Octal Bus Buffer

TC74LVQ240 Inverted, 3-State Outputs
TC74LVQ241 Non-Inverted, 3-State Outputs
TC74LVQ244 Non-Inverted, 3-State Outputs

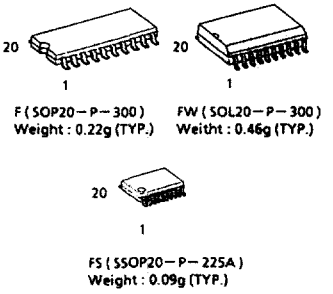
The TC74LVQ240, 241 and 244 are high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate and double-layer metal wiring C^2MOS technology.

Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

The TC74LVQ240 is an inverting 3-state buffer having two active-low output enables. The TC74LVQ241 and TC74LVQ244 are non-inverting 3-state buffers that differ only in that the LVQ241 has one active-high and one active-low output enable, and the LVQ244 has two active-low output enables.

These devices are designed to be used with 3-state memory address drivers, etc.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.



F (SOP20 – P – 300)
Weight : 0.22g (TYP.)

FW (SOL20 – P – 300)
Weitht : 0.46g (TYP.)

FS (SSOP20 – P – 225A)
Weight : 0.09g (TYP.)

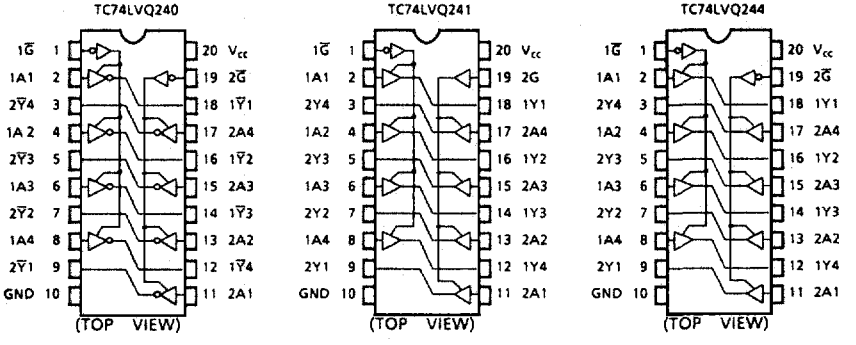
Features

- High Speed: t_{pd} = 5.4ns (Typ.) at V_{CC} = 3.3V
- Low Power Dissipation: I_{CC} = 4μA (Max.) at Ta = 25°C
- Input Voltage Level:
  - V_{IL} = 0.8V (Max.) at V_{CC} = 3V
  - V_{IH} = 2.0V (Min.) at V_{CC} = 3V
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL}$ = 12mA (Min.)
- Balanced Propagation Delays: $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74HC240/241/244

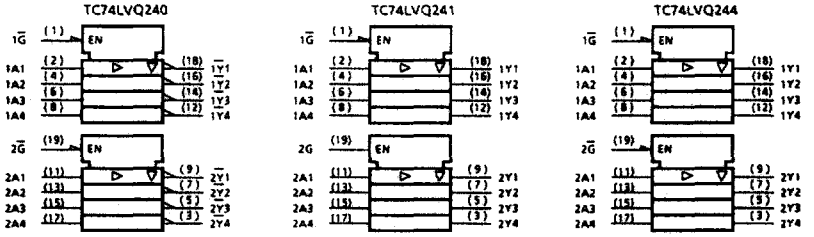
Truth Table

Inputs			Outputs	
$\overline{G}$	GΔ	A_n	Y_n	$\overline{Y}_n$ΔΔ
L	H	L	L	H
L	H	H	H	L
H	L	X	Z	Z

Δ: for TC74LVQ241 only
ΔΔ: for TC74LVQ240 only
x: Don't Care
z: High Impedance



Pin Assignment



IEC Logic Symbol

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 ~ 7.0	V
DC Input Voltage	V_{IN}	-0.5 ~ V_{CC} + 0.5	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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC}/Ground Current	I_{CC}	±200	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2.0 ~ 3.6	V
Input Voltage	V_{IN}	0 ~ V_{CC}	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

DC Electrical Characteristics

Parameter	Symbol	Test Condition		V_{CC} (V)	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40 ~ 85°C Min.	Ta = -40 ~ 85°C Max.	Unit
High-Level Input Voltage	V_{IH}			3.0	2.0	–	–	2.0	–	V
Low-Level Input Voltage	V_{IL}			3.0	–	–	0.8	–	0.8	V
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -50μA	3.0	2.9	3.0	–	2.9	–	V
			I_{OH} = -12mA	3.0	2.58	–	–	2.48	–	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	3.0	–	0.0	0.1	–	0.1	V
			I_{OL} = 12mA	3.0	–	–	0.36	–	0.44	
3-State Output Off-State Current	IOZ	V_{IN} = V_{IH} or V_{IL}; V_{OUT} = V_{CC} or GND		3.6	–	–	±0.5	–	±5.0	μA
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} 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 Electrical Characteristics (Input $t_r = t_f = 3ns$, $C_L = 50pF$, $R_L = 500\Omega$)

Parameter	Symbol	Test Condition		Ta = 25°C			Ta = -40 ~ 85°C		Unit
			V_{CC} (V)	Min	Typ.	Max.	Min.	Max.	
Propagation Delay Time (TC74LVQ240)	t_{pLH} t_{pHL}		2.7 3.3±0.3	– –	7.2 6.0	14.1 10.0	1.0 1.0	15.0 10.5	ns
Propagation Delay Time (TC74LVQ241/244)	t_{pLH} t_{pHL}		2.7 3.3±0.3	– –	7.8 6.5	13.4 9.5	1.0 1.0	15.0 10.5	
Output Enable Time	t_{pZL} t_{pZH}		2.7 3.3±0.3	– –	9.5 7.9	18.3 13.0	1.0 1.0	19.0 13.5	
Output Disable Time	t_{pLZ} t_{pHZ}		2.7 3.3±0.3	– –	7.2 6.0	19.0 13.5	1.0 1.0	20.0 14.0	
Output to Output Skew	t_{osLH} t_{osHL}	(Note 1)	2.7 3.3±0.3	– –	– –	1.5 1.5	– –	1.5 1.5	
Input Capacitance	C_{IN}	(Note 2)		–	5	10	–	10	pF
Output Capacitance	C_{OUT}			–	10	–	–	–	
Power Dissipation Capacitance	C_{PD}	(Note 3)		–	30	–	–	–	

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:

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

Noise Characteristics (Input $t_r = t_f = 3ns$, $C_L = 50pF$, $R_L = 500\Omega$)

Parameter	Symbol	Test Condition		Ta = 25°C		Unit
			V_{CC}	Typ.	Max.	
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