

AZ100EL16VS

ECL/PECL Differential Receiver with Variable Output Swing

FEATURES

- 250ps Propagation Delay
- High Bandwidth Output Transitions
- 75k Ω Internal Input Pulldown Resistors
- Functionally Equivalent to ON Semiconductor MC100EL16
- Variable Output Swing
- Available in a 3x3mm MLP Package

PACKAGE AVAILABILITY

| PACKAGE | PART NO. | MARKING |
|-------------|----------------|--------------|
| MLP 8 | AZ100EL16VSL | AZM16P |
| MLP 8 T&R | AZ100EL16VSLR1 | AZM16P |
| MLP 8 T&R | AZ100EL16VSLR2 | AZM16P |
| SOIC 8 | AZ100EL16VSD | AZM100EL16VS |
| SOIC 8 T&R | AZ100EL16VSDR1 | AZM100EL16VS |
| SOIC 8 T&R | AZ100EL16VSDR2 | AZM100EL16VS |
| TSSOP 8 | AZ100EL16VST | AZH16VS |
| TSSOP 8 T&R | AZ100EL16VSTR1 | AZH16VS |
| TSSOP 8 T&R | AZ100EL16VSTR2 | AZH16VS |

DESCRIPTION

The AZ100EL16VS is a differential receiver with variable output swing. The EL16VS has functionality and output transition times similar to the EL16, with an input that controls the amplitude of the Q/Q outputs. Maximum swing is achieved by leaving the V_{CTRL} pin open or tied to V_{EE} .

The operational range of the EL16VS control input, V_{CTRL} , is from V_{BB} (full swing) to V_{CC} (min. swing). Simple control of the output swing can be obtained by a variable resistor between the V_{BB} and V_{CC} pins, with the wiper driving V_{CTRL} . Typical application circuits and results are described in this Data Sheet.

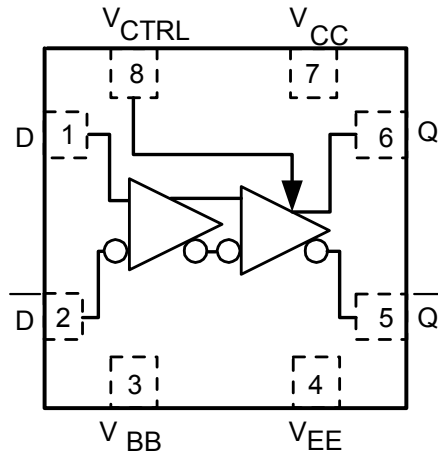
The EL16VS provides a V_{BB} output for single-ended use or a DC bias reference for AC coupling to the device. For single-ended input applications, the V_{BB} reference should be connected to one side of the D/D differential input pair. The input signal is then fed to the other D/D input. The V_{BB} pin can support 1.0mA sink/source current. When used, the V_{BB} pin should be bypassed to ground via a 0.01 μ F capacitor.

Under open input conditions (pulled to V_{EE}) internal input clamps will force the Q output LOW.

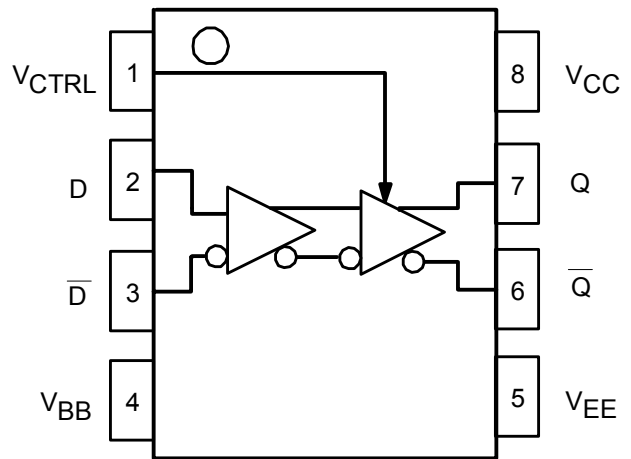
NOTE: Specifications in ECL/PECL tables are valid when thermal equilibrium is established.

AZ100EL16VS

LOGIC DIAGRAM AND PINOUT ASSIGNMENT



8 MLP (TOP VIEW)



8 SOIC & 8 TSSOP

PIN DESCRIPTION

| PIN | FUNCTION |
|--------------|--------------------------|
| D, \bar{D} | Data Inputs |
| V_{CTRL} | Output Swing Control |
| Q, \bar{Q} | Data Outputs |
| V_{BB} | Reference Voltage Output |
| V_{CC} | Positive Supply |

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 --- Surge | 50 100 | mA |
| T_A | Operating Temperature Range | -40 to +85 | °C |
| T_{STG} | Storage Temperature Range | -65 to +150 | °C |

100K ECL DC Characteristics ($V_{EE} = -4.2V$ to $-5.5V$, $V_{CC} = GND$; $V_{CTRL} = V_{BB}$)

| Symbol | Characteristic | -40°C | | 0°C | | 25°C | | 85°C | | Unit | | | | |
|----------|---|-------|-----|-----------|-------|-----------|-------|-------|-----------|-------|-----------|----|----|----|
| | | Min | Typ | Min | Typ | Min | Typ | Min | Typ | | | | | |
| V_{OH} | Output HIGH Voltage ² | -1085 | | -880 | -1025 | -880 | -1025 | -955 | -880 | -1025 | -880 | mV | | |
| V_{OL} | Output LOW Voltage ² $V_{CTRL} = V_{BB}$ ¹ | -1890 | | -1620 | -1870 | -1680 | -1870 | -1775 | -1680 | -1870 | -1680 | mV | | |
| V_{OL} | Output LOW Voltage ² $V_{CTRL} = V_{CC}$ | -1180 | | -975 | -1135 | -990 | -1135 | -1065 | -990 | -1135 | -990 | 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 | -1420 | | -1260 | -1420 | -1260 | -1420 | | -1260 | -1420 | -1260 | mV | | |
| I_{IH} | Input HIGH Current D, \bar{D} V_{CTRL} | | | 150 40 | | 150 40 | | | 150 40 | | 150 40 | μA | | |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | 0.5 | | | 0.5 | | μA | | |
| I_{EE} | Power Supply Current | | 18 | 25 | | 18 | 25 | | 18 | 25 | | 21 | 26 | mA |

- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{REF}$: Max only) limits.
- Each output is terminated through a 50Ω resistor to $V_{CC} - 2V$.

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

| 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 ^{1,3} | 3915 | | 4120 | 3975 | | 4120 | 3975 | 4045 | 4120 | 3975 | | 4120 | mV |
| V_{OL} | Output LOW Voltage ^{1,3} $V_{CTRL} = V_{BB}$ | 3110 | | 3380 | 3130 | | 3320 | 3130 | 3225 | 3320 | 3130 | | 3320 | mV |
| V_{OL} | Output LOW Voltage ^{1,3} $V_{CTRL} = V_{CC}$ | 3820 | | 4025 | 3865 | | 4010 | 3865 | 3935 | 4010 | 3865 | | 4010 | 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 | 3580 | | 3740 | 3580 | | 3740 | 3580 | | 3740 | 3580 | | 3740 | mV |
| I_{IH} | Input HIGH Current D, \bar{D} V_{CTRL} | | | 150 40 | | | 150 40 | | | 150 40 | | | 150 40 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | | | μA |
| I_{EE} | Power Supply Current | | 18 | 25 | | 18 | 25 | | 18 | 25 | | 21 | 26 | mA |

- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{REF}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

AC Characteristics ($V_{EE} = -4.2\text{V}$ to -5.5V ; $V_{CC} = \text{GND}$ or $V_{EE} = \text{GND}$; $V_{CC} = +4.2\text{V}$ to $+5.5\text{V}$)

| Symbol | Characteristic | -40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|---------------------|---|----------------|------------|----------------|----------------|------------|----------------|----------------|------------|----------------|----------------|------------|----------------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| t_{PLH} / t_{PHL} | Input to Output Delay (Diff) (SE) | | 250 250 | | 175 125 | 250 250 | 325 375 | 175 125 | 250 250 | 325 375 | 205 155 | 280 280 | 355 405 | ps |
| t_{SKEW} | Duty Cycle Skew ¹ (Diff) | | 5 | | | 5 | 20 | | 5 | 20 | | 5 | 20 | ps |
| $V_{PP}(\text{AC})$ | Minimum Input Swing ² | 150 | | | 150 | | | 150 | | | 150 | | | mV |
| V_{CMR} | Common Mode Range ³ | $V_{CC} - 2.0$ | | $V_{CC} - 0.4$ | $V_{CC} - 2.0$ | | $V_{CC} - 0.4$ | $V_{CC} - 2.0$ | | $V_{CC} - 0.4$ | $V_{CC} - 2.0$ | | $V_{CC} - 0.4$ | V |
| t_r / t_f | Rise/Fall Time 20 – 80% | 100 | | 350 | 100 | | 350 | 100 | | 350 | 100 | | 350 | ps |

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

Typical Voltage Output Swing at +25C, V_{EE} Nom (see Figure 1 and Figure 2)

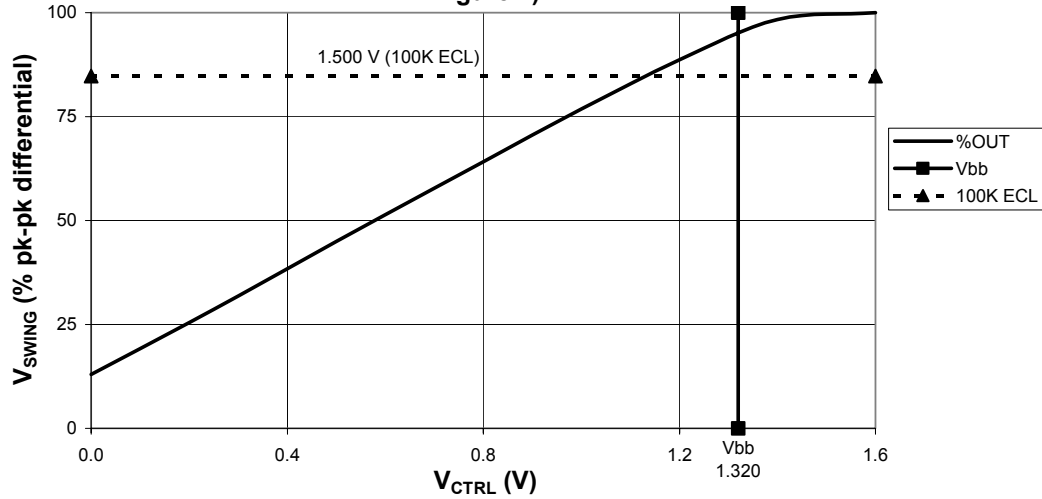


Figure 1: Voltage Source Implementation

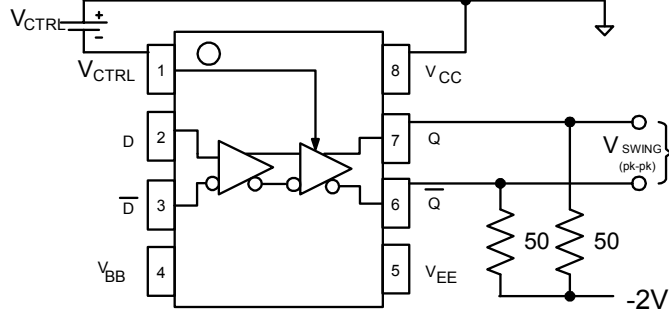
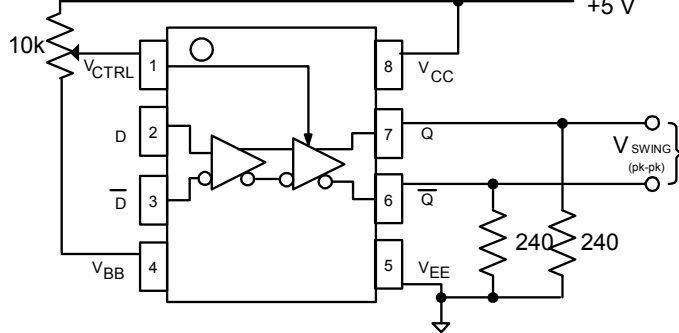
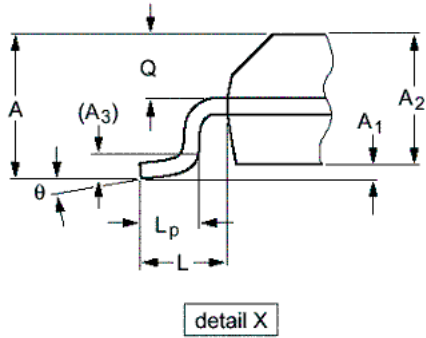
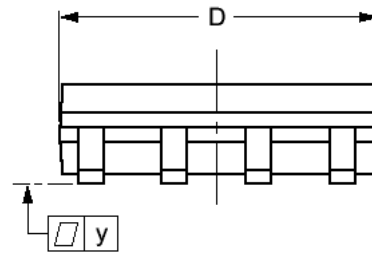
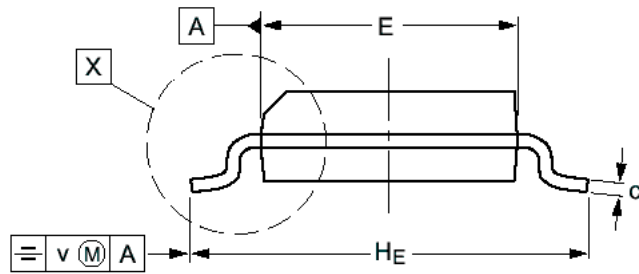
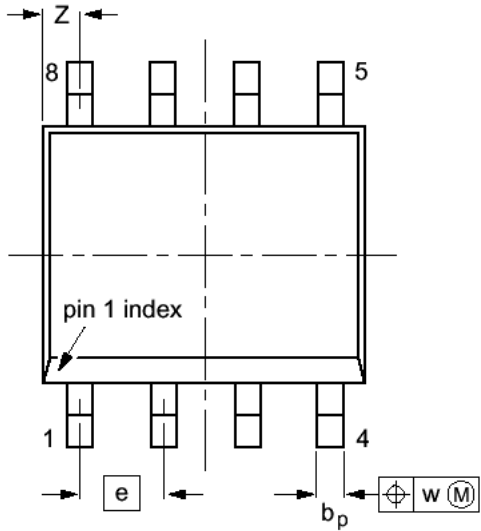


Figure 2: Alternative Implementation



**PACKAGE DIAGRAM
SOIC 8**

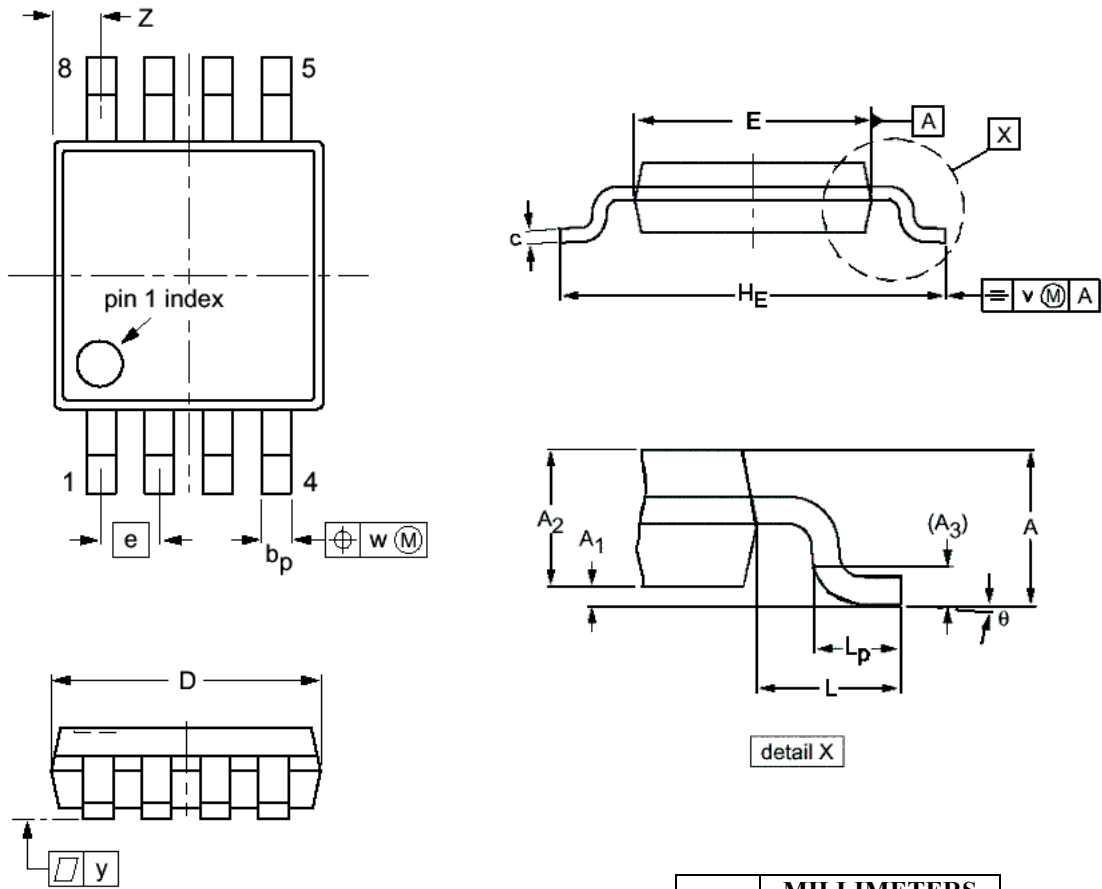


| DIM | MILLIMETERS | | INCHES | |
|----------------|----------------|----------------|----------------|----------------|
| | MIN | MAX | MIN | MAX |
| A | 12.32 | 12.57 | 0.485 | 0.495 |
| A ₁ | 0.10 | 0.25 | 0.004 | 0.010 |
| A ₂ | 1.25 | 1.45 | 0.049 | 0.057 |
| A ₃ | 0.25 | | 0.01 | |
| b _p | 0.36 | 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 _E | 5.80 | 6.20 | 0.228 | 0.244 |
| L | 1.05 | | 0.041 | |
| L _p | 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 ^o | 8 ^o | 0 ^o | 8 ^o |

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.

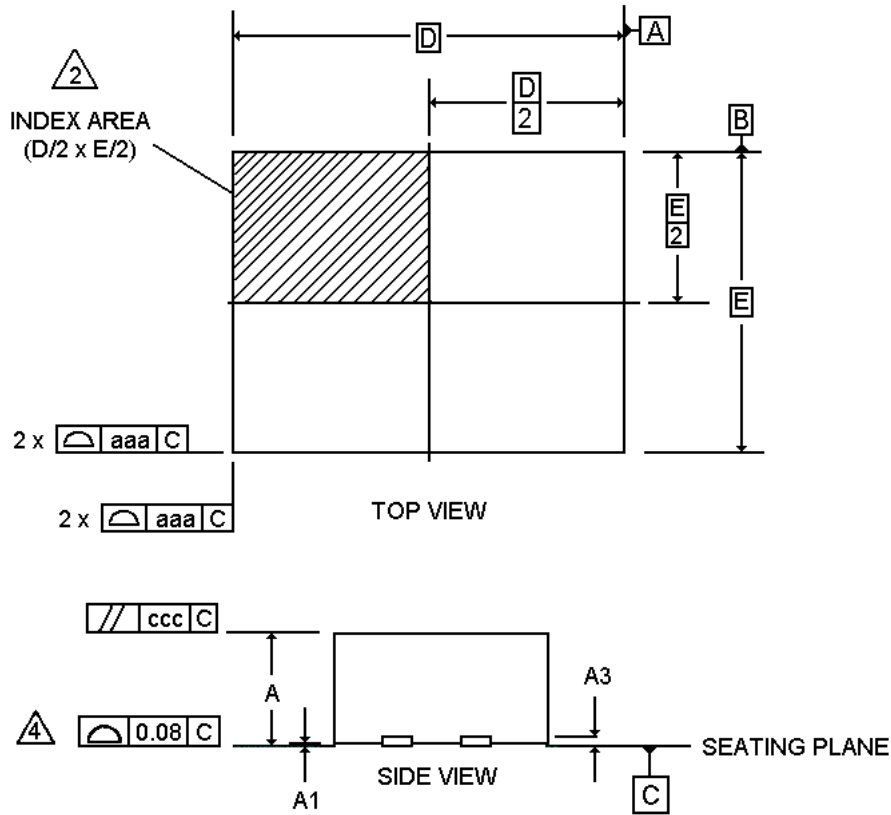
**PACKAGE DIAGRAM
TSSOP 8**



- 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 ₁ | 0.05 | 0.15 |
| A ₂ | 0.80 | 0.95 |
| A ₃ | 0.25 | |
| b _p | 0.25 | 0.45 |
| c | 0.15 | 0.28 |
| D | 2.90 | 3.10 |
| E | 2.90 | 3.10 |
| e | 0.65 | |
| H _E | 4.70 | 5.10 |
| L | 0.94 | |
| L _p | 0.40 | 0.70 |
| v | 0.10 | |
| w | 0.10 | |
| y | 0.10 | |
| Z | 0.35 | 0.70 |
| θ | 0° | 6° |

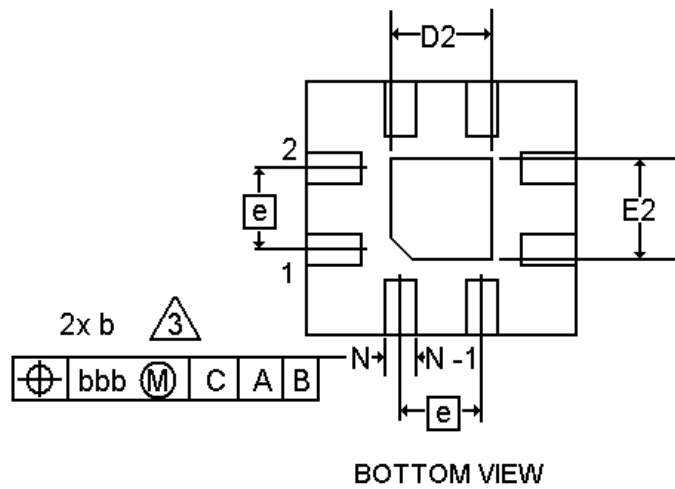
**PACKAGE DIAGRAM
MLP 8**



NOTES

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME T14-1994.
2. THE TERMINAL #1 AND PAD NUMBERING CONVENTION SHALL CONFORM TO JESD 95-1 SPP-012.
3. DIMENSION *b* APPLIES TO METALLIZED PAD AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM PAD TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS | |
|----------|-------------|------|
| | MIN | MAX |
| A | 0.80 | 1.00 |
| A1 | 0.00 | 0.05 |
| A3 | 0.25 REF | |
| <i>b</i> | 0.30 | 0.35 |
| D | 2.90 | 3.10 |
| D2 | 1.65 | 1.95 |
| E | 2.90 | 3.10 |
| E2 | 1.65 | 1.95 |
| <i>e</i> | 0.65 BSC | |
| L | 0.35 | 0.45 |
| aaa | 0.25 | |
| bbb | 0.10 | |
| ccc | 0.10 | |



AZ100EL16VS

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