

TC74LVX245F, TC74LVX245FW, TC74LVX245FT

OCTAL BUS TRANSCEIVER

The TC74LVX245 is a high speed CMOS OCTAL BUS TRANSCEIVER fabricated using silicon gate C²MOS technology.

Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation. These devices are suitable for low voltage and battery operated systems.

It is intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

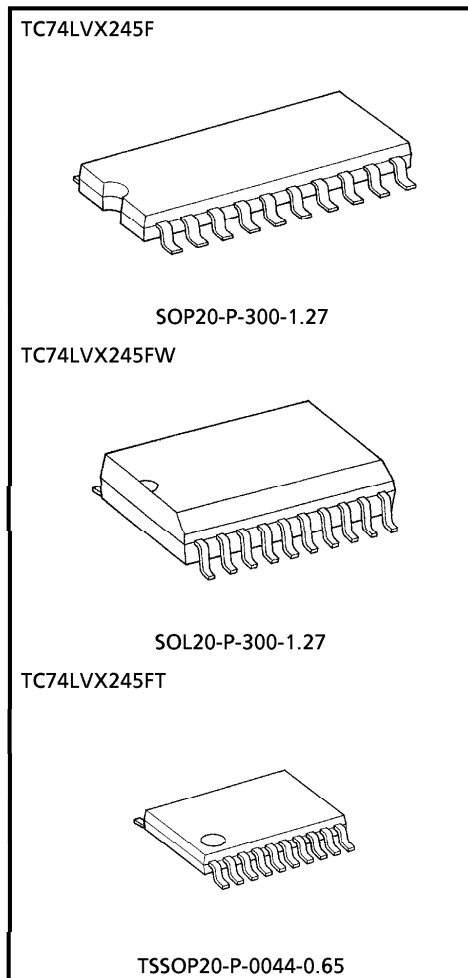
The enable input (\bar{G}) can be used to disable the device so that the busses are effectively isolated.

All inputs are equipped with protection circuits against static discharge.

FEATURES

- High speed : $t_{pd} = 4.7ns$ (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.) ($V_{CC} = 3V$)
- Balanced propagation delays : $t_{pLH} \approx t_{pHL}$
- Low noise : $V_{OLP} = 0.8V$ (Max.)
- Pin and function compatible with 74HC245

(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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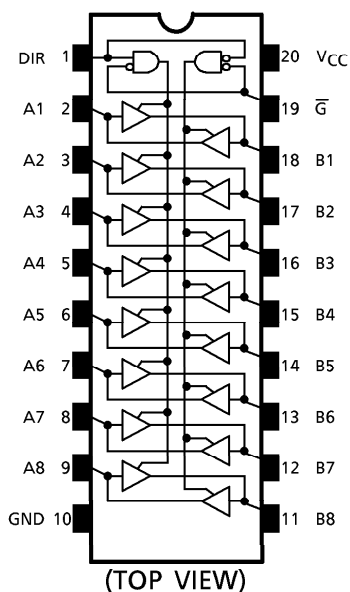
APPLICATION NOTES

Do not apply a signal to any bus terminal when it is in the output mode. Damage may result.

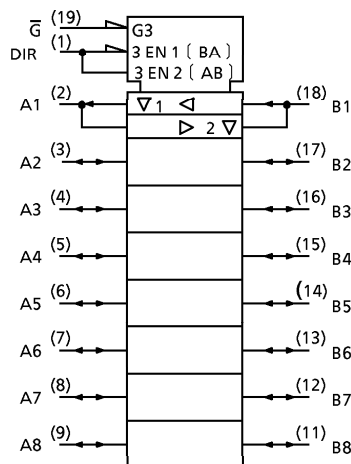
All floating (high impedance) bus terminals must have their input levels fixed by means of pull up or pull down resistors.

A parasitic diode is formed between the bus and V_{CC} terminals. Therefore bus terminal can not be used to interface 5V to 3V systems directly.

PIN ASSIGNMENT



IEC LOGIC SYMBOL



TRUTH TABLE

| INPUTS | | OUTPUTS | FUNCTION | |
|-----------|-----|---------|----------------|--------|
| \bar{G} | DIR | | A-BUS | B-BUS |
| L | L | A = B | OUTPUT | INPUT |
| L | H | B = A | INPUT | OUTPUT |
| H | X | Z | High Impedance | |

X : Don't Care

Z : High Impedance

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

MAXIMUM RATINGS

| PARAMETER | SYMBOL | RATING | UNIT |
|------------------------------------|------------------|---------------------------|------|
| Supply Voltage Range | V _{CC} | -0.5~7.0 | V |
| DC Input Voltage (DIR, \bar{G}) | V _{IN} | -0.5~7.0 | V |
| DC Bus I/O Voltage | V _{I/O} | -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 (DIR, \bar{G}) | V _{IN} | 0~5.5 | V |
| Bus I/O Voltage | V _{I/O} | 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 _{IH} = V _{IH} or V _{IL} | V _{OH} | | I _{OH} = -50 μA | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V | | |
| | | | | | I _{OH} = -50 μA | 3.0 | 2.9 | 3.0 | — | 2.9 | — | | | |
| | | | | | I _{OH} = -4mA | 3.0 | 2.58 | — | — | 2.48 | — | | | |
| | "L" Level | | | V _{OL} | V _{IH} = V _{IH} or V _{IL} | V _{OL} | I _{OL} = 50 μA | 2.0 | — | 0.0 | 0.1 | | — | 0.1 |
| | | | | | | | I _{OL} = 50 μA | 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 | | |

AC characteristics (Input $t_r = t_f = 3\text{ns}$)

| 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 | t _{pLH} | | 2.7 | 15 | — | 6.1 | 10.7 | 1.0 | 13.5 | ns |
| | | | | 50 | — | 8.6 | 14.2 | 1.0 | 17.0 | |
| | 3.3 ± 0.3 | | 15 | — | 4.7 | 6.6 | 1.0 | 8.0 | | |
| | | | 50 | — | 7.2 | 10.1 | 1.0 | 11.5 | | |
| Output Enable Time | t _{pZL} | R _L = 1kΩ | 2.7 | 15 | — | 9.0 | 16.9 | 1.0 | 20.5 | ns |
| | | | | 50 | — | 11.5 | 20.4 | 1.0 | 24.0 | |
| | 3.3 ± 0.3 | | 15 | — | 7.1 | 11.0 | 1.0 | 13.0 | | |
| | | | 50 | — | 9.6 | 14.5 | 1.0 | 16.5 | | |
| Output Disable Time | t _{pLZ} | R _L = 1kΩ | 2.7 | 50 | — | 11.5 | 18.0 | 1.0 | 21.0 | ns |
| | t _{pHZ} | | 3.3 ± 0.3 | 50 | — | 9.6 | 12.8 | 1.0 | 14.5 | |
| Output To Output Skew | t _{osLH} | (Note 1) | 2.7 | 50 | — | — | 1.5 | — | 1.5 | ns |
| | t _{osHL} | | 3.3 ± 0.3 | 50 | — | — | 1.5 | — | 1.5 | |
| Input Capacitance | C _{IN} | DIR, \bar{G} (Note 2) | | | — | 4 | 10 | — | 10 | pF |
| Bus Input Capacitance | C _{I/O} | An, Bn | | | — | 8 | — | — | — | pF |
| Power Dissipation Capacitance | C _{PD} | (Note 3) | | | — | 21 | — | — | — | 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.

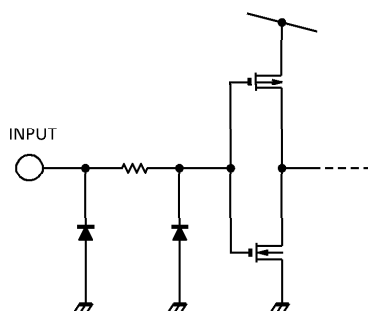
Average operating current can be obtained by the equation :

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

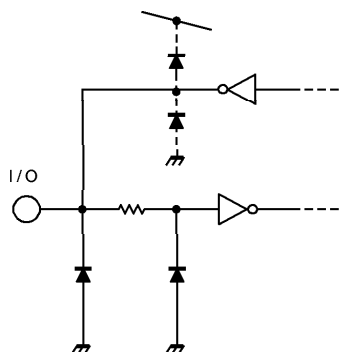
Noise characteristics (Ta = 25°C, Input tr = tf = 3ns, CL = 50pF)

| PARAMETER | SYMBOL | TEST CONDITION | VCC (V) | TYP. | LIMIT | UNIT |
|--|--------|----------------|---------|------|-------|------|
| | | | | | | |
| 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 (DIR, \bar{G})

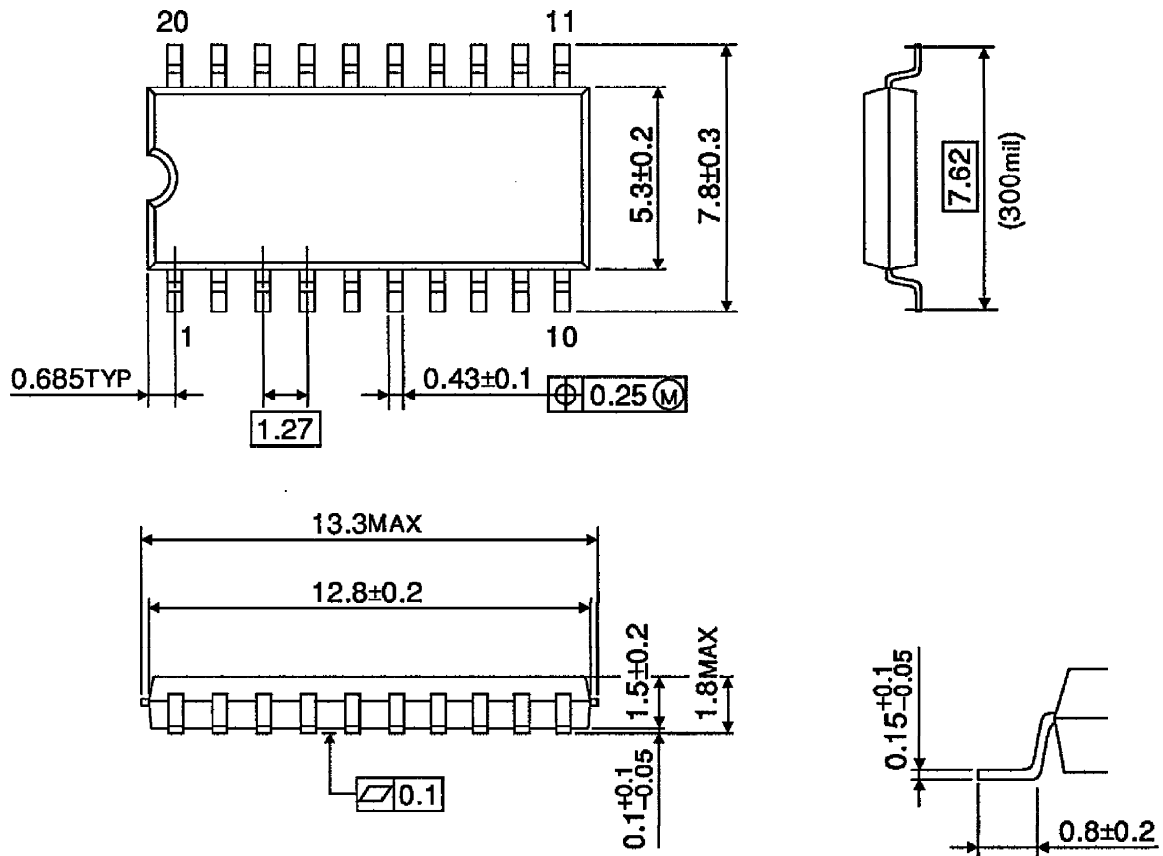


BUS TERMINAL EQUIVALENT CIRCUIT (An, Bn)



OUTLINE DRAWING
SOP20-P-300-1.27

Unit : mm

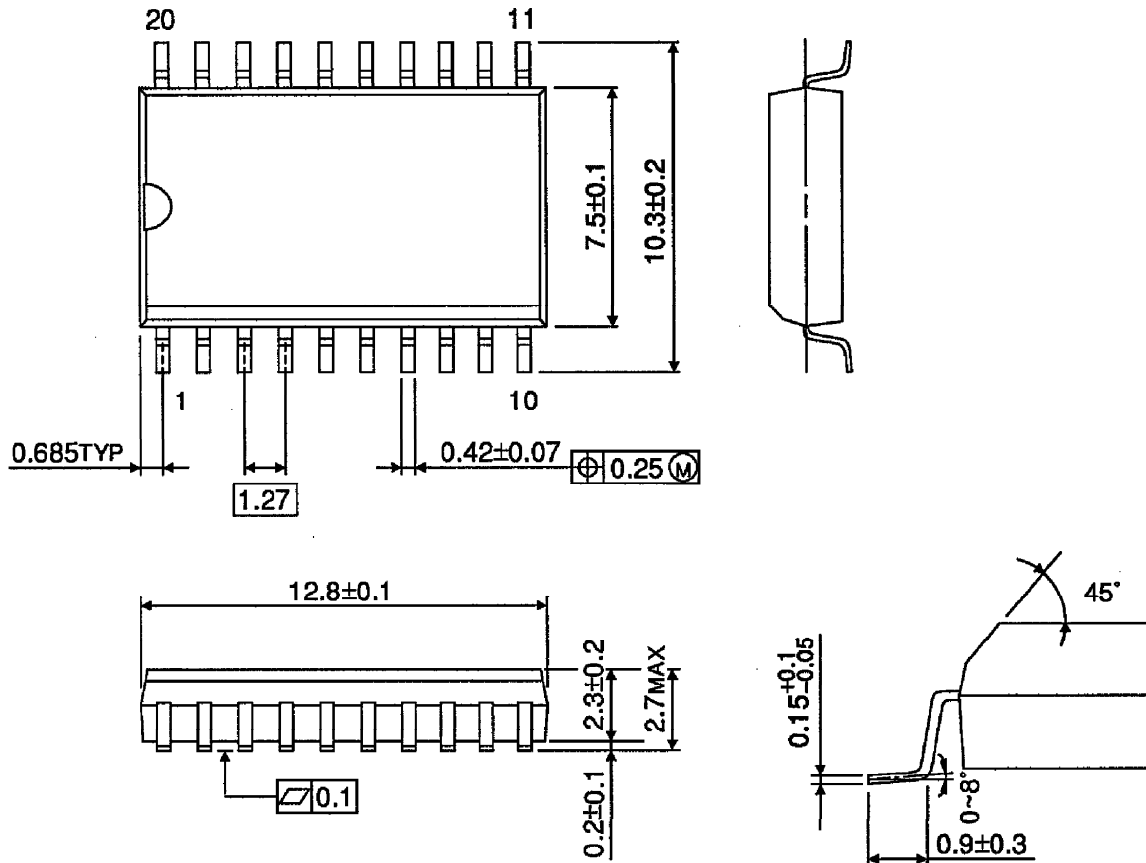


Weight : 0.22g (Typ.)

OUTLINE DRAWING
SOL20-P-300-1.27

Unit : mm

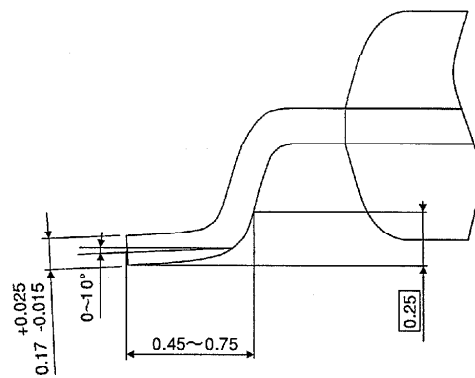
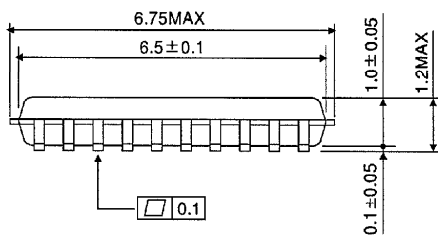
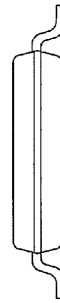
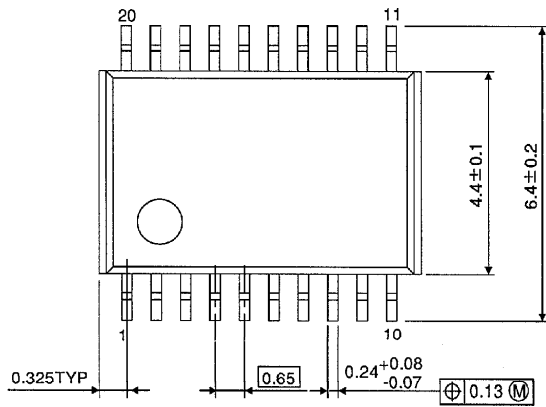
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

OUTLINE DRAWING
TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)