



EiceDRIVER™ 2L-SRC Compact – System efficiency with two-level slew-rate control

Andreas Genser, Senior Product Marketing Manager
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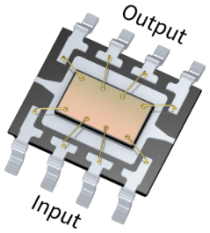
EiceDRIVER™ gate driver portfolio segmentation – Wide portfolio to best fit with application requirements

Non-Isolated GD

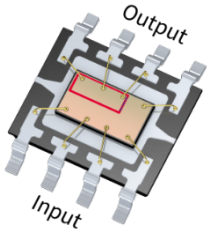
Low-side



- **Comprehensive Families** of single- and dual-low-side drivers with flexible options for output current, logic configurations and UVLOs (plus non-isolated TDI)
- **Rugged technology** of the high-voltage gate drivers, and on the latest state-of-the-art 130-nm process
- **Industry-standard** DSO-8 and small form-factor SOT23, WSON and TSNP packages

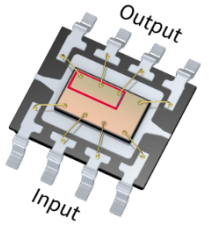
Level-Shift GD

Junction Isolation (JI)



- **Proven technology** trustfully used in all high-voltage gate drive applications for over 20 years
- **Largest portfolio** of 120V, 200 V, 600 V, and 1200 V industry standard gate drivers using rugged proprietary HVIC process
- **Solution-specific** motor-control and switch-mode power applications

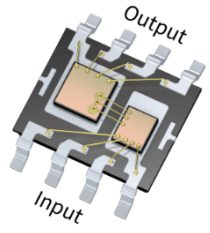
Silicon on Insulator (SOI)



- **Infineon SOI technology** for high-voltage applications with **inherent integrated boot-strap diode** capability and lower level-shift losses
- Industry **best-in-class robustness against negative VS transient spikes**
- Higher level of integration reduces BOM and total system cost

Isolated GD

Coreless Transformer



- **Magnetically-coupled isolation technology** provides galvanic isolation for industrial applications
- **Strongest gate-drive output currents** (up to 14 A) reducing need for external booster circuits
- **Reliable and accurate protection** precise & fast on-/off-switching, desat protection, active Miller clamp, isolation rating in different packages, VDE 0884-11 certification

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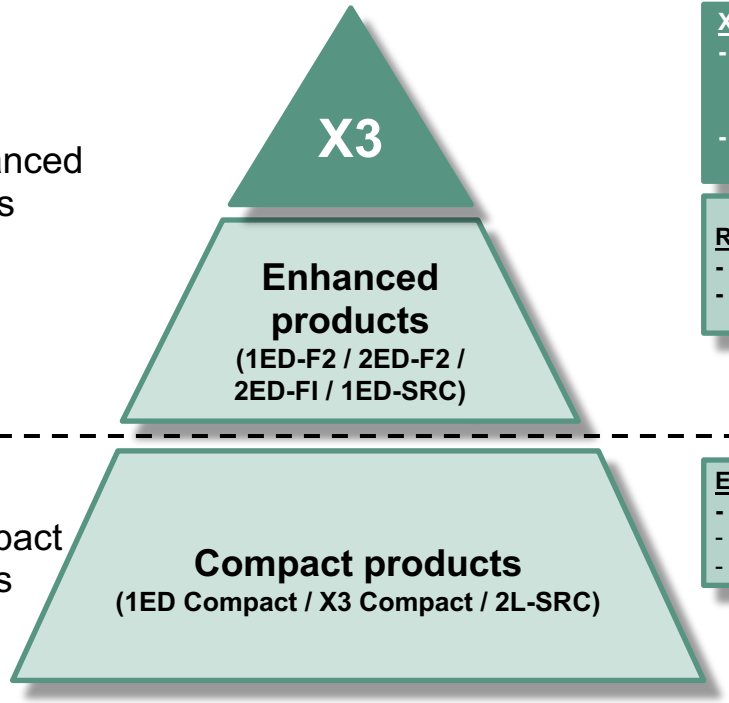
EiceDRIVER™ isolated gate driver portfolio – 2L-SRC Compact (1ED32xx) positioning

Enhanced series

Compact series



X3
- **Highly flexible based on configurability**
  - I2C configurable (X3 Digital)
  - Resistor adjustable (X3 Analog)
- **Highest isolation standards**
  - UL1577 and VDE-11

Rich protection feature-set
- **Active Miller clamp**
- **DESAT protection**



Easy to design-in
- **Cost-sensitive solutions**
- **Limited feature-set**
- **New with two-level slew-rate control (2L-SRC)**



2L-SRC Compact – Slew-rate control in the most **compact form factor**

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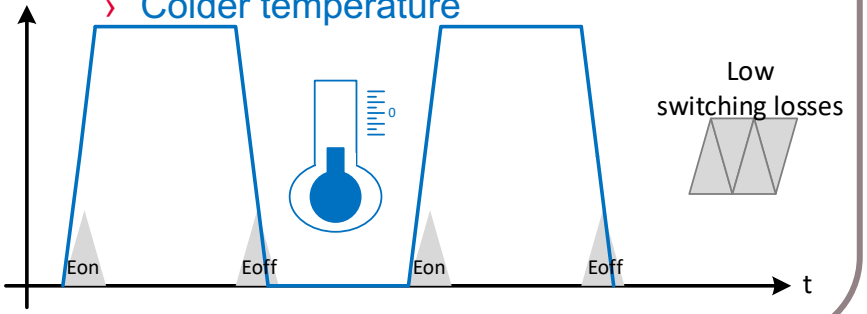
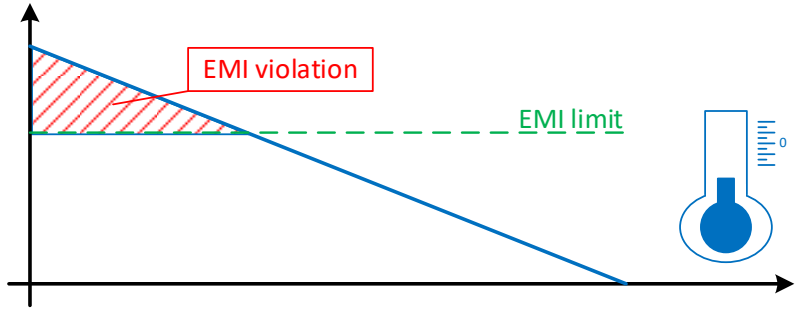
Systems design challenges: striving for system efficiency

- System efficiency requires fast switching
  - Low switching losses
  - Colder temperature



- Fast switching IGBTs cause
  - High EMI radiations



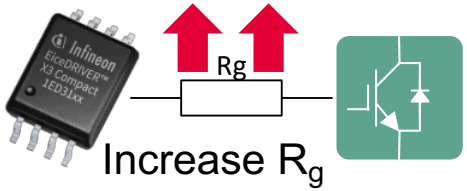


- Customer advantages
  - Smaller heatsink
  - Reduced bill-of-materials / system costs



- Customer disadvantages
  - Potential EMI violations
  - Higher effort in EMI filter design

How to solve the EMI violation?



BUT…

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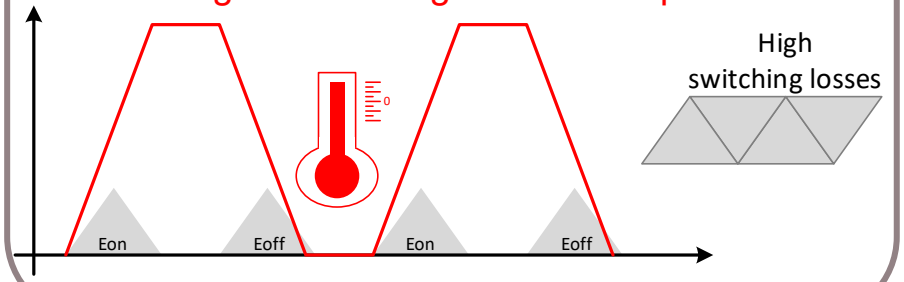
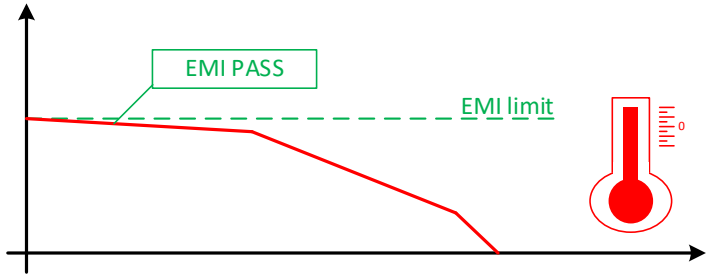
Systems design challenges: Increasing R_g compromises system efficiency

- Higher Rg causes
  - Slower switching IGBTs
  - Higher switching losses / temperature



- Slower switching IGBTs cause
  - Lower EMI radiations





- Customer advantages
  - EMI limits maintained



Customer disadvantages
- Lower system efficiency
- Higher current-rated switches required
- Reduced lifetime (temperature cycling)

Conventional gate drive trade-off:
System efficiency vs. EMI compliance

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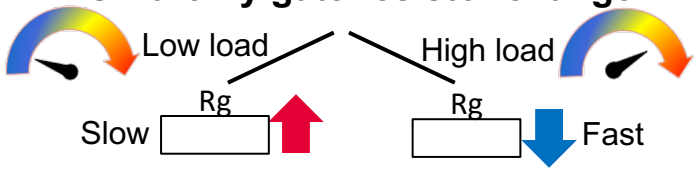
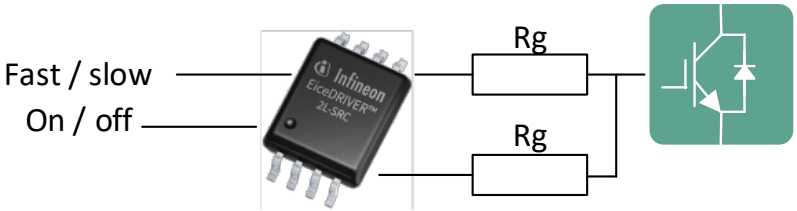
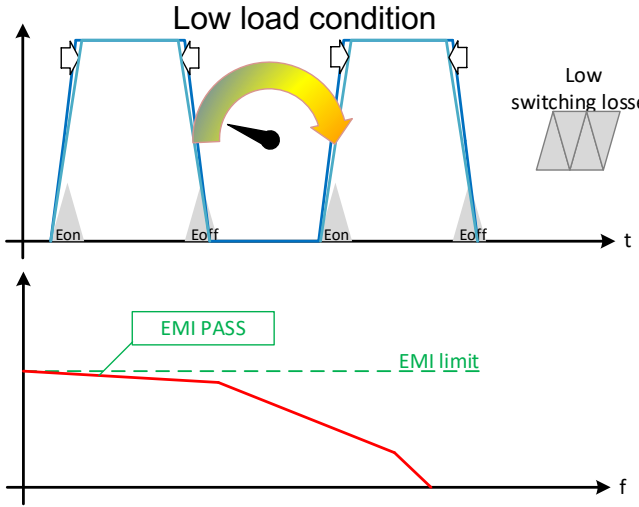
Systems design challenges:
2L-SRC – solving the system efficiency vs. EMI trade-off

- The solution: EiceDRIVER(TM) 2L-SRC Compact 1ED32xx (**two-level slew-rate control**)
  - **On-the-fly gate resistor change**

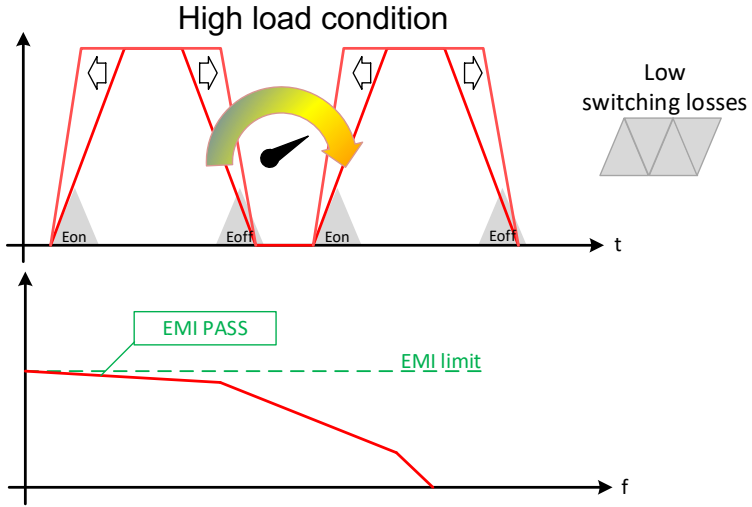






Combine

System efficiency
and
EMI compliance



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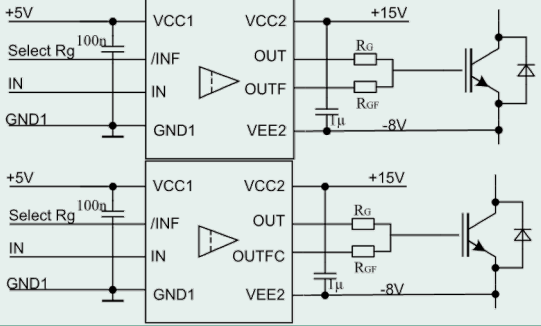
EiceDRIVER™ 2L-SRC Compact (1ED32xx) family overview

Product highlights

- Single channel isolated gate driver with **10 / 18 A**
- **2-level slew rate control (EMI & switching losses optimization)**
  - **On-the-fly gate resistor change**
- **100 ns** propagation delay with **30 ns** input filter
- **1 ns** propagation delay matching (between OUT & OUTF)
- Standard output configuration and **Active Miller clamp option**
- Exceptional CMTI robustness > **200 kV/µs**
- **40 V absolute maximum** output supply voltage
- Isolation capabilities & certification
  - 1ED32xxM**C**12H: **UL 1577 & VDE 0884-11**
- **300 mil wide-body package (8 mm creepage)**
- For IGBTs, MOSFETs, CoolSiC™ SiC MOSFETs **up to 2300 V**



Sample schematic







Value proposition

- **2-level slew rate control**
  - **Separate outputs for two-level (fast & slow) turn-on to reduce** dv/dt
  - **Reduction of switching losses**
  - **Tight propagation delay matching between outputs**
- **8-pin** gate driver (with **300-mil** bodies) enabling **easy to design-in**
- Fulfilling **highest isolation standards**
  - UL1577 and VDE-11 (planned)

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EiceDRIVER™ 2L-SRC Compact (1ED32xx) family overview

	2L-SRC			
	1ED3240MC12H	1ED3241MC12H	1ED3250MC12H	1ED3251MC12H
Package	300-mil			
Total output current (typ.)	±10 A	±18 A	±10 A	±18 A
Slew rate control	@ turn-on & turn-off		@ turn-on only	
Output configuration	Standard		Miller Clamp	
UVLO	10.5 V			
Prop. delay / filter time	100 ns / 30 ns			
Output supply voltage range	40 V			
CMTI	200 kV / us			
Pinouts				

Certification options (applies to all variants)

- 1ED32xxM**C**12H:: **UL 1577**, 5.7 kV(rms) + **VDE 0884-11**, 1767 kV(peak)

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EiceDRIVER™ 2L-SRC (1ED32xx): Isolated gate driver certification

	Family	Part number	Functional	UL 1577	VDE 0884-11		VDE 0884-10[1)]	
			V_{OFFSET}	V_{ISO}	V_{IORM}	V_{IOTM}	V_{IORM}	V_{IOTM}
	1ED-2LSRC Compact 300 mil	**1ED32xxMC12H**	**2300 V**	**5700 V(rms)**	**1767 V**	**8000 V**		
EiceDRIVER™ Compact	1ED-X3 Compact 300mil	1ED31xxMU12H	2300 V	5700 V(rms)				
		1ED31xxMC12H	2300 V	5700 V(rms)	1767 V	8000 V		
	1ED-X3 Compact 150mil	1ED31xxMU12F	2300 V	3000 V(rms)				
	1ED Compact 150mil	1ED-AF 1ED-MF	1200 V	Functional isolation only				
	1EDI Compact 300mil	1EDI-AH 1EDI-MH	1200 V	Functional isolation only				
	1EDC Compact 300mil	1EDC-AH 1EDC-MH	1200 V	2500 V(rms)				
EiceDRIVER™ Enhanced	**1ED-X3 Enhanced X3 Analog**	**1ED34xxMU12M**	**2300 V**	**5700 V(rms)**				
		1ED34xxMC12M			**1767 V**	**8000 V**		
	1ED-X3 Enhanced X3 Digital	**1ED38xxMU12M**	**2300 V**	**5700 V(rms)**				
		1ED38xxMC12M			**1767 V**	**8000 V**		
	1ED/2ED-F2 Enhanced	1ED-B2	1420 V	3750 V(rms)			1420 V	6000 V
		1ED/2ED-F2	1420 V	Functional isolation only				
	1ED-SRC Enhanced	1EDI-SRC	1420 V	Functional isolation only				
		1EDS-SRC	1420 V	5000 V(rms)			1420 V	8000 V
		1EDU-SRC						
	2ED-FI Enhanced	2ED-FI	1200 V	Functional isolation only				

[1)] VDE 0884-10 standard expired Dec. 31, 2019, product and testing remain unchanged.

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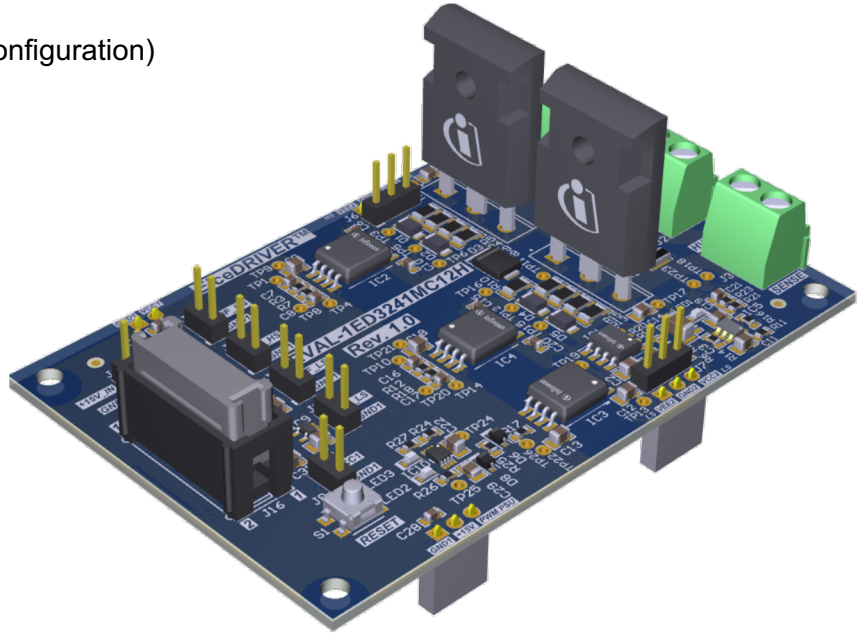
EiceDRIVER™ 2L-SRC (1ED32xx) - Evaluation boards

- Evaluation board with **2L-SRC Compact** in **half-bridge configuration**
- Application notes available soon
  - Evaluation board application note 1ED3241 (18 A, Standard output configuration)
  - Evaluation board application note 1ED3251 (18 A, Miller Clamp)



- Available soon via ISAR

Type	Mat No.
EVAL-1ED3141MC12H	SP005572873
EVAL-1ED3151MC12H	SP005572875

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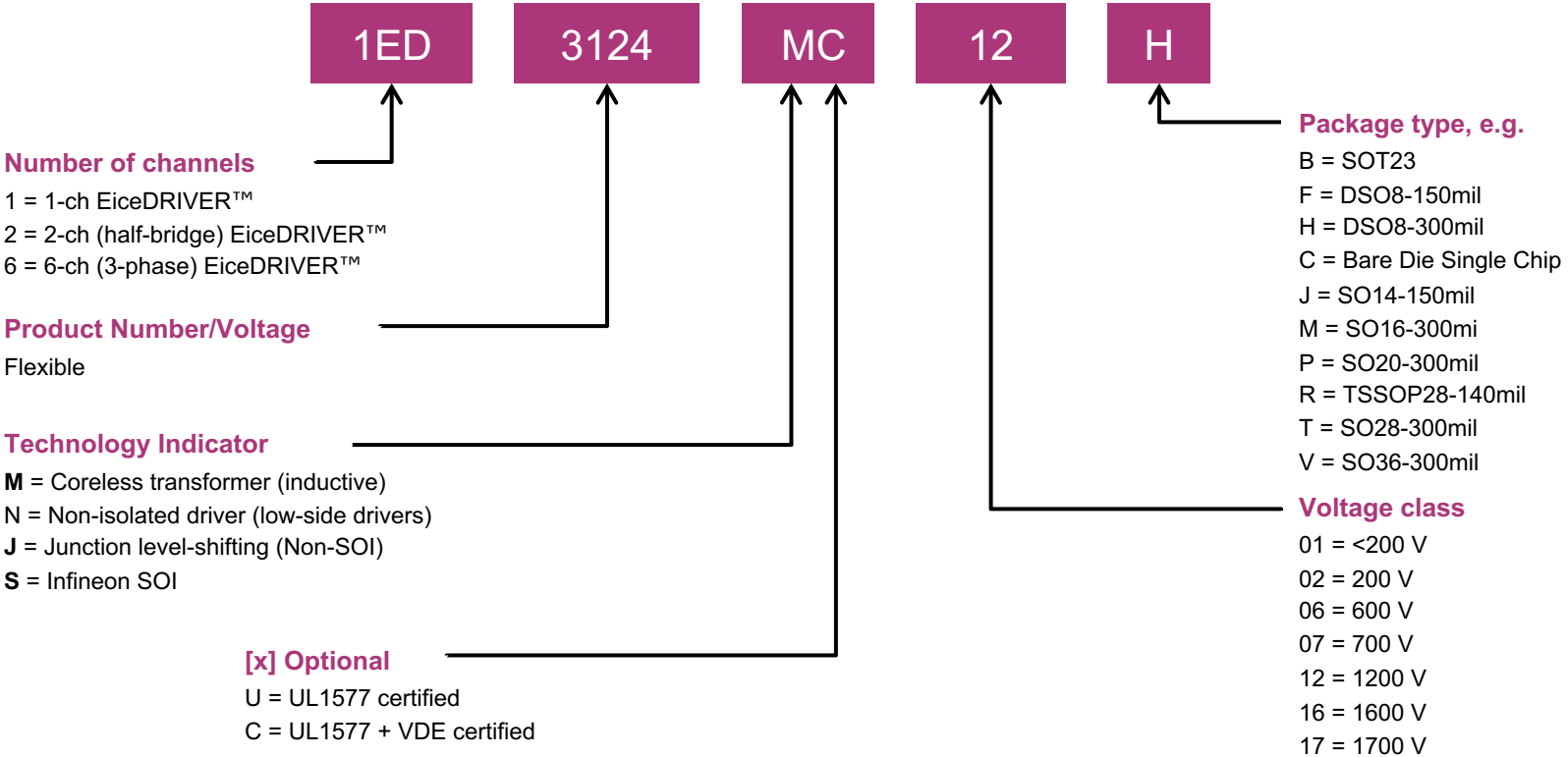
Part of your life. Part of tomorrow.

Naming convention for existing and upcoming families of gate driver ICs



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