

APPENDIX D – Maximum Permissible Exposure

RF Exposure Limit

According to RSS-102 Issue 5 : The criteria listed in the following table shall be used to evaluate the Environmental of human exposure to radio frequency (RF) radiation as specified in RSS-102 Issue 5.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (W/m ²)	Averaging Time (Minutes)
(A) Limits for occupational / Controlled Exposure				
48 - 100	49.33	0.1309	6.455	6
100 - 6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000 - 15000	137	0.364	50	6
(B) Limits for General Population / Uncontrolled Exposure				
48 - 300	22.06	0.05852	1.291	6
300 - 6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000 - 15000	61.4	0.163	10	6

f = Frequency (MHz)

Fries formula

Fries transmission formula : $P_d = (P_{out} * G) / (4 * \pi * r^2)$

$$r = \sqrt{((P_{out} * G) / 4 * \pi * P_d)}$$

Where

P_d = Power density in W/m²

P_{out} = Output power to antenna in W

G = Gain of antenna in linear scale

π = 3.1416

r = Distance between observation point center of the radiator in cm

P_d is the limit of MPE, $0.02619 f^{0.6834}$ W/m². If we know the Maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the Maximum distance r where the MPE limit is reached and Power density at prediction frequency.

Test Result :

The maximum antenna gain is **0.8 dBi or 2.0(Numeric).**

Maximum peak output power at antenna input terminal:	14.00 (dBm)
Maximum peak output power at antenna input terminal:	25.12 (mW)
Antenna gain(typical):	0.80 (dBi)
Maximum antenna gain:	1.20 (numeric)
Prediction distance:	20 (cm)
Prediction frequency:	2402 (MHz)
MPE limit for uncontrolled exposure at prediction frequency:	5.350805 (W/m ²)
<u>Power density at prediction frequency :</u>	<u>0.060080 (W/m²)</u>

Test result: PASS

*The MPE was calculated with maximum permitted output level add to positive power tolerance.
According to the operational description submitted by manufacturer, maximum permitted output power is 14.0 dBm including positive tolerance.*