

# 1. RF Exposure Requirements

---

## 1.1 General Information

### Client Information

Applicant: SHENZHEN GIEC DIGITAL CO.,LTD  
Address of applicant: 1st&3rd Building,No.26 Puzai Road,Pingdi,Longgang District,Shenzhen, China

Manufacturer: SHENZHEN GIEC DIGITAL CO.,LTD  
Address of manufacturer: 1st&3rd Building,No.26 Puzai Road,Pingdi,Longgang District,Shenzhen, China

### General Description of EUT:

Product Name: Smart Camera  
Trade Name: /  
Model No.: GK-IPC2034  
Adding Model(s): GK-IPC2032, GK-IPC2033, GK-IPC2035, AD-CAM-OUT-WH-001  
Rated Voltage: DC 12V  
Battery Capacity: /  
Model: JYSY1501-1201000U  
Power Adapter: Input: 100-240V~50/60Hz 0.5A  
Output: 12.0V-1.0A 12.0W  
FCC ID: 2AHYK-GKIPC20AA  
Equipment Type: Mobile device

### Technical Characteristics of EUT:

#### Wi-Fi (5G)

Support Standards: 802.11a, 802.11n(HT20), 802.11n-HT40, 802.11ac-VHT20/40, 802.11ax-HE20/40  
Frequency Range: 5180-5240MHz, 5745-5825MHz  
Max. RF Output Power: Band 1: 16.83dBm (Conducted)  
Band 4: 14.48dBm (Conducted)  
Type of Modulation: QPSK, 16QAM, 64QAM, 256QAM  
Type of Antenna: PCB Antenna  
Antenna Gain: Band 1: 1.45dBi  
Band 4: 1.31dBi

#### Wi-Fi (2.4G)

Support Standards: 802.11b, 802.11g, 802.11n, 802.11ax  
Frequency Range: 2412-2462MHz for 802.11b/g/n/ax(HT/HE20)  
2422-2452MHz for 802.11n/ax(HT/HE40)  
RF Output Power: 16.78dBm (Conducted)  
Type of Modulation: CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM  
Quantity of Channels: 11 for 802.11b/g/n/ax(HT/HE20); 7 for 802.11n/ax(HT/HE40)

|                       |                            |
|-----------------------|----------------------------|
| Channel Separation:   | 5MHz                       |
| Type of Antenna:      | PCB Antenna                |
| Antenna Gain:         | 1.42dBi                    |
| <b>Bluetooth</b>      |                            |
| Bluetooth Version:    | V5.1 (BLE mode)            |
| Frequency Range:      | 2402-2480MHz               |
| RF Output Power:      | 1Mbps: 5.63dBm (Conducted) |
|                       | 2Mbps: 5.72dBm (Conducted) |
| Data Rate:            | 1Mbps, 2Mbps               |
| Modulation:           | GFSK                       |
| Quantity of Channels: | 40                         |
| Channel Separation:   | 2MHz                       |
| Type of Antenna:      | PCB Antenna                |
| Antenna Gain:         | 1.42dBi                    |

## 1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, 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.

**Option A:** FCC Rule Part 1.1307 (b)(3)(i)(A): The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

**Option B:** FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P_{th}$  (mW) described in the following formula.  $P_{th}$  is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

**Where**

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

**and**

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

$d$  = the separation distance (cm);

**Option C:** FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters.

| Single RF Sources Subject to Routine Environmental Evaluation |                       |
|---------------------------------------------------------------|-----------------------|
| RF Source frequency (MHz)                                     | Threshold ERP (watts) |
| 0.3-1.34                                                      | $1,920 R^2$           |
| 1.34-30                                                       | $3,450 R^2/f^2$       |
| 30-300                                                        | $3.83 R^2$            |
| 300-1,500                                                     | $0.0128 R^2f$         |
| 1,500-100,000                                                 | $19.2R^2$             |

**For Multiple RF sources:** FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

### 1.3 Calculated Result

| Radio Access Technology | Prediction Frequency (MHz) | Output Power (dBm) | Antenna Gain (dBi) | Duty Cycle (%) | Tune-Up Time-Averaged Power (dBm) | ERP (dBm) |
|-------------------------|----------------------------|--------------------|--------------------|----------------|-----------------------------------|-----------|
| Bluetooth               | 2402                       | 5.72               | 1.42               | 100            | 6.00                              | 5.27      |
| Wi-Fi (2.4G)            | 2412                       | 16.78              | 1.42               | 100            | 17.00                             | 16.27     |
| Wi-Fi (5G)              | 5180                       | 16.83              | 1.45               | 100            | 17.00                             | 16.30     |
| Wi-Fi (5G)              | 5745                       | 14.48              | 1.31               | 100            | 15.00                             | 14.16     |

| Frequency (MHz) | Option | Min. Distance (cm) | Max. Power (dBm) (mW) |       | Exposure Limit (mW) | Ratio | Result Pass/Fail |
|-----------------|--------|--------------------|-----------------------|-------|---------------------|-------|------------------|
| 2402            | C      | 20.00              | 5.27                  | 3.37  | 768.00              | 0.01  | Pass             |
| 2412            | C      | 20.00              | 16.27                 | 42.36 | 768.00              | 0.06  | Pass             |
| 5180            | C      | 20.00              | 16.30                 | 42.66 | 768.00              | 0.06  | Pass             |

|      |   |       |       |       |        |      |      |
|------|---|-------|-------|-------|--------|------|------|
| 5745 | C | 20.00 | 14.16 | 26.06 | 768.00 | 0.03 | Pass |
|------|---|-------|-------|-------|--------|------|------|

*Note: 1. Time-Averaged Power=Output Power \* Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB*

*2. Option A, B and C refers as clause 1.2.*

*3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;*

*4. For option B,  $P_{th}$  (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).*

*5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)*

**Mode for Simultaneous Multi-band Transmission:**

| Radio Access Technology | Ratio 1 | Ratio 2 | Simultaneous Ratio | Limit | Result    |
|-------------------------|---------|---------|--------------------|-------|-----------|
|                         |         |         |                    |       | Pass/Fail |
| --                      | --      | --      | --                 | --    | --        |

*Note: BT and Wi-Fi can't transmit at the same time.*

Result: Pass