

Trio Q

Licensed VHF | UHF
Ethernet and Serial data radio

QR150 | QR450 – Half Duplex



Product at a glance

Trio™ Q Data Radios are advanced, high-speed licensed digital data radios, providing both Ethernet and serial communications for complex and demanding applications in Point-to-Point and Point-to-Multipoint (Multiple Address Radio) Telemetry and remote SCADA systems.

Features such as ChannelShare+™ and web-based user configuration, together with powerful remote diagnostics and Network Management, make Trio Q Data Radios the complete licensed radio solution that works with leading host systems and remote equipment.

Combining both Ethernet and serial connectivity, Trio Q Data Radios are suitable for use with the latest SCADA technology and for providing a smooth transition from serial-based infrastructure to IP/Ethernet.

Ideal for deployment at remote sites, the Trio QR Half Duplex Radio supports Simplex or Half duplex operation. Where base stations or hot-standby radios are required, refer to the Trio QB (19" Rack Mount Base), Trio QP and QH (Hot Standby 19" Rack Mount Base) radios.

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Specifications – Trio QR150 | QR450

Radio

Frequency Range	<ul style="list-style-type: none"> • QR150: 135...175 MHz • QR450: 400...450 MHz (L-Band) or 450...518 MHz (H-Band)
Frequency Splits	Various Tx/Rx frequency splits - configurable
Channel Selection	<ul style="list-style-type: none"> • QR150: 3.125 kHz or 1.25 kHz channel steps • QR450: 3.125 kHz channel steps
Channel Spacing	12.5 and 25 kHz (software selectable)
Frequency Accuracy	±0.8 ppm, -40...70 °C (-40...158 °F) ambient
Aging	<= 1 ppm/year
Radio Modes ¹	Simplex and Half Duplex

Transmitter

Tx Power	<ul style="list-style-type: none"> • CPM: 0.05...10 W (+17...+40 dBm) • QAM QPSK: 0.05...5 W (+17...+37 dBm) • QAM 16-QAM: 0.05...3.2 W (+17...+35 dBm) • QAM 64-QAM: 0.05...2.5 W (+17...+34 dBm) • 0.1 dB resolution, user-configurable 			
Modulation ¹	Narrow band 2, 4, 8 and 16-level continuous phase modulation (CPM) QPSK, 16-QAM and 64-QAM quadrature amplitude modulation (QAM)			
Emission Designator	Region	Channel Bandwidth	CPM	QAM
	ACMA/ETSI	12.5 kHz	11K2F1D	12K0D1D
		25 kHz	20K1F1D	23K6D1D
FCC/ISED	12.5 kHz	11K2F1D	11K2D1D	
Tx Keyup Time	<1ms			
Timeout Timer	Configurable 0...255 seconds			
Tx Spurious	<= -36 dBm			
PTT Control	Auto (Data) / RTS line on Data Port			
Protection	Over-temperature and high VSWR protection			

Receiver^{1,5}

Topology	Hybrid single conversion / SDR
Frequency Error Compensation	Digital receiver frequency tracking up to +/- 2000 Hz
Maximum RF Level (Decoding)	-10 dBm
Adjacent Channel Rejection Ratio (Selectivity)	<ul style="list-style-type: none"> • 12.5 kHz: -44 dBm / 52 dB • 25 kHz: -37 dBm / 58 dB
CoChannel Rejection Ratio	QPSK: -12 dB / 64-QAM: -23 dB
Intermodulation Rejection	-30 dBm [65 dB]
Spurious Response Rejection	-30 dBm [65 dB]
Blocking or Desensitization	-5 dBm [90 dB]

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Specifications – Trio QR150 | QR450 – cont'd

Connections

Serial Interface 1/2	1 x DB9 female connector providing 2 x RS-232 3-wire serial ports or 1x RS485 serial port (shared connector).
Serial Interface Data Rates	300...115,200 bps
Serial Interface Flow Control	Configurable hardware / 3-wire interface
Serial Interface DCD Control	Configurable DCD operation: activated on RF carrier or from user-data output
Ethernet Port	2 x RJ45: 10/100 Mbps (auto-MDIX sensing) compliant with IEEE 802.3
USB Port	USB Type A Host supporting Zero-Touch Configuration
Antenna	1 x TNC female [Tx/Rx] and 1 x SMA female, optional user-configurable Rx-only port
Power	4-pin locking, mating connector supplied (shared connector, x2 pins for power, x2 pins for digital I/O)
Digital I/O	Optional 2 x user-configurable digital Inputs/Outputs, which can be monitored or controlled by TVIEW+™ Diagnostics Software, EcoStruxure™ Geo SCADA Expert (ClearSCADA™) or SNMP
LED Display	Multimode Indicators for DC Power, Transmit, Receive, Synchronized Data, Serial Interface 1 & 2 Transmit & Receive Data, Ethernet 1 & 2 Transmit & Receive Data

Ethernet

Supported Protocols	Ethernet (including UDP, TCP, DHCP, ARP, ICMP, STP, IGMP, NTP & TFPT)
Ethernet Repeating	Automatic Peer-to-Peer repeating
Operating Modes	Layer-2 Ethernet Bridge mode / Layer-3 IP Router mode
Network Address Translation	Static NAT Port forwarding
VLAN	802.1Q VLAN
Quality of Service (QoS)	Eight priority lanes / Min-Max bandwidth / Flexible user-defined matches
Compression	Ethernet/IP/TCP/UDP/ESP Header (ROHC RFC-3095) and Advanced Payload Compression
Terminal Server	Legacy RS-232/RS-485 serial support via embedded terminal server (UDP/TCP)
Protocol Gateway	TCP <-> UDP and UDP <-> TCP Protocol Gateway with Unicast/Multicast Support
IP Configuration	Auto (DHCP) and Manual
SNMP	SNMP V1, V2c & V3, RFC 1213-compliant & radio diagnostics parameters (with notifications)
Modbus™ Gateway	Configurable Modbus/TCP-to-Modbus/RTU Gateway
Time Server	NTP Client / Server / Client-Server / Manual modes

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Modem

	Regulatory Region	Bandwidth (KHz)	Forward Error Correction (FEC)	Modulation	RF Data Rate (Kbps)	RF 1×10^{-6} BER Sensitivity (dBm)
RF Channel Data Rate ^{1,4}	ACMA/ETSI (QAM)	12.5	None	64-QAM	60.0	-100
				16-QAM	40.0	-107
				QPSK	20.0	-113
			Min FEC	64-QAM	49.8	-105
				16-QAM	33.2	-111
				QPSK	16.6	-113
			Max FEC	64-QAM	43.2	-106
				16-QAM	20.8	-112
				QPSK	10.4	-113
	ACMA/ETSI (QAM)	25	None	64-QAM	120.0	-96
				16-QAM	80.0	-104
				QPSK	40.0	-112
			Min FEC	64-QAM	99.6	-101
				16-QAM	66.4	-108
QPSK				33.2	-112	
Max FEC			64-QAM	86.4	-102	
			16-QAM	41.6	-109	
			QPSK	20.8	-112	
FCC/ISED (QAM)	12.5	None	64-QAM	55.4	-100	
			16-QAM	36.9	-107	
			QPSK	18.5	-113	
		Min FEC	64-QAM	46.2	-105	
			16-QAM	30.5	-111	
			QPSK	15.7	-113	
		Max FEC	64-QAM	39.7	-106	
			16-QAM	19.4	-112	
			QPSK	9.2	-113	
ACMA/ETSI (CPM)	12.5	None	2-CPM	8.0	-113	
	4-CPM		16.0	-110		
	8-CPM		24.0	-107		
	16-CPM		32.0	-100		
ACMA/ETSI (CPM)	25	None	2-CPM	14.0	-111	
	4-CPM		28.0	-109		
	8-CPM		42.0	-106		
	16-CPM		56.0	-99		
FCC/ISED (CPM)	12.5	None	2-CPM	8.0	-113	
	4-CPM		16.0	-110		
	8-CPM		24.0	-107		
	16-CPM		32.0	-100		

Dynamic Speed Selection

- User-configurable packet error rate / SNR / RSSI based algorithm for automatic data rate selection
- User-configurable minimum and maximum data rates, FEC and fixed data rate modes

	Forward Error Correction (FEC) Level	Modulation	FEC Sensitivity Gain (dB) with 10% Packet Error Rate due to Impulse Noise
Forward Error Correction	Min FEC (0.52)	QPSK	5
		16-QAM	13
		64-QAM	17
	Max FEC (0.83)	QPSK	6
		16-QAM	15
		64-QAM	22
Truncated interleaved BCH encoding with 0.52/0.72/0.83 coding rates			

Operating Modes	Base, remote, repeater or store-and-forward
Channelshare+	<ul style="list-style-type: none"> • Channelshare+ Advanced CSMA supervisory collision avoidance system (full-duplex) • Channelshare+ Token Grant channel management system (half-duplex/simplex)
E/M-Series Compatibility ²	Over-the-air compatibility with Trio E/M-Series radios
Firmware	Local and over-the-air flash-based firmware – upgradable patches with support for broadcast updates

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Security

Encryption ³	256-bit AES / AES-GCM with automatic rotating keys as per NIST SP 800-38D
HTML Interface	Password-protected HTTP and HTTPS configuration and management interface
Console Interface	Password-protected Telnet, SSHv2 and Serial console interface
User access control	Multi-User password-protected access control [read only, read/write, read/write with security, unrestricted] 256 max users
Centralized user access control	RADIUS (RFC2865) based user-authentication for remote or local logins with local user-access control fallback
Authentication	Certificate based radio authentication using DTLS and X509.3v3
Packet Filtering Firewall	Advanced and basic mode packet filtering firewall with user-configurable Layer 2 and Layer 3 rules for radio and ethernet ports
Certificate Management	FIPS Level 2 certified Trusted Platform Module
Event Logging	Non-volatile time-stamped event log

Diagnostics

Diagnostics	<ul style="list-style-type: none"> • Local (HTTP/HTTPS/Telnet/SSH/Console) or remote (Serial/TCP/UDP) access • Compatible with TVIEW+ and EcoStruxure Geo SCADA Expert • Network-wide access • Non-intrusive protocol – runs simultaneously with the application • Embedded history of diagnostics parameters and data statistics • Embedded error rate testing capabilities • Many diagnostics parameters available including Tx Power, RSSI, Supply Voltage, Temperature and VSWR
Logging	Embedded event and performance logs including time-stamped data statistics and channel occupancy
Configuration	<ul style="list-style-type: none"> • Manual Configuration via embedded HTTP, HTTPS web interface and/or Telnet/SSH/Serial console with optional TFTP • Automatic Zero-Touch configuration load via USB • Automatic configuration save via TFTP/SCP server
Ping Tester	Embedded ping test facility

General

Operating Temperature Range	-40...70 °C (-40...158 °F) ambient
Relative Humidity	Up to 95% at 40 °C (104 °F) ambient
Input Voltage	10...30 Vdc
Input Power (Tx typical)	<ul style="list-style-type: none"> • QR150: 18 W @ 30 dBm, 28 W @ 37 dBm, 39 W @ 40 dBm • QR450: 24 W @ 30 dBm, 35 W @ 37 dBm, 52 W @ 40 dBm
Input Power (Rx typical)	5 W
Housing & Dimensions	Rugged die-cast, 115 x 56 x 164 mm (4.52 x 2.2 x 6.45 in.)
Mounting	Integrated Mounting Holes or DIN Rail mounting (optional)
Weight	0.95 kg (2.1 lbs.)

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Compliance ^{1,4}

Europe (ETSI)	ETSI EN 300 113 V2.2.1 RED, ETSI EN 302 561, EN 301 489, EN 60950, EN 50385, EN 50383 and EN 300 019-2-3
United States (FCC)	47CFR PART 2, PART 15 A & B, PART 90, IEC 60950-14
Canada (ISED)	RSS-Gen, RSS-102, RSS-119, IEC 60950-14
Australia (ACMA)	AS/NZS 4295-2004, AS/NZS 60950.1
Hazardous Locations	CSA Class I, Division II, Groups (A,B,C,D) for Hazardous Locations ANSI/UL equivalent
Substation	Substation hardened to IEEE 1613 Class 2 and IEC-61850-3

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Model Code

TBURQR4HN-E00E1L00 represents a typical part number

Model	Trio Radio QR450
TBURQ	Q Data Radios
Code	Select: Unit Type
R	Simplex/Half Duplex Radio
Code	Select: Frequency Band & Sub Band
1M	VHF Mid Band: 135...175 MHz
4L	UHF Low Band: 400...450 MHz
4H	UHF High Band: 450...518 MHz
Code	Select: Hazardous Area Approvals
H	Hazardous Environment Class 1 Div 2 Groups A, B, C & D
Code	Select: Regulatory Region ^{1,4}
E00	ETSI/ACMA Region
F00	FCC Region
Code	Select: Encryption ³
E	256-bit AES encryption (standard)
N	No encryption
Code	Select: Hardware Features
1	No integrated I/O / No separate Rx port
2	Integrated I/O and separate Rx port
Code	Select: Software Licensed Features
L	Ethernet & Serial (two Ethernet & two Serial Ports)

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Model Code cont'd

TBURQR4HN-E00E1L00 represents a typical part number

Code	Select: Power Supply
0	10...30 Vdc

Code	Select: Reserved for future use
0	Reserved for future use

Example: TBURQR4LH-E00E1L00 specifies: Trio QR450 remote station, 400...450 MHz, Class 1 Div 2, ETSI/ACMA Regulatory Region, 256-bit Encryption enabled, two Ethernet & two Serial Ports, 10...30 Vdc power supply.

Radio Regulatory Standards:

FCC – Federal Communications Commission

ISED – Innovation, Science and Economic Development Canada

ETSI – European Telecommunication Standards Institute

ACMA – Australian Communications and Media Authority

Footnotes

1: Availability of radio models is dependent on country of deployment. Local and regulatory conditions may determine the performance and suitability of the radio in different countries. It is the responsibility of the buyer to ensure the radio model meets the regulatory conditions required. Some parameters depend on model type and/or mode of operation. Contact your local Schneider Electric sales office for more details.

2: Backward-compatibility is not available for all types & models of Trio E radio. Not all features are available when operating in backward-compatible mode. The following modulations are supported in E/M compatibility mode (as of Firmware Version 1.3.6.3674):

E-Series	M-Series
9600 12.5 kHz ACA 4 Level	9600 25.0 kHz ACA M-Series
19200 25.0 kHz ACA 4 Level	4800 12.5 kHz ACA M-Series
9600 12.5 kHz FCC 4 Level	4800 25.0 kHz ACA M-Series
19200 12.5 kHz FCC 4 Level	2400 12.5 kHz ACA M-Series
19200 25.0 kHz FCC 2 Level	9600 12.5 kHz FCC M-Series
9600 12.5 kHz ETSI 4 Level	4800 12.5 kHz ETSI M-Series

For BER specifications and/or sensitivities, refer to the corresponding E or M Series datasheet.

3: Export and import restrictions may apply.

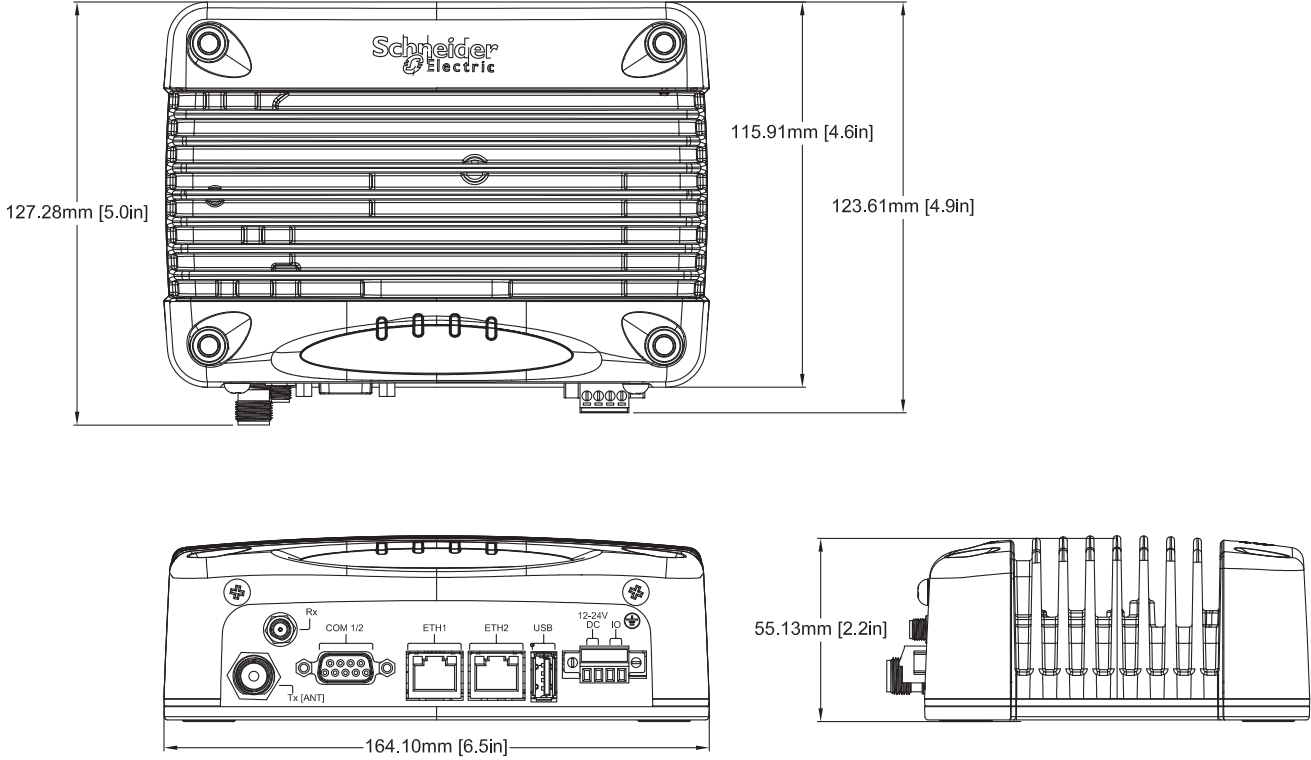
4: Other country and radio regulatory regional approvals are available upon request. Contact your local Schneider Electric sales office for more details.

5: Typical figures shown based on QPSK modulation in 12.5 kHz ETSI channel without Forward Error Correction unless otherwise specified.

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Dimensions



This is a Green Premium product and is RoHS compliant. Accessories sold separately.

Disclaimer: Not all product features are available in every mode of operation. Schneider Electric reserves the right to change product specifications. For more information visit www.se.com.

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