TinyLogic UHS Dual Buffer with Schmitt Trigger Inputs

NC7WZ17

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 MicroPakTM Packages
- Space–Saving SC–88 Package
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

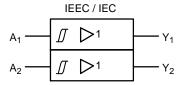


Figure 1. Logic Symbol



ON Semiconductor®

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MARKING DIAGRAMS



SIP6 1.45x1.0 CASE 127EB





UDFN6 1.0X1.0, 0.35P CASE 517DP





SC-88 CASE 419B-02



A5, Z17

= Specific Device Code

KK XY = 2-Digit Lot Run Traceability Code = 2-Digit Date Code Format

Z

= Assembly Plant Code

M

= Date Code= Pb-Free Package

(Microdot may be in either location)

ORDERING INFORMATION

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

Pin Configurations

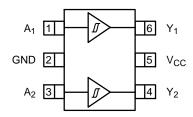


Figure 2. SC-88 (Top View)

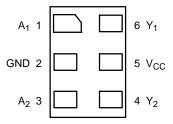
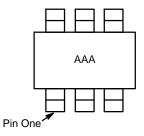


Figure 3. MicroPak (Top Through View)



NOTES:

- AAA represents Product Code Top Mark (see ordering code).
 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. SC-88 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
Α	Y
L	L
Н	Н

H = HIGH Logic Level L = LOW Logic Level

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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} or I _{GND}	DC V _{CC} or Ground Current	-	±50	mA	
T _{STG}	Storage Temperature Range		-65	+150	°C
TJ	Junction Temperature Under Bias		-	+150	°C
TL	Junction Lead Temperature (Soldering	g, 10 Seconds)	-	+260	°C
P _D	Power Dissipation in Still Air	SC-88	-	332	mW
		MicroPak-6	-	812	1
		MicroPak2™-6	-	812	1
ESD	Human Body Model, JEDEC: JESD22-A114		-	4000	V
	Charge Device Model, JEDEC: JESD:	22-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
$\theta_{\sf JA}$	Thermal Resistance	SC-88	-	377	°C/W
		MicroPak-6	-	154	
		MicroPak2-6	-	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 ELECTICAL CHARACTERISTICS

							T _A = 25°C		$T_A = -40$	to 85°C	
Symbol	Parameter	V _{CC} (V)	Conditions	Min	Тур	Max	Min	Max	Unit		
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	1.74	2.20	-	2.20						
		4.50		_	2.43	3.10	_	3.10			
		5.50		_	2.88	3.60	_	3.60			

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DC ELECTICAL CHARACTERISTICS (continued)

					T _A = 25°C		$T_A = -40$) to 85°C	
Symbol	Parameter	V _{CC} (V)	Conditions	Min	Тур	Max	Min	Max	Unit
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	$V_{IN} = V_P \text{ or } V_N,$	1.55	1.65	-	1.55	_	V
		1.80	I _{OH} = -100 μA	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	$V_{IN} = V_P \text{ or } V_N$	-	0.00	0.10	_	0.10	V
		1.80	I _{OL} = 100 μA	_	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	1	0.16	0.40	_	0.40	1
		3.00	I _{OL} = 24 mA	1	0.24	0.55	_	0.55	1
		4.50	I _{OL} = 32 mA	_	0.25	0.550	_	0.55	1
I _{IN}	Input Leakage Current	1.65 to 5.5	V _{IN} = 5.5 V, GND	1	-	±0.1	_	±1.0	μΑ
I _{OFF}	Power Off Leakage Current	0	V _{IN} or V _{OUT} = 5.5 V	1	-	1	_	10	μΑ
I _{CC}	Quiescent Supply Current	1.65 to 5.50	V _{IN} = 5.5 V, GND	-	-	1	-	10	μΑ

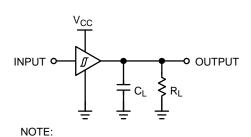
AC ELECTRICAL CHARACTERISTICS

					T _A = 25°C		$T_A = -40$	to 85°C	
Symbol	Parameter	V _{CC} (V)	Conditions	Min	Тур	Max	Min	Max	Unit
t _{PLH} , t _{PHL}	Propagation Delay	1.65	C _L = 15 pF,	_	8.3	14.3	_	15.8	ns
	(Figure 5, 6)	1.80	$R_L = 1 M\Omega$	_	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,	-	4.3	6.6	_	7.3	
		5.00 ±0.50	$R_L = 500 \Omega$	_	3.6	5.6	_	6.2	
C _{IN}	Input Capacitance	0		_	2.5	_	_	_	pF
C _{PD}	Power Dissipation Capacitance	3.30		-	10.0	-	_	_	pF
(Note 4) (Figure 7)	(Note 4) (Figure 7)	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: $I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CCstatic}).$

INPUT

OUTPUT



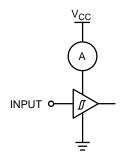
C_L includes load and stray capacitance; Input PRR = 1.0 MHz, t_W = 500 ns

 $-t_f = 3 \text{ ns}$ $t_r = 3 \text{ ns} -$ 50% 10% 10% GND V_{OH} 50%

Figure 6. AC Waveforms

VOL





NOTE:

6. Input = AC Waveform; $t_r = t_f = 1.8 \text{ ns}$; PRR = 10 MHz; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

NC7WZ17

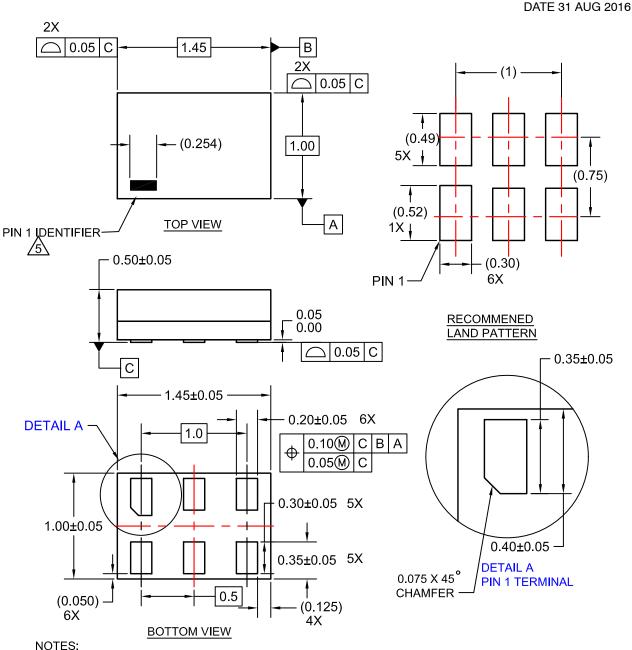
DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping [†]
NC7WZ17P6X	Z17	6-Lead SC70, EIAJ SC-88, 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.

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- 1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
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- 3. DRAWING CONFORMS TO ASME Y14.5M-2009
 4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY

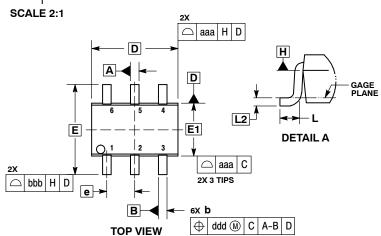
 - OTHER LINE IN THE MARK CODE LAYOUT.

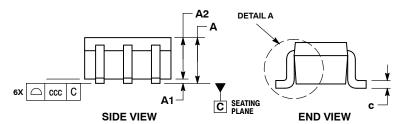
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DATE 11 DEC 2012





NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS
- CONTROLLING DIMENSION: MILLIMETERS.
 DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H. DATUMS A AND B ARE DETERMINED AT DATUM H. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.

- DIMENSION & DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION 6 AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

	MIL	LIMETE	RS		INCHES	3
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α			1.10			0.043
A1	0.00		0.10	0.000		0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
С	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
Е	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
е		0.65 BS	С	0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2		0.15 BS	C		0.006 BS	SC
aaa		0.15			0.006	
bbb	0.30				0.012	
ccc	0.10				0.004	
ddd		0.10			0.004	

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

= Date Code*

= Pb-Free Package

(Note: Microdot may be in either location)

- *Date Code orientation and/or position may vary depending upon manufacturing location.
- *This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

RECOMMENDED SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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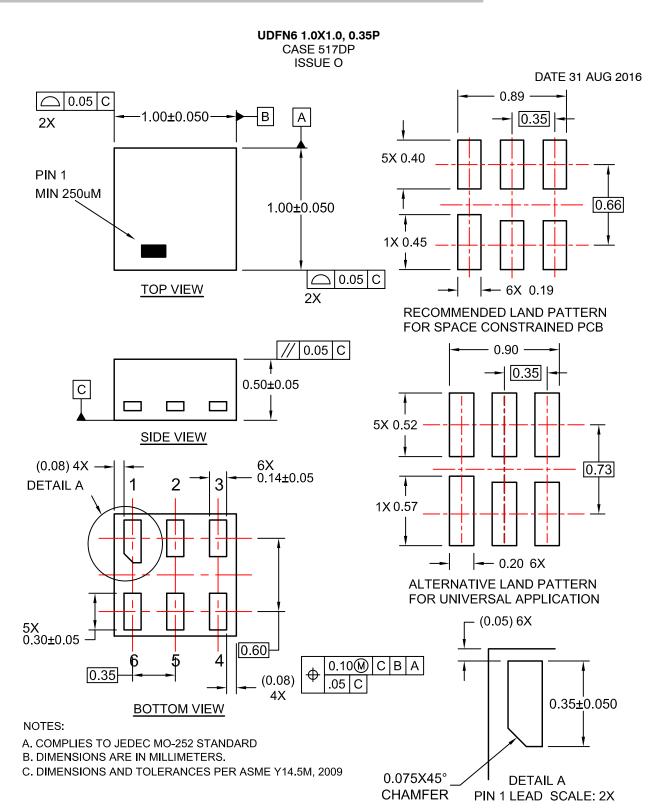
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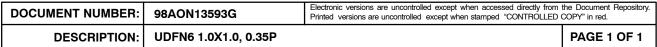
STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 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. I OUT 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

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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74AUP1G34FW5-7 74AUP1G07FW5-7 74LVC2G126RA3-7 NLX2G17CMUTCG 74LVCE1G125FZ4-7 Le87501NQC 74AUP1G126FW5-7 TC74HC4050AP(F) 74LVCE1G07FZ4-7 NLX3G16DMUTCG NLX2G06AMUTCG NLVVHC1G50DFT2G NLU2G17AMUTCG
LE87100NQC LE87290YQC LE87290YQCT LE87511NQC LE87511NQCT LE87557NQC LE87557NQCT LE87614MQC
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