

# APPENDIX D - Maximum Permissible Exposure

## **FCC RF Exposure Limit**

According to FCC 1.1310: 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 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency	Electric Field	Magnetic Field	<b>Power Density</b>	Averaging Time	
Range(MHz)	Strength(V/m)	Strength(A/m)	$(mW/cm^2)$	(Minutes)	
(A) Limits for occupational / Contral Exposure					
30 - 300	61.4	0.163	1	6	
300 - 1500			F/300	6	
1500 - 100000			5	6	
(B) Limits for General Population / Uncontrolled Exposure					
30 - 300	27.5	0.073	0.2	30	
300 - 1500			F/1500	30	
1500 - 100000			1	30	

F = Frequency (MHz)

#### Fries formula

Fries transmission formula : Pd = (Pout \* G) / (4 \*  $\pi$ \*  $r^2$ )

 $r = \sqrt{((Pout * G) / 4 * \pi * Pd))}$ 

Where

Pd = Power density in mW/cm²

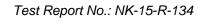
Pout = Output power to antenna in mW

G = Gain of antenna in linear scale

 $\pi$ = 3.1416

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

Pd is the limit of MPE, <u>0.61 mW/cm²</u>. 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.



FCC and IC Certification



Test Result:

## 900 MHz band

The maximum antenna gain is 3.4 dBi.

Maximum peak output power at antenna input terminal:	-2.50 (dBm)
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Maximum peak output power at antenna input terminal: 0.56 (mW)

Antenna gain(typical): 3.40 (dBi)

Maximum antenna gain: 2.19 (numeric)

Prediction distance: 20 (cm)

Prediction frequency: 916 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 0.61 (mW/cm^2)

Maximum allowable antenna gain: 37.37 (dBi)

Minimum Distance: 0.40 (cm)

<u>Power density at prediction frequency: 0.000245 (mW/cm^2)</u>

Test result: PASS

# Note(s)

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 <u>-4.0 dBm</u> and positive tolerance is <u>1.5 dB</u>.

SmartThings, Inc.