



P2576

LINEAR INTEGRATED CIRCUIT

3A STEP-DOWN VOLTAGE SWITCHING REGULATOR

DESCRIPTION

As a step-down (buck) switching regulator, the UTC **P2576** provides drives 3A load. The UTC **P2576** are simple because it only needs to use a minimum number of external components.

Frequency compensation and a fixes-frequency oscillator are in it. UTC **P2576** can perform with standard inductors, and simplifying the switch mode power supplies' design. UTC **P2576** guarantees output load conditions and $\pm 10\%$ on the oscillator frequency. Its external shutdown is included with 50 μ A standby current. As well as thermal shutdown for full protection under fault conditions, the output switch has cycle by cycle current limiting.

FEATURES

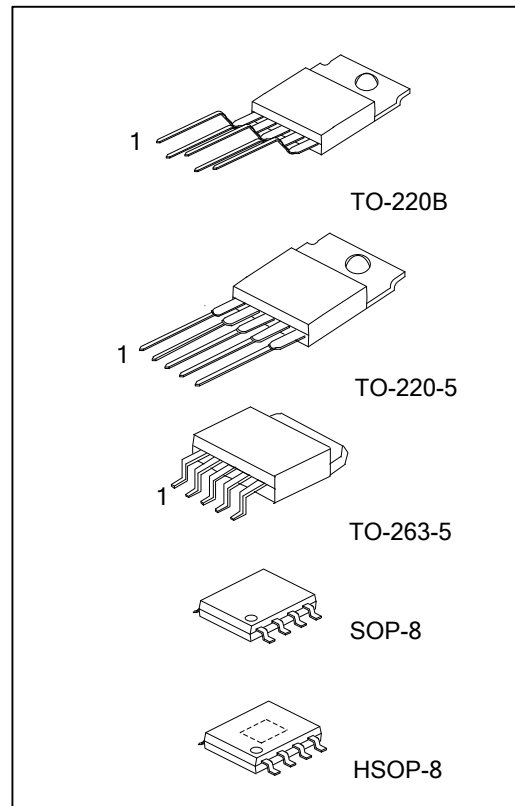
- * Output Current 3A
- * Input Voltage Range from 7V to 40V
- * Requires 4 External Components
- * Very High Efficiency
- * TTL Shutdown
- * Low Power Standby Mode
- * Thermal Shutdown,
- * Current Limit Protection
- * Internal Oscillator: 52 kHz Fixed Frequency

ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|-----------------|-----------------|----------|-----------|
| Lead Free | Halogen Free | | |
| P2576L-xx-TA5-T | P2576G-xx-TA5-T | TO-220-5 | Tube |
| P2576L-xx-TB5-T | P2576G-xx-TB5-T | TO-220B | Tube |
| P2576L-xx-TQ5-R | P2576G-xx-TQ5-R | TO-263-5 | Tape Reel |
| P2576L-xx-TQ5-T | P2576G-xx-TQ5-T | TO-263-5 | Tube |
| - | P2576G-xx-S08-R | SOP-8 | Tape Reel |
| - | P2576G-xx-SH2-R | HSOP-8 | Tape Reel |

Note: xx: Output Voltage, refer to Marking Information.

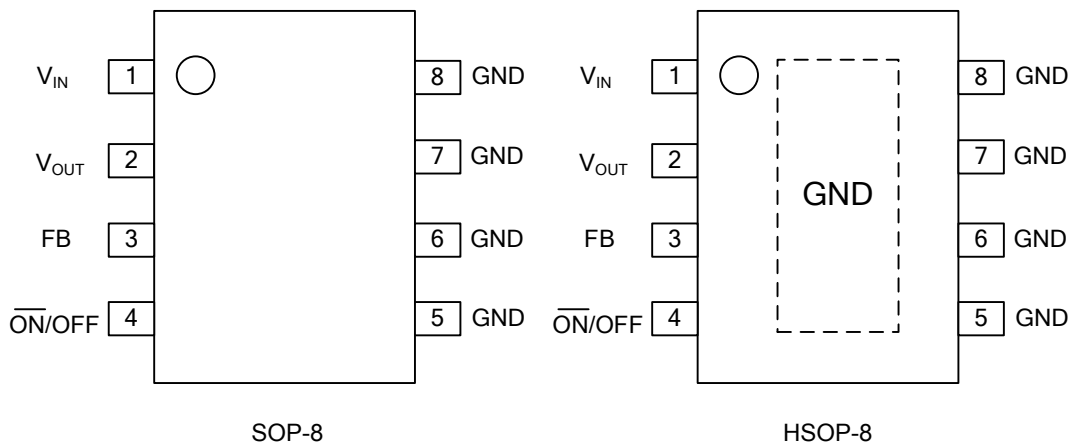
| | |
|--|--|
| | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA5: TO-220-5, TB5: TO-220B, TQ5: TO-263-5, S08: SOP-8, SH2: HSOP-8</p> <p>(3) xx: refer to Marking Information</p> <p>(4) L: Lead Free, G: Halogen Free and Lead Free</p> |
|--|--|



MARKING INFORMATION

| PACKAGE | VOLTAGE CODE | MARKING |
|---------------------------------|-----------------------------|---------|
| TO-220B TO-220-5 TO-263-5 | 50:5.0V 12:12V AD:ADJ | |
| SOP-8 HSOP-8 | | |

PIN CONFIGURATION of SOP-8/HSOP-8



PIN DESCRIPTIONS

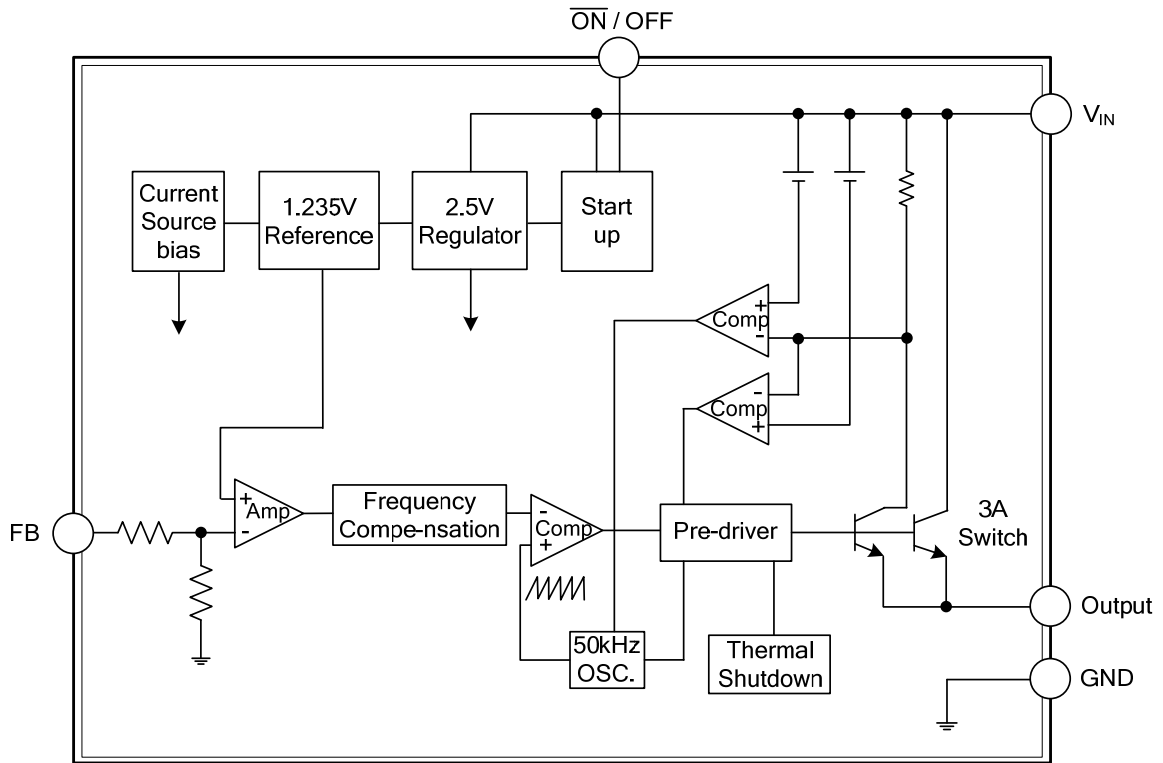
FOR SOP-8/HSOP-8

| PIN NO. | PIN NAME | PIN DESCRIPTION |
|---------|---------------------|--|
| 1 | V_{IN} | Input voltage |
| 2 | V_{OUT} | Output voltage |
| 3 | FB | Feed back. |
| 4 | $\overline{ON/OFF}$ | $\overline{ON/OFF}$ select pin, when connected to the ground the chip in operating normally. |
| 5,6,7,8 | GND | Ground |

FOR TO-220B/TO-220-5/TO-263-5

| PIN NO. | PIN NAME | PIN DESCRIPTION |
|---------|---------------------|--|
| 1 | V_{IN} | Input voltage |
| 2 | V_{OUT} | Output voltage |
| 3 | GND | Ground |
| 4 | FB | Feed back. |
| 5 | $\overline{ON/OFF}$ | $\overline{ON/OFF}$ select pin, when connected to the ground the chip in operating normally. |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNITS |
|---|---------------|--------------------|------------------|
| Supply Voltage | V_{CC} | 40 | V |
| Maximum Supply Voltage | $V_{CC(MAX)}$ | 45 | V |
| ON/OFF Pin Input Voltage | $V_{ON/OFF}$ | $-0.3 \sim V_{IN}$ | V |
| Output Voltage to Ground (Steady State) | V_{OUT} | -1.0 | V |
| Power Dissipation | P_D | Internally Limited | mW |
| Junction Temperature | T_J | +150 | $^\circ\text{C}$ |
| Operating Temperature | T_{OPR} | $-40 \sim +125$ | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | $-65 \sim +150$ | $^\circ\text{C}$ |

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.

■ ELECTRICAL CHARACTERISTICS

($T_J=25^\circ\text{C}$, When $V_{OUT} = 5\text{V}$ & ADJ, $V_{IN} = 12\text{V}$; $V_{OUT} = 12\text{V}$, $V_{IN} = 15\text{V}$, $I_{LOAD}=500\text{mA}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------|---------------|--|-------|------|-------|---------------|
| Feedback Voltage | V_{OUT} | $8\text{V} \leq V_{IN} \leq 40\text{V}$, $0.5\text{A} \leq I_{LOAD} \leq 3\text{A}$ | 4.8 | 5.0 | 5.2 | V |
| | | $15\text{V} \leq V_{IN} \leq 40\text{V}$, $0.5\text{A} \leq I_{LOAD} \leq 3\text{A}$ | 11.52 | 12.0 | 12.48 | V |
| Efficiency | η | $V_{IN}=12\text{V}$, $I_{LOAD}=3\text{A}$ | | 77 | | % |
| | | $V_{IN}=15\text{V}$, $I_{LOAD}=3\text{A}$ | | 88 | | % |
| P2576 - ADJ | | | | | | |
| Feedback Voltage | V_{FB} | $V_{IN}=12\text{V}$, $I_{LOAD}=0.5\text{A}$, $V_{OUT} = 5\text{V}$ | 1.217 | 1.23 | 1.243 | V |
| | | $8\text{V} \leq V_{IN} \leq 40\text{V}$, $0.5\text{A} \leq I_{LOAD} \leq 3.0\text{A}$, $V_{OUT} = 5\text{V}$ | 1.193 | 1.23 | 1.267 | V |
| Efficiency | η | $V_{IN} = 12\text{V}$, $I_{LOAD} = 3.0\text{A}$, $V_{OUT} = 5\text{V}$ | | 77 | | % |
| ALL OUTPUT VOLTAGE | | | | | | |
| Oscillator Frequency | f_{OSC} | (Note 4) | 42 | 52 | 63 | kHz |
| Saturation Voltage | V_{SAT} | $I_{OUT}=3\text{A}$ (Note 1) | | 1.4 | 1.8 | V |
| Max Duty Cycle (ON) | DC | (Note 2) | 93 | 98 | | % |
| Current Limit | I_{LIMIT} | (Note 1, 4) | 4.2 | 5.8 | 6.9 | A |
| Output Leakage Current | $I_{I(LEAK)}$ | $V_{IN}=40\text{V}$, Output=-1V (Notes 3) | | | 2 | mA |
| | | Output=-1V | | 7.5 | 30 | mA |
| Quiescent Current | I_Q | (Note 3) | | 5 | 10 | mA |
| Standby Quiescent Current | I_{STBY} | ON/OFF Pin=5V (OFF) | | 50 | 200 | μA |
| ON/OFF Pin Logic Input Level | V_{IH} | $V_{OUT}=0\text{V}$ | 2.2 | | | V |
| | V_{IL} | $V_{OUT}=\text{Nominal Output Voltage}$ | | | 1.0 | V |
| ON/OFF Pin Input Current | I_{IH} | ON/OFF Pin=5V (OFF) | | 12 | 30 | μA |
| | I_{IL} | ON/OFF Pin=5V (ON) | | 0 | 10 | μA |

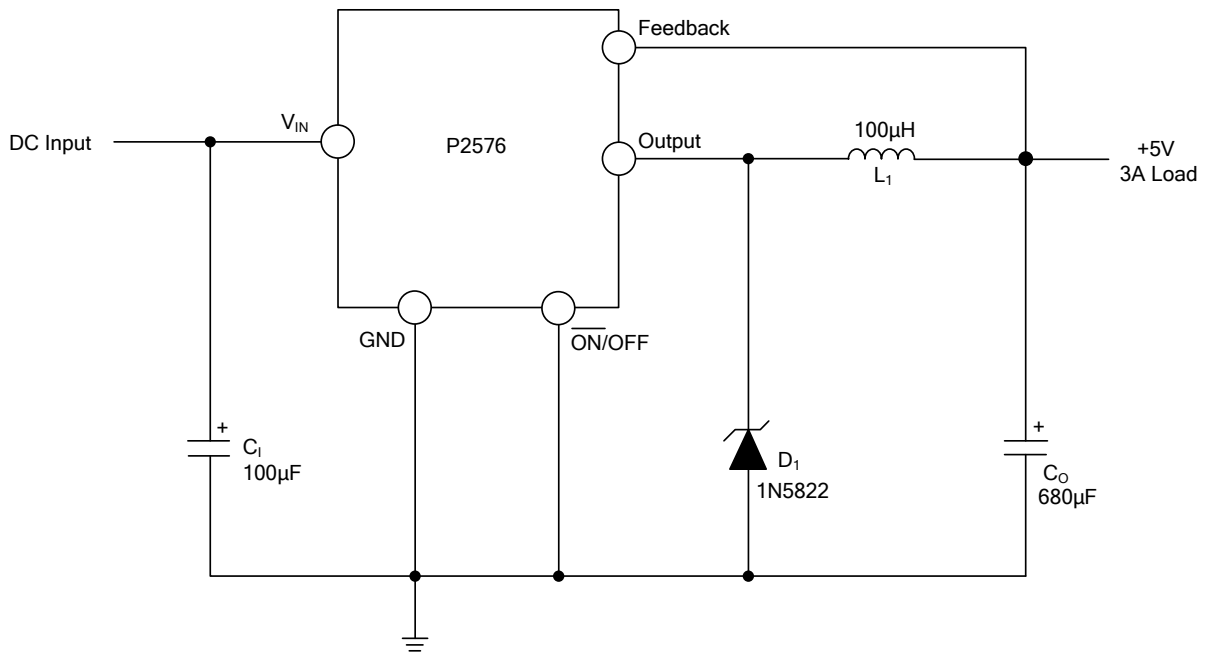
Notes: 1. Output pin sourcing current. No diode, inductor or capacitor connected to output.

2. Feedback pin removed from output and connected to 0V.

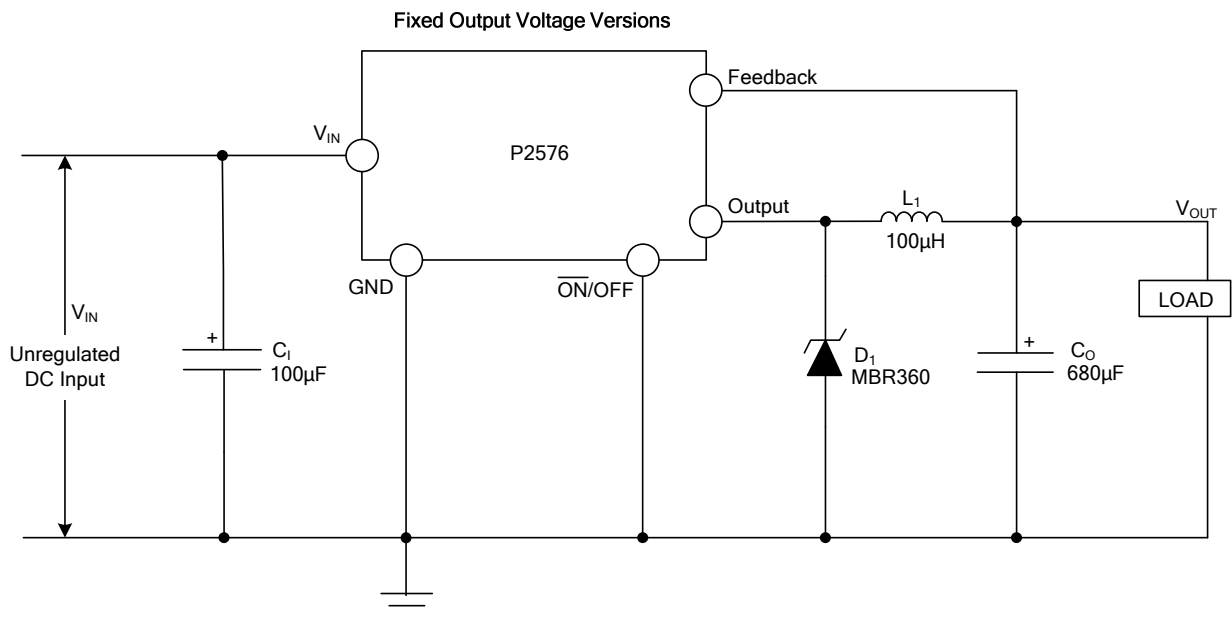
3. Feedback pin removed from output and connected to +12V, to force the output transistor OFF.

4. The oscillator frequency reduces to approximately 11 kHz in the event of an output short or an overload which causes the regulated output voltage to drop approximately 40% from the nominal output voltage. This self-protection feature lowers the Average power dissipation of P2576 by lowering the minimum duty cycle from 5% down to approximately 2%.

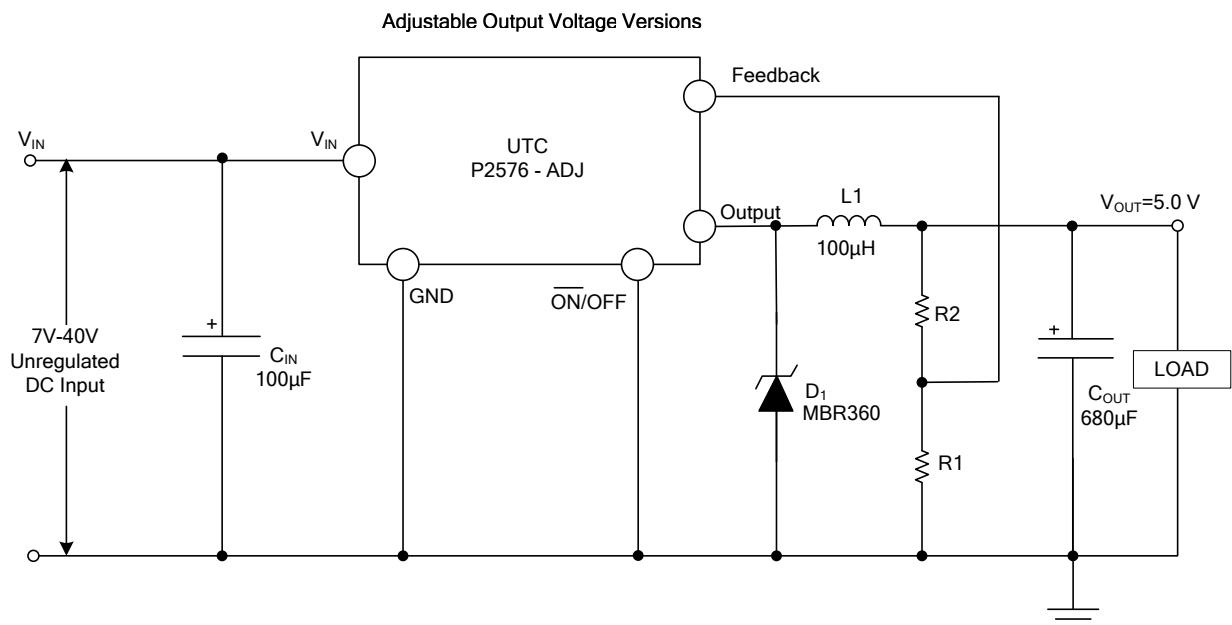
■ APPLICATION CIRCUIT



■ TYPICAL TEST CIRCUIT



C_1 : 100µF, 75V
 C_0 : 680µF, 25V
 D_1 : Schottky, MBR360
 L_1 : 100µH
 R_1 : 2K, 0.1%
 R_2 : 6.12K, 0.1%

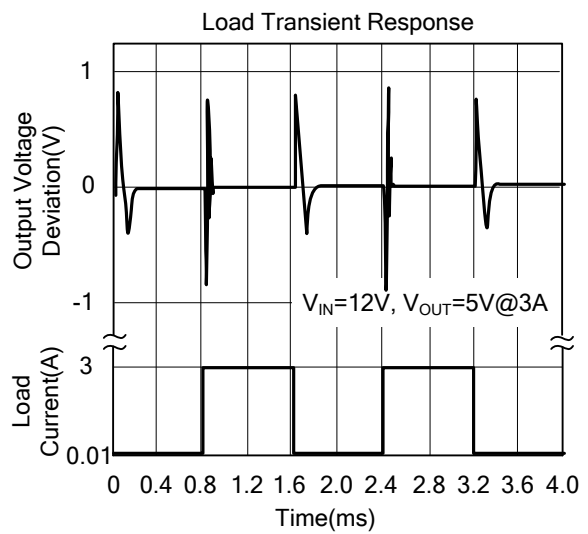
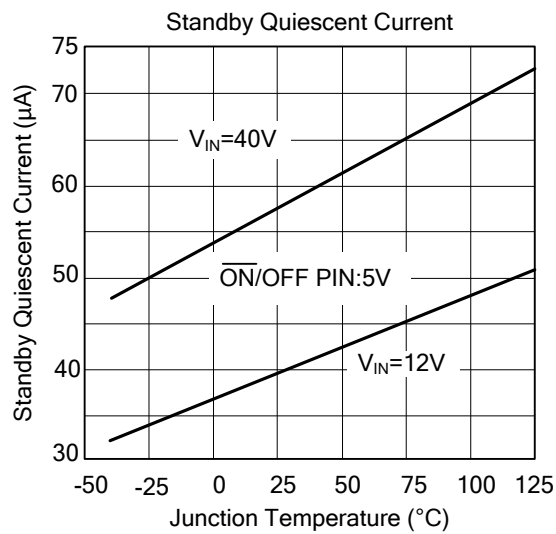
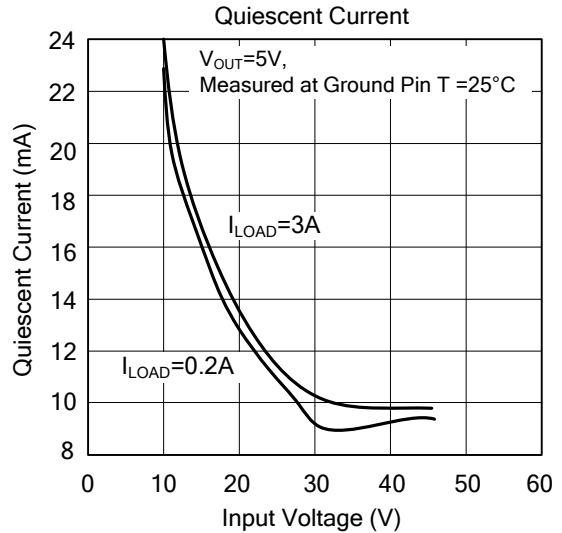
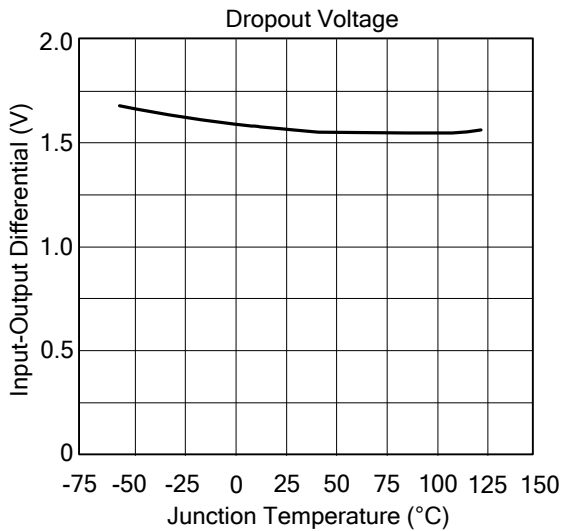
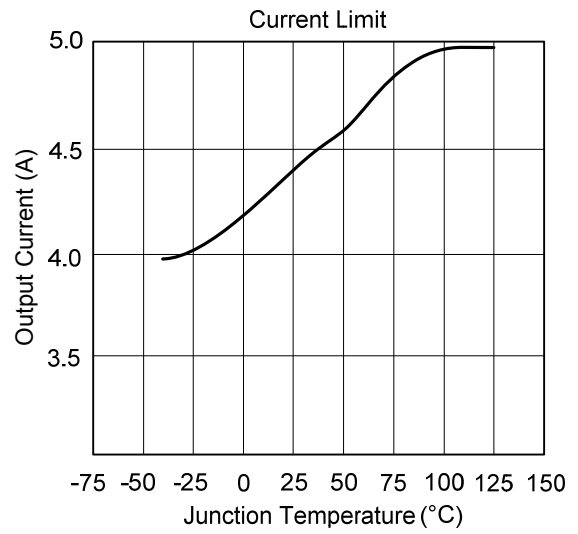
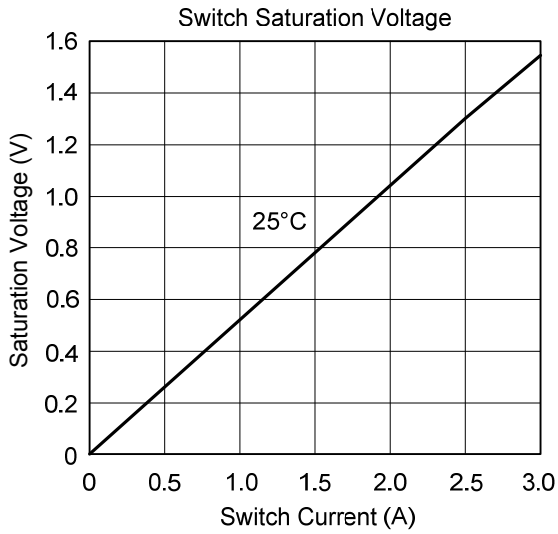


Note: $V_{OUT} = V_{REF} \left(1 + \frac{R_2}{R_1}\right)$

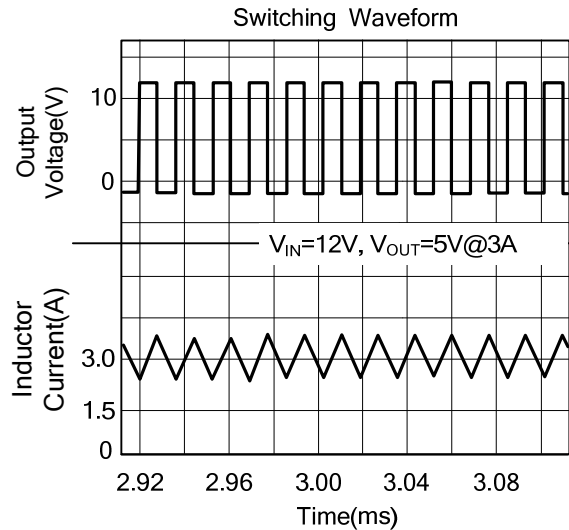
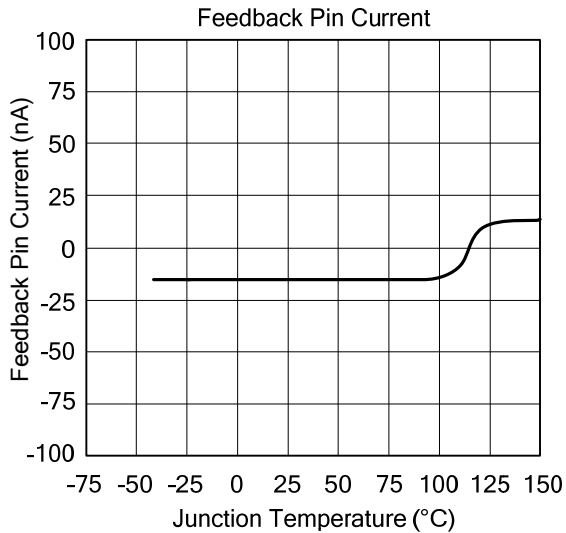
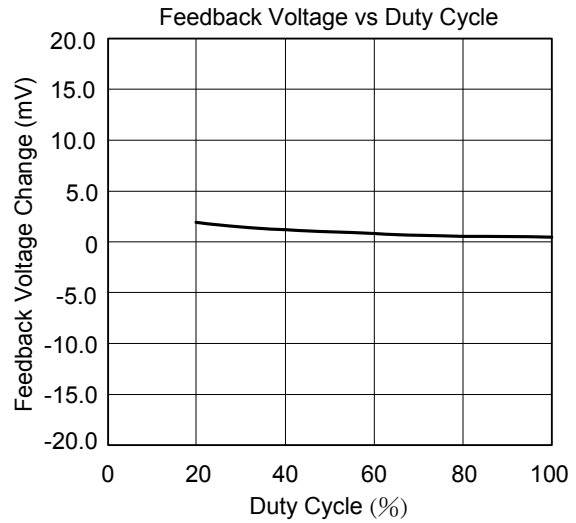
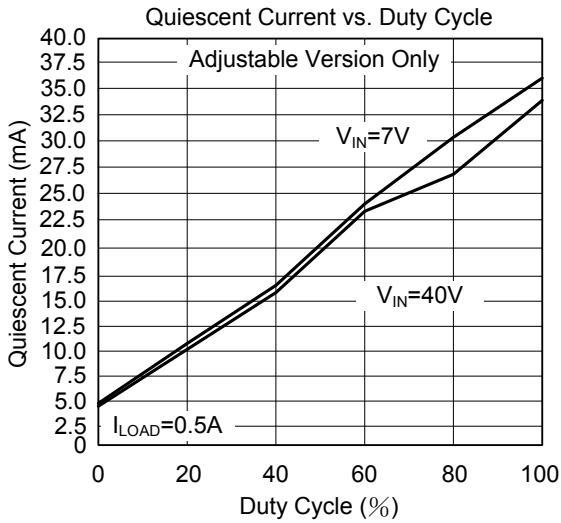
$$R_2 = R_1 \left(\frac{V_{OUT}}{V_{REF}} - 1\right)$$

(Where $V_{REF}=1.23V$, R_1 between 1k and 5k.)

■ TYPICAL APPLICATION CIRCUIT ($T_A=25^\circ\text{C}$, $V_{CC}=12\text{V}$, unless otherwise specified)



■ TYPICAL APPLICATION CIRCUIT(Cont.)



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