RF Exposure: MPE Calculation

Product: 802.11n 2x2 MIMO mini PCI module
Applicant: Meraki Networks
FCC ID: UDX-62009015

The referenced RF module will not be sold to the general public, rather, Meraki will use the module in its access point products, which will use external mount antennas. Meraki controls the design, manufacture, and distribution of its AP products.

The MPE calculations below show worst case MPE for each antenna at each band. Meraki plans to produce an AP that will incorporate 3 of the referenced radio modules. Worst case from an RF exposure situation, the radio modules can operate simultaneously at 2.4 GHz, 5.1 GHz, and 5.8 GHz. In at least one anticipated configuration, antenna separation will be less than 20 cm, when monopole antennas are used for all three radios. All other antenna mountings will result in separations greater than 20 cm.

For transmissions with co-located antennas less than 20cm apart, the three sets of 2x2 antennas can be considered as a point source, and the three RF power densities at 20 cm are then summed and compared to the limit. Data shows the total exposure from the three radios operating with co-located monopole antennas is 0.17 mW/cm2, below the 1.0 mW/cm2 limit in the Rules for a mobile device.

Meraki Backbone									
FCC ID: UDX-62009015									
802.11n AP					**Calculate mW/cm2 here. Enter frequency in MHz:**				
RF Hazard Distance Calculation					Calculation of Limits from 1.1310 Table 1				
								Controlled	Uncontrolled
								Ave 6 min	Ave 30 min
mW/cm2 from Table1:		**1.00**			F(MHz)	**Actual F, MHz**		Occ, mW/c2	Gen, mW/cm2
					0.3-3	0.5		100.0	100.0
Max RF Powe	TX Antenna	MPE distance	S, mW/cm@	Comment	*3.0 - 30.0*	*5*		*180.0*	*36.0*
P, dBm	G, dBi	cm	at 20 cm		**30.0-300**	**55**		**1.0**	**0.2**
					300-1500	*902*		*3.0*	*0.60*
21.87	3.00	4.9	0.06	2.4 GHz dual mono	1500-100000	5555		5.0	1.0
21.87	2.5	4.7	0.05	2.4 GHz dual band mono					
21.87	11.5	13.1	0.43	2.4 GHz H/V dual pol					
17.00	19.0	17.8	0.79	2.4 GHz panel	**Enter P(mW)**	Equivalent dBr	**Enter dBm**	Equivalent Watts	
21.17	4.0	5.1	0.07	5.8GHz mono					
21.17	5.0	5.7	0.08	5.8GHz dual band mono					
21.17	14.5	17.1	0.73	5GHz H/V dual pol					
21.17	5.0	5.7	0.08	5.8GHz dual band mono					
16.60	5.0	3.4	0.03	5.15 GHz dual band mono					
21.87	3.0	4.9	0.06	2.4GHz mono					
			0.17	Worst case co located					
Basis of Calculations:					***1000***	**30.00**	***30.00***	1000.0	
E^2/3770 = S, mW/cm2									
E, V/m = (Pwatts*Ggain*30)^.5/d, meters									
d = ((Pwatts*G*30)/3770*S))^0.5			Pwatts*Ggain = 10^(PdBm-30+GdBi)/10)						
S@20cm = 20 log (MPE dist/20cm)									
NOTE: For mobile or fixed location transmitters, minimum separation distance is for FCC compliance is 20 cm,									
even if calculations indicate MPE distance is less									