

MPE Estimates

The devices covered by this estimate are fixed installation only and professional installation is required to comply with certification agency and legal requirements.
Only the following combinations of radios are permitted in the Extended Temperature Multinode:
A. DSSS Radio (FCC ID: S57 – 51306343) and TWO 802.11a/b/g Radio (FCC ID: S57 - DCMA-82)
B. FHSS Radio (FCC ID: S57 – WNMNFHSS) and TWO 802.11a/b/g Radio (FCC ID: S57 - DCMA-82)

NOTE:

*The DSSS Radio (FCC ID: S57 – 51306343) and the FHSS Radio (FCC ID: S57 – WNMNFHSS) are never permitted to be co-located.

Multinode FHSS Radio FCC ID: S57 – WNMNFHSS
Multinode FHSS Radio Industry Canada ID: 5731 – WNMNFHSS

$$P_{app} = (P_{mit} \cdot G_{linear}) / 4 \cdot \pi \cdot d^2$$

$$G_{linear} = \text{antilog}(G_{dbi} / 10)$$

Multinode 2.4GHz FHSS Radio

Application	Antenna Type	Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
			(MHz)	(mW)	(dBi)	(dB)	(mW/cm ²)	(mW/cm ²)	
Integral Co-Located	Omni	SMARTANT HON04-052160 Honeywell 51506534-100	2,402 - 2,482	96.161	5	0	0.060	1.00	0.060496
Remote Not Co-Located	Omni	Hyperlink HGV-2409U Honeywell 50018414-001	2,402 - 2,483	64.27	8	0.9	0.066	1.00	0.065575
Remote Not Co-Located	Sector 120 deg.	Hyperlink HG2414P-120	2,402 - 2,484	17.5	14	0.9	0.071	1.00	0.071083

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.071083
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.060496

Multinode DSSS Radio FCC ID: S57 - 51306343
Multinode DSSS Radio Industry Canada ID: 5731 - 51306343

Multinode 2.4GHz DSSS Radio, has the worst case output power density as compared to the FHSS radio.

Application	Antenna Type	Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
			(MHz)	(mW)	(dBi)	(dB)	(mW/cm ²)	(mW/cm ²)	
Integral Co-Located	Omni	PacWireless OD24M-5 Honeywell 51506534-101	2,402 - 2,482	99.08	5	0	0.062	1.00	0.062333
Integral Co-Located	Omni	SMARTANT SAA04-051000 Honeywell 51506534-101	2,402 - 2,482	99.08	5	0	0.062	1.00	0.062333
Integral Co-Located	Omni	SMARTANT HON04-052160 Honeywell 51506534-100	2,402 - 2,482	99.08	5	0	0.062	1.00	0.062333
Remote Not Co-Located	Omni	Hyperlink HGV-2409U Honeywell 50018414-001	2,402 - 2,483	90.36	8	0.9	0.092	1.00	0.092195
Remote Not Co-Located	Sector 120 deg.	Hyperlink HG2414P-120	2,402 - 2,484	90.36	14	0.9	0.367	1.00	0.367034
Remote Not Co-Located	Right Hand Circular Polarized Patch	Hyperlink HG2409PCR-NF	2,402 - 2,483	90.36	8	0.9	0.092	1.00	0.092195
Remote Not Co-Located	Left Hand Circular Polarized Patch	Hyperlink HG2409PCL-NF	2,402 - 2,483	90.36	8	0.9	0.092	1.00	0.092195

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.367034
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.062333

FCC ID: S57-DCMA-82
Industry Canada ID: 5731-DCMA82

802.11 (a,b,g) Bridge/Mesh Radio

Application	Antenna Type	Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
			(MHz)	(mW)	(dBi)	(dB)	(mW/cm ²)	(mW/cm ²)	
Integral Co-Located	Omni	Air802 ANOM245XM	2,412 - 2,462	147	3.5	0	0.065	1.00	0.065471
Integral Co-Located	Omni	Air802 ANOM245XM	5,745 - 5,825	446.68	5.3	0	0.301	1.00	0.301111
Integral Co-Located	Omni	SmartAnt SAA05-220920	2,412 - 2,462	147	5.5	0	0.104	1.00	0.103764
Integral Co-Located	Omni	SmartAnt SAA05-220920	5,745 - 5,825	330	8.5	0	0.465	1.00	0.464776
Remote Not Co-Located	Omni	Hyperlink HGV2409U	2,412 - 2,462	120	8	0.9	0.122	1.00	0.122437
Remote Not Co-Located	Omni	Hyperlink HG5812U-PRO	5,745 - 5,825	234.42	12	1.8	0.488	1.00	0.488343
Remote Not Co-Located	Sector 120 deg.	Hyperlink HG2414SP-120	2,412 - 2,462	88.2	14	2.4	0.254	1.00	0.253629
Remote Not Co-Located	Sector 90 deg.	Hyperlink HG5817P-090	5,745 - 5,825	75.86	17	1.8	0.500	1.00	0.499739
Remote Not Co-Located	Yagi 19 deg.	Telex 5816AB	5,745 - 5,825	75.86	16.5	1.8	0.445	1.00	0.445393

NOTE: The max peak conducted output power has been reduced from what was tested, in order to comply with MPE limits. This has been accounted for in the professional installation guide EIRP limits.

Also, the SmartAnt SAA05-220920 was originally tested assuming a worst case gain of 5.5dBi @ 2.4GHz and 8.5 dBi @ 5GHz. The actual gain values are 4dBi @ 2.4GHz and 7dBi @ 5GHz. Refer to Honeywell document 51506534.

This has also been accounted for in the professional installation guide. However, for the MPE calculations the worst case gain values have been used.

Application	Antenna Type	Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 100 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
Remote Not Co-Located Fixed Point to Point	Dish 9 deg.	Hyperlink HG5824D	5,745 - 5,825	446.68	24	1.8	0.590	1.00	0.589911

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.589911
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.464776

FCC ID: S57-DCMA-82
Industry Canada ID: 5731-DCMA82

802.11 (a,b,g) Access Point

Application	Antenna Type	Antenna Part No.	Transmit Frequency (MHz)	Max Peak Conducted Output Power (mW)	Antenna Gain (dBi)	Minimum Antenna Cable Loss (dB)	Power Density @ 20 cm (mW/cm ²)	General Population Exposure Limit from 1.1310 (mW/cm ²)	Ratio of Power Density to the Exposure Limit
Integral Co-Located	Omni	Air802 ANOM245XM	2,412 - 2,462	147	3.5	0	0.065	1.00	0.065471
Integral Co-Located	Omni	Air802 ANOM245XM	5,745 - 5,825	446.68	5.3	0	0.301	1.00	0.301111
Integral Co-Located	Omni	SmartAnt SAA05-220920	2,412 - 2,462	147	5.5	0	0.104	1.00	0.103764
Integral Co-Located	Omni	SmartAnt SAA05-220920	5,745 - 5,825	330	8.5	0	0.465	1.00	0.464776
Remote	Omni	Hyperlink HGV2409U	2,412 - 2,462	120	8	0.9	0.122	1.00	0.122437
Remote	Omni	Hyperlink HG5812U-PRO	5,745 - 5,825	234.42	12	1.8	0.488	1.00	0.488343
Not Co-Located	Sector 120 deg.	Hyperlink HG2414SP-120	2,412 - 2,462	88.2	14	2.4	0.254	1.00	0.253629
Not Co-Located	Sector 90 deg.	Hyperlink HG5817P-090	5,745 - 5,825	75.86	17	1.8	0.500	1.00	0.499739
Not Co-Located	Yagi 19 deg.	Telex 5816AB	5,745 - 5,825	75.86	16.5	1.8	0.445	1.00	0.445393

NOTE: The max peak conducted output power has been reduced from what was tested, in order to comply with MPE limits. This has been accounted for in the professional installation guide EIRP limits.

Also, the SmartAnt SAA05-220920 was originally tested assuming a worst case gain of 5.5dBi @ 2.4GHz and 8.5 dBi @ 5GHz. The actual gain values are 4dBi @ 2.4GHz and 7dBi @ 5GHz. Refer to Honeywell document 51506534.

This has also been accounted for in the professional installation guide. However, for the MPE calculations the worst case gain values have been used.

Application	Antenna Type	Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 100 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
Remote Not Co-Located Fixed Point to Point	Dish 9 deg.	Hyperlink HG5824D	5,745 - 5,825	446.68	24	1.8	0.590	1.00	0.589911

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.589911
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.464776

MPE Estimates for Self Co-located Device

DSSS Radio Worst Case Ratio of Power Density to the Exposure Limit	802.11 (a,b,g) Bridge/Mesh Radio Worst Case Ratio of Power Density to the Exposure Limit	802.11 (a,b,g) Access Point/Client Radio Worst Case Ratio of Power Density to the Exposure Limit	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios	
0.06233	0.46478	0.46478	0.99189	1.0	PASS

The results shown in the above table are equivalent to the Sum of the EIRP of the Two Co-located Transmitters (EIRP TX1 + EIRP TX2) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequencies against different exposure limits.

RF Safety Statement:

To comply with FCC's and Industry Canada's RF exposure requirements, the following antenna installation and device operating configurations must be satisfied.

- Remote Point-to-Multi-Point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20cm and a separation distance of at least 20cm from all persons.
- Remote Fixed Point-to-Point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20cm and a separation distance of at least 100cm from all persons.
- Furthermore, when using integral antenna(s) the Multinode unit must not be co-located with any other antenna or transmitter device and have a separation distance of at least 20cm from all persons.