



Selection Guide

Battery powered motor drives



Highest performance in your motor control

Content

Evaluation boards	4
Solution matrix for battery powered motor drives	5
Consumer robotics	6
Home and professional	10
Light electric vehicles	12
Low voltage MOSFETs	14
OptiMOS™ and StrongIRFET™	14
Small Signal MOSFETs	18
High voltage MOSFETs – CoolMOS™	19
Intelligent power modules (IPM)	20
Motor control and gate driver ICs	21
Gate driver ICs	21
iMOTION™	24
Microcontroller – XMC™	26



Evaluation boards

High efficiency demonstrators driving your innovation



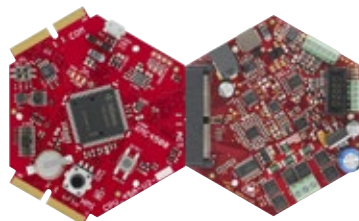
iMOTION™ modular application design kit (EVAL-M1-099M)

The iMOTION™ modular application design kit (MADK) evaluation platform covers motor drive applications up to 1 kW. Using iMOTION™ MADK standardized M1 platform interface, different control and power boards can be combined in a system that perfectly matches the requirements of the application. This modular approach allows developers a maximum in flexibility and scalability during the evaluation and development phases at affordable cost.



XMC1000 and XMC4400 motor control application kits

The XMC1000 and XMC4400 motor control application kits are ready-made evaluation kits for three-phase drives. These two kits are best suited to customers looking for a motor control plug & play experience. Both kits have a similar setup with a microcontroller board, the respective 24 V power board including n-channel OptiMOS™ power transistors and a three-phase gate driver EiceDRIVER™ from Infineon, rounded off with a brushless DC motor. The kits are supported by the DAVE™ motor control apps library, including sinusoidal and block commutation as well as various position detection and sensing schemes with encoder, hall sensors and shunts. The XMC4400 motor control application kit also includes a resolver interface.



40 V Medium Can ME/MF DirectFET™ three-phase BLDC motor drive demonstrator board



Top view

The power tools ME/MF DirectFET™ kit consists of a power board and a control board (KIT_XMC1300_DC_V1). The kit demonstrates the complete solution from Infineon for cordless power tools BLDC motor drives, which achieves the best-in-class power efficiency and power density.



Bottom view

www.infineon.com/motorcontrol
www.infineon.com/imotion
www.infineon.com/xmc

Solution matrix for battery powered motor drives




Highest performance in your motor control application

Based on industry leading technology, highest quality and manufacturing expertise, Infineon provides a variety of innovative power semiconductors which enable designers to develop highly reliable and efficient solutions for all kinds of motor drive applications.

Through our comprehensive portfolio we can address a broad range of battery powered motor control applications, such as power tools, forklifts, all kinds of light electric

vehicles including e-skateboards, e-scooters, pedelecs, low speed cars and many others. Infineon offers an excellent selection of devices for power management and consumption, as well as voltage regulation – such as power MOSFETs (e.g. CoolMOS™ and OptiMOS™), XMC™ microcontrollers, EiceDRIVER™ gate drivers and more.

To explore our comprehensive portfolio, please visit our website www.infineon.com

	Consumer robotics 	Home and professional 	Light electric vehicles 
MOSFETs	StrongIRFET™ 20 V-300 V		
	OptiMOS™ 25 V-80 V		OptiMOS™ 80 V-300 V
	CoolMOS™ P7 (standard grade) ¹		CoolMOS™ P7 (industrial grade) ¹
Gate driver ICs	EiceDRIVER™		
	200 V and 600 V gate driver ICs		
IPM	CIPOS™ Nano		
Microcontrollers	XMC1300/XMC1400		
	iMOTION™	XMC4500/XMC4400	
Microcontroller & driver support	Linear voltage and DC-DC switching regulators		
Magnetic sensors	Hall sensors		

¹) If the necessary package/ $R_{DS(on)}$ combination is not available in the new CoolMOS™ P7 series yet, the previous CoolMOS™ CE and P6 series are the preferred series



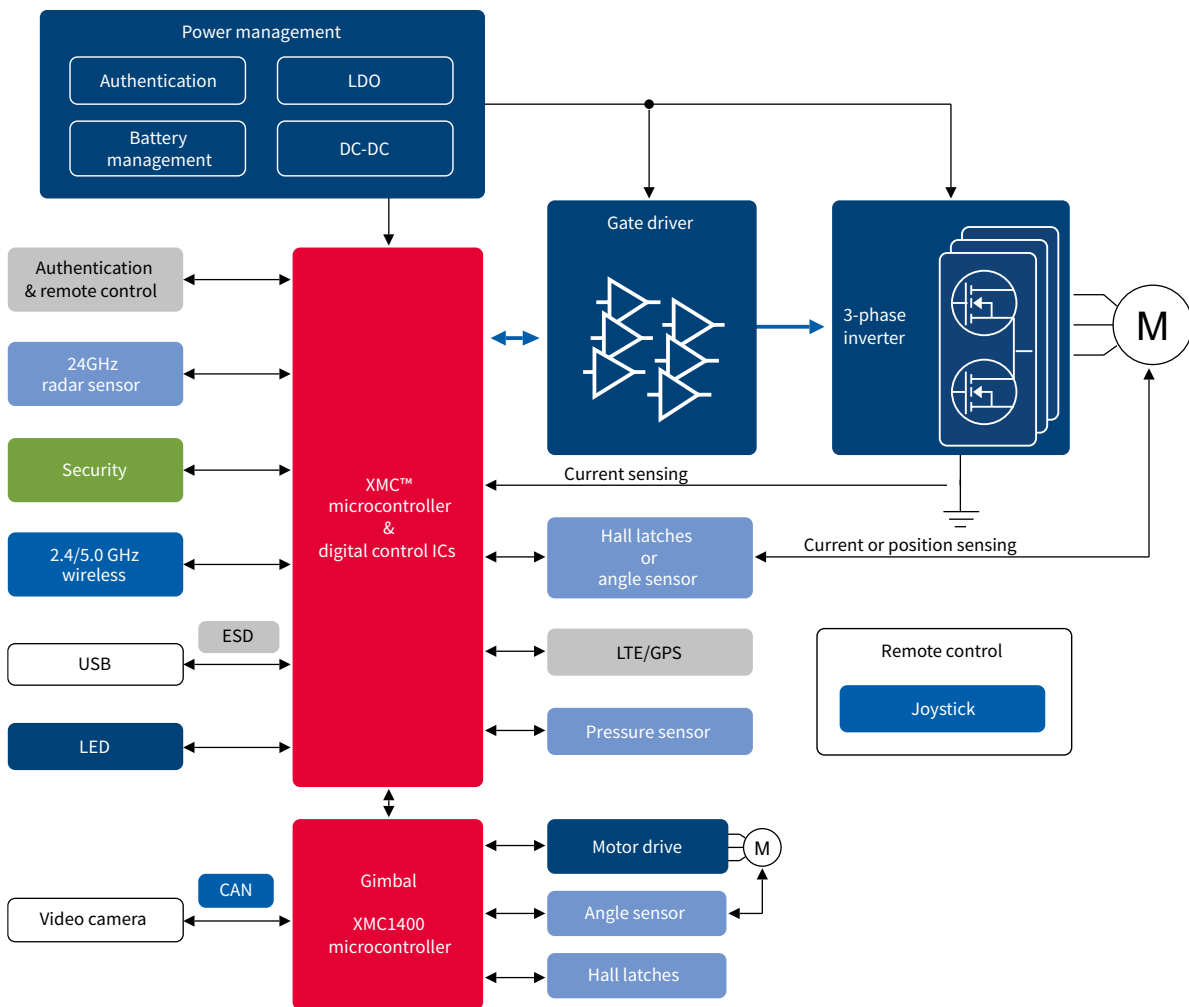
Consumer robotics - multicopters

Cost-effective system solutions

Consumer robotics is the fastest growing segment of the whole robotics market. The biggest growth is in multicopters and service robots. Within multicopters, camera applications, autonomous flying and sophisticated on-board equipment are pushing the

limits of performance, efficiency and control. From XMC™ microcontrollers and iMOTION™ motor control ICs through to magnetic sensors, Infineon offers a comprehensive system solution portfolio of high quality products suitable for multicopter designs.

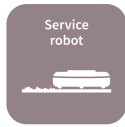
Application example block diagram – multicopter





Solution tree for multicopters

Flight control					ESC		
Microcontrollers	Sensors	DC-DC modules	LDO	Low noise amplifier(LNA)	Microcontrollers	Sensors	Intelligent power modules
<ul style="list-style-type: none"> > XMC4000 family > XMC1000 family > AURIX™ 	<ul style="list-style-type: none"> > Pressure sensor: DPS310 > 24 GHz radar sensor: BGT24MR > Current sensor: TLI4970 	<ul style="list-style-type: none"> > IFX90121ELV50 > IFX91041EJV33 > IFX91041EJV50 	<ul style="list-style-type: none"> > IFX1117ME > IFX54441EJV > IFX1763XEJV33 	<ul style="list-style-type: none"> > LTE: BGA7H, BGA7M, BGA7L > GPS: BGA524N6, BGA824N6 > Wi-Fi: BFP842ESD, BFR840L3RHESD, BFR843L3, etc. 	<ul style="list-style-type: none"> > XMC1300 family > iMOTION™ > IRMCK099 > Integrated driver TLE987x family 	<ul style="list-style-type: none"> > Hall sensor: TLI4961, TLV4961 > Angle sensor: TLI5012B, TLE5009 	<ul style="list-style-type: none"> > Pressure sensor: DSP310 > Hall sensor: TLI4961 > Angle sensor: TLI5012B
Security	Accessory authentication	Joystick	Interface protection diodes	LED drivers	MOSFET gate drivers	Dual n-channel power MOSFETs	Low voltage MOSFETs
<ul style="list-style-type: none"> > OPTIGA™ Trust E SLS32AIA > OPTIGA™ Trust P SLJ52ACA > OPTIGA™ TPM SLB96XX 	<ul style="list-style-type: none"> > OPTIGA™ Trust SLS10ERE > ORIGA™ SLE95050 	<ul style="list-style-type: none"> > 3D magnetic sensor: TLV493D 	<ul style="list-style-type: none"> > ESD102 series 	<ul style="list-style-type: none"> > BCR450 > BCR321IU > BCR421U 	<ul style="list-style-type: none"> > IRS2301S > 6EDL04N02P > IRS23365 > PX3517 	<ul style="list-style-type: none"> > IR3742, etc. > BSC0925ND, etc. 	<ul style="list-style-type: none"> > OptiMOS™ 5 series > StrongIRFET™ series
Charger				Battery management			
High voltage MOSFETs	Low voltage MOSFETs	Stand alone PWM controllers	Authentication ICs	Cell balancing	Low voltage MOSFETs		
<ul style="list-style-type: none"> > 600 V-650 V CoolMOS™ CE > 600 V CoolMOS™ P7 (standard grade) 	<ul style="list-style-type: none"> > 40 V-80 V OptiMOS™ 5 in TO-220, SuperS08 > 40 V-75 V StrongIRFET™ 	<ul style="list-style-type: none"> > ICE2QS03G 	<ul style="list-style-type: none"> > OPTIGA™ Trust B SLE95250 	<ul style="list-style-type: none"> > 30 V OptiMOS™ in SS08, S308, DirectFET™ > 30 V StrongIRFET™ 	<ul style="list-style-type: none"> > OptiMOS™ 5 in SuperS08, S308, DirectFET™ > 40 V-80 V StrongIRFET™ 		
Gimbal control							
Microcontrollers	Angle sensors	LDO	CAN transceivers	Low voltage MOSFETs	Dual n-channel power MOSFETs	MOSFET gate drivers	
<ul style="list-style-type: none"> > XMC1400 family 	<ul style="list-style-type: none"> > TLI5012B > TLE5009 	<ul style="list-style-type: none"> > IFX1117ME > IFX54441EJV > IFX1763XEJV33 	<ul style="list-style-type: none"> > HS CAN IFX1050G > IFX1050GVIO 	<ul style="list-style-type: none"> > OptiMOS™ 5 25 V-30 V > StrongIRFET™ 25 V-30 V 	<ul style="list-style-type: none"> > IRFHM8363TRPBF, etc. 	<ul style="list-style-type: none"> > IR2101STRPBF, etc. 	



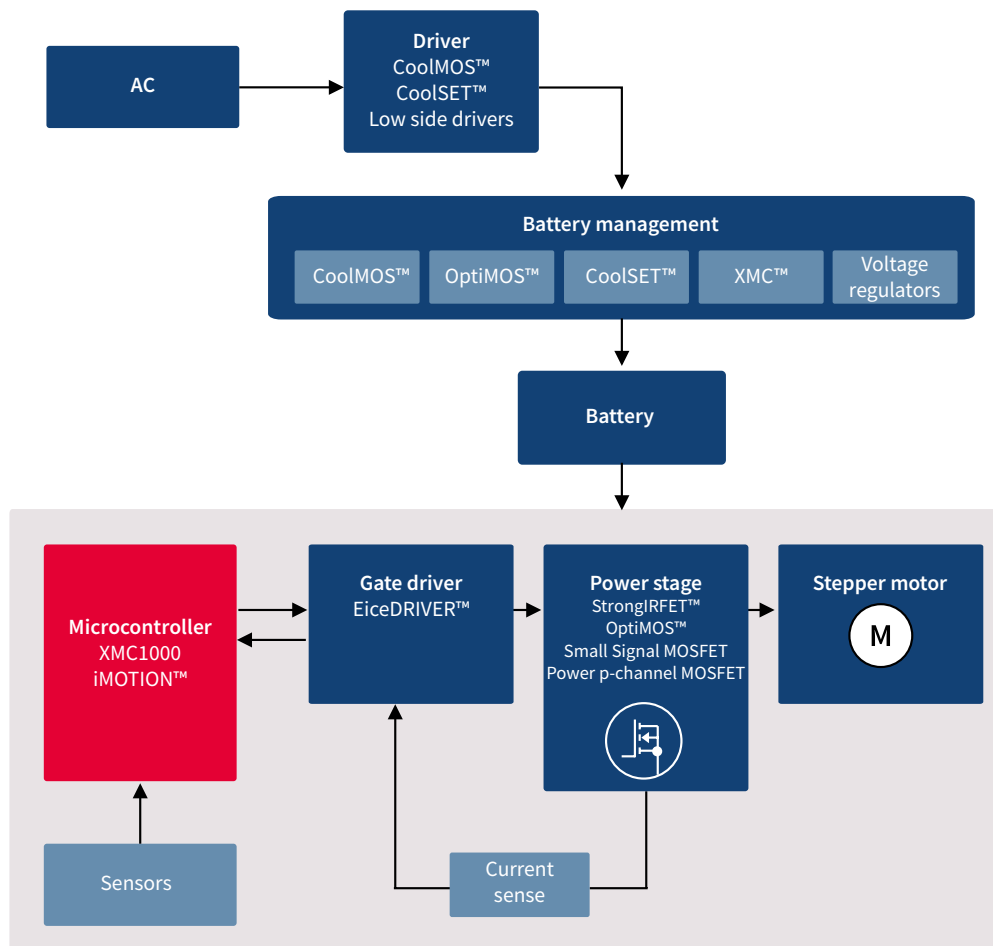
Consumer robotics – service robotics

Powerful and quiet solutions

Service robotics is another fast growing segment with a 15 percent CAGR within the next 5 years. The key applications are electric vacuum cleaners and lawn mowers. High

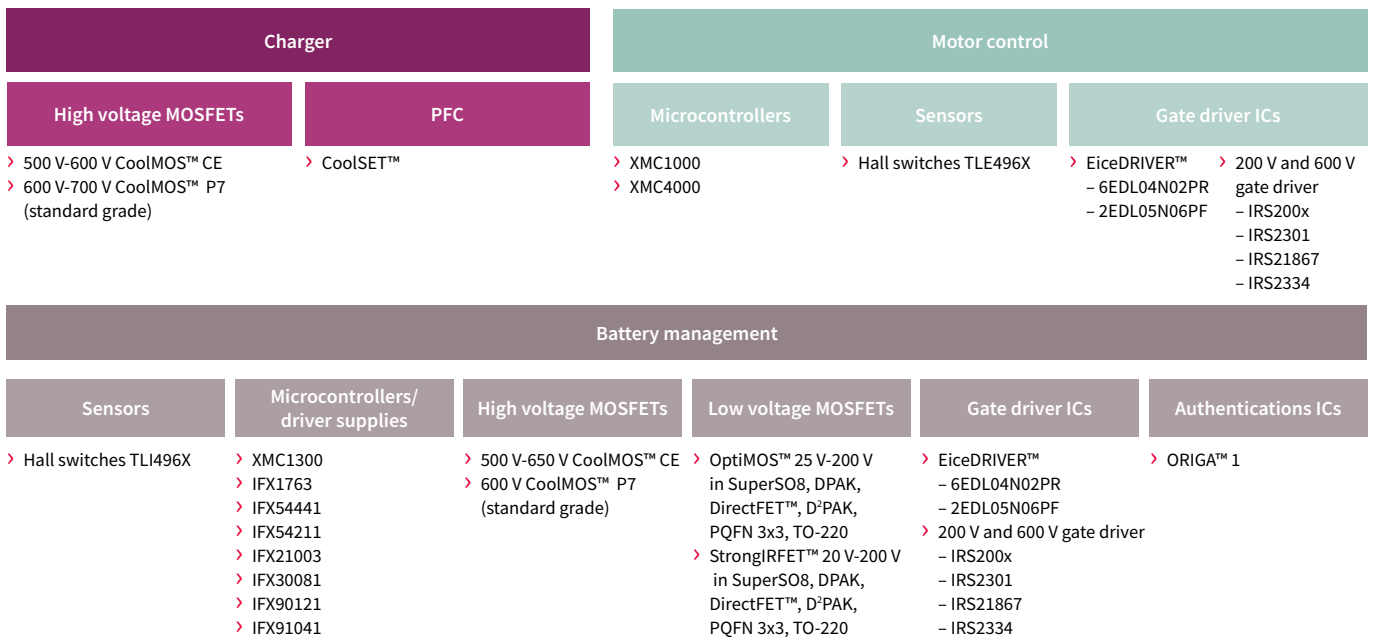
performance Infineon components such as low $R_{DS(on)}$ MOSFETs, powerful microcontrollers and sensors enable high power density, weight reduction and quietness.

Application example block diagram – service robotics





Solution tree for service robotics (vacuum cleaners and lawn mowers)





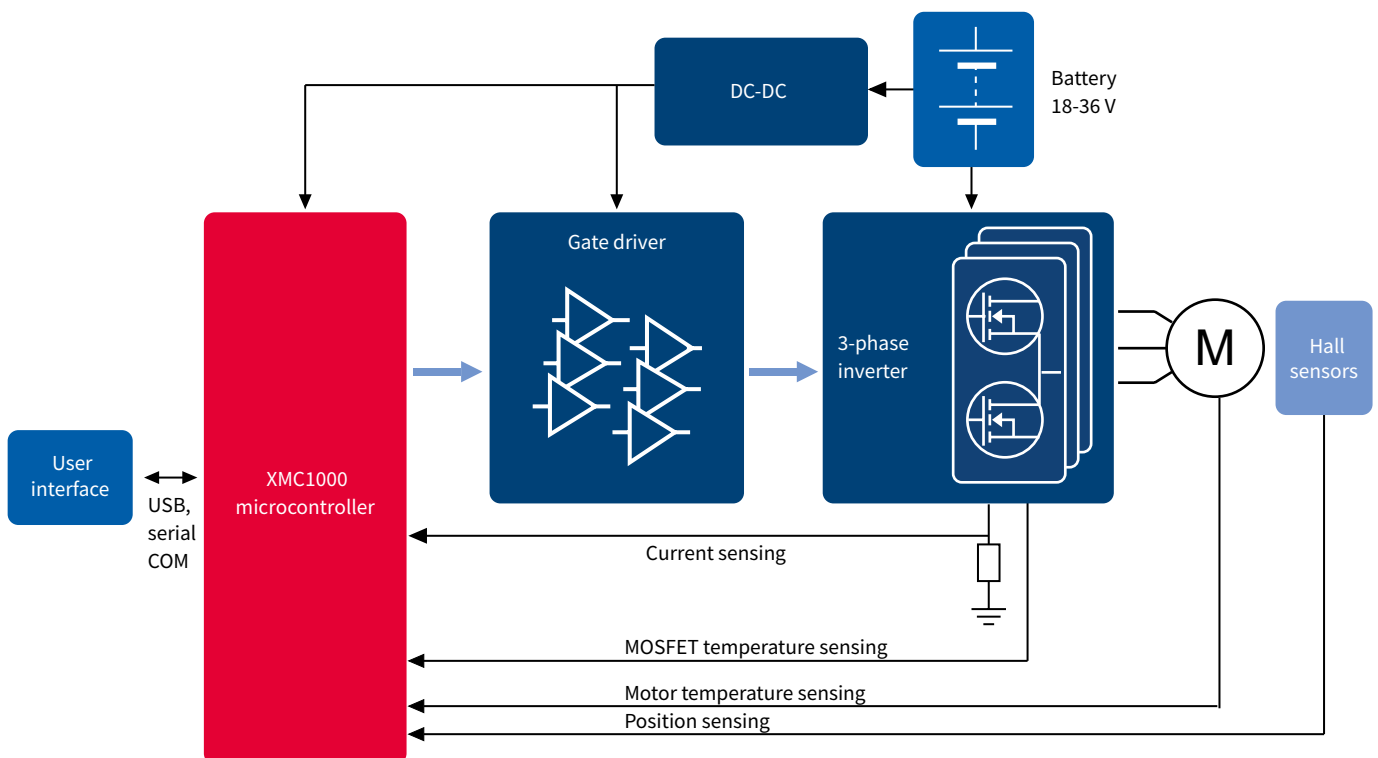
Home and professional

Highest power density and system efficiency

Today, cordless power tools are the fastest growing sector within the electric tool market. The convenience and safety of lightweight and low voltage cordless power tools bring benefits to both professional and private users. Depending on the topology, cordless power tools require

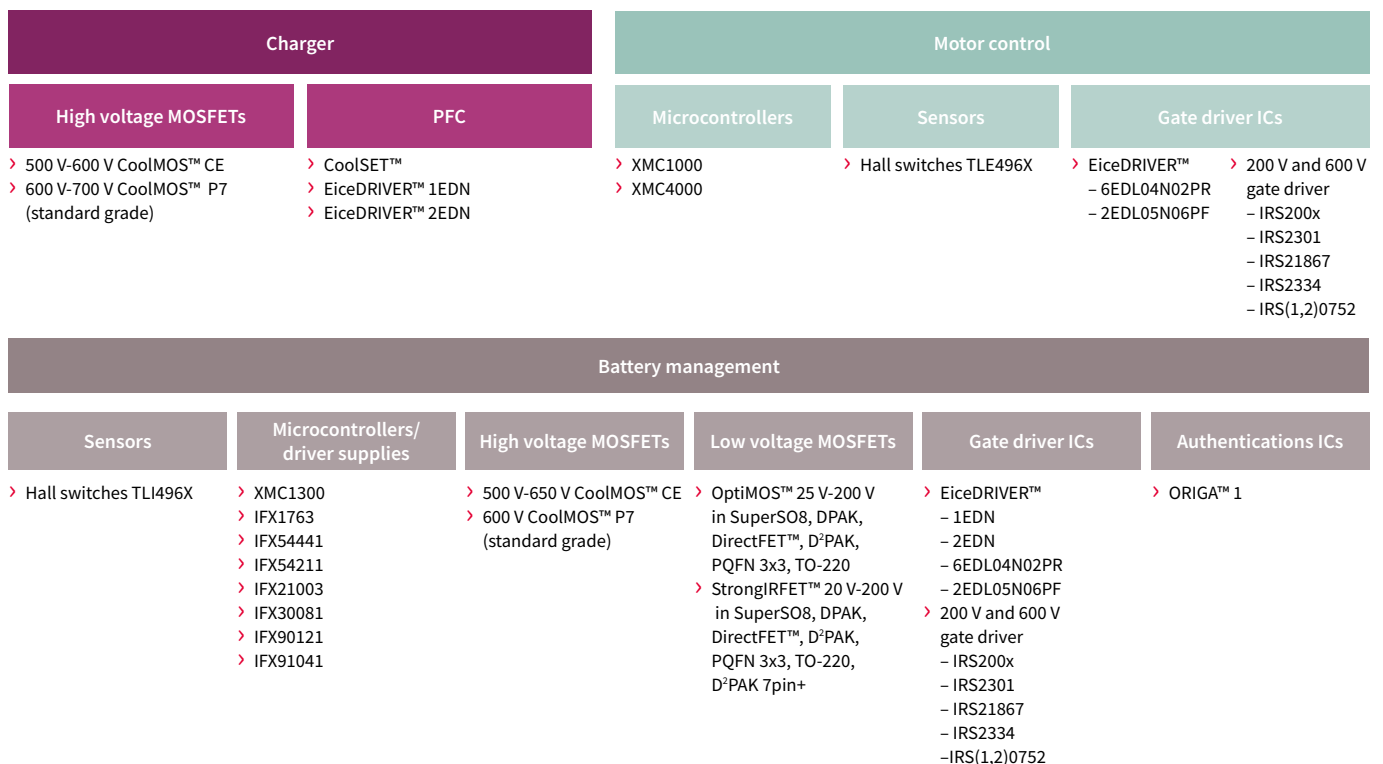
either space optimized designs or cost optimized solutions. For both requirements Infineon can offer a complete portfolio of products including MOSFETs, drivers, microcontrollers, and sensors to enable excellent product performance and reliability.

Application example block diagram – power tool





Solution tree for power tools





Light electric vehicles

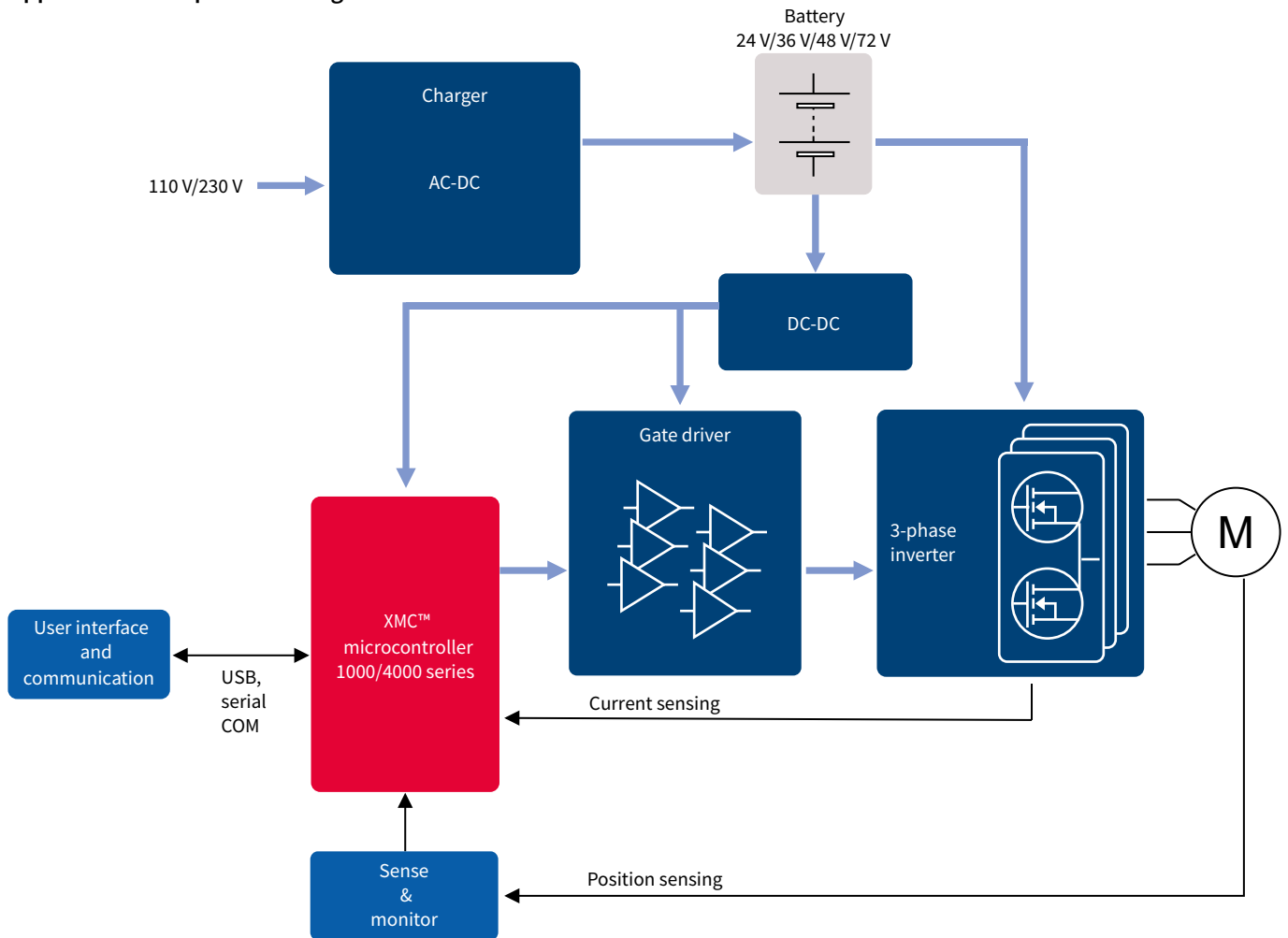
Performance leadership and system solution

Environmental concerns have seen the rapid need to reduce pollution within large urban areas. E-mobility alternatives such as e-bikes, e-scooters and low speed cars have exposed the needs for more efficient and higher performing electric motors. At the same time increasing battery operat-

ing range and life time as well as reduced charging time are key requirements.

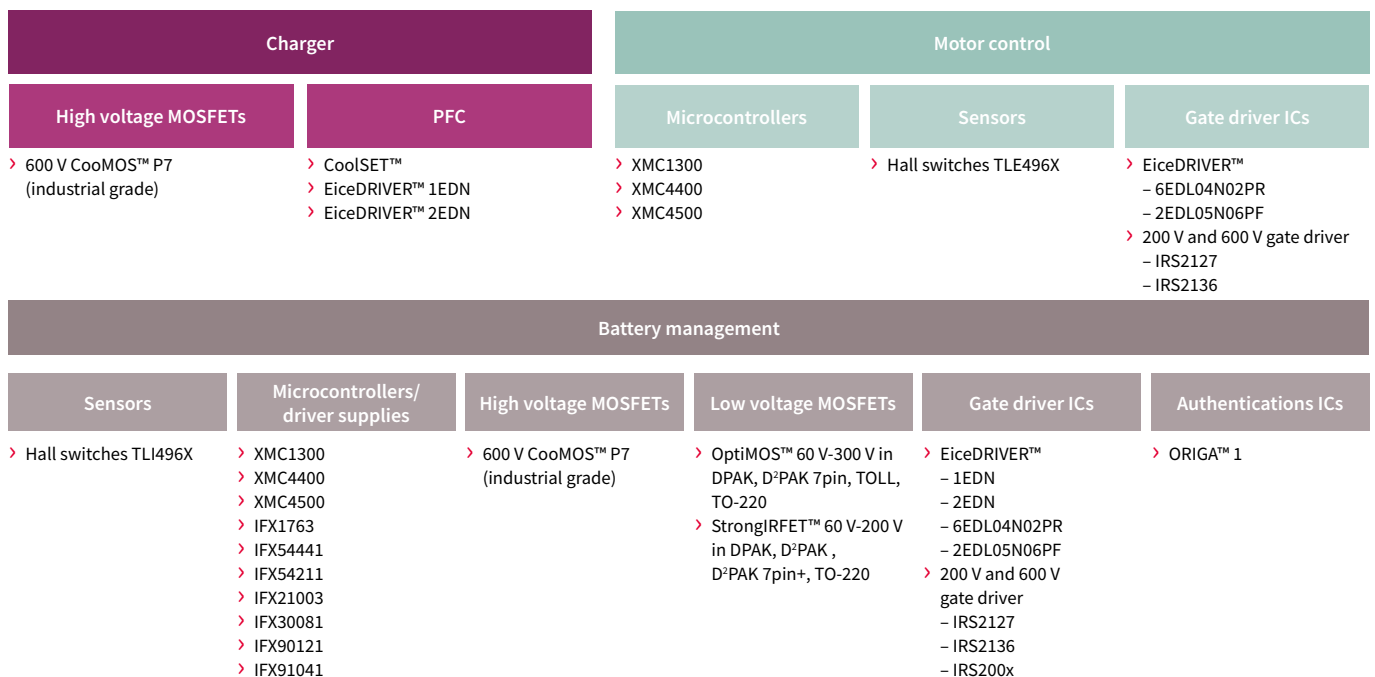
With XMC™ microcontrollers, EiceDRIVER™ gate drivers and OptiMOS™ low voltage MOSFETs, Infineon provides solutions for all e-mobility applications.

Application example block diagram – e-bike





Solution tree for light electric vehicles



OptiMOS™ and StrongIRFET™

Power MOSFETs for motor drive applications

Infiniteon power MOSFETs enable higher efficiency, power density and cost effectiveness within motor driven applications. The joint OptiMOS™ and StrongIRFET™ portfolio, covering 20 V up to 300 V MOSFETs, addresses both low and high switching frequencies.

OptiMOS™ and StrongIRFET™ family positioning

The graph shows the recommended technology for best fit standard components, price/performance and differentiated products according to switching frequency.

For low frequency applications, OptiMOS™ 5 is the best fit when best-in-class performance is required. However, StrongIRFET™ is recommended for 20 V to 75 V applications

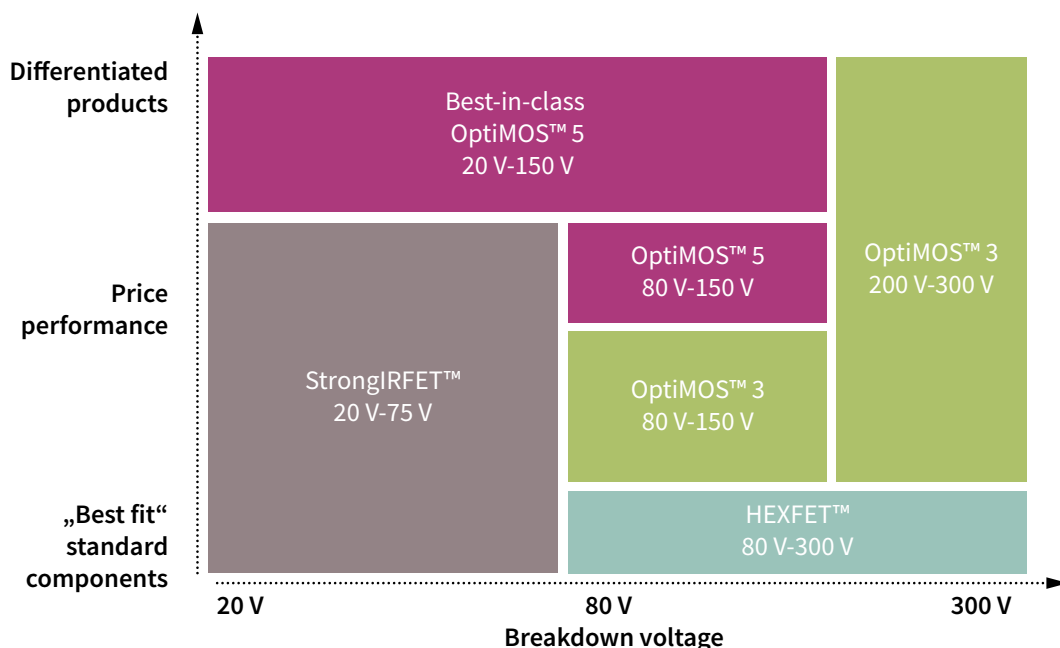
when best-in-class performance is not essential and cost is a more significant consideration.

For best-in-class performance at voltages from 80 V to 150 V, OptiMOS™ 5 is recommended. If best-in-class is not essential and price/performance is more important, then OptiMOS™ 3 or StrongIRFET™ is the recommendation.

Voltages above 150 V are available in OptiMOS™ 3 and StrongIRFET™. In addition, older trench MOSFETs, shown here as HEXFET™, are an option for highly commoditized markets where cost is the main consideration.

Infiniteon can offer bare die options, if this is the preferred design choice.

Low frequency applications <100 kHz







Best-in-class technology, robustness and price/performance ratio

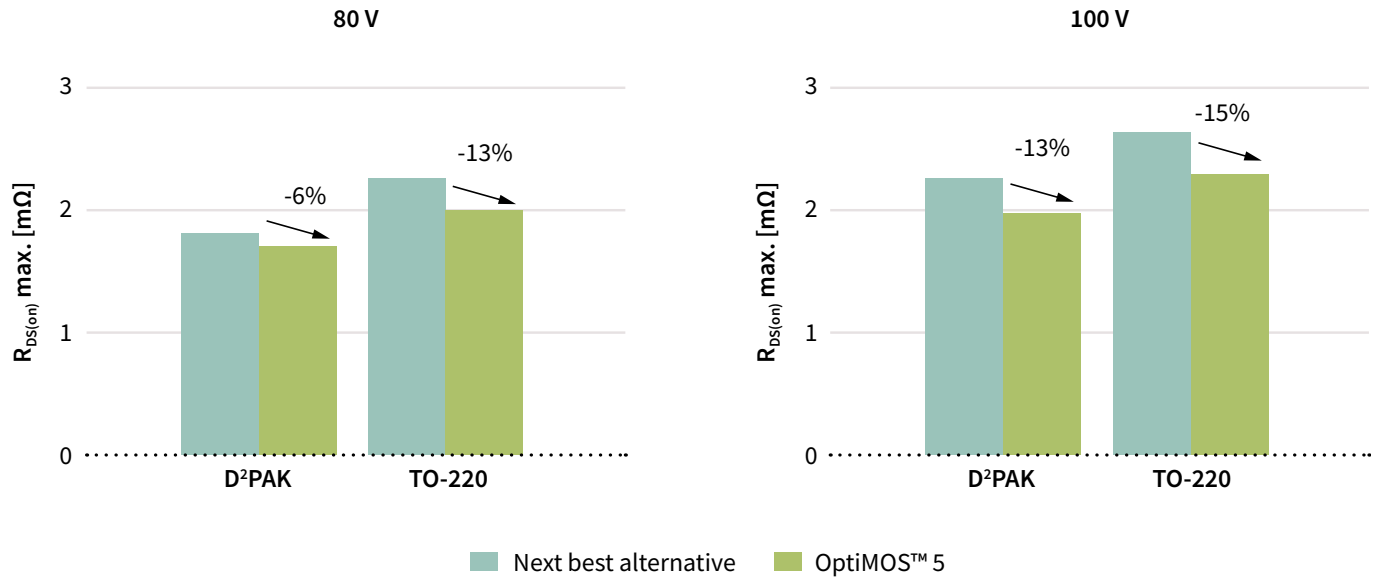
OptiMOS™ and StrongIRFET™ MOSFETs consistently meet the highest quality and performance demands in key spec-

ifications for power system design such as on-state resistance and figure of merit characteristics.

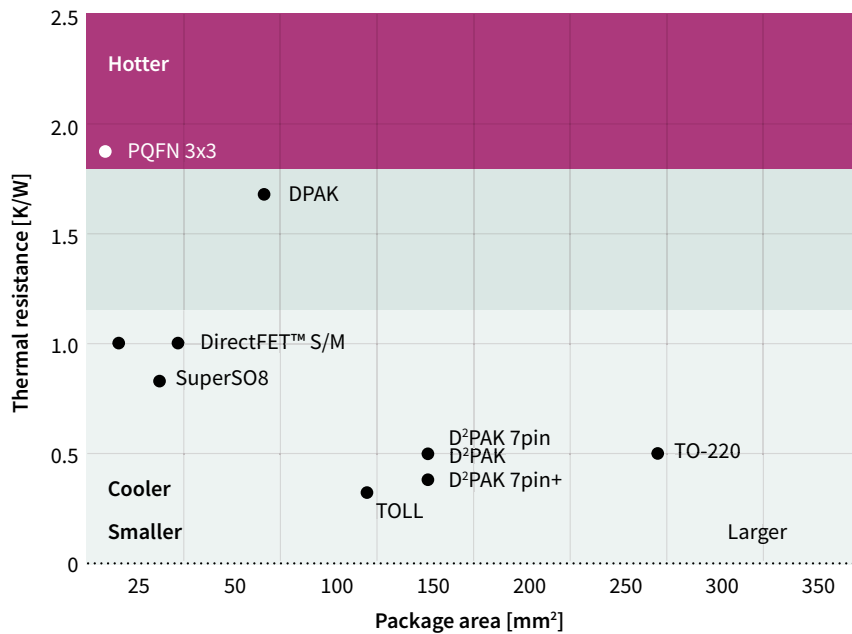
Features and benefits

OptiMOS™	StrongIRFET™
Highest system efficiency and reduced switching losses due to output capacitance reduction	Designed for industrial applications
Increased commutation ruggedness	Ideal for low switching frequency (<100 kHz)
Narrow parameter spread e.g. $V_{GS(th)}$ especially in 100 V and 150 V	High current carrying capability (>120 A) for increased power capability
Less paralleling required	Rugged silicon for robustness
Increased power density	4.5 V logic level optimized
Low voltage overshoot	Low $R_{DS(on)}$ for reduced conduction losses
	

$R_{DS(on)}$ comparison between OptiMOS™ 5 and next best alternative in 80 V and 100 V



The right package depending on the requirements



A full portfolio of industry standard packages is available to suit differing design requirements such as thermal behavior and footprint.

- www.infineon.com/packages
- www.infineon.com/toll
- www.infineon.com/to-247-4
- www.infineon.com/to-247plus
- www.infineon.com/optimos-latest-packages
- www.infineon.com/powermosfet-20V-300V

Best-in-class technology, robustness and price/performance ratio



Best thermal behavior in a tiny footprint

DirectFET™

The DirectFET™ portfolio is the best fit for a broad number of industrial applications such as voltage regulators for servers, DC-DC converters in telecom, solar microinverters and maximum power point trackers (MPPT), low voltage drives and synchronous rectification in server and desktop. With only a 31 mm² footprint, DirectFET™ M allows 79 percent space reduction in power components on the board compared to traditional D²PAK. In addition, the metal can enables double-sided cooling along with almost no package parasitic inductances, leading to a higher system efficiency. DirectFET™ Corner Gate offers the same benefits but in addition reduced package resistance, improved thermal behavior as well as increased current rating.



For highest efficiency and power management

SuperSO8/PQFN 3.3 x 3.3

In applications such as synchronous rectification in server and desktop, motor drives and DC-DC converters in telecom, high power density and high efficiency are the main objectives. The trend set by Infineon to move from TO-220 to SuperSO8 and PQFN 3.3 x 3.3 reduces the area consumption considerably. With a three times lower parasitic resistance compared to TO-220, SuperSO8 offers high system efficiency and low design effort due to reduced spikes.



Optimized for high power applications

TO-Leadless

TO-Leadless is especially designed for high current applications such as forklift and light electric vehicles. The outstanding current capability of up to 300 A is a key feature of TO-Leadless. Furthermore, this package offers benefits in terms of optimized board space. The significantly smaller package size, reduced by 60 percent, enables a very compact design. Additionally, the 50 percent height reduction offers a significant advantage in narrow applications.



Optimized for rugged, high power applications

D²PAK 7pin plus

D²PAK 7pin plus offers an optimized lead-frame which allows up to 20 percent more die than a regular D²PAK 7pin. Due to increased numbers of bond wires the $R_{DS(on)}$ is improved by 27 percent and improved thermal resistance by up to 15 percent. The lead trimming option in our production allows to accommodate three different lead configurations (SA, SC, SN).



Automotive qualified packages








Small Signal packages

Small Signal MOSFETs from Infineon are available in seven industry standard package types ranging from the largest SOT-223 down to the smallest SOT-363 measuring 2.1 x 2 x 0.9 mm. Products are offered in single, dual and complementary configurations and are suitable for a wide range of applications including battery protection and motor control.

Small Signal MOSFETs

Suitable for high quality demanding applications

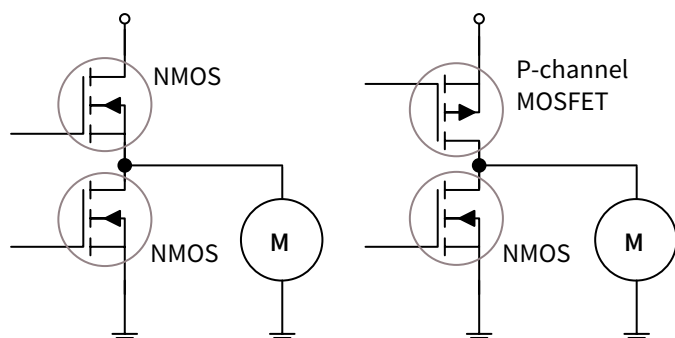
The Infineon Small Signal and Small PowIR™ MOSFET portfolio covers n-channel and p-channel enhancement MOSFETs as well as depletion mode products. The drain to source breakdown voltage offering ranges from 250 V p-channel up to 800 V n-channel in single, dual and complementary configurations. Many products are suitable for battery protection and low voltage drives applications.

Polarity	N-channel enhancement/n-channel depletion P-channel enhancement with and without ESD protection						
V_{DS} range	from -250 V up to 800 V						
Configuration	Single, dual and complementary						
Gate drive voltage	1.8 V (ULL), 2.5 V (SLL), 4.5 V (LL), 10 V (NL) ¹⁾						
Qualification	Automotive AEC Q101 (except where indicated)						
Packages	SOT-223	SOT-89	TSOP-6	SC59	SOT-23	SOT-323	SOT-363
							

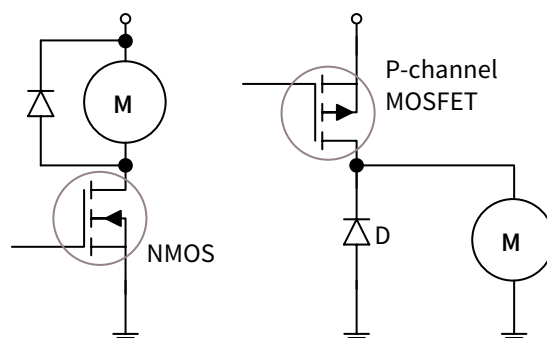
1) ULL: Ultra logic level SLL: Super logic level LL: Logic level NL: Normal level

Low voltage drives

N-channel



P-channel



Main features and benefits of Small Signal MOSFETs and Small PowIR™

- > V_{DS} range -250 V to 800 V in industry standard small outline packages
- > 4 $V_{GS(th)}$ classes
- > ESD protected p-channel parts
- > Reduced design complexity
- > Many products qualified to automotive AEC Q101

CoolMOS™

Trusted leader in high voltage MOSFETs

The revolutionary CoolMOS™ power MOSFET family sets new standards in the field of energy efficiency. Our CoolMOS™ products offer a significant reduction of conduction, switching and driving losses and enable high power density and efficiency for superior power conversion systems. Driving factors like efficiency, power density, controllability, EMI, layout resistance, commutation behavior and cost, cannot be fulfilled at the same time and lead to different technologies and solutions. Designers will select the most suitable part based on efficiency, ease-of-use and commutation.

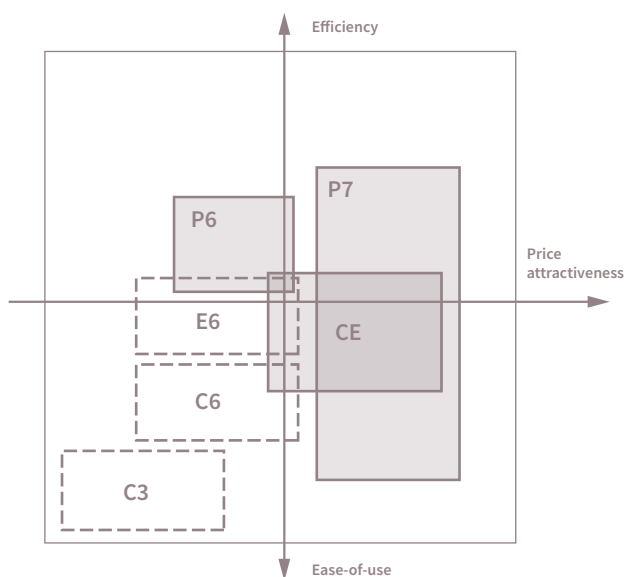
The 600 V CoolMOS™ P7 is the successor of the 600 V CoolMOS™ P6 series targeting a broad range of applications ranging from low power SMPS up to the highest power levels. The 600 V CoolMOS™ P7 is Infineon's most well balanced CoolMOS™ technology in terms of combining ease-of-use (e.g. low ringing) with excellent efficiency performance and reasonable price.

600 V CoolMOS™ P7 achieves up to 1.5 percent better effi-

ciency and 4.2°C lower MOSFET temperature versus competitor offerings. Its gate charge Q_g and E_{OSS} are 30 percent to 60 percent lower compared to previous CoolMOS™ families and competition, which leads to reduced driving and switching losses that allow high efficiency in various power classes. Furthermore, the optimized $R_{DS(on)}$ enables smaller footprints and higher power density.

The 700 V CoolMOS™ P7 offers 2 percent to 5 percent lower switching losses (E_{OSS}), up to 3.9 percent higher efficiency and impressively up to 16°C lower device temperature against competition. Compared to the previous 650 V CoolMOS™ C6 technology it offers 2.4 percent gain in efficiency and 12°C lower device temperature, measured at a flyback based charger application, operating at 140 kHz switching speed.

If the necessary package/ $R_{DS(on)}$ combinations are not yet available in the new CoolMOS™ P7 series, the previous CoolMOS™ CE and P6 series are the preferred series.



- Active and preferred**
Infineon recommendation for new designs
- Active**
Production continued for extended period of time
Replaced by better performance/priced products

CIPOS™ Nano

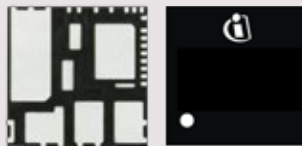
Three-phase or half-bridge driver with MOSFETs

The CIPOS™ Nano is a family of highly integrated, ultra-compact, patent pending power modules for high efficiency appliance and light industrial applications, including pumps, fans, automation systems or consumer drives e.g. multicopters. By utilizing an innovative packaging solution, the CIPOS™ Nano family delivers a new benchmark in device size, offering up to a 60 percent smaller footprint than existing three-phase motor control power ICs.

Main features

- › Integrated gate drivers and bootstrap functionality
- › Suitable for sinusoidal or trapezoidal modulation
- › Low $R_{DS(on)}$ trench FREDFET
- › Under-voltage lockout for both channels
- › Matched propagation delay for all channels
- › Optimized dV/dt for loss and EMI trade-offs
- › 3.3 V input logic compatible
- › Active high HIN and LIN
- › Isolation 1500 VRMS 1 min.

Full-bridge



12 x 12 x 0.9 mm

Built-in bootstrap function

Overcurrent protection

Fault reporting

Programmable fault clear function

Optimized dV/dt

250 V

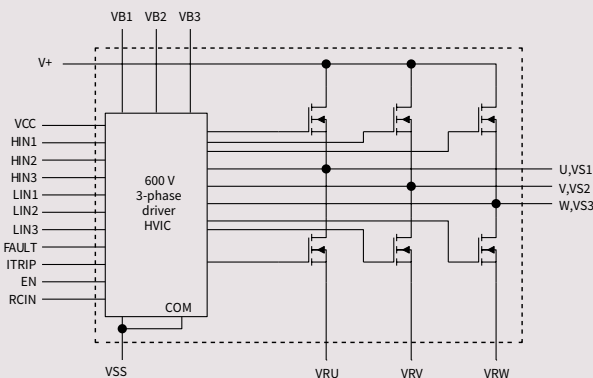
0.45 Ω-2.4 Ω

500 V

1.7 Ω-6.0 Ω

600 V

in development



Half-bridge



7 x 8 x 0.9 mm

8 x 9 x 0.9 mm

Higher power than 3-phase

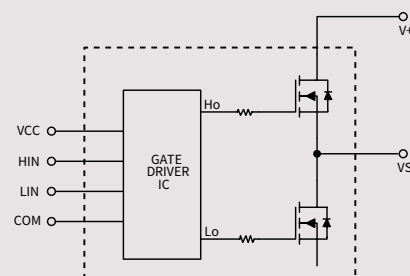
2 FETs + half-bridge gate driver

Built-in bootstrap function

40 V-100 V
5 Ω-21 Ω

250 V
0.15 Ω

500 V
0.8 Ω-1.7 Ω



EiceDRIVER™

The right gate driver for all motor drives

Leveraging the application expertise and advanced technologies of Infineon and International Rectifier the general purpose high voltage gate driver ICs are well suited for many industrial and commercial applications including battery powered motor drives and are complementary to Infineon IGBTs, silicon and silicon carbide MOSFETs (CoolMOS™ and CoolSiC™), as well as part of integrated power modules.

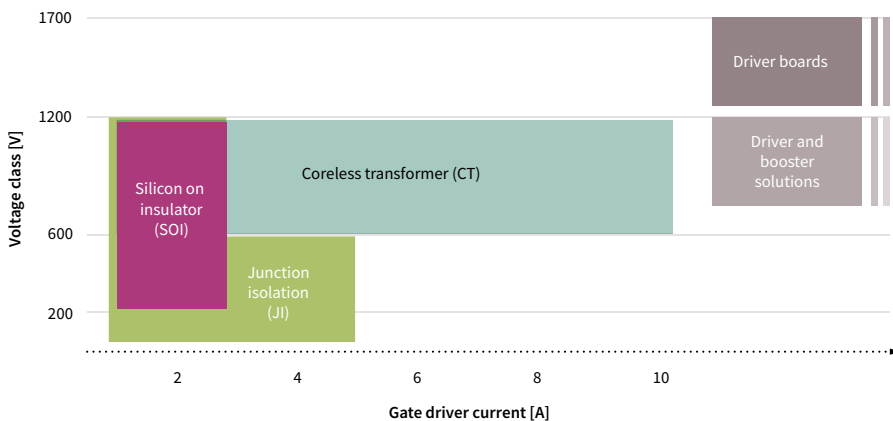
The Infineon portfolio of gate driver ICs spans from single channel low-side and high-side drivers, through popular half-bridge drivers, all the way to three-phase level-shift drivers. The breadth and depth of Infineon’s industry leading gate driver IC portfolio provides a solution for virtually every application with an assortment of configurations addressing different topologies, voltage classes, drive capabilities and package options.

These gate driver ICs optimize performance, minimize size and reduce cost.

From gardening equipment through power tools and electric drives, Infineon’s family of configurable half-bridge and three-phase gate driver ICs can be combined with powerful Infineon MOSFETs to provide the required power and efficiency these systems need for industrial applications.

Infineon’s industrial and general purpose gate driver ICs utilize the following technologies:

- > Coreless transformer technology (CT)
- > Level-shifting silicon-on-insulator technology (SOI)
- > Level-shifting junction-isolation technology (JI)
- > Non-isolated technology (NI)



Lower voltage gate drivers based on Silicon on insulator (SOI) and junction isolation (JI) technologies are recommended for battery powered drives.

A wide variety of driver types for a large range of voltage classes

Driver type	5 V	25 V	100 V	200 V	500 V	600 V	700 V	1200 V
Single channel high-side					●	●		●
Single channel low-side	●	●						●
Dual channel high-side						●		●
Dual channel low-side		●						
High- and low-side				●	●	●	●	●
Half-bridge			●	●		●	●	●
Half-bridge plus single low-side						●		
H-bridge			●					
Three-phase bridge				●		●	●	●
Current sense						●		●

- Non-isolated (NISO)
- Junction isolation (JI)
- Silicon on insulator (SOI)
- Coreless transformer (CT)
- Recommended for battery powered drives

The new 200 V gate driver IC family

IRS200x half-bridge and high-side + low-side high voltage gate driver ICs



The 200 V half-bridge driver ICs (IRS2008S, IRS2007S) and high-side + low-side driver ICs (IRS2005S, IRS2005M) are tailored for low voltage (24 V, 36 V and 48 V) and mid voltage (60 V, 80 V and 100 V) motor drive applications.

- › 290 mA/600 mA typical output sink/source current
- › 70 ns/35 ns typical turn-on rise/turn-off fall times
- › Less than 60 ns delay matching time
- › Under-voltage lockout (UVLO) protection
- › Deadtime and cross-conduction prevention logic (IRS2008S, IRS2007S)
- › Fully operational to +200 V off set voltage
- › Negative transient voltage tolerance, dV/dt immune
- › Low quiescent current
- › Various input options
- › Standard 8-lead SOIC pin-out and space-saving 4 x 4 MLPQ (IRS2005M)

Product portfolio

Part number	Voltage class [V]	Configuration	Source/sink current typ. [mA]	Deadtime typ. [ns]	Typ. propagation delay [ns]		Control inputs	UVLO typ. [V]		Package	Old version
					on	off		on	off		
IRS2008S	200	Half-bridge	290/600	520	680	150	IN, SD	8.9	8.2	8-lead SOIC	IRS2004
IRS2007S	200	Half-bridge	290/600	520	160	150	HIN, LIN	8.9	8.2	8-lead SOIC	IRS2003
IRS2005S	200	High-side + low-side	290/600		160	150	HIN, LIN	8.9	8.2	8-lead SOIC	IRS2001
IRS2005M	200	High-side + low-side	290/600		160	150	HIN, LIN	8.9	8.2	14-lead 4x4 MLPQ	IRS2001

For more information: www.infineon.com/200VHVIC

Additional gate driver ICs for battery powered motor drive applications

Part number	Voltage class [V]	Configuration	Source/sink current typ. [mA]	Typ. propagation delay [ns]		UVLO typ. [V]		Package	Features
				on	off	on	off		
6EDL04N02PR	200	Three-phase	165/375	530	490	9	8.1	TSSOP-28	<ul style="list-style-type: none"> › Separate control circuits for all six drives; interlock › Ultra-fast integrated bootstrap diode (R_{BS0} 40 Ω) › Over-current protection › Shutdown of all switches during error conditions › Evaluation board available: EVAL-6EDL04N02PR
IRS2301S	600	High-side + low-side	200/350	220	200	4.1	3.8	8-lead SOIC	<ul style="list-style-type: none"> › Wide V_{cc} range from 20 V down to 3.8 V › Floating channel designed for bootstrap operation
IRS2302	600	Half-bridge	200/350	650	200	4.1	3.8	8-lead SOIC	<ul style="list-style-type: none"> › Wide V_{cc} range from 20 V down to 3.8 V › Undervoltage lockout for both channels › Floating channel designed for bootstrap operation › High-side output in phase with input
IRS21867	600	High-side + low-side	4000/4000	170	170	6	5.5	8-lead SOIC	<ul style="list-style-type: none"> › Wide V_{cc} range from 20 V down to 5.5 V › Designed for use with bootstrap power supplies
IRS2127	600	Single high-side	290/600	150	150	10.3	9	8-lead SOIC	<ul style="list-style-type: none"> › Dedicated fault pin to indicate over-current shutdown › Designed for use with bootstrap power supplies
IR2010S	200	High-side + low-side	3000/3000	95	65	8.6	8.2	8-lead SOIC	<ul style="list-style-type: none"> › Non-inverting logic › Separate logic supply range from 3.3 V to 20 V › Cross-conduction prevention logic
IRS2011S	200	High-side + low-side	1000/1000	60	60	9	8.2	8-lead SOIC	<ul style="list-style-type: none"> › Independent low- and high-side channels › Matched propagation delay for both channels
IR2011S	200	High-side + low-side	1000/1000	80	60	9	8.2	8-lead SOIC	<ul style="list-style-type: none"> › Independent low- and high-side channels › Matched propagation delay for both channels



Gate driver ICs for battery chargers and battery management

Part number	Voltage class [V]	Configuration	Source/sink current typ. [mA]	Typ. propagation delay [ns]		UVLO typ. [V]		Package
				on	off	on	off	
1EDN7511B	20	Single-channel low-side	4000/8000	19	19	4.2	3.9	SOT-23 6 pin
1EDN8511B	20	Single-channel low-side	4000/8000	19	19	8.0	7.0	SOT-23 6 pin
1EDN7512B	20	Single-channel low-side	4000/8000	19	19	4.2	3.9	SOT-23 5 pin
1EDN7512G	20	Single-channel low-side	4000/8000	19	19	4.2	3.9	WSOP 6 pin
2EDN7524F	20	Dual-channel low-side	5000/5000	17	19	4.2	3.9	DSO 8 pin
2EDN7524R	20	Dual-channel low-side	5000/5000	17	19	4.2	3.9	TSSOP 8 pin
2EDN7524G	20	Dual-channel low-side	5000/5000	17	19	4.2	3.9	WSOP 8 pin
2EDN8524F	20	Dual-channel low-side	5000/5000	17	19	8.0	7.0	DSO 8 pin
2EDN8524R	20	Dual-channel low-side	5000/5000	17	19	8.0	7.0	TSSOP 8 pin

Product features

- > 4 A source/8 A sink current
- > 6 ns rise/5 ns fall times
- > ± 5 ns propagation delay precision
- > True rail-to-rail low impedance output stages
- > 4 V and 8 V UVLO options
- > 19 ns propagation delay
- > -10 V robustness of inputs
- > 5 A reverse output current robustness
- > Industry standard pinout and packages

Product benefits

- > Fast Miller plateau transition
- > Precise timing
- > Low power dissipation in driver IC
- > Fast and reliable MOSFET turn-off, independent of control IC
- > Increased GND-bounce robustness
- > Saves switching diodes
- > Straight forward design upgrades

Application benefits

- > High power efficiency
 - in hard switching PFC with SiC diode
 - in half-bridges and synchronous rectifications
- > Cooler driver IC operation
- > Higher MOSFET drive capability
- > Instant MOSFET protection during start-up and under abnormal operation
- > Crucial safety margin to drive pulse transformer
- > Increases power density
- > BOM savings
- > Short time-to-market

www.infineon.com/1edn

www.infineon.com/2edn

Digital motor controller – iMOTION™ IRMCK099

High performance sensorless motor control IC

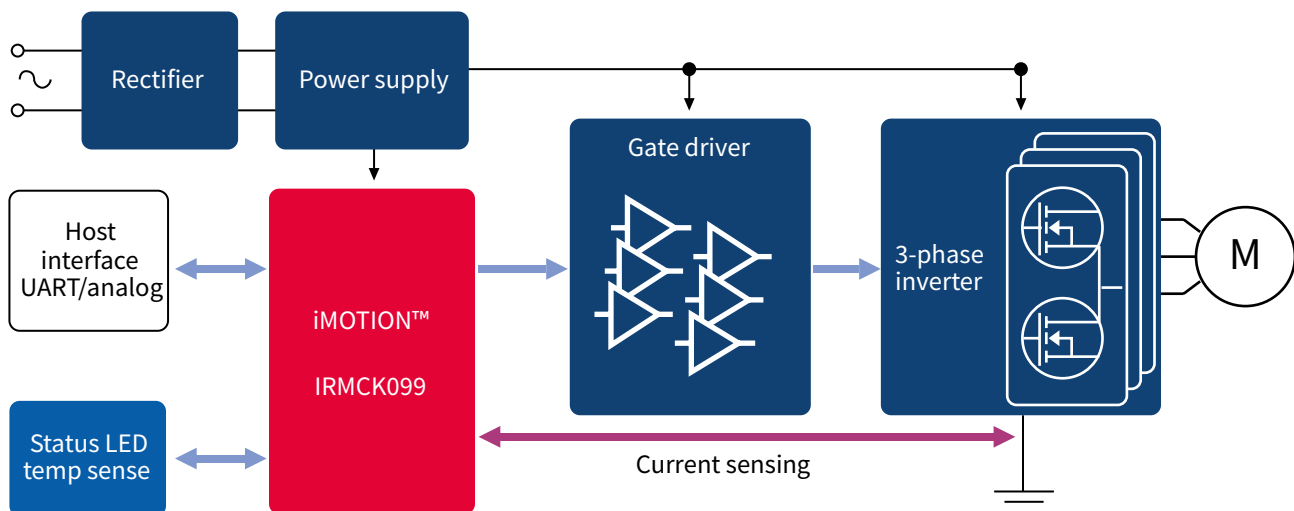
iMOTION™ is a family of highly integrated products for the control of variable speed drives. By integrating both the required hardware and software to perform sensorless control of a permanent magnet synchronous motor (PMSM), they provide the highest energy efficient appliance motor system with the lowest system cost. The iMOTION™ modules integrate digital, analog and power technologies together in a flexible, mixed signal chipset to simplify motor control designs and bring energy-efficient and cost-effective solutions faster to market.

The IRMCK099 is the stand-alone implementation of Infineon's patented and field-proven motion control engine (MCE) that eliminates software coding from the motor con-

trol algorithm development process. With the help of the IRMCK099, implementing a variable speed drive is reduced to simply configuring the MCE for the respective motor. Assisted by powerful tools like MCEWizard and MCEDesigner, it is possible to have the motor up and running in less than an hour.

One IRMCK099 can hold the parameter sets for up to 31 different motors which are identified via their ID. In applications running multiple motors in parallel, like a multicopter, the IRMCK099 supports a special UART communication scheme that allows the communication to 4 or 6 motors in parallel via a single UART of the application host.

Application block diagram





Features and benefits of iMOTION™ IRMCK099M

Features

- › 32-bit MCE computation engine
- › 100 MIPS by internal calibrated 100 MHz system clock
- › Hardware accelerator (multiply, divide, cordic vector rotate, ATAN) for fast FOC algorithm execution
- › Zero offset/gain 8-channel 12-bit ADC (0-1.2 V)
- › Integrated OP amps and comparator for current sensing
- › 31 times re-writable parameters with 16 Kbyte OTP memory
- › Low power standby mode, wake up by analog input (Vsp.)
- › Internal temperature sensor
- › Configurable digital IO
- › Internal overcurrent hardware comparator
- › UART, I²C, analog (PWM) output and capture input

Benefits

- › No hall sensors – this lowers system cost and increases reliability
- › No active components
- › Higher efficiency due to IPM reluctance torque
- › Smooth operation and low acoustic noise
- › High performance with FOC
- › Control 1 motor, 1 motor and PFC or 2 motors and PFC
- › Integrated digital PFC
- › Save time and money in motor control development
- › Zero risk, yet innovative architecture
- › Can control three-phase permanent magnet motor/IPM and BLDC motors
- › Large speed range operation
- › Vibration suppression control



XMC™

One microcontroller platform – countless solutions

Infineon's XMC™ 32-bit industrial microcontroller portfolio is designed for system cost and efficiency for demanding industrial applications. It comes with the most advanced peripheral set in the industry. Fast and largely autonomous peripherals can be configured to support individual needs.

Highlights include analog-mixed signal, timer/PWM and communication peripherals powered by either an ARM® Cortex®-M0 core (XMC1000 family) or a Cortex®-M4 core with a floating point unit (XMC4000 family).










		Motor control	Industrial I/O
XMC4000 family <ul style="list-style-type: none"> > ARM® Cortex®-M4 up to 144 MHz > Built in DSP, SFPU > Peripherals up to 144 MHz > Event request unit (ERU) > T_{Ambient}: -40°C to 125°C 	XMC4000 ARM® Cortex® M4F up to 144 MHz core 64 KB-2 MB Flash	XMC4700 Industrial drives LQFP-100, -144/LFBGA-196 up to 125°C	XMC4800, XMC4300 EtherCAT®, Multi CAN 6 nodes, industrial drives LQFP-100, -144/LFBGA-196 up to 125°C
		XMC4500, XMC4400 Industrial drives, hall & encoder I/F, ΔΣ demodulator LQFP-64, -100, 144/ LFBGA-144 up to 125°C	XMC4500 Multi CAN 3 nodes, external memory, Ethernet, SD/MMC, industrial drives LQFP-100, -144/LFBGA-144 up to 125°C
XMC1000 family <ul style="list-style-type: none"> > ARM® Cortex®-M0 up to 48 MHz > Peripherals up to 96 MHz > One time event request unit (ERU) > V_{DD}: 1.8 to 5.5 V > T_{Ambient}: -40°C to 105°C 	XMC1000 ARM® Cortex® M0 up to 48 MHz core/96 MHz peripheral 8-200 KB Flash	XMC1400 Motor control, hall & encoder I/F, co-processor VQFN-40, -64/LQFP-64 up to 105°C	XMC1400 Multi CAN 2 nodes VQFN-48, -64/LQFP-64 up to 105°C
		XMC1300 Motor control, hall & encoder I/F, co-processor TSSOP-16, 38/VQFN-24, -40 up to 105°C	



32-bit industrial microcontroller based on ARM® Cortex®-M

Infinion has combined its wealth of experience in microcontroller design for real-time critical applications with all the benefits of an industry-standard core.

Device selector	Power Tools 	Multicopter 	Drives 	Pumps 	CAV 	LEV 	Battery 
XMC1300	●	●	●	●		●	●
XMC1400	●	●	●	●			
XMC4400			●		●	●	
XMC4500			●		●	●	
XMC4700			●		●	●	
XMC4800			●				

Where to buy

Infiniteon distribution partners and sales offices:

www.infineon.com/WhereToBuy

Service hotline

Infiniteon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

- > Germany 0800 951 951 951 (German/English)
- > China, mainland 4001 200 951 (Mandarin/English)
- > India 000 800 4402 951 (English)
- > USA 1-866 951 9519 (English/German)
- > Other countries 00* 800 951 951 951 (English/German)
- > Direct access +49 89 234-0 (interconnection fee, German/English)

* Please note: Some countries may require you to dial a code other than "00" to access this international number, please visit www.infineon.com/service for your country!



Mobile product catalog

Mobile app for iOS and Android.

www.infineon.com

Published by
Infineon Technologies AG
9500 Villach, Austria

© 2017 Infineon Technologies AG.
All rights reserved.

Order number: B111-I0457-V1-7600-EU-EC-P
Date: 06/2017

Please note!

THIS DOCUMENT IS FOR INFORMATION PURPOSES ONLY AND ANY INFORMATION GIVEN HEREIN SHALL IN NO EVENT BE REGARDED AS A WARRANTY, GUARANTEE OR DESCRIPTION OF ANY FUNCTIONALITY, CONDITIONS AND/OR QUALITY OF OUR PRODUCTS OR ANY SUITABILITY FOR A PARTICULAR PURPOSE. WITH REGARD TO THE TECHNICAL SPECIFICATIONS OF OUR PRODUCTS, WE KINDLY ASK YOU TO REFER TO THE RELEVANT PRODUCT DATA SHEETS PROVIDED BY US. OUR CUSTOMERS AND THEIR TECHNICAL DEPARTMENTS ARE REQUIRED TO EVALUATE THE SUITABILITY OF OUR PRODUCTS FOR THE INTENDED APPLICATION.

WE RESERVE THE RIGHT TO CHANGE THIS DOCUMENT AND/OR THE INFORMATION GIVEN HEREIN AT ANY TIME.

Additional information

For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

Warnings

Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by us in a written document signed by authorized representatives of Infineon Technologies, our products may not be used in any life-endangering applications, including but not limited to medical, nuclear, military, life-critical or any other applications where a failure of the product or any consequences of the use thereof can result in personal injury.