Low-side and level-shift gate driver solutions & leading-edge silicon-on-insulator technology

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가상부스에 오신 걸 환영합니다!

Why EiceDRIVER™ gate drivers?

www.infineon.com/gatedriver

EiceDRIVER™ gate drivers

No. 1 in gate driver ICs*

Largest product portfolio, extending from 20 V to 1200 V

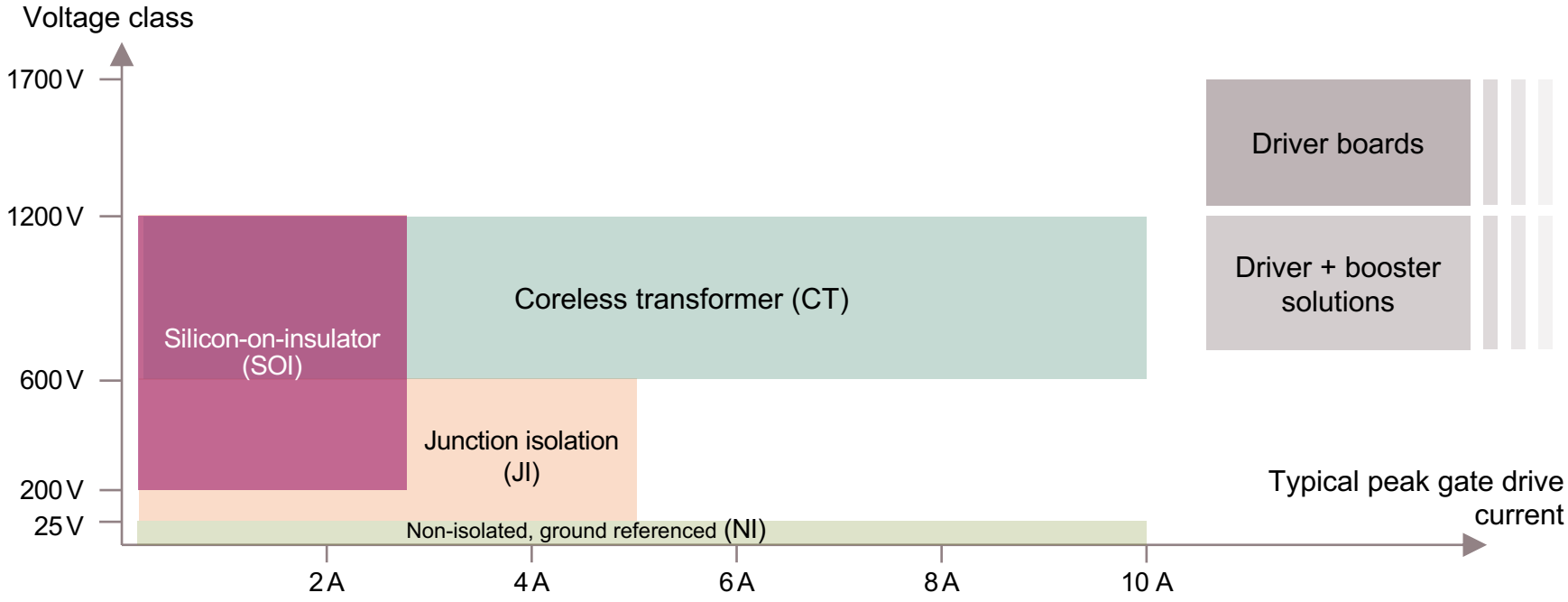
World-class production, quality and business continuity support

Experienced, best-in-class application engineers, and excellent support

*IHS Markit report 2019

Infineon provides a comprehensive, market-leading portfolio of gate driver solutions

Non-isolated GD	Level-shift GD	Isolated GD
Low voltage	Junction isolation (JI) & silicon-on-insulator (SOI)	Coreless transformer



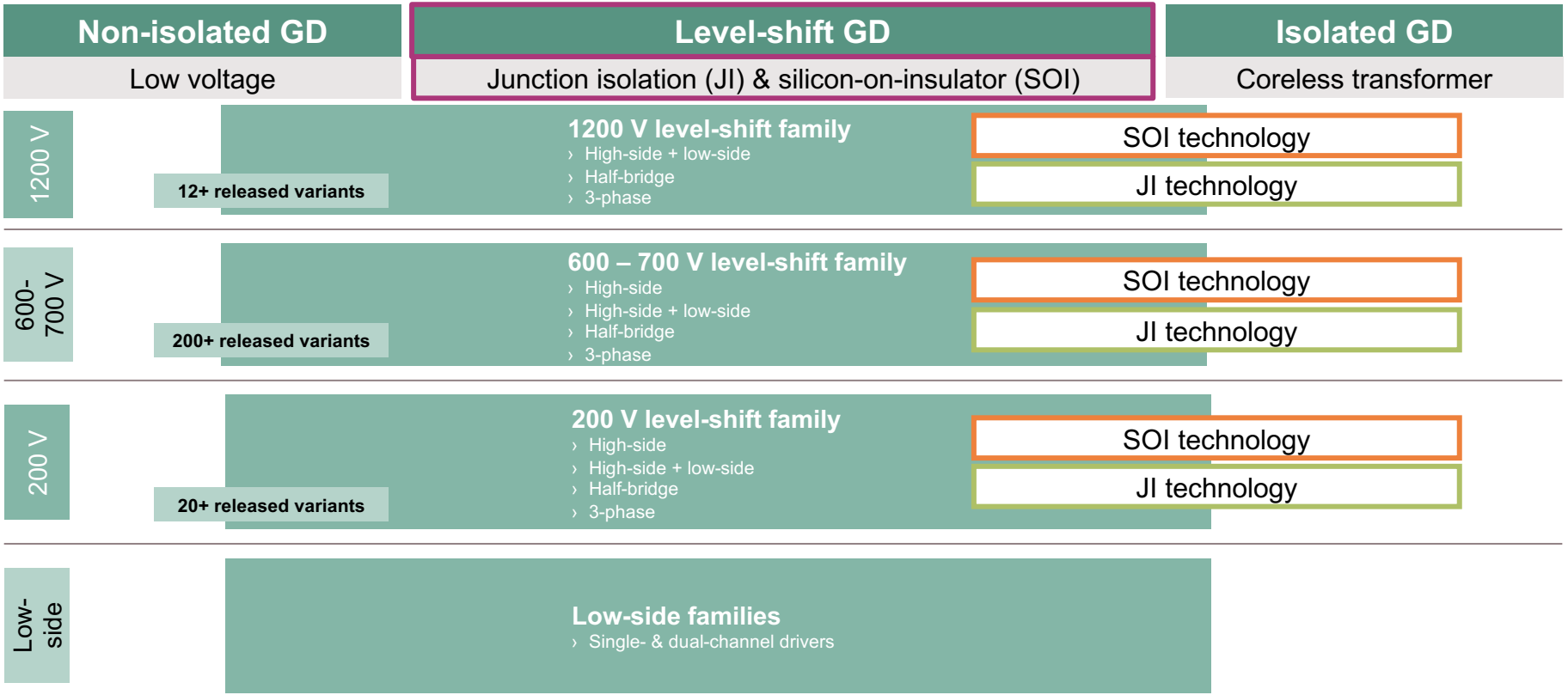
Infineon drivers are offered across a wide variety of configurations and voltage ranges

Non-isolated GD	Level-shift GD	Isolated GD
Low voltage	Junction isolation (JI) & silicon-on-insulator (SOI)	Coreless transformer

Gate driver configuration			5 V	25 V	100 V	200 V	500 V	600 V	650 V	1200 V
Gate drivers	1-channel	High-side			●	●	●	●	●	●
		Low-side	●	●						
	2-channel	High-side							●	●
		Low-side		●						
		High-side + low-side				●	●	● ●	●	●
		Half-bridge			●	●		● ●	● ●	● ●
	4-channel	Full bridge			●					
	6-channel	Three-phase				●		● ●		● ●
System building blocks		Current sense						●		●
		Start-up					●			

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

EiceDRIVER™ level-shift gate driver portfolio



Infineon SOI offers best-in-class price/performance

Leading negative VS immunity

- Improved and leading robustness (-100 V)
  - With 500 ns pulse width
- High reliability - lowest failures
  - Customer example (6EDL04):
  - **1M inverters built with zero failures = 0 ppm failure rate**

50% lower level-shift losses

- Lowest power loss
- Higher frequency operation
  - ~10% lower temperature for smaller heatsink

Infineon SOI = Best-in-class value proposition

Integrated bootstrap diode

- Useable internal bootstrap diodes (e.g. 36 Ω) vs. BootFETs of > 125 Ω, or none
- Reduced PCB and internal logic complexity
- Full motor control algorithm support
- **Space/cost saving ($0.06 - $0.09) per inverter**

Integrated input filter / 650 V

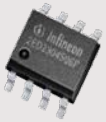
- 650 V drivers to support new 650-V IGBTs and MOSFETs
- Integrated input filter
  - No external filters needed to reduce noise sensitivity

2ED28073 – Level-shift gate driver

2ED28073J06F overview

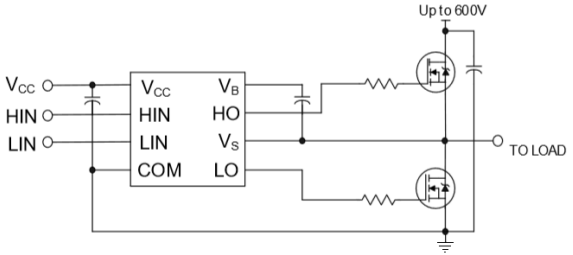
Key features

- Infineon JI technology operational up to **600 V voltage**
  - **Bootstrap voltage** up to **625 V**
- **Neg. VS transient immunity of 70 V**
- **Integrated** ultra-fast, low $R_{DS(ON)}$ **bootstrap diode**
- I_{o+} / I_{o-} +20 mA / -80 mA drive current (typical)
- Integrated short pulse/noise rejection filter
- Maximum supply voltage of 25 V
- Integrated short-through protection
- Lower di/dt for better noise immunity
- Package options
  - 2ED28073J06F: DSO-8 (SOIC-8)



Part number	$I_{O+/-}$ typ. [mA]	$t_{ON/OFF}$ (typ) [ns]	MT (max) [ns]	$t_{r/f}$ (typ) [ns]
2ED28073J06F	+20/ -80	530/530	50	1500 / 225

Sample schematic



Value proposition

- Highest reliability and quickest time-to-market with superior negative VS immunity
- Lower system-level BOM cost with integrated, monolithic bootstrap diode
- Floating channel design for bootstrap operation
- Simple, low-cost solution to drive CoolMOS™ PFD7 MOSFETs or RC-D2 IGBTs up to 600 V
- Independent UVLO for both high and low sides
- Robust IC with increased device reliability
- Form, fit, function, pin2pin and electrical compatibility with earlier-generation drivers

Applications

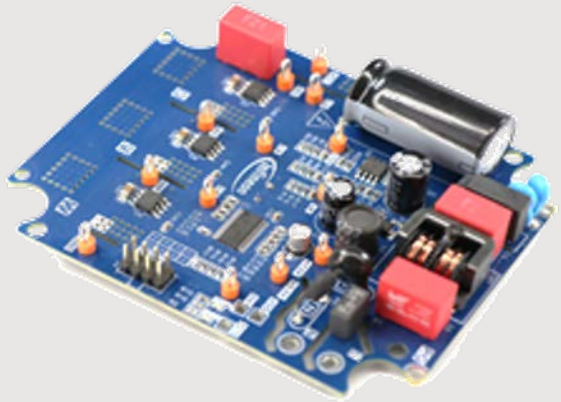
2ED28073 and 600 V CoolMOS™ PFD7 are perfect solutions for low-power drives

Value proposition for low-power drives

High efficiency x robustness x competitive pricing

CoolMOS™ PFD7 600 V enablers for low-power drives

- High efficiency
  - Optimized figure of merit: $R_{DS(ON)}$ x Q_{rr} + $R_{DS(ON)}$ x E_{ON} + $R_{DS(ON)}$ x E_{OFF}
- Design flexibility
  - Broad package portfolio
  - Wide range of $R_{DS(ON)}$ values
- Robust & easy-to-use
  - ESD protection of up to 2 kV
  - Excellent commutation ruggedness
  - Low EMI



EVALDRIVE3PHPFD7TOBO1

600 V CoolMOS™ PFD7
Portfolio and EiceDRIVER™ for low-power drives

CoolMOS™ PFD7 600 V						EiceDRIVER™
$R_{DS(ON)}$ [mΩ]	TO-220FP_NL	IPAK SL	DPAK	SOT-223	ThinPak 5x6	EiceDRIVER™ Gate driver P/Ns motor drives
2000			IPD60R2K0PFD7S	IPN60R2K0PFD7S		2ED28073J06F
1500			IPD60R1K5PFD7S	IPN60R1K5PFD7S	IPLK60R1K5PFD7	2ED28073J06F
1000		IPS60R1K0PFD7S	IPD60R1K0PFD7S	IPN60R1K0PFD7S	IPLK60R1K0PFD7	2ED28073J06F
600		IPS60R600PFD7S	IPD60R600PFD7S	IPN60R600PFD7S	IPLK60R600PFD7	2ED2304S06F
360	IPAN60R360PFD7S	IPS60R360PFD7S	IPD60R360PFD7S	IPN60R360PFD7S	IPLK60R360PFD7	2ED2304S06F
280	IPAN60R280PFD7S	IPS60R280PFD7S	IPD60R280PFD7S			2ED2304S06F
210	IPAN60R210PFD7S	IPS60R210PFD7S	IPD60R210PFD7S			2ED2304S06F
125	IPAN60R125PFD7S					2ED2304S06F

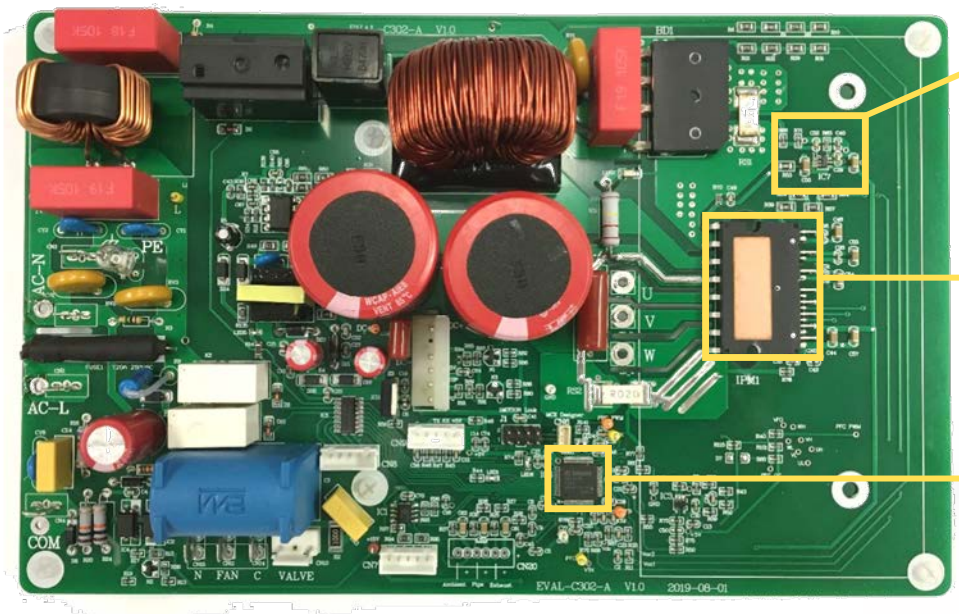
SOP 02/2020 (productive parts 05/2020) Other PFD7 and EiceDRIVER™ parts are available now

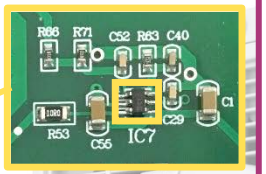
Key features and benefits

Key features	Key benefits	Value
Lower di/dt output stage to drive CoolMOS™ PFD7 MOSFETs	› Increased robustness and reliability → reduced manufacturing and field failures › Reduced power dissipation; lower temperature › High-efficiency performance › Smaller PCB footprints › Reduced BOM costs › Improved noise sensitivity	Increased profitability from lower lifecycle costs
Negative VS immunity of 70 V, dv/dt immune		Faster time-to-market to capture higher market share
Integrated bootstrap diode		Enabling new applications
Integrated input filters		Flexibility

1ED4417x – Low-side gate driver family

One-stop shop for your residential air conditioner design





EiceDRIVER™ 1ED44175N01B
New single-channel low-side gate driver with integrated overcurrent protection in tiny SOT23-6-pin package

CIPOS™ Mini IFCM15S60GD
600 V, 15 A three-phase TRENCHSTOP™ IGBT-based intelligent power module (IPM) with PFC switching

iMOTION™ IMC302A-F064
New motor & PFC controller with motion control engine (MCE 2.0), scripting and Arm® Cortex®-M0 MCU in QFP-64 package

Infineon offers the total solution

EVAL-1ED44176N01F
1-channel low-side gate driver with overcurrent protection

Evaluate the key functions of Infineon's low-side gate driver with built-in overcurrent protection, fault reporting and enable functionality

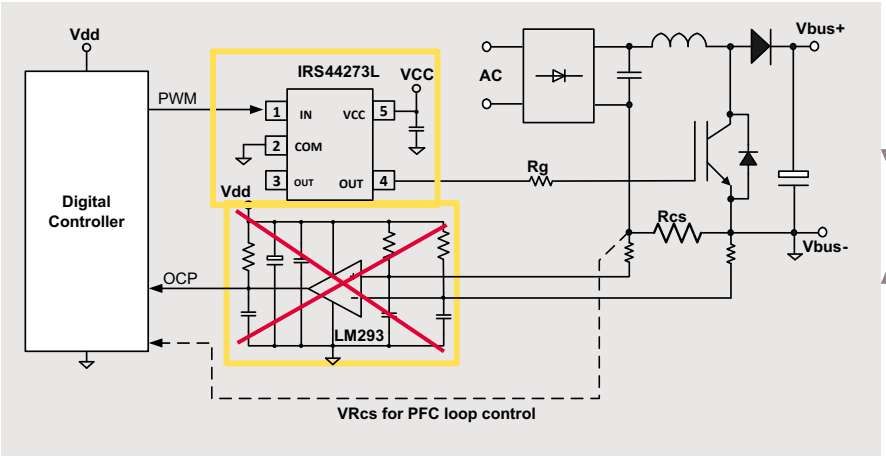
1ED44176N0F
New single-channel low-side gate driver

- Integrated overcurrent protection
- Accurate current sensing threshold tolerance of **± 5%**
- Fault reporting
- Enable functionality

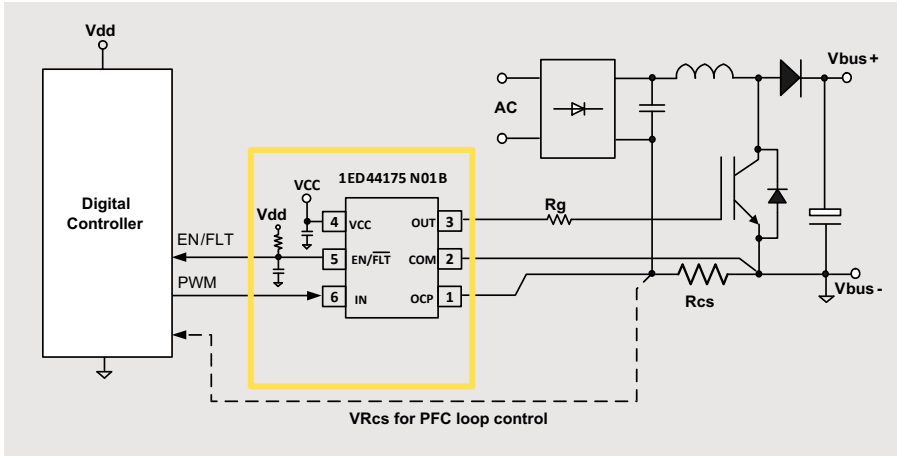
Simplify your design with the new low-side gate driver family: 1ED44175 and 1ED44176

Example: Digitally controlled boost PFC solution

Typical solution



1ED44175-based design



In this example, a low-side gate driver is used to drive the IGBT.
An external circuit is used for overcurrent protection.
With Infineon's new 1ED4417x family, the OCP circuit is not needed.

1ED44175 low-side gate driver integrates:

- Overcurrent protection
- Fault reporting
- Enable functionality

Enables up to **20% cost saving** and up to **50% space saving!**

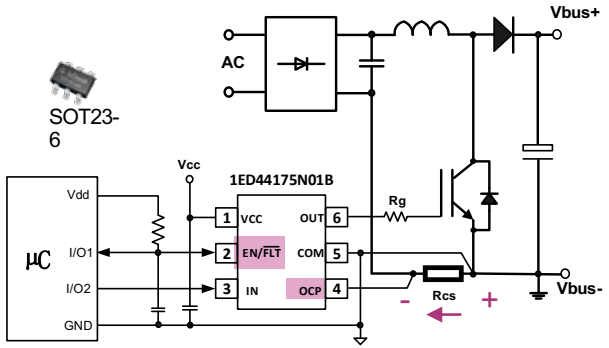
1ED44175N01B & 1ED44176N01F at a glance:
1-channel low-side gate drivers with overcurrent prot.

Features

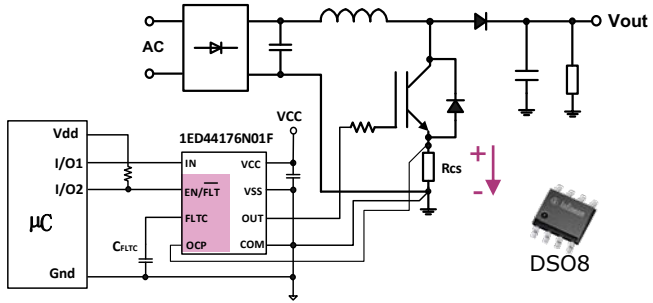
- 1ED44175: Overcurrent limit with **minus** voltage input
- 1ED44176: Overcurrent limit with **positive** voltage input
- Overcurrent protection threshold voltage with **±5% tolerance**
- Single pin for fault output and enable
- Programmable fault clear time
- 25 V max. V_{CC} supply voltage
- Undervoltage lockout (UVLO) protection
- CMOS Schmitt-triggered inputs
- 3.3 V, 5 V and 15 V input logic-compatible
- Output in phase with input

	Key specifications			
	$I_{O+/-}$ typ	UVLO typ (on/off)	Prop. delay typ (on/off)	Package
1ED44175N01B	2.6 A	11.9 / 11.4 V	50 ns	SOT23-6
1ED44175N01F	+0.8 / -1.75 A	11.9 / 11.4 V	50 ns	DSO-8

1ED44175 typical connection diagram



1ED44176 typical connection diagram



Target Applications

Support materials

Support materials

- Gate driver selection guide brochure (PDF)
- Gate driver application selection matrix (PDF)/ 中文
- Gate driver product portfolio presentation (PPT)
- Gate driver application selection matrix (PPT)
- Isolated gate driver selection guide (PDF)/ Chinese
- Gate driver selection & support tools manual (PPT)
- Solid-state relay product portfolio presentation (PPT)
- Solid-state relay cross reference (Excel)
- Solid-state relay simple selection tool (Excel)

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