



P2583

LINEAR INTEGRATED CIRCUIT

380KHz, 3A STEP-DOWN SWITCHING REGULATOR

DESCRIPTION

The UTC **P2583** is a fixed 380kHz frequency, current mode, PWM controller with an internal power MOSFET. It achieves 3A continuous output current over a wide input supply range with excellent load and line regulation. Equipped with an external compensation pin, this device offers user flexibility in determining loop dynamic.

The UTC **P2583** integrates controls, monitoring and protection functions into a single 8-pin package to provide a low cost and perfect power solution. The device provides wide 3.6V to 28V operating input range, also highly efficient with peak operating efficiency at 90%.

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

The UTC **P2583** provides fast transient respond and requires very few external devices for operation.

FEATURES

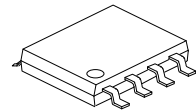
- * 3A Output Current
- * $V_{in}=3.6V, V_{out}=2.5V, I_{load_max}$ up to 3A
- * 380kHz frequency of operation
- * 3.6V to 28V Input Voltage Range
- * 25 μ A Shutdown Supply Current
- * Output Adjustable from 1.22V to 21V
- * Frequency FoldBack at Short Circuit
- * Thermal Shutdown
- * Under Voltage Lock Output
- * Current Mode with Low ESR Output Ceramic Capacitors
- * Up to 90% Efficiency

ORDERING INFORMATION

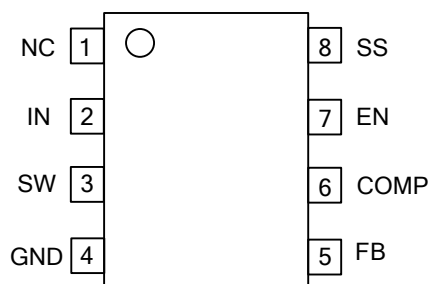
| Ordering Number | | Package | Packing |
|-----------------|--------------|---------|-----------|
| Lead Free | Halogen Free | | |
| P2583L-S08-R | P2583G-S08-R | SOP-8 | Tape Reel |
| P2583L-S08-T | P2583G-S08-T | SOP-8 | Tube |

| | |
|--|---|
| <p>P2583G-S08-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Halogen Free</p> | <p>(1) R: Tape Reel, T: Tube</p> <p>(2) S08: SOP-8</p> <p>(3) G: Halogen Free, L: Lead Free</p> |
|--|---|

PIN CONFIGURATION



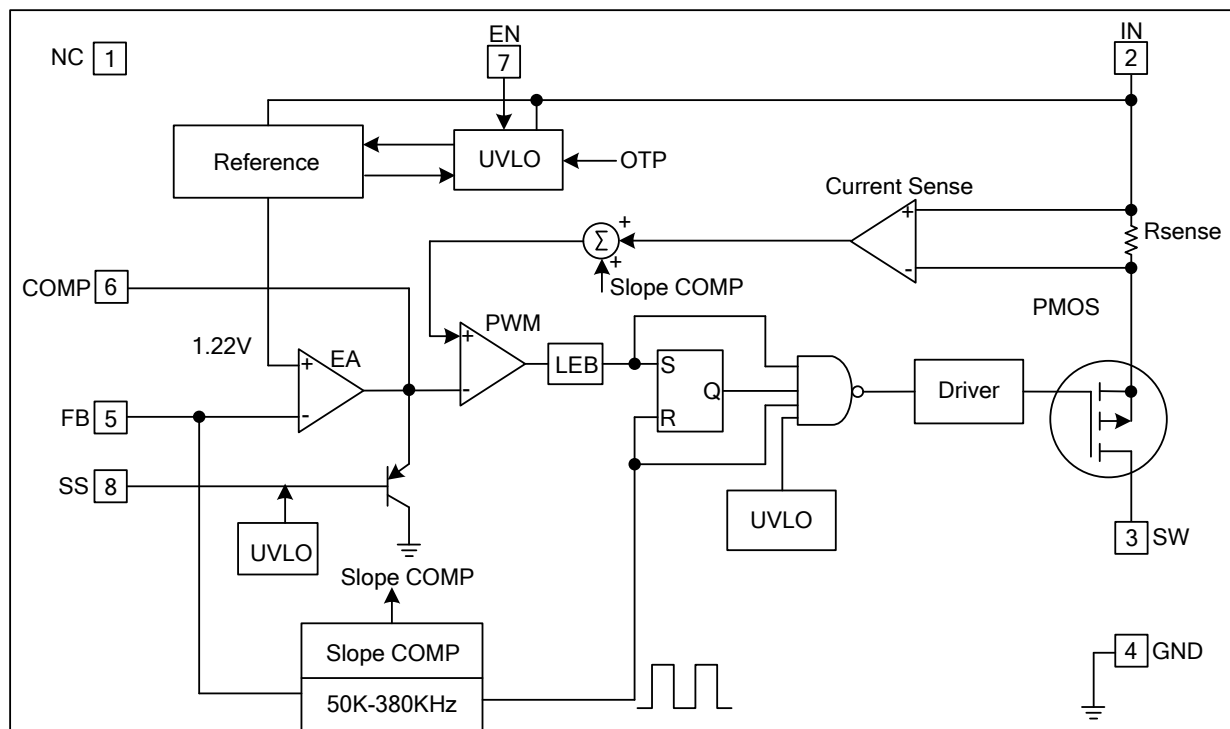
SOP-8



■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---------|----------|---|
| 1 | NC | NC |
| 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 | SS | Soft Start |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Note 2)

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

Note: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 3)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------------|----------|-----------------|------|
| Input Voltage | V_{IN} | 3.6~28 | V |
| Ambient Operating Temperature | T_A | $-40 \sim +125$ | °C |

Note: 3. The device is not guaranteed to function outside its operating rating.

■ PACKAGE THERMAL CHARACTERISTICS (Note 4)

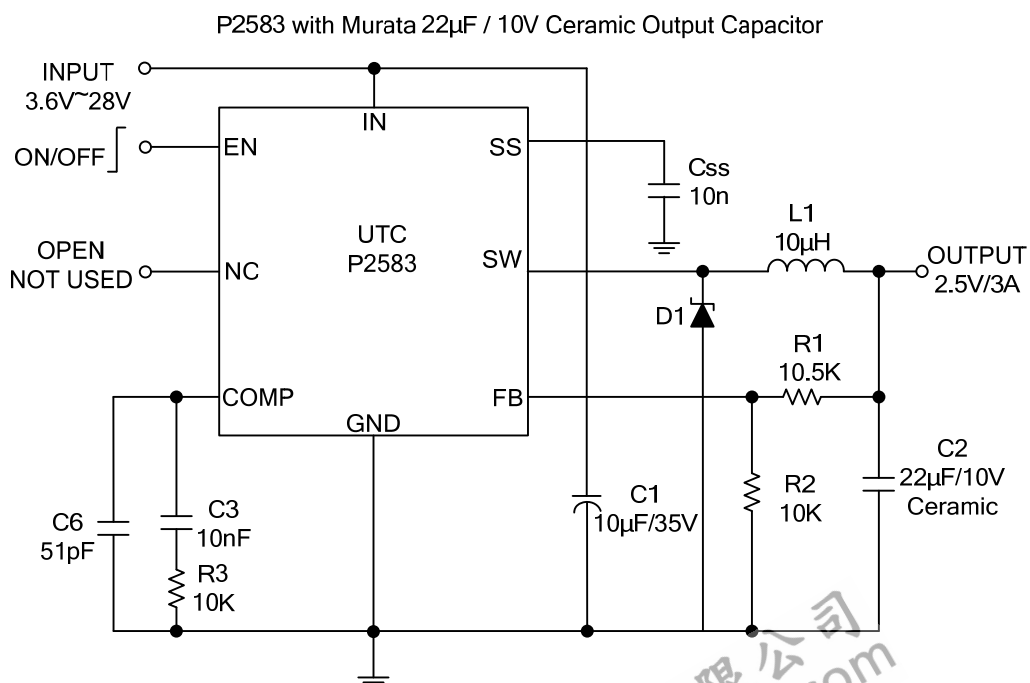
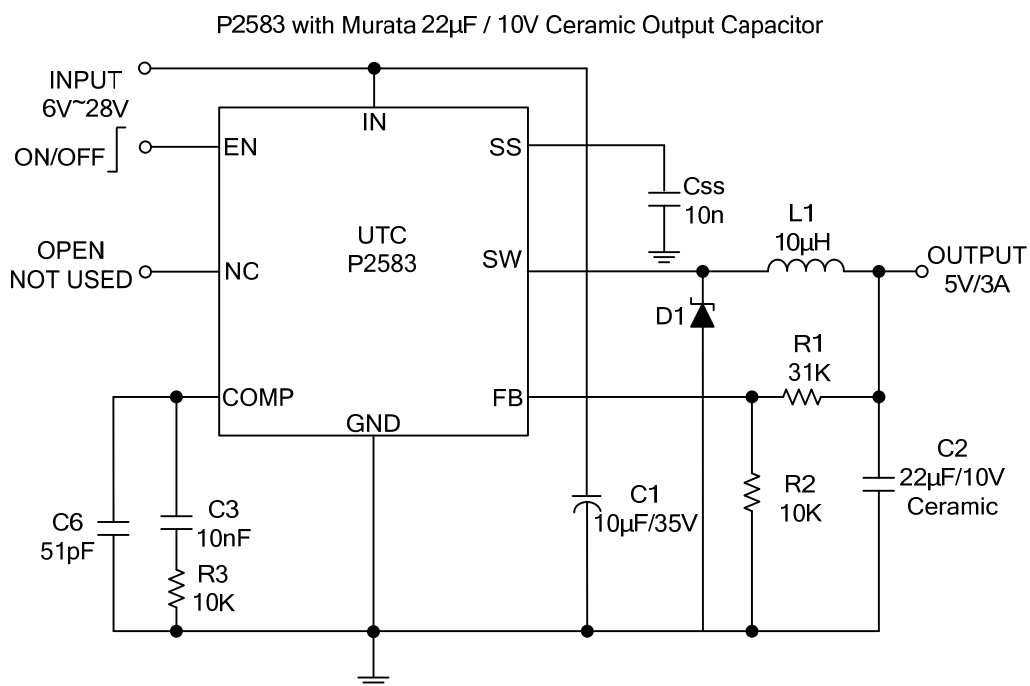
| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------|------|
| Junction to Ambient | θ_{JA} | 105 | °C/W |
| Junction to Case | θ_{JC} | 50 | °C/W |

Note: 4. Measured on approximately 1" square of 1 oz. Copper surrounding device leads.

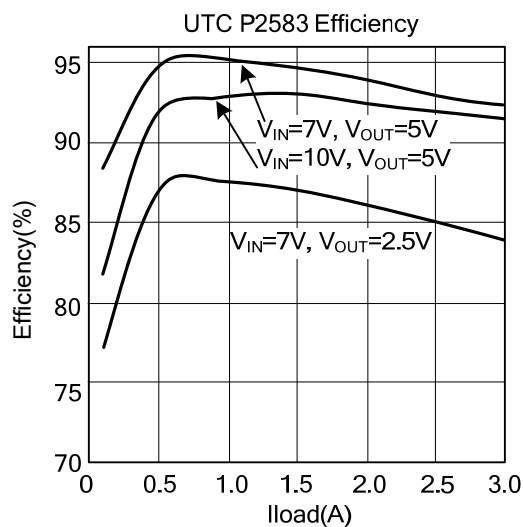
■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified $V_{IN}=12V$, $T_A=25^\circ C$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|--------------|--|-------|-------|-------|-----------|
| Feedback Voltage | V_{FB} | $4.75V \leq V_{IN} \leq 25V$, $V_{COMP} < 2V$ | 1.198 | 1.222 | 1.246 | V |
| Switch On Resistance | R_{SW} | | | 0.11 | | Ω |
| Upper Switch Leakage | $I_{O(OFF)}$ | $V_{EN}=0V$, $V_{SW}=0V$ | | 0 | 15 | μA |
| Current Limit | I_{LIMIT} | | 3.3 | | | A |
| Current Limit Gain. | | | | 5.5 | | A/V |
| Output Current to Comp Pin Voltage | | | | | | |
| Error Amplifier Transconductance | | $\Delta I_C = \pm 10\mu A$ | 500 | 800 | 1100 | $\mu A/V$ |
| Oscillator Frequency | F | | 342 | 380 | 418 | KHz |
| Short Circuit Frequency | F | $V_{FB}=0V$ | 25 | 50 | 75 | KHz |
| Maximum Duty Cycle | D_{MAX} | $V_{FB}=1.0V$ | | 90 | | % |
| Minimum Duty Cycle | D_{MIN} | $V_{FB}=1.5V$ | | | 0 | % |
| Enable Threshold | V_{EN} | $I_{CC} > 100\mu A$ | | 1.2 | | V |
| Enable Pull Up Current | I_{EN} | $V_{EN}=0V$ | | 1.5 | | μA |
| Supply Current (quiescent) | I_{CC} | $V_{EN} \geq 2.6V$; $V_{FB}=1.4V$ | | 2.2 | 3.5 | mA |
| Shutdown Current | I_{SD} | $V_{EN}=0V$ | | 20 | 35 | μA |
| Thermal Shutdown | T | | | 160 | | °C |

■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL CHARACTERISTICS



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