

Trio Q

Licensed VHF | UHF
Ethernet and Serial data radio

QH150 | QH450 – Hot Standby - Simplex, Half and Full 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 as well as providing a smooth transition from serial-based infrastructure to IP/Ethernet.

As a complement to the Trio QR half duplex remote radio, the Trio QH radio kit is ideal for deployment at base & repeater sites in systems using single or two-frequency operation. In high duty cycle applications, the Trio QH delivers maximum-rated transmitter power in ambient temperatures up to +70 °C (158 °F). Where 1+1 hot standby redundancy is not required, the Trio QB radio is available.

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Specifications – QH150 | QH450

Radio

Frequency Range	<ul style="list-style-type: none"> QH150: 135...175 MHz QH450: 400...450 MHz (L-Band) or 450...518 MHz (H-Band)
Frequency Splits	User-configurable frequency splits, including: 4.5 MHz, 5 MHz, 5.2 MHz, 9.5 MHz, 9.8 MHz & 10 MHz
Channel Selection	<ul style="list-style-type: none"> QH150: 3.125 kHz or 1.25 kHz channel steps QH450: 3.125 kHz channel steps
Channel Spacing	12.5 kHz 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, Half Duplex & Full Duplex (model code dependent)
Duplexer ⁵	External duplexer filter may be required (not included) - Refer to note 5 for more information.
Tx/Rx Port Isolation Requirements	<ul style="list-style-type: none"> QH150: >75 dB (Typical) QH450: >70 dB (Typical)

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	<1 ms			
Timeout Timer	Configurable 0...255 seconds			
Tx Spurious	≤ -36 dBm			
PTT Control	Auto (Data)			

Receiver^{1,6}

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 – QH150 | QH450 – cont'd

Connections (for each QB within the Hot Standby configuration)

Serial Interface 1/2	1 x RS232 DB9 female connector providing 2 x RS-232 3-wire serial ports (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	3 x RJ45: 10/100 Mbps (auto-MDIX sensing) compliant with IEEE 802.3
USB Port	USB Type A Host supporting Zero-Touch Configuration
Antenna ⁵	<ul style="list-style-type: none"> • 2 x N female bulkhead (Separate Tx and Rx ports - Full duplex) – refer to diagram at end of data-sheet for more details • 1 x N female bulkhead (shared Tx and Rx port - Simplex)
Power	10-pin locking, mating connector (11...30 Vdc)
Digital I/O	Optional 3 x digital inputs / 3 x digital 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 & TFTP)
Ethernet Repeating	Automatic Peer-to-Peer repeating
Operating Modes	Layer-2 Ethernet Bridge mode / Layer-3 IP Router mode
Ethernet Link Monitoring	Monitor the Ethernet link between a QB and up to two remote IP addresses
Compression	Ethernet/IP/TCP/UDP/ESP Header (ROHC RFC-3095) and Advanced Payload Compression
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
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

Hot Standby

Change-over control	Manual (front panel switched) / automatic upon alarm / automatic upon timer / remote (software driven)
Alarm Monitoring	General Alarms / Transmitter / Receiver / Received Signal Strength / Received Data Errors / Ethernet Connectivity / Power Supply

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Specifications – QH150 | QH450 – cont'd

Modem

Regulatory Region	Bandwidth (KHz)	Forward Error Correction (FEC)	Modulation	RF Data Rate (Kbps)	RF 1×10^{-6} BER Sensitivity (dBm)
ACMA/ETSI (QAM)	12.5	None	64-QAM	60.0	-100
			16-QAM	40.0	-107
			QPSK	20.0	-113
	12.5	Min FEC	64-QAM	49.8	-105
			16-QAM	33.2	-111
			QPSK	16.6	-113
	12.5	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
	25	Min FEC	64-QAM	99.6	-101
			16-QAM	66.4	-108
			QPSK	33.2	-112
	25	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
	12.5	Min FEC	64-QAM	46.2	-105
			16-QAM	30.5	-111
			QPSK	15.7	-113
	12.5	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
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+

- Channelshare+ Advanced CSMA supervisory collision avoidance system (full-duplex)
- Channelshare+ Token Grant channel management system (half-duplex/simplex)

E/M-Series Compatibility²

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
Cooling	Built-in temperature-controlled fan
Input Voltage	11...30 Vdc
Input Power (Tx Typical)	<ul style="list-style-type: none"> • QH150: 48 W @ 30 dBm, 59 W @ 37 dBm, 68 W @ 40 dBm • QH450: 55 W @ 30 dBm, 67 W @ 37 dBm, 80 W @ 40 dBm
Input Power (Rx Typical)	35 W
Protection mode	Automatic or manual changeover between QB450 units
Housing & Dimensions	Hot Standby is configured using 2 x QB450 + 1 x Hot Standby Controller (19 in. 1 RU each) for a total of 19 in. (483 mm) 3 RU rack mount. (Brackets adjustable for front, centre or proud mount) Without mounting brackets, 42 x 133.3 x 436.5 mm (16.7 x 5.25 x 17.18 in.)
Weight	15 kg (33 lbs) excluding optional duplexer
Warranty	3 years on parts and labor

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Specifications – QH150 | QH450 – cont'd

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
Substation	Communications ports substation hardened to IEC-61850-3

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Model Code

TBURQH4HN-E00E1L0A represents a typical part number

Model	Trio Radio QH150 QH450
TBURQ	Q Data Radios
Code	Select: Unit Type
H	Hot Standby Kit (with controller) - 19 in. 3 RU Comprised of 2 x QB Radios + 1 x QH Hot Standby Controller
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: Reserved for future use
N	Reserved for future use
Code	Select: Regulatory Region ¹
E00	ETSI/ACMA Region
F00	FCC Region
Code	Select: Encryption ³
E	256-bit AES encryption (standard)
N	No encryption
Code	Select: Reserved for future use
1	Reserved for future use
Code	Select: Software Licensed Features
L	Ethernet & Serial (Two Ethernet & two Serial Ports)

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Model Code cont'd

TBURQH4HN-E00E1L0A represents a typical part number

Code	Select: Power Supply
0	11...30 Vdc

Code	Select: Hot Standby Controller Options
A	Common Tx/Rx Ports with Full Duplex Capability (External Duplexer required)
B	Duplicated Tx/Rx Antennas with Full Duplex Capability (Two external duplexers required)
E	User-configurable common (Single) Tx/Rx port or separate Tx/Rx ports with half duplex/simplex capability

Example: TBURQH4LN-E00E1L0A specifies: Trio QH450 Hot Standby full duplex radio kit, 400...450 MHz, modulation for ETSI/ACMA regions, 256-bit Encryption enabled, three Ethernet & two Serial Ports, 10...30 Vdc power supply, Common Tx/Rx Ports.

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: The version of QHxxx that is a full duplex must be deployed with suitable isolation between transmitter and receiver. Isolation may be achieved by the use of band pass duplexer, external filters or suitably spaced separate antennas. Internal duplexers and filters are not available.

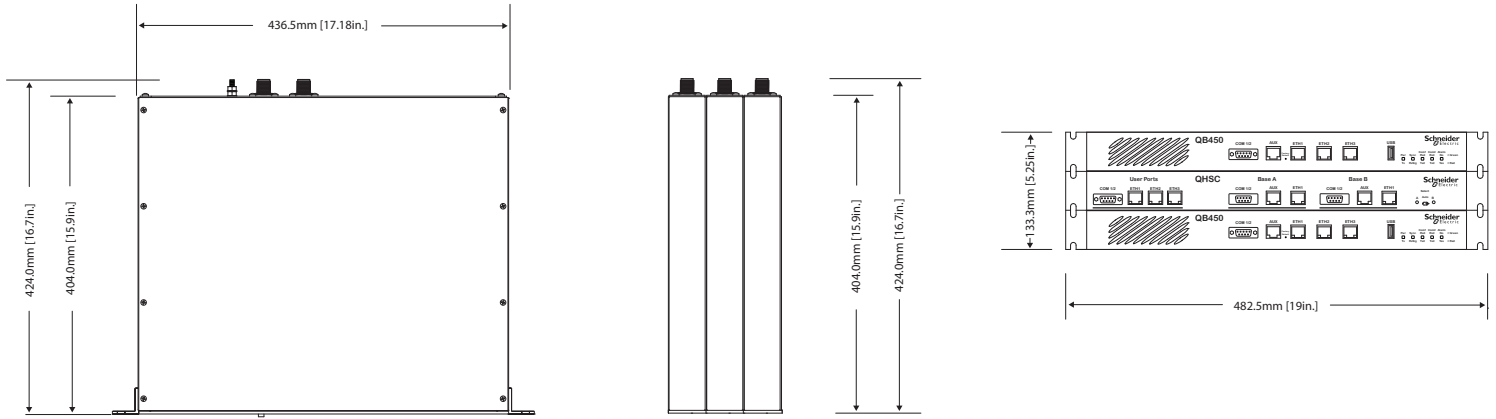
Suitable duplexers include TBUMDUPLXPBXXXCOA. For information regarding duplexers, contact your local sales office or refer to the Wireless Accessories data sheet.

6: 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 QH150 | QH450 – Hot Standby Full Duplex Radio



QH150 | QH450 – Hot Standby Controller Kit Configurations

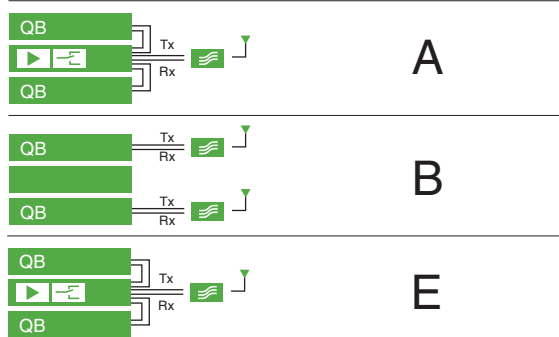
Kit Configuration

- TBURQH4xxx-xxxxxxxA
 • 2 x TBURQB4xxx-xxxxxx0
 • 1 x TBURQHHC-01A

- TBURQH4xx-xxxxxxxB
 • 2 x TBURQB4xxx-xxxxxx0
 • 1 x TBURQHHC-00B

- TBURQH4xx-xxxxxxxE
 • 2 x TBURQB4xxx-xxxxxxE
 • 1 x TBURQHHC-00A

QHHC Hot Standby Controller Option



QHHC - Option Descriptions

	Description	Antenna Type
A	LNA (Rx) & RF Relay (Tx) Fitted	Common Tx/Rx Antenna (Full Duplex)
B	Duplicated Tx/Rx Ports	Duplicated Tx/Rx Antennas
E	LNA (Rx) & RF Relay (Tx) Fitted	Common Tx/Rx Antenna (Half duplex/Simplex)

Note – Type A & B QH are full duplex radio platforms and must be deployed with suitable band pass duplexer or external filters. Internal Duplexers are not available. Suitable duplexers include TBURDUP4BP4XXCOA. For information regarding external duplexers, contact your local sales office.

- LNA (Low Noise Receiver Amplifier / Splitter)
- RELAY (Coaxial Transmitter Switch)
- EXTERNAL FILTER/DUPLEXER

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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