



**THE DATASHEET OF
AZV331KTR-E1**



**SINGLE GENERAL PURPOSE
LOW VOLTAGE COMPARATOR**

Description

The AZV331 is a low voltage 2.5V to 5.5V, single comparator, which has a very low supply current of 60μA, making the part an excellent choice for portable electronic systems. The device is pin-for-pin compatible replacement of the LMV331.

The AZV331 is built with BiCMOS process with bipolar input and output stages for improved noise performance. It is a cost-effective solution for portable consumer products where space, low voltage, low power and price are the primary specification in circuit design.

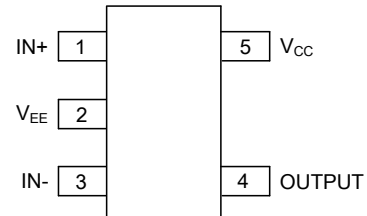
The AZV331 is available in space saving SC-70-5 and SOT-23-5 packages, the SC-70-5 is approximately half the size of the SOT-23-5.

Features

- Guaranteed 2.5V to 5.5V Performance
- Industrial Temperature Range: -40°C to 85°C
- Low Supply Current: 60μA Typical
- Input Common Mode Voltage Range Includes Ground
- Low Output Saturation Voltage 200mV Typical
- Open Collector Output for Maxima Flexibility
- Space Saving SC-70-5 and SOT-23-5 Packages

Pin Assignments

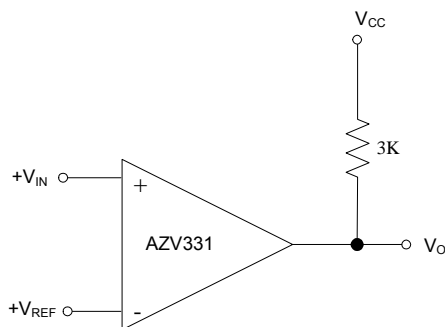
KS/K Package
(SC-70-5/SOT-23-5)



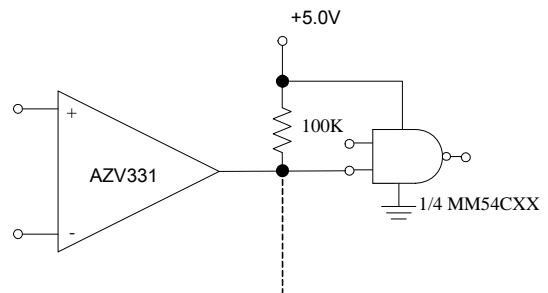
Applications

- Notebook and PDA
- Low Power, Low Voltage Applications
- General Purpose Portable Devices
- Mobile Communication
- Battery-Powered Systems

Typical Applications Circuit

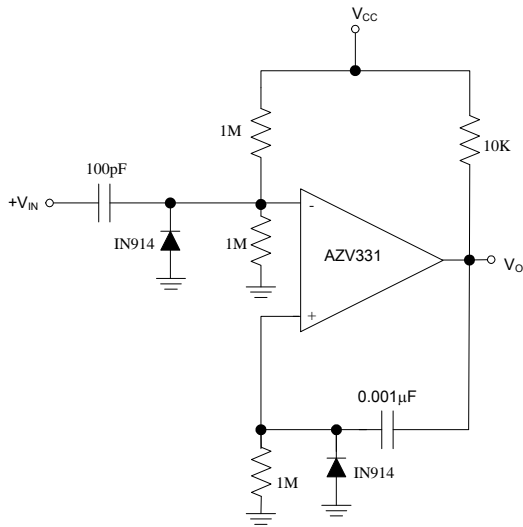


Basic Comparator

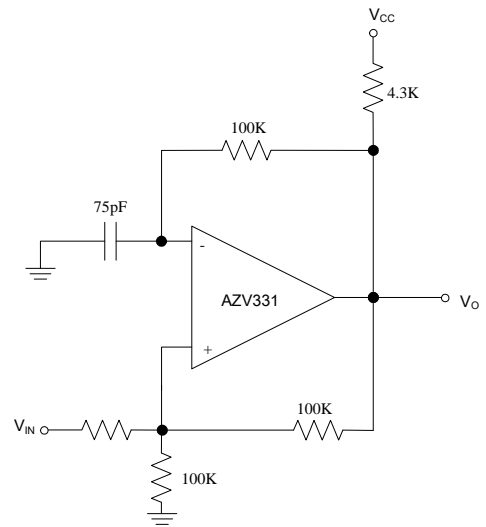


Driving CMOS/TTL

Typical Applications Circuit (Cont.)

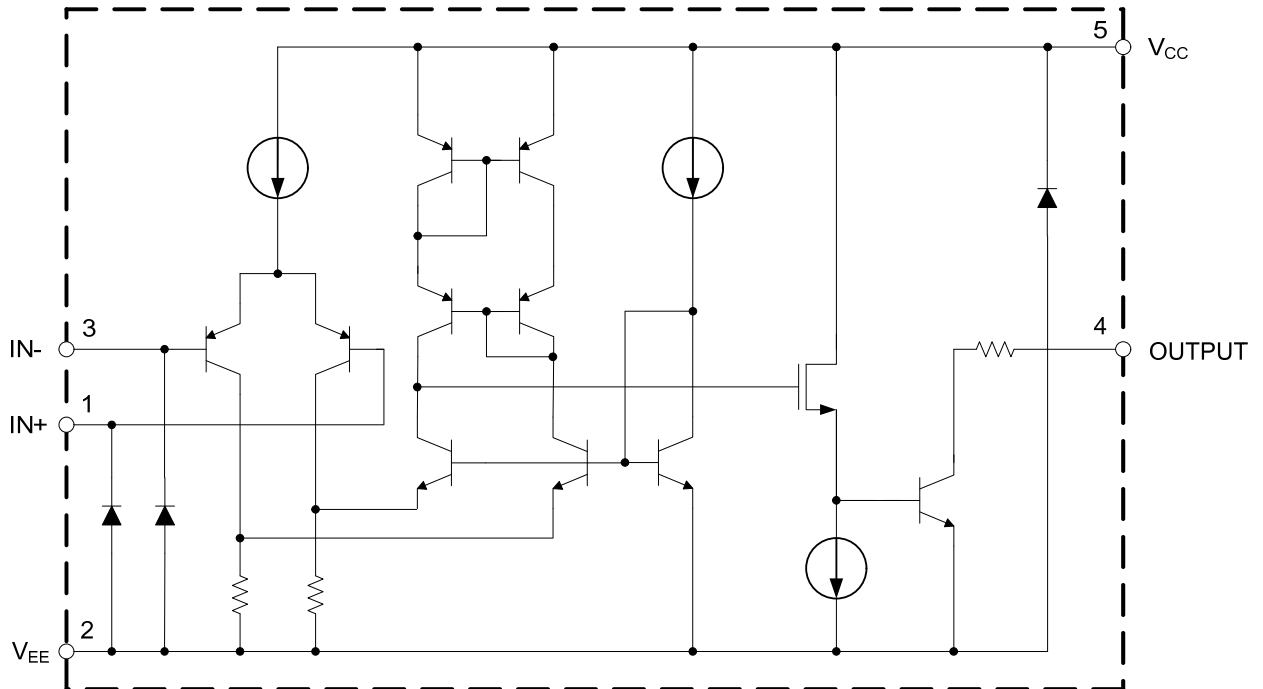


One Shot Multivibrator



Squarewave Oscillator

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

| Symbol | Parameter | Rating | Unit |
|------------|--|------------|------|
| V_{CC} | Power Supply Voltage | 6 | V |
| T_J | Operation Junction Temperature | 150 | °C |
| T_{STG} | Storage Temperature Range | -65 to 150 | °C |
| T_{LEAD} | Lead Temperature (Soldering, 10 Seconds) | 260 | °C |
| | ESD (Machine Model) | 300 | V |
| | ESD (Human Body Model) | 4000 | V |

Note 1: 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

| Symbol | Parameter | Min | Max | Unit |
|----------|-------------------------------------|-----|-----|------|
| V_{CC} | Supply Voltage | 2.5 | 5.5 | V |
| T_A | Ambient Operating Temperature Range | -40 | 85 | °C |

Electrical Characteristics

AZV331-2.7V DC Electrical Characteristics (Limits in standard typeface are guaranteed for $T_A=25^\circ\text{C}$, $V_{CC}=2.7\text{V}$, $V_{EE}=0\text{V}$, $R_L=5.1\text{k}\Omega$ connected to V_{CC} and $V_{CM}=0$, **bold** typeface applies over full temperature ranges, unless otherwise specified.)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|------------------------------------|--|------|-------|------------|------------------------------|
| V_{OS} | Input Offset Voltage | | | 1.7 | 7 | mV |
| | | | | | 9 | |
| TCV_{OS} | Input Offset Voltage Average Drift | | | 5 | | $\mu\text{V}/^\circ\text{C}$ |
| I_B | Input Bias Current | I_{IN+} or I_{IN-} with output in linear range, $V_{CM}=0\text{V}$ | | 10 | 250 | nA |
| | | | | | 400 | |
| I_{IO} | Input Offset Current | $I_{IN+} - I_{IN-}$, $V_{CM}=0\text{V}$ | | 5 | 50 | nA |
| | | | | | 150 | |
| V_{SAT} | Saturation Voltage | $I_{SINK} \leq 1\text{mA}$ | | 200 | | mV |
| | | | | | 500 | |
| I_{SINK} | Output Sink Current | $V_O \leq 1.5\text{V}$ | 5 | 23 | | mA |
| V_{CM} | Input Common-Mode Voltage Range | | -0.1 | | 2 | V |
| I_{CC} | Supply Current | | | 40 | 100 | μA |
| | | | | | 150 | |
| $I_{LEAKAGE}$ | Output Leakage Current | | | 0.003 | | μA |

AZV331-2.7V AC Electrical Characteristics (All limits are guaranteed for $T_A=25^\circ\text{C}$, $V_{CC}=2.7\text{V}$, $V_{EE}=0\text{V}$, $R_L=5.1\text{k}\Omega$ connected to V_{CC} and $V_{CM}=0$, unless otherwise specified.)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------------|-----------------------|-----|------|-----|------|
| T_{PHL} | Propagation Delay (High to Low) | Input Overdrive=10mV | | 1000 | | ns |
| | | Input Overdrive=100mV | | 350 | | |
| T_{PLH} | Propagation Delay (Low to High) | Input Overdrive=10mV | | 500 | | ns |
| | | Input Overdrive=100mV | | 400 | | |

Electrical Characteristics (Cont.)

AZV331-5V DC Electrical Characteristics (Limits in standard typeface are guaranteed for $T_A=25^\circ\text{C}$, $V_{CC}=5\text{V}$, $V_{EE}=0\text{V}$, $R_L=5.1\text{k}\Omega$ connected to V_{CC} and $V_{CM}=0$, **bold** typeface applies over full temperature ranges, unless otherwise specified.)

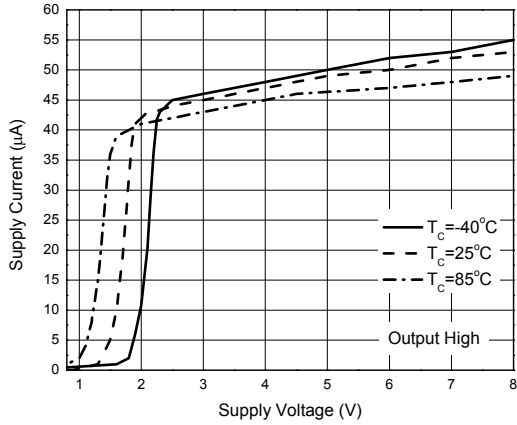
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|------------------------------------|--|------|-------|------------|------------------------------|
| V_{OS} | Input Offset Voltage | | | 1.7 | 7 | mV |
| | | | | | 9 | |
| TCV_{OS} | Input Offset Voltage Average Drift | | | 5 | | $\mu\text{V}/^\circ\text{C}$ |
| I_B | Input Bias Current | I_{IN+} or I_{IN-} with output in linear range, $V_{CM}=0\text{V}$ | | 25 | 250 | nA |
| | | | | | 400 | |
| I_{IO} | Input Offset Current | $I_{IN+} - I_{IN-}$, $V_{CM}=0\text{V}$ | | 2 | 50 | nA |
| | | | | | 150 | |
| V_{SAT} | Saturation Voltage | $I_{SINK} \leq 4\text{mA}$ | | 200 | 400 | mV |
| | | | | | 500 | |
| I_{SINK} | Output Sink Current | $V_O \leq 1.5\text{V}$ | 10 | 84 | | mA |
| V_{CM} | Input Common-Mode Voltage Range | | -0.1 | | 4.2 | V |
| A_V | Voltage Gain | | 20 | 50 | | V/mV |
| I_{CC} | Supply Current | | | 60 | 120 | μA |
| | | | | | 150 | |
| $I_{LEAKAGE}$ | Output Leakage Current | | | 0.003 | | μA |

AZV331-5V AC Electrical Characteristics (All limits are guaranteed for $T_A=25^\circ\text{C}$, $V_{CC}=5\text{V}$, $V_{EE}=0\text{V}$, $R_L=5.1\text{k}\Omega$ connected to V_{CC} and $V_{CM}=0$, unless otherwise specified.)

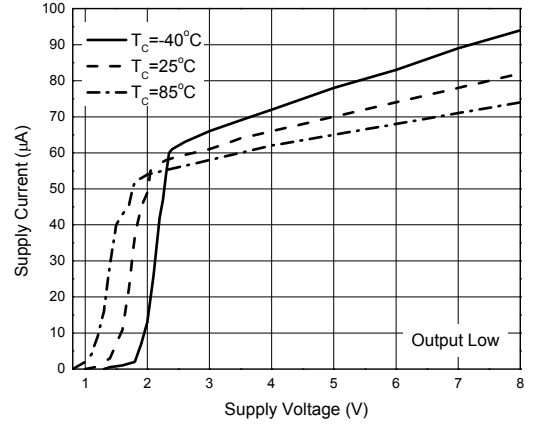
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------------|-----------------------|-----|-----|-----|------|
| T_{PHL} | Propagation Delay (High to Low) | Input Overdrive=10mV | | 600 | | ns |
| | | Input Overdrive=100mV | | 200 | | |
| T_{PLH} | Propagation Delay (Low to High) | Input Overdrive=10mV | | 450 | | ns |
| | | Input Overdrive=100mV | | 300 | | |

Performance Characteristics (@ $T_A=25^\circ\text{C}$, unless otherwise specified.)

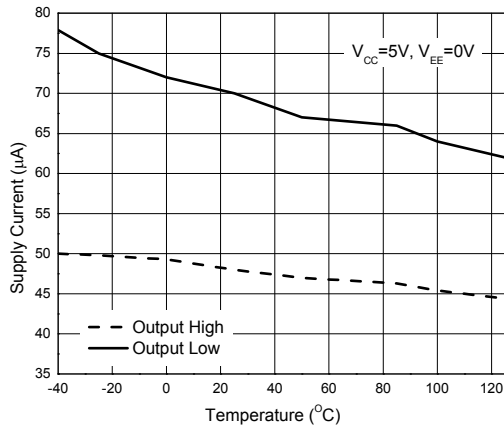
Supply Current vs. Supply Voltage



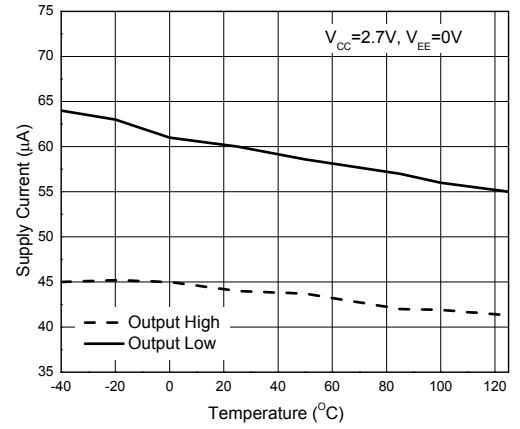
Supply Current vs. Supply Voltage



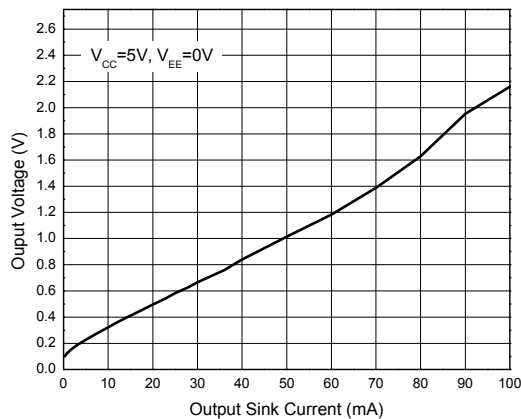
Supply Current vs. Temperature



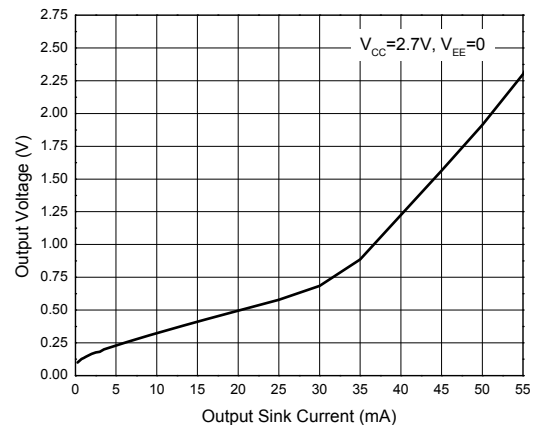
Supply Current vs. Temperature



Output Voltage vs. Output Sink Current

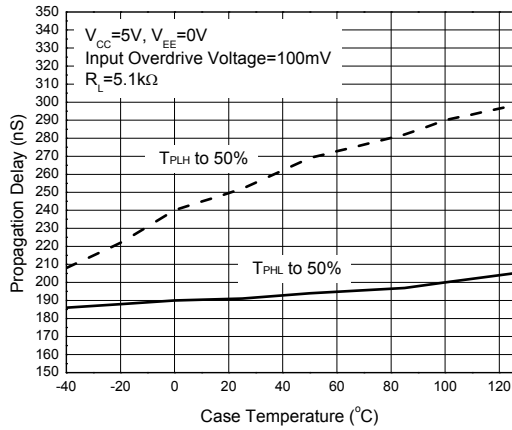


Output Voltage vs. Output Sink Current

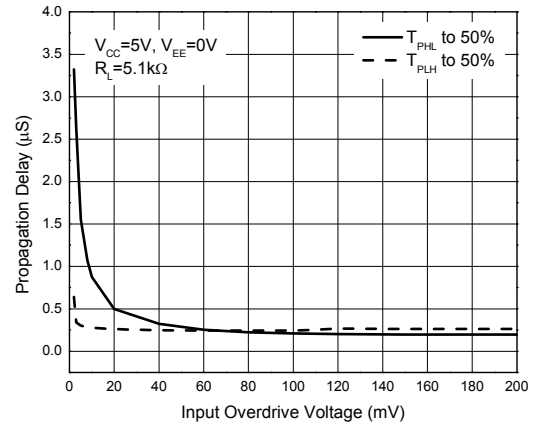


Performance Characteristics (Cont. @ $T_A=25^\circ\text{C}$, unless otherwise specified.)

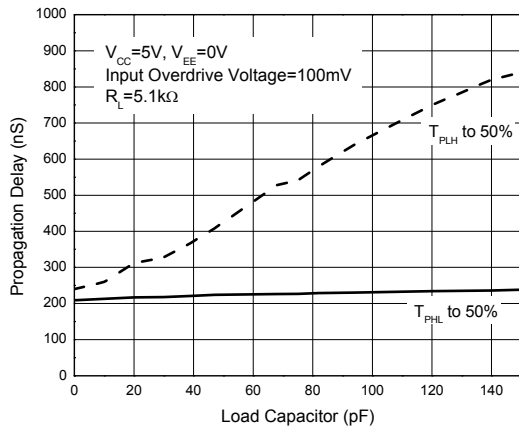
Propagation Delay vs. Temperature



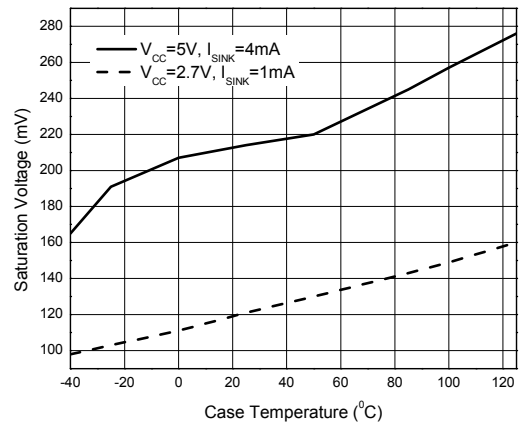
Propagation Delay vs. Input Overdrive Voltage



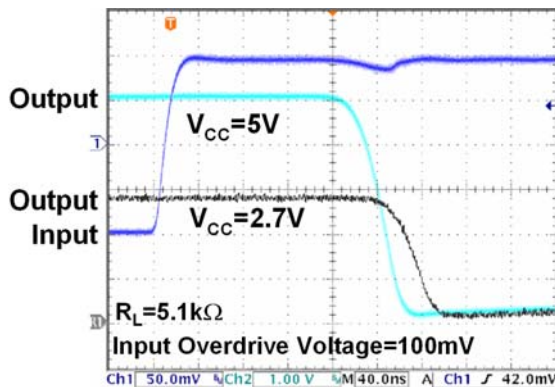
Propagation Delay vs. Load Capacitors



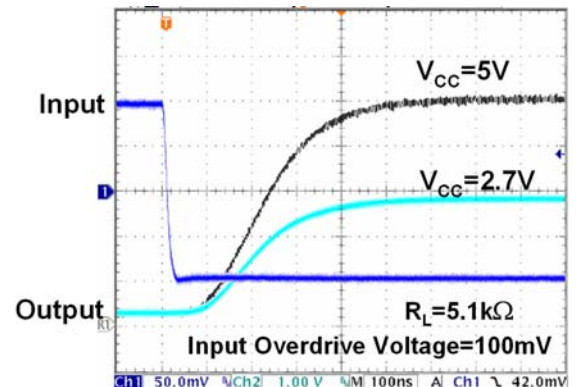
Saturation Voltage vs. Case Temperature



Response Time for Positive Transition

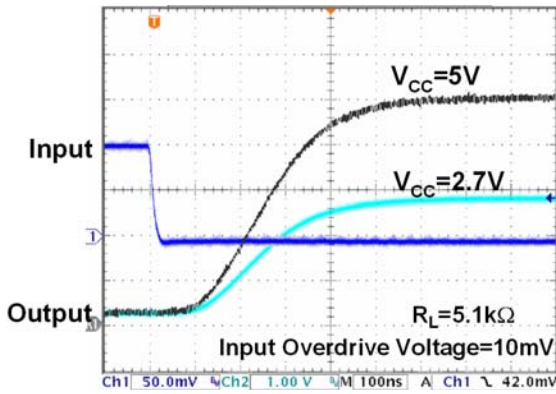


Response Time for Negative Transition

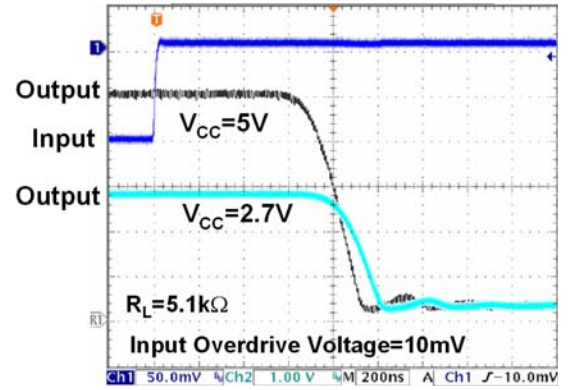


Performance Characteristics (Cont. @ $T_A=25^{\circ}\text{C}$, unless otherwise specified.)

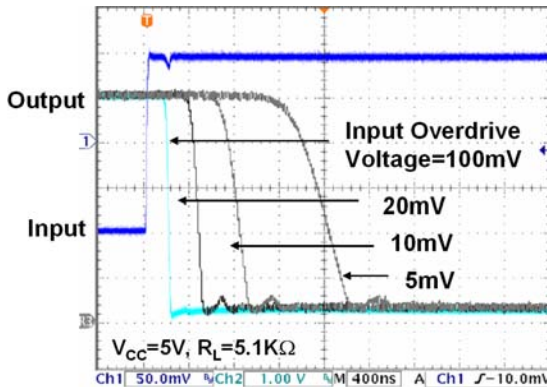
Response Time for Negative Transition



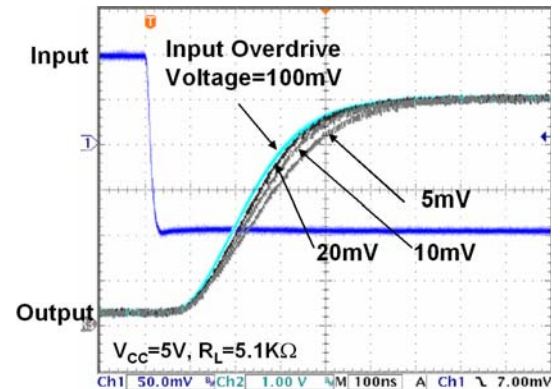
Response Time for Positive Transition



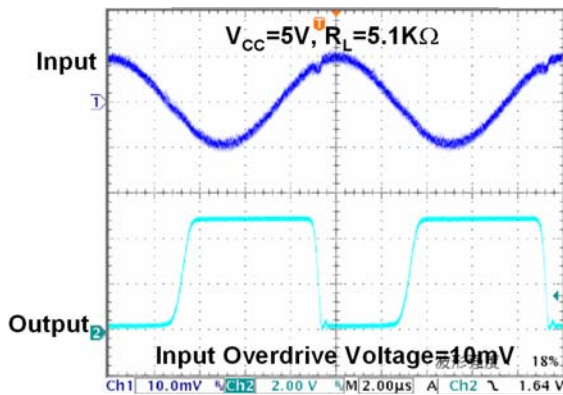
Response Time for Positive Transition



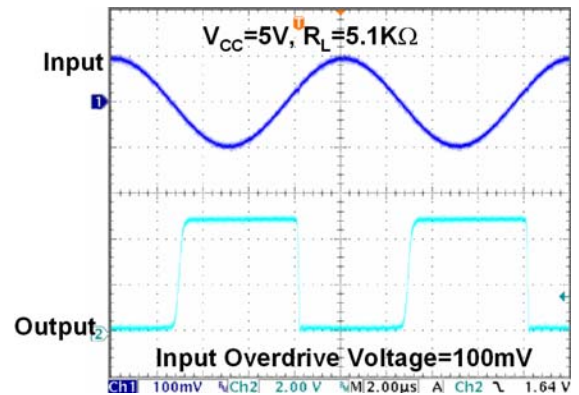
Response Time for Negative Transition



100kHz Response

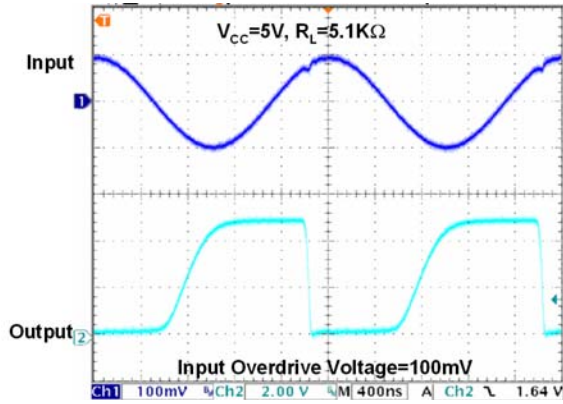


100kHz Response

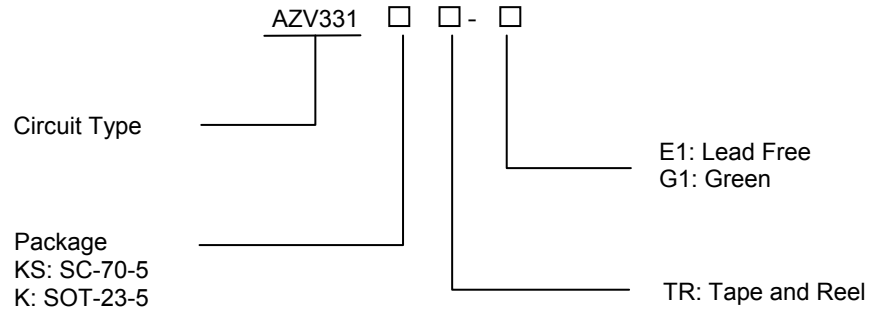


Performance Characteristics (Cont. @ $T_A=25^\circ\text{C}$, unless otherwise specified.)

500kHz Response



Ordering Information

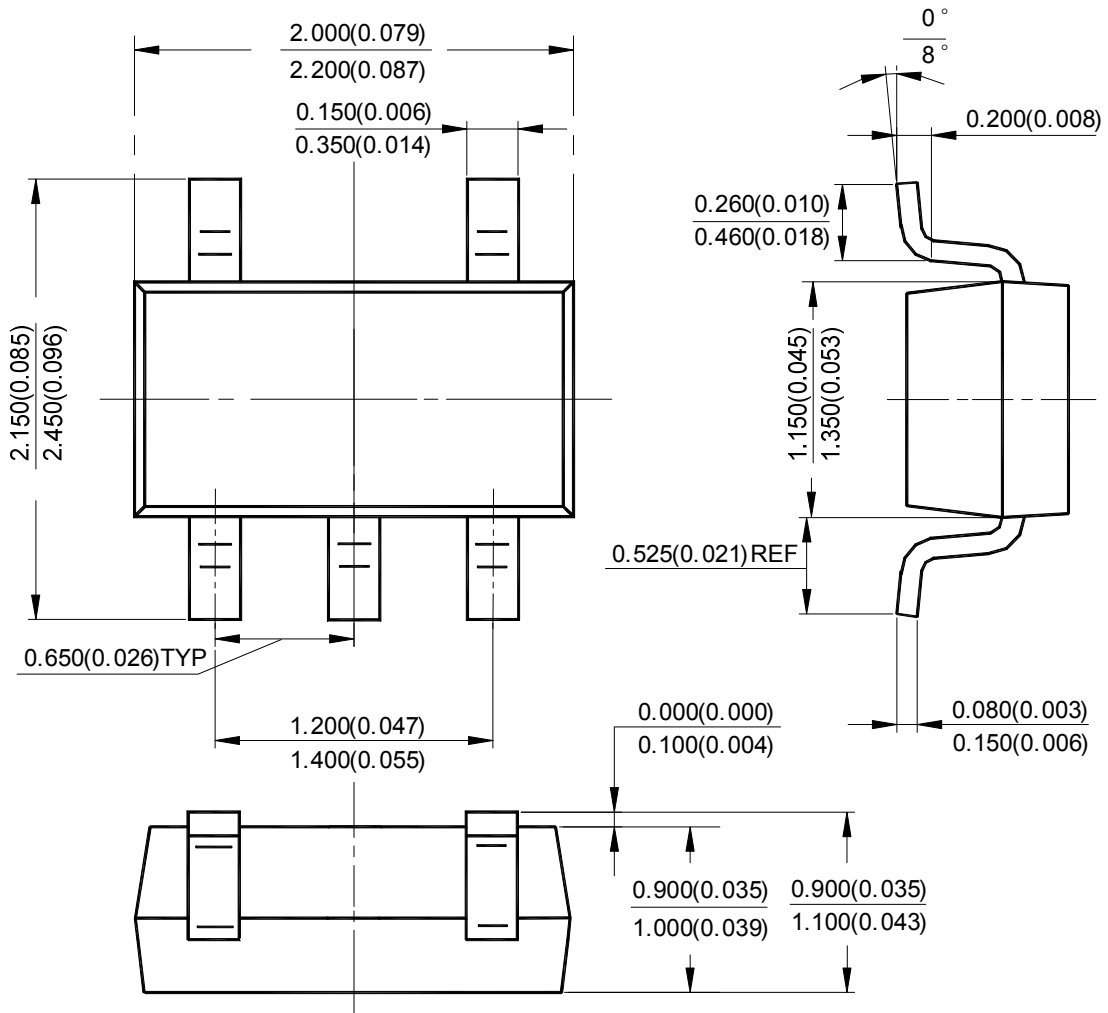


| Package | Temperature Range | Part Number | | Marking ID | | Packing Type |
|----------|-------------------|---------------|---------------|------------|-------|--------------|
| | | Lead Free | Green | Lead Free | Green | |
| SC-70-5 | -40 to 85°C | AZV331KSTR-E1 | AZV331KSTR-G1 | 22 | B2 | Tape & Reel |
| SOT-23-5 | | AZV331KTR-E1 | AZV331KTR-G1 | E6S | G6S | Tape & Reel |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

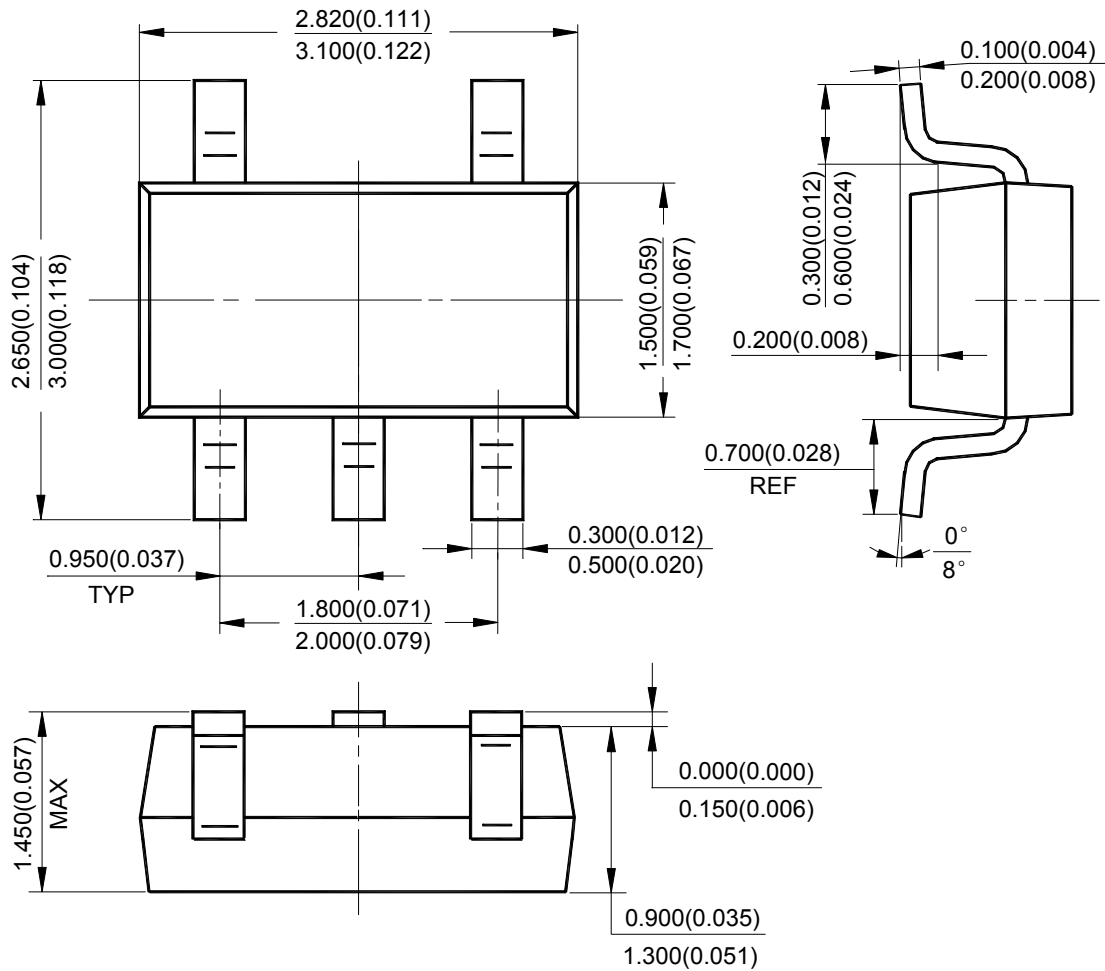
Package Outline Dimensions (All dimensions in mm(inch).)

SC-70-5



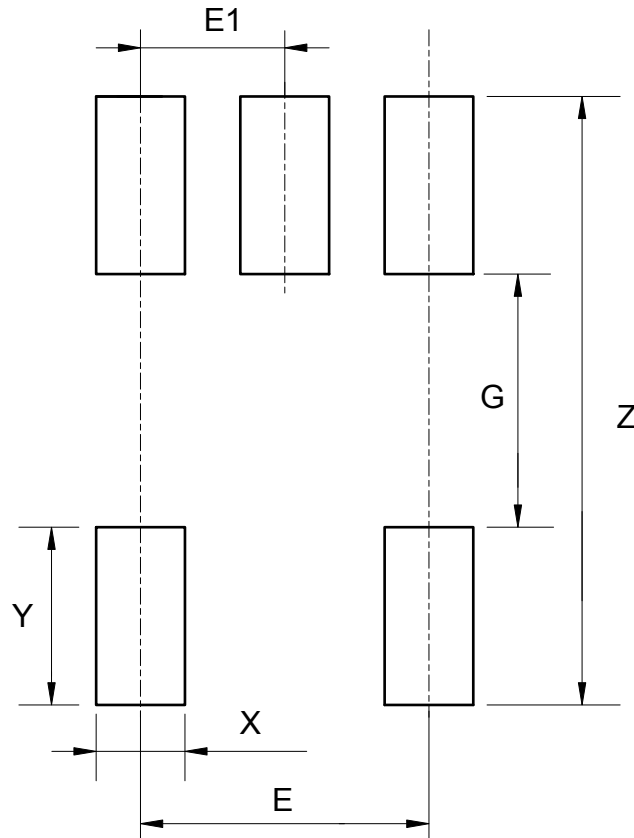
Package Outline Dimensions (Cont. All dimensions in mm(inch).)

SOT-23-5



Suggested Pad Layout

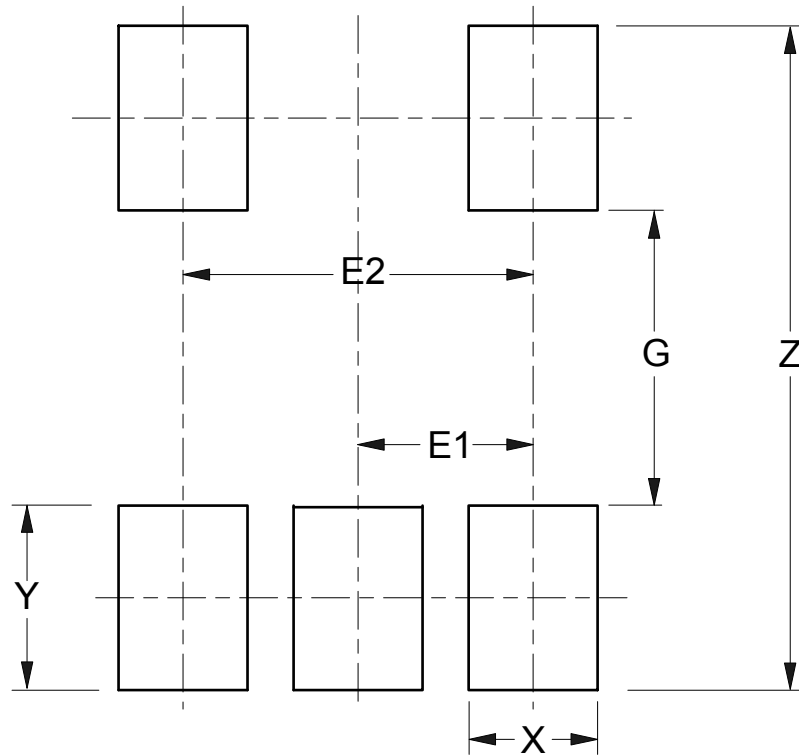
SC-70-5



| Dimensions | Z (mm)/(inch) | G (mm)/(inch) | X (mm)/(inch) | Y (mm)/(inch) | E (mm)/(inch) | E1 (mm)/(inch) |
|------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Value | 2.740/0.108 | 1.140/0.045 | 0.400/0.016 | 0.800/0.031 | 1.300/0.051 | 0.650/0.026 |

Suggested Pad Layout (Cont.)

SOT-23-5



| Dimensions | Z (mm)/(inch) | G (mm)/(inch) | X (mm)/(inch) | Y (mm)/(inch) | E1 (mm)/(inch) | E2 (mm)/(inch) |
|------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| Value | 3.600/0.142 | 1.600/0.063 | 0.700/0.028 | 1.000/0.039 | 0.950/0.037 | 1.900/0.075 |

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