

NL17SZ05

Product Preview

Single Inverter with Open Drain Outputs

The NL17SZ05 is a high performance single inverter with open drain outputs operating from a 1.65 to 5.5 V supply.

The Output stage is open drain with Over Voltage Tolerance. This allows the NL17SZ05 to be used to interface 5.0 V circuits to circuits of any voltage between 0 and +7.0 V.

Features

- Tiny SOT-953 Package
- Extremely High Speed: t_{PD} 2.5 ns (typical) at $V_{CC} = 5.0$ V
- Designed for 1.65 V to 5.5 V V_{CC} Operation, CMOS Compatible
- LVC MOS Compatible
- 24 mA Output Sink Capability, Pullup may be between 0 and 7.0 V
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 20
- These Devices are Pb-Free and are RoHS Compliant

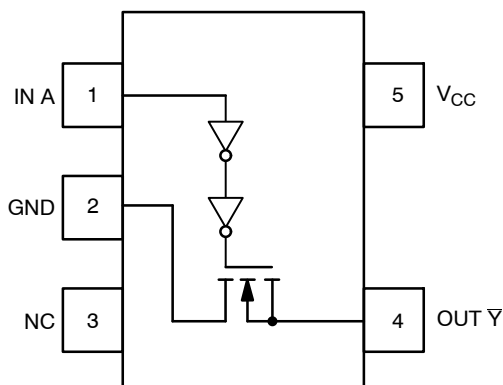


Figure 1. Pinout (Top View)

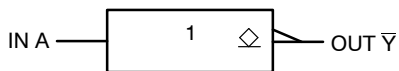


Figure 2. Logic Symbol



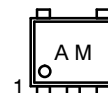
ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAM



SOT-953
CASE 527AE



A = Specific Device Code
M = Month Code

PIN ASSIGNMENT

| Pin | Function |
|-----|---------------|
| 1 | IN A |
| 2 | GND |
| 3 | NC |
| 4 | OUT \bar{Y} |
| 5 | V_{CC} |

FUNCTION TABLE

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

ORDERING INFORMATION

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

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

NL17SZ05

MAXIMUM RATINGS

| 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 at High or Low State Power-Down Mode (V _{CC} = 0 V) | −0.5 to V _{CC} + 0.5 −0.5 to +0.5 | 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 SOT-353 SOT-553 | 186 135 | mW |
| θ _{JA} | Thermal Resistance SOT-353 SOT-553 | 350 496 | °C/W |
| T _L | Lead Temperature, 1 mm from Case for 10 Seconds | 260 | °C |
| T _J | Junction Temperature Under Bias | +150 | °C |
| MSL | Moisture Sensitivity | Level 1 | |
| F _R | Flammability Rating Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in | |
| ESD | ESD Classification Human Body Model (Note 1) Machine Model (Note 2) Charged Device Model (Note 3) | Class IC Class A N/A | |
| I _{Latch-Up} | Latchup Performance Above V _{CC} and Below GND at 85°C (Note 3) | ±500 | mA |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Tested to EIA/JESD22-A115-A, rated to EIA/JESD22-A115-A.
2. Tested to JESD22-C101-A.
3. 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 (Z or LOW State) | 0 | V _{CC} | V |
| T _A | Operating Free-Air Temperature | −55 | +125 | °C |
| Δt/ΔV | Input Transition Rise or Fall Rate 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 | 20 10 5 | ns/V |

DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Condition | V _{CC} (V) | T _A = 25°C | | | -55°C ≤ T _A ≤ 125°C | | Unit |
|------------------|--|--|----------------------------|---|------|---|---|---|------|
| | | | | 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 |
| I _{LKG} | Z-State Output Leakage Current | V _{IN} = V _{IL} V _{OUT} = V _{CC} or GND | 2.3 to 5.5 | | | ±5.0 | | ±10.0 | μA |
| V _{OL} | Low-Level Output Voltage V _{IN} = V _{IH} or V _{IL} | I _{OL} = 100 μA | 1.65 to 5.5 | | 0.0 | 0.1 | | 0.1 | V |
| | | I _{OL} = 4 mA | 1.65 | | 0.08 | 0.24 | | 0.24 | |
| | | I _{OL} = 8 mA | 2.3 | | 0.22 | 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} = 5.5 V or GND | 0 to 5.5 | | | ±0.1 | | ±1.0 | μA |
| I _{OFF} | Power Off Leakage Current | V _{IN} = 5.5 V or V _{OUT} = 5.5 V | 0 | | | 1.0 | | 10 | μA |
| I _{CC} | Quiescent Supply Current | V _{IN} = 5.5 V or GND | 5.5 | | | 1.0 | | 10 | μA |

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 | | | -55°C ≤ T _A ≤ 125°C | | Unit |
|------------------|---------------------------------------|---|---------------------|-----------------------|-----|------|--------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PZL} | Propagation Delay (Figure 3 and 4) | R _L = R ₁ = 500 Ω, C _L = 50 pF | 1.65 | 0.8 | 5.3 | 11.6 | 0.8 | 12.0 | ns |
| | | | 2.5 ± 0.2 | 0.8 | 3.0 | 3.6 | 0.8 | 4.1 | |
| | | | 3.3 ± 0.3 | 0.8 | 2.4 | 3.2 | 0.8 | 3.7 | |
| | | | 5.0 ± 0.5 | 0.5 | 2.4 | 3.0 | 0.5 | 3.5 | |
| t _{PLZ} | Propagation Delay (Figure 3 and 4) | R _L = R ₁ = 500 Ω, C _L = 50 pF | 1.65 | 0.8 | 5.3 | 11.6 | 0.8 | 12.0 | ns |
| | | | 2.5 ± 0.2 | 0.8 | 2.5 | 3.6 | 0.8 | 4.1 | |
| | | | 3.3 ± 0.3 | 0.8 | 2.1 | 3.2 | 0.8 | 3.7 | |
| | | | 5.0 ± 0.5 | 0.5 | 1.2 | 3.0 | 0.5 | 3.5 | |

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} | 4.0 | pF |
| C _{PD} | Power Dissipation Capacitance (Note 4) | 10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC} | 4.0 | pF |

4. 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}.

NL17SZ05

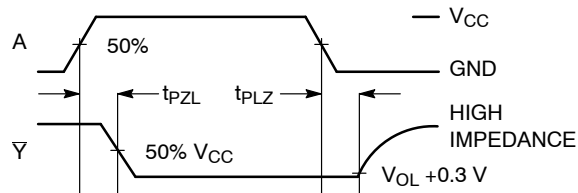


Figure 3. Switching Waveforms

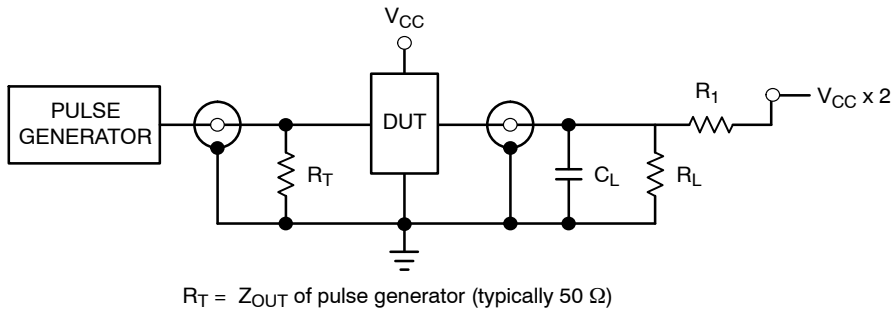


Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

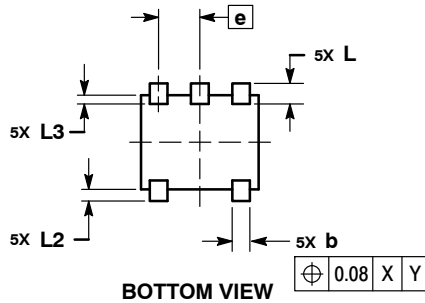
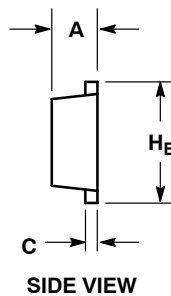
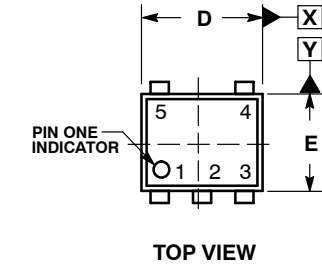
| Device Order Number | Package Type | Shipping [†] |
|---------------------|----------------------|-----------------------|
| NL17SZ05P5T5G | SOT-953 (Pb-Free) | 8000 / Tape & Reel |

[†]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.

NL17SZ05

PACKAGE DIMENSIONS

SOT-953
CASE 527AE
ISSUE E

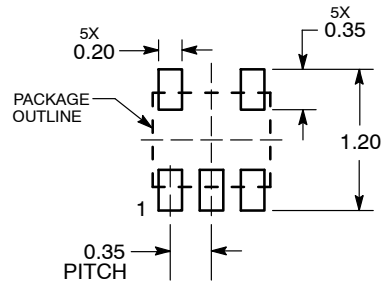


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.


| MILLIMETERS | | | |
|----------------|-----------|------|------|
| DIM | MIN | NOM | MAX |
| A | 0.34 | 0.37 | 0.40 |
| b | 0.10 | 0.15 | 0.20 |
| C | 0.07 | 0.12 | 0.17 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.75 | 0.80 | 0.85 |
| e | 0.35 BSC | | |
| H _E | 0.95 | 1.00 | 1.05 |
| L | 0.175 REF | | |
| L2 | 0.05 | 0.10 | 0.15 |
| L3 | 0.05 | 0.10 | 0.15 |

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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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