VFM Step-up DC/DC Converter

General Description

The RP6500 Series are VFM Step-up DC/DC converter ICs with ultra low supply current by CMOS process and suitable for use with battery-powered instruments.

The RP6500 IC consists of an oscillator, a VFM 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 with the RP6500 IC and only three external components.

Ordering Information

RP6500-□□□□

- Package Type
  - B : SOT-23-5
  - X : SOT-89
- Operating Temperature Range
  - G : Green (Halogen Free with Comme--rcial Standard)
- Output Voltage
  - 15 : 1.5V
  - 16 : 1.6V
  - :
  - 49 : 4.9V
  - 50 : 5.0V

Note :

Richpower Green products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.

Marking Information

For marking information, contact our sales representative directly or through a Richpower distributor located in your area.

Features

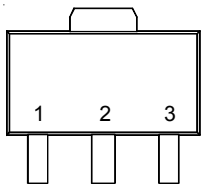
- **Minimal Number of External Components (Only an Inductor, a Diode, and a Capacitor)**
- **Ultra Low Input Current (6.5μA at Switch Off)**
- **Capable of Supplying 150mA Output Current with Internal Switch**
- **± 2% Output Voltage Accuracy**
- **Low Ripple and Low Noise**
- **Low Start-up Voltage, 0.85V at 1mA**
- **80% Efficiency with Low Cost Inductor**
- **+50 ppm/° C Low Temperature-Drift**
- **SOT-89 and SOT-23-5 Small Packages**
- **RoHS Compliant and 100% Lead (Pb)-Free**

Applications

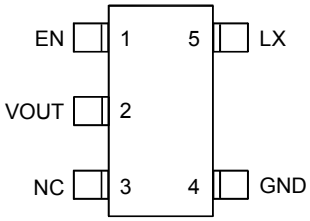
- Power source for battery-powered equipment
- Power source for cameras, camcorders, VCRs, PDAs, pagers, electronic data banks, and hand-held communication equipment
- Power source for appliances, which require higher voltage than that of batteries used in the appliances

Pin Configurations

(TOP VIEW)

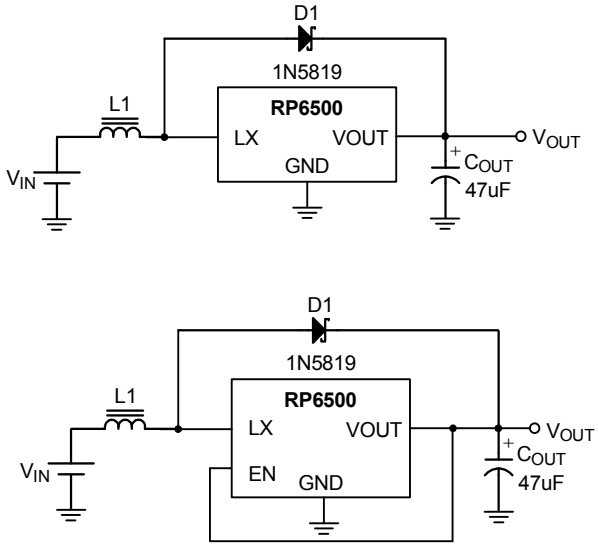


SOT-89



SOT-23-5

Typical Application Circuit

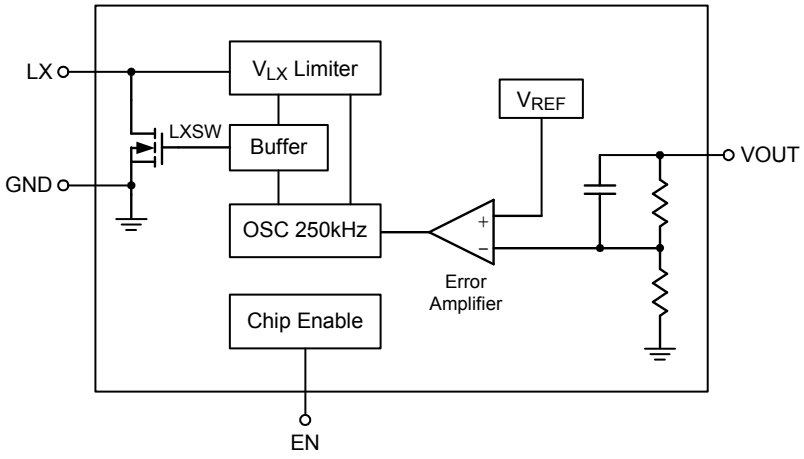


* L1 ranges from 10μH to 47μH

Functional Pin Description

Pin No.		Pin Name	Pin Function
SOT-89	SOT-23-5		
1	4	GND	Ground.
2	2	VOUT	Output Voltage.
3	5	LX	Pin for Switching.
--	1	EN	Chip Enable (Active High).
--	3	NC	No Connection.

Function Block Diagram



Absolute Maximum Ratings

- Output Voltage ---------- 6V
- LX Pin Voltage ---------- 6V
- Power Dissipation, P_D @ T_A = 25° C
  - SOT-23-5 ---------- 0.25W
  - SOT-89 ---------- 0.5W
- Package Thermal Resistance
  - SOT-89, θ_{JC} ---------- 100° C/W
  - SOT-89, θ_{JA} ---------- 300° C/W
  - SOT-23-5, θ_{JA} ---------- 250° C/W
- Operating Temperature Range ---------- –20 to +85° C
- Storage Temperature Range ---------- –65° C to 150° C
- Lead Temperature (Soldering, 10 sec.) ---------- 260° C

Electrical Characteristics

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		–	--	6	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				–	80	--	%
LX switch on Resistance	$V_{OUT} \le 3.5V$ (1)	R_{ON}	V_{LX} = 0.4V	–	--	2	Ω
	$3.5V < V_{OUT} \le 5V$ (2)			–	--	1.5	
Input Current 1		I_Q	Measure at V_{IN} in switching off	–	6.5	10	µA
Input Current 2	$V_{OUT} \le 3.5V$ (1)	I_{OUT}	Measure at V_{OUT} in no load	–	18	36	µA
	$3.5V < V_{OUT} \le 5V$ (2)	I_{OUT}		–	20	45	
LX Leakage Current		$I_{LEAKAGE}$	V_{LX} = 6V	–	50	--	µA
Enable Threshold		V_{IL}	$V_{IN} = V_{OUT} * 0.9$	–	--	0.2	V
		V_{IH}	$V_{IN} = V_{OUT} * 0.9$	1	--	--	
Enable Input Current		I_{EN}	V_{EN} from 0 to 5.5V	–	0.5	--	µA
Maximum Oscillator Frequency		F_{MAX}		150	250	350	kHz
Oscillator Duty Cycle		D_{OSC}		65	75	85	%
V_{LX} Voltage Limit			LX Switch On	–	0.65	--	V

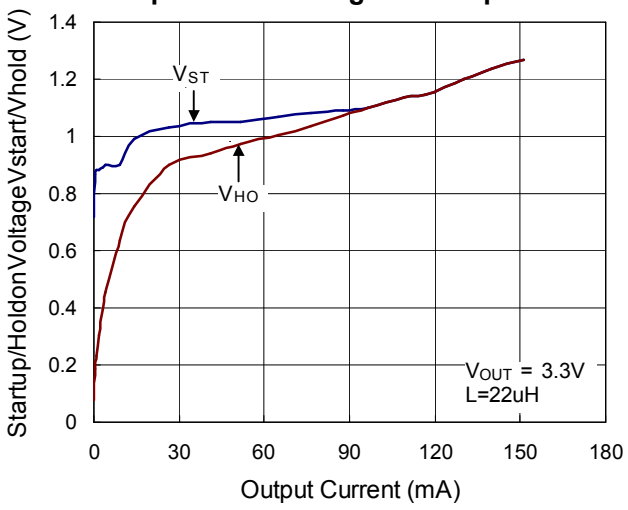
Notes:

(1) V_{IN} = 1.8V, V_{SS} = 0V, I_{OUT} = 1mA, Topt = 25° C, and use External Circuit of Typical Application

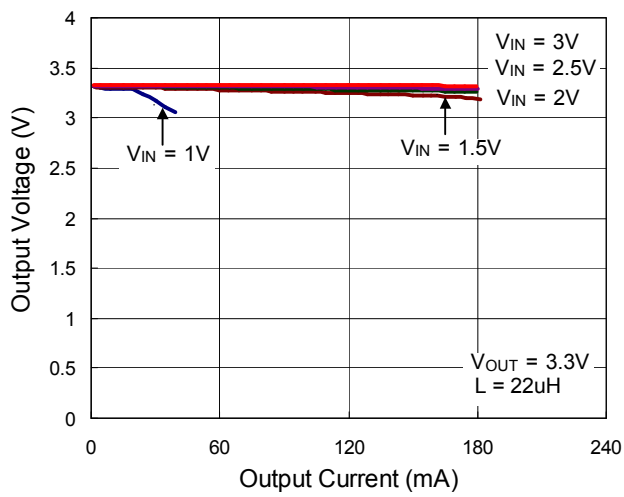
(2) V_{IN} = 3V, V_{SS} = 0V, I_{OUT} = 1mA, Topt= 25° C, and External Circuit of Typical Application

Typical Operating Characteristics

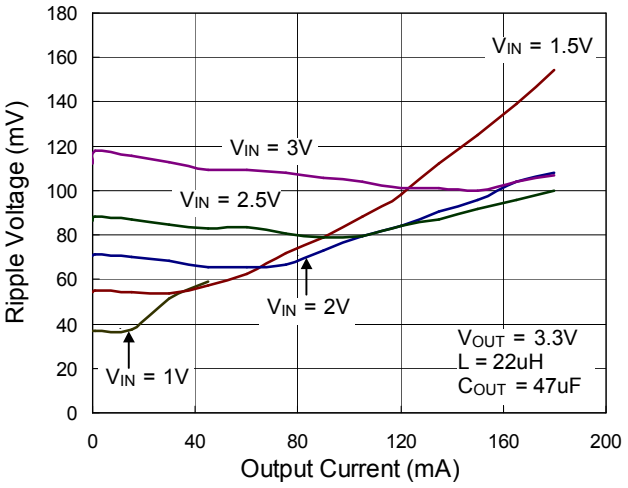
Start up/Hold on Voltage Vs. Output Current



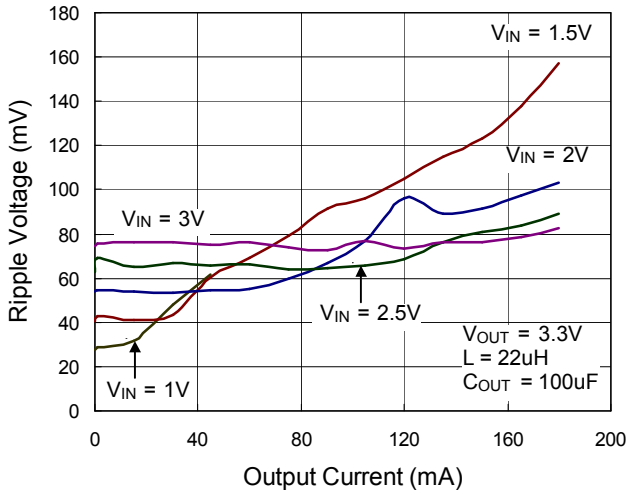
Output Voltage Vs. Output Current



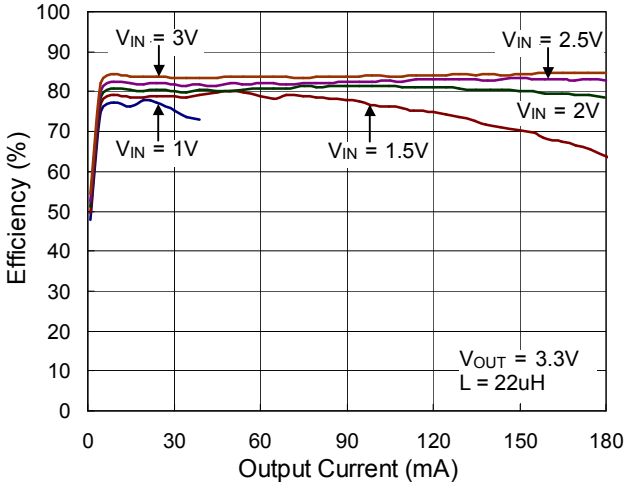
Output Current Vs Ripple Voltage



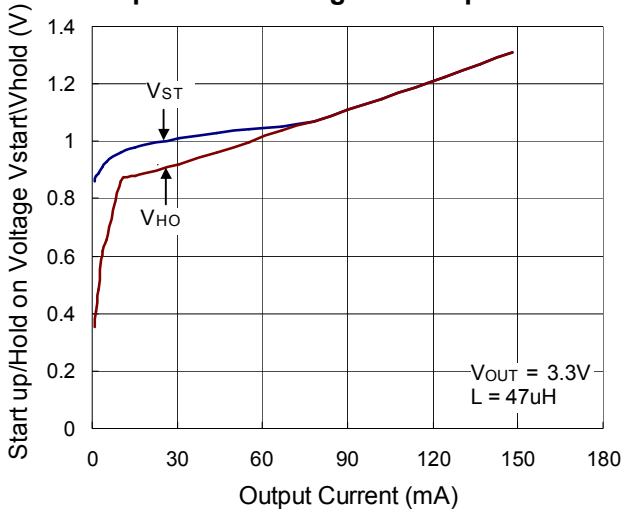
Output Current Vs Ripple Voltage



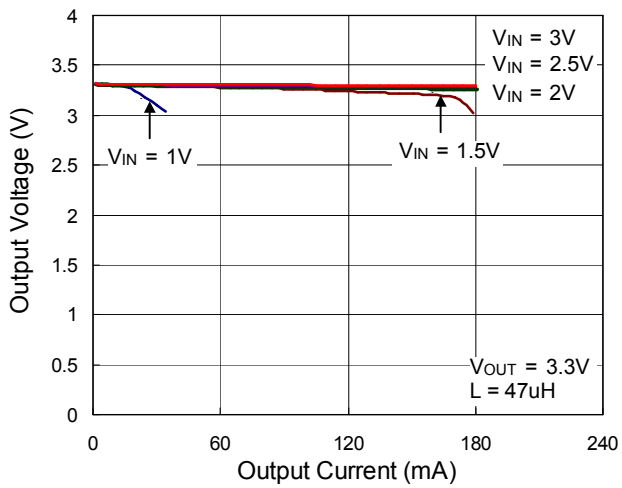
Efficiency Vs Output Current



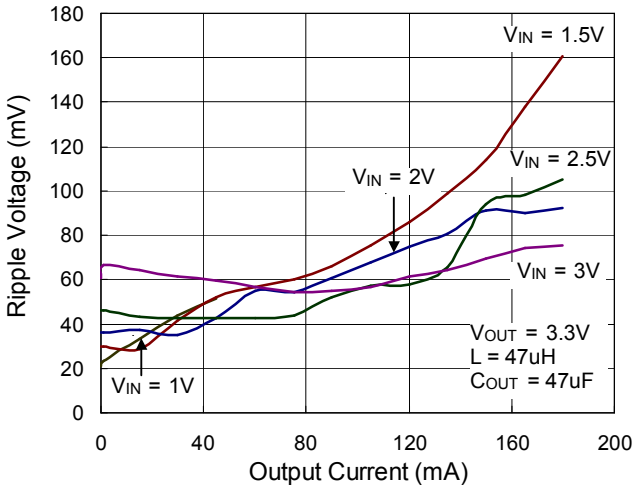
Start up/Hold on Voltage Vs. Output Current



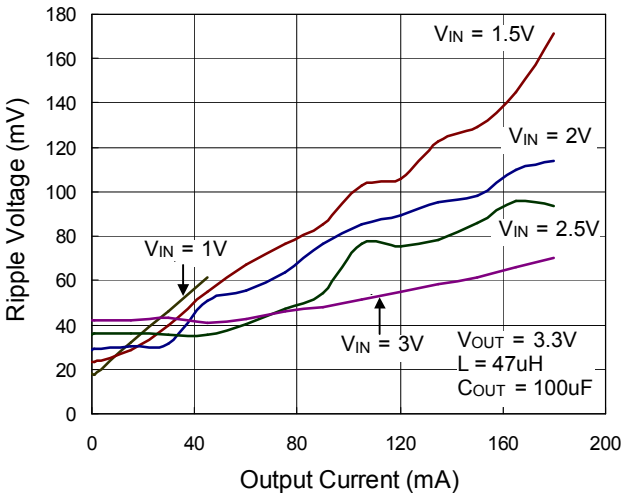
Output Voltage Vs. Output Current



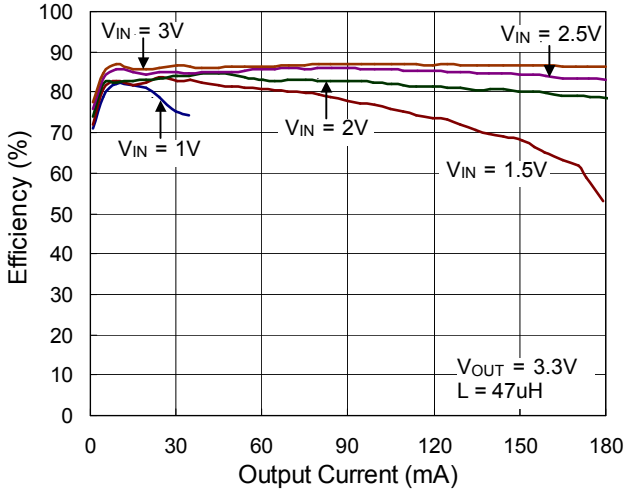
Output Current Vs Ripple Voltage



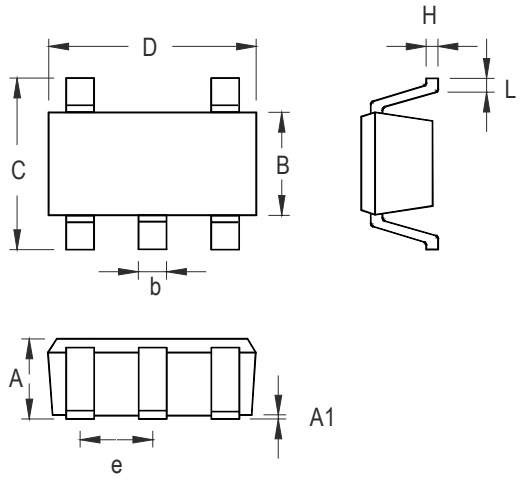
Output Current Vs Ripple Voltage



Efficiency Vs Output Current

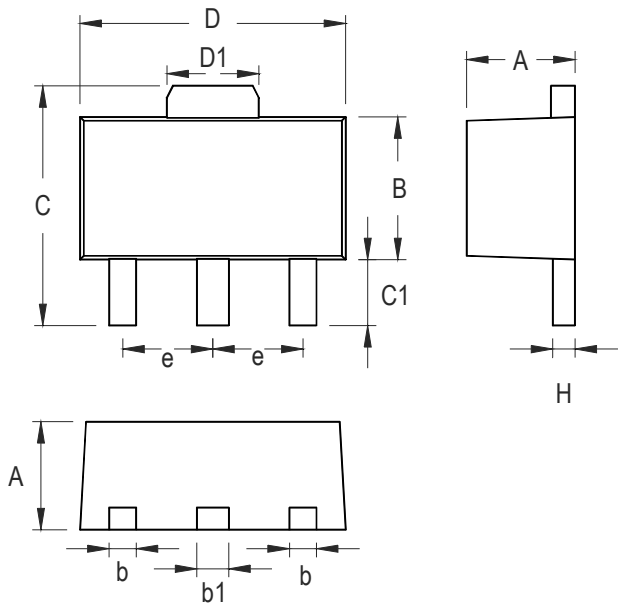


Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.559	0.014	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-5 Surface Mount Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.397	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
B	2.300	2.600	0.091	0.102
b1	0.400	0.580	0.016	0.023
C	3.937	4.250	0.155	0.167
C1	0.787	1.200	0.031	0.047
D	4.394	4.600	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.350	0.440	0.014	0.017

3-Lead SOT-89 Surface Mount

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