

# TC74LVX245F, TC74LVX245FW, TC74LVX245FT

## OCTAL BUS TRANSCEIVER

The TC74LVX245 is a high speed CMOS OCTAL BUS TRANSCEIVER fabricated using silicon gate C<sup>2</sup>MOS 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.

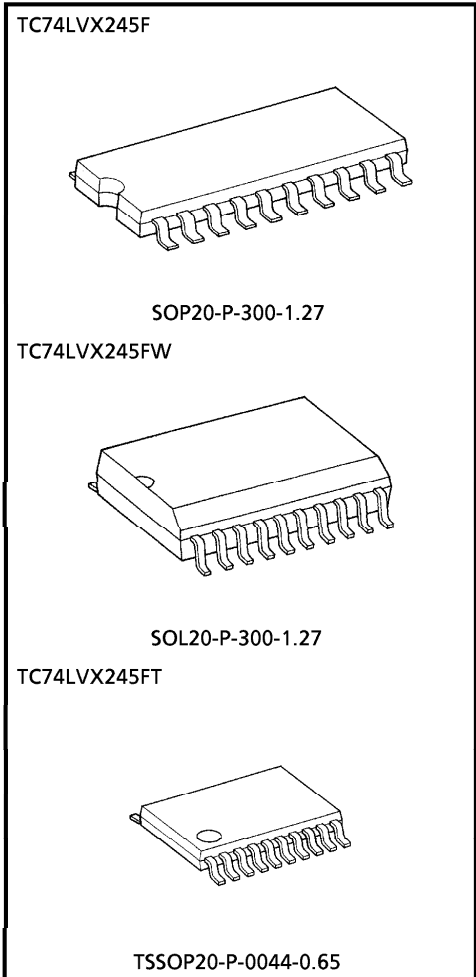
The enable input ( $\bar{G}$ ) can be used to disable the device so that the busses are effectively isolated.

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.



<b>Weight</b>	
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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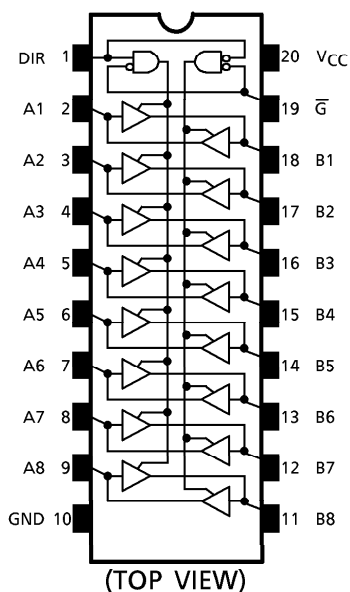
**APPLICATION NOTES**

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

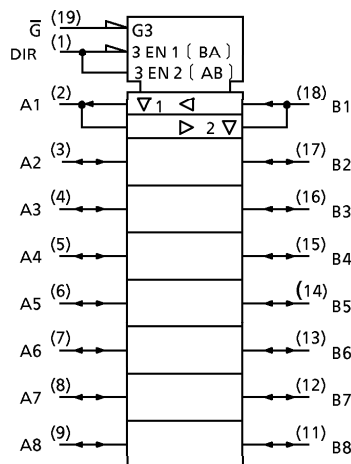
All floating (high impedance) bus terminals must have their input levels fixed by means of pull up or pull down resistors.

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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**MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage Range	V <sub>CC</sub>	-0.5~7.0	V
DC Input Voltage (DIR, $\bar{G}$ )	V <sub>IN</sub>	-0.5~7.0	V
DC Bus I/O Voltage	V <sub>I/O</sub>	-0.5~V <sub>CC</sub> +0.5	V
Input Diode Current	I <sub>IK</sub>	-20	mA
Output Diode Current	I <sub>OK</sub>	±20	mA
DC Output Current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /Ground Current	I <sub>CC</sub>	±75	mA
Power Dissipation	P <sub>D</sub>	180	mW
Storage Temperature	T <sub>stg</sub>	-65~150	°C

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	2.0~3.6	V
Input Voltage (DIR, $\bar{G}$ )	V <sub>IN</sub>	0~5.5	V
Bus I/O Voltage	V <sub>I/O</sub>	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Input Rise And Fall Time	dt/dv	0~100	ns/V

**ELECTRICAL CHARACTERISTICS**

DC characteristics

PARAMETER	SYM-BOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT		
				MIN.	TYP.	MAX.	MIN.	MAX.			
Input Voltage	"H" Level	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
			3.0	2.0	—	—	2.0	—			
			3.6	2.4	—	—	2.4	—			
	"L" Level		V <sub>IL</sub>	2.0	—	—	0.5	—		0.5	
				3.0	—	—	0.8	—		0.8	
				3.6	—	—	0.8	—		0.8	
Output Voltage	"H" Level	V <sub>OH</sub> V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>		I <sub>OH</sub> = -50 μA	2.0	1.9	2.0	—	1.9	—	V
				I <sub>OH</sub> = -50 μA	3.0	2.9	3.0	—	2.9	—	
				I <sub>OH</sub> = -4mA	3.0	2.58	—	—	2.48	—	
	"L" Level		V <sub>OL</sub> V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50 μA	2.0	—	0.0	0.1	—	0.1	
				I <sub>OL</sub> = 50 μA	3.0	—	0.0	0.1	—	0.1	
				I <sub>OL</sub> = 4mA	3.0	—	—	0.36	—	0.44	
3-State Output Off-State Current	I <sub>OZ</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND		3.6	—	—	±0.25	—	±2.5	μA	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5V or GND		3.6	—	—	±0.1	—	±1.0	μA	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> 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 <sub>CC</sub> (V)	C <sub>L</sub> (pF)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t <sub>pLH</sub>		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 <sub>pZL</sub>	R <sub>L</sub> = 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 <sub>pLZ</sub>	R <sub>L</sub> = 1kΩ	2.7	50	—	11.5	18.0	1.0	21.0	ns
	t <sub>pHZ</sub>		3.3 ± 0.3	50	—	9.6	12.8	1.0	14.5	
Output To Output Skew	t <sub>osLH</sub>	(Note 1)	2.7	50	—	—	1.5	—	1.5	ns
	t <sub>osHL</sub>		3.3 ± 0.3	50	—	—	1.5	—	1.5	
Input Capacitance	C <sub>IN</sub>	DIR, $\bar{G}$ (Note 2)			—	4	10	—	10	pF
Bus Input Capacitance	C <sub>I/O</sub>	An, Bn			—	8	—	—	—	pF
Power Dissipation Capacitance	C <sub>PD</sub>	(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<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.

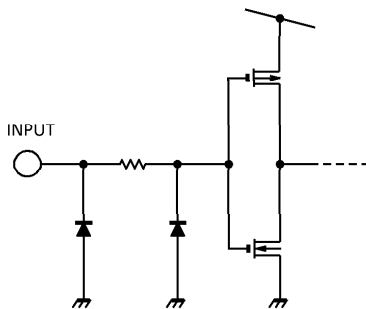
Average operating current can be obtained by the equation :

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

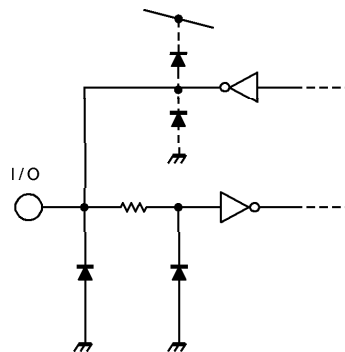
Noise characteristics ( $T_a = 25^\circ\text{C}$ , Input  $t_r = t_f = 3\text{ns}$ ,  $C_L = 50\text{pF}$ )

PARAMETER	SYMBOL	TEST CONDITION	$V_{CC}$ (V)	TYP.	LIMIT	UNIT
Quiet Output Maximum Dynamic $V_{OL}$	$V_{OLP}$		3.3	0.5	0.8	V
Quiet Output Minimum Dynamic $V_{OL}$	$V_{OLV}$		3.3	-0.5	-0.8	V
Minimum High Level Dynamic Input Voltage	$V_{IHD}$		3.3	—	2.0	V
Maximum Low Level Dynamic Input Voltage	$V_{ILD}$		3.3	—	0.8	V

**INPUT EQUIVALENT CIRCUIT (DIR,  $\bar{G}$ )**

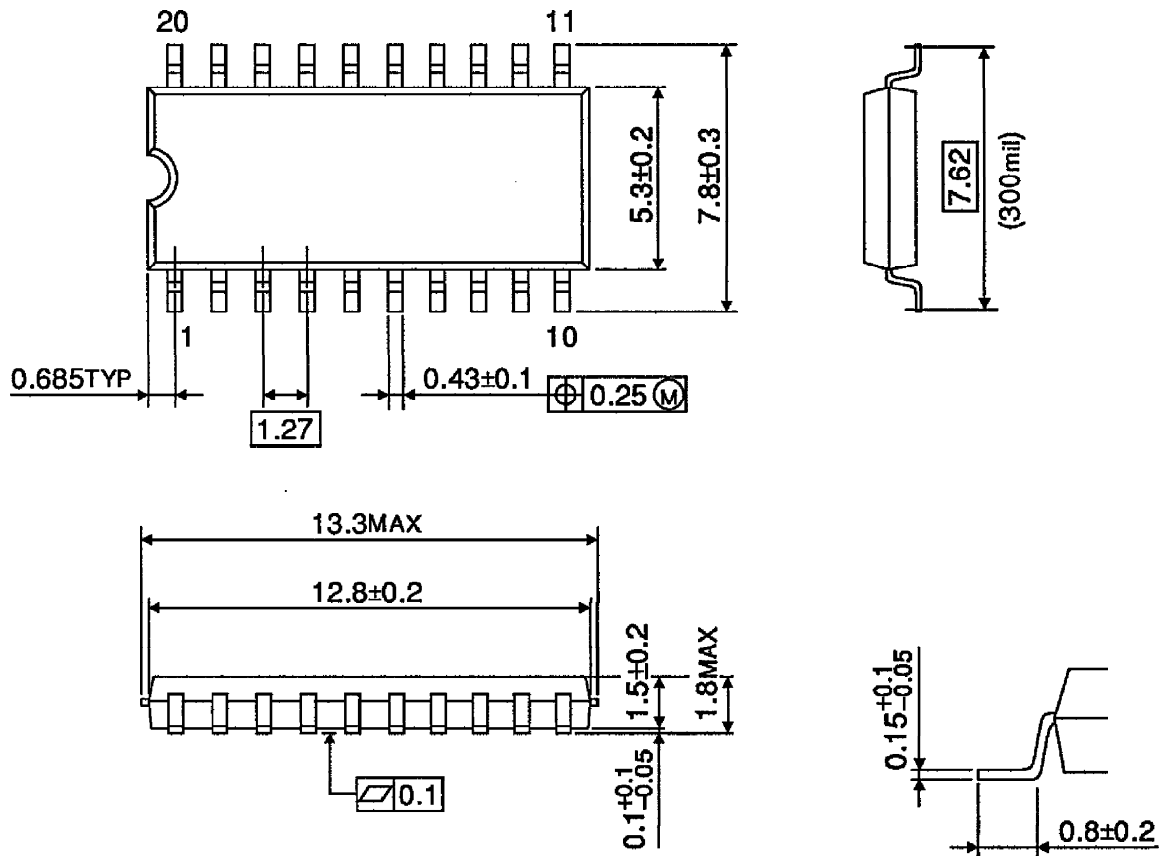


**BUS TERMINAL EQUIVALENT CIRCUIT ( $A_n, B_n$ )**



**OUTLINE DRAWING**  
SOP20-P-300-1.27

Unit : mm

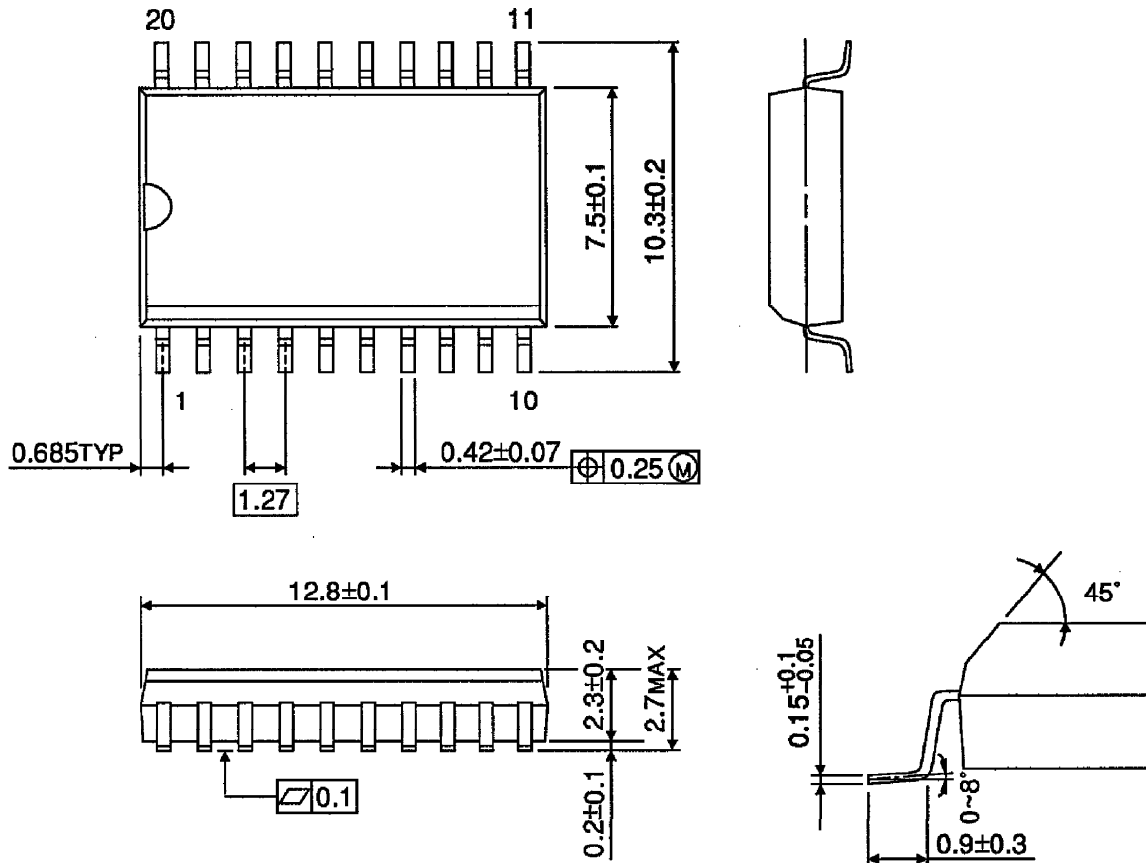


Weight : 0.22g (Typ.)

**OUTLINE DRAWING**  
SOL20-P-300-1.27

Unit : mm

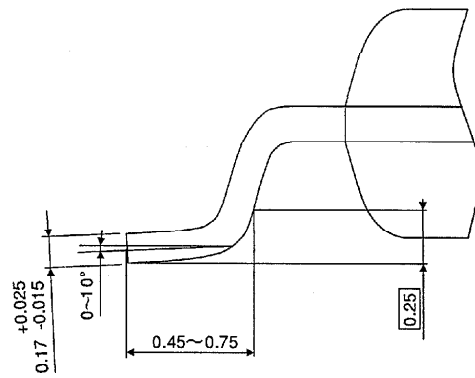
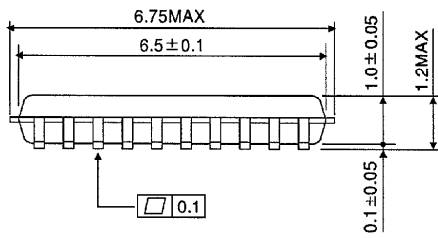
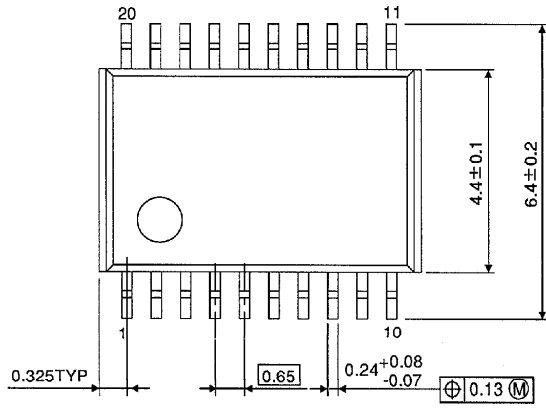
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

**OUTLINE DRAWING**  
TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)



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