

# NLSF2500

## Keypad Multiplexer

The NLSF2500 is a keyboard multiplexer fabricated in sub-micron silicon CMOS Technology. The NLSF2500 is designed to operate over wide operating voltage, with minimum power consumption and very low voltage drop from  $V_{CC}$ . The device saves dozens of active and passive components and permits operating voltage far lower than the standard diode scheme.

### Features

- Single Supply Operation
- Optimized for 1.8 V to 3.6 V  $V_{CC}$
- Tiny 3 x 3 mm QFN-16 Package
- Conforms to: JEDEC MO-220, Issue H, Variation VEED-6
- Very Low Voltage Drop
- Permits Operation Down to 1.65 V
- Near Zero Static Power
- ESD Protection: Human Body Model (HBM); > 3000 V, Machine Model (MM); >300 V
- Latchup Maximum Rating: 200 mA
- Pin-to-Pin Compatible with CM2500
- This is a Pb-Free Device

### Typical Applications

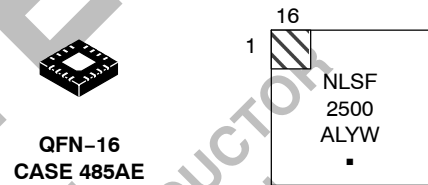
- Cell Phones
- PDAs
- MP3 players



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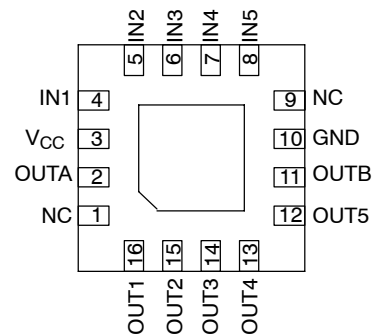
<http://onsemi.com>

### MARKING DIAGRAM



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

### PIN CONNECTIONS



Bottom View

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# NLSF2500

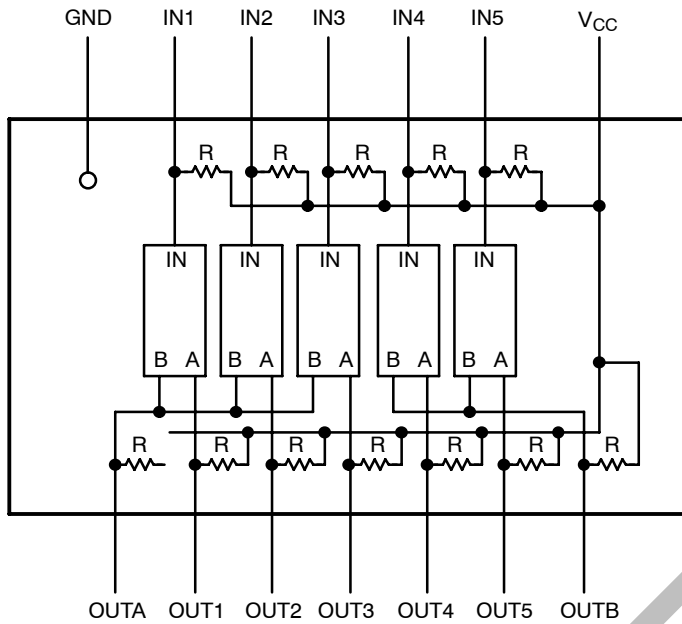


Figure 1. Device Block Diagram

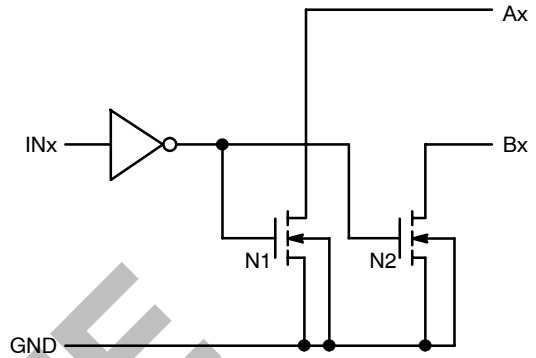


Figure 2. Circuit Schematic (1 Channel Pair Only)

## PIN DESCRIPTION

Pin	Name	Function Description
1	NC	Not Internally Connected
2	OUTA	Combined "Functional OR" Output of IN1, IN2, and IN3
3	V <sub>CC</sub>	Supply Pin
4	IN1	Input 1 from Switch to be Multiplexed
5	IN2	Input 2 from Switch to be Multiplexed
6	IN3	Input 3 from Switch to be Multiplexed
7	IN4	Input 4 from Switch to be Multiplexed
8	IN5	Input 5 from Switch to be Multiplexed
9	NC	Not Internally Connected
10	GND	Ground
11	OUTB	Combined "Functional OR" Output of IN4 and IN5
12	OUT5	Output 5 for Keyboard Interface Lines
13	OUT4	Output 4 for Keyboard Interface Lines
14	OUT3	Output 3 for Keyboard Interface Lines
15	OUT2	Output 2 for Keyboard Interface Lines
16	OUT1	Output 1 for Keyboard Interface Lines

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## MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	0 ≤ V <sub>CC</sub> ≤ V <sub>CC</sub> + 0.5	V
V <sub>O</sub>	DC Output Voltage	- 0.5 to + 7.0	V
I <sub>IK</sub>	DC Input Diode Current V <sub>I</sub> < GND	±50	mA
I <sub>OK</sub>	DC Output Diode Current V <sub>O</sub> = GND	- 50	mA
I <sub>O</sub>	DC Output Sink Current	± 50	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	± 100	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	± 100	mA
T <sub>STG</sub>	Storage Temperature Range	- 65 to + 150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature under bias	+ 150	°C
θ <sub>JA</sub>	Thermal Resistance	80	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	800	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0125 in	
V <sub>ESD</sub>	ESD Test Voltage Human Body Model (Note 1) Machine Model (Note 2)	> 3000 > 300	V

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. Tested to EIA/JESD22-A114-A.
2. Tested to EIA/JESD22-A115-A.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics	Min	Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	1.5	5.5	V
V <sub>IN</sub>	DC Input Voltage	GND	V <sub>CC</sub> + 0.5	V
V <sub>OUT</sub>	DC Output Voltage	GND	5.5	V
T <sub>A</sub>	Operating Temperature Range	40	85	°C

## DC CHARACTERISTICS

Symbol	Parameter	Condition	V <sub>CC</sub>	Min	Max	Unit
V <sub>IL</sub>	Input Logic Low Voltage		1.65 – 3.6	0.3 * V <sub>CC</sub>		V
V <sub>IH</sub>	Input Logic High Voltage		1.65 – 3.6		0.7 * V <sub>CC</sub>	V
R <sub>OUT</sub>	OUT <sub>x</sub> Pullup Resistance		1.65 – 3.6	50	150	kΩ
R <sub>IN 2.7</sub>	IN <sub>x</sub> Pullup Resistance	PIN = GND	2.7	50	150	kΩ
R <sub>IN 1.8</sub>	IN <sub>x</sub> Pullup Resistance	PIN = GND	1.8	100	360	kΩ
V <sub>D</sub>	Voltage Drop	IN <sub>x</sub> = GND, I <sub>OUT</sub> = 100 μA			100	mV
I <sub>CC</sub>	Quiescent Current	All I/O Floating	1.65 – 3.6		10	μA
I <sub>L</sub>	Output Leakage Current	IN <sub>x</sub> = Floating			1.0	μA
C <sub>P</sub>	I/O Pin Capacitance	1.0 MHz	2.5		15	pF

# NLSF2500

## ORDERING INFORMATION

Device Order Number	Device Nomenclature					Package Type	Tape & Reel Size <sup>†</sup>
	Circuit Indicator	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
NLSF2500MN1R2G	NL	SF	2500	MN1	R2	QFN-16 (Pb-Free)	3000

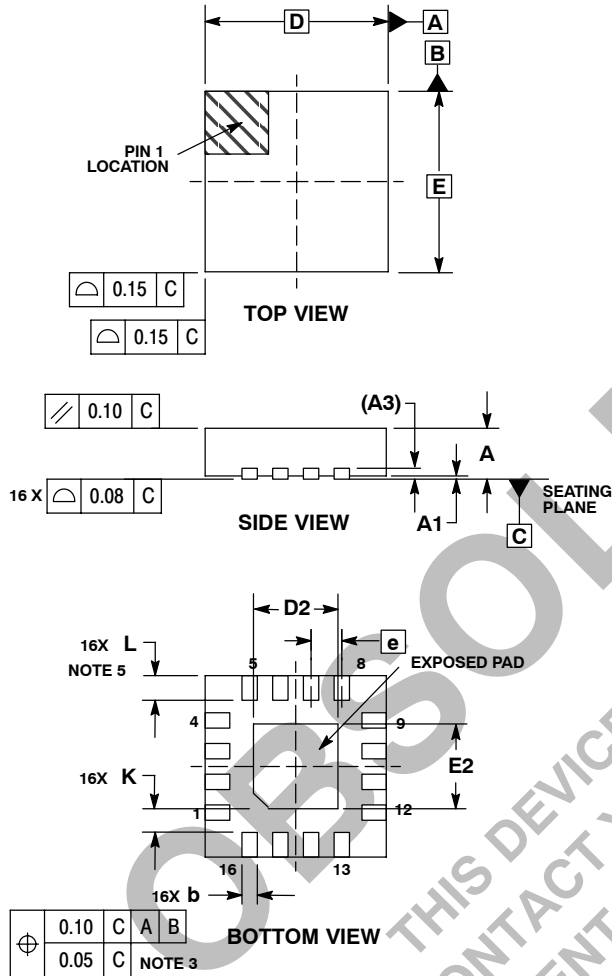
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**OBSOLETE**  
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# NLSF2500

## PACKAGE DIMENSIONS

QFN-16 3\*3\*0.85 MM, 0.5 P  
CASE 485AE-01  
ISSUE O



**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. OUTLINE MEETS JEDEC DIMENSIONS PER MO-220, VARIATION VEED-6.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.800	0.900	1.000
A1	0.000	0.025	0.050
A3	0.200 REF		
b	0.180	0.250	0.300
D	3.00 BSC		
D2	1.250	1.40	1.550
E	3.00 BSC		
E2	1.250	1.40	1.550
e	0.500 BSC		
K	0.200	---	---
L	0.300	0.400	0.500

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