

TinyLogic UHS Dual Buffer

NC7WZ16

Description

The NC7WZ16 is a dual buffer from ON Semiconductor's Ultra-High Speed Series of TinyLogic. 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.

Features

- Ultra-High Speed: $t_{PD} = 2.4$ ns (Typical) 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
- Matches Performance of LCX when Operated at 3.3 V V_{CC}
- Power Down High-Impedance Inputs / Outputs
- Over-Voltage Tolerance Inputs Facilitate 5 V to 3 V Translation
- Proprietary Noise / EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages
- Space-Saving SC-88 Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

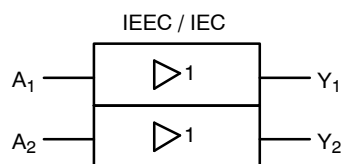


Figure 1. Logic Symbol



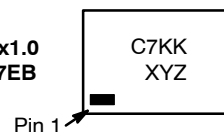
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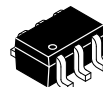
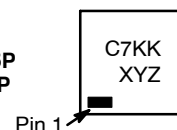
MARKING DIAGRAMS



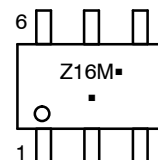
**SIP6 1.45x1.0
CASE 127EB**



**UDFN6
1.0x1.0, 0.35P
CASE 517DP**



**SC-88
CASE 419B-02**



C7, Z16 = Specific Device Code
KK = 2-Digit Lot Run Traceability Code
XY = 2-Digit Date Code Format
Z = Assembly Plant Code
M = Assembly Operation Month
▪ = Pb-Free Package

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

Pin Configurations

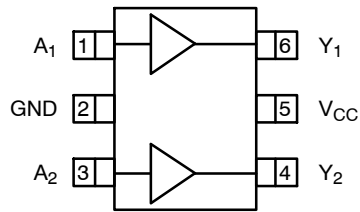


Figure 2. SC-88 (Top View)

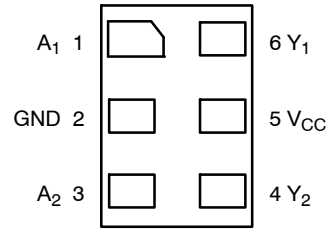
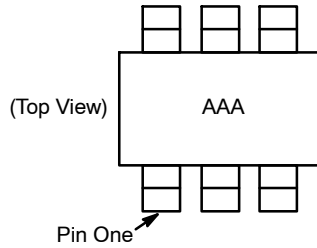


Figure 3. MicroPak (Top Through View)



NOTES:

1. AAA represents product code top mark (see ordering table).
2. Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin.

Figure 4. Pin 1 Orientation

PIN DEFINITIONS

Pin # SC-88	Pin # MicroPak	Name	Description
1	1	A ₁	Input
2	2	GND	Ground
3	3	A ₂	Input
4	4	Y ₂	Output
5	5	V _{CC}	Supply Voltage
6	6	Y ₁	Output

FUNCTION TABLE (Y = A)

Inputs	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 Source / Sink Current		-	±50	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current		-	±50	mA
T _{STG}	Storage Temperature Range		-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	SC-88	-	332	mW
		MicroPak-6	-	812	
		MicroPak2™-6	-	812	
ESD	Human Body Model, JEDEC: JESD22-A114		-	4000	V
	Charge Device Model, JEDEC: JESD22-C101		-	2000	

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	Conditions	Min	Max	Unit
V _{CC}	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.50	5.50	
V _{IN}	Input Voltage		0	5.5	V
V _{OUT}	Output Voltage		0	V _{CC}	V
t _r , t _f	Input Rise and Fall Times	V _{CC} = 1.8 V, 2.5 V ±0.2 V	0	20	ns/V
		V _{CC} = 3.3 V ±0.3 V	0	10	
		V _{CC} = 5.5 V ±0.5 V	0	5	
T _A	Operating Temperature		-40	+125	°C
θ _{JA}	Thermal Resistance	SC-88	-	377	°C/W
		MicroPak	-	154	
		MicroPak2	-	154	°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.

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

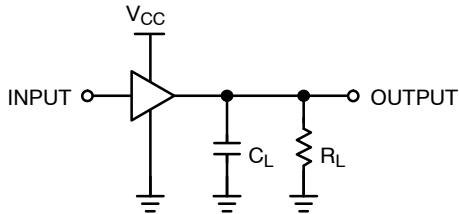
DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	Conditions		T _A = 25°C			T _A = -40 to 85°C		Unit
					Min	Typ	Max	Min	Max	
V _{IH}	HIGH Level Control 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 Control 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	1.65	V _{IN} = V _{IH} or V _{IL}	I _{OH} = –100 µA	1.55	1.65	–	1.55	–	V
		1.80			1.70	1.80	–	1.70	–	
		2.30			2.20	2.30	–	2.20	–	
		3.00			2.90	3.00	–	2.90	–	
		4.50			4.40	4.50	–	4.40	–	
		1.65			1.29	1.52	–	1.21	–	
		2.30			1.90	2.14	–	1.90	–	
		3.00			2.40	2.75	–	2.40	–	
		3.00			2.30	2.62	–	2.30	–	
		4.50			3.80	4.13	–	3.80	–	
				I _{OH} = –4 mA						
				I _{OH} = –8 mA						
				I _{OH} = –16 mA						
				I _{OH} = –24 mA						
				I _{OH} = –32 mA						
V _{OL}	LOW Level Output Voltage	1.65	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 µA	–	0.00	0.10	–	0.10	V
		1.80			–	0.00	0.10	–	0.10	
		2.30			–	0.00	0.10	–	0.10	
		3.00			–	0.00	0.10	–	0.10	
		4.50			–	0.00	0.10	–	0.10	
		1.65			–	0.08	0.24	–	0.24	
		2.30			–	0.10	0.30	–	0.30	
		3.00			–	0.16	0.40	–	0.40	
		3.00			–	0.24	0.55	–	0.55	
		4.50			–	0.25	0.55	–	0.55	
				I _{OL} = 4 mA						
				I _{OL} = 8 mA						
				I _{OL} = 16 mA						
				I _{OL} = 24 mA						
				I _{OL} = 32 mA						
I _{IN}	Input Leakage Current	1.65 to 5.5		0 ≥ V _{IN} ≥ 5.5 V	–	–	±0.1	–	±1.0	µA
I _{OFF}	Power Off Leakage Current	0		V _{IN} or V _{OUT} = 5.5 V	–	–	1.0	–	10	µA
I _{CC}	Quiescent Supply Current	1.65 to 5.50		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, 6)	1.65	C _L = 15 pF, R _L = 1 MΩ	–	5.5	9.6	–	10.6	ns
		1.80		–	4.6	8.0	–	8.8	
		2.50 ±0.20		–	3.0	5.2	–	5.8	
		3.30 ±0.30		–	2.3	3.6	–	4.0	
		5.00 ±0.50		–	1.8	2.9	–	3.2	
		3.30 ±0.30	C _L = 50 pF, R _L = 500 Ω	–	3.0	4.6	–	5.1	
		5.00 ±0.50		–	2.4	3.8	–	4.2	
C _{IN}	Input Capacitance	0		–	2.5	–	–	–	pF
C _{PD}	Power Dissipation Capacitance (Note 4) (Figure 7)	3.30		–	10	–	–	–	pF
		5.00		–	12	–	–	–	

4. 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:
 $I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CCstatic})$.



NOTE:

5. C_L includes load and stray capacitance;
 inputs PRR = 1.0 MHz, t_W = 500 ns.

Figure 5. AC Test Circuit

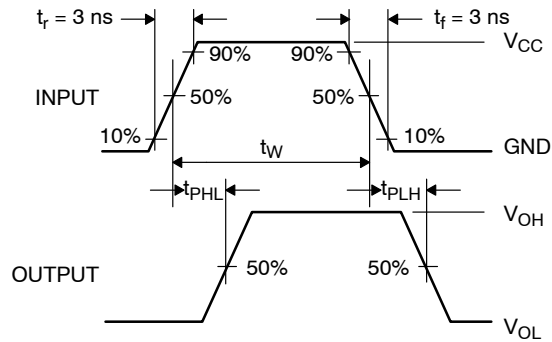
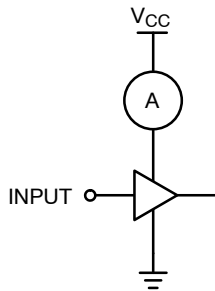


Figure 6. AC Waveforms



NOTE:

6. Input = AC Waveform; t_r = t_f = 1.8 ns;
 PRR = 10 MHz; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

NC7WZ16

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping [†]
NC7WZ16P6X	Z16	6-Lead SC70, EIAJ SC-88, 1.25 mm Wide	3000 / Tape & Reel
NC7WZ16L6X	C7	6-Lead MicroPak, 1.00 mm Wide	5000 / Tape & Reel
NC7WZ16FHX	C7	6-Lead, MicroPak2, 1x1 mm Body, .35 mm Pitch	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.

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SIP6 1.45X1.0
CASE 127EB
ISSUE O


DATE 31 AUG 2016



NOTES:

1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-2009
4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

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ON




SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE Y

DATE 11 DEC 2012

STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13: PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 14: PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	STYLE 15: PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	STYLE 16: PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	STYLE 17: PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	STYLE 18: PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
STYLE 19: PIN 1. IOUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	STYLE 20: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	STYLE 21: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	STYLE 22: PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	STYLE 23: PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	STYLE 24: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 25: PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	STYLE 26: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 27: PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	STYLE 28: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	STYLE 29: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	STYLE 30: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

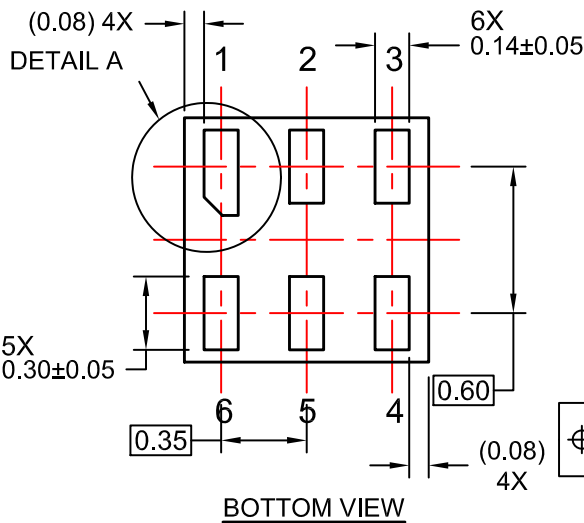
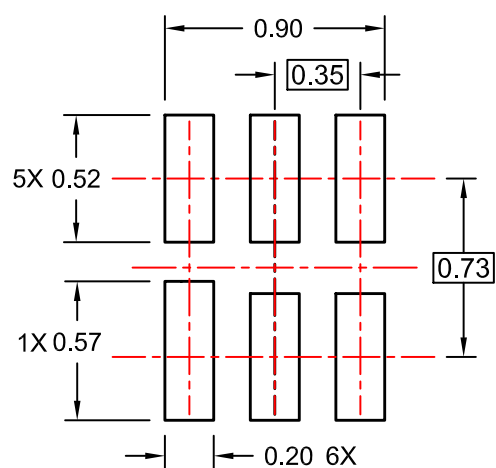
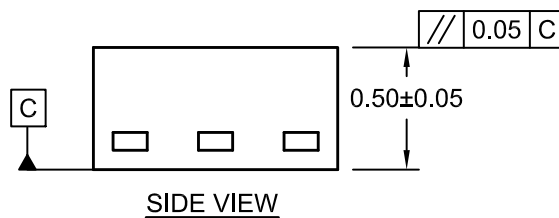
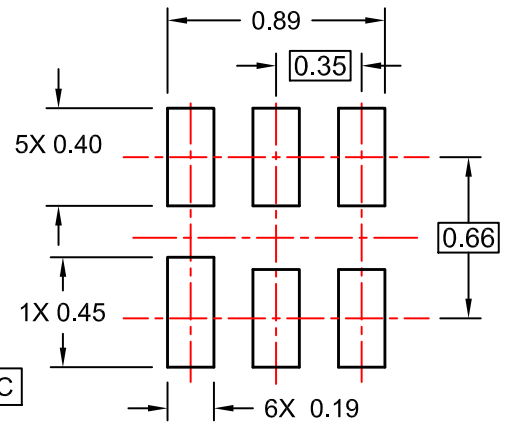
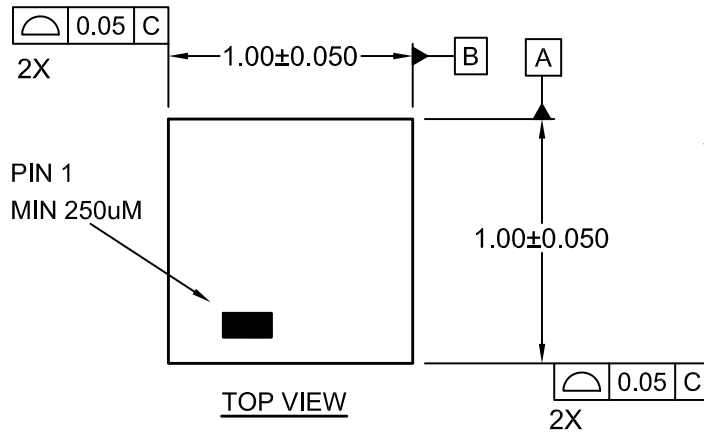
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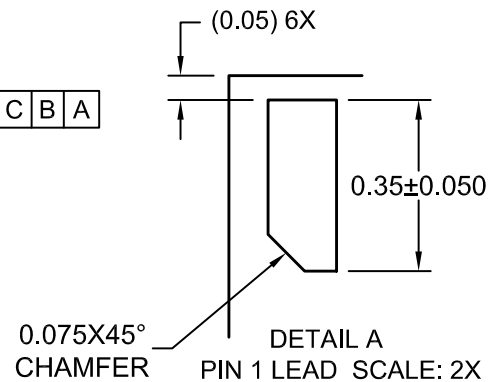
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CASE 517DP
ISSUE O

DATE 31 AUG 2016




ALTERNATIVE LAND PATTERN FOR UNIVERSAL APPLICATION



NOTES:

- A. COMPLIES TO JEDEC MO-252 STANDARD
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009

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