

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) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) 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 |
| (B) 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

MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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
BR+EDR**

| Test Channel | Frequency | Power Setting | Peak Output Power | LIMIT | Verdict |
|--------------|-----------|---------------|-------------------|-------|---------|
| | (MHz) | | (dBm) | (dBm) | |
| 1Mbps | | | | | |
| 0 | 2402 | Default | -3.76 | 30 | PASS |
| 39 | 2441 | Default | -3.56 | 30 | PASS |
| 78 | 2480 | Default | -3.95 | 30 | PASS |
| 2Mbps | | | | | |
| 0 | 2402 | Default | -2.69 | 20.97 | PASS |
| 39 | 2441 | Default | -2.45 | 20.97 | PASS |
| 78 | 2480 | Default | -2.88 | 20.97 | PASS |

BLE

| Test Channel | Frequency (MHz) | Power Setting | Peak Output Power (dBm) | LIMIT (dBm) | Verdict |
|--------------|-----------------|---------------|-------------------------|-------------|---------|
| 1Mbps | | | | | |
| 00 | 2402 | Default | -4.28 | 30 | PASS |
| 19 | 2440 | Default | -2.95 | 30 | PASS |
| 39 | 2480 | Default | -2.40 | 30 | PASS |

Measurement Result

Operation Frequency: BT: 2402-2480MHz

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

Antenna Type: PCB Antenna

Antenna gain: 0.5dBi,

R=20cm

BDR+EDR/BLE

| Channel Freq. (MHz) | modulation | conducted power (dBm) | Tune-up power (dBm) | Max | | Antenna | | Evaluation result (mW/cm ²) | Power density (mW/cm ²) |
|---------------------|------------|-----------------------|---------------------|---------------|-------|---------|---------|---|-------------------------------------|
| | | | | tune-up power | | Gain | | | |
| | | | | (dBm) | (mW) | (dBi) | Numeric | | |
| 2402 | GFSK | -3.76 | -3±1 | -2 | 0.631 | 0.50 | 1.12 | 0.0001 | 1 |
| 2441 | | -3.56 | -3±1 | -2 | 0.631 | 0.50 | 1.12 | 0.0001 | 1 |
| 2480 | | -3.95 | -3±1 | -2 | 0.631 | 0.50 | 1.12 | 0.0001 | 1 |
| 2402 | π/4-DQPSK | -2.69 | -2±1 | -1 | 0.794 | 0.50 | 1.12 | 0.0002 | 1 |
| 2441 | | -2.45 | -2±1 | -1 | 0.794 | 0.50 | 1.12 | 0.0002 | 1 |
| 2480 | | -2.88 | -2±1 | -1 | 0.794 | 0.50 | 1.12 | 0.0002 | 1 |
| 2402 | BLE | -4.28 | -3.3±1 | -2.3 | 0.589 | 0.50 | 1.12 | 0.0001 | 1 |
| 2440 | | -2.95 | -3.3±1 | -2.3 | 0.589 | 0.50 | 1.12 | 0.0001 | 1 |
| 2480 | | -2.4 | -3.3±1 | -2.3 | 0.589 | 0.50 | 1.12 | 0.0001 | 1 |

Conclusion:

For the max result : $0.0002 \leq 1.0$ for Max Power Density, compliance RF exposure..

Jason chen

Signature:

Date: 2019-7-14

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.