RF exposure evaluation

The Proximity Reader operating according to FCC part 15 subpart C section 15.209. The Proximity Reader operating at 125.65kHz that is a near field region. The radiated power within the 1-mW in the far-field region can be exempt and no evaluation is required according to §1.1307(b)(3)(i)(A).

Far-Field Region:

Power estimate via the far-field was described by the following equation:

$$P = 4\pi r^2 \frac{E^2}{Z_o}, where\ Z = 120\pi$$

Near-Field Region:

Power estimate via the near-field was described by the following equation:

$$P = 4\pi r^2 \frac{E^2}{Z_o} \times \frac{1}{2} \times \left(1 + \frac{{Z_o}^2}{{Z_w}^2}\right)$$

Where: Z_0 = free impedance in Far-Field region = 377Ω

$$Z_w = \frac{\text{measurement distance (m)}}{\frac{\lambda}{2\pi}} x\ 377\Omega$$

Table 0.1 Power calculation for Far-Field and Near-Field region

F,MHz	d, m	λ, m	λ/2π, m	E, dBμV/m	E, V/m*	Z_w, Ω	Near-field formula		Far-field formula	
							P, W	P, mW	P, W	P, mW
0.12565	300	2387.58456	380.00	25.6	0.000019	297.63	0.000001	0.001418	0.000001	0.001089

*The Field strength that was used for power calculation is a level specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

Based on the above, the limit presented in the 47CFR, section 15.209 may be excluded. All products that corresponding with the above limit can be considered complying with the RF exposure limitations.

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