

NC7WZ132

TinyLogic® UHS Dual 2-Input NAND Gate with Schmitt Trigger Inputs

Features

- Space saving US8 surface mount package
- MicroPak™ leadless package
- Ultra High Speed; t_{PD} 3.1ns typ. into 50pF at 5V V_{CC}
- High Output Drive; $\pm 24mA$ at 3V V_{CC}
- Broad V_{CC} Operating Range; 1.65V to 5.5V
- Matches the performance of LCX when operated at 3.3V V_{CC}
- Power down high impedance inputs/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented
- Schmitt trigger inputs are tolerant of slow changing input signals


General Description

The NC7WZ132 is a dual 2-Input NAND 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 1.65V to 5.5V V_{CC} operating range. The inputs and output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage. Schmitt trigger inputs achieve typically 1V hysteresis between the positive-going and negative-going input threshold voltage at 5V V_{CC} .

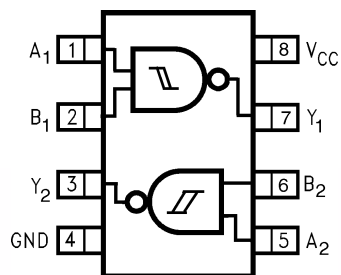
Ordering Information

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7WZ132K8X	MAB08A	WZD2	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	3k Units on Tape and Reel
NC7WZ132L8X	MAC08A	T5	8-Lead MicroPak, 1.6 mm Wide	5k Units on Tape and Reel

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering number.

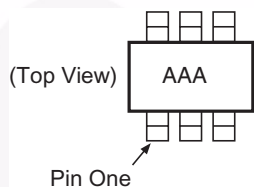
 All packages are lead free per JEDEC: J-STD-020B standard.

Connection Diagram



(Top View)

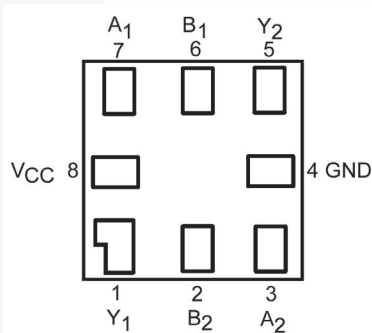
Pin One Orientation Diagram



AAA represents Product Code Top Mark – see ordering code

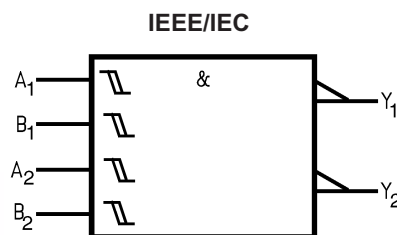
Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignments for MicroPak



(Top Thru View)

Logic Symbol



Function Table

$$Y = \overline{AB}$$

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

H = HIGH Logic Level

L = LOW Logic Level

Pin Description

Pin Names	Description
A _n , B _n	Inputs
Y _n	Output

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	Rating
V_{CC}	Supply Voltage	-0.5V to +7V
V_{IN}	DC Input Voltage	-0.5V to +7V
V_{OUT}	DC Output Voltage	-0.5V to +7V
I_{IK}	DC Input Diode Current @ $V_{IN} < -0.5V$	-50mA
I_{OK}	DC Output Diode Current @ $V_{OUT} < -0.5V$	-50mA
I_{OUT}	DC Output Current	$\pm 50mA$
I_{CC}/I_{GND}	DC V_{CC}/GND Current	$\pm 100mA$
T_{STG}	Storage Temperature	-65°C to +150°C
T_J	Junction Temperature Under Bias	150°C
T_L	Junction Lead Temperature (Soldering, 10 seconds)	260°C
P_D	Power Dissipation @ +85°C	250mW

Recommended Operating Conditions⁽¹⁾

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

Note:

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

DC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	Conditions		T _A = +25°C			T _A = -40°C to +85°C		Units
					Min.	Typ.	Max.	Min.	Max.	
V _P	Positive Threshold Voltage	1.65			0.6	0.99	1.4	0.6	1.4	V
		2.3			1.0	1.39	1.8	1.0	1.8	
		3.0			1.3	1.77	2.2	1.3	2.2	
		4.5			1.9	2.49	3.1	1.9	3.1	
		5.5			2.2	2.96	3.6	2.2	3.6	
V _N	Negative Threshold Voltage	1.65			0.2	0.53	0.9	0.2	0.9	V
		2.3			0.4	0.78	1.15	0.4	1.15	
		3.0			0.6	1.02	1.5	0.6	1.5	
		4.5			1.0	1.48	2.0	1.0	2.0	
		5.5			1.2	1.76	2.3	1.2	2.3	
V _H	Hysteresis Voltage	1.65			0.15	0.46	0.9	0.15	0.9	V
		2.3			0.25	0.61	1.1	0.25	1.1	
		3.0			0.4	0.75	1.2	0.4	1.2	
		4.5			0.6	1.01	1.5	0.6	1.5	
		5.5			0.7	1.20	1.7	0.7	1.7	
V _{OH}	HIGH Level Output Voltage	1.65	V _{IN} = V _{IL}	I _{OH} = -100μA	1.55	1.65		1.55		V
		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	V _{IN} = V _{IH}	I _{OH} = -4mA	1.29	1.52		1.29		
		2.3		I _{OH} = -8mA	1.9	2.15		1.9		
		3.0		I _{OH} = -16mA	2.4	2.80		2.4		
		3.0		I _{OH} = -24mA	2.3	2.68		2.3		
		4.5		I _{OH} = -32mA	3.8	4.20		3.8		
		V _{OL}	LOW Level Output Voltage	1.65	V _{IN} = V _{IH}	I _{OL} = 100μA		0.0	0.10	
2.3				0.0			0.10		0.10	
3.0					0.0	0.10		0.10		
4.5					0.0	0.10		0.10		
1.65	V _{IN} = V _{IH}			I _{OL} = 4mA		0.08	0.24		0.24	
2.3				I _{OL} = 8mA		0.10	0.3		0.3	
3.0				I _{OL} = 16mA		0.15	0.4		0.4	
3.0				I _{OL} = 24mA		0.22	0.55		0.55	
4.5				I _{OL} = 32mA		0.22	0.55		0.55	
I _{IN}	Input Leakage Current			0 to 5.5	V _{IN} = 5.5V, GND				±0.1	±1
I _{OFF}	Power Off Leakage Current	0.0	V _{IN} or V _{OUT} = 5.5V				1	10	μA	
I _{CC}	Quiescent Supply Current	1.65 to 5.5	V _{IN} = 5.5V, GND				1	10	μA	

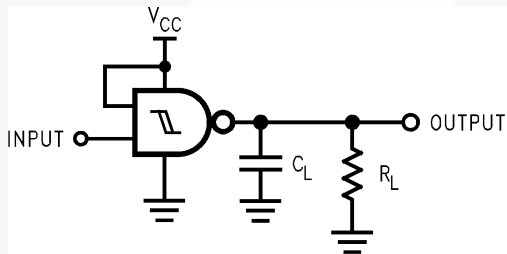
AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	Conditions	T _A = +25°C			T _A = -40°C to +85°C		Units	Figure Number
				Min.	Typ.	Max.	Min.	Max.		
t _{PLH} , t _{PHL}	Propagation Delay	1.8 ± 0.15	C _L = 15 pF, R _L = 1MΩ	3.0	7.1	13.0	3.0	13.5	ns	Figure 1 Figure 3
		2.5 ± 0.2		2.0	4.5	7.5	2.0	8.0		
		3.3 ± 0.3		1.2	3.4	5.0	1.2	5.5		
		5.0 ± 0.5		0.8	2.6	3.8	0.8	4.2		
t _{PLH} , t _{PHL}	Propagation Delay	3.3 ± 0.3	C _L = 50pF, R _L = 500Ω	1.8	4.0	5.8	1.8	6.3	ns	Figure 1 Figure 3
		5.0 ± 0.5		1.2	3.1	4.5	1.2	4.9		
C _{IN}	Input Capacitance	0			2.5				pF	
C _{PD}	Power Dissipation Capacitance	3.3	(2)		15				pF	Figure 2
		5.0			18					

Note:

2. 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).

AC Loading and Waveforms



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

Figure 1. AC Test Circuit

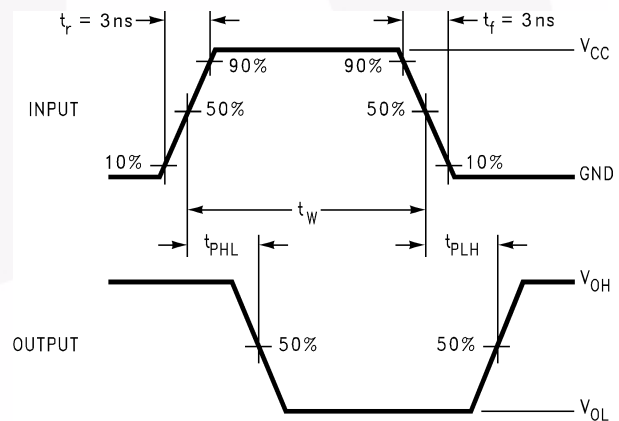
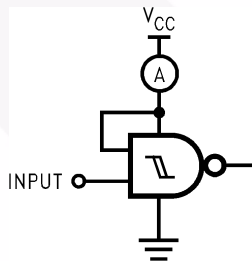


Figure 3. AC Waveforms



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

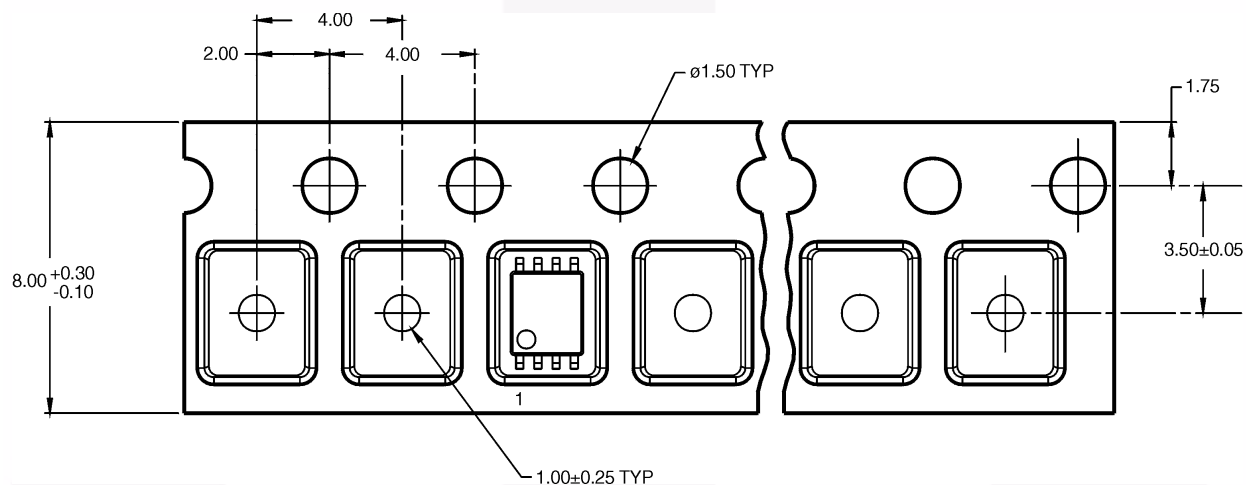
Figure 2. I_{CCD} Test Circuit

Tape and Reel Specifications

Tape Format for US8

Package Designator	Tape Section	Number of Cavities	Cavity Status	Cover Tape Status
K8X	Leader (Start End)	125 (typ.)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ.)	Empty	Sealed

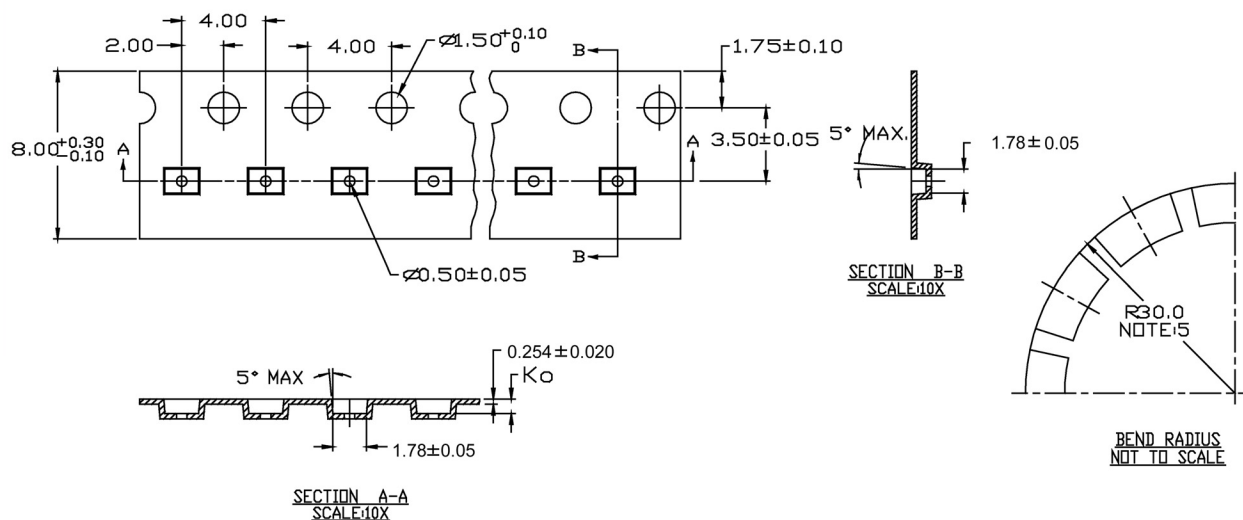
Tape Dimensions inches (millimeters)



Tape Format for MicroPak

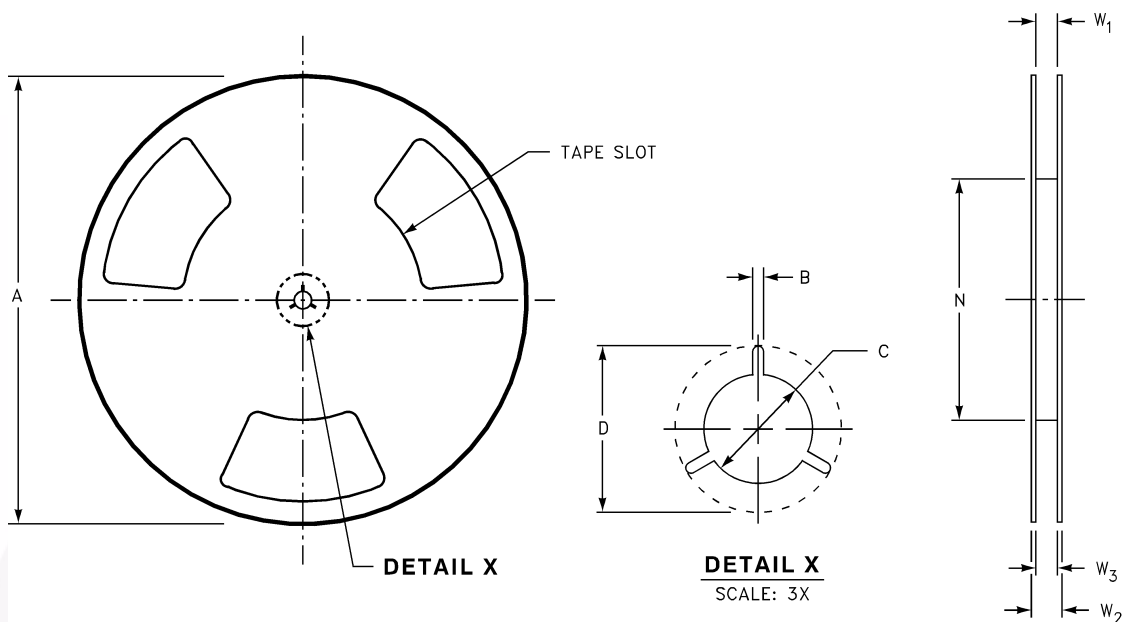
Package Designator	Tape Section	Number of Cavities	Cavity Status	Cover Tape Status
L8X	Leader (Start End)	125 (typ.)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ.)	Empty	Sealed

Tape Dimensions inches (millimeters)



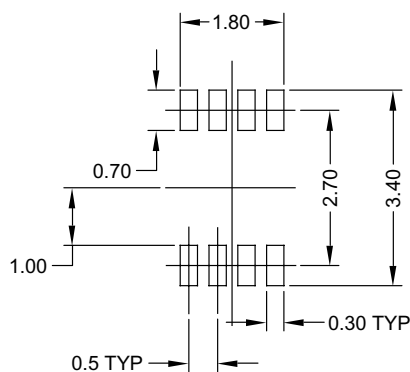
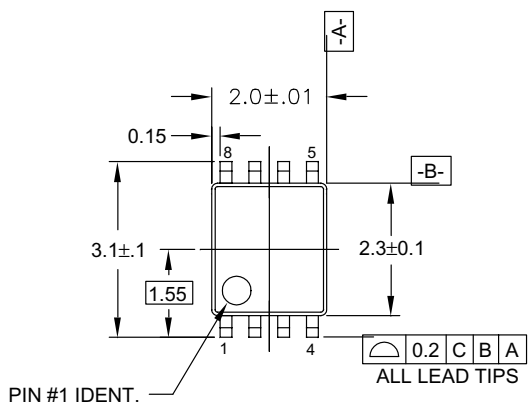
Tape and Reel Specifications (Continued)

Reel Dimensions inches (millimeters)

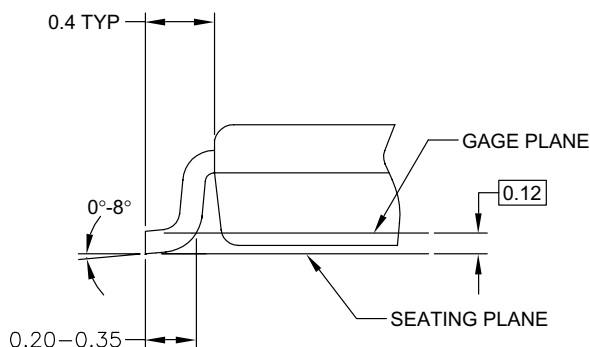
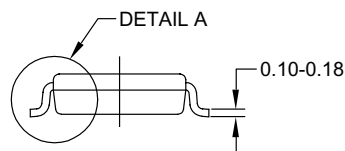
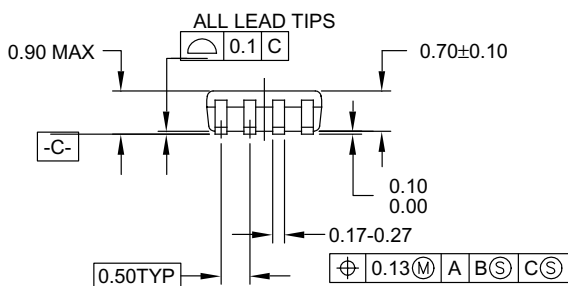


Tape Size	A	B	C	D	N	W1	W2	W3
8mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 +0.059/-0.000 (8.40 +1.50/-0.00)	0.567 (14.40)	W1 +0.078/-0.039 (W1 +2.00/-1.00)

Physical Dimensions



LAND PATTERN RECOMMENDATION



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, 1982.

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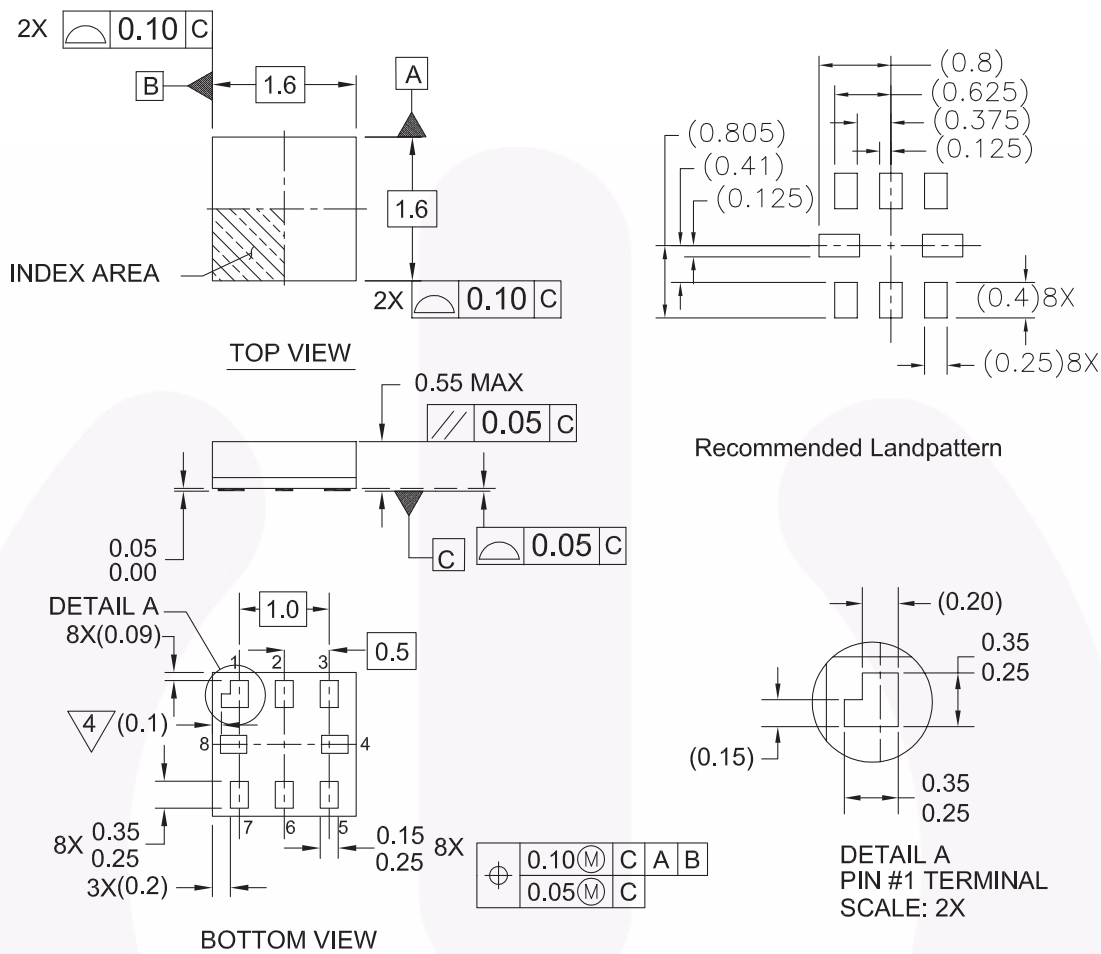
Figure 4. 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide

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Physical Dimensions (Continued)



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

Figure 5. 8-Lead MicroPak, 1.6 mm Wide

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

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- 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.

PRODUCT STATUS DEFINITIONS

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Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This 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	This 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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