



## SPX2937

### 500mA Low Dropout Voltage Regulators (PRELIMINARY INFORMATION)

#### FEATURES

- Output Current 500mA at 15V, 12V, 10V, 8V, 5V, 3.3V and 2.5V
- Internal Short Circuit Current Limit
- Dropout Voltage 0.5V at 500mA Output
- Extremely Tight Load and Line Regulation
- Very Low Temperature Coefficient
- Mirror Image Insertion Protection
- Direct Replacement For LM2937 Socket

#### APPLICATIONS

- Battery Powered Systems
- Cordless Telephones
- Automotive Electronics
- Portable/ Palm Top / Notebook Computers
- Portable Consumer Equipment
- Portable Instrumentation
- SMPS Post-Regulator
- Voltage Reference

#### PRODUCT DESCRIPTION

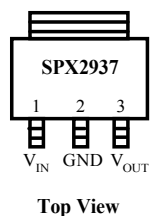
The SPX2937 is a low power positive voltage regulator. The SPX2937 offers 500mA output current with a dropout voltage of only 0.5V and over temperature dropout is up to 1V. The quiescent current is 10mA at differential output of 5V and output current of 500mA. A higher quiescent current can exist when the device is in dropout mode ( $V_{IN} - V_{OUT} \leq 3V$ )

The regulator will automatically shut down to protect both the internal circuits and the load. This device also features short circuit and thermal overload protection.

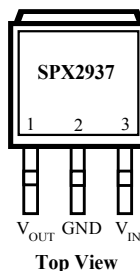
The SPX2937 is offered in a 3-pin TO-220 package compatible with other 5 volt and 3.3 volt regulators, TO-263 and SOT-223. This device offers a variety of output voltages 15V, 12V, 10V, 8V, 5V, 3.3V and 2.5V. SPX2937 is a direct replacement to LM2937.

#### PIN CONNECTIONS

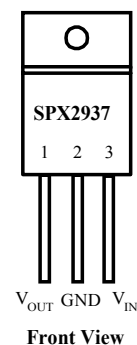
SOT-223 (M3)



TO-263-3 (T)



TO-220-3 (U)



## ABSOLUTE MAXIMUM RATINGS

Power Dissipation.....Internally Limited  
 Lead Temp. (Soldering, 10 Seconds) ..... 260°C  
 Storage Temperature Range ..... -65°C to +150°C  
 Operating Junction Temperature Range ..... -40°C to +125°C

Input Supply Voltage ..... +20V  
 Feedback Input Voltage ..... -1.5V to +20V  
 Shutdown Input Voltage.....-0.3V to +20V  
 Error Comparator Output.....-0.3V to +20V  
 ESD Rating ..... 2KV Min

**ELECTRICAL CHARACTERISTICS** at  $V_{IN} = V_O + 5V$ ,  $I_O = 500mA$ ,  $C_O = 10 \mu F$ , unless otherwise specified. Limits in **Boldface** type apply over the entire operating temperature range. All other specifications are  $T_A = 25^\circ C$ .

PARAMETER	CONDITIONS	SPX2937-2.5			SPX2937-3.3			SPX2937-5.0			SPX2937-8.0			UNITS
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Output Voltage	$5mA \leq I_O \leq 0.75A$	2.42 <b>2.38</b>	2.5	2.56 <b>2.62</b>	3.20 <b>3.14</b>	3.3	3.40 <b>3.46</b>	4.85 <b>4.75</b>	5.0	5.15 <b>5.25</b>	7.76 <b>7.60</b>	8.0	8.24 <b>8.40</b>	V
Line Regulation	$V_O + 2V \leq V_{IN} \leq 20V$ $I_O = 5mA$		7.5	<b>25</b>		9.9	<b>33</b>		15	<b>50</b>		24	<b>80</b>	mV
Load Regulation	$50mA \leq I_O \leq 500mA$		2.5	<b>25</b>		3.3	<b>33</b>		5	<b>50</b>		8	<b>80</b>	mV
Dropout Voltage	$I_L = 50 mA$ $I_L = 500mA$		110	<b>250</b>		110	<b>250</b>		110	<b>250</b>		110	<b>250</b>	mV
			0.5	<b>1.0</b>		0.5	<b>1.0</b>		0.5	<b>1.0</b>		0.5	<b>1.0</b>	V
Quiescent Current	$V_O + 2V \leq V_{IN} \leq 20V$ $I_O = 5mA$ $V_{IN} = V_O + 5V$ $I_O = 500mA$		2	<b>10</b>		2	<b>10</b>		2	<b>10</b>		2	<b>10</b>	mA
			10	<b>20</b>		10	<b>20</b>		10	<b>20</b>		10	<b>20</b>	mA
Output Noise Voltage	10Hz - 100kHz $I_O = 5mA$		75			99			150			240		$\mu V_{RMS}$
Ripple Rejection	$F_O = 120Hz$ , $1V_{RMS}$ $I_O = 500mA$		60 <b>54</b>	72		60 <b>54</b>	72	60 <b>54</b>	72		60 <b>54</b>	72		dB
Long Term Stability			10			13.2			20			32		mV/ 1000Hr
Short Circuit Current		0.6	1.0		<b>0.6</b>	1.0		1.0	<b>0.60</b>		1.0	<b>0.60</b>		A
Maximum Line Transient	$R_O = 100\Omega$ $T \leq 100ms$	<b>60</b>	75		<b>60</b>	75		<b>60</b>	75		<b>60</b>	75		V
Reverse Polarity DC Input Voltage	$R_O = 100\Omega$	-15	-30		-15	-30		-15	-30		-15	-30		V
Reverse Polarity Transient Input Voltage	$R_O = 100\Omega$ $T \leq 100ms$	<b>-50</b>	-75		<b>-50</b>	-75		<b>-50</b>	-75		<b>-50</b>	-75		V

**ELECTRICAL CHARACTERISTICS** at  $V_{IN} = V_O + 5V$ ,  $I_O = 500mA$ ,  $C_O = 10 \mu F$ , unless otherwise specified. Limits in **Boldface** type apply over the entire operating temperature range. All other specifications are  $T_A = 25^\circ C$ .

PARAMETER	CONDITIONS	SPX2937-10			SPX2937-12			SPX2937-15			UNITS
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Output Voltage	$5mA \leq I_O \leq 500mA$	9.70 <b>9.50</b>	10.0	10.3 <b>10.5</b>	11.64 11.40	12.0	12.36 12.60	14.55 <b>14.25</b>	15.0	15.45 15.75	V
Line Regulation	$V_O + 2V \leq V_{IN} \leq 20V$ $I_O = 5mA$		30	100		36	<b>120</b>		45	<b>150</b>	mV
Load Regulation	$5mA \leq I_O \leq 500mA$		10	100		12	<b>120</b>		15	<b>150</b>	mV
Dropout Voltage	$I_L = 50 mA$ $I_L = 500mA$		0.5	<b>250</b> <b>1.0</b>		110 0.5	<b>250</b> <b>1.0</b>		110 0.5	<b>250</b> <b>1.0</b>	mV V
Quiescent Current	$V_O + 2V \leq V_{IN} \leq 20V$ $I_O = 5mA$ $V_{IN} = V_O + 5V$ $I_O = 500mA$		2	<b>10</b>		2	<b>10</b>		2	<b>10</b>	mA
			10	<b>20</b>		10	<b>20</b>		10	<b>20</b>	mA
Output Noise Voltage	10Hz- 100kHz $I_O = 5mA$		300			360			450		$\mu V_{RMS}$
Long Term Stability		51 <b>45</b>	63			44			56		mV/ 1000Hr
Short Circuit Current			1.0	<b>0.6</b>		1.0	<b>0.6</b>		1.0	<b>0.6</b>	A
Maximum Line Transient	$R_O = 100\Omega$ $T \leq 100ms$	<b>60</b>	75		<b>60</b>	75		<b>60</b>	75		V
Reverse Polarity DC Input Voltage	$R_O = 100\Omega$	-15 <b>-15</b>	-30		-15 <b>-15</b>	-30		-15 <b>-15</b>	-30		V
Reverse Polarity Transient Input Voltage	$R_O = 100\Omega$ $T \leq 100ms$	<b>-50</b>	-75		<b>-50</b>	-75		<b>-50</b>	-75		V

## APPLICATION HINTS

### EXTERNAL CAPACITORS

The stability of the SPX2937 requires a  $10\mu F$  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  $-25^\circ C$  solid tantalum is recommended since the many aluminum types have electrolytes that freeze at about  $-30^\circ C$ . The ESR of about  $5\Omega$  or less and resonant frequency above 500 kHz are the most important parameters in the value of the capacitor. The capacitor value may be increased without limit.

At lower values of output current, less output capacitance is required for stability. For the currents below 10mA the value of the capacitor can be reduced to  $22\mu F$  and  $0.15\mu F$  for 1mA.

## ORDERING INFORMATION

Ordering No.	Output Voltages	Packages
SPX2937U3-2.5	2.5V	3 Lead TO-220
SPX2937U3-3.3	3.3V	3 Lead TO-220
SPX2937U3-5.0	5.0V	3 Lead TO-220
SPX2937U3-8.0	8.0V	3 Lead TO-220
SPX2937U3-10	10.0V	3 Lead TO-220
SPX2937U3-12	12.0V	3 Lead TO-220
SPX2937U3-15	15.0V	3 Lead TO-220
SPX2937T3-2.5	2.5V	3 Lead TO-263
SPX2937T3-3.3	3.3V	3 Lead TO-263
SPX2937T3-5.0	5.0V	3 Lead TO-263
SPX2937T3-8.0	8.0V	3 Lead TO-263
SPX2937T3-10	10.0V	3 Lead TO-263
SPX2937T3-12	12.0V	3 Lead TO-263
SPX2937T3-15	15.0V	3 Lead TO-263
SPX2937M3-2.5	2.5V	3 Lead SOT-223
SPX2937M3-3.3	3.3V	3 Lead SOT-223
SPX2937M3-5.0	5.0V	3 Lead SOT-223
SPX2937M3-8.0	8.0V	3 Lead SOT-223
SPX2937M3-10	10.0V	3 Lead SOT-223
SPX2937M3-12	12.0V	3 Lead SOT-223
SPX2937M3-15	15.0V	3 Lead SOT-223



SIGNAL PROCESSING EXCELLENCE

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