# NL27WZ126

# Dual Buffer with 3-State Outputs

The NL27WZ126 is a high performance dual noninverting buffer operating from a 2.3 V to 5.5 V supply.

- Extremely High Speed: $t_{PD}$ 2.6 ns (typical) at $V_{CC}$ = 5 V
- Designed for 2.3 V to 5.5 V $V_{CC}$ Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible – Interface Capability With 5 V TTL Logic with $V_{CC}$ = 3 V
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- 3–State OE Input is Active–High
- Replacement for NC7WZ126
- Chip Complexity = 72 FETs

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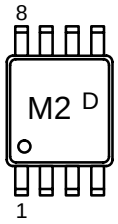
**MARKING DIAGRAM**


**US8**
**US SUFFIX**
**CASE 493–01**




D = Date Code

**ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

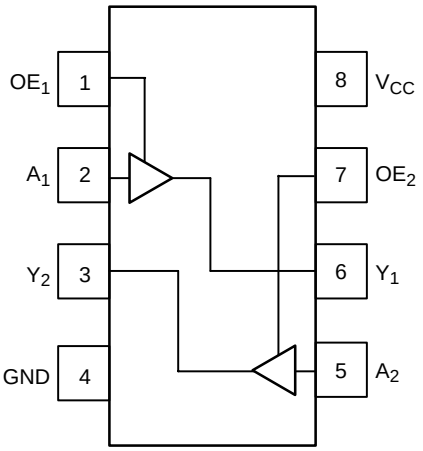



**Figure 1. Pinout** (Top View)

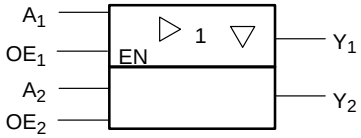



**Figure 2. Logic Symbol**

**PIN ASSIGNMENT**

| Pin | Function |
|---|---|
| 1 | OE |
| 2 | $A_1$ |
| 3 | $Y_2$ |
| 4 | GND |
| 5 | $A_2$ |
| 6 | $Y_1$ |
| 7 | $OE_2$ |
| 8 | $V_{CC}$ |

**FUNCTION TABLE**

| Input | | Output |
|---|---|---|
| $OE_n$ | $A_n$ | $Y_n$ |
| H | H | H |
| H | L | L |
| L | X | Z |

X = Don't Care
n = 1, 2

**MAXIMUM RATINGS**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage | | −0.5 to +7.0 | V |
| $V_I$ | DC Input Voltage | | −0.5 to +7.0 | V |
| $V_O$ | DC Output Voltage | | −0.5 to +7.0 | V |
| $I_{IK}$ | DC Input Diode Current | $V_I$ < GND | −50 | mA |
| $I_{OK}$ | DC Output Diode Current | $V_O$ < GND | −50 | mA |
| $I_O$ | DC Output Sink Current | | ±50 | mA |
| $I_{CC}$ | DC Supply Current per Supply Pin | | ±100 | mA |
| $I_{GND}$ | DC Ground Current per Ground Pin | | ±100 | mA |
| $T_{STG}$ | Storage Temperature Range | | −65 to +150 | °C |
| $T_L$ | Lead Temperature, 1 mm from Case for 10 Seconds | | 260 | °C |
| $T_J$ | Junction Temperature under Bias | | +150 | °C |
| $\theta_{JA}$ | Thermal Resistance | (Note 1) | 250 | °C/W |
| $P_D$ | Power Dissipation in Still Air at 85°C | | 250 | mW |
| MSL | Moisture Sensitivity | | Level 1 | |
| $F_R$ | Flammability Rating | Oxygen Index: 28 to 34 | UL 94 V–0 @ 0.125 in | |
| $V_{ESD}$ | ESD Withstand Voltage | Human Body Model (Note 2)<br>Machine Model (Note 3)<br>Charged Device Model (Note 4) | > 2000<br>> 200<br>N/A | V |

Maximum Ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute maximum–rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm–by–1 inch, 2–ounce copper trace with no air flow.
2. Tested to EIA/JESD22–A114–A.
3. Tested to EIA/JESD22–A115–A.
4. Tested to JESD22–C101–A.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | Operating<br>Data Retention Only | 2.3<br>1.5 | 5.5<br>5.5 | V |
| $V_I$ | Input Voltage | (Note 5) | 0 | 5.5 | V |
| $V_O$ | Output Voltage | (HIGH or LOW State) | 0 | 5.5 | V |
| $T_A$ | Operating Free–Air Temperature | | −40 | +85 | °C |
| $\Delta t/\Delta V$ | Input Transition Rise or Fall Rate | $V_{CC}$ = 2.5 V ±0.2 V<br>$V_{CC}$ = 3.0 V ±0.3 V<br>$V_{CC}$ = 5.0 V ±0.5 V | 0<br>0<br>0 | 20<br>10<br>5 | ns/V |

5. Unused inputs may not be left open. All inputs must be tied to a high– or low–logic input voltage level.

## DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Condition | $V_{CC}$ (V) | $T_A$ = 25°C Min | Typ | Max | −40°C ≤ $T_A$ ≤ 85°C Min | Max | Unit |
|---|---|---|---|---|---|---|---|---|---|
| $V_{IH}$ | High–Level Input Voltage | | 2.3 to 5.5 | 0.7 $V_{CC}$ | | | 0.7 $V_{CC}$ | | V |
| $V_{IL}$ | Low–Level Input Voltage | | 2.3 to 5.5 | | | 0.3 $V_{CC}$ | | 0.3 $V_{CC}$ | V |
| $V_{OH}$ | High–Level Output Voltage $V_{IN}$ = $V_{IH}$ | $I_{OH}$ = 100 μA | 2.3 to 5.5 | $V_{CC}$ – 0.1 | $V_{CC}$ | | $V_{CC}$ – 0.1 | | V |
| | | $I_{OH}$ = –8 mA | 2.3 | 1.9 | 2.1 | | 1.9 | | |
| | | $I_{OH}$ = –12 mA | 2.7 | 2.2 | 2.4 | | 2.2 | | |
| | | $I_{OH}$ = –16 mA | 3.0 | 2.4 | 2.7 | | 2.4 | | |
| | | $I_{OH}$ = –24 mA | 3.0 | 2.3 | 2.5 | | 2.3 | | |
| | | $I_{OH}$ = –32 mA | 4.5 | 3.8 | 4.0 | | 3.8 | | |
| $V_{OL}$ | Low–Level Output Voltage $V_{IN}$ = $V_{IH}$ or $V_{IL}$ | $I_{OL}$ = 100 μA | 2.3 to 5.5 | | | 0.1 | | 0.1 | V |
| | | $I_{OL}$ = 8 mA | 2.3 | | 0.20 | 0.3 | | 0.3 | |
| | | $I_{OL}$ = 12 mA | 2.7 | | 0.22 | 0.4 | | 0.4 | |
| | | $I_{OL}$ = 16 mA | 3.0 | | 0.28 | 0.4 | | 0.4 | |
| | | $I_{OL}$ = 24 mA | 3.0 | | 0.38 | 0.55 | | 0.55 | |
| | | $I_{OL}$ = 32 mA | 4.5 | | 0.42 | 0.55 | | 0.55 | |
| $I_{IN}$ | Input Leakage Current | $V_{IN}$ = $V_{CC}$ or GND | 0 to 5.5 | | | ±0.1 | | ±1.0 | μA |
| $I_{OFF}$ | Power Off–Output Leakage Current | $V_{OUT}$ = 5.5 V | 0 | | | 1 | | 10 | μA |
| $I_{CC}$ | Quiescent Supply Current | $V_{IN}$ = $V_{CC}$ or GND | 5.5 | | | 1 | | 10 | μA |
| $I_{OZ}$ | 3–State Output Leakage | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>0 V ≤ $V_{OUT}$ ≤ 5.5 V | 2.3 to 5.5 | | | ±0.5 | | ±5 | μA |

## AC ELECTRICAL CHARACTERISTICS ($t_R$ = $t_F$ = 3.0 ns)

| Symbol | Parameter | Condition | $V_{CC}$ (V) | $T_A$ = 25°C Min | Typ | Max | −40°C ≤ $T_A$ ≤ 85°C Min | Max | Unit |
|---|---|---|---|---|---|---|---|---|---|
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay AN to YN (Figures 3 and 4, Table 1) | $R_L$ = 1 MΩ $C_L$ = 15 pF | 2.5 ± 0.2 | 1.0 | | 7.5 | 1.0 | 8 | ns |
| | | $R_L$ = 1 MΩ $C_L$ = 15 pF | 3.3 ± 0.3 | 0.8 | | 5.2 | 0.8 | 5.5 | |
| | | $R_L$ = 500 Ω $C_L$ = 50 pF | | 1.2 | | 5.7 | 1.2 | 6.0 | |
| | | $R_L$ = 1 MΩ $C_L$ = 15 pF | 5.0 ± 0.5 | 0.5 | | 4.5 | 0.5 | 4.8 | |
| | | $R_L$ = 500 Ω $C_L$ = 50 pF | | 0.8 | | 5.0 | 0.8 | 5.3 | |
| $t_{OSLH}$<br>$t_{OSHL}$ | Output to Output Skew (Note 6) | $R_L$ = 500 Ω $C_L$ = 50 pF | 3.3 ± 0.3 | | | 1.0 | | 1.0 | ns |
| | | $R_L$ = 500 Ω $C_L$ = 50 pF | 5.0 ± 0.5 | | | 0.8 | | 0.8 | |
| $t_{PZH}$<br>$t_{PZL}$ | Output Enable Time (Figures 5, 6 and 7, Table 1) | $R_L$ = 250 Ω $C_L$ = 50 pF | 2.5 ± 0.2 | 1.8 | | 8.5 | 1.8 | 9.0 | ns |
| | | | 3.3 ± 0.3 | 1.2 | | 6.2 | 1.2 | 6.5 | |
| | | | 5.0 ± 0.5 | 0.8 | | 5.5 | 0.8 | 5.8 | |
| $t_{PHZ}$<br>$t_{PLZ}$ | Output Enable Time (Figures 5, 6 and 7, Table 1) | $R_L$ and R1= 500 Ω $C_L$ = 50 pF | 2.5 ± 0.2 | 1.5 | | 8.0 | 1.5 | 8.5 | ns |
| | | | 3.3 ± 0.3 | 0.8 | | 5.7 | 0.8 | 6.0 | |
| | | | 5.0 ± 0.5 | 0.3 | | 4.7 | 0.3 | 5.0 | |

6. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. This specification applies to any outputs switching in the same direction, either HIGH–to–LOW ($t_{OSHL}$) or LOW–to–HIGH ($t_{OSLH}$); parameter guaranteed by design.

## CAPACITIVE CHARACTERISTICS

| Symbol | Parameter | Condition | Typical | Unit |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | $V_{CC}$ = 5.5 V, $V_I$ = 0 V or $V_{CC}$ | 2.5 | pF |
| $C_{OUT}$ | Output Capacitance | $V_{CC}$ = 5.5 V, $V_I$ = 0 V or $V_{CC}$ | 2.5 | pF |
| $C_{PD}$ | Power Dissipation Capacitance (Note 7) | 10 MHz, $V_{CC}$ = 3.3 V, $V_I$ = 0 V or $V_{CC}$ | 9 | pF |
| | | 10 MHz, $V_{CC}$ = 5.5 V, $V_I$ = 0 V or $V_{CC}$ | 11 | |

7. $C_{PD}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. $C_{PD}$ is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

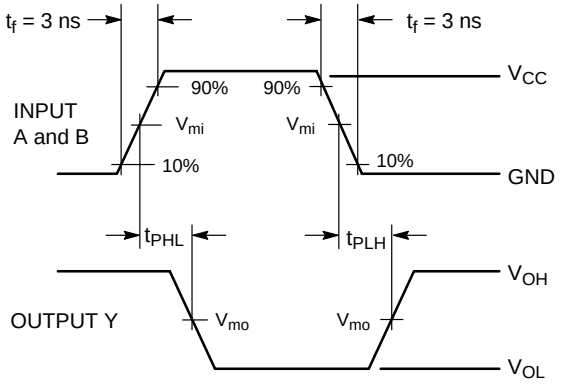
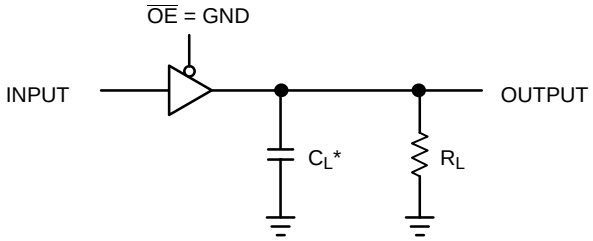



**Figure 3. Switching Waveform**




*Includes all probe and jig capacitance.
A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 4. $T_{PLH}$ or $T_{PHL}$**

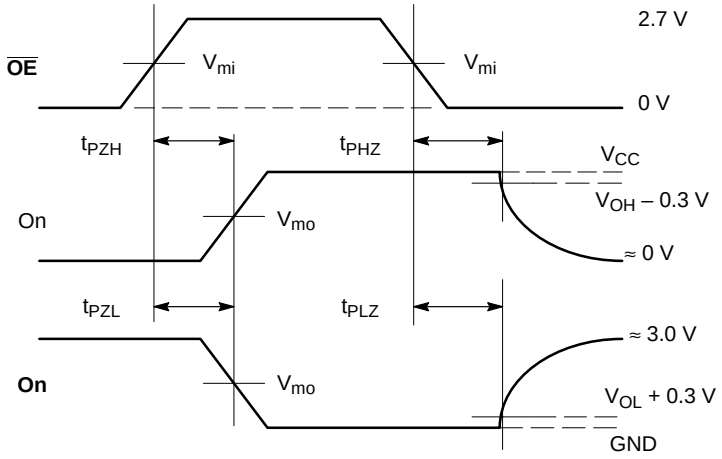
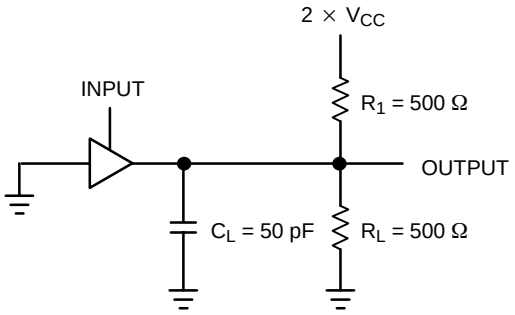



**Figure 5. AC Output Enable and Disable Waveform**

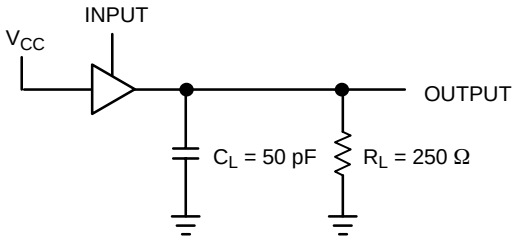
**Table 1. Output Enable and Disable Times**
$t_R = t_F$ = 2.5 ns, 10% to 90%; f = 1 MHz; $t_W$ = 500 ns

| Symbol | $V_{CC}$ | | |
|---|---|---|---|
| | **3.3 V ± 0.3 V** | **2.7 V** | **2.5 V ± 0.2 V** |
| $V_{mi}$ | 1.5 V | 1.5 V | $V_{CC}/2$ |
| $V_{mo}$ | 1.5 V | 1.5 V | $V_{CC}/2$ |




A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 6. $T_{PZL}$ or $T_{PLZ}$**




A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 7. $T_{PZH}$ or $T_{PHZ}$**

**DEVICE ORDERING INFORMATION**

| Device Order Number | Device Nomenclature | | | | | | Package Type | Tape and Reel Size |
|---|---|---|---|---|---|---|---|---|
| | Logic Circuit Indicator | No. of Gates per Package | Temp Range Identifier | Technology | Device Function | Package Suffix | | |
| NL27WZ126US | NL | 2 | 7 | WZ | 126 | US | US8 | 178 mm, 3000 Units |

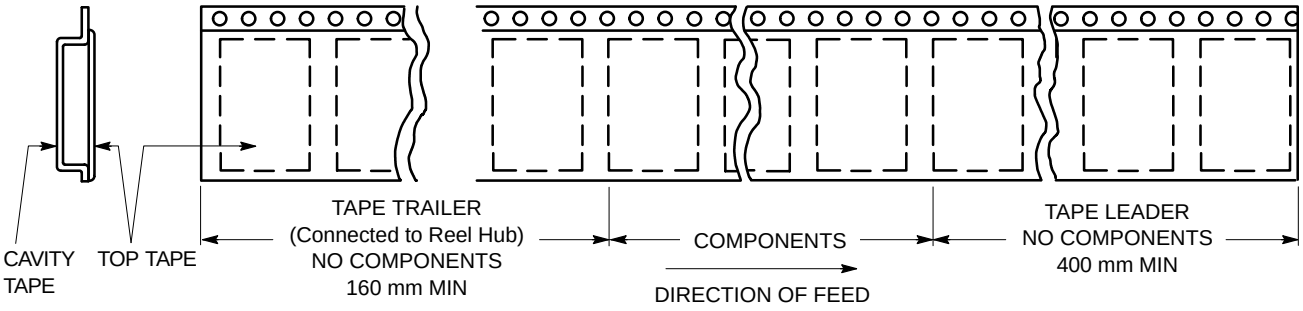



**Figure 8. Tape Ends for Finished Goods**

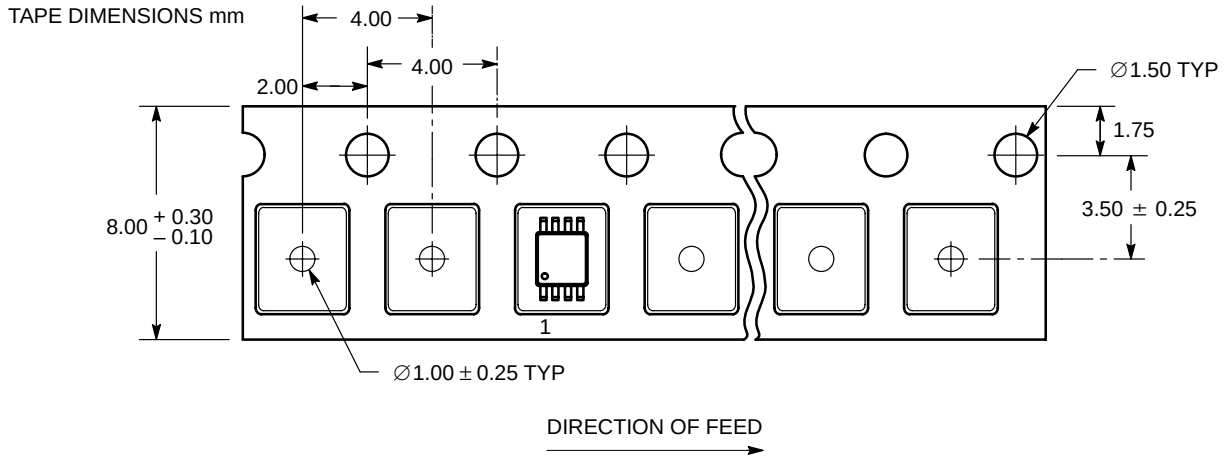



**Figure 9. US8 Reel Configuration/Orientation**

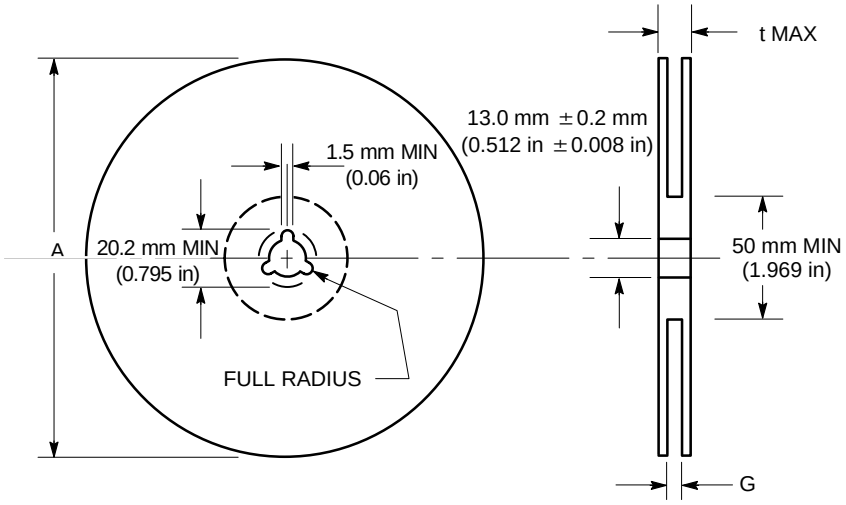



**Figure 10. Reel Dimensions**

**REEL DIMENSIONS**

| Tape Size | T and R Suffix | A Max | G | t Max |
|---|---|---|---|---|
| 8 mm | US | 178 mm<br>(7 in) | 8.4 mm, + 1.5 mm, –0.0<br>(0.33 in + 0.059 in, –0.00) | 14.4 mm<br>(0.56 in) |

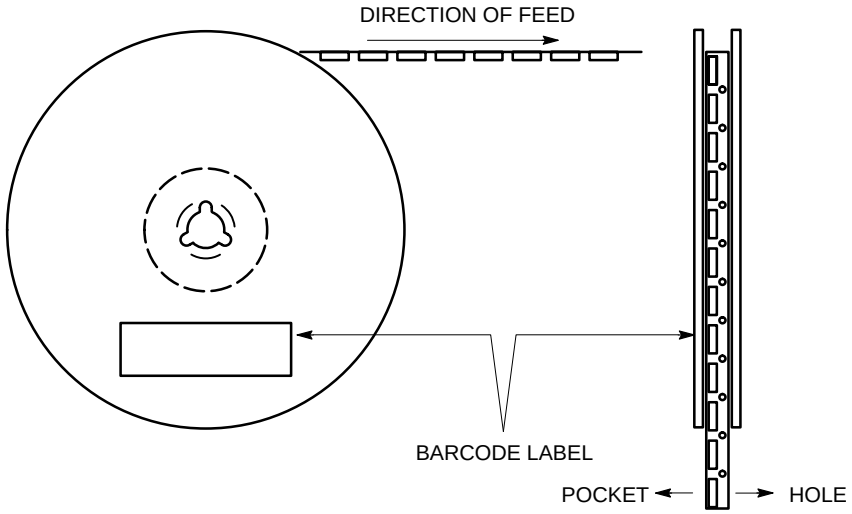
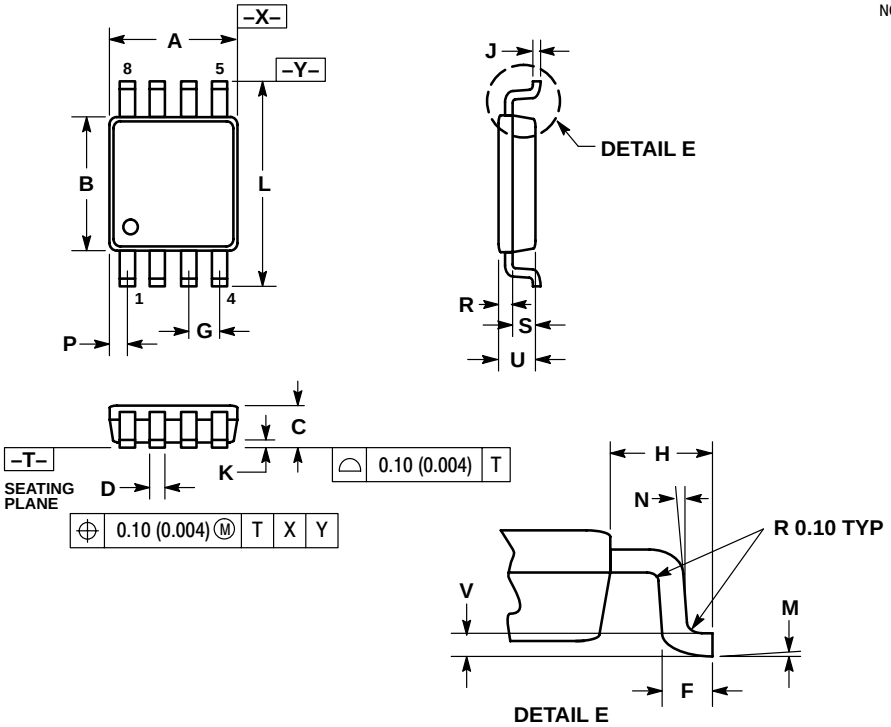



**Figure 11. Reel Winding Direction**

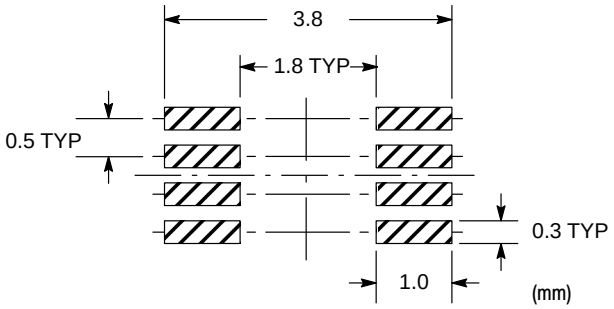
## PACKAGE DIMENSIONS

**US8**
**US SUFFIX**
CASE 493–01
ISSUE O




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH. PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER–LEAD FLASH OR PROTRUSION. INTER–LEAD FLASH AND PROTRUSION SHALL NOT E3XCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076–0. 0203 MM. (300–800 INCH).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (0.0002").

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 1.90 | 2.10 | 0.075 | 0.083 |
| B | 2.20 | 2.40 | 0.087 | 0.094 |
| C | 0.60 | 0.90 | 0.024 | 0.035 |
| D | 0.17 | 0.25 | 0.007 | 0.010 |
| F | 0.20 | 0.35 | 0.008 | 0.014 |
| G | 0.50 BSC | | 0.020 BSC | |
| H | 0.40 REF | | 0.016 REF | |
| J | 0.10 | 0.18 | 0.004 | 0.007 |
| K | 0.00 | 0.10 | 0.000 | 0.004 |
| L | 3.00 | 3.20 | 0.118 | 0.126 |
| M | 0 ° | 6 ° | 0 ° | 6 ° |
| N | 5 ° | 10 ° | 5 ° | 10 ° |
| P | 0.28 | 0.44 | 0.011 | 0.017 |
| R | 0.23 | 0.33 | 0.009 | 0.013 |
| S | 0.37 | 0.47 | 0.015 | 0.019 |
| U | 0.60 | 0.80 | 0.024 | 0.031 |
| V | 0.12 BSC | | 0.005 BSC | |



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