

1 EXPOSURE EVALUATION OF PORTABLE OR MOBILE DEVICES

Human exposure to RF emissions from portable devices (47 CFR §2.1093), as defined by the FCC, must be evaluated with respect to the FCC-adopted limits for SAR. Evaluation of mobile devices, as defined by the FCC, may also be performed with respect to SAR limits, but in such cases it is usually simpler and more cost-effective to evaluate compliance with respect to field strength or power density limits. For certain devices that are designed to be used in both mobile and portable configurations similar to those described in 47 CFR §2.1091(d)(4), such as certain desktop phones and wireless modem modules, compliance for mobile configurations is also satisfied when the same device is evaluated for SAR compliance in portable configurations.

1.1 SAR TEST EXCLUSION THRESHOLD FOR 100MHz to 6GHz and ≤ 50mm

Frequency (MHz)	5	10	15	20	25	Separation distance (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 ≤ 50 mm are determined by

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

- $f(\text{GHz})$ 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 ≤ 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

1.2 EVALUATION RESULTS

Maximum Conducted Output Power Result					
Condition		RF Output Power (dBm)			
Modulation Mode	Freq. (MHz)	Peak Power (dBm)	Average Power (dBm)	Average Power (mW)	Antenna Gain (dBi)
BT-LE	2402	0.42	0.15	1.04	2
BT-LE	2440	0.05	-0.24	0.95	2
BT-LE	2480	-0.46	-0.76	0.84	2

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{\text{min. test separation distance, mm}} \right] * [\sqrt{f(\text{GHz})}]$$

$$= 1.04 / 5 * \sqrt{2.402} = 0.322 < 3.0$$

SAR Test Exclusion Thresholds is < 10mW and 3.0 for separation distance 5mm. Therefore, SAR test is not required.