5V/6A High-Efficiency Synchronous Buck Converter

Description

The ZCC3460, a high-frequency integrated synchronous buck convert r, provides a high-efficiency and compact-footprint power management solution.

The device can start up from an input voltage as low as 2.7V and deliver up to 6A output current. When the output is shorted, the ZCC3460 enter s a hiccup protection mode and automaticall y recovers when the output short is removed.

Applications

- Point of Load
- Hard Disk Drive and SSD
- Battery and USB Powered Device
- Set-Top Box
- LCD Monitor and TV
- Telecom and Networking
- Server and Storage System
- Computing Application

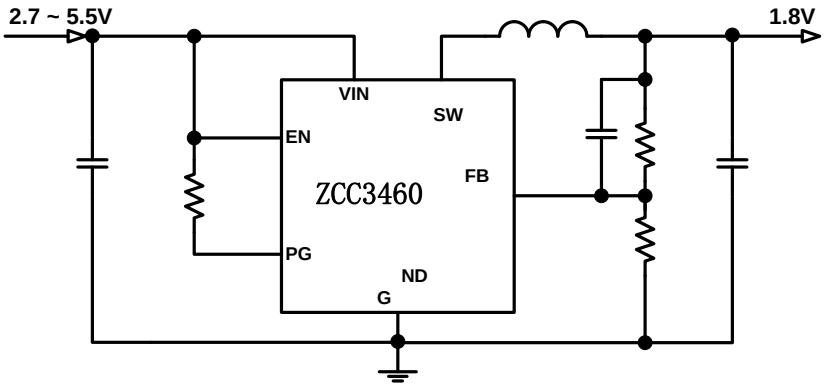
Features

- Input Voltage Range: 2.7V to 5.5V
- Output Voltage Range: 0.6V to Vin
- Integrated Power MOSFETs
- Up to 6A Output Current
- High Efficiency with Low Temperature Rise
- 1.7MHz Switching Frequency
- Auto-Skip Power Saving Operation
- Low Shutdown Current
- Internal Soft Start
- Quick Output Discharge at Power Down
- Power Good Indicator
- Cycle-by-Cycle Current Limit
- Short-Circuit Hiccup Protection
- Thermal Shutdown Protection
- 2x3mm FCQFN 12-Pin Package
- This is a Pb−Free Device

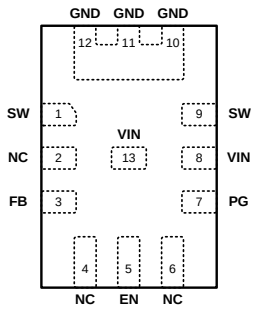
Ordering Information

Device	Package	Top Marking*	Shipping†
ZCC3460	FCQFN-12 (2x3mm)	3460 YWLL	3000 Tape & Reel

Typical Application Circuit



Pinout (Top View)



FCQFN-12 (Top View)

Pin Functions

Pin	Name	Description
1,9	SW	Switch Node. Connected to the internal high-side MOSFET and low-side MOSFET.
2,4,6	NC	Not Connected.
3	FB	Feedback Input. Connecting a resistive divider from VOUT to this pin to adjust output voltage.
5	EN	Enable pin of the chip.
7	PG	Power Good. Open-drain output. Provides a logic high valid power good output signal, indicating the regulator's output is in the regulation window.
8,13	VIN	Input Supply. VIN must be locally bypassed by a 10uF or more ceramic capacitors.
10,11,12	GND	Ground. Ground of the power stage and control circuit. Directly connect this pin to the system ground planes.

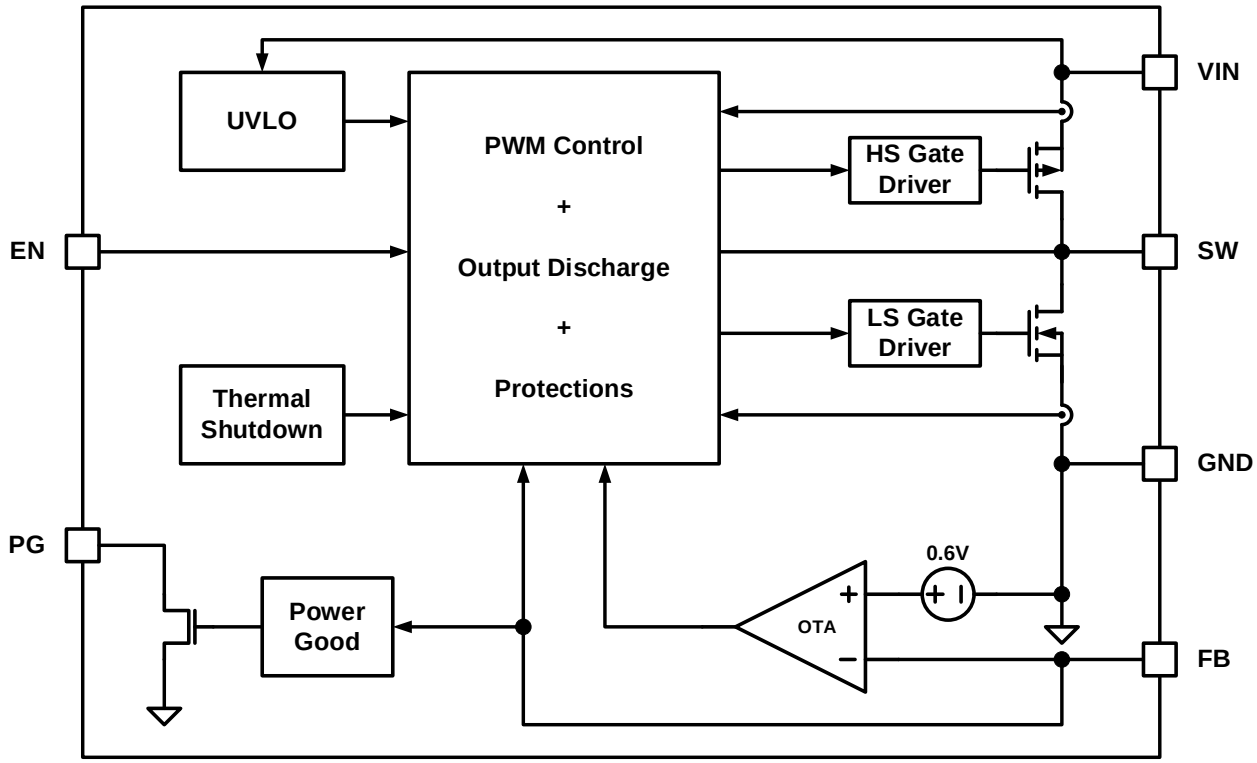


Figure 1. Functional Block Diagram

Absolute Maximum Ratings (1)

VIN	-0.3V to +6V
SW	-0.3V to +6V
All Other Pins	-0.3V to +6V or VIN+0.6V
Junction Temperature	150°C
Lead Temperature	260°C
Storage Temperature	-65°C to 150°C

Recommended Operating Conditions (3)

Supply Voltage V_{IN}	2.7V to 5.5V
Output Voltage V_{OUT}	0.6V to V_{IN}
Operating Junction Temperature	-40°C to +125°C

Notes:

1) Exceeding these ratings may damage the device.
2) The maximum allowable power dissipation is a function of the maximum junction temperature T_J (MAX), the junction-to-ambient thermal resistance θ_{JA}, and the ambient temperature T_A. The maximum allowable continuous power dissipation at any ambient temperature is calculated by P_D (MAX) = (T_J (MAX)-T_A)/θ_{JA}. Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.
3) The device is not guaranteed to function outside of its operating conditions.

Electrical Characteristics

V_{IN} = V_{EN} = 3.6V, typical values are tested at T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Condition		Min	Typ	Max	Units
Operating Input Voltage	V_{IN}			2.7		5.5	V
Undervoltage Rising	V_{UVLO_R}	V_{IN} rising				2.65	V
Undervoltage Hysteresis	V_{UVLO_HYS}				150		mV
Supply Quiescent Current	I_{INQ}	V_{FB} = 0.7V			55		μA
Supply Shutdown Current	I_{INSD}	V_{EN} = 0V				1	μA
Switching Frequency	F_{SW}	CCM Operation		1.4	1.7	2.0	MHz
EN High Threshold	V_{EN_H}	V_{EN} rising		1.1			V
EN Low Threshold	V_{EN_L}	V_{EN} falling				0.4	V
FB Voltage	V_{FB}			0.594	0.6	0.606	V
High-Side MOSFET On-Resistance	R_{ON_H}	V_{IN} = 3.6V			21		mΩ
		V_{IN} = 5V (4)			18		
Low-Side MOSFET On-Resistance	R_{ON_L}	V_{IN} = 3.6V			21		mΩ
		V_{IN} = 5V (4)			18		
High-Side Peak Current Limit	I_{LIMT}			6.9			A
Minimum On Time (4)	T_{ON_MIN}				80		ns
Maximum Duty Ratio (4)	D_{MAX}			100			%
Soft Start Time (4)	T_{SS}				1.2		ms
Hiccup Idle Time (4)	T_{HIC}	V_{IN} = 5V			9		ms
Output Discharge Resistance (From SW to GND)	R_{DISCH}	V_{IN} = 5V (4)	V_{SW} = 1.0V		6		Ω
			V_{SW} = 1.8V		9		
		V_{IN} = 3.3V	V_{SW} = 1.0V		10		
			V_{SW} = 1.8V		15		
PGOOD Window (4)		V_{FB} / 0.6V x 100%			85~115		%
PGOOD Hysteresis (4)					5		%
PGOOD Pull-Low Voltage	V_{PG_L}	10mA Sink Current				0.3	V
Thermal Shutdown (4)	T_{SD}				155		°C
Thermal Shutdown Hysteresis (4)	T_{SDhys}				20		°C

Notes:

4) Guaranteed by design, not production tested.