

RDL-3000 Family

Broadband Wireless Systems

RDL-3000-RMF

Fixed TVBD

Radio Module

Product Manual

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1 Product Overview

The RDL-3000 Radio Module RDL-3000-RMF Fixed TVBD is comprised of a proprietary Media Access Control (MAC) protocol engine and Time Division Duplexing (TDD)/ Orthogonal Frequency Division Duplexing (OFDM) digital radio.

The RDL-3000-RMF module is not designed for stand-alone operation. The module is sold as one component of a packaged system which includes a suitable housing for the module connectors for required external components including a power supply and antenna system. This is afterwards referred to as the 'final product'. The final product may be designed and manufactured by Redline or a licensed third party.

Frequency settings within the specified frequency ranges are software keyed to be compliant with specific regulatory agency requirements in the region of deployment.

RDL-3000-RMF: 470 - 608 and 614 - 698 MHz band

Important: Read this entire document prior to installing or operating the RDL-3000-RMF module.

2 Conditions of Use

2.1 General Conditions

The RDL-3000-RMF is not provided for sale to the general public. The RDL-3000-RMF contains a proprietary radio interface and can not be directly connected to any standard telecommunications or computer devices.

This manual is provided as supplement to technical and operational documentation and training provided by Redline and its agents. Any operation or use of the RDL-3000-RMF in any manner not expressly specified within this manual or approved in writing by Redline (or its agents) is expressly forbidden and voids the user's right to operate the module. This includes, but is not limited to, any modification of the module hardware or software, installation of the module in a non approved enclosure, and use with non approved antennas.

2.2 Country of Use

Refer to the regulatory notices in this document before installing or operating the module.

When installed on this module, the software key region code restricts device operation to the FCC 470 - 608 and 614 - 698 MHz band on TV channels 14 - 35 and 39 - 51. The RDL-3000-RMF is certified with limited modular approval for use as an 'intentional radiator' in the United States as device FCC ID: QC8-RDL3000RMF.

Regional Identification Codes								
Region Code	Band (MHz)	Chan. (MHz)	Freq. (MHz)	WSDB	Max. Tx Power (dBm)			
					Int. Ant.	HAZ	Ext. Ant.	
Region 12								
US 470-698	470 to 698	6 6 Notch	473 to 599 623 to 695 602 to 620	Yes	N/A	18	18	

Operation of the final product requires a software 'key' that is available exclusively from Redline or its authorized agents.

The software key is unique to each module and must be installed and activated before the radio will operate.

The key contains sufficient security features that the professional installer and operator can not decode, modify, substitute, or otherwise circumvent the operational restrictions imposed by the 'key'.

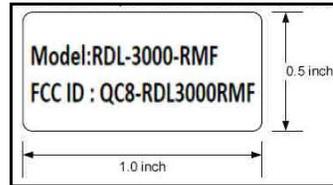
The software 'key' limits the transmit power, operating frequency range, and channel bandwidth per the regulator domain governing the location where the radio will be deployed. The operator does not have the option to select the country or regulatory region of operation.

The software 'key' limits the mode of operation as a master or client. The client mode is 'passive listener' and while in this mode the module can not initiate any transmission without first receiving and decoding a valid authorization message from the master. A module with a key for client operation can not be changed by the installer to enable master mode operation. A module with a key for master operation can operate in master or client (passive) mode.

2.3 Product Labeling

Module Label

The modular transmitter will display a label referring to the FCC ID: QC8-RDL3000RMF registration number for the RDL-3000-RMF module. An information label is applied directly to the modular transmitter (example shown below).



Do not to remove any labels from the module.

External Label

The chassis of the final product device/enclosure into which the module is installed will display a label referring to the FCC ID: QC8-RDL3000RMF registration number for the enclosed RDL-3000-RMF module. An information label is applied to the outside of the final product (example shown below).



Do not to remove any labels from the final product.

3 Module Installation and Service

3.1 Installation Into a Final Product

Redline shall retain complete control over the final installation of the module and will ensure compliance of the end product to all applicable FCC regulations. The module must be installed only into an approved enclosure (see Conditions of Use) and only at an approved manufacturing facility or service depot.

Redline licensing of the modular transmitter includes monitoring to ensure compliance in the operation and use of the RDL-3000-RMF as expressly specified within this manual. This includes restrictions against modification of the module hardware, approval of the final enclosure, operational restrictions for installers and end-users, and approval of antennas provided for use with the product.

Operation of the final product requires the 'key' be controlled exclusively by the manufacturer. The 'key' must be unique to each module and must be installed and activated before the radio will operate. The key must contain sufficient security features to the professional installer and operator can not decode, modify, substitute, or otherwise circumvent the operational restrictions imposed by the 'key'.

The software 'key' must limit the transmit power, operating frequency range, and channel bandwidth per the regulator domain governing the location where the radio will be deployed. The operator does not have the option to select the country or regulatory region of operation.

The software 'key' must limit the mode of operation as a master or client. The client mode is 'passive listener' and while in this mode the module can not initiate any transmission without first receiving and decoding a valid authorization message from the master. A module with a key for client operation can not be changed by the installer to enable master mode operation.

Redline will review all final products for compliance to regulatory restrictions.

The manufacturer must meet all labeling described in section 2.3.

3.2 Module Servicing

The RDL-3000-RMF is not intended to be field serviceable, and contains no field serviceable or field replaceable parts. The module must be serviced only at an approved manufacturing facility or service depot.



Warning: The RDL-3000-RMF is susceptible to damage from electrostatic charge. Electrostatic Discharge (ESD) must be avoided to prevent damaging or destroying the module. The module must always be store in an anti-static container/bag prior to installation and following removal from the product for servicing. Observe ESD precautions when handling the module.

3.3 Professional Installation

Devices containing the Redline RDL-3000-RMF require professional installation.

The RDL-3000-RMF must only be installed by trained professional technicians authorized by Redline or its agents.

It is the responsibility of the installer to understand the product operation by attending training as required, reading and understanding the product documentation, and ensuring that all building, safety and regulatory codes are met and the installation is complete and secure.

3.4 Safety Precautions

Installation and service must be done by personnel having technical training and experience necessary to be aware of hazards during installation and/or service of RF equipment. The installation and/or service must be done using procedures designed to minimize any danger to technical personnel or any other person.

3.5 Radio Frequency Safety

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of the general population limits as defined by FCC CFR 47, Part 2.1091 and OET Bulletin 65, Radio frequency radiation exposure evaluation for fixed devices & Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website:

<http://www.gpo.gov/fdsys/pkg/CFR-2009-title47-vol1/pdf/CFR-2009-title47-vol1-sec2-1091.pdf>

http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65c.pdf

http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php

Refer to the regulatory statements included in this document.

4 Final Product Requirements

The following requirements apply to all final products incorporating the RDL-3000-RMF.

4.1 Frequency Bands

Operation of the final product requires a software 'key' that is available exclusively from Redline. This key restricts device operation to the FCC 473-695 MHz band on TV channels 14 - 35 and 39 - 51. The professional installer and operator can not modify or otherwise circumvent these operational restrictions.

To operate in the TV Whitespaces frequency range, each RDL-3000-RMF must contact and register with the WSDB database server (server URL is programmed into the RDL-3000-RMF). The RDL-3000 may only transmit on channels indicated as 'available' by the WSDB database. Channel assignments are temporary and the RDL-3000-RMF must periodically contact the WSDB to refresh the channel list. The RDL-3000-RMF vacates a channel in-use immediately when a WSDB database status update indicates the channel is no longer available or the expiry time for an obtained list has elapsed.

The RDL-3000-RMF operating as a PMP Sector Controller/PTP Master (PMP-SC) is not allowed to transmit on any channel before registering with the WSDB database and obtaining a list of available channels for its location. The RDL-3000-RMF operating as a PMP Subscriber/PTP Slave (PMP-SS) is allowed to transmit on the channel currently being used by the PMP-SC initially only for the purpose of registering with the WSDB database and obtaining a list of available channels for its location. If the channel in-use is not available, the PMP-SS notifies the PMP-SC and stops transmitting. The PMP-SS may register and obtain the current channel list once per hour.

Region 12 FCC White Space Channel Definitions			
Channel Number	Center Frequency (MHz)	Channel Number	Center Frequency (MHz)
14	473.00	32	581.00
15	479.00	33	587.00
16	485.00	34	593.00
17	491.00	35*	598.50
18	497.00	39*	623.50
19	503.00	40	629.00
20	509.00	41	635.00
21	515.00	42	641.00
22	521.00	43	647.00
23	527.00	44	653.00
24	533.00	45	659.00
25	539.00	46	665.00
26	545.00	47	671.00
27	551.00	48	677.00
28	557.00	49	683.00
29	563.00	50	689.00
30	569.00	51	695.00
31	575.00		

* Note: Channels 35 and 39 Tx power limits are 2 dBm lower (16 dBm).

4.2 Antenna Use and Transmit Power

The RDL-3000-RMF module supports operation with 2x2 MIMO antenna systems with two transmit chains and two receive chains. The RDL-3000-RMF module must be used only with certified antennas and using the channel size and output power level specified by the FCC regulations.

Table 1: Transmit Power	
Channel #	Tx Power (dBm)
14-34 40-51	+18
35, 39	+16

4.3 Certified Antennas

This device has been designed to operate with the antennas listed in the following table. Any additional antennas will be used only after authorization is obtained through Class II permissive change. Antennas having a gain higher than 13 dBi are strictly prohibited.

Table 2: Approved Antennas						
Supplier	Part #	Gain	Frequency Range (MHz)	Application	Size	Beamwidth / Polarity
Redline	AFS-VH-60060-01	13 dBi	470-698	Sector	122 cm (48 in)	60 deg vpol & hpol
Redline	AFS-SB-60055-01	11 dBi	470-698	Log-P Directional	122 cm (48 in)	55 deg vpol & hpol

5 Regulatory Notices

FCC Notices: Deployment in USA

The following notices about deployment in the USA are included in training and documentation provided to professional installers and operators of the final product:

1. The final product must be professionally installed.
2. WARNING -- FCC RF Exposure Warnings

To satisfy FCC RF exposure requirements for RF transmitting devices, a minimum distance of 40 cm (15 3/4") should be maintained between the antenna of this device and persons during device operation:

To ensure compliance, operation at closer than these distances is not recommended. The antenna used for this transmitter must not be collocated in conjunction with any other antenna or transmitter.

3. FCC Information to Users @ FCC 15.706:

This equipment has been tested and found to comply with the rules for TV bands devices, pursuant to part 15 of the FCC rules. These rules are designed to provide reasonable protection against harmful interference. 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. 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:

- (1) Reorient or relocate the receiving antenna.
- (2) Increase the separation between the equipment and receiver.
- (3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- (4) Consult the manufacturer, dealer or an experienced radio/TV technician for help.

4. FCC Information to Users @ FCC 15.19:

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

5. FCC Information to Users @ FCC 15.21:

Warning: Changes or modifications not expressly approved by Redline Communications could void the user's authority to operate the equipment.

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