May 2000

Revised December 2005

Minimal propagation delay through the switch

Power down high impedance input/output

■ Space saving US8 surface mount package

■ MicroPak<sup>™</sup> Pb-Free leadless package

Typical 3Ω switch resistance at 5.0V V<sub>CC</sub>

Zero bounce in flow through mode

**Features** 

- TTL compatible active LOW control inputs
- Control inputs are overvoltage tolerant
- Bus switch replacement for Logic x125 part

#### **Ordering Code:**

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7WB3125K8X	MAB08A	WB25	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	3k Units on Tape and Reel
NC7WB3125L8X (Preliminary)	MAC08A	T4	Pb-Free 8-Lead MicroPak, 1.6 mm Wide	5k Units on Tape and Reel

Pb-Free package per JEDEC J-STD-020B.

MircoPak™ is a trademark of Fairchild Semiconductor Corporation.

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**General Description** 

ages up to 5.5V independent of V<sub>CC</sub>.

# 2-Bit Low Power Bus Switch

The NC7WB3125 is a 2-bit ultra high-speed CMOS FET bus

switch with TTL-compatible active LOW control inputs. The low

On Resistance of the switch allows inputs to be connected to outputs with minimal propagation delay and without generating

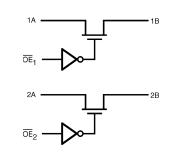
additional ground bounce noise. The device is organized as a 2-

bit switch with independent bus enable ( $\overline{OE}$ ) controls. When  $\overline{OE}$  is LOW, the switch is ON and Port A is connected to Port B.

When  $\overline{OE}$  is HIGH, the switch is OPEN and a high-impedance

state exists between the two ports. Control inputs tolerate volt-

#### Logic Diagram



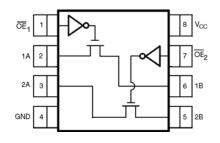
# **Pin Descriptions**

Pin Name	Description
A	Bus A
В	Bus B
OE	Bus Enable Input

## **Function Table**

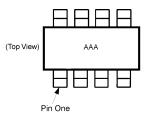
Bus Enable Input OE	Function
L	B Connected to A
Н	Disconnected

## **Connection Diagrams**



#### (Top View)

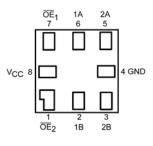
Pin One Orientation Diagram



AAA represents Product Code Top Mark - see ordering code

Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin (see diagram).

#### Pad Assignments for MicroPak



(Top Through View)

#### Absolute Maximum Ratings(Note 1)

Supply Voltage (V <sub>CC</sub> )	-0.5V to +7.0V
DC Switch Voltage (V <sub>S</sub> )	-0.5V to +7.0V
DC Output Voltage (VIN) (Note 2)	-0.5V to +7.0V
DC Input Diode Current	
(I <sub>IK</sub> ) V <sub>IN</sub> < 0V	–50 mA
DC Output (I <sub>OUT</sub> ) Current	128 mA
DC V <sub>CC</sub> or Ground Current	
(I <sub>CC</sub> /I <sub>GND</sub> )	±100 mA
Storage Temperature Range (T <sub>STG</sub> )	-65°C to +150°C
Junction Temperature under Bias (T <sub>J</sub> )	+150°C
Junction Lead Temperature (TL)	
(Soldering, 10 Seconds)	+260°C
Power Dissipation (P <sub>D</sub> ) @ +85°C	250 mW

# Recommended Operating Conditions (Note 3)

Supply Operating (V <sub>CC</sub> )	4.0V to 5.5V
Control Input Voltage (VIN)	0V to 5.5V
Switch Input Voltage (V <sub>IN</sub> )	0V to 5.5V
Output Voltage (V <sub>OUT</sub> )	0V to 5.5V
Operating Temperature (T <sub>A</sub> )	-40°C to +85°C
Input Rise and Fall Time $(t_r, t_f)$	
Switch Control Input	0 ns/V to 5 ns
Switch I/O	0 ns/V to DC
Thermal Resistance (θ <sub>JA</sub> )	250°C/W

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 3: Unused logic inputs must be held HIGH or LOW. They may not float.

# **DC Electrical Characteristics**

Symbol	Parameter	V <sub>cc</sub>	т	$A = -40^{\circ}C \text{ to } +85^{\circ}C$	C	Units	Conditions
Symbol	Farameter	(V)	Min	Тур	Max	Units	
V <sub>IK</sub>	Clamp Diode Voltage	4.5			-1.2	V	I <sub>IN</sub> = -18 mA
V <sub>IH</sub>	HIGH Level Input Voltage	4.0 to 5.5	2.0			V	
V <sub>IL</sub>	LOW Level Input Voltage	4.0 to 5.5			0.8	V	
V <sub>OH</sub>	HIGH Level Output Voltage	4.0 to 5.5		See Figure 3		V	$V_{IN} = V_{CC}$
I <sub>IN</sub>	Input Leakage Current	5.5			±1.0	μA	$0 \le V_{IN} \le 5.5 V$
I <sub>OFF</sub>	Switch OFF Leakage Current	5.5			±1.0	μA	$0 \le A, B \le V_{CC}$
R <sub>ON</sub>	Switch On Resistance	4.5		3.0	7.0		V <sub>IN</sub> = 0V, I <sub>IN</sub> = 64 mA
	(Note 4)	4.5		3.0	7.0	Ω	$V_{IN} = 0V, I_{IN} = 30 \text{ mA}$
		4.5		6.0	15.0	52	$V_{IN} = 2.4V, I_{IN} = 15 \text{ mA}$
		4.0		10.0	20.0		$V_{IN} = 2.4V, I_{IN} = 15 \text{ mA}$
I <sub>CC</sub>	Quiescent Supply Current	5.5			3.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
							$I_{OUT} = 0$
Δ I <sub>CC</sub>	Increase in I <sub>CC</sub> per Input (Note 5)	5.5		1.0	2.5	mA	$V_{IN} = 3.4V$ , One $\overline{OE}$ Input only,
							Other $\overline{OE} = V_{CC}$

Note 4: 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) pins.

Note 5: Per TTL driven input (V<sub>IN</sub> = 3.4V, control input only). A and B pins do not contribute to I<sub>CC</sub>.

# **AC Electrical Characteristics**

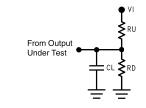
Symbol	Parameter	v <sub>cc</sub>		= -40°C to +8 ) pF, RU = RD		Units	Conditions	Figure
		(V)	Min	Тур	Max			Number
t <sub>PHL</sub> , t <sub>PLH</sub>	Propagation Delay Bus-to-Bus (Note 6)	4.0 to 5.5			0.25	ns	V <sub>I</sub> = OPEN	Figures 1, 2
t <sub>PZL</sub> ,	Output Enable Time	4.5 to 5.5	0.8	2.5	4.2		V <sub>I</sub> = 7V for t <sub>PZL</sub>	Figures
t <sub>PZH</sub>		4.0	0.8	3.0	4.6	ns	$V_I = 0V$ for $t_{PZH}$	1, 2
t <sub>PLZ</sub> ,	Output Disable Time	4.5 to 5.5	0.8	3.1	4.8		$V_I = 7V$ for $t_{PLZ}$	Figures
t <sub>PHZ</sub>		4.0	0.8	2.9	4.4	ns	$V_I = 0V$ for $t_{PHZ}$	1Figure 2

Note 6: This parameter is guaranteed by design. The bus switch contributes no propagation delay other than the RC delay of the typical On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance). The specified limit is calculated on this basis.

## Capacitance

Symbol	Parameter	Тур	Max	Units	Conditions
CIN	Control Pin Input Capacitance	2.5		pF	$V_{CC} = 0V$
$C_{I/O} (OFF)$	Port Off Capacitance	6.0		pF	$V_{CC} = 5.0V = \overline{OE}$
C <sub>I/O</sub> (ON)	Switch ON Capacitance	12.0		pF	$V_{CC} = 5.0V, \overline{OE} = 0V$

## AC Loading and Waveforms

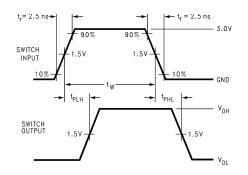


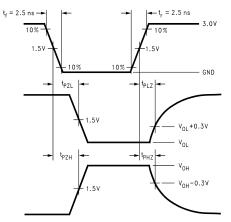
Input driven by  $50\Omega$  source terminated in  $50\Omega$ 

C<sub>L</sub> includes load and stray capacitance

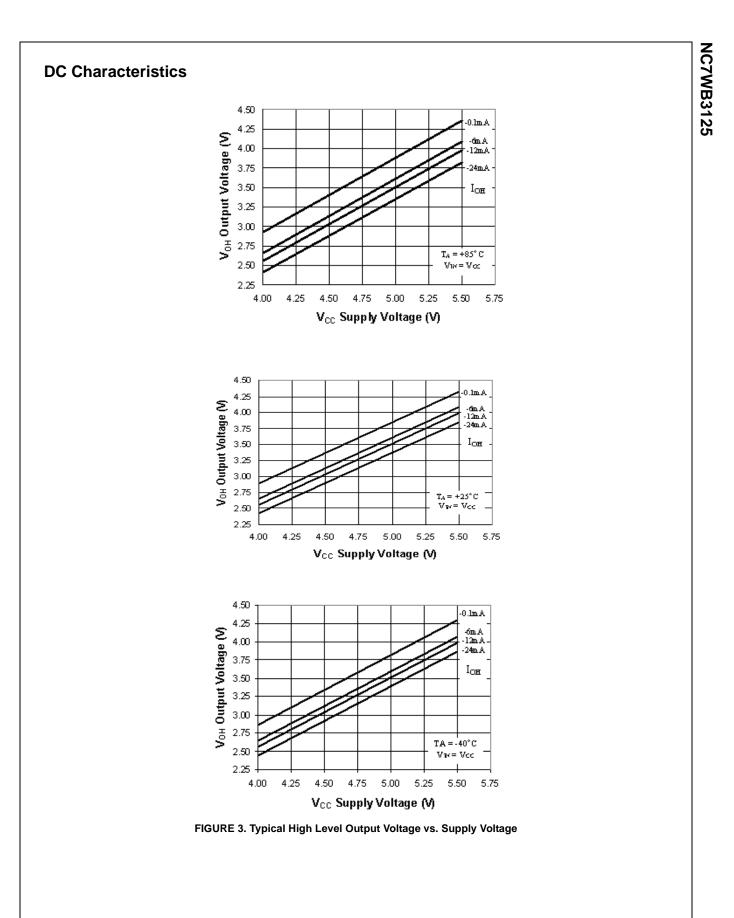
Input PRR = 1.0 MHz;  $t_W$  = 500 ns









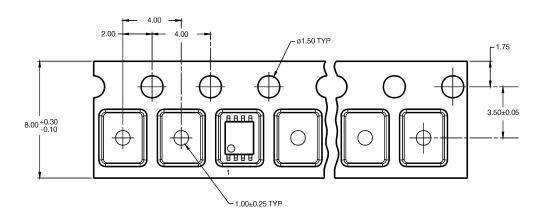


# Tape and Reel Specification

#### TAPE FORMAT for US8

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
	Leader (Start End)	125 (typ)	Empty	Sealed
K8X	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

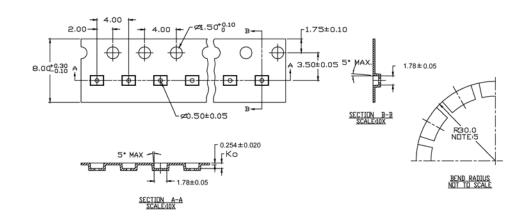
#### TAPE DIMENSIONS inches (millimeters)



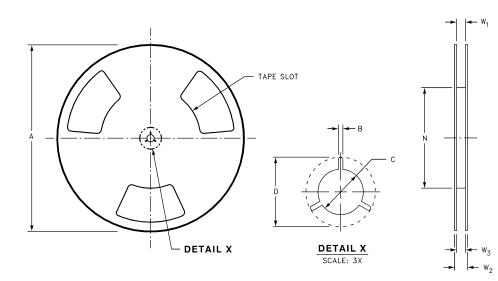
#### TAPE FORMAT for MicroPak

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
	Leader (Start End)	125 (typ)	Empty	Sealed
L8X	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)

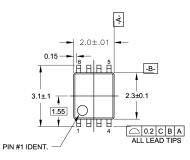


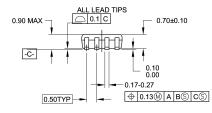
#### REEL DIMENSIONS inches (millimeters)

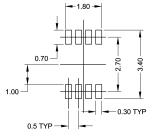


Tape Size	Α	В	С	D	Ν	W1	W2	W3
9 mm	7.0	0.059	0.512	0.795	2.165	0.331 + 0.059/-0.000	0.567	W1 + 0.078/-0.039
8 mm	(177.8)	(1.50)	(13.00)	(20.20)	(55.00)	(8.40 + 1.50/-0.00)	(14.40)	(W1 + 2.00/-1.00)

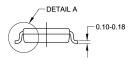
#### Physical Dimensions inches (millimeters) unless otherwise noted

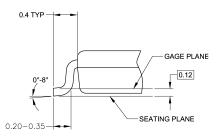






LAND PATTERN RECOMMENDATION





DETAIL A

#### NOTES:

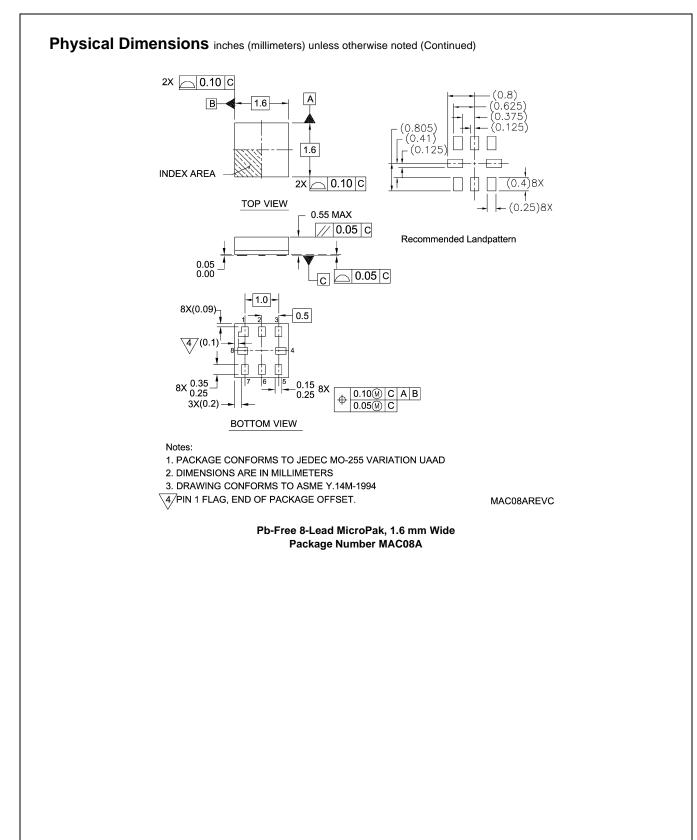
A. CONFORMS TO JEDEC REGISTRATION MO-187 B. DIMENSIONS ARE IN MILLIMETERS.

B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MAB08AREVC

#### 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide Package Number MAB08A



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