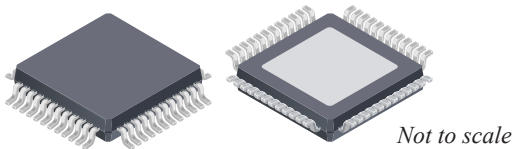# Automotive Three-Phase MOSFET Driver

FEATURES AND BENEFITS

- Three-phase bridge MOSFET driver
- Bootstrap gate drive for N-channel MOSFET bridge
- Cross-conduction protection with adjustable dead time
- Charge pump for low supply voltage operation
- Programmable gate drive voltage
- 5.5 to 50 V supply voltage operating range
- Integrated logic supply
- Logic level phase state outputs
- SPI-compatible serial interface
- Bridge control by direct logic inputs or serial interface
- TTL compatible logic inputs
- Extensive programmable diagnostics
- Diagnostic verification
- Safety-assist features
- Automotive AEC-Q100 qualified
- A^2-SIL™ product—device features for safety-critical systems

PACKAGE:

48-pin LQFP with exposed thermal pad (suffix JP)

Not to scale

DESCRIPTION

The A4916 is an N-channel power MOSFET driver capable of controlling MOSFETs connected in a three-phase bridge arrangement and is specifically designed for automotive applications with high-power inductive loads, such as BLDC motors.

The A4916 was developed in accordance with ISO 26262:2011 as a hardware safety element out of context with ASIL D capability (pending assessment) for use in automotive safety-related systems when integrated and used in the manner prescribed in the applicable safety manual and datasheet.

A unique charge pump regulator provides the supply for the MOSFET gate drive for battery voltages down to 7 V and allows the A4916 to operate with a reduced gate drive down to 5.5 V. A bootstrap capacitor is used to provide the above-battery supply voltage required for N-channel MOSFETs.

Full control over all six power MOSFETs in the three-phase bridge is provided, allowing motors to be driven with block commutation or sinusoidal excitation. The power MOSFETs are protected from shoot-through by integrated crossover control and optional programmable dead time.

Integrated diagnostics provide indication of multiple internal faults, system faults, and power bridge faults, and can be

Typical Application Drawing
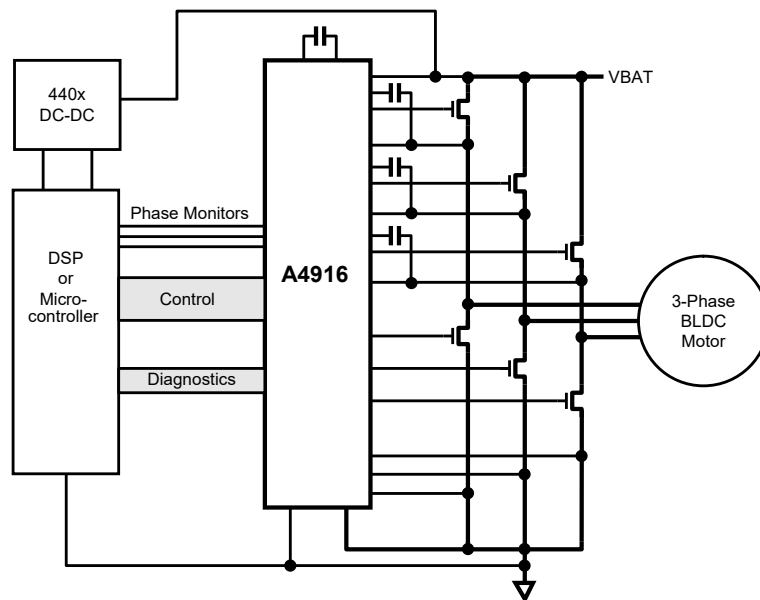
DESCRIPTION (CONTINUED)

configured to protect the power MOSFETs under most short-circuit conditions. For safety-critical systems, the integrated diagnostic operation can be verified under control of the serial interface.

The serial interface is provided to alter programmable settings and read back detailed diagnostic information.

The A4916 is supplied in a 48-lead LQFP package (suffix 'JP') with exposed thermal pad. This package is lead (Pb) free with 100% matte-tin leadframe plating.
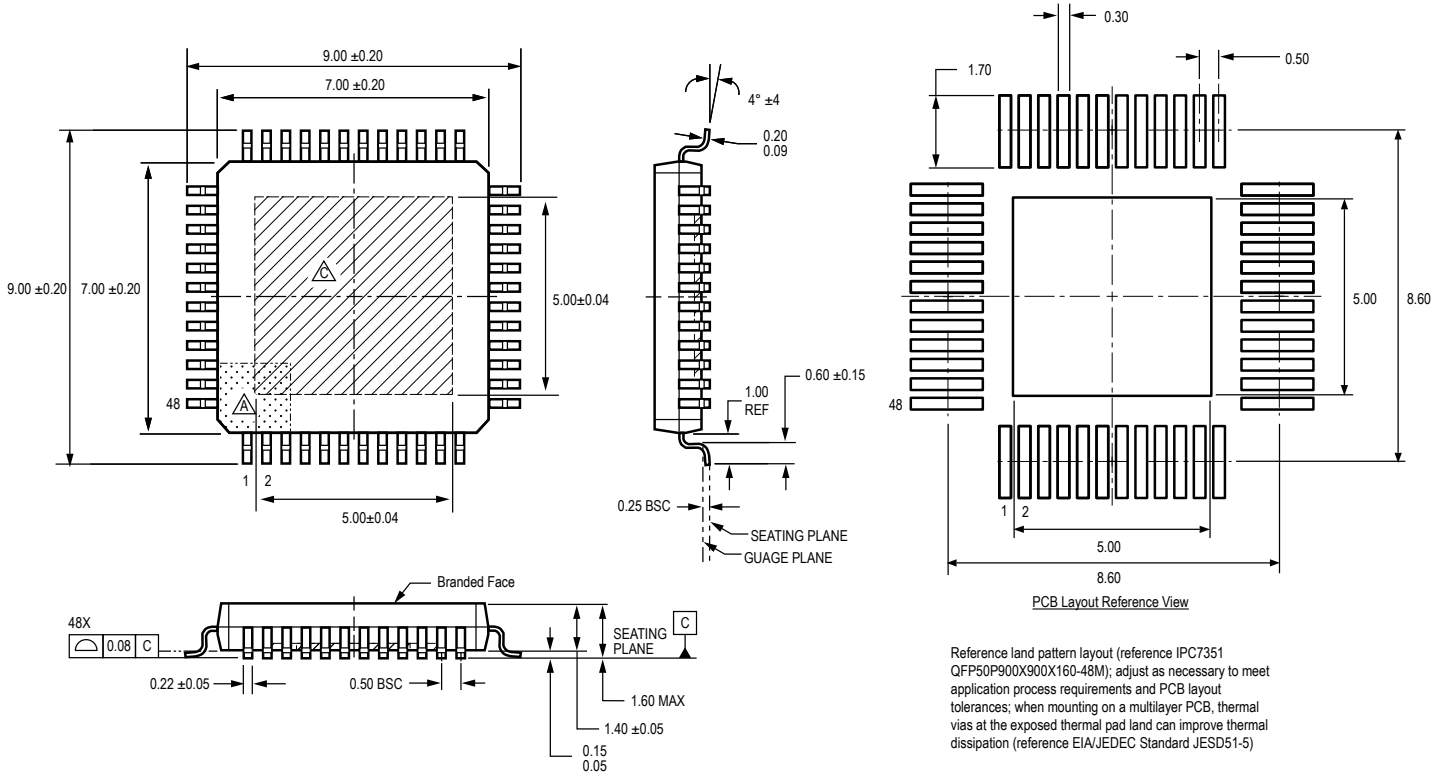
SELECTION GUIDE

Part Number	Package	Packing*
A4916KJPTR-T-2	1500 pieces per 13-in. reel	7 mm × 7 mm, 1.6 mm nominal height LQFP with exposed thermal pad

*Contact Allegro™ for additional packing options.

Package JP, 48-Pin LQFP

with Exposed Thermal Pad

9.00 ±0.20

7.00 ±0.20

9.00 ±0.20 7.00 ±0.20

5.00±0.04

48

1 2

5.00±0.04

4° ±4

0.20
0.09

1.00
REF

0.60 ±0.15

0.25 BSC

SEATING PLANE

GUAGE PLANE

0.30

1.70

0.50

5.00

8.60

48

1 2

5.00

8.60

PCB Layout Reference View

Reference land pattern layout (reference IPC7351 QFP50P900X900X160-48M); adjust as necessary to meet application process requirements and PCB layout tolerances; when mounting on a multilayer PCB, thermal vias at the exposed thermal pad land can improve thermal dissipation (reference EIA/JEDEC Standard JESD51-5)

Branded Face

48X

0.08 C

0.22 ±0.05

0.50 BSC

SEATING PLANE

C

1.60 MAX

1.40 ±0.05

0.15
0.05

For Reference Only; not for tooling use (reference MS-026 BBCHD)
Dimensions in millimeters
Dimensions exclusive of mold flash, gate burrs, and dambar protrusions
Exact case and lead configuration at supplier discretion within limits shown

Ⓐ Terminal #1 mark area

Ⓑ Branding scale and appearance at supplier discretion

Ⓒ Exposed thermal pad (bottom surface) ; exact dimensions may vary with device

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Revision History

Number	Date	Description
–	April 24, 2019	Initial release
1	September 18, 2024	Created short-form variant of long-form datasheet

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