

FCC ID: EF400156

RF EXPOSURE EVALUATION

According to 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 §1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

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

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(20cm)

P_d the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

$mW = 10^{(dBm/10)}$

11.2 Measurement Result

Operation Frequency: ZIGBEE 2405MHz~2480MHz,
 Antenna Type: PCB antenna
 Antenna gain: 1.0dBi,
 R=20cm
 $mW=10^{(dBm/10)}$

Zigbee:

Channel Freq. (MHz)	modulation	conducted power (mW)	conducted 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)
2405	O-QPSK	4.10	6.126	6±1	7	1.26	0.001255	1
2440		4.06	6.082	6±1	7	1.26	0.001255	1
2480		4.04	6.069	6±1	7	1.26	0.001255	1

simultaneous emission

Power density Limits (mW/cm ²) Zigbee	Calculate Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
0.001255	0.001255	1

Conclusion:

For the max result : $0.001255 \leq 1.0$ for 1g SAR, No SAR is required.

Jason chen

Signature:

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NAME AND TITLE (Please print or type): Jason Chen/Manager

COMPANY (Please print or type): Shenzhen NTEK Testing Technology Co., Ltd./ 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street Bao'an District, Shenzhen P.R. China.