



B2XH094AA

B2XH094AA Product Manual

ERM5 5 GHz WLAN Radio Module

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About this Document

This document is a product manual for the B2XH094AA 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 B2XH094AA (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 module.

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 antenna (hereafter referred to as “the product” or the “final product”).

The module can be used in the 5 GHz NII and DTS 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 B2XH094AA 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 B2XH094AA 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 an antenna which is not expressly listed in this document or approved by BelAir Networks.

List of Approved Final Products

The B2XH094AA module is only approved for use in the following BelAir Networks products:

- BelAir200. See BelAir200 documentation for complete manufacturing instructions. Includes variants of BelAir200 and BelAir200D.
- BelAir100. See BelAir100 documentation for complete manufacturing instructions. Includes variants of BelAir100, BelAir100T, BelAir100D, BelAir100S, BelAir100C, and BelAir100M.

Operation of the module within the products expressly listed above is required to ensure compliance to all FCC and Industry Canada regulations. Any modification of the module, or its use in any configuration not expressly listed above may void the user's right to operate this module.

Country of Use

B2XH094AA is certified with limited modular approval for use as an Intentional Radiator in the United States as device: FCC ID: RAR20051001. 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: B2XH094AA 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 B2CH052AA module is installed.

Antenna Usage and Module Transmit Power

B2XH094AA 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.

5250-5350 MHz – Part 15.247 Subpart E

For operation in the 5250-5350 MHz NII band, the B2XH094AA may be set to operate on 20 or 40 MHz channel bandwidths (B/W).

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

Output Power 20 MHz channel

Freq. (MHZ)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5280	10	17.91	26.91	30.00
5300	10	17.85	26.85	30.00
5320	10	18.20	27.20	30.00
5280	15	13.57	27.57	30.00
5300	15	12.59	26.59	30.00
5320	15	12.57	26.57	30.00

Output Power 40MHz channel

Freq. (MHZ)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5280	10	20.85	29.85	30.00
5320	10	20.88	29.88	30.00
5280	15	15.99	29.99	30.00
5320	15	15.71	29.71	30.00

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

Output Power 20 MHz channel

Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5280	19	7.22	25.22	30.00
5300	19	8.84	26.84	30.00
5320	19	6.18	24.18	30.00
5280	22.5	5.91	27.41	30.00
5300	22.5	5.99	27.49	30.00
5320	22.5	5.64	27.14	30.00
5280	23	4.79	26.79	30.00
5300	23	5.04	27.04	30.00
5320	23	4.68	26.68	30.00
5280	10.5	17.91	27.41	30.00
5300	10.5	17.37	26.87	30.00
5320	10.5	17.65	27.15	30.00
5280	15	13.57	27.57	30.00
5300	15	12.59	26.59	30.00
5320	15	12.57	26.57	30.00

Output Power 40MHz channel

Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5280	19	11.94	29.94	30.00
5320	19	11.30	29.30	30.00
5280	22.5	7.92	29.42	30.00
5320	22.5	7.33	28.83	30.00
5280	23	7.92	29.92	30.00
5320	23	7.88	29.88	30.00
5280	10.5	20.45	29.95	30.00
5320	10.5	20.17	29.67	30.00
5280	15	15.71	29.71	30.00
5320	15	15.71	29.71	30.00

5725-5825 MHz – Part 15.247 Subpart E

For operation in the 5725-5825 MHz NII band, the B2XH094AA may be set to operate on 20 or 40 MHz channel bandwidths (B/W).

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

Output Power 20 MHz channel

Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5745	10	21.90	30.90	36.00
5785	10	21.57	30.57	36.00
5805	10	21.68	30.68	36.00
5745	15	18.77	32.77	36.00
5785	15	18.45	32.45	36.00
5805	15	18.60	32.60	36.00

Output Power 40 MHz channel

Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Limit (dBm)
5765	10	21.10	30.10	36.00
5805	10	14.71	23.71	36.00
5765	15	19.80	33.80	36.00
5805	15	9.67	23.67	36.00

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

20 MHz channel

Freq. (MHz)	G _{ANT} (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)
5745	19	19.26	37.26	53.00
5785	19	21.57	39.57	53.00
5805	19	20.03	38.03	53.00
5745	22.5	18.26	39.76	53.00
5785	22.5	21.57	43.07	53.00
5805	22.5	18.60	40.10	53.00
5745	23	18.26	40.26	53.00
5785	23	21.57	43.57	53.00
5805	23	18.60	40.60	53.00
5745	10.5	21.90	31.40	53.00
5785	10.5	21.57	31.07	53.00
5805	10.5	21.68	31.18	53.00
5745	15	20.63	34.63	53.00
5785	15	21.57	35.57	53.00
5805	15	21.18	35.18	53.00
5745	29	16.84	44.84	53.00
5785	29	21.57	49.57	53.00
5805	29	17.09	45.09	53.00

40 MHz channel

Freq. (MHz)	G _{ANT} (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
5765	19	18.20	36.20	53.00	16.80
5805	19	7.75	25.75	53.00	27.25
5765	22.5	17.12	38.62	53.00	14.38
5785	22.5	18.57	40.07	53.00	12.93
5765	23	17.12	39.12	53.00	13.88
5785	23	18.03	40.03	53.00	12.97
5765	10.5	20.59	30.09	53.00	22.91
5805	10.5	14.81	24.31	53.00	28.69
5765	15	19.80	33.80	53.00	19.20
5805	15	9.67	23.67	53.00	29.33
5765	29	15.85	43.85	53.00	9.15
5785	29	16.34	44.34	53.00	8.66

5725-5850 MHz – Part 15.247 Subpart C

For operation in the 5725–5850 MHz DTS band, the B2XH094AA may be set to operate on 20 or 40 MHz channel bandwidths to the maximum output power (PTX) shown below:

ChBW: 20MHz				ChBW: 40MHz			
Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)	Freq. (MHz)	G _{ANT} (dBi)	PTX Cond. (dBm)	EIRP (dBm)
5740	10	20.93	29.93	5750	10	19.57	28.57
5790	10	21.71	30.71	5790	10	20.02	29.02
5835	10	22.20	31.20	5825	10	20.63	29.63
5740	15	21.70	35.70	5750	15	20.84	34.84
5790	15	21.71	35.71	5790	15	20.02	34.02
5835	15	21.64	35.64	5825	15	20.63	34.63
5740	19	22.68	40.68	5750	19	20.84	38.84
5790	19	21.71	39.71	5790	19	20.02	38.02
5835	19	22.20	40.20	5825	19	20.63	38.63
5740	22.5	22.68	44.18	5750	22.5	20.84	42.34
5790	22.5	21.71	43.21	5790	22.5	20.02	41.52
5835	22.5	22.20	43.70	5825	22.5	20.63	42.13
5740	23	22.68	44.68	5750	23	20.84	42.84
5790	23	21.71	43.71	5790	23	20.02	42.02
5835	23	22.20	44.20	5825	23	20.63	42.63
5740	10.5	22.68	32.18	5750	10.5	20.84	30.34
5790	10.5	21.71	31.21	5790	10.5	20.02	29.52
5835	10.5	22.20	31.70	5825	10.5	20.63	30.13
5740	15	22.68	36.68	5750	15	20.84	34.84
5790	15	21.71	35.71	5790	15	20.02	34.02
5835	15	22.20	36.20	5825	15	20.63	34.63
5740	29	19.17	47.17	5750	29	20.84	48.84
5790	29	19.27	47.27	5790	29	20.02	48.02
5835	29	22.20	50.20	5825	29	20.63	48.63

Certified Antennas:

The following antennas are certified for use:

CERTIFIED ANTENNAS

Manufacturer	Part #	Gain (dBi)	Type	Notes
MAXRAD	MHO515010NM	10	OMNI	
MTI	MT-462008	10	OMNI	
MAXRAD	WISP4959018MBV	15	90 DEGREE SECTOR	
MTI	MT-485001	19	DIRECTIONAL	
HUBER & SUHNER	SPA 5600/9/23/0/V	23	DIRECTIONAL	
BELAIR	BEL10008-A01	15	DIRECTIONAL	
BELAIR	B1BB025AA-A01	10.5	DIRECTIONAL	
MTI	MT-485028/N	22.5	DIRECTIONAL	
MAXRAD	MPRC2449	29	DISH	5725-5850MHz ONLY

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.

* P2P indicates that the rated transmit power is only permissible for use in point-to-point links. For point-to-multipoint or multipoint-to-multipoint links the power must be reduced as shown.

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 B2XH094AA 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,

- 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:

Minimum Safety Distances								
Product	Standard Gain Antennas (up to 15 dBi)				High Gain Antennas (up to 29 dBi)			
RF boards: All valid combinations	ERM1	ERM5	ARM3	PSM2	ERM1	ERM5	ARM3	PSM2
BelAir100, BelAir100C, BelAir100T, BelAir100S, BelAir100M, BelAir100D	up to 15 dBi	up to 15 dBi	Any	9 dBi	up to 23 dBi	up to 29 dBi	Any	25 dBi
Distance	{ 10.6 inches }				{ 54.3 inches }			
BelAir200, BelAir200D	up to 15 dBi	up to 15 dBi	Any	9 dBi	up to 23 dBi	up to 29 dBi	Any	25 dBi
Distance	{ 13.0 inches }				{ 63.0 inches }			
RAR20000003 (ARM3); RAR20008001 (PSM2); RAR20021001 (ERM1); RAR20051001 (ERM5)								

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:

FCC ID: RAR20051001 IC: 4674A-20051001

Regulatory Statements

The following regulatory notes apply to the product which contains module B2XH094AA. 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 29 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.

RF Exposure Statement

This Wireless LAN radio device has been evaluated under FCC Bulletin OET 65C 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 Wireless LAN radio device has been evaluated under FCC Bulletin OET 65C and found to be compliant to the requirements set forth in CFR 47 90.1335 and Sections 2.1091, 2.1093, addressing RF exposure from radio frequency devices.

This device complies with FCC RF radiation exposure limits for an uncontrolled environment. The radiated output power of this Wireless LAN device is below the FCC radio frequency exposure limits. However, this device should still 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 established in the ANSI C95.1 standard, this equipment should be installed and operated at a minimum distance between the radiator and a human body. This minimum distance is:

Minimum Safety Distances								
Product	Standard Gain Antennas (up to 15 dBi)				High Gain Antennas (up to 29 dBi)			
RF boards: All valid combinations	ERM1	ERM5	ARM3	PSM2	ERM1	ERM5	ARM3	PSM2
BelAir100, BelAir100C, BelAir100T, BelAir100S, BelAir100M, BelAir100D	up to 15 dBi	up to 15 dBi	Any	9 dBi	up to 23 dBi	up to 29 dBi	Any	25 dBi
Distance	{ 10.6 inches }				{ 54.3 inches }			
BelAir200, BelAir200D	up to 15 dBi	up to 15 dBi	Any	9 dBi	up to 23 dBi	up to 29 dBi	Any	25 dBi
Distance	{ 13.0 inches }				{ 63.0 inches }			
RAR20000003 (ARM3); RAR20008001 (PSM2); RAR20021001 (ERM1); RAR20051001 (ERM5)								

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