

# RF Exposure Evaluation

## REQUIREMENT

KDB447498 D01 General RF Exposure Guidance v06, Clause 4.3.1(a)

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$

Where

-f(GHz) is the RF channel transmit frequency in GHz

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

-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 according to 4.1 f) is applied to determine SAR test exclusion.

## TEST RESULT

**Passed**

**Not Applicable**

### For BT

According to RF test report, the results are as follow:

Type	Channel (GHz)	Output power (dBm)	Tune-up tolerance (dB)	Tune-up power (dBm)	Max output Power (mW)	Test Distance (mm)	Test data	Limit	Result
BT4.0+EDR GFSK	2.402	2.25	1.00	3.25	2.11	5.00	0.66	<3	Pass
	2.441	2.25	1.00	3.25	2.11	5.00	0.66		
	2.480	2.25	1.00	3.25	2.11	5.00	0.67		
BT4.0+EDR $\pi$ /4DQPSK	2.402	2.25	1.00	3.25	2.11	5.00	0.66	<3	Pass
	2.441	2.25	1.00	3.25	2.11	5.00	0.66		
	2.480	2.25	1.00	3.25	2.11	5.00	0.67		
BT4.0+EDR 8DPSK	2.402	2.25	1.00	3.25	2.11	5.00	0.66	<3	Pass
	2.441	2.25	1.00	3.25	2.11	5.00	0.66		
	2.480	2.25	1.00	3.25	2.11	5.00	0.67		
BT4.0+BLE GFSK	2.402	1.50	1.00	2.50	1.78	5.00	0.55	<3	Pass
	2.440	4.50	1.00	5.50	3.55	5.00	1.11		
	2.480	2.50	1.00	3.50	2.24	5.00	0.71		

Note:

Tune-up tolerance=1.0dB, Max Output power = Tune-up power + Tune-up tolerance.

**For PTT**

According to KDB 447498 D01, no SAR required if power is lower than the flowing threshold:

**Step 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:

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

$$[\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation<sup>25</sup>
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

**Step 2:** At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B

a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz

b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤6 GHz

MHz	5	10	15	20	25
150	39	77	116	155	194
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

MHz	30	35	40	45	50
150	232	271	310	349	387
300	164	192	219	246	274
450	134	157	179	201	224
835	98	115	131	148	164
900	95	111	126	142	158
1500	73	86	98	110	122
1900	65	76	87	98	109
2450	57	67	77	86	96
3600	47	55	63	71	79
5200	39	46	53	59	66
5400	39	45	52	58	65
5800	37	44	50	56	62

## Conclusion

Tun up 200Mw (23.01 dBm) < 224 mW (at 50mm),so the Standalone 1-g head SAR evaluation by measurement is not required



Ant to head is exceed 50mm



**P1281 is actually 12N force with 172mm(max.distance&worst case) head width.**

Note :It is one product, no other mechanical or electrical alternatives. It is a CE PPE product under EN352-1, 6, 8 and is 100% tested in production. Factory is ISO9000 certified.

## Simultaneous Transmission analysis

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is  $\leq 1.0$ . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or

numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

No.	Simultaneous Transmission Configurations	Head	Note
1	PTT + Bluetooth	Yes	

**Conclusion:**

**BT**

Bluetooth	Exposure position	Head
Max power	Test separation	0mm
5.50 dBm	Estimated SAR (W/kg)	0.15 W/kg

**PTT**

PTT	Exposure position	Head
Max power	Test separation	50mm
23.01 dBm	Estimated SAR (W/kg)	0.36 W/kg

**Sum of the MPE ratios =  $0.15 \text{ W/kg} / 1.60 \text{ W/kg} + 0.36 \text{ W/kg} / 1.60 \text{ W/kg} = 0.318 < 1.0$**