24 V APPLICATION ENVIRONMENTS

Specifically designed for harsh 24 V operating environments, VIPower™ M0-5T products guarantee a very long application lifetime and can operate in a wide supply voltage range, including jump start and load dump conditions as well as ISO transients.

Furthermore they offer a high ruggedness against short circuits and the inductive flyback energy caused by long wire harnesses or inductive loads.

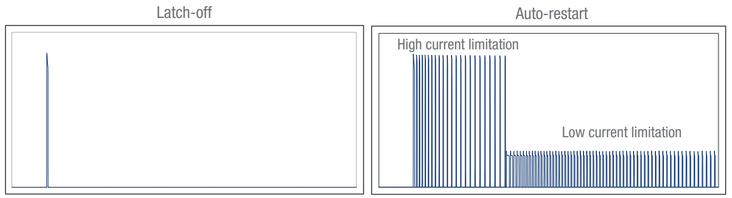
24 V APPLICATION REQUIREMENTS

- Lifetime: up to 30.000 hours
- Supply voltage: 8 V to 36 V
- Jump start voltage: 48 V
- Clamping voltage: > 58 V
- High ruggedness

VIPower™ M0-5T ADVANCED PROTECTION STRATEGY

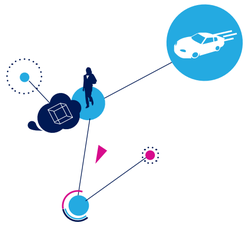
In order to protect the device against fast thermal transients during overload or heavy short circuit condition, the M0-5T products adopt a power limitation circuitry.
In addition, a two-step current limitation is provided: the higher one during load inrush, the lower one during thermal cycling.
On top of above protections, devices are equipped with output Latch-off.

VIPower™ for 24 V – Output current profile in heavy short circuit condition



- As soon as a fault is detected, the output is switched off and kept low until the device receives a Fault Reset signal.
- When chip temperature quickly rises, Power Limitation actively manages inrush phase (high current limitation)
- When thermal shutdown temperature is reached, thermal cycling begins (low current limitation).

The combination of the two protection modes allows a flexible and reliable protection strategy that can be customized according to the application and car maker requirements.



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Order code: BRMO5T0914

For more information on ST products and solutions, visit www.st.com

VIPower™ 24 V
High reliability smart power switches

24 V applications

Smart High Side Switches with advanced diagnostic and protections designed for long-term mission profile

The VIPower™ M0-5T products are specifically designed for vehicles with 24 V Board Net, like trucks, buses, tractors for agricultural usage, boats, snow mobiles, jet ski and others.
They can be used to drive most common loads found in any of the above applications.
This family of products has been designed for wide voltage operating range and long-term mission profile required by this specific environment.

Vehicles with 24 V board net


Trucks


Snow mobiles


Tractors


Boats

LIGHTING

- Exterior lighting:
  - High and Low beam
  - Fog lights
  - Rear and braking lights
  - Turn indicators
  - Flashing lights
- Interior lighting
- Flashing lights
- Metering clusters

OTHER APPLICATIONS

- Electric Motors
- Valves
- Oil / water pumps
- Heaters

APPLICATION DOMAIN

Applications are driven by 24 V environment: trucks, buses, construction vehicles, tractors and other agricultural vehicles, popular hobbies requiring boats, snow mobiles, jet ski.
VIPower™ M0-5T for 24 V Board Net have been designed for driving most common loads found in any of the above applications.

Interior and exterior lighting

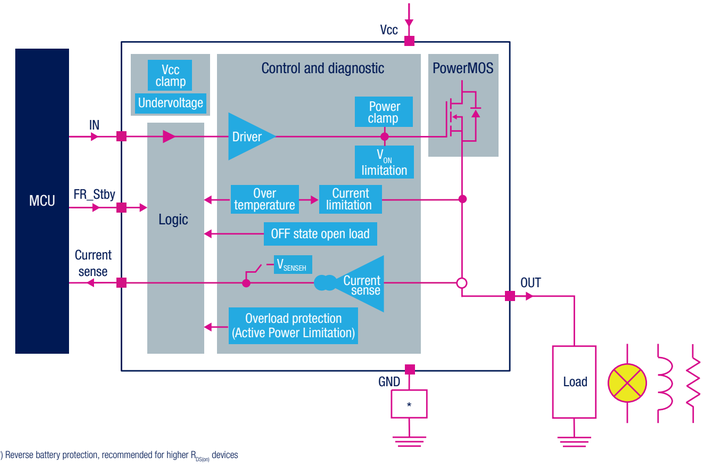
VIPower™ M0-5T product family is best suited for driving different lights, including headlights, blinkers, position, fog and brake lights, whichever type – incandescent bulbs, HID lamps or LED clusters.
The availability of different classes of $R_{DS(on)}$ makes VIPower™ 24 V the right solution for each standalone light or combination of paralleled lights.
The embedded current limitation circuitry ensures the correct turn on of the lamp in extreme conditions (in hot or cold ambient temperature).

Other applications

On top of the standard lighting application, the M0-5T products can be successfully used for driving many other types of loads.
They can drive inductive, resistive or capacitive loads, such as valves, pumps, heaters, motors and many more.

DEVICE AND APPLICATION BLOCK DIAGRAM

VIPower™ M0-5T High Side Switches for 24 V Board Net are designed to drive loads having one side connected to ground.



(*) Reverse battery protection, recommended for higher R_{GND} devices

All the family is equipped with Analog Current Sense pin, CS, which delivers a current proportional to the load current. The same pin is used to identify fault conditions, such as open load, short circuit and thermal shut down.
A dedicated Fault reset / Standby pin, FR_Stby, provides a programmable latch-off feature, so allowing sophisticated protection strategy.

VIPower™ M0-5T HIGH-SIDE DRIVER HIGHLIGHTS

KEY FEATURES

- Advanced protection strategy:
  - Self-limiting of fast thermal transients (Power Limitation)
  - Thermal Shutdown
  - Programmable Latch-off
  - Reverse battery protection
- Internally limited output current:
  - 2-Step Current Limitation
- Powerful diagnostic:
  - Proportional load current sense
  - Open load detection in ON and OFF state
  - Overload, short to V_{CC} and short to ground detection

KEY BENEFITS

- State of the art silicon and package technology
- High durability in harsh operating environments
  - To handle massive voltage spikes and high stray inductance coming from significant wire harness length
- Detailed diagnosis and sophisticated protection concept
  - Power Limitation and programmable Latch-off are able to secure unsurpassed ruggedness
- $R_{DS(on)}$ scalability
- Short circuit ruggedness up to 32 V with 40 µH stray inductance

PRODUCT PORTFOLIO

- VIPower™ 24 V product family includes single- and dual- channel devices in a very broad $R_{DS(on)}$ range, all assembled in lead-free packages.
- This product family includes devices especially optimized for LED applications, which guarantee a very precise sensing of output current.


PowerSSO-12


SO-16N

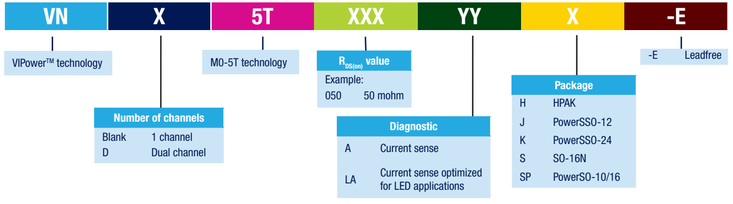

PowerSSO-24


PowerSO-10/16


HPAK

Part number	Package	Number of channels	Operating voltage range	On-state resistance $R_{DS(ON)}$ typ (mΩ)	Drain current limit (I_{LIM}) typ (A)	Current sense
VND5T100AJ-E	PowerSSO-12	2	8 to 36 V	100	22	•
VND5T100LAJ-E	PowerSSO-12	2	8 to 36 V	100	22	Optimized for LED applications
VND5T100LAS-E	SO-16N	2	8 to 36 V	100	22	Optimized for LED applications
VND5T050AK-E	PowerSSO-24	2	8 to 36 V	50	34	•
VND5T035AK-E	PowerSSO-24	2	8 to 36 V	35	42	•
VND5T035LAK-E	PowerSSO-24	2	8 to 36 V	35	42	Optimized for LED applications
VND5T016ASP-E	PowerSO-16	2	8 to 36 V	16	60	•
VN5T016AH-E	HPAK	1	8 to 36 V	16	67	•
VN5T006ASP-E	PowerSO-10	1	8 to 36 V	6	84	•

VIPower™ M0-5T HIGH-SIDE DRIVERS PART NUMBERING SCHEME

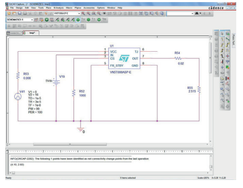


DEVELOPMENT SUPPORT TOOLS

The support tools are available at: http://www.st.com/automotive24v

Orcad models

ORCAD models for all the products belonging to this family are readily available on the website



User manual

The user manual presents applications hints, device functionality, choice of components given a certain load, paralleling of pins, Current Sense usage, and much more.

Easy board

Evaluation boards for VIPower 24 V products are available at STMicroelectronics partner distributors.
These boards allow electrical connectivity and thermal heat-sinking for easy prototyping.