



## U74LVC244-Q

CMOS IC

### OCTAL BUFFER/DRIVER WITH 3-STATE OUTPUTS

#### DESCRIPTION

The UTC **U74LVC244-Q** contains two 4-bit line drivers with separate output-enable ( $\overline{OE}$ ) inputs. When  $\overline{OE}$  is low, the device passes data from the A to the Y. When  $\overline{OE}$  is high, the outputs are in the high-impedance state.

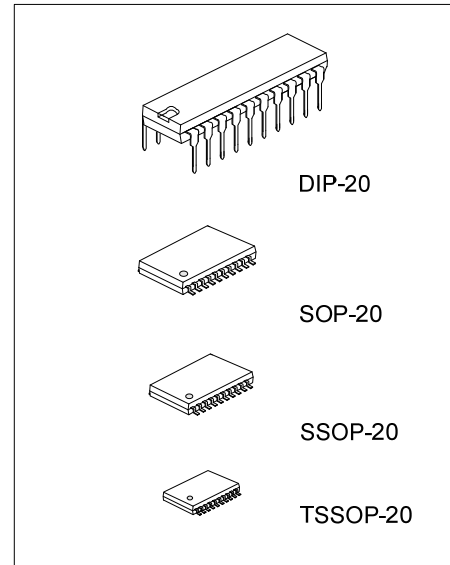
The UTC **U74LVC244-Q** can be used in a mixed 3.3V/5V system environment.

#### FEATURES

- \* Operate From 1.65V to 3.6V
- \* Input Accept Voltages to 5.5V
- \* Partial-Power-Down Mode Operation
- \* Max tpd is 5.9ns at 3.3V

#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC244L-D20-T	U74LVC244G-D20-T	DIP-20	Tube
U74LVC244L-S20-R	U74LVC244G-S20-R	SOP-20	Tape Reel
U74LVC244L-R20-R	U74LVC244G-R20-R	SSOP-20	Tape Reel
U74LVC244L-P20-R	U74LVC244G-P20-R	TSSOP-20	Tape Reel

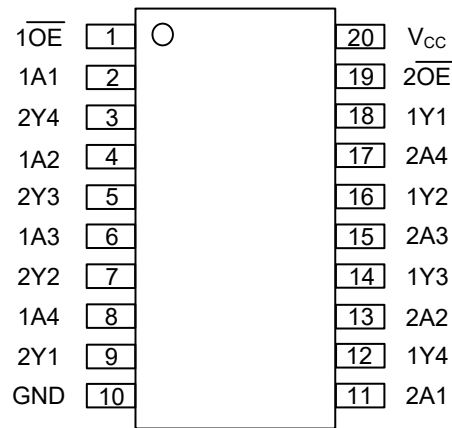


<p>U74LVC244G-D20-T</p>	<p>(1) T: Tube, R: Tape Reel  (2) D20: DIP-20, S20: SOP-20, R20: SSOP-20  P20: TSSOP-20  (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

DIP-20	SOP-20 / SSOP-20 / TSSOP-20

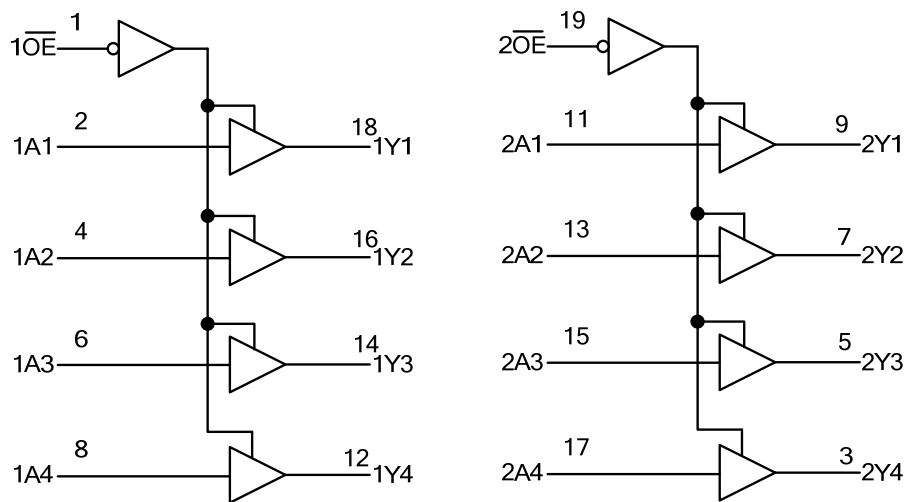
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

INPUT( $\overline{OE}$ )	INPUT(A)	OUTPUT(Y)
H	X	Z
L	H	H
L	L	L

■ LOGIC DIAGRAM (Positive Logic)



## ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	$V_{CC}$		-0.5 ~ 6.5	V
Input Voltage	$V_{IN}$		-0.5 ~ 6.5	V
Output Voltage	$V_{OUT}$	Output in high-impedance or power-off state	-0.5 ~ 6.5	V
		Output in high or low state	-0.5 ~ $V_{CC}+0.5$	V
Input Clamp Current	$I_{IK}$		-50	mA
Output Clamp Current	$I_{OK}$		-50	mA
Output Current	$I_{OUT}$		±50	mA
$V_{CC}$ or GND Current	$I_{CC}$		±100	mA
Operating Temperature	$T_{OPR}$		-40 ~ +125	°C
Storage Temperature	$T_{STG}$		-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	DIP-20	$\theta_{JA}$	60	°C/W
	SOP-20		85	°C/W
	SSOP-20		106	°C/W
	TSSOP-20		110	°C/W

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	Operating	1.65		3.6	V
		Data retention only	1.5			V
Input Voltage	$V_{IN}$		0		5.5	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
High-Level Input Voltage	$V_{IH}$	$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$			V
		$V_{CC}=2.3V$ to $2.7V$	1.7			V
		$V_{CC}=2.7V$ to $3.6V$	2			V
Low-Level Input Voltage	$V_{IL}$	$V_{CC}=1.65V$ to $1.95V$			$0.35 \times V_{CC}$	V
		$V_{CC}=2.3V$ to $2.7V$			0.7	V
		$V_{CC}=2.7V$ to $3.6V$			0.8	V
High-Level Output Current	$I_{OH}$	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	mA
		$V_{CC}=2.7V$			-12	mA
		$V_{CC}=3V$			-24	mA
Low-Level Output Current	$I_{OL}$	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	mA
		$V_{CC}=2.7V$			12	mA
		$V_{CC}=3V$			24	mA
Input Rise and Fall Times	$t_r / t_f$	$V_{CC}=1.65V$ to $2.7V$	0		20	ns/V
		$V_{CC}=2.7V$ to $3.6V$	0		10	ns/V

## ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	$V_{OH}$	$V_{CC}=1.65V$ to $3.6V$ , $I_{OH}=-100\mu A$	$V_{CC}-0.2$			V
		$V_{CC}=1.65V$ , $I_{OH}=-4mA$	1.29			V
		$V_{CC}=2.3V$ , $I_{OH}=-8mA$	1.9			V
		$V_{CC}=2.7V$ , $I_{OH}=-12mA$	2.2			V
		$V_{CC}=3V$ , $I_{OH}=-12mA$	2.4			V
		$V_{CC}=3V$ , $I_{OH}=-24mA$	2.3			V
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65V$ to $3.6V$ , $I_{OL}=100\mu A$			0.1	V
		$V_{CC}=1.65V$ , $I_{OL}=4mA$			0.24	V
		$V_{CC}=2.3V$ , $I_{OL}=8mA$			0.3	V
		$V_{CC}=2.7V$ , $I_{OL}=12mA$			0.4	V
		$V_{CC}=3V$ , $I_{OL}=24mA$			0.55	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=3.6V$ , $V_{IN}=5.5V$ or GND			$\pm 1$	$\mu A$
Power OFF Leakage Current	$I_{OFF}$	$V_{CC}=0V$ , $V_{IN}$ or $V_{OUT}=5.5V$			$\pm 1$	$\mu A$
Output OFF-State Current	$I_{OZ}$	$V_{CC}=3.6V$ , $V_{OUT}=0$ or $5.5V$			$\pm 1$	$\mu A$
Quiescent Supply Current	$I_q$	$V_{CC}=3.6V$ , $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			1	$\mu A$
		$V_{CC}=3.6V$ , $3.6V \leq V_{IN} \leq 5.5V$ , $I_{OUT}=0$			1	$\mu A$
Additional Quiescent Supply Current	$\Delta I_q$	$V_{CC}=2.7V$ to $3.6V$ , One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND			500	$\mu A$
Input Capacitance	$C_I$	$V_{CC}=3.3V$ , $V_{IN}=V_{CC}$ or GND		4		pF
Output Capacitance	$C_O$	$V_{CC}=3.3V$ , $V_{OUT}=V_{CC}$ or GND		5.5		pF

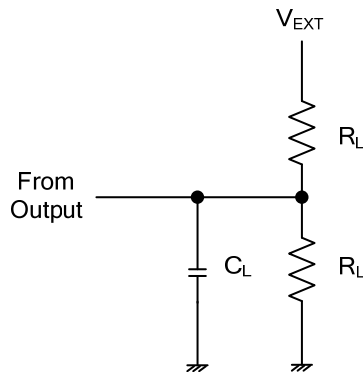
## ■ SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
From Input(A) to Output(Y)	$t_{pd}$	$V_{CC}=1.5V$	1	8	16	ns
		$V_{CC}=1.8V \pm 0.15V$	1	6.5	12	ns
		$V_{CC}=2.5V \pm 0.2V$	1	4.6	8.4	ns
		$V_{CC}=2.7V$	1	4.5	7.7	ns
		$V_{CC}=3.3V \pm 0.3V$	1.5	4.2	6.6	ns
From Input( $\overline{OE}$ ) to Output(Y)	$t_{en}$	$V_{CC}=1.5V$	1	8.8	19.5	ns
		$V_{CC}=1.8V \pm 0.15V$	1	7.6	14	ns
		$V_{CC}=2.5V \pm 0.2V$	1	5.6	10.3	ns
		$V_{CC}=2.7V$	1	5.7	9.7	ns
		$V_{CC}=3.3V \pm 0.3V$	1.5	4.9	8.3	ns
From Input( $\overline{OE}$ ) to Output(Y)	$t_{dis}$	$V_{CC}=1.5V$	1	8.3	17	ns
		$V_{CC}=1.8V \pm 0.15V$	1	6.7	13.2	ns
		$V_{CC}=2.5V \pm 0.2V$	1	4.3	8.1	ns
		$V_{CC}=2.7V$	1	4.2	7.6	ns
		$V_{CC}=3.3V \pm 0.3V$	1.5	4.0	7.3	ns

## ■ OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$\overline{OE}=0$ , $f=10MHz$ , $V_{CC}=1.8V$		43		pF
		$\overline{OE}=0$ , $f=10MHz$ , $V_{CC}=2.5V$		43		pF
		$\overline{OE}=0$ , $f=10MHz$ , $V_{CC}=3.3V$		44		pF
		$\overline{OE}=1$ , $f=10MHz$ , $V_{CC}=1.8V$		1		pF
		$\overline{OE}=1$ , $f=10MHz$ , $V_{CC}=2.5V$		1		pF
		$\overline{OE}=1$ , $f=10MHz$ , $V_{CC}=3.3V$		2		pF

■ TEST CIRCUIT AND WAVEFORMS



V <sub>CC</sub>	V <sub>IN</sub>	t <sub>R</sub> /t <sub>F</sub>	V <sub>M</sub>	V $\Delta$	C <sub>L</sub>	R <sub>L</sub>	V <sub>EXT</sub>		
							t <sub>PLH</sub> /t <sub>PHL</sub>	t <sub>PZH</sub> /t <sub>PHZ</sub>	t <sub>PZL</sub> /t <sub>PLZ</sub>
1.5V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	0.1V	15pF	2K $\Omega$	OPEN	GND	2*V <sub>CC</sub>
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	0.15V	30pF	1K $\Omega$	OPEN	GND	2*V <sub>CC</sub>
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	0.15V	30pF	500 $\Omega$	OPEN	GND	2*V <sub>CC</sub>
2.7V	2.7V	≤2.5ns	1.5V	0.3V	50pF	500 $\Omega$	OPEN	GND	6V
3.3V±0.3V	2.7V	≤2.5ns	1.5V	0.3V	50pF	500 $\Omega$	OPEN	GND	6V

Fig-1 Load circuitry

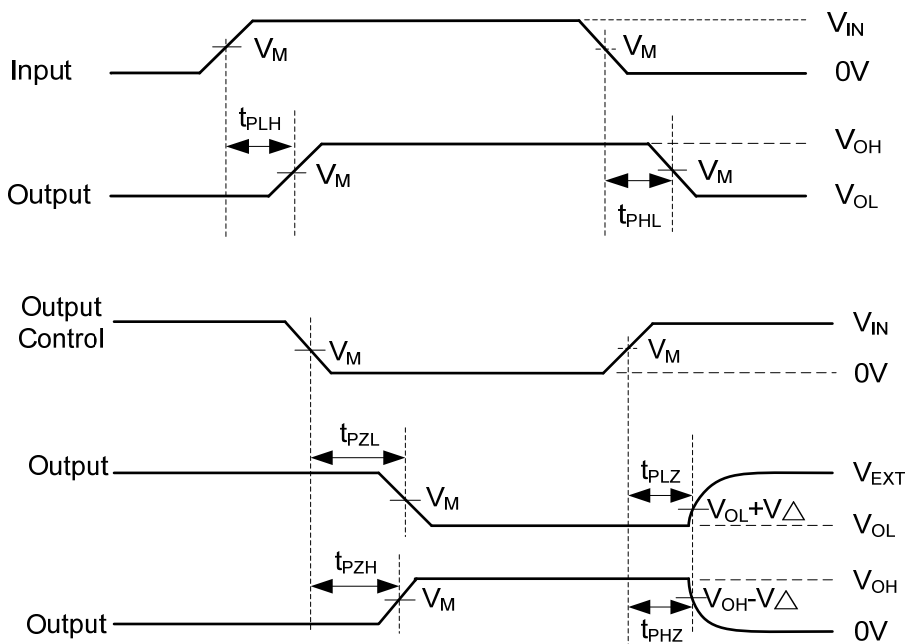


Fig-2 Propagation delay waves

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