

MPE Analysis Report

The Equipment-Under-Test (EUT) is a Video Monitor - Baby Unit. It contains 2.4GHz and 5GHz Wi-Fi, Bluetooth BLE and FHSS features. The EUT is powered by a 5V DC AC/DC adaptor.

For Maximum Permissible Exposure (MPE) evaluation of the unit, the maximum power density at 20 cm from this transmitter shall be less than the General Population / Uncontrolled MPE limit in OET Bulletin 65 and meet the requirement listed in KDB447498 D04 v01.

For the RF portions of the unit, the measured powers among all the measured channels were within its production tolerance. The maximum source-based time-averaging duty factor is 100%. From these data and its operating configuration, the exposed power density at a distance (R) of 20 cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

2.4GHz Wi-Fi Portion

Antenna Type: Internal, Integral antenna

Antenna Gain: 0dBi

Operating Mode	Nominal Power	Range of Peak Conducted Power
802.11b	21.88dBm	11dBm to 22dBm
802.11g	18.96dBm	11dBm to 22dBm
802.11n(HT20)	18.84dBm	11dBm to 22dBm
802.11ax(HE20)	17.90dBm	11dBm to 22dBm

5GHz Wi-Fi Portion

Antenna Type: Internal, Integral antenna

Antenna Gain: 0dBi

Operating Mode	Nominal Power	Range of Peak Conducted Power
802.11a	18.57dBm	11dBm to 22dBm
802.11n(HT20)	17.46dBm	11dBm to 22dBm
802.11ac(VHT20)	17.52dBm	11dBm to 22dBm
802.11ax(HE20)	17.47dBm	11dBm to 22dBm

Bluetooth BLE Portion

Antenna Type: Internal, integral

Antenna Gain: 0dBi

Nominal Conducted Power: 3.9dBm

Range of Peak Conducted Power: 0dBm to 10dBm

FHSS portion

Antenna Type: Internal, integral

Antenna Gain: 0dBi

Nominal Conducted Power: 17.70dBm

Range of Peak Conducted Power: 17dBm to 20dBm

For Maximum Permissible Exposure (MPE) evaluation of the EUT, the maximum power density at 20 cm from this mobile transmitter shall be less than the General Population / Uncontrolled MPE limit in OET Bulletin 65.

1) For the 2.4GHz Wi-Fi portion, maximum conducted power was 22dBm. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these 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:

The radiated power = 22dBm + 0dBi = 22dBm (158.49 mW)

The radiated (EIRP) source-based time-averaging output power
= (158.49 * 1) mW
= 158.49 mW

The power density at 20 cm from the antenna
= $EIRP / 4\pi R^2$
= 0.031531 mW cm⁻²

2) For the 5GHz Wi-Fi portion, maximum conducted power was 22dBm. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these 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:

The radiated power = 22dBm + 0dBi = 22dBm (158.49 mW)

The radiated (EIRP) source-based time-averaging output power
= (158.49 * 1) mW
= 158.49 mW

The power density at 20 cm from the antenna
= $EIRP / 4\pi R^2$
= 0.031531 mW cm⁻²

3) For the BLE portion, maximum conducted power was 10dBm. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these 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:

The radiated power = 10dBm + 0dBi = 10dBm (10 mW)

The radiated (EIRP) source-based time-averaging output power
= (10 * 1) mW
= 10 mW

The power density at 20 cm from the antenna
= $EIRP / 4\pi R^2$
= 0.001989 mW cm⁻²

4) For FHSS portion, maximum conducted power was 20 dBm. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these 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:

The radiated power = 20dBm + 0dBi = 20dBm (100 mW)

The radiated (EIRP) source-based time-averaging output power
= (100 * 1) mW
= 100 mW

The power density at 20 cm from the antenna
= EIRP / $4\pi R^2$
= 0.019894 mW cm⁻²

In the frequency range of 1,500 - 100,000MHz, the MPE limit is 1.0 mWcm⁻² for general population and uncontrolled exposure. 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 structures 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: To maintain compliance with the FCC’s RF exposure guidelines, place the unit at least 20cm from nearby persons.”

In addition, for this product with multiple transmitter and antenna

Case 1: 2.4GHz Wi-Fi portion, BLE portion and FHSS portion

Case 2: 5GHz Wi-Fi portion, BLE and FHSS portion,

the requirement of Simultaneous Transmission evaluation has also been considered and has complied with the following conditions of the worst case;

$$MPE1/Limit1 + MPE2/Limit2 + MPE3/Limit3 \leq 1$$

Thus,

$$\begin{array}{ccccccc} 0.001989 / 1 & + & 0.031531 / 1 & + & 0.019894 / 1 & = & 0.053414 \\ \text{BLE portion} & & \text{Wi-Fi portion} & & \text{FHSS portion} & & \end{array}$$

$$\begin{array}{ccccccc} 0.001989 / 1 & + & 0.031531 / 1 & + & 0.019894 / 1 & = & 0.053414 \\ \text{BLE portion} & & \text{Wi-Fi portion} & & \text{FHSS portion} & & \end{array}$$

It is concluded that no Simultaneous Transmission evaluation is required.