# AMD89614

# Dual-Channel, Automotive, Programmable, Intelligent Contactor Driver

## FEATURES AND BENEFITS

- Integrated high-side and low-side power stage with current control for contactor and relay
- Can drive up to two contactors
- Low sleep mode quiescent current typically 2 µA
- Programmable pull-in and hold current profile
  - Pull-in current from 1.5 to 6 A
  - Hold current from 0.3 to 2 A
- ASIL Compliant: ASIL D safety element out-of-context developed per ISO 26262

ISO 26262 ASIL Compliant

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## APPLICATIONS

- Battery Disconnect Unit
- Junction Box
- xEV Charger Disconnect
- Relay

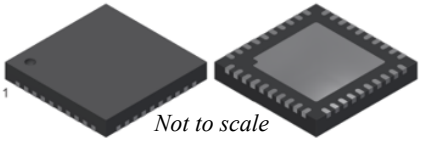
## DESCRIPTION

The AMD89614 automotive smart contactor driver is a dual-channel flexible coil driver with integrated low-side current sense with digital current readback through SAFE SPI. It is a single-chip solution, designed to energize a 12 V mechanical contactor or inductive loads with a programmable pull-in and hold current profile.

A unique charge-pump regulator provides the supply for the internal DMOS gate driver, for a battery operating voltage down to 4.3 V. The internal gate drivers provide a high pull-in current that establishes a high electromagnetic force. This force is used to close the mechanical contactor, and a holding current

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## PACKAGE



*Not to scale*

40-pin QFN with exposed thermal pad (suffix EV)

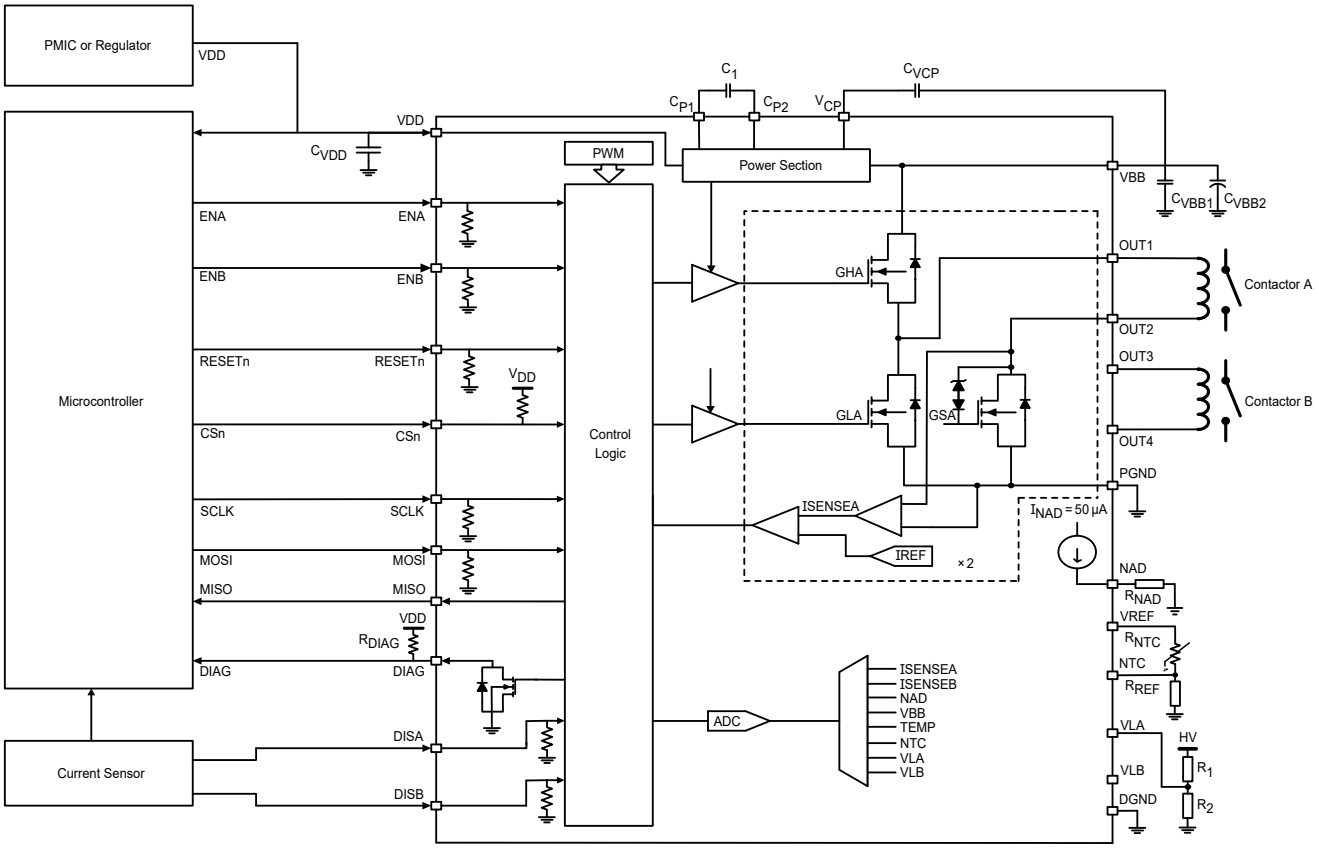



**Figure 1: Typical Application**

## FEATURES AND BENEFITS (cont.)

- Low on-state drain-to-source resistance ($R_{DS(ON)}$) outputs, typically 104 mΩ source and sink for low power and thermal dissipation
- Full disconnect of the coil from both supply and ground
- 4.3 to 40 V supply voltage operating range
- Integrated programmable pulse-width modulation (PWM) from 9.5 to 25 kHz with dithering to improve electromagnetic compatibility (EMC) performance
- Integrated closed-loop PWM current regulation
- ±3% accuracy for low-side current sensing with current reading through serial peripheral interface (SPI)
- Dedicated pin for fast disconnect control
- Quick turn-off and contactor disconnect
- Highly integrated solution with minimal external components
- High-efficiency operation and minimal power dissipation
- One general-purpose 12-bit analog-to-digital converter (ADC) input for high-voltage line measurement through voltage divider
- ±1% accuracy negative temperature coefficient (NTC) interface for external temperature sensor
- Advance diagnostics
  - Coil current, closing and opening contactor diagnostics
  - Continuous measurement of battery voltage
  - Off-state open-load detection
  - Short-circuit detection
  - Temperature measurements
- Able to drive up to four devices on the same SPI
- 10 MHz, 48-bit serial analog frontend (SAFE) SPI for control and diagnostics
- Automotive AEC-Q100 qualified
  - Grade 1: –40°C to 125°C

## DESCRIPTION (cont.)

in the lower end of the programmable range maintains the contactor in the closed state. Thus, the holding phase efficiently achieves low power and thermal dissipation.

To improve the EMC performance, an integrated slew-rate control mechanism is included. This mechanism is defined by the rising time and falling time of the output terminals of the contactor coil. Each MOSFET can be independently controlled to regulate the current in the solenoid and to provide a fast opening of the mechanical contactor. The low-side power stage integrates a current sensor to regulate the current during the pull-in and hold phase. To ensure a safe and robust operation, during this pull-in and hold phase, current data is also used for diagnostics.

A built-in advanced diagnostic indicates the occurrence of multiple internal faults, system faults, and power DMOS bridge faults, and can be configured to protect the power DMOS under most faults conditions. For diagnostic purposes, coil current, off-state open-load detection and short circuit detection can be monitored before the coil is energized; during operations, the battery voltage can be measured continuously with ±2.5% accuracy.

General-purpose 12-bit ADC-sampling VLA and VLB voltage terminals are available to measure the high-voltage lines or auxiliary-contact signals through external voltage divider before and after the contact is activated to verify the contactor state. The external temperature can be measured with an accuracy of ±1% through a dedicated NTC terminal.

The AMD89614 was developed in accordance with ISO 26262 as a hardware safety element out-of-context with ASIL D capability for use in automotive safety-related systems when integrated and used in the manner prescribed in the applicable safety manual and datasheet.

The AMD89614 automotive battery-disconnect gate driver is supplied in a 40-pin quad-flat no-lead (QFN) wettable flank package (suffix EV), with exposed thermal pad. This package is lead (Pb) free with 100% matte tin leadframe plating.



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## SPECIFICATIONS

### SELECTION GUIDE

| Part Number | Packing | Header |
|---|---|---|
| AMD89614KEV | 1500 pieces per 13-inch reel | 40-terminal-lead QFN with exposed thermal pad |

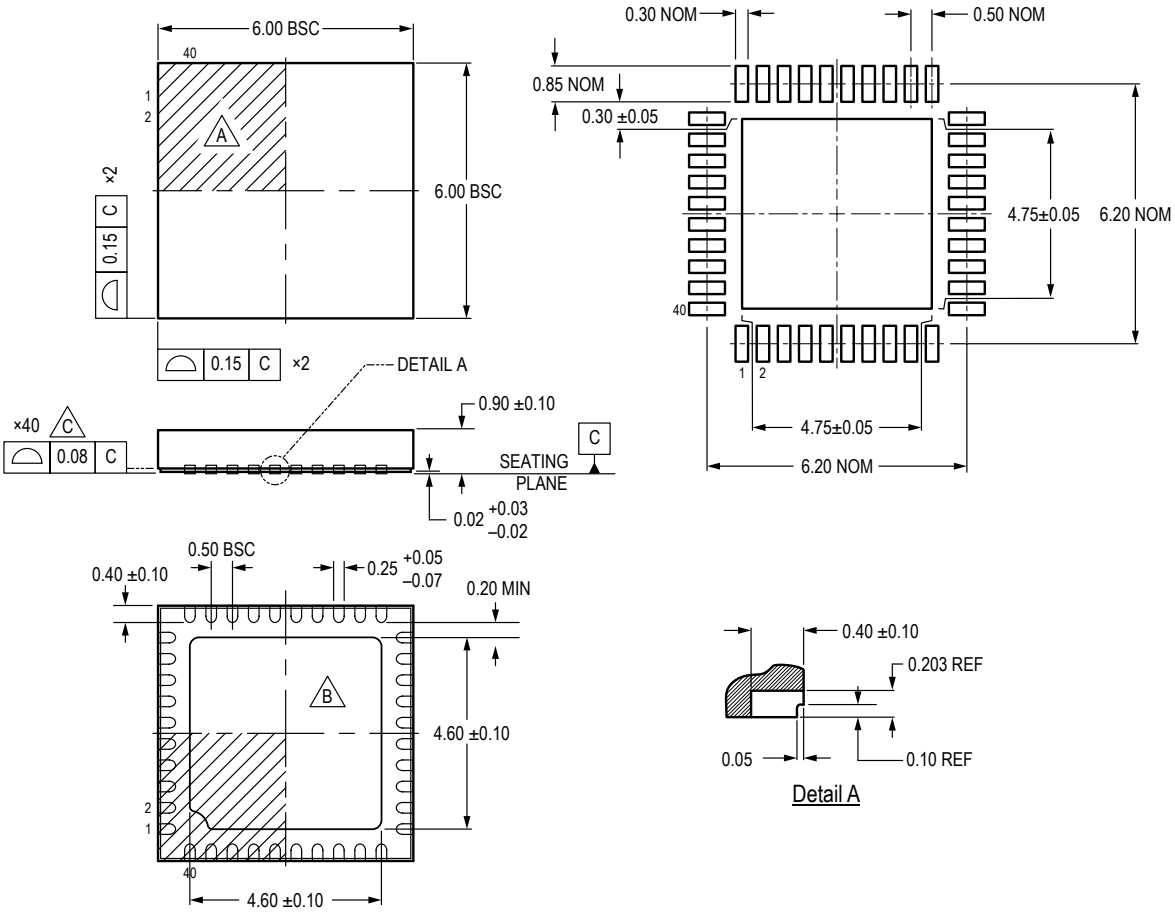


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## PACKAGE OUTLINE DRAWING

### For Reference Only – Not for Tooling Use

(Reference Allegro DWG-0000378, Rev. 8 and JEDEC MO-220VJJD-2)
Dimensions in millimeters
NOT TO SCALE
Exact case and lead configuration at supplier discretion within limits shown




A Terminal #1 mark area

B Exposed thermal pad (reference only, terminal #1 identifier appearance at supplier discretion)

C Coplanarity includes exposed thermal pad and terminals

D Reference land pattern layout (reference IPC7351 QFN50P600X600X100-41V5M); 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)

E Branding scale and appearance at supplier discretion.




Line 1: Allegro Part Number
Line 2: Logo A, 4-Digit Date Code (YYWW)
Line 3: Characters 5, 6, 7, 8 of Allegro Assembly Lot Number

E Standard Branding Reference View

**Figure 2: 40-Pin QFN with Exposed Thermal Pad (Suffix EV)**



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## REVISION HISTORY

| Number | Date | Description |
|---|---|---|
| – | September 18, 2026 | Initial release of short-form datasheet and publication to the Allegro website |

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