Configurable multichannel drivers
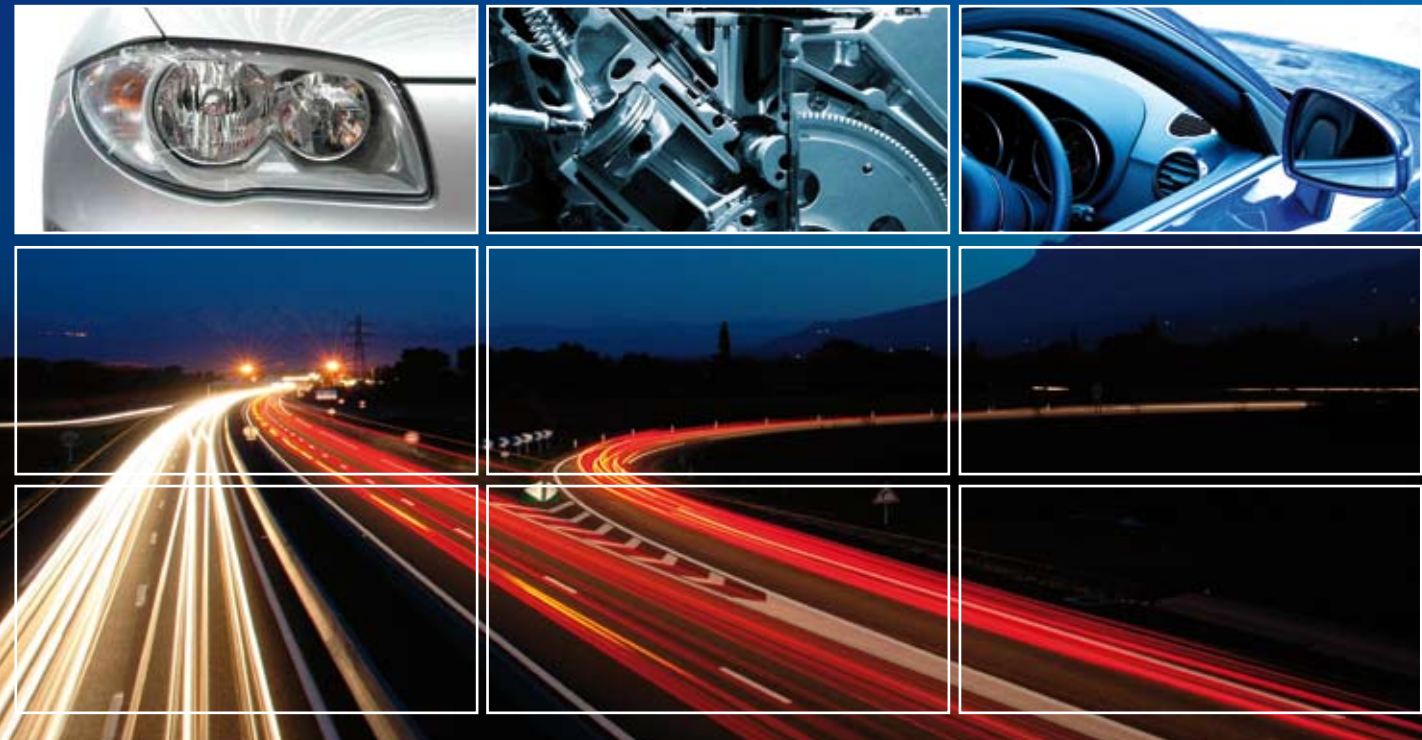
Designed for driving various loads, high- or low-side configured

December 2008

www.st.com/automotive

Configurable multichannel drivers for automotive systems

In automotive applications, increasing numbers of loads are required to be driven in high-side mode. Multichannel switches of today are mostly either high- or low-side configured. This requires more than one IC if mixed load configurations need to be driven.

STMicroelectronics offers a new device family, which provides freely configurable output drivers in either high- or low-side mode. Flexible configurability is also the key to many interesting applications which need a bridge arrangement, driving DC or stepper motors.

The L9733, L9753, L9848 and L99MC6 form a family of configurable, SPI-controlled multichannel drivers for various loads such as incandescent lamps, LEDs, DC motors, unipolar and bipolar stepper motors.

Because of the freely configurable power switches, the device family offers load driving in high-side and low-side mode.

Up to four channels can operate in PMW mode – dimming LEDs, for example. Open-load diagnosis is provided in off mode.

The L9753 and L99MC6 can disable the open-load sensing current to prevent glowing LEDs.

The L99MC6 offers an adjustable slew rate for LED drive and a cross current protection in bridge configuration. The devices are housed in small power packages with superior thermal performance – ideal for compact and lightweight systems.

Key applications

- Engine management
- Junction boxes
- Door-module systems
- HVAC flap driving
- LED driving

Load driving in low-side and high-side mode
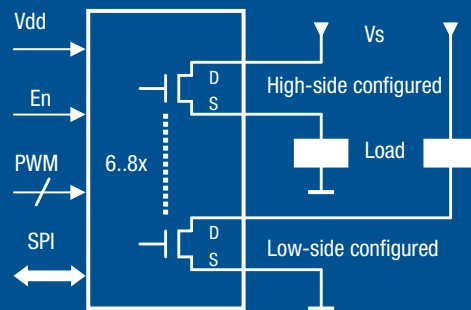
A single PC-board layout allows flexible load partitioning

Configurable drivers can drive stepper or DC motors by just interconnecting drain and source outputs in different schemes. With the intelligent use of zero-ohm resistors, 4 MOSFET drivers can be configured as low-side drivers to drive a unipolar stepper motor, or they can be bridge-configured to drive a DC motor. This flexibility is achieved without changing the PC-board layout. This is an ideal concept to cover various HVAC platforms from low to high end with a single PC board without changing the actuator driver IC.


= zero ohm resistors

www.BDTIC.com/ST
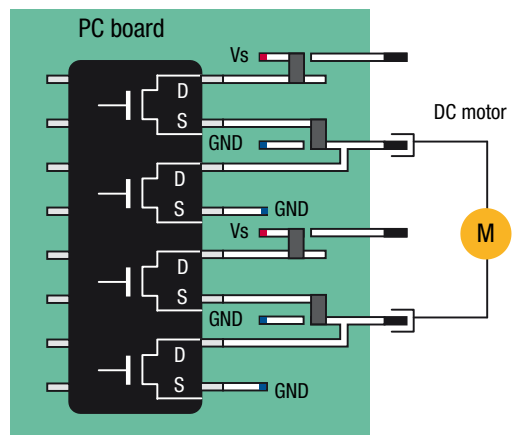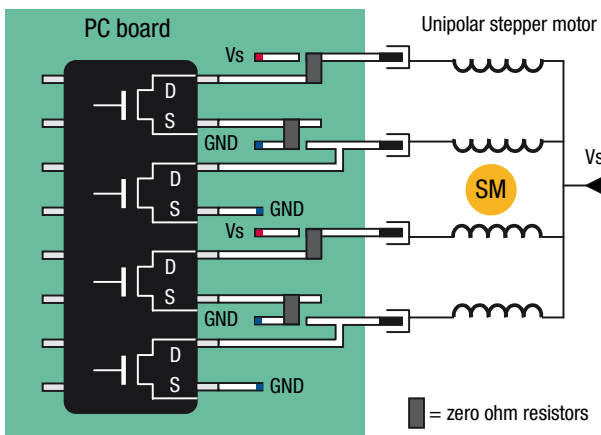
Configurable multichannel driver features
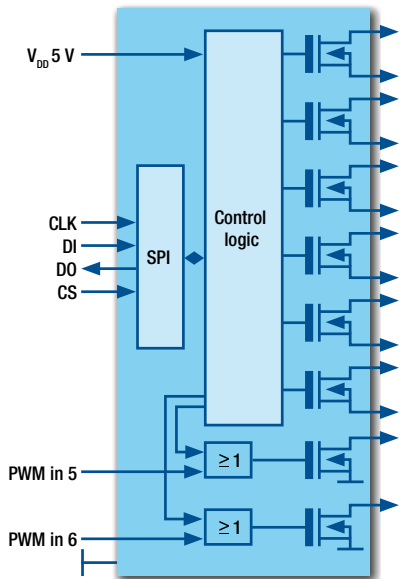
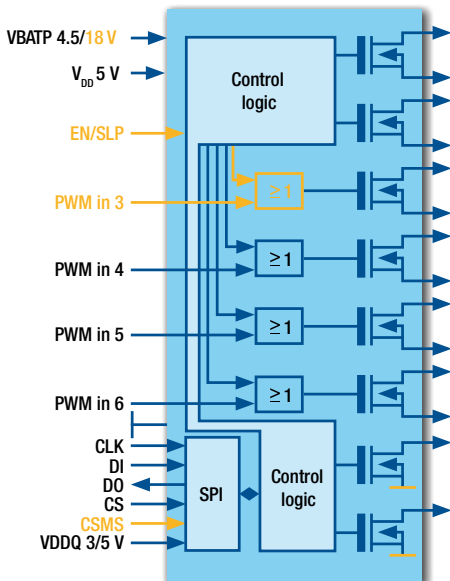## Basic features of L9848

- Configurable up to six high-side or eight low-side drivers
- $R_{DS(on)}$ = max. 1.5 Ω @ Tj = 25 °C
- Minimum current limit of each output: 0.8 A
- PWM or direct drive inputs for two low-side outputs
- SPI interface (8 bit) for data communication and diagnostics
- Diagnostic of open-load detection in off state
- Diagnostic of shorted-load detection in on state
- Single supply voltage 4.75 V to 5.25 V
- Output voltage clamping min. 35 V (low-side mode)
- Output voltage clamping -30 V (high-side mode)
- Thermal shutdown for all outputs
- SO-28 package
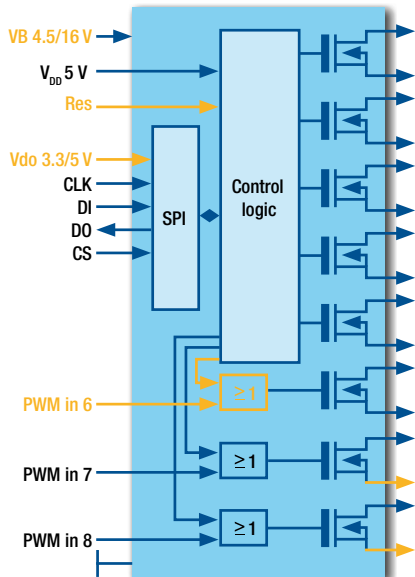
Additional features of L9733 versus L9848

- Configurable up to eight high-side or eight low-side drivers
- $R_{DS(on)}$ = max. 0.7 Ω @ Tj = 25 °C
- Minimum current limit of each output: 1 A
- PWM or direct drive inputs for three outputs
- SPI interface (16 bit) for data communication and diagnostics
- Selective diagnostic of open load, shorted load and shorted switch
- Programmable latched or unlatched fault mode
- Additional supply voltage from battery (min. 4.5 V)
- Additional supply voltage for I/O interfaces (3.3/5 V)
- Output voltage clamping min. 40 V (low-side mode)
- Output voltage clamping max. -14 V (high-side mode)
- PowerSSO-28 package

Additional features of L9753 versus L9733

- Configurable up to six high-side or eight low-side drivers
- $R_{DS(on)}$ = max. 0.9 Ω @ Tj = 25 °C
- PWM or direct drive inputs for four outputs
- Discrete input to enable or disable all eight outputs in parallel
- Independently selectable high/low current limit for each output
- Programmable specific LED mode for each output
- Programmable open-load detection thresholds for each output
- Latched fault condition
- Output voltage clamping max. -27 V (high-side mode)
- Reverse-battery protection for outputs
- Protection against module ground loss
- PowerSSO-28 package

Configurable multichannel driver features
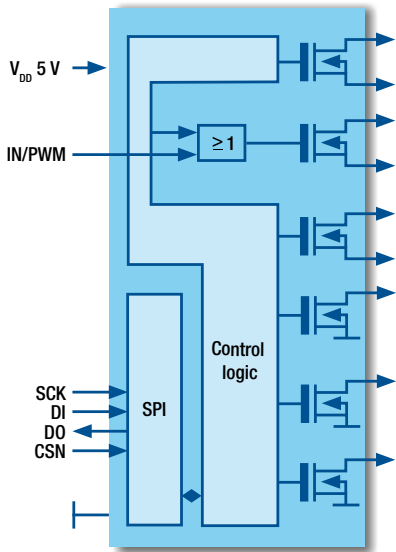
Features of L99MC6

- Configurable up to three high-side or six low-side drivers
- $R_{DS(on)}$ = max. 1.0 Ω @ Tj = 25 °C
- Minimum current limit of each output: 0.6 A
- Direct input for channel 2, configurable for other outputs
- ST SPI interface (16-bit) for data communication and diagnostics
- Diagnostic of open-load detection in off state
- Diagnostic of shorted-load detection in on state
- Programmable bridge / LED / bulb mode
- Logic supply voltage compatible with 3.3 V and 5 V
- Output voltage clamping
- Temperature pre-warning and thermal shutdown
- Package PSSO-16

# Configurable multichannel driver applications
Junction box – relay, LED and bulb driving
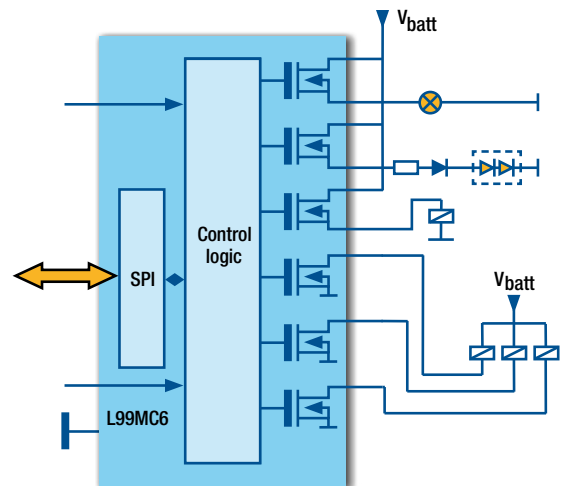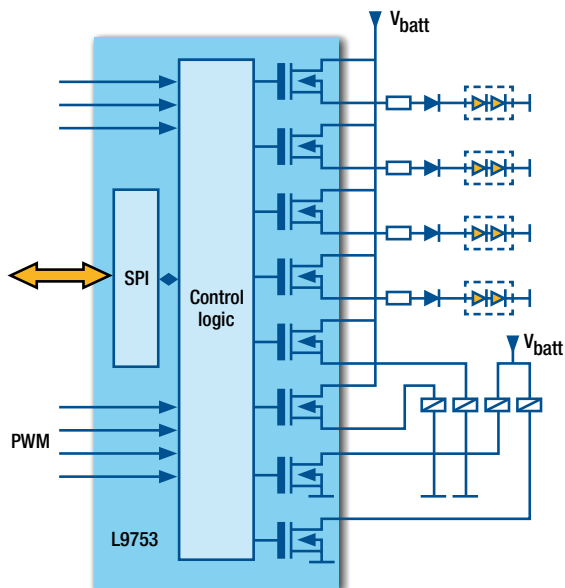
PWM driven outputs configured for high-side mode allow LED and bulb driving with dimming. Further configurable outputs control high-side relays. The remaining outputs are preferred to drive relays in low-side operation.
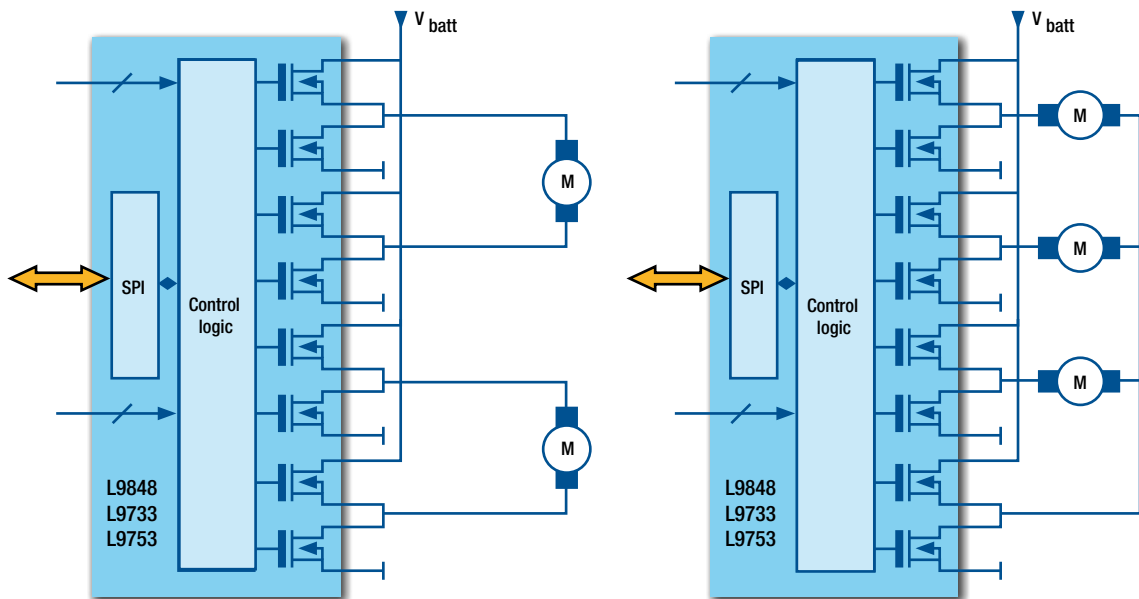
Configurable multichannel driver applications

Door modules – motor, relay and LED driving
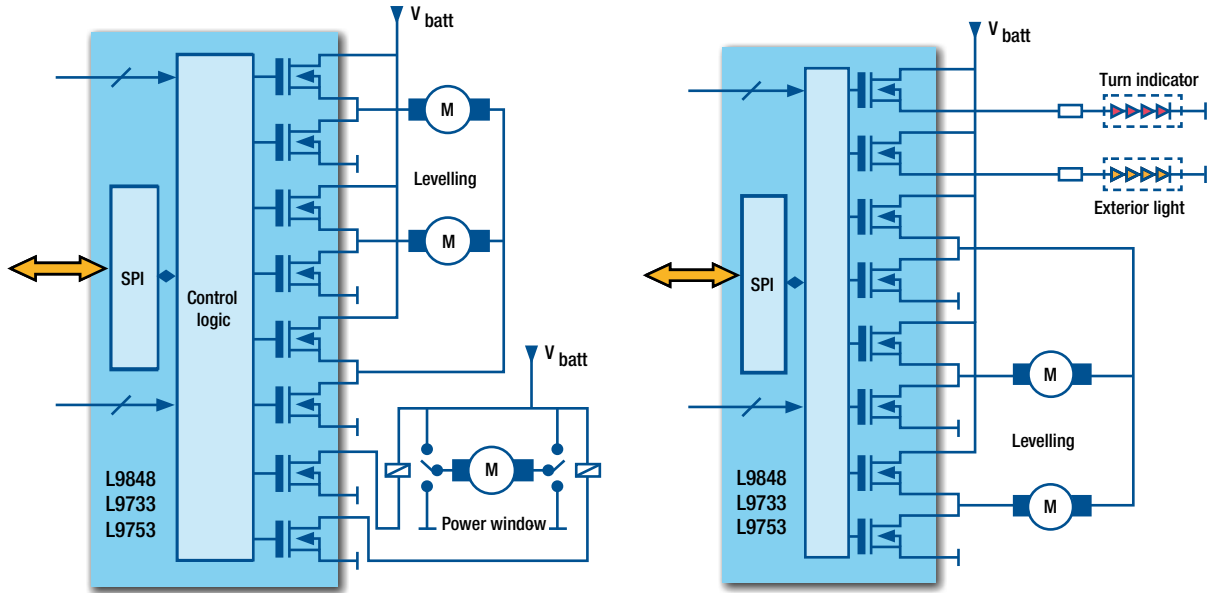
Door modules need to drive vertical and lateral levelling motors for the exterior mirror. Six switches are needed to configure 3 half bridges. The multichannel drivers have two residual switches which are suitable to drive the relays for the power window. Alternatively, these two channels may also be dedicated to driving the LED side marker and the exterior courtesy light.
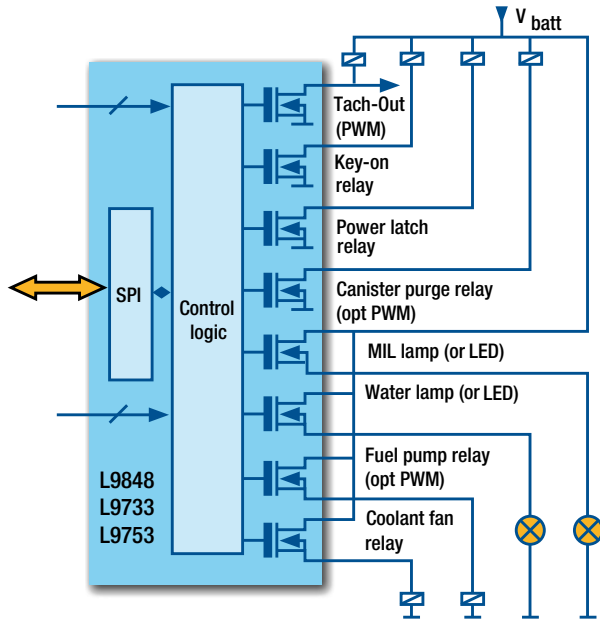
HVAC – DC-motor driving

Four channels configured to low-side mode and four channels configured to high-side mode form a quad half bridge. This allows two DC motors to be driven simultaneously or three DC motors in sequential mode.

www.BDTIC.com/ST

Configurable multichannel driver applications

Powertrain systems

Driving the main relays and lamps of an engine management unit.
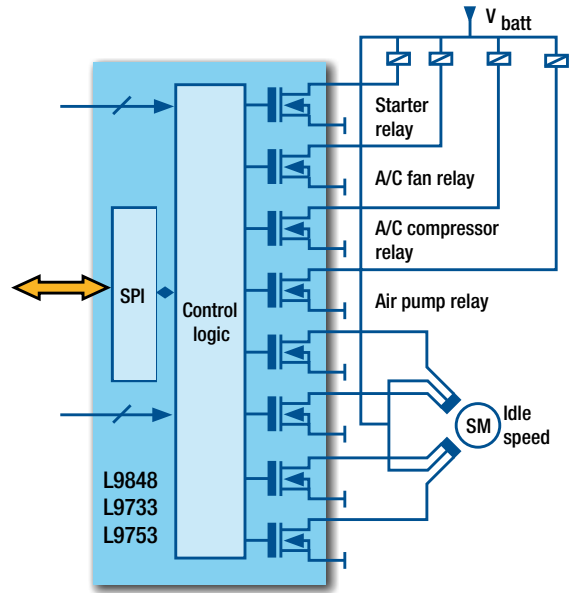
Driving the idle-speed stepper motor and four auxiliary relays of an engine management unit.

Packages

SO-28

PowerSSO-28

PowerSSO-28

PowerSSO-16

For more information on ST products and solutions,

visit **www.st.com**

www.BDTIC.com/ST