

Single 2-Input Non-Inverting Multiplexer

NL17SZ157

The NL17SZ157 is a single 2-input non-inverting multiplexer operating from a 1.65 to 5.5 V supply.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 2.4 ns t_{PD} at $V_{CC} = 5$ V (Typ)
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 32 mA at 4.5 V
- Available in SC-88, SC-74 and UDFN6 Packages
- Chip Complexity < 100 FETs
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

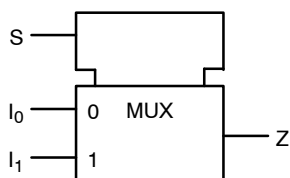
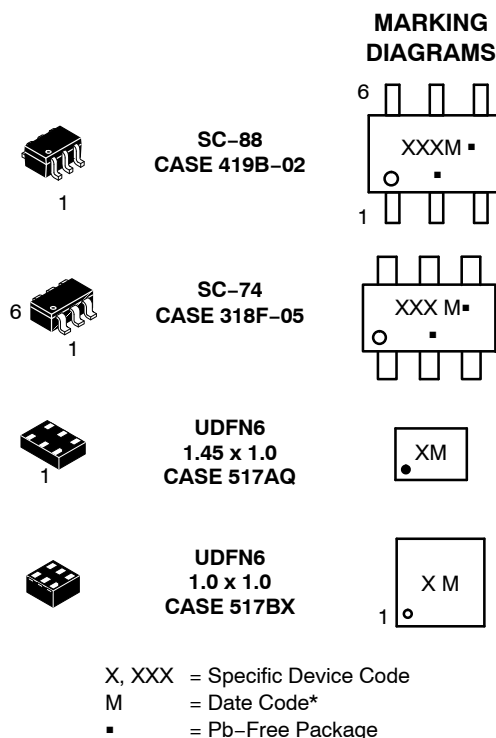


Figure 1. Logic Symbol



(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

NL17SZ157

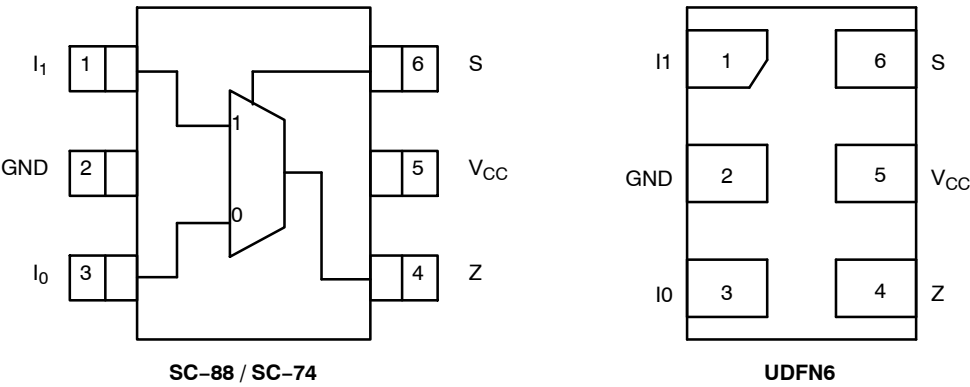


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	I ₁
2	GND
3	I ₀
4	Z
5	V _{CC}
6	S

FUNCTION TABLE

Inputs			Output
S	I ₁	I ₀	$Z = (I_0) \cdot (\overline{S}) + (I_1) \cdot (S)$
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

H = HIGH Logic Level
L = LOW Logic Level
X = Don't Care

MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +6.5	V
V_{IN}	DC Input Voltage	-0.5 to +6.5	V
V_{OUT}	DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	-0.5 to $V_{CC} + 0.5$ -0.5 to +6.5 -0.5 to +6.5	V
I_{IK}	DC Input Diode Current $V_{IN} < GND$	-50	mA
I_{OK}	DC Output Diode Current $V_{OUT} < GND$	-50	mA
I_{OUT}	DC Output Source/Sink Current	± 50	mA
I_{CC} or I_{GND}	DC Supply Current per Supply Pin or Ground Pin	± 100	mA
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 secs	260	°C
T_J	Junction Temperature Under Bias	+150	°C
θ_{JA}	Thermal Resistance (Note 2) SC-88 SC-74 UDFN6	377 320 154	°C/W
P_D	Power Dissipation in Still Air SC-88 SC-74 UDFN6	332 390 812	mW
MSL	Moisture Sensitivity	Level 1	-
F_R	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V_{ESD}	ESD Withstand Voltage (Note 3) Human Body Model Charged Device Model	2000 1000	V
$I_{Latchup}$	Latchup Performance (Note 4)	± 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.

1. Applicable to devices with outputs that may be tri-stated.
2. Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22-A115-A (Machine Model) be discontinued per JEDEC/JEP172A.
4. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	1.65	5.5	V
V_{IN}	DC Input Voltage	0	5.5	V
V_{OUT}	DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	0 0 0	V_{CC} 5.5 5.5	V
T_A	Operating Temperature Range	-55	+125	°C
t_r, t_f	Input Rise and Fall Time $V_{CC} = 1.65$ V to 1.95 V $V_{CC} = 2.3$ V to 2.7 V $V_{CC} = 3.0$ V to 3.6 V $V_{CC} = 4.5$ V to 5.5 V	0 0 0 0	20 20 10 5	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.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 to 1.95	0.65 V _{CC}	–	–	0.65 V _{CC}	–	V
			2.3 to 5.5	0.70 V _{CC}	–	–	0.70 V _{CC}	–	
V _{IL}	Low-Level Input Voltage		1.65 to 1.95	–	–	0.35 V _{CC}	–	0.35 V _{CC}	V
			2.3 to 5.5	–	–	0.30 V _{CC}	–	0.30 V _{CC}	
V _{OH}	High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OH} = –100 μA I _{OH} = –4 mA I _{OH} = –8 mA I _{OH} = –16 mA I _{OH} = –24 mA I _{OH} = –32 mA	1.65 to 5.5	V _{CC} – 0.1	V _{CC}	–	V _{CC} – 0.1	–	V
			1.65	1.29	1.52	–	1.29	–	
			2.3	1.9	2.1	–	1.9	–	
			3	2.4	2.7	–	2.4	–	
			3	2.3	2.5	–	2.3	–	
			4.5	3.8	4	–	3.8	–	
V _{OL}	Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OH} = 100 μA I _{OH} = 4 mA I _{OH} = 8 mA I _{OH} = 16 mA I _{OH} = 24 mA I _{OH} = 32 mA	1.65 to 5.5	–	–	0.1	–	0.1	V
			1.65	–	0.08	0.24	–	0.24	
			2.3	–	0.12	0.3	–	0.3	
			3	–	0.24	0.4	–	0.4	
			3	–	0.26	0.55	–	0.55	
			4.5	–	0.31	0.55	–	0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	–	–	±0.1	–	±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0	–	–	1.0	–	10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	–	–	1.0	–	10	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.

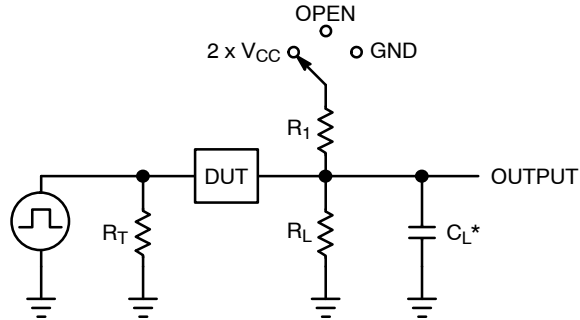
AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	Conditions	T _A = +25°C			T _A = –40 to +85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, S to Z (Figure 3, 4)	1.65 to 1.95	C _L = 15 pF, R _L = 1 MΩ,	–	6.0	11.5	–	12.0	ns
		2.3 to 2.7		–	3.5	6.1	–	6.5	
		3.0 to 3.6		–	2.6	4.1	–	4.5	
		4.5 to 5.5		–	1.9	3.2	–	3.5	
	Propagation Delay, I _n to Z (Figure 3, 4)	1.65 to 1.95	C _L = 15 pF, R _L = 1 MΩ,	–	5.9	10.0	–	10.5	
		2.3 to 2.7		–	3.5	5.8	–	6.1	
		3.0 to 3.6		–	2.6	3.9	–	4.2	
		4.5 to 5.5		–	1.9	3.1	–	3.3	
	Propagation Delay, S to Z (Figure 3, 4)	3.0 to 3.6	C _L = 50 pF, R _L = 500 Ω,	–	3.2	4.8	–	5.2	
		4.5 to 5.5		–	2.4	3.8	–	4.1	
	Propagation Delay, I _n to Z (Figure 3, 4)	3.0 to 3.6	C _L = 50 pF, R _L = 500 Ω,	–	3.2	4.6	–	5.0	
		4.5 to 5.5		–	2.4	3.7	–	4.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5 \text{ V}$, $V_{IN} = 0 \text{ V}$ or V_{CC}	2.5	pF
C_{OUT}	Output Capacitance	$V_{CC} = 5.5 \text{ V}$, $V_{IN} = 0 \text{ V}$ or V_{CC}	4.0	pF
C_{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, $V_{CC} = 5.5 \text{ V}$, $V_{IN} = 0 \text{ V}$ or V_{CC}	4.0	pF

5. C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. C_{PD} is related to I_{CCD} dynamic operating current by the expression:
 $I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CCstatic})$.



C_L includes probe and jig capacitance
 R_T is Z_{OUT} of pulse generator (typically 50 Ω)
 $f = 1 \text{ MHz}$

Figure 3. Test Circuit

Test	Switch Position	C_L , pF	R_L , Ω	R_1 , Ω
t_{PLH} / t_{PHL}	Open	See AC Characteristics Table		
t_{PLZ} / t_{PZL}	$2 \times V_{CC}$	50	500	500
t_{PHZ} / t_{PZH}	GND	50	500	500

X = Don't Care

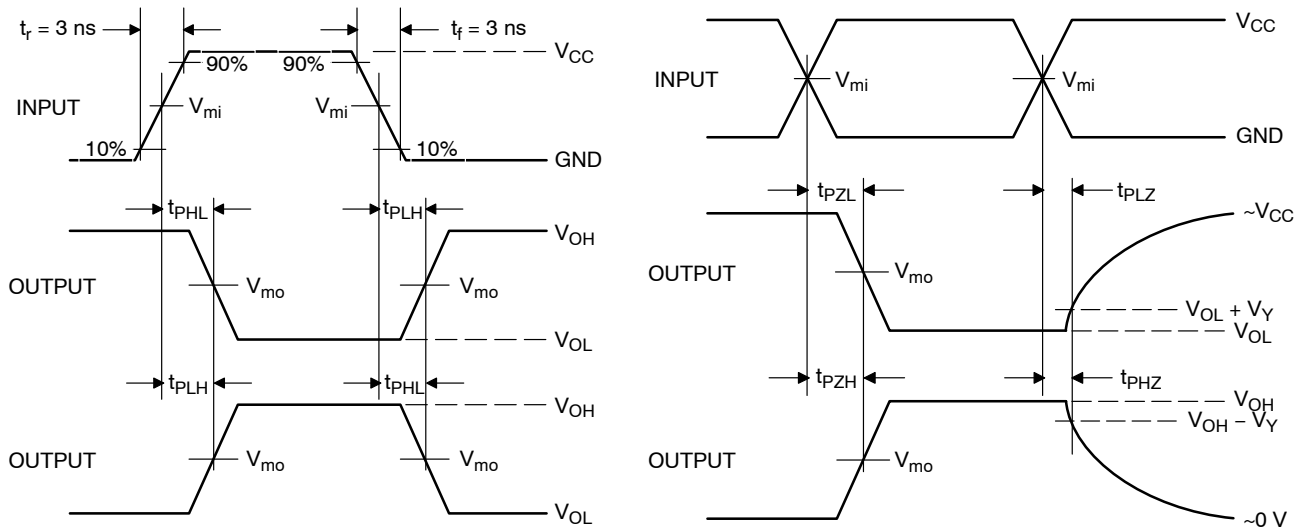


Figure 4. Switching Waveforms

V_{CC} , V	V_{mi} , V	V_{mo} , V		V_Y , V
		t_{PLH} , t_{PHL}	t_{PZL} , t_{PLZ} , t_{PZH} , t_{PHZ}	
1.65 to 1.95	$V_{CC} / 2$	$V_{CC} / 2$	$V_{CC} / 2$	0.15
2.3 to 2.7	$V_{CC} / 2$	$V_{CC} / 2$	$V_{CC} / 2$	0.15
3.0 to 3.6	$V_{CC} / 2$	$V_{CC} / 2$	$V_{CC} / 2$	0.3
4.5 to 5.5	$V_{CC} / 2$	$V_{CC} / 2$	$V_{CC} / 2$	0.3

NL17SZ157

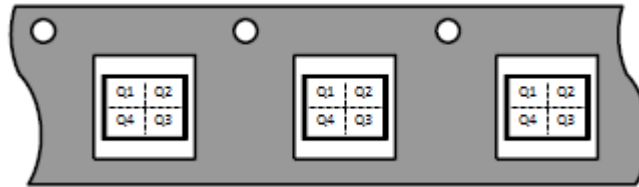
DEVICE ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
NL17SZ157DFT2G	SC-88	ZF7	Q4	3000 / Tape & Reel
NL17SZ157DBVT1G	SC-74	AR	Q4	3000 / Tape & Reel
NL17SZ157MU1TCG (Contact onsemi sales)	UDFN6, 1.45 x 1.0, 0.5P	TBD	Q4	3000 / Tape & Reel
NL17SZ157MU3TCG (Contact onsemi sales)	UDFN6, 1.0 x 1.0, 0.35P	TBD	Q4	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.

PIN 1 ORIENTATION IN TAPE AND REEL

Direction of Feed

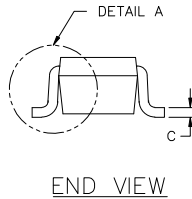
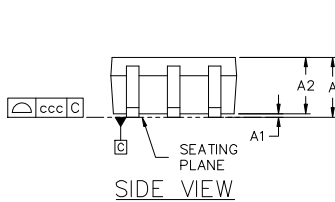
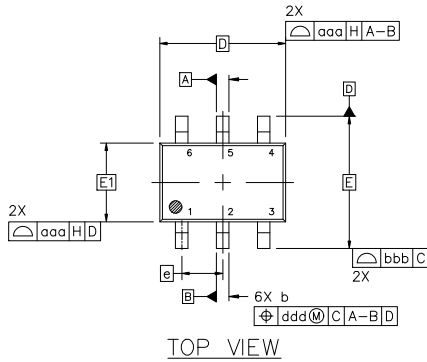


NL17SZ157

PACKAGE DIMENSIONS

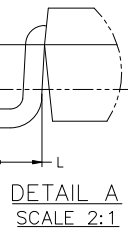
SC-88 2.00x1.25x0.90, 0.65P
CASE 419B-02
ISSUE Z

DATE 18 APR 2024



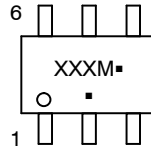
NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, 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 CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.10
A1	0.00	---	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

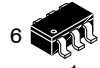
*Date Code orientation and/or position may vary depending upon manufacturing location.

*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. Some products may not follow the Generic Marking.

RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

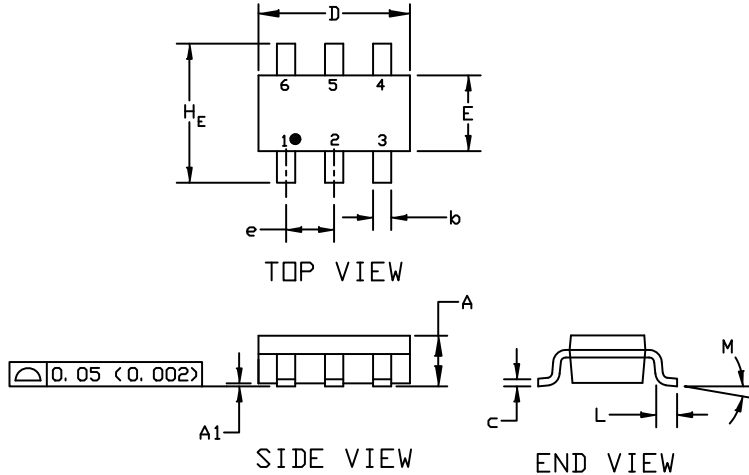
PACKAGE DIMENSIONS



SCALE 2:1

SC-74
CASE 318F
ISSUE P

DATE 07 OCT 2021

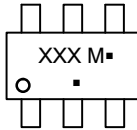


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN.	NDM.	MAX.	MIN.	NDM.	MAX.
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
H _E	2.50	2.75	3.00	0.099	0.108	0.118
L	0.20	0.40	0.60	0.008	0.016	0.024
M	0°	---	10°	0°	---	10°

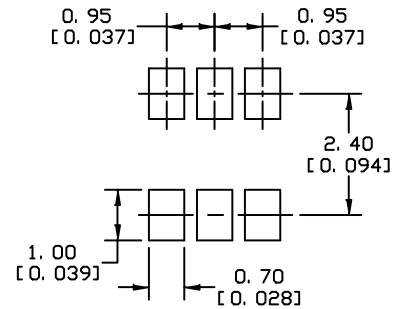
GENERIC
MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

*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. Some products may not follow the Generic Marking.



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

SOLDERING FOOTPRINT

STYLE 1:

PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

STYLE 2:

PIN 1. NO CONNECTION
2. COLLECTOR
3. EMITTER
4. NO CONNECTION
5. COLLECTOR
6. BASE

STYLE 3:

PIN 1. EMITTER 1
2. BASE 1
3. COLLECTOR 2
4. EMITTER 2
5. BASE 2
6. COLLECTOR 1

STYLE 4:

PIN 1. COLLECTOR 2
2. EMITTER 1/EMITTER 2
3. COLLECTOR 1
4. EMITTER 3
5. BASE 1/BASE 2/COLLECTOR 3
6. BASE 3

STYLE 5:

PIN 1. CHANNEL 1
2. ANODE
3. CHANNEL 2
4. CHANNEL 3
5. CATHODE
6. CHANNEL 4

STYLE 6:

PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 7:

PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 8:

PIN 1. EMITTER 1
2. BASE 2
3. COLLECTOR 2
4. EMITTER 2
5. BASE 1
6. COLLECTOR 1

STYLE 9:

PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 10:

PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 11:

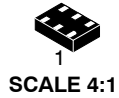
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR



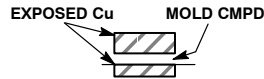
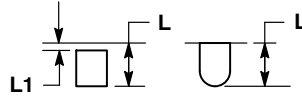
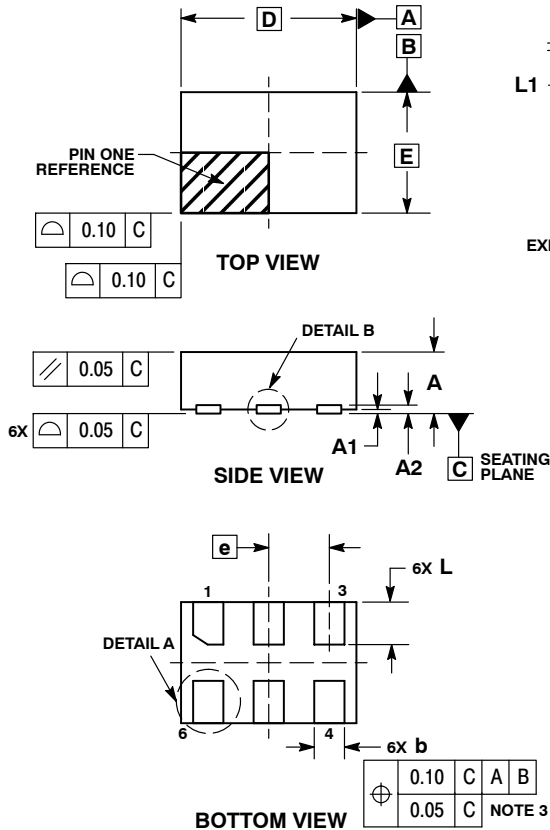
NL17SZ157

PACKAGE DIMENSIONS

UDFN6, 1.45x1.0, 0.5P
CASE 517AQ
ISSUE O



DATE 15 MAY 2008

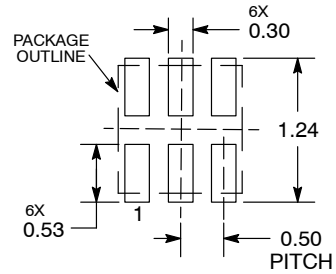


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A2	0.07	REF
b	0.20	0.30
D	1.45	BSC
E	1.00	BSC
e	0.50	BSC
L	0.30	0.40
L1	---	0.15

MOUNTING FOOTPRINT



DIMENSIONS: MILLIMETERS

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

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.

NL17SZ157

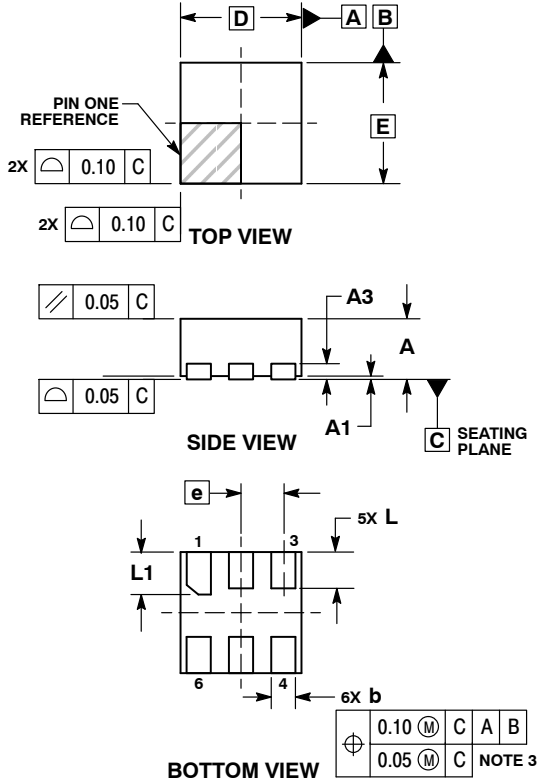
PACKAGE DIMENSIONS



SCALE 4:1

UDFN6, 1x1, 0.35P
CASE 517BX
ISSUE O

DATE 18 MAY 2011

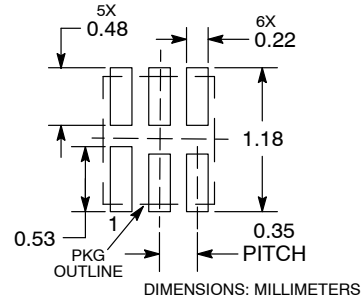


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

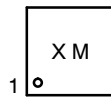
DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13	REF
b	0.12	0.22
D	1.00	BSC
E	1.00	BSC
e	0.35	BSC
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*



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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. Some products may not follow the Generic Marking.

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