

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 μ 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 μ 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°C to 105°C
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

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

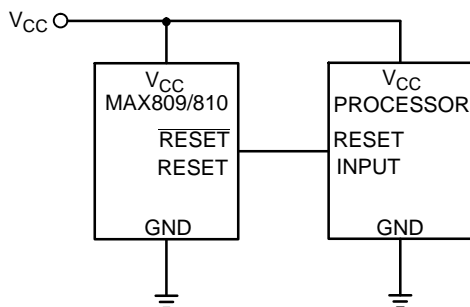


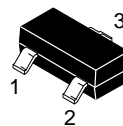
Figure 1. Typical Application Diagram



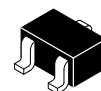
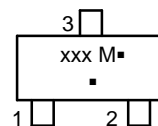
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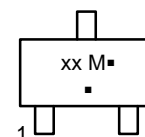
MARKING DIAGRAM



SOT-23
(TO-236)
CASE 318

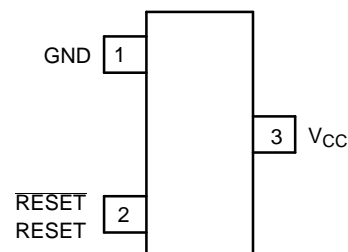


SC-70
(SOT-323)
CASE 419



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: $\overline{\text{RESET}}$ 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.

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.

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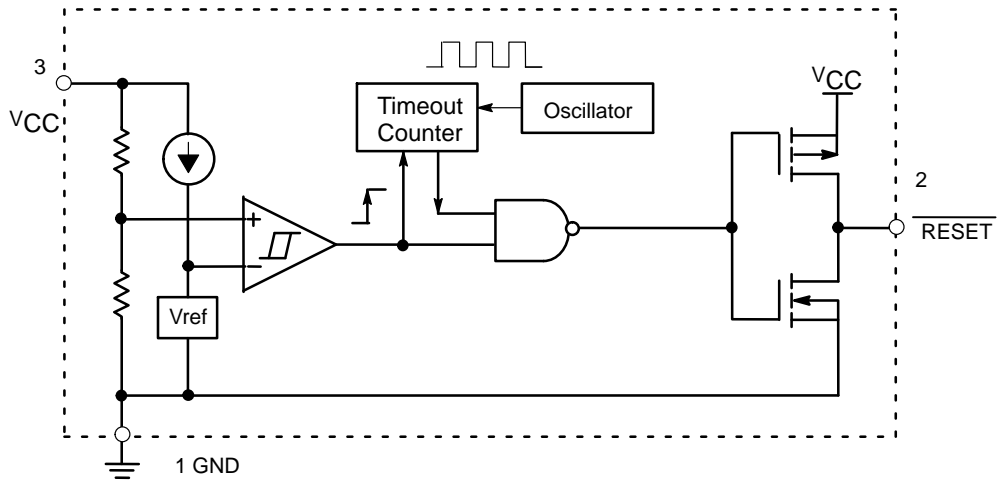


Figure 2. MAX809 Series Complementary Active-Low Output

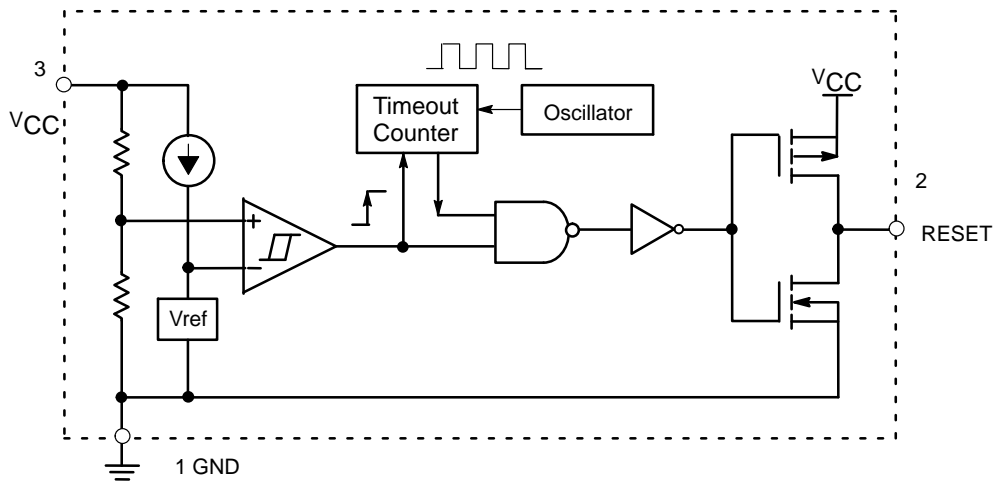


Figure 3. MAX810 Series Complementary Active-High Output

MAX809 Series, MAX810 Series

PIN DESCRIPTION

| Pin No. | Symbol | Description |
|---------|----------------|--|
| 1 | GND | Ground |
| 2 | RESET (MAX809) | RESET output remains low while V_{CC} is below the reset voltage threshold, and for a reset timeout period after V_{CC} rises above reset threshold |
| 2 | RESET (MAX810) | RESET output remains high while V_{CC} is below the reset voltage threshold, and for a reset timeout period after V_{CC} rises above reset threshold |
| 3 | V_{CC} | Supply Voltage (Typ) |

ABSOLUTE MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|------------------------------------|----------------------------|-----------------------------|
| Power Supply Voltage (V_{CC} to GND) | V_{CC} | -0.3 to 6.0 | V |
| RESET Output Voltage (CMOS) | | -0.3 to ($V_{CC} + 0.3$) | V |
| Input Current, V_{CC} | | 20 | mA |
| Output Current, $\overline{\text{RESET}}$ | | 20 | mA |
| dV/dt (V_{CC}) | | 100 | V/ μsec |
| Thermal Resistance, Junction-to-Air (Note 1) | SOT-23 SC-70 $R_{\theta JA}$ | 301 314 | $^{\circ}\text{C}/\text{W}$ |
| Operating Junction Temperature Range | T_J | -40 to +125 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{stg} | -65 to +150 | $^{\circ}\text{C}$ |
| Lead Temperature (Soldering, 10 Seconds) | T_{sol} | +260 | $^{\circ}\text{C}$ |
| 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_{Latchup} | 200 200 | mA |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. This based on a 35x35x1.6mm FR4 PCB with 10mm² 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.

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

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 $+105^{\circ}\text{C}$ (Note 4) | | 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 $+105^{\circ}\text{C}$ (Note 5) $V_{CC} = 5.5\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ (Note 5) | I_{CC} | – – – – | 0.5 – 0.8 – | 1.2 2.0 1.8 2.5 | μA |
| Reset Threshold (V_{in} Decreasing) (Note 6) | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 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 $+105^{\circ}\text{C}$ (Note 5) | | 1.18 1.17 1.14 | 1.20 – – | 1.22 1.23 1.26 | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

4. For NCV automotive devices, this temperature range is $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$.

5. For NCV automotive devices, this temperature range is $T_A = +85^{\circ}\text{C}$ to $+125^{\circ}\text{C}$.

6. 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 7)

| 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 | – | μsec |
| Reset Active TimeOut Period (Note 8) 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 |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

8. Contact your ON Semiconductor sales representative for timeout options availability for other threshold voltage options.

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TYPICAL OPERATING CHARACTERISTICS



Figure 4. Supply Current vs. Supply Voltage



Figure 5. Supply Current vs. Supply Voltage

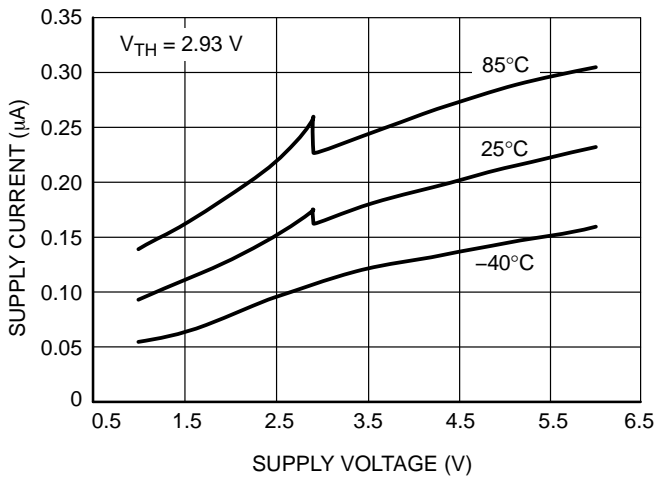


Figure 6. Supply Current vs. Supply Voltage

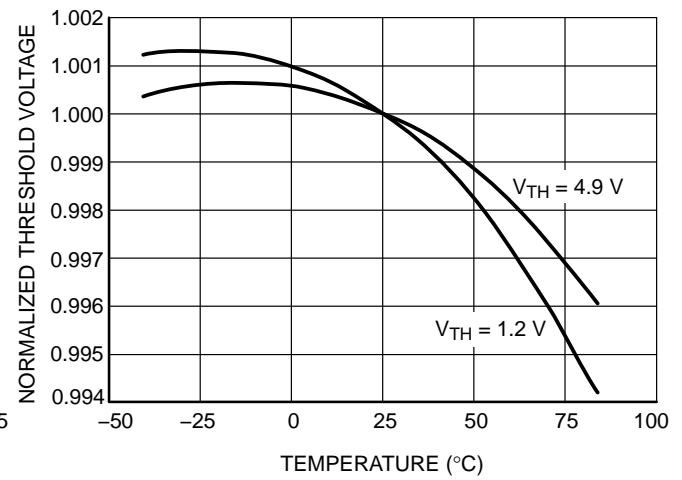


Figure 7. Normalized Reset Threshold Voltage vs. Temperature



Figure 8. Supply Current vs. Temperature (No Load, MAX809)



Figure 9. Supply Current vs. Temperature (No Load, MAX810)

MAX809 Series, MAX810 Series

TYPICAL OPERATING CHARACTERISTICS



Figure 10. Output Voltage Low vs. Supply Voltage

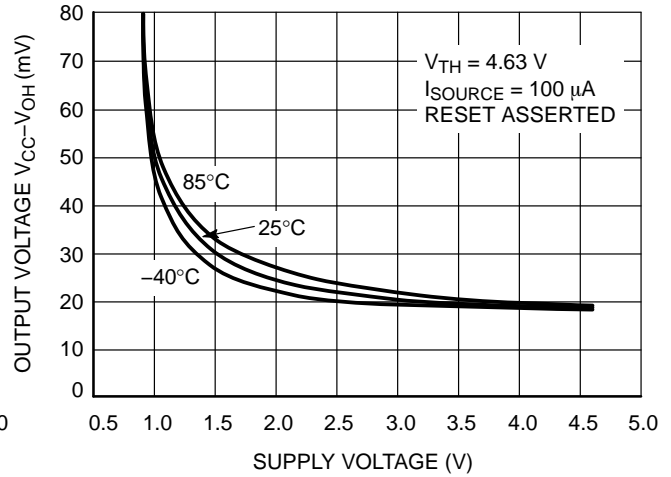


Figure 11. Output Voltage High vs. Supply Voltage

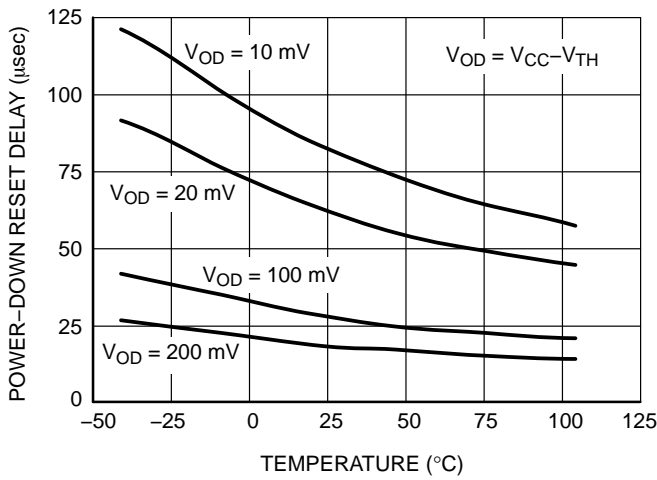


Figure 12. Power-Down Reset Delay vs. Temperature and Overdrive ($V_{TH} = 1.2 V$)

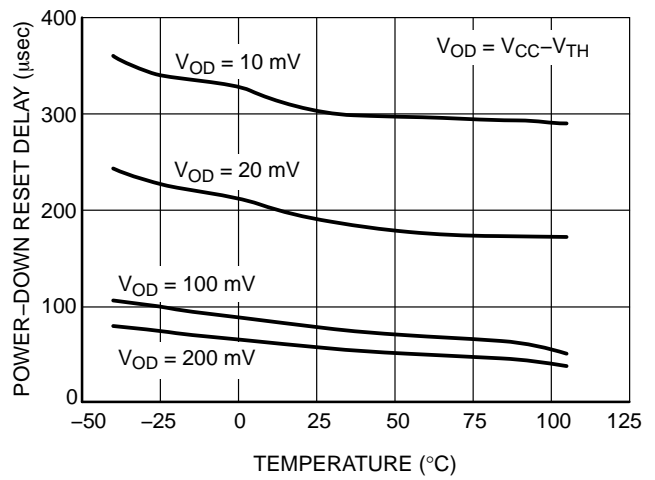


Figure 13. Power-Down Reset Delay vs. Temperature and Overdrive ($V_{TH} = 4.9 V$)



Figure 14. Normalized Power-Up Reset vs. Temperature

MAX809 Series, MAX810 Series

Detail Operation Description

The MAX809/810 series microprocessor reset supervisory circuits are designed to monitor the power supplies in digital systems and provide a reset signal to the processor without any external components. Figure 2 shows the timing diagram and a typical application below. Initially consider that input voltage V_{CC} is at a nominal level greater than the voltage detector upper threshold (V_{TH+}). And the $\overline{\text{RESET}}$ (RESET) output voltage (Pin 2) will be in the high state for MAX809, or in the low state for MAX 810 devices.

If there is an input power interruption and V_{CC} becomes significantly deficient, it will fall below the lower detector threshold (V_{TH-}). This event causes the RESET output to be in the low state for the MAX809, or in the high state for the NCP810 devices. After completion of the power interruption, V_{CC} will rise to its nominal level and become greater than the V_{TH} . This sequence activates the internal oscillator circuitry and digital counter to count. After the count of the timeout period, the reset output will revert back to the original state.



Figure 15. Timing Waveforms

APPLICATIONS INFORMATION

V_{CC} Transient Rejection

The MAX809 provides accurate V_{CC} monitoring and reset timing during power-up, power-down, and brownout/sag conditions, and rejects negative-going transients (glitches) on the power supply line. Figure 16 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power-down. Typically, transient that goes 100 mV below the reset threshold and lasts 5.0 μs or less will not cause a reset pulse. Transient immunity can be improved by adding a capacitor in close proximity to the V_{CC} pin of the MAX809.

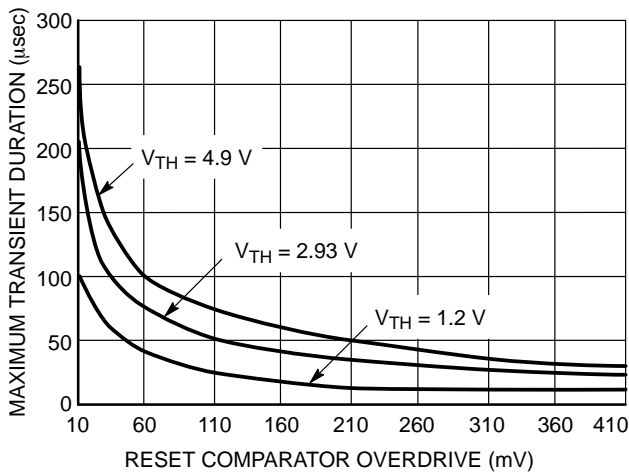
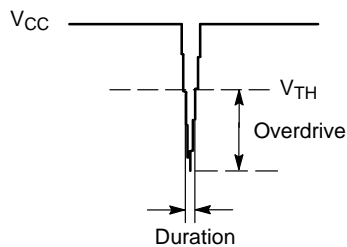


Figure 16. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25°C

RESET Signal Integrity During Power-Down

The MAX809 RESET output is valid to V_{CC} = 1.0 V. Below this voltage the output becomes an “open circuit” and does not sink current. This means CMOS logic inputs to the Microprocessor will be floating at an undetermined voltage. Most digital systems are completely shutdown well above this voltage. However, in situations where RESET must be

maintained valid to V_{CC} = 0 V, a pull-down resistor must be connected from RESET to ground to discharge stray capacitances and hold the output low (Figure 17). This resistor value, though not critical, should be chosen such that it does not appreciably load RESET under normal operation (100 kΩ will be suitable for most applications).

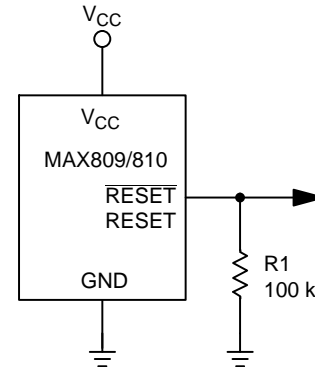


Figure 17. Ensuring RESET Valid to V_{CC} = 0 V

Processors With Bidirectional I/O Pins

Some Microprocessor's have bidirectional reset pins. Depending on the current drive capability of the processor pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7 kΩ resistor in series with the output of the MAX809 (Figure 18). If there are other components in the system which require a reset signal, they should be buffered so as not to load the reset line. If the other components are required to follow the reset I/O of the Microprocessor, the buffer should be connected as shown with the solid line.

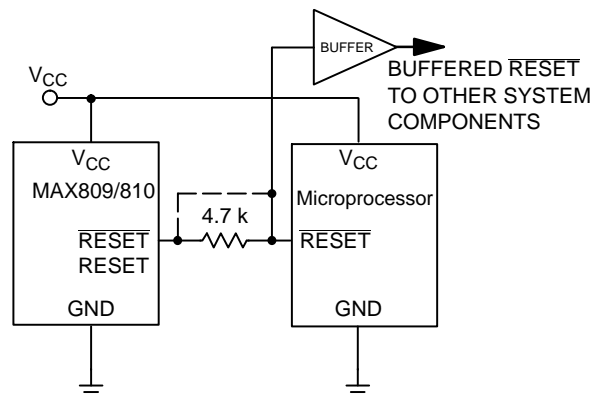


Figure 18. Interfacing to Bidirectional Reset I/O

MAX809 Series, MAX810 Series

ORDERING, MARKING AND THRESHOLD INFORMATION

| Part Number | V _{TH} * (V) | Timeout* (ms) | Description | Marking | Package | Shipping† |
|-------------------------------------|-----------------------|---------------|-------------------------------------|---------|----------------------|--------------------|
| MAX809SN160T1G | 1.60 | 140–460 | Push–Pull $\overline{\text{RESET}}$ | SAA | SOT23–3 (Pb–Free) | 3000 / Tape & Reel |
| MAX809SN232T1G | 2.32 | 140–460 | | SQP | | |
| MAX809RTRG | 2.63 | 140–460 | | SPS | | |
| NCV809RTRG | 2.63 | 140–460 | | RPA | | |
| MAX809STRG | 2.93 | 140–460 | | SPT | | |
| NCV809STRG | 2.93 | 140–460 | | SUC | | |
| MAX809TTRG | 3.08 | 140–460 | | SPU | | |
| MAX809JTRG | 4.00 | 140–460 | | SPR | | |
| MAX809MTRG | 4.38 | 140–460 | | SPV | | |
| NCV809MTRG | 4.38 | 140–460 | | TAT | | |
| MAX809HTRG | 4.55 | 140–460 | | SBD | | |
| MAX809LTRG | 4.63 | 140–460 | | SPW | | |
| NCV809LTRG | 4.63 | 140–460 | | STA | | |
| MAX809SN490T1G | 4.90 | 140–460 | | SBH | | |
| MAX809SN120T1G | 1.20 | 140–460 | | SSO | | |
| MAX809SN293D1T1G | 2.93 | 1–3.3 | | SSP | | |
| NCV809SN293D1T1G* | | | | ACT | | |
| MAX809SN293D2T1G | 2.93 | 20–66 | | SSQ | | |
| NCV809SN293D2T1G | 2.93 | 20–66 | | ACE | | |
| MAX809SN293D3T1G | 2.93 | 100–330 | | SSR | | |
| MAX809SQ120T1G | 1.20 | 140–460 | | ZD | SC70–3 (Pb–Free) | 3000 / Tape & Reel |
| MAX809SQ232T1G | 2.32 | 140–460 | | ZE | | |
| MAX809SQ263T1G | 2.63 | 140–460 | | ZF | | |
| MAX809SQ293T1G | 2.93 | 140–460 | | ZG | | |
| NCV809SQ293T1G* (In Development) | | | | ZH | | |
| MAX809SQ308T1G | 3.08 | 140–460 | | SZ | | |
| MAX809SQ400T1G | 4.00 | 140–460 | | ZI | | |
| MAX809SQ438T1G | 4.38 | 140–460 | | ZJ | | |
| MAX809SQ463T1G | 4.63 | 140–460 | ZK | | | |
| MAX809SQ293D1T1G | 2.93 | 1–3.3 | ZL | | | |
| MAX809SQ293D2T1G | 2.93 | 20–66 | ZM | | | |
| MAX809SQ293D3T1G | 2.93 | 100–330 | | | | |

MAX809 Series, MAX810 Series

ORDERING, MARKING AND THRESHOLD INFORMATION

| Part Number | V _{TH} ** (V) | Timeout** (ms) | Description | Marking | Package | Shipping† |
|------------------|------------------------|----------------|-----------------|---------|----------------------|--------------------|
| MAX810RTRG | 2.63 | 140–460 | Push–Pull RESET | SPX | SOT23–3 (Pb–Free) | 3000 / Tape & Reel |
| MAX810STRG | 2.93 | 140–460 | | SPY | | |
| MAX810TTRG | 3.08 | 140–460 | | SPZ | | |
| MAX810MTRG | 4.38 | 140–460 | | SQA | | |
| MAX810LTRG | 4.63 | 140–460 | | SQB | | |
| MAX810SN120T1G | 1.20 | 140–460 | | SSS | | |
| MAX810SN293D1T1G | 2.93 | 1–3.3 | | SST | | |
| MAX810SN293D2T1G | 2.93 | 20–66 | | SSU | | |
| MAX810SN293D3T1G | 2.93 | 100–330 | | SSZ | | |
| MAX810SQ120T1G | 1.20 | 140–460 | | ZN | | |
| MAX810SQ263T1G | 2.63 | 140–460 | | ZO | | |
| MAX810SQ270T1G | 2.70 | 20–66 | | ZB | | |
| MAX810SQ293T1G | 2.93 | 140–460 | | ZP | | |
| MAX810SQ400T1G | 4.00 | 20–66 | | ZC | | |
| MAX810SQ438T1G | 4.38 | 140–460 | | ZQ | | |
| MAX810SQ463T1G | 4.63 | 140–460 | | ZR | | |
| MAX810SQ293D1T1G | 2.93 | 1–3.3 | | ZS | | |
| MAX810SQ293D2T1G | 2.93 | 20–66 | | ZT | | |
| MAX810SQ293D3T1G | 2.93 | 100–330 | | ZU | | |

†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.

*NCV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q100 Qualified and PPAP Capable.

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

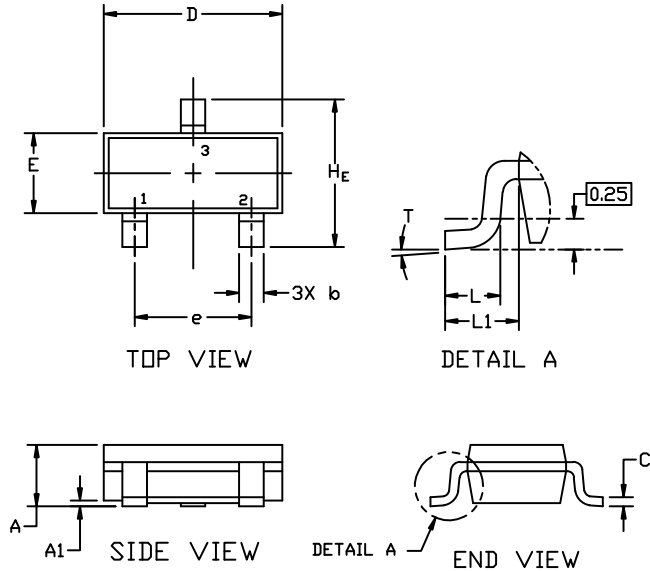
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1

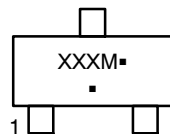


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

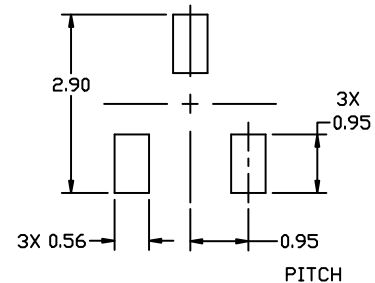
| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|--------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.039 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.017 | 0.020 |
| c | 0.08 | 0.14 | 0.20 | 0.003 | 0.006 | 0.008 |
| 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 | 0.080 |
| L | 0.30 | 0.43 | 0.55 | 0.012 | 0.017 | 0.022 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.027 |
| H _E | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |
| T | 0° | --- | 10° | 0° | --- | 10° |

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED MOUNTING 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.

STYLES ON PAGE 2

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



SOT-23 (TO-236) CASE 318 ISSUE AT

DATE 01 MAR 2023

- | | | | | | |
|---|---|---|---|---|---|
| STYLE 1 THRU 5: CANCELLED | STYLE 6: PIN 1. BASE 2. EMITTER 3. COLLECTOR | STYLE 7: PIN 1. EMITTER 2. BASE 3. COLLECTOR | STYLE 8: PIN 1. ANODE 2. NO CONNECTION 3. CATHODE | | |
| STYLE 9: PIN 1. ANODE 2. ANODE 3. CATHODE | STYLE 10: PIN 1. DRAIN 2. SOURCE 3. GATE | STYLE 11: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE | STYLE 12: PIN 1. CATHODE 2. CATHODE 3. ANODE | STYLE 13: PIN 1. SOURCE 2. DRAIN 3. GATE | STYLE 14: PIN 1. CATHODE 2. GATE 3. ANODE |
| STYLE 15: PIN 1. GATE 2. CATHODE 3. ANODE | STYLE 16: PIN 1. ANODE 2. CATHODE 3. CATHODE | STYLE 17: PIN 1. NO CONNECTION 2. ANODE 3. CATHODE | STYLE 18: PIN 1. NO CONNECTION 2. CATHODE 3. ANODE | STYLE 19: PIN 1. CATHODE 2. ANODE 3. CATHODE-ANODE | STYLE 20: PIN 1. CATHODE 2. ANODE 3. GATE |
| STYLE 21: PIN 1. GATE 2. SOURCE 3. DRAIN | STYLE 22: PIN 1. RETURN 2. OUTPUT 3. INPUT | STYLE 23: PIN 1. ANODE 2. ANODE 3. CATHODE | STYLE 24: PIN 1. GATE 2. DRAIN 3. SOURCE | STYLE 25: PIN 1. ANODE 2. CATHODE 3. GATE | STYLE 26: PIN 1. CATHODE 2. ANODE 3. NO CONNECTION |
| STYLE 27: PIN 1. CATHODE 2. CATHODE 3. CATHODE | STYLE 28: PIN 1. ANODE 2. ANODE 3. ANODE | | | | |

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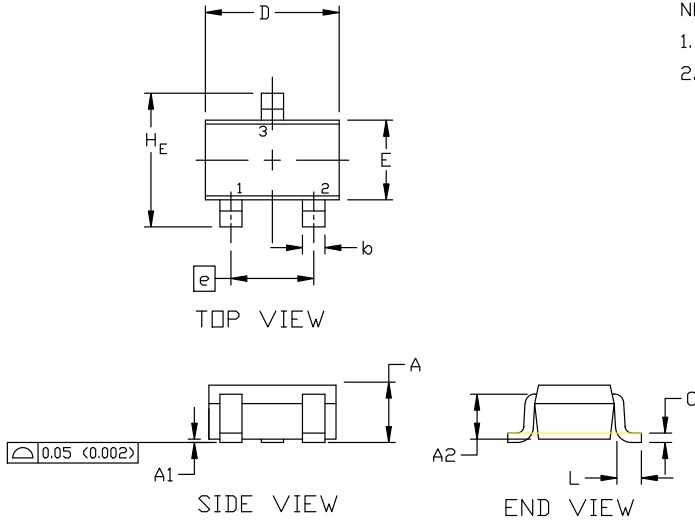
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 4:1

SC-70 (SOT-323) CASE 419 ISSUE R

DATE 11 OCT 2022

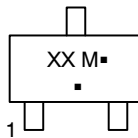


NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH

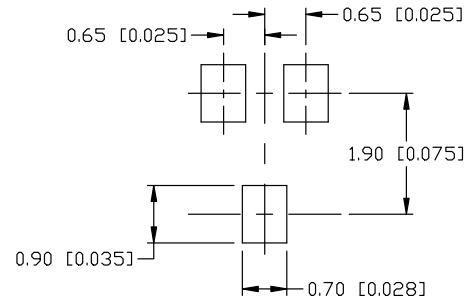
| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|-----------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A2 | 0.70 REF | | | 0.028 BSC | | |
| b | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |
| c | 0.10 | 0.18 | 0.25 | 0.004 | 0.007 | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.071 | 0.080 | 0.087 |
| E | 1.15 | 1.24 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e1 | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.38 | 0.56 | 0.008 | 0.015 | 0.022 |
| H _E | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

GENERIC MARKING DIAGRAM



- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.



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

SOLDERING FOOTPRINT

| | | | | |
|---|---|---|--|---|
| STYLE 1: CANCELLED | STYLE 2: PIN 1. ANODE 2. N.C. 3. CATHODE | STYLE 3: PIN 1. BASE 2. EMITTER 3. COLLECTOR | STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE | STYLE 5: PIN 1. ANODE 2. ANODE 3. CATHODE |
| STYLE 6: PIN 1. EMITTER 2. BASE 3. COLLECTOR | STYLE 7: PIN 1. BASE 2. EMITTER 3. COLLECTOR | STYLE 8: PIN 1. GATE 2. SOURCE 3. DRAIN | STYLE 9: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE | STYLE 10: PIN 1. CATHODE 2. ANODE 3. ANODE-CATHODE |
| | | | | STYLE 11: PIN 1. CATHODE 2. CATHODE 3. CATHODE |

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