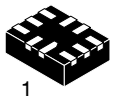
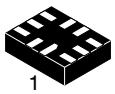
NLAS5223B, NLAS5223BL

超低0.35 Ωデュアル SPDTアナログ・スイッチ



WQFN10
CASE 488AQ



UQFN10
CASE 488AT

NLAS5223Bは、サブミクロン・シリコン・ゲートCMOSテクノロジで製造された高性能CMOSアナログ・スイッチです。V_{CC} = 4.3 Vで0.35 Ωの超低R_{ON}のデュアル独立型単極双投(SPDT)スイッチを内蔵しています。

ブレーク・ビフォア・メイク(BBM)スイッチングが保証されており、スイッチでドライバが短絡することはありません。

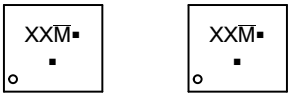
特長

- 超低R_{ON}、V_{CC} = 4.3 Vで0.35 Ω (標準)
- NLAS5223Bは2.8 Vチップセットにインタフェース
- NLAS5223BLは1.8 Vチップセットにインタフェース
- 1.65～4.5 Vでの単一電源動作
- 0からV_{CC}までのフル信号処理能力
- 高オフチャネル絶縁
- 低スタンバイ電流、< 50 nA
- 低歪み
- 0.15 ΩのR_{ON}平坦性
- 高連続電流能力
  - ±320 mA、各スイッチ
- アナログ入力での大電流クランプ・ダイオード
  - ±320 mAの連続電流能力
- パッケージ：
  - 1.4 x 1.8 x 0.75 mm WQFN10鉛フリー
  - 1.4 x 1.8 x 0.55 mm UQFN10鉛フリー
- 鉛フリー・デバイス

アプリケーション

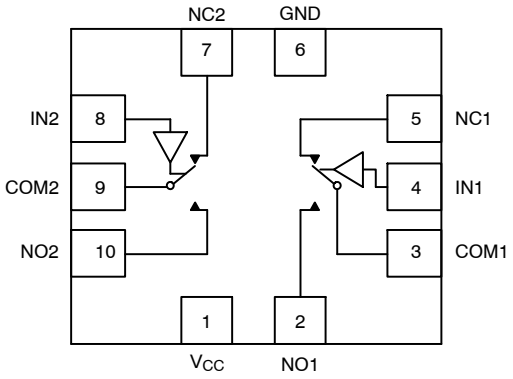
- 携帯電話オーディオ・ブロック
- スピーカおよびイヤホーンの切り替え
- リングトーン・チップ/アンプの切り替え
- モデム

MARKING DIAGRAM



XX = Specific Device Code
AD = NLAS5223BMNR2G
AE = NLAS5223BLMNR2G
AP = NLAS5223BMUR2G
M = Date Code/Assembly Location
▪ = Pb−Free Device

(Note: Microdot may be in either location)



FUNCTION TABLE

IN 1, 2	NO 1, 2	NC 1, 2
0	OFF	ON
1	ON	OFF

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

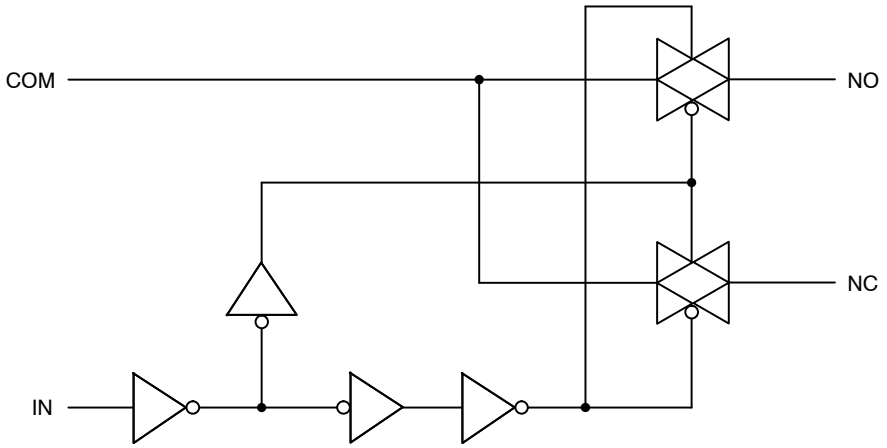


Figure 1. Logic Equivalent Circuit

PIN DESCRIPTION

QFN PIN #	Symbol	Name and Function
2, 5, 7, 10	NC1 to NC2, NO1 to NO2	Independent Channels
4, 8	IN1 and IN2	Controls
3, 9	COM1 and COM2	Common Channels
6	GND	Ground (V)
1	V_{CC}	Positive Supply Voltage

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Positive DC Supply Voltage	−0.5 to +5.5	V
V_{IS}	Analog Input Voltage (V_{NO}, V_{NC}, or V_{COM})	$-0.5 \le V_{IS} \le V_{CC} + 0.5$	V
V_{IN}	Digital Select Input Voltage	$-0.5 \le V_{IN} \le +5.5$	V
I_{anl1}	Continuous DC Current from COM to NC/NO	±320	mA
$I_{anl-pk1}$	Peak Current from COM to NC/NO, 10% Duty Cycle, 100 ms = t_{ON} (Note 1)	±600	mA
$I_{anl-pk2}$	Instantaneous Peak Current from COM to NC/NO, 10% Duty Cycle, t_{ON} < 1 μs	±850	mA
I_{clmp}	Continuous DC Current into COM/NO/NC with Respect to V_{CC} or GND	±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.
(参考訳)
最大定格を超えるストレスは、デバイスにダメージを与える危険性があります。これらの定格値を超えた場合は、デバイスの機能性を損ない、ダメージが生じたり、信頼性に影響を及ぼす危険性があります。
1. Defined as 10% ON, 90% OFF Duty Cycle.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	1.65	4.5	V
V_{IN}	Digital Select Input Voltage (OVT) Overvoltage Tolerance	GND	4.5	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} = 1.6 V – 2.7 V V_{CC} = 3.0 V – 4.5 V		 20 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.
(参考訳)
推奨動作範囲を超えるストレスでは推奨動作機能を得られません。推奨動作範囲を超えるストレスの印加は、デバイスの信頼性に影響を与える危険性があります。

NLAS5223B DC CHARACTERISTICS – DIGITAL SECTION (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC}	Guaranteed Limit		Unit
				25°C	–40°C to +85°C	
V_{IH}	Minimum High–Level Input Voltage, Select Inputs		3.0 4.3	1.4 2.0	1.4 2.0	V
V_{IL}	Maximum Low–Level Input Voltage, Select Inputs		3.0 4.3	0.7 0.8	0.7 0.8	V
I_{IN}	Maximum Input Leakage Current, Select Inputs	V_{IN} = V_{CC} or GND	4.3	±0.1	±1.0	μA
I_{OFF}	Power Off Leakage Current	V_{IN} = V_{CC} or GND	0	±0.5	±2.0	μA
I_{CC}	Maximum Quiescent Supply Current (Note 2)	Select and V_{IS} = V_{CC} or GND	1.65 to 4.5	±1.0	±2.0	μA

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.
(参考訳)
製品パラメータは、特別な記述が無い限り、記載されたテスト条件に対する電気的特性で示しています。異なる条件下で製品動作を行った時には、電気的特性で示している特性を得られない場合があります。
2. Guaranteed by design. Resistance measurements do not include test circuit or package resistance.

NLAS5223B DC ELECTRICAL CHARACTERISTICS – ANALOG SECTION

Symbol	Parameter	Condition	V_{CC}	Guaranteed Maximum Limit				Unit
				25°C		–40°C to +85°C		
				Min	Max	Min	Max	
R_{ON}	NC/NO On–Resistance (Note 3)	V_{IN} = V_{IL} or V_{IN} = V_{IH} V_{IS} = GND to V_{CC} I_{COM} = 100 mA	3.0 4.3		0.4 0.35		0.5 0.4	Ω
R_{FLAT}	NC/NO On–Resistance Flatness (Notes 3 and 4)	I_{COM} = 100 mA V_{IS} = 0 to V_{CC}	3.0 4.3		0.16 0.11		0.20 0.14	Ω
ΔR_{ON}	On–Resistance Match Between Channels (Notes 3 and 5)	V_{IS} = 1.5 V; I_{COM} = 100 mA V_{IS} = 2.2 V; I_{COM} = 100 mA	3.0 4.3		0.05 0.05		0.05 0.05	Ω
$I_{NC(OFF)}$ $I_{NO(OFF)}$	NC or NO Off Leakage Current (Note 3)	V_{IN} = V_{IL} or V_{IH} V_{NO} or V_{NC} = 0.3 V V_{COM} = 4.0 V	4.3	–5.0	5.0	–50	50	nA
$I_{COM(ON)}$	COM ON Leakage Current (Note 3)	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	10	–100	100	nA

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.
(参考訳)
製品パラメータは、特別な記述が無い限り、記載されたテスト条件に対する電気的特性で示しています。異なる条件下で製品動作を行った時には、電気的特性で示している特性を得られない場合があります。
3. Guaranteed by design. Resistance measurements do not include test circuit or package resistance.
4. Flatness is defined as the difference between the maximum and minimum value of On–resistance as measured over the specified analog signal ranges.
5. ΔR_{ON} = $R_{ON(MAX)}$ – $R_{ON(MIN)}$ between NC1 and NC2 or between NO1 and NO2.

NLAS5223BL DC CHARACTERISTICS – DIGITAL SECTION (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC}	Guaranteed Limit		Unit
				25°C	–40°C to +85°C	
V_{IH}	Minimum High−Level Input Voltage, Select Inputs		3.0 4.3	1.3 1.6	1.3 1.6	V
V_{IL}	Maximum Low−Level Input Voltage, Select Inputs		3.0 4.3	0.5 0.6	0.5 0.6	V
I_{IN}	Maximum Input Leakage Current, Select Inputs	V_{IN} = 4.5 V or GND	4.3	±0.1	±1.0	μA
I_{OFF}	Power Off Leakage Current	V_{IN} = 4.5 V or GND	0	±0.5	±2.0	μA
I_{CC}	Maximum Quiescent Supply Current (Note 6)	Select and V_{IS} = V_{CC} or GND	1.65 to 4.5	±1.0	±2.0	μA

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.
(参考訳)
製品パラメータは、特別な記述が無い限り、記載されたテスト条件に対する電気的特性で示しています。異なる条件下で製品動作を行った時には、電気的特性で示している特性を得られない場合があります。
6. Guaranteed by design. Resistance measurements do not include test circuit or package resistance.

NLAS5223BL DC ELECTRICAL CHARACTERISTICS – ANALOG SECTION

Symbol	Parameter	Condition	V_{CC}	Guaranteed Maximum Limit				Unit
				25°C		–40°C to +85°C		
				Min	Max	Min	Max	
R_{ON}	NC/NO On−Resistance (Note 7)	V_{IN} = V_{IL} or V_{IN} = V_{IH} V_{IS} = GND to V_{CC} I_{COM} = 100 mA	3.0 4.3		0.4 0.35		0.5 0.4	Ω
R_{FLAT}	NC/NO On−Resistance Flatness (Notes 7 and 8)	I_{COM} = 100 mA V_{IS} = 0 to V_{CC}	3.0 4.3		0.16 0.11		0.20 0.14	Ω
ΔR_{ON}	On−Resistance Match Between Channels (Notes 7 and 9)	V_{IS} = 1.5 V; I_{COM} = 100 mA V_{IS} = 2.2 V; I_{COM} = 100 mA	3.0 4.3		0.05 0.05		0.05 0.05	Ω
$I_{NC(OFF)}$ $I_{NO(OFF)}$	NC or NO Off Leakage Current (Note 7)	V_{IN} = V_{IL} or V_{IH} V_{NO} or V_{NC} = 0.3 V V_{COM} = 4.0 V	4.3	−10	10	−100	100	nA
$I_{COM(ON)}$	COM ON Leakage Current (Note 7)	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	10	−100	100	nA

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.
(参考訳)
製品パラメータは、特別な記述が無い限り、記載されたテスト条件に対する電気的特性で示しています。異なる条件下で製品動作を行った時には、電気的特性で示している特性を得られない場合があります。
7. Guaranteed by design. Resistance measurements do not include test circuit or package resistance.
8. Flatness is defined as the difference between the maximum and minimum value of On−resistance as measured over the specified analog signal ranges.
9. ΔR_{ON} = $R_{ON(MAX)}$ − $R_{ON(MIN)}$ between NC1 and NC2 or between NO1 and NO2.

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

Symbol	Parameter	Test Conditions	V_{CC} (V)	V_{IS} (V)	Guaranteed Maximum Limit					Unit
					25°C			−40°C to +85°C		
					Min	Typ*	Max	Min	Max	
t_{ON}	Turn−On Time	R_L = 50 Ω, C_L = 35 pF (Figures 3 and 4)	2.3 – 4.5	1.5			50		60	ns
t_{OFF}	Turn−Off Time	R_L = 50 Ω, C_L = 35 pF (Figures 3 and 4)	2.3 – 4.5	1.5			30		40	ns
t_{BBM}	Minimum Break−Before−Make Time	V_{IS} = 3.0 R_L = 50 Ω, C_L = 35 pF (Figure 2)	3.0	1.5	2	15				ns

		Typical @ 25, V_{CC} = 3.6 V	
C_{IN}	Control Pin Input Capacitance	3.5	pF
$C_{NO/NC}$	NO, NC Port Capacitance	60	pF
C_{COM}	COM Port Capacitance When Switch is Enabled	200	pF

*Typical Characteristics are at 25°C.

ADDITIONAL APPLICATION CHARACTERISTICS (Voltages Referenced to GND Unless Noted)

Symbol	Parameter	Condition	V_{CC} (V)	25°C	Unit
				Typical	
BW	Maximum On−Channel −3 dB Bandwidth or Minimum Frequency Response	V_{IN} centered between V_{CC} and GND (Figure 5)	1.65 – 4.5	19	MHz
V_{ONL}	Maximum Feed−through On Loss	V_{IN} = 0 dBm @ 100 kHz to 50 MHz V_{IN} centered between V_{CC} and GND (Figure 5)	1.65 – 4.5	−0.06	dB
V_{ISO}	Off−Channel Isolation	f = 100 kHz; V_{IS} = 1 V RMS; C_L = 5.0 pF V_{IN} centered between V_{CC} and GND (Figure 5)	1.65 – 4.5	−68	dB
Q	Charge Injection Select Input to Common I/O	V_{IN} = V_{CC} to GND, R_{IS} = 0 Ω, C_L = 1.0 nF Q = C_L x DV_{OUT} (Figure 6)	1.65 – 4.5	38	pC
THD	Total Harmonic Distortion THD + Noise	F_{IS} = 20 Hz to 20 kHz, R_L = R_{gen} = 600 Ω, C_L = 50 pF V_{IS} = 2.0 V RMS	3.0	0.08	%
VCT	Channel−to−Channel Crosstalk	f = 100 kHz; V_{IS} = 1.0 V RMS, C_L = 5.0 pF, R_L = 50 Ω V_{IN} centered between V_{CC} and GND (Figure 5)	1.65 – 4.5	−70	dB

10. Off−Channel Isolation = 20log10 (V_{COM}/V_{NO}), V_{COM} = output, V_{NO} = input to off switch.

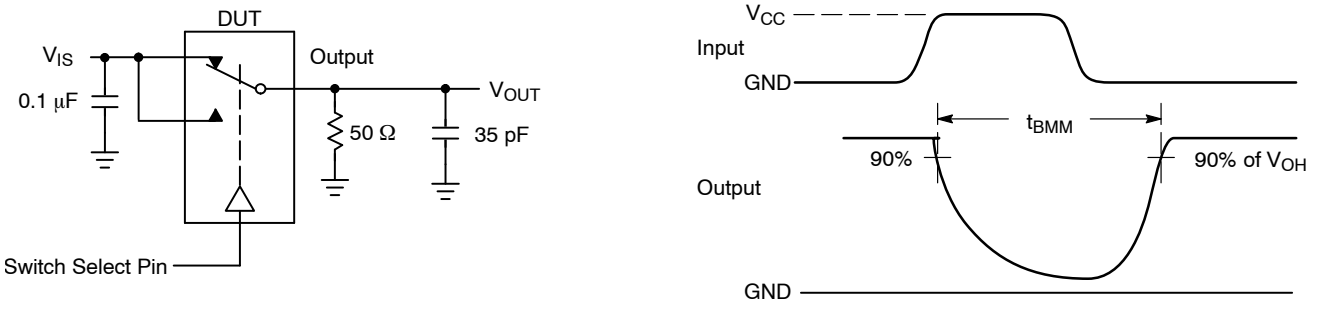


Figure 2. t_{BBM} (Time Break−Before−Make)

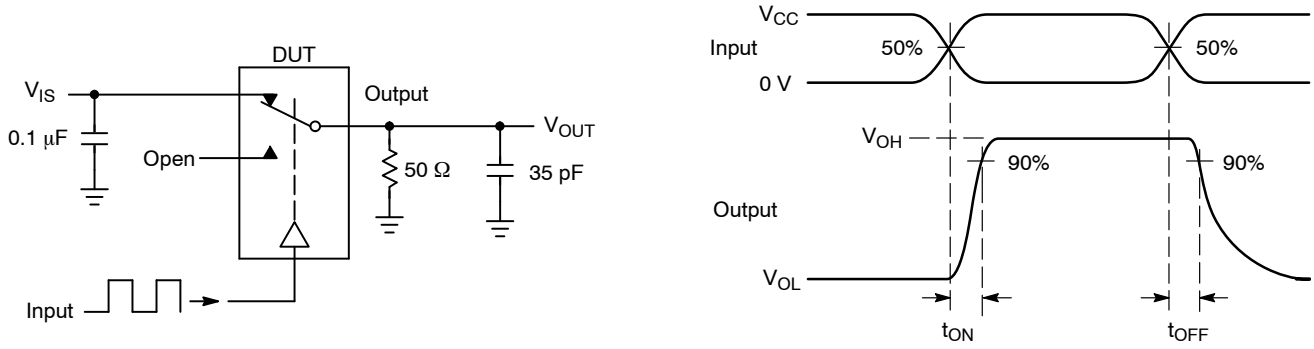


Figure 3. t_{ON}/t_{OFF}

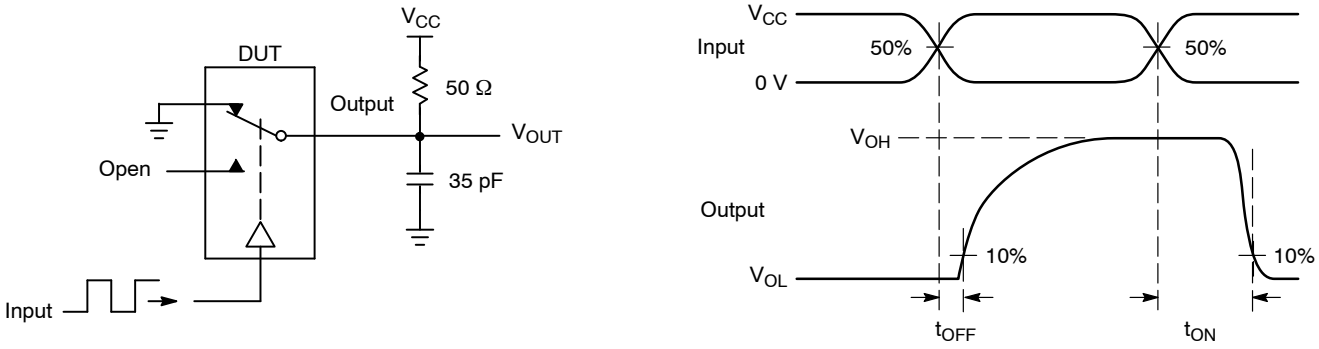
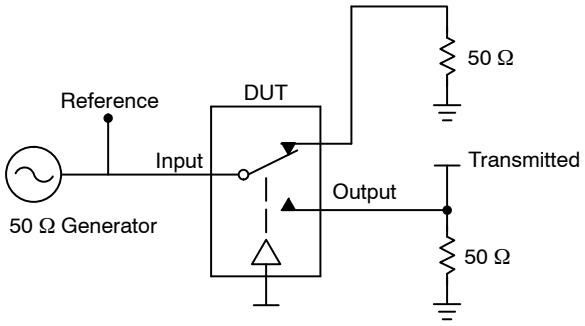


Figure 4. t_{ON}/t_{OFF}



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

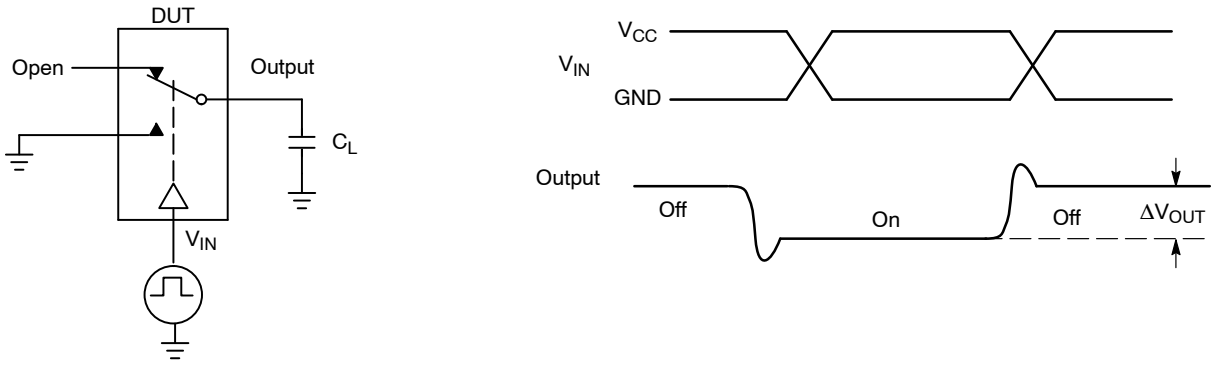


Figure 6. Charge Injection: (Q)

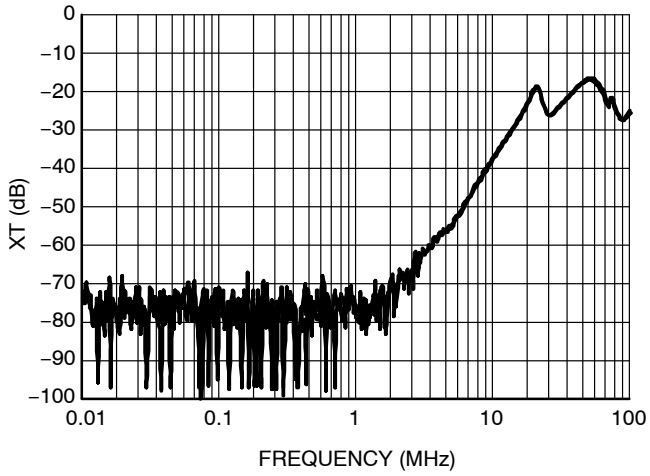


Figure 7. Cross Talk vs. Frequency @ V_{CC} = 4.3 V

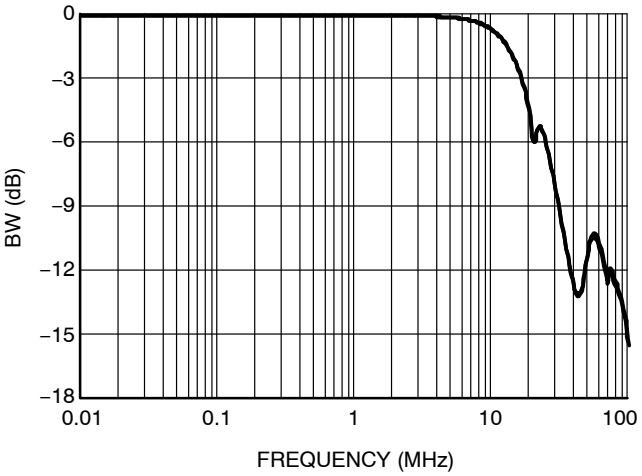


Figure 8. Bandwidth vs. Frequency

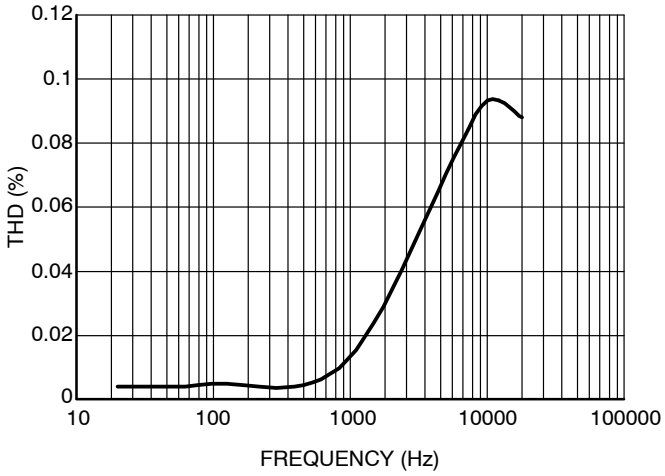


Figure 9. Total Harmonic Distortion

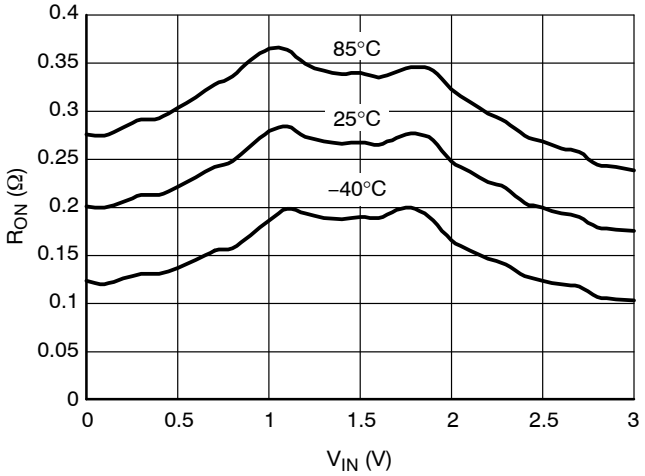


Figure 10. On−Resistance vs. Input Voltage @ V_{CC} = 3.0 V

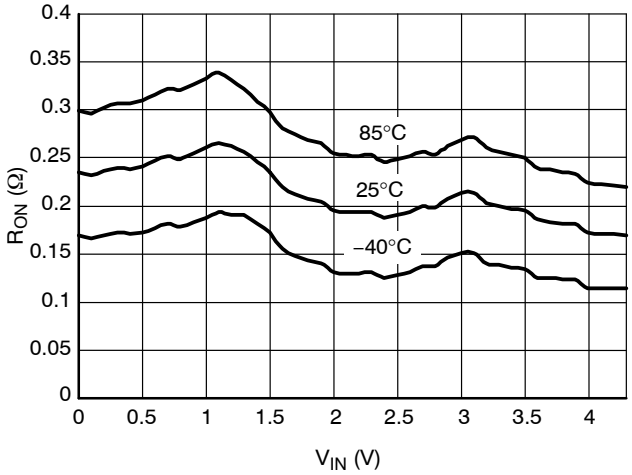


Figure 11. On−Resistance vs. Input Voltage @ V_{CC} = 4.3 V

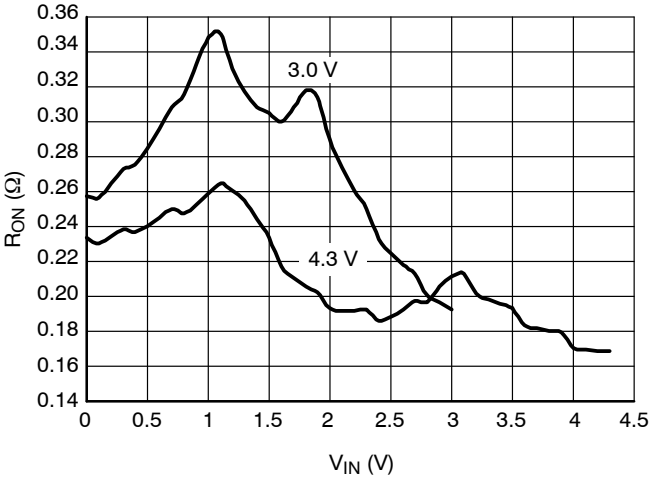


Figure 12. On−Resistance vs. Input Voltage

ORDERING INFORMATION

Device	Package	Shipping†
NLAS5223BMNR2G	WQFN10 (Pb−Free)	3000 / Tape & Reel
NLAS5223BLMNR2G	WQFN10 (Pb−Free)	3000 / Tape & Reel
NLAS5223BMUR2G	UQFN10 (Pb−Free)	3000 / Tape & Reel

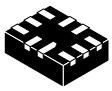
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

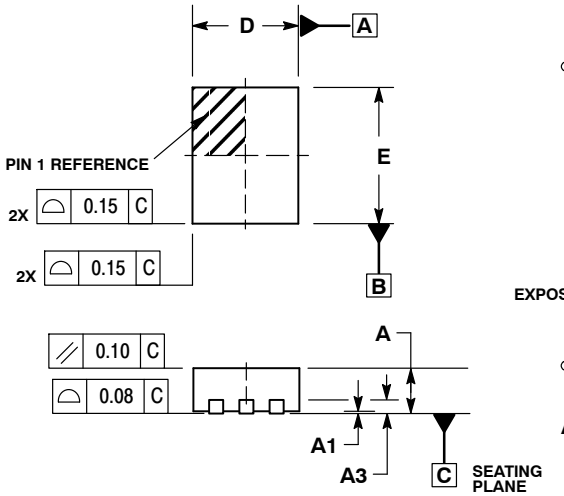
ON Semiconductor®

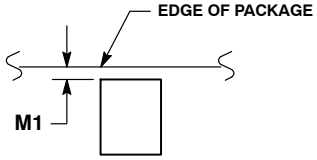
WQFN10, 1.4x1.8, 0.4P
CASE 488AQ−01
ISSUE C

DATE 19 JUN 2007

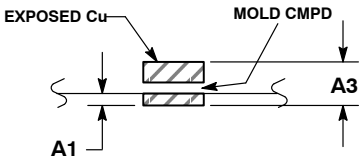


1
SCALE 5:1

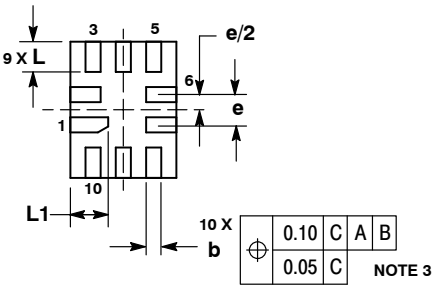




DETAIL A
Bottom View
(Optional)



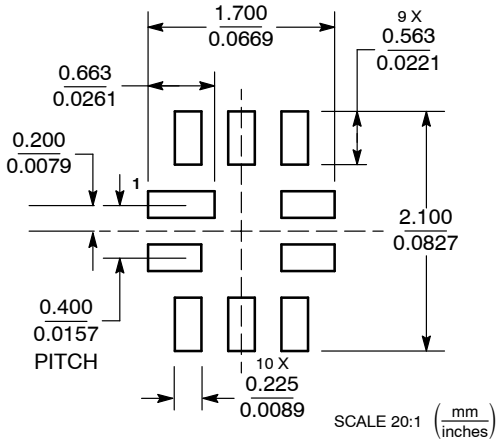
DETAIL B
Side View
(Optional)



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



SCALE 20:1 (mm / inches)

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DESCRIPTION:	**WQFN10, 1.4 X 1.8, 0.4P**		**PAGE 1 OF 1**

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