Application Brief

Migrating From Legacy 3.3V CAN to TCAN3413 and TCAN3414

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Introduction

In industrial applications, Controller Area Network (CAN) has long been used to connect devices like sensors, actuators and controllers, carrying important information across the system. Surrounding electrically noisy equipment and long cabling creates risks of bus fault and data distortion, which can compromise the communication between these devices and cause system downtime.

TI has enabled mixed CAN networks for over 20 years with 3.3V and 5V CAN transceivers, such as the SN65HVD234 and the TCAN334 in 3.3V industrial applications. For more information on our legacy devices, please see Overview of 3.3V CAN (Controller Area Network) Transceivers. TI's latest family of 3.3V CAN transceivers, TCAN3413 and TCAN3414, improve on these previous devices by offering higher bus fault protection, stronger ESD resilience, faster data rates and more options for power savings.

These devices allow designers to create CAN nodes powered by 3.3V, eliminating 5V rails solely powering 5V CAN and allowing full interoperability with existing 5V CAN nodes. Migration to this family from legacy 3.3V CAN designs is simple, requiring a few pin changes. This application brief addresses common concerns and considerations for migrating from other industrial TI 3.3V CAN transceivers.

Why Switch to a TCAN341x 3.3V CAN Transceiver?

The TCAN3413 and TCAN3414 offer performance improvements in key specifications such as bus fault protection and maximum data rate. These devices also feature standby and shutdown modes for added power savings. In particular, the maximum supply current used by the TCAN3413/4 in standby mode is lower than previous 3.3V CAN devices, minimizing power consumed by the device when not in use. Shutdown mode, available on the TCAN3414, can further reduce power consumption by fully shutting down the transceiver when not in use. Table 1 provides a comparison of the TCAN341x important features against older 3.3V CAN transceivers.

Table 1. Feature comparison of TCAN341x against other 3.3V CAN devices

Parameter	TCAN341x	TCAN33x	SN65HVD23x
Maximum data rate	8Mbps	5Mbps	1Mbps
Bus fault voltage	-58V to +58V	-14V to +14V	-36V to +36V
Supply voltage, absolute maximum	-0.3V to +6.0V	-0.3V to +5.0V	-0.3V to +7.0V
Maximum standby supply current	17µA	20µA	600µA

How Can I implement the TCAN341x?

Industrial designers migrating from previous TI 3.3V CAN designs such as SN65HVD23x and TCAN332 must adjust the connections to maintain that TCAN341x pin 8 is not floating. When this pin is left floating, the device is in permanent standby mode.

Depending on the application, designers also need to review pin 5 connections. If internal level-shifting is not required, the TCAN3414 can be used with pin 5 floating or controlled by an MCU, as pin 5 is the shutdown pin

in this device. If I/O functionality is needed, customers can use the TCAN3413 with V_{IO} functionality on pin 5. These changes are illustrated in Figure 1.

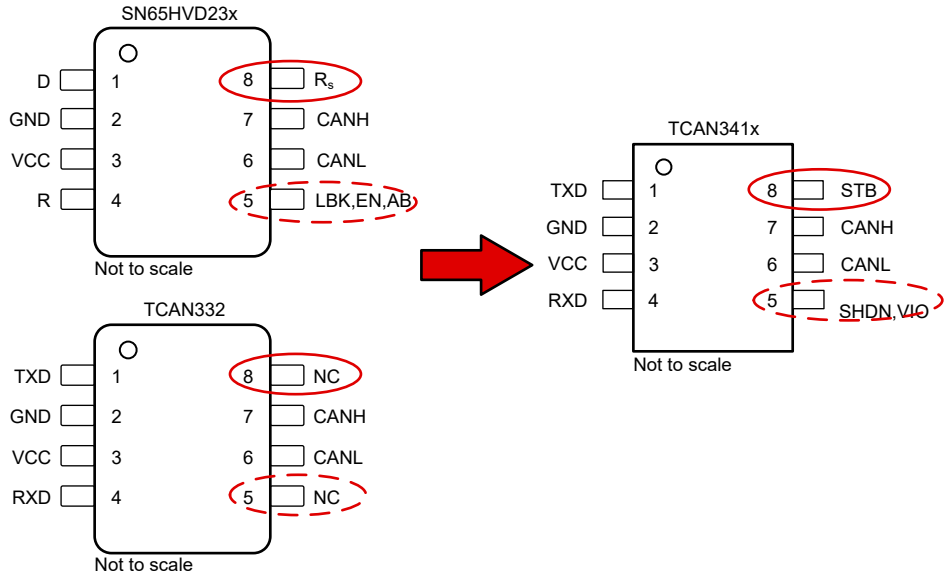

Figure 1. Pin Changes Necessary to Migrate to TCAN341x

Overall, the TCAN3413 and TCAN3414 offer enhanced performance compared to previous 3.3V CAN transceivers, with high bus fault protection, robust ESD protection and more options for power savings. Get started on implementing 3.3V CAN in your designs with the TCAN3413 and TCAN3414.

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