

TinyLogic UHS Triple Buffer with Schmitt Trigger Inputs

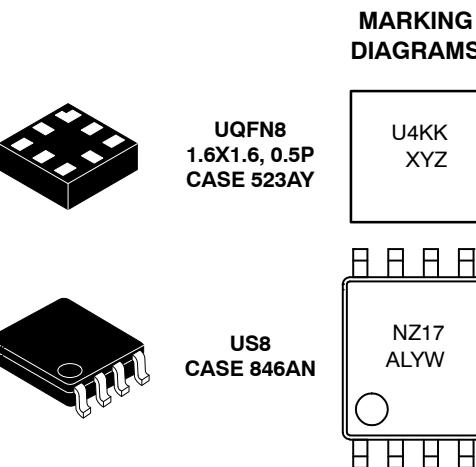
NC7NZ17

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



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.

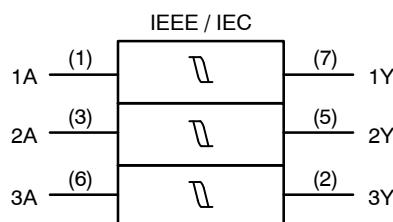


Figure 1. Logic Symbol

Connection Diagrams

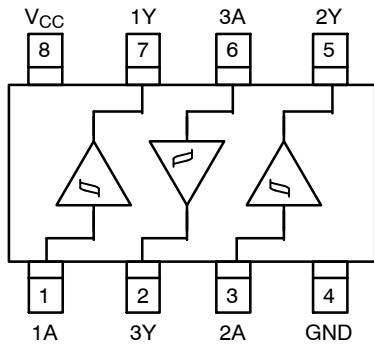


Figure 2. Connection Diagram (Top View)

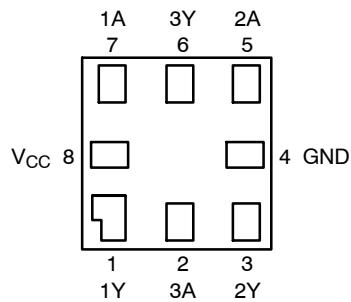
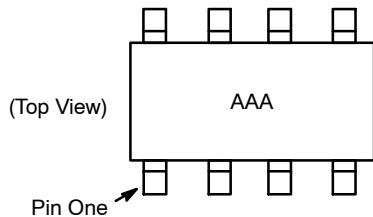


Figure 4. Pad Assignments for MicroPak (Top Thru View)



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 ELECTRICAL 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		I _{OH} = -100 µA	2.2	2.3	–	2.2		
		3.0		I _{OH} = -100 µA	2.9	3.0	–	2.9		
		4.5		I _{OH} = -100 µA	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		
		1.65		I _{OH} = -32 mA	–	0.0	0.1	–	0.1	
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		I _{OL} = 100 µA	–	0.0	0.1	–	0.1	
		3.0		I _{OL} = 100 µA	–	0.0	0.1	–	0.1	
		4.5		I _{OL} = 100 µA	–	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	
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
		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	–	–	–
C _{PD}	Power Dissipation Capacitance (Figure 6)	3.3	(Note 2)	–	9	–	–	–
		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_{CCDstatic}).

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = +25°C		Unit
				Typical	Unit	
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

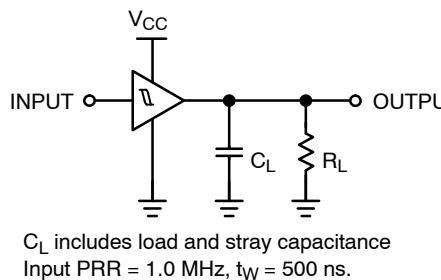


Figure 5. AC Test Circuit

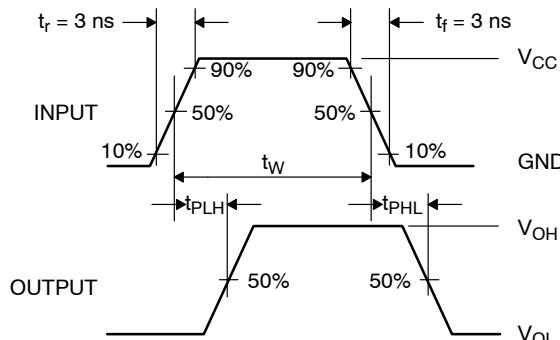
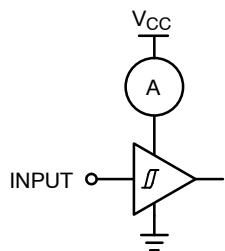


Figure 7. AC Waveforms



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

Figure 6. I_{CCD} Test Circuit

NC7NZ17

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

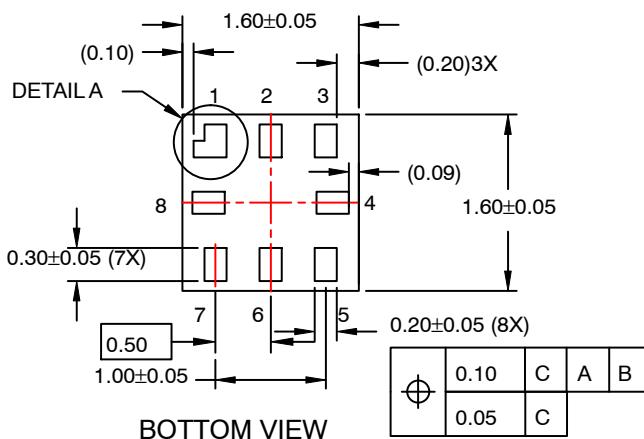
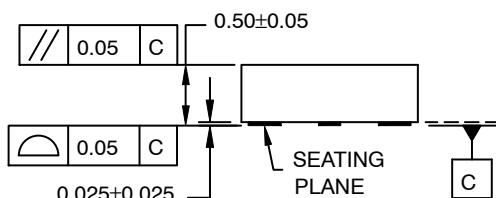
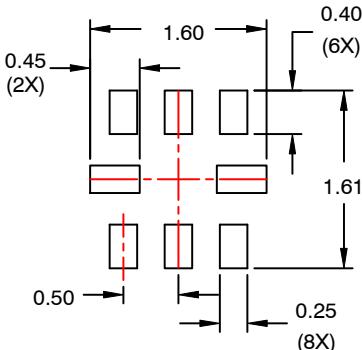
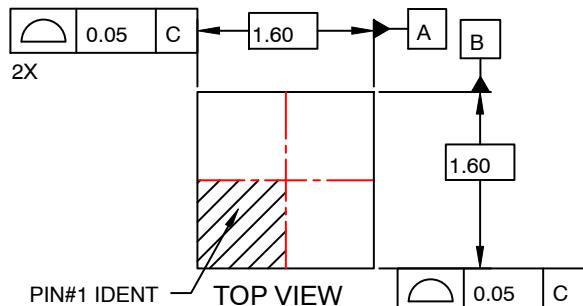
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

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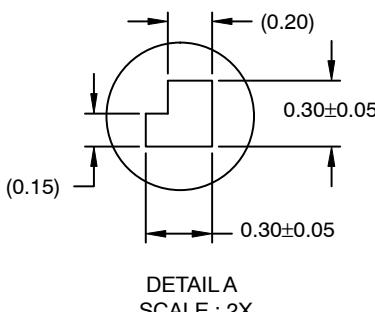
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ISSUE O

DATE 31 AUG 2016



NOTES:

- A. PACKAGE CONFORMS TO JEDEC MO-255 VARIATION UAAD.
- B. DIMENSIONS ARE IN MILLIMETERS.
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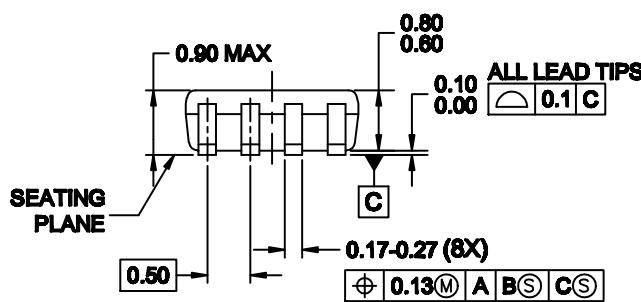
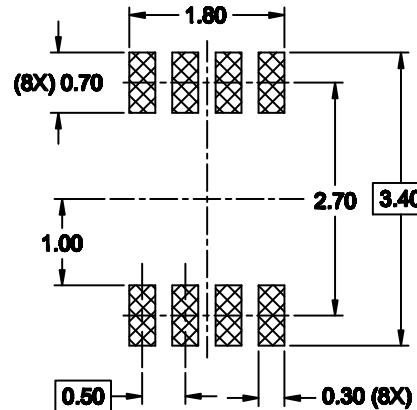
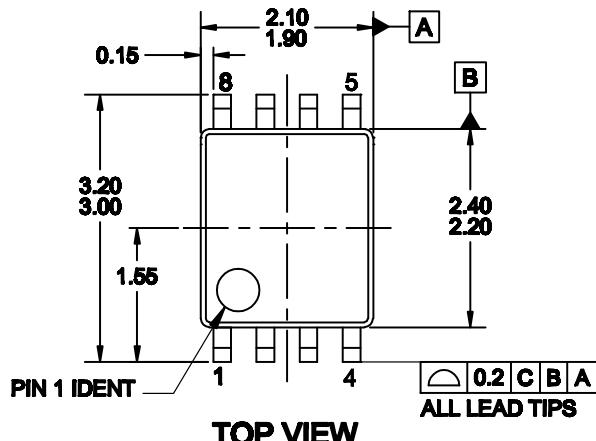
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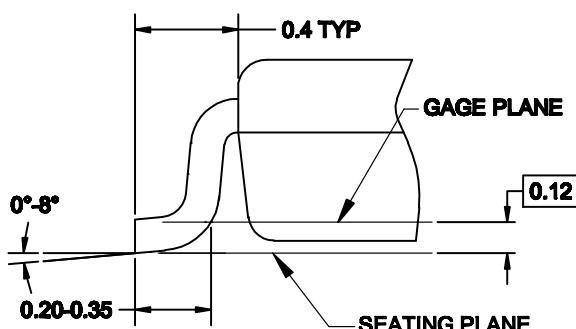


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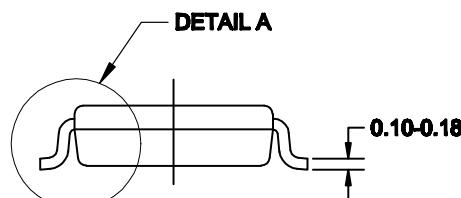
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SIDE VIEW



DETAIL A



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