RF EXPOSURE EVALUATION

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

FCC ID: 2A2PW149657

EUT Specification

EUT	Outdoor Access Point
Frequency band (Operating)	☐BT: 2.402GHz ~ 2.480GHz ☒BLE: 2.402GHz ~ 2.480GHz ☒WIFI: 2.412GHz ~ 2.462GHz ☒WIFI: 5.180GHz ~ 5.240GHz ☒WIFI: 5.260GHz ~ 5.320GHz ☒WIFI: 5.500GHz ~ 5.700GHz ☒WIFI: 5.745GHz ~ 5.825GHz
Device category	☐Portable (<20cm separation) ☒Mobile (>20cm separation)
Exposure classification	☐Occupational/Controlled exposure (S = 5mW/cm^2) ☒General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☐Single antenna ☒Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Max. output power（peak power）	BLE BLE 1M: 3.76 dBm 2.4G WIFI IEEE 802.11b: 10.79 dBm IEEE 802.11g: 9.74 dBm IEEE 802.11n HT20: 12.24 dBm IEEE 802.11n HT40: 11.48 dBm IEEE 802.11ax HE20: 12.73 dBm IEEE 802.11ax HE40: 12.26 dBm 5G WIFI U-NII-1 IEEE 802.11a: 13.2 dBm IEEE 802.11n HT20: 11.03 dBm IEEE 802.11n HT40: 11.8 dBm IEEE 802.11ac VHT20: 11.06 dBm IEEE 802.11ac VHT40: 11.51 dBm IEEE 802.11ac VHT80: 11.57 dBm IEEE 802.11ax HE20: 11.37 dBm

	IEEE 802.11ax HE40: 11.84 dBm IEEE 802.11ax HE80: 11.74 dBm U-NII-2A IEEE 802.11a: 13.22 dBm IEEE 802.11n HT20: 10.98 dBm IEEE 802.11n HT40: 10.55 dBm IEEE 802.11ac VHT20: 10.91 dBm IEEE 802.11ac VHT40: 10.31 dBm IEEE 802.11ac VHT80: 10.48 dBm IEEE 802.11ax HE20: 11.13 dBm IEEE 802.11ax HE40: 10.51 dBm IEEE 802.11ax HE80: 10.69 dBm U-NII-2C IEEE 802.11a: 12.75 dBm IEEE 802.11n HT20: 10.74 dBm IEEE 802.11n HT40: 10.58 dBm IEEE 802.11ac VHT20: 10.88 dBm IEEE 802.11ac VHT40: 10.28 dBm IEEE 802.11ac VHT80: 10.16 dBm IEEE 802.11ax HE20: 10.97 dBm IEEE 802.11ax HE40: 10.62 dBm IEEE 802.11ax HE80: 10.64 dBm U-NII-3 IEEE 802.11a: 8.5 dBm IEEE 802.11n HT20: 10.99 dBm IEEE 802.11n HT40: 10.74 dBm IEEE 802.11ac VHT20: 10.88 dBm IEEE 802.11ac VHT40: 10.64 dBm IEEE 802.11ac VHT80: 10.84 dBm IEEE 802.11ax HE20: 11.23 dBm IEEE 802.11ax HE40: 10.76 dBm IEEE 802.11ax HE80: 11.16 dBm
Antenna gain (Max)	BLE: 5dBi 2.4G WIFI 4 dBi for antenna 1 4 dBi for antenna 2 5G WIFI 6 dBi for antenna 1 6 dBi for antenna 2
Evaluation applied	☒MPE Evaluation ☐SAR Evaluation

Limits for Maximum Permissible Exposure(MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: $P_d=(P_{out}*G)\backslash(4*pi*R^2)$

Where

P_d= Power density in mW/cm^2, P_{out}=output power to antenna in mW.

G= gain of antenna in linear scale, Pi=3.1416

R= distance between observation point and center of the radiator in cm=20cm

P_d the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

For multiple RF sources: Multiple RF sources are exempt if:
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

$$\sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

$Evaluated_k$: the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure $Limit_k$: either the general population/uncontrolled maximum permissible exposure (MPE) or specific Absorption rate (SAR) limit for each fixed, mobile, or portable RF source k.

Measurement Result

BLE:

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
BLE 1M	3.76	3±1	4	2.512	5	3.162	0.00158	1

2.4G WIFI:

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
802.11b	10.79	10±1	11	12.589	4	2.512	0.00629	1
802.11g	9.74	9±1	10	10.000	4	2.512	0.00500	1
802.11n HT20	12.24	12±1	13	19.953	4	2.512	0.00997	1
802.11n HT40	11.48	11±1	12	15.849	4	2.512	0.00792	1
802.11ax HE20	12.73	12±1	13	19.953	4	2.512	0.00997	1
802.11ax HE40	12.26	12±1	13	19.953	4	2.512	0.00997	1

5G WIFI:

U-NII-1

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
802.11a	13.2	13±1	14	25.119	6	3.981	0.01989	1
802.11n HT20	11.03	11±1	12	15.849	6	3.981	0.01255	1
802.11n HT40	11.8	11±1	12	15.849	6	3.981	0.01255	1
802.11ac VHT20	11.06	11±1	12	15.849	6	3.981	0.01255	1
802.11ac VHT40	11.51	11±1	12	15.849	6	3.981	0.01255	1
802.11ac VHT80	11.57	11±1	12	15.849	6	3.981	0.01255	1
802.11ax HE20	11.37	11±1	12	15.849	6	3.981	0.01255	1
802.11ax HE40	11.84	11±1	12	15.849	6	3.981	0.01255	1
802.11ax HE80	11.74	11±1	12	15.849	6	3.981	0.01255	1

U-NII-2A

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
802.11a	13.22	13±1	14	25.119	6	3.981	0.01989	1
802.11n HT20	10.98	10±1	11	12.589	6	3.981	0.00997	1
802.11n HT40	10.55	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT20	10.91	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT40	10.31	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT80	10.48	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE20	11.13	11±1	12	15.849	6	3.981	0.01255	1
802.11ax HE40	10.51	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE80	10.69	10±1	11	12.589	6	3.981	0.00997	1

U-NII-2C

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
802.11a	12.75	12±1	13	19.953	6	3.981	0.01580	1
802.11n HT20	10.74	10±1	11	12.589	6	3.981	0.00997	1
802.11n HT40	10.58	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT20	10.88	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT40	10.28	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT80	10.16	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE20	10.97	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE40	10.62	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE80	10.64	10±1	11	12.589	6	3.981	0.00997	1

U-NII-3

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11a	8.5	8±1	9	7.943	6	3.981	0.00629	1
802.11n HT20	10.99	10±1	11	12.589	6	3.981	0.00997	1
802.11n HT40	10.74	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT20	10.88	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT40	10.64	10±1	11	12.589	6	3.981	0.00997	1
802.11ac VHT80	10.84	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE20	11.23	11±1	12	15.849	6	3.981	0.01255	1
802.11ax HE40	10.76	10±1	11	12.589	6	3.981	0.00997	1
802.11ax HE80	11.16	11±1	12	15.849	6	3.981	0.01255	1

Maximum Simultaneous transmission MPE Ratio for Bluetooth & 2.4G WIFI & 5G WIFI

Maximum MPE ratio (Bluetooth)	Maximum MPE ratio (2.4G WIFI)	Maximum MPE ratio (5G WIFI)	∑ MPE ratios	Limit	Results
0.00158	0.00997	0.01989	0.03145	1.000	Pass

Signature:

Shawn Wen

Date: 2024-3-28