

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 C²MOS 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.

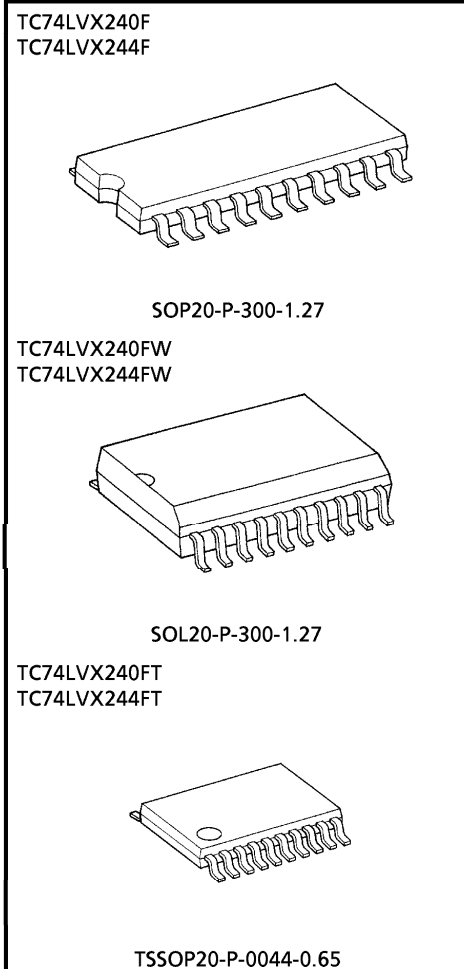
These devices are designed to be used in such applications as 3-state memory address drivers.

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.

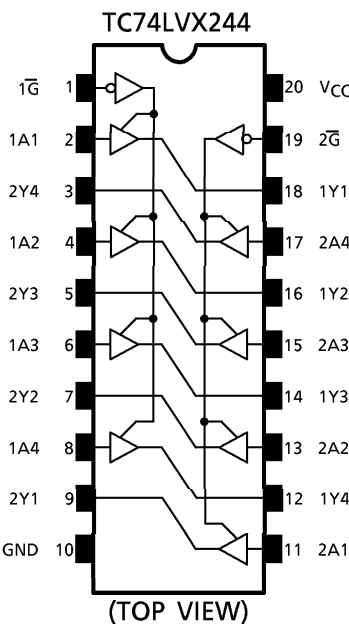
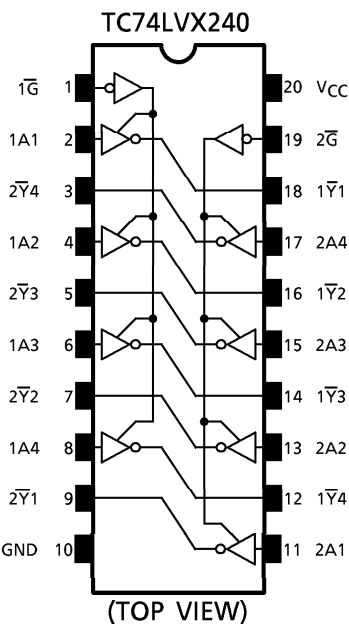


Weight
 SOP20-P-300-1.27 : 0.22g (Typ.)
 SOL20-P-300-1.27 : 0.46g (Typ.)
 TSSOP20-P-0044-0.65 : 0.08g (Typ.)

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PIN ASSIGNMENT

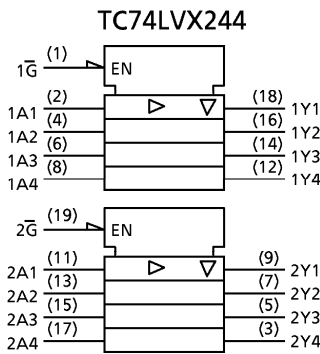
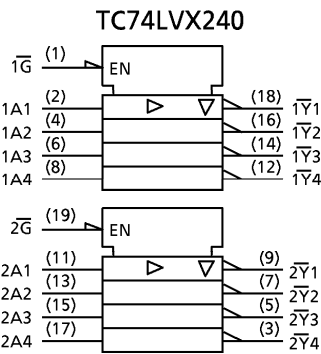


TRUTH TABLE

INPUTS		OUTPUTS	
$\overline{G}$	A_n	Y_n (244)	$\overline{Y}_n$ (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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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}	I _{OH} = - 50μA	2.0	1.9	2.0	—	1.9	—	V
			or V _{IL}	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}	I _{OL} = 50μA	2.0	—	0.0	0.1	—	0.1	
			or V _{IL}	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

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 (TC74LVX240)	t_{pLH} t_{pHL}		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_{pLH} t_{pHL}		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_{pZL} t_{pZH}	$R_L = 1\text{k}\Omega$	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_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	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_{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 (Note 3)	C _{PD}	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_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.

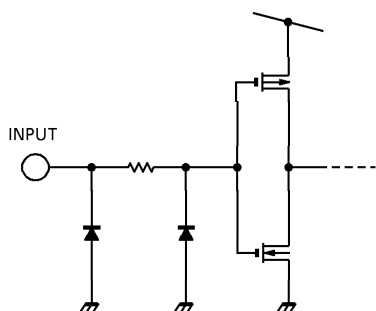
Average operating current can be obtained by the equation :

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

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

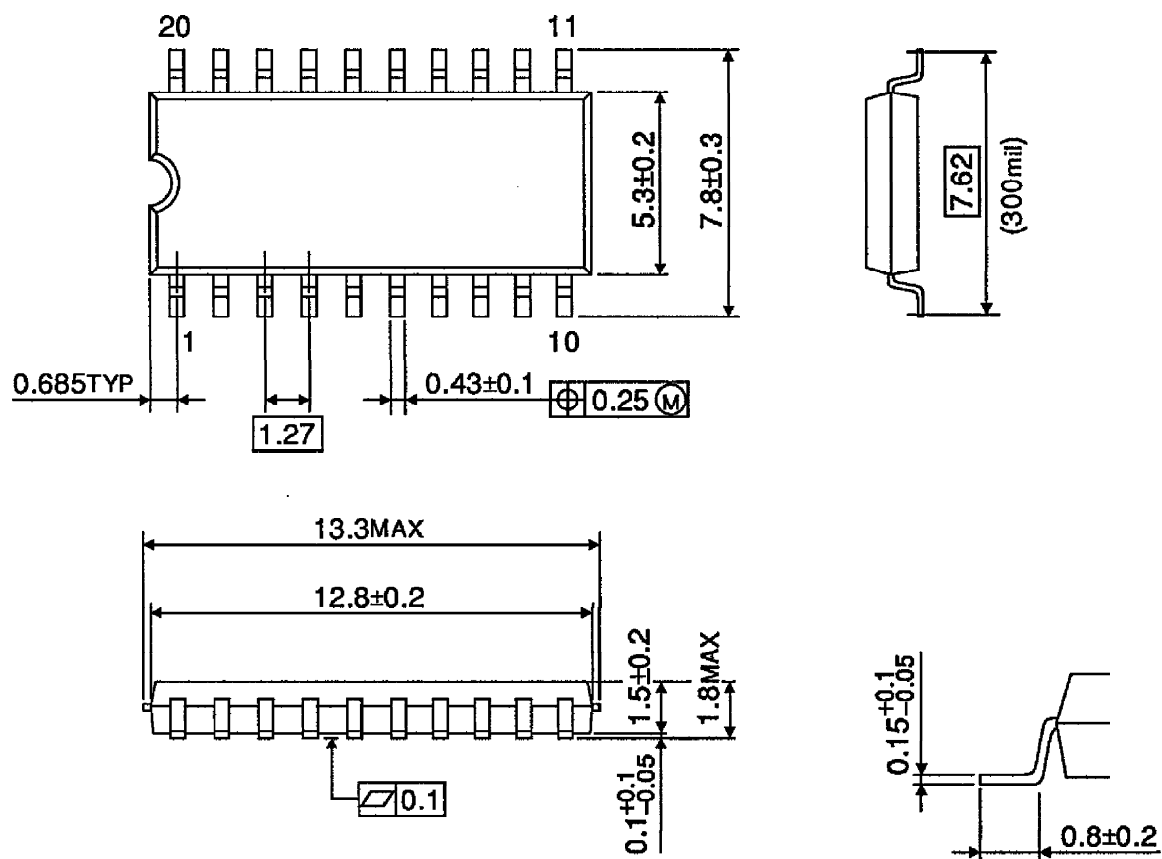
PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	TYP.	LIMIT	UNIT
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}		3.3	0.5	0.8	V
Quiet Output Minimum Dynamic V_{OL}	V_{OLV}		3.3	-0.5	-0.8	V
Minimum High Level Dynamic Input Voltage	V_{IHD}		3.3	—	2.0	V
Maximum Low Level Dynamic Input Voltage	V_{ILD}		3.3	—	0.8	V

INPUT EQUIVALENT CIRCUIT



OUTLINE DRAWING
SOP20-P-300-1.27

Unit : mm

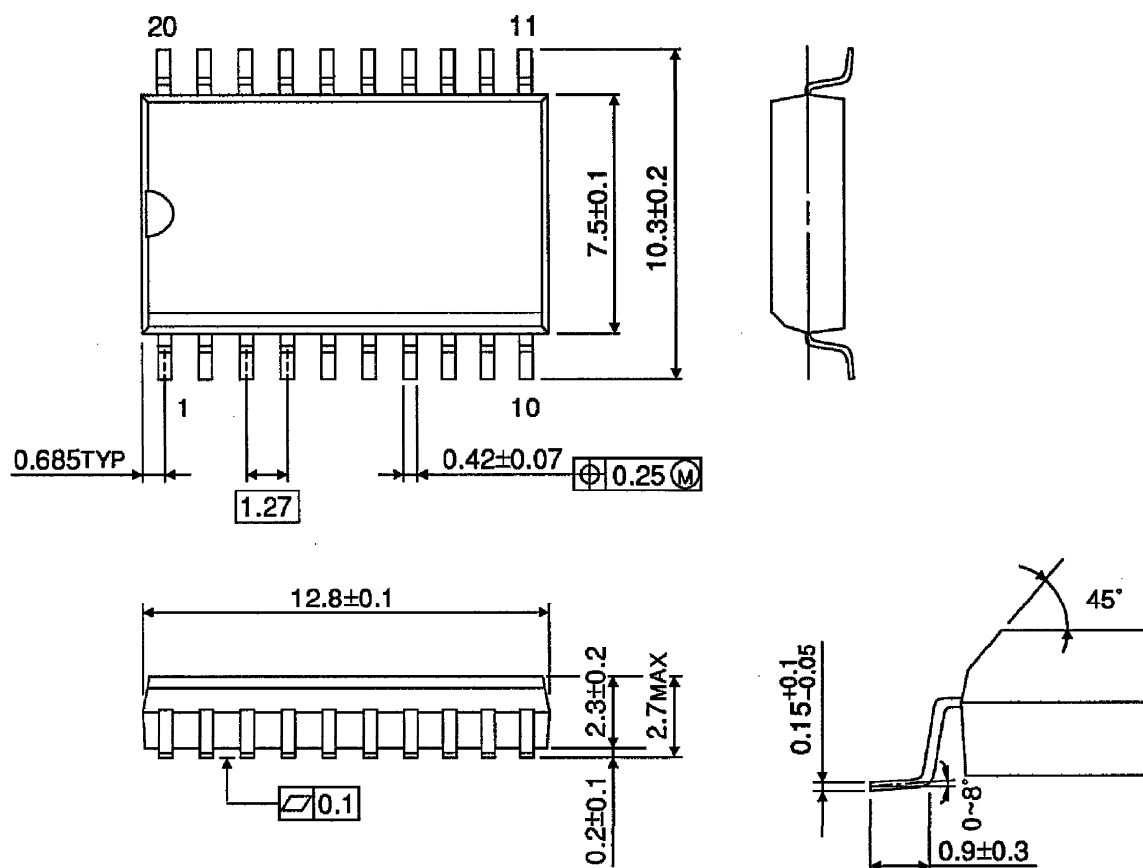


Weight : 0.22g (Typ.)

OUTLINE DRAWING
SOL20-P-300-1.27

Unit : mm

(Note) This package is not available in Japan.

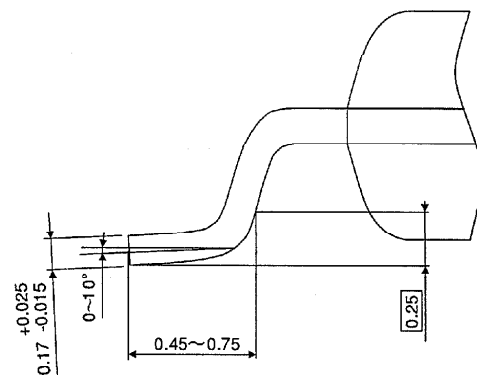
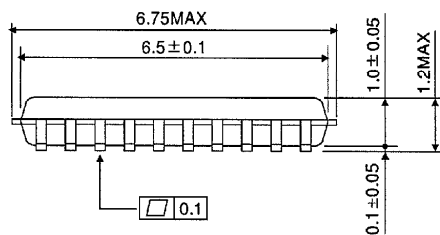
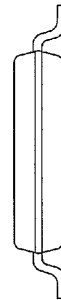
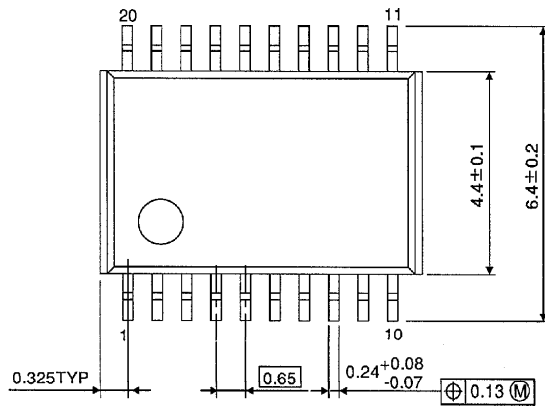


Weight : 0.46g (Typ.)

OUTLINE DRAWING

TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)