# AZP96

ARIZONA MICROTEK, INC.

## ECL/PECL Differential Receiver

## FEATURES

- Green and RoHS Compliant / Lead (Pb) Free Package available
- 250ps Propagation Delay
- High Bandwidth Output Transitions
- Operating Range of 3.0V to 5.5V
- Minimized Input Loading
- IBIS Model File Available on Arizona Microtek Website

**PACKAGE AVAILABILITY**

| PACKAGE | PART NUMBER | MARKING | NOTES |
|---|---|---|---|
| MLP 8 (2x2) Green / RoHS Compliant / Lead (Pb) Free | AZP96NG | Q1G <Date Code> | 1,2 |

1 Add R1 at end of part number for 7 inch (1K parts), R2 for 13 inch (2.5K parts) Tape & Reel.
2 Date code format: "Y" for year followed by "WW" for week.

## DESCRIPTION

The AZP96 is a differential receiver without the input clamping networks found on similar devices such as the AZ100LVEL16. This makes it especially useful as a buffer when input loading effects must be minimized. Removal of the input clamping network means that the output state will be undefined if both inputs are left open.

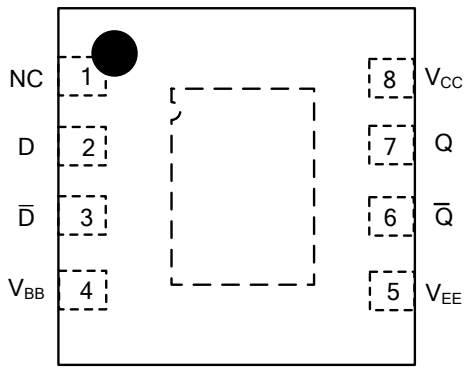
The AZP96 provides a $V_{BB}$ output for single-ended use or a DC bias reference for AC coupling to the device. For single-ended input applications, the $V_{BB}$ reference should be connected to one side of the D/$\overline{D}$ differential input pair. The input signal is then fed to the other D/$\overline{D}$ input. The $V_{BB}$ pin can support 1.5 mA sink/source current. When used, the $V_{BB}$ pin should be bypassed to ground via a 0.01 μF capacitor.

NOTE: Specifications in the ECL/PECL/LVPECL tables are valid when thermal equilibrium is established.

**PIN DESCRIPTION**

| PIN | FUNCTION |
|---|---|
| D, $\overline{D}$ | Data Inputs |
| Q, $\overline{Q}$ | Data Outputs |
| $V_{BB}$ | Reference Voltage Output |
| $V_{CC}$ | Positive Supply |
| $V_{EE}$ | Negative Supply |
| NC | No Connect |

**AZP96N**
**MLP 8, 2x2 mm**




**TOP VIEW**

**Bottom Center Pad may be left open or tied to $V_{EE}$.**

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**Absolute Maximum Ratings are those values beyond which device life may be impaired.**

| Symbol | Characteristic | Rating | Unit |
|---|---|---|---|
| $V_{CC}$ | PECL Power Supply ($V_{EE}$ = 0V) | 0 to +8.0 | Vdc |
| $V_I$ | PECL Input Voltage ($V_{EE}$ = 0V) | 0 to +6.0 | Vdc |
| $V_{EE}$ | ECL Power Supply ($V_{CC}$ = 0V) | -8.0 to 0 | Vdc |
| $V_I$ | ECL Input Voltage ($V_{CC}$ = 0V) | -6.0 to 0 | Vdc |
| $I_{OUT}$ | Output Current --- Continuous<br>--- Surge | 50<br>100 | mA |
| $T_A$ | Operating Temperature Range | -40 to +85 | °C |
| $T_{STG}$ | Storage Temperature Range | -65 to +150 | °C |

**100K ECL DC Characteristics** ($V_{EE}$ = -3.0V to -5.5V, $V_{CC}$ = GND)

| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $V_{OH}$ | Output HIGH Voltage[1] | -1085 | -1005 | -880 | -1025 | -955 | -880 | -1025 | -955 | -880 | -1025 | -955 | -880 | mV |
| $V_{OL}$ | Output LOW Voltage[1] | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV |
| $V_{IH}$ | Input HIGH Voltage | -1165 | | -880 | -1165 | | -880 | -1165 | | -880 | -1165 | | -880 | mV |
| $V_{IL}$ | Input LOW Voltage | -1810 | | -1475 | -1810 | | -1475 | -1810 | | -1475 | -1810 | | -1475 | mV |
| $V_{BB}$ | Reference Voltage | -1380 | | -1260 | -1380 | | -1260 | -1380 | | -1260 | -1380 | | -1260 | mV |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | µA |
| $I_{IH}$ | Input HIGH Current | | | 50 | | | 50 | | | 50 | | | 50 | µA |
| $I_{EE}$ | Power Supply Current | | 18 | 22 | | 18 | 22 | | 18 | 22 | | 18 | 24 | mA |

1. Each output is terminated through a 50Ω resistor to $V_{CC}$ – 2V.

**100K LVPECL DC Characteristics** ($V_{EE}$ = GND, $V_{CC}$ = +3.3V)

| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $V_{OH}$ | Output HIGH Voltage[1,2] | 2215 | 2295 | 2420 | 2275 | 2345 | 2420 | 2275 | 2345 | 2420 | 2275 | 2345 | 2420 | mV |
| $V_{OL}$ | Output LOW Voltage[1,2] | 1470 | 1605 | 1745 | 1490 | 1595 | 1680 | 1490 | 1595 | 1680 | 1490 | 1595 | 1680 | mV |
| $V_{IH}$ | Input HIGH Voltage[1] | 2135 | | 2420 | 2135 | | 2420 | 2135 | | 2420 | 2135 | | 2420 | mV |
| $V_{IL}$ | Input LOW Voltage[1] | 1490 | | 1825 | 1490 | | 1825 | 1490 | | 1825 | 1490 | | 1825 | mV |
| $V_{BB}$ | Reference Voltage[1] | 1920 | | 2040 | 1920 | | 2040 | 1920 | | 2040 | 1920 | | 2040 | mV |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | µA |
| $I_{IH}$ | Input HIGH Current | | | 50 | | | 50 | | | 50 | | | 50 | µA |
| $I_{EE}$ | Power Supply Current | | 18 | 22 | | 18 | 22 | | 18 | 22 | | 18 | 24 | mA |

1. For supply voltages other that 3.3V, use the ECL table values and ADD supply voltage value.
2. Each output is terminated through a 50Ω resistor to $V_{CC}$ – 2V.

**100K PECL DC Characteristics** ($V_{EE}$ = GND, $V_{CC}$ = +5.0V)

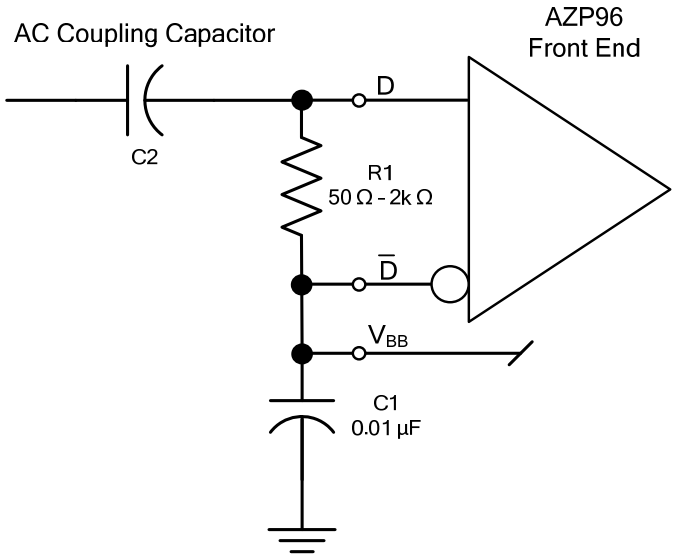
| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $V_{OH}$ | Output HIGH Voltage[1,2] | 3915 | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4045 | 4120 | 3975 | 4045 | 4120 | mV |
| $V_{OL}$ | Output LOW Voltage[1,2] | 3170 | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV |
| $V_{IH}$ | Input HIGH Voltage[1] | 3835 | | 4120 | 3835 | | 4120 | 3835 | | 4120 | 3835 | | 4120 | mV |
| $V_{IL}$ | Input LOW Voltage[1] | 3190 | | 3525 | 3190 | | 3525 | 3190 | | 3525 | 3190 | | 3525 | mV |
| $V_{BB}$ | Reference Voltage[1] | 3620 | | 3740 | 3620 | | 3740 | 3620 | | 3740 | 3620 | | 3740 | mV |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | µA |
| $I_{IH}$ | Input HIGH Current | | | 50 | | | 50 | | | 50 | | | 50 | µA |
| $I_{EE}$ | Power Supply Current | | 18 | 22 | | 18 | 22 | | 18 | 22 | | 18 | 24 | mA |

1. For supply voltages other that 5.0V, use the ECL table values and ADD supply voltage value.
2. Each output is terminated through a 50Ω resistor to $V_{CC}$ – 2V.

**AC Characteristics** ($V_{EE}$ = -3.0V to -5.5V; $V_{CC}$ = GND or $V_{EE}$ = GND; $V_{CC}$ = +3.0V to +5.5V)

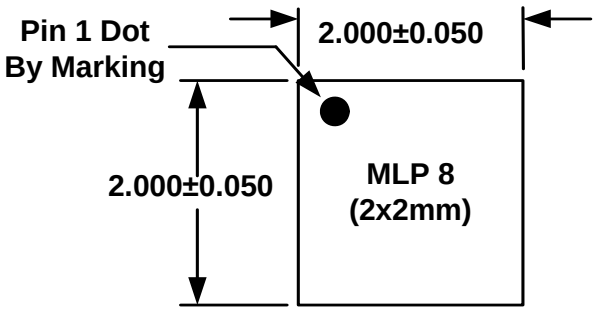
| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $t_{PLH}$ / $t_{PHL}$ | Propagation Delay to Output (Diff) | 125 | 250 | 375 | 175 | 250 | 325 | 175 | 250 | 325 | 205 | 280 | 355 | ps |
| | (SE) | 75 | 250 | 425 | 125 | 250 | 375 | 125 | 250 | 375 | 155 | 280 | 405 | |
| $t_{SKEW}$ | Duty Cycle Skew [1](Diff) | | 5 | | | 5 | 20 | | 5 | 20 | | 5 | 20 | ps |
| $V_{PP}$ (AC) | Minimum Input Swing[2] | 150 | | | 150 | | | 150 | | | 150 | | | mV |
| $V_{CMR}$ | Common Mode Range[3] | $V_{EE}$ + | | $V_{CC}$ - | $V_{EE}$ + | | $V_{CC}$ - | $V_{EE}$ + | | $V_{CC}$ - | $V_{EE}$ + | | $V_{CC}$ - | |
| | $V_{PP}$ < 500mV | 1.2 | | 0.4 | 1.1 | | 0.4 | 1.1 | | 0.4 | 1.1 | | 0.4 | V |
| | $V_{PP}$ ≥ 500mV | 1.5 | | 0.4 | 1.4 | | 0.4 | 1.4 | | 0.4 | 1.4 | | 0.4 | |
| $t_r$ / $t_f$ | Output Rise/Fall Times Q (20% - 80%) | 100 | | 260 | 100 | | 260 | 100 | | 260 | 100 | | 260 | ps |

1. Duty cycle skew is the difference between a $t_{PLH}$ and $t_{PHL}$ propagation delay through a device.
2. $V_{PP}$ is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40.
3. The $V_{CMR}$ range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between $V_{PP}$(min) and 1V.

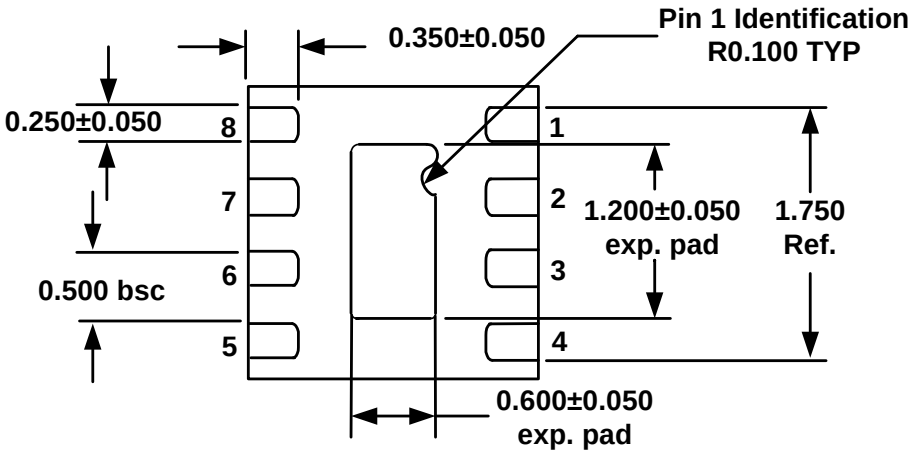



**Recommended Circuit for Single-Ended Input Limiting Applications**

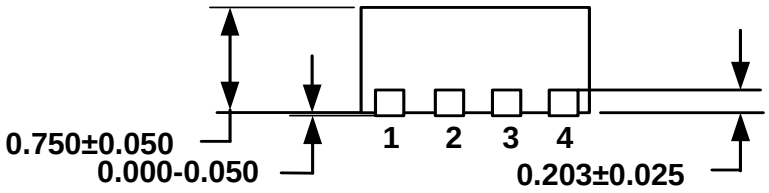
**PACKAGE DIAGRAM**
**MLP 8 2x2mm**




**TOP VIEW**




**BOTTOM VIEW**




**SIDE VIEW**

**Note: All dimensions are in mm**