

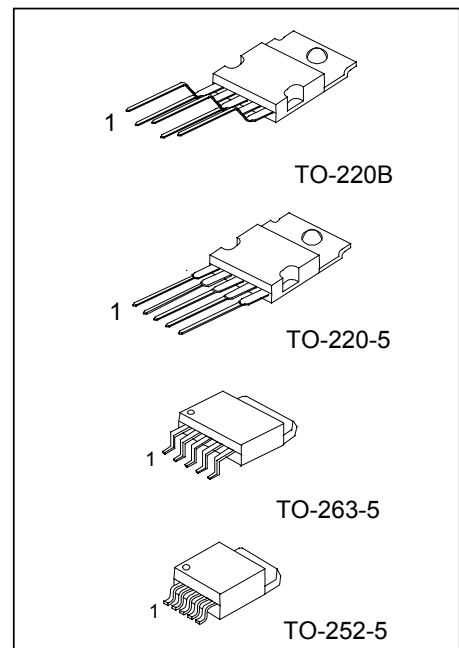
150KHZ, 3A PWM STEP-DOWN DC/DC CONVERTER

**DESCRIPTION**

The UTC **P3596** series is a step-down switching regulator able to provide **3A** output current. The available output voltages are **3.3V, 5V, 12V, and an adjustable** output version.

**FEATURES**

- \*Output load current: **3A**
- \*Adjustable version output voltage range, 1.23V ~ 37V±4%
- \*Operating voltage can be up to **40V**
- \*Low power standby mode
- \*High efficiency
- \*Internal current and thermal limit

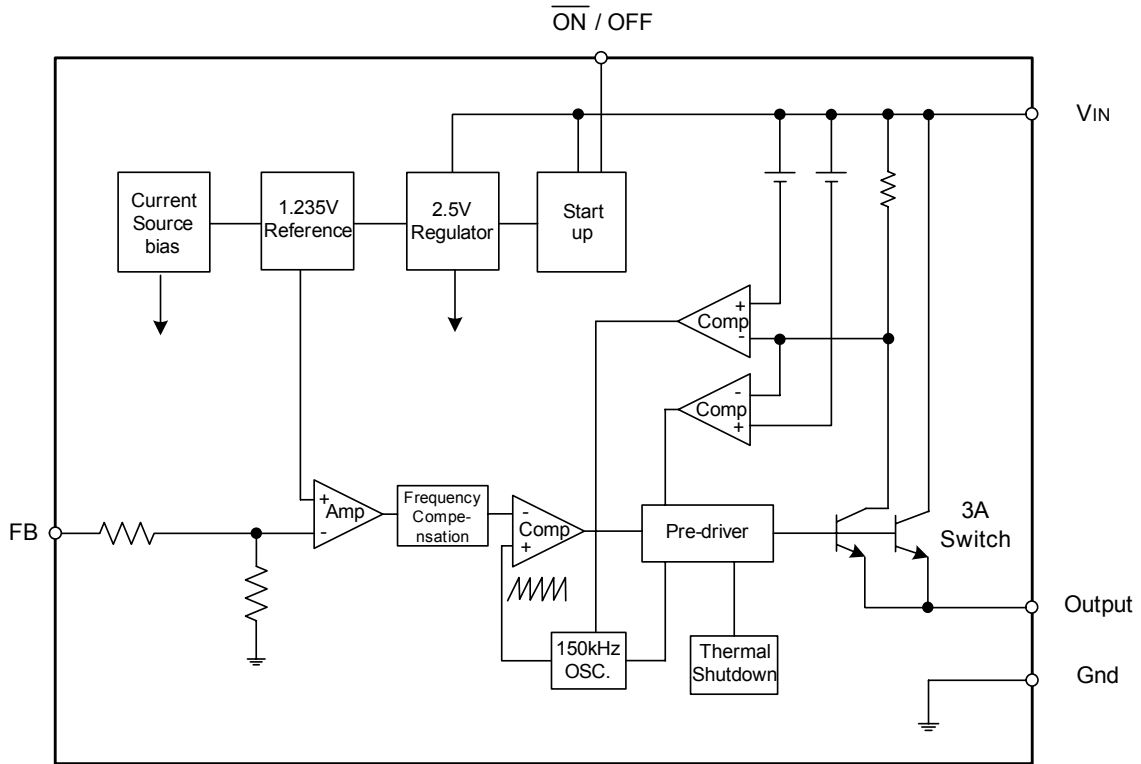


\*Pb-free plating product number: P3596L

**PIN DESCRIPTION**

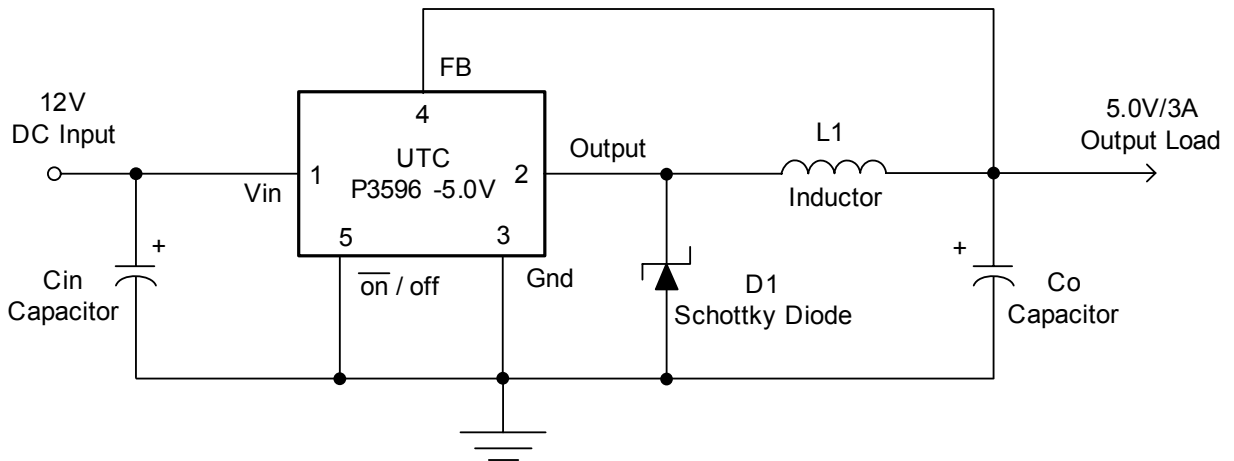
PIN NO.	PIN NAME	DESCRIPTION
1	Vin	Operating voltage input
2	Output	Switching output
3	GND	Circuit Ground
4	FB (Feedback)	Output voltage feedback control
5	SD (Shutdown)	ON/OFF shutdown

BLOCK DIAGRAM

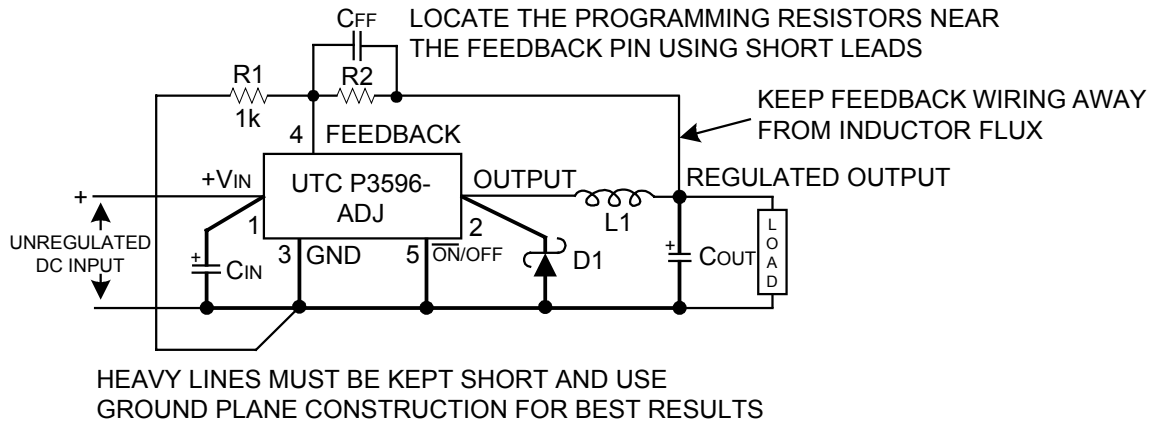


TYPICAL APPLICATION

(Fixed Output Voltage Versions)



ADJUSTABLE OUTPUT VOLTAGE VERSIONS



$$V_{out} \times \left( \frac{R1}{R1 + R2} \right) = V_{ref}$$

$$V_{out} = V_{ref} \left( 1 + \frac{R2}{R1} \right)$$

Where  $V_{ref} = 1.23V$

$$R2 = R1 \left( \frac{V_{out}}{V_{ref}} - 1 \right)$$

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	$V_{CC}$	45	V
Operating Voltage	$V_{opr}$	4.5 ~ 40	V
ON/OFF Pin Input Voltage	$V_{ON/OFF}$	-0.3 ~ +25	V
Feedback Pin Voltage	$V_{FB}$	-0.3 ~ +25	V
Output Voltage to Ground (Steady State)	$V_{out}$	-1	V
Power Dissipation	PD	Internally limited	mW
Maximum Junction Temperature	$T_j$	+150	°C
Temperature Range	$T_{opr}$	-40 ~ +125	°C
Storage Temperature Range	$T_{stg}$	-65 ~ +150	°C

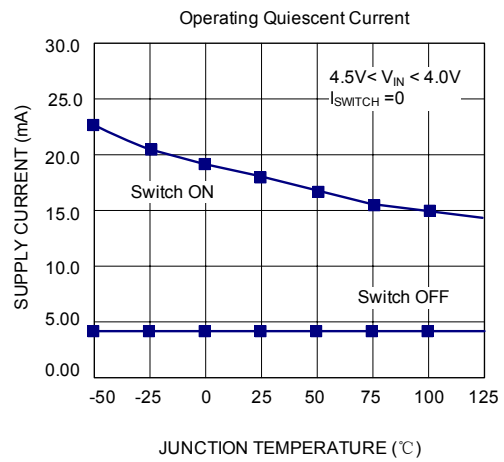
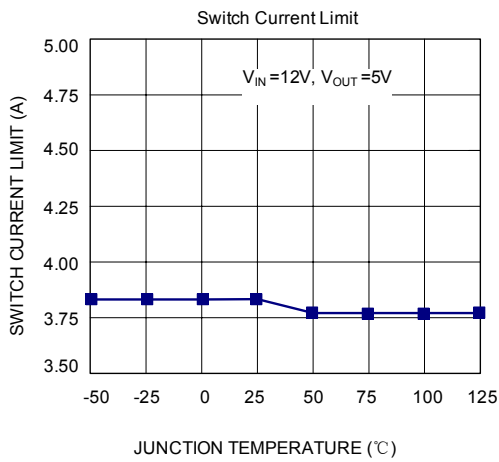
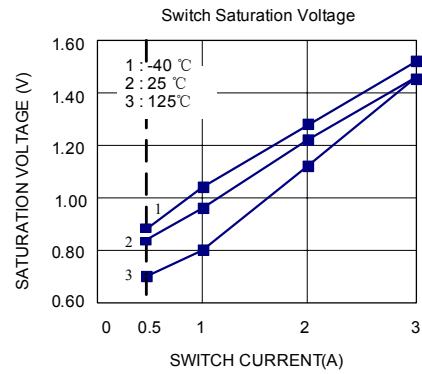
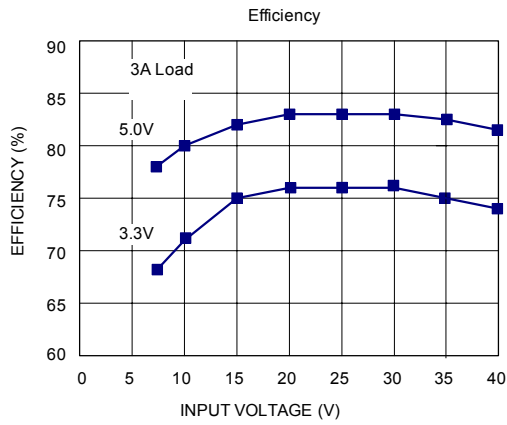
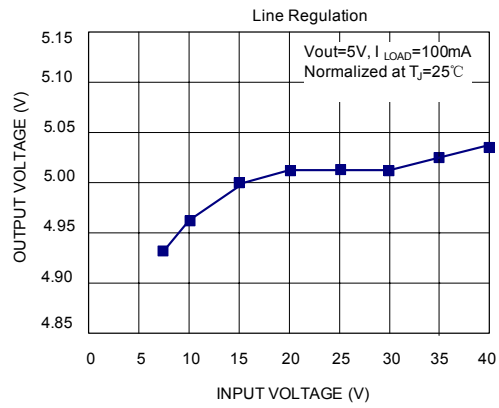
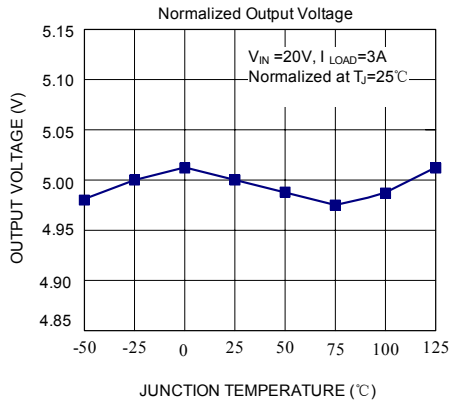
**ELECTRICAL CHARACTERISTICS**(T<sub>j</sub>=25°C, V<sub>IN</sub>=12V for the 3.3V, 5V, and Adjustable version and V<sub>IN</sub>=24V for the 12V version, I<sub>LOAD</sub>=500mA.)

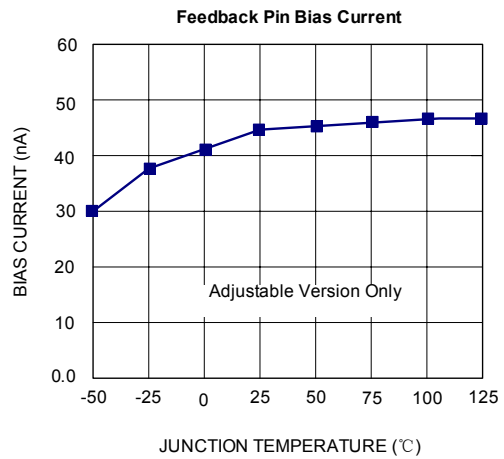
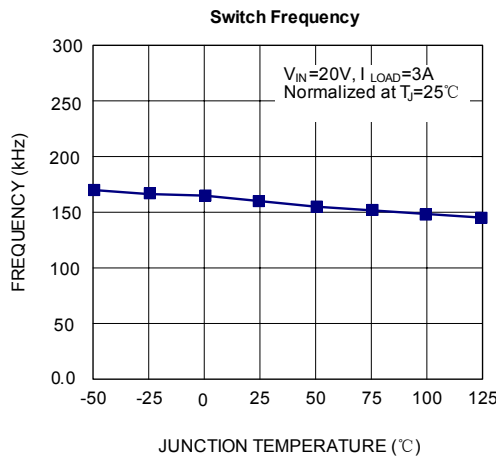
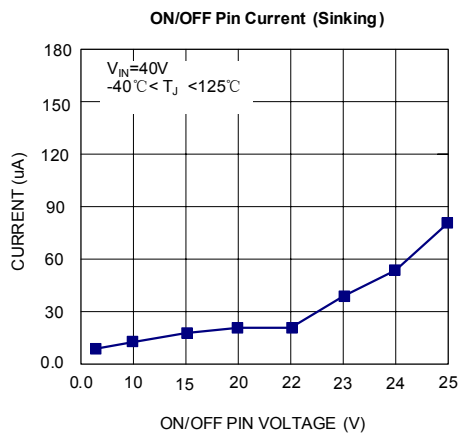
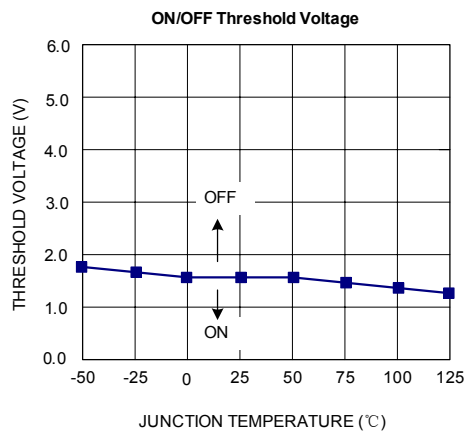
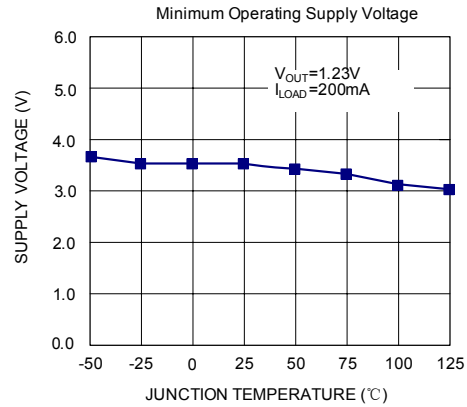
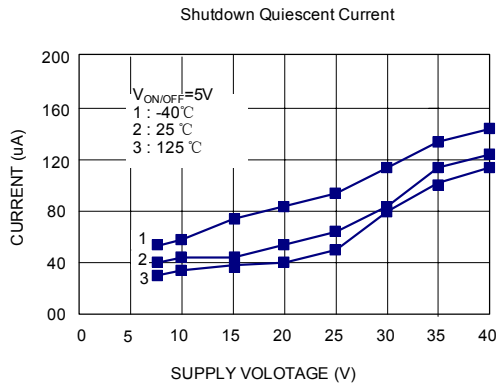
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT						
Output Voltage	3.3V	V <sub>OUT</sub>	4.75V ≤ V <sub>IN</sub> ≤ 40V, 0.2A ≤ I <sub>LOAD</sub> ≤ 3A	3.168	3.3	3.432	V					
	5.0V							7V ≤ V <sub>IN</sub> ≤ 40V, 0.2A ≤ I <sub>LOAD</sub> ≤ 3A	4.8	5.0	5.2	V
	12V							15V ≤ V <sub>IN</sub> ≤ 40V, 0.2A ≤ I <sub>LOAD</sub> ≤ 3A	11.52	12.0	12.48	V
Efficiency	3.3V	η	V <sub>IN</sub> =12V, I <sub>LOAD</sub> =3A		73		%					
	5.0V							V <sub>IN</sub> =12V, I <sub>LOAD</sub> =3A		80		%
	12V							V <sub>IN</sub> =25V, I <sub>LOAD</sub> =3A		90		%
<b>UTC P3596-ADJ</b>												
Feedback Voltage	V <sub>FB</sub>	4.5V ≤ V <sub>IN</sub> ≤ 40V, 0.2A ≤ I <sub>LOAD</sub> ≤ 3A V <sub>OUT</sub> programmed for 3V	1.193	1.230	1.267	V						
Efficiency	η	V <sub>IN</sub> =12V, V <sub>OUT</sub> =3V, I <sub>LOAD</sub> =3A		73		%						
<b>ALL OUTPUT VOLTAGE</b>												
Feedback Bias Current	I <sub>b</sub>	Adjustable Version Only, V <sub>FB</sub> =1.3V		10	50	nA						
Oscillator Frequency	f <sub>o</sub>	(Note 1)	127	150	173	kHz						
Saturation Voltage	V <sub>SAT</sub>	I <sub>OUT</sub> =3A (Note 2, 3)		1.16	1.4	V						
Max Duty Cycle (ON)	DC	(Note 3)		100		%						
Min Duty Cycle (OFF)		(Note 4)		0								
Current Limit	I <sub>CL</sub>	Peak Current (Notes 2, 3)	3.6	4.5	6.9	A						
Output Leakage Current	I <sub>L</sub>	Output=0V (Notes 2, 4)			50	μA						
		Output=-1V (Note 5)		2	30	mA						
Quiescent Current	I <sub>Q</sub>	(Note 4)		5	10	mA						
Standby Quiescent Current	I <sub>STBY</sub>	ON/OFF pin=5V (OFF) (Note 5)		80	200	μA						
<b>ON/OFF CONTROL</b>												
ON/OFF Pin Logic Input Threshold Voltage	V <sub>IH</sub>	Low (Regulator ON)	2.0	1.3	0.6	V						
	V <sub>IL</sub>	High (Regulator OFF)		1.3								
ON/OFF Pin Input Current	I <sub>H</sub>	V <sub>LOGIC</sub> =2.5V (Regulator OFF)		5	15	μA						
	I <sub>L</sub>	V <sub>LOGIC</sub> =0.5V (Regulator ON)		0.02	5	μA						

**THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction to Case	θ <sub>Jc</sub>	TO-220B	3
		TO-220-5	3
		TO-263-5	4
		TO-252-5	8
Thermal Resistance Junction to Ambient	θ <sub>JA</sub>	TO-220B	45
		TO-220-5	45
		TO-263-5	55
		TO-252-5	90

**Note 1:** The switching frequency is reduced when the second stage current limit is activated.**Note 2:** No diode, inductor or capacitor connected to output pin.**Note 3:** Feedback pin removed from output and connected to 0V to force the output transistor switch ON.**Note 4:** Feedback pin removed from output and connected to 12V for the 3.3V, 5V, and the ADJ. version, and 15V for the 12V version, to force the output transistor switch OFF.**Note 5:** V<sub>IN</sub> = 40V





UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.