BelAir Networks Inc.
603 March Road
Kanata, Ontario
Canada K2K 2M5
www.belairnetworks.com

**B5CH118AA**

# B5CH118AA-A A01 Product Manual
# DRU 5 GHz WLAN Radio Module

| | |
|---|---|
| Document Date: | Sept 8, 2011 |
| Document Number: | B5CH118AA |
| Document Version Number: | 1 |
| Document Status: | Release |

# Contents



# About this Document

This document is a product manual for the DRU 5 GHz WLAN Radio Module, including its limitations on use in any product marketed or offered for sale. It is intended as a supplement to training and documentation by BelAir Networks Inc. or its authorized agents.

# Introduction

The B5CH118AA (hereafter referred to as “the module”) is a 5 GHz radio module compatible with the IEEE 802.11 standard for Wireless LAN operation. It is designed to be interoperable with WLAN products which are based on Orthogonal Frequency Division Multiplexing (OFDM) radio technology.

The module contains a complete IEEE 802.11a/n radio and Medium Access Control (MAC) protocol engine which allows implementation of an IEEE 802.11a/n access point (AP).

The module is not intended for stand-alone operation. It will only be marketed as a complete product, in conjunction with a package, DC power supply and antennas (hereafter referred to as “the product” or the “final product”).

The module can be used in the 5 GHz ISM unlicensed bands.

Since the module has a BelAir networks proprietary digital interface, it cannot be directly connected to any standard telecommunications or computer devices. It can only be used with final products designed and authorized specifically for that purpose.

# Conditions of Use

## General Conditions of Use

This manual is intended to supplement training provided by BelAir Networks or authorized parties. The module B5CH118AA is only intended for use in BelAir Networks products and is not for sale to the general public as a stand-alone module.

Please read this entire document, including the Regulatory Statements section before attempting to install or operate the module.

**Warning:** Any use of B5CH118AA in any manner which is not expressly specified within this manual or specifically approved by BelAir Networks or its authorized agents will void the user's right to operate this module, and is expressly forbidden by BelAir Networks. This includes any modification of the module, installation of the module in a configuration or used with antennas which are not expressly listed in this document or approved by BelAir Networks.

## Country of Use

B5CH118AA is certified with limited modular approval for use as an Intentional Radiator in the United States as device: FCC ID: RAR50005001 and in Canada as IC: 4674A-50005001. Please read all regulatory statements at the end of this document before any attempt to install or operate this module.

The module is only certified for operation in the United States and Canada. Before attempting to install and operate this module in any other country, contact BelAir Networks for approval.

## Module Labeling

One or more labels are applied to the module during manufacture, including a label which identifies the FCC and Industry Canada identification numbers. Do not attempt to remove any labels from the module.

# Module Installation and Service

## Installation into a Product

The module shall only be installed by a technician trained by BelAir Networks or its authorized agents. It should only be installed into an approved product (see above) following all manufacturing and service procedures for that product. The module should only be installed into a final product in a manufacturing or service depot site.

**Caution:** B5CH118AA is an electro-static discharge (ESD) sensitive device. All appropriate ESD measures must be taken when handling the module. Failure to employ appropriate ESD protection may damage the module.

## Module Service

The module is not intended as a field-serviceable unit. It contains no field-replaceable or field-serviceable parts, or any external adjustable mechanisms. The module should only be serviced in a manufacturing or service depot site approved by BelAir Networks or its authorized agents.

# Final Product Requirements

The requirements below apply to any final product in which the B5CH118AA module is installed.

## Antenna Usage and Module Transmit Power

The DRU 5GHz radio module supports MIMO 3x3 configuration with three transmit chains and three receive chains. The B5CH118AA module shall only be used at the following output power levels in conjunction with the following antenna types as outlined in the tables that follow.

## 5725-5850 MHz – Part 15 Subpart E

For operation in the 5725-5850 MHz NII band, the B5CH118AA may be set to operate on 20 MHz.

**Table 8.3-2:** Power and EIRP results for 3x3 MIMO 802.11n (SM-MIMO and STBC operation)

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 154.195 | 139.172 | 143.151 | 26.40 | 30.00 | 3.60 | 6.50 | 0.5 | 32.40 | 36.0 | 3.60 |
| 5800 | 214.642 | 205.475 | 159.745 | 27.63 | 30.00 | 2.37 | 6.50 | 0.5 | 33.63 | 36.0 | 2.37 |
| 5825 | 213.854 | 182.772 | 181.802 | 27.62 | 30.00 | 2.38 | 6.50 | 0.5 | 33.62 | 36.0 | 2.38 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

# 5725-5850 MHz – Part 15.247 Subpart C

For operation in the 5725-5850 MHz ISM band, the B5CH118AA may be set to operate on 20 MHz and 40 MHz channel bandwidths.

## POINT-TO-MULTIPOINT (MAXIMUM OUTPUT POWER SHOWN AS PTX):

**Table 8.3-1:** Power and EIRP results for not correlated 3×3 MIMO, 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | 219.048 | 218.375 | 28.43 | 30.00 | 1.57 | 6.50 | 0.5 | 34.43 | 36.0 | 1.57 |
| | 5800 | 308.397 | 266.877 | 251.935 | 29.18 | 30.00 | 0.82 | 6.50 | 0.5 | 35.18 | 36.0 | 0.82 |
| | 5825 | 252.477 | 245.572 | 238.694 | 28.67 | 30.00 | 1.33 | 6.50 | 0.5 | 34.67 | 36.0 | 1.33 |
| 40 | 5750 | 179.904 | 145.592 | 152.486 | 26.79 | 30.00 | 3.21 | 6.50 | 0.5 | 32.79 | 36.0 | 3.21 |
| | 5790 | 186.413 | 171.952 | 152.800 | 27.09 | 30.00 | 2.91 | 6.50 | 0.5 | 33.09 | 36.0 | 2.91 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))
- Combined 3 antennae gain (dBi) = 6.5 [dBi] + 10×$Log_{10}$(3) = 11.27 dBi
- Limit (dBm) = 30 − ((11.27 − 0.5) − (6.5 − 0.5)) = 30 − (10.77 − 6.0) = 25.23 dBm

**Table 8.3-2:** Power and EIRP results for not correlated 3×3 MIMO, 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 170.876 | 150.168 | 152.800 | 26.76 | 30.00 | 3.24 | 6.50 | 0.5 | 32.76 | 36.0 | 3.24 |
| 5800 | 190.523 | 167.860 | 158.667 | 27.14 | 30.00 | 2.86 | 6.50 | 0.5 | 33.14 | 36.0 | 2.86 |
| 5825 | 154.635 | 145.592 | 152.486 | 26.56 | 30.00 | 3.44 | 6.50 | 0.5 | 32.56 | 36.0 | 3.44 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-3:** Power and EIRP results for correlated 3×3 MIMO (CDD/TXBF), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 114.412 | 98.730 | 109.247 | 25.08 | 25.23 | 0.15 | 11.27 | 0.5 | 35.85 | 36.0 | 0.15 |
| | 5800 | 108.002 | 108.976 | 101.075 | 25.02 | 25.23 | 0.21 | 11.27 | 0.5 | 35.79 | 36.0 | 0.21 |
| | 5825 | 115.169 | 108.231 | 106.576 | 25.18 | 25.23 | 0.05 | 11.27 | 0.5 | 35.95 | 36.0 | 0.05 |
| 40 | 5750 | 118.614 | 98.017 | 100.255 | 25.01 | 25.23 | 0.22 | 11.27 | 0.5 | 35.78 | 36.0 | 0.22 |
| | 5790 | 105.095 | 101.559 | 77.897 | 24.54 | 25.23 | 0.69 | 11.27 | 0.5 | 35.31 | 36.0 | 0.69 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))
- Combined 3 antennae gain (dBi) = 6.5 [dBi] + 10×$Log_{10}$(3) = 11.27 dBi
- Limit (dBm) = 30 − ((11.27 − 0.5) − (6.5 − 0.5)) = 30 − (10.77 − 6.0) = 25.23 dBm

**Table 8.3-4:** Power and EIRP results for correlated 3×3 MIMO (CDD/TXBF), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 108.816 | 97.136 | 105.151 | 24.93 | 25.23 | 0.30 | 11.27 | 0.5 | 35.70 | 36.0 | 0.30 |
| 5800 | 123.704 | 112.594 | 90.544 | 25.14 | 25.23 | 0.09 | 11.27 | 0.5 | 35.91 | 36.0 | 0.09 |
| 5825 | 112.131 | 103.394 | 107.960 | 25.10 | 25.23 | 0.13 | 11.27 | 0.5 | 35.87 | 36.0 | 0.13 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))
- Combined 3 antennae gain (dBi) = 6.5 [dBi] + 10×$Log_{10}$(3) = 11.27 dBi
- Limit (dBm) = 30 − ((11.27 − 0.5) − (6.5 − 0.5)) = 30 − (10.77 − 6.0) = 25.23 dBm

**Table 8.3-5:** Power and EIRP results for correlated 2×3, 2×2 MIMO (CDD/TXBF), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | 219.048 | N/A | 26.79 | 27.00 | 0.21 | 9.50 | 0.5 | 35.79 | 36.0 | 0.21 |
| | 5800 | 248.781 | 223.106 | N/A | 26.74 | 27.00 | 0.26 | 9.50 | 0.5 | 35.74 | 36.0 | 0.26 |
| | 5825 | 252.477 | 245.572 | N/A | 26.97 | 27.00 | 0.03 | 9.50 | 0.5 | 35.97 | 36.0 | 0.03 |
| 40 | 5750 | 179.904 | 145.592 | N/A | 25.13 | 27.00 | 1.87 | 9.50 | 0.5 | 34.13 | 36.0 | 1.87 |
| | 5790 | 186.413 | 171.952 | N/A | 25.54 | 27.00 | 1.46 | 9.50 | 0.5 | 34.54 | 36.0 | 1.46 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))
- Combined 2 antennae gain (dBi) = 6.5 [dBi] + 10×$Log_{10}$(2) = 9.5 dBi
- Limit (dBm) = 30 − ((9.5 − 0.5) − (6.5 − 0.5)) = 30 − (9.0 − 6.0) = 27.00 dBm

**Table 8.3-6:** Power and EIRP results for correlated 2×3, 2×2 MIMO (CDD/TXBF), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 170.876 | 150.168 | N/A | 25.07 | 27.00 | 1.93 | 9.50 | 0.5 | 34.07 | 36.0 | 1.93 |
| 5800 | 190.523 | 167.860 | N/A | 25.54 | 27.00 | 1.46 | 9.50 | 0.5 | 34.54 | 36.0 | 1.46 |
| 5825 | 154.635 | 145.592 | N/A | 24.77 | 27.00 | 2.23 | 9.50 | 0.5 | 33.77 | 36.0 | 2.23 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))
- Combined 2 antennae gain (dBi) = 6.5 [dBi] + 10×$Log_{10}$(2) = 9.5 dBi
- Limit (dBm) = 30 − ((9.5 − 0.5) − (6.5 − 0.5)) = 30 − (9.0 − 6.0) = 27.00 dBm

**Table 8.3-7:** Power and EIRP results for correlated 1×3, 1×2, 1×1 MIMO (CDD/TXBF), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | N/A | N/A | 24.13 | 30.00 | 5.87 | 6.50 | 0.5 | 30.13 | 36.0 | 5.87 |
| | 5800 | 308.397 | N/A | N/A | 24.89 | 30.00 | 5.11 | 6.50 | 0.5 | 30.89 | 36.0 | 5.11 |
| | 5825 | 252.477 | N/A | N/A | 24.02 | 30.00 | 5.98 | 6.50 | 0.5 | 30.02 | 36.0 | 5.98 |
| 40 | 5750 | 179.904 | N/A | N/A | 22.55 | 30.00 | 7.45 | 6.50 | 0.5 | 28.55 | 36.0 | 7.45 |
| | 5790 | 186.413 | N/A | N/A | 22.70 | 30.00 | 7.30 | 6.50 | 0.5 | 28.70 | 36.0 | 7.30 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-8:** Power and EIRP results for correlated 1×3, 1×2, 1×1 MIMO (CDD/TXBF), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 152.800 | N/A | N/A | 152.800 | 22.33 | 30.00 | 7.67 | 6.50 | 0.5 | 28.33 | 36.0 |
| 5800 | 158.667 | N/A | N/A | 158.667 | 22.80 | 30.00 | 7.20 | 6.50 | 0.5 | 28.80 | 36.0 |
| 5825 | 152.486 | N/A | N/A | 152.486 | 21.89 | 30.00 | 8.11 | 6.50 | 0.5 | 27.89 | 36.0 |

– Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
– EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-9:** Power and EIRP results for correlated 3×3 MIMO (STBC/STC), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | 219.048 | 218.375 | 28.43 | 30.00 | 1.57 | 6.50 | 0.5 | 34.43 | 36.0 | 1.57 |
| | 5800 | 308.397 | 266.877 | 251.935 | 29.18 | 30.00 | 0.82 | 6.50 | 0.5 | 35.18 | 36.0 | 0.82 |
| | 5825 | 252.477 | 245.572 | 238.694 | 28.67 | 30.00 | 1.33 | 6.50 | 0.5 | 34.67 | 36.0 | 1.33 |
| 40 | 5750 | 179.904 | 145.592 | 152.486 | 26.79 | 30.00 | 3.21 | 6.50 | 0.5 | 32.79 | 36.0 | 3.21 |
| | 5790 | 186.413 | 171.952 | 152.800 | 27.09 | 30.00 | 2.91 | 6.50 | 0.5 | 33.09 | 36.0 | 2.91 |

– Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
– EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-10:** Power and EIRP results for correlated 3×3 MIMO (STBC/STC), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 170.876 | 150.168 | 152.800 | 26.76 | 30.00 | 3.24 | 6.50 | 0.5 | 32.76 | 36.0 | 3.24 |
| 5800 | 190.523 | 167.860 | 158.667 | 27.14 | 30.00 | 2.86 | 6.50 | 0.5 | 33.14 | 36.0 | 2.86 |
| 5825 | 154.635 | 145.592 | 152.486 | 26.56 | 30.00 | 3.44 | 6.50 | 0.5 | 32.56 | 36.0 | 3.44 |

– Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
– EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-11:** Power and EIRP results for correlated 2×3, 2×2 MIMO (STBC/STC), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | 219.048 | N/A | 26.79 | 30.00 | 3.21 | 6.50 | 0.5 | 32.79 | 36.0 | 3.21 |
| | 5800 | 308.397 | 266.877 | N/A | 27.60 | 30.00 | 2.40 | 6.50 | 0.5 | 33.60 | 36.0 | 2.40 |
| | 5825 | 252.477 | 245.572 | N/A | 26.97 | 30.00 | 3.03 | 6.50 | 0.5 | 32.97 | 36.0 | 3.03 |
| 40 | 5750 | 179.904 | 145.592 | N/A | 25.13 | 30.00 | 4.87 | 6.50 | 0.5 | 31.13 | 36.0 | 4.87 |
| | 5790 | 186.413 | 171.952 | N/A | 25.54 | 30.00 | 4.46 | 6.50 | 0.5 | 31.54 | 36.0 | 4.46 |

– Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
– EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-12:** Power and EIRP results for correlated 2×3, 2×2 MIMO (STBC/STC), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 170.876 | 150.168 | N/A | 25.07 | 30.00 | 4.93 | 6.50 | 0.5 | 31.07 | 36.0 | 4.93 |
| 5800 | 190.523 | 167.860 | N/A | 25.54 | 30.00 | 4.46 | 6.50 | 0.5 | 31.54 | 36.0 | 4.46 |
| 5825 | 154.635 | 145.592 | N/A | 24.77 | 30.00 | 5.23 | 6.50 | 0.5 | 30.77 | 36.0 | 5.23 |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

## POINT-TO-POINT (MAXIMUM OUTPUT POWER SHOWN AS PTX):

**Table 8.3-13:** Power and EIRP results for correlated 3×3 MIMO (TXBF), 802.11n

| Channel bandwidth (MHz) | Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5740 | 258.978 | 219.048 | 218.375 | 28.43 | 30.00 | 1.57 | 11.27 | 0.5 | 39.20 | N/A | N/A |
| | 5800 | 308.397 | 266.877 | 251.935 | 29.18 | 30.00 | 0.82 | 11.27 | 0.5 | 39.95 | N/A | N/A |
| | 5825 | 252.477 | 245.572 | 238.694 | 28.67 | 30.00 | 1.33 | 11.27 | 0.5 | 39.44 | N/A | N/A |
| 40 | 5750 | 179.904 | 145.592 | 152.486 | 26.79 | 30.00 | 3.21 | 11.27 | 0.5 | 37.56 | N/A | N/A |
| | 5790 | 186.413 | 171.952 | 152.800 | 27.09 | 30.00 | 2.91 | 11.27 | 0.5 | 37.86 | N/A | N/A |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

**Table 8.3-14:** Power and EIRP results for correlated 3×3 MIMO (TXBF), 802.11a

| Frequency (MHz) | Conducted Avg. Power ANT 1 (mW) | Conducted Avg. Power ANT 2 (mW) | Conducted Avg. Power ANT 3 (mW) | Combined Output Power (dBm) | Conducted Output Power Limit (dBm) | Conducted Output Power Margin (dB) | Antenna Gain (dBi) | Cable loss (dB) | EIRP (dBm) | EIRP Limit (dBm) | EIRP Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5740 | 170.876 | 150.168 | 152.800 | 26.76 | 30.00 | 3.24 | 11.27 | 0.5 | 37.53 | N/A | N/A |
| 5800 | 190.523 | 167.860 | 158.667 | 27.14 | 30.00 | 2.86 | 11.27 | 0.5 | 37.91 | N/A | N/A |
| 5825 | 154.635 | 145.592 | 152.486 | 26.56 | 30.00 | 3.44 | 11.27 | 0.5 | 37.33 | N/A | N/A |

- Combined output power (dBm) = 10 $Log_{10}$ (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW) + Conducted Avg. Power ANT-3 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

## Certified Antennas:

The following antennas are certified for use:

| Manufacturer | Part # | Gain (dBi) | Type |
|---|---|---|---|
| BelAir | BMAG00291-A | 6.5 | OMNI |

In order to comply with the FCC and Industry Canada rules in the USA and Canada, respectively, it is required to respect the maximum transmit power limits as follows for each of the antenna types as indicated in the above tables.

**Warning:** Use of this module in conjunction with any antenna not expressly listed above will void authority to install or operate this equipment.

**Warning:** Setting of module transmit power above the limits specified in the above table for a particular combination of antenna type, frequency of operation, and type of usage, will exceed FCC or Industry Canada limits and void authority to install or operate this equipment.

## Product Installation

Products which contain B5CH118AA shall only be installed by professional installers trained by BelAir Networks or its authorized agents. This product is to be installed on fixed permanent structures. In addition to normal installation procedures and good installation practice, professional installers are responsible to ensure that:

1. Only an approved antenna (see above) is connected to the module, and,
2. The antenna is mounted in such a manner and in such a location that access to the antenna by the general population is minimized. Access to the antenna by the general population should be limited to more than the minimum safety distance. This distances are outlined according to product type and whether high gain antennas are used:

| | Max E.I.R.P | Minimum Safety Distance |
|---|---|---|
| **DRUE 2.4 GHz radio** | 37.85 dB | 14.2 inches |
| **DRUE 5 GHz radio** | 39.95 dB | |

Adherence to these rules by the professional installer is mandatory. See full installation procedures for the particular product for details.

## Product Labeling

The following permanent label, or one containing equivalent information, must be affixed in a conspicuous location on the exterior of every product containing this module:

This device ccontains the following:
FCC ID: RAR50002001

# Regulatory Statements

The following regulatory notes apply to the product which contains module B5CH118AA. The following sections or equivalent information shall appear in the user-manual of the final product.

## Regulatory Information and Disclaimers

Installation and use of this device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

The manufacturer is not responsible for any interference to radio or television equipment caused by unauthorized modification of this device, or attachment of any antennas or equipment other than those specified by the manufacturer. The manufacturer or its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

## Manufacturer's FCC Conformity Statement

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Manufacturer's Industry Canada Conformity Statement

This device has been designed to operate with an antenna having a maximum gain of 6.5 dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

This device has been designed to ensure that radio frequency emissions are maintained within the band of operation under all normal operating conditions listed in this manual.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (EIRP) is not more than that required for successful communication.

This Class B Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil a été conçu pour fonctionner avec une antenne avec un gain maximum de 4.5dBi. L'utilisation d' antennes de gain supérieur est strictement défendue selon la réglementation d'Industrie Canada.

Cet appareil a été conçu a garantir que les émissions de fréquences radio soit maintenues dans la bande d'opération sous toutes les conditions énoncé dans ce manuel.

Son utilisation est soumise aux deux conditions suivantes: (1) Cet appareil ne doit pas être la cause d'interférence, et (2) cet appareil doit pouvoir être capable de recevoir toutes sortes d'interférences, incluant l'interférence qui pourrait affecter le bon fonctionnement de cet appareil.

Pour réduire le potentiel d'interférence radio sur d'autres utilisateurs, le type d'antenne et son gain doivent être choisies tel que la Puissance Isotrope Rayonnée Equivalente (PIRE) ne dépasse pas le niveau nécessaire pour une communication efficace.

Cet appareil Digitale de Classe B rencontre toutes les normes du Canadian Interference-Causing Equipment Regulations.

## RF Exposure Statement

This Wireless LAN radio device has been evaluated under FCC Bulletin OET 65C and Health Canada Safety Code 6, and found to be compliant to the requirements set forth in CFR 47 Sections 2.1091, 2.1093, and 15.247 (b) (4) addressing RF exposure from radio frequency devices.

This device complies with IC and FCC RF exposure limits for an uncontrolled environment. The radiated output power of this Wireless LAN device is below the IC and FCC radio frequency exposure limits. However, this device should be installed and used in such a manner that the potential for human contact during normal operation is minimized. In order to comply with RF exposure limits, this equipment should be installed and operated at a minimum distance between the radiator and a human body. This minimum distance is:

| | Max E.I.R.P | Minimum Safety Distance |
|---|---|---|
| **DRUE 2.4 GHz radio** | 37.85 dB | 14.2 inches |
| **DRUE 5 GHz radio** | 39.95 dB | |

Cet appareil radio LAN sans-fils a été évalué par le FCC Bulletin OET 65C and le code de sécurité 6 de santé Canada, et est conforme a toutes les normes de la section FCR 47 Sections 2.1091, 2.1093, and 15.247 (b) (4) qui s'adressent a l'exposition FR d'appareil utilisant des fréquences radios.

Cet appareil se conforme selon IC et FCC RF pour l'exposition maximum dans un environnement non-contrôlé. Le puissance de rayonnement de cet appareil LAN

est dessous les limites d'exposition de fréquences radio selon IC et FCC. Toutefois, cet appareil doit être installé et utilise de manière a limiter au minimum le contact humain durant son utilisation normal. Afin de respecter l'exposition limite des FR, cet appareil doit être installé et utilisé a une distance minimale entre le radiateur et le corps humain. La distance minimale est:

| | Max E.I.R.P | Distance Minimale de Séruité |
|---|---|---|
| **DRUE 2.4 GHz radio** | 37.85 dB | 14.2 inches |
| **DRUE 5 GHz radio** | 39.95 dB | |

**BelAir Networks Inc.**
603 March Road
Kanata, Ontario
Canada
K2K 2M5
**613-254-7070**

**Sales**
sales@belairnetworks.com
**Support**
support@belairnetworks.com
**General Information**
Info@belairnetworks.com