

FULL DUPLEX Radio MODEM

- Direct Cable Replacement
- Range 2KM
- RS232 / RS485 / USB
- Host Data Rates up to 38,400 Baud
- RF Data Rates to 115200Kbps
- Waterproof IP68 Enclosure
- 8 User Selectable Channels
- CE Compliant for Licence Free Use
- 100mW Transmit Power (+20dBm)
- Receiver Sensitivity -116dBm



Applications

- M2M Communications
- Remote Networking
- Building Management

The HURRICANE radio Modem is a simple to use and very versatile. It can operate as a one to one cable replacement link for PCs or in M2M applications. It can even handle multiple master/slave arrangements or work in simple broadcast mode.

One-to-One operation; point to point cable replacement comms

Broadcast Mode; single master, addresses many Modems concurrently.

One-to-Many; a network consisting of a master and many slaves

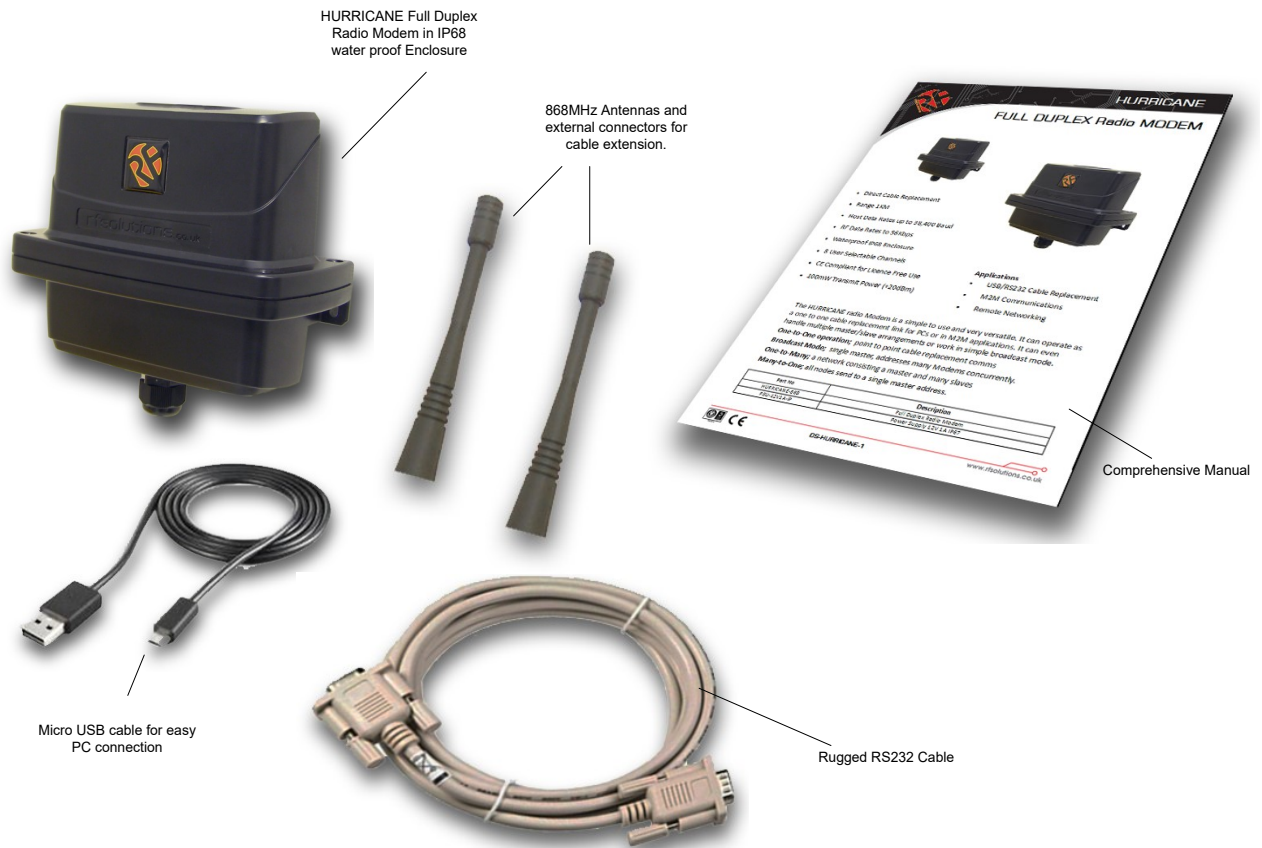
Many-to-One; all nodes send to a single master address.

Part No	Description
HURRICANE-868	Full Duplex Radio Modem
PSU-12V1A-IP	Power Supply 12V 1A IP67

HURRICANE Radio Modem



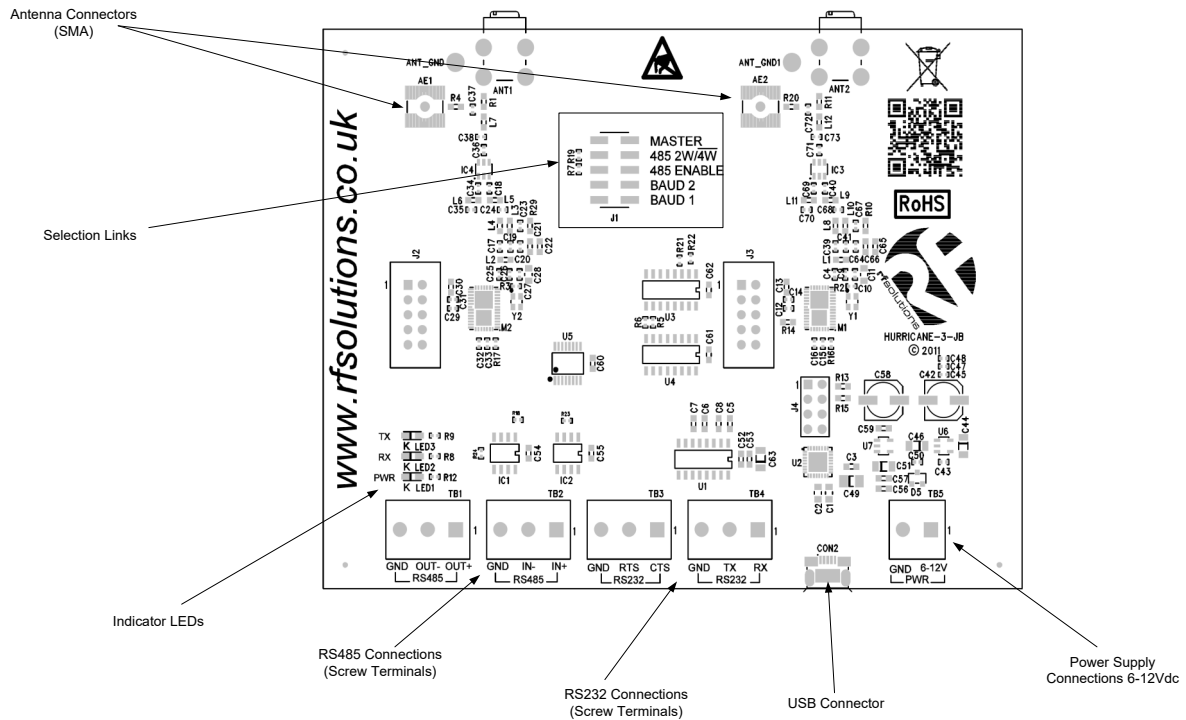
What's in the Box?



Functional Specification Overview

Specification	Typical	Units
RADIO		
Frequency Band	869.5	MHz
Power Output	100	mW
Range (Max)	4000	m
Modulation	GFSK	-
Data Rate	4,800 – 34,8000	Kbps
PHYSICAL		
Enclosure Rating	IP68	
Enclosure Material	ABS	
Antenna Connections	SMA	
Temperature Range	0 - +55°	Celsius
Dimensions (Enclosure)	144 x 168 x 85	mm
Dimensions (PCB)	125 x 90 x 1.6	mm

PCB Layout



Antenna Connectors

SMA screw connections (female) are provided on the PCB for connection of external antennas.

Selection Links

Master: Used to create the FULL DUPLEX communication. In each system one unit must have the MASTER pin enabled to allow simultaneous two way communication. Please note that in one-to-many systems only one SLAVE will be able to communicate back to the MASTER at any one time.

485 2W/4W: When using RS485 fit this link for 4 Wire operation and remove for 2 Wire operation details on page 4

485 ENABLE: Fit when using RS485 (as well as using the above selector link)

BAUD2: See Table

BAUD1: See Table

BAUD1	BAUD2	Host Baud Rate
Remove	Remove	4,800
Remove	Fit	9,600
Fit	Remove	19,200
Fit	Fit	38,400

Power

Power Supply connector can be connected to any good quality dc source between 6-12V(details page 4).

USB

Micro USB connector. Connect for USB communication and/or power. You may connect one of or both USB and 6-12Vdc (details page 4)

RS485 Connections

Rising Clamp type high quality screw terminals. Connect your wire inputs to the screw terminals provided. (details page 4)

RS232 Connections

Rising Clamp type high quality screw terminals. Connect the RS232 to the terminals. (details page 4)

Set-Up Guide

Step 1: Connect Power

Connect Power to ONE OR BOTH USB and screw terminals.

If using USB connection no external power supply is required. However, it is recommended to use one if your USB port cannot supply at least 500mW of power (this is often the case for USB hubs or expander ports on peripherals such as monitors and keyboards).

With power connected check that the PWR Led lights when switched on. Turn off before connecting communication cables (unless using USB!)

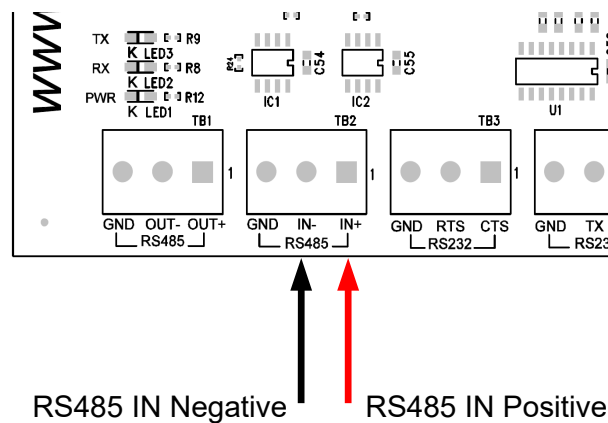
Step 2: Communications Cable Connections

Select which of the following cable connection types you are using and follow the instructions associated.

Notes: GND should only be Connected if Available.

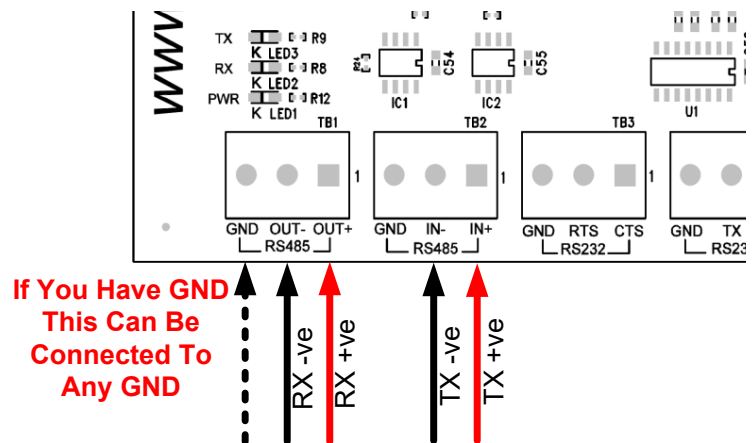
RS485 2 Wire

Connect your two wires as shown:



RS485 4 Wire

Connect your 4 wires as shown:



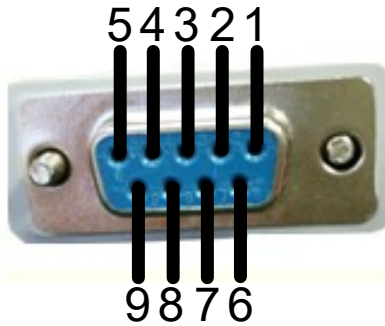
HURRICANE Radio Modem



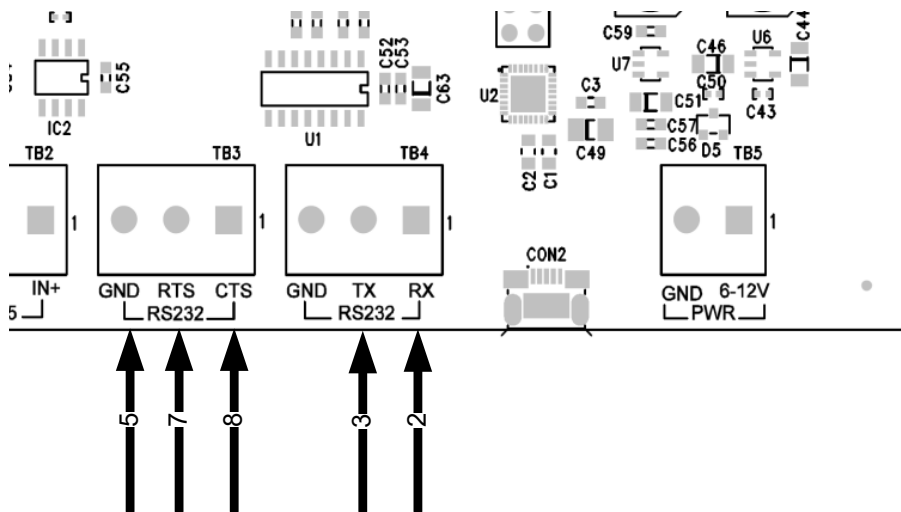
USB

Simply plug and play no other connections required (see Step 1 for power considerations)

RS232 FEMALE PINOUT



- PIN 1 – Data Carrier Detect
- PIN 2 – Received Data
- PIN 3 – Transmitted Data
- PIN 4 – Data Terminal Ready
- PIN 5 – GND
- PIN 6 – Data Set Ready
- PIN 7 – Request to Send
- PIN 8 – Clear to Send
- PIN 9 – Ring Indicator



Modes of Operation

Step 3: Decide on your the mode of operation required

One-to-One Operation; for point to point data communication or cable replacement

1. Connect the USB or RS232 Cables to the Host to each Modem
2. Set the Addresses for both modems to the same
3. The Two Modems will provide wire replacement comms link

One-to-Many; A network consisting a master and many slaves

1. Connect the USB or RS232 Cables to the Host to each Modem
2. Set the address on the Master to any unique and set all Slaves to a second unique address
3. The master should be set to send to the slave address and the slaves to send to the master

Configure Each Modem

Host Terminal Software

To configure a Hurricane modem you must place it into configuration mode this can be done using any Terminal program capable of sending and receiving serial data.

One we have found to be easy to use and powerful is 'Terminal' This can be downloaded from :

<https://sites.google.com/site/terminalbpp/>

Modem Addresses:

Each Hurricane Modem can have its own address, this is user set during configuration. Data received is examined by all modems and the address header embedded within the data packet is compared with its address. Only data received with a matching address will be processed and output to the host, all other data will be discarded. All Hurricane Modem modules are shipped with a default address of 7F7F7F.

The Hurricane Modem contains an on-board data buffer equal to two data packets. Therefore if RTS is asserted (then the host is unable to receive data) the module will store a max of two data packets, all further data packets received will be discarded.

Configuration Mode: To enter configuration mode you must send the modem the configuration command .

Once in this mode you may send commands to set-up the parameters of the unit . (See page 6 for details) .

In Configuration mode the Hurricane Modem can receive a number of commands and the internal registers can be pre-set to control its operation. In this mode the Hurricane Modem is 'Offline' and cannot send or receive RF data.

Normal Operation: Whenever not in configuration mode the Hurricane Modem is 'Online' automatically transmitting and receiving data from its host and across the RF network as per its settings.

Ping Pong Mode

This test mode is built into the modem to enable two modems to ping pong signals to each other and report the (RSSI) on the originating modem. To initiate Ping Pong;

1. Connect two Hurricane Modems to Host devices ideally PCs via USB or Serial
2. Run Terminal Emulation program
3. Determine the port that the Hurricane Modem is connected to (from Device Manage under Computer Properties)
4. Set the Terminal emulation 'port' to Data Bits: 8, Parity: None, Stop bits: 1, CTS/RTS enabled
5. Enter AT mode by sending '+\$\$\$' (must be sent as one command not individual key presses and with no <CR>)
6. Send the character 'P' from one modem. This Modem will now Ping and report back the reply with RSSI indication

PLEASE NOTE: Ping pong mode will only function if the address set on R1 and R2 and the same.

Configuration Mode (Offline)

Commands can be set using a standard Terminal program or by sending the relevant ASCII characters.

Each Command must be followed by the Carriage Return <CR> or 'Enter'

Note All commands are entered in UPPER case

Command	Description	Response from Hurricane
+++	<p>Enter Configuration Mode</p> <p>Note: these must be sent as a string with no char in front or behind this is to ensure that the +++ is not mistakenly received in mid data.</p>	Hurricane responds with status info
?	Retrieve the current register values	Hurricane responds with all register values
F	<p>Set Factory Defaults;</p> <p>R1=7F7F7F R2=7F7F7F R3 = CH2 (869.400MHz) - Master (869.650MHz) - Slave R4 = 7 (+20dBm) R5 = 1 (19K2) R6 = 00 R7 = D4</p>	'OK'
H	Help	Brief description of commands available
P	<p>Ping Mode This sends a ping request .</p> <p>On receiving, the recipient Hurricane Modem will respond with its address and the level of RSSI (Received Signal Strength). The Ping command is continuously repeated every 1 second until any command or character is entered.</p>	<p>The originating Hurricane Modem will respond with the recipient Hurricane Modems' response, eg. Received From 7F7F7F (D5)</p> <p>Where : 7F7F7F = the recipient address D5= RSSI</p> <p>RSSI Is a HEX value corresponding to the received signal strength Min = 20hex Max =E0hex</p>
S	Save Configuration	'SAVED OK'
V	Version	Displays
Q	Exit configuration mode and return to online mode	No Response

Register Setting (Configuration Mode)

The internal registers enable various parameters to be controlled.

To set a register type 'R#='x' where # is the register number (1-6) and x is the value to set

For example, to set the channel to channel 3 type the following.

R3=3<CR>

(Where <CR> is carriage return or enter on the keyboard) The modem will then return 'OK' or 'Error' if an incorrect command is entered. Save the changes by typing

S<CR>

The modem will return with 'SAVED'

Default values are shown in **BOLD**

Register	Value Range	Description	Example
R1	0000 - FFFFFFFF (24 bit address)	Sets the recipient Hurricane MO-DEM Address	R1=0001 (Data sent is addressed to Hurricane MODEM with address 0001)
R2	0000 - FFFFFFFF (24 bit address)	Set own Hurricane Modem address	R2=F001 (Data sent is from Hurricane MODEM with address F001)
R3	CH0 = TX: 868.000 MHz RX: 868.600 MHz CH1 = TX: 869.700 MHz RX: 868.200 MHz CH2 = TX: 869.400 MHz RX: 869.650 MHz CH3 = TX: 869.700 MHz RX: 870.000 MHz	Set RF channel	R3=2 (Operate on Channel 2) NOTE: Because the HURRICANE is FULL DUPLEX it needs two frequencies to operate on for each channel.
R4	0 = +1dBm 1 = +2dBm 2 = +5dBm 3 = +8dBm 4 = +11dBm 5 = +14dBm 6 = +17dBm	Set the RF Transmit Power output	R4=7 (Sets Transmit Power to max) NOTE: As per the below table Maximum power can only be used on RF Channel 2
R5	0 = 9,600 1 = 19,200 2 = 28,800 3 = 56,000 4 = 115,200	Set the RF baud rate*	R5=3 (Sets the RF data rate to 56Kbps) NOTE: the Higher the Data Rate the Lower the range - expect extreme
R6	0 = Disable 1 = Enable	Data Acknowledge	R6=1 (Enables Data Acknowledge)
R7	0-FF	Device ID	R7=A1 (Sets Device ID)
R8	0 = Disable 1 = Enable	Data Whitening	R8=1 (Enables Data Whitening)

HURRICANE Radio Modem



Notes on power and frequency

The EU standard sets maximum power transmission limits dependent on the frequency, the bandwidth and the application. Please check the relevant standards are being met when implementing your RF Application. A rough guidance applicable to the HURRICANE channel numbers is given below

Channel Number	Frequency Centre (MHz)	EU Power Allowance mW / dBm	Notes
0	868.400	25 / 14	Applicable standard - EN300-220
1	868.900	25 / 14	
2	869.450	100 / 20	
3	869.600	100 / 20	
4	869.800	25 / 14	

Technical Specifications

Absolute Maximums:

Temperature Range: Storage -50 to +125°C.

Weight: SMT version 7grams, DIP Part 13grams

DC Characteristics

Parameter	Min	Typical	Max	Units
Supply Voltage	6		16	V
Operating Temperature	0		85	°C
Hurricane Tx Supply Current: When Transmitting		60		mA
Hurricane Rx Supply Current: When Receiving		38		mA
Max Input power (thro Antenna)		+10		dBm

HURRICANE Radio Modem



RF Solutions Ltd. Recycling Notice

Meets the following EC Directives:

DO NOT Discard with normal waste, please recycle.

ROHS Directive 2002/95/EC

Specifies certain limits for hazardous substances.

WEEE Directive 2002/96/EC

Waste electrical & electronic equipment. This product must be disposed of through a licensed WEEE collection point. RF Solutions Ltd., fulfils its WEEE obligations by membership of an approved compliance scheme.

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