



# TMR1

## SPREAD SPECTRUM RADIO

### HIGH-SPEED SPREAD SPECTRUM RADIO FOR HIGH RELIABILITY COMMUNICATIONS

#### Rugged and extremely versatile radio

Trimble's portfolio of market-leading advanced positioning and seismic monitoring solutions is greatly enhanced by the rugged and versatile TMR1 spread spectrum radio. Trimble® is committed to developing next generation industrial communications networks with high speed data links offering the highest level of performance.

#### License-free, certified around the world

The Trimble TMR1 is a dual ISM band (865-870 and 902-928 MHz) networked transceiver supporting license-free wireless communications around the world. With available throughput up to 2.6 Mbps, the TMR1 allows you to seamlessly integrate both serial and Ethernet traffic as well as having the throughput available for video. Range as high as 70 miles has been demonstrated in low noise environments. The TMR1's high performance and versatility make it ideal for oil/gas, water and electric utilities, environmental monitoring and agricultural applications.

#### Adaptive speed/modulation technology

The Trimble TMR1 supports both point-to-point and point-to-multipoint network topologies. With most networked radios operating in point-to-multipoint mode, the speed of the access point radio is restricted to the speed and modulation of the weakest link. For example, if one link can only maintain 256 kbps with 2FSK modulation, all links will operate at the same reduced speed/modulation. But the Trimble TMR1 supports multiple speed/modulation pairs within a single network allowing a TMR1 master radio to select the optimal speed for each individual remote radio. This unique capability automatically adapts to changing signal and noise levels by selecting the highest link rate/modulation pair maintainable for each individual radio link without forcing the

entire network to operate at the speed of the slowest link. So a distant radio or changing noise levels won't drag down the speed of the whole network.

#### Dual data ports for both serial and IP (Ethernet) communication

The Trimble TMR1 is equipped with two data connectors: one for serial/power and one for Ethernet. This allows you to attach sensors to the TMR1 in the field and to communicate with any TMR1 via Ethernet cables, a LAN/WAN or the Internet. All links can be protected by AES 128- and 256-bit data encryption and VLAN segregation, so only you are allowed to communicate with your network.

#### Rugged, waterproof, made for the real world

The Trimble TMR1 is built to survive in real-world industrial applications, from mines and construction sites to warehouses and oil rigs. The rugged aluminum housing and connectors are certified to withstand submersion in 1 meter of water and are chemically treated to withstand corrosion.

### Key Features

- ▶ Software-defined dual-band (865-870 and 902-928 MHz) link using Frequency Hopping Spread Spectrum (FHSS) technology
- ▶ ISM (license-free) operation certified around the world
- ▶ Supports up to 2.6 Mbps throughput
- ▶ Dual data ports for simultaneous communication with both TCP/IP (Ethernet) and serial devices
- ▶ Upload configurations and firmware upgrades over the air or over the Internet
- ▶ Waterproof, high-vibration housing withstands harsh industrial conditions



# TMR1 SPREAD SPECTRUM RADIO

TRANSMITTER	900 ISM Band	868 ISM Band
Frequency	902-928 MHz	864.9-870 MHz
Output Power	1 mW to 1W	3 mW to 500 mW
Range – LOS	70+ miles (112+ km)	31+ miles (50+ km)
Modulation	MSK, 2FSK, BPSK, QPSK, 8PSK)	MSK, QPSK, 8PSK, 16QAM, 32QAM
RF Data Rate	57 kbps to 2.6 Mbps	10 kbps to 736 kbps
Occupied Bandwidth	6.25 kHz to 1.5 MHz	50 kHz, 100 kHz, 250 kHz
Frequency Stability	1.0 ppm	1.0 ppm
Duty Cycle	Continuous	50% (10% in 250 kHz channels)
Output Impedance	50 Ohms	

RECEIVER SENSITIVITY	900 ISM Band	868 ISM Band
@ BER = 1X10 <sup>-6</sup>	- 114 @ 57 kbps MSK	- 110 @ 38 kbps MSK
	- 112 @ 114 kbps MSK	- 108 @ 74 kbps MSK
	- 111 @ 153 kbps MSK	- 107 @ 76 kbps QPSK
	- 107 @ 229 kbps MSK	- 104 @ 120 kbps QPSK
	- 104 @ 663 kbps 2FSK	- 103 @ 177 kbps MSK
	- 105 @ 884 kbps BPSK	- 100 @ 280 kbps QPSK
	- 101 @ 1768 kbps QPSK	- 94 @ 420 kbps 8PSK
	- 95 @ 2651 kbps 8PSK	- 86 @ 736 kbps 32QAM
RF Selectivity	50 dB	50 dB

## CONNECTIVITY

- Ethernet
  - Waterproof, locking rotary connector
  - IEEE 802.3, TCP/IP, UDP, Modbus, Profibus DP, DNP3 & IEC-61850 and many more industrial protocols due to fully transparent communication
- Serial/Power
  - Waterproof, locking rotary connector
  - RS-232/422/485
  - Up to 230.4 kbps

## ERROR DETECTION

- Error detection: up to 32-bit CRC with retransmit on error

## SECURITY

- AES 128- and 256-bit encryption
- VLAN network segregation
- Password authentication
- FHSS technology

## OPERATING MODES

- Point to Point
- Point to Multipoint
- Adaptive Speed/Modulation
- Repeater

## CONFIGURATION SOFTWARE

- Web-based configuration and diagnostics software application

## ANTENNA CONNECTION

- TNC female
- Works with all 50 Ohm antennas

## ELECTRICAL

- Input voltage range: 10-32 VDC +/- 1%
- Input current
  - 902-928 MHz: 430 mA @ 12 V, 1W RF output
  - 869.4-869.65 MHz: 860 mA @ 12V, 500 mW RF output

## PHYSICAL

- Dimensions: 175 x 98 x 36 mm (7 x 4 x 1.5")
- Weight: 705 g (1.55 lb)
- Compatible with standard 35 mm DIN rail mounts (EN 50022)

## ENVIRONMENTAL

- Water/dust: IP67
- Vibration/Shock: 9.8 gRMS, 2000 Hz
- Temperature range:
  - Operating: -50 to +65°C
  - Storage: -50 to +85°C

## COMPLIANCE

- FCC, ETSI, IC, Australia, Brazil

## APPLICATIONS

- Seismic Monitoring
- Structural Monitoring – dams/bridges
- Volcano Monitoring
- Ethernet bridge to remote sites
- Remote sensing
- RTK corrections for precise positioning

## PART NUMBERS

- 109117-10 TMR1, 902-928 MHz for Americas, Australia, and New Zealand
- 109117-20 TMR1, 865-870 MHz for Europe
- 109117-50 Yagi Antenna (824-960 MHz Yagi, 6 dB gain and 9' cable)
- 104209-90 Cable, Ethernet, TMR1 to SG160/RT130
- 104211-00 Cable, TMR1 Serial/Power

Contact your local dealer today

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