

8 通道输出 LED 驱动专用芯片--74HC595

概述与特点

- ◆ 概述 74HC595 是一颗 8 位串并转换和串行传输的控制芯片, 具有 8 位移位、存储和三态输出。数据在 SCK 的上升沿输入和串行输出, 在 RCK 的上升沿存储。当使能 G 为低电平, 存储寄存器的数据输出到 8 位总线。

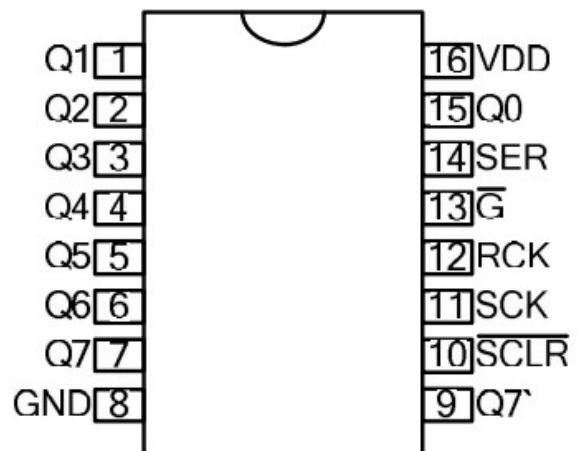
主要特性

- ◆ 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)

应用领域

- ◆ LED 显示屏
- ◆ 小家电显示

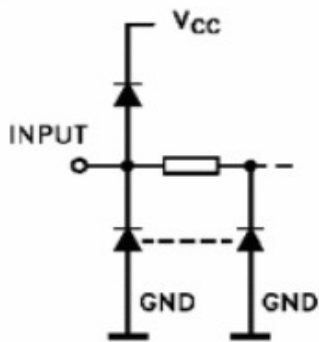
管脚定义



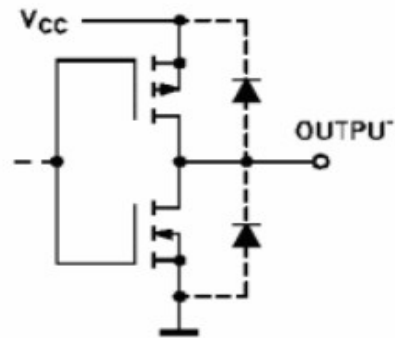
管脚说明

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

输入输出管脚



输入管脚

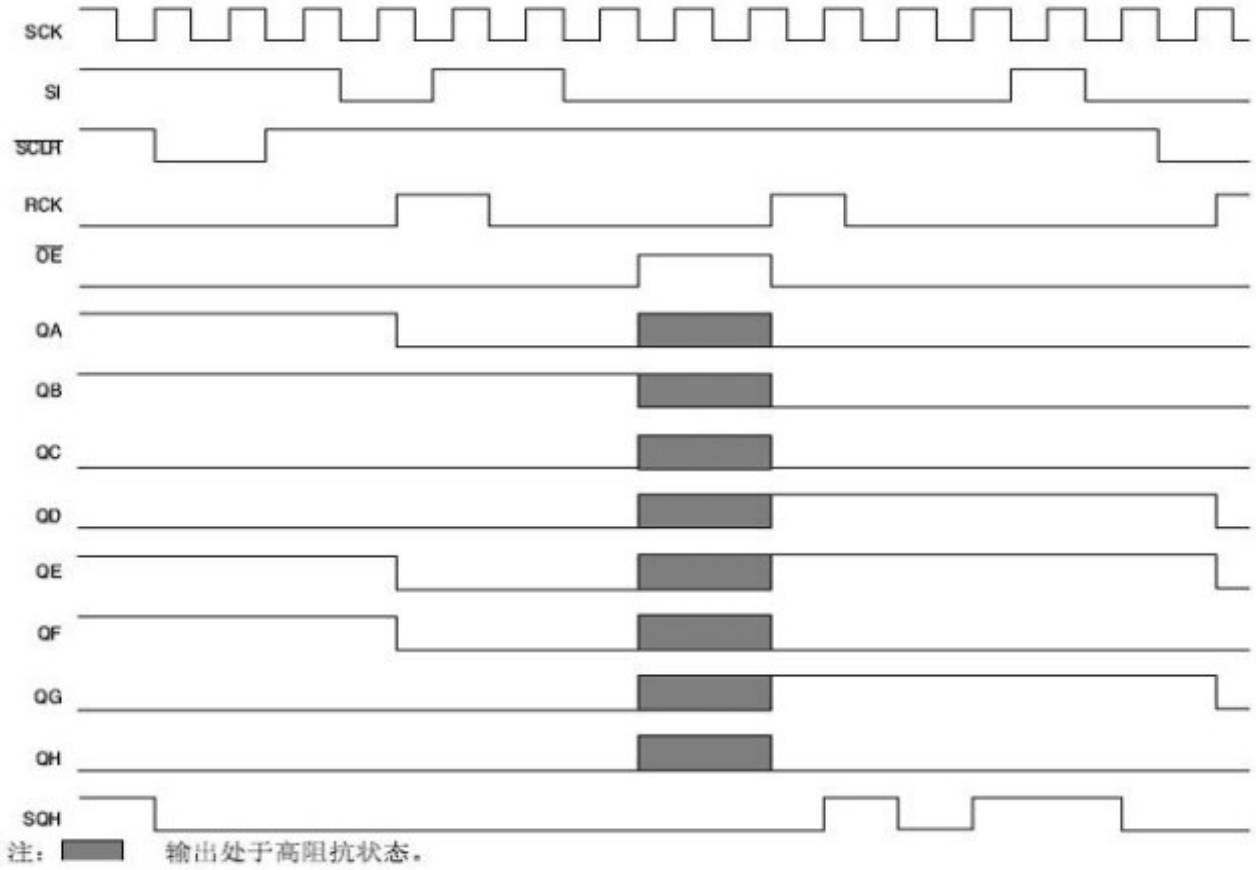


输出管脚

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

时序表



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

DC 电气特性

类型	参数定义	测试条件		数值						单位		
				25°C			-40°C—85°C		-55°C—125°C			
				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		1.32	
		6.0					1.77		1.77		1.77	
V _{OH}	输出高电平 (SQH)	2.0	V _I =V _{IH} or V _{IL}	I _O =-20 μA	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 μA	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		
V _{OL}	输出低电平 (SQH)	2.0	V _I =V _{IH} or V _{IL}	I _O =20 μA		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		
V _{OL}	输出低电平 (QA- QH)	2.0	V _I =V _{IH} or V _{IL}	I _O =20 μA		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		
I _{CC}	静态电流	6.0	V _I =V _{CC} or GND				4		40		80	μA

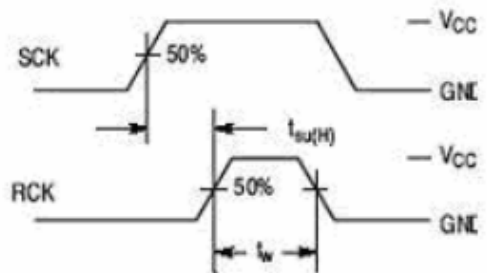
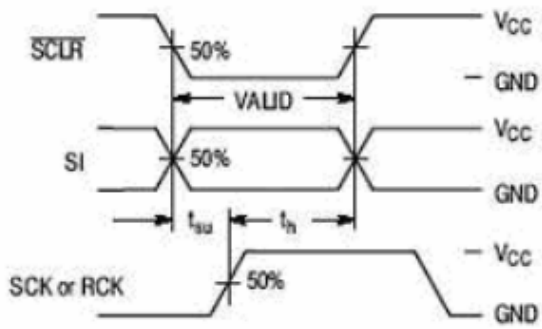
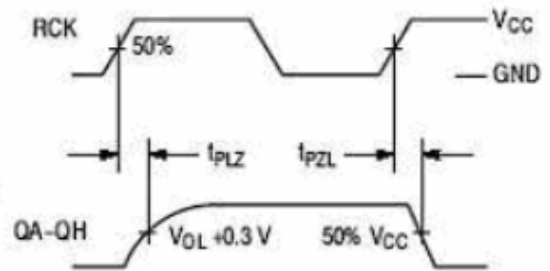
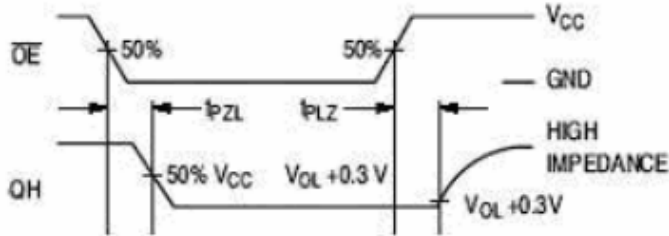
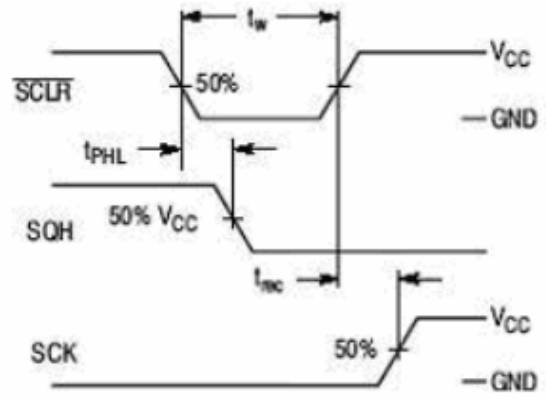
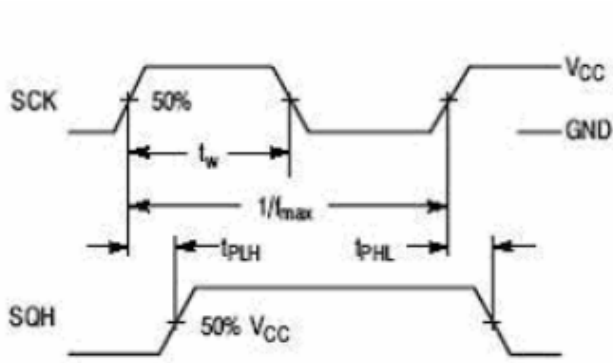
AC 特性

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	6.0	4.8	4.0	MHz
		4.5	30	24	20	
		6.0	35	28	24	
t _{PLH} t _{PHL}	Maximum Propagation Delay, Shift Clock to SQ _H (Figures 1 and 7)	2.0	140	175	210	ns
		4.5	28	35	42	
		6.0	24	30	36	
t _{PHL}	Maximum Propagation Delay, Reset to SQ _H (Figures 2 and 7)	2.0	145	180	220	ns
		4.5	29	36	44	
		6.0	25	31	38	
t _{PLH} t _{PHL}	Maximum Propagation Delay, Latch Clock to Q _A – Q _H (Figures 3 and 7)	2.0	140	175	210	ns
		4.5	28	35	42	
		6.0	24	30	36	
t _{PLZ} t _{PHZ}	Maximum Propagation Delay, Output Enable to Q _A – Q _H (Figures 4 and 8)	2.0	150	190	225	ns
		4.5	30	38	45	
		6.0	26	33	38	
t _{PZL} t _{PZH}	Maximum Propagation Delay, Output Enable to Q _A – Q _H (Figures 4 and 8)	2.0	135	170	205	ns
		4.5	27	34	41	
		6.0	23	29	35	
t _{TLH} t _{THL}	Maximum Output Transition Time, Q _A – Q _H (Figures 3 and 7)	2.0	60	75	90	ns
		4.5	12	15	18	
		6.0	10	13	15	
t _{TLH} t _{THL}	Maximum Output Transition Time, SQ _H (Figures 1 and 7)	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
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

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, $\overline{\text{SCLR}}$ 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, $\overline{\text{SCLR}}$ to RCK	3.3 5.0		0 0	0 0	1.0 1.0	ns
t _{rec}	Recovery Time, $\overline{\text{SCLR}}$ 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, $\overline{\text{SCLR}}$	3.3 5.0		5.0 5.0	5.0 5.0	5.0 5.0	ns

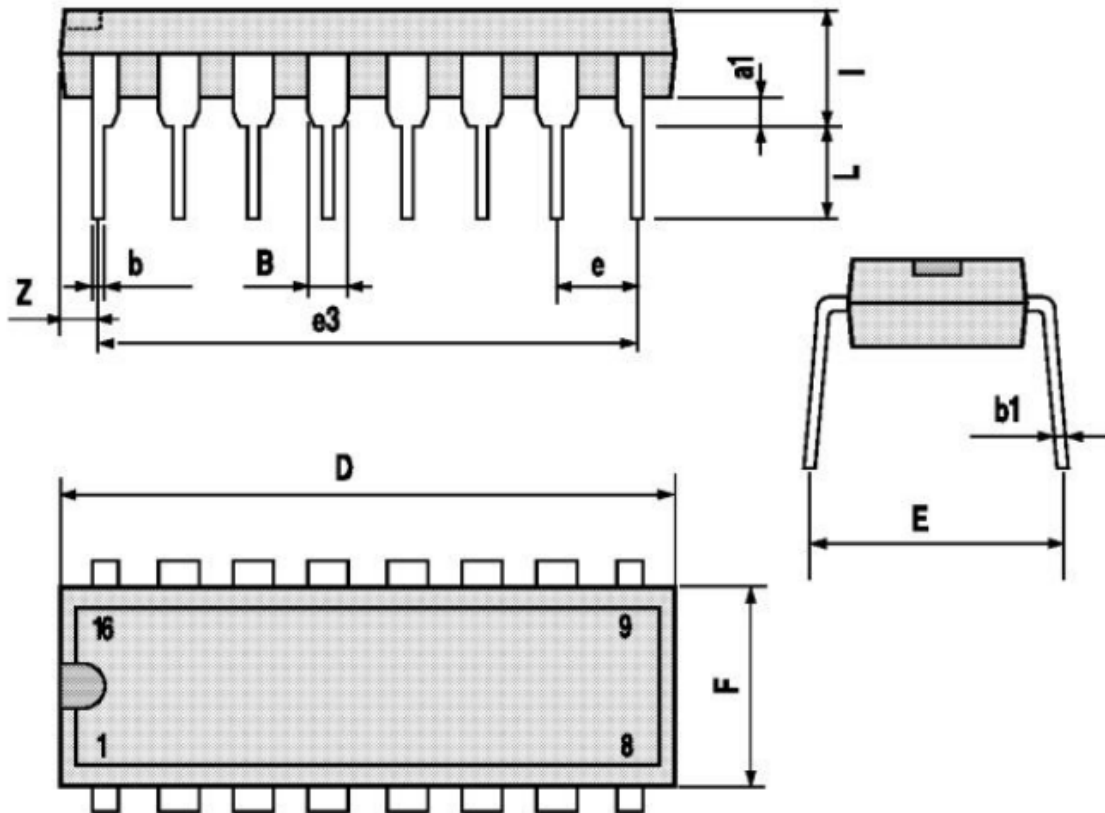
时序图



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
l			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



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.)					

