FAIRCHILD SEMICONDUCTOR™

November 1988
Revised October 1999

74AC573 • 74ACT573
Octal Latch with 3-STATE Outputs

General Description

The 74AC573 and 74ACT573 are high-speed octal latches with buffered common Latch Enable (LE) and buffered common Output Enable ($\overline{OE}$) inputs.

The 74AC573 and 74ACT573 are functionally identical to the 74AC373 and 74ACT373 but with inputs and outputs on opposite sides.

Features

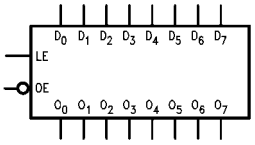
- I_{CC} and I_{OZ} reduced by 50%
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors
- Functionally identical to 74AC373 and 74ACT373
- 3-STATE outputs for bus interfacing
- Outputs source/sink 24 mA
- 74ACT573 has TTL-compatible inputs

Ordering Code:

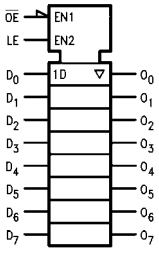
Order Number	Package Number	Package Description
74AC573SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS--013, 0.300" Wide Body
74AC573SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC573MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC573PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT573SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS--013, 0.300" Wide Body
74ACT573SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT573MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT573PC	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.

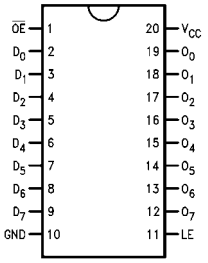
Logic Symbols



IEEE/IEC



Connection Diagram



Pin Descriptions

Pin Names	Description
D_0–D_7	Data Inputs
LE	Latch Enable Input
$\overline{OE}$	3-STATE Output Enable Input
O_0–O_7	3-STATE Latch Outputs

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Functional Description

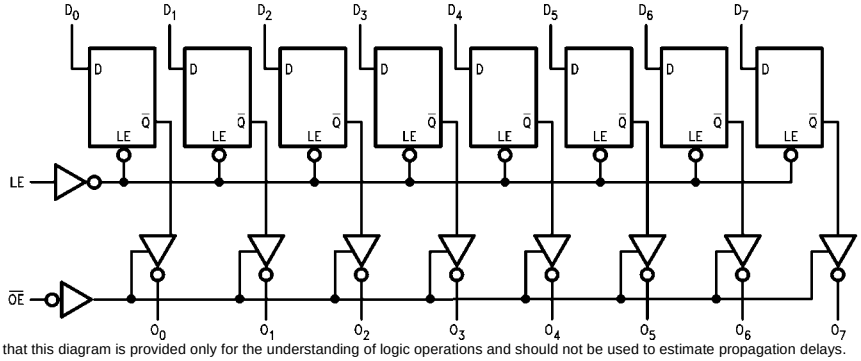
The 74AC573 and 74ACT573 contain eight D-type latches with 3-STATE output buffers. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D-type input changes. When LE is LOW the latches store the information that was present on the D-type inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-STATE buffers are controlled by the Output Enable ($\overline{OE}$) input. When $\overline{OE}$ is LOW, the buffers are enabled. When $\overline{OE}$ is HIGH the buffers are in the high impedance mode but this does not interfere with entering new data into the latches.

Truth Table

Inputs			Outputs
$\overline{OE}$	LE	D	O_n
L	H	H	H
L	H	L	L
L	L	X	O_0
H	X	X	Z

H = HIGH Voltage
L = LOW Voltage
Z = High Impedance
X = Immaterial
O_0 = Previous O_0 before HIGH-to-LOW transition of Latch Enable

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings(Note 1)

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} @ 3.0V, 4.5V, 5.5V	125 mV/ns
ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

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 FACT™ circuits outside databook specifications.

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	T_A = +25°C Typ	T_A = −40°C to +85°C Guaranteed Limits		Units	Conditions
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 μA
		4.5	4.49	4.4	4.4		
		5.5	5.49	5.4	5.4		
							V_{IN} = V_{IL} or V_{IH}
		3.0		2.56	2.46	V	I_{OH} = −12 mA
		4.5		3.86	3.76		I_{OH} = −24 mA
		5.5		4.86	4.76		I_{OH} = −24 mA (Note 2)
V_{OL}	Maximum LOW Level Output Voltage	3.0	0.002	0.1	0.1	V	I_{OUT} = 50 μA
		4.5	0.001	0.1	0.1		
		5.5	0.001	0.1	0.1		
							V_{IN} = V_{IL} or V_{IH}
		3.0		0.36	0.44	V	I_{OL} = 12 mA
		4.5		0.36	0.44		I_{OL} = 24 mA
		5.5		0.36	0.44		I_{OL} = 24 mA (Note 2)
I_{IN} (Note 3)	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V_I = V_{CC}, GND
I_{OLD}	Minimum Dynamic Output Current (Note 4)	5.5			75	mA	V_{OLD} = 1.65V Max
I_{OHD}		5.5			−75	mA	V_{OHD} = 3.85V Min
I_{CC} (Note 3)	Maximum Quiescent Supply Current	5.5		4.0	40.0	μA	V_{IN} = V_{CC} or GND
I_{OZ}	Maximum 3-STATE Leakage Current	5.5		±0.25	±2.5	μA	V_I (OE) = V_{IL}, V_{IH} V_I = V_{CC}, GND V_O = V_{CC}, GND

Note 2: All outputs loaded; thresholds on input associated with output under test.

Note 3: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.

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

AC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V) (Note 5)	$T_A = +25°C$, $C_L = 50$ pF			$T_A = -40°C$ to $+85°C$, $C_L = 50$ pF		Units
			Min	Typ	Max	Min	Max	
t_{PHL}	Propagation Delay	3.3	0.5	8.5	10.5	2.5	11.0	ns
t_{PLH}	D_n to O_n	5.0	1.5	5.5	7.0	1.5	7.5	
t_{PLH}	Propagation Delay	3.3	2.5	8.5	12.0	2.5	12.5	ns
t_{PHL}	LE to O_n	5.0	2.0	6.0	8.0	2.0	8.5	
t_{PZL}	Output Enable Time	3.3	2.5	8.5	13.0	2.5	13.5	ns
t_{PZH}		5.0	1.5	6.0	8.5	1.5	9.0	
t_{PHZ}	Output Disable Time	3.3	1.0	9.0	14.5	1.0	15.0	ns
t_{PLZ}		5.0	1.0	6.0	9.5	1.0	10.0	

Note 5: Voltage Range 5.0 is 5.0V ± 0.5V
Voltage Range 3.3 is 3.3V ± 0.3V

AC Operating Requirements for AC

Symbol	Parameter	V_{CC} (V) (Note 6)	$T_A = +25°C$, $C_L = 50$ pF		$T_A = -40°C$ to $+85°C$, $C_L = 50$ pF	Units
			Typ	Guaranteed Minimum		
t_S	Setup Time, HIGH or LOW	3.3	0	3.0	3.0	ns
	D_n to LE	5.0	0	3.0	3.0	
t_H	Hold Time, HIGH or LOW	3.3	0	1.5	1.5	ns
	D_n to LE	5.0	0	1.5	1.5	
t_W	LE Pulse Width, HIGH	3.3	2.0	4.0	4.0	ns
		5.0	2.0	4.0	4.0	

Note 6: Voltage Range 5.0 is 5.0V ± 0.5V
Voltage Range 3.3 is 3.3V ± 0.3V

DC Electrical Characteristics for ACT

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$ Typ	$T_A = -40°C$ to $+85°C$ Guaranteed Limits		Units	Conditions
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		
V_{OH}	Minimum HIGH Level Output Voltage	4.5	4.49	4.4	4.4	V	$I_{OUT} = -50\ \mu A$
		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
		5.5		4.86	4.76		$I_{OH} = -24$ mA (Note 7)
V_{OL}	Maximum LOW Level Output Voltage	4.5	0.001	0.1	0.1	V	$I_{OUT} = 50\ \mu A$
		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
		5.5		0.36	0.44		$I_{OL} = 24$ mA (Note 7)
I_{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	$V_I = V_{CC}$, GND
I_{OZ}	Maximum 3-STATE Leakage Current	5.5		±0.25	±2.5	μA	$V_I = V_{IL}$, V_{IH} $V_O = V_{CC}$, GND
I_{CCT}	Maximum I_{CC}/Input	5.5	0.6		1.5	mA	$V_I = V_{CC} - 2.1V$
I_{OLD}	Minimum Dynamic Output Current (Note 8)	5.5			75	mA	$V_{OLD} = 1.65V$ Max
I_{OHD}		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

Note 7: All outputs loaded; thresholds on input associated with output under test.

Note 8: Maximum test duration 2.0 ms, one output loaded at a time.

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} t_{PHL}	Propagation Delay D_n to O_n	5.0	2.5	6.0	10.5	2.0	12.0	ns
t_{PLH}	Propagation Delay LE to O_n	5.0	3.0	6.0	10.5	2.5	12.0	ns
t_{PHL}	Propagation Delay LE to O_n	5.0	2.5	5.5	9.5	2.0	10.5	ns
t_{PZH}	Output Enable Time	5.0	2.0	5.5	10.0	1.5	11.0	ns
t_{PZL}	Output Enable Time	5.0	1.5	5.5	9.5	1.5	10.5	ns
t_{PHZ}	Output Disable Time	5.0	2.5	6.5	11.0	1.5	12.5	ns
t_{PLZ}	Output Disable Time	5.0	1.5	5.0	8.5	1.0	9.5	ns

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

AC Operating Requirements for ACT

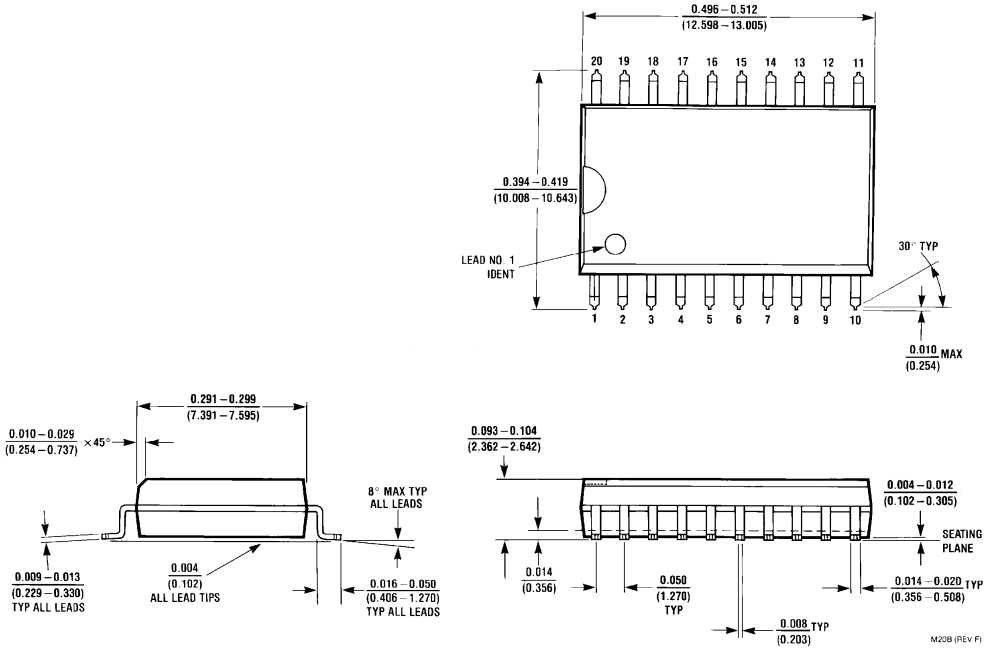
Symbol	Parameter	V_{CC} (V) (Note 10)	$T_A = +25°C$, $C_L = 50$ pF		$T_A = -40°C$ to $+85°C$, $C_L = 50$ pF	Units
			Typ	Guaranteed Minimum		
t_S	Setup Time, HIGH or LOW D_n to LE	5.0	1.5	3.0	3.5	ns
t_H	Hold Time, HIGH or LOW D_n to LE	5.0	–1.5	0	0	ns
t_W	LE Pulse Width, HIGH	5.0	2.0	3.5	4.0	ns

Note 10: Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

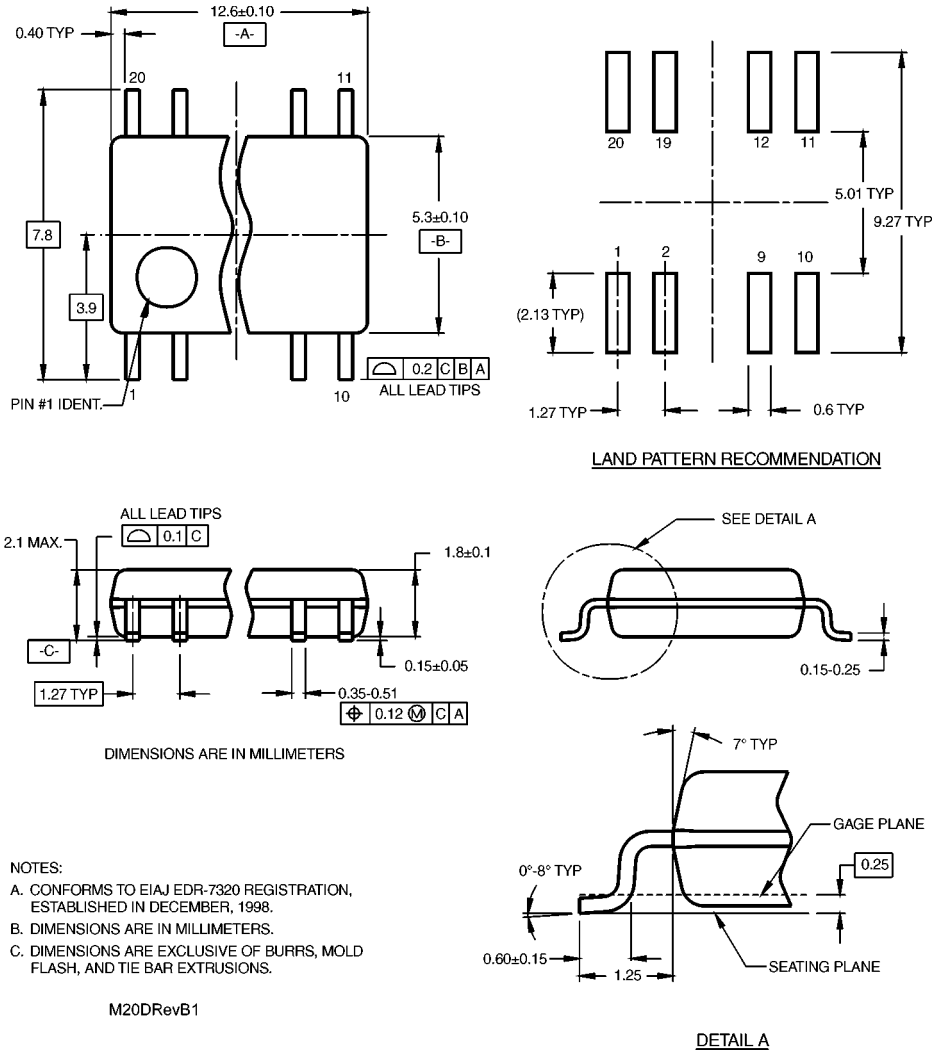
Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	5.0	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance for AC for ACT	25.0 42.0	pF	V_{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted



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

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



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

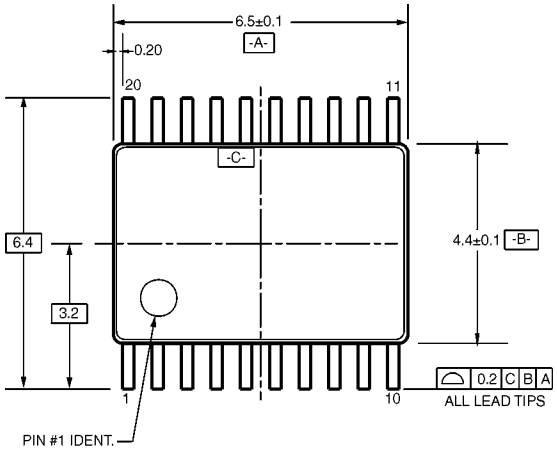
B. DIMENSIONS ARE IN MILLIMETERS.

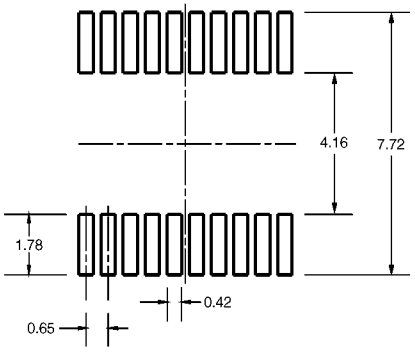
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

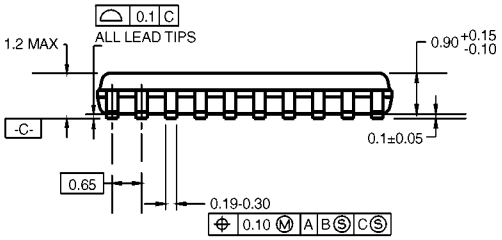
20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D

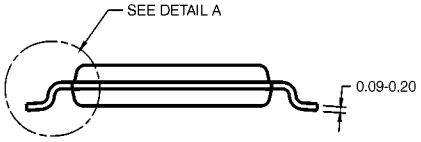
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)





LAND PATTERN RECOMMENDATION





DIMENSIONS ARE IN MILLIMETERS

NOTES:

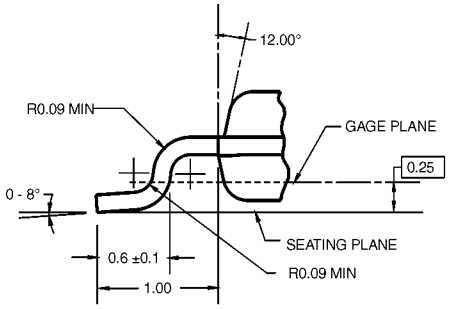
A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, REF NOTE 6, DATE 7/93.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

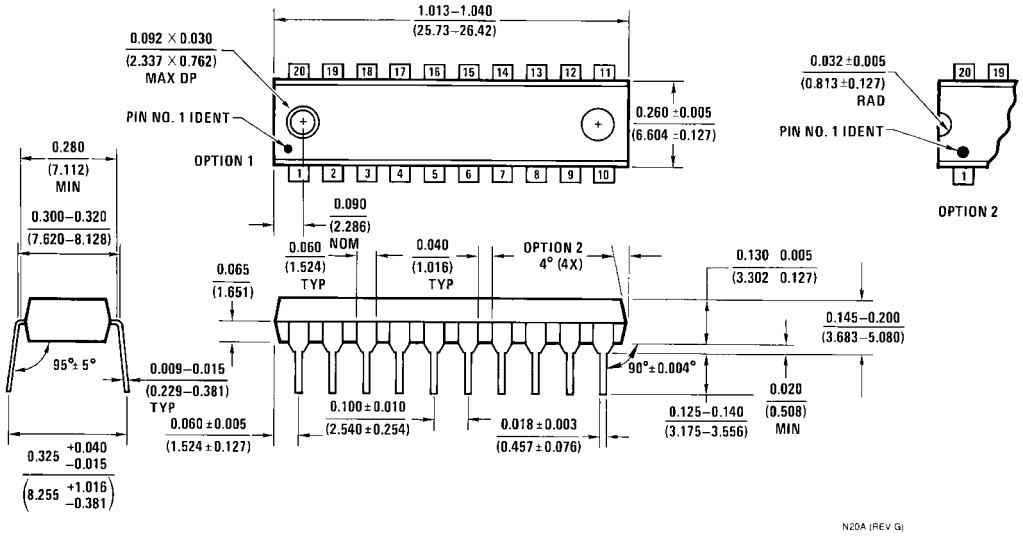
MTC20RevD1



DETAIL A

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)



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