PFM Step-up DC/DC Converter

Features

• Minimal Number of External Components
(Only an Inductor, a Diode, and a Capacitor)
• Ultra Low Input Current (5 μA at Switch Off)
• ±2% High Output Voltage Accuracy
• Low Ripple and Low Noise
• Low Start-up Voltage, 0.85V at 1mA
• 85% Efficiency with Low Cost Inductor
• SOT-89 , SOT-23-3L Small Packages

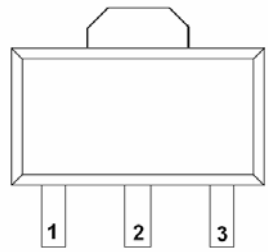
Applications

• Power source for battery-powered equipment
• Power source for cameras, camcorders, VCRs, PDAs, pagers, electronic data banks, and hand-held communication equipment
• Power source for applications, which require higher voltage than that of batteries used in the appliances

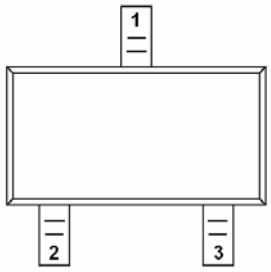
General Description

The FS1501 Series are PFM Step-up DC/DC IC swith ultra low supply current by CMOS process and suitable for use with battery-powered instruments.
The FS1501 IC consists of an oscillator, a PFM control circuit, a driver transistor (LX switch), a reference voltage unit, an error amplifier, resistors for voltage detection, and a LX switch protection circuit. A low ripple and high efficiency step-up DC/DC converter can be constructed of this FS1501 IC with only three external components.

Pin Configurations



SOT89-3L



SOT23

Pin Description

Pin Port	SOT89-3L（A）	SOT89-3L（B）	SOT-23（A）	SOT23（B）
①	GND	GND	GND	VOUT
②	VOUT	VOUT	LX	GND
③	LX	EXT	VOUT	EXT

Gnd	Ground
Vout	Output
Lx	Pin for Switching
Ext	External

Ordering Information

FS1501-①②③④⑤

Designator	Symbol	Description
①②	Output Detection Voltage	….18=1.8V, 25=2.5V, 30=3.0V 33=3.3V％0.1V step）…….
③	Pin Description	A：SOT89-3L（A）；SOT23-3L（A）
		B：SOT89-3L（B）；SOT23-3L（B）
④⑤	Package Type:	SI: SOT23、SM:SOT89-3L

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Output Voltage		V_{OUT}	-0.3 to +10	V
LX Pin Voltage		V_{LX}	-0.3 to +10	V
EN Pin Voltage		EN	-0.3 to +10	V
LX Pin Output Current		I_{LX}	1	A
Power Dissipation, PD @ TA = 25℃	SOT-89	PD	500	mW
	SOT23-3L		250	
Operating Temperature Range		Topr	-40 to 85	℃
Storage Temperature Range		Tstg	-40 to 125	℃

Electrical Characteristics @ (T_A=25°C, unless otherwise specified)

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		--	--	10	V
Start-up Voltage		V_{ST}	I_{OUT} = 1mA, V_{IN}: 0 → 2V	--	0.85	1.0	V
Hold-on Voltage		V_{HO}	I_{OUT} = 1mA, V_{IN} : 2 → 0V	0.7	--	--	V
Efficiency				--	75	85	%
Input Current1	V_{OUT} ≤ 3.5V	Iss	To be measured at V_{IN} at no load	--	30	40	μA
	3.5V < V_{OUT} ≤ 5V			--	50	60	
Input Current 2	V_{OUT} ≤ 3.5V	Iss	To be measured at V_{OUT} in switch off condition	--	5	8	μA
	3.5V < V_{OUT} ≤ 5V			--	6	10	
LX Switch_ ing Current		$I_{SWITCHING}$	V_{LX} = 0.4V	100	200	--	mA
EN “H” Level		V_{SH}	V_{IN} = V_{OUT} × 0.9	0.75	--	--	V
EN “L” Level		V_{SL}	V_{IN} = V_{OUT} × 0.9	--	--	0.3	V
EN “H” Input Current		I_{SH}	EN = 10	--	--	0.1	μA
EN “L” Input Current		I_{SL}	EN = 0V	-0.5	--	0.1	μA
Maximum Oscillator		F_{MAX}		--	100	--	KHz
Oscillator Duty Cycle		D_{OSC}	On (V_{LX} ”L”) side	65	75	85	%

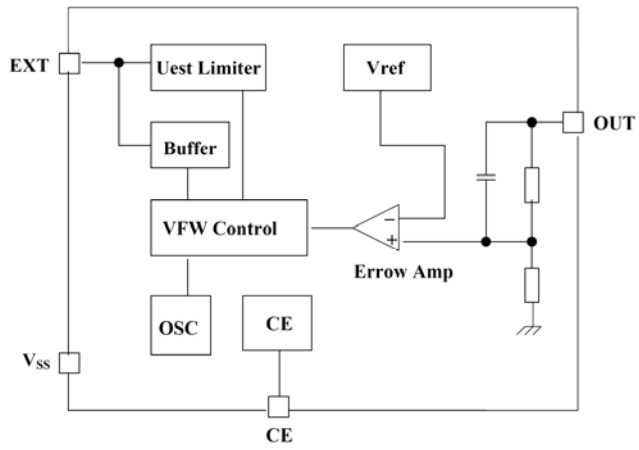
NOTE:

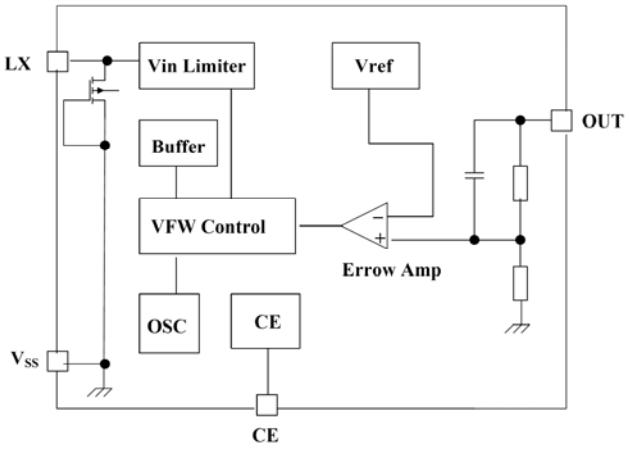
1. $V_{OUT(T)}$ = Specified output Voltage.

2. Unless otherwise provided, VIN = 1.8V, VSS = 0V, IOUT = 10mA, TOPT = 25℃

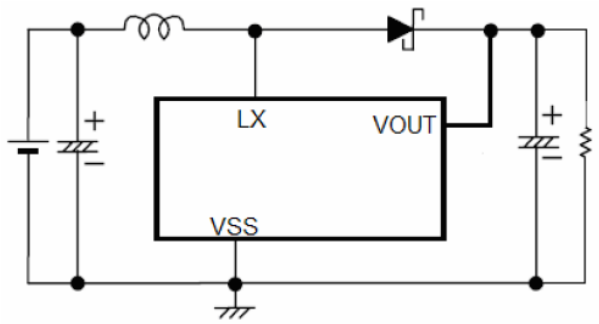
3. Unless otherwise provided, VIN = 3V, VSS= 0V, IOUT = 10mA, TOPT = 25℃

- **Typical Block Diagram**

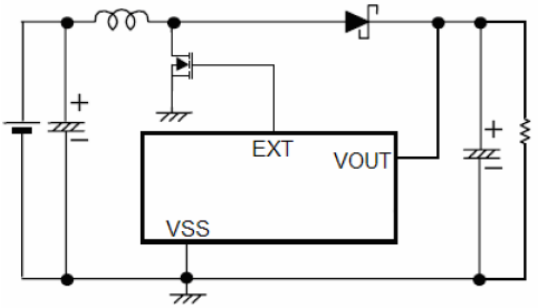




- **Typical Application Circuit**



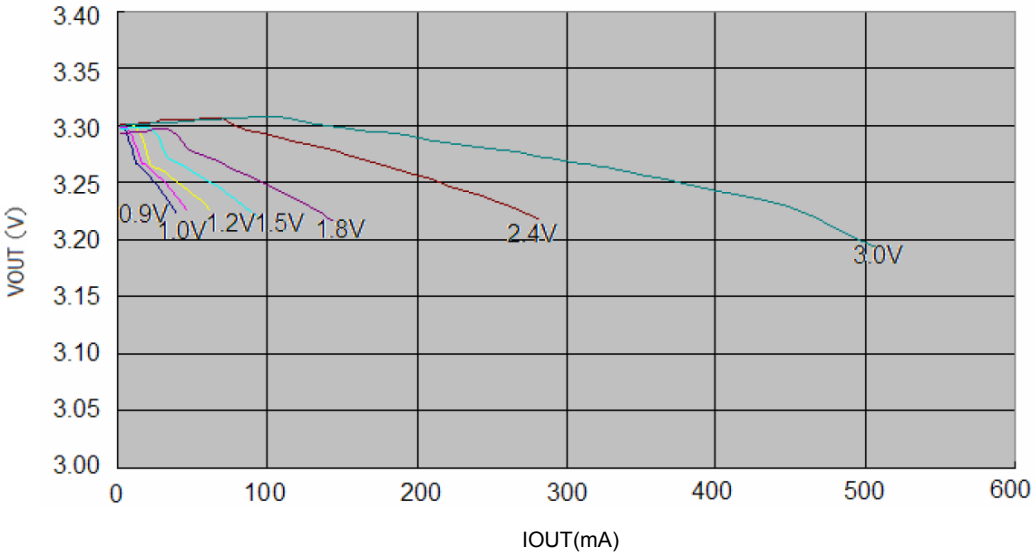
APPLICATION NO.1

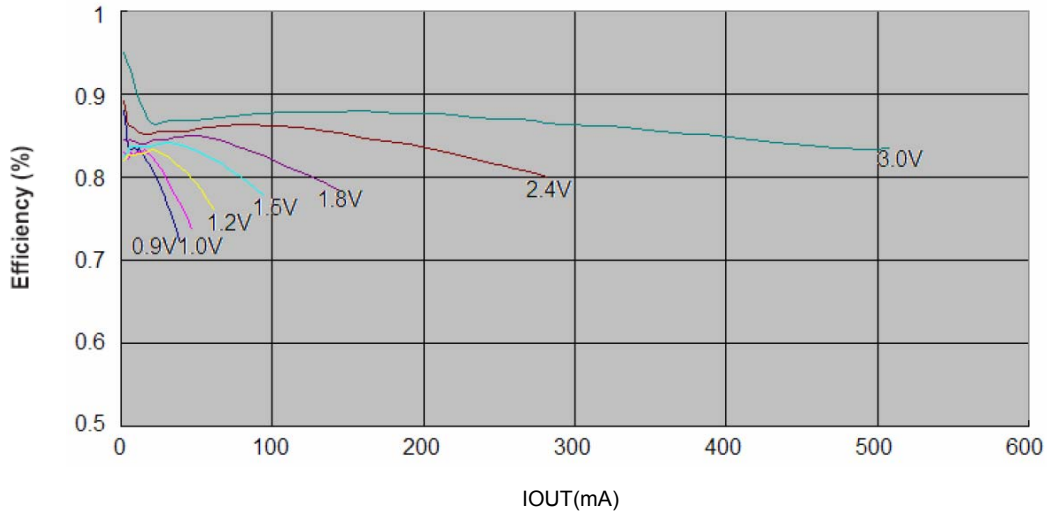


APPLICATION NO.2

- **Typical Performance Characteristics**

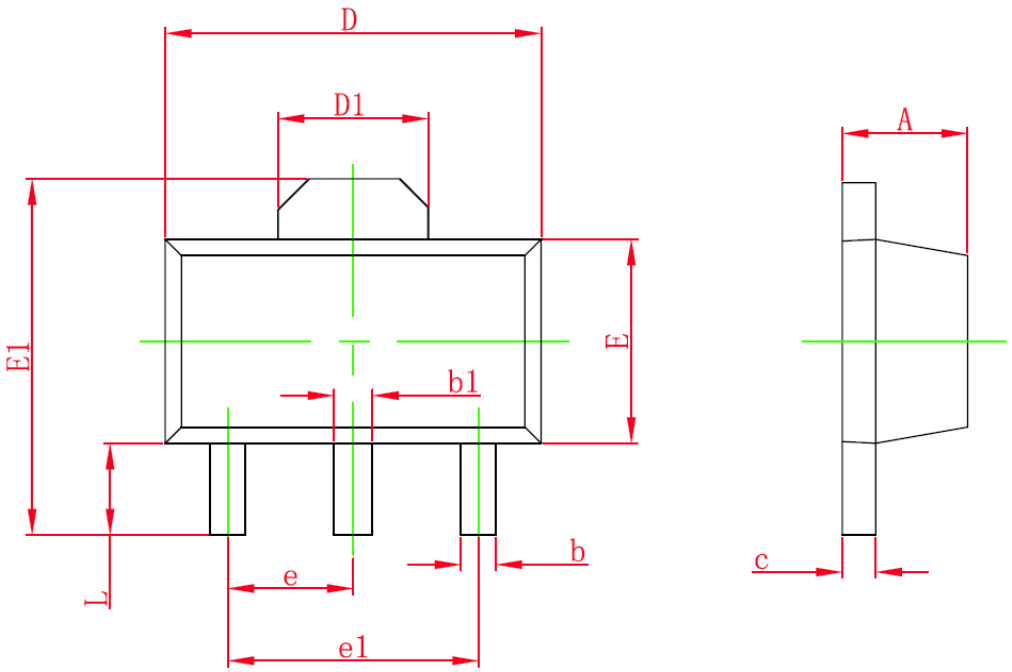
  (For Vout = 3.3V)





- **Package Information**

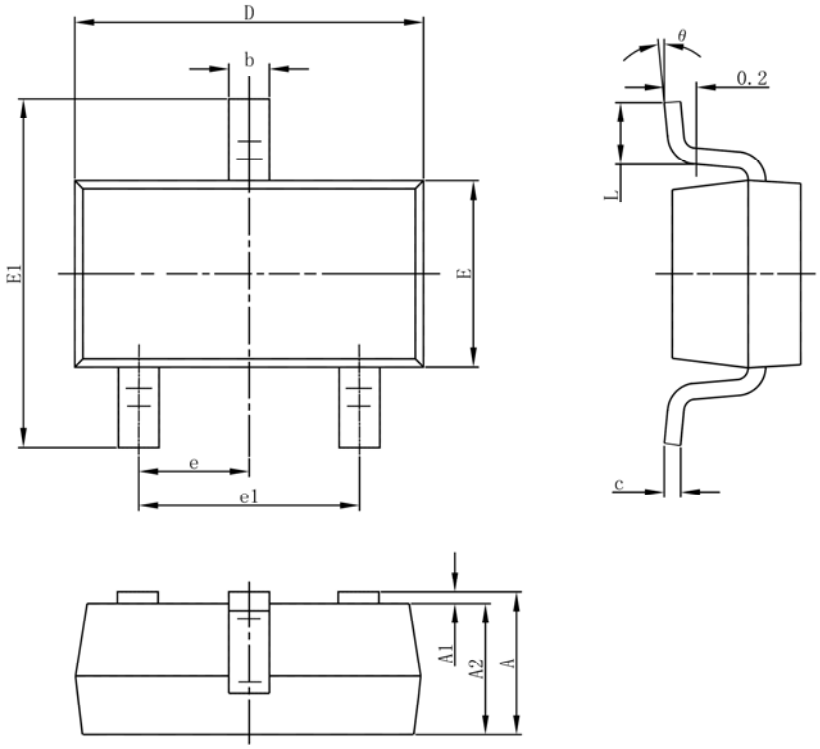
SOT-89-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

- **Package Information**

SOT-23-3L 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°
UNIT:mm				