



## P1696

## LINEAR INTEGRATED CIRCUIT

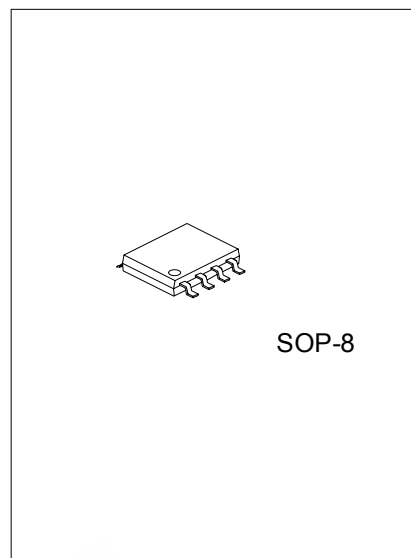
### 150KHZ, 2A PWM STEP-DOWN DC/DC CONVERTER

#### DESCRIPTION

The UTC **P1696** series is a step-down switching regulator able to provide **2A** output current. The available output voltages are **2.5V 3.3V, 5V, 12V, and an adjustable** output version.

#### FEATURES

- \*Output load current: **2A**
- \*Adjustable version output voltage range, 1.23V ~ 27.5V±4%
- \*Operating voltage can be up to **30V** ( $V_{IN} > 30V$ )
- \*Low power standby mode
- \*High efficiency
- \*Internal current and thermal limit



SOP-8

\*Pb-free plating product number:P1696L

#### ORDERING INFORMATION

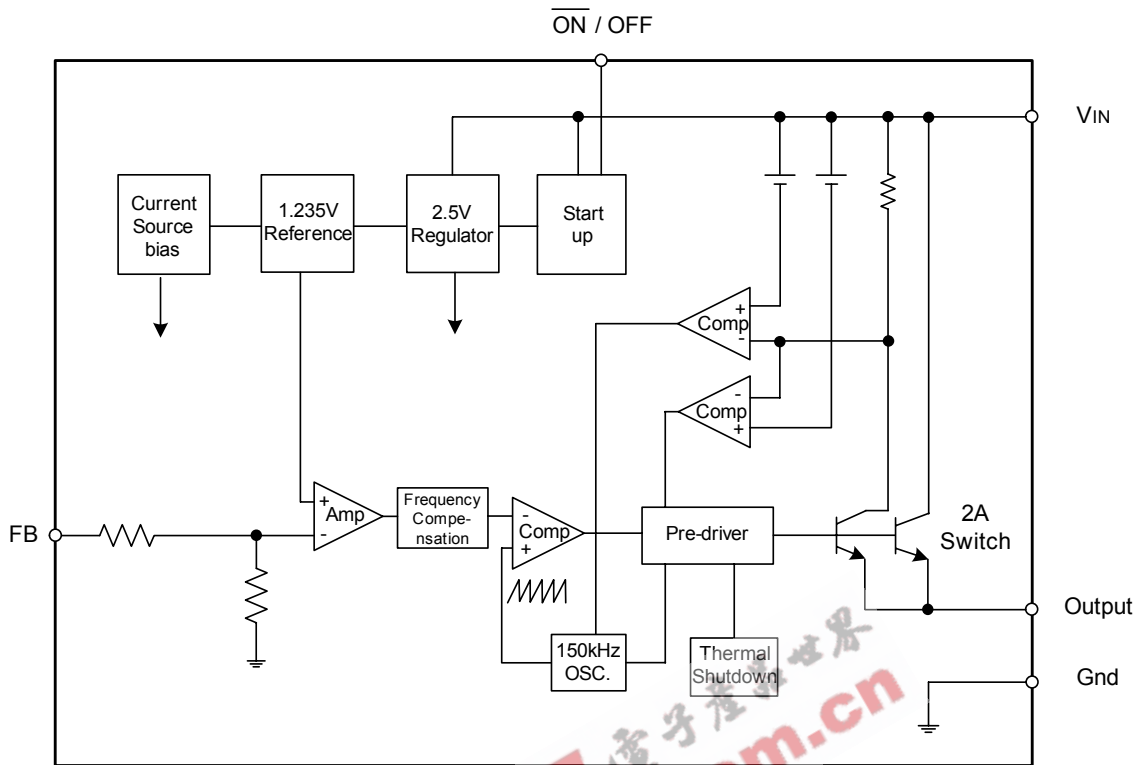
Order Number		Package	Packing
Normal	Lead Free Plating		
P1696-xx-S08-R	P1696L-xx-S08-R	SOP-8	Tape Reel
P1696-xx-S08-T	P1696L-xx-S08-T	SOP-8	Tube

<p>P1696L-xx-S08-R</p> <p>(1)Packing Type (2)Package Type (3)Output Voltage Code (4)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) S08: SOP-8 (3) xx: 25:2.5V, 33:3.3V, 50:5.0V, 12:12V, AD:ADJ (4) L: Lead Free Plating, Blank: Pb/Sn</p>
--	--

#### PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	$V_{IN}$	Operating voltage input
2	Output	Switching output
3	FB (Feedback)	Output voltage feedback control
4	SD (Shutdown)	ON/OFF shutdown
5,6,7,8	GND	Circuit Ground

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	$V_{CC}$	40	V
Operating Voltage	$V_{OPR}$	3.8 ~ 30	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	$P_D$	Internally limited	mW
Junction Temperature	$T_J$	+150	
Operating Temperature	$T_{OPR}$	-40 ~ +125	
Storage Temperature	$T_{STG}$	-40 ~ +150	

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

( $T_J=25^\circ\text{C}$ ,  $V_{IN}=12\text{V}$  for the 2.5V 3.3V, 5V, and Adjustable version and  $V_{IN}=24\text{V}$  for the 12V version,  $I_{LOAD}=500\text{mA}$ .)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	2.5V	3.8V $V_{IN}$ 30V, 0.2A $I_{LOAD}$ 2A	2.4	2.5	2.6	V
	3.3V	4.75V $V_{IN}$ 30V, 0.2A $I_{LOAD}$ 2A	3.168	3.3	3.432	V
	5.0V	7V $V_{IN}$ 30V, 0.2A $I_{LOAD}$ 2A	4.8	5.0	5.2	V
	12V	15V $V_{IN}$ 30V, 0.2A $I_{LOAD}$ 2A	11.52	12.0	12.48	V
Efficiency	2.5V	$V_{IN}=12\text{V}$ , $I_{LOAD}=2\text{A}$		73		%
	3.3V	$V_{IN}=12\text{V}$ , $I_{LOAD}=2\text{A}$		75		%
	5.0V	$V_{IN}=12\text{V}$ , $I_{LOAD}=2\text{A}$		80		%
	12V	$V_{IN}=25\text{V}$ , $I_{LOAD}=2\text{A}$		80		%
<b>UTC P1696-ADJ</b>						
Feedback Voltage	$V_{FB}$	4.5V $V_{IN}$ 30V, 0.2A $I_{LOAD}$ 2A $V_{OUT}$ programmed for 3V	1.19	1.230	1.267	V
Efficiency	$\eta$	$V_{IN}=12\text{V}$ , $V_{OUT}=3\text{V}$ , $I_{LOAD}=2\text{A}$		75		%
<b>ALL OUTPUT VOLTAGE</b>						
Feedback Bias Current	$I_{BIAS}$	Adjustable Version Only, $V_{FB}=1.3\text{V}$		10	50	nA
Oscillator Frequency	$f_{OSC}$	(Note 1)	127	150	173	kHz
Saturation Voltage	$V_{SAT}$	$I_{OUT}=2\text{A}$ (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	$I_{CL}$	Peak Current (Notes 2, 3)		2		A
Output Leakage Current	$I_L$	Output=0V (Notes 2, 4)			50	$\mu\text{A}$
		Output=-1V (Note 5)		2	30	mA
Quiescent Current	$I_Q$	(Note 4)		5	10	mA
Standby Quiescent Current	$I_{STBY}$	ON/OFF pin=5V (OFF) (Note 5)		80	200	$\mu\text{A}$
<b>ON/OFF CONTROL</b>						
ON/OFF Pin Logic Input Threshold Voltage	$V_{IH}$	Low (Regulator ON)		1.3	0.6	V
	$V_{IL}$	High (Regulator OFF)	2.0	1.3		V
ON/OFF Pin Input Current	$I_H$	$V_{LOGIC}=2.5\text{V}$ (Regulator OFF)		5	15	$\mu\text{A}$
	$I_L$	$V_{LOGIC}=0.5\text{V}$ (Regulator ON)		0.02	5	$\mu\text{A}$

Note 1: The switching frequency is reduced when the second stage current limit is activated.

2: No diode, inductor or capacitor connected to output pin.

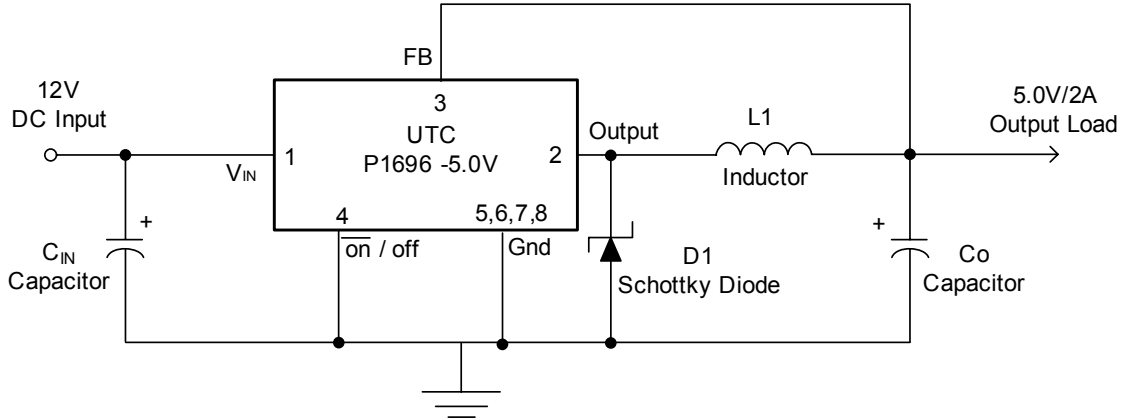
3: Feedback pin removed from output and connected to 0V to force the output transistor switch ON.

4: Feedback pin removed from output and connected to 12V for the 2.5V 3.3V, 5V, and the ADJ. version, and 15V for the 12V version, to force the output transistor switch OFF.

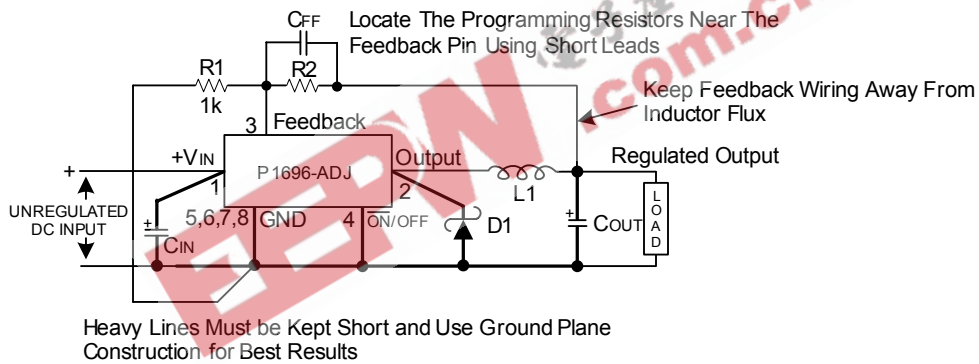
5:  $V_{IN} = 30\text{V}$

## ■ TYPICAL APPLICATION

(Fixed Output Voltage Versions)



## ■ ADJUSTABLE OUTPUT VOLTAGE VERSIONS



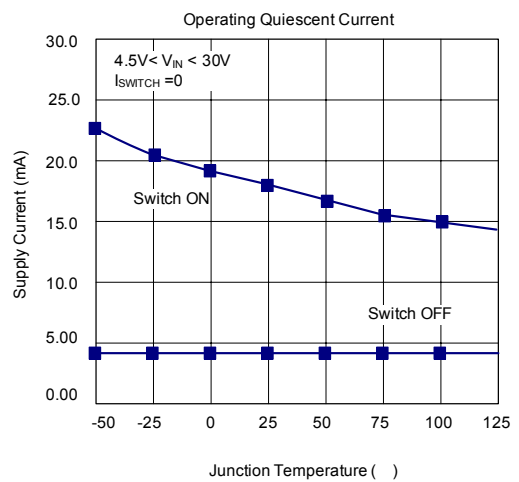
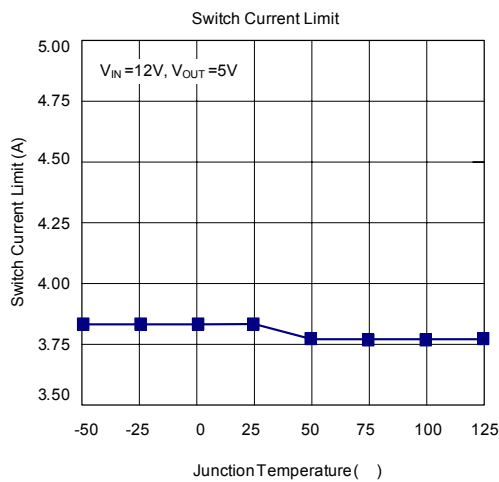
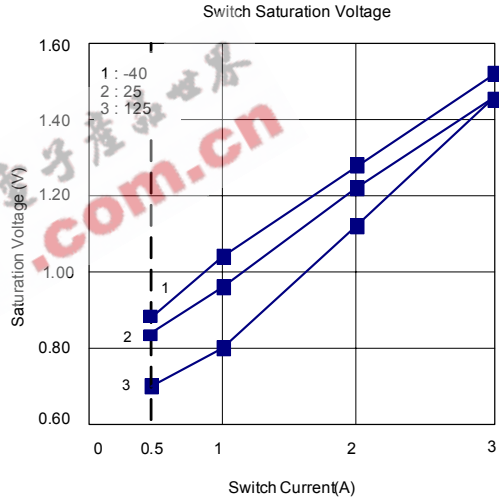
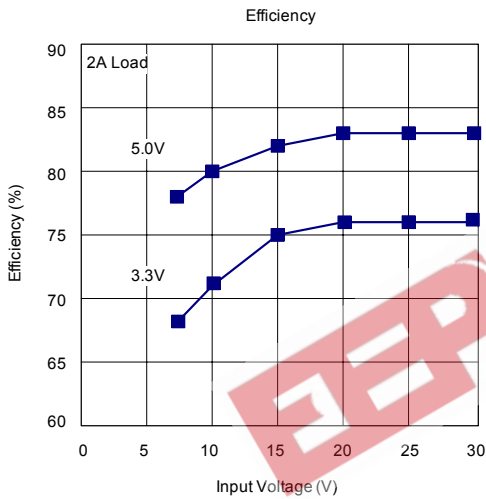
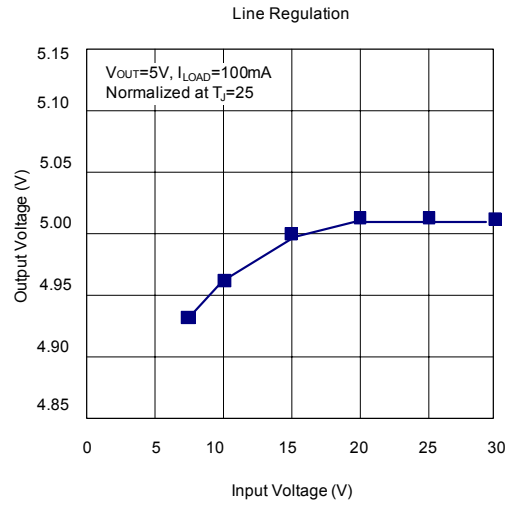
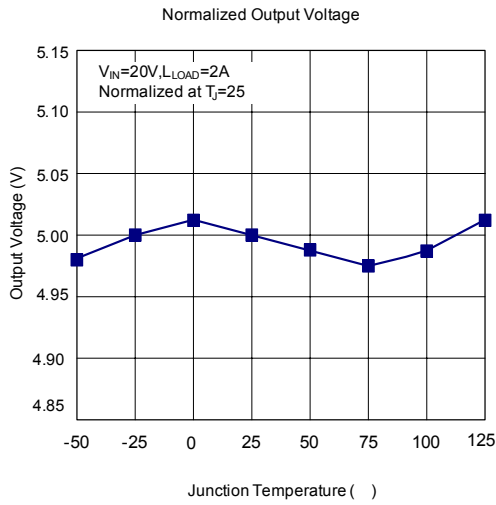
$$V_{OUT} \times \left( \frac{R1}{R1 + R2} \right) = V_{REF}$$

$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right)$$

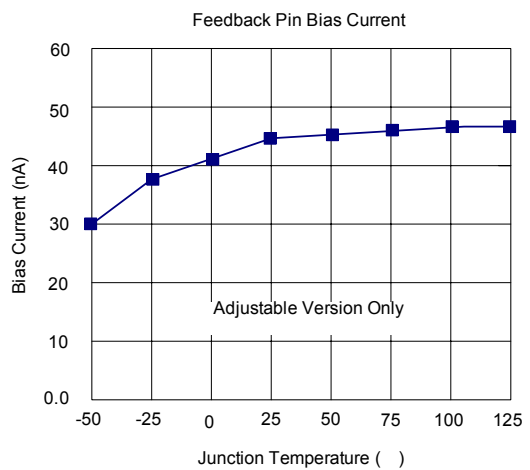
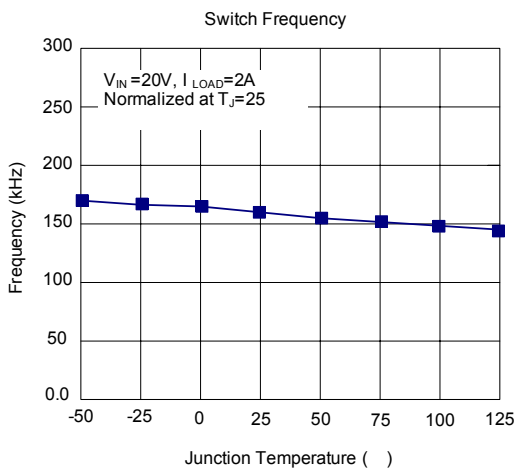
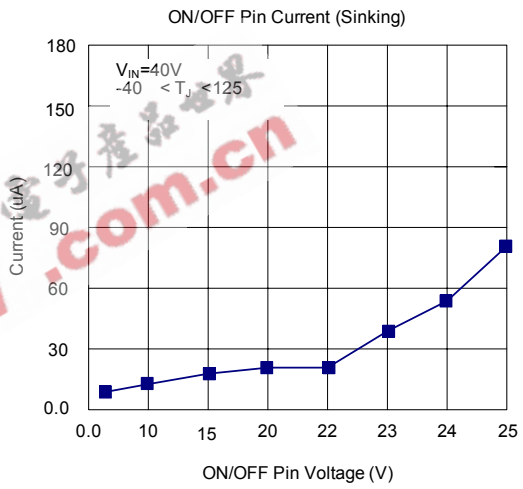
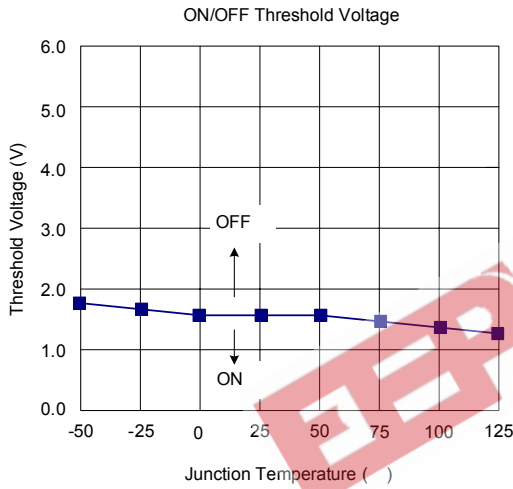
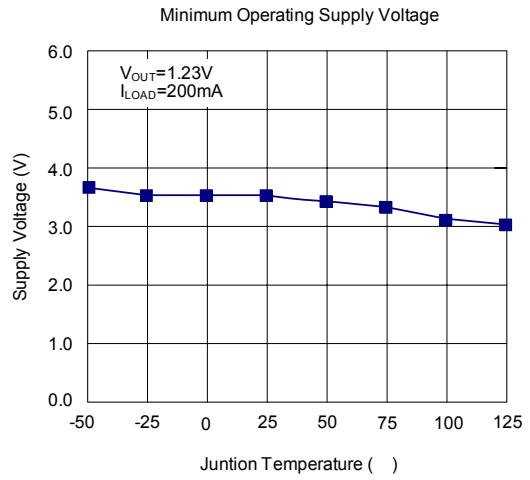
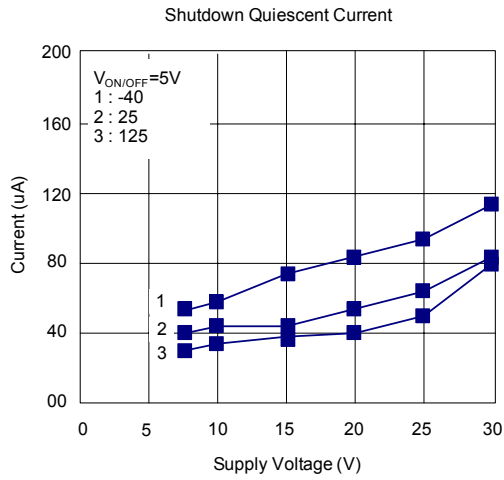
Where  $V_{REF} = 1.23V$

$$R2 = R1 \left( \frac{V_{OUT}}{V_{REF}} - 1 \right)$$

## TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS(Cont.)



EEPW 电子產品世界  
.com.cn

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.