> MPE Evaluation <input checked="" type="checkbox"/> SAR Evaluation

### Standard Requirement

#### Portable Device

According to §15.247(i) and §1.1307b(1), 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. See KDB 447498 D01 General RF Exposure Guidance v05, section 4.3.1.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR,}^{16}$  where

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation<sup>17</sup>
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.

## Measurement Result

**For 2.4G:**

Channel Frequency (MHz)	Max Output power (dB $\mu$ V/m)	Max Output power (dBm)	Max Output power (mW)	Calculation Value (Note 1)	Threshold Value
2427	81.85	-13.41	0.046	0.014	3.0
2443	81.56	-13.70	0.043	0.013	3.0
2457	81.98	-13.28	0.047	0.015	3.0

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB $\mu$ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

$$\text{EIRP} = E - 104.8 + 20\log D = 81.98 - 104.8 + 20\log 3 = -13.28 \text{ dBm}$$

Note 1: Calculation Value = [(max. power of channel, mW)/(min. test separation distance, mm)]  $\cdot$  [ $\sqrt{f(\text{GHz})}$ ].  
For example:  $0.047/5 \cdot \sqrt{2.457} = 0.015 \leq 3.0$

**For BLE:**

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Output power (mW)	Calculation Value (Note 1)	Threshold Value
<b>Test Mode: GFSK</b>						
Low	2402	-5.03	$\pm 0.5$	0.352	0.1091	3.0
Middle	2440	-3.92	$\pm 0.5$	0.455	0.1422	3.0
High	2480	-3.99	$\pm 0.5$	0.448	0.1411	3.0

Note 1: Calculation Value = [(max. power of channel, mW)/(min. test separation distance, mm)]  $\cdot$  [ $\sqrt{f(\text{GHz})}$ ].  
For example:  $0.455/5 \cdot \sqrt{2.44} = 0.1422 \leq 3.0$

**According to KDB447498 D01 V05, threshold at which no SAR required is  $\leq 3.0$  for 1-g SAR, separation distance is 5mm, and no SAR measurement is required.**

The SAR measurement is not necessary.