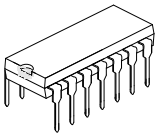
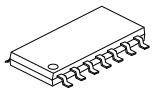
U74HC164

CMOS IC

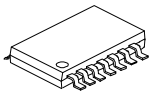
8-BIT SERIAL-IN AND PARALLEL-OUT SHIFT REGISTER



DIP-14



SOP-14



TSSOP-14

■ 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
* Specified from -40~ +125°C

■ ORDERING INFORMATION

Order Number		Package	Packing
Lead Free Plating	Halogen Free		
U74HC164L-D14-T	U74HC164G-D14-T	DIP-14	Tube
U74HC164L-S14-R	U74HC164G-S14-R	SOP-14	Tape Reel
U74HC164L-P14-R	U74HC164G-P14-R	TSSOP-14	Tape Reel

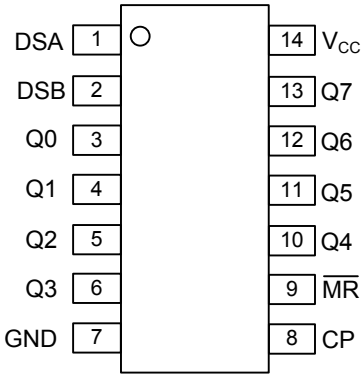
U74HC164L-D14-T

(1)Packing Type
(2)Package Type
(3)Lead Free

(1) R: Tape Reel, T: Tube
(2) D14: DIP-14, S14: SOP-14, P14: TSSOP-14
(3) G: Halogen Free, L: Lead Free Plating

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■ PIN CONFIGURATION

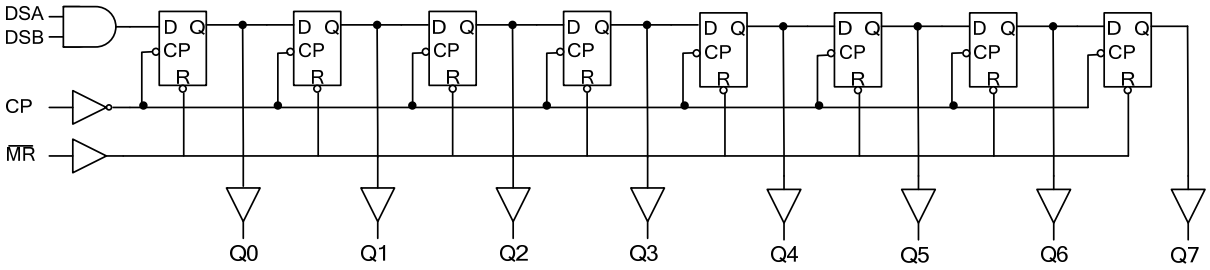


■ FUNCTION TABLE

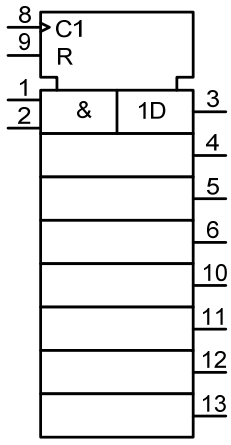
INPUT				OUTPUT	
$\overline{MR}$	CP	DSA	DSB	Q0	Q1 to Q7
L	×	×	×	L	L to L
H	↑	H	L	L	Q0 to Q6
H	↑	H	H	H	Q0 to Q6
H	↑	L	H	L	Q0 to Q6
H	↑	L	L	L	Q0 to Q6

■ FUNCTIONAL DIAGRAM

Logic Diagram



IEC Logic Symbol



■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	-0.5~ +7	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
Power Dissipation	DIP-14	P_D	750	mW
	SOP-14		500	mW
	TSSOP-14		500	mW
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	t_R,t_F	V_{CC}=2V			1000	ns
		V_{CC}=4.5V		6.0	500	ns
		V_{CC}=6V			400	ns
Ambient Operating Temperature	T_{OPR}		-40		125	°C

■ ELECTRICAL CHARACTERISTICS (T_a=25°C)

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}=20μA	1.9	2.0		V
		V_{CC}=4.5V, I_{OH}=20μA	4.4	4.5		V
		V_{CC}=6.0V, I_{OH}=20μA	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}=20μA		0	0.1	V
		V_{CC}=4.5V, I_{OL}=20μA		0	0.1	V
		V_{CC}=6.0V, I_{OL}=20μA		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

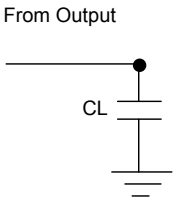
■ DYNAMIC CHARACTERISTICS (T_A=25°C, GND=0V; t_R=t_F=6ns; C_L=50Pf, unless otherwise specified)

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

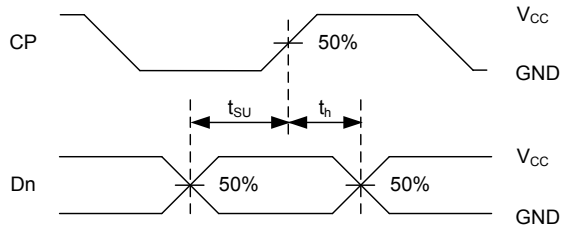
■ OPERATING CHARACTERISTICS (T_a=25°C)

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

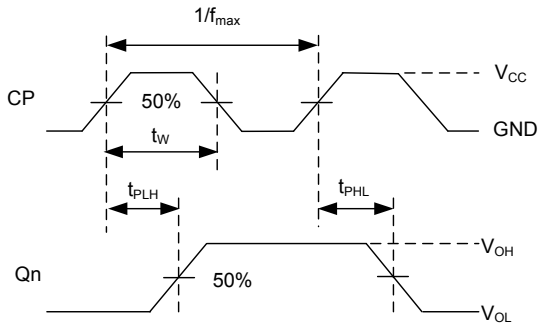
■ TEST CIRCUIT AND WAVEFORMS



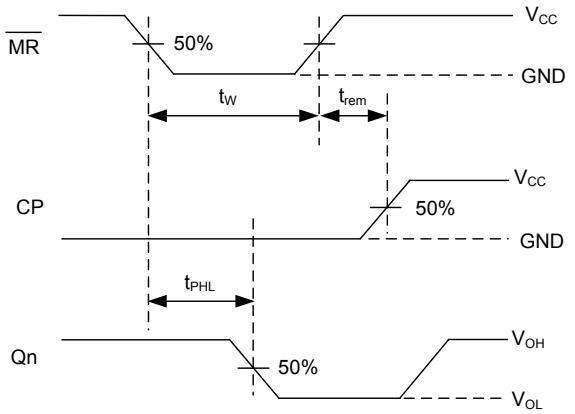
TEST CIRCUIT



SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES FROM CP TO Qn



PROPAGATION DELAY TIMES FROM $\overline{MR}$ TO Qn

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