

RF Exposure

The equipment under test (EUT) is a EcoFlow Alternator Charger Plus 1000, EF-AC-001 with Bluetooth 5.3 BLE function operating in 2402-2480MHz 40 channels with 2MHz channel spacing and Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20/ax-VHT20, 11 channels with 5MHz channel spacing and 2422-2452MHz for 802.11n-HT40, 7 channels with 5MHz channel spacing. The EUT is powered by DC 12V, DC 24V, DC 60V from battery. For more detail information pls. refer to the user manual.

For Bluetooth function:

Bluetooth function Modulation Type: GFSK

Bluetooth Version: 5.3 BLE (Single Mode BLE only, support 1M and 2M)

Antenna Type: PCB antenna

Antenna Gain: 0.63dBi Max.

The nominal radiated output power (e.i.r.p) specified: 6.63dBm (tolerance: ± 2 dB).

The nominal conducted output power specified: 6dBm (tolerance: ± 2 dB).

The maximum conducted output power for the EUT is 7.86dBm in the frequency 2440MHz BLE 1M which is within the production variation.

The minimum conducted output power for the EUT is 4.87dBm in the frequency 2402MHz BLE 2M 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 source-based time averaged maximum radiated power = 6.63dBm+2dB= 8.63dBm = 7.29mW

The maximum ERP= 8.63dBm-2.15dB= 6.48dBm = 4.45mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The ERP Threshold is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. As the maximum ERP at 20cm from the transmitter is lower than the ERP Threshold, the compliance to the ERP Threshold can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

Note: EIRP is higher than ERP, thus EIRP is compared with the Exclusion Threshold.

For Wi-Fi function:

Wi-Fi function Modulation Type: BPSK, QPSK, 16QAM, 64QAM for OFDM; BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM for OFDMA; CCK, DQPSK, DBPSK for DSSS.

Antenna Type: PCB antenna

Antenna Gain: 0.63dBi Max.

The nominal radiated output power (e.i.r.p) specified: 15.63dBm (tolerance: ± 3 dB).

The nominal conducted output power specified: 15.0dBm (tolerance: ± 3 dB).

The maximum conducted power for the EUT is 17.56dBm in the frequency 2.412GHz 802.11g mode which is within the production variation.

The minimum conducted output power for the EUT is 12.26dBm in the frequency 2.437GHz 802.11ax-HE20 mode 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 source-based time averaged maximum radiated power = 15.63dBm+3dB= 18.63dBm = 72.95mW

The maximum ERP= 18.63dBm -2.15dB= 16.48dBm = 44.46mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The ERP Threshold is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. As the maximum ERP at 20cm from the transmitter is lower than the ERP Threshold, the compliance to the ERP Threshold can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

Note: EIRP is higher than ERP, thus EIRP is compared with the Exclusion Threshold.

Simultaneous Transmission:

EUT can't transmit simultaneously. (Bluetooth and Wi-Fi use a single antenna and do not support simultaneous transmission.)

The following RF exposure statement or similar sentence 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."