

Efficient Semiconductor Solutions for Motor Control and Drives



[www.infineon.com/motorcontrol]



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Efficient Semiconductor Solutions for Motor Control and Drives

Energy efficiency, mobility and security are the main challenges facing modern society. Our motor control solutions address all of these needs, providing outstanding reliability, excellent quality and leading-edge innovations. Rich functionality and extensive integration capabilities ensure easy design-in and fast time-to-market. Our broad portfolio maximizes flexibility across a wide range of voltage and power classes in industrial, consumer and automotive markets.

This guide showcases the full range of products, from microcontrollers and gate drivers through MOSFETs, IGBTs, voltage regulators and sensors to integrated bridge driver ICs, integrated power modules and high-power modules.

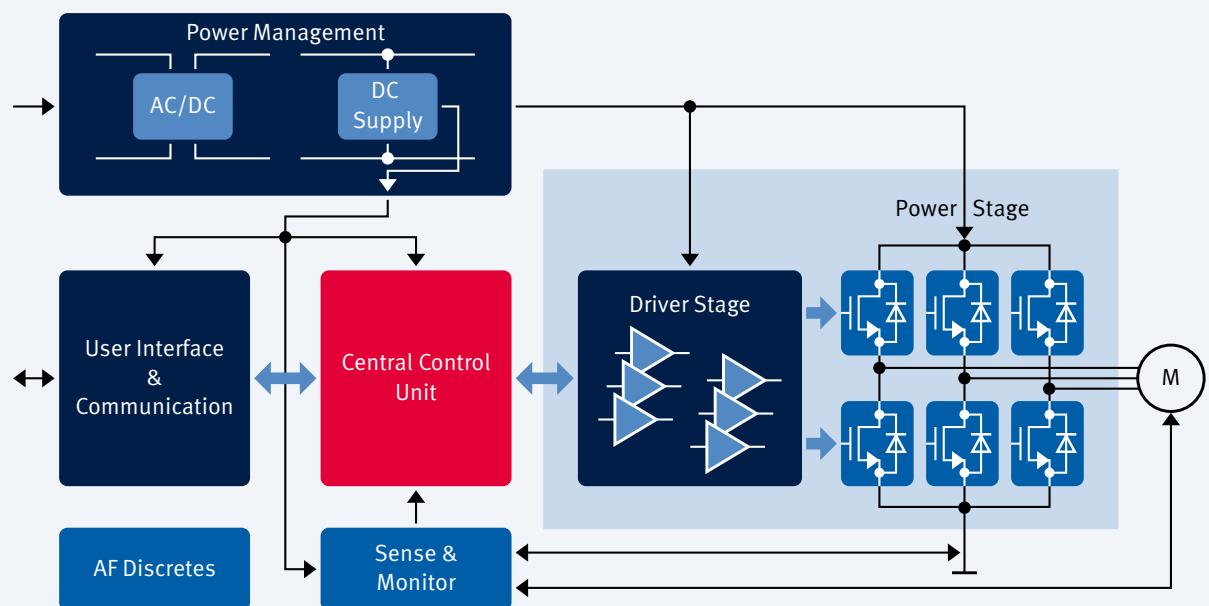
Our power products and microcontrollers enable efficient, robust and cost-effective designs for virtually all types of motors, including brushless DC and permanent magnet synchronous motors as well as induction and stepper motors and switched reluctance motors.

We complement this vast product offering with excellent customer support from our application experts, technical documentation and online training opportunities. We also deliver a variety of evaluation and application kits to support all motor designs. Each application kit comes with a reference code and instructions, along with all the software you need to start and successfully complete your design as quickly as possible.

We hope you enjoy exploring the benefits of our efficient semiconductor solutions for motor control and drive applications.



Typical Motor Control Block Diagram

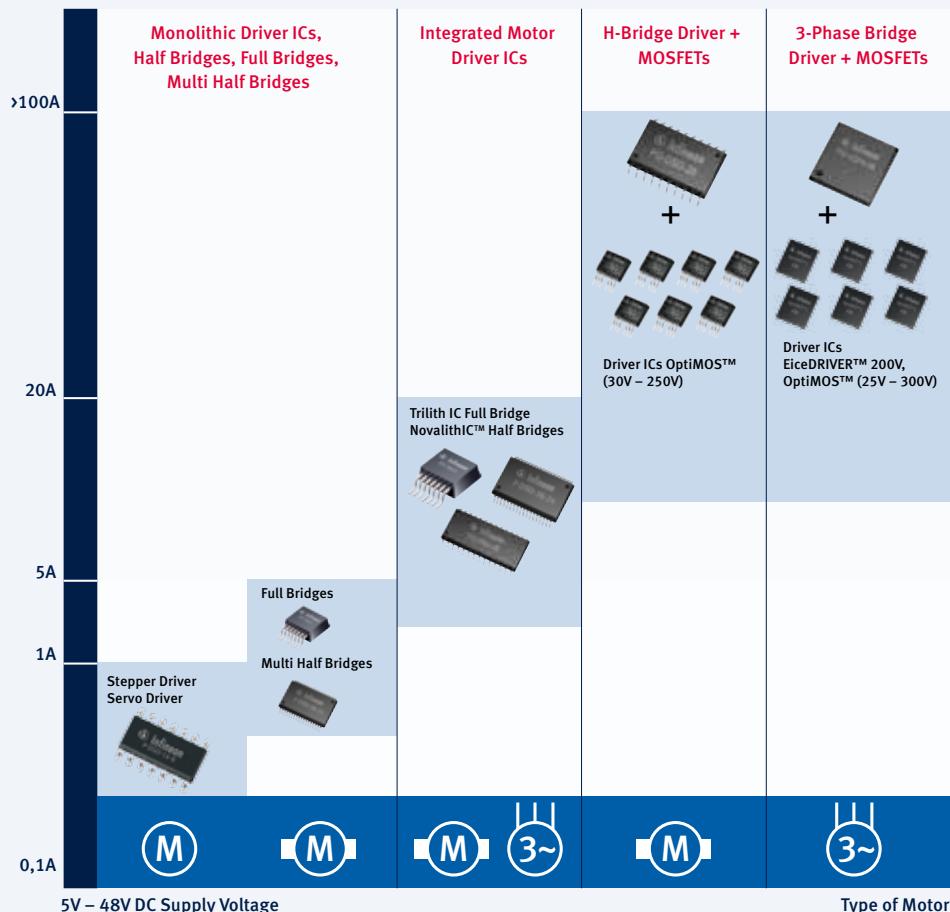


Application Solutions for Motor Controls and Drives

Low-Voltage Applications



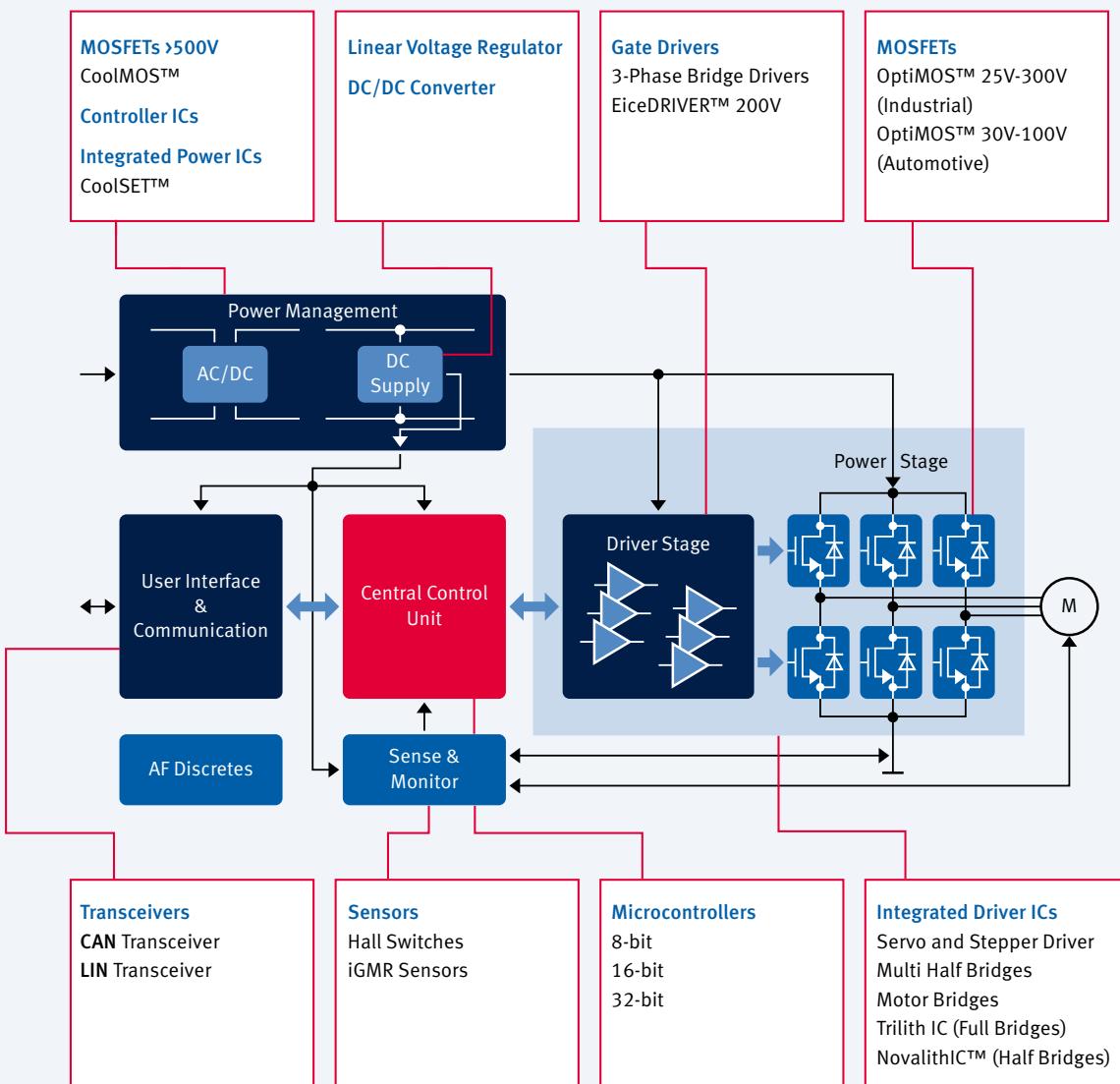
We are the partner of choice for low-voltage motor drive solutions, providing the perfect fit across the full current range from 0.1 to 100A. You can also rely on us to support the entire application spectrum from steppers to 3-phase drivers.



Infineon's solutions cover a broad range of target low-voltage applications including

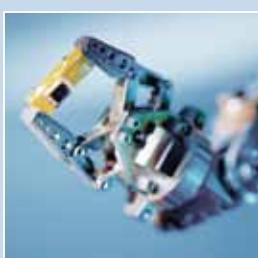
- Pumps (fuel, heating, water)
 - Fans / blowers
 - Automotive applications
 - E-bikes
 - E-scooters
 - Wheelchairs
 - Trucks/transport
 - Forklifts
 - Scooters
 - Wheelchairs
 - Industrial drives
 - Robotics
 - Door openers
 - Power tools, cordless power tools
 - Gardening tools
 - Small robots (cleaning robots)
 - Electric toys
 - Kitchen machines / food processors / coffee machines

Our products and solutions cover all of the main motor control design blocks. The block diagram shows an example of a 3-phase BLDC motor drive.



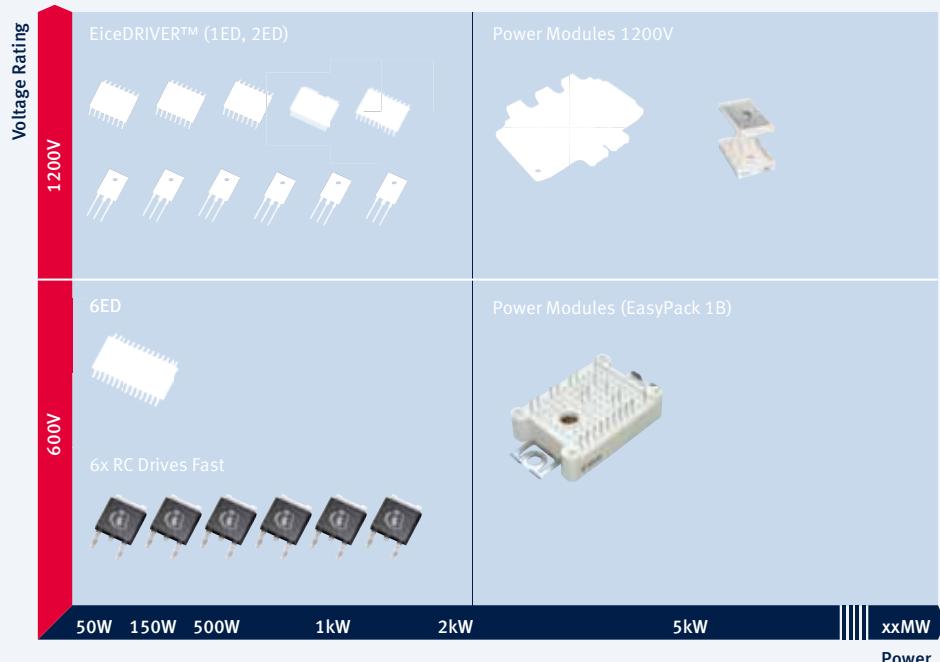
Application Solutions for Motor Control and Drives

High-Voltage Applications



Infineon offers gate driver ICs, discrete IGBTs, integrated modules and high-power modules across the entire power class range for high-voltage drives. Whatever power needs your application has we provide the optimized, cost-effective solution.

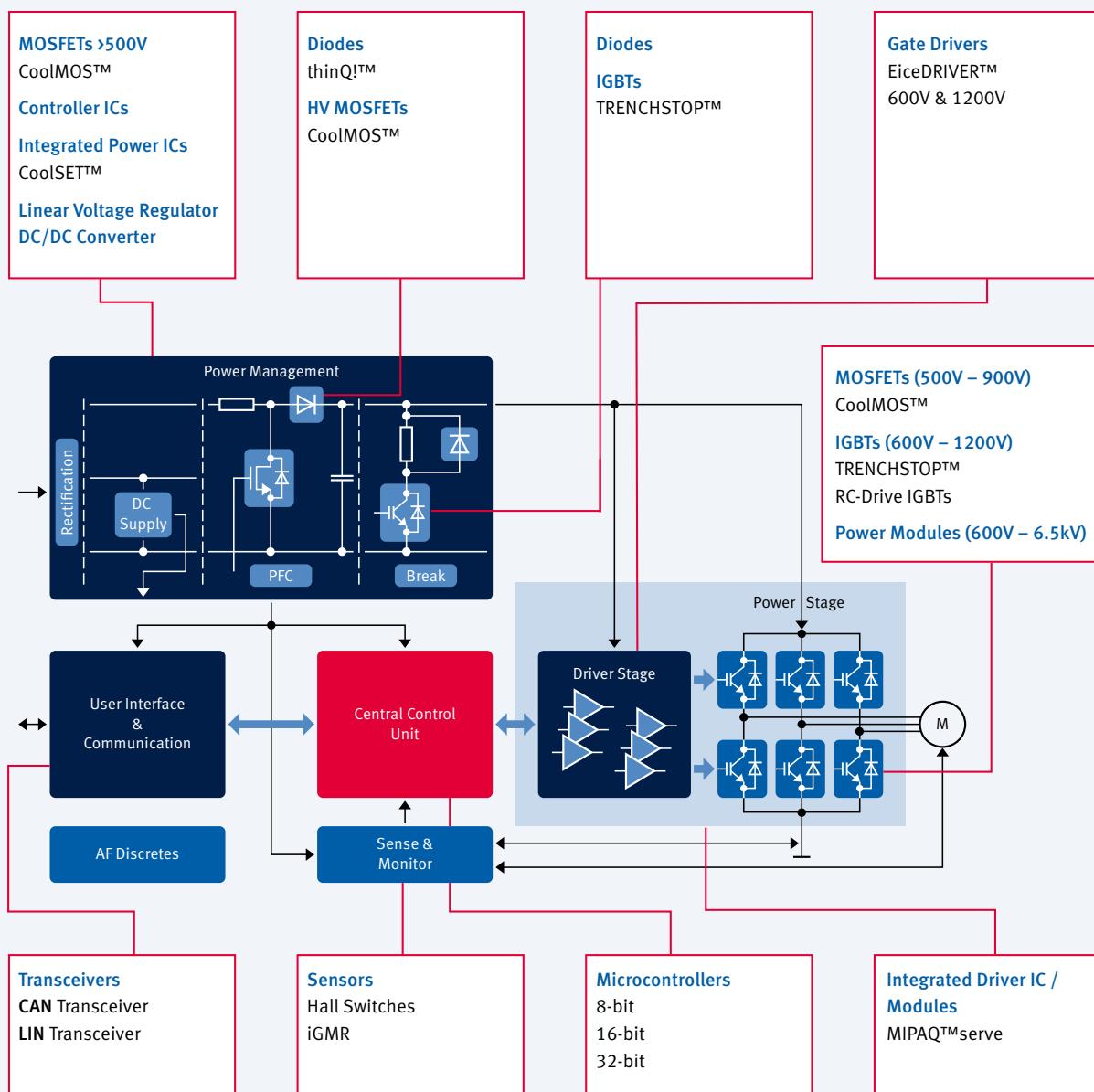
Discrete IGBTs, EiceDRIVER™ and Modules



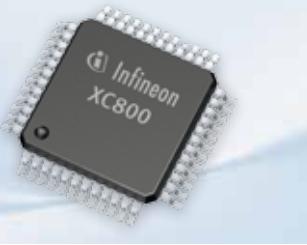
Infineon solutions cover a broad range of target high-voltage applications including

- Pumps
- Fans / blowers
- Compressors
- Industrial drives
- Robotics
- Air conditioning systems
- Washing machines
- Dish washers
- Refrigerators
- Kitchen hoods
- Vacuum cleaners
- Door openers

Infineon products cover all of main high-voltage motor drive design blocks. The block diagram provides an overview of the product portfolio for high-voltage products.



XC800 Family – 8-bit Microcontrollers



The feature-rich XC800 microcontroller with its optimized peripheral set supports cost-optimized solutions in the industrial and automotive segments.

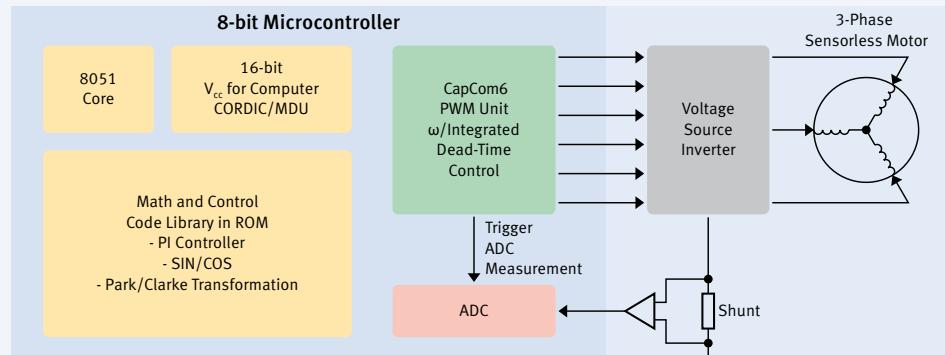
Application Segments

- Home appliance
- E-bikes
- Stepper gauges
- Fans
- Pumps
- Valve control

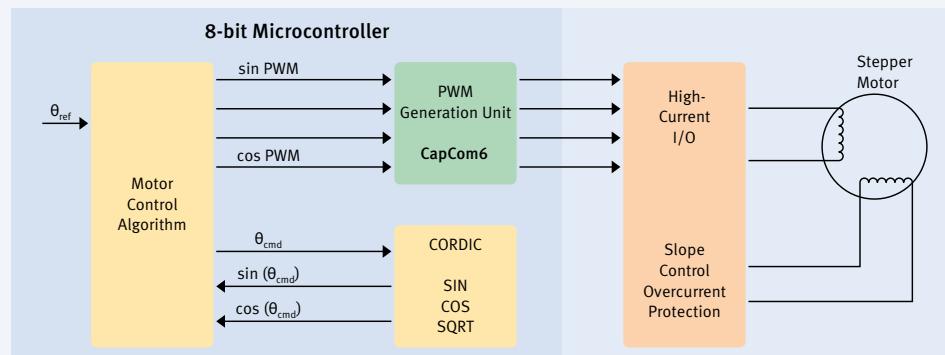
Product Benefits

- Up to 50% system cost savings – Field-Oriented Control (FOC) at lowest cost
- Portfolio from 2kB to 64kB Flash and from 16-pin to 64-pin package options, qualified AEC-Q100 and up to an ambient temperature of 150°C
- Optimized peripherals and code library in ROM for Field-Oriented Control
- Two PWM units with separate time bases to combine motor control and power factor correction algorithms on one chip
- For use in IEC 60730/Class B-certified applications
- Low cost stepper motor drive
- Free tool chain: www.infineon.com/davebench

Sensorless Field-Oriented Control for 3-Phase Motor e.g. PMSM Motor

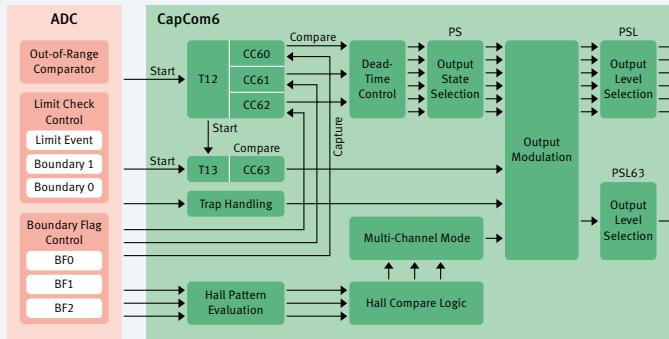


Stepper Motor Drive e.g. Stepper Gauge



[www.infineon.com/xc800]

ADC and CapCom6 – High-Performance PWM



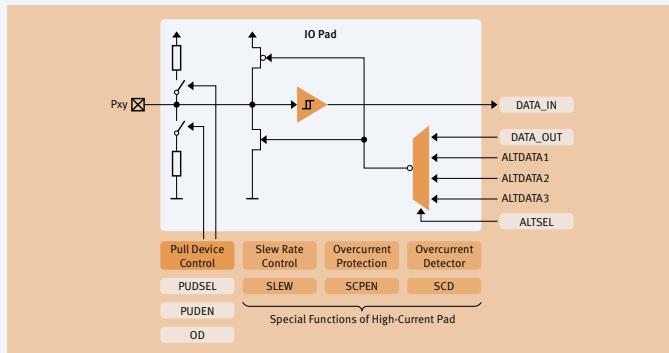
ADC Features

- 10-bit resolution, $\pm 2\text{LSB}$
- Conversion time of $<1.5\mu\text{s}$
- Hardware synchronization with PWM enables noise-free sampling

CapCom6 Features

- Capture for time measurement
- Compare for PWM generation
- Block communication for brushless DC drives
- Programmable dead-time control

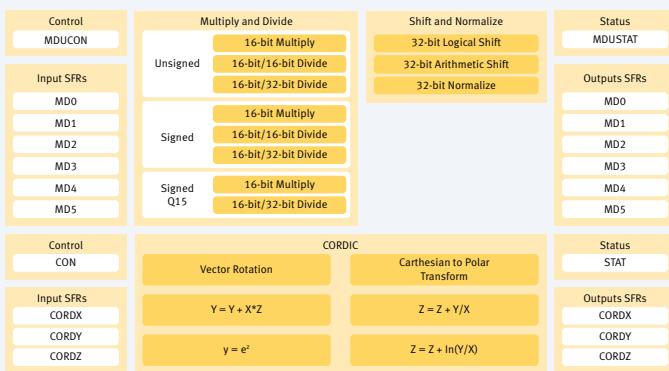
High-Current I/O



High-Current Pad Features

- High-current pads
- Direct drive of stepper gauges 25mA
- Sink current up to 50mA
- Over current detection

CORDIC and Vector Computer MDU



Vector Computer Features

- The vector computer is a powerful 16-bit coprocessor
 - Multiply and divide (MDU) unit
 - CORDIC
- Parallel processing of CPU, MDU and CORDIC is supported

XC2000/XE166 Family – 16-bit Microcontrollers



The highly scalable XC2000/XE166 family is ideal for a wide range of motor control designs, including applications based on DC brushed control, DC servo control, AC induction scalar-slip control, BLDC commutated control, permanent magnet AC field-oriented control and AC induction field-oriented control.

Application Segments

Industrial

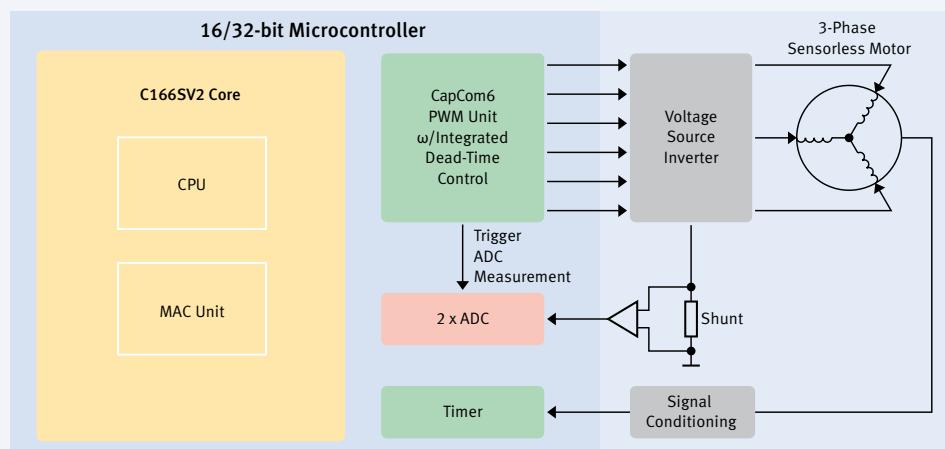
- Inverters
- Elevators
- Spindle drives
- PLC, Servo, CNC

Automotive

- Steering (e.g. EPS)
- Heating, ventilation, air condition (e.g. HVAC) control systems
- Pumps

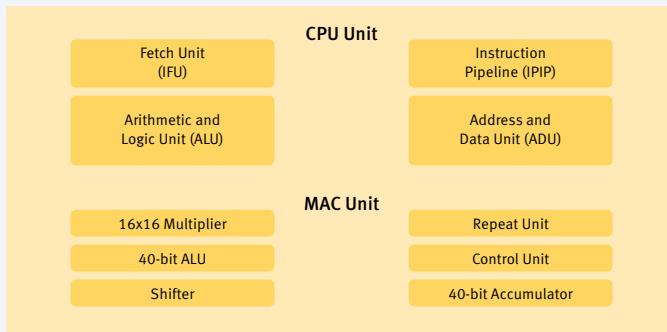
Product Benefits

- Reduced BOM cost – XE166/XC2000 family offers up to 4 PWM units with separate time bases for combined control of two motors and the PFC algorithm on one chip
- High performance speeds up your motor control algorithm
- Two independent ADC units are triggered by the PWM timers
- The MAC unit provides DSP functionality by a seamless integration into the CPU instruction set
- Supports safety critical systems to achieve IEC61508/ISO26262 compliance
- Free tool chain: www.infineon.com/davebench



[www.infineon.com/XC2000] [www.infineon.com/XE166]

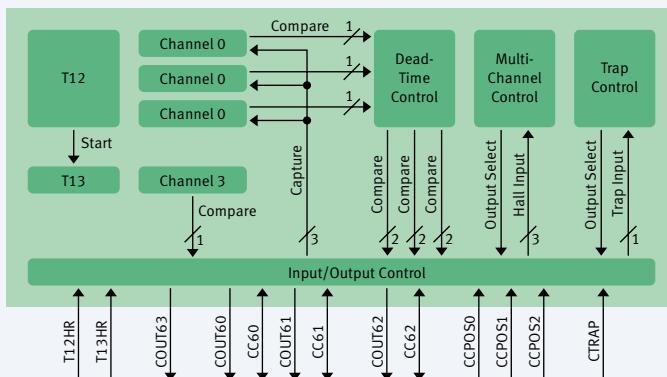
MAC Unit – Multiply-Accumulate Operation Unit



MAC Unit Provides

- Single instruction cycle
- 75% of all MAC instructions executed in one CPU clock cycle
- Multiplication with cumulative subtractions/additions (32-bit)
- 40-bit accumulator to handle overflow

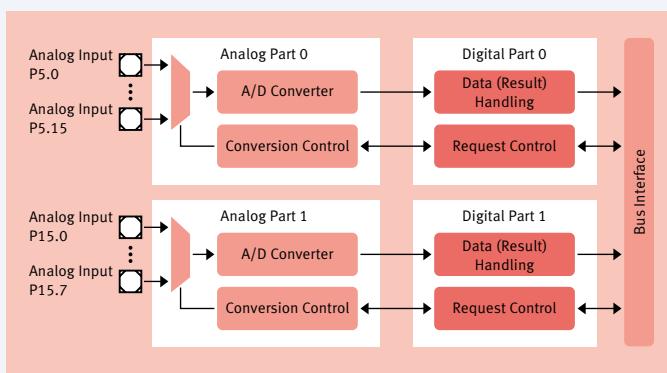
CapCom6 – High-Performance PWM



CapCom6 Features

- Capture for time measurement
- Compare for PWM generation
- Block commutation for brushless DC drives
- Programmable dead-time control

ADC – Enhanced Analog-Digital Converter



ADC Features

- Two synchronizable A/D converters with up to 12-bit resolution, $\pm 2\text{LSB}$
- Conversion time down to $1.2\mu\text{s}$
- External or internal trigger events automatic conversion sequencing



TriCore™ Family – 32-bit Microcontrollers

The Infineon TriCore™ family is optimized for 3-phase motor control applications in the industrial and automotive segments, including Permanent Magnet Synchronous Motors (PMSM) and AC Induction Motors (ACIM).

Application Segments

Industrial

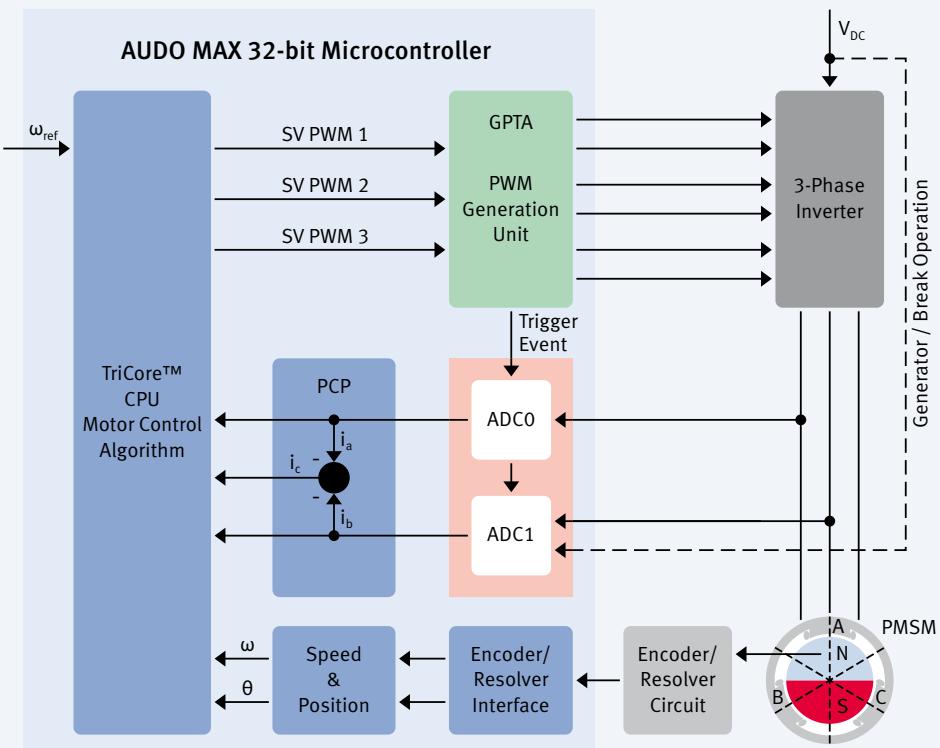
- AC Servo drives
- PLC
- Mobile controllers
- Process control

Automotive

- Steering (e.g. EPS)
- Electric propulsion for hybrid and electric vehicles

Product Benefits

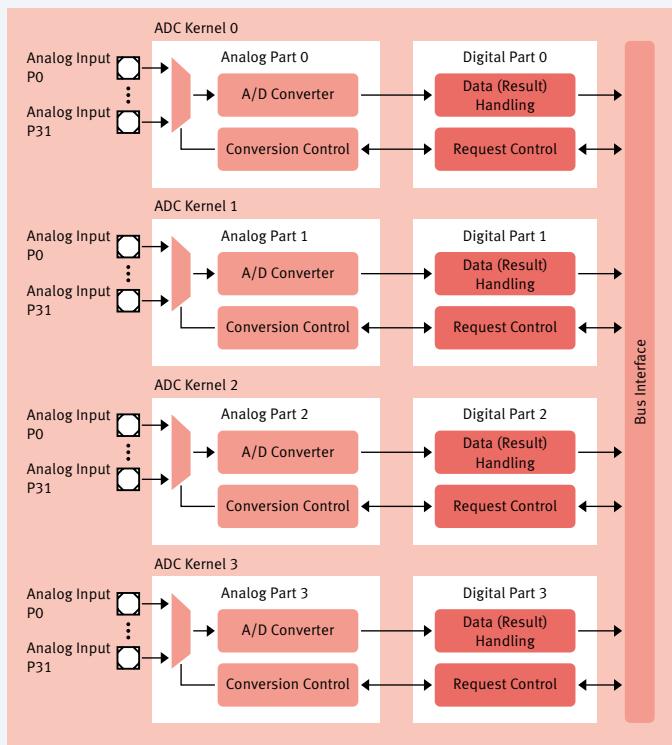
- High performance speeds up your motor control algorithm
- TriCore™ DSP instruction set for multiple motor control algorithms (e.g. park, clarke, space vector modulation)
- Software library for Field-Oriented Control (“e-motor module”) facilitates fast implementation
- Supports safety critical systems to achieve IEC61508/ISO26262 compliance
- Free tool chain: www.infineon.com/davebench



[www.infineon.com/tricore]

TriCore™ comes with advanced peripherals for sophisticated algorithms such as FOC, sensorless FOC and state observers.

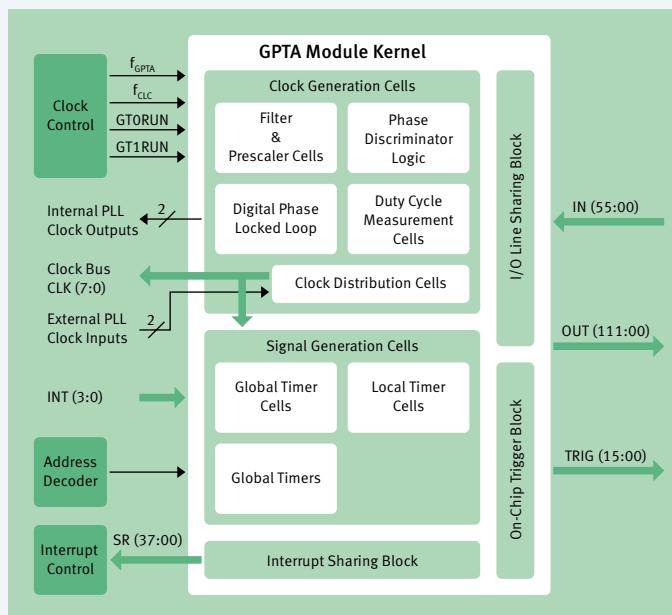
Enhanced Analog-Digital Converter (ADC)



Features and Benefits

- 1-4 synchronizable A/D converters with up to 64 channels
- 8/10/12-bit resolution, +/- 2LSB @ 10-bit
- Conversion time down to 1.0µs
- Data reduction pre-processing
- Results accumulation and limit check

General Purpose Timer Array (GPTA)



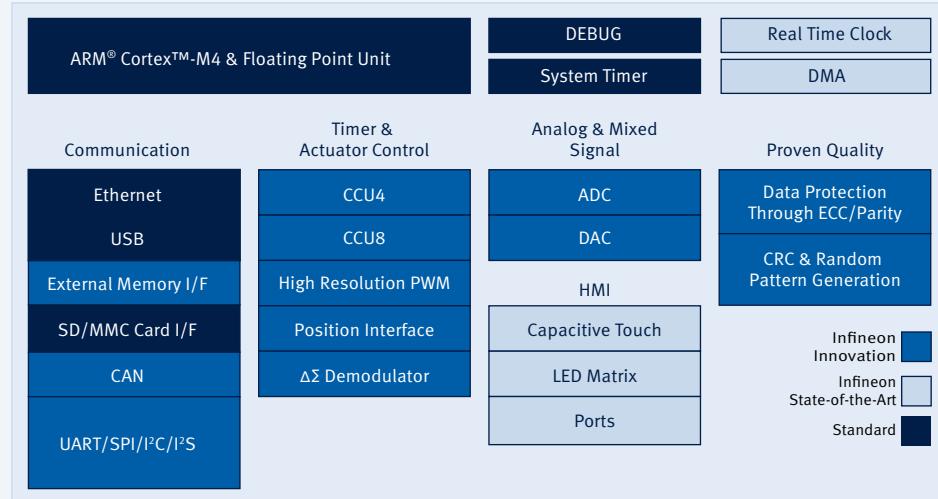
Features and Benefits

- Very flexible digital input filtering
- Tracking of all kinds of rotating shafts
- Scalable high resolution
- Independent access to time and angle domain
- All types of PWM generation supported thanks to Local Timer Cell (LTC) array
- Digital PLL for fine grain angle resolution
- PCP2 is the ideal coprocessor to handle critical real time GPTA interrupt tasks from the GPTA
- Ideal for field test and repair work

XMC4000 – 32-bit Microcontrollers with ARM® Cortex™-M4



Infineon XMC4000 family of microcontrollers is tailored to power industrial applications with a need for advanced motor controls. Its unique combination of Infineon's leading-edge timers, PWM and analog front-end peripherals with the real-time and signal processing capabilities of the ARM® Cortex™-M4 make XMC4000 the ideal solution for industrial drive applications.



Overview of XMC4000 Family

	low-end	XMC4100	XMC4200	XMC4400	XMC4500	high-end
Core	ARM® Cortex™-M4					
CPU frequency (at 125°C)	80MHz	80MHz	120MHz	120MHz	180MHz	
Co-proc			Floating Point Unit			
Flash size	128kB	256kB	512kB	1MB	2.5MB	
RAM size	20kB	40kB	80kB	160kB	512kB	
Cache	4kB	4kB	4kB	4kB	6kB	
POSIF	1x	1x	2x	2x	2x	
CCU4 (4ch)	2x	2x	4x	4x	4x	
CCU8 (4ch)	1x	1x	2x	2x	2x	
High-resolution PWM (150ps) channels	4x	4x	4x			
ADC 12-bit	2x	2x	4x	4x	4x	
Delta-sigma demodulator			4x	4x	4x	
DAC	2x	2x	2x	2x	2x	
IEEE 1588 Ethernet MAC			1x	1x	2x	
USB	FS DEV	FS DEV	FS OTG	FS OTG	HS OTG	
SD/MMC			✓	✓		
Serial channels (URAT, SPI, I ² C, I ² S)	4x	4x	4x	6x	6x	
Ext. memory I/F			✓	✓	✓	
CAN	2x	2x	2x	3x	3x	
Touch button	✓	✓	✓	✓	✓	

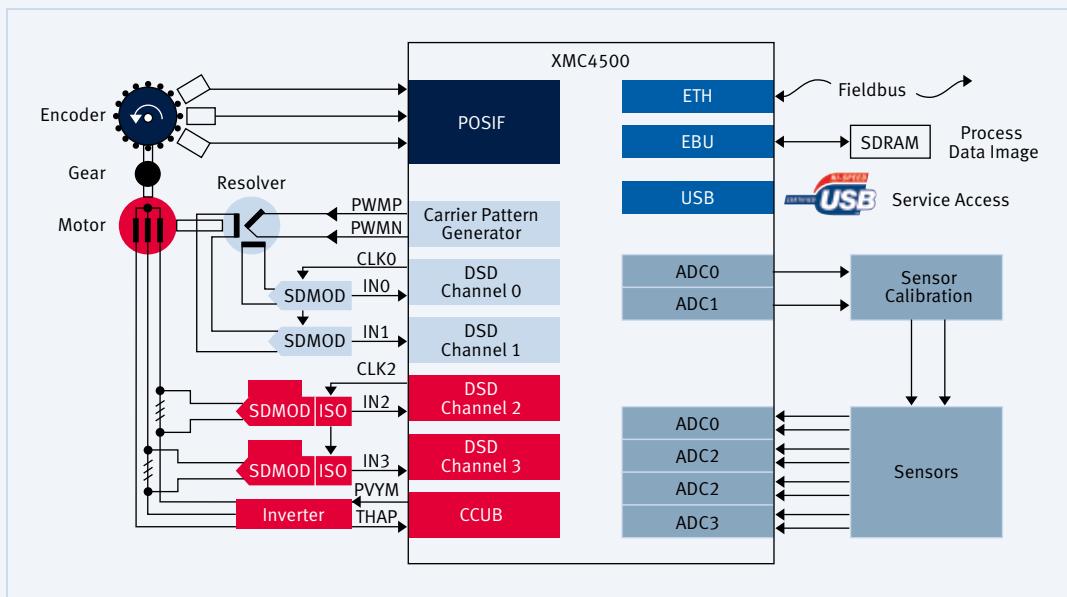
* under definition

[www.infineon.com/xmc]

In advanced motor control, microcontrollers must offer high real-time performance to handle fast digital control loops. XMC4000 peripherals are autonomous and therefore free up the CPU kernel to a large degree, enabling it to service other requests. They are specifically designed to implement efficient motor control algorithms:

- 4 ADC kernels for simultaneous 3-phase current measurement + Power Factor Correction (PFC)
- 2 POSIF modules provide a programmable interface to process inputs from rotary encoders or Hall sensors; the position and velocity of the motor can be easily determined when used in series with CCU4
- 24 independent PWM timers for generating complex pulses and sequential patterns for any kind of power inverter topology for motor control and power supplies
- 4 high-resolution PWM channels for advanced power conversion methods (e.g. peak current control)
- 4 delta-sigma demodulators for direct interface to external delta-sigma modulators supporting galvanic isolated in-phase current measurement, power measurement or resolver feedback
- Pattern generator for resolver primary coil excitation
- 2 DAC channels for analog wave generation for sensor stimulation or calibration

Example of Motor Control Application



Infineon Safety Computing Platform – Safe Computing for 3-Phase Motor Control

ISO26262 and IEC61508-compliant safety applications require an independent watchdog with a robust monitoring channel for the main microcontroller. With its small footprint, CIC61508 is the ideal watchdog solution for safety applications where space and cost are the main drivers. It monitors the main microcontroller through a range of features that detect common clock and power supply failure modes as well as temperature-related computational errors on the microcontroller. It therefore acts as an independent diagnostic monitoring device supporting approval up to ASIL-D for 3-phase motor control applications.

Reliability is key

- Proven management of power-off sequence even when MCU is in fail safe; CIC61508 offers a power off sequence with up to 3 steps

Key Benefits

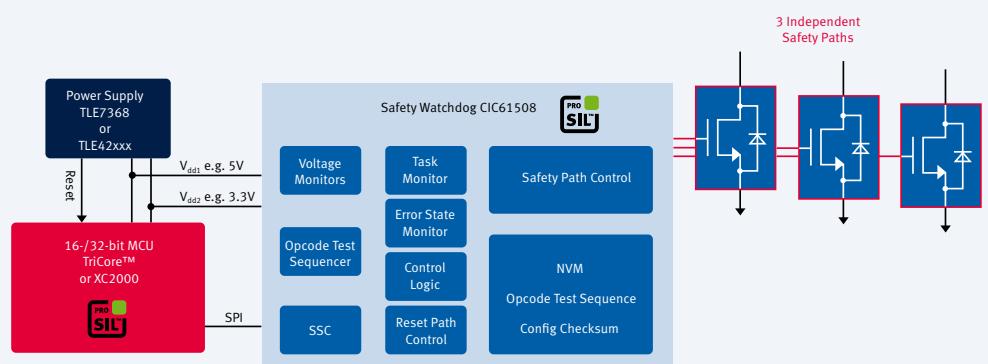
- Allows energy circulation before final power down
- Reduced voltage / current spike on power stage due to abrupt power-off when MCU enters fail safe
- Increased component life time

Availability has to be ensured

- Single transient error should not stop the application
- 3-phase motor applications must keep running in case of a single transient error, e.g. xEV, steering

Key Benefits

- Safe support for error recovery and limp mode
- Reduced error recovery time (no steering assistance provided)
- Reduced false alarm



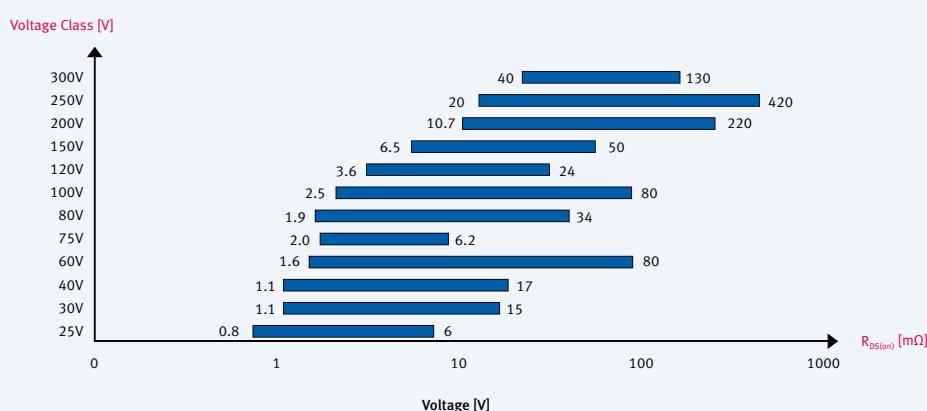
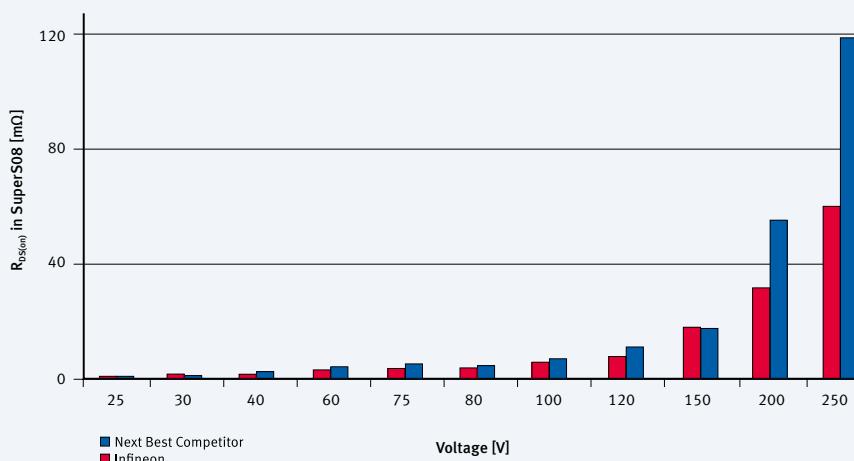
[www.infineon.com/SIL]

Industry MOSFETs – Power Density for the Next Level of Energy Efficiency

Our OptiMOS™ family sets new standards for power MOSFETs, offering the industry's lowest $R_{DS(on)}$ and Figure of Merit (FOM) in all voltage classes from 30V to 250V. Available in high-performance packages featuring state-of-the-art process technologies, the OptiMOS™ portfolio is the right fit for all motor control applications.

Key Benefits

- Highest power density thanks to minimum conduction losses and reduced need for device paralleling
- Cost savings due to smaller heat sinks
- Board space savings of up to 50 %
- DC currents of up to 180A per device in CanPAK™, 100A in SuperSO8 and 40A in S308 package
- High-current capability for motor control applications
- Extremely low on-state resistance and high-current capability up to 180A in D²PAK-7Pin version



Available Packages



[www.infineon.com/optimos]

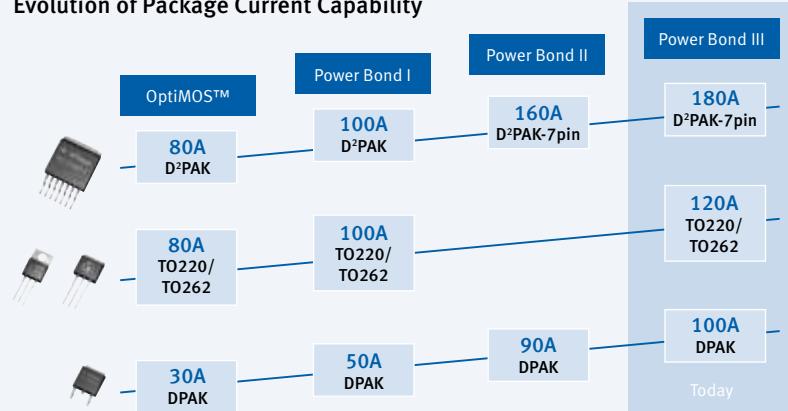
Automotive MOSFETs – Benchmark for Motor Control Applications

Best-in-Class OptiMOS™ Products

Infineon OptiMOS™ range combines leading MOSFET technology with a robust package to deliver best-in-class performance and outstanding current capacity. Automotive-qualified MOSFET packages now have even higher current capacity thanks to our PowerBond technology.

- Best-in-class $R_{DS(on)}$ performance for increased system efficiency
- Highest current DPAK + D²PAK on the market for reduced ECU module size
- Lowest switching and conduction power losses for increased thermal system reliability
- Robust green package for easy process handling

Evolution of Package Current Capability



OptiMOS™ for Motor Control Solutions

OptiMOS™ T2 30V, 40V, 60V products are the future building blocks for all half-bridge, H-bridge and 3-phase motor control solutions. They can be paired with driver IC products to create all-inclusive motor drive solutions.

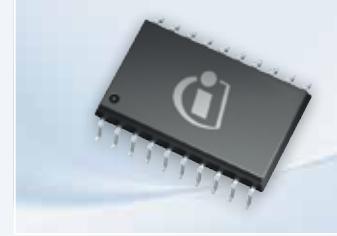
Product Overview

	Voltage Class [V]	OptiMOS™-T2 (Trench)	OptiMOS™-T (Trench)	OptiMOS™ (Planar)
Single MOSFET				
N-Channel	30	•		•
N-Channel	40	•	•	•
N-Channel	55			•
N-Channel	60	•		
N-Channel	75			•
N-Channel	100		•	
N-Channel	250		•	
P-Channel	30	•		
P-Channel	40	•		
Dual MOSFET				
Dual N-Channel	2 x 40		•	•
Dual N-Channel	2 x 55		•	

[www.infineon.com/automotivemosfet]

Bridge Drivers – H-Bridge and 3-Phase Gate Driver ICs

The trend toward greater efficiency in automotive applications extends to electric motors as well. In the future, applications such as power steering, HVAC compressors and engine cooling fans will all be controlled by electronic motors. Our family of configurable, H-bridge and 3-phase gate driver ICs can be combined with MOSFETs to provide the required power and efficiency these systems need.



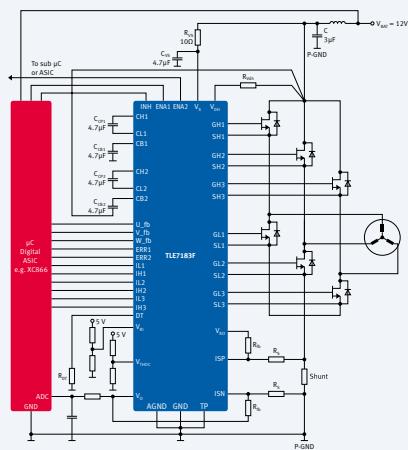
Basic Features

- Strong output stage up to 1.5A
- Precise OpAmp for current shut monitoring
- Operation down to 5.5V
- Duty cycle adjustable up to 100%

Diagnostic Features

- Undervoltage
- Short circuit
- Overtemperature
- Overvoltage

Application Example for BLDC Motors



H-Bridge/ Dual Half-Bridge Driver Family

Product Type	Operating Range [V]	OpAmp	PWM/DIR Input	Reverse Polarity Protection	Diagnosis	Package
TLE6281G	7.5 ... 60.0	0	•		UV, OT, SCD	PG-DSO-20
TLE6282G	7.5 ... 60.0	0			UV, SCD	PG-DSO-20
TLE6284G	7.5 ... 60.0	0	•		UV, OT, SCD	PG-DSO-20
TLE7181EM	7.0 ... 34.0	1	•		UV, OV, OC, SCD, OT	PG-SSOP-24
TLE7182EM	7.0 ... 34.0	1		•	UV, OV, OC, SCD, OT	PG-SSOP-24

3-Phase Bridge Driver IC

Product Type	Operating Range [V]	Drives Stage	D.C. Range @ 20kHz [%]	Numbers of integrated OpAmps for load Current Measurement	Adjustable Dead Time	SIL3 Features	Diagnosis	Package
TLE6280GP	8.0 ... 36.0	0.9/0.85A	0 ... 95	0	•		UV, SCD, OT	PG-DSO-36 (Power-SO)
TLE7183F	5.5 ... 28.0	1.5/1.5A	0 ... 100	1	•		OT, UV, OV, OC, OCD	PG-VQN-48
TLE7184F TLE7184F-3V ¹⁾	7.0 ... 32.0	13.5/9.0Ω 13.5Ω	0 ... 95	1	•		UV, OV, OC, SCD, OT, VDD supervision	PG-VQN-48
TLE7185E	5.5 ... 32.0	13.5/9.0Ω	0 ... 95	0	•		UV, OV, SCD, OT	PG-DSO-36
TLE7188F	5.5 ... 28.0	1.5/1.5A	0 ... 100	3			UV, OV, OC, SCD, OT	PG-VQN-48
TLE7189F	5.5 ... 28.0	1.5/1.5A	0 ... 100	3		•	UV, OV, SCD, OT, VDD supervision	PG-VQN-48
TLE7189QK	5.5 ... 28.0	1.5/1.5A	0 ... 100	3		•	UV, OV, SCD, OT, VDD supervision	PG-VQN-64
TLE7183QU	5.5 ... 28.0	1.5/1.5A	0 ... 100	1	•		OT, UV, OV, OC, SCD	PG-VQN-48

1) System IC for fans and pumps with integrated LDO and PWM interface

LO = Lockout
OL = Open Load
OV = Overvoltage
OC = Overcurrent

UV = Undervoltage
OT = Overtemperature
SCD = Short Circuit Detection

Speed PROFET™ – Protected High-Side Switch for PWM-Driven Applications



The Speed PROFET™ BTF50060-1TEA is a high-side switch for high PWM frequencies such as 25 kHz. It can be used for controlling, driving and protecting a 12V DC motor (e.g. 100W) or valve. In combination with a freewheeling diode or a low-side switch, the Speed PROFET™ can be set up in a half-bridge or boost converter topology. It can also be driven with a 25kHz PWM signal directly from a microcontroller. This device is capable of a 100% duty cycle. Its feature set simplifies hardware and software design and includes protection functions such as short-circuit and overtemperature shutdown. It also offers an accurate load current measurement and open load or short-to-battery detection.

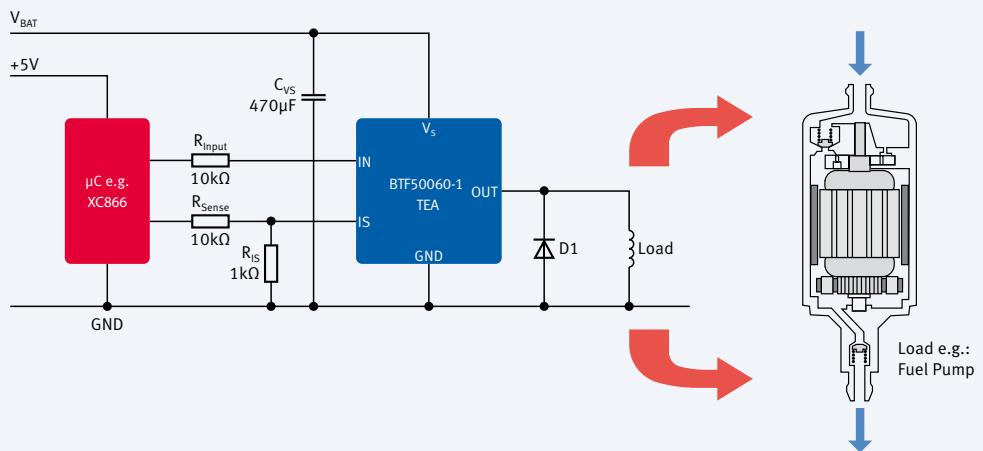
Key Features

- PWM capability of more than 25kHz
- $6\text{m}\Omega R_{(\text{ON})}$ (max. $12\text{m}\Omega$ @ 150°C) with high inrush current
- No external bootstrap capacitor necessary
- 3.3V and 5V compatible logic inputs
- Advanced analog load current sense signal
- Overload and overtemperature protection, with defined diagnostic signal

Key Benefits

- Reduced power dissipation
- Small package for high-current motor drive, less PCB space
- Reduced component count and easier PCB layout
- Direct connection to the MCU
- Easy current sense calibration

Application Example for Fuel Pump



Product Overview

Product Type	$R_{DS(\text{on})}$ @ $T_J = 25^\circ\text{C}$ [mΩ]	Typical Load Current [A]	E_{AS} [mJ]	Recommended Operating Voltage Range [V]	$I_{LSC(\text{typ})}$ [A]
BTF50060-1 TEA	6	16.5	280 @ 20A	4.7 ... 28.0	75
Number of Channels	Load Current	Overvoltage Shutdown	Sense Enable	Latch	Reversave
1	Limit • Trip			•	DPAK-5pin

[www.infineon.com/profet]

NovalithIC™ – Integrated Half-Bridge Driver

NovalithIC™ provides a complete, low-ohmic protected half bridge in a single package (typ. path resistance @ 25°C: 16mΩ down from 28mΩ). It can also be combined with an additional NovalithIC™ to create an H-bridge or 3-phase bridge. The NovalithIC™ family has the capability to switch to up to 25kHz while providing overcurrent, overvoltage and overtemperature protection. The NovalithIC™ family offers cost-optimized, scalable solutions for protected high-current PWM motor drives with very restrictive board space. NovalithIC™ includes a P-N MOSFET enabling a significant reduction of EME (Electro Magnetic Emissions) and power dissipation thanks to an optimized switching shape and the absence of a charge pump.



Basic Features

- Low quiescent current
- Adjustable slew rate
- Capable for high PWM frequency (e.g. 25kHz)
- Cross current protection
- Logic level input

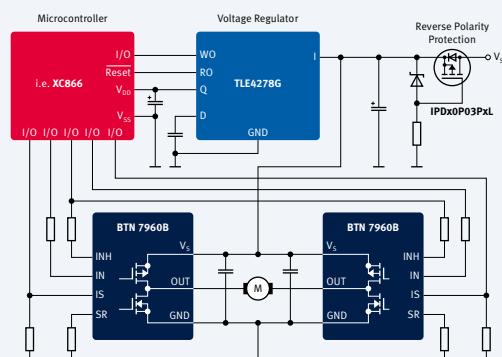
Diagnostic Features

- Overtemperature
- Overvoltage
- Overcurrent
- Current sense and status

Protection Features

- Overtemperature shutdown
- Overvoltage (lockout or smart clamp)
- Undervoltage
- Overcurrent

Application Example for High-Current PWM Motor Drives



NovalithIC™ Product Overview

Product Type	Operating Range [V]	R _{DS(on)} Path (Type) [mΩ]	I _{D(on)} (Type) [A]	I _S (Type) [mA]	Switch Time (typ) [μs]	Diagnosis	Protect	Package
BTN 7930B	5.5 ... 28.0	28.0	32	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7930P	5.5 ... 28.0	29.6	32	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-220-7
BTN 7930S	5.5 ... 28.0	28.2	32	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-220-7
BTN 7960B	5.5 ... 28.0	16.0	47	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7960P	5.5 ... 28.0	17.6	47	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-220-7
BTN 7960S	5.5 ... 28.0	16.2	47	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7970B	5.5 ... 28.0	16.0	70	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7970P	5.5 ... 28.0	17.6	70	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-220-7
BTN 7970S	5.5 ... 28.0	16.2	70	7	1.0	OV, OT, OC, CS	UV, OT, OC	PG-T0-220-7
BTN 7971B	4.5 ... 28.0	16.0	70	7	0.5	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7933B	4.5 ... 28.0	28.0	32	7	0.5	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7963B	4.5 ... 28.0	16.0	47	7	0.5	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 7973B	4.5 ... 28.0	16.0	70	7	0.5	OV, OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 8946TA ¹⁾	4.5 ... 40.0	5.3 ²⁾	42	7	0.5 ³⁾	OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 8960TA ¹⁾	4.5 ... 40.0	13.5	42	7	0.5 ³⁾	OT, OC, CS	UV, OT, OC	PG-T0-263-7
BTN 8980TA ¹⁾	4.5 ... 40.0	9.0	70	7	0.5 ³⁾	OT, OC, CS	UV, OT, OC	PG-T0-263-7

1) Product in development, electrical values specified must be considered as target values

2) Target values calculated

3) Target value for the HS switch only

OV = Overvoltage
OC = Overcurrent
CS = Current Sense

UV = Undervoltage
OT = Overtemperature
SCL = Short Clamping

[www.infineon.com/novalithic]

Trilith IC – Integrated Full-Bridge Driver



Trilith IC family members combine two high-side and two low-side switches in a single package. They are designed to drive high-current DC motors in an H-bridge configuration (peak currents of up to 42A), but can also be used as single independent switches. All Trilith ICs include overcurrent and overtemperature protection for high-side switches. For low-side switches, designers can choose between fast unprotected switches and protected switches for lower frequencies (typ. path resistance @ 25°C from 210mΩ down to 40mΩ). The third generation of Trilith IC (BTM7742G/BTM7745G/BTM7752G/BTM7755G) is based on the NovalithIC™ concept and includes P-N MOSFET. This enables a significant reduction of EME (Electro Magnetic Emissions) and power dissipation thanks to an optimized switching shape and the absence of a charge pump.

Basic Features

- Low quiescent current
- Capable for high PWM frequency

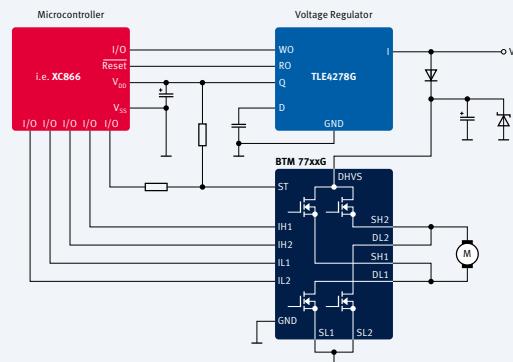
Protection Features

- Overvoltage
- Undervoltage
- Overtemperature
- Short-circuit / overcurrent detection

Diagnostic Features

- Overvoltage
- Overtemperature
- Short-circuit / overcurrent detection
- Current sense / status
- Open Load

Application Example for DC Brush Motors



Trilith IC Product Overview

Product Type	Operating Range [V]	R _{D(on)} Path (Type) @ 25°C [mΩ]	I _{D(on)} (Type) [A]	I _g (Type) [μ A]	Switch Freq. (Type) [kHz]	Diagnosis	Protect	Package
BTM 7740G	4.8 ... 42.0	210	8.0	5	1	OT	OT, SC	PG-DSO-28
BTM 7741G	4.8 ... 42.0	210	8.0	5	1	OT, OL	OT, SC	PG-DSO-28
BTM 7700G	4.8 ... 42.0	190	9.5	5	1	OT	OT, SC	PG-DSO-28
BTM 7750G	4.8 ... 42.0	115	12.0	5	1	OT	OT, SC	PG-DSO-28
BTM 7750GP ¹⁾	4.8 ... 42.0	115	12.0	5	1	OT	OT, SC	PG-TQ-263-15
BTM 7751G	4.8 ... 42.0	115	14.0	5	1	OT, OL	OT, SC	PG-DSO-28
BTM 7710GP ¹⁾	4.8 ... 42.0	110	15.0	5	1	OT	OT, SC	PG-TQ-263-15
BTM 7710G	4.8 ... 42.0	110	15.0	5	1	OT	OT, SC	PG-DSO-28
BTM 7810K ¹⁾	5.0 ... 42.0	40	42.0	4	1	OT, OL	OT, SC	PG-TQ-263-15
BTM 7811K ¹⁾	5.0 ... 42.0	40	42.0	4	20	OT, OL	OT, SC	PG-TQ-263-15
BTM 7752G	5.5 ... 28.0	150	12.0	5	25	OV, OT, SC/OC, CS	OV, UV, OT, SC/OC	PG-DSO-36
BTM 7755G	5.5 ... 28.0	150	12.0	5	1	OV, OT, SC/OC	OV, UV, OT, SC/OC	PG-DSO-36
BTM 7742G	5.5 ... 28.0	250	12.0	5	25	OV, OT, OC, CS	OV, UV	PG-DSO-36
BTM 7745G	5.5 ... 28.0	250	12.0	5	25	OV, OC, OT, SC/OC	OV, UV, OT, SC/OC	PG-DSO-36

1) AEC std. grade 3, T_{j(max)} = 110°C CS = Current Sense OV = Overvoltage
OL = Open Load UV = Undervoltage OT = Overtemperature OC = Overcurrent
SC = Short Circuit

[www.infineon.com/trilithic]

Multi Half Bridges – Single-Chip Solutions for Low-Current Applications

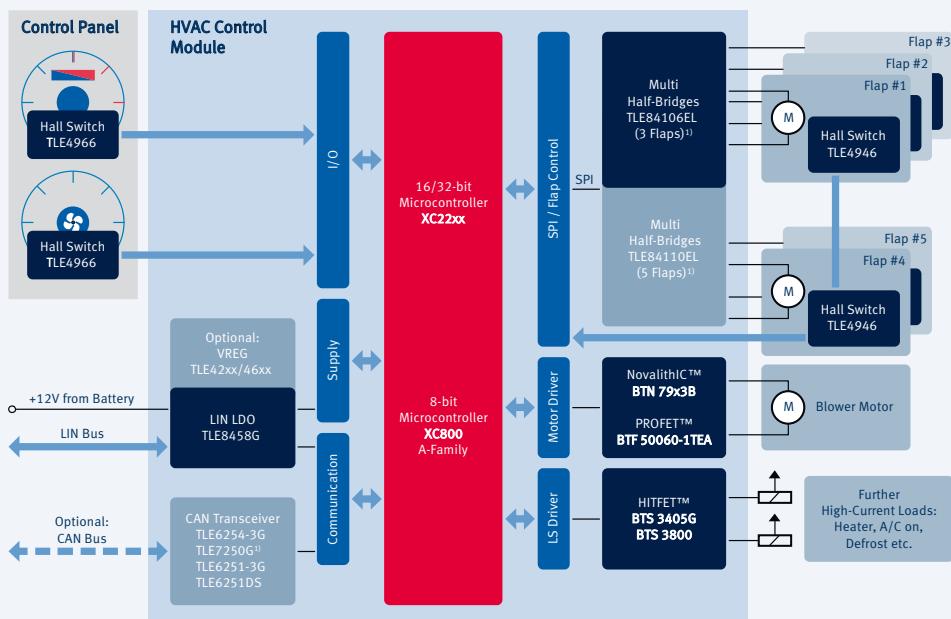
Cost-effective, space-saving IC solutions are ideal for implementing DC brush motor controls that drive low load currents (<1A). We offer a broad range of half-bridge drivers – from 2-fold half-bridge drivers with parallel interface in a DSO-14 pin package to a 10-fold, half-bridge driver with SPI interfaces in a SSOP-24 pin package. All products are equipped with protection features and support diagnostics via a status flag or SPI. Typical applications include flap motors for climate control and motors for mirror adjustment or idle speed control.



Basic Features

- Overvoltage
- Undervoltage
- Overtemperature
- Short circuit

Application Example for HVAC Control Module



¹⁾ In development, samples available

Product Overview

Product Type	Config.	I _{L(NOM)}	I _{L(LIM)}	L _q	V _{S(sop)}	Protection	Diagnostic Interface	Highlights	V _{C(EASAT)/R_{ES(on)}} Path	Package
TLE4207G	2x Half bridge	2 x 0.8	2 x 1.5	20	8 ... 18	LO	Status flag	Error detection	1.2V	PG-DSO-14
TLE4208G	4x Half bridge	4 x 0.8	4 x 1.5	20	8 ... 18	LO	Status flag	Error detection	1.2V	PG-DSO-28
TLE8444SL	4x Half bridge	4 x 0.5	4 x 0.9	1	8 ... 18	OL	Status flag	Open-load detection in ON state	600mΩ/switch	PG-SSOP-24
TLE6208-3G	3x Half bridge	3 x 0.8	3 x 1.0	10	8 ... 40	LO	16-bit SPI	Detailed diagnosis via SPI	800mΩ/switch	PG-DSO-14
TLE6208-6G	6x Half bridge	6 x 0.8	6 x 1.0	12	8 ... 40	LO	16-bit SPI	Single switch usage possible	800mΩ/switch	PG-DSO-28
TLE84106EL	6x Half bridge	6 x 0.3	6 x 0.5	2	7 ... 18	OL	16-bit SPI	Pin compatible with TLE 84110EL	800mΩ/switch	PG-SSOP-24
TLE84110EL	10x Half bridge	10 x 0.3	10 x 0.5	2	7 ... 18	OL	16-bit SPI	Pin compatible with TLE 84106EL	800mΩ/switch	PG-SSOP-24

[www.infineon.com/bridges]

Door Power IC – Single-Chip Devices for Door Zone Modules

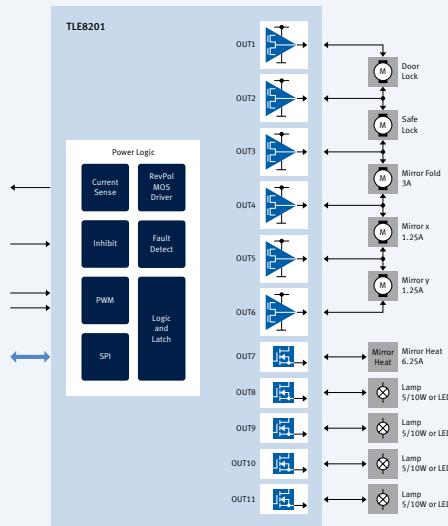


Single-chip solutions for door zone modules help maximize PCB space by integrating common door loads into a single package. TLE8201R and TLE8203E drive loads such as DC motors for door locks (TLE8201R only) and x-y mirror adjustment as well as resistive loads such as mirror heaters and lamps/LEDs. TLE8201R is available in a DSO-48 pin package, while TLE8203E comes in the smaller SSOP-36 package. Both devices feature integrated protection against short circuits and overtemperature as well as an SPI interface for programming and diagnosis.

Key Features

- SPI interface
- $I_Q = 3\mu A$
- Operating range: 8–20V

Block Diagram of TLE8201



Product Overview

Product Type	Outputs	I _{L(max)}	R _{DS(on)}	Driver Stage	Operating Range [V]	Protect	Diagnosis	Target Load	Package
TLE8201R	1, 2	8.0	130	Half bridge	8–20	OC, OT, OV, UV	CS	Central lock	PG-DSO-36
	3, 4	3.0	350	Half bridge			CS	Mirror folding	
	5, 6	1.25	650	Half bridge			OC, OT	Mirror X-Y	
	7	6.25	85	High-side switch (mirror defrost)			CS	Mirror defrost	
	8–11	1.8	400	Lamp driver			OC, OT	Repeater	
TLE8203R	4	3.0	350	Half bridge	8–20	OC, OT, OV, UV	CS	Mirror folding	PG-DSO-36
	5, 6	1.25	650	Half bridge			OC, OT	Mirror X-Y	
	7	6.25	85	High-side switch (mirror defrost)			CS	Mirror defrost	
	8, 10	1.8	400	Lamp driver			OC, OT	Repeater	

LO = Lockout
OL = Open Load

OV = Overvoltage
OC = Overcurrent

UV = Undervoltage
OT = Overtemperature

SC = Short Circuit

[www.infineon.com/door-module-ic]

Servo Driver – Robust and Reliable

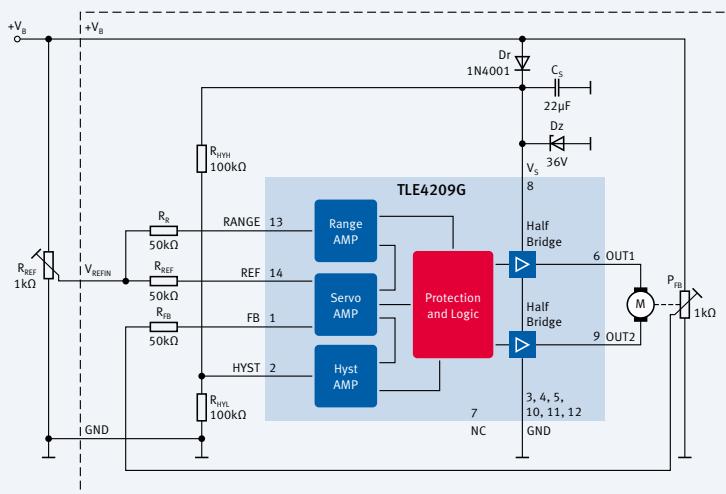
The servo driver family comprises three devices: TLE4206G, TLE4206-2G and TLE4209. Each one features a fully integrated, full bridge with freewheeling diodes and smart power protection features for automotive headlight beam leveling control applications. The standard, thermally enhanced power PG-DSO-14 package leverages low RTH for environments with high ambient temperatures of 150°C. Additional features such as over- and undervoltage lockout, short-circuit protection and overtemperature protection open the way for a wide range of additional automotive and industrial applications.



Key Features

- Protected bipolar power stages
- Low saturation voltage
- Internal freewheeling diodes
- Optimized for Headlight Beam Control (HBC) applications

Block Diagram of TLE4209G



Product Overview

Product Type	$I_{L(NOM)}$	$I_{L(lim)}$	I_q [μA]	$V_{S(\text{op})}$	Protection	Inhibit	Highlights	V_{sat} Path	Package
TLE4205G	0.6	1.0	0.01	6 ... 32	SC	•	Dual power comparator for higher voltage	2.1V at 0.6A ¹⁾ supply voltage	PG-DSO-20/ PG-DIP-18
TLE4206G	0.8	1.5	12	8 ... 18	OT, OV, UV, LO, SC		Servo driver with current peak blanking	1.2V at 0.4A ¹⁾	PG-DSO-14
TLE4206-2G	0.8	1.5	12	8 ... 18			Switching hysteresis on range input	1.2V at 0.4A ¹⁾	PG-DSO-14
TLE4206-4G	0.9	1.6	13	8 ... 19			Adapted range input	1.2V at 0.4A ¹⁾	PG-DSO-16
TLE4209A	0.8	1.5	12	8 ... 18			Servo driver	1.2V at 0.4A ¹⁾	PG-DIP-8
TLE4209G	0.8	1.5	12	8 ... 18			Servo driver	1.2V at 0.3A ¹⁾	PG-DSO-14

1) Total drop saturation voltage
typ. value @ 25°C

LO = Lockout
OL = Open Load
OV = Overvoltage

UV = Undervoltage
OT = Overtemperature
SC = Short Circuit

Monolithic H-Bridges

Infineon offers a broad range of automotive-qualified H-bridges for industrial applications, from gardening equipment through printers and scanners to coffee machines. Originally designed for the extreme environments of powertrain engine applications, the H-bridges can be used for all types of DC motor applications and feature state-of-the-art SmartPower™ technology.

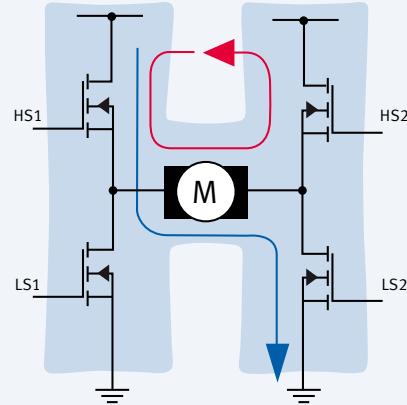
Product Features

- Supply range¹⁾: 5V – 40V
- Output current¹⁾: 1A – 8,6A
- $R_{DS(on)}$ ¹⁾: 120mΩ – 230mΩ
(typ.25°C per transistor)

Protection Features

- Diagnosis capability¹⁾
- Broad green package portfolio

¹⁾ depending on selected H-Bridge



Product Overview

Feature	Ron Max. @ 150°C	Current Limit Type	Current Limit Min.	Short Circuit Det. Min.	Output Control	V _{dd} Monitoring	Max. Switching Freq.	Status Flag	SPI	All I/O 18V Tolerance	Open Load Detection	Package
TLE5205	500mW	-	-	6A	IN1/IN2	-	not specified	✓	-	-	While OFF (TLE5205)	PG-TQ-220-7
TLE5206												
TLE6209	280mW	4.0/5.0 / 6.0/7.0A	3.4/4.25 / 5.1/5.95A	8A	PWM/DIR	-	not specified	-	✓	-	While ON	PG-DSO-20
TLE7209-2	300mW	6.6A	5.5A	8A	IN1/IN2	-	30kHz	✓	✓	✓	While OFF	PG-DSO-20
TLE8209-2	250mW	1.5/4.0 / 6.6/86A	1.0/3.5 / 5.5/7.8A	2.5/5.0 / 7.5/9.5A	IN1/IN2 or SPI	✓	11kHz	✓	✓	✓	While OFF	PG-DSO-20

[www.infineon.com/powertrain-ic]

Stepper Drivers – Cost-Efficient, Durable and Reliable

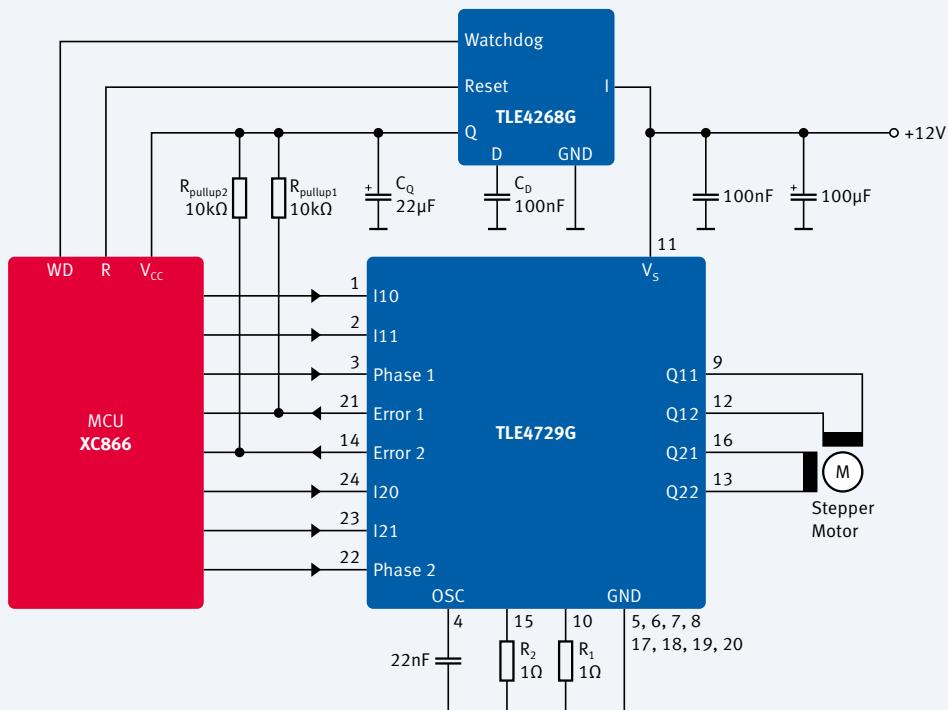
In body electronics, stepper motors are used in headlight beam leveling and HVAC flap systems. They are also widely used in engine management systems, for example, in rpm management, where a motor-driven valve in the bypass air inlet controls idling speed.



Key Features

- Full- to half-step operation
- Protected bipolar power stages
- Implemented current control
- Error flag for diagnosis

Application Example for Stepper Motor Drive



Product Overview

Product Type	$I_{L(NOM)}$	$I_{L(lim)}$	I_q [μA]	$V_{S(op)}$	Step Operations	Protection	Diagnostic Interface	Highlights	Package
Current controlled									
TCA 3727G	2 x 0.75	2 x 1.5	200	5–50	Full to mini step	OT	–	High operating voltage, low quiescent current with inhibit	PG-DSO-24/ PG-DIP-20
TLE4726G	2 x 0.75	2 x 1.5	200	5–50	Full to mini step	OT	–		PG-DSO-24
TLE4729G	2 x 0.7	2 x 1.5	50	6–16	Full to mini step	OL, OT, SC	Status flag	Very low quiescent current with inhibit	PG-DSO-24
Voltage controlled									
TLE4208G	4 x 0.8	4 x 1.5	20	8–18	Full to half step	SC, OT, OV, UV	Status flag	Dual full bridge	PG-DSO-28
TLE8444SL	4 x 0.5	4 x 0.9	1	8–18	Full to half step	SC, OT, OV, UV, OL	Status flag	Open-load detection in ON state	PG-SSOP-24

LO = Lockout
OL = Open Load
OV = Overvoltage

UV = Undervoltage
OT = Overtemperature
SC = Short Circuit

[www.infineon.com/bridges]



IGBTs – For All Your Hard-Switching Requirements

Infineon 600V and 1200V TRENCHSTOP™ IGBTs are the most efficient devices available on the market today. This makes them ideal for applications where efficiency is a key priority. The 600V and 1200V TRENCHSTOP™ IGBTs are typically used in UPS and solar inverters as well as in welding and industrial drives up to 10kW. The new 600V RC-D (Reverse Conducting for Drives) family is a cost-optimized, space-saving solution in DPAK or IPAK up to 15A. These devices are the perfect fit for the white goods segment up to 2kW, where cost and performance are key issues.

RC Drives for 600V Hard-Switching Applications

Key Features

- Optimized for consumer markets
- Best in class $V_{ce(sat)}$ and V_f for outstanding efficiency at frequencies up to 20kHz
- Soft current turn-off waveforms

Key Benefits

- Outstanding space saving capabilities
- Cost optimized
- Lowest power dissipation
- Low cooling and reduced EMI filtering requirements

RC Drives Fast IGBTs for Comfort and Quietness

We have developed new versions of our RC drives IGBT devices to meet rising demand for IGBTs in the low-power motor drive consumer market.

Key Features

- Optimized E_{on} , E_{off} and Q_{rr} for up to 20 % lower switching losses
- Smooth switching performance leading to low EMI levels
- Very tight parameter distribution
- Operating range of 4kHz to 30kHz

Key Benefits

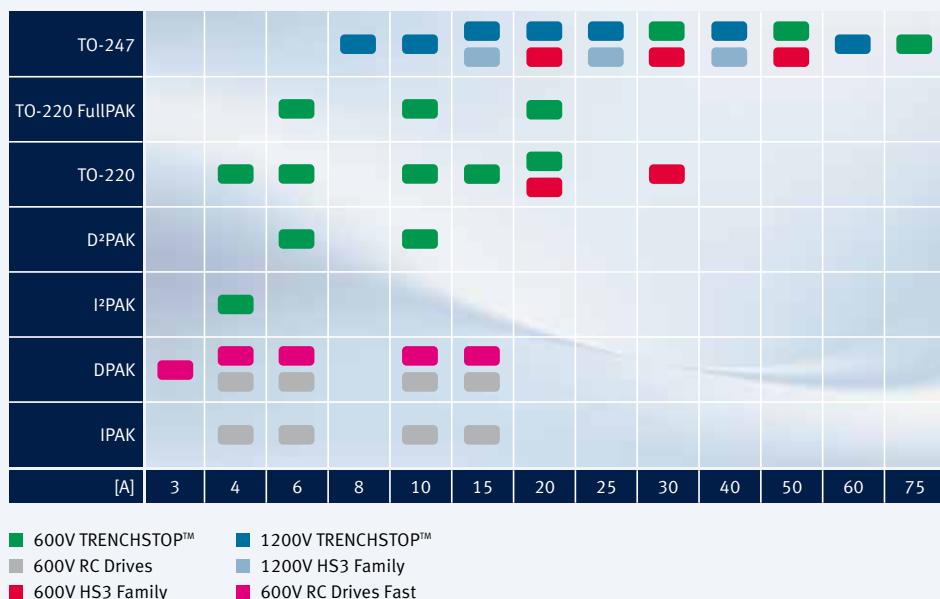
- Best cost/performance for hard switching applications
- Up to 60% space saving on the PCB
- Excellent EMI behavior

At switching frequencies greater than 40kHz, the new 600V and 1200V third-generation, high-speed family (HS3) offers low switching losses and excellent EMI performance.

Key Features and Benefits

- High efficiency thanks to lowest switching losses for switching frequencies up to 60kHz
- Soft switching waveforms for excellent EMI behavior
- Low conduction losses thanks to low $V_{ce(sat)}$
- Optimized diode for target applications with low diode losses and fast recovery times
- RoHS compliance
- Positive $V_{ce(sat)}$ temperature coefficient for easy paralleling and no thermal runaway
- 10µs short-circuit rating

Product Overview



EiceDRIVER™ – Gate Driver IC for MOSFETs & IGBTs



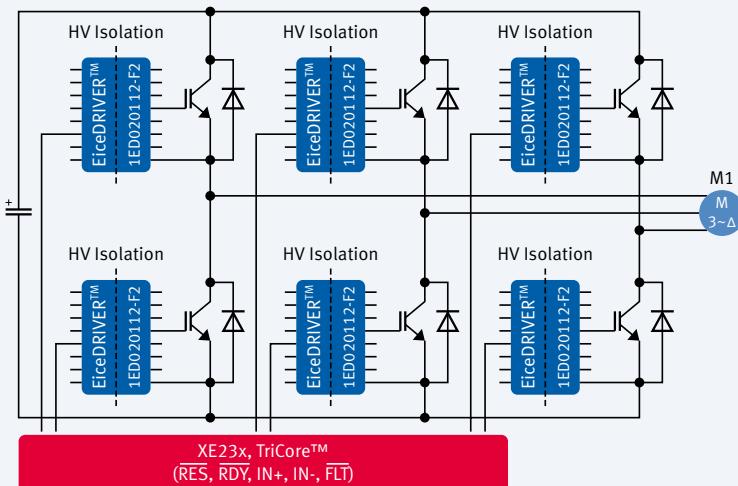
Infineon has launched a new family of EiceDRIVER™ IGBT / MOSFET gate driver ICs for applications with blocking voltages from 600V up to 1200V. The new 6ED series is also available in a 200V version. Based on innovations such as thin-film, silicon-on-insulator technology (600V) and coreless transformer technology (1200V), these products increase reliability levels, reduce losses and improve performance.

Family member 1ED020I12-F2 (1200V) is a single-channel, isolated IGBT / MOSFET driver IC that provides bidirectional galvanic isolation as well as feedback and integrated protection features. 1ED020I12-B2 (1200V) also offers basic isolation at a maximum working voltage of 1420V. A special two-level turn-off feature is integrated in the 1ED020I12-FT and 1ED020I12-BT models.

2ED020I12-F2 (1200V) is a dual-channel, isolated IGBT / MOSFET driver IC. It bundles the same functionality as two 1ED020I12-F2 ICs in a single, compact package. The 2ED020I06-FI (600V) and 2ED020I12-FI (1200V) half-bridge driver ICs include galvanic isolation on the high-side channel as well as customizable overcurrent protection.

The new 200V and 600V 6ED series comprises 3-phase gate driver ICs, which offer excellent robustness against negative transients down to -50V. Variants are available with or without fully integrated bootstrap functionality, positive or negative logic, different undervoltage lockouts and overcurrent protection.

Application Example 1200V 3-Phase Drives



[www.infineon.com/gatedriver]

High-Power Modules

Variable-speed drive systems play a key role to enhance energy efficiency. We can help to boost energy performance with our latest chip technologies and innovative module designs covering the power range from 0.5kW up to more than 1MW. We recently introduced three new module platforms in the low and medium power range: MIPAQ™, SmartPIM & SmartPACK and the EconoPACK™4. PrimePACK™ and IHM-B are new packages in the high-power segment.

SmartPIM and SmartPACK – Flexible Assembly Through Self-Acting PressFIT Technology

Infineon has expanded our PressFIT technology range to include the new SmartPIM and Smart-PACK housing concepts.

The new housing enables the module to be connected with the heat sink and the PCB in a single mounting process. The PressFIT pin is pressed into the PCB, the PCB is stabilized and the module is mounted on the surface of the heat sink in a single step. The whole mounting concept can be performed using an adapted screwdriver. No additional tools are required. This new technology is suited to all conventional electrical circuits. The housing accommodates current up to 75A.

This module family combines all the reliability of established PressFIT technology with a range of advanced features:



- Press-in process by simply tightening a single screw
- Flexible mounting
- The new module and mounting concept reduces process time
- Robust housing concept with decoupled DCB force
- Gas-tight contact so immune to ambient atmosphere
- Decreased FIT rates for interconnections
- Reliable, cold-welded connection of module pins and PCB
- Can be mounted on both sides of standard PCBs

I_c [A]	1200V PIM	600V PIM	1200V SixPACK	600V SixPACK
75				
50				
35				
25				
15				
10				

[www.infineon.com/SMART]

MIPAQ™ – New Level of Extended Functionality and Integration

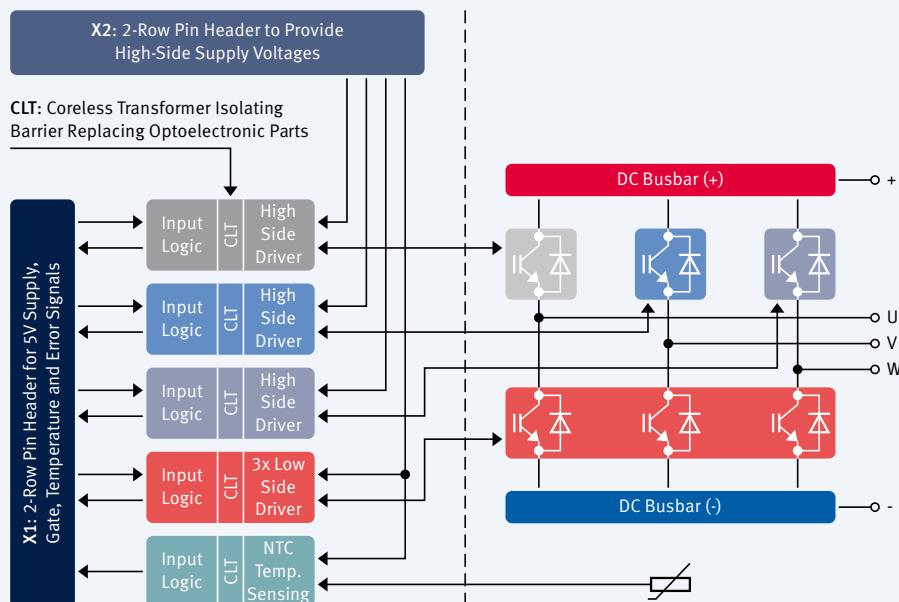
MIPAQ™ is the latest addition to our IGBT module portfolio, enabling electronics to be integrated into power modules.

MIPAQ™ combines an IGBT module with sensing and drive electronics, making it the ideal solution for designing powerful and compact inverters for cost-effective, low and medium-power applications. The resulting energy savings benefit profitability and the environment.

The MIPAQ™ family is based on IGBT modules and offers advanced functions for power ranges between 22kW and 75kW:

- **MIPAQ™ base** module offers integrated shunts
- **MIPAQ™ sense** module offers additional current measurement feature and is fully digital with galvanically isolated output signals
- **MIPAQ™ serve** module includes driver electronics

MIPAQ™ Serve Functional Diagram



The MIPAQ™ serve module is a 3-phase, full-bridge IGBT module with integrated drivers and digital temperature measurement.

These features make it a full plug-and-play solution for high-current drive applications. The module contains galvanically isolated drivers based on our coreless transformer technology. Eliminating optical couplers further enhances the module's long-term stability.

MIPAQ™ serve modules are based on the new EconoPACK™4 and utilize IGBT4 technology. They cover the 1200V range and manage currents of 100A, 150A and 200A. Screws are used for high-current connections. The modules feature standardized connectors for supply voltage and logic signals for plug-and-play functionality.

[www.infineon.com/MIPAQ]

EconoPACK™4 – The New Standard for Compact Inverter Designs

EconoPACK™4 is a new member in our highly-rated Econo product family.

The new EconoPACK™4 IGBT modules feature screw power terminals with excellent electric connections, separate DC and AC links and PressFIT control pins for solder-less inverter assembly. All of which makes them the ideal choice for industrial applications.

- Superb reliability, conductivity and efficiency
- Low stray inductance design
- IGBT4 650V and IGBT4 1200V and 1700V chip technologies
- Screw power terminals and PressFIT control pins
- Robust design

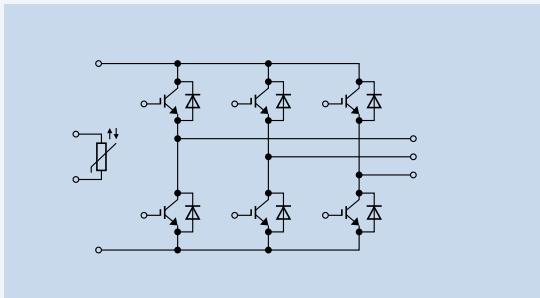


3-Phase, Full-Bridge (SixPACK)

Configuration:

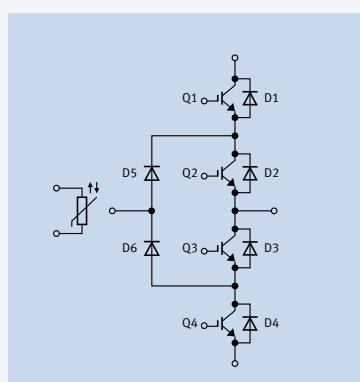
650V/1200V: 100A, 150A, 200A

1700V: 100A, 150A



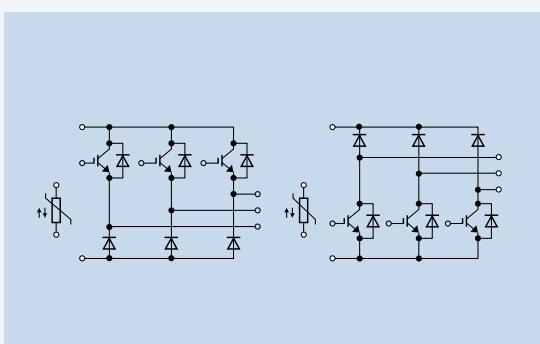
3-Level, 1-Phase Configuration:

650V: 200A, 300A



3*Chopper Configurations:

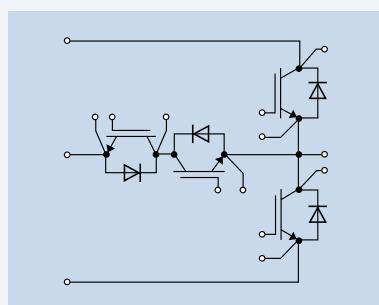
650V: 300A



3-Level, 1-Phase NPC2 Configuration:

1200V/650V: 300A, 400A

1700V/1200V: 300A



[www.infineon.com/EconoPACK4]

PrimePACK™ and IHM-B – Revolutionizing Current and Future Designs

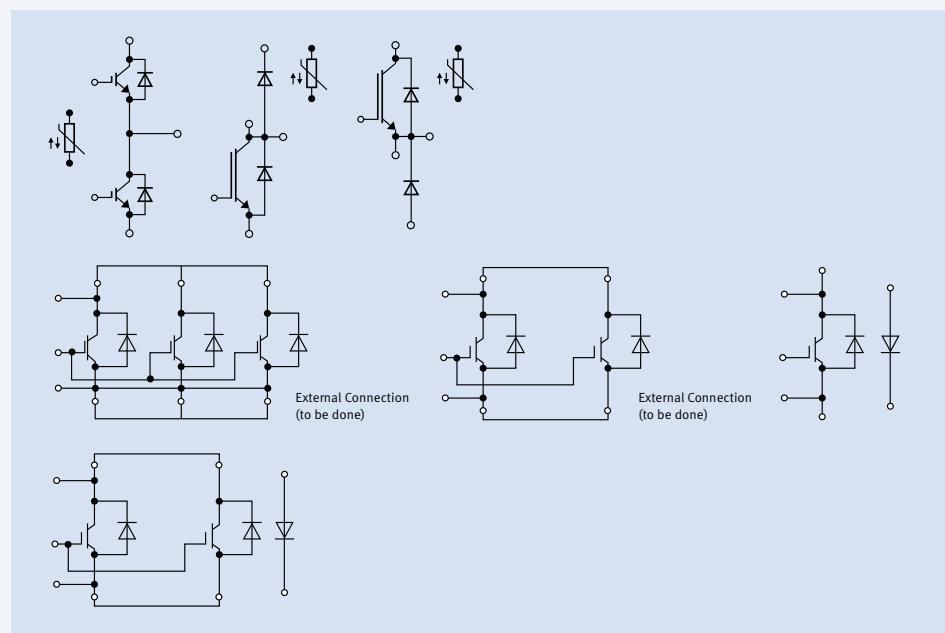


Infineon PrimePACK™ standardizes a novel approach to high-power inverter designs. The innovative housing utilizes a special heat sink that is more efficient than ever before. It is the first high-power module in the market to feature an embedded NTC sensor. The module's new layout enables very compact and high-power three-level inverter topology configurations.

The new IHM-B family meets the reliability requirements of today's widespread IHM high-power modules. The module family also features several new technologies tailored to applications subject to harsh environments. To meet designers' needs, the IHM-B housing has the same outline as the IHM-A.

Key Technologies Implemented in Both Housings

- Ultrasonically welded power and auxiliary terminals
- IGBT4 for 1200V and 1700V
- IGBT3 for 3300V
- Green products able to operate up to $T_j=150^\circ\text{C}$



Both PrimePACK™ and IHM-B products provide optimum design flexibility and are available in half-bridge or chopper configurations (IHM-B as single switch). These two families feature the very latest silicon technology and are available in the following voltage and current ranges:

PrimePACK™:

- 450A-1400A for 1200V
- 450A-1400A for 1700V

IHM-B:

- 1200A-3600A for 1200V and 1700V
- 1000A-1500A for 3300V

[www.infineon.com/PrimePACK]

Hall IC Switches

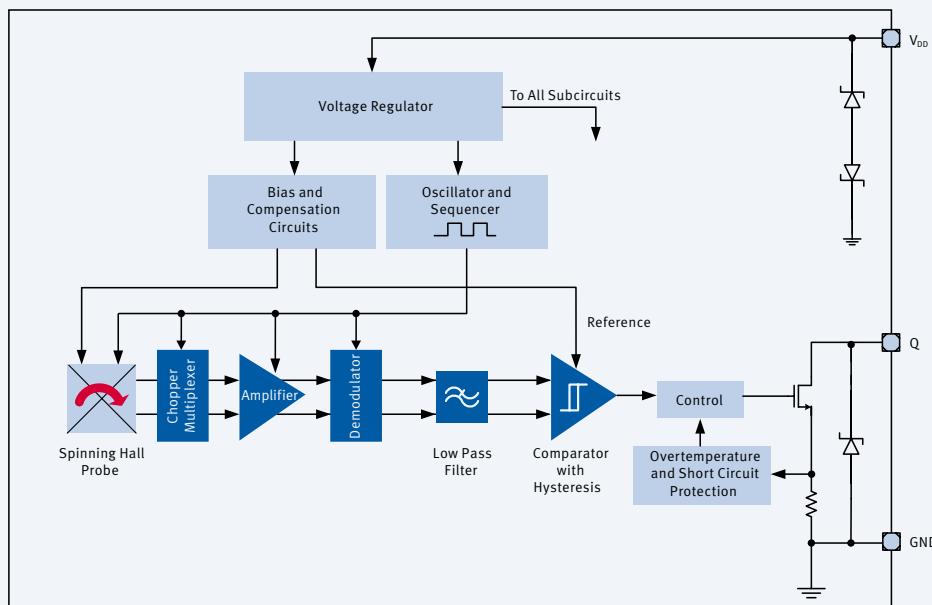
Infineon TLE4968-1K and TLE4961-1K bipolar Hall-effect switches enable exact rotor position detection in BLDC motor commutation. These automotive-qualified sensors feature precise magnetic switching thresholds of +/- 1mT (TLE4968-1K) and +/- 2mT (TLE4961-1K) which enables motors with smooth torque. With an operating voltage of 3V to 32V and a typ. current consumption of just 1.6mA, the sensors are ideally suited for energy efficient system requirements. Offered in a small package, very compact BLDC systems can be realized.



Common Sensor Features

- Operation from unregulated power supply
- 3.0V to 32V extended high operating supply voltage
- Overvoltage capability up to 42V (no additional, external resistor necessary)
- Reverse battery protection (- 18V)
- High sensitivity and high stability of the magnetic switching points
- High resistance to mechanical stress due to active error compensation
- Superior temperature stability
- Extended ESD performance ($\pm 7\text{kV}$ HBM)
- Low jitter (typ. 0,3 μs for a square input signal)
- Automotive qualified
- Output overcurrent & overtemperature protection
- Available in SMD packages SC59 and SOT23 and leaded package PG-SSO-3

Application Example TLE496x



Product Overview

Product Type	Package	Type	B_{OP}	B_{RP}
TLE4961-1K	PG-SC59	Latch	2mT	-2mT
TLE4961-1L	PG-SSO-3	Latch	2mT	-2mT
TLE4961-1M	PG-SOT23	Latch	2mT	-2mT
TLE4968-1K	PG-SC59	Bipolar Switch	1mT	-1mT
TLE4968-1L	PG-SSO-3	Bipolar Switch	1mT	-1mT

[www.infineon/hall-switches]

GMR-Based Magnetic Angle Sensor

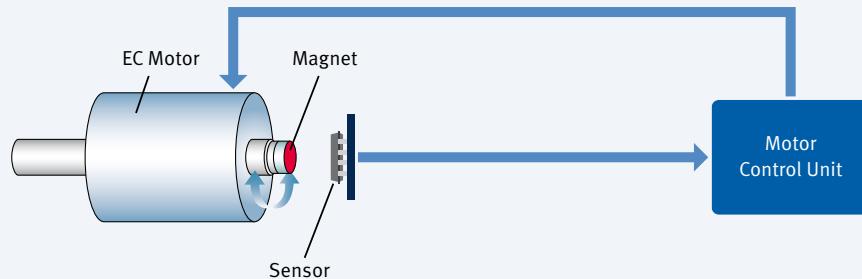


Infineon magnetic angle sensing principle is based on tried-and-tested, automotive-qualified integrated Giant Magneto Resistive (iGMR) technology. iGMR technology combines magneto resistive sensing elements and integrated circuits into one chip. The iGMR technology can determine the absolute orientation of a magnetic field between 0° and 360°. The product portfolio covers a wide range of integrated signal processing and interfaces. Infineon iGMR sensors combine high angular accuracy and resolution with fast signal processing and short delay times, making them ideal for rotor position sensing in electrical drives.

Key Features

- Integrated GMR (iGMR) technology
- 0 - 360° angle measurement with sine and cosine bridge
- Supply voltage 3.3 or 5.0V
- -40°C to +150°C
- On-chip signal processing with angle calculation
- Digital and analog interfaces
- Automotive qualified

Application Example



Product Overview

Product Type	Packages	Halogen-Free	Package	Interface	Application
TLE5009 E1000	PG-DSO-8	Available	SMD	Analog	Angle iGMR
TLE5009 E1010	PG-DSO-8	Available	SMD	Analog	Angle iGMR
TLE5009 E2000	PG-DSO-8	Available	SMD	Analog	Angle iGMR
TLE5009 E2010	PG-DSO-8	Available	SMD	Analog	Angle iGMR
TLE5011	PG-DSO-8	Available	SMD	SPI	Angle iGMR
TLE5012B E1000	PG-DSO-8	Available	SMD	SPI, IIF	Angle iGMR
TLE5012B E3005	PG-DSO-8	Available	SMD	SPI, HSM	Angle iGMR
TLE5012B E5000	PG-DSO-8	Available	SMD	SPI, PWM	Angle iGMR
TLE5012B E9000	PG-DSO-8	Available	SMD	SPI, SPC	Angle iGMR

Support Tools

XMC4500 Low Voltage Motor Drive Kit

[www.infineon.com/xmc]

New

Key Features

- XMC4500
 - ARM® Cortex™-M4 with 120MHz, 1MB Flash, 160kB RAM
- PWM with emergency shutdown and ADC trigger
 - Quad-ADC with 4x12-bit and 70ns sample time
 - Delta Sigma Demodulator for resolver feedback
 - Pattern Generator for resolver excitation
 - 3-phase halfbridge inverter for Motors with 24V/7.5A
- Multi-phase current measurement
- Quadrature Encoder Interface (Maxon Motor compatible)
- Resolver Interface
- Communication: Ethernet, USB, CAN and RS485
- HMI: OLED Display and touch buttons
- Mobile mass storage: SDMMC Card slot
- IDE: Free Tool Chain DAVE™ 3 including compiler and debugger
- Software: DAVE™ 3 Motor Control App
- Code Instrumentation with DAVE™ 3 XSPY-Plugin



Applications

General purpose industrial motor applications:

- Conveyor Belts
- Transportation and Lifting Systems
- Linear Drives
- Positioning and Synchronized Drives
- HVAC

Automotive BLDC Motor Drive Kit

[www.infineon.com/bldc]

Key Features

- Scalable, 3-phase inverter
- Sample code:
FOC & V/f for XC886 and XC2238N
- Integrated protection features for high system reliability
- Complete IDE software packages included
- Easy installation, plug & play



Applications

- Pumps
- Fans

BLDC (Brushless DC) Application KIT[www.infineon.com/BLDC]**Key Features**

- XC866
 - PWM unit
 - Fast ADC with <200ns sample time
- Power board 9V-18V, 20A
- 50W PMSM motor and plug-in power supply 12V
- Uses Infineon NovalithIC™ BTN 7960B and TLE4264 LDO

- DAVE™ Drive auto-code generator (fully functional application code) for
 - Block switching with Hall sensors and sensorless
 - Free tool chain including compiler and debugger
- Digital isolated, real-time monitoring tool (USB to JTAG and CAN bridge)
- Tutorial videos demonstrating how to use the kit
- Suitable for Windows 98/2000/XP

**Applications**

- Water pumps
- Fuel pumps
- Fans
- Valves
- Power tools

DAVE™ Drive Application Kit[www.infineon.com/davedrive]**Key Features**

- XC886 with vector computer
 - PWM unit
 - Fast ADC with <200ns sample time
- Power board 23V-56V, 7.5A
- 15W PMSM motor and plug-in power supply 24V
- Uses Infineon 6ED003L06 gate driver, BSC196N10, MOSFETs, CoolSET™ ICE3B0565 power supply and TLE4264 LDO
- DAVE™ Drive auto-code generator (fully functional application code) for
 - Block switching with Hall sensors and sensorless
 - Sensorless FOC of PMSM

- Free tool chain integrated in DAVE™ Drive
- Flexibly generates optimized code and is not based on static libraries
- Configures Infineon's powerful and flexible motor control peripherals
- Compresses a detailed user manual into a few mouse clicks
- Helps designers to quickly and easily implement advanced motor control techniques on low-cost components
- Digital isolated real-time monitoring tool (USB to JTAG and CAN bridge)
- Suitable for Windows 98/2000/XP

**Applications**

- Industrial motor controls
- Transportation systems
- Consumer motor controls
- Appliance motor controls



FOC Drive Application Kit

[www.infineon.com/FOCdrive]

Key Features

- XC878 with vector computer
 - Two independent PWM units
 - Fast ADC with <200ns sample time
- XE164 real-time signal controller with MAC unit
 - Three independent PWM units
 - Two independent fast ADCs with <200ns sample time
- Power board 23V - 56V, 7.5A
- 15W PMSM motor and plug-in power supply 24V
- Uses Infineon 6ED003L06 gate driver, BSC196N10, MOSFETs, CoolSET™ ICE3B0565 power supply and TLE4264 LDO
- Software package including source code
 - Sensorless FOC of PMSM with XE164
 - Sensorless FOC of PMSM with XC878
- Free tool chain for XC878 and XE164 including compiler and debugger
- Digital isolated, real-time monitoring tool (USB to JTAG and CAN bridge)
- DAVE™-compatible software packages
- Suitable for Windows 98/2000/XP

Applications

- Industrial drives
- Fans, blowers
- Pumps

Air-Conditioning Reference Board

[www.infineon.com/aircon]

Key Features

- XC878 with vector computer
- XE164 real-time signal controller with MAC unit
- Power board
- 1kW compressor inverter stage using 15A RC drives IGBT in DPAK (TO-252)
- 200W outdoor fan inverter stage using 4A RC drives IGBT in DPAK (TO-252)
- 1.5kW CCM-PFC using 20A high-speed 3 IGBT and 10A SIC diode
- Software package including source code
- Simultaneous control of two PMSMs with sensorless FOC & digital PFC with XE164
- Sensorless FOC & digital PFC with XC878
- V/f control of ACIM for quick evaluation
- Free tool chain for XC878 and XE164 including compiler and debugger
- Digital isolated, real-time monitoring tool (USB to JTAG and CAN bridge)
- DAVE™-compatible software packages
- Suitable for Windows 98/2000/XP/7

Applications

- Air conditioning
- Industrial drives
- Fans, blowers
- Pumps
- White goods

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- Direct access +49 89 234-0 (interconnection fee, German/English)

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