

**RF EXPOSURE EVALUATION METHOD**

**FCC ID: 2AKQQ-BSW042**

**Applicable standard:**

In accordance with FCC 47 CFR part 2 (2.1093) this device has been defined as a portable device which is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

Portable devices must be evaluated using the specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEEC95.1-1992. and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

Per FCC KDB 447498 D01 v06, 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:

**SAR Test Exclusion Thresholds for 100 MHz - 6 GHz and  $\leq 50$  mm**

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

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:

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

Power and distance are rounded to the nearest mW and mm before calculation

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.

b) 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:36

1)  $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x] \text{ W/kg}$ , for test separation distances  $\leq 50 \text{ mm}$ ;

where  $x = 7.5$  for 1-g SAR and  $x = 18.75$  for 10-g SAR.

2)  $0.4 \text{ W/kg}$  for 1-g SAR and  $1.0 \text{ W/kg}$  for 10-g SAR, when the test separation distance is  $>50 \text{ mm}$ .

#### BT-EDR

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	-2.65	21
GFSK	Middle	-3	21
GFSK	High	-3.88	21
$\pi/4$ DQPSK	Low	-1.88	21
$\pi/4$ DQPSK	Middle	-2.4	21
$\pi/4$ DQPSK	High	-3.26	21
8DPSK	Low	-1.35	21
8DPSK	Middle	-1.76	21
8DPSK	High	-2.52	21

max possible output power (PK,conducted):  $-1 \pm 1 \text{ dBm}$

0dBi logarithmic terms convert to numeric result is nearly 1

0dBm=1mW

2402MHz

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation}$

$\text{distance, mm})] * [\sqrt{f(\text{GHz})}/7.5] = (1/5) * (\sqrt{2.402}/7.5) = 0.041 < 3$

2441MHz

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f(\text{GHz})/7.5}$ ]= (1/5)\*( $\sqrt{2.441/7.5}$ )=0.042 < 3

2480MHz

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f(\text{GHz})/7.5}$ ]= (1/5)\*( $\sqrt{2.480/7.5}$ )=0.042 < 3

**BLE**

	Frequency	Maximum Conducted Output Power(PK)	Conducted Output Power Limit
	(MHz)	(dBm)	dBm
GFSK 1Mbps	2402	-2.55	30
	2440	-2.4	30
	2480	-2.3	30
GFSK 2Mbps	2402	-2.54	30
	2440	-2.36	30
	2480	-2.35	30

max possible output power (PK,conducted):  $-2 \pm 1$  dBm

0dBi logarithmic terms convert to numeric result is nearly 1

-1dBm=0.79mW

2402MHz

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f(\text{GHz})/7.5}$ ] = (0.79/5)\*( $\sqrt{2.402/7.5}$ )=0.033 < 3

2440MHz

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f(\text{GHz})/7.5}$ ] = (0.79/5)\*( $\sqrt{2.440/7.5}$ )=0.033 < 3

2480MHz

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f(\text{GHz})/7.5}$ ] = (0.79/5)\*( $\sqrt{2.480/7.5}$ )=0.033 < 3

**For the Max simultaneous transmission:**

Evaluation mode	Result calculation	Total Result calculation	SAR Exclusion threshold	Result
BLE	0.033	0.075	3	Pass
BT(EDR)	0.042			

**Conclusion:**

For the max result : 0.075 < 3, the SAR testing is not required.