

**LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS****AZ339****General Description**

The AZ339 series consists of four independent precision voltage comparators with an offset voltage specification as low as 2mV. The input common mode voltage range of these comparators includes ground, even when operated from a single power supply voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

The AZ339 series is designed to directly interface with TTL and CMOS.

The AZ339 series can be widely used in such applications as battery charger, cordless telephone, switching power supply, DC-DC module and PC motherboard.

The AZ339 series are available in 2 Packages: DIP-14 and SOIC-14.

Features

- Wide Supply Voltage Range
 - Single Supply: 2.0V to 18V
 - Dual Supplies: $\pm 1.0V$ to $\pm 9V$
- Very Low Supply Current Drain: 0.8mA
 - Independent of Supply Voltage
- Low Input Bias Current: 25nA (Typical)
- Low Input Offset Current: $\pm 5nA$ (Typical)
- Low Input Offset Voltage: $\pm 2mV$ (Typical)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage: 250mV at 4mA
- Open Collector Output

Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply
- DC-DC Module
- PC Motherboard
- Communication Equipment

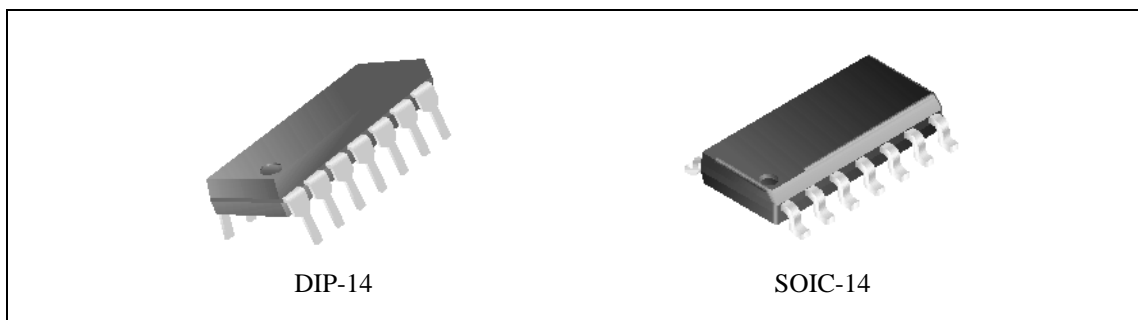


Figure 1. Package Types of AZ339



LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS

AZ339

Pin Configuration

M Package/P Package

SOIC-14/DIP-14

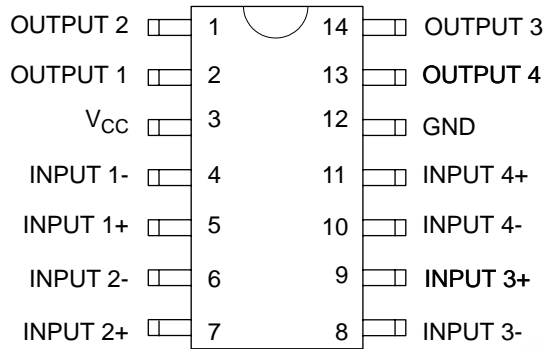


Figure 2. Pin Configuration of AZ339 (Top View)

Functional Block Diagram

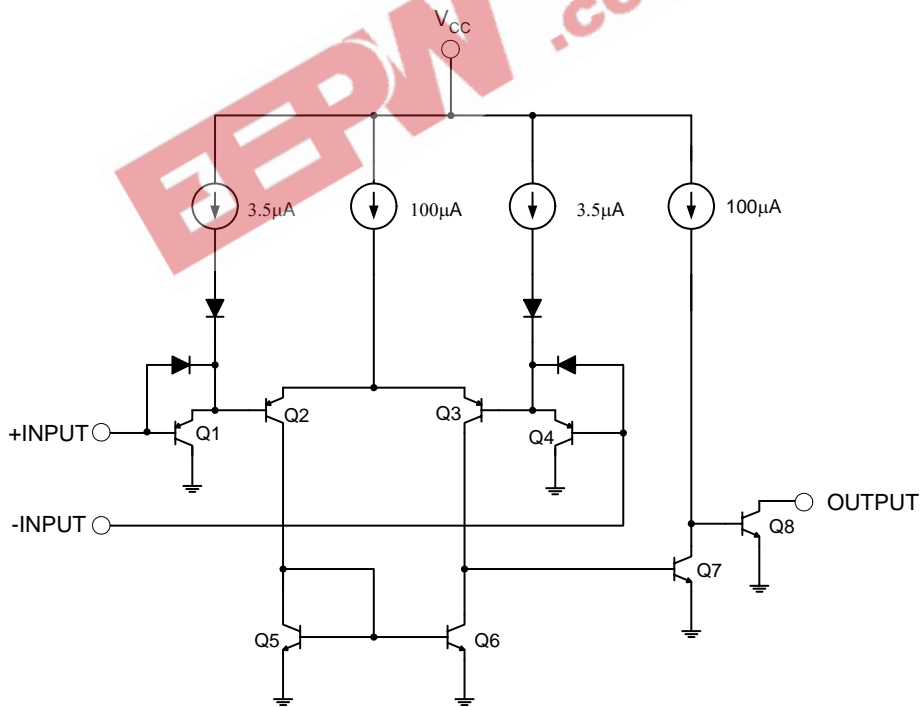
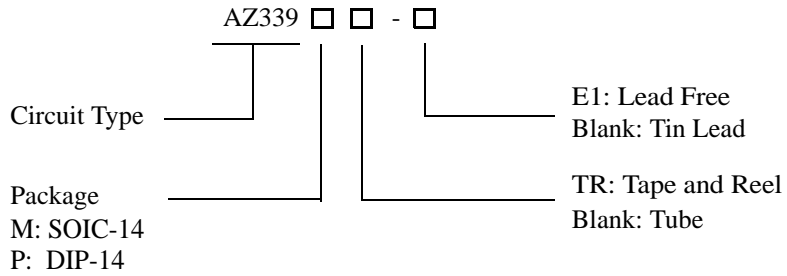


Figure 3. Functional Block Diagram of AZ339 (Each Comparator)



LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS **AZ339**

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
SOIC-14	-40 to 85 °C	AZ339M	AZ339M-E1	AZ339M	AZ339M-E1	Tube
		AZ339MTR	AZ339MTR-E1	AZ339M	AZ339M-E1	Tape & Reel
DIP-14	-40 to 85 °C	AZ339P	AZ339P-E1	AZ339P	AZ339P-E1	Tube

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

**LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS****AZ339****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	20	V
Differential Input Voltage	V_{ID}	20	V
Input Voltage	V_{IN}	-0.3 to 20	V
Input Current ($V_{IN} < -0.3V$) (Note 2)	I_{IN}	50	mA
Power Dissipation ($T_A=25^\circ C$)	P_D	DIP-14	1050
		SOIC-14	890
Output Short Circuit to Ground		Continuous	
Operating Junction Temperature	T_J	150	$^\circ C$
Storage Temperature Range	T_{STG}	-65 to 150	$^\circ C$
Lead Temperature (Soldering, 10 seconds)	T_{LEAD}	260	$^\circ C$

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.

Note 2: This input current will only exist when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistors becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also lateral NPN parasitic transistor action on the IC chip. This transistor action can cause the output voltages of the comparators to go to the $V+$ voltage level (or to ground for a large overdrive) for the time duration that an input is driven negative. This is not destructive and normal output states will re-establish when the input voltage, which was negative, again returns to a value greater than $-0.3 V_{DC}$ (at $25^\circ C$).

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	2	18	V
Operating Temperature Range	T_A	-40	85	$^\circ C$

**LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS****AZ339****Electrical Characteristics** $V_{CC}=5V$, $GND=0V$, $T_A=25^{\circ}C$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Unit
Input Offset Voltage	(Note 3)		2.0	5.0	mV
Input Bias Current	I_{IN+} or I_{IN-} with output in linear range, $V_{CM}=0V$ (Note 4)		25	250	nA
Input Offset Current	$I_{IN+}-I_{IN-}$, $V_{CM}=0V$		5.0	50	nA
Input Common Mode Voltage Range	$V_{CC}=15V$ (Note 5)	0		$V_{CC}-1.5$	V
Supply Current	$R_L=\infty$ on all comparators		0.8	2.0	mA
	$R_L=\infty$, $V_{CC}=18V$		1.0	2.5	
Voltage Gain	$R_L \geq 15K\Omega$, $V_{CC}=15V$, $V_O=1V$ to $11V$	50	200		V/mV
Large Signal Response Time	$V_{IN}=\text{TTL logic swing}$, $V_{REF}=1.4V$, $V_{RL}=5V$, $R_L=5.1K\Omega$		300		ns
Response Time	$V_{RL}=5V$, $R_L=5.1K\Omega$ (Note 6)		1.3		μs
Output Sink Current	$V_{IN-}=1V$, $V_{IN+}=0$, $V_O \leq 1.5V$	6.0	16		mA
Saturation Voltage	$V_{IN-}=1V$, $V_{IN+}=0$, $I_{SINK} \leq 4mA$		250	400	mV
Output Leakage Current	$V_{IN-}=0$, $V_{IN+}=1V$, $V_O=5V$		0.1		nA

Note 3: At output switch point, $V_O=1.4V$, $R_S=0$ with V_{CC} from $5V$ to $15V$, and over the full common-mode range ($0V$ to $V_{CC}-1.5V$), at $25^{\circ}C$.

Note 4: The direction of the input current is out of the PNP input stage. This current is essentially constant, independent of the state of the output, so no loading charge exists on the reference of input lines.

Note 5: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than $0.3V$. The upper end of the common-mode voltage range is $V_{CC}-1.5V$, but either or both inputs can go to $+18V$ without damage, independent of the magnitude of V_{CC} .

Note 6: The response time specified is a $100mV$ input step with $5mV$ overdrive. For large overdrive signals $300ns$ can be obtained.



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Typical Performance Characteristics

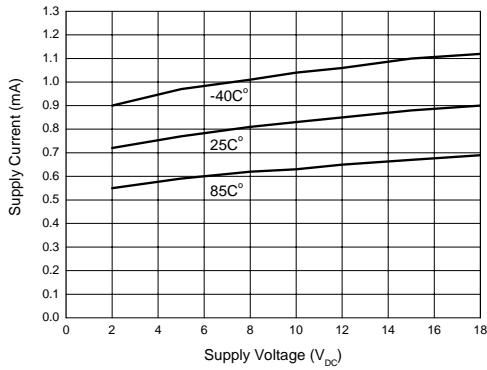


Figure 4. Supply Voltage vs. Supply Current

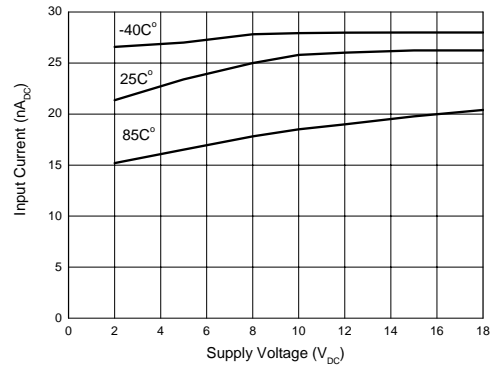


Figure 5. Supply Voltage vs. Input Current

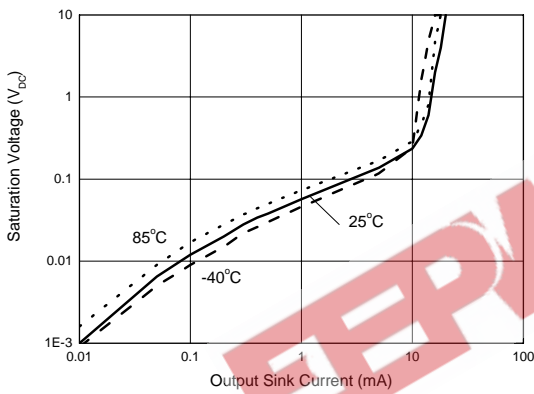


Figure 6. Output Sink Current vs. Saturation Voltage

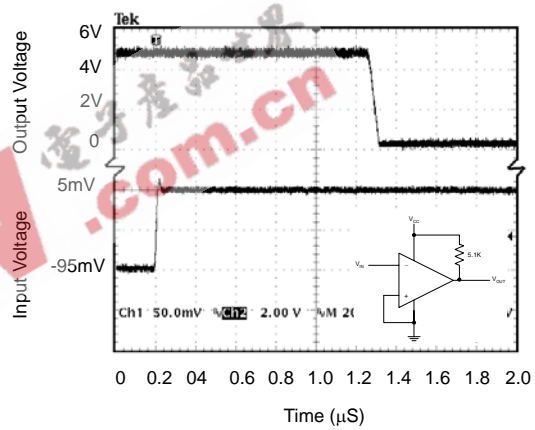


Figure 7. Response Time for 5mV Input Overdrive - Negative Transition

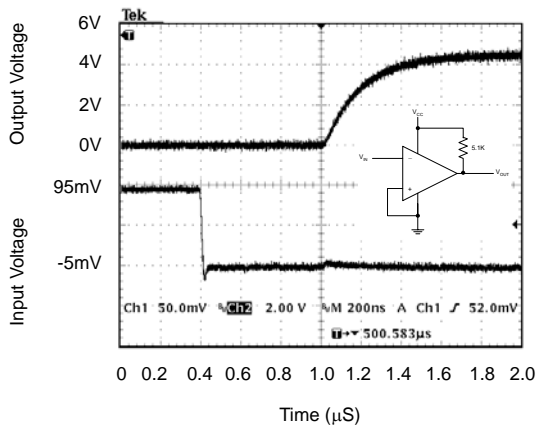


Figure 8. Response Time for 5mV Input Overdrive - Positive Transition



LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS

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Typical Applications

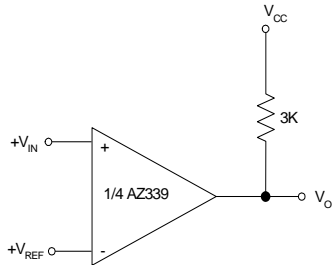


Figure 9. Basic Comparator

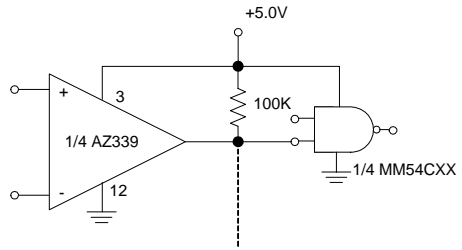


Figure 10. Driving CMOS/TTL

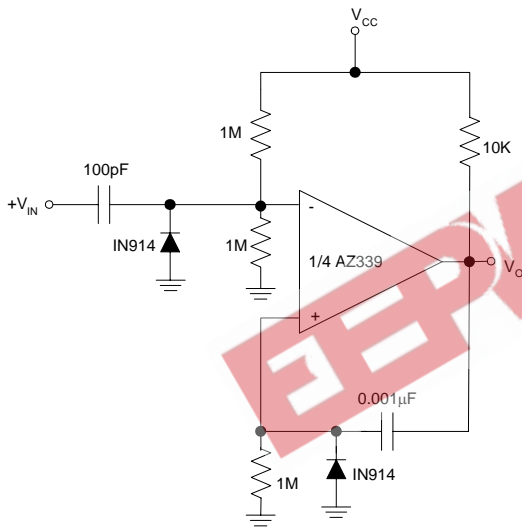


Figure 11. One Shot Multivibrator

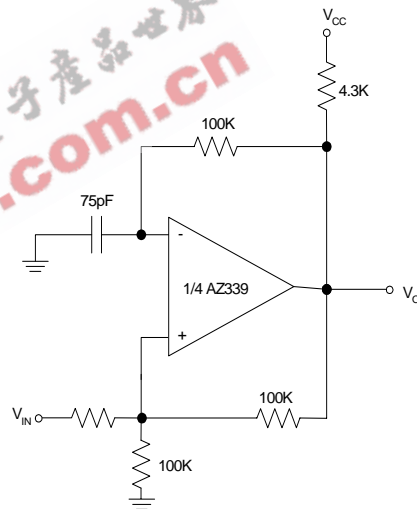


Figure 12. Squarewave Oscillator



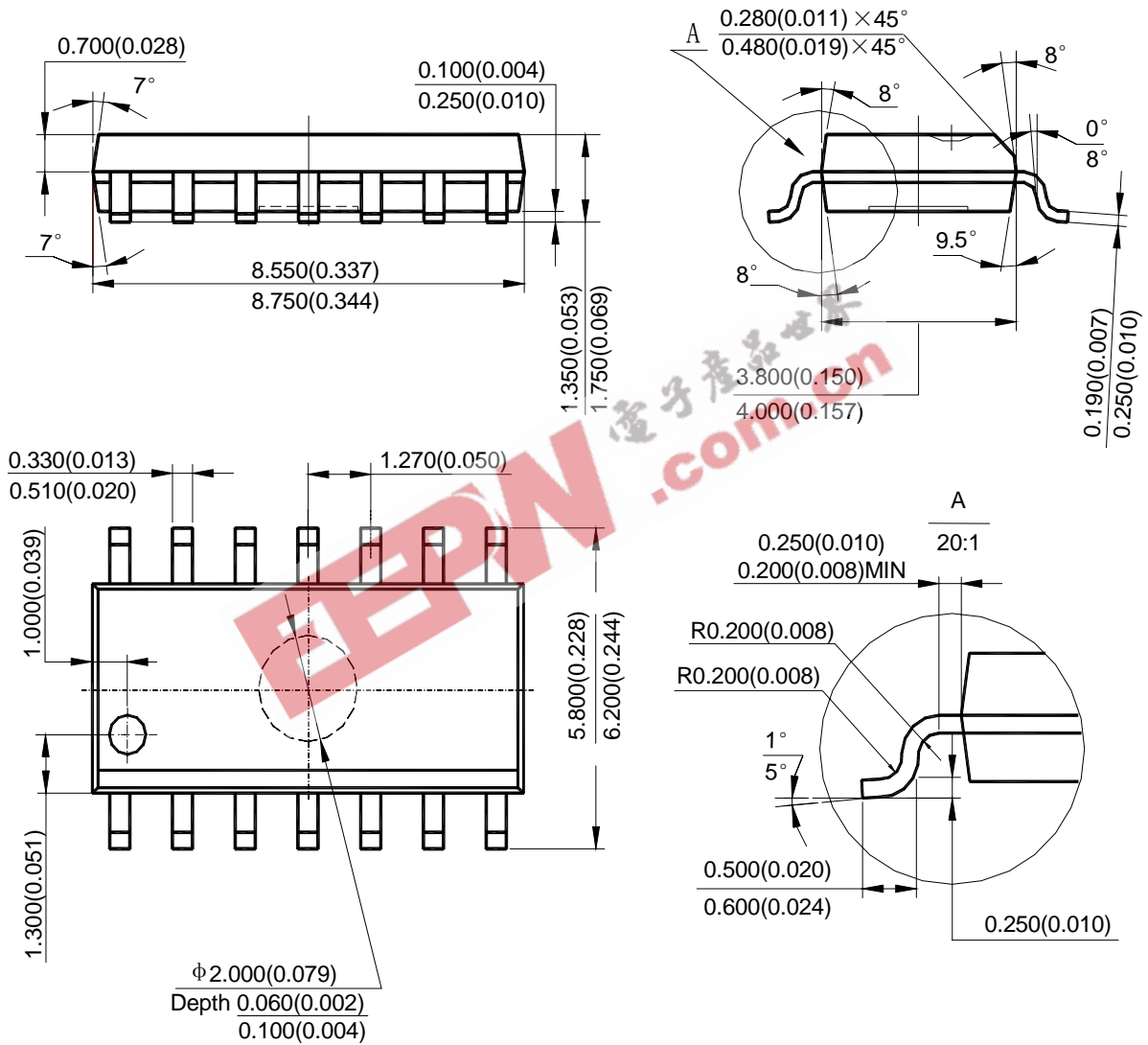
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Mechanical Dimensions

SOIC-14

Unit: mm(inch)





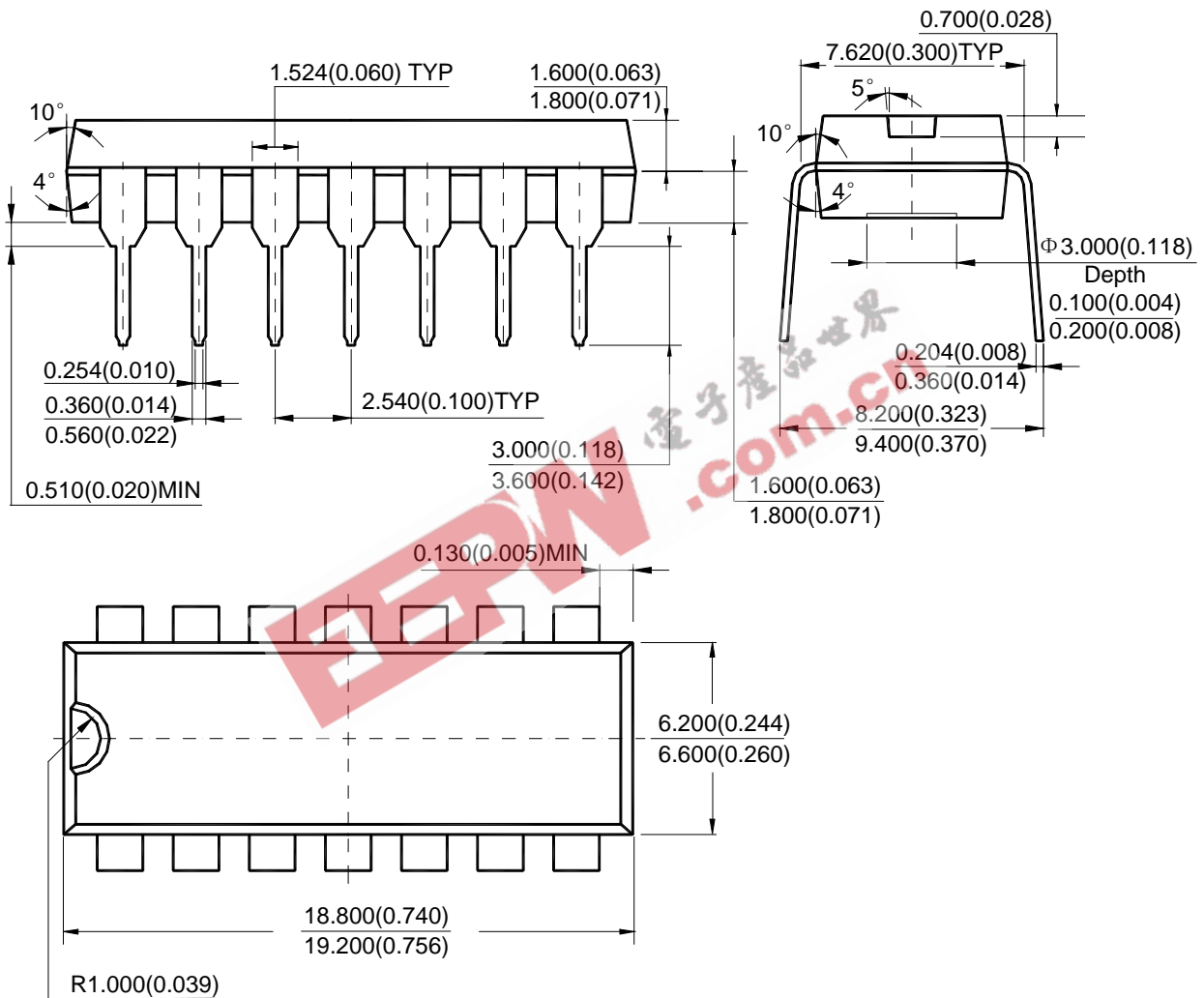
LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS

AZ339

Mechanical Dimensions (Continued)

DIP-14

Unit: mm(inch)





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MAIN SITE

BCD Semiconductor Manufacturing Limited
- Wafer Fab
Shanghai SIM-BCD Semiconductor Manufacturing Limited
800, Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

BCD Semiconductor Manufacturing Limited
- IC Design Group
Advanced Analog Circuits (Shanghai) Corporation
8F, Zone B, 900, Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6495 9539, Fax: +86-21-6485 9673

REGIONAL SALES OFFICE

Shenzhen Office
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd. Shenzhen Office
Advanced Analog Circuits (Shanghai) Corporation Shenzhen Office
27B, Tower C, 2070, Middle Shen Nan Road, Shenzhen 518031, China
Tel: +86-755-8368 3987, Fax: +86-755-8368 3166

Taiwan Office
BCD Semiconductor (Taiwan) Company Limited
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei,
Taiwan
Tel: +886-2-2656 2808, Fax: +886-2-2656 2806

USA Office
BCD Semiconductor Corporation
3170 De La Cruz Blvd., Suite 105, Santa Clara,
CA 95054-2411, U.S.A
Tel: +1-408-988 6388, Fax: +1-408-988 6386