

# RM24100D

RS232 / RS485 / RS422 2.4GHz DSSS Radio Modem  
IEEE 802.15.4

Operating Manual – English 1.02



## Introduction

The RM24100D acts as a wireless serial cable replacement and can wirelessly connect various devices together in a large range of applications. The RM24100D Radio modems operates in the license free 2.4GHz ISM (industrial, scientific, medical) band and is capable of achieving long range line-of-sight communications up to 1km. With its durable polyimide industrial din rail mount enclosure and industrial temperature grade electronics makes the unit perfect for industrial automation/SCADA systems. The RM24100D includes DSSS (Direct Sequence Spread Spectrum) radio technology to ensure reliable communication in noisy environments. The RM24100D can operate in a peer-to-peer, point-to-point and point-to-multipoint network topology.

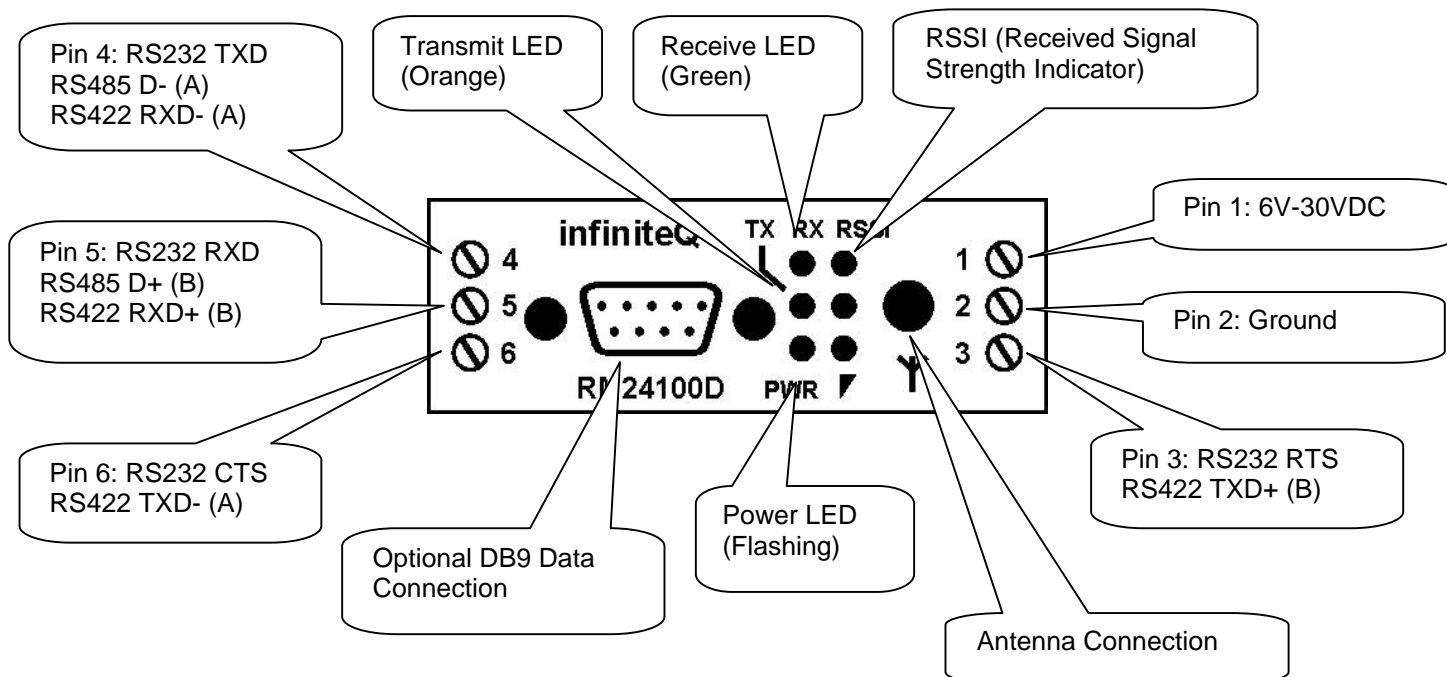
## Features

- **Transparent wireless link. The modem acts as a serial cable replacement**
- **License free operation in the 2.4GHz ISM (industrial, scientific, medical) band**
- **Long Range – indoor/urban (+100m/300ft), outdoor/line-of-sight (+1000m/0.6 miles). With a 2.1dBi dipole antenna**
- **Durable polyimide industrial din rail mount enclosure**
- **6-30VDC switch mode power supply with built in 33V over voltage and reverse voltage protection**
- **Max transmit current of 215mA**
- **Transmit power of 100mW (20dBm) EIRP with a 2.1dBi antenna**
- **DSSS (Direct Sequence Spread Spectrum) technology for increased reliability in noisy environments**
- **Peer-to-peer, point-to-point, or point-to-multipoint addressing modes**
- **Easy interfacing connection via terminals or by a standard DB9 female connector**
- **Built in LED's for power, transmit and receive indication**
- **RSSI (received signal strength indicator) to give optimum antenna placement**
- **RPSMA (reverse polarity SMA) 50 ohm antenna connection allows for remote location of antenna**
- **Available in RS232, RS485 and 4-wire RS422, includes built in line termination resistor (RS485/RS422)**
- **Serial interface data rate of 1200 to 115200 bps**
- **Industrial operating temperature range (-40°C to 85°C)**
- **Agency approved radio module (US FCC part 15.247 / Industry Canada (IC) / Europe (CE) \***
- **IEEE 802.15.4 compliant**
- **Free configuration software**

\* Maximum transmit power output levels and local radio frequency regulator bodies must be obeyed in the country of operation.

# 1 Installation

Connect the RM24100D unit as indicated in the following diagram. Use of an external 1A fuse is recommended.



## RS485/RS422 Communications (RS485/RS422 Models only):

The RS485/RS422 protocol allows for a wired connection to be established as far as 4000ft (1200m). RS232 only allows for a wired connection up to 100ft (30.5m). The RM24100D includes an onboard termination resistor which can be selected by linking J1 on the main PCB inside the unit. The termination resistor is 120 Ohms. Please note that DIO7 configuration must be set to "RS485 TX ENABLE HIGH".

## DB9 Female Pinout:

DB9 Female Pin	RS232 / RS485/ RS422 Signal
1	RS232 DCD
2	RS232 RXD/RS485 D+/RS422 RXD+ (B)
3	RS232 TXD/RS485 D-/RS422 RXD- (A)
4	RS232 DTR
5	GND
6	RS232 DSR
7	RS232 RTS/RS422 TXD+ (B)
8	RS232 CTS/RS422 TXD- (A)
9	Optional Power (6-30VDC)

**RSSI (Received Signal Strength Indicator) Red LEDs:**

- 3 LED's on: Very strong signal (>30db fade margin)
- 2 LED's on: Strong Signal (>20db fade margin)
- 1 LED on: Moderate Signal (>10db fade margin)
- 0 LED's on: Weak Signal (<10db fade margin)

## 2 Network Setup

**Frequency Selection:**

The RM24100D allows for IEEE 802.15.4 channel assignment which ranges from 2407.5 to 2467.5 MHz with 5MHz spacing between channels. The most likely cause of interference for the RM24100D will be from a wireless LAN (802.11b/g access points). If interference is detected then the RM24100D can be configured to use another channel as in the list below. By default the RM24100D is shipped with the settings of channel 12 (0x0c). The RM24100D can handle 12 channels with 65535 modems per channel.

Center Frequency (MHz)	Nominal Occupied bandwidth	Channel
2410	2407.5-2412.5	12 (0x0c)
2415	2412.5-2417.5	13 (0x0d)
2420	2417.5-2422.5	14 (0x0e)
2425	2422.5-2427.5	15 (0x0f)
2430	2427.5-2432.5	16 (0x10)
2435	2432.5-2437.5	17 (0x11)
2440	2437.5-2442.5	18 (0x12)
2445	2442.5-2447.5	19 (0x13)
2450	2447.5-2452.5	20 (0x14)
2455	2452.5-2457.5	21 (0x15)
2460	2457.5-2462.5	22 (0x16)
2465	2462.5-2467.5	23 (0x17)

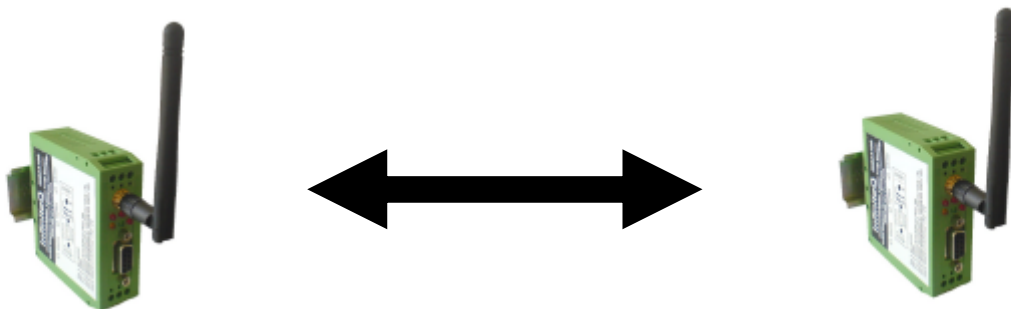
**Network configuration:**

The RM24100D can be operated in a unicast or broadcast mode.

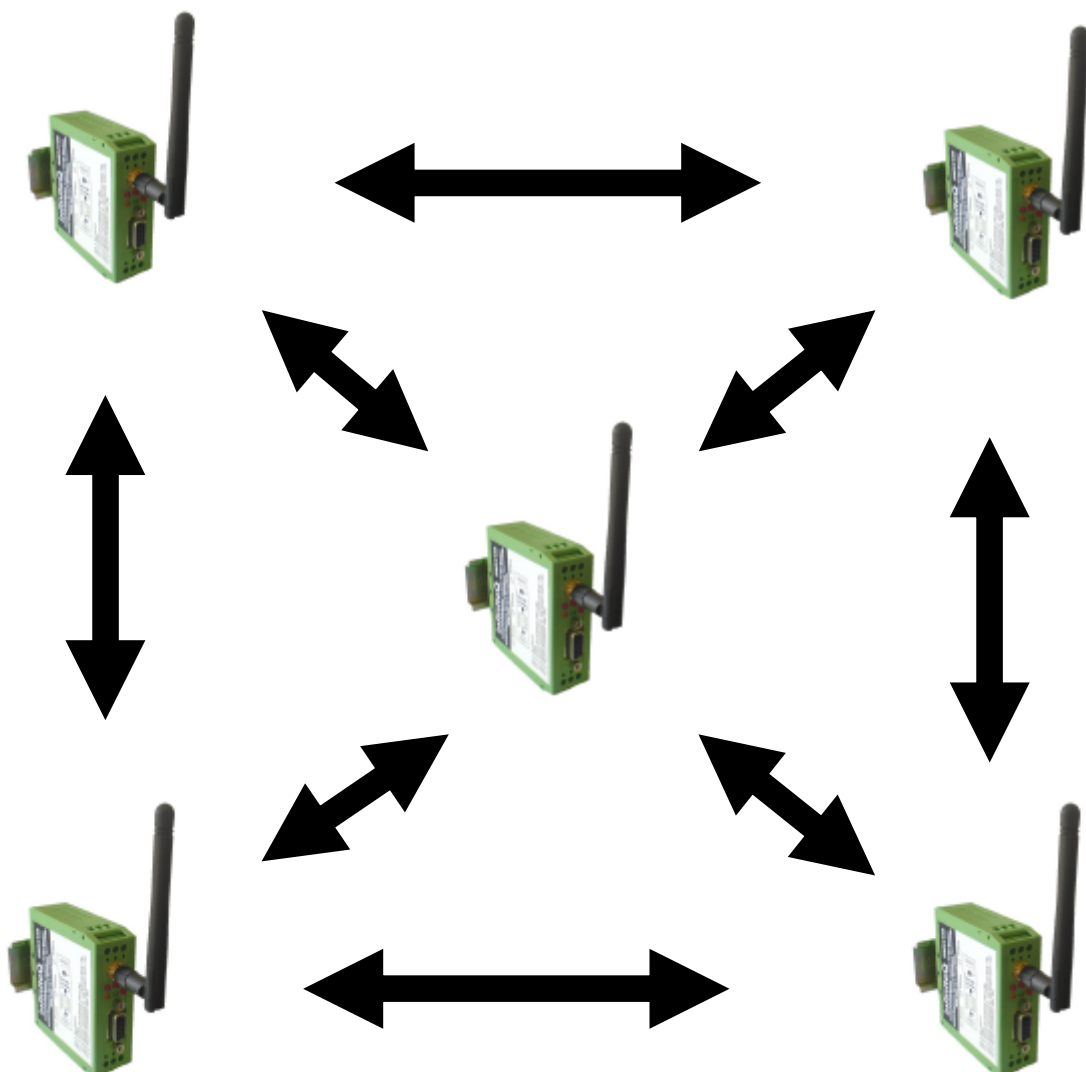
**Unicast Mode:** Unicast mode is the only mode that supports retries. While in this mode, receiving modules send an ACK (acknowledge) of RF packet reception to the transmitter. If the transmitter does not receive an ACK, it will try to resend the packet up to 3 times. For 2 modems to communicate with each other, the destination address of the transmitter module must match the address of the receiver.

**Broadcast Mode (Default):** Any RF modem in range will accept a packet that contains a broadcast address. In this mode receiving modems do not send ACK's and transmitting modems do not resend packets as in the case of unicast mode. To send a broadcast packet, all modems addresses must be setup as:  
 Destination Low Address: 0x0000FFFF  
 Destination High Address: 0x00000000

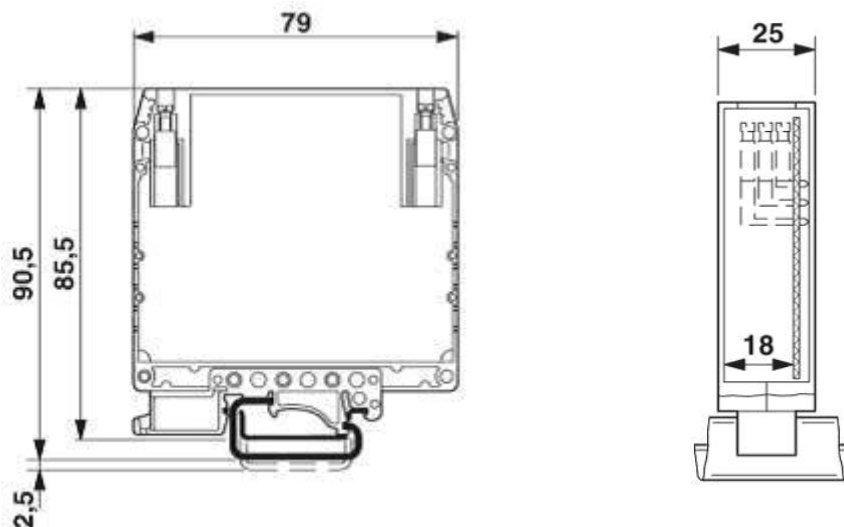
Peer-to-peer/ point-to-point topography (Broadcast/Unicast Mode):



Point-to-multipoint topography (Broadcast Mode):



### 3 Dimensional Drawings



### 4 Specifications

<b>Frequency range</b>	2.4GHz ISM band (2407.5-2467.5MHz)
<b>Protocol</b>	IEEE 802.15.4 compliant
<b>Modulation</b>	OQPSK (Offset Quadrature Phase Shift Keying)
<b>Spread Spectrum Technology</b>	DSSS (Direct Sequence Spread Spectrum)
<b>Number of channels</b>	12 direct sequence channels
<b>Transmit Power</b>	60mW (18dBm) conducted, 100mW (20dBm) EIRP with a 2.1dBi dipole antenna (Output transmit power is configurable via software)
<b>Receiver sensitivity</b>	(1% PER) -92dBm/-100dBm
<b>Range</b>	Indoor/urban (+-100m/300ft), outdoor/line-of-sight (+-1km/0.6 miles), with a 2.1dBi dipole antenna
<b>RF data rate</b>	250 kbps
<b>Antenna connection</b>	RPSMA (reverse polarity SMA)
<b>Antenna impedance</b>	50 ohms unbalanced
<b>Antenna</b>	2.4GHz 2.1dBi omni-direction dipole antenna
<b>Enclosure Material</b>	Polymide (PA 6.6)
<b>Enclosure Color</b>	Green
<b>Enclosure Dimensions</b>	79mmx90.5mmx25mm (din rail mount)
<b>Data Connection</b>	Terminal or DB9 female
<b>Operating Temperature Range</b>	-40°C to 85°C (14°F to 122°F) industrial temperature range
<b>Humidity</b>	<85% non-condensing
<b>Supply Voltage</b>	6 to 30VDC switch mode power supply with built in 33V over voltage and reverse voltage protection
<b>Current Consumption</b>	Approximately 215mA (@18dBm transmit power)
<b>Baud Rate</b>	1200 to 115200 bps(non-standard baud rates also supported)
<b>Agency approved radio module</b>	US FCC Part 15.247), Industry Canada (IC), Europe (CE)* **

\*When operating in Europe the maximum transmit power output level must not exceed 10dBm. Additionally, European regulations stipulate an EIRP power maximum of 12.86dBm (19mW).

\*\*Maximum transmit power output levels and local radio frequency regulator bodies must be obeyed in the country of operation.

## 5 Warranty

This product carries a warranty for a period of one year from date of purchase against faulty workmanship or defective materials, provided there is no evidence that the unit has been mishandled or misused. Warranty is limited to the replacement of faulty components and includes the cost of labour. Shipping costs are for the account of the purchaser.

**Note:** Product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies and or sensors, and damage caused by inductive loads.

## 6 Disclaimer

Operation of this instrument is the sole responsibility of the purchaser of the unit. The user must make themselves familiar with the operation of this instrument and the effect of any possible failure or malfunction.

The manufacturer reserves the right to alter any specification without notice.

### DISTRIBUTED BY:

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