NL17SG126

Bus Buffer with 3-State Output

The NL17SG126 MiniGate™ is an advanced high−speed CMOS Bus Buffer with 3−State Output in ultra−small footprint.

The NL17SG126 input structures provides protection when voltages up to 4.6 V are applied.

Features

- Wide Operating V_{CC} Range: 0.9 V to 3.6 V
- High Speed: t_{PD} = 2.3 ns (Typ) at V_{CC} = 3.0 V, C_L = 15 pF
- Low Power Dissipation: I_{CC} = 0.5 μA (Max) at T_A = 25°C
- 4.6 V Overvoltage Tolerant (OVT) Input Pins
- Ultra−Small Packages
- These are Pb−Free and Halide−Free Devices

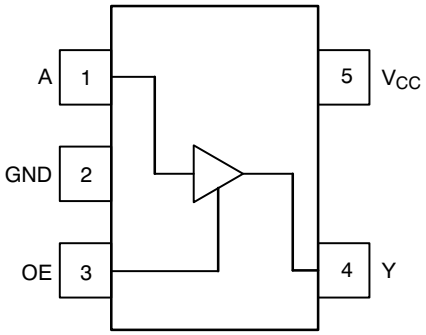


Figure 1. Pinout (Top View)

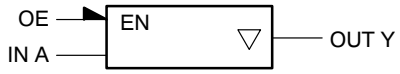


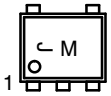
Figure 2. Logic Symbol

ON Semiconductor®

http://onsemi.com

MARKING DIAGRAM

SOT−953
CASE 527AE



J = Specific Device Code
(J with 90 degree clockwise rotation)
M = Month Code

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

FUNCTION TABLE

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

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

© Semiconductor Components Industries, LLC, 2013

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +5.5	V
V_{IN}	DC Input Voltage		−0.5 to +4.6	V
V_{OUT}	DC Output Voltage	Output at High or Low State Power−Down Mode (V_{CC} = 0 V)	−0.5 to V_{CC} +0.5 −0.5 to +4.6	V
I_{IK}	DC Input Diode Current	V_{IN} < GND	−20	mA
I_{OK}	DC Output Diode Current	V_{OUT} < GND	−20	mA
I_{OUT}	DC Output Source/Sink Current		±20	mA
I_{CC}	DC Supply Current per Supply Pin		±20	mA
I_{GND}	DC Ground Current per Ground Pin		±20	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
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)	>2000 >100	V
$I_{LATCHUP}$	Latchup Performance	Above V_{CC} and Below GND at 125°C (Note 4)	±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 EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics		Min	Max	Unit
V_{CC}	Positive DC Supply Voltage		0.9	3.6	V
V_{IN}	Digital Input Voltage		0.0	3.6	V
V_{OUT}	Output Voltage	Output at High or Low State Power−Down Mode (V_{CC} = 0 V)	0.0 0.0	V_{CC} 3.6	V
T_A	Operating Temperature Range		−55	+125	°C
$\Delta t / \Delta V$	Input Transition Rise or Fail Rate	V_{CC} = 3.3 V ± 0.3 V	0	10	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions		V_{CC} (V)	T_A = 25°C		T_A = −55°C to +125°C		Unit
					Min	Max	Min	Max	
V_{IH}	High−Level Input Voltage			0.9	V_{CC}		V_{CC}		V
				1.1 to 1.3	0.7xV_{CC}		0.7xV_{CC}		
				1.4 to 1.6	0.65xV_{CC}		0.65xV_{CC}		
				1.65 to 1.95	0.65xV_{CC}		0.65xV_{CC}		
				2.3 to 2.7	1.7		1.7		
				3.0 to 3.6	2.0		2.0		
V_{IL}	Low−Level Input Voltage			0.9		GND		GND	V
				1.1 to 1.3		0.3xV_{CC}		0.3xV_{CC}	
				1.4 to 1.6		0.35xV_{CC}		0.35xV_{CC}	
				1.65 to 1.95		0.35xV_{CC}		0.35xV_{CC}	
				2.3 to 2.7		0.7		0.7	
				3.0 to 3.6		0.8		0.8	
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20 μA	0.9	0.75		0.75		V
			I_{OH} = −0.3 mA	1.1 to 1.3	0.75xV_{CC}		0.75xV_{CC}		
			I_{OH} = −1.7 mA	1.4 to 1.6	0.75xV_{CC}		0.75xV_{CC}		
			I_{OH} = −3.0 mA	1.65 to 1.95	V_{CC}−0.45		V_{CC}−0.45		
			I_{OH} = −4.0 mA	2.3 to 2.7	2.07		2.07		
			I_{OH} = −8.0 mA	3.0 to 3.6	2.75		2.75		
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	0.9		0.1		0.1	V
			I_{OL} = 0.3 mA	1.1 to 1.3		0.25xV_{CC}		0.25xV_{CC}	
			I_{OL} = 1.7 mA	1.4 to 1.6		0.25xV_{CC}		0.25xV_{CC}	
			I_{OL} = 3.0 mA	1.65 to 1.95		0.45		0.45	
			I_{OL} = 4.0 mA	2.3 to 2.7		0.4		0.4	
			I_{OL} = 8.0 mA	3.0 to 3.6		0.4		0.4	
I_{IN}	Input Leakage Current	0 ≤ V_{IN} ≤ 3.6 V		0 to 3.6		±0.1		±1.0	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND		3.6		1.0		10.0	μA
I_{OZ}	3−State Output Leakage Current	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		0.9 to 3.6		1.0		10.0	μA

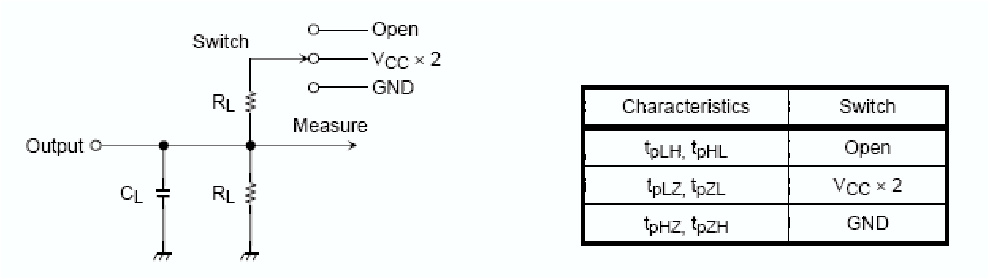
AC ELECTRICAL CHARACTERISTICS Input $t_r = t_f = 3.0$ ns

Symbol	Parameter	Test Condition	V_{CC} (V)	T_A = 25 °C			T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay, A to Y	C_L = 10 pF, R_L = 1 MΩ	0.9	–	11.3	13.6	–	15.9	ns
			1.1 to 1.3	–	8.3	10.4	–	12.8	
			1.4 to 1.6	–	5.0	8.5	–	10.0	
			1.65 to 1.95	–	4.0	6.2	–	6.7	
			2.3 to 2.7	–	2.6	3.9	–	4.4	
			3.0 to 3.6	–	2.1	3.1	–	3.7	
		C_L = 15 pF, R_L = 1 MΩ	0.9	–	12.6	14.7	–	17.0	ns
			1.1 to 1.3	–	9.6	11.5	–	15.2	
			1.4 to 1.6	–	5.6	9.3	–	11.2	
			1.65 to 1.95	–	4.5	6.9	–	7.1	
			2.3 to 2.7	–	2.9	4.4	–	5.0	
			3.0 to 3.6	–	2.4	3.4	–	3.9	
		C_L = 30 pF, R_L = 1 MΩ	0.9	–	14.5	16.3	–	19.6	ns
			1.1 to 1.3	–	11.3	13.6	–	17.5	
			1.4 to 1.6	–	8.2	13.1	–	15.9	
			1.65 to 1.95	–	6	9.2	–	9.6	
			2.3 to 2.7	–	4	5.7	–	6.1	
			3.0 to 3.6	–	3.3	4.4	–	4.8	
t_{PZH}, t_{PZL}	Output Enable Time, OE to Y	C_L = 10 pF;							ns
		R_L = 100 kΩ	0.9	–	11.0	13.3	–	15.8	
		R_L = 5 kΩ	1.1 to 1.3	–	8.4	10.9	–	13.0	
		R_L = 5 kΩ	1.4 to 1.6	–	5.3	7.8	–	8.3	
		R_L = 5 kΩ	1.65 to 1.95	–	3.9	5.5	–	5.9	
		R_L = 5 kΩ	2.3 to 2.7	–	2.5	3.5	–	3.8	
		R_L = 5 kΩ	3.0 to 3.6	–	2.1	2.7	–	3	
		C_L = 15 pF;							ns
		R_L = 100 kΩ	0.9	–	12.0	14.8	–	17.0	
		R_L = 5 kΩ	1.1 to 1.3	–	9.0	11.7	–	13.8	
		R_L = 5 kΩ	1.4 to 1.6	–	5.9	8.9	–	11	
		R_L = 5 kΩ	1.65 to 1.95	–	4.4	6.3	–	6.5	
		R_L = 5 kΩ	2.3 to 2.7	–	2.9	3.9	–	4.2	
		R_L = 5 kΩ	3.0 to 3.6	–	2.3	3	–	3.3	
		C_L = 30 pF;							ns
		R_L = 100 kΩ	0.9	–	13.0	15.2	–	18.3	
		R_L = 5 kΩ	1.1 to 1.3	–	10.0	13.1	–	15.2	
		R_L = 5 kΩ	1.4 to 1.6	–	8.3	12.2	–	13.7	
		R_L = 5 kΩ	1.65 to 1.95	–	6.1	8.6	–	9.7	
		R_L = 5 kΩ	2.3 to 2.7	–	3.8	5	–	5.5	
		R_L = 5 kΩ	3.0 to 3.6	–	2.9	3.8	–	4.2	

AC ELECTRICAL CHARACTERISTICS Input $t_r = t_f = 3.0$ ns

Symbol	Parameter	Test Condition	V_{CC} (V)	T_A = 25 °C			T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PHZ}, t_{PLZ}	Output Disable Time, $\overline{OE}$ to Y	C_L = 10 pF;							ns
		R_L = 100 kΩ	0.9	–	100.4	–	–	–	
		R_L = 5 kΩ	1.1 to 1.3	–	9.1	14.4	–	22.4	
		R_L = 5 kΩ	1.4 to 1.6	–	7.1	9.1	–	10.4	
		R_L = 5 kΩ	1.65 to 1.95	–	6.5	8.3	–	9	
		R_L = 5 kΩ	2.3 to 2.7	–	5.8	7.3	–	8.8	
		R_L = 5 kΩ	3.0 to 3.6	–	5.4	6.9	–	7.6	
		C_L = 15 pF;							ns
		R_L = 100 kΩ	0.9	–	122.2	–	–	–	
		R_L = 5 kΩ	1.1 to 1.3	–	9.8	15.3	–	25.1	
		R_L = 5 kΩ	1.4 to 1.6	–	7.8	9.8	–	11.3	
		R_L = 5 kΩ	1.65 to 1.95	–	7.2	9.2	–	10.6	
		R_L = 5 kΩ	2.3 to 2.7	–	7	8.2	–	10.3	
		R_L = 5 kΩ	3.0 to 3.6	–	6.6	7.7	–	9.5	
		C_L = 30 pF;							ns
		R_L = 100 kΩ	0.9	–	217.1	–	–	–	
		R_L = 5 kΩ	1.1 to 1.3	–	13.2	19.6	–	31.9	
		R_L = 5 kΩ	1.4 to 1.6	–	12.2	13.5	–	14.9	
		R_L = 5 kΩ	1.65 to 1.95	–	11.4	12.7	–	13.9	
		R_L = 5 kΩ	2.3 to 2.7	–	11.3	12.2	–	13.5	
		R_L = 5 kΩ	3.0 to 3.6	–	10.2	11.5	–	12.9	
C_{IN}	Input Capacitance		0 to 3.6		3	–	–	–	pF
C_O	Output Capacitance	V_O = GND	0		3	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 5)	f = 10 MHz	0.9 to 3.6	–	4	–	–	–	pF

5. 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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.



Characteristics	Switch
t_{pLH}, t_{pHL}	Open
t_{pLZ}, t_{pZL}	V_{CC} × 2
t_{pHZ}, t_{pZH}	GND

Figure 3. Test Circuit

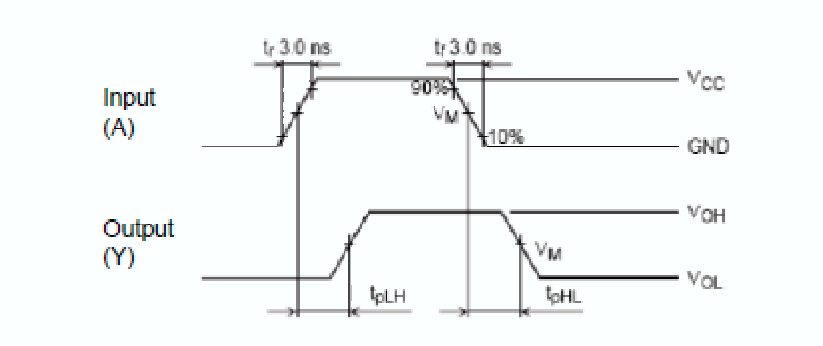


Figure 4. t_{PLH}, t_{PHL} Waveforms

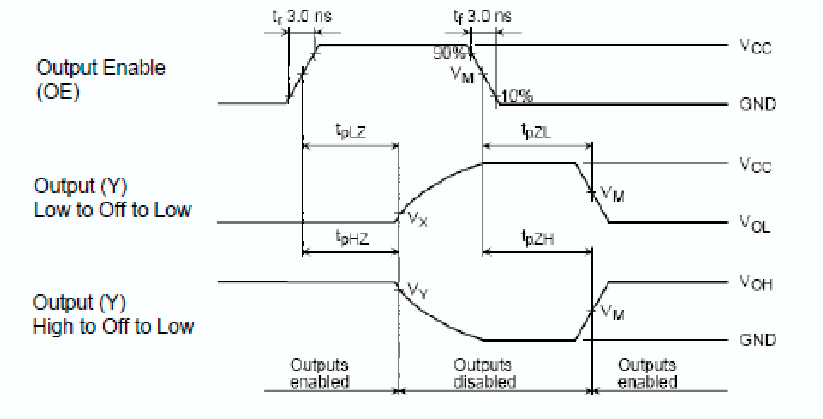


Figure 5. t_{PLZ}, t_{PHZ}, t_{PZH}, t_{PZL} Waveforms

	V_{CC}					
Unit	**3.3 ± 0.3 V**	**2.5 ± 0.2 V**	**1.8 ± 0.15 V**	**1.5 ± 0.1 V**	**1.2 ± 0.1 V**	**0.9 V**
V_M	V_{CC} / 2	V_{CC} / 2	V_{CC} / 2	V_{CC} / 2	V_{CC} / 2	V_{CC} / 2
V_X	V_{OL} + 0.3 V	V_{OL} + 0.15 V	V_{OL} + 0.1 V	V_{OL} + 0.1 V	V_{OL} + 0.1 V	V_{OL} + 0.1 V
V_Y	V_{OH} − 0.3 V	V_{OH} − 0.15 V	V_{OH} − 0.15 V	V_{OH} − 0.1 V	V_{OH} − 0.1 V	V_{OH} − 0.1 V

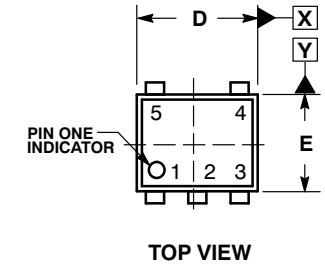
ORDERING INFORMATION

Device	Package	Shipping†
NL17SG126P5T5G	SOT−953 (Pb−Free)	8000 / Tape & Reel

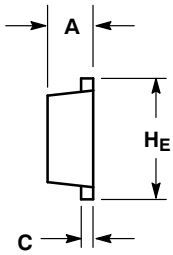
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

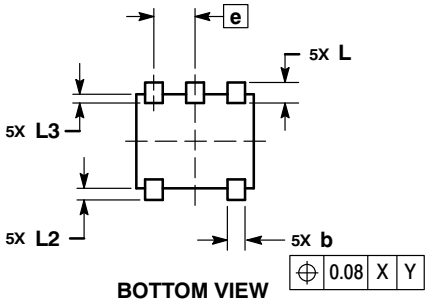
SOT−953
CASE 527AE
ISSUE E



TOP VIEW



SIDE VIEW

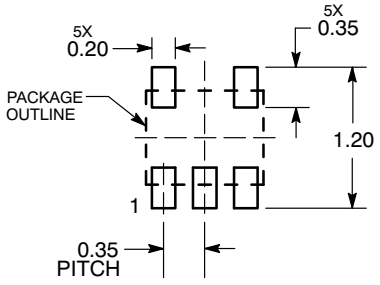


BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.34	0.37	0.40
b	0.10	0.15	0.20
C	0.07	0.12	0.17
D	0.95	1.00	1.05
E	0.75	0.80	0.85
e	0.35 BSC		
H_E	0.95	1.00	1.05
L	0.175 REF		
L2	0.05	0.10	0.15
L3	------		0.15

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

MiniGate is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and ON are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative