

## 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.

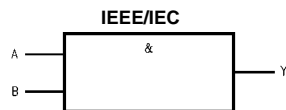
### Features

- 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

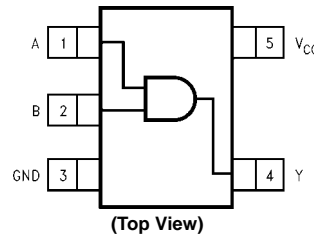
$Y = AB$

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

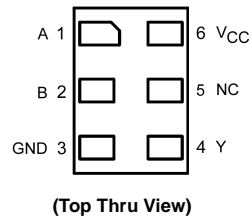
H = HIGH Logic Level      L = LOW Logic Level

### Connection Diagrams

#### Pin Assignments for SC70 and SOT23



#### Pad Assignment for MicroPak



TinyLogic® is a registered trademark of Fairchild Semiconductor Corporation.  
MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

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**

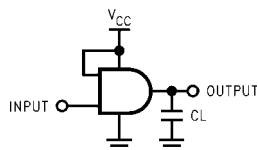
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$			$T_A = 40^\circ C$ to $+85^\circ C$		Units	Conditions
			Min	Typ	Max	Min	Max		
$V_{IH}$	HIGH Level Input Voltage	4.5-5.5	2.0			2.0		V	
$V_{IL}$	LOW Level Input Voltage	4.5-5.5			0.8		0.8	V	
$V_{OH}$	HIGH Level Output Voltage	4.5 4.5	4.4 4.18	4.5 4.35		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

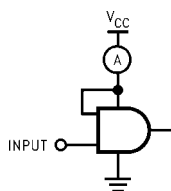
**Note 3:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2.) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating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

## AC Loading and Waveforms



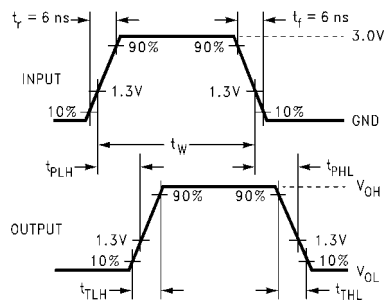
C<sub>L</sub> includes load and stray capacitance  
 Input PRR = 1.0 MHz; t<sub>w</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



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

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



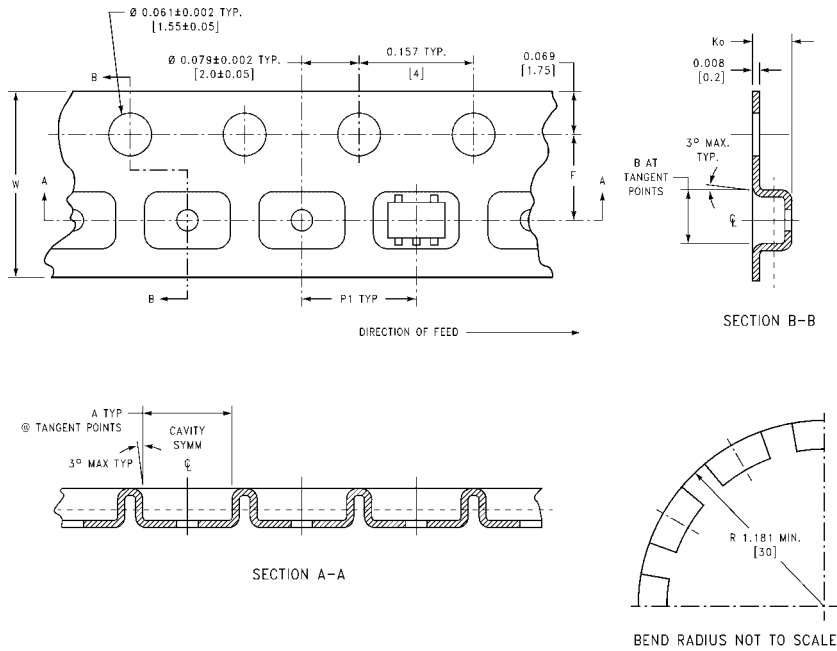
**FIGURE 3. AC Waveforms**

### Tape and Reel Specification

**TAPE FORMAT for SC70 and SOT23**

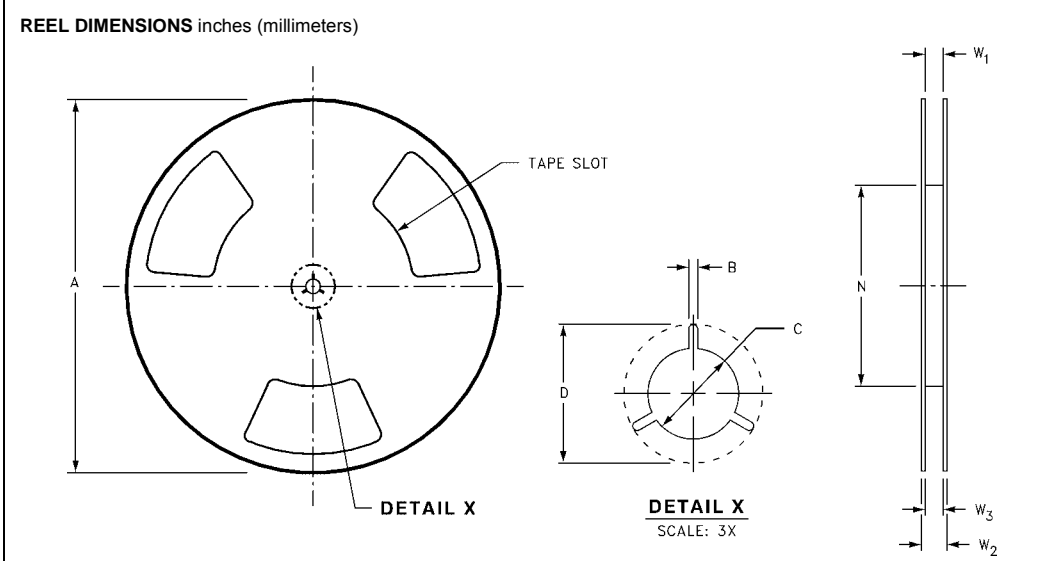
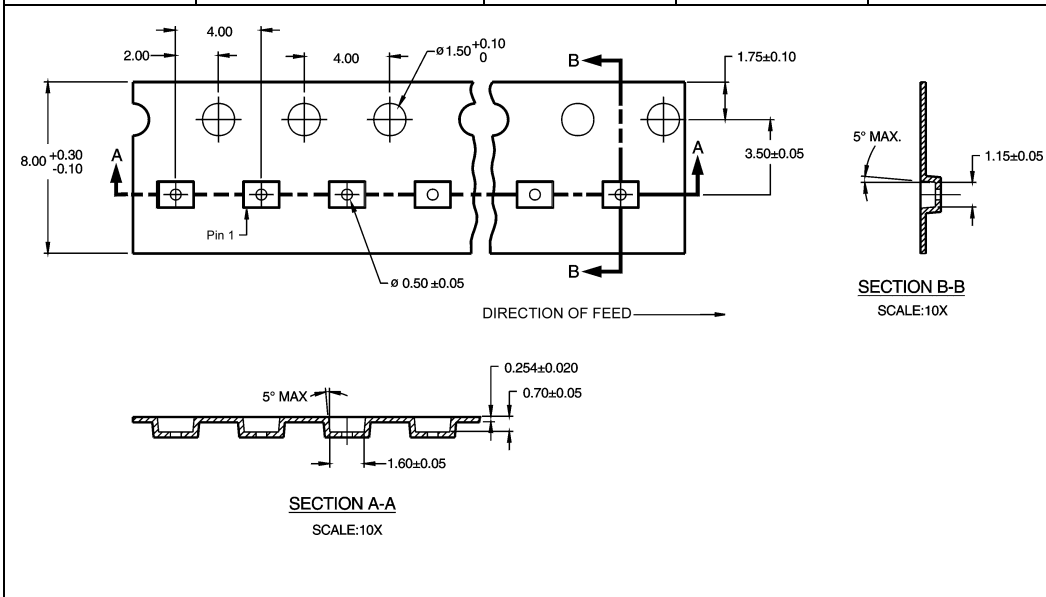
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
M5X, P5X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

**TAPE DIMENSIONS inches (millimeters)**



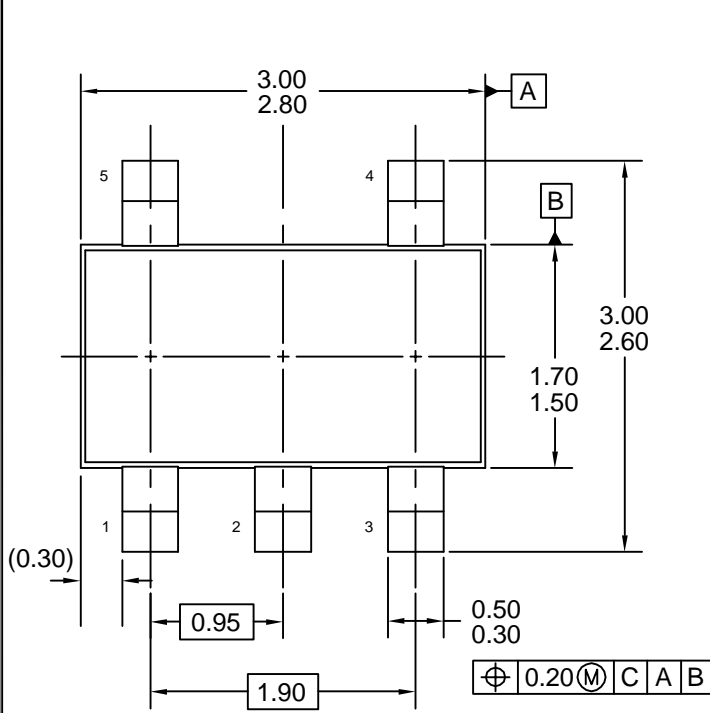
Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>0</sub>	DIM P1	DIM W
SC70-5	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ± 0.002 (3.5 ± 0.05)	0.055 ± 0.004 (1.4 ± 0.11)	0.157 (4)	0.315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

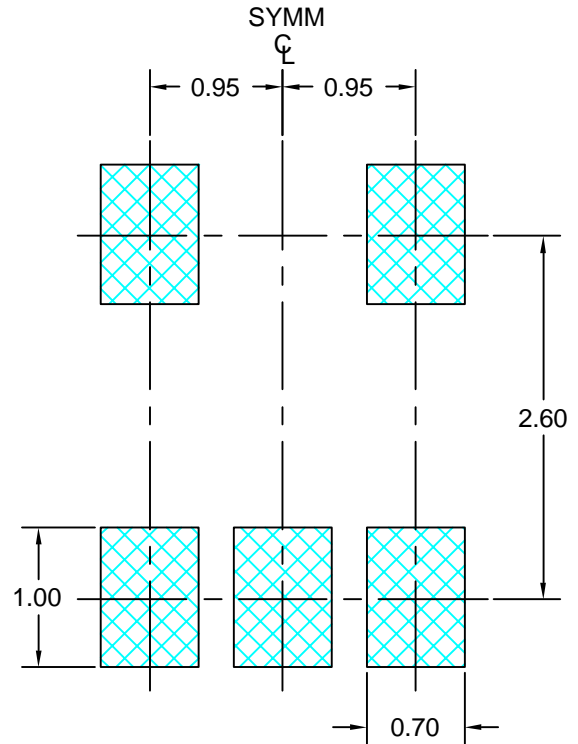


Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/-0.000 (8.40 + 1.50/-0.00)	0.567 (14.40)	W1 + 0.078/-0.039 (W1 + 2.00/-1.00)

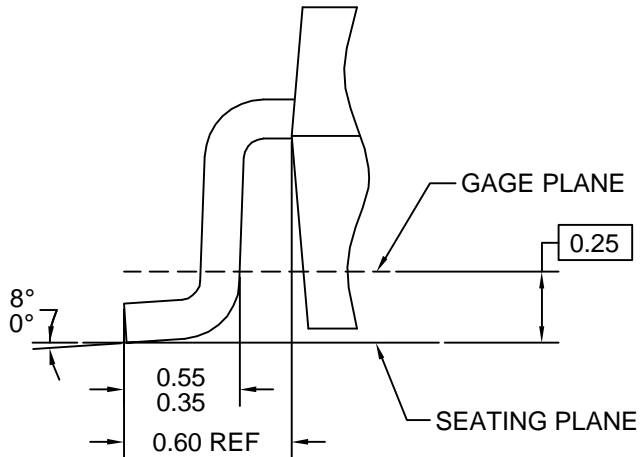
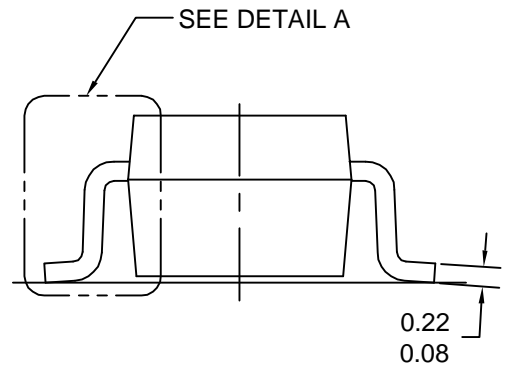
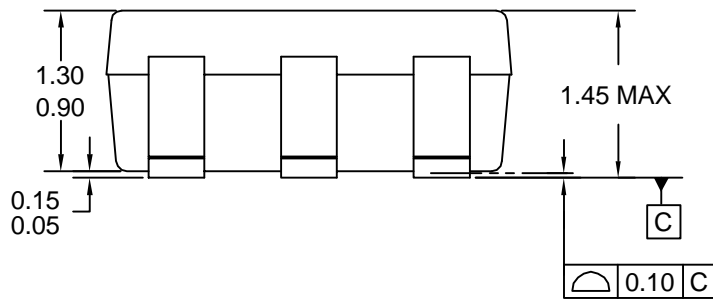
REVISIONS			
LTR	DESCRIPTION	E.C.N	DATE
A	RELEASE TO DOCUMENT CONTROL	11208	12/07/95
B	REDRAW PER CURRENT STANDARD	11531	07/31/96
C	REDRAW AS PER JEDEC NEW ISSUE FROM A TO B. CHANGE DRAWING TEMPLATE FROM LANDSCAPE TO PORTRAIT. CHANGE DIMENSION UNIT FROM INCHES TO MILLIMETERS.		
4	CHANGED BOTTOM VIEW 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



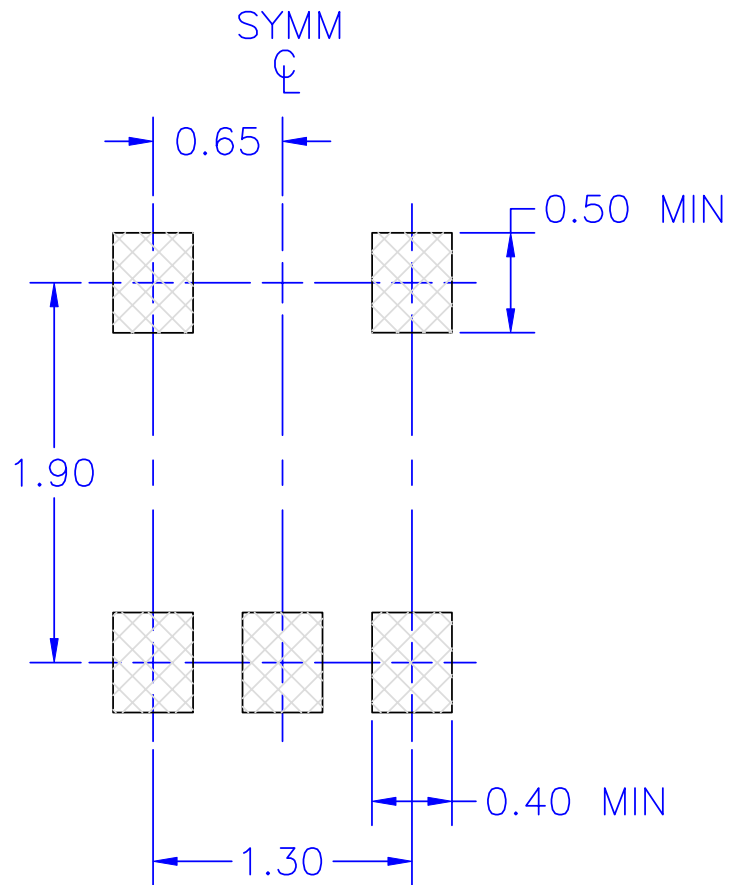
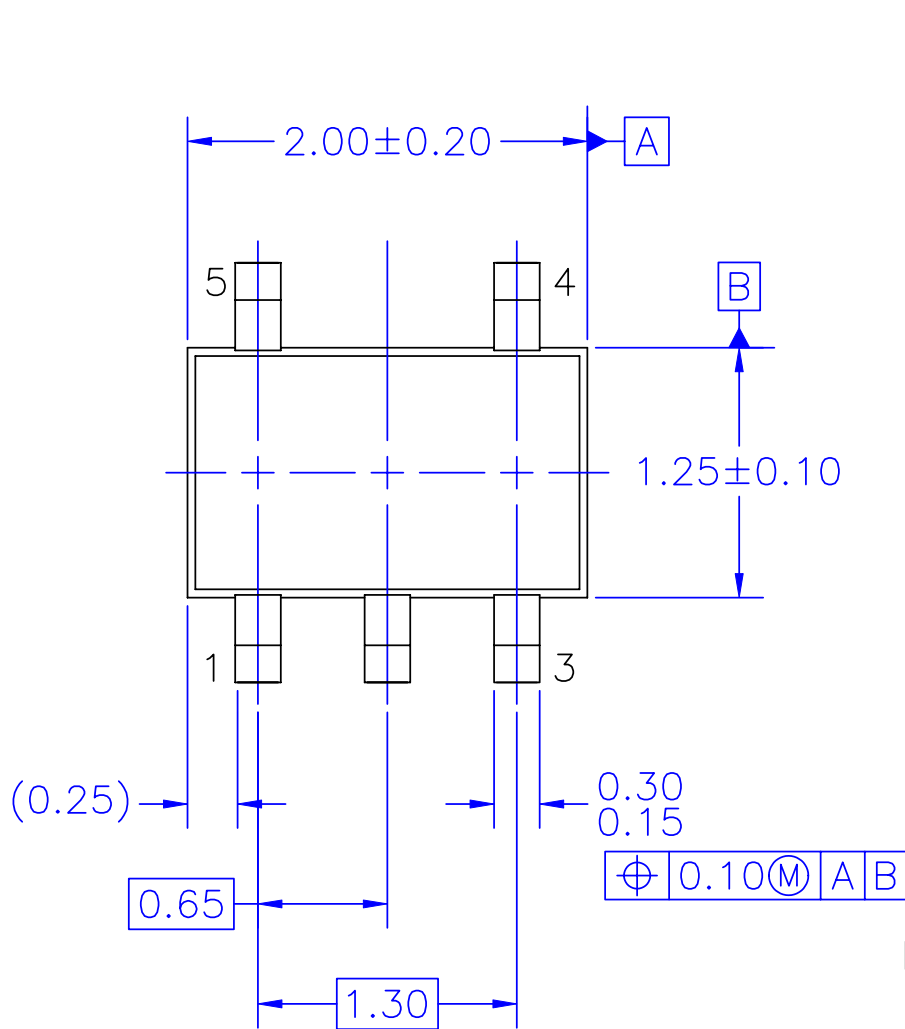
NOTES: UNLESS OTHERWISE SPECIFIED

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

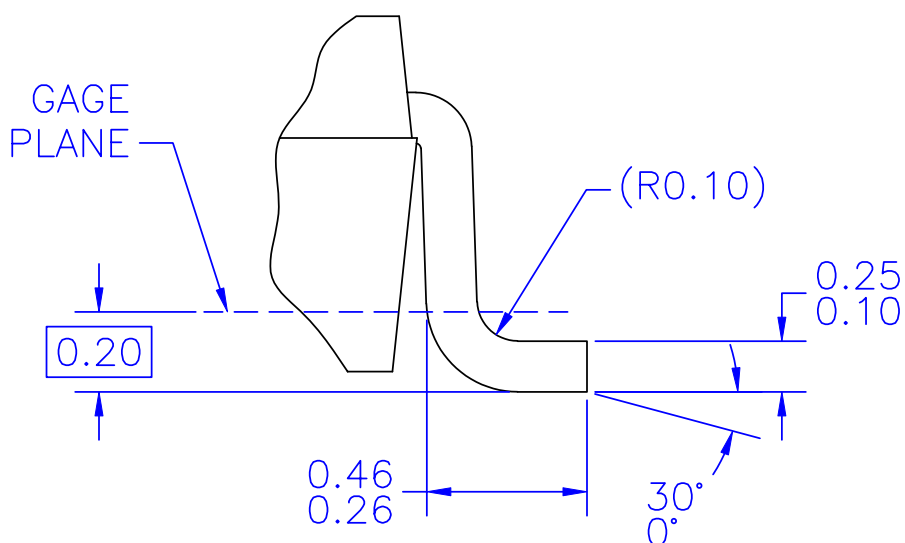
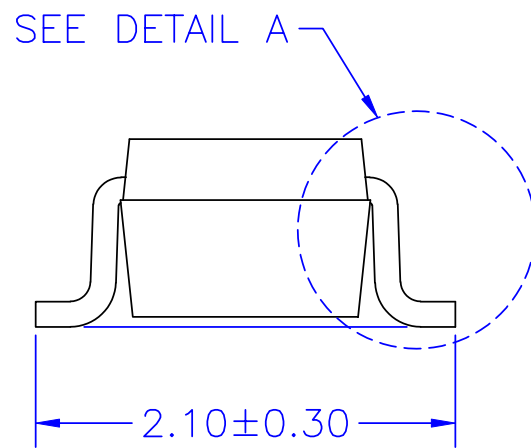
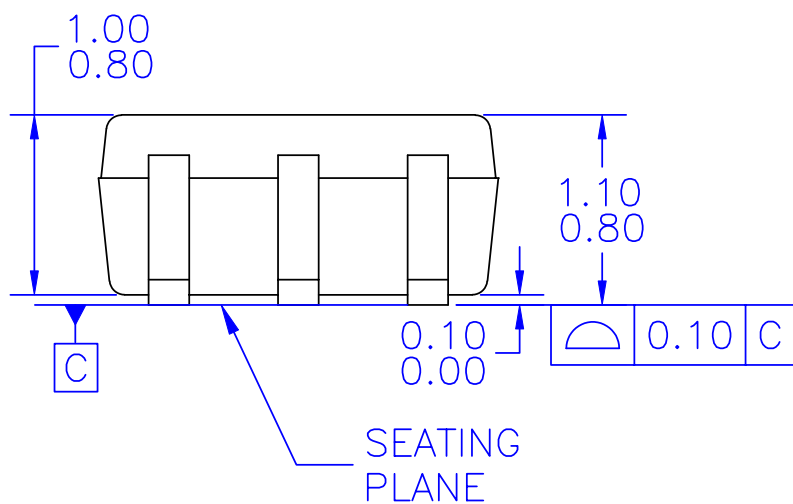
APPROVALS	DATE	
DRAWN: L.HUEBENER CHECKED: H.ALLEN APPROVED:	17 JULY 07 19 JULY 07	
5LD,SOT23,JEDEC MO-178,1.6MM		SCALE: NA SIZE: NA DRAWING NUMBER: MKT-MA05B REV: 5
		FORMERLY: N/A SHEET: 1 OF 1

THIS DRAWING IS THE PROPERTY OF FAIRCHILD SEMICONDUCTOR CORPORATION. NO USE THEREOF SHALL BE MADE OTHER THAN AS A REFERENCE FOR PROPOSALS AS SUBMITTED TO FAIRCHILD SEMICONDUCTOR CORPORATION FOR JOBS TO BE EXECUTED IN CONFORMITY WITH SUCH PROPOSALS UNLESS THE CONSENT OF SAID FAIRCHILD SEMICONDUCTOR CORPORATION HAS PREVIOUSLY BEEN OBTAINED. NO PART OF THIS DRAWING SHALL BE COPIED OR DUPLICATED OR ITS CONTENTS DISCLOSED. THE INFORMATION CONTAINED ON THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY.

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



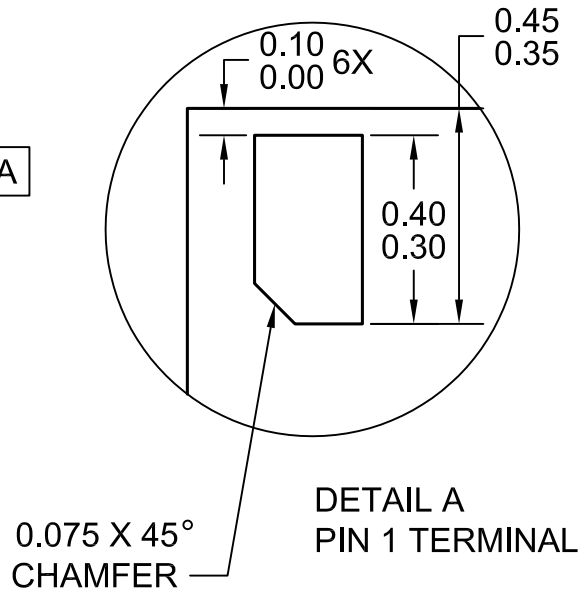
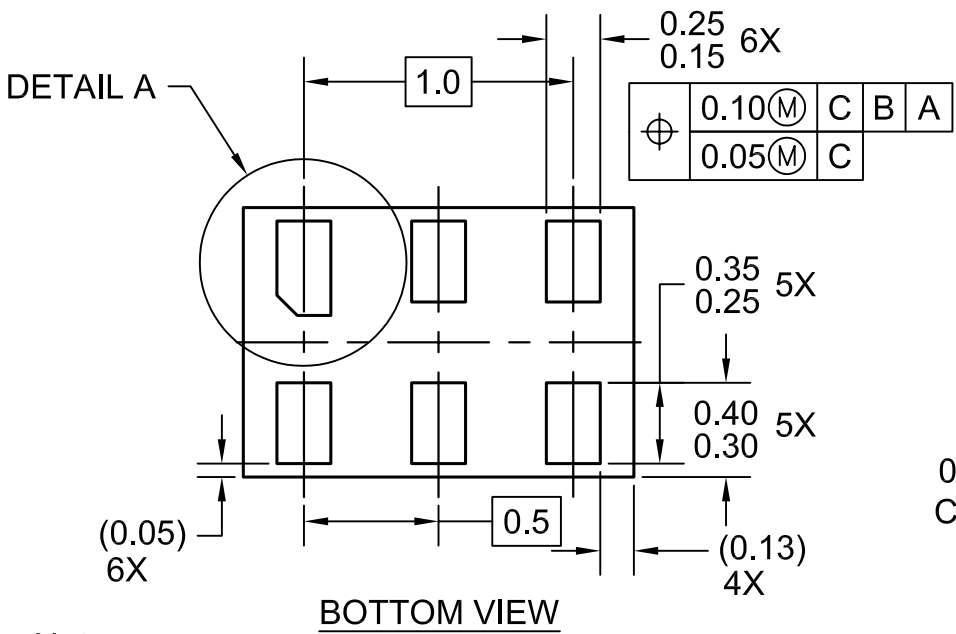
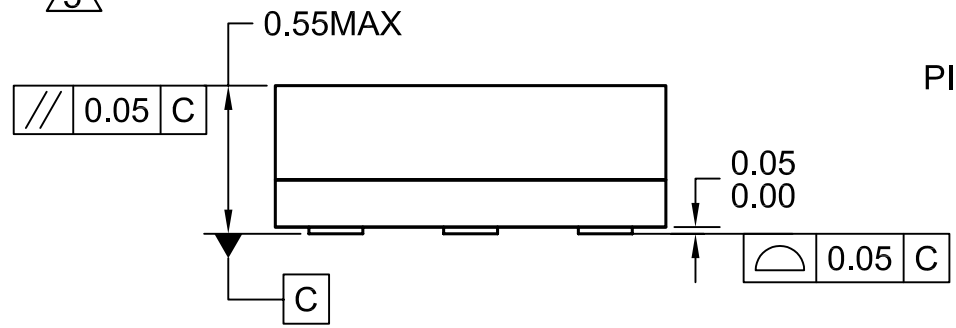
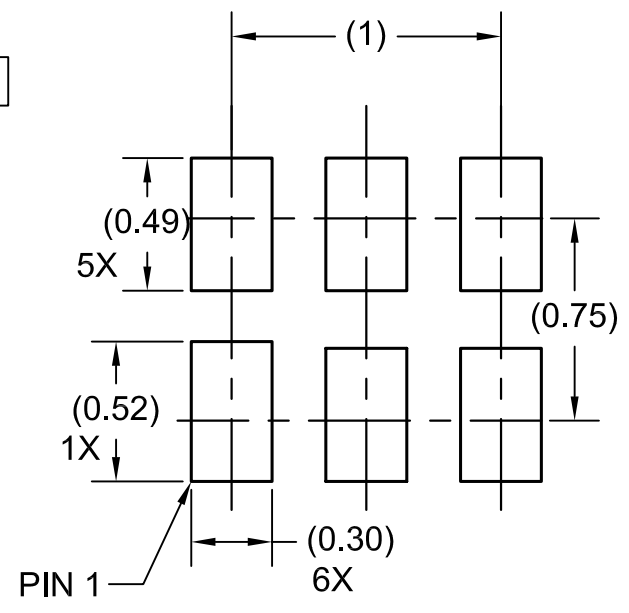
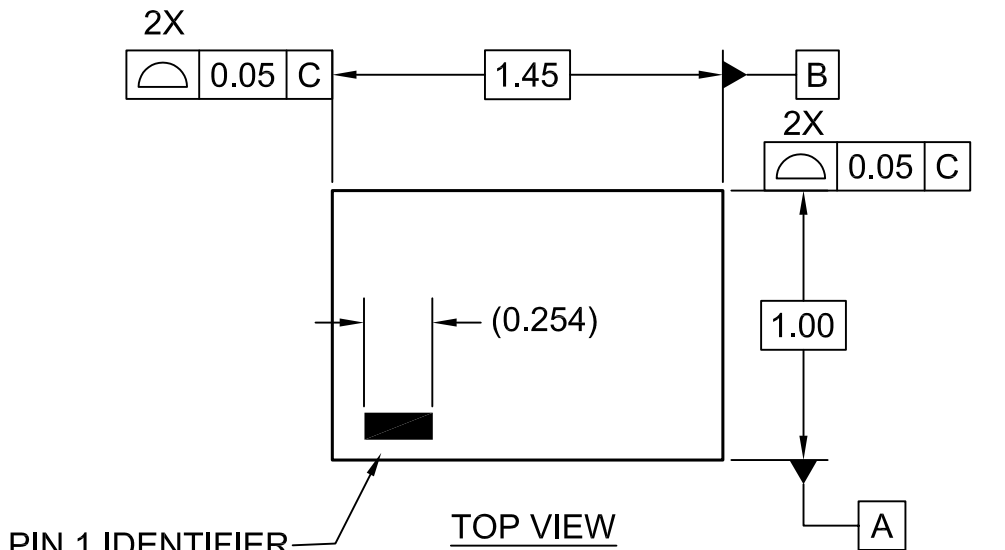
DETAIL A  
SCALE: 60X

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.





**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- |                          |  |                                       |                      |
|--------------------------|--|---------------------------------------|----------------------|
| 2Cool™                   | F-PFS™   | PowerTrench®                          | The Power Franchise® |
| AccuPower™               | FRFET®   | PowerXS™                              |                      |
| AX-CAP™*                 | Global Power Resource™                         | Programmable Active Droop™            | TinyBoost™           |
| BitSiC™                  | GreenBridge™                                   | QFET®                                 | TinyBuck™            |
| Build it Now™            | Green FPS™                                     | QS™                                   | TinyCalc™            |
| CorePLUS™                | Green FPS™ e-Series™                           | Quiet Series™                         | TinyLogic®           |
| CorePOWER™               | Gmax™  | RapidConfigure™                       | TINYOPTO™            |
| CROSSVOL™                | GTO™   |                                       | TinyPower™           |
| CTL™                     | IntelliMAX™                                    | Saving our world, 1mW/W/kW at a time™ | TinyPWM™             |
| Current Transfer Logic™  | ISOPLANAR™                                     | SignalWise™                           | TinyWire™            |
| DEUXPEED®                | Making Small Speakers Sound Louder and Better™ | SmartMax™                             | TranSiC™             |
| Dual Cool™               | MegaBuck™                                      | SMART START™                          | TriFault Detect™     |
| EcoSPARK®                | MICROCOUPLER™                                  | Solutions for Your Success™           | TRUECURRENT®*        |
| EfficientMax™            | MicroFET™                                      | SPM®                                  | μSerDes™             |
| ESBC™                    | MicroPak™                                      | STEALTH™                              |                      |
|                          | MicroPak2™                                     | SuperFET®                             | UHC®                 |
| Fairchild®               | MillerDrive™                                   | SuperSOT™-3                           | Ultra FRFET™         |
| Fairchild Semiconductor® | MotionMax™                                     | SuperSOT™-6                           | UniFET™              |
| FACT Quiet Series™       | mWSaver™                                       | SupreMOS®                             | VCX™                 |
| FACT®                    | OptoHiT™                                       | SyncFET™                              | VisualMax™           |
| FAST®                    | OPTOLOGIC®                                     | Sync-Lock™                            | VoltagePlus™         |
| FastvCore™               | OPTOPLANAR®                                    |                                       | XS™                  |
| FETBench™                |  |                                       |                      |
| FlashWriter®*            |  |                                       |                      |
| FPS™                     |  |                                       |                      |

\* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

Datasheet Identification	Product Status	Definition
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.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I62