CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

RF450
900 MHz, 1 W Spread-Spectrum Radio

Overview

The RF450 is a frequency-hopping, spread-spectrum radio that operates within the 902 to 928 MHz license-free band[a]. This 1 W radio provides a solution for wireless network communications over longer distances (13 to 60 miles, depending on antenna and line-of sight). Designed specifically for our PakBus® dataloggers, the RF450 works particularly well in point-to-multipoint PakBus networks.

Benefits and Features

- › Individual FCC license not required[b]
- › Maximum transmission distance of 60 miles, and realistic reliable transmission distance of approximately 13 miles[c]
- › Low current drain
- › Wide operating temperature range
- › High data transfer speeds

- › High noise immunity—superior performance in noise congested environments
- › Error Free Communications—32 bit Cyclical Redundancy Checking (CRC) with automatic retransmission
- › Ability to have stand-alone RF router/repeaters (up to 8 repeaters)
- › Real-time remote diagnostics and setup, transparent to network communications

Technical Description

The RF450 consists of a radio module manufactured by FreeWave Technologies and a Campbell Scientific interface board. It reduces susceptibility to RF interference from other spread spectrum devices by providing user-selectable frequency hopping patterns.

Spread spectrum radios spread the normally narrowband information signal over a relatively wide band of frequencies. This process allows communications to be more immune to noise and interference from RF sources such as pagers and cellular phones.

Ordering Information

Spread Spectrum Radio

RF450	900 MHz, 1 W Spread Spectrum Radio

Demonstration Kits

21108	RF450 Demo Kit Rental for 2 weeks allows customers to test their radio communications onsite. Contact Campbell Scientific for more information.
21109	Additional Weeks of Demo Kit Rental. The time period of the demo kit's rental starts when Campbell Scientific ships the kit and ends when Campbell Scientific receives the kit. Each week, or a portion thereof, past the original two week rental will be charged an additional amount.

Charger, Power Cable, Null Modem Cable, Data Cable

15966	Wall Charger is required for ac power to serve as the power source for the radio. Typically it is used when the radio is connected to a PC at the base station.
14291	Field Power Cable is required at the field site if the radio is connected to the datalogger's RS-232 port instead of the CS I/O port (also requires the 18663 null modem cable), or if the datalogger was purchased before December 1997.
18663	Null Modem Cable is used to connect a spread spectrum radio to the datalogger's RS-232 port.
14413	Data Cable RS-232 DB9 Male to DB25 Male with 6 ft length. The 14413 connects the radio to an SRM-5A Short Haul Modem, SDS-122 Serial Data Switch, or another 25-pin DTE RS-232 port.

[a] *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.*

[b] *The RF450 radio, 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.*

[c] *All transmission distances assume line-of-sight and appropriate antenna (line-of-sight obstructions, RF interference, and antenna type will affect transmission distance).*

Ordering Information Continued

Antennas (choose one)

Only the following FCC-approved antennas can be used with the RF450. Call one of our Applications Engineers for help in choosing an antenna.

19512 0 dbd, ½-wave, whip antenna with SMA connector that attaches directly to the radio; no antenna cable is needed. This antenna can transmit short distances.

20644 1 dBd, dipole antenna with window or wall mount. Antenna comes with a 3 m (10 ft) cable that attaches to the radio; an additional cable is not needed. This antenna can transmit short distances.

14221 3 dBd omnidirectional antenna with mounting hardware. This higher gain antenna is suitable for base station use where it needs to communicate with multiple stations located in different directions. This antenna's type N female connector attaches to an antenna cable that's purchased separately (see right column).

14205 6 dBd, Yagi antenna with mounting hardware. This directional antenna is intended for longer transmission distances.. Its type N female connector attaches to an antenna cable that's purchased separately (see right column).

14221

Cables/Surge Suppressors for the 14221 and 14205 Antennas

COAXSMA-L Type N Male-to-SMA Antenna Cable with user-specified length; enter length, in feet, after the -L. This cable is recommended for lengths less than 3 m (10 ft).

COAXNTN-L Type N Male-to-Type N Male Antenna Cable with user-specified length; enter length, in feet, after the -L. This cable is used with the 31317 surge suppressor (see below) and is recommended for environments susceptible to lightning or electrostatic buildup.

31317 Antenna Surge Protector Kit that includes one COAXSMA-L1.5 cable. This surge suppressor is used with the COAXNTN cable (see above) and is recommended for environments susceptible to lightning or electrostatic buildup.

Adjustable Angle Mounting Kits

CM230 Adjustable Angle Mounting Kit allows the 14201 Yagi antenna to be aimed at the service provider's antenna. It attaches to a mast or pipe with a 1.3 to 2.1 in. OD.

CM230XL Adjustable Angle Mounting Kit with Extended Length. Provides the same functionality as the CM230, but the CM230XL places the antenna further from the pole or crossarm.

Diagnostics

20625 RF450 Diagnostics & Programming Cable with Software. These items allow advanced users to perform Network Diagnostics.

Specifications

- Operating Frequency: 902 to 928 MHz
- Type: Frequency Hopping Spread Spectrum (FHSS) Transceiver
- FCC ID: KNY-6231812519
- Canada ID: 2329B-DGR09RAS
- Power Output: 5 mW to 1 W, user selectable
- Modulation: GFSK, 120 or 170 kbps
- Occupied Bandwidth: 230 kHz at 60 dB
- Channel Spacing: 230 kHz
- Hopping Patterns: 15 per band, 105 total, user selectable
- Hopping Channels: 50 to 112, user selectable
- Hopping Bands: 7, user selectable
- Frequency Zones: 16 zones, 7 channels per zone
- Receiver Sensitivity: -108 dBm for 10^{-6} BER; -110 dBm for 10^{-4} BER
- Receiver Selectivity: -20 dB at Fc ±115 kHz; -60 dB at Fc ±145 kHz
- System Gain: 140 dB
- Error Detection: 32-bit CRC, retransmit on error
- Data Encryption: Substitution, dynamic key
- Link Throughput: 115.2 kbps, maximum
- Data Interface Protocol: CS I/O, RS-232, DCE, ME and SDC, user selectable
- RS-232 Baud Rate: 1200, 4800, 9600, 19.2k, 34.4k, 57.6k, or 115.2k bps; user selectable
- RS-232 Connector: 9-pin D Female (4 wire: Tx, Rx, CTS, GND)
- CS I/O Connector: 9-pin D Male[d]
- Antenna Connector: Type SMA female
- Power Connector: Barrel plug, center positive 12 V; used to connect the 14291 Field Power Cable or 15966 AC adapter
- Input Voltage: 7 to 28 Vdc
- Average Current Drain @ 12 Vdc

Sleep	Idle	Receiving	Transmitting
7 mA	22 mA	76 mA	500 mA

- Operating Temperature: -40° to +75°C
- Relative Humidity: 0 to 95% RH non-condensing
- Weight: 0.3 kg (0.7 lb)
- Length
  Without Mounting Plate: 14.48 cm (5.7 in)
  With Mounting Plate: 19.05 cm (7.5 in)
- Height: 8.05 cm (3.17 in)
- Depth: 3.66 cm (1.44 in)
- CE Compliant

[d]*Newer dataloggers provide power to the RF450 radio on this connector. Dataloggers purchased before December 1997 require the 14291 Field Power Cable (see Ordering Information).*