MPE Estimates

FCC ID: S57 – WNMNFHSS
Industry Canada ID: 573I – WNMNFHSS

Papp = (Pxmit*Glinear)/4*pi*d²
Glinear = antilog(Gdbi/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/cm²)	(mW/cm²)	
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

FCC ID: S57 – WNMNCM9
Industry Canada ID: 573I – WNMNCM9

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/cm²)	(mW/cm²)	
Integral **Co-Located**	Omni	SMARTANT SAA04-220080	2,412 - 2,462	57.28	4.5	0	0.032	1.00	0.032117
Integral **Co-Located**	Omni	SMARTANT SAA04-220080	5,745 - 5,825	264.24	7	0	0.263	1.00	0.263469
Remote Not Co-Located	Omni	Hyperlink HGV2409U	2,412 - 2,462	57.28	8	0.9	0.058	1.00	0.058443
Remote Not Co-Located	Omni	Hyperlink HG5812U-PRO	5,745 - 5,825	264.24	12	1.8	0.550	1.00	0.550464
Remote Not Co-Located	Sector 120 deg.	Hyperlink HG2414SP-120	2,412 - 2,462	57.28	14	2.4	0.165	1.00	0.164715
Remote Not Co-Located	Sector 90 deg.	Hyperlink HG5817P-090	5,745 - 5,825	73.11	17	1.8	0.482	1.00	0.481623
Remote Not Co-Located	Yagi 19 deg.	Telex 5816AB	5,745 - 5,825	73.11	16.5	1.8	0.429	1.00	0.429247

NOTE: Power Density is calculated based on a 100cm separation distance, for fixed point to point applications.

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	264.24	24	1.8	0.349	1.00	0.348970

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.550464
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.263469

FCC ID: S57 – WNMNCM9
Industry Canada ID: 573I – WNMNCM9

802.11 (a,b,g) Access Point / Client 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/cm²)	(mW/cm²)	
Integral **Co-Located**	Omni	SMARTANT SAA04-220080	2,412 - 2,462	57.28	4.5	0	0.032	1.00	0.032117
Integral **Co-Located**	Omni	SMARTANT SAA04-220080	5,745 - 5,825	264.24	7	0	0.263	1.00	0.263469
Remote Not Co-Located	Omni	Hyperlink HGV2409U	2,412 - 2,462	57.28	8	0.9	0.058	1.00	0.058443
Remote Not Co-Located	Omni	Hyperlink HG5812U-PRO	5,745 - 5,825	264.24	12	1.8	0.550	1.00	0.550464
Remote Not Co-Located	Sector 120 deg.	Hyperlink HG2414SP-120	2,412 - 2,462	57.28	14	2.4	0.165	1.00	0.164715
Remote Not Co-Located	Sector 90 deg.	Hyperlink HG5817P-090	5,745 - 5,825	73.11	17	1.8	0.482	1.00	0.481623
Remote Not Co-Located	Yagi 19 deg.	Telex 5816AB	5,745 - 5,825	73.11	16.5	1.8	0.429	1.00	0.429247

NOTE: Power Density is calculated based on a 100cm separation distance, for fixed point to point applications.

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	264.24	24	1.8	0.349	1.00	0.348970

Overall Worst Case Ratio of Power Density to the Exposure Limit: 0.550464
Worst Case Co-Located Antenna Ratio of Power Density to the Exposure Limit: 0.263469

MPE Estimates for Self Co-located Device

FHSS 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**	
0.06050	**0.26347**	**0.26347**	**0.58743**	**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.***

Fixed

- Fixed – In an RF exposure context, fixed means a "fixed location" where the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location.
  - Licensed Fixed Systems
    - generally have RF exposure issues addressed at the time of licensing under 47 CFR §1.1307(b)(3).
    - Do not require MPE evaluation for certification if the station is licensed.
    - May require MPE in such cases where the transmitter is under the license of a base station etc.
  - Part 15 “Fixed Systems”
    - Since there is not licensing, the system must have an MPE evaluation.
    - Highest gain antenna must be evaluated.

Mobile

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
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
1500-100,000	--	--	1.0	30

f = frequency in MHz

*Plane-wave equivalent power density