MPE Calculations for EmulationEngine Model: RCX-11ABG3

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The MPE calculation for this exposure is shown below.

For the 2.4 GHz band

The peak radiated output power (EIRP) is calculated as follows:

EIRP = P + G
EIRP = 21.40 dBm + 4.00 dBi
EIRP = 25.40 dBm (346.74 mW)

Where
P = Power input to the antenna (dBm) – worst case
G = Power gain of the antenna (dBi) – worst case

Power density at the specific separation:

$S = PG/(4R^2\Pi)$
$S = (138.04 \times 2.511) / (4 \times 20^2 \times \Pi)$
$S = 0.0690$ mW/cm^2

Where
S = Maximum power density (mW/cm^2)
P = Power input to the antenna (mW).
G = Numeric power gain of the antenna – worst case
R = Distance to the center of the radiation of the antenna (20 cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is 1mW/cm^2.

The power density at 20 cm does not exceed the 1mW/cm^2 limit. Therefore, the exposure condition is compliant with FCC rules.

The numeric gain (G) of the antenna with a gain specified in dB is determined by:
G = Log -1 (dB antenna gain/10)
G = Log -1 (4 dBi/10)
G = 2.511

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For the 5 GHz bands

The peak radiated output power (EIRP) is calculated as follows:

EIRP = P + G
EIRP = 23.72 dBm + 5.00 dBi
EIRP = 28.72 dBm (744.73 mW)

Where
P = Power input to the antenna (dBm) – worst case
G = Power gain of the antenna (dBi) – worst case

Power density at the specific separation:

$S = PG/(4R^2\Pi)$
$S = (235.50 \times 3.162) / (4 \times 20^2 \times \Pi)$
$S = 0.148$ mW/cm^2

Where
S = Maximum power density (mW/cm^2)
P = Power input to the antenna (mW).
G = Numeric power gain of the antenna – worst case
R = Distance to the center of the radiation of the antenna (20 cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is 1mW/cm^2.

The power density at 20 cm does not exceed the 1mW/cm^2 limit. Therefore, the exposure condition is compliant with FCC rules.

The numeric gain (G) of the antenna with a gain specified in dB is determined by:
G = Log -1 (dB antenna gain/10)
G = Log -1 (5 dBi/10)
G = 3.162