800mA,2V-6.5V Input,1.5MHz Synchronous Step-Down Converter

■ INTRODUCTION

The SMD501 is a constant frequency, current mode step-down converter. The device integrates a main switch and a synchronous rectifier for high efficiency without an external Scotty diode. It is ideal for powering portable equipment that runs from a single cell Lithium-Ion (Li+) battery. The output voltage can be regulated as low as 0.6V. The SMD501 can also run at 100% duty cycle for low dropout operation, extending battery life in portable system. This device offers two operation modes, PWM control and PFM Mode switching control, which allows a high efficiency over the wider range of the load.

The SMD501 is offered in a low profile 5-pin, SOT package, and is available in an adjustable version.

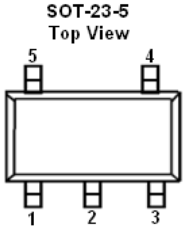
■ FEATURES

- High efficiency :Up to 96%
- 1.5MHz Constant Frequency Operation
- 800mA Output Current
- No Scotty Diode Required
- 2V to 6.5V Input Voltage Range
- Output Voltage as Low as 0.6V
- PFM Mode for High Efficiency in Light Load
- 100% Duty Cycle in Dropout Operation
- Low Quiescent Current: 20μA
- Slope Compensated Current Mode Control for Excellent Line and Load Transient Response
- Short Circuit Protection
- Thermal Fault Protection
- Inrush Current Limit and Soft Start
- <1μA Shutdown Current
- SOT-23-5 package

■ APPLICATIONS

- Cellular and Smart Phones
- PDAs
- Wireless and DSL Modems
- Digital Still and Video Cameras
- DTV
- Portable Instruments

■ PIN CONFIGURATION



■ ORDER INFORMATION

SMD501①②

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
②	M/MR	Package:SOT-23-5

Tabel1. Pin Description

PIN NUMBER		PIN NAME	FUNCTION
M	MR		
1	3	EN	Chip Enable Pin. Drive EN above 1.5V to turn on the part. Drive EN below 0.3V to turn it off. Do not leave EN floating
2	2	V_{SS}	Analog Ground Pin
3	5	SW	Power Switch Output. It is the switch node connection to Inductor. This pin connects to the drains of the internal P-ch and N-ch MOSFET switches.
4	1	V_{IN}	Power Supply Input. Must be closely decoupled to GND with a 4.7μF or greater ceramic capacitor.
5	4	FB	Output Voltage Feedback Pin. An internal resistive divider divides the output voltage down for comparison to the internal reference voltage.

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	V_{SS}-0.3 ~ V_{SS}+7.5	V
CE,SW,FB/V_{OUT} Voltage			V_{SS}-0.3 ~ V_{IN}+0.3	V
Power Dissipation	SOT-23-5	P_D	400	mW
Operating Temperature		T_{opr}	-40 ~ +85	℃
Junction Temperature		T_j	-40 ~ +150	℃
Storage Temperature		T_{stg}	-55 ~ +150	℃
Soldering Temperature & Time		T_{solder}	260℃, 10s	
ESD HBM(Human Body Mode)		-	≥ 2	kV
ESD MM(Machine Mode)		-	≥ 200	V

■ ELECTRICAL CHARACTERISTICS

SMD501 Series (V_{IN} = V_{EN} = 3.6V, V_{OUT} = 1.8V, T_A = 25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		2.0		6.5	V
Input DC Supply Current	V_{OUT} = 90%, I_{LOAD}= 0mA V_{OUT} = 105%, I_{LOAD} = 0mA V_{EN} = 0V, V_{IN} = 4.2V	-	-	-	μA
PWM Mode		-	140	300	μA
PFM Mode		-	20	35	μA
Shutdown Mode		-	0.1	1.0	μA
Regulated Feedback Voltage VFB	T_A = 25℃	0.588	0.600	0.612	V
	T_A = 0℃≤T_A≤85℃	0.586	0.600	0.613	V
	T_A = -40℃≤T_A≤85℃	0.585	0.600	0.615	V
Reference Voltage Line Regulation	V_{IN} = 2.7V to 5.5V	-	0.04	0.40	%/V
Output Voltage Line Regulation	V_{IN} = 2.7V to 5.5V		0.04	0.40	%
Output Voltage Load Regulation			0.5		%
Oscillation Frequency	V_{OUT} = 100%		1.5		MHz
	V_{OUT} = 0V		300		KHZ
On Resistance of PMOS	I_{SW} =100mA		300	450	mΩ
On Resistance of NMOS	I_{SW} =-100mA		300	450	mΩ
Peak Current Limit	V_{IN} = 3V, V_{OUT} = 90%		1.5		A
Turn on delay time			0.2		ms
EN "High" Voltage	V_{ENH}	1.5		V_{IN}	V
EN "Low" Voltage	V_{ENL}			0.4	V
EN Leakage Current			±0.01	±1.0	μA
SW Leakage Current	V_{EN} = 0V,V_{IN} = V_{SW} = 5V		±0.01	±1.0	μA

■ TYPICAL APPLICATION CIRCUITS

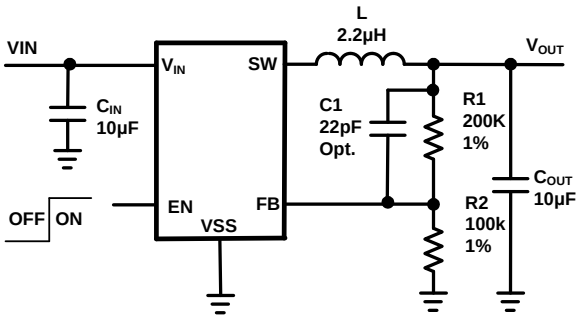
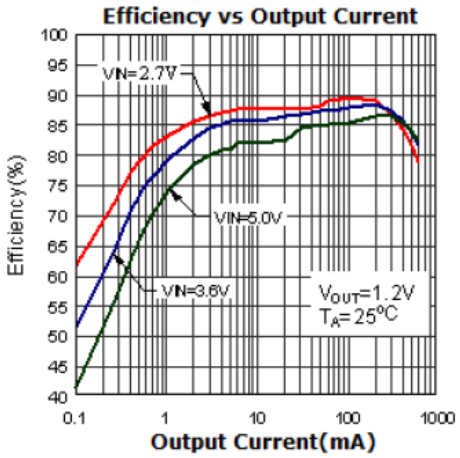
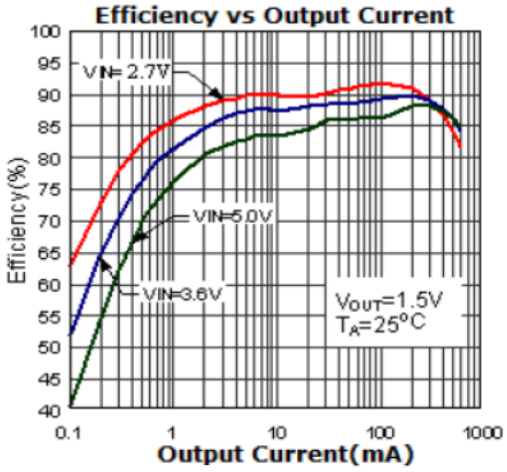


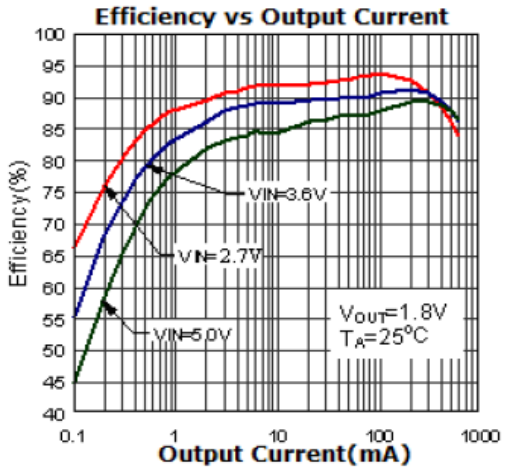
Figure1 Basic Application Circuit

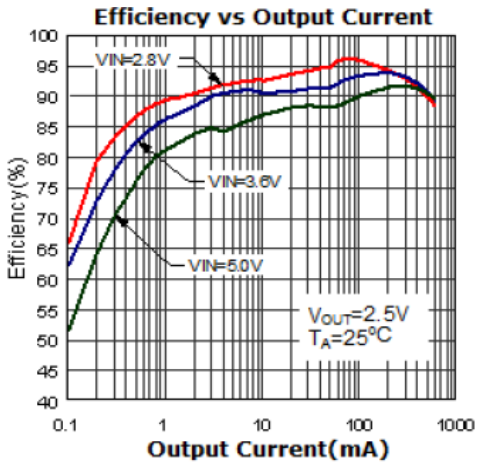
■ TYPICAL PERFORMANCE CHARACTERISTICS

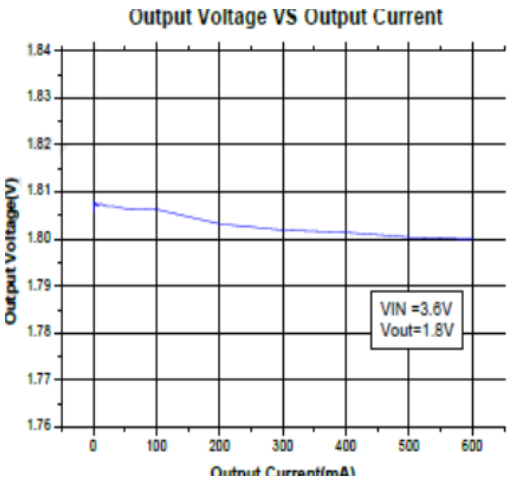
(Test Figure1 above, unless otherwise specified)

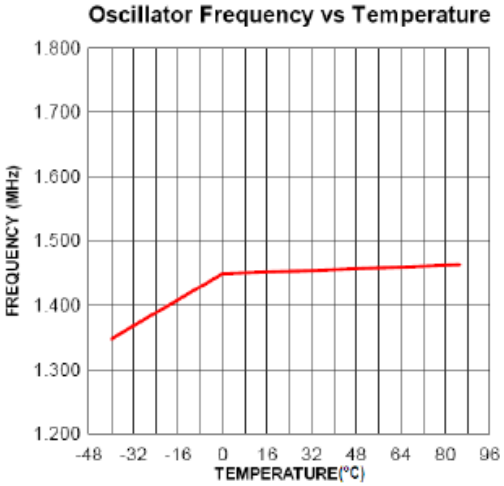


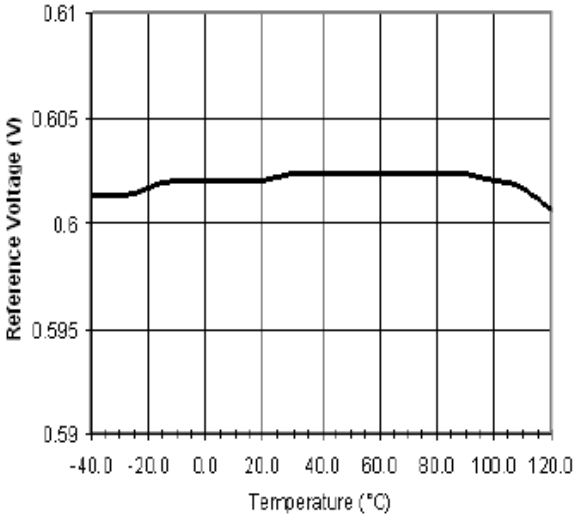


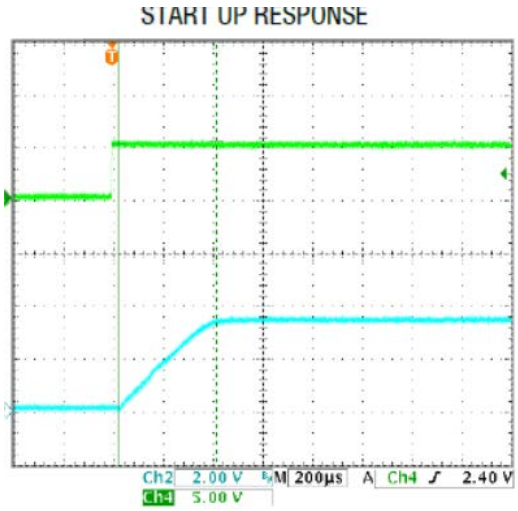




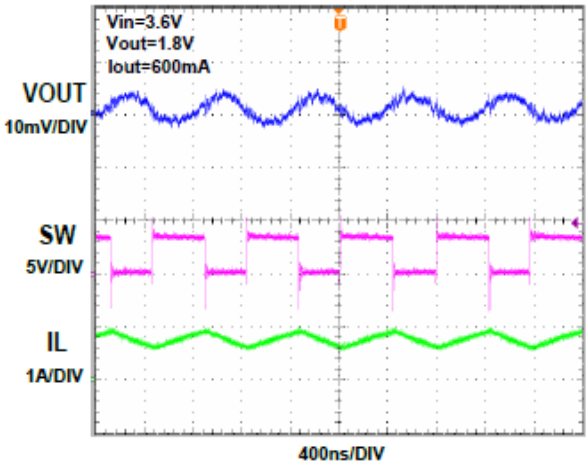




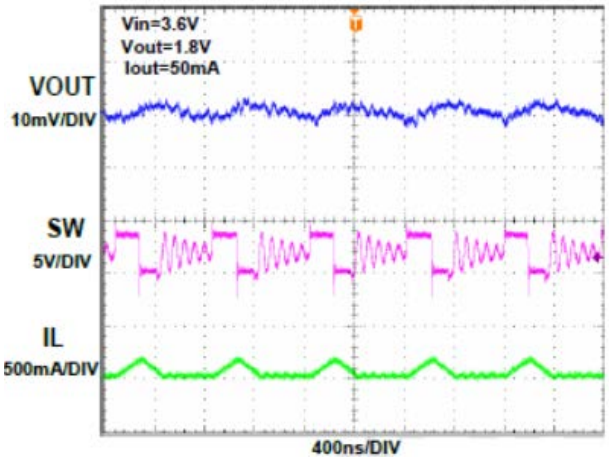




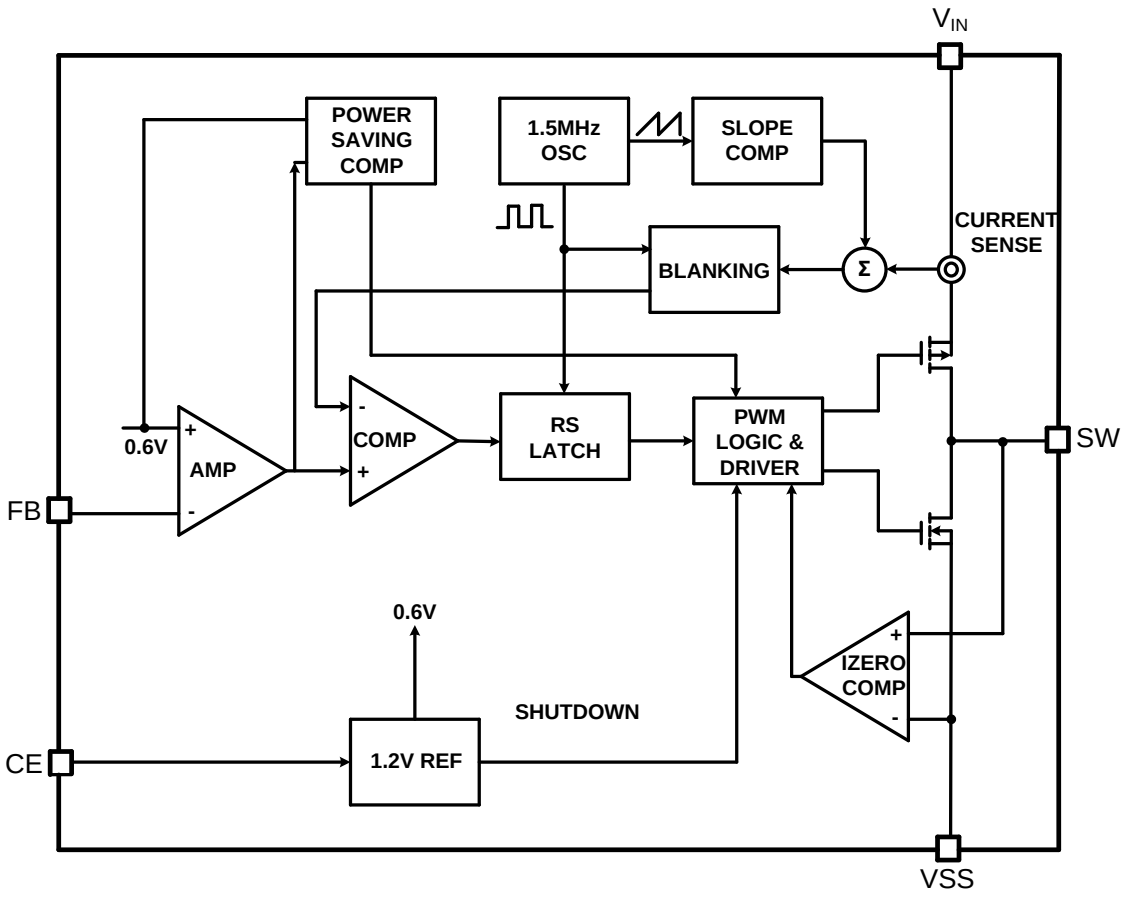
PWM MODE



PFM MODE

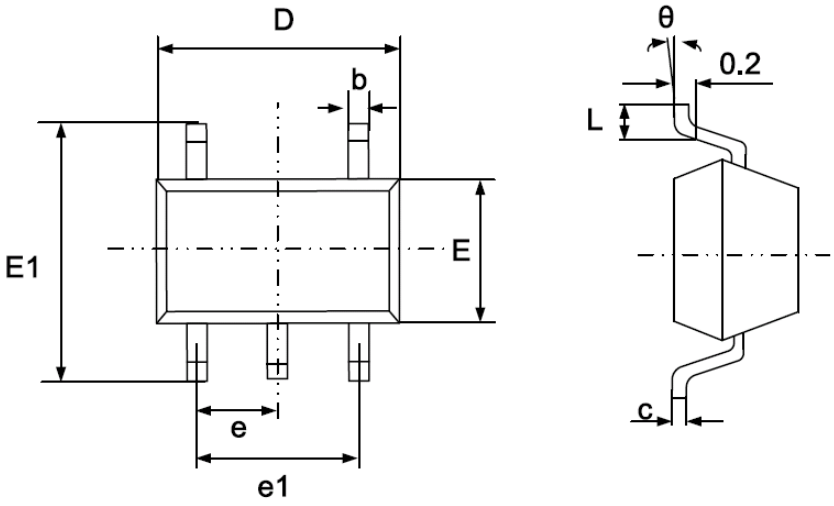


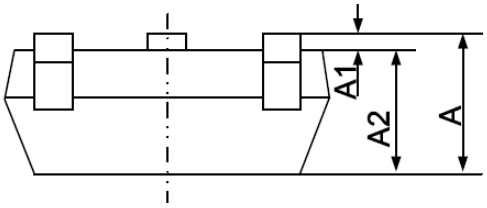
■ FUNCTIONAL BLOCK DIAGRAM



■ PACKAGING INFORMATION

● SOT-23-5 PACKAGE OUTLINE DIMENSIONS





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°