

TC74LVX573F, TC74LVX573FW, TC74LVX573FT

OCTAL D-TYPE LATCH WITH 3-STATE OUTPUT

The TC74LVX573 is a high speed CMOS OCTAL LATCH with 3-STATE OUTPUT fabricated with silicon gate C²MOS technology.

Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

This device is suitable for low voltage and battery operated systems.

This 8bit D-type latch is controlled by a latch enable input (LE) and a output enable input (\overline{OE}).

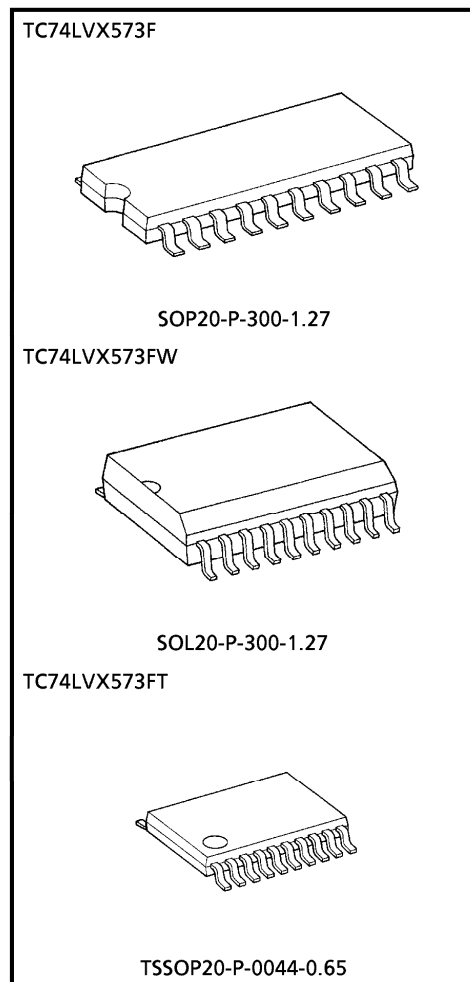
When the \overline{OE} input is high, the eight outputs are in a high impedance state.

An input protection circuit ensures that 0 to 7V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

FEATURES

- High speed : $t_{pd} = 6.4ns$ (Typ.) ($V_{CC} = 3.3V$)
- Low power dissipation : $I_{CC} = 4\mu A$ (Max.) ($T_a = 25^\circ C$)
- Input voltage level : $V_{IL} = 0.8V$ (Max.) ($V_{CC} = 3V$)
 $V_{IH} = 2.0V$ (Min.) ($V_{CC} = 3V$)
- Power down protection is provided on all inputs.
- Balanced propagation delays : $t_{pLH} \approx t_{pHL}$
- Low noise : $V_{OLP} = 0.8V$ (Max.)
- Pin and function compatible with 74HC573

(Note) The JEDEC SOP (FW) is not available in Japan.



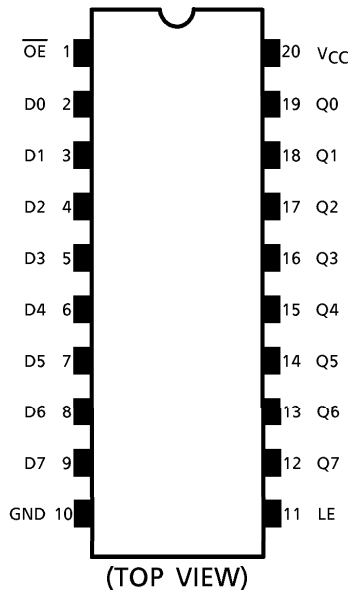
Weight

| | |
|---------------------|----------------|
| SOP20-P-300-1.27 | : 0.22g (Typ.) |
| SOL20-P-300-1.27 | : 0.46g (Typ.) |
| TSSOP20-P-0044-0.65 | : 0.08g (Typ.) |

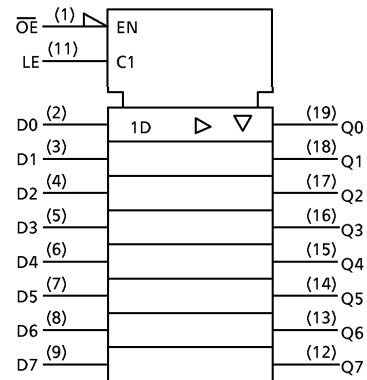
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PIN ASSIGNMENT



IEC LOGIC SYMBOL

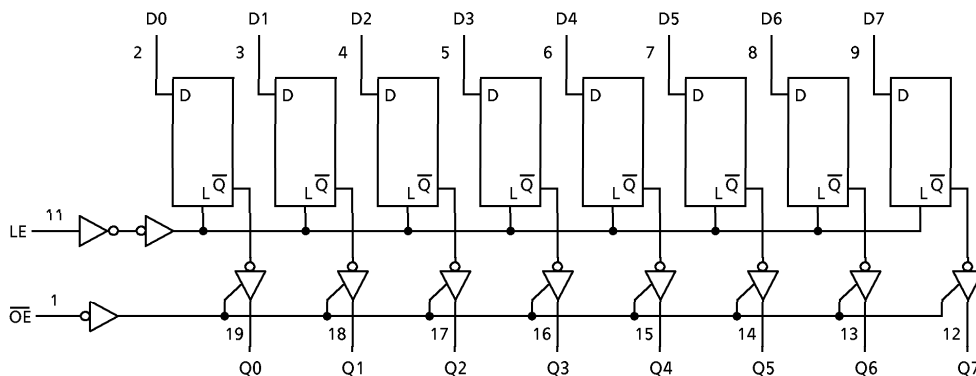


TRUTH TABLE

| INPUTS | | | OUTPUTS |
|-----------------|----|---|---------|
| \overline{OE} | LE | D | |
| H | X | X | Z |
| L | L | X | Qn |
| L | H | L | L |
| L | H | H | H |

X : Don't Care
 Z : High Impedance
 Qn : Q outputs are latched at the time when the LE input is taken to a low logic level.

SYSTEM DIAGRAM



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MAXIMUM RATINGS

| PARAMETER | SYMBOL | RATING | UNIT |
|------------------------------------|------------------|---------------------------|------|
| Supply Voltage Range | V _{CC} | -0.5~7.0 | V |
| DC Input Voltage | V _{IN} | -0.5~7.0 | V |
| DC Output Voltage | V _{OUT} | -0.5~V _{CC} +0.5 | V |
| Input Diode Current | I _{IK} | -20 | mA |
| Output Diode Current | I _{OK} | ±20 | mA |
| DC Output Current | I _{OUT} | ±25 | mA |
| DC V _{CC} /Ground Current | I _{CC} | ±75 | mA |
| Power Dissipation | P _D | 180 | mW |
| Storage Temperature | T _{stg} | -65~150 | °C |

RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | RATING | UNIT |
|--------------------------|------------------|-------------------|------|
| Supply Voltage | V _{CC} | 2.0~3.6 | V |
| Input Voltage | V _{IN} | 0~5.5 | V |
| Output Voltage | V _{OUT} | 0~V _{CC} | V |
| Operating Temperature | T _{opr} | -40~85 | °C |
| Input Rise And Fall Time | dt/dv | 0~100 | ns/V |

ELECTRICAL CHARACTERISTICS

DC characteristics

| PARAMETER | SYM-BOL | TEST CONDITION | V _{CC} (V) | Ta = 25°C | | | Ta = -40~85°C | | UNIT | |
|----------------------------------|-----------------|---|-------------------------|-----------|------|-------|---------------|------|------|---|
| | | | | MIN. | TYP. | MAX. | MIN. | MAX. | | |
| Input Voltage | "H" Level | V _{IH} | 2.0 | 1.5 | — | — | 1.5 | — | V | |
| | | | 3.0 | 2.0 | — | — | 2.0 | — | | |
| | | | 3.6 | 2.4 | — | — | 2.4 | — | | |
| | "L" Level | V _{IL} | 2.0 | — | — | 0.5 | — | 0.5 | | |
| | | | 3.0 | — | — | 0.8 | — | 0.8 | | |
| | | | 3.6 | — | — | 0.8 | — | 0.8 | | |
| Output Voltage | "H" Level | V _{OH} V _{IN} = V _{IH} or V _{IL} | I _{OH} = -50μA | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V |
| | | | I _{OH} = -50μA | 3.0 | 2.9 | 3.0 | — | 2.9 | — | |
| | | | I _{OH} = -4mA | 3.0 | 2.58 | — | — | 2.48 | — | |
| | "L" Level | V _{OL} V _{IN} = V _{IH} or V _{IL} | I _{OL} = 50μA | 2.0 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | I _{OL} = 50μA | 3.0 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | I _{OL} = 4mA | 3.0 | — | — | 0.36 | — | 0.44 | |
| 3-state Output Off-state Current | I _{OZ} | V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND | 3.6 | — | — | ±0.25 | — | ±2.5 | μA | |
| Input Leakage Current | I _{IN} | V _{IN} = 5.5V or GND | 3.6 | — | — | ±0.1 | — | ±1.0 | μA | |
| Quiescent Supply Current | I _{CC} | V _{IN} = V _{CC} or GND | 3.6 | — | — | 4.0 | — | 40.0 | μA | |

TIMING REQUIREMENTS (Input $t_r = t_f = 3ns$)

| PARAMETER | SYM-BOL | TEST CONDITION | Ta = 25°C | | Ta = -40~85°C | | UNIT |
|--------------------------|--------------------|----------------|---------------------|-------|---------------|-------|------|
| | | | V _{CC} (V) | LIMIT | LIMIT | LIMIT | |
| Minimum Pulse Width (LE) | t _W (H) | | 2.7 | 6.5 | 7.5 | | ns |
| | | | 3.3 ± 0.3 | 5.0 | 5.0 | | |
| Minimum Set-up Time | t _s | | 2.7 | 5.0 | 5.0 | | ns |
| | | | 3.3 ± 0.3 | 3.5 | 3.5 | | |
| Minimum Hold Time | t _h | | 2.7 | 1.5 | 1.5 | | ns |
| | | | 3.3 ± 0.3 | 1.5 | 1.5 | | |

AC characteristics (Input $t_r = t_f = 3ns$)

| PARAMETER | SYM-BOL | TEST CONDITION | Ta = 25°C | | | Ta = -40~85°C | | UNIT | | |
|-------------------------------|--|----------------------|---------------------|---------------------|------|---------------|------|------|------|------|
| | | | V _{CC} (V) | C _L (pF) | MIN. | TYP. | MAX. | | MIN. | MAX. |
| Propagation Delay Time (LE-Q) | t _{pLH} | | 2.7 | 15 | — | 8.2 | 15.6 | 1.0 | 18.5 | ns |
| | | | | 50 | — | 10.7 | 19.1 | 1.0 | 22.0 | |
| | 3.3 ± 0.3 | | 15 | — | 6.4 | 10.1 | 1.0 | 12.0 | | |
| | | | 50 | — | 8.9 | 13.6 | 1.0 | 15.5 | | |
| Propagation Delay Time (D-Q) | t _{pLH} | | 2.7 | 15 | — | 7.6 | 14.5 | 1.0 | 17.5 | ns |
| | | | | 50 | — | 10.1 | 18.0 | 1.0 | 21.0 | |
| | 3.3 ± 0.3 | | 15 | — | 5.9 | 9.3 | 1.0 | 11.0 | | |
| | | | 50 | — | 8.4 | 12.8 | 1.0 | 14.5 | | |
| Output Enable Time | t _{pZL} | R _L = 1kΩ | 2.7 | 15 | — | 7.8 | 15.0 | 1.0 | 18.5 | ns |
| | | | | 50 | — | 10.3 | 18.5 | 1.0 | 22.0 | |
| | 3.3 ± 0.3 | | 15 | — | 6.1 | 9.7 | 1.0 | 12.0 | | |
| | | | 50 | — | 8.6 | 13.2 | 1.0 | 15.5 | | |
| Output Disable Time | t _{pLZ} t _{pHZ} | R _L = 1kΩ | 2.7 | 50 | — | 12.1 | 19.1 | 1.0 | 22.0 | ns |
| | | | 3.3 ± 0.3 | 50 | — | 10.1 | 13.6 | 1.0 | 15.5 | |
| Output To Output Skew | t _{osLH} t _{osHL} | (Note 1) | 2.7 | 50 | — | — | 1.5 | — | 1.5 | ns |
| | | | 3.3 ± 0.3 | 50 | — | — | 1.5 | — | 1.5 | |
| Input Capacitance | C _{IN} | (Note 2) | | | — | 4 | 10 | — | 10 | pF |
| Output Capacitance | C _{OUT} | | | | — | 6 | — | — | — | pF |
| Power Dissipation Capacitance | C _{PD} | (Note 3) | | | — | 29 | — | — | — | pF |

(Note 1) Parameter guaranteed by design.

$$(t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|)$$

(Note 2) Parameter guaranteed by design.

(Note 3) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.

Average operating current can be obtained by the equation :

$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 8 \text{ (per Latch)}$$

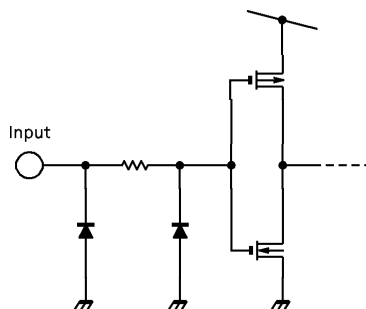
And the total C_{PD} when n pcs. of Latch operate can be gained by the following equation :

$$C_{PD}(\text{total}) = 21 + 8 \cdot n$$

Noise characteristics (Ta = 25°C, Input tr = tf = 3ns, CL = 50pF)

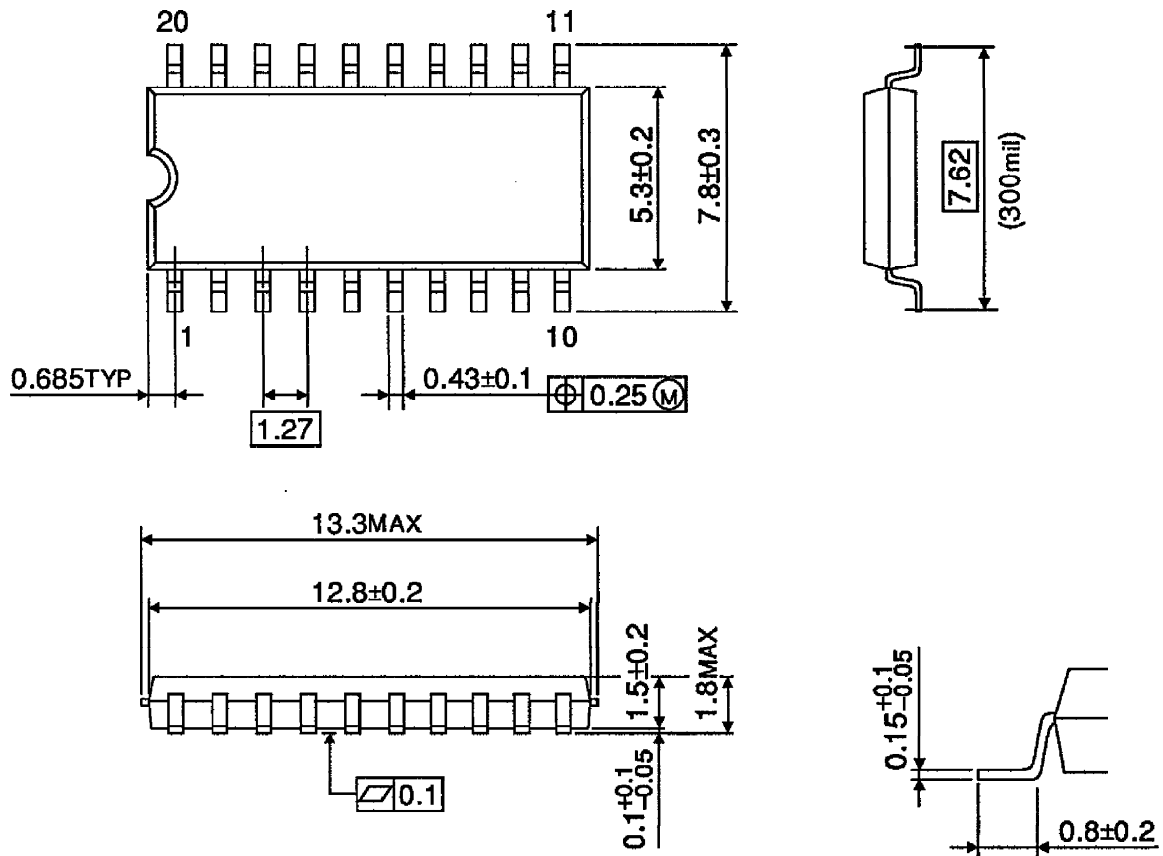
| PARAMETER | SYMBOL | TEST CONDITION | VCC (V) | TYP. | LIMIT | UNIT |
|---|--------|----------------|---------|------|-------|------|
| | | | 3.3 | | | |
| Quiet Output Maximum Dynamic VOL | VOLP | | 3.3 | 0.5 | 0.8 | V |
| Quiet Output Minimum Dynamic VOL | VOLV | | 3.3 | -0.5 | -0.8 | V |
| Minimum High Level Dynamic Input Voltage | VIHD | | 3.3 | — | 2.0 | V |
| Maximum Low Level Dynamic Input Voltage | VILD | | 3.3 | — | 0.8 | V |

INPUT EQUIVALENT CIRCUIT



OUTLINE DRAWING
SOP20-P-300-1.27

Unit : mm

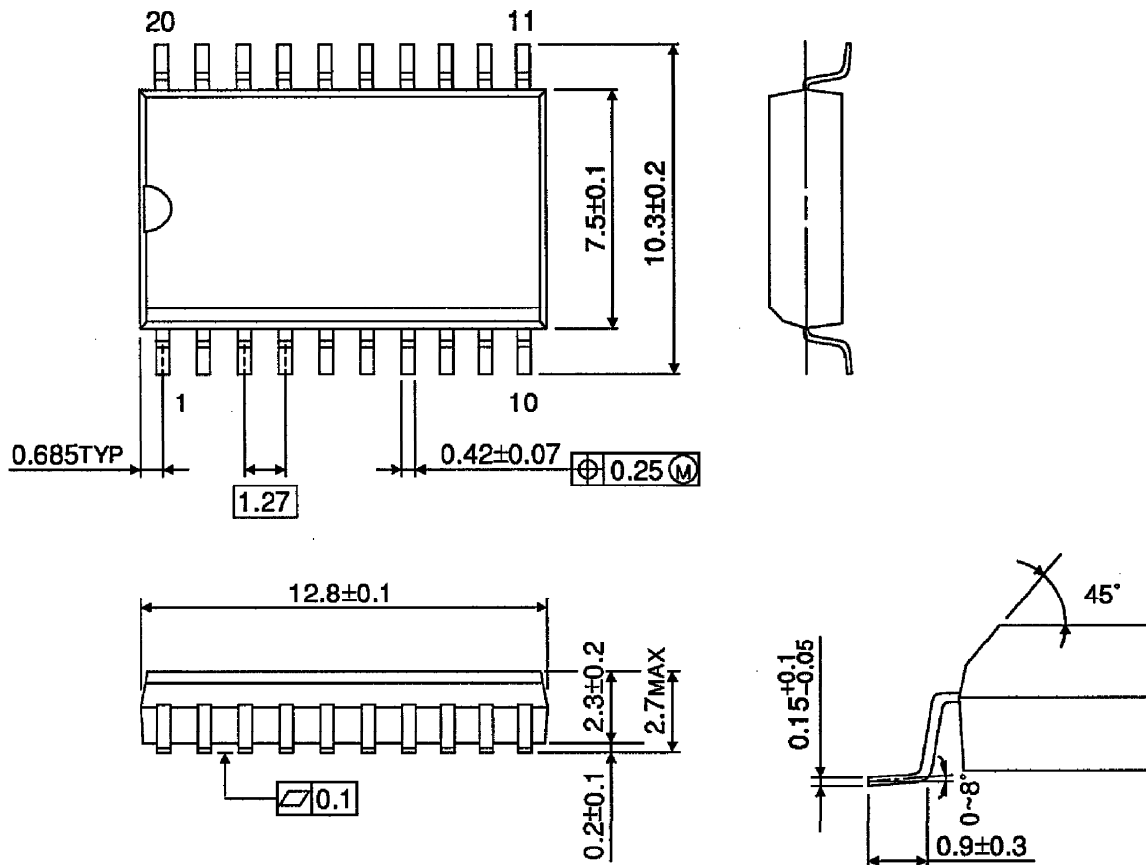


Weight : 0.22g (Typ.)

OUTLINE DRAWING
SOL20-P-300-1.27

Unit : mm

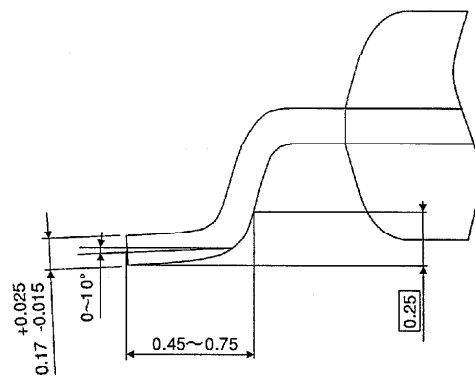
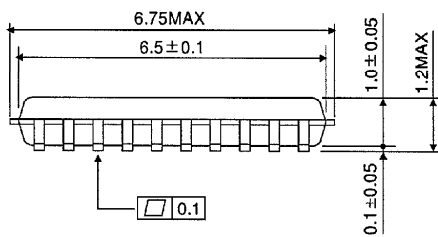
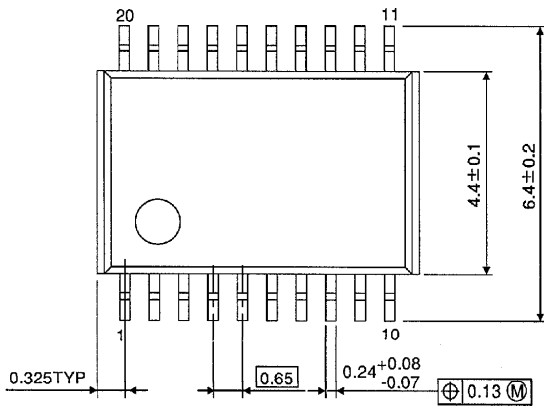
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

OUTLINE DRAWING
TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)