

FCC §1.1307 (b) – RF EXPOSURE

Applicable Standard

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 - MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 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 § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

f = frequency in MHz;

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

Test Result

For worst case:

Mode	Frequency Range (MHz)	Tune-up Output Power		Antenna Gain		ERP		Evaluation Distance (cm)	MPE-Based Exemption Limit (mW)
		(dBm)	(mW)	(dBi)	(dBd)	(dBm)	(mW)		
Lora	903.9-908.3	14.0	25.12	-0.7	-2.85	11.15	13.03	20	462.8
FSK	903.9-908.3	14.0	25.12	-0.7	-2.85	11.15	13.03	20	462.8
BLE	2402-2480	3.0	2.0	-4.3	-6.45	-3.45	0.45	20	768
UWB	4493-6490	-0.8	0.83	0.8	-1.35	-2.15	0.61	20	768

Note 1: The tune-up power was declared by the applicant.

Note 2: 0dBd=2.15dBi.

Note 3: The tune-up power of Lora and FSK, please refer to report number: 12522-FCC-IC-1 for the module (model: WM205X, FCC ID: 2ARZVWM).

Note 4: The tune-up power of BLE and UWB, please refer to report number: SZNS211102-56246E-RFA and SZNS211102-56246E-RF-00 for the Module (model: UM-1, FCC ID:2ARZVUM-1).

Note 5: The BLE function and UWB function can not transmit at same time.

Note 6: The BLE antenna or UWB antenna can transmit at the same time with the Sub-GHz antenna.

Worst case for Simultaneous transmitting consideration:

The ratio= $MPE_{FSK}/limit + MPE_{BLE}/limit = 13.03/462.8 + 0.61/768 = 0.029 < 1.0$

Result: Compliant.