RF EXPOSURE EVALUATION

EUT Specification

EUT	Bestable
Frequency band (Operating)	⊠WLAN: 2.412GHz ~ 2.462GHz ⊠WLAN: 5.18GHz ~ 5.24GHz ⊠WLAN: 5.745GHz ~ 5825GHz ⊠Others(Bluetooth: 2.402GHz ~ 2.480GHz)
Device category	⊠Portable (<20cm separation) ☐Mobile (>20cm separation) ☐Others ___
Antenna diversity	⊠Single antenna ☐Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Max. output power	For BLE: 6.55dBm(4.52mW) For BT4.0+EDR: 3.33dBm(2.15mW) For 2.4G WIFI: 5.35dBm(3.43mW) For 5G: 6.06dBm(4.04mW)
Antenna gain	2dBi
Evaluation applied	☐MPE Evaluation ⊠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 ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

·f(GHz) is the RF channel transmit frequency in GHz
·Power and distance are rounded to the nearest mW and mm before calculation17
·The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 10 mm, a distance of 10 mm is applied to determine SAR test exclusion.

Measurement Result

Channel Frequency (MHz)	Max Output power (dBuV/m)	Max Output power (dBm)	Max Output power (mW)	Calculation Value (Note 1)	Threshold Value
For BT 4.0+EDR Worst case: GFSK					
2402	98.59	3.33	2.15	0.3336	3.0
2441	96.43	1.17	1.31	0.2045	3.0
2480	94.20	-1.06	0.78	0.1234	3.0
For BLE					
2402	101.81	6.55	4.52	0.7003	3.0
2440	99.57	4.31	2.70	0.4214	3.0
2480	97.41	2.15	1.64	0.2583	3.0

EIRP= E-104.8+20logD=101.81-104.8+20log3=**6.55**dBm

Note 1: Calculation Value =[(max. power of channel, mW)/(min. test separation distance, mm)] ·[√f(GHz)].
Fox example:4.52**/10*√2.402=0.7003 ≤ 3.0**

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Calculation Value (Note 1)	Threshold Value
IEEE 802.11b					
Low	2412	3.30	2.14	0.3320	3.0
Middle	2437	3.38	2.18	0.3400	3.0
High	2462	3.30	2.14	0.3355	3.0
IEEE 802.11g					
Low	2412	5.14	3.27	0.5072	3.0
Middle	2437	5.02	3.18	0.4959	3.0
High	2462	5.21	3.32	0.5208	3.0
IEEE 802.11n(HT20)					
Low	2412	4.90	3.09	0.4799	3.0
Middle	2437	4.71	2.96	0.4618	3.0
High	2462	5.35	3.43	0.5378	3.0

Note 1: Calculation Value =[(max. power of channel, mW)/(min. test separation distance, mm)] ·[√f(GHz)].
Fox example: 3.43/10 *√2.462 =0.5378 ≤ 3.0

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Calculation Value (Note 1)	Threshold Value
U-NII-1 802.11a					
Low	5180	6.06	4.04	0.9187	3.0
Middle	5200	5.28	3.37	0.7690	3.0
High	5240	5.63	3.66	0.8369	3.0
U-NII-1 802.11n(HT20)					
Low	5180	5.07	3.21	0.7314	3.0
Middle	5200	4.46	2.79	0.6367	3.0
High	5240	5.02	3.18	0.7272	3.0
U-NII-1 802.11n(HT40)					
Low	5190	3.86	2.43	0.5541	3.0
High	5230	3.70	2.34	0.5361	3.0
U-NII-1 802.11ac(HT20)					
Low	5180	4.83	3.04	0.6921	3.0
Middle	5200	4.78	3.01	0.6854	3.0
High	5240	5.03	3.18	0.7289	3.0
U-NII-1 802.11ac(HT40)					
Low	5190	3.79	2.39	0.5452	3.0
High	5230	3.88	2.44	0.5588	3.0
U-NII-1 802.11ac(HT80)					
Low	5210	3.56	2.27	0.5181	3.0

Note 1: Calculation Value =[(max. power of channel, mW)/(min. test separation distance, mm)] ·[$\sqrt{f(GHz)}$].
Fox example: 4.04/10 *$\sqrt{5.180}$ =0.9187 ≤ 3.0

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Max Output power (mW)	Calculation Value [Note 1]	Threshold Value
U-NII-3 802.11a					
Low	5745	5.88	3.87	0.9282	3.0
Middle	5785	4.44	2.78	0.6686	3.0
High	5825	4.03	2.53	0.6104	3.0
U-NII-3 802.11n(HT20)					
Low	5745	4.73	2.97	0.7123	3.0
Middle	5785	4.16	2.61	0.6268	3.0
High	5825	3.60	2.30	0.5529	3.0
U-NII-3 802.11n(HT40)					
Low	5755	3.73	2.36	0.5663	3.0
High	5795	2.99	1.99	0.4792	3.0
U-NII-3 802.11ac(HT20)					
Low	5745	5.14	3.27	0.7828	3.0
Middle	5785	4.41	2.76	0.6640	3.0
High	5825	3.63	2.31	0.5567	3.0
U-NII-3 802.11ac(HT40)					
Low	5755	3.68	2.33	0.5598	3.0
High	5795	2.81	1.91	0.4598	3.0
U-NII-3 802.11ac(HT80)					
Low	5775	3.49	3.78	0.9084	3.0

Note 1: Calculation Value =[(max. power of channel, mW)/(min. test separation distance, mm)] ·[$\sqrt{f(GHz)}$].
Fox example: $3.87/10 * \sqrt{5.745} = 0.9282 \leq 3.0$

When bluetooth and WIFI work together:

The worst case:

Calculation Value (Note 1) For Bluetooth	Calculation Value (Note 1) For WIFI	Calculation Value (Note 1) Total	Threshold Value
0.7003	0.9282	1.6285	3

According to KDB447498 D01 V06, threshold at which no SAR required is ≤3.0 for 1-g SAR, separation distance is 5mm, and no simultaneous SAR measurement is required.