

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1093 Radiofrequency radiation exposure, portable devices

**RF Exposure Requirements:** §1.1307(b)(1) and §1.1307(b)(2): Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

**RF Radiation Exposure Limit:** §1.1310: As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

**§2.1093:** As specified in this section, a portable device is defined as a transmitting device designed to be used so that the radiated structure(s) of the device is within 20 centimeters of the body of the user.  
Calculations below are in accordance with KDB 447498 D01 General RF Exposure Guidance v06, Section 4.3 General SAR test exclusion guidance.  
The SAR test exclusion thresholds are 3.0 for 1-g SAR and 7.5 for 10-g extremity SAR.

#### 13.56 MHz SAR Exclusion Calculation

Per KDB 447498, Section 4.3.1 (c)(2), applicable for frequencies below 100 MHz and test separation distances  $\leq 50$  mm:

1. Using the information from 4.3.1 (b), the formula from 4.3.1 (a), and using the 1-g SAR limit of 3.0:  
*Power allowed at numeric threshold for 50 mm and 100 MHz in step 4.3.1 (a) =*

$$\left(\frac{3}{\sqrt{0.1}}\right) * 50 \text{ mm} = 474.34 \text{ mW}$$

2. Using information from 4.3.1 (c)(1) and the formula from 4.3.1 (b), defined at 50 mm and 100 MHz:

$$\left(\text{Power allowed at numeric threshold for 50 mm in step 4.3.1 (a)}\right) + \left(\text{test separation distance} - 50 \text{ mm}\right) * \left(\frac{f [\text{MHz}]}{150}\right)$$

$$(474.34 \text{ mW}) + (50 \text{ mm} - 50 \text{ mm}) * \left(\frac{100 \text{ MHz}}{150}\right) = 474.34 \text{ mW}$$

3. Using the information from 4.3.1 (c)(2) and the formula from 4.3.1 (c)(1), defined at 13.56 MHz, the final max power should be:

*Max Power of 13.56MHz Transmitter under the 1g SAR Limit =*

$$\frac{1}{2} * 474.34 \text{ mW} \left[1 + \log\left(\frac{100 \text{ MHz}}{13.56 \text{ MHz}}\right)\right] = 442.972 \text{ mW}$$

**Encoder**

FCC									
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Margin	Distance (cm)	Result
13.56	-72.718	0	1	1.259	0	1	1	20	Pass

**Film**

FCC									
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Margin	Distance (cm)	Result
13.56	-86.488	0	1	1.259	0	1	1	20	Pass

**Ribbon**

FCC									
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Margin	Distance (cm)	Result
13.56	-82.908	0	1	1.259	0	1	1	20	Pass