UNISONIC TECHNOLOGIES CO., LTD

U74LVC574

CMOS IC

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

SOP-20

SSOP-20

TSSOP-20
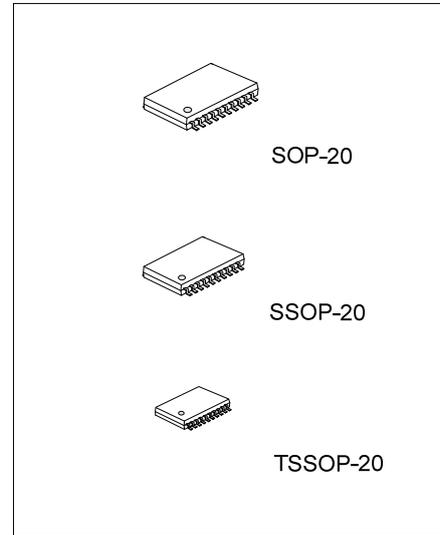
■ **DESCRIPTION**

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°C
* Typical V_{OH}> 2V at V_{CC}=3.3V, T_a=25°C
* Power off disables outputs, permitting live insertion

■ **ORDERING INFORMATION**

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

U74LVC574G-R20-R

——— (1)Packing Type

——— (2)Package Type

——— (3)Green Package

(1) R: Tape Reel

(2) P20: TSSOP-20, R20: SSOP-20, S20:SOP-20

(3) G: Halogen Free and Lead Free

■ **MARKING**

UTC ▢▢▢▢
U74LVC574G

Date Code

Lot Code

QW-R502-266.C

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■ **PIN CONFIGURATION**

Pin			Pin
$\overline{OE}$	1	20	V_{CC}
1D	2	19	1Q
2D	3	18	2Q
3D	4	17	3Q
4D	5	16	4Q
5D	6	15	5Q
6D	7	14	6Q
7D	8	13	7Q
8D	9	12	8Q
GND	10	11	CLK
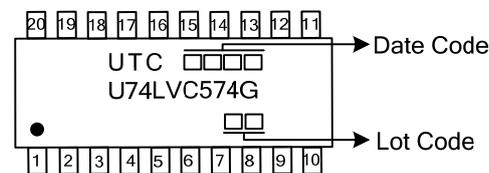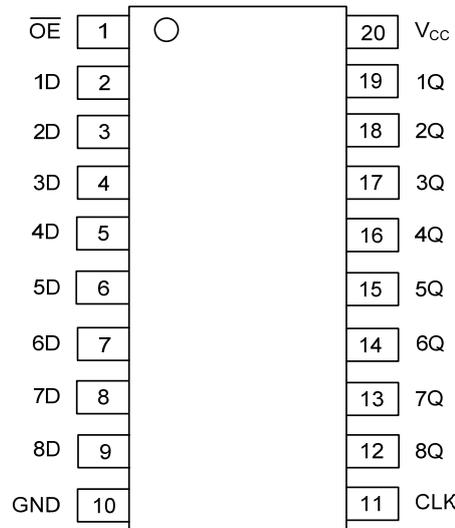
■ **FUNCTION TABLE**

INPUTS(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**

$\overline{OE}$ 1	EN		
CLK 11	>C1		
1D 2	1D ▽	19	1Q
2D 3		18	2Q
3D 4		17	3Q
4D 5		16	4Q
5D 6		15	5Q
6D 7		14	6Q
7D 8		13	7Q
8D 9		12	8Q

■ **LOGIC DIAGRAM**

To six other channels

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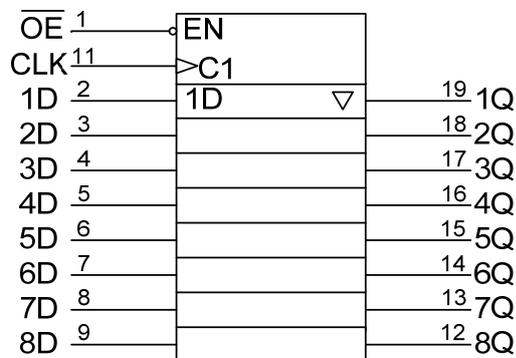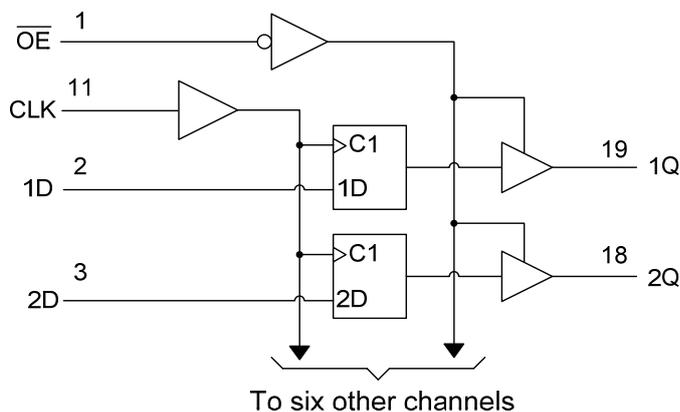
■ **ABSOLUTE MAXIMUM RATING** (T_A=25°C, unless otherwise specified)

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)	V
		-0.5 ~ V_{CC} +0.5 (Note 3)	
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.

■ **RECOMMENDED OPERATING CONDITIONS** (T_A=25°C, unless otherwise specified)

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×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×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

■ **THERMAL CHARACTERISTICS**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20	θ_{JA}	100	°C/W
	SSOP-20/TSSOP-20		115	°C/W

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■ **ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP (Note 1)	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_{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}=1.65~3.6V, I_{OL}=100µA			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			±5	µA
Power OFF Leakage Current	I_{OFF}	V_{CC}=0V, V_{IN} or V_{OUT}=5.5V			±10	µA
Disable Output Leakage Current	I_{OZ}	V_{CC}=3.6V, V_{OUT}=0 to 5.5V			±10	µA
Quiescent Supply Current	I_Q	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_Q	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

Note: 1. V_{CC}=3.3V, T_A=25°C
2. This applies in the disabled state only.

■ **SWITCHING CHARACTERISTICS**

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	ns
		V_{CC}=3.3V±0.3V	2.2		7	
Output enable time from input ($\overline{OE}$) to output (Q)	t_{PZL}/t_{PZH}	V_{CC}=2.7V			8.5	ns
		V_{CC}=3.3V±0.3V	1.5		7.5	
Output disable time from input ($\overline{OE}$) to output (Q)	t_{PLZ}/t_{PHZ}	V_{CC}=2.7V			7	ns
		V_{CC}=3.3V±0.3V	1.7		6.4	
Maximum Clock Frequency	f_{MAX}	V_{CC}=2.7V	150			MHz
		V_{CC}=3.3V±0.3V	150			
Pulse Width	t_W	V_{CC}=2.7V	3.3			ns
		V_{CC}=3.3V±0.3V	3.3			
Setup Time	t_{SU}	V_{CC}=2.7V	2			ns
		V_{CC}=3.3V±0.3V	2			
Hold Time	t_H	V_{CC}=2.7V	1.5			ns
		V_{CC}=3.3V±0.3V	1.5			

■ **OPERATING CHARACTERISTICS**(T_a=25°C)

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

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■ **TEST CIRCUIT AND WAVEFORMS**

S → ○ V_{LOAD}
○ OPEN
○ GND

From Output
R_L
C_L
R_L
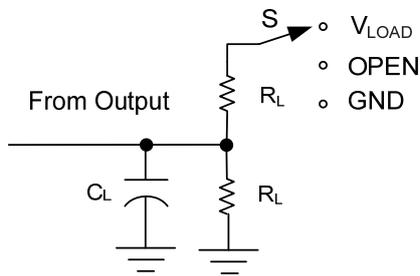
TEST CIRCUIT

V_{CC}	V_{IN}	t_{PLZ}/t_{PZL} (V_{LOAD})	t_{PLH}/t_{PHL}	t_{PHZ}/t_{PZH}	C_L	R_L (Note 1)	$\triangle V$
1.8V±0.15V	V_{CC}	2×V_{CC}	OPEN	OPEN	30pF	1kΩ	0.15V
2.5V±0.2V	V_{CC}	2×V_{CC}	OPEN	GND	30pF	500Ω	0.15V
2.7V	2.7V	6V	OPEN	GND	50pF	500Ω	0.3V
3.3V±0.3V	2.7V	6V	OPEN	GND	50pF	500Ω	0.3V

Timing Input
V_{CC}
50%
0V
t_{SU} t_h
Data Input
V_{CC}
50% 50%
0V

SETUP TIME AND HOLD TIME

t_W
V_{IN}
50% 50%
V_{CC}
0V

PULSE WIDTH

V_{IN}
50% 50%
V_{CC}
0V
t_{PLH} t_{PHL}
V_{OUT}
50% 50%
V_{OH}
V_{OL}

PROPAGATION DELAY TIMES

$\overline{OE}$
50% 50%
V_{CC}
0V
t_{PZL} t_{PLZ}
V_{OUT}
50%
V_{CC}
$V_{OL}+\triangle V$
V_{OL}
t_{PZH} t_{PHZ}
V_{OUT}
50%
$V_{OH}-\triangle V$ V_{OH}
0V
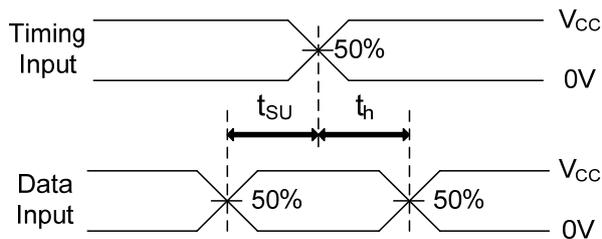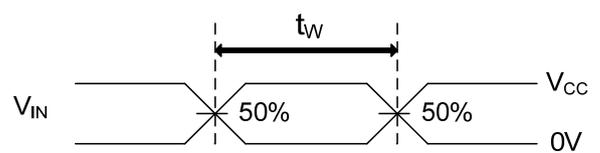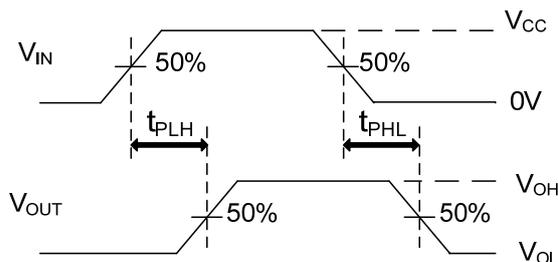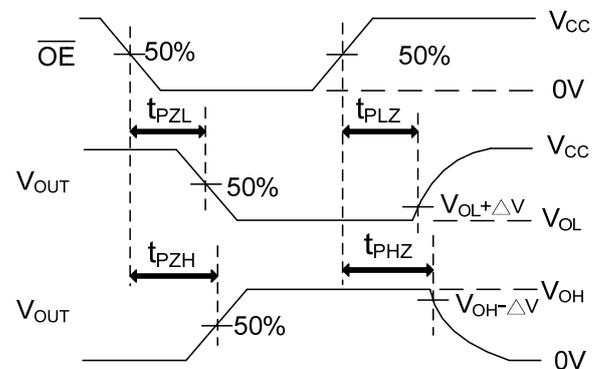
ENABLE AND DISABLE TIMES

Note: 1. C_L includes probe and jig capacitance.
Note: 2. PRR≤10MHz, Z_O=50Ω, t_{THL}≤2ns, t_{TLH}≤2ns.