NI-9852 Getting Started

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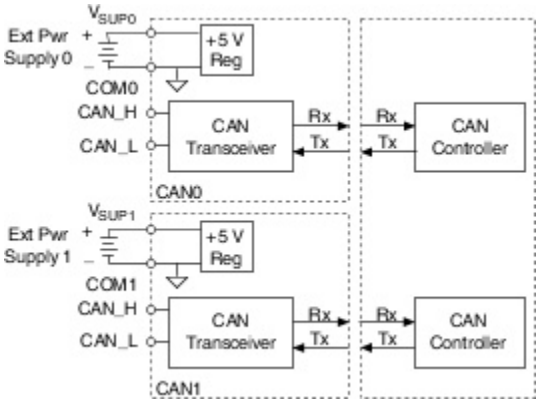
NI-9852 Block Diagram

The NI-9852 has two full-featured, independent CAN ports that are isolated from each other, and from the other modules in the system. Each port on the NI-9852 has a Philips SJA1000 controller that is CAN 2.0B-compatible and fully supports both 11-bit and 29-bit identifiers. The port also has a Philips TJA1054A 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-9852 Hardware Overview



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 Philips 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. Philips 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-9852 is set through the NI 985x 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.

Wiring the NI-9852

The NI-9852 has two 9-pin male D-Sub connectors that provides connections to a CAN bus. Each port on the NI-9852 has pins for CAN_H and CAN_L, to which you connect the CAN bus signals. Connect these signals using twisted-pair cable.

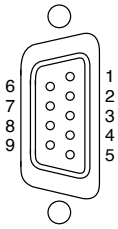
Each port has two isolated common pins (COM) that are internally connected to the module's isolated reference and serve as the reference ground for CAN_H and CAN_L. You can connect the CAN bus reference ground (sometimes referred to as CAN_V-) to one or both COM pins. The port also has an optional shield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

Both of the ports on the NI-9852 require an external power supply of +8 to +25 V to operate. Supply power from the CAN bus to the V_{SUP0} pin on CAN0, and the V_{SUP1} pin

on CAN1.

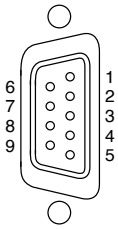
NI-9852 CAN0 Pinout

Table 2. Pin Assignments for CAN0 Port

Connector	Pin	Signal
	1	No Connection (NC)
	2	CAN_L
	3	COM0
	4	NC
	5	SHLD
	6	COM0
	7	CAN_H
	8	NC
	9	V_{SUP0}

NI-9852 CAN1 Pinout

Table 3. Pin Assignments for CAN1 Port

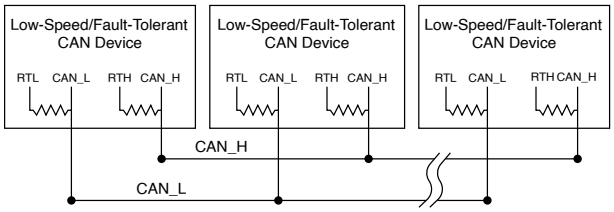
Connector	Pin	Signal
	1	No Connection (NC)
	2	CAN_L
	3	COM0
	4	NC
	5	SHLD
	6	COM0
	7	CAN_H
	8	NC
	9	V_{SUP1}

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 2. CAN Bus Topology and Termination Resistor Locations



Connecting a CAN Bus to the NI-9852

You can connect each port of the NI-9852 to any location on a CAN bus. Figure 2 shows one example of connecting CAN0 of the NI-9852 directly to one CAN node, and CAN1 directly to another CAN node. CAN0 and CAN1 require an external power supply on the CAN bus.

Figure 3. Connecting Both Ports of the NI-9852 to CAN Buses