



Is Now Part of



**ON Semiconductor®**

To learn more about ON Semiconductor, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (\_), the underscore (\_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (\_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at [www.onsemi.com](http://www.onsemi.com). Please email any questions regarding the system integration to [Fairchild\\_questions@onsemi.com](mailto:Fairchild_questions@onsemi.com).

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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 ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



# NC7SZ11 TinyLogic® UHS Three-Input AND Gate

## Features

- Ultra-High Speed:  $t_{PD}$  2.7 ns (Typical) into 50 pF at 5V  $V_{CC}$
- High Output Drive:  $\pm 24$  mA at 3 V  $V_{CC}$
- Broad  $V_{CC}$  Operating Range: 1.65 V to 5.5 V
- 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

## Description

The NC7SZ11 is a single three-input AND Gate from Fairchild's Ultra-High Speed 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 the 1.65 V to 5.5 V  $V_{CC}$  operating range. The inputs and output are high impedance when  $V_{CC}$  is 0 V. Inputs tolerate voltages up to 7 V, independent of  $V_{CC}$  operating voltage.

## Ordering Information

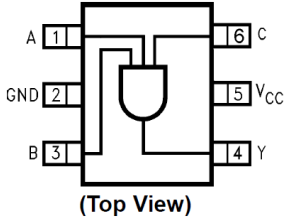
Part Number	Top Mark	Package	Packing Method
NC7SZ11P6X	Z11	6-Lead SC70, EIAJ SC-88a, 1.25 mm Wide	3000 Units on Tape & Reel
NC7SZ11L6X	E7	6-Lead MicroPak™, 1.00 mm Wide	5000 Units on Tape & Reel

**Connection Diagrams**



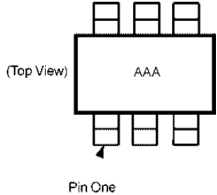
Figure 1. Logic Symbol

**Pin Configurations**



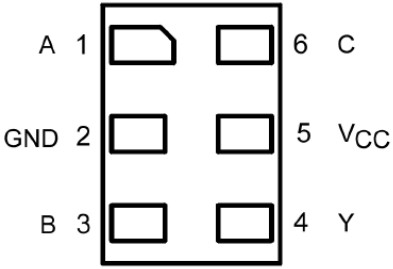
(Top View)

Pin One Orientation Diagram



AAA represents Product Code Top Mark - see ordering code.  
**Note:** Orientation of Top Mark determines Pin One location. Read the Top Product Code Mark left to right, Pin One is the lower left pin (see diagram)

Figure 2. SC70 (Top View)



(Top Thru View)

Figure 3. MicroPak (Top Through View)

**Pin Definitions**

Pin # SC70	Pin # MicroPak	Name	Description
1	1	A	Input
2	2	GND	Ground
3	3	B	Input
4	4	Y	Output
5	5	V <sub>CC</sub>	Supply Voltage
6	6	C	Input

**Function Table**

Y=ABC

Inputs			Output
A	B	C	Y
X	X	L	L
X	L	X	L
L	X	X	L
H	H	H	H

H = HIGH Logic Level  
 L = LOW Logic Level  
 X = Either LOW or HIGH Logic Level

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
$V_{CC}$	Supply Voltage		-0.5	7.0	V
$V_{IN}$	DC Input Voltage		-0.5	7.0	V
$V_{OUT}$	DC Output Voltage		-0.5	7.0	V
$I_{IK}$	DC Input Diode Current	$V_{IN} < -0.5\text{ V}$		-50	mA
$I_{OK}$	DC Output Diode Current	$V_{OUT} < -0.5\text{ V}$		-50	mA
		$V_{OUT} > 6\text{ V}, V_{CC}=\text{GND}$		+20	
$I_{OUT}$	DC Output Current			$\pm 50$	mA
$I_{CC}$ OR $I_{GND}$	DC $V_{CC}$ OR Ground Current			$\pm 50$	mA
$T_{STG}$	Storage Temperature Range		-65	+150	$^{\circ}\text{C}$
$T_J$	Junction Temperature Under Bias			+150	$^{\circ}\text{C}$
$T_L$	Junction Lead Temperature (Soldering, 10 Seconds)			+260	$^{\circ}\text{C}$
$P_D$	Power Dissipation at +85 $^{\circ}\text{C}$	SC70-6		150	mW
		MicroPak-6		130	
ESD	Human Body Model, JESD22-A114			4000	V
	Charged Device Model, JESD22-C101			2000	

## Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min.	Max.	Unit
$V_{CC}$	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.50	5.50	
$V_{IN}$	Input Voltage		0	5.5	V
$V_{OUT}$	Output Voltage		0	$V_{CC}$	V
$T_A$	Operating Temperature		-40	+85	$^{\circ}\text{C}$
$t_r, t_f$	Input Rise and Fall Times	$V_{CC}$ at 1.8 V, 2.5 V $\pm$ 0.2 V	0	20	ns/V
		$V_{CC}$ at 3.3 V $\pm$ 0.3 V	0	10	
		$V_{CC}$ at 5.0 V $\pm$ 0.5 V	0	5	
$\theta_{JA}$	Thermal Resistance	SC70-6		425	$^{\circ}\text{C}/\text{W}$
		MicroPak-6		500	

### Note:

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

### DC Electrical Characteristics

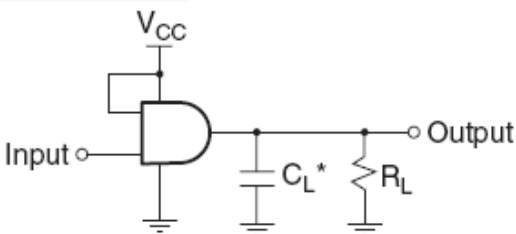
Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =25°C			T <sub>A</sub> =-40 to +85°C		Unit
				Min.	Typ.	Max.	Min.	Max.	
V <sub>IH</sub>	HIGH Level Input Voltage	1.8 ± 0.15		0.75 V <sub>CC</sub>			0.75 V <sub>CC</sub>		V
		2.30 to 5.50		0.70 V <sub>CC</sub>			0.70 V <sub>CC</sub>		
V <sub>IL</sub>	LOW Level Input Voltage	1.8 ± 0.15				0.25 V <sub>CC</sub>		0.25 V <sub>CC</sub>	V
		2.30 to 5.50				0.30 V <sub>CC</sub>		0.30 V <sub>CC</sub>	
V <sub>OH</sub>	HIGH Level Output Voltage	1.65	V <sub>IN</sub> =V <sub>IH</sub> , I <sub>OH</sub> =-100 μA	1.55	1.65		1.55		V
		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 <sub>OH</sub> =-4 mA	1.29	1.52		1.29		
		2.30	I <sub>OH</sub> =-8 mA	1.90	2.15		1.90		
		3.00	I <sub>OH</sub> =-16 mA	2.50	2.80		2.40		
		3.00	I <sub>OH</sub> =-24 mA	2.40	2.68		2.30		
4.50	I <sub>OH</sub> =-32 mA	3.90	4.20		3.80				
V <sub>OL</sub>	LOW Level Output Voltage	1.65	V <sub>IN</sub> =V <sub>IL</sub> , I <sub>OL</sub> =100 μA		0.00	0.10		0.10	V
		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 <sub>OL</sub> =4 mA		0.80	0.24		0.24	
		2.30	I <sub>OL</sub> =8 mA		0.10	0.30		0.30	
		3.00	I <sub>OL</sub> =16 mA		0.15	0.40		0.40	
		3.00	I <sub>OL</sub> =24 mA		0.22	0.55		0.55	
		4.50	I <sub>OL</sub> =32 mA		0.22	0.55		0.55	
		I <sub>IN</sub>	Input Leakage Current	0 to 5.5	V <sub>IN</sub> =5.5 V, GND			±1	
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> =5.5 V			1		10	μA
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> =5.5 V, GND			2		20	μA

## AC Electrical Characteristics

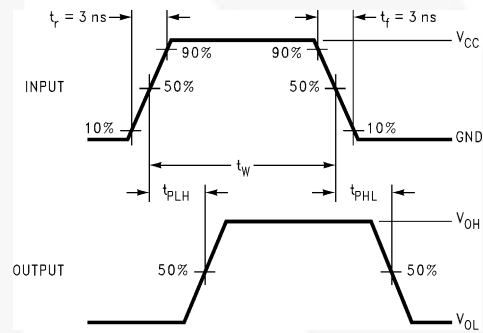
Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =25°C			T <sub>A</sub> =-40 to +85°C		Unit	Figure
				Min.	Typ.	Max.	Min.	Max.		
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay	1.80 ± 0.15	C <sub>L</sub> =15 pF, R <sub>L</sub> =1M Ω	2.0	9.0	18.5	2.0	19.0	ns	Figure 4 Figure 5
		2.50 ± 0.20		0.8	4.9	10.5	0.8	11.0		
		3.30 ± 0.30		0.5	3.5	8.5	0.5	9.0		
		5.00 ± 0.50		0.5	2.5	6.5	0.5	7.0		
		3.30 ± 0.30	C <sub>L</sub> =50 pF, R <sub>L</sub> =500 Ω	1.5	4.1	8.5	1.5	9.0		
		5.00 ± 0.50		0.8	2.9	7.5	0.8	8.0		
C <sub>IN</sub>	Input Capacitance	0.00			4				pF	
C <sub>PD</sub>	Power Dissipation Capacitance <sup>(2)</sup>	3.30			20				pF	Figure 6
		5.00			25					

**Note:**

- C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output lading and operating at 50% duty cycle. C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression: I<sub>CCD</sub>=(C<sub>PD</sub>)(V<sub>CC</sub>)(f<sub>IN</sub>)+(I<sub>CCStatic</sub>).



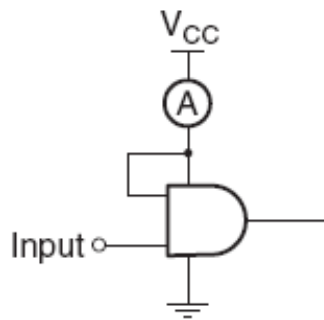
**Figure 4. AC Test Circuit**



**Figure 5. AC Waveforms**

**Notes:**

- C<sub>L</sub> includes load and stray capacitance.
- Input PRR=1.0 MHz; t<sub>w</sub>500 ns.



**Figure 6. I<sub>CCD</sub> Test Circuit**

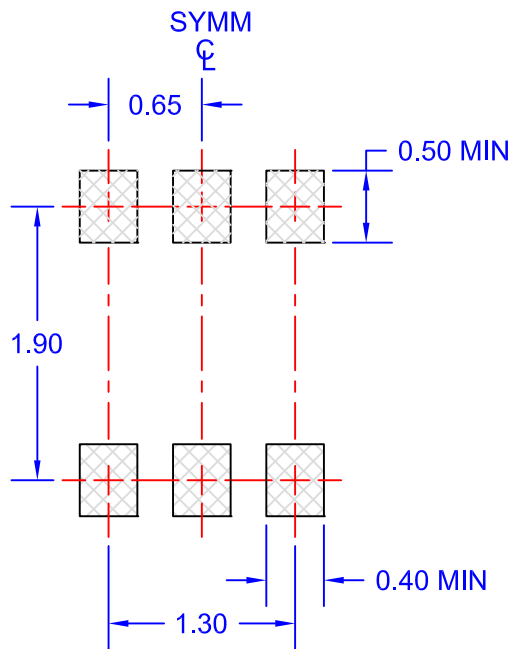
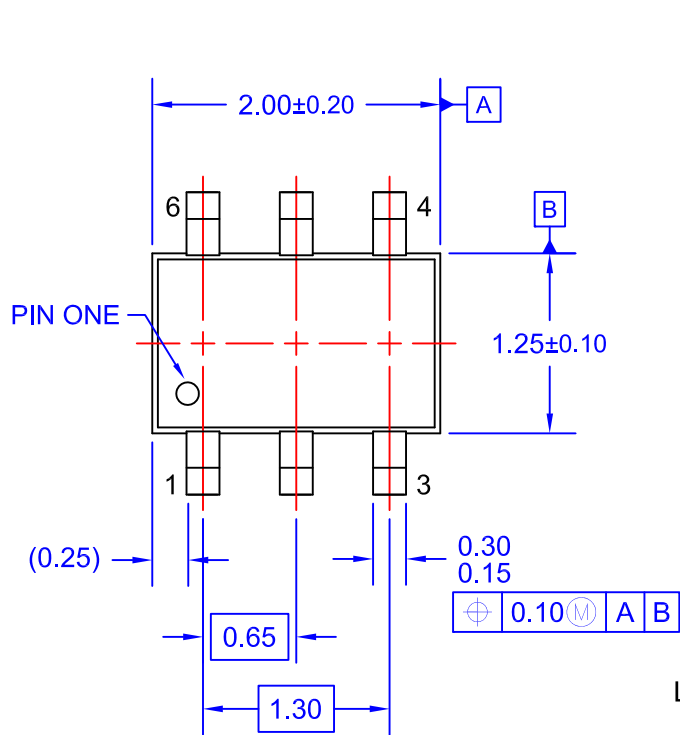
**Note:**

- Input=AC Waveform; t<sub>r</sub>=t<sub>f</sub>=1.8 ns; PRR=10 MHz; Duty Cycle=50%.

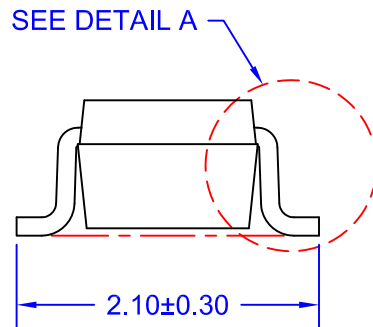
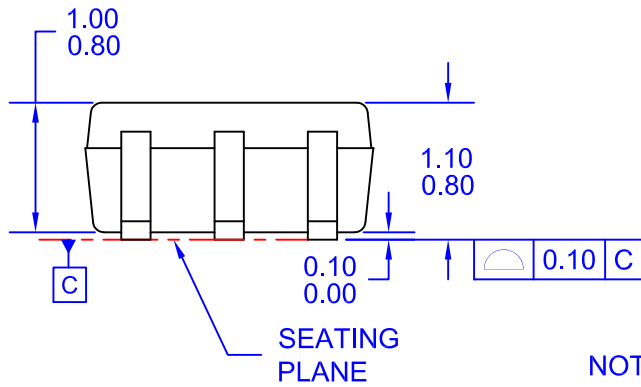
### Tape and Reel Specifications

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
P6X	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
L6X	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed



LAND PATTERN RECOMMENDATION

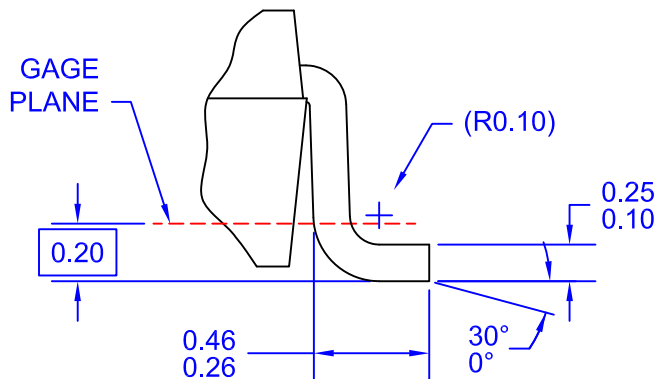


NOTES: UNLESS OTHERWISE SPECIFIED  
 A) THIS PACKAGE CONFORMS TO EIAJ SC-88, 1996.

B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.

D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009

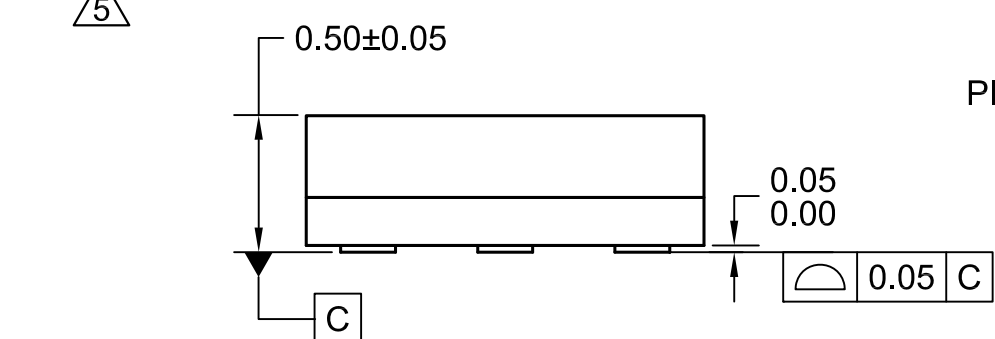
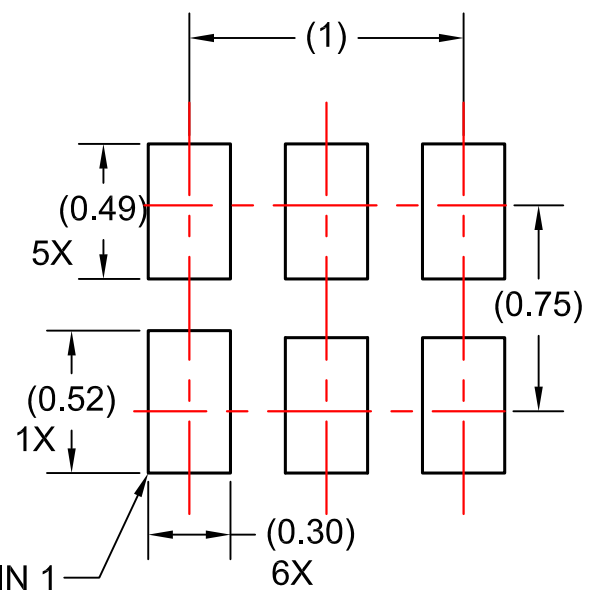
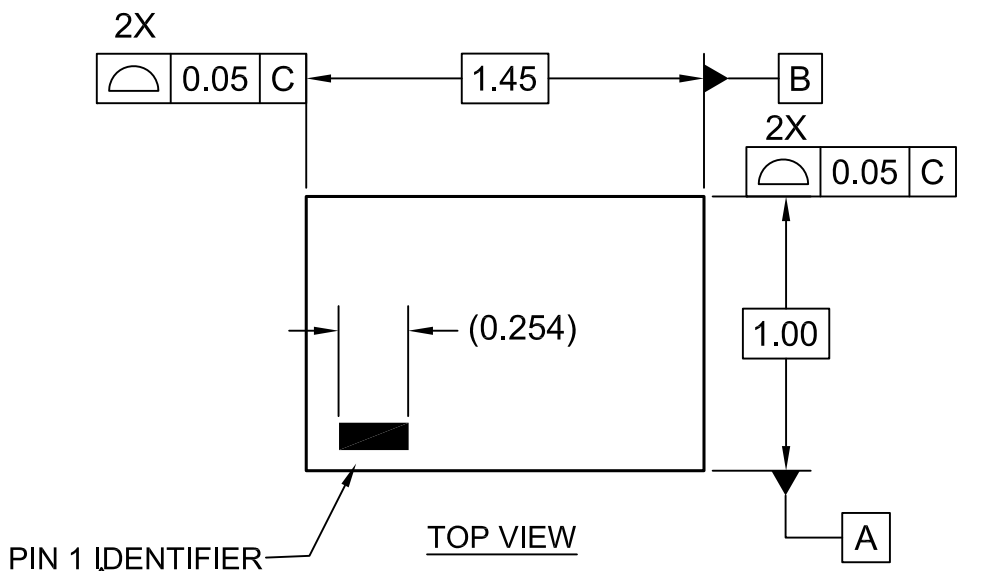
E) DRAWING FILENAME: MKT-MAA06AREV7



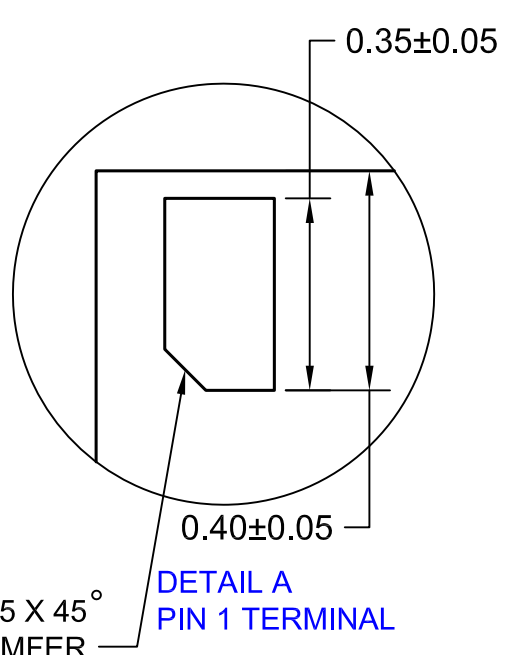
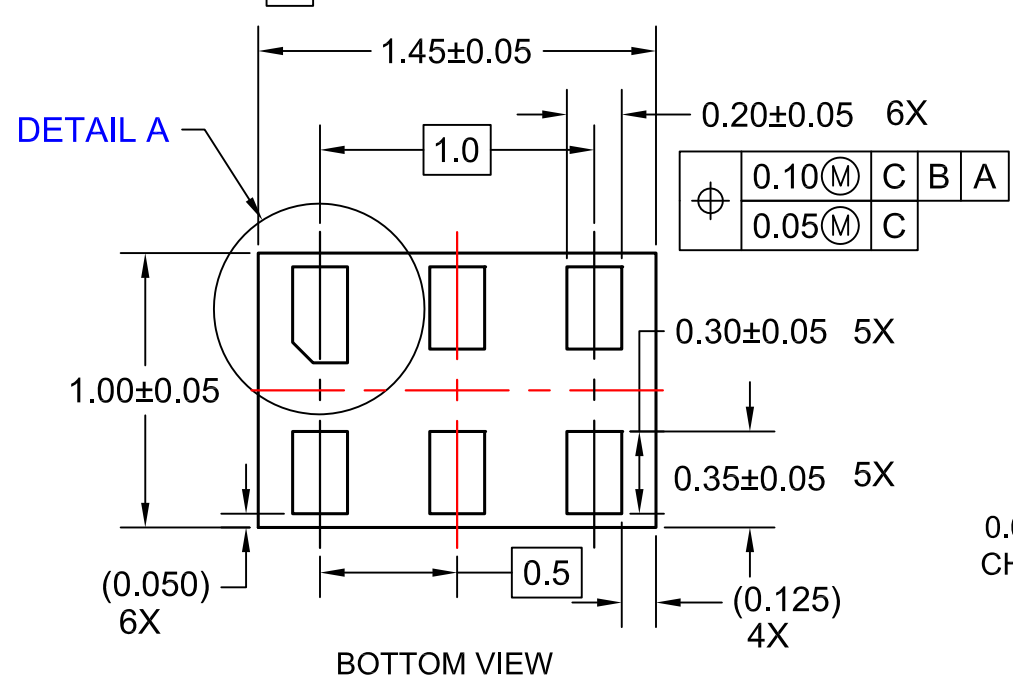
DETAIL A  
 SCALE: 60X







RECOMMENDED LAND PATTERN



NOTES:

1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-2009
4. LANDPATTERN RECOMMENDATION PER FSC
5. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.
6. FILENAME AND REVISION: MAC06AREV6



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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 ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local  
Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[NC7SZ11L6X\\_F131](#)