

NC7WZ04

TinyLogic UHS Dual Inverter

Description

The NC7WZ04 is a dual inverter 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 tolerate voltages up to 5.5 V independent of V_{CC} operating voltage.

Features

- Ultra-High Speed: t_{PD} 2.3 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 6-Lead Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

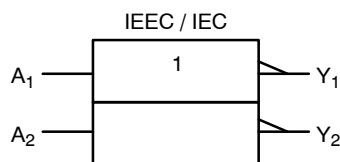


Figure 1. Logic Symbol



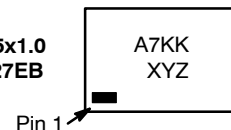
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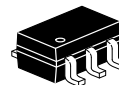
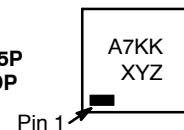
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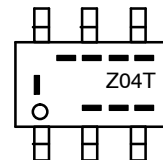
SIP6 1.45x1.0
CASE 127EB



UDFN6
1.0X1.0, 0.35P
CASE 517DP



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



A7, Z04	= Specific Device Code
KK	= 2-Digit Lot Run Traceability Code
XY	= 2-Digit Date Code Format
Z	= Assembly Plant Code
----	= Year Coding Scheme
I- -	= 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 6 of this data sheet.

Pin Configurations

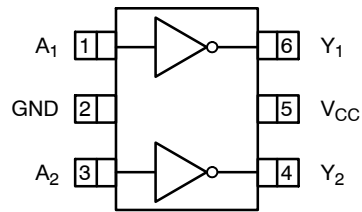


Figure 2. SC70 (Top View)

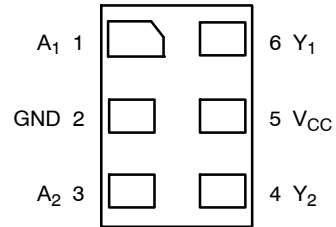
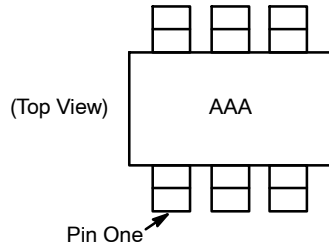


Figure 3. MicroPak (Top Through View)



NOTES:

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

FUNCTION TABLE (Y = /A)

Input	Output
A	Y
L	H
H	L

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		–	±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		1.5	5.5	
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} at 1.8 V, 2.5 V ±0.2 V	0	20	ns/V
		V _{CC} at 3.3 V ±0.3 V	0	10	
		V _{CC} at 5.0 V ±0.5 V	0	5	
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.

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

NC7WZ04

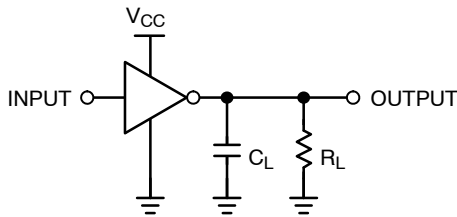
DC ELECTRICAL CHARACTERISTICS

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 Input Voltage	1.65 to 1.95		0.65 V _{CC}	–	–	0.65 V _{CC}	–	V
		2.30 to 5.50		0.70 V _{CC}	–	–	0.70 V _{CC}	–	
V _{IL}	LOW Level Input Voltage	1.65 to 1.95		–	–	0.35 V _{CC}	–	0.35 V _{CC}	V
		2.30 to 5.50		–	–	0.30 V _{CC}	–	0.30 V _{CC}	
V _{OH}	HIGH Level Output Voltage	1.65	V _{IN} = 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	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 _{IH} , I _{OL} = 100 µA	–	0.10	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	–	0.80	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	0.55	–	0.55	
I _{IN}	Input Leakage Current	1.65 to 5.5	0 ≤ V _{IN} ≤ 5.5 V	–	–	±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	$T_A = +25^{\circ}\text{C}$			$T_A = -40 \text{ to } +85^{\circ}\text{C}$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} , t_{PHL}	Propagation Delay (Figure 5, 6)	1.65	$C_L = 15 \text{ pF}$, $R_L = 1 \text{ M}\Omega$	–	5.3	9.2	–	11.0	ns
		1.80		–	4.4	7.6	–	8.4	
		2.50 ± 0.20		–	3.0	5.1	–	5.6	
		3.30 ± 0.30		–	2.2	3.4	–	3.8	
		5.00 ± 0.50		–	1.8	2.8	–	3.1	
		3.30 ± 0.30	$C_L = 50 \text{ pF}$, $R_L = 500 \Omega$	–	2.9	4.5	–	5.0	
		5.00 ± 0.50		–	2.3	3.6	–	4.0	
C_{IN}	Input Capacitance	0.00		–	2.5	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 5) (Figure 7)	3.30		–	9	–	–	–	pF
		5.00		–	11	–	–	–	

5. 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:

6. C_L includes load and stray capacitance.
 7. Input PRR = 1.0 MHz, $t_W = 500 \text{ ns}$.

Figure 5. AC Test Circuit

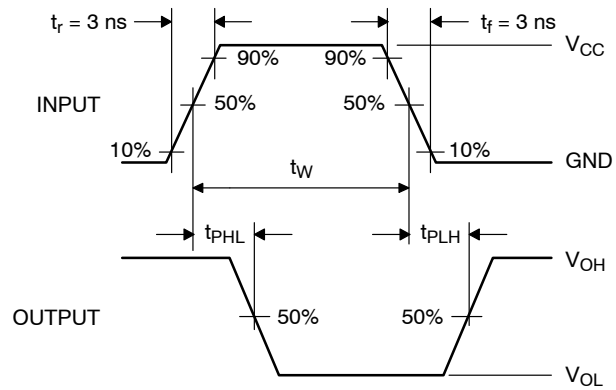
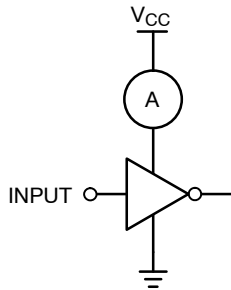


Figure 6. AC Waveforms



NOTE:

8. Input = AC Waveform; $t_r = t_f = 1.8 \text{ ns}$.
 9. PRR = Variable; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

NC7WZ04

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping [†]
NC7WZ04P6X	Z04	6-Lead SC70, EIAJ SC-88, 1.25 mm Wide	3000 / Tape & Reel
NC7WZ04L6X	A7	6-Lead MicroPak, 1.00 mm Wide	5000 / Tape & Reel
NC7WZ04FHX	A7	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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NOTES:

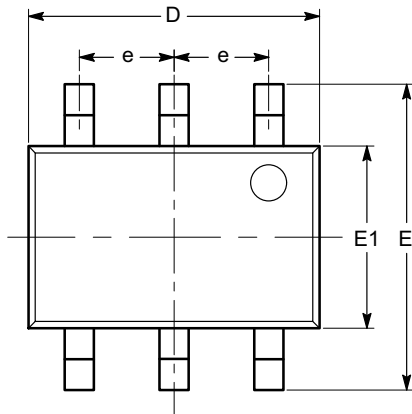
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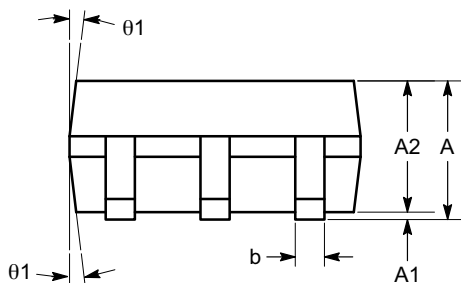
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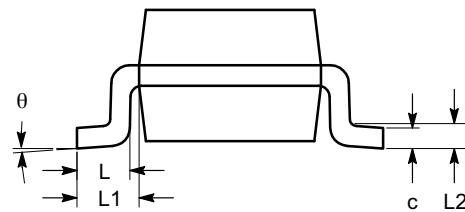


TOP VIEW



SIDE 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		
θ	0°		8°
θ1	4°		10°




END VIEW

Notes:

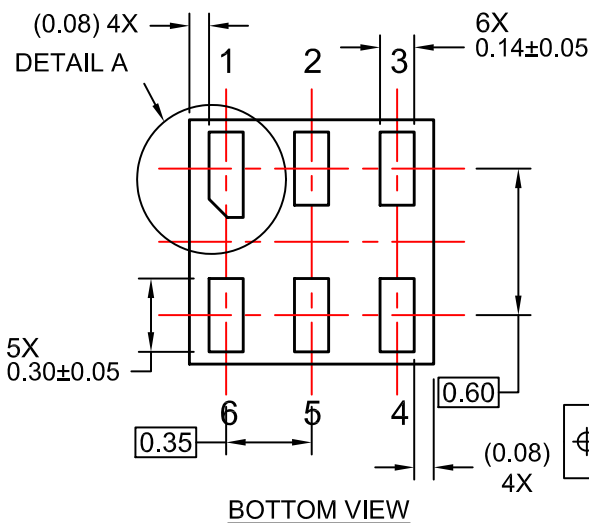
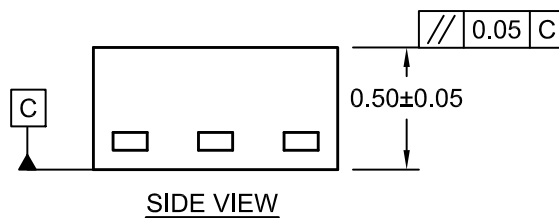
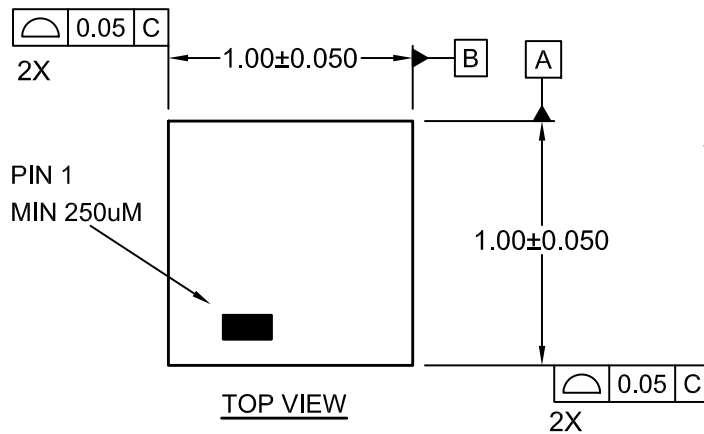
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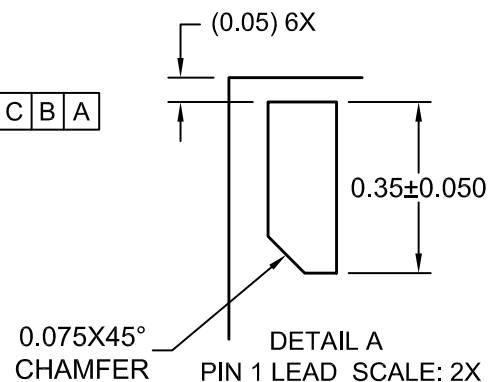
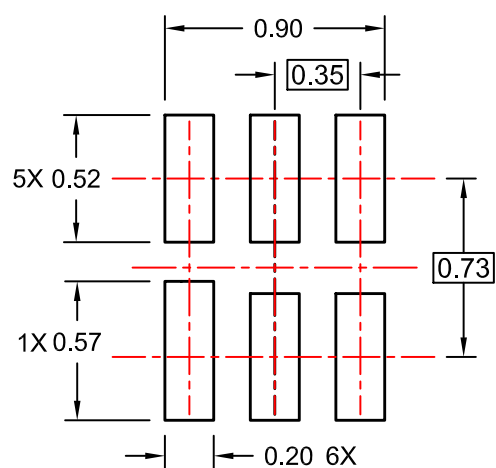
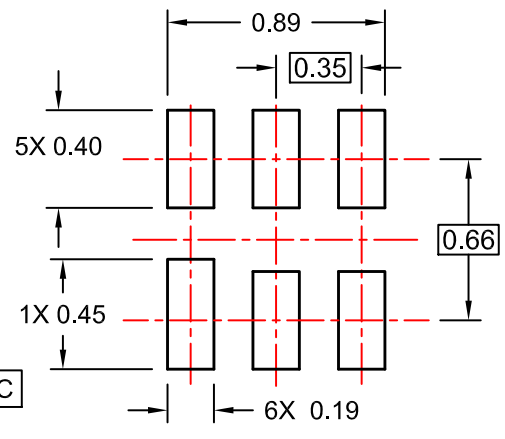
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