NI-9861 Getting Started

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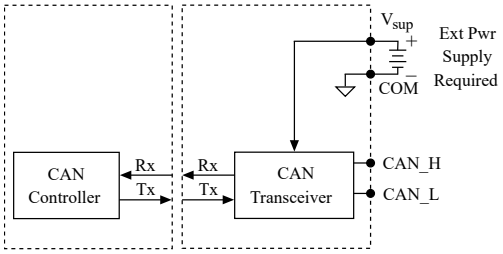
NI-9861 Block Diagram

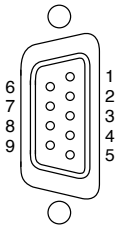
The NI-9861 has one full-featured, independent CAN port that is isolated from the other modules in the system. The port has a Bosch DCAN CAN controller that is CAN 2.0B-compatible and fully supports both 11-bit and 29-bit identifiers. The port also has an NXP TJA 1054AT Low-Speed/Fault-Tolerant CAN transceiver that is fully compatible with the ISO 11898 standard and supports baud rates up to 125 Kbps.

Figure 1. NI-9861 Hardware Overview



NI-9861 Pinout

Pin assignments for the NI-9861.

Connector	Pin	Signal
	1	No Connection (NC)
	2	CAN_L
	3	COM
	4	NC
	5	SHLD
	6	COM
	7	CAN_H
	8	NC

Connector	Pin	Signal
	9	V_{SUP}

Wiring the NI-9861

The NI-9861 has one 9-pin male D-Sub connector that provides connections to a CAN bus. The NI-9861 has pins for CAN_H and CAN_L, to which you connect the CAN bus signals. Connect these signals using twisted-pair cable.

The port has two isolated common pins (COM) that are internally connected to the module's isolated reference and serve as the reference ground for CAN_H and CAN_L. You can connect the CAN bus reference ground (sometimes referred to as CAN_V-) to one or both COM pins. The port also has an optional shield pin, SHLD, that you can connect to a shielded CAN cable. Connecting SHLD may improve signal integrity and EMC performance in a noisy environment.

Caution You must use a UL listed ITE power supply marked LPS with the NI-9861.

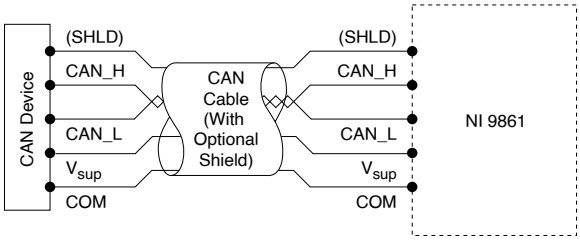
The NI-9861 requires an external power supply of +9 to +30 V to operate. Supply power from the CAN bus to the V_{SUP} pin.

Note Power on V_{SUP} is required for CAN operation.

Connecting a CAN Bus to the NI-9861

You can connect each port of the NI-9861 to any location on a CAN bus. Figure 2 shows one example of connecting the NI-9861 directly to one CAN node.

Figure 2. Connecting Both Ports of the NI-9861 to CAN Buses

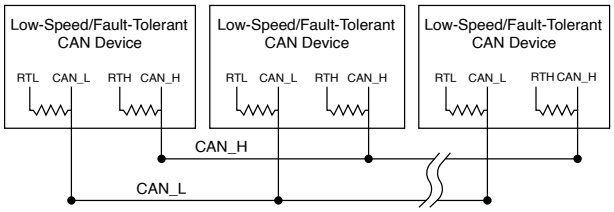


CAN Bus Topology and Termination

A CAN bus consists of two or more CAN nodes cabled together. The CAN_H and CAN_L pins of each node are connected to the main CAN bus cable through a short connection known as a “stub.” The pair of signal wires, CAN_H and CAN_L, constitutes a transmission line. Every device on a low-speed/fault-tolerant CAN network requires a termination resistor for each CAN data line: R_{RTH} for CAN_H and R_{RTL} for CAN_L.

Figure 1 shows a simplified diagram of a low-speed/fault-tolerant CAN bus with termination resistor placements.

Figure 3. CAN Bus Topology and Termination Resistor Locations



Cable Specifications

Cables should meet the physical medium requirements specified in ISO 11898, shown in the following table. Belden cable (3084A) meets all these requirements and should be suitable for most applications.

Table 1. ISO 11898 Specifications for Characteristics of a CAN_H and CAN_L Pair of Wires

Characteristic	Value
Length-related resistance	90 mΩ/m nominal
Length-related capacitance: CAN_L and ground, CAN_H and ground, CAN_L and CAN_H	30 pF/m nominal

Determining the Necessary Termination Resistance for the Board

Unlike High-Speed CAN, Low-Speed/Fault-Tolerant CAN requires termination at the Low-Speed/Fault-Tolerant CAN transceiver instead of on the cable itself. Termination requires two resistors, RTH for CAN_H and RTL for CAN_L. This configuration allows the NXP Fault-Tolerant CAN transceiver to detect and recover from bus faults. It is important to determine the overall termination of the existing network, or the

termination of the individual device, before connecting it to a Low-Speed/Fault-Tolerant port. NXP recommends an overall RTH and RTL termination of 100 to 500 Ω (each) for a properly terminated low-speed network.

Termination on the low-speed/fault-tolerant ports of the NI-9861 is set through the NI-XNET software to either 1 kΩ or 5 kΩ.

Number of CAN Nodes

The maximum number of nodes depends on the electrical characteristics of the nodes on the network. If all of the nodes meet the requirements of Low-Speed/Fault-Tolerant CAN, up to 32 nodes may be connected to the bus.