

RDL-3100 Family

Broadband Wireless Systems

RDL-3100-RMA Radio Modules

Product Manual

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Contact Information

Contact Information: Redline Communications Inc. 302 Town Centre Blvd. Markham, ON Canada L3R 0E8
Web site: http://www.rdlcom.com
Email: Inquiries: info@rdlcom.com Support: support@rdlcom.com Training: training@rdlcom.com
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1 Product Overview

The RDL-3100-RMA radio module is comprised of a proprietary Media Access Control (MAC) protocol engine and Time Division Duplexing (TDD)/ Orthogonal Frequency Division Duplexing (OFDM) digital radio.

The 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.

USA & Canada: 4900 to 5975 MHz

Important: Read this entire document prior to installing or operating these modules.

2 Conditions of Use

2.1 General Conditions

The RDL-3100-RMA module is not provided for sale to the general public. The module 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 this module in any manner not expressly specified within this manual or approved in writing by Redline (or its agents) is expressly forbidden and voids the users 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.

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.

Operation in the United States

The RDL-3100-RMA module is certified with limited modular approval for use as an 'intentional radiator' in the United States as device FCC ID: QC8-RDL3100RMA.

Operation in Canada

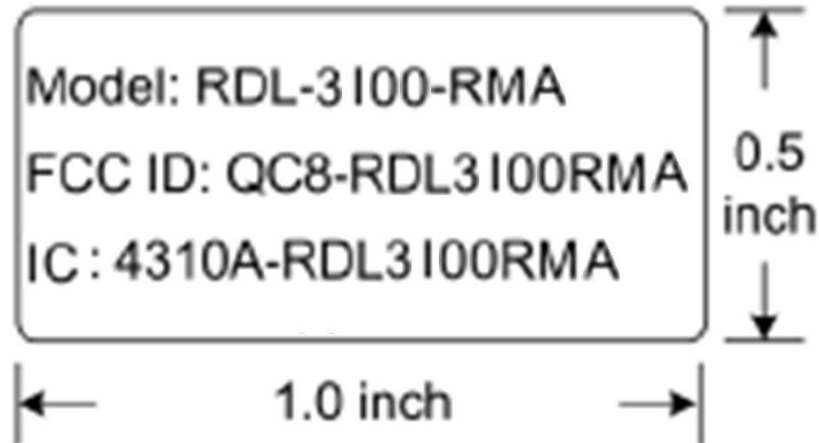
The RDL-3100-RMA module is certified with limited modular approval for use as an 'intentional radiator' in the Canada as IC: 4310A-RDL3100RMA.

2.3 Product Labeling

2.3.1 Module Label

The modular transmitter will display a label referring to the FCC ID registration number and the IC registration number. An information label is applied directly to the modular transmitter (example shown below).

Do not to remove any labels from the module.



2.3.2 External Label

Information labels are applied to the final product. The final product features a label on the outside surface listing the registration number for the enclosed module. Do not to remove any labels from the module or the final product.



3 Module Installation and Service

3.1 Installation into a Final Product

The module must be installed only by trained professional technicians authorized by Redline or its agents. 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 shall retain complete control over the final installation of the module and will ensure compliance of the end product to all applicable FCC/ISED 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 module 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 module 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 module 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 module require professional installation. 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 of the module must be performed 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 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
<http://www.gpo.gov/fdsys/pkg/CFR-2009-title47-vol1/pdf/CFR-2009-title47-vol1-sec2-1091.pdf>
- FCC OET Bulletin 65, Radio frequency radiation exposure evaluation for fixed devices
http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65c.pdf
- Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website:
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 an RDL-3100-RMA, module.

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/ISED 4940-4990 MHz, FCC 5150-5250 MHz or 5725-5850 MHz band. The professional installer and operator can not modify or otherwise circumvent these operational restrictions.

4.1.1 Antenna Use and Transmit Power

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

4.1.2 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.

Table 1: Approved Antennas

Manufacturer	Part #	Gain (dBi)	Frequency Range	4940-4990 MHz	5150-5250 MHz	5725-5850 MHz
Redline	AOD-DB-0512-02	10	4940-5875 MHz	PMP	PMP	PMP
L-Com	HG5158DP-10U	10	5100-5800 MHz	PMP	PMP	PMP
Redline	30-00362-00	24	4900-6100 MHz	PTP PMP	PMP	PTP PMP
Redline	A3FT3204LTPD	32	4900-5875 MHz	PTP PMP	PMP	PTP PMP

4.1.3 Power & EIRP (MIMO Operation)

4.9 GHz: FCC 47 CFR Part 90 Subpart Y and RSS-III

Table 2: FCC 4.9 GHz: output power: 10 MHz channel, 10 dBi and 24 dBi antennas

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	4945.0	20.96	20.60	23.79	30.00	6.21
	4965.0	21.09	20.69	23.90	30.00	6.10
	4985.0	21.22	20.67	23.96	30.00	6.04
256-QAM	4945.0	21.00	20.57	23.80	30.00	6.20
	4965.0	21.05	20.72	23.90	30.00	6.10
	4985.0	20.23	20.65	23.46	30.00	6.54

Table 3: FCC 4.9 GHz: output power: 10 MHz channel, 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	4945.0	20.10	18.64	22.44	24.70	2.26
	4965.0	19.96	18.79	22.42	24.70	2.28
	4985.0	19.14	19.74	22.46	24.70	2.24
256-QAM	4945.0	20.14	18.65	22.47	24.70	2.23
	4965.0	19.92	18.82	22.42	24.70	2.28
	4985.0	19.08	19.75	22.44	24.70	2.26

Table 4: FCC 4.9 GHz: output power: 20 MHz channel, 10 dBi and 24 dBi antennas

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	4950.0	21.38	21.18	24.29	33.00	8.71
	4965.0	21.37	21.16	24.28	33.00	8.72
	4980.0	21.49	21.25	24.38	33.00	8.62
256-QAM	4950.0	21.36	21.16	24.27	33.00	8.73
	4965.0	21.38	21.16	24.28	33.00	8.72
	4980.0	21.47	21.29	24.39	33.00	8.61

Table 5: FCC 4.9 GHz: output power: 20 MHz channel, 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	4950.0	21.38	21.18	24.29	27.70	3.41
	4965.0	21.37	21.16	24.28	27.70	3.42
	4980.0	21.49	21.25	24.38	27.70	3.32
256-QAM	4950.0	21.36	21.16	24.27	27.70	3.43
	4965.0	21.38	21.16	24.28	27.70	3.42
	4980.0	21.47	21.29	24.39	27.70	3.31

5.2 GHz: FCC 47 CFR Part 15 Subpart E, §15.407

Table 6: FCC 5.2 GHz: output power: 10 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5160.0	11.22	11.04	14.14	26.70	12.56
	5200.0	19.47	18.42	21.99	26.70	4.71
	5245.0	18.77	18.45	21.62	26.70	5.08
256-QAM	5165.0	12.11	11.59	14.87	26.70	11.83
	5200.0	19.50	18.45	22.02	26.70	4.68
	5245.0	18.83	18.48	21.67	26.70	5.03

Table 7: FCC 5.2 GHz: output power: 10 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5160.0	5.13	4.91	8.03	12.70	4.67
	5200.0	5.13	4.92	8.04	12.70	4.66
	5245.0	4.23	5.00	7.64	12.70	5.06
256-QAM	5160.0	4.92	4.92	7.93	12.70	4.77
	5200.0	5.14	4.95	8.06	12.70	4.64
	5245.0	4.28	5.00	7.67	12.70	5.03

Table 8: FCC 5.2 GHz: output power: 10 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5160.0	-3.11	-3.13	-0.11	4.70	4.81
	5200.0	-3.01	-3.55	-0.26	4.70	4.96
	5245.0	-3.90	-3.02	-0.43	4.70	5.13
256-QAM	5160.0	-3.22	-3.44	-0.32	4.70	5.02
	5200.0	-3.37	-3.48	-0.41	4.70	5.11
	5245.0	-3.89	-3.28	-0.56	4.70	5.26

Table 9: FCC 5.2 GHz: output power: 20 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	12.28	12.11	15.21	26.70	11.49
	5200.0	21.75	21.56	24.67	26.70	2.03
	5240.0	18.75	19.53	22.17	26.70	4.53
256-QAM	5175.0	12.47	13.22	15.87	26.70	10.83
	5200.0	21.80	21.56	24.69	26.70	2.01
	5240.0	18.66	19.48	22.10	26.70	4.60

Table 10: FCC 5.2 GHz: output power: 20 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	7.31	7.09	10.21	12.70	2.49
	5200.0	7.48	7.35	10.43	12.70	2.27
	5240.0	7.47	7.28	10.39	12.70	2.31
256-QAM	5170.0	7.31	7.11	10.22	12.70	2.48
	5200.0	7.45	7.34	10.41	12.70	2.29
	5240.0	7.47	7.30	10.40	12.70	2.30

Table 11: FCC 5.2 GHz: output power: 20 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	-0.82	-0.51	2.35	4.70	2.35
	5200.0	-0.95	-0.84	2.12	4.70	2.58
	5240.0	-0.89	-1.01	2.06	4.70	2.64
256-QAM	5170.0	-0.82	-0.30	2.46	4.70	2.24
	5200.0	-0.67	-0.90	2.23	4.70	2.47
	5240.0	-0.69	-0.94	2.20	4.70	2.50

Table 12: FCC 5.2 GHz: output power: 40 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	-3.08	-3.09	-0.07	26.70	26.77
	5200.0	22.01	21.97	25.00	26.70	1.70
	5230.0	18.71	17.45	21.14	26.70	5.56
256-QAM	5185.0	13.44	13.26	16.36	26.70	10.34
	5200.0	22.01	21.89	24.96	26.70	1.74
	5230.0	18.56	18.41	21.50	26.70	5.20

Table 13: FCC 5.2 GHz: output power: 40 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	9.04	8.93	12.00	12.70	0.70
	5200.0	9.02	8.91	11.98	12.70	0.72
	5230.0	8.95	8.84	11.91	12.70	0.79
256-QAM	5170.0	8.84	8.76	11.81	12.70	0.89
	5200.0	9.00	8.96	11.99	12.70	0.71
	5230.0	8.96	9.00	11.99	12.70	0.71

Table 14: FCC 5.2 GHz: output power: 40 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5170.0	0.80	0.85	3.84	4.70	0.86
	5200.0	0.78	0.73	3.77	4.70	0.93
	5230.0	0.68	0.63	3.67	4.70	1.03
256-QAM	5170.0	0.57	0.60	3.60	4.70	1.10
	5200.0	0.77	0.74	3.77	4.70	0.93
	5230.0	0.67	0.64	3.67	4.70	1.03

5.8 GHz: FCC Part 15 Subpart E and RSS-247 Issue 1**Table 15: FCC 5.8 GHz: output power: 10 MHz channel, PMP 10 dBi antenna**

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	22.38	22.27	25.34	26.70	1.36
	5790.0	22.30	22.44	25.38	26.70	1.32
	5845.0	21.97	22.21	25.10	26.70	1.60
256-QAM	5730.0	22.27	22.24	25.27	26.70	1.43
	5790.0	22.37	22.40	25.40	26.70	1.30
	5845.0	22.07	22.26	25.18	26.70	1.52

Table 16: FCC 5.8 GHz: output power: 10 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	8.82	8.75	11.80	12.70	0.90
	5790.0	8.10	9.14	11.66	12.70	1.04
	5845.0	8.57	9.04	11.82	12.70	0.88
256-QAM	5730.0	9.09	8.83	11.97	12.70	0.73
	5790.0	8.06	9.21	11.68	12.70	1.02
	5845.0	8.71	9.01	11.87	12.70	0.83

Table 17: FCC 5.8 GHz: output power: 10 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	0.67	0.72	3.71	4.70	0.99
	5790.0	1.13	1.03	4.09	4.70	0.61
	5845.0	0.31	1.00	3.68	4.70	1.02
256-QAM	5730.0	0.82	0.61	3.73	4.70	0.97
	5790.0	1.08	1.00	4.05	4.70	0.65
	5845.0	0.25	1.04	3.67	4.70	1.03

Table 18: FCC 5.8 GHz: output power: 20 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	22.49	22.37	25.44	26.70	1.26
	5790.0	22.64	22.47	25.57	26.70	1.13
	5840.0	22.29	22.34	25.33	26.70	1.37
256-QAM	5735.0	22.63	22.34	25.50	26.70	1.20
	5790.0	22.57	22.50	25.55	26.70	1.15
	5840.0	22.26	22.36	25.32	26.70	1.38

Table 19: FCC 5.8 GHz: output power: 20 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	8.27	9.02	11.67	12.70	1.03
	5790.0	9.36	8.40	11.92	12.70	0.78
	5840.0	9.02	8.23	11.65	12.70	1.05
256-QAM	5735.0	8.10	9.03	11.60	12.70	1.10
	5790.0	9.25	8.41	11.86	12.70	0.84
	5840.0	8.91	9.06	12.00	12.70	0.70

Table 20: FCC 5.8 GHz: output power: 20 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	1.06	0.79	3.94	4.70	0.76
	5790.0	1.35	1.26	4.32	4.70	0.38
	5840.0	0.68	0.87	3.79	4.70	0.91
256-QAM	5735.0	0.93	0.79	3.87	4.70	0.83
	5790.0	1.40	1.23	4.33	4.70	0.37
	5840.0	0.64	0.91	3.79	4.70	0.91

Table 21: FCC 5.8 GHz: output power: 40 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	22.61	22.49	25.56	26.70	1.14
	5790.0	22.63	22.70	25.68	26.70	1.02
	5830.0	22.47	22.45	25.47	26.70	1.23
256-QAM	5745.0	22.70	22.50	25.61	26.70	1.09
	5790.0	22.64	22.74	25.70	26.70	1.00
	5830.0	22.44	22.49	25.48	26.70	1.22

Table 22: FCC 5.8 GHz: output power: 40 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	9.07	8.80	11.95	12.70	0.75
	5790.0	8.30	9.40	11.90	12.70	0.80
	5830.0	8.98	8.28	11.65	12.70	1.05
256-QAM	5745.0	9.15	8.77	11.97	12.70	0.73
	5790.0	8.24	9.36	11.85	12.70	0.85
	5830.0	9.00	8.06	11.57	12.70	1.13

Table 23: FCC 5.8 GHz: output power: 40 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	0.78	0.60	3.70	4.70	1.00
	5790.0	1.07	1.17	4.13	4.70	0.57
	5830.0	0.78	0.90	3.85	4.70	0.85
256-QAM	5745.0	0.83	0.57	3.71	4.70	0.99
	5790.0	1.11	1.20	4.17	4.70	0.53
	5830.0	0.75	0.91	3.84	4.70	0.86

Table 24: ISED 5.8 GHz: output power: 10 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	16.72	15.30	19.08	26.70	7.62
	5790.0	22.30	22.44	25.38	26.70	1.32
	5845.0	16.19	15.80	19.01	26.70	7.69
256-QAM	5730.0	16.73	15.29	19.08	26.70	7.62
	5790.0	22.37	22.40	25.40	26.70	1.30
	5845.0	16.14	15.81	18.99	26.70	7.71

Table 25: ISED 5.8 GHz: output power: 10 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	2.31	1.77	5.06	12.70	7.64
	5790.0	8.10	9.14	11.66	12.70	1.04
	5845.0	1.94	2.28	5.12	12.70	7.58
256-QAM	5730.0	2.29	1.76	5.04	12.70	7.66
	5790.0	8.06	9.21	11.68	12.70	1.02
	5845.0	1.91	2.27	5.10	12.70	7.60

Table 26: ISED 5.8 GHz: output power: 10 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	-6.15	-6.66	-3.39	4.70	8.09
	5790.0	1.13	1.03	4.09	4.70	0.61
	5845.0	-6.59	-6.04	-3.30	4.70	8.00
256-QAM	5730.0	-6.38	-6.63	-3.49	4.70	8.19
	5790.0	1.08	1.00	4.05	4.70	0.65
	5845.0	-6.57	-6.37	-3.46	4.70	8.16

Table 27: ISED 5.8 GHz: output power: 20 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	17.06	16.82	19.95	26.70	6.75
	5790.0	22.64	22.47	25.57	26.70	1.13
	5840.0	16.61	16.87	19.75	26.70	6.95
256-QAM	5735.0	17.02	16.75	19.90	26.70	6.80
	5790.0	22.57	22.50	25.55	26.70	1.15
	5840.0	16.66	16.89	19.79	26.70	6.91

Table 28: ISED 5.8 GHz: output power: 20 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	3.80	3.22	6.53	12.70	6.17
	5790.0	9.36	8.40	11.92	12.70	0.78
	5840.0	3.14	3.31	6.24	12.70	6.46
256-QAM	5735.0	3.78	3.18	6.50	12.70	6.20
	5790.0	9.25	8.41	11.86	12.70	0.84
	5840.0	3.11	3.30	6.22	12.70	6.48

Table 29: ISED 5.8 GHz: output power: 20 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	-5.01	-5.26	-2.12	4.70	6.82
	5790.0	1.35	1.26	4.32	4.70	0.38
	5840.0	-5.37	-4.80	-2.07	4.70	6.77
256-QAM	5735.0	-5.01	-5.17	-2.08	4.70	6.78
	5790.0	1.40	1.23	4.33	4.70	0.37
	5840.0	-5.32	-4.75	-2.02	4.70	6.72

Table 30: ISED 5.8 GHz: output power: 40 MHz channel, PMP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	17.14	16.96	20.06	26.70	6.64
	5790.0	22.63	22.70	25.68	26.70	1.02
	5830.0	16.75	17.04	19.91	26.70	6.79
256-QAM	5745.0	17.13	16.97	20.06	26.70	6.64
	5790.0	22.64	22.74	25.70	26.70	1.00
	5830.0	16.80	17.07	19.95	26.70	6.75

Table 31: ISED 5.8 GHz: output power: 40 MHz channel, PMP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	4.54	3.41	7.02	12.70	5.68
	5790.0	8.30	9.40	11.90	12.70	0.80
	5830.0	4.23	3.46	6.87	12.70	5.83
256-QAM	5745.0	4.48	3.41	6.99	12.70	5.71
	5790.0	8.24	9.36	11.85	12.70	0.85
	5830.0	4.24	3.44	6.87	12.70	5.83

Table 32: ISED 5.8 GHz: output power: 40 MHz channel, PMP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	-3.66	-3.86	-0.75	4.70	5.45
	5790.0	1.07	1.17	4.13	4.70	0.57
	5830.0	-3.78	-3.59	-0.67	4.70	5.37
256-QAM	5745.0	-3.66	-3.77	-0.70	4.70	5.40
	5790.0	1.11	1.20	4.17	4.70	0.53
	5830.0	-3.76	-3.86	-0.80	4.70	5.50

Table 33: FCC 5.8 GHz: output power: 10 MHz channel, PTP 10 dBi & 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	22.38	22.27	25.34	30.00	4.66
	5790.0	22.30	22.44	25.38	30.00	4.62
	5845.0	21.97	22.21	25.10	30.00	4.90
256-QAM	5730.0	22.27	22.24	25.27	30.00	4.73
	5790.0	22.37	22.40	25.40	30.00	4.60
	5845.0	22.07	22.26	25.18	30.00	4.82

Table 34: FCC 5.8 GHz: output power: 10 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	19.53	19.44	22.50	30.00	7.50
	5790.0	21.60	21.57	24.60	30.00	5.40
	5845.0	18.34	18.48	21.42	30.00	8.58
256-QAM	5730.0	19.67	19.52	22.61	30.00	7.39
	5790.0	21.65	21.53	24.60	30.00	5.40
	5845.0	18.26	18.47	21.38	30.00	8.62

Table 35: FCC 5.8 GHz: output power: 20 MHz channel, PTP 10 dBi & 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	22.49	22.37	25.44	30.00	4.56
	5790.0	22.64	22.47	25.57	30.00	4.43
	5840.0	22.29	22.34	25.33	30.00	4.67
256-QAM	5735.0	22.63	22.34	25.50	30.00	4.50
	5790.0	22.57	22.50	25.55	30.00	4.45
	5840.0	22.26	22.36	25.32	30.00	4.68

Table 36: FCC 5.8 GHz: output power: 20 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	18.07	17.95	21.02	30.00	8.98
	5790.0	20.99	21.17	24.09	30.00	5.91
	5840.0	17.47	18.34	20.94	30.00	9.06
256-QAM	5735.0	18.11	19.92	22.12	30.00	7.88
	5790.0	20.91	21.26	24.10	30.00	5.90
	5840.0	17.74	18.32	21.05	30.00	8.95

Table 37: FCC 5.8 GHz: output power: 40 MHz channel, PTP 10 dBi & 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	22.61	22.49	25.56	30.00	4.44
	5790.0	22.63	22.70	25.68	30.00	4.32
	5830.0	22.47	22.45	25.47	30.00	4.53
256-QAM	5745.0	22.70	22.50	25.61	30.00	4.39
	5790.0	22.64	22.74	25.70	30.00	4.30
	5830.0	22.44	22.49	25.48	30.00	4.52

Table 38: FCC 5.8 GHz: output power: 40 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	15.95	15.81	18.89	30.00	11.11
	5790.0	21.90	21.84	24.88	30.00	5.12
	5830.0	15.79	16.01	18.91	30.00	11.09
256-QAM	5745.0	15.90	15.84	18.88	30.00	11.12
	5790.0	21.63	21.80	24.73	30.00	5.27
	5830.0	15.74	16.11	18.94	30.00	11.06

Table 39: ISED 5.8 GHz: output power: 10 MHz channel, PTP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	16.72	15.30	19.08	30.00	10.92
	5790.0	22.30	22.44	25.38	30.00	4.62
	5845.0	16.19	15.80	19.01	30.00	10.99
256-QAM	5730.0	16.73	15.29	19.08	30.00	10.92
	5790.0	22.37	22.40	25.40	30.00	4.60
	5845.0	16.14	15.81	18.99	30.00	11.01

Table 40: ISED 5.8 GHz: output power: 10 MHz channel, PTP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	2.31	1.77	5.06	30.00	24.94
	5790.0	22.30	22.44	25.38	30.00	4.62
	5845.0	1.94	2.28	5.12	30.00	24.88
256-QAM	5730.0	2.29	1.76	5.04	30.00	24.96
	5790.0	22.37	22.40	25.40	30.00	4.60
	5845.0	1.91	2.27	5.10	30.00	24.90

Table 41: ISED 5.8 GHz: output power: 10 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5730.0	-6.15	-6.66	-3.39	30.00	33.39
	5790.0	21.60	21.57	24.60	30.00	5.40
	5845.0	-6.59	-6.04	-3.30	30.00	33.30
256-QAM	5730.0	-6.38	-6.63	-3.49	30.00	33.49
	5790.0	21.65	21.53	24.60	30.00	5.40
	5845.0	-6.57	-6.37	-3.46	30.00	33.46

Table 42: ISED 5.8 GHz: output power: 20 MHz channel, PTP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	17.06	16.82	19.95	30.00	10.05
	5790.0	22.64	22.47	25.57	30.00	4.43
	5840.0	16.61	16.87	19.75	30.00	10.25
256-QAM	5735.0	17.02	16.75	19.90	30.00	10.10
	5790.0	22.57	22.50	25.55	30.00	4.45
	5840.0	16.66	16.89	19.79	30.00	10.21

Table 43: ISED 5.8 GHz: output power: 20 MHz channel, PTP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	3.80	3.22	6.53	30.00	23.47
	5790.0	22.64	22.47	25.57	30.00	4.43
	5840.0	3.14	3.31	6.24	30.00	23.76
256-QAM	5735.0	3.78	3.18	6.50	30.00	23.50
	5790.0	22.57	22.50	25.55	30.00	4.45
	5840.0	3.11	3.30	6.22	30.00	23.78

Table 44: ISED 5.8 GHz: output power: 20 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5735.0	-5.01	-5.26	-2.12	30.00	32.12
	5790.0	20.99	21.17	24.09	30.00	5.91
	5840.0	-5.37	-4.80	-2.07	30.00	32.07
256-QAM	5735.0	-5.01	-5.17	-2.08	30.00	32.08
	5790.0	20.91	21.26	24.10	30.00	5.90
	5840.0	-5.32	-4.75	-2.02	30.00	32.02

Table 45: ISED 5.8 GHz: output power: 40 MHz channel, PTP 10 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	17.14	16.96	20.06	30.00	9.94
	5790.0	22.63	22.70	25.68	30.00	4.32
	5830.0	16.75	17.04	19.91	30.00	10.09
256-QAM	5745.0	17.13	16.97	20.06	30.00	9.94
	5790.0	22.64	22.74	25.70	30.00	4.30
	5830.0	16.80	17.07	19.95	30.00	10.05

Table 46: ISED 5.8 GHz: output power: 40 MHz channel, PTP 24 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	4.54	3.41	7.02	30.00	22.98
	5790.0	22.63	22.70	25.68	30.00	4.32
	5830.0	4.23	3.46	6.87	30.00	23.13
256-QAM	5745.0	4.48	3.41	6.99	30.00	23.01
	5790.0	22.64	22.74	25.70	30.00	4.30
	5830.0	4.24	3.44	6.87	30.00	23.13

Table 47: ISED 5.8 GHz: output power: 40 MHz channel, PTP 32 dBi antenna

Modulation	Frequency, MHz	Power at ch0, dBm	Power at ch1, dBm	Combined output power, dBm	Output power limit, dBm	Power margin, dB
BPSK	5745.0	-3.66	-3.86	-0.75	30.00	30.75
	5790.0	21.90	21.84	24.88	30.00	5.12
	5830.0	-3.78	-3.59	-0.67	30.00	30.67
256-QAM	5745.0	-3.66	-3.77	-0.70	30.00	30.70
	5790.0	21.63	21.80	24.73	30.00	5.27
	5830.0	-3.76	-3.86	-0.80	30.00	30.80

5 Regulatory Notices

5.1.1 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, the following distances should be maintained between the antenna of this device and persons during device operation:

Table 48: FCC: RDL-3100-RMA Recommended Safe Distances

Frequency (MHz)	Deployment	Separation Distance
4900	PMP/PTP	220 cm (86.6") or more
5200	PMP	20 cm (7.8") or more
5800	PMP	20 cm (7.8") or more
5800	PTP	220 cm (86.6") or more

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 15.105:

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.

Where DFS is required by regional regulations, this function is permanently enabled at the factory and can not be disabled by the installer or end-user.

4. FCC Information to Users @ FCC 15.19:

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.

(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.

5.1.2 ISED Notices

Deployment in Canada

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

The following notices about deployment in Canada 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 -- ISED RF Exposure Warnings

To satisfy ISED RF exposure requirements for RF transmitting devices, the following distances should be maintained between the antenna of this device and persons during device operation:

Table 49: ISED: RDL-3100-RMA Recommended Safe Distances

Frequency (MHz)	Deployment	Separation Distance
4900	PMP/PTP	220 cm (86.6") or more
5800	PMP	20 cm (7.9") or more
5800	PTP	220 cm (86.6") or more

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.

The RDL-3100-RMA has been designed to operate with an antenna having a maximum gain of 32 dBi. Antenna having a higher gain is strictly prohibited per regulations of ISED. 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.

This device complies with ISED license-exempt RSS standard(s). 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.

Déploiement aux le Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Les avis suivants à propos du déploiement au Canada sont inclus dans la formation et la documentation fournies aux installateurs professionnels et les opérateurs du produit final:

1. Le produit final doit être installé par un professionnel.
2. AVERTISSEMENT - ISED avertissements d'exposition RF

Pour satisfaire les exigences d'ISED en ce qui a trait aux expositions aux RF pour RF dispositifs de transmission, les distances suivantes doit être maintenue entre l'antenne de ce dispositif et des personnes pendant le fonctionnement du dispositif:

Table 50: ISED: RDL-3100-RMA distances de sécurité recommandées

Frequency (MHz)	Deployment	Separation Distance
4900	PMP/PTP	220 cm (86.6") ou plus
5800	PMP	20 cm (7.9") ou plus
5800	PTP	220 cm (86.6") ou plus

Le RDL-3100-RMA a été conçu pour fonctionner avec une antenne ayant un gain maximal de 32 dBi. Antenne ayant un gain plus élevé est strictement interdite par les règlements d'Industrie Canada. L'impédance d'antenne requise est de 50 ohms.

Ce dispositif a été conçu pour veiller à ce que les émissions de radiofréquences sont maintenus dans la bande de fonctionnement dans toutes les conditions normales de fonctionnement figurant dans ce manuel.

Cet appareil est conforme la norme d'Industrie Canada exempts de licence RSS (s). Son fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne peut pas causer d'interférences, et
2. Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'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.

302 Town Centre • Markham, Ontario • Canada • L3R 0E8

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