



U74HC164

CMOS IC

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

DESCRIPTION

The **U74HC164** is an 8-bit edge-triggered shift registers with serial input and parallel output. A LOW-to-HIGH transition on the CP will shifts the data one place to the right which is the logical AND of DSA and DSB.

A Low level on the \overline{MR} will clear the registers asynchronously and force the outputs LOW.

FEATURES

- * Operation Voltage Range: 2~6V
- * Asynchronous Reset Input

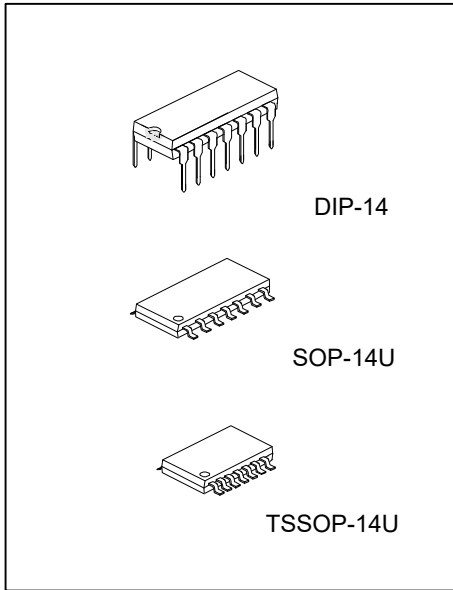
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC164L-D14-T	U74HC164G-D14-T	DIP-14	Tube
U74HC164L-UEA-R	U74HC164G-UEA-R	SOP-14U	Tape Reel
U74HC164L-UEB-R	U74HC164G-UEB-R	TSSOP-14U	Tape Reel

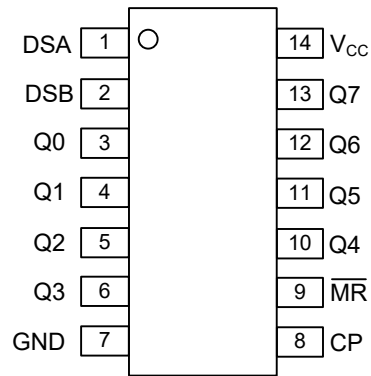
	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) D14: DIP-14, UEA: SOP-14U, UEB: TSSOP-14U</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

DIP-14	SOP-14U / TSSOP-14U



■ PIN CONFIGURATION

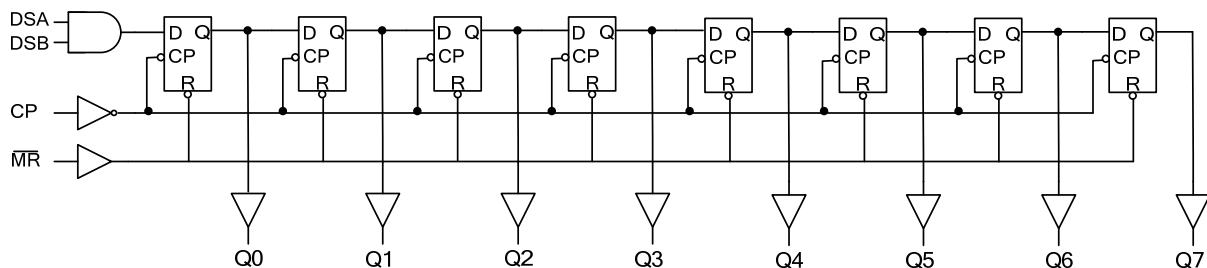


■ FUNCTION TABLE

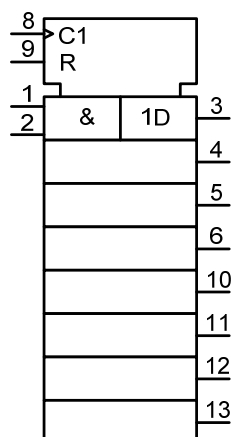
INPUT				OUTPUT	
\overline{MR}	CP	DSA	DSB	Q0	Q1 to Q7
L	X	X	X	L	L to L
H	L	X	X	Q0	Q1 to Q7
H	↑	H	L	L	Q0 to Q6
H	↑	H	H	H	Q0 to Q6
H	↑	L	H	L	Q0 to Q6
H	↑	L	L	L	Q0 to Q6

■ FUNCTIONAL DIAGRAM

Logic Diagram



IEC Logic Symbol



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7.0	V
V_{CC} or GND Current	I_{CC}	±50	mA
Output Current	I_{OUT}	±25	mA
Input Diode Current	I_{IK}	±20	mA
Switch Diode Current	I_{OK}	±20	mA
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.

■ RECOMMENDED OPERATING COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2.0	5.0	6.0	V
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=2V$			1000	ns
		$V_{CC}=4.5V$		6.0	500	ns
		$V_{CC}=6V$			400	ns
Operating Temperature	T_A		-40		+125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Ambient to Junction	DIP-14	100	°C/W
	SOP-14U	125	°C/W
	TSSOP-14U	150	°C/W

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage High-Level	V_{IH}	$V_{CC}=2.0V$	1.5	1.2		V
		$V_{CC}=4.5V$	3.15	2.4		V
		$V_{CC}=6.0V$	4.2	3.2		V
Input Voltage Low-Level	V_{IL}	$V_{CC}=2.0V$		0.8	0.5	V
		$V_{CC}=4.5V$		2.1	1.35	V
		$V_{CC}=6.0V$		2.8	1.8	V
Output Voltage High-Level	V_{OH}	$V_{CC}=2.0V, I_{OH}=20\mu A$	1.9	2.0		V
		$V_{CC}=4.5V, I_{OH}=20\mu A$	4.4	4.5		V
		$V_{CC}=6.0V, I_{OH}=20\mu A$	5.9	6.0		V
		$V_{CC}=4.5V, I_{OH}=4mA$	3.98	4.32		V
		$V_{CC}=6.0V, I_{OH}=5.2mA$	5.48	5.81		V
Output Voltage Low-Level	V_{OL}	$V_{CC}=2.0V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=6.0V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=4.5V, I_{OL}=4mA$		0.15	0.26	V
		$V_{CC}=6.0V, I_{OL}=5.2mA$		0.16	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=V_{CC}$ or GND, $V_{CC}=6.0V$			±0.1	μA
Quiescent Supply Current	I_Q	$V_{IN}=V_{CC}$ or GND, $V_{CC}=6.0V, I_{OUT}=0$			8	μA
Input Capacitance	C_{IN}			3.5		pF

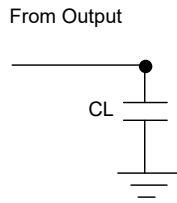
■ DYNAMIC CHARACTERISTICS (GND=0V; $t_R=t_F=6\text{ns}$; $C_L=50\text{pF}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay From CP to Qn	t_{PHL}, t_{PLH}	$V_{CC}=2.0\text{V}$		41	170	ns
		$V_{CC}=4.5\text{V}$		15	34	ns
		$V_{CC}=6.0\text{V}$		12	29	ns
Propagation Delay From $\overline{\text{MR}}$ to Qn	t_{PHL}	$V_{CC}=2.0\text{V}$		39	140	ns
		$V_{CC}=4.5\text{V}$		14	28	ns
		$V_{CC}=6.0\text{V}$		11	24	ns
Output Transition Time	t_{THL}, t_{TLH}	$V_{CC}=2.0\text{V}$		19	75	ns
		$V_{CC}=4.5\text{V}$		7	15	ns
		$V_{CC}=6.0\text{V}$		6	13	ns
Clock Pulse Width High or Low	t_w	$V_{CC}=2.0\text{V}$	80	14		ns
		$V_{CC}=4.5\text{V}$	16	5		ns
		$V_{CC}=6.0\text{V}$	14	4		ns
Master Reset Pulse Width Low	t_w	$V_{CC}=2.0\text{V}$	60	17		ns
		$V_{CC}=4.5\text{V}$	12	6		ns
		$V_{CC}=6.0\text{V}$	10	5		ns
Removal Time $\overline{\text{MR}}$ to CP	t_{rem}	$V_{CC}=2.0\text{V}$	60	17		ns
		$V_{CC}=4.5\text{V}$	12	6		ns
		$V_{CC}=6.0\text{V}$	10	5		ns
Setup Time DSA and DSB to CP	t_{SU}	$V_{CC}=2.0\text{V}$	60	8		ns
		$V_{CC}=4.5\text{V}$	12	3		ns
		$V_{CC}=6.0\text{V}$	10	2		ns
Hold Time DSA and DSB to CP	t_h	$V_{CC}=2.0\text{V}$	+4	-6		ns
		$V_{CC}=4.5\text{V}$	+4	-2		ns
		$V_{CC}=6.0\text{V}$	+4	-2		ns
Maximum Clock Pulse Frequency	f_{MAX}	$V_{CC}=2.0\text{V}$	6	23		MHz
		$V_{CC}=4.5\text{V}$	30	71		MHz
		$V_{CC}=6.0\text{V}$	35	85		MHz
Clock Frequency	f_{CLOCK}	$V_{CC}=2.0\text{V}$			6	MHz
		$V_{CC}=4.5\text{V}$			31	MHz
		$V_{CC}=6.0\text{V}$			36	MHz

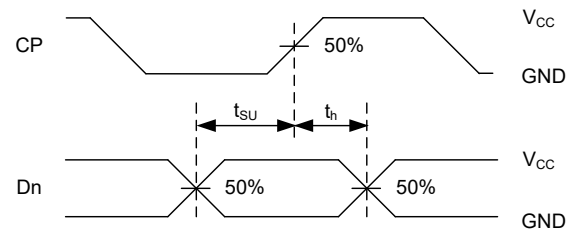
■ OPERATING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	No load		40		pF

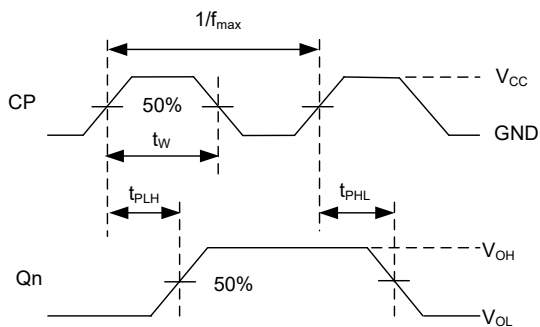
■ TEST CIRCUIT AND WAVEFORMS



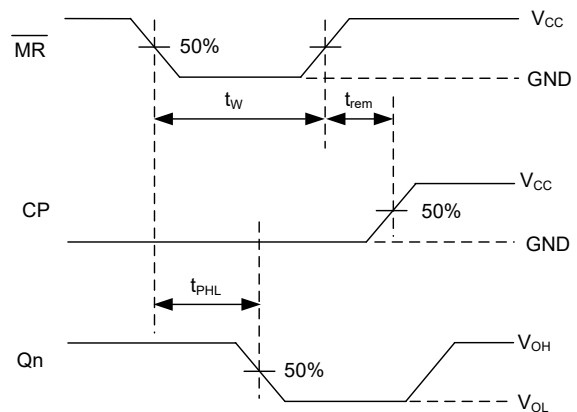
TEST CIRCUIT



SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES FROM CP TO Qn



PROPAGATION DELAY TIMES FROM \overline{MR} TO Qn

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