

**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.

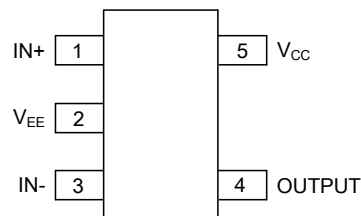
The AZV331 is available in space saving SC-70-5 and SOT-23-5 packages, the SC-70-5 is approximately half the size of the SOT-23-5.

## 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

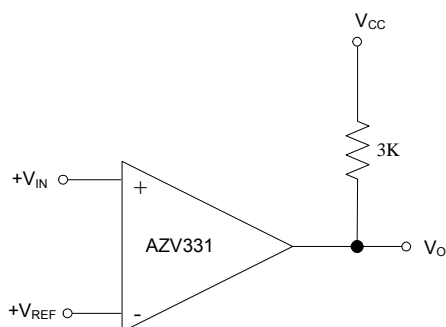
KS/K Package  
(SC-70-5/SOT-23-5)



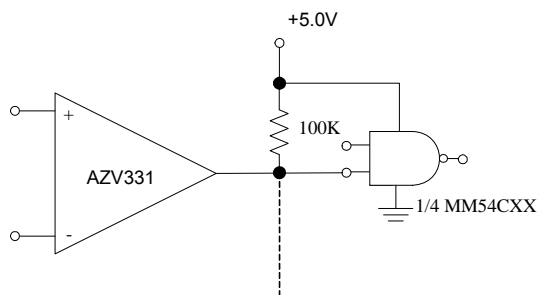
## Applications

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

## Typical Applications Circuit

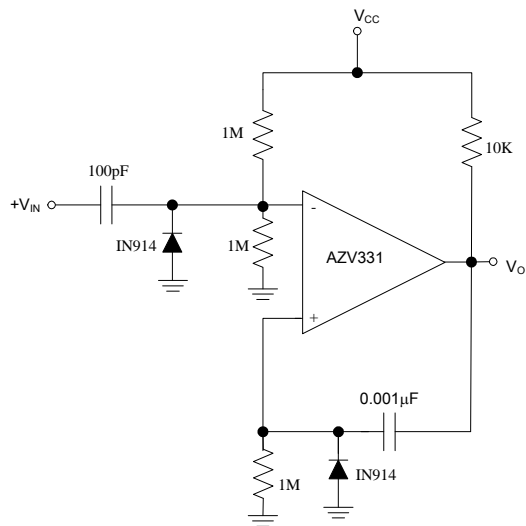


**Basic Comparator**

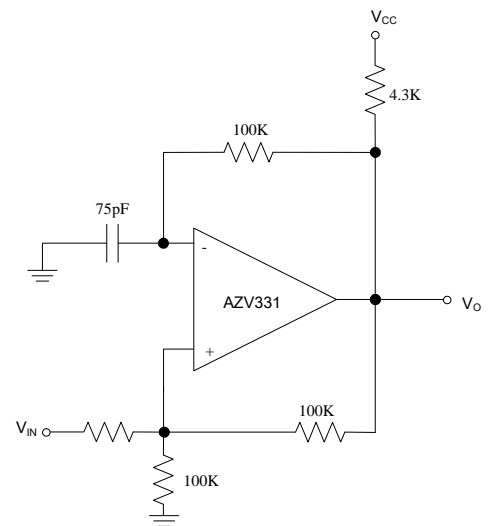


**Driving CMOS/TTL**

## Typical Applications Circuit (Cont.)

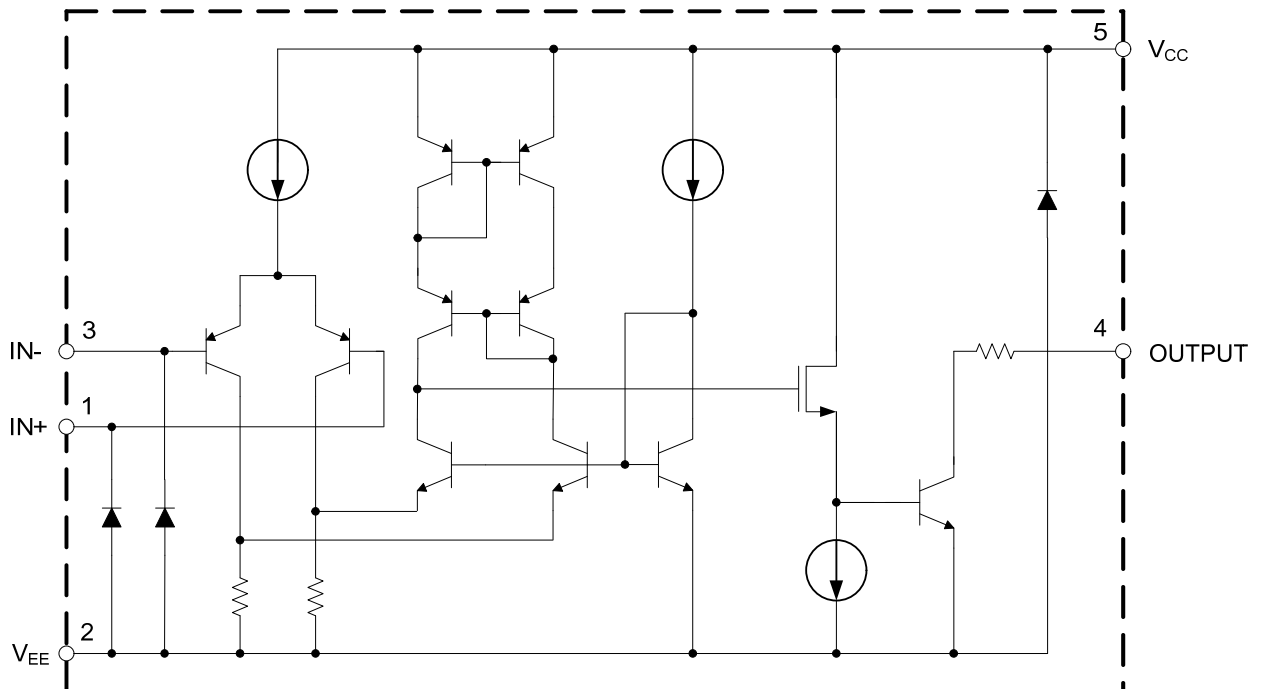


One Shot Multivibrator



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
					<b>9</b>	
$TCV_{OS}$	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
					<b>400</b>	
$I_{IO}$	Input Offset Current	$I_{IN+} - I_{IN-}$ , $V_{CM}=0\text{V}$		5	50	nA
					<b>150</b>	
$V_{SAT}$	Saturation Voltage	$I_{SINK} \leq 1\text{mA}$		200		mV
					<b>500</b>	
$I_{SINK}$	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	$\mu\text{A}$
					<b>150</b>	
$I_{LEAKAGE}$	Output Leakage Current			0.003		$\mu\text{A}$

**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.)

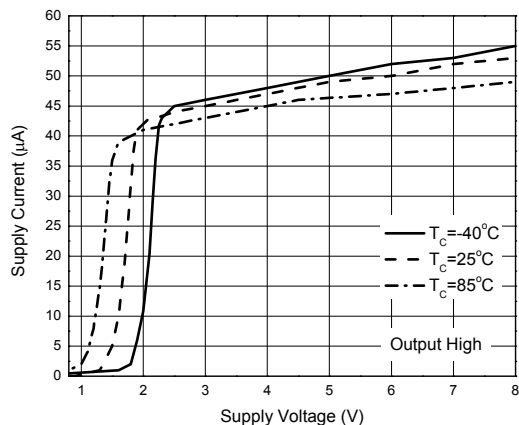
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{OS}$	Input Offset Voltage			1.7	7	mV
					<b>9</b>	
$TCV_{OS}$	Input Offset Voltage Average Drift			5		$\mu\text{V}/^\circ\text{C}$
$I_B$	Input Bias Current	$I_{IN+}$ or $I_{IN-}$ with output in linear range, $V_{CM}=0\text{V}$		25	250	nA
					<b>400</b>	
$I_{IO}$	Input Offset Current	$I_{IN+} - I_{IN-}$ , $V_{CM}=0\text{V}$		2	50	nA
					<b>150</b>	
$V_{SAT}$	Saturation Voltage	$I_{SINK} \leq 4\text{mA}$		200	400	mV
					<b>500</b>	
$I_{SINK}$	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	$\mu\text{A}$
					<b>150</b>	
$I_{LEAKAGE}$	Output Leakage Current			0.003		$\mu\text{A}$

**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.)

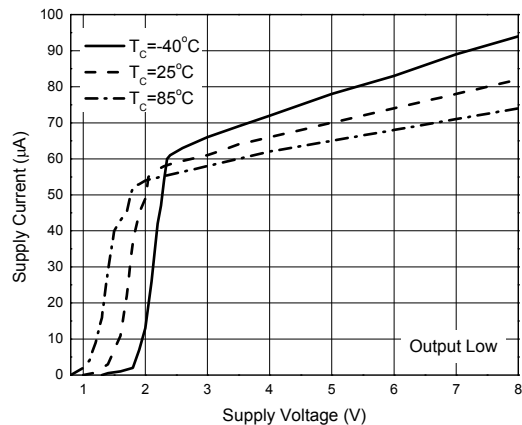
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{PHL}$	Propagation Delay (High to Low)	Input Overdrive=10mV		600		ns
		Input Overdrive=100mV		200		
$T_{PLH}$	Propagation Delay (Low to High)	Input Overdrive=10mV		450		ns
		Input Overdrive=100mV		300		

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

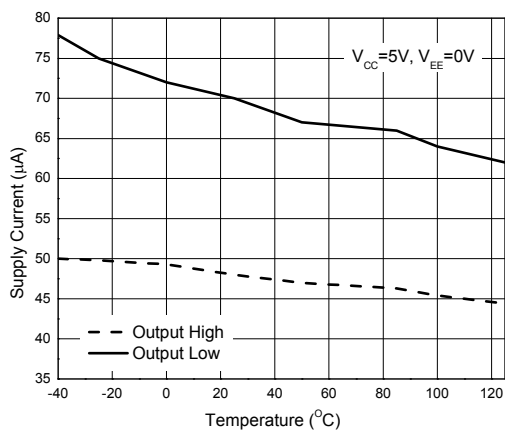
**Supply Current vs. Supply Voltage**



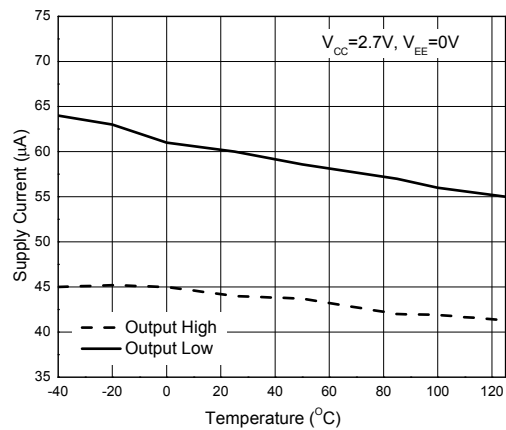
**Supply Current vs. Supply Voltage**



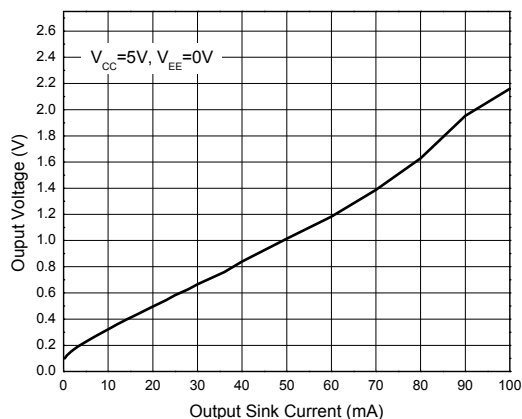
**Supply Current vs. Temperature**



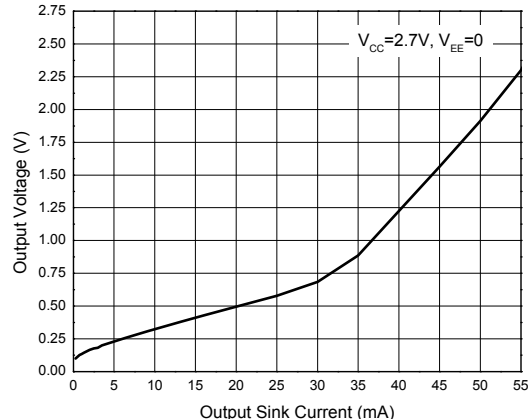
**Supply Current vs. Temperature**



**Output Voltage vs. Output Sink Current**

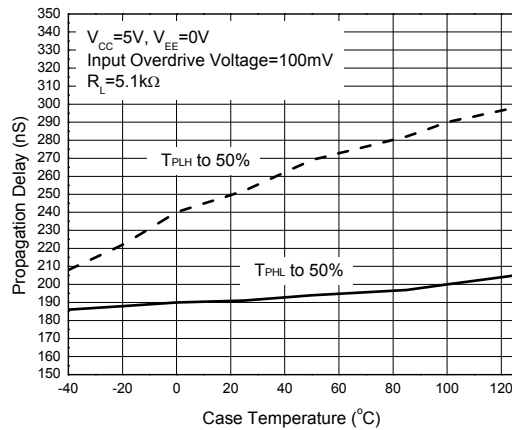


**Output Voltage vs. Output Sink Current**

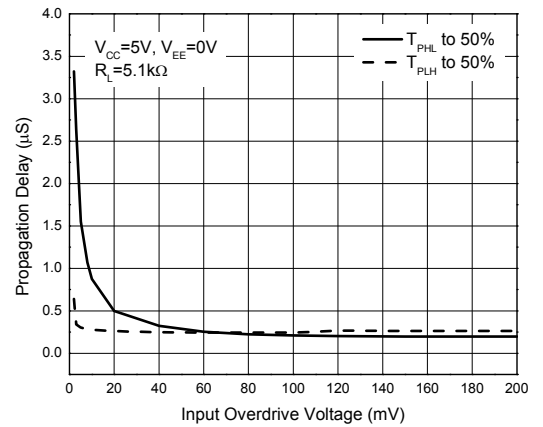


**Performance Characteristics** (Cont. @  $T_A=25^\circ\text{C}$ , unless otherwise specified.)

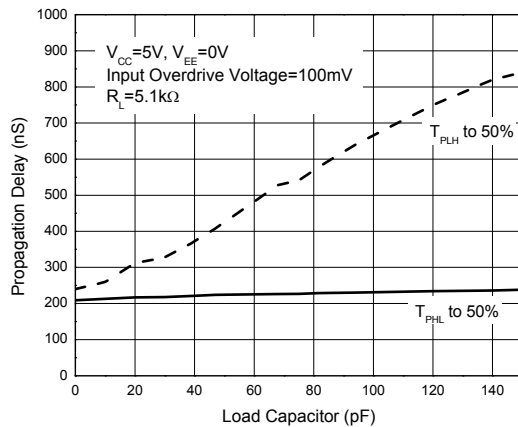
**Propagation Delay vs. Temperature**



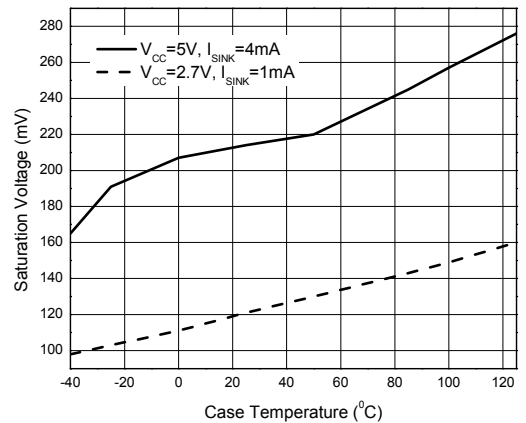
**Propagation Delay vs. Input Overdrive Voltage**



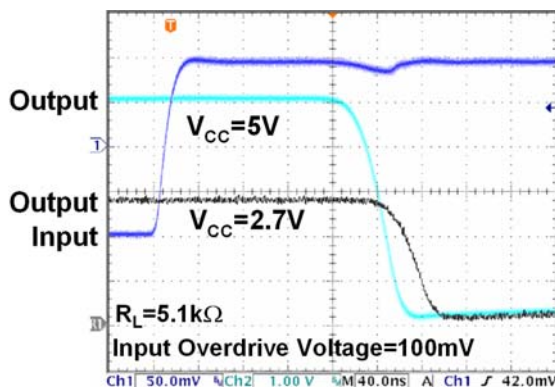
**Propagation Delay vs. Load Capacitors**



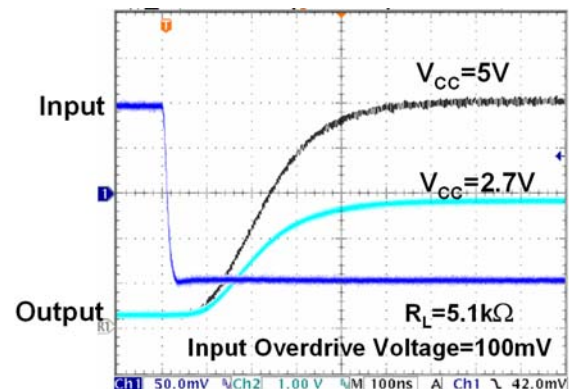
**Saturation Voltage vs. Case Temperature**



**Response Time for Positive Transition**

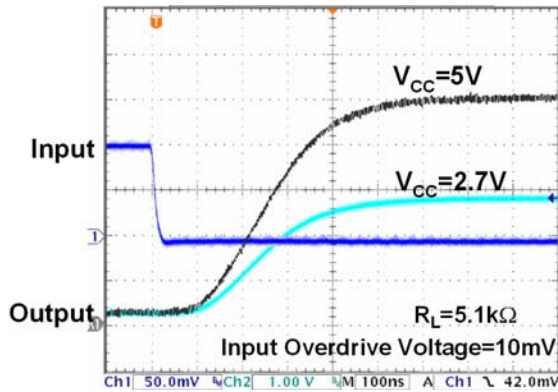


**Response Time for Negative Transition**

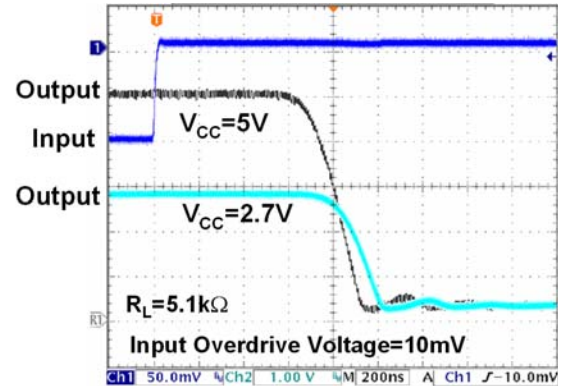


**Performance Characteristics** (Cont. @ $T_A=25^\circ\text{C}$ , unless otherwise specified.)

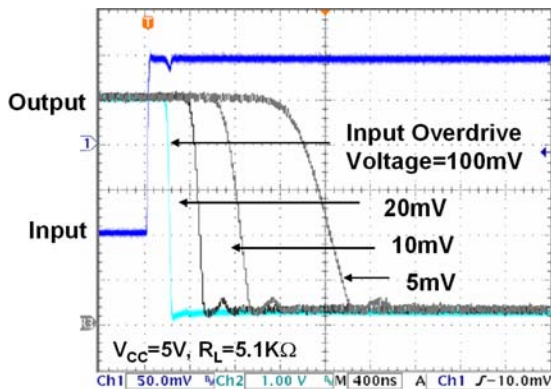
**Response Time for Negative Transition**



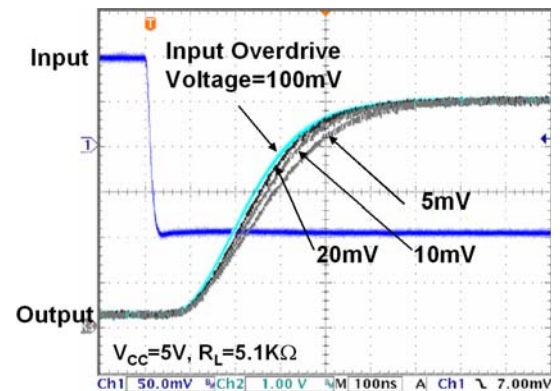
**Response Time for Positive Transition**



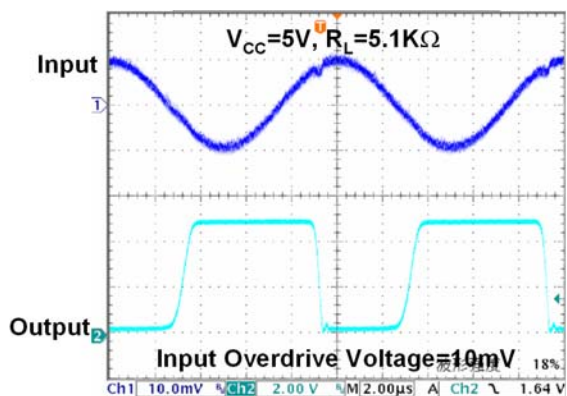
**Response Time for Positive Transition**



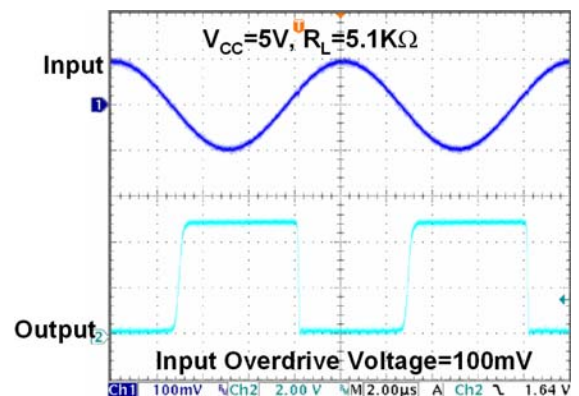
**Response Time for Negative Transition**



**100kHz Response**



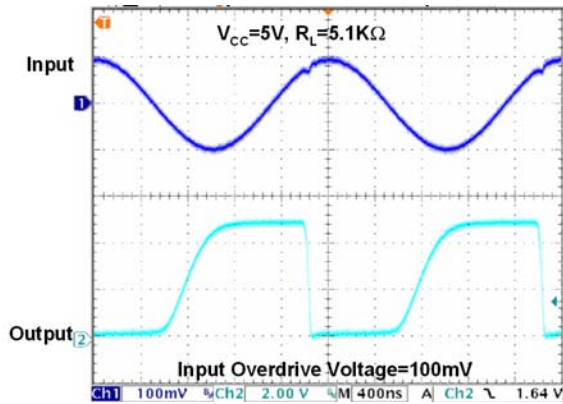
**100kHz Response**



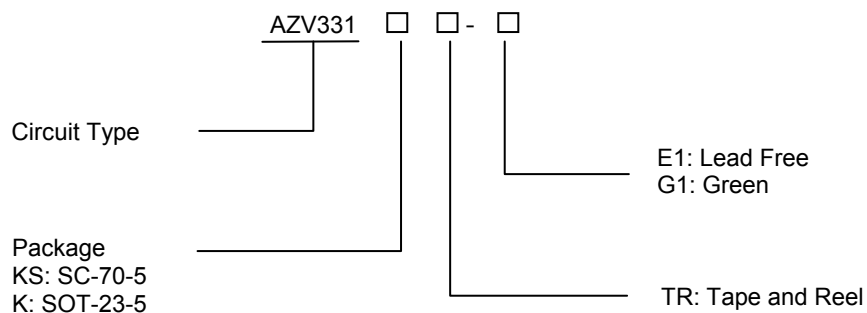


### Performance Characteristics (Cont. @T<sub>A</sub>=25°C, unless otherwise specified.)

### 500kHz Response



## Ordering Information

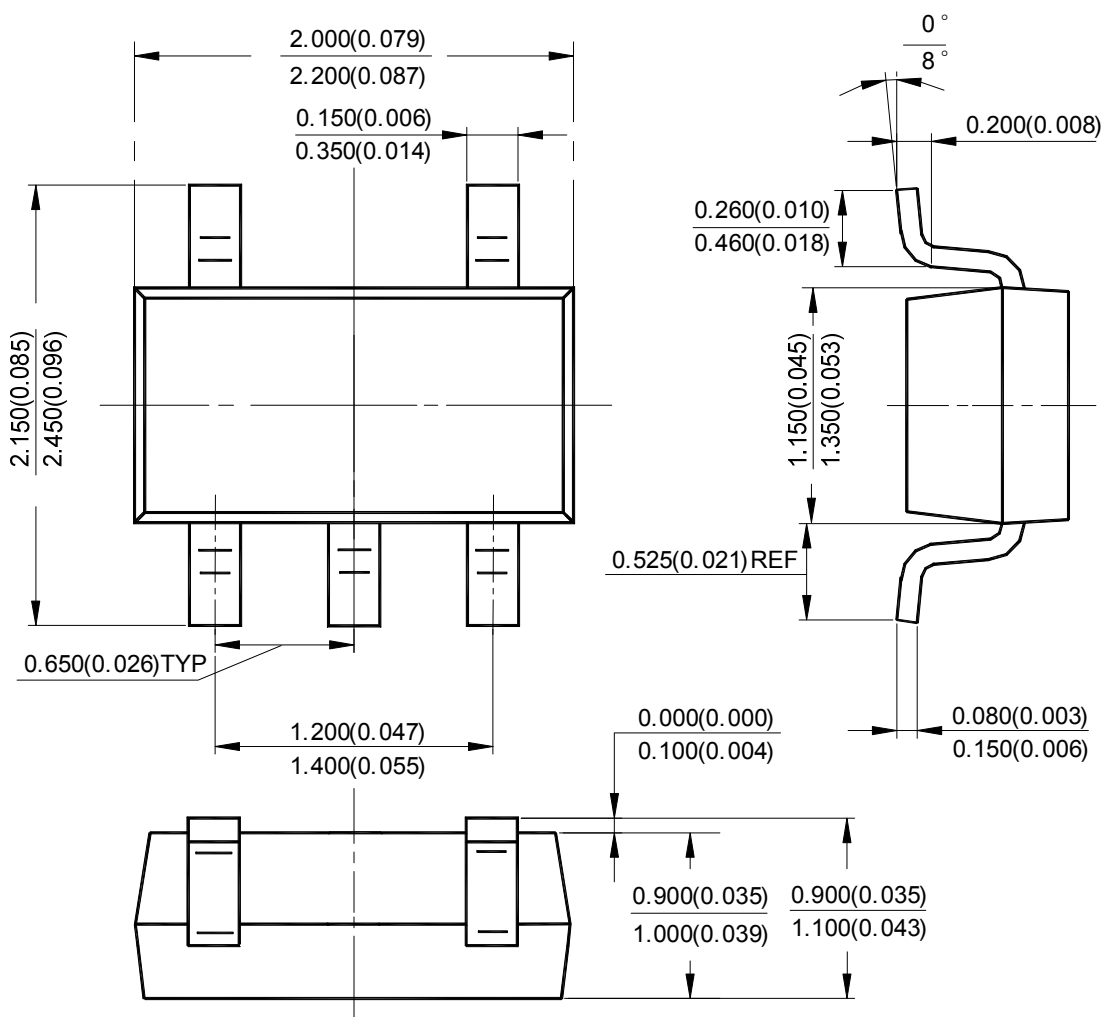


Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SC-70-5	-40 to 85°C	AZV331KSTR-E1	AZV331KSTR-G1	22	B2	Tape & Reel
SOT-23-5		AZV331KTR-E1	AZV331KTR-G1	E6S	G6S	Tape & Reel

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.

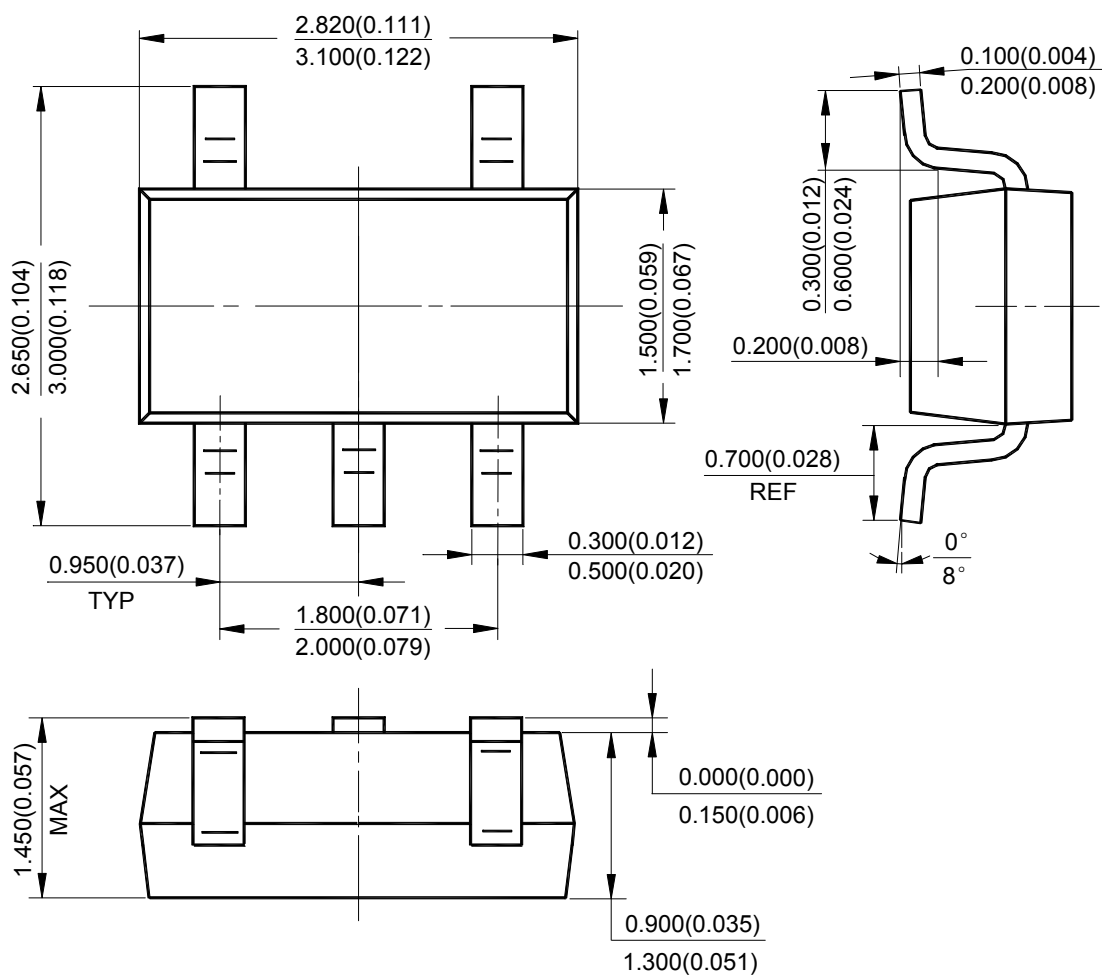
**Package Outline Dimensions** (All dimensions in mm(inch).)

**SC-70-5**



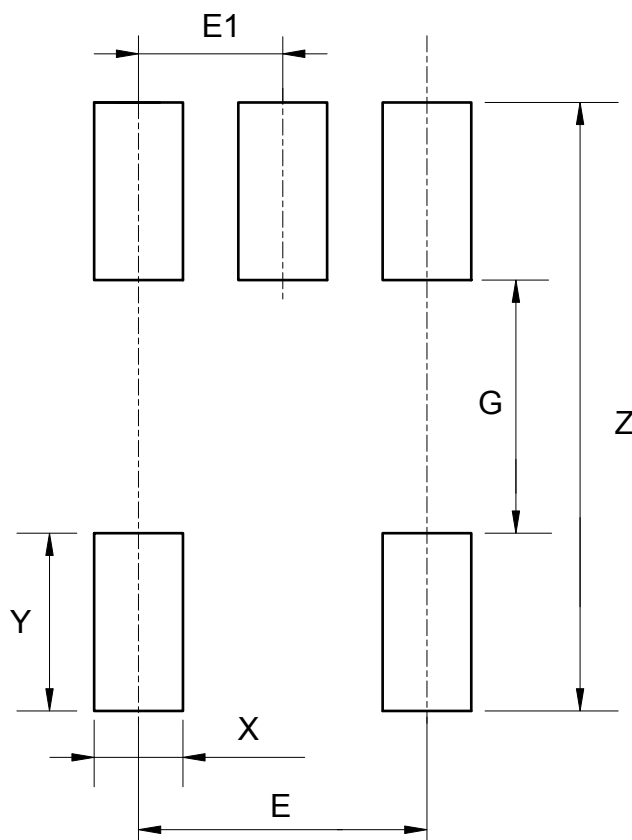
**Package Outline Dimensions** (Cont. All dimensions in mm(inch).)

**SOT-23-5**



## Suggested Pad Layout

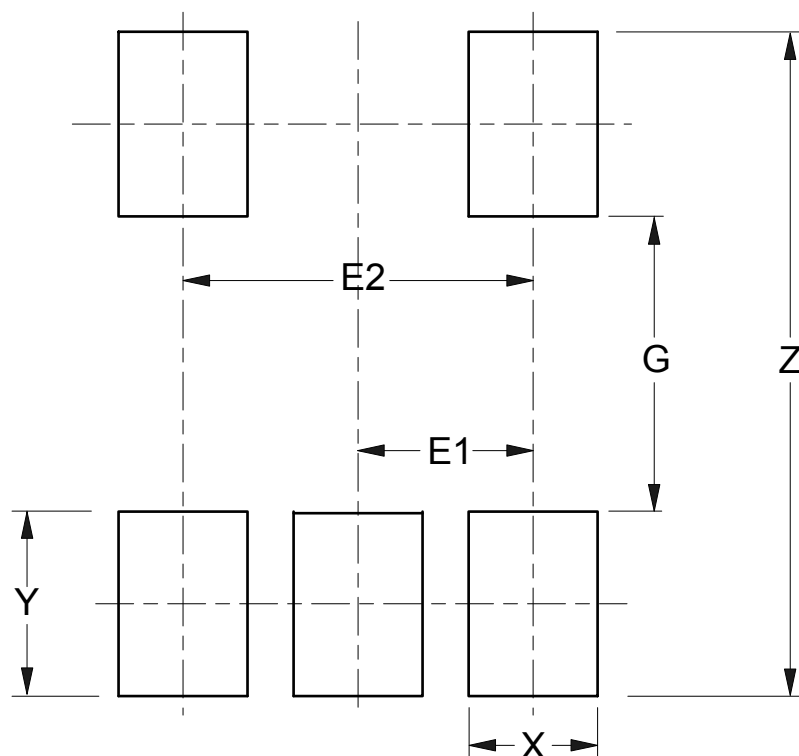
### SC-70-5



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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