



## U74AHC595

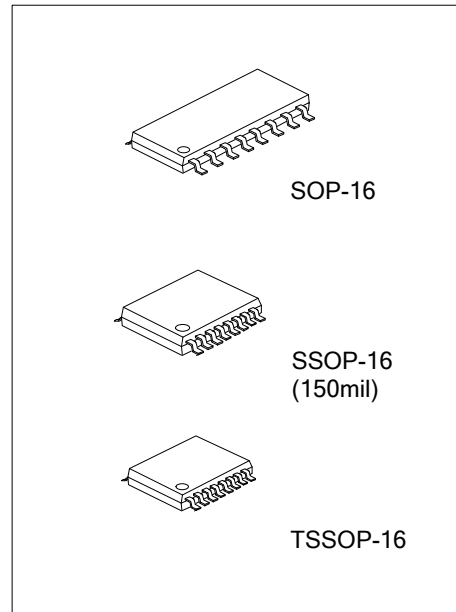
CMOS IC

### 8-BIT SHIFT REGISTER WITH 3-STATE OUTPUT REGISTERS

#### DESCRIPTION

The UTC **74AHC595** contains an 8-bit serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. The storage register has parallel 3-state outputs. Separate clocks are provided for both the shift and storage registers. The shift register has a direct overriding clear ( $\overline{\text{SRCLR}}$ ) input, serial (SER) input, and a serial output for cascading. When the output-enable ( $\overline{\text{OE}}$ ) input is high, all outputs, except  $Q_H$ , are in the high-impedance state.

Both the shift-register clock (SRCLK) and storage-register clock (RCLK) are positive-edge triggered. If both clocks are connected together the shift register always is one clock pulse ahead of the storage register.



#### FEATURES

- \* Operation Voltage Range: 2~5.5V
- \* 8-bit Serial-In, Parallel-Out Shift
- \* Shift Register Has Direct Clear

#### ORDERING INFORMATION

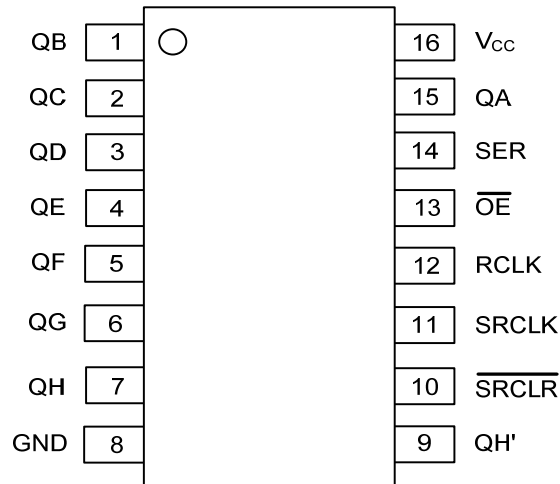
Ordering Number	Package	Packing
U74AHC595G-S16-R	SOP-16	Tape Reel
U74AHC595G-R16-R	SSOP-16	Tape Reel
U74AHC595G-P16-R	TSSOP-16	Tape Reel

<p>U74AHC595G-S16-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S16: SOP-16, R16: SSOP-16, P16: TSSOP-16 (3) G: Halogen Free and Lead Free</p>
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#### MARKING

SOP-16 / TSSOP-16	SSOP-16
<p>16 15 14 13 12 11 10 9 → Date Code</p> <p>UTC □□□□</p> <p>U74AHC595G</p> <p>□□</p> <p>1 2 3 4 5 6 7 8 → Lot Code</p>	<p>16 15 14 13 12 11 10 9 → Date Code</p> <p>UTC □□□□</p> <p>AHC595G</p> <p>□□</p> <p>1 2 3 4 5 6 7 8 → Lot Code</p>

■ PIN CONFIGURATION

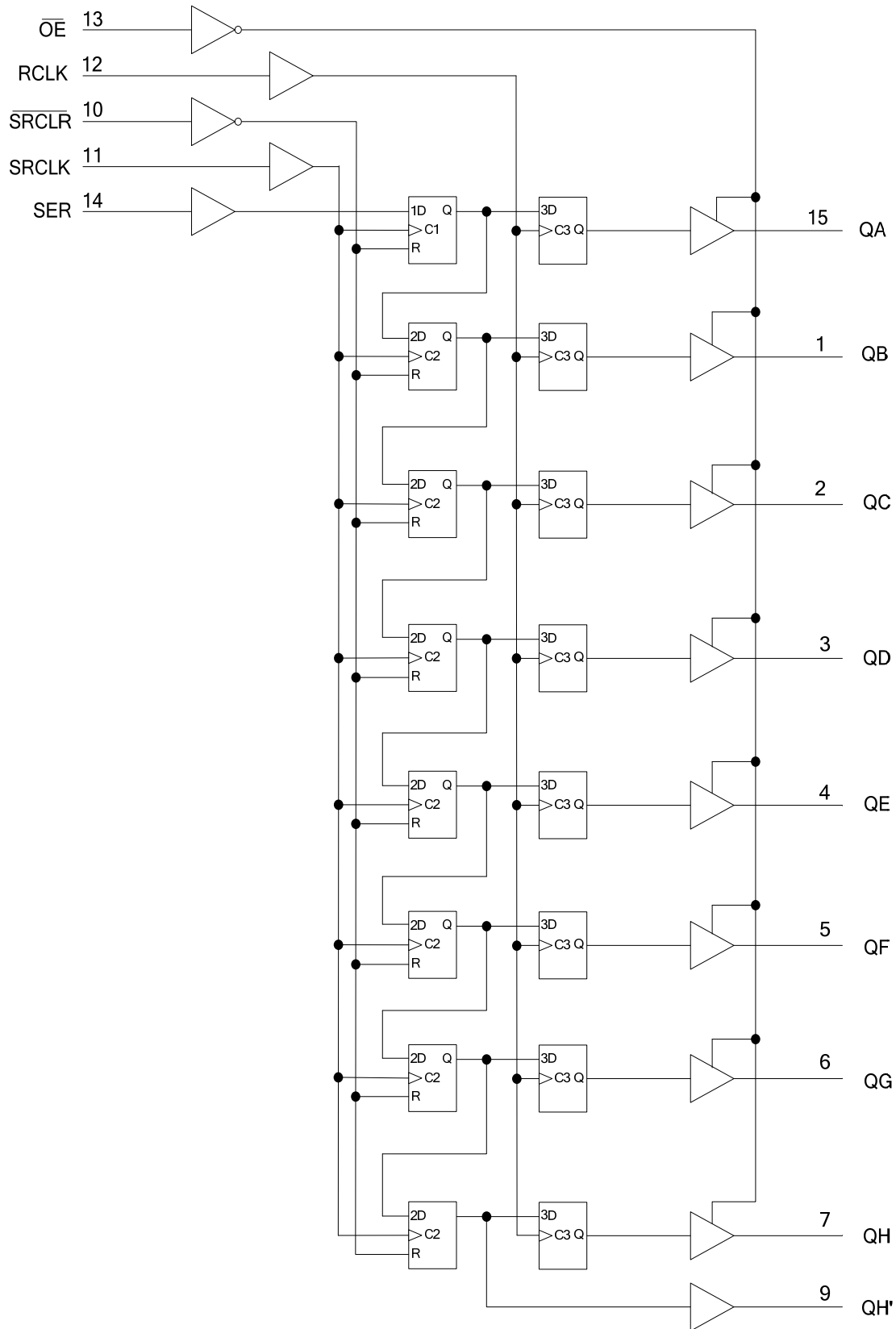


■ FUNCTION TABLE

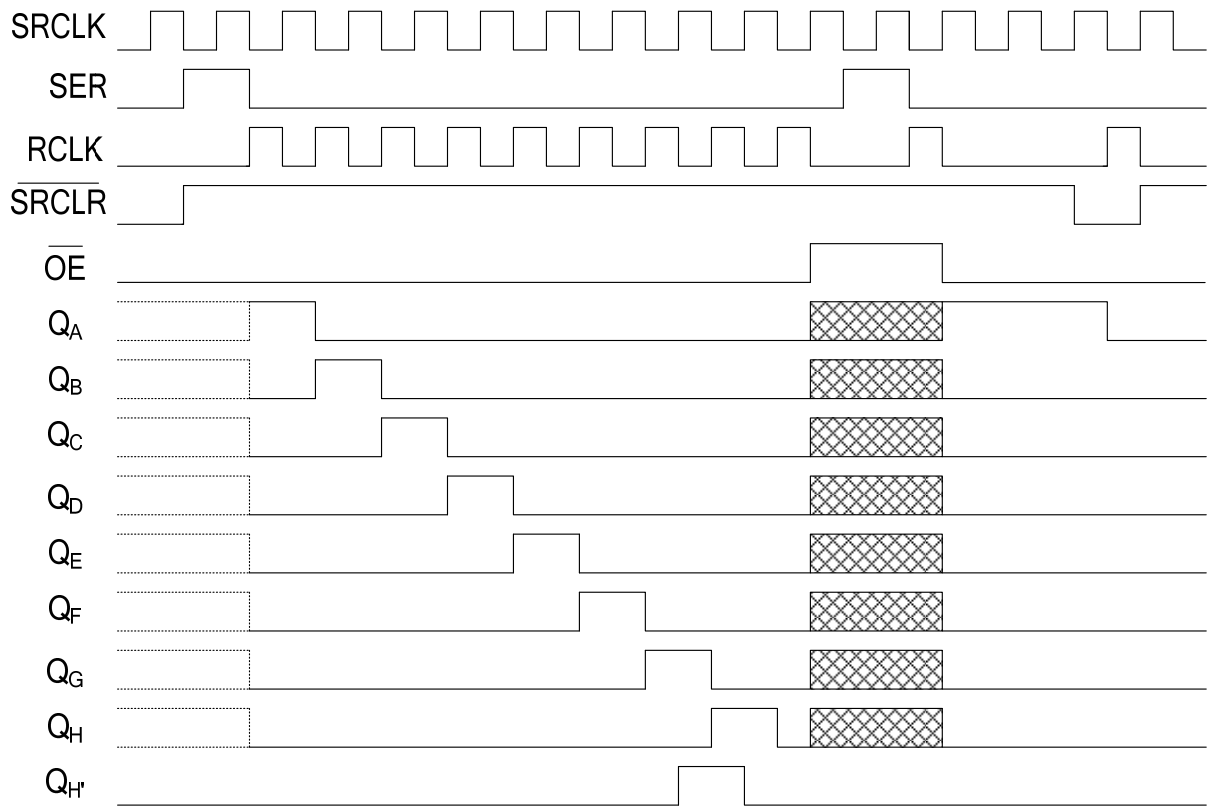
INPUTS					FUNCTION
SER	SRCLK	SRCLR	RCLK	OE	
X	X	X	X	H	Outputs Q <sub>A</sub> -Q <sub>H</sub> are disabled.
X	X	X	X	L	Outputs Q <sub>A</sub> -Q <sub>H</sub> are enabled.
X	X	L	X	X	Shift register is cleared.
L	↑	H	X	X	First stage of the shift register goes low. Other stages store the data of previous stage, respectively.
H	↑	H	X	X	First stage of the shift register goes high. Other stages store the data of previous stage, respectively.
X	X	X	↑	X	Shift-register data is stored into the storage register.


L: low voltage level; H: high voltage level; ↑: low-to-high; X: don't care

■ LOGIC DIAGRAM (POSITIVE LOGIC)



## ■ TIMING DIAGRAM



Note:  Implies that the outputs is in 3-State mode.

■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)(Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5~7.0	V
Input Voltage	V <sub>IN</sub>	-0.5~7.0	V
Output Voltage(active mode)	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> +0.5	V
Input Clamp Current (V <sub>IN</sub> <0)	I <sub>IK</sub>	-20	mA
Output Clamp Current (V <sub>OUT</sub> <0)	I <sub>OK</sub>	±20	mA
Output Current	I <sub>OUT</sub>	±25	mA
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±75	mA
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°C

Notes: 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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	73	°C/W
		90	
		108	

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	2		5.5	V
Input Voltage	V <sub>IN</sub>	0		5.5	V
Output Voltage	V <sub>OUT</sub>	0		V <sub>CC</sub>	V
Operating free-air temperature	T <sub>A</sub>	-40		125	°C
Input Transition Rise or Fall Rate	V <sub>CC</sub> =3.3±0.3V			100	ns/V
	V <sub>CC</sub> =5±0.5V			20	

■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
HIGH-level input voltage	V <sub>IH</sub>	V <sub>CC</sub> =2V	1.5			V
		V <sub>CC</sub> =3V	2.1			
		V <sub>CC</sub> =5.5V	3.85			
LOW-level output voltage	V <sub>IL</sub>	V <sub>CC</sub> =2V			0.5	V
		V <sub>CC</sub> =3V			0.9	
		V <sub>CC</sub> =5.5V			1.65	
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> =2V, I <sub>OH</sub> =-50μA	1.9	2		V
		V <sub>CC</sub> =3V, I <sub>OH</sub> =-50μA	2.9	3		
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-50μA	4.4	4.5		
		V <sub>CC</sub> =3V, I <sub>OH</sub> =-4mA	2.58			
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-8mA	3.94			
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =2V, I <sub>OL</sub> =50μA			0.1	V
		V <sub>CC</sub> =3V, I <sub>OL</sub> =50μA			0.1	
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =50μA			0.1	
		V <sub>CC</sub> =3V, I <sub>OL</sub> =4mA			0.36	
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =8mA			0.36	
Input Leakage Current	I <sub>I</sub>	I <sub>I</sub> =5.5V or GND, V <sub>CC</sub> =0 to 5.5V			±0.1	μA
Output Off-state Current	I <sub>OZ</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND, V <sub>O</sub> =V <sub>CC</sub> or GND, $\overline{OE}$ =V <sub>IH</sub> or V <sub>IL</sub> , V <sub>CC</sub> =5.5V			±0.25	μA
Quiescent Supply Current	I <sub>CC</sub>	V <sub>I</sub> =GND or V <sub>CC</sub> , I <sub>O</sub> =0, V <sub>CC</sub> =5.5V			4	μA
Input Capacitance	C <sub>I</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND, V <sub>CC</sub> =5V		3	10	pF
Output Capacitance	C <sub>OUT</sub>	V <sub>O</sub> =V <sub>CC</sub> or GND, V <sub>CC</sub> =5V		5.5		pF

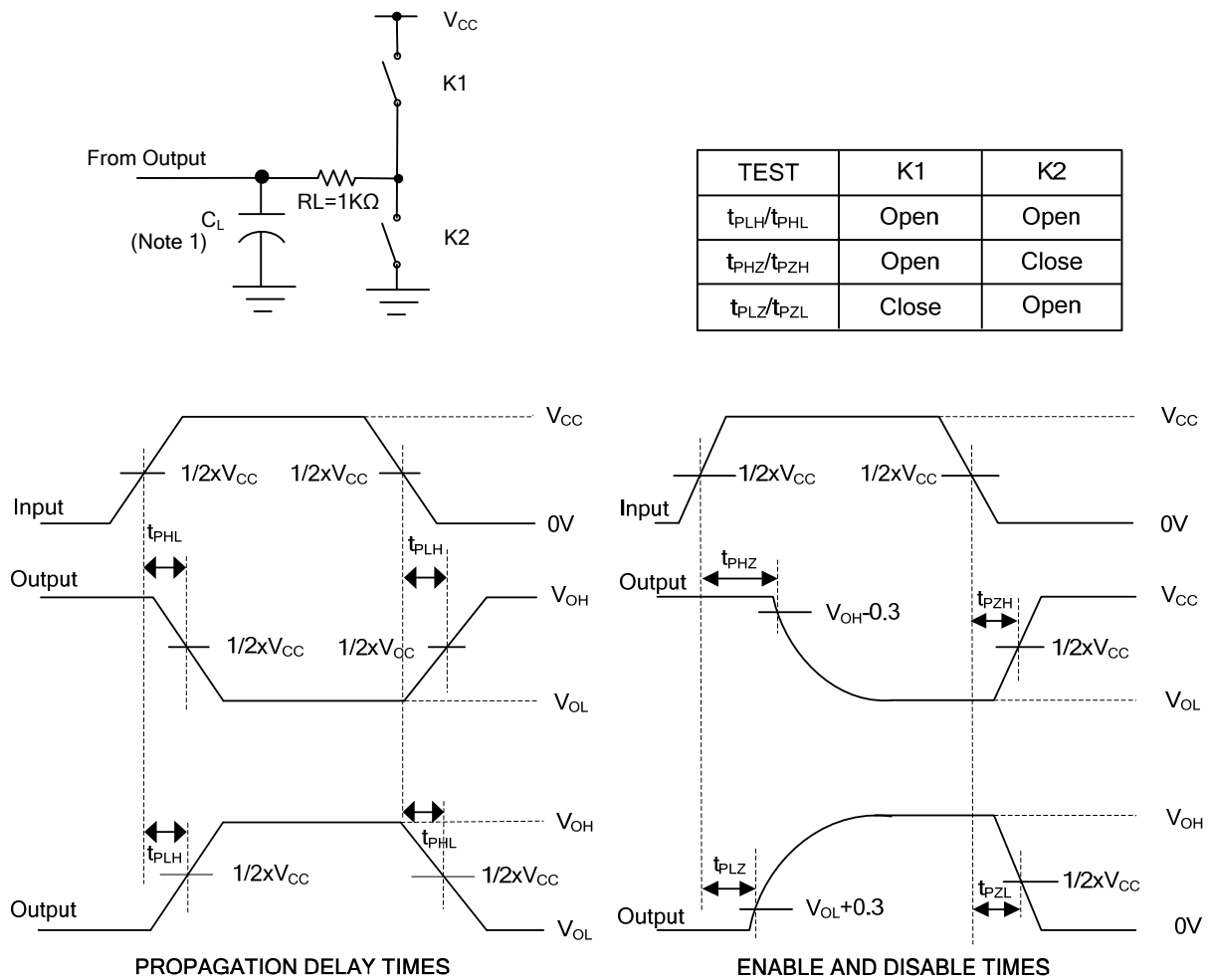
■ DYNAMIC CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Clock Frequency	f <sub>max</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF	80	120		MHz
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF	55	105		
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF	135	170		
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF	95	140		
From RCLK to Q <sub>A</sub> -Q <sub>H</sub>	t <sub>PLH</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6	11.9	ns
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		7.9	15.4	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.3	7.4	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		5.6	9.4	
	t <sub>PHL</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6	11.9	
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		7.9	15.4	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.3	7.4	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		5.6	9.4	
From SRCLK to QH'	t <sub>PLH</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6.6	13	ns
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		9.2	16.5	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.5	8.2	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		6.4	10.2	
	t <sub>PHL</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6.6	13	
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		9.2	16.5	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.5	8.2	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		6.4	10.2	
From $\overline{\text{SRCLR}}$ to QH'	t <sub>PHL</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6.2	12.8	ns
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		9	16.3	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.5	8	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		6.4	10	
From $\overline{\text{OE}}$ to Q <sub>A</sub> -Q <sub>H</sub>	t <sub>PZH</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		6	11.5	ns
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		7.8	15	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		4.3	8.6	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		5.7	10.6	
	t <sub>PZL</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =15pF		7.8	11.5	
		V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		9.6	15	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =15pF		5.4	8.6	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		6.8	10.6	
From $\overline{\text{OE}}$ to Q <sub>A</sub> -Q <sub>H</sub>	t <sub>PHZ</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		8.1	15.7	ns
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		3.5	10.3	
	t <sub>PLZ</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF		9.3	15.7	
		V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF		3.4	10.3	

■ OPERATING CHARACTERISTICS (V<sub>CC</sub>=5V, T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	No load, f=1MHz		25.2		pF

■ TEST CIRCUIT AND WAVEFORMS



- Note: 1.  $C_L$  includes probe and jig capacitance.  
 2. All input pulses are supplied by generators having the following characteristics:  
 PRR  $\leq$  1MHz,  $Z_0=50\Omega$ ,  $t_r \leq 3ns$ ,  $t_f \leq 3ns$ .  
 3. The outputs are measured one at a time, with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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