

## Product brief

# OptiMOS™ 5 and 6 40 V normal level MOSFETs

## Normal level products with latest Infineon technology

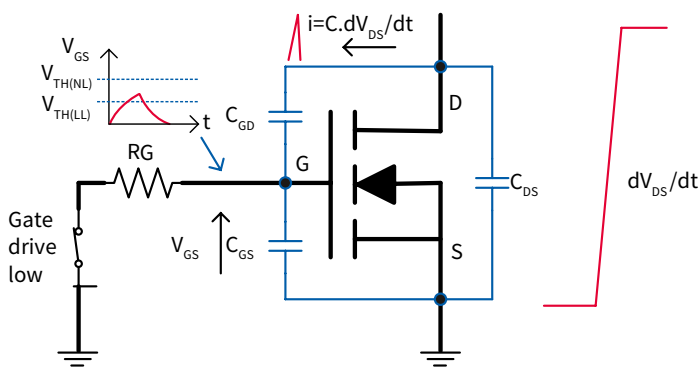
With the new OptiMOS™ 5 and 6 normal level product family Infineon offers a benchmark solution for normal level (higher threshold voltage) required applications.

This family of MOSFETs is optimized for immunity against unwanted induced turn-on, which often occurs in real-life applications and causes increased power dissipation leading to over-heating and in extreme cases failure of the end-equipment. The mechanism of induced turn-on involves a high drain-to-source  $dv/dt$  inducing a voltage spike at the gate due to the capacitive voltage divider formed by the gate-to-drain (Miller) and gate-to-source capacitances. This can be quantified as a charge ratio  $Q_{GD}/Q_{GS}$ .

For logic level devices the gate threshold voltage  $V_{th}$  is typically below 2 V. With the induced voltage spike on the gate, this could be enough for the MOSFET to turn on as shown in Figure 1. A higher  $V_{th}$  for the normal level portfolio means that only larger gate voltage spikes would cause unwanted turn-on. In addition, lower  $Q_{GD}/Q_{GS}$  ratios ( $C_{GD}/C_{GS}$  divider ratio) reduce the peak of the gate voltage spikes, further contributing to the robustness against unwanted turn-on. With the normal level device additional design margin at elevated temperatures is available, as  $V_{th}$  decreases with rising temperatures.

The Infineon new normal level products are designed for high performance applications, that also require a high level of robustness. Best-in-class OptiMOS™ 6 devices offer on-resistance as low as 0.7 mΩ with excellent induced turn-on immunity.

Figure 1: MOSFET



### Key features

- > Normal level gate threshold (2.3 V and 2.8 V typical)
- > 175°C junction temperature ( $T_j$ )
- > Optimized charge ratio  $Q_{GD}/Q_{GS} < 0.8$  for  $dv/dt$  and noise immunity
- > Low gate charge
- > High current rating

### Key benefits

- > Normal gate drive offers immunity to false turn-on in noisy environments
- > Increased operating temperature for robust designs
- > Reduced switching losses leading to greater system efficiency and power density
- > Suitable for operation at higher frequencies enabling advanced motor control techniques like field oriented control (FOC), direct torque control (DTC) as well as block commutation method
- > Capable of withstanding high surge current during in-rush, locked rotor and braking scenarios
- > Increased current carrying capability

### Target applications

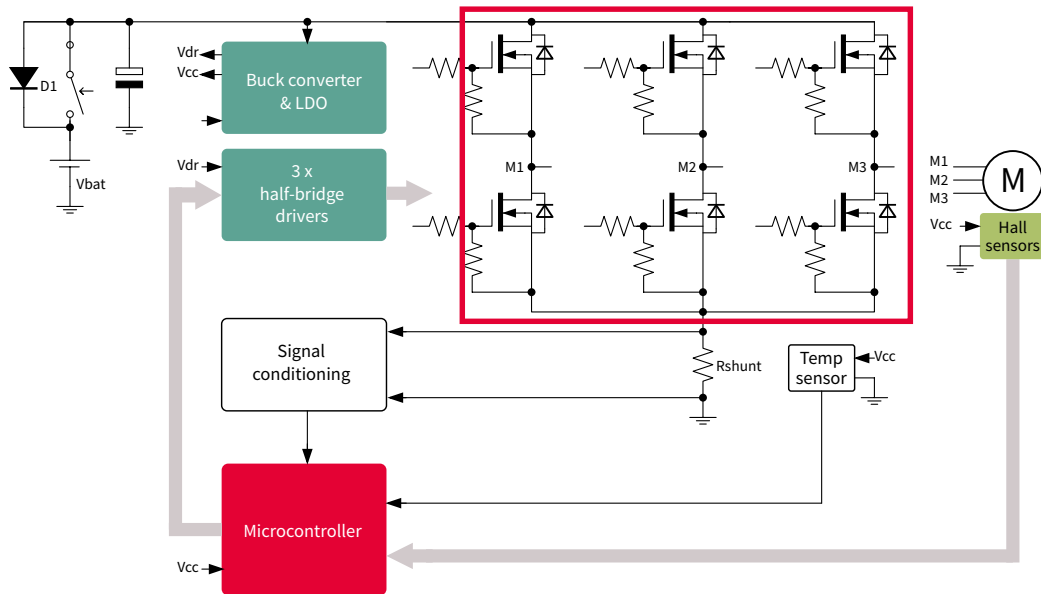
- > Battery powered applications
- > Battery powered tools
- > Battery management
- > Low voltage drives



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Figure 2: Block diagram



In low voltage drives applications, OptiMOS™ 5 and 6 normal level products minimize induced turn-on, reducing unwanted losses in the system and support safe operation of the end equipment in harsh environments.

### Product portfolio

Package	Part number	Voltage [V]	$R_{DS(on)}$ max, mΩ
SuperS08	ISC007N04NM6	40	0.7
	ISC010N04NM6	40	1.0
	ISC012N04NM6	40	1.2
	ISC015N04NM5	40	1.5
	ISC017N04NM5	40	1.7
	ISC019N04NM5	40	1.9
	ISC028N04NM5	40	2.8
	ISC036N04NM5	40	3.6
	ISC046N04NM5	40	4.6
ISC058N04NM5	40	5.8	

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