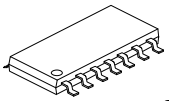
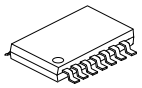
U74LV164

CMOS IC

8-BIT SERIAL-IN/ PARALLEL-OUT SHIFT REGISTER



SOP-14U



TSSOP-14U

■ DESCRIPTION

The **U74LV164** is an 8-bit serial-in/parallel-out shift register. The logical AND of the A and B enters into Qn and shifts one place to right on each LOW-to-HIGH transition of the clock (CLK). A low level on the reset ($\overline{CLR}$) input clears all the register asynchronously and force all output LOW.

■ FEATURES

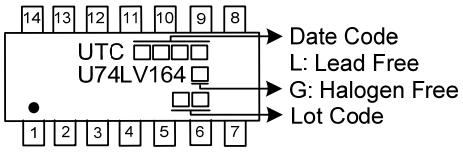
* Wide supply voltage range from 2V to 5.5V
* Inputs accept voltages up to 5.5V
* Low static power consumption; I_{CC}=20μA (Max.)
* Optimized for 3.3V Operation
* Support Mixed-Mode Voltage Operation on All Ports

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LV164L-UEA-R	U74LV164G-UEA-R	SOP-14U	Tape Reel
U74LV164L-UEB-R	U74LV164G-UEB-R	TSSOP-14U	Tape Reel

U74LV164G-UEA-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) UEA: SOP-14U, UEB: TSSOP-14U (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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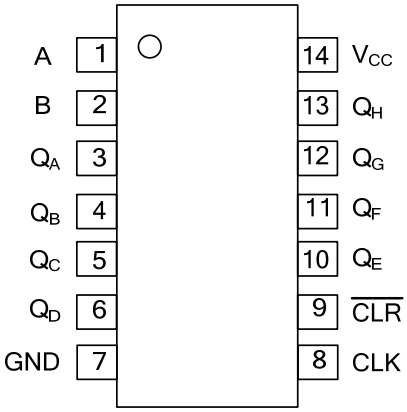
■ PIN CONFIGURATION

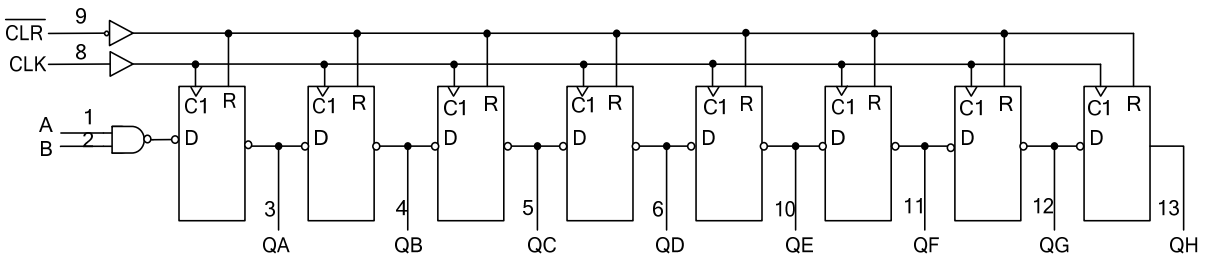


■ FUNCTION TABLE (each gate)

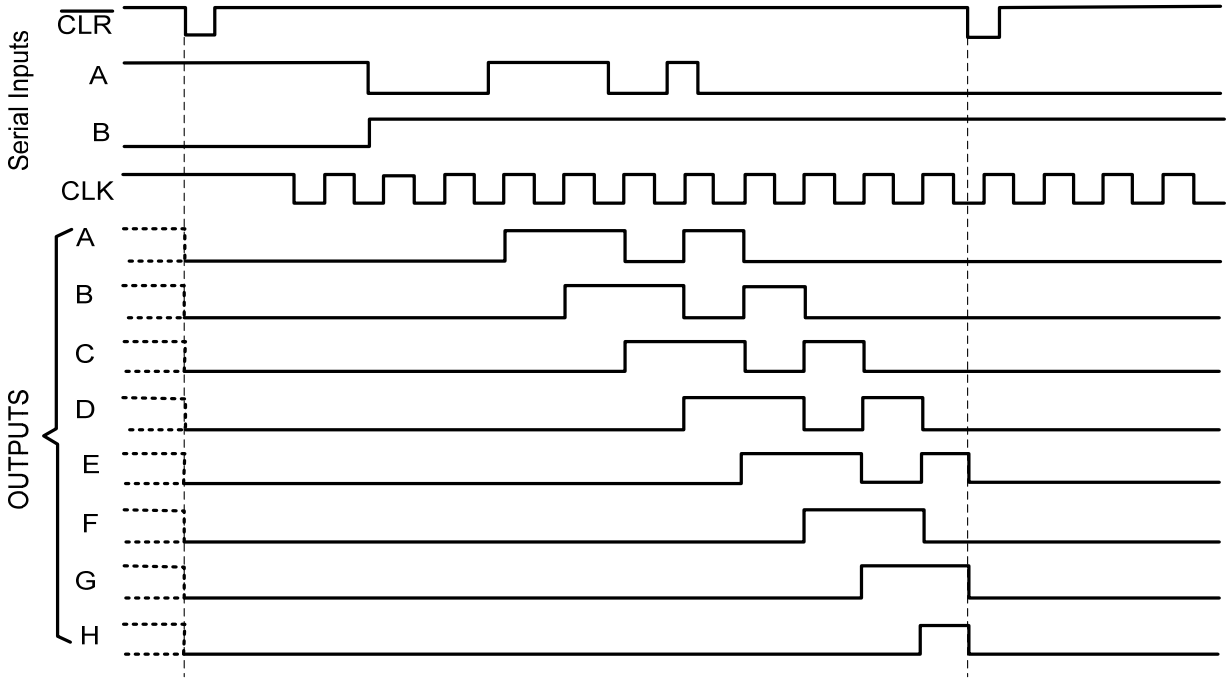
INPUTS				OUTPUTS		
$\overline{CLR}$	CLK	A	B	Q_A	Q_B	Q_H
L	X	X	X	L	L	L
H	L	X	X	Q_{A0}	Q_{B0}	Q_{H0}
H	↑	H	H	H	Q_{An}	Q_{Gn}
H	↑	L	X	L	Q_{An}	Q_{Gn}
H	↑	X	L	L	Q_{An}	Q_{Gn}

H = High voltage level；L = Low voltage level；X = Don't care

■ LOGIC DIAGRAM (positive gate)



■ TIMING DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ +7.0	V
Input Voltage (Note 2)	V_{IN}		-0.5 ~ +7.0	V
Output Voltage	V_{OUT}		-0.5 ~ +7.0	V
Continuous Output Current	I_{OUT}	V_{OUT}=0V ~ V_{CC}	±25	mA
Input Clamp Current	I_{IK}	V_{IN} < 0 or V_{IN} > V_{CC}	-20	mA
Output Clamp Current	I_{OK}	V_{OUT} < 0 or V_{OUT} > V_{CC}	-50	mA
Continuous Current Through V_{CC} or GND	I_{CC}		±50	mA
Storage Temperature Range	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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2.0		5.5	V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	Δt/Δv	V_{CC}=2.5V±0.2V			200	ns/V
		V_{CC}=3.3V±0.3V			100	ns/V
		V_{CC}=5.0V±0.5V			20	ns/V
Operating Temperature	T_A		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High Level Input Voltage	V_{IH}	V_{CC}=2V	1.5			1.5			V
		V_{CC}=2.5V±0.2V	0.7 ×V_{CC}			0.7 ×V_{CC}			V
		V_{CC}=3.3V±0.3V	0.7 ×V_{CC}			0.7 ×V_{CC}			V
		V_{CC}=5.0V±0.5V	0.7 ×V_{CC}			0.7 ×V_{CC}			V
Low Level Input Voltage	V_{IL}	V_{CC}=2.0V			0.5			0.5	V
		V_{CC}=2.5V±0.2V			0.3× V_{CC}			0.3× V_{CC}	V
		V_{CC}=3.3V±0.3V			0.3× V_{CC}			0.3× V_{CC}	V
		V_{CC}=5.0V±0.5V			0.3× V_{CC}			0.3× V_{CC}	V
High-Level Output Voltage	V_{OH}	V_{CC} =2V ~ 5.5V, I_{OH}=-50μA	V_{CC} -0.1			V_{CC} -0.1			V
		V_{CC} =2.3V, I_{OH}=-2mA	2			2			V
		V_{CC} =3V, I_{OH}=-6mA	2.48			2.2			V
		V_{CC} =4.5V, I_{OH}=-12mA	3.8			3.5			V
Low-Level Output Voltage	V_{OL}	V_{CC} =2V ~ 5.5V, I_{OL}=50μA			0.1			0.1	V
		V_{CC} =2.3V, I_{OL}=2mA			0.4			0.4	V
		V_{CC} =3V, I_{OL}=6mA			0.44			0.5	V
		V_{CC} =4.5V, I_{OL}=12mA			0.55			0.65	V
Input Leakage Current	$I_{I(LEAK)}$	V_{CC}=0~5.5V, V_{IN}=V_{CC} or GND			±1			±1	μA
Quiescent Supply Current	I_{CC}	V_{CC}=5.5V, V_{IN}=V_{CC} or GND, I_{OUT}=0A			20			160	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_{CC}	V_{CC}=5.5V, One input at 0.6V, Other inputs at V_{CC} or GND			500			850	μA

■ TIMING REQUIREMENTS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Pulse duration CLK High or Low	t_W	V_{CC}=2.5±0.2V	9			11			ns
		V_{CC}=3.3±0.3V	8			10			ns
		V_{CC}=5±0.5V	8			10			ns
Pulse duration $\overline{CLR}$ Low	t_W	V_{CC}=2.5±0.2V	9.5			12			ns
		V_{CC}=3.3±0.3V	8			10			ns
		V_{CC}=5±0.5V	8			10			ns
Setup Time A and B to CLK ↑	t_{SU}	V_{CC}=2.5±0.2V	9.5			12			ns
		V_{CC}=3.3±0.3V	8			10			ns
		V_{CC}=5±0.5V	7.5			10			ns
Setup Time $\overline{CLR}$ inactive	t_{SU}	V_{CC}=2.5±0.2V	6			8			ns
		V_{CC}=3.3±0.3V	5.5			7.5			ns
		V_{CC}=5±0.5V	5.5			7.5			ns
Hold Time A and B to CLK ↑	t_h	V_{CC}=2.5±0.2V	0			2			ns
		V_{CC}=3.3±0.3V	0			2			ns
		V_{CC}=5±0.5V	1			3			ns

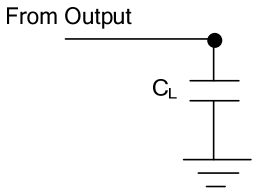
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		T_A=25°C			T_A=-40°C~+125°C			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
Maximum frequency	f_{MAX}	C_L=15pF, R_L=1MΩ	V_{CC}=2.5±0.2V	45	90		35			MHz
			V_{CC}=3.3±0.3V	65	110		55			MHz
			V_{CC}=5±0.5V	95	140		75			MHz
		C_L=50pF, R_L=1MΩ	V_{CC}=2.5±0.2V	35	75		25			MHz
			V_{CC}=3.3±0.3V	50	100		40			MHz
			V_{CC}=5±0.5V	80	120		65			MHz
Propagation delay from input (CLK) to output(Q)	t_{PD}	C_L=15pF, R_L=1MΩ	V_{CC}=2.5±0.2V		11	20	1		23	ns
			V_{CC}=3.3±0.3V		9	15	1		18	ns
			V_{CC}=5±0.5V		7	10	1		13	ns
		C_L=50pF, R_L=1MΩ	V_{CC}=2.5±0.2V		13	25	1		28	ns
			V_{CC}=3.3±0.3V		10	19	1		22	ns
			V_{CC}=5±0.5V		8	12	1		15	ns
Propagation delay from input($\overline{CLR}$) to output(Q)	t_{PHL}	C_L=15pF, R_L=1MΩ	V_{CC}=2.5±0.2V		10	16	1		19	ns
			V_{CC}=3.3±0.3V		8	13	1		16	ns
			V_{CC}=5±0.5V		6	9	1		12	ns
		C_L=50pF, R_L=1MΩ	V_{CC}=2.5±0.2V		11	20	1		23	ns
			V_{CC}=3.3±0.3V		9	17	1		20	ns
			V_{CC}=5±0.5V		7	11	1		14	ns

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

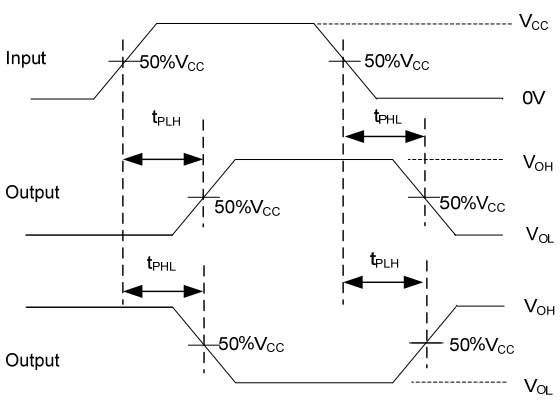
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{CC}=3.3V, f=10MHz		48		pF
Input Capacitance	C_{IN}	V_{CC}= 3.3V, V_{IN}= V_{CC} or GND		2.2		pF

■ TEST CIRCUIT AND WAVEFORMS

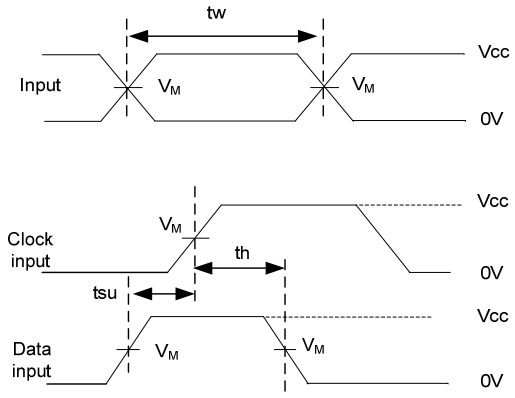


TEST CIRCUIT

Note : C_L includes probe and jig capacitance.



PROPAGATION DELAY TIMES



PROPAGATION DELAY FROM INPUT TO OUTPUT AND INPUT VOLTAGE WAVEFORMS.

Notes: 1. C_L includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR ≤1MHz, Z_O = 50Ω.

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