

In the frequency range 40 to 240 GHz, spurious frequencies are measured as power densities. The EUT is operating with FMCW-modulation. The RBW and VBW are set to such a value that spurious power levels are clearly readable above the fundamental noise level of spectrum analyzer. The measurement distance is chosen to 0.125 m for detecting spurious emission signals.

#### 5. Measurements of maximum safe level for radiated power density

According to FCC § 1.1307, § 1.1310, § 2.1091 and § 2.1093 measurements are carried out in order to evaluate the impact of human exposure to RF radiation. For this test the EUT is in normal operation mode: FMCW. The measurement is performed at 6 different distances: 4 m, 2 m, 1 m, 0.5 m, 0.25 m, and 0.125 m.

The measurements are applicable only for far field conditions. The near field area extends to a distance of R (meters) and can be calculated from the following equation:

$$R < 2 * L^2 / \lambda$$

with R = distance in meters, L = largest dimension of either measuring horn or transmitting EUT antenna (L ≈ 0.07 m), and λ = wavelength in meters. In case of 76.5 GHz (λ = 0.0039 m), the far field theoretically starts at R = 2.5 m. However, it was shown by variation the test distance that measurements in a distance of 2.0 m provide accurate results.

The maximum peak power density PD in r = 3 m distance is determined as 1.16 μW/cm<sup>2</sup>.

$$\begin{aligned} \text{Peak Power (EIRP)} \quad \text{EIRP} &= \text{PD} * 4\pi * r^2 = \text{PD} * 1130973.4 \text{ cm}^2 \\ \text{EIRP} &= 1.32 \text{ W (see plot 1)} \end{aligned}$$

Limit of maximum ERP (EIRP) for frequencies above 1.5 GHz is 3 W (4.9W). See FCC § 2.1091 (eirp = erp + 2.15 dB, EIRP = ERP x 1.64).

RF Exposure for mobile conditions at r = 20 cm distance from EUT

$$\begin{aligned} \text{PD} &= \text{EIRP} / (4\pi * r^2) \\ \text{PD} &= 0.26 \text{ mW/cm}^2 = 2.6 \text{ W/m}^2 \end{aligned}$$

Limit of maximum permissible exposure (MPE) for uncontrolled environment: 1.0 mW/cm<sup>2</sup>. See FCC § 1.1310.