NLAS3157

Product Preview

Low Voltage SPDT Mux / Demux Analog Switch

The NLAS3157 Mux / Demux Analog Switch is an advanced high−speed single−pole double−throw (SPDT) CMOS switch. It can be used as an analog switch or as a low−delay bus switch. Break−before−make switching prevents both switches being enabled simultaneously. This eliminates signal disruption during switching. The control input, S, is independent of supply voltage line switch in an ultra−small footprint.

Features

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

Typical Applications

- Mobile Phones, PDAs, Camera

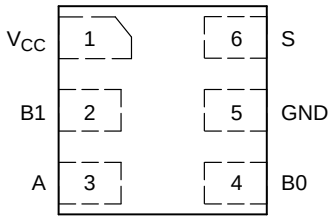

Figure 1. ULLGA6
(Top View)

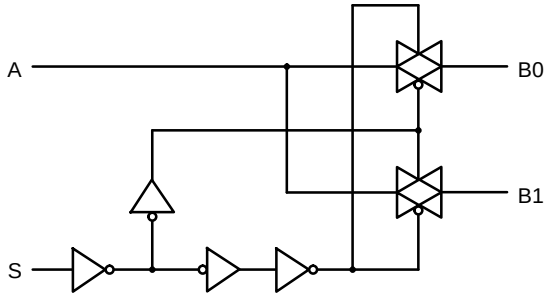

Figure 2. Logic Diagram

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

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MARKING DIAGRAMS

ULLGA6
1.0 x 1.0
CASE 613AD

Y = Specific Device Code
M = Date Code

FUNCTION TABLE

Input S	Function
L	A = B0
H	A = B1

ORDERING INFORMATION

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

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, BO, B1 Pins)		−0.5 to +5.5	V
I_{IK}	Control DC Input Diode Current (S Pin)	V_{IN} < GND	−50	mA
I_{OK}	Switch I/O Port DC Diode Current (A, BO, B1 Pins)	$V_{I/O}$ < GND or $V_{I/O}$ > V_{CC}	±50	mA
I_O	On−State Switch Current		±128	mA
	Continuous Current Through V_{CC} or GND		±150	mA
I_{CC}	DC Supply Current per Supply Pin		±150	mA
I_{GND}	DC Ground Current per Ground Pin		±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
θ_{JA}	Thermal Resistance (Note 1)		TBD	°C/W
P_D	Power Dissipation in Still Air at 85°C (Note 1)		TBD	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 Mode (Note 2) Machine Mode (Note 3) Charged Device Mode (Note 4)	>2000 >200 N/A	V
$I_{LATCHUP}$	Latchup Performance Above V_{CC} and Below GND at 85°C (Note 5)		±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 Input Voltage (S Pin)		0	4.5	V
$V_{I/O}$	Switch Input / Output Voltage (A, BO, 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 0	5 10	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.

Table 3. DC ELECTRICAL CHARACTERISTICS (Typical: T = 25°C, V_{CC} = 3.3 V)

Symbol	Parameter	Test Conditions	V_{CC} (V)	−40°C to +85°C			Unit
				Min	Typ	Max	
V_{IH}	Control Input, HIGH Voltage		2.7 3.3 4.2	1.25 1.52 1.94			V
V_{IL}	Control Input, LOW Voltage		2.7 3.3 4.2			0.4 0.4 0.5	V
I_{IN}	Control Input, Leakage Current	$0 \le V_{IS} \le V_{CC}$	1.65 − 4.5			±1.0	μA
I_{CC}	Quiescent Supply Current	$V_{IS} = V_{CC}$ or GND; I_D = 0 A	1.65 − 4.5			1.0	μA
$I_{NC (OFF)}$ $I_{NO (OFF)}$	NC or NO Leakage Current	V_{IS} = 1.65 V to 4.5 V	4.5		10		nA
$I_{COM (ON)}$	COM ON Leakage Current	V_{IS} = 1.65 V to 4.5 V	4.5		10		nA
ON RESISTANCE (Typical: T = 25°C)							
R_{ON}	On−Resistance	I_{ON} = 8 mA V_{IS} = 0 V to V_{CC}	2.7 3.3 4.2		9.3 8.7 7.5		Ω
R_{FLAT}	On−Resistance Flatness	I_{ON} = 8 mA V_{IS} = 0 V to V_{CC}	2.7 3.3 4.2		3.6 3.3 2.9		Ω
ΔR_{ON}	Delta On−Resistance	I_{ON} = 8 mA V_{IS} = 0 V to V_{CC}	2.7 3.3 4.2		0.8 0.7 0.5		Ω

Table 4. AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC} (V)	−40°C to +85°C			Unit
				Min	Typ	Max	
TIMING/FREQUENCY (Typical: T = 25°C, V_{CC} = 3.3 V, R_L = 50 Ω, C_L = 35 pF, f = 1 MHz)							
t_{PD}	Propagation Delay, A to Bn or Bn to A	(See Figures 3 and 4)	1.65 − 4.5			0.25	ns
t_{ON}	Turn−ON Time	(See Figures 6 and 7)	1.65 − 4.5		13.0	30.0	ns
t_{OFF}	Turn−OFF Time	(See Figures 6 and 7)	1.65 − 4.5		12.0	25.0	ns
T_{BBM}	Break−Before−Make Time	(See Figure 5)	1.65 − 4.5	2.0			ns
BW	−3 dB Bandwidth	C_L = 5 pF	1.65 − 4.5		1000		MHz
ISOLATION (Typical: T = 25°C, V_{CC} = 3.3 V, R_L = 50 Ω, C_L = 5 pF)							
O_{IRR}	OFF−Isolation	f = 240 MHz (See Figure 9)	1.65 − 4.5		-21		dB
X_{TALK}	Non−Adjacent Channel Crosstalk	f = 240 MHz	1.65 − 4.5		-21		dB

Table 4. AC ELECTRICAL CHARACTERISTICS

CAPACITANCE (Typical: T = 25°C)

C_{IN}	Control Pin Input Capacitance	V_{CC} = 0 V, f = 1 MHz		1.5		pF
		V_{CC} = 0 V, f = 10 MHz		1.0		
C_{ON}	ON Capacitance	V_{CC} = 3.3 V; OE = 0 V, S = 0 V or 3.3 V, f = 1 MHz		7.5		
		V_{CC} = 3.3 V; OE = 0 V, S = 0 V or 3.3 V, f = 10 MHz		6.5		
C_{OFF}	OFF Capacitance	V_{CC} = V_{IS} = 3.3 V; OE = 0 V, S = 3.3 V or 0 V, f = 1 MHz		3.8		
		V_{CC} = V_{IS} = 3.3 V; OE = 0 V, S = 3.3 V or 0 V, f = 10 MHz		2.0		

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.

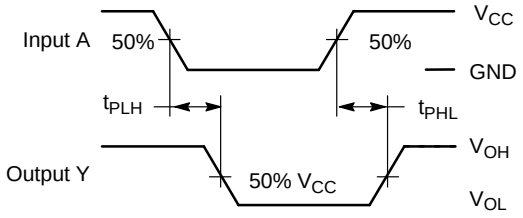
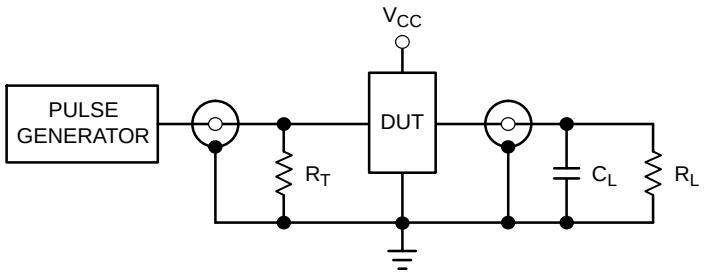


Figure 3. Propagation Delay Waveforms



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

Figure 4. Propagation Delay Test Circuit

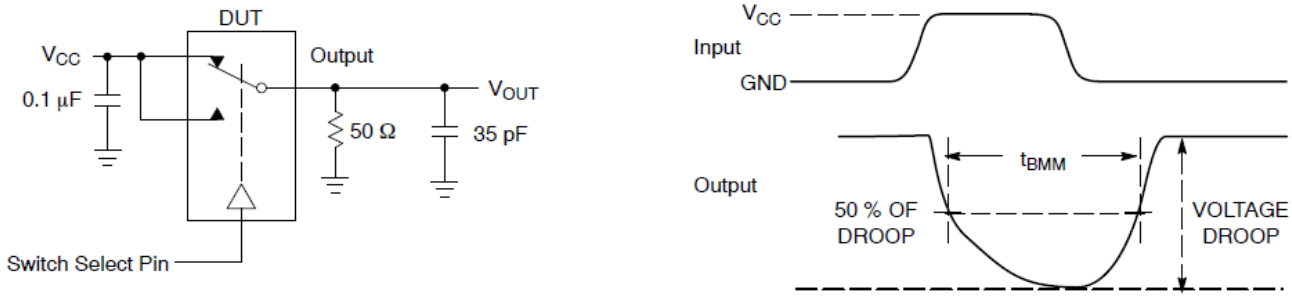


Figure 5. t_{BBM} (Time Break−Before−Make)

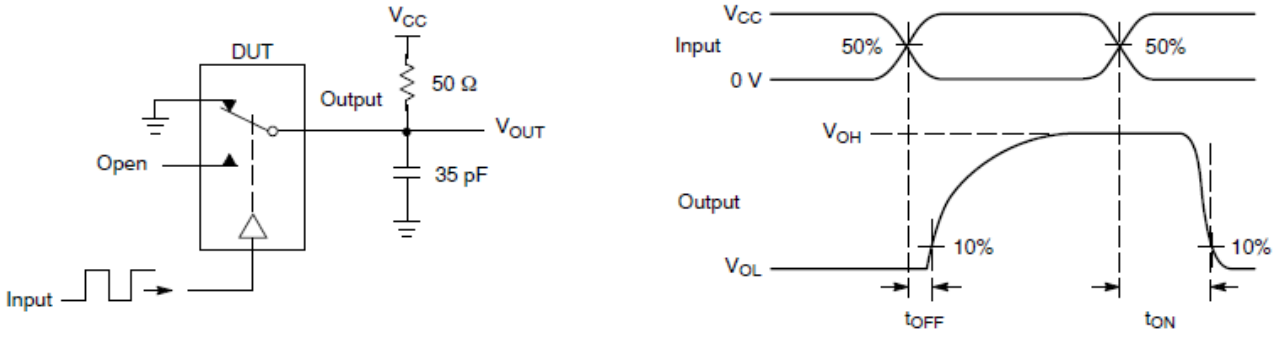


Figure 6. t_{ON} / t_{OFF}

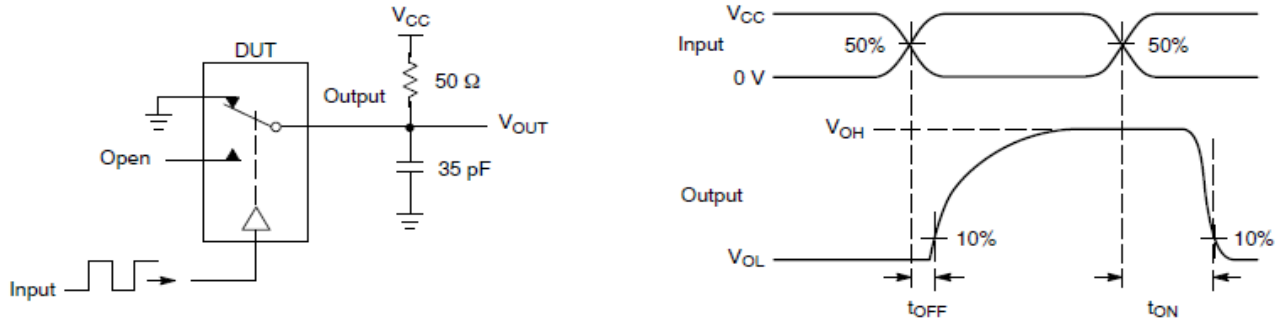
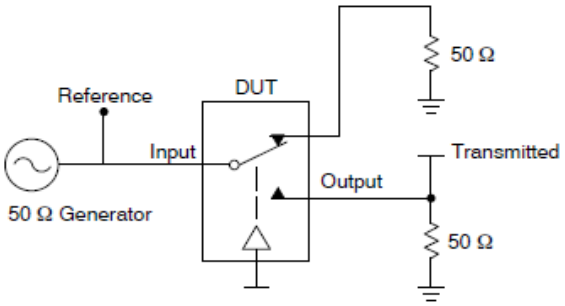


Figure 7. t_{ON} / t_{OFF}



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

V_{ONL} = On Channel Loss = $20\ Log\left(\frac{V_{OUT}}{V_{IN}}\right)$ for V_{IN} at 100 kHz to 50 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 8. Off Channel Isolation / On Channel Loss (BW)/Crosstalk (On Channel to Off Channel) / V_{ONL}

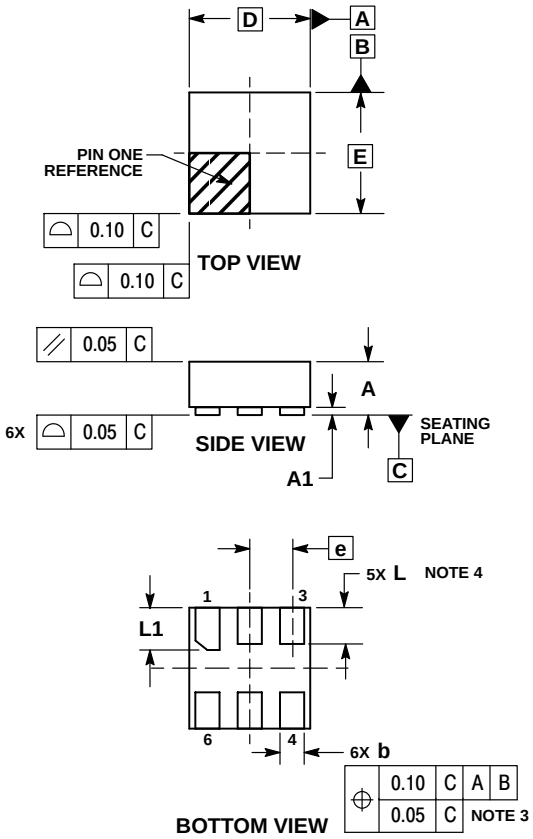
ORDERING INFORMATION

Device	Package	Shipping†
NLAS3157MX3TCG	ULLGA6 − 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.

PACKAGE DIMENSIONS

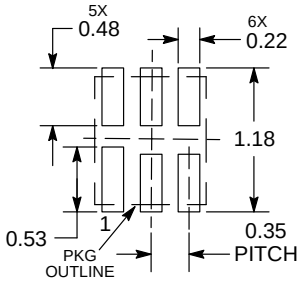
ULLGA6 1.0x1.0, 0.35P
CASE 613AD
ISSUE A



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS	
DIM	MIN	MAX
A	----	0.40
A1	0.00	0.05
b	0.12	0.22
D	1.00 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
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