

NL27WZ16

Dual Buffer

The NL27WZ16 is a high performance dual buffer operating from a 1.65 to 5.5 V supply. At $V_{CC} = 3$ V, high impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance.

- Extremely High Speed: t_{PD} 2.0 ns (typical) at $V_{CC} = 5.0$ V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs
- LVTTL Compatible – Interface Capability With 5.0 V TTL Logic with $V_{CC} = 3.0$ V
- LVC MOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72; Equivalent Gate = 18

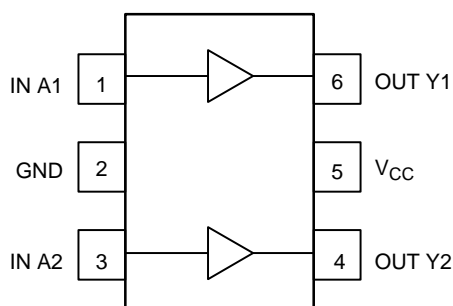


Figure 1. Pinout (Top View)

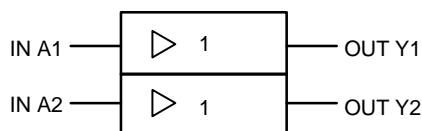


Figure 2. Logic Symbol

PIN ASSIGNMENT

| | |
|---|----------|
| 1 | IN A1 |
| 2 | GND |
| 3 | IN A2 |
| 4 | OUT Y2 |
| 5 | V_{CC} |
| 6 | OUT Y1 |

FUNCTION TABLE

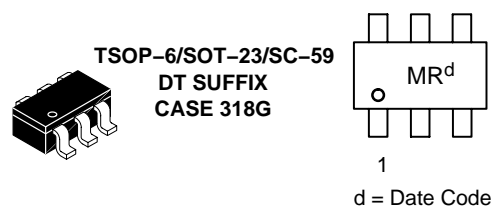
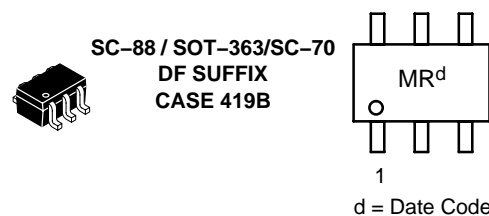
| A Input | \bar{Y} Output |
|---------|------------------|
| L | L |
| H | H |



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MARKING DIAGRAMS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

NL27WZ16

MAXIMUM RATINGS (Note 1)

| Symbol | Characteristics | Value | Unit |
|-----------------------|---|------------------------------|------|
| V _{CC} | DC Supply Voltage | -0.5 to +7.0 | V |
| V _I | DC Input Voltage | -0.5 ≤ V _I ≤ +7.0 | V |
| V _O | DC Output Voltage Output in Z or LOW State (Note 2) | -0.5 ≤ V _O ≤ 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 |
| P _D | Power Dissipation in Still Air SC-88, TSOP-6 | 200 | mW |
| θ _{JA} | Thermal Resistance SC-88, TSOP-6 | 333 | °C/W |
| T _L | Lead Temperature, 1 mm from case for 10 s | 260 | °C |
| T _J | Junction Temperature under Bias | +150 | °C |
| V _{ESD} | ESD Withstand Voltage Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5) | > 2000 > 200 N/A | V |
| I _{Latch-Up} | Latch-Up Performance Above V _{CC} and Below GND at 85°C (Note 6) | ±500 | mA |

1. Absolute maximum continuous 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.
2. I_O absolute maximum rating must be observed.
3. Tested to EIA/JESD22-A114-A
4. Tested to EIA/JESD22-A115-A
5. Tested to JESD22-C101-A
6. Tested to EIA/JESD78

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|-----------------|---|------------------|---------------------|------|
| V _{CC} | Supply Voltage Operating Data Retention Only | 1.65 1.5 | 5.5 5.5 | V |
| V _I | Input Voltage | 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 |
| Δt/ΔV | Input Transition Rise or Fall Rate V _{CC} = 1.8 V ± 0.15 V V _{CC} = 2.5 V ± 0.2 V V _{CC} = 3.0 V ± 0.3 V V _{CC} = 5.0 V ± 0.5 V | 0 0 0 0 | 20 20 10 5 | ns/V |

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DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | T _A = 25°C | | | -40°C ≤ T _A ≤ 85°C | | Unit | Condition |
|------------------|--|----------------------------------|---|--------------------------------------|---|---|---|------|--|
| | | | Min | Typ | Max | Min | Max | | |
| V _{IH} | High-Level Input Voltage | 1.65 to 1.95 2.3 to 5.5 | 0.75 V _{CC} 0.7 V _{CC} | | | 0.75 V _{CC} 0.7 V _{CC} | | V | |
| V _{IL} | Low-Level Input Voltage | 1.65 to 1.95 2.3 to 5.5 | | | 0.25 V _{CC} 0.3 V _{CC} | | 0.25 V _{CC} 0.3 V _{CC} | V | |
| V _{OH} | High-Level Output Voltage V _{IN} = V _{IH} | 1.65 1.8 2.3 3.0 4.5 | 1.55 1.7 2.2 2.9 4.4 | 1.65 1.8 2.3 3.0 4.5 | | 1.55 1.7 2.2 2.9 4.4 | | V | I _{OH} = -100 μA |
| | | 1.65 2.3 3.0 3.0 4.5 | 1.29 1.9 2.4 2.3 3.8 | 1.52 2.15 2.80 2.68 4.20 | | 1.29 1.9 2.4 2.3 3.8 | | V | I _{OH} = -4 mA I _{OH} = -8 mA I _{OH} = -16 mA I _{OH} = -24 mA I _{OH} = -32 mA |
| V _{OL} | Low-Level Output Voltage V _{IN} = V _{IL} | 1.65 1.8 2.3 3.0 4.5 | | 0.0 0.0 0.0 0.0 0.0 | 0.1 0.1 0.1 0.1 0.1 | | 0.1 0.1 0.1 0.1 0.1 | V | I _{OL} = 100 μA |
| | | 1.65 2.3 3.0 3.0 4.5 | | 0.08 0.10 0.15 0.22 0.22 | 0.24 0.30 0.40 0.55 0.55 | | 0.24 0.30 0.40 0.55 0.55 | V | I _{OL} = 4 mA I _{OL} = 8 mA I _{OL} = 16 mA I _{OL} = 24 mA I _{OL} = 32 mA |
| I _{IN} | Input Leakage Current | 0 to 5.5 | | | ±1.0 | | ±1.0 | μA | 0 V ≤ V _{IN} ≤ 5.5 V |
| I _{OFF} | Power Off Leakage Current | 0.0 | | | 1.0 | | 10 | μA | V _{IN} or V _{OUT} = 5.5 V |
| I _{CC} | Quiescent Supply Current | 1.65 to 5.5 | | | 1.0 | | 10 | μA | V _{IN} = 5.5 V, GND |

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

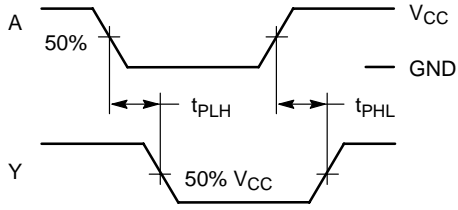
| Symbol | Parameter | Condition | V _{CC} (V) | T _A = 25°C | | | -40°C ≤ T _A ≤ 85°C | | Unit |
|--------------------------------------|---------------------------------------|--|---------------------|-----------------------|-----|-----|-------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PLH} t _{PHL} | Propagation Delay (Figure 3 and 4) | R _L = 1 MΩ, C _L = 15 pF | 1.8 ± 0.15 | 1.8 | 8.0 | 9.6 | 1.8 | 10.2 | ns |
| | | R _L = 1 MΩ, C _L = 15 pF | 2.5 ± 0.2 | 1.0 | 3.0 | 5.2 | 1.0 | 5.8 | |
| | | R _L = 1 MΩ, C _L = 15 pF | 3.3 ± 0.3 | 0.8 | 2.3 | 3.6 | 0.8 | 4.0 | |
| | | R _L = 500 Ω, C _L = 50 pF | | 1.2 | 3.0 | 4.6 | 1.2 | 5.1 | |
| | | R _L = 1 MΩ, C _L = 15 pF | 5.0 ± 0.5 | 0.5 | 1.8 | 2.9 | 0.5 | 3.2 | |
| | | R _L = 500 Ω, C _L = 50 pF | | 0.8 | 2.4 | 3.8 | 0.8 | 4.2 | |

CAPACITIVE CHARACTERISTICS

| Symbol | Parameter | Condition | Typical | Unit |
|-----------------|--|--|---------|------|
| C _{IN} | Input Capacitance | V _{CC} = 5.5 V, V _I = 0 V or V _{CC} | 7.0 | pF |
| C _{PD} | Power Dissipation Capacitance (Note 7) | 10 MHz, V _{CC} = 3.3 V, V _I = 0 V or V _{CC} 10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC} | 9 11 | pF |

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} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

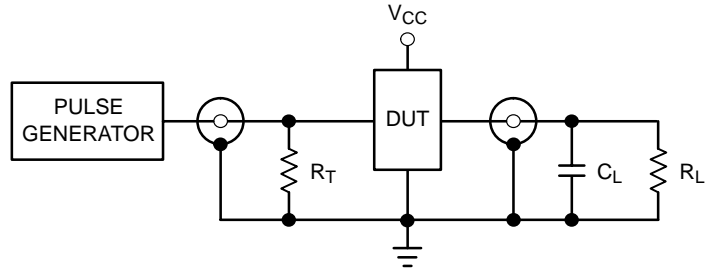
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PROPAGATION DELAYS

$t_R = t_F = 2.5 \text{ ns}$, 10% to 90%; $f = 1 \text{ MHz}$; $t_W = 500 \text{ ns}$

Figure 3. Switching Waveforms



$R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

Figure 4. Test Circuit

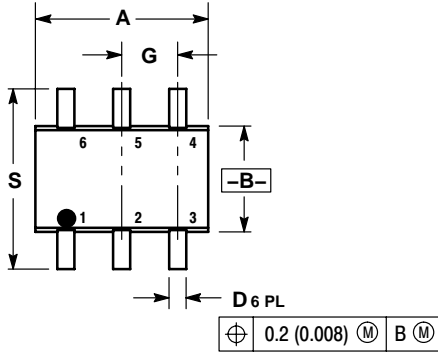
DEVICE ORDERING INFORMATION

| Device Order Number | Device Nomenclature | | | | | | | Package Type (Name/SOT#/ Common Name) | Tape and Reel Size |
|---------------------|-------------------------|--------------------------|-----------------------|------------|-----------------|----------------|--------------------|---------------------------------------|--------------------------|
| | Logic Circuit Indicator | No. of Gates per Package | Temp Range Identifier | Technology | Device Function | Package Suffix | Tape & Reel Suffix | | |
| NL27WZ16DFT2 | NL | 2 | 7 | WZ | 16 | DF | T2 | SC-88 / SOT-363 / SC-70 | 178 mm (7") 3000 Unit |
| NL27WZ16DTT1 | NL | 2 | 7 | WZ | 16 | DT | T1 | TSOP-6 / SOT-23 / SC-59 | 178 mm (7") 3000 Unit |

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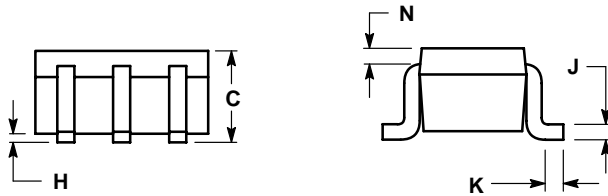
PACKAGE DIMENSIONS

SC70-6/SC-88/SOT-363
 DF SUFFIX
 CASE 419B-02
 ISSUE U

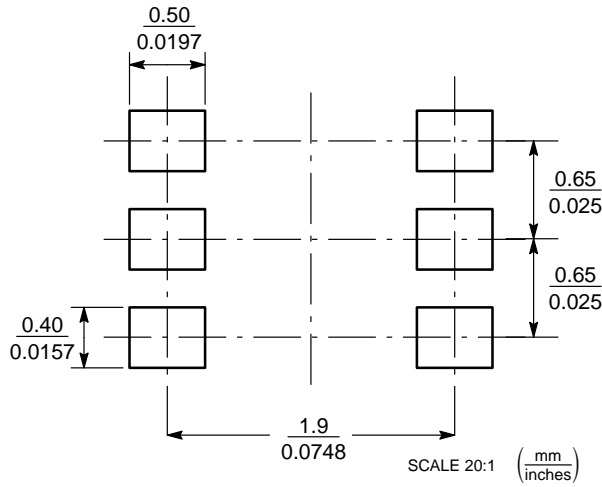


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |



SOLDERING FOOTPRINT*

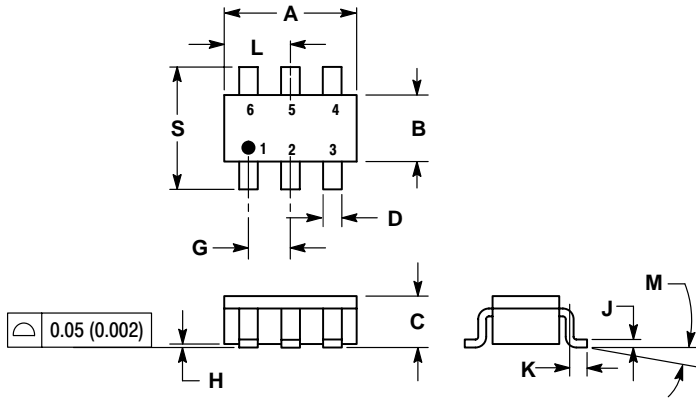


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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PACKAGE DIMENSIONS

SOT23-6/TSOP-6/SC59-6
DT SUFFIX
CASE 318G-02
ISSUE L

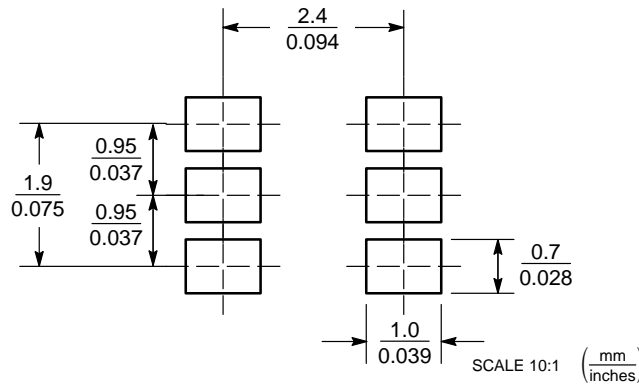


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|--------|
| | MIN | MAX | MIN | MAX |
| A | 2.90 | 3.10 | 0.1142 | 0.1220 |
| B | 1.30 | 1.70 | 0.0512 | 0.0669 |
| C | 0.90 | 1.10 | 0.0354 | 0.0433 |
| D | 0.25 | 0.50 | 0.0098 | 0.0197 |
| G | 0.85 | 1.05 | 0.0335 | 0.0413 |
| H | 0.013 | 0.100 | 0.0005 | 0.0040 |
| J | 0.10 | 0.26 | 0.0040 | 0.0102 |
| K | 0.20 | 0.60 | 0.0079 | 0.0236 |
| L | 1.25 | 1.55 | 0.0493 | 0.0610 |
| M | 0° | 10° | 0° | 10° |
| S | 2.50 | 3.00 | 0.0985 | 0.1181 |

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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