

MPE Evaluation

FCC ID: 2A88A-MK16

Applicable Standard

KDB447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 MPE-Base Exemption:

An alternative to the SAR-based exemption is provided in clause 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 KHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP(watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in clause 1. 1310(e)(1).

Tabel 1-Thresholds For Single Rf Sources Subject To Routine Environmental Evaluation

RF Source Frequency		Minimum Distance			Threshold ERP	
f_L MHz	f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$		W
0.3	—	1.34	159 m	—	35.6 m	1,920 R^2
1.34	—	30	35.6 m	—	1.6 m	3,450 R^2/f^2
30	—	300	1.6 m	—	159 mm	3.83 R^2
300	—	1,500	159 mm	—	31.8 mm	0.0128 R^2f
1,500	—	100,000	31.8 mm	—	0.5 mm	19.2 R^2

Subscripts L and H are low and high; λ is wavelength.
 From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

Note: The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates the ERP (watts) is no more than the calculated value prescribed for that frequency

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20\ cm}(d/20\ cm)^x & d \leq 20\ cm \\ ERP_{20\ cm} & 20\ cm < d \leq 40\ cm \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20\ cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm} \text{ (mW)} = \begin{cases} 2040f & 0.3\ GHz \leq f < 1.5\ GHz \\ 3060 & 1.5\ GHz \leq f \leq 6\ GHz \end{cases}$$

TRF No. FCC RF Exposure R2

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Note: f is in GHz, d is the separation distance (cm)

TEST RESULT

 Passed

 Not Applicable

MK16A / BLE

Test mode	Channel Frequency (MHz)	Max. Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain		ERP		Evaluation distance cm	Exemption Limit (mW)
					(dBi)	(dBd)	dBm	mw		
BLE1M/2M	2440	6.9	6±1	7	0.29	-1.86	7	5.01	20	768

MK16B / BLE

Test mode	Channel Frequency (MHz)	Max. Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain		ERP		Evaluation distance cm	Exemption Limit (mW)
					(dBi)	(dBd)	dBm	mw		
BLE1M/2M	2440	6.9	6±1	7	4.42	2.27	9.17	8.26	20	768

Note:

- The tune-up power was declared by the applicant
- limit=19.2*0.2²=0.768W=768mW
- dBi=dBd+2.15
- The maximum antenna gain value of the MK16A is 0.29dBi.
- The maximum antenna gain value of the MK16B is 4.42dBi.
- To maintain compliance with the RF exposure guidelines, place the equipment at least 20cm from nearby persons

Result:Compliant

--THE END--