

TinyLogic ULP-A 2-Input NAND Gate

NC7SV00

The NC7SV00 is a single 2-Input NAND Gate in tiny footprint packages. The device is designed to operate for $V_{CC} = 0.9\text{ V}$ to 3.6 V .

Features

- Designed for 0.9 V to 3.6 V V_{CC} Operation
- 1.5 ns t_{PD} at 3.3 V (Typ)
- Inputs/Outputs Over-Voltage Tolerant up to 3.6 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.3 V
- Available in SC-88A and MicroPak™ Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

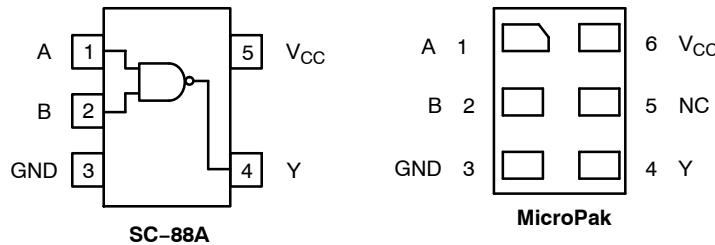


Figure 1. Pinout Diagrams (Top Views)

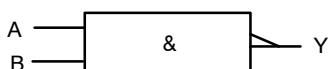


Figure 2. Logic Symbol

PIN ASSIGNMENT

Pin	SC-88A	MicroPak
1	A	A
2	B	B
3	GND	GND
4	Y	Y
5	V_{CC}	N.C.
6	-	V_{CC}

N.C. = No Connect

FUNCTION TABLE

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +4.3	V
V_{IN}	DC Input Voltage	-0.5 to +4.3	V
V_{OUT}	DC Output Voltage Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	Active-Mode (High or Low State) -0.5 to $V_{CC} + 0.5$ -0.5 to +4.3 -0.5 to +4.3	V
I_{IK}	DC Input Diode Current	$V_{IN} < GND$	-50
I_{OK}	DC Output Diode Current	$V_{OUT} < GND$	-50
I_{OUT}	DC Output Source/Sink Current		± 50
I_{CC} or I_{GND}	DC Supply Current per Supply Pin or Ground Pin		± 50
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T_J	Junction Temperature Under Bias	+150	°C
θ_{JA}	Thermal Resistance (Note 2) MicroPak	SC-88A 377 154	°C/W
P_D	Power Dissipation in Still Air MicroPak	SC-88A 332 812	mW
MSL	Moisture Sensitivity	Level 1	-
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
V_{ESD}	ESD Withstand Voltage (Note 3) Charged Device Model	Human Body Model	4000 2000
$I_{Latchup}$	Latchup Performance (Note 4)		± 100
			mA

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.

1. Applicable to devices with outputs that may be tri-state.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.
4. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	0.9	3.6	V
V_{IN}	DC Input Voltage	0	3.6	V
V_{OUT}	DC Output Voltage Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	0 0 0	V_{CC} 3.6 3.6	
T_A	Operating Temperature Range	-40	+85	°C
t_r, t_f	Input Transition Rise and Fall Time	$V_{CC} = 3.3$ V ± 0.3 V		0 to 10 ns/V

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.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High-Level Input Voltage		0.9	—	0.5	—	—	—	V
			1.1 to 1.3	$0.65 \times V_{CC}$	—	—	$0.65 \times V_{CC}$	—	
			1.4 to 1.6	$0.65 \times V_{CC}$	—	—	$0.65 \times V_{CC}$	—	
			1.65 to 1.95	$0.65 \times V_{CC}$	—	—	$0.65 \times V_{CC}$	—	
			2.3 to <2.7	1.6	—	—	1.6	—	
			2.7 to 3.6	2.0	—	—	2.0	—	
V_{IL}	Low-Level Input Voltage		0.9	—	0.5	—	—	—	V
			1.1 to 1.3	—	—	$0.35 \times V_{CC}$	—	$0.35 \times V_{CC}$	
			1.4 to 1.6	—	—	$0.35 \times V_{CC}$	—	$0.35 \times V_{CC}$	
			1.65 to 1.95	—	—	$0.35 \times V_{CC}$	—	$0.35 \times V_{CC}$	
			2.3 to <2.7	—	—	0.7	—	0.7	
			2.7 to 3.6	—	—	0.8	—	0.8	
V_{OH}	High-Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL}							V
		$I_{OH} = -100 \mu\text{A}$	0.9	—	$V_{CC} - 0.1$	—	—	—	
			1.1 to 1.3	$V_{CC} - 0.1$	—	—	$V_{CC} - 0.1$	—	
			1.4 to 1.6	$V_{CC} - 0.1$	—	—	$V_{CC} - 0.1$	—	
			1.65 to 1.95	$V_{CC} - 0.2$	—	—	$V_{CC} - 0.2$	—	
			2.3 to <2.7	$V_{CC} - 0.2$	—	—	$V_{CC} - 0.2$	—	
			2.7 to 3.6	$V_{CC} - 0.2$	—	—	$V_{CC} - 0.2$	—	
		$I_{OH} = -2 \text{ mA}$	1.1 to 1.3	$0.75 \times V_{CC}$	—	—	$0.75 \times V_{CC}$	—	
			1.4 to 1.6	$0.75 \times V_{CC}$	—	—	$0.75 \times V_{CC}$	—	
			1.65 to 1.95	1.25	—	—	1.25	—	
		$I_{OH} = -6 \text{ mA}$	2.3 to <2.7	2.0	—	—	2.0	—	
			2.7 to 3.6	2.2	—	—	2.2	—	
		$I_{OH} = -12 \text{ mA}$	2.3 to <2.7	1.8	—	—	1.8	—	
			2.7 to 3.6	2.2	—	—	2.2	—	
		$I_{OH} = -18 \text{ mA}$	2.3 to <2.7	1.7	—	—	1.7	—	
			2.7 to 3.6	2.4	—	—	2.4	—	
		$I_{OH} = -24 \text{ mA}$	2.7 to 3.6	2.2	—	—	2.2	—	



DC ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A = -40°C to +85°C		Unit
				Min	Typ	Max	Min	Max	
V _{OL}	Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL}							V
		I _{OL} = 100 μA	0.9	—	0.1	—	—	—	
			1.1 to 1.3	—	—	0.1	—	0.1	
			1.4 to 1.6	—	—	0.1	—	0.1	
			1.65 to 1.95	—	—	0.2	—	0.2	
			2.3 to < 2.7	—	—	0.2	—	0.2	
			2.7 to 3.6	—	—	0.2	—	0.2	
		I _{OL} = 2 mA	1.1 to 1.3	—	—	0.25 × V _{CC}	—	0.25 × V _{CC}	
		I _{OL} = 4 mA	1.4 to 1.6	—	—	0.25 × V _{CC}	—	0.25 × V _{CC}	
		I _{OL} = 6 mA	1.65 to 1.95	—	—	0.3	—	0.3	
		I _{OL} = 12 mA	2.3 to < 2.7	—	—	0.4	—	0.4	
			2.7 to 3.6	—	—	0.4	—	0.4	
		I _{OL} = 18 mA	2.3 to < 2.7	—	—	0.6	—	0.6	
			2.7 to 3.6	—	—	0.4	—	0.4	
		I _{OL} = 24 mA	2.7 to 3.6	—	—	0.55	—	0.55	
I _{IN}	Input Leakage Current	V _{IN} = 0 V to 3.6 V	0.9 to 3.6	—	—	±0.1	—	±0.5	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 0 V to 3.6 V or V _{OUT} = 0 V to 3.6 V	0	—	—	0.5	—	0.5	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	0.9 to 3.6	—	—	0.9	—	0.9	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS

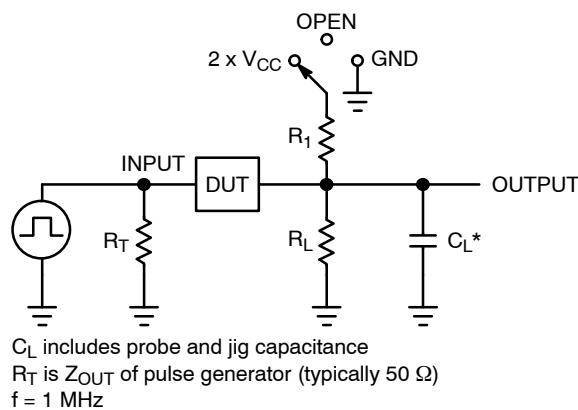
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A = -40°C to +85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, (A or B) to Y (Figures 3 and 4)	R _L = 1 MΩ, C _L = 15 pF	0.9	—	20.5	—	—	—	ns
		R _L = 2 kΩ, C _L = 15 pF	1.1 to 1.3	—	6.3	13.1	—	15.2	
			1.4 to 1.6	—	3.4	6.0	—	7.2	
		R _L = 500 Ω, C _L = 30 pF	1.65 to 1.95	—	2.4	4.5	—	5.3	
			2.3 to 2.7	—	1.8	2.6	—	3.7	
			2.7 to 3.6	—	1.5	2.3	—	3.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition	Typical (T _A = 25°C)	Unit
C _{IN}	Input Capacitance	V _{CC} = 0 V	2.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	f = 10 MHz, V _{CC} = 0.9 to 3.6 V, V _{IN} = 0 V or V _{CC}	8.0	pF

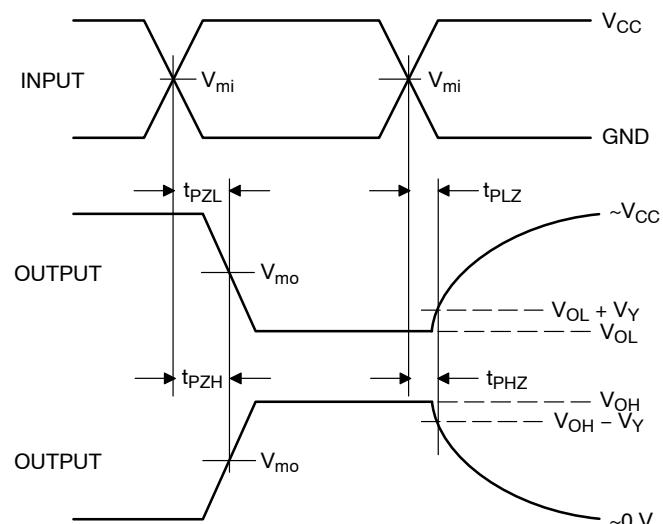
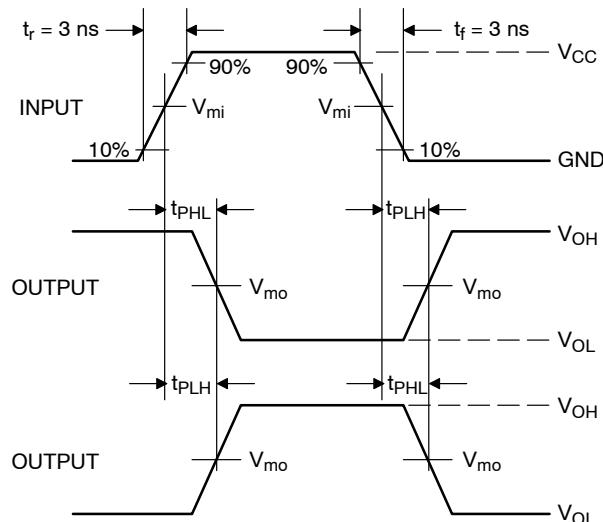
5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption: P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.





Test	Switch Position
t_{PLH} / t_{PHL}	Open
t_{PLZ} / t_{PZL}	$2 \times V_{CC}$
t_{PHZ} / t_{PZH}	GND

Figure 3. Test Circuit



V_{CC} , V	V_{mi} , V	V_{mo} , V	V_Y , V
0.9	$V_{CC} / 2$	$V_{CC} / 2$	0.1
1.1 to 1.3	$V_{CC} / 2$	$V_{CC} / 2$	0.1
1.4 to 1.6	$V_{CC} / 2$	$V_{CC} / 2$	0.1
1.65 to 1.95	$V_{CC} / 2$	$V_{CC} / 2$	0.15
2.3 to 2.7	$V_{CC} / 2$	$V_{CC} / 2$	0.15
3.0 to 3.6	1.5	1.5	0.3

Figure 4. Switching Waveforms

NC7SV00

ORDERING INFORMATION

Device	Package	Marking	Pin 1 Orientation (See below)	Shipping [†]
NC7SV00P5X	SC-88A	V00	Q4	3000 / Tape & Reel

DISCONTINUED (Note 6)

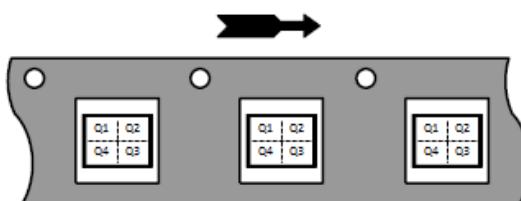
NC7SV00L6X	MicroPak	F5	Q4	5000 / Tape & Reel
NC7SV00FHX	MicroPak2	F5	Q4	5000 / Tape & Reel
NC7SV00FHX-L22780	MicroPak2	F5	Q4	5000 / Tape & Reel

[†] 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.

6. **DISCONTINUED:** These devices are not available. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

PIN 1 ORIENTATION IN TAPE AND REEL

Direction of Feed

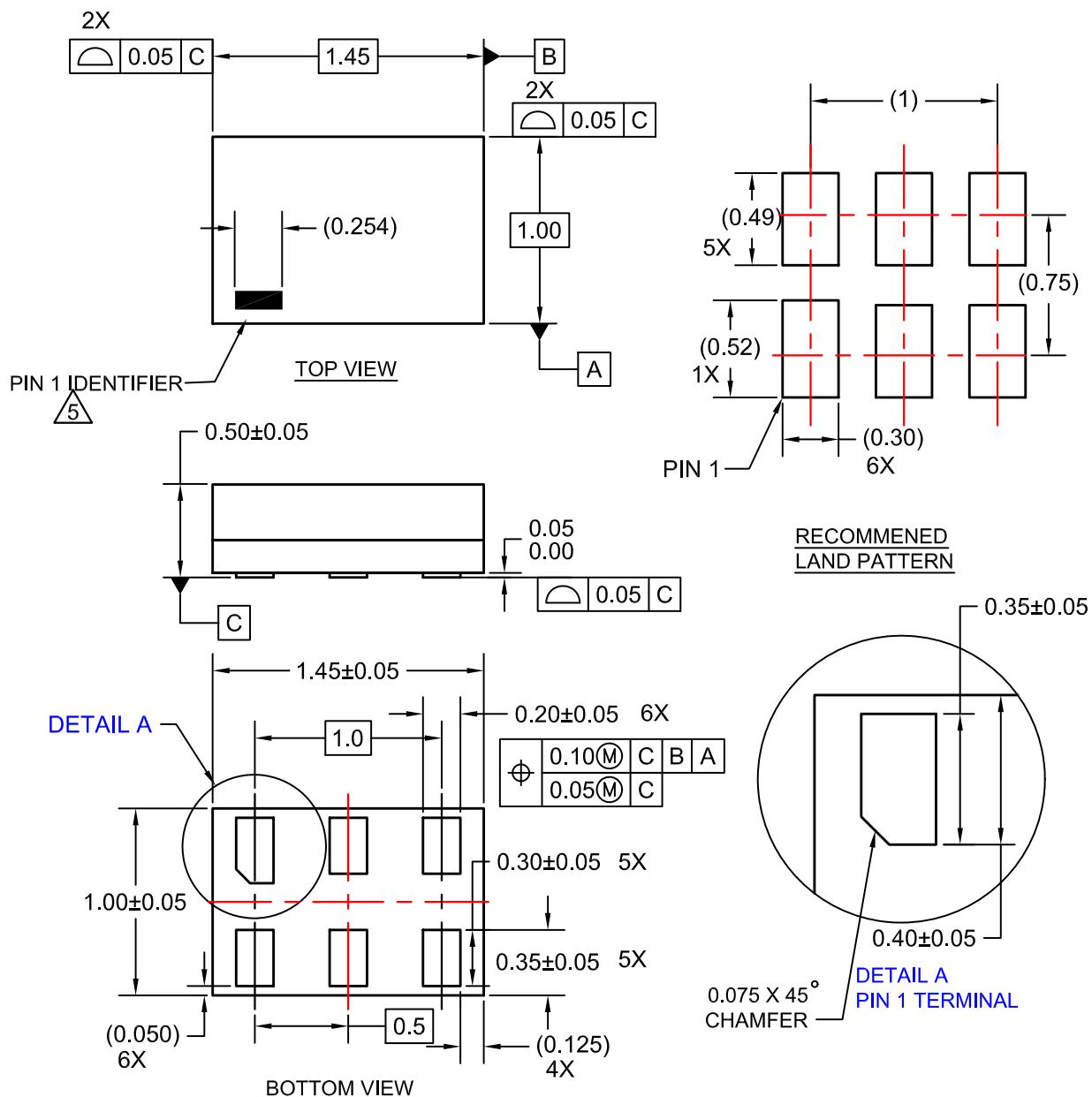


MicroPak and MicroPak2 are trademarks of Semiconductor Components Industries, LLC dba “**onsemi**” or its affiliates and/or subsidiaries in the United States and/or other countries.



SIP6 1.45X1.0
CASE 127EB
ISSUE O

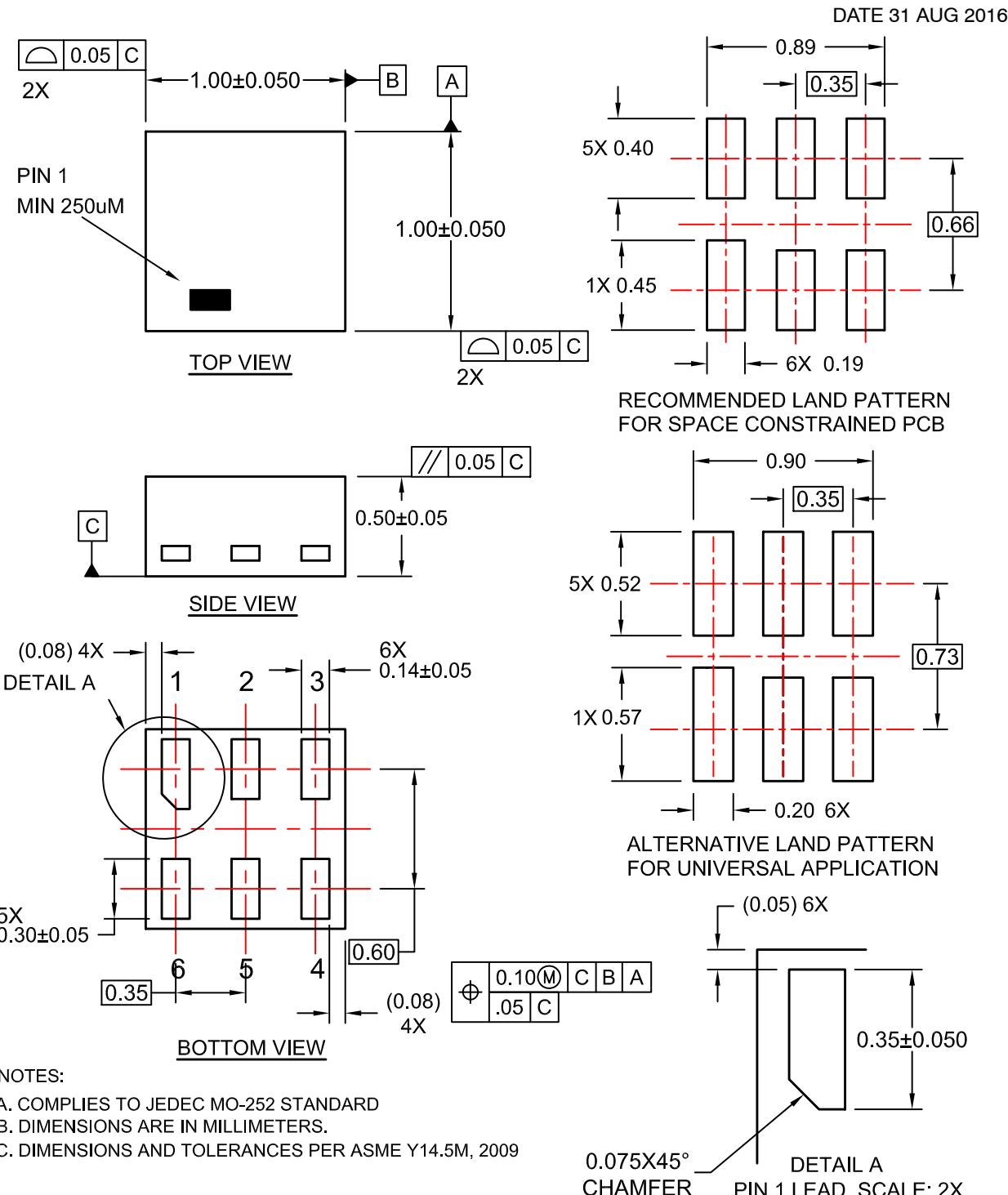
DATE 31 AUG 2016



DOCUMENT NUMBER:	98AON13590G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SIP6 1.45X1.0	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

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



DOCUMENT NUMBER:	98AON13593G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	UDFN6 1.0X1.0, 0.35P	PAGE 1 OF 1

onsemi and **ONSEMI** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, **ONSEMI**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

