

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: $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,³⁰ where

- $f(\text{GHz})$ 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: $[(\text{max. power of channel, including tune-up tolerance, mW}) / (60 / \sqrt{f(\text{GHz})} \text{ mW})] \cdot [20 \text{ mm} / (\text{min. test separation distance, mm})] \leq 1.0$ for 1-g SAR; also see Appendix A for approximate exclusion threshold numerical values at selected frequencies and distances.

$$\text{eirp} = \text{pt} \times \text{gt} = (\text{EXd})^2 / 30$$

where:

pt = transmitter output power in watts,

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

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

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

$$\text{So pt} = (\text{EXd})^2 / 30 \times \text{gt}$$

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

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

$EIRP/ \text{dBm} = \text{Conducted Max Output Power/ dBm} + \text{Antenna gain /dBi}$.

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:

$$(7.28\text{mW}) / (5.0\text{mm}) \times \sqrt{2.412 \text{ GHz}} = 2.26$$

$$(7.19\text{mW}) / (5.0\text{mm}) \times \sqrt{2.437 \text{ GHz}} = 2.24$$

$$(6.18\text{mW}) / (5.0\text{mm}) \times \sqrt{2.412 \text{ GHz}} = 1.92$$

$$(4.94\text{mW}) / (5.0\text{mm}) \times \sqrt{2.422 \text{ GHz}} = 1.54$$

$$(6.19\text{mW}) / (5.0\text{mm}) \times \sqrt{5.200 \text{ GHz}} = 2.83$$

$$(6.05\text{mW}) / (5.0\text{mm}) \times \sqrt{5.180 \text{ GHz}} = 2.75$$

SAR requirement: $S=3.0$

General RF Exposure < 3

Then SAR evaluation is not required