



8-BIT PARALLEL-LOAD SHIFT REGISTER

HTC74HC165

DATA SHEET

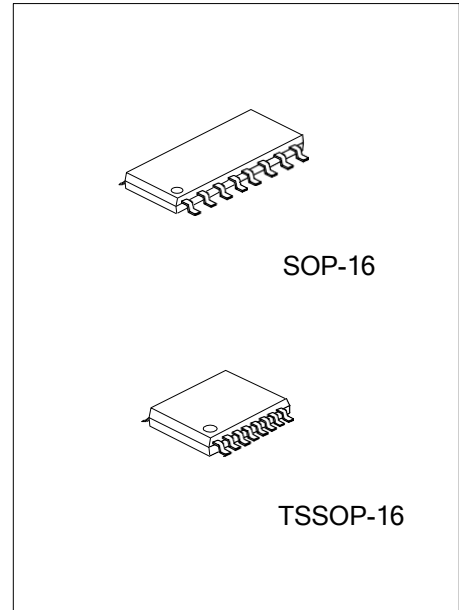
Rev 0.91

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1. DESCRIPTION

The **HTC74HC165** is an 8-bit parallel-load shift register that, when clocked, shifts the data toward a serial (Q_H) output. Parallel-in access to each stage is provided by eight individual direct data (A-H) inputs that are enabled by a low level at shift/load (SH/\overline{LD}) input. The HTC74HC165 also features a clock-inhibit (CLK INH) function and a complementary serial (\overline{Q}_H) output.

Clocking is accomplished by a low-to-high transition of the clock (CLK) input while SH/\overline{LD} is held high and CLK INH is held low. The functions of CLK and CLK INH are interchangeable. Since a low CLK and a low-to-high transition of CLK INH also accomplish clocking, CLK INH should be changed to the high level only while CLK is high. Parallel loading is inhibited when SH/\overline{LD} is held high. While SH/\overline{LD} is low, the parallel inputs to the register are enabled independently of the levels of the CLK, CLK INH, or serial (SER) inputs.



2. FEATURES

- Complementary Outputs
- Direct Overriding Load (Data) Inputs
- Gated Clock Inputs
- Parallel-to-Serial Data Conversion

3. ORDERING INFORMATION

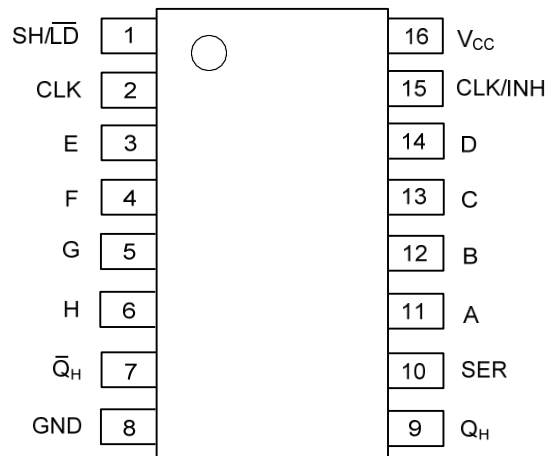
• Tube

Part Number	Marking code	Package	Packing	Pcs/Tube	Pcs/Box
HTC74HC165S-T	HTC74HC165	SOP-16	Tube	50	40K

• Tape Reel

Part Number	Marking code	Package	Packing	Pcs/Reel	Pcs/ Box
HTC74HC165S-R	HTC74HC165	SOP-16	Tape Reel	4K	64K
HTC74HC165T-R	HTC74HC165	TSSOP-16	Tape Reel	5K	80K

4. PIN CONFIGURATION



5. PIN DESCRIPTION

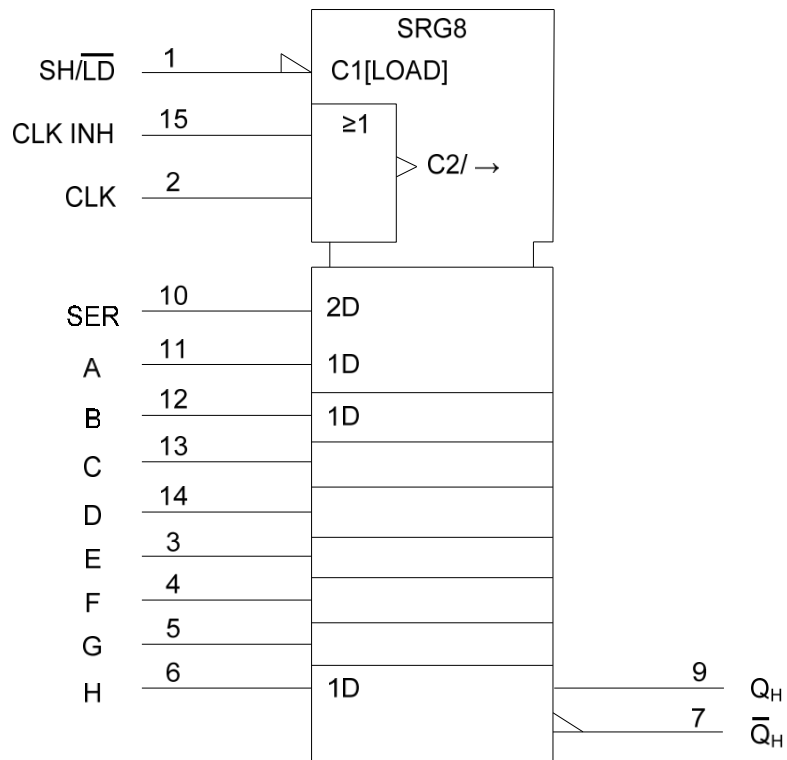
PIN NO.	PIN NAME	DESCRIPTION
1	SH/ $\overline{\text{LD}}$	Asynchronous parallel load input (active LOW)
2	CLK	Clock input (LOW-to-HIGH edge-triggered)
3, 4, 5, 6 11, 12, 13, 14	A to H	Parallel data inputs (also referred to as Dn)
7	$\overline{\text{QH}}$	Complementary output from the last stage
8	GND	Ground (0V)
9	QH	Serial output from the last stage
10	SER	Serial data input
15	CLK/INH	Clock enable input (active LOW)
16	V _{CC}	Positive supply voltage

6. FUNCTION TABLE

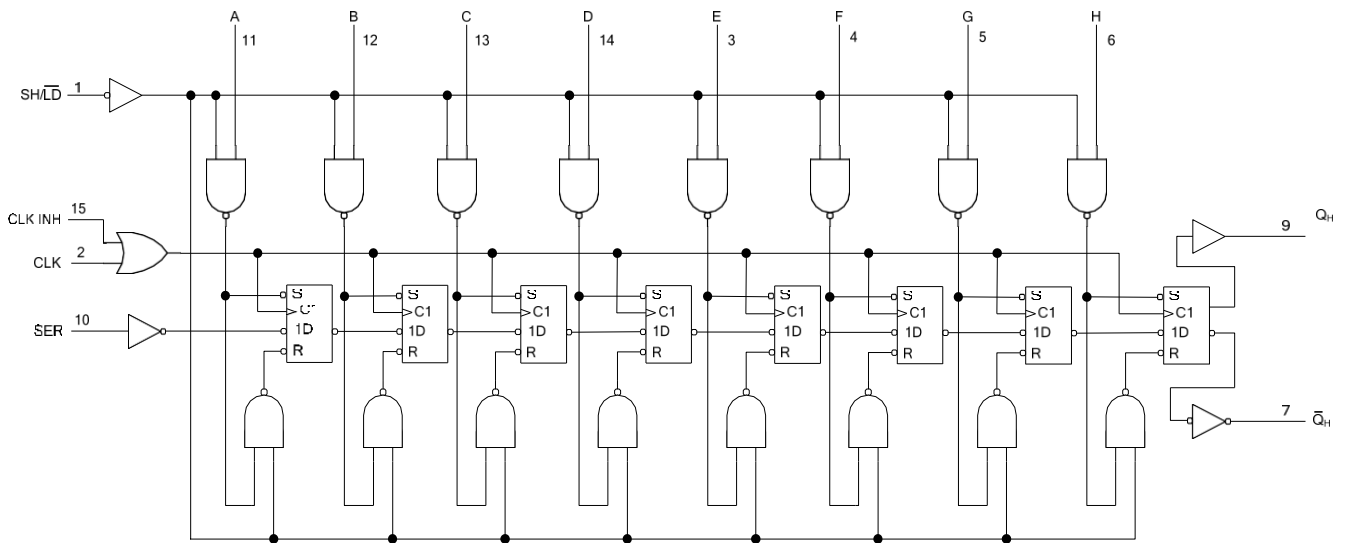
INPUTS			FUNCTION
SH/ $\overline{\text{LD}}$	CLK	CLK INH	
L	X	X	Parallel load
H	H	X	No change
H	X	H	No change
H	L	↑	Shift↑
H	↑	L	Shift↑

↑ Shift=content of each internal register shifts toward serial output Q_H. Data at SER is shifted into the first register.

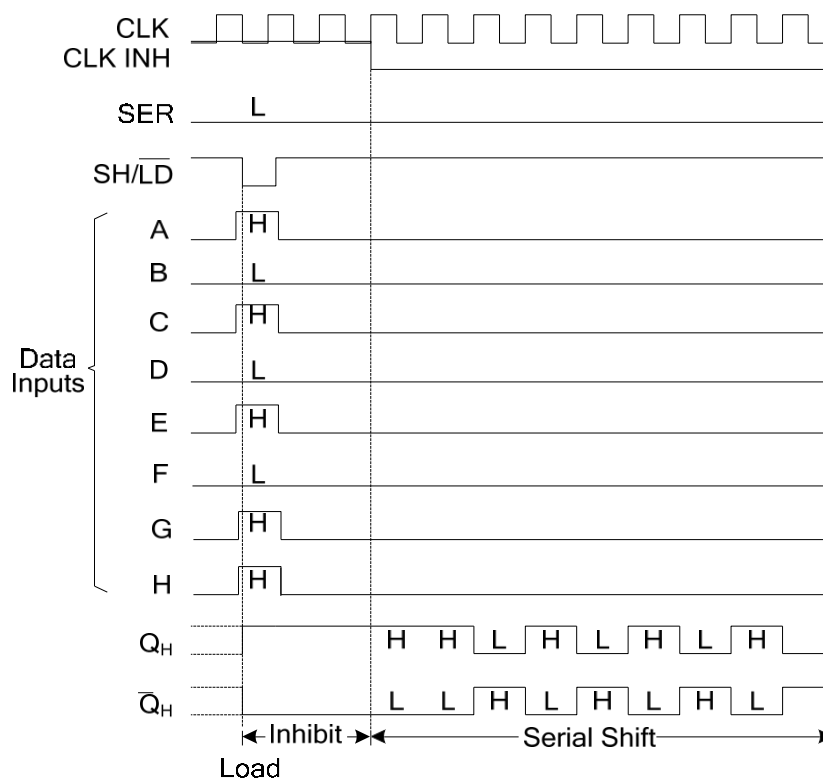
7. LOGIC SYMBOL



8. LOGIC DIAGRAM (positive logic)



9. TYPICAL SHIFT, LOAD, AND INHIBIT SEQUENCE



10. 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 Clamp Current	I _{IK}	±20	mA
Output Clamp 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.

11. RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V _{CC}	-	2	5	6	V
High-level Input Voltage	V _{IH}	V _{CC} =2V	1.5	-	-	V
		V _{CC} =4.5V	3.15	-	-	V
		V _{CC} =6V	4.2	-	-	V
Low-level Input Voltage	V _{IL}	V _{CC} =2V	-	-	0.5	V
		V _{CC} =4.5V	-	-	1.35	V
		V _{CC} =6V	-	-	1.8	V
Input Voltage	V _{IN}	-	0	-	V _{CC}	V
Output Voltage	V _{OUT}	-	0	-	V _{CC}	V
Input Transition (Rise and Fall) Time	t _t	V _{CC} =2V	-	-	1000	ns
		V _{CC} =4.5V	-	-	500	ns
		V _{CC} =6V	-	-	400	ns
Operating Free-air Temperature	T _A	-	-40	-	+125	°C

12. THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-16	73	°C/W
	TSSOP-16	110	°C/W

13. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output Voltage High-Level	V _{OH}	V _{CC} =2V, I _{OH} =-20μA	1.9	1.998	-	1.9	-	-	V
		V _{CC} =4.5V, I _{OH} =-20μA	4.4	4.499	-	4.4	-	-	V
		V _{CC} =6V, I _{OH} =-20μA	5.9	5.999	-	5.9	-	-	V
		V _{CC} =4.5V, I _{OH} =-4mA	3.98	4.3	-	3.7	-	-	V
		V _{CC} =6V, I _{OH} =-5.2mA	5.48	5.8	-	5.2	-	-	V
Output Voltage Low-Level	V _{OL}	V _{CC} =2V, I _{OL} =20μA	-	0.002	0.1	-	-	0.1	V
		V _{CC} =4.5V, I _{OL} =20μA	-	0.002	0.1	-	-	0.1	V
		V _{CC} =6V, I _{OL} =20μA	-	0.002	0.1	-	-	0.1	V
		V _{CC} =4.5V, I _{OL} =4mA	-	0.15	0.26	-	-	0.4	V
		V _{CC} =6V, I _{OL} =5.2mA	-	0.16	0.26	-	-	0.4	V
Input Leakage Current	I _{I(LEAK)}	V _{CC} =6V, V _{IN} =V _{CC} or GND	-	±0.1	±1	-	-	±1	μA
Quiescent Supply Current	I _{CC}	V _{CC} =6V, V _{IN} =V _{CC} or GND, I _{OUT} =0	-	-	8	-	-	160	μA

14. TIMING REQUIREMENTS

PARAMETER		SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
Clock frequency		f _{clock}	V _{CC} =2V	0	-	6	-	-	4.2	MHz
			V _{CC} =4.5V	0	-	31	-	-	21	MHz
			V _{CC} =6V	0	-	36	-	-	25	MHz
Pulse duration	SH/ $\overline{\text{LD}}$ low	t _w	V _{CC} =2V	80	-	-	120	-	-	ns
			V _{CC} =4.5V	16	-	-	24	-	-	ns
			V _{CC} =6V	14	-	-	20	-	-	ns
	CLK high or low		V _{CC} =2V	80	-	-	120	-	-	ns
			V _{CC} =4.5V	16	-	-	24	-	-	ns
			V _{CC} =6V	14	-	-	20	-	-	ns
Setup time	SH/ $\overline{\text{LD}}$ high before CLK↑	t _{SU}	V _{CC} =2V	80	-	-	120	-	-	ns
			V _{CC} =4.5V	16	-	-	24	-	-	ns
			V _{CC} =6V	14	-	-	20	-	-	ns
	SER before CLK↑		V _{CC} =2V	40	-	-	60	-	-	ns
			V _{CC} =4.5V	8	-	-	12	-	-	ns
			V _{CC} =6V	7	-	-	10	-	-	ns
	CLK INH low before CLK↑		V _{CC} =2V	100	-	-	150	-	-	ns
			V _{CC} =4.5V	20	-	-	30	-	-	ns
			V _{CC} =6V	17	-	-	25	-	-	ns
	CLK INH high before CLK↑		V _{CC} =2V	40	-	-	60	-	-	ns
			V _{CC} =4.5V	8	-	-	12	-	-	ns
			V _{CC} =6V	7	-	-	10	-	-	ns
	Data before SH/ $\overline{\text{LD}}$ ↓		V _{CC} =2V	100	-	-	150	-	-	ns
			V _{CC} =4.5V	20	-	-	30	-	-	ns
			V _{CC} =6V	17	-	-	25	-	-	ns
Hold time	SER data after CLK↑	t _h	V _{CC} =2V	5	-	-	5	-	-	ns
			V _{CC} =4.5V	5	-	-	5	-	-	ns
			V _{CC} =6V	5	-	-	5	-	-	ns
	PAR data after SH/ $\overline{\text{LD}}$ ↓		V _{CC} =2V	5	-	-	5	-	-	ns
			V _{CC} =4.5V	5	-	-	5	-	-	ns
			V _{CC} =6V	5	-	-	5	-	-	ns

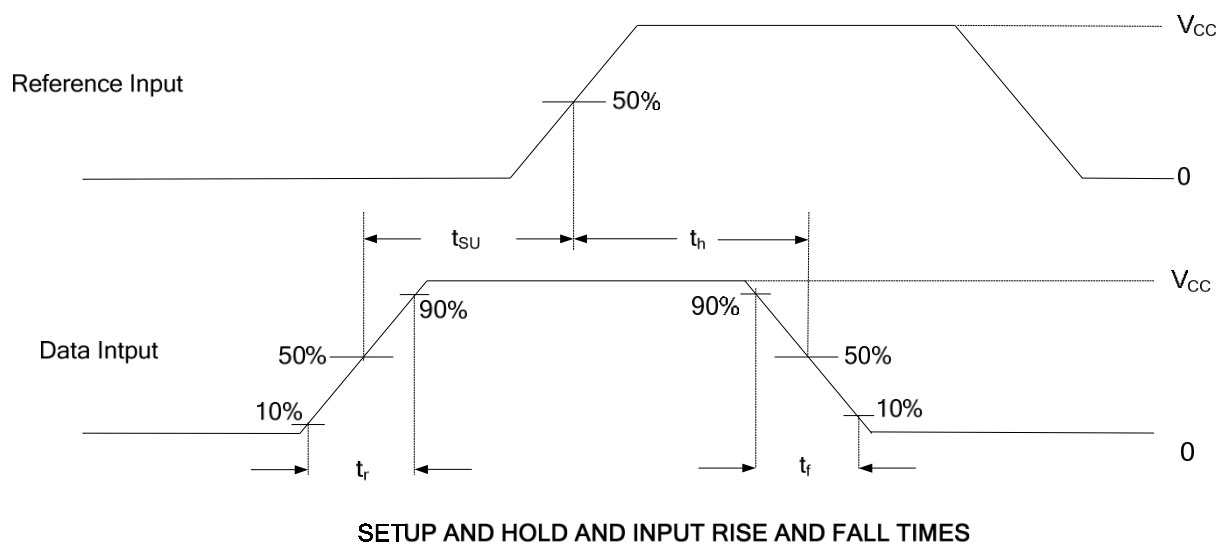
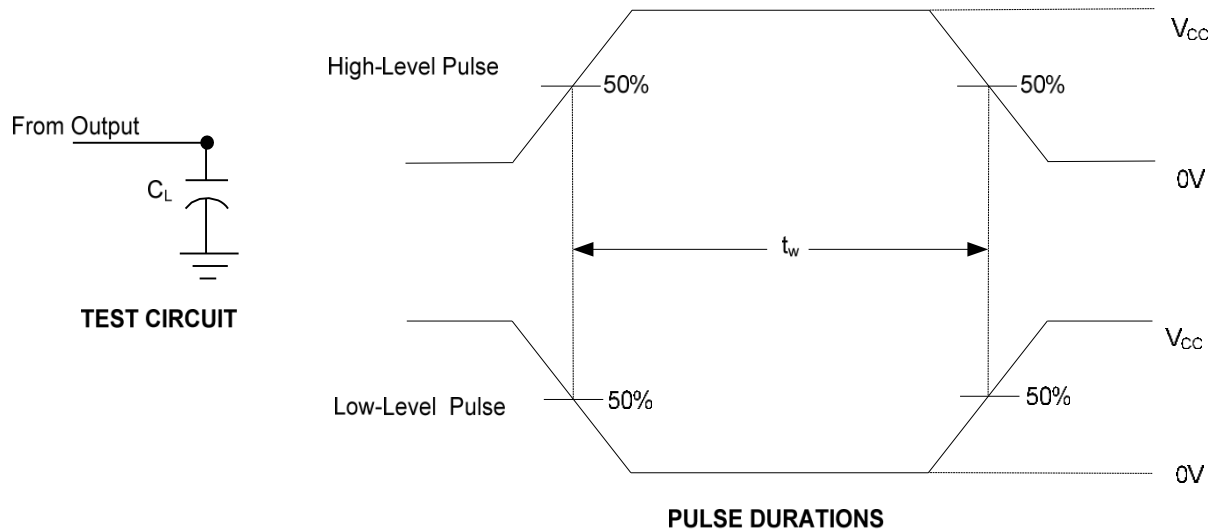
15. SWITCHING CHARACTERISTICS ($t_r = t_f = 6\text{ns}$, $C_L=50\text{Pf}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Minimum Frequency Response	f _{max}	V _{CC} =2V	6	13	-	4	-	-	MHz
		V _{CC} =4.5V	31	50	-	20	-	-	MHz
		V _{CC} =6V	36	62	-	24	-	-	MHz
Propagation delay from input (SH/ $\overline{\text{LD}}$) to output (QH or $\overline{\text{QH}}$)	t _{PD}	V _{CC} =2V	-	52	150	-	-	250	ns
		V _{CC} =4.5V	-	18	30	-	-	50	ns
		V _{CC} =6V	-	15	26	-	-	43	ns
Propagation delay from input (CLK) to output (QH or $\overline{\text{QH}}$)	t _{PD}	V _{CC} =2V	-	52	150	-	-	250	ns
		V _{CC} =4.5V	-	19	30	-	-	50	ns
		V _{CC} =6V	-	16	26	-	-	43	ns
Propagation delay from input (H) to output (QH or $\overline{\text{QH}}$)	t _{PD}	V _{CC} =2V	-	36	150	-	-	180	ns
		V _{CC} =4.5V	-	13	30	-	-	36	ns
		V _{CC} =6V	-	10	26	-	-	31	ns
To Output (Any)	t _t	V _{CC} =2V	-	19	75	-	-	110	ns
		V _{CC} =4.5V	-	7	15	-	-	22	ns
		V _{CC} =6V	-	6	13	-	-	19	ns

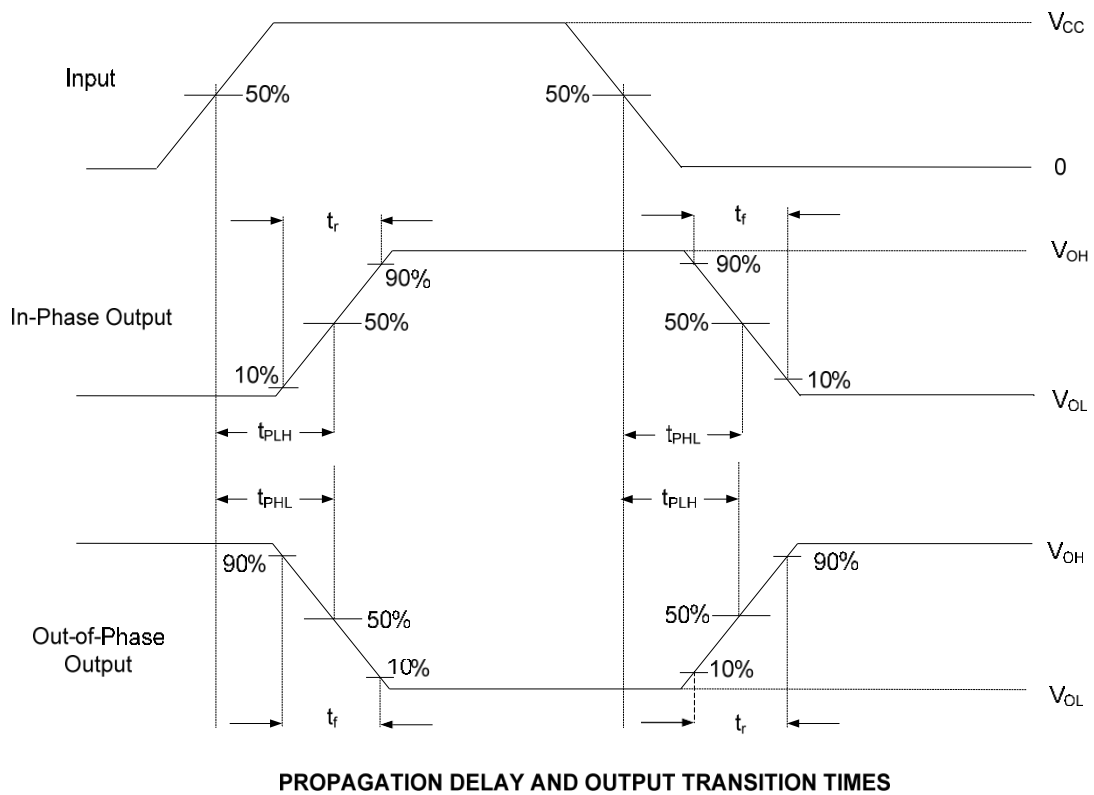
16. OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C _I	V _{CC} =2V to 6V	-	3	10	pF
Power Dissipation Capacitance	C _{PD}	No load	-	75	-	pF

17. TEST CIRCUIT AND WAVEFORMS

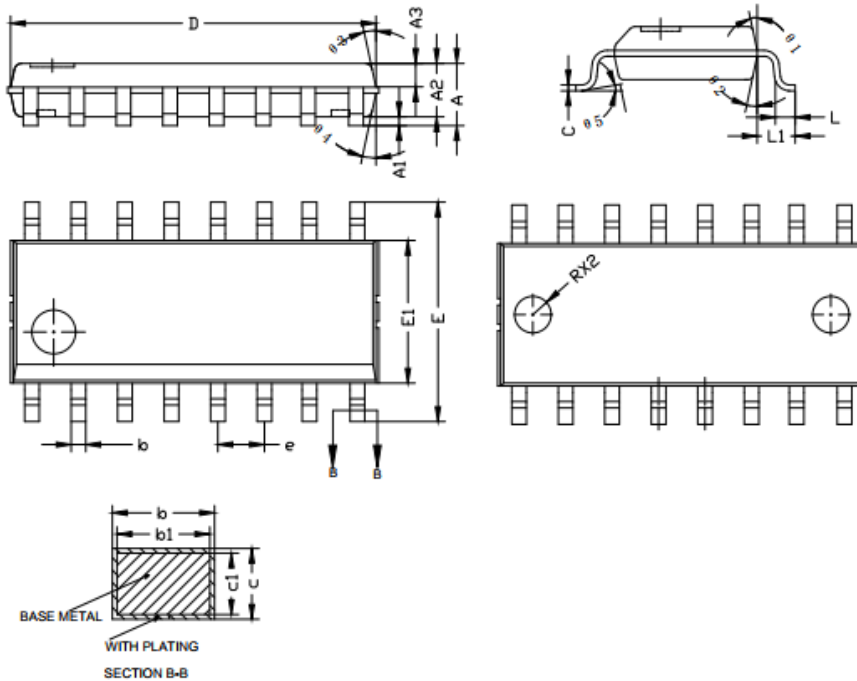


18. TEST CIRCUIT AND WAVEFORMS (Cont.)



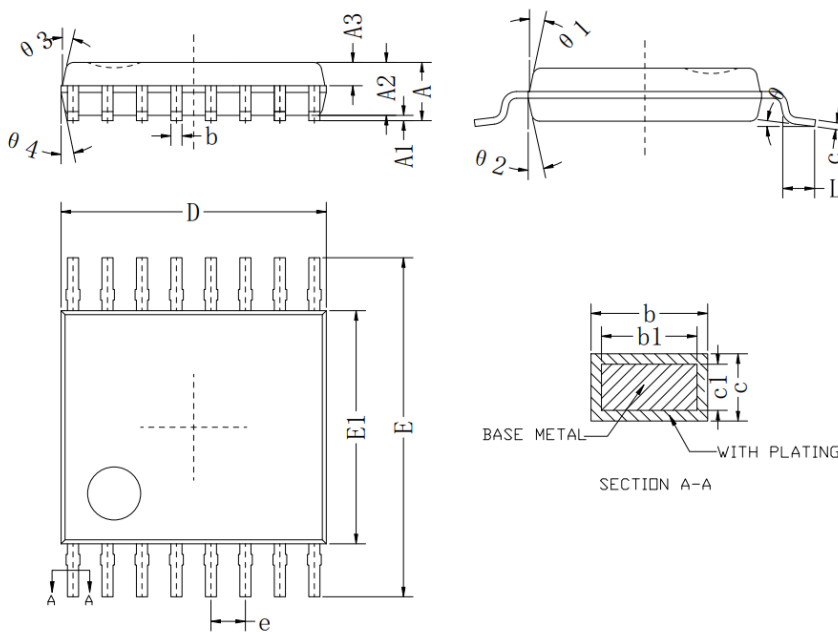
19. PACKAGE INFORMATION

SOP 16 package information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.70
A1	0.10	0.15	0.21
A2	1.40	1.45	1.50
A3	0.60	0.65	0.70
b	0.33	--	0.47
b1	0.32	0.41	0.44
c	0.20	--	0.24
c1	0.19	0.20	0.21
D	9.50	9.90	10.05
E	5.80	6.00	6.20
E1	3.85	3.90	4.00
e	1.27(BSC)		
L	0.50	0.60	0.70
L1	1.10(BSC)		
θ1	8°	~	15°
θ2	8°	~	15°
θ3	8°	~	15°
θ4	8°	~	15°
θ5	0°	~	6°
R	0.45°	0.50°	0.05°

TSSOP16 package information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.20
A1	0.05	0.10	0.15
A2	0.80	1.00	1.05
A3	0.38	0.43	0.48
b	0.19	--	0.29
b1	0.16	0.22	0.26
c	0.13	--	0.15
c1	0.12	0.13	0.14
D	4.90	5.00	5.10
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65(BSC)		
L	0.45	0.60	0.75
θ	0°	~	8°
θ1	10°	~	14°
θ2	10°	~	14°
θ3	10°	~	14°
θ4	10°	~	14°

20. REVISION HISTORY

 海速芯（杭州）科技有限公司 Hitenx(hanghou)Technology co.,Ltd	Total page	12
	Rev.	V0.91
File Name	DS-HTC74HC165_EV091	
Edition number	Effective date	Summary of revised contents
V0.90	2025/05/20	New Release
V0.91	2025/07/29	Parameter modification