

CMOS 移位寄存器

74HC595

SHENZHEN DEVELOPER MICROELECTRONICS CO.,LTD.

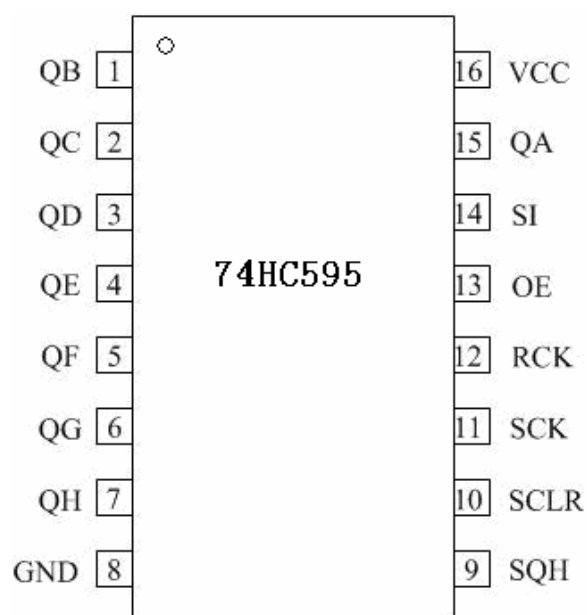
概述:

74HC595 是一款漏极开路输出的 CMOS 移位寄存器，输出端口为可控的三态输出端，亦能串行输出控制下一级级联芯片。

特点:

- 高速移位时钟频率 $F_{max} > 25\text{MHz}$
- 标准串行（SPI）接口
- CMOS 串行输出，可用于多个设备的级联
- 低功耗： $T_A = 25^\circ\text{C}$ 时， $I_{cc} = 4\mu\text{A}$ （MAX）

管脚图:



管脚说明:

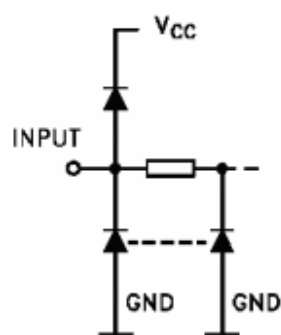
管脚编号	管脚名	说明
1、2、3、4、5、6、7、15	QA—QH	三态输出管脚
8	GND	电源地
9	SQH	串行数据输出管脚
10	SCLR	移位寄存器清零端
11	SCK	数据输入时钟线
12	RCK	输出存储器锁存时钟线
13	OE	输出使能
14	SI	数据线
15	VCC	电源端

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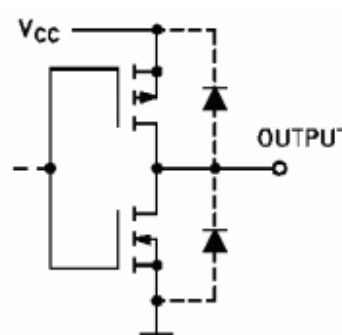
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输入输出管脚电路:



输入管脚

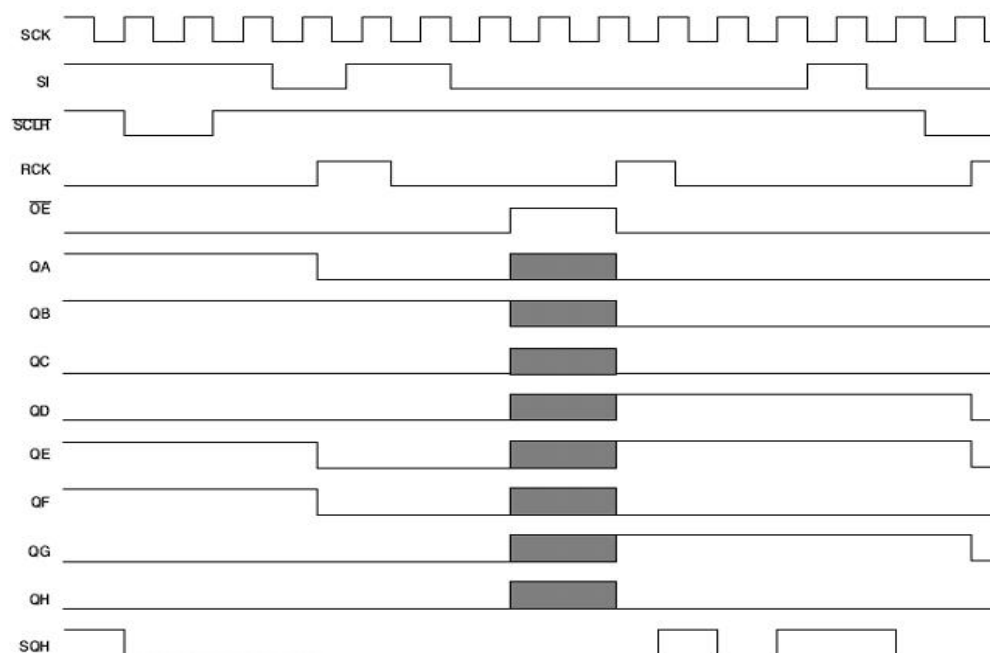


输出管脚

真值表:

输入管脚					输出管脚
SI	SCK	SCLR	RCK	OE	
X	X	X	X	H	QA—QH 输出高阻
X	X	X	X	L	QA—QH 输出有效值
X	X	L	X	X	移位寄存器清零
L	上沿	H	X	X	移位寄存器存储 L
H	上沿	H	X	X	移位寄存器存储 H
X	下沿	H	X	X	移位寄存器状态保持
X	X	X	上沿	X	输出存储器锁存移位寄存器中的状态值
X	X	X	下沿	X	输出存储器状态保持

时序图:



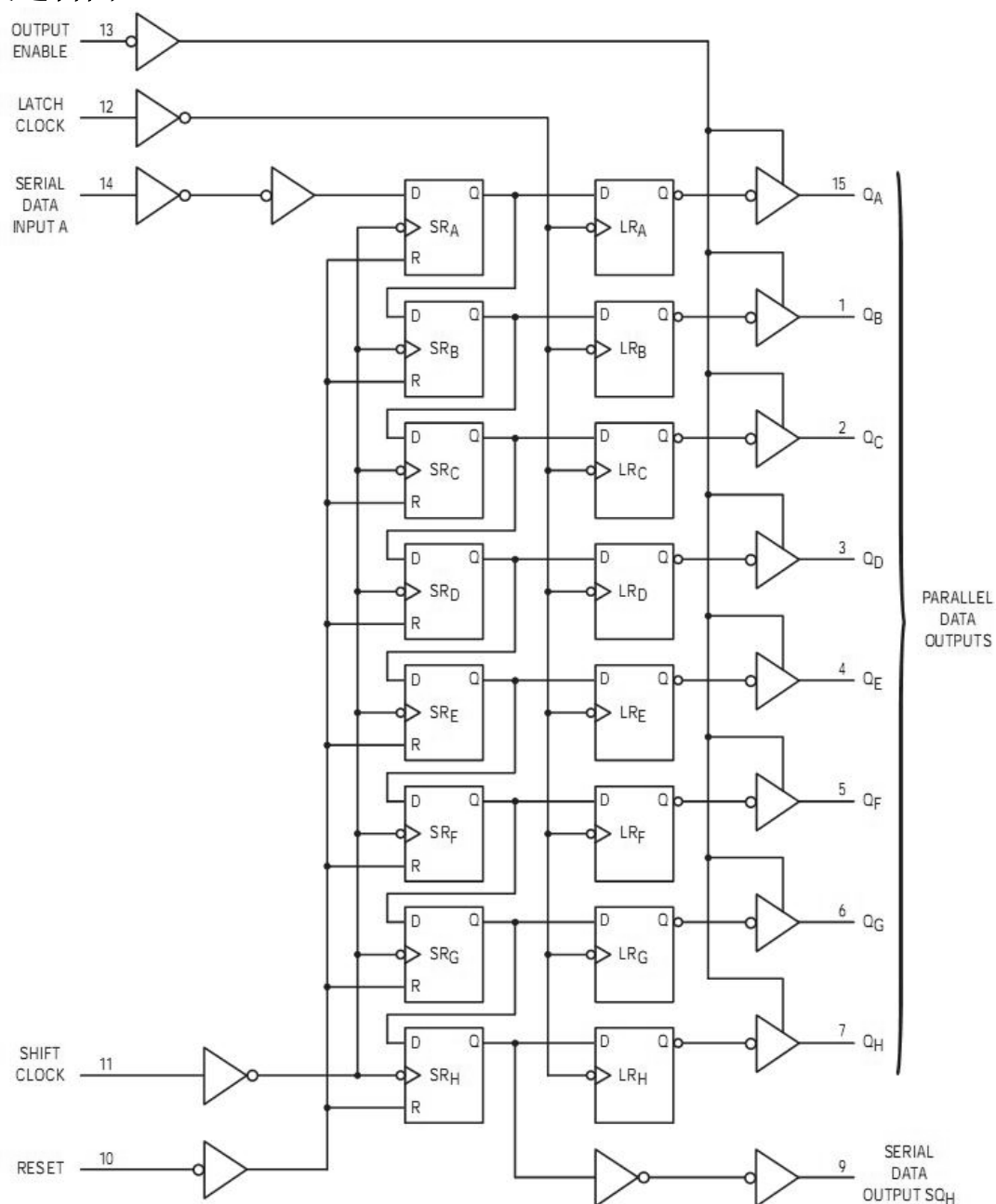
注: 输出处于高阻抗状态。

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扩展逻辑图:



推荐工作条件:

符号	参数	最小值	最大值	单位
V_{CC}	直流电源电压	2.0	5.5	V
V_{IN}	直流输入电压	0	5.5	V
V_{OUT}	DC 输出电压	0	V_{CC}	V
T_A	工作温度	-55	125	°C

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DC 电气特性:

类型	参数定义	测试条件		数值								单位	
		V _{CC}		25℃			-40℃—85℃		-55℃—125℃				
				Min	Typ	Max	Min	Max	Min	Max			
V _{IH}	输入高电平	2.0		1.46			1.46		1.46		V		
		4.5		3.23		3.23		3.23					
		6.0		4.30		4.30		4.30					
V _{IL}	输入低电平	2.0				0.52		0.52		0.52	V		
		4.5				1.32		1.32					
		6.0				1.77		1.77					
V _{OH}	输出高电平 (SQH)	2.0	V _I =V _{IH} or V _{IL}	I _O =-20 μ A	1.9	2.0		1.9		1.9		V	
		4.5			4.4	4.5		4.4		4.4			
		6.0			5.9	6.0		5.9		5.9			
		4.5		I _O =-4.0mA		4.18	4.31		4.13		4.10		
		6.0		I _O =-5.2mA		5.68	5.8		5.63		5.60		
V _{OH}	输出高电平 (QA- QH)	2.0	V _I =V _{IH} or V _{IL}	I _O =-20 μ A	1.9	2.0		1.9		1.9		V	
		4.5			4.4	4.5		4.4		4.4			
		6.0			5.9	6.0		5.9		5.9			
		4.5		I _O =-6.0mA		4.18	4.31		4.13		4.10		
		6.0		I _O =-7.8mA		5.68	5.8		5.63		5.60		
V _{OL}	输出低电平 (SQH)	2.0	V _I =V _{IH} or V _{IL}	I _O =20 μ A		0.0	0.1		0.1		0.1	V	
		4.5				0.0	0.1		0.1		0.1		
		6.0				0.0	0.1		0.1		0.1		
		4.5		I _O =4.0mA			0.17	0.26		0.33			0.40
		6.0		I _O =5.2mA			0.18	0.26		0.33			0.40
V _{OL}	输出低电平 (QA- QH)	2.0	V _I =V _{IH} or V _{IL}	I _O =20 μ A		0.0	0.1		0.1		0.1	V	
		4.5				0.0	0.1		0.1		0.1		
		6.0				0.0	0.1		0.1		0.1		
		4.5		I _O =6.0mA			0.17	0.26		0.33			0.40
		6.0		I _O =7.8mA			0.18	0.26		0.33			0.40
I _{CC}	静态电流	6.0	V _I =V _{CC} or GND				4		40		80	μ A	

AC 电气特性:

Symb	Parameter	V _{CC} V	Guaranteed Limit			Unit
			- 55 to 25°C	≤ 85°C	≤ 125°C	
f _{max}	Maximum Clock Frequency (50% Duty Cycle) (Figures 1 and 7)	2.0 4.5 6.0	6.0 30 35	4.8 24 28	4.0 20 24	MHz
t _{PLH} t _{PHL}	Maximum Propagation Delay, Shift Clock to SQ _H (Figures 1 and 7)	2.0 4.5 6.0	140 28 24	175 35 30	210 42 36	ns
t _{PHL}	Maximum Propagation Delay, Reset to SQ _H (Figures 2 and 7)	2.0 4.5 6.0	145 29 25	180 36 31	220 44 38	ns
t _{PLH} t _{PHL}	Maximum Propagation Delay, Latch Clock to Q _A – Q _H (Figures 3 and 7)	2.0 4.5 6.0	140 28 24	175 35 30	210 42 36	ns
t _{PZL} t _{PZH}	Maximum Propagation Delay, Output Enable to Q _A – Q _H (Figures 4 and 8)	2.0 4.5 6.0	150 30 26	190 38 33	225 45 38	ns
t _{PZL} t _{PZH}	Maximum Propagation Delay, Output Enable to Q _A – Q _H (Figures 4 and 8)	2.0 4.5 6.0	135 27 23	170 34 29	205 41 35	ns
t _{TLH} t _{THL}	Maximum Output Transition Time, Q _A – Q _H (Figures 3 and 7)	2.0 4.5 6.0	60 12 10	75 15 13	90 18 15	ns
t _{TLH} t _{THL}	Maximum Output Transition Time, SQ _H (Figures 1 and 7)	2.0 4.5 6.0	75 15 13	95 19 16	110 22 19	ns
C _{in}	Maximum Input Capacitance	—	10	10	10	pF
C _{out}	Maximum Three-State Output Capacitance (Output in High-Impedance State), Q _A – Q _H	—	15	15	15	pF

时序说明:

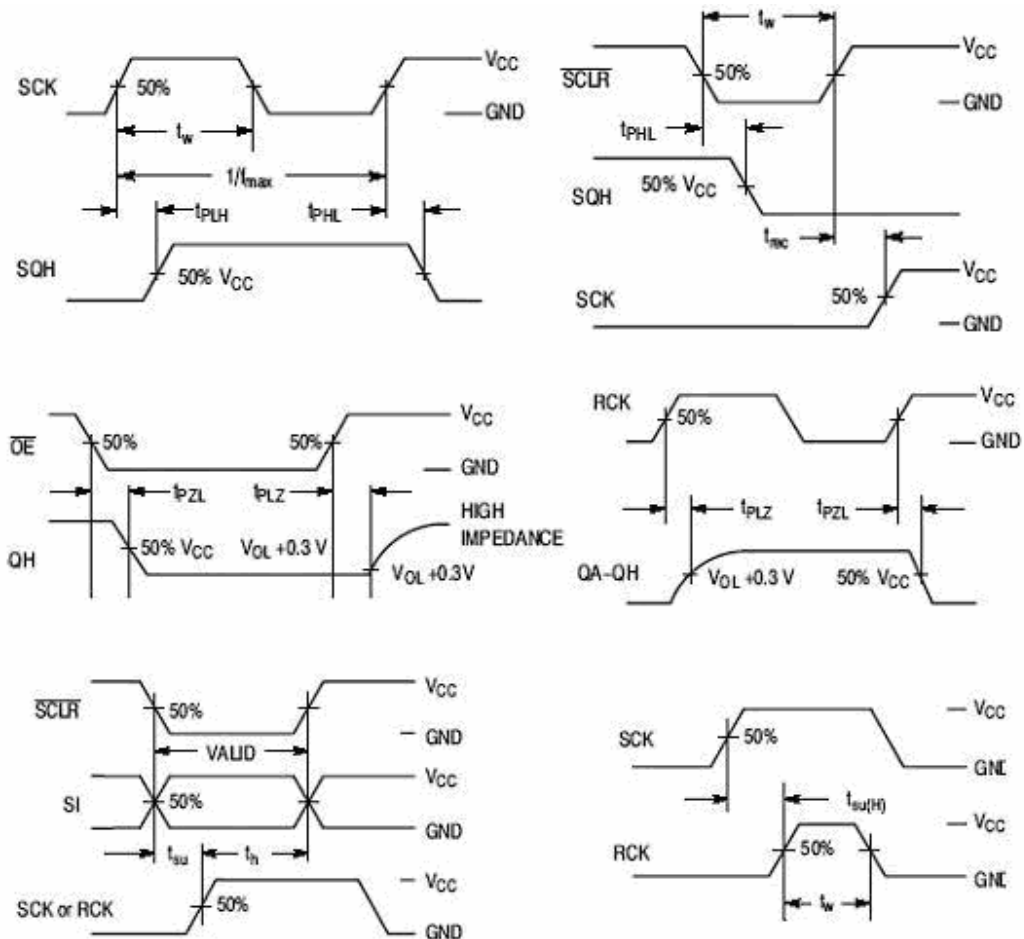
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Symbol	Parameter	V _{CC} V	T _A = 25°C		T _A = - 40 to 85°C	T _A = - 55 to 125°C	Unit
			Typ	Limit	Limit	Limit	
t _{su}	Setup Time, SI to SCK	3.3 5.0		3.5 3.0	3.5 3.0	3.5 3.0	ns
t _{su(H)}	Setup Time, SCK to RCK	3.3 5.0		8.0 5.0	8.5 5.0	8.5 5.0	ns
t _{su(L)}	Setup Time, SCLR to RCK	3.3 5.0		8.0 5.0	9.0 5.0	9.0 5.0	ns
t _h	Hold Time, SI to SCK	3.3 5.0		1.5 2.0	1.5 2.0	1.5 2.0	ns
t _{h(L)}	Hold Time, SCLR to RCK	3.3 5.0		0 0	0 0	1.0 1.0	ns
t _{rec}	Recovery Time, SCLR to SCK	3.3 5.0		3.0 2.5	3.0 2.5	3.0 2.5	ns
t _w	Pulse Width, SCK or RCK	3.3 5.0		5.0 5.0	5.0 5.0	5.0 5.0	ns
t _{w(L)}	Pulse Width, SCLR	3.3 5.0		5.0 5.0	5.0 5.0	5.0 5.0	ns

时序图:



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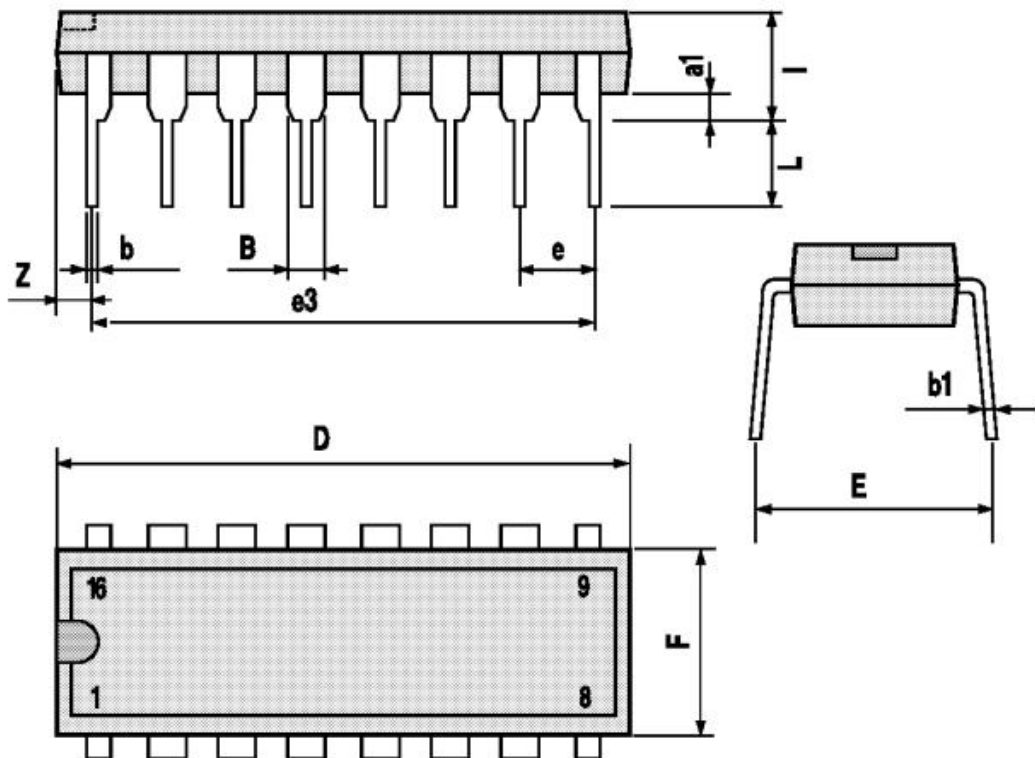
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封装尺寸:

Plastic DIP16 (0.25) MECHANICAL DATA

DIM	mm			inch		
	MIN	TYP	MAX	MIN	TYP	MAX
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



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SO16 (Narrow) MECHANICAL DATA

DIM	mm			inch		
	MIN	TYP	MAX	MIN	TYP	MAX
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10			0.393
E	5.8		6.2			0.244
e		1.27				
e3		8.89				
F	3.8		4.0			0.157
G	5.8		5.3			0.208
L	0.5		1.27			0.005
M			0.62			0.024
S	8° (max.)					

