

# NLAS3257A

## Mux / Demux Analog Switch

The NLAS3257A Mux / Demux Analog Switch is an advanced high-speed single pole double throw (SPDT) analog switch in ultra-small footprint.

### Features

- High Speed:  $t_{PD} = 0.25 \text{ ns (Max) @ } V_{CC} = 4.5 \text{ V}$
- $R_{ON}: 7.5 \Omega, \text{ Typ @ } V_{CC} = 4.2 \text{ V}$
- $C_{ON}: 7.5 \text{ pF, Typ @ } V_{CC} = 3.3 \text{ V}$
- $V_{CC}$  Range: 1.65 V to 4.5 V
- Ultra-Small 1 x 1 mm Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- Mobile Phones, PDAs, Camera

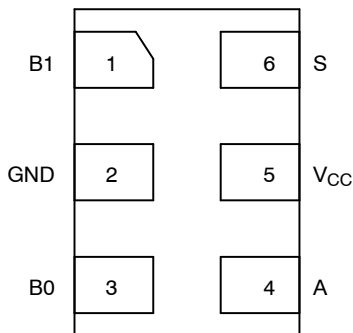


Figure 1. UDFN6 (Top View)

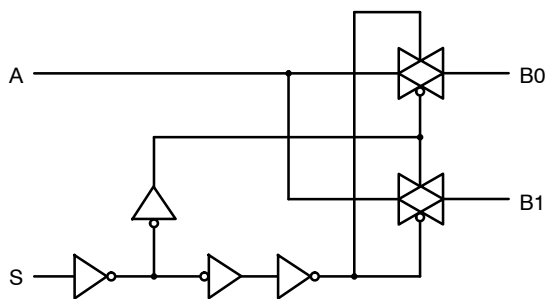


Figure 2. Logic Diagram

### Function Table

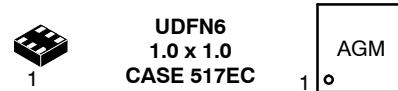
Input S	Function
L	A = B0
H	A = B1



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### MARKING DIAGRAM



AG = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

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**Table 1. MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage	-0.5 to +5.5	V
$V_{IN}$	Control Input Voltage (S Pin)	-0.5 to +5.5	V
$V_{I/O}$	Switch Input / Output Voltage (A, B0, B1 Pins)	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	Control Pin DC Input Diode Current (S Pin) $V_{IN} < GND$	-50	mA
$I_{OK}$	Switch I/O Port DC Diode Current (A, B0, B1 Pins) $V_{I/O} < GND$ or $V_{I/O} > V_{CC}$	$\pm 50$	mA
$I_O$	On-State Switch Current	$\pm 128$	mA
	Continuous Current Through $V_{CC}$ or GND	$\pm 150$	mA
$I_{CC}$	DC Supply Current per Supply Pin	$\pm 150$	mA
$I_{GND}$	DC Ground Current per Ground Pin	$\pm 150$	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
$\theta_{JA}$	Thermal Resistance (Note 1)	466	°C/W
$P_D$	Power Dissipation in Still Air at 85°C (Note 1)	269	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)	>6000	V
		>200	
		>2000	
$I_{LATCHUP}$	Latchup Performance Above $V_{CC}$ and Below GND at 85°C (Note 5)	$\pm 100$	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. 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
4. Tested to JESD22-C101-A
5. Tested to EIA / JESD78.

**Table 2. RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	Positive DC Supply Voltage	1.65	4.5	V
$V_I$	Control Pin Input Voltage (S Pin)	0	4.5	V
$V_{I/O}$	Switch Input / Output Voltage (A, B0, B1 Pins)	0	$V_{CC}$	V
$T_A$	Operating Free-Air Temperature	-40	+85	°C
$\Delta t / \Delta V$	Input Transition Rise or Fall Rate Control Input Switch I/O	0	20	ns/V
		0	DC	

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.

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**Table 3. DC ELECTRICAL CHARACTERISTICS** (Typical: T = 25°C, V<sub>CC</sub> = 3.3 V)

Symbol	Parameter	Test Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C			Unit
				Min	Typ	Max	
V <sub>IH</sub>	Control Input, High Voltage (S Pin)		2.7 3.3 4.2	0.95 1.0 1.25			V
V <sub>IL</sub>	Control Input, Low Voltage (S Pin)		2.7 3.3 4.2			0.3 0.4 0.5	V
I <sub>IN</sub>	Control Input, Leakage Current (S Pin)	0 ≤ V <sub>IN</sub> ≤ V <sub>CC</sub>	1.65 – 4.5		±0.5	±1.0	μA
I <sub>B0/B1_OFF</sub>	Off State Leakage Current (B0/B1 Pins)	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> V <sub>B0</sub> and V <sub>B1</sub> = 0.3 V V <sub>A</sub> = 4 V	4.5		±20	±100	nA
I <sub>A_ON</sub>	On State Leakage Current (A Pin)	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> V <sub>B0</sub> = 0.3 V or 4 V with V <sub>B1</sub> = Floating or V <sub>B1</sub> = 0.3 V or 4 V with V <sub>B0</sub> = Floating V <sub>A</sub> = 0.3 V or 4.0 V	4.5		±20	±100	nA
I <sub>Power_OFF</sub>	Power Off Leakage Current (S Pin)	V <sub>IN</sub> = 0 or 4.5 V	0			±100	nA
I <sub>CC</sub>	Quiescent Supply Current (V <sub>CC</sub> Pin)	V <sub>IN</sub> = V <sub>CC</sub> or GND, V <sub>IS</sub> = V <sub>CC</sub> or GND, I <sub>Load</sub> = 0 A	1.65 – 4.5		0.1	1.0	μA
ΔI <sub>CC</sub>	Additional Quiescent Supply Current (V <sub>CC</sub> Pin)	V <sub>IN</sub> = V <sub>CC</sub> or GND, V <sub>IS</sub> = V <sub>CC</sub> or GND, I <sub>Load</sub> = 0 A	3.3 4.2			2.0 3.0	mA

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.

**Table 4. ON RESISTANCE** (Typical: T = 25°C)

Symbol	Parameter	Test Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C			Unit
				Min	Typ	Max	
R <sub>ON</sub>	ON-Resistance	I <sub>ON</sub> = 8 mA, V <sub>IS</sub> = 0 V to V <sub>CC</sub>	2.7 3.3 4.2		9.3 8.7 7.5		Ω
R <sub>FLAT</sub>	ON-Resistance Flatness	I <sub>ON</sub> = 8 mA, V <sub>IS</sub> = 0 V to V <sub>CC</sub>	2.7 3.3 4.2		3.6 3.3 2.9		Ω
ΔR <sub>ON</sub>	Delta ON- Resistance	I <sub>ON</sub> = 8 mA, V <sub>IS</sub> = 0 V to V <sub>CC</sub>	2.7 3.3 4.2		0.8 0.7 0.5		Ω

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## AC ELECTRICAL CHARACTERISTICS

**Table 5. TIMING/FREQUENCY** (Typical: T = 25°C, V<sub>CC</sub> = 3.3 V, R<sub>L</sub> = 50 Ω, C<sub>L</sub> = 5 pF, f = 1 MHz)

Symbol	Parameter	Test Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C			Unit
				Min	Typ	Max	
t <sub>PD</sub>	Propagation Delay, A to Bn or Bn to A		1.65 – 4.5			0.25	ns
t <sub>ON</sub>	Turn-ON Time	(See Figures 4 and 5)	1.65 – 4.5			35	ns
t <sub>OFF</sub>	Turn-OFF Time	(See Figures 4 and 5)	1.65 – 4.5			25	ns
t <sub>BBM</sub>	Break-Before-Make Time	(See Figure 3)	1.65 – 4.5	2.0			ns
BW	-3 dB Bandwidth	C <sub>L</sub> = 5 pF	1.65 – 4.5		900		MHz

**Table 6. ISOLATION** (Typical: T = 25°C, V<sub>CC</sub> = 3.3 V, R<sub>L</sub> = 50 Ω, C<sub>L</sub> = 5 pF)

Symbol	Parameter	Test Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C			Unit
				Min	Typ	Max	
O <sub>IRR</sub>	OFF-Isolation	f = 240 MHz (See Figure 6)	1.65 – 4.5		-21		dB
X <sub>TALK</sub>	Non-Adjacent Channel Crosstalk	f = 240 MHz	1.65 – 4.5		-21		dB

**Table 7. CAPACITANCE** (Typical: T = 25°C, V<sub>CC</sub> = 3.3 V, f = 1 MHz)

Symbol	Parameter	Test Condition	T <sub>A</sub> = -40°C to +85°C			Unit
			Min	Typ	Max	
C <sub>IN</sub>	Control Input Capacitance	S pin			2.0	pF
C <sub>ON</sub>	ON Capacitance	Switch ON A to B0 A to B1			7.5	pF
C <sub>OFF</sub>	OFF Capacitance	Switch OFF B0 OFF B1 OFF			2.5	pF

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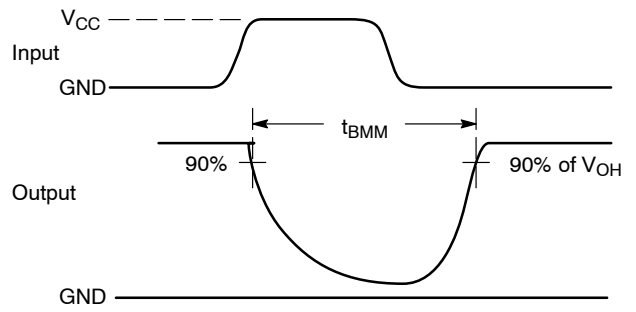
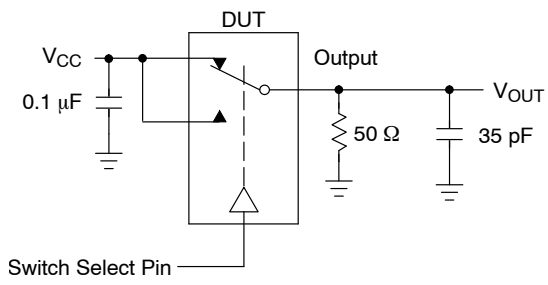


Figure 3.  $t_{BMM}$  (Time Break-Before-Make)

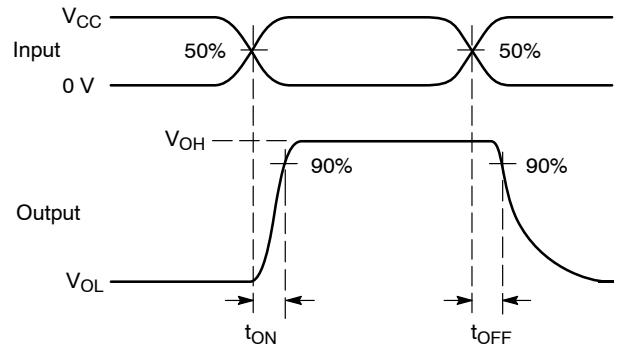
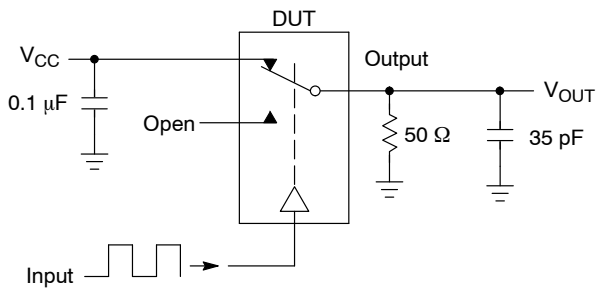


Figure 4.  $t_{ON}/t_{OFF}$

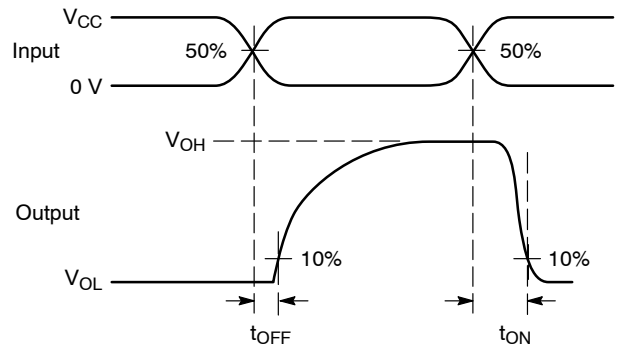
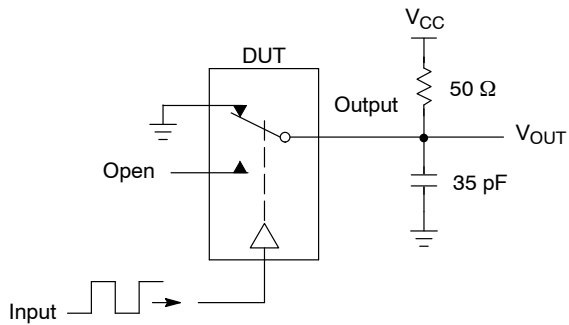
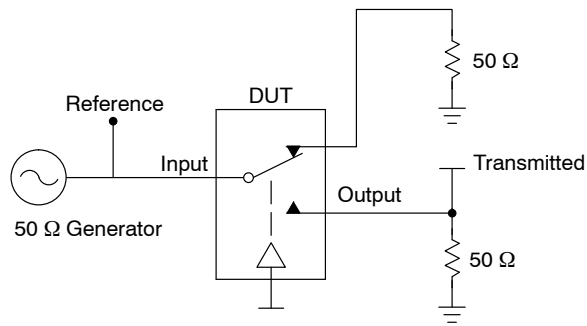


Figure 5.  $t_{ON}/t_{OFF}$

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Channel switch control/s test socket is normalized. Off isolation is measured across an off channel. On loss is the bandwidth of an On switch.  $V_{ISO}$ , Bandwidth and  $V_{ONL}$  are independent of the input signal direction.

$$V_{ISO} = \text{Off Channel Isolation} = 20 \text{ Log} \left( \frac{V_{OUT}}{V_{IN}} \right) \text{ for } V_{IN} \text{ at } 100 \text{ kHz}$$

$$V_{ONL} = \text{On Channel Loss} = 20 \text{ Log} \left( \frac{V_{OUT}}{V_{IN}} \right) \text{ for } V_{IN} \text{ at } 100 \text{ kHz to } 50 \text{ MHz}$$

Bandwidth (BW) = the frequency 3 dB below  $V_{ONL}$

$V_{CT}$  = Use  $V_{ISO}$  setup and test to all other switch analog input/outputs terminated with 50 Ω

**Figure 6. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/ $V_{ONL}$**

## DEVICE ORDERING INFORMATION

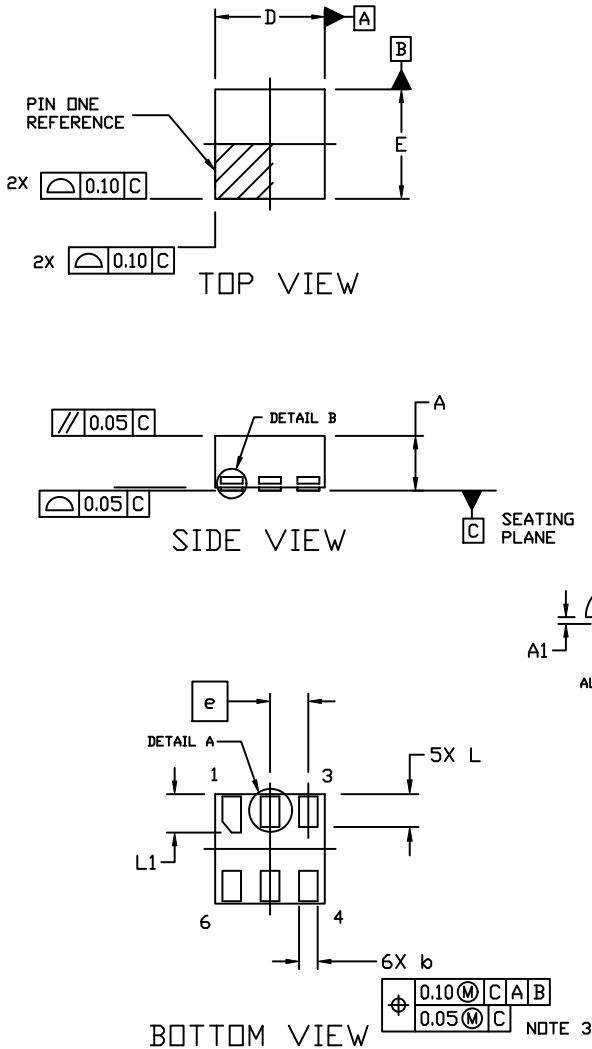
Device	Package	Shipping†
NLAS3257AMU3TCG	UDFN6 – 1.0 x 1.0, 0.35P (Pb-Free)	3000 / Tape & Reel

†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.

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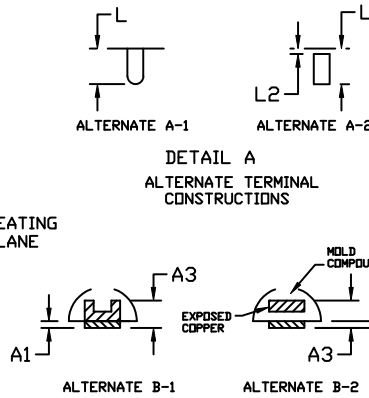
## PACKAGE DIMENSIONS

UDFN6, 1x1, 0.35P  
CASE 517EC  
ISSUE O



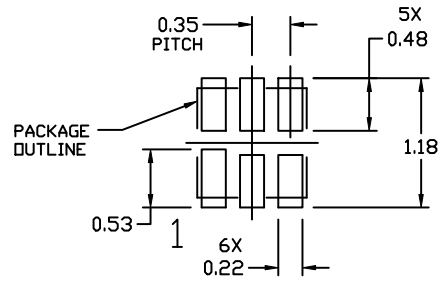
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO THE PLATED TERMINALS AND IS MEASURED BETWEEN 0.15 AND 0.20 FROM THE TERMINAL TIPS.
4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.45	0.50	0.55
A1	0.00	0.025	0.05
A3	0.13 REF		
b	0.12	0.17	0.22
D	0.90	1.00	1.10
E	0.90	1.00	1.10
e	0.35 BSC		
L	0.25	0.30	0.35
L1	0.30	0.35	0.40
L2	---	---	0.10

DETAIL B  
ALTERNATE CONSTRUCTION



### RECOMMENDED MOUNTING 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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