

# NC7SZ157

## TinyLogic® UHS 2-Input Non-Inverting Multiplexer

### General Description

The NC7SZ157 is a single, high performance, 2 to 1 CMOS non-inverting multiplexer 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<sub>CC</sub> operating range. The device is specified to operate over the 1.65V to 5.5V V<sub>CC</sub> operating range. The inputs and outputs are high impedance when V<sub>CC</sub> is 0V. Inputs tolerate voltages up to 5.5V independent of V<sub>CC</sub> operating range.

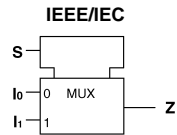
### Features

- Space saving SC70-6 lead surface mount package
- Ultra Small MicroPak™ leadless package
- Ultra High Speed
- Broad V<sub>CC</sub> operating range: 1.65V to 5.5V
- Power down high impedance input/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

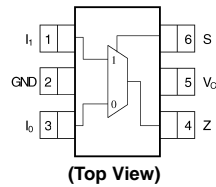
### Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7SZ157P6X	MAA06A	ZF7	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SZ157L6X	MAC06A	B9	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

### Logic Symbol



### Connection Diagram

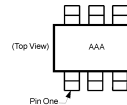


### Function Table

Inputs			Output
S	I <sub>1</sub>	I <sub>0</sub>	Z = (I <sub>0</sub> )•(S)+(I <sub>1</sub> )•(S)
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

H = HIGH Logic Level      L = LOW Logic Level

### Pin One Orientation Diagram



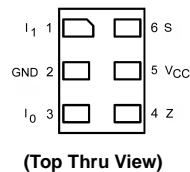
AAA = Product Code Top Mark - see ordering code

**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).

### Pin Descriptions

Pin Name	Description
I <sub>0</sub> , I <sub>1</sub>	Data Inputs
S	Control Input
Z	Output

### Pad Assignments for MicroPak



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MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

**Absolute Maximum Ratings**(Note 1)

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Input Voltage ( $V_{IN}$ )	-0.5V to +7.0V
DC Output Voltage ( $V_{OUT}$ )	-0.5V to +7.0V
DC Input Diode Current ( $I_{IK}$ ) @ $V_{IN} \leq 0.5V$	-50 mA
DC Output Diode Current ( $I_{OK}$ ) @ $V_{IN} \leq -0.5V$	-50 mA
DC Output Source/Sink Current ( $I_{OUT}$ )	$\pm 50$ mA
DC $V_{CC}$ or Ground Current ( $I_{CC} / I_{GND}$ )	$\pm 50$ mA
Storage Temperature Range ( $T_{STG}$ )	-65°C to +150°C
Max Junction Temperature under Bias ( $T_J$ )	150°C
Lead Temperature ( $T_L$ ) (Soldering, 10 seconds)	260°C
Power Dissipation ( $P_D$ ) @+85°C SC70-6	180 mW

**Recommended Operating Conditions**

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
Input Rise and Fall Time ( $t_r, t_f$ ) $V_{CC}$ @ 1.8V $\pm$ 0.15V, 2.5V $\pm$ 0.2V	0 ns/V to 20 ns/V
$V_{CC}$ @ 3.3V $\pm$ 0.3V	0 ns/V to 10 ns/V
$V_{CC}$ @ 5.0V $\pm$ 0.5V	0 ns/V to 5 ns/V
Thermal Resistance ( $\theta_{JA}$ ) SC70-6	350°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 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 outside datasheet specifications.

**DC Electrical Characteristics**

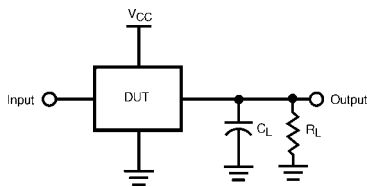
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$			$T_A = -40^\circ C$ to $+85^\circ C$		Units	Conditions
			Min	Typ	Max	Min	Max		
$V_{IH}$	HIGH Level Input Voltage	1.65-1.95 2.3-5.5	0.75 $V_{CC}$ 0.7 $V_{CC}$			0.75 $V_{CC}$ 0.7 $V_{CC}$		V	
$V_{IL}$	LOW Level Input Voltage	1.65-1.95 2.3-5.5	0.25 $V_{CC}$ 0.3 $V_{CC}$			0.25 $V_{CC}$ 0.3 $V_{CC}$		V	
$V_{OH}$	HIGH Level Output Voltage	1.65	1.55	1.65	1.55		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OH} = -100 \mu A$
		2.3	2.2	2.3	2.2				
$V_{OH}$	HIGH Level Output Voltage	3.0	2.9	3.0	2.9		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OH} = -4$ mA $I_{OH} = -8$ mA $I_{OH} = -16$ mA $I_{OH} = -24$ mA $I_{OH} = -32$ mA
		4.5	4.4	4.5	4.4				
$V_{OL}$	LOW Level Output Voltage	1.65	1.29	1.52	1.29		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 100 \mu A$
		2.3	1.9	2.15	1.9				
$V_{OL}$	LOW Level Output Voltage	3.0	2.4	2.80	2.4		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 4$ mA $I_{OL} = 8$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA
		4.5	3.9	4.20	3.8				
$V_{OL}$	LOW Level Output Voltage	1.65	0.0	0.10	0.10		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 100 \mu A$
		2.3	0.0	0.10	0.10				
$V_{OL}$	LOW Level Output Voltage	3.0	0.0	0.10	0.10		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 100 \mu A$
		4.5	0.0	0.10	0.10				
$I_{IN}$	Input Leakage Current	1.65	0.08	0.24	0.24		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 4$ mA $I_{OL} = 8$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA
		2.3	0.10	0.3	0.3				
$I_{IN}$	Input Leakage Current	3.0	0.15	0.4	0.4		V	$V_{IN} = V_{IL}$ or = $V_{IH}$	$I_{OL} = 4$ mA $I_{OL} = 8$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA
		4.5	0.22	0.55	0.55				
$I_{OFF}$	Power Off Leakage Current	0-5.5	$\pm 0.1$			$\pm 1$		$\mu A$	$V_{IN} = 5.5V, GND$
$I_{CC}$	Quiescent Supply Current	0.0	1			10		$\mu A$	$V_{IN}$ or $V_{OUT} = 5.5V$
$I_{CC}$	Quiescent Supply Current	1.65-5.5				10		$\mu A$	$V_{IN} = 5.5V, GND$

## 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	Fig. No.
			Min	Typ	Max	Min	Max			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Z	1.8 ± 0.15	2.5	6.0	11.5	2.5	12	ns	C <sub>L</sub> = 15 pF R <sub>L</sub> = 1 MΩ	Figures 1, 3
		2.5 ± 0.2	1.2	3.5	6.1	1.2	6.5			
		3.3 ± 0.3	0.8	2.6	4.1	0.8	4.5			
		5.0 ± 0.5	0.5	1.9	3.2	0.5	3.5			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I <sub>H</sub> to Z	1.8 ± 0.15	2.5	5.9	10	2.5	10.5	ns	C <sub>L</sub> = 15 pF R <sub>L</sub> = 1 MΩ	Figures 1, 3
		5.0 ± 0.5	1.2	3.5	5.8	1.2	6.1			
		3.3 ± 0.3	0.8	2.6	3.9	0.8	4.2			
		5.0 ± 0.5	0.5	1.9	3.1	0.5	3.3			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay S to Z	3.3 ± 0.3	1.2	3.2	4.8	1.2	5.2	ns	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	Figures 1, 3
		5.0 ± 0.5	0.8	2.4	3.8	0.8	4.1			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I <sub>H</sub> to Z	3.3 ± 0.3	1.2	3.2	4.6	1.2	5.0	ns	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	Figures 1, 3
		5.0 ± 0.5	0.8	2.4	3.7	0.8	4.0			
C <sub>IN</sub>	Input Capacitance	0	2					μF		
C <sub>PD</sub>	Power Dissipation Capacitance	3.3	14					μF	(Note 2)	Figure 2

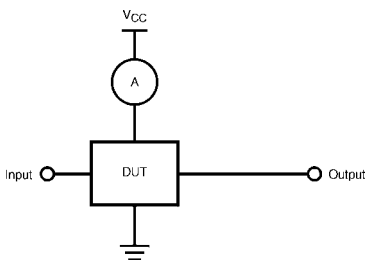
**Note 2:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current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

## AC Loading and Waveforms



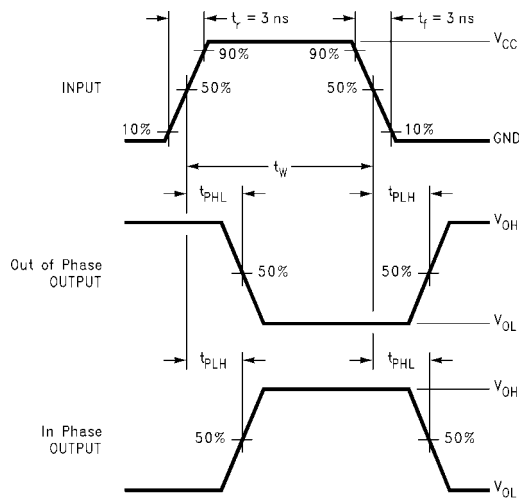
C<sub>L</sub> includes load and stray Capacitance  
 Input PRR = 1.0 MHz, t<sub>W</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



Input = AC Waveforms  
 PRR = Variable; Duty Cycle = 50%

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



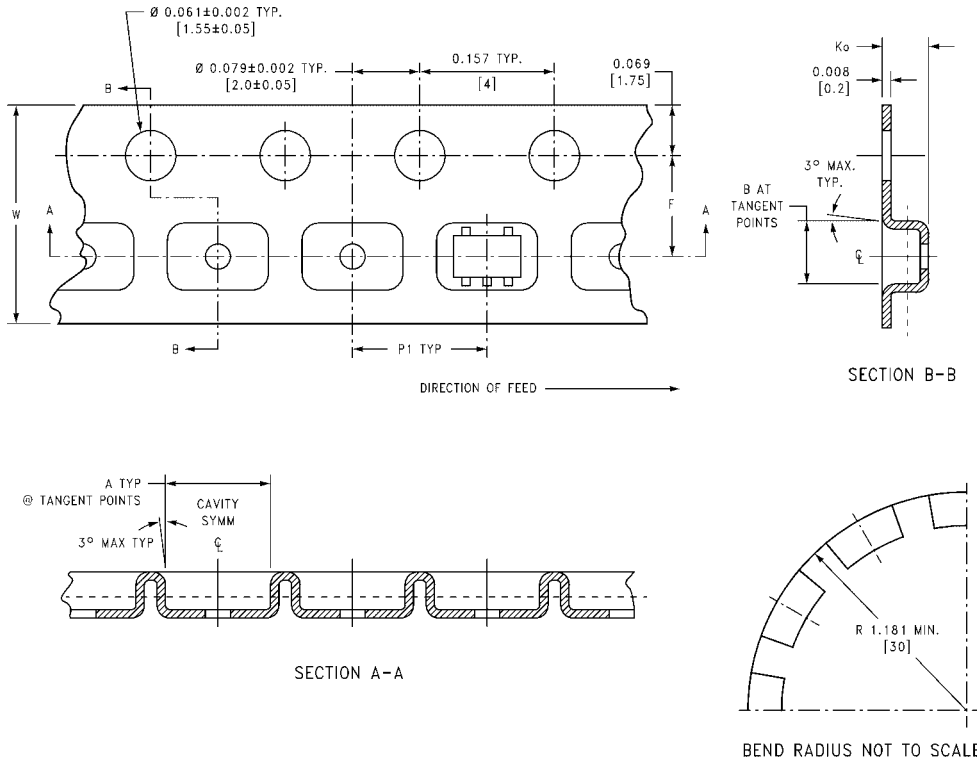
**FIGURE 3. AC Waveforms**

## Tape and Reel Specification

### TAPE FORMAT For SC70

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

### TAPE DIMENSIONS inches (millimeters)

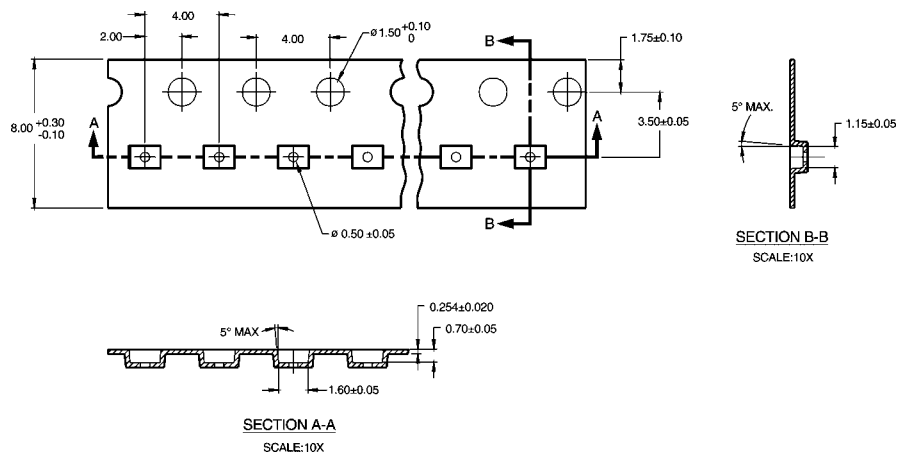


Package	Tape Size	DIM A	DIM B	DIM F	DIM Ko	DIM P1	DIM W
SC70-6	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)

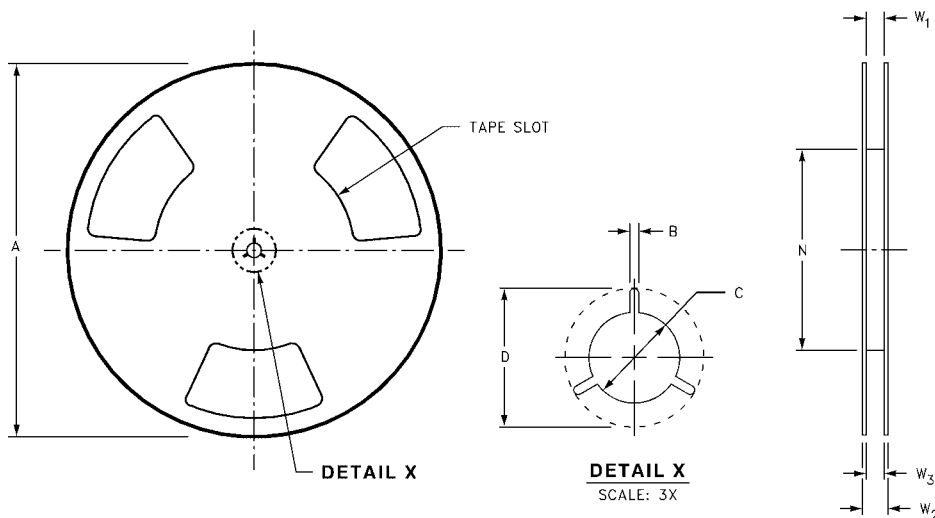
**Tape and Reel Specification** (Continued)

**TAPE FORMAT for MicroPak**

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



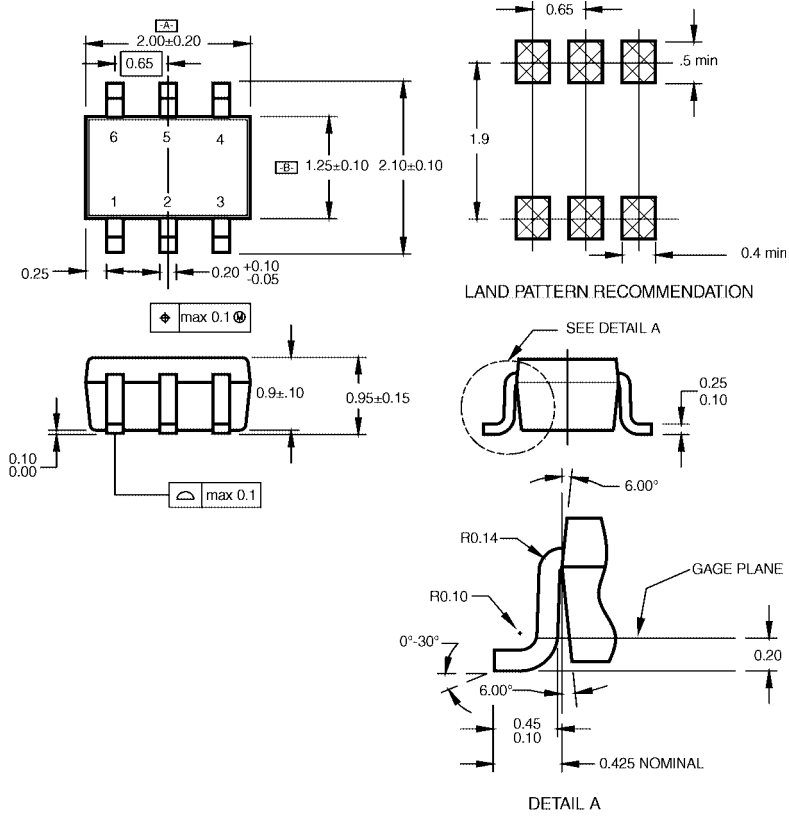
**REEL DIMENSIONS** inches (millimeters)



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)

NC7SZ157

**Physical Dimensions** inches (millimeters) unless otherwise noted



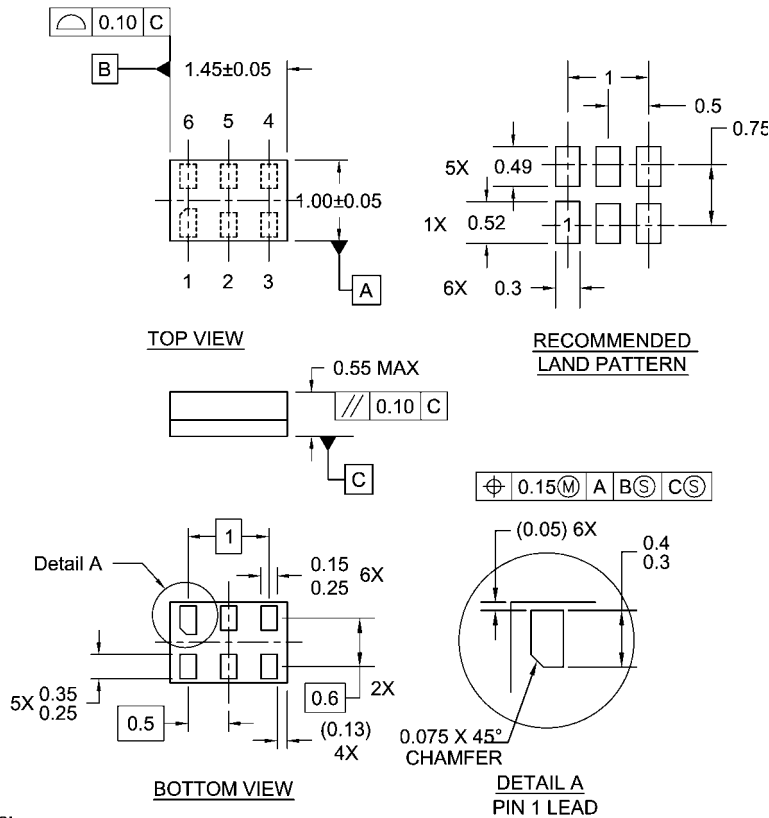
NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

MAA06ARevC

**6-Lead SC70, EIAJ SC88, 1.25mm Wide  
Package Number MAA06A**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



- Notes:
1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
  2. DIMENSIONS ARE IN MILLIMETERS
  3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

**6-Lead MicroPak, 1.0mm Wide  
Package Number MAC06A**

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