

# NC7WZ07

## TinyLogic UHS Dual Buffer (Open-Drain Outputs)

### Description

The NC7WZ07 is a dual buffer with open-drain outputs from ON Semiconductor's Ultra-High Speed (UHS) 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 broad  $V_{CC}$  operating range. The device is specified to operate 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:  $t_{PZL}$  2.3 ns (Typical)
- High  $I_{OL}$  Output Drive:  $\pm 24$  mA at 3 V  $V_{CC}$
- Broad  $V_{CC}$  Operating Range: 1.65 V to 5.50 V
- 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
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

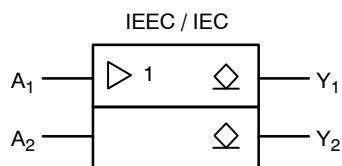


Figure 1. Logic Symbol



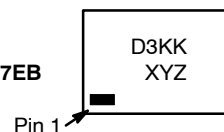
ON Semiconductor®

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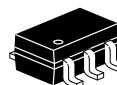
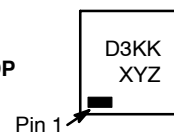
### MARKING DIAGRAMS



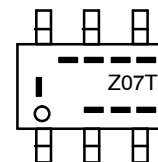
SIP6  
CASE 127EB



UDFN6  
CASE 517DP



SC-88  
CASE 419AD-01



D3, Z07 = Specific Device Code  
 KK = 2-Digit Lot Run Traceability Code  
 XY = 2-Digit Date Code Format  
 Z = Assembly Plant Code  
 - - - - = Year Coding Scheme  
 | - - = Plant Code Identifier  
 T = Die Run Code  
 - - - = Eight-Week Datacoding Scheme

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

# NC7WZ07

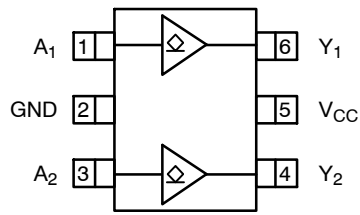


Figure 2. SC-88 (Top View)

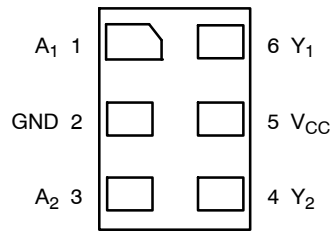
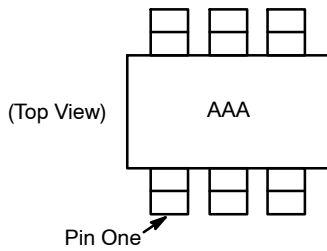


Figure 3. MicroPak (Top Through View)



NOTES:

1. AAA represents product code top mark (see *Ordering Information*).
2. Orientation of top mark determines pin one location.
3. Read the top 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 <sub>1</sub>	Input
2	2	GND	Ground
3	3	A <sub>2</sub>	Input
4	4	Y <sub>2</sub>	Output
5	5	V <sub>CC</sub>	Supply Voltage
6	6	Y <sub>1</sub>	Output

**FUNCTION TABLE (Y = A)**

Inputs	Output
A	Y
LOW Logic Level	LOW Logic Level
HIGH Logic Level	HIGH Impedance Output State, Open Drain

# NC7WZ07

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
V <sub>CC</sub>	Supply Voltage		-0.5	6.5	V
V <sub>IN</sub>	DC Input Voltage		-0.5	6.5	V
V <sub>OUT</sub>	DC Output Voltage		-0.5	6.5	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < -0.5 V	-	-50	mA
I <sub>OK</sub>	DC Output Diode Current	V <sub>OUT</sub> < -0.5 V	-	-50	mA
I <sub>OUT</sub>	DC Output Current		-	±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current		-	±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65	+150	°C
T <sub>J</sub>	Junction Temperature Under Bias		-	+150	°C
T <sub>L</sub>	Junction Lead Temperature (Soldering, 10 Seconds)		-	+260	°C
P <sub>D</sub>	Power Dissipation in Still Air	SC-88-6	-	190	mW
		MicroPak-6	-	327	
		MicroPak2™-6	-	327	
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 <sub>CC</sub>	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.5	5.5	
V <sub>IN</sub>	Input Voltage		0	5.5	V
V <sub>OUT</sub>	Output Voltage		0	5.5	V
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Times	V <sub>CC</sub> at 1.8 V ±0.15 V, 2.5 V ±0.2 V	0	20	ns/V
		V <sub>CC</sub> at 3.3 V ±0.3 V	0	10	
		V <sub>CC</sub> at 5.0 V ±0.5 V	0	5	
T <sub>A</sub>	Operating Temperature		-40	+85	°C
θ <sub>JA</sub>	Thermal Resistance	SC-88-6	-	659	°C/W
		MicroPak-6	-	382	
		MicroPak2-6	-	382	

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.

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

# NC7WZ07

## DC ELECTRICAL CHARACTERISTICS

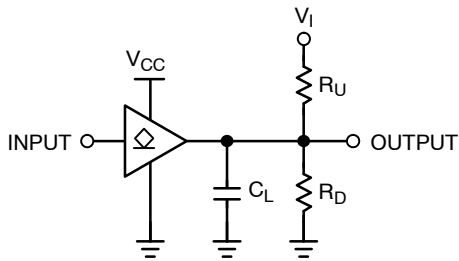
Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40 to +85°C		Unit	
				Min	Typ	Max	Min	Max		
V <sub>IH</sub>	HIGH Level Input Voltage	1.65 to 1.95		0.65 V <sub>CC</sub>	-	-	0.65 V <sub>CC</sub>	-	V	
		2.30 to 5.50		0.70 V <sub>CC</sub>	-	-	0.70 V <sub>CC</sub>	-		
V <sub>IL</sub>	LOW Level Input Voltage	1.65 to 1.95		-	-	0.35 V <sub>CC</sub>	-	0.35 V <sub>CC</sub>	V	
		2.30 to 5.50		-	-	0.30 V <sub>CC</sub>	-	0.30 V <sub>CC</sub>		
I <sub>LKG</sub>	HIGH Level Output Leakage Current	1.65 to 1.95	V <sub>IN</sub> = V <sub>IH</sub> , V <sub>OUT</sub> = V <sub>CC</sub> or GND	-	-	±5	-	±10	µA	
V <sub>OL</sub>	LOW Level Output Voltage	1.65	V <sub>IN</sub> = V <sub>IL</sub> , I <sub>OL</sub> = 100 µA	-	0.00	0.10	-	0.00	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	I <sub>OL</sub> = 4 mA	-	0.80	0.24	-	0.24		
		2.30		I <sub>OL</sub> = 8 mA	-	0.10	0.30	-		0.30
		3.00		I <sub>OL</sub> = 16 mA	-	0.16	0.40	-		0.40
		3.00		I <sub>OL</sub> = 24 mA	-	0.24	0.55	-		0.55
		4.50		I <sub>OL</sub> = 32 mA	-	0.25	0.55	-		0.55
I <sub>IN</sub>	Input Leakage Current	1.65 to 5.5	0 ≤ V <sub>IN</sub> ≤ 5.5 V	-	-	±0.1	-	±10	µA	
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V	-	-	1	-	10	µA	
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> = 5.5 V, GND	-	-	1	-	10	µA	

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40 to +85°C		Unit
				Min	Typ	Max	Min	Max	
t <sub>PZL</sub> , t <sub>PLZ</sub>	Propagation Delay (Figure 5, 6)	1.65	C <sub>L</sub> = 50 pF, R <sub>U</sub> = 500 Ω, R <sub>D</sub> = 500 Ω, V <sub>I</sub> = 2 × V <sub>CC</sub>	-	6.6	11.5	-	12.6	ns
		1.80		-	5.5	9.5	-	10.5	
		2.50 ±0.20		-	3.7	5.8	-	6.4	
		3.30 ±0.30		-	2.9	4.4	-	4.8	
		5.00 ±0.50		-	2.3	3.5	-	3.9	
		1.65	C <sub>L</sub> = 50 pF, R <sub>U</sub> = 500 Ω, R <sub>D</sub> = 500 Ω, V <sub>I</sub> = 2 × V <sub>CC</sub>	-	5.5	11.5	-	12.6	
		1.80		-	4.3	9.5	-	10.5	
		2.50 ±0.20		-	2.8	5.8	-	6.4	
		3.30 ±0.30		-	2.1	4.4	-	4.8	
		5.00 ±0.50		-	1.4	3.5	-	3.9	
C <sub>IN</sub>	Input Capacitance	0		-	2.5	-	-	-	pF
C <sub>OUT</sub>	Output Capacitance	0		-	4.0	-	-	-	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5) (Figure 7)	3.30		-	3	-	-	-	pF
		5.00		-	4	-	-	-	

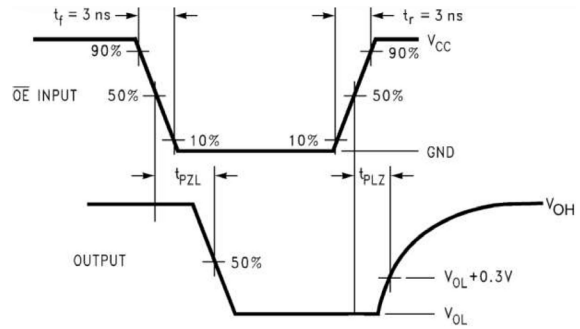
5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression:  
I<sub>CCD</sub> = (C<sub>PD</sub>) (V<sub>CC</sub>) (f<sub>IN</sub>) + (I<sub>CC</sub>static).

# NC7WZ07

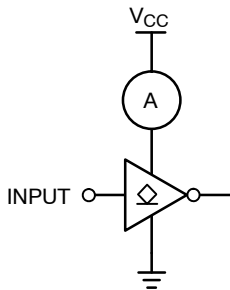


NOTE:  
 6.  $C_L$  includes load and stray capacitance.  
 7. Input PRR = 1.0 MHz,  $t_W$  = 500 ns.

**Figure 5. AC Test Circuit**



**Figure 6. AC Waveforms**



NOTE:  
 8. Input = AC Waveform;  $t_r = t_f = 1.8$  ns;  
 PRR = Variable; Duty Cycle = 50%.

**Figure 7.  $I_{CCD}$  Test Circuit**

## ORDERING INFORMATION

Part Number	Top Mark	Package	Shipping <sup>†</sup>
NC7WZ07P6X	Z07	SC-88	3000 / Tape & Reel
NC7WZ07L6X	D3	MicroPak	5000 / Tape & Reel
NC7WZ07FHX	D3	MicroPak2	5000 / Tape & Reel

<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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



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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# MECHANICAL CASE OUTLINE

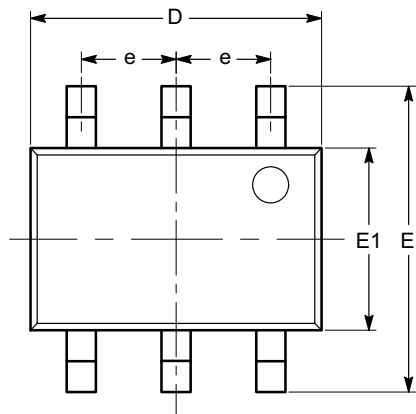
## PACKAGE DIMENSIONS

ON Semiconductor®



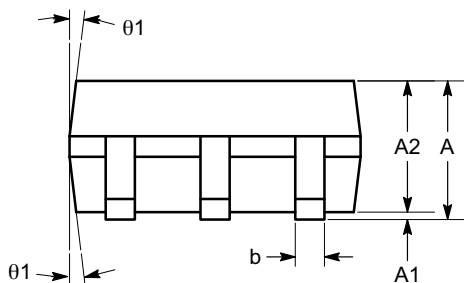
SC-88 (SC-70 6 Lead), 1.25x2  
CASE 419AD-01  
ISSUE A

DATE 07 JUL 2010

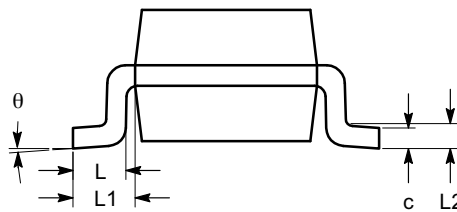


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80		1.00
b	0.15		0.30
c	0.10		0.18
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.26	0.36	0.46
L1	0.42 REF		
L2	0.15 BSC		
$\theta$	0°		8°
$\theta_1$	4°		10°



SIDE VIEW



END VIEW

**Notes:**

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-203.

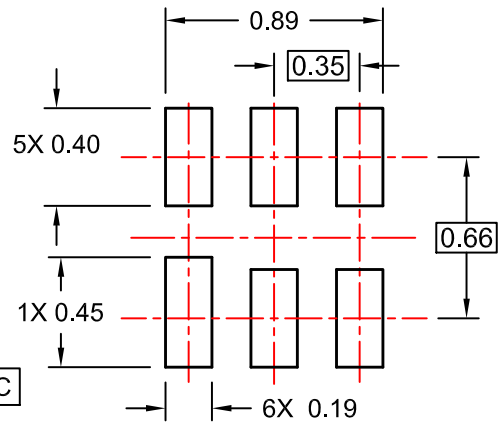
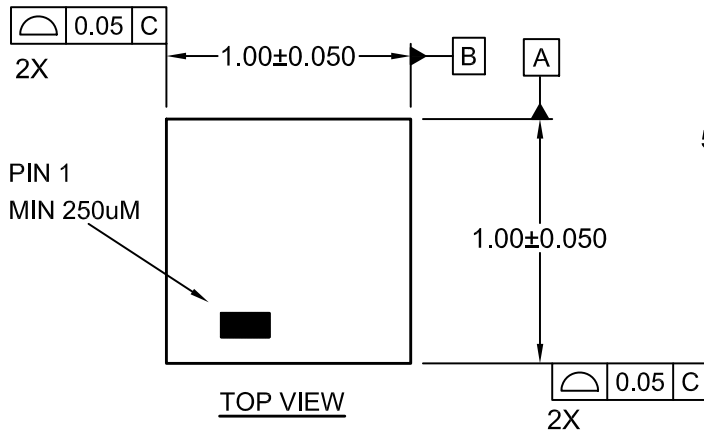
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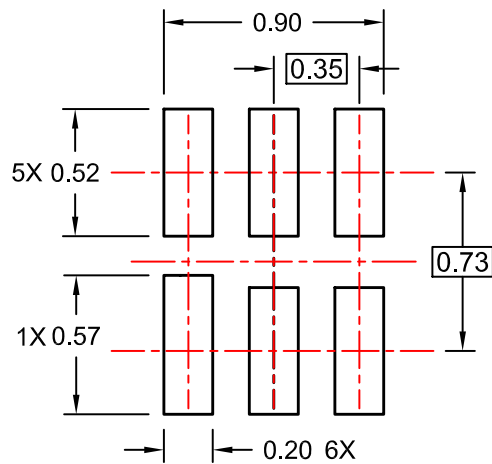
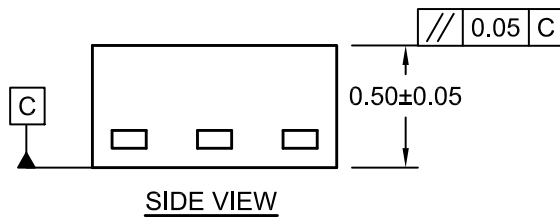


**UDFN6 1.0X1.0, 0.35P**  
CASE 517DP  
ISSUE O

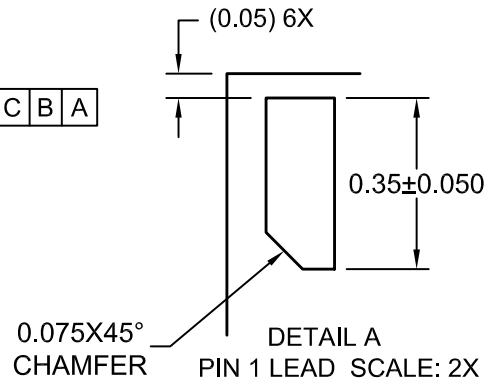
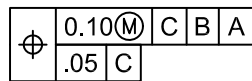
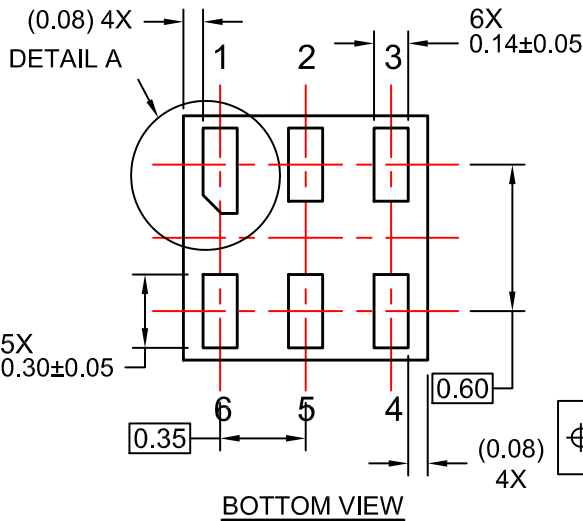
DATE 31 AUG 2016



**RECOMMENDED LAND PATTERN FOR SPACE CONSTRAINED PCB**



**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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