

# TinyLogic UHS Triple Buffer

## NC7NZ34

### Description

The NC7NZ34 is a triple buffer from ON Semiconductors's Ultra High Speed Series of TinyLogic in the space saving US8 package. The device is fabricated with advanced CMOS technology to achieve ultra high speed with high output drive while maintaining low static power dissipation over a very broad  $V_{CC}$  operating range. The device is specified to operate over the 1.65 V to 5.5 V  $V_{CC}$  range. The inputs and outputs are high impedance when  $V_{CC}$  is 0 V. Inputs tolerate voltages up to 5.5 V independent of  $V_{CC}$  operating voltage.

### Features

- Space Saving US8 Surface Mount Package
- MicroPak™ Pb-Free Leadless Package
- Ultra High Speed:  $t_{PD}$  2.4 ns Typ into 50 pF at 5 V  $V_{CC}$
- High Output Drive:  $\pm 24$  mA at 3 V  $V_{CC}$
- Broad  $V_{CC}$  Operating Range: 1.65 V to 5.5 V
- Power Down High Impedance Inputs / Outputs
- Overvoltage Tolerant Inputs Facilitate 5 V to 3 V Translation
- Proprietary Noise / EMI Reduction Circuitry Implemented
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

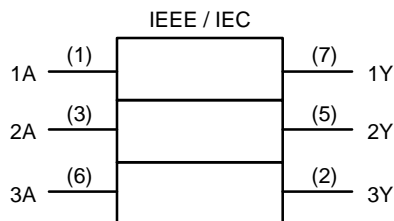


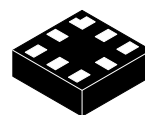
Figure 1. Logic Symbol



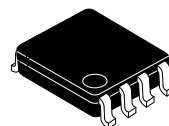
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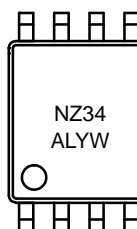
### MARKING DIAGRAMS



**UQFN8**  
**1.6X1.6, 0.5P**  
**CASE 523AY**



**US8**  
**CASE 846AN**



P9, NZ34 = Specific Device Code  
KK, L = 2-Digit Lot Run Traceability Code  
XY, YW = 2-Digit Date Code Format  
Z, A = Assembly Plant Code

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

NC7NZ34

Connection Diagrams

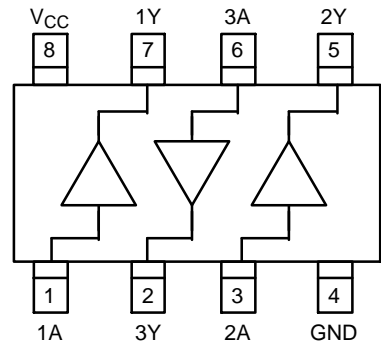


Figure 2. Connection Diagram (Top View)

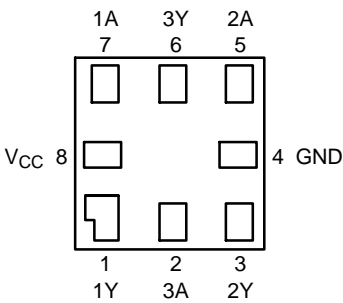
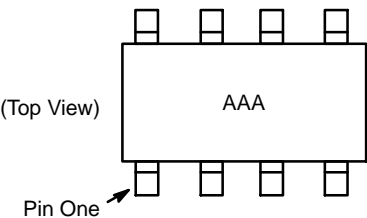


Figure 4. Pad Assignments for MicroPak (Top Thru View)



AAA represents Product Code Top Mark – see ordering code  
NOTE: Orientation of Top Mark determines Pin One location.  
Read the Top Product Code Mark left to right, Pin One is the lower left pin (see diagram).

Figure 3. Pin One Orientation Diagram

PIN DESCRIPTIONS

| Name   | Description |
|--|-------------|
| A <sub>1</sub> , A <sub>2</sub> , A <sub>3</sub> | Data Inputs |
| Y <sub>1</sub> , Y <sub>2</sub> , Y <sub>3</sub> | Output      |

FUNCTION TABLE (Y = A)

| Input | Output |
|-------|--------|
| A     | Y      |
| L     | L      |
| H     | H      |

H = HIGH Logic Level  
L = LOW Logic Level

## ABSOLUTE MAXIMUM RATINGS

| Symbol                             | Parameter   |                        | Min  | Max  | Unit |
|------------------------------------|---|------------------------|------|------|------|
| V <sub>CC</sub>                    | Supply Voltage                                    |                        | −0.5 | 6.5  | V    |
| V <sub>IN</sub>                    | DC Input Voltage                                  |                        | −0.5 | 6.5  | V    |
| V <sub>OUT</sub>                   | DC Output Voltage                                 |                        | −0.5 | 6.5  | V    |
| I <sub>IK</sub>                    | DC Input Diode Current                            | V <sub>IN</sub> < 0 V  | −    | −50  | mA   |
| I <sub>OK</sub>                    | DC Output Diode Current                           | V <sub>OUT</sub> < 0 V | −    | −50  | mA   |
| I <sub>OUT</sub>                   | DC Output Source / Sink Current                   |                        | −    | ±50  | mA   |
| I <sub>CC</sub> / I <sub>GND</sub> | DC V <sub>CC</sub> / GND Current                  |                        | −    | ±100 | mA   |
| T <sub>STG</sub>                   | Storage Temperature                               |                        | −65  | +150 | °C   |
| T <sub>J</sub>                     | Junction Temperature under Bias                   |                        | −    | +150 | °C   |
| T <sub>L</sub>                     | Junction Lead Temperature (Soldering, 10 Seconds) |                        | −    | +260 | °C   |
| P <sub>D</sub>                     | Power Dissipation in Still Air                    | US8                    | −    | 500  | mW   |
|                                    |   | MicroPak−8             | −    | 539  | mW   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## RECOMMENDED OPERATING CONDITIONS

| Symbol                          | Parameter                     |                                       | Min  | Max             | Unit |
|---------------------------------|-------------------------------|---------------------------------------|------|-----------------|------|
| V <sub>CC</sub>                 | Supply Voltage Operating      |                                       | 1.65 | 5.5             | V    |
|                                 | Supply Voltage Data Retention |                                       | 1.5  | 5.5             |      |
| V <sub>IN</sub>                 | Input Voltage                 |                                       | 0    | 5.5             | V    |
| V <sub>OUT</sub>                | Output Voltage                |                                       | 0    | V <sub>CC</sub> | V    |
| t <sub>r</sub> , t <sub>f</sub> | Input Rise and Fall Time      | V <sub>CC</sub> = 1.8 V, 2.5 V ±0.2 V | 0    | 20              | ns/V |
|                                 |                               | V <sub>CC</sub> = 3.3 V ±0.3 V        | 0    | 10              |      |
|                                 |                               | V <sub>CC</sub> = 5.5 V ±0.5 V        | 0    | 5               |      |
| T <sub>A</sub>                  | Operating Temperature         |                                       | −40  | +85             | °C   |
| θ <sub>JA</sub>                 | Thermal Resistance            | US8                                   | −    | 250             | °C/W |
|                                 |                               | MicroPak−8                            | −    | 232             | °C/W |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1. Unused inputs must be held HIGH or LOW. They may not float.

## DC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter                         | V <sub>CC</sub> (V) | Conditions                                  | T <sub>A</sub> = +25°C    |      |                      | T <sub>A</sub> = -40 to +85°C |                      | Unit  |
|------------------|-----------------------------------|---------------------|---|---------------------------|------|----------------------|-------------------------------|----------------------|-------|
|                  |                                   |                     |   | Min                       | Typ  | Max                  | Min                           | Max                  |       |
| V <sub>IH</sub>  | HIGH Level Control Input Voltage  | 1.8 ±0.15           |   | 0.65 V <sub>CC</sub>      | –    | –                    | 0.65 V <sub>CC</sub>          | –                    | V     |
|                  |                                   | 2.3 to 5.5          |   | 0.7 V <sub>CC</sub>       | –    | –                    | 0.7 V <sub>CC</sub>           | –                    |       |
| V <sub>IL</sub>  | LOW Level Control Input Voltage   | 1.8 ±0.15           |   | –                         | –    | 0.35 V <sub>CC</sub> | –                             | 0.35 V <sub>CC</sub> | V     |
|                  |                                   | 2.3 to 5.5          |   | –                         | –    | 0.3 V <sub>CC</sub>  | –                             | 0.3 V <sub>CC</sub>  |       |
| V <sub>OH</sub>  | HIGH Level Control Output Voltage | 1.65                | V <sub>IN</sub> = V <sub>IH</sub>           | I <sub>OH</sub> = -100 µA | 1.55 | 1.65                 | –                             | 1.55                 | V     |
|                  |                                   | 2.3                 |   |                           | 2.2  | 2.3                  | –                             | 2.2                  |       |
|                  |                                   | 3.0                 |   |                           | 2.9  | 3.0                  | –                             | 2.9                  |       |
|                  |                                   | 4.5                 |   |                           | 4.4  | 4.5                  | –                             | 4.4                  |       |
|                  |                                   | 1.65                | V <sub>IN</sub> = V <sub>IH</sub>           | I <sub>OH</sub> = -4 mA   | 1.29 | 1.52                 | –                             | 1.29                 |       |
|                  |                                   | 2.3                 |   | I <sub>OH</sub> = -8 mA   | 1.9  | 2.14                 | –                             | 1.9                  |       |
|                  |                                   | 3.0                 |   | I <sub>OH</sub> = -16 mA  | 2.4  | 2.75                 | –                             | 2.4                  |       |
|                  |                                   | 3.0                 |   | I <sub>OH</sub> = -24 mA  | 2.3  | 2.62                 | –                             | 2.3                  |       |
|                  |                                   | 4.5                 |   | I <sub>OH</sub> = -32 mA  | 3.8  | 4.13                 | –                             | 3.8                  |       |
|                  |                                   |                     |   |                           |      |                      |                               |                      |       |
| V <sub>OL</sub>  | LOW Level Control Output Voltage  | 1.65                | V <sub>IN</sub> = V <sub>IL</sub>           | I <sub>OL</sub> = 100 µA  | –    | 0.0                  | 0.1                           | –                    | V     |
|                  |                                   | 2.3                 |   |                           | –    | 0.0                  | 0.1                           | –                    |       |
|                  |                                   | 3.0                 |   |                           | –    | 0.0                  | 0.1                           | –                    |       |
|                  |                                   | 4.5                 |   |                           | –    | 0.0                  | 0.1                           | –                    |       |
|                  |                                   | 1.65                | V <sub>IN</sub> = V <sub>IL</sub>           | I <sub>OL</sub> = 4 mA    | –    | 0.08                 | 0.24                          | –                    |       |
|                  |                                   | 2.3                 |   | I <sub>OL</sub> = 8 mA    | –    | 0.10                 | 0.3                           | –                    |       |
|                  |                                   | 3.0                 |   | I <sub>OL</sub> = 16 mA   | –    | 0.16                 | 0.4                           | –                    |       |
|                  |                                   | 3.0                 |   | I <sub>OL</sub> = 24 mA   | –    | 0.24                 | 0.55                          | –                    |       |
|                  |                                   | 4.5                 |   | I <sub>OL</sub> = 32 mA   | –    | 0.25                 | 0.55                          | –                    |       |
|                  |                                   |                     |   |                           |      |                      |                               |                      |       |
| I <sub>IN</sub>  | Input Leakage Current             | 1.65 to 5.5         | 0 ≤ V <sub>IN</sub> ≤ 5.5 V                 |                           | –    | –                    | ±0.1                          | –                    | µA    |
| I <sub>OFF</sub> | Power Off Leakage Current         | 0.0                 | V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V |                           | –    | –                    | 1.0                           | –                    | 10 µA |
| I <sub>CC</sub>  | Quiescent Supply Current          | 1.65 to 5.5         | V <sub>IN</sub> = 5.5 V, GND                |                           | –    | –                    | 1.0                           | –                    | 10 µA |

# AC ELECTRICAL CHARACTERISTICS

| Symbol                              | Parameter                                   | V <sub>CC</sub> (V) | Conditions   | T <sub>A</sub> = +25°C |     |     | T <sub>A</sub> = -40 to +85°C |     | Unit |
|-------------------------------------|---|---------------------|--|------------------------|-----|-----|-------------------------------|-----|------|
|                                     |   |                     |  | Min                    | Typ | Max | Min                           | Max |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay<br>(Figure 5, 7)          | 1.8 ±0.15           | C <sub>L</sub> = 15 pF,<br>R <sub>L</sub> = 1 MΩ,  | –                      | 4.6 | 8.0 | –                             | 8.8 | ns   |
|                                     |   | 2.5 ±0.2            |  | –                      | 3.0 | 5.2 | –                             | 5.8 |      |
|                                     |   | 3.3 ±0.3            |  | –                      | 2.3 | 3.6 | –                             | 4.0 |      |
|                                     |   | 5.0 ±0.5            |  | –                      | 1.8 | 2.9 | –                             | 3.2 |      |
|                                     |   | 3.3 ±0.3            | C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω, | 1.2                    | 3.0 | 4.6 | –                             | 5.1 |      |
|                                     |   | 5.0 ±0.5            |  | 0.8                    | 2.4 | 3.8 | –                             | 4.2 |      |
| C <sub>IN</sub>                     | Input Capacitance                           | 0                   |  | –                      | 2.5 | –   | –                             | –   | pF   |
| C <sub>PD</sub>                     | Power Dissipation Capacitance<br>(Figure 6) | 3.3                 | (Note 2)   | –                      | 9   | –   | –                             | –   | pF   |
|                                     |   | 5.0                 |  | –                      | 11  | –   | –                             | –   |      |

2. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 6). C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression: I<sub>CCD</sub> = (C<sub>PD</sub>) (V<sub>CC</sub>) (f<sub>IN</sub>) + (I<sub>CCstatic</sub>).

# AC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter                                   | Conditions   | V <sub>CC</sub> (V) | T <sub>A</sub> = +25°C | Unit |
|------------------|---|--|---------------------|------------------------|------|
|                  |   |  |                     | Typical                |      |
| V <sub>OLP</sub> | Quiet Output Dynamic Peak V <sub>OL</sub>   | C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 5.0 V, V <sub>IL</sub> = 0 V | 5.0                 | 0.8                    | V    |
| V <sub>OLV</sub> | Quiet Output Dynamic Valley V <sub>OL</sub> | C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 5.0 V, V <sub>IL</sub> = 0 V | 5.0                 | –0.8                   | V    |

## AC Loading and Waveforms

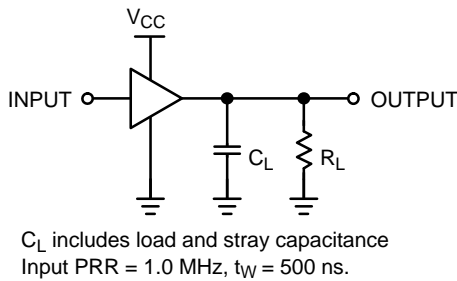


Figure 5. AC Test Circuit

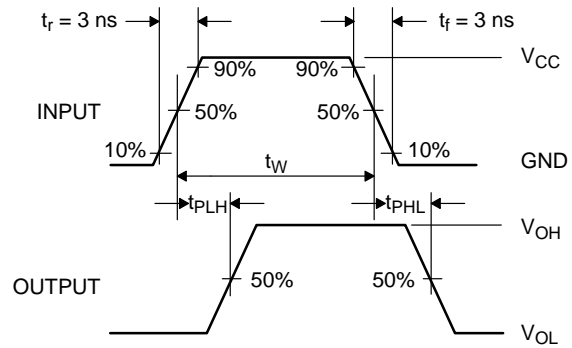
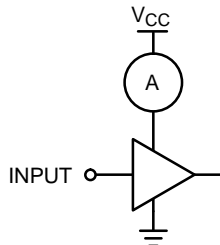


Figure 7. AC Waveforms



Input = AC Waveform; t<sub>r</sub> = t<sub>f</sub> = 1.8 ns;  
PRR = 10 MHz; Duty Cycle = 50%.

Figure 6. I<sub>CCD</sub> Test Circuit

## NC7NZ34

### ORDERING INFORMATION

| Part Number | Top Mark | Package   | Shipping†          |
|-------------|----------|---|--------------------|
| NC7NZ34K8X  | NZ34     | 8-Lead US8, JEDEC MO-187, Variation CA<br>3.1 mm Wide | 3000 / Tape & Reel |
| NC7NZ34L8X  | P9       | 8-Lead MicroPak, 1.6 mm Wide<br>(Pb-Free)             | 5000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

3. Pb-Free package per JEDEC J-STD-020B.

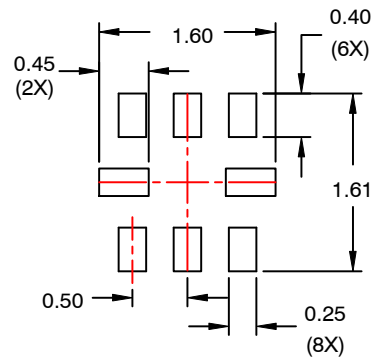
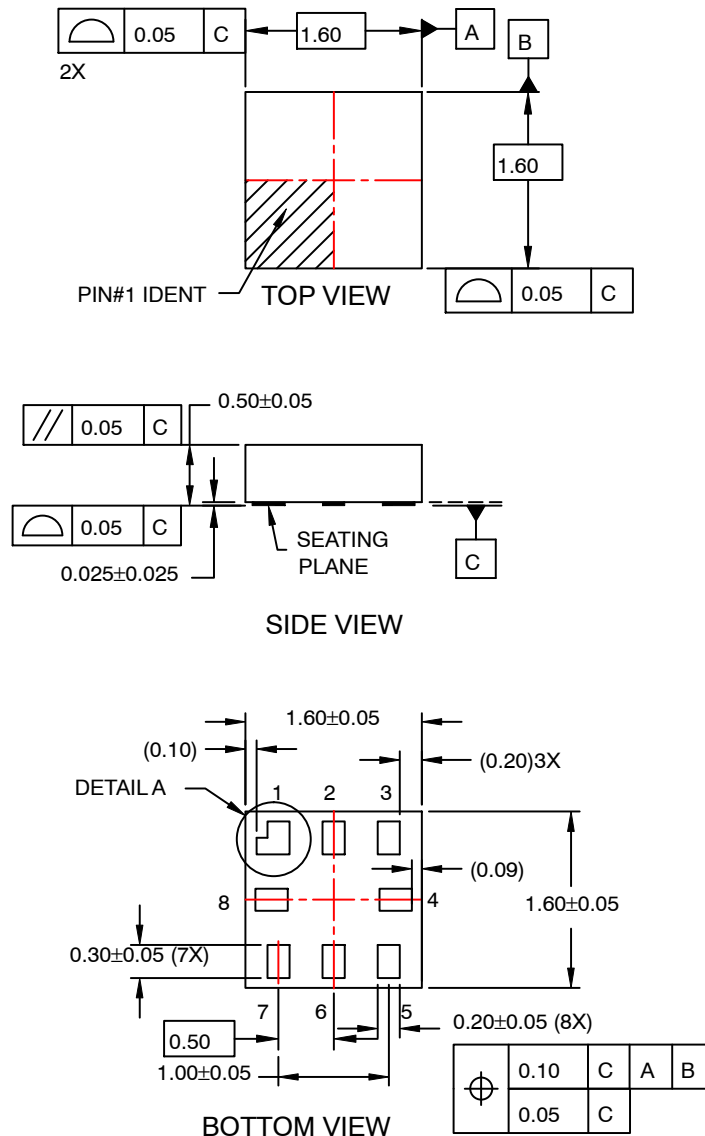
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### UQFN8 1.6X1.6, 0.5P

#### CASE 523AY

#### ISSUE O

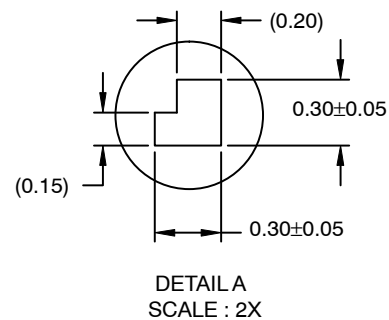
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### RECOMMENDED LAND PATTERN

#### NOTES:

- A. PACKAGE CONFORMS TO JEDEC MO-255 VARIATION UAAD.
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- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
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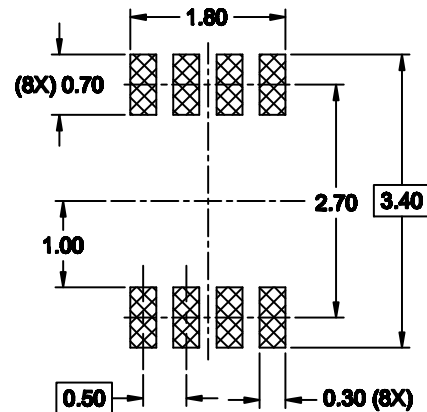
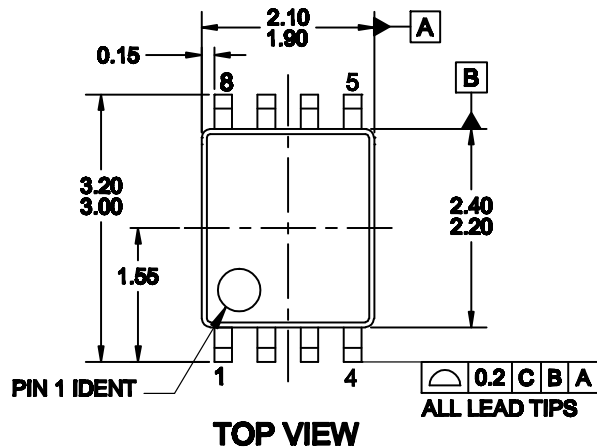


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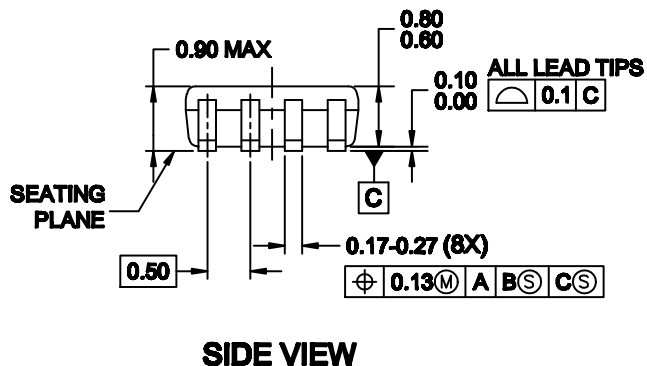
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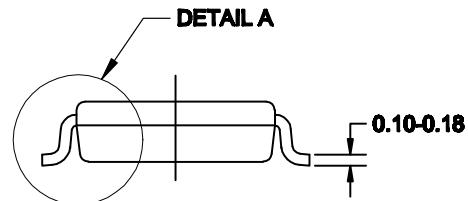
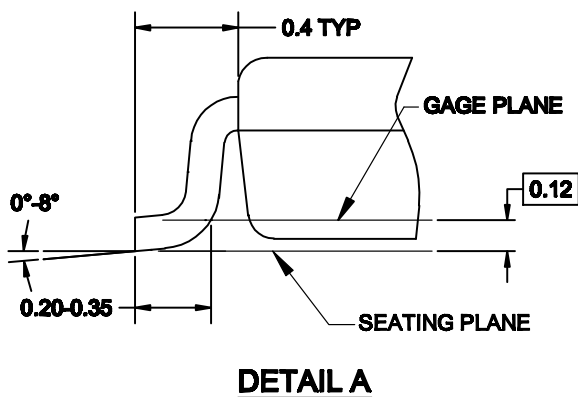


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