Schmitt Buffer

The NL17SG17 MiniGate[™] is an advanced high-speed CMOS Schmitt Buffer in ultra-small footprint.

The NL17SG17 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: $t_{PD} = 3.7 \text{ ns}$ (Typ) at $V_{CC} = 3.0 \text{ V}$, $C_L = 15 \text{ pF}$
- Low Power Dissipation: $I_{CC} = 0.5 \mu A$ (Max) at $T_A = 25^{\circ}C$
- 4.6 V Overvoltage Tolerant (OVT) Input Pins
- Ultra-Small Packages
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

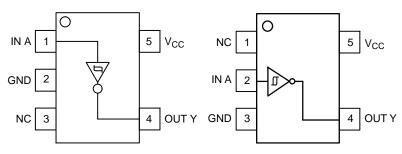


Figure 1. SOT-953 (Top Thru View)

Figure 2. SC-88A (Top View)

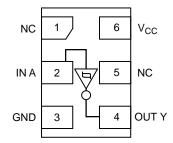


Figure 3. UDFN6 (Top View)

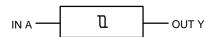


Figure 4. Logic Symbol



ON Semiconductor®

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MARKING DIAGRAMS



SOT-953 CASE 527AE



A = Specific Device Code (A with 90 degree clockwise rotation)



UDFN6 1.0 x 1.0 CASE 517BX





UDFN6 1.45 x 1.0 CASE 517AQ





SC-88A DF SUFFIX CASE 419A



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						
	SOT-953 SC-88A UDFN6					
1	IN A	NC	NC			
2	GND	IN A	IN A			
3	NC	GND	GND			
4	OUT Y	OUT Y	OUT Y			
5	V _{CC}	V _{CC}	NC			
6			V _{CC}			

FUNCTION TABLE

A Input	Y Output
L	L
Н	Н

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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}		out at High or Low State 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
TL	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
TJ	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}		an Body Model (Note 2) Machine Model (Note 3)	>2000 >100	V

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. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
- Tested to EIA/JESD22-A114-A.
 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 ($V_{\rm CC}$ = 0 V)	0.0 0.0	V _{CC} 3.6	V
T _A	Operating Temperature Range	-55	+125	°C
Δt / ΔV	Input Transition Rise or Fail Rate	0	No Limit	ns/V

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

		Parameter Condition		V _{CC}	$T_A = 25^{\circ}C$ $-55^{\circ}C \le T_A \le 125^{\circ}C$			T _A ≤ 125°C		
Symbol	Parameter			(V)	Min	Тур	Max	Min	Max	Unit
V _{T+}	Positive-Going			0.9	0.64	0.7	0.86	0.62	0.87	
	Input Threshold Voltage			1.1	0.73	0.81	0.95	0.71	1	
				1.4	0.86	0.94	1.16	0.84	1.2	.,
				1.65	0.95	1.06	1.25	0.94	1.3	V
				2.3	1.22	1.36	1.6	1.18	1.65	
				3.0	1.51	1.8	2.05	1.38	2.1	
V _{T-}	Negative-Go-			0.9	0.09	0.23	0.30	0.08	0.33	
	ing Input Threshold			1.1	0.15	0.33	0.39	0.12	0.43	
	Voltage			1.4	0.3	0.47	0.54	0.25	0.55	,,
				1.65	0.35	0.6	0.65	0.3	0.65	٧
				2.3	0.55	0.85	0.88	0.5	0.88	
				3.0	0.95	1.13	1.16	0.9	1.16	
V _H	Hysteresis Volt-			0.9	0.15	0.5	0.75	0.2	0.8	
	age			1.1	0.15	0.5	0.75	0.2	0.8	
				1.4	0.15	0.5	0.75	0.2	0.8	1,,
				1.65	0.15	0.5	0.75	0.2	0.8	V
				2.3	0.15	0.5	0.75	0.2	0.8	
				3.0	0.25	0.65	0.85	0.3	0.9	
V _{OH}	High-Level	V _{IN} =	$I_{OH} = -20 \mu A$	0.9	0.75			0.75		V
	Output Voltage	V _{IH} or V _{IL}	$I_{OH} = -0.3 \text{ mA}$	1.1 to 1.3	0.75 x V _{CC}			0.75 x V _{CC}		
			$I_{OH} = -1.7 \text{ mA}$	1.4 to 1.6	0.75 x V _{CC}			0.75 x V _{CC}		
			$I_{OH} = -3.0 \text{ mA}$	1.65 to 1.95	V _{CC} – 0.45			V _{CC} - 0.45		
			$I_{OH} = -4.0 \text{ mA}$	2.3 to 2.7	2.0			2.0		
			$I_{OH} = -8.0 \text{ mA}$	3.0 to 3.6	2.48			2.48		
V _{OL}	Low-Level Out-	V _{IN} =	I _{OL} = 20 μA	0.9			0.1		0.1	V
	put Voltage	V _{IH} or V _{IL}	I _{OL} = 0.3 mA	1.1 to 1.3			0.25 x V _{CC}		0.25 x V _{CC}	
			I _{OL} = 1.7 mA	1.4 to 1.6			0.25xV CC		0.25 x V _{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	1
			I _{OL} = 8.0 mA	3.0 to 3.6			0.4		0.4	1
I _{IN}	Input Leakage Current	0 ≤	$V_{IN} \le 3.6 \text{ V}$	0 to 3.6			±0.1		±1.0	μΑ
I _{CC}	Quiescent Sup- ply Current	V _{IN} =	· V _{CC} or GND	3.6			0.5		10.0	μΑ

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.

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0 \text{ ns}$)

					T _A = 25 °C	;		= 0 +125°C	
Symbol	Parameter	Test Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Unit
t _{PLH} ,	Propagation Delay,	C _L = 10 pF,	0.9	-	27.3	-	-	_	ns
t _{PHL}	A to Y	$R_L = 1 M\Omega$	1.1 to 1.3	-	13.0	22.6	1.0	35.9	
			1.4 to 1.6	-	7.5	10.5	1.0	11.3	
			1.65 to 1.95	-	6.0	7.8	1.0	8.2	
			2.3 to 2.7	-	4.3	5.4	1.0	5.8	
			3.0 to 3.6	-	3.5	4.4	1.0	4.6	
		C _L = 15 pF,	0.9	-	29.5	-	-	-	ns
		$R_L = 1 M\Omega$	1.1 to 1.3	-	14.3	25.1	1.0	41.8	
			1.4 to 1.6	-	8.0	11.5	1.0	12.6	
			1.65 to 1.95	-	6.3	8.4	1.0	8.7	
			2.3 to 2.7	-	4.6	5.7	1.0	6.1	
			3.0 to 3.6	-	3.7	4.6	1.0	5.0	
		$C_L = 30 \text{ pF},$ $R_L = 1 \text{ M}\Omega$	0.9	_	40.5	_	-	_	ns
		$R_L = 1 \text{ IVIS2}$	1.1 to 1.3	-	19.6	35.7	1.0	58.1	
			1.4 to 1.6	-	10.7	15.8	1.0	17.6	
			1.65 to 1.95	-	7.8	10.7	1.0	11.7	
			2.3 to 2.7	_	5.4	6.9	1.0	8.1	
			3.0 to 3.6	-	4.3	5.2	1.0	6.1	
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

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.

5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the dynamic 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}.

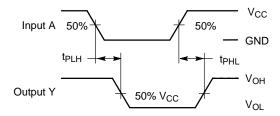
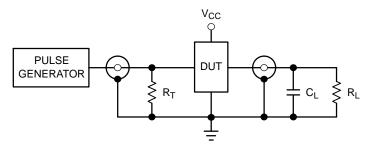


Figure 5. Switching Waveform



 $R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 6. Test Circuit

ORDERING INFORMATION

Device	Package	Shipping [†]
NL17SG17P5T5G	SOT-953 (Pb-Free)	8000 / Tape & Reel
NL17SG17DFT2G	SC-88A (Pb-Free)	3000 / Tape & Reel
NL17SG17AMUTCG	UDFN6 1.45x1 mm (Pb-Free)	3000 / Tape & Reel
NL17SG17CMUTCG*	UDFN6 1x1 mm (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.

^{*}In Development



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

DATE 17 JAN 2013



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

	INCHES		MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.071	0.087	1.80	2.20
В	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	
Н		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

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

= Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.



0.50 0.0197 0.65 0.025 0.65 0.025 0.40 0.0157 1.9 mm 0.0748 SCALE 20:1

SOLDER FOOTPRINT

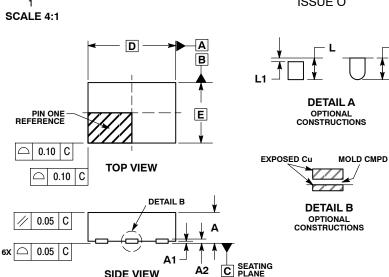
STYLE 1: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 5. COLLECTOR	STYLE 2: PIN 1. ANODE 2. EMITTER 3. BASE 4. COLLECTOR 5. CATHODE	STYLE 3: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. CATHODE 1	STYLE 4: PIN 1. SOURCE 1 2. DRAIN 1/2 3. SOURCE 1 4. GATE 1 5. GATE 2	STYLE 5: PIN 1. CATHODE 2. COMMON ANODE 3. CATHODE 2 4. CATHODE 3 5. CATHODE 4

5. COLLECTOR	5. CATHODE	5. CATHODE I	5. GATE 2	5. CATHODE 4
STYLE 6: PIN 1. EMITTER 2 2. BASE 2 3. EMITTER 1 4. COLLECTOR 5. COLLECTOR 2/BASE 1	STYLE 7: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 5. COLLECTOR	STYLE 8: PIN 1. CATHODE 2. COLLECTOR 3. N/C 4. BASE 5. EMITTER	STYLE 9: PIN 1. ANODE 2. CATHODE 3. ANODE 4. ANODE 5. ANODE	Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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6X L

6X b

0.10 | C | A | B

0.05 C NOTE 3

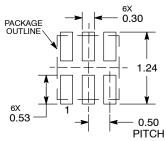
UDFN6, 1.45x1.0, 0.5P CASE 517AQ **ISSUE O**

DATE 15 MAY 2008

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER
- ASME Y14.5M, 1994. CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

	MILLIMETERS			
DIM	MIN	MAX		
Α	0.45	0.55		
A1	0.00	0.05		
A2	0.07 REF			
b	0.20	0.30		
D	1.45	BSC		
Е	1.00	BSC		
Ф	0.50	BSC		
L	0.30	0.40		
L1		0.15		

MOUNTING FOOTPRINT



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*

BOTTOM VIEW

SIDE VIEW

е



= Specific Device Code

= Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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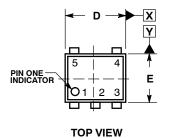
^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

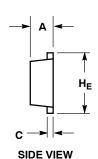


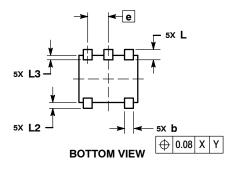
SOT-953 CASE 527AE **ISSUE E**

DATE 02 AUG 2011

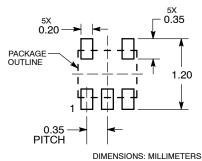








SOLDERING FOOTPRINT*



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

NOTES:

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

	MILLIMETERS			
DIM	MIN	NOM	MAX	
Α	0.34	0.37	0.40	
b	0.10	0.15	0.20	
С	0.07	0.12	0.17	
D	0.95	1.00	1.05	
E	0.75	0.80	0.85	
е	0.35 BSC			
HE	0.95	1.00	1.05	
L	0.175 REF			
L2	0.05	0.10	0.15	
L3			0.15	

GENERIC MARKING DIAGRAM*



= Specific Device Code = Month Code

*This information is generic. Please refer to device data sheet for actual part marking.

Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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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