Airgo 1200 AP True MIMO Access Point
FCC ID: SA3-AGN1202AP0000

MPE Calculations

The EUT has two radio boards , one operating at 2.4 GHz, the other operating at 5 GHz. Each radio uses 3 antennas in MIMO (multiple in, multiple out) configuration. Two of the antennas are transmit/receive, the third antenna is receive only. The receive only antenna is the center antenna of each triplet.

Each transmit antenna is fed half the total radio output power at that frequency.

The maximum RF exposure will be when both transmitter cards are transmitting data at their highest power settings.

Maximum Power output:

2.4 GHz: 25.13 dBm (2412 MHz in 802.11g mode)
5 GHz: 25.28 dBm (5745 MHz DTS)

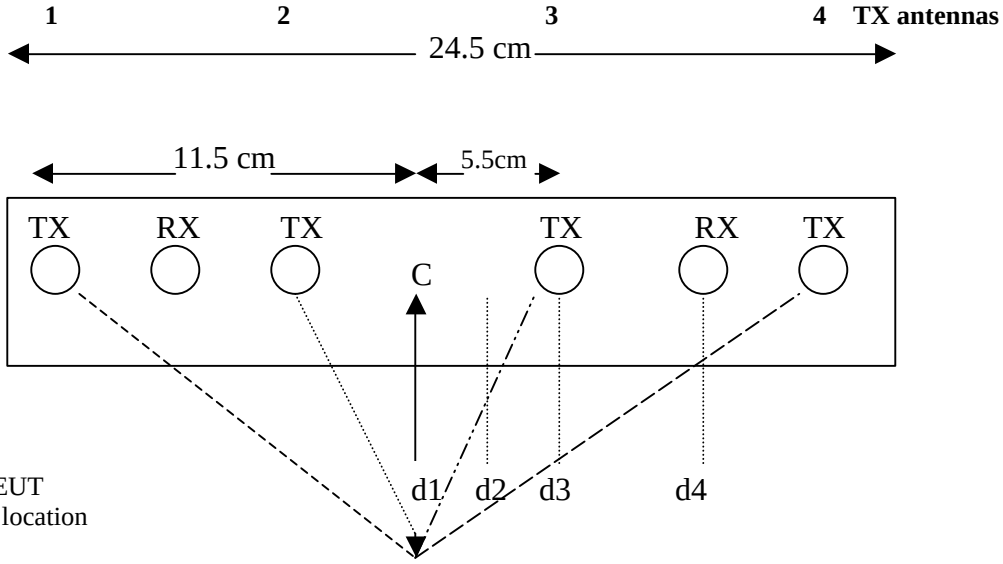
Antenna gain, 2.4GHz: 2 dBi
Antenna gain, 5 GHz: 3 dBi

One-half power 2.4 GHz: 22.13 dBm
One-half power 5 GHz: 22.28 dBm

Maximum EIRP from each 2.4 GHz transmit antenna is 22.13 + 2 = 24.13 dBm EIRP
Maximum EIRP from each 5 GHz transmit antenna is 22.28 + 3 = 25.28 dBm EIRP

To determine the overall exposure at 20 cm from the EUT, the contribution from each antenna will be added and then compared to the limit of 1 mW/cm^2

TOP VIEW EUT



C: center of EUT
d1-d4: 20cm location

d1 to d2: 0.75 cm d2 to d3: 4.75cm d3 to d4: 3cm

Since the antennas are symmetrical around the center of the EUT, and the EIRPs are almost identical for each radio, a point 20 cm from the center of the EUT is intuitively the point at which all antennas are at their minimum separation distance, meaning the greatest field strength contribution will be located here. This is the result of a number of iterations of the calculation spread sheet, choosing different locations along the length of the EUT for exposure points. Power density decreases as the square of the separation distance, so that even if the 20 cm point is directly in front of one of the antennas, the contributions from the other antennas are less.

Antenna 1 distance to d1: $(11.5^2 + 20^2)^{0.5}$ = 23.1cm = 0.231m
Antenna 2 distance to d1: $(5.5^2 + 20^2)^{0.5}$ = 20.7 cm = 0.207m
Antenna 3 distance to d1: $(5.5^2 + 20^2)^{0.5}$ = 20.7 cm = 0.207m
Antenna 4 distance to d1: $(11.5^2 + 20^2)^{0.5}$ = 23.1cm = 0.231m

The field strength contribution from each antenna is calculated using the equation

E, V/m = $(30*\text{EIRP,watts})^{0.5}$/separation distance

Maximum EIRP from each 2.4 GHz transmit antenna is 24.13 dBm EIRP = 0.258 watt EIRP
Maximum EIRP from each 5 GHz transmit antenna is 25.28 dBm EIRP = 0.336 watt EIRP

S, mW/cm2 = E/3770 , E in V/m

20 cm exposure distances were calculated for four locations;

d1: 20 cm projected from the center point of the EUT
d2: 20 cm projected from horizontal point at which fields are equal from the two outer antennas
d3: 20 cm projected from the inner 5 GHz antenna
d4: 20 cm projected from the center point between the two 5 GHz antennas.

Refer to Excel spread sheet *AP 1200 MPE calc.xls* for calculations Worst case data was at d1.

Total exposure at d1: 0.01447 mW/cm^2
Limit: 1.00000 mW/cm^2

MPE Calculations for Airgo 1200AP

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Antenna	Slant dist. cm	Slant dist. m	E- field, V/m	Calculated mW/cm2	TX antenna at location
1-d1 dist:	23.1	0.231	12.0	0.00319	2.4 GHz
2-d1 dist:	20.7	0.207	13.4	0.00356	2.4 GHz
3-d1 dist:	23.1	0.207	15.3	0.00407	5 GHz
4-d1 dist:	20.7	0.231	13.7	0.00365	5 GHz
Total at 20 cm from d1:				**0.01447 mW/cm2**	
1-d2 dist:	22.7	0.227	12.3	0.00325	2.4 GHz
2-d2 dist:	20.6	0.206	13.5	0.00359	2.4 GHz
3-d2 dist:	21.0	0.210	15.2	0.00402	5 GHz
4-d2 dist:	23.5	0.235	13.5	0.00359	5.Ghz
Total at 20cm from d2:				**0.01400 mW/cm2**	
1-d3 dist:	26.2	0.262	10.6	0.00281	2.4 GHz
2-d3 dist:	22.8	0.228	12.2	0.00323	2.4 GHz
3-d3 dist:	20.0	0.200	15.9	0.00421	5 GHz
4-d3 dist:	20.9	0.209	15.2	0.00403	5 GHz
Total at 20cm from d3:				**0.01429 mW/cm2**	
1-d4 dist:	28.3	0.283	9.8	0.00261	2.4 GHz
2-d4 dist:	24.4	0.244	11.4	0.00302	2.4 GHz
3-d4 dist:	20.2	0.202	15.7	0.00416	5 GHz
4-d4 dist:	20.2	0.202	15.7	0.00416	5 GHz
Total at 20 cm from d4::				**0.01396 mW/cm2**	