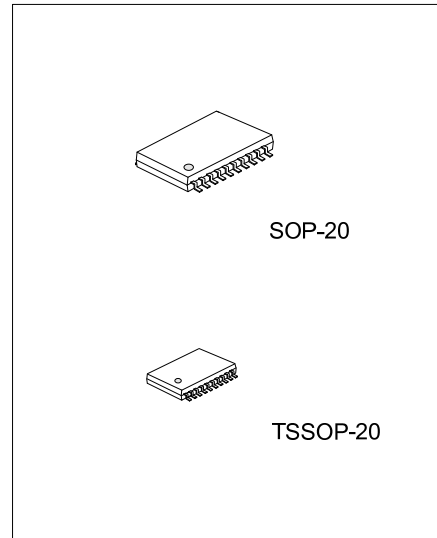




U74LVC374

CMOS IC

OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS



DESCRIPTION

The **U74LVC374** is an octal edge-triggered D-type flip-flop with 3-state outputs and 8 channels.

FEATURES

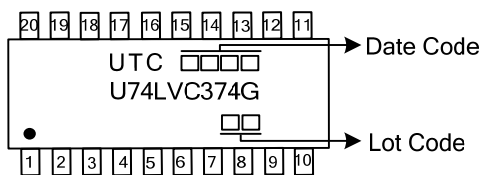
- * Operate from 1.65V to 3.6V
- * Max t_{pd} of 6.5ns at 3.3 V
- * Typical $V_{OL} < 0.8V @ V_{CC}=3.3V (T_A=25^\circ C)$
- * Typical $V_{OH} > 2.0V @ V_{CC}=3.3V (T_A=25^\circ C)$
- * Power off disables outputs, permitting live insertion

ORDERING INFORMATION

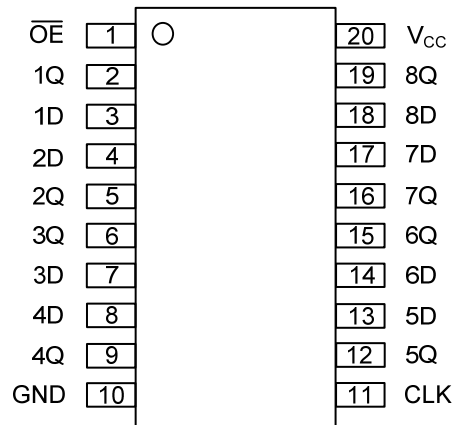
Ordering Number	Package	Packing
U74LVC374G-S20-R	SOP-20	Tape Reel
U74LVC374G-P20-R	TSSOP-20	Tape Reel

<p>U74LVC374G-S20-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S20: SOP-20, P20: TSSOP-20 (3) G: Halogen Free and Lead Free</p>
--	--

MARKING



■ PIN CONFIGURATION

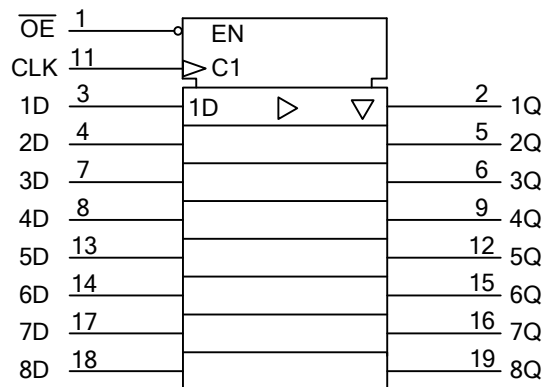


■ FUNCTION TABLE

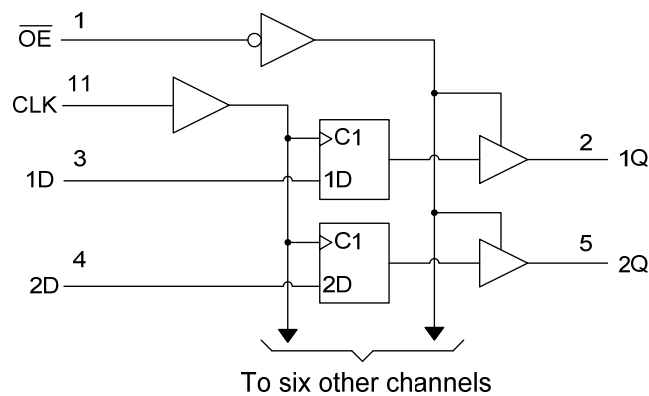
INPUTS (\overline{OE})	INPUTS (CLK)	INPUTS (D)	OUTPUT (Q)
L	↑	H	H
L	↑	L	L
L	L/H	X	Q0
H	X	X	Z

Note: H: HIGH voltage level; L: LOW voltage level.

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ +6.5	V
Input Voltage	V_{IN}	-0.5 ~ +6.5	V
Voltage Range Applied To Any Output In The High-Impedance Or Power-Off State	V_{OUT}	-0.5 ~ +6.5	V
Voltage Range Applied To Any Output In The High Or Low State		-0.5 ~ $V_{CC}+0.5$	V
V_{CC} or GND Current	I_{CC}	±100	mA
Output Current	I_{OUT}	±50	mA
Input Clamp Current	I_{IK}	-50	mA
Output Clamp Current	I_{OK}	-50	mA
Operating Temperature	T_{OPR}	-40 ~ + 85	°C
Storage Temperature	T_{STG}	-65 ~ + 150	°C

Note: 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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20	58	°C/W
	TSSOP-20	83	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.65		3.6	V
		Data retention only	1.5			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
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}	High or low state	0		V_{CC}	V
		3 state	0		5.5	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 transition Rise or Fall rate	$\Delta t/\Delta v$				10	ns/V

■ ELECTRICAL CHARACTERISTICS (T_A =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note1)	MAX	UNIT
Output Voltage High-Level	V _{OH}	V _{CC} =1.65~3.6V, I _{OH} =-100μA	V _{CC} -0.2			V
		V _{CC} =1.65V, I _{OH} =-4mA	1.2			V
		V _{CC} =2.3V, I _{OH} =-8mA	1.7			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	2.2			V
Output Voltage Low-Level	V _{OL}	V _{CC} =1.65~3.6V, I _{OL} =100μA			0.2	V
		V _{CC} =1.65V, I _{OL} =4mA			0.45	V
		V _{CC} =2.3V, I _{OL} =8mA			0.7	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} =0 to 5.5V			±5	μA
Power OFF Leakage Current	I _{OFF}	V _{CC} =0V, V _{IN} or V _{OUT} =5.5V			±10	μA
3-state Output Off-state Current	I _{OZ}	V _{CC} =3.6V, V _{OUT} =0 to 5.5V			±10	μA
Quiescent Supply Current	I _{CC}	V _{CC} =3.6V, V _{IN} =V _{CC} or GND, I _{OUT} =0			10	μA
		V _{CC} =3.6V, 3.6V≤V _{IN} ≤5.5V, I _{OUT} =0(Note 2)			10	μA
Additional Quiescent Supply Current	ΔI _{CC}	V _{CC} =2.7~3.6V One input at V _{CC} -0.6V Other inputs at V _{CC} or GND			500	μA
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

Notes: 1. V_{CC}=3.3V.

2. This applies in the disabled state only.

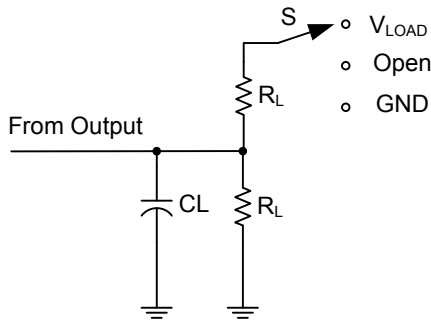
■ SWITCHING CHARACTERISTICS (T_A =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input CLK to output Q	t _{PLH} /t _{PHL}	V _{CC} =2.7V			8.1	ns
		V _{CC} =3.3V±0.3V	1.5		7	ns
Propagation delay from input $\overline{\text{OE}}$ to output Q	t _{PZL} /t _{PZH}	V _{CC} =2.7V			8.5	ns
		V _{CC} =3.3V±0.3V	1.5		7.5	ns
Propagation delay from input $\overline{\text{OE}}$ to output Q	t _{PLZ} /t _{PHZ}	V _{CC} =2.7V			7.1	ns
		V _{CC} =3.3V±0.3V	1.5		6.5	ns
Maximum Clock Frequency	f _{MAX}	V _{CC} =2.7V	80			MHz
		V _{CC} =3.3V±0.3V	100			MHz
Clock Frequency	f _{CLOCK}	V _{CC} =2.7V			80	MHz
		V _{CC} =3.3V±0.3V			100	MHz
Pulse Width	t _w	V _{CC} =2.7V	3.3			ns
		V _{CC} =3.3V±0.3V	3.3			ns
Setup Time	t _{SU}	V _{CC} =2.7V	2			ns
		V _{CC} =3.3V±0.3V	2			ns
Hold Time	t _H	V _{CC} =2.7V	1.5			ns
		V _{CC} =3.3V±0.3V	1.5			ns

■ OPERATING CHARACTERISTICS (T_A =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation	C _{PD}	f=10MHz, V _{CC} =3.3V±0.3V		54.5		pF
Capacitance Per Flip-flop		f=10MHz, V _{CC} =3.3V±0.3V		13.5		pF

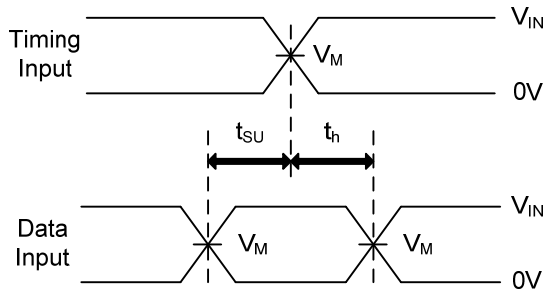
TEST CIRCUIT AND WAVEFORMS



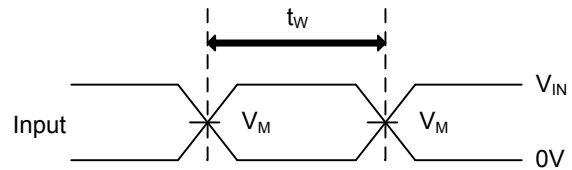
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{LOAD}

TEST CIRCUIT

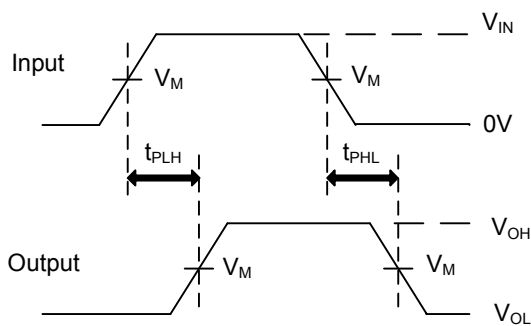
V_{CC}	Inputs		V_M	V_{LOAD}	V_{Δ}	C_L	R_L
	V_{IN}	t_R, t_F					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	0.15V	30pF	1K Ω
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	0.15V	30pF	500 Ω
2.7V	2.7V	$\leq 2.5ns$	1.5V	6V	0.3V	50pF	500 Ω
$3.3V \pm 0.3V$	2.7V	$\leq 2.5ns$	1.5V	6V	0.3V	50pF	500 Ω



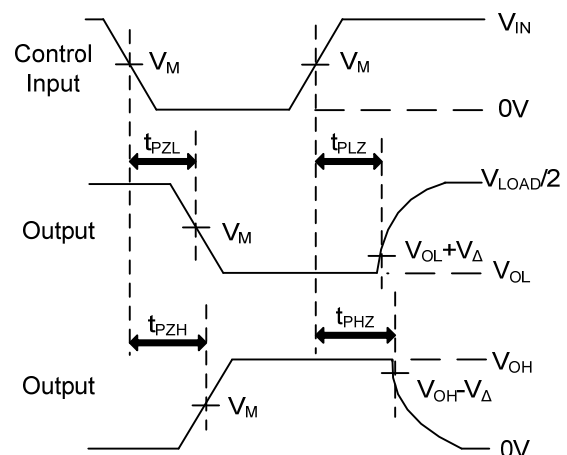
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Note: C_L includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: PRR $\leq 10MHz$, $Z_o = 50\Omega$.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.