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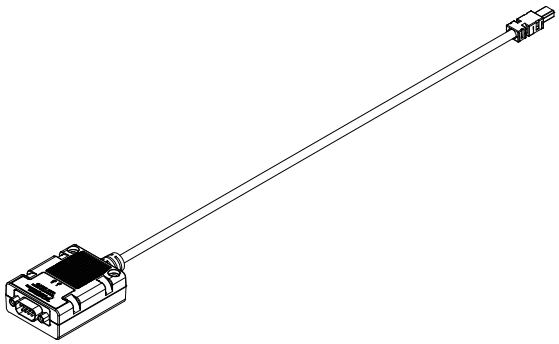
TRC-8546 Getting Started

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Overview



This document explains how to connect the TRC-8546.

Note Before you begin, complete the software and hardware installation procedures in your chassis documentation.

Note The guidelines in this document are specific to the TRC-8546. The other components in the system might not meet the same safety ratings. Refer to the documentation for each component in the system to determine the safety and EMC ratings for the entire system.

Safety Guidelines

Caution Observe all instructions and cautions in the user documentation. Using the product in a manner not specified can damage the product and compromise the built-in safety protection.

Attention Suivez toutes les instructions et respectez toutes les mises en garde de la documentation d'utilisation. L'utilisation du produit de

toute autre façon que celle spécifiée risque de l'endommager et de compromettre la protection de sécurité intégrée.

Safety Guidelines for Hazardous Locations

The TRC-8546 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class I, Zone 2, AEx nA IIC T4 Gc and Ex nA IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the TRC-8546 in a potentially explosive environment. Not following these guidelines may result in serious injury or death.

Caution Do not disconnect bus-side connector unless power has been switched off or the area is known to be nonhazardous.

Caution Do not unplug the TRC-8546 unless power has been switched off or the area is known to be nonhazardous.

Caution Substitution of components may impair suitability for Class I, Division 2, or Zone 2.

Caution The system must be installed in an enclosure certified for the intended hazardous (classified) location, having a tool secured cover/door, where a minimum protection of at least IP54 is provided.

Caution For Zone 2 applications, install a protection device between the LIN bus and the TRC-8546LIN pins. The device must prevent the LIN Port-to-COM voltage from exceeding 55 V if there is a transient overvoltage condition.

Special Conditions for Hazardous Locations Use in Europe and Internationally

The TRC-8546 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 12 ATEX 1202658X and is IECEx UL 14.0089X certified. Each TRC-8546 is marked ⟨Ex⟩ II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of -40 °C ≤ Ta ≤ 70 °C.

Caution Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value of 85 V at the supply terminals to the equipment.

Caution The system shall only be used in an area of not more than Pollution Degree 2, as defined in IEC/EN 60664-1.

Caution The system shall be mounted in an ATEX/IECEx-certified enclosure with a minimum ingress protection rating of at least IP54 as defined in IEC/EN 60079-15.

Caution The enclosure must have a door or cover accessible only by the use of a tool.

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and

prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Notice To ensure the specified EMC performance, operate this product only with shielded cables and accessories. Do not use unshielded cables or accessories unless they are installed in a shielded enclosure with properly designed and shielded input/output ports and connected to the product using a shielded cable. If unshielded cables or accessories are not properly installed and shielded, the EMC specifications for the product are no longer guaranteed.

Mounting the TRC-8546

Caution The TRC-8546 is a thermally active device that dissipates heat. Refer to the user manual of the host this device directly connects to for specific information regarding thermal management. Not following mounting requirements may affect the system ambient temperature and/or the measurement accuracy of modules in the system.

Caution To meet thermal management requirements, do not zip tie more than six cables in a bundle, and allow for air flow around the bundle. If used with a cRIO or cDAQ chassis, mount all cables at least 152 mm (6.0 in.) from the chassis and do not mount more than six cables directly beneath the chassis.

You can route and strain relieve the TRC-8546 similarly to ordinary cables. You also can panel mount it using its removable jackscrews, zip tie, or screw mount it. The screw mounting holes support #6 and M3 screws spaced 35.56 mm (1.400 in.) center-to-center, with minimum length of 23 mm (7/8 in.). The TRC-8546 supports zip ties up to 5.33 mm (0.210 in.) wide.

The following figure shows jackscrews, zip tie mounting slots, and screw mounting holes on the TRC-8546.

Figure 1. TRC-8546 Mounting Features



Panel Mounting the TRC-8546

The recommended panel mounting cutout dimensions are shown below.

Figure 2. Recommended Cutout Dimensions



The jackscrews included with the TRC-8546 work with panel thicknesses up to 2.21 mm (0.087 in.).

> **Caution** Tighten the jackscrews to a maximum torque of 0.56 N · m (5.0 lb · in.).

If your panel is thicker than 2.21 mm (0.087 in.), you can mill out a recessed pocket for the TRC-8546. The following figure shows the recommended pocket dimensions and cutout position.

Figure 3. Recommended Pocket Dimensions



Wiring to the TRC-8546

The TRC-8546 is used with an NI-XNET interface host port.

Figure 4. TRC-8546 Connections



The TRC-8546 has one 9-pin male D-Sub connector that provides connections to a LIN bus.

The port has two common pins (COM) that are internally connected to the transceiver cable's isolated reference and serve as the reference ground for the LIN signal. You can connect the LIN bus reference ground to one or both COM pins.

The D-Sub connector shell connects through the TRC-8546 shielding to the connector on the host port end. The shielding does not electrically connect to the COM signals.

Caution When connecting the D-Sub connector shell, do not exceed the maximum jackscrew torque of 0.56 N · m (5.0 lb · in.).

The TRC-8546 receives power from the NI-XNET host port but also requires an external power supply of +8 V to +18 V to operate. Supply power to the TRC-8546 V_{SUP} pin from the LIN bus.

The TRC-8546 pinout is listed in the following table.

Table 2. Pin Assignments for the TRC-8546

Connector	Pin	Signal Name
	1	No Connection (NC)
	2	NC
	3	COM
	4	NC
	5	NC
	6	COM
	7	LIN
	8	NC
	9	V_{SUP}

Cable Specifications

LIN cables should meet the physical medium requirement of a bus RC time constant of 5 µs. For detailed formulas for calculating this value, refer to the **Line Characteristics** section of the LIN specification. Belden cable (3084A) and other unterminated CAN/Serial quality cables meet these requirements and should be suitable for most applications.

Cable Lengths

The maximum allowable cable length is 40 m, per the LIN specification.

Number of LIN Nodes

The maximum number of devices on a LIN bus is 16, per the LIN specification.

Termination Resistors

LIN cables require no termination, as nodes are terminated at the transceiver. Slave nodes typically are pulled up from the LIN bus to V_{SUP} with a 30 kΩ resistance and a serial diode. This termination usually is integrated into the transceiver package. The master node requires a 1 kΩ resistor and serial diode between the LIN bus and V_{SUP}. On NI-XNET LIN products, master termination is software selectable; you can enable it in the API with the NI-XNET Session Interface:LIN:Termination property.

TRC-8546 Hardware Overview

The TRC-8546 has one full-featured LIN port that is isolated from the host it is plugged into. The port has an NXP TJA1028 LIN transceiver that is fully compatible with the LIN 1.3/2.0/2.1/2.2 standard and supports baud rates up to 20 kbps.

Figure 5. TRC-8546 Hardware Overview



Inserting and Removing the TRC-8546

The TRC-8546 connects to a host device with an active latching connector. To connect the TRC-8546 to a host device, push the connector assembly into the host receptacle until the internal latch snaps into position. The latch emits an audible click when engaged. To remove the TRC-8546, push the lock ejector forward to disengage the latch and simultaneously pull the TRC-8546, as shown in the following figure.

Figure 6. Inserting and Removing the TRC-8546



TRC-8546 LEDs

The TRC-8546 includes two LEDs per port to help you monitor hardware and bus status. LED 1 primarily indicates whether the hardware is currently in use. LED 2 primarily indicates the activity information of the connected bus. Each LED can display two colors (red or green), which display in the following four patterns:

Table 2. LED Pattern Definitions

Pattern	Meaning
Off	No LED illumination
Solid	LED fully illuminated
Blink	Blinks at a constant rate of several times per second
Activity	Blinks in a pseudo-random pattern

Table 3. LED Pattern Indications

Condition/State	LED 1	LED 2
Port identification	Blinks green	Blinks green
NI-XNET catastrophic error	Blinks red	Blinks red
No open session on hardware	Off	Off
Open session on hardware, port is properly powered, and hardware is not communicating	Solid green	Off

Condition/State	LED 1	LED 2
Open session on hardware, port is missing power	Solid red	Off
Hardware is communicating	Solid green	Activity green (returns to idle/off one second after last TX or RX)

TRC-8546 Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted.

LIN Characteristics

Transceiver	NXP TJA1028
Max certified baud rate	20 kbps
LIN bus lines voltage	-40 VDC to +40 VDC
Supply voltage range (V_{SUP})	+8 VDC to +18 VDC normal operating; -0.3 VDC to +40 VDC absolute limits
MTBF	Contact NI for Bellcore MTBF specifications at other temperatures or MIL-HDBK-217F specifications.

Power Requirements

Thermal dissipation (at 70 °C)	650 mW max (active mode); 330 mW typical (active mode)
Power consumption from NI-XNET Transceiver Cable host	330 mW max (active mode); 150 mW typical (active mode)
Power consumption from V_{SUP}	320 mW max; 180 mW typical

Physical Characteristics

To clean the TRC-8546, wipe it with a dry towel.

Weight	70 g (2.5 oz)
Length	447 mm to 462 mm(17.6 in. to 18.2 in.)
D-Sub connector jackscrew maximum torque	0.56 N · m (5.0 lb · in.)

Safety

Maximum Voltage

Note The maximum voltage that can be applied or output without creating a safety hazard.

Connect only the voltages that are within these limits.

Port-to-COM	-40 VDC to +40 VDC max, Measurement Category I

Measurement Category I is for measurement performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Caution Do not connect to signals or use for measurements within Measurement Categories II, III, or IV.

Note Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINs building installations of Measurement Categories CAT II, CAT III, and CAT IV.

Port-to-earth ground	
Continuous	60 VDC, Measurement Category I

Note The TRC-8546 COM signals are not connected to the host port ground.

Safety and Hazardous Locations Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 6, UL 60079-15; Ed 4
- CSA 60079-0:2011, CSA 60079-15:2012

Note For safety certifications, refer to the product label or the Product Certifications and Declarations section.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4 Gc
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (DEMKO)	Ex nA IIC T4 Gc

Environmental

Refer to the manual for the host you are using for more information about meeting these specifications.

Operating temperature[1](IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature[2](IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40

Operating humidity (IEC 60068-2-56)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-56)	5% RH to 95% RH, noncondensing
Pollution Degree (IEC 60664)	2
Maximum altitude	5,000 m

Indoor use only.

Shock and Vibration

To meet these specifications, you must securely mount your TRC-8546 and ensure all cables and connectors have proper strain relief.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Industrial immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, and additional information, refer to the **Online Product Certification** section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.
For additional environmental information, refer to the **Engineering a Healthy Planet** web page at ni.com/environment. This page contains the environmental

regulations and directives with which NI complies, as well as other environmental information not included in this document.

EU and UK Customers

- Waste Electrical and Electronic Equipment (WEEE)—At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

电子信息产品污染控制管理办法（中国 RoHS）

- 中国 RoHS— NI 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 NI 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

[1] Similar to other standard PVC cables, this product's cable becomes less ductile at low temperatures. Preroute and secure the cable while flexible to avoid premature failure.

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