

# AZ10EP16 AZ100EP16

## ECL/PECL Differential Receiver

### FEATURES

- Silicon-Germanium for High Speed Operation
- 150ps Typical Propagation Delay
- Internal Input Pulldown Resistors
- Functionally Equivalent to ON Semiconductor MC10EP16 & MC100EP16

### PACKAGE AVAILABILITY

| PACKAGE     | PART NO.     | MARKING    |
|-------------|--------------|------------|
| SOIC 8      | AZ10EP16D    | AZM10EP16  |
| SOIC 8 T&R  | AZ10EP16DR1  | AZM10EP16  |
| SOIC 8 T&R  | AZ10EP16DR2  | AZM10EP16  |
| SOIC 8      | AZ100EP16D   | AZM100EP16 |
| SOIC 8 T&R  | AZ100EP16DR1 | AZM100EP16 |
| SOIC 8 T&R  | AZ100EP16DR2 | AZM100EP16 |
| TSSOP 8     | AZ10EP16T    | AZTEP16    |
| TSSOP 8 T&R | AZ10EP16TR1  | AZTEP16    |
| TSSOP 8 T&R | AZ10EP16TR2  | AZTEP16    |
| TSSOP 8     | AZ100EP16T   | AZHEP16    |
| TSSOP 8 T&R | AZ100EP16TR1 | AZHEP16    |
| TSSOP 8 T&R | AZ100EP16TR2 | AZHEP16    |

### DESCRIPTION

The AZ10/100EP16 is a Silicon–Germanium (SiGe) differential receiver. The device is functionally equivalent to the AZ10/100EL16 device with higher performance capabilities. With output transition times significantly faster than the AZ10/100EL16, the EP16 is ideally suited for interfacing with high frequency sources.

The EP16 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/ $\bar{D}$  differential input pair. The input signal is then fed to the other D/ $\bar{D}$  input. The  $V_{BB}$  pin can support 1.5mA sink/source current. When used, the  $V_{BB}$  pin should be bypassed to ground via a 0.01 $\mu$ F capacitor.

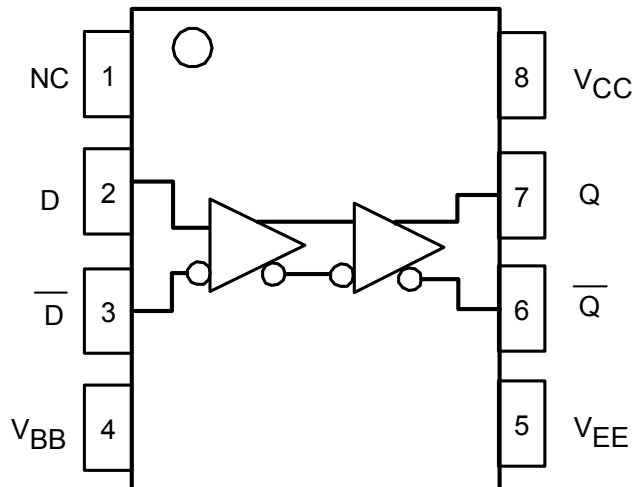
Under open input conditions internal input clamps will force the Q output LOW.

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

### LOGIC DIAGRAM AND PINOUT ASSIGNMENT

#### PIN DESCRIPTION

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



# AZ10EP16

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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 +4.5   | Vdc  |
| $V_I$     | PECL Input Voltage ( $V_{EE} = 0V$ )          | 0 to +4.5   | Vdc  |
| $V_{EE}$  | ECL Power Supply ( $V_{CC} = 0V$ )            | -4.5 to 0   | Vdc  |
| $V_I$     | ECL Input Voltage ( $V_{CC} = 0V$ )           | -4.5 to 0   | Vdc  |
| $I_{OUT}$ | Output Current<br>--- 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   |

### 10K ECL DC Characteristics ( $V_{EE} = -3.0V$ to $-3.6V$ , $V_{CC} = GND$ )

| 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 <sup>1</sup> | -1135     |      | -885  |       |     |       | -1070 | -945  | -820  | -1010 |     | -760  | mV   |
| $V_{OL}$ | Output LOW Voltage <sup>1</sup>  | -1935     |      | -1685 |       |     |       | -1870 | -1745 | -1620 | -1810 |     | -1560 | mV   |
| $V_{IH}$ | Input HIGH Voltage               | -1200     |      | -885  |       |     |       | -1150 |       | -820  | -1090 |     | -760  | mV   |
| $V_{IL}$ | Input LOW Voltage                | -1935     |      | -1530 |       |     |       | -1870 |       | -1450 | -1810 |     | -1410 | mV   |
| $V_{BB}$ | Reference Voltage                | -1430     |      | -1300 | -1380 |     | -1270 | -1350 |       | -1250 | -1310 |     | -1190 | mV   |
| $I_{IH}$ | Input HIGH Current               |           |      | 175   |       |     |       |       |       | 175   |       |     | 175   | μA   |
| $I_{IL}$ | Input LOW Current                |           |      |       |       |     |       |       |       |       |       |     |       | μA   |
|          |                                  | D         | 0.5  |       | 0.5   |     | 0.5   |       |       |       | 0.5   |     |       | μA   |
|          |                                  | $\bar{D}$ | -150 |       | -150  |     | -150  |       |       |       | -150  |     |       | μA   |
| $I_{EE}$ | Power Supply Current             | 20        | 25   | 33    | 21    | 26  | 34    | 21    | 27    | 35    | 23    | 29  | 37    | mA   |

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

### 10K 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 <sup>1,2</sup> | 2165      |      | 2415 |      |     |      | 2230 | 2355 | 2480 | 2290 |     | 2540 | mV   |
| $V_{OL}$ | Output LOW Voltage <sup>1,2</sup>  | 1365      |      | 1615 |      |     |      | 1430 | 1555 | 1680 | 1490 |     | 1740 | mV   |
| $V_{IH}$ | Input HIGH Voltage <sup>1</sup>    | 2100      |      | 2415 |      |     |      | 2035 |      | 2480 | 2210 |     | 2540 | mV   |
| $V_{IL}$ | Input LOW Voltage <sup>1</sup>     | 1365      |      | 1770 |      |     |      | 1430 |      | 1850 | 1490 |     | 1890 | mV   |
| $V_{BB}$ | Reference Voltage <sup>1</sup>     | 1870      |      | 2000 | 1920 |     | 2030 | 1950 |      | 2050 | 1990 |     | 2110 | mV   |
| $I_{IH}$ | Input HIGH Current                 |           |      | 175  |      |     |      |      |      | 175  |      |     | 175  | μA   |
| $I_{IL}$ | Input LOW Current                  |           |      |      |      |     |      |      |      |      |      |     |      | μA   |
|          |                                    | D         | 0.5  |      | 0.5  |     | 0.5  |      |      |      | 0.5  |     |      | μA   |
|          |                                    | $\bar{D}$ | -150 |      | -150 |     | -150 |      |      |      | -150 |     |      | μA   |
| $I_{EE}$ | Power Supply Current               | 20        | 25   | 33   | 21   | 26  | 34   | 21   | 27   | 35   | 23   | 29  | 37   | mA   |

1. For supply voltages other than 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 ECL DC Characteristics ( $V_{EE} = -3.0V$ to $-3.6V$ , $V_{CC} = GND$ )

| 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 <sup>1</sup> | -1085     |      | -880  | -1025 |     | -880  | -1025 | -955  | -880  | -1025 |     | -880  | mV   |
| $V_{OL}$ | Output LOW Voltage <sup>1</sup>  | -1830     |      | -1555 | -1810 |     | -1620 | -1810 | -1705 | -1620 | -1810 |     | -1620 | mV   |
| $V_{IH}$ | Input HIGH Voltage               | -1220     |      | -880  | -1160 |     | -880  | -1160 |       | -880  | -1160 |     | -880  | mV   |
| $V_{IL}$ | Input LOW Voltage                | -1830     |      | -1540 | -1810 |     | -1480 | -1810 |       | -1480 | -1810 |     | -1480 | mV   |
| $V_{BB}$ | Reference Voltage                | -1440     |      | -1320 | -1380 |     | -1260 | -1380 |       | -1260 | -1380 |     | -1260 | mV   |
| $I_{IH}$ | Input HIGH Current               |           |      | 175   |       |     |       |       |       | 175   |       |     | 175   | μA   |
| $I_{IL}$ | Input LOW Current                |           |      |       |       |     |       |       |       |       |       |     |       | μA   |
|          |                                  | D         | 0.5  |       | 0.5   |     | 0.5   |       |       |       | 0.5   |     |       | μA   |
|          |                                  | $\bar{D}$ | -150 |       | -150  |     | -150  |       |       |       | -150  |     |       | μA   |
| $I_{EE}$ | Power Supply Current             | 19        | 24   | 32    | 20    | 25  | 33    | 21    | 26    | 35    | 23    | 29  | 38    | mA   |

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

# AZ10EP16

## AZ100EP16

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

| 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 <sup>1,2</sup> | 2215  |      | 2420 | 2275 |     | 2420 | 2275 | 2345 | 2420 | 2275 |     | 2420 | mV            |
| $V_{OL}$ | Output LOW Voltage <sup>1,2</sup>  | 1470  |      | 1745 | 1490 |     | 1680 | 1490 | 1595 | 1680 | 1490 |     | 1680 | mV            |
| $V_{IH}$ | Input HIGH Voltage <sup>1</sup>    | 2080  |      | 2420 | 2140 |     | 2420 | 2140 |      | 2420 | 2140 |     | 2420 | mV            |
| $V_{IL}$ | Input LOW Voltage <sup>1</sup>     | 1470  |      | 1760 | 1490 |     | 1820 | 1490 |      | 1820 | 1490 |     | 1820 | mV            |
| $V_{BB}$ | Reference Voltage <sup>1</sup>     | 1860  |      | 1980 | 1920 |     | 2040 | 1920 |      | 2040 | 1920 |     | 2040 | mV            |
| $I_{IH}$ | Input HIGH Current                 |       |      | 175  |      |     | 175  |      |      | 175  |      |     | 175  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current                  | D     | 0.5  |      | 0.5  |     |      | 0.5  |      |      | 0.5  |     |      | $\mu\text{A}$ |
|          |                                    | D     | -150 |      | -150 |     |      | -150 |      |      | -150 |     |      |               |
| $I_{EE}$ | Power Supply Current               | 19    | 24   | 32   | 20   | 25  | 33   | 21   | 26   | 35   | 23   | 29  | 38   | mA            |

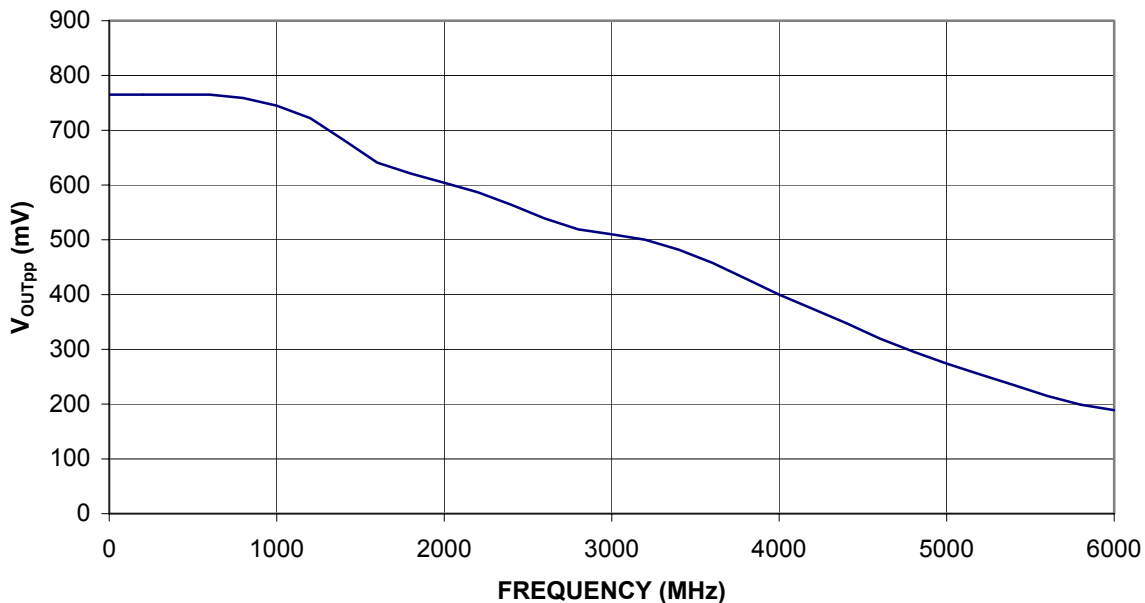
- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50 $\Omega$  resistor to  $V_{CC} - 2\text{V}$ .

### AC Characteristics ( $V_{EE} = -3.0$ to $-3.6\text{V}$ , $V_{CC} = \text{GND}$ or $V_{EE} = \text{GND}$ , $V_{CC} = +3.0\text{V}$ to $+3.6\text{V}$ )

| Symbol                            | Characteristic                        | -40°C          |     |          | 0°C            |     |          | 25°C           |     |          | 85°C           |     |          | Unit |
|-----------------------------------|---------------------------------------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|------|
|                                   |                                       | Min            | Typ | Max      | Min            | Typ | Max      | Min            | Typ | Max      | Min            | Typ | Max      |      |
| $f_{\text{max}}$                  | Maximum Toggle Frequency <sup>4</sup> |                | >4  |          |                | >4  |          |                | >4  |          |                | >4  |          | GHz  |
| $t_{\text{PLH}} / t_{\text{PHL}}$ | Input to Output Delay (DIFF)          | 100            | 160 | 240      | 100            | 160 | 240      | 100            | 160 | 240      | 120            | 190 | 280      | ps   |
| $t_{\text{SKEW}}$                 | Duty Cycle Skew <sup>1</sup> (Diff)   |                | 5   |          |                | 5   | 20       |                | 5   | 20       |                | 5   | 20       | ps   |
| $V_{\text{PP}}(\text{AC})$        | Minimum Input Swing <sup>2</sup>      | 150            |     |          | 150            |     |          | 150            |     |          | 150            |     |          | mV   |
| $V_{\text{CMR}}$                  | Common Mode Range <sup>3</sup>        | $V_{EE} + 2.0$ |     | $V_{CC}$ | $V_{EE} + 2.0$ |     | $V_{CC}$ | $V_{EE} + 2.0$ |     | $V_{CC}$ | $V_{EE} + 2.0$ |     | $V_{CC}$ | V    |
| $t_r / t_f$                       | Output Rise/Fall Times Q (20% - 80%)  |                | 120 | 170      |                | 130 | 180      |                | 130 | 180      |                | 150 | 200      | ps   |

- Duty cycle skew is the difference between a  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  propagation delay through a device.
- $V_{\text{PP}}$  is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed.
- The  $V_{\text{CMR}}$  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  $V_{\text{PP}}(\text{min})$  and 1V.
- See Graph Below.

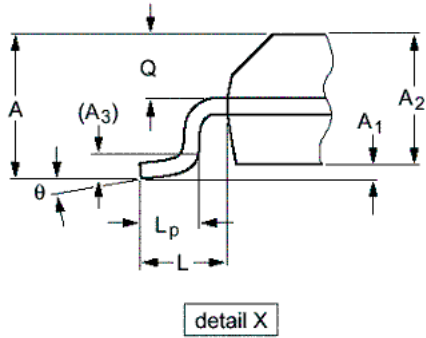
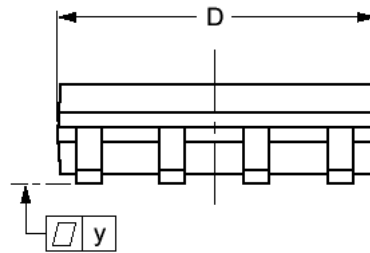
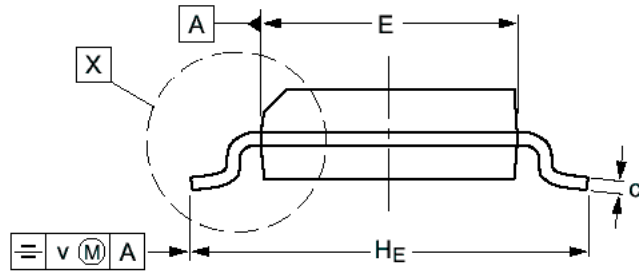
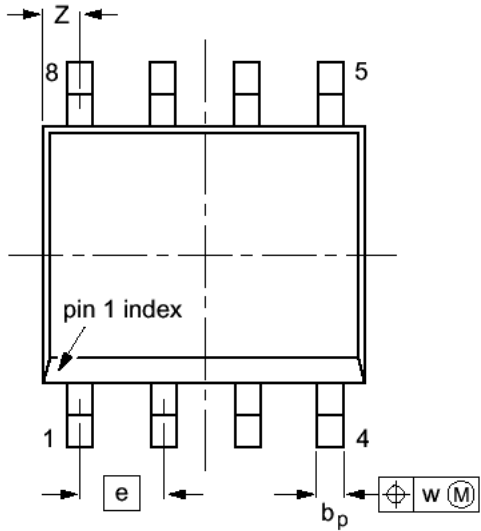
### Large Signal Performance\*



\*Measured using a 750mV differential input source at 50% duty cycle.

AZ10EP16  
AZ100EP16

**PACKAGE DIAGRAM  
SOIC 8**



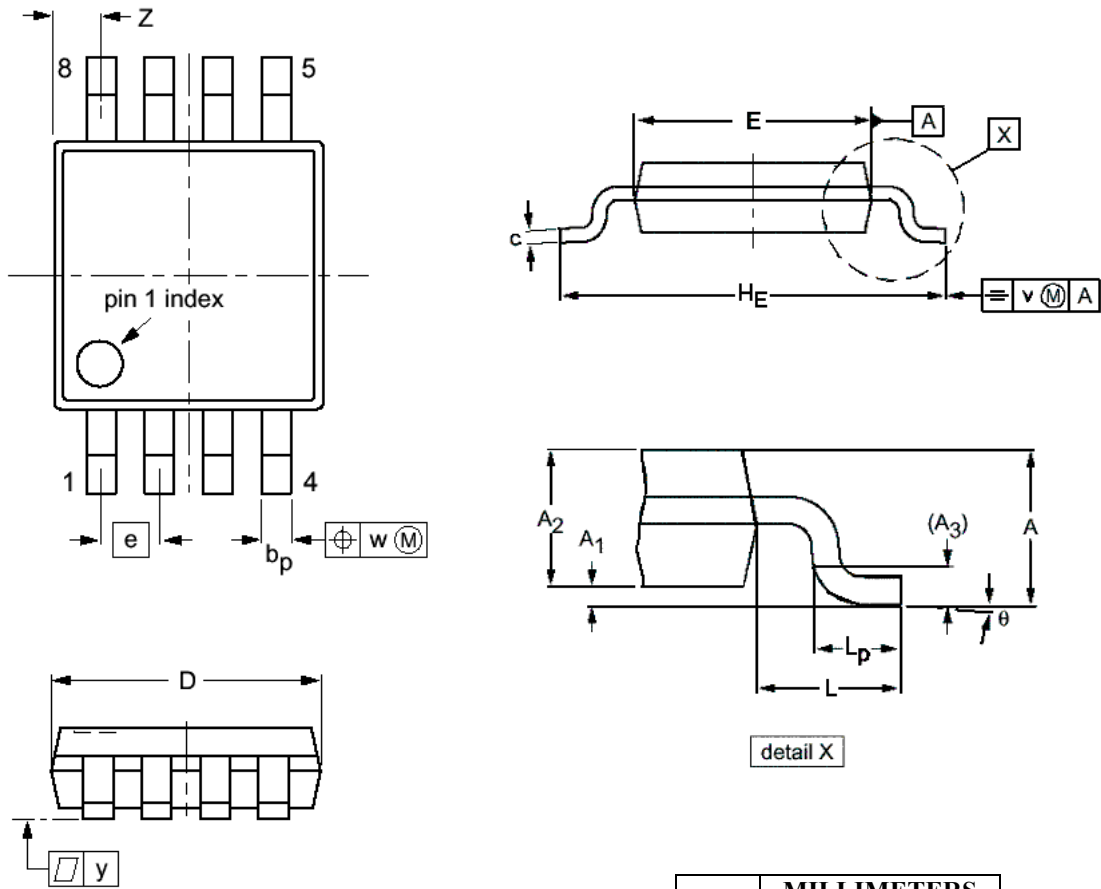
| DIM            | MILLIMETERS |      | INCHES |        |
|----------------|-------------|------|--------|--------|
|                | MIN         | MAX  | MIN    | MAX    |
| A              |             | 1.75 |        | 0.069  |
| A <sub>1</sub> | 0.10        | 0.25 | 0.004  | 0.010  |
| A <sub>2</sub> | 1.25        | 1.45 | 0.049  | 0.057  |
| A <sub>3</sub> | 0.25        |      | 0.01   |        |
| b <sub>p</sub> | 0.36        | 0.49 | 0.014  | 0.019  |
| c              | 0.19        | 0.25 | 0.0075 | 0.0100 |
| D              | 4.8         | 5.0  | 0.19   | 0.20   |
| E              | 3.8         | 4.0  | 0.15   | 0.16   |
| e              | 1.27        |      | 0.050  |        |
| H <sub>E</sub> | 5.80        | 6.20 | 0.228  | 0.244  |
| L              | 1.05        |      | 0.041  |        |
| L <sub>p</sub> | 0.40        | 1.00 | 0.016  | 0.039  |
| Q              | 0.60        | 0.70 | 0.024  | 0.028  |
| v              | 0.25        |      | 0.01   |        |
| w              | 0.25        |      | 0.01   |        |
| y              | 0.10        |      | 0.004  |        |
| Z              | 0.30        | 0.70 | 0.012  | 0.028  |
| θ              | 0°          | 8°   | 0°     | 8°     |

NOTES:

1. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
2. MAXIMUM MOLD PROTRUSION FOR D IS 0.15mm.
3. MAXIMUM MOLD PROTRUSION FOR E IS 0.25mm.

AZ10EP16  
AZ100EP16

**PACKAGE DIAGRAM  
TSSOP 8**



- NOTES:
1. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
  2. MAXIMUM MOLD PROTRUSION FOR D IS 0.15mm.
  3. MAXIMUM MOLD PROTRUSION FOR E IS 0.25mm.

| DIM            | MILLIMETERS |      |
|----------------|-------------|------|
|                | MIN         | MAX  |
| A              |             | 1.10 |
| A <sub>1</sub> | 0.05        | 0.15 |
| A <sub>2</sub> | 0.80        | 0.95 |
| A <sub>3</sub> | 0.25        |      |
| b <sub>p</sub> | 0.25        | 0.45 |
| c              | 0.15        | 0.28 |
| D              | 2.90        | 3.10 |
| E              | 2.90        | 3.10 |
| e              | 0.65        |      |
| H <sub>E</sub> | 4.70        | 5.10 |
| L              | 0.94        |      |
| L <sub>p</sub> | 0.40        | 0.70 |
| v              | 0.10        |      |
| w              | 0.10        |      |
| y              | 0.10        |      |
| Z              | 0.35        | 0.70 |
| θ              | 0°          | 6°   |

**AZ10EP16**  
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