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Local Interconnect Network (LIN) Physical Interface

Difference Between MC33399 and MC33661

Introduction

This engineering bulletin highlights the differences between two Local Interconnect Network (LIN) Physical Interfaces, namely the 33399 and the 33661.

The LIN is a serial communication protocol designed to support automotive networks in conjunction with Controller Area Network (CAN). As the lowest level of a hierarchical network, LIN enables cost-effective communication with sensors and actuators when all the features of CAN are not required.

The 33399 and the 33661 are physical layer components dedicated to automotive sub-bus applications. They offer speech communication from 1.0 kbps to 20 kbps. There are two main operating modes: Normal and Sleep.

For feature information, refer to the device data sheets for 33399 and 33661

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Differences Guide

This section should be used as a quick guide to determine the main differences between the devices in a similar family. Using Table 1, you can note the differences most relevant to your system/application. This engineering bulletin should be used in conjunction with the most recent specification for each device, to ensure that all differences have been captured.

Table 1. Device Differences

Parameter	33399	33661
LIN Protocol Specification	Addresses LIN 1.3 Applications	Addresses LIN 2.0 Applications
Terminal Out and Package	8-terminal SOICN.	8-terminal SOICN.
Baud Rate Operation	One baud rate operation: 1.0 kbps to 20 kbps	Two baud rate operations: • 1.0 kbps to 10 kbps • 1.0 kbps to 20 kbps
INH Output	Capable of: Controlling an external switchable voltage regulator.	Capable of: • Controlling an external switchable voltage regulator. • Driving a bus master termination resistor.
WAKE Terminal	Identical to 33661.	Identical to 33399.
TXD, RXD, EN	5.0 V compatible only.	5.0 V and 3.3 V compatible.
LIN Bus Termination	Normal and Sleep modes use internal 30 kΩ pullup resistor.	• Normal, Slow, and Fast modes use internal 30 kΩ pullup resistor. • Sleep mode and bus short-to-ground use 20 µA current source pullup resistor.
Sleep Current	Typical 20 µA, maximum 50 µA.	8.0 µA Typical
Mode	Normal and Sleep modes.	Normal, Slow, Fast, and Sleep modes.
Normal Mode	Selected by TXD HIGH and EN HIGH at device wake-up. Operation up to 20 kbps.	Selected by TXD HIGH, then EN HIGH at device wake-up. Operation up to 20 kbps.
Slow Mode	N/A	Selected by TXD LOW, then EN HIGH at device wake-up. Operation up to 10 kbps.
Fast Mode	N/A	Selected by sequence at TXD and EN. Operation at baud rate >100 kbps.
Sleep Mode and Bus Wake-Up	Dominant state, 50 µs duration.	Recessive-to-dominant transition, followed by a dominant state of more than 70 µs duration, followed by a dominant-to-recessive transition.
Slew Rate	One slew rate: 20 kbps.	Three slew rates: Normal (20 kbps), Slow (10 kbps), and Fast (>100 kbps). Normal and Slow mode selected by EN and TXD terminal sequence at device wake-up.
Wake-Up from Internal Node Activity (LOW to HIGH transition of EN)	If the EN terminal is switched HIGH, the 33399 wakes up and the Normal Mode is selected. The TX terminal is, per default, HIGH in Sleep Mode.	If TXD is set HIGH and then EN is switched HIGH, the 33661 wakes up and the Normal Mode is selected. In this setup sequence, there is a direct compatibility between 33399 and 33661.
Radiated Emission	The level of radiated emissions measured in identical configurations is higher for the 33399 compared to the 33661 in Normal mode.	The level of radiated emissions measured in identical configurations is lower for the 33661 compared to the 33399 in Normal mode, allowing operation up to 20 kbps. If the 33661 device is set to the Slow mode, allowing operation up to 10 kbps, the radiated emission level is significantly reduced.

Device Difference

Terminal Assignments

The 33399 and the 33661 are available in an 8-terminal SOICN package.

NOTE
Terminal assignments are exactly the same for both devices. Refer to the Terminal Definitions table in the respective device specification data sheets for terminal assignments and definitions.

LIN Protocol Specification

Both devices are compatible with the LIN Protocol Specification. The 33399 is designed to support LIN Protocol Specification Revision 1.3 and the 33661 is designed to support Revision 2.0.

Application

Figure 1 illustrates that both the 33399 and the 33661 can be configured to perform as a slave node.

The 33661 offers slew rate selection for optimized operation at 10 kbps and 20 kbps, fast baud rate (above 100 kbps) for test and programming modes, excellent radiated emission performance, and safe behavior in the event of LIN bus short-to-ground or LIN bus leakage during low-power mode.

The 33661 can also be configured as a master node and drives a 1.0 kΩ bus master termination resistor.

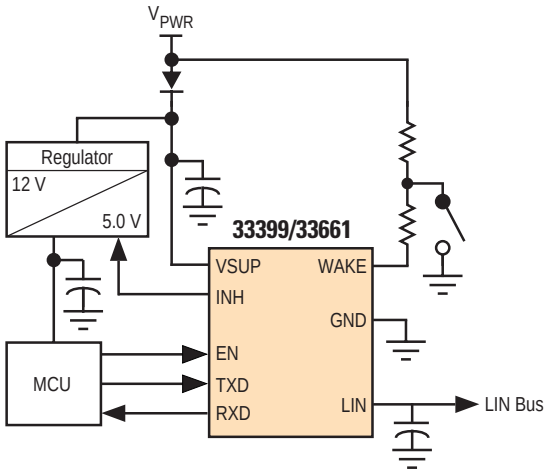

Figure 1. 33399/33661 Slave Node Typical Application

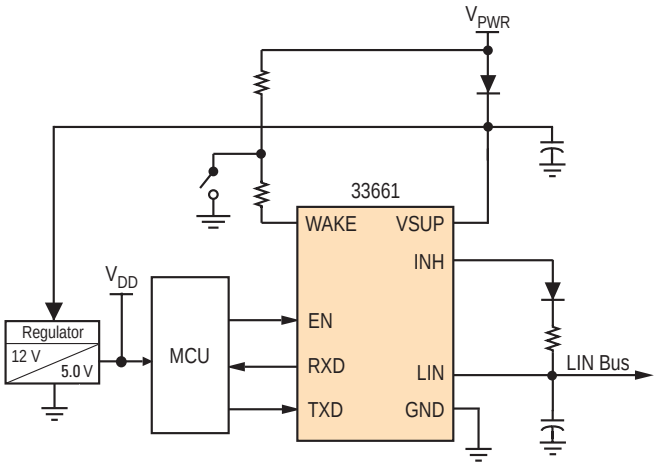

Figure 2. 33661 Master Node Typical Application

Reference Documentation

Table 2. Reference Documents

Title	LIterature Order Number
Local Interconnect Network (LIN) Physical Interface	MC33399
Local Area Network (LIN) Enhanced Physical Interface with Selectable Slew Rate	MC33661

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