

NLAS5123

SPDT, 1 Ω R_{ON} Switch

The NLAS5123 is a low R_{ON} SPDT analog switch. This device is designed for low operating voltage, high current switching of speaker output for cell phone applications. It can switch a balanced stereo output. The NLAS5123 can handle a balanced microphone/speaker/ringtone generator in a monophone mode. The device contains a break-before-make (BBM) feature.

Features

- Single Supply Operation:
1.65 V to 5.5 V V_{CC}
- Function Directly from LiON Battery
- R_{ON} Typical = 1.0 Ω @ $V_{CC} = 4.5$ V
- Low Static Power
- These are Pb-Free Devices

Typical Applications

- Cell Phone Speaker/Microphone Switching
- Ringtone-Chip/Amplifier Switching
- Stereo Balanced (Push-Pull) Switching

Important Information

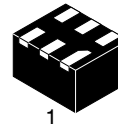
- Continuous Current Rating Through each Switch ± 300 mA
- 1.2 x 1.0 x 0.4P mm 6-Lead Thin DFN Package



ON Semiconductor®

<http://onsemi.com>

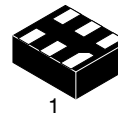
MARKING DIAGRAMS



**WDFN6
MN SUFFIX
CASE 506AS**



W = Specific Device Code
M = Date Code
▪ = Pb-Free Device

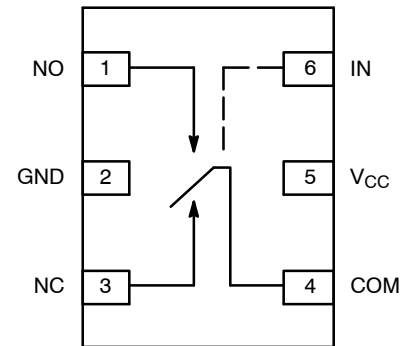


**UDFN6
MU SUFFIX
CASE 517AA**



X = Specific Device Code
M = Date Code
▪ = Pb-Free Device

PIN ASSIGNMENTS



(Top View)

ORDERING INFORMATION

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

NLAS5123

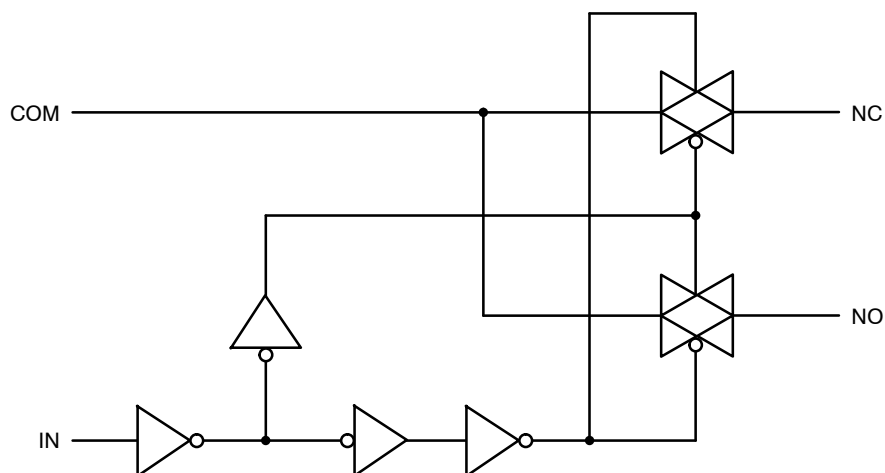


Figure 1. Input Equivalent Circuit

PIN DESCRIPTION

| Pin Name | Description |
|-------------|---------------|
| NC, NO, COM | Data Ports |
| IN | Control Input |

TRUTH TABLE

| Control Input | Function |
|---------------|---------------------|
| L | NC Connected to COM |
| H | NO Connected to COM |

H = HIGH Logic Level.
L = LOW Logic Level.

MAXIMUM RATINGS

| Symbol | Rating | Value | Unit |
|---------------|--|------------------------|------|
| V_{CC} | Positive DC Supply Voltage | -0.5 to +6.0 | V |
| V_{IS} | Analog Input Voltage (V_{NO} , V_{NC} , or V_{COM}) | -0.5 to $V_{CC} + 0.5$ | V |
| V_{IN} | Digital Select Input Voltage | -0.5 to +6.0 | V |
| I_{anl1} | Continuous DC Current from COM to NC/NO | ± 300 | mA |
| $I_{anl-pk1}$ | Peak Current from COM to NC/NO, 10 Duty Cycles (Note 1) | ± 500 | mA |
| I_{clmp} | Continuous DC Current into COM/NC/NO with respect to V_{CC} or GND | ± 100 | mA |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Defined as 10% ON, 90% off duty cycle.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Rating | Min | Max | Unit |
|---------------|------------------------------------|------|----------|-------------|
| V_{CC} | Positive DC Supply Voltage | 1.65 | 5.5 | V |
| V_{IS} | Analog Input Voltage (NC, NO, COM) | 0 | V_{CC} | V |
| V_{IN} | Digital Select Input Voltage (IN) | 0 | V_{CC} | V |
| T_A | Operating Temperature Range | -40 | 85 | $^{\circ}C$ |
| t_r , t_f | Input Rise or Fall Time, SELECT | | 20 10 | ns/V |

NLAS5123

DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test Conditions | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Unit |
|------------------|--|--|------------------------|------------------------|-----|------|---------------------------------|------------|------|
| | | | | Min | Typ | Max | Min | Max | |
| V _{IH} | HIGH Level Input Voltage | | 2.7 4.5 | | | | 2.0 2.4 | | V |
| V _{IL} | LOW Level Input Voltage | | 2.7 4.5 | | | | | 0.6 0.8 | V |
| I _{IN} | Input Leakage Current | 0 ≤ V _{IN} ≤ 5.5 V | 0-5.5 | | | ±0.1 | | ±1 | μA |
| I _{OFF} | OFF State Leakage Current (Note 7) | 0 ≤ NO, NC, COM ≤ V _{CC} | 5.5 | -2.0 | | +2.0 | | ±20 | nA |
| I _{ON} | ON State Leakage Current (Note 7) | 0 ≤ NO, NC, COM ≤ V _{CC} | 5.5 | -4.0 | | +4.0 | | ±40 | nA |
| R _{ON} | Switch On Resistance (Note 2) | I _O = 100 mA, V _{IS} = 0 V to V _{CC} | 2.7 | | | 1.7 | | 2.0 | Ω |
| | | I _O = 100 mA, V _{IS} = 0 V to V _{CC} | 4.5 | | | 1.0 | | 1.2 | |
| I _{CC} | Quiescent Supply Current All Channels ON or OFF | V _{IN} = V _{CC} or GND, I _{OUT} = 0 | 5.5 | | | 0.5 | | 1.0 | μA |

Analog Signal Range

| | | | | | | | | | |
|-------------------|--|--|-----|--|------|--|--|------|---|
| ΔR _{ON} | On Resistance Match Between Channels (Notes 2, 3, 4) | I _A = 100 mA, V _{IS} = 1.5 V | 2.7 | | 0.15 | | | 0.15 | Ω |
| | | I _A = 100 mA, V _{IS} = 2.5 V | 4.5 | | 0.12 | | | | |
| R _{flat} | On Resistance Flatness (Notes 2, 3, 5) | I _A = 100 mA, V _{IS} = 0 V to V _{CC} | 2.7 | | 0.4 | | | 0.4 | Ω |
| | | I _A = 100 mA, V _{IS} = 0 V to V _{CC} | 4.5 | | 0.3 | | | | |

2. Measured by the voltage drop between NC/NO and COM pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (NO, NC, COM).
3. Parameter is characterized but not tested in production.
4. ΔR_{ON} = R_{ON} max – R_{ON} min measured at identical V_{CC}, temperature and voltage levels.
5. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
6. Guaranteed by Design.
7. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

NLAS5123

AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test Conditions | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Unit | Figure # |
|--------------------------------------|---|--|------------------------|------------------------|----------|------------|---------------------------------|----------|------|----------|
| | | | | Min | Typ | Max | Min | Max | | |
| t _{PHL} t _{PLH} | Propagation Delay Bus-to-Bus (Note 9) | V _{IN} = V _{IH} or V _{IL} | 2.7 4.5 | | | 2.0 0.3 | | | ns | |
| t _{ON} | Output Enable Time Turn On Time (COM to NO or NC) | V _{IS} = 1.5 V, R _L = 50 Ω, C _L = 35 pF V _{IS} = 3.0 V, R _L = 50 Ω, C _L = 35 pF | 2.7 4.5 | | | 30 20 | | 35 25 | ns | 3, 4 |
| t _{OFF} | Output Disable Time Turn Off Time (COM to NO, NC) | V _{IS} = 1.5V, R _L = 50 Ω, C _L = 35 pF V _{IS} = 3.0 V, R _L = 50 Ω, C _L = 35 pF | 2.7 4.5 | | | 20 15 | | 25 20 | ns | 3, 4 |
| t _{BBM} | Break Before Make Time (Note 8) | V _{IS} = 1.5V, R _L = 50 Ω, C _L = 35 pF | 2.7 4.5 | 0.5 0.5 | | | 0.5 0.5 | | ns | 2 |
| Q | Charge Injection (Note 8) | C _L = 1.0 nF, V _{GEN} = 0 V R _{GEN} = 0 Ω | 2.7 4.5 | | 26 48 | | | | pC | 6 |
| O _{IRR} | Off Isolation (Note 10) | R _L = 50 Ω f = 1.0 MHz | 2.7 – 5.5 | | -62 | | | | dB | 5 |
| X _{talk} | Crosstalk | R _L = 50 Ω f = 1.0 MHz | 2.7 – 5.5 | | -70 | | | | dB | 7 |
| BW | -3 dB Bandwidth | R _L = 50 Ω | 2.7 – 5.5 | | 55 | | | | MHz | 8 |
| THD | Total Harmonic Distortion (Note 8) | R _L = 600 Ω 0.5 V _{P-P} f = 20 Hz to 20 kHz | 2.7 – 5.5 | | 0.012 | | | | % | 9 |

8. Guaranteed by Design.

9. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

10. Off Isolation = 20 log₁₀ [V_{COM}/V_{NO,NC}].

CAPACITANCE (Note 11)

| Symbol | Parameter | Test Conditions | Typ | Max | Unit |
|--------------------|---|------------------------------------|-----|-----|------|
| C _{IN} | Select Pin Input Capacitance | V _{CC} = 0 V, f = 1 MHz | 2.0 | | pF |
| C _{NC/NO} | NC, NO Port Off Capacitance | V _{CC} = 4.5 V, f = 1 MHz | 20 | | pF |
| C _{COM} | COM Port Capacitance when Switch is Enabled | V _{CC} = 4.5 V, f = 1 MHz | 55 | | pF |

11. T_A = +25°C, f = 1 MHz, Capacitance is characterized but not tested in production.

NLAS5123

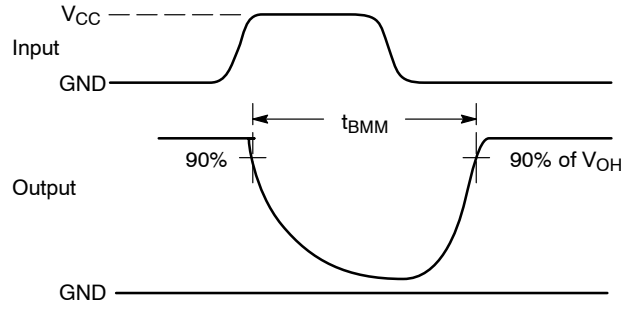
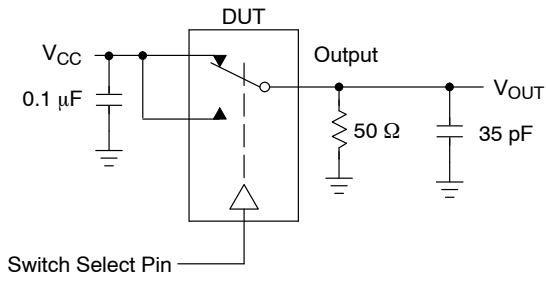


Figure 2. t_{BMM} (Time Break-Before-Make)

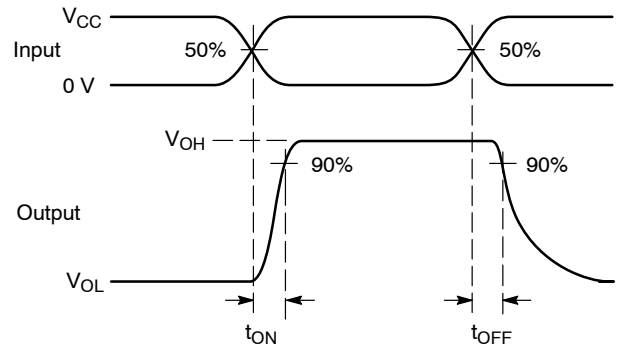
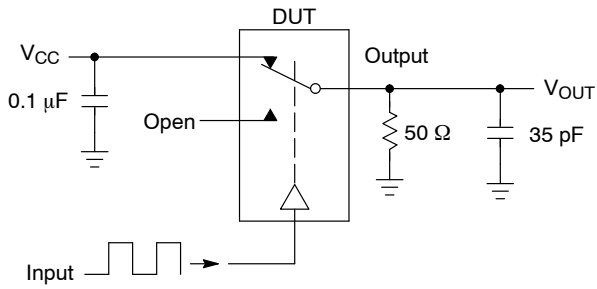


Figure 3. t_{ON}/t_{OFF}

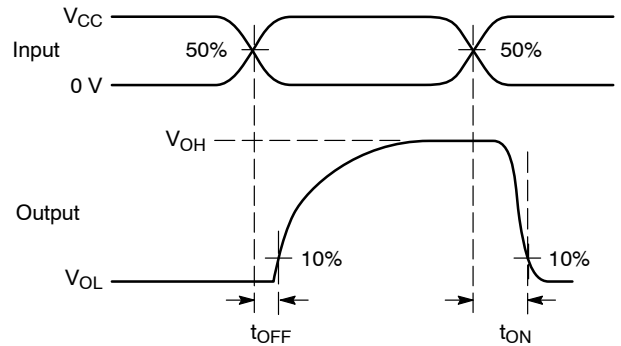
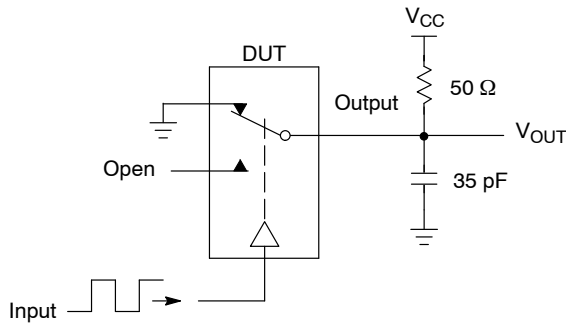
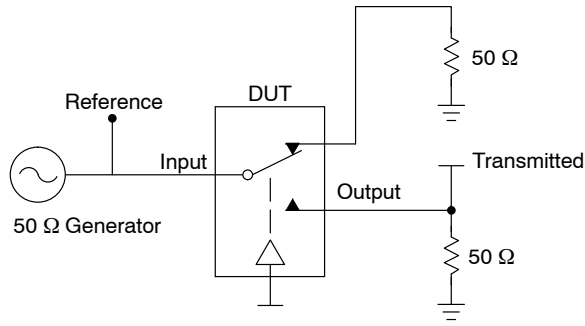


Figure 4. t_{ON}/t_{OFF}

NLAS5123



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

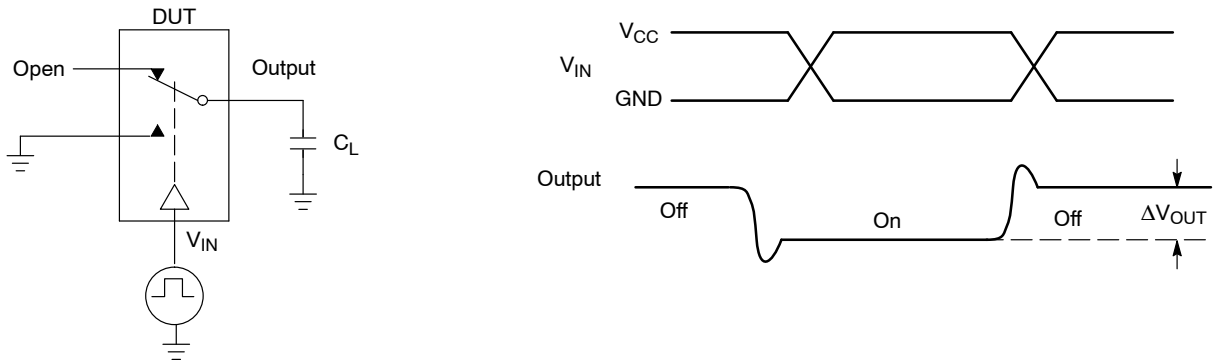


Figure 6. Charge Injection: (Q)

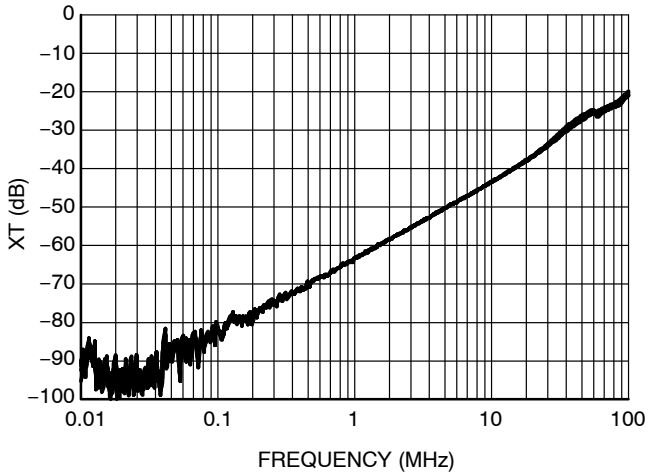


Figure 7. Cross Talk vs. Frequency
@ $V_{CC} = 4.5\text{ V}$

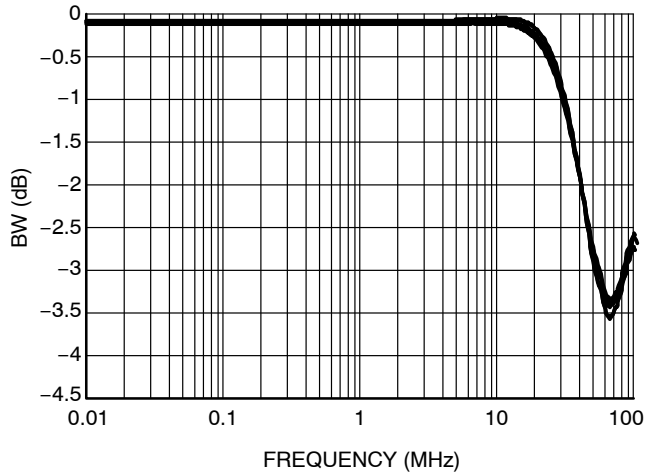


Figure 8. Bandwidth vs. Frequency

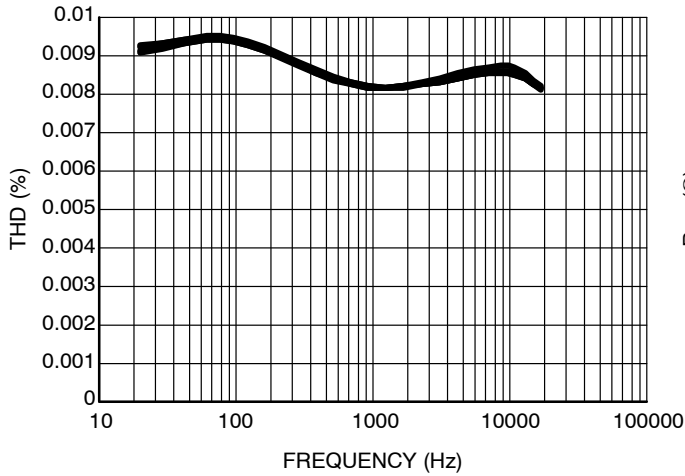


Figure 9. Total Harmonic Distortion

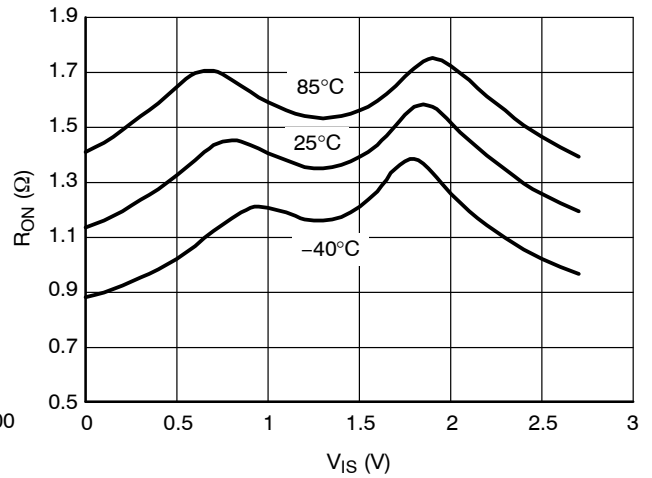


Figure 10. On-Resistance vs. Input Voltage
@ $V_{CC} = 2.7\text{ V}$

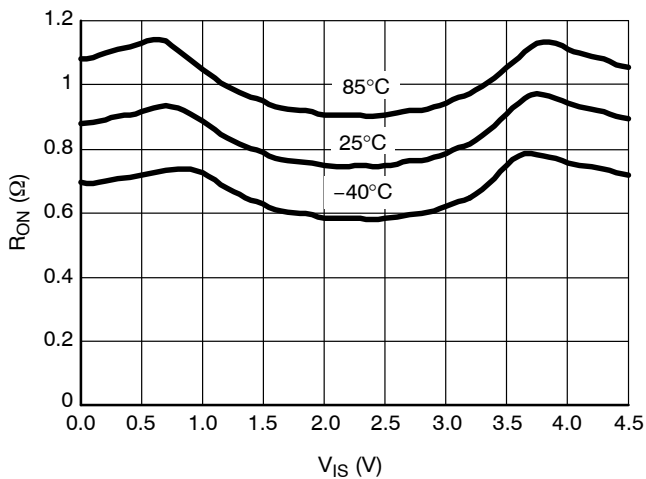


Figure 11. On-Resistance vs. Input Voltage
@ $V_{CC} = 4.5\text{ V}$

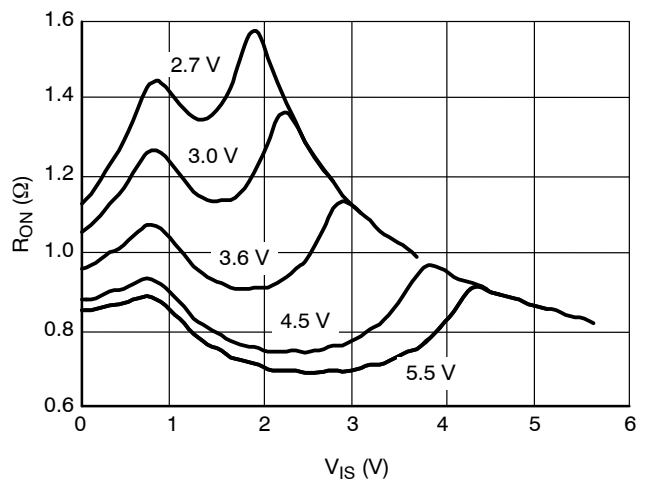


Figure 12. On-Resistance vs. Input Voltage

NLAS5123

DEVICE ORDERING INFORMATION

| Device Order Number | Device Nomenclature | | | | | Package Type | Tape & Reel Size [†] |
|---------------------|---------------------|------------|-----------------|----------------|--------------------|--------------------|-------------------------------|
| | Circuit Indicator | Technology | Device Function | Package Suffix | Tape & Reel Suffix | | |
| NLAS5123MNR2G | NL | AS | 5123 | MN | 2 | WDFN6 (Pb-Free) | 3000 / Tape & Reel |
| NLAS5123MUR2G | NL | AS | 5123 | MU | 2 | UDFN6 (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.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®

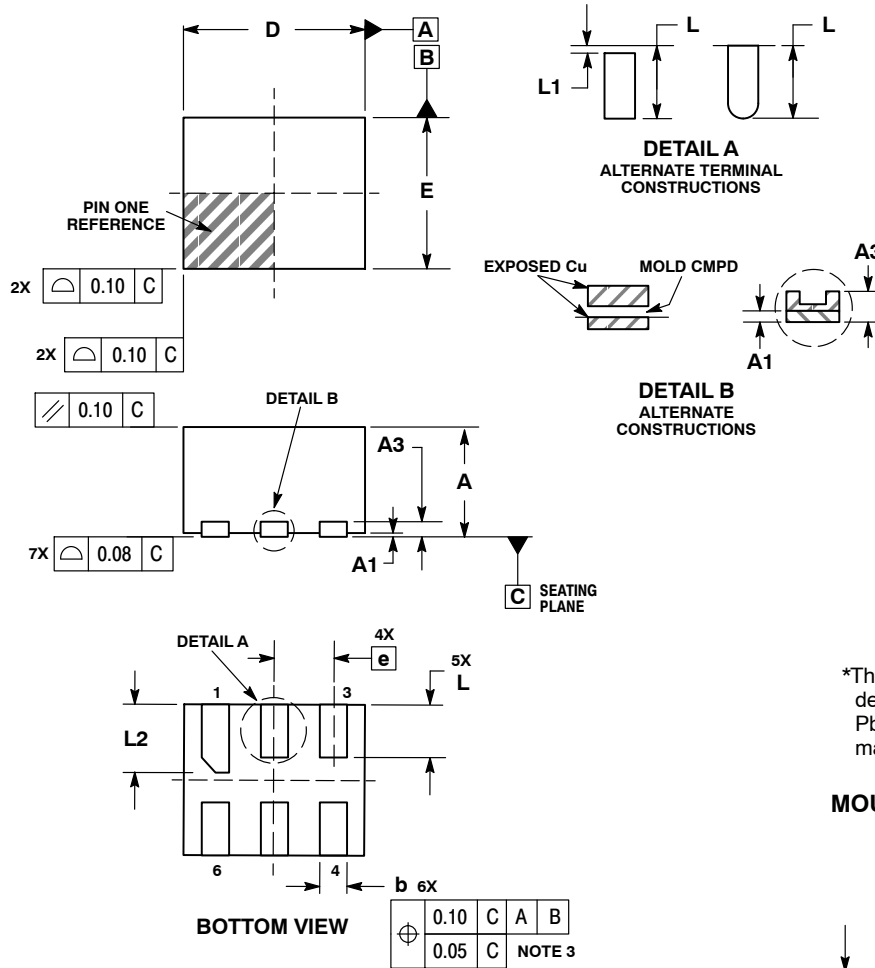


WDFN6 1.2x1.0, 0.4P
CASE 506AS
ISSUE D

DATE 27 AUG 2013



SCALE 4:1



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 0.25 AND 0.30mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 0.70 | 0.80 |
| A1 | 0.00 | 0.05 |
| A3 | 0.20 REF | |
| b | 0.15 | 0.25 |
| D | 1.20 BSC | |
| E | 1.00 BSC | |
| e | 0.40 BSC | |
| L | 0.30 | 0.40 |
| L1 | 0.00 | 0.15 |
| L2 | 0.40 | 0.50 |

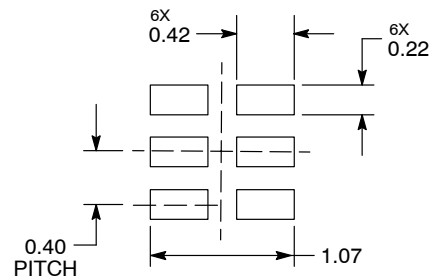
GENERIC MARKING DIAGRAM*



X = Specific Device Code
M = 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.

MOUNTING FOOTPRINT*



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.

- STYLE 1:
PIN 1: DRAIN
2: DRAIN
3: GATE
4: SOURCE
5: DRAIN
6: DRAIN

| | | |
|-------------------------|-------------------------|--|
| DOCUMENT NUMBER: | 98AON21223D | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | WDFN6, 1.2 X 1.0, 0.4 P | PAGE 1 OF 1 |

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

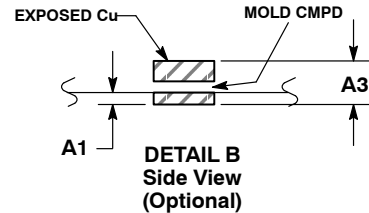
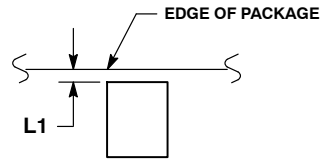
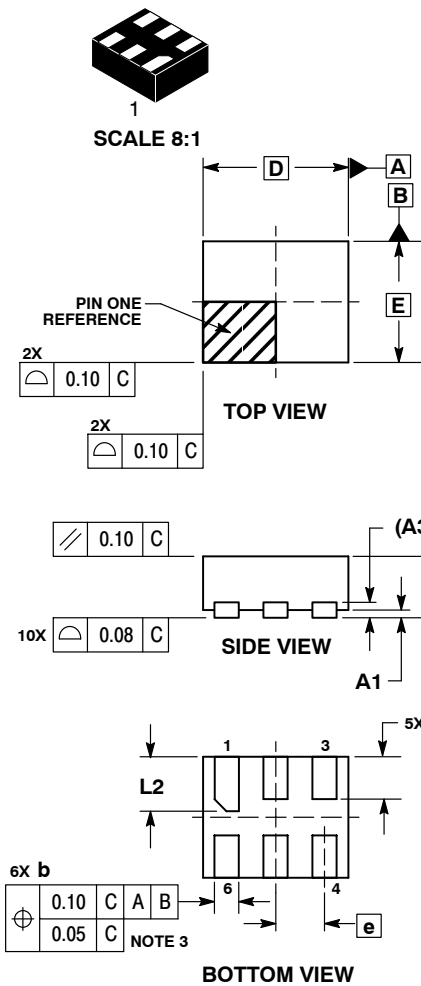
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



UDFN6, 1.2x1.0, 0.4P
CASE 517AA-01
ISSUE D

DATE 03 SEP 2010



- 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 0.25 AND 0.30 mm FROM TERMINAL.
 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| MILLIMETERS | | |
|-------------|-------|------|
| DIM | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.127 | REF |
| b | 0.15 | 0.25 |
| D | 1.20 | BSC |
| E | 1.00 | BSC |
| e | 0.40 | BSC |
| L | 0.30 | 0.40 |
| L1 | 0.00 | 0.15 |
| L2 | 0.40 | 0.50 |

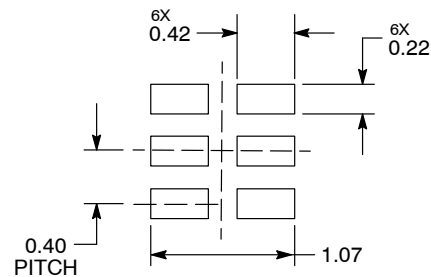
GENERIC MARKING DIAGRAM*



X = Specific Device Code
M = 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.

MOUNTING FOOTPRINT*



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.

| | | |
|-------------------------|----------------------------------|--|
| DOCUMENT NUMBER: | 98AON22068D | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | 6 PIN UDFN, 1.2X1.0, 0.4P | PAGE 1 OF 1 |

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** 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:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Analogue Switch ICs](#) category:

Click to view products by [ON Semiconductor](#) manufacturer:

Other Similar products are found below :

[FSA3051TMX](#) [NLAS4684FCTCG](#) [NLAS5223BLMNR2G](#) [NLX2G66DMUTCG](#) [425541DB](#) [425528R](#) [099044FB](#) [NLAS5123MNR2G](#)
[PI5A4157CEX](#) [NLAS4717EPFCT1G](#) [PI5A3167CCEX](#) [SLAS3158MNR2G](#) [PI5A392AQE](#) [PI5A4157ZUEX](#) [PI5A3166TAEX](#) [FSA634UCX](#)
[XS3A1T3157GMX](#) [TC4066BP\(N,F\)](#) [DG302BDJ-E3](#) [PI5A100QEX](#) [HV2605FG-G](#) [HV2301FG-G](#) [RS2117YUTQK10](#) [RS2118YUTQK10](#)
[RS2227XUTQK10](#) [ADG452BRZ-REEL7](#) [MAX4066ESD+](#) [MAX391CPE+](#) [MAX4730EXT+T](#) [MAX314CPE+](#) [BU4066BCFV-E2](#)
[MAX313CPE+](#) [BU4S66G2-TR](#) [NLASB3157MTR2G](#) [TS3A4751PWR](#) [NLAST4599DFT2G](#) [NLAST4599DTT1G](#) [DG300BDJ-E3](#)
[DG2503DB-T2-GE1](#) [TC4W53FU\(Te12L,F\)](#) [74HC2G66DC.125](#) [DG3257DN-T1-GE4](#) [ADG619BRMZ-REEL](#) [ADG1611BRUZ-REEL7](#)
[DG2535EDQ-T1-GE3](#) [LTC201ACN#PBF](#) [74LV4066DB,118](#) [ISL43410IUZ](#) [FSA2275AUMX](#) [DIO1500WL12](#)