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Abstract:

This document lists the requirements that must be met in order to use the WaveRider 915A Radio in different packages and configurations.

Revision History:

| <u>Date</u> | <u>Rev.</u> | <u>Author</u> | <u>Comments</u> |
|----------------|-------------|---------------|---|
| 24 Mar '06 | A | L. Gordon | Initial Approval for AC to 4.2 VDC power supply; Indoor, and YAGI antennas |
| 27 Mar '06 | B | L. Gordon | Add FCC / IC Warnings, indicate that Radio Module can only to be installed by WaveRider manufacturers |
| 27 Mar. '06 | C | L. Gordon | Correct Antenna gain |

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Appendix A1 INTRODUCTION

The WaveRider 915A Radio is certified by FCC and Industry Canada (IC) under a Limited Modular Approval (FCC ID: OOX-915A and IC ID: 3225B-915A). This means that the radio can be used in various packages and configurations provided the requirements below are met.

These requirements apply to any WaveRider final product using the 915A radio.

Note that this radio under the 915A certifications cannot be sold as a bare board to end-customers or OEMs. Only WaveRider manufactured final products can be sold. As such, this document is intended only for WaveRider or its contractors to act as an ‘installation guide’ for installing the 915A radio into a final product.

Adhering to these requirements will not necessarily ensure compliance to FCC and IC requirements for the final product. If there are any concerns, testing should be done to ensure compliance. For example, the 915A radio meets the FCC and IC Class B unintentional radiator requirements as a standalone unit. If it is combined with other components or radios, the aggregate may not meet the same limits as the standalone unit.

The term “final product” in this document will refer to the product that is sold that incorporates the 915A radio. WaveRider products that use the 915A radio currently includes the EUM2005.

This document will be updated as new configurations are approved for the 915A radio, such as new antenna and power supplies.

The approved configurations are shown in Section 3.

WARNING – Final product (e.g. EUM3005, MMT9000, etc.) user documentation (e.g. Installation Guides, Spec. Sheets) must NOT contain any information about how the 915A radio is installed in the final product nor how to access the radio.

A.11.1 References

- | | |
|---------|---|
| LMA | PART 15 UNLICENSED MODULAR TRANSMITTER APPROVAL, DA 00-1407, June 26, 2000. |
| Part 15 | FCC CFR 47 Part 15 - RADIO FREQUENCY DEVICES, April 5, 2005. |

Appendix B2 REQUIREMENTS

2.1 Regulatory Notices Requirements

Regulatory Notices

This equipment has been tested and found to comply with the limits for a Class B Intentional Radiator, pursuant to Part 15 of the FCC Regulations. These limits are intended to provide protection against harmful interference when the equipment is operated in a residential environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

All versions of this device have been tested using unshielded Ethernet CAT-5 cable.

Notice to User

Any changes or modifications to equipment that are not expressly approved by WaveRider may void the user's authority to operate the equipment.

2.1.1 FCC

The 915A radio has been designed and manufactured to comply with FCC Part 15 under FCC ID: OOX-915A.

Operators must be familiar with the requirements of the FCC Part 15 Regulations prior to operating any link using this equipment. For installations outside the United States, contact local authorities for applicable regulations.

Note: 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.

Interference Environment

Operation is subject to the following conditions:

- This device may not cause harmful interference and,
- This device must accept any interference received, including interference that might cause undesired operation.

Operational Requirements

In accordance with the FCC Part 15 regulations:

1. The maximum average power output of the intentional radiator shall not exceed one (1) watt (30 dBm) for all spread spectrum systems operating in the 902 to 928MHz band.
2. Stations operating in the 902 to 928MHz band may use transmitting antennas of directional gain greater than 6dBi, provided the average output power from the intentional radiator is reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3. The operator of a spread spectrum system and the user of the radio device are each responsible for ensuring that the system is operated in the manner outlined in the section on Interference Environment above.

The 915A radio with its certified antennas complies with these requirements when installed correctly as detailed in this manual.

2.1.2 Industry Canada

The 915A radio has Industry Canada (IC) Certification Number 3225B-915A.

Operators must be familiar with IC RSS-210 and RSS-102. The 915A has been designed and manufactured to comply with IC RSS-210 and RSS-102.

This device has been designed to operate with the antennas listed below and having a maximum antenna system gain of 8.7dB. Antennas not included in this list or having a gain greater than 8.7 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

2.1.3 Installation Warnings

It is the responsibility of the operator to ensure that the public is not exposed to excessive Radio Frequency (RF) levels. The applicable regulations can be obtained from local authorities.

WARNING

To comply with FCC RF exposure limits, the Indoor Antenna must be fix-mounted indoors to provide a separation distance of 20cm (8 inches) or more from all persons to satisfy RF exposure requirements. The outdoor antennas are to be fix-mounted to provide a separation distance of 30 cm (1 ft.) or more from all persons to satisfy RF exposure requirements. The distance is measured from the nearest point of the modem to the human body. It is recommended that the modem be installed in a location with minimal pathway disruption by nearby personnel.

WARNING

Outdoor antennas must be professionally. The installer must understand applicable FCC or Industry Canada rules regarding antennas. Only the approved antenna types with gains up to the specified maximum can be used with the 915A Radio and its final products. Installer must also understand and follow electrical codes that apply to installing outdoor antennas.

2.2 Final Product Installation Guide Requirements

The following notices must appear in any 'final product' installation guides as well as applying to the 915A radio itself. As well, the text of sections 2.1.1, 2.1.2, and 2.1.3 apply to the 915A

radio and any of its final products and should be included in any final product installation guide, edited as appropriate (e.g. use final product name rather than 915A Radio).

The regulatory notices in sections 2.1.1, 2.1.2, and 2.1.3 must be included in the installation guide for the final product edited as appropriate (e.g. use final product name rather than 915A Radio). As well, the final product installation guide must provide NO instructions on how to remove the 915A radio from the product. The following notices should be included to make this clear:

This product contains no user-serviceable parts. Opening this product will void any warranty.

2.3 Final Product Labeling Requirements

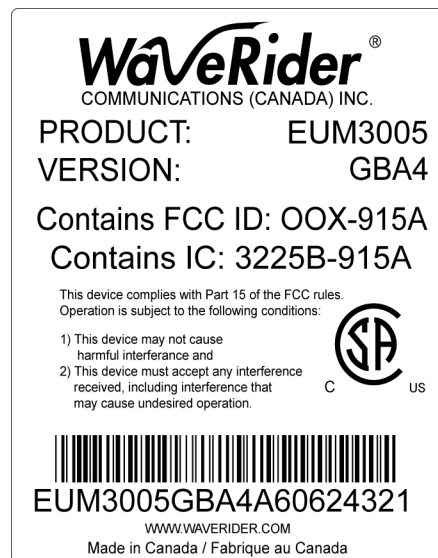
The final product must have a permanent label that contains the following text:

“Contains FCC ID: OOX-915A” and

“Contains IC: 3225B-915A”.

If the label has room, then the statement “This device complies with Part 15 of FCC rules” plus the text from the Interference Environment sub-section of 2.1.1 should be included.

The following picture shows the WaveRider standard label that is recommended for all products containing the 915A radio, edited as appropriate.



B-12.4 Power Supplies

The 915A radio is approved by FCC and IC using specific AC/DC converters. The currently approved converter is the Fairway WVG 10F-420A, AC to 4.2 VDC power supply. The use of any other AC power supply requires testing to ensure it complies with FCC and IC rules on Conducted Limits on AC lines (e.g. [Part 15] 15.207).

If the 915A radio is powered by a supply other than the AC lines (e.g. vehicle power) then no testing is required.

B.22.5 Antennas

Only antennas that have been approved by FCC and IC shall be used with the 915A radio. This means that any antenna of the same family with a gain less than or equal to the approved antenna can be used.

The list of approved antennas is given in Appendix A, which will be updated as new antennas are approved.

The 915A radio is initially approved with the WaveRider Indoor Diversity Antenna (4.4 dBi) and a YAGI (13 dBi).

However, the 915A radio is approved for 27.3 dBm output power at the antenna port and FCC and IC rules require the peak radiated power be no more than 36 dBm, so a maximum of 8.7 dB gain is allowed for the antenna system, which includes the antenna gain in dBi and any losses between the 915A radio and the antenna, including cable losses, insertion losses at filters and surge protectors etc.

Therefore if a 13 dBi YAGI antenna is used, then the losses must be at least 4.3 dB ($27.3 + 13 - 4.3 = 36$ dBm). A rule of thumb is that the losses must equal Antenna Gain (dBi) – 8.7.

This information shall be clearly noted in any installation manual for the final product.

It is also required that warnings be included in the installation manual regarding separation of people from the antennas.

- Indoor antennas are limited to gains of 7.5 dBi or less, including cable losses. This limits the total EIRP to 34.8 dBm. Indoor antennas must be installed so that people are at least 20 cm from the antenna under normal conditions. The WaveRider Indoor Diversity Antenna meets these requirements.
- Outdoor antennas can support the full total gain of 8.7 dBi for the antenna system, for a maximum EIRP of 36 dBm. Outdoor antennas must be installed so that people are normally at least 30 cm from the antenna.

B.32.6 External RF Connectors

The 915A radio can be manufactured by WaveRider with a variety of external RF connection options. The following requirements apply:

- WaveRider proprietary, unique external connector – This connector is externally accessible and can be used on any final product.
- No RF connector – Final products with an integrated, approved antenna (i.e. no RF connector externally accessible).
- Standard external RF Connectors (e.g. SMA or N type) – Final products that have standard externally accessible RF connectors can only be installed by professionals. The installation guide for these products must make this clear. The guide must provide sufficient instruction to the installer for a successful installation.

Appendix A3 APPROVED CONFIGURATIONS**A.13.1 Approved Power Supplies****Table 1 – Approved Power Supplies**

| # | <u>Power Supply</u> | <u>Voltage</u> | <u>Comments</u> |
|----------|----------------------------|-----------------------|------------------------|
| 1 | Fairway WVG 10F-420A | AC to 4.2 VDC | |

A.23.2 Approved Antennas**Table 2 – Approved Antennas**

| # | <u>Antenna Type</u> | <u>Max. Gain</u> | <u>Required Loss @ max. gain</u> | <u>Separation Distance</u> | <u>Comments</u> |
|----------|----------------------------|-------------------------|---|-----------------------------------|--------------------------|
| 1 | WaveRider Indoor Diversity | 4.4 dBi | 0 | 20 cm | Approved for indoor use. |
| 2 | YAGI | 13 dBi | 4.3 dB | 30 cm | Outdoor antenna |