



## RF407 and RF412

900 MHz Spread Spectrum Radios



### Overview

The RF407 and RF412 are high-speed 900 MHz serial radios<sup>a</sup> designed for unlicensed operation in North America (FCC and IC) and Australia (ACMA RCM). These radios can be used for general purpose wireless data communications and support point-to-

point and point-to-multipoint datalogger communications. The radios can serve as a field modem/radio while connected to the datalogger or as a base station modem/radio while connected to a PC. They can also serve as a standalone RF router/repeater.

### Benefits and Features

- Does not require individual operational license in the North America and Australia (RF407 and RF412, respectively)
- High-speed serial communication, optimized for PakBus networks
- Low power (< 2 mA idle) during periods of inactivity
- Supports point-to-point with RF retries and point-to-multipoint operations
- Remote diagnostics using PakBus node operations
- Faster communication due to elimination of some small link state packets

### System Components

#### Radios

A spread spectrum radio<sup>b</sup> needs to be at both the base station and field site. The following table shows the spread spectrum radios that each model can communicate with:

Model	Where Used	Frequency <sup>c</sup>	Communicates With
RF407	U.S., Canada	902 to 928 MHz	RF407, CR6-RF407, CR300-RF407, CR310-RF407, CRVW3-RF407
RF412	Australia, New Zealand	915 to 928 MHz	RF412, CR6-RF412, CR300-RF412, CR310-RF412, CRVW3-RF412

<sup>a</sup> The operating frequency band of these radio modems may be shared with other unlicensed services such as cordless telephones and with licensed services including emergency broadcast and air-traffic control.

<sup>b</sup> Spread spectrum radios, like all FCC Part 15 devices, are not allowed to cause harmful interference to licensed radio communications and must accept any interference that they receive. Most Campbell Scientific users operate in open or remote locations where interference is unlikely. If there is a problem, interference can be reduced using methods such as moving the device, reorienting or using a different type of antenna, or adding RF shielding.

<sup>c</sup> Campbell Scientific also offers the RF422 868 MHz spread spectrum radio, which can be used in many European countries. Refer to the RF422 product brochure for more information.

<sup>d</sup> Although the RF401A and RF411A cannot communicate with these radios, a factory upgrade is available to convert an RF401A or RF411A to an RF407 or RF412, respectively ([www.campbellsci.com/upgrade-rf401a](http://www.campbellsci.com/upgrade-rf401a)). However an upgrade is not available for our retired spread spectrum radios or for the onboard radio in a CR200(X)-series datalogger or AVW200-series interface.



## Antennas

Campbell Scientific offers a variety of FCC-approved antennas for these radios. Our inexpensive whip antennas connect directly to the radio (no cable required) and can transmit short distances. A complete listing of our whip antennas is available at:

- › [www.campbellsci.com/order/rf407](http://www.campbellsci.com/order/rf407)
- › [www.campbellsci.com/order/rf412](http://www.campbellsci.com/order/rf412)

A dipole antenna (pn 15970) is ideal for the base station. It includes a window or wall mount and a cable for connecting to the radio. Our higher gain omnidirectional (pn 14221) and Yagi (pn 14201) antennas require a cable to connect them to the radio. A surge protector (pn 31314) is available for sites susceptible to lightning or electrostatic buildup.

## Powering the Radio

At the base station, the radio typically uses ac power that is either supplied by a wall charger (pn 15966) or through the PC via the USB port and cable. At the field site, the radio is typically powered by the datalogger through the CS I/O port. A field cable (pn 14291)

can also be used to connect the radio to an appropriate 12 Vdc power supply. This field cable is required when the radio is connected to the datalogger's RS-232 port instead of the CS I/O port.

## Specifications

- › Type: Frequency Hopping Spread Spectrum (FHSS) Transceiver
- › Transmitter Power Output: 5 to 250 mW, software selectable
- › Receiver Sensitivity: -101 dBm
- › Channel Capacity: 8 25-channel hop sequences sharing 64 (RF407) or 31 (RF412) available channels
- › RF Data Rate: 200 kbps
- › Antenna Connector: Reverse polarity SMA (RPSMA) jack
- › LEDs: Power/Tx, Rx
- › RS-232 Connector: 9-pin D female
- › RS-232 Baud Rate: 1200 to 115200 bps
- › CS I/O Connector: 9-pin D male
- › CS I/O Modes: SDC 7, 8, 10, 11, and ME master
- › USB: USB Type B jack
- › Dimensions\*: 11.1 x 6.9 x 2.7 cm (4.4 x 2.7 x 1.1 in)
- › Power: 9 to 16 Vdc

- › Power Connector: 2.5 mm DC power jack
- › Operating Temperature Range: -40° to 70°C

### Weight

- › Without Ships With Items: 136 g (4.8 oz)
- › With Ships With Items: 283.5 g (10 oz)

### Average Current Drain

- › Transmit: < 80 mA (250 mW Tx Power)
- › Receive: 15 mA
- › Stand-by: < 0.5 mA (depending on power saving mode)

### Compliance Information

- › United States: FCC Part 15.247: MCQ-XB900HP
- › Industry Canada: IC: 1846A-XB900HP
- › ACMA RCM (RF412 only)

\*Dimensions are from the tip of the antenna connector to other the side of the case, and from the bottom of the case to the top of the DB9 connector jack screw. The width includes the thickness of the screw heads on the screws that hold the case together.

