

5.10 RF Exposure

5.10.1 Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissible Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Averaging Time [minute]
Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*(100)	30
1.34 ~ 30	824 /f	2.19/f	*(180/f ²)	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1500	/	/	f/1500	30
1500 ~ 15000	/	/	1.0	30

f=frequency in MHz, *= plane-wave equivalent power density

MPE (Maximum Permissible Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S=power density [mW/cm²]

P=Power input to antenna [mW]

G=Power gain of the antenna in the direction of interest relative to an isotropic radiator

R= distance to the center of radiation of the antenna [cm]

5.10.2 RF Exposure Compliance Issue

The information should be included in the user's manual:

This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

Band [MHz]	Mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
2 400 ~ 2 483.5	11n HT40	ANT0+ANT1	Middle	2 437	4.08	27.71	589.78	0.479 09
5 745 ~ 5 850	11n HT20	ANT0+ANT1	Highest	5 825	4.18	27.78	600.03	0.498 78
								0.977 87

5.10.3 Calculation Result of RF Exposure

- 2 400 ~ 2 483.5 MHz (RF4CE)

Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
Lowest	2 425	1.95	24.64	291.07	0.112 65
Middle	2 450	1.95	24.52	283.14	0.109 58
Highest	2 475	1.95	24.22	264.24	0.102 27

- 2 400 ~ 2 483.5 MHz (WIFI)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11b	ANT0	Lowest	2 412	2.04	24.64	291.07	0.118 23
		Middle	2 437	2.04	24.52	283.14	0.115 01
		Highest	2 462	2.04	24.22	264.24	0.107 33
	ANT1	Lowest	2 412	2.04	23.95	248.31	0.100 86
		Middle	2 437	2.04	23.80	239.88	0.097 44
		Highest	2 462	2.04	23.76	237.68	0.096 55
11g	ANT0	Lowest	2 412	2.04	27.53	566.24	0.230 00
		Middle	2 437	2.04	27.30	537.03	0.218 14
		Highest	2 462	2.04	26.20	416.87	0.169 33
	ANT1	Lowest	2 412	2.04	27.29	535.80	0.217 64
		Middle	2 437	2.04	27.27	533.33	0.216 64
		Highest	2 462	2.04	25.50	354.81	0.144 12
11n HT20	ANT0	Lowest	2 412	2.04	27.11	514.04	0.208 80
		Middle	2 437	2.04	27.98	628.06	0.255 11
		Highest	2 462	2.04	27.28	534.56	0.217 14
	ANT1	Lowest	2 412	2.04	27.18	522.40	0.212 19
		Middle	2 437	2.04	27.80	602.56	0.244 75
		Highest	2 462	2.04	27.31	538.27	0.218 64
	ANT0 + ANT1	Lowest	2 412	4.08	27.33	540.30	0.438 90
		Middle	2 437	4.08	27.65	581.75	0.472 57
		Highest	2 462	4.08	26.95	495.51	0.402 51
11n HT40	ANT0 + ANT1	Lowest	2 422	4.08	27.51	563.67	0.457 88
		Middle	2 437	4.08	27.71	589.78	0.479 09
		Highest	2 452	4.08	27.65	582.54	0.473 21

- 5 150 ~ 5 250 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 180	2.09	12.56	18.03	0.007 49
		Middle	5 200	2.09	12.57	18.07	0.007 51
		Highest	5 240	2.09	12.72	18.71	0.007 78
	ANT1	Lowest	5 180	2.09	13.38	21.78	0.009 05
		Middle	5 200	2.09	13.68	23.33	0.009 70
		Highest	5 240	2.09	13.75	23.71	0.009 86
11n HT20	ANT0	Lowest	5 180	2.09	12.94	19.68	0.008 18
		Middle	5 200	2.09	12.61	18.24	0.007 58
		Highest	5 240	2.09	12.79	19.01	0.007 90
	ANT1	Lowest	5 180	2.09	13.47	22.23	0.009 24
		Middle	5 200	2.09	13.91	24.60	0.010 23
		Highest	5 240	2.09	14.02	25.23	0.010 49
	ANT0 + ANT1	Lowest	5 180	4.18	12.78	18.95	0.015 76
		Middle	5 200	4.18	12.88	19.40	0.016 13
		Highest	5 240	4.18	12.58	18.10	0.015 05
11n HT40	ANT0 + ANT1	Lowest	5 190	4.18	14.49	28.14	0.023 39
		Middle	5 230	4.18	14.38	27.42	0.022 79

- 5 250 ~ 5 350 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 260	2.09	18.90	77.62	0.032 26
		Middle	5 300	2.09	19.03	79.98	0.033 25
		Highest	5 320	2.09	19.19	82.99	0.034 49
	ANT1	Lowest	5 260	2.09	20.06	101.39	0.042 14
		Middle	5 300	2.09	20.11	102.57	0.042 63
		Highest	5 320	2.09	20.30	107.15	0.044 54
11n HT20	ANT0	Lowest	5 260	2.09	19.22	83.56	0.034 73
		Middle	5 300	2.09	19.34	85.90	0.035 71
		Highest	5 320	2.09	19.54	89.95	0.037 39
	ANT1	Lowest	5 260	2.09	20.28	106.66	0.044 33
		Middle	5 300	2.09	20.70	117.49	0.048 83
		Highest	5 320	2.09	20.88	122.46	0.050 90
	ANT0 + ANT1	Lowest	5 260	4.18	21.17	131.04	0.108 93
		Middle	5 300	4.18	21.30	135.02	0.112 24
		Highest	5 320	4.18	21.47	140.29	0.116 61
11n HT40	ANT0 + ANT1	Lowest	5 270	4.18	21.26	133.53	0.111 00
		Middle	5 310	4.18	18.64	73.12	0.060 78

- 5 470 ~ 5 725 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 500	2.09	17.52	56.49	0.023 48
		Middle	5 600	2.09	18.37	68.71	0.028 56
		Highest	5 700	2.09	17.98	62.81	0.026 11
	ANT1	Lowest	5 500	2.09	18.60	72.44	0.030 11
		Middle	5 600	2.09	19.93	98.40	0.040 90
		Highest	5 700	2.09	18.12	64.86	0.026 96
11n HT20	ANT0	Lowest	5 500	2.09	17.38	54.70	0.022 74
		Middle	5 600	2.09	18.40	69.18	0.028 76
		Highest	5 700	2.09	16.61	45.81	0.019 04
	ANT1	Lowest	5 500	2.09	18.50	70.79	0.029 43
		Middle	5 600	2.09	20.13	103.04	0.042 83
		Highest	5 700	2.09	18.15	65.31	0.027 15
	ANT0 + ANT1	Lowest	5 500	4.18	20.74	118.53	0.098 53
		Middle	5 600	4.18	21.17	130.84	0.108 76
		Highest	5 700	4.18	20.20	104.73	0.087 05
11n HT40	ANT0 + ANT1	Lowest	5 510	4.18	15.78	37.88	0.031 49
		Middle	5 590	4.18	21.68	147.19	0.122 35
		Highest	5 670	4.18	21.59	144.15	0.119 82

- 5 725 ~ 5 850 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 745	2.09	25.57	360.58	0.149 88
		Middle	5 785	2.09	25.95	393.55	0.163 58
		Highest	5 825	2.09	25.97	395.37	0.164 34
	ANT1	Lowest	5 745	2.09	27.42	552.08	0.229 47
		Middle	5 785	2.09	27.47	558.47	0.232 13
		Highest	5 825	2.09	27.99	629.51	0.261 66
11n HT20	ANT0	Lowest	5 745	2.09	25.46	351.56	0.146 13
		Middle	5 785	2.09	25.62	364.75	0.151 61
		Highest	5 825	2.09	26.06	403.65	0.167 78
	ANT1	Lowest	5 745	2.09	27.43	553.35	0.230 00
		Middle	5 785	2.09	27.59	574.12	0.238 63
		Highest	5 825	2.09	27.94	622.30	0.258 66
	ANT0 + ANT1	Lowest	5 745	4.18	27.52	565.52	0.470 09
		Middle	5 785	4.18	27.63	579.51	0.481 71
		Highest	5 825	4.18	27.78	600.03	0.498 78
11n HT40	ANT0 + ANT1	Lowest	5 755	4.18	27.59	574.72	0.477 74
		Middle	5 795	4.18	27.61	576.97	0.479 61