

# NL17SV16XV5T2

## Ultra-Low Voltage Buffer

The NL17SV16XV5T2 is an ultra-high performance single Buffer fabricated in sub-micron silicon gate (0.35  $\mu$ ) CMOS technology with excellent performance down to 0.9 V. This device is ideal for extremely high-speed and high-drive applications. Additionally, limitations of board space are no longer a constraint. The very small SOT-553 makes this device fit most tight designs and spaces.

The internal circuit is composed of three stages; including a buffered output which provides high noise immunity and stable output. The NL17SV16XV5T2 input structure provides protection when voltages up to 3.6 V are applied.

### Features

- Extremely High Speed: 1.5 ns (Typ) at  $V_{CC} = 3.3$  V
- Designed for 0.9 V to 3.6 V Operation
- Over Voltage Tolerance\* (OVT) Input  
Permits Logic Translation
- Balanced  $\pm 24$  mA Output Drive @ 3.3 Volts
- Near Zero Static Supply Current
- Ultra-Tiny SOT-553 5 Pin Package only 1.6 x 1.6 mm Footprint

### Applications

- Cellular
- Digital Camera
- PDA
- Digital Video

\*Over Voltage Tolerance (OVT) enables pins to function outside (higher) of their operating voltages, with no damage to the devices or to signal integrity.

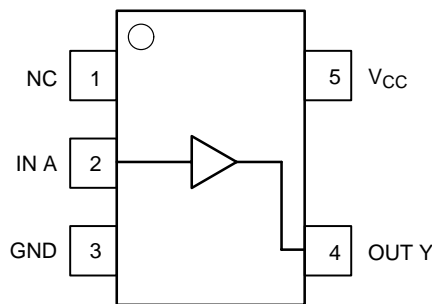
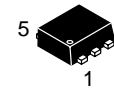


Figure 1. Pinout (Top View)



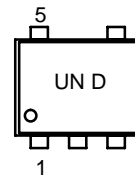
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SOT-553  
CASE 463B

### MARKING DIAGRAM



UN = Specific Device Code  
D = Date Code

### PIN ASSIGNMENT

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

### FUNCTION TABLE

Input A	Output Y
L	L
H	H

### ORDERING INFORMATION

Device	Package	Shipping†
NL17SV16XV5T2	SOT-553	4000 Tape & Reel (178 mm)

†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.

# NL17SV16XV5T2

## MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to + 4.6	V
V <sub>I</sub>	DC Input Voltage	-0.5 to + 4.6	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> +0.5	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>I</sub> < GND	±50
I <sub>OK</sub>	DC Output Diode Current	V <sub>O</sub> = GND V <sub>O</sub> = V <sub>CC</sub>	-50 +50
I <sub>O</sub>	DC Output Sink Current		±50
I <sub>CC</sub>	DC Supply Current per Supply Pin		±50
I <sub>GND</sub>	DC Ground Current per Ground Pin		±50
T <sub>STG</sub>	Storage Temperature Range	- 65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1.0 mm from Case for 10 seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 1)	250	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	250	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating	Oxygen index: 28 to 34	UL 94 V-0 @ 0125 in
V <sub>ESD</sub>	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3)	2000 300

Maximum 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. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	0.9	3.6	V
V <sub>IN</sub>	Digital Input Voltage	0	3.6	V
V <sub>out</sub>	Output Voltage	0	V <sub>CC</sub>	V
I <sub>OH</sub> /I <sub>OL</sub>	Output Current		±24 ±18 ±6 ±4 ±2 ±0.1	mA
t <sub>A</sub>	Operating Temperature Range. All Package Types	-40	+85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise or Fall Time		10	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

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## DC CHARACTERISTICS— Digital Section (Voltages Referenced to GND)

Symbol	Parameter	Condition	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = -40 to 85°C		Unit
				Min	Max	Min	Max	
V <sub>IH</sub>	High Level Input Voltage		0.90	0.65 x V <sub>CC</sub>		0.65 x V <sub>CC</sub>		V
			1.10 ≤ V <sub>CC</sub> ≤ 1.30	0.65 x V <sub>CC</sub>		0.65 x V <sub>CC</sub>		
			1.40 ≤ V <sub>CC</sub> ≤ 1.60	0.65 x V <sub>CC</sub>		0.65 x V <sub>CC</sub>		
			1.65 ≤ V <sub>CC</sub> ≤ 1.95	0.65 x V <sub>CC</sub>		0.65 x V <sub>CC</sub>		
			2.30 ≤ V <sub>CC</sub> ≤ 2.70	1.6		1.6		
2.70 ≤ V <sub>CC</sub> ≤ 3.60	2.0		2.0					
V <sub>IL</sub>	Low Level Input Voltage		0.90		0.35 x V <sub>CC</sub>		0.35 x V <sub>CC</sub>	V
			1.10 ≤ V <sub>CC</sub> ≤ 1.30		0.35 x V <sub>CC</sub>		0.35 x V <sub>CC</sub>	
			1.40 ≤ V <sub>CC</sub> ≤ 1.60		0.35 x V <sub>CC</sub>		0.35 x V <sub>CC</sub>	
			1.65 ≤ V <sub>CC</sub> ≤ 1.95		0.35 x V <sub>CC</sub>		0.35 x V <sub>CC</sub>	
			2.30 ≤ V <sub>CC</sub> ≤ 2.70		0.7		0.7	
2.70 ≤ V <sub>CC</sub> ≤ 3.60		0.8		0.8				
V <sub>OH</sub>	High Level Output Voltage	I <sub>OH</sub> = -100 μA	0.90	V <sub>CC</sub> - 0.1		V <sub>CC</sub> - 0.1		V
			1.10 ≤ V <sub>CC</sub> ≤ 1.30	V <sub>CC</sub> - 0.1		V <sub>CC</sub> - 0.1		
			1.40 ≤ V <sub>CC</sub> ≤ 1.60	V <sub>CC</sub> - 0.2		V <sub>CC</sub> - 0.2		
			1.65 ≤ V <sub>CC</sub> ≤ 1.95	V <sub>CC</sub> - 0.2		V <sub>CC</sub> - 0.2		
			2.30 ≤ V <sub>CC</sub> ≤ 2.70	V <sub>CC</sub> - 0.2		V <sub>CC</sub> - 0.2		
			2.70 ≤ V <sub>CC</sub> ≤ 3.60	V <sub>CC</sub> - 0.2		V <sub>CC</sub> - 0.2		
			I <sub>OH</sub> = -2.0 mA	1.10 ≤ V <sub>CC</sub> ≤ 1.30	0.75 x V <sub>CC</sub>		0.75 x V <sub>CC</sub>	
I <sub>OH</sub> = -4.0 mA	1.40 ≤ V <sub>CC</sub> ≤ 1.60	0.75 x V <sub>CC</sub>		0.75 x V <sub>CC</sub>				
I <sub>OH</sub> = -6.0 mA	1.65 ≤ V <sub>CC</sub> ≤ 1.95	2.30 ≤ V <sub>CC</sub> ≤ 2.70	1.25		1.25			
			2.0		2.0			
I <sub>OH</sub> = -12 mA	2.30 ≤ V <sub>CC</sub> ≤ 2.70	2.70 ≤ V <sub>CC</sub> ≤ 3.60	1.8		1.8			
			2.2		2.2			
I <sub>OH</sub> = -18 mA	2.30 ≤ V <sub>CC</sub> ≤ 2.70	2.70 ≤ V <sub>CC</sub> ≤ 3.60	1.7		1.7			
			2.4		2.4			
I <sub>OH</sub> = -24 mA	2.70 ≤ V <sub>CC</sub> ≤ 3.60		2.2		2.2			
V <sub>OL</sub>	Low Level Output Voltage Low Level Output Voltage	I <sub>OL</sub> = 100 μA	0.90		0.1		0.1	V
			1.10 ≤ V <sub>CC</sub> ≤ 1.30		0.1		0.1	
			1.40 ≤ V <sub>CC</sub> ≤ 1.60		0.2		0.2	
			1.65 ≤ V <sub>CC</sub> ≤ 1.95		0.2		0.2	
			2.30 ≤ V <sub>CC</sub> ≤ 2.70		0.2		0.2	
			2.70 ≤ V <sub>CC</sub> ≤ 3.60		0.2		0.2	
			I <sub>OL</sub> = 2.0 mA	1.10 ≤ V <sub>CC</sub> ≤ 1.30		0.25 x V <sub>CC</sub>		
I <sub>OL</sub> = 4.0 mA	1.40 ≤ V <sub>CC</sub> ≤ 1.60		0.25 x V <sub>CC</sub>		0.25 x V <sub>CC</sub>			
I <sub>OL</sub> = 6.0 mA	1.65 ≤ V <sub>CC</sub> ≤ 1.95	2.30 ≤ V <sub>CC</sub> ≤ 2.70	2.70 ≤ V <sub>CC</sub> ≤ 3.60	0.3		0.3		
				0.3		0.3		
I <sub>OL</sub> = 12 mA	2.30 ≤ V <sub>CC</sub> ≤ 2.70	2.70 ≤ V <sub>CC</sub> ≤ 3.60	0.4		0.4			
			0.4		0.4			
I <sub>OL</sub> = 18 mA	2.30 ≤ V <sub>CC</sub> ≤ 2.70	2.70 ≤ V <sub>CC</sub> ≤ 3.60	0.6		0.6			
			0.4		0.4			
I <sub>OL</sub> = 24 mA	2.70 ≤ V <sub>CC</sub> ≤ 3.60		0.55		0.55			
I <sub>IN</sub>	Input Leakage Current	0 = V <sub>I</sub> = 3.6 V	0.90 to 3.60		±0.1		±0.9	μA
I <sub>OFF</sub>	Power Off Leakage Current		0		1		5	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>I</sub> = V <sub>CC</sub> or GND V <sub>CC</sub> = V <sub>I</sub> = 3.6 V	0.90 to 3.60		0.9		5 ±5	μA

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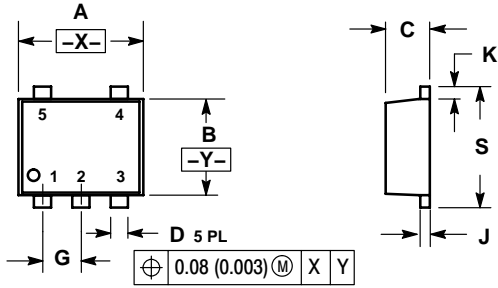
## AC CHARACTERISTICS (Input $t_r = t_f = 3.0$ nS)

Symbol	Parameter	-40°C		25°C			85°C		Unit
		Condition	V <sub>CC</sub>	Min	Typ	Max	Min	Max	
T <sub>PHL</sub> , T <sub>PLH</sub>	Propagation Delay	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 1.0 MΩ	0.90		20				nS
		C <sub>L</sub> = 15 pF, R <sub>L</sub> = 2.0 kΩ	1.10 ≤ V <sub>CC</sub> ≤ 1.30	2.0	6.0	13	1.0	16.9	nS
			1.40 ≤ V <sub>CC</sub> ≤ 1.60	1.0	3.2	6.1	1.0	7.0	
C <sub>L</sub> = 30 pF, R <sub>L</sub> = 500 kΩ	1.65 ≤ V <sub>CC</sub> ≤ 1.95	1.0	2.0	5.2	1.0	6.2	nS		
		2.30 ≤ V <sub>CC</sub> ≤ 2.70	0.8	1.2	3.7	0.7		4.4	
		2.70 ≤ V <sub>CC</sub> ≤ 3.60	0.7	1.0	3.3	0.6		3.8	
C <sub>IN</sub>	Input Capacitance		0		2.0				pF
C <sub>OUT</sub>	Output Capacitance		0		4.5				pF
C <sub>PD</sub>	Power Dissipation Capacitance	V <sub>I</sub> = 0 V or V <sub>CC</sub> F = 10 MHz	0.90 to 3.60		20				pF

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## PACKAGE DIMENSIONS

**SOT-553**  
**5-LEAD PACKAGE**  
**CASE 463B-01**  
**ISSUE A**




**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	MAX	MIN	MAX
A	1.50	1.70	0.059	0.067
B	1.10	1.30	0.043	0.051
C	0.50	0.60	0.020	0.024
D	0.17	0.27	0.007	0.011
G	0.50 BSC		0.020 BSC	
J	0.08	0.18	0.003	0.007
K	0.10	0.30	0.004	0.012
S	1.50	1.70	0.059	0.067

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