SPX1521

300mA Low Dropout Voltage Regulator

FEATURES

- 1% Output Accuracy 3.3V, 5V, at 300mA Output
- Very Low Quiescent Current
- 0.3V (Typ.) Dropout Voltage at 300mA
- Extremely Tight Load and Line Regulation
- Current & Thermal Limiting
- Reverse Battery Protection
- Equivalent Replacement For LT1521

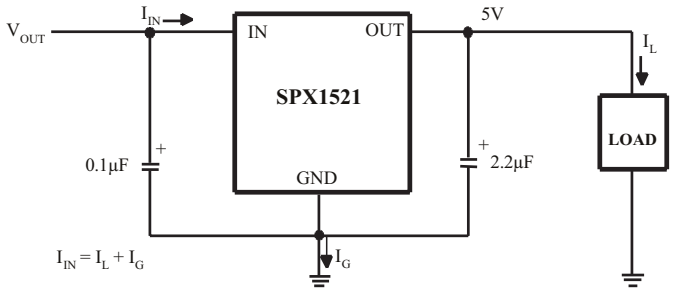


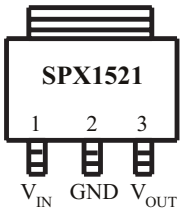
Figure 1. 5V Regulator Circuit

DESCRIPTION

The SPX1521 is a low power voltage regulator. This device is an excellent choice for use in battery-powered applications such as cordless telephones, radio control systems, and portable computers. The SPX1521 features very low quiescent current and very low dropout voltage. This includes a tight initial tolerance of ±1% max, and very low output temperature coefficient, making the SPX1521 useful as a low-power voltage reference.

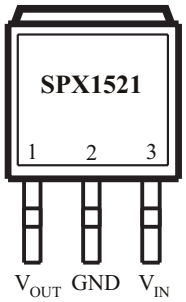
The SPX1521 is offered in a SOT-252, TO-223, TO-220 & TO-263 3 lead packages.

SOT-223 (M3)



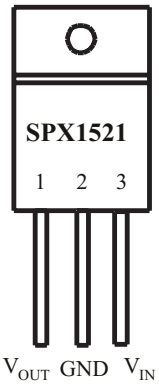
Top View

TO-263-3 (T)



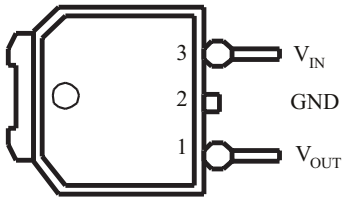
Top View

TO-220-3 (U)



Front View

TO-252 (R)



Front View

ABSOLUTE MAXIMUM RATINGS

Power Dissipation ..... Internally Limited
Lead Temp. (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 ..... -20V to +20V
Shutdown Input Voltage ..... -0.6V to +6.5V
ESD Rating ..... 2kV Min

ELECTRICAL CHARACTERISTICS

Electrical characteristics at V_{IN} = 6V, I_O = 1mA, C_{OUT} = 2.2µF, T_A = 25°C, unless otherwise specified. **Boldface** applies over the full operating temperature range.

PARAMETER	CONDITIONS (Note 2)	TYP	MIN	MAX	UNITS
3.3V Version					
Output Voltage		3.3	3.267	3.333	V
	1mA ≤ I_L ≤ 300mA	**3.3**	**3.217**	**3.382**	
Reverse Output Current	V_{OUT}= 3.3V, V_{IN}= 0V	16		25	µA
5.0V Version					
Output Voltage		5.0	4.950	5.050	V
	1mA ≤ I_L ≤ 300mA	**5.0**	**4.880**	**5.120**	
Reverse Output Current	V_{OUT}= 5.0V, V_{IN}= 0V	16		25	µA
All Voltage Options					
Output Voltage Temperature Coefficient	(Note1)	20		**100**	ppm/°C
Line Regulation	6V ≤ V_{IN} ≤ 20V (Note 4)	1.5		**20**	mV
Load Regulation (Note 3)	I_L=1 to 300mA	4		20	mV
				30	
Dropout Voltage (Note 5)	I_L=1mA	0.13		0.17	V
				0.25	
	I_L=300mA	0.30		0.55	
				0.70	
Ground Current	I_L=1mA	**100**		**150**	µA
	I_L=10mA	**350**		**500**	
	I_L=50mA	**1.5**		**3**	mA
	I_L=100mA	**2**		**6**	
	I_L=300mA	**5**		**14**	
Current Limit	V_{OUT}=0	330		**500**	mA
Ripple Rejection	V_{IN} -V_{OUT}=1V(Avg), V_{RIPPLE}=0.5Vp-p, F_{RIPPLE}=120Hz, I_{LOAD}=150mA	58	50		dB
Input Reverse Leakage Current	V_{IN}= -20V, V_{OUT}=0V			**1.0**	mA

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 are guaranteed for T_j = 25°C, V_{IN} = 6V, I_L = 1mA and C_L = 2.2µF.
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 SPX1521 is tested at 25°C for I_L = 1 mA. For T_J = 125°C, line regulation is guaranteed by design.
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.

APPLICATION HINTS

External Capacitors

The stability of the SPX1521 requires a 2.2µF 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 of 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 capacitor value can be increased without limit.

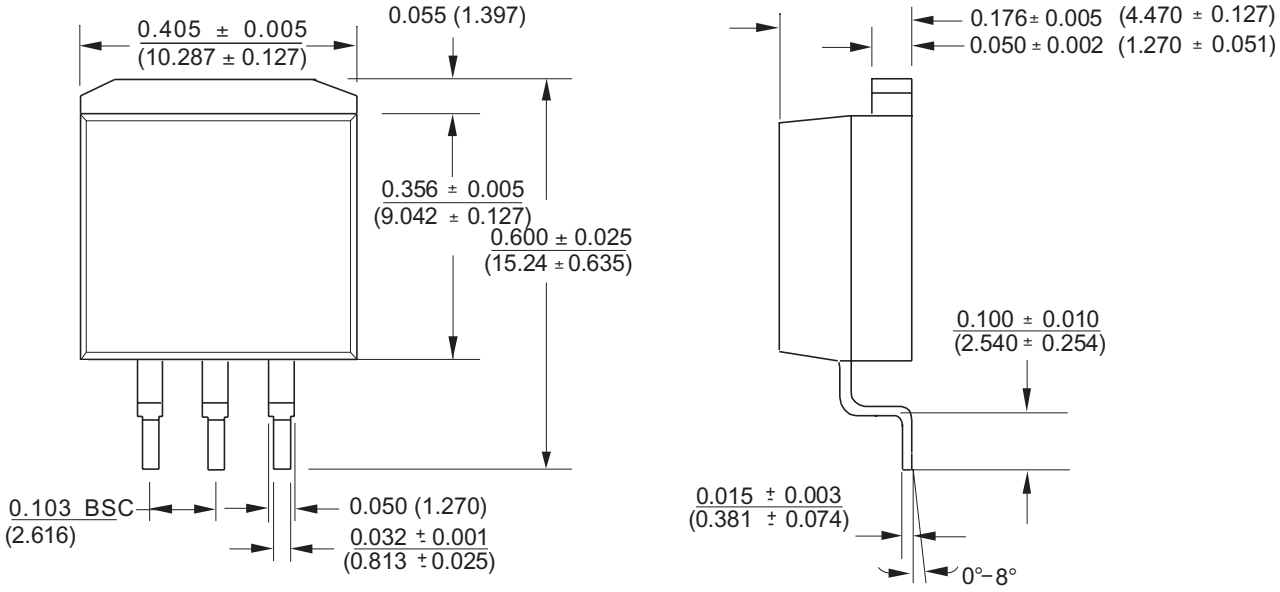
The SPX1521, unlike other low dropout regulators will remain stable and in regulation with no load in addition to the internal voltage divider. This feature is especially important in applications like CMOS RAM keep-alive.

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.

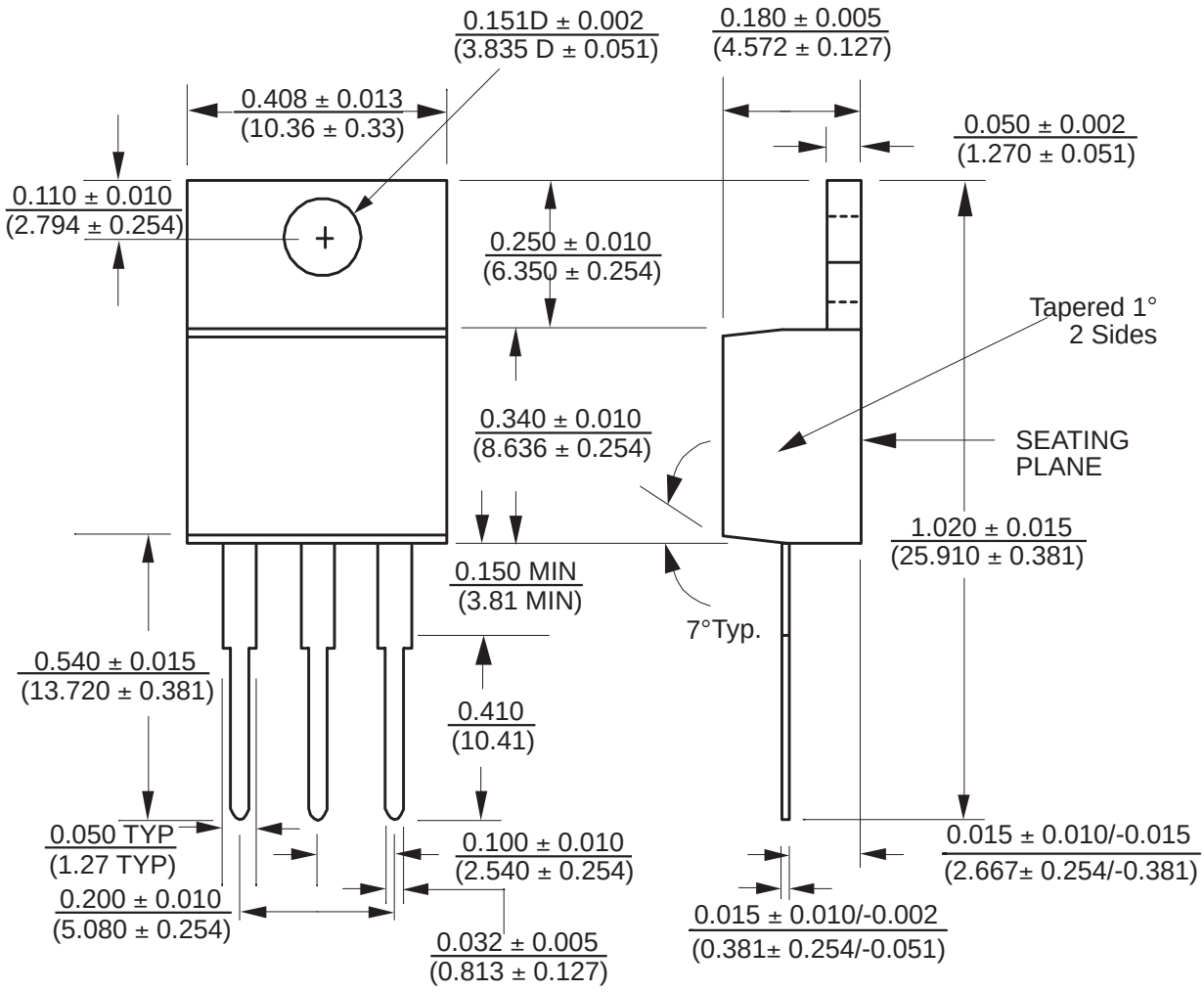
Reducing Output Noise

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 220µF only decreases the noise from 430µV to 160µVrms for a 100kHz bandwidth at 5V output.

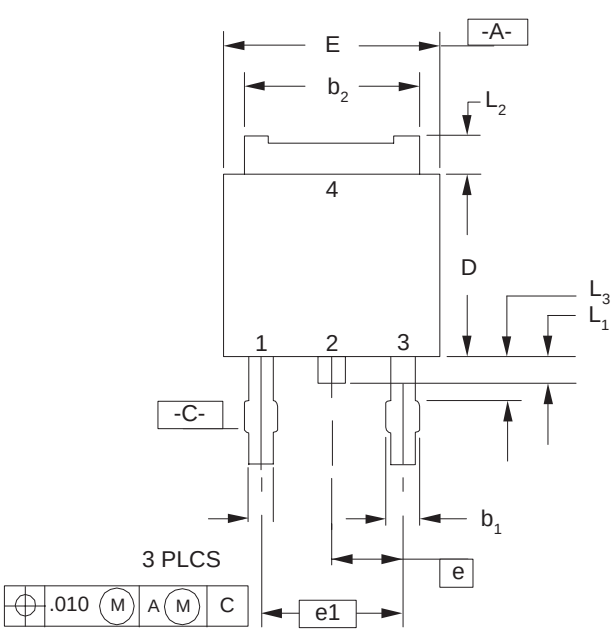
PACKAGE: 3 Lead TO-263

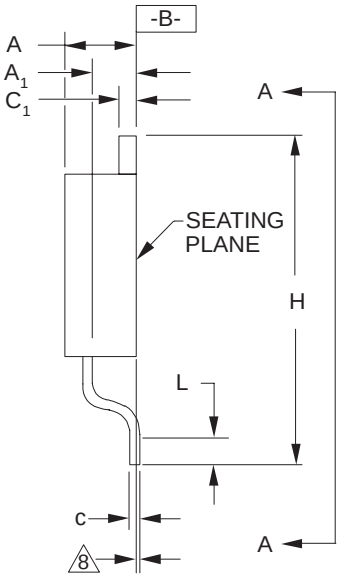


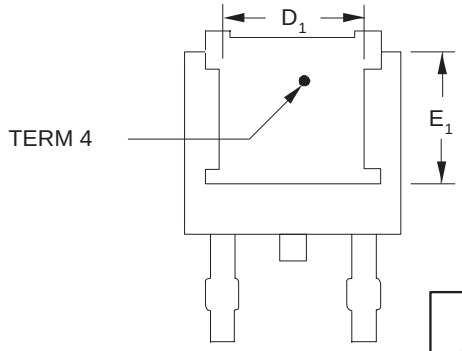
PACKAGE: 3 Lead TO-220



PACKAGE: 3 Lead TO-252







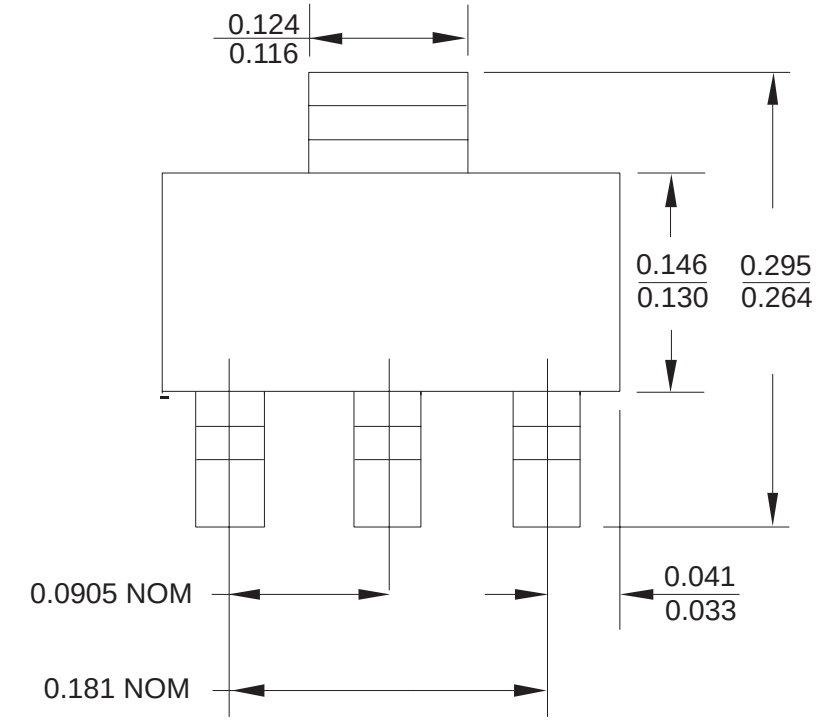
BACK VIEW A-A

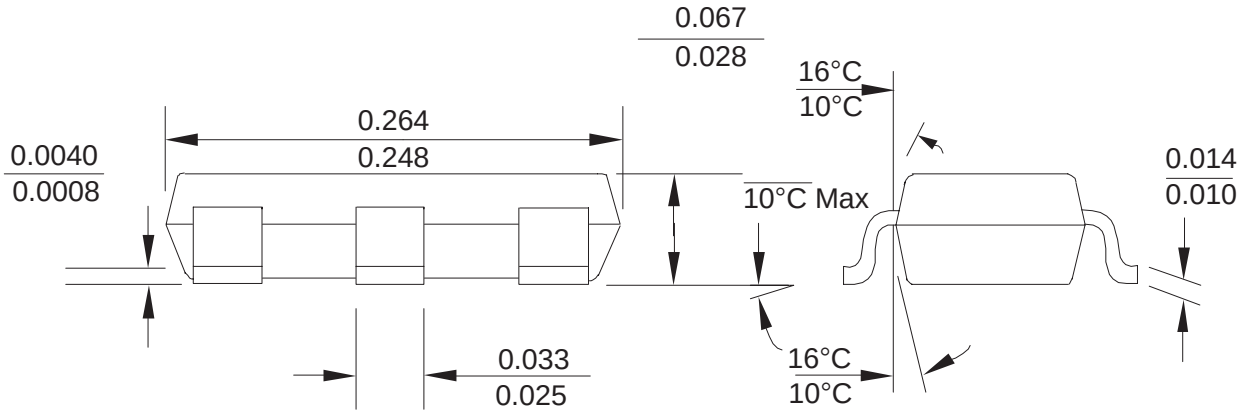
NOTES

1. Refer To Applicable Symbol List.
2. Dimensions And Tolerancing Per Ansi Y14.5m - 1982.
3. Lead Dimension Uncontrolled in L_3
4. Tab Contour Optional Within Dim. b_2 & L_2 And E_1 & D_1
5. D_1 & E_1 Establishes A Minimum Mounting Surface for Terminal 4.
6. L is the Termal Length for Soldering.
7. Controlling Dimension: Inch
8. 2 Mils Suggested For Postive Contact At Mounting.

SYMBOL	INCHES		MM		NOTE
	MIN.	MAX	MIN.	MAX	
A	0.086	0.094	2.184	2.3876	
A1	0.035	0.045	0.889	1.143	
b	0.025	0.035	0.635	0.889	
b1	0.300	0.045	7.620	1.143	
b2	0.205	0.215	5.207	5.461	4
c	0.018	0.023	0.457	0.5842	
c1	0.018	0.023	0.457	0.5842	
D	0.235	0.245	5.969	6.223	
D1	0.170	-	4.318	-	4,5
E	0.250	0.265	6.350	6.731	
E1	0.170	-	4.318	-	4,5
e	0.098		2.489		
e1	0.180		4.572		
H	0.370	0.410	9.398	10.414	
L	0.020	-	0.508	-	6
L1	0.025	0.040	0.635	1.016	
L2	0.035	0.050	0.889	1.270	4
L3	0.045	0.060	1.143	1.524	3

PACKAGE: 3 Lead SOT-223





ORDERING INFORMATION

Ordering No.	Accuracy	Output Voltage	Packages
SPX1521M3-3.3	1%	3.3V	3-Pin SOT-223
SPX1521M3-5.0	1%	5.0V	3-Pin SOT-223
SPX1521R-3.3	1%	3.3V	3-Pin TO-252
SPX1521R-5.0	1%	5.0V	3-Pin TO-252
SPX1521T-3.3	1%	3.3V	3-Pin TO-263
SPX1521T-5.0	1%	5.0V	3-Pin TO-263
SPX1521U-3.3	1%	3.3V	3-Pin TO-220
SPX1521U-5.0	1%	5.0V	3-Pin TO-220

SIGNAL PROCESSING EXCELLENCE

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