



# WIDE INPUT 2A SYNCHRONOUS RECTIFIED STEP-DOWN CONVERTER

### DESCRIPTION

The UTC **P2680** is a monolithic synchronous step-down, fixed 340kHz frequency, current-mode, PWM controller with an internal power MOSFET. It achieves 2A continuous output current over a wide input supply range from 4V to 26V with excellent load and line regulation. Equipped with an external compensation pin, this device offers user flexibility in determining loop dynamic.

Current mode control provides fast transient response and cycle-by-cycle current limit. A PWM control circuit can provide the duty ratio from 0 up to 90% linearly. An Under-Voltage-Lock-Output (UVLO) circuit monitors the VIN supply voltage to prevent wrong logic controls. Additional under voltage protections monitor the voltage on FB pin for short-circuit protections.

In application, the UTC **P2680** is suitable for portable devices when it works as an ideal power supply in SOP-8L package.

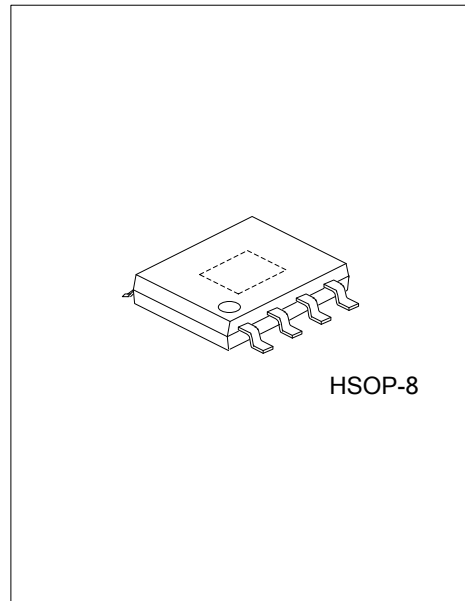
### FEATURES

- \* 2A Output Current
- \* 340KHz frequency of operation
- \* 4V~26V Input Voltage Range
- \* 20µA Shutdown Supply Current
- \* Output Adjustable
- \* Frequency FoldBack at Short Circuit
- \* VIN Under-voltage Lockout
- \* Thermal Shutdown
- \* OCP
- \* Programmable Soft-Start
- \* Up to 90% Efficiency

### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
P2680L-SH2-R	P2680G-SH2-R	HSOP-8	Tape Reel

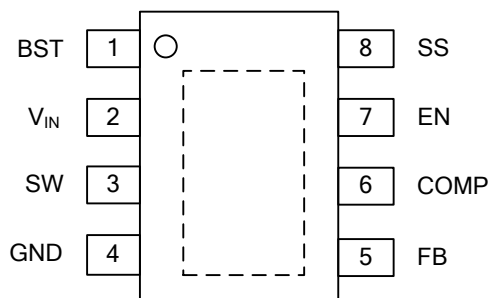
<p>P2680L-SH2-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) R: Tape Reel (2) SH2: HSOP-8 (3) L: Lead Free, G: Halogen Free</p>
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### MARKING INFORMATION

PACKAGE	MARKING
HSOP-8	<p>             8 7 6 5 → Date Code              UTC □□□□ L: Lead Free              P2680 □ G: Halogen Free              ● □□ □ Lot Code              1 2 3 4           </p>

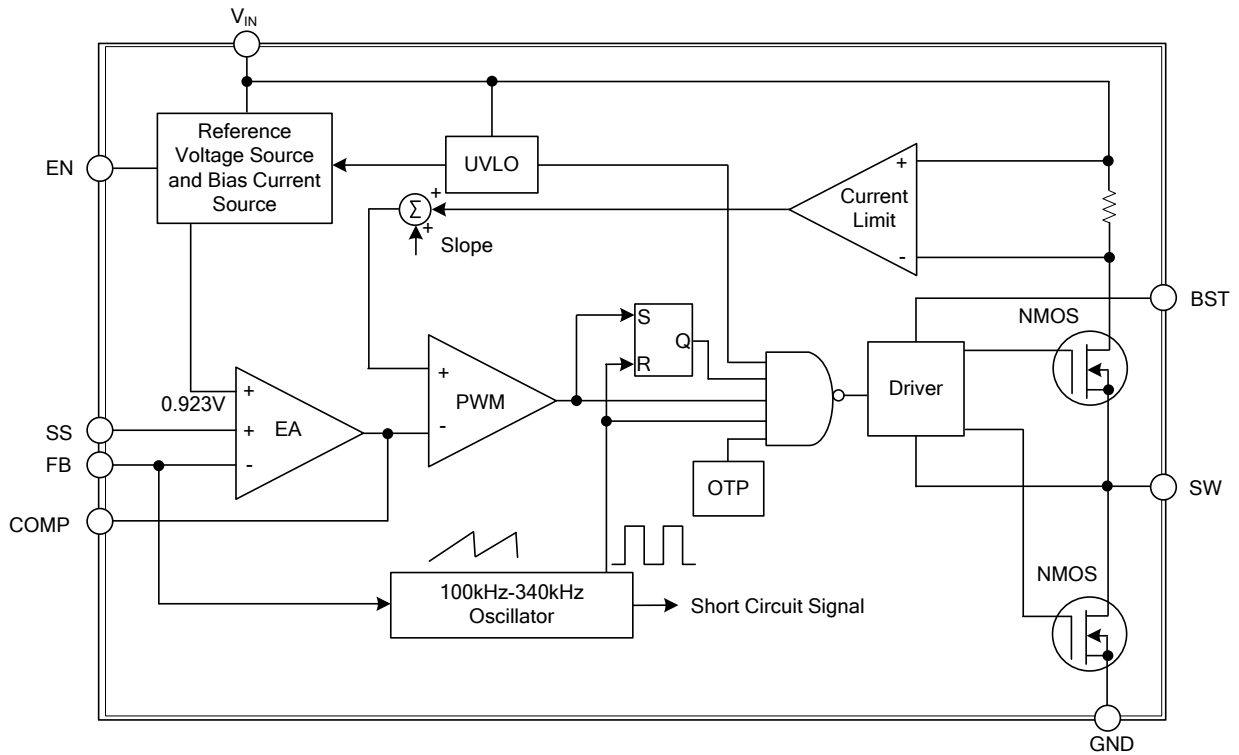
### PIN CONFIGURATION



### PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	BST	Bootstrap pin. Positive supply for the upper MOSFET driver.
2	V <sub>IN</sub>	Power supply pin.
3	SW	Power switch output pin.
4	GND	Ground pin.
5	FB	The output voltage feedback pin. It is also the inverting input of the error amplifier.
6	COMP	Compensation pin. It is also the output of the internal error amplifier.
7	EN	Enable Input. A high input at EN turns on the converter, and a low input turns it off.
8	SS	Soft-Start pin. Connect a capacitor from SS to GND to set the soft-start period. To disable the soft-start feature, leave SS unconnected.

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
VIN Supply Voltage	$V_{IN}$	26	V
SW Voltage	$V_{SW}$	$-1 \sim V_{IN} + 1$	V
BST Voltage	$V_{BST}$	$V_{SW} - 0.3 \sim V_{SW} + 8$	V
EN Voltage	$V_{EN}$	-0.3~6	V
FB Voltage	$V_{FB}$	-0.3~6	V
COMP Voltage	$V_{COMP}$	-0.3~6	V
Maximum Power Dissipation	$P_D$	0.76	W
Junction Temperature	$T_J$	-40~150	°C
Storage Temperature	$T_{STG}$	-55~150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.  
2. Exceeding these ratings may damage the device.

### ■ RECOMMENDED OPERATING CONDITIONS (Note)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	4~26	V
Ambient Operating Temperature	$T_A$	-40 ~ +125	°C

Note: The device is not guaranteed to function outside its operating rating.

### ■ PACKAGE THERMAL CHARACTERISTICS (Note)

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	105	°C/W
Junction to Case	$\theta_{JC}$	50	°C/W

Note: Measured on approximately 1" square of 1 oz. Copper surrounding device leads.

### ■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , $V_{IN} = 12\text{V}$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage	$V_{IN}$	$V_{OUT} = 5\text{V}$ , $I_{LOAD} = 0\text{A} \sim 1\text{A}$	7		26	V
Feedback Voltage	$V_{FB}$	$4.5\text{V} \leq V_{IN} \leq 23\text{V}$ , $V_{COMP} < 2\text{V}$	0.900	0.923	0.946	V
Switch On Resistance (High-Side)	$R_{ONH}$			0.20		$\Omega$
Switch On Resistance (Low-Side)	$R_{ONL}$			0.20		$\Omega$
SW Leakage		$V_{EN} = 0\text{V}$		0	8	$\mu\text{A}$
Current Limit	$I_{LIM}$		2.4			A
Current Limit Gain. Output Current to Comp Pin Voltage				3.3		A/V
Error Amplifier Transconductance		$\Delta I_{COMP} = \pm 10\mu\text{A}$		600		$\mu\text{A/V}$
Error Amplifier Gain				8000		V/V
Oscillator Frequency	$F_{OSC}$		305	340	375	kHz
Short Circuit Frequency	$F_{OSC\_S}$	$V_{FB} = 0\text{V}$		100		kHz
Maximum Duty Cycle	$D_{MAX}$	$V_{FB} = 0.7\text{V}$		90		%
Minimum Duty Cycle	$D_{MIN}$	$V_{FB} = 1.1\text{V}$			0	%
Enable Threshold Voltage	$V_{EN}$	Hysteresis = 0.2V		1		V
Enable Pull-Up Current	$I_{EN}$	$V_{EN} = 0\text{V}$		4.8		$\mu\text{A}$
Supply Current in Shutdown	$I_{SD}$	$V_{EN} = 0\text{V}$		110		$\mu\text{A}$
IC Supply Current in Operation	$I_O$	$V_{EN} > 2\text{V}$ , $V_{FB} = 1.4\text{V}$		0.9		mA
Soft-Start Current		$V_{SS} = 0\text{V}$		6		$\mu\text{A}$
Soft-Start Period		$C_{SS} = 0.1\mu\text{F}$		15		ms
Thermal Shutdown Temperature	T	Hysteresis = 10°C		160		°C

■ TYPICAL APPLICATION CIRCUIT

Figure 1. Shows an example UTC P2680 application circuit generating a 2.5V/2A output.

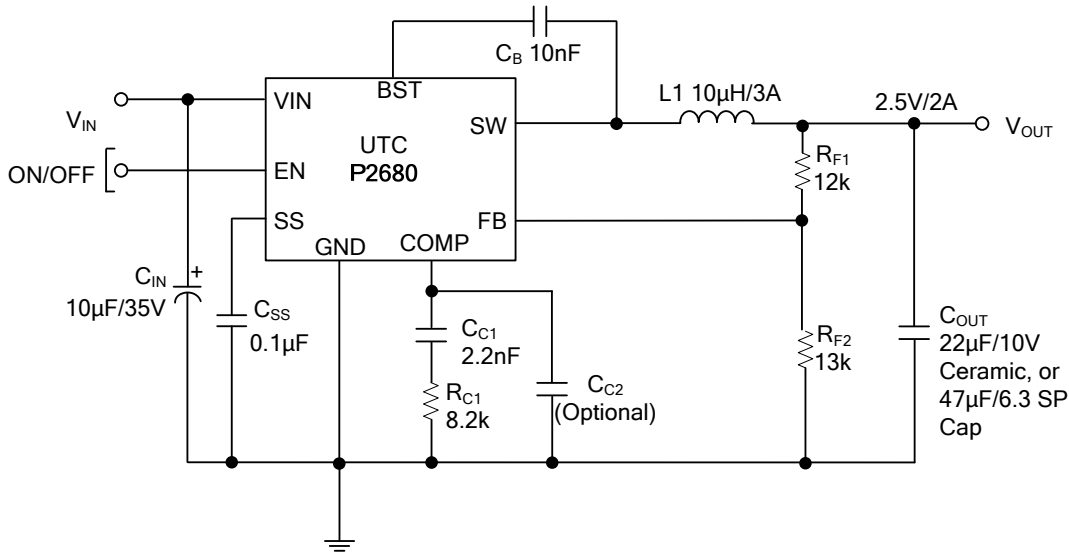


Figure 1. UTC P2680 2.5V/2A Output Application

Typical Compensation for Different Output Voltages and Output Capacitors

V <sub>OUT</sub>	C <sub>OUT</sub>	R <sub>C1</sub>	C <sub>C1</sub>	C <sub>C2</sub> (Note )
2.5V	22µF Ceramic	8.2kΩ	2.2nF	None
3.3V	22µF Ceramic	12kΩ	1.5nF	None
5V	22µF Ceramic	15kΩ	1.5nF	None
2.5V	47µF SP CAP	15kΩ	1.5nF	None
3.3V	47µF SP CAP	15kΩ	1.8nF	None
5V	47µF SP CAP	15kΩ	2.7nF	None
2.5V	470µF/6.3V/30mΩ	15kΩ	15nF	1nF
3.3V	470µF/6.3V/30mΩ	15kΩ	22nF	1nF
5V	470µF/6.3V/30mΩ	15kΩ	27nF	None

Note: C<sub>C2</sub> is needed for high ESR output capacitor.

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