MPE Analysis Report

The Equipment-Under-Test (EUT) FLY12 is a Bicycle Light and Camera. The EUT contains a WIFI (b/g/n) and a Bluetooth 4.0 BLE modules. The video can be transferred via WIFI or micro USB port to Smartphone or PC. The Bluetooth connection is for the security between the EUT and the Smartphone. The EUT is powered by a 3.7V rechargeable battery which can be charged by the micro USB port. An iOS/Android apps installed in Smartphone can act as the remote control of the EUT. WIFI and BLE mode cannot be operated simultaneously.

For the WLAN (WiFi) module:
For 802.11b mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via direct-sequence spread spectrum (DSSS) modulation. Maximum bit rate can be up to 11Mbps. For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps. For 802.11n (HT20 with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels.

For Bluetooth 4.0 module:
For Bluetooth 4.0 BLE mode, it occupies a frequency range from 2402MHz to 2480MHz (40 channels with channel spacing of 2MHz). It transmits via GFSK modulation.

WiFi Module
Antenna Type: Internal, Integral
Antenna Gain: 1.05dBi

Operating mode	Nominal Conducted Power	Production Tolerance
802.11b	19.75 dBm	+/- 3dB
802.11g	23.77 dBm	+/- 3dB
802.11n (HT20)	23.10 dBm	+/- 3dB

Bluetooth Module
Antenna Type: Internal, Integral
Antenna Gain: 1.05dBi

Operating mode	Nominal Radiated Power	Production Tolerance

Bluetooth 4.0 BLE   92.0 dBμV/m at 3m   +/- 3dB

For Maximum Permissible Exposure (MPE) evaluation of the NODE 2, 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 WLAN (WiFi), maximum conducted power measured within its production tolerance was 23.77dBm (maximum). The antenna gain is 1.05 dBi = 1.27 (num gain) 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 conducted power = 26.77dBm (475.3mW)

   The radiated (EIRP) source-based time-averaging output power (with antenna gain)
   = (475.3 * 1 * 1.27) mW
   = 603.6 mW

   The power density at 20 cm from the antenna
   = EIRP / $4\pi R^2$
   = 0.12 mW cm-2

   2) For the Bluetooth 4.0 BLE, maximum field strength measured within its production tolerance was 95.0 dBμV/m (maximum). 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 = $(FS*D)^2$ / 30 = 0.95 mW

   The radiated (EIRP) source-based time-averaging output power
   = (0.95 * 1) mW
   = 0.95 mW

   The power density at 20 cm from the antenna
   = EIRP / $4\pi R^2$
   = 0.00019 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 product at least 20cm from nearby persons."