

# SCADAWave E-Series Licensed Digital Data Radios

## Features:

- 370-520MHz band operation
- Up to 19,200bps over-air data rates
- Superior receiver sensitivity
- 128-bit AES encryption (North America/Australia only)
- Industry-standard protocol support
- Multistream™ simultaneous data stream support
- User friendly Windows-based configuration and diagnostics interface
- 3-year warranty (parts and labor)



**SCADAWave E-Series** licensed UHF radio modems are designed to efficiently transmit data for SCADA, telemetry and other information, and control applications. E-Series radios use advanced digital modulation and signal processing techniques to achieve exceptionally high data throughput efficiency using traditional licensed narrow band radio channels. The products are available in a wide range of frequency bands and carry the best warranty in the business.

As with all SCADAWave radio solutions, the E-Series can be rapidly deployed as a permanent or temporary alternative to wired communication networks which are costly to install and difficult to modify. When integrated into legacy systems or used as the communications backbone of a new system, SCADAWave radios bring up-to-date communication technology and performance to the forefront.

### Applications

E-Series radio products are used across a wide range of industrial markets in traditional point-to-point and point-to-multipoint applications as well as repeater and store-and-forward systems, and are compatible with SCADAWave M-Series data radios.

They are often used for remote interconnection of PLCs, RTUs, data loggers, and other data monitoring and control devices.

The radios can be ordered as a CSA Class I, Division II-compliant product.

### Features

Designed for maximum value and functionality Control Microsystems has incorporated a wide range of state-of-the-art features in the E-Series:

**Data modem:** Advanced technology DSP-based GMSK digital data modem featuring error-checked high data throughput and true 19,200bps over-the-air data rates.

**User-configurable data ports** offer simultaneous data streams, collision avoidance, 128-bit AES encryption (within North America/Australia only) and support for Industry-standard protocols including Modbus, DNP3.0 and IEC 60870-5-101.

**Radio:** Dual independent, high frequency stability digital synthesizers, providing rapid Tx-Rx turnaround times and greater system capacity with optimized data quality. These highly flexible radios are universally applicable with compliance to FCC and ETSI radio communication regulatory requirements.

### Configuration & Management

All SCADAWave radios offer maximum versatility by providing local and over-the-air configuration options.

### SCADAWave Manager

As the Network Management and Remote Diagnostics environment for all SCADAWave radios this tool helps to eliminate system down-time and reduce maintenance costs. The software incorporates a wide range of efficient network management utilities including error rate testing, channel occupancy statistics and data error statistics. SCADAWave Manager also includes a diagnostics utility that permits monitoring and logging of radio performance parameters for all units in the network.

### Design, Environmental and Power

The SCADAWave E-Series is built using compact, lightweight housings, ensuring maximum reliability together with ease-of-installation and serviceability. Full specification operation is guaranteed over the entire -30 to +60°C, [-22 to 140°F] temperature range. Overall power consumption is optimized with a user-controlled shutdown mode.

### Selection

The E-Series consists of a basic half-duplex remote radio-modem ER50, extended feature full-duplex remote radio-modem ER55, a performance-hardened base station EB60 and a Hot Standby base station controller unit EH70.

**SCADAWave ER50& ER55 Specifications**

<b>Functional</b>	
<b>Location</b>	Remote station
<b>Licensed Radio Frequency Range</b>	370-520MHz (various sub-frequency bands available)
<b>Operational Modes</b>	Simplex, half-duplex (ER50) or full-duplex (ER55)
<b>RF Channel Data Rate</b>	4800/9600/19,200bps
<b>Features</b>	
<b>Configuration Interface</b>	SCADAWave Manager: configuration, network management and diagnostic windows GUI software
<b>Radio Frequency Accuracy</b>	± 1ppm (-30 to 60°C) [-22 to 140°F] ambient
<b>Transmitter</b>	Power: 0.05 - 5W (+37dBm) ± 1dB, user-configurable with over-temperature and reverse power protection Modulation: User-configurable narrow band digitally filtered GMSK or 4 Level FSK PTT Control: Auto (on data) / RTS line (Port A or B) / System Port Override
<b>Receiver</b>	Sensitivity: -118dBm for 12dB SINAD Selectivity: Better than 60dB AFC Tracking: Digital receiver frequency tracking Mute: Programmable digital mute
<b>Connections</b>	User Data Ports: 2 x DE9 female ports wired as DCE (modem) System Port: RJ45 for diagnostic, configuration and re-programming Antenna: N female bulkhead Separate N (Tx) and SMA (Rx) connectors for full-duplex (ER55) Power: 2 pin locking, mating connector supplied LED Display: Multimode Indicators for Pwr, Tx, Rx, Sync, TxD and RxD data LEDs (for both port A and B)
<b>Modem</b>	Data Serial Port A: RS-232, DCE, 600-57,600bps asynchronous Data Serial Port B: RS-232, DCE, 300-38,400bps asynchronous System Port: RS-232, 19,200bps asynchronous Flow Control: Selectable hardware/software/3-wire interface Data Buffer: 16Kbyte of on-board RAM Bit Error Rate: < 1x10 <sup>-6</sup> @ -110dBm (4800 bps) < 1x10 <sup>-6</sup> @ -108dBm (9600 bps) < 1x10 <sup>-6</sup> @ -106dBm (19,200 bps) Encryption: 128-bit AES encryption (within North America/Australia only) Collision Avoidance: Channelshare™ supervisory channel C/DSMA collision avoidance system Data Stream: Simultaneous delivery of multiple data streams (protocols) provided by Multistream™ Data Turnaround Time: < 10mS Firmware: Field-upgradeable Flash memory
<b>General</b>	Temperature: -30 to +60°C, [-22 to 140°F] Power Supply: 13.8VDC nominal (10-16VDC) Transmit Current: 750mA nominal @ 1W 1600mA nominal @ 5W Receive Current: < 125mA nominal Sleep Mode: External control, < 1mA Enclosure: Rugged die-cast, w/ fitted mounting plate Dimensions: 170 x 150 x 42mm (6.7 x 5.9 x 1.65 inches) With mounting plate: 190 x 150 x 47mm (7.5 x 5.9 x 1.85 inches) Weight: 1.27kg (2.8lbs.)
<b>Diagnostics</b>	Network-wide operation from any remote terminal Non-intrusive protocol - runs simultaneously with the application Over-the-air re-configuration of all parameters Storage of data error and channel occupancy statistics In-built error rate testing capabilities
<b>Approvals and Certifications</b>	ETSI: EN300113, EN301489, EN60950 FCC: PART 15, PART 90 IC: RS119, ICES-001 ACA: AS4295-1995 (Data) CSA: Class I, Division II, Groups (A, B, C, D) for Hazardous Locations ANSI/UL equivalent CE: Directive 1999/5/EC
<b>Warranty</b>	3-Year parts and labor

**SCADAWave EB60 & EH70 Specifications**

<b>Functional</b>	
<b>Location</b>	Base Station (EB60) Hot Standby Base Station (EH70)
<b>Licensed Radio Frequency Range</b>	370-520MHz (various sub-frequency bands available)
<b>Operational Modes</b>	EB60: Full and half-duplex, simplex EH70: Full or half-duplex Optional internal or external-duplexer available for single antenna operation
<b>RF Channel Data Rate</b>	4800/9600/19,200bps full-duplex
<b>Features</b>	
<b>Configuration Interface</b>	SCADAWave Manager (Windows™-based GUI software) for configuration, network management and diagnostics
<b>Radio Frequency Accuracy</b>	± 1ppm (-30 to 60°C) [-22 to 140°F] ambient
<b>Transmitter</b>	Power: 5W (+37dBm) ± 1dB, user-configurable with over-temperature and reverse power protection Modulation: User-configurable narrow band digitally filtered GMSK or 4 Level FSK PTT Control: Auto (on data) / RTS line (Port A or B) / System Port Override
<b>Receiver</b>	Sensitivity: -118dBm for 12dB SINAD Selectivity: Better than 60dB AFC Tracking: Digital receiver frequency tracking Mute: Programmable digital mute
<b>Connections**</b>	User Data Ports: 2 x DE9 female ports wired as DCE (modem) System Port: RJ45 for diagnostic, configuration and programming Antenna: 2 x N female bulkhead (separate Tx and Rx ports) 1 x N female bulkhead (with optional internal-duplexer) Power: 2 pin locking, mating connector supplied LED Display: Multimode Indicators for Pwr, Tx, Rx, Sync, TxD and RxD data LEDs (for both port A and B)
<b>Modem</b>	Data Serial Port A: RS-232, DCE, 600-57,600bps asynchronous Data Serial Port B: RS-232, DCE, 300-38,400bps asynchronous System Port: RS-232, 19,200bps asynchronous Flow Control: Selectable hardware/software/3-wire interface Data Buffer: 16Kbyte of on-board RAM Bit Error Rate: < 1x10 <sup>-6</sup> @ -110dBm (4800 bps) < 1x10 <sup>-6</sup> @ -108dBm (9600 bps) < 1x10 <sup>-6</sup> @ -106dBm (19,200 bps) Encryption: 128-bit AES encryption Collision Avoidance: Channelshare™ supervisory channel C/DSMA collision avoidance system Data Stream: Simultaneous delivery of multiple data streams (protocols) provided by Multistream™ Data Turnaround Time: <10mS Firmware: Field-upgradeable Flash memory
<b>General</b>	Temperature: -30 to +60°C, (-22 to 140°F) Power Supply: 13.8VDC nominal (11-16VDC) Transmit Current: EB60: 1.3A nominal @ 1W, 2.5A nominal @ 5W EH70: 2.0A nominal @ 1W, 3.2A nominal @ 5W Receive Current: EB60: < 350mA EH70: < 1A Sleep Mode: External control, < 1mA Enclosure: EB60: 19" 2 RU rack mount EH70: 19" 5 RU rack mount Dimensions: EB60: 485 x 90 x 420 mm (19 x 3.5 x 16.5 inches) including heat sink EH70: 485 x 225 x 420 mm (19 x 8.9 x 16.5 inches) including heat sink Weight: EB60: 1.27kg (2.8lbs.) EH70: 12.7kg (28lbs) (excluding optional-duplexer) Digital I/O: 2 Inputs monitored by SCADAWave Manager**
<b>Diagnostics</b>	Network-wide operation from any remote terminal Non-intrusive protocol - runs simultaneously with the application Over-the-air re-configuration of all parameters Storage of data error and channel occupancy statistics In-built error rate testing capabilities
<b>Approvals and Certifications</b>	ETSI: EN300113, EN301489, EN60950 FCC: PART 15, PART 90 IC: RS119, ICES-001 ACA: AS4295-1995 (Data) CE: Directive 1999/5/EC
<b>Warranty</b>	3-Year parts and labor

## Model Code

Code T	Select: Model Type
E	E-Series
Code y	Select: Unit Type
R	Remote Station (ER50/ER55)
B	Base / Repeater Station (EB60)
H	Hot Standby Base / Repeater (EH70)
Code xxx	Select: Generic Frequency Band
450	370 to 518MHz
Code aa	Select: Frequency (400MHz bands)
46	370 to 388MHz (Tx & Rx)
47	380 to 396MHz (Tx & Rx)
48	395 to 406MHz (Tx & Rx)
50	403 to 417MHz (Tx & Rx)
63	406 to 421MHz (Tx & Rx)
64	415 to 430MHz (Tx & Rx)
56	418 to 435MHz (Tx & Rx)
57	428 to 444MHz (Tx & Rx)
55	436 to 450MHz (Tx & Rx)
51	450 to 465MHz (Tx & Rx)
65	455 to 470MHz (Tx & Rx)
52	465 to 480MHz (Tx & Rx)
53	480 to 494MHz (Tx & Rx)
60	490 to 500MHz (Tx & Rx)
54	505 to 518MHz (Tx & Rx)
Note: Other frequency bands available upon request.	
Code bbb	Select: RF Channel Data Rate & Bandwidth (Internal Modem)
F01	FCC/IC 9600 / 19k2bps 12.5kHz ≈
F02	FCC/IC 19,200bps 25kHz
E01	ETSI 4800/9600bps 12.5kHz -4800bps provides M-Series compatibility for Europe
E02	ETSI 19k2bps 25kHz
A01	ACA 4800 / 9600bps 12.5kHz ≈
A02	ACA 9600 / 19k2bps 25kHz

Tyxxx-aabbb-cde represents the part number matrix

Code c	Select: Options 1
D	No Encryption (mandatory outside North America/Australia)
E	No Encryption and Full Duplex Operation required for ER55, requires selection of one or two external Duplexers: (mandatory outside North America/Australia)
X	Encryption (mandatory within North America/Australia)
Y	Encryption and Full Duplex Operation required for ER55, requires selection of one or two external Duplexers: (mandatory within North America/Australia)
Code d	Select: Options 2
O	No Class 1 Div 2 (EB60 & EH70 only)
H	Hazardous Environment Class1 Div2 (ER50 & ER55 only)
Note: Specify internally or externally fitted duplexers. Externally fitted require feeder tails.	
Code e	Select: Hot Standby Configurations
O	None
A	Single External Duplexer (not included) with switching via Hot Standby Controller
B	Dual Redundant External Duplexers (not included)
C	Single Internal Band Reject Duplexer with switching via Hot Standby Controller
D	Dual Redundant Internal Band Reject Duplexers

### Notes:

≈ M-Series-compatible EB60/EH70 Base Stations are Type F01 or A01

### Communications Standards:

FCC – Federal Communications Commission (USA)  
 IC – Industry Canada  
 ETSI – European Telecommunication Standards Institute  
 ACA – Australian Communications Authority

**Example: ER450-63F01-EH0** specifies: SCADAWave E-Series, Remote Station, Generic 450MHz band with a specific frequency range of 406 to 421MHz, FCC/IC 9600/19200bps modem with a bandwidth of 12.5kHz, Encryption, Class1 Div2 and no hot-standby options.

## Accessories (Contact Sales Support Department for up-to-date list)

Model Number	Description	Part Number
<b>Duplexers<sup>+</sup></b>		
DUPLX450BP	450 MHz Band Pass Duplexer, 19" Rack Mount	210095
<b>Programming and Communication Cables</b>		
	SCADAWave Manager E & K Series Programming Cable	297816
	SCADAWave Communication Cable, DE-9M to DE-9F - Modem, 10 feet (3.05m)	297820
	SCADAWave Communication Cable, DE-9M to RJ45M - Modem, 10 feet (3.05m)	297821
<b>Other</b>		
EDOVM	Digital Order Wire Voice Module (E-Series only)	210128
	SCADAWave Manager Configuration/Diagnostics software package	297826

+ Frequencies must be specified at time of order