NL37WZ07

Triple Buffer with Open Drain Outputs

The NL37WZ07 is a high performance triple buffer with open drain outputs operating from a 1.65 V to 5.5 V supply.

The internal circuit is composed of multiple stages, including an open drain output which provides the capability to set output switching level. This allows the NL37WZ07 to be used to interface 5 V circuits to circuits of any voltage between V_{CC} and 7 V using an external resistor and power supply.

- Extremely High Speed: t_{PD} 2.5 ns (typical) at V_{CC} = 5 V

- Designed for 1.65 V to 5.5 V V_{CC} Operation

- Over Voltage Tolerant Inputs

- LVTTL Compatible – Interface Capability with 5 V TTL Logic with V_{CC} = 3 V

- LVCMOS Compatible

- 24 mA Output Sink Capability @ 3.0 V

- Near Zero Static Supply Current Substantially Reduces System Power Requirements
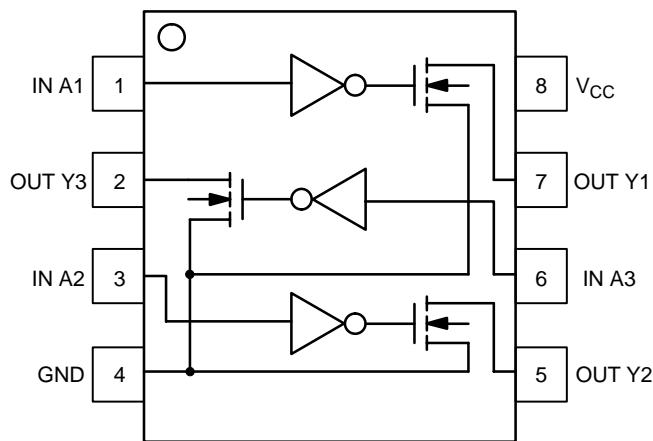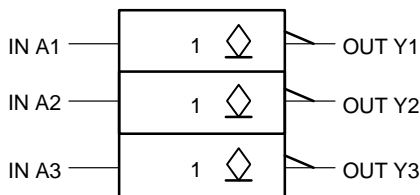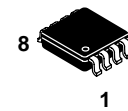
- Chip Complexity: FET = 72

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MARKING DIAGRAM

US8
US SUFFIX
CASE 493

L7 D

L7 = Device Code
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}

Figure 1. Pinout

Figure 2. Logic Symbol

FUNCTION TABLE

A Input	Y Output
L	L
H	Z

ORDERING INFORMATION

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

NL37WZ07

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 > 150 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. 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	$V_{CC} = 2.5$ 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

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

NL37WZ07

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25°C$ Min	$T_A = 25°C$ Typ	$T_A = 25°C$ Max	$-40°C \leq T_A \leq 85°C$ Min	$-40°C \leq T_A \leq 85°C$ Max	Unit
V_{IH}	High–Level Input Voltage		1.65 to 1.95 2.3 to 5.5	0.7 V_{CC} 0.7 V_{CC}			0.7 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	1.65 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		0.20	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} or $V_{OUT} = V_{CC}$ 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)	$T_A = 25°C$ Min	$T_A = 25°C$ Typ	$T_A = 25°C$ Max	$-40°C \leq T_A \leq 85°C$ Min	$-40°C \leq T_A \leq 85°C$ Max	Unit
t_{PZL}	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	1.8 ± 0.15			7.8		7.8	ns
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	2.5 ± 0.2	1.2	3.7	5.8	1.2	6.4	
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	3.3 ± 0.3	0.8	2.9	4.4	0.8	4.8	
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	5.0 ± 0.5	0.5	2.3	3.5	0.5	3.9	
t_{PLZ}	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	1.8 ± 0.15			7.8		7.8	ns
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	2.5 ± 0.2	1.2	2.8	5.8	1.2	6.4	
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	3.3 ± 0.3	0.8	2.1	4.4	0.8	4.8	
		$R_L = R_1 = 500 \Omega$, $C_L = 50$ pF	5.0 ± 0.5	0.5	1.4	3.5	0.5	3.9	

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 6)	10 MHz, $V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	4.0	pF

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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.
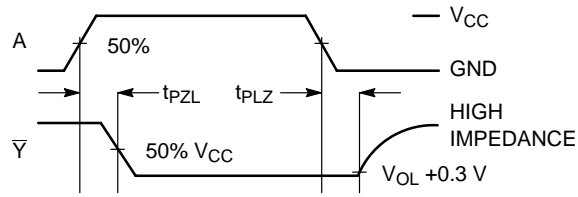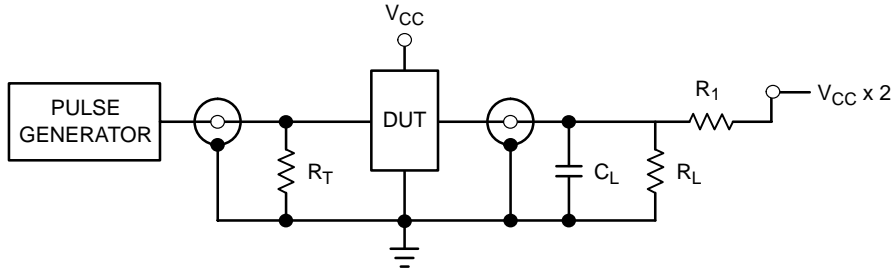
NL37WZ07

Figure 3. Switching Waveforms

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

Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

| Device Order Number | Device Nomenclature | | | | | | Package Type | Tape and Reel Size |
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix		
NL37WZ07US	NL	3	7	WZ	07	US	US8	178 mm (7″) 3000 Unit

NL37WZ07
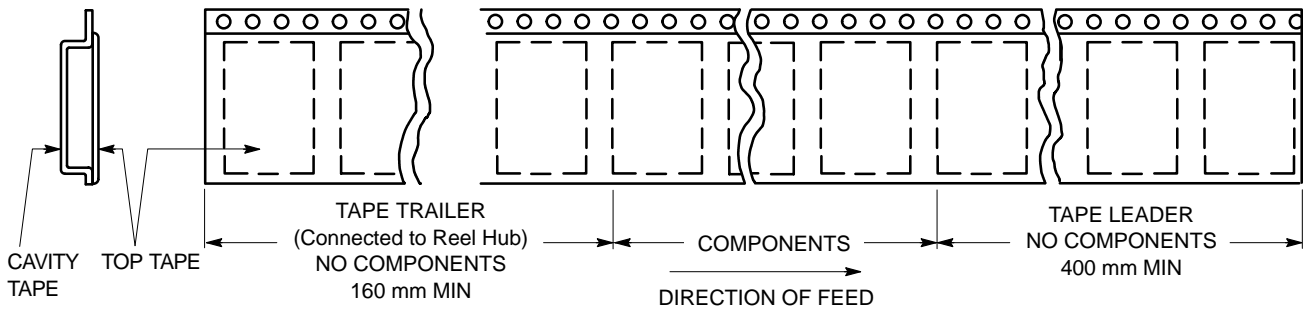
Figure 5. Tape Ends for Finished Goods

CAVITY TAPE

TOP TAPE

TAPE TRAILER
(Connected to Reel Hub)
NO COMPONENTS
160 mm MIN

COMPONENTS

DIRECTION OF FEED

TAPE LEADER
NO COMPONENTS
400 mm MIN
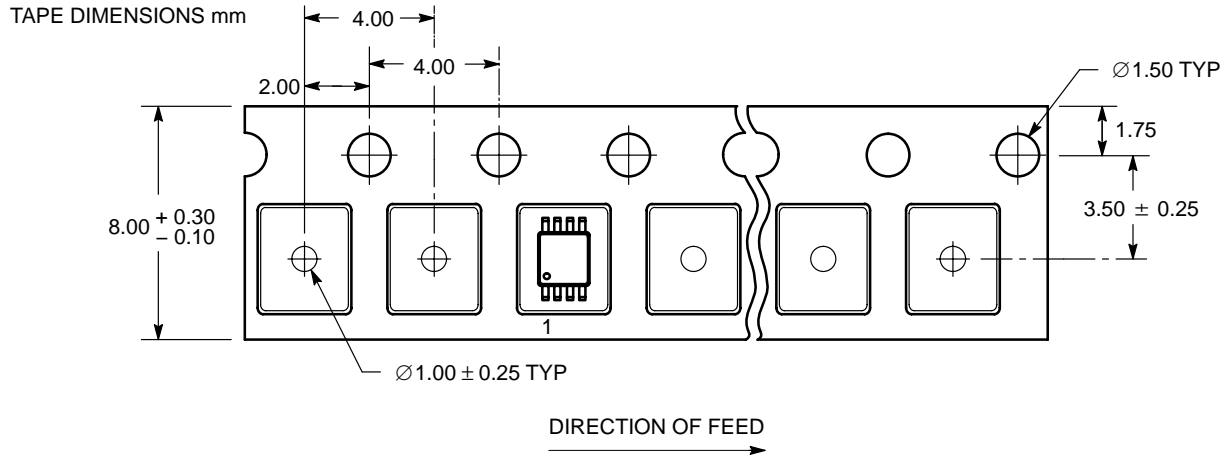
Figure 6. US8 Reel Configuration/Orientation

TAPE DIMENSIONS mm

4.00

4.00

2.00

$\varnothing$1.50 TYP

1.75

3.50 ± 0.25

$8.00 \begin{smallmatrix} +0.30 \\ -0.10 \end{smallmatrix}$

$\varnothing$1.00 ± 0.25 TYP

DIRECTION OF FEED
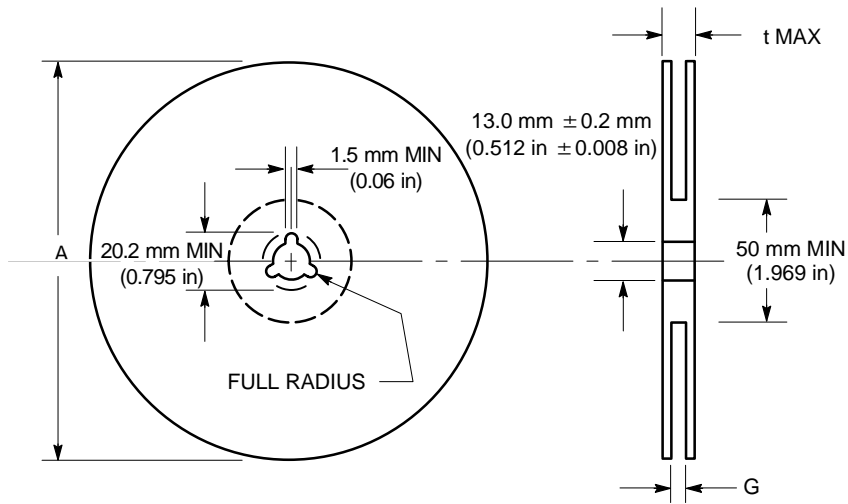
NL37WZ07

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)

DIRECTION OF FEED

BARCODE LABEL

POCKET ← → HOLE
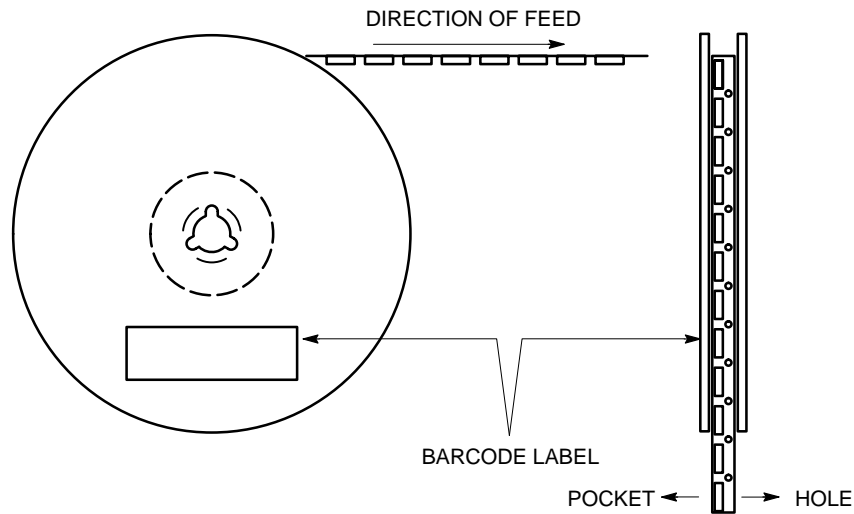
Figure 8. Reel Winding Direction

PACKAGE DIMENSIONS

US8
US SUFFIX
CASE 493−02
ISSUE A
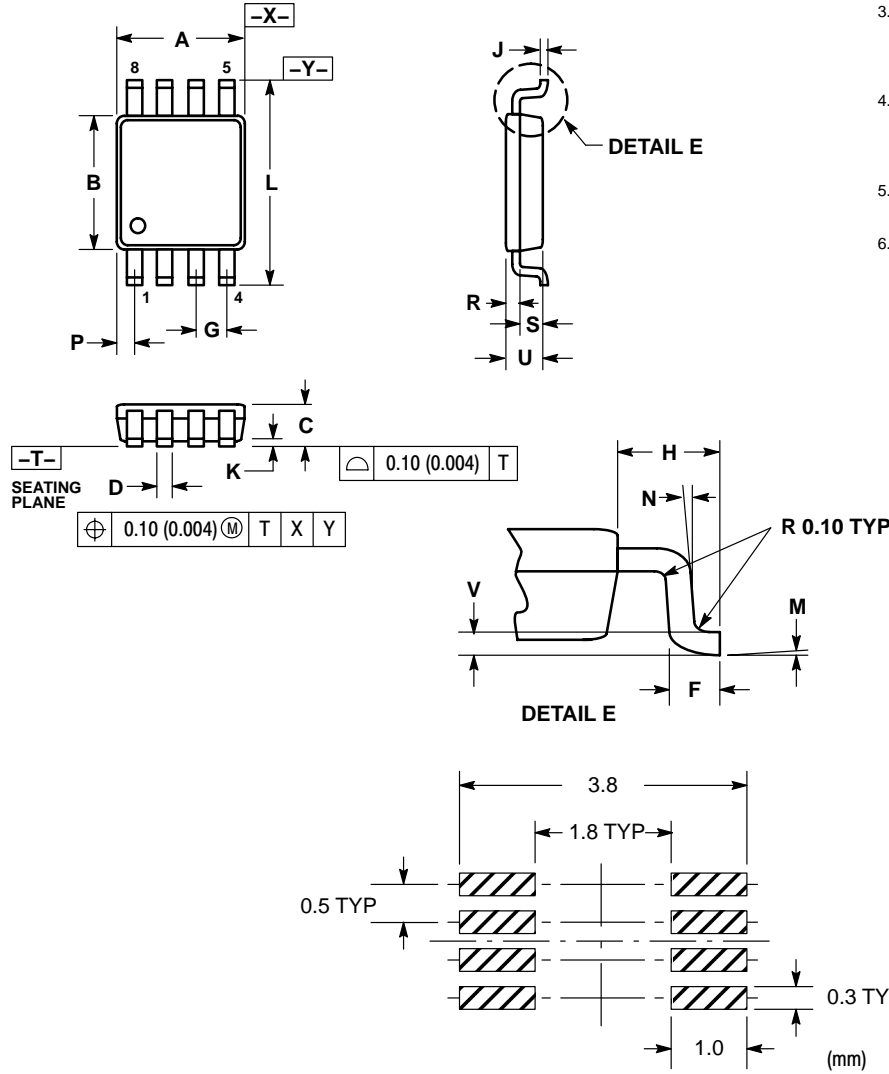
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH. PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER−LEAD FLASH 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 ").
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (0.0002 ").

DETAIL E

SEATING PLANE

0.10 (0.004) T

0.10 (0.004) (M) T X Y

R 0.10 TYP

DETAIL E

DIM	MILLIMETERS		INCHES	
	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	0.23	0.34	0.010	0.013
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	

3.8

1.8 TYP

0.5 TYP

0.3 TYP

1.0

(mm)

NL37WZ07

PUBLICATION ORDERING INFORMATION