MPE/SAR exclusion/RF Exposure Evaluation

Maximum Permissible Exposure to RF (MPE) CFR 15.247 (i), CFR 1.1310 (e)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density, **S** as per the respective limits in Table 1 below, at a distance, d, of 5 cm (Mobile condition) from the EUT.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE for 902 MHz – 928 MHz:

Limit: 0.607 mW/cm^2 @ 911MHz
Peak Power (dBm) = 29.99 dBm
Peak Power (Watts) = 0.998 W
Gain of Transmit Antenna = +4.7 dB_i = 2.95 numeric

d = Distance = 20 cm = 0.2 m

P= 15.64 mW, G = 6.2 dBi (4.16)

$S = (PG/ 4\pi d^2)$ = EIRP/4A = 0.998(2.95)/4*π*0.2*0.2
= 2.944/0.5030 = 5.85 W/m^2
= (5.8500 W/m^2) ($1m^2/W$) (0.1 mW/cm^2)
= 0.5850 mW/cm^2

which is << less than S = 0.607 mW/cm^2

RF Exposure Evaluation – IC

According to RSS-102, Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

At or above 300 MHz and below 6 GHz and the source-based time averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} \times f^{0.6834}$ in Watts (adjusted for tune up tolerance where applicable), where f= frequency in MHz

For 902-928 MHz band: Limit = $1.31 \times 10^{-2} \times 911^{0.6834} = 1.38$ (W/m^2)

EUT source-based time averaged (SBTA) = (output power + antenna gain * duty cycle)

Duty cycle = 33.44 mSec/100 mSec = 33.44%

SBTA= 29.99 dBm + 4.7 dBi * (0.33) = 11.45 dBm = 13.96 mW

P= 13.96 mW, G = 4.7 dBi (2.95)

$S = (PG/ 4\pi d^2)$ = EIRP/4A = 0.1396(2.95)/4*π*0.2*0.2
= 0.4118/0.5030 = 0.818 W/m^2

Which is less than S = 1.38 (W/m^2)

All calculations performed by:

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Signature: