

TC74LCX540F, TC74LCX540FW, TC74LCX540FT

**LOW VOLTAGE OCTAL BUS BUFFER (INVERTED)
WITH 5V TOLERANT INPUTS AND OUTPUTS**

The TC74LCX540 is a high performance CMOS OCTAL BUS BUFFER. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

The device is designed for low-voltage (3.3V) V_{CC} applications, but it could be used to interface to 5V supply environment for both inputs and outputs.

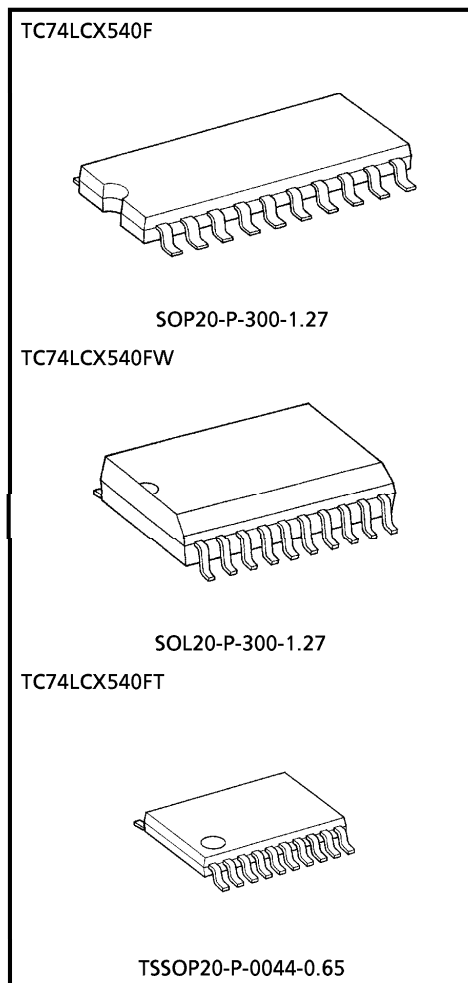
The 74LCX540 is an inverting 3-state buffer having two active-low output enables. When either $\overline{OE}1$ or $\overline{OE}2$ are high, the terminal outputs are in the high-impedance state. This device is designed to be used with 3-state memory address drivers, etc.

All inputs are equipped with protection circuits against static discharge.

FEATURES

- Low voltage operation : $V_{CC} = 2.0 \sim 3.6V$
- High speed operation : $t_{pd} = 6.5ns$ (Max.)
($V_{CC} = 3.0 \sim 3.6V$)
- Output current : $|I_{OH}| / I_{OL} = 24mA$ (Min.)
($V_{CC} = 3.0V$)
- Latch-up performance : $\pm 500mA$
- Available in JEDEC SOP, EIAJ SOP and TSSOP
- Power down protection is provided on all inputs and outputs.
- Pin and function compatible with the 74 series (74AC/VHC/HC/F/ALS/LS etc.) 540 type.

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



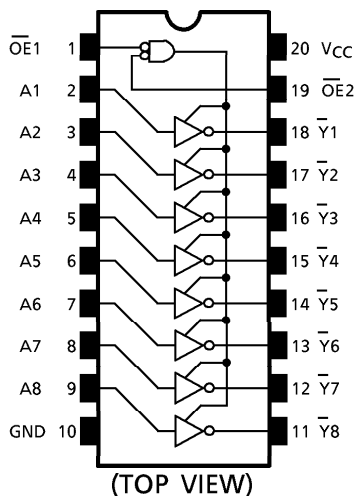
Weight

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

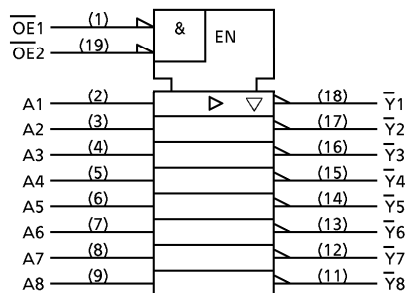
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PIN ASSIGNMENT



IEC LOGIC SYMBOL



TRUTH TABLE

| INPUTS | | | OUTPUTS |
|--------|-----|----|---------|
| OE1 | OE2 | An | |
| H | X | X | Z |
| X | H | X | Z |
| L | L | H | L |
| L | L | L | H |

X : Don't Care
Z : High Impedance

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} | -0.5~7.0 (Note 1) | V |
| | | -0.5~V _{CC} +0.5 (Note 2) | |
| Input Diode Current | I _{IK} | -50 | mA |
| Output Diode Current | I _{OK} | ±50 (Note 3) | mA |
| DC Output Current | I _{OUT} | ±50 | mA |
| Power Dissipation | P _D | 180 | mW |
| DC V _{CC} /Ground Current | I _{CC} /I _{GND} | ±100 | mA |
| Storage Temperature | T _{stg} | -65~150 | °C |

(Note 1) Output in Off-State
 (Note 2) High or Low State. I_{OUT} absolute maximum rating must be observed.
 (Note 3) V_{OUT}<GND, V_{OUT}>V_{CC}

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- The information contained herein is subject to change without notice.

RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | RATING | UNIT |
|--------------------------|-----------------|----------------------|------|
| Supply Voltage | V_{CC} | 2.0~3.6 | V |
| | | 1.5~3.6 (Note 4) | |
| Input Voltage | V_{IN} | 0~5.5 | V |
| Output Voltage | V_{OUT} | 0~5.5 (Note 5) | V |
| | | 0~ V_{CC} (Note 6) | |
| Output Current | I_{OH}/I_{OL} | ± 24 (Note 7) | mA |
| | | ± 12 (Note 8) | |
| Operating Temperature | T_{opr} | -40~85 | °C |
| Input Rise And Fall Time | dt/dv | 0~10 (Note 9) | ns/V |

(Note 4) Data Retention Only

(Note 5) Output in Off-State

(Note 6) High or Low State

(Note 7) $V_{CC} = 3.0\sim 3.6V$ (Note 8) $V_{CC} = 2.7\sim 3.0V$ (Note 9) $V_{IN} = 0.8\sim 2.0V$, $V_{CC} = 3.0V$

ELECTRICAL CHARACTERISTICS

DC characteristics ($T_a = -40\sim 85^\circ C$)

| PARAMETER | | SYMBOL | TEST CONDITION | V_{CC} (V) | MIN. | MAX. | UNIT | |
|----------------------------------|-----------------|---|-------------------------------|----------------------|---------|----------------|---------|---|
| Input Voltage | "H" Level | V_{IH} | | 2.7~3.6 | 2.0 | — | V | |
| | "L" Level | V_{IL} | | 2.7~3.6 | — | 0.8 | | |
| Output Voltage | "H" Level | V_{OH} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -100\mu A$ | 2.7~3.6 | $V_{CC} - 0.2$ | — | V |
| | | | | $I_{OH} = -12mA$ | 2.7 | 2.2 | — | |
| | | | | $I_{OH} = -18mA$ | 3.0 | 2.4 | — | |
| | | | | $I_{OH} = -24mA$ | 3.0 | 2.2 | — | |
| | "L" Level | V_{OL} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 100\mu A$ | 2.7~3.6 | — | 0.2 | |
| | | | | $I_{OL} = 12mA$ | 2.7 | — | 0.4 | |
| | | | | $I_{OL} = 16mA$ | 3.0 | — | 0.4 | |
| | | | | $I_{OL} = 24mA$ | 3.0 | — | 0.55 | |
| Input Leakage Current | I_{IN} | $V_{IN} = 0\sim 5.5V$ | | 2.7~3.6 | — | ± 5.0 | μA | |
| 3-State Output Off-State Current | I_{OZ} | $V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0\sim 5.5V$ | | 2.7~3.6 | — | ± 5.0 | μA | |
| Power Off Leakage Current | I_{OFF} | $V_{IN}/V_{OUT} = 5.5V$ | | 0 | — | 10.0 | μA | |
| Quiescent Supply Current | I_{CC} | $V_{IN} = V_{CC}$ or GND | | 2.7~3.6 | — | 10.0 | μA | |
| | | $V_{IN}/V_{OUT} = 3.6\sim 5.5V$ | | 2.7~3.6 | — | ± 10.0 | | |
| Increase In I_{CC} Per Input | ΔI_{CC} | $V_{IH} = V_{CC} - 0.6V$ | | 2.7~3.6 | — | 500 | μA | |

AC characteristic (Ta = -40~85°C)

| PARAMETER | SYMBOL | TEST CONDITION | V _{CC} (V) | MIN. | MAX. | UNIT |
|------------------------|-------------------|----------------|---------------------|------|------|------|
| | | | | | | |
| Propagation Delay Time | t _{pLH} | (Fig.1, 2) | 2.7 | — | 7.5 | ns |
| | t _{pHL} | | 3.3 ± 0.3 | 1.5 | 6.5 | |
| Output Enable Time | t _{pZL} | (Fig.1, 3) | 2.7 | — | 9.5 | ns |
| | t _{pZH} | | 3.3 ± 0.3 | 1.5 | 8.5 | |
| Output Disable Time | t _{pLZ} | (Fig.1, 3) | 2.7 | — | 8.5 | ns |
| | t _{pHZ} | | 3.3 ± 0.3 | 1.5 | 7.5 | |
| Output To Output Skew | t _{osLH} | (Note 10) | 2.7 | — | — | ns |
| | t _{osHL} | | 3.3 ± 0.3 | — | 1.0 | |

(Note 10) Parameter guaranteed by design.
 (t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|)

DYNAMIC SWITCHING CHARACTERISTICS (Ta = 25°C, Input t_r = t_f = 2.5ns, C_L = 50pF, R_L = 500Ω)

| PARAMETER | SYMBOL | TEST CONDITION | V _{CC} (V) | TYP. | UNIT |
|--|------------------|--|---------------------|------|------|
| | | | | | |
| Quiet Output Maximum Dynamic V _{OL} | V _{OLP} | V _{IH} = 3.3V, V _{IL} = 0V | 3.3 | 0.8 | V |
| Quiet Output Minimum Dynamic V _{OL} | V _{OLV} | V _{IH} = 3.3V, V _{IL} = 0V | 3.3 | 0.8 | V |

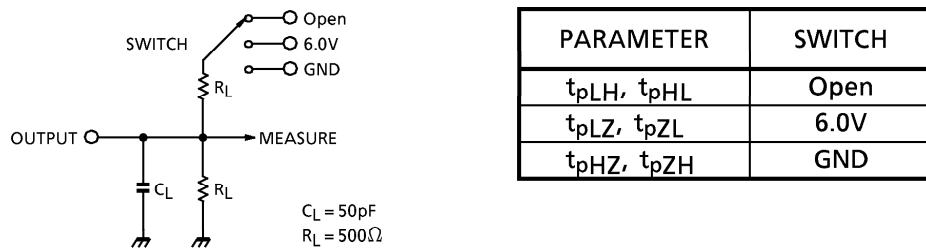
CAPACITIVE CHARACTERISTICS (Ta = 25°C)

| PARAMETER | SYMBOL | TEST CONDITION | V _{CC} (V) | TYP. | UNIT |
|-------------------------------|------------------|-----------------------------------|---------------------|------|------|
| | | | | | |
| Input Capacitance | C _{IN} | — | 3.3 | 7 | pF |
| Output Capacitance | C _{OUT} | | 3.3 | 8 | pF |
| Power Dissipation Capacitance | C _{PD} | f _{IN} = 10MHz (Note 11) | 3.3 | 40 | pF |

(Note 11) 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} · V_{CC} · f_{IN} + I_{CC} / 8 (per bit)

TEST CIRCUIT

Fig.1



AC WAVEFORM

Fig.2 t_{pLH}, t_{pHL}

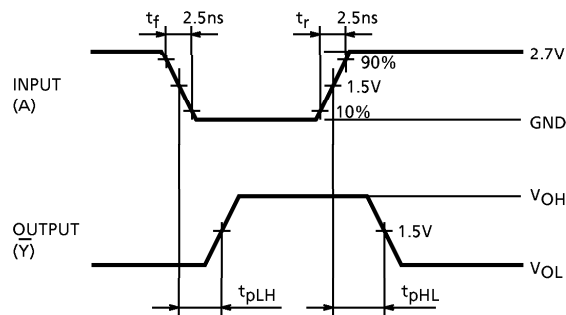
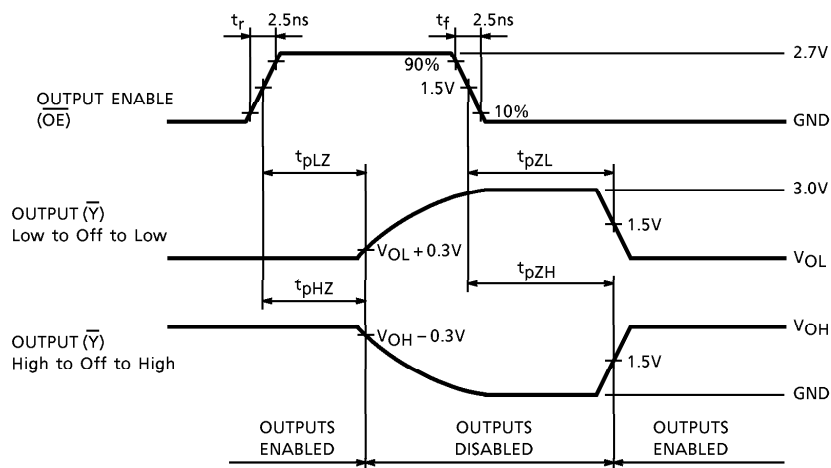
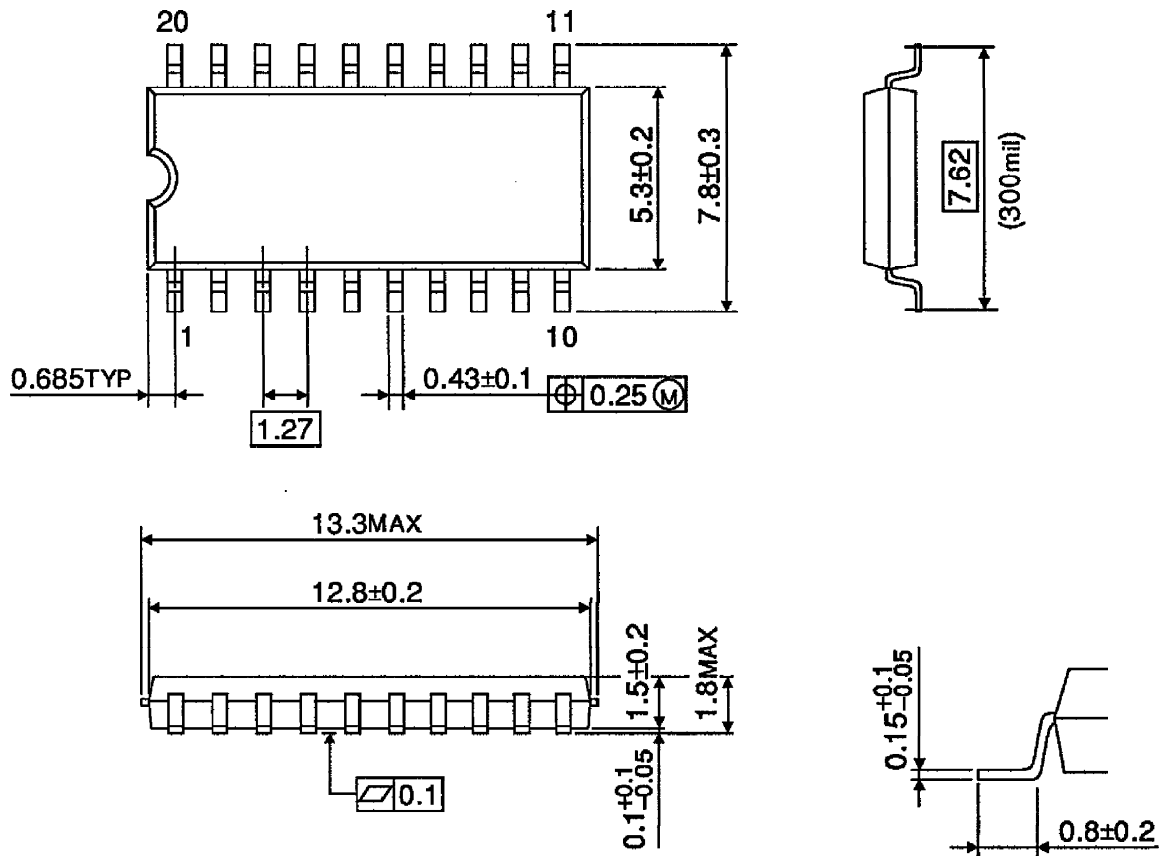


Fig.3 $t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}$



OUTLINE DRAWING
SOP20-P-300-1.27

Unit : mm

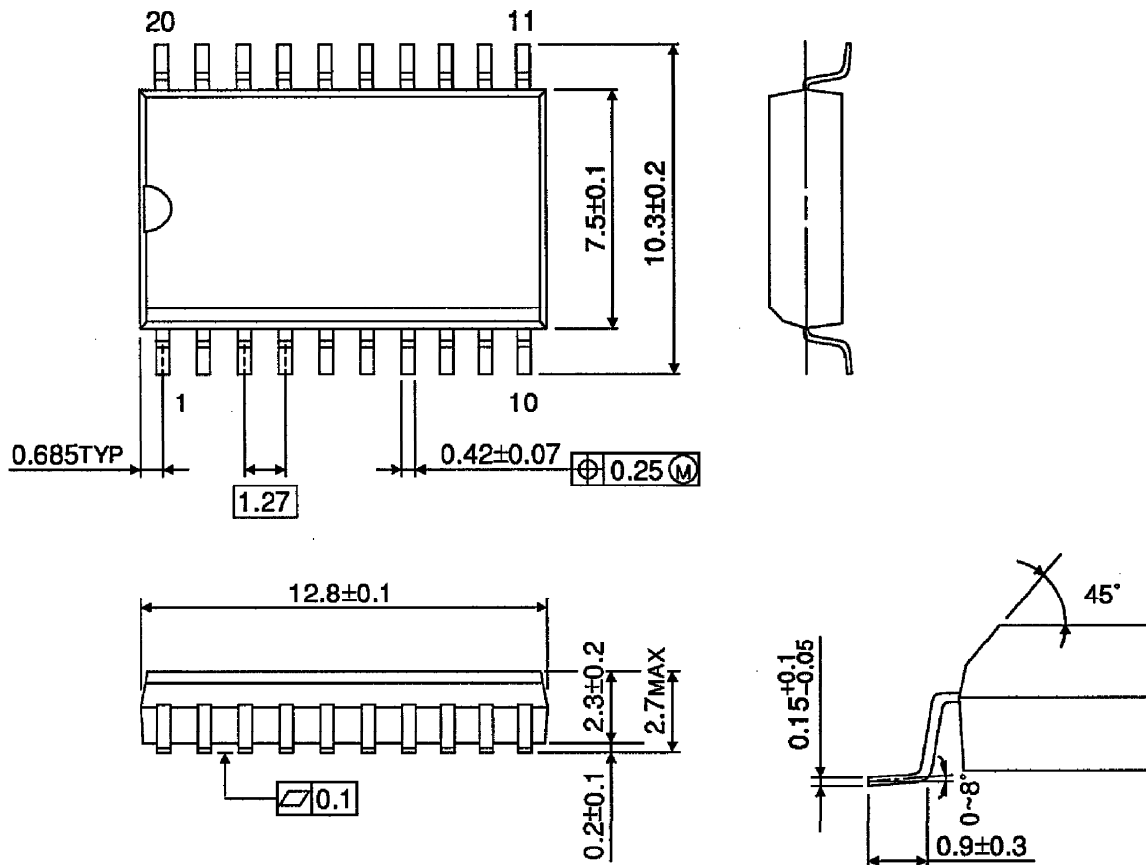


Weight : 0.22g (Typ.)

OUTLINE DRAWING
SOL20-P-300-1.27

Unit : mm

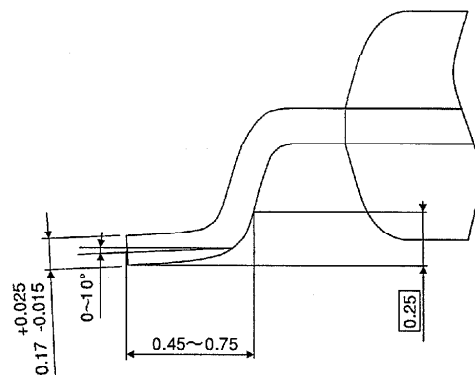
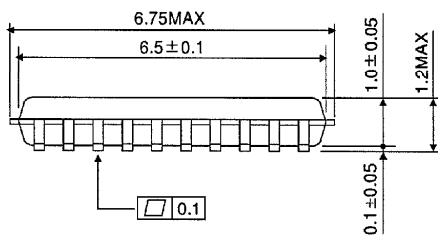
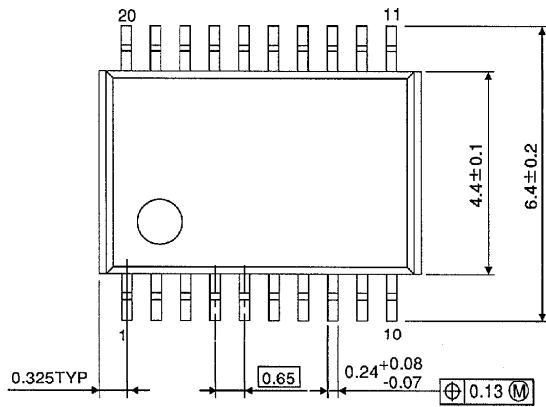
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

OUTLINE DRAWING
TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)