

## Product Overview

# ***UCC571xx: TI's First Protection Low-Side Protection Drivers With DESAT (UCC5710x), OCP (UCC5714x)***

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The UCC5710x devices are TI's first low-side gate driver family which uses desaturation (DESAT) protection, whereas the UCC5714x devices are TI's first low-side gate driver family with over-current protection (OCP, or OC protection). These single-channel families were designed primarily for both automotive and industrial topologies that require additional protection. The UCC571x8 devices target IGBT while the UCC571x2 devices target SiC FETs. Some of the benefits are discussed below:

### **Protection**

The UCC5710x devices have DESAT protection, which is a voltage-based detection of the collector of a FET. When the DESAT threshold is tripped, the outputs of the gate driver are turned off, preventing system damage.

The UCC5714x devices have OCP, which is a current-based detection which utilizes a shunt resistor or sensing-FET. Using a voltage threshold at the OC pin, when the voltage across the shunt resistor is higher than the voltage threshold of the gate driver, the output of the driver turns off.

During a short-circuit event, both gate driver families turn off the outputs of the driver, and the fault pin is pulled to ground. The integrated fault reporting maintains the fault signal to the MCU and keeps the outputs of the driver off until the fault is cleared. This extra level of protection compared to a comparable driver without protection allows for a safer system in noisy or harsh environments.

### **Feature Options**

The UCC571xx devices have pinouts which add useful features depending on what the system requires:

- Bipolar ground: UCC571xxB devices in the D package have bipolar ground which provides negative clearance below ground; this prevents accidental turn-on from miller capacitor-induced noise.
- Split output: UCC571xxC devices in the D package have split outputs which utilize separate pins for sourcing and sinking current. This allows for complete control and customizable gate resistance for turn-on and turn-off.
- Enable: UCC5710xW devices have an enable pin, which is an additional condition to make output high. In the event of a system fault, turning Enable low can quickly shut off the gate drive.

### **Internal Voltage Reference**

The UCC5710x devices have an integrated LDO which creates a 5V bias with a max of 20mA. This LDO can provide an additional bias supply without needing to redesign the power rail. The LDO typically is used to bias digital isolators, thermistors, modulators, and other components.

**Table 1. UCC5710x Overview Table**

Product Features	Feature Impact	Key Applications
DESAT Protection	Integrated protection from short-circuits	xEV Automotive HVAC xEV Traction Inverter Servo Drives Power Tools A/C Inverter
Thermal shutdown	Shuts down driver when over temperature thresholds	
Fault Reporting	Reports faults to MCU	
30V Max VDD	Allows driver to survive transients and noise at inputs and VDD.	
-5V Negative Voltage Handling		
8V or 12V UVLO Options	IGBT and SicFET applications	
Bipolar Ground Option	Allows for negative clearance below 0V ground	
Split Output Option	Complete and separate control over drive source and sink strength	
Enable Option	Allows the power stage to be controlled independently of main control logic	

**Table 2. UCC5714x Overview Table**

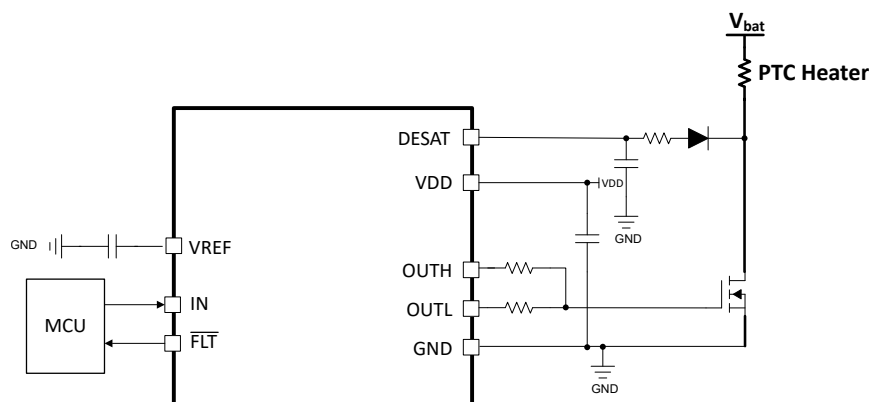
Product Features	Feature Impact	Key Applications
OC Protection	Integrated protection from short-circuits	Residential HVAC xEV OBC/DC-DC Servo Drives Power Tools A/C Inverter
Thermal shutdown	Shuts down driver when over temperature thresholds	
Fault Reporting	Reports faults to MCU	
30V Max VDD	Allows driver to survive transients and noise at inputs and VDD.	
-5V Negative Voltage Handling		
8V or 12V UVLO Options	IGBT and SicFET applications	

There are some technical features that can provide benefits to a design engineer.

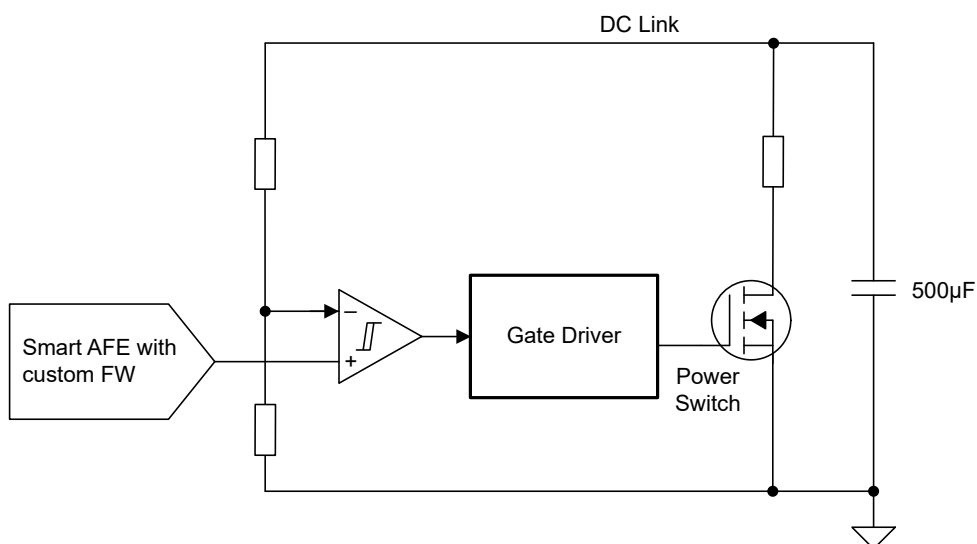
**Table 3. UCC571xx System Benefits**

System Requirement	Product Features	System Benefits
Robustness	DESAT Protection (UCC5710x)	Integrated protection in the gate drivers provides protection during short-circuit events.
	OC Protection (UCC5714x)	
	Thermal shutdown	Protects driver from over-temperature, protecting driver during harsh environments
	Fault Reporting	Reports faults to MCU for diagnostics.
	30V Max VDD	Driver can more easily handle transients and noise on VDD and inputs, providing robustness in system.
	-5V Negative Voltage Handling	
Flexibility	Bipolar Ground (UCC5710x)	Protects systems that use SiC FETs by preventing accidental turn-on from miller capacitor-induced noise
	8V or 12V UVLO Options	Optimizes driver UVLO for switch type.
Minimized Size and Cost	Integrated LDO (UCC5710x)	Adds convenient additional bias supply separate from the power rail
	DESAT Protection	Integrated DESAT prevents need of a larger discrete DESAT circuit.
	Split Output (UCC5710x)	Split output reduces cost by removing need for the output diode.

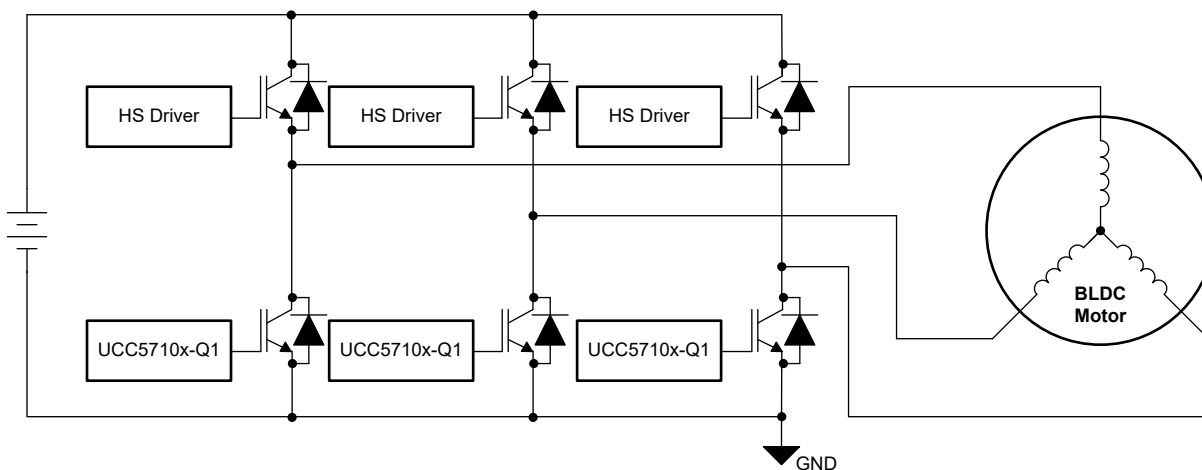
The UCC571xx family of devices have a wide variety of end equipments that have targeted sockets. Below are some topologies and end equipments where the UCC5710x family of devices can fit.



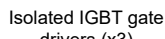
**Figure 1. UCC5710x-Q1 in Automotive PTC Heater**



**Figure 2. UCC5710x-Q1 in xEV Traction Inverter**



**Figure 3. UCC5710x-Q1 in Automotive HVAC Compressor**



### Figure 4. UCC571xx in Servo Drives



### Figure 5. UCC5714x in Residential Air Conditioner

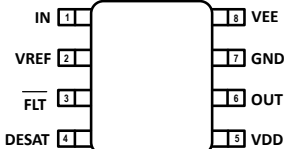
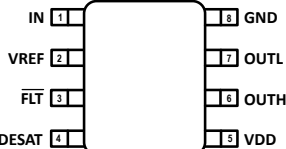
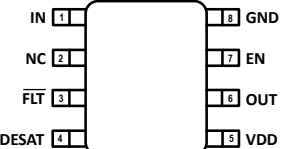
## Device Selection Guides

The UCC5710x devices have distinct features, electrical specifications, and pinouts. To aid in selection, the following tables help distinguish major differences between part numbers, variants, and provide insight comparing to legacy devices.

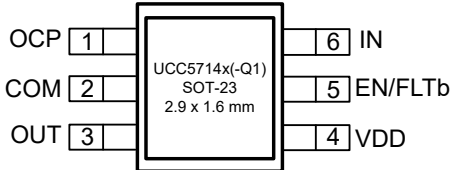
#### Table 4. UCC571xx Generic Part Number Comparison Table

Device	Channel Count	Drive Current	UVLO	Package Options	Protection Type
UCC57108 (-Q1)	1	3A/3A	8V	D	DESAT
UCC57102 (-Q1)	1	3A/3A	12V	D	DESAT
UCC57102Z (-Q1)	1	3A/3A	12V	D	DESAT
UCC57148 (-Q1)	1	3A/3A	8V	DBV	OCP
UCC57142 (Q1)	1	3A/3A	12V	DBV	OCP

**Table 5. UCC5710x Pinouts by Variants**

	Pinouts		
Variant	UCC5710xB, UCC57102Z	UCC5710xC	UCC5710xW
UVLO	8V, 12V	8V, 12V	8V, 12V
Variant Feature	Bipolar ground	Split output	Enable
Pinout			

**Table 6. UCC5714x Pinouts by Variants**

	Pinouts
Variant	UCC5714xA
UVLO	8V, 12V
Variant Feature	-250mV OCP
Pinout	

**Table 7. Legacy Devices Similar to UCC571xx**

Legacy Device	New Replacement GPN	Pin-to-Pin	Key Advantages
UCC27531	UCC57108C	No	Adds DESAT protection, fault reporting, and VREF while maintaining split output and 8V UVLO option.
UCC2753x	UCC57148	No	Adds OC protection and fault reporting while maintaining DBV package and 8V UVLO option.
UCC27511[A]	UCC5710xC	No	Adds DESAT protection, fault reporting, and VREF while maintaining split output and increasing VDD to 30V.
UCC27511[A]	UCC5714x	No	Adds OC protection and fault reporting while maintaining DBV package.
UCC44273	UCC5714x	No	Adds OC protection and fault reporting while maintaining DBV package.

## Additional Information:

### Additional References:

- [Applications and Benefits of UCC5710x-Q1](#)
- [Design Considerations for Automotive PTC Heater Modules](#)
- [Designing a Robust Traction Inverter Redundant Power Supply From 800V Battery](#)
- [Selecting Gate Drivers for HVAC Systems](#)
- [How to Choose a Gate Driver for DC Motor Drives](#)

**Table 8. UCC571xx Orderable Part Numbers**

Orderable Device	Package Type	Pins	Op Temp (°C)	Device Marking	Samples
UCC57108BDR	SOIC	8	-40 to 125	UC108B	<a href="#">Samples</a>
UCC57108BQDRQ1	SOIC	8	-40 to 125	U108BQ	<a href="#">Samples</a>
UCC57102BDR	SOIC	8	-40 to 125	UC102B	<a href="#">Samples</a>
UCC57102BQDRQ1	SOIC	8	-40 to 125	U102BQ	<a href="#">Samples</a>
UCC57108CDR	SOIC	8	-40 to 125	UC108C	<a href="#">Samples</a>
UCC57108CQDRQ1	SOIC	8	-40 to 125	U108CQ	<a href="#">Samples</a>
UCC57102CDR	SOIC	8	-40 to 125	UC102C	<a href="#">Samples</a>
UCC57102CQDRQ1	SOIC	8	-40 to 125	U102CQ	<a href="#">Samples</a>
UCC57108WDR	SOIC	8	-40 to 125	UC108W	<a href="#">Samples</a>
UCC57108WQDRQ1	SOIC	8	-40 to 125	U108WQ	<a href="#">Samples</a>
UCC57102WDR	SOIC	8	-40 to 125	UC102W	<a href="#">Samples</a>
UCC57102WQDRQ1	SOIC	8	-40 to 125	U102WQ	<a href="#">Samples</a>
UCC57102ZDR	SOIC	8	-40 to 125	UC102Z	<a href="#">Samples</a>
UCC57102ZQDRQ1	SOIC	8	-40 to 125	U102ZQ	<a href="#">Samples</a>
UCC57148ADBVR	SOT-23	6	-40 to 125	U148	<a href="#">Samples</a>
UCC57148AQDBVR Q1	SOT-23	6	-40 to 125	U48Q	<a href="#">Samples</a>
UCC57142ADBVR	SOT-23	6	-40 to 125	U142	<a href="#">Samples</a>
UCC57142AQDBVR Q1	SOT-23	6	-40 to 125	U42Q	<a href="#">Samples</a>

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