Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

NLASB3157

SPDT, 3 Ω R$_{ON}$ Switch

The NLASB3157 is an advanced CMOS analog switch fabricated with silicon gate CMOS technology. It achieves very low propagation delay and RDS$_{ON}$ resistances while maintaining CMOS low power dissipation. Analog and digital voltages that may vary across the full power−supply range (from V$_{CC}$ to GND). This device is a drop in replacement for the NC7SB3157.

The select pin has overvoltage protection that allows voltages above V$_{CC}$, up to 7.0 V to be present on the pin without damage or disruption of operation of the part, regardless of the operating voltage.

Features

- High Speed: t$_{PD}$ = 1.0 ns (Typ) at V$_{CC}$ = 5.0 V
- Low Power Dissipation: I$_{CC}$ = 2.0 µA (Max) at T$_A$ = 25°C
- Standard CMOS Logic Levels
- High Bandwidth, Improved Linearity
- Switches Standard NTSC/PAL Video, Audio, SPDIF and HDTV
- May be used for Clock Switching, Data Multiplexing, etc.
- R$_{ON}$ Typical = 3 Ω @ V$_{CC}$ = 4.5 V
- Break Before Make Circuitry, Prevents Inadvertent Shorts
- 2 Devices can Switch Balanced Signal Pairs, e.g. LVDS > 200 Mb/s
- Latchup Performance Exceeds 300 mA
- Pin for Pin Drop in for NC7SB3157
- Tiny SC88 and WDFN6 Packages
- ESD Performance:
  - Human Body Model; > 2000 V;
  - Machine Model; > 200 V
- NLVASB3157 Features Extended Automotive Temperature Range; −55°C to +125°C (See Appendix A)
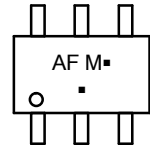- Pb−Free Packages are Available

MARKING DIAGRAMS

SC−88
DF SUFFIX
CASE 419B

6
1

AF M■
○   ■

WDFN6
MT SUFFIX
CASE 506AS

F M
●

AF, F = Specific Device Code
M = Date Code*
■ = Pb−Free Package
(Note: Microdot may be in either location)
*Date Code orientation may vary depending upon manufacturing location.

FUNCTION TABLE

Select Input	Function
L	B0 Connected to A
H	B1 Connected to A

ORDERING INFORMATION

Device	Package	Shipping†
NLASB3157DFT2	SC−88	3000 / Tape & Reel
NLASB3157DFT2G	SC−88 (Pb−Free)	3000 / Tape & Reel
NLVASB3157DFT2	SC−88	3000 / Tape & Reel
NLVASB3157DFT2G	SC−88 (Pb−Free)	3000 / Tape & Reel
NLASB3157MTR2G	WDFN6 (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.
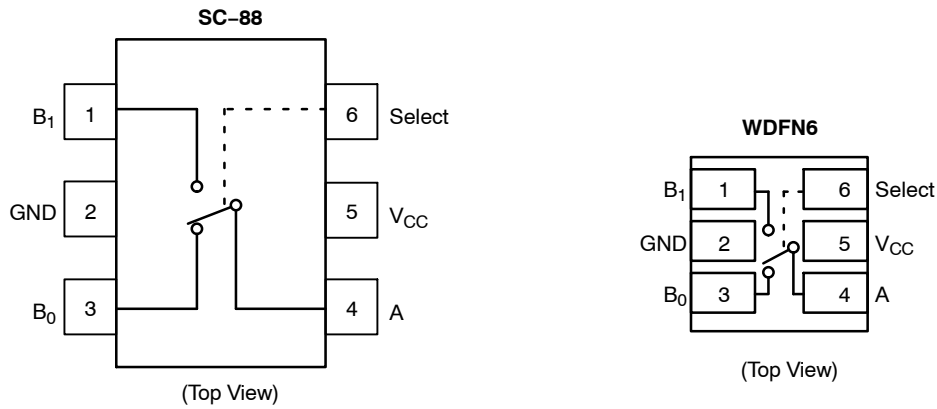
NLASB3157

SC−88

WDFN6

Figure 1. Pin Assignment & Logic Diagram

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	−0.5 to +7.0	V
DC Switch Voltage (Note 1)	V_{IS}	−0.5 to V_{CC} + 0.5	V
DC Input Voltage (Note 1)	V_{IN}	−0.5 to + 7.0	V
DC Input Diode Current @ V_{IN} < 0 V	I_{IK}	−50	mA
DC Output Current	I_{OUT}	128	mA
DC V_{CC} or Ground Current	I_{CC}/I_{GND}	+100	mA
Storage Temperature Range	T_{stg}	−65 to +150	°C
Junction Temperature Under Bias	T_J	150	°C
Junction Lead Temperature (Soldering, 10 Seconds)	T_L	260	°C
Power Dissipation @ +85°C	P_D	180	mW

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. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

RECOMMENDED OPERATING CONDITIONS (Note 2)

Characteristic	Symbol	Min	Max	Unit
Supply Voltage Operating	V_{CC}	1.65	5.5	V
Select Input Voltage	V_{IN}	0	5.5	V
Switch Input Voltage	V_{IS}	0	V_{CC}	V
Output Voltage	V_{OUT}	0	V_{CC}	V
Operating Temperature	T_A	−55	+125	°C

Input Rise and Fall Time
    Control Input V_{CC} = 2.3 V–3.6 V
    Control Input V_{CC} = 4.5 V–5.5 V
	t_r, t_f	0
		0
			10
			5.0
				ns/V

Thermal Resistance	θ_{JA}	–	350	°C/W

2. Select input must be held HIGH or LOW, it must not float.

DC ELECTRICAL CHARACTERISTICS – NLASB3157

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		1.65–1.95 2.3–5.5				0.75 V_{CC} 0.7 V_{CC}		V
V_{IL}	LOW Level Input Voltage		1.65–1.95 2.3–5.5					0.25 V_{CC} 0.3 V_{CC}	V
I_{IN}	Input Leakage Current	$0 \leq V_{IN} \leq 5.5$ V	0–5.5		± 0.05	± 0.1		± 1	μA
I_{OFF}	OFF State Leakage Current	$0 \leq A, B \leq V_{CC}$	1.65–5.5		± 0.05	± 0.1		± 1	μA
R_{ON}	Switch On Resistance (Note 3)	V_{IN} = 0 V, I_O = 30 mA V_{IN} = 2.4 V, I_O = −30 mA V_{IN} = 4.5 V, I_O = −30 mA	4.5		3.0 5.0 7.0			7.0 12 15	Ω
		V_{IN} = 0 V, I_O = 24 mA V_{IN} = 3 V, I_O = −24 mA	3.0		4.0 10			9.0 20	Ω
		V_{IN} = 0 V, I_O = 8 mA V_{IN} = 2.3 V, I_O = −8 mA	2.3		5.0 13			12 30	Ω
		V_{IN} = 0 V, I_O = 4 mA V_{IN} = 1.65 V, I_O = −4 mA	1.65		6.5 17			20 50	Ω
I_{CC}	Quiescent Supply Current All Channels ON or OFF	V_{IN} = V_{CC} or GND I_{OUT} = 0	5.5			1.0		10	μA
	Analog Signal Range		V_{CC}	0		V_{CC}	0	V_{CC}	V
R_{RANGE}	On Resistance Over Signal Range (Note 3) (Note 7)	I_A = −30 mA, $0 \leq V_{Bn} \leq V_{CC}$	4.5					25	Ω
		I_A = −24 mA, $0 \leq V_{Bn} \leq V_{CC}$	3.0					50	
		I_A = −8 mA, $0 \leq V_{Bn} \leq V_{CC}$	2.3					100	
		I_A = −4 mA, $0 \leq V_{Bn} \leq V_{CC}$	1.65					300	
ΔR_{ON}	On Resistance Match Between Channels (Note 3) (Note 4) (Note 5)	I_A = −30 mA, V_{Bn} = 3.15 I_A = −24 mA, V_{Bn} = 2.1 I_A = −8 mA, V_{Bn} = 1.6 I_A = −4 mA, V_{Bn} = 1.15	4.5 3.0 2.3 1.65		0.15 0.2 0.5 0.5				Ω
R_{flat}	On Resistance Flatness (Note 3) (Note 4) (Note 6)	I_A = −30 mA, $0 \leq V_{Bn} \leq V_{CC}$	5.0		6.0				Ω
		I_A = −24 mA, $0 \leq V_{Bn} \leq V_{CC}$	3.3		12				
		I_A = −8 mA, $0 \leq V_{Bn} \leq V_{CC}$	2.5		28				
		I_A = −4 mA, $0 \leq V_{Bn} \leq V_{CC}$	1.8		125				

3. Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).
4. Parameter is characterized but not tested in production.
5. ΔR_{ON} = R_{ON} max – R_{ON} min measured at identical V_{CC}, temperature and voltage levels.
6. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
7. Guaranteed by Design.

AC ELECTRICAL CHARACTERISTICS – NLASB3157

Symbol	Parameter	Test Conditions	V_{CC} (V)	T_A = +25°C			T_A = −40°C to +85°C		Unit	Figure Number
				Min	Typ	Max	Min	Max		
t_{PHL} t_{PLH}	Propagation Delay Bus to Bus (Note 9)	V_I = OPEN	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5					1.2 0.8 0.3	ns	Figures 2, 3
t_{PZL} t_{PZH}	Output Enable Time Turn On Time (A to B_n)	V_I = 2 × V_{CC} for t_{PZL} V_I = 0 V for t_{PZH}	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5			23 13 6.9 5.2	7.0 3.5 2.5 1.7	24 14 7.6 5.7	ns	Figures 2, 3
t_{PLZ} t_{PHZ}	Output Disable Time Turn Off Time (A Port to B Port)	V_I = 2 × V_{CC} for t_{PLZ} V_I = 0 V for t_{PHZ}	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5			12.5 7.0 5.0 3.5	3.0 2.0 1.5 0.8	13 7.5 5.3 3.8	ns	Figures 2, 3
$t_{B–M}$	Break Before Make Time (Note 8)		1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5				0.5 0.5 0.5 0.5		ns	Figure 4
Q	Charge Injection (Note 8)	C_L = 0.1 nF, V_{GEN} = 0 V R_{GEN} = 0 Ω	5.0 3.3		7.0 3.0				pC	Figure 5
OIRR	Off Isolation (Note 10)	R_L = 50 Ω f = 10 MHz	1.65–5.5		−57				dB	Figure 6
Xtalk	Crosstalk	R_L = 50 Ω f = 10 MHz	1.65–5.5		−54				dB	Figure 7
BW	−3 dB Bandwidth	R_L = 50 Ω	1.65–5.5		250				MHz	Figure 10
THD	Total Harmonic Distortion (Note 8)	R_L = 600 Ω 0.5 $V_{P–P}$ f = 600 Hz to 20 kHz	5.0		0.011				%	

CAPACITANCE – NLASB3157 (Note 11)

Symbol	Parameter	Test Conditions	Typ	Max	Unit	Figure Number
C_{IN}	Select Pin Input Capacitance	V_{CC} = 0 V	2.3		pF	
$C_{IO–B}$	B Port Off Capacitance	V_{CC} = 5.0 V	6.5		pF	Figure 8
$C_{IOA–ON}$	A Port Capacitance when Switch is Enabled	V_{CC} = 5.0 V	18.5		pF	Figure 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 $\log_{10}$ [V_A/V_{Bn}].
11. T_A = +25°C, f = 1 MHz, Capacitance is characterized but not tested in production.

APPENDIX A

DC ELECTRICAL EXTENDED AUTOMOTIVE TEMPERATURE RANGE CHARACTERISTICS – NLVASB3157

Symbol	Parameter	Test Conditions	V_{CC} (V)	T_A = +25°C			T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	HIGH Level Input Voltage		1.65–1.95 2.3–5.5				0.75 V_{CC} 0.7 V_{CC}		V
V_{IL}	LOW Level Input Voltage		1.65–1.95 2.3–5.5					0.25 V_{CC} 0.3 V_{CC}	V
I_{IN}	Input Leakage Current	$0 \leq V_{IN} \leq 5.5$ V	0–5.5		± 0.05	± 0.1		± 1	μA
I_{OFF}	OFF State Leakage Current	$0 \leq A, B \leq V_{CC}$	1.65–5.5		± 0.05	± 0.1		± 1	μA
R_{ON}	Switch On Resistance (Note 12)	V_{IN} = 0 V, I_O = 30 mA V_{IN} = 2.4 V, I_O = −30 mA V_{IN} = 4.5 V, I_O = −30 mA	4.5		3.0 5.0 7.0			8.5 13.0 15.0	Ω
		V_{IN} = 0 V, I_O = 24 mA V_{IN} = 3 V, I_O = −24 mA	3.0		4.0 10			11 20	
		V_{IN} = 0 V, I_O = 8 mA V_{IN} = 2.3 V, I_O = −8 mA	2.3		5.0 13			12 30	
		V_{IN} = 0 V, I_O = 4 mA V_{IN} = 1.65 V, I_O = −4 mA	1.65		6.5 17			20 50	
I_{CC}	Quiescent Supply Current All Channels ON or OFF	V_{IN} = V_{CC} or GND I_{OUT} = 0	5.5			1.0		10	μA
	Analog Signal Range		V_{CC}	0		V_{CC}	0	V_{CC}	V
R_{RANGE}	On Resistance Over Signal Range (Note 12) (Note 14)	I_A = −30 mA, $0 \leq V_{Bn} \leq V_{CC}$ I_A = −24 mA, $0 \leq V_{Bn} \leq V_{CC}$	4.5					25	Ω
		I_A = −8 mA, $0 \leq V_{Bn} \leq V_{CC}$	3.0					50	
		I_A = −4 mA, $0 \leq V_{Bn} \leq V_{CC}$	2.3					100	
			1.65					300	

12. Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).
13. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
14. Guaranteed by Design.

* For ΔR_{ON}, R_{FLAT}, Q, OIRR, Xtalk, BW, THD, and CIN see −40°C to 85°C section.

APPENDIX A

AC ELECTRICAL EXTENDED AUTOMOTIVE TEMPERATURE RANGE CHARACTERISTICS – NLVASB3157

Symbol	Parameter	Test Conditions	V_{CC} (V)	T_A = +25°C			T_A = −55°C to +125°C		Unit	Figure Number
				Min	Typ	Max	Min	Max		
t_{PHL} t_{PLH}	Propagation Delay Bus to Bus (Note 16)	V_I = OPEN	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5					1.2 0.8 0.3	ns	Figures 2, 3
t_{PZL} t_{PZH}	Output Enable Time Turn On Time (A to B_n)	V_I = 2 × V_{CC} for t_{PZL} V_I = 0 V for t_{PZH}	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5			23 13 6.9 5.2	7.0 3.5 2.5 1.7	24 14 9.0 7.0	ns	Figures 2, 3
t_{PLZ} t_{PHZ}	Output Disable Time Turn Off Time (A Port to B Port)	V_I = 2 × V_{CC} for t_{PLZ} V_I = 0 V for t_{PHZ}	1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5			12.5 7.0 5.0 3.5	3.0 2.0 1.5 0.8	13 7.5 6.5 5.0	ns	Figures 2, 3
t_{B-M}	Break Before Make Time (Note 15)		1.65–1.95 2.3–2.7 3.0–3.6 4.5–5.5				0.5 0.5 0.5 0.5		ns	Figure 4

15. Guaranteed by Design.
16. 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).

* For ΔR_{ON}, R_{FLAT}, Q, OIRR, Xtalk, BW, THD, and CIN see −40°C to 85°C section.

AC LOADING AND WAVEFORMS

NOTE: Input driven by 50 Ω source terminated in 50 Ω
NOTE: C_L includes load and stray capacitance
NOTE: Input PRR = 1.0 MHz; t_W = 500 ns
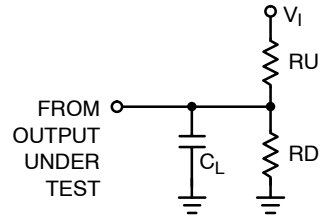
Figure 2. AC Test Circuit
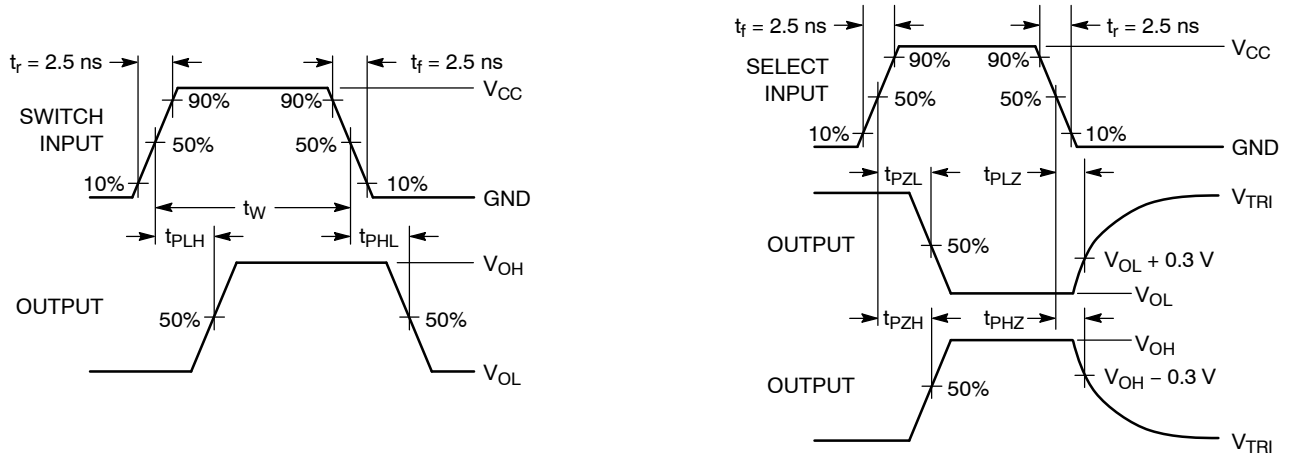
Figure 3. AC Waveforms

Figure 4. Break Before Make Interval Timing

NLASB3157

AC LOADING AND WAVEFORMS
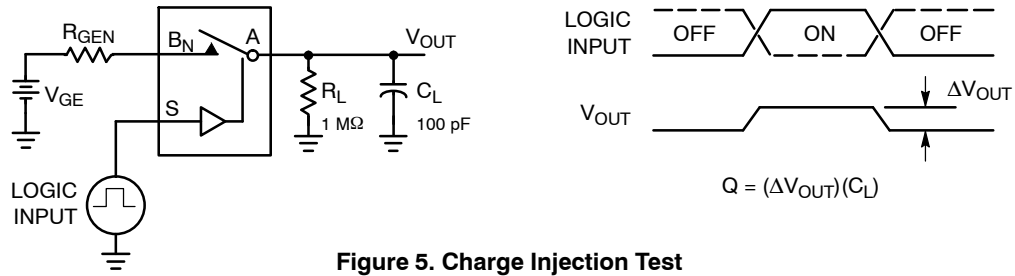
Figure 5. Charge Injection Test

$$Q = (\Delta V_{OUT})(C_L)$$
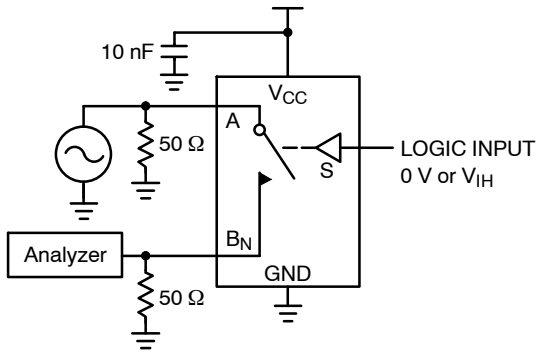
Figure 6. Off Isolation
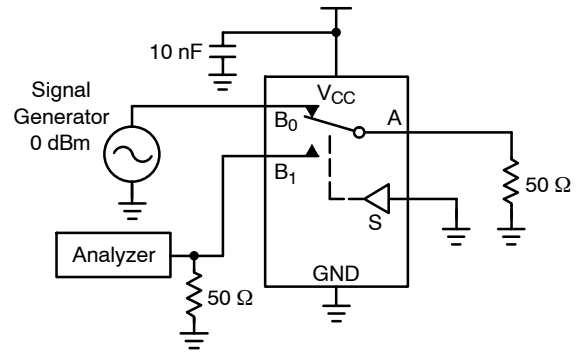
Figure 7. Crosstalk
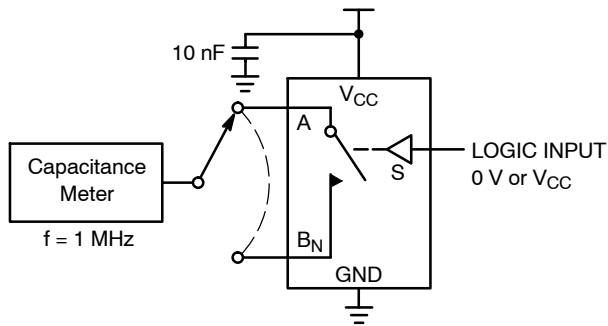
Figure 8. Channel Off Capacitance
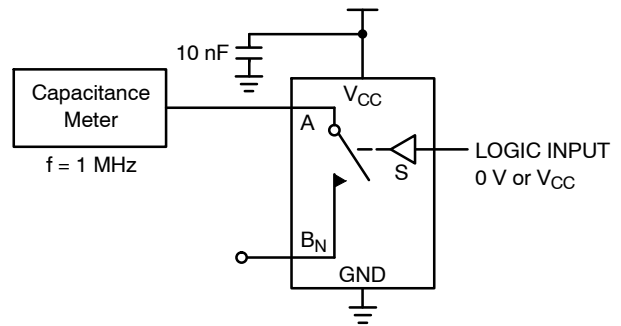
Figure 9. Channel On Capacitance
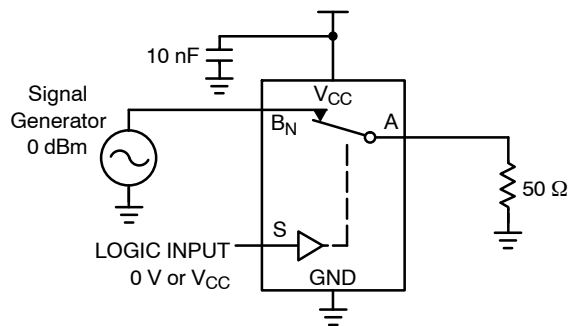
Figure 10. Bandwidth

PACKAGE DIMENSIONS

SC−88/SOT−363/SC−70
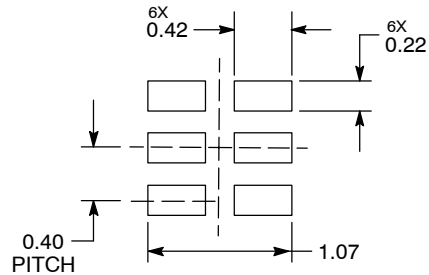**DF SUFFIX**
CASE 419B−02
ISSUE Y
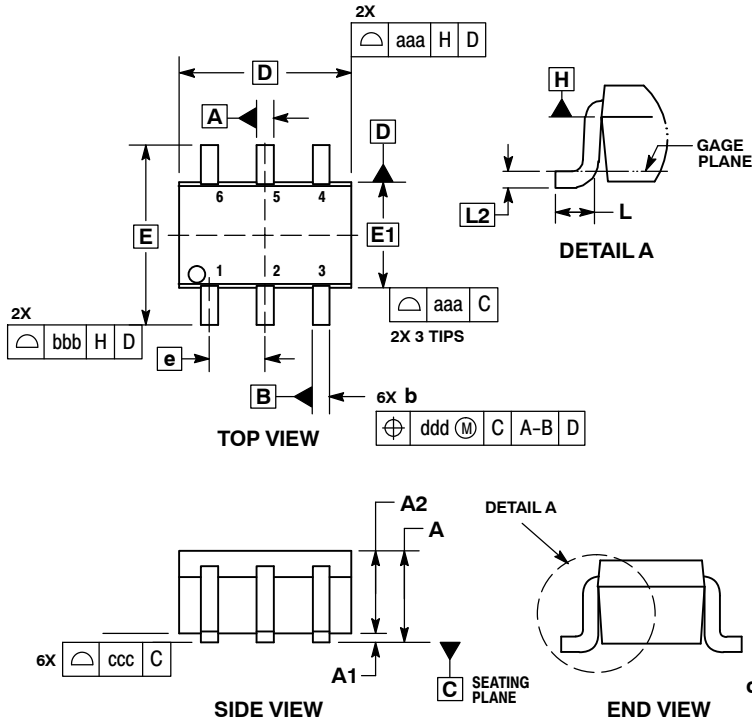
TOP VIEW

DETAIL A

SIDE VIEW

END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PRO-TRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDI-TION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	–––	–––	1.10	–––	–––	0.043
A1	0.00	–––	0.10	0.000	–––	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.006		
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd	0.10			0.004		

RECOMMENDED
SOLDERING FOOTPRINT*
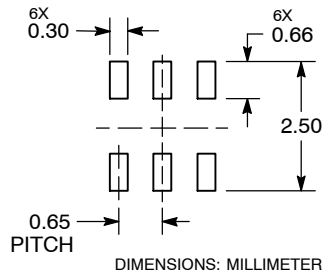
DIMENSIONS: MILLIMETERS

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

NLASB3157

PACKAGE DIMENSIONS

WDFN6 1.2x1.0, 0.4P
CASE 506AS
ISSUE D
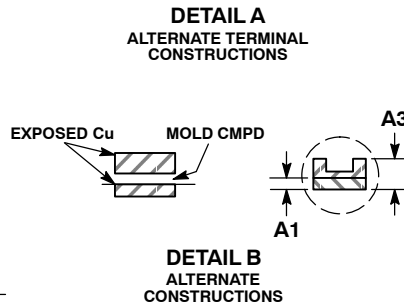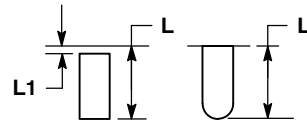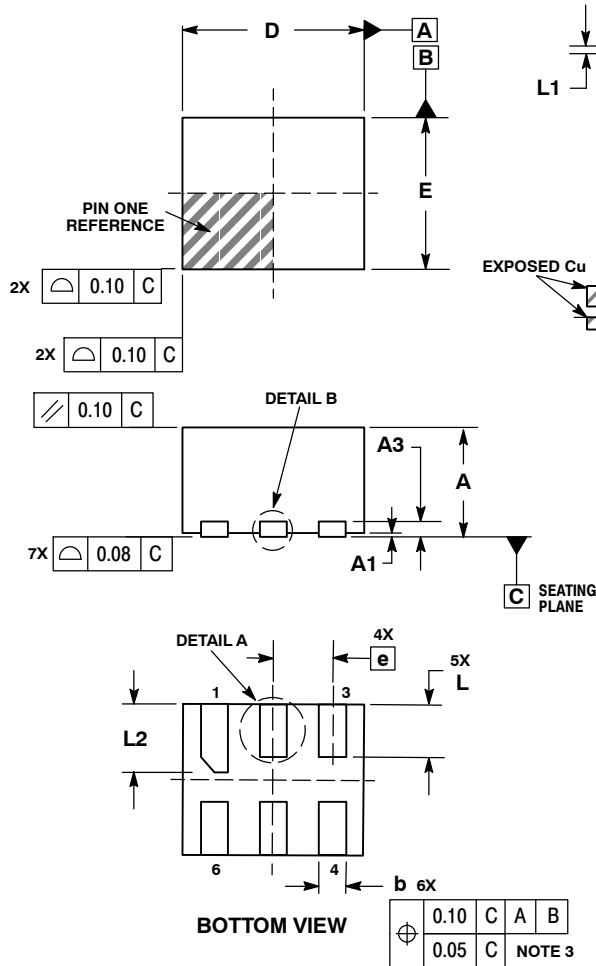
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| 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

DETAIL A
ALTERNATE TERMINAL CONSTRUCTIONS

DETAIL B
ALTERNATE CONSTRUCTIONS

EXPOSED Cu   MOLD CMPD

BOTTOM VIEW

MOUNTING FOOTPRINT*

6X 0.42
6X 0.22
0.40 PITCH
1.07

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.

NLASB3157/D