# APX809S00-31SA-7 Datasheet

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| | |
|---|---|
| DiGi Electronics Part Number | APX809S00-31SA-7-DG |
| Manufacturer | Diodes Incorporated |
| Manufacturer Product Number | APX809S00-31SA-7 |
| Description | IC SUPERVISOR 1 CHANNEL SOT23 |
| Detailed Description | Supervisor Push-Pull, Totem Pole 1 Channel SOT-23-3 |

# Purchase and inquiry

| | |
|---|---|
| **Manufacturer Product Number:** | **Manufacturer:** |
| APX809S00-31SA-7 | Diodes Incorporated |
| **Series:** | **Product Status:** |
| - | Active |
| **DiGi-Electronics Programmable:** | **Type:** |
| Not Verified | Simple Reset/Power-On Reset |
| **Number of Voltages Monitored:** | **Voltage - Threshold:** |
| 1 | 3.08V |
| **Output:** | **Reset:** |
| Push-Pull, Totem Pole | Active Low |
| **Reset Timeout:** | **Operating Temperature:** |
| 1ms Minimum | -40°C ~ 125°C (TA) |
| **Mounting Type:** | **Package / Case:** |
| Surface Mount | TO-236-3, SC-59, SOT-23-3 |
| **Supplier Device Package:** | **Base Product Number:** |
| SOT-23-3 | APX809 |

# Environmental & Export classification

| | |
|---|---|
| **RoHS Status:** | **Moisture Sensitivity Level (MSL):** |
| ROHS3 Compliant | 1 (Unlimited) |
| **REACH Status:** | **ECCN:** |
| REACH Unaffected | EAR99 |
| **HTSUS:** | |
| 8542.39.0001 | |

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Lead-free Green

**APX809S/810S**

**3-PIN MICRO POWER VOLTAGE DETECTOR**

## Description

The APX809S/810S are used for microprocessor (µP) supervisory circuits to monitor the power supplies in µP and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V and +2.5V powered circuits.
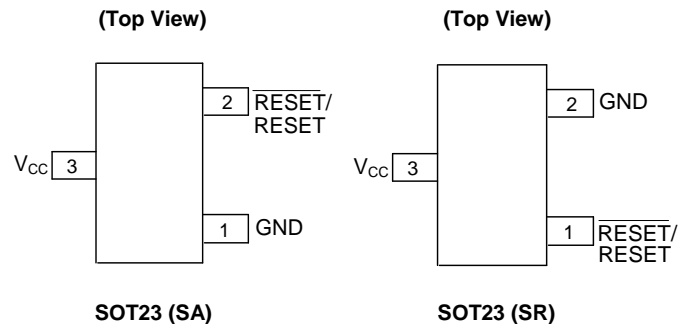
These circuits perform a single function: they assert a reset signal whenever the $V_{CC}$ supply voltage declines below a preset threshold, keeping it asserted for at least 240ms after $V_{CC}$ has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available. The APX809S/810S have push pull outputs. The APX809S has an active low $\overline{RESET}$ output, while the APX810S has an active high RESET output. The reset comparator is designed to ignore fast transients on $V_{CC}$, and the outputs are guaranteed to be in the correct logic state for $V_{CC}$ down to 1V. Low supply current makes the APX809S/810S ideal for use in portable equipment. The APX809S/810S is available in a 3-pin SOT23 package.

## Pin Assignments

**(Top View)**

$V_{CC}$ [3]

[2] $\overline{RESET}$/ RESET

[1] GND

**SOT23 (SA)**

**(Top View)**

$V_{CC}$ [3]

[2] GND

[1] $\overline{RESET}$/ RESET

**SOT23 (SR)**

## Applications

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

## Features

- Precision Monitoring of +2.5V, +3V, +3.3V and +5V Power-Supply Voltages
- Fully Specified Over-temperature
- Available in Three Output Configurations
- Push-Pull $\overline{RESET}$ Active Low (APX809S)
- Push-Pull RESET Active High (APX810S)
- 200ms Typ Power-On Reset Pulse Width
- 7µA Supply Current (Typ.)
- Guaranteed Reset Valid to $V_{CC}$ = +1V
- No External Components
- SOT23 Available in "Green" Molding Compound (No Br, Sb)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.

2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.

3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
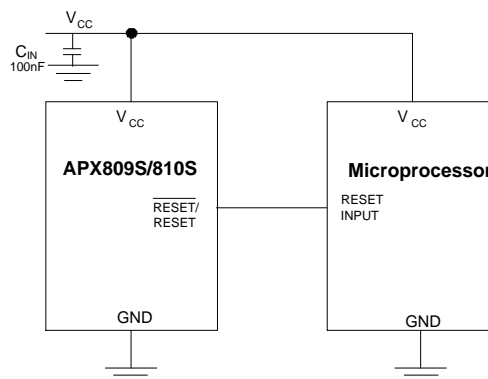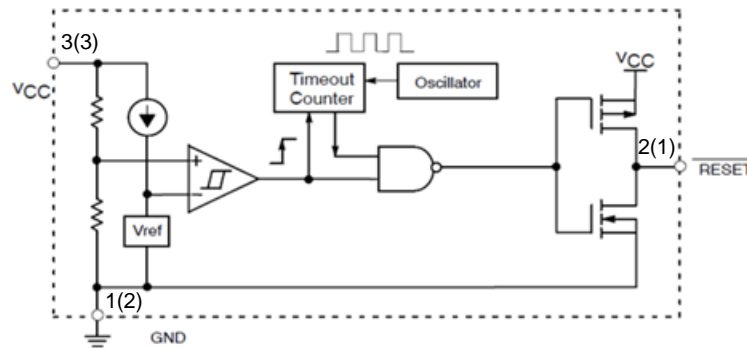
## Typical Applications Circuit



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## Pin Descriptions

| Pin Number | | Pin Name | Function |
|---|---|---|---|
| SOT23 (SA) | SOT23 (SR) | | |
| 3 | 3 | $V_{CC}$ | Operating Voltage Input |
| 2 | 1 | $\overline{RESET}$/RESET | Reset Output Pin |
| 1 | 2 | GND | Ground |

## Functional Block Diagram



APX809 S Series Complementary Active-Low Output
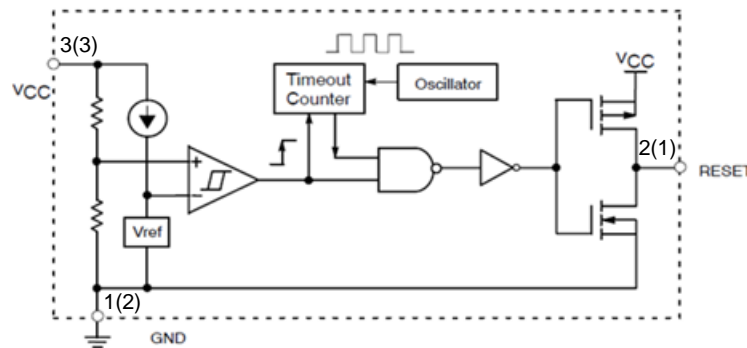


APX810 S Series Complementary Active-High Output

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**APX809S/810S**

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.) (Note 4)

| Symbol | Parameter | | Rating | Unit |
|--------|-----------|--|--------|------|
| $V_{CC}$ | Supply Voltage | | -0.3 to 6.0 | V |
| $V_{RESET}$ | $\overline{RESET}$/RESET Voltage | | -0.3 to 6.0 | V |
| $I_{CC}$ | Input Current | | 20 | mA |
| $I_O$ | Output Current | | 20 | mA |
| $\theta_{JA}$ | Thermal Resistance Junction-to-Ambient | SOT23 | 232 | °C/W |
| $\theta_{JC}$ | Thermal Resistance Junction-to-Case | SOT23 | 87 | |
| ESD | HBM (Human Body Model) | | 6,000 | V |
| | MM (Machine Model) | | 600 | |
| $T_J$ | Junction Temperature Range | | -40 to +150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -65 to +150 | °C |

Note: 4. Stresses greater than 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 under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

## Recommended Operating Conditions (@$T_A$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | Min | Max | Unit |
|--------|-----------|-----|-----|------|
| $T_A$ | Operating Ambient Temperature Range | -40 | +125 | °C |
| $V_{CC}$ | Supply Voltage | 1.0 | 5.5 | V |
| $V_{RESET}$ | $\overline{RESET}$/RESET Output Voltage | 0 | 5.5 | V |

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## Electrical Characteristics (@T$_A$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| I$_{CC}$ | Supply Current | | V$_{TH}$ + 0.2V | — | 7 | 16 | µA |
| V$_{TH}$ | APX809SXX/810SXX-23 | | T$_A$ = +25°C | 2.22 | 2.25 | 2.29 | V |
| | APX809SXX/810SXX-26 | | | 2.59 | 2.63 | 2.67 | |
| | APX809SXX/810SXX-29 | | | 2.89 | 2.93 | 2.97 | |
| | APX809SXX/810SXX-31 | | | 3.04 | 3.08 | 3.12 | |
| | APX809SXX/810SXX-40 | | | 3.94 | 4.00 | 4.05 | |
| | APX809SXX/810SXX-44 | | | 4.32 | 4.38 | 4.44 | |
| | APX809SXX/810SXX-46 | | | 4.57 | 4.63 | 4.69 | |
| $\dfrac{\Delta V_{TH}}{V_{TH} \times \Delta T}$ | Reset Threshold Voltage Temperature Coefficient | | T$_A$ = -40 to +125°C | — | 30 | — | ppm/°C |
| t$_S$ | V$_{CC}$ Drop to $\overline{RESET}$ Delay | | V$_{CC}$ = V$_{TH}$ to (V$_{TH}$ - 100mV) | — | 20 | — | µs |
| t$_{DELAY}$ | Reset Active Timeout Period | APX809S00/810S00-XX | V$_{CC}$ ≥ 1.02 x V$_{TH}$ | 1 | 1.7 | 3.3 | ms |
| | | APX809S05/810S05-XX | | 20 | 50 | 70 | |
| | | APX809S/810S-XX | | 140 | 240 | 280 | |
| V$_{OL}$ | $\overline{RESET}$ Output Voltage Low (APX809S) | | V$_{CC}$ = V$_{TH}$ - 0.2V, I$_{SINK}$ = 1.2mA | — | — | 0.3 | V |
| | | | V$_{CC}$ = V$_{TH}$ - 0.2V, I$_{SINK}$ = 3.2mA | — | — | 0.4 | |
| | | | V$_{CC}$ > 1.0V, I$_{SINK}$ = 50µA | — | — | 0.3 | |
| V$_{OH}$ | $\overline{RESET}$ Output Voltage-High (APX809S) | | V$_{CC}$ > V$_{TH}$ + 0.2V, I$_{SOURCE}$ = 500µA | 0.8V$_{CC}$ | — | — | V |
| | | | V$_{CC}$ > V$_{TH}$ + 0.2V, I$_{SOURCE}$ = 800µA | V$_{CC}$ - 1.5 | — | — | |
| V$_{OL}$ | RESET Output Voltage-Low (APX810S) | | V$_{CC}$ = V$_{TH}$ + 0.2V, I$_{SINK}$ = 1.2mA | — | — | 0.3 | V |
| | | | V$_{CC}$ = V$_{TH}$ + 0.2V, I$_{SINK}$ = 3.2mA | — | — | 0.4 | |
| V$_{OH}$ | RESET Output Voltage-High (APX810S) | | 1.8V < V$_{CC}$ < V$_{TH}$ - 0.2, I$_{SOURCE}$ = 150µA | 0.8V$_{CC}$ | — | — | V |

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## Performance Characteristics

### RESET Threshold Voltage vs. Temperature

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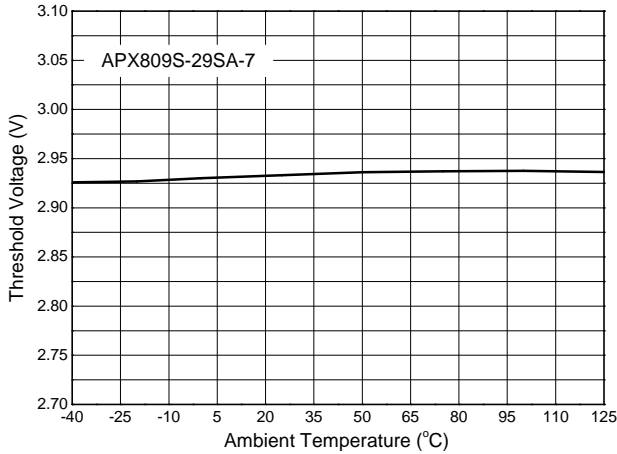
### RESET Active Timeout Period vs. Temperature

APX809S-29SA-7
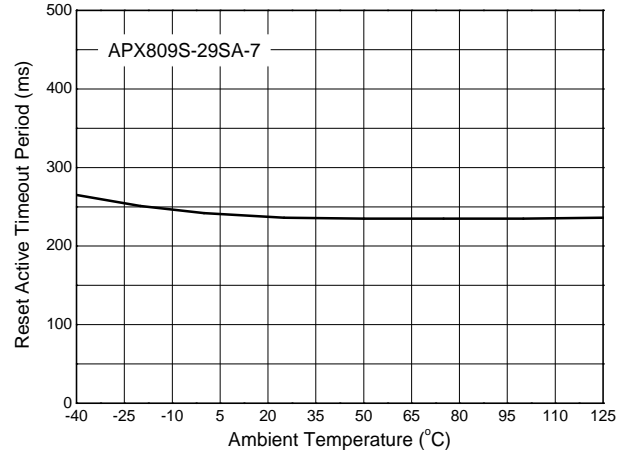
### Supply Current vs. Temperature

APX809S-29SA-7
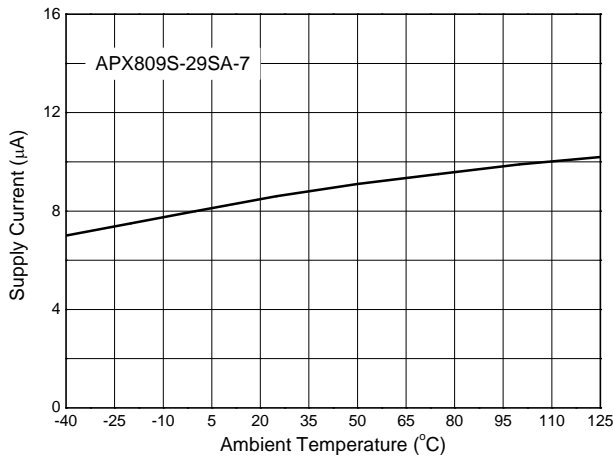
### Output Voltage vs. Input Voltage
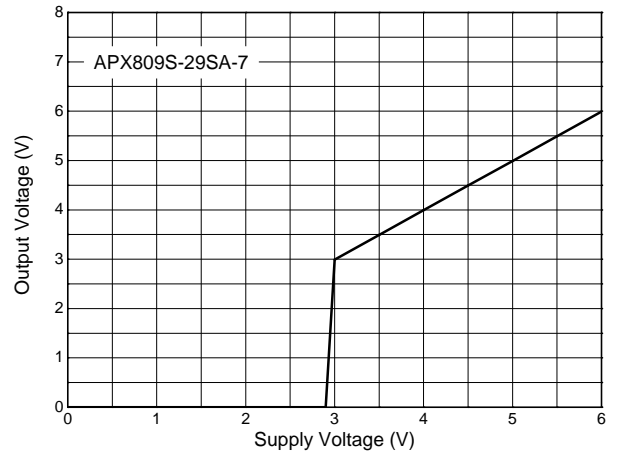
APX809S-29SA-7

### Output Sink Current vs. Input Voltage

APX809S-29SA-7
$V_{RESET}$=0.2V

-40°C
25°C
125°C

### Output Sink Current vs. Input Voltage

APX809S-29SA-7
$V_{RESET}$=$V_{IN}$-0.2V

-40°C
25°C
125°C

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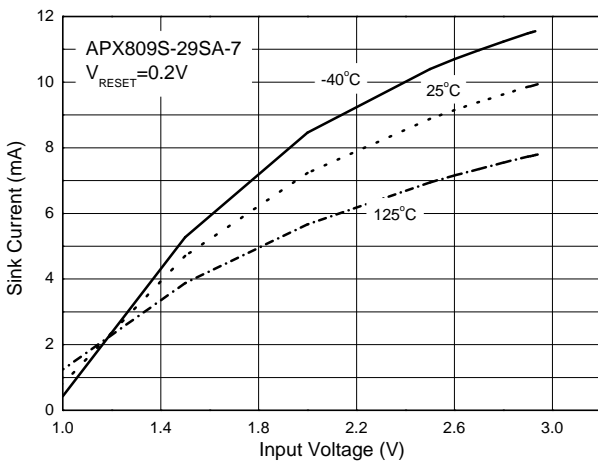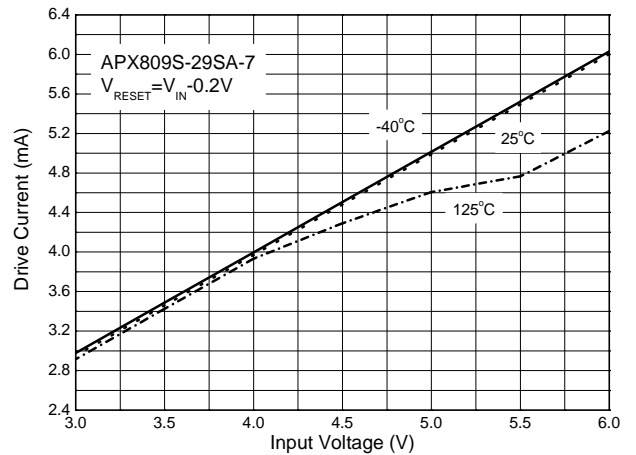
**APX809S/810S**

## Timing Diagram



## Ordering Information

APX8**XX**S **X** - **X** **X** - **X**
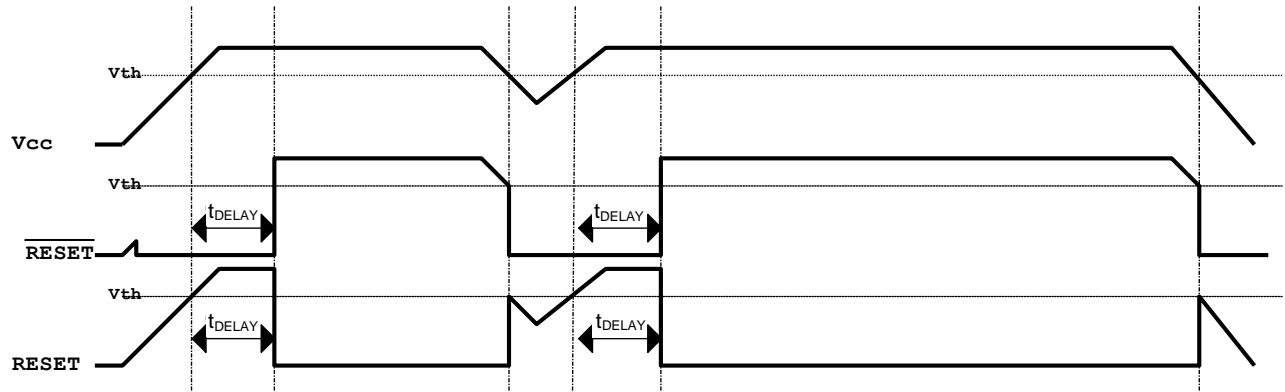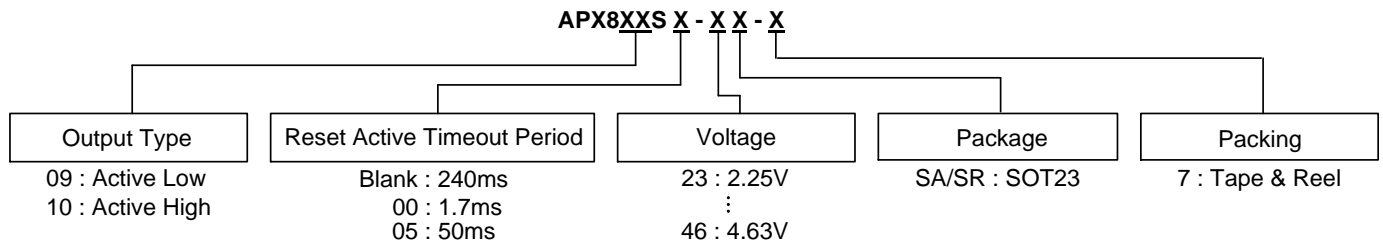
| Output Type | Reset Active Timeout Period | Voltage | Package | Packing |
|---|---|---|---|---|
| 09 : Active Low<br>10 : Active High | Blank : 240ms<br>00 : 1.7ms<br>05 : 50ms | 23 : 2.25V<br>⋮<br>46 : 4.63V | SA/SR : SOT23 | 7 : Tape & Reel |

| Part Number | Package Code | Packaging | 7" Tape and Reel | |
|---|---|---|---|---|
| | | | Quantity | Part Number Suffix |
| APX809SXX-XXSA-7 | SA | SOT23 | 3,000/Tape & Reel | -7 |
| APX810SXX-XXSA-7 | SA | SOT23 | 3,000/Tape & Reel | -7 |
| APX809SXX-XXSR-7 | SR | SOT23 | 3,000/Tape & Reel | -7 |
| APX810SXX-XXSR-7 | SR | SOT23 | 3,000/Tape & Reel | -7 |

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## Marking Information

**1)  SOT23**

( Top View )
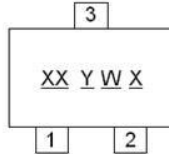


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
         a~z : 27~52 week; z represents
         52 and 53 week
X : A~Z : Green

| Part Number | Package | Identification Code |
|---|---|---|
| APX809S00-46SA-7 | SOT23 | PB |
| APX809S05-46SA-7 | SOT23 | R5 |
| APX809S-46SA-7 | SOT23 | X2 |
| APX809S00-44SA-7 | SOT23 | PC |
| APX809S05-44SA-7 | SOT23 | R6 |
| APX809S-44SA-7 | SOT23 | X3 |
| APX809S00-40SA-7 | SOT23 | PD |
| APX809S05-40SA-7 | SOT23 | R7 |
| APX809S-40SA-7 | SOT23 | X4 |
| APX809S00-31SA-7 | SOT23 | PE |
| APX809S05-31SA-7 | SOT23 | R8 |
| APX809S-31SA-7 | SOT23 | X5 |
| APX809S00-29SA-7 | SOT23 | Q2 |
| APX809S05-29SA-7 | SOT23 | RM |
| APX809S-29SA-7 | SOT23 | X6 |
| APX809S00-26SA-7 | SOT23 | Q3 |
| APX809S05-26SA-7 | SOT23 | RN |
| APX809S-26SA-7 | SOT23 | X7 |
| APX809S00-23SA-7 | SOT23 | Q4 |
| APX809S05-23SA-7 | SOT23 | RP |
| APX809S-23SA-7 | SOT23 | X8 |
| APX810S00-46SA-7 | SOT23 | Q5 |
| APX810S05-46SA-7 | SOT23 | RR |
| APX810S-46SA-7 | SOT23 | XA |
| APX810S00-44SA-7 | SOT23 | Q6 |
| APX810S05-44SA-7 | SOT23 | RS |
| APX810S-44SA-7 | SOT23 | XB |
| APX810S00-40SA-7 | SOT23 | Q7 |
| APX810S05-40SA-7 | SOT23 | RT |
| APX810S-40SA-7 | SOT23 | XC |
| APX810S00-31SA-7 | SOT23 | Q8 |
| APX810S05-31SA-7 | SOT23 | RU |
| APX810S-31SA-7 | SOT23 | XD |
| APX810S00-29SA-7 | SOT23 | Q9 |
| APX810S05-29SA-7 | SOT23 | RV |
| APX810S-29SA-7 | SOT23 | XE |
| APX810S00-26SA-7 | SOT23 | QJ |
| APX810S05-26SA-7 | SOT23 | RW |
| APX810S-26SA-7 | SOT23 | XF |
| APX810S00-23SA-7 | SOT23 | QK |
| APX810S05-23SA-7 | SOT23 | RX |
| APX810S-23SA-7 | SOT23 | XG |

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## Marking Information (Cont.)

| Part Number | Package | Identification Code |
|---|---|---|
| APX809S00-46SR-7 | SOT23 | QM |
| APX809S05-46SR-7 | SOT23 | RY |
| APX809S-46SR-7 | SOT23 | Y2 |
| APX809S00-44SR-7 | SOT23 | QN |
| APX809S05-44SR-7 | SOT23 | RZ |
| APX809S-44SR-7 | SOT23 | Y3 |
| APX809S00-40SR-7 | SOT23 | QP |
| APX809S05-40SR-7 | SOT23 | SM |
| APX809S-40SR-7 | SOT23 | Y4 |
| APX809S00-31SR-7 | SOT23 | QQ |
| APX809S05-31SR-7 | SOT23 | SP |
| APX809S-31SR-7 | SOT23 | Y5 |
| APX809S00-29SR-7 | SOT23 | QR |
| APX809S05-29SR-7 | SOT23 | SR |
| APX809S-29SR-7 | SOT23 | Y6 |
| APX809S00-26SR-7 | SOT23 | QS |
| APX809S05-26SR-7 | SOT23 | SS |
| APX809S-26SR-7 | SOT23 | Y7 |
| APX809S00-23SR-7 | SOT23 | QT |
| APX809S05-23SR-7 | SOT23 | ST |
| APX809S-23SR-7 | SOT23 | Y8 |
| APX810S00-46SR-7 | SOT23 | QU |
| APX810S05-46SR-7 | SOT23 | SU |
| APX810S-46SR-7 | SOT23 | YA |
| APX810S00-44SR-7 | SOT23 | QV |
| APX810S05-44SR-7 | SOT23 | SV |
| APX810S-44SR-7 | SOT23 | YB |
| APX810S00-40SR-7 | SOT23 | QW |
| APX810S05-40SR-7 | SOT23 | SW |
| APX810S-40SR-7 | SOT23 | YC |
| APX810S00-31SR-7 | SOT23 | QX |
| APX810S05-31SR-7 | SOT23 | SX |
| APX810S-31SR-7 | SOT23 | YD |
| APX810S00-29SR-7 | SOT23 | QY |
| APX810S05-29SR-7 | SOT23 | SY |
| APX810S-29SR-7 | SOT23 | YE |
| APX810S00-26SR-7 | SOT23 | QZ |
| APX810S05-26SR-7 | SOT23 | SZ |
| APX810S-26SR-7 | SOT23 | YF |
| APX810S00-23SR-7 | SOT23 | R4 |
| APX810S05-23SR-7 | SOT23 | TY |
| APX810S-23SR-7 | SOT23 | YG |

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## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.
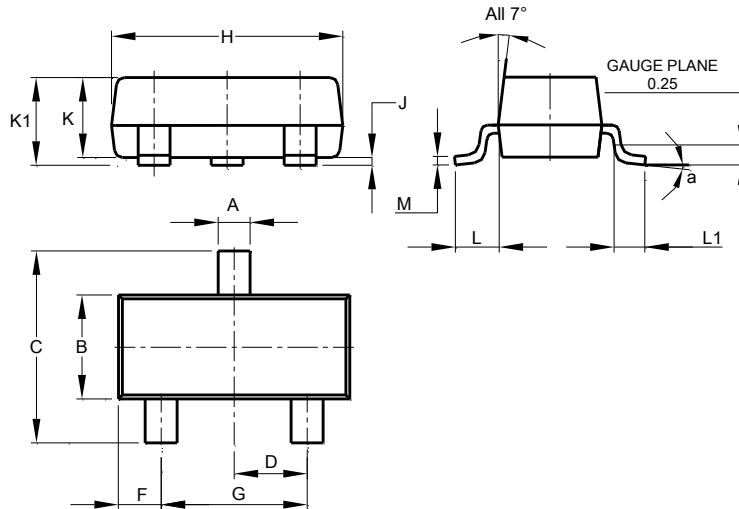
**SOT23**

| SOT23 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

GAUGE PLANE 0.25
All 7°

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**
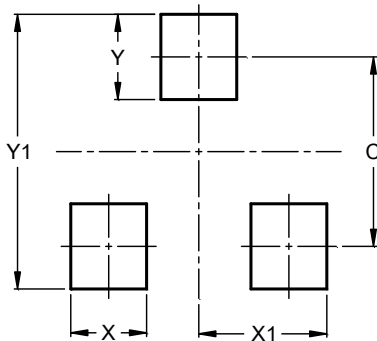
| Dimensions | Value (in mm) |
|---|---|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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## IMPORTANT NOTICE

## LIFE SUPPORT

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