

# AZ100LVEL16VR

## ECL/PECL Oscillator Gain Stage & Buffer with Selectable Enable

### FEATURES

- High Bandwidth for  $\geq 1\text{GHz}$
- Similar Operation as AZ100EL16VO
- Operating Range of 3.0V to 5.5V
- Minimizes External Components
- Selectable Enable Polarity and Threshold (CMOS/TTL or PECL)
- Available in a 3x3mm MLP Package

### PACKAGE AVAILABILITY

| PACKAGE    | PART NO.         | MARKING |
|------------|------------------|---------|
| MLP 16     | AZ100LVEL16VRL   | AZM16R  |
| MLP 16 T&R | AZ100LVEL16VRLR1 | AZM16R  |
| MLP 16 T&R | AZ100LVEL16VRLR2 | AZM16R  |
| DIE        | AZ100LVEL16VRX   | N/A     |

### DESCRIPTION

The AZ100LVEL16VR is a specialized oscillator gain stage with high gain output buffer including an enable. The  $Q_{HG}/\bar{Q}_{HG}$  outputs have a voltage gain several times greater than the  $Q/\bar{Q}$  outputs.

The AZ100LVEL16VR provides a selectable enable that allows continuous oscillator operation. See truth table below for enable function. If Enable pull-up is desired in the CMOS mode, an external  $\leq 20\text{k}\Omega$  resistor connecting EN to  $V_{CC}$  will override the on-chip pull-down resistor. The AZ100LVEL16VR also provides a  $V_{BB}$  and  $470\Omega$  internal bias resistors from D to  $V_{BB}$  and  $\bar{D}$  to  $V_{BB}$ . The  $V_{BB}$  pin can support 1.5mA sink/source current. Bypassing  $V_{BB}$  to ground with a  $0.01\ \mu\text{F}$  capacitor is recommended.

Outputs  $Q/\bar{Q}$  each have a selectable on-chip pull-down current source. See truth table below for current source functions. External resistors may also be used to increase pull-down current to a maximum total of 25mA.

Outputs  $Q_{HG}/\bar{Q}_{HG}$  each have an optional on-chip pull-down current source of 10mA. When pad/pin  $V_{EEP}$  is left open (NC), the output current sources are disabled and the  $Q_{HG}/\bar{Q}_{HG}$  operate as standard PECL/ECL. When  $V_{EEP}$  is connected to  $V_{EE}$ , the current sources are activated. The  $Q_{HG}/\bar{Q}_{HG}$  pull-down current can be decreased, by using a resistor to connect from  $V_{EEP}$  to  $V_{EE}$ .

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

# AZ100LVEL16VR

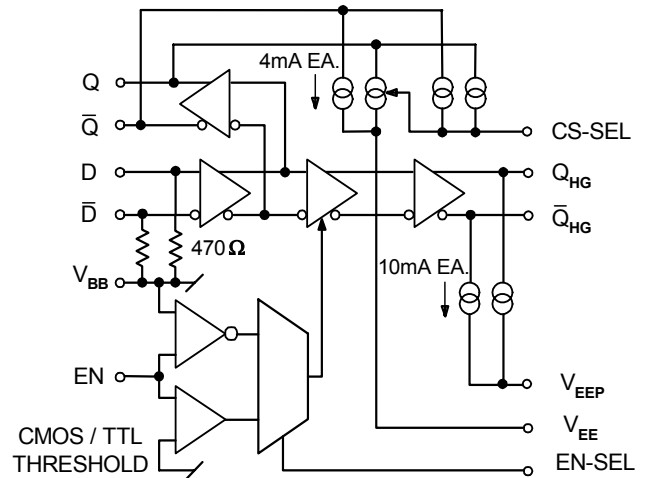
## ENABLE TRUTH TABLE

| EN-SEL            | EN                                | Q/Q̄ | Q <sub>HG</sub> | Q̄ <sub>HG</sub> |
|-------------------|-----------------------------------|------|-----------------|------------------|
| NC                | PECL Low, V <sub>EE</sub> or NC   | Data | Data            | Data             |
| NC                | PECL High or V <sub>CC</sub>      | Data | Low             | High             |
| V <sub>EE</sub> * | CMOS Low or V <sub>EE</sub>       | Data | Low             | High             |
| V <sub>EE</sub> * | CMOS High or V <sub>CC</sub>      | Data | Data            | Data             |
| V <sub>EE</sub>   | NC, no external pull-up           | Data | Low             | High             |
| V <sub>EE</sub>   | NC, with ≤20kΩ to V <sub>CC</sub> | Data | Data            | Data             |

\*Connections to V<sub>CC</sub> or V<sub>EE</sub> must be less than 1Ω.

## PIN DESCRIPTION

| PIN                               | FUNCTION  |
|-----------------------------------|---|
| D/D̄                              | Data Inputs   |
| Q/Q̄                              | Data Outputs  |
| Q <sub>HG</sub> /Q̄ <sub>HG</sub> | Data Outputs w/High Gain                                      |
| V <sub>BB</sub>                   | Reference Voltage Output                                      |
| EN-SEL                            | Selects Enable Logic  |
| EN                                | Enable Input  |
| CS-SEL                            | Selects Q and Q̄ Current Source Magnitude                     |
| V <sub>EEP</sub>                  | Optional Q <sub>HG</sub> and Q̄ <sub>HG</sub> Current Sources |
| V <sub>EE</sub>                   | Negative Supply   |
| V <sub>CC</sub>                   | Positive Supply   |



## CURRENT SOURCE TRUTH TABLE

| CS-SEL            | Q        | Q̄       |
|-------------------|----------|----------|
| NC                | 4mA typ. | 4mA typ. |
| V <sub>EE</sub> * | 8mA typ. | 8mA typ. |
| V <sub>CC</sub> * | 0        | 4mA typ. |

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

| Symbol           | Characteristic                                | Rating      | Unit |
|------------------|---|-------------|------|
| V <sub>CC</sub>  | PECL Power Supply (V <sub>EE</sub> = 0V)      | 0 to +8.0   | Vdc  |
| V <sub>I</sub>   | PECL Input Voltage (V <sub>EE</sub> = 0V)     | 0 to +6.0   | Vdc  |
| V <sub>EE</sub>  | ECL Power Supply (V <sub>CC</sub> = 0V)       | -8.0 to 0   | Vdc  |
| V <sub>I</sub>   | ECL Input Voltage (V <sub>CC</sub> = 0V)      | -6.0 to 0   | Vdc  |
| I <sub>OUT</sub> | Output Current<br>--- Continuous<br>--- Surge | 50<br>100   | mA   |
| T <sub>A</sub>   | Operating Temperature Range                   | -40 to +85  | °C   |
| T <sub>STG</sub> | Storage Temperature Range                     | -65 to +150 | °C   |

## 100K ECL DC Characteristics (V<sub>EE</sub> = -3.0V to -5.5V, V<sub>CC</sub> = GND)

| Symbol          | Characteristic                     | -40°C                          |                                | 0°C                            |                                | 25°C                           |                                | 85°C                           |                                | Unit |
|-----------------|------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|------|
|                 |                                    | Min                            | Max                            | Min                            | Max                            | Min                            | Max                            | Min                            | Max                            |      |
| V <sub>OH</sub> | Output HIGH Voltage <sup>2</sup>   | -1045                          | -835                           | -995                           | -835                           | -995                           | -835                           | -995                           | -835                           | mV   |
| V <sub>OL</sub> | Output LOW Voltage <sup>2</sup>    | -1925                          | -1555                          | -1900                          | -1620                          | -1900                          | -1620                          | -1900                          | -1620                          | mV   |
| V <sub>IH</sub> | Input HIGH Voltage                 |                                |                                |                                |                                |                                |                                |                                |                                |      |
|                 | D/D̄, EN (PECL)<br>EN (CMOS/TTL)   | -1165<br>V <sub>EE</sub> +2000 | -880<br>V <sub>CC</sub>        | -1165<br>V <sub>EE</sub> +2000 | -880<br>V <sub>CC</sub>        | -1165<br>V <sub>EE</sub> +2000 | -880<br>V <sub>CC</sub>        | -1165<br>V <sub>EE</sub> +2000 | -880<br>V <sub>CC</sub>        | mV   |
| V <sub>IL</sub> | Input LOW Voltage                  |                                |                                |                                |                                |                                |                                |                                |                                |      |
|                 | D/D̄, EN (PECL)<br>EN (CMOS/TTL)   | -1810<br>V <sub>EE</sub>       | -1475<br>V <sub>EE</sub> + 800 | -1810<br>V <sub>EE</sub>       | -1475<br>V <sub>EE</sub> + 800 | -1810<br>V <sub>EE</sub>       | -1475<br>V <sub>EE</sub> + 800 | -1810<br>V <sub>EE</sub>       | -1475<br>V <sub>EE</sub> + 800 | mV   |
| V <sub>BB</sub> | Reference Voltage                  | -1390                          | -1250                          | -1390                          | -1250                          | -1390                          | -1250                          | -1390                          | -1250                          | mV   |
| I <sub>IL</sub> | Input LOW Current EN <sup>3</sup>  | 0.5                            |                                | 0.5                            |                                | 0.5                            |                                | 0.5                            |                                | μA   |
| I <sub>IH</sub> | Input HIGH Current EN <sup>3</sup> |                                | 150                            |                                | 150                            |                                | 150                            |                                | 150                            | μA   |
| I <sub>EE</sub> | Power Supply Current <sup>1</sup>  |                                | 48                             |                                | 48                             |                                | 48                             |                                | 54                             | mA   |

1. Specified with V<sub>EEP</sub> and CS-SEL open.
2. Specified with V<sub>EEP</sub> and CS-SEL connected to V<sub>EE</sub>.
3. Specified with EN-SEL open.

# AZ100LVEL16VR

## 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          | Max              | Min          | Max              | Min          | Max              | Min          | Max              |               |
| $V_{OH}$ | Output HIGH Voltage <sup>1,3</sup>           | 2255         | 2465             | 2305         | 2465             | 2305         | 2465             | 2305         | 2465             | mV            |
| $V_{OL}$ | Output LOW Voltage <sup>1,3</sup>            | 1375         | 1745             | 1400         | 1655             | 1480         | 1680             | 1400         | 1680             | mV            |
| $V_{IH}$ | Input HIGH Voltage                           |              |                  |              |                  |              |                  |              |                  |               |
|          | D/D, EN (PECL) <sup>1</sup><br>EN (CMOS/TTL) | 2135<br>2000 | 2420<br>$V_{CC}$ | 2135<br>2000 | 2420<br>$V_{CC}$ | 2135<br>2000 | 2420<br>$V_{CC}$ | 2135<br>2000 | 2420<br>$V_{CC}$ | mV            |
| $V_{IL}$ | Input LOW Voltage                            |              |                  |              |                  |              |                  |              |                  |               |
|          | D/D, EN (PECL) <sup>1</sup><br>EN (CMOS/TTL) | 1490<br>GND  | 1825<br>800      | 1490<br>GND  | 1825<br>800      | 1490<br>GND  | 1825<br>800      | 1490<br>GND  | 1825<br>800      | mV            |
| $V_{BB}$ | Reference Voltage <sup>1</sup>               | 1910         | 2050             | 1910         | 2050             | 1910         | 2050             | 1910         | 2050             | mV            |
| $I_{IL}$ | Input LOW Current EN <sup>4</sup>            | 0.5          |                  | 0.5          |                  | 0.5          |                  | 0.5          |                  | $\mu\text{A}$ |
| $I_{IH}$ | Input HIGH Current EN <sup>4</sup>           |              | 150              |              | 150              |              | 150              |              | 150              | $\mu\text{A}$ |
| $I_{EE}$ | Power Supply Current <sup>2</sup>            |              | 48               |              | 48               |              | 48               |              | 54               | mA            |

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Specified with  $V_{EEP}$  and CS-SEL open.
- Specified with  $V_{EEP}$  and CS-SEL connected to  $V_{EE}$ .
- Specified with EN-SEL open.

## 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          | Max              | Min          | Max              | Min          | Max              | Min          | Max              |               |
| $V_{OH}$ | Output HIGH Voltage <sup>1,3</sup>           | 3955         | 4165             | 4005         | 4165             | 4005         | 4165             | 4005         | 4165             | mV            |
| $V_{OL}$ | Output LOW Voltage <sup>1,3</sup>            | 3075         | 3445             | 3100         | 3338             | 3100         | 3338             | 3100         | 3338             | mV            |
| $V_{IH}$ | Input HIGH Voltage                           |              |                  |              |                  |              |                  |              |                  |               |
|          | D/D, EN (PECL) <sup>1</sup><br>EN (CMOS/TTL) | 3835<br>2000 | 4120<br>$V_{CC}$ | 3835<br>2000 | 4120<br>$V_{CC}$ | 3835<br>2000 | 4120<br>$V_{CC}$ | 3835<br>2000 | 4120<br>$V_{CC}$ | mV            |
| $V_{IL}$ | Input LOW Voltage                            |              |                  |              |                  |              |                  |              |                  |               |
|          | D/D, EN (PECL) <sup>1</sup><br>EN (CMOS/TTL) | 3190<br>GND  | 3525<br>800      | 3190<br>GND  | 3525<br>800      | 3190<br>GND  | 3525<br>800      | 3190<br>GND  | 3525<br>800      | mV            |
| $V_{BB}$ | Reference Voltage <sup>1</sup>               | 3610         | 3750             | 3610         | 3750             | 3610         | 3750             | 3610         | 3750             | mV            |
| $I_{IL}$ | Input LOW Current EN <sup>4</sup>            | 0.5          |                  | 0.5          |                  | 0.5          |                  | 0.5          |                  | $\mu\text{A}$ |
| $I_{IH}$ | Input HIGH Current EN <sup>4</sup>           |              | 150              |              | 150              |              | 150              |              | 150              | $\mu\text{A}$ |
| $I_{EE}$ | Power Supply Current <sup>2</sup>            |              | 48               |              | 48               |              | 48               |              | 54               | mA            |

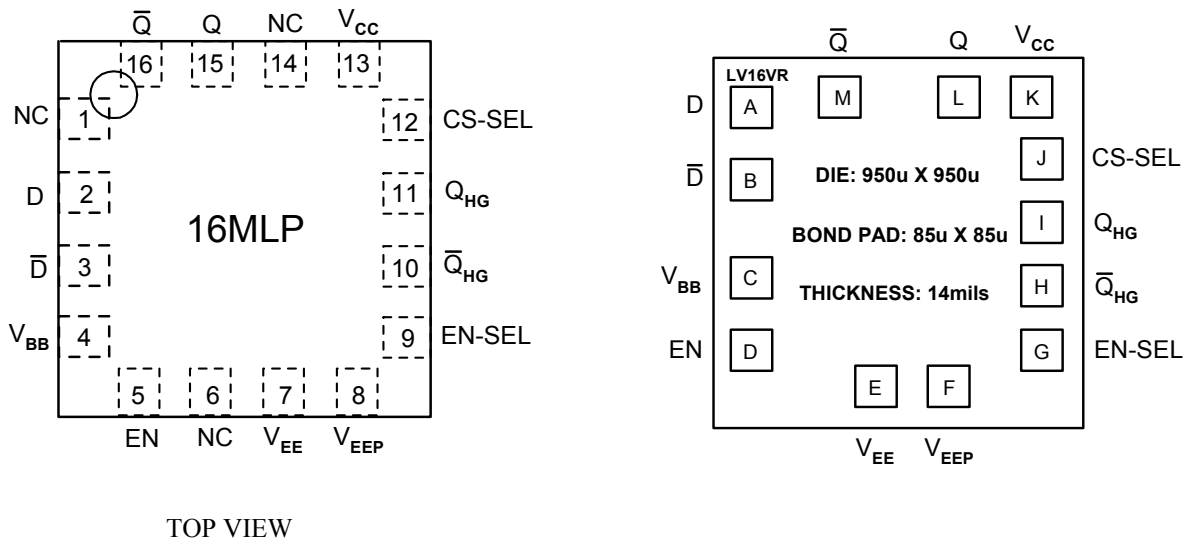
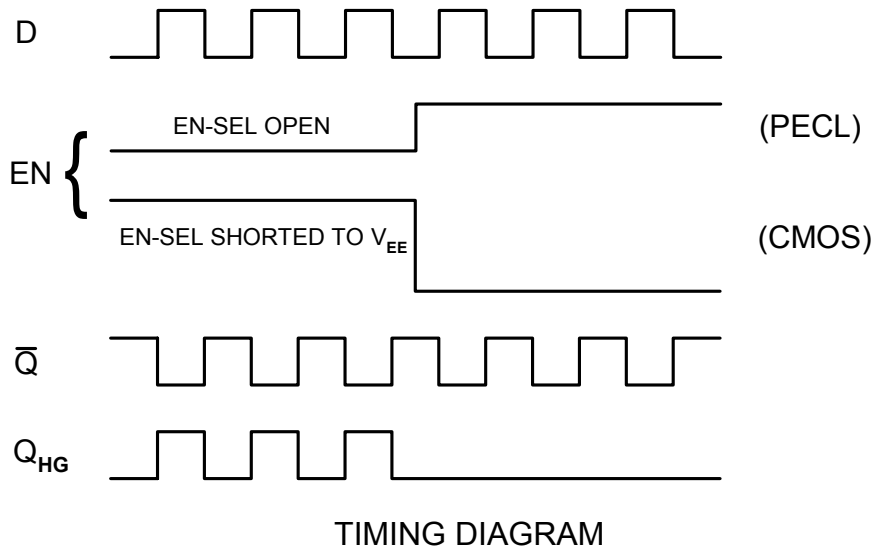
- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- Specified with  $V_{EEP}$  and CS-SEL open.
- Specified with  $V_{EEP}$  and CS-SEL connected to  $V_{EE}$ .
- Specified with EN-SEL open.

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

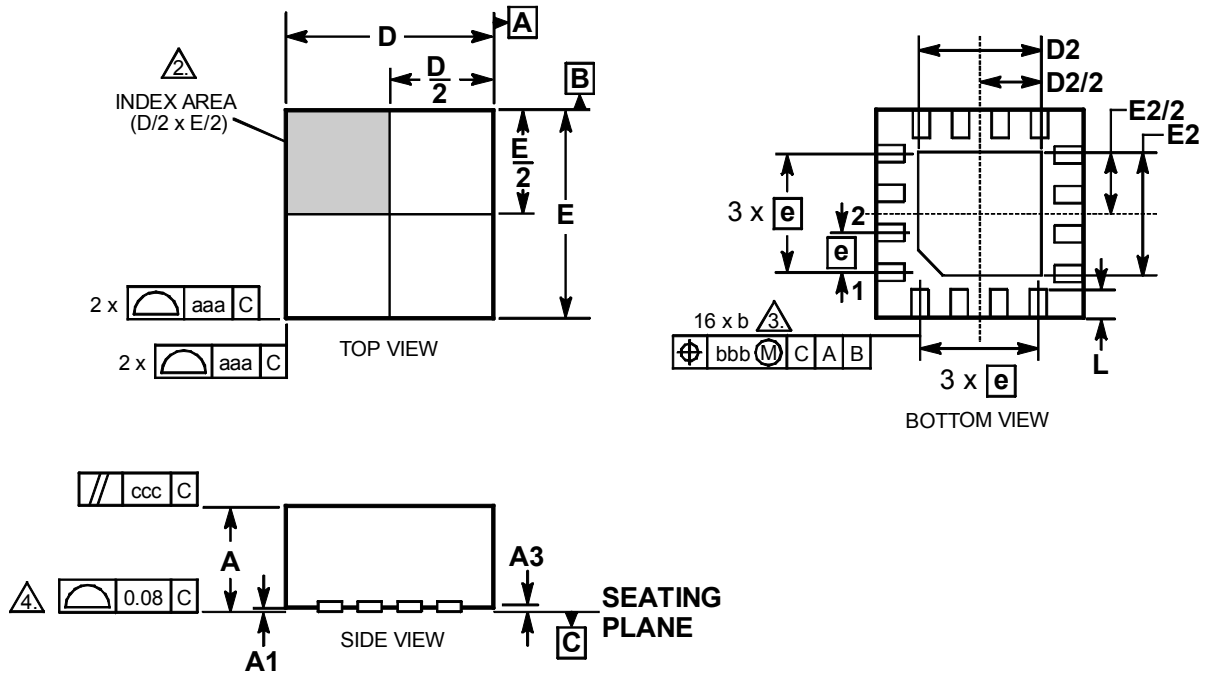
| Symbol              | Characteristic  | -40°C |     |            | 0°C |     |            | 25°C |     |            | 85°C |     |            | Unit |
|---------------------|---|-------|-----|------------|-----|-----|------------|------|-----|------------|------|-----|------------|------|
|                     |   | Min   | Typ | Max        | Min | Typ | Max        | Min  | Typ | Max        | Min  | Typ | Max        |      |
| $t_{PLH} / t_{PHL}$ | Propagation Delay   |       |     |            |     |     |            |      |     |            |      |     |            |      |
|                     | D to Q/Q Outputs <sup>1</sup> (SE)<br>D to Q <sub>HG</sub> /Q <sub>HG</sub> Outputs <sup>1</sup> (SE) |       |     | 400<br>550 |     |     | 400<br>550 |      |     | 400<br>550 |      |     | 430<br>630 |      |
| $t_{SKEW}$          | Duty Cycle Skew <sup>2</sup> (SE)   |       | 5   | 20         |     | 5   | 20         |      | 5   | 20         |      | 5   | 20         | ps   |
| $V_{PP}(\text{AC})$ | Minimum Input Swing <sup>3</sup>  | 80    |     |            | 80  |     |            | 80   |     |            | 80   |     |            | mV   |
| $t_r / t_f$         | Output Rise/Fall Times <sup>1</sup><br>(20% - 80%)  | 100   |     | 260        | 100 |     | 260        | 100  |     | 260        | 100  |     | 260        | ps   |

- Output specified with  $V_{EEP}$  and CS-SEL connected to  $V_{EE}$  with an AC coupled 50 $\Omega$  load.
- 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 guaranteed. The device has a voltage gain of  $\approx 20$  to Q/Q outputs and a voltage gain of  $\approx 100$  to Q<sub>HG</sub>/Q<sub>HG</sub> outputs.

# AZ100LVEL16VR



**PACKAGE DIAGRAM  
MLP 16**



- 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 THE 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    |      |
| b   | 0.18        | 0.30 |
| D   | 2.90        | 3.10 |
| D2  | 0.25        | 1.95 |
| E   | 2.90        | 3.10 |
| E2  | 0.25        | 1.95 |
| e   | 0.50 BSC    |      |
| L   | 0.30        | 0.50 |
| aaa | 0.25        |      |
| bbb | 0.10        |      |
| ccc | 0.10        |      |

## AZ100LEVEL16VR

Arizona Microtek, Inc. reserves the right to change circuitry and specifications at any time without prior notice. Arizona Microtek, Inc. makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Arizona Microtek, Inc. assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Arizona Microtek, Inc. does not convey any license rights nor the rights of others. Arizona Microtek, Inc. products are not designed, intended or authorized for use as components in systems intended to support or sustain life, or for any other application in which the failure of the Arizona Microtek, Inc. product could create a situation where personal injury or death may occur. Should Buyer purchase or use Arizona Microtek, Inc. products for any such unintended or unauthorized application, Buyer shall indemnify and hold Arizona Microtek, Inc. and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Arizona Microtek, Inc. was negligent regarding the design or manufacture of the part.