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VIpower M0-9 Standard family

The latest generation of protected high-side drivers



VIPower M0-9 technology

For smart high-side drivers

ST's VIPower* M0-9 technology consists of two product series: M0-9 Standard and M0-9 SPI high-side drivers. The M0-9 Standard HSDs are intelligent power switches housed in a tiny PowerSSO-16 package. For more information about M0-9 SPI HSDs, [download our flyer](#). VIPower M0-9 Standard HSDs are particularly well suited for use in harsh automotive environments and in applications targeting the ASIL-B standard.

The series supports the driving and protection of different loads ranging from just a few mA to approximately 20 A, making it the ideal solution for different types of ECU power actuators.

All the drivers are robust for chip temperatures up to 150 °C and are pin-to-pin compatible with each other as well as the previous generation of HSDs.

*Please refer to www.st.com/trademarks

Up to
75%
Package footprint
reduction
versus previous
generation



INCREASING DEMAND FOR ELECTRIFICATION IN MODERN CARS

The VIPower M0-9 series meets today's electrification requirements in automobiles providing comfort and safety functions as a definitive replacement for electro-mechanical relays

An increasing demand for electrification in modern cars has come and the M0-9 series is the perfect solution. Designed for applications ranging from traditional ones like driving LED, xenon or halogen lamps as well as unidirectional motors, heaters, these robust devices are also ideal for new and appealing applications including ADAS and battery management systems.

Moreover M0-9 is the solution to replace electromechanical relays not only in the low/medium current range (up to 5 A DC) but also for loads requiring up to 20 A DC. The main advantages of replacing relays are:

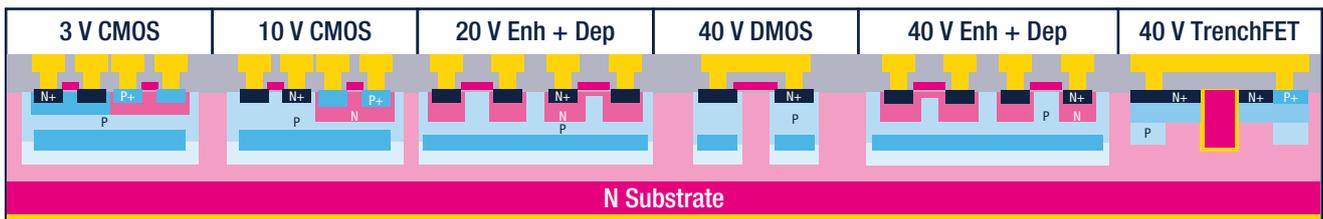
- 10 times longer operating life
- Weight and space saving
- Reduced number of external components required for diagnostic and protection
- No need for an auxiliary circuit to energize the coil
- Possibility to implement Pulse Width Modulation (PWM)

The intrinsic thermal protections embedded in the chip ensure a rapid reaction in case of a short circuit with cutting off power to the load as well as the wire harness allowing minimizing the size of the cabling and thus decreasing their weight. The M0-9 series features a reduction of R_{ON} of the MOSFET hosted in the tiny PowerSSO-16. This means that adopting M0-9 series contributes to saving power in the vehicle bringing down fuel consumption and CO₂ emissions.

VIPOWER M0-9 Standard family

Smart switch with embedded protection

VIPOWER M0-9 high-side drivers are formed by a TrenchFET power stage and also contain accurate control, diagnostics and protection circuits.



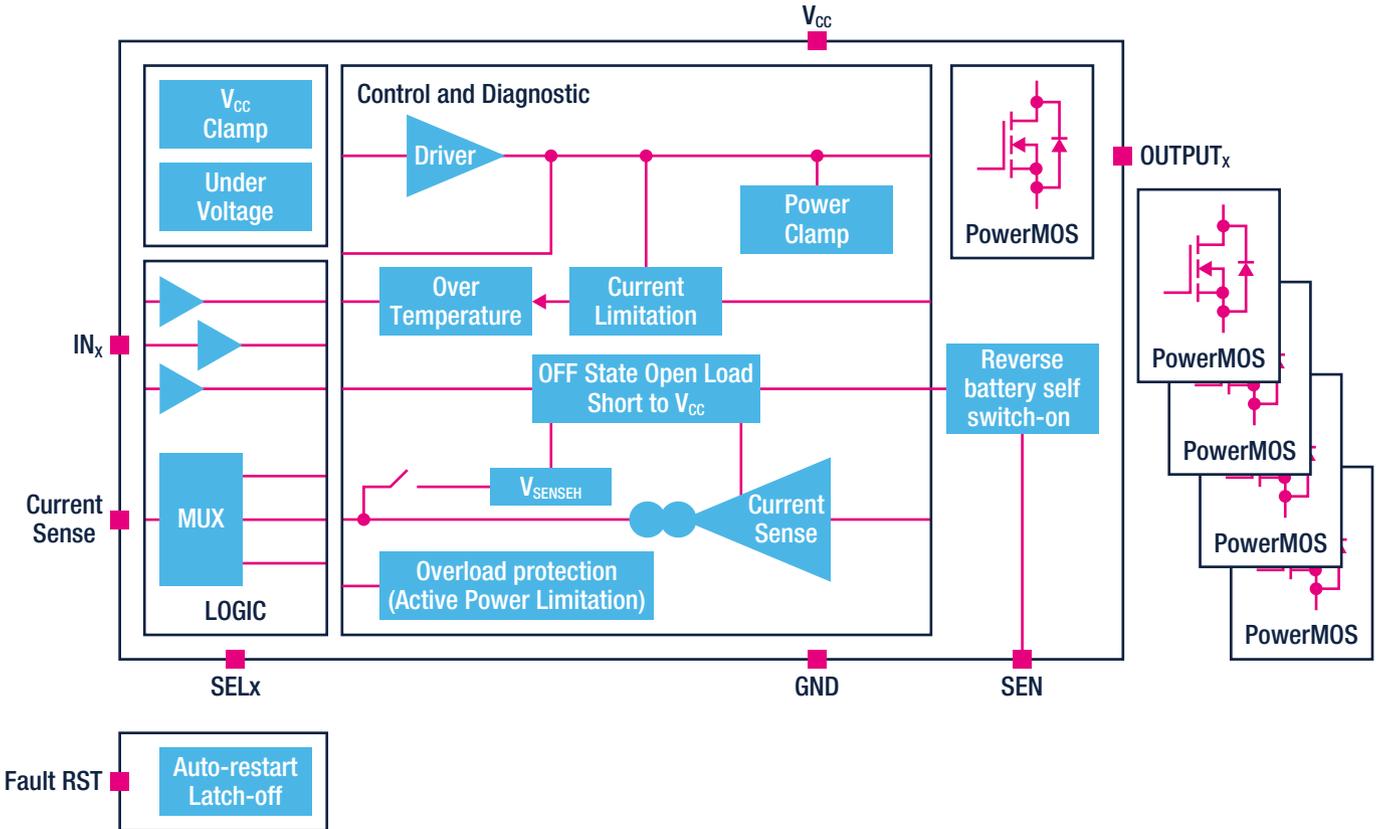
VALUE PROPOSITION

Enhanced robustness for harsh automotive environments

The M0-9 Power stage can be simply driven by a logic I/Os from a microcontroller or from a 5 V or 3.3 V regulator.

During standby mode, when all logic pins are set to low, the current absorbed by the device from the battery does not exceed 0.5 mA.

The analog Current Sense circuit integrated also in the chip mirrors the load current with outstanding precision (about 6% at nominal load) and warns of any eventual fault such as an OUT to GND short circuit or an open load.



M0-9 STANDARD HIGH SIDE DRIVERS: A SCALABLE SERIES TARGETING DIFFERENT LOADS IN A UNIQUE PACKAGE

From 4 to 80 mΩ: single-, dual- and quad-channel devices

The M0-9 series further extends the largest family of high-side drivers in the market. All HSDs come in a PowerSSO-16 package, the benchmark invented by ST.

M0-9 high-side drivers are pin-to-pin compatible with the previous generation of M0-7 high-side drivers also housed in the PowerSSO-16 package.



Product portfolio

Part Number	Package	Operating Range Vcc (V) ⁽¹⁾	Maximum Operating Voltage Vcc (V)	On state Resistance R _{ON} typ (mΩ)	Current Limitation I _{LIMH} typ (A)	Reverse Battery Auto-turn ON	Current sense total spread at Nominal current/at open load threshold
VN9004AJ	PowerSSO-16	4 - 28	36	4.2	108	Yes	7% - 25%
VN9006AJ				6	82		
VN9008AJ				8	81.6		
VN9012AJ				12	63		
VN9016AJ				16	50.6		
VND9008AJ				9.4	67		
VND9012AJ				12	63		
VND9016AJ				16	50.6		
VND9025AJ				25	35		
VNQ9025AJ				25	30		
VNQ9080AJ*				86	13.6		

Note: * No reverse battery turn-on block

DEVELOPMENT SUPPORT TOOL

ST offers a wide range of support tools to ensure that engineers can rapidly develop the best solutions for their application.

AUTOMOTIVE IC EVALUATION BOARDS

To help developers evaluate products without committing to the expenses, time and resources typically necessary to design a customized circuit board, ST proposes the Easyboard concept. Easyboards are simple, low-cost evaluation tools that wire-in a VIPower product to a load.

ST also offers several evaluation boards for driving different loads.

Visit our [Automotive IC evaluation board page](#)

TwisterSIM

TwisterSIM is a unique electro-thermal simulator that helps shortening the design solution cycle by enabling complex engineering evaluation. Interactive selector for finding the suitable HSDs in few clicks; load compatibility; fault condition impact analysis; diagnostic behavior analysis dynamic thermal performance, and more.

Visit [TwisterSIM - Dynamic Electro-Thermal simulator for devices in VIPower technology - STMicroelectronics](#)

VIPower SMART FINDER MOBILE APP

A user-friendly product selector ensuring a smooth and simple navigation experience with a parametric search engine that lets you rapidly identify the appropriate device by just selecting a few parameters related to the specific application, like nominal voltage (12 V for automotive cars or 24 V for trucks), topology (high/low-side switch or h-bridge), number of channels and type of loads (bulbs, motors, etc.) you need to drive. The selection can be furthermore restricted by setting source type (DC or PWM), temperature of the environment and PCB type. Available on Google Play and App Store.

Visit the download page for our [VIPower smart finder mobile app](#)

KEY FEATURES

- Extremely accurate current sensing for load and overload monitoring in real time
- Automatic turn-on of the Power stage during reverse battery operation
- Programmable latch or auto restart during short circuit conditions
- Immunity against deep cold cranking pulse down to 2.7 V (between device's V_{CC} and GND pin)
- Trimmed current limitation to manage high inrush loads
- Capability to drive loads at higher battery voltage than nominal

KEY BENEFITS

- Unique package throughout the family and pin to pin compatibility among different chip Ron
- Extremely low power dissipation on board
- Unsurpassed robustness in faulty conditions (transients on battery, overload, short circuit)
- PWM driving allows load dimming and transmitted power partialization, preventing thermal issues and optimizing wire harness cross section
- Complementing SPI high-side drivers in zonal ECUs
- Suitable for ISO 26262 ASIL-B system

KEY APPLICATIONS

- Light modules
- Heaters
- Power distribution modules
- Zonal ECUs
- HVAC
- Glow plugs
- Valves and solenoids
- Battery management systems
- ADAS systems
- Door modules
- Tailgates
- Seat modules
- Roof modules

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