

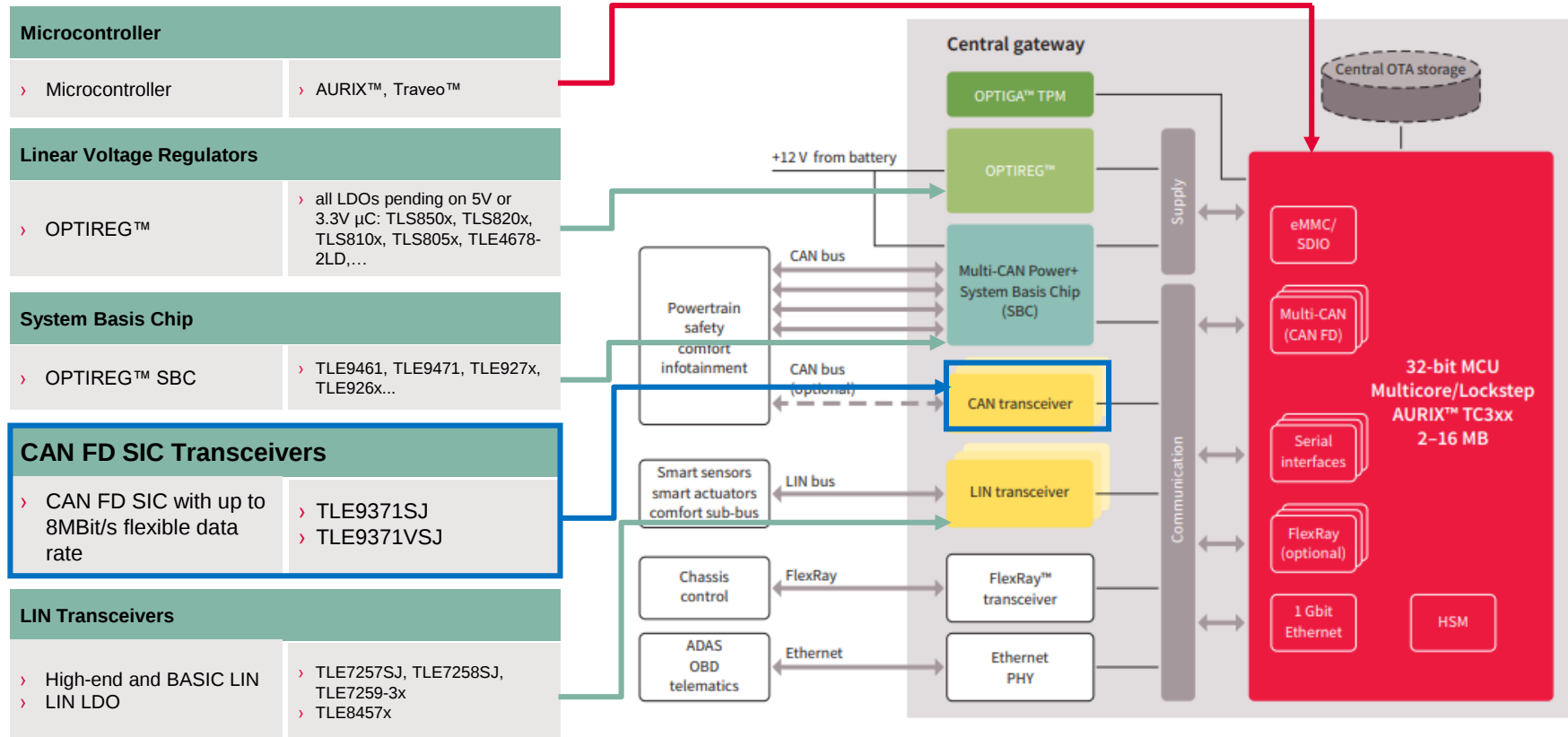
CAN FD SIC

Introduction of new CAN FD Signal Improvement Transceivers



CAN FD Signal Improvement TLE9371SJ/VSJ

Our components are a perfect match with customer system needs



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Target applications



Electric power steering



Automated Driving



Transmission Control



Engine management



Motivation

Initially the CAN technology had been invented to offer robust and scalable networks in the car. With faster data rate it turned out to be more difficult to keep this robustness. Developing complex networks with low data rates e.g. 500kbit/s or 1Mb/s had been comparable easy. Faster networks using 2Mb/s or 5Mb/s data rate could be only realized in smaller and less complex networks. Due to the impedance mismatch when switching from dominant to the high ohmic recessive state, reflections occur, which results in typical ringing effects. The ringing of a lower data rate network could be compensated with time, but with high data rate this time (bit time) is not available any more. Never the less modern networks require both: high data rates in stable networks. This signal integrity can be granted with the newly developed CAN SIC Transceivers.

Product description of CAN FD SIC

CAN Signal Improvement transceivers actively improve the signal integrity in a network, reducing signal ringing effects and help to operate in larger topologies at bit rates significantly faster than before. The CAN FD SIC parts can replace existing CAN (FD) transceivers, making the adoption of this technology straight-forward and without significant changes in the application. Even more, they are backward compatible to existing CAN transceiver solutions.

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How to address the trends!

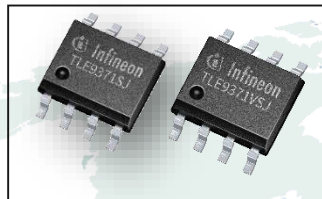


Trends	CAN FD SIC solution	Value
› Increasing No. of nodes e.g. new sensors, new car architectures (zone)	› Highly accurate transmitter allowing precise control of CANH and CANL signals, active drive of recessive edge and active signal improvement	Connection of more nodes to the network
› Expanding CAN networks and emerging in new applications	› Ringing in CAN networks significantly reduced, star-based typologies with higher data rates possible	Entry for more complex application e.g. autonomous driving with security requirements, new comfort features in a body applications
› Pressure to optimized CAN networks: more efficient cables & connectors, higher data rates	› Increases maximum achievable CAN speed to 8MB/s › Increased EMC performance	Simple wire harness & costs; more positive CO ₂ balance
› CAN FD reached their limits	› Guaranteed CAN FD protocol operations under all conditions incl. error handling and arbitration scenarios › Fully interoperable with CAN XL protocol	No loss of network in case of single failure independently of CAN protocol; Drop-in replacement without adoption of Hardware or Software

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Product Brief

<https://www.infineon.com/TLE9371SJ>
<https://www.infineon.com/TLE9371VSJ>



Description

CAN FD Transceiver



TLE9371SJ PG-DSO-8

TLE9371VSJ PG-DSO-8

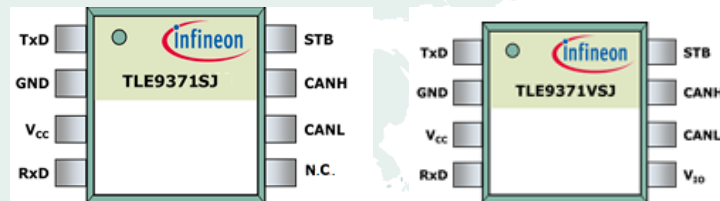
Main Features

- › It is designed to fulfill the requirements of ISO 11898-2 (2016) physical layer specification and respectively also the SAE standards J1939 and J2284.
- › It is compliant to TxD-based CAN FD SIC according to CiA 601-4
- › Certification according to VeLIO (Vehicle LAN Interoperability & Optimization) ongoing, release expected in February 2023
- › Very high ESD robustness and the perfect RF immunity allows the use in automotive application without adding additional protection devices, like suppressor diodes for example
- › Transceiver is not supplied the bus is switched off and illustrate an ideal passive behavior with the lowest possible load to all other subscribers of the HS CAN network
- › The high symmetry of the CANH and CANL output signals provides a very low level of electromagnetic emission (EME) within a wide frequency range
- › Depending on the size of the network and the along coming parasitic effects the device supports bit rates up to 8MB/s
- › Dedicated low-power modes, like Stand-by mode provide very low quiescent currents while the device is powered up.
- › Fail-safe features like overtemperature protection, output current limitation or the TxD time-out feature protect the transceiver and the external circuitry from irreparable damage.
- › VIO input for voltage adaption to the microcontroller interface (3.3 V or 5 V)
- › Green Product (RoHS compliant)

Applications

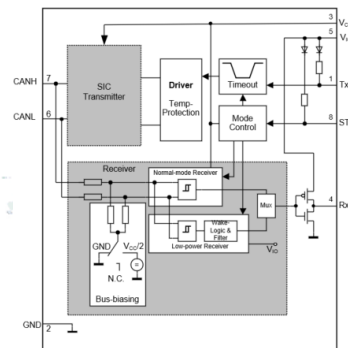
- › Gateway modules: engine management, transmission control, automated driving, electric power steering
- › Body control modules (BCM)
- › Engine Control Units (ECUs)
- › ADAS
- › Radar

PINOUT TLE9371SJ/VSJ DSO-8



PG-DSO-8

BLOCK DIAGRAM



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At a Glance



CAN FD SIC	Package	Features
TLE9371VSJ	DSO-8	With bus wake up and Vio Pin
TLE9371SJ	DSO-8	With bus wake up and <u>NO</u> Vio Pin

The TLE937x series...

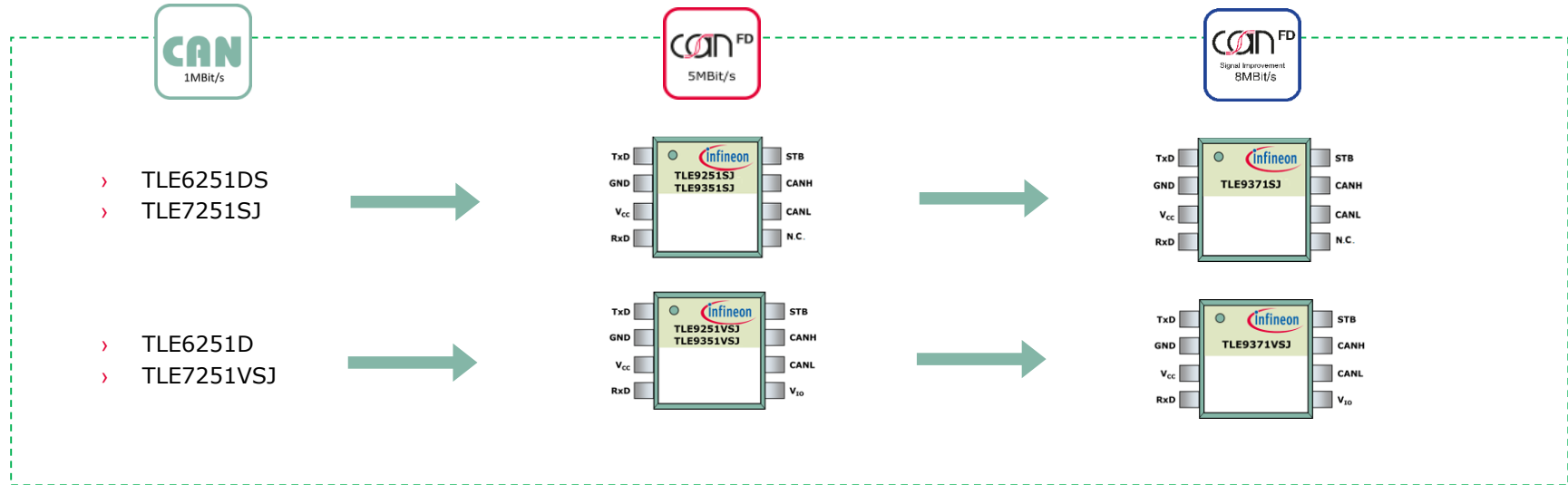
- ✓ actively improve CAN signals to ensure robust communication in large networks and at faster bit rates. Signal ringing, an artifact of large, complex networks with unterminated stubs, is dramatically reduced, removing previous limitations in network topologies. Even lower specification cabling solutions can be considered.
- ✓ achieve significantly faster bit rates than conventional transceivers thanks to a highly symmetrical transmitter, ensuring very accurate bits are reliably generated on the bus. With much tighter control over the transmitted signal, faster and shorter bit times can be guaranteed.
- ✓ are available as pin-compatible replacements to conventional HS-CAN transceivers, allowing simple upgrades for existing designs and backward compatibility, fulfilling the ISO 11898-2 (2016) specification.
- ✓ ES available, QS Q1_2023, SOP: May 2023



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Ease of Change from Old to New CANs

CAN Classic & CAN FD becomes CAN FD SIC



CAN FD SIC variants are backwards compatible to 1MBit/s, 2MBit/s and 5MBit/s



Fulfills latest ISO Standard (Edition 2016)



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Conclusion



- › This technology will reduce costs and simplify designs for network architects and consequently impact significantly existing CAN FD networks. It will pave the way for reliable 5MB/s network communication up to 8MB/s for point-to-point communication. CAN FD Signal Improvement is designed to ensure the CAN FD protocol remains fully robust and there are no adverse side effects, making it the go-to technology for CAN FD and future CAN networks.
- › CAN XL, the next generation CAN protocol, now under definition, intends to remove some of the limitations of the CAN FD protocol, allowing for even faster transceiver concepts. CAN XL will also support payloads up to 2kB frames, enabling the seamless tunneling of Ethernet frames over CAN networks. As CAN XL will also be fully interoperable with legacy CAN FD nodes on the same network, this technology opens up a simple migration path for network architects to introduce new functions alongside legacy ECUs, reducing migration complexity.
- › With the new CAN Signal Improvement boosting not only existing CAN FD but also CAN XL networks. Therefore CAN will remain a highly relevant technology for in-vehicle networking.



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