5.3.   RF EXPOSURE REQUIRMENTS [§§ 15.247(i), 1.1310 & 2.1091]

5.3.1.   Limits

§ **1.1310:** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f^2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f^2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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5.3.2. Method of Measurements

Calculation Method of Power Density/RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where,   P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

5.3.3. RF Evaluation

5.3.3.1. Co-location (Evaluation Distance at 24 cm)

Pursuant to KDB 447498 D01 General RF Exposure Guidance v06, Section 7.2:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0, according to calculated/estimated, numerically modeled, or measured field strengths or power density.

Co-location will applies to EUT with 1.9 dBi typical antenna gain, worst case EIRP of 27.9 dBm will be used in co-location at the minimum 24 cm evaluation separation distance required by the operating configurations and exposure conditions of the host device.

The maximum calculated MPE ratio of the EUT with 1.9 dBi antenna gain

Frequency (MHz)	EUT EIRP (dBm)	EUT EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm^2)	FCC MPE Limit (mW/cm^2)	MPE Ratio
902.6	27.9	616.595	24	0.085	0.602	0.141

The maximum calculated MPE ratio for the EUT with 1.9 dBi dipole antenna is 0.141, this configuration can be co-located with other antennas provided the sum of the MPE ratios for all the other simultaneous transmitting antennas incorporated in a host device is ≤ 1.0 - 0.141 ≤ 0.859.

The following table addresses the co-location of the EUT with 1.9 dBi antenna and the specified radio module(s).

Co-location of EUT with 1.9 dBi antenna and radio module identified in this table

*Radio Module	Frequency (MHz)	EIRP (dBm)	EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm^2)	FCC MPE Limit (mW/cm^2)	MPE Ratio	MPE Ratio of EUT with 1.9 dBi antenna	Sum of MPE Ratios	Verdict
WP8548 Radio Module (FCC ID: N7NWP8, IC 2417C-WP8)	824	30.98	1253.141	24	0.173	0.549	0.315	0.141	0.456	Compliant

* The test data of the radio modules represented in this table is the worst-case configuration (maximum MPE ratio) derived from the original radio module(s) MPE report(s). Refer to the report(s) for details.

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