

NC7NZ14 TinyLogic® UHS Inverter with Schmitt Trigger Input

General Description

The NC7NZ14 is a triple Inverter with Schmitt Trigger input 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 very broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} range. The input and output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage.

Features

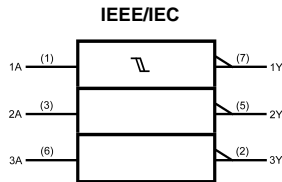
- Space saving US8 surface mount package
- MicroPak™ Pb-Free leadless package
- Ultra High Speed; t_{PD} 3.7 ns Typ into 50 pF at 5V V_{CC}
- High Output Drive; ±24 mA at 3V V_{CC}
- Broad V_{CC} Operating Range; 1.65V to 5.5V
- Power down high impedance inputs/output
- Overvoltage Tolerant inputs facilitate 5V to 3V translation
- Proprietary noise/EMI reduction circuitry implemented

Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7NZ14K8X	MAB08A	NZ14	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	3k Units on Tape and Reel
NC7NZ14L8X	MAC08A	P6	Pb-Free 8-Lead MicroPak, 1.6 mm Wide	5k Units on Tape and Reel

Pb-Free package per JEDEC J-STD-020B.

Logic Symbol



Pin Descriptions

Pin Names	Description
A	Input
Y	Output

Function Table

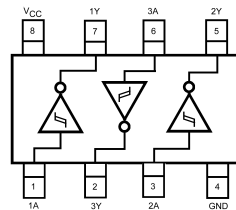
$Y = \bar{A}$

Input	Output
A	Y
L	H
H	L

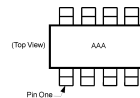
H = HIGH Logic Level

L = LOW Logic Level

Connection Diagrams



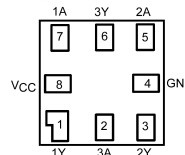
(Top View)



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).

Pad Assignment for MicroPak



(Top Thru View)

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Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	-0.5V to +7V
DC Input Voltage (V_{IN})	-0.5V to +7V
DC Output Voltage (V_{OUT})	-0.5V to +7V
DC Input Diode Current (I_{IK}) @ $V_{IN} < -0.5V$	-50 mA
DC Output Diode Current (I_{OK}) @ $V_{OUT} < -0.5V$	-50 mA
@ $V_{OUT} > 6V, V_{CC} = GND$	+20 mA
DC Output Current (I_{OUT})	±50 mA
DC V_{CC}/GND Current (I_{CC}/I_{GND})	±50 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Junction Temperature under Bias (T_J)	150°C
Junction Lead Temperature (T_1); (Soldering, 10 seconds)	260°C
Power Dissipation (P_D) @ +85°C	250 mW

Recommended Operating Conditions (Note 2)

Supply Voltage Operating (V_{CC})	1.65V to 5.5V
Supply Voltage Data Retention (V_{CC})	1.5V to 5.5V
Input Voltage (V_{IN})	0V to 5.5V
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Thermal Resistance (θ_{JA})	250°C/W

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specification 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 outside datasheet specifications.

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

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Unit	Conditions	
			Min	Typ	Max	Min	Max			
V_P	Positive Threshold Voltage	1.65	0.7	1.1	1.5	0.7	1.5	V		
		2.3	1.0	1.4	1.8	1.0	1.8			
		3.0	1.3	1.75	2.2	1.3	2.2			
		4.5	1.9	2.45	3.1	1.9	3.1			
		5.5	2.2	2.9	3.6	2.2	3.6			
V_N	Negative Threshold Voltage	1.65	0.25	0.55	0.9	0.25	0.9	V		
		2.3	0.40	0.75	1.15	0.40	1.15			
		3.0	0.6	1.0	1.5	0.6	1.5			
		4.5	1.0	1.43	2.0	1.0	2.0			
		5.5	1.2	1.70	2.3	1.2	2.3			
V_H	Hysteresis Voltage	1.65	0.15	0.54	1.0	0.15	1.0	V		
		2.3	0.25	0.65	1.1	0.25	1.1			
		3.0	0.4	0.77	1.2	0.4	1.2			
		4.5	0.6	1.01	1.5	0.6	1.5			
		5.5	0.7	1.18	1.7	0.7	1.7			
V_{OH}	HIGH Level Output Voltage	1.65	1.55	1.65		1.55		V	$V_{IN} = V_{IL}$	$I_{OH} = -100 \mu\text{A}$
		2.3	2.2	2.3		2.2				
		3.0	2.9	3.0		2.9				
		4.5	4.4	4.5		4.4				
		1.65	1.29	1.52		1.29				
		2.3	1.9	2.15		1.9				
		3.0	2.4	2.80		2.4				
		3.0	2.3	2.68		2.3				
		4.5	3.8	4.20		3.8				
								$I_{OH} = -8 \text{ mA}$		
								$I_{OH} = -16 \text{ mA}$		
								$I_{OH} = -24 \text{ mA}$		
								$I_{OH} = -32 \text{ mA}$		

DC Electrical Characteristics (Continued)

Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Unit	Conditions	
			Min	Typ	Max	Min	Max			
V _{OL}	LOW Level Output Voltage	1.65		0.0	0.1		0.1	V	V _{IN} = V _{IH}	I _{OL} = 100 μA
		2.3		0.0	0.1		0.1			
		3.0		0.0	0.1		0.1			
		4.5		0.0	0.1		0.1			
		1.65		0.08	0.24		0.24			
		2.3		0.10	0.3		0.3			
		3.0		0.15	0.4		0.4			
		3.0		0.22	0.55		0.55			
		4.5		0.22	0.55		0.55			
		I _{IN}	Input Leakage Current	0 to 5.5			±0.1			
I _{OFF}	Power Off Leakage Current	0.0			1		10	μA	V _{IN} or V _{OUT} = 5.5V	
I _{CC}	Quiescent Supply Current	1.65 to 5.5			1		10	μA	V _{IN} = 5.5V, GND	

AC Electrical Characteristics

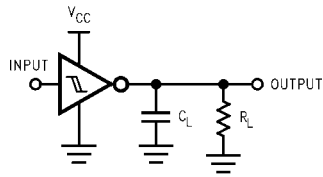
Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Unit	Conditions	Figure Number
			Min	Typ	Max	Min	Max			
t _{PLH}	Propagation Delay	1.8 ± 0.15	2.0	7.6	12.5	2.0	13	ns	C _L = 15 pF, R _L = 1 MΩ	Figures 1, 3
t _{PHL}		2.5 ± 0.2	1.0	5.0	9.0	1.0	9.5			
		3.3 ± 0.3	1.0	3.7	6.3	1.0	6.5			
		5.0 ± 0.5	0.5	3.1	5.2	0.5	5.5			
t _{PLH}	Propagation Delay	3.3 ± 0.3	1.5	4.4	7.2	1.5	7.5	ns	C _L = 50 pF, R _L = 500Ω	Figures 1, 3
t _{PHL}		5.0 ± 0.5	0.8	3.7	5.9	0.8	6.2			
C _{IN}	Input Capacitance	0		2.5				pF		
C _{PD}	Power Dissipation Capacitance	3.3 5.0		9 11				pF	(Note 3)	Figure 2

Note 3: 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. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression:
I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CC} static).

Dynamic Switching Characteristics

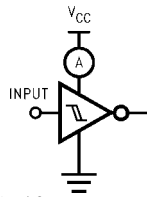
Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C	Unit
				Typical	
V _{OLP}	Quiet Output Dynamic Peak V _{OL}	C _L = 50pF, V _{IH} = 5.0V, V _{IL} = 0V	5.0	0.8	V
V _{OLV}	Quiet Output Dynamic Valley V _{OL}	C _L = 50pF, V _{IH} = 5.0V, V _{IL} = 0V	5.0	-0.8	V

AC Loading and Waveforms



C_L includes load and stray capacitance
 Input PRR = 1.0 MHz; $t_w = 500$ ns

FIGURE 1. AC Test Circuit



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

FIGURE 2. I_{CCD} Test Circuit

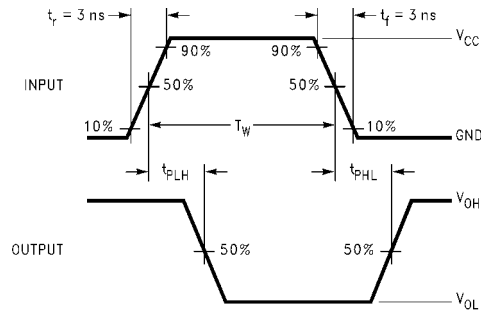
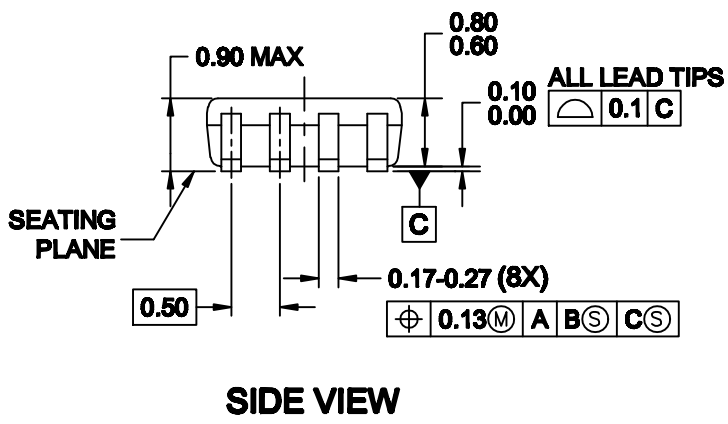
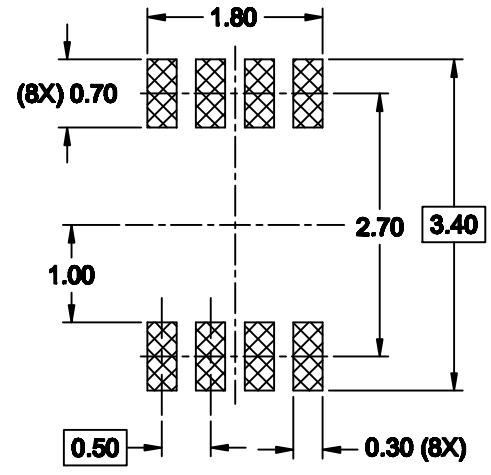
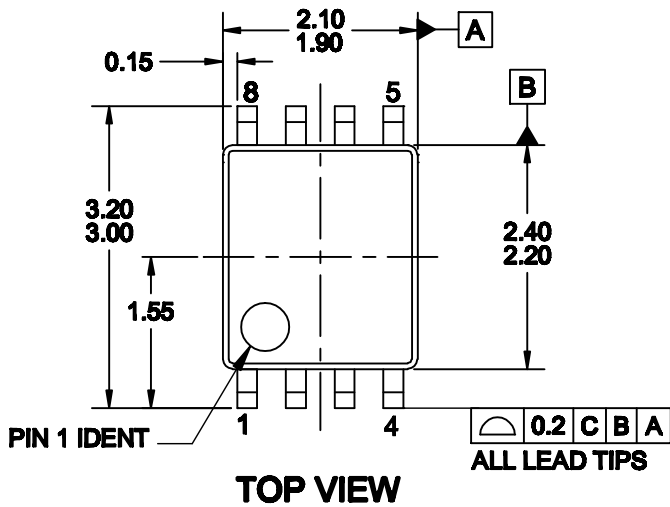
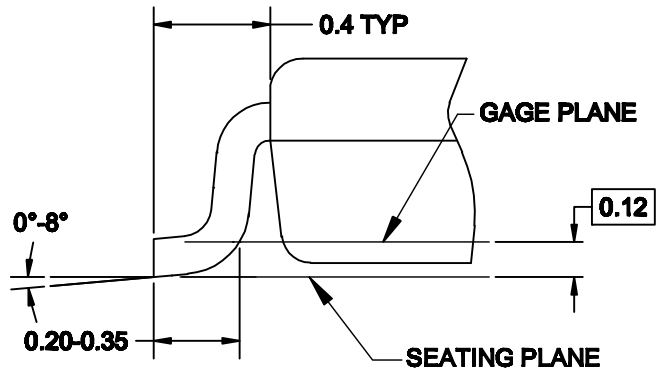


FIGURE 3. AC Waveforms

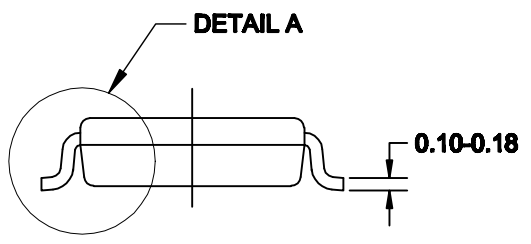


NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-187
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1994.
- E. FILE DRAWING NAME : MKT-MAB08Arev4

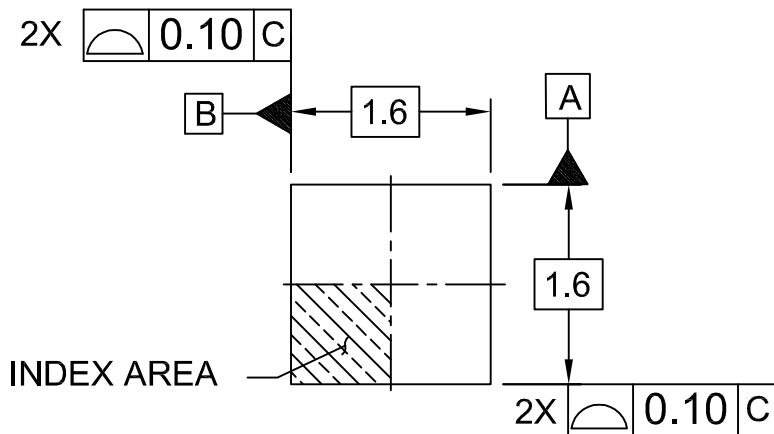


DETAIL A

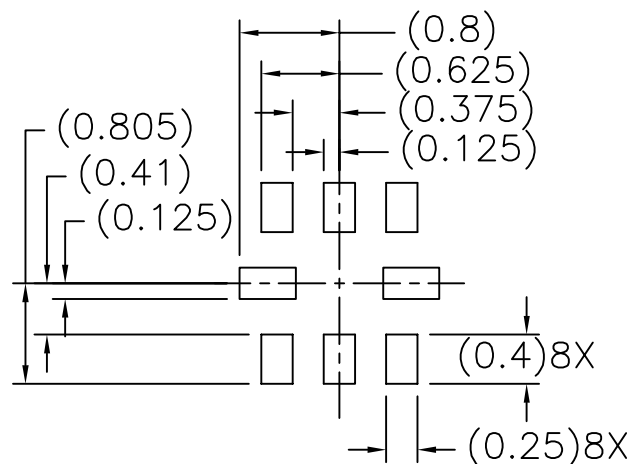


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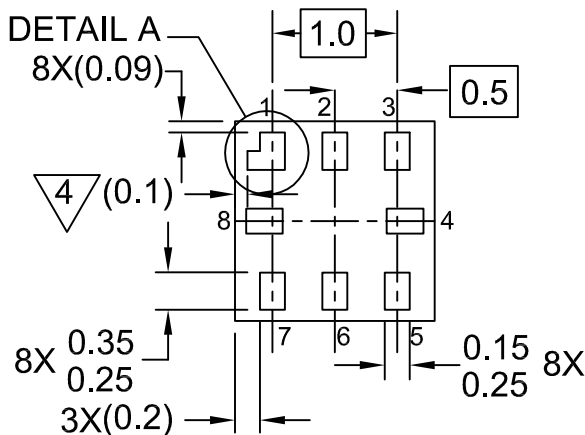
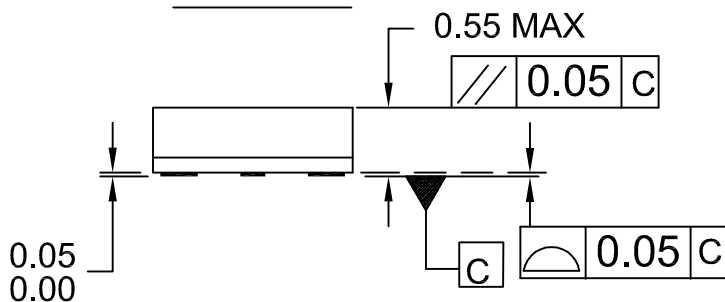
REVISIONS				
LTR	DESCRIPTION	EDCN	DATE	BY/APP'D
A	Initial Drawing Release to Doc control	ECH-MKT-MAC08A	11/26/02	H.HALLEN
B	Revised landpattern recommendation and terminal dimensions	ECH-MKT-MAC08ArevB	3/28/03	H.HALLEN
C	REVISED PIN ONE INDEX AREA	ECH-MKT-MAC08ArevC	11/17/04	H.HALLEN
4	ADDED IN PIN #1 TERMINAL DETAIL	ECH-MKT-MAC08Arev4	APRIL 05, 07	CHP KING



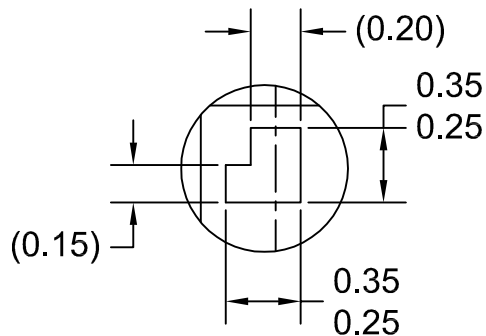
TOP VIEW



Recommended Landpattern



BOTTOM VIEW



DETAIL A
PIN #1 TERMINAL
SCALE: 2X

Notes:

1. PACKAGE CONFORMS TO JEDEC MO-255 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y.14M-1994
4. PIN 1 FLAG, END OF PACKAGE OFFSET
5. DRAWING FILE NAME: MKT-MAC08AREV4

MAC08AREV4

APPROVALS	DATE	FAIRCHILD SEMICONDUCTOR		
DRAWN: CHIP KING	09 APRIL,07	Bayan Lepas, FIZ, 11900, Penang, Malaysia.		
DATE CHK: GL CHEW	09 APRIL,07	8LD, MICROPAK, JEDEC MO255, VARIATION UAAD, 1.6MM SQUARE		
ENGR. CHK: DAVID CHONG	09 APRIL,07			
PROJECTION		SCALE	SIZE	DRAWING NUMBER
INCH DIMS		N/A	N/A	MKT-MAC08A
		DO NOT SCALE DRAWING		REV 4
		SHEET 1 of 1		

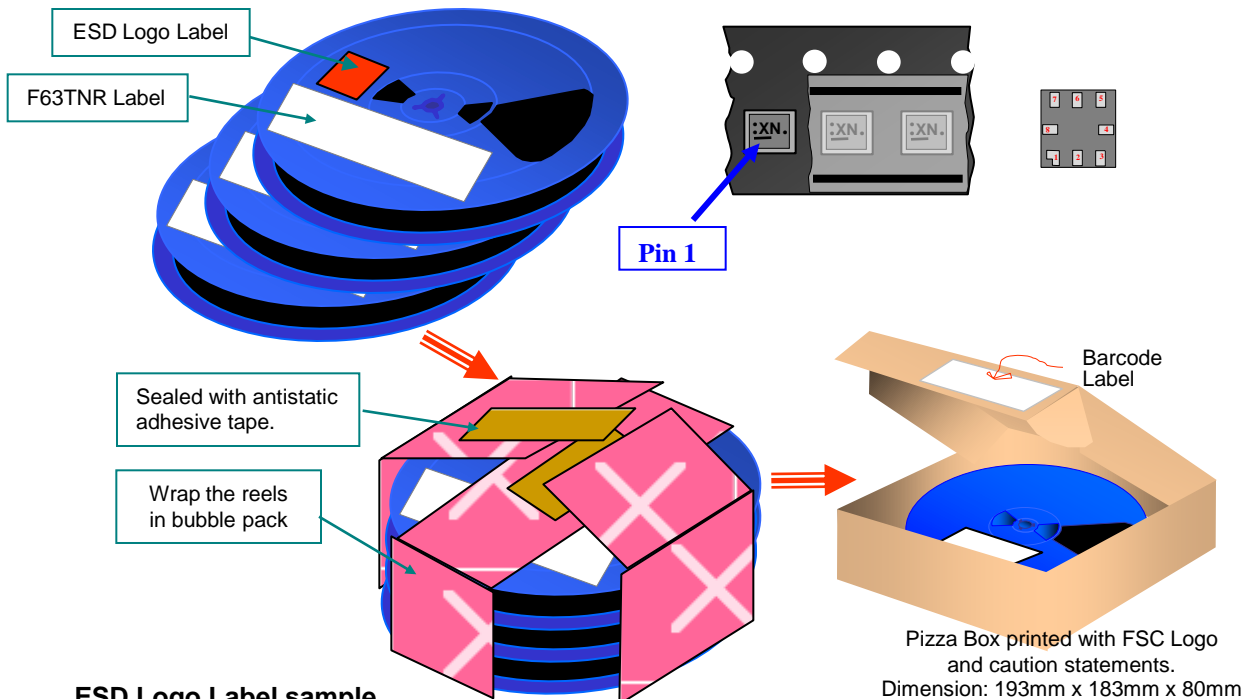
MicroPak 1.6x1.6, Packing Drawing

Packing Description:

MicroPak 1.6x1.6 products are classified under Moisture Sensitive Level 1.

The carrier tape is made from dissipative polystyrene or polycarbonate resin. The cover tape is a multilayer film primarily composed of polyester film, adhesive layer, heat activated sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 5000 units per 178 mm diameter reel. Up to three reels are packed in each intermediate box. The reels is made of polystyrene plastic (anti-static coated or intrinsic).

These full reels are individually barcode labeled and placed inside a pizza box made of recyclable corrugated brown paper with a Fairchild logo printing. Up to 3 reels could be packed in the pizza box. And these pizza boxes are placed inside a barcode labeled shipping box which comes in different sizes depending on the number of parts shipped.



ESD Logo Label sample

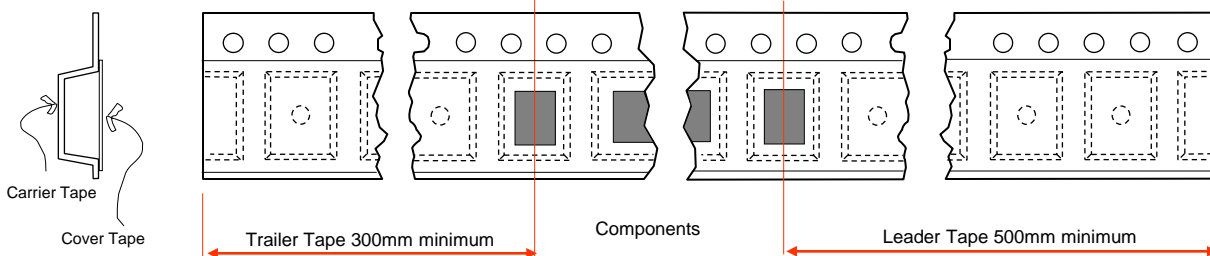


F63TNR Label sample

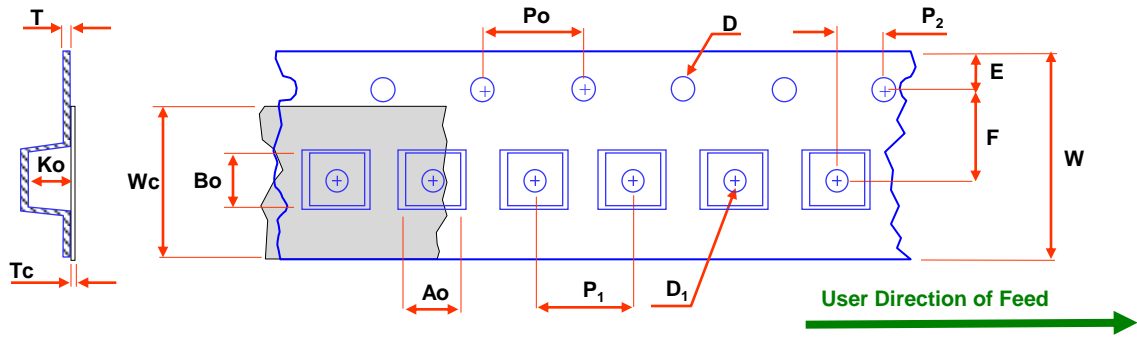
LOT: PMH010088888	QTY: 5000
FSID: FXMA2102L8X	SPEC:
D/C1: P1215NA QTY1:	SPEC REV: 2 nd Level Interconnect
D/C2: QTY2:	1. Category G3
Green Component	2. Maximum safe temperature 260 deg C
RoHS COMPLIANT	3. MSL 1
	FAIRCHILD SEMICONDUCTOR

(F63TNR)6.0

Tape Leader and Trailer Configuration



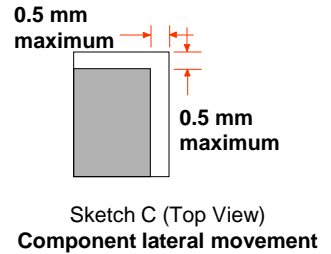
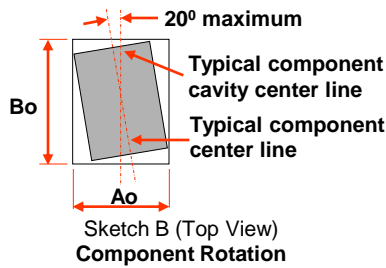
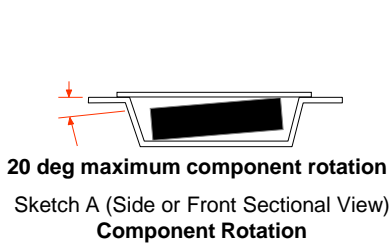
MicroPAK Embossed Tape Dimension



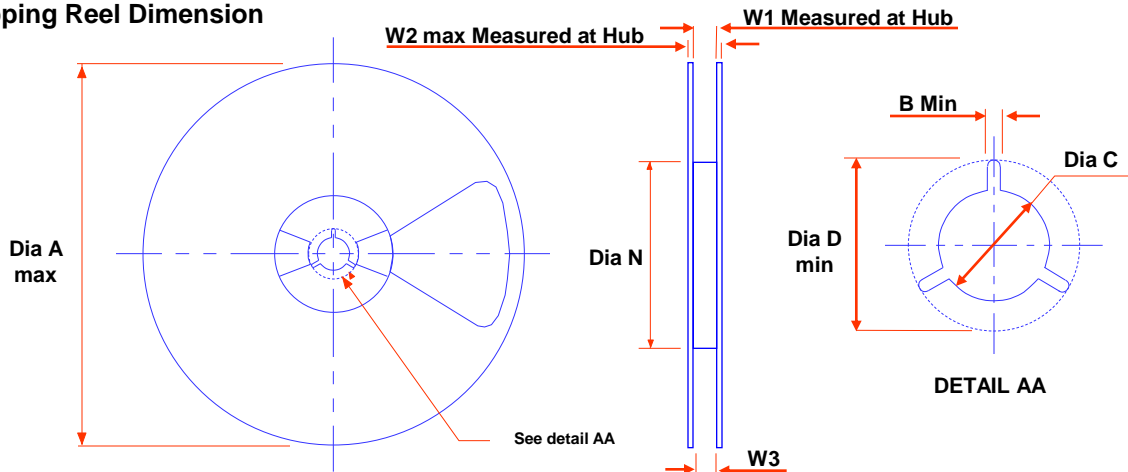
Dimensions are in millimeters

Package	Ao +/-0.10	Bo +/-0.10	D +/-0.05	D ₁ min.	E +/-0.1	F +/-0.1	Ko +/-0.1	P ₁ TYP	P _o TYP	P ₂ +/-0/05	T TYP	Tc +/-0.005	W +/-0.3	Wc TYP
MAC08A	1.78	1.78	1.55	0.5	1.75	3.5	0.68	4	4	2.0	0.254	0.06	8	5.3

Notes: Ao, Bo, and Ko dimensions are determined with respect to the EIA /Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Shipping Reel Dimension



Dimensions are in millimeters






Tape Width	Dia A max	Dim B min	Dia C +.5/- .2	Dia D min	Dim N min	Dim W1 +2/-0	Dim W2 max	Dim W3 (LSL - USL)
8	178	1.5	13	20.2	55	8.4	14.4	7.9~10.4

APPROVALS	DATE	FAIRCHILD SEMICONDUCTOR			
DRAWN		MicroPak 1.6x1.6 Packing Configuration			
DFTG. CHK.					
ENGR. CHK.					
PROJECTION		SCALE	SIZE	DRAWING NUMBER	REV
		1:1	N/A	PKG - MAC08A	1
INCH [MM]		DO NOT SCALE DRAWING		SHEET 1 of 1	



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| AX-CAP®* | FRFET® | PowerXS™ |  |
| BitSiC™ | Global Power Resource SM | Programmable Active Droop™ | TinyBoost® |
| Build it Now™ | GreenBridge™ | QFET® | TinyBuck® |
| CorePLUS™ | Green FPS™ | QS™ | TinyCalc™ |
| CorePOWER™ | Green FPS™ e-Series™ | Quiet Series™ | TinyLogic® |
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| CTL™ | GTO™ |  | TinyPower™ |
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| EcoSPARK® | MegaBuck™ | SMART START™ | TriFault Detect™ |
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| FPS™ | | | |

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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.

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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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