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 $V_{CC} = 5.0 \text{ V}$
- Designed for 1.65 V to 5.5 V V_{CC} Operation, CMOS Compatible
- LVCMOS 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

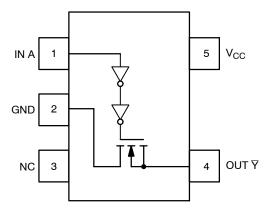


Figure 1. Pinout (Top View)

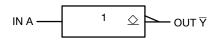


Figure 2. Logic Symbol



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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 ₹	
5	V _{CC}	

FUNCTION TABLE

A Input	▼ Output	
L	Z	
Н	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.

MAXIMUM RATINGS

Symbol	C	haracteristics	Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +7.0	V
VI	DC Input Voltage		$-0.5 \le V_{ } \le +7.0$	V
V _O	DC Output Voltage	Output at High or Low State Power–Down Mode ($V_{CC} = 0 \text{ V}$)	-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
Io	DC Output Sink Current		±50	mA
I _{CC}	DC Supply Current Per Supply P	in	±100	mA
I _{GND}	DC Ground Current Per Ground I	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
TL	Lead Temperature, 1 mm from Ca	ase for 10 Seconds	260	°C
TJ	Junction Temperature Under Bias	5	+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.

- Tested to EIA/JESD22-A115-A, rated to EIA/JESD22-A115-A.
 Tested to JESD22-C101-A.
 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
VI	Input Voltage		0	5.5	V
Vo	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	$V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ $V_{CC} = 3.0 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	0 0 0	20 10 5	ns/V

DC ELECTRICAL CHARACTERISTICS

			V _{CC}	T _A = 25°C		$T_A = 25^{\circ}C$ $-55^{\circ}C \le T_A \le 125^{\circ}C$		-55°C ≤ T _A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Unit
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	μΑ
V _{OL}	Low-Level Output	I _{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
	Voltage V _{IN} = V _{IH} or V _{II}	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	μА
l _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0			1.0		10	μΑ
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5			1.0		10	μΑ

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

			$T_A = 25^{\circ}C$ $-55^{\circ}C \le T_A \le 125^{\circ}$		T _A = 25°C		_A ≤ 125°C		
Symbol	Parameter	Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Unit
t _{PZL}	Propagation Delay	$R_{L} = R_1 = 500 \Omega, C_L = 50 pF$	1.65	0.8	5.3	11.6	0.8	12.0	ns
	(Figure 3 and 4)		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	$R_{L} = R_1 = 500 \Omega, C_L = 50 pF$	1.65	0.8	5.3	11.6	0.8	12.0	ns
	(Figure 3 and 4)	(Figure 3 and 4)	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}.

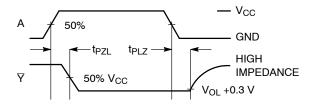
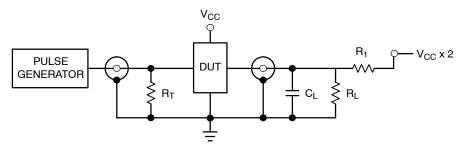


Figure 3. Switching Waveforms



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

Figure 4. Test Circuit

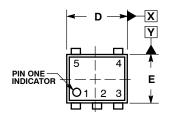
DEVICE ORDERING INFORMATION

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

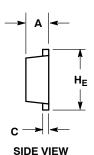
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

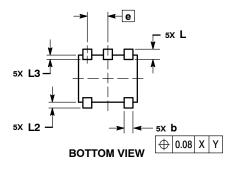
PACKAGE DIMENSIONS

SOT-953 CASE 527AE ISSUE E



TOP VIEW



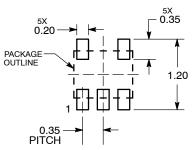


NOTES

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

	MILLIMETERS						
DIM	MIN	NOM	MAX				
Α	0.34	0.37	0.40				
b	0.10	0.15	0.20				
С	0.07	0.12	0.17				
D	0.95	1.00	1.05				
E	0.75	0.80	0.85				
е		0.35 BS	С				
HE	0.95	1.00	1.05				
L	(0.175 RE	F				
L2	0.05	0.10	0.15				
L3			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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