

NL37WZ04

Triple Inverter

The NL37WZ04 is a high performance triple inverter operating from a 1.65 V to 5.5 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance.

Features

- Extremely High Speed: t_{PD} 2.0 ns (typical) at $V_{CC} = 5$ V
- Designed for 1.65 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
- LVCMS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72
- Pb-Free Package is Available

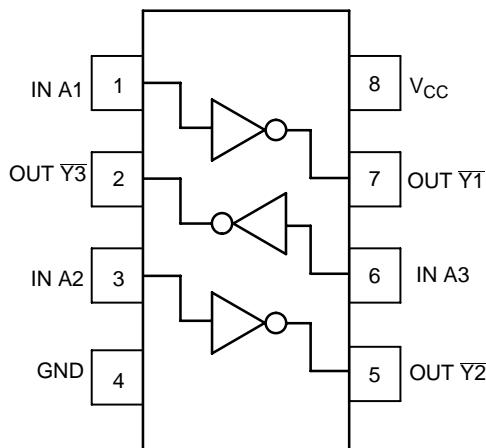


Figure 1. Pinout (Top View)

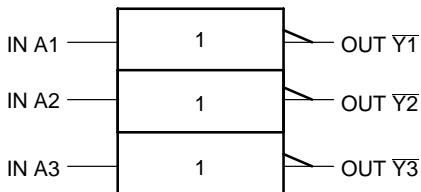


Figure 2. Logic Symbol

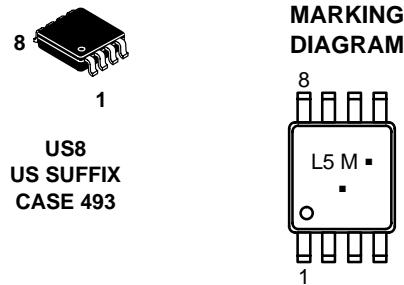


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US8
US SUFFIX
CASE 493



L5 = Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

PIN ASSIGNMENT

1	IN A1
2	OUT Y3
3	IN A2
4	GND
5	OUT Y2
6	IN A3
7	OUT Y1
8	V _{CC}

FUNCTION TABLE

A Input	Y Output
L	H
H	L

ORDERING INFORMATION

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

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
θ_{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) Machine Model (Note 3) Charged Device Model (Note 4)	>2000 >200 N/A	V

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. 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 Data Retention Only	1.65 1.5	5.5 5.5	V
V_I	Input Voltage (Note 5)	0	5.5	V
V_O	Output Voltage (HIGH or LOW State)	0	V_{CC}	V
T_A	Operating Free–Air Temperature	−40	+85	°C
$\Delta t/\Delta V$	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

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			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65	0.75 V _{CC}			0.75 V _{CC}		V
			2.3 to 5.5	0.7 V _{CC}			0.7 V _{CC}		
V _{IL}	Low-Level Input Voltage		1.65			0.25 V _{CC}		0.25 V _{CC}	V
			2.3 to 5.5			0.3 V _{CC}		0.3 V _{CC}	
V _{OH}	High-Level Output Voltage V _{IN} = V _{IL}	I _{OH} = -100 µA	1.65 to 5.5	V _{CC} - 0.1	V _{CC}		V _{CC} - 0.1		V
		I _{OH} = -3 mA	1.65	1.29	1.52		1.29		
		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}	I _{OL} = 100 µA	1.65 to 5.5			0.1		0.1	V
		I _{OL} = 3 mA	1.65		0.08	0.24		0.24	
		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	1.65 to 5.5			1		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			-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	4.4	9.5	2.0	10	ns
		R _L = 1 MΩ, C _L = 15 pF	2.5 ± 0.2	1.2	5.0	5.7	1.2	6.1	
		R _L = 1 MΩ, C _L = 15 pF	3.3 ± 0.3	0.8	2.2	3.4	0.8	3.8	
		R _L = 500 Ω, C _L = 50 pF		1.2	3.9	4.5	1.2	5.0	
		R _L = 1 MΩ, C _L = 15 pF	5.0 ± 0.5	0.5	1.8	2.8	0.5	3.1	
		R _L = 500 Ω, C _L = 50 pF		0.8	2.3	3.6	0.8	4.0	

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 _{PD}	Power Dissipation Capacitance (Note 6)	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	

6. 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}.

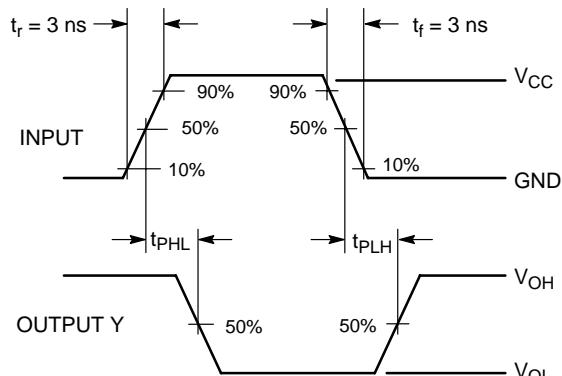


Figure 3. Switching Waveform

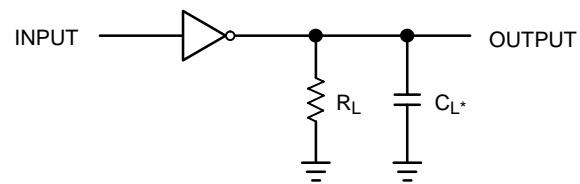


Figure 4. Test Circuit

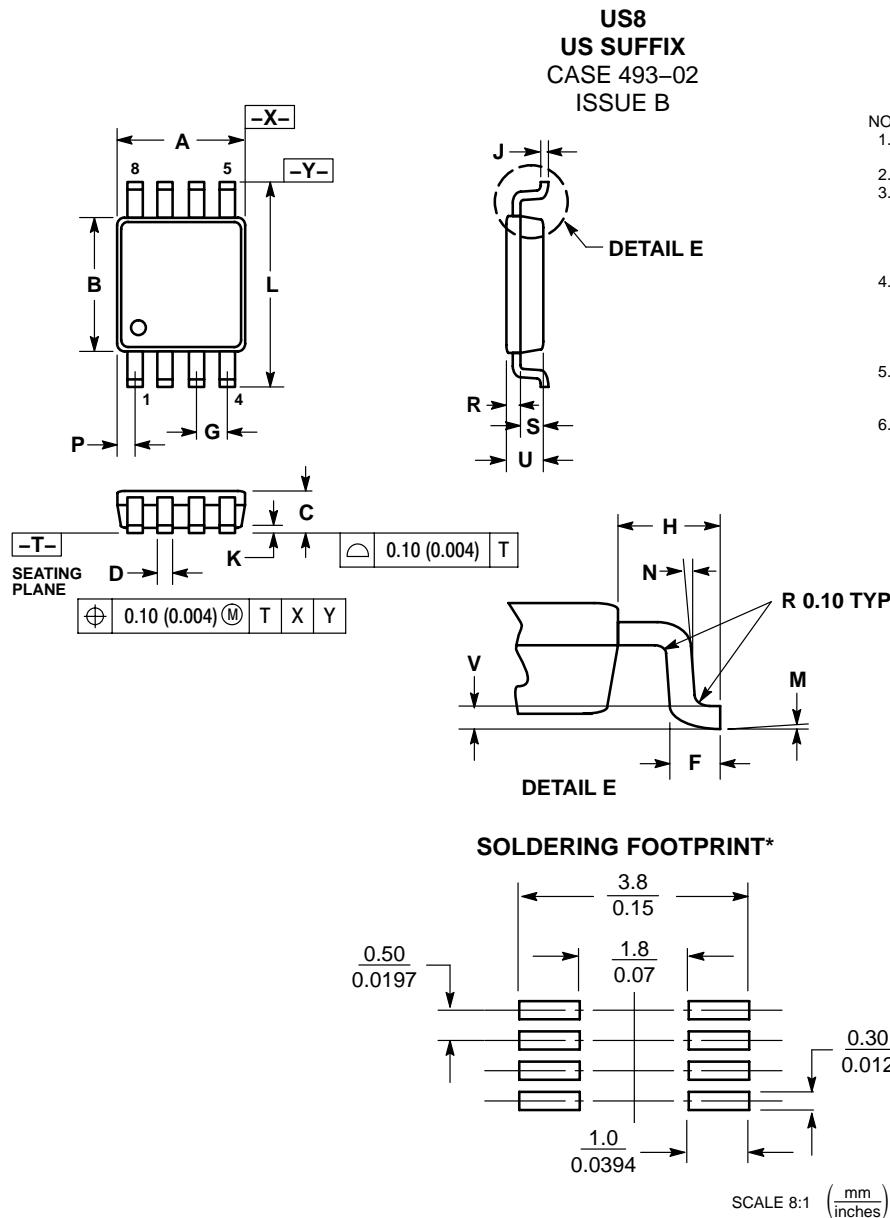
* C_L includes all probe and jig capacitances.
A 1-MHz square input wave is recommended for propagation delay tests.

DEVICE ORDERING INFORMATION

Device Order Number	Package Type	Tape and Reel Size [†]
NL37WZ04US	US8	178 mm, 3000 Units / Tape & Reel
NL37WZ04USG	US8 (Pb-Free)	178 mm, 3000 Units / 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



*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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