Application Report

Isolated CAN Reference Design

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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 1-1 lists the family of isolated CAN transceivers from Texas Instruments.

Table 1-1. Isolated CAN Transceivers

Device	Maximum Transient Isolation Voltage	Data Rate	Primary-Supply Voltage Range	Secondary-Supply Voltage Range	Bus-Fault Protection	PCB Footprint
ISO1042DW	5 kVrms	5 Mbps	1.71 V to 5.5 V	4.5 V to 5.5 V	±70 V	10.30 mm x 10.30 mm
ISO1042DWV	5 kVrms	5 Mbps	1.71 V to 5.5 V	4.5 V to 5.5 V	±70 V	5.85 mm x 11.50 mm
ISO1044BD	3 kVrms	5 Mbps	1.71 V to 5.5 V	4.5 V to 5.5 V	±58 V	4.90 mm x 6.00 mm

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Trademarks

1 Design

The ISO1042 possesses 7 kV peak isolation voltage and has a typical transient immunity of 100 kV/µs. The device operates from a 1.8 V to 5 V nominal supply on the primary side and a 5 V 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 5 V 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 2.5 V to 5 V inputs into a 5 V output while providing up to 5 kV 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 250 W maximum pulse power capability, 30 pF of capacitance, while its standoff voltages of ±30 V cover the CAN common-mode range of ISO1042. Similarly to enhance the transient protection in designs using ISO1044, the CPDT-12V TVS diode or a TVS diode with similar specifications can be used. See the *How to Design Isolated CAN Systems With Correct Bus Protection* TI TechNote for more information.

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

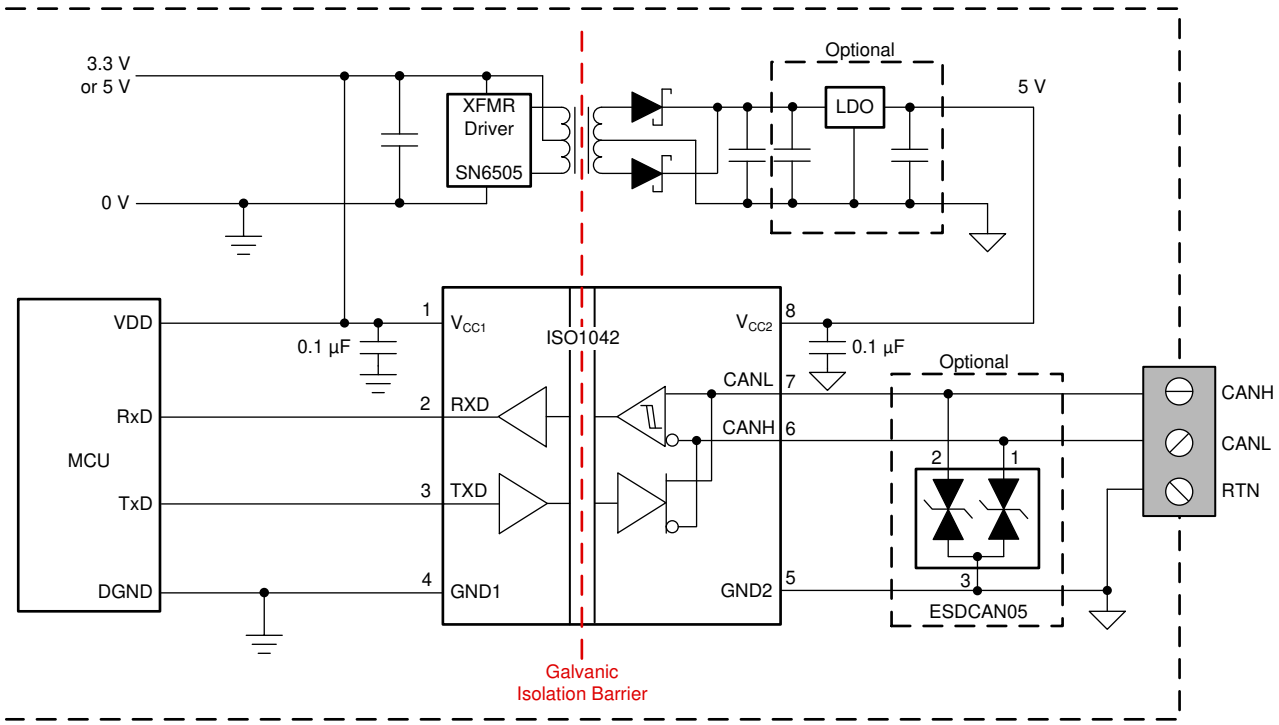

Figure 1-1. 5-kV$_{RMS}$ Isolated CAN Node

2 References

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

- Texas Instruments, Isolated CAN transceivers – Products
- 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

3 Revision History

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

Changes from Revision D (April 2020) to Revision E (July 2020)	Page
• Updated Figure 1-1: 5-k V_{rms} Isolated CAN Node	2

Changes from Revision C (September 2018) to Revision D (April 2020)	Page
• Updated Table 1-1 for ISO1044 release	2

Changes from Revision B (May 2010) to Revision C (September 2018)	Page
• Added the ISO1042 device to the reference design	2

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