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74HC595D(MS)

产品规格手册

产品简介

74HC595 是一款 8 位 CMOS 移位寄存器。8 位并行输出端口为可控的三态输出，一个串行输出端口，可以实现多级芯片串行控制，组成 8n 位（n 为芯片数量）并行输出。

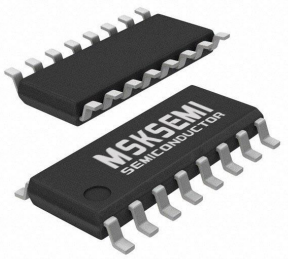
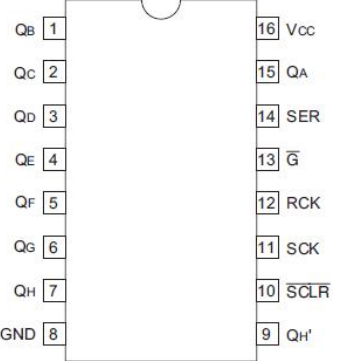
产品特点

- 低输入电流：≤1uA
- 可控的三态输出设计
- CMOS 串行输出，可用于多个设备的级联
- 低功耗：I_{cc}≤5.0 μA, @ VCC=6V
- 标准串行（SPI）接口
- 封装形式：SOP16

产品用途

- LED 数码管驱动
- 自动化工程控制
- 其它应用领域

封装形式和管脚功能定义

封装图	脚位信息
 <p>SOP-16</p>	

封装形式	SOP16	
管脚序号	管脚定义	功能说明
15	Q _A	Q _A ~Q _H 八位数据并行输出端
1~7	Q _B ~Q _G	
8	GND	电源地
9	Q' _H	串行数据输出管脚
10	$\overline{\text{SCLR}}$	移位寄存器清零端
11	SCK	数据输入时钟端
12	RCK	输出存储器锁存时钟端
13	$\overline{\text{G}}$	输出使能端
14	SER	数据输入端
16	VCC	电源端

真值表 (“↑” 表示上升沿；“↓” 表示下降沿)

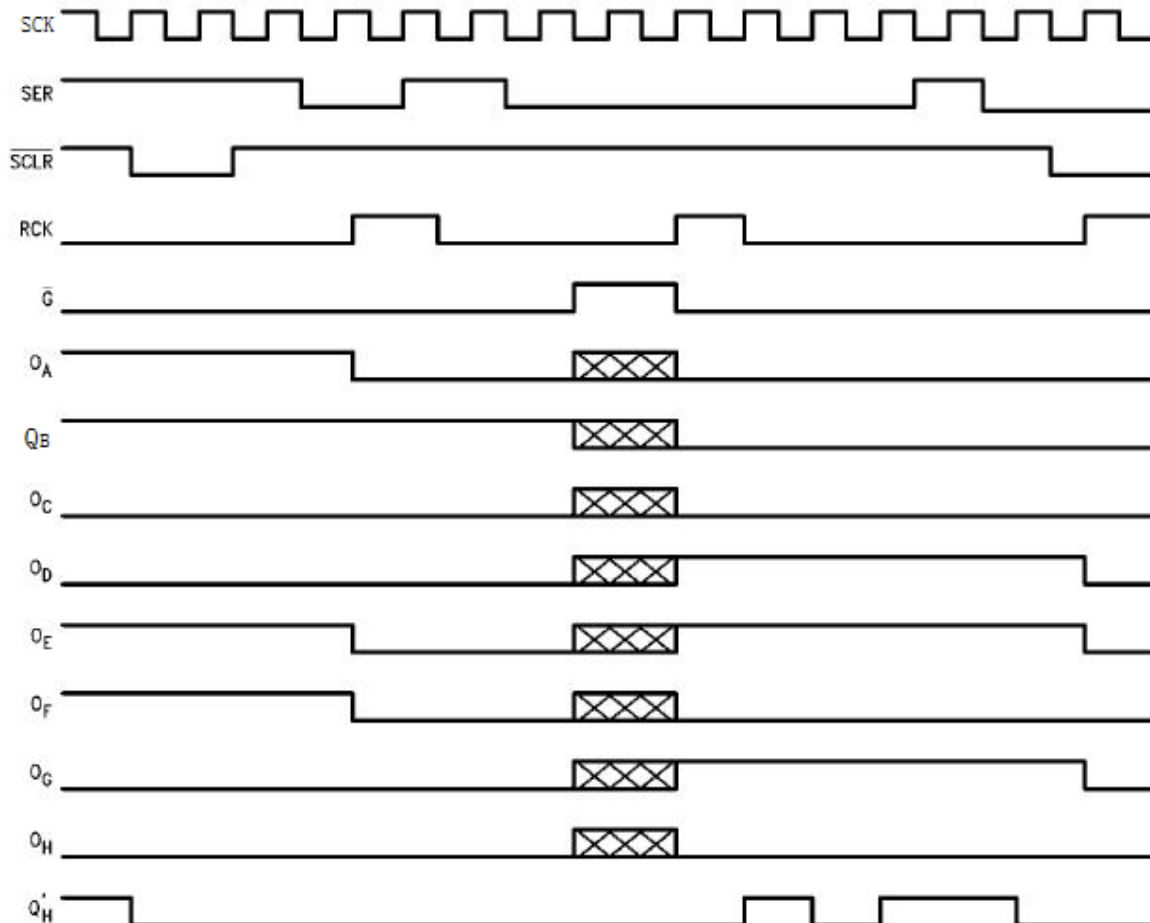
输入管脚					输出管脚
SER	RCK	SCK	SCLR	-	
X	X	X	X	H	Q _A ~Q _H 输出端高阻态
X	X	X	X	L	Q _A ~Q _H 输出端输出有效值 L 或 H
X	X	X	L	L	移位寄存器清零，Q' _H =0
L	X	↑	H	L	移位寄存器存储 L 值，Q' _H 输出 Q _{n-1}
H	X	↑	H	L	移位寄存器存储 H 值，Q' _H 输出 Q _{n-1}
X	X	↓	H	L	移位寄存器状态保持不变
X	↑	X	H	L	8 位锁存移位寄存器中的状态值并行输出
X	↓	X	H	L	存储器输出状态保持不变


极限参数

参数	符号	极限值	单位
工作电压	V_{CC}	-0.5 to 6.5	V
输入/输出电压	V_{IN} 、 V_{OUT}	-0.5 to $V_{CC}+0.5$	V
输入/输出钳位电流	I_{IK} 、 I_{OK}	± 20	mA
输出电流	I_{OUT}	± 35	mA
VCC、GND 电流	I_{CC} 、 I_{GND}	± 70	mA
耗散功率	P_D	500	mW
工作温度	T_A	0-70	°C
存储温度	T_S	-65-150	°C
引脚焊接温度	T_W	260, 10s	°C

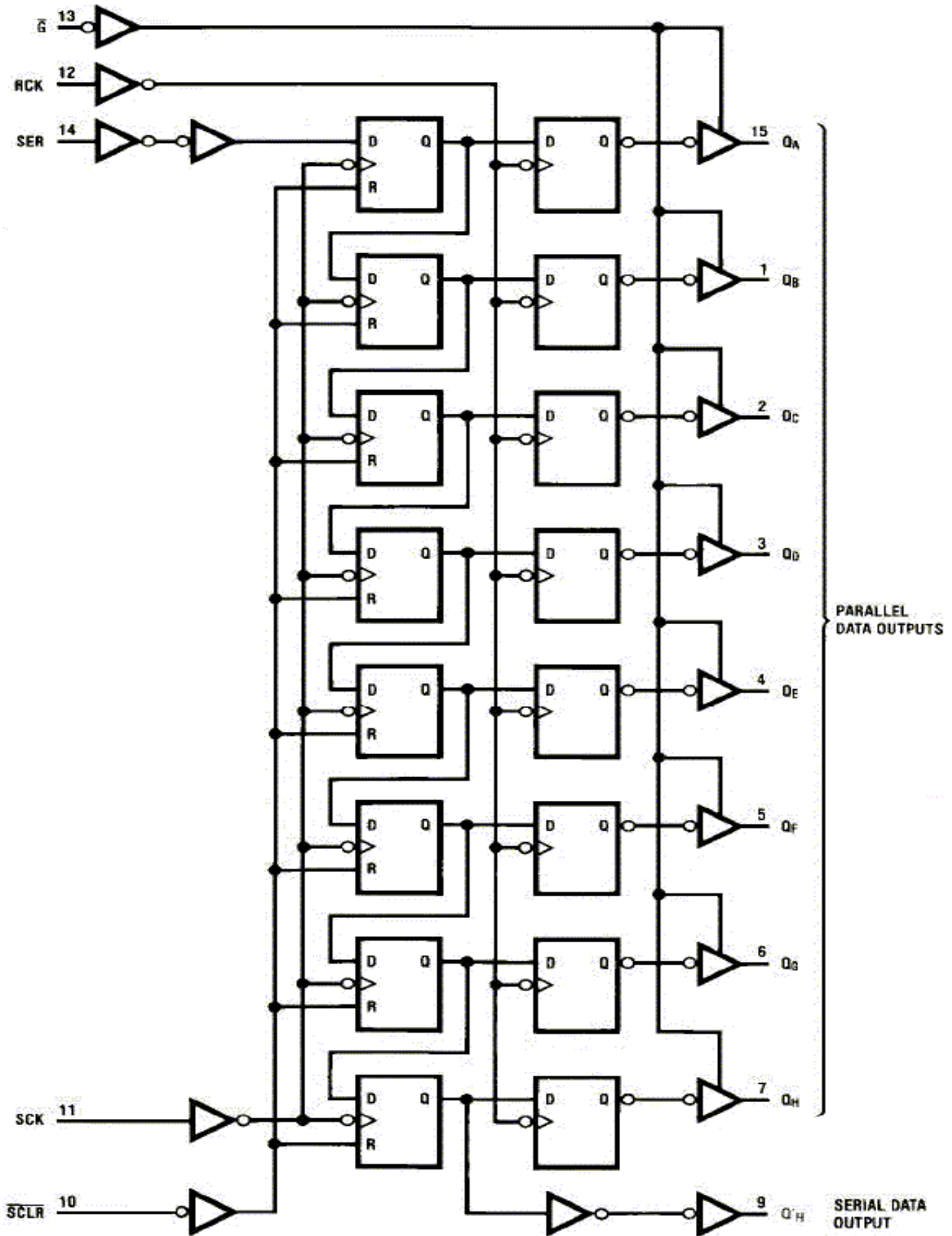
注：极限参数是指无论在任何条件下都不能超过的极限值。万一超过此极限值，将有可能造成产品劣化等物理性损伤；同时在接近极限参数下，不能保证芯片可以正常工作。

时序图



NOTE:  Implies that the output is in TRI-STATE mode.

原理逻辑图



工作条件

项目	符号	最小值	典型值	最大值	单位
电源电压	V_{CC}	2	5	6	V
输入输出电压	V_{IN} 、 V_{out}	0		V_{CC}	V
输入上升/ 下降时间	t_r t_f	$V_{CC}=2.0V$	0	1000	ns
		$V_{CC}=4.5V$	0	500	ns
		$V_{CC}=6.0V$	0	400	ns

电学特性

 直流电学特性: $T_A=25^{\circ}C$

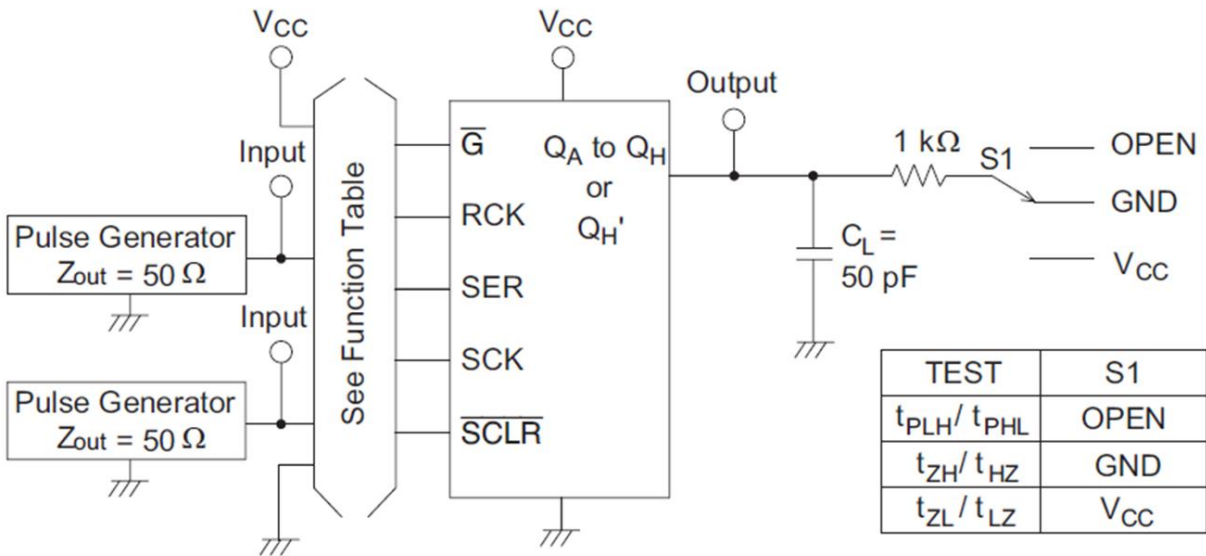
符号	项目		测试条件	$V_{CC}(V)$	最小值	典型值	最大值	单位	
V_{IH}	高电平有效输入电压			2.0	1.5			V	
				4.5	3.15			V	
				6.0	4.2			V	
V_{IL}	低电平有效输入电压			2.0			0.5	V	
				4.5			1.35	V	
				6.0			1.8	V	
V_{OH}	高电平输出电压	Q_A to Q_H Q'_H	$V_I = V_{IH}$ or V_{IL}	$I_{OH}=20\mu A$	2.0	1.9			V
					4.5	4.4			V
					6.0	5.9			V
		Q'_H		$I_{OH}=6.0mA$	4.5	3.9	4.3		V
				$I_{OH}=7.8mA$	6.0	5.2	5.8		V
				$I_{OH}=4.0mA$	4.5	3.9	4.2		V
V_{OL}	低电平输出电压	Q_A to Q_H Q'_H	$V_I = V_{IH}$ or V_{IL}	$I_{OH}=20\mu A$	2.0			0.1	V
					4.5			0.1	V
					6.0			0.1	V
		Q'_H		$I_{OH}=6.0mA$	4.5		0.2	0.4	V
				$I_{OH}=7.8mA$	6.0		0.25	0.4	V
				$I_{OH}=4.0mA$	4.5		0.2	0.5	V
		$I_{OH}=5.2mA$	6.0		0.15	0.5	V		
I_{OZ}	关闭状态输出电流		$V_{OUT}=V_{CC}$ or GND , $V_I=V_{IH}$ or V_{IL}	6.0			10	μA	
I_{IN}	输入电流		$V_I=V_{CC}$ or GND	6.0			1	μA	
I_{CC}	工作电流		$V_I=V_{CC}$ or GND , $I_{OUT}=0\mu A$	6.0			5	μA	
V_{CC}	工作电压				2		6	V	

交流电学特性: $T_a=25^{\circ}\text{C}$ $V_{CC}=5.0\text{V}$, $t_r=t_f \leq 20\text{ns}$ 见测试方法。

符号	项目	测试条件	最小值	典型值	最大值	单位
f_{Max}	SCK 最高工作频率			10		MHZ
t_{PHL} , t_{PLH}	传输延迟时间 SCK to Q'_H	$C_L=50\text{pF}$		100		ns
	传输延迟时间 RCK to Q_A thru Q_H	$C_L=50\text{pF}$		100		ns
	传输延迟时间 $\overline{\text{SCLR}}$ to Q'_H	$C_L=50\text{pF}$		50		ns
t_{ZH} , t_{ZL}	输出启用时间 to Q_A thru Q_H	$R_L=1\text{k}\Omega$ $C_L=50\text{pF}$		17		ns
t_{HZ} , t_{LZ}	输出禁用时间 to Q_A thru Q_H	$R_L=1\text{k}\Omega$ $C_L=50\text{pF}$		15		ns
t_{SU}	最小存储时间 SER to SCK			20		ns
t_{SU}	最小存储时间 SCK to RCK			20		ns
T_{rem}	最小清除时间 $\overline{\text{SCLR}}$ to SCK			10		ns
t_{W}	最小脉冲宽度 SCK or $\overline{\text{SCLR}}$			20		ns
t_{H}	最小保持时间 SER to SCK			5		ns
t_{TLH} , t_{THL}	输出上升/下降沿时间 Q_A thru Q_H , Q'_H			100		ns

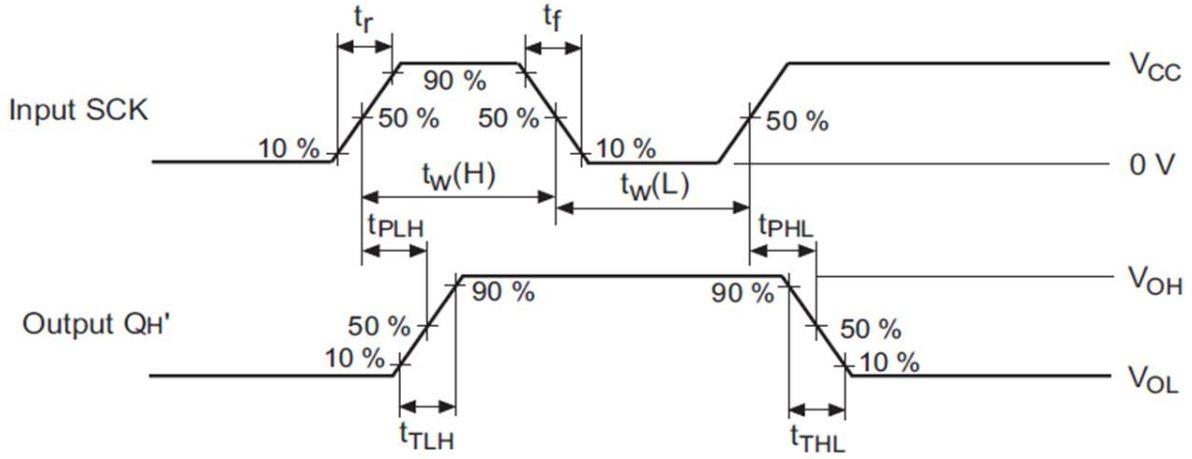
■测试方法

1、接线图



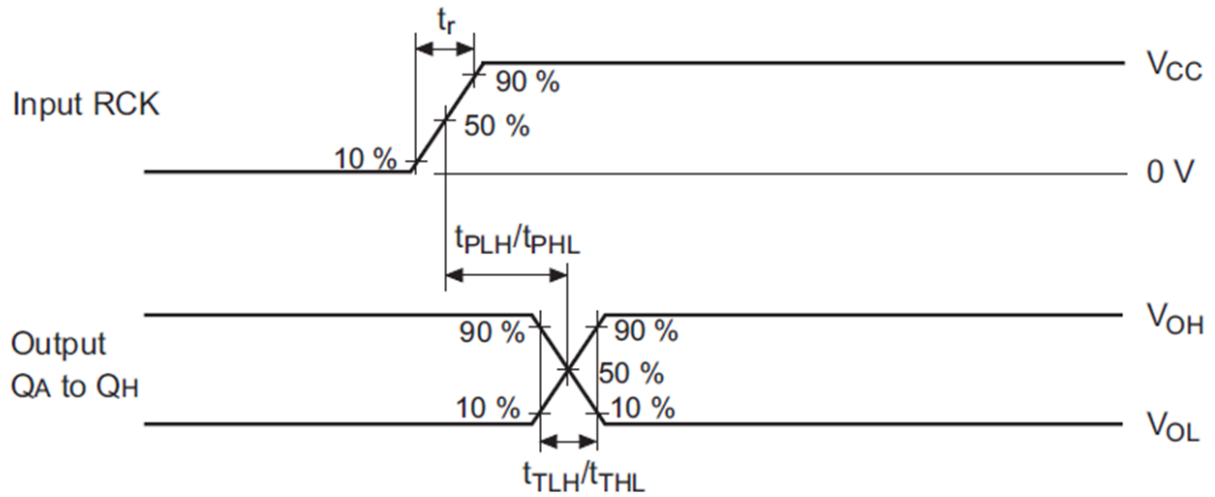
2、波形测量示意图

• Waveform – 1 (SCK to QH')



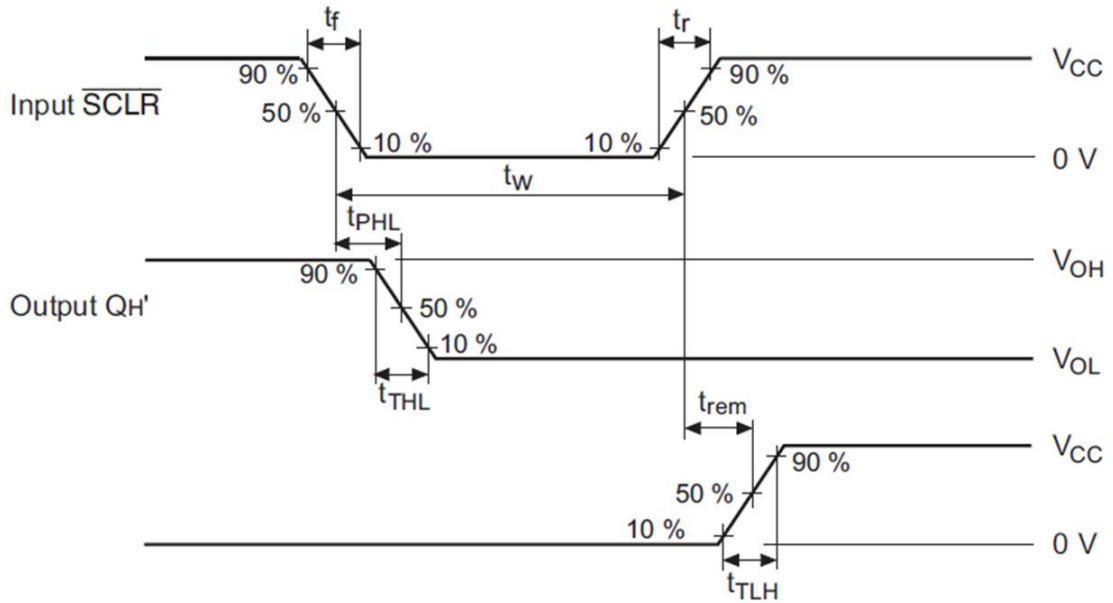
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%

• Waveform – 2 (RCK to Q)



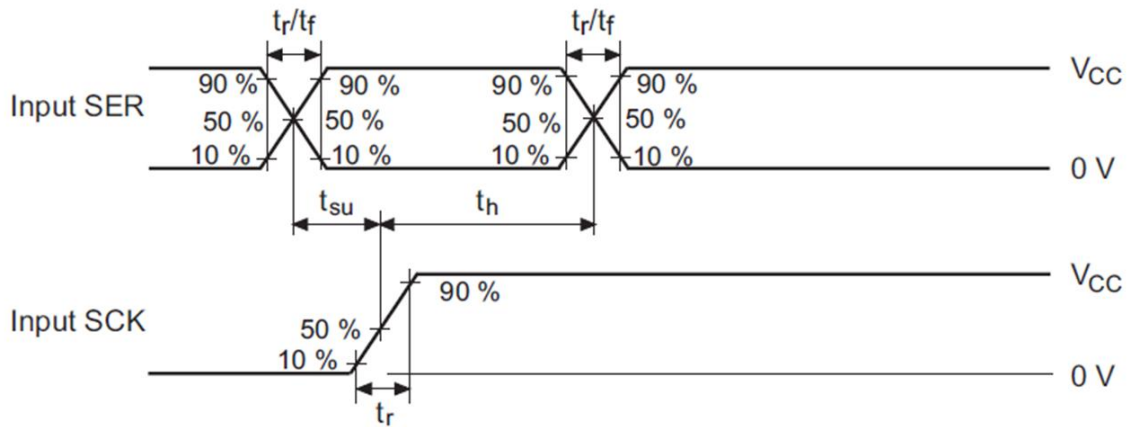
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%

• Waveform – 3 ($\overline{\text{SCLR}}$ to QH')



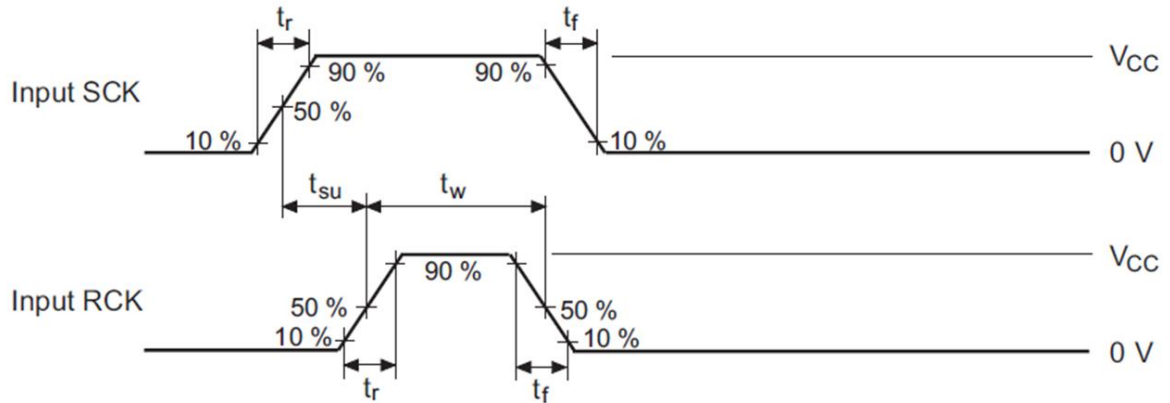
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%

• Waveform – 4 (SER to SCK)



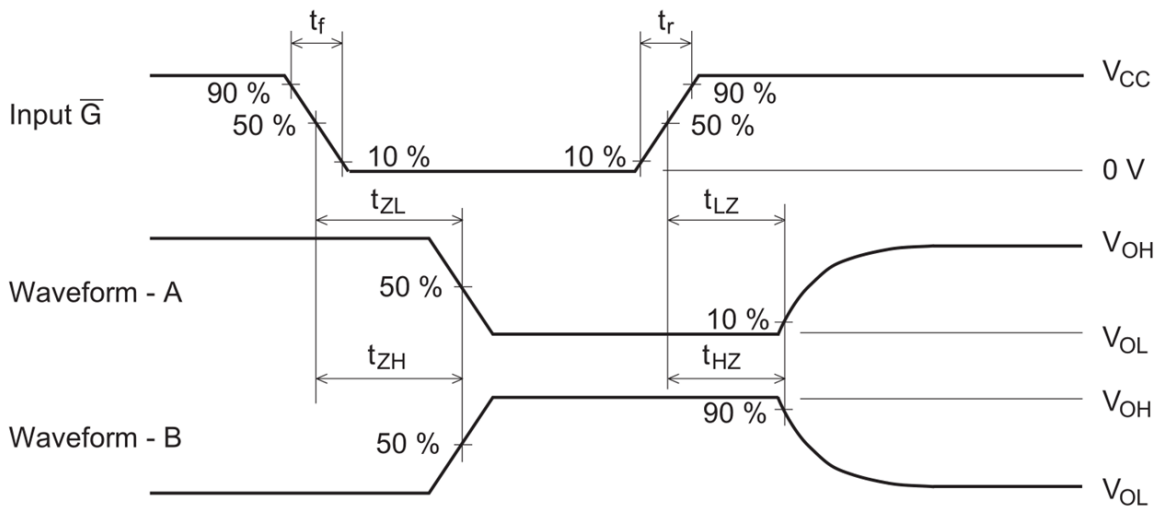
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%

• Waveform – 5 (SCK to RCK)



Note : 1. Input waveform : PRR ≤ 1 MHz, duty cycle 50%

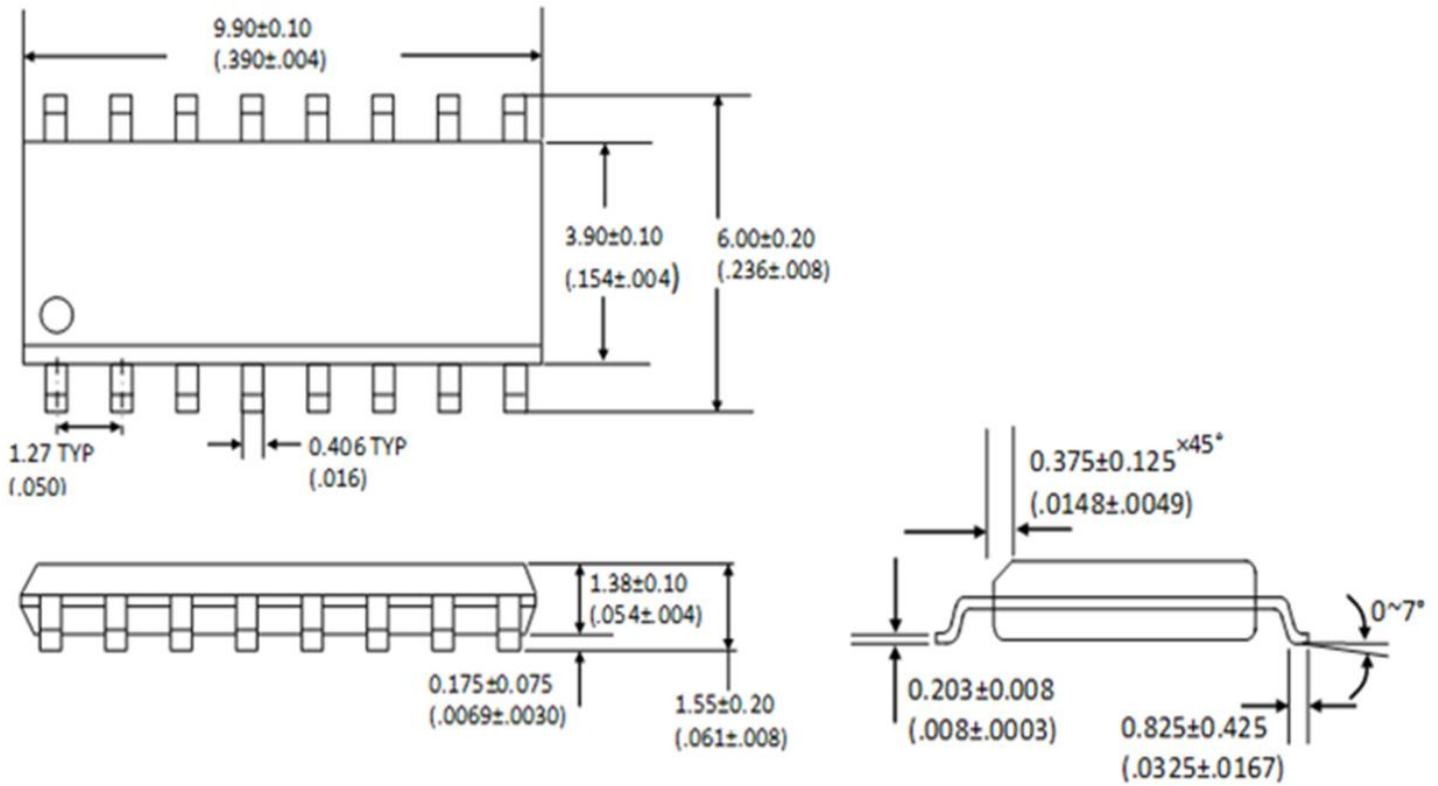
• Waveform – 6 (t_{ZL}, t_{ZH}, t_{LZ}, t_{HZ})



- Notes :
1. Input waveform : PRR ≤ 1 MHz, duty cycle 50%
 2. Waveform - A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform - B is for an output with internal conditions such that the output is high except when disabled by the output control.
 4. The output are measured one at a time with one transition per measurement.

SOP-16 包装数据

单位：毫米 / 英寸



卷轴规格

P/N	PKG	QTY
74HC595D(MS)	SOP-16	2500

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