

FCC ID : VYVBW2569-14P

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)

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

11.1 Friis 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= Numeric gain of the antenna relative to isotropic antenna

π =3.1416

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

P_d the limit of MPE, 1mW/cm². 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.

11.2 Measurement Result

Antenna gain: 5.0dBi

Array Gain: 8.0dBi

Antenna A

Mode	Measured power Min (dBm)	Measured power Max (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	20.23	20.36	20.0±1	21.0	0.0792	1
802.11g	19.58	20.11	20.0±1	21.0	0.0792	1
802.11n HT20	19.70	19.92	19.0±1	20.0	0.0629	1
802.11n HT40	15.88	16.14	16.0±1	17.0	0.0315	1

Antenna B

Mode	Measured power Min (dBm)	Measured power Max (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	16.55	16.80	16.0±1	17.0	0.0315	1
802.11g	15.74	16.43	16.0±1	17.0	0.0315	1
802.11n HT20	15.78	16.34	16.0±1	17.0	0.0315	1
802.11n HT40	13.73	14.18	14.0±1	15.0	0.0199	1

Antenna A+B

Mode	Measured A (mW/cm ²)	Measured B (mW/cm ²)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11n HT20	0.0629	0.0315	0.0944	1
802.11n HT40	0.0315	0.0199	0.0514	1

Antenna A

Mode	Band	Measured power Min (dBm)	Measured power Max (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11a	UNII Band I	15.19	15.31	15.0±1	16.0	0.0250	1
	UNII Band II-A	15.84	16.01	16.0±1	17.0	0.0315	1
	UNII Band II-C	12.96	14.29	13.5±1	14.5	0.0177	1
	UNII Band III	10.58	10.77	10.0±1	11.0	0.0079	1
802.11n HT20	UNII Band I	15.60	16.31	16.0±1	17.0	0.0315	1
	UNII Band II-A	13.99	16.66	15.4±1.5	17.0	0.0315	1
	UNII Band II-C	11.20	13.53	12.4±1.5	13.9	0.0154	1
	UNII Band III	11.14	11.75	11.0±1	12.0	0.0100	1
802.11ac HT20	UNII Band I	14.99	15.32	15.0±1	16.0	0.0250	1
	UNII Band II-A	15.02	16.05	16.0±1	17.0	0.0315	1
	UNII Band II-C	12.35	13.35	13.0±1	14.0	0.0158	1
	UNII Band III	10.22	10.35	10.0±1	11.0	0.0079	1
802.11n HT40	UNII Band I	12.46	12.58	12.0±1	13.0	0.0126	1
	UNII Band II-A	13.16	13.36	13.0±1	14.0	0.0158	1
	UNII Band II-C	10.10	11.09	11.0±1	12.0	0.0100	1
	UNII Band III	8.12	8.78	8.0±1	9.0	0.0050	1
802.11ac HT40	UNII Band I	13.08	13.12	13.0±1	14.0	0.0158	1
	UNII Band II-A	13.27	13.47	13.0±1	14.0	0.0158	1
	UNII Band II-C	10.27	12.00	11.0±1	12.0	0.0100	1
	UNII Band III	7.89	8.28	8.0±1	9.0	0.0050	1
802.11ac HT80	UNII Band I	10.69	10.69	10.0±1	11.0	0.0079	1
	UNII Band II-A	10.94	10.94	10.0±1	11.0	0.0079	1
	UNII Band II-C	9.01	9.07	9.0±1	10.0	0.0063	1
	UNII Band III	8.81	8.81	8.0±1	9.0	0.0050	1

Antenna B

Mode	Band	Measured power Min (dBm)	Measured power Max (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (dBm)	Power density Limits (mW/cm ²)
802.11a	UNII Band I	14.34	15.00	15.0±1	16.0	0.0250	1
	UNII Band II-A	14.35	14.90	14.0±1	15.0	0.0199	1
	UNII Band II-C	12.34	14.26	12.5±1.5	14.0	0.0158	1
	UNII Band III	10.99	11.65	11.0±1	12.0	0.0100	1
802.11n HT20	UNII Band I	15.10	15.87	15.0±1	16.0	0.0250	1
	UNII Band II-A	13.60	15.80	14.5±1.5	16.0	0.0250	1
	UNII Band II-C	11.16	13.25	12.5±1.5	14.0	0.0158	1
	UNII Band III	10.23	11.10	11.0±1	12.0	0.0100	1
802.11ac HT20	UNII Band I	14.06	15.16	15.0±1	16.0	0.0250	1
	UNII Band II-A	13.70	15.23	15.0±1	16.0	0.0250	1
	UNII Band II-C	11.42	12.55	12.0±1	13.0	0.0126	1
	UNII Band III	9.60	9.98	9.0±1	10.0	0.0063	1
802.11n HT40	UNII Band I	11.15	11.58	11.0±1	12.0	0.0100	1
	UNII Band II-A	12.95	12.97	12.0±1	13.0	0.0126	1
	UNII Band II-C	9.62	9.94	9.0±1	10.0	0.0063	1
	UNII Band III	7.33	7.85	8.0±1	9.0	0.0050	1
802.11ac HT40	UNII Band I	12.73	12.95	12.0±1	13.0	0.0126	1
	UNII Band II-A	12.24	12.48	12.0±1	13.0	0.0126	1
	UNII Band II-C	9.96	11.18	11.0±1	12.0	0.0100	1
	UNII Band III	7.34	7.63	7.0±1	8.0	0.0040	1
802.11ac HT80	UNII Band I	10.19	10.19	10.0±1	11.0	0.0079	1
	UNII Band II-A	10.37	10.37	10.0±1	11.0	0.0079	1
	UNII Band II-C	8.37	8.42	8.0±1	9.0	0.0050	1
	UNII Band III	8.63	8.63	8.0±1	9.0	0.0050	1

Mode	Band	Measured A (mW/cm ²)	Measured B (mW/cm ²)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11n HT20	UNII Band I	0.0250	0.0250	0.0500	1
	UNII Band II-A	0.0315	0.0199	0.0514	1
	UNII Band II-C	0.0177	0.0158	0.0335	1
	UNII Band III	0.0079	0.0100	0.0179	1
802.11ac HT20	UNII Band I	0.0315	0.0250	0.0565	1
	UNII Band II-A	0.0315	0.0250	0.0565	1
	UNII Band II-C	0.0154	0.0158	0.0312	1
	UNII Band III	0.0100	0.0100	0.0200	1
802.11n HT40	UNII Band I	0.0250	0.0250	0.0500	1
	UNII Band II-A	0.0315	0.0250	0.0565	1
	UNII Band II-C	0.0158	0.0126	0.0284	1
	UNII Band III	0.0079	0.0063	0.0142	1
802.11ac HT40	UNII Band I	0.0126	0.0100	0.0226	1
	UNII Band II-A	0.0158	0.0126	0.0284	1
	UNII Band II-C	0.0100	0.0063	0.0163	1
	UNII Band III	0.0050	0.0050	0.0100	1
802.11ac HT80	UNII Band I	0.0158	0.0126	0.0284	1
	UNII Band II-A	0.0158	0.0126	0.0284	1
	UNII Band II-C	0.0100	0.0100	0.0200	1
	UNII Band III	0.0050	0.0040	0.0090	1

BT for classical mode

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK	2402	-0.852	0.5±1.5	2.0	3.1623	0.0010	1
GFSK	2441	0.691	0.5±1.5	2.0	3.1623	0.0010	1
GFSK	2480	1.528	0.5±1.5	2.0	3.1623	0.0010	1
1/4π-DQPSK	2402	-1.329	-0.5±1.5	1.0	3.1623	0.0008	1
1/4π-DQPSK	2441	0.014	-0.5±1.5	1.0	3.1623	0.0008	1
1/4π-DQPSK	2480	0.675	-0.5±1.5	1.0	3.1623	0.0008	1
8DPSK	2402	-0.758	0.5±1.5	2.0	3.1623	0.0010	1
8DPSK	2441	0.616	0.5±1.5	2.0	3.1623	0.0010	1
8DPSK	2480	1.265	0.5±1.5	2.0	3.1623	0.0010	1

BT for BLE mode

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK	2402	2.381	3.0±1.5	4.5	3.1623	0.0018	1
GFSK	2441	3.404	3.0±1.5	4.5	3.1623	0.0018	1
GFSK	2480	4.076	3.0±1.5	4.5	3.1623	0.0018	1