

74LCX573

Low Voltage Octal Latch with 5V Tolerant Inputs and Outputs

General Description

The 'LCX573 is a high-speed octal latch with buffered common Latch Enable (LE) and buffered common Output Enable (\overline{OE}) inputs.

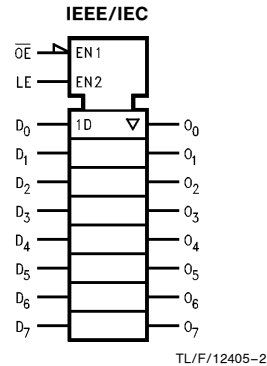
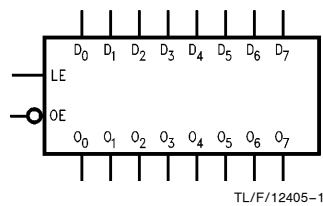
The 'LCX573 is functionally identical to the 'LCX373 but has inputs and outputs on opposite sides.

The 'LCX573 is designed for low voltage (3.3V) applications with capability of interfacing to a 5V signal environment. The 'LCX573 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

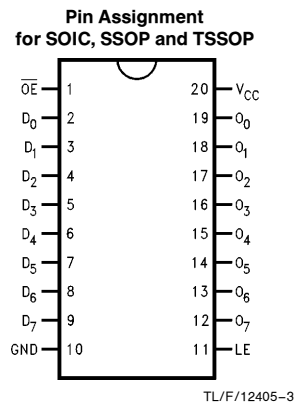
Features

- 5V tolerant inputs and outputs
- 7.0 ns t_{PD} max, 10 μA I_{CCQ} max
- Power down high impedance inputs and outputs
- Supports live insertion/withdrawal
- 2.0V–3.6V V_{CC} supply operation
- ± 24 mA output drive
- Implements patented Quiet Series™ noise/EMI reduction circuitry
- Functionally compatible with 74 series 573
- Latch-up performance exceeds 500 mA
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V

Logic Symbols



Connection Diagram



Pin Names	Description
D ₀ –D ₇	Data Inputs
LE	Latch Enable Input
\overline{OE}	TRI-STATE® Output Enable Input
O ₀ –O ₇	TRI-STATE Latch Outputs

	SOIC JEDEC	SOIC EIAJ	SSOP TYPE II	TSSOP JEDEC
Order Number	74LCX573WM	74LCX573SJ	74LCX573MSA	74LCX573MTC
	74LCX573WMX	74LCX573SJX	74LCX573MSAX	74LCX573MTCX
See NS Package Number	M20B	M20D	MSA20	MTC20

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Functional Description

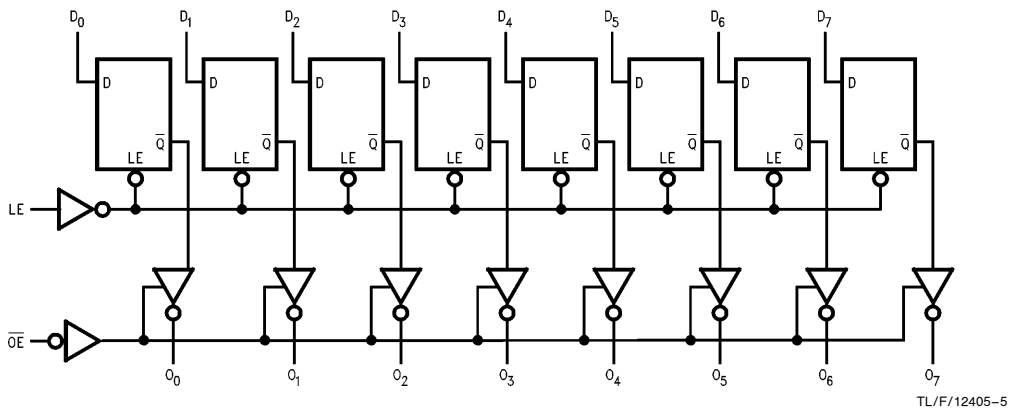
The 'LCX573 contains eight D-type latches with TRI-STATE output buffers. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The TRI-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)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Symbol	Parameter	Value	Conditions	Units
V _{CC}	Supply Voltage	-0.5 to +7.0		V
V _I	DC Input Voltage	-0.5 to +7.0		V
V _O	DC Output Voltage	-0.5 to +7.0	Output in TRI-STATE	V
		-0.5 to V _{CC} + 0.5	Output in High or Low State (Note 2)	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
I _{OK}	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	
I _O	DC Output Source/Sink Current	±50		mA
I _{CC}	DC Supply Current per Supply Pin	±100		mA
I _{GND}	DC Ground Current per Ground Pin	±100		mA
T _{STG}	Storage Temperature	-65 to +150		°C

Note 1: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: I_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Units	
V _{CC}	Supply Voltage	Operating	2.0	3.6	V
		Data Retention	1.5	3.6	
V _I	Input Voltage	0	5.5	V	
V _O	Output Voltage	HIGH or LOW State	0	V _{CC}	V
		TRI-STATE	0	5.5	
I _{OH} /I _{OL}	Output Current				
		V _{CC} = 3.0V-3.6V		±24	mA
		V _{CC} = 2.7V		±12	
T _A	Free-Air Operating Temperature	-40	85	°C	
Δt/ΔV	Input Edge Rate, V _{IN} = 0.8V-2.0V, V _{CC} = 3.0V	0	10	ns/V	

DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units
				Min	Max	
V _{IH}	HIGH Level Input Voltage		2.7-3.6	2.0		V
V _{IL}	LOW Level Input Voltage		2.7-3.6		0.8	V
V _{OH}	HIGH Level Output Voltage	I _{OH} = -100 μA	2.7-3.6	V _{CC} - 0.2		V
		I _{OH} = -12 mA	2.7	2.2		V
		I _{OH} = -18 mA	3.0	2.4		V
		I _{OH} = -24 mA	3.0	2.2		V
V _{OL}	LOW Level Output Voltage	I _{OL} = 100 μA	2.7-3.6		0.2	V
		I _{OL} = 12 mA	2.7		0.4	V
		I _{OL} = 16 mA	3.0		0.4	V
		I _{OL} = 24 mA	3.0		0.55	V
I _I	Input Leakage Current	0 ≤ V _I ≤ 5.5V	2.7-3.6		±5.0	μA
I _{OZ}	TRI-STATE Output Leakage	0 ≤ V _O ≤ 5.5V V _I = V _{IH} or V _{IL}	2.7-3.6		±5.0	μA
I _{OFF}	Power-Off Leakage Current	V _I or V _O = 5.5V	0		10	μA
I _{CC}	Quiescent Supply Current	V _I = V _{CC} or GND	2.7-3.6		10	μA
		3.6V ≤ V _I , V _O ≤ 5.5V	2.7-3.6		±10	μA
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 0.6V	2.7-3.6		500	μA

AC Electrical Characteristics

Symbol	Parameter	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$				Units
		$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 2.7V$		
		Min	Max	Min	Max	
t_{PHL} t_{PLH}	Propagation Delay D_n to O_n	1.5 1.5	8.0 8.0	1.5 1.5	9.0 9.0	ns
t_{PHL} t_{PLH}	Propagation Delay LE to O_n	1.5 1.5	8.5 8.5	1.5 1.5	9.5 9.5	ns
t_{PZL} t_{PZH}	Output Enable Time	1.5 1.5	8.5 8.5	1.5 1.5	9.5 9.5	ns
t_{PLZ} t_{PHZ}	Output Disable Time	1.5 1.5	6.5 6.5	1.5 1.5	7.0 7.0	ns
t_S	Setup Time, D_n to LE	2.5		2.5		ns
t_H	Hold Time, D_n to LE	1.5		1.5		ns
t_W	LE Pulse Width	3.3		3.3		ns
t_{OSHL} t_{OSLH}	Output to Output Skew (Note 3)		1.0 1.0			ns

Note 3: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH to LOW (t_{OSHL}) or LOW to HIGH (t_{OSLH}).

Dynamic Switching Characteristics

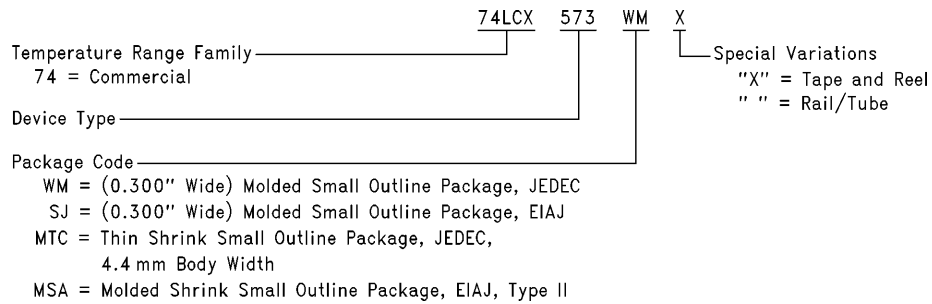
Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25^\circ\text{C}$	Units
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50 \text{ pF}, V_{IH} = 3.3V, V_{IL} = 0V$	3.3	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50 \text{ pF}, V_{IH} = 3.3V, V_{IL} = 0V$	3.3	-0.8	V

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0V \text{ or } V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3V, V_I = 0V \text{ or } V_{CC}$	8	pF
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 3.3V, V_I = 0V \text{ or } V_{CC}, F = 10 \text{ MHz}$	25	pF

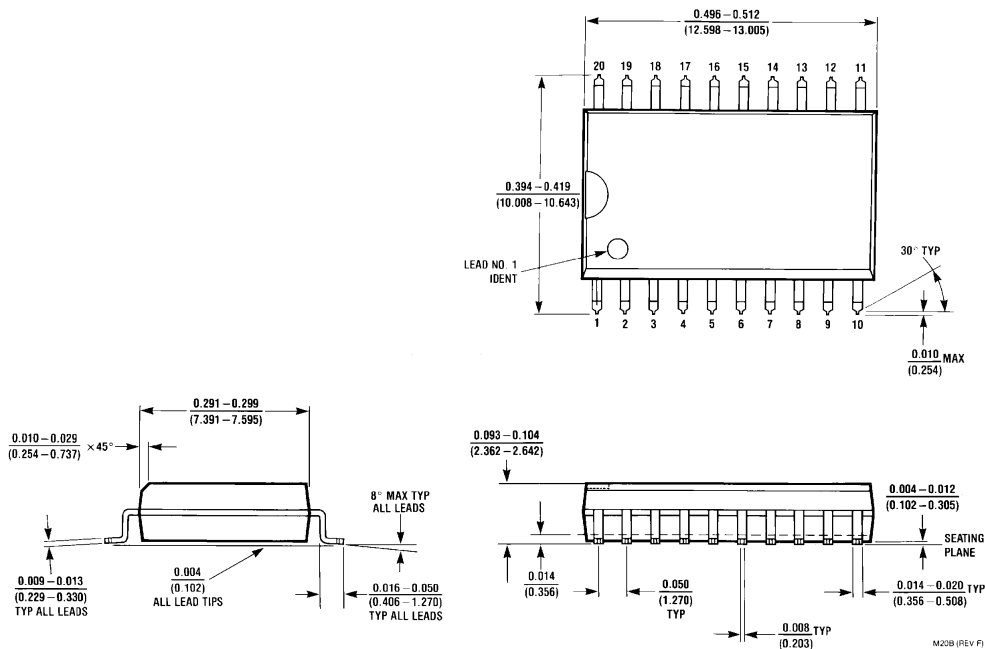
74LCX573 Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



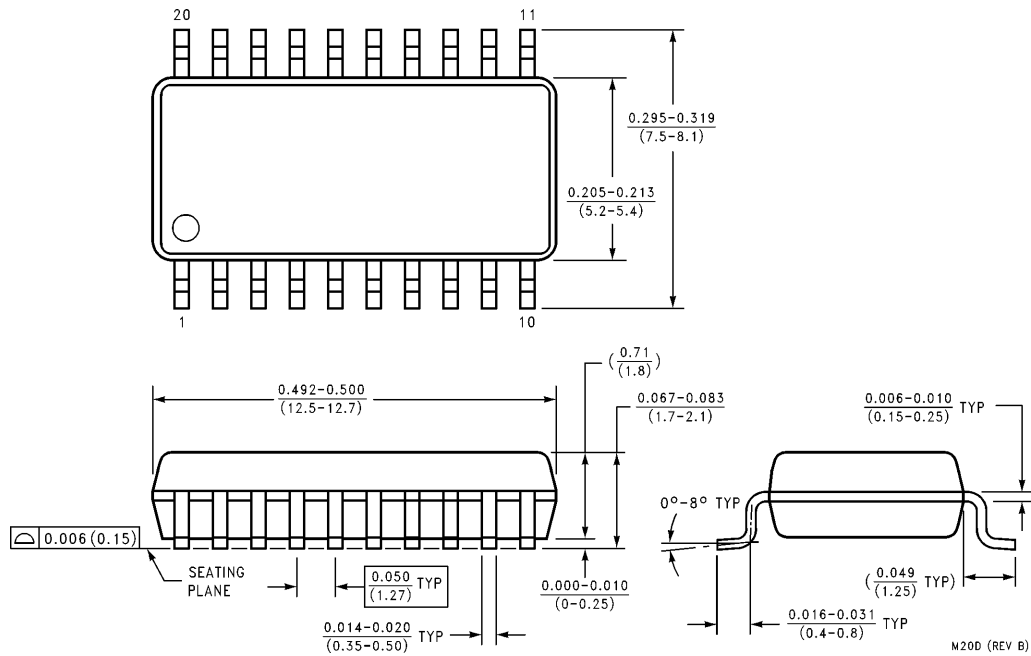
TL/F/12405-6

Physical Dimensions All dimensions are in inches (millimeters)



20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC
Order Number 74LCX573WM or 74LCX573WMX
NS Package Number M20B

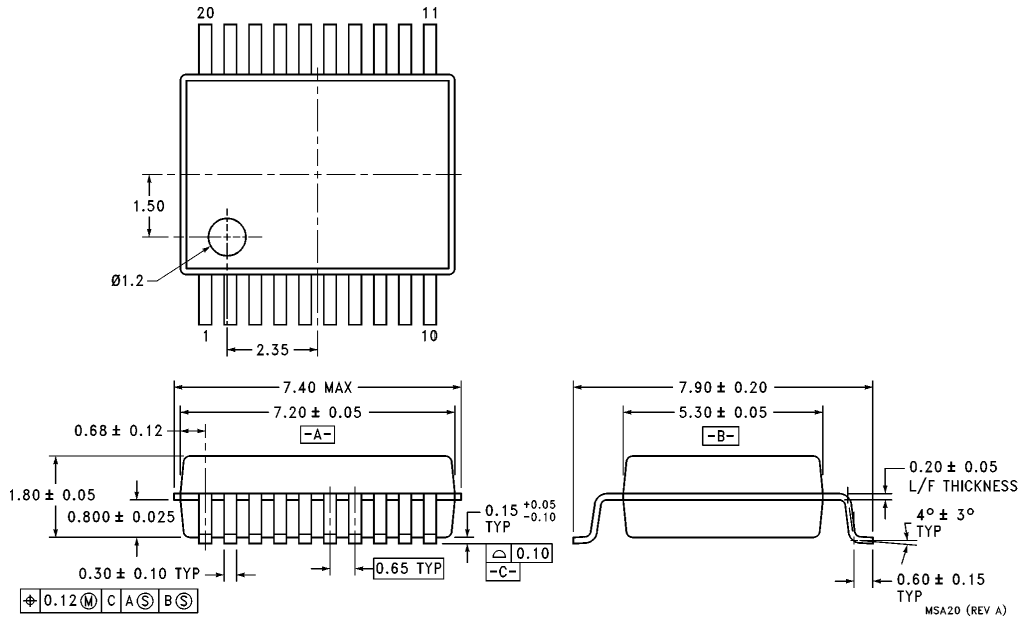
Physical Dimensions All dimensions are in inches (millimeters) (Continued)



20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ
Order Number 74LCX573SJ or 74LCX573SJX
NS Package Number M20D

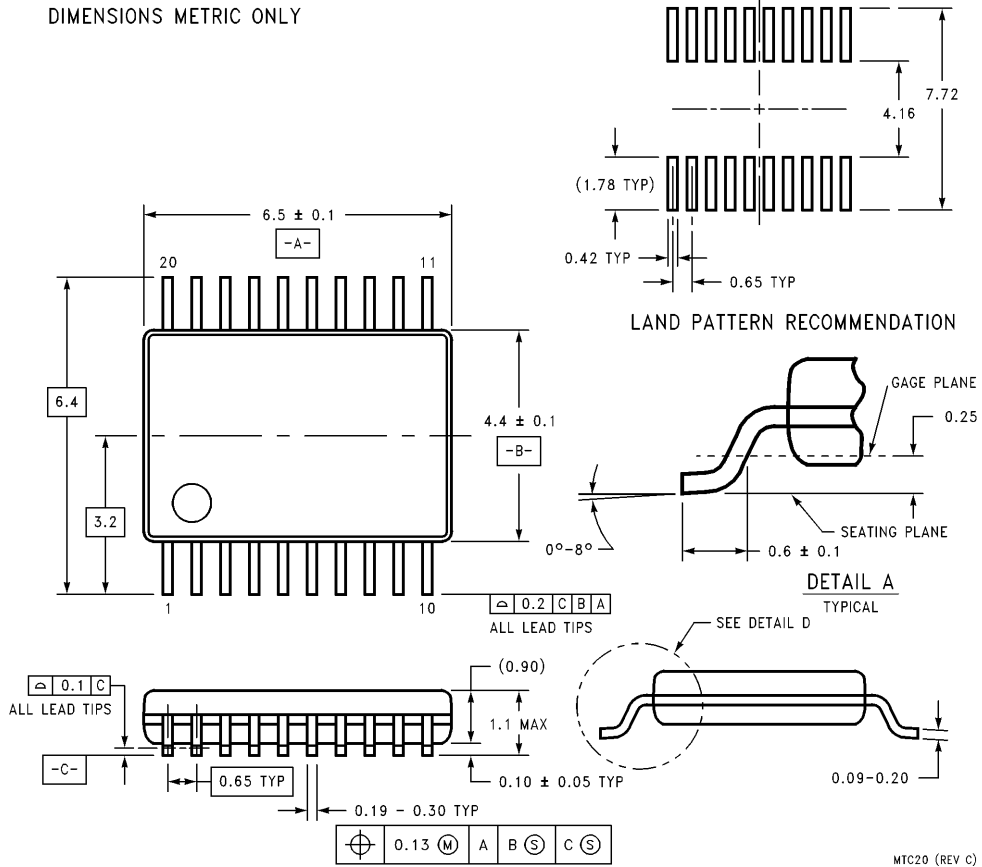
M20D (REV B)

Physical Dimensions All dimensions are in millimeters (Continued)



20-Lead Molded Shrink Small Outline Package, EIAJ, Type II
Order Number 74LCX573MSA or 74LCX573MSAX
NS Package Number MSA20

Physical Dimensions All dimensions are in millimeters (Continued)



20-Lead Think Shrink Small Outline Package, JEDEC
Order Number 74LCX573MTC or 74LCX573MTCX
NS Package Number MTC20

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