

# Now That You Have Isolated Your CAN Signals, What about Power?



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As I covered in my [previous post](#), the use of the isolated Controller Area Network (CAN) standard is increasing in both industrial and automotive applications. With higher voltages being used in these end applications, isolated communications are becoming imperative when protecting the low-voltage microcontroller while also reducing noise. But just adding an isolated CAN transceiver is not enough.

Isolated power supplies are necessary to power the two sides on an isolated CAN device. Some systems already have an isolated power supply (flyback, buck) for other purposes, so adding one extra winding to the isolation transformer for the CAN interface is easy. However, when there is no isolated power supply available, you may need to create one for the isolated CAN device, either with discrete components or integrated options.

## Discrete Solutions for Isolated Power

Figure 1 shows two ways of implementing a discrete solution for an isolated CAN signal and isolated power. For isolating CAN, you can either choose a single-chip isolated CAN device (like the [ISO1042](#)) as shown on the left or use a discrete isolator (like the [ISO77xx](#)) with a discrete CAN transceiver (like the [TCAN1042](#)), as shown on the right. Choosing the latter option gives you more flexibility to select any CAN transceiver that meets your needs.

As far as power supply is concerned, both solutions use a transformer driver with a transformer, rectifier and regulator to generate the isolated power supply. Your selection of transformer drivers such as the [SN6501](#) or [SN6505B](#) will depend on the output current needed for the isolated power supply. If the same power supply will supply power to multiple isolated transceivers, then a higher-current-output device like the [SN6505B](#) may be a better fit given its output current of 1 A.

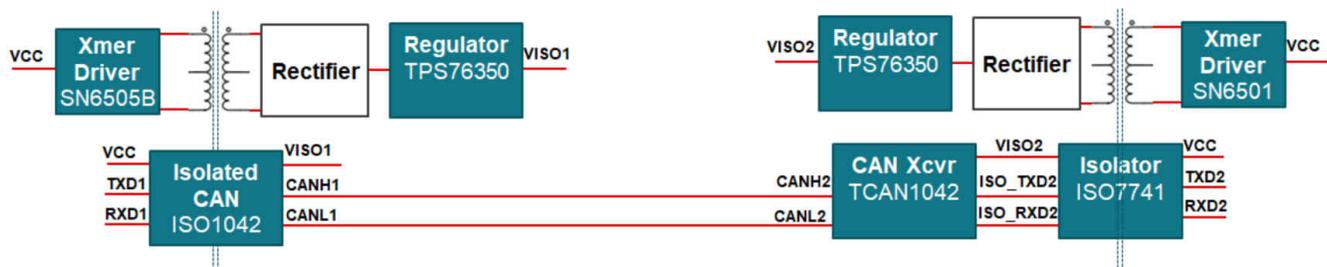


Figure 1. Discrete Implementations of Isolated CAN and Power

A discrete implementation of the isolated power supply, as seen in the TI [Automotive Reinforced Isolation CAN](#) and [Automotive Isolated CAN and Power Front End](#) reference designs, enables more flexibility in the voltage and current specifications based on the transformer windings ratio. In this case, the transformer and isolator/isolated CAN device need to meet the isolation ratings of the end application.

## Integrated Power and Data Solutions

Figure 2 shows a way to integrate the signal and power in a single chip. The [ISOW7841](#) digital isolator is a single-chip isolated data and power device that provides 3.3 V or 5 V at the output and 130 mA at 5 V on the isolated secondary side. Connecting a discrete CAN transceiver to the isolated power supply of the [ISOW7841](#) provides a complete system solution. With just two components to build this subsystem, this solution, featured in the [TI Isolated CAN Module with Integrated Power reference design](#), is compact; reduces the time to design the isolated power supply; and eases the number of certifications necessary, as only the [ISOW7841](#) device needs to be certified from isolation agencies compared to the discrete implementation. In addition, because of the small height of the package, the space reduction is also in the Z dimension, which enables board stacking in space-constrained applications.

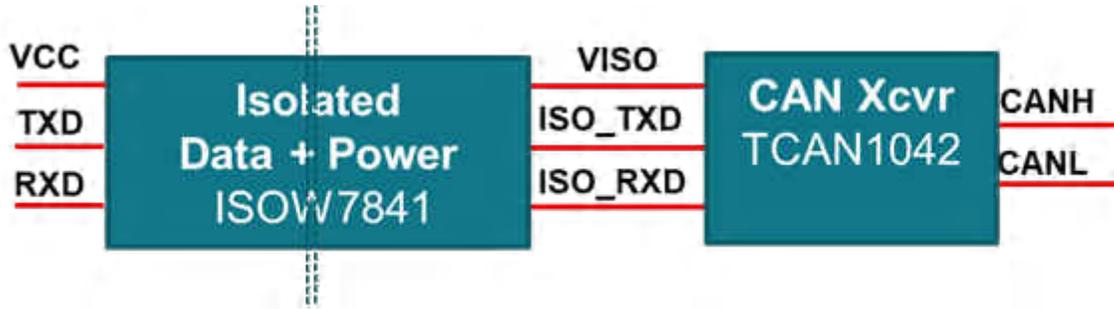


Figure 2. Integrated Implementations of Isolated CAN and Power

## Power Modules

Another solution for isolated power is to use isolated power modules, as shown in [Figure 3](#). For example, [Recom's R1SX-3.305/H-isolated DC/DC converter](#) operates from 3.3 V or 5 V to provide a single unregulated 3.3-V or 5-V output. Using this module in conjunction with an isolated CAN transceiver like the [ISO1042](#) provides a complete isolated solution for the CAN bus. [Recom's R-REF03-CAN1 reference board](#) enables quick development and analysis of isolated CAN bus systems.



Figure 3. Isolated Power Using Power Modules

With various options available to isolate CAN signals and power, the decision of which solution to choose will depend on the isolation specifications, CAN performance, power requirements, space availability and ease of design. For more design flexibility, a discrete solution may be more preferable, while the integrated solution is compact and reduces design time, making it suitable for space-constrained systems.

## Additional Resources

- Check out [TI's isolation portfolio](#).

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