MPE Calculations

The device is not a portable device (i.e. not intended to be worn on the body or be hand-held), so it is classified as being either a mobile device or a fixed mounted device. The user's manual specifies a minimum separation distance of at least 25cm (the manual covers multiple devices, some of which require a larger separation), consistent with a mobile classification.

The maximum output power (average) per transceiver in each band and for internal and external antennas is listed below:

Channel	Mode	Internal antenna - Pmax		Ant Gain	EIRP	EIRP mW
		Setting	Measured (dBm)	dBi	dBm	
1	CCK	20	19.8	2.0	21.8	151.4
6	CCK	20	20.3	2.0	22.3	169.8
11	CCK	15	17.7	2.0	19.7	93.3
1	OFDM	16	17.1	2.0	19.1	81.3
6	OFDM	20	21.2	2.0	**23.2**	**208.9**
11	OFDM	14	13.3	2.0	15.3	33.9
36	OFDM	10	12.7	3.0	15.7	37.2
48	OFDM	10	15.9	3.0	18.9	77.6
52	OFDM	19	17.7	3.0	**20.7**	**117.5**
64	OFDM	19	17.5	3.0	20.5	112.2
149	OFDM	17	16.8	3.0	**19.8**	95.5
157	OFDM	18	15.9	3.0	18.9	77.6
165	OFDM	18	14.2	3.0	17.2	52.5

Channel	Mode	External antenna - Pmax		Ant Gain	EIRP	EIRP mW
		Setting	Measured (dBm)	dBi	dBm	
1	CCK	20	19.8	5.2	25.0	316.2
6	CCK	20	20.3	5.2	25.5	354.8
11	CCK	15	17.7	5.2	22.9	195.0
1	OFDM	16	17.1	5.2	22.3	169.8
6	OFDM	20	21.2	5.2	**26.4**	**436.5**
11	OFDM	13	12.5	5.2	17.7	58.9
36	OFDM	10	12.7	5.2	17.9	61.7
48	OFDM	10	15.9	5.2	21.1	128.8
52	OFDM	19	17.7	5.2	**22.9**	**195.0**
64	OFDM	16	14.9	5.2	20.1	102.3
149	OFDM	13	13.8	5.2	19.0	79.4
157	OFDM	16	14.5	5.2	**19.7**	**93.3**
165	OFDM	18	14.2	5.2	19.4	87.1

Setting = software setting to set output power in the test tool.
Measured power is the average power (except for CCK mode, where power is peak power)
Bolded value is highest EIRP in each sub-band

FCC part 1.1310, Table 1 limits the power density for uncontrolled exposure. The power density, P_d (mW/cm^2) calculated from the maximum EIRP, P_t (mW) and the distance, d (m), between the transmitting antenna and the closest person, can be calculated using:

$$P_d = P_t/(4 \pi d^2)$$

As the MPE limit is the same for both 2.4 GHz and 5 GHz bands, the worst case scenario is with all four transceivers operating in the band with the highest eirp.

From the tables on the previous page, the highest eirp for both the internal and external antennas is with the transceiver operating in 802.11g mode in the 2.4 GHz band. The eirp is 23.2dBm for the internal antenna and 26.4dBm for the external antenna. As only three non-overlapping channels exist in this band, the worst-case scenario for rf exposure is with the fourth transceiver operating on the channel with the next highest eirp – channel 52 (eirp = 20.7dBm internal antenna, 22.9dBm external antenna).

The worst case eirp would be with the one transceiver using the external antenna in the 2.4 GHz (26.4dBm) and the remaining three transceivers operating with their internal antennas, two in the 2.4 GHz band (23.2dBm eirp each) and one at 2560 MHz (20.7dBm eirp). The combined eirp from this combination is:

436.5mW + 208.9mW + 208.9mW + 117.5mW = 971.8mW

This combined eirp value is conservative since it assumes flat power across the 2.4 GHz band, does not account for the fact that there is some separation between the antennas and does not account for the fact that the beams from the individual antennas do not fully overlap.

Frequency	MPE Limit (mW/cm^2)	EIRP (mW)	Pd at 20cm (mW/cm^2)	Distance (cm) where Pd = limit
2400 to 5850 MHz	1.00	971.8	0.2	8.8

As shown in the calculations above, the power density 20cm from the device is below the maximum permitted level for uncontrolled exposure.