

NLAS4717EP

4.5 Ω 広帯域幅デュアル SPDTアナログ・スイッチ

NLAS4717EPは、サブミクロン・シリコン・ゲートCMOSテクノロジーで製造された高性能CMOSアナログ・スイッチです。このデバイスは、3.0 Vで4.5 Ωの低 $R_{DS(on)}$ を備えたデュアル独立型単極双投(SPDT)スイッチです。

保証されたブレーク・ビフォア・メイク(BBM)スイッチングも備えており、スイッチがドライバを短絡させることはありません。

NLAS4717EPは次の2つの小型サイズ・パッケージで供給されます。

- ◆ Microbump: 2.0 x 1.5 mm
- ◆ WQFN-10: 1.4 x 1.8 mm

特長

- 低 $R_{DS(on)}$: 4.5 Ω@3.0 V
- スイッチ間でのマッチング $\pm 0.5 \Omega$
- 広い電圧範囲: 1.8~5.5 V
- 広帯域幅 > 90 MHz
- 1.65~5.5 Vの動作範囲
- ピン4および8 (CTRLピン)での低スレッショルド電圧
- 超低電荷注入 ≤ 6.0 pC
- 低スタンバイ電流: $I_{CC} = 1.0$ nA (Max) @ $T_A = 25^\circ\text{C}$
- ピン4および8 (CTRLロジック・ピン)でのOVT*
- 鉛フリー・デバイス

代表的アプリケーション

- 携帯電話
- PDA
- MP3
- デジタル・スチル・カメラ
- USB 2.0 Full Speed (USB1.1) – 12 Mbps 準拠

重要情報

- ESD保護:
 - ◆ 人体モデル(HBM) = 2500 V、
 - ◆ マシン・モデル(MM) = 200 V
- ラッチアップ最大定格: 200 mA (JEDEC EIA/JESD78 準拠)
- MAX4717とピン・コンパチブル

*OVT

- 過電圧耐性(OVT)専用ピンは通常の電源電圧より高い電圧で動作し、デバイスやシグナル・インテグリティに損傷を与えません。



ON Semiconductor®

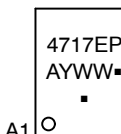
<http://onsemi.com>

MARKING DIAGRAMS



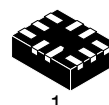
A1

Microbump-10
CASE 489AA



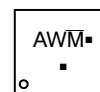
A1

A = Assembly Location
Y = Year
W, WW = Work Week
▪ = Pb-Free Package
(Note: Microdot may be in either location)



1

WQFN-10
CASE 488AQ



AW = Specific Device Code
M = Date Code
▪ = Pb-Free Device
(Note: Microdot may be in either location)

FUNCTION TABLE

IN ₋	NO ₋	NC ₋
0	OFF	ON
1	ON	OFF

ORDERING INFORMATION

Device	Package	Shipping [†]
NLAS4717EPFCT1G	Microbump-10 (Pb-Free)	3000 / Tape & Reel
NLAS4717EPMTR2G	WQFN-10 (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.

NLAS4717EP

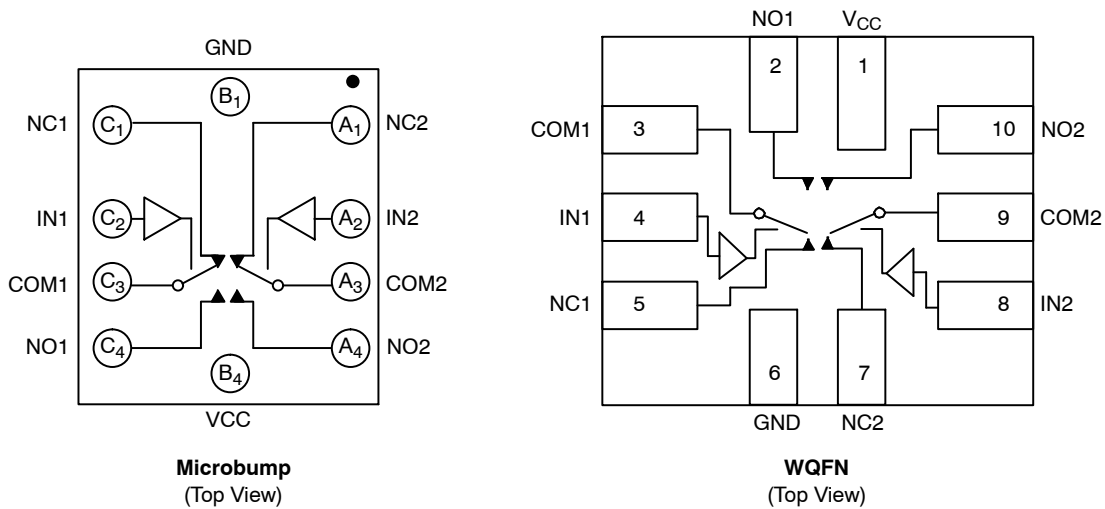


Figure 1. Device Circuit Diagrams and Pin Configurations

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V+	DC Supply Voltage	-0.5 to +7.0	V
V _{IS}	Analog Input Voltage (V _{NO} , V _{NC} , or V _{COM}) (Note 1)	-0.5 ≤ V _{IS} ≤ V _{CC} + 0.5	V
V _{IN}	Digital Select Input Voltage	-0.5 ≤ V _I ≤ +7.0	V
I _{IK}	DC Current, Into or Out of Any Pin (Continuous)	±100	mA
I _{PK}	Peak Current (10% Duty Cycle)	±200	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. Signal voltage on NC, NO, and COM exceeding VCC or GND are clamped by the internal diodes. Limit forward diode current to maximum current rating.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V+	DC Supply Voltage	1.8	5.5	V
V _{IN}	Digital Select Input Voltage	GND	5.5	V
V _{IS}	Analog Input Voltage (NC, NO, COM)	GND	V _{CC}	V
T _A	Operating Temperature Range	-40	+85	°C
t _r , t _f	Input Rise or Fall Time, SELECT V _{CC} = 3.3 V ± 0.3 V V _{CC} = 5.0 V ± 0.5 V	0 0	100 20	ns/V

NLAS4717EP

ANALOG SWITCH DC CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	-40°C to +85°C		Unit
				Min	Max	
V _{IH}	Input Logic High Voltage	V _{OUT} = 0.1 V I _{OUT} ≤ 20 μA	1.65 to 2.2 2.7 to 3.6 4.5 to 5.5	V _{CC} × 0.55 V _{CC} × 0.5 2.0	- - -	V
V _{IL}	Input Logic Low Voltage	V _{OUT} = -V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	1.65 to 2.2 2.7 to 3.6 4.5 to 5.5	- - -	V _{CC} × 0.2 V _{CC} × 0.2 0.8	V
I _{IN}	Input Leakage Current	V _{IN} = V _{CC} or GND	5.5	-100	+100	nA
V _{CC}	Power Supply Range	All	-	1.65	5.5	V
I _{CC}	Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA	1.8 3.3 5.5	- - -	1.0 1.0 1.0	μA

ANALOG SWITCH CHARACTERISTICS – Digital Section (Voltages Referenced to GND)

Symbol	Parameter	Condition	V _{CC} (V)	-40°C to +85°C			Unit
				Min	Typ	Max	
R _{ON}	ON Resistance (Note 2)	I _{COM} = 10 mA V _{IS} = 0 to V _{CC}	3.0	-	3.2	4.5	Ω
			5.0	-	2.1	3.5	
ΔR _{ON}	ON Resistance Match Between Channels (Note 2 and 3)	I _{COM} = 10 mA V _{IS} = 0 to V _{CC}	3.0	-	0.1	0.4	Ω
			5.0	-	0.1	0.4	
R _{FLAT[ON]}	ON Resistance Flatness (Note 4)	I _{COM} = 10 mA V _{IS} = 0 to V _{CC}	3.0	-	1.12	1.5	Ω
			5.0	-	0.55	1.36	
I _{NO_[OFF]} I _{NC_[OFF]}	NO_, NC_ Off-Leakage Current (Note 5)	V _{COM} = 0.3 V or 3.3 V V _{NO} or V _{NC} = 0.3 V or 3.3 V	3.6	-1.0	0.01	+1.0	nA
		V _{COM} = 0 V or 5.0 V V _{NO} or V _{NC} = 0 V or 5.0 V	5.5	-1.0	0.01	+1.0	
I _{COM_[ON]}	COM_ On-Leakage Current (Note 5)	V _{COM} = 0.3 V or 3.3 V V _{NO} or V _{NC} = 0.3 V or 3.3 V	3.6	-2.0	0.01	+2.0	nA
		V _{COM} = 0 V or 5.0 V V _{NO} or V _{NC} = 0 V or 5.0 V	5.5	-2.0	0.01	+2.0	

NLAS4717EP

ANALOG SWITCH AC CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	-40°C to +85°C			Unit
				Min	Typ	Max	
t _{ON}	Turn-On Time	V _{NC_} , V _{NO_} = V _{IH} or V _{IL} R _L = 300 Ω, C _L = 35 pF V _{IN[x]} = V _{IH} or V _{IL}	1.8 to 5.5	-	-	30	nS
t _{OFF}	Turn-Off Time	V _{NC_} , V _{NO_} = V _{IH} or V _{IL} R _L = 300 Ω, C _L = 35 pF V _{IN[x]} = V _{IH} or V _{IL}	1.8 to 5.5	-	-	40	nS
t _{BBM}	Break-Before-Make Time Delay (Note 5)	V _{NC_} , V _{NO_} = 1.5 V R _L = 300 Ω, C _L = 35 pF	-	-	8.0	-	nS
t _{SKEW}	Skew (Note 5)	R _S = 39 Ω, C _L = 50 pF	-	-	0.15	2.0	nS

- R_{ON} characterized for V_{CC} range (1.65 V to 5.5 V).
- ΔR_{ON} = R_{ON}(MAX) - R_{ON}(MIN).
- R_{FLAT[ON]} = R_{ON}(MAX) - R_{ON}(MIN), measured over V_{CC} range.
- Guaranteed by design.

ANALOG SWITCH APPLICATION CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	-40°C to +85°C			Unit
				Min	Typ	Max	
Q	Charge Injection	V _{IN} = V _{CC} to GND R _{In} = 0 Ω, C _L = 1.0 nF Q = C _L - ΔV _{OUT}	3.0 5.0		6.0 9.0		pC
VISO	Off-Isolation	f = 10 MHz V _{NO_} , V _{NC_} = 1.0 Vp-p R _L = 50 Ω, C _L = 5.0 pF	1.65 to 5.5	-50		dB	
		f = 1.0 MHz V _{NO_} , V _{NC_} = 1.0 Vp-p R _L = 50 Ω, C _L = 5.0 pF		-75			
VCT	Cross-Talk	f = 10 MHz V _{NO_} , V _{NC_} = 1.0 Vp-p R _L = 50 Ω, C _L = 5.0 pF	1.65 to 5.5	-80		dB	
		f = 1.0 MHz V _{NO_} , V _{NC_} = 1.0 Vp-p R _L = 50 Ω, C _L = 5.0 pF		-110			
BW	On-Channel -3.0 db Bandwidth	Signal = 0 dB R _L = 50 Ω, C _L = 5.0 pF	1.8 to 5.0	90		MHz	
THD	Total Harmonic Distortion	V _{COM} = 2.0 Vp-p, R _L = 600 Ω, T _A = 25°C	-	0.02		%	
C _{NO_[OFF]} C _{NC_[OFF]}	NO_, NC_ OFF-Capacitance	F = 1.0 MHz	-	15		pF	
C _{NO_[ON]} C _{NC_[ON]}	NO_, NC_ ON-Capacitance	F = 1.0 MHz	-	38		pF	

NLAS4717EP

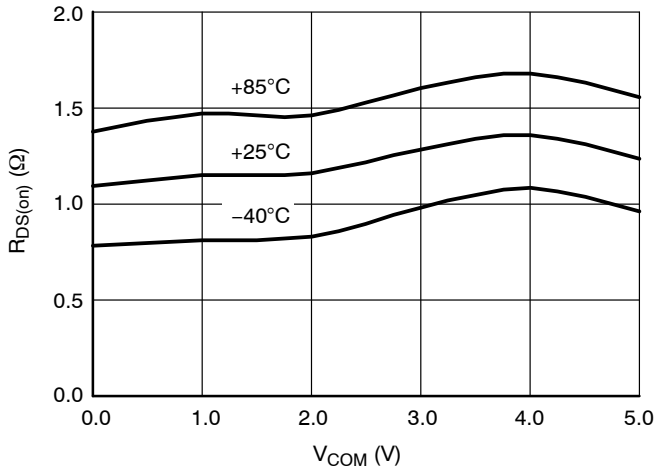


Figure 2. R_{DS(on)} @ V_{CC} = 5.0 V

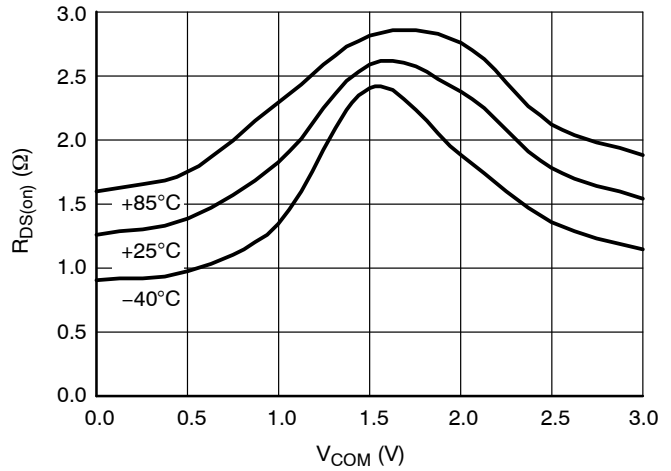


Figure 3. R_{DS(on)} @ V_{CC} = 3.0 V

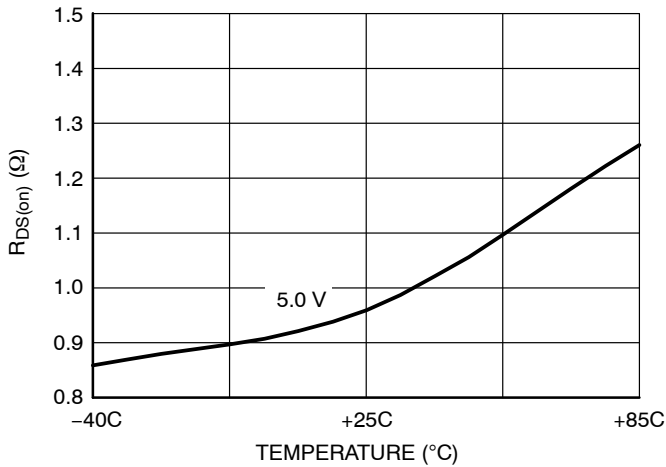


Figure 4. Delta R_{DS(on)} @ V_{CC} = 5.0 V

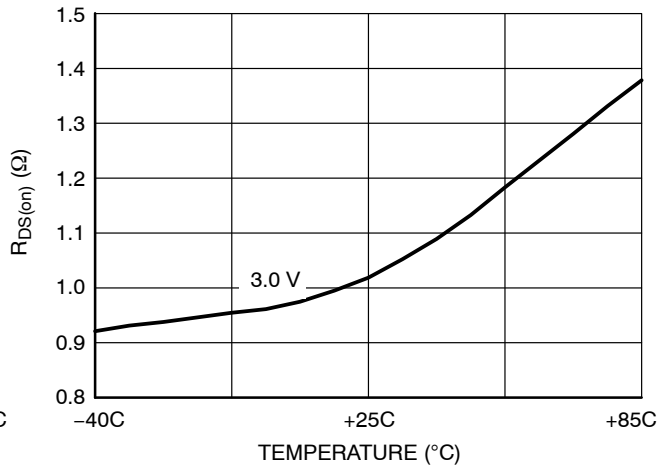


Figure 5. Delta R_{DS(on)} @ V_{CC} = 3.0 V

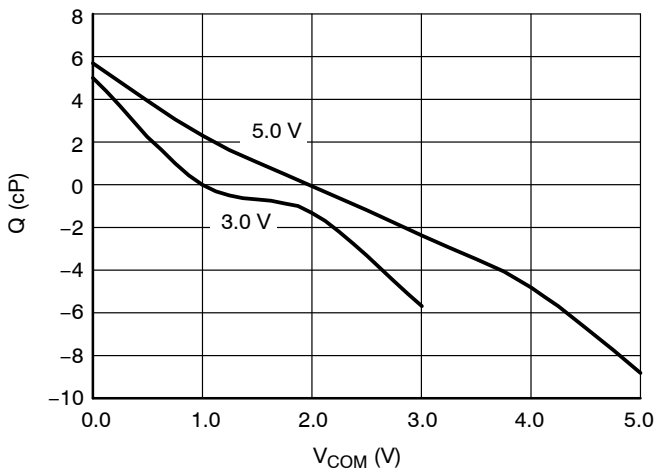


Figure 6. Charge Injection

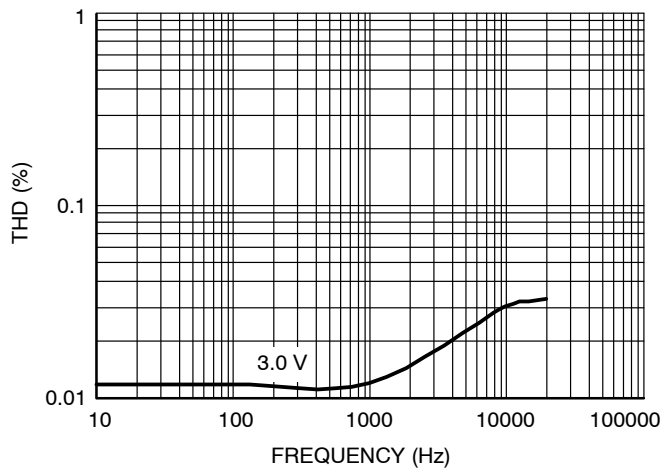


Figure 7. Total Harmonic Distortion

NLAS4717EP

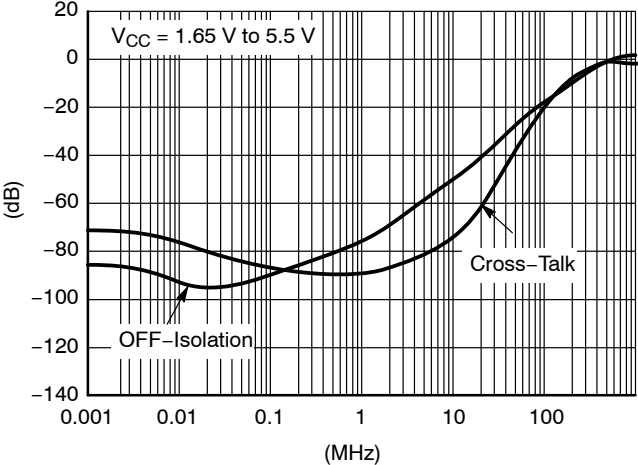


Figure 8. Frequency Response

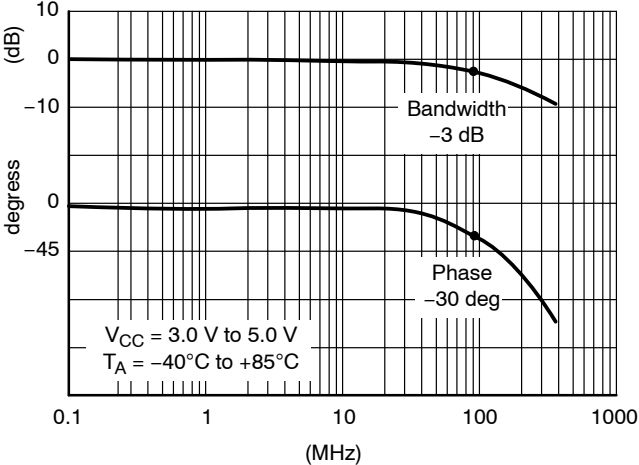


Figure 9. Bandwidth and Phase

NLAS4717EP

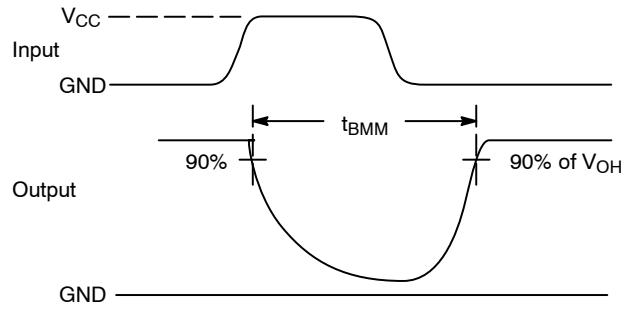
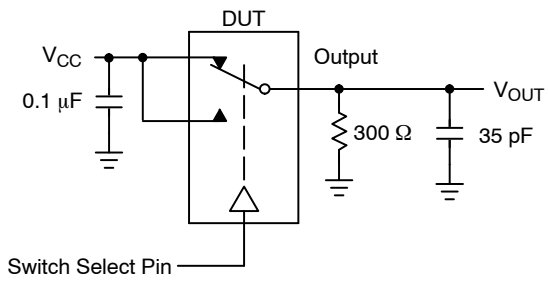


Figure 10. t_{BMM} (Time Break-Before-Make)

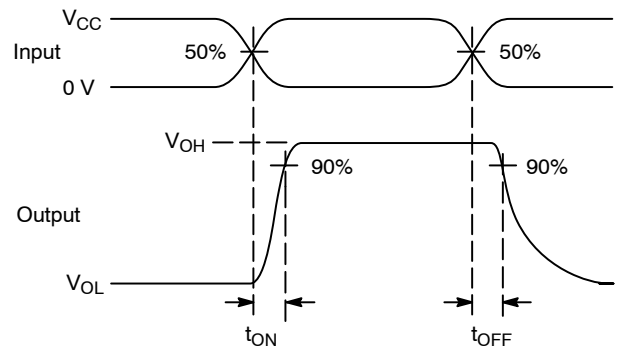
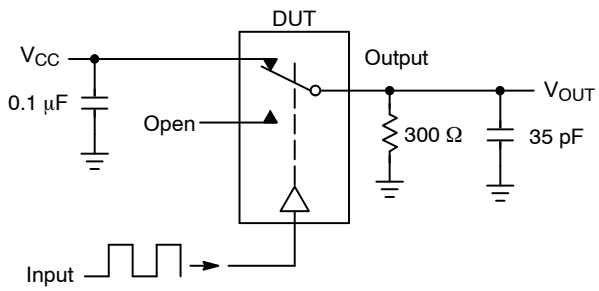


Figure 11. t_{ON}/t_{OFF}

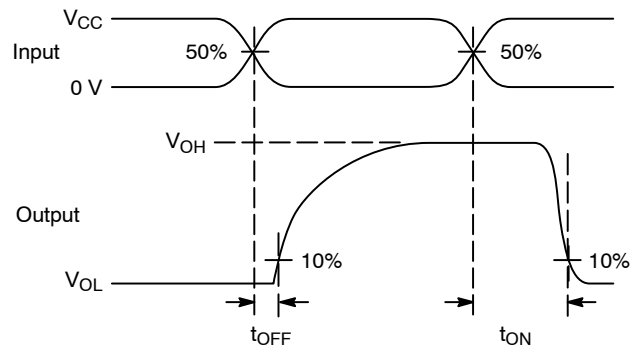
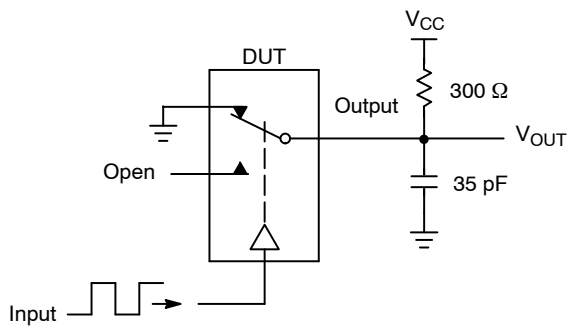
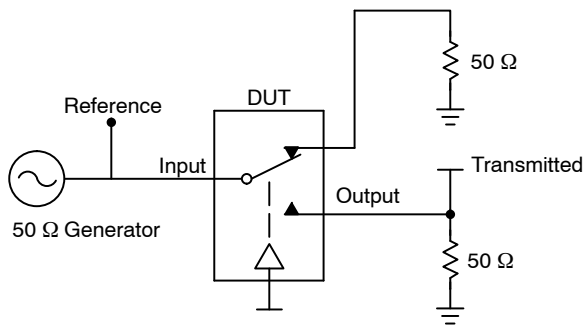


Figure 12. t_{ON}/t_{OFF}

NLAS4717EP



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}

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

Figure 13. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/ V_{ONL}

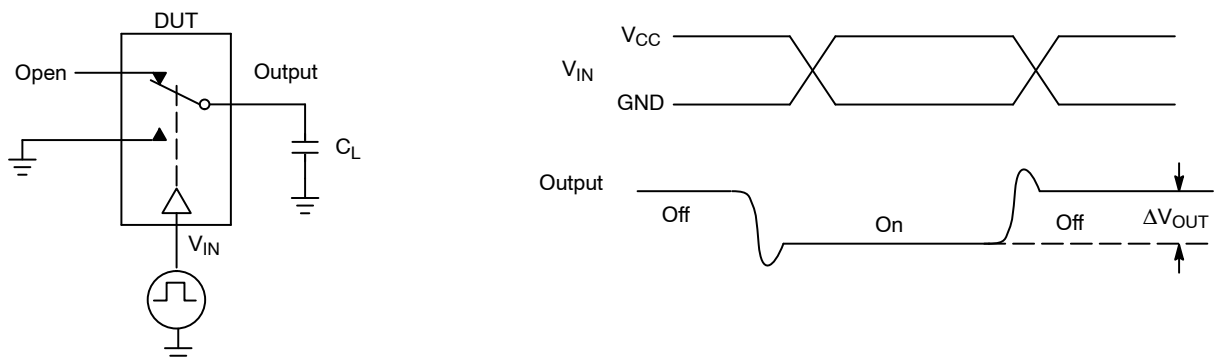


Figure 14. Charge Injection: (Q)

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

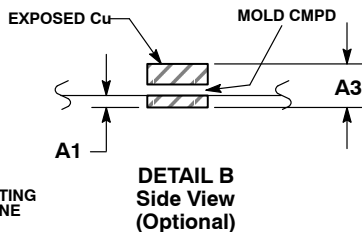
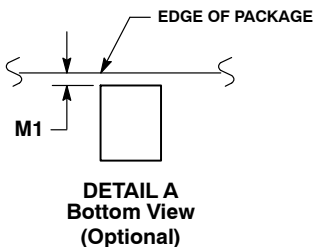
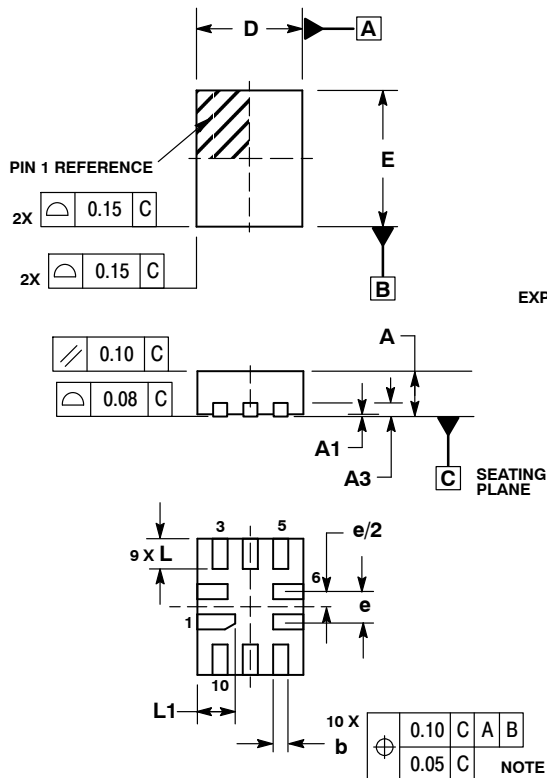
ON Semiconductor®



1
SCALE 5:1

WQFN10, 1.4x1.8, 0.4P
CASE 488AQ-01
ISSUE C

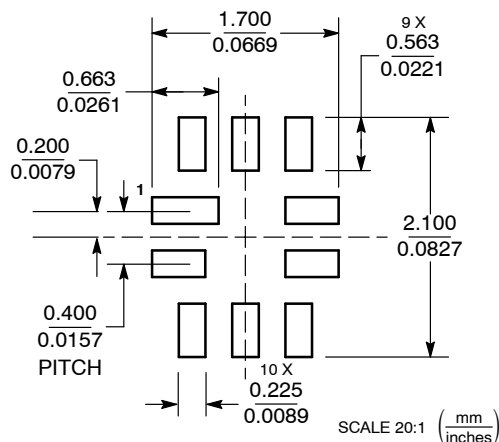
DATE 19 JUN 2007



- 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.

MILLIMETERS		
DIM	MIN	MAX
A	0.70	0.80
A1	0.00	0.050
A3	0.20 REF	
b	0.15	0.25
D	1.40 BSC	
E	1.80 BSC	
e	0.40 BSC	
L	0.30	0.50
L1	0.40	0.60
M1	0.00	0.05

MOUNTING FOOTPRINT



DOCUMENT NUMBER:	98AON20791D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	WQFN10, 1.4 X 1.8, 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.

MECHANICAL CASE OUTLINE

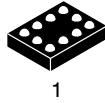
PACKAGE DIMENSIONS

ON Semiconductor®



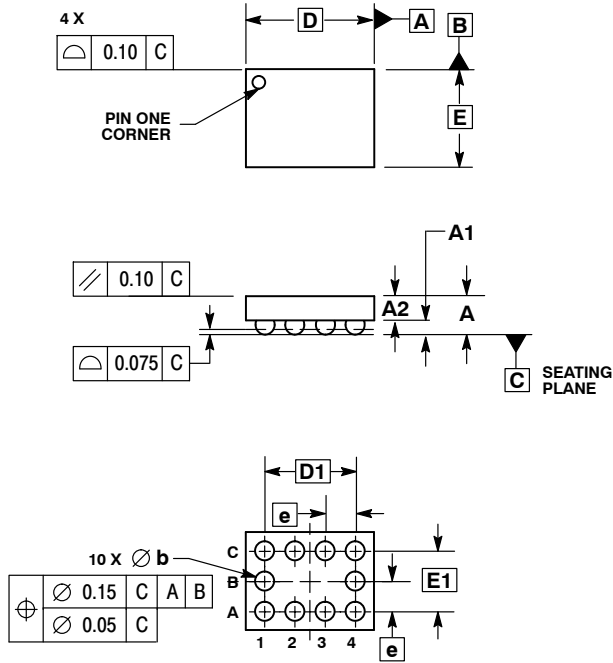
10 PIN FLIP-CHIP CASE 489AA-01 ISSUE A

DATE 04 MAY 2004



1

SCALE 4:1

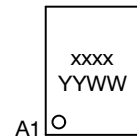


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.650
A1	0.210	0.270
A2	0.280	0.380
D	1.965 BSC	
E	1.465 BSC	
b	0.250	0.350
e	0.500 BSC	
D1	1.500 BSC	
E1	1.000 BSC	

GENERIC MARKING DIAGRAM*



- xxxx = Specific Device Code
- YY = Year
- WW = Work Week

*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.

DOCUMENT NUMBER:	98AON12946D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	10 PIN FLIP-CHIP	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.

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 owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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

ON Semiconductor 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