



## 1、概述

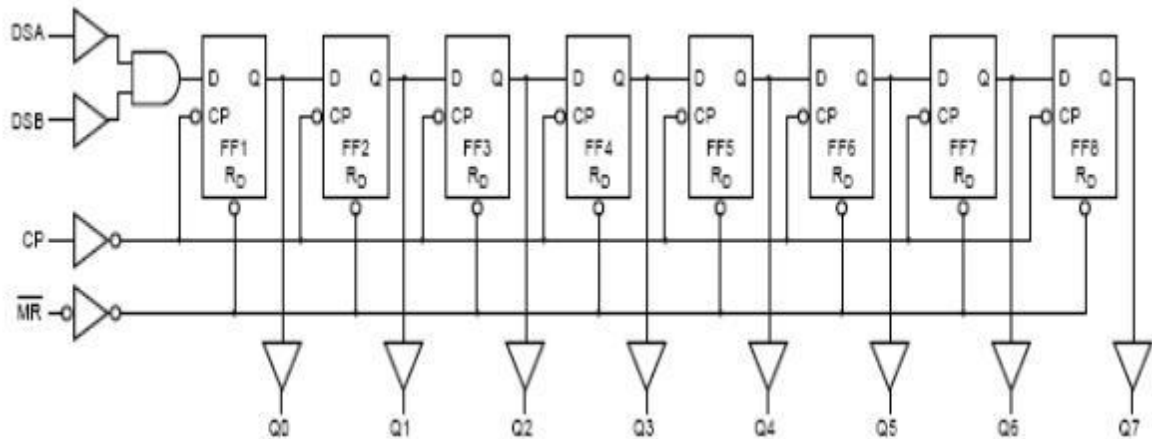
74HC164D是高速 CMOS 电路，管脚与低功耗肖特基 TTL（LSTTL）系列兼容。74HC164D是8位的串入并出、边沿触发的移位寄存器，串入数据由 DSA、DSB 输入，在每个时钟 CP 的上升沿数据向右移一位，数据由 DSA 和 DSB 相与而成，且在上升沿到来之前已满足了建立时间。低电平有效的

复位信号将直接把寄存器清零而输出为低。其主要特点如下：

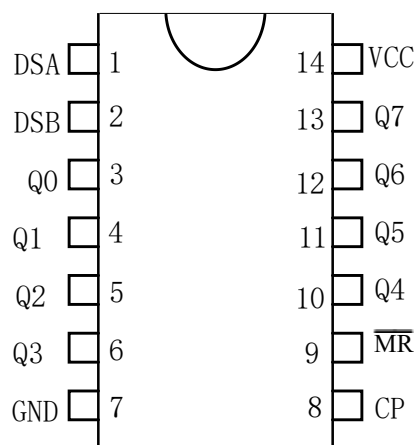
- 较宽的工作电压：2~6V
- 相与的串行输入，直接的清零信号
- 输出能驱动 10 个 LSTTL 负载
- 封装型式:DIP14/SOP14(SOIC-14)/TSSOP14

## 2、功能框图及引脚说明

### 2.1、功能框图



### 2.2、引脚排列图





### 2.3、引脚说明及结构原理图

管脚号	符号	说明	管脚号	符号	说明
1	DSA	数据输入	8	CP	时钟输入(低到高, 边沿触发)
2	DSB	数据输入	9	$\overline{MR}$	复位输入(低有效)
3	Q0	输出	10	Q4	输出
4	Q1	输出	11	Q5	输出
5	Q2	输出	12	Q6	输出
6	Q3	输出	13	Q7	输出
7	GND	地 (0V)	14	VCC	电源电压

### 2.4、功能说明

工作模式	输入				输出	
	$\overline{MR}$	CP	DSA	DSB	Q0	Q1~Q7
Reset(clear)	L	X	X	X	L	L~L
Shift	H	t	l	l	L	Q0~Q6
	H	t	l	h	L	Q0~Q6
	H	t	h	l	L	Q0~Q6
	H	t	h	h	H	Q0~Q6

注: H: 高电平

h: 时钟上升沿前建立起来的高电平电压

L: 低电平

l: 时钟上升沿前建立起来的低电平电压

q: 对应于时钟上升沿时, 前面一个寄存器的状态

t: 时钟上升沿

## 3、电特性

### 3.1、极限参数 除非另有规定, $T_{amb}=25^{\circ}\text{C}$

参数名称	符号	条件	最小值	最大值	单位
电源电压	$V_{CC}$		-0.5	+7	V
输入钳位电流	$I_{IK}$	$V_I < -0.5\text{V}$ 或 $V_I > V_{CC} + 0.5\text{V}$		$\pm 20$	mA
输出钳位电流	$I_{OK}$	$V_O < -0.5\text{V}$ 或 $V_O > V_{CC} + 0.5\text{V}$		$\pm 20$	mA
输出电流	$I_O$	$V_O = -0.5\text{V} \sim V_{CC} + 0.5\text{V}$		$\pm 25$	mA
VCC 或 GND 电流	$I_{CC}, I_{GND}$			$\pm 50$	mA
贮存温度	$T_{STG}$		-65	+150	$^{\circ}\text{C}$
焊接温度	$T_L$	10 秒	DIP 封装	245	C
			SOP 封装	250	



### 3.2、推荐使用条件

参数	符号	条件	最小	典型	最大	单位
电源电压	$V_{CC}$		2.0	5.0	6.0	V
输入电压	$V_I$		0	-	$V_{CC}$	V
输出电压	$V_O$		0	-	$V_{CC}$	V
输入上升、下降时间	tr,tf	$V_{CC}=2.0V$	-	-	1000	ns
		$V_{CC}=4.5V$	-	6.0	500	ns
		$V_{CC}=6.0V$	-	-	400	ns
工作温度	$T_{amb}$		-40	-	+85	°C

### 3.3、电气特性

除非另有规定， $T_{amb}=25^{\circ}C$

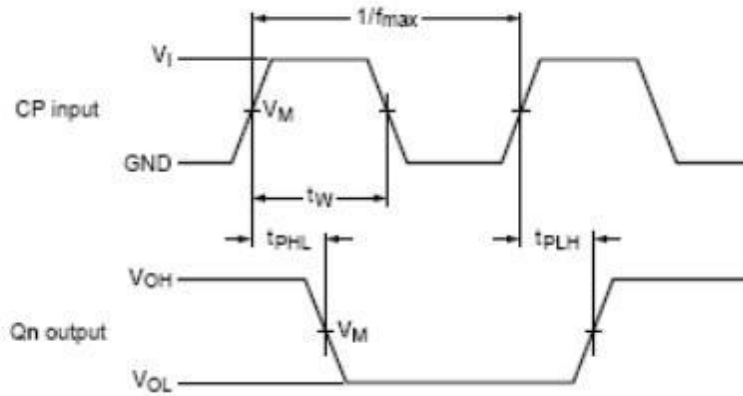
参数名称	符号	测试条件	规范值			单位
			最小	典型	最大	
<b>直流参数</b>						
高电平输入电压	$V_{IH}$	$V_{CC}=2.0V$	1.5	-	-	V
		$V_{CC}=4.5V$	3.15	-	-	V
		$V_{CC}=6.0V$	4.2	-	-	V
低电平输入电压	$V_{IL}$	$V_{CC}=2.0V$	-	-	0.5	V
		$V_{CC}=4.5V$	-	-	1.35	V
		$V_{CC}=6.0V$	-	-	1.8	V
高电平输出电压	$V_{OH}$	$V_I=V_{IH}$ 或 $V_{IL}$				
		$I_O=-20\ \mu A$ ; $V_{CC}=2.0V$	1.9	2.0	-	V
		$I_O=-20\ \mu A$ ; $V_{CC}=4.5V$	4.4	4.5	-	V
		$I_O=-20\ \mu A$ ; $V_{CC}=6.0V$	5.9	6.0	-	V
		$I_O=-4mA$ ; $V_{CC}=4.5V$	3.98	4.32	-	V
		$I_O=-5.2mA$ ; $V_{CC}=6.0V$	5.48	5.81	-	V
低电平输出电压	$V_{OL}$	$V_I=V_{IH}$ 或 $V_{IL}$				
		$I_O=20\ \mu A$ ; $V_{CC}=2.0V$	-	0	0.1	V
		$I_O=20\ \mu A$ ; $V_{CC}=4.5V$	-	0	0.1	V
		$I_O=20\ \mu A$ ; $V_{CC}=6.0V$	-	0	0.1	V
		$I_O=4mA$ ; $V_{CC}=4.5V$	-	0.19	0.26	V
		$I_O=5.2mA$ ; $V_{CC}=6.0V$	-	0.21	0.26	V
静态电流	$I_{CC}$	$V_{CC}=6.0V$ ; $I_O=0A$ ; $V_I=V_{CC}$ 或GND	-	3.9	8	$\mu A$
输入电容	$C_i$		-	3.5	-	pF



参数名称		符号	测试条件	规范值			单位
				最小	典型	最大	
<b>交流参数</b>							
传输延时	负载电容						
Cp ~ Qn	CL=50p	tPHL, tPLH	见图 1				
			VCC=2.0V	-	41	170	ns
			VCC=4.5V	-	15	34	ns
			VCC=6.0V	-	12	29	ns
$\overline{MR}$ ~ Qn	CL=50p	tPHL, tPLH	见图 2				
			VCC=2.0V	-	39	140	ns
			VCC=4.5V	-	14	28	ns
			VCC=6.0V	-	11	24	ns
输出传输时间	CL=50p	tTHL, tTLH	见图 1				
			VCC=2.0V	-	19	75	ns
			VCC=4.5V	-	7	15	ns
			VCC=6.0V	-	6	13	ns
时钟脉宽(低电平或高电平)		tw	见图 1				
			VCC=2.0V	80	-	-	ns
			VCC=4.5V	16	-	-	ns
			VCC=6.0V	14	-	-	ns
主复位时钟脉宽(低电平)		tw	见图 2				
			VCC=2.0V	60	-	-	ns
			VCC=4.5V	12	-	-	ns
			VCC=6.0V	10	-	-	ns
从 $\overline{MR}$ ~ CP 的响应时间		trem	见图 2				
			VCC=2.0V	60	-	-	ns
			VCC=4.5V	12	-	-	ns
			VCC=6.0V	10	-	-	ns
从 DSA、DSB ~ CP 的建立时间		tsu	见图 3				
			VCC=2.0V	60	-	-	ns
			VCC=4.5V	12	-	-	ns
			VCC=6.0V	10	-	-	ns
从 DSA、DSB ~ CP 的保持时间		th	见图 3				
			VCC=2.0V	6	-	-	ns
			VCC=4.5V	6	-	-	ns
			VCC=6.0V	6	-	-	ns

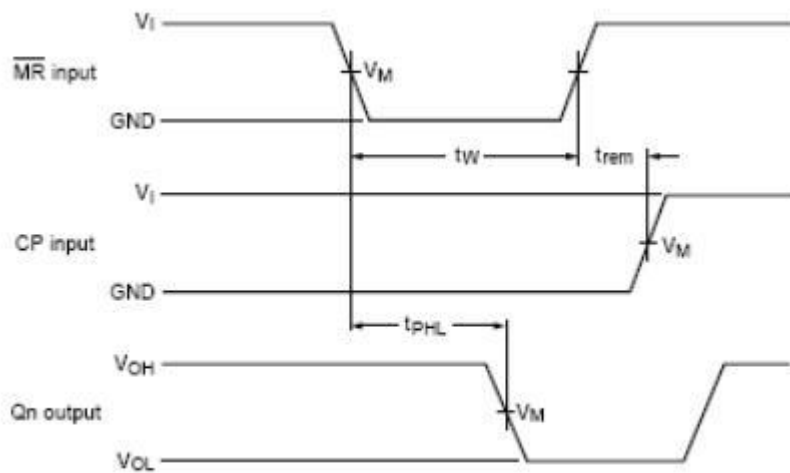


最大时钟频率	$f_{max}$	见图 1				
		$V_{CC}=2.0V$	6	23	-	MHz
		$V_{CC}=4.5V$	30	71	-	MHz
		$V_{CC}=6.0V$	35	85	-	MHz



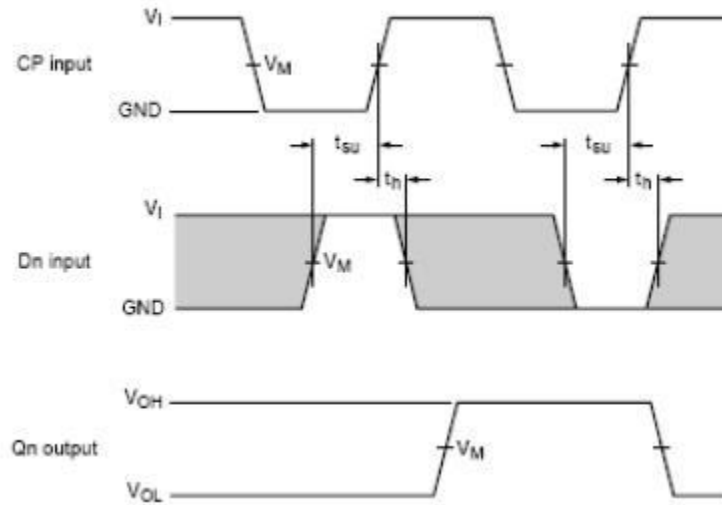
$$V_M=50\%; V_I=GND \sim V_{CC}$$

图 1.时钟(CP)到输出端(Qn)的传输延时、时钟脉宽、输出传输时间和最大时钟频率



$$V_M=50\%; V_I=GND \sim V_{CC}$$

图 2.主复位( $\overline{MR}$ )脉宽, 主复位到输出端(Qn)的传输延时、主复位结束到时钟(CP)的响应时间



$$V_M=50\%; V_I=GND \sim VCC$$

图 3. Dn 输入前的数据建立时间和保持时间

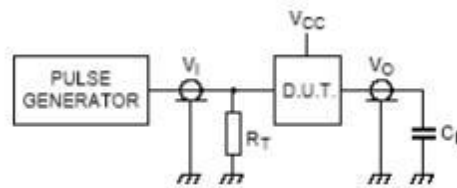
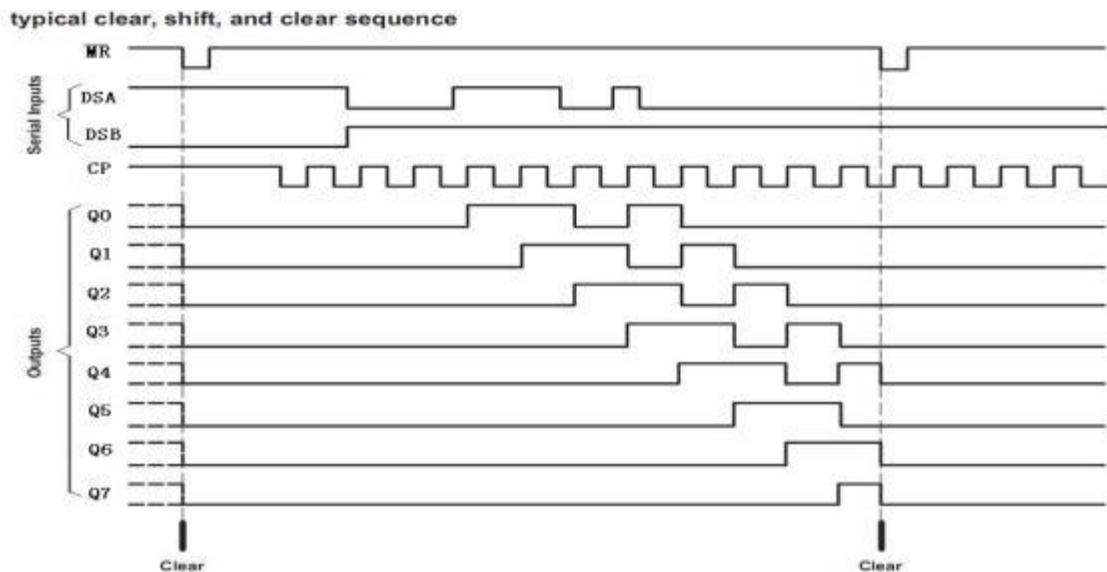


图 4.测试开关时间的负载电路

注：RT：终端电阻须与信号发生器的输出阻抗匹配

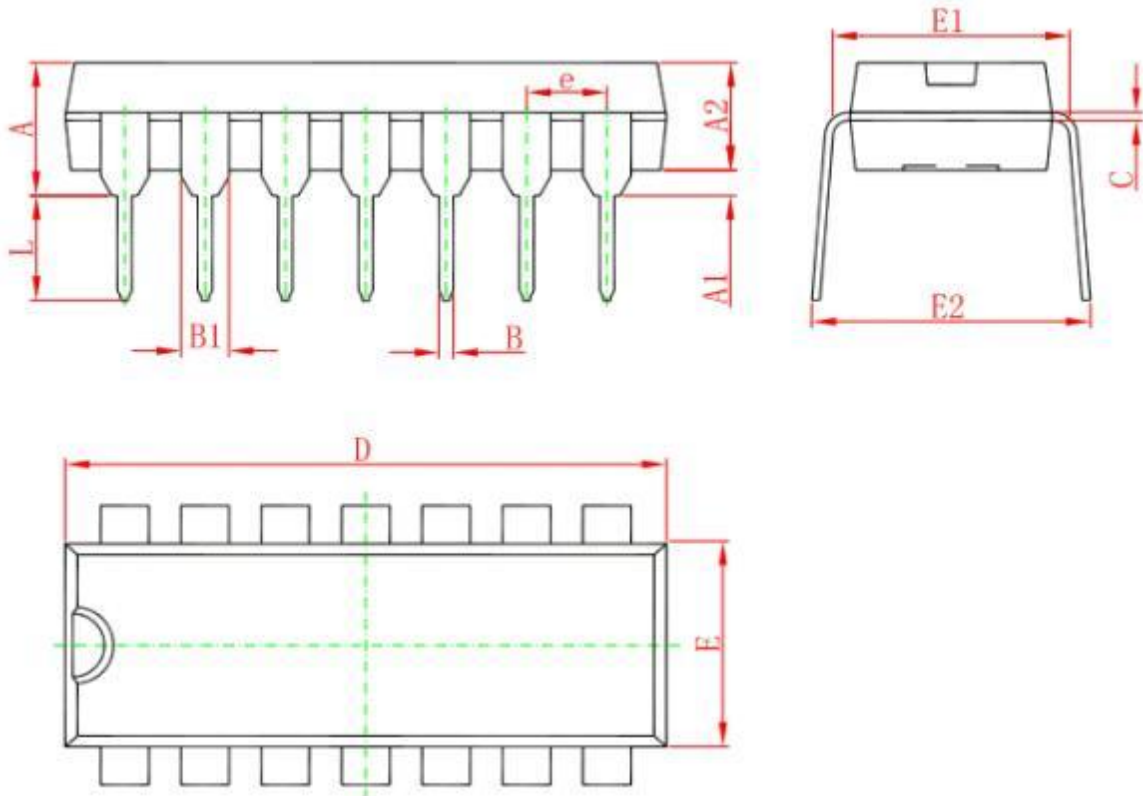
CL：负载电容须包括夹具有探针电容





#### 4、封装尺寸与外形图

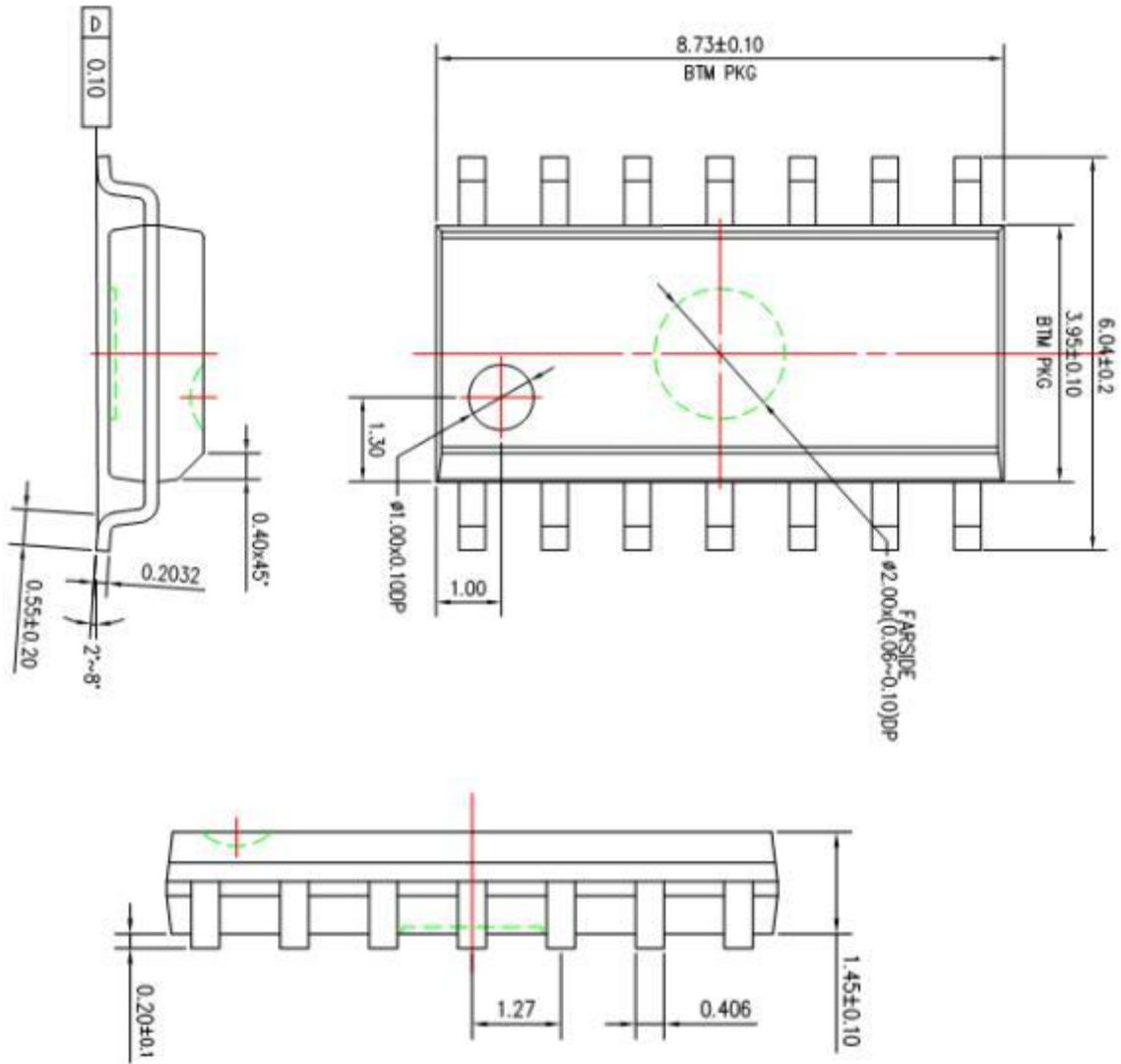
##### 4.1、DIP14 外形图与封装尺寸



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



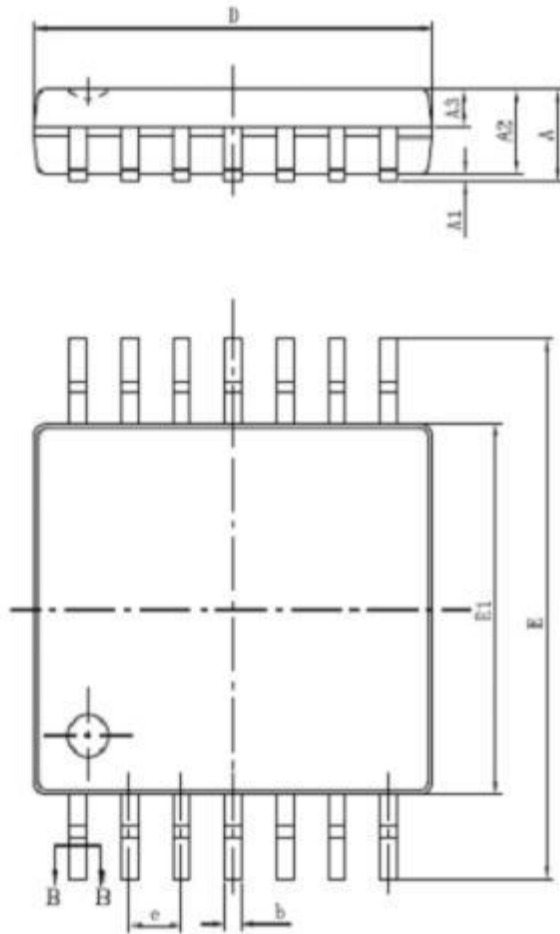
4.2、SOP14(SOIC14) 外形图与封装尺寸



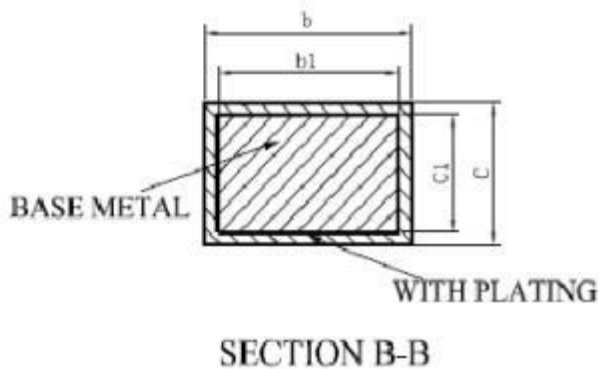
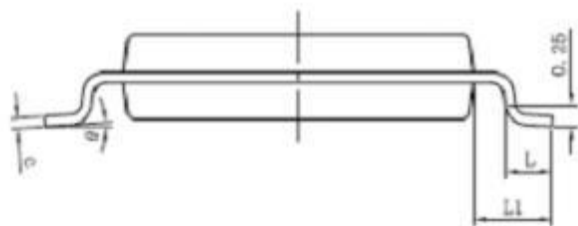




4.3、TSSOP14 外形图与封装尺寸



SYMBOL	MILLIMETER	
	MIN	MAX
A	—	1.20
A1	0.05	0.15
A2	0.90	1.05
A3	0.39	0.49
b	0.20	0.30
b1	0.19	0.25
c	0.13	0.19
c1	0.12	0.14
D	4.86	5.06
E1	4.30	4.50
E	6.20	6.60
e	0.65BSC	
L	0.45	0.75
L1	1.00BSC	
θ	0	8°





## 5、声明及注意事项：

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部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBBs)	多溴联苯醚 (PBDEs)
引线框	○	○	○	○	○	○
塑封树脂	○	○	○	○	○	○
芯片	○	○	○	○	○	○
内引线	○	○	○	○	○	○
装片胶	○	○	○	○	○	○
说明	○：表示该有毒有害物质或元素的含量在 SJ/T11363-2006 标准的检出限以下。 ×：表示该有毒有害物质或元素的含量超出 SJ/T11363-2006 标准的限量要求。					

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