

FCC ID: 2AJ9T-20703

RF EXPOSURE EVALUATION

According to KDB 447498 D01 V06 and FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in part 2.1091

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)
(i) LIMITS FOR OCCUPATIONAL/CONTROLLED EXPOSURE				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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.*

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

Where

P_d = Power density in mW/cm²

P_{out} =output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π =3.1416

R = distance between observation point and center of the radiator in cm

Under the limit of MPE, $1\text{mW}/\text{cm}^2$, If we know the maximum gain of the antenna total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

RF Exposure Information: The radiated output power of this device meets the limits of FCC/IC radio frequency exposure limits. This device should be operated with a minimum separation distance of 20cm (8 inches) between the equipment and a person's body.

11.2 Measurement Result

Wifi 2.4G Test Mode 11N20 Transmit Power Max: 15.90dBm
Antenna gain: 3.13dBi

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
15.90	15 to 16	16	2.06	0.01628	1

RFID 125KHz, Antenna Gain: 0dBi

Transmit Frequency (KHz)	Mode	H-field Level@3m (dBuV/m)	H-field Level@3m (V/m)	Field intensity limited V/m
125K	ASK	57.22	0.000726	614
NOTE 1: $V/m = 10^{\frac{dB\mu V/m - 120}{20}}$				

RFID 13.56MHz, Antenna Gain: 0dBi

Transmit Frequency (MHz)	Mode	H-field Level@3m (dBuV/m)	H-field Level@3m (V/m)	Field intensity limited V/m
13.56	ASK	44.33	0.00016	60.77
NOTE 1: Field intensity limited: $824/f(13.56\text{MHz}) = 60.77\text{ V/m}$				
NOTE 2: $V/m = 10^{\frac{dB\mu V/m - 120}{20}}$				

The imultaneous transmit:

Operating Band	The MPE ratio
WiFi 2.4G	0.01628
RFID 125KHz	0.0000012
RFID 13.56MHz	0.0000026

So the simultaneous transmitting antenna pairs as below:

WiFi 2.4G + RFID 125KHz + RFID 13.56MHz = 0.01628+0.0000012+0.0000026 =0.0162838

For the max result: $0.0162838 \leq 1.0$, No SAR is required.

*** End of Report ***