NL17SZ07

Single Non-Inverting Buffer with Open Drain Output

The NL17SZ07 is a high performance single buffer with open drain output operating from a 2.3 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 NL17SZ07 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

- Near Zero Static Supply Current Substantially Reduces System Power Requirements
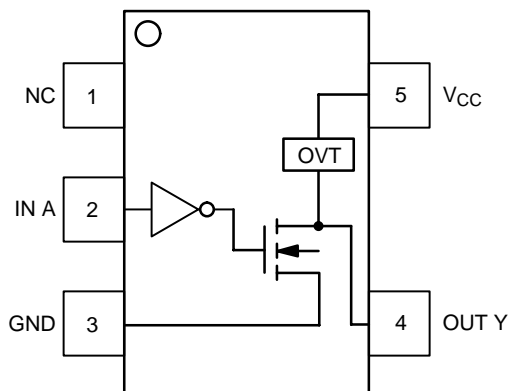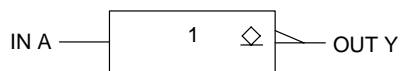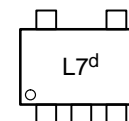
- Chip Complexity: FET = 24

ON Semiconductor®

http://onsemi.com

Figure 1. Pinout

Figure 2. Logic Symbol

PIN ASSIGNMENT

1	NC
2	IN A
3	GND
4	OUT Y
5	V_{CC}

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.

Publication Order Number:
NL17SZ07/D

NL17SZ07

MAXIMUM RATINGS (Note 1)

Symbol	Characteristics		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 2)	$-0.5 \leq V_O \leq 7.0$	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
P_D	Power Dissipation in Still Air	SC–88	150	mW
θ_{JA}	Thermal Resistance	SC–88	350	°C/W
T_L	Lead Temperature, 1 mm from case for 10 s		260	°C
T_J	Junction Temperature under Bias		$+150$	°C
$I_{Latch-Up}$	Latch–Up Performance	Above V_{CC} and Below GND at 85°C (Note 6)	± 500	mA

1. Absolute maximum continuous 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.
2. I_O absolute maximum rating must be observed.
3. Tested to EIA/JESD22–A114–A
4. Tested to EIA/JESD22–A115–A
5. Tested to JESD22–C101–A
6. 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
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage	(Z 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 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

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		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	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; $R_L = 500$ Ω

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_{PZL}	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500$ Ω, $C_L = 50$ pF	1.65	0.8	5.3	11.6	0.8	12.0	ns
			2.5 ± 0.2	1.2	3.7	5.8	1.2	6.4	
			3.3 ± 0.3	0.8	2.9	4.4	0.8	4.8	
			5.0 ± 0.5	0.5	2.3	3.5	0.5	3.9	
t_{PLZ}	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500$ Ω, $C_L = 50$ pF	1.65	0.8	5.3	11.6	0.8	1.20	ns
			2.5 ± 0.2	1.2	2.8	5.8	1.2	6.4	
			3.3 ± 0.3	0.8	2.1	4.4	0.8	4.8	
			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 7)	10 MHz, $V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	4.0	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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

NL17SZ07
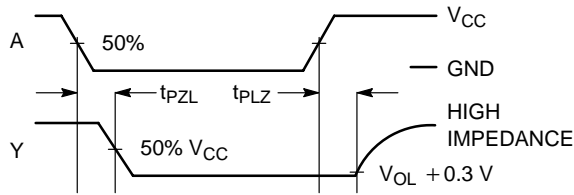
Figure 3. Switching Waveforms

R_T = Z_{OUT} of pulse generator (typically 50 Ω)
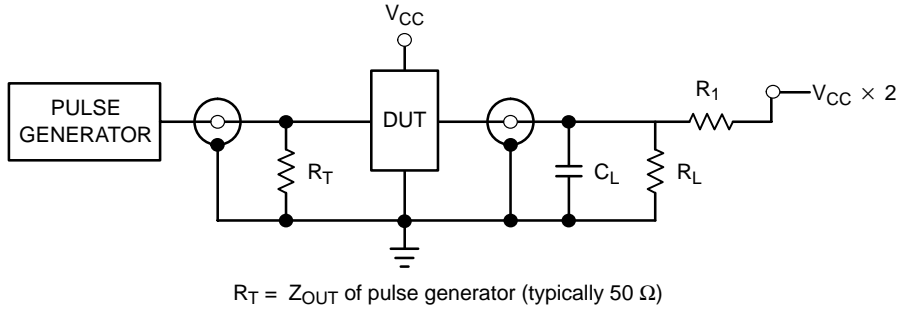
Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

	Device Nomenclature								
Device Order Number	**Logic Circuit Indicator**	**No. of Gates per Package**	**Temp Range Identifier**	**Technology**	**Device Function**	**Package Suffix**	**Tape & Reel Suffix**	**Package Type** (Name/SOT#/ Common Name)	**Tape and Reel Size**
NL17SZ07DFT2	NL	1	7	SZ	07	DF	T2	SC–88/SOT–3 63 /SC–70	178 mm (7") 3000 Unit

NL17SZ07
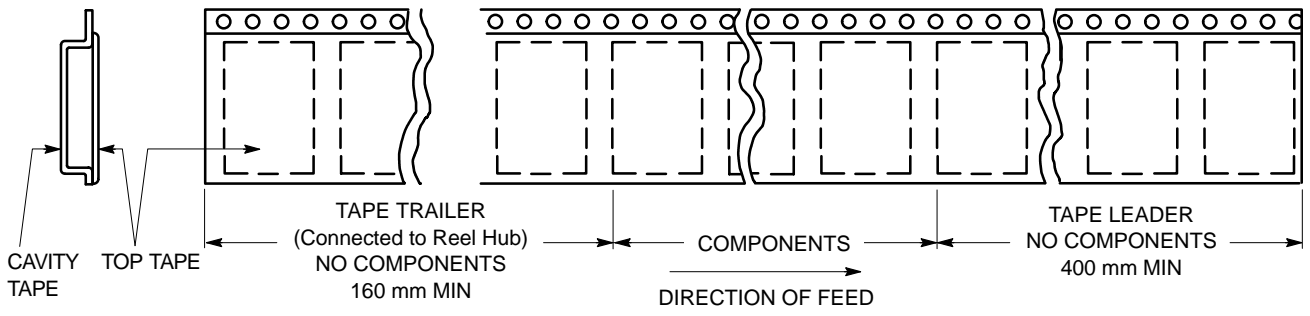
Figure 5. Tape Ends for Finished Goods

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

TAPE DIMENSIONS mm

4.00

4.00

2.00

∅1.50 TYP

1.75

3.50 ± 0.50

8.00 ± 0.30

∅1.00 MIN

DIRECTION OF FEED

1
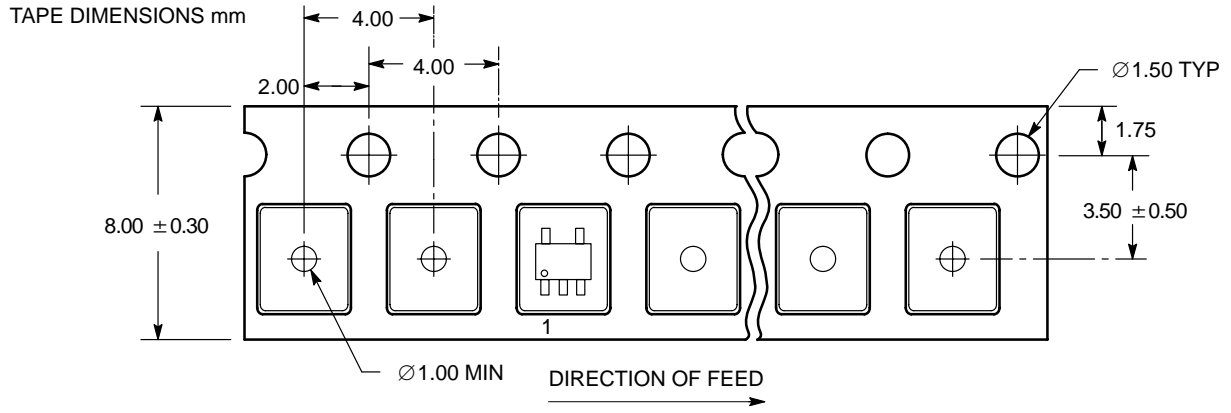
Figure 6. SC−70/SC−88A/SOT−353 DFT2 Reel Configuration/Orientation
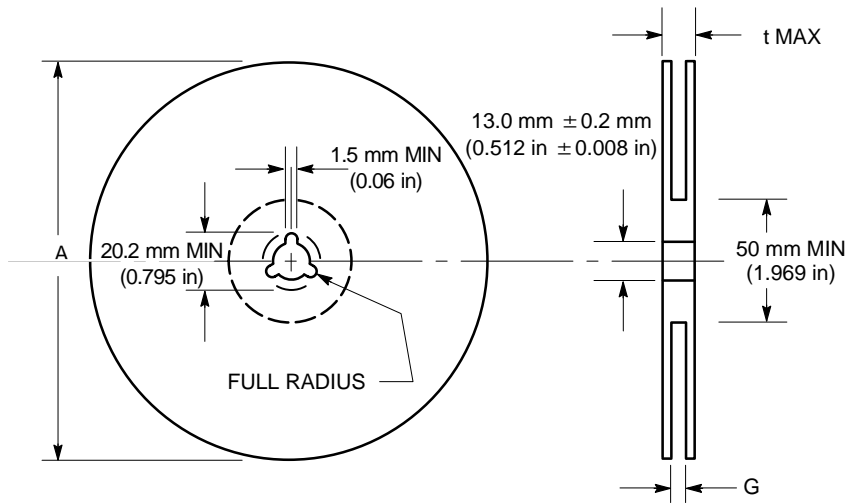
Figure 7. Reel Dimensions

REEL DIMENSIONS

Tape Size	T and R Suffix	A Max	G	t Max
8 mm	T1, T2	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)
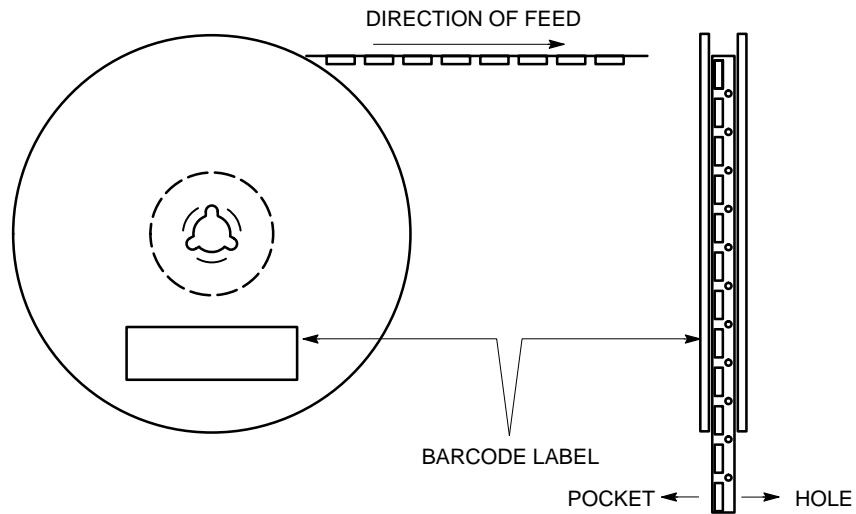
Figure 8. Reel Winding Direction

NL17SZ07

PACKAGE DIMENSIONS

SC70–5/SC–88A/SOT–353
DF SUFFIX
5–LEAD PACKAGE
CASE 419A–02
ISSUE F
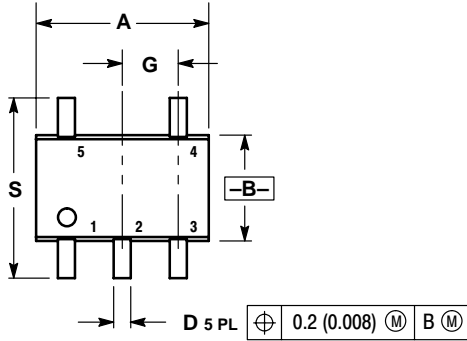
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A–01 OBSOLETE. NEW STANDARD 419A–02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	–––	0.004	–––	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

D 5 PL ⊕ 0.2 (0.008) Ⓜ B Ⓜ

0.5 mm (min)

0.65 mm

0.65 mm

0.4 mm (min)

1.9 mm

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PUBLICATION ORDERING INFORMATION