

NLAS3899B

Dual DPDT Low R_{ON} , Low Capacitance Switch

The NLAS3899B is a dual DPDT analog switch designed for low power audio and dual SIM card applications. The low R_{ON} of $3.0\ \Omega$ (typical) is ideal for routing audio signals to or from a moderately high impedance load. In addition, the low C_{ON} of 20 pF (typical) gives the NLAS3899B a high bandwidth of 280 MHz, perfect for dual SIM card applications.

Features

- Single Supply Operation
1.65 to 4.3 V V_{CC}
Function Directly from Li-Ion Battery
- Low ON Resistance ($3.0\ \Omega$ Typical Across V_{CC})
- Low C_{ON} (20 pF Typical)
- Bandwidth 280 MHz
- Maximum Breakdown Voltage: 5.5 V
- Low Static Power
- Interfaces with 1.8 V Chipset
- These are Pb-Free Devices

Typical Applications

- Cell Phone Speaker/Microphone Switching
- Ringtone-Chip/Amplifier Switching
- Dual SIM Card Data Switching
- Four Unbalanced (Single-Ended) Switches

Important Information

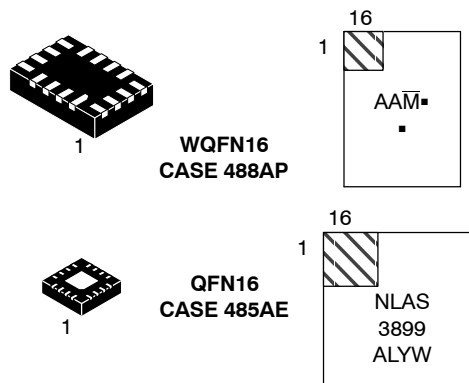
- ESD Protection:
Human Body Model (HBM) 1000 V – All Pins
5000 V – I/O to GND
- Continuous Current Rating Through each Switch $\pm 300\text{ mA}$
- Conforms to: JEDEC MO-220, Issue H, Variation VEED-6
- Package:
 - ♦ 1.8 x 2.6 x 0.75 mm WQFN16 Pb-Free
 - ♦ 3.0 x 3.0 x 0.9 mm QFN16 Pb-Free



ON Semiconductor®

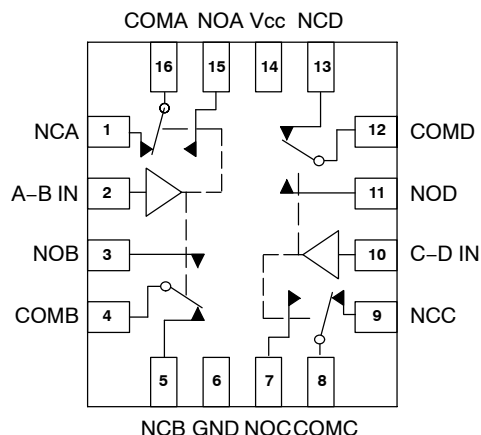
<http://onsemi.com>

MARKING DIAGRAMS



XX = Specific Device Code
A = Assembly Location
M = Date Code/Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)



ORDERING INFORMATION

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

NLAS3899B

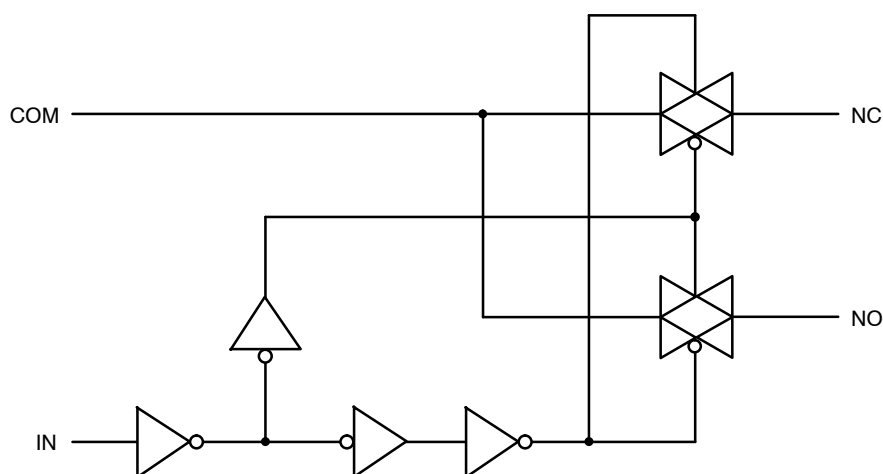


Figure 1. Input Equivalent Circuit

PIN DESCRIPTION

QFN PIN #	Symbol	Name and Function
1, 3, 5, 7, 9, 11, 13, 15	NO A-D, NC A-D	Independent Channels
2, 10	A-B IN, C-D IN	Controls
4, 8, 12, 16	COM A-D	Common Channels
6	GND	Ground (V)
14	V _{CC}	Positive Supply Voltage

TRUTH TABLE

IN	NO	NC
H	ON	OFF*
L	OFF*	ON

*High impedance.

OPERATING CONDITIONS

MAXIMUM RATINGS

Symbol	Pins	Parameter	Value	Condition	Unit
V _{CC}	V _{CC}	Positive DC Supply Voltage	-0.5 to +5.5		V
V _{IS}	NOx, NCx, or COMx	Analog Signal Voltage	-0.5 to V _{CC} + 0.5		V
V _{IN}	A-B IN, C-D IN	Control Input Voltage	-0.5 to 5.5		V
I _{IS_CON}	NOx, NCx, or COMx	Analog Signal Continuous Current	±300	Closed Switch	mA
I _{IS_PK}	NOx, NCx, or COMx	Analog Signal Peak Current	±500	10% Duty Cycle	mA
I _{IN}	A-B IN, C-D IN	Control Input Current	±20		mA
T _{STG}		Storage Temperature Range	-65 to 150		°C

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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Pins	Parameter	Value	Condition	Unit
V_{CC}	V_{CC}	Positive DC Supply Voltage	1.65 to 4.3		V
V_{IS}	NOx, NCx, or COMx	Analog Signal Voltage	GND to V_{CC}		V
V_{IN}	A-B IN, C-D IN	Control Input Voltage	GND to 4.3		V
T_A		Operating Temperature Range	-40 to +85		°C
t_r, t_f		Input Rise or Fall Time	20	$V_{CC} = 1.6\text{ V} - 2.7\text{ V}$	ns/V
			10	$V_{CC} = 3.0\text{ V} - 4.5\text{ V}$	

Minimum and maximum values are guaranteed through test or design across the **Recommended Operating Conditions**, where applicable. Typical values are listed for guidance only and are based on the particular conditions listed for each section, where applicable. These conditions are valid for all values found in the characteristics tables unless otherwise specified in the test conditions.

ESD PROTECTION

Pins	Description	Minimum Voltage
All Pins	Human Body Model	1 kV
I/O to GND	Human Body Model	5 kV

DC Electrical Characteristics

Typical: T = 25°C; V_{CC} = 3.0 V

CONTROL INPUT (Typical: T = 25°C; V_{CC} = 3.0 V)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
V _{IH}	A-B IN, C-D IN	Control Input High		3.0 4.3	1.3 1.6			V
V _{IL}	A-B IN, C-D IN	Control Input Low		3.0 4.3			0.5 0.6	V
I _{IN}	A-B IN, C-D IN	Control Input Leakage	0 ≤ V _{IN} ≤ V _{CC}	4.3		±0.1	±1.0	μA

SUPPLY CURRENT AND LEAKAGE (Typical: T = 25°C; V_{CC} = 3.0 V)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
I _{NO/NC} (OFF)	NCx, NOx	OFF State Leakage	V _{IN} = V _{IL} or V _{IH} V _{NC/NO} = 0.3 V V _{COM} = 4.0 V	4.3		±10	±300	nA
I _{COM} (ON)	COMx	ON State Leakage	V _{IN} = V _{IL} or V _{IH} V _{NO} = 0.3 V or 4.0 V with V _{NC} floating or V _{NC} = 0.3 V or 4.0 V with V _{NO} floating V _{COM} = 0.3 V or 4.0 V	4.3		±10	±300	nA
I _{CC}	V _{CC}	Quiescent Supply	V _{IN} and V _{IS} = V _{CC} or GND I _D = 0 A	1.65 – 4.3		±1.0	±2.0	μA
I _{OFF}	A-B IN, C-D IN	Power Off Leakage	V _{IN} = 4.3 V or GND	0		±0.5	±2.0	μA

ON RESISTANCE (Typical: T = 25°C; V_{CC} = 3.0 V)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
R _{ON}	NOx, NCx COMx	ON Resistance	I _{ON} = -100 mA V _{IS} = 0 to V _{CC}	2.5 3.0 3.6 4.3		3.0 2.6 2.5 2.2	4.0 3.0 3.0 2.5	Ω
R _{FLAT}	NOx, NCx COMx	R _{ON} Flatness	I _{ON} = -100 mA V _{IS} = 0 to V _{CC}	3.0 4.3		0.8 1.1		Ω
ΔR _{ON}	NOx, NCx COMx	R _{ON} Matching	I _{ON} = -100 mA V _{IS} = 0 to V _{CC}	3.0 4.3		0.8 0.7		Ω

AC ELECTRICAL CHARACTERISTICS

TIMING/FREQUENCY (Typical: T = 25°C; V_{CC} = 3.0 V, R_L = 50 Ω, C_L = 35 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
t _{ON}	IN to NCx or NOx	Turn On Time		2.3 – 4.3		30	40	ns
t _{OFF}	IN to NCx or NOx	Turn Off Time		2.3 – 4.53		20	30	ns
t _{BBM}	IN to NCx or NOx	Break Before Make		3.0	2	15		ns
BW		-3dB Bandwidth	C _L = 5 pF	1.65 – 4.3		280		MHz

ISOLATION AND THD (Typical: T = 25°C; V_{CC} = 3.0 V, R_L = 50 Ω, C_L = 5 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
Q		Charge Injection	V _{IN} = V _{CC} to GND R _{IS} = 0 Ω, C _L = 1.0 nF Q = C _L - ΔV _{OUT}	1.65 – 4.3		111		pC
THD		Total Harmonic Distortion	F _{IS} = 20 Hz to 20 kHz R _L = R _{gen} = 600 Ω, C _L = 1.0 pF V _{IS} = 1.0 V _{PP}	3.0		0.007		%
V _{ONL}		Maximum Feed-through On Loss	V _{IN} = 0 dBm @ 100 kHz to 50 MHz V _{IN} centered between V _{CC} & GND	1.65 – 4.3		-0.06		dB
O _{IRR}	NOx	Off Isolation	V _{IN} = 0 V _{NO} or V _{NC} (pk-pk) = 1.0 V	1.65 – 4.3		-67		dB
Xtalk	COMx to COMy	Non-Adjacent Channel	V _{NO} or V _{NC} (pk-pk) = 1.0 V	1.65 – 4.3		-100		dB

CAPACITANCE (Typical: T = 25°C; V_{CC} = 3.0 V, R_L = 50 Ω, C_L = 5 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	V _{CC} (V)	-40°C to +85°C			Unit
					Min	Typ	Max	
C _{IN}	A-B IN, C-D IN	Control Input		0 V		5.0		pF
C _{ON}	NCx to COMx	Through Switch	V _{IN} = 0V	3.0 V		20		pF
C _{OFF}	NCx NOx	Unselected Port	V _{IS} = 3.0V, V _{IN} = 3.0V	3.0 V		10		pF

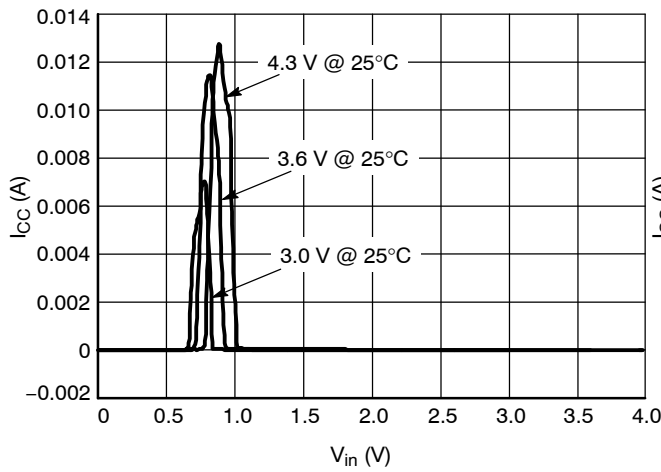


Figure 2. I_{CC} vs. V_{in}

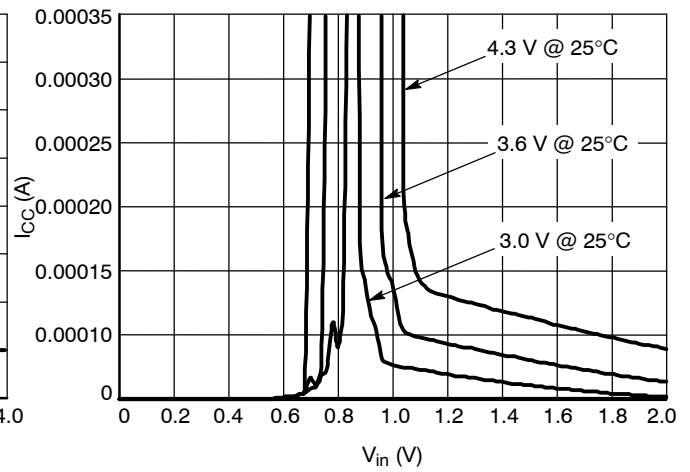


Figure 3. (Expanded View) I_{CC} vs. V_{in}

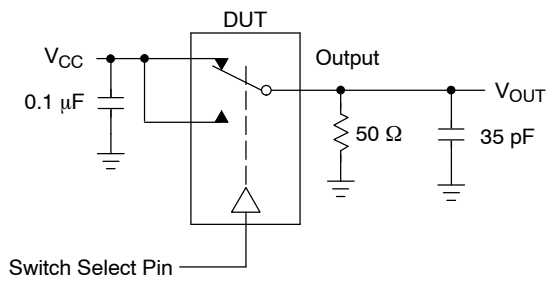


Figure 4. t_{BMM} (Time Break-Before-Make)

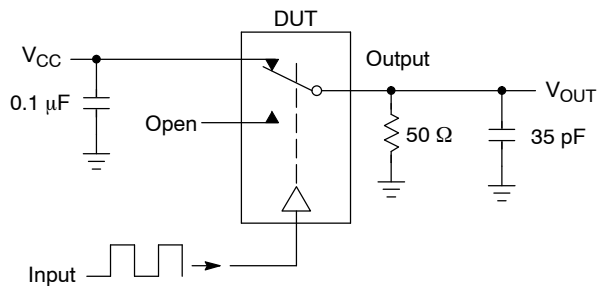
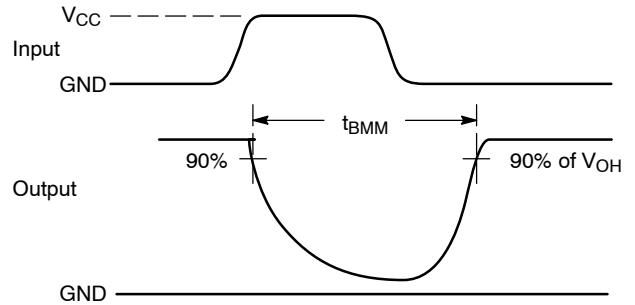


Figure 5. t_{ON}/t_{OFF}

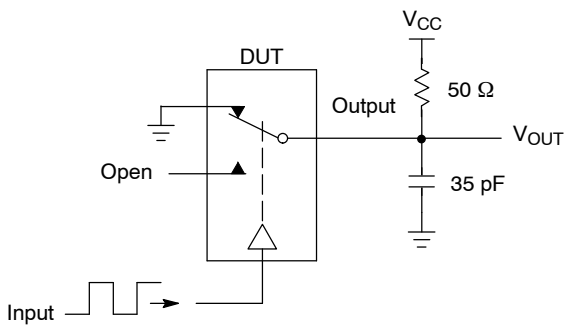
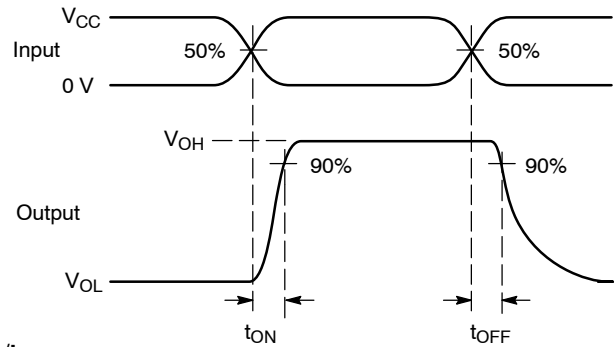
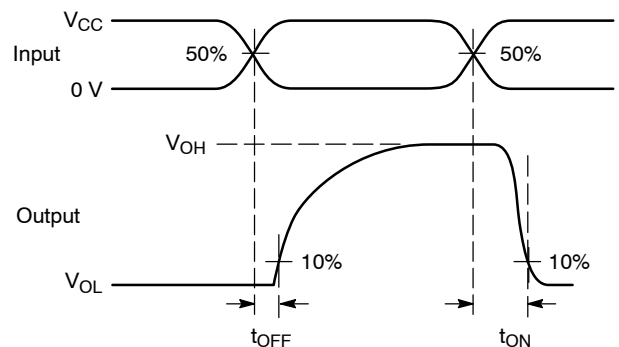
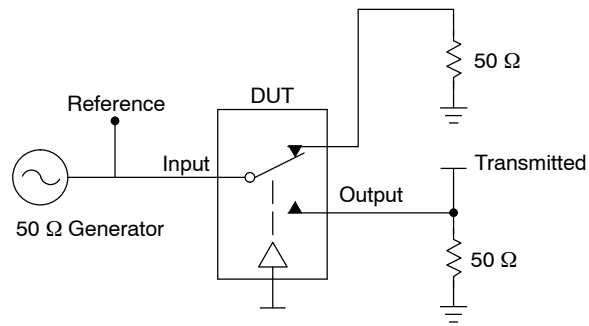


Figure 6. t_{ON}/t_{OFF}





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 dB below V_{ONL}

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

Figure 7. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/ V_{ONL}

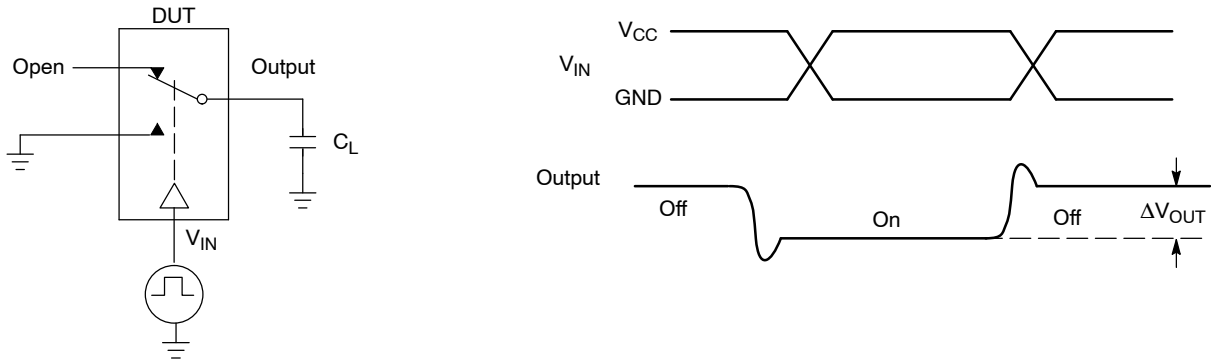


Figure 8. Charge Injection: (Q)

NLAS3899B

DEVICE ORDERING INFORMATION

Device Order Number	Package Type	Tape & Reel Size [†]
NLAS3899BMNTBG	WQFN16 (Pb-Free)	3000 / Tape & Reel
NLAS3899BMNTWG	QFN16 (Pb-Free)	3000 / Tape & Reel
NLAS3899BMNTXG	QFN16 (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

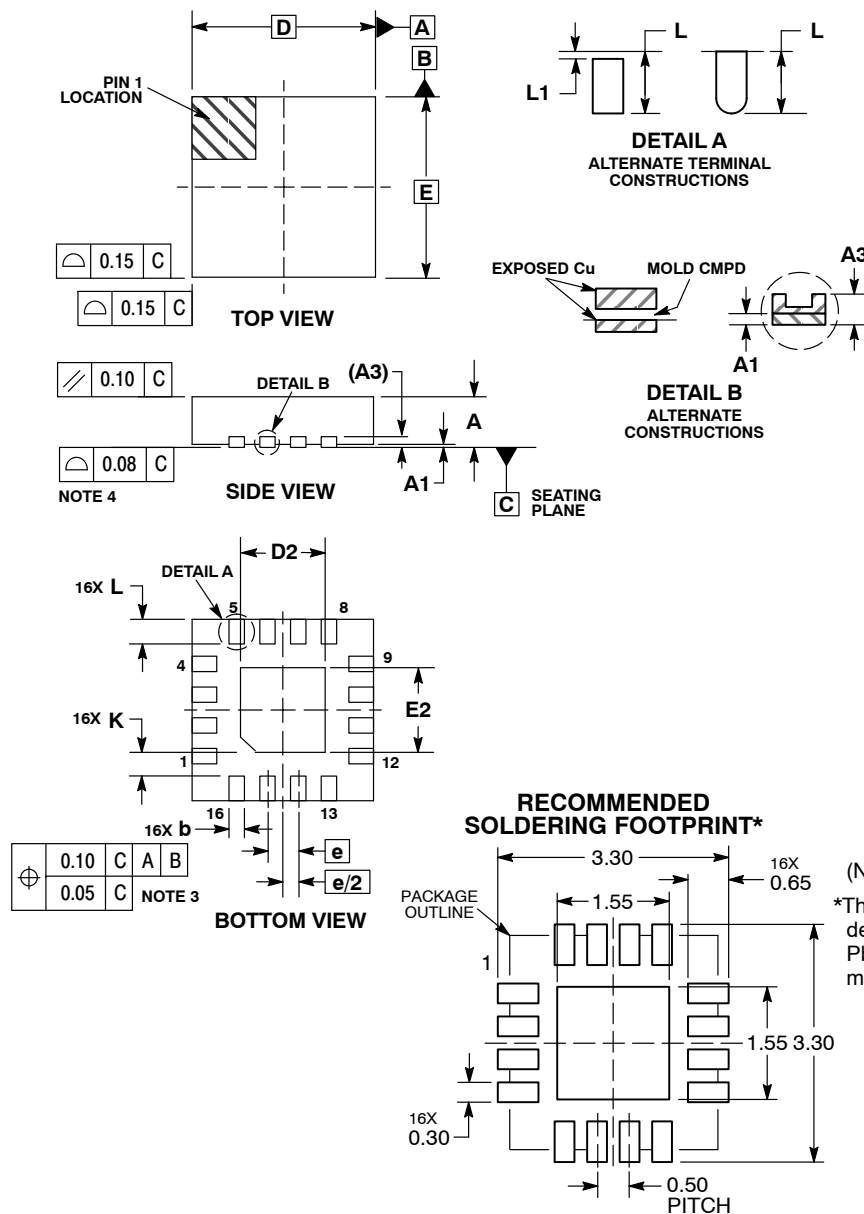
ON Semiconductor®



SCALE 2:1

QFN16 3x3, 0.5P
CASE 485AE
ISSUE C

DATE 24 JUN 2016



MECHANICAL CASE OUTLINE

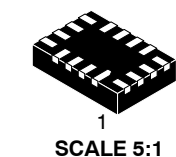
PACKAGE DIMENSIONS

ON Semiconductor®

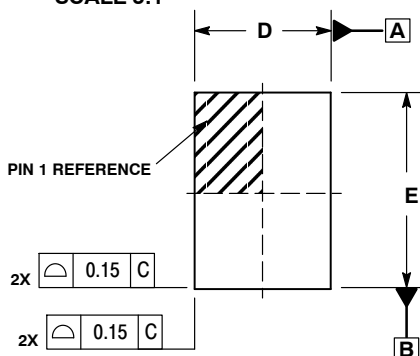


WQFN16, 1.8x2.6, 0.4P
CASE 488AP-01
ISSUE B

DATE 25 JUN 2008

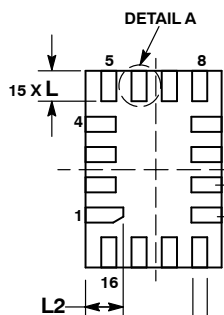
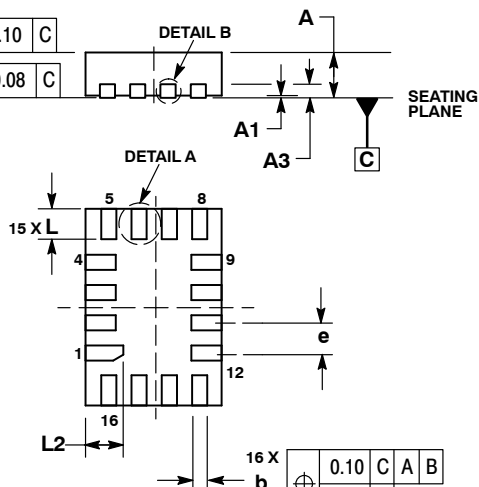


SCALE 5:1

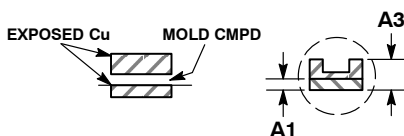


2X		0.15	C
2X		0.15	C

	0.10	C
	0.08	C



DETAIL A
ALTERNATE TERMINAL
CONSTRUCTIONS



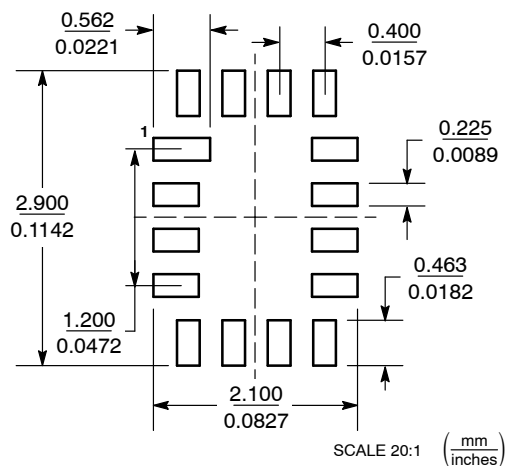
DETAIL B
ALTERNATE
CONSTRUCTIONS

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.
5. EXPOSED PADS CONNECTED TO DIE FLAG. USED AS TEST CONTACTS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.050
A3	0.20	REF
b	0.15	0.25
D	1.80	BSC
E	2.60	BSC
e	0.40	BSC
L	0.30	0.50
L1	0.00	0.15
L2	0.40	0.60

MOUNTING FOOTPRINT



SCALE 20:1 (mm inches)

DOCUMENT NUMBER: 98AON20790D

Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

DESCRIPTION: WQFN16, 1.8 X 2.6, 0.4P

PAGE 1 OF 1

ON Semiconductor and 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