Appendix A: RF Exposure Compliance FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093; ISED RSS-102 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

General Information

Environment: General Population/Uncontrolled Exposure
Device category: Level Probing Radar
Modulation Type/Mode: Pulsed Radar

List of Antennas, Operating Configurations and Test Conditions

FCC 15.256 Antennas	Antenna Gain (dBi)
Dielectric Lens Patch Array	27.0
Patch Array	19.0

The maximum permissible RF exposure for a controlled environment is specified in FCC 1.1310 Table 1A.

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

For the above device operating at 77-81 GHz or 24.125 GHz, the MPE limit for a controlled environment is 5 mW/cm^2 and the MPE limit for an uncontrolled environment is 1 mW/cm^2.

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RSS-102 §5.3.2

From Table 7: 15000-150000 MHz; Uncontrolled environment 10 W/m^2 or 1 mW/cm^2.

From Table 8: 15000-150000 MHz; Controlled environment 50 W/m^2 or 5 mW/cm^2.

Power Density for Surface Velocity Sensor (24.125 GHz)

1. The Surface Velocity Sensor (SVS) fundamental field strength = 115.4 dBuV/m at 3 meters = 20.2 dBm.
2. The maximum antenna gain for this frequency range of operation is 19 dBi / 79.4 numeric.
3. The EIRP + 1 dB tune-up tolerance = 21.2 dBm = 131.8 mW.
4. S = 0.03 mW/cm^2 = at 20 cm separation.

Power Density for Radar Level Sensor (77-81 GHz)

1. The Level Sensor (LS) operational description power level = 15.8 dBm.
2. The maximum antenna gain for this frequency range of operation is 27 dBi / 501.2 numeric.
3. The EIRP + 1 dB tune-up tolerance = 16.8 dBm = 47.9 mW.
4. S = 0.0095 mW/cm^2 = at 20 cm separation.

Calculation of Co-Location MPE per Section 7.2 of KDB 447498 D01 General RF Exposure Guidance v06.

Co-location - Summary of MPE: Surface Velocity Sensor and Level Sensor

Transmitter	Frequency (GHz)	MPE Result (mW/cm^2)	Limit (mW/cm^2)	Ratio
Surface Velocity Sensor	24.125	0.03	**1.0**	0.03
Level Sensor	77-81	0.0095	**1.0**	0.0095
			Sum of Ratios	**0.0395**

Rounding up the sum of the ratios per FCC KDB policy, the sum of the ratios must be <1.

The sum of ratios = 0.04<1

Thus, the EUT meets the uncontrolled exposure limit at 20 cm when all transmitters transmit simultaneously and does **NOT** require MPE measurement.