

# 74ABT573CSC Datasheet





DiGi Electronics Part Number

Manufacturer Product Number

Description

Manufacturer

**Detailed Description** 

74ABT573CSC-DG

onsemi

74ABT573CSC

IC D-TYPE TRANSP SGL 8:8 20SOIC

D-Type Transparent Latch 1 Channel 8:8 IC Tri-Stat e 20-SOIC

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# Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
74ABT573CSC	onsemi
Series:	Product Status:
74ABT	Obsolete
Logic Type:	Circuit:
D-Type Transparent Latch	8:8
Output Type:	Voltage - Supply:
Tri-State	4.5V ~ 5.5V
Independent Circuits:	Delay Time - Propagation:
1	2.7ns
Current - Output High, Low:	Operating Temperature:
32mA, 64mA	-40°C ~ 85°C
Mounting Type:	Package / Case:
Surface Mount	20-SOIC (0.295", 7.50mm Width)
Supplier Device Package:	Base Product Number:
20-SOIC	74ABT573

# **Environmental & Export classification**

Moisture Sensitivity Level (MSL):	REACH Status:
1 (Unlimited)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8542.39.0001



December 2007

# 74ABT573 Octal D-Type Latch with 3-STATE Outputs

#### Features

- Inputs and outputs on opposite sides of package allow easy interface with microprocessors
- Useful as input or output port for microprocessors
- Functionally identical to ABT373
- 3-STATE outputs for bus interfacing
- Output sink capability of 64mA, source capability of 32mA
- Guaranteed output skew
- Guaranteed multiple output switching specifications
- Output switching specified for both 50pF and 250pF loads
- Guaranteed simultaneous switching, noise level and dynamic threshold performance
- Guaranteed latchup protection
- High-impedance, glitch-free bus loading during entire power up and power down
- Nondestructive, hot insertion capability

# **General Description**

The ABT573 is an octal latch with buffered common Latch Enable (LE) and buffered common Output Enable  $(\overline{OE})$  inputs.

This device is functionally identical to the ABT373 but has broadside pinouts.

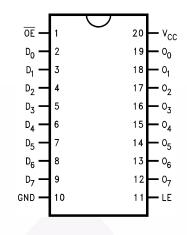
# Ordering Information

Order Number	Package Number	Package Description
74ABT573CSC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74ABT573CSJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ABT573CMSA	MSA20	20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide
74ABT573CMTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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.





#### **Pin Descriptions**

Pin Names	Descriptions
D <sub>0</sub> –D <sub>7</sub>	Data Inputs
LE	Latch Enable Input (Active HIGH)
ŌĒ	3-STATE Output Enable Input (Active LOW)
0 <sub>0</sub> –0 <sub>7</sub>	3-STATE Latch Outputs

# **Functional Description**

The ABT573 contains 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 input changes. When LE is LOW the latches store the information that was present on the D 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 in the bi-state mode. 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.

# **Function Table**

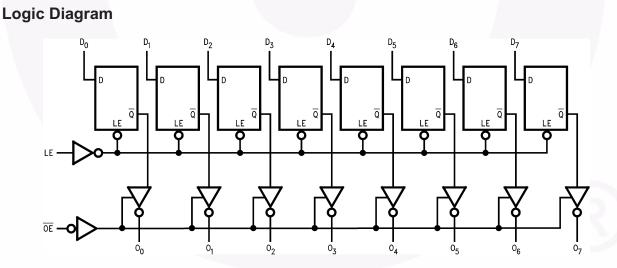
	Inputs	Outputs	
OE	LE	D	0
L	н	Н	Н
L	н	L	L
L	L	Х	O <sub>0</sub>
Н	Х	Х	Z

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

 $O_0 =$  Value stored from previous clock cycle



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**

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
T <sub>STG</sub>	Storage Temperature	–65°C to +150°C
T <sub>A</sub>	Ambient Temperature Under Bias	–55°C to +125°C
TJ	Junction Temperature Under Bias	–55°C to +150°C
V <sub>CC</sub>	V <sub>CC</sub> Pin Potential to Ground Pin	-0.5V to +7.0V
V <sub>IN</sub>	Input Voltage <sup>(1)</sup>	-0.5V to +7.0V
I <sub>IN</sub>	Input Current <sup>(1)</sup>	-30mA to +5.0mA
Vo	Voltage Applied to Any Output	
	Disabled or Power-Off State	–0.5V to 5.5V
	HIGH State	–0.5V to V <sub>CC</sub>
	Current Applied to Output in LOW State (Max.)	twice the rated I <sub>OL</sub> (mA)
	DC Latchup Source Current	–500mA
	Over Voltage Latchup (I/O)	10V
	<b>3 1 1 1 1</b>	

#### Note:

1. Either voltage limit or current limit is sufficient to protect inputs.

## **Recommended Operating Conditions**

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
T <sub>A</sub>	Free Air Ambient Temperature	–40°C to +85°C
V <sub>CC</sub>	Supply Voltage	+4.5V to +5.5V
$\Delta V / \Delta t$	Minimum Input Edge Rate	
	Data Input	50mV/ns
	Enable Input	20mV/ns

Symbol	Pa	arameter	V <sub>cc</sub>	Conditions	Min.	Тур.	Max.	Units
VIH	Input HIGH	Voltage		Recognized HIGH Signal	2.0			V
V <sub>IL</sub>	Input LOW	/oltage		Recognized LOW Signal			0.8	V
V <sub>CD</sub>	Input Clamp	Diode Voltage	Min.	$I_{IN} = -18 \text{mA}$			-1.2	V
V <sub>OH</sub>	H Output HIGH Voltage		Min.	$I_{OH} = -3mA$	2.5			V
				$I_{OH} = -32 \text{mA}$	2.0			
V <sub>OL</sub>	Output LOW	/ Voltage	Min.	$I_{OL} = 64 \text{mA}$			0.55	V
I <sub>IH</sub>	Input HIGH	Current	Max.	$V_{IN} = 2.7V^{(3)}$			1	μA
				$V_{IN} = V_{CC}$			1	
I <sub>BVI</sub>	Input HIGH Test	Current Breakdown	Max.	$V_{IN} = 7.0V$			7	μA
IIL	IL Input LOW Current Ma	Max.	$V_{IN} = 0.5V^{(3)}$			-1	μA	
				$V_{IN} = 0.0V$	_1			
V <sub>ID</sub>	Input Leakage Test		0.0	I <sub>ID</sub> = 1.9 μA, All Other Pins Grounded	4.75			V
I <sub>OZH</sub>	Output Leakage Current		0-5.5V	$V_{OUT} = 2.7V, \overline{OE} = 2.0V$			10	μA
I <sub>OZL</sub>	Output Leak	age Current	0-5.5V	$V_{OUT} = 0.5 V, \overline{OE} = 2.0 V$			-10	μA
I <sub>OS</sub>	Output Sho	rt-Circuit Current	Max.	$V_{OUT} = 0.0V$	-100		-275	mA
I <sub>CEX</sub>	Output HIG	H Leakage Current	Max.	$V_{OUT} = V_{CC}$			50	μA
I <sub>ZZ</sub>	Bus Drainag	ge Test	0.0	V <sub>OUT</sub> = 5.5V, All Others GND			100	μA
I <sub>CCH</sub>	Power Supp	ly Current	Max.	All Outputs HIGH			50	μA
I <sub>CCL</sub>	Power Supp	ly Current	Max.	All Outputs LOW			30	mA
I <sub>CCZ</sub>	Power Supp	ly Current	Max.	$\overline{OE} = V_{CC}$ , All Others at $V_{CC}$ or GND			50	μA
I <sub>CCT</sub>	Additional	Outputs Enabled	Max.	$V_{I} = V_{CC} - 2.1V$			2.5	mA
	I <sub>CC</sub> /Input	Outputs 3-STATE		Enable Input $V_I = V_{CC} - 2.1V$			2.5	mA
		Outputs 3-STATE		Data Input $V_I = V_{CC} - 2.1V$ , All Others at $V_{CC}$ or GND			2.5	mA
I <sub>CCD</sub>	Dynamic I <sub>Co</sub>	No Load <sup>(3)</sup>	Max.	Outputs Open, $\overline{OE}$ = GND, LE = V <sub>CC</sub> <sup>(2)</sup> , One-Bit Toggling, 50% Duty Cycle			0.12	mA/ MHz

#### Notes:

2. For 8-bits toggling,  $I_{CCD} < 0.8 mA/MHz.$ 

3. Guaranteed but not tested.

# 74ABT573 — Octal D-Type Latch with 3-STATE Outputs

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## **DC Electrical Characteristics**

SOIC package.

			Conditions C <sub>L</sub> = 50pF,				
Symbol	Parameter	V <sub>cc</sub>	$R_L = 500\Omega$	Min.	Тур.	Max.	Units
V <sub>OLP</sub>	Quiet Output Maximum Dynamic V <sub>OL</sub>	5.0	$T_A = 25^{\circ}C^{(4)}$		0.7	1.0	V
V <sub>OLV</sub>	Quiet Output Minimum Dynamic $V_{OL}$	5.0	$T_A = 25^{\circ}C^{(4)}$	-1.5	-1.2		V
V <sub>OHV</sub>	Minimum HIGH Level Dynamic Output Voltage	5.0	$T_A = 25^{\circ}C^{(5)}$	2.5	3.0		V
V <sub>IHD</sub>	Minimum HIGH Level Dynamic Input Voltage	5.0	$T_A = 25^{\circ}C^{(6)}$	2.2	1.8		V
V <sub>ILD</sub>	Maximum LOW Level Dynamic Input Voltage	5.0	$T_A = 25^{\circ}C^{(6)}$		1.0	0.7	V

#### Notes:

4. Max number of outputs defined as (n). n − 1 data inputs are driven 0V to 3V. One output at LOW. Guaranteed, but not tested.

- 5. Max number of outputs defined as (n). n 1 data inputs are driven 0V to 3V. One output HIGH. Guaranteed, but not tested.
- Max number of data inputs (n) switching. n 1 inputs switching 0V to 3V. Input-under-test switching: 3V to threshold (V<sub>ILD</sub>), 0V to threshold (V<sub>IHD</sub>). Guaranteed, but not tested.

## **AC Electrical Characteristics**

SOIC and SSOP package.

		$\label{eq:TA} \begin{array}{l} T_A = +25^\circ C, \\ V_{CC} = +5.0V, \\ C_L = 50 pF \end{array}$		$T_A = -40^{\circ}C$ $V_{CC} = 4.5$ $C_L =$			
Symbol	Parameter	Min.	Тур.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay, D <sub>n</sub> to O <sub>n</sub>	1.9	2.7	4.5	1.9	4.5	ns
t <sub>PHL</sub>		1.9	2.8	4.5	1.9	4.5	
t <sub>PLH</sub>	Propagation Delay, LE to O <sub>n</sub>	2.0	3.1	5.0	2.0	5.0	ns
t <sub>PHL</sub>		2.0	3.0	5.0	2.0	5.0	
t <sub>PZH</sub>	Output Enable Time	1.5	3.1	5.3	1.5	5.3	ns
t <sub>PZL</sub>		1.5	3.1	5.3	1.5	5.3	
t <sub>PHZ</sub>	Output Disable Time	2.0	3.6	5.4	2.0	5.4	ns
t <sub>PLZ</sub>		2.0	3.4	5.4	2.0	5.4	

# AC Operating Requirements

SOIC and SSOP package.

		T <sub>A</sub> = +25°C, V <sub>CC</sub> = +5.0V, C <sub>L</sub> = 50pF		$T_A = -40^{\circ}C$ $V_{CC} = 4.5$ $C_L =$			
Symbol	Parameter	Min.	Min. Typ. Max.		Min.	Max.	Units
f <sub>TOGGLE</sub>	Max Toggle Frequency		100				MHz
t <sub>S</sub> (H)	Set Time, HIGH or LOW D <sub>n</sub>	1.5			1.5		ns
t <sub>S</sub> (L)	to LE	1.5			1.5		
t <sub>H</sub> (H)	Hold Time, HIGH or LOW D <sub>n</sub>	1.0			1.0		ns
t <sub>H</sub> (L)	to LE	1.0			1.0		
t <sub>W</sub> (H)	Pulse Width, LE HIGH	3.0			3.0		ns

#### **Extended AC Electrical Characteristics**

SOIC package.

		$\label{eq:TA} \begin{split} T_A &= -40^\circ \text{C to } +85^\circ \text{C}, \\ V_{CC} &= 4.5 \text{V to } 5.5 \text{V}, \\ C_L &= 50 \text{pF}, \\ 8 \text{ Outputs} \\ \text{Switching}^{(7)} \end{split}$		$T_{A} = -40^{\circ}($ $V_{CC} = 4.5$ $C_{L} = 2$	C to +85°C, 5V to 5.5V, 50pF <sup>(8)</sup>	V <sub>CC</sub> = 4.5 C <sub>L</sub> = 2 8 Ou	C to +85°C, V to 5.5V, 250pF, tputs hing <sup>(9)</sup>	
Symbol	Parameter	Min.	Max.	Min.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay,	1.5	5.2	2.0	6.8	2.0	9.0	ns
t <sub>PHL</sub>	D <sub>n</sub> to O <sub>n</sub>	1.5	5.2	2.0	6.8	2.0	9.0	]
t <sub>PLH</sub>	Propagation Delay,	1.5	5.5	2.0	7.5	2.0	9.5	ns
t <sub>PHL</sub>	LE to O <sub>n</sub>	1.5	5.5	2.0	7.5	2.0	9.5	]
t <sub>PZH</sub>	Output Enable	1.5	6.2	2.0	8.0	2.0	10.5	ns
t <sub>PZL</sub>	Time	1.5	6.2	2.0	8.0	2.0	10.5	
t <sub>PHZ</sub>	Output Disable	1.0	5.5	(10)		(10)		ns
t <sub>PLZ</sub>	Time	1.0	5.5					

#### Notes:

- 7. This specification is guaranteed but not tested. The limits apply to propagation delays for all paths described switching in phase (i.e., all LOW-to-HIGH, HIGH-to-LOW, etc.).
- This specification is guaranteed but not tested. The limits represent propagation delay with 250pF load capacitors in place of the 50pF load capacitors in the standard AC load. This specification pertains to single output switching only.
- 9. This specification is guaranteed but not tested. The limits represent propagation delays for all paths described switching in phase (i.e., all LOW-to-HIGH, HIGH-to-LOW, etc.) with 250 pF load capacitors in place of the 50pF load capacitors in the standard AC load.
- 10. The 3-STATE delay times are dominated by the RC network (500 $\Omega$ , 250pF) on the output and has been excluded from the datasheet.

# Skew<sup>(11)</sup>

SOIC package.

		$T_A = -40^{\circ}C \text{ to } +85^{\circ}C,$ $V_{CC} = 4.5V \text{ to } 5.5V,$ $C_L = 50pF,$ 8  Outputs Switching <sup>(11)</sup>	$T_{A} = -40^{\circ}C \text{ to } +85^{\circ}C,$ $V_{CC} = 4.5V \text{ to } 5.5V,$ $C_{L} = 250\text{pF},$ 8  Outputs Switching <sup>(12)</sup>	
Symbol	Parameter	Max.	Max.	Units
t <sub>OSHL</sub> <sup>(13)</sup>	Pin to Pin Skew, HL Transitions	1.0	1.5	ns
t <sub>OSLH</sub> <sup>(13)</sup>	Pin to Pin Skew, LH Transitions	1.0	1.5	ns
t <sub>PS</sub> <sup>(14)</sup>	Duty Cycle, LH–HL Skew	1.4	3.5	ns
t <sub>OST</sub> <sup>(13)</sup>	Pin to Pin Skew, LH/HL Transitions	1.5	3.9	ns
t <sub>PV</sub> <sup>(15)</sup>	Device to Device Skew LH/HL Transitions	2.0	4.0	ns

#### Notes:

11. This specification is guaranteed but not tested. The limits apply to propagation delays for all paths described switching in phase (i.e., all LOW-to-HIGH, HIGH-to-LOW, etc.)

- 12. This specification is guaranteed but not tested. The limits represent propagation delays with 250pF load capacitors in place of the 50pF load capacitors in the standard AC load.
- 13. Skew is defined as the absolute value of the difference between the actual propagation delays for any two separate outputs of the same device. The specification applies to any outputs switching HIGH-to-LOW (t<sub>OSHL</sub>), LOW-to-HIGH (t<sub>OSLH</sub>), or any combination switching LOW-to-HIGH and/or HIGH-to-LOW (t<sub>OST</sub>). This specification is guaranteed but not tested.
- 14. This describes the difference between the delay of the LOW-to-HIGH and the HIGH-to-LOW transition on the same pin. It is measured across all the outputs (drivers) on the same chip, the worst (largest delta) number is the guaranteed specification. This specification is guaranteed but not tested.
- 15. Propagation delay variation for a given set of conditions (i.e., temperature and V<sub>CC</sub>) from device to device. This specification is guaranteed but not tested.

#### Capacitance

Symbol	Parameter	Conditions (T <sub>A</sub> = 25°C)	Тур.	Units
C <sub>IN</sub>	Input Capacitance	$V_{CC} = 0V$	5	pF
C <sub>OUT</sub> <sup>(16)</sup>	Output Capacitance	$V_{CC} = 5.0V$	9	pF

#### Note:

16. C<sub>OUT</sub> is measured at frequency f = 1MHz per MIL-STD-883B, Method 3012.

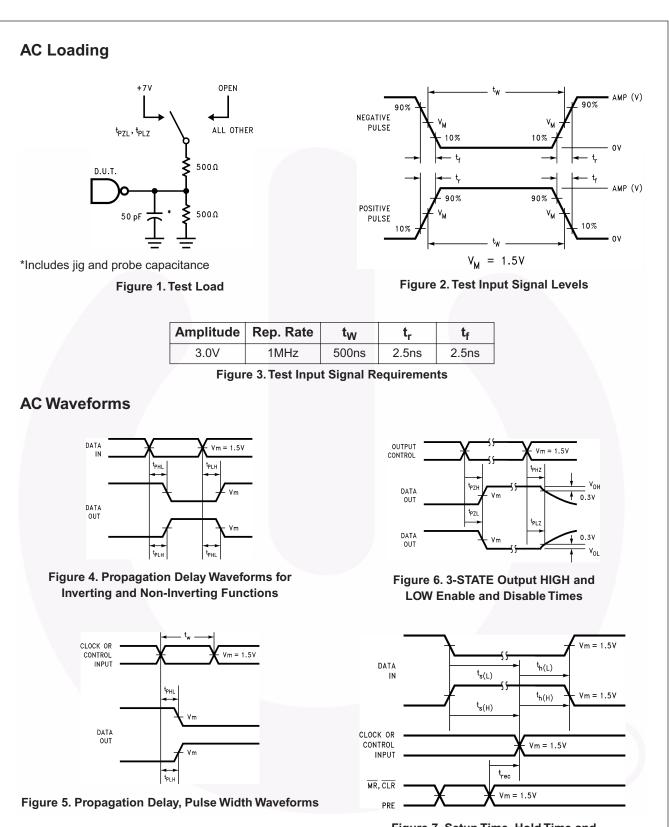
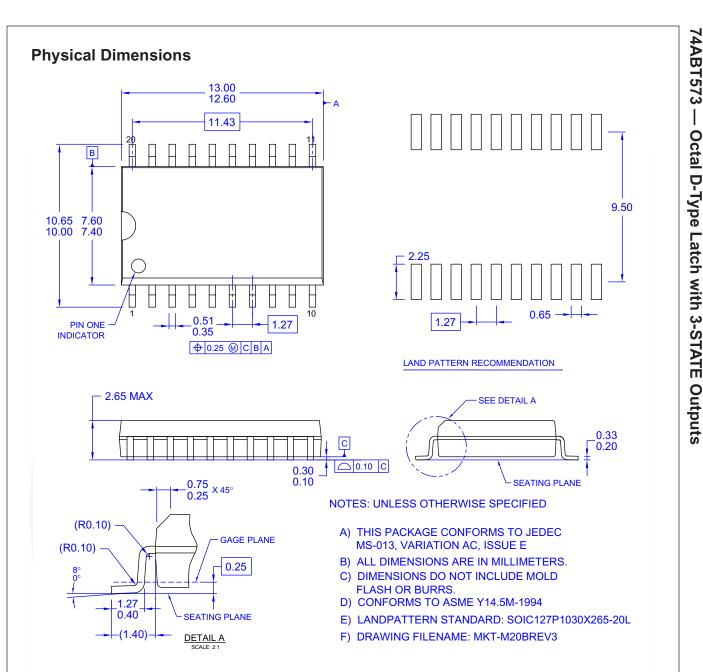


Figure 7. Setup Time, Hold Time and Recovery Time Waveforms 74ABT573 — Octal D-Type Latch with 3-STATE Outputs

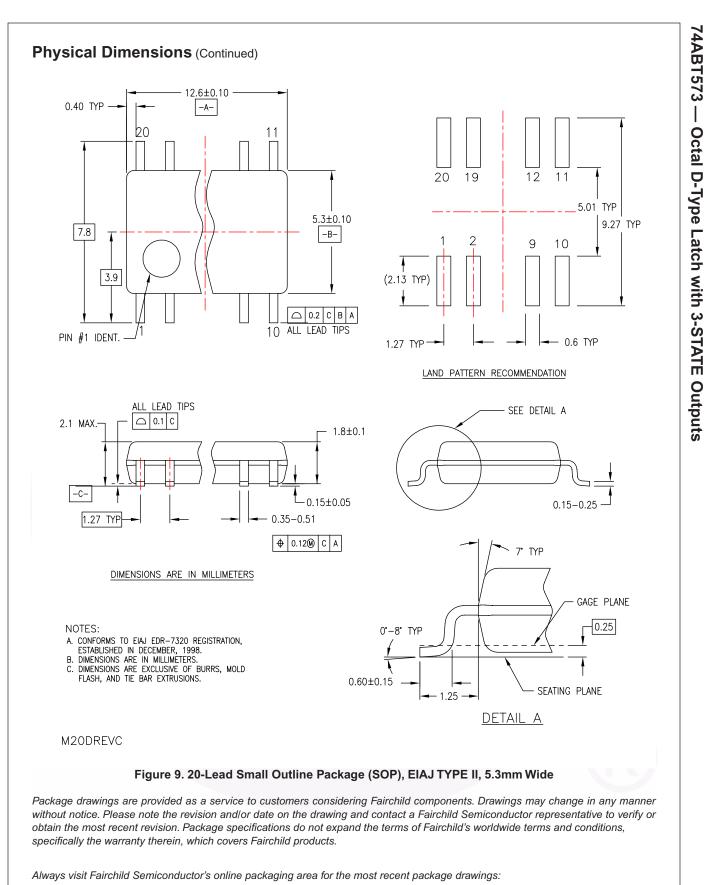
8



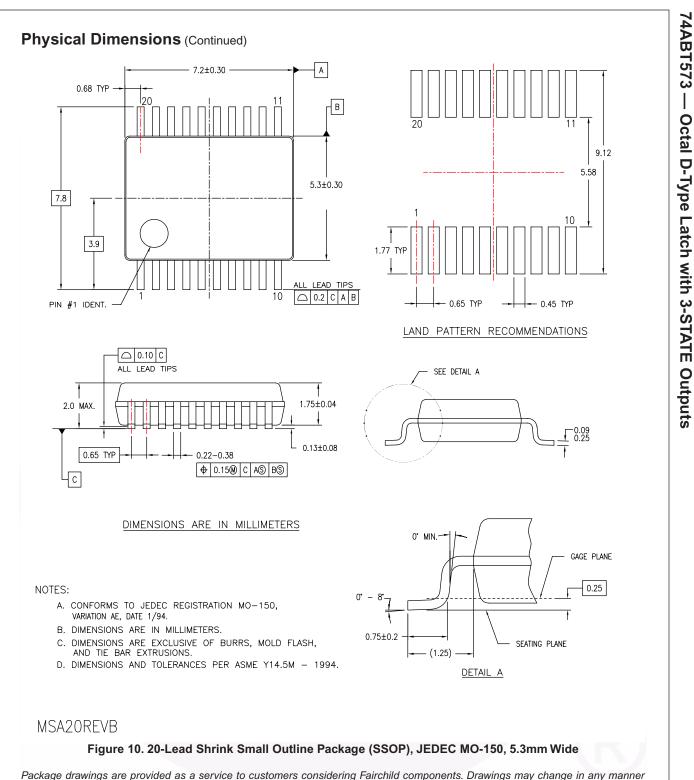
#### Figure 8. 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide

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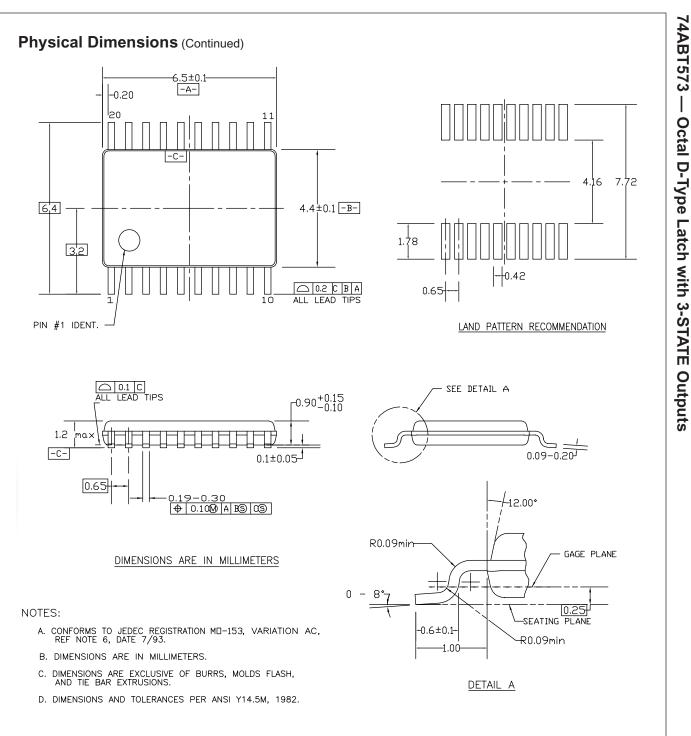
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#### MTC20REVD1

#### Figure 11. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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