MARKING

TinyLogic UHS Inverter with Schmitt Trigger Input

NC7SZ14

Description

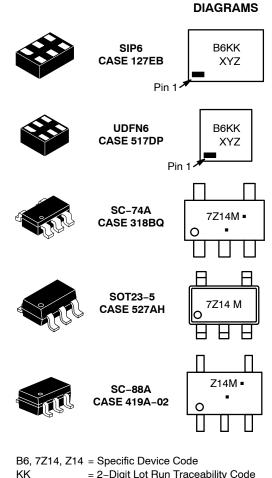
The NC7SZ14 is a single inverter with Schmitt trigger input from **onsemi**'s Ultra–High Speed (UHS) series of TinyLogic. The device is fabricated w ith advanced CMOS technology to achieve ultra–high speed with high output drive while maintaining low static power dissipation over a very broad V_{CC} 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} = 3.7 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 SOT23-5, SC-74A and SC-88A Packages
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant



Figure 1. Logic Symbol



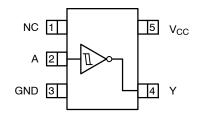
B6, 7Z14, Z14	= Specific Device Code
KK	= 2-Digit Lot Run Traceability Code
XY	= 2-Digit Date Code Format
Z	= Assembly Plant Code
М	= Date Code
•	= Pb-Free Package

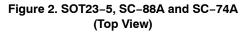
(Note: Microdot may be in either location)

ORDERING INFORMATION

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

Pin Configurations





PIN DEFINITIONS

Pin # SC-88A / SC74A/ SOT23-5	Pin # MicroPak	Name	Description
1	1, 5	NC	No Connect
2	2	А	Input
3	3	GND	Ground
4	4	Y	Output
5	6	V _{CC}	Supply Voltage

ABSOLUTE MAXIMUM RATINGS

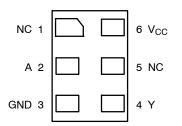


Figure 3. MicroPak (Top Through View)

FUNCTION TABLE

Inputs	Output
А	Y
L	Н
Н	L

H = HIGH Logic Level L = LOW Logic Level

Symbol	Paran	Min	Мах	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
۱ _{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
$I_{CC} \text{ or } I_{GND}$	DC V _{CC} or Ground Current		_	±50	mA
T _{STG}	Storage Temperature Range		-65	+150	°C
TJ	Junction Temperature Under Bia	S	_	+150	°C
ΤL	Junction Lead Temperature (Solo	dering, 10 Seconds)	-	+260	°C
PD	Power Dissipation in Still Air	SC-74A / SOT23-5	_	390	mW
		SC-88A	_	332	
		MicroPak-6	_	812	
		MicroPak2™–6	_	812	
ESD	Human Body Model, JEDEC: JESD22-A114		_	2000	V
	Charge Device Model, JEDEC: JESD22-C101		-	1000	

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	5.5	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 _A	Operating Temperature		-40	+85	°C
θ_{JA}	Thermal Resistance	SC-74A / SOT23-5	-	320	°C/W
		SC-88A	-	377	
		MicroPak-6	-	154	
		MicroPak2-6	-	154	

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

DC ELECTRICAL 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		-	1.10	1.50	-	1.50	
		2.30		-	1.40	1.80	-	1.80	
		3.00		-	1.75	2.20	-	2.20	
		4.50		-	2.45	3.10	-	3.10	
		5.50		-	2.90	3.60	-	3.60	
V _N	Negative Threshold Voltage	1.65		0.20	0.50	-	0.20	-	V
		1.80		0.25	0.55	-	0.25	-	
		2.30		0.40	0.75	-	0.40	-	
		3.00		0.60	1.00	-	0.60	-	
		4.50		1.00	1.43	-	1.00	-	
		5.50		1.20	1.70	-	1.20	-	
V _H	Hysteresis Voltage	1.65		0.10	0.48	0.90	0.10	0.90	V
		1.80		0.15	0.54	1.00	0.15	1.00	
		2.30		0.25	0.65	1.10	0.25	1.10	
		3.00		0.40	0.77	1.20	0.40	1.20	1
		4.50		0.60	1.01	1.50	0.60	1.50	1
		5.50		0.70	1.18	1.70	0.70	1.70	1

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DC ELECTRICAL 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 _{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	2.15	-	1.90	-	
		3.00	I _{OH} = -16 mA	2.40	2.80	-	2.40	-	
		3.00	I _{OH} = -24 mA	2.30	2.68	-	2.30	-	
		4.50	I _{OH} = -32 mA	3.80	4.20	-	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	l _{OL} = 100 μΑ	-	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	-	0.15	0.40	-	0.40	
		3.00	I _{OL} = 24 mA	-	0.22	0.55	-	0.55	
		4.50	I _{OL} = 32 mA	-	0.22	0.55	-	0.55	
I _{IN}	Input Leakage Current	1.65 to 5.5	V _{IN} = 5.5 V, GND	-	-	±0.1	-	±1.0	μΑ
I _{OFF}	Power Off Leakage Current	0	V_{IN} or V_{OUT} = 5.5 V	-	-	1	-	10	μΑ
I _{CC}	Quiescent Supply Current	1.65 to 5.5	V _{IN} = 5.5 V, GND	-	-	1.0	-	10	μA

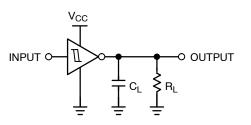
AC ELECTRICAL CHARACTERISTICS

					T _A = +25°C		T _A = -40	to +85°C	
Symbol	Parameter	V _{CC} (V)	Conditions	Min	Тур	Мах	Min	Мах	Unit
t _{PLH} , t _{PHL}	Propagation Delay	1.65	C _L = 15 pF,	-	9.1	15.0	-	15.6	ns
	(Figure 4, 5)	1.80	$R_L = 1 M\Omega$	-	7.6	12.5	-	13.0	
		2.50 ±0.20		-	5.0	9.0	-	9.5	
		3.30 ± 0.30		-	3.7	6.3	-	6.5	
		5.00 ±0.50		-	3.1	5.2	-	5.5	
		3.30 ± 0.30	$C_L = 50 \text{ pF},$ $R_L = 500 \Omega$	-	4.4	7.2	-	7.5	
		5.00 ±0.50		-	3.7	5.9	-	6.2	
C _{IN}	Input Capacitance	0.00		-	4	-	-	-	pF
C _{PD}	Power Dissipation Capacitance	3.30		-	24	-	-	-	pF
	(Note 2) (Figure 6)	5.00		_	30	-	-	-	

2. 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_{CC}static).

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t_r = 3 ns -

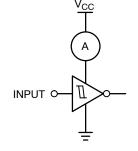


NOTE:

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

Figure 4. AC Test Circuit





NOTE:

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

Figure 6. I_{CCD} Test Circuit

Part Number	Top Mark	Operating Temperature	Packages	Shipping [†]
NC7SZ14M5X	7Z14	−40 to +85°C	SC-74A	3000 / Tape & Reel
NC7SZ14M5X-L22090	7Z14	−40 to +85°C	SOT23-5	3000 / Tape & Reel
NC7SZ14P5X	Z14	−40 to +85°C	SC-88A	3000 / Tape & Reel
NC7SZ14P5X-L22057	Z14	−40 to +85°C	SC-88A	3000 / Tape & Reel
NC7SZ14L6X	B6	−40 to +85°C	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ14L6X-L22175	B6	−40 to +85°C	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ14FHX	B6	−40 to +85°C	UDFN6, MicroPak2	5000 / Tape & Reel
NC7SZ14FHX-L22175	B6	−40 to +85°C	UDFN6, MicroPak2	5000 / Tape & Reel

ORDERING INFORMATION

+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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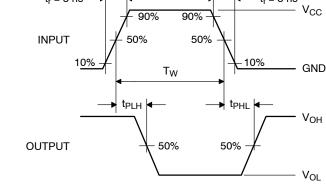


Figure 5. AC Waveforms

t_f = 3 ns

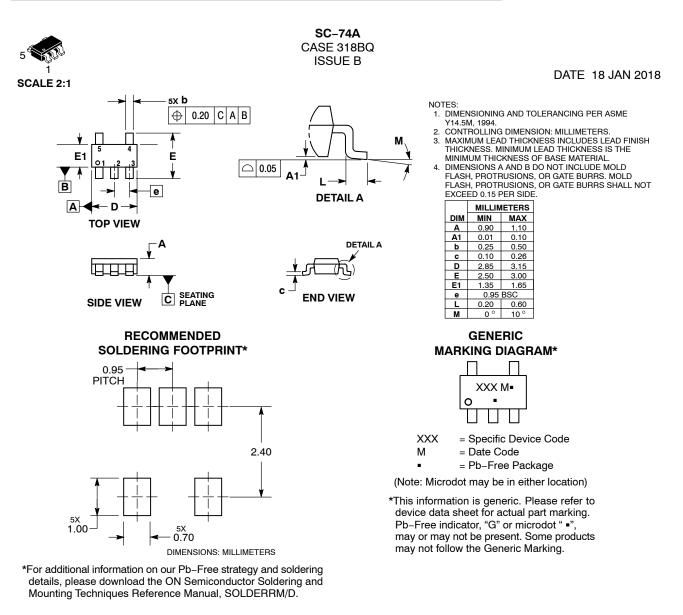


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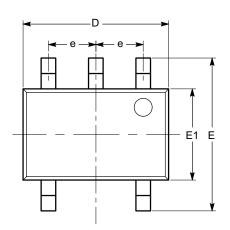
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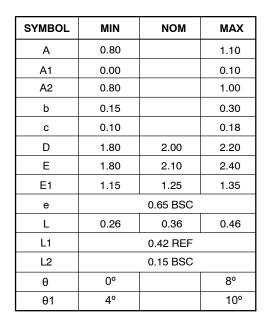


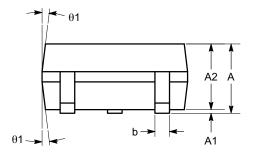
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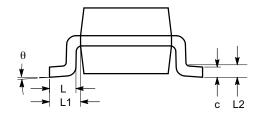








SIDE VIEW



END VIEW

Notes:

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

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