150mA Low Dropout Voltage Regulator

FEATURES

- 5.0V and 3.3V output versions
- 1% Output Accuracy
- Very Low Quiescent Current
- Low Dropout: 300mV @ 150mA
- Very Tight Load & Line Regulation
- Very Low Temperature Coefficient
- Current and Thermal Limiting
- Requires only 1μF for Stability
- Equivalent Replacement for LT1121
- Industry Standard SOT-223 and TO-92 3 lead packages

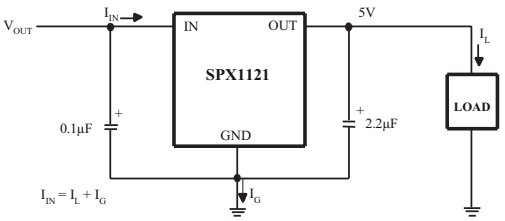
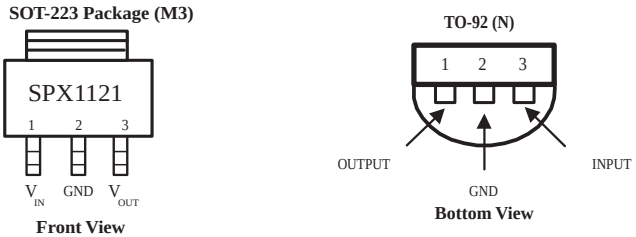


Figure 1. Fixed +5V Regulator Circuit

DESCRIPTION

The SPX1121 is a low power voltage regulator. It is an excellent choice for use in battery-powered applications such as cordless telephones, radio control systems, and portable computers. The SPX1121 features very low quiescent current and low dropout voltage (typ. 20mV at 100μA and 300mV at 150mA). A tight initial tolerance (1%), extremely good load and line regulation (0.05% typ.), and very low output temperature coefficient (20 ppm/°C typ.), make the SPX1121 useful as a low power voltage reference.

PACKAGES



ABSOLUTE MAXIMUM RATINGS

Power Dissipation.....Internally Limited
Lead Temperature (soldering, 5 seconds) .....260°C
Storage Temperature Range.....-65°C to +150°C
Operating Junction Temperature Range.....-40°C to +125°C
Input Supply Voltage.....-0.3V to +30V
ESD Rating.....2kV min

ELECTRICAL CHARACTERISTICS

V_{IN}=6V, I_L=100μA, C_L=1μF (NOTE 2), T_A = 25°C, unless otherwise specified. Boldface applies over the full operating temperature ranges.

PARAMETER	CONDITIONS	MIN.	TYP.	MAX	UNIT
3.3 V Versions					
Output Voltage	T_J=25°C 1mA ≤I_L ≤150 mA	3.267 **3.217**	3.300 **3.300**	3.333 **3.382**	V
5 V Versions					
Output Voltage	T_J = 25°C 1 mA ≤I_L ≤150 mA	4.950 **4.880**	5.000 **5.000**	5.050 **5.120**	V
All Voltage Options					
Output Voltage Temperature Coefficient	(NOTE 1)		20	100	ppm/°C
Line Regulation (NOTE 3)	6V≤V_{IN}≤30V (NOTE 4)		0.03	0.20	%
Load Regulation (NOTE 3)	100 μA≤I_L≤150 mA		0.04	0.60	%
Dropout Voltage (NOTE 5)	I_L = 100μA I_L = 1mA I_L = 100 mA I_L = 150 mA		20 110 270 300	 550	mV
Ground Current	I_L = 100μA I_L = 1mA I_L = 10mA		100 110 350	170	μA
	I_L = 50mA I_L = 100 mA I_L = 150 mA		1 3 5	 6 10	mA
Current Limit	V_{OUT} = 0		230	500	mA
Thermal Regulation			0.05	0.20	%/W
Output Noise, 10Hz to 100kHz	C_L = 1μF C_L = 200 μF		430 160		μV rms μV rms

NOTE 1: Output or reference voltage temperature coefficients defined as the worst case voltage change divided by the total temperature range.

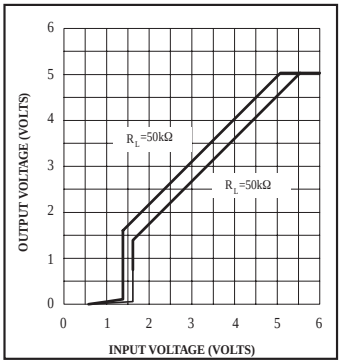
NOTE 2: Unless otherwise specified all limits guaranteed for T_J = 25°C, V_{IN} = 6V, I_L = 100μA and C_L = 1μF.

NOTE 3: Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

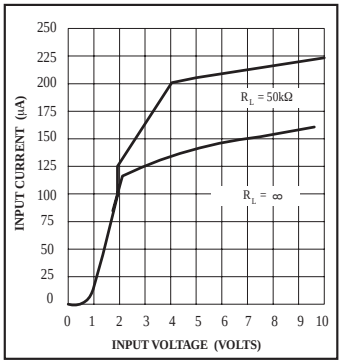
NOTE 4: Line regulation for the SPX1121 is tested at I_L = 1mA. For T_J = 125°C, line regulation is guaranteed by design. See typical performance characteristics for line regulation versus temperature and load current.

NOTE 5: Dropout voltage is defined as the input to output differential at which the output voltage drops 100 mV below its nominal value measured at 1V differential.

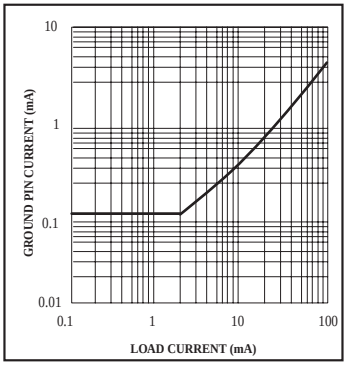
TYPICAL PERFORMANCE CHARACTERISTICS



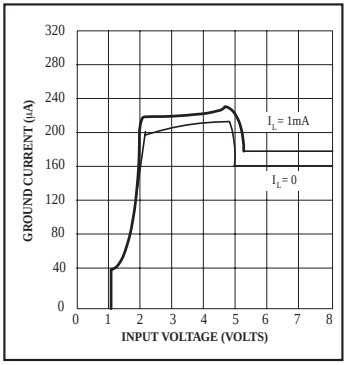
Dropout Characteristics



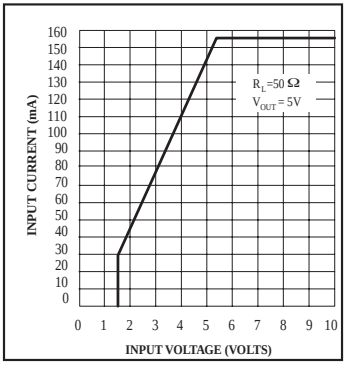
Input Current



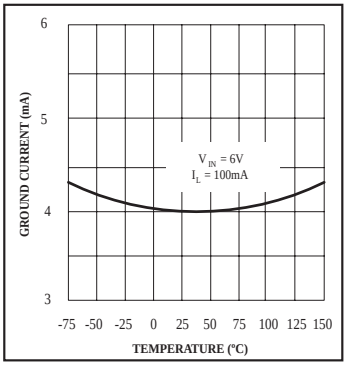
Ground Current vs. Load Current



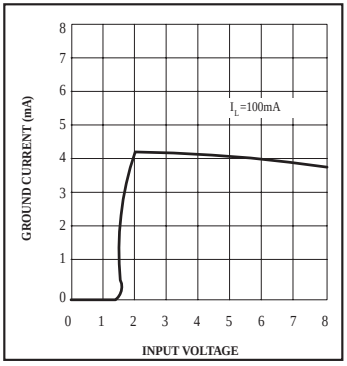
Ground Current vs. Input Voltage



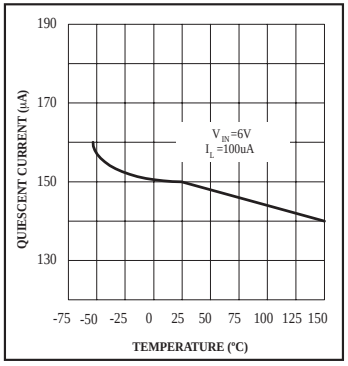
Input Current



Ground Current

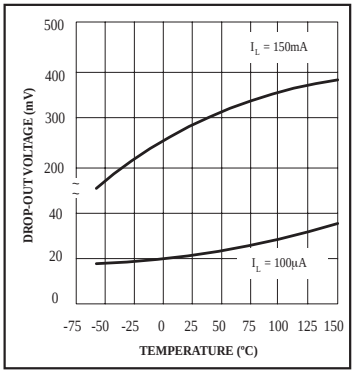


Ground Current

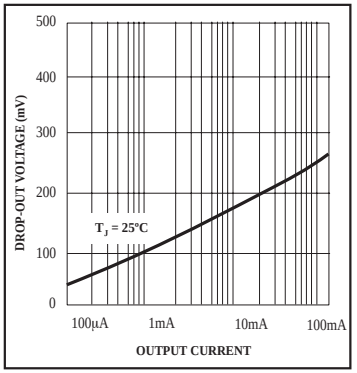


Quiescent Current

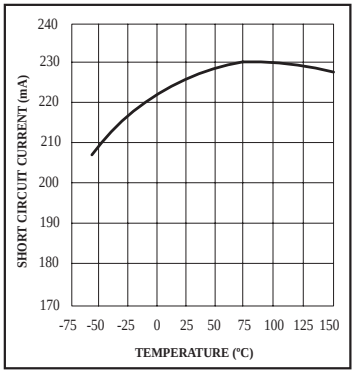
TYPICAL PERFORMANCE CHARACTERISTICS



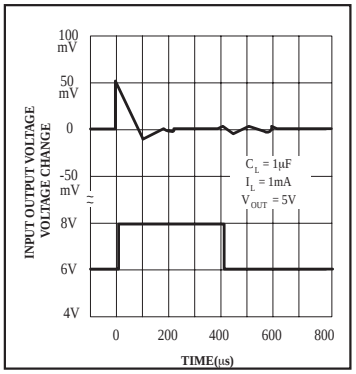
Drop-Out Voltage



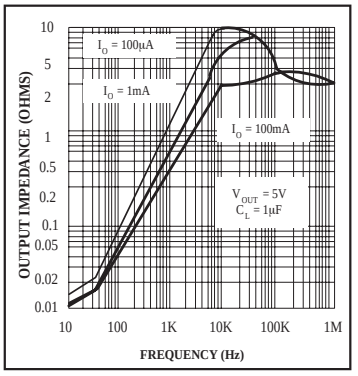
Drop-Out Voltage



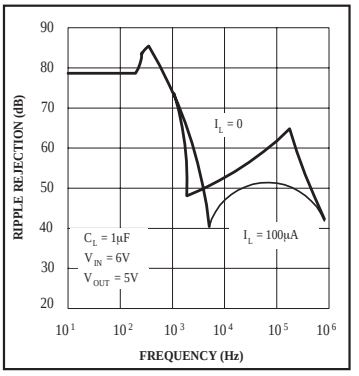
Short Circuit Current



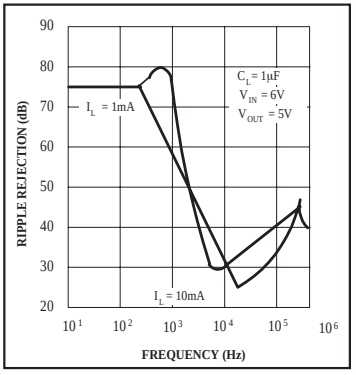
Line Transient Response



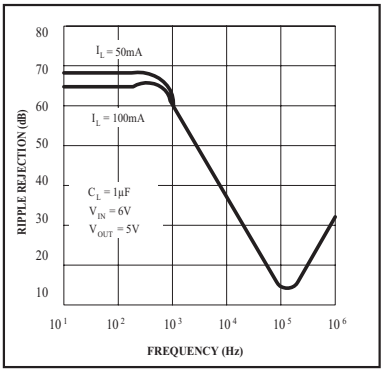
Output Impedance



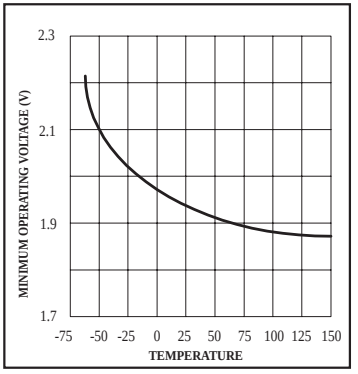
Ripple Rejection



Ripple Rejection

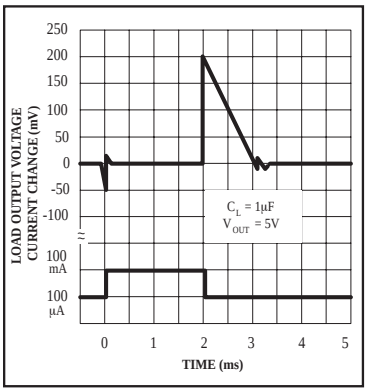


Ripple Rejection

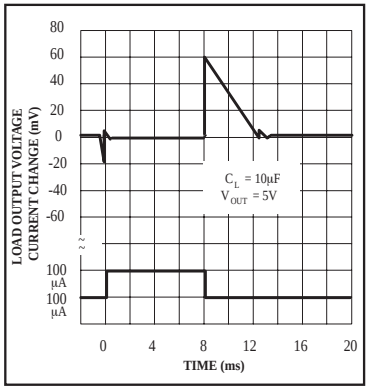


Minimum Operating Voltage

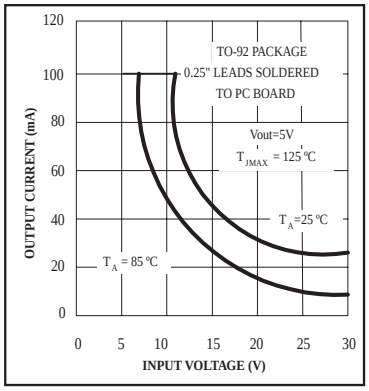
TYPICAL PERFORMANCE CHARACTERISTICS *(CONT.)*



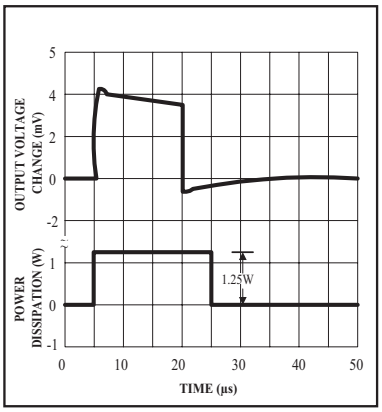
Load Transient Response



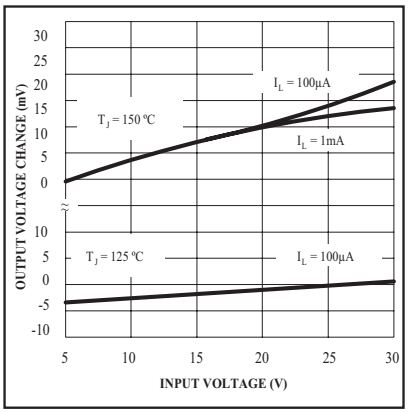
Load Transient Response



Maxium Rated Output



Thermal Response



Line Regulation

APPLICATIONS HINTS

EXTERNAL CAPACITORS

The stability of the SPX1121 requires a 1μF or greater capacitor between output and ground. Oscillation could occur without this capacitor. Most types of tantalum or aluminum electrolytic works fine here. For operations below -25°C solid tantalum is recommended since the many aluminum types have electrolytes that freeze at about -30°C. The ESR of about 5Ω or less and resonant frequency above 500kHz are the most important parameters in the value of the capacitor. The capacitors value may be increased without limit.

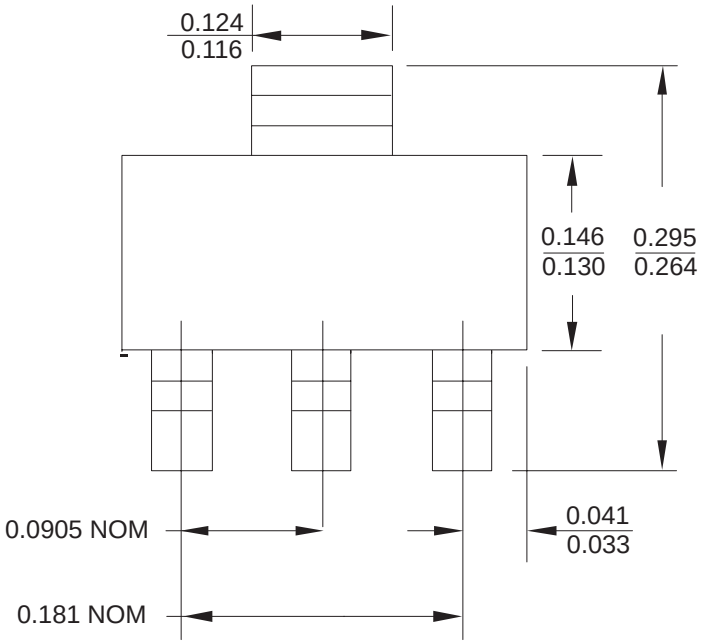
The SPX1121 unlike other low dropout regulators will remain stable and in regulation with no load in addition to the internal voltage divider. This feature is especially important in applications like CMOS RAM keep-alive.

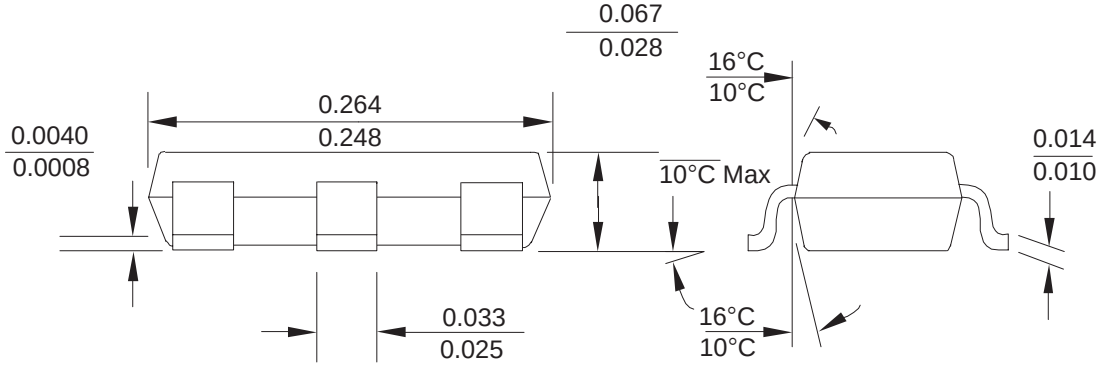
If there is more than 10 inches of wire between the input and the AC filter capacitor or if a battery is used as the input then a 0.1μF tantalum or aluminum electrolytic capacitor should be placed from the input to the ground.

REDUCING OUTPUT NOISE

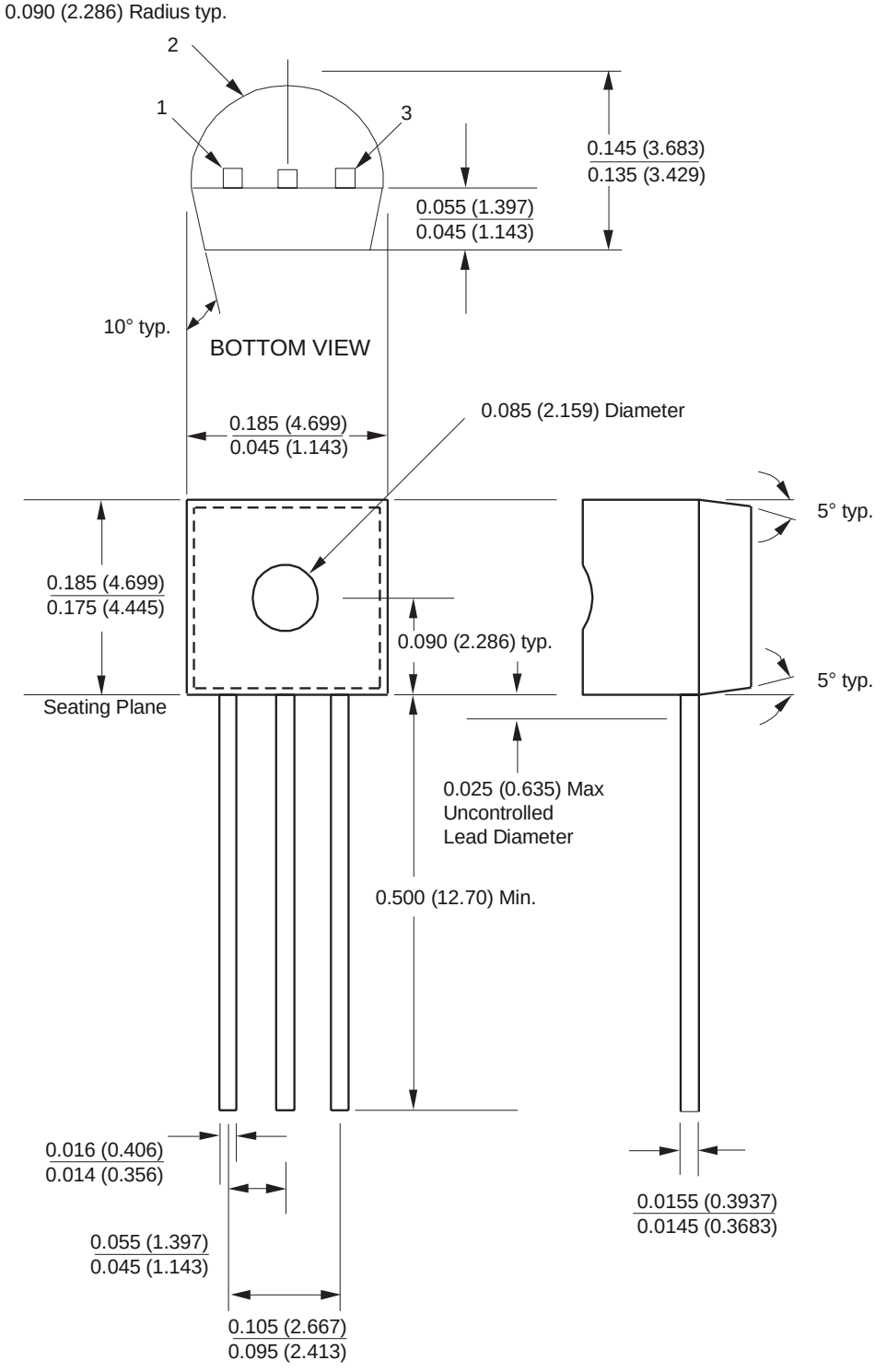
It may be an advantage to reduce the AC noise present at the output. One way is to reduce the regulator bandwidth by increasing the size of the output capacitor. Increasing the capacitor from 1μF to 220 μF decreases the noise from 430μV to 160μVRMS for a 100kHz bandwidth at 5V output.

PACKAGE: 3 Lead SOT-223





PACKAGE: TO-92



ORDERING INFORMATION

PART NUMBER	ACCURACY	OUTPUT VOLTAGE	PACKAGE
SPX1121N-3.3	1%	3.3V	3 lead TO-92
SPX1121N-5.0	1%	5.0V	3 lead TO-92
SPX1121M3-3.3	1%	3.3V	3 lead SOT-223
SPX1121M3-5.0	1%	5.0V	3 lead SOT-223

Please consult the factory for pricing and availability on a Tape-On-Reel option.

SIGNAL PROCESSING EXCELLENCE

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