5V/3A High-Efficiency Synchronous Buck Converter

Description

The VIS8703, a high-frequency integrated synchronous buck converter, 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 3A output current. When the output is shorted, the VIS8703 enters a hiccup protection mode and recovers automatically when the output short is removed.

Applications

- Point of Load
- Hard Disk Drive and SSD
- Set-Top Boxes
- LCD Monitor and TV
- Telecom and Networking
- Server and Storage System
- Computing Application

Features

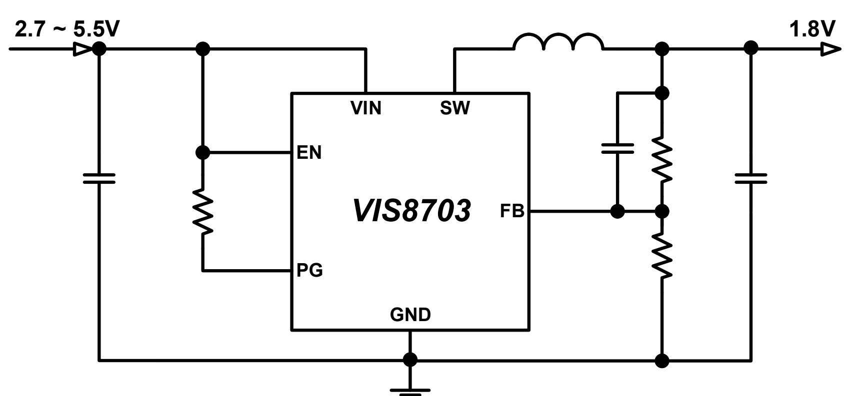
- Input Voltage Range: 2.7V to 5.5V
- Output Voltage Range: 0.6V to Vin
- Integrated Power MOSFETs
- Up to 3A Output Current
- 1.5MHz Switching Frequency
- Auto-Skip Power Saving Operation
- Low Shutdown Current
- Internal Soft Start
- Output Discharge at Power Down
- Power Good Indicator
- Cycle-by-Cycle Current Limit
- Short-Circuit Hiccup Protection
- Thermal Shutdown Protection
- QFN1.5x1.5 Package
- This is a Pb−Free Device

Ordering Information

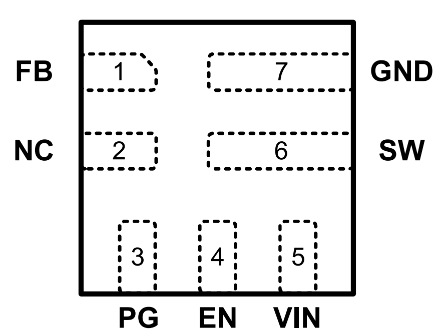
Device	Package	Top Marking*	Shipping†
VIS8703	QFN1.5x1.5	8703 YWLL	3000 Tape & Reel

* Top Marking Code: Y is Year, W is Week, LL is Lot.
† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications.

Typical Application Circuit



Pinout (Top View)



QFN1.5x1.5 (Top View)

Pin Functions

Pin	Name	Description
1	FB	Feedback Input. Connecting a resistive divider from VOUT to this pin to adjust output voltage.
2	NC	Not Connected.
3	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.
4	EN	Enable pin of the chip.
5	VIN	Input Supply. VIN must be locally bypassed by a 10uF or more ceramic capacitors.
6	SW	Switch Node. Connected to the internal high-side MOSFET and low-side MOSFET.
7	GND	Ground. Ground of the power stage and control circuit. Directly connect this pin to the system ground planes.

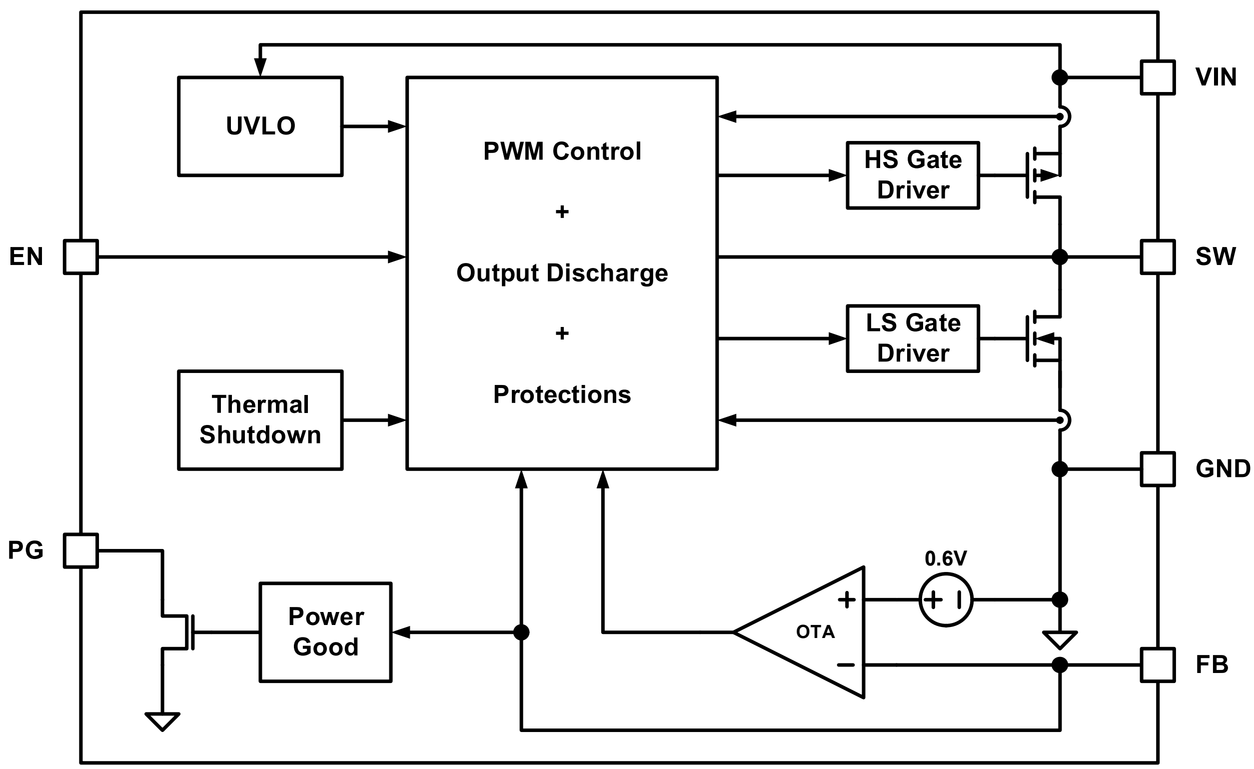


Figure 1. Functional Block Diagram

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
Continuous Power Dissipation (T_A= 25°C) [2]	TBD

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

Thermal Resistance [4]

Junction to Case Θ_{JC}	TBD
Junction to Ambient Θ_{JA}	TBD

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.
4) The thermal resistance values are dependent of the internal losses split between devices and the PCB heat dissipation. These data are based on a typical operation condition with a 4−layer FR−4 PCB board, which has two, 1−ounce copper internal power and ground planes and 2−ounce copper traces on top and bottom layers with approximately 80% copper coverage. No airflow and no heat sink applied (reference JEDEC 51.7). It also does not account for other heat sources that may be present on the PCB next to the device.

Electrical Characteristics

V_{IN} = V_{EN} = 3.3V, 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}			200		mV
Supply Current (Quiescent)	I_{INQ}	V_{FB} = 0.8V		50	100	µA
Supply Current (Shutdown)	I_{INS}	V_{EN} = 0V			1	µA
Switching Frequency	F_S	CCM Operation	1200	1500	1800	kHz
EN High Threshold	V_{EN_H}	V_{EN} rising	1.5			V
EN Low Threshold	V_{EN_L}	V_{EN} falling			0.4	V
FB Voltage	V_{FB}		0.594	0.6	0.606	V
Low-Side MOSFET On-Resistance	R_{ON_L}			85		mΩ
High-Side MOSFET On-Resistance	R_{ON_H}			50		mΩ
High-Side Peak Current Limit	I_{LIM}		5.0			A
Minimum On Time (5)				50		ns
Maximum Duty Ratio (5)			100			%
Soft Start Time (5)	T_{SS}			1.2		ms
Hiccup Idle Time (5)	T_{HIC}			10		ms
Output Discharge Resistance at Power Down (5)	R_{DISCH}	From SW to GND V_{OUT} = 1.8V		15		Ω
PGOOD Window (5)		V_{FB} / 0.6V x 100%		85~115		%
PGOOD Hysteresis (5)				5		%
PGOOD Pull-Low Voltage	V_{PG_L}	10mA Sink Current			0.3	V
Thermal Shutdown (5)	T_{SD}			150		°C
Thermal Shutdown Hysteresis (5)	T_{SDhys}			25		°C

Notes:
5) Guaranteed by design, not production tested.