

## 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	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 Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

**MAX OUTPUT POWER**

Zigbee

Test Channel	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	LIMIT (dBm)	Verdict
<b>0.25Mbps</b>					
01	2405	Default	6.565	30	PASS
08	2440	Default	5.850	30	PASS
16	2480	Default	5.850	30	PASS

## Measurement Result

Operation Frequency: Zigbee: 2405-2480MHz

Power density limited:  $1\text{mW}/\text{cm}^2$

Antenna Type: Built-in Inverted F antenna

Antenna gain: 1dBi,

R=20cm

Zigbee:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2 )	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2405	O-QPSK	6.565	6±1	7	5.012	1.00	1.26	0.0013	1
2440		5.850	6±1	7	5.012	1.00	1.26	0.0013	1
2480		5.850	6±1	7	5.012	1.00	1.26	0.0013	1

### Conclusion:

For the max result :  $0.0013 \leq 1.0$  for Max Power Density, compliance RF exposure.

Jason chen

Signature:

Date: 2018-05-18

**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.