

# AZ10EL32

# AZ100EL32

## ECL/PECL $\div 2$ Divider

### FEATURES

- 510ps Propagation Delay
- 3.0GHz Toggle Frequency
- High Bandwidth Output Transitions
- 75k $\Omega$  Internal Input Pulldown Resistors
- Direct Replacement for ON Semiconductor MC10EL32 & MC100EL32

### PACKAGE AVAILABILITY

| PACKAGE                                      | PART NUMBER  | MARKING         | NOTES |
|--|--------------|-----------------|-------|
| SOIC 8                                       | AZ10EL32D    | AZM10<br>EL32   | 1,2   |
| SOIC 8                                       | AZ100EL32D   | AZM100<br>EL32  | 1,2   |
| SOIC 8 RoHS<br>Compliant / Lead<br>(Pb) Free | AZ100EL32D+  | AZM100+<br>EL32 | 1,2   |
| TSSOP 8                                      | AZ10EL32T    | AZT<br>EL32     | 1,2   |
| TSSOP 8                                      | AZ100LVEL32T | AZH<br>EL32     | 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" or "YY" for year followed by "WW" for week on underside of part.

### DESCRIPTION

The AZ10/100EL32 is an integrated  $\div 2$  divider. The reset pin is asynchronous and is asserted on the rising edge. Upon power-up, the internal flip-flop will attain a random logic state; the reset allows for the synchronization of multiple EL32's in a system.

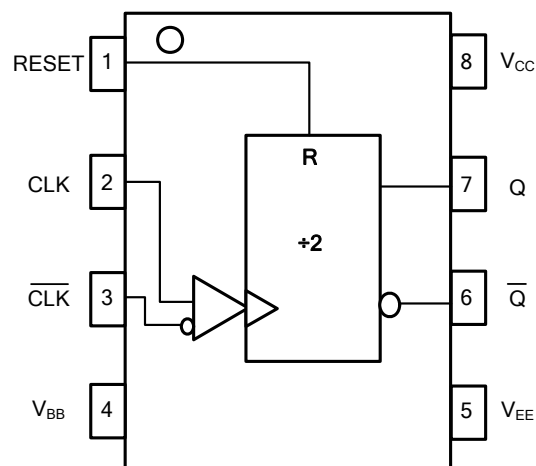
The EL32 provides a  $V_{BB}$  output for single-ended use or a DC bias reference for AC coupling to the device. For single-ended input applications, the  $V_{BB}$  reference should be connected to one side of the CLK/CLK differential input pair. The input signal is then fed to the other CLK/CLK input. The  $V_{BB}$  pin should be used only as a bias for the EL32 as its sink/source capability is limited. When used, the  $V_{BB}$  pin should be bypassed to ground via a 0.01 $\mu$ F capacitor.

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

### LOGIC DIAGRAM AND PINOUT ASSIGNMENT

#### PIN DESCRIPTION

| PIN      | FUNCTION                 |
|----------|--------------------------|
| CLK, CLK | Clock Inputs             |
| RESET    | Asynchronous Reset       |
| $V_{BB}$ | Reference Voltage Output |
| Q, Q     | Data Outputs             |
| $V_{CC}$ | Positive Supply          |
| $V_{EE}$ | Negative Supply          |



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**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   |

**10K ECL DC Characteristics (V<sub>EE</sub> = -4.75V to -5.5V, V<sub>CC</sub> = 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 <sub>OH</sub> | Output HIGH Voltage <sup>1</sup> | -1080 |     | -890  | -1020 |     | -840  | -980  |     | -810  | -910  |     | -720  | mV   |
| V <sub>OL</sub> | Output LOW Voltage <sup>1</sup>  | -1950 |     | -1650 | -1950 |     | -1630 | -1950 |     | -1630 | -1950 |     | -1595 | mV   |
| V <sub>IH</sub> | Input HIGH Voltage               | -1230 |     | -890  | -1170 |     | -840  | -1130 |     | -810  | -1060 |     | -720  | mV   |
| V <sub>IL</sub> | Input LOW Voltage                | -1950 |     | -1500 | -1950 |     | -1480 | -1950 |     | -1480 | -1950 |     | -1445 | mV   |
| I <sub>IH</sub> | Input HIGH Current               |       |     | 150   |       |     | 150   |       |     | 150   |       |     | 150   | μA   |
| I <sub>IL</sub> | Input LOW Current                | 0.5   |     |       | 0.5   |     |       | 0.5   |     |       | 0.5   |     |       | μA   |
| V <sub>BB</sub> | Output Reference Voltage         | -1430 |     | -1300 | -1380 |     | -1270 | -1350 |     | -1250 | -1310 |     | -1190 | mV   |
| I <sub>EE</sub> | Power Supply Current             |       | 25  | 30    |       | 25  | 30    |       | 25  | 30    |       | 25  | 30    | mA   |

- Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

**10K PECL DC Characteristics (V<sub>EE</sub> = GND, V<sub>CC</sub> = +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 <sub>OH</sub> | Output HIGH Voltage <sup>1,2</sup> | 3920  |     | 4110 | 3980 |     | 4160 | 4020 |     | 4190 | 4090 |     | 4280 | mV   |
| V <sub>OL</sub> | Output LOW Voltage <sup>1,2</sup>  | 3050  |     | 3350 | 3050 |     | 3370 | 3050 |     | 3370 | 3050 |     | 3405 | mV   |
| V <sub>IH</sub> | Input HIGH Voltage <sup>1</sup>    | 3770  |     | 4110 | 3830 |     | 4160 | 3870 |     | 4190 | 3940 |     | 4280 | mV   |
| V <sub>IL</sub> | Input LOW Voltage <sup>1</sup>     | 3050  |     | 3500 | 3050 |     | 3520 | 3050 |     | 3520 | 3050 |     | 3555 | mV   |
| I <sub>IH</sub> | Input HIGH Current                 |       |     | 150  |      |     | 150  |      |     | 150  |      |     | 150  | μA   |
| I <sub>IL</sub> | Input LOW Current                  | 0.5   |     |      | 0.5  |     |      | 0.5  |     |      | 0.5  |     |      | μA   |
| V <sub>BB</sub> | Output Reference Voltage           | 3570  |     | 3700 | 3620 |     | 3730 | 3650 |     | 3750 | 3690 |     | 3810 | mV   |
| I <sub>EE</sub> | Power Supply Current               |       | 25  | 30   |      | 25  | 30   |      | 25  | 30   |      | 25  | 30   | mA   |

- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

**100K ECL DC Characteristics (V<sub>EE</sub> = -4.2V to -5.5V, V<sub>CC</sub> = 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 <sub>OH</sub> | Output HIGH Voltage <sup>1</sup> | -1085 | -1005 | -880  | -1025 | -955  | -880  | -1025 | -955  | -880  | -1025 | -955  | -880  | mV   |
| V <sub>OL</sub> | Output LOW Voltage <sup>1</sup>  | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV   |
| V <sub>IH</sub> | Input HIGH Voltage               | -1165 |       | -880  | -1165 |       | -880  | -1165 |       | -880  | -1165 |       | -880  | mV   |
| V <sub>IL</sub> | Input LOW Voltage                | -1810 |       | -1475 | -1810 |       | -1475 | -1810 |       | -1475 | -1810 |       | -1475 | mV   |
| I <sub>IH</sub> | Input HIGH Current               |       |       | 150   |       |       | 150   |       |       | 150   |       |       | 150   | μA   |
| I <sub>IL</sub> | Input LOW Current                | 0.5   |       |       | 0.5   |       |       | 0.5   |       |       | 0.5   |       |       | μA   |
| V <sub>BB</sub> | Output Reference Voltage         | -1380 |       | -1260 | -1380 |       | -1260 | -1380 |       | -1260 | -1380 |       | -1260 | mV   |
| I <sub>EE</sub> | Power Supply Current             |       | 25    | 30    |       | 25    | 30    |       | 25    | 30    |       | 29    | 35    | mA   |

- Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

**AZ10EL32**  
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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 <sup>1,2</sup> | 3915  | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4045 | 4120 | 3975 | 4045 | 4120 | mV   |
| $V_{OL}$ | Output LOW Voltage <sup>1,2</sup>  | 3170  | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV   |
| $V_{IH}$ | Input HIGH Voltage <sup>1</sup>    | 3835  |      | 4120 | 3835 |      | 4120 | 3835 |      | 4120 | 3835 |      | 4120 | mV   |
| $V_{IL}$ | Input LOW Voltage <sup>1</sup>     | 3190  |      | 3525 | 3190 |      | 3525 | 3190 |      | 3525 | 3190 |      | 3525 | mV   |
| $I_{IH}$ | Input HIGH Current                 |       |      | 150  |      |      | 150  |      |      | 150  |      |      | 150  | μA   |
| $I_{IL}$ | Input LOW Current                  | 0.5   |      |      | 0.5  |      |      | 0.5  |      |      | 0.5  |      |      | μA   |
| $V_{BB}$ | Output Reference Voltage           | 3620  |      | 3740 | 3620 |      | 3740 | 3620 |      | 3740 | 3620 |      | 3740 | mV   |
| $I_{EE}$ | Power Supply Current               |       | 25   | 30   |      | 25   | 30   |      | 25   | 30   |      | 29   | 35   | mA   |

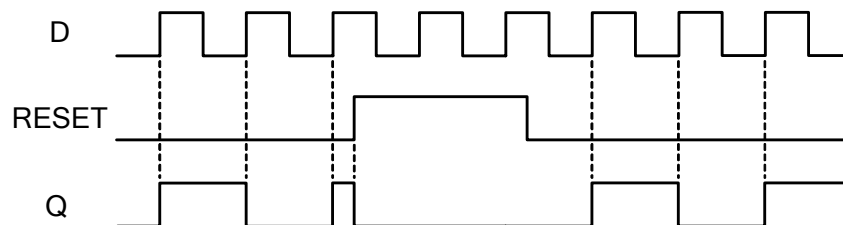
- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50Ω resistor to  $V_{CC} - 2\text{V}$ .

**AC Characteristics** ( $V_{EE} = 10\text{E}(-4.75\text{V to } -5.5\text{V})$ ,  $100\text{E}(-4.2\text{V to } -5.5\text{V})$ ;  $V_{CC} = \text{GND}$  or  $V_{EE} = \text{GND}$ ,  $V_{CC} = 10\text{E}(+4.75\text{V to } +5.5\text{V})$ ,  $100\text{E}(+4.2\text{V to } +5.5\text{V})$ )

| Symbol                          | Characteristic                              | -40°C                 |            |                       | 0°C                   |            |                       | 25°C                  |            |                       | 85°C                  |            |                       | Unit |
|---------------------------------|---|-----------------------|------------|-----------------------|-----------------------|------------|-----------------------|-----------------------|------------|-----------------------|-----------------------|------------|-----------------------|------|
|                                 |   | Min                   | Typ        | Max                   | Min                   | Typ        | Max                   | Min                   | Typ        | Max                   | Min                   | Typ        | Max                   |      |
| $f_{\text{max}}$                | Maximum Toggle Frequency                    | 2.2                   | 3.0        |                       | 2.6                   | 3.0        |                       | 2.6                   | 3.0        |                       | 2.6                   | 3.0        |                       | GHz  |
| $t_{\text{PLH}}/t_{\text{PHL}}$ | Propagation Delay<br>CLK to Q<br>Reset to Q | 360<br>390            | 500<br>540 | 640<br>690            | 410<br>440            | 500<br>540 | 590<br>640            | 420<br>440            | 510<br>540 | 600<br>640            | 450<br>450            | 540<br>550 | 630<br>650            | ps   |
| $V_{\text{PP}}(\text{AC})$      | Minimum Input Swing <sup>1</sup>            | 150                   |            |                       | 150                   |            |                       | 150                   |            |                       | 150                   |            |                       | mV   |
| $V_{\text{CMR}}$                | Common Mode Range <sup>2</sup>              | $V_{\text{CC}} - 2.5$ |            | $V_{\text{CC}} - 0.4$ | $V_{\text{CC}} - 2.5$ |            | $V_{\text{CC}} - 0.4$ | $V_{\text{CC}} - 2.5$ |            | $V_{\text{CC}} - 0.4$ | $V_{\text{CC}} - 2.5$ |            | $V_{\text{CC}} - 0.4$ | V    |
| $t_r / t_f$                     | Output Rise/Fall Times Q<br>(20% - 80%)     | 100                   |            | 350                   | 100                   |            | 350                   | 100                   |            | 350                   | 100                   |            | 350                   | ps   |

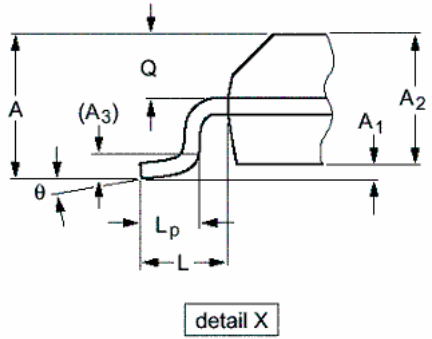
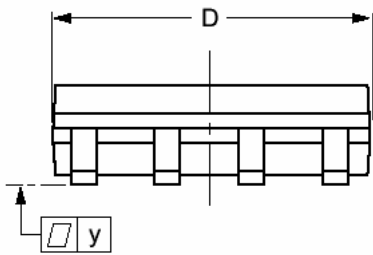
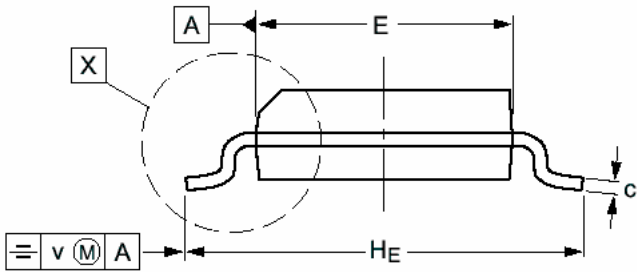
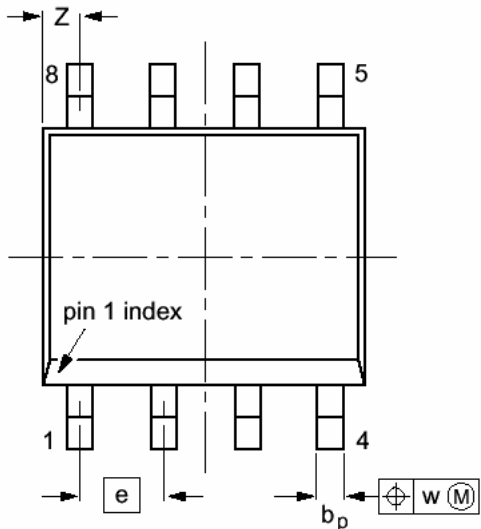
- $V_{\text{PP}}$  is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed.
- $V_{\text{CMR}}$  is defined as the range within which the  $V_{\text{IH}}$  level may vary, with the device still meeting the propagation delay specification. The  $V_{\text{IL}}$  level must be such that the peak-to-peak voltage is less than 1.0V and greater than or equal to  $V_{\text{PP}}(\text{min})$ .

**Figure 1: Timing Diagram**



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**PACKAGE DIAGRAM  
SOIC 8**

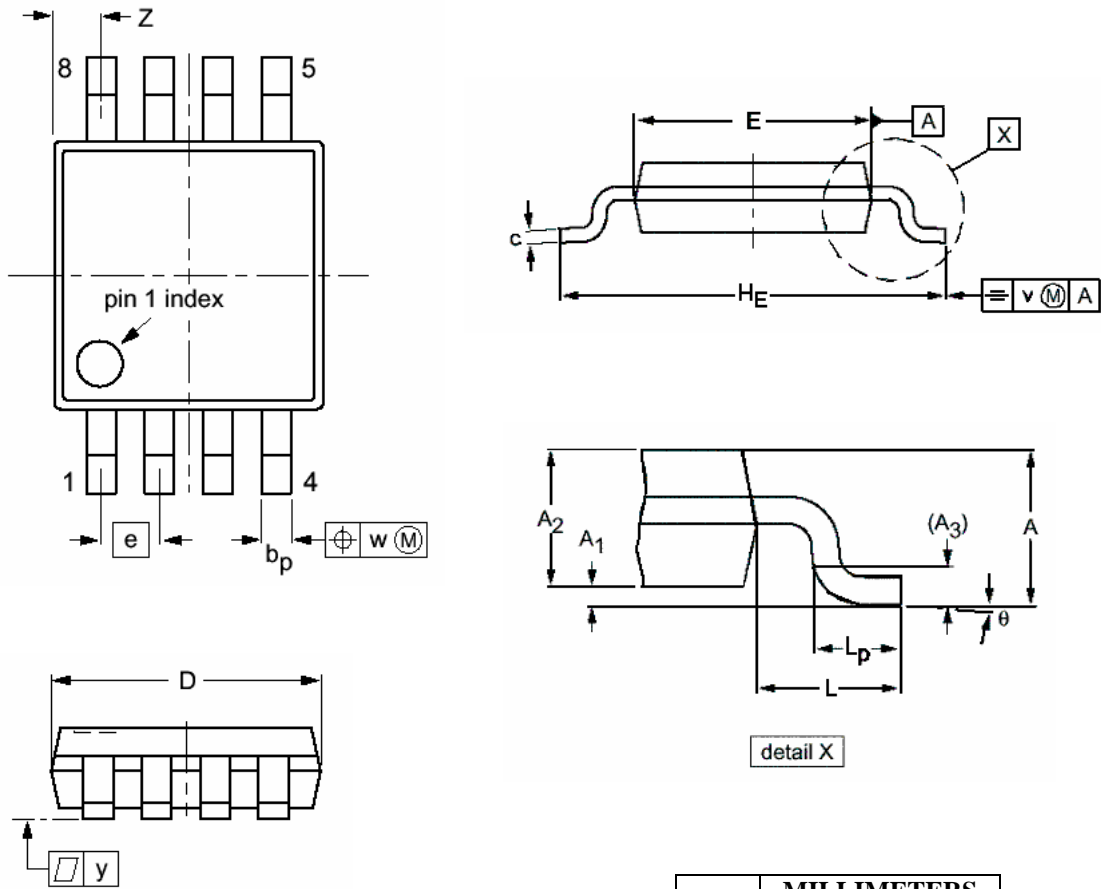


| DIM            | MILLIMETERS |      | INCHES |        |
|----------------|-------------|------|--------|--------|
|                | MIN         | MAX  | MIN    | MAX    |
| A              |             | 1.75 | 0.069  |        |
| A <sub>1</sub> | 0.10        | 0.25 | 0.004  | 0.010  |
| A <sub>2</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.

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**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°   |

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