

NL17SZ126

Non-Inverting 3-State Buffer

The NL17SZ126 is a high performance single noninverting buffer operating from a 1.65 V to 5.5 V V_{CC} supply.

Features

- Extremely High Speed: t_{PD} 2.6 ns (typical) at $V_{CC} = 5.0$ V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible – Interface Capability With 5.0 V TTL Logic with $V_{CC} = 3.0$ V
- LVC MOS 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 HIGH
- Replacement for NC7SZ126
- Chip Complexity = 36 FETs
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

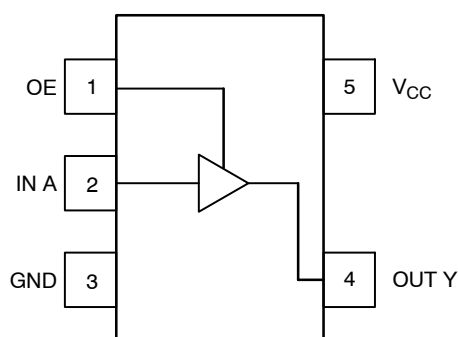


Figure 1. Pinout (Top View)

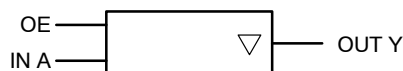


Figure 2. Logic Symbol



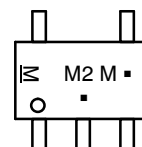
ON Semiconductor®

<http://onsemi.com>


SC-88A (SOT-353)
DF SUFFIX
CASE 419A


SOT-553
XV5 SUFFIX
CASE 463B

MARKING DIAGRAM



M2 = Specific Device Code

M = Date Code

■ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

PIN ASSIGNMENT

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

FUNCTION TABLE

OE Input	A Input	Y Output
H	L	L
H	H	H
L	X	Z

X = Don't Care

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage	− 0.5 to + 7.0	V
V _{IN}	DC Input Voltage	− 0.5 to + 7.0	V
V _{OUT}	DC Output Voltage	− 0.5 to + 7.0	V
I _{IK}	DC Input Diode Current	− 50	mA
I _{OK}	DC Output Diode Current	− 50	mA
I _{OUT}	DC Output Sink Current	± 50	mA
I _{CC}	DC Supply Current per Supply 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) SC-70/SC-88A	350	°C/W
P _D	Power Dissipation in Still Air at 85°C SC-70/SC-88A	150	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
I _{LATCHUP}	Latchup Performance Above V _{CC} and Below GND at 125°C (Note 5)	±100	mA

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.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	1.65	5.5	V
V_{IN}	DC Input Voltage	0	5.5	V
V_{OUT}	DC Output Voltage	0	5.5	V
T_A	Operating Temperature Range	- 40	+125	°C
t_r, t_f	Input Rise and Fall Time	$V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}$ $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ $V_{CC} = 3.0 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$		ns/V

DEVICE JUNCTION TEMPERATURE VERSUS TIME TO 0.1% BOND FAILURES

Junction Temperature °C	Time, Hours	Time, Years
80	1,032,200	117.8
90	419,300	47.9
100	178,700	20.4
110	79,600	9.4
120	37,000	4.2
130	17,800	2.0
140	8,900	1.0

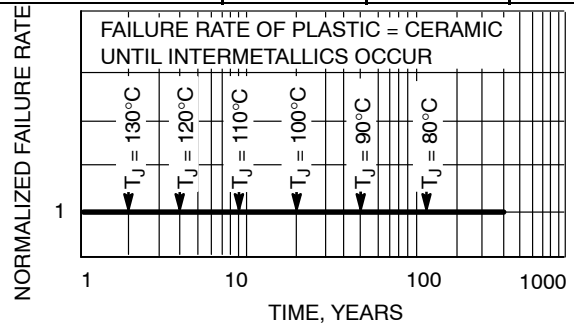


Figure 3. Failure Rate versus Time Junction Temperature

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 125°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
V _{OH}	High-Level Output Voltage V _{IN} = V _{IH}	I _{OH} = -100 μA	1.65	1.55	1.65		1.55		V
			1.8	1.7	1.8		1.7		
			2.3	2.2	2.3		2.2		
			3.0	2.9	3.0		2.9		
			4.5	4.4	4.5		4.4		
		I _{OH} = -4 mA I _{OH} = -8 mA I _{OH} = -16 mA I _{OH} = -24 mA I _{OH} = -32 mA	1.65	1.29	1.52		1.29		V
			2.3	1.9	2.15		1.9		
			3.0	2.4	2.80		2.4		
			3.0	2.3	2.68		2.3		
			4.5	3.8	4.20		3.8		
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IL}	I _{OL} = 100 μA	1.65		0.0	0.1		0.1	V
			1.8		0.0	0.1		0.1	
			2.3		0.0	0.1		0.1	
			3.0		0.0	0.1		0.1	
			4.5		0.0	0.1		0.1	
		I _{OL} = 4 mA I _{OL} = 8 mA I _{OL} = 16 mA I _{OL} = 24 mA I _{OL} = 32 mA	1.65		0.08	0.24		0.24	V
			2.3		0.10	0.30		0.30	
			3.0		0.15	0.40		0.40	
			3.0		0.22	0.55		0.55	
			4.5		0.22	0.55		0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	0 to 5.5			±0.1		±1.0	μA
I _{OZ}	3-State Output Leakage	V _{IN} = V _{IH} or V _{IL} 0 V ≤ V _{OUT} ≤ 5.5 V	1.65 to 5.5			±0.5		±5.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0			1.0		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS (t_R = t_F = 3.0 ns)

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay AN to YN (Figures 4, and 5, Table 1)	R _L = 1 MΩ C _L = 15 pF	1.8 ± 0.15	2.0	9.5	12	2.0	12.5	ns
		R _L = 1 MΩ C _L = 15 pF	2.5 ± 0.2	1.0	3.4	7.5	1.0	8.0	
		R _L = 1 MΩ C _L = 15 pF R _L = 500 Ω C _L = 50 pF	3.3 ± 0.3	0.8 1.2		5.2 5.7	0.8 1.2	5.5 6.0	
		R _L = 1 MΩ C _L = 15 pF R _L = 500 Ω C _L = 50 pF	5.0 ± 0.5	0.5 0.8		4.5 5.0	0.5 0.8	4.8 5.3	
t _{PZH} t _{PZL}	Output Enable Time (Figures 6, 7 and 8, Table 1)	R _L = 250 Ω C _L = 50 pF	1.8 ± 0.15	2.0	9.0	10.5	2.0	12.5	ns
			2.5 ± 0.2	1.8		8.5	1.8	9.0	
			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 Disable Time (Figures 6, 7 and 8, Table 1)	R _L and R1 = 500 Ω C _L = 50 pF	2.5 ± 0.2	1.5		8.0	1.5	8.5	ns
			2.5 ± 0.2	1.5		8.0	1.5	8.5	
			3.3 ± 0.3	0.8		5.7	0.8	6.0	
			5.0 ± 0.5	0.3		4.7	0.3	5.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$ or V_{CC}	2.5	pF
C_{OUT}	Output Capacitance	$V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$ or V_{CC}	2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, $V_{CC} = 3.3 \text{ V}$, $V_I = 0 \text{ V}$ or V_{CC} 10 MHz, $V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$ or V_{CC}	9 11	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: $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$. C_{PD} is used to determine the no-load dynamic power consumption; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

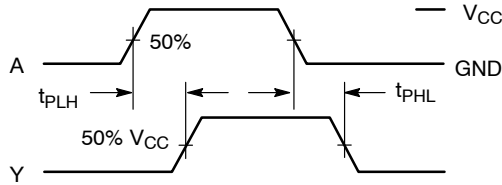
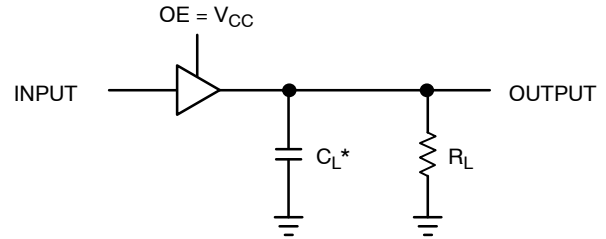
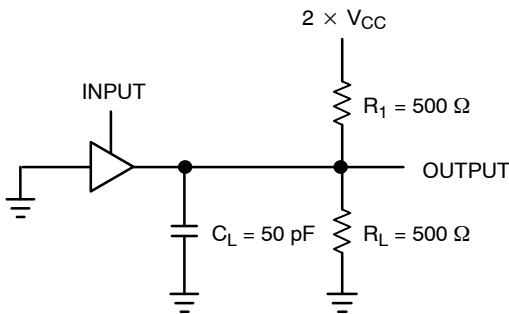


Figure 4. Switching Waveform



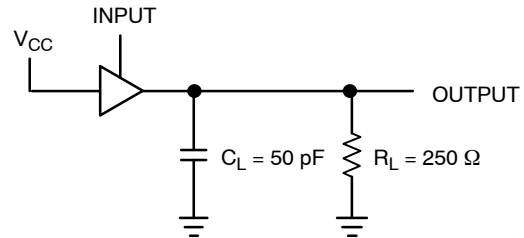
*Includes all probe and jig capacitance.
A 1-MHz square input wave is recommended for propagation delay tests.

Figure 5. t_{PLH} or t_{PHL}



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

Figure 6. t_{PZL} or t_{PLZ}



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

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

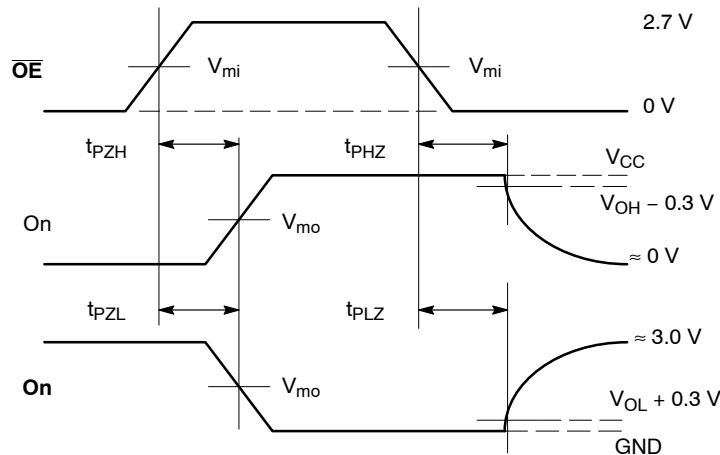


Figure 8. AC Output Enable and Disable Waveform

NL17SZ126

Table 1. Output Enable and Disable Times

$t_R = t_F = 2.5 \text{ ns}$, 10% to 90%; $f = 1 \text{ MHz}$; $t_W = 500 \text{ ns}$

Symbol	V_{CC}		
	$3.3 \text{ V} \pm 0.3 \text{ V}$	2.7 V	$2.5 \text{ V} \pm 0.2 \text{ V}$
V_{mi}	1.5 V	1.5 V	$V_{CC}/2$
V_{mo}	1.5 V	1.5 V	$V_{CC}/2$

DEVICE ORDERING INFORMATION

Device	Package Type	Shipping [†]
NL17SZ126DFT2G	SC70-5/SC-88A/SOT-353 (Pb-Free)	3000 / Tape & Reel
NLV17SZ126DFT2G*	SC70-5/SC-88A/SOT-353 (Pb-Free)	3000 / Tape & Reel
NL17SZ126XV5T2G	SOT-553 (Pb-Free)	4000 / Tape & Reel

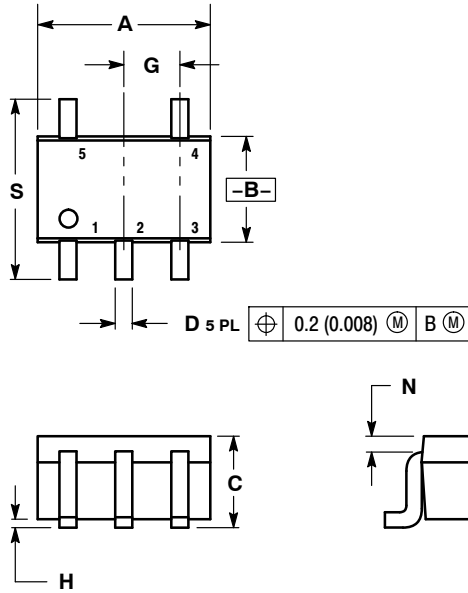
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

NL17SZ126

PACKAGE DIMENSIONS

SC-88A (SC-70-5/SOT-353)
CASE 419A-02
ISSUE L

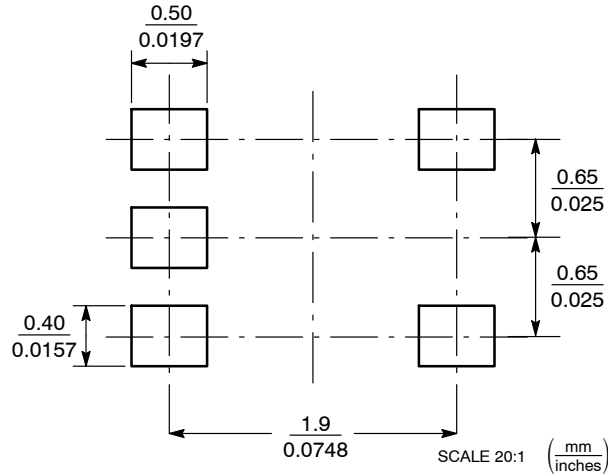


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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

SOLDER FOOTPRINT*

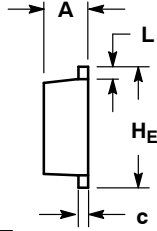
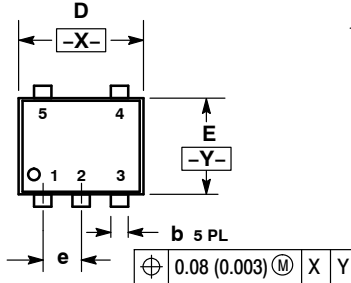


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NL17SZ126

PACKAGE DIMENSIONS

SOT-553, 5 LEAD CASE 463B ISSUE B

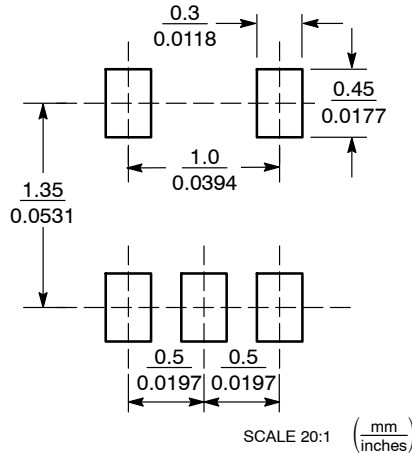


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.50 BSC			0.020 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	1.50	1.60	1.70	0.059	0.063	0.067

SOLDERING FOOTPRINT*



*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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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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