CAN-ISO-2500 User Manual

Galvanic CAN bus Isolation Device

Overview

The CAN-ISO-2500 is a galvanic isolation device for use on CAN Bus networks in mobile or stationary applications. The device features 2500 V isolation between the HV and LV sides and supports CAN Baud rates of up to 1 Mbit/s.

The CAN-ISO-2500 is available with M12 5-pin connector pigtails or M12 connectors directly on the case and features flange-style holes for mounting to a surface. Two case options are available. The ABS case is rated IP54 (protection against dust and splashing water) while the Polycarbonate option is rated IP68 (Protection against dust and long-term submersion in water) and features an extended temperature range.

Features

- Up to 2500 V Galvanic Isolation
- Up to 1 Mbit/s data rate
- Standard termination resistor with cuttable solder jumper
- Optional silent mode allows data in one direction (LV->HV)
- Automatically adjusts to CAN baud-rates, no need to set data rate
- Wide input voltage range of 6-28v DC
- IP54 standard rating, IP68 optional

Applications

CAN Bus data transmission is ubiquitous on vehicles and mobile equipment and is a popular protocol for industrial communications applications. Many CAN data busses are powered by a single power supply; however, on busses with different power supplies voltage transients can travel across the data bus causing signal integrity problems and possibly destroy CAN connected devices. Alternately, high-precision data acquisition systems may require isolation from the main power supply to ensure measurement accuracy. Either of these scenarios will require high-quality galvanic isolation for proper operation.

Multiple Power Supplies on single CAN Network

For scenarios where CAN devices are connected to different power supplies (see Figure 1) voltage differences on the CAN network can cause data transmission issues and even damage components. The CAN-ISO-2500 can be used to isolate different components on the bus and eliminate the possibility of damage caused by voltage differences.

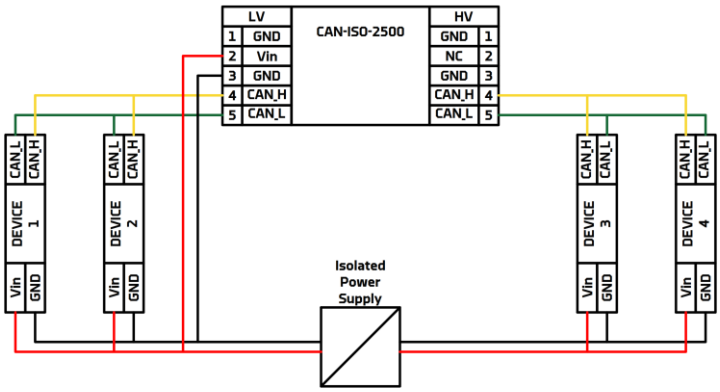

Figure 1: CAN Circuit with Galvanic Isolation Requirement

Specifications

Physical – ABS Enclosure

Dimension	Measure (pigtails) (Figure 2)	Measure (Bulkhead) (Figure 3)
Width	5.8 cm	5.8 cm
Length	13 cm (measured from strain reliefs) 8.6 cm (case)	8.6 cm
Height	3 cm	4.2 cm (no connector)
Weight	110 g	87 g
Cable Length	15 cm	On Case
IP Rating	IP54	IP54
Flange Mounting Holes	Rectangular pattern 4x 5mm through holes, countersunk (see Figure 4)	Rectangular pattern 4x 5mm through holes, countersunk (see Figure 4)

Figure 2: Pigtail Option

Figure 3: Bulkhead Option

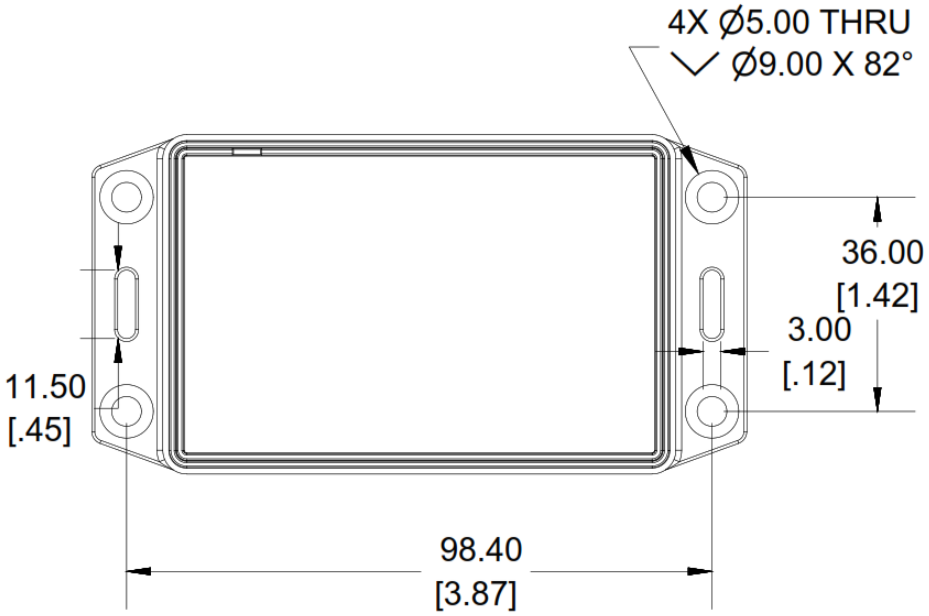

Figure 4: Flange Mounting Pattern – mm [in]

Physical – Polycarbonate Enclosure

Dimension	Measure (pigtails) (Figure 2)
Width	9 cm
Length	13 cm (measured from flanges) 9 cm (case)
Height	3.4 cm
Weight	200 g
Cable Length	15 cm
IP Rating	IP68
Flange Mounting Holes	Rectangular pattern 4x 5mm through holes, (see Figure 6)

Figure 5: IP68 Enclosure

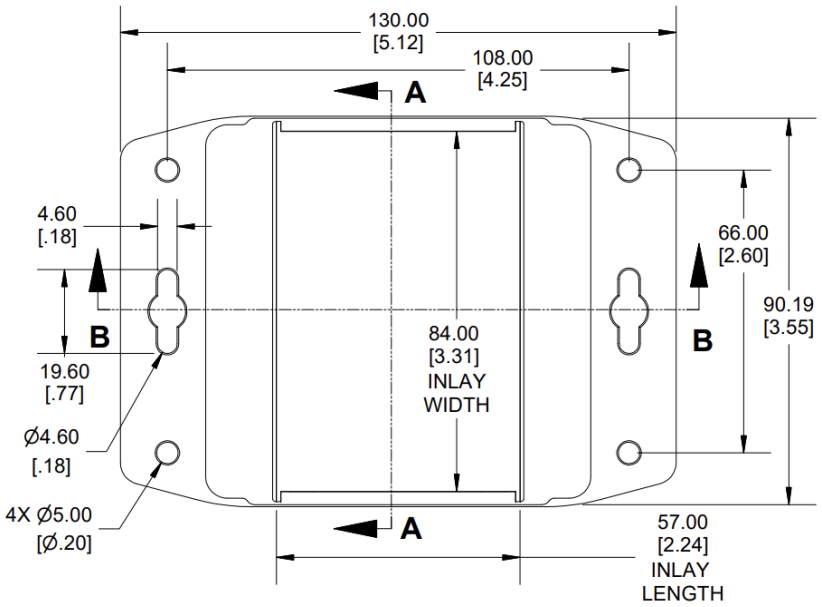

Figure 6: Flange Mounting Pattern – mm [in]

Electrical

Spec	Min	Max	Note
Input Voltage	5 V	28 V	
Current Draw (5V input voltage)	40 mA	40 mA	Idle and Active
Current Draw (28V Input Voltage)	30 mA	30 mA	Idle and Active
CAN Baudrate	100 Kbit/s	1 Mbit/s	
Isolation Between HV and LV		2.5 kV	Tested 1s
Propagation Delay		150 ns	

Environmental – IP56 ABS Case

Spec	Min	Max	Note
Temperature	-20 C	80 C	
Moisture – Relative Humidity	0 %	95 %	Non Condensing

Environmental – IP68 Polycarbonate Case

Spec	Min	Max	Note
Temperature	-40 C	105 C	
Moisture – Relative Humidity	0 %	100 %	

Protections

- Reverse Polarity protected
- ESD Protected inputs

Configurations

CAN Bus Termination Resistor

Devices with board version V3.1 or later have optional termination resistor cut traces to remove termination resistance from either LV and/or HV sides. See Figure 7 and Figure 8 for traces to cut highlighted in red. Ensure to cut traces to both 60 Ohm resistors and check the cut with a multimeter to confirm continuity has been lost. To re-connect the termination resistor: solder between the pad and resistor.

NOTE: cut only traces indicated in red. Cutting other traces will cause the device to malfunction.

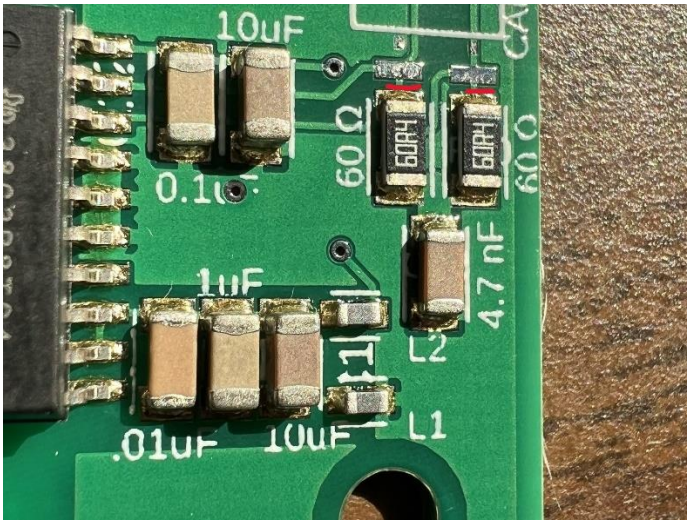

Figure 7: HV Side Termination Resistor Cut Trace

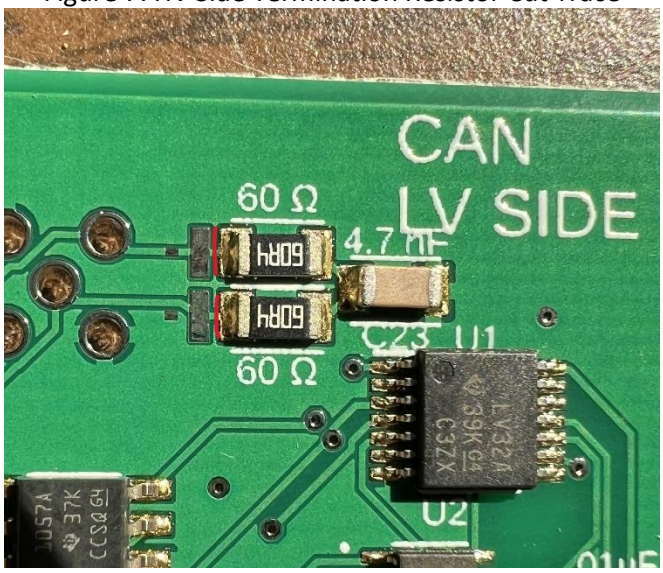

Figure 8: LV Side Termination Resistor Cut Trace

Silent Mode

Optional “LV silent mode” jumper is included on board revision V3 or later. Indicated as “JP1” on the board. Soldering this jumper together will allow data from LV -> HV but block data from HV -> LV.

Silent mode refers to silence on the LV bus, the device will not transmit data on the LV bus, it will only transmit on the HV bus.

Installation Considerations

The CAN-ISO-2500 adds 150 ns of propagation delay to the CAN data signals, see table below for CAN data bus lengths with CAN Isolator installed. For proper operation ensure maximum CAN bus length does not exceed the following values with one CAN-ISO-2500 installed.

Bit Rate	Typical Max Bus Length	Recommended Max Bus length with CAN-ISO-2500
1 Mbit/s	40 m	10 m
500 kbit/s	110 m	80 m
250 kbit/s	240 m	210 m
125 kbit/s	500 m	470 m
50 kbit/s	1300 m	1270 m
Bitrates below 50 kbit/s the propagation delay is negligible		

Tests and Certifications

RF Emissions: Tested per *CISPR22 Edition 5.2 2006-03* Class A
EMC: Tested per *IEC 61000-4-2 Edition 3.2 2010-04* Level 2
ESD Immunity: Tested per *IEC 61000-4-2 Edition 2.0 2008-12* Class 2

Galvanic Isolation: tested 2.5kV between HV and LV connector pins

Wiring and Connections

The CAN-ISO-2500 comes standard with two waterproof M12 A-Code barrel type connectors. The CAN-ISO-2500 contains a 120 Ohm termination resistor on both the input and output and can be placed anywhere in the middle of an existing CAN data bus. Pinouts are consistent across all M12 connector types.

Pin	LV Side	HV Side
1	GND (Optional)	NC
2	Vin	NC
3	GND	NC
4	CAN High	CAN High
5	CAN Low	CAN Low

Pigtail Option

The pigtail option has a Male M12 connector on the LV side and Female M12 connector on the HV side. The wires are each 15 cm long. The LV side has a female M12 connector and the HV side has a male M12 connector. See Figure 2.

Bulkhead Option

The bulkhead option features two Male M12 connectors directly on the case. See Figure 3.

M12 connector part numbers

Use the following parts or equivalents to connect to the CAN-ISO-2500. Any M12 A keyed connector will connect properly. Below are some examples that will fit.

Part Number	Style	Supplier
T4110001051-000	M12 Female, straight	TE
7000-12961-0000000	M12 Female, straight	Automation Direct
T4111002051-000	M12 Male, Straight	TE
7000-12761-0000000	M12 Male, Straight	Automation Direct

Wiring Option: Deutsch/Amphenol plugs

Deutsch/Amphenol connectors are optional on any pigtail design.
Contact us for assembly part numbers with Deutsch/Amphenol plugs.

Pin	LV Side (AT06-6S)	HV Side (AT04-2S)
1	CAN Low	CAN Low
2	CAN High	CAN High
3	NC	
4	Vin	
5	GND	
6	NC	

Note: standard wiring harness limited to -20..80C ambient temperatures.
Contact us for extended temperature range wiring harness.

Wiring Option: Unterminated Pigtails

Unterminated pigtail option includes 4-conductor cables on each end.

Color	LV Side	HV Side
Red	Vin	
Black	GND	HV GND (Optional)
Yellow	CAN High	CAN High
White	CAN Low	CAN Low

Wiring Option: Custom Connectors

Contact us for more details on custom wiring harnesses and connectors

CAN-ISO-2500 Part Numbers

Part Number	IP Rating	Wiring Option	Input Voltage Range	Temperature Range	Connector
10-21001	IP54	Pigtail	5..28V	-20..80 C	M12 Male/Female
10-21031	IP54	Pigtail	5..28V	-20..80 C	Unterminated Pigtails
10-21002	IP54	Bulkhead	5..28V	-20..80 C	M12 Male/Male
10-21003	IP54	Pigtail	5V	-20..80 C	M12 Male/Female
10-21022	IP68	Pigtail	5..28V	-40..105 C	M12 Male/Female
10-21023	IP68	Bulkhead	5..28V	-40..105 C	M12 Male/Male

Troubleshooting

No CAN data

- Check Input Voltage (5-30v DC).
- Confirm CAN HV/LV wiring pin out.
- Check power status LED inside cover.
- Check CAN termination resistor configuration.
- Check silent mode solder-jumper “JP1”.