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**DUAL GENERAL PURPOSE LOW VOLTAGE COMPARATOR**

**Description**

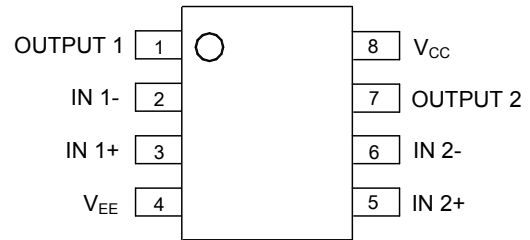
The AZV393 is a low voltage 2.5V to 5.5V, dual comparator, which has a very low supply current of 100µA, making the part an excellent choice for portable electronic systems. The device is pin-for-pin compatible replacement of the LMV393.

The AZV393 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 AZV393 is available in standard SOIC-8 and space saving TSSOP-8 and MSOP-8 packages.

**Pin Assignments**

M/G/MM Package  
(SOIC-8/TSSOP-8/MSOP-8)



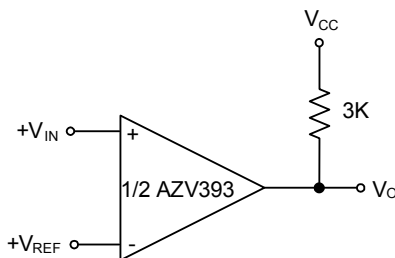
**Features**

- Guaranteed 2.5V to 5.5V Performance
- Industrial Temperature Range: -40°C to +85°C
- Low Supply Current: 100µA Typical
- Input Common Mode Voltage Range Includes Ground
- Low Output Saturation Voltage: 200mV Typical
- Open Collector Output for Maximal Flexibility

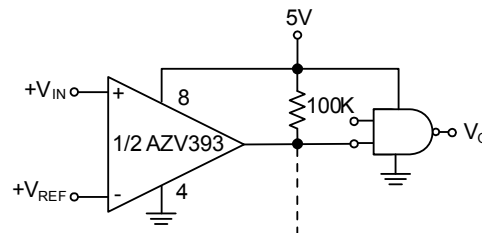
**Applications**

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

**Typical Applications Circuit**

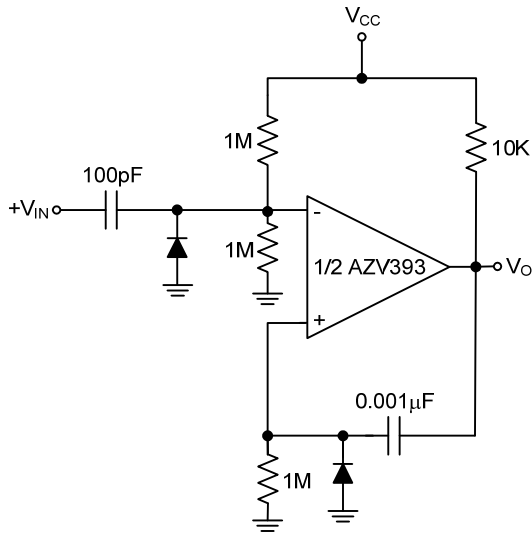


**Basic Comparator**

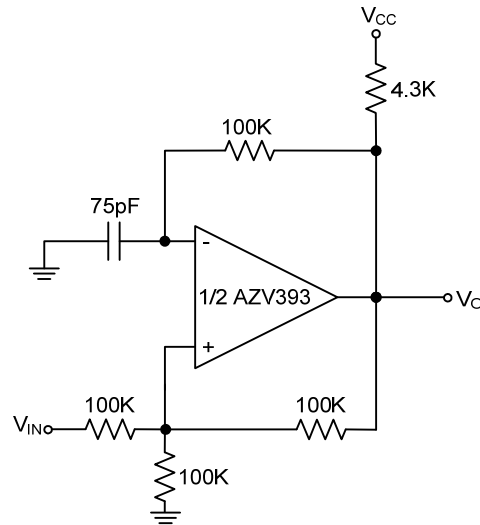


**Driving CMOS**

**Typical Applications Circuit** (Cont.)

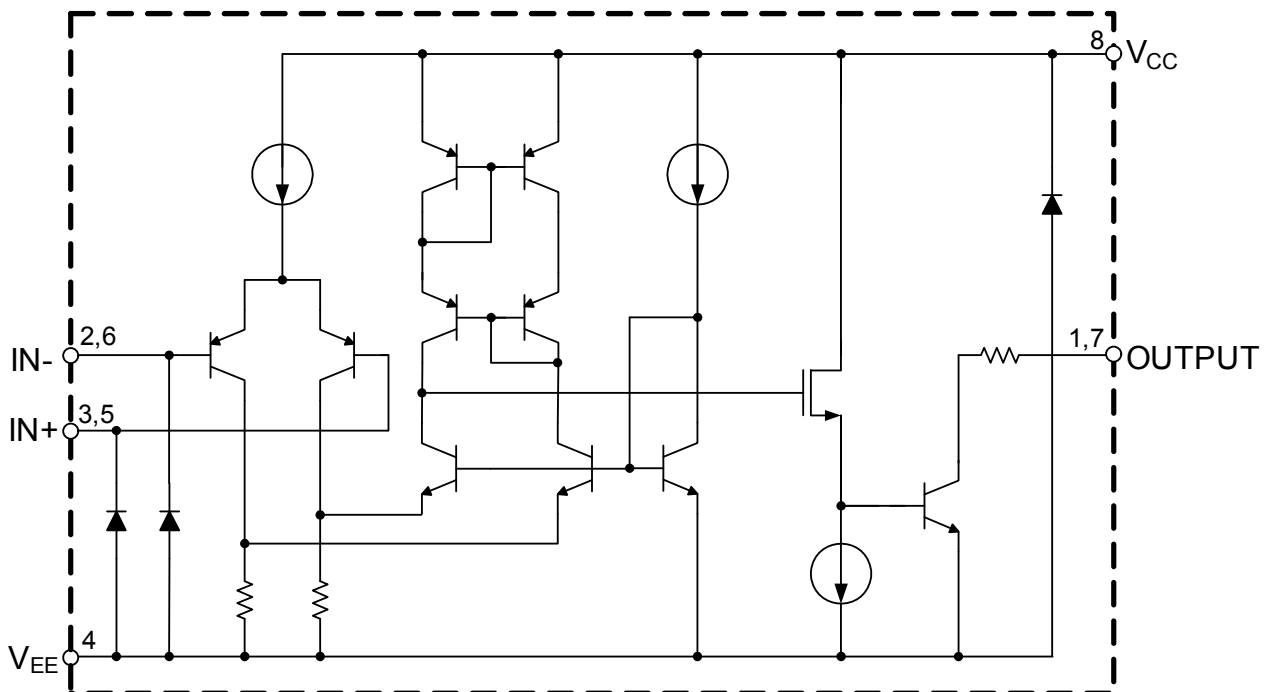


**One Shot Multivibrator**



**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

## 2.7V DC Electrical Characteristics (@ $T_A = +25^\circ\text{C}$ , $V_{CC} = 2.7\text{V}$ , $V_{EE} = 0\text{V}$ , $R_L = 5.1\text{k}\Omega$ 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	–	–	70	150	$\mu\text{A}$
			–	–	<b>200</b>	
$I_{LEAKAGE}$	Output Leakage Current	–	–	0.003	–	$\mu\text{A}$

**2.7V AC Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 2.7\text{V}$ ,  $V_{EE} = 0\text{V}$ ,  $R_L = 5.1\text{k}\Omega$  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	–	

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

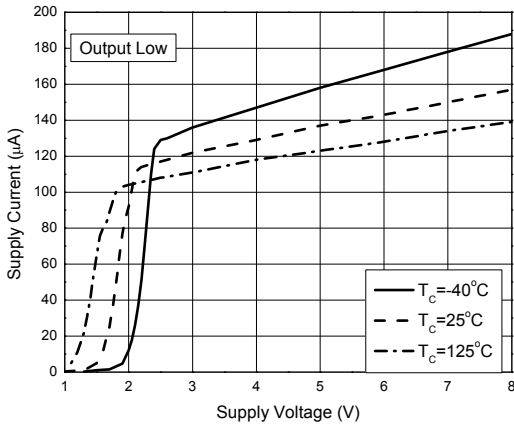
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{OS}$	Input Offset Voltage	–	–	1.7	7	mV
		–	–	–	<b>9</b>	
$TCV_{OS}$	Input Offset Voltage Average Drift	–	–	5	–	$\mu\text{V}/^\circ\text{C}$
$I_B$	Input Bias Current	$I_{IN+}$ or $I_{IN-}$ with output in linear range, $V_{CM}=0\text{V}$	–	25	250	nA
			–	–	<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	–	–	100	200	$\mu\text{A}$
			–	–	<b>250</b>	
$I_{LEAKAGE}$	Output Leakage Current	–	–	0.003	–	$\mu\text{A}$

**5V AC Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $V_{EE} = 0\text{V}$ ,  $R_L = 5.1\text{k}\Omega$  connected to  $V_{CC}$  and  $V_{CM} = 0$ , unless otherwise specified.)

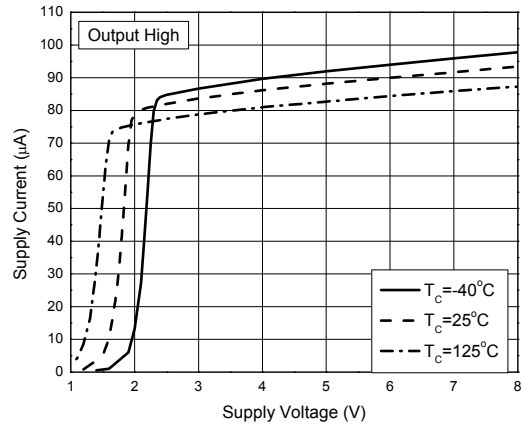
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{PHL}$	Propagation Delay (High to Low)	Input Overdrive=10mV	–	600	–	ns
		Input Overdrive=100mV	–	200	–	
$T_{PLH}$	Propagation Delay (Low to High)	Input Overdrive=10mV	–	450	–	ns
		Input Overdrive=100mV	–	300	–	

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

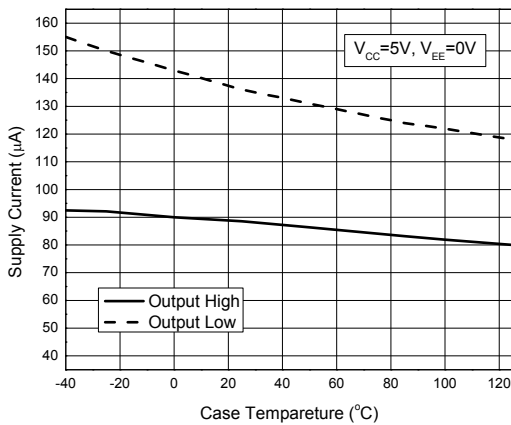
**Supply Current vs. Supply Voltage**



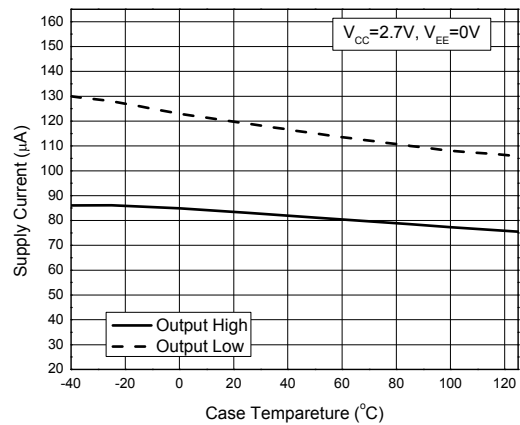
**Supply Current vs. Supply Voltage**



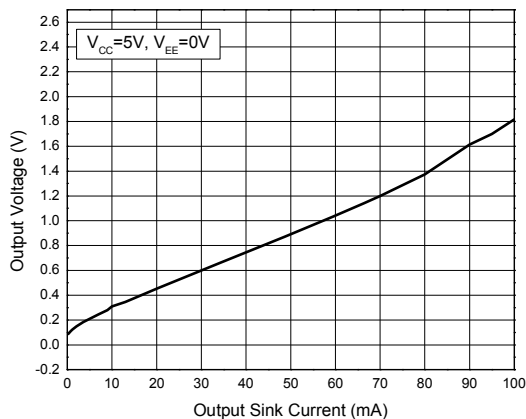
**Supply Current vs. Case Temperature**



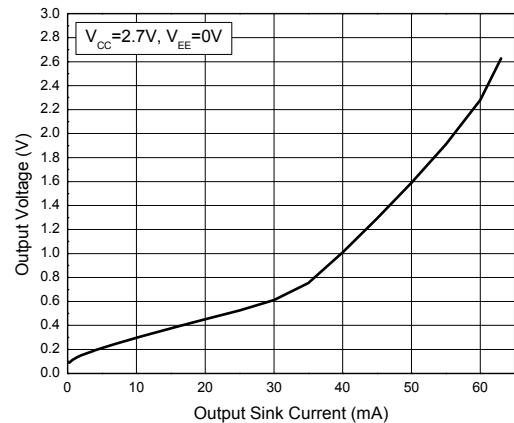
**Supply Current vs. Case Temperature**



**Output Voltage vs. Output Sink Current**

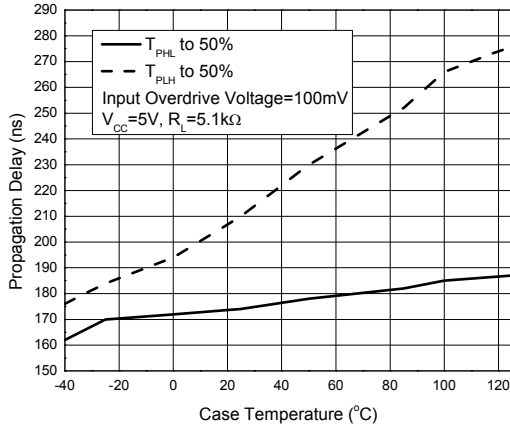


**Output Voltage vs. Output Sink Current**

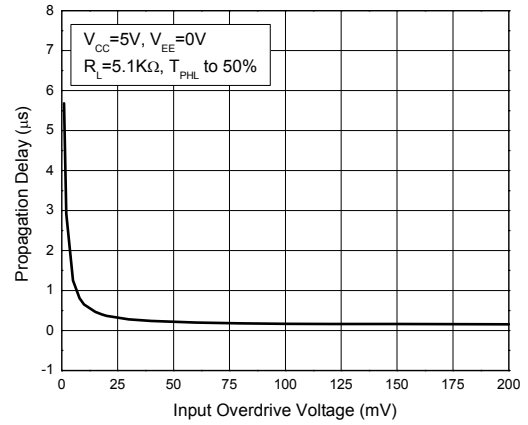


**Performance Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.) (Cont.)

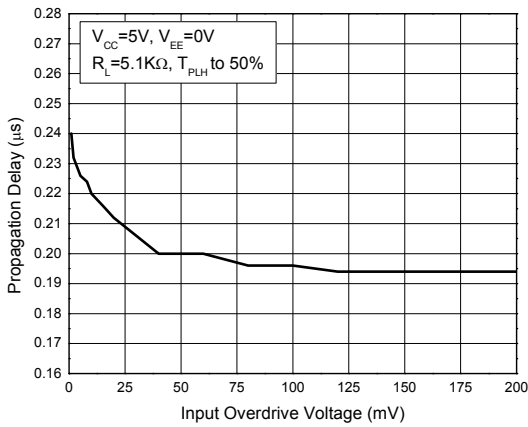
**Propagation Delay vs. Temperature**



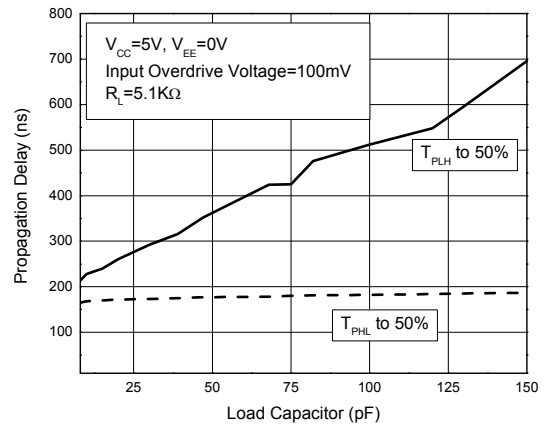
**Propagation Delay vs. Input Overdrive Voltage**



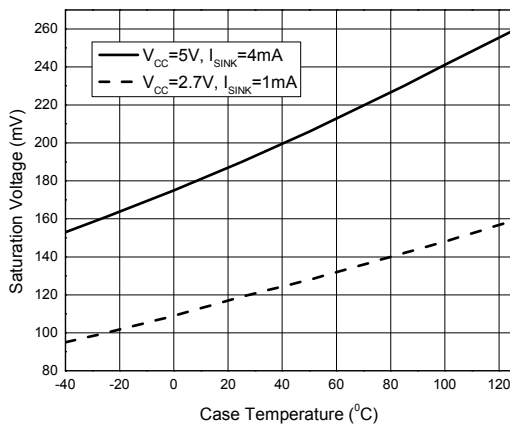
**Propagation Delay vs. Input Overdrive Voltage**



**Propagation Delay vs. Load Capacitor**

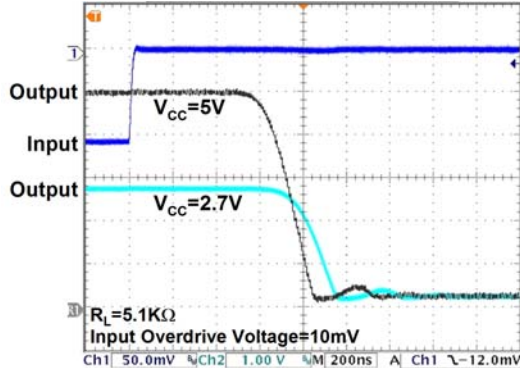


**Saturation Voltage vs. Case Temperature**

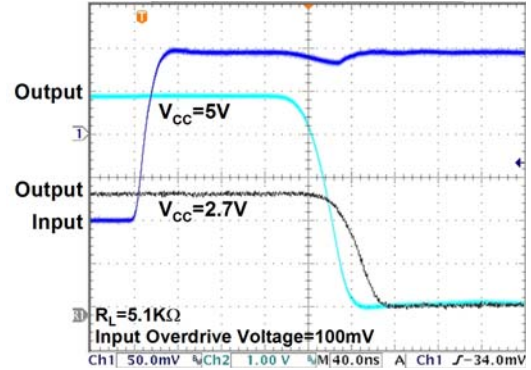


**Performance Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.) (Cont.)

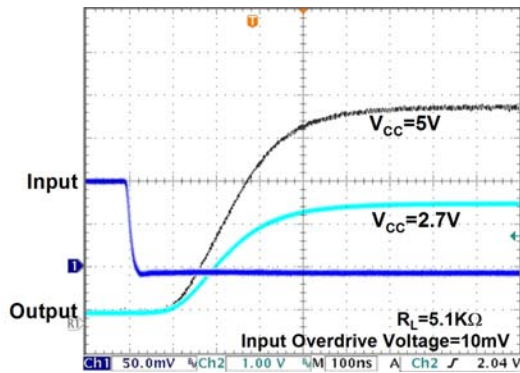
**Response Time for Positive Transition**



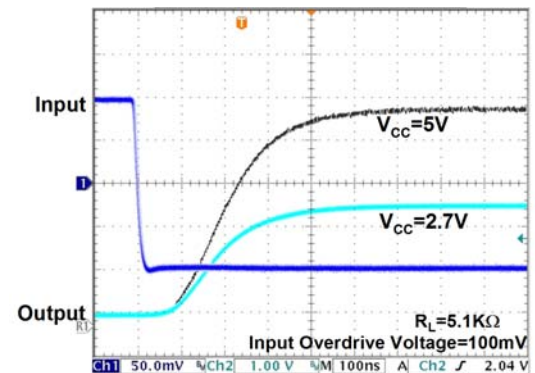
**Response Time for Positive Transition**



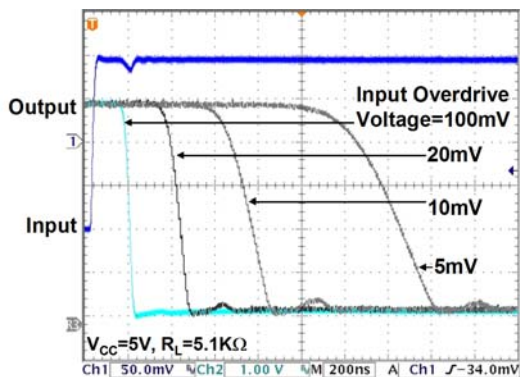
**Response Time for Negative Transition**



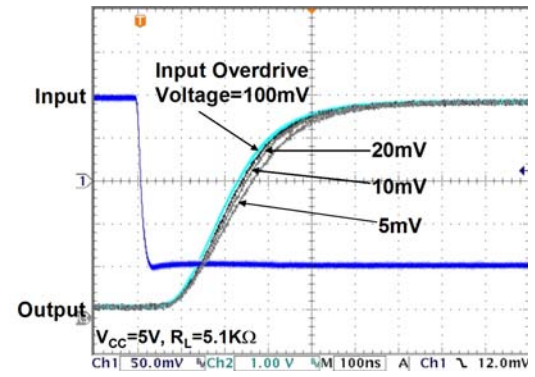
**Response Time for Negative Transition**



**Response Time for Positive Transition**



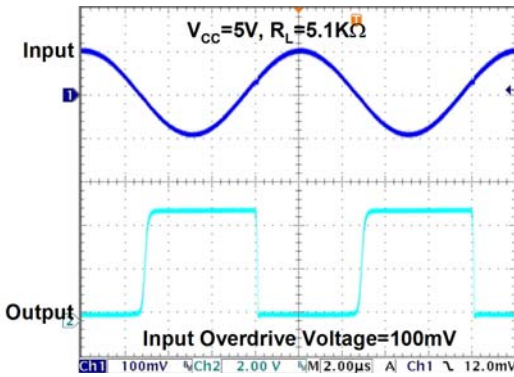
**Response Time for Negative Transition**



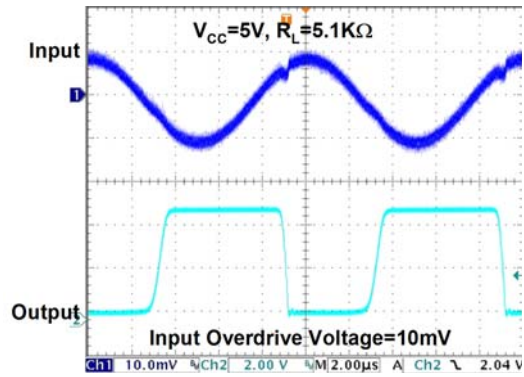


**Performance Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.) (Cont.)

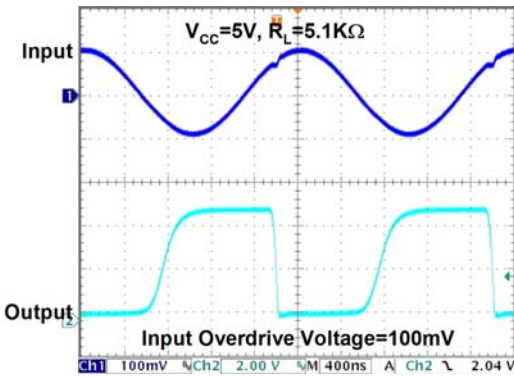
**100kHz Response**



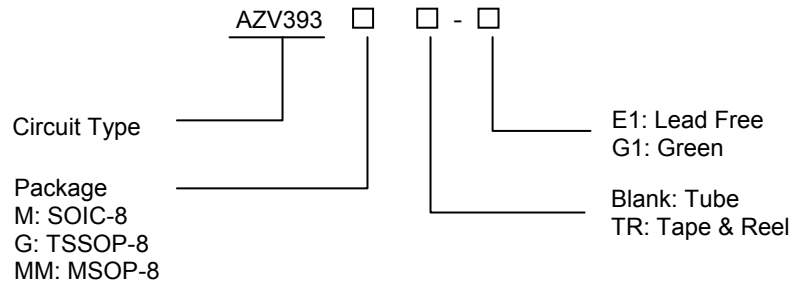
**100kHz Response**



**500kHz Response**



## Ordering Information

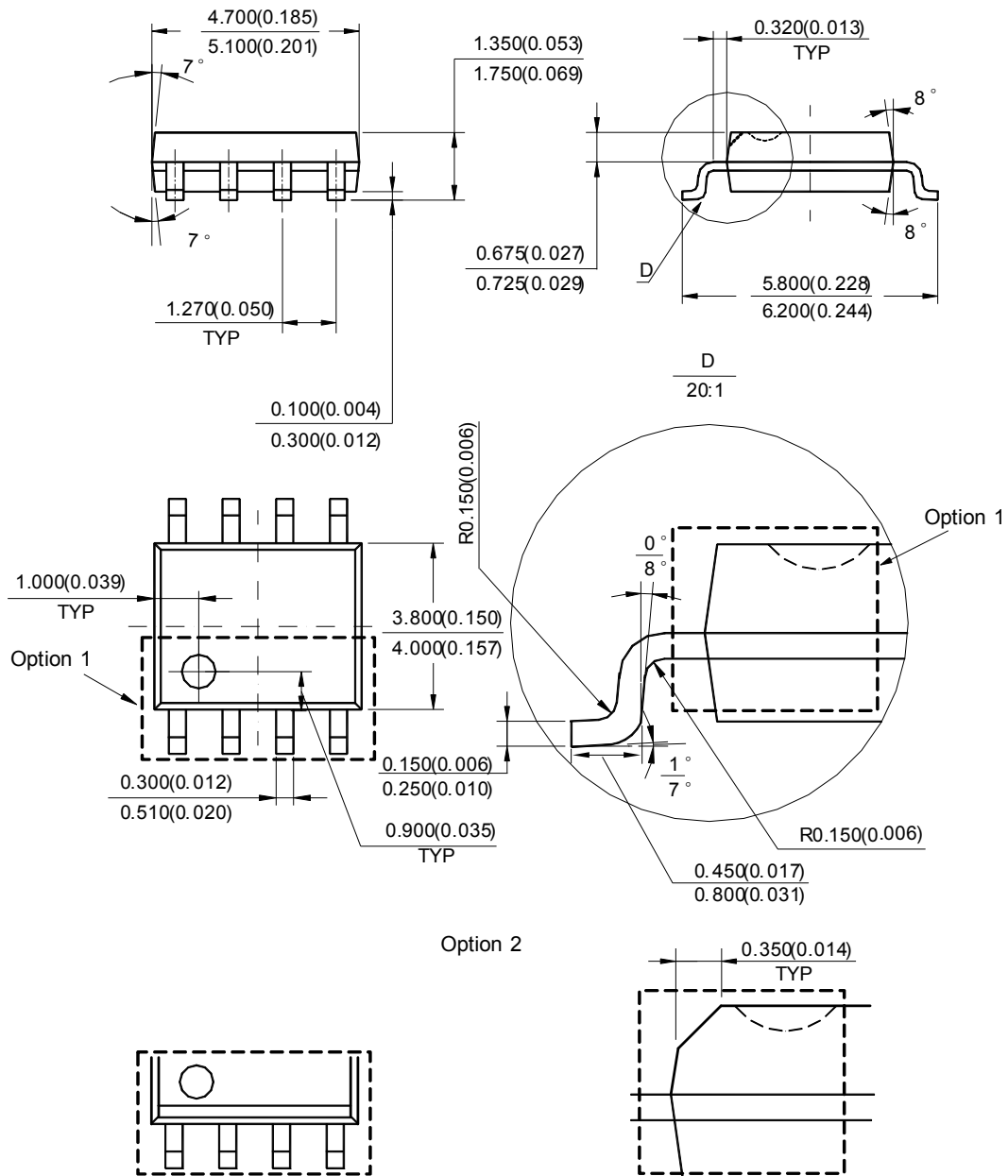


Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SOIC-8	-40 to +85°C	AZV393M-E1	AZV393M-G1	AZV393M-E1	AZV393M-G1	Tube
		AZV393MTR-E1	AZV393MTR-G1	AZV393M-E1	AZV393M-G1	Tape & Reel
TSSOP-8	-40 to +85°C	AZV393G-E1	AZV393G-G1	EG3D	GG3D	Tube
		AZV393GTR-E1	AZV393GTR-G1	EG3D	GG3D	Tape & Reel
MSOP-8	-40 to +85°C	AZV393MM-E1	AZV393MM-G1	AZV393MM-E1	AZV393MM-G1	Tube
		AZV393MMTR-E1	AZV393MMTR-G1	AZV393MM-E1	AZV393MM-G1	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).)

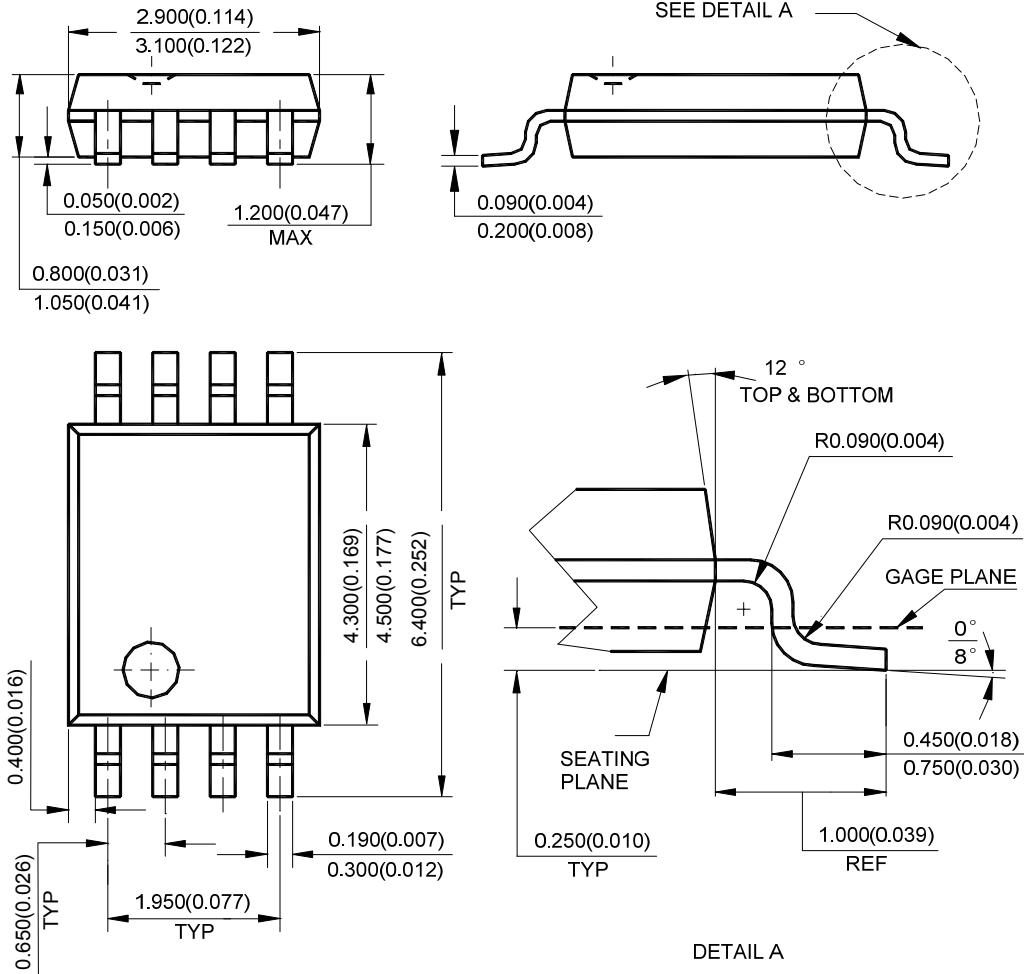
**SOIC-8**



Note: Eject hole, oriented hole and mold mark is optional.

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

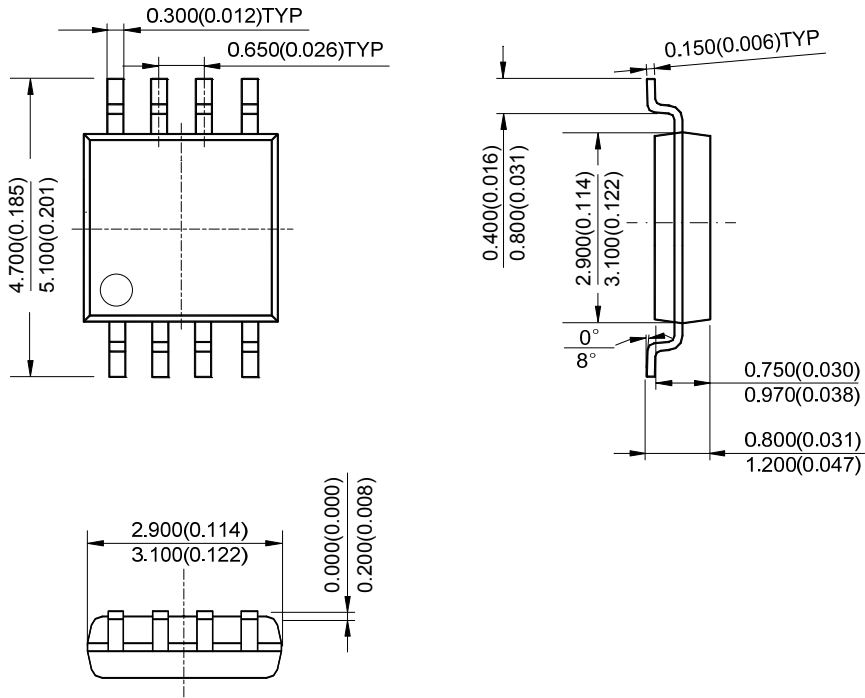
**TSSOP-8**



Note: Eject hole, oriented hole and mold mark is optional.

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

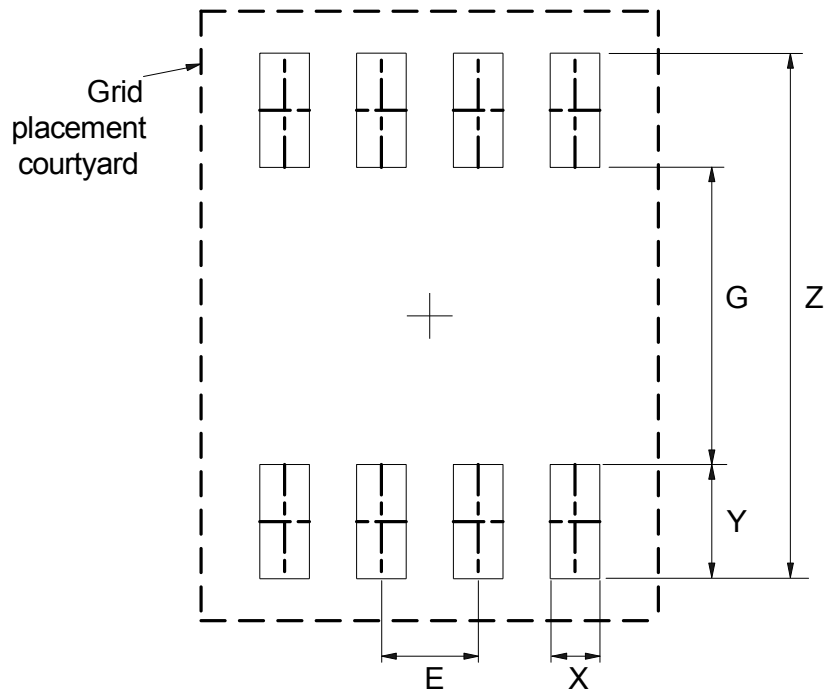
**MSOP-8**



Note: Eject hole, oriented hole and mold mark is optional.

**Suggested Pad Layout**

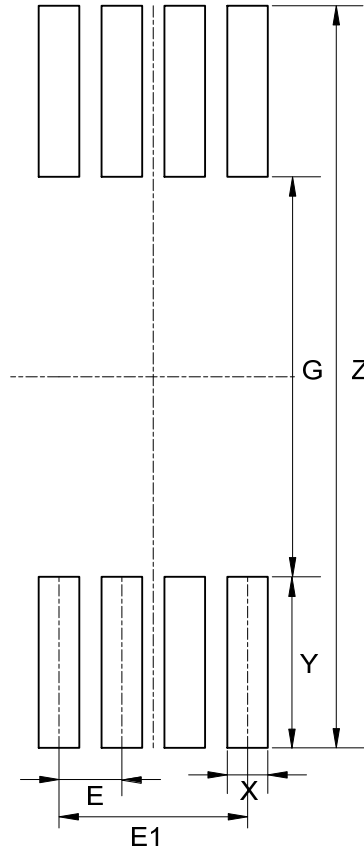
**SOIC-8**



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050

**Suggested Pad Layout (Cont.)**

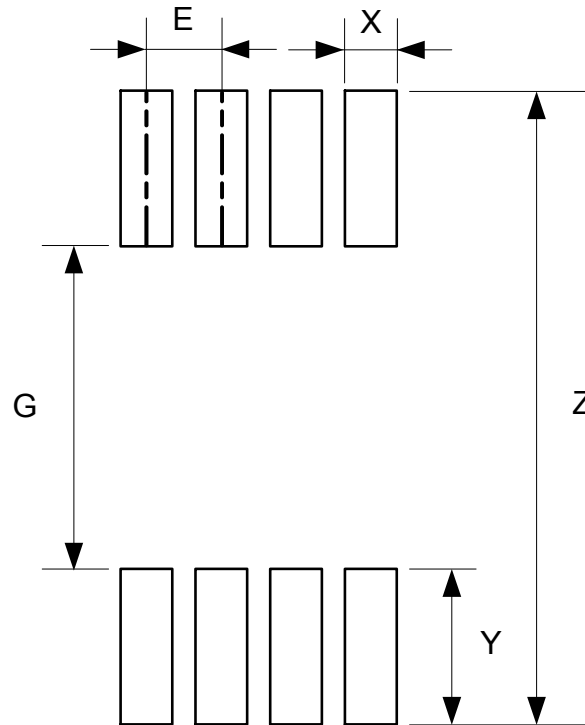
**TSSOP-8**



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)	E1 (mm)/(inch)
Value	7.720/0.304	4.160/0.164	0.420/0.017	1.780/0.070	0.650/0.026	1.950/0.077

**Suggested Pad Layout (Cont.)**

**MSOP-8**



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	5.500/0.217	2.800/0.110	0.450/0.018	1.350/0.053	0.650/0.026



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