



## P1580

## LINEAR INTEGRATED CIRCUIT

### 380KHz, 2.5A STEP-DOWN SWITCHING REGULATOR

#### DESCRIPTION

The UTC **P1580** is a current mode, PWM controller with 380kHz fixed frequency. It achieves 2.5A continuous output current over a wide input supply range with excellent load and line regulation. By using an external compensation pin, this device offers user flexibility in determining loop dynamic.

The UTC **P1580** integrates control, monitor and protection functions to provide a low cost and perfect power solution. The device provides 3.5 to 28V wide range operating input and high-efficiency up to 90%.

An Under- Voltage-Lock-Output (UVLO) circuit monitors the supply voltage to prevent from wrong logic control. An internal 1.222V reference voltage provides low output voltage down to 1.22V for further applications. The over-current protection of controller monitors the output current by using the voltage drop across a current sensing resistor. Additional under voltage protection monitors the voltage on FB pin for short-circuits protection.

The UTC **P1580** provides fast transient response and requires very few external devices for operation.

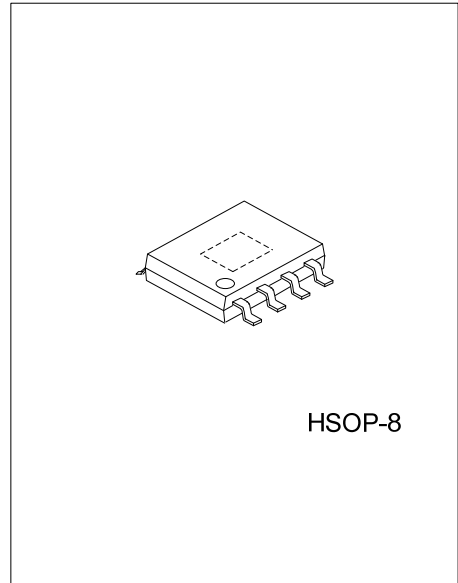
#### FEATURES

- \* 2.5A Output Current
- \* 380kHz Frequency of Operation
- \* 3.5V to 28V Input Voltage Range
- \* 5μA Shutdown Supply Current
- \* Output Adjustable From 1.22 to 21
- \* Frequency Feedback at Short Circuit
- \* Thermal Shutdown
- \* Under Voltage Lock Output
- \* Current Mode With Low ESR Output Ceramic Capacitors
- \* Up to 90% Efficiency
- \* Frequency Synchronization Input

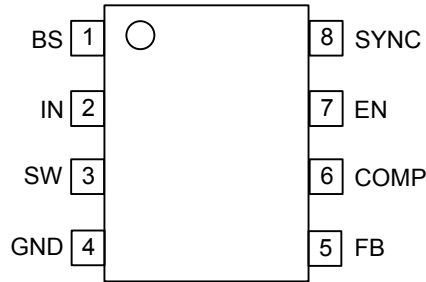
#### ORDERING INFORMATION

Ordering Number	Package	Packing
P1580G-SH2-R	HSOP-8	Tape Reel

<p>P1580G-SH2-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Halogen Free</p>	<p>(1) R: Tape Reel</p> <p>(2) SH2: HSOP-8</p> <p>(3) G: Halogen Free</p>
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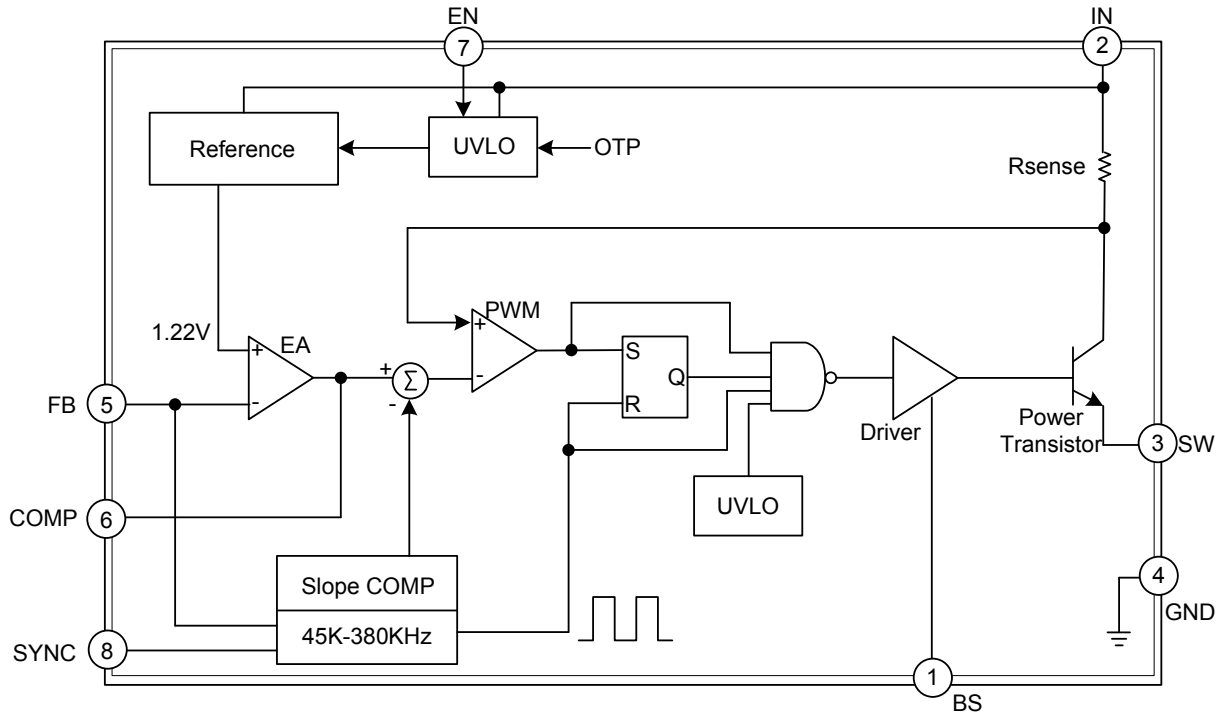
### ■ PIN CONFIGURATION



### ■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	BS	Supply pin to the power transistor driver. Tie to external circuit to generate a local supply voltage higher than the input voltage in order to fully turn on the internal power transistor.
2	IN	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. (1). A RC network at this pin compensates the control loop. (2). The voltage at this pin controls the peak current of the internal switch.
7	EN	Regulator On/Off Control pin. Leave EN unconnected if unused. A low input at EN turns on the converter, and a high input turns it off.
8	SYNC	Synchronization Input - The sync pin is used to synchronize the internal oscillator to an external signal.

## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING (Note 3)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{IN}$	28	V
Switch Voltage	$V_{SW}$	$-1 \sim V_{IN}+1$	V
Boost Voltage	$V_{BS}$	$V_{SW}+6$	V
Feedback Voltage	$V_{FB}$	$-0.3 \sim 6$	V
Enable/UVLO Voltage	$V_{EN}$	$-0.3 \sim 6$	V
Compensation Voltage	$V_{COMP}$	$-0.3 \sim 6$	V
Synchronization Voltage	$V_{SYNC}$	$-0.3 \sim 6$	V
Junction Temperature	$T_J$	150	°C
Storage Temperature	$T_{STG}$	$-65 \sim +150$	°C

Note: 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.

### ■ RECOMMENDED OPERATING CONDITIONS (Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	3.5~28	V
Ambient Operating Temperature	$T_A$	$-40 \sim +125$	°C

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

### ■ THERMAL DATA (Note 1)

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

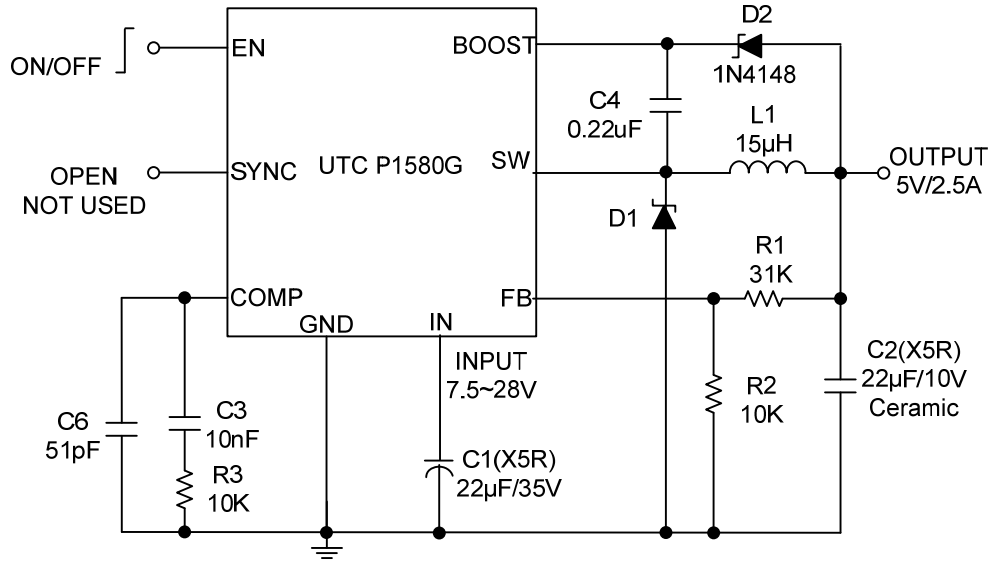
Note: Measured on approximately 1" square of 1 oz. Copper surrounding device leads.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Feedback Voltage	$V_{FB}$	$7V \leq V_{IN} \leq 25V$ , $V_{COMP} < 2V$	1.198	1.222	1.246	V	
Upper Switch Leakage		$V_{EN}=0V$ , $V_{SW}=0V$		0.1	10	$\mu A$	
Current Limit	$I_{LIMIT}$		3.1	3.3	3.3	A	
Current Limit Gain. Output Current to Comp Pin Voltage	$G_{COMP}$			2.2		A/V	
Error Amplifier Voltage Gain	$A_{VEA}$			400		V/V	
Error Amplifier Transconductance	$G_{EA}$	$\Delta I_C = \pm 10\mu A$	680	770	1000	$\mu A/V$	
Oscillator Frequency	$F_{OSC}$		342	380	418	KHz	
Short Circuit Frequency	$F_{SC}$	$V_{FB}=0V$	40	46	54	KHz	
Synchronization Frequency	$F_{SYNC}$	Sync Drive $0 \sim 2.7V$	370		660	KHz	
Duty Cycle	Maximum	$D_{MAX}$	$V_{FB}=1.0V$		90	%	
	Minimum	$D_{MIN}$	$V_{FB}=1.5V$		0	%	
Switch $V_{CESAT}$		$I_{SW}=2A$		400		mV	
Enable Threshold	$V_{EN}$	$I_{CC} > 100\mu A$	0.9	1.1	1.3	V	
Enable Pull Up Current	$I_{EN}$	$V_{EN}=0V$		0.1		$\mu A$	
Supply Current	Shutdown	$I_{SHDN}$	$V_{EN} \leq 0.4V$		5	8	$\mu A$
	Quiescent	$I_Q$	$V_{EN} \geq 2.6V$ ; $V_{FB}=1.4V$		1.7		mA
Current of Short Circuit	$I_{SC}$	$V_{IN}=10V$		1.8		A	
Thermal Shutdown	$T_{OTP}$			160		°C	

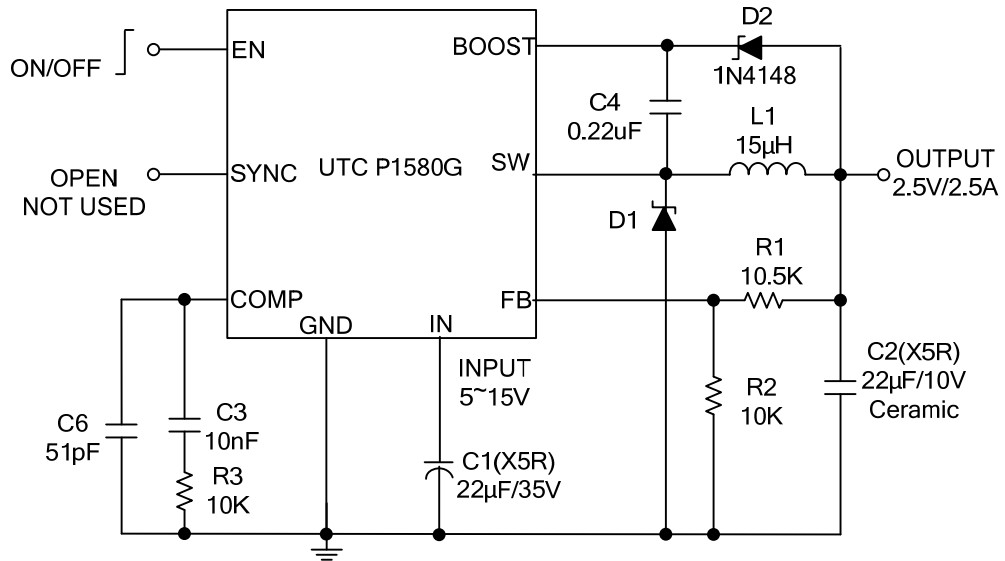
Note: If the  $V_{IN}$  voltage exceeding 23V under short circuit condition, there will be some risk.

## ■ TYPICAL APPLICATION CIRCUIT



UTC P1580 with 5V Output Voltage and 22μF / 10V Ceramic Output Capacitor

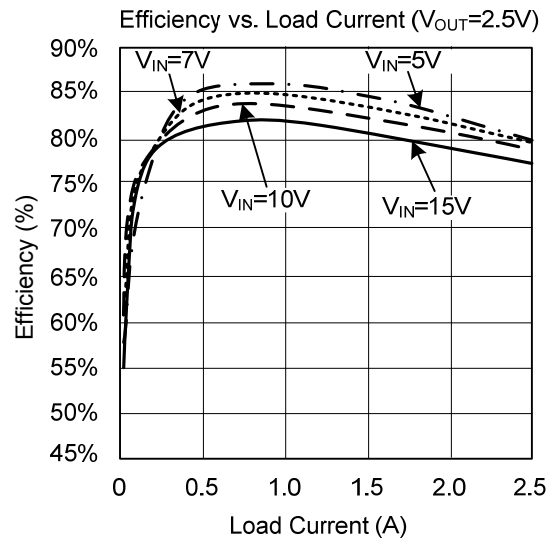
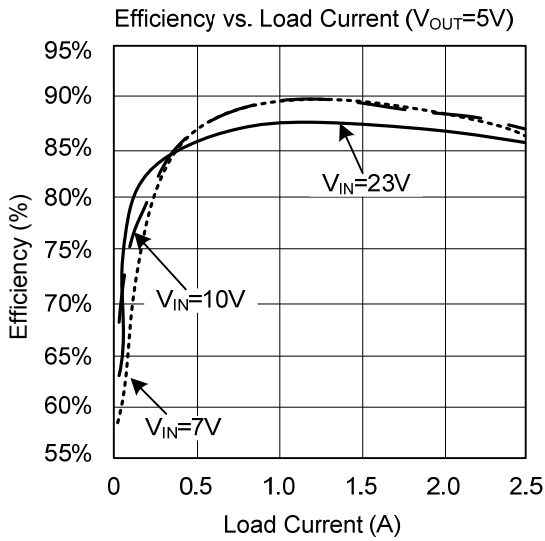
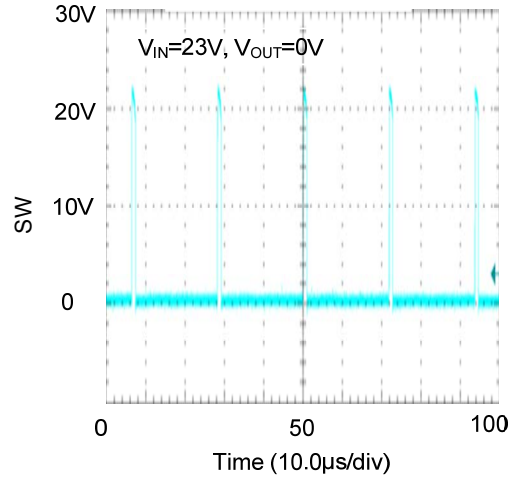
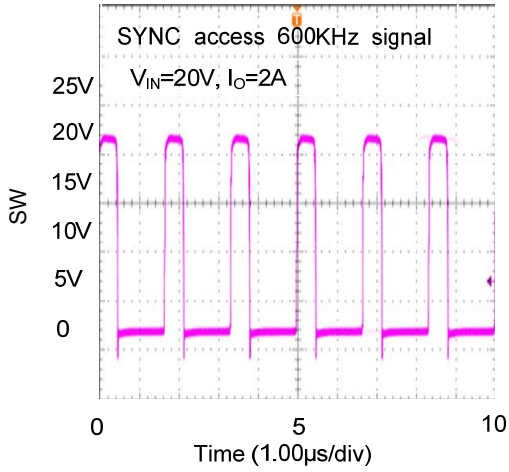
If the load current is applied in 2A, the input voltage can range from 7 to 28V.



UTC P1580 with 2.5V Output Voltage and 22μF / 10V Ceramic Output Capacitor

If the load current is applied in 2A, the input voltage can range from 4.4 to 28V.

■ TYPICAL CHARACTERISTICS



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