



# EiceDRIVER™ gate driver ICs

Every switch needs a driver - gate driver solutions for Si, SiC and GaN switches

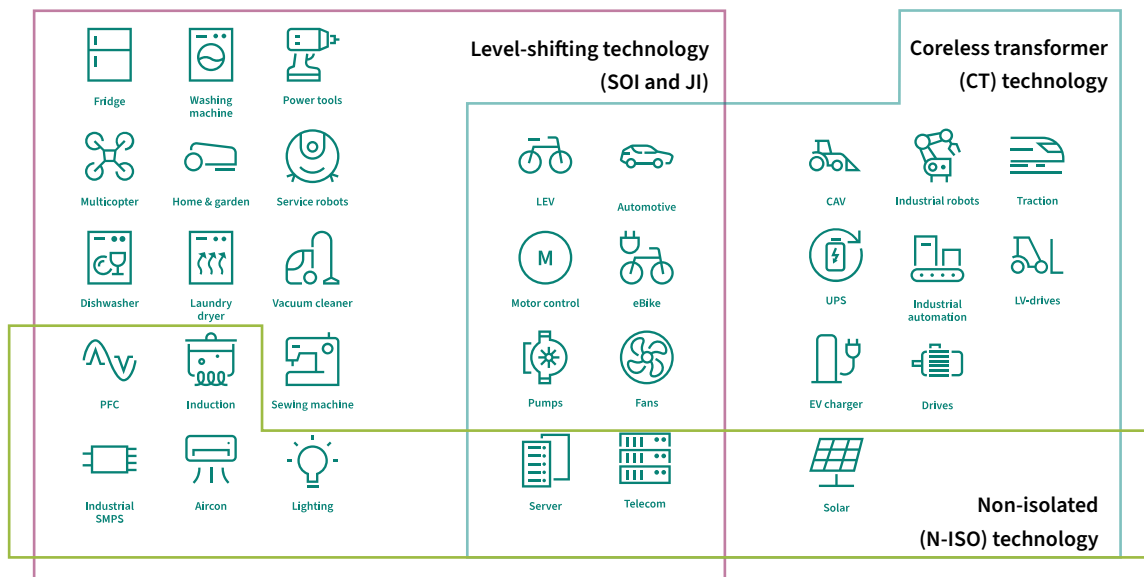
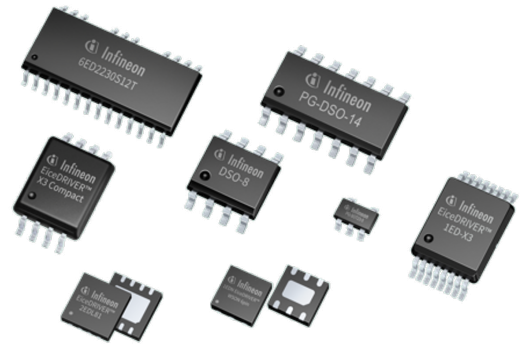
Edition 2024

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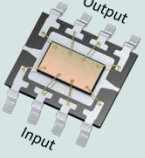
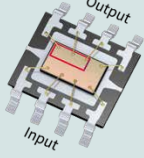
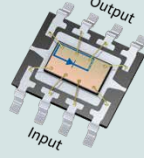
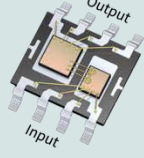


# Infinion gate driver IC applications

Leveraging the application expertise and advanced technologies of Infineon and International Rectifier, EiceDRIVER™ gate driver ICs are well-suited for many applications such as industrial motor drives, home appliances, solar inverters, automotive applications, EV-charging, UPS, switch-mode power supplies (SMPS), high-voltage lighting, battery-powered applications, and so on.



## Infinion gate driver IC technologies

Non-isolated GD	Level-shift GD		Isolated GD
● Non-isolated (N-ISO)	● Junction isolation (JI)	● Silicon on insulator (SOI)	● Coreless transformer (CT)
 <p>Monolithic construction of ground-reference gate drivers for 20 to 25 V supply voltage applications</p> <p>Comprehensive families of single- and dual-low-side drivers with flexible options for output current, logic configurations and UVLOs (plus non-isolated TDI)</p> <p>Uses rugged and high-performance technologies of HVIC process or state-of-the-art 130 nm process</p>	 <p>Monolithic construction of one to six gate drive channels up to 1200 V rating</p> <p>Industrial pioneering high-voltage IC (HVIC) technology used in all high-voltage gate drive applications</p> <p>Gen 2 technology (IR prefix): Industrial pioneering HVIC process</p> <p>Gen 5 technology (IRS prefix): Cost-effective pin-to-pin versions of Gen 2</p>	 <p>Monolithic construction of 2 to 6 gate drive channels up to 1200 V rating</p> <p>Built-in PN-based bootstrap diode (36 Ω typ.) for simplified bootstrap operation and reduced PCB area</p> <p>Negative transient immunity to prevent latch-up: -100 V for 300 ns</p> <p>&gt;50 percent lower level-shift losses for higher efficiency, higher frequency operation, smaller heat sinks, and higher reliability</p>	 <p>Two separate chips solution with magnetic coupling providing galvanically isolated single- and dual channel gate drivers</p> <p>IEC 60747-17 isolation technology providing isolation up to 8 kVpk <math>V_{IOTM}</math> and up to ±2300 V functional isolation</p> <p>CMTI of more than 300 V/ns</p> <p>Strongest gate-drive output currents (up to ±18 A) reducing need for external booster</p>



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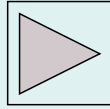
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# Driver configuration overview

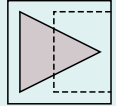
## 1-channel low-side driver

Allows low offset of the voltage between input and output



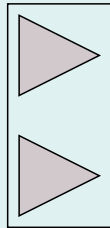
## 1-channel high-side driver

Allows high voltage offset between input and output



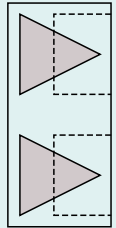
## 2-channel low-side driver

Both channels allow individual low voltage offsets, no interlock



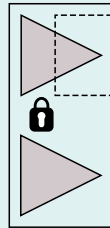
## 2-channel high-side driver

Both channels allow individual high voltage offsets, no interlock



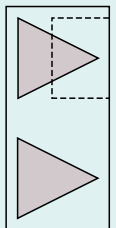
## Half-bridge driver

Two interlocked channels for shoot through protection where one of the channels allows a high voltage offset.



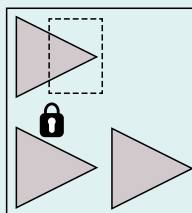
## High- and low-side driver

Two non-interlocked channels, one for high voltage, one for low voltage offsets. The industry may also refer this as half-bridge.



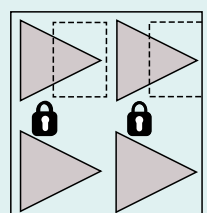
## Half-bridge plus single low-side driver

Half-bridge with one additional low-side driver.



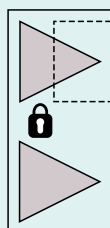
## Full-bridge driver

Four channels in a package with two independent half bridges.



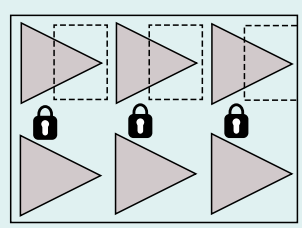
## Synchronous-buck drivers

High speed drivers for dual high side and low side MOSFETs in synchronous rectified buck converters.



## Three-phase bridge

Six channels in a package with three independent half bridges



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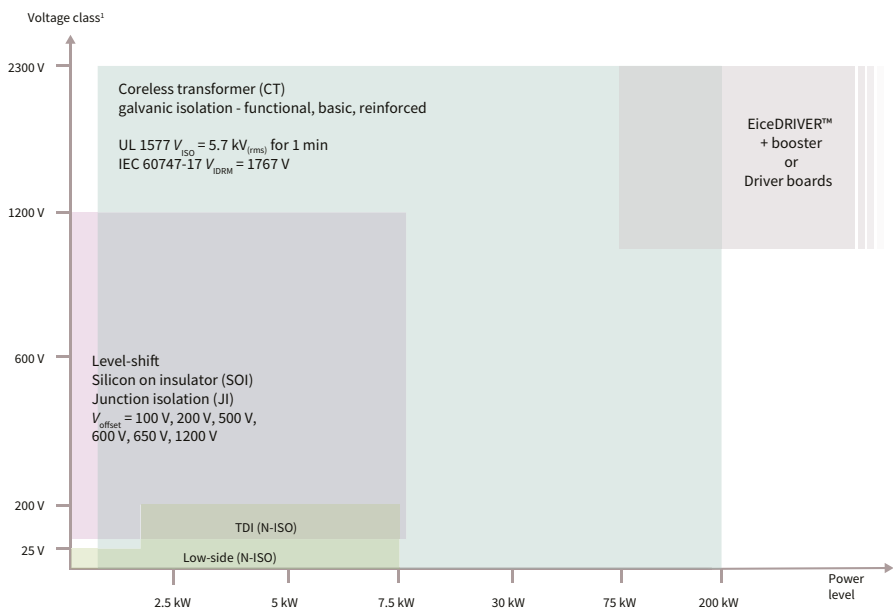
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# EiceDRIVER™ and MOTIX™ gate driver IC

Gate driver ICs serve as the interface between control signals (digital or analog controllers) and power switches (IGBTs, MOSFETs, SiC MOSFETs, and GaN HEMTs). Integrated gate driver solutions reduce design complexity, development time, bill of materials (BOM), and board space while improving reliability over discretely-implemented gate-drive solutions.

Every switch needs a driver, the right driver makes a difference. Infineon offers a comprehensive portfolio of EiceDRIVER™ gate driver ICs with a variety of configurations, voltage classes, isolation levels, protection features, and package options. EiceDRIVER™ gate driver ICs are complementary to Infineon IGBT discretes and modules, silicon (CoolMOS™, OptiMOS™, and StrongIRFET™) and silicon carbide MOSFETs (CoolSiC™), gallium nitride HEMTs (CoolGaN™), or as part of integrated power modules (CIPOS™ IPM and iMOTION™ IPM).

In addition, MOTIX™ motor gate driver ICs are part of the MOTIX™ scalable product portfolio for low-voltage motor control solutions including MOTIX™ Driver, MOTIX™ Bridge, MOTIX™ SBC, and MOTIX™ MCU (SoC/SiP).



Gate driver configuration			25 V	25 - 105 V	200 V	500 V	600 V	650 V	1200 V	2300 V
Gate drivers	1-Channel	Isolated			●	●	●	●	●	●
		High-side		● ●	● ●	●	●			
		Low-side	●							
	2-Channel	Isolated			●	●	●	●	●	
		High-side		●						
		Low-side	●							
		High-side + Low-side			● ●	●	● ●	●	●	
		Half-bridge		●	● ●		● ●	●	●	
	4-Channel	Half-bridge		●			●			
	6-Channel	Three-phase			●		● ●	●	● ●	

● Non-isolated (N-ISO) ● Junction isolation (JI) ● Silicon on insulator (SOI) ● Coreless transformer (CT)

Note 1 Voltage class on the top row is defined base on different driver configurations for the maximum Voltage class.  
1. For single high-side, high-side and low-side, half bridge and three phase gate drivers, voltage class is defined as switch break down voltage in applications.  
2. For low side drivers (N-ISO), voltage class is defined as maximum operating range supply voltage.  
3. For special cases as 1EDNx550 (1EDN-TDI, N-ISO), voltage class is defined as maximum bus voltage (highest floating voltage it can manage).



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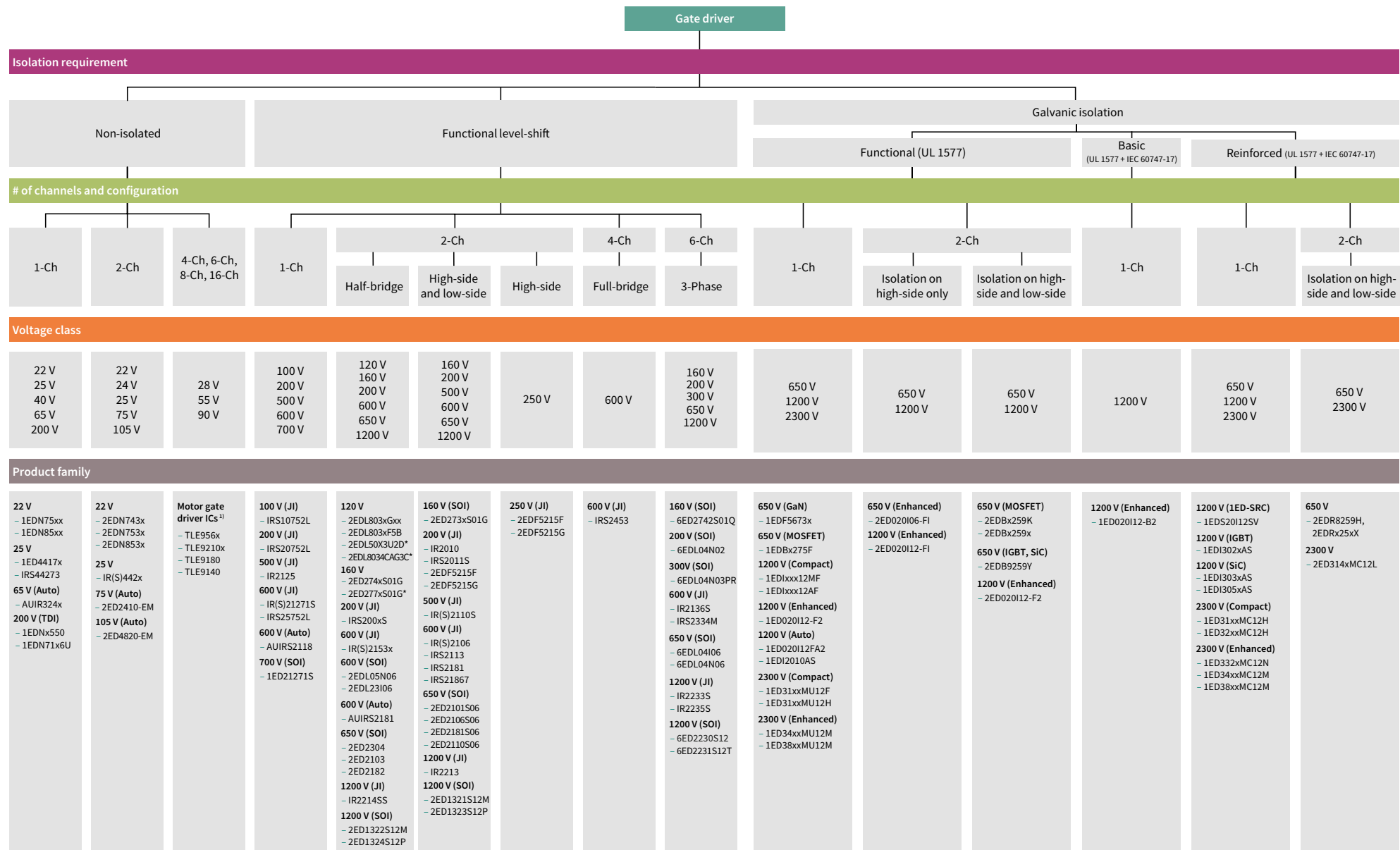
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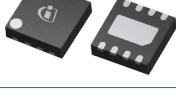


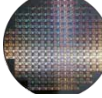



# Choosing a gate driver IC



\*Coming soon

1) Find out more on Motor gate driver ICs on [page 434](#)

# Infinion gate driver IC package options

DSO-8 (SOIC-8N)		DSO-24 (DSO-28 without 4 pins)		TSSOP-8	
TSSOP-25		DSO-8 with power pad		DSO-28 (SOIC-28WB)	
TSSOP-28		DSO-8 300-mil (SOIC-8WB)		DSO-36	
VDSON-8		DSO-14 (SOIC-14N)		LCC-32 (PLCC-44)	
VQFN-14 (MLPQ 4X4 14L)		DSO-14 150mil		LQFP-64	
VQFN-28 (MLPQ 5x5 28L)		DSO-14 300 mil (DSO-16 without 2 pins)		SOT23-5	
VQFN-32 5x5 mm		DSO-16		SOT23-6	
VQFN-34 (MLPQ 7X7 48L)		DSO-16 300-mil (SOIC-16WB)		SSOP-24	
VQFN-48		DSO-16 (fine pitch)		TFLGA-13	
VSON-10 3x3 mm		DSO-18		TQFN-48	
WSO-6		DSO-19		TSDSO-24	
WSO-8		DSO-20 (SOIC-20WB)		TSNP-7	
CHIP		TSNP-6			
DSO-20 (fine pitch)		DSO-20 WB			



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# Gate driver ICs for GaN HEMTs

GaN HEMTs represent a key technology for modern power electronics systems, providing high efficiency and power density. Infineon's CoolGaN™ HEMT families and EiceDRIVER™ gate driver ICs are designed to provide the best possible performance in GaN-based systems, minimizing R&D effort and cost. Infineon offers a broad range of EiceDRIVER™ gate driver ICs optimized for driving GaN GIT (gate injection transistor) and SG (Schottky gate) HEMTs.

## Recommended drivers for GaN GIT HEMTs and 650 V GaN HEMTs

Infineon's CoolGaN™ GIT technology is based on a hybrid-drain HEMT with p-GaN gate resulting in a robust normally-off power switch. To deal with the particularities of this concept, an innovative differential gate-drive concept has been implemented in tailor-made gate driver ICs of the EiceDRIVER™ 1EDx56x3 product family optimized for CoolGaN™ GIT HEMTs. These drivers ensure robust and highly efficient operation of the high-voltage GaN switch, and at the same time concurrently minimizing R&D efforts and shortening time-to-market. Infineon's EiceDRIVER™ 1EDx56x3 provide negative  $V_{GS}$  voltage, which leads to safe off-states during switching transients. Additionally, it protects the GaN switch against spurious turn-on, even for the first pulse or after a burst mode operation. Thanks to the integrated galvanic isolation, Infineon's EiceDRIVER™ GaN gate driver ICs are best suited to drive high-voltage GaN HEMTs in hard-switching half-bridge applications, such as the totem-pole PFC topology. If the PWM signals have to cross the safe isolation barrier, such as in the resonant LLC with secondary-side control, the 1EDS5663H with reinforced isolation is the right choice. Nevertheless, in many applications, standard gate driver ICs with right fit UVLO protection can also be employed when coupled to an RC circuit to generate both the required small steady-state current and the turn-on/turn-off peak currents. Dual-channel drivers of the EiceDRIVER™ 2EDxx259 product family feature dead-time control (DTC) and shoot-through protection (STP) to ensure safe operation in half-bridge topologies using a single IC. A hybrid gate driving configuration for half-bridge topologies, composed of two single-channel gate driver ICs of the EiceDRIVER™ 1EDBx275F and 1EDNx550B, allows optimizing the driver IC placement on the PCB in order to minimize the gate loop parasitic inductances. This results in a PCB area saving (compared with a dual-channel gate driver IC) and it comes with a highly competitive bill-of-material (BOM).

To summarize, the 1-channel and 2-channel gate driver ICs of the EiceDRIVER™ family are the best choices to match with Infineon's CoolGaN™ GIT HEMTs and other 650 V GaN HEMTs technologies (e.g., Schottky gate, Cascode) to achieve an optimum combination of efficiency, power density, and robustness in high-performance power conversion applications.

Product family	Part number	Current peak sink/source	VCC2 (-Vee2)	UVLO*	Prop delay	CMTI	Other features	Package
1EDB	1EDB7275F	5 A / -9 A	20 V	4 V	45 ns	300 V/ns	Separate source/sink outputs, fast start-up times and fast recovery, basic isolation, UL 1577	DSO-8 150 mil
	1EDB8275F			8 V				
1EDN-TDI	1EDN7550B	5 A / -9 A	20 V	4 V	45 ns	n. a.	Truly differential inputs to provide high common-mode robustness	SOT23 6-pin
	1EDN8550B			8 V				
2EDB	2EDB7259Y	5 A / -9 A	20 V	4 V	38 ns	150 V/ns	fast start-up times and fast output clamping, basic isolation, UL 1577	DSO-14 150 mil
	2EDB8259Y			8 V				
2EDR	2EDR7259X	5 A / -9 A	20 V	4 V	38 ns	150 V/ns	fast start-up times and fast output clamping, reinforced isolation, UL 1577, VDE 0884-17, IEC 60747-17	DSO-14 300 mil
	2EDR8259X			8 V				



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\* 8 V UVLO parts recommended for bipolar driving or for unipolar driving with  $V_{DD} \geq 10V$

## Evaluation boards with gate driver ICs for GaN GIT HEMTs and 650 V GaN HEMTs

Our evaluation board helps you to set up and test GaN driving solutions quickly and easily.

EVAL_1EDF_G1B_HB_GAN	EVAL_2EDB_HB_GAN	KIT_1EDB_AUX_GAN
		
High-frequency half-bridge evaluation board featuring EiceDRIVER™ 1EDi-G1.	CoolGaN™ GIT HEMT half-bridge evaluation board with EiceDRIVER™ 2EDB.	Complete driving solution for GaN HEMTs including an isolated gate driver IC with a configurable floating auxiliary supply supporting unipolar and bipolar driving.
<a href="http://www.infineon.com/cms/en/product/evaluation-boards/eval_1edf_g1b_hb_gan/">www.infineon.com/cms/en/product/evaluation-boards/eval_1edf_g1b_hb_gan/</a>	<a href="http://www.infineon.com/cms/en/product/evaluation-boards/eval_2edb_hb_gan/">www.infineon.com/cms/en/product/evaluation-boards/eval_2edb_hb_gan/</a>	<a href="http://www.infineon.com/cms/en/product/evaluation-boards/kit_1edb_aux_gan/">www.infineon.com/cms/en/product/evaluation-boards/kit_1edb_aux_gan/</a>

## Recommended drivers for GaN SG HEMTs

The 1EDN71x6Gx is a single-channel gate driver IC product family optimized for driving Infineon CoolGaN™ SG HEMTs, as well as other GaN SG HEMTs and Si MOSFETs. This gate driver includes several key features that enable a high-performance system design with fast-switching transistors, including truly differential input (TDI), four driving strength options, active Miller clamp, bootstrap voltage clamp, and with or without adjustable charge pump in PG-SON-10 and PG-TSNP-7 package respectively.

Product family	PN	Current peak sink/ source	CMR <sub>static</sub> / CMR <sub>dynamic</sub>	UVLO	Prop delay	CMTI	Other features	Package
1EDN71x6x	1EDN7116G	2.0 A/2.0 A	150 V/200 V	4 V	55 ns	100 V/ns	Negative charge pump, miller clamp	PG-VSON-10
	1EDN7126G	1.5 A/1.5 A			75 ns			
	1EDN7136G	1.0 A/1.0 A			105 ns			
	1EDN7146G	0.5 A/0.5 A			125 ns			
	1EDN7116U	2.0 A/2.0 A	150 V/200 V	4 V	55 ns	100 V/ns	Miller clamp	PG-TSNP-7
	1EDN7126U	1.5 A/1.5 A			75 ns			
	1EDN7136U	1.0 A/1.0 A			105 ns			
	1EDN7146U	0.5 A/0.5 A			125 ns			
1EDB	1EDB7275F	5 A / -9 A	20 V	4 V	45 ns	300 V/ns	Separate source/sink outputs, fast start-up times and fast recovery, basic isolation, UL 1577	DSO-8 150 mil
	1EDB8275F			8 V				
1EDN-TDI	1EDN7550B	5 A / -9 A	20 V	4 V	45 ns	n. a.	Truly differential inputs to provide high common-mode robustness	SOT23 6-pin
	1EDN8550B	5 A / -9 A		8 V				
2EDB	2EDB7259Y	5 A / -9 A	20 V	4 V	38 ns	150 V/ns	Fast start-up times and fast output clamping, basic isolation, UL 1577	DSO-14 150 mil
	2EDB8259Y			8 V				
2EDR	2EDR7259X	5 A / -9 A	20 V	4 V	38 ns	150 V/ns	Fast start-up times and fast output clamping, reinforced isolation, UL 1577, VDE 0884-17, IEC 60747-17	DSO-14 300 mil
	2EDR8259X			8 V				



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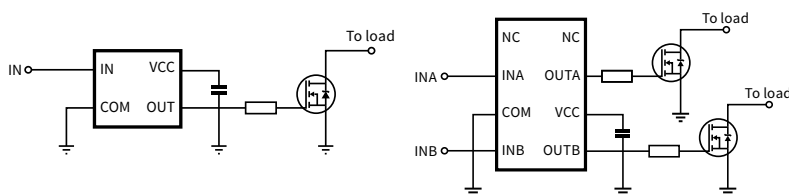


# Product overview

Infineon's gate driver IC solutions are the expert's choice. With more than 400 reliable and efficient gate driver solutions, we provide a comprehensive portfolio for virtually any application. To ease the selection process, this overview is structured along the configurations of the gate driver ICs, as opposed to application topology.

## Non-isolated low-side gate driver IC

Typical connection



Configuration	Voltage class [V]	I <sub>o+</sub> /I <sub>o-</sub> typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features				Package						
1-channel	25	2.6/2.6	8.0/7.3	34/34	1ED44173N01B	NEW	N-ISO	✓	✓	✓				✓			
		2.6/2.6	11.9/11.0	50/50	1ED44175N01B	NEW	N-ISO	✓	✓	✓				✓			
		0.8/1.75	11.9/11.4	50/50	1ED44176N01F	NEW	N-ISO	✓	✓	✓	✓	✓					
		2.6/2.6	11.9/11.0	50/50	1ED44171N01B	NEW	N-ISO	✓	✓					✓			
		1.5/1.5	10.2/9.2	50/50	IRS44273L		N-ISO							✓			
	22	4/8	4.2/3.9	19/19	1EDN7511B		N-ISO	✓				✓			✓		
		4/8	4.2/3.9	19/19	1EDN7512B		N-ISO	✓						✓			
		4/8	4.2/3.9	19/19	1EDN7512G		N-ISO	✓				✓			✓		
		4/8	8.0/7.0	19/19	1EDN8511B		N-ISO	✓				✓			✓		
	5	1.6/3.3	8.9/8	200/150	IR2121		N-ISO		✓	✓			✓				
2-channel	25	2.3/3.3	10.2/9.2	50/50	IRS44262S		N-ISO					✓					
		2.3/3.3	N.A.	50/50	IRS4426S		N-ISO					✓					
		2.3/3.3	N.A.	50/50	IRS4427S		N-ISO					✓					
		2.3/3.3	N.A.	65/85	IR4426S		N-ISO					✓					
		2.3/3.3	N.A.	65/85	IR4427S		N-ISO					✓					
	22	5/5	4.2/3.9	19/19	2EDN7523F		N-ISO	✓				✓					
		5/5	4.2/3.9	19/19	2EDN7523G		N-ISO	✓							✓		
		5/5	4.2/3.9	19/19	2EDN7523R		N-ISO	✓								✓	
		5/5	4.2/3.9	19/19	2EDN7524F		N-ISO	✓				✓					
		5/5	4.2/3.9	19/19	2EDN7524G		N-ISO	✓							✓		
		5/5	4.2/3.9	19/19	2EDN7524R		N-ISO	✓								✓	
		5/5	8.0/7.0	19/19	2EDN8523F		N-ISO	✓				✓					
		5/5	8.0/7.0	19/19	2EDN8523R		N-ISO	✓								✓	
		5/5	8.0/7.0	19/19	2EDN8524F		N-ISO	✓				✓					
		5/5	8.0/7.0	19/19	2EDN8524R		N-ISO	✓								✓	
		4/4	4.2/3.9	19/19	2EDN7424F		N-ISO	✓				✓					
		4/4	4.2/3.9	19/19	2EDN7424R		N-ISO	✓								✓	
		4/4	4.2/3.9	19/19	2EDN7434F	NEW	N-ISO	✓				✓					
		4/4	4.2/3.9	19/19	2EDN7434R	NEW	N-ISO	✓								✓	
		5/5	4.2/3.9	19/19	2EDN7533B	NEW	N-ISO							✓			
		5/5	4.2/3.9	19/19	2EDN7533F	NEW	N-ISO	✓				✓					
		5/5	4.2/3.9	19/19	2EDN7533R	NEW	N-ISO	✓								✓	
		5/5	4.2/3.9	19/19	2EDN7534U	NEW	N-ISO									✓	
		5/5	4.2/3.9	19/19	2EDN7534B	NEW	N-ISO							✓			
		5/5	4.2/3.9	19/19	2EDN7534F	NEW	N-ISO	✓				✓					
		5/5	4.2/3.9	19/19	2EDN7534R	NEW	N-ISO	✓								✓	
		5/5	4.2/3.9	19/19	2EDN7534G	NEW	N-ISO	✓							✓		
		5/5	8.0/7.0	19/19	2EDN8533F	NEW	N-ISO	✓				✓					
		5/5	8.0/7.0	19/19	2EDN8533R	NEW	N-ISO	✓								✓	
		5/5	8.0/7.0	19/19	2EDN8534F	NEW	N-ISO	✓				✓					
		5/5	8.0/7.0	19/19	2EDN8534R	NEW	N-ISO	✓								✓	



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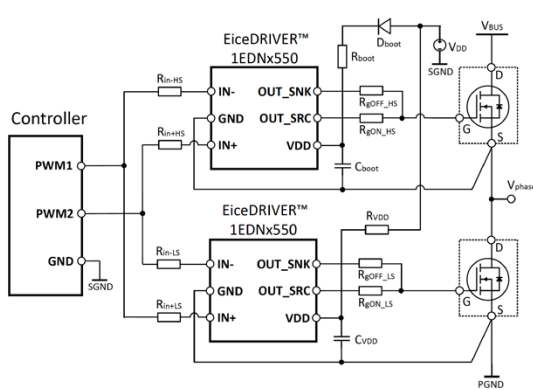
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## Non-isolated TDI gate driver IC

### Typical connection



Configuration	Voltage class [V]	I <sub>o</sub> /I <sub>o</sub> typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features			Package			
1-channel	200	4/8	4.2/3.9	45/45	1EDN7550U	N-ISO			✓	✓		✓	
		4/8	4.2/3.9	45/45	1EDN7550B	N-ISO			✓	✓	✓		
		4/8	8.0/7.0	45/45	1EDN8550B	N-ISO			✓	✓	✓		
		4/8	12.2/11.5	45/45	1EDN6550B	N-ISO			✓	✓	✓		
		4/8	14.9/14.4	45/45	1EDN9550B	N-ISO			✓	✓	✓		
		2/2	3.85/3.75	55/55	1EDN7116G	NEW N-ISO	✓	✓		✓			✓
		2/2	3.85/3.75	55/55	1EDN7116U	NEW N-ISO		✓		✓		✓	
		1.5/1.5	3.85/3.75	75/75	1EDN7126G	NEW N-ISO	✓	✓		✓			✓
		1.5/1.5	3.85/3.75	75/75	1EDN7126U	NEW N-ISO		✓		✓		✓	
		1/1	3.85/3.75	105/105	1EDN7136G	NEW N-ISO	✓	✓		✓			✓
		1/1	3.85/3.75	105/105	1EDN7136U	NEW N-ISO		✓		✓		✓	
		0.5/0.5	3.85/3.75	125/125	1EDN7146G	NEW N-ISO	✓	✓		✓			✓
0.5/0.5	3.85/3.75	125/125	1EDN7146U	NEW N-ISO		✓		✓			✓		



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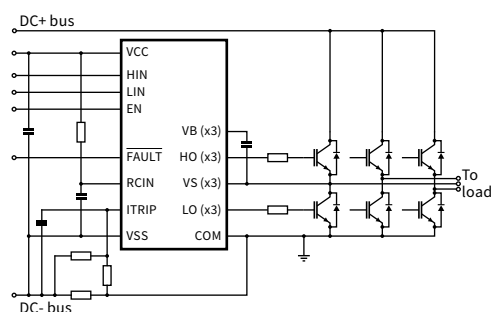
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## Three-phase gate driver ICs

Typical connection



Voltage class [V]	$I_{OH}/I_{OL}$ typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Enable	Fault reporting	Integrated bootstrap diode	Operational amplifier	Overcurrent protection	Power Management Unit	Programmable deadtime	Programmable fault clear/Reset	Programmable OCP Reference Threshold	Programmable Op-amp Voltage Gain	Trickle Charge pumps (100% duty cycle)	Separate pin for logic ground	Shoot-through protection	Shutdown	Two stage turn-on	DSO-20 WB	DSO-24	DSO-28 WB	LCC-32	TSSOP-25	TSSOP-28	VQFN-28	VQFN-32	VQFN-48	CHIP
1200	0.35/0.65	12.2 / 11.3	600/600	6ED2231S12T NEW	SOI	✓	✓	✓	✓			✓				✓	✓				✓									✓
	0.35/0.65	11.4/10.4	600/600	6ED2230S12T	SOI	✓	✓	✓	✓			✓				✓	✓				✓									✓
	0.25/0.5	8.6/8.2	700/750	IR2233S	JI	✓		✓	✓	✓						✓	✓	✓				✓								
	0.25/0.5	8.6/8.2	700/750	IR2233J	JI	✓		✓	✓	✓						✓	✓	✓					✓							
	0.25/0.5	10.4/9.4	700/750	IR2235S	JI	✓		✓	✓	✓						✓	✓	✓				✓								
	0.25/0.5	10.4/9.4	700/750	IR2235J	JI	✓		✓	✓	✓						✓	✓	✓					✓							
650	0.165/0.375	9.0/8.1	490/530	6EDL04N065PR NEW	SOI	✓	✓	✓	✓							✓									✓					
	0.165/0.375	11.7/9.8	490/530	6EDL04I065PR NEW	SOI	✓	✓	✓	✓							✓									✓					
	0.165/0.375	11.7/9.8	490/530	6EDL04I065NR NEW	SOI	✓	✓	✓	✓							✓									✓					
	0.165/0.375	9.0/8.1	490/530	6EDL04N065NT NEW	SOI	✓	✓	✓	✓							✓						✓								
	0.165/0.375	11.7/9.8	490/530	6EDL04I065PT NEW	SOI	✓	✓	✓	✓							✓						✓								
	0.165/0.375	11.7/9.8	490/530	6EDL04I06NT	SOI	✓	✓	✓	✓							✓						✓								✓
600	0.165/0.375	11.7/9.8	490/530	6EDL04I06PT	SOI	✓	✓	✓	✓							✓						✓								✓
	0.165/0.375	9/8.1	530/530	6EDL04N06PT	SOI	✓	✓	✓	✓							✓						✓								✓
	0.2/0.35	8.9/8.2	400/425	IR2136S	JI	✓	✓		✓							✓						✓	✓							
	0.2/0.35	11.1/10.9	400/425	IR21363S	JI	✓	✓		✓							✓						✓								
	0.2/0.35	10.4/9.4	530/500	IR21364S	JI	✓	✓		✓							✓						✓								
	0.2/0.35	11.1/10.9	530/530	IRS2334M	JI																					✓				
	0.2/0.35	11.1/10.9	530/530	IRS2334S	JI																✓									
	0.2/0.35	8.9/8.2	530/530	IRS2336DJ	JI	✓	✓	✓	✓							✓							✓							
	0.2/0.35	8.9/8.2	530/530	IRS2336DS	JI	✓	✓	✓	✓							✓						✓								
	0.2/0.35	8.9/8.2	530/530	IRS23364DS	JI	✓	✓	✓	✓							✓						✓								
	0.25/0.5	9/8.7	425/675	IR2130S	JI	✓		✓	✓	✓						✓						✓								
	0.25/0.5	9/8.7	425/675	IR2130J	JI	✓		✓	✓	✓						✓							✓							
	0.25/0.5	9/8.7	425/675	IR2132S	JI	✓		✓	✓	✓						✓						✓								
	0.25/0.5	9/8.7	425/675	IR2132J	JI	✓		✓	✓	✓						✓							✓							
	0.25/0.5	8.6/8.2	700/750	IR2133S	JI	✓		✓	✓	✓						✓	✓					✓								
	0.25/0.5	8.6/8.2	700/750	IR2133J	JI	✓		✓	✓	✓						✓	✓						✓							
	0.25/0.5	10.4/9.4	700/750	IR2135J	JI	✓		✓	✓	✓						✓	✓					✓								
300	0.165/0.375	9.0/8.1	530/530	6EDL04N03PR NEW	SOI	✓	✓	✓	✓							✓								✓						
200	0.165/0.375	11.7/9.8	490/530	6ED003L02-F2	SOI	✓	✓		✓							✓									✓					
	0.165/0.375	9/8.1	530/530	6EDL04N02PR	SOI	✓	✓	✓	✓							✓	✓								✓					
160	1/2	7.5/6.8	100/100	6ED2742S01Q NEW	SOI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										✓		
60	1.5/1.5	5.8/4.5	140/140	6EDL7141	SOI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										✓	



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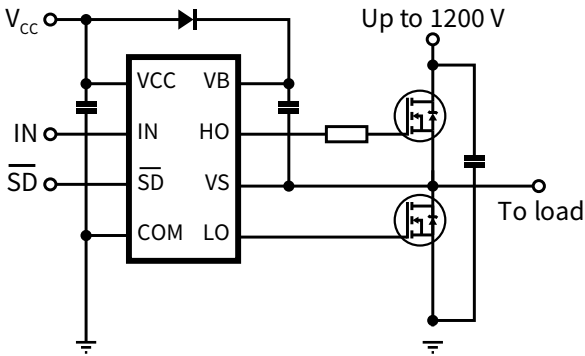
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Half-bridge and high- and low-side gate driver IC

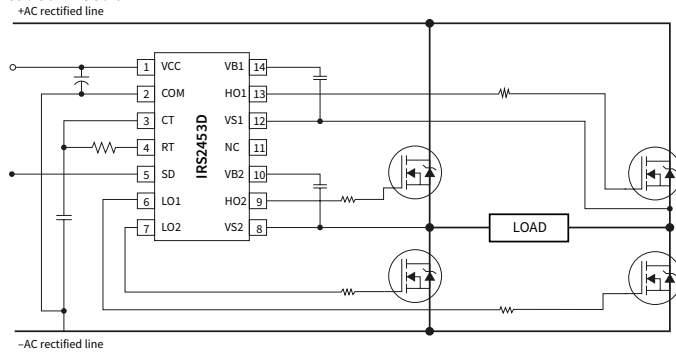
Typical connection



Voltage class [V]	I <sub>o</sub> /I <sub>o</sub> typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features																		Package										
1200	1.5/2.5	12.2/11.2	85/85	2ED020I12-FI	CT	✓	✓											✓	✓	✓							✓						✓	
	2/2.5	10.2/9.3	225/280	IR2213S	JI													✓	✓	✓	✓	✓				✓							✓	
	2/3	10.2/9.3	440/440	IR2214SS	JI			✓		✓					✓			✓	✓	✓	✓	✓							✓				✓	
	2.3/2.3	12.2/11.3	500/500	2ED1324S12P NEW	SOI				✓	✓	✓	✓	✓	✓	✓			✓	✓										✓					
	2.3/2.3	12.2/11.3	350/350	2ED1323S12P NEW	SOI				✓	✓	✓	✓	✓	✓	✓			✓									✓							
	2.3/4.6	12.2/11.3	500/500	2ED1322S12M NEW	SOI				✓	✓	✓	✓	✓	✓	✓			✓	✓								✓							
650	2.3/4.6	12.2/11.3	350/350	2ED1321S12M NEW	SOI				✓	✓	✓	✓	✓	✓			✓									✓								
	0.29/0.7	8.9/8.0	90/90	2ED2101S06F NEW	SOI						✓												✓											
	0.29/0.7	8.9/8.0	90/90	2ED2103S06F NEW	SOI						✓								✓				✓											
	0.29/0.7	8.9/8.0	90/90	2ED2104S06F NEW	SOI						✓								✓	✓			✓											
	0.29 / 0.7	8.9 / 8.0	90 / 90	2ED2388S06F NEW	SOI						✓								✓				✓											
	0.29/0.7	9.1/8.2	200/200	2ED2106S06F	SOI						✓												✓											
	0.29/0.7	9.1/8.2	200/200	2ED21064S06J	SOI						✓												✓											
	0.29/0.7	9.1/8.2	200/200	2ED2108S06F	SOI						✓												✓											
	0.29/0.7	9.1/8.2	200/200	2ED21084S06J	SOI						✓		✓					✓	✓				✓					✓						
	0.29/0.7	9.1/8.2	200/200	2ED2109S06F	SOI						✓								✓	✓			✓											
	0.29/0.7	9.1/8.2	200/200	2ED21094S06J	SOI						✓		✓					✓	✓	✓			✓					✓						
	0.29/0.7	9.1/8.2	200/200	2ED21091S06F	SOI						✓		✓						✓	✓			✓											
	0.36/0.7	9.1/8.3	300/310	2ED2304S06F	SOI						✓								✓				✓											
	2.5/2.5	9.1/8.2	200/200	2ED2181S06F	SOI						✓												✓											
	2.5/2.5	9.1/8.2	200/200	2ED21814S06J	SOI						✓												✓											
	2.5/2.5	9.1/8.2	200/200	2ED2182S06F	SOI						✓								✓				✓											
	2.5/2.5	9.1/8.2	200/200	2ED21824S06J	SOI						✓		✓					✓	✓				✓											
	2.5/2.5	9.1/8.2	200/200	2ED2183S06F	SOI						✓								✓				✓											
	2.5/2.5	9.1/8.2	200/200	2ED21834S06J	SOI						✓		✓					✓	✓				✓					✓						
	2.5/2.5	9.1/8.2	200/200	2ED2184S06F	SOI						✓								✓	✓			✓											
	2.5/2.5	9.1/8.2	200/200	2ED21844S06J	SOI						✓		✓					✓	✓	✓			✓					✓						
1.5/2.5	12.2/11.2	85/85	2ED020I06-FI	CT	✓	✓												✓	✓	✓							✓							
600	0.078/0.169	8.9/8.2	220/220	IR2304S	JI														✓				✓											
	0.078/0.169	8.9/8.2	220/220	IR25601S	JI														✓				✓											
	0.18/0.26	9/8	N.A.	IR21531S	JI												✓	✓		✓	✓		✓											
	0.18/0.26	9/8	N.A.	IR25603S	JI													✓	✓		✓	✓		✓										
	0.18/0.26	11/9	N.A.	IRS2153DS	JI							✓						✓	✓		✓	✓		✓										
	0.18/0.26	11/9	N.A.	IRS21531DS	JI							✓						✓	✓		✓	✓		✓										
	0.2/0.35	8.9/8.2	200/220	IR2106S	JI																		✓											
	0.2/0.35	8.9/8.2	200/220	IR21064S	JI																	✓						✓						
	0.2/0.35	8.9/8.2	200/220	IR2108S	JI																	✓						✓						
	0.2/0.35	8.9/8.2	200/220	IR21084S	JI										✓				✓	✓			✓				✓							
	0.2/0.35	8.9/8.2	200/750	IR2109S	JI																	✓					✓							
	0.2/0.35	8.9/8.2	200/750	IR21094S	JI														✓			✓	✓				✓							
	0.2/0.35	8.9/8.2	200/220	IR2308S	JI																	✓					✓							
	0.2/0.35	8.9/8.2	200/220	IR25606S	JI																	✓					✓							
	0.2/0.35	8.9/8.2	200/220	IR25604S	JI																		✓					✓						
	0.2/0.35	4.1/3.8	200/220	IR2301S	JI																			✓					✓					
	0.2/0.35	4.1/3.8	200/220	IRS2301S	JI																							✓						
	0.2/0.35	4.1/3.8	200/750	IR2302S	JI																		✓	✓				✓						
	0.21/0.36	8.9/8.2	150/160	IR2101S	JI																							✓						
	0.21/0.36	8.9/8.2	150/160	IRS2101S	JI																							✓						
	0.21/0.36	8.9/8.2	150/160	IR2102S	JI																							✓						
	0.21/0.36	8.9/8.2	150/680	IR2103S	JI																													

## Full-bridge gate driver ICs

Typical connection

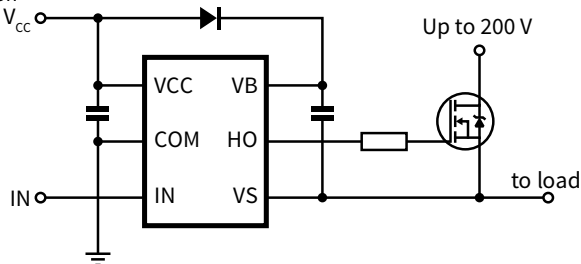


Voltage class [V]	$I_{O1}/I_{O2}$ typ. [A]	UVLO on/off typ. [V]	Base PN	Technology	Features			Package
600	0.18/0.26	11/9	IRS2453DS	J1	✓	✓	✓	✓

Integrated bootstrap diode	Shoot-through protection	Shutdown	DSO-14
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## Single high-side gate driver ICs

Typical connection



Voltage class [V]	$I_{O1}/I_{O2}$ typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features			Package			
700	4.0/4.0	7.2/6.8	50/50	1ED21271S07F*	SOI	✓	✓	✓	✓			
600	0.16/0.24	9/8	215/140	IRS25752L	J1				✓			
	0.25/0.5	8.6/8.2	105/125	IR2117S	J1				✓			
	0.25/0.5	8.6/8.2	105/125	IR2118S	J1				✓			
	0.25/0.5	10.3/9	150/200	IR2127S	J1		✓	✓	✓			
	0.25/0.5	10.3/9	150/200	IR2128S	J1		✓	✓	✓			
	0.25/0.5	7.2/6.8	150/200	IR21271S	J1		✓	✓	✓			
	0.29/0.6	8.6/8.2	105/125	IRS2117S	J1				✓			
	0.29/0.6	8.6/8.2	105/125	IRS2118S	J1				✓			
	0.29/0.6	10.3/9	150/150	IRS2127S	J1		✓	✓	✓			
	0.29/0.6	7.2/6.8	150/150	IRS21271S	J1		✓	✓	✓			
500	1.6/3.3	9.2/8.3	200/170	IR2125S	J1		✓	✓		✓		
200	0.16/0.24	9/8	215/140	IRS20752L	J1						✓	
	4/8	4.2/3.9	5/45	1EDN7550B	TDI						✓	
	4/8	8/7	45/45	1EDN8550B	TDI						✓	
	4/8	12.2/11.5	45/45	1EDN6550B	TDI						✓	
	4/8	14.9/14.4	45/45	1EDN9550B	TDI						✓	
	4/8	4.2/3.9	45/45	1EDN7550U	TDI							✓
100	0.16/0.24	9/8	215/140	IRS10752L	J1						✓	

Integrated bootstrap diode	Fault reporting	Overcurrent protection	DSO-8	DSO-16 WB	SOT23-6	TSNP-6
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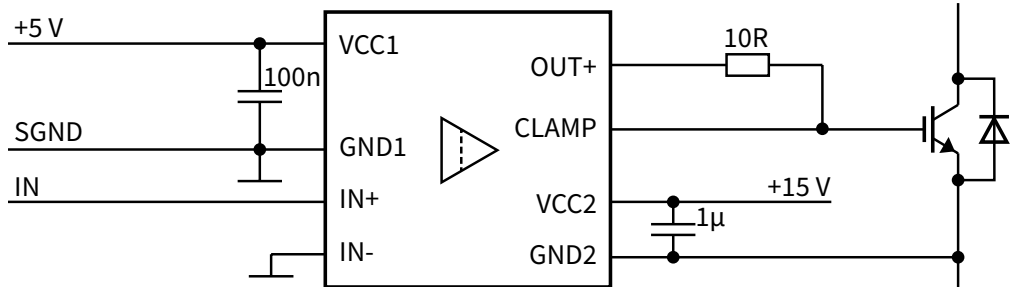
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## Automotive gate driver ICs

							Buffer	Desaturation protection	Enable	Fault reporting	Operational amplifier	Overcurrent protection	Programmable frequency	Programmable deadtime	Self-oscillating (Oscillator)	Separate pin for logic ground	Shoot-through protection	Shutdown	SPI interface	Synchronous rectification	Two-level turn-off	Soft-off	UL 1577	VDE 0884-11	ISO 26262 ready	ISO 26262 compliant	DSO-8	DSO-14	DSO-16 NB	DSO-16 WB	DSO-20 (sine pitch)	DSO-28	DSO-36	TSDSO-24	
Configuration	Voltage class [V]	I <sub>o</sub> /I <sub>o</sub> typ. [A]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features																	Package											
1-channel isolated	1200	12/12	12.6/11.8	60/60	1EDI3020AS	CT (IGBT)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3021AS	CT (IGBT)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3023AS	CT (IGBT)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3030AS	CT (SiC)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3031AS	CT (SiC)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3033AS	CT (SiC)	✓	✓	✓	✓	✓					✓	✓				✓	✓	✓	✓							✓				
		12/12	12.6/11.8	60/60	1EDI3025AS	NEW CT (SiC)	✓	✓	✓	✓	✓					✓	✓					✓	✓	✓	✓						✓				
		12/12	12.6/11.8	60/60	1EDI3026AS	NEW CT (IGBT)	✓	✓	✓	✓	✓					✓	✓					✓	✓	✓	✓						✓				
		12/12	12.6/11.8	60/60	1EDI3028AS	NEW CT (IGBT)	✓	✓	✓	✓	✓					✓	✓					✓	✓	✓	✓						✓				
		12/12	12.6/11.8	60/60	1EDI3035AS	NEW CT (SiC)	✓	✓	✓	✓	✓					✓	✓					✓	✓	✓	✓						✓				
		12/12	12.6/11.8	60/60	1EDI3038AS	NEW CT (SiC)	✓	✓	✓	✓	✓					✓	✓					✓	✓	✓	✓						✓				
		12/12	12.6/11.8	60/60	1EDI3050AS	NEW CT (IGBT & SiC)	✓	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓									✓	
12/12	12.6/11.8	60/60	1EDI3051AS	NEW CT (IGBT & SiC)	✓	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓									✓			
Half-bridge	100	1/1	7.3/6.8	N.A.	AUIR2085S	JI			✓			✓	✓	✓	✓												✓								
High-side and low-side	600	1.9/2.3	8.9/8.2	135/135	AUIRS21811S	JI																					✓								
		1.9/2.3	8.9/8.2	200/160	AUIRS21814S	JI										✓											✓								
		1.9/2.3	8.9/8.2	200/160	AUIRS2181S	JI																					✓								
		3.5/3.5	8.9/8.2	90/90	AUIRS2191S	JI										✓													✓						
		0.2/0.35	4.1/3.8	200/220	AUIRS2301S	JI																						✓							
Single high-side	65	0.3/0.3	10/6.5	2500/2500	AUIR3241STR	N-ISO			✓	✓																	✓								
	65	0.3/0.3	10/6.5	2500/2500	AUIR3242STR	N-ISO			✓	✓																	✓								
Dual high-side	75	0.3/1.4	12.5/10.0	4000/7000	2ED2410-EM	NEW N-ISO			✓	✓	✓									✓					✓									✓	
	105	0.3/1.0	7.0/6.6	3000/3000	2ED4820-EM	NEW N-ISO			✓	✓	✓								✓						✓									✓	



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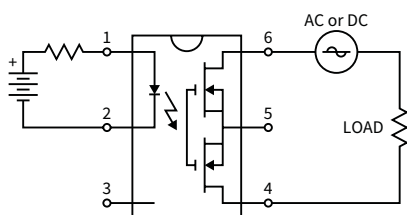
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## Complementary: Opto-isolated solid state relays

Typical connection



Microelectronic relays (MER) are power MOSFET or IGBT output photovoltaic relays where the output switch is controlled by radiation from a GaAlAs light emitting diode (LED) optically isolated from the output. MERs are a good choice to replace mechanical relays.

Load voltage [V]	Load current [mA]	$R_{DS(on)}$ [ $\Omega$ ]	Isolation voltage [ $V_{RMS}$ ]	Base PN	DIP-6	SMT-6	DIP-8	SMT-8	DIP-4	SMT-8 (with 4 pins)
400	140 AC-DC	27/7	4000	PVU414		✓				
	120 AC-DC	35/9	4000	PVT412L	✓			✓		
	240 AC-DC	6/2	4000	PVT412A	✓	✓				
	140 AC-DC	27/7	4000	PVT412	✓	✓				
	120 AC-DC	35	4000	PVT422			✓	✓		
300	150 AC-DC	24	4000	PVA3354N					✓	✓
				PVA3324N					✓	
	50 AC-DC	160	4000	PVA3055N					✓	✓
				PVA3054N						✓
250	170 AC-DC	15/4.25	4000	PVT312L	✓	✓				
	190 AC-DC	10/3	4000	PVT312		✓				
	170 AC-DC	8	4000	PVT322A				✓		
	170 AC-DC	10	4000	PVT322			✓	✓		
200	150 AC-DC	24	4000	PVA2352N					✓	
150	550 AC-DC	0.7/0.25	4000	PVT212		✓				
100	550 DC	1.5	4000	PVD1354N					✓	✓
				PVD1352N					✓	✓
	375 AC-DC	5	4000	PVA1354N					✓	
				PVA1352N					✓	✓
60	1500 DC	0.25	4000	PVDZ172N					✓	✓
	2000 AC/4000 DC	0.1/0.035	4000	PVG612A	✓	✓				
	1000 AC/2000 DC	0.5/0.15	4000	PVG612	✓	✓				



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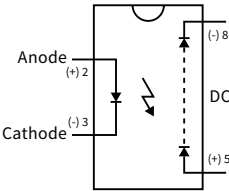
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# Infineon solid state relay and isolators package options



## Complementary: Opto-isolated solid state isolators

Typical connection



Photovoltaic isolators generate an electrically isolated DC voltage upon receipt of a DC input signal and are capable of directly driving MOSFET or IGBT gates. The output is controlled by radiation from a GaAlAs light emitting diode (LED) optically isolated from the output

Output voltage DC [V]	Short current [μA]	Nominal control current (DC) [mA]	Isolation voltage [V <sub>RMS</sub> ]	Base PN	Package			
					DIP-8	SMT-8	DIP-8 (with 4 pins)	SMT-8 (with 4 pins)
5/10	10/5	5	3570	PVI5033R	✓	✓		
5/10	10/5	10	2500	PVI1050N	✓	✓		
5	8	10	4000	PVI5080N			✓	✓
5	5	10	4000	PVI5050N				✓



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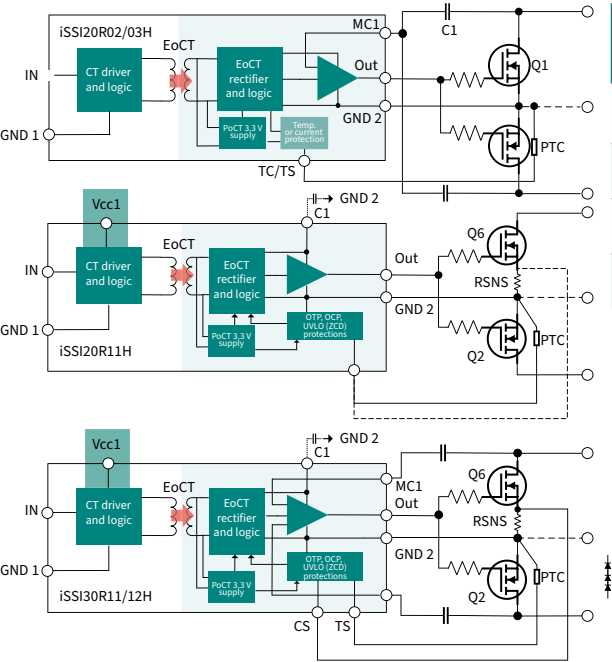
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# Coreless Transformer Solid State Isolators

## ISSI20RXXH, ISSI30RXXH

The new Infineon Solid State Isolator (SSI) family of products use Infineon’s Coreless Transformer technology for a high-performance isolator. They allow driving high power and low on-state resistance MOSFETs, thus allowing to replace SCRs and TRIACs with the advantage of dramatically reducing the power dissipation and extending the field application range of the SSR. Solid State Relays (SSR) built by using the SSI can easily replace most Electromechanical Relay (EMR) in a wide range of power applications where conventional SSR had no success until today. The new SSI also comes with precise and fast-acting protection functions such as Miller Clamp, overcurrent, and overtemperature protections to achieve unprecedented reliability and availability of SSR designs.

### Typical connection diagram



### Product specifications at a glance

Part Number	V <sub>in</sub> range	V <sub>cc</sub> range	I <sub>out</sub> peak	V <sub>out</sub> typ	Features	Package
iSSI20R02H iSSI20R03H	TTL /CMOS	2.85 V –3.5 V	175 uA	13 V at Vin = 2.6 V 15 V at Vin= 3.3 V	TS/CS + MC	DSO-8-66
iSSI20R11H	TTL /CMOS	2.85 V –3.5 V	400 mA	13 V at Vin = 2.6 V >15 V at Vin= 3.3 V	TS, CS	DSO-8-66
iSSI30R11H	TTL /CMOS	2.85 V –3.5 V	400 mA	13 V at Vin = 2.6 V >15 V at Vin= 3.3 V	CS, TS, MC (2)	DSO-16-33
iSSI30R12H	TTL /CMOS	2.85 V –3.5 V	400 mA	13 V at Vin = 2.6 V >15 V at Vin= 3.3 V	CS, TS, MC (2), D-Sense (30R12H)	DSO-16-33

TS: Temperature Sense (input pin for overtemperature protection)  
CS: Current Sense (input pin for overcurrent protection)  
MC: Miller Clamp  
D-Sense: Diode Sense (30R12H Only)



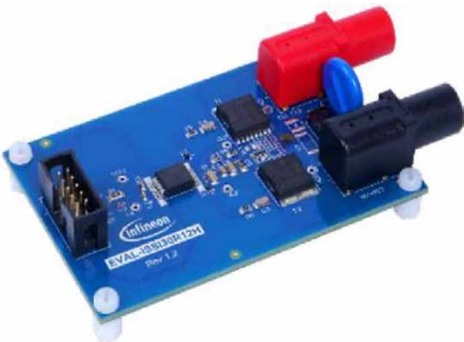
### Features and benefits

Product features
– Large input voltage range, compatible with photovoltaic isolators.
– Self-supplied output stage with very high output short circuit
– Very high output voltage, suitable for MOSFETs and IGBTs
– Thermal protection
– Overcurrent protection
– Miller Clamp
– Fast turn-off /-on of output devices
– Power on reset and safety clamp on input stage

Product benefits
– Replaces PVI and improves circuit performances
– No need for isolated supply for the output stage, smaller BOM
– Direct drive of switches’ gate, no need for series/parallel
– Switches protection in temperature and current, avoids CdV/dT effect by Miller Clamp
– Ensures safe switching transition of MOSFETs

### Full featured evaluation board: EVAL-iSSI30R12H

- Evaluation board with iSSI30R12H and two CoolMOST™ IPT60T02S7 MOSFETs in an AC switch configuration
- Ultrafast overcurrent detection that is triggered at the typical peak current of 35 A
- Direct-chip temperature measurement of CoolMOST™ with shutdown at 155°C



### Evaluation board options:

Product type	Voltage range	Current range	Features
EVAL-iSSI20R02HCS	40 V d.c. or 24 V a.c.	10 A d.c. or 7A a.c	– Overcurrent protection at 20 A peak by shunt monitoring, Fast turn-off (< 5 μs typ), Dynamic Miller clamping
EVAL-iSSI20R02HTS	60 V d.c. or 48 V a.c.	10 A d.c. or 6.5 A a.c.	– PTC temperature measurement – Fast turn-off (< 5 μs typ), Dynamic Miller clamping
EVAL-iSSI20R03H	60 V d.c. or 48 V a.c.	10 A d.c. or 7 A a.c	– Overcurrent protection at 20 A peak by shunt monitoring – PTC Temperature measurement Fast turn-off (< 5 μs typ)
EVAL-iSSI20R11H	320 V d.c. or 230 V a.c.	2 A d.c. or a.c.	– Overcurrent protection at 9 A peak by shunt monitoring – Fast turn-off (< 5 μs typ)
EVAL-iSSI30R11H	320 V d.c. or 230 V a.c.	7A d.c. or a.c., 45 A <sub>Peak</sub>	– PTC Temperature measurement – Fast turn-off of CoolMOST™ (< 5 μs typ)
EVAL-iSSI30R12H	320 V d.c. or 230 V a.c.	7A d.c. or a.c., 45 A <sub>Peak</sub>	– On-chip junction temperature measurement of CoolMOST™, Fast turn-off of CoolMOST™ (< 5 μs typ)



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# Infiniteon Solid State Relays (SSR) technologies

Using Infineon power-switch technologies, Infineon Solid State Relays (SSRs) are remotely controlled switches (on/off) with complete galvanic isolation from input to output. No power supply is needed on the output.

## Two main sub-groups:

- Isolated: Photovoltaic (PVI) And Coreless Transformer (Solid State Isolators-SSI)
  - Isolated, low-power DC voltage sources capable of driving MOSFET or IGBT gates directly
- Photovoltaic relays (PVR)
  - PVI plus internal power MOSFET

## Main benefits of Infineon SSR technology:

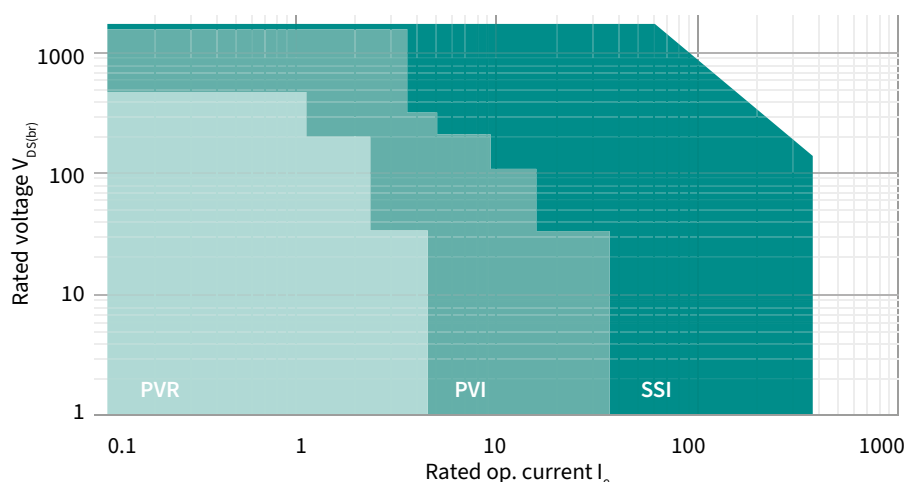
- Optically isolated and Coreless Transformer – based technology provides galvanic isolation for safety applications
- Wide range of applications from industrial automation to test equipment
- Established and reliable products with over 20 years of history

## Key advantages over electromechanical relays:

- Low total cost of ownership
- Silent operation
- No contact bounce
- Compact solution
- Fast response time
- High input sensitivity
- High reliability with long operational life
- Insensitivity to stray EMF, shock, and vibration
- Stable contact resistance over life

## Infineon SSRs can be used in a wide range of applications:

- Electro-mechanical relay (EMR) replacement
- Battery management systems
- UPS
- Automatic test equipment
- Instrumentation systems
- Industrial automation
- Thermostats
- Programmable logic controller
- Power Distribution Units (PDU)
- Building Automation
- HVAC Controllers



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# Features

Addressing various application requirements, Infineon delivers solutions with an assortment of features intended to optimize performance, minimize size and reduce cost. Below is a table of additional gate driver IC features available in the current portfolio.

Features	Abbreviation	Benefits
Active Miller clamp	M-CLAMP	Protection against inadvertent dynamic turn-on because of parasitic Miller effects
Active shutdown	SD-ACT	Ensures a safe IGBT off-state in case the output chip is not connected to the power supply or an undervoltage lockout is in effect
Brake chopper	BRAKE	Integrated brake IGBT driver with protection
Comparator	CMP	General purpose comparator included
Desaturation protection	DESAT	Protects the IGBT at short circuit
Enable	EN	Dedicated pin terminates all outputs
Fault reporting	FAULT-RPT	Indicates an overcurrent or undervoltage shutdown has occurred
Fault reset	FAULT-RST	Dedicated pin resets the DESAT-FAULT-state of the chip
High-voltage start-up	HVSTART	Provides easy and fast circuit start-up while enabling low circuit standby losses
Integrated bootstrap diode	BSD	Integrated bootstrap reduces BOM
Operational amplifier	OPAMP	An independent op-amp for current measurement or overcurrent detection
Oscillator	OSC	Integrated front end oscillator
Over-current protection (ITRIP)	OC	Ensures safe application operation in case of overcurrent
Programmable deadtime	DT-PROG	Deadtime is programmable with external resistor for flexible design
Programmable fault clear time	FLTC	The length of the fault clear time period ( $t_{FLTC}$ ) is programmed by external capacitor which connected between FLTC and $V_{SS}$ ( $C_{FLTC}$ ).
Programmable shutdown	SD-PROG	A shutdown feature has been designed into a pin
Separate pin for logic ground	SEP-GND	Dedicated pin or logic ground for improved noise immunity
Separate sink/source outputs	SEP-OUT	Simplifies gate resistor selection, reduces BOM, and improves dV/dt control
Shoot-through protection	STP	Additional shoot-through protection logic such as interlock
Short-circuit clamping	SC-CLAMP	During short circuit the IGBT's gate voltage tends to rise because of the feedback via the Miller capacitance. An additional protection circuit connected to OUT+ limits this voltage to a value slightly higher than the supply voltage.
Shutdown	SD	Dedicated pin disables the IC outputs
Soft overcurrent shutdown	SD-SOFT	Dedicated pin turns off the desaturated transistor, preventing overvoltages
Truly Differential Inputs	TDI	Control inputs independent from gate driver GND, robust against ground shifts from power MOSFET switching
Two-level turn-off	TLTO	Lowers VCE overshoots at turn-off during short circuits or overcurrent events
UL 1577	UL	Double galvanic isolation certification
Undervoltage lockout	UVLO	Ensures safe application operation by avoiding unexpected driver behavior at low voltages
VDE 0884-10 or VDE 0884-11	VDE	Reinforced galvanic isolation certifications for non-optical couplers



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# Gate driver ICs for SiC MOSFETs

Ultrafast switching from 650 V to 2000 V power transistors, such as CoolSiC™ SiC MOSFETs, can be more easily handled by isolated gate driver solutions.

The following EiceDRIVER™ gate driver ICs incorporate the most important key features for driving SiC MOSFET such as tight propagation delay matching, precise input filters, wide output supply voltage range, negative gate voltage capability, extended CMTI capability, Miller clamp, and DESAT protection.

Product family	Part number	Typ. current	$V_{CE2}$ $-V_{EE2}$	UVLO	Prop. delay (accuracy)	CMTI	Isolated	Other key features	Package
Achieve high efficiency and power density: take advantage of low propagation delay and high CMTI									
EiceDRIVER™ 1EDB 1-channel family	1EDB9275F 1EDB6275F	5/9 A	20 V	14.9/14.4 V 12.2/11.5 V	45 ns (+6/-4 ns)	300 V/ns	✓	Separate source/sink outputs, fast start-up times and fast recovery, basic isolation, UL 1577	DSO-8, 150 mil
EiceDRIVER™ 2EDi 2-channel family	2EDR9259X 2EDR9258X 2EDR6258X	5/9 A	20 V	14.9/15.4 V 14.9/15.4 V 12.5/11.5 V	38 ns (+9/-5 ns)	150 V/ns	✓	2EDi Gen 2, dead-time control, disable/enable, reinforced isolation, UL 1577, VDE-11, IEC 62368-1, GB4943.1	DSO-14, 300mil
	2EDB9259Y			14.9/15.4 V			✓	2EDi Gen 2, dead-time control, basic isolation, UL 1577, GB4943.1	DSO-14, 150 mil
EiceDRIVER™ 1EDN-TDi 1-channel family	1EDN6550B 1EDN9550B	4/8 A	20 V	12.2/11.5 V 14.9/14.4 V	45 ns (+10/-7 ns)	N/A	–	Separate source/sink outputs	SOT23-6
EiceDRIVER™ X3 Compact 2-channel family	2ED3146MC12L	6.5/6.5 A	35 V	12.5 / 13.6 V	50 ns (+/- 8ns)	300 V/ns	✓	Active shutdown, dead-time (DT) control with arm shoot-through prevention in half-bridge operation, Individual channel control operation (DT: open or tied to VCC1), Enable, Reinforced isolation IEC 60747-17, UL 1577	DSO-14, 300mil
Avoid parasitic turn-on: take advantage of Miller clamp options									
EiceDRIVER™ 1ED Compact 1-channel family	1EDI20I12MF	4 A	20 V	12.7/10.5 V	300 ns	100 V/ns	✓	Miller clamp, functional isolation	DSO-8, 150 mil
	1EDI60N12AF	10 A	35 V	10/8 V	125 ns	100 V/ns	✓	Separate source/sink outputs, functional isolation	
EiceDRIVER™ X3 Compact 1-channel family	1ED1342MU12F	6.5/6.5 A	35 V	12.5 / 13.6 V	45 ns (+/- 7ns)	300 V/ns	✓	Active shutdown, functional isolation UL 1577	DSO-8, 150 mil
EiceDRIVER™ 2L-SRC Compact 1-channel family	1ED3145MC12H	6.5/6.5 A	35 V	12.5 / 13.6 V	45 ns (+/- 7ns)	300 V/ns	✓	Active shutdown, reinforced isolation IEC 60747-17, UL 1577	DSO-8, 300 mil
	1ED32xxMC12H	10/18 A	35 V	12.5/10.4 V	110 ns (+/- 15 ns)	200 V/ns	✓	Two-level slew-rate control, Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO-8, 300 mil
Short-circuit protect your CoolSiC™: take advantage of the fast and accurate DESAT protection									
EiceDRIVER™ 1ED-F3 1-channel family	1ED332xMC12N	3/6 A	35 V	12.6/10.4 V 13.6/12.6 V	85 ns	300 V/ns	✓	Miller clamp, short circuit protection, soft-off, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ X3 Analog 1-channel family	1ED34x1MC12M	3/6/9 A	35 V	12.6/10.4 V	244 ns (+/- 30 ns)	200 V/ns	✓	Analog configurable, fast and accurate short circuit protection and soft turn-off Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ X3 Digital 1-channel family	1ED38x0MC12M	3/6/9 A	35 V	12.6/10.4 V default, but adjustable	244 ns (+/- 30 ns)	200 V/ns	✓	Digital configurable (I <sup>2</sup> C), fast and accurate short circuit protection, rich monitoring functionality (predictive maintenance) Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ 2ED-F2 2-channel family	2ED020I12-F2	2 A	28 V	12.6/10.4 V	170 ns	50 V/ns	✓	Miller clamp, short circuit protection	DSO-36, 300mil



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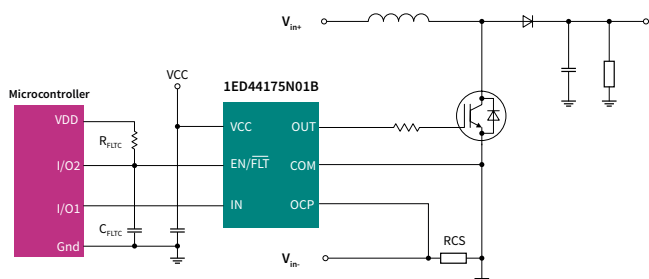
# EiceDRIVER™ non-isolated low-side gate drivers

## 1ED4417x, 1-ch, low-side drivers with integrated protection features

EiceDRIVER™ 1ED4417x family are 25 V, 1-channel low-voltage, non-inverting, low-side gate drivers designed for ground-referenced applications such as power-factor correction (PFC) circuits. Typically, overcurrent protection (OCP) is implemented by a current measurement with a comparator and multiple resistors and capacitors. The 1ED44176N01F, 1ED44175N01B, and 1ED44173N01B provides up to 20 percent cost and 50 percent space savings by integrating a fast and accurate OCP. The new family of low-side gate drivers utilize Infineon's proprietary latch immune CMOS technologies to enable a rugged monolithic construction while realizing best-in-class fault reporting accuracy with OCP threshold tolerance of +/-5 percent. In addition, Infineon's IC technology enables a tiny PG-SOT23 package (or DSO-8 for 1ED44176N01) by combining the fault output and enable functions into a single pin.

The family also includes 1ED44171N01B, a cost-effective, simple driver with enable and fault reporting functions. With a single PCB layout, 1ED44171N01B can be used as a second source option for the popular IRS44273L. Enabling a single-supplier, dual sourcing strategy for fast-reacting supply flexibility.

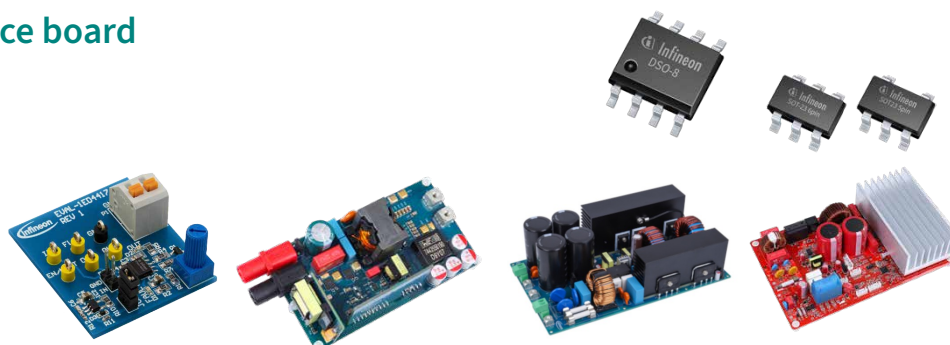
### Simplified application diagram



Part Number	Package	I <sub>OZ</sub> [A]	UVLO [V]	V <sub>OCTH</sub> [mV]	T <sub>on/off</sub> [ns]	Ground pins	Feature
1ED44171N01B	SOT23-5	2.6/2.6 A	11.9/11.4 V	N/A	50/50 ns	COM	Enable, Fault, cost-effective
1ED44173N01B	SOT23-6	2.6/2.6 A	8/7 V	-250 mV	34/34 ns	COM	OCP (negative current sensing), Enable, Fault
1ED44175N01B	SOT23-6	2.6/2.6 A	11.9/11.4 V	-250 mV	50/50 ns	COM	OCP (positive current sensing), Enable, Fault, Programmable fault clear time
1ED44176N01F	DSO-8	0.8/1.75 A	11.9/11.4 V	500 mV	50/50 ns	V <sub>SS</sub> /COM	

## Evaluation and reference board

- › EVAL-1ED44176N01F
- › EVAL-1ED44175N01B
- › EVAL-1ED44173N01B
- › EVAL-PFC5KIKWWR5SYS
- › REF-SHA35WRC2SYS
- › REF-AIRCON-C302A-IM564



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Drives



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# 2EDN EiceDRIVER™ family

## Rugged, fast, dual-channel low-side 4 A/5 A gate driver ICs

### EiceDRIVER™ 2EDN family overview

Dual-channel driver ICs are the crucial link between control ICs and powerful MOSFET, wide band gap (WBG) switching devices. Driver ICs enable high system level efficiencies, excellent power density, and consistent system robustness.

### EiceDRIVER™ 2EDN family: Fast, precise, and compatible

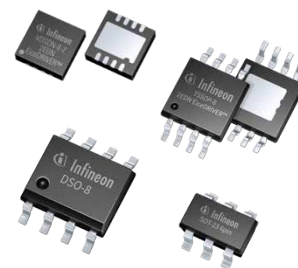
- Highly efficient SMPS enabled by 19 ns propagation delay and 2 ns channel-to-channel mismatch precision for fast MOSFET and WBG switches
- Diversified applications driven by strong output current 4 A/5 A per channel
- Unique designs are supported by the availability of numerous packages

### EiceDRIVER™ 2EDN family: The new reference in ruggedness and low power dissipation

- 4 V and 8 V UVLO (undervoltage lock out) options for instant FETs protection under abnormal conditions, further improved with active output voltage clamping
- -10 V robustness of control and enable inputs provides crucial safety margin when driving pulse transformers or driving FETs in various packages
- 5 A reverse output current robustness eliminates the need for Schottky switching diodes and reduces bill-of-material
- Cool driver ICs from true rail-to-rail low impedance output stages

### Applications

- Server
- Telecom
- DC-DC Converters
- Power tools
- Industrial SMPS
- Low speed electrical vehicles
- Solar power inverter
- LED lighting



Key features	Product benefits	System benefits
<ul style="list-style-type: none"> <li>– 5 A source/sink current</li> <li>– 2 ns channel-to-channel mismatch</li> <li>– 10 ns minimum input pulse width</li> </ul>	<ul style="list-style-type: none"> <li>– Fast Miller plateau transition</li> <li>– Precise timing</li> </ul>	<ul style="list-style-type: none"> <li>– High power efficiency               <ul style="list-style-type: none"> <li>– in hard switching PFC with SiC diode</li> <li>– in half-bridges and synchronous rectifications</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>– True rail-to-rail low impedance output stages</li> </ul>	<ul style="list-style-type: none"> <li>– Low power dissipation in driver IC</li> </ul>	<ul style="list-style-type: none"> <li>– Cooler driver IC operation</li> <li>– Higher FETs drive capability</li> </ul>
<ul style="list-style-type: none"> <li>– 4 V and 8 V UVLO options, with active output voltage clamping</li> <li>– 19 ns propagation delay for both control and enable</li> </ul>	<ul style="list-style-type: none"> <li>– Fast and reliable FETs turn-off, independent of control IC</li> </ul>	<ul style="list-style-type: none"> <li>– Instant FETs protection under abnormal operation</li> </ul>
<ul style="list-style-type: none"> <li>– -10 V robustness of control and enable inputs</li> </ul>	<ul style="list-style-type: none"> <li>– Increased GND-bounce robustness</li> </ul>	<ul style="list-style-type: none"> <li>– Crucial safety margin to drive pulse transformer</li> </ul>
<ul style="list-style-type: none"> <li>– 5 A reverse output current robustness</li> </ul>	<ul style="list-style-type: none"> <li>– Saves switching diodes</li> </ul>	<ul style="list-style-type: none"> <li>– Increases power density</li> <li>– BOM savings</li> </ul>
<ul style="list-style-type: none"> <li>– 2 independent channels</li> </ul>	<ul style="list-style-type: none"> <li>– Option to increase drive current by truly concurrent switching of 2 channels</li> </ul>	<ul style="list-style-type: none"> <li>– One IC covering many applications</li> </ul>
<ul style="list-style-type: none"> <li>– Industry standard pinout and packages</li> </ul>	<ul style="list-style-type: none"> <li>– Straight forward design upgrades</li> </ul>	<ul style="list-style-type: none"> <li>– Short time-to-market</li> </ul>



SMPS



Server



Telecom



Motor control



Power tools



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Lighting



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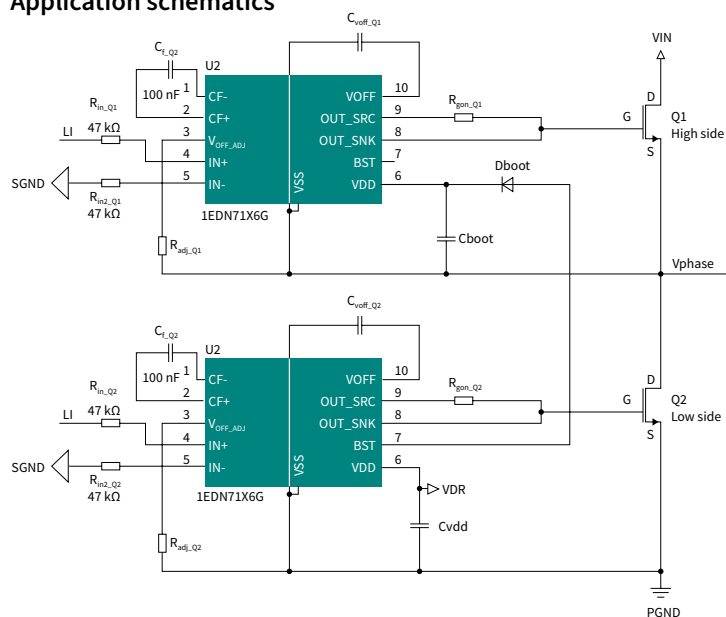


# EiceDRIVER™ 1EDN71x6G/U family

## 200 V 1-ch gate drivers with truly differential input (TDI)

The 1EDN71x6G/U is a 1-channel gate driver family optimized for Infineon CoolGaN™ Schottky-gate (SG) HEMTs, and also compatible with other GaN SG HEMTs and silicon MOSFETs. The TDI feature eliminates the risk of false triggering due to ground bounce in low-side applications and enable 1EDN71x6G/U to address even high-side applications. The TDI feature works by controlling the gate driver output state exclusively by the voltage difference between the two inputs, completely independent of the driver's reference (ground) potential as long as the common-mode voltage is below 150 V (static) and 200 V (dynamic).

### Application schematics



### Features and benefits

#### Product features

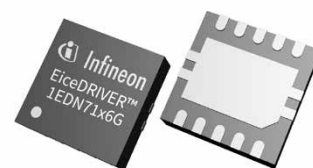
- Truly differential logic input (TDI)
- Four driving strengths
- Active Miller clamp
- Optional negative charge pump
- Active bootstrap capacitor

#### Product benefits

- High-side driving and low-side ground bounce immunity
- Optimize switching speed without external gate resistors
- Prevent induced turn-on
- Additional induced turn-on immunity
- No overcharging the bootstrap capacitor during deadtime

### Product family

Product	Output current	Source/sink resistance	Input pulse blanking time	Package
1EDN7116G	2 A	0.8 Ω	20 ns	VSON-10
1EDN7126G	1.5 A	1.0 Ω	40 ns	VSON-10
1EDN7136G	1 A	1.5 Ω	60 ns	VSON-10
1EDN7146G	0.5 A	3.0 Ω	80 ns	VSON-10
1EDN7116U	2 A	0.8 Ω	20 ns	TSNP-7
1EDN7126U	1.5 A	1.0 Ω	40 ns	TSNP-7
1EDN7136U	1 A	1.5 Ω	60 ns	TSNP-7
1EDN7146U	0.5 A	3.0 Ω	80 ns	TSNP-7



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# EiceDRIVER™ 1EDL8011, 135 V high-side driver

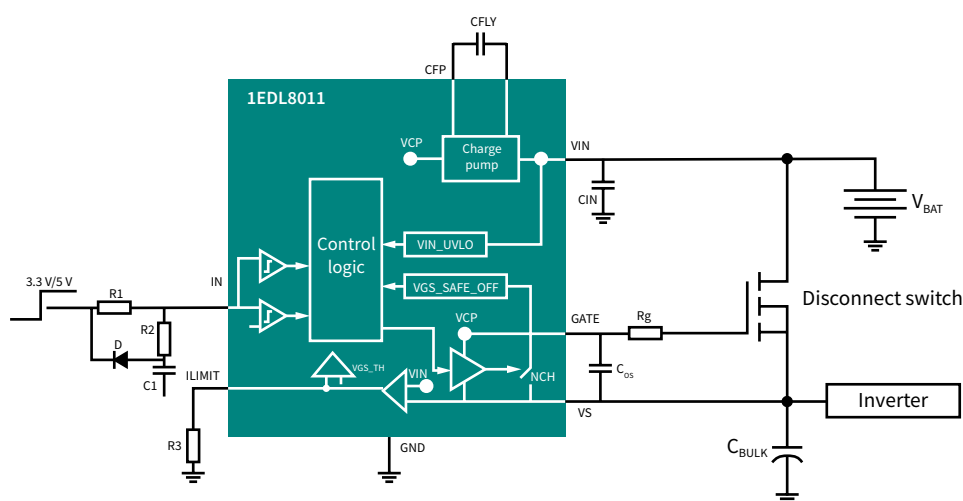
## Integrated high-side driver with strong gate drive and integrated charge pump

Infineon's upcoming EiceDRIVER™ 1EDL8011 high-side gate driver provides a simple and highly robust solution to drive a disconnect switch to protect battery operated systems during potential short conditions. 1EDL8011 enables fast turn on/off control of high side N-channel MOSFETs due to the powerful internal gate sourcing and sinking current capabilities. It consists of an integrated charge pump with an external capacitor to provide support for strong start-up and turn-off and scalable FETs in parallel application scenarios. The internal charge pump provides proper MOSFET gate voltage during low operating input voltage conditions. High-side protection avoids faulty shorting conditions in the load and the dangerous presence of in-rush currents for battery-powered applications.

1EDL8011 features include OCP protection, the adjustable current setting threshold, time delay, as well as a safe start-up mechanism with flexible blanking during MOSFET turn-on transition. Input voltage under-voltage lockout (UVLO) avoids operation under hazardous conditions and ensures the right level of gate voltage to fully enhance the MOSFET.

The 1EDL8011 gate driver addresses two main use cases in battery operated systems:

- In-rush current control: allows controlled turn-on of the disconnect switch by using an external  $R_g$  combined with a safe start-up and blanking mechanism.
- Short circuit protection: whenever a short occurs at the load side, it allows disconnecting the load from the source by quickly turning off the disconnect switch. This is made possible by the strong pull-down inside the 1EDL8011, therefore protecting the whole system.



## Features and benefits

### Product features

- Operating voltage: 7 – 135 V
- Powerful gate sinking current up to 1 A
- Off-mode quiescent current 1  $\mu$ A

### Product benefits

- Wide voltage operating range
- Fast turn-off for proper protection
- Efficiency and long battery life

## Product family

Product	Package	Voltage [A]
1EDL8011*	DSO-8	7 – 135 V



Power tools



Gardening tools



Multicopter



Service robots



eBike



Vacuum cleaner



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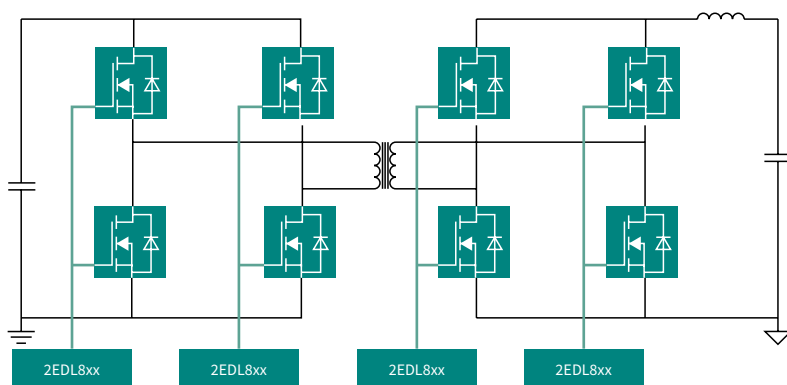
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# EiceDRIVER™ 2EDL8x2x family

## 120 V, 3/4 A, junction-isolated high- and low-side gate drivers

The 2EDL8x2x is a family of high- and low-side gate drivers designed for advanced switching DC-DC converters. The 2EDL802x takes in independent inputs, while 2EDL812x takes in differential inputs, both of which have built-in hysteresis for enhanced noise immunity. The gate driver family comes in two packages: VDSO-8 4x4 mm and VSON-10 3x3 mm.

### Application schematics



### Features and benefits

#### Product features

- 120 V integrated boot-strap diode with 10 ns reverse recovery time
- 2 to 4 A output source currents
- 6 A output sink currents
- -8 V/+ 15 V differential input robustness
- 5 A reverse current output robustness
- ±1 ns (typ.) channel-to-channel delay matching

#### Product benefits

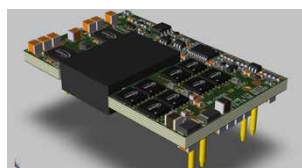
- Drive strength for fast Miller plateau transition
- Fast and robust
- Immunity against false triggering from ground bounce
- No need for Schottky clamping diodes

### Product family

Part nu	Input	Source current	Sink current	Min. input pulse width	Propagation delay (typ.)	Matching delay (typ.)	ESD	Package
2EDL8123G	Differential	3 A	6 A	40 ns	45 ns	2 ns	2 kV	VDSO-8 4x4 mm
2EDL8124G		4 A						
2EDL8023G	Independent	3 A						
2EDL8024G		4 A						
2EDL8123G3C	Differential	3 A						VSON-10 3x3 mm
2EDL8124G3C		4 A						
2EDL8023G3C	Independent	3 A						
2EDL8024G3C		4 A						

### Evaluation board:

EVAL\_HB\_2EDL8x2xG\*  
REF\_600W\_FBFB\_QB\*



DC-DC



Battery formation



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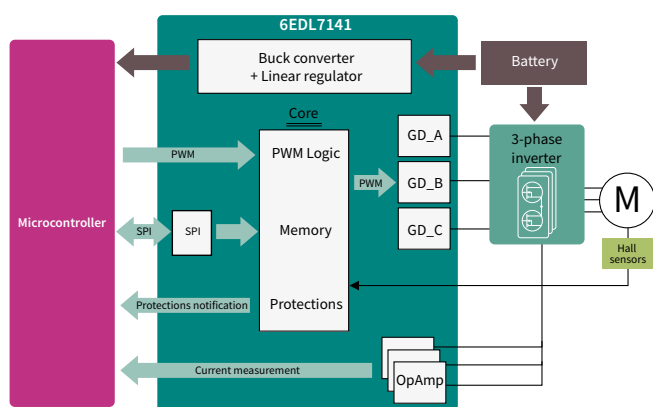
# MOTIX™ 6EDL7141 high performance motor control

## Next-generation fully programmable three-phase gate driver

6EDL7141, Infineon's latest three-phase motor control gate driver IC allows our customers to develop their next generation of high performance battery operated products using BLDC or PMSM motors. Ideal applications include cordless power tools, gardening products, and automated guided vehicles. With over 50 fully programmable parameters using built-in digital SPI interface, 6EDL7141 is fully configurable to drive a wide range of MOSFET's to yield the best possible system efficiency. The integrated buck regulator provides the power for both the microcontroller and the Hall sensors in the motor, further reducing peripheral components and required PCB area. In addition, with a full suite of system protection features such as OCP, UVLO, overtemperature, and locked rotor detection, this dedicated motor controller will increase reliability and robustness in severe operating fault conditions.

### Block diagram

Three-phase BLDC battery-powered motor control



### Features and benefits

#### Key features

- Integrated power supply
- Programmable slew rate
- Programmable gate drive supply
- 3x current shunt amplifier
- ADC ref. of 5 V
- Complete dedicated motor control protection suite

#### Key benefits

- Reduced external components and PCB area
- Optimized efficiency and EMI
- Maximum flexibility to use different inverter FETs
- Highly accurate current sense while saving external components
- Higher dynamic range to increase signal resolution
- Improve reliability and fault detection



### EVAL\_6EDL7141\_TRAP\_1SH

#### BC 1 shunt evaluation board

Parallel 40 V OptiMOS™5 PQFN

XMC1404 MCU

On-board programming dongle

Featured module IC: 6EDL7141



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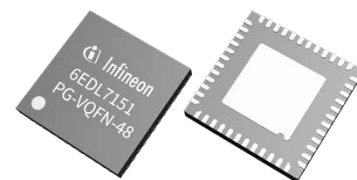
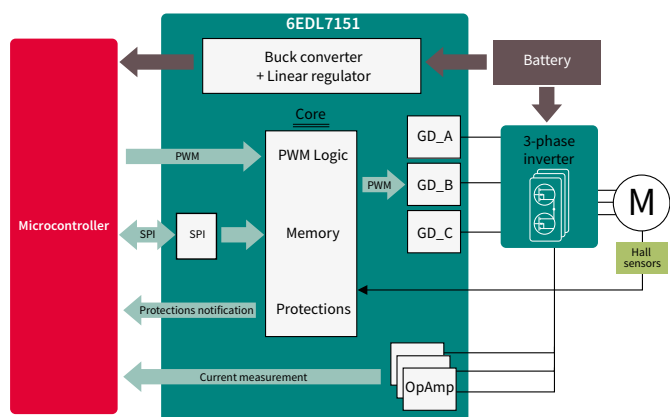
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# MOTIX™ 6EDL7151 3-phase smart gate drive controller IC

## Three-phase motor control gate driver IC for battery supplied BLDC motor control

The 6EDL7151 is Infineon's latest 3-phase gate driver which includes added  $V_{ds}$  sensor to allow additional hardware system protection for battery supplied motor control products. Ideal applications include cordless power tools, gardening products, and automated guided vehicles. With over 50 programmable parameters using built-in digital SPI interface, 6EDL7151 is fully configurable to drive a wide range of MOSFET's to yield the best possible system efficiency. 6EDL7151 is also designed for maximum performance. Features include programmable deadtime delays for preventing current shoot through between HS and LS switches in normal operation and separate charge pumps for low and high side gate drivers support 100 percent duty cycle and low voltage supply operation. Supplies for the gate drivers are programmable to one of the following levels: 7 V, 10 V, 12 V, or 15 V. Additionally, the slew rate of the driving signal can be programmed with fine granularity to reduce EMI emissions. An integrated synchronous buck converter provides an efficient supply of current to the rest of the system. The 6EDL7151 also integrates a linear voltage regulator (up to 300 mA), powered by the buck converter to supply the MCU and other sensitive components in the system. 6EDL7151 includes three current sense amplifiers for accurate current measurements that support bi directional low side current sensing with programmable gain.  $R_{DS(on)}$  sensing is supported through internal connection of the phase nodes to the current sense amplifiers inputs. Temperature compensation if needed shall be provided by the user application. 6EDL7151 also includes highly programmable  $V_{ds}$  sensors for inverter MOSFET protection. In addition, 6EDL7151 provides numerous protections features for improving application robustness during adverse conditions like monitoring of power supply voltages and system parameters. The failure behavior, threshold voltages, and filter times of the supervisions of the device are adjustable via SPI. Monitored aspects include inverter currents, gate drive voltages and currents, device temperature, and rotor locked.



### Features and benefits

#### Product features

- Integrated power supplies
- Adjustable slew rate
- 3x current shunt amplifier
- Complete dedicated motor control protection suite
- $V_{ds}$  sensing

#### Product benefits

- Reduced external component count and PCB area
- Lower voltage overshoots and EMI reduction
- Maximum flexibility to use different inverter MOSFET's
- Highly accurate integrated current sense saves external components
- Improved reliability and fault detection

### Product family

Product	Package	Voltage [V]	DVDD regulator output [V]
6EDL7151*	VQFN 48 7mm x 7mm	5.5 – 70 V	5.0 V



Power tools



Gardening tools



Multicopter



Service robots



eBike



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# MOTIX™ 160 V SOI gate driver family

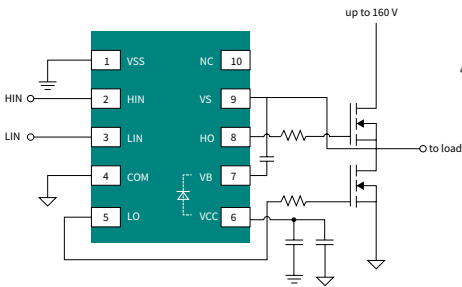
2ED27xxS01G half-bridge and high- and low-side gate driver family with integrated bootstrap diode

6ED2742S01Q three-phase driver with charge pump, current sense amplifier, OCP, and bootstrap diode

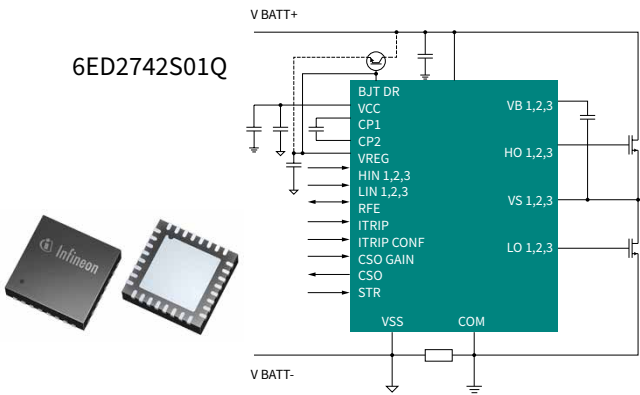
MOTIX™ 160 V SOI gate driver family is designed for the BLDC motor drive applications. The SOI technology enables integrated bootstrap diodes, which can be used to supply the external high-side bootstrap capacitor. The output drivers feature a high-pulse current buffer stage designed for minimum driver cross-conduction. MOTIX™ 2ED27xxS01G family consists of three half-bridge and three high- and low-side 160 V SOI gate drivers. The UVLO protection is on both  $V_{CC}$  and  $V_B$  pins. Fast propagation delays (50 ns) are suitable for motor drive and power conversion applications in VSON-10 (3x3 mm) package with exposed ground pad. MOTIX™ 6ED2742S01Q is a 160 V three-phase SOI gate driver, which supports 100 percent duty cycle operation by a trickle charge pump. Protection features include UVLO, OCP with configurable threshold, fault, and automatic fault clear. A current sense operational amplifier (CSA) with selectable gain is integrated between the  $V_{SS}$  and COM.

### Simplified application diagram

2ED27xxS01G



6ED2742S01Q



Product	Package	Output current	Configuration	Deadtime	Propagation delay
2ED2732S01G <b>NEW</b>	VSON-10 3x3 mm	1/2 A	High- and low-side (HS+LS)	None	50 ns
2ED2734S01G*		2/4 A			65 ns
2ED2738S01G <b>NEW</b>		4/8 A			65 ns
2ED2742S01G <b>NEW</b>		1/2 A	Half-bridge	50 ns	50 ns
2ED2744S01G*		2/4 A			65 ns
2ED2748S01G <b>NEW</b>		4/8 A			65 ns
6ED2742S01Q	VQFN-32 5x5 mm	1/2 A	Three-phase	100 ns	100 ns
2ED772S01G*	VSON-10 3x3 mm	1/2 A	Half-bridge	30 ns	50 ns
2ED2778S01G*	VSON-10 3x3 mm	4/8 A	Half-bridge	30 ns	65 ns

### Applications for MOTIX™ 160 V SOI gate driver family

- Servo/stepper drives in robotics and factory automation
- General purpose low-voltage drives
- Battery-operated small home appliances (SHA)
- Professional and consumer service robotics
- Logistics vehicles (e-forklifts, autonomous warehouse robotics)
- Commercial and agricultural drones
- Hand-held battery-operated power tools
- Garden or outdoor power equipment (OPE) tools
- e-scooters, e-bikes, and other e-vehicles that do not require automotive qualification (LSEV)

### 6ED2742S01Q key features

- Integrated power management with charge pump and pre-regulator supports wide input voltage range of 6 to 140 V
- Integrated overcurrent protection comparator for single-shunt low side operation with programmable +/-5% reference threshold
- Integrated current sense amplifier with programmable voltage gain and ability to read output voltage offset during zero phase current
- Always positive output voltage offset to reduce need for +/-  $V_{REF}$  for downstream ADC in microcontroller.
- Integrated, per phase, high-side trickle charge pumps to enable 100% duty cycle operation
- Integrated, multi-function RFE pin combines FAULT, FAULT Clear, and Enable functionality



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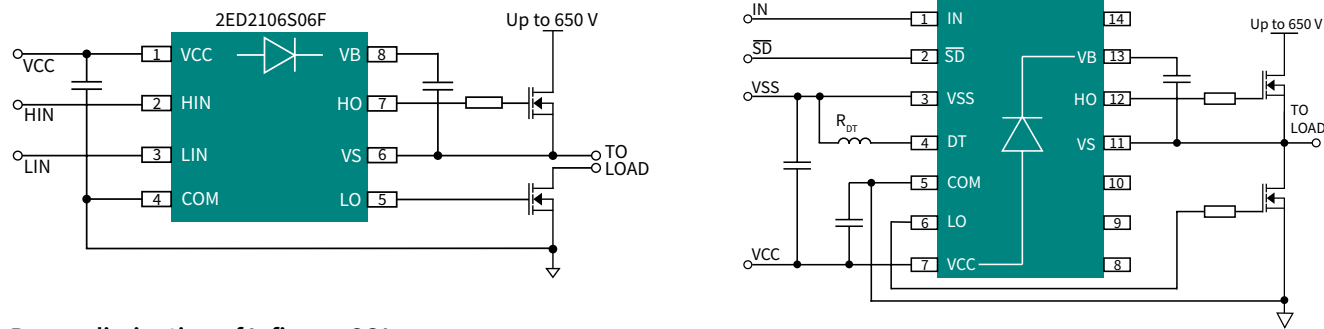
\* Coming soon

# EiceDRIVER™ 650 V level-shift SOI gate driver family

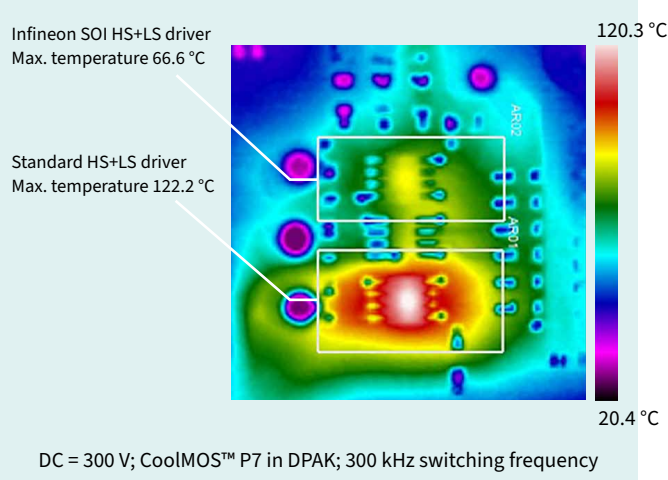
2ED2101/3/4 and 2ED2110: EiceDRIVER™ fast level-shift SOI family with 90 ns prop delay  
2ED2106/8/9 and 2ED2181/2/3/4: EiceDRIVER™ general purpose SOI family

EiceDRIVER™ 650 V SOI is a family of high-voltage, high-speed MOSFET and IGBT gate drivers. Based on Infineon’s SOI technology, this family features an integrated, ultrafast, low  $R_{DS(on)}$  bootstrap diode and offers excellent ruggedness and noise immunity with tolerance to negative transient voltages of up to -100 V. The absence of parasitic thyristor structures ensures superior latch up immunity. The level-shift loss is significantly reduced on the EiceDRIVER™ SOI gate drivers compared to other technologies.

### Simplified application diagrams

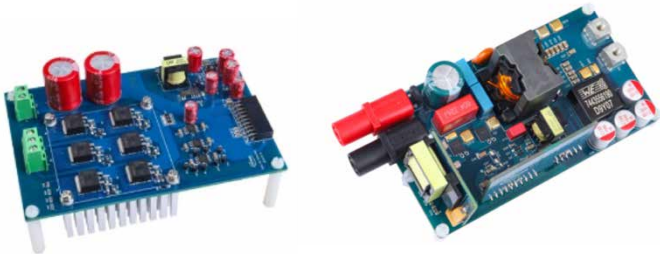


### Power dissipation of Infineon SOI



### Evaluation board

EVAL-M1-2ED2106S  
EVAL-2ED2101 HB-LLC



Product family	Part number	Output current	Prop. delay	Input logic	Configuration	Package
EiceDRIVER™ fast level-shift SOI	2ED2101S06F	0.29/0.7 A	90 ns	HIN, LIN	High- and low-side	DSO-8
	2ED2103S06F			HIN, LIN	Half-bridge	
	2ED2104S06F			IN, SD	Half-bridge	
	2ED2388S06F	0.29/0.7 A		HIN, LIN	Half-bridge	DSO-16 WB
	2ED2110S06M	2.5/2.5 A		HIN, LIN	High- and low-side	
EiceDRIVER™ general purpose SOI	2ED2106S06F	0.29/0.7 A	200/200 ns	HIN, LIN	High- and low-side	DSO-8
	2ED21064S06J			HIN, LIN	Half-bridge	DSO-14
	2ED2108S06F			HIN, LIN		DSO-8
	2ED21084S06J			HIN, LIN		DSO-14
	2ED2109S06F		740/200 ns	IN, SD	Half-bridge	DSO-8
	2ED21094S06J			IN, SD		DSO-14
	2ED21091S06F			IN, DT/SD		DSO-8
	2ED2181S06F	2.5/2.5 A	200/200 ns	HIN, LIN	High- and low-side	DSO-8
	2ED21814S06J			HIN, LIN	Half-bridge	DSO-14
	2ED2182S06F			HIN, LIN		DSO-8
	2ED21824S06J			HIN, LIN		DSO-14
	2ED2183S06F		600/200 ns	HIN, LIN		DSO-8
	2ED21834S06J			HIN, LIN		DSO-14
	2ED2184S06F			IN, SD		DSO-8
	2ED21844S06J			IN, SD		DSO-14



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# New EiceDRIVER™ 650 V and 300 V 6ED family in TSSOP-25

6EDL04I065NR, 6EDL04I065PR, 6EDL04N065PR, 6EDL04N03PR

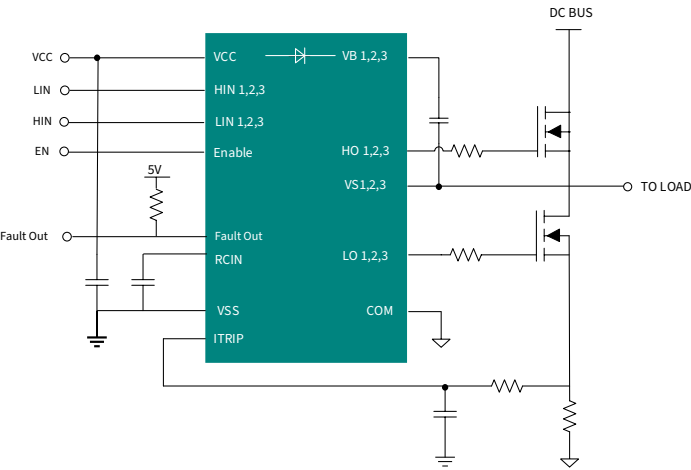
Infineon’s next generation 6ED family is now available in compact TSSOP-25 package. Compared to standard DSO-28 3-phase gate drivers, the TSSOP-25 package offers a 65 percent reduction in footprint size enabling PCB space and cost saving. Two pins are removed to support a sufficient creepage distance of 1 mm.

The EiceDRIVER™ 6ED family of high voltage gate driver ICs are designed to drive power MOSFETs or IGBTs in 3-phase motor drive applications such as home appliances, fans, pumps, and much more. The new 6-channel family offers a higher maximum blocking voltage up to +650 V compared to industry-standard competition and source/sink current +0.165 A/-0.375 A.

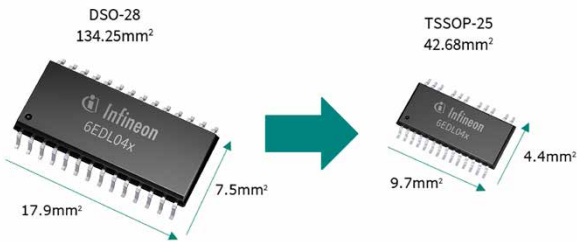
Because the 6ED family utilizes Infineon’s unique silicon-on-insulator (SOI) technology, they offer excellent ruggedness on transient voltages. No parasitic thyristor structures are present in the device. Hence, no parasitic latch-up may occur at all temperatures and voltage conditions. Infineon’s SOI technology also enables the integration of ultrafast, low ohmic bootstrap diode (40 Ω).

The 6ED family offers additional integrated protection features such as undervoltage lockout (UVLO), accurate overcurrent protection, programmable fault communication, and signal interlocking of every phase to prevent cross-conduction.

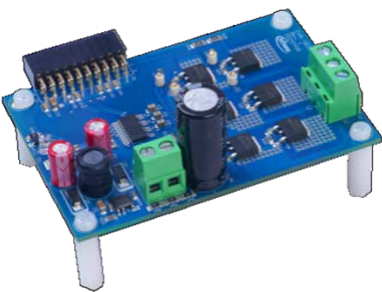
### Typical Connection Diagram



### Package Comparison: TSSOP-25 offers 65% shrink compared to DSO-28



Sales name	Breakdown voltage	Control Logic	Io +/- (typ.)	UVLO (typ.)	Deadtime	Integrated bootstrap diode
6EDL04I065NR	650 V	Negative	+0.165 A / -0.375 A	11.7 V / 9.8 V	310 ns	✓ (40 Ω)
6EDL04I065PR	650 V	Positive				
6EDL04N065PR	650 V	Positive				
6EDL04N03PR	300 V	Positive				



### Full Featured Evaluation Board: EVAL-iSSI30R12H

EVAL-6EDL04I065PR is intended to drive a brushless direct current (BLDC) motor by connecting it to an external controller board such as iMOTION™ EVAL-M1-101T. Evaluation board is coming soon for the device. The board is designed to evaluate the 650 V SOI three-phase gate driver 6EDL04I065PR along with six Trenchstop™ IGBTs IKD06N60RC2.

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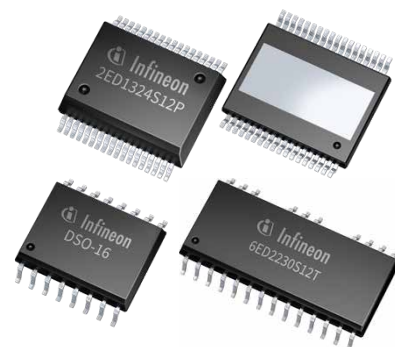


# EiceDRIVER™ 1200 V level-shift SOI gate driver family

**6ED223x: 1200 V three-phase SOI driver with OCP, bootstrap diode**

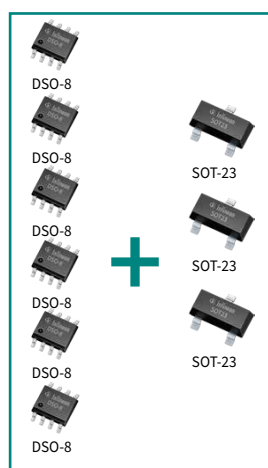
**2ED132x: 1200 V half-bridge and high- and low-side SOI driver with OCP, Miller clamp and bootstrap diode**

The 6ED2231S12T is a 1200-V three-phase SOI gate driver, with 0.35 A/0.65 A current in DSO-24 package (DSO-28 with 4 pins removed). The 2ED132x family consists of four 1200 V SOI gate drivers, in half-bridge or high- and low-side configurations. 2ED132x family offers 2.3 A output current in high creepage (8 mm)/clearance DSO-20 wide body package or higher sink option (4.6 A) in DSO-16 wide body package. Both 6ED2231S12T and the 2ED132x family integrates ultrafast overcurrent protection (OCP) with  $\pm 5\%$  accuracy, and bootstrap diode. In addition, the 2ED132x family also integrates active Miller clamp.



## Current solutions

6 x opto-isolated drivers +  
3 x 1200 V bootstrap diodes



- Space savings
- Cost savings
- Easy to design
- Higher reliability
- Faster time-to-market

## New 6ED2231S12T

Integrates 6x gate driver  
functionality and  
3x boot-strap diodes  
Overcurrent protection  
IGBT/SiC MOSFET UVLOs



6ED2231S12T easily fits within  
EasyPIM™ 1B module footprint



EVAL-M1-6ED2231-B1

## Features and benefits

### Key features

- Leading negative VS immunity
- > 50% lower level-shift switching losses
- Integrated bootstrap diode
- 1200 V breakdown voltage
- Integrated input filters

### Key benefits

- Increased robustness and reliability resulting in reduced manufacturing and field failures
- Reduced power dissipation, lower temperature
- Faster frequency switching
- Smaller PCB footprints
- Reduced BOM costs
- Improved noise sensitivity
- Latch-up immunity

### Customer value

- Increased profitability from lower lifecycle costs
- Faster time-to-market for higher share capture
- Enables new applications
- Increased flexibility
- Increased reliability

Product Name	Configuration	Package	Output current	Key features	Deadtime	T <sub>ON</sub> /T <sub>OFF</sub>
6ED2231S12T	NEW Three-phase	DSO-24 (DSO-28 with 4 pins removed)	0.35/0.65 A	OCP, RFE	460 ns	700/650 ns
2ED1324S12P	NEW Half-bridge	DSO-20WB (20 fine pitch leads)	2.3/2.3 A	OCP, SOFF, AMC, RFE	380 ns	500 ns
2ED1323S12P	NEW HS+LS	DSO-20WB (20 fine pitch leads)	2.3/2.3 A	OCP, SOFF, AMC, RFE	None	350 ns
2ED1322S12M	NEW Half-bridge	DSO-16WB (300mil)	2.3/4.6 A	OCP, SOFF, RFE	400 ns	500 ns
2ED1321S12M	NEW HS+LS	DSO-16WB (300mil)	2.3/4.6 A	OCP, SOFF, RFE	None	350 ns



Click here to learn more:

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[www.infineon.com/1200VHVIC](http://www.infineon.com/1200VHVIC)

[www.infineon.com/6ED2230](http://www.infineon.com/6ED2230)

# 2EDi EiceDRIVER™ family

## Fast, robust, dual-channel galvanic isolated gate-driver ICs

### Galvanic isolated EiceDRIVER™ family overview

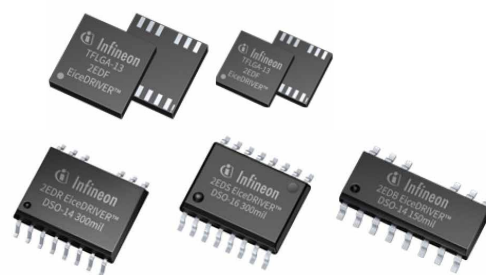
The 2EDi is a family of dual-channel isolated gate driver ICs designed to drive Si MOSFETs, SiC MOSFETs, and GaN power switches. Isolation is achieved by means of Infineon's coreless transformer (CT) technology which guarantees robust operation and industry benchmark common-mode rejection (CMTI). The high propagation delay accuracy and low channel-to-channel mismatch makes the product ideal for use in fast-switching power system. In addition, high CMTI, high reverse current capability and fast clamping of the output below UVLO guarantees reliable operation in the application.

### 2EDi Gen 2: What is new?

- New DSO-8 4x4 package
- DSO-14 packages with increased channel-to-channel creepage to ease the layout easier or enable the use with higher working voltages or worst pollution layout
- Fulfills the latest component standard for magnetic couplers (IEC 60747-17)
- Programmable deadtime and shoot-through functionality

### Applications

- Server
- Telecom
- DC-DC converters
- Power tools
- Industrial SMPS
- Low speed electrical vehicles
- Solar power inverter
- LED lighting
- Home appliances air conditioner
- Motor driver
- Battery charger
- EV chargers
- OBC-DCDC
- Microinverters



### Features and benefits

#### Key features

- Fast power switching with accurate timing
- 5 A/9 A source/sink currents
- Propagation delay typ. 38 ns with 6 ns channel-to-channel precision
- Optimized for area and system BOM
- < 1 Ω source and sink output resistance
- Output stages with 5 A reverse current capability
- Robust
- CMTI >150 V/ns
- Undervoltage lockout function for switch protection
- Deadtime control and shoot through protection
- Output-to-output channel isolation
- Functional level galvanic isolation
- Input-to-output channel isolation
- Functional, basic, and reinforced galvanic isolation

#### Key benefits

- Efficiency gain and lower losses
- Strong driving enables reduced switching losses
- Accurate timing enables deadtime optimization or synchronized driving in case of parallel MOSFETs
- Improved thermal behavior at smaller form factor
- Most of the driving power is dissipated externally with reduced thermal stress on the driver
- Eliminates two costly protection diodes on the gate driver outputs
- Protection and safe operation
- Reliable driver operation against fast switching transients
- MOSFET is protected from thermal stress in abnormal conditions
- Protection against noise and spurious pulses
- Flexible configurations
- High-side + low-side, high-side + high-side, low-side + low-side
- Regulatory safety
- Functional for level-shifting and ground bounce immunity
- Reinforced for control of primary-side MOSFETs from secondary-side controller

#### Customer value

- Enabling higher system efficiency and higher power density designs
- Improving long term competitive cost position, integration and mass manufacturability
- Extending end-product lifetime
- by improving safe operation of power switches in normal and abnormal field (grid) conditions
- Lower EMI by ground isolation
- Simplified safety approval
- through component standards (UL1577, IEC60747-17) and system standards (IEC62368) certificates



SMPS



Server



Telecom



Motor control



Power tools



Solar



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# EiceDRIVER™ X3 Compact and 2L-SRC Compact

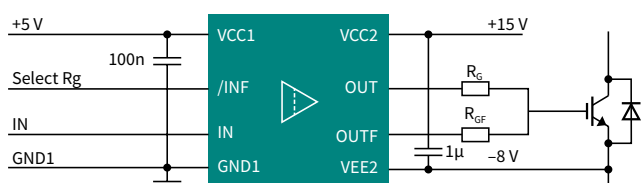
## 5.7 kV, 18 A, 1-ch, isolated drivers with Miller clamp and two-level slew rate control

The EiceDRIVER™ X3 Compact family (1ED31xx) provides Miller clamp or separate output options with up to 14 A current, in DSO-8 150 mil and 300 mil package. The EiceDRIVER™ 2L-SRC Compact family (1ED32xx) provides Miller clamp or two-level slew rate control options with up to 18 A current, in DSO-8 300 mil package. The Miller clamp function is highly recommended for SiC MOSFET 0 V turn-off and TRENCHSTOP™ IGBT7 against parasitic turn-on. The two-level slew rate control function allows customers to change the output current on the fly. It is highly recommend for industrial drives application, where customer suffer from the EMI and switching loss optimization. Both EiceDRIVER™ X3 Compact and 2L-SRC Compact families are rated up to 2300 V functional isolation and 200 kV/μs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC MOSFETs in applications like solar inverter, EV-charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc.

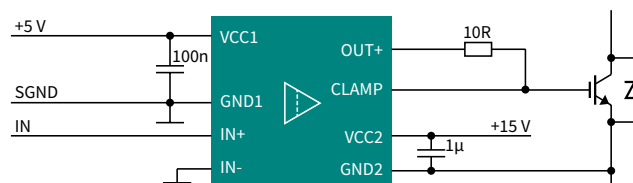


### Simplified application diagram

Two-level slew rate control (1ED3241MC12H)



Active Miller clamp (1ED3122MC12H)



### Evaluation board

EVAL-1ED3121MX12H

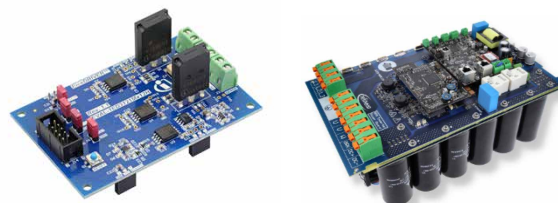
EVAL-1ED3122MX12H

EVAL-1ED3124MX12H

EVAL-1ED3241MC12H

EVAL-1ED3251MC12H

REF-22K-GPD-INV-EASY3B



Family	Part number	Typ. output current	Feature	Prop. delay	Input filter	UVLO	Prop.delay matching	Package	Isolation rating
EiceDRIVER™ X3 Compact	1ED3127MU12F	10 A	Miller clamp	90 ns	30 ns	12 V	7 ns	DSO-8 150 mil	UL 1577: VISO = 3 kV <sub>RMS</sub>
	1ED3125MU12F	10 A				10.5 V			
	1ED3140MU12F	6.5 A	Separate output	45 ns	15 ns	8.5 V			
	1ED3141MU12F	6.5 A				11 V			
	1ED3142MU12F	6.5 A				12.5 V			
	1ED3124MU12F	14 A				90 ns			
	1ED3141MC12H*	6.5 A	45 ns	15 ns	11 V	DSO-8 300 mil		UL 1577: VISO = 5.7 kV <sub>rms</sub> IEC 60747-17 VIORM = 1.767 kVrms	
	1ED3142MC12H*	6.5 A	45 ns	15 ns	12.5 V				
	1ED3143MC12H*	6.5 A	UVLO2 refers GND2	45 ns	15 ns				11 V
	1ED3144MC12H*	6.5 A	45 ns	15 ns	12.5 V				
	1ED3145MC12H*	6.5 A	UVLO2 adjustable	45 ns	15 ns				Adjustable
	1ED3122MC12H	10 A	Miller clamp	90 ns	30 ns				8 V
	1ED3123MC12H	14 A	Separate output			8 V			
1ED3124MC12H	14 A				10.5 V				
EiceDRIVER™ 2L-SRC Compact	1ED3240MC12H	10 A	Turn-on and turn-off slew rate control	110 ns	30 ns	10.5 V	15 ns		VDE 0884-11: VIORM = 1767 V (reinforced)
	1ED3241MC12H	18 A				10.5 V			
	1ED3250MC12H	10 A	Turn-on slew rate control and Miller clamp			10.5 V			
	1ED3251MC12H	18 A				10.5 V			



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# EiceDRIVER™ X3 Compact Gen 2 product family

## Single channel isolated gate driver for functional or reinforced isolation

**1ED3140MU12F, 1ED3141MU12F, 1ED3142MU12F, 1ED3141MC12H  
1ED3142MC12H, 1ED3143MC12H, 1ED3144MC12H, 1ED3145MC12H**

The EiceDRIVER™ Compact 1ED314x products are high-performance single-channel galvanically isolated gate driver ICs. This family is available in either a 150 mil DSO-8 package with 4 mm creepage and clearance or in a 300 mil DSO-8 package with 8 mm creepage and clearance suitable for most industrial applications. The creepage and clearance offered by these packages meet the requirements for fulfilling the functional or reinforced isolation in applications. The excellent part-to-part propagation delay matching of only 7 ns reduces the required deadtime during switching and the strong output stage provides driving currents up to 6.5 A. These features enable high-efficiency power conversion when using IGBTs or SiC MOSFETs in high switching frequency applications. The best-in-class common mode transient immunity (CMTI) rating of 300 kV/μs ensures smooth operation of the gate driver and the system even under very fast switching conditions. The high absolute maximum rating of the output supply voltage enables the straightforward driving of SiC MOSFET and IGBT with both unipolar and bipolar voltage configurations. Undervoltage lockout (UVLO) options in the 1ED314x family cater to the driving voltage requirements of silicon MOSFETs, IGBTs, and SiC MOSFETs. The isolation capabilities of the gate drivers are planned to be certified under both UL 1577 and IEC 60747-17. The 1ED314x product family is an excellent choice for applications such as electric vehicle charging station, solar inverter, energy storage system, uninterruptible power supply, high voltage air-conditioner, switched-mode power supply, and industrial drives.

### Features

Product features	
–	35 V absolute maximum output supply voltage
–	6.5 A peak output driving current
–	Very short propagation delay (40 ns) and part-to-part tolerance (7 ns)
–	UVLO options for Si MOSFETs, IGBTs, and SiC MOSFETs
–	Active shutdown
–	150 mil and 300 mil DSO 8-pin standard packages
–	Certified according to UL 1577 and IEC 60747-17 (planned) standards



DSO-8 150 mil package



DSO-8 300 mil package

### 150 mil product family

Product Name	Type	Package Information		Typical UVLO2 (VUVLOL2 / VUVLOH2)	UVLO Ref.	Output Type	Certification	Isolation Voltage
1ED3140MU12F	DSO-8, 150 mil	400	4 mm / 4 mm	8.5 V / 9.3 V	VEE2	Separate	UL 1577	V <sub>ISO</sub> = 3000 V (rms)
1ED3141MU12F				11.0 V / 12.0 V				
1ED3142MU12F				12.5 V / 13.6 V				

### 300 mil product family

Product Name	Type	Package Information		Typical UVLO2 (VUVLOL2 / VUVLOH2)	UVLO Ref.	Output Type	Certification	Isolation Voltage
1ED3141MC12H	DSO-8, 300 mil	600	8 mm / 8 mm	11.0 V / 12.0 V	VEE2	Separate	UL 1577 (pending) IEC 60747-17 (planned)	V <sub>ISO</sub> = 5700 V (rms) V <sub>IORM</sub> = 1767 V (pk)
1ED3142MC12H				12.5 V / 13.6 V	VEE2	Separate		
1ED3143MC12H				11.0 V / 12.0 V	GND2	Combined		
1ED3144MC12H				12.5 V / 13.6 V	GND2	Combined		
1ED3145MC12H				Adjustable	VCC2	Combined		



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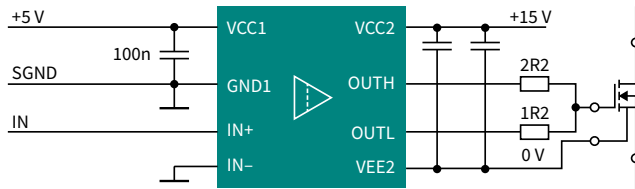
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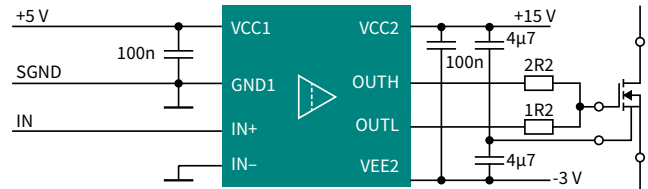
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## Typical Application Schematic

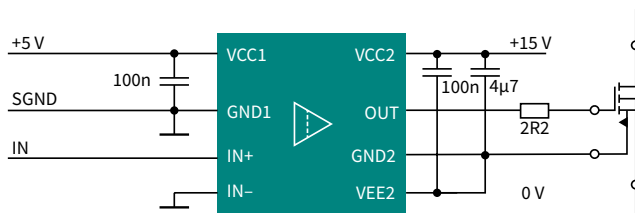
Separate output for unipolar driving,  
UVLO2 referred to VEE2



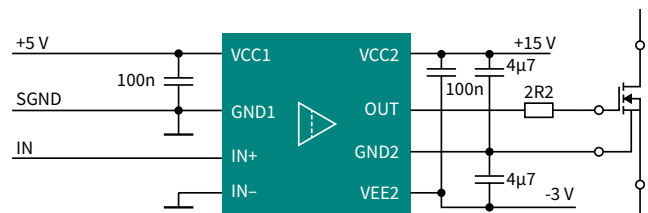
Separate output for bipolar driving,  
UVLO2 referred to VEE2



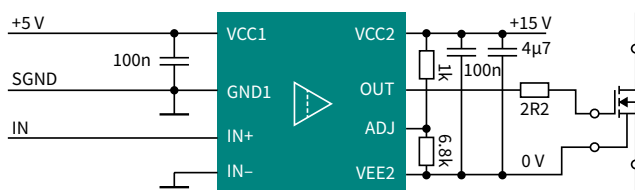
Combined output for unipolar driving,  
UVLO2 referred to GND2



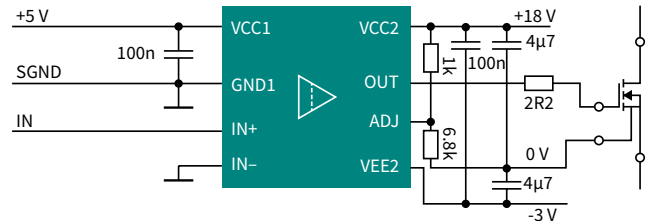
Combined output for bipolar driving,  
UVLO2 referred to GND2



Combined output for unipolar driving,  
UVLO2 adjustable



Combined output for bipolar driving,  
UVLO2 adjustable



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# EiceDRIVER™ X3 Compact 2ED314xMC12H

## Dual channel isolated gate driver with reinforced isolation

**2ED3140MC12L, 2ED3141MC12L, 2ED3142MC12L, 2ED3143MC12L, 2ED3144MC12L, 2ED3145MC12L, 2ED3146MC12L, 2ED3147MC12L**

The EiceDRIVER™ Compact 2ED314x products are high-performance dual-channel galvanically isolated gate driver ICs. The 300 mil DSO-14 package offers an input-to-output creepage and clearance of 8 mm and an output channel-to-channel distance of 3.3 mm. The reinforced isolation between input and output and the functional isolation between the outputs meet the requirements of most industrial applications. With only a 39 ns propagation delay and 8 ns channel-to-channel mismatch, the gate drivers support all high frequency switching applications. The 6.5 A output current allows using these ICs with many IGBT and SiC MOSFETs in discrete and power module packages. The deadtime control pin (DT) enables the dual-channel or the half-bridge mode. In half-bridge mode, the gate driver implements a shoot-through protection with configurable dead-time. The established coreless transformer isolation technology offers high common mode transient immunity (CMTI) for robust signal transmission in high dV/dt application conditions. The maximum output supply rating of 35 V is optimized to drive SiC MOSFET and IGBT with unipolar or bipolar gate voltages. The 2ED314x has UVLO options for Si MOSFETs, IGBTs, and SiC MOSFETs. The products are planned with UL 1577 and IEC 60747-17 certification to support a broad range of applications, such as electric vehicle charge station, solar inverter, energy storage system, uninterruptible power supply, high voltage air-conditioner, and switched-mode power supply.

## Features

Product features
– 35 V absolute maximum output supply voltage
– 6.5 A peak output driving current
– Short propagation delay (39 ns) and part-to-part tolerance (8 ns)
– UVLO options for Si MOSFETs, IGBTs, and SiC MOSFETs
– Active shutdown
– Output enable or disable logic control pin
– Selectable dual-channel (non-interlocked) or half-bridge (interlocked) mode
– Shoot-through protection with configurable deadtime in half-bridge mode
– 300 mil DSO-14 package
– UL1577 (pending) and IEC 60747-17 certified (planned)

## Product family

Product Name	Type	Package Information		Typical UVLO2 (VUVLOL2 / VUVLOH2)	UVLO Ref.	Output Type	Certification	Isolation Voltage
		CTI	CLR / CPG					
2ED3140MC12L	DSO-14, 300 mil	400	8 mm / 8 mm	3.3 mm / 3.3 mm	8.5 V / 9.3 V	DIS	UL 1577 (pending) IEC 60747-17 (planned)	V <sub>ISO</sub> = 5700 V (rms) V <sub>IORM</sub> = 1767 V (pk)
2ED3141MC12L					11.0 V / 12.0 V	DIS		
2ED3142MC12L					12.5 V / 13.6 V	DIS		
2ED3143MC12L					14.7 V / 16.0 V	DIS		
2ED3144MC12L					8.5 V / 9.3 V	EN		
2ED3145MC12L					11.0 V / 12.0 V	EN		
2ED3146MC12L					12.5 V / 13.6 V	EN		
2ED3147MC12L					14.7 V / 16.0 V	EN		



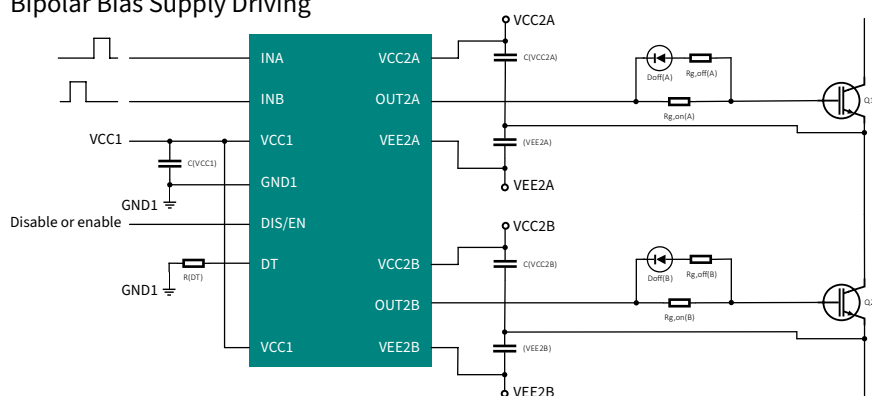
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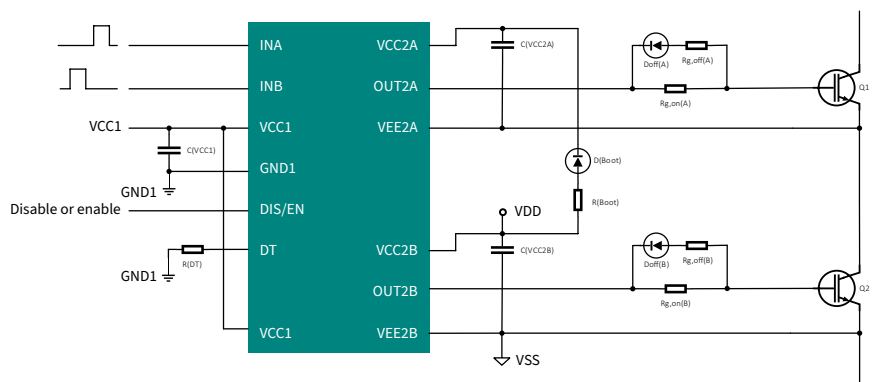
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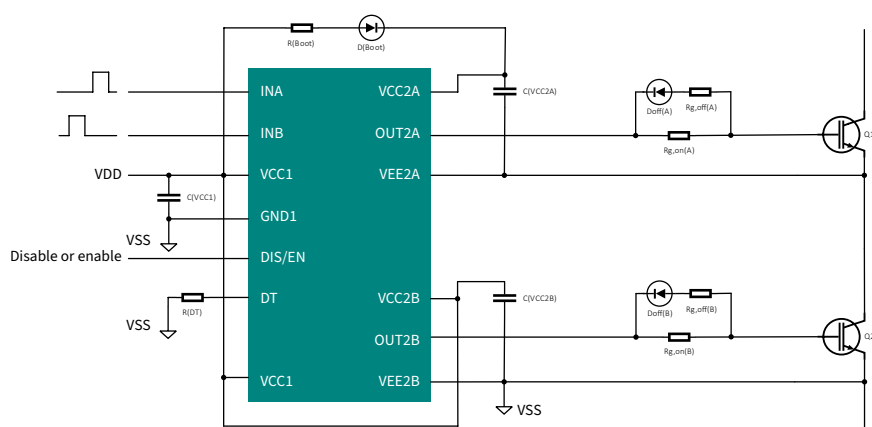
### Half-Bridge, Full Isolation Configuration of Input, Output, and Ch-to-Ch with Bipolar Bias Supply Driving



### Half-Bridge, Isolation Configuration of Input and Output only, Ch-to-Ch with Unipolar Bootstrap Bias Supply Driving



### Half-Bridge, Non-isolation Configuration of Input, Output, and Ch-to-Ch with Unipolar Bootstrap Bias Supply Driving



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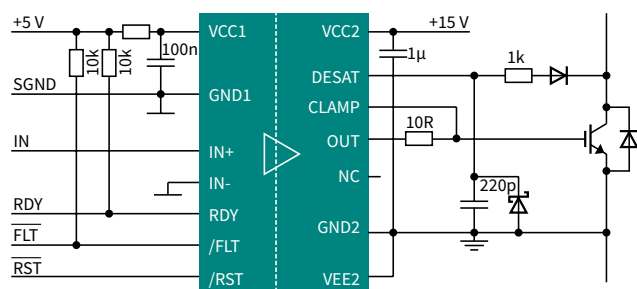
# EiceDRIVER™ Enhanced 1ED-F3 and X3 Analog

## 5.7 kV, 9 A, 1-ch, isolated drivers with DESAT, Miller clamp and soft-off

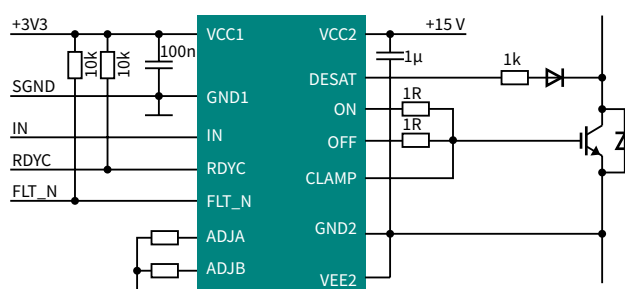
The EiceDRIVER™ Enhanced 1ED-F3 family (1ED332x) provides DESAT, Miller clamp and soft-off features with up to 6 A current, in DSO-16 300 mil package. The EiceDRIVER™ Enhanced X3 Analog family (1ED34xx) provides Miller clamp, resistor configurable DESAT, and soft-off function with up to 9 A current, in DSO-16 300 mil fine pitch package. The 1ED-F3 family (1ED332x) is pin-to-pin with our previous generation 1ED020I12-F2 (1ED-F2), with higher current, shorter propagation delay, higher isolation ratings, and additional soft-off function. The X3 Analog family (1ED34xx) offers best-in-class DESAT protection accuracy with the resistor configurability on DESAT filter and leading edge blanking time and soft-off current. Both EiceDRIVER™ Enhanced 1ED-F3 and X3 Analog families are rated up to 2300 V functional isolation and 200 kV/μs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC in applications like solar inverter, EV-charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc.

### Simplified application diagram

1ED-F3 (1ED332x)



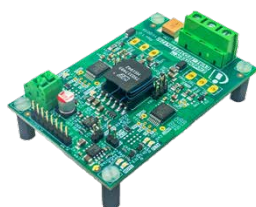
X3 Analog (1ED34xx)



### Evaluation board

EVAL-1ED3321MC12N

EVAL-1ED3491MX12M



Family	Part number	Typ. output current	Feature	Prop. delay	Input filter	UVLO	Prop.delay matching	Package	Isolation rating
EiceDRIVER™ Enhanced 1ED-F3	1ED3320MC12N	3/6 A	Miller clamp, DESAT, soft-off	80 ns	35 ns	10.5 V	15 ns	DSO-16 300mil	UL 1577: V <sub>ISO</sub> = 5.7 kV <sub>RMS</sub>  VDE 0884-11: V <sub>IORM</sub> = 1767 V (reinforced)
	1ED3321MC12N	6/8.5 A	10.5 V						
	1ED3322MC12N	6/8.5 A	Miller clamp, DESAT			12 V			
	1ED3323MC12N	6/8.5 A	10.5 V						
EiceDRIVER™ Enhanced X3 Analog	1ED3431MC12M	3 A	Miller clamp, resistor adjustable DESAT and soft-off	236 ns	100 ns	10.5 V	30 ns	DSO-16 300mil fine pitch	
	1ED3461MC12M	6 A	Clamp driver, resistor adjustable DESAT and soft-off			10.5 V			
	1ED3491MC12M	9 A				10.5 V			



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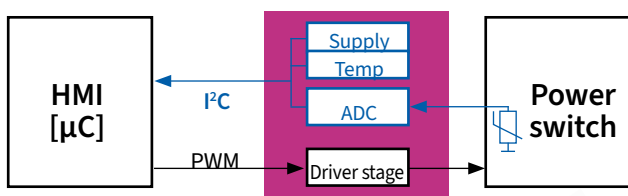
# EiceDRIVER™ Enhanced X3 Digital

## 5.7 kV, 9 A, 1-ch, isolated drivers with I<sup>2</sup>C configurability for DESAT, Miller clamp, soft-off and many more

The EiceDRIVER™ Enhanced X3 Digital family (1ED38xx) provides I<sup>2</sup>C configurability for DESAT, soft-off, UVLO, Miller clamp, two-level turn-off (TLTO), and fault function to simplify the design of highly reliable systems. All adjustments are done from the input side via the I<sup>2</sup>C interface (pin SDA and SCL). The 1ED38xx offers up to 9 A current, in DSO-16 300 mil fine-pitch package. The EiceDRIVER™ Enhanced X3 Digital family is rated up to 2300 V functional isolation and 200 kV/μs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC MOSFETs especially due to the configurability of DESAT and UVLO. This family is recommended in applications like solar inverter, EV-charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc. Two noticeable advantages of the digitally configurable approach for customers are predictive maintenance in sophisticated industrial systems and rapid prototyping for fast solution development.

### Predictive maintenance

Using the I<sup>2</sup>C interface, the 1ED38xx is able to register the counts of UVLO spikes, monitor the supply voltage and temperature increase. With the long-term analysis of the collected data, customers are able to decide when is the best time to schedule a maintenance cycle before the system fails.



### Evaluation board

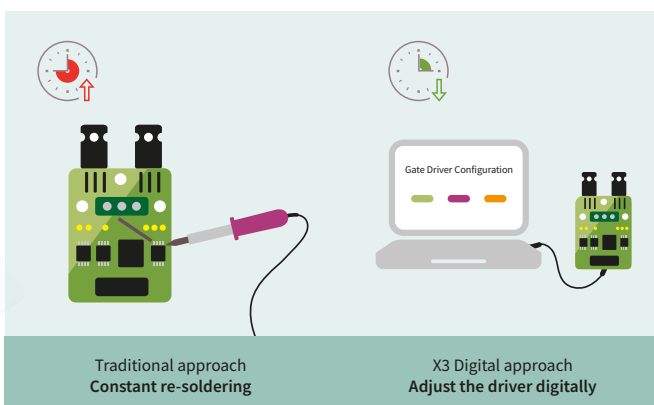
EVAL-1ED3890Mx12M

EVAL-1ED38x0DCT



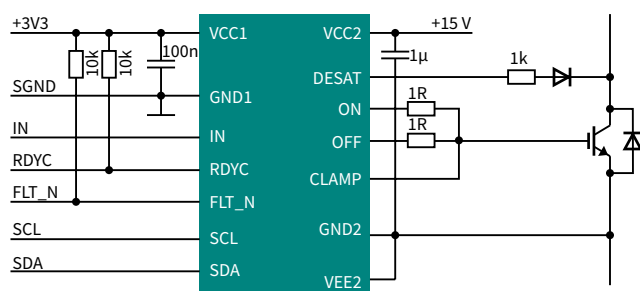
### Rapid prototyping

The I<sup>2</sup>C interface enables rapid prototyping without hardware changes. Using a traditional gate driver, customers have to first design an initial PCB board, and then adjust and replace the components on the board during evaluation. However, with the 1ED38xx I<sup>2</sup>C interface, customers can configure up to 27 parameters to optimize the board without replacing the components. This feature extremely shortens the development flow.



### Simplified application diagram

X3 Digital (1ED38xx)



Family	Part Number	Typ. output current	Feature	Isolation rating
EiceDRIVER™ Enhanced X3 Digital	1ED3830MC12M	3 A	I <sup>2</sup> C configurability, Miller clamp, DESAT, soft-off, two-level turn-off, integrated ADC	UL 1577: VISO = 5.7 kV <sub>RMS</sub> VDE 0884-11: VIORM = 1767 V (reinforced)
	1ED3860MC12M	6 A		
	1ED3890MC12M	9 A		



+SiC



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# EiceDRIVER™ Full-Bridge Transformer Driver

Isolated power supply for IGBT and SiC MOSFET gate driver supply

## 2EP100R, 2EP101R, 2EP110R, 2EP130

The 2EP is a full-bridge transformer driver to enable customers to build an isolated gate driver power supply. The highly integrated and resistor configurable 2EP reduces the external component count. The open-loop controller drives the integrated full-bridge power MOSFETs and is therefore also able to offer various protection features. These features include overcurrent protection, thermal shutdown, and a ready signal. The adjustable duty cycle and switching frequency allow customers to customize the operation to the gate voltage requirements of various power switches like IGBT and SiC MOSFETs. The EiceDRIVER™ Power 2EP products come in a small TSSOP-8 package with an exposed pad for optimized thermal behavior. The small footprint additionally allows for space saving PCB designs in area constrained applications. The broad frequency range of up to 695 kHz together with the output power capability of 5 W or more enable isolated gate driver supply designs for a wide range of discrete and power modules. This flexibility allows the product to be used many applications such as uninterruptible power supply, solar inverter, energy storage system, electric vehicle charge station, and motor drive inverters.

### Features

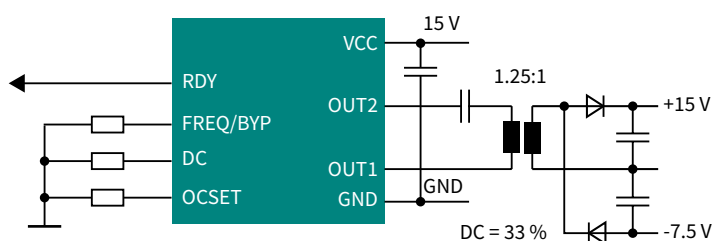
#### Product features

- Wide input voltage range 4.5 to 20 V
- Wide range of switching frequency from 50 to 695 kHz
- Higher accuracy duty cycle adjustment from 10% to 50%
- Peak-current controlled soft start
- Overcurrent and overtemperature protection
- Ready signal to indicate successful completion of soft start
- 3x3 mm<sup>2</sup> TSSOP-8 package with exposed pad

### Product Family

Product name	Package	Switching frequency	Duty cycle	Bypass mode	Overcurrent protection
2EP100R	TSSOP-8	65 kHz, 103 kHz	33%, 50%	No	Fixed
2EP101R	TSSOP-8	50 kHz, 65 kHz	12%, 17%	No	Fixed
2EP110R	TSSOP-8	50 kHz, 65 kHz	10% to 50%	No	Fixed
2EP130R	TSSOP-8	50 kHz to 695 kHz	10% to 50%	Yes	Adjustable

### Application schematic



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# EiceDRIVER™ APD 2ED4820-EM

## 48 V smart high-side MOSFET gate driver with SPI for automotive applications

The EiceDRIVER™ 2ED4820-EM is a smart high side N-channel MOSFET gate driver with two outputs controlled via SPI. The integrated powerful charge pump allows external MOSFETs to stay continuously on. Thanks to the enhanced turn-on and turn-off ability of the driver, the number of MOSFETs could be easily scaled up to manage large currents in the order of several hundred amps, while ensuring fast switch on and off. The MOSFETs could be controlled in a back to back configuration either common mode or common source. The integrated current sense amplifier supports high-side and even load-side current measurement with a dedicated monitoring output. The 2ED4820-EM comes along with several latching failure detections, to implement protections for the external MOSFETs, the load and the power source. Parameters can be adjusted by SPI; monitoring data, configuration, warning and failure detection registers can be read.

### Summary of features

- Extended supply voltage range: 20 - 70 V
- Two independent high-side gate driver outputs with 1 A pull down, 0.3 A pull up for fast switch off/on
- Low supply current in sleep mode  $IBAT\_Q < 5 \mu A$
- Device control, configuration, and diagnostic via SPI
- Configurable overcurrent/short circuit protection
- Configurable Drain-Source overvoltage protection
- Gate undervoltage lockout ( $V_{GS}$ )
- Ground loss detection
- AEC-Q100 qualification

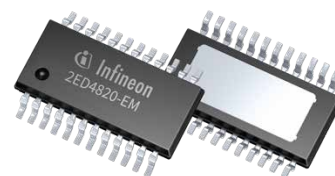
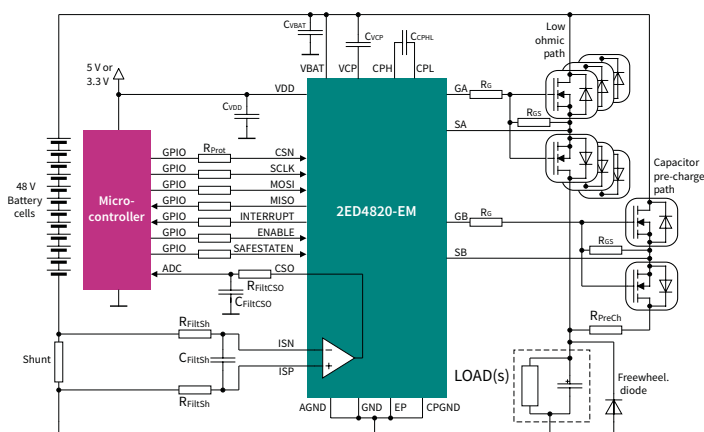


### Benefits

- Supports back-to-back MOSFET topologies (common drain or common source)
- SAFESTATEN input to trigger safe state mode in case of  $\mu C$  failure
- One bidirectional high or low side analog current sense interface with configurable gain to optimize power losses
- Robust against  $V_{bat}$  voltages up to 105 V and  $V_{source}$  voltages versus  $V_{bat}$  of -90 V

### Potential applications

- Battery protection switch
- Input protection switch
- Static load and supply switch for high currents



### Products and evaluation boards

Product	Description	Ordering code	Package
2ED4820-EM	48 V smart high-side MOSFET gate driver with SPI	SP005629911	PG-TSDSO-24
2ED4820 EB2 2HSV48	2ED4820 dual high-side switch - 48 V evaluation board	SP005353778	BOARD
R 48V BATT Switch10	48 V battery disconnect switch - reference design	SP005595834	BOARD



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# EiceDRIVER™ 1EDI302x/1EDI303x/1EDI305xAS

## 1200 V galvanically isolated automotive gate driver IC family

EiceDRIVER™ 1EDI302xAS, 1EDI303xAS, and 1EDI305xAS are automotive-qualified single-channel high-voltage gate drivers optimized for IGBT and SiC technologies. They are galvanically isolated using Infineon coreless transformer (CT) technology. Comprehensive safety features and ISO 26262 compliance enable ASIL-D classification on the system level. Accompanying safety documents ease and speed-up FMEDA analysis in the application.

The EiceDRIVER™ 1EDI302x/1EDI303xAS product family offers a compact package design, and its high level of feature integration save valuable PCB space and system cost, while the pre-configured settings reduce design efforts. Pin-compatible product variants make switching between variants easy and swiftly adjusting ECUs to different application needs (i.e., SiC MOSFET vs. IGBT).

1EDI305xAS offers full configurability via SPI, which enables platform development. The integrated high-accuracy flyback controller can optimize the supply architecture and reduce conduction losses in power devices.

### Potential applications

- Traction inverters for HEV and EV
- Auxiliary inverters for HEV and EV
- High-power DC-DC converters

Product feature	1EDI302xAS & 1EDI303xAS (x=0,1,3)	1EDI302xAS & 1EDI303xAS (x=5,6,8)	1EDI305xAS (x=0,1)
Isolation and CMTI	Reinforced 6.8 kV, CMTI >150V/ns		
Interface	Fast pins and PWM data stream		Fast pins and SPI
Power technology	Pre-configured variants either for IGBT (302x) or SiC (303x)		SPI to configure for SiC or IGBT
Drive stage strength	20 A	20 A (15 A for 1EDI3028/38)	20 A
Drive stage	TOUT (ext. diode needed to separate $R_{on}$ and $R_{off}$ )	Split output (TON and TOFF)	Split output (TON and TOFF)
Active miller clamp	Yes, internal	Yes, internal	Yes, internal and external
STP1 and deadtime	Yes		Yes, configurable via SPI
SC detection	DESAT and OCP	DESAT (incl. BIST)	DESAT & OCP (both incl. BIST)
SC reaction	Internal soft-off ramp	Soft-off pin	Internal soft-off ramp
ISO 26262-compliant	Yes, ASIL B (D)		
Safe state pin (ASC)	Yes, on secondary side (1EDI3031 & 1EDI3021)	Yes, on primary and secondary side	Yes, on primary and secondary side
Integrated flyback	No		Yes, with 2% accuracy
ADC	Yes, 12-bit DS-ADC (1EDI3020/3 & 1EDI3030/3)	Yes, 12-bit DS-ADC (except 1EDI3038)	Yes, 12-bit DS-ADC, 2 ext. channels
Package	DSO-20 (10.3 mm x 6.4 mm)		DSO-36 (10.3 mm x 10.3 mm)



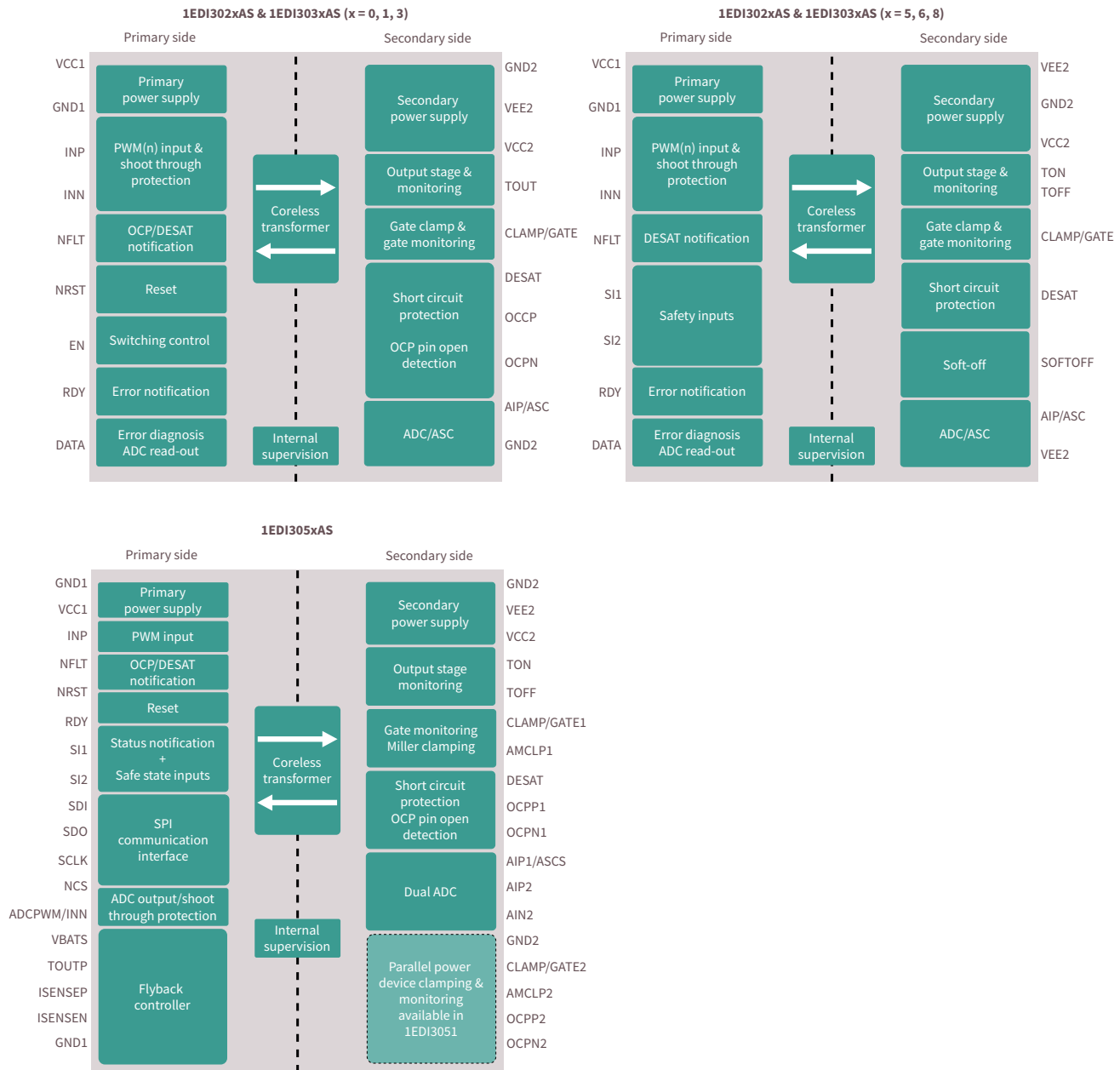
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## Block diagrams



The following evaluation boards are available:

Available evaluation boards	For the following products
1EDI302xAS EVALBOARD	high side: 1EDIS020AS low side: 1EDIS021A5
1EDI303xAS EVALBOARD	high side: 1EDIS031AS low side: 1EDIS033A5
1EDI302ZAS EVALBOARD	high side: 1EDI3025A5 low side: 1EDIS026AS
1EDI3028 EVALBOARD	1EDI3028AS
1EDI303YAS EVALBOARD	1EDI3035AS
1EDI3038 EVALBOARD	1EDI3038AS
1EDI3050 EVALBOARD	1EDI3050AS
1EDI3051 EVALBOARD	1EDI3051AS



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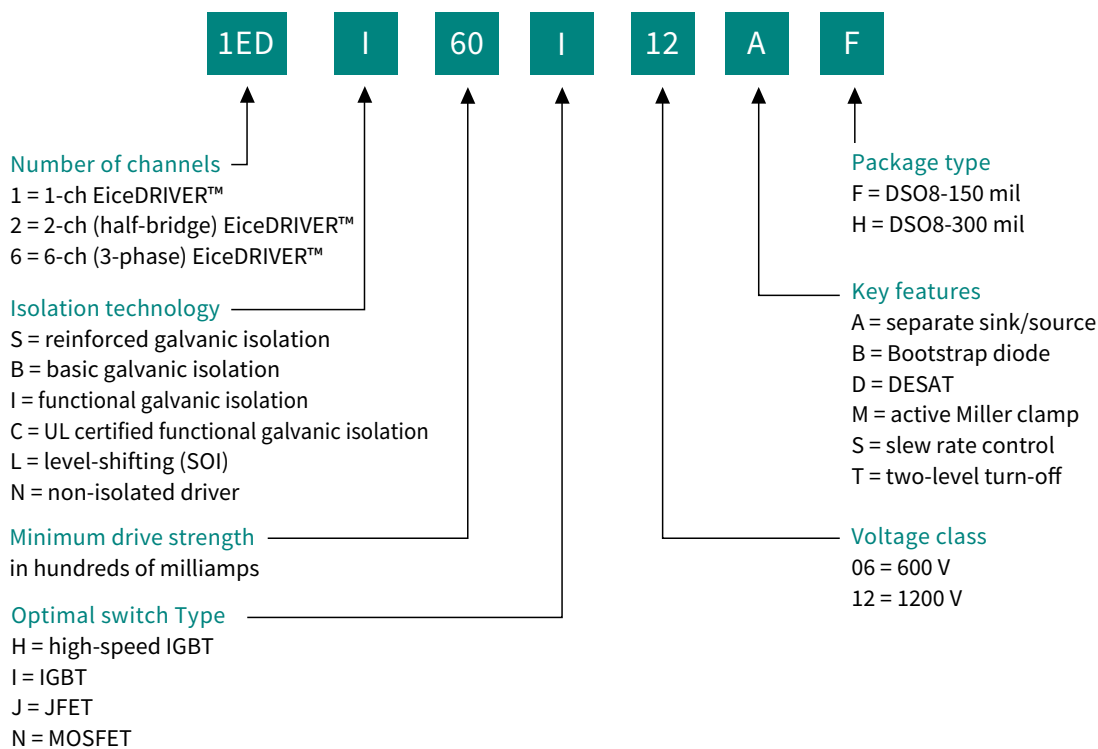
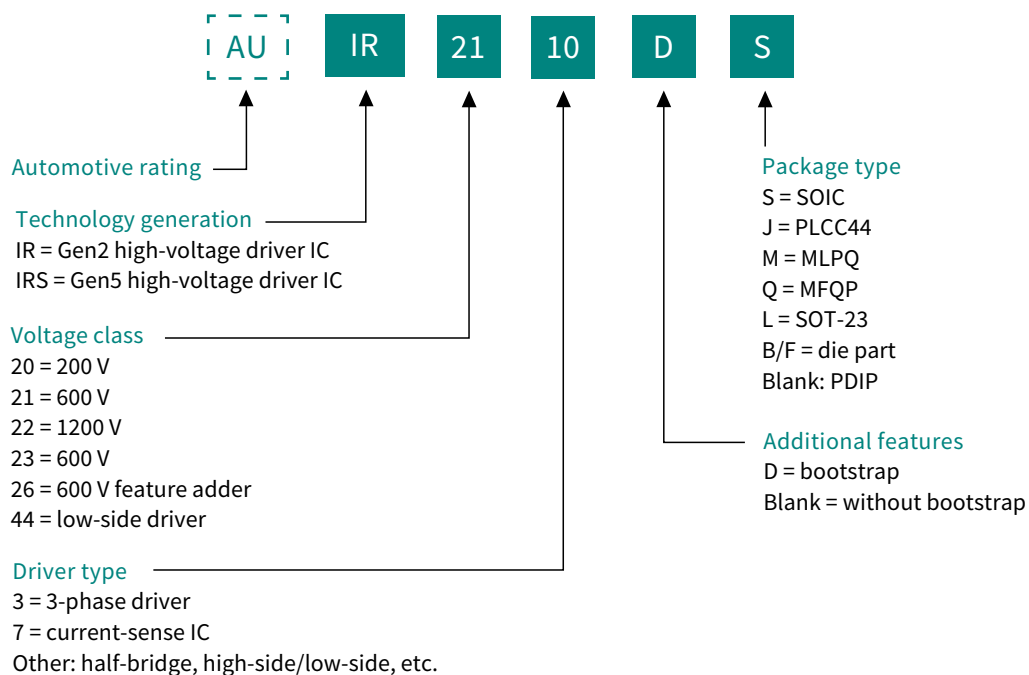
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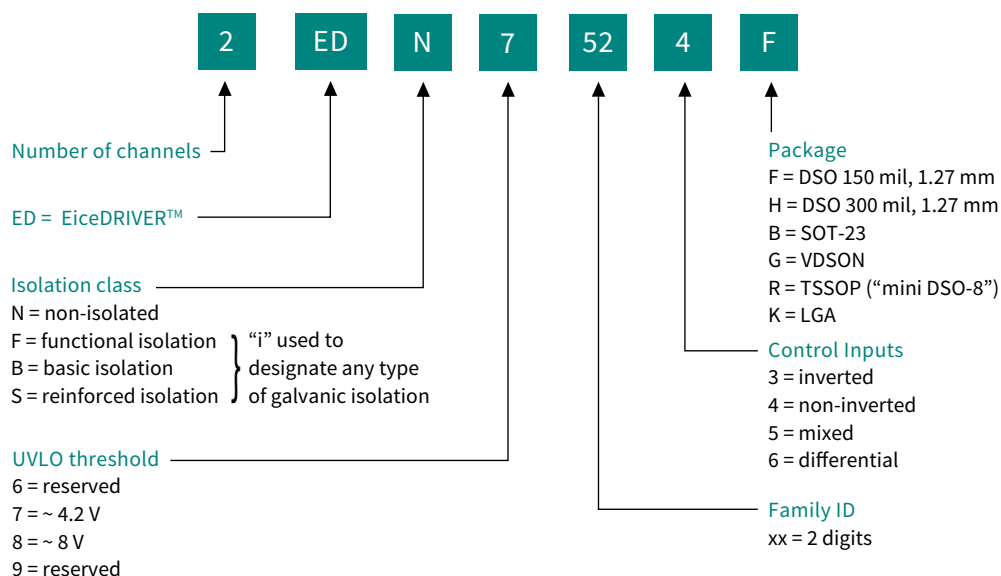
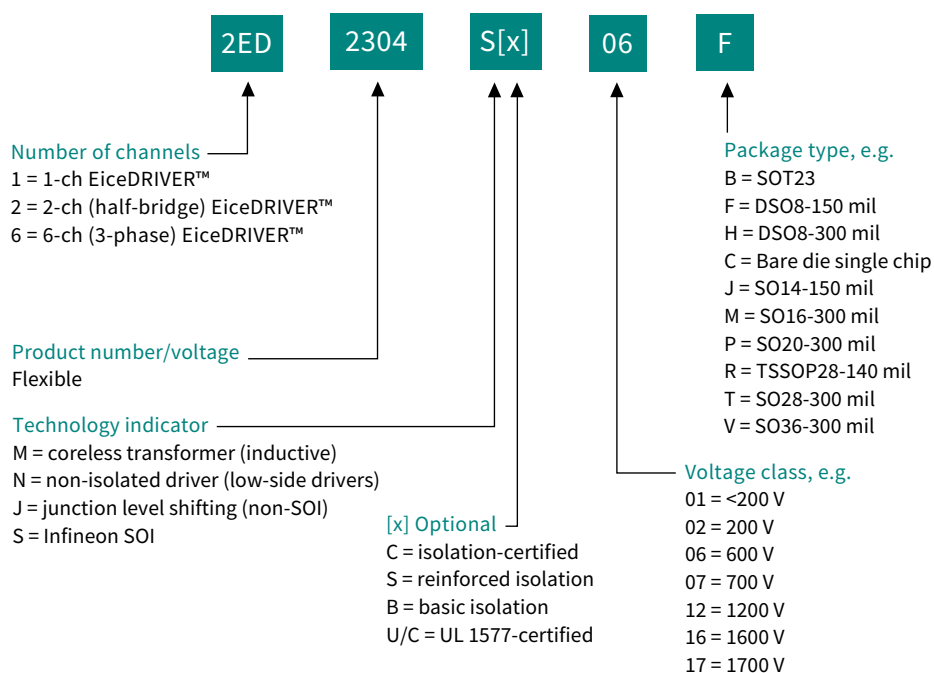
# Nomenclature

## Naming convention for existing families of gate driver ICs

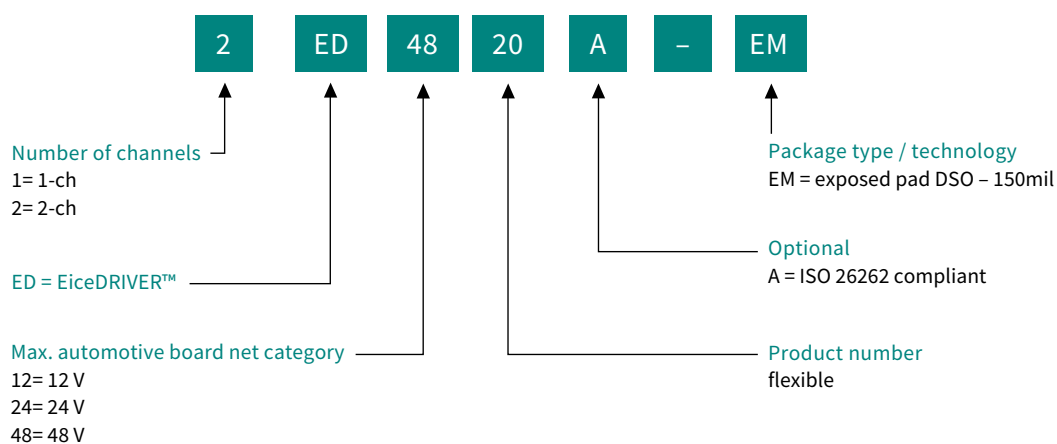




## Naming convention for existing and upcoming families of gate driver ICs



## Naming convention for existing and upcoming families of gate driver ICs





# Infineon support for gate driver ICs

## Useful links and helpful information

### Further information, datasheets and documents

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[www.infineon.com/ifxdesigner](http://www.infineon.com/ifxdesigner)

[www.infineon.com/gdevalboards](http://www.infineon.com/gdevalboards)

[www.infineon.com/gdlowside](http://www.infineon.com/gdlowside)

[www.infineon.com/eicedriver-xEV](http://www.infineon.com/eicedriver-xEV)

[www.infineon.com/eicedriver-apd](http://www.infineon.com/eicedriver-apd)

### Gate driver IC community FAQs

[www.infineon.com/gdforum](http://www.infineon.com/gdforum)

### Gate driver selection tools

[www.infineon.com/gdfinder](http://www.infineon.com/gdfinder)

### Gate driver simulation (SPICE) models

[www.infineon.com/gdmodel](http://www.infineon.com/gdmodel)

### Cross reference tool

[www.infineon.com/crs](http://www.infineon.com/crs)



Support



Evaluation board



Tools

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