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## NC7ST08 TinyLogic® HST 2-Input AND Gate

### General Description

The NC7ST08 is a single 2-Input high performance CMOS AND Gate, with TTL-compatible inputs. Advanced Silicon Gate CMOS fabrication assures high speed and low power circuit operation. ESD protection diodes inherently guard both inputs and output with respect to the  $V_{CC}$  and GND rails. High gain circuitry offers high noise immunity and reduced sensitivity to input edge rate. The TTL-compatible inputs facilitate TTL to NMOS/CMOS interfacing. Device performance is similar to MM74HCT but with 1/2 the output current drive of HC/HCT.

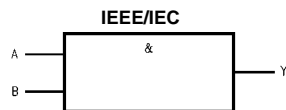
### Features

- Space saving SOT23 or SC70 5-lead package
- Ultra small MicroPak™ leadless package
- High Speed:  
 $t_{PD}$  6 ns (typ),  $V_{CC} = 5V$ ,  $C_L = 15$  pF,  $T_A = 25^\circ C$
- Low Quiescent Power,  $I_{CC} < 1 \mu A$ ,  $V_{CC} = 5.5V$
- Balanced Output Drive; 2 mA  $I_{OL}$ , -2 mA  $I_{OH}$
- TTL-compatible inputs

### Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7ST08M5X	MA05B	8S08	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7ST08P5X	MAA05A	T08	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel
NC7ST08L6X	MAC06A	NN	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

### Logic Symbol



### Pin Descriptions

Pin Names	Description
A, B	Inputs
Y	Output
NC	No Connect

### Function Table

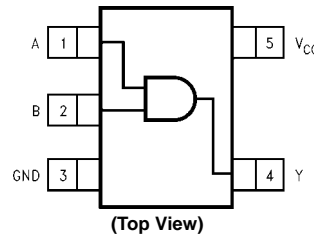
$Y = AB$

Inputs		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

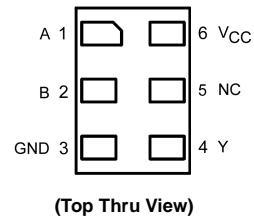
H = HIGH Logic Level      L = LOW Logic Level

### Connection Diagrams

#### Pin Assignments for SC70 and SOT23



#### Pad Assignment for MicroPak



Absolute Maximum Ratings (Note 1)		Recommended Operating Conditions (Note 2)	
Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V	Supply Voltage	4.5V to 5.5V
DC Input Diode Current ( $I_{IK}$ )		Input Voltage ( $V_{IN}$ )	0.0V to $V_{CC}$
@ $V_{IN} < -0.5V$	-20 mA	Output Voltage ( $V_{OUT}$ )	0V to $V_{CC}$
@ $V_{IN} \geq V_{CC} + 0.5V$	+20 mA	Operating Temperature ( $T_A$ )	-40°C to +85°C
DC Input Voltage ( $V_{IN}$ )	-0.5V to $V_{CC} + 0.5V$	Input Rise and Fall Time ( $t_r, t_f$ )	$V_{CC} = 5.0V$ 0 ns to 500 ns
DC Output Diode Current ( $I_{OK}$ )		Thermal Resistance ( $\theta_{JA}$ )	
$V_{OUT} < -0.5V$	-20 mA	SOT23-5	300°C/W
$V_{OUT} > V_{CC} + 0.5V$	+20 mA	SC70-5	425°C/W
Output Voltage ( $V_{OUT}$ )	-0.5V to $V_{CC} + 0.5V$		
DC Output Source or Sink Current ( $I_{OUT}$ )	$\pm 12.5$ mA		
DC $V_{CC}$ or Ground Current per Supply Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 25$ mA		
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C		
Junction Temperature ( $T_J$ )	150°C		
Lead Temperature ( $T_L$ ); (Soldering, 10 seconds)	260°C		
Power Dissipation ( $P_D$ ) @+85°C			
SOT23-5	200 mW		
SC70-5	150 mW		

**Note 1:** Absolute Maximum Ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of circuits outside the databook specifications.

**Note 2:** Unused inputs must be held HIGH or LOW. They may not float.

**DC Electrical Characteristics**

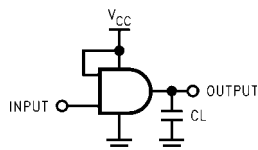
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$			$T_A = 40^\circ C$ to $+85^\circ C$		Units	Conditions
			Min	Typ	Max	Min	Max		
$V_{IH}$	HIGH Level Input Voltage	4.5-5.5	2.0			2.0		V	
$V_{IL}$	LOW Level Input Voltage	4.5-5.5			0.8		0.8	V	
$V_{OH}$	HIGH Level Output Voltage	4.5 4.5	4.4 4.18	4.5 4.35		4.4 4.13		V	$I_{OH} = -20 \mu A$ $I_{OH} = -2 mA$ $V_{IN} = V_{IH}$
$V_{OL}$	LOW Level Output Voltage	4.5 4.5		0 0.10	0.1 0.26		0.1 0.33	V	$I_{OL} = 20 \mu A$ $I_{OL} = 2 mA$ $V_{IN} = V_{IL}$
$I_{IN}$	Input Leakage Current	5.5			$\pm 0.1$		$\pm 1.0$	$\mu A$	$0 \leq V_{IN} \leq 5.5V$
$I_{CC}$	Quiescent Supply Current	5.5			1.0		10.0	$\mu A$	$V_{IN} = V_{CC}$ or GND
$I_{CCT}$	$I_{CC}$ per Input	5.5			2.0		2.9	mA	One Input $V_{IN} = 0.5V$ or $2.4V$ , Other Input $V_{CC}$ or GND

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = +25°C			T <sub>A</sub> = 40°C to +85°C		Units	Conditions	Figure Number
			Min	Typ	Max	Min	Max			
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay	5.0		4	12			ns	C <sub>L</sub> = 15 pF	Figures 1, 3
		4.5		6	16		20		C <sub>L</sub> = 50 pF	
		5.5		5	14		18			
t <sub>TLH</sub> , t <sub>THL</sub>	Output Transition Time	5.0		4	10			ns	C <sub>L</sub> = 15 pF	Figures 1, 3
		4.5		11	25		31		C <sub>L</sub> = 50 pF	
		5.5		10	21		26			
C <sub>IN</sub>	Input Capacitance	Open			10			pF		
C <sub>PD</sub>	Power Dissipation Capacitance	5.0		6				pF	(Note 3)	Figure 2

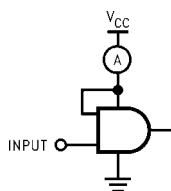
**Note 3:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2.) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression:  
 $I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CCstatic})$ .

## AC Loading and Waveforms



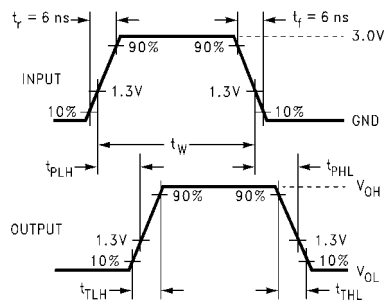
C<sub>L</sub> includes load and stray capacitance  
 Input PRR = 1.0 MHz; t<sub>w</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



Input = AC Waveform; PRR = variable; Duty Cycle = 50%

**FIGURE 2. I<sub>CCD</sub> Test Circuit**



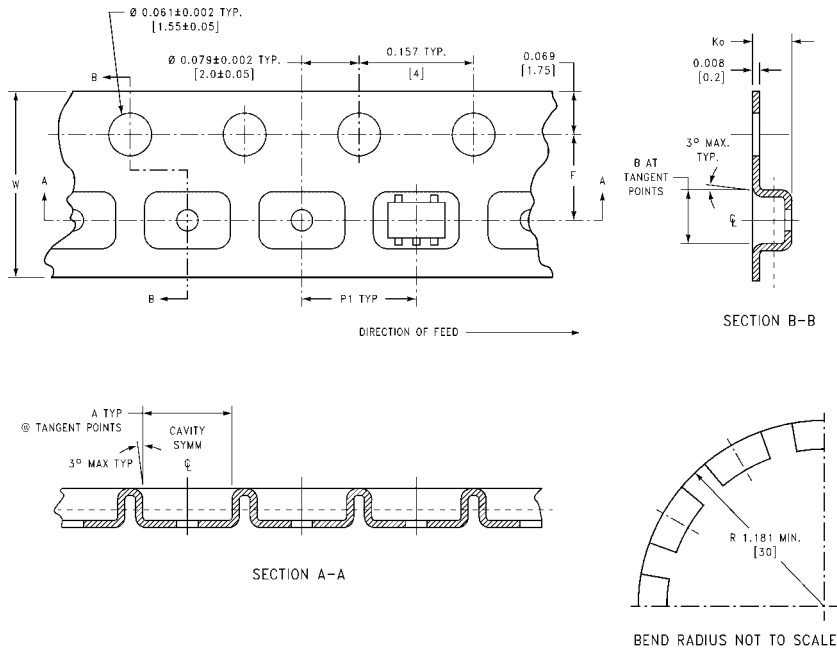
**FIGURE 3. AC Waveforms**

### Tape and Reel Specification

**TAPE FORMAT for SC70 and SOT23**

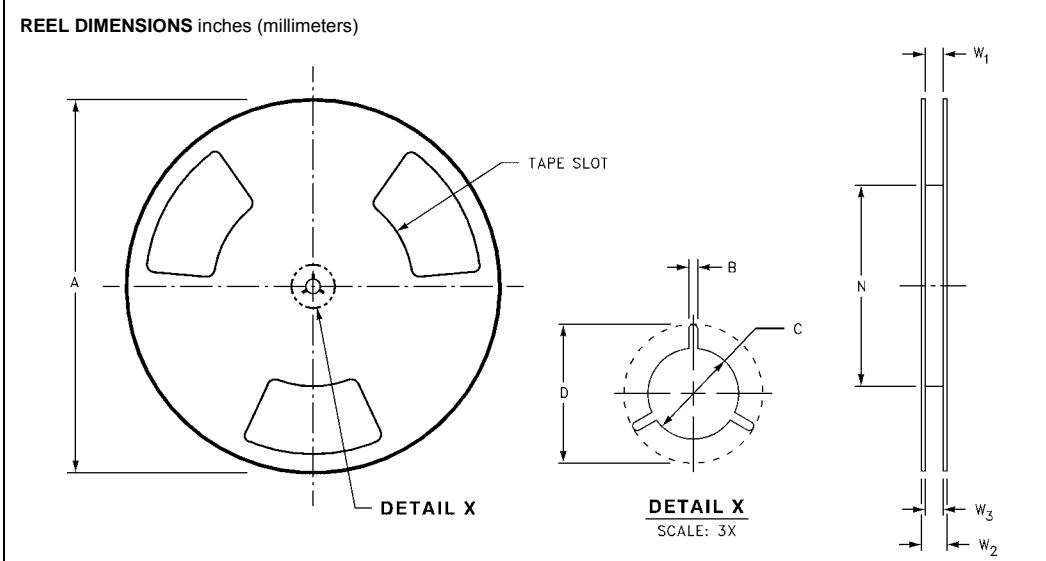
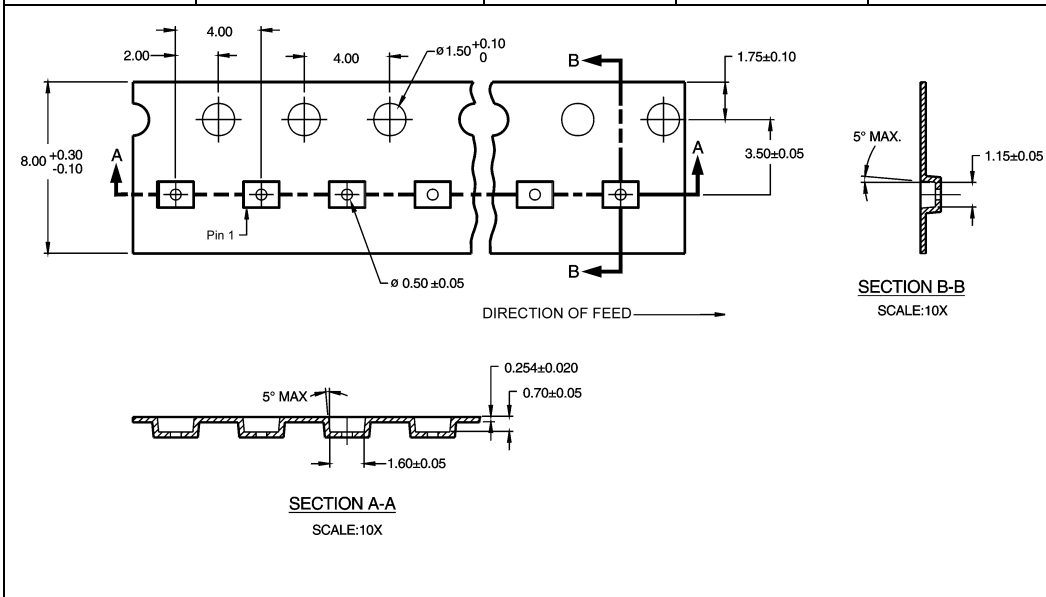
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
M5X, P5X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

**TAPE DIMENSIONS** inches (millimeters)



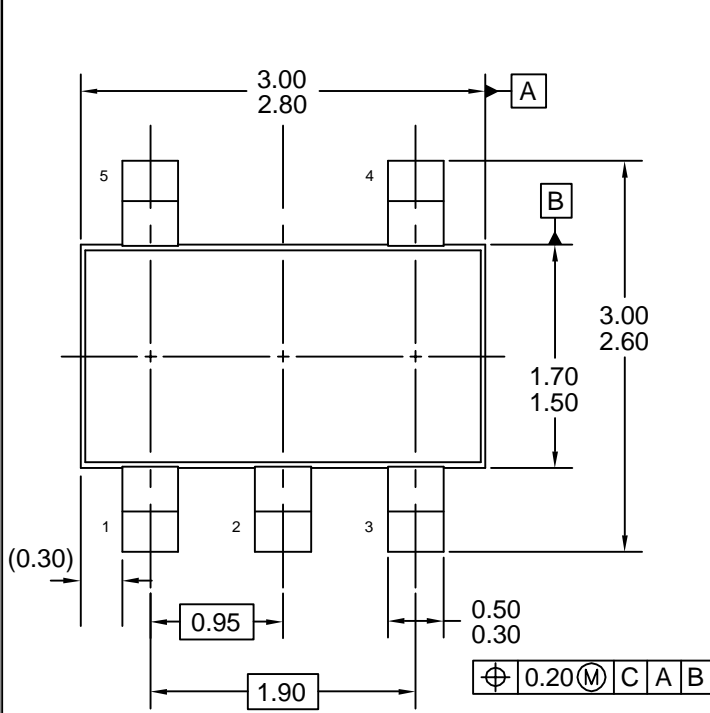
Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>0</sub>	DIM P1	DIM W
SC70-5	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ± 0.002 (3.5 ± 0.05)	0.055 ± 0.004 (1.4 ± 0.11)	0.157 (4)	0.315 ± 0.012 (8 ± 0.3)

Tape and Reel Specification (Continued)				
TAPE FORMAT for MircoPak				
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
L6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

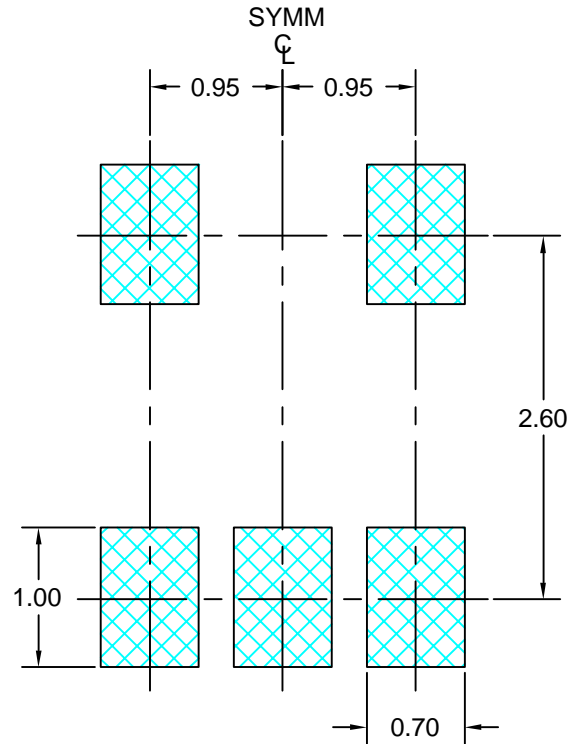


Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	$0.331 + 0.059/-0.000$ ( $8.40 + 1.50/-0.00$ )	0.567 (14.40)	$W1 + 0.078/-0.039$ ( $W1 + 2.00/-1.00$ )

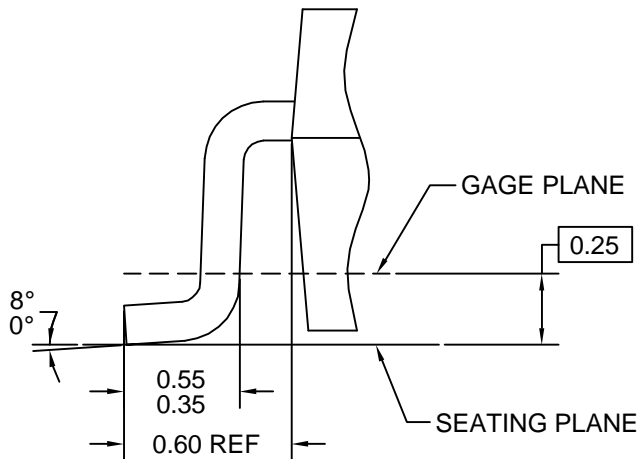
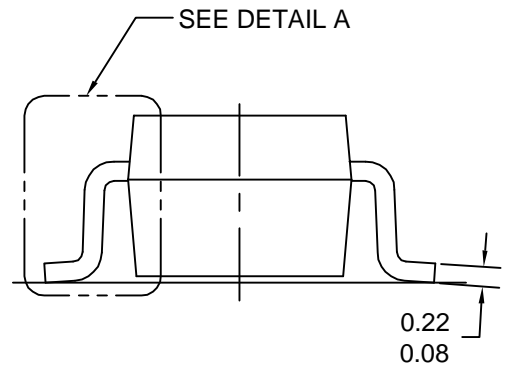
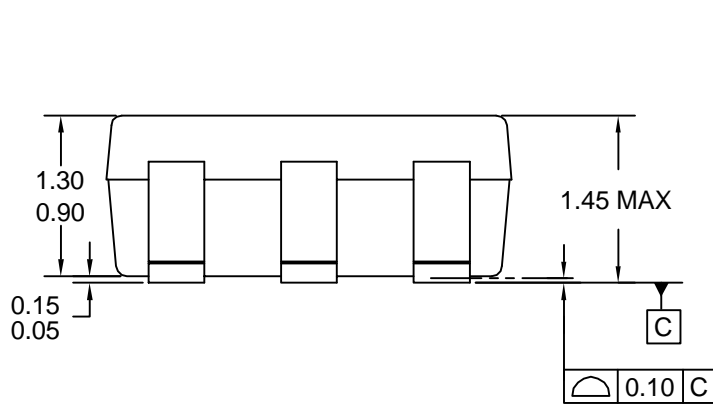
REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
A	RELEASE TO DOCUMENT CONTROL	11208	12/07/95
B	REDRAW PER CURRENT STANDARD	11531	07/31/96
C	REDRAW AS PER JEDEC NEW ISSUE FROM A TO B. CHANGE DRAWING TEMPLATE FROM LANDSCAPE TO PORTRAIT. CHANGE DIMENSION UNIT FROM INCHES TO MILLIMETERS.		
4	CHANGED BOTTOM VIEW TO TOP VIEW. REMOVED DATE FROM NOTES. ADDED NOTE C. CHANGED FONT STYLE		27 JUNE 07
5	BODY THICKNESS, TERMINAL THICKNESS, PACKAGE HEIGHT ADJUSTED TO MEET JEDEC STD		17 JULY 07



TOP VIEW



LAND PATTERN RECOMMENDATION



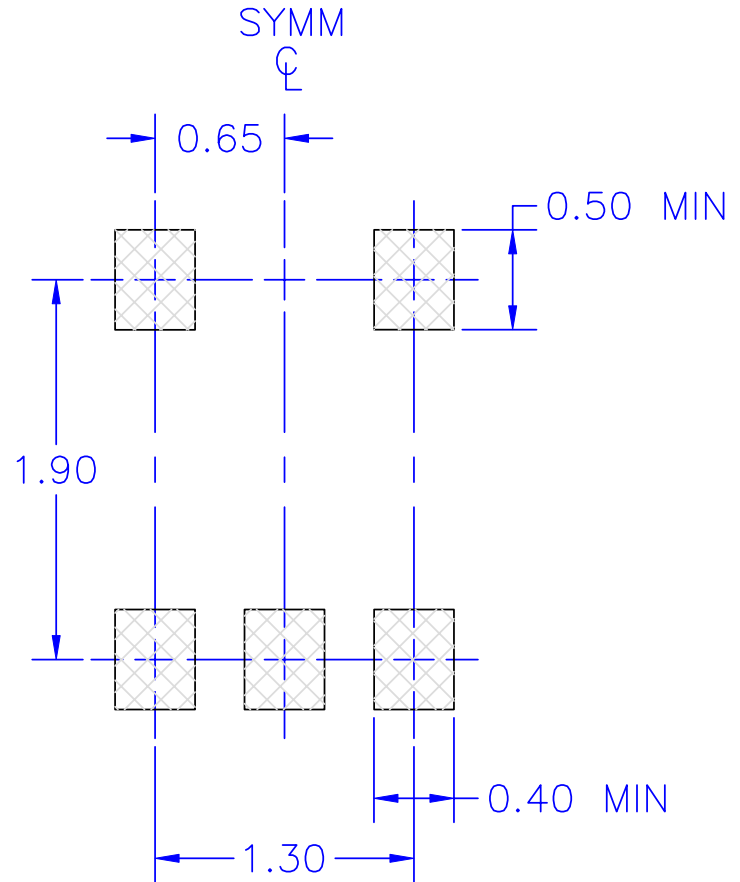
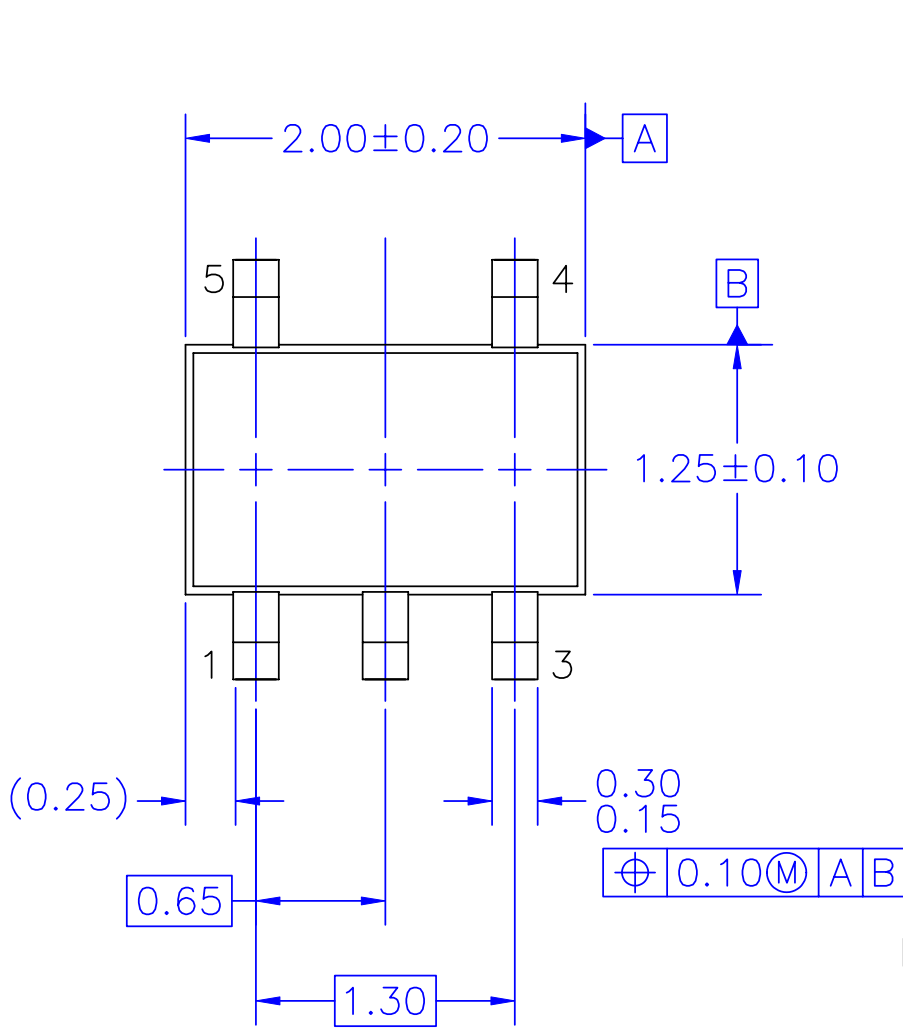
NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MO-178, ISSUE B, VARIATION AA,
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) MA05Brev5

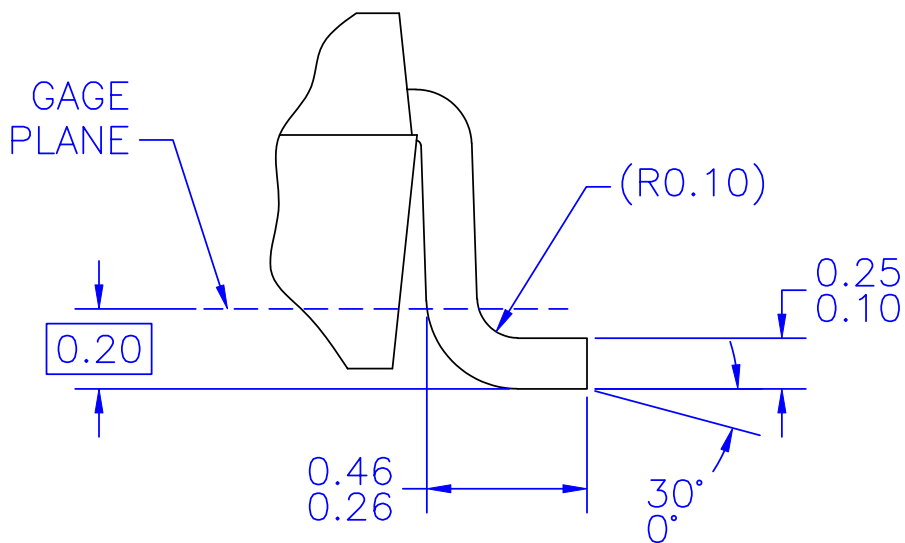
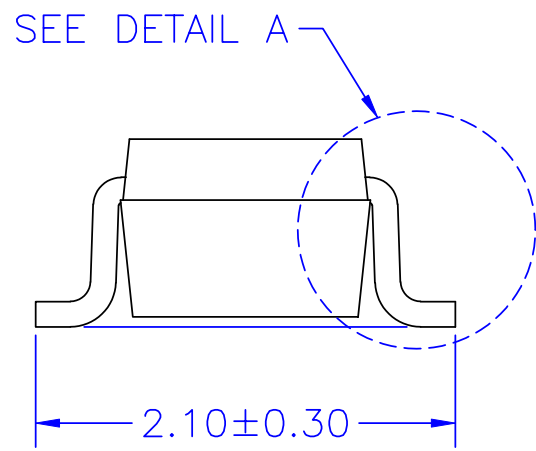
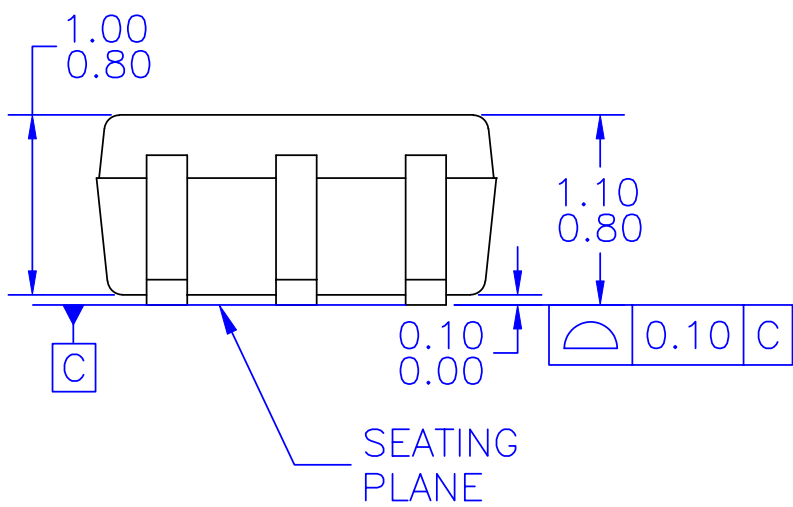
APPROVALS	DATE	FAIRCHILD SEMICONDUCTOR™			
DRAWN: L.HUEBENER	17 JULY 07	5LD,SOT23,JEDEC MO-178,1.6MM			
CHECKED: H.ALLEN	19 JULY 07				
APPROVED:					
		SCALE: NA	SIZE: NA	DRAWING NUMBER: MKT-MA05B	REV: 5
		FORMERLY: N/A	SHEET: 1 OF 1		

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REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
A	RELEASE TO DOCUMENT CONTROL			
B	REDRAW AS PER FAIRCHILD TEMPLATE, REDUCE LEAD SPREAD DISTANCE FROM 0.083±0.004 TO 0.082±0.004.			
C	COMPLETE REDRAW AS PER EIAJ SC88A	57500	JUL.22,1998	H. ALLEN
D	REDRAW AS PER STANDARD DRAWING TEMPLATE; ADD MIN FOOT LENGTH DIM; CHANGE DIMENSION STYLE FROM DEVIATION TO LIMITS. REARRANGE DWG TITLE. ADD DWG NUMBER&REV. AT LOWER LEFT CORNER OF TEMPLATE.	04899	AUG.02,1999	MAG
5	CHG LD SPREAD DIM FR 2.10±0.10 TO 2.10±0.30; DETAIL A: CHG LD TIP DIM FR 0.38 TO 0.26; REM LD DIM (0.43)	CB/013/07	17JAN2007	SR



LAND PATTERN RECOMMENDATION



DETAIL A  
SCALE: 60X

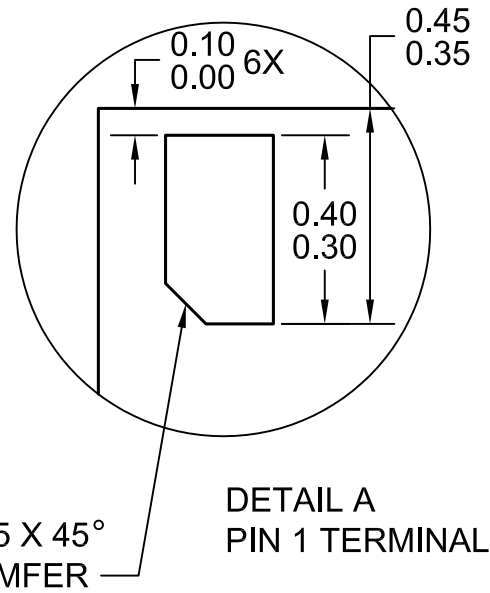
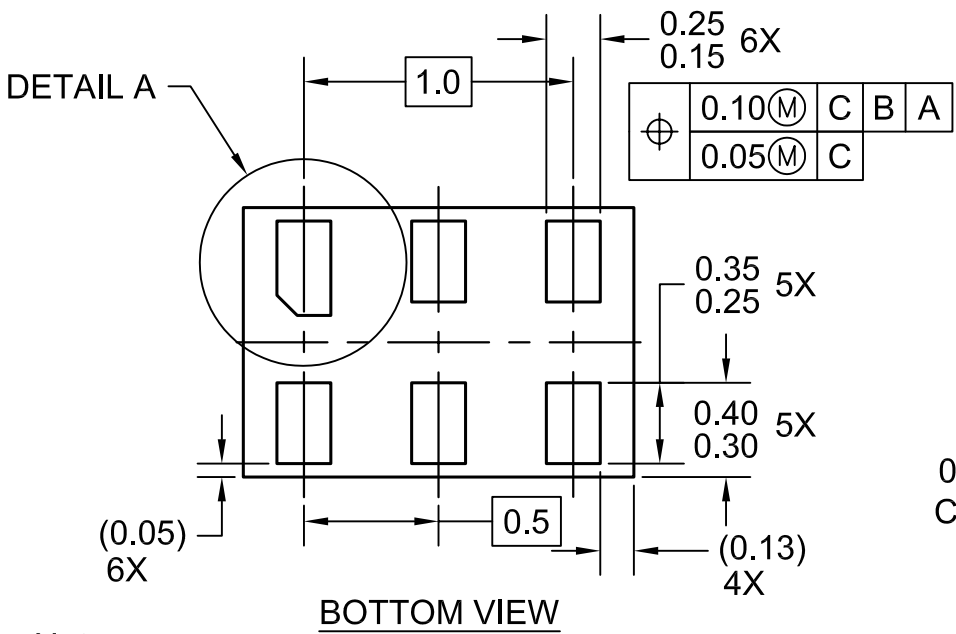
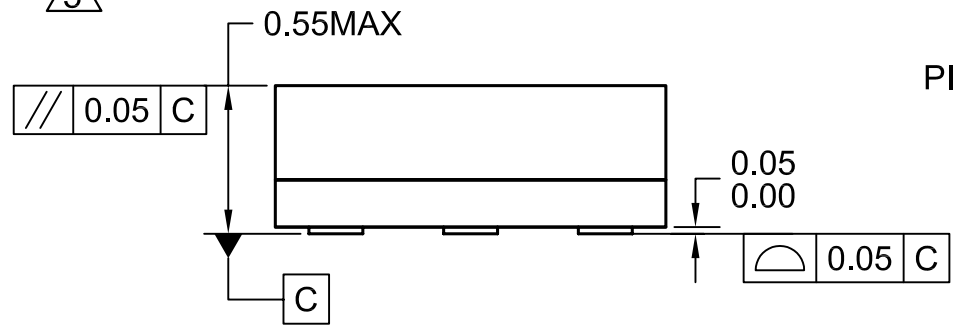
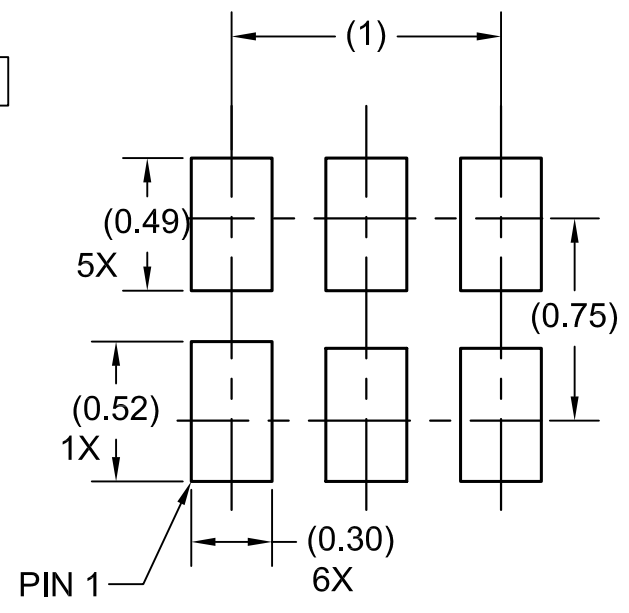
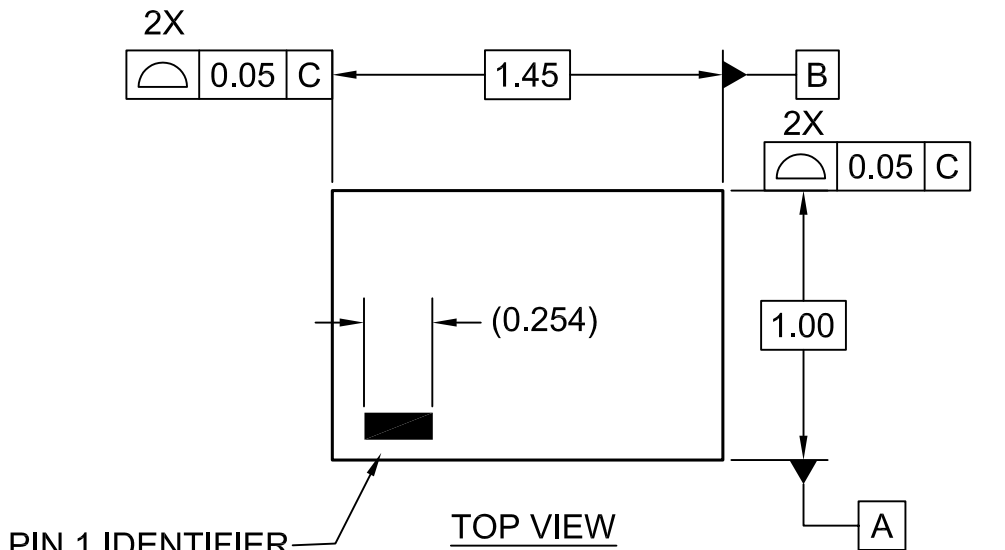
NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ SC-88A, 1996.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.

MAA05AREV5

APPROVALS	DATE	FAIRCHILD SEMICONDUCTOR™		
DRAWN: J. GOMEZ	17JAN2007	CEBU PHILIPPINES		
CHECKED: B.M. RULONA		5LD, SC-70, EIAJ SC-88A, 1.25MM WIDE		
APPROVED: M.R. GESTOLE		SCALE 30:1	SIZE A3	DRAWING NUMBER MKT-MAA05A
G.S. BAJE		FORMERLY: N/A		REV 5
		SHEET : 1 OF 1		








**Notes:**

1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994
4. FILENAME AND REVISION: MAC06AREV4
5. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.



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Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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