# RF Exposure evaluation

FCC ID: **2ARZ2-PILOT-CAMERA**

According to 447498 D01 General RF Exposure Guidance v06

4.3. General SAR test exclusion guidance

4.3.1. Standalone SAR test exclusion considerations

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, [30] where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation31
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

[30] This is equivalent to the formula written as: [(max. power of channel, including tune-up tolerance, mW)/(60/√f(GHz) mW)]·[20 mm/(min. test separation distance, mm)] ≤ 1.0 for 1-g SAR; also see Appendix A for approximate exclusion threshold numerical values at selected frequencies and distances.

eirp = pt x gt = $(EXd)^2/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, --- $10((dBuV/m)/20)/10^6$

d = measurement distance in meters (m)---3m

So pt = $(EXd)^2/30$ x gt

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**RF Exposure evaluation**

Copied from the FCC test report: (2.4GWIFIG)clause 9.4 an (5GWIFI)clause 8.4 Maximum Peak Output Power

**Test Result:**

For 2.4G WIFI:

Antenna Gain:0dBi

| Test Mode | Frequency MHz | Reading dBm | Output Power mW |
|---|---|---|---|
| 802.11b _ 11Mbps | 2412 | 8.62 | 7.28 |
| | 2437 | 8.34 | 6.82 |
| | 2462 | 8.52 | 7.11 |
| 802.11g_54Mbps | 2412 | 8.31 | 6.78 |
| | 2437 | 8.57 | 7.19 |
| | 2462 | 7.34 | 5.42 |
| 802.11n HT20_MCS7 | 2412 | 7.91 | 6.18 |
| | 2437 | 7.67 | 5.85 |
| | 2462 | 7.58 | 5.73 |
| 802.11n HT40_MCS7 | 2422 | 6.94 | 4.94 |
| | 2437 | 6.68 | 4.66 |
| | 2452 | 6.52 | 4.49 |

For 5G WIFI

Antenna Gain:0dBi

| Test mode | Frequency MHz | Output Power dBm | Output Power mW |
|---|---|---|---|
| 802.11a | 5180 | 7.89 | 6.15 |
| | 5200 | 7.92 | 6.19 |
| | 5240 | 7.88 | 6.14 |
| 802.11ac-HT20 | 5180 | 7.82 | 6.05 |
| | 5200 | 7.76 | 5.97 |
| | 5240 | 7.80 | 6.03 |

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Then we choose Normal mode channel as the worst case of Maximum Peak Output Power:

| Test Mode | Frequency MHz | Reading dBm | Output Power mW |
|---|---|---|---|
| 802.11b _ 11Mbps | 2412 | 8.62 | 7.28 |
| 802.11g_54Mbps | 2437 | 8.57 | 7.19 |
| 802.11n HT20_MCS7 | 2412 | 7.91 | 6.18 |
| 802.11n HT40_MCS7 | 2422 | 6.94 | 4.94 |

| Test mode | Frequency MHz | Output Power dBm | Output Power mW |
|---|---|---|---|
| 802.11a | 5200 | 7.92 | 6.19 |
| 802.11ac-HT20 | 5180 | 7.82 | 6.05 |

EIRP/ dBm= Conducted Max Output Power/ dBm+ Antenna gain /dBi.

Since the distance from the internal BT-antenna to the outer is more than 10mm, we choose the min. test separation distance = 5mm

General RF Exposure:
(7.28mW )/5.0mm)x √2.412 GHz = 2.26
(7.19mW )/5.0mm)x √2.437 GHz = 2.24
(6.18mW )/5.0mm)x √2.412 GHz = 1.92
(4.94mW )/5.0mm)x √2.422 GHz = 1.54

(6.19mW )/5.0mm)x √5.200 GHz = 2.83
(6.05mW )/5.0mm)x √5.180 GHz = 2.75

SAR requirement: S=3.0
General RF Exposure<3
Then SAR evaluation is not required

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