

NLAS323

Dual SPST Analog Switch, Low Voltage, Single Supply

The NLAS323 is a dual SPST (Single Pole, Single Throw) switch, similar to 1/2 a standard 4066. The device permits the independent selection of 2 analog/digital signals. Available in the US8 package.

The use of advanced 0.6 micron CMOS process, improves the R_{ON} resistance considerably compared to older higher voltage technologies.

- On Resistance is 20 Ω Typical at 5.0 V
- Matching is < 1.0 Ω Between Sections
- 2.0 to 6.0 V Operating Range
- Ultra Low < 5.0 pC Charge Injection
- Ultra Low Leakage < 1.0 nA at 5.0 V, 25 C
- Wide Bandwidth > 200 MHz, -3.0 dB
- 2000 V ESD (Human Body Model)
- Ron Flatness $\pm 6.0 \Omega$ at 5.0 V
- US8 Package
- Independent, Positive Enable
- Pb-Free Package is Available*

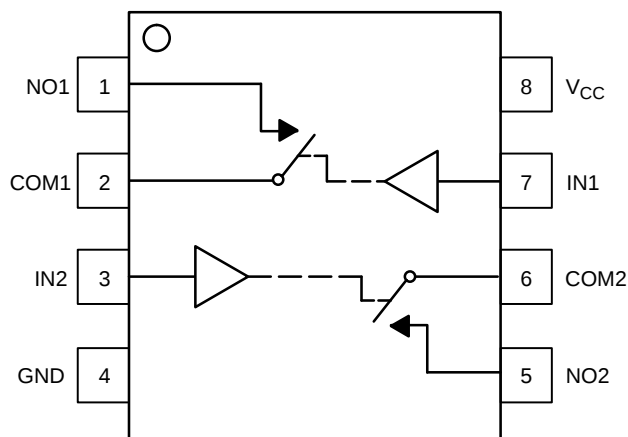


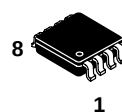
Figure 1. Pinout



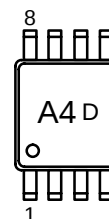
ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAM



US8
US SUFFIX
CASE 493



A4 = Device Code
D = Date Code

PIN ASSIGNMENT

1	NO1
2	COM1
3	IN2
4	GND
5	NO2
6	COM2
7	IN1
8	VCC

FUNCTION TABLE

On/Off Enable Input	State of Analog Switch
L	Off
H	On

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

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

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage	− 0.5 to + 7.0	V
V _I	DC Input Voltage	− 0.5 to + 7.0	V
V _O	DC Output Voltage	− 0.5 to + 7.0	V
I _{IK}	DC Input Diode Current V _I < GND	− 50	mA
I _{OK}	DC Output Diode Current V _O < 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
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)	250	°C/W
P _D	Power Dissipation in Still Air at 85°C	250	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)	> 2000 > 150 N/A	V

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 with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.

RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics	Min	Max	Unit
V _{CC}	Positive DC Supply Voltage	2.0	5.5	V
V _{IN}	Digital Input Voltage (Enable)	GND	5.5	V
V _{IO}	Static or Dynamic Voltage Across an Off Switch	GND	V _{CC}	V
V _{IS}	Analog Input Voltage (NO, COM)	GND	V _{CC}	V
T _A	Operating Temperature Range, All Package Types	−55	+125	°C
t _r , t _f	Input Rise or Fall Time, (Enable Input) V _{CC} = 3.3 V ± 0.3 V V _{CC} = 5.0 V ± 0.5 V	0 0	100 20	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

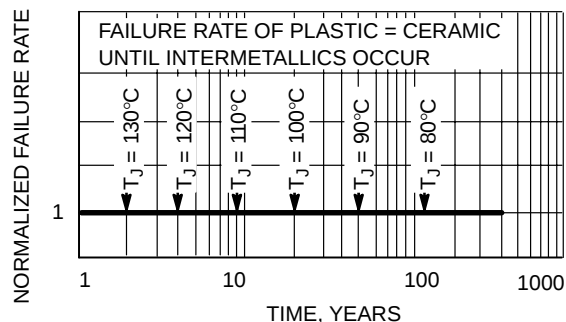


Figure 2. Failure Rate vs. Time Junction Temperature

NLAS323

DC CHARACTERISTICS – Digital Section (Voltages Referenced to GND)

Symbol	Parameter	Condition	V _{CC}	Guaranteed Max Limit			Unit
				-55 to 25°C	<85°C	<125°C	
V _{IH}	Minimum High-Level Input Voltage, Enable Inputs		2.0 3.0 4.5 5.5	1.5 2.1 3.15 3.85	1.5 2.1 3.15 3.85	1.5 2.1 3.15 3.85	V
V _{IL}	Maximum Low-Level Input Voltage, Enable Inputs		2.0 3.0 4.5 5.5	0.5 0.9 1.35 1.65	0.5 0.9 1.35 1.65	0.5 0.9 1.35 1.65	V
I _{IN}	Maximum Input Leakage Current, Enable Inputs	V _{IN} = 5.5 V or GND	0 V to 5.5 V	±0.1	±1.0	±1.0	μA
I _{CC}	Maximum Quiescent Supply Current (per package)	Enable and V _{IS} = V _{CC} or GND	5.5	1.0	1.0	2.0	μA

DC ELECTRICAL CHARACTERISTICS – Analog Section

Symbol	Parameter	Condition	V _{CC}	Guaranteed Max Limit			Unit
				-55 to 25°C	<85°C	<125°C	
R _{ON}	Maximum On Resistance (Figures 8 – 12)	V _{IN} = V _{IH} V _{IS} = V _{CC} to GND I _{IS} ≤ 10.0 mA	3.0 4.5 5.5	45 30 25	50 35 30	55 40 35	Ω
R _{FLAT(ON)}	On Resistance Flatness	V _{IN} = V _{IH} I _{IS} ≤ 10.0 mA V _{IS} = 1 V, 2 V, 3.5 V	4.5	4.0	4.0	5.0	Ω
I _{NO(OFF)}	Off Leakage Current, Pin 2 (Figure 3)	V _{IN} = V _{IL} V _{NO} = 1.0 V, V _{COM} = 4.5 V or V _{COM} = 1.0 V and V _{NO} 4.5 V	5.5	1.0	10	100	nA
I _{COM(OFF)}	Off Leakage Current, Pin 1 (Figure 3)	V _{IN} = V _{IL} V _{NO} = 4.5 V or 1.0 V V _{COM} = 1.0 V or 4.5 V	5.5	1.0	10	100	nA

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3.0 ns)

Symbol	Parameter	Test Conditions	V _{CC} (V)	Guaranteed Max Limit									Unit
				−55 to 25°C			<85°C			<125°C			
				Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t _{ON}	Turn-On Time	R _L = 300 Ω, C _L = 35 pF (Figures 4, 5, and 13)	2.0		7.0	14			16			16	ns
			3.0		5.0	10			12			12	
			4.5		4.5	9.0			11			11	
			5.5		4.5	9.0			11			11	
t _{OFF}	Turn-Off Time	R _L = 300 Ω, C _L = 35 pF (Figures 4, 5, and 13)	2.0		11.0	22			24			24	ns
			3.0		7.0	14			16			16	
			4.5		5.0	10			12			12	
			5.5		5.0	10			12			12	

		Typical @ 25, VCC = 5.0 V	
CIN	Maximum Input Capacitance, Select Input	8.0	pF
CNO or CNC	Analog I/O (switch off)	10	
CCOM(OFF)	Common I/O (switch off)	10	
CCOM(ON)	Feedthrough (switch on)	20	

NLAS323

ADDITIONAL APPLICATION CHARACTERISTICS (Voltages Referenced to GND Unless Noted)

Symbol	Parameter	Condition	V _{CC} V	Limit	Unit
				25°C	
BW	Maximum On-Channel -3dB Bandwidth or Minimum Frequency Response	V _{IS} = 0 dBm V _{IS} centered between V _{CC} and GND (Figures 6 and 14)	3.0 4.5 5.5	190 200 220	MHz
V _{ONL}	Maximum Feedthrough On Loss	V _{IS} = 0 dBm @ 10 kHz V _{IS} centered between V _{CC} and GND (Figure 6)	3.0 4.5 5.5	-2 -2 -2	dB
V _{ISO}	Off-Channel Isolation	f = 100 kHz; V _{IS} = 1.0 V RMS V _{IS} centered between V _{CC} and GND (Figures 6 and 15)	3.0 4.5 5.5	-93	dB
Q	Charge Injection Enable Input to Common I/O	V _{IS} = V _{CC} to GND, F _{IS} = 20 kHz t _r = t _f = 3.0 ns R _{IS} = 0 Ω, C _L = 1000 pF Q = C _L * ΔV _{OUT} (Figures 6 and 16)	3.0 5.5	1.5 3.0	pC
THD	Total Harmonic Distortion THD + Noise	F _{IS} = 20 Hz to 1 MHz, R _L = R _{gen} = 600 Ω, C _L = 50 pF V _{IS} = 3.0 V _{PP} sine wave V _{IS} = 5.0 V _{PP} sine wave (Figure 17)	3.3 5.5	0.3 0.15	%

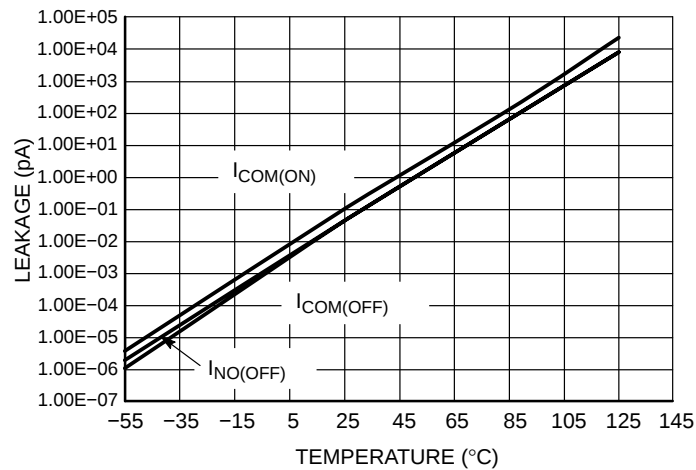


Figure 3. Switch Leakage vs. Temperature

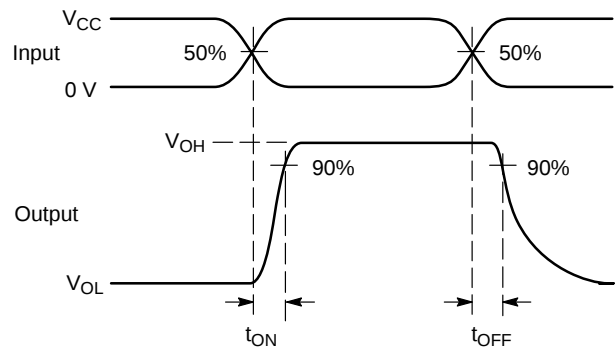
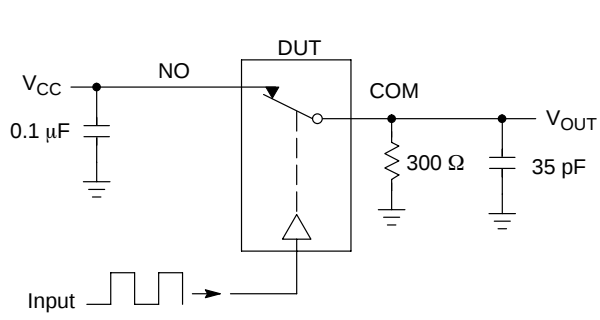


Figure 4. t_{ON}/t_{OFF}

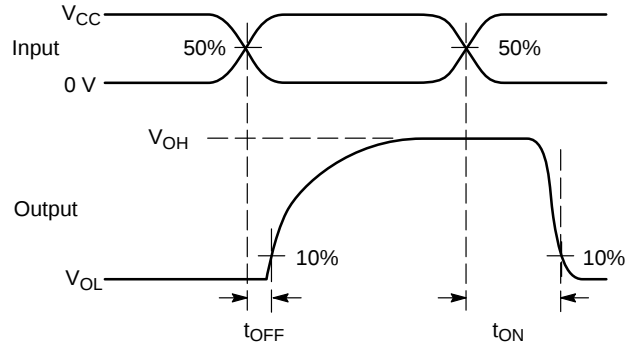
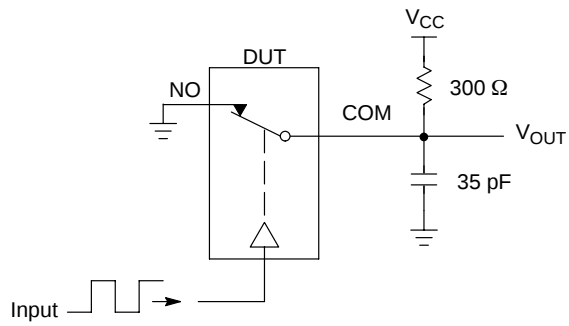
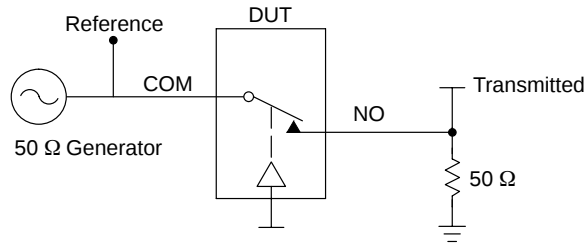


Figure 5. t_{ON}/t_{OFF}



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.

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

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

Bandwidth (BW) = the frequency 3.0 dB below V_{ONL}

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

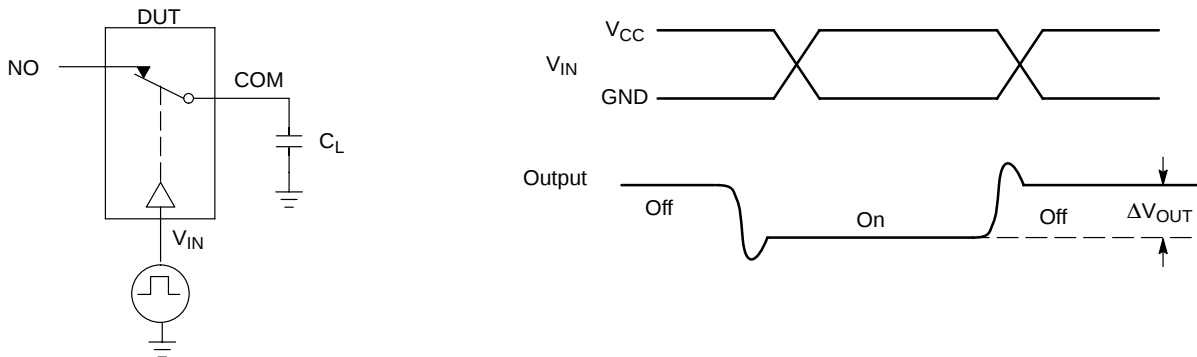


Figure 7. Charge Injection: (Q)

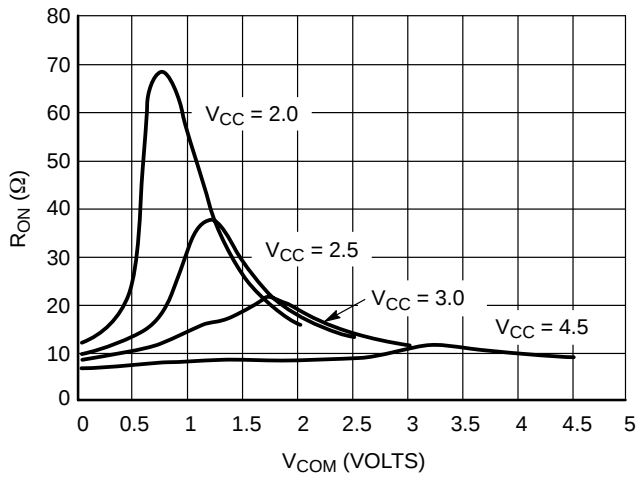


Figure 8. R_{ON} vs. V_{COM} and V_{CC} (@25°C)

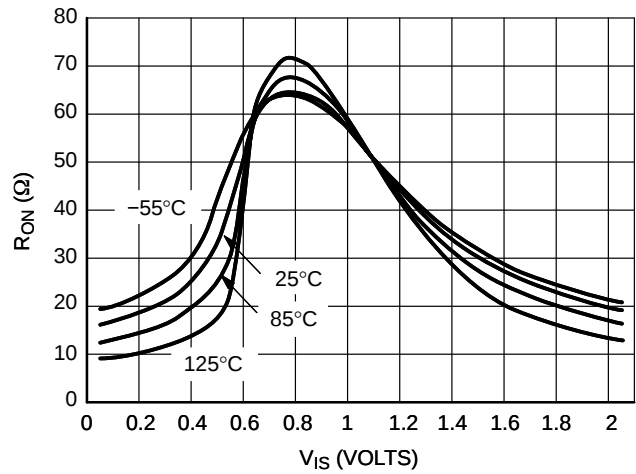


Figure 9. R_{ON} vs. V_{COM} and Temperature, $V_{CC} = 2.0$ V

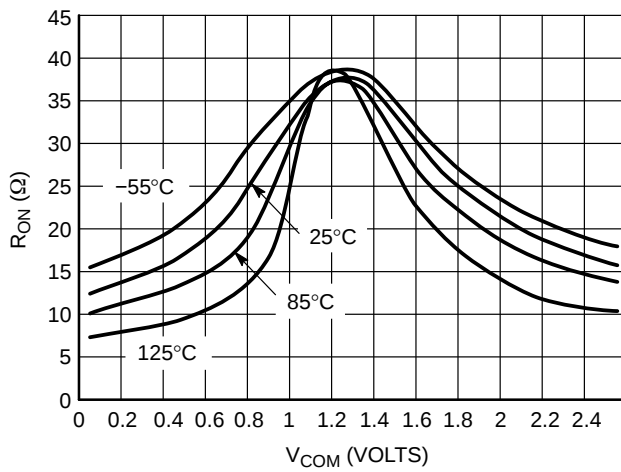


Figure 10. R_{ON} vs. V_{COM} and Temperature, $V_{CC} = 2.5$ V

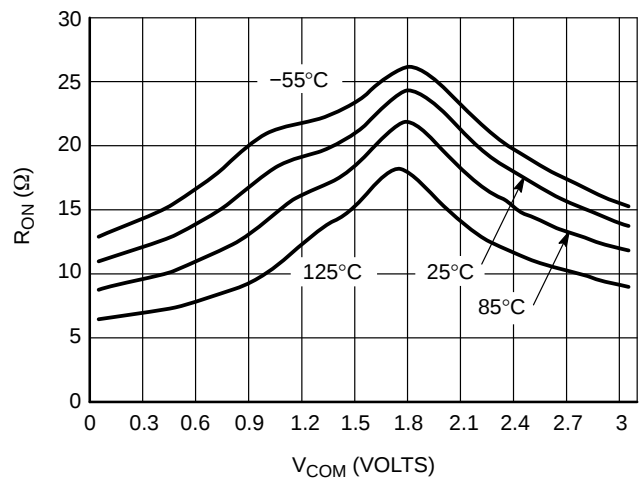


Figure 11. R_{ON} vs. V_{COM} and Temperature, $V_{CC} = 3.0$ V

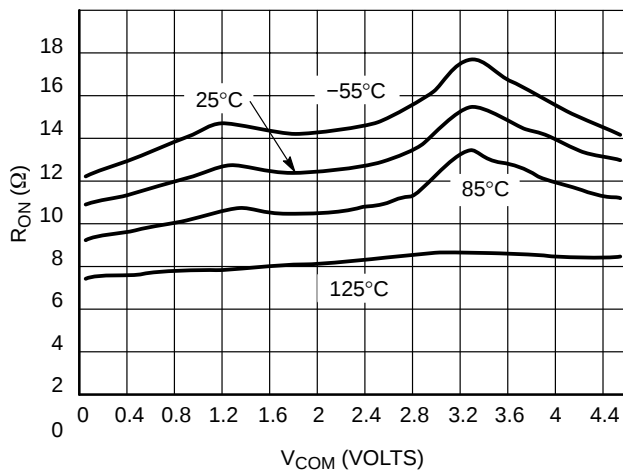


Figure 12. R_{ON} vs. V_{COM} and Temperature, $V_{CC} = 4.5$ V

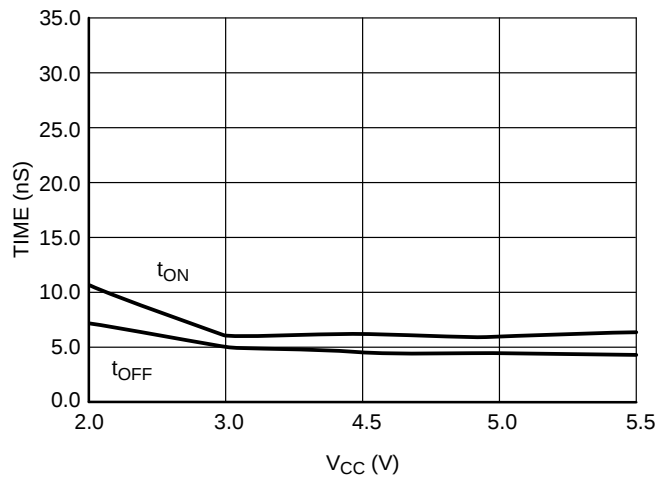


Figure 13. Switching Time vs. Supply Voltage, $T = 25^\circ\text{C}$

NLAS323

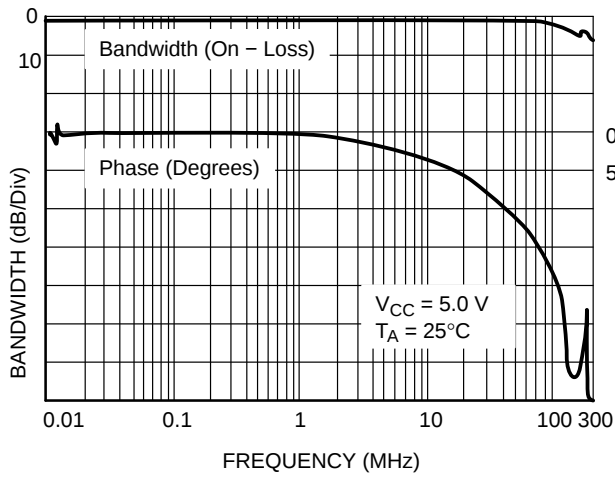


Figure 14. ON Channel Bandwidth and Phase Shift Over Frequency

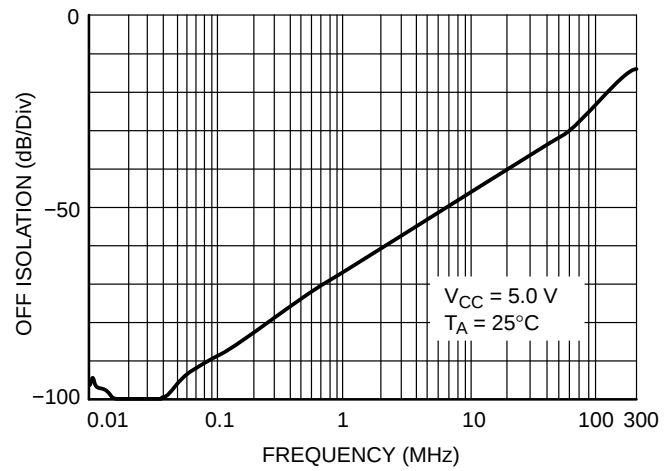


Figure 15. Off Channel Isolation

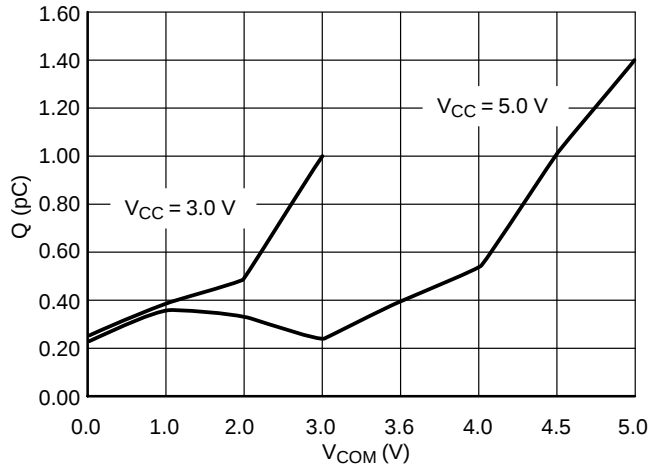


Figure 16. Charge Injection vs. V_{COM}

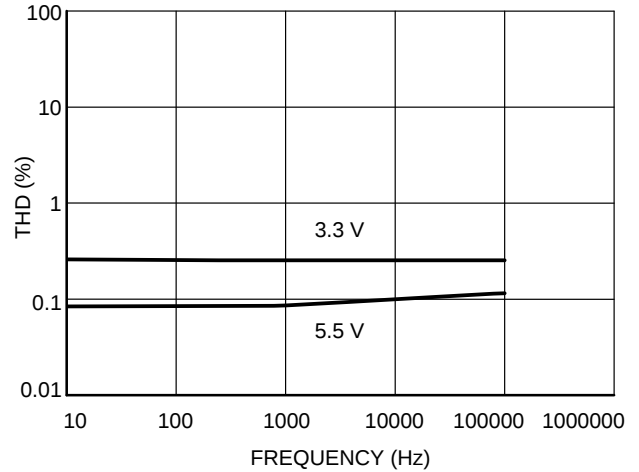


Figure 17. THD vs. Frequency

DEVICE ORDERING INFORMATION

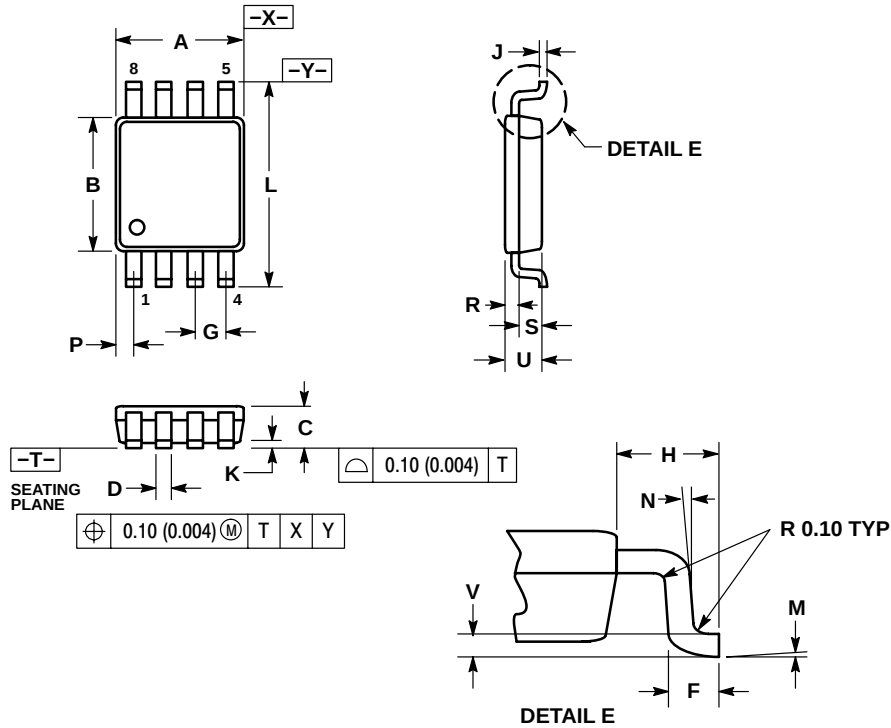
Device Order Number	Device Nomenclature				Package	Shipping [†]
	Circuit Indicator	Technology	Device Function	Package Suffix		
NLAS323US	NL	AS	323	US	US8	178 mm (7") 3000 / Tape & Reel
NLAS323USG	NL	AS	323	US	US8 (Pb-Free)	178 mm (7") 3000 / Tape & Reel

[†]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.

NLAS323

PACKAGE DIMENSIONS

US8
US SUFFIX
CASE 493-02
ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH, PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076-0.0203 MM. (300-800 °).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ± 0.0508 (0.0002 °).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.90	2.10	0.075	0.083
B	2.20	2.40	0.087	0.094
C	0.60	0.90	0.024	0.035
D	0.17	0.25	0.007	0.010
F	0.20	0.35	0.008	0.014
G	0.50 BSC		0.020 BSC	
H	0.40 REF		0.016 REF	
J	0.10	0.18	0.004	0.007
K	0.00	0.10	0.000	0.004
L	3.00	3.20	0.118	0.126
M	0 °	6 °	0 °	6 °
N	5 °	10 °	5 °	10 °
P	0.23	0.34	0.010	0.013
R	0.23	0.33	0.009	0.013
S	0.37	0.47	0.015	0.019
U	0.60	0.80	0.024	0.031
V	0.12 BSC		0.005 BSC	

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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
P.O. Box 5163, Denver, Colorado 80217 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

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

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

For additional information, please contact your
local Sales Representative.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9