

Isolated CAN Reference Design

Daniel Kisling

ABSTRACT

This design note presents the reference design of an isolated CAN node using the isolated CAN transceiver and a transformer driver, [SN6505A](#), to generate the isolated power. [Table 1](#) lists the family of [isolated CAN transceivers](#) from Texas Instruments.

Table 1. Isolated CAN Transceivers

Device	Description	Data Rate	Primary-Supply Voltage Range	Secondary-Supply Voltage Range
ISO1042	Isolated CAN Transceiver With 70V Bus Fault Protection and Flexible Data Rate (Industrial and Automotive)	5 Mbps	1.71V to 5.5V	4.5V to 5.5V
ISO1050	Isolated CAN Transceiver (Industrial)	1 Mbps	3V to 5.5V	4.75V to 5.25V

Contents

1	Design	2
2	References	2

List of Figures

1	5-kV _{RMS} Isolated CAN Node	2
---	---	---

List of Tables

1	Isolated CAN Transceivers	1
---	---------------------------------	---

Trademarks

All trademarks are the property of their respective owners.

1 Design

The ISO1042 possesses 7kV peak isolation voltage and has a typical transient immunity of 100kV/ μ s. The device operates from a 1.8V to 5V nominal supply on the primary side and a 5V nominal supply on the secondary side. This is of particular advantage for applications operating in harsh industrial environments. The wide range of supply voltages on the primary side enables the connection to low-voltage micro-controllers for power preservation, whereas the 5V on the secondary side maintains a high signal-to-noise ratio of the bus signals.

The push-pull transformer driver SN6505A in conjunction with an external transformer, rectifier and regulator converts a 2.5V to 5V inputs into a 5V output while providing up to 5kV of isolation depending on the transformers used.

The ISO1042 has excellent transient protection. To further enhance the transient protection, a low-capacitive transient voltage suppressor (TVS), such as ESDCAN05, is optional. The device provides a 250W maximum pulse power capability, 30pF of capacitance, while its standoff voltages of ± 30 V cover the CAN common-mode range of ISO1042. If using the ISO1050, the CPDT-12V TVS diode or a TVS diode with similar specifications should be used. See the [How to Design Isolated CAN Systems With Correct Bus Protection TI TechNote](#) for more information.

Figure 1 shows the final system diagram including transceiver, power supply, and transient suppressor.

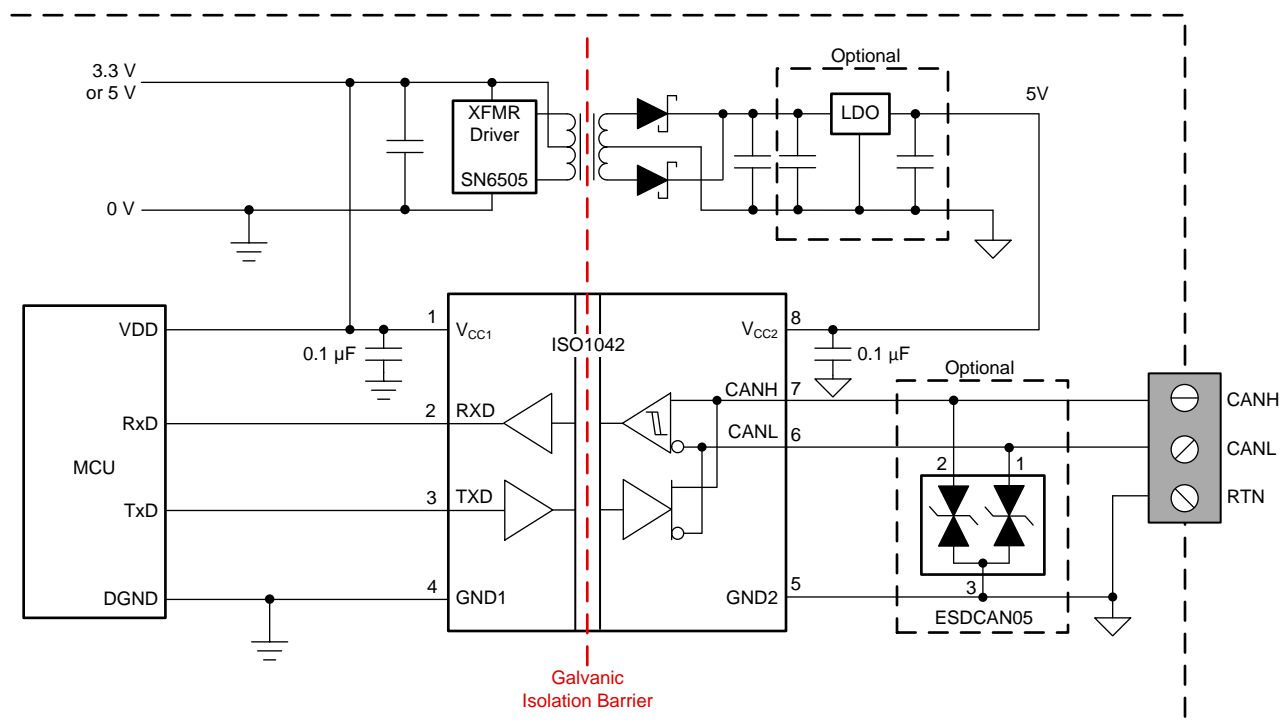


Figure 1. 5-kV_{RMS} Isolated CAN Node

2 References

Refer to these references for more information on the devices listed in this application report:

- [TI's isolated CAN portfolio](#)
- Texas Instruments, [SN6505 Low-Noise 1-A Transformer Drivers for Isolated Power Supplies data sheet](#)
- Texas Instruments, [How to Isolate Signal and Power in Isolated CAN Systems TI TechNote](#)
- Texas Instruments, [Isolate your CAN systems without compromising on performance or space TI TechNote](#)

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from B Revision (June 2010) to C Revision	Page
• Added the ISO1042 device to the reference design	1

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2018, Texas Instruments Incorporated