NL37WZ16

Triple Buffer

The NL37WZ16 is a high performance buffer with inputs operating from a 2.3 to 5.5 V supply.

The NL37WZ16 can be used as a line receiver which will receive slow input signals.

- 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
- Current Drive Capability is 24 mA at the Outputs
- Chip Complexity: FET = 94

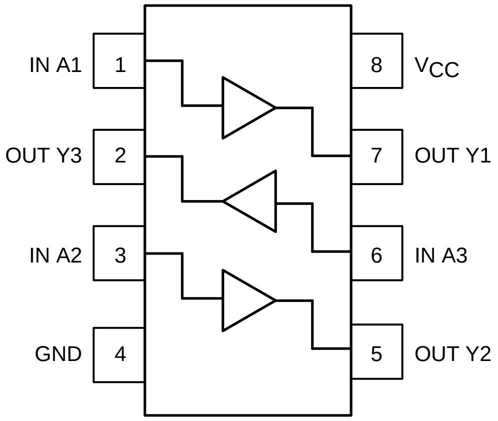

Figure 1. Pinout (Top View)

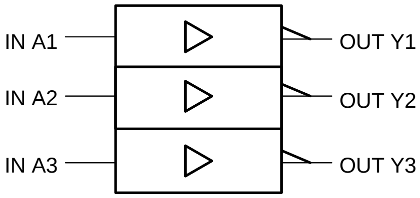

Figure 2. Logic Symbol

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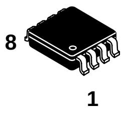
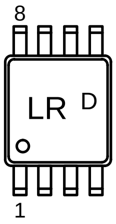
MARKING DIAGRAM



US8
US SUFFIX
CASE 493–01



D = Date Code

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	$\overline{Y}$ Output
L	L
H	H

ORDERING INFORMATION

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

August, 2001 – Rev. 0

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to $+7.0$	V
V_I	DC Input Voltage	$-0.5 \leq V_I \leq +7.0$	V
V_O	DC Output Voltage Output in Z or LOW State (Note 1)	$-0.5 \leq V_O \leq 7.0$	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 2)	333	°C/W
P_D	Power Dissipation in Still Air at 85°C	200	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 3) Machine Model (Note 4) Charged Device Model (Note 5)	> 2000 > 200 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. I_O absolute maximum rating must be observed.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm–by–1 inch, 2–ounce copper trace with no air flow.
3. Tested to EIA/JESD22–A114–A.
4. Tested to EIA/JESD22–A115–A.
5. Tested to JESD22–C101–A.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage Operating Data Retention Only	2.3 1.5	5.5 5.5	V
V_I	Input Voltage (Note 6)	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 $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ $V_{CC} = 3.0\text{ V} \pm 0.3\text{ V}$ $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	0 0 0	20 10 5	ns/V

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

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25°C$			$-40°C \leq T_A \leq 85°C$		Unit
				Min	Typ	Max	Min	Max	
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 $V_{IN} = V_{IH}$ or V_{IL}	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

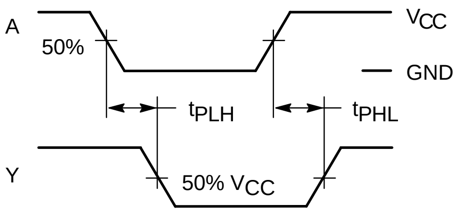
AC ELECTRICAL CHARACTERISTICS $t_R = t_F = 2.5$ ns; $C_L = 50$ pF; $R_L = 500\ \Omega$

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25°C$			$-40°C \leq T_A \leq 85°C$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure 3 and 4)	R_L = 1 MΩ, C_L = 15 pF	2.5 ± 0.2	1.0	3.0	5.2	1.0	5.8	ns
		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

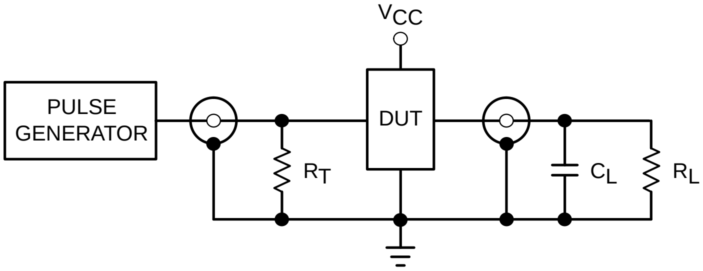
Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	7.0	pF
C_{PD}	Power Dissipation Capacitance (Note NO TAG)	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC} 10 MHz, V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	9 11	pF

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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.



PROPAGATION DELAYS
$t_R = t_F = 2.5$ ns, 10% to 90%; f = 1 MHz; $t_W = 500$ ns

Figure 3. Switching Waveforms



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

Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

	Device Nomenclature							
Device Order Number	**Logic Circuit Indicator**	**No. of Gates per Package**	**Temp Range Identifier**	**Technology**	**Device Function**	**Package Suffix**	**Package Type**	**Tape and Reel Size**
NL37WZ16US	NL	3	7	WZ	16	US	US8	178 mm, 3000 Unit

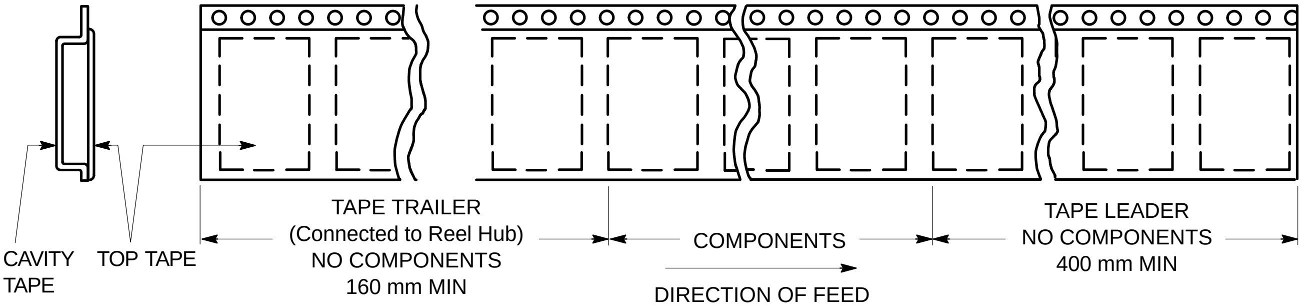


Figure 5. Tape Ends for Finished Goods

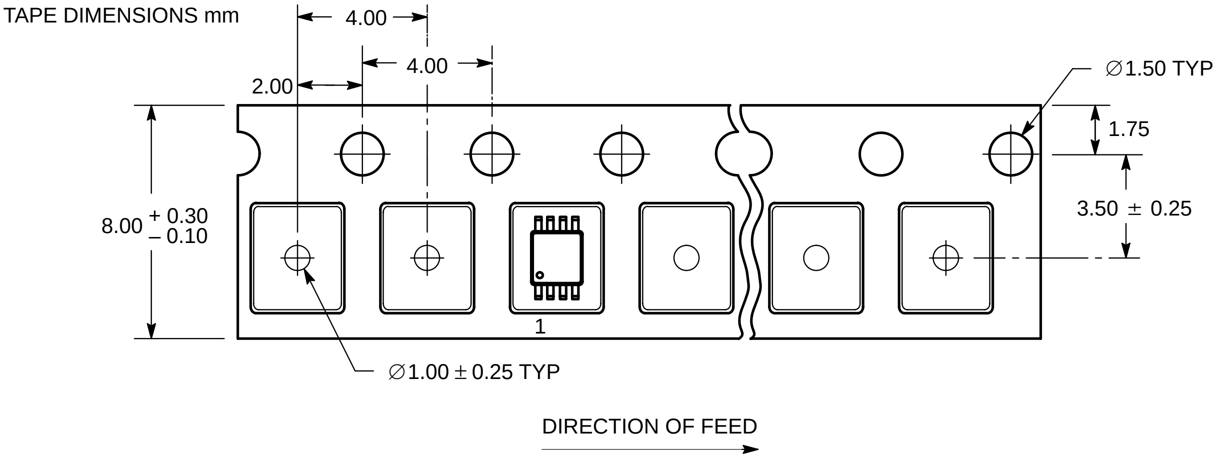


Figure 6. US8 Reel Configuration/Orientation

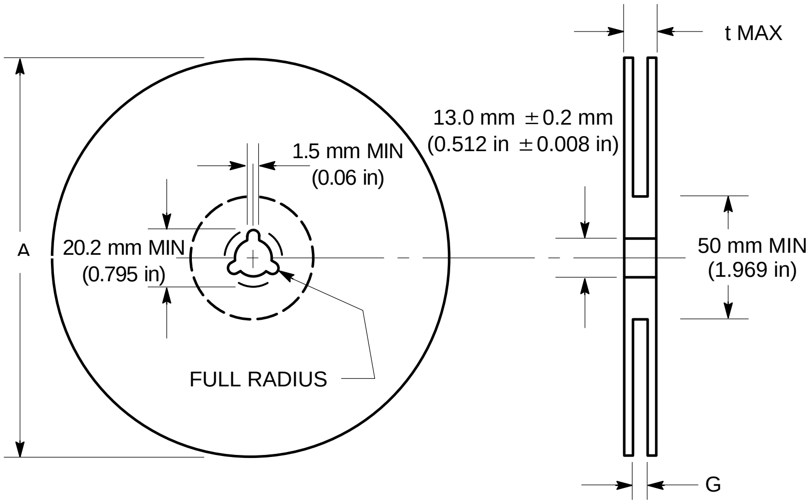


Figure 7. Reel Dimensions

REEL DIMENSIONS

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

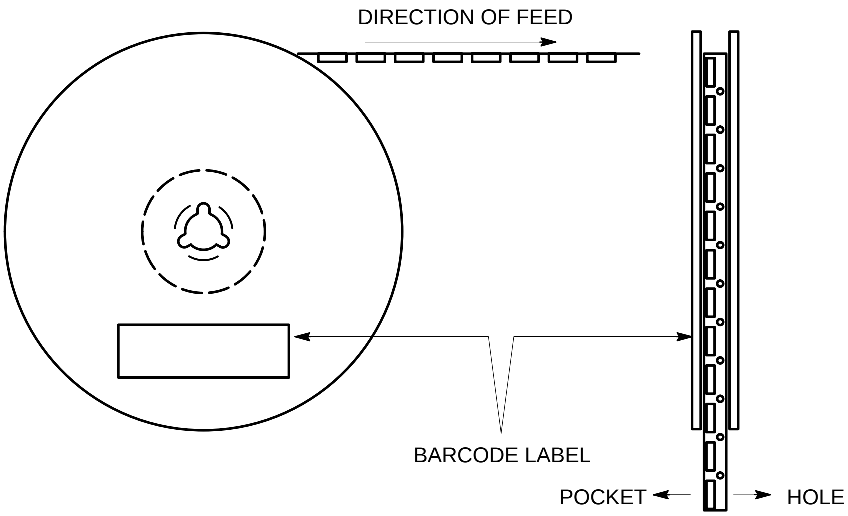
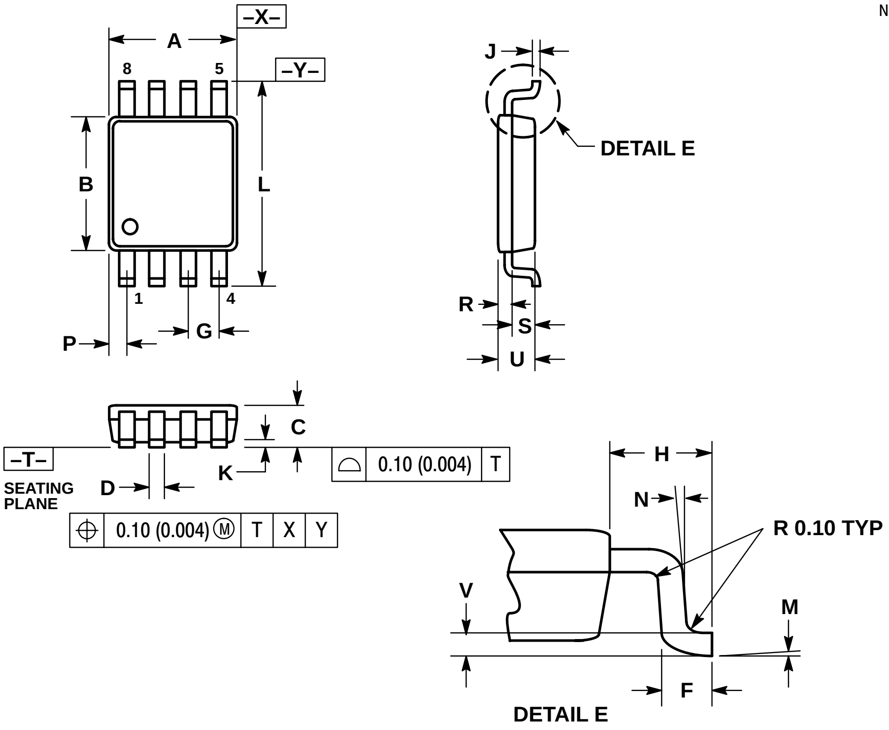


Figure 8. Reel Winding Direction

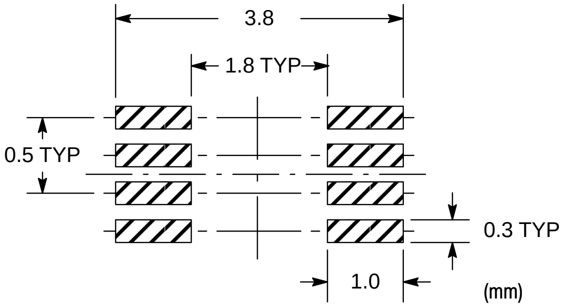
PACKAGE DIMENSIONS

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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