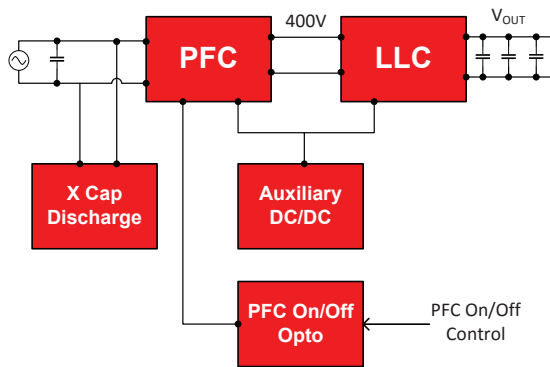


UCC25630x Selection Guide



Introduction

UCC25630x is a fully featured, LLC controller with integrated high-voltage gate driver. The controller is designed to pair with a PFC stage to provide a complete, AC to DC power tree for medium power applications in the 75W to 500W range. Shown below is an example AC to DC power tree.



AC/DC system block diagram.

For applications >75W of output power, an active PFC stage is recommended in order to satisfy industry standards like EN61000-3-2. To meet efficiency standards such as 80 PLUS, low power modes in the PFC and DC/DC stages are desirable. The ability to shut down the PFC but continue to operate the DC/DC in light load conditions further enables efficiency compliance. An auxiliary DC/DC such as a flyback is used to supply a bias voltage to the PFC and DC/DC stages. In this example, a feature is included to discharge the X capacitor when the AC input is disconnected. While this example shows a complete AC to DC solution, further optimization is possible. The strength of the UCC25630x family is the flexibility it affords the designer to tailor their power configuration to meet their system needs.

Feature Differentiation and System Considerations

The below table provides a concise description of feature differences between UCC25630x devices. It is important to keep in mind which system performance metrics matter most for a given design in order to select the right device.

X Capacitor Discharge

The X capacitor used in EMC filters requires a means to discharge in the event of AC disconnect. This is to ensure voltage does not remain present on the main cord indefinitely. The maximum allowable discharge time is governed by industry standards such as IEC60950 and IEC60065. A traditional approach is to connect bleed resistors in parallel to the X capacitor, however, this approach comes with a power penalty. UCC256301 and UCC256304 integrate an X-capacitor discharge function by sensing an AC disconnect event and sinking current from the HV pin to ground. This active approach offers lower standby power and improves overall system efficiency.

AC Input Range

To enable the LLC, the UCC25630x controller senses the PFC output voltage and compares the reading to a turn-on threshold and turn-off threshold. The thresholds of UCC256302 and UCC256303 requires the PFC stage to be on at all times. The lower turn-on threshold of UCC256304 means the LLC will turn on before the PFC. UCC256301, UCC256302 and UCC256303 require the PFC to turn on first to enable the LLC stage. UCC256301 and UCC256304 are able to operate while the PFC is off due to having a lower turn-off threshold. The benefit of being able to turn the PFC off is lower standby power and improved light-load efficiency.

UCC25630x Feature Differentiation

	UCC256301	UCC256302	UCC256303	UCC256304
X-Capacitor Discharge	Supports	Does Not Support	Does Not Support	Supports
PFC Off in Standby Mode	Yes*	No	No	Yes
DC Startup (Threshold Typical)**	3V/340V	3V/340V	3V/340V	1.06V/120V
DC Shutdown (Threshold Typical)**	0.96V/102V	2.2V/249V	2.2V/249V	0.96V/102V
Input Overvoltage (Threshold Typical)**	4V/453V	4V/453V	4V/453V	5V/566V
External Bias Required	No	No	Yes	No
VCC Range	13V to 26V	13V to 26V	11.25V to 26V	13V to 26V

*PFC must be turned on first in order to enable LLC. PFC can then be turned off in standby mode.

** Typical startup, shutdown and overvoltage values assume Bulk Divider Ratio 113.33.

Bias Supply

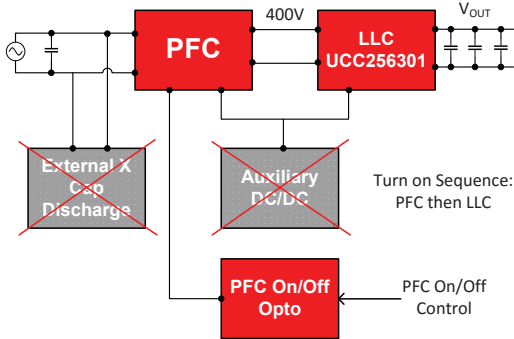
The HV self-startup feature enables the device to turn on directly from the high-voltage PFC output by sourcing current from the HV pin to the VCC capacitor, charging the VCC to reach its startup threshold. After the device is turned on, current is supplied to the LLC controller through a bias winding on the LLC transformer. The major benefit of the HV self-startup feature is an auxiliary bias

supply is not needed to power the LLC and PFC stages, allowing the designer to minimize BOM count and solution size. In situations where including an external bias supply is preferred, UCC256303 is capable of operating at a voltage as low as 11.25V, offering flexibility in the auxiliary supply design.

Selection Summary

UCC256301

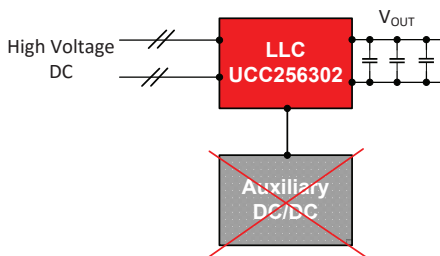
- Systems requiring X-capacitor discharge.
- No external bias supply required.
- Wide DC input range.
- LLC does not turn on until PFC stage is enabled.
- After LLC startup, PFC can be shut off to save power when LLC is in standby mode.
- Suitable for applications such as TV, printers and other home appliances.



AC/DC using UCC256301.

UCC256302

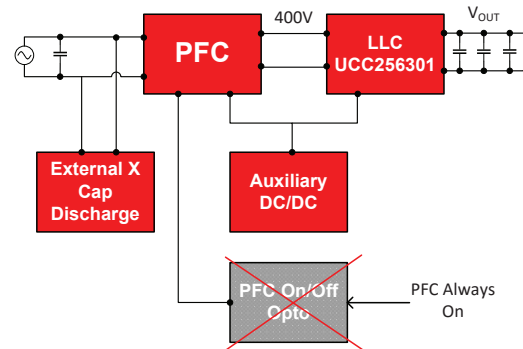
- No X-capacitor discharge required in LLC stage.
- No external bias supply required.
- PFC always on.
- Suitable for systems where the AC input is not physically close or not easily accessible to the DC/DC stage.
- Suitable for applications such as enterprise computing and industrial lighting.



AC/DC using UCC256302.

UCC256303

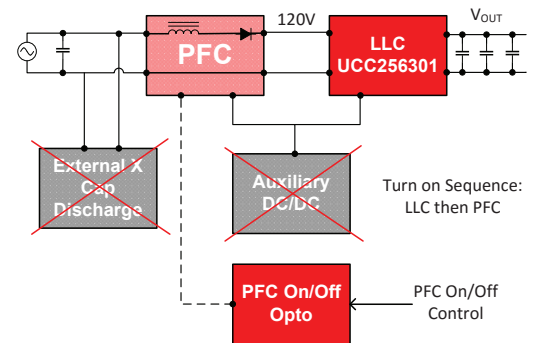
- No X-capacitor discharge required in LLC stage.
- External bias available.
- PFC always on.
- Suitable for applications such as gaming consoles, power tools, desktop PC.



AC/DC using UCC256303.

UCC256304

- X-capacitor discharge required.
- No external bias supply required.
- Wide-DC input range.
- LLC turns on before PFC.
- Suitable for applications such as TV and desktop PC.



AC/DC using UCC256304.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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