



LinearDimensions
SEMICONDUCTOR

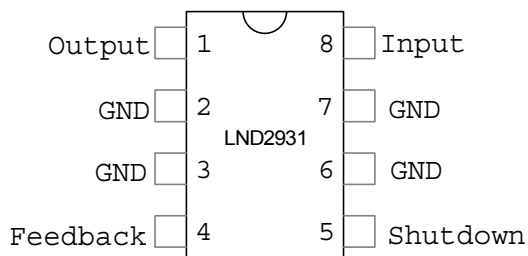
LND2931

100mA Low Dropout Voltage Regulator

GENERAL DESCRIPTION

This series of fixed-voltage and adjustable monolithic micropower voltage regulators is designed for a wide range of applications. This device is an excellent choice for use in battery-powered application. Furthermore, the quiescent current increases only slightly at dropout, which prolongs battery life. This series of fixed-voltage (Typ. 60mV at light load and 300mV at 100mV) includes a tight initial tolerance of 0.5% typ., extremely good load and line regulation of 0.05% typ., and very low output temperature coefficient. This series of fixed-voltage and adjustable regulators is offered in 3-pin TO-92 package (TO-220-5, SO-8 for LND2931) compatible with other fixed-voltage regulators.

PIN CONFIGURATION



FEATURES

- 3-terminal regulators (TO-220-5, SO-8 for LND2931)
- 100mA output within 2% over temperature
- Very low quiescent current
- Low dropout voltage (300mV Typ)
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Unregulated DC input can withstand -20V reverse battery and +60V positive transients
- Direct replacement for National LM2931 fixed series, but has lower ground current, higher accuracy of output voltage and extremely tight load and line regulation. For adjust model LND2931 see typical applications on figure 2.

APPLICATIONS

- High-efficiency linear regulators
- Battery powered systems
- Portable/Palm top/ Notebook Computers
- Portable consumer equipment
- Portable instrumentation
- Automotive Electronics
- SMPS Post Regulator



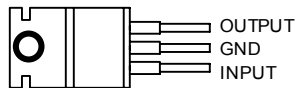
ABSOLUTE MAXIMUM RATINGS

Power Dissipation	Internally Limited
Lead Temperature(Soldering, 5 seconds)	260°C
Storage Temperature Range	-65°C to +150°C
Operating Junction Temperature Range	-55°C to +150°C
Input Supply Voltage	-20V to +35V

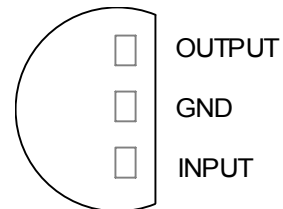
DEVICE SELECTION GUIDE

Vout , VOLTS	Device
3.3V*	LND2931-3.3
5.0V	LND2931-5.0
8.0V	LND2931-8.0
8.5V	LND2931-8.5
9.0V	LND2931-9.0
10.0V	LND2931-10
12.0V	LND2931-12
15.0V	LND2931-15
3.0v to 24V	LND2931

* Other fixed versions are also available, V_{OUT} =2.0V to 5.0V. Please consult for more information.



TO-220
(Top View)



TO-92
(Bottom View)



ELECTRICAL CHARACTERISTICS

($T_J=25^\circ\text{C}$, $I_O=100\mu\text{A}$, $V_{IN}=14\text{V}$ (for 2931-15, $V_{IN}=16\text{V}$), $C_O=100\mu\text{F}$; unless otherwise noted)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage (Fixed Model)	$-25^\circ\text{C} \leq T_J \leq 85^\circ\text{C}$ Full Operating Temperature	0.985 $ V_O $ 0.98 $ V_O $	V_O	1.015 $ V_O $ 1.02 $ V_O $	V
Output Voltage (Fixed Model)	$100\mu\text{A} \leq I_L \leq 100\text{mA}$, $T_J \leq T_{Jmax}$	0.975 $ V_O $	V_O	1.025 $ V_O $	
Input Supply Voltage				26	
Output Voltage Temperature Coefficient	(Note 1)		50	150	ppm/ $^\circ\text{C}$
Line Regulation (Note 2)	$13\text{V} \leq V_{in} \leq 26\text{V}$ (Note 3)		0.1	0.4	%
Load Regulation (Note 2)	$1\text{mA} \leq I_L \leq 100\text{mA}$		0.1	0.3	%
Dropout Voltage (Note 4)	$I_L=10\text{mA}$		60	200	mV
	$I_L=100\text{mA}$		300	600	
Ground Current (Note 5)	$I_L=100\mu\text{A}$		100	150	μA
	$I_L=10\text{mA}$		0.9	1.5	mA
	$I_L=100\text{mA}$		8	12	mA
Dropout Ground Current (Note 5)	$V_{in}=V_{out}-0.5\text{V}$, $I_L=100\mu\text{A}$		110	170	μA
Current Limit	$V_{out}=0$		160	200	mA
Thermal Regulation (Note 6)			0.05	0.2	% / W
Output Noise, 10Hz to 100KHz $I_L=100\text{mA}$	$C_L=2.2\mu\text{F}$		500		$\mu\text{V RMS}$
	$C_L=3.3\mu\text{F}$		350		
	$C_L=33\mu\text{F}$		120		
Ripple Rejection Ratio	$I_O=10\text{mA}$, $f=120\text{Hz}$, $C_O=100\mu\text{F}$, $V_{in}=V_O+3\text{V}+2\text{Vpp}$	60			dB
TO-220-5, SO-8 Versions Only					
Reference Voltage		1.21	1.235	1.26	V
Reference Voltage	Over Temperature (note 7)	1.185		1.285	
Feedback Pin Bias Current			20	40	nA
Reference Voltage Temperature Coefficient	(Note 1)		50		ppm/ $^\circ\text{C}$
Feedback Pin Bias Current Temperature Coefficient			0.1		nA/ $^\circ\text{C}$
Shutdown Input					
Input Logic Voltage	Low (Regulator ON) High (Regulator OFF)	2	1.3	0.7	V
Shutdown Pin Input Current	$V_S=2.4\text{V}$		30	50	μA
	$V_S=26\text{V}$		450	600	
Regulator Output Current in Shutdown	(Note 8)				
	$5.0\text{V} \leq V_{out} < 15.0\text{V}$			10	
	$3.3\text{V} \leq V_{out} < 5.0\text{V}$			20	
	$2.0\text{V} \leq V_{out} < 3.3\text{V}$			30	



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

Note 2: Regulations are 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 3: Line regulation is tested at 150°C for $I_L = 1\text{mA}$, for $I_L = 100\mu\text{A}$ and $T_J = 125^\circ\text{C}$, line regulation is guaranteed by design to 0.2%. For LND2931-15 $16\text{V} \leq V_{in} \leq 26\text{V}$.

Note 4: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential.

Note 5: Ground pin current is the regulator quiescent current. The total current drawn from the source is the sum of the ground pin current and output load current.

Note 6: Thermal regulation is the change in output voltage at a time T after a change in power dissipation, excluding load or line regulation effects. Specifications are for a 50mA load pulse (1.25W pulse) for T=10ms.

Note 7: $V_{ref} \leq V_{out} \leq (V_{in} - 1\text{V})$, $2.3\text{V} \leq V_{in} \leq 26\text{V}$, $100\mu\text{A} \leq I_L \leq 100\text{mA}$, $T_J \leq T_{jmax}$.

Note 8: $V_{shutdown} \geq 2\text{V}$, $V_{IN} \leq 26\text{V}$, $V_{out} = 0\text{V}$.

BLOCK DIAGRAM AND TYPICAL APPLICATIONS

Figure 1: Fixed Regulator

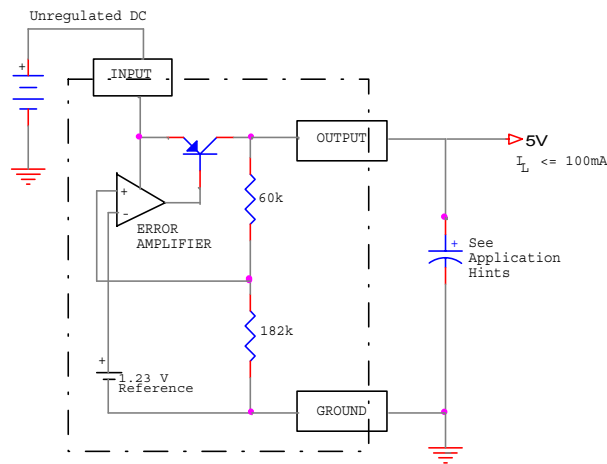
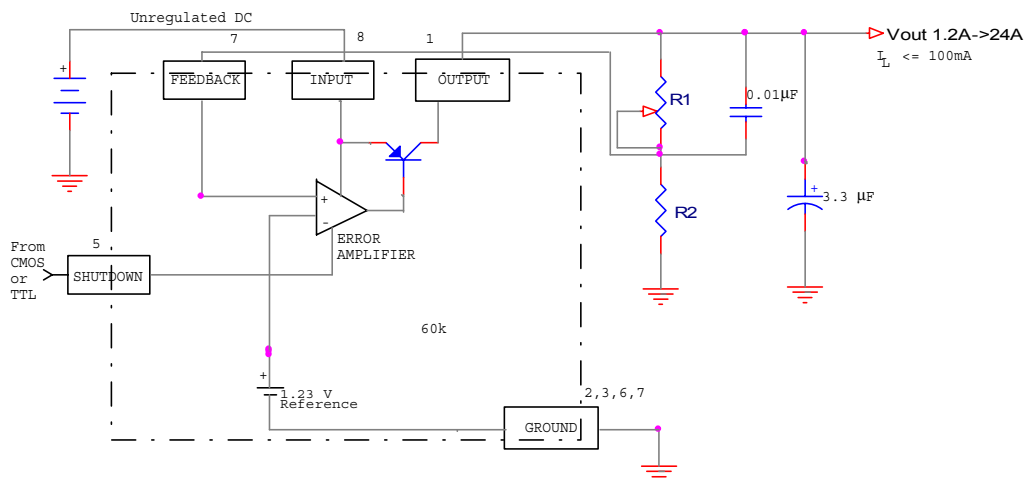
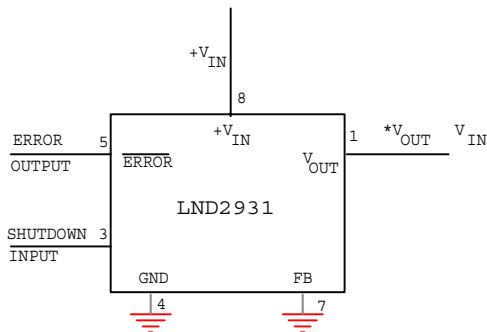


Figure 2: Adjustable Regulator

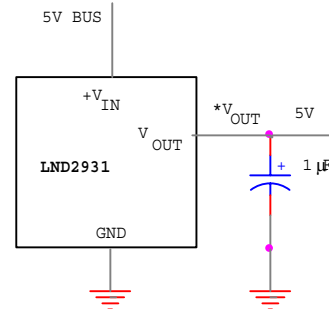




TYPICAL APPLICATIONS



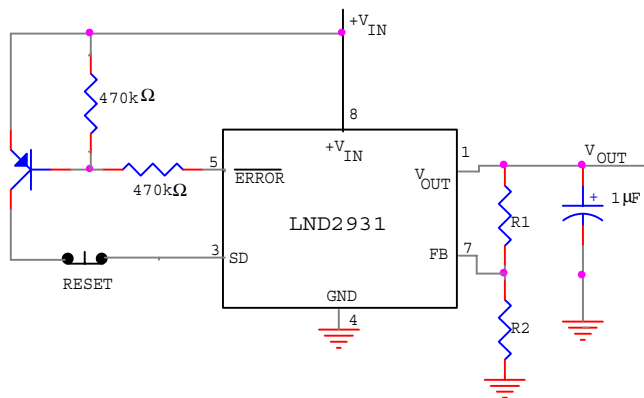
*Minimum input-output voltage ranges from 40mV to 400mV, depending on load current. Current limit is typically 160mA.



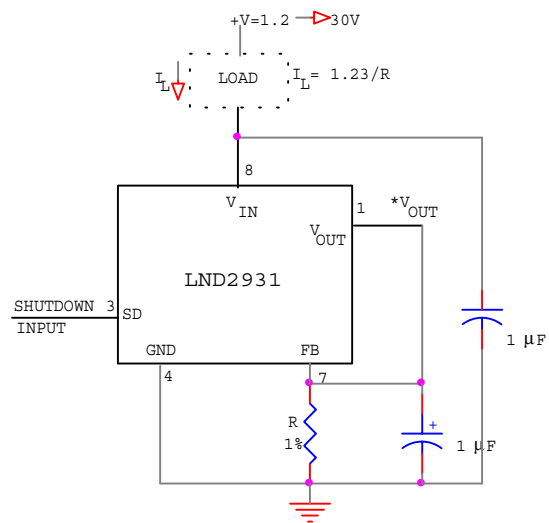
*Minimum input-output voltage ranges from 40mV to 400mV, depending on load current. Current limit is typically 160mA.

Wide Input Voltage Range Current Limiter

5V Current Limiter



Latch Off When Error Flag Occurs



Low Drift Current Source