

# SAR evaluation

**Product Name** : 4G camera  
**FCC ID** : 2A9XK-P5  
**Test Standard** : KDB447498D04 General RF Exposure Guidance v01

According to 447498 D04 Interim General RF Exposure Guidance v01

Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

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

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20 \text{ cm}}$  is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

| Frequency (MHz) | Distance (mm) |    |    |    |     |     |     |     |     |     |     |
|-----------------|---------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|
|                 |               | 5  | 10 | 15 | 20  | 25  | 30  | 35  | 40  | 45  | 50  |
|                 | 300           | 39 | 65 | 88 | 110 | 129 | 148 | 166 | 184 | 201 | 217 |
|                 | 450           | 22 | 44 | 67 | 89  | 112 | 135 | 158 | 180 | 203 | 226 |
|                 | 835           | 9  | 25 | 44 | 66  | 90  | 116 | 145 | 175 | 207 | 240 |
|                 | 1900          | 3  | 12 | 26 | 44  | 66  | 92  | 122 | 157 | 195 | 236 |
|                 | 2450          | 3  | 10 | 22 | 38  | 59  | 83  | 111 | 143 | 179 | 219 |
|                 | 3600          | 2  | 8  | 18 | 32  | 49  | 71  | 96  | 125 | 158 | 195 |
|                 | 5800          | 1  | 6  | 14 | 25  | 40  | 58  | 80  | 106 | 136 | 169 |

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

Calculated Result and Limit (WORSE CASE IS AS BELOW)

LTE:

LTE Band 2

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 25.59                   | 362.243 (QPSK 1900.0)  | 3060                        | Compiles    |

$$\text{ERP}=25.59+2.39-2.15=382.825\text{mW}$$

LTE Band 4

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 24.33                   | 271.019 (16QAM 1732.5) | 3060                        | Compiles    |

$$\text{ERP}=24.33+2.39-2.15=286.418\text{mW}$$

LTE Band 5:TX: 824MHz-849MHz, RX: 869MHz-894MHz

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 23.06                   | 202.302 (QPSK 829.0)   | 2040f=1691.16               | Compiles    |

$$\text{ERP}=23.06+2.39-2.15=213.796\text{mW}$$

LTE Band 12

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 24.01                   | 251.768 (QPSK 713.5)   | 2040f=1455.54               | Compiles    |

$$\text{ERP}=24.01+2.39-2.15=266.073\text{mW}$$

LTE Band 13

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 22.59                   | 181.552 (QPSK 779.5)   | 2040f=1590.18               | Compiles    |

$$\text{ERP}=22.59+2.39-2.15=191.867\text{mW}$$

LTE Band 66

| Directional antennaGain (Numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Limit (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------|-------------------------|------------------------|-----------------------------|-------------|
| 2.39dBi Max (1.734)               | 25.04                   | 319.154 (16QAM 1770.0) | 3060                        | Compiles    |

$$\text{ERP}=25.04+2.39-2.15=337.287\text{mW}$$