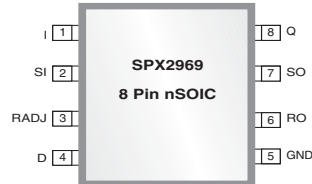


150mA Low Dropout Voltage Regulator

FEATURES

- 5V Fixed Output
- 150mA current capability
- 250mV Dropout
- Programmable Reset Threshold
- 250 μ A Quiescent Current
- Over Temperature Protection
- Reverse Polarity Protection
- Integrated Pull Up Resistor on Logic Outputs
- -40° to +125°C Operating Range



Now Available in Lead Free Packaging

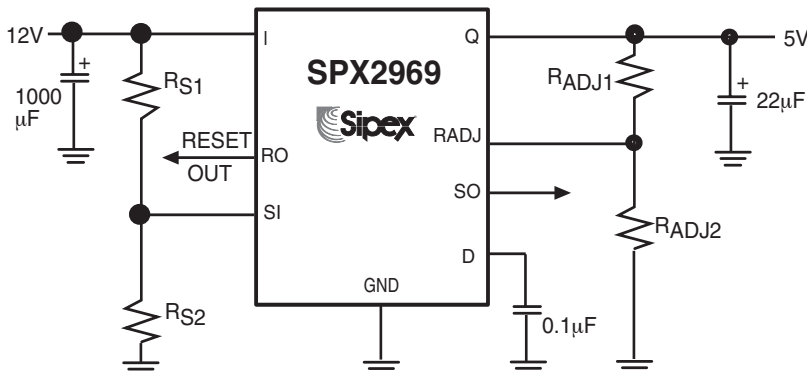
APPLICATIONS

- Automotive
- Industrial
- Wireless Base Station

DESCRIPTION

The SPX2969 is a low dropout linear regulator with integrated PNP pass transistor. This part is designed for high voltage applications, which can withstand up to 45V and 125°C. The output voltage is set at a fixed 5V, and the part is guaranteed to deliver at least 150mA. The SPX2969 provides multiple protection mechanisms, including over-temperature and over-current detection. The part has a built-in reset circuit to monitor when the output voltage is below 4.65V. The reset voltage threshold can be programmed down to 3.5V using an external resistor voltage divider, while the reset timing can be programmed via an external capacitor. A built-in comparator compares the signal at the pin SI, normally fed by a voltage divider from the input voltage, with the reference and gives an early warning on the pin SO. Both the sense output and the reset output delay signals contain integrated 20k Ω pull up resistors. The part is available in an 8 Pin nSOIC package.

TYPICAL APPLICATION CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Input Voltage -40V to 45V
 Input Current internally limited
 Sense Input Voltage -40V to 45V
 Sense Input Current -1mA to 1mA
 Reset Threshold Voltage -0.3 to 7V
 Reset Threshold Current -10 to 10mA
 Reset Delay Voltage -0.3 to 7V
 Reset Delay Current internally limited
 Ground Current 50mA (min)
 Reset Output Voltage -0.3 to 7V
 Reset Output Current internally limited
 Sense Output Voltage -0.3 to 7V
 Sense Output Current internally limited

Output Voltage -0.3 to 7V
 Output Current internally limited

Thermal Data
 Junction Ambient (8 Pin NSOIC) 163°C/W
 Junction to Pin 4, all GND Pins grounded 30°C/W
 Storage Temperature -50°C to +150°C
 Junction Temperature. (Note 1).....-40°C to +150°C

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

ELECTRICAL CHARACTERISTICS

$V_{IN} = 13.5V$; $-40^{\circ}C < T_J < 125^{\circ}C$. The ♦ denotes the specifications which apply over the full operating temperature range, unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS		CONDITIONS
Output Voltage	V_O	4.90	5.00	5.10	V	♦	$1mA < I_Q < 100mA$ $6V < V_I < 16V$
Current Limit	I_Q	150	250	500	mA	♦	
Current Consumption $I_Q = I_I - I_Q$	I_q	-	240	300	μA		$I_Q < 1 mA, T_J < 85^{\circ}C$
Current Consumption $I_Q = I_I - I_Q$	I_q	-	250	700	μA	♦	$I_Q = 10mA$
Current Consumption $I_Q = I_I - I_Q$	I_q	-	2	8	mA	♦	$I_Q = 50mA$
Dropout Voltage	V_{DR}	-	0.25	0.5	V	♦	$I_Q = 100mA (Q - I)$ when output drops below 2% (see note 2)
Load Regulation	V_O	-	2	20	mV	♦	$I_Q = 5mA$ to $100mA$
Line Regulation	V_O	-	1	10	mV	♦	$V_I = 6V$ to $26V$ $I_Q = 1 mA$
Reset Generator							
Threshold Voltage	V_{RT}	4.50	4.65	4.80	V	♦	
Reset Adjust	$V_{RADJ, TH}$	1.26	1.35	1.44	V	♦	$V_O = 3.5V$ (see note 3)
Reset Pullup	-	10	20	40	K Ω	♦	
Saturation Voltage	$V_{RO, SAT}$	-	0.1	0.4	V	♦	R_{int}

Note 1: Specifications in the $-40^{\circ}C$ to $150^{\circ}C$ range are guaranteed by design, not production tested.

Note 2: Dropout voltage = $V_I - V_O$ measured when the output voltage has dropped 100mV from the nominal value obtained at 13.5V input.

Note 3: The reset threshold V_{RT} can be decreased via an external voltage divider connected to the RADJ. In this case the reset condition is reached if $V_Q < V_{RT}$ and $V_{RADJ} < V_{RADJ, TH}$. Dimensioning the voltage divider according to: $V_{THRES} = V_{RADJ, TH} \times (RADJ1 + RADJ2) / RADJ2$.

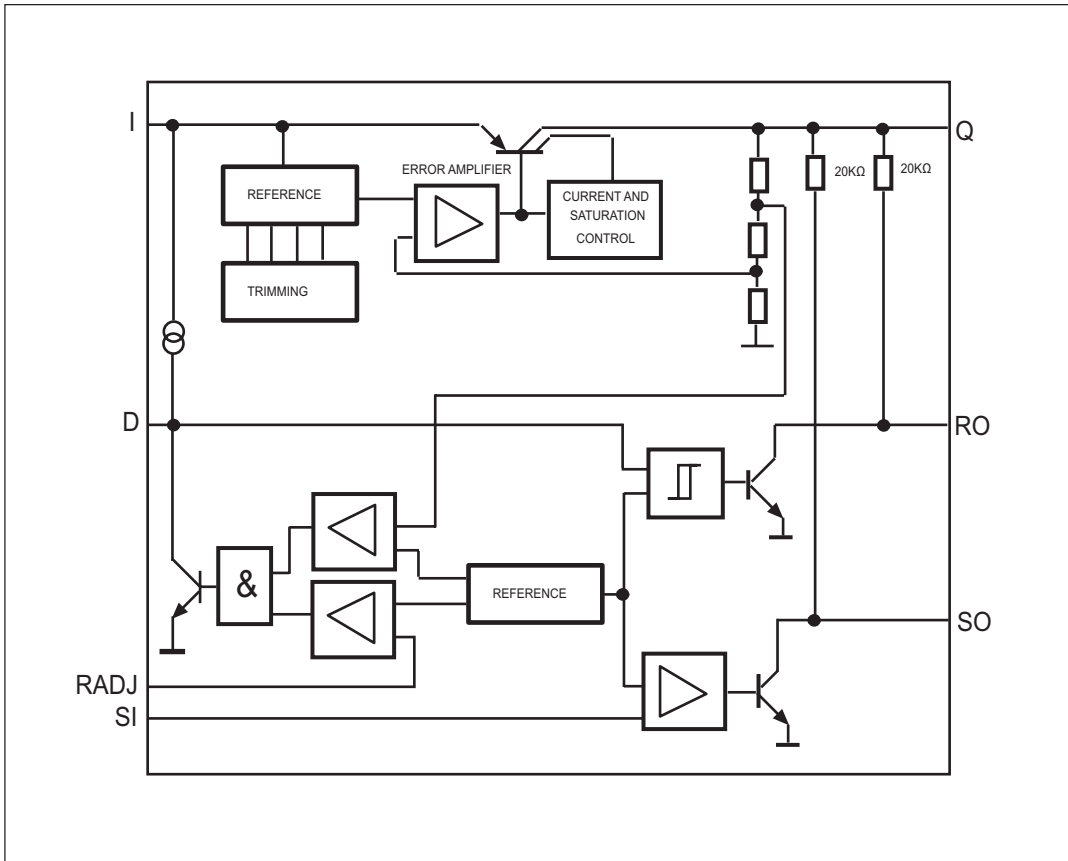
ELECTRICAL CHARACTERISTICS

$V_{IN} = 13.5V$; $-40^{\circ}C < T_J < 125^{\circ}C$. The ♦ denotes the specifications which apply over the full operating temperature range, unless otherwise specified.

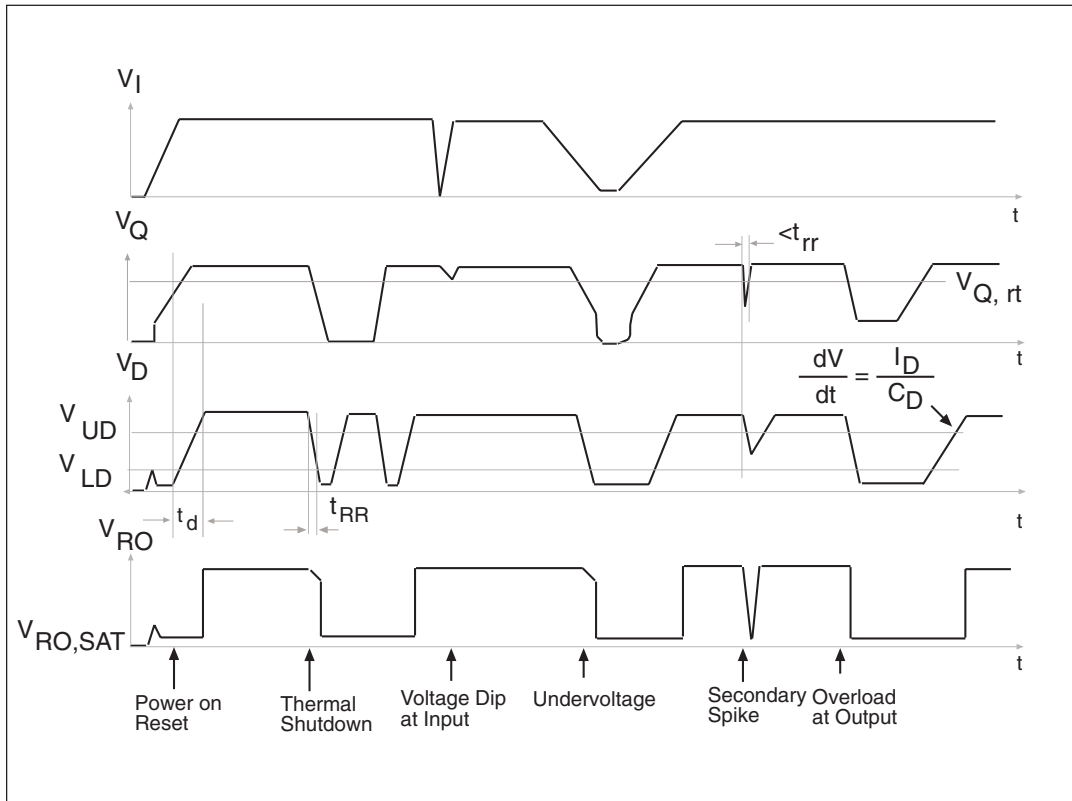
PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS		CONDITIONS
Reset Generator							
Upper Delay Switching Threshold	V_{UD}	1.4	1.8	2.2	V	♦	
Lower Delay Switching Threshold	V_{LD}	0.3	0.45	0.60	V	♦	
Saturation Voltage Delay Capacitor	$V_{D, SAT}$	-	-	0.1	V	♦	$V_Q < V_{RT}$
Charge Current	I_D	3.0	6.5	9.5	μA	♦	$V_D = 1V$
Delay Time L to H	t_D	17	28	-	ms	♦	$C_D = 100nF$
Delay Time H to L	t_t	-	1	-	μs	♦	$C_D = 100nF$
Input Voltage Sense							
Sense Threshold High	$V_{SI, high}$	1.25	1.33	1.36	V	♦	
Sense Threshold Low	$V_{SI, low}$	1.18	1.22	1.28	V	♦	
Sense Output low Voltage	$V_{SO, low}$	-	0.1	0.4	V	♦	$V_{SI} < 1.20V$ $V_Q > 3V R_{intern}$
Sense Pull up	-	10	20	40	K	♦	
Sense Input Current	i_{SI}	-1	0.1	1	μA	♦	
Sense Response Time	-		2		μs	♦	

The input capacitor C_i is necessary for compensating line influences. Using a resistor of approximately 1Ω in series with C_i , the oscillating circuit consisting of input inductance and input capacitance can be damped. The output capacitor C_o is necessary for the stability of the regulating circuit. Stability is guaranteed at values $\geq 10\mu\text{F}$ and an $\text{ESR} \leq 10\Omega$ within the operating temperature range. For small tolerances of the reset delay the variation of the capacitance of the delay capacitor and its temperature coefficient should be noted.

BLOCK DIAGRAM

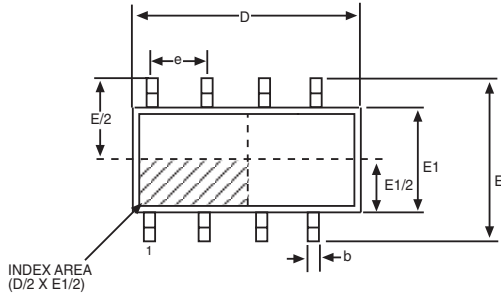
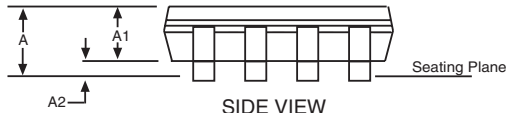
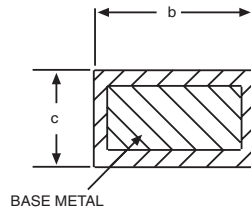
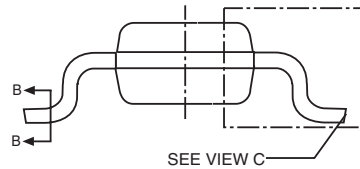
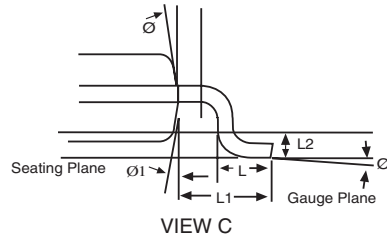


RESET TIMING DIAGRAM



PIN DESCRIPTION

PIN NUMBER	PIN NAME	DESCRIPTION (8 PIN NSOIC)
1	V_{IN}	Input. Decouple to GND with a Ceramic capacitor.
2	SENSE IN	Sense Input. If not needed, connect to Q.
3	R_{ADJ}	Reset Threshold Adj. If not needed, connect to GND.
4	DELAY	Reset Delay. To select delay time, connect to GND via capacitor.
5	GND	Ground
6	RESET	Reset Output. The open-collector output is internally linked to Q via a resistor. Leave open if not needed.
7	SENSE OUT	Sense Output. The open-collector output is internally linked to Q via a resistor. Leave open if not needed.
8	V_{OUT}	5V Output. Connect to GND with a 10 μ F capacitor, ESR<10.


TOP VIEW

SIDE VIEW

**SECTION B-B
WITH PLATING**

8 Pin NSOIC JEDEC MS-012 (AA) Variation			
SYMBOL	MIN	NOM	MAX
A	1.35	-	1.75
A1	0.10	-	0.25
A2	1.25	-	1.65
b	0.31	-	0.51
c	0.17	-	0.25
D	4.90 BSC		
E	6.00 BSC		
E1	3.90 BSC		
e	1.27 BSC		
L	0.40	-	1.27
L1	1.04 REF		
L2	0.25 BSC		
$\varnothing$	0°	-	8°
$\varnothing 1$	5°	-	15°

Note: Dimensions in (mm)
Controlling Dimension

8 Pin NSOIC JEDEC MS-012 (AA) Variation			
SYMBOL	MIN	NOM	MAX
A	0.053	-	0.069
A1	0.004	-	0.010
A2	0.049	-	0.065
b	0.012	-	0.020
c	0.007	-	0.010
D	0.193 BSC		
E	0.236 BSC		
E1	0.154 BSC		
e	0.050 BSC		
L	0.016	-	0.050
L1	0.04 REF		
L2	0.010 BSC		
$\varnothing$	0°	-	8°
$\varnothing 1$	5°	-	15°

Note: Dimensions in (inches)
Conversion Factor: 1 Inch = 25.40 mm

ORDERING INFORMATION

Part number	Output Voltage	Package Type
SPX2969S	5.0V	8 Pin NSOIC
SPX2969S/TR.	5.0V	8 Pin NSOIC

Available in lead free packaging. To order add "-L" suffix to part number.

Example: SPX2969S/TR = standard; SPX2969S-L/TR = lead free

/TR = Tape and Reel

Pack quantity is 1,500 for WSOIC and 2,500 for NSOIC.

➔ [CLICK HERE TO ORDER SAMPLES](#) ➔



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