

NL17SZ07E

Single Non-Inverting Buffer with Open Drain Output

The NL17SZ07E is a high performance single non-inverting buffer with open drain outputs operating from a 1.65 to 5.5 V supply.

The Output stage is open drain with Over Voltage Tolerance. This allows the NL17SZ07E to be used to interface 5.0 V circuits to circuits of any voltage between 0 and +5.5 V.

Features

- Tiny SOT-353 Package
- 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, CMOS Compatible
- Over Voltage Tolerant Inputs V_{IN} may be Between 0 and 5.5 V for V_{CC} Between 0.5 and 5.5 V
- TTL Compatible – Interface Capability with 5.0 V TTL Logic with $V_{CC} = 2.7$ V to 3.6 V
- LVCMOS Compatible
- 24 mA Output Sink Capability, Pullup may be between 0 and 5.5 V
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 20
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

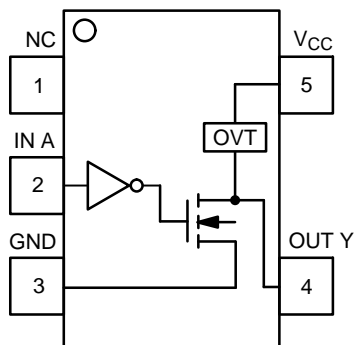


Figure 1. Pinout

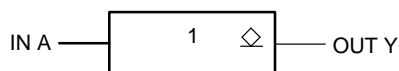


Figure 2. Logic Symbol



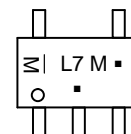
ON Semiconductor®

www.onsemi.com

MARKING DIAGRAMS



SC-88A / SOT-353 / SC-70
DF SUFFIX
CASE 419A



- L7 = Specific Device Marking
- 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

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

FUNCTION TABLE

Input	Output
A	Y
L	L
H	Z

ORDERING INFORMATION

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

NL17SZ07E

MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit	
V_{CC}	DC Supply Voltage	-0.5 to +6.5	V	
V_I	DC Input Voltage	-0.5 to +6.5	V	
	DC Output Voltage	Active Mode, LOW State (Note 1) Tri-State Mode Power-Down Mode ($V_{CC} = 0$ V)		-0.5 to $V_{CC} + 0.5$ -0.5 to +6.5 -0.5 to +6.5
I_{OK}	DC Output Diode Current	$V_O < GND$	-50	mA
I_{IK}	DC Input Diode Current	$V_I < GND$	-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		186	mW
θ_{JA}	Thermal Resistance		350	°C/W
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	
ESD	ESD Classification	Human Body Model (Note 2)	4000	V
		Charged Device Model (Note 3)	1000	V
$I_{Latch-Up}$	Latch-Up Performance	Above V_{CC} and Below GND at 85°C (Note 4)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.
2. Tested to EIA/JESD22-A114-A, rated to EIA/JESD22-A114-B.
3. Tested to JESD22-C101-A.
4. Tested to EIA/JESD78.

NL17SZ07E

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit	
V _{CC}	Supply Voltage	Operating	1.65	5.5	V
		Data Retention Only	1.5	5.5	
V _I	Input Voltage	0	5.5	V	
	Output Voltage	Active Mode, LOW State	0		V _{CC}
		Tri-State Mode	0		5.5
	Power-Down Mode (V _{CC} = 0 V)	0	5.5		
T _A	Operating Free-Air Temperature	-55	+125	°C	
Δt/ΔV	Input Transition Rise or Fall Rate	V _{CC} = 2.5 V ±0.2 V	0	20	ns/V
		V _{CC} = 3.0 V ±0.3 V	0	10	
		V _{CC} = 5.0 V ±0.5 V	0	5	

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°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
I _{LKG}	Z-State Output Leakage Current	V _{IN} = V _{IH} 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 _{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} = 5.5 V or GND	1.65 to 5.5			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0			1		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5			1		10	μA
I _{CCT}	Quiescent Supply Current	V _{IN} = 3.0 V	3.6			10		100	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NL17SZ07E

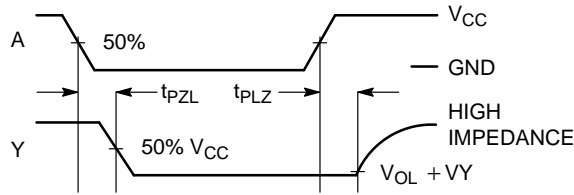
AC ELECTRICAL CHARACTERISTICS $t_R = t_F = 2.5 \text{ ns}$

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°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	1.8 ± 0.15		5.3	9.0		9.5	ns
			2.5 ± 0.2		3.7	6.1		6.5	
			3.3 ± 0.3		2.9	5.6		6.0	
			5.0 ± 0.5		2.3	4.4		4.8	
t _{PLZ}	Propagation Delay (Figure 3 and 4)	R _L = R ₁ = 500 Ω, C _L = 50 pF	1.8 ± 0.15		5.3	9.0		9.5	ns
			2.5 ± 0.2		2.8	6.1		6.5	
			3.3 ± 0.3		2.1	5.6		6.0	
			5.0 ± 0.5		1.4	4.4		4.8	

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 5)	10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4.0	pF

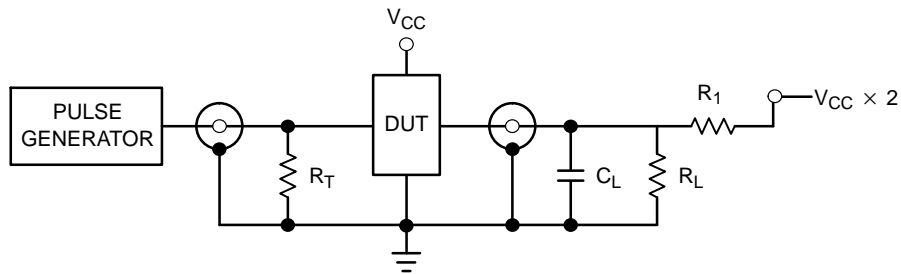
5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.



$$V_{CC} = 1.8 \pm 0.15 \text{ V or } 2.5 \pm 0.2 \text{ V, } VY = 0.15 \text{ V}$$

$$V_{CC} = 3.3 \pm 0.3 \text{ V or } 5.0 \pm 0.5 \text{ V, } VY = 0.30 \text{ V}$$

Figure 3. Switching Waveforms



$$R_T = Z_{OUT} \text{ of pulse generator (typically } 50 \Omega)$$

Figure 4. Test Circuit

NL17SZ07E

DEVICE ORDERING INFORMATION

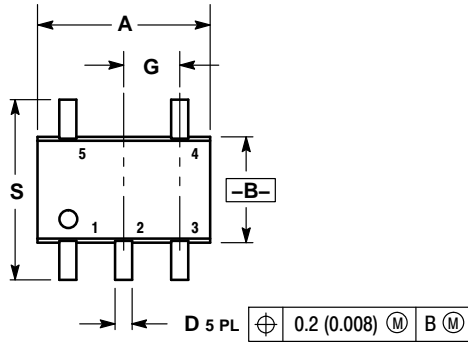
Device	Package	Shipping†
NL17SZ07EDFT2G	SOT-353/SC70-5/SC-88A (Pb-Free)	3000 / Tape & Reel

†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.

NL17SZ07E

PACKAGE DIMENSIONS

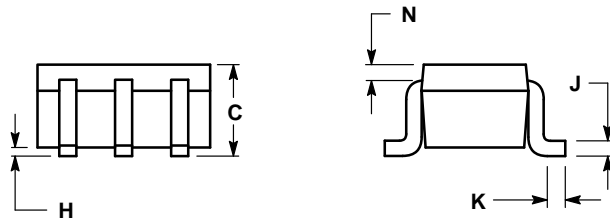
SC-88A (SC-70-5/SOT-353) CASE 419A-02 ISSUE L



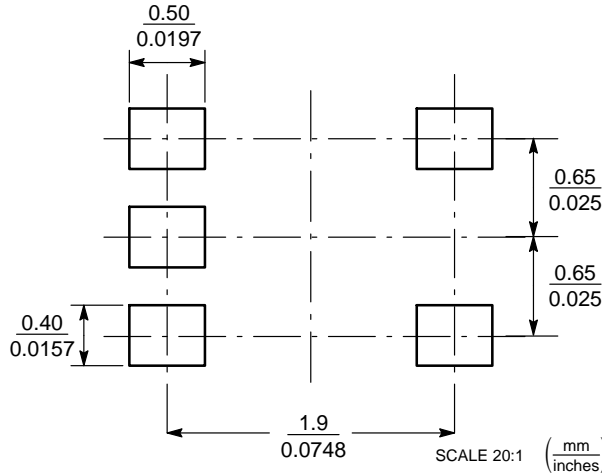
NOTES:

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.

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marketing.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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

ON Semiconductor Website: www.onsemi.com

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

For additional information, please contact your local Sales Representative

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Buffers & Line Drivers](#) category:

Click to view products by [ON Semiconductor](#) manufacturer:

Other Similar products are found below :

[LXV200-024SW](#) [74AUP2G34FW3-7](#) [HEF4043BP](#) [PI74FCT3244L](#) [MC74HCT365ADTR2G](#) [Le87401NQC](#) [Le87402MQC](#) [028192B](#)
[042140C](#) [051117G](#) [070519XB](#) [NL17SZ07P5T5G](#) [NLU1GT126AMUTCG](#) [74AUP1G17FW5-7](#) [74LVC2G17FW4-7](#) [CD4502BE](#) [5962-](#)
[8982101PA](#) [5962-9052201PA](#) [74LVC1G125FW4-7](#) [NL17SH17P5T5G](#) [NL17SH125P5T5G](#) [NLV37WZ07USG](#) [RHRXH162244K1](#)
[74AUP1G34FW5-7](#) [74AUP1G07FW5-7](#) [74LVC2G126RA3-7](#) [NLX2G17CMUTCG](#) [74LVCE1G125FZ4-7](#) [Le87501NQC](#) [74AUP1G126FW5-](#)
[7](#) [TC74HC4050AP\(F\)](#) [74LVCE1G07FZ4-7](#) [NLX3G16DMUTCG](#) [NLX2G06AMUTCG](#) [NLVVHC1G50DFT2G](#) [NLU2G17AMUTCG](#)
[LE87100NQC](#) [LE87290YQC](#) [LE87290YQCT](#) [LE87511NQC](#) [LE87511NQCT](#) [LE87557NQC](#) [LE87557NQCT](#) [LE87614MQC](#)
[LE87614MQCT](#) [74AUP1G125FW5-7](#) [NLU2G16CMUTCG](#) [MC74LCX244MN2TWG](#) [NLV74VHC125DTR2G](#) [NL17SG126DFT2G](#)