



# Internal TRIUMPH Radio

Internal TRIUMPH Land Mobile/Cell Radio is a half duplex, 1 W UHF Radio Transceiver with built-in quad band 2.5G GSM/GPRS/EDGE module developed to be integrated in new JAVAD GNSS TRIUMPH-1 and TRIUMPH-4X Receivers.

It takes incoming data from a JAVAD GNSS receiver through the standard asynchronous serial port (CMOS/ TTL compatible), modulates it with GMSK, FSK, PSK or most spectrum efficient QAM modulation and transmits it at RF power output levels from 15 dBm up to 30 dBm operating in UHF frequency band (406 to 470 MHz).

The UHF transceiver is also capable of receiving RF signals through a 50 Ohm impedance external antenna port. These signals are demodulated and output to the JAVAD GNSS receiver.

The UHF transceiver delivers a reliable radio link at up to 38.4 kbps over the air for the 25 kHz channel spacing, 30 kbps for 20 kHz, 19.2 kbps for 12.5 kHz, and 9.6 kbps for 6.25 kHz.

The incoming data could be also sent over the cellular network using built-in 2.5G GSM/ GPRS/ EDGE if such operation mode is selected.

The unit's user settings can be changed through the built-in Command Line interface (CLI), Tracy Software or through ModemVU.

The system built-in diagnostic features provide the information required to monitor and maintain user's communications link. The output transmit power, receive signal strength (RSSI), antenna/feed line condition, and data decode performance will be transmitted online without application interruption.

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## General Radio Specifications

Component	Details
Operating Frequency Range	406 - 470 MHz
Channel Spacing	25/20/12.5/6.25 kHz
Data Rate (25kHz Channel Spacing)	9600 bps – DBPSK/GMSK 19200 bps – DQPSK/4FSK 28800 bps – D8PSK 38400 bps – D16QAM
Data Rate (20kHz Channel Spacing)	7500 bps – DBPSK/GMSK 15000 bps – DQPSK/4FSK 22500 bps – D8PSK 30000 bps – D16QAM
Data Rate (12.5kHz Channel Spacing)	4800 bps – DBPSK/GMSK 9600 bps – DQPSK/4FSK 14400 bps – D8PSK 19200 bps – D16QAM
Data Rate (6.25 kHz Channel Spacing)	2400 bps – DBPSK 4800 bps – DQPSK 7200 bps – D8PSK 9600 bps – D16QAM
System Gain for DBPSK modulation (Antenna gain is not included)	146 dB (for 25 kHz Channel Spacing) 146 dB (for 20 kHz Channel Spacing) 148 dB (for 12.5 kHz Channel Spacing) 149 dB (for 6.25 kHz Channel Spacing)
Roaming Speed for DBPSK modulation	75 mph / 120 km/h
Modulation	GMSK/4FSK/DBPSK/DQPSK/D8PSK/D16QAM
Nominal Impedance	50 Ohms
End to End delay	60 ms
Communication Mode	Time Division Duplex (TDD) Time Division Multiple Access (TDMA)
Maximum Distance Range	8 miles / 13 km
Electromagnetic Compliance	FCC Part 90 ETSI EN 300-113-2 V1.5.1
Compatibility with other manufacturers	Pacific Crest Compatible (TX/RX) Trimble Compatible (TX/RX) Satel Compatible (TX/RX)

## Transmitter Specifications

Component	Details
Output Power	15 dBm to 30 dBm in 1 dB steps
Output Power Control Accuracy	±1.5 dB (at normal test conditions) +2.0 dB and -3.0 dB (under extreme test conditions)
Carrier Frequency Stability	±1.5 ppm initial stability over temp with ±3 ppm aging/year
Max. Frequency Error	±1.0 kHz (at normal test conditions) ±1.5 kHz (under extreme test conditions)
Adjacent Channel Power (Conducted)	70 dBc for 25 kHz Channel Spacing 70 dBc for 20 kHz Channel Spacing 60 dBc for 12.5 kHz Channel Spacing 50 dBc for 6.25 kHz Channel Spacing
Spurious Emission (Conducted)	-36 dBm (9 kHz to 1 GHz) -30 dBm (1 GHz to 4 GHz)
Spurious Emission (Radiated)	-36 dBm (9 kHz to 1 GHz) -30 dBm (1 GHz to 4 GHz)
Compliance	FCC Part 90 §90.210(c) for 25 kHz Channel Spacing §90.210(d) for 12.5 kHz Channel Spacing §90.210(e) for 6.25 kHz Channel Spacing ETSI EN 300-113-1 V1.5.1 Clause 5.1.4 Clause 8.6.1

## Receiver Specifications

Component	Details
Noise Figure	4 dB
Receiver Sensitivity (BER 1x10 <sup>-4</sup> , 25 kHz CS)	DBPSK -116 dBm 25kHz / -117 dBm 12.5kHz DQPSK -115 dBm 25kHz / -116 dBm 12.5kHz D8PSK -110 dBm 25kHz / -111 dBm 12.5kHz D16QAM -106 dBm 25kHz / -107 dBm 12.5kHz GMSK -113 dBm 25kHz / -114 dBm 12.5kHz
Dynamic Range	-115 to -15 dBm
Max. Input Signal Level	-10 dBm
Co-channel Rejection	-8 dB for 25 kHz Channel Spacing -8 dB for 20 kHz Channel Spacing -12 dB for 12.5 kHz Channel Spacing -16 dB for 6.25 kHz Channel Spacing
Adjacent Channel Selectivity	70 dB for 25 kHz Channel Spacing 70 dB for 20 kHz Channel Spacing 60 dB for 12.5 kHz Channel Spacing 50 dB for 6.25 kHz Channel Spacing
Intermodulation Response Rejection	65 dB
Blocking Ratio	84 dB

## G24 GSM Module Specification

Component	Details
Operating Systems	Quad band: 850/900/1800/1900 MHz
Tx power	850/900 MHz – Class 4 (2 Watt) 1800/1900 MHz – Class 1 (1 Watt)
Typical RX sensitivity	-106dBm (4dB margin on top of spec)
GPRS	Multi-slot class 10 (4 down; 2 up; 5 Total) Max BR 85.6 Kbps Class B GSM 07.10 multiplexing protocol Coding scheme CS1-CS4 Embedded TCP/IP and UDP/IP protocol stack Embedded FTP Embedded SMTP/POP3 – e-mail SSL – Secure Connection
EDGE – Model Dependent	Multi-slot class 10 (4 Down; 2 Up; 5 Total) Max BR Downlink 236.8 Kbps (Over RS232) Coding Scheme MCS1-MCS9
CSD	Max BR 14.4 Kbps
SMS	MO/MT Text and PDU modes Cell broadcast
One serial port	Data and Command port
UART	BR from 300 bps to 460 Kbps, Auto BR
SIM Card	2 SIM cards support, 3.0 V, STK 3.1
Connectors	RF MMCX
Regulatory and Approvals	FCC, IC, CCC FTA, PTCRB R&TTE GCF EMC QS9000 manufacturing RoHS/WEEE

Specifications are subject to change without notice.



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