MPE Co-location Calculations

The maximum permissible RF exposure for an uncontrolled environment is specified in FCC 1.1310 table 1B.

From OET 65, $S = EIRP / 4\pi R^2$

       where:
       S = Power density (mw/cm^2)
       EIRP = Equivalent Isotropic Radiated Power
       R = 20 cm separation distance

Power density for Zwave FCC ID: YL6-143600T

The MPE limit for the above device operating at 908.4 MHz for uncontrolled environments is 0.6 mW/cm^2

EUT fundamental field strength at 908.4 MHz = 91.2 dBuV/m at 3 meters

S = 0.00008 mW/cm^2 = at 20 cm separation

Power density for Image Sensor FCC ID: YL6-143IS205V4

The MPE limit for the above device operating at 912 - 924 MHz for uncontrolled environments is 0.6 mW/cm2

EIRP = 16 mW

S = 0.0032 mW/cm^2 = at 20 cm separation

Power density for FCC ID: RI7HE910NA

The MPE limit for the above device operating at 824.2 MHz for uncontrolled environments is 0.6 mW/cm^2

Worst case conducted power for the low band is 1.648 W (from grant)

Maximum antenna gain for this frequency range of operation is 1.35 dBi / 1.37 numeric (Alarm.com antenna specification for this specific host)

S = 0.45 mW/cm^2 = at 20 cm separation

The MPE limit for the above device operating at 1850.2 - 1909.8 MHz for uncontrolled environments is 1 mW/cm^2

Worst case conducted power for this band is 0.793 W (from grant)

Maximum antenna gain for this frequency range of operation is 5.64 dBi / 3.66 numeric (Alarm.com antenna specification for this specific host)

S = 0.58 mW/cm^2 = at 20 cm separation

Co-location Case #1 - Summary of MPE FCC ID: YL6-143600T + YL6-143IS205V4 + RI7HE910NA

Frequency (MHz)	MPE Result (mW/cm^2)	Limit (mW/cm^2)
908.4	0.00008	0.6
912 - 924	0.0032	0.6
1850.2 – 1909.8	0.58	1

MPE (1)	MPE (2)	MPE (3)	MPE Power Density Aggregate MPE(1) + MPE(2) + MPE(3) < 0.6 (mW/cm^2)	Power Density Limit (mW/cm^2)
908.4 MHz	912 - 924 MHz	1850.2 – 1909.8 MHz		
0.00008	0.0032	0.58	0.5833	0.6

* only showing upper band for RI7HE910NA since it represents worst case

Thus, the EUT meets the uncontrolled exposure limit at 20 cm when all transmitters are transmitting simultaneously.

Power density for FCC ID: RI7CE910-DUAL

The MPE limit for the above device operating at 824.7 MHz for uncontrolled environments is 0.6 mW/cm^2

Conducted power for the low band is 0.292 W (from grant)

Maximum antenna gain for this frequency range of operation is 1.35 dBi / 1.37 numeric (Alarm.com antenna specification for this specific host)

S = 0.08 mW/cm^2 = at 20 cm separation

The MPE limit for the above device operating at 1851.25 - 1908.75 MHz for uncontrolled environments is 1 mW/cm^2

Conducted power for this band is 0.278 W (from grant)

Maximum antenna gain for this frequency range of operation is 5.64 dBi / 3.66 numeric (Alarm.com antenna specification for this specific host)

S = 0.20 mW/cm^2 = at 20 cm separation

Co-location Case #2 - Summary of MPE FCC ID: YL6-143600T + YL6-143IS205V4 + RI7CE910-DUAL

Frequency (MHz)	MPE Result (mW/cm^2)	Limit (mW/cm^2)
908.4	0.00008	0.6
912 - 924	0.0032	0.6
1851.25 – 1908.75	0.20	1

MPE (1)	MPE (2)	MPE (3)	MPE Power Density Aggregate MPE(1) + MPE(2) + MPE(3) < 0.6 (mW/cm^2)	Power Density Limit (mW/cm^2)
908.4 MHz	912 - 924 MHz	1851.25 – 1908.75 MHz		
0.00008	0.0032	0.20	0.2033	0.6

* only showing upper band for RI7CE910-DUAL since it represents worst case

Thus, the EUT meets the uncontrolled exposure limit at 20 cm when all transmitters are transmitting simultaneously.