

INTERTEK TESTING SERVICES

RF Exposure report

The equipment under test (EUT) is a transmitter for a Beer Keg Weight Sensor model: OK-01 operating at 13.56MHz and 2.4 GHz band. The EUT is powered by a 3.6V Lithium battery. For more detail information pls. refer to the user manual.

For 13.56MHz

Modulation Type: Pulse modulation

The nominal radiated output power (e.r.p) specified: -31.15dBm (+/- 3dB)

The nominal radiated output power (e.i.r.p) specified: -29dBm (+/- 3dB)

Antenna Gain: 0dBi

Antenna Type: Integral antenna

The worst-case peak radiated emission for the EUT is 66.4dBμV/m at 3m in the frequency 13.56MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -28.83dBm

The ERP = EIRP – 2.15 = -30.98 dBm which is within the production variation.

According to FCC Part 2.1091, this unlicensed transmitting devices is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, According to the KDB 447498 and OET 65, the simple calculation as below:

The maximum radiated output power (e.i.r.p) specified is -26dBm = 0.0025mW.

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

$$= 0.0025 \text{ mW} / 4\pi R^2$$

$$= 0.0000005 \text{ mW/cm}^2$$

The MPE limit is $900/f^2 \text{ mWcm}^2 = 0.98 \text{ mWcm}^2$ for general population and uncontrolled exposure in the 13.56MHz according to FCC Part 1.1310. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

For 2.4GHz band:

Modulation Type: GFSK

The nominal radiated output power (e.i.r.p) specified: 4.0-18.0 dBm

Antenna Gain: 4.3dBi

Antenna Type: Integral antenna

The Maximum peak radiated emission for the EUT is 102.5dB μ V/m at 3m in the frequency 2410MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 7.3dBm

which is within the production variation.

The Minimum peak radiated emission for the EUT is 101.2dB μ V/m at 3m in the frequency 2475MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 6.0dBm

which is within the production variation.

According to FCC Part 2.1091, this unlicensed transmitting devices is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, According to the KDB 447498 and OET 65, the simple calculation as below:

The maximum radiated output power(e.i.r.p) =18.0 dBm = 63.1mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

$$= 63.1 \text{ mW} / 4\pi R^2$$

$$= 0.0125 \text{ mW/cm}^2$$

The MPE limit is 1.0 mWcm² for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1310. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

The following RF exposure statement is proposed to be included in the user manual:

“FCC RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”