NC7WZ17

TinyLogic UHS Dual Buffer with Schmitt Trigger Inputs

Description

The NC7WZ17 is a dual buffer with Schmitt trigger inputs from ON Semiconductor's Ultra−High Speed (UHS) series of TinyLogic products. 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 achieve 1 V typical hysteresis between the positive− and negative−going input threshold voltage at 5 V.

Features

- Ultra−High Speed: t_{PD} 3.6 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 SC70 Package
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant
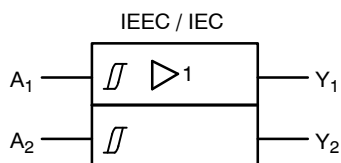
IEEC / IEC

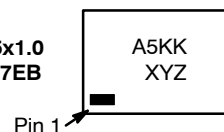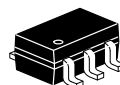**Figure 1. Logic Symbol**

ON Semiconductor®

MARKING DIAGRAMS

SIP6 1.45x1.0
CASE 127EB

```
A5KK
XYZ
```
Pin 1

UDFN6
1.0X1.0, 0.35P
CASE 517DP

```
A5KK
XYZ
```
Pin 1

SC−88
(SC−70 6 Lead)
1.25x2
CASE 419AD−01

```
Z17T
```
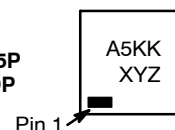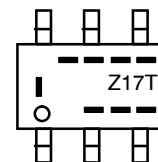
A5, Z17	= Specific Device Code
KK	= 2−Digit Lot Run Traceability Code
XY	= 2−Digit Date Code Format
Z	= Assembly Plant Code
▬ ▬ ▬ ▬	= Year Coding Scheme
▌•▬	= Plant Code Identifier
T	= Die Run Code
▬ ▬ ▬	= Eight−Week Datacoding Scheme

ORDERING INFORMATION
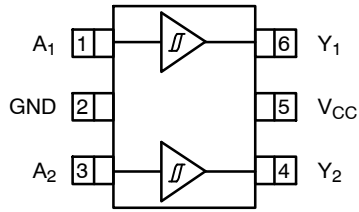
NC7WZ17

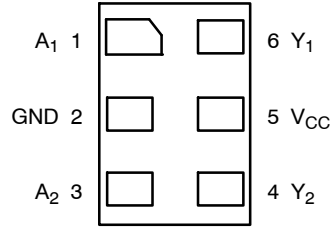**Pin Configurations**

Figure 2. SC70 (Top View)

Figure 3. MicroPak (Top Through View)

Pin One

NOTES:
1. AAA represents Product Code Top Mark *(see ordering code)*.
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. SC70 Pin 1 Orientation

PIN DEFINITIONS

Pin # SC70	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	$V_{IN} < −0.5$ V	–	−50	mA
I_{OK}	DC Output Diode Current	$V_{OUT} < 0.5$ V	–	−50	mA
I_{OUT}	DC Output Current		–	±50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current		–	±100	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	SC70−6	–	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_{CC}	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.50	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	SC70−6	–	659	°C/W
		MicroPak−6	–	382	
		MicroPak2−6	–	382	°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 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		–	1.00	1.40	–	1.40	V
		1.80		–	1.07	1.50	–	1.50	
		2.30		–	1.38	1.80	–	1.80	
		3.00		–	1.74	2.20	–	2.20	
		4.50		–	2.43	3.10	–	3.10	
		5.50		–	2.88	3.60	_	3.60	

DC ELECTICAL CHARACTERISTICS (continued)

Symbol	Parameter	V_{CC} (V)	Conditions	$T_A = 25°C$			$T_A = -40$ to $85°C$		Unit
				Min	Typ	Max	Min	Max	
V_N	Negative Threshold Voltage	1.65		0.20	0.50	–	0.20	–	V
		1.80		0.25	0.56	–	0.25	–	
		2.30		0.40	0.75	–	0.40	–	
		3.00		0.60	0.98	–	0.60	–	
		4.50		1.00	1.42	–	1.00	–	
		5.50		1.20	1.68	–	1.20	–	
V_H	Hysteresis Voltage	1.65		0.10	0.48	0.90	0.10	0.90	V
		1.80		0.15	0.51	1.00	0.15	1.00	
		2.30		0.25	0.62	1.10	0.25	1.10	
		3.00		0.40	0.76	1.20	0.40	1.20	
		4.50		0.60	1.01	1.50	0.60	1.50	
		5.50		0.70	1.20	1.70	0.70	1.70	
V_{OH}	HIGH Level Output Voltage	1.65	$V_{IN} = V_{IH}$, $I_{OH} = -100 \mu A$	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	$I_{OH} = -4$ mA	1.29	1.52	–	1.29	–	
		2.30	$I_{OH} = -8$ mA	1.90	2.14	–	1.90	–	
		3.00	$I_{OH} = -16$ mA	2.40	2.75	–	2.40	–	
		3.00	$I_{OH} = -24$ mA	2.30	2.62	–	2.30	–	
		4.50	$I_{OH} = -32$ mA	3.80	4.13	–	3.80	–	
V_{OL}	LOW Level Output Voltage	1.65	$V_{IN} = V_{IL}$, $I_{OL} = 100 \mu A$	–	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	$I_{OL} = 4$ mA	–	0.08	0.24	–	0.24	
		2.30	$I_{OL} = 8$ mA	–	0.10	0.30	–	0.30	
		3.00	$I_{OL} = 16$ mA	–	0.16	0.40	–	0.40	
		3.00	$I_{OL} = 24$ mA	–	0.24	0.55	–	0.55	
		4.50	$I_{OL} = 32$ mA	–	0.25	0.550	–	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	V_{IN} or $V_{OUT} = 5.5$ V	–	–	1	–	10	μA
I_{CC}	Quiescent Supply Current	1.65 to 5.50	$V_{IN} = 5.5$ V, GND	–	–	1	–	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	–	8.3	14.3	–	15.8	ns
		1.80		–	6.9	11.9	–	13.1	
		2.50 ±0.20		–	4.8	8.2	–	9.0	
		3.30 ±0.30		–	3.7	5.6	–	6.2	
		5.00 ±0.50		–	3.0	4.7	–	5.2	
		3.30 ±0.30	$C_L = 50$ pF, $R_L = 500$ Ω	–	4.3	6.6	–	7.3	
		5.00 ±0.50		–	3.6	5.6	–	6.2	
C_{IN}	Input Capacitance	0		–	2.5	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 4) (Figure 7)	3.30		–	10.0	–	–	–	pF
		5.00		–	12.0	–	–	–	

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: $I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CCstatic})$.
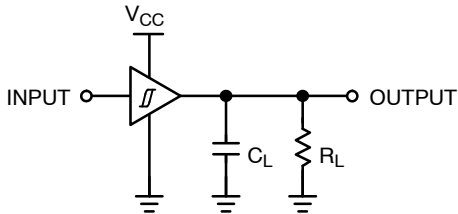
NOTE:
5. C_L includes load and stray capacitance; Input PRR = 1.0 MHz, t_W = 500 ns

Figure 5. AC Test Circuit
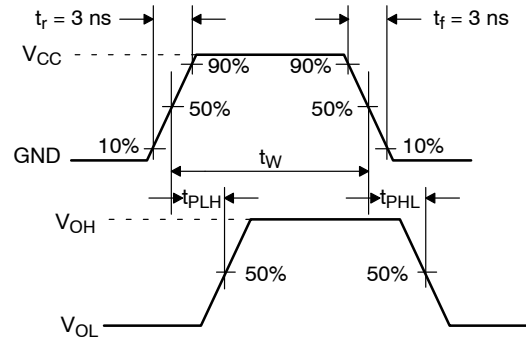
Figure 6. AC Waveforms
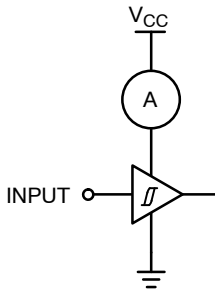
NOTE:
6. Input = AC Waveform; $t_r = t_f$ = 1.8 ns; PRR = 10 MHz; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

NC7WZ17

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping†
NC7WZ17P6X	Z17	6−Lead SC70, EIAJ SC−88a, 1.25 mm Wide	3000 / Tape & Reel
NC7WZ17L6X	A5	6−Lead MicroPak, 1.00 mm Wide	5000 / Tape & Reel
NC7WZ17FHX	A5	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.

SIP6 1.45X1.0
CASE 127EB
ISSUE O

DATE 31 AUG 2016

2X
△ 0.05 C — 1.45 — ▶ B

2X
△ 0.05 C

(0.254)

1.00

PIN 1 IDENTIFIER
△5

TOP VIEW

0.50±0.05

0.05
0.00

△ 0.05 C

C

DETAIL A

1.45±0.05

1.0

0.20±0.05   6X

⊕ | 0.10 Ⓜ | C B A
  | 0.05 Ⓜ | C

0.30±0.05   5X

1.00±0.05

0.35±0.05   5X

(0.050)
6X

0.5

(0.125)
4X

BOTTOM VIEW

RECOMMENED
LAND PATTERN

(1)

(0.49)
5X

(0.52)
1X

(0.75)

PIN 1

(0.30)
6X

0.35±0.05

0.40±0.05

0.075 X 45°
CHAMFER

DETAIL A
PIN 1 TERMINAL

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.

DOCUMENT NUMBER:	98AON13590G
STATUS:	ON SEMICONDUCTOR STANDARD
NEW STANDARD:	
DESCRIPTION:	SIP6 1.45X1.0

ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION FROM FAIRCHILD MAC06A TO ON SEMICONDUCTOR. REQ. BY B. MARQUIS.	31 AUG 2016

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

DATE 07 JUL 2010
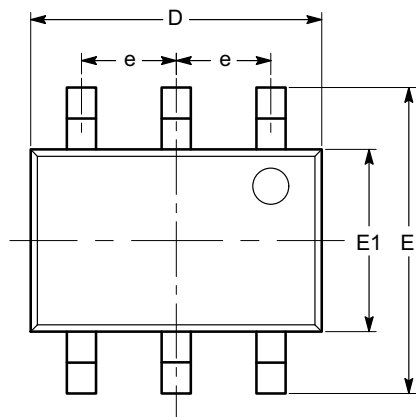
SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80		1.00
b	0.15		0.30
c	0.10		0.18
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0º		8º
θ1	4º		10º

TOP VIEW
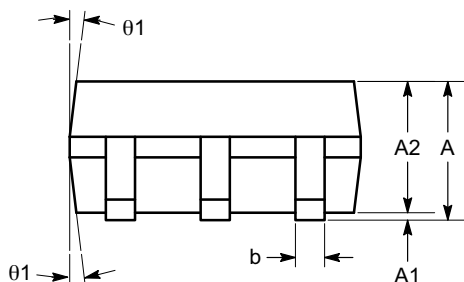
SIDE VIEW
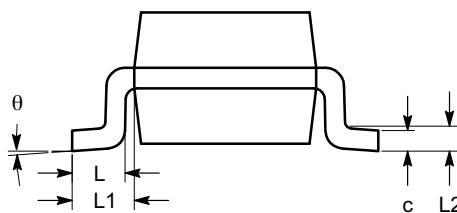
END VIEW

Notes:

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

DOCUMENT NUMBER:	98AON34266E	
STATUS:	ON SEMICONDUCTOR STANDARD	
REFERENCE:		
DESCRIPTION:	SC−88 (SC−70 6 LEAD), 1.25X2	PAGE 1 OF 2

ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION FROM POD #SC706–023–02 TO ON SEMICONDUCTOR. REQ. BY B. BERGMAN.	19 DEC 2008
A	ADDED SC–88 TO DESCRIPTION AND TITLE. REQ. BY D. TRUHITTE.	07 JUL 2010

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

DATE 31 AUG 2016

TOP VIEW

PIN 1
MIN 250uM

1.00±0.050

1.00±0.050

0.05 C 2X

0.05 C 2X

B   A

SIDE VIEW

0.50±0.05

0.05 C

C

BOTTOM VIEW

DETAIL A

(0.08) 4X

6X
0.14±0.05

1   2   3

6   5   4

5X
0.30±0.05

0.35

0.60

(0.08) 4X

0.10 Ⓜ C B A
.05 C

**RECOMMENDED LAND PATTERN
FOR SPACE CONSTRAINED PCB**

0.89

0.35

5X 0.40

0.66

1X 0.45

6X 0.19
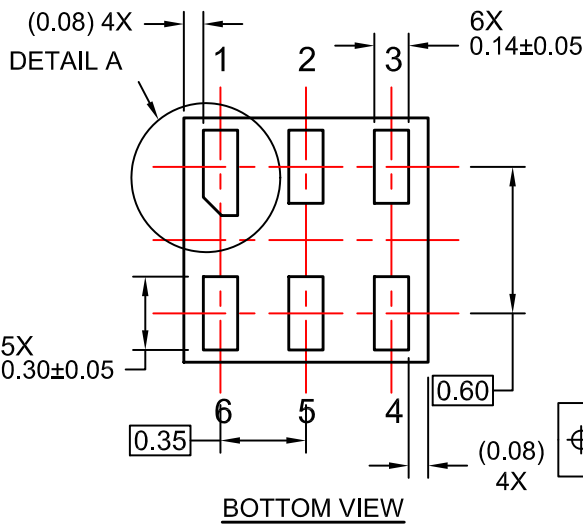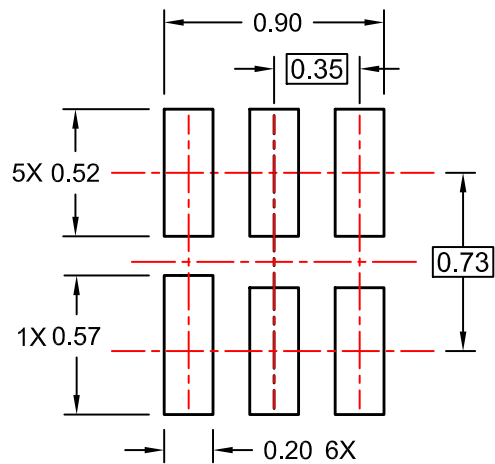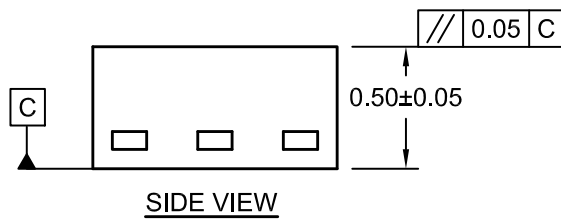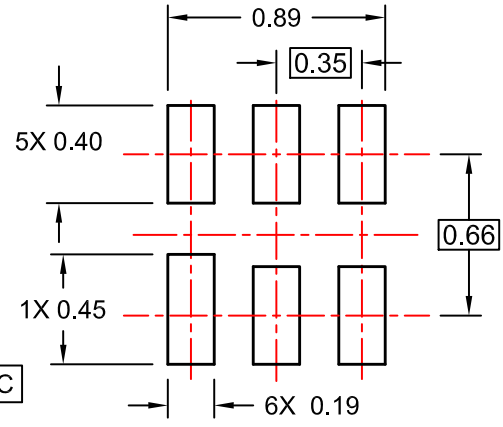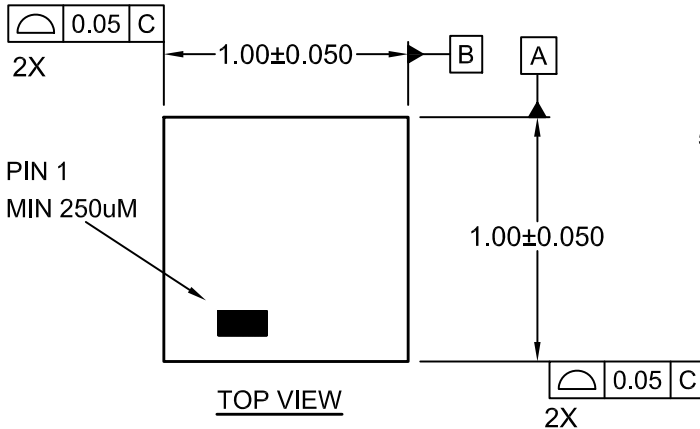
**ALTERNATIVE LAND PATTERN
FOR UNIVERSAL APPLICATION**

0.90

0.35

5X 0.52

0.73

1X 0.57

0.20 6X

DETAIL A
PIN 1 LEAD SCALE: 2X

(0.05) 6X

0.35±0.050

0.075X45°
CHAMFER
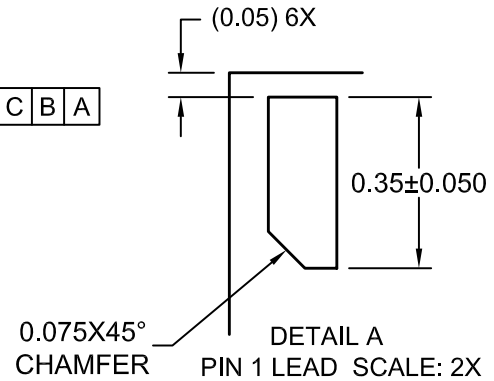
NOTES:
A. COMPLIES TO JEDEC MO-252 STANDARD
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009

DOCUMENT NUMBER:	98AON13593G	
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	UDFN6 1.0X1.0, 0.35P	PAGE 1 OF 2

ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION FROM FAIRCHILD MGF06A TO ON SEMICONDUCTOR. REQ. BY B. MARQUIS.	31 AUG 2016

PUBLICATION ORDERING INFORMATION

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