



INTEGRATOR'S GUIDE

Trimble® TRM 900



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Support hours are 8 am to 5 pm Pacific Time. Please visit our website for up-to-date news and product announcements. Firmware and software upgrades are available from our website, usually free of charge.

Notices

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Certified Modular Transceiver The TRM900 (902.0 MHz to 928.0 MHz) Limited Singular Modular Transceiver is only approved for use by Trimble in its own GNSS Receiver products and not intended for sale to third parties. This module is not intended for OEM integrators or end users. As a Limited Single Module, additional compliance evaluation is required for use in each of the GNSS Receiver host. The antenna listed below is allowed to be used with this transmitter module:

- Monopole antenna with peak gain of 2.1 dBi.
- The connector type is MMCX.

Changes or modifications made to this equipment not expressly approved by Trimble may void the FCC authorization to operate this equipment.

Canada

Antenna Statement

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Licence exempt

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Safety Information

Before you use your radio, ensure that you have read and understood this publication, as well as safety requirements.

CAUTION – A license is required before operating radio communication equipment.

Warnings and cautions

An absence of specific alerts does not mean that there are no safety risks involved.

Always follow the instructions that accompany a Warning or Caution. The information they provide is intended to minimize the risk of personal injury and/or damage to the equipment. In particular, observe safety instructions that are presented in the following formats:

WARNING – A Warning alerts you to a likely risk of serious injury to your person and/or damage to the equipment. A warning identifies the nature of the risk and the extent of possible injury and/or damage. It also describes how to protect yourself and/or the equipment from this risk. Warnings that appear in the text are repeated at the front of the manual.

CAUTION – A Caution alerts you to a possible risk of damage to the equipment and/or loss of data. A Caution describes how to protect the equipment and/or data from this

Exposure to radio frequency energy

The radio is designed to comply with the following national and international standards and guidelines regarding exposure of human beings to radio frequency electromagnetic energy, in addition to protection against harmful interference of neighboring electrical equipment:

- FCC Report and Order FCC 96-326 (August, 1996)
- American National Standards Institute (C95.3-1992)
- National Council on Radiation Protection and Measurement (NCRP - 1986)
- International Commission on Non-ionizing Radiation Protection (ICNRP - 1986)
- European Committee for Electrotechnical Standardization (CENELEC)
- 47 CFR FCC Part 15, Subpart C (Section 15.247)
- RSS-247 Issue2, February 2017

Contact your sales representative for model specific country approval.

To assure optimal radio performance and to ensure that exposure to RF energy is within the guidelines in the above standards, observe the following operating procedures:

- Do not operate a transceiver when someone is within the distance noted below of the antenna (unity gain).
 - 20 cm (approximately 7.9 in) for the TRM 900 radio @ 1W

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- Do not operate the transceiver unless all RF connectors are secure and any open connectors are properly terminated.
 - Avoid contact with the antenna while operating the transceiver.
 - Do not operate the transceiver with a damaged antenna. If a damaged antenna comes in contact with the skin, a minor burn may result.
 - Do not operate the equipment near electrical blasting caps or in an explosive atmosphere.

CAUTION – Changes or modifications not expressly approved by the FCC could void the user’s authority to operate the equipment.



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Introduction

This guide provides information concerning the integration of the TRM 900 radio modem transceiver into your product (Model Number: **TRM900 MHZ TX/RX**). This guide should be used in conjunction with the GNSS Receiver User's Guide – Dealer Version that should be referenced for general information concerning the configuration of TRM 900 modems, and also for detailed programming information.

The TRM 900 is a general-purpose radio modem transceiver that is compatible with other Trimble radio modems. The TRM 900 transceiver is designed specifically for integration into existing or new products. Its small size, light weight and power efficient operation provide superior performance in embedded systems.

Getting Started

Caution: TRM 900 transceiver must be handled with care during installation. Remove the transceiver from its protective bag only in an ESD safe area.

To set up the hardware components, follow these steps:

1. Plug the TRM 900 transceiver into the host product per the assemble drawing and procedure.
2. Attach an antenna cable to the TRM 900 transceiver
3. Configure the radio through the host GNSS receiver software interface
4. Attach the PC interface cable to a serial port on your PC

Interface Port Pin Out

The standard TRM 900 transceiver comprises a 30-pin port for power, data and interfacing with other electronic devices.



30 Pin TRM 900 Board

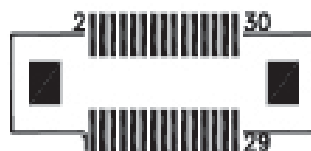
The following signals are available on the 30-pin connector:

Pin	Name	Description
1	GND	GROUND FOR SIGNAL AND POWER
2	DO NOT USE	FACTORY USE ONLY, NO CONNECTION
3	TX	TX DATA, DTE SERIAL PORT, 3V CMOS (3.3V COMPATIBLE)
4	DO NOT USE	FACTORY USE ONLY, PLEASE NO CONNECTION
5	GND	GROUND FOR SIGNAL AND POWER
6	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION

Pin	Name	Description
7	GND	GROUND FOR SIGNAL AND POWER
8	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
9	GND	GROUND FOR SIGNAL AND POWER
10	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
11	CONFIG	I/O TO FORCE RADIO SWITCH BETWEEN OPERATING MODE AND CONFIGURATION MODE
12	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
13	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
14	RX	RX DATA, DTE SERIAL PORT, 3V CMOS (3.3V COMPATIBLE)
15	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
16	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
17	DO NOT USE	FACTORY USE ONLY, PLEASE LEAVE NO CONNECTION
18	VCC	POWER IN
19	GND	GROUND FOR SIGNAL AND POWER
20	GND	GROUND FOR SIGNAL AND POWER
21	GND	GROUND FOR SIGNAL AND POWER
22	GND	GROUND FOR SIGNAL AND POWER
23	VCC	POWER IN
24	VCC	POWER IN
25	VCC	POWER IN
26	VCC	POWER IN
27	VCC	POWER IN
28	VCC	POWER IN
29	POWER	POWER DOWN RADIO
30	GND	GROUND FOR SIGNAL AND POWER

TX and RX Pins

Pin 3 is used by the TRM900 module to received data from an external device (a PC, GPS receiver, weather sensor, etc). Pin 14 is used to transmit data to the external device. The external device is transmitting data to the TRM 900 on Pin 3, so according to the DTE naming convention, Pin 3 is called the “TX Data” pin. The external device receives data from the TRM 900’s Pin 14 so this is called the “RX Data” pin.



Pin Orientation

Antenna Port

A coaxial antenna port is provided for connecting the antenna system to the TRM 900 transceiver. The antenna connector is a 50-Ohm MMCX type. Appendix B provides part numbers and manufacturer information for compatible interface and RF connectors.

Warning: Don't transmit without first connecting an antenna.

Compliance

The TRM 900 transceiver radio modem is designed to be compliant with FCC and Industry Canada regulatory requirements, including FCC Part 15.247.

Warning: The TRM 900 transceiver is classified as an intentional radiator of type radio transceiver. Conducted and radiated emissions of the standard TRM 900 transceiver do not exceed the requirements of FCC Part 15.247. Trimble is responsible for full compliance of final product.

Label per FCC Rules

This limited modular transmitter must be labeled with its own FCC ID number. In the event that the module is installed inside a host device and the FCC ID of the module is not visible the host device will display a label referring to the FCC ID of the enclosed module.

Contains: FCC ID: JUP-900MHZ IC: 1756A-900MHZ

Protocols and Modes of Operation

The TRM 900 transceiver radio modem is completely configurable using host GNSS receiver software. Configuration parameters define the DTE interface and the over-the-air protocol. Depending on the application you may need to change the factory default settings. The following table shows the factory default configuration of the TRM 900 transceiver.

Parameter	Default
Channel	1
Baud Rate	127,381 bps
Parity	None
Soft Break Disable	Off
TX Power	1.0 W
Modulation	BPSK

Parameter	Default
Link Rate	127,381 bps BPSK
EOT	50 ms
Repeater Delay	0

Electrical Considerations

Power Supply

The TRM 900 transceiver has a power supply connection on Pin 18 and Pins 23 to 28 of the interface connector. Pins 1, 5, 7, 9, 30 and Pins 19 to 22 are connections to both power ground and serial interface signal grounds. Note that these pins are tied to a common point on the TRM 900 transceiver. If there is a potential for a ground path current loop due to improper power application, we recommend a fusible link be inserted in the signal ground to protect the TRM 900 transceiver.

TRM 900 transceiver modems are designed to operate with unregulated DC voltage levels between 3.6 and 4VDC. The power supply must be capable of sourcing 2A.

Shielding Considerations

The TRM 900 transceiver is designed to operate in proximity to noise generating circuitry. However, certain radiated or conducted frequencies may degrade the performance of the TRM 900 transceiver or render it inoperable. When possible, provide well-grounded shielding between circuits that radiate, such as power supplies, voltage-controlled oscillators, crystal oscillators and the TRM 900 transceiver.

Mechanical Considerations

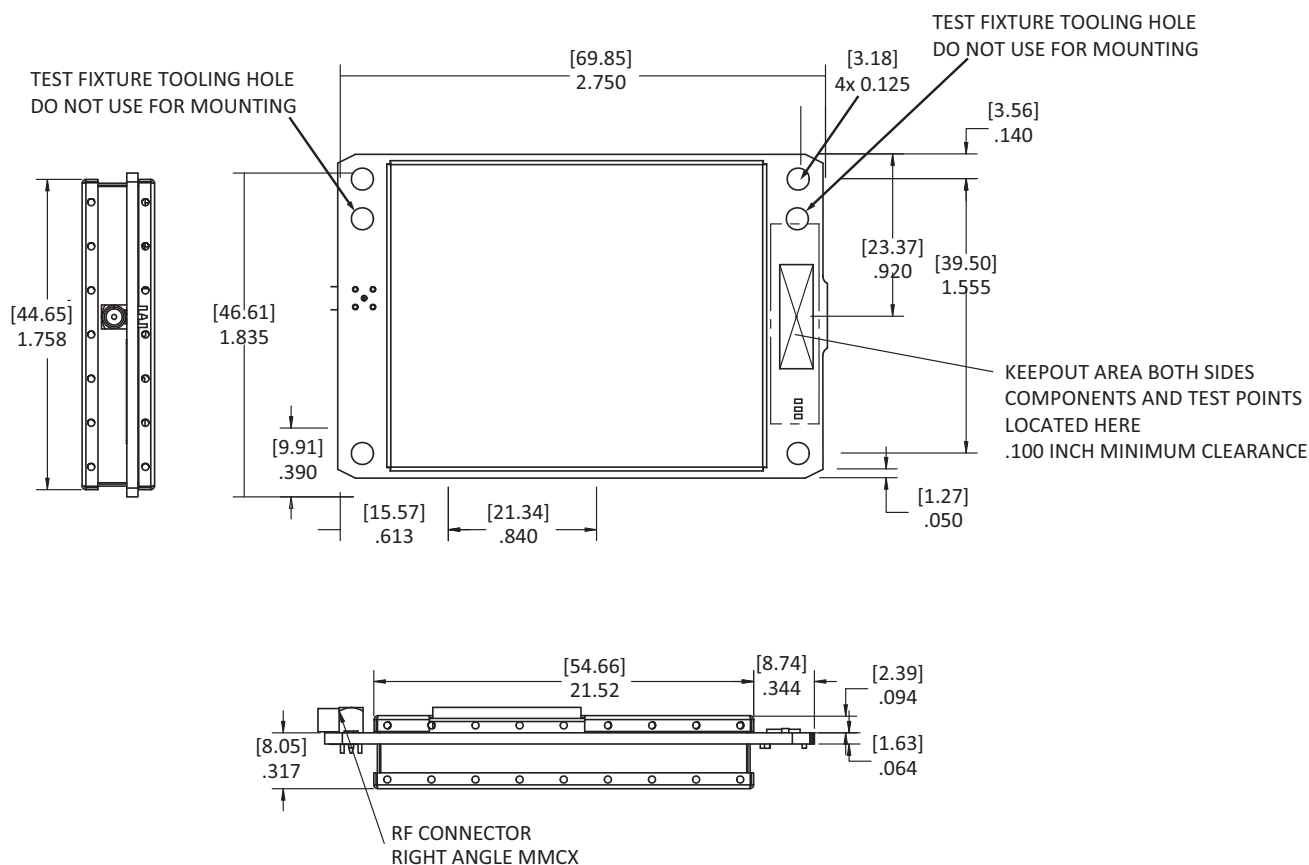
EMI interferers

The TRM 900 transceiver is easily mounted inside new and existing products. The TRM 900 transceiver is specifically designed for operation in harsh environments. For best performance, mount the radio away from potential EMI radiators and route RF signals apart from digital signals.

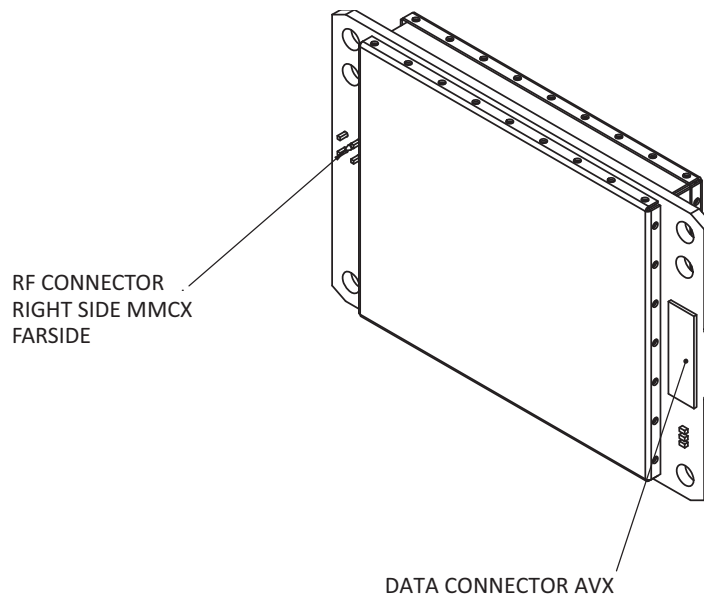
Caution: We do not recommend the bundling of the antenna interface cable with other signal cables internal to your product.

Materials

The TRM 900 transceiver is housed in a metal shield that is a conductor and is electrically connected to the ground and signal ground pins.



TRM 900 Mounting Template



TRM 900 Mounting Template with Shields

Appendix A - Cables and Connectors

Interface Connector

The 30-pin data/power header is a Samtec TFM series housing a standard-configuration connector, AVX part number 14-5046-030-630-829. The mating Samtec connector is part number 24-5046-030-600-829 for a board-to-board interface. See AVX website: <http://www.samtec.com> and www.AVXcorp.com for other mating connector options.

RF Connector

The RF connector is compatible with an MMCX-style coaxial plug. Plugs are available from many sources and in many configurations. We use plugs manufactured by Radiall. Radiall MMCX right-angle plug for use with RG-178 cable is part number R110 172 100. Radiall MMCX straight plug for use with RG-178 cable is part number R110 083 120.