

# MAX809 Series, MAX810 Series

## Very Low Supply Current 3-Pin Microprocessor Reset Monitors

The MAX809 and MAX810 are cost-effective system supervisor circuits designed to monitor  $V_{CC}$  in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 10  $\mu$ sec of  $V_{CC}$  falling through the reset voltage threshold. Reset is maintained active for a timeout period which is trimmed by the factory after  $V_{CC}$  rises above the reset threshold. The MAX810 has an active-high RESET output while the MAX809 has an active-low  $\overline{\text{RESET}}$  output. Both devices are available in SOT-23 and SC-70 packages.

The MAX809/810 are optimized to reject fast transient glitches on the  $V_{CC}$  line. Low supply current of 0.5  $\mu$ A ( $V_{CC} = 3.2$  V) makes these devices suitable for battery powered applications.

### Features

- Precision  $V_{CC}$  Monitor for 1.5 V, 2.5 V, 3.0 V, 3.3 V, and 5.0 V Supplies
- Precision Monitoring Voltages from 1.2 V to 4.9 V Available in 100 mV Steps
- Four Guaranteed Minimum Power-On Reset Pulse Width Available (1 ms, 20 ms, 100 ms, and 140 ms)
- $\overline{\text{RESET}}$  Output Guaranteed to  $V_{CC} = 1.0$  V.
- Low Supply Current
- Compatible with Hot Plug Applications
- $V_{CC}$  Transient Immunity
- No External Components
- Wide Operating Temperature:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- Pb-Free Packages are Available

### Typical Applications

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical Microprocessor Power Supply Monitoring

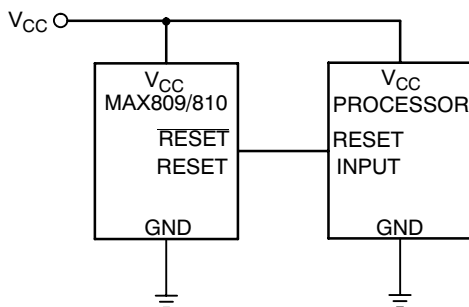
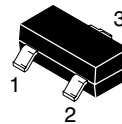


Figure 1. Typical Application Diagram

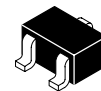
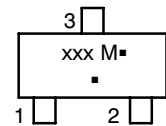


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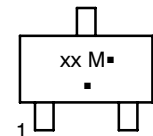
### MARKING DIAGRAM



SOT-23  
(TO-236)  
CASE 318

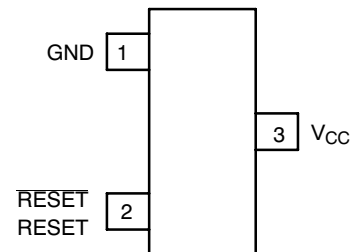


SC-70  
(SOT-323)  
CASE 419



xxx = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### PIN CONFIGURATION



SOT-23/SC-70  
(Top View)

NOTE: RESET is for MAX809  
RESET is for MAX810

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 10 of this data sheet.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 10 of this data sheet.

## MAX809 Series, MAX810 Series

### PIN DESCRIPTION

Pin No.	Symbol	Description
1	GND	Ground
2	RESET (MAX809)	RESET output remains low while V <sub>CC</sub> is below the reset voltage threshold, and for a reset timeout period after V <sub>CC</sub> rises above reset threshold
2	RESET (MAX810)	RESET output remains high while V <sub>CC</sub> is below the reset voltage threshold, and for a reset timeout period after V <sub>CC</sub> rises above reset threshold
3	V <sub>CC</sub>	Supply Voltage (Typ)

### ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage (V <sub>CC</sub> to GND)	V <sub>CC</sub>	-0.3 to 6.0	V
RESET Output Voltage (CMOS)		-0.3 to (V <sub>CC</sub> + 0.3)	V
Input Current, V <sub>CC</sub>		20	mA
Output Current, RESET		20	mA
dV/dt (V <sub>CC</sub> )		100	V/μsec
Thermal Resistance, Junction-to-Air (Note 1)	SOT-23 SC-70	R <sub>θJA</sub> 301 314	°C/W
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +105	°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C
Lead Temperature (Soldering, 10 Seconds)	T <sub>sol</sub>	+260	°C
ESD Protection Human Body Model (HBM): Following Specification JESD22-A114 Machine Model (MM): Following Specification JESD22-A115		2000 200	V
Latchup Current Maximum Rating: Following Specification JESD78 Class II Positive Negative	I <sub>Latchup</sub>	200 200	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. This based on a 35x35x1.6mm FR4 PCB with 10mm<sup>2</sup> of 1 oz copper traces under natural convection conditions and a single component characterization.
2. The maximum package power dissipation limit must not be exceeded.

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}} \quad \text{with } T_{J(max)} = 150^\circ\text{C}$$

## MAX809 Series, MAX810 Series

**ELECTRICAL CHARACTERISTICS**  $T_A = -40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  unless otherwise noted. Typical values are at  $T_A = +25^{\circ}\text{C}$ . (Note 3)

Characteristic	Symbol	Min	Typ	Max	Unit
$V_{CC}$ Range $T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		1.0 1.2	- -	5.5 5.5	V
Supply Current $V_{CC} = 3.3\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ $V_{CC} = 5.5\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$	$I_{CC}$	- - - -	0.5 - 0.8 -	1.2 2.0 1.8 2.5	$\mu\text{A}$
Reset Threshold ( $V_{in}$ Decreasing) (Note 4)	$V_{TH}$				V
MAX809SN490 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		4.83 4.78 4.66	4.9 - -	4.97 5.02 5.14	
MAX8xxLTR, MAX8xxSQ463 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		4.56 4.50 4.40	4.63 - -	4.70 4.75 4.86	
MAX809HTR $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		4.48 4.43 4.32	4.55	4.62 4.67 4.78	
MAX8xxMTR, MAX8xxSQ438 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		4.31 4.27 4.16	4.38	4.45 4.49 4.60	
MAX809JTR, MAX8xxSQ400 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		3.94 3.90 3.80	4.00 - -	4.06 4.10 4.20	
MAX8xxTTR, MAX809SQ308 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		3.04 3.00 2.92	3.08 - -	3.11 3.16 3.24	
MAX8xxSTR, MAX8xxSQ293 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		2.89 2.85 2.78	2.93 - -	2.96 3.00 3.08	
MAX8xxRTR, MAX8xxSQ263 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		2.59 2.56 2.49	2.63 - -	2.66 2.70 2.77	
MAX809SN232, MAX809SQ232 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		2.28 2.25 2.21	2.32 - -	2.35 2.38 2.45	
MAX809SN160 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		1.58 1.56 1.52	1.60 - -	1.62 1.64 1.68	
MAX809SN120, MAX8xxSQ120 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		1.18 1.17 1.14	1.20 - -	1.22 1.23 1.26	

3. Production testing done at  $T_A = 25^{\circ}\text{C}$ , over temperature limits guaranteed by design.

4. Contact your ON Semiconductor sales representative for other threshold voltage options.

## MAX809 Series, MAX810 Series

**ELECTRICAL CHARACTERISTICS (continued)**  $T_A = -40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  unless otherwise noted. Typical values are at  $T_A = +25^{\circ}\text{C}$ . (Note 5)

Characteristic	Symbol	Min	Typ	Max	Unit
Detector Voltage Threshold Temperature Coefficient		-	30	-	ppm/ $^{\circ}\text{C}$
$V_{CC}$ to Reset Delay $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$		-	10	-	$\mu\text{sec}$
Reset Active TimeOut Period (Note 6) MAX8xxSN(Q)293D1 MAX8xxSN(Q)293D2 MAX8xxSN(Q)293D3 MAX8xxSN(Q)293	$t_{RP}$	1.0 20 100 140	- - - -	3.3 66 330 460	msec
RESET Output Voltage Low (No Load) (MAX809) $V_{CC} = V_{TH} - 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.0\text{ V}$ , $I_{SINK} = 0.5\text{ mA}$ $2.1\text{ V} \leq V_{TH} \leq 4.0\text{ V}$ , $I_{SINK} = 1.2\text{ mA}$ $4.1\text{ V} \leq V_{TH} \leq 4.9\text{ V}$ , $I_{SINK} = 3.2\text{ mA}$	$V_{OL}$	-	-	0.3	V
RESET Output Voltage High (No Load) (MAX809) $V_{CC} = V_{TH} + 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.4\text{ V}$ , $I_{SOURCE} = 200\text{ }\mu\text{A}$ $2.5\text{ V} \leq V_{TH} \leq 4.9\text{ V}$ , $I_{SOURCE} = 500\text{ }\mu\text{A}$	$V_{OH}$	$0.8 V_{CC}$	-	-	V
RESET Output Voltage High (No Load) (MAX810) $V_{CC} = V_{TH} + 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.4\text{ V}$ , $I_{SOURCE} = 200\text{ }\mu\text{A}$ $2.5\text{ V} \leq V_{TH} \leq 4.9\text{ V}$ , $I_{SOURCE} = 500\text{ }\mu\text{A}$	$V_{OH}$	$0.8 V_{CC}$	-	-	V
RESET Output Voltage Low (No Load) (MAX810) $V_{CC} = V_{TH} - 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.0\text{ V}$ , $I_{SINK} = 0.5\text{ mA}$ $2.1\text{ V} \leq V_{TH} \leq 4.0\text{ V}$ , $I_{SINK} = 1.2\text{ mA}$ $4.1\text{ V} \leq V_{TH} \leq 4.9\text{ V}$ , $I_{SINK} = 3.2\text{ mA}$	$V_{OL}$	-	-	0.3	V

5. Production testing done at  $T_A = 25^{\circ}\text{C}$ , over temperature limits guaranteed by design.
6. Contact your ON Semiconductor sales representative for timeout options availability for other threshold voltage options.

## MAX809 Series, MAX810 Series

### ORDERING, MARKING AND THRESHOLD INFORMATION

Part Number	V <sub>TH</sub> * (V)	Timeout* (ms)	Description	Marking	Package	Shipping†
MAX809SN160T1	1.60	140-460	Push-Pull RESET	SAA	SOT23-3	3000 / Tape & Reel
MAX809SN160T1G	1.60	140-460		SAA	SOT23-3 (Pb-Free)	
MAX809SN232T1	2.32	140-460		SQP	SOT23-3	
MAX809SN232T1G	2.32	140-460		SQP	SOT23-3 (Pb-Free)	
MAX809RTR	2.63	140-460		SPS	SOT23-3	
MAX809RTRG	2.63	140-460		SPS	SOT23-3 (Pb-Free)	
MAX809STR	2.93	140-460		SPT	SOT23-3	
MAX809STRG	2.93	140-460		SPT	SOT23-3 (Pb-Free)	
NCV809STRG	2.93	140-460		SUC	SOT23-3 (Pb-Free)	
MAX809TTR	3.08	140-460		SPU	SOT23-3	
MAX809TTRG	3.08	140-460		SPU	SOT23-3 (Pb-Free)	
MAX809JTR	4.00	140-460		SPR	SOT23-3	
MAX809JTRG	4.00	140-460		SPR	SOT23-3 (Pb-Free)	
MAX809MTR	4.38	140-460		SPV	SOT23-3	
MAX809MTRG	4.38	140-460		SPV	SOT23-3 (Pb-Free)	
MAX809HTR	4.55	140-460		SBD	SOT23-3	
MAX809HTRG	4.55	140-460		SBD	SOT23-3 (Pb-Free)	
MAX809LTR	4.63	140-460		SPW	SOT23-3	
MAX809LTRG	4.63	140-460		SPW	SOT23-3 (Pb-Free)	
NCV809LTRG	4.63	140-460		STA	SOT23-3 (Pb-Free)	
MAX809SN490T1	4.90	140-460		SBH	SOT23-3	
MAX809SN490T1G	4.90	140-460		SBH	SOT23-3 (Pb-Free)	
MAX809SN120T1G	1.20	140-460		SSO	SOT23-3 (Pb-Free)	
MAX809SN293D1T1G	2.93	1-3.3		SSP	SOT23-3 (Pb-Free)	
MAX809SN293D2T1G	2.93	20-66		SSQ	SOT23-3 (Pb-Free)	
MAX809SN293D3T1G	2.93	100-330		SSR	SOT23-3 (Pb-Free)	
MAX809SQ120T1G	1.20	140-460		ZD	SC70-3 (Pb-Free)	
MAX809SQ232T1G	2.32	140-460		ZE	SC70-3 (Pb-Free)	
MAX809SQ263T1G	2.63	140-460		ZF	SC70-3 (Pb-Free)	
MAX809SQ293T1G	2.93	140-460		ZG	SC70-3 (Pb-Free)	
MAX809SQ308T1G	3.08	140-460		ZH	SC70-3 (Pb-Free)	
MAX809SQ400T1G	4.00	140-460		SZ	SC70-3 (Pb-Free)	
MAX809SQ438T1G	4.38	140-460		ZI	SC70-3 (Pb-Free)	
MAX809SQ463T1G	4.63	140-460		ZJ	SC70-3 (Pb-Free)	
MAX809SQ293D1T1G	2.93	1-3.3		ZK	SC70-3 (Pb-Free)	
MAX809SQ293D2T1G	2.93	20-66		ZL	SC70-3 (Pb-Free)	
MAX809SQ293D3T1G	2.93	100-330		ZM	SC70-3 (Pb-Free)	

## MAX809 Series, MAX810 Series

### ORDERING, MARKING AND THRESHOLD INFORMATION

Part Number	V <sub>TH</sub> * (V)	Timeout* (ms)	Description	Marking	Package	Shipping†
MAX810RTR	2.63	140-460	Push-Pull RESET	SPX	SOT23-3	3000 / Tape & Reel
MAX810RTRG	2.63	140-460		SPX	SOT23-3 (Pb-Free)	
MAX810STR	2.93	140-460		SPY	SOT23-3	
MAX810STRG	2.93	140-460		SPY	SOT23-3 (Pb-Free)	
MAX810TTR	3.08	140-460		SPZ	SOT23-3	
MAX810TTRG	3.08	140-460		SPZ	SOT23-3 (Pb-Free)	
MAX810MTR	4.38	140-460		SQA	SOT23-3	
MAX810MTRG	4.38	140-460		SQA	SOT23-3 (Pb-Free)	
MAX810LTR	4.63	140-460		SQB	SOT23-3	
MAX810LTRG	4.63	140-460		SQB	SOT23-3 (Pb-Free)	
MAX810SN120T1G	1.20	140-460		SSS	SOT23-3 (Pb-Free)	
MAX810SN293D1T1G	2.93	1-3.3		SST	SOT23-3 (Pb-Free)	
MAX810SN293D2T1G	2.93	20-66		SSU	SOT23-3 (Pb-Free)	
MAX810SN293D3T1G	2.93	100-330		SSZ	SOT23-3 (Pb-Free)	
MAX810SQ120T1G	1.20	140-460		ZN	SC70-3 (Pb-Free)	
MAX810SQ263T1G	2.63	140-460		ZO	SC70-3 (Pb-Free)	
MAX810SQ293T1G	2.93	140-460		ZP	SC70-3 (Pb-Free)	
MAX810SQ438T1G	4.38	140-460		ZQ	SC70-3 (Pb-Free)	
MAX810SQ463T1G	4.63	140-460		ZR	SC70-3 (Pb-Free)	
MAX810SQ293D1T1G	2.93	1-3.3		ZS	SC70-3 (Pb-Free)	
MAX810SQ293D2T1G	2.93	20-66	ZT	SC70-3 (Pb-Free)		
MAX810SQ293D3T1G	2.93	100-330	ZU	SC70-3 (Pb-Free)		

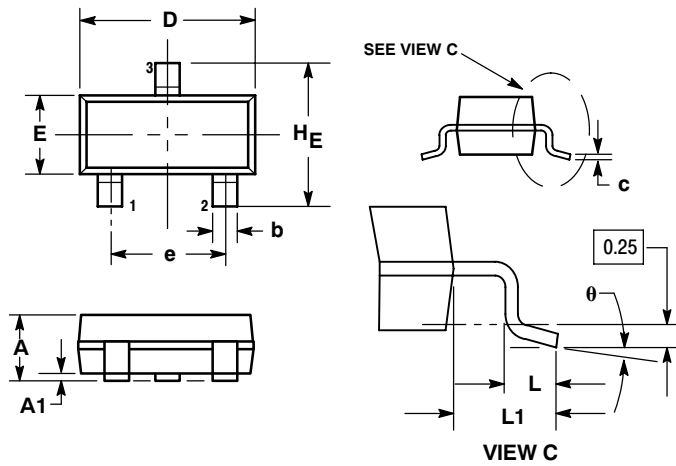
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*Contact your ON Semiconductor sales representative for other threshold voltage options.

# MAX809 Series, MAX810 Series

## PACKAGE DIMENSIONS

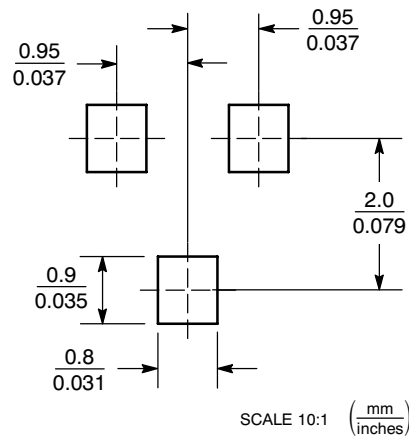
SOT-23 (TO236)  
CASE 318-08  
ISSUE AN



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.