FOSLINK

CMOS LOW DROPOUT REGULATORS

FSP2114

■ FEATURES

- Up to 250mA Output Current
- Below 60μA Supply Current
- ±3% Voltage Accuracy
- 400mA Current Limit with Foldback Protection
- 1.5V to 4V Fixed Output Voltages
- Stable with Wide Range of Capacitance
- Compact SOT23-3L and SOT89-3L Packages

■ APPLICATIONS

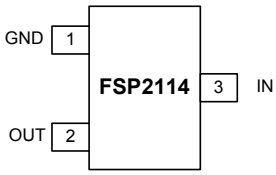
- Cellular Handsets
- Battery-Powered Equipment
- Personal Communication Devices
- Portable Information Devices
- Peripherals, Consumer Electronics

■ GENERAL DESCRIPTION

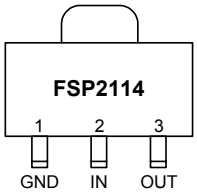
The FSP2114 is a high performance low dropout voltage regulator designed for portable applications with low quiescent current and low dropout voltage.
The FSP2114 has a typical current limit of 400mA and is capable of delivering up to 250mA output current. It is available in output voltages from 1.5V to 4V in 50mV increments. It features current limit with fold-back in short circuit.
The FSP2114 is available in SOT23-3L and SOT89-3L packages. These products are ideal for portable information devices, cellular phones, and other battery powered applications.

■ PIN CONFIGURATION

(Top View)



(Top View)



■ PIN DESCRIPTION

Pin Number		Pin Name	Pin Function
SOT23-3L	SOT89-3L		
1	1	GND	Ground
2	3	OUT	Output
3	2	IN	Input Voltage

■ Typical Application Circuits

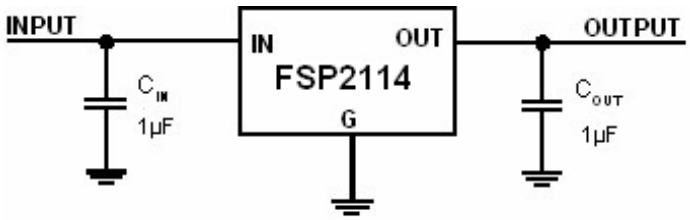


Figure 1 Typical Application Circuit

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Unit
Input Supply Voltage	-0.3 to +6	V
OUT Voltage	-0.3 to VIN + 0.3	V
Continuous OUT Current	Internally limited	A
Maximum Power Dissipation (T_A = 75°C)	0.38 (SOT23-3L)	W
	0.55 (SOT89-3L)	
Junction to Ambient Thermal Resistance (θ_{JA})	200 (SOT23-3L)	℃/ W
	130 (SOT89-3L)	
Operating Junction Temperature	-40 to 150	°C
Storage Temperature	-55 to 125	°C
Lead Temperature (Soldering, 10 sec)	300	°C

Note: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

■ ELECTRICAL CHARACTERISTICS

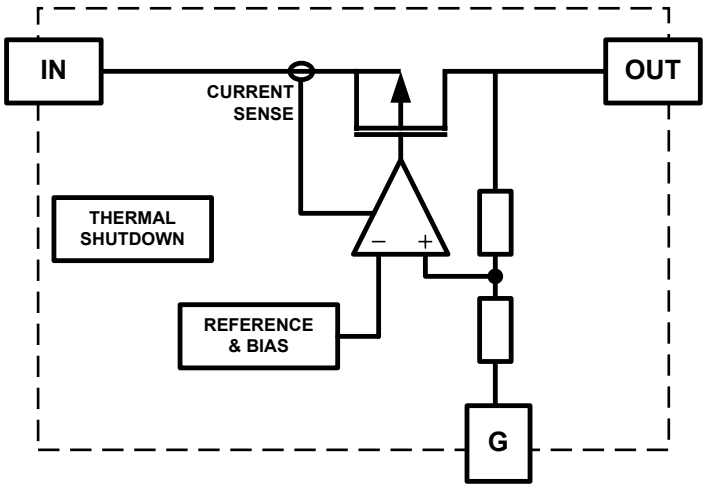
(V_{IN} = Greater of 4V or V_{OUT} + 0.5V to 5.5V, I_{OUT} = 1mA, C_{OUT} = 1μF, T_J = 25°C unless otherwise specified.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage Accuracy	ΔV_{OUT}		-3		3	%
Input Voltage Range			2.5		5.5	V
Line Regulation		V_{IN} = V_{OUT} + 1.0V to 5.5V, I_{OUT} = 40mA			0.3	%/V
Load Regulation		I_{OUT} = 1mA to 60mA		0.01		%/mA
Supply Current	I_Q	No Load			60	μA
Dropout Voltage (Note1)	V_{DO}	V_O≤1.8V，I_{OUT} = 40mA		400		mV
		1.8V <V_O<3.3V，I_{OUT} = 40mA		260		
		V_O≥3.3V，I_{OUT} = 40mA		150		
Current Limit (Note 2)	I_{LIM}	V_{OUT} ≥ 2V	250	400		mA
		V_{OUT} < 2V	150	280		
Current Limit Short Circuit Foldback	I_{LIMSC}	V_{OUT} =0 V		100		mA
Stable C_{OUT}			1		20	μF

Note 1：Dropout Voltage is defined as the different voltage between input and output when the output voltage drops 100mV below the regulation voltage at 1V different voltage.

Note 2: Current Limit is measured at by forcing output voltage to 95% of regulation voltage.

■ FUNCTIONAL BLOCK DIAGRAM



■ FUNCTIONAL DESCRIPTION

The FSP2114 is a high performance LDO with low quiescent current consumption. As illustrated in the above Figure, Functional Block Diagram, the FSP2114 architecture incorporates reference and bias circuitry, error amplifier, feedback voltage resistor divider, 2Ω P-channel power MOSFET pass transistor and current limiter.

VOLTAGE REGULATION

Normally, the LDO's error amplifier compares the output feedback voltage (via the resistor divider) with the reference voltage and generates an error signal that is used to drive the P-channel power MOSFET. When the output voltage is higher than the needed value, the P-channel is driven to maintain regulation. When the output voltage is lower than the needed value, the P-channel conducts to increase the output to its desired value. This negative feedback mechanism results in a constant regulated output voltage.

CURRENT LIMIT

When the output current is at the current limit value, the current limiter circuitry prevents the output current from increasing further. This current limit value is typically 400mA for output voltage higher than 2V, and decreases for lower output voltage parts (see Typical Performance Characteristics). As the output voltage decreases, the current limit value folds back gradually, eventually reaching 100mA at 0V.

■ APPLICATION INFORMATION

INPUT CAPACITOR

Any good quality capacitor with a value of 1μF or more can be used as an input capacitor for this LDO. Connect the input capacitor as close to the IN and G as possible. Ceramic capacitors have better performance and lower ESR (Equivalent Series Resistance) than other types of capacitors, and are recommended.

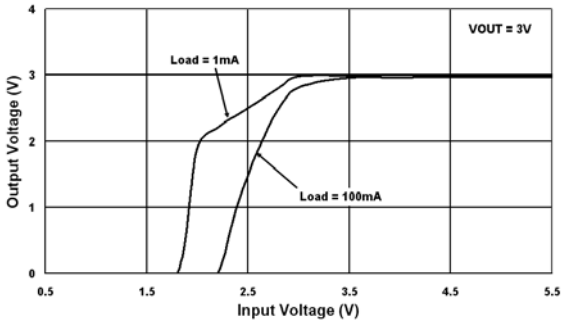
OUTPUT CAPACITOR

The FSP2114 LDO requires an output capacitor for stability. This capacitor should be connected as close to OUT and G as possible to maximize the performance of the device. The output capacitance and ESR ranges for stability are shown in the Region of Stable C_{OUT} ESR vs. Output Current graph in Typical Performance Characteristics. However, to ensure the best performance for the device, the output capacitor should have a minimum capacitance of 1μF, and an ESR value between 10mΩ and 500mΩ. High quality ceramic capacitors with X7R or X5R dielectric types are strongly recommended.

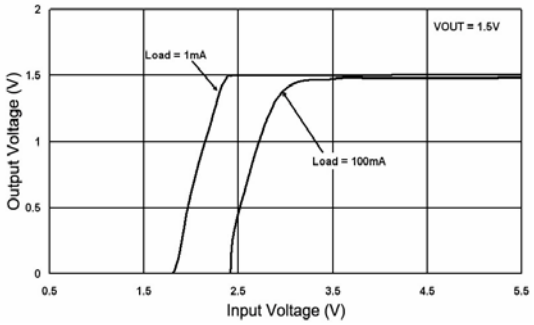
■ TYPICAL PERFORMANCE CHARACTERISTICS

(Circuit of Figure 1, capacitors = 1μF X7R, V_{IN} = 3.3V, T_A = 25°C unless otherwise specified.)

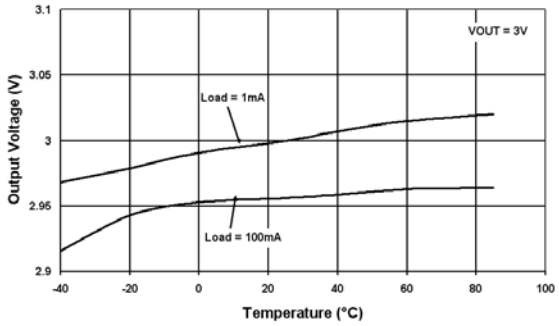
Output Voltage vs. Input Voltage



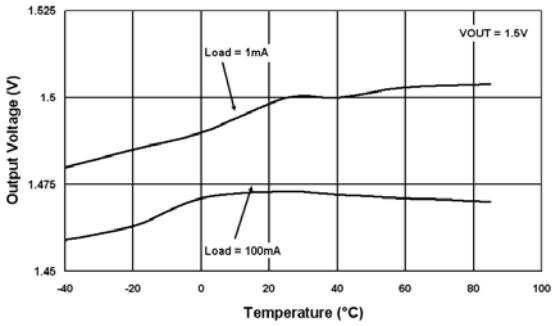
Output Voltage vs. Input Voltage



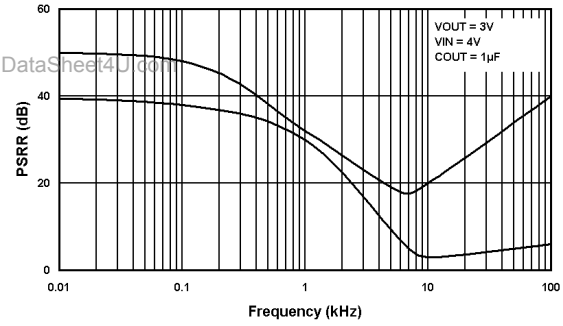
Output Voltage vs. Temperature



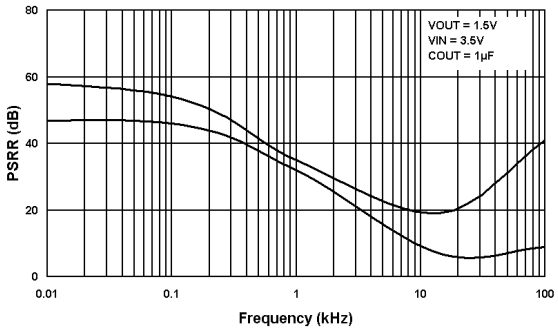
Output Voltage vs. Temperature



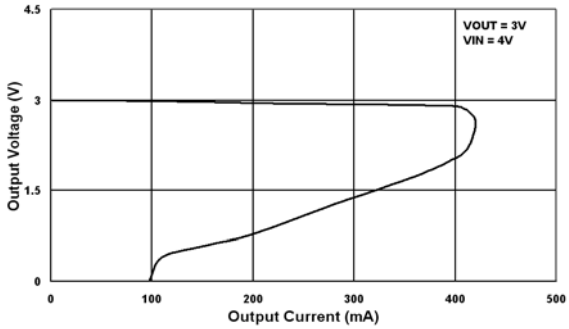
Power Supply Rejection Ratio



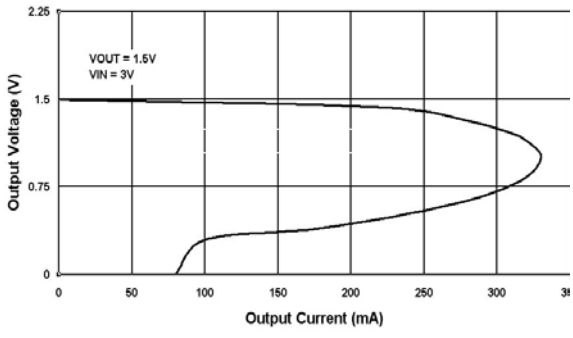
Power Supply Rejection Ratio



Current Limit Foldback



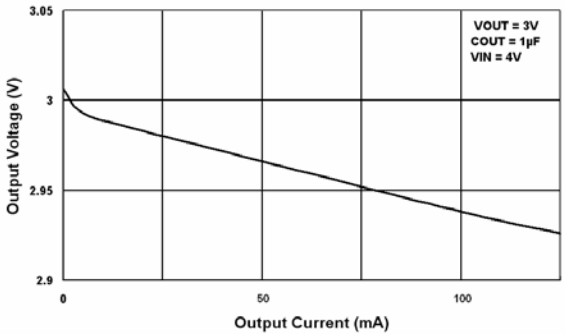
Current Limit Foldback



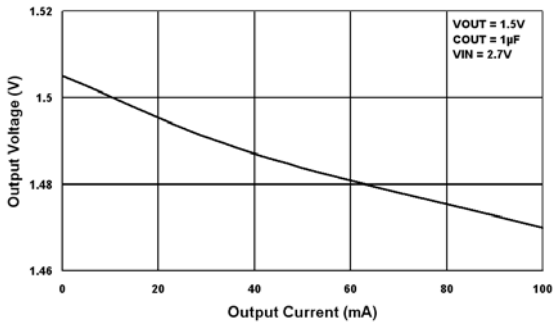
■ TYPICAL PERFORMANCE CHARACTERISTICS（CONTINUED）

(Circuit of Figure 1, capacitors = 1μF X7R, V_{IN} = 3.3V, T_A = 25°C unless otherwise specified.)

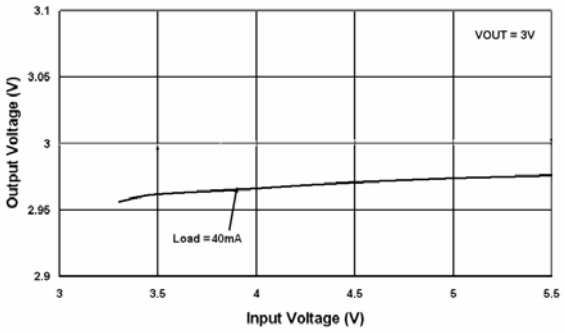
Load Regulation



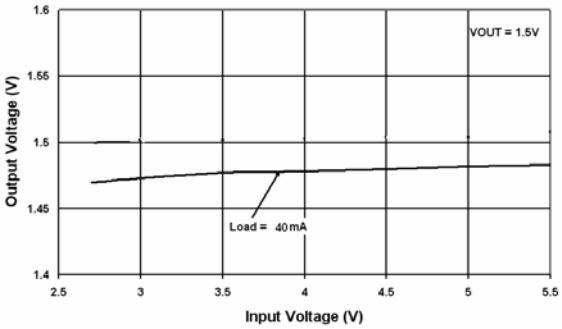
Load Regulation



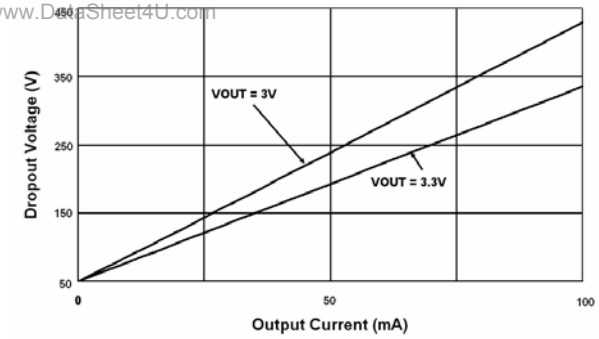
Line Regulation



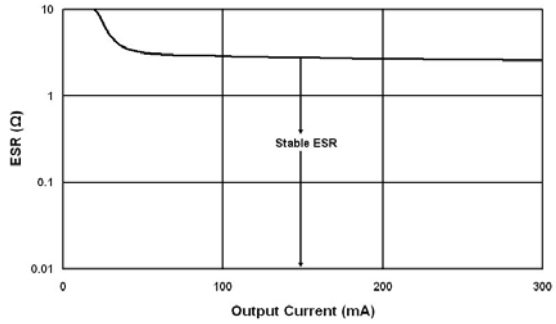
Line Regulation



Dropout Voltage vs. Output Current



Region of Stable COUT ESR vs. Output Current



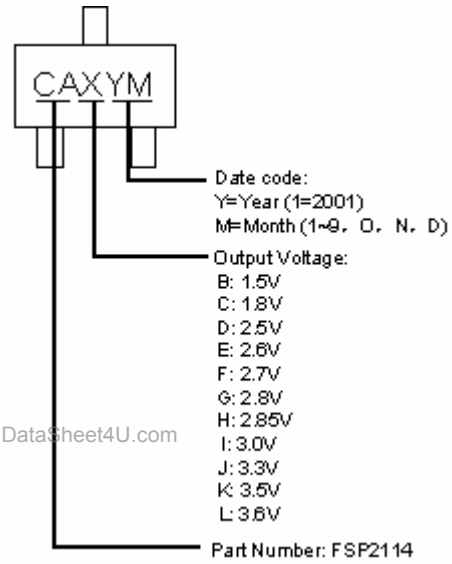
■ ORDERING INFORMATION

FSP2114XXXX

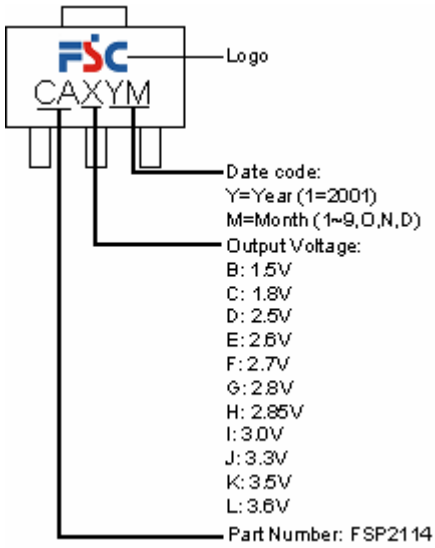
Package:	Output Voltage:	Packing:	Temperature Grade:
C: SOT23-3L Y: SOT89-3L	15: 1.5V 18: 1.8V 25: 2.5V 26: 2.6V 27: 2.7V 28: 2.8V 285: 2.85V 30: 3.0V 33: 3.3V 35: 3.5V 36: 3.6V	A: Tape & Reel	D: -40~85℃

■ MARKING INFORMATION

(1) SOT23-3L

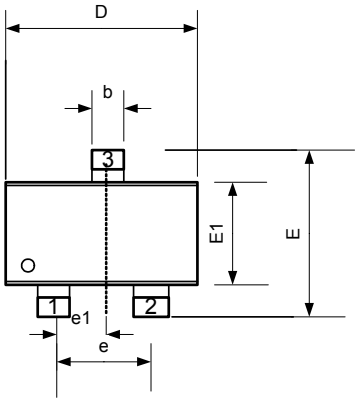


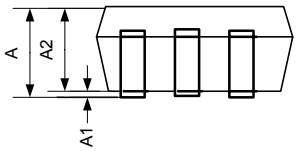
(2) SOT89-3L

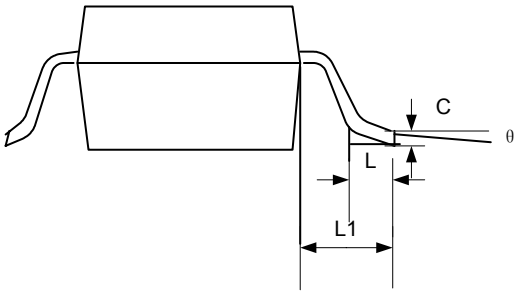


■ PACKAGE INFORMATION

(1) SOT23-3L

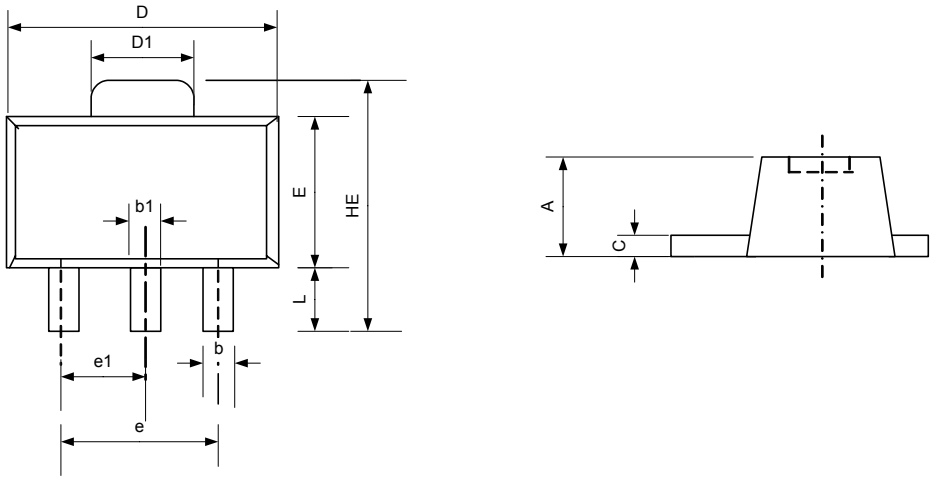






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.060	0.068
L	0.300	0.600	0.012	0.024
L1	0.700REF		0.028REF	
e1	0.95 Bsc.		0.038 Bsc.	
e	1.90 Bsc.		0.076 Bsc.	
θ	0°	8°	0°	8°

(2) SOT89-3L



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
HE	3.940	4.250	0.155	0.167
e1	1.500 TYP		0.060	
e	3.000 TYP		0.118	
L	0.900	1.200	0.035	0.047