

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 G_{xx} 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.

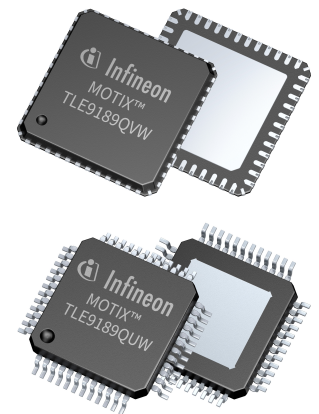


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1 Package

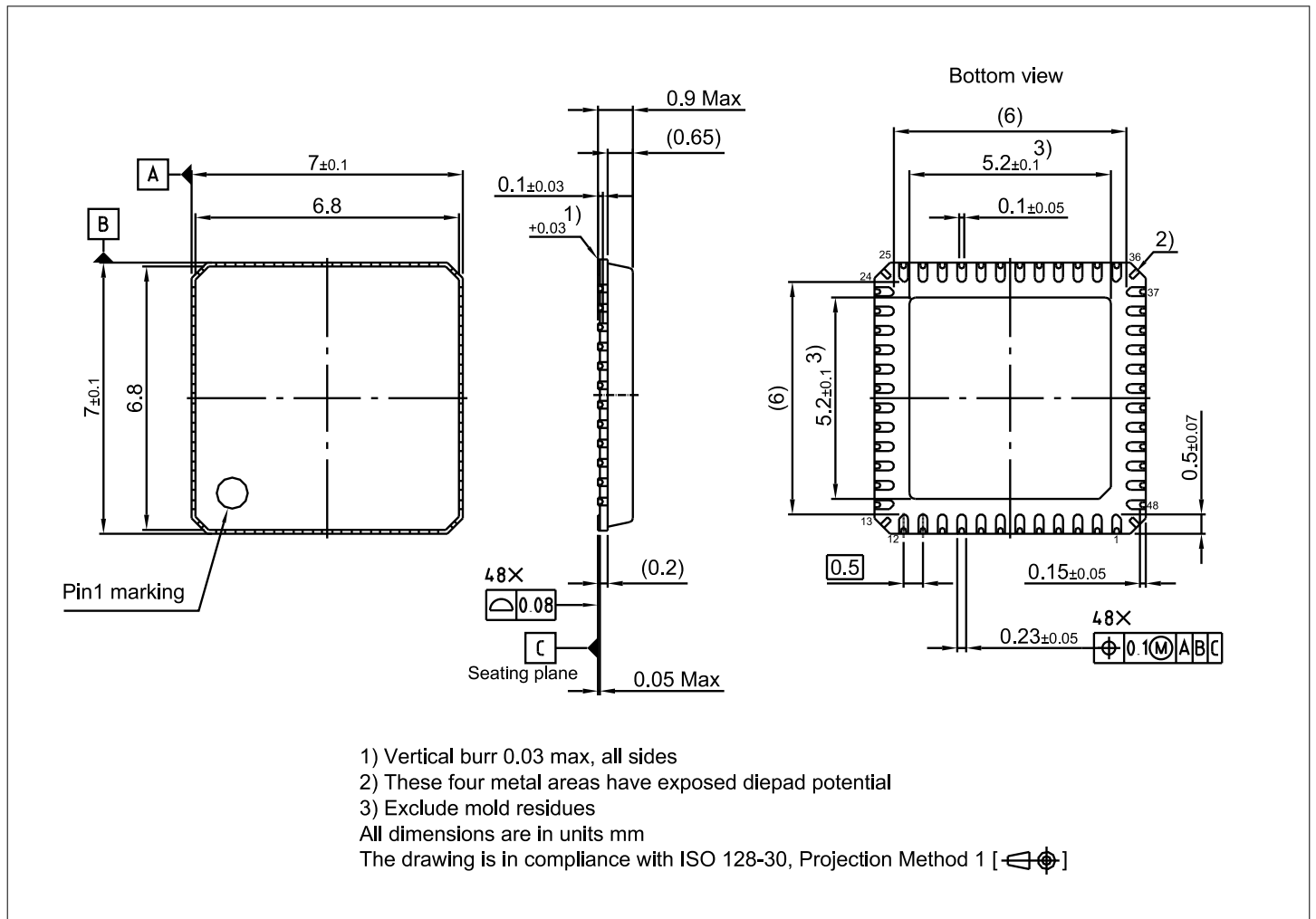


Figure 2 Package outline VQFN-48

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

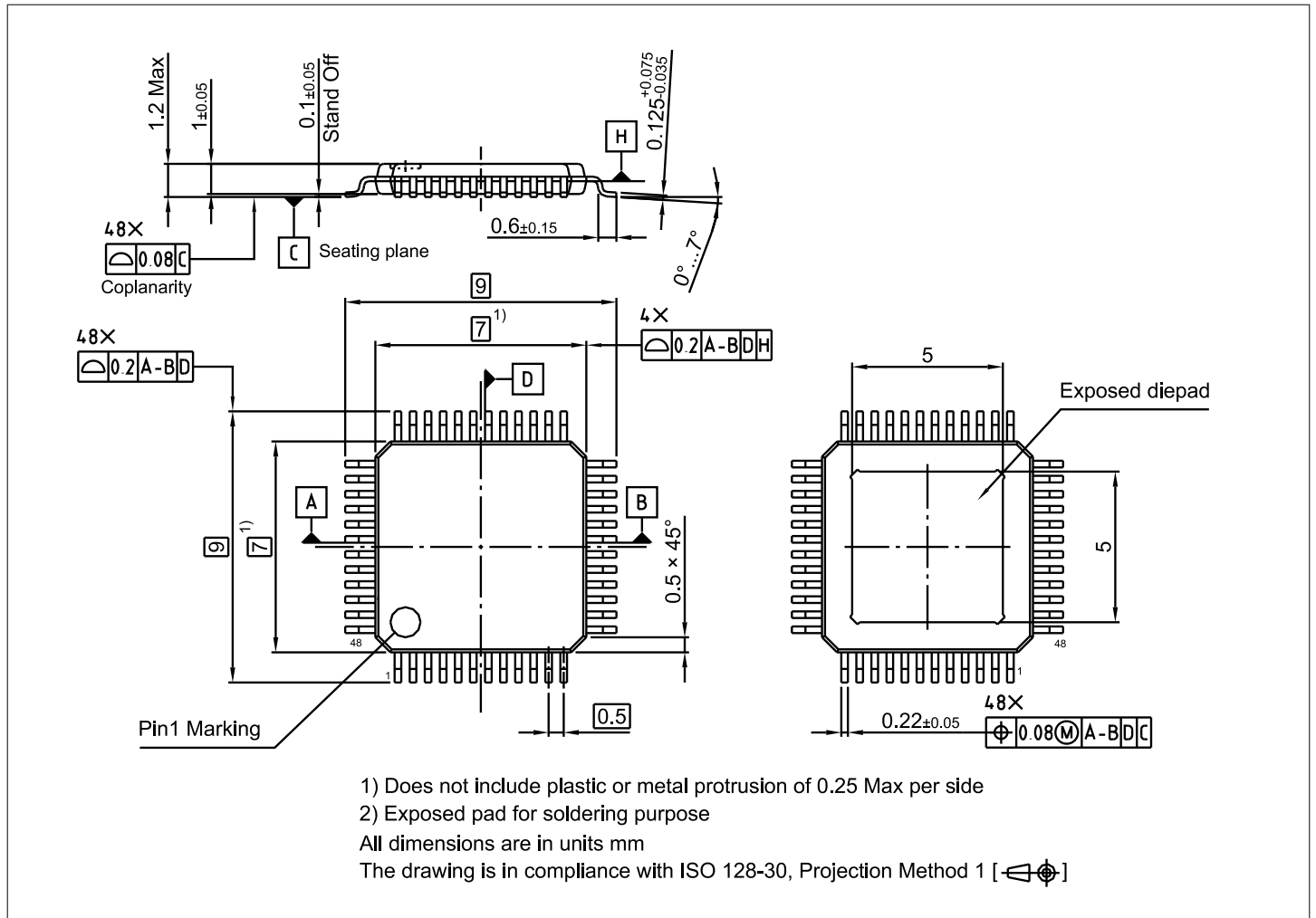


Figure 3 Package outline TQFP-48

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Revision history

Document version	Date of release	Description of changes
1.01	2026-03-26	Editorial changes (footer)
1.00	2025-01-17	Product overview available

Trademarks

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