

MOTIX™ TLE9189 gate driver IC for 12 V BLDC motors**Features**

- High power 3-phase bridge driver for switching of six N-channel FETs with a Q_{Gtot} of 200 nC at a 20 kHz PWM
- Current source controlled output stages Gxx with adaptive MOSFET gate control
- 0...100% duty cycle, adjustable without restrictions
- Specified fully functional supply voltage range of 4.2 V to 36 V for a 12 V battery supply systems
- High robustness of motor connection pins of -12 V to 48 V
- 3 current sense amplifiers for low side shunt current measurement with high accuracy of 1% and fast settle time 1 μ s
- Extended monitoring and diagnostic functions via serial peripheral interface (SPI)
- Configurable failure reactions including motor brake function
- Additional safe state control pin SOFF_N
- High voltage rated digital input and output pins
- Developed according to ISO 26262 ASIL-D
- ISO 26262 Safety Element out of Context for safety requirements up to ASIL D
- Safety manual and safety analysis summary report
- Safety barrier to microcontroller interface
- Support of self-test features
- SPI window watchdog for microcontroller supervision
- Passive clamping of external FETs
- Low quiescent current mode
- Optimized pinout
- Green product (RoHS-compliant)
- Soldering: automated optical inspection capability (AOI)
- AEC qualified

Potential application

- Electric power steering (EPS)
- Electric brake booster (EBB)
- Functional safety related BLDC or PMSM motor drive applications

Product validation

Product validation according to AEC-Q100, Grade 0. Qualified for automotive applications.

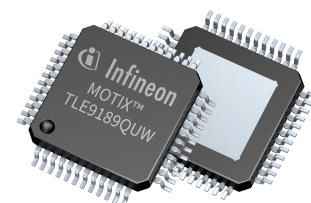
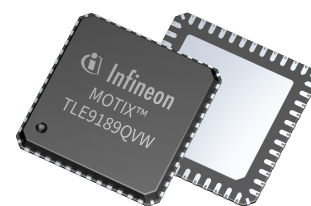
Product description

The TLE9189 is an advanced gate driver IC designed for controlling 6 external N-channel power MOSFETs forming an inverter for high current 3-phase motor drive applications in the automotive sector. All low- and high-side output stages are based on a floating gate driver concept and capable of driving a wide range of N-channel power MOSFETs.

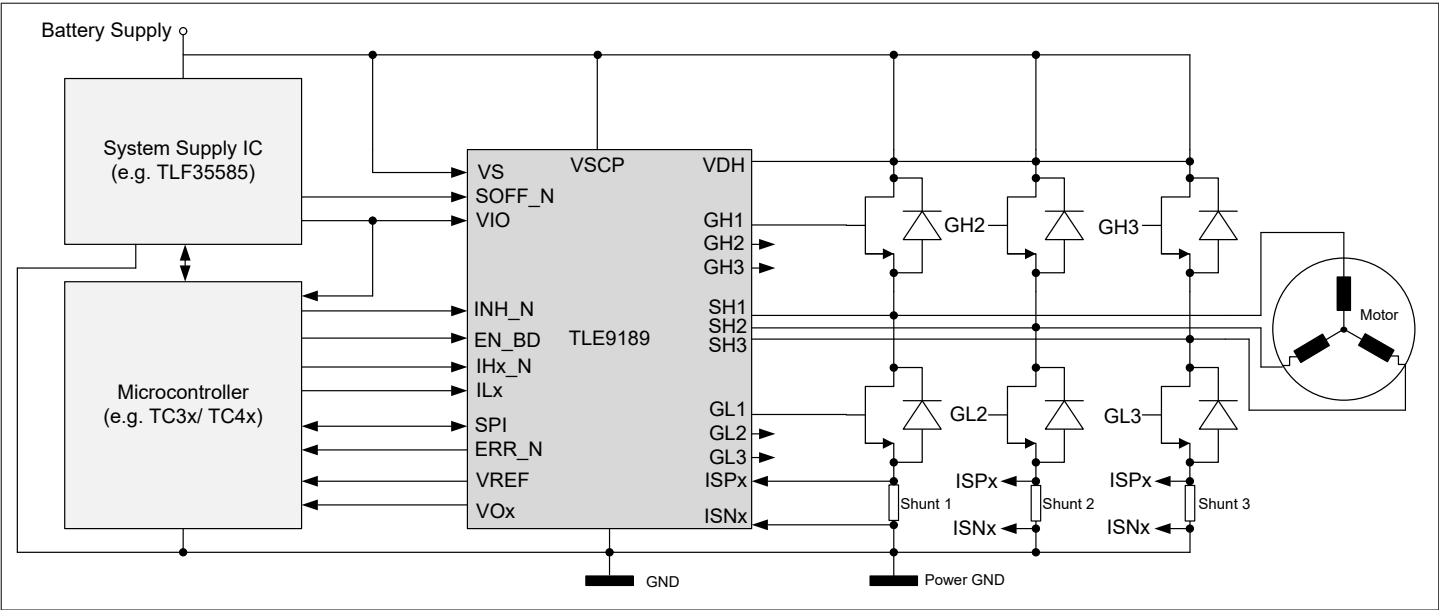
An integrated SPI interface is used to configure the TLE9189 for the application after power-up. After successful power-up, parameters can be adjusted by SPI, monitoring data, configuration and error registers can be read out. Cyclic redundancy check over data and address bits ensures safe communication and data integrity. GND related bridge currents can be measured with three integrated current sense amplifiers.

Gain and zero current voltage can be adjusted via SPI. The input referred voltage offset can be calibrated. Diagnostic coverage and redundancy have increased steadily in recent years in automotive drive applications. Therefore the TLE9189 offers a wide range of diagnostic features, like monitoring of power supply voltages as well as system parameter monitoring. Failure behavior, threshold voltages and filter times of the supervisions of the device are adjustable via SPI. The TLE9189 is especially designed for safety relevant motor drive applications and was developed according to the ISO 26262 standard. An optimized monitoring and diagnostic concept, including built-in self-test functions ensures high flexibility on fault reactions and low FIT rates for the relevant failure modes. The VQFN48 package with an exposed pad for an optimized thermal performance and provides special leads allowing an automated optical inspection.

TLE9189 is offered in leaded TQFP-48 package as well.



Product description



Simplified application diagram

Product type	Package	Marking
TLE9189	VQFN-48	TLE9189QVW
TLE9189	TQFP-48	TLE9189QUW



Table of contents

	Table of contents	3
1	Package	4
	Revision history	6
	Disclaimer	7

1 Package

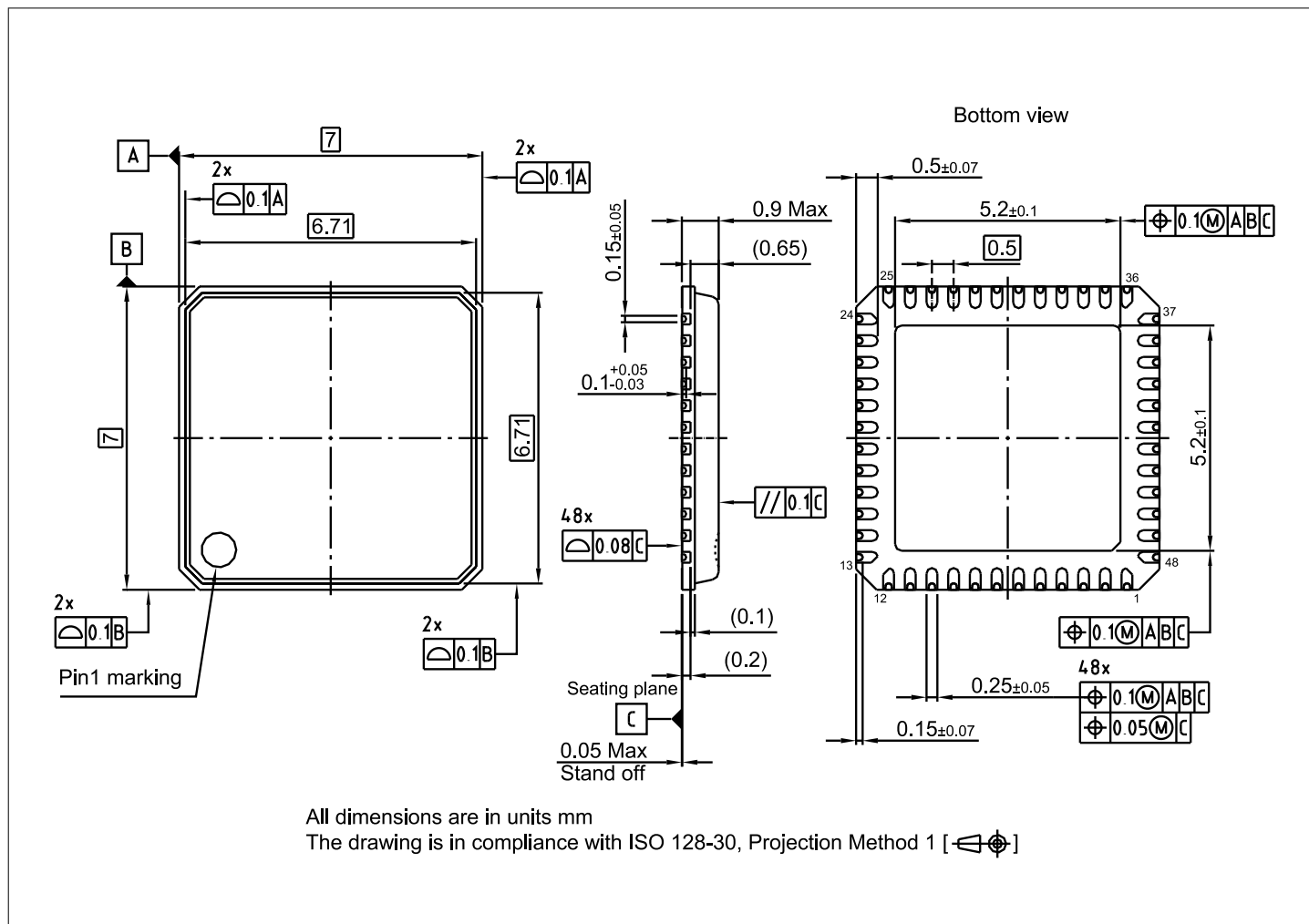


Figure 2 Package outline VQFN-48

To meet the world-wide customer requirements for environmental friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e. lead-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

1 Package

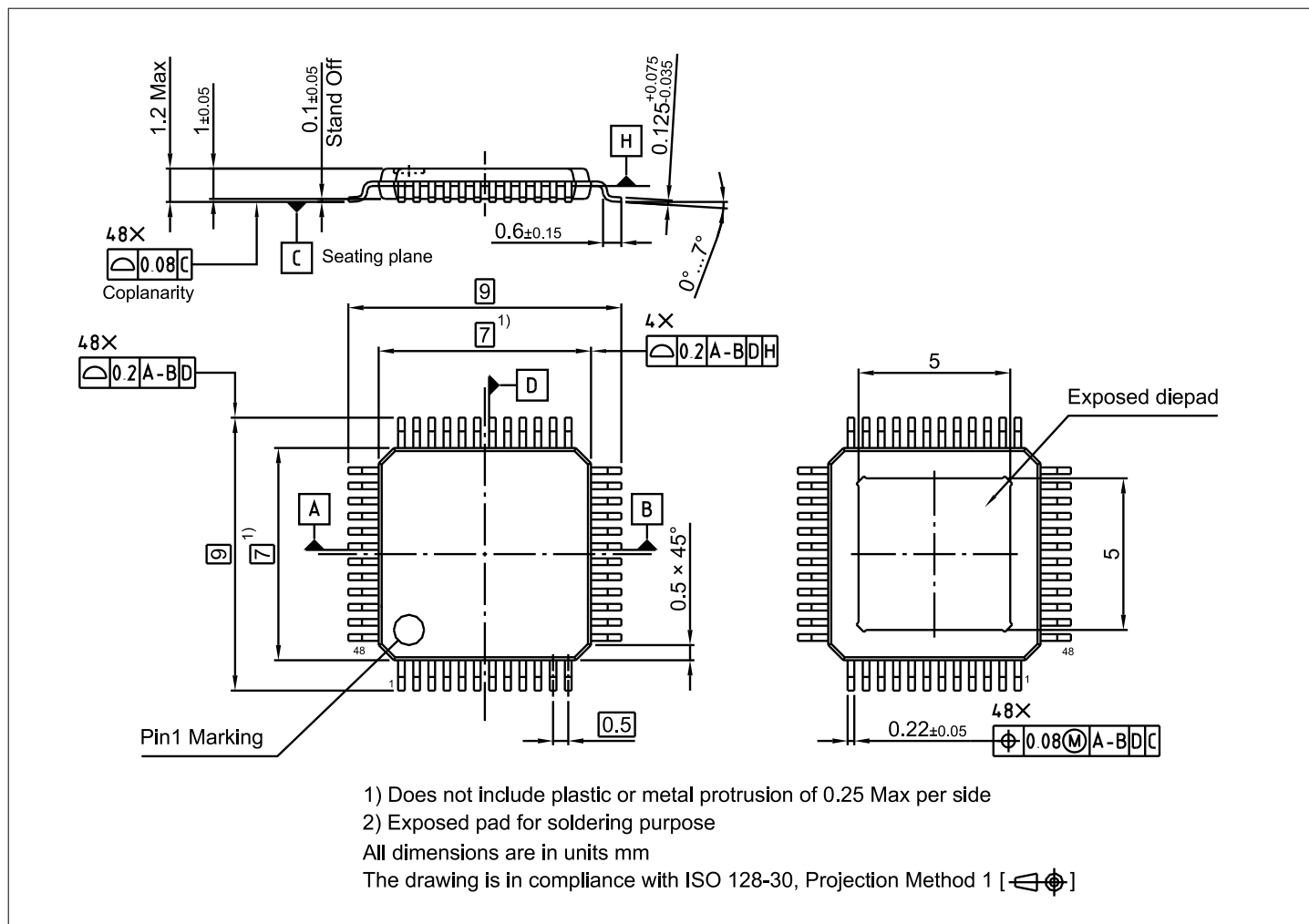


Figure 3 Package outline TQFP-48

To meet the world-wide customer requirements for environmental friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e. lead-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

Revision history

Document version	Date of release	Description of changes
1.10	2026-05-26	Package outline changed for PG-VQFN
1.01	2026-03-26	Editorial changes (footer)
1.00	2025-01-17	Product overview available

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2026-05-26

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2026 Infineon Technologies AG

All Rights Reserved.

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference

IFX-zwa1724234879036

Important notice

Products which may also include samples and may be comprised of hardware or software or both ("Product(s)") are sold or provided and delivered by Infineon Technologies AG and its affiliates ("Infineon") subject to the terms and conditions of the frame supply contract or other written agreement(s) executed by a customer and Infineon or, in the absence of the foregoing, the applicable Sales Conditions of Infineon. General terms and conditions of a customer or deviations from applicable Sales Conditions of Infineon shall only be binding for Infineon if and to the extent Infineon has given its express written consent.

For the avoidance of doubt, Infineon disclaims all warranties of non-infringement of third-party rights and implied warranties such as warranties of fitness for a specific use/purpose or merchantability. Infineon shall not be responsible for any information with respect to samples, the application or customer's specific use of any Product or for any examples or typical values given in this document.

If this document is marked as 'Preliminary', 'Target', 'Draft' or 'Proposal', Infineon reserves the right to change all information given in this document at any time without notice. Subject to the development and release of a Product for series supply by Infineon, the technical specifications of the Product are set forth in the relevant datasheet provided by Infineon without such marking.

The data contained in this document is exclusively intended for technically qualified and skilled customer representatives. It is the responsibility of the customer to evaluate the suitability of the Product for the intended application and the customer's specific use and to verify all relevant technical data contained in this document in the intended application and the customer's specific use. The customer is responsible for properly designing, programming, and testing the functionality and safety of the intended application, as well as complying with any legal requirements related to its use.

Unless otherwise explicitly approved by Infineon, Products may not be used in any application where a failure of the Products or any consequences of the use thereof can reasonably be expected to result in personal injury.

However, the foregoing shall not prevent the customer from using any Product in such fields of use that Infineon has explicitly designed and sold it for, provided that the overall responsibility for the application lies with the customer. Infineon expressly reserves the right to use its content for commercial text and data mining (TDM) according to applicable laws, e.g. Section 44b of the German Copyright Act (UrhG). If the Product includes security features:

Because no computing device can be absolutely secure, and despite security measures implemented in the Product, Infineon does not guarantee that the Product will be free from intrusion, data theft or loss, or other breaches ("Security Breaches"), and Infineon shall have no liability arising out of any Security Breaches.

If this document includes or references software:

The software is owned by Infineon under the intellectual property laws and treaties of the United States, Germany, and other countries worldwide. All rights reserved. Therefore, you may use the software only as provided in the software license agreement accompanying the software.

If no software license agreement applies, Infineon hereby grants you a personal, non-exclusive, non-transferable license (without the right to sublicense) under its intellectual property rights in the software (a) for software provided in source code form, to modify and reproduce the software solely for use with Infineon hardware products, only internally within your organization, and (b) to distribute the software in binary code form externally to end users, solely for use on Infineon hardware products. Any other use, reproduction, modification, translation, or compilation of the software is prohibited.

For further information on the Product, technology, delivery terms and conditions, and prices, please contact your nearest Infineon office or visit www.infineon.com.