

Application Note

PCB Layout Recommendations for TLE9255W

About this document

Scope and purpose

This document provides application information for the transceiver TLE9255W from Infineon Technologies AG as Physical Medium Attachment within a Controller Area Network (CAN).

This document contains information about:

- PCB recommendations for CAN FD applications (see [Chapter 1](#))

This document refers to the data sheet of the Infineon Technologies AG CAN Transceiver TLE9255W.

Note: The following information is given as a hint for the implementation of our devices only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.

Intended audience

This document is intended for engineers who develop applications.

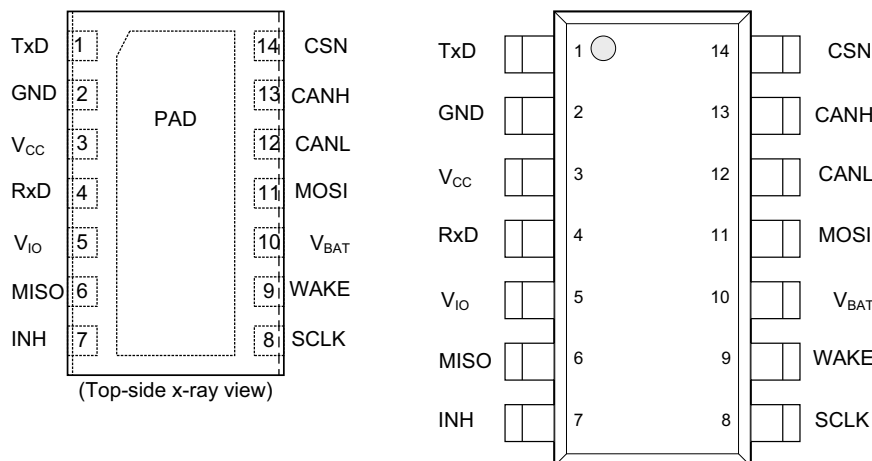


Figure 1 Pin Configuration of the TLE9255W

The main features of the TLE9255W are:

- Baud rate up to 5Mbit/s for CAN Flexible Data Rate
- CAN Partial Networking functionality according to ISO11898-2: 2016
- Very low Electromagnetic Emission (EME) and high Electromagnetic Immunity (EMI)
- Excellent ESD performance according to HBM (+/-8 kV) and IEC 61000-4-2 (+/-8 kV)
- Bus wake-up pattern feature with optimized filter timing ($0.5\mu\text{s} < t_{\text{Filter}} < 1.8\mu\text{s}$) and Local Wake-up feature
- INH output pin to control external circuitry
- Undervoltage detection on V_{BAT} , V_{CC} and V_{IO}
- Very low current consumption in Stand-by and Sleep Mode (20 μA)
- Control input levels compatible with 3.3 V and 5 V devices
- Advanced bus biasing according to ISO11898-2: 2016

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1 PCB Layout Recommendations for TLE9255W

The following layout rules should be considered to achieve best performance of the transceiver and the ECU. An example PCB Layout is given in [Figure 2](#):

- TxD and RxD connections to microcontroller should be as short as possible.
- For each microcontroller the TxD driver output stage current capability may vary depending on the selected port and pin. The driver output stage current capability should be strong enough to guarantee a maximum propagation delay from μC port to transceiver TxD pin of less than 30ns.
- Place three individual 100nF capacitors close to V_{BAT} , V_{CC} and V_{IO} pins for local decoupling. Due to their low resistance and lower inductance compared to other capacitor types, it is recommended to use ceramic capacitors.
- If a common mode choke is used, it has to be placed as close as possible to the bus pins CANH and CANL.
- Avoid routing CANH and CANL in parallel to fast-switching lines or off-board signals in order to reduce noise injection to the bus.
- It is recommended to place the transceiver as close as possible to the ECU connector in order to minimize track length of bus lines.
- Avoid routing digital signals in parallel to CANH and CANL.
- CANH and CANL tracks should have the same length. They should be routed symmetrically close together with smooth edges.
- GND connector should be placed as close as possible to the transceiver.
- Avoid routing transceiver GND and microcontroller GND in series in order to reduce coupled noise to the transceiver. This also applies for high current applications, where the current should not flow through the GND line of transceiver and microcontroller in serial.
- Avoid routing transceiver V_{CC} supply and microcontroller V_{CC} supply in series in order to reduce coupled noise to the transceiver.
- Same dimensions and lengths for all wire connections from the transceiver to CMC and/or termination.
- If the WAKE pin is not used, it is recommend to connect it directly to GND in order to avoid unwanted wake-up pulses. If Local Wake-up function is used it is recommended to place a 3.3K and 10nF at WAKE input.
- For CAN FD it is recommended to use a Common Mode Choke 100 μH impedance and a Split termination of two times 60 Ω with a capacitance of 4.7nF in order to achieve excellent EME performance in automotive applications.
- High ohmic pulldown resistor on inhibit 100k Ω recommended, if INH-control device does not have internal pulldown resistor.
- For the SPI it is recommended to have short lines between TLE9255W and microcontroller. Avoid crossings of SPI signal traces on PCB and multiple layer routings. Optionally serial resistances (100 Ω - 1k Ω) can be used (MISO close to TLE9255W/ SCLK, MOSI, CSN close to microcontroller).
- If using the TLE9255WLC (TSON-14 Package), the exposed pad should not be connected to other potential than GND.

PCB Layout Recommendations for TLE9255W

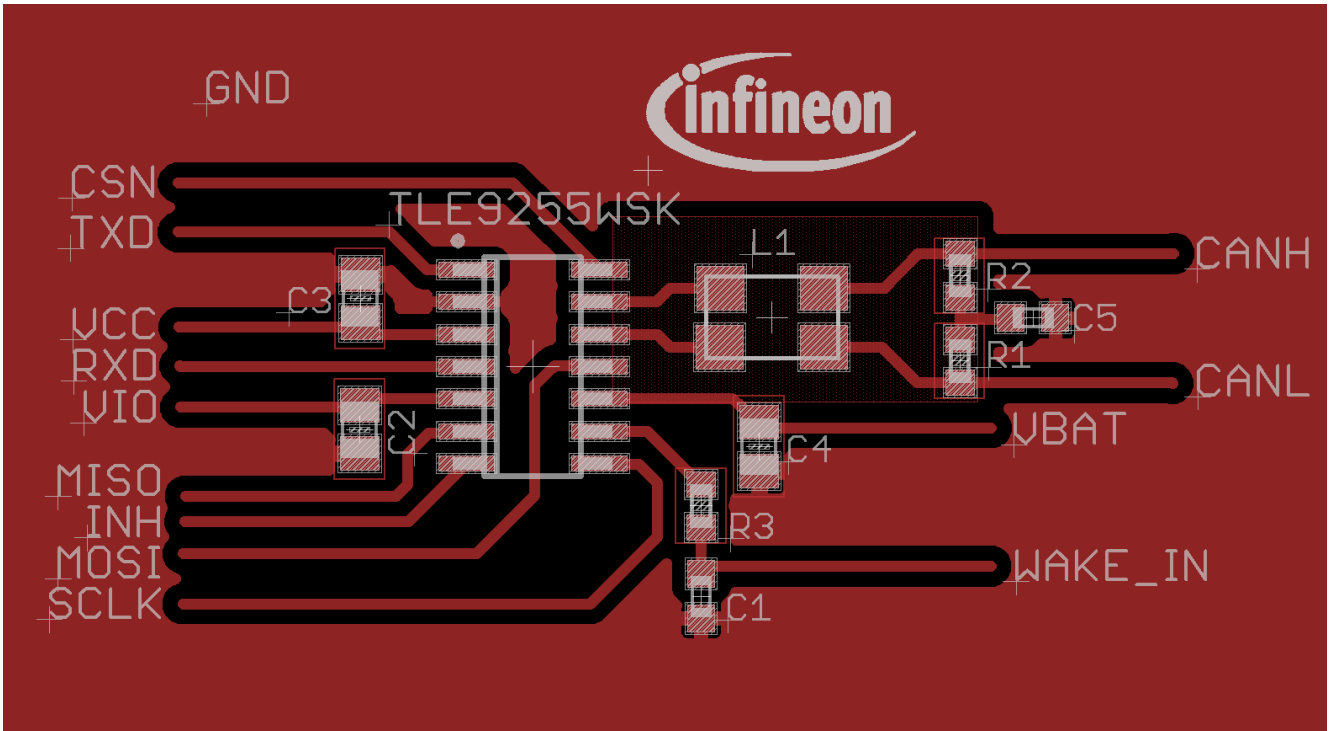


Figure 2 Example CAN transceiver PCB layout

Revision History

2 Revision History

Revision	Date	Changes
1.0	2017-05-22	Application Note created

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Edition 2017-05-22

Published by

Infineon Technologies AG

81726 Munich, Germany

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Document reference

Z8F57329536

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