



Engineering Analysis MPE for 5 GHz Transceiver

FCC ID: RAR20005002

BelAir Networks

This analysis was performed as part of the FCC certification requirements for spread spectrum devices, according to the requirements of: FCC part 15, and FCC OET Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields".

- Module RAR20005002 will be mounted in BelAir Networks host units and will be professionally installed (Fixed) to provide a minimum separation distance from all persons as detailed in co-location compliance tables below.
- Module RAR20005002 may be co-located with other modules in BelAir Networks products as shown in the co-location compliance tables below. Worst-case configurations are shown below.
- This device will only be operated according to the exposure conditions described in this application.
- End users and installers will be provided with antenna installation and transmitter operating conditions for satisfying RF exposure compliance.

The measured worst-case transmit power yielding the worst-case EIRP were used for the MPE calculations. Calculations were performed based on FCC OET Bulletin 65. The calculations are performed based on the following formula provided in OET 65:

$$S = EIRP / (4\pi R^2).$$

Co-location compliance for multiple frequency exposure criteria to the power density exposure limit is detailed in the table below. This calculation is a worst-case analysis since it assumes all devices are continuously transmitting. The device utilizes the 802.11 WLAN protocol which operates in time-division duplex (TDD) mode, so the transmit duty cycle can never be 100% in normal operation. It is also assumed that all directional antennas are aligned to point in the same direction so that power from all radios add.

**Case I: 5.25 – 5.35 GHz, 15 dBi antenna, 1 x RAR20000003 plus 3 x RAR20005002**

Safety distance: 25 cm (9.8 inches)

Case I: 5.25 - 5.35 GHz, 15 dBi antenna

Co-location Compliance for Integrated 802.11b/g & 802.11a Radios										
Safety Distance:		25 cm		(9.8 inches)						
Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Total Density for co-located radios [mW/cm^2]	Limit: General Population / Uncontrolled Exposure [mW/cm^2]			
RAR20000003	35.5	0.452	1	30	RAR20005002	0.127	3	0.834	1	Complies

Case II: 5.725 – 5.850 GHz, 15 dBi antenna, 1 x RAR20000003 plus 3 x**RAR20005002**

Safety Distance: 33 cm (13 inches)

Case II: 5.725 - 5.850 GHz, 15 dBi antenna

Co-location Compliance for Integrated 802.11b/g & 802.11a Radios										
Safety Distance:		33 cm		(13.0 inches)						
Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Total Density for co-located radios [mW/cm^2]	Limit: General Population / Uncontrolled Exposure [mW/cm^2]			
RAR20000003	35.5	0.259	1	35	RAR20005002	0.231	3	0.953	1	Complies

Case III: 5.725 – 5.850 GHz, 15 dBi antennas, 1 x RAR20000003 plus 1 x**RAR20001003**

Safety Distance: 25 cm (9.8 inches)

Case III: 5.25 - 5.35 and 5.725 - 5.850 GHz, 15 dBi antenna, single BRM

Co-location Compliance for Integrated 802.11b/g & 802.11a Radios										
Safety Distance:		25 cm		(9.8 inches)						
Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Worst-case Total EIRP [dBm]	Max Power Density [mW/cm^2]	Maximum Number of Radios	Total Density for co-located radios [mW/cm^2]	Limit: General Population / Uncontrolled Exposure [mW/cm^2]			
RAR20000003	35.5	0.452	1	35	RAR20005002	0.403	1	0.854	1	Complies

The equipment therefore fulfills the requirements on power density for general population/uncontrolled exposure and therefore complies with the requirements of FCC Part 15.247 (b) (4) and FCC Bulletin 65.