



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.

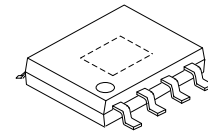
■ FEATURES

- * 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

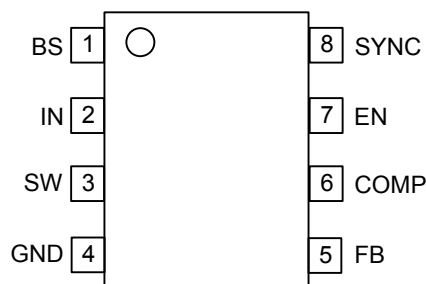
Ordering Number	Package	Packing
P1580G-SH2-R	HSOP-8	Tape Reel

P1580G-SH2-R (1)Packing Type (2)Package Type (3)Halogen Free	(1) R: Tape Reel (2) SH2: HSOP-8 (3) G: Halogen Free
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HSOP-8

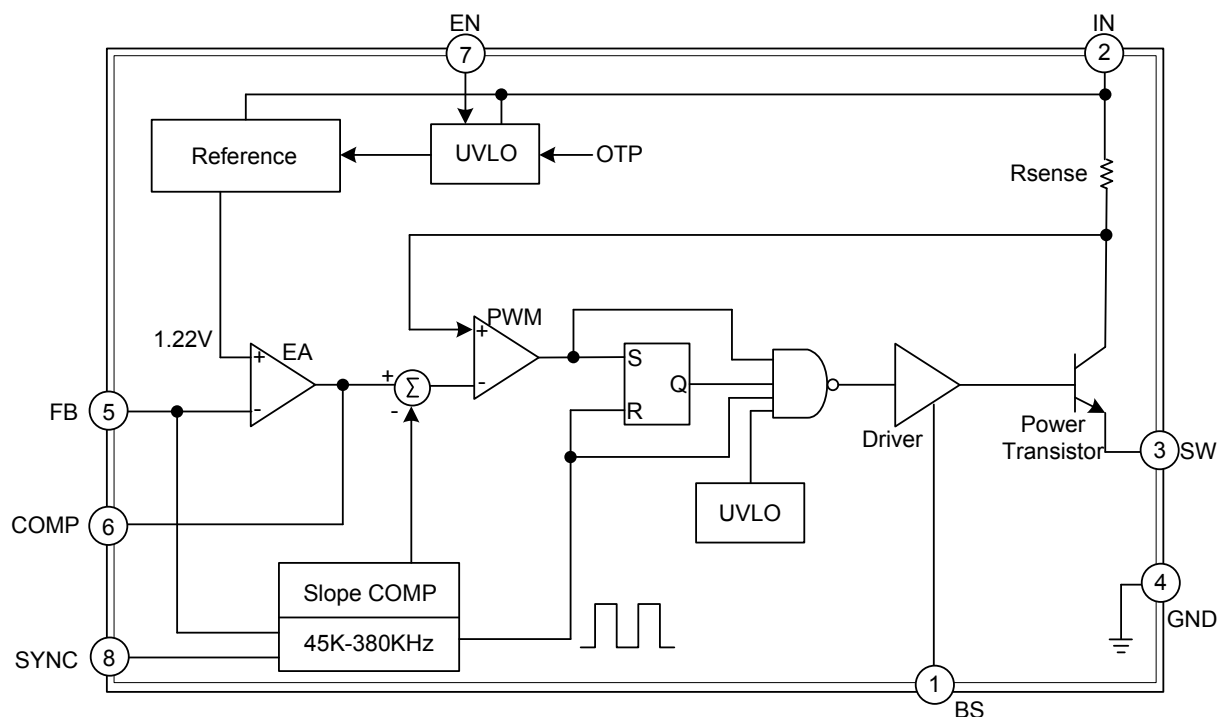
■ PIN CONFIGURATION



■ 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	θ_{JA}	105	°C/W
Junction to Case	θ_{JC}	50	°C/W

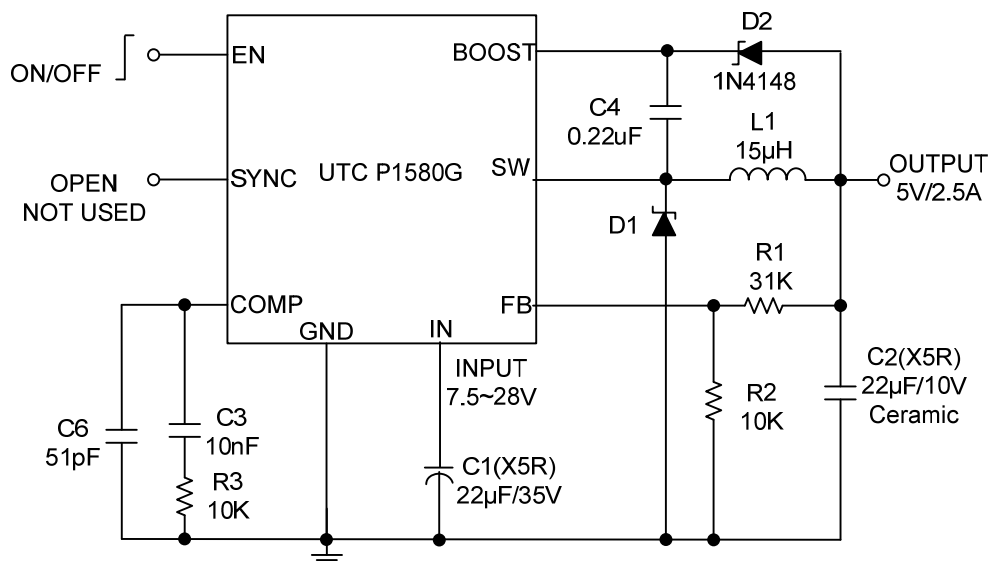
Note: Measured on approximately 1" square of 1 oz. Copper surrounding device leads.

■ 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	μA
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 ~ 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		μA
Supply Current	Shutdown	I_{SHDN} $V_{EN} \leq 0.4V$		5	8	μA
	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

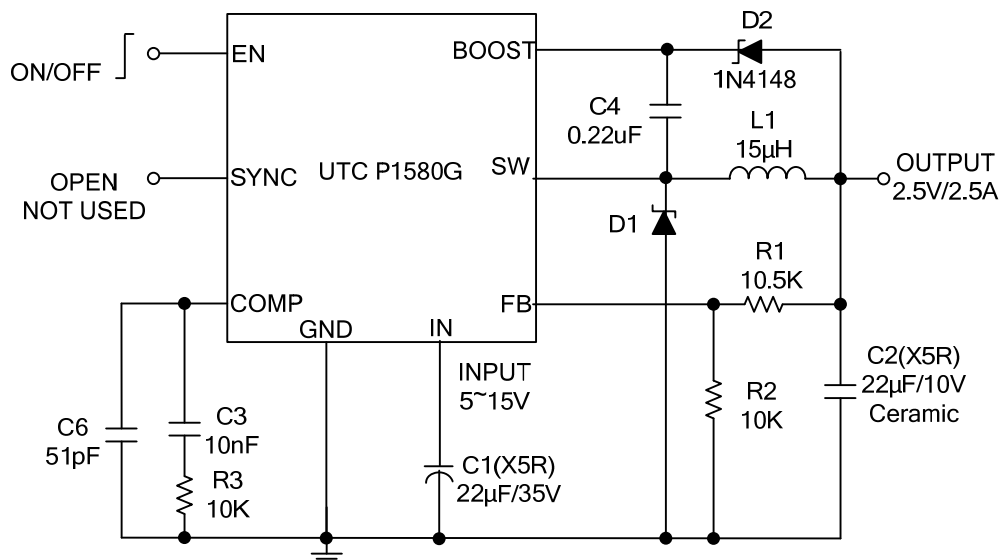
Note: If the V_{IN} voltage exceeding 23V under short circuit condition, there will be some risk.

■ TYPICAL APPLICATION CIRCUIT



UTC **P1580** with 5V Output Voltage and 22 μ F / 10V Ceramic Output Capacitor

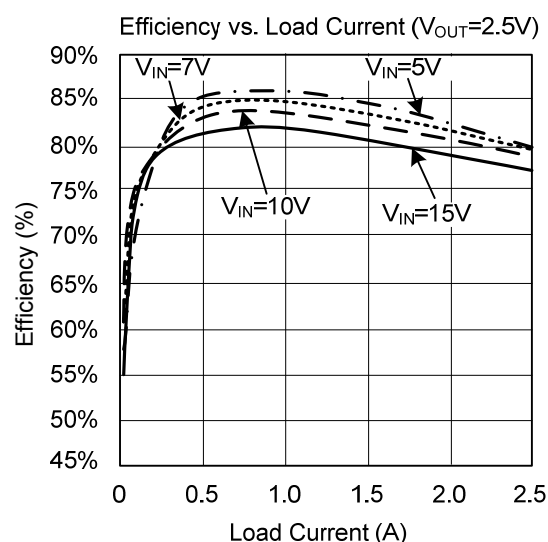
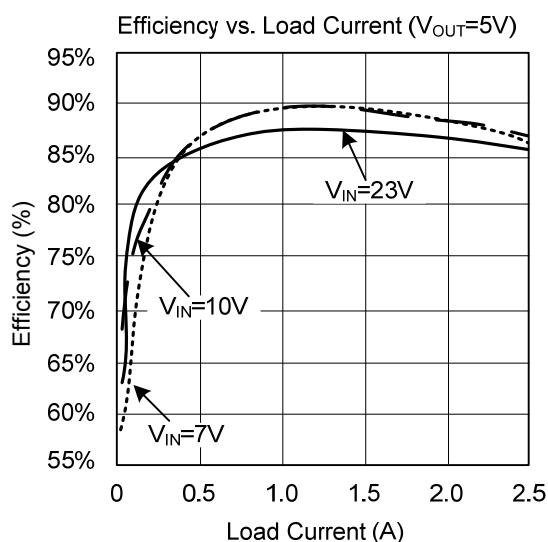
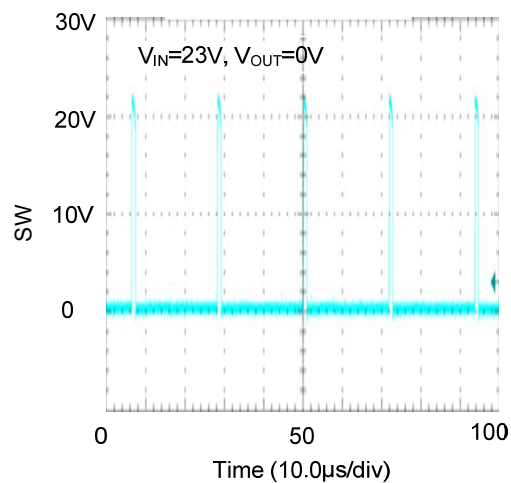
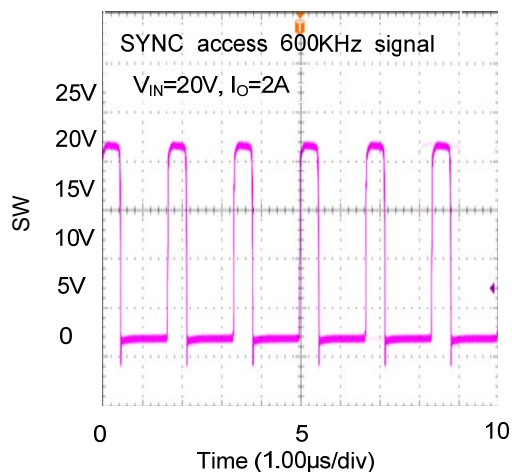
If the load current is applied in 2A, the input voltage can range from 7 to 28V.



UTC **P1580** with 2.5V Output Voltage and 22 μ F / 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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