100mA Low Dropout Positive Voltage Regulators

Rev.1. June 2010.

VSP MIKRON | **LP2951-XX**

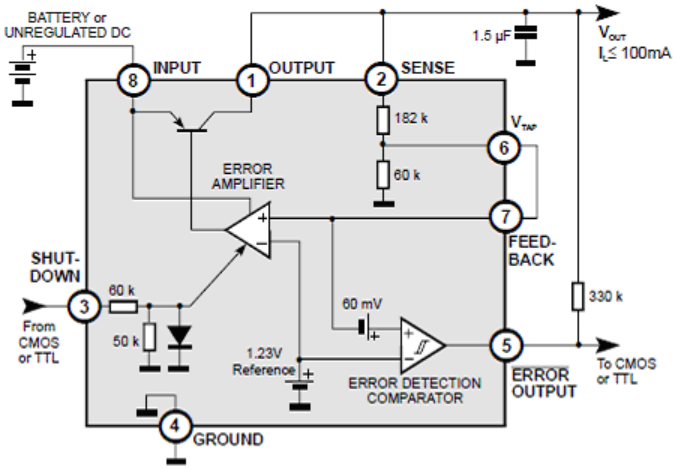
GENERAL DESCRIPTION

The 2951 is an adjustable micro power voltage regulator suitable for use in battery-powered systems. This regulator has various functions such as alarm which warns of a low output voltage, often due to falling batteries on the input, the external shutdown which enables the regulator to be switched ON and OFF, current and temperature limiting.

FEATURES

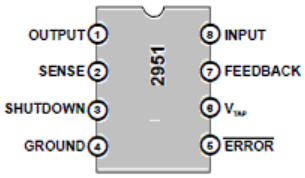
- High accuracy output voltage
- Guaranteed 100mA output
- Very low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Needs only 1µF for stability
- Error Flag warns of output dropout
- Logic-Controlled electronic shutdown
- Output programmable from 1.24 to 29V

BLOCK DIAGRAM



DIP-8 2951-XX

PIN CONNECTION



ABSOLUTE MAXIMUM RATINGS

PARAMETER	MAXIMUM	UNIT
Power Dissipation	Internally Limited	W
Lead Temperature (Soldering, 5 seconds)	260	°C
Storage Temperature Range	-65 to +150	°C
Operating Junction Temperature Range	-55 to +150	°C
Input Supply Voltage	-0.3 to +30	V
Feedback Input Voltage	-1.5 to +30	V
Shutdown Input Voltage	-0.3 to +30	V
Error Comparator Output	-0.3 to +30	V

ELECTRICAL CHARACTERISTICS

Electrical characteristics at T_A = 25°C, V_{IN} = 15V (unless otherwise noted)

PARAMETER	TEST CONDITIONS (NOTE 2)	MIN	TYP	MAX	UNIT
Output Voltage	-25°C ≤ T_J ≤ 85°C Full Operating Temperature	0.985 |V_O| 0.980 |V_O|	V_O	1.015 |V_O| 1.020 |V_O|	V
Output Voltage	100µA ≤ I_L ≤ 100mA, $T_J \leq T_{JMAX}$	0.976 |V_O|	V_O	1.024 |V_O|	V
Output Voltage Temperature Coefficient	(Note 1)		50	150	ppm/°C
Line Regulation (Note 3)	V_O +1V ≤ V_{IN} ≤ 30V (Note 4)		0.04	0.4	%
Load Regulation (Note 3)	100µA ≤ I_L ≤ 100mA		0.1	0.3	%
Dropout Voltage (Note 5)	I_L=100 µA		50	80	mV
	I_L=100 mA		380	450	mV
Ground Current	I_L=100 µA		75	120	µA
	I_L=100 mA		8	12	mA
Dropout Ground Current	V_{IN} = V_O - 0.5V, I_L= 100 µA		110	170	µA

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ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical characteristics at T_A = 25°C, V_{IN} = 15V (unless otherwise noted)

PARAMETER	TEST CONDITIONS (NOTE 2)	MIN	TYP	MAX	UNIT
Current Limit	V_{OUT} = 0		160	200	mA
Thermal Regulation			0.05	0.2	%/W
Output Noise, 10Hz to 100KHz	C_L=1µF C_L=200µF C_L=3.3µF (Bypass=0.01µF pins 7 to 1)		430 160 100		µV rms
Reference Voltage		1.21	1.235	1.26	V
Reference Voltage	Over Temperature (Note 6)	1.185		1.285	
Feedback Pin Bias Current			20	40	nA
Reference Voltage Temperature Coefficient	(Note 7)		50		ppm/°C
Feedback Pin Bias Current Temperature Coefficient			0.1		nA/°C
ERROR COMPARATOR					
Output Leakage Current	V_{OH} = 30V		0.01	1.0	µA
Output Low Voltage	V_{IN} = 4.5V, I_{OL} = 400µA		150	250	mV
Upper Threshold Voltage	(Note 8)	40	60		mV
Lower Threshold Voltage	(Note 8)		75	95	mV
Hysteresis	(Note 8)		15		mV
SHUTDOWN INPUT					
Input Logic Voltage	Low (Regulator ON) High (Regulator OFF)	 2	1.3	0.7	V
Shutdown Pin Input Current	V_S = 2.4V V_S = 30V		30 450	50 600	µA
Regulator Output Current in Shutdown	(Note 9)				
	V_{OUT} = 5.0 V		3	10	µA
	3.3V ≤ V_{OUT} < 5.0 V			20	µA
	2.0V ≤ V_{OUT} < 3.3 V			30	µA

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} = V_O + 1V, I_L = 100µA and C_L = 1µF. Additional conditions are feedback tied to -XX V_{TAP} and output tied to output SENSE (V_{OUT} = XX V) and $V_{SHUTDOWN}$ ≤ 0.8 V.

Note 3: Regulations 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 MIK2951-xx is tested at 150°C for I_L = 1mA. For I_L = 100µA and T_J = 125°C, line regulation is guaranteed by design to 0.2%.

Note 5: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below its nominal value measured at 1V differential. At very low values of programmed output voltage, the minimum input supply voltage of 2V (2.3V over temperature) must be taken into account.

Note 6: V_{REF} ≤ V_{OUT} ≤ (V_{IN} - 1V), 2.3V ≤ V_{IN} ≤ 30V, 100µA ≤ I_L ≤ 100mA, T_J ≤ T_{JMAX}.

Note 7: Output or reference voltage temperature coefficient is defined as the worst case voltage change divided by the total temperature range.

Note 8: Comparator thresholds are expressed in terms of a voltage differential at the feedback terminal below the nominal reference voltage measured at V_O + 1V input. To express these thresholds in terms of output voltage change, multiply by the error amplifier gain = V_{OUT}/V_{REF}= (R1 + R2)/R2. For example, at a programmed output voltage of 5V, the error output is guaranteed to go low when the output drops by 95mV x 5V/1.235V=384mV. Thresholds remain constant as a percent of Vout as Vout is varied, with the dropout warning occurring at typically 5% below nominal, 7.5% guaranteed.

Note 9: $V_{SHUTDOWN}$ ≥ 2V, Vin ≤ 30V, V_{OUT} = 0, FEEDBACK pin tied to -XX V_{TAP}.

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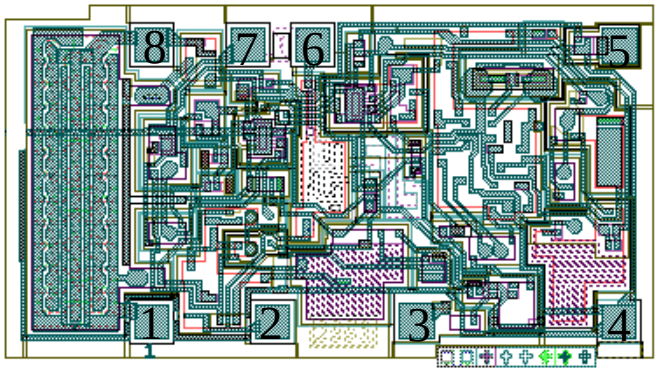
Device Selection Guide

Vout,V	Device
2.5	LP2951-2.5
2.85	LP2951-2.85
3.0	LP2951-3.0
3.3	LP2951-3.3
5.0	LP2951-5.0

Pad Location



Chip size: 2.05x1.15 mm

Wafer Thickness: 460±30µm (or 280±30µm)
Top metal: AlSi
Backside metal: - (or Ti-Ni (V)-Ag)
Wafer size: 100 mm

Pad Location Coordinates

Pad №	Pad Name	X(um)	Y(um)	Pad size(um)
1	Output	440	110	85 x 85
2	Sense	810	110	85 x 85
3	Shutdown	1250	110	85 x 85
4	Ground	1865	110	85 x 85
5	Error	1865	950	85 x 85
6	XX V tap	935	950	85 x 85
7	Feedback	735	950	85 x 85
8	Input	440	950	85 x 85