

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)


1.1 General Information

Client Information

Applicant: ACOUSTMAX INTERNATIONAL CO.,LTD
Address of applicant: Unit D16/F Cheuk Nang Plaza 250 Hennessy Road
WanchaiHongKong, HongKong, China.

Manufacturer: Monster, Inc.
Address of manufacturer: Nevada City, California.

General Description of EUT:

Product Name: ROCKIN' ROLLER 270 SPEAKER
Trade Name:  **MONSTER**[®]
Model No.: MNRR270
Adding Model(s): MNRR270-X, MNRR270C, MNRR270-EU
Rated Voltage: Power Port:AC120V/60Hz
Battery:DC12V
Battery Capacity: 9.0Ah
Software Version: V01
Hardware Version: RR270
FCC ID: 2AAIN-MNRR2702
Equipment Type: Mobile

| Technical Characteristics of EUT: | |
|-----------------------------------|----------------------|
| Bluetooth (BR/EDR mode) | |
| Bluetooth Version: | V5.0 (BR/EDR mode) |
| Frequency Range: | 2402-2480MHz |
| RF Output Power: | -3.25dBm (Conducted) |
| Data Rate: | 1Mbps, 2Mbps |
| Modulation: | GFSK, $\pi/4$ DQPSK |
| Quantity of Channels: | 79 |
| Channel Separation: | 1MHz |
| Type of Antenna: | PCB Antenna |
| Antenna Gain: | -0.58dBi |
| Bluetooth (BLE mode) | |
| Bluetooth Version: | V5.0 (BLE mode) |
| Frequency Range: | 2402-2480MHz |
| RF Output Power: | 2.83dBm (Conducted) |
| Data Rate: | 1Mbps |
| Modulation: | GFSK |

| | |
|-----------------------|-------------|
| Quantity of Channels: | 40 |
| Channel Separation: | 2MHz |
| Type of Antenna: | PCB Antenna |
| Antenna Gain: | -0.58dBi |

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

| Frequency range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Times E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|--|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842/f | 4.89/f | (900/f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | / | / | F/300 | 6 |
| 1500-100000 | / | / | 5 | 6 |

(b) Limits for General Population / Uncontrolled Exposure

| Frequency range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Times E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|--|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | F/1500 | 30 |
| 1500-100000 | / | / | 1 | 30 |

Note: f = frequency in MHz: * = Plane-wave equivalent power density

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

Bluetooth (BR/EDR mode):

Maximum Tune-Up output power: -3(dBm)

Maximum peak output power at antenna input terminal: 0.50 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2402 (MHz)

Antenna gain: -0.58 (dBi)

Directional gain (numeric gain): 0.87

The worst case is power density at prediction frequency at 20cm: 0.0001(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Bluetooth (BLE mode):

Maximum Tune-Up output power: 20(dBm)

Maximum peak output power at antenna input terminal: 2.00(mW)

Prediction distance: >20(cm)

Prediction frequency: 2402 (MHz)

Antenna gain: -0.58 (dBi)

Directional gain (numeric gain): 0.87

The worst case is power density at prediction frequency at 20cm: 0.0003(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Mode for Simultaneous Multi-band Transmission

Bluetooth (BR/EDR mode) + Bluetooth (BLE mode)

The worst case is power density at prediction frequency at 20cm: $0.0001+0.0003=0.0004(\text{mw}/\text{cm}^2)$

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Result: Pass