

RF Exposure Report

FCC ID: 2AYKCNSAC1200RZ

RF Exposure Measurement

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

F= Frequency in MHz

Friss Formula

Friss Transmission Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

EUT Operation condition

EUT was enabled to transmit and receive at lowest, middle and highest channels.

Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

ANT Gain (G)

2.4G WIFI

ANT 1 gain : 5dBi (gain of antenna in linear scale=3.162)

ANT 2 gain : 5dBi (gain of antenna in linear scale=3.162)

5G WIFI

ANT 3 gain : 5dBi (gain of antenna in linear scale=3.162)

ANT 4 gain : 5dBi (gain of antenna in linear scale=3.162)

2.4G WIFI

Mode	802.11b/g/n20:2412-2462MHz 802.11n40:2422-2452MHz
Detector	AVG
802.11b	12±1dBm
802.11g	2±1dBm
802.11n20 ANT 1	1±1dBm
802.11n20 ANT 2	1±1dBm
802.11n40 ANT 1	0±1dBm
802.11n40 ANT 2	0±1dBm

Protocol	ANT Gain (gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11 b	3.162	2462	13	19.9526	0.01256	1
802.11 g	3.162	2462	3	1.9953	0.00126	1
802.11 n20 ANT 1	3.162	2412	2	1.5849	0.00100	1
802.11 n20 ANT 2	3.162	2412	2	1.5849	0.00100	1
802.11 n40 ANT 1	3.162	2452	1	1.2589	0.00079	1
802.11 n40 ANT 2	3.162	2452	1	1.2589	0.00079	1

Note:

802.11 n20 MIMO = 802.11n20 ANT 1(0.001/1) mW/cm² + 802.11n20 ANT 2(0.001/1) mW/cm² = 0.002 ≤ 1

802.11 n40 MIMO = 802.11n40 ANT 1(0.00079/1) mW/cm² + 802.11n40 ANT 2 (0.00079/1) mW/cm² = 0.00158 ≤ 1

5G WIFI

ANT Gain (G)

Mode	IEEE 802.11a/ n/ac(HT20) 5.180GHz-5.240GHz IEEE 802.11n/ac(HT40) 5.190GHz-5.230GHz IEEE 802.11ac(HT80) 5.210GHz
Detector	AVG
802.11 a	8.5±1dBm
802.11 n/ac20 ANT 3	8±1dBm
802.11 n/ac20 ANT 4	4±1dBm
802.11 n/ac40 ANT 3	8±1dBm
802.11 n/ac40 ANT 4	4±1dBm
802.11 ac80 ANT 3	14±1dBm
802.11 ac80 ANT 4	10±1dBm

Protocol	ANT Gain (gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11 a	3.162	5180	9.5	8.9125	0.00561	1
802.11 n/ac20 ANT 3	3.162	5180	9	7.9433	0.00500	1
802.11 n/ac20 ANT 4	3.162	5180	5	3.1623	0.00199	1
802.11 n/ac40 ANT 3	3.162	5190	9	7.9433	0.00500	1
802.11 n/ac40 ANT 4	3.162	5190	5	3.1623	0.00199	1
802.11 ac80 ANT 3	3.162	5210	15	31.6228	0.01990	1
802.11 ac80 ANT 4	3.162	5210	11	12.5893	0.00792	1

Note:

802.11 n/ac20 MIMO = 802.11 n/ac20 ANT 3(0.005/1) mW/cm² + 802.11 n/ac20 ANT 4(0.00199/1) mW/cm² = 0.00699 ≤ 1

802.11 n/ac40 MIMO = 802.11 n/ac40 ANT 3(0.005/1) mW/cm² + 802.11 n/ac40 ANT 4(0.00199/1) mW/cm² = 0.00699 ≤ 1

802.11 ac80 MIMO = 802.11 ac80 ANT 3(0.0199/1) mW/cm² + 802.11 ac80 ANT 4(0.00792/1) mW/cm² = 0.02782 ≤ 1

5G WIFI

ANT Gain (G)

Mode	IEEE 802.11a/ n/ac(HT20) 5.745GHz-5.825GHz IEEE 802.11n/ac(HT40) 5.755GHz-5.795GHz IEEE 802.11ac(HT80) 5775GHz
Detector	AVG
802.11 a	9±1dBm
802.11 n/ac20 ANT 3	8.5±1dBm
802.11 n/ac20 ANT 4	9±1dBm
802.11 n/ac40 ANT 3	8±1dBm
802.11 n/ac40 ANT 4	9±1dBm
802.11 ac80 ANT 3	12±1dBm
802.11 ac80 ANT 4	13±1dBm

Protocol	ANT Gain (gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11 a	3.162	5785	10	10.0000	0.00629	1
802.11 n/ac20 ANT 3	3.162	5745	9.5	8.9125	0.00561	1
802.11 n/ac20 ANT 4	3.162	5745	10	10.0000	0.00629	1
802.11 n/ac40 ANT 3	3.162	5755	9	7.9433	0.00500	1
802.11 n/ac40 ANT 4	3.162	5755	10	10.0000	0.00629	1
802.11 ac80 ANT 3	3.162	5775	13	19.9526	0.01256	1
802.11 ac80 ANT 4	3.162	5775	14	25.1189	0.01581	1

Note:

802.11 n/ac20 MIMO = 802.11 n/ac20 ANT 3(0.00561/1) mW/cm² + 802.11 n/ac20 ANT 4(0.00629/1) mW/cm² = 0.0119 ≤ 1

802.11 n/ac40 MIMO = 802.11 n/ac40 ANT 3(0.005/1) mW/cm² + 802.11 n/ac40 ANT 4(0.00629/1) mW/cm² = 0.01129 ≤ 1

802.11 ac80 MIMO = 802.11 ac80 ANT 3(0.01256/1) mW/cm² + 802.11 ac80 ANT 4(0.01581/1) mW/cm² = 0.02837 ≤ 1

2.4G WIFI, 5G WIFI simultaneous transmission:

2.4G WIFI(0.002/1) mW/cm² + 5G WIFI(0.02837/1) mW/cm² = 0.03037 ≤ 1

According to the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know max MPE value 0.06309 at distance 20cm. This is less than the limit 1. So Compliance the RF exposure requirement..