

How to Build the Isolated CAN Solution

1 Introduction

CAN bus, short for Controller Area Network, is one of the most widely used field buses in the world.

This article provides different solutions for RS485/RS422 nodes and the use schemes.

2 Signal Isolation

The following uses the CA-IS3050/52, CA-IS3105W and CA-IF1051HS/s devices as examples to describe how to build CAN isolation. Combined with the CA-IS3092W device, a higher-integrated use scheme is proposed.

Traditional isolated CAN solution is the solution for the digital isolator and the CAN transceiver. In this solution, receive (RX), transmit (TX) and silent enable (S) signals are isolated with the digital isolator, such as the CA-IS3731HW device between MCU and the CAN transceiver.

Fig. 1 shows an example of a solution using the CA-IS3731HW device and the CA-IF1051S/HS transceiver. The advantage of this split solution is the flexibility to choose the best transceiver for application. The CA-IS3105W device can be used as the secondary side power supply for the CA-IS3731HW device because both sides of the isolator need power supply. However, because this is a multi-chip scheme, the external circuit requirements are higher, and the PCB board requires a larger space.

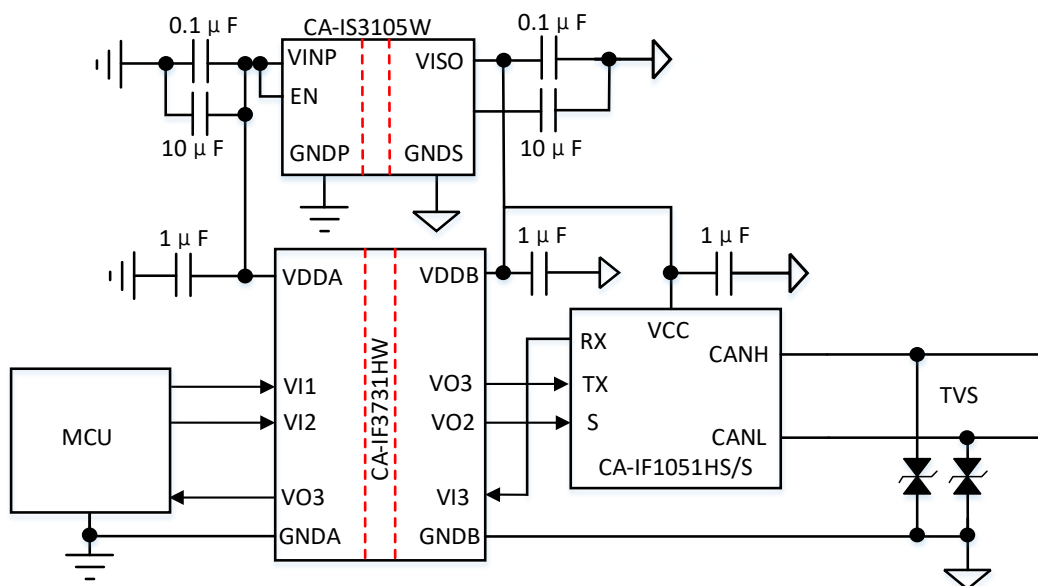


Fig. 1 CA-IS3731HW+CA-IF1051S/HS+CA-IS3105W Transceiver Solution

The CA-IS3050/52 and CA-1044S devices are highly reliable isolated CAN transceivers with high electromagnetic immunity and low radiation characteristics.

The CA-IS3050/52 and CA-1044S devices provide failure protection. The CA-IS3050/52 and CA-1044S devices have high insulation capabilities that help prevent noises and surges from the data bus or other circuits from entering the local ground, and thus interfering with or damaging sensitive circuits.

High CMTI capability is expected to ensure correct transmission of digital signals. The CA-IS3050W/52W device is packaged in 16-pin widebody SOIC package and supports insulated voltage withstand up to $5kV_{RMS}$. The CA-IS1044S device is packaged in SOIC8 package and supports insulated voltage withstand up to $3kV_{RMS}$. The advantage of this solution is that it requires less PCB space and less peripheral circuitry. Fig. 2 shows the application circuit of the CAN integrated isolation scheme CA-IS3050/52 and CA-1044. See the specification for more information.

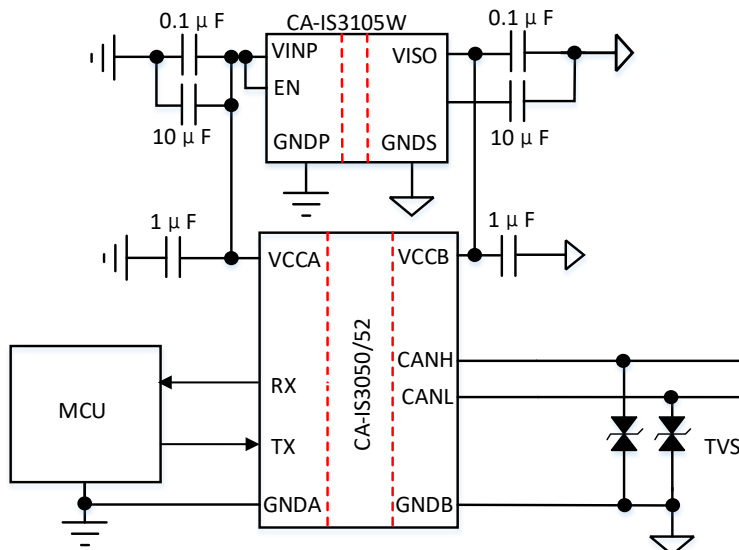


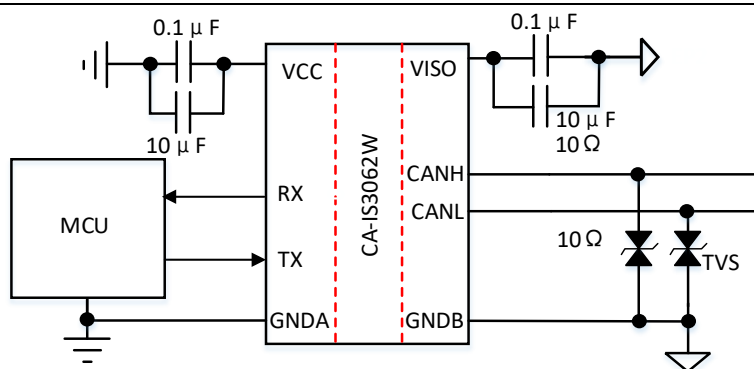
Fig. 2 CA-IS3050/52+CA-IS3105W Solution

3 CAN Isolation with Integrated Power Supply

The CA-IS3050/52 devices require isolated power supply for secondary side, and the CA-IS3105W device with SOIC16-W package requires more space. Therefore, using the CA-IS3062W device can reduce the scheme area.

The isolation scheme of the CA-IS3062W device integrates the isolation power supply, digital isolation chip and CAN interface chip. The CA-IS3062W device has high electromagnetic immunity and low radiation characteristics. The high insulation capability of the CA-IS3062W device helps prevent noises and surges from the data bus or other circuits from entering the local ground, and thus interfering with or damaging sensitive circuits. High CMTI capability ensures correct transmission of digital signals.

The CA-IS3062W solution has the advantage of eliminating isolation power supply and reducing PCB board size, making it easier for applications to pass safety certification.


Fig. 3 CA-IS3062W Isolation Solution

4 Recommended Solution Combination Table

Isolated Power Supply	Isolated CAN Interface Chip	Rate (Mbps)	Package	Fully Integrated Scheme	Note
CA-IS3105W	CA-IS3050W	1	SOIC16-WB	CA-IS3062W	1Mbps, (SOIC16-W)
CA-IS3105W	CA-IS3052W	1	SOIC16-WB		
CA-IS3105W	CA-IS3050G	1	SOIC8-WB		
CA-IS3105W	CA-IS3052G	1	SOIC8-WB		
CA-IS3105W	CA-IS3050U	1	SOP8		
CA-IS3105W	CA-IS1044S	2	SOIC8-NB		
CA-IS3105W	CA-IS3050EW	5	SOIC16-WB		
CA-IS3105W	CA-IS3052EW	5	SOIC16-WB		
CA-IS3105W	CA-IS3050EU	5	SOP8	-	-
CA-IS3105W	CA-IS3050EG	5	SOIC8-WB	-	-
CA-IS3105W	CA-IS3052EG	5	SOIC8-WB		

Isolated Power Supply	CAN Interface Chip	Digital Isolator	Rate (Mbps)	Half/Full Duplex	Note	Fully Integrated Scheme	Note
CA-IS3105W	CA-IF1051H	CA-IS3731HW	5	Half		CA-IS3062W	1Mbps, (SOIC16-W)
CA-IS3105W	CA-IF1051HS	CA-IS3731HW	5	Half			
CA-IS3105W	CA-IF1051VS	CA-IS3731HW	5	Half			

5 Conclusion

Using the CA-IS3731 series digital isolator chip, the CA-IF1051 series CAN interface chip and the CA-IS3105W isolation power supply chip can realize discrete isolated CAN interface isolation.

6 Version Information

Version	Date	State Description
Ver1.0	Apr. 2022	Initial version

7 Important Statement

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