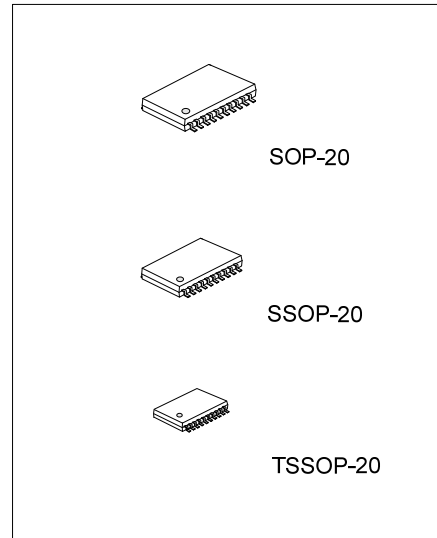




## U74LVC574

CMOS IC

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



#### DESCRIPTION

The **U74LVC574** is a octal edge-triggered D-type flip-flop with 3-state outputs, and it has 8 channels.

#### FEATURES

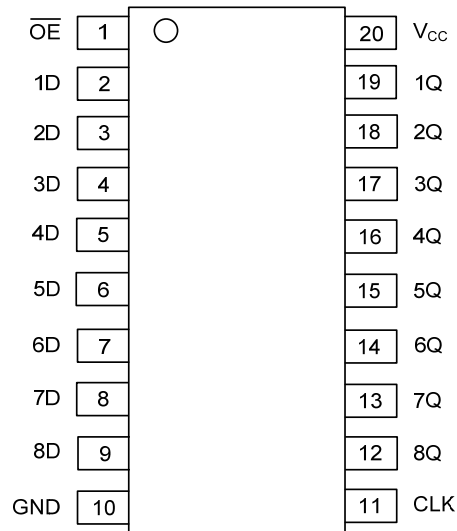
- \* Operate from 1.65V to 3.6V
- \* Max  $t_{pd}$  of 7ns at 3.3 V
- \* Typical  $V_{OL} < 0.8V$  at  $V_{CC}=3.3V$ ,  $T_a=25^\circ C$
- \* Typical  $V_{OH} > 2V$  at  $V_{CC}=3.3V$ ,  $T_a=25^\circ C$
- \* Power off disables outputs, permitting live insertion

#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC574L-P20-R	U74LVC574G-P20-R	TSSOP-20	Tape Reel
U74LVC574L-R20-R	U74LVC574G-R20-R	SSOP-20	Tape Reel
U74LVC574L-S20-R	U74LVC574G-S20-R	SOP-20	Tape Reel

<p>U74LVC574L-R20-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) P20: TSSOP-20, R20: SSOP-20, S20:SOP-20 (3) G: Halogen Free, L: Lead Free</p>
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■ PIN CONFIGURATION

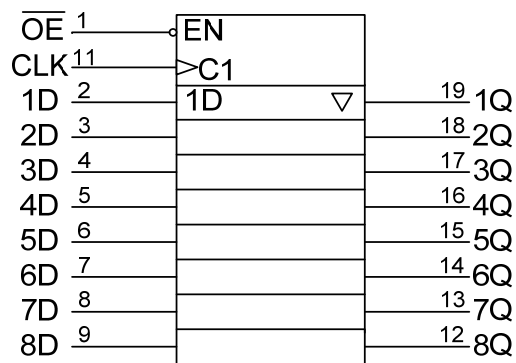


■ FUNCTION TABLE

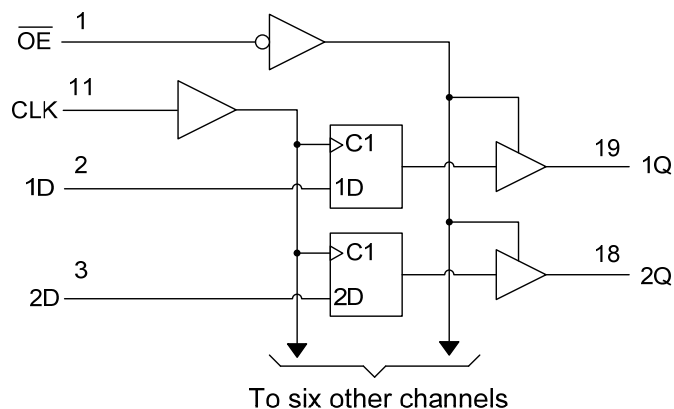
INPUTS( $\overline{OE}$ )	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	↑	H	H
L	↑	L	L
L	L	X	Q0
H	X	X	Z

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
Output Voltage	$V_{OUT}$	-0.5 ~ 6.5 (Note 2) -0.5 ~ $V_{CC} + 0.5$ (Note 3)	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: 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. Voltage range applied to any output in the high-impedance or power-off state.

3. Voltage range applied to any output in the high or low state, and  $V_{CC}$  is provided in the recommended operating conditions table.

### ■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient	SOP-20	$\theta_{JA}$		100	°C/W
	SSOP-20/TSSOP-20			115	°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			
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			
		$V_{CC}=2.7V$ to $3.6V$	2			
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	
		$V_{CC}=2.7V$ to $3.6V$			0.8	
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	
High-level Output Current	$I_{OH}$	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	
		$V_{CC}=2.7V$			-12	
		$V_{CC}=3V$			-24	
Low-level Output Current	$I_{OL}$	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	
		$V_{CC}=2.7V$			12	
		$V_{CC}=3V$			24	
Input Rise or Fall Times	$t_R, t_F$		0		6	ns/V

## ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note 1)	MAX	UNIT
Output Voltage High-Level	$V_{OH}$	$V_{CC}=1.65\sim 3.6V, I_{OH}=-100\mu A$	$V_{CC}-0.2$			V
		$V_{CC}=1.65V, I_{OH}=-4mA$	1.2			
		$V_{CC}=2.3V, I_{OH}=-8mA$	1.7			
		$V_{CC}=2.7V, I_{OH}=-12mA$	2.2			
		$V_{CC}=3V, I_{OH}=-12mA$	2.4			
		$V_{CC}=3V, I_{OH}=-24mA$	2.2			
Output Voltage Low-Level	$V_{OL}$	$V_{CC}=1.65\sim 3.6V, I_{OL}=100\mu A$			0.2	V
		$V_{CC}=1.65V, I_{OL}=4mA$			0.45	
		$V_{CC}=2.3V, I_{OL}=8mA$			0.7	
		$V_{CC}=2.7V, I_{OL}=12mA$			0.4	
		$V_{CC}=3V, I_{OL}=24mA$			0.55	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=3.6V, V_{IN}=0$ to 5.5V			$\pm 5$	$\mu A$
Power OFF Leakage Current	$I_{OFF}$	$V_{CC}=0V, V_{IN}$ or $V_{OUT}=5.5V$			$\pm 10$	$\mu A$
Disable Output Leakage Current	$I_{OZ}$	$V_{CC}=3.6V, V_{OUT}=0$ to 5.5V			$\pm 10$	$\mu A$
Quiescent Supply Current	$I_Q$	$V_{CC}=3.6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			10	$\mu A$
		$V_{CC}=3.6V, 3.6V \leq V_{IN} \leq 5.5V, I_{OUT}=0$ (Note 2)			10	$\mu A$
Additional Quiescent Supply Current	$\Delta I_Q$	$V_{CC}=2.7\sim 3.6V$ , 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

Note: 1.  $V_{CC}=3.3V, T_a=25^\circ C$

2. This applies in the disabled state only.

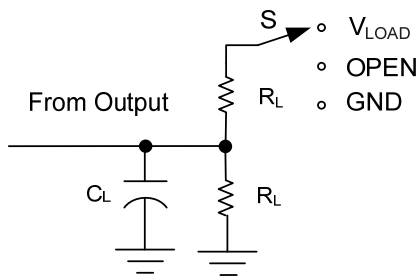
## ■ SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
From CLK to Q	$t_{PLH}/t_{PHL}$	$V_{CC}=2.7V$			8	ns
		$V_{CC}=3.3V \pm 0.3V$	2.2		7	
From $\overline{OE}$ to Q	$t_{PZL}/t_{PZH}$	$V_{CC}=2.7V$			8.5	ns
		$V_{CC}=3.3V \pm 0.3V$	1.5		7.5	
From $\overline{OE}$ to Q	$t_{PLZ}/t_{PHZ}$	$V_{CC}=2.7V$			7	ns
		$V_{CC}=3.3V \pm 0.3V$	1.7		6.4	
Maximum Clock Frequency	$f_{MAX}$	$V_{CC}=2.7V$	150			MHz
		$V_{CC}=3.3V \pm 0.3V$	150			
Pulse Width	$t_w$	$V_{CC}=2.7V$	3.3			ns
		$V_{CC}=3.3V \pm 0.3V$	3.3			
Setup Time	$t_{SU}$	$V_{CC}=2.7V$	2			ns
		$V_{CC}=3.3V \pm 0.3V$	2			
Hold Time	$t_{H}$	$V_{CC}=2.7V$	1.5			ns
		$V_{CC}=3.3V \pm 0.3V$	1.5			

## ■ OPERATING CHARACTERISTICS( $T_a=25^\circ C$ )

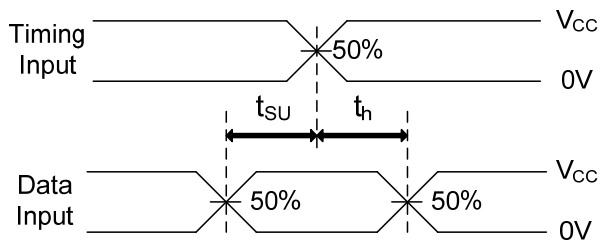
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	Cpd	$\overline{OE}=0, f=10MHz, V_{CC}=3.3V \pm 0.3V$		43		pF
		$\overline{OE}=1, f=10MHz, V_{CC}=3.3V \pm 0.3V$		15		

## ■ TEST CIRCUIT AND WAVEFORMS

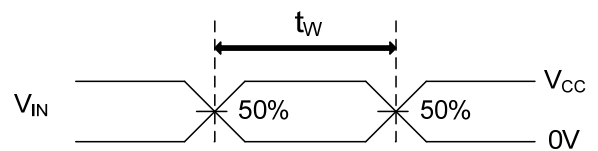


TEST CIRCUIT

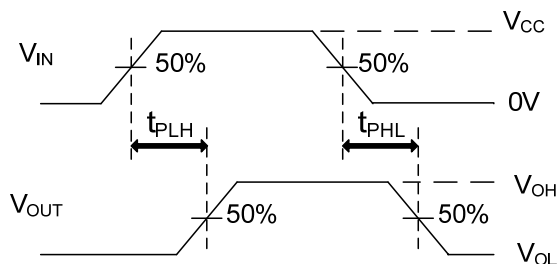
$V_{CC}$	$V_{IN}$	$t_{PLZ}/t_{PZL}$ ( $V_{LOAD}$ )	$t_{PLH}/t_{PHL}$	$t_{PHZ}/t_{PZH}$	$C_L$	$R_L$ (Note 1)	$\Delta V$
$1.8V \pm 0.15V$	$V_{CC}$	$2 \times V_{CC}$	OPEN	OPEN	30pF	1k $\Omega$	0.15V
$2.5V \pm 0.2V$	$V_{CC}$	$2 \times V_{CC}$	OPEN	GND	30pF	500 $\Omega$	0.15V
2.7V	2.7V	6V	OPEN	GND	50pF	500 $\Omega$	0.3V
$3.3V \pm 0.3V$	2.7V	6V	OPEN	GND	50pF	500 $\Omega$	0.3V



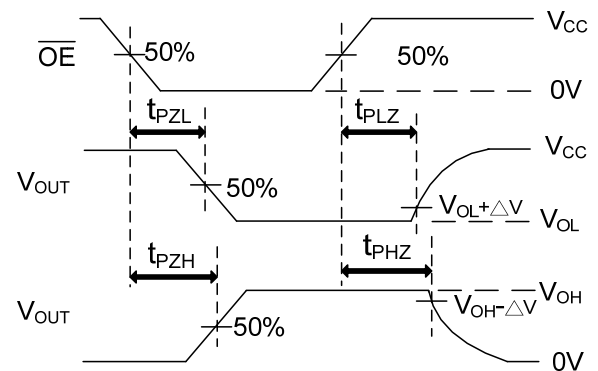
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Note: 1.  $C_L$  includes probe and jig capacitance.  
2.  $PRR \leq 10\text{MHz}$ ,  $Z_O = 50\Omega$ ,  $t_{THL} \leq 2\text{ns}$ ,  $t_{TLH} \leq 2\text{ns}$ .

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