



November 1988
Revised March 2005

74AC245 • 74ACT245

Octal Bidirectional Transceiver with 3-STATE Inputs/Outputs

General Description

The AC/ACT245 contains eight non-inverting bidirectional buffers with 3-STATE outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA at both the A and B ports. The Transmit/Receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active-HIGH) enables data from A ports to B ports; Receive (active-LOW) enables data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a HIGH Z condition.

Features

- I_{CC} and I_{OZ} reduced by 50%
- Non-inverting buffers
- Bidirectional data path
- A and B outputs source/sink 24 mA
- ACT245 has TTL-compatible inputs

Ordering Code:

Order Number	Package Number	Package Description
74AC245SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74AC245SJ	M20D	Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC245MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC245PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT245SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74ACT245SCX_NL (Note 1)	M20B	Pb-Free 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74ACT245SJ	M20D	Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT245MSA	MSA20	20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide
74ACT245MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT245MTCX_NL (Note 1)	MTC20	Pb-Free 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT245PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

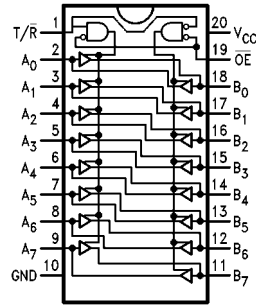
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Note 1: "_NL" indicates Pb-Free package (per JEDEC J-STD-020B). Device available in Tape and Reel only.

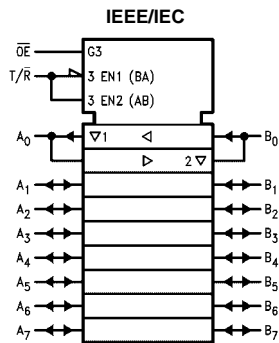
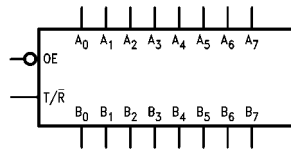
FACT™ is a trademark of Fairchild Semiconductor Corporation.

74AC245 • 74ACT245 Octal Bidirectional Transceiver with 3-STATE

Connection Diagram



Logic Symbols



Pin Descriptions

Pin Names	Description
\overline{OE}	Output Enable Input
T/\overline{R}	Transmit/Receive Input
A_0-A_7	Side A 3-STATE Inputs or 3-STATE Outputs
B_0-B_7	Side B 3-STATE Inputs or 3-STATE Outputs

Truth Table

Inputs		Outputs
\overline{OE}	T/\overline{R}	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	HIGH-Z State

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial

Absolute Maximum Ratings (Note 2)

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	± 50 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Junction Temperature (T_J)	
PDIP	140°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
AC	2.0V to 6.0V
ACT	4.5V to 5.5V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
AC Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

Note 2: 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 FACT™ circuits outside databook specifications.

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
			Typ	Guaranteed Limits				
V_{IH}	Minimum HIGH Level Input Voltage	3.0	1.5	2.1	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V_{IL}	Maximum LOW Level Input Voltage	3.0	1.5	0.9	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V_{OH}	Minimum HIGH Level Output Voltage	3.0	2.99	2.9	2.9	V	$I_{OUT} = -50 \mu\text{A}$	
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
			3.0		2.56	2.46	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ (Note 3)
			4.5		3.86	3.76		
			5.5		4.86	4.76		
V_{OL}	Maximum LOW Level Output Voltage	3.0	0.002	0.1	0.1	V	$I_{OUT} = 50 \mu\text{A}$	
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
			3.0		0.36	0.44	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ (Note 3)
			4.5		0.36	0.44		
			5.5		0.36	0.44		
I_{IN} (Note 5)	Maximum Input Leakage Current	5.5		± 0.1	± 1.0	μA	$V_I = V_{CC}$, GND	
I_{OLD}	Dynamic Output	5.5			75	mA	$V_{OLD} = 1.65V$ Max	
I_{OHD}	Current Minimum (Note 4)	5.5			-75	mA	$V_{OHD} = 3.85V$ Min	
I_{CC} (Note 5)	Maximum Quiescent Supply Current	5.5		4.0	40.0	μA	$V_{IN} = V_{CC}$ or GND	
I_{OZT}	Maximum I/O Leakage Current	5.5		± 0.3	± 3.0	μA	V_I (OE) = V_{IL} , V_{IH} $V_I = V_{CC}$, GND $V_O = V_{CC}$, GND	

Note 3: All outputs loaded; thresholds on input associated with output under test.

Note 4: Maximum test duration 2.0 ms, one output loaded at a time.

Note 5: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC} .

DC Characteristics for ACT								
Symbol	Parameter	V _{CC} (V)	T _A = +25°C		T _A = -40°C to +85°C		Units	Conditions
			Typ	Guaranteed Limits				
V _{IH}	Minimum HIGH Level Input Voltage	4.5	1.5	2.0	2.0	V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	1.5	2.0	2.0			
V _{IL}	Maximum LOW Level Input Voltage	4.5	1.5	0.8	0.8	V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	1.5	0.8	0.8			
V _{OH}	Minimum HIGH Level Output Voltage	4.5	4.49	4.4	4.4	V	I _{OUT} = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5		3.86	3.76	V	V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA I _{OH} = -24 mA (Note 6)	
5.5		4.86	4.76					
V _{OL}	Maximum LOW Level Output Voltage	4.5	0.001	0.1	0.1	V	I _{OUT} = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5		0.36	0.44	V	V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA I _{OL} = 24 mA (Note 6)	
5.5		0.36	0.44					
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V _I = V _{CC} , GND	
I _{CC}	Maximum I _{CC} /Input	5.5	0.6		1.5	mA	V _I = V _{CC} - 2.1V	
I _{OLD}	Dynamic Output Current Minimum (Note 7)	5.5			75	mA	V _{OLD} = 1.65V Max	
I _{OHD}	Current Minimum (Note 7)	5.5			-75	mA	V _{OHD} = 3.85V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		4.0	40.0	μA	V _{IN} = V _{CC} or GND	
I _{OZT}	Maximum I/O Leakage Current	5.5		±0.3	±3.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND	

Note 6: All outputs loaded; thresholds on input associated with output under test.

Note 7: Maximum test duration 2.0 ms, one output loaded at a time.

AC Electrical Characteristics for AC

Symbol	Parameter	V _{CC} (V) (Note 8)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay A _n to B _n or B _n to A _n	3.3	1.5	5.0	8.5	1.0	9.0	ns
		5.0	1.5	3.5	6.5	1.0	7.0	
t _{PHL}	Propagation Delay A _n to B _n or B _n to A _n	3.3	1.5	5.0	8.5	1.0	9.0	ns
		5.0	1.5	3.5	6.0	1.0	7.0	
t _{PZH}	Output Enable Time	3.3	2.5	7.0	11.5	2.0	12.5	ns
		5.0	1.5	5.0	8.5	1.0	9.0	
t _{PZL}	Output Enable Time	3.3	2.5	7.5	12.0	2.0	13.5	ns
		5.0	1.5	5.5	9.0	1.0	9.5	
t _{PHZ}	Output Disable Time	3.3	2.0	6.5	12.0	1.0	12.5	ns
		5.0	1.5	5.5	9.0	1.0	10.0	
t _{PLZ}	Output Disable Time	3.3	2.0	7.0	11.5	1.5	13.0	ns
		5.0	1.5	5.5	9.0	1.0	10.0	

Note 8: Voltage Range 3.3 is 3.3V ± 0.3V
Voltage Range 5.0 is 5.0V ± 0.5V

AC Electrical Characteristics for ACT

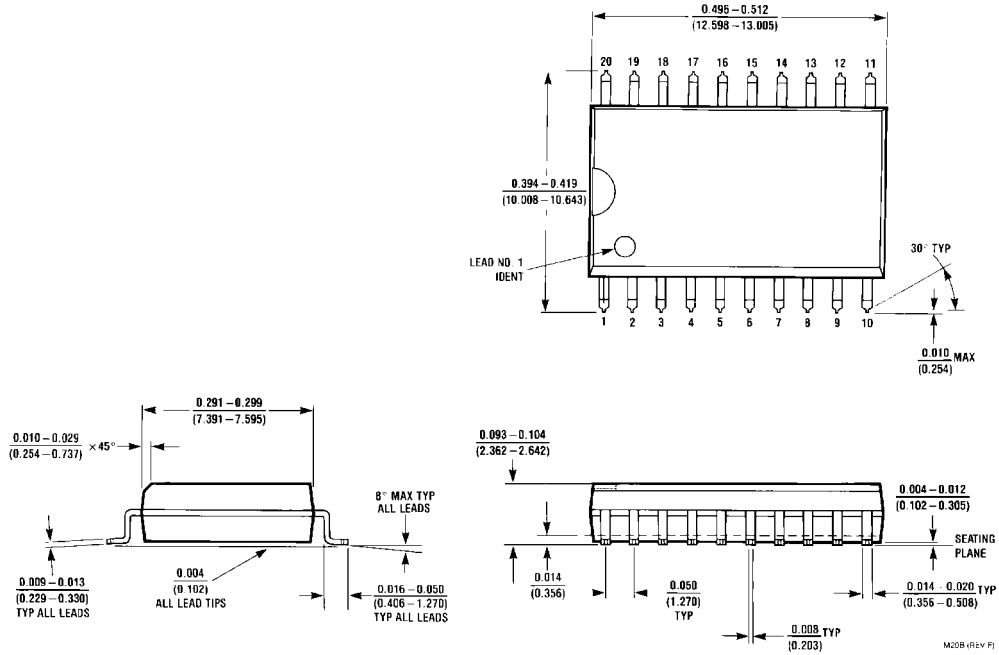
Symbol	Parameter	V _{CC} (V) (Note 9)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay A _n to B _n or B _n to A _n	5.0	1.5	4.0	7.5	1.5	8.0	ns
t _{PHL}	Propagation Delay A _n to B _n or B _n to A _n	5.0	1.5	4.0	8.0	1.0	9.0	ns
t _{PZH}	Output Enable Time	5.0	1.5	5.0	10.0	1.5	11.0	ns
t _{PZL}	Output Enable Time	5.0	1.5	5.5	10.0	1.5	12.0	ns
t _{PHZ}	Output Disable Time	5.0	1.5	5.5	10.0	1.0	11.0	ns
t _{PLZ}	Output Disable Time	5.0	2.0	5.0	10.0	1.5	11.0	ns

Note 9: Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

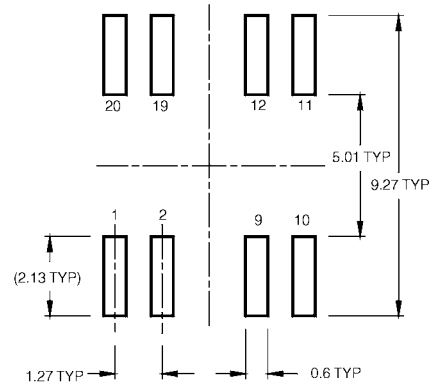
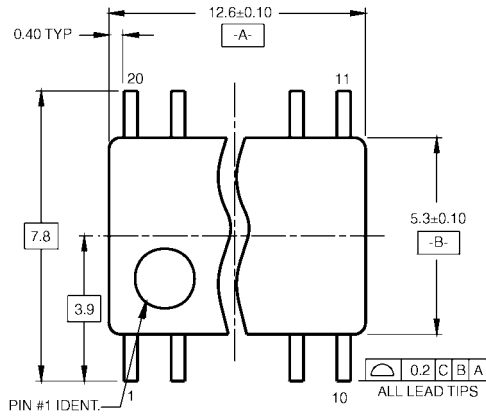
Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{I/O}	Input/Output Capacitance	15.0	pF	V _{CC} = 5.0V
C _{PD}	Power Dissipation Capacitance	45.0	pF	V _{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted

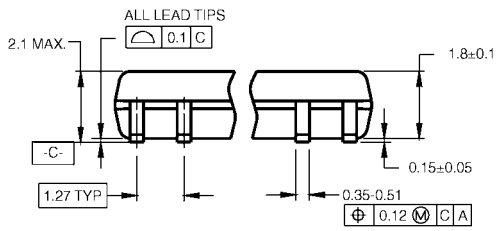


20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Package Number M20B

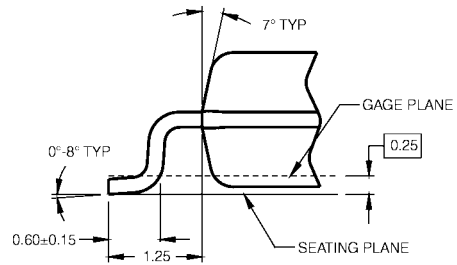
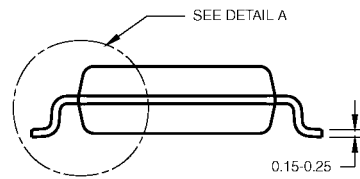
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS



DETAIL A

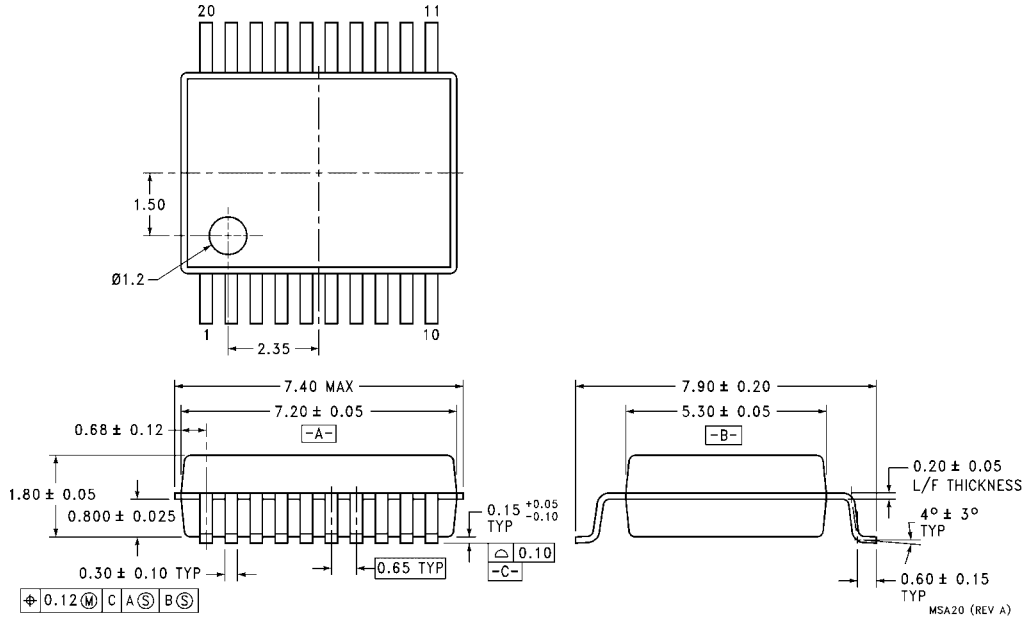
NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

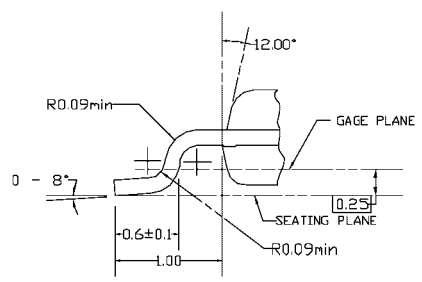
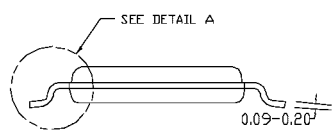
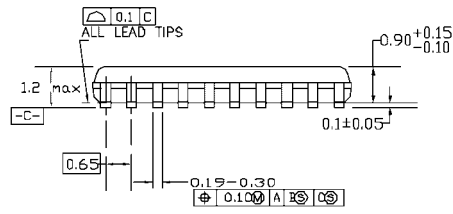
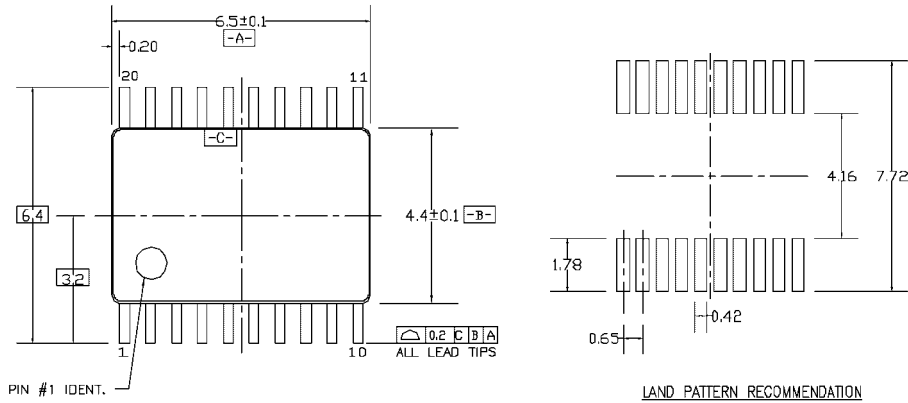
**Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D**

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



**20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide
Package Number MSA20**

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



DIMENSIONS ARE IN MILLIMETERS

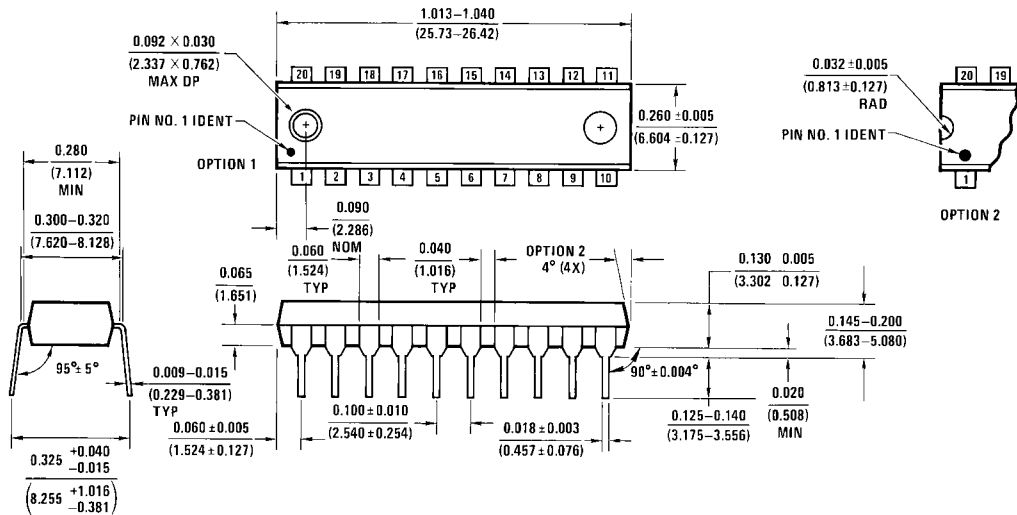
NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, REF NOTE 6, DATE 7/93.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC20REVD1

**20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC20**

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



N20A (REV G)

20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N20A

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

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 THE PRESIDENT 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 to 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.

www.fairchildsemi.com