

MAXIM

Voltage Detectors

MAX6806/MAX6807/MAX6808

General Description

The MAX6806/MAX6807/MAX6808 precision voltage detectors are ideal for accurate monitoring of power supplies in digital systems. They provide circuit reliability and reduce total cost by eliminating external components and adjustments.

The MAX6806/MAX6807/MAX6808 assert a reset signal whenever the supply voltage (V_{CC}) falls below the factory-preset, $\pm 2\%$ accurate threshold. Internal hysteresis ensures stable switching. The MAX6806/MAX6807/MAX6808 are available in 4.6V and 2.6V thresholds (2.3V is also available for the MAX6806 only). The MAX6806 features an active-low, push-pull RESET output; the MAX6807 features an active-high, push-pull RESET output; and the MAX6808 features an active-low, open-drain RESET output. $\overline{\text{RESET}}$ is valid for V_{CC} down to 1V (MAX6806/MAX6808), and RESET (MAX6807) is guaranteed for V_{CC} down to 1.2V.

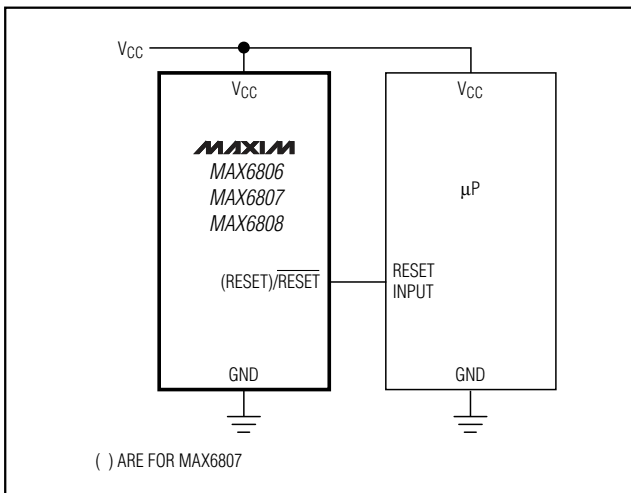
The MAX6806/MAX6807/MAX6808 are available in 3-pin SC70, 3-pin SOT23, 8-pin μMAX , 8-pin SO, and 4-pin SOT143 packages. The SOT143 package includes a manual-reset input.

Applications

- Computers
- Automotive
- Controllers
- Bar-Code Scanners
- Intelligent Instruments
- Critical μP and μC Power Monitoring
- Portable/Battery-Powered Equipment

Selector Guide and Pin Configurations appear at end of data sheet.

Typical Operating Circuit



Features

- ◆ Preset Reset Thresholds: 4.6V and 2.6V (2.3V also available for MAX6806 only)
- ◆ $\pm 2\%$ Accurate Reset Thresholds
- ◆ Reset Output Available in Active-Low (MAX6806), Active-High (MAX6807), and Open-Drain (MAX6808) Versions
- ◆ Immune to Power-Supply Transients
- ◆ $\overline{\text{RESET}}$ Valid to $V_{CC} = 1.0\text{V}$ (MAX6806/MAX6808)
- ◆ 35 μA Supply Current
- ◆ No External Components
- ◆ Manual Reset Available with 4-Pin SOT143 Package
- ◆ Miniature 3-Pin SC70, 3-Pin SOT23, and 4-Pin SOT143 Packages
- ◆ 8 Lead μMAX and 8 Lead SO Packages are Pin Compatible with the MC33064/MC33164/MC34064/MC34164

Ordering Information

| PART | TEMP. RANGE | PIN-PACKAGE |
|----------------|----------------|-------------------|
| MAX6806XR__ -T | -40°C to +85°C | 3 SC70 |
| MAX6806UR__ -T | -40°C to +85°C | 3 SOT23 |
| MAX6806US__ -T | -40°C to +85°C | 4 SOT143 |
| MAX6806UA__ | -40°C to +85°C | 8 μMAX |
| MAX6806SA__ | -40°C to +85°C | 8 SO |
| MAX6807XR__ -T | -40°C to +85°C | 3 SC70 |
| MAX6807UR__ -T | -40°C to +85°C | 3 SOT23 |
| MAX6807US__ -T | -40°C to +85°C | 4 SOT143 |
| MAX6807UA__ | -40°C to +85°C | 8 μMAX |
| MAX6807SA__ | -40°C to +85°C | 8 SO |
| MAX6808XR__ -T | -40°C to +85°C | 3 SC70 |
| MAX6808UR__ -T | -40°C to +85°C | 3 SOT23 |
| MAX6808US__ -T | -40°C to +85°C | 4 SOT143 |
| MAX6808UA__ | -40°C to +85°C | 8 μMAX |
| MAX6808SA__ | -40°C to +85°C | 8 SO |

* SOT23, SOT143, and SC70s are available in tape-and-reel only, 2500 piece minimum order quantity.

Note: Insert the desired number from the Selector Guide into the blank to complete the part number. Also see Selector Guide for top mark for SOT23

Voltage Detectors

ABSOLUTE MAXIMUM RATINGS

V_{CC} to GND-0.3V to +6.0V
 RESET, $\overline{\text{RESET}}$ to GND
 (MAX6806/MAX6807)-0.3V to (V_{CC} + 0.3V)
 RESET to GND (MAX6808).....-0.3V to + 6.0V
 MR to GND (SOT143 package only)-0.3V to + 6.0V
 Input Current, V_{CC}±20mA
 Output Current, RESET, $\overline{\text{RESET}}$ ±20mA
 Rate of Rise, V_{CC}100V/μs

Continuous Power Dissipation (T_A = +70°C)
 SOT23, SOT143 (derate 4mW/°C above +70°C)320mW
 SC70 (derate 2.17mW/°C above +70°C)174mW
 μMAX (derate 4.5mW/°C above +70°C)362mW
 SO (derate 5.9mW/°C above +70°C)471mW
 Operating Temperature Range-40°C to +85°C
 Storage Temperature Range-65°C to +160°C
 Lead Temperature (soldering, 10s)+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(V_{CC} = +5V, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS | |
|---|-------------------|--|--------------------|--------------------------|--------------------------|--------|---|
| Supply Voltage Range | V _{CC} | T _A = 0°C to +70°C | 1.0 | | 5.5 | V | |
| | | T _A = -40°C to +85°C | 1.2 | | 5.5 | | |
| Supply Current | I _{CC} | V _{CC} = +3.6V, no load | | 35 | 60 | μA | |
| | | V _{CC} = +5.5V, no load | | 50 | 80 | | |
| Reset Threshold | V _{TH-} | T _A = +25°C, V _{CC} falling | MAX680__46 | 4.508 | 4.60 | 4.692 | V |
| | | | MAX680__32 | 3.136 | 3.20 | 3.264 | |
| | | | MAX680__26 | 2.548 | 2.60 | 2.652 | |
| | | | MAX680__23 | 2.254 | 2.30 | 2.346 | |
| Reset Threshold Hysteresis | V _{HYST} | T _A = +25°C, Figure 2 | | 0.02 V _{TH-} | 0.03 V _{TH-} | V | |
| $\overline{\text{RESET}}$ Output Voltage (MAX6806/MAX6808) | V _{OL} | I _{SINK} = 20μA, V _{CC} = 1.0V | | | 0.3 | V | |
| | V _{OH} | I _{SOURCE} = 1.0mA, V _{CC} = 2.0V | | | 0.4 | | |
| | V _{OH} | I _{SOURCE} = 2.0mA, V _{CC} = 5.0V (MAX6806 only) | 0.8V _{CC} | | | | |
| $\overline{\text{RESET}}$ Output Leakage Current | I _{OH} | V _{CC} = 5.5V, $\overline{\text{RESET}}$ deasserted (MAX6808 only) | | | 1 | μA | |
| RESET Output Voltage (MAX6807) | V _{OH} | I _{SOURCE} = 20μA, V _{CC} = 1.2V | 0.8V _{CC} | | | V | |
| | | I _{SOURCE} = 400μA, V _{CC} = 2.0V | 0.8V _{CC} | | | | |
| | V _{OL} | I _{SINK} = 3.2mA, V _{CC} = 5.0V | | | 0.4 | | |
| V _{CC} to Reset Delay (Note 2) | | V _{CC} falling at 1mV/μs | | 30 | | μs | |
| Reset Threshold Tempco | | | | 30 | | ppm/°C | |
| MR Pull-Down Resistance | R _{MR} | | 40 | 80 | 120 | kΩ | |
| MR Input Threshold | V _{IL} | V _{CC} > V _{TH+} | | | 0.6 | V | |
| | V _{IH} | | | | 0.7V _{CC} | | |

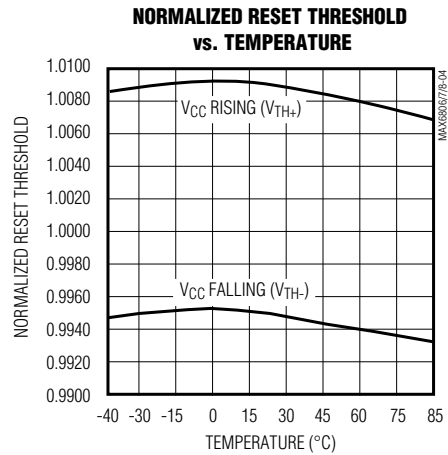
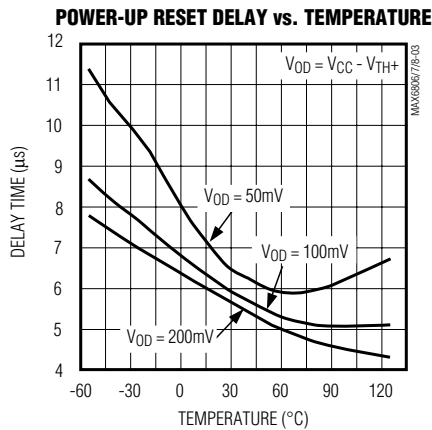
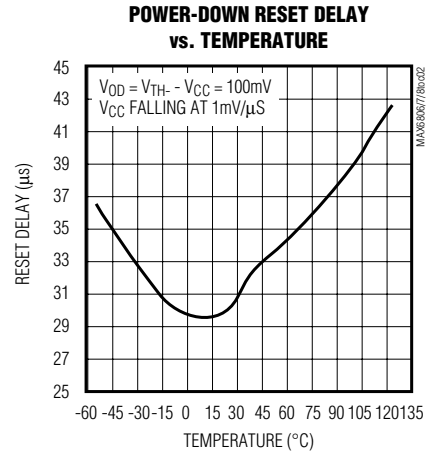
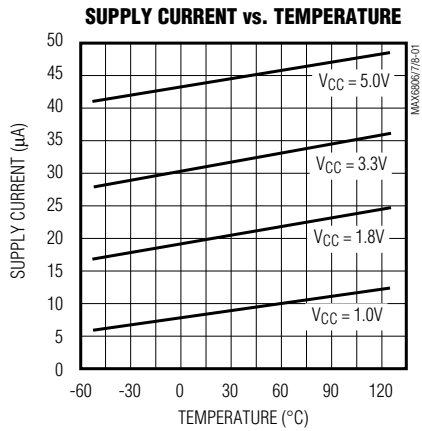
Note1: All devices are 100% production tested at T_A = +25°C, and are guaranteed by design for T_A = T_{MIN} to T_{MAX}, as specified.

Note 2: $\overline{\text{RESET}}$ output for MAX6806/MAX6808, RESET output for MAX6807.

Voltage Detectors

Typical Operating Characteristics

($T_A = +25^\circ\text{C}$, unless otherwise noted.)



Pin Description

| PIN | | | NAME | FUNCTION |
|------------|--------|---------|---------------------------|--|
| SOT23/SC70 | SOT143 | µMAX/SO | | |
| 1 | 1 | 1 | $\overline{\text{RESET}}$ | Active-Low Reset Output (MAX6806/MAX6808). $\overline{\text{RESET}}$ remains low while V_{CC} is below the reset-threshold voltage or while MR is held high. |
| | | | RESET | Active-High Reset Output (MAX6807). RESET remains high while V_{CC} is below the reset-threshold voltage or while MR is held high. |
| 2 | 4 | 4 | GND | Ground |
| 3 | 3 | 2 | V_{CC} | Supply Voltage Input |
| — | 2 | — | MR | Active-High Manual Reset Input. Internal 80kΩ resistor to GND. |
| — | — | 3, 5–8 | N.C. | Not Internally Connected |

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Detailed Description

Reset Output

The MAX6806 voltage detector features an active-low, push-pull $\overline{\text{RESET}}$ output, while the MAX6807 features an active-high, push-pull RESET output. Unlike micro-processor (μP) supervisory circuits that offer a reset timeout period, the MAX6806 and MAX6807 $\overline{\text{RESET}}$ goes high and RESET goes low virtually immediately once V_{CC} exceeds the reset threshold. If a brownout occurs (V_{CC} falls below the reset threshold), $\overline{\text{RESET}}$ goes low and RESET goes high. RESET is guaranteed to be a logic low for $V_{\text{CC}} \geq 1\text{V}$ and $\overline{\text{RESET}}$ is guaranteed to be a logic high for $V_{\text{CC}} \geq 1.2\text{V}$.

The MAX6808 features an active-low, open-drain $\overline{\text{RESET}}$ output. The output sinks current when V_{CC} falls below the reset threshold. Connect a pull-up resistor from $\overline{\text{RESET}}$ to any supply voltage up to 6V (Figure 1). Select a resistor value large enough to provide a logic low and small enough to provide a logic high while supplying all input and leakage currents connected to the $\overline{\text{RESET}}$ line. A 100k Ω resistor is sufficient in applications driving high-impedance loads.

The manual reset input (MR, 4-pin SOT143 package) can also initiate a reset (see *Manual Reset Input* section).

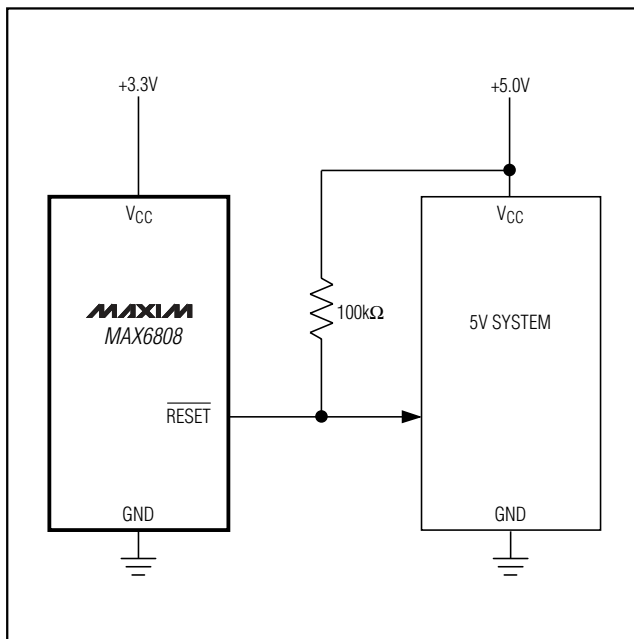


Figure 1. The MAX6808 open-drain $\overline{\text{RESET}}$ output allows use with multiple supplies.

Manual Reset Input

Many applications require manual-reset capabilities, allowing an operator, a test technician, or external logic circuitry to initiate a reset. A logic high on MR asserts a reset and remains asserted while MR is high. This input has an 80k Ω pull-down resistor, so the input may be left unconnected if not used. Connect a normally open momentary switch from MR to V_{CC} to create a manual-reset function. If MR is driven from long cables or if the device is used in a noisy environment, connecting a 0.1 μF capacitor from MR to ground provides noise immunity.

Hysteresis

The MAX6806/MAX6807/MAX6808 feature internal hysteresis that creates two trip points: one for the rising supply voltage and one for the falling supply voltage (Figure 2). The hysteresis prevents the output from oscillating (chattering) when V_{CC} is near the reset threshold.

Reset Threshold Accuracy

The MAX6806/MAX6807/MAX6808 are ideal for systems using a 5V $\pm 5\%$, 3V $\pm 5\%$, or 2.5V $\pm 5\%$ power supply with ICs specified for 5V $\pm 10\%$, 3V $\pm 10\%$, or 2.5V $\pm 10\%$, respectively. The reset is guaranteed to assert after the power supply falls out of regulation, but before power drops below the minimum specified operating voltage range for the system ICs.

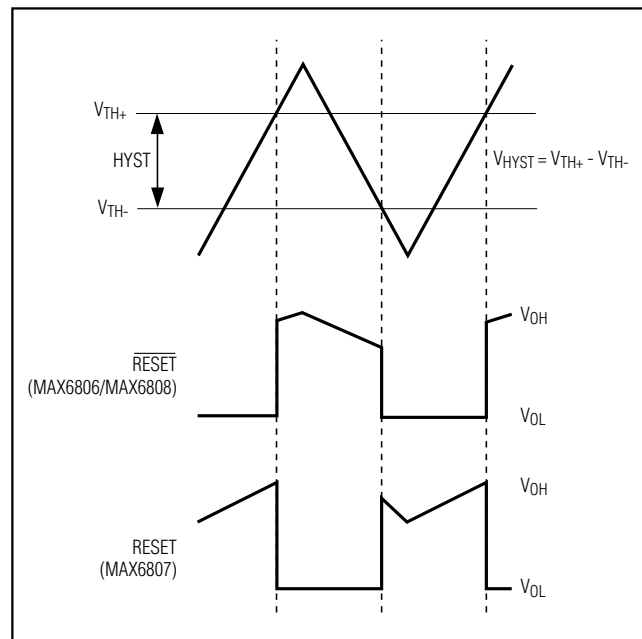


Figure 2. Input and Output Waveforms with V_{CC} Varied

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Applications Information

Negative-Going VCC Transients

In addition to asserting a reset signal during power-up, power-down, and brown-out conditions, the MAX6806/MAX6807/MAX6808 are immune to short-duration, negative-going VCC transients.

Figure 3 displays typical transient durations vs. reset-comparator overdrive for which the MAX6806/MAX6807/MAX6808 do **not** generate a reset pulse. The graph was generated using a negative-going pulse applied to VCC, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset-comparator overdrive). The graph indicates the maximum pulse width a negative-going VCC transient can have without causing a reset pulse. As the magnitude of the transient increases (goes further below the reset threshold), the maximum allowable pulse width decreases. A 0.1µF capacitor mounted as close as possible to VCC provides additional transient immunity.

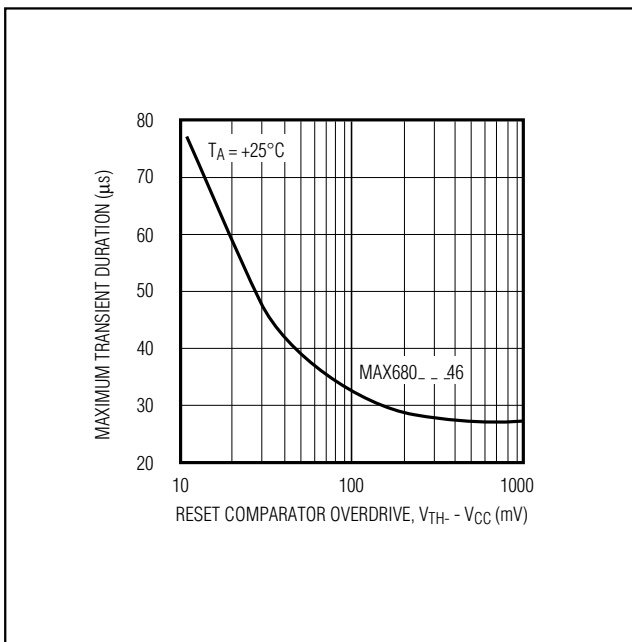


Figure 3. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

Ensuring a Valid Reset Output Down to VCC = Ground

When VCC falls below 1V, the MAX6806/MAX6808 RESET output no longer sinks current—it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to RESET can drift to undetermined voltages. This presents no problem in most applications, since most circuitry is inoperative when VCC is below 1V. In applications where RESET must be valid down to ground, add a pull-down resistor to RESET so any stray leakage currents flow to ground, holding RESET low (Figure 4). Select R1 to be large enough not to load RESET and small enough to pull RESET to ground. For most applications, 100kΩ will not load RESET and will pull RESET to ground. Similarly, if RESET (MAX6807) must be valid below 1.2V, add a pull-up resistor to RESET.

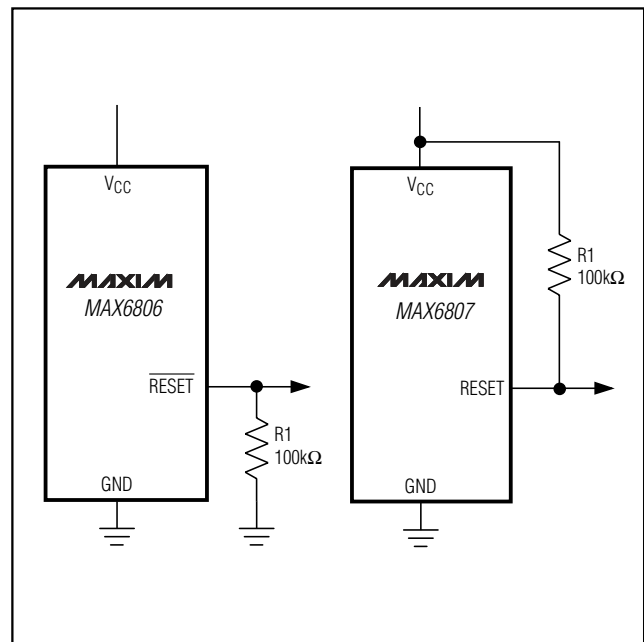


Figure 4. RESET / RESETE Valid to VCC = Ground Circuit

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Interfacing to μ Ps with Bidirectional Reset Pins

μ Ps with bidirectional reset pins (such as the Motorola 68HC11 series) can contend with push-pull RESET outputs, resulting in indeterminate logic levels. Use the MAX6808 with the open-drain RESET when interfacing to this type of controller.

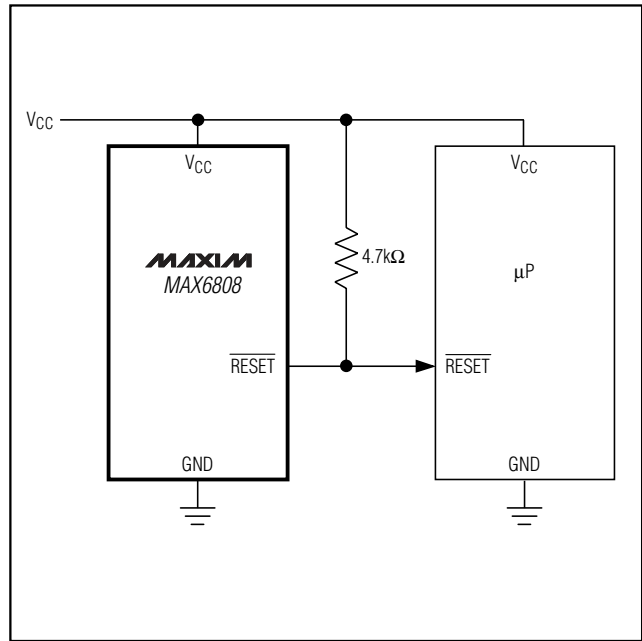


Figure 5. Interfacing to μ Ps with Bidirectional Reset I/O

Selector Guide

| PART | RESET OUTPUT | TOP MARK CODE | NOMINAL V_{TH} (V) |
|---------------|-----------------------|---------------|----------------------|
| MAX6806SA46 | Active-Low, Push-Pull | — | 4.6 |
| MAX6806SA26 | | — | 2.6 |
| MAX6806SA23 | | — | 2.3 |
| MAX6806UA46 | | — | 4.6 |
| MAX6806UA26 | | — | 2.6 |
| MAX6806UA23 | | — | 2.3 |
| MAX6806UR46-T | | FZDP | 4.6 |
| MAX6806UR26-T | | FZDQ | 2.6 |
| MAX6806UR23-T | | FZDR | 2.3 |
| MAX6806US46-T | | KABT | 4.6 |
| MAX6806US26-T | | KABU | 2.6 |
| MAX6806US23-T | | KABV | 2.3 |
| MAX6806XR46-T | | AAA | 4.6 |
| MAX6806XR26-T | | AAB | 2.6 |
| MAX6806XR23-T | | AAC | 2.3 |

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Selector Guide (continued)

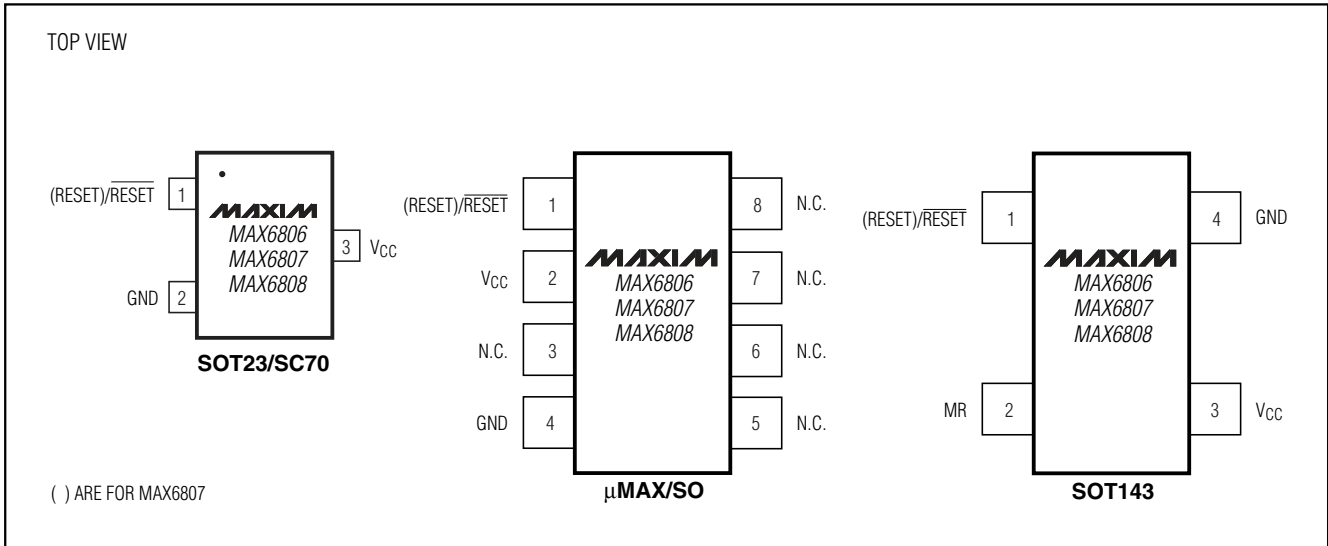
MAX6806/MAX6807/MAX6808

| PART | RESET OUTPUT | TOP MARK CODE | NOMINAL V_{TH} (V) | |
|---------------|------------------------|------------------------|----------------------|-----|
| MAX6807SA46 | Active-High, Push-Pull | — | 4.6 | |
| MAX6807SA26 | | — | 2.6 | |
| MAX6807UA46 | | — | 4.6 | |
| MAX6807UA26 | | — | 2.6 | |
| MAX6807UR46-T | | FZDS | 4.6 | |
| MAX6807UR26-T | | FZDT | 2.6 | |
| MAX6807US46-T | | KABW | 4.6 | |
| MAX6807US26-T | | KABX | 2.6 | |
| MAX6807XR46-T | | AAD | 4.6 | |
| MAX6807XR26-T | | AAE | 2.6 | |
| MAX6808SA46 | | Active-Low, Open-Drain | — | 4.6 |
| MAX6808SA32 | | | — | 3.2 |
| MAX6808SA26 | — | | 2.6 | |
| MAX6808UA46 | — | | 4.6 | |
| MAX6808UA32 | — | | 3.2 | |
| MAX6808UA26 | — | | 2.6 | |
| MAX6808UR46-T | FZDU | | 4.6 | |
| MAX6808UR32-T | FZFL | | 3.2 | |
| MAX6808UR26-T | FZDV | | 2.6 | |
| MAX6808US46-T | KABY | | 4.6 | |
| MAX6808US32-T | KACC | | 3.2 | |
| MAX6808US26-T | KABZ | | 2.6 | |
| MAX6808XR46-T | AAF | | 4.6 | |
| MAX6808XR32-T | ACD | | 3.2 | |
| MAX6808XR26-T | AAG | | 2.6 | |

Other voltage thresholds may be available. Contact factory for availability.

Voltage Detectors

Pin Configurations



Chip Information

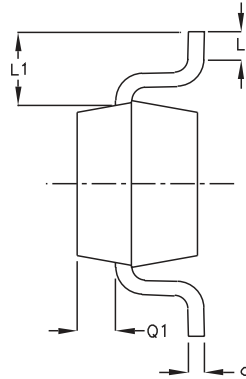
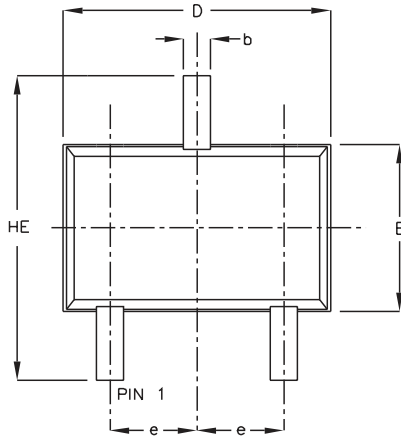
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Voltage Detectors

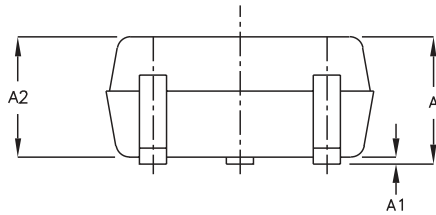
Package Information

SC70, 3L EPS

MAX6806/MAX6807/MAX6808



| SYMBOL | MIN | MAX |
|--------|-------|------|
| e | 0.65 | BSC |
| D | 1.80 | 2.20 |
| b | 0.25 | 0.40 |
| E | 1.15 | 1.35 |
| HE | 1.80 | 2.40 |
| Q1 | 0.10 | 0.40 |
| A2 | 0.80 | 1.00 |
| A1 | 0.00 | 0.10 |
| A | 0.80 | 1.10 |
| c | 0.10 | 0.18 |
| L | 0.10 | 0.30 |
| L1 | 0.425 | TYP. |



NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. DIMENSIONS ARE INCLUSIVE OF PLATING
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR
4. ALL SPECIFICATIONS COMPLY TO EIAJ SC70
5. COPLANARITY 4 MILS. MAX.

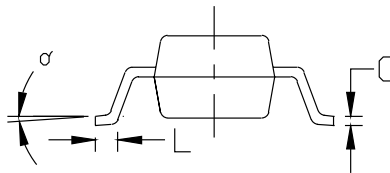
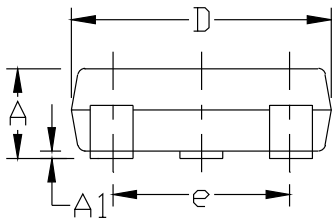
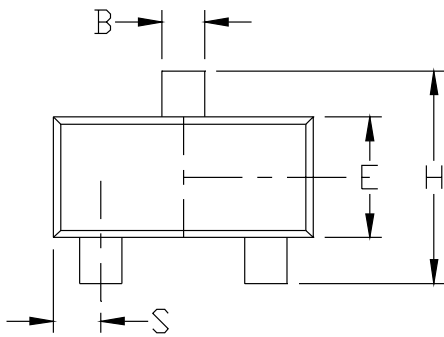
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| PACKAGE OUTLINE, SC70, 3L | | |
| <small>APPROVAL</small> | <small>DOCUMENT CONTROL NO.</small> | <small>REV</small> |
| | 21-0075 | B 1/1 |

Voltage Detectors

Package Information (continued)

NOTES:

1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
3. CONTROLLING DIMENSION: MILLIMETER



| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.031 | 0.047 | 0.787 | 1.194 |
| A1 | 0.001 | 0.005 | 0.025 | 0.127 |
| B | 0.014 | 0.022 | 0.356 | 0.559 |
| C | 0.0034 | 0.006 | 0.086 | 0.152 |
| D | 0.105 | 0.120 | 2.667 | 3.048 |
| E | 0.047 | 0.055 | 1.194 | 1.397 |
| e | 0.070 | 0.080 | 1.778 | 2.032 |
| H | 0.082 | 0.098 | 2.083 | 2.489 |
| L | 0.004 | 0.012 | 0.102 | 0.305 |
| S | 0.017 | 0.022 | 0.432 | 0.559 |
| α | 0° | 8° | 0° | 8° |

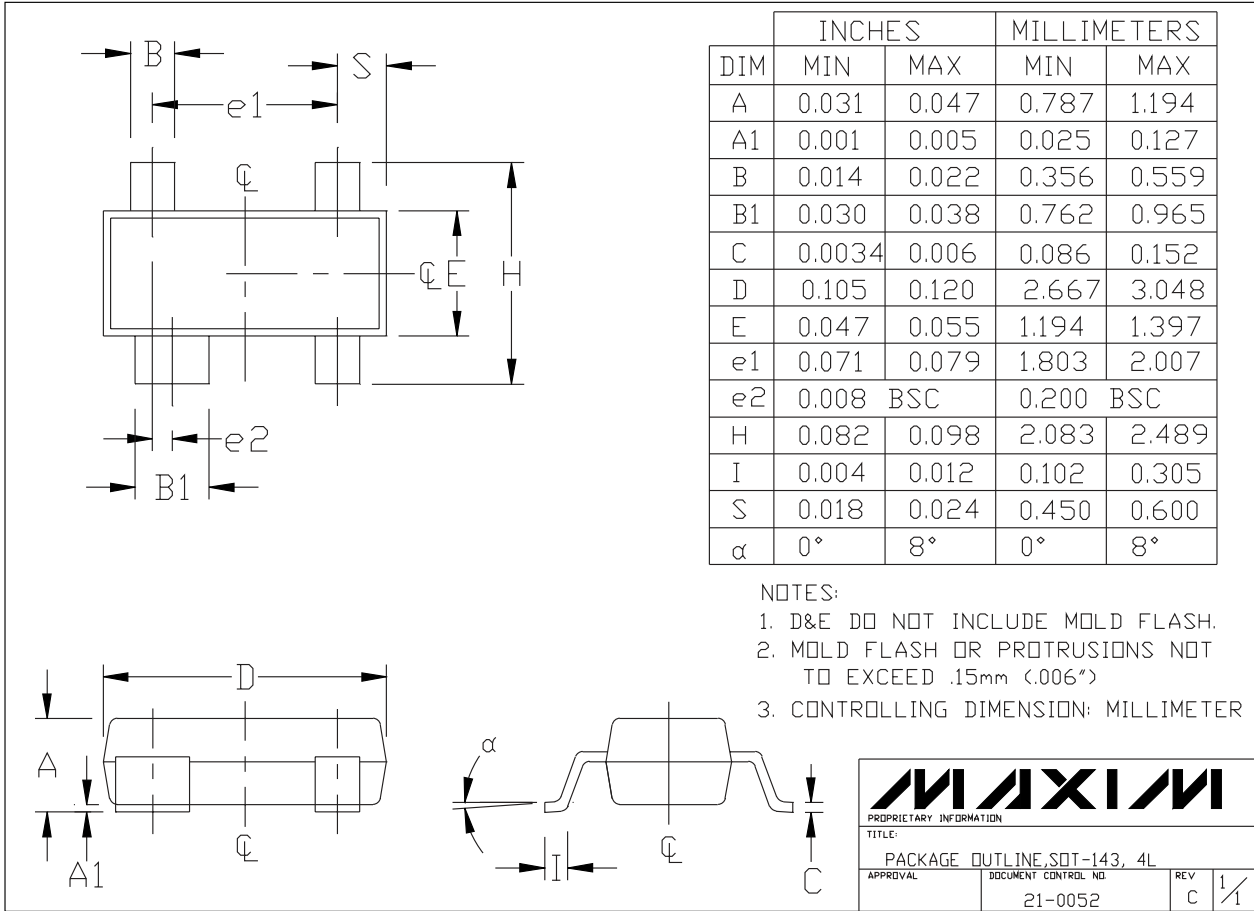
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| <small>APPROVAL</small> | <small>DOCUMENT CONTROL NO.</small> | <small>REV</small> | <small>1/1</small> |
| | 21-0051 | C | |

SOT03LEPS

Voltage Detectors

Package Information (continued)

MAX6806/MAX6807/MAX6808



Voltage Detectors

Package Information (continued)

8LUMAXD EPS

| | INCHES | | MILLIMETERS | | JEDEC | | | |
|----|------------|-------|-------------|------|------------|-------|----------|------|
| | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| A | 0.037 | 0.043 | 0.94 | 1.10 | --- | 0.043 | --- | 1.10 |
| A1 | 0.002 | 0.006 | 0.05 | 0.15 | 0.002 | 0.006 | 0.05 | 0.15 |
| B | 0.010 | 0.014 | 0.25 | 0.36 | 0.010 | 0.016 | 0.25 | 0.40 |
| C | 0.005 | 0.007 | 0.13 | 0.18 | 0.005 | 0.009 | 0.13 | 0.23 |
| D | 0.116 | 0.120 | 2.95 | 3.05 | 0.114 | 0.122 | 2.9 | 3.1 |
| e | 0.0256 BSC | | 0.65 BSC | | 0.0256 BSC | | 0.64 BSC | |
| E | 0.116 | 0.120 | 2.95 | 3.05 | 0.114 | 0.122 | 2.9 | 3.1 |
| H | 0.188 | 0.198 | 4.78 | 5.03 | 0.193 BSC | | 4.9 BSC | |
| L | 0.016 | 0.026 | 0.41 | 0.66 | 0.016 | 0.027 | 0.40 | 0.70 |
| α | 0° | 6° | 0° | 6° | 0° | 6° | 0° | 6° |
| S | 0.0207 BSC | | 0.5250 BSC | | | | | |

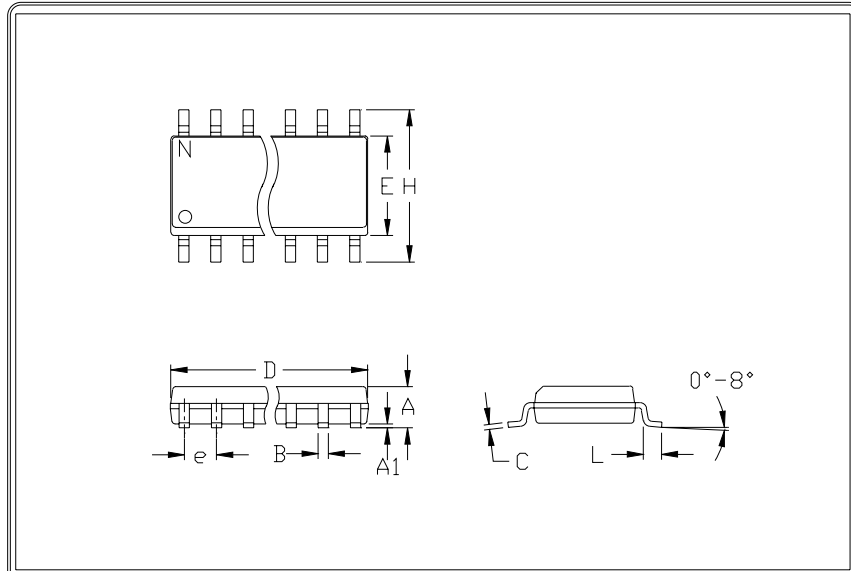
NOTES:
 1. D&E DO NOT INCLUDE MOLD FLASH.
 2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED 0.15MM (.006").
 3. CONTROLLING DIMENSION: MILLIMETERS.
 4. MEETS JEDEC MO-187.

MAXIM
 PROPRIETARY INFORMATION
 TITLE: PACKAGE OUTLINE, 8L uMAX
 APPROVAL: _____ DOCUMENT CONTROL NO: 21-0036 REV: I 1/1

Voltage Detectors

Package Information (continued)

MAX6806/MAX6807/MAX6808



| | INCHES | | MILLIMETERS | |
|----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.053 | 0.069 | 1.35 | 1.75 |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 |
| B | 0.014 | 0.019 | 0.35 | 0.49 |
| C | 0.007 | 0.010 | 0.19 | 0.25 |
| e | 0.050 | | 1.27 | |
| E | 0.150 | 0.157 | 3.80 | 4.00 |
| H | 0.228 | 0.244 | 5.80 | 6.20 |
| h | 0.010 | 0.020 | 0.25 | 0.50 |
| L | 0.016 | 0.050 | 0.40 | 1.27 |

| | INCHES | | MILLIMETERS | | N | MS012 |
|---|--------|-------|-------------|-------|----|-------|
| | MIN | MAX | MIN | MAX | | |
| D | 0.189 | 0.197 | 4.80 | 5.00 | 8 | A |
| D | 0.337 | 0.344 | 8.55 | 8.75 | 14 | B |
| D | 0.386 | 0.394 | 9.80 | 10.00 | 16 | C |

NOTES:

1. D&E DO NOT INCLUDE MOLD FLASH
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
3. LEADS TO BE COPLANAR WITHIN .102mm (.004")
4. CONTROLLING DIMENSION: MILLIMETER
5. MEETS JEDEC MS012-XX AS SHOWN IN ABOVE TABLE
6. N = NUMBER OF PINS



PACKAGE FAMILY OUTLINE: SOIC .150"



21-0041 A

120 SAN GABRIEL DR. SUNNYVALE, CA 94086 FAX (408) 737-7700
PROPRIETARY INFORMATION

TITLE

DOCUMENT CONTROL NUMBER REV

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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