

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74LVX240F, TC74LVX240FW, TC74LVX240FT**  
**TC74LVX244F, TC74LVX244FW, TC74LVX244FT**

**OCTAL BUS BUFFER**

**TC74LVX240 INVERTED, 3-STATE OUTPUTS**

**TC74LVX244 NON-INVERTED, 3-STATE OUTPUTS**

The TC74LVX240 and 244 are high speed CMOS OCTAL BUS BUFFERS fabricated using silicon gate C<sup>2</sup>MOS technology.

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

The TC74LVX240 is an inverting 3-state buffer while the TC74LVX244 is non-inverting. Both devices have two active-low output enables.

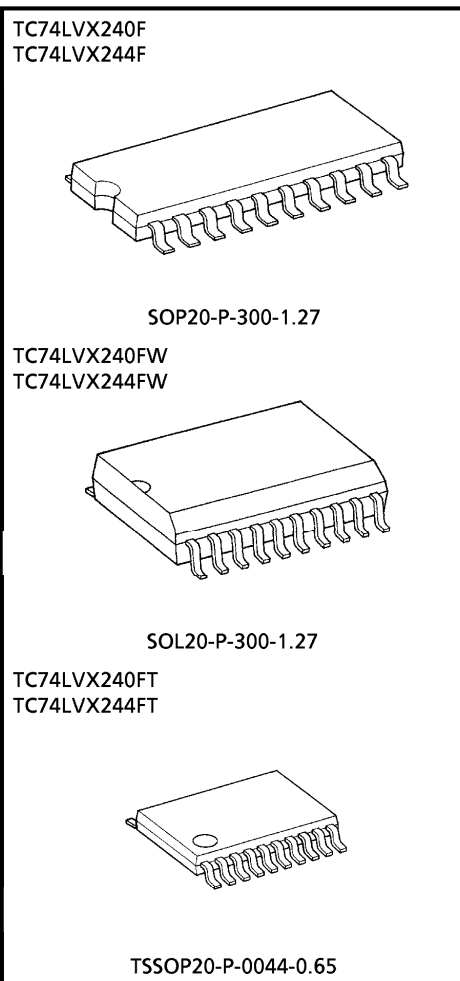
These devices are designed to be used in such applications as 3-state memory address drivers.

An input protection circuit ensures that 0 to 7V can be applied to the input pins without regard to the supply voltage. These devices 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 :  $t_{pd} = 4.7ns$  (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.) ( $V_{CC} = 3V$ )
- 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 74HC240 / 244

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



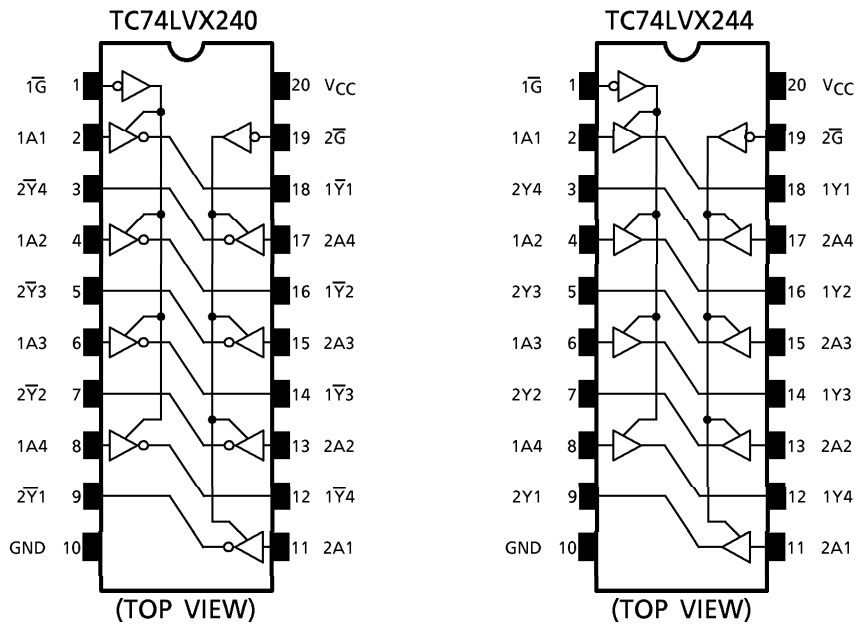
**Weight**

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**

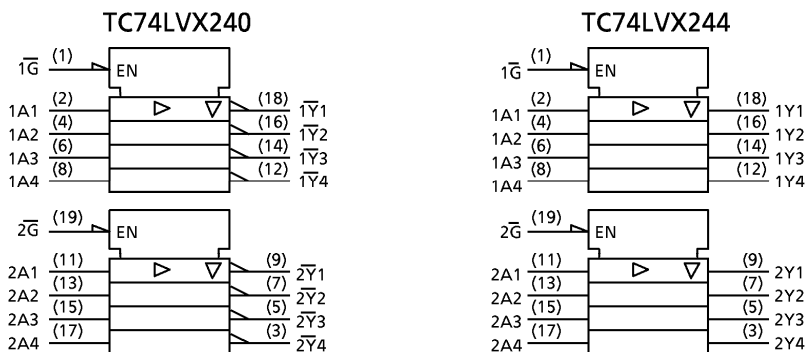


**TRUTH TABLE**

INPUTS		OUTPUTS	
$\bar{G}$	$A_n$	$Y_n$ (244)	$\bar{Y}_n$ (240)
L	L	L	H
L	H	H	L
H	X	Z	Z

X : Don't Care  
Z : High Impedance

**IEC LOGIC SYMBOL**



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

**MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage Range	V <sub>CC</sub>	-0.5~7.0	V
DC Input Voltage	V <sub>IN</sub>	-0.5~7.0	V
DC Output Voltage	V <sub>OUT</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	V <sub>IN</sub>	0~5.5	V
Output Voltage	V <sub>OUT</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		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 (TC74LVX240)	t <sub>pLH</sub>		2.7	15	—	5.7	10.1	1.0	12.5	ns		
				50	—	8.2	13.6	1.0	16.0			
	3.3 ± 0.3		15	—	4.3	6.2	1.0	7.5				
			50	—	6.8	9.7	1.0	11.0				
Propagation Delay Time (TC74LVX244)	t <sub>pLH</sub>		2.7	15	—	6.1	11.4	1.0	13.5	ns		
				50	—	8.6	14.9	1.0	17.0			
	3.3 ± 0.3		15	—	4.7	7.1	1.0	8.5				
			50	—	7.2	10.6	1.0	12.0				
Output Enable Time	t <sub>pZL</sub>	R <sub>L</sub> = 1kΩ	2.7	15	—	7.1	13.8	1.0	16.5	ns		
				50	—	9.6	17.3	1.0	20.0			
	3.3 ± 0.3		15	—	5.5	8.8	1.0	10.5				
			50	—	8.0	12.3	1.0	14.0				
Output Disable Time	t <sub>pLZ</sub>	R <sub>L</sub> = 1kΩ	2.7	50	—	11.6	16.0	1.0	19.0	ns		
				3.3 ± 0.3	50	—	9.7	11.4	1.0		13.0	
Output To Output Skew	t <sub>osLH</sub>		(Note 1)	2.7	50	—	—	1.5	—		1.5	ns
					3.3 ± 0.3	50	—	—	1.5		—	
Input Capacitance	C <sub>IN</sub>	(Note 2)				—	4	10	—	10	pF	
Output Capacitance	C <sub>OUT</sub>			—	6	—	—	—	—	pF		
Power Dissipation Capacitance (Note 3)	C <sub>PD</sub>	TC74LVX240		—	17	—	—	—	—	pF		
		TC74LVX244		—	19	—	—	—	—			

(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.

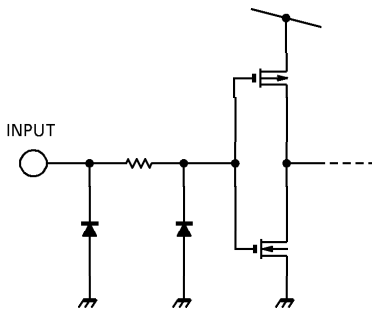
Average operating current can be obtained by the equation :

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

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

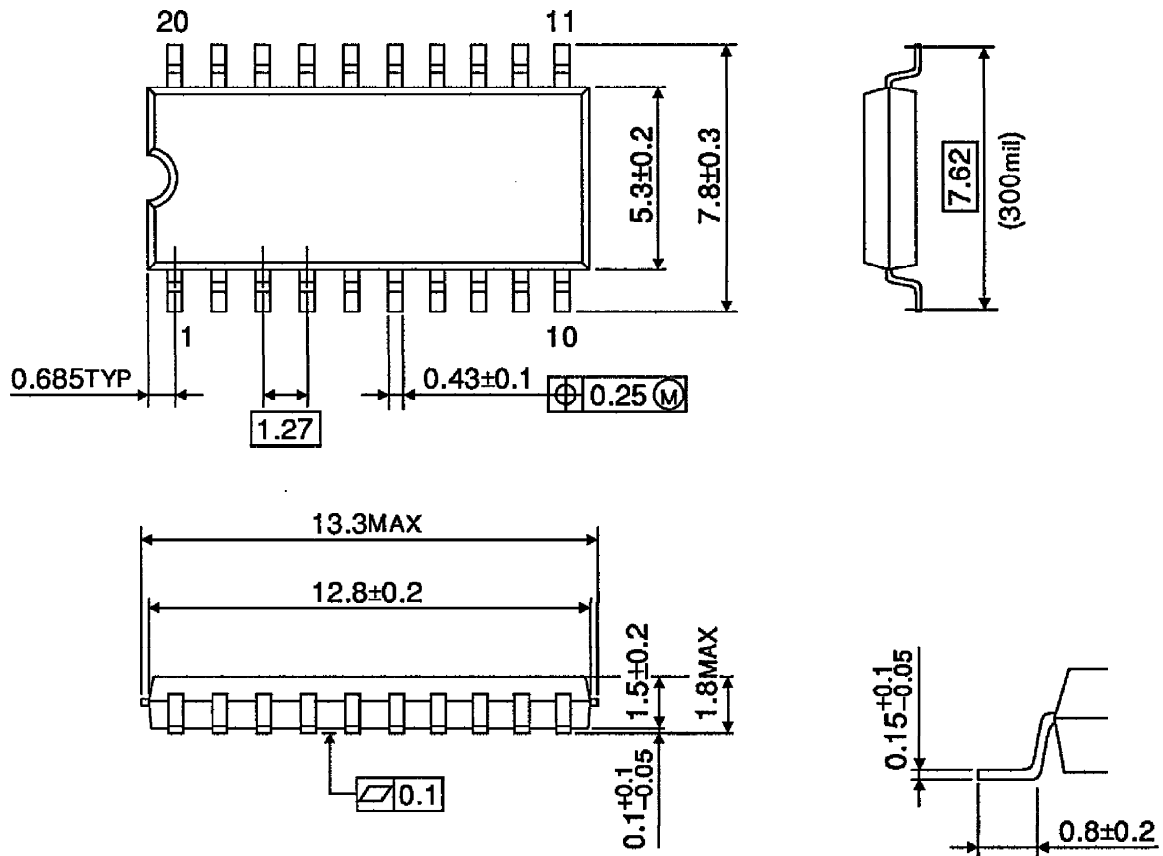
PARAMETER	SYMBOL	TEST CONDITION	$\sqrt{V_{CC}}$ (V)	TYP.	LIMIT	UNIT
Quiet Output Maximum Dynamic $V_{OL}$	$V_{OLP}$		3.3	0.5	0.8	V
Quiet Output Minimum Dynamic $V_{OL}$	$V_{OLV}$		3.3	-0.5	-0.8	V
Minimum High Level Dynamic Input Voltage	$V_{IHD}$		3.3	—	2.0	V
Maximum Low Level Dynamic Input Voltage	$V_{ILD}$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

**INPUT EQUIVALENT CIRCUIT**



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

Unit : mm

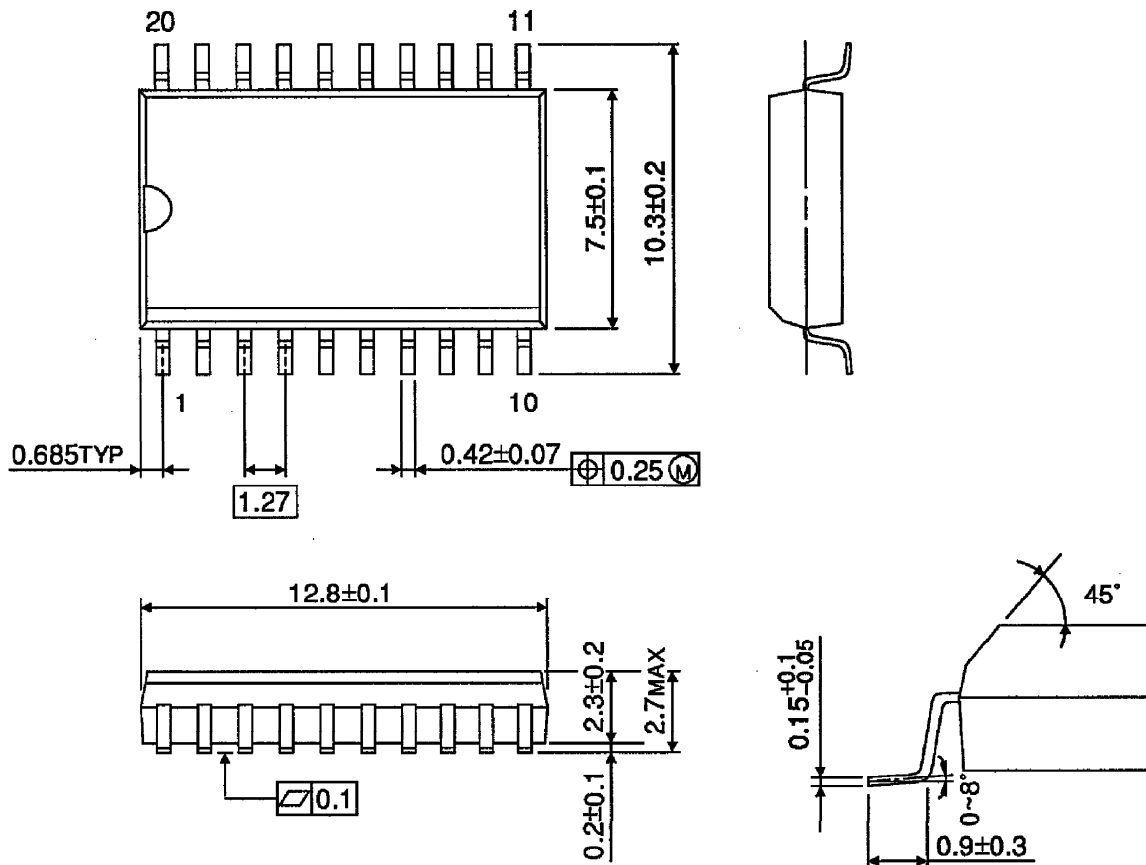


Weight : 0.22g (Typ.)

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

Unit : mm

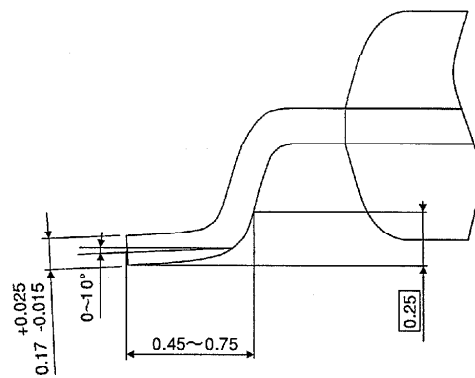
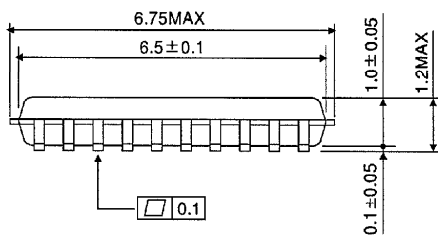
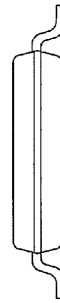
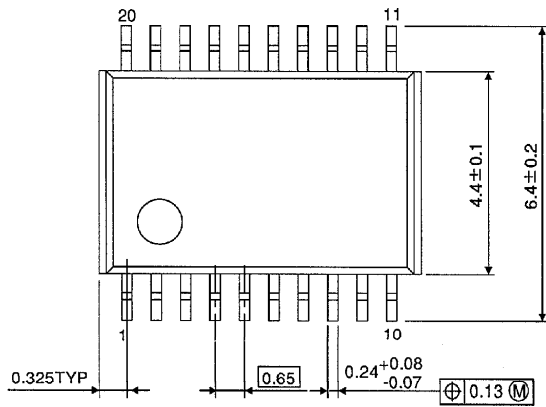
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

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

Unit : mm



Weight : 0.08g (Typ.)