



Introduction:

With the increase in the usage of signal isolation in many industrial and automotive applications, the need for isolated power has also increased. The benefits of isolation are lost if the power supplies on either side of the isolation barrier are simply shorted. At the same time, if the isolated power sub-systems are not designed carefully, it affects the overall system performance like temperature rise due to poor power transfer efficiency, data corruption due to emissions, and so on. To simplify the design process of isolated CAN sub-systems, this document provides various options (discrete and integrated) to isolate CAN signals and power.

Discrete implementation of isolated power:

Figure 1 shows an example of a discrete isolated signal and power solution for an isolated CAN subsystem. The isolated CAN functionality is achieved using a digital isolator [ISO7721](#), which provides one channel in each direction for transmit (TXD) and receive (RXD) signals, and [TCAN1042H](#), a fault protected CAN transceiver with flexible data-rate.

(Product Update: ISO7721 is a previous generation digital isolator. For new designs, we recommend [ISO6421](#), a next-generation, pin-to-pin compatible, reinforced digital isoaltor with improved timing and EMC performance.)

The [SN6501](#) device is a push-pull transformer driver that can be used in conjunction with an external transformer, rectifier diodes and an LDO to generate the isolated power supply. Depending on the regulation needed, the LDO can be optional. For transformer driver currents up to 350 mA on the primary side of the transformer, the SN6501 would suffice. If the driver current needs to be larger, the [SN6505A](#) or [SN6505B](#) with 1A drive current may be more suitable.

By replacing the discrete isolator and CAN from [Figure 1](#) with an isolated CAN device allows for a simplified signal chain as depicted in [Figure 2](#). The isolated power solution is the same as the previous discrete implementation. The isolated CAN [ISO1042](#) device in this design reduces the device count by one, improves the loop time and provides high levels of protection. This solution has all of the benefits of the previous discrete solution but with no additional drawbacks.

If there are multiple isolated CAN devices in the system powered from the same isolated power supply, this architecture makes the signal chain section compact as output of the LDO can be used to power all the isolated CAN devices. [TIDA-01255](#) is a detailed reference design for the discrete implementation, that is applicable to automotive and industrial CAN systems.

Advantages of this solution:

- Higher power transfer efficiency (~ 70-80%) due to use of external transformer.
- Emissions can be minimized by lower switching frequencies of the transformer drivers.
- Flexibility of using any CAN transceiver or digital isolator or single chip isolated CAN.
- Isolated power supply has ability to provide current for multiple isolated CAN transceivers.

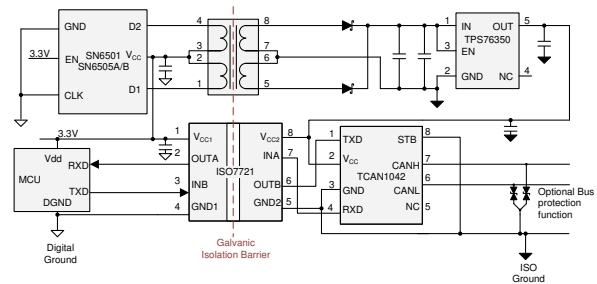


Figure 1. Discrete Implementation of Isolated CAN Sub-system

Conclusion

Choosing the right components for designing isolated CAN systems is critical. The selection of the discrete or integrated solutions depends on the trade-offs between size, ease of design versus efficiency, emissions. Discrete implementation of isolated power supplies provides higher efficiency of power transfer, lower emissions while the integrated solution for isolated power provides a compact solution for space critical applications.

Table 1. Alternative Device Recommendations

Device	Optimized Parameters	Performance Trade-Off
ISO1044	Ultra-small isolated CAN transceiver	3 kV _{RMS} isolation and ±58-V bus fault protection

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, regulatory 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 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](#), [TI's General Quality Guidelines](#), 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. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025