TinyLogic UHS Triple Buffer with Schmitt Trigger Inputs

NC7NZ17

Description

The NC7NZ17 is a triple buffer with Schmitt trigger inputs from **onsemi**'s Ultra High Speed Series of TinyLogic in the US8 package. The device is fabricated with advanced CMOS technology to achieve ultra high speed with high output drive while maintaining low static power dissipation over a very broad V_{CC} operating range. The device is specified to operate over the 1.65 V to 5.5 V V_{CC} range. The inputs and outputs are high impedance when V_{CC} is 0 V. Inputs tolerate voltages up to 5.5 V independent of V_{CC} operating voltage. Schmitt trigger inputs typically achieve 1 V hysteresis between the positive going and negative going input threshold voltage at 5 V V_{CC}.

Features

- Space Saving US8 Surface Mount Package
- MicroPak™ Pb−Free Leadless Package
- Ultra High Speed: t_{PD} 3.6 ns Typ into 50 pF at 5 V V_{CC}
- High Output Drive: ±24 mA at 3 V V_{CC}
- Broad V_{CC} Operating Range: 1.65 V to 5.5 V
- Power Down High Impedance Inputs / Outputs
- Overvoltage Tolerant Inputs Facilitate 5 V to 3 V Translation
- Proprietary Noise / EMI Reduction Circuitry Implemented
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

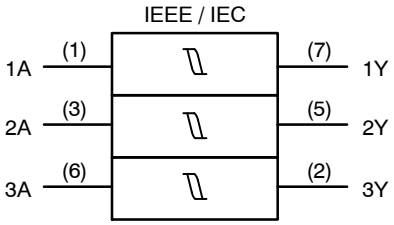
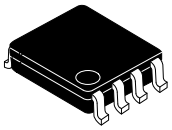


Figure 1. Logic Symbol

MARKING DIAGRAMS

UQFN8
1.6X1.6, 0.5P
CASE 523AY



US8
CASE 846AN

U4, NZ17	= Specific Device Code
KK	= 2−Digit Lot Run Traceability Code
XY	= 2−Digit Date Code Format
Z	= Assembly Plant Code
A	= Assembly Site
L	= Wafer Lot Number
YW	= Assembly Start Week

ORDERING INFORMATION

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

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

Connection Diagrams

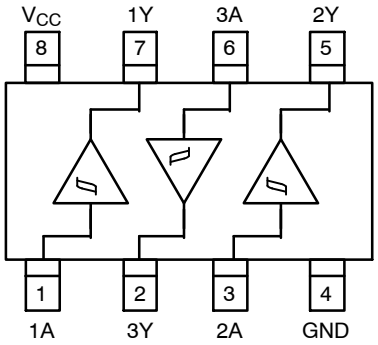


Figure 2. Connection Diagram (Top View)

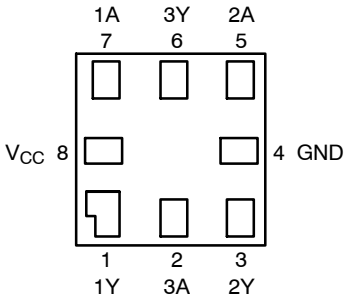
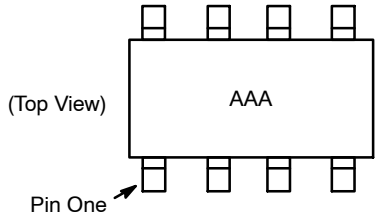


Figure 4. Pad Assignments for MicroPak (Top Thru View)



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).

Figure 3. Pin One Orientation Diagram

PIN DESCRIPTIONS

Name	Description
A_1, A_2, A_3	Data Inputs
Y_1, Y_2, Y_3	Output

FUNCTION TABLE (Y = A)

Input	Output
A	**Y**
L	L
H	H

H = HIGH Logic Level
L = LOW Logic Level

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		−0.5	6.5	V
V_{IN}	DC Input Voltage		−0.5	6.5	V
V_{OUT}	DC Output Voltage		−0.5	6.5	V
I_{IK}	DC Input Diode Current	V_{IN} < 0 V	−	−50	mA
I_{OK}	DC Output Diode Current	V_{OUT} < 0 V	−	−50	mA
I_{OUT}	DC Output Current		−	±50	mA
I_{CC} / I_{GND}	DC V_{CC} / GND Current		−	±100	mA
T_{STG}	Storage Temperature		−65	+150	°C
T_J	Junction Temperature under Bias		−	+150	°C
T_L	Junction Lead Temperature (Soldering, 10 Seconds)		−	+260	°C
P_D	Power Dissipation in Still Air US8 MicroPak−8		− −	500 539	mW

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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage Operating	1.65	5.5	V
	Supply Voltage Data Retention	1.5	5.5	
V_{IN}	Input Voltage	0	5.5	V
V_{OUT}	Output Voltage	0	V_{CC}	V
T_A	Operating Temperature	−40	+85	°C
θ_{JA}	Thermal Resistance US8 MicroPak−8	− −	250 232	°C/W

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.

1. Unused inputs must be held HIGH or LOW. They may not float.

DC ELECTICAL CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	Conditions		T_A = +25°C			T_A = −40 to +85°C		Unit
					Min	Typ	Max	Min	Max	
V_P	Positive Threshold Voltage	1.65			–	1.07	1.5	–	1.5	V
		2.3			–	1.38	1.8	–	1.8	
		3.0			–	1.74	2.2	–	2.2	
		4.5			–	2.43	3.1	–	3.1	
		5.5			–	2.88	3.6	–	3.6	
V_N	Negative Threshold Voltage	1.65			0.25	0.56	–	0.25	–	V
		2.3			0.40	0.75	–	0.40	–	
		3.0			0.6	0.98	–	0.6	–	
		4.5			1.0	1.42	–	1.0	–	
		5.5			1.2	1.68	–	1.2	–	
V_H	Hysteresis Voltage	1.65			0.15	0.51	1.0	0.15	1.0	V
		2.3			0.25	0.62	1.1	0.25	1.1	
		3.0			0.4	0.76	1.2	0.4	1.2	
		4.5			0.6	1.01	1.5	0.6	1.5	
		5.5			0.7	1.20	1.7	0.7	1.7	
V_{OH}	HIGH Level Output Voltage	1.65	$V_{IN} = V_{IH}$	I_{OH} = −100 μA	1.55	1.65	–	1.55	–	V
		2.3			2.2	2.3	–	2.2	–	
		3.0			2.9	3.0	–	2.9	–	
		4.5			4.4	4.5	–	4.4	–	
		1.65		I_{OH} = −4 mA	1.29	1.52	–	1.29	–	
		2.3		I_{OH} = −8 mA	1.9	2.14	–	1.9	–	
		3.0		I_{OH} = −16 mA	2.4	2.75	–	2.4	–	
		3.0		I_{OH} = −24 mA	2.3	2.62	–	2.3	–	
		4.5		I_{OH} = −32 mA	3.8	4.13	–	3.8	–	
V_{OL}	LOW Level Output Voltage	1.65	$V_{IN} = V_{IL}$	I_{OL} = 100 μA	–	0.0	0.1	–	0.1	V
		2.3			–	0.0	0.1	–	0.1	
		3.0			–	0.0	0.1	–	0.1	
		4.5			–	0.0	0.1	–	0.1	
		1.65		I_{OL} = 4 mA	–	0.08	0.24	–	0.24	
		2.3		I_{OL} = 8 mA	–	0.10	0.3	–	0.3	
		3.0		I_{OL} = 16 mA	–	0.16	0.4	–	0.4	
		3.0		I_{OL} = 24 mA	–	0.24	0.55	–	0.55	
		4.5		I_{OL} = 32 mA	–	0.25	0.55	–	0.55	
I_{IN}	Input Leakage Current	1.65 to 5.5		V_{IN} = 5.5 V, GND	–	–	±0.1	–	±1.0	μA
I_{OFF}	Power Off Leakage Current	0.0		V_{IN} or V_{OUT} = 5.5 V	–	–	1	–	10	μA
I_{CC}	Quiescent Supply Current	1.65 to 5.5		V_{IN} = 5.5 V, GND	–	–	1.0	–	10	μA

AC ELECTRICAL CHARACTERISTICS

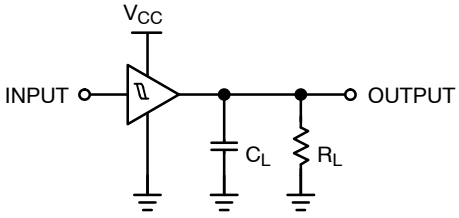
Symbol	Parameter	V_{CC} (V)	Conditions	T_A = +25°C			T_A = −40 to +85°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay (Figure 5, 7)	1.8 ±0.15	C_L = 15 pF, R_L = 1 MΩ,	–	6.9	11.9	–	13.1	ns
		2.5 ±0.2		–	4.8	8.2	–	9.0	
		3.3 ±0.3		–	3.7	5.6	–	6.2	
		5.0 ±0.5		–	3.0	4.7	–	5.2	
		3.3 ±0.3	C_L = 50 pF, R_L = 500 Ω,	–	4.3	6.6	–	7.3	
		5.0 ±0.5		–	3.6	5.6	–	6.2	
C_{IN}	Input Capacitance	0		–	2.5	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Figure 6)	3.3	(Note 2)	–	9	–	–	–	pF
		5.0		–	11	–	–	–	

2. 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. (See Figure 6). C_{PD} is related to I_{CCD} dynamic operating current by the expression: I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CC}static).

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V_{CC} (V)	T_A = +25°C	Unit
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	C_L = 50 pF, V_{IH} = 5.0 V, V_{IL} = 0 V	5.0	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	C_L = 50 pF, V_{IH} = 5.0 V, V_{IL} = 0 V	5.0	−0.8	V

AC Loading and Waveforms



C_L includes load and stray capacitance
Input PRR = 1.0 MHz, t_W = 500 ns.

Figure 5. AC Test Circuit

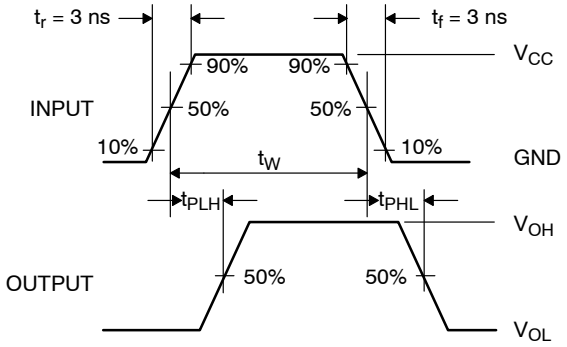
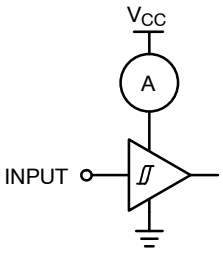


Figure 7. AC Waveforms



Input = AC Waveform; t_r = t_f = 1.8 ns;
PRR = variable; Duty Cycle = 50%.

Figure 6. I_{CCD} Test Circuit

ORDERING INFORMATION

Part Number	Top Mark	Package	Shipping†
NC7NZ17K8X	NZ17	8−Lead US8, JEDEC MO−187, Variation CA 3.1 mm Wide	3000 / Tape & Reel
NC7NZ17L8X	U4	8−Lead MicroPak, 1.6 mm Wide (Pb−Free)	5000 / Tape & Reel

DISCONTINUED (Note 4)

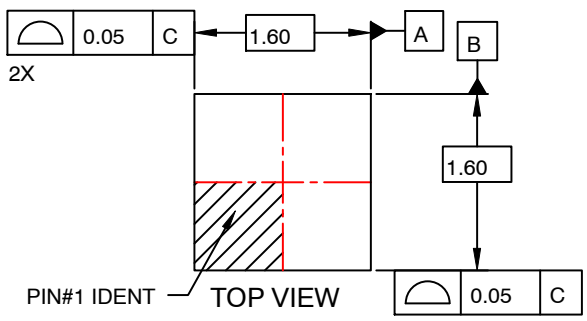
NC7NZ17L8X−L22185	U4	8−Lead MicroPak, 1.6 mm Wide (Pb−Free)	5000 / Tape & Reel

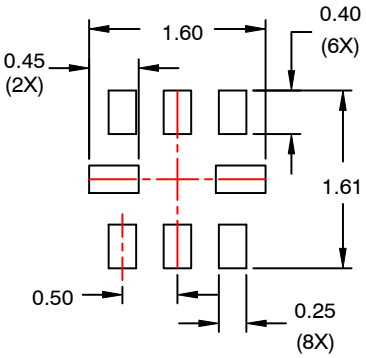
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

3. Pb−Free package per JEDEC J−STD−020B.
4. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

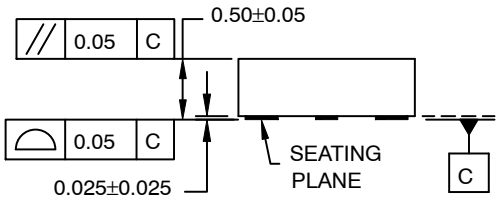
UQFN8 1.6X1.6, 0.5P
CASE 523AY
ISSUE O

DATE 31 AUG 2016





RECOMMENDED
LAND PATTERN



SIDE VIEW

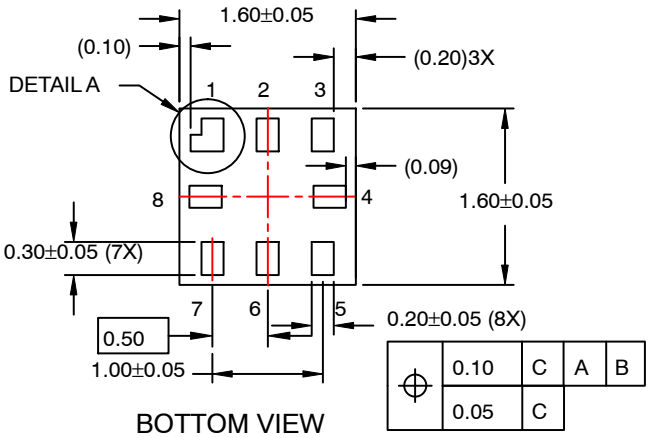
NOTES:

A. PACKAGE CONFORMS TO JEDEC MO−255 VARIATION UAAD.

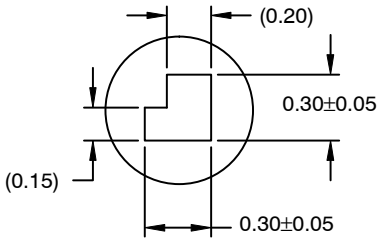
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.



BOTTOM VIEW



DETAIL A
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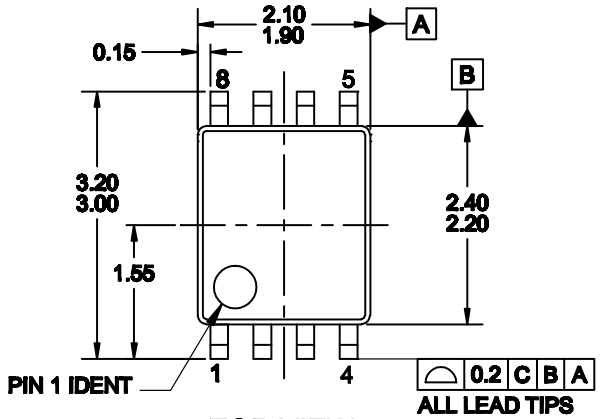
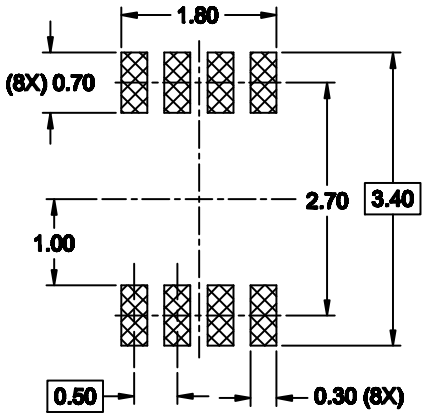
DESCRIPTION:	**UQFN8 1.6X1.6, 0.5P**	**PAGE 1 OF 1**

US8
CASE 846AN
ISSUE O

DATE 31 DEC 2016



TOP VIEW



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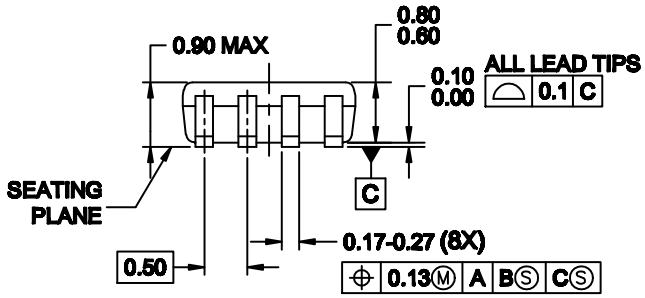


SIDE VIEW

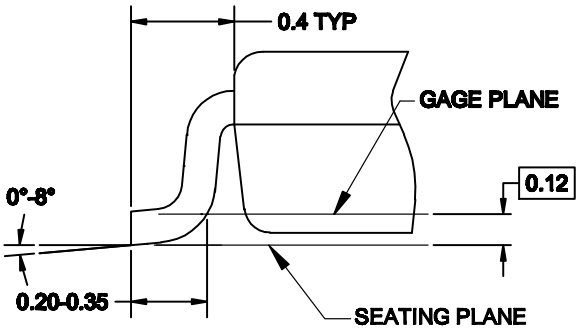
NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-187

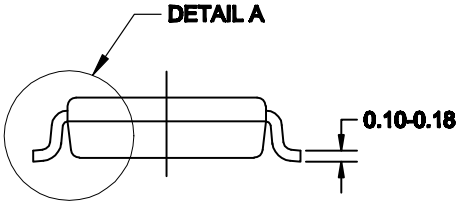
B. DIMENSIONS ARE IN MILLIMETERS.

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

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1994.



DETAIL A



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DESCRIPTION:	US8		PAGE 1 OF 1

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