

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 TC74LVX240,244F/ FW/ FT is a high-speed CMOS OCTAL BUS BUFFER fabricated using silicon gate CMOS technology. Designed for use in 3-V systems, it achieves high-speed operation while maintaining the CMOS low power dissipation. This device is 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.

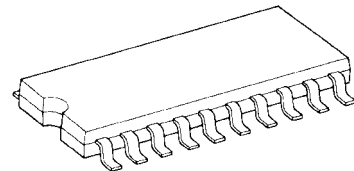
An input protection circuit ensures that 0 to 5.5V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

Features

- High-speed: $t_{pd} = 4.7 \text{ ns (typ.) (VCC = 3.3 V)}$
- Low power dissipation: $I_{CC} = 4 \mu\text{A (max) (Ta = 25}^\circ\text{C)}$
- Input voltage level: $V_{IL} = 0.8 \text{ V (max) (VCC = 3 V)}$
 $V_{IH} = 2.0 \text{ V (min) (VCC = 3 V)}$
- Power-down protection provided on all inputs
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Low noise: $V_{OLP} = 0.8 \text{ V (max)}$
- Pin and function compatible with 74HC240/244

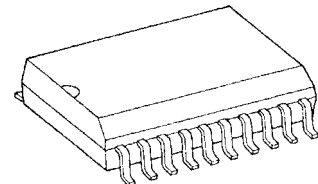
Note: xxxFW (JEDEC SOP) is not available in Japan.

TC74LVX240F, TC74LVX244F



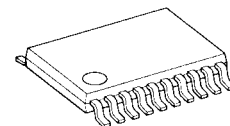
SOP20-P-300-1.27

TC74LVX240FW, TC74LVX244FW



SOL20-P-300-1.27

TC74LVX240FT, TC74LVX244FT



TSSOP20-P-0044-0.65

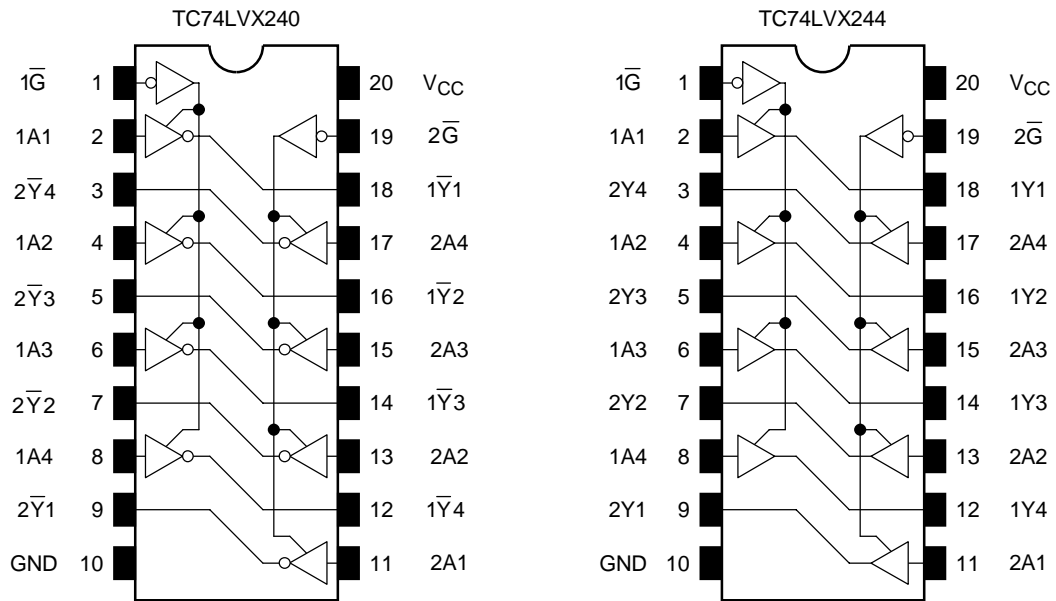
Weight

SOP20-P-300-1.27: 0.22 g (typ.)

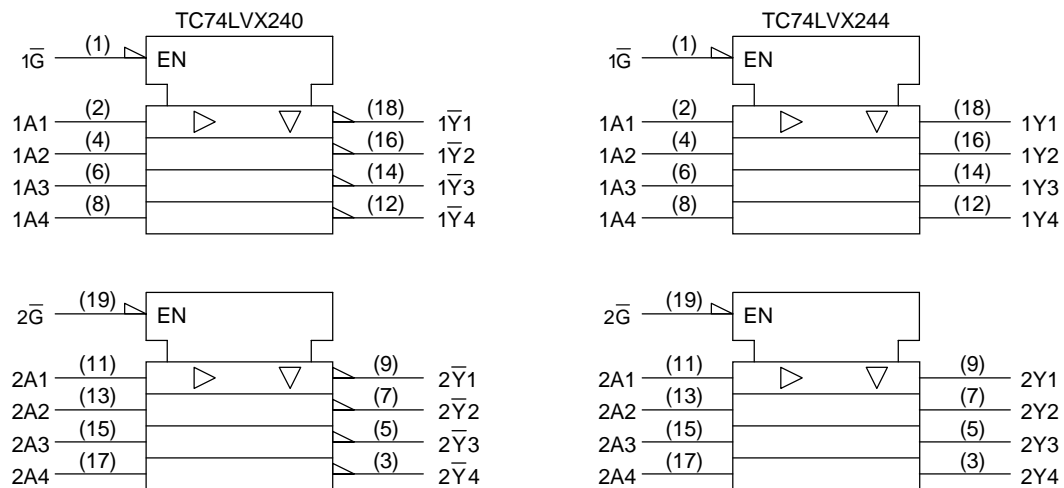
SOL20-P-300-1.27: 0.46 g (typ.)

TSSOP20-P-0044-0.65: 0.08 g (typ.)

Pin Assignment (top view)



IEC Logic Symbol



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

Maximum Ratings

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
DC input voltage	V_{IN}	-0.5 to 7.0	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	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 to 150	$^{\circ}C$

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 3.6	V
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to 85	$^{\circ}C$
Input rise and fall time	dt/dv	0 to 100	ns/V

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition	$T_a = 25^{\circ}C$			$T_a = -40$ to $85^{\circ}C$		Unit		
				V_{CC} (V)	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}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50 \mu A$	2.0	1.9	2.0	—	1.9	—	V
				$I_{OH} = -50 \mu A$	3.0	2.9	3.0	—	2.9	—	
				$I_{OH} = -4 mA$	3.0	2.58	—	—	2.48	—	
	L-level	V_{OL}		$I_{OL} = 50 \mu A$	2.0	—	0	0.1	—	0.1	
				$I_{OL} = 50 \mu A$	3.0	—	0	0.1	—	0.1	
				$I_{OL} = 4 mA$	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}	$V_{IN} = 5.5 V$ 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: $t_r = t_f = 3 \text{ ns}$)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit		
			V _{CC} (V)	C _L (pF)	Min	Typ.	Max		Min	Max
Propagation delay time (TC74LVX240)	t _{pLH}	—	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}	—	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}	R _L = 1 kΩ	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 kΩ	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.

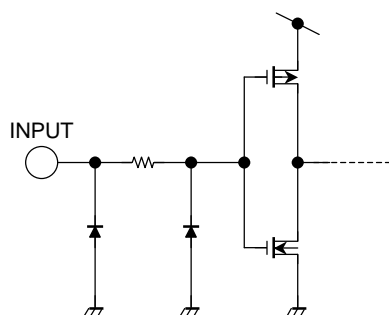
Average operating current can be obtained by the equation:

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

Noise Characteristics (Ta = 25°C, input: tr = tf = 3 ns, CL = 50 pF)

Characteristics	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	VIH	VIHD	—	3.3	—	2.0	V
Maximum low level dynamic input voltage	VIL	VILD	—	3.3	—	0.8	V

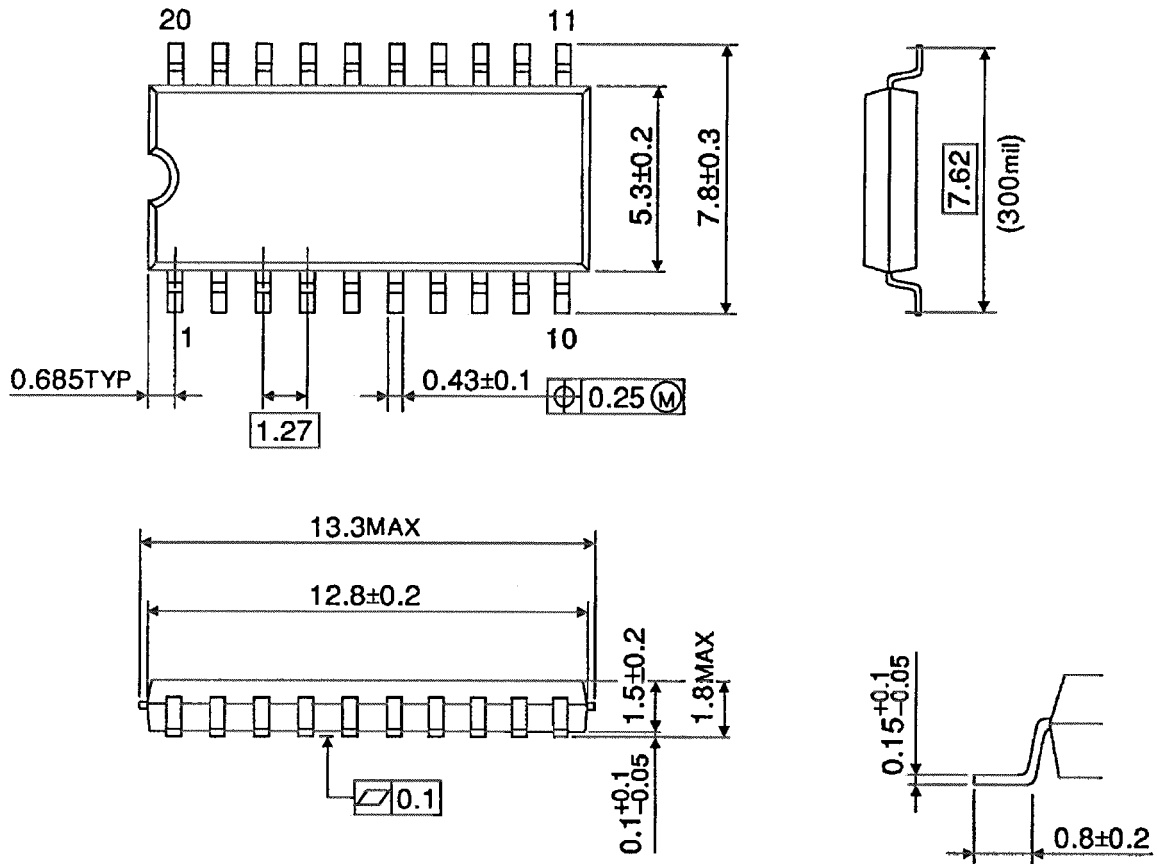
Input Equivalent Circuit



Package Dimensions

SOP20-P-300-1.27

Unit : mm

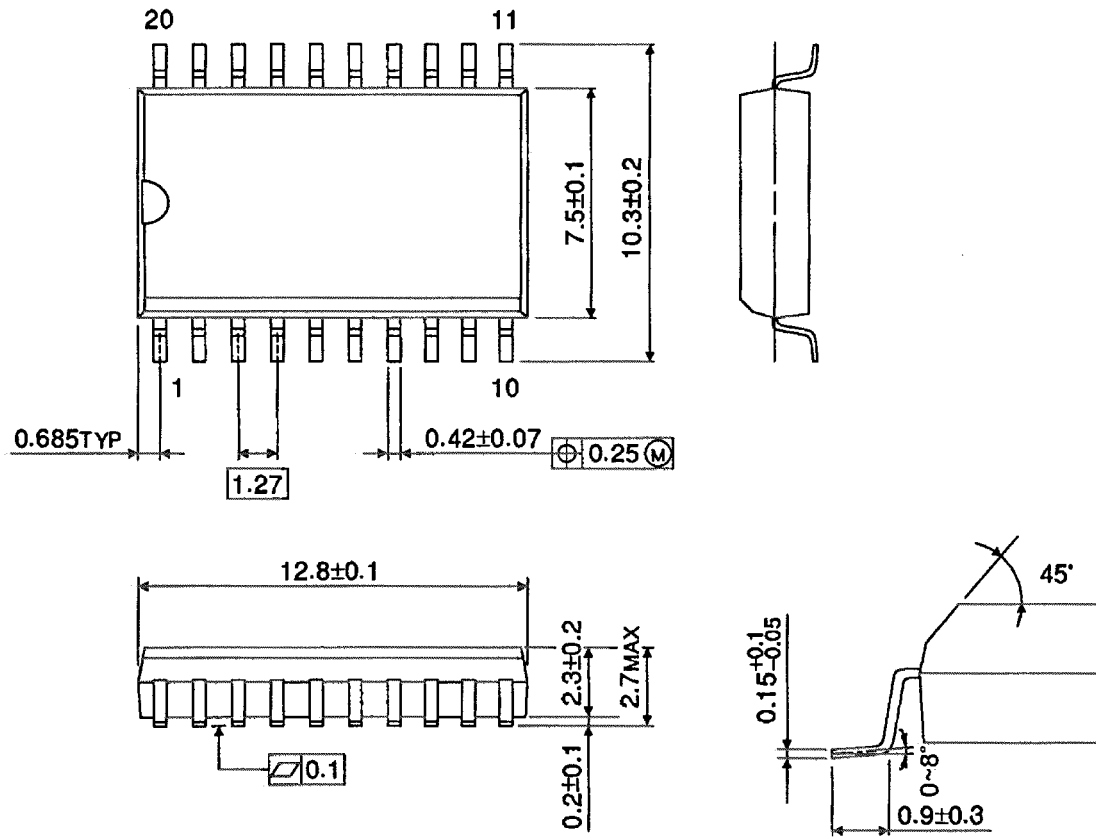


Weight: 0.22 g (typ.)

Package Dimensions

SOL20-P-300-1.27

Unit : mm

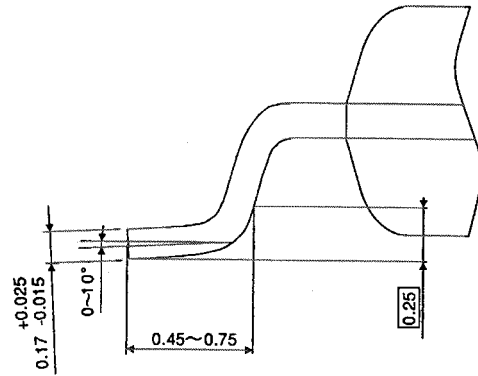
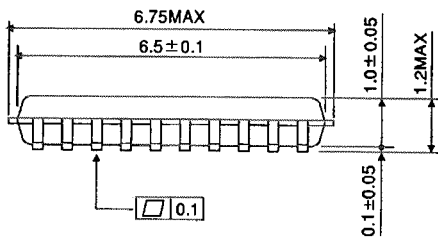
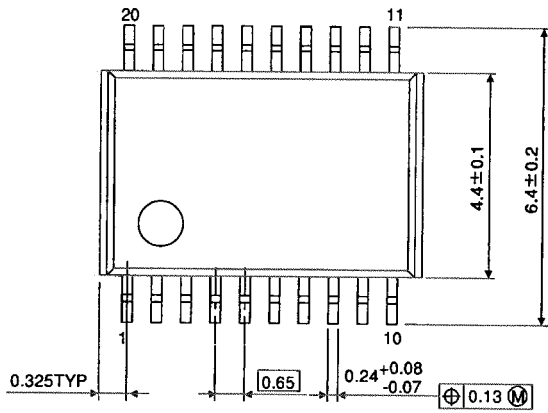


Weight: 0.46 g (typ.)

Package Dimensions

TSSOP20-P-0044-0.65

Unit : mm



Weight: 0.08 g (typ.)

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