MAXIMUM PERMISSIBLE EXPOSURE FOR SUBPART C 2.4 GHz BAND

Calculations

EUT Power density at the specific separation:

$S_1 = PG_1/(4\,\pi\,R^2)$
$S_1 = (562.341 * 2.75) / (4 * \pi * 20^2)$
$S_1 = 0.307654$ mW/cm^2 (at 20 cm)
Limit = 1 mW/cm^2

Internal Approved Modals Power density at the specific separation:

$S_2 = PG_2/(4\,\pi\,R^2)$
$S_2 = (95.499 * 1.12) / (4 * \pi * 20^2)$
$S_2 = 0.021279$ mW/cm^2 (at 20 cm)
Limit = 1 mW/cm^2

$S_3 = PG_3/(4\,\pi\,R^2)$
$S_3 = (48.977 * 3.16) / (4 * \pi * 20^2)$
$S_3 = 0.030790$ mW/cm^2 (at 20 cm)
Limit = 1 mW/cm^2

Combine Power density at the specific separation:

$S_T = S_1 / LPD + S_2 / LPD + S_3 / LPD$
$S_T = (0.307654 / 1) + (0.021279 / 1) + (0.030790 / 1)$
$S_T = 0.359723$ mW/cm^2 (at 20 cm)
Limit = 1 mW/cm^2

Where

S_1 = DAC-0 Maximum power density (mW/cm^2)
S_2 = Zigbee Maximum power density (mW/cm^2)
S_3 = Zigbee (with 5 dBi antenna) Maximum power density (mW/cm^2)
S_T = Total Maximum power density (mW/cm^2)
P = Power input to the antenna (mW)
G_1 = DAC-0 Numeric power gain of the antenna
G_2 = Zigbee Numeric power gain of the antenna
G_3 = Zigbee (with 5 dBi antenna)Numeric power gain of the antenna
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE)
LPD = Limit of power density

The maximum permissible exposure (MPE) for the general population is 1 mW/cm2.

The power density at 20 cm does not exceed the 1 mW/cm2. 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:

G1 = Log-1 (dB antenna gain/10)
G1 = Log-1 (4.4 dBi/10)
G1 = 2.75

G2 = Log-1 (dB antenna gain/10)
G2 = Log-1 (.5 dBi/10)
G2 = 1.12

G3 = Log-1 (dB antenna gain/10)
G3 = Log-1 (5 dBi/10)
G3 = 3.16