

Description

AZV3001 and AZV3002 are single and dual channel comparators developed for new generation low-power comparator families for battery-powered devices and systems requiring low voltage operation.

The supply current each comparator typically consumes is 6µA to extend battery life. It is guaranteed to operate at a low voltage of 1.6V and is fully operational up to 5.5V. These features make the AZV3001 and AZV3002 convenient for use in 1.8V, 3.0V and 5.0V systems, and are perfectly suitable for battery-powered devices from its low-power characteristics.

The AZV3001 and AZV3002 have complementary push-pull output stage comprised of P- and N-Channel MOSFET for each comparator capable of driving rail-to-rail output swing.

The whole family is packaged in miniaturized packaging to reduce the space needed on PCB boards. The AZV3001 is available in X2-DFN1410-6; the AZV3002 is available in U-FLGA1616-8 and SO-8.

Features

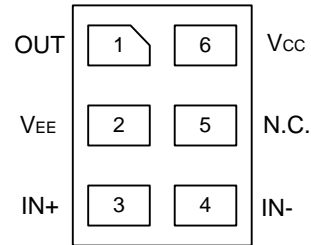
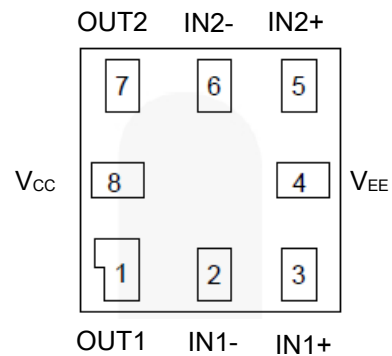
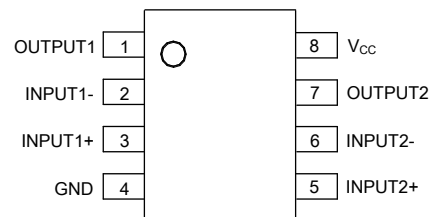
- Low Supply Current: 6µA (typical)
- Wide Supply Voltage Range: 1.6–5.5V
- Rail to Rail Input/ Output Performance
- Push-Pull Output Structure
- Propagation Delay: 0.8µs (typical)
- Low Input Bias Current: 1pA (typical)
- No Phase Inversion with Overdrive Input Signals
- Internal Hysteresis
- X2-DFN1410-6, U-FLGA1616-8 and SO-8 Package: 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)**

Applications

- Mobile Phones
- Tablets
- Battery Powered Devices
- Alarm and Security Systems

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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.

Pin Assignments

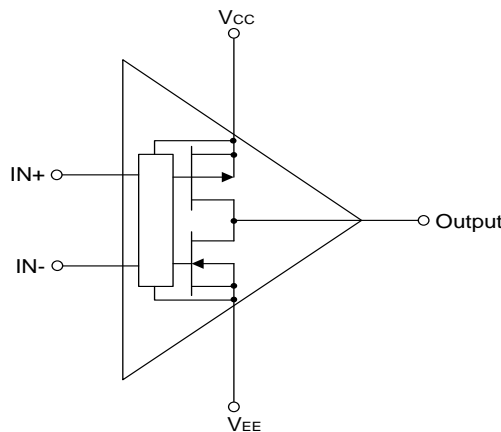
AZV3001

**Top View
(X2-DFN1410-6)**
AZV3002

**Top View
(U-FLGA1616-8)**

**Top View
(SO-8)**

Pin Descriptions

| AZV3001 | | |
|-----------------|------------|---------------------|
| Pin Name | Pin Number | Function |
| V _{CC} | 6 | Supply Voltage |
| V _{EE} | 2 | Supply Voltage |
| IN+ | 3 | Non-Inverting Input |
| IN- | 4 | Inverting Input |
| OUT | 1 | Comparator Output |
| N.C. | 5 | No Connection |

| AZV3002 | | | |
|-----------------|--------------|------|-------------------------------------|
| Pin Name | Pin Number | | Function |
| | U-FLGA1616-8 | SO-8 | |
| V _{CC} | 8 | 8 | Supply Voltage |
| V _{EE} | 4 | 4 | Supply Voltage |
| IN1+ | 3 | 3 | Non-Inverting Input of Comparator 1 |
| IN1- | 2 | 2 | Inverting Input of Comparator 1 |
| OUT1 | 1 | 1 | Comparator 1 Output |
| IN2+ | 5 | 5 | Non-Inverting Input of Comparator 2 |
| IN2- | 6 | 6 | Inverting Input of Comparator 2 |
| OUT2 | 7 | 7 | Comparator 2 Output |

Functional Block Diagram



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

| Symbol | Parameter | | Min | Max | Unit |
|---------------------|--|--------------|------|----------------------|------|
| V _{CC} | Supply Voltage | | - | 6 | V |
| V _I | Input Voltage | | -0.3 | V _{CC} +0.3 | V |
| t _{SC(O)} | Output Short-Circuit Time | | - | Indefinite | S |
| T _{J(max)} | Maximum Junction Temperature | | - | +150 | °C |
| T _{STG} | Storage Temperature | | -65 | +150 | °C |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | X2-DFN1410-6 | 315 | | °C/W |
| | | U-FLGA1616-8 | 306 | | |
| | | SO-8 | 220 | | |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | X2-DFN1410-6 | 150 | | °C/W |
| | | U-FLGA1616-8 | 122 | | |
| | | SO-8 | 80 | | |

DC Electrical Characteristics ($V_{CC}=1.6V$ to $5.5V$, $V_{EE}=0V$; $V_{CM}=0.5V_{CC}$ unless otherwise specified.)

| Symbol | Parameter | Conditions | +25°C | | | -40°C to +85°C | | Units |
|------------------------|------------------------------|--|-------|------------------------------------|-----|----------------|------|-------|
| | | | Min | Typ | Max | Min | Max | |
| V _{HYST} | Hysteresis Voltage | - | 6 | 9 | 13 | - | - | mV |
| | | V _{CC} =1.3V | - | 20 | - | - | - | mV |
| V _{I(offset)} | Offset Input Voltage | - | -30 | 0.5 | +30 | -30 | +30 | mV |
| | | V _{CC} =1.3V | - | 3 | - | - | - | mV |
| V _{OH} | High-Level Output Voltage | I _O = -0.5mA; V _{CC} = 1.3V | - | 1.24 | - | - | - | V |
| | | I _O = -0.5mA; V _{CC} = 1.6V | - | 1.55 | - | 1.35 | - | V |
| | | I _O = -3mA; V _{CC} = 3.0V | - | 2.85 | - | 2.7 | - | V |
| | | I _O = -5mA; V _{CC} = 5.5V | - | 5.33 | - | 5.2 | - | V |
| V _{OL} | Low-Level Output Voltage | I _O = -0.5mA; V _{CC} = 1.3V | - | 0.05 | - | - | - | V |
| | | I _O = -0.5mA; V _{CC} = 1.6V | - | 0.04 | - | - | 0.25 | V |
| | | I _O = -3mA; V _{CC} = 3.0V | - | 0.14 | - | - | 0.3 | V |
| | | I _O = -5mA; V _{CC} = 5.5V | - | 0.2 | - | - | 0.3 | V |
| V _{CM} | Common-Mode Voltage | V _{CC} = 1.3V to 5.5V | - | V _{EE} to V _{CC} | - | - | - | V |
| I _{OS} | Output Short-Circuit Current | V _{CC} = 5.5V; V _O = V _{EE} or V _{CC} | - | 68 | - | - | - | mA |
| CMRR | Common-Mode Rejection Ratio | ΔV _{CM} = V _{CC} | - | 70 | - | - | - | dB |
| PSRR | Power Supply Rejection Ratio | ΔV _{CC} = 1.95V | 45 | 80 | - | - | - | dB |
| I _{IB} | Input Bias Current | - | - | 1 | - | - | - | pA |
| I _{CC} | Supply Current – AZV3001 | - | - | 6 | - | - | 9 | μA |
| | Supply Current – AZV3002 | - | - | 9 | - | - | 12 | μA |

AC Electrical Characteristics ($V_{CC}=1.6V$ to $5.5V$, $V_{EE}=0V$; $V_{CM}=0.5V_{CC}$ unless otherwise specified.)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|------------------------------------|---|-----|-----|-----|------|
| t _{pd} | Propagation Delay | 20mV Overdrive; C _L =15pF | — | 0.8 | — | μs |
| t _{THL} | High to Low Output Transition Time | V _{CC} =5.5V; C _L =50pF | — | 10 | — | ns |
| t _{TLH} | Low to High Output Transition Time | V _{CC} =5.5V; C _L =50pF | — | 10 | — | ns |

Performance Characteristics

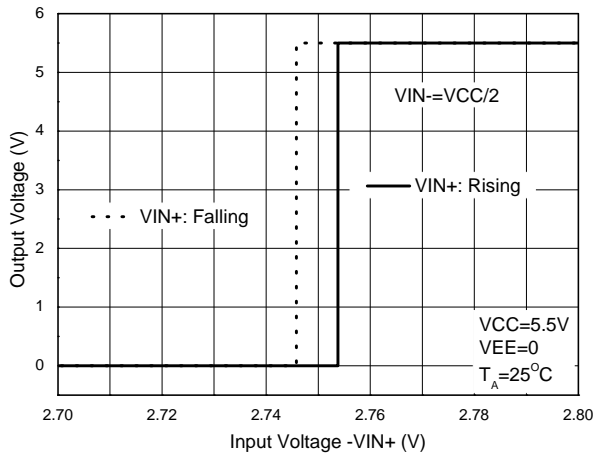


Figure 1 Input Hysteresis Voltage

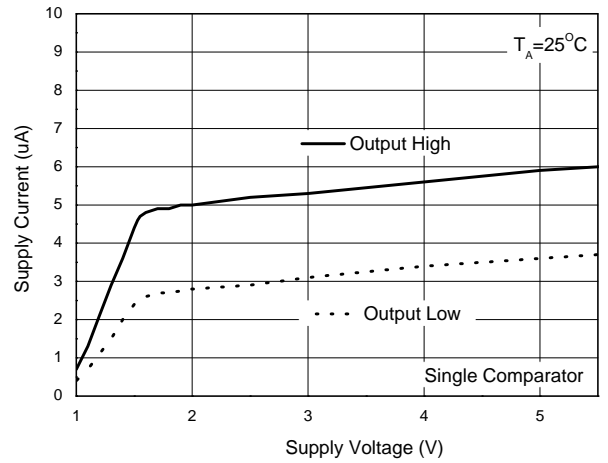


Figure 2 Supply Current vs. Supply Voltage

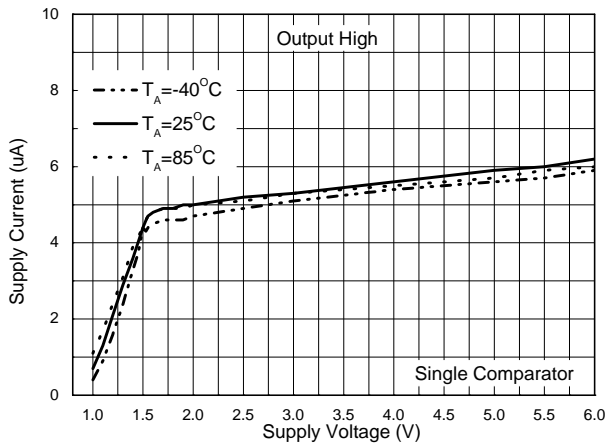


Figure 3 Supply Current vs. Supply Voltage

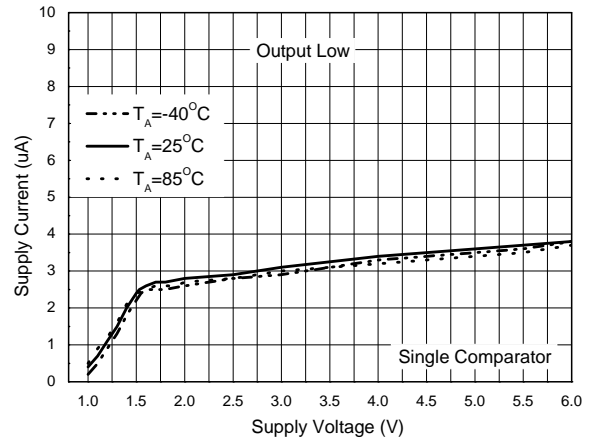


Figure 4 Supply Current vs. Supply Voltage

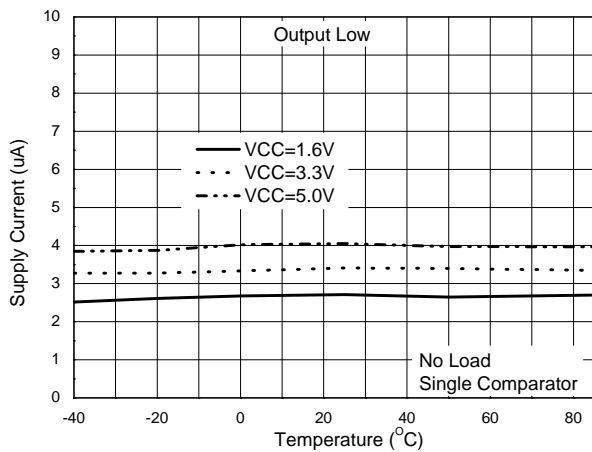


Figure 5 Supply Current vs. Temperature

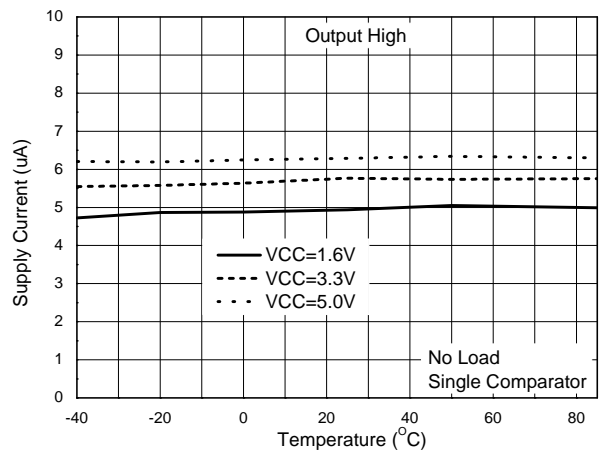


Figure 6 Supply Current vs. Temperature

Performance Characteristics (continued)

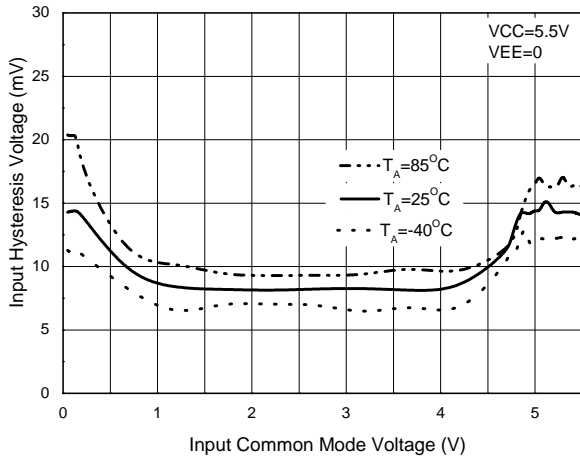


Figure 7 Input Hysteresis Voltage

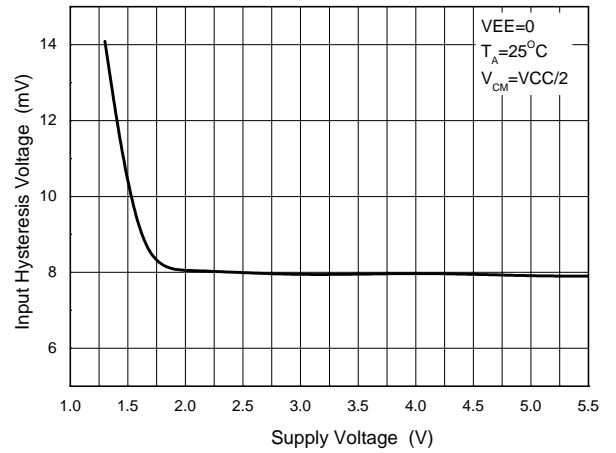


Figure 8 Input Hysteresis Voltage

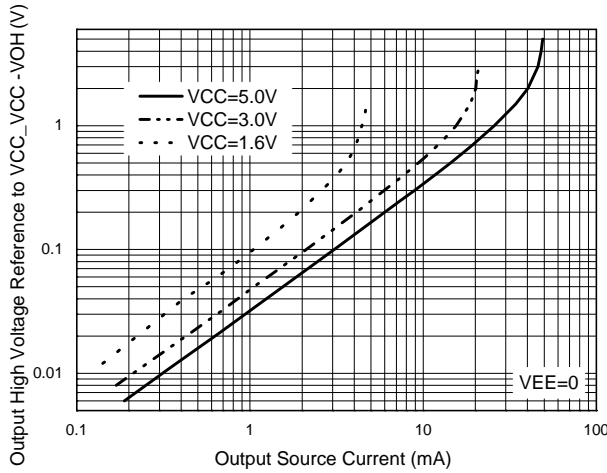


Figure 9 Output Voltage vs. Output Source Current

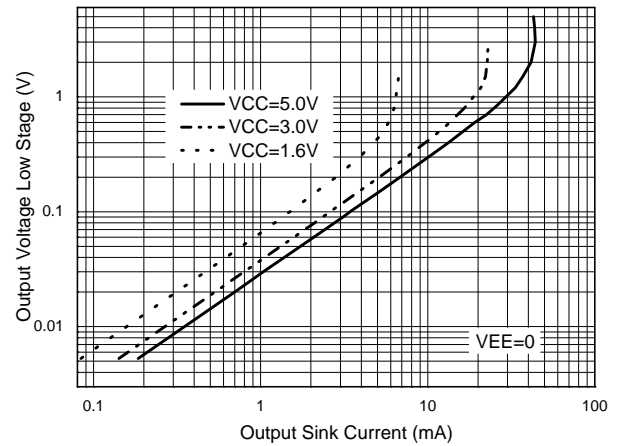


Figure 10 Output Voltage vs. Output Sink Current

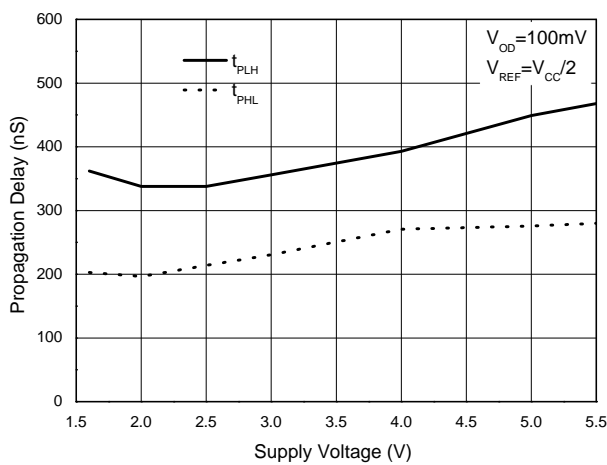


Figure 11 Propagation Delay vs. Supply Voltage

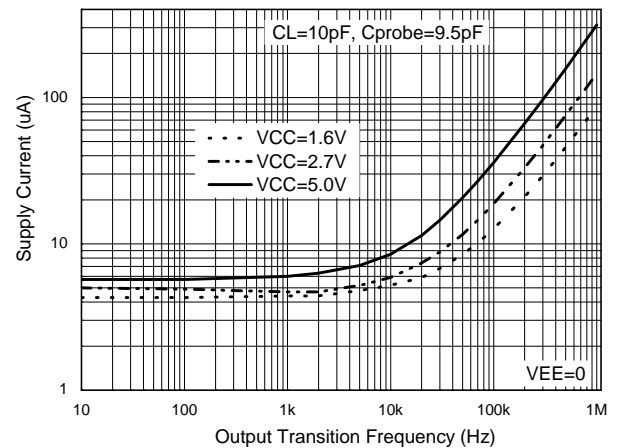


Figure 12 Supply Current vs. Transition Frequency

Application Information

Description

The AZV3001/2 are single and dual low-voltage, low-power comparators. These devices are designed for rail-to-rail input and output applications. The AZV3001 device consumes only 6µA supply current while achieving a typical propagation delay 0.8µS under 20mV input overdrive condition. These family comparators are guaranteed to operate at a low supply voltage range of 1.6V to 5.5V.

The AZV3001 /2 series has a typical internal hysteresis of 9.0mV. This allows for greater noise immunity and clean output switching.

The Output Stage

The AZV3001 and AZV3002 feature a push-pull output, which have a complementary P- and N-Channel output stage. When the output switches, there is a direct path between V_{CC} and V_{EE}, causing increased output sinking or sourcing current during the transition. Following the transition, the output current decreases and supply current returns to 6µA, thus maintaining low power consumption.

Many comparators consume more current during switching than during steady-state operation. However, with this family of comparators, the supply current change during an output transition is extremely small. The graph of Supply Current vs. Output Transition Frequency shows the minimal supply current increase as the output switching frequency approaches 1KHz. In battery- powered applications, this characteristic results in a substantial increase in battery life.

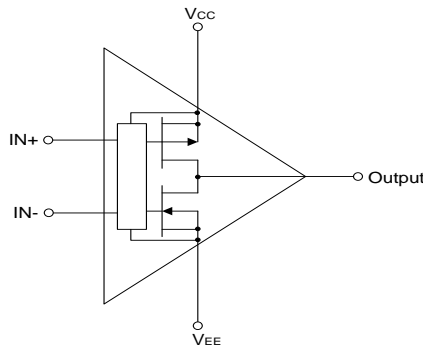


Figure 13 AZV3001/2 Complementary Output Configuration

Internal Input Hysteresis Voltage (V_{HYST})

Many comparators oscillate in the linear region of operation because of noise or undesired parasitic feedback. This tends to occur when the voltage on one input is equal to, or very close to the voltage on the other input. The AZV3001/2 have internal 9mV (Typ.) hysteresis to counter parasitic effects and noise.

The hysteresis in a comparator creates two trip points: one for the rising input voltage (V_{HYST+}) and one for the falling input voltage (V_{HYST-}). The difference between the trip points is the hysteresis (V_{HYST}). When the comparator's input voltages are equal, the hysteresis effectively causes one comparator input to move quickly past the other, thus taking the input out of the region where oscillation occurs. Figure 1 illustrates the case in which V_{IN-} has a fixed voltage applied, and V_{IN+} is varied. If the inputs were reversed, the figure would be the same, except with an inverted output.

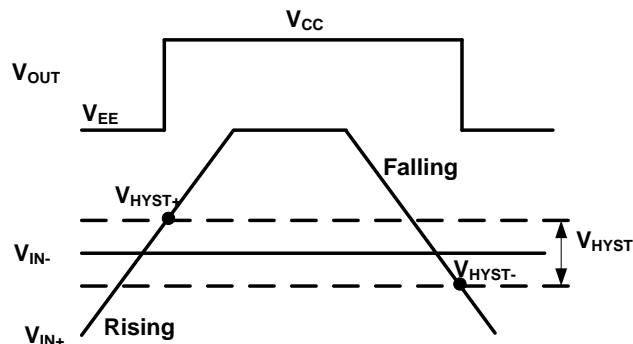


Figure 14 AZV3001 / 2 Internal Input Hysteresis Voltage

Application Information (continued)

External Hysteresis Application

The AZV3001 and AZV3002 have a hysteresis transfer curve that is a function of the following three components:

V_{TH} : the actual set voltage or threshold trip voltage

V_{OS} : the internal offset voltage between V_{IN+} and V_{IN-} . This voltage is added to V_{TH} to form the actual trip point at which the comparator must respond in order to change output states.

V_{HYST} : internal hysteresis (or trip window) that is designed to produce comparator sensitivity to noise.

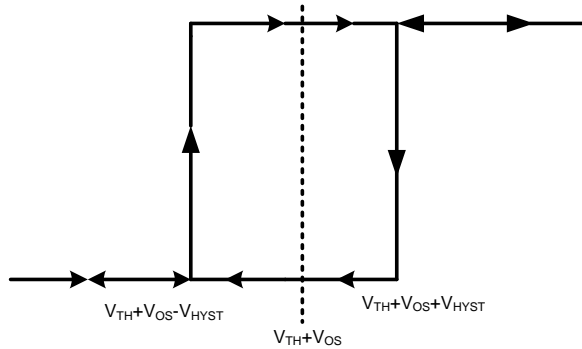


Figure 15 AZV3001 Hysteresis Transfer Curve

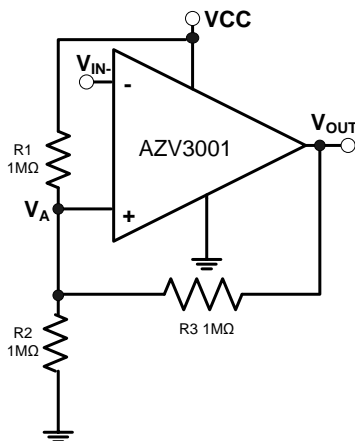


Figure 16. Inverting Comparator With Hysteresis

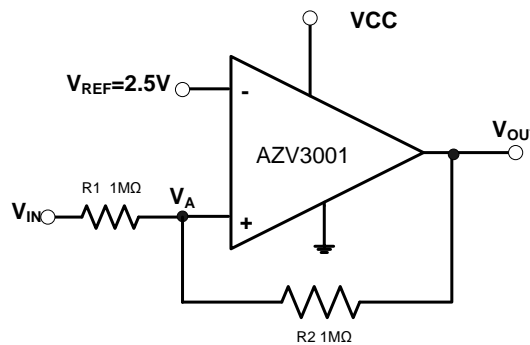


Figure 17. Non-Inverting Comparator With Hysteresis

No Phase Inversion

AZV3001 and AZV3002 are rail-to-rail input comparators, with the input common-mode voltage range reaching to the supply rails for both positive and negative supplies. The AZV3001 and AZV3002 are designed to prevent phase inversion when the input pins exceed the supply voltage. Figure 18 shows the AZV3001/2 response when input voltages exceed the supply, resulting in no phase inversion.

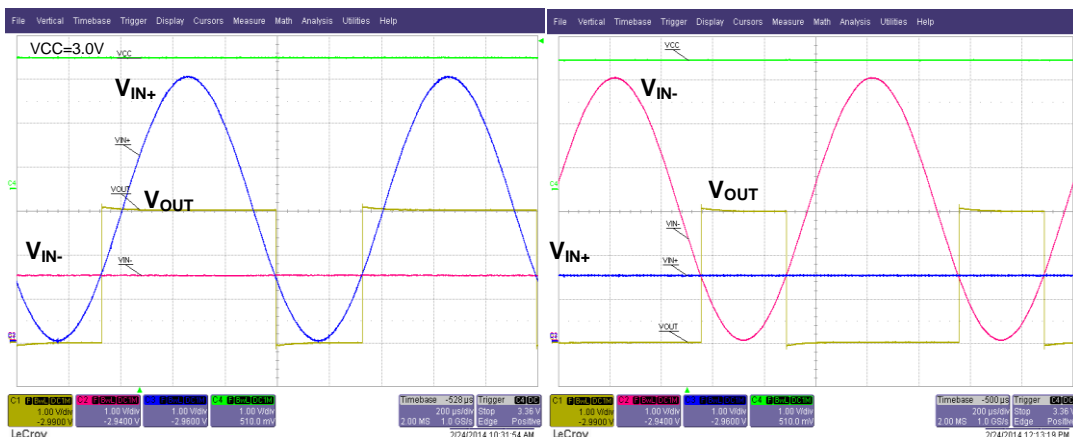
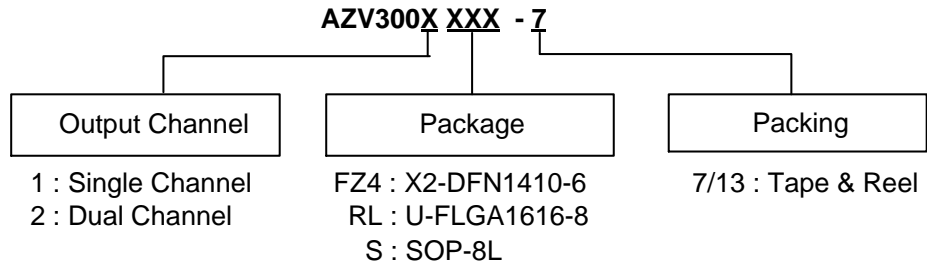


Figure 18 Comparator Response to Input Voltage –No Phase Inversion

Ordering Information



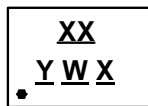
| Part Number | Package Code | Packaging | 7"/13" Tape and Reel | |
|--------------|--------------|--------------|----------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| AZV3001FZ4-7 | FZ4 | X2-DFN1410-6 | 5,000/Tape & Reel | -7 |
| AZV3002RL-7 | RL | U-FLGA1616-8 | 3,000/Tape & Reel | -7 |
| AZV3002S-13 | S | SO-8 | 2500/Tape & Reel | -13 |

Note: 4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

Marking Information

(1) X2-X2-DFN1410-6

(Top View)

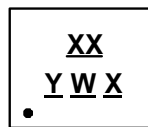


XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents 52 and 53 week
X : Internal Code

| Part Number | Package | Identification Code |
|-------------|--------------|---------------------|
| AZV3001FZ4 | X2-DFN1410-6 | YA |

(2) U-FLGA1616-8

(Top View)

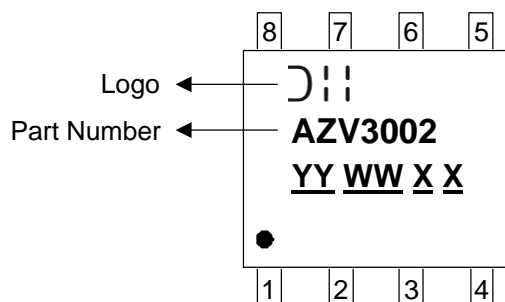


XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents 52 and 53 week
X : Internal Code

| Part Number | Package | Identification Code |
|-------------|--------------|---------------------|
| AZV3002RL | U-FLGA1616-8 | XD |

(3) SO-8

(Top View)

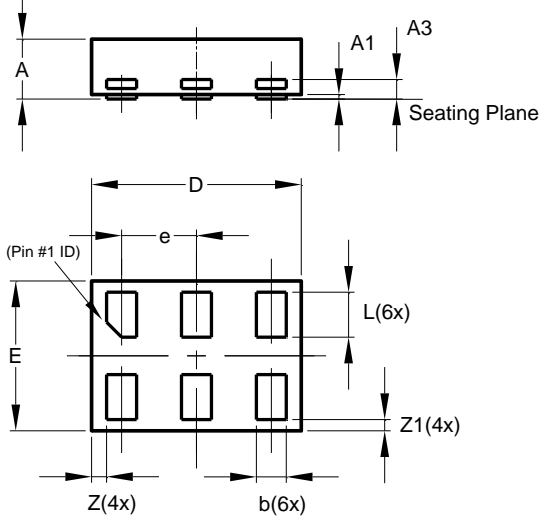


YY : Year : 14,15,16~
WW : Week : 01~52; 52 represents 52 and 53 week
XX : Internal Code

Package Outline Dimensions (All dimensions in mm.)

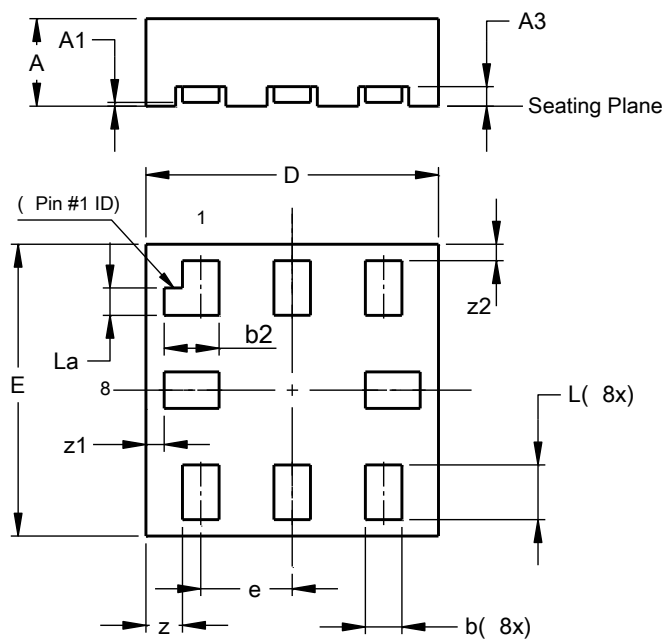
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

(1) Package Type: X2-DFN1410-6



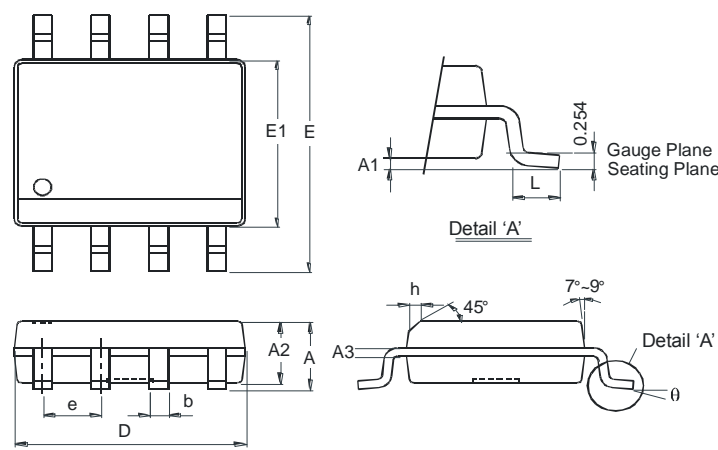
| X2-DFN1410-6 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | — | 0.40 | 0.39 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | — | — | 0.13 |
| b | 0.15 | 0.25 | 0.20 |
| D | 1.35 | 1.45 | 1.40 |
| E | 0.95 | 1.05 | 1.00 |
| e | — | — | 0.50 |
| L | 0.25 | 0.35 | 0.30 |
| Z | — | — | 0.10 |
| Z1 | 0.045 | 0.105 | 0.075 |
| All Dimensions in mm | | | |

(2) U-FLGA1616-8



| U-FLGA1616-8 | | | |
|----------------------|---------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.45 | 0.55 | 0.50 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.176 |
| b | 0.15 | 0.25 | 0.20 |
| b2 | - | - | 0.30 |
| D | 1.55 | 1.65 | 1.60 |
| E | 1.55 | 1.65 | 1.60 |
| e | 0.50BSC | | |
| L | 0.25 | 0.35 | 0.30 |
| La | - | - | 0.15 |
| z | - | - | 0.20 |
| z1 | - | - | 0.10 |
| z2 | - | - | 0.09 |
| All Dimensions in mm | | | |

(3) SO-8

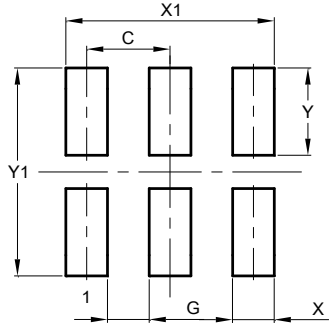


| SO-8 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | - | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 Typ | |
| h | - | 0.35 |
| L | 0.62 | 0.82 |
| θ | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout

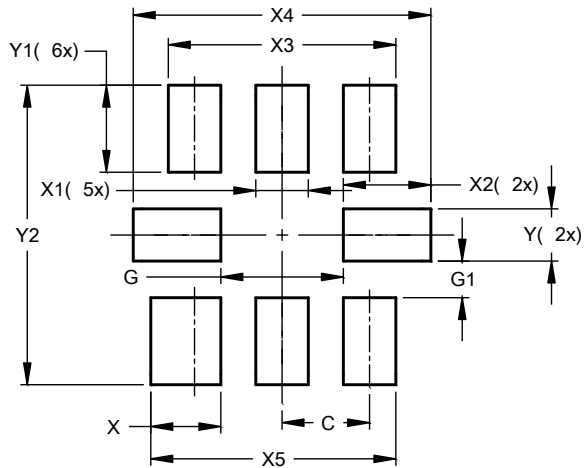
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

(1) Package Type: X2-DFN1410-6



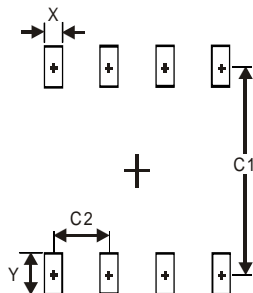
| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.500 |
| G | 0.250 |
| X | 0.250 |
| X1 | 1.250 |
| Y | 0.525 |
| Y1 | 1.250 |

(2)U-FLGA1616-8



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.500 |
| G | 0.700 |
| G1 | 0.210 |
| X | 0.400 |
| X1 | 0.300 |
| X2 | 0.500 |
| X3 | 1.300 |
| X4 | 1.700 |
| X5 | 1.400 |
| Y | 0.300 |
| Y1 | 0.500 |
| Y2 | 1.720 |

(3)SO-8



| Dimensions | Value (in mm) |
|------------|---------------|
| X | 0.60 |
| Y | 1.55 |
| C1 | 5.4 |
| C2 | 1.27 |

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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