

150KHz, 3A PWM Buck DC/DC Converter

DESCRIPTION

The STD2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving 3A load with excellent line and load regulation. These devices are available in fixed output voltage of 5V and adjustable output version.

The STD2596 operates at a switching frequency of 150KHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators.

Other features include a guaranteed $\pm 3\%$ tolerance on output voltage under specified input voltage and output load conditions, and $\pm 15\%$ on the oscillator frequency. External shutdown is included, featuring typically 100uA standby current.

STD2596-XXD-TRG ROHS Compliant This is Halogen Free

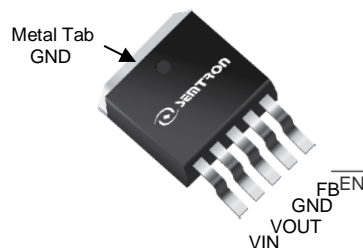
FEATURE

- ◆ 5V and adjustable output versions
- ◆ Adjustable version output voltage range 1.23V to 43V
- ◆ Input voltage range up to 45V
- ◆ Guaranteed 3A output current
- ◆ 150KHz fixed frequency internal oscillator
- ◆ Built-in thermal shutdown and current limit protection

APPLICATIONS

- ◆ Fixed voltage power supply for LCD monitor and LCD TV
- ◆ On-Card switching regulation
- ◆ Simple high efficiency Step-down regulator

PIN CONFIGURATION



TO263-5L
Top View

PART NUMBER INFORMATION

<p>STD 2596-XX D TR G</p> <p>a b c d e f</p>	<p>a : Company name.</p> <p>b : Product Serial number.</p> <p>c : Voltage Code.</p> <p> XX</p> <p> 50 : 5.0V, ADJ : ADJ</p> <p>d : Package code.</p> <p>e : Handling code.</p> <p>f : Green produce code.</p>
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ORDERING INFORMATION

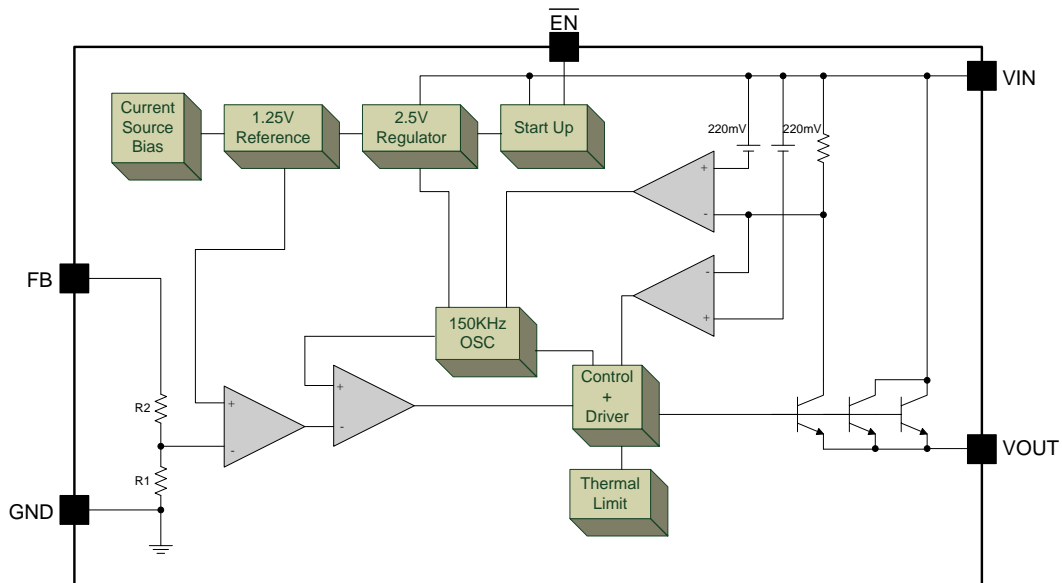
Part Number	Package Code	VOUT Voltage	Shipping
STD2596-XXD-TRG	D :TO-263-5L	5.0	800 Pcs/Reel
		ADJ	

※ Year Code : 0 ~ 9, 2011 : 1

※ Week Code : A(1~2) ~ Z(53~54)

※ TO-263-5L : Only available in tape and reel packaging.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (TA=25°C Unless otherwise noted)

Symbol	Parameter	Maximum	Unit
P _D	Power Dissipation	Internally Limited	W
V _{IN}	Maximum Supply Voltage	-0.3 to 45	V
$\overline{\text{EN}}$	$\overline{\text{EN}}$ Pin Input Voltage	-0.3V < V < +V _{IN}	V
θ _{JT}	Thermal resistance junction to Case	3.0	°C/W
θ _{JA}	Thermal resistance junction to Ambient	36	°C/W
T _J	Operating Junction Temperature Range	-40~+125	°C
T _{STG}	Storage Temperature Range	-65~+150	°C
ESD	Minimum EDS Rating (C=100pF, R=1.5KΩ)	2	KV
T _{LEAD}	Lead Soldering Temperature (Soldering, 10 sec)	260	°C

Note: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

θ_{JA} : Thermal Resistance-Junction to Ambient, Junction Temperature Calculation: T_J = T_A + (P_D × θ_{JA})

The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.

All of the above assume no ambient airflow.

θ_{JT} : Thermal Resistance-Junction to Ambient,

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Unless otherwise specified, these specifications apply $V_{IN}=12\text{V}$ for 5.0V options, and Adj option $I_{load}=0.5\text{A}$

Symbol	Parameter		Test Conditions	Min	Typ	Max	Unit
V_{OUT}	5.0V	Output Voltage (Note 1)	$7\text{V} \leq V_{IN} \leq 38\text{V}$ $0.2\text{A} \leq I_{OUT} \leq 3\text{A}$	4.850	5.000	5.150	V
V_{FB}	ADJ		$4.5\text{V} \leq V_{IN} \leq 38\text{V}$ $0.2\text{A} \leq I_{OUT} \leq 3\text{A}$ $V_{OUT} = 3\text{V}$	1.193	1.230	1.267	
η	5.0V	Efficiency	$V_{IN} = 12\text{V}$, $I_{LOAD} = 3\text{A}$	-	83	-	%
	ADJ		$V_{IN} = 12\text{V}$, $I_{LOAD} = 3\text{A}$, $V_{OUT} = 9\text{V}$	-	88	-	
I_B	Feedback Bias Current		$V_{FB}=1.3\text{V}$ (Adjustable Version Only)	-	10	50	nA
V_{SAT}	Saturation Voltage		$I_{out}=3\text{A}$, (Note 1, 2)	-	1.16	1.4	V
f_o	Oscillator Frequency		(Note 2)	127	150	173	KHz
DC	Duty Cycle (ON)		(Note 3)	-	100	-	%
DC	Duty Cycle (OFF)		(Note 4)	-	0	-	%
I_L	Output Leakage Current		Output=0V, $V_{FB}=12\text{V}$ (Note 3, 4,)	-	-	50	μA
			Output=-0.9V, $V_{IN}=36\text{V}$	-	2	30	mA
I_Q	Quiescent Current		(Note 4)	-	5	-	mA
I_{STBY}	Standby Current		$\overline{\text{EN}}$ Pin=5V(OFF)	-	100	200	μA
V_{IH}	$\overline{\text{EN}}$ Pin Input Level		Low (ON)	-	1.3	0.6	V
V_{IL}			High (OFF)	2.0	1.4	-	
I_H			$V_{LEVEL} = 2.5\text{V}$ (OFF)	-	5	15	μA
I_L			$V_{LEVEL} = 0.5\text{V}$ (ON)	-	0.02	5	

Note 1: No diode, inductor or capacitor connected to output pin.

Note 2: The switching frequency is reduced when the second stage current limit is activated.

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

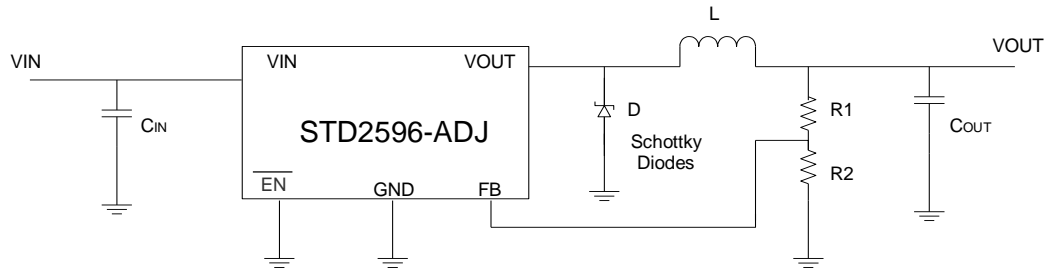
Note 4: Feedback pin removed from output and connected to 12V for the 5V, and the ADJ. version.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Operating Conditions			Unit
		Min	Typ	Max	
V_{IN}	Input Voltage	-	-	43	V
I_{PC}	Peak Current ($V_{FB}=0\text{V}$)	3.4	4.5	5.5	A
I_{OUT}	Maximum Load Current	-	3	-	A
T_J	Junction Temperature	-40	-	150	$^{\circ}\text{C}$

TYPICAL APPLICATIONS

Adjustable Output Voltage



$$V_{OUT} = 1.23 \times \left(1 + \frac{R1}{R2}\right)$$

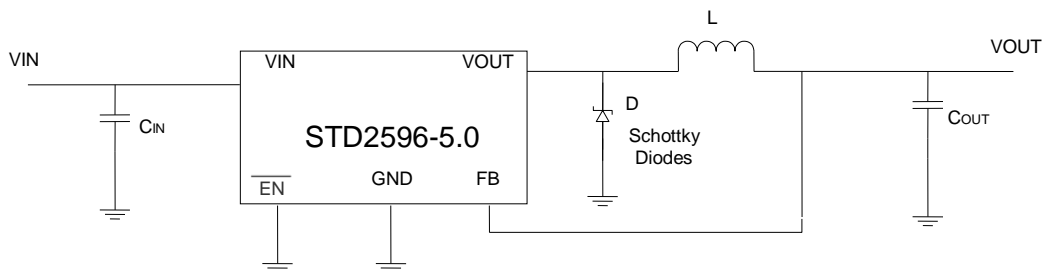
$C_{IN} = 100\mu F$, Aluminum Electrolytic

$C_{OUT} = 220\mu F$, 25V, Aluminum Electrolytic

$D =$ Schottky, 5A/40V

$L = 33\mu H$

Figure 2 Fixed Output Voltage



$C_{IN} = 100\mu F$, Aluminum Electrolytic

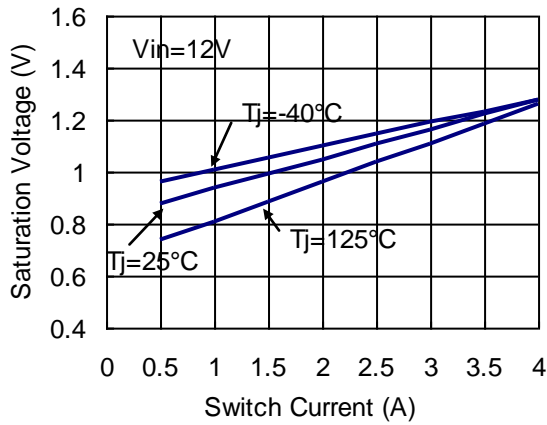
$C_{OUT} = 220\mu F$, 25V, Aluminum Electrolytic

$D =$ Schottky, 5A/40V

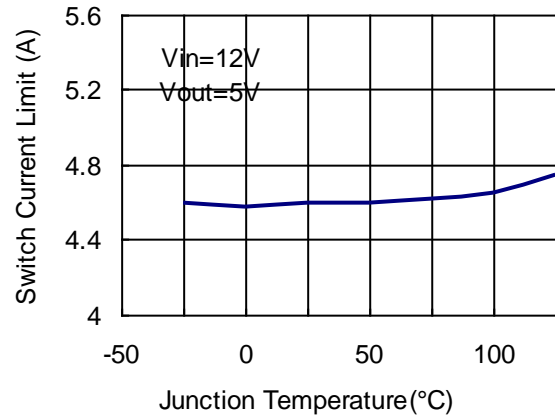
$L = 33\mu H$

TYPICAL CHARACTERISTICS (25°C Unless Note)

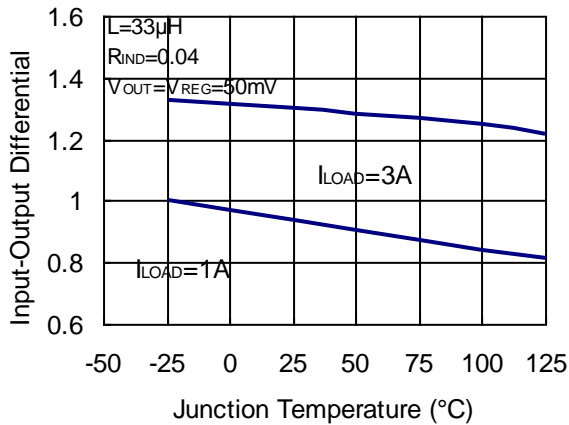
Switch Saturation Voltage



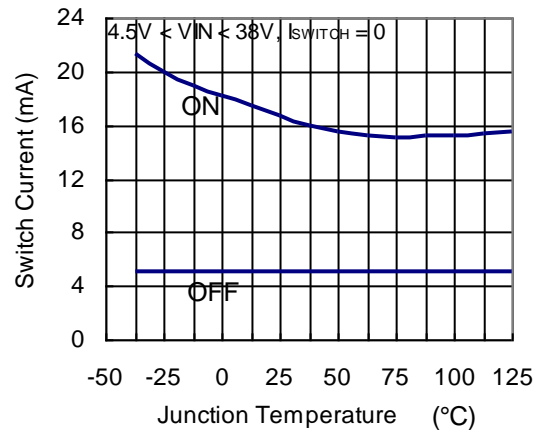
Switch Current Limit



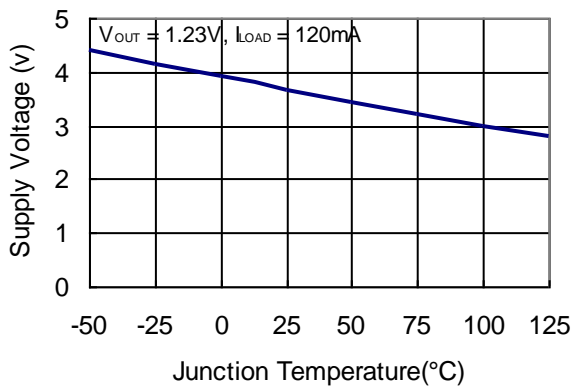
Dropout Voltage



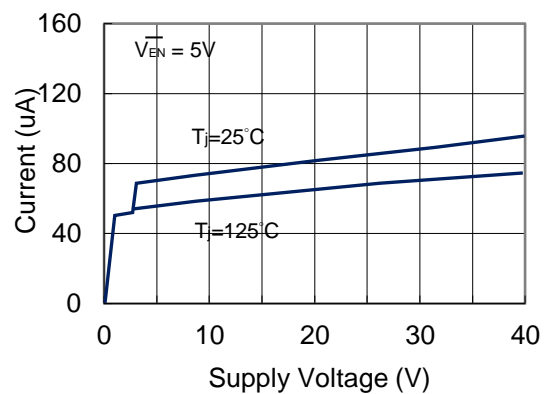
Operating Quiescent Current



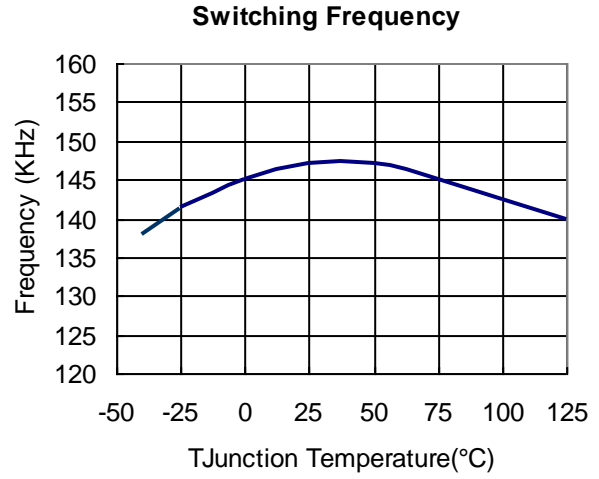
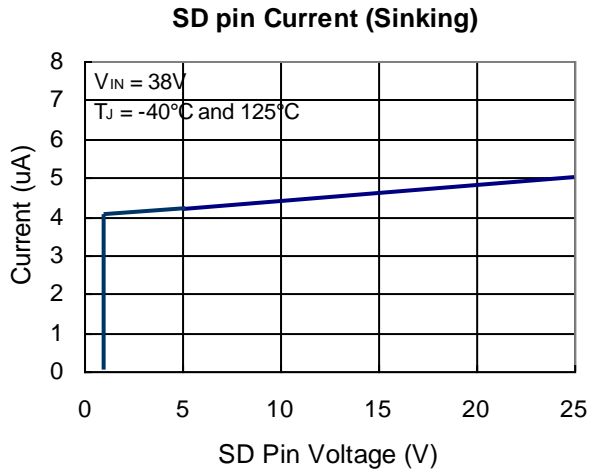
Minimum Operating Supply Voltage



Shutdown Quiescent Current



■ **TYPICAL CHARACTERISTICS** (25°C Unless Note)



TO263-5L PACKAGE DIMENSIONS

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A1	0.050	0.250	0.002	0.010
A2	4.460	4.670	0.176	0.184
A3	1.470	1.570	0.058	0.062
b	0.790	0.890	0.031	0.035
b1	0.780	0.840	0.031	0.033
c	0.370	0.450	0.015	0.018
c1	0.360	0.400	0.014	0.016
c2	1.270 BSC		0.050 BSC	
D	10.000	10.200	0.394	0.402
D1	8.000 REF		0.315 REF	
D2	7.000 REF		0.276 REF	
E	14.650	15.050	0.577	0.593
E1	8.300	8.500	0.327	0.335
E2	5.800 BSC		0.228 REF	
e	1.700 BSC		0.067 BSC	
L	1.840	2.240	0.072	0.088
L1	1.650 BSC		0.065 BSC	
θ	0°	8°	0°	8°

