RF416 and RF432

2.4 GHz, 50 mW, Spread Spectrum Radios

Overview

The RF416 and RF432 radios can be used for general purpose wireless data communications and support point-to-point and point-to-multipoint datalogger communications. Both the RF416 and RF432 spread-spectrum radios have a frequency range of 2.450 to 2.482 GHz. This frequency can be used to communicate in many countries worldwide. These radios can communicate with RF416 radios, RF432 radios, CR216(X) dataloggers, and AVW216 interfaces.

Spread spectrum radios spread the normally narrowband information signal over a relatively wide band of frequencies. This allows the communications to be highly immune to noise and interference from RF sources such as pagers, cellular phones and multipath.[b] The RF416 and RF432 radios reduce susceptibility to RF interference from other spread spectrum devices by providing user-selectable frequency hopping patterns.

Benefits and Features

- ❯ Long range, wireless communications between devices
- ❯ Hassle-free operation in many countries where license free operation is allowed[c]
- ❯ Low average power consumption
- ❯ Optimized for Campbell Scientific PakBus networking

- ❯ Improved RF efficiency when using PakBus protocol compared to other third party solutions
- ❯ Low-cost, stand-alone operation when a dedicated PakBus RF repeater is needed
- ❯ Frequency-hops over 25 channels avoids interference from other spread spectrum radios

[a] *Purchase of this product is not recommended for new networks deployed in the European Union (EU) that may require future expansion. This and other RF compatible products will not be available for sale in Europe after 1/1/2015 due to changes in EU legislation.*

[b] *The operating frequency band of this radio modem may be shared with other non-licensed services such as cordless telephones and with licensed services including emergency broadcast and air-traffic control.*

[c] *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.*

System Components

Radio Models

The RF416 and RF430 differ in their ports used for connecting to computers/dataloggers. Refer to the following table for specifics.

Model	Communication Ports	Typically Serves As
RF416	CS I/O, RS-232	Field modem/radio while connected to the datalogger or base station modem/radio while connected to a PC's RS-232 port
RF432	USB, RS-232	Base station modem/radio while connected to the PC's USB port[d.]

[d] *The RF432 may also serve as a field modem by connecting to the datalogger's RS-232 port. This non-standard use requires the 18633 null modem cable and the 14291 field power cable.*

Powering the Radio

At the base station, the RF432 is powered by the PC through the USB port, and the RF416 is powered using the 15966 wall charger. At the field site, the RF416 is typically powered by the datalogger through the CS I/O port. The #14291 Field Cable is required at the field site for the following situations:

❭ Radio connected to the datalogger's RS-232 port instead of the CS I/O port

❭ Datalogger purchased before December 1997

Antennas

Campbell Scientific offers a variety of antennas for this radio. The 16005 is an omnidirectional 1/2-wave, 0 dBd, whip antenna that connects directly to the radio (no cable required) and can transmit short distances (up to 1 mile). The 17480 dipole antenna includes adhesive for window or wall mounting and a cable for connecting to the radio.

Our higher gain #30411 omnidirectional and #16755 Yagi antennas require a cable to connect them to the radio. The #16982 surge protector is available for susceptible to lightning or electrostatic buildup or when the cable length needs to be longer than 3 m (10 ft), as measured between the transceiver and the antenna.

The 16755 is a high-gain (13 dBd), directional antenna that is intended for longer distances, and for communicating with one other station.

Specifications

❭ Type: Frequency Hopping Spread Spectrum (FHSS) Transceiver

❭ RS-232 Baud Rate: 38.4k, 19.2k, 9600, 4800, or 1200 bps

❭ USB Baud Rate[e] (RF432): 38.4k, 19.2k, 9600, 4800, or 1200 bps

❭ Channel Capacity: 65,000 Network Identifiers share 25 hop channels

❭ Frequency Hopping Patterns: Six different selectable patterns

❭ Frequency Control: Direct FM

❭ Receiver Sensitivity[f]: -104 dBm at 10^{-4} bit error rate

❭ Interference Rejection: 70 dB at pager and cellular phone frequencies

❭ Transmitter Power Output: 50 mW nominal

❭ Power: 9 to 16 Vdc

❭ Average Current Drain
Stand-by: <1 mA (power-saving options used)
Receiving: 36 mA (RF416), 40 mA (RF432)
Transmitting: 75 mA (RF416), 78 mA (RF432)

❭ LEDs: Power on, TX, RX, diagnostics

❭ FCC ID: OUR-24XSTREAM

❭ Antenna Connector: Reverse polarity SMA (RPSMA)

❭ RS-232 Connector: 9-pin D female (4 wire: Tx, Rx, CTS, GND)

❭ CS I/O Connector[g] (RF416): 9-pin D male

❭ Power Connector: Barrel plug, center positive 12 V; used to connect the 14291 Field Power Cable or 15966 AC adapter

❭ Dimensions: 11.4 x 7.0 x 2.9 cm (4.9 x 2.8 x 1.2 in)

❭ Weight: 227 g (8 oz)

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[e] *If the RF432 radio has an operating system prior to OS 2, its USB port will only communicate at 38.4 kbps. Therefore, the operating system of the radio may need to be updated to a newer version if the network will contain dataloggers that do not support 38.4 kbps (e.g., CR200(X), CR510, CR10X).*

[f] *Campbell Scientific protocols will issue retries wherever a bit error occurs.*