Product Overview

UCC272xx and UCC273xx: 120V Half-Bridge Gate Drivers for High-Powered Applications

TEXAS INSTRUMENTS

The UCC272xx and UCC273xxA devices are a family of high current half-bridge drivers optimized to drive Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFETs) and Insulated Gate Bipolar Transistor (IGBTs) in fast switching, high-powered environments across industrial and automotive applications. The family has over 15 generic parts, each with specific differences. This product overview highlights the benefits of all the offerings and aims to assist engineers in selecting the best driver.

Optimized

UCC272xx and UCC273xxA features both 3A/3A and 3.7A/4.5A drive current options to reduce switching losses and improve overall efficiency in high-power systems. This drive capability paired with small package options, such as the 3mm × 3mm VSON, make the UCC272xx and UCC273xxA family one of the most versatile families of half-bridges. The extensive GPNs and feature sets allows an option to be found for your application.

Features

The UCC273xxA family extends the UCC272xx portfolio by offering input interlock and enable functionality. Input interlock is a logic function built in to prevent shoot-through events. If both the high-side and low-side of the half bridge were to output at the same time, current shoots through and cause damage to the transistor. Since power FETs are not cheap, interlock is offered as a preventative measure to save the board. Enable functionality is designed via an additional pin, and thus only offered in the 10-pin DRC orderable parts. If enable is sent low, then regardless of the input signal the IC receives, the driver is prevented from outputting. An extended benefit of this feature is that UCC273xxA operates at a lower quiescent current when disabled, drawing a typical of only 3μA. This decreases the power drawn from your system and helps optimize efficiency in designs.

Robust

The UCC272xx and UCC273xxA 120V V_{HB} and -(28V_{DD})V negative transient handling allows the proper headroom and buffer for the driver to exist and operate in noisy environments without the need for external components. The integrated bootstrap diode is designed to handle fast-switching, high stress environments. As mentioned, interlock logic helps prevent damage to transistors which can be a significant cost on the board.

Table 1. Product Summary

| Product Features	Product Benefits	Key Applications
120V V_{HB}, 3.7A/4.5A Drive	Robust in fast switching environments	Rack and Server Power
-(28V-V_{DD}) Switching Transient Handling	Good for handling transients and noise in operations	HEV/EV On-Board Charger Bi-directional DCDC
6V or 8V UVLO Options	MOSFET and IGBT applications	Solar Inverters
3mm × 3mm Package Options	Power Density	Traction Inverters

Target End Equipments

With the product family features discussed, consider the ways that this can improve a system design.

**Table 2. End Equipment Impact**

| System Requirement	System Benefit
Size	3mm × 3mm packages enable small design size.
Robustness	-(28V-V_{DD}) handling on SH allows the UCC272xx and UCC273xxA to better withstand noise and transients.
	High-performance integrated bootstrap diode maintains operation across fastest switching applications.
Cost	The excellent transient performance reduces the need for external components such as clamping diodes.
	Integrating the bootstrap diode saves BOM cost and reduces components needed.
Efficiency	6V and 8V UVLO options prevent the driver from partially turning on the power switch with insufficient voltage to the FET gate.
	3.7A/4.5A drive current enables reduction in switching losses.
Flexibility	UVLO and package options allow high degree of optionality.
	Interlock (UCC2730xA) or non-interlock options allows choice of feature inclusion. DRC package offers enable functionality with low-current shutdown mode.

The UCC272xx and UCC273xxA can be utilized in a wide variety of end equipments. Figure 1 through Figure 3 help explore some of the most popular use cases and respective topologies.
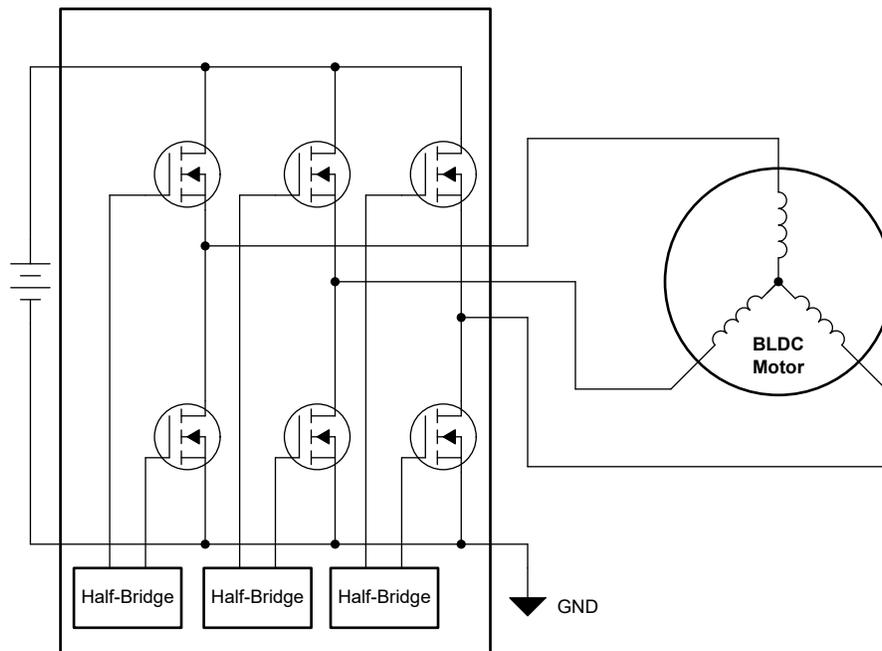
Figure 1. 3-Phase Motor Drive
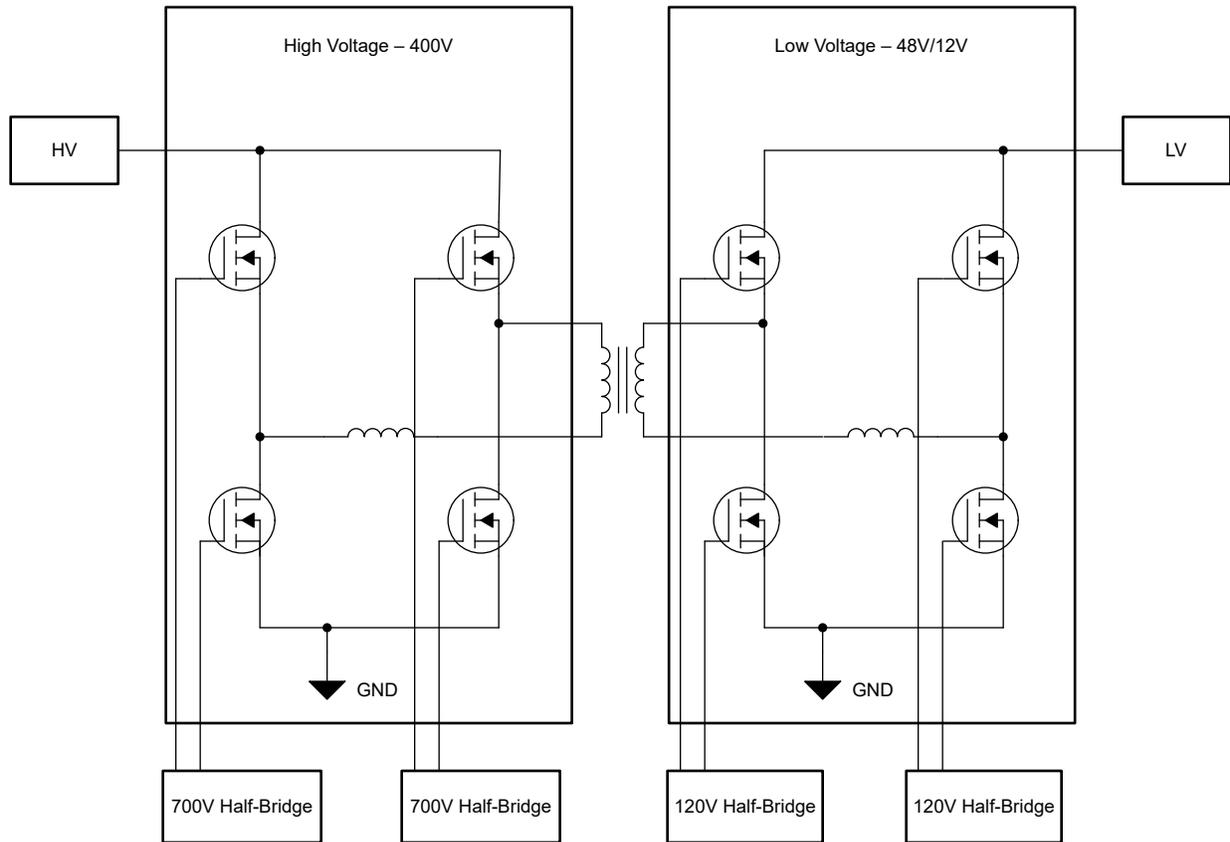
Figure 2. 48V-12V DC/DC Converter
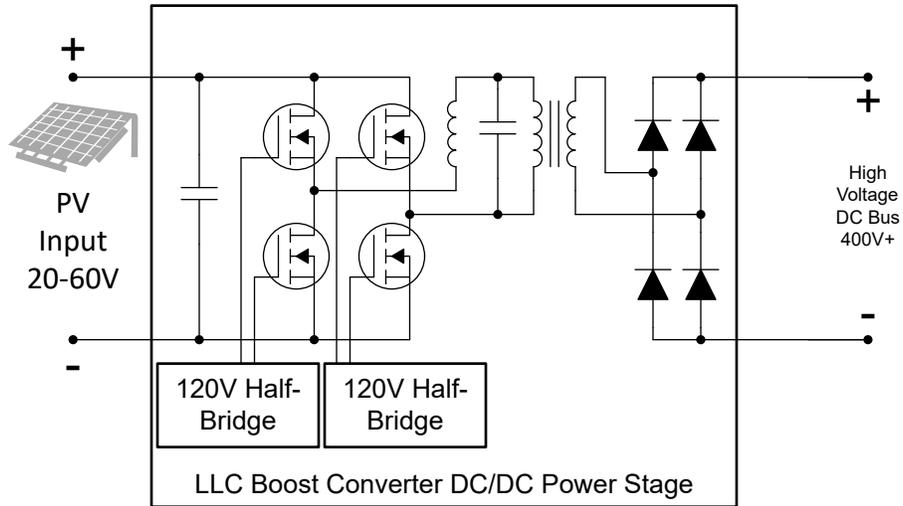
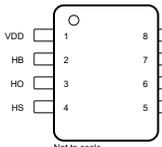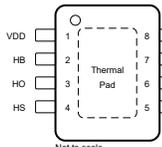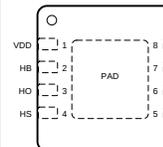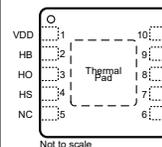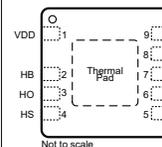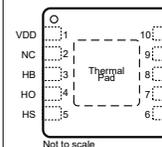**Figure 3. DC/DC in Solar Application**

Device Selection Guides

The UCC272xx and UCC273xxA devices have distinct features, electrical specifications, and pinouts. To aid in selection, Table 3 through Table 5 help distinguish major differences between part numbers and variants.

Table 3. Device Key Specs

Part Number	UVLO	Feature	Catalog Package Options	Automotive Package Options
UCC27301A (-Q1)	8V	3.7A/4.5A, Input Interlock, Enable Pin (DRC only)	D, DRC	D, DDA, DRC
UCC27311A(-Q1)	8V	3.7A/4.5A, Enable Pin (DRC only)	DRC	DRC
UCC27302A(-Q1)	6V	3.7A/4.5A, Input Interlock, Enable Pin (DRC only)	D, DDA, DRC	D, DDA, DRC
UCC27200A	8V	3A/3A, CMOS Input	D, DDA, DRM, DRC	N/A
UCC27200-Q1	8V	3A/3A, CMOS Input	N/A	DDA
UCC27201A(-Q1)	8V	3A/3A, TTL Input	D, DDA, DRM, DRC, DPR	DDA, DMK
UCC27211	8V	3.7A/4.5A, TTL Input	D, DDA, DPR	N/A
UCC27211A(-Q1)	8V	3.7A/4.5A, TTL Input	DRM	D, DRM
UCC27212	6V	3.7A/4.5A, TTL Input	D, DPR	N/A
UCC27212A-Q1	6V	3.7A/4.5A, TTL Input	N/A	D, DDA

Table 4. Pinout Maps and Availability

D 4.9mm × 3.9mm SOIC-8	DDA 4.9mm × 3.9mm HSOIC-8	DRM 4mm × 4mm VSON-8	DPR 4mm × 4mm VSON-10	DRC 3mm × 3mm VSON-9	DRC 3mm × 3mm VSON-10

Table 5. Legacy Devices Similar to UCC272xx and UCC273xxA

Legacy Device	New GPN Replacement	Pin-to-Pin?	Key Advantages
UCC27282	UCC27302A	Yes	Increased drive current to decrease switching losses, increasing system efficiency. Optimized integrated boot diode to handle high-stress environment.
UCC27284	UCC27212	Yes	
UCC27289	UCC27x11/A	Yes	
LM5101A	UCC27311A	Yes	Smaller package options allow for reduced design size

Additional Information

Table 6. Orderable Table

Orderable Device	Package Type	Pins	Op Temp (°C)	Device Marking	Samples
UCC27301ADR	SOIC	8	-40 to 150	27301A	Samples
UCC27301ADRCR	VSON	10	-40 to 150	27301A	Samples
UCC27301AQDRQ1	SOIC	8	-40 to 150	U27301Q	Samples
UCC27301AQDDARQ1	HSOIC	8	-40 to 150	U27301Q	Samples
UCC27301AQDRCRQ1	VSON	10	-40 to 150	27301Q	Samples

Table 6. Orderable Table (continued)

Orderable Device	Package Type	Pins	Op Temp (°C)	Device Marking	Samples
UCC27311ADRCR	VSON	10	-40 to 150	27311A	Samples
UCC27311AQDRCRQ1	VSON	10	-40 to 150	27311Q	Samples
UCC27302ADR	SOIC	8	-40 to 150	27302A	Samples
UCC27302ADDAR	HSOIC	8	-40 to 150	U27302A	Samples
UCC27302ADRCR	VSON	10	-40 to 150	27302A	Samples
UCC27302AQDRQ1	SOIC	8	-40 to 150	27302Q	Samples
UCC27302AQDDARQ1	HSOIC	8	-40 to 150	U27302Q	Samples
UCC27302AQDRCRQ1	VSON	10	-40 to 150	27302Q	Samples
UCC27200ADR	SOIC	8	-40 to 150	27200A	Samples
UCC27200ADRCR	VSON	10	-40 to 150	200A	Samples
UCC27200ADDAR	HSOIC	8	-40 to 150	27200A	Samples
UCC27200ADRMR	VSON	8	-40 to 150	27200A	Samples
UCC27200QDDARQ1	HSOIC	8	-40 to 150	27200Q	Samples
UCC27201ADDAR	HSOIC	8	-40 to 150	27201A	Samples
UCC27201ADPRR	WSON	10	-40 to 150	UCC27201A	Samples
UCC27201ADR	SOIC	8	-40 to 150	27201A	Samples
UCC27201ADRCR	VSON	10	-40 to 150	201A	Samples
UCC27201ADRMR	WSON	10	-40 to 150	27201A	Samples
UCC27201AQDDARQ1	HSOIC	8	-40 to 150	201AQ1	Samples
UCC27201AQDMKRQ1	VSON	10	-40 to 150	UCC27201AQ	Samples
UCC27211ADRMR	VSON	8	-40 to 150	27211A	Samples
UCC27211AQDDARQ1	HSOIC	8	-40 to 150	27211Q	Samples
UCC27211AQDRQ1	SOIC	8	-40 to 150	27211Q	Samples
UCC27211DDAR	HSOIC	8	-40 to 150	27211	Samples
UCC27211DPRR	WSON	10	-40 to 150	UCC27211	Samples
UCC27211DR	SOIC	8	-40 to 150	27211	Samples
UCC27212DR	SOIC	8	-40 to 150	27212	Samples
UCC27212DPRR	WSON	10	-40 to 150	UCC27212	Samples
UCC27212ADDARQ1	HSOIC	8	-40 to 150	27212Q	Samples
UCC27212AQDRQ1	SOIC	8	-40 to 150	27212Q	Samples

Additional References:

• Texas Instruments, *Mapping Application Requirements with the 120V Halfbridge Gate Driver* application note.
• Texas Instruments, *Challenges and Solutions for Half-Bridge Gate Drivers in Bidirectional DC-DC Converters* application note.
• Texas Instruments, *Half-bridge Minimum Current Calculator* forum post.

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Last updated 10/2025