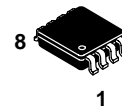# NL27WZ125

Dual Buffer with 3-State Outputs

The NL27WZ125 is a high performance dual noninverting buffer operating from a 1.65 V to 5.5 V supply.

- Extremely High Speed: t_{PD} 2.6 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
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- 3–State OE Input is Active–Low
- Replacement for NC7WZ125
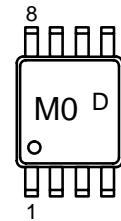- Chip Complexity = 72 FETs

MARKING DIAGRAM

8
1

US8
US SUFFIX
CASE 493–01

8

M0 ^{D}

1

D = Date Code

ORDERING INFORMATION
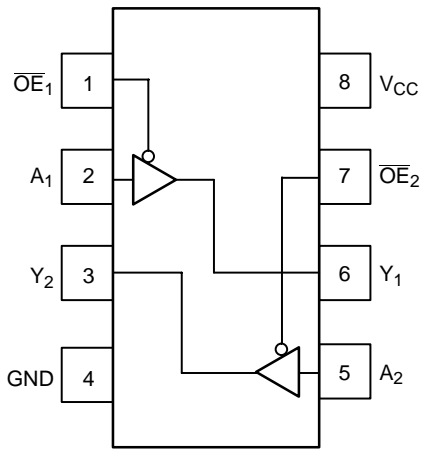
Figure 1. Pinout (Top View)

Figure 2. Logic Symbol

PIN ASSIGNMENT

Pin	Function
1	$\overline{OE}_1$
2	A_1
3	Y_2
4	GND
5	A_2
6	Y_1
7	$\overline{OE}_2$
8	V_{CC}
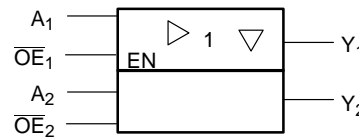
FUNCTION TABLE

Input		Output
$\overline{OE}_n$	A_n	Y_n
L	L	L
L	H	H
H	X	Z

X = Don't Care
n = 1, 2

NL27WZ125

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 Output in High Impedance State Output in HIGH or LOW State		 -0.5 to $+7.0$ -0.5 to V$_{CC}$ + 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
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

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	5.5	V
T$_A$	Operating Free–Air Temperature		-40	$+85$	°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

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

NL27WZ125

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 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 2.3 to 5.5			0.25 V_{CC} 0.3 V_{CC}		0.25 V_{CC} 0.3 V_{CC}	V
V_{OH}	High–Level Output Voltage V_{IN} = V_{IL} or V_{IH}	I_{OH} = 100 μA I_{OH} = −3 mA I_{OH} = −8 mA I_{OH} = −12 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	V_{CC} − 0.1 1.29 1.9 2.2 2.4 2.3 3.8	V_{CC} 1.52 2.1 2.4 2.7 2.5 4.0		V_{CC}−0.1 1.29 1.9 2.2 2.4 2.3 3.8		V
V_{OL}	Low–Level Output Voltage V_{IN} = V_{IL}	I_{OL} = 100 μA I_{OL} = 3 mA I_{OL} = 8 mA I_{OL} = 12 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 32 mA	1.65 to 5.5 2.3 2.7 3.0 3.0 4.5		0.08 0.20 0.22 0.28 0.38 0.42	0.1 0.24 0.3 0.4 0.4 0.55 0.55		0.1 0.24 0.3 0.4 0.4 0.55 0.55	V
I_{IN}	Input Leakage Current	V_{IN} = V_{CC} or GND	5.5			± 0.1		± 1.0	μA
I_{OFF}	Power Off Leakage Current	V_{OUT} = 5.5 V V_{IN} = 5.5 V	0			1.0		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	5.5			1.0		10	μA
I_{OZ}	3–State Output Leakage	V_{IN} = V_{IL} or V_{IH} 0V $\leq V_{OUT} \leq$ 5.5 V	2.3 to 5.5			± 0.5		± 5	μA

AC ELECTRICAL CHARACTERISTICS (t_R = t_F = 3.0 ns)

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_{PLH} t_{PHL}	Propagation Delay AN to YN (Figures 3 and 4)	R_L = 1 MΩ	C_L = 15 pF	1.8 ± 0.15 2.5 ± 0.2	2.0 1.0		12 7.5	2.0 1.0	13 8	ns
		R_L = 1 MΩ	C_L = 15 pF	3.3 ± 0.3	0.8		5.2	0.8	5.5	
		R_L = 500 Ω	C_L = 50 pF		1.2		5.7	1.2	6.0	
		R_L = 1 MΩ	C_L = 15 pF	5.0 ± 0.5	0.5		4.5	0.5	4.8	
		R_L = 500 Ω	C_L = 50 pF		0.8		5.0	0.8	5.3	
t_{OSLH} t_{OSHL}	Output to Output Skew (Note 6)	R_L = 500 Ω	C_L = 50 pF	3.3 ± 0.3			1.0		1.0	ns
		R_L = 500 Ω	C_L = 50 pF	5.0 ± 0.5			0.8		0.8	
t_{PZH} t_{PZL}	Output Enable Time (Figures 5, 6 and 7)			1.8 ± 0.15 2.5 ± 0.2	3.0 1.8		14 8.5	3.0 1.8	15 9.0	ns
				3.3 ± 0.3	1.2		6.2	1.2	6.5	
				5.0 ± 0.5	0.8		5.5	0.8	5.8	
t_{PHZ} t_{PLZ}	Output Enable Time (Figures 5, 6 and 7)			1.8 ± 0.15 2.5 ± 0.2	2.5 1.5		12 8.0	2.5 1.5	13 8.5	ns
				3.3 ± 0.3	0.8		5.7	0.8	6.0	
				5.0 ± 0.5	0.3		4.7	0.3	5.0	

6. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. This specification applies to any outputs switching in the same direction, either HIGH–to–LOW (t_{OSHL}) or LOW–to–HIGH (t_{OSLH}); parameter guaranteed by design.

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_{OUT}	Output Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	7.0	pF
C_{PD}	Power Dissipation Capacitance (Note 7)	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}	18 27	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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.
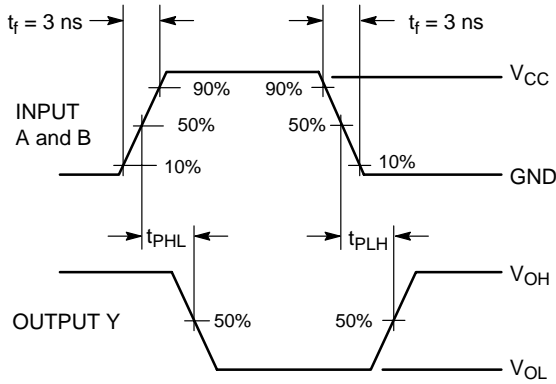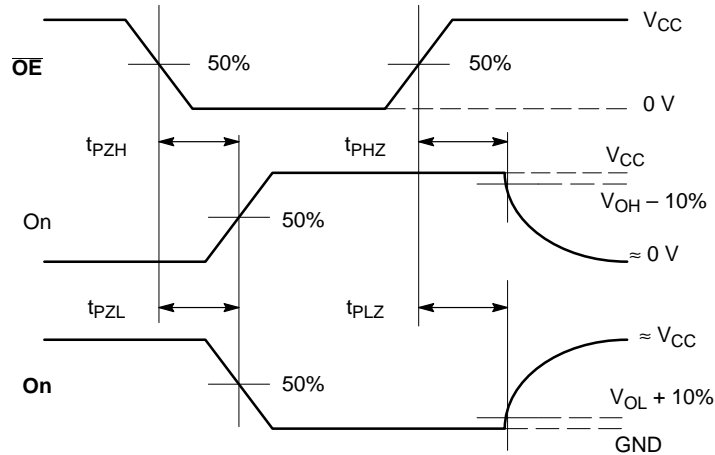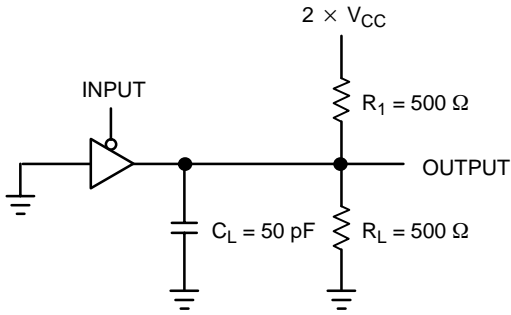

Figure 3. Switching Waveform
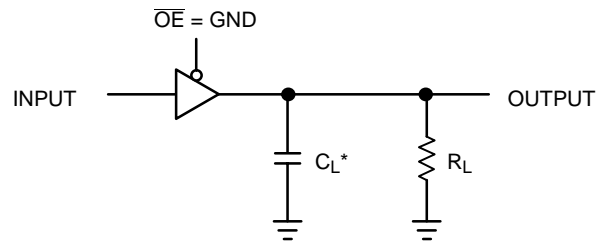
*Includes all probe and jig capacitance. A 1 MHz square input wave is recommended for propagation delay tests.
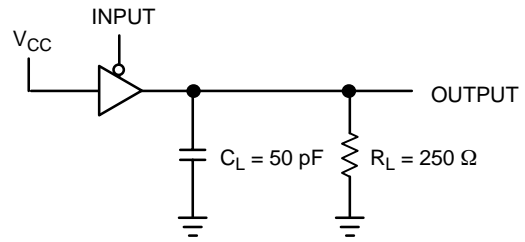
Figure 4. T$_{PLH}$ or T$_{PHL}$

Figure 5. AC Output Enable and Disable Waveform

NL27WZ125

A 1 MHz square input wave is recommended for propagation delay tests.

Figure 6. T_{PZL} or T_{PL}

A 1 MHz square input wave is recommended for propagation delay tests.

Figure 7. T_{PZH} or T_{PHZ}

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		
NL27WZ125US	NL	2	7	WZ	125	US	US8	178 mm, 3000 Unit

NL27WZ125

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
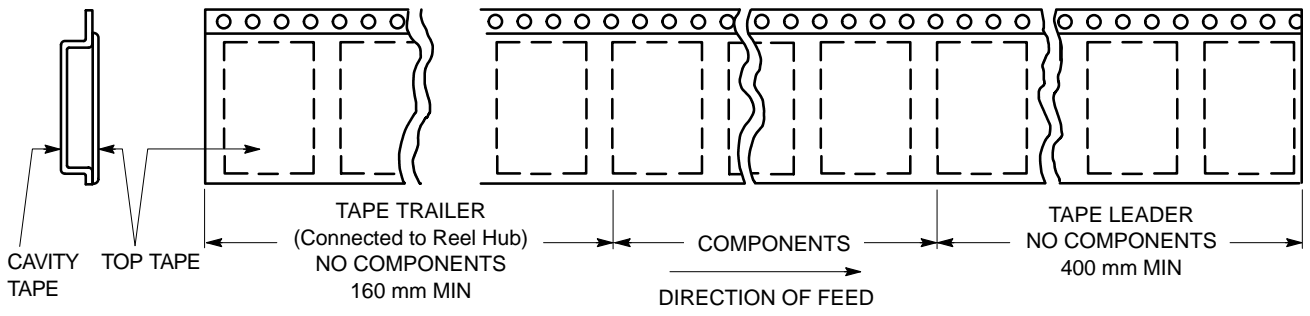
Figure 8. Tape Ends for Finished Goods

TAPE DIMENSIONS mm

4.00

4.00

2.00

∅1.50 TYP

1.75

$8.00 \begin{array}{c} + 0.30 \\ - 0.10 \end{array}$

3.50 ± 0.25

∅1.00 ± 0.25 TYP

1

DIRECTION OF FEED
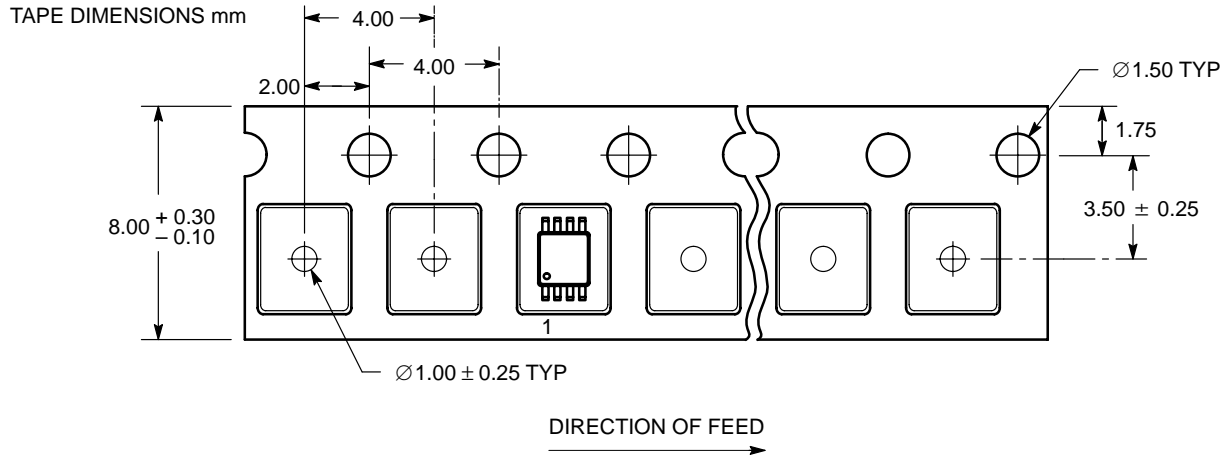
Figure 9. US8 Reel Configuration/Orientation

NL27WZ125
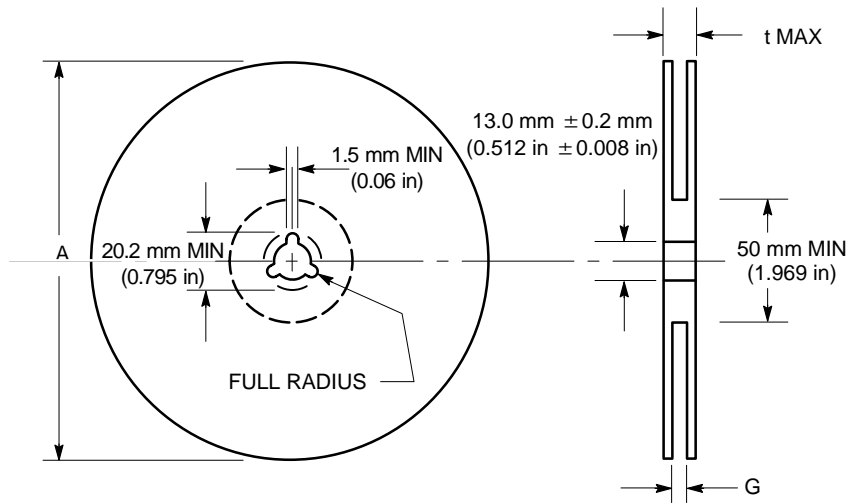
Figure 10. Reel Dimensions

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 11. Reel Winding Direction

NL27WZ125

PACKAGE DIMENSIONS

US8
US SUFFIX
CASE 493–01
ISSUE O

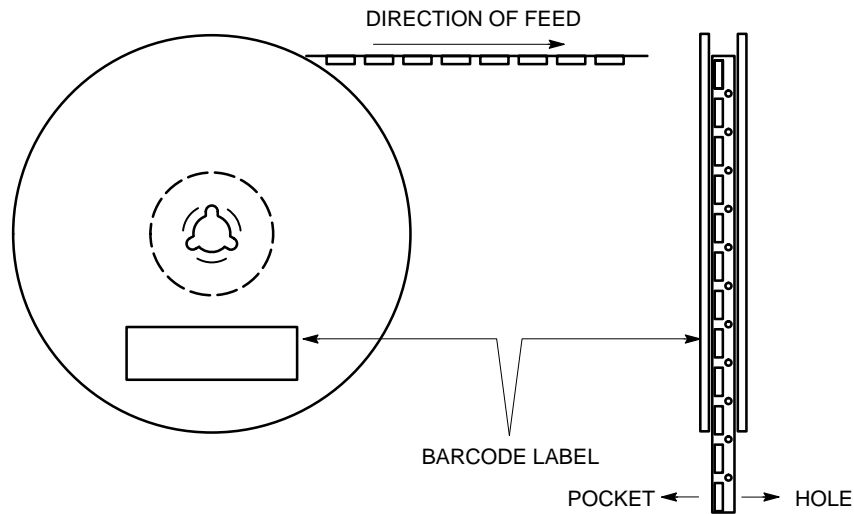| DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	1.90	2.10	0.075	0.083
B	2.20	2.40	0.087	0.094
C	0.60	0.90	0.024	0.035
D	0.17	0.25	0.007	0.010
F	0.20	0.35	0.008	0.014
G	0.50 BSC		0.020 BSC	
H	0.40 REF		0.016 REF	
J	0.10	0.18	0.004	0.007
K	0.00	0.10	0.000	0.004
L	3.00	3.20	0.118	0.126
M	0 °	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	

DETAIL E

0.10 (0.004) | T

−T−
SEATING PLANE

0.10 (0.004) M | T | X | Y

R 0.10 TYP

DETAIL E

3.8
1.8 TYP
0.5 TYP
0.3 TYP
1.0
(mm)

PUBLICATION ORDERING INFORMATION

NL27WZ125/D