

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

CD4017

产品规格手册


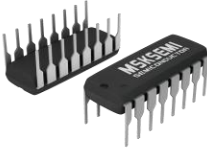
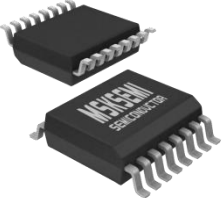
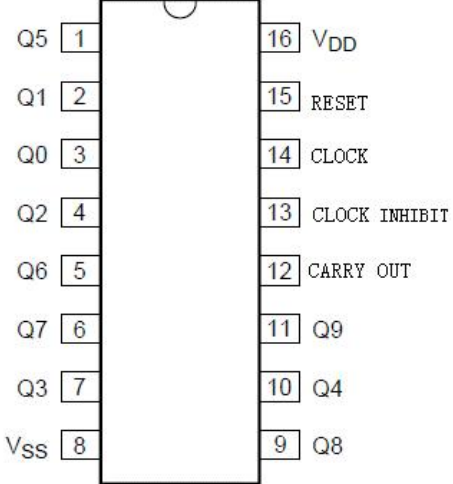
概述

CD4017 是一个 5 阶 Johnson 译码计数器，具有 10 个译码输出端，CLOCK、RE、INH 输入端，时钟输入端的斯密特触发器具有脉冲整形功能，对输入时钟脉冲上升和下降时间无限制。INH 为低电平时，计数器在时钟上升沿计数；反之，计数功能无效。RE 为高电平时，计数器清零。

特征

- 全静态工作
- 5V 、 10V 、 15V 参数标准范围
- 标准的对称输出特性
- 工作在工业级标准温度范围内 (-40~85°C)
- 100%测试的静态电流在 20V
- 封装形式：DIP-16/SOP-16/TSSOP-16

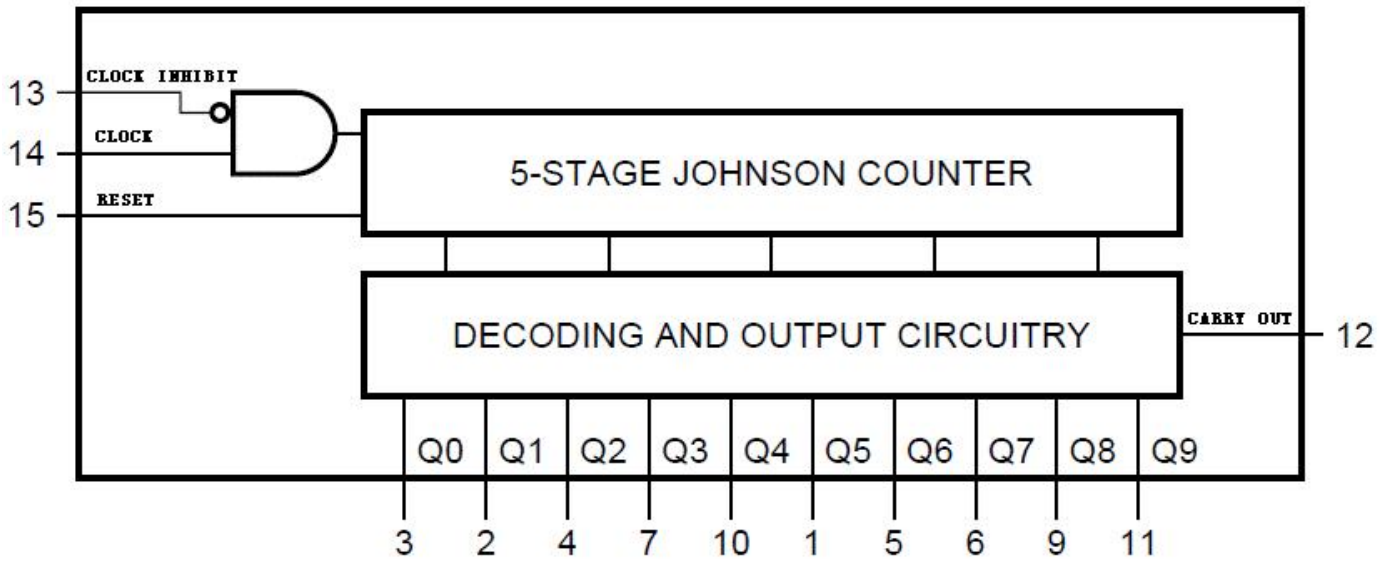
参考消息

封装图			引脚排列图
			 <p>Q5 1 16 VDD Q1 2 15 RESET Q0 3 14 CLOCK Q2 4 13 CLOCK INHIBIT Q6 5 12 CARRY OUT Q7 6 11 Q9 Q3 7 10 Q4 Vss 8 9 Q8</p>
SOP-16	DIP-16	TSSOP-16	管脚排列

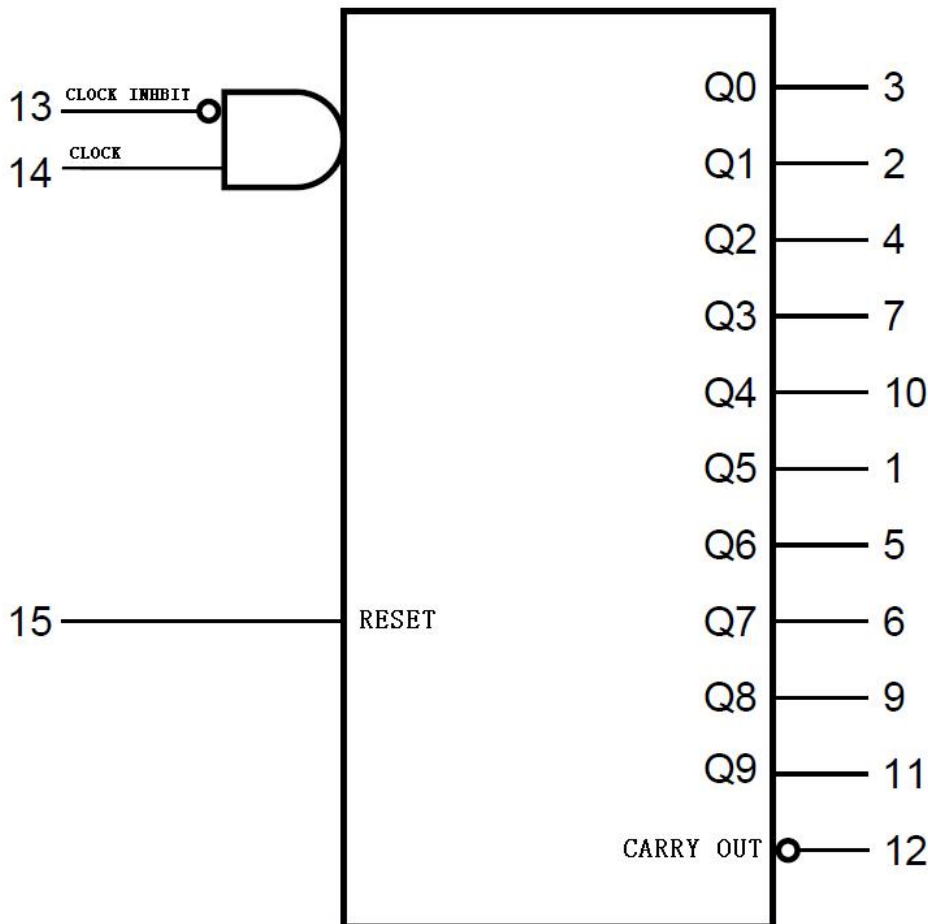
引脚说明

引脚	符号	功能	引脚	符号	功能
1	Q5	译码输出端	9	Q8	译码输出端
2	Q1	译码输出端	10	Q4	译码输出端
3	Q0	译码输出端	11	Q9	译码输出端
4	Q2	译码输出端	12	CARRY OUT	进位输出端
5	Q6	译码输出端	13	CLOCK INHIBIT	时钟抑制
6	Q7	译码输出端	14	CLOCK	时钟
7	Q3	译码输出端	15	RESET	复位
8	V _{SS}	地	16	V _{DD}	电源

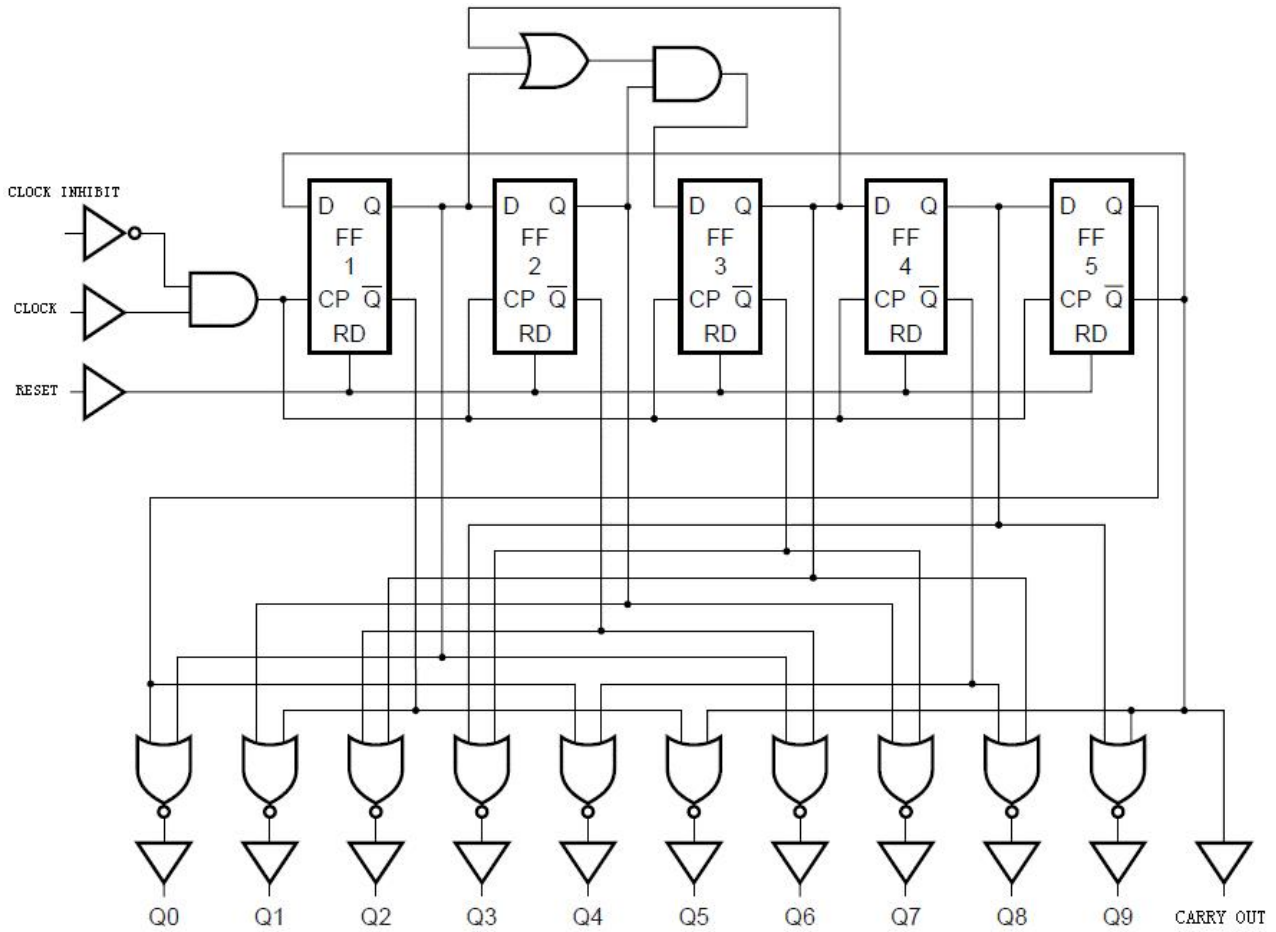
功能框图



逻辑符号



逻辑图

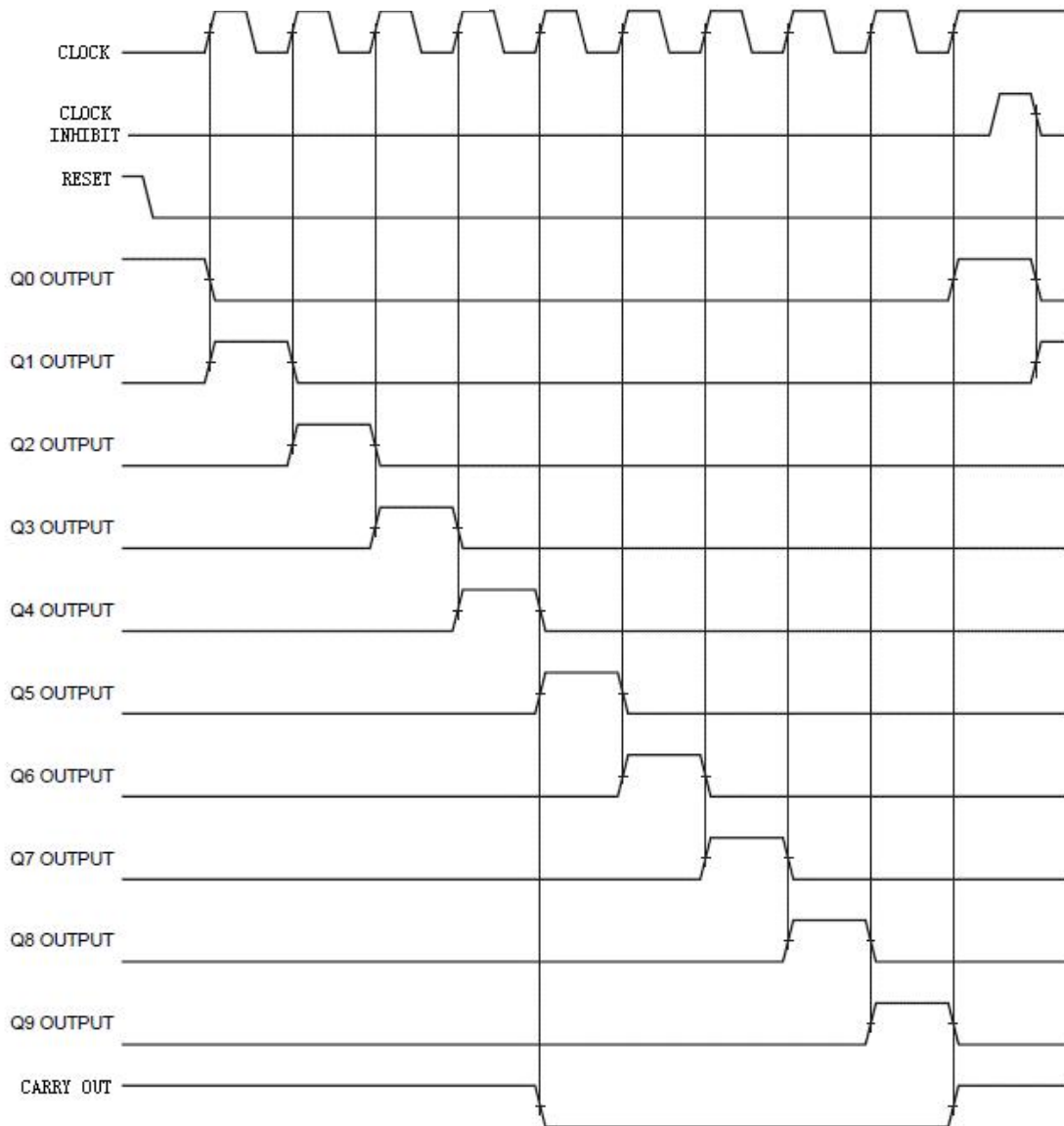


真值表

RESET	CLOCK	CLOCK INHIBIT	功能
H	X	X	Q0=CARRY OUT=H; Q0-Q9=L
L	H	↓	计数器进位
L	↑	L	计数器进位
L	L	X	没有变化
L	X	H	没有变化
L	H	↑	没有变化
L	↓	L	没有变化

注：H 为高电平电压，L 为低电平电压，X 为忽略不计，↑ 为上升沿，↓ 下降沿

时序图



电特性

极限参数 (除非另有规定, $T_{amb}=25^{\circ}C$)

参数名称	符号	条件	额定值	单位	
电源电压	V_{DD}		-0.5~20	V	
输入电压	V_I		-0.5~ $V_{DD}+0.5$	V	
输入输出电流	$\pm I$		± 10	mA	
功耗	P_D	$T_{amb} = -40 \text{ to } +85^{\circ}C$	500	mW	
输出功率	P		100	mW	
工作环境温度	T_{amb}		-40~+85	$^{\circ}C$	
贮存温度	T_{stg}		-65~+150	$^{\circ}C$	
焊接温度	T_L	10 秒	DIP 封装电路	245	$^{\circ}C$
			SOP 封装电路	250	

推荐使用条件 (除非另有规定, $T_{amb}=25^{\circ}\text{C}$)

参数名称	VDD (V)	最小	最大	单位
工作电压		3	18	V
抑制时钟设置时间 T_s	5	230		ns
	10	100		
	15	70		
脉冲宽度, T_w	5	200		ns
	10	90		
	15	60		
时钟输入频率, f_{CL}	5		2.5	MHz
	10		5	
	15		5.5	
复位脉宽 t_{RW}	5	260		ns
	10	110		
	15	60		
复位清除时间 t_{rem}	5	400		ns
	10	280		
	15	150		
时钟上升/下降时间, t_{rCL}, t_{fCL}	5	无限制		
	10			
	15			

 直流电气特性 (除非另有规定, $V_{SS}=0V$, $T_{amb}=-40^{\circ}\text{C}$ 。)

参数名称	符号	测试条件	最小	典型	最大	单位
静态电流(最大)	I_{DD}	$V_I=V_{SS}$ 或 V_{DD} ; $I_O=0$	$V_{DD}=5V$		5	μA
			$V_{DD}=10V$		10	
			$V_{DD}=15V$		20	
输出低电平电压	V_{OL}	$V_I=V_{SS}$ 或 V_{DD} , $ I_O < 1\mu A$	$V_{DD}=5V$		0.05	V
			$V_{DD}=10V$		0.05	
			$V_{DD}=15V$		0.05	
输出高电平电压	V_{OH}	$V_I=V_{SS}$ 或 V_{DD} , $ I_O < 1\mu A$	$V_{DD}=5V$	4.95		V
			$V_{DD}=10V$	9.95		
			$V_{DD}=15V$	14.95		
输入低电平	V_{IL}	$V_O=0.5V$ 或 $4.5V$, $ I_O < 1\mu A$	$V_{DD}=5V$		1.5	V
		$V_O=1.0V$ 或 $9.0V$, $ I_O < 1\mu A$	$V_{DD}=10V$		3.0	
		$V_O=1.5V$ 或 $13.5V$, $ I_O < 1\mu A$	$V_{DD}=15V$		4.0	
输入高电平	V_{IH}	$V_O=0.5V$ 或 $4.5V$, $ I_O < 1\mu A$	$V_{DD}=5V$	3.5		V
		$V_O=1.0V$ 或 $9.0V$, $ I_O < 1\mu A$	$V_{DD}=10V$	7.0		
		$V_O=1.5V$ 或 $13.5V$, $ I_O < 1\mu A$	$V_{DD}=15V$	11.0		

输出低电平电流	I _{OL}	V _O =0.4V , V _I =0 或 5V	V _{DD} =5V	0.61		mA	
		V _O =0.5V , V _I =0 或 10V	V _{DD} =10V	1.5			
		V _O =1.5V , V _I =0 或 15V	V _{DD} =15V	4			
输出高电平电流	I _{OH}	V _O =4.6V , V _I =0 或 5V	V _{DD} =5V	-0.61		mA	
		V _O =9.5V , V _I =0 或 10V	V _{DD} =10V	-1.5			
		V _O =13.5V , V _I =0 或 15V	V _{DD} =15V	-4			
		V _O =2.5V , V _I =0 或 5V	V _{DD} =5V	-1.8			
输入漏电流	I _{IN}	V _{IN} =0 或 18V , V _{DD} =18V	V _{DD} =15V			±0.1	μA

(除非另有规定, V_{SS}=0V , T_{amb}=25℃。)

参数名称	符号	测试条件	最小	典型	最大	单位	
静态电流	I _{DD}	V _I =V _{SS} 或 V _{DD} ; I _O =0	V _{DD} =5V	0.04	5	μA	
			V _{DD} =10V	0.04	10		
			V _{DD} =15V	0.04	20		
输出低电平电压	V _{OL}	V _I =V _{SS} 或 V _{DD} , I _O <1μA	V _{DD} =5V	0	0.05	V	
			V _{DD} =10V	0	0.05		
			V _{DD} =15V	0	0.05		
输出高电平电压	V _{OH}	V _I =V _{SS} 或 V _{DD} , I _O <1μA	V _{DD} =5V	4.95	5	V	
			V _{DD} =10V	9.95	10		
			V _{DD} =15V	14.95	15		
输入低电平	V _{IL}	V _O =0.5V 或 4.5V, I _O <1μA	V _{DD} =5V		1.5	V	
		V _O =1.0V 或 9.0V, I _O <1μA	V _{DD} =10V		3.0		
		V _O =1.5V 或 13.5V, I _O <1μA	V _{DD} =15V		4.0		
输入高电平	V _{IH}	V _O =0.5V 或 4.5V, I _O <1μA	V _{DD} =5V	3.5		V	
		V _O =1.0V 或 9.0V, I _O <1μA	V _{DD} =10V	7.0			
		V _O =1.5V 或 13.5V, I _O <1μA	V _{DD} =15V	11.0			
输出低电平电流	I _{OL}	V _O =0.4V , V _I =0 或 5V	V _{DD} =5V	0.51	1	mA	
		V _O =0.5V , V _I =0 或 10V	V _{DD} =10V	1.3	2.6		
		V _O =1.5V , V _I =0 或 15V	V _{DD} =15V	3.4	6.8		
输出高电平电流	I _{OH}	V _O =4.6V , V _I =0 或 5V	V _{DD} =5V	-0.51	-1	mA	
		V _O =9.5V , V _I =0 或 10V	V _{DD} =10V	-1.3	-2.6		
		V _O =13.5V , V _I =0 或 15V	V _{DD} =15V	-3.4	-6.8		
		V _O =2.5V , V _I =0 或 5V	V _{DD} =5V	-1.6	-3.2		
输入漏电流	I _{IN}	V _{IN} =0 或 18V , V _{DD} =18V	V _{DD} =15V			±0.1	μA

(除非另有规定, $V_{SS}=0V$, $T_{amb}=85^{\circ}C$ 。)

参数名称	符号	测试条件	最小	典型	最大	单位
静态电流(最大)	I_{DD}	$V_I=V_{SS}$ 或 V_{DD} ; $I_O=0$	$V_{DD}=5V$		150	μA
			$V_{DD}=10V$		300	
			$V_{DD}=15V$		600	
输出低电平电压	V_{OL}	$V_I=V_{SS}$ 或 V_{DD} , $ I_O < 1\mu A$	$V_{DD}=5V$		0.05	V
			$V_{DD}=10V$		0.05	
			$V_{DD}=15V$		0.05	
输出高电平电压	V_{OH}	$V_I=V_{SS}$ 或 V_{DD} , $ I_O < 1\mu A$	$V_{DD}=5V$	4.95		V
			$V_{DD}=10V$	9.95		
			$V_{DD}=15V$	14.95		
输入低电平	V_{IL}	$V_O=0.5V$ 或 $4.5V$, $ I_O < 1\mu A$	$V_{DD}=5V$		1.5	V
		$V_O=1.0V$ 或 $9.0V$, $ I_O < 1\mu A$	$V_{DD}=10V$		3.0	
		$V_O=1.5V$ 或 $13.5V$, $ I_O < 1\mu A$	$V_{DD}=15V$		4.0	
输入高电平	V_{IH}	$V_O=0.5V$ 或 $4.5V$, $ I_O < 1\mu A$	$V_{DD}=5V$	3.5		V
		$V_O=1.0V$ 或 $9.0V$, $ I_O < 1\mu A$	$V_{DD}=10V$	7		
		$V_O=1.5V$ 或 $13.5V$, $ I_O < 1\mu A$	$V_{DD}=15V$	11		
输出低电平电流	I_{OL}	$V_O=0.4V$, $V_I=0$ 或 $5V$	$V_{DD}=5V$	0.42		mA
		$V_O=0.5V$, $V_I=0$ 或 $10V$	$V_{DD}=10V$	1.1		
		$V_O=1.5V$, $V_I=0$ 或 $15V$	$V_{DD}=15V$	2.8		
输出高电平电流	I_{OH}	$V_O=4.6V$, $V_I=0$ 或 $5V$	$V_{DD}=5V$	-0.42		mA
		$V_O=9.5V$, $V_I=0$ 或 $10V$	$V_{DD}=10V$	-1.1		
		$V_O=13.5V$, $V_I=0$ 或 $15V$	$V_{DD}=15V$	-2.8		
		$V_O=2.5V$, $V_I=0$ 或 $5V$	$V_{DD}=5V$	-1.3		mA
输入漏电流	I_{IN}	$V_{IN}=0$ 或 $18V$, $V_{DD}=18V$	$V_{DD}=15V$		± 1	μA

交流电气特性 (除非另有规定, $T_{amb}=25^{\circ}C$, $CL=50pF$, $Input\ tr = tf = 20ns$, $RL=200K\Omega$;))

参数	条件	最小值	典型值	最大值	单位
传输延时时间 t_{PHL} , t_{PLH} 译码输出	$V_{DD}=5V$		325	650	ns
	$V_{DD}=10V$		135	270	ns
	$V_{DD}=15V$		85	170	ns
进位输出	$V_{DD}=5V$		300	600	ns
	$V_{DD}=10V$		125	250	ns
	$V_{DD}=15V$		80	160	ns
最小的抑制时钟设置时间, t_s	$V_{DD}=5V$		115	230	ns
	$V_{DD}=10V$		50	100	ns
	$V_{DD}=15V$		35	70	ns

最小时钟脉冲宽度 T_w	$V_{DD}=5V$		100	200	ns
	$V_{DD}=10V$		45	90	ns
	$V_{DD}=15V$		30	60	ns
爬波时间 t_{THL}, t_{TLH} 进位输出或者译码输出	$V_{DD}=5V$		100	200	ns
	$V_{DD}=10V$		50	100	ns
	$V_{DD}=15V$		40	80	ns
最大时钟输入的上升或下降时间 t_{rCL}, t_{fCL}	$V_{DD}=5V$	无限制			ns
	$V_{DD}=10V$				ns
	$V_{DD}=15V$				ns
最大时钟输入频率, f_{CL}	$V_{DD}=5V$	2.5	5		MHz
	$V_{DD}=10V$	5	10		MHz
	$V_{DD}=15V$	5.5	11		MHz
输入电容 C_{IN}	任意口		5		pF
复位操作					
传输延时时间 t_{PHL}, t_{PLH} 进位输出或者译码输出	$V_{DD}=5V$		265	530	ns
	$V_{DD}=10V$		115	230	ns
	$V_{DD}=15V$		85	170	ns
最小的复位脉宽, t_w	$V_{DD}=5V$		130	260	ns
	$V_{DD}=10V$		55	110	ns
	$V_{DD}=15V$		30	60	ns
最小复位清除时间	$V_{DD}=5V$		200	400	ns
	$V_{DD}=10V$		140	280	ns
	$V_{DD}=15V$		75	150	ns

波形图

交流参数测试图

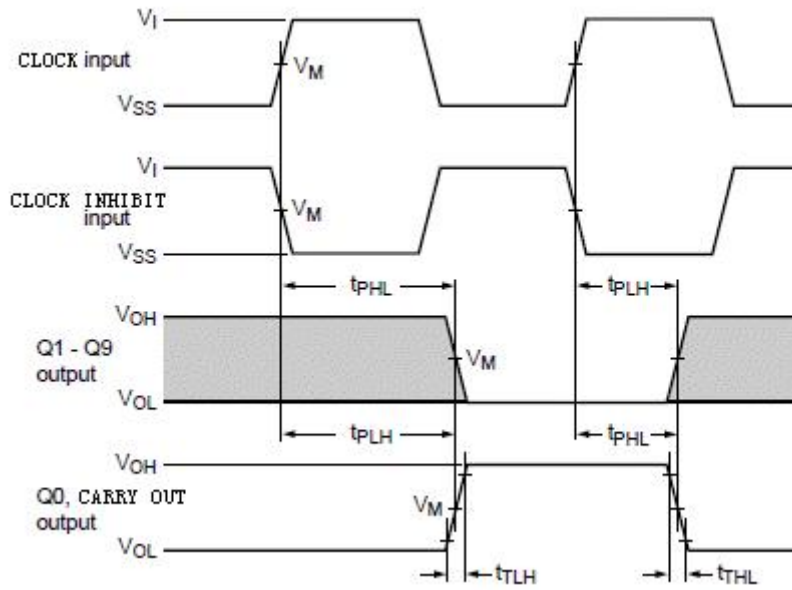


图 1

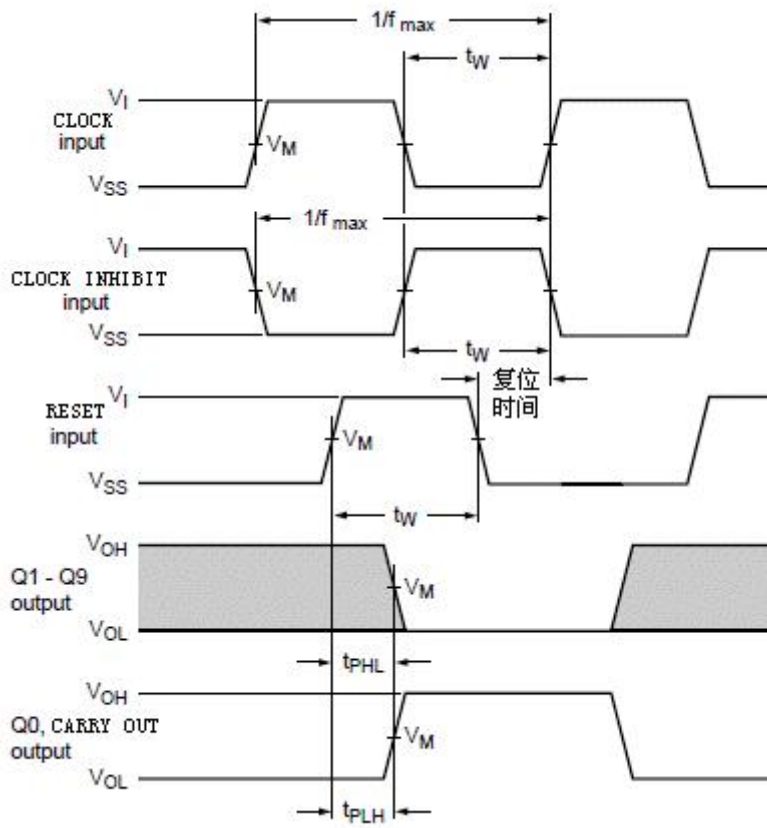


图 2

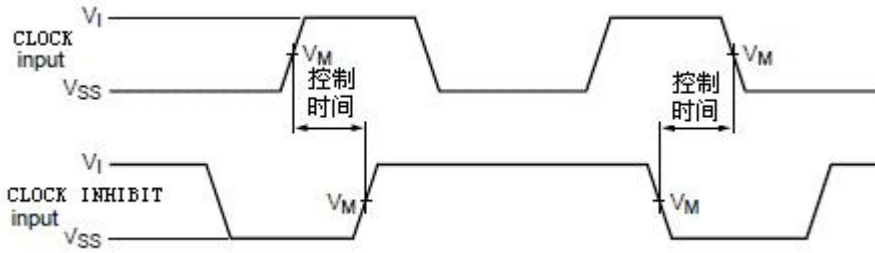


图 3

说明: 图 1~图 3 中 $V_{DD}=5\sim 15V$, 输入 $V_M=0.5V_{DD}$, 输出 $V_M=0.5V_{DD}$

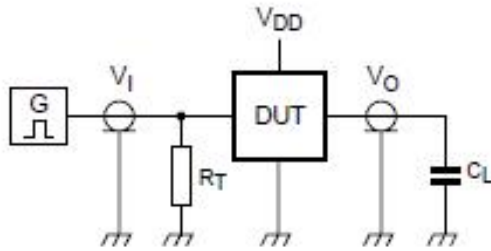
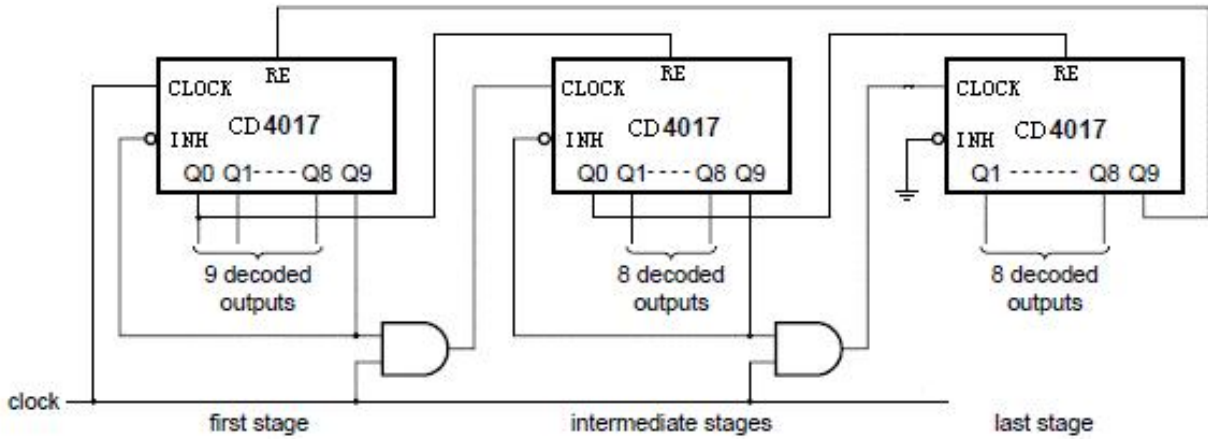


图 4 测试电路

说明: 图 4 中 $V_{DD}=5\sim 15V$, 输入 $V_I=V_{DD}$ 或者 V_{SS} , 输入 $t_r = t_f \leq 20ns$, $C_L=50pF$ 。

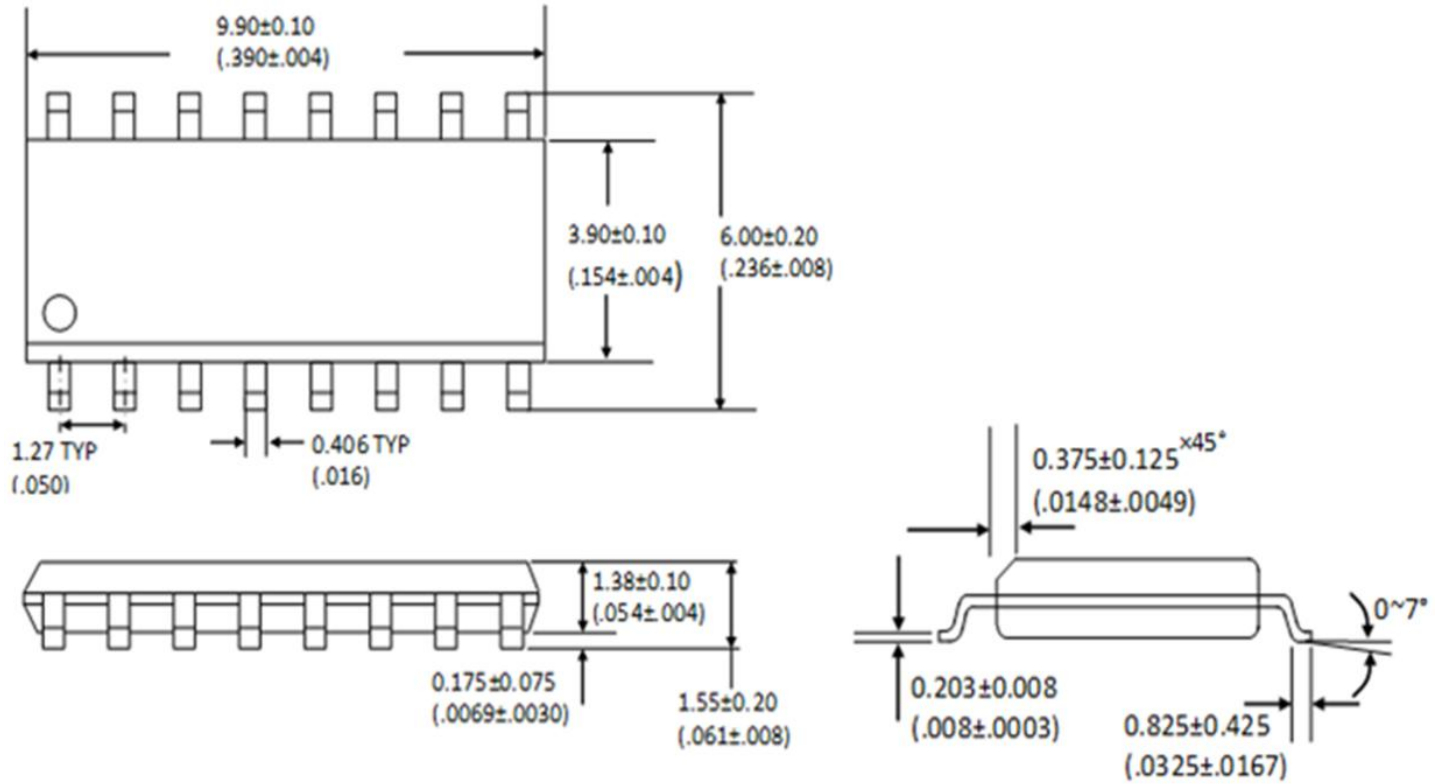
典型应用线路

应用电路图



扩展计数器

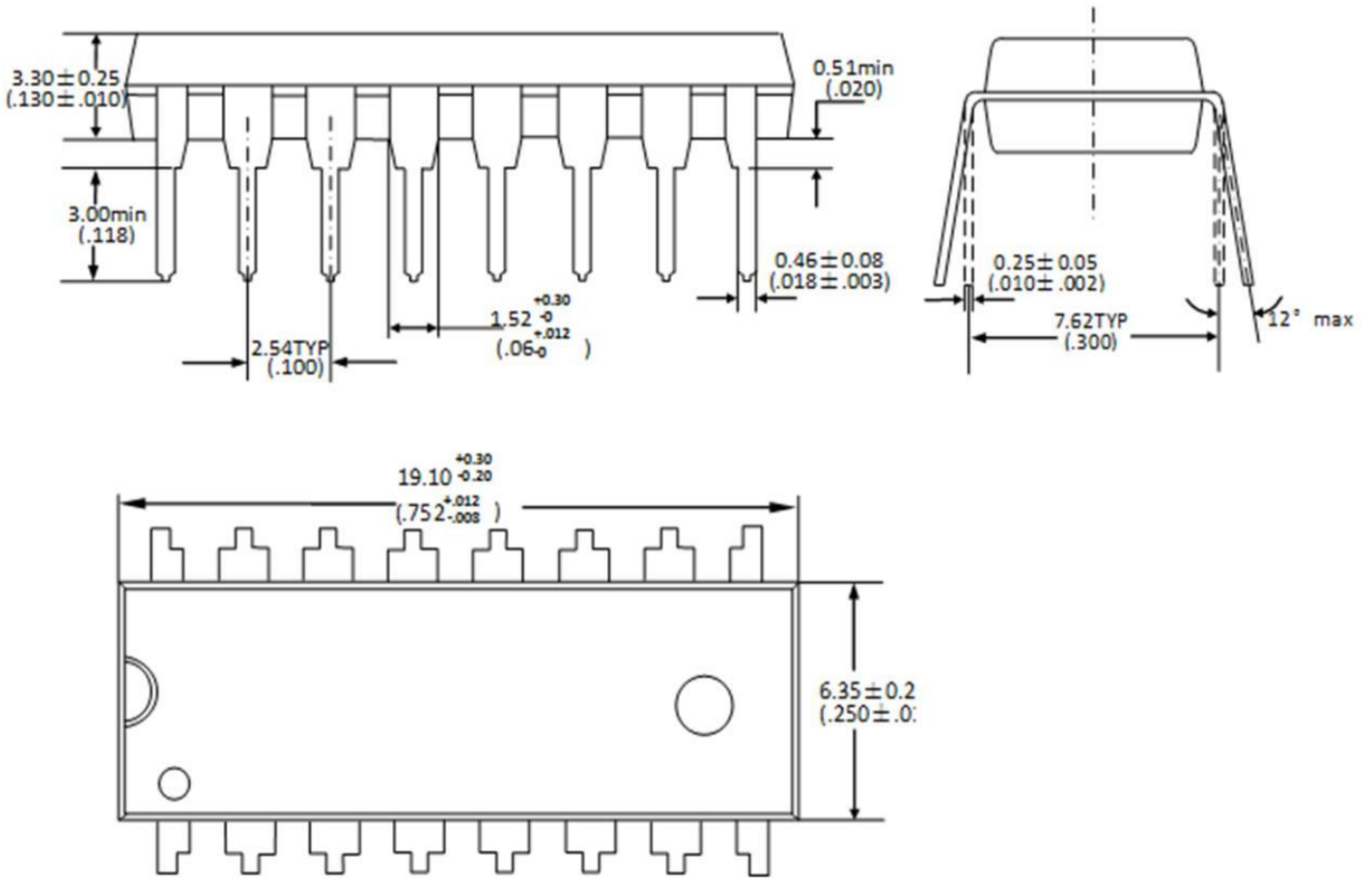
SOP-16 包装数据



卷轴规格

P/N	PKG	QTY
CD4017BM-MS	SOP-16	2500

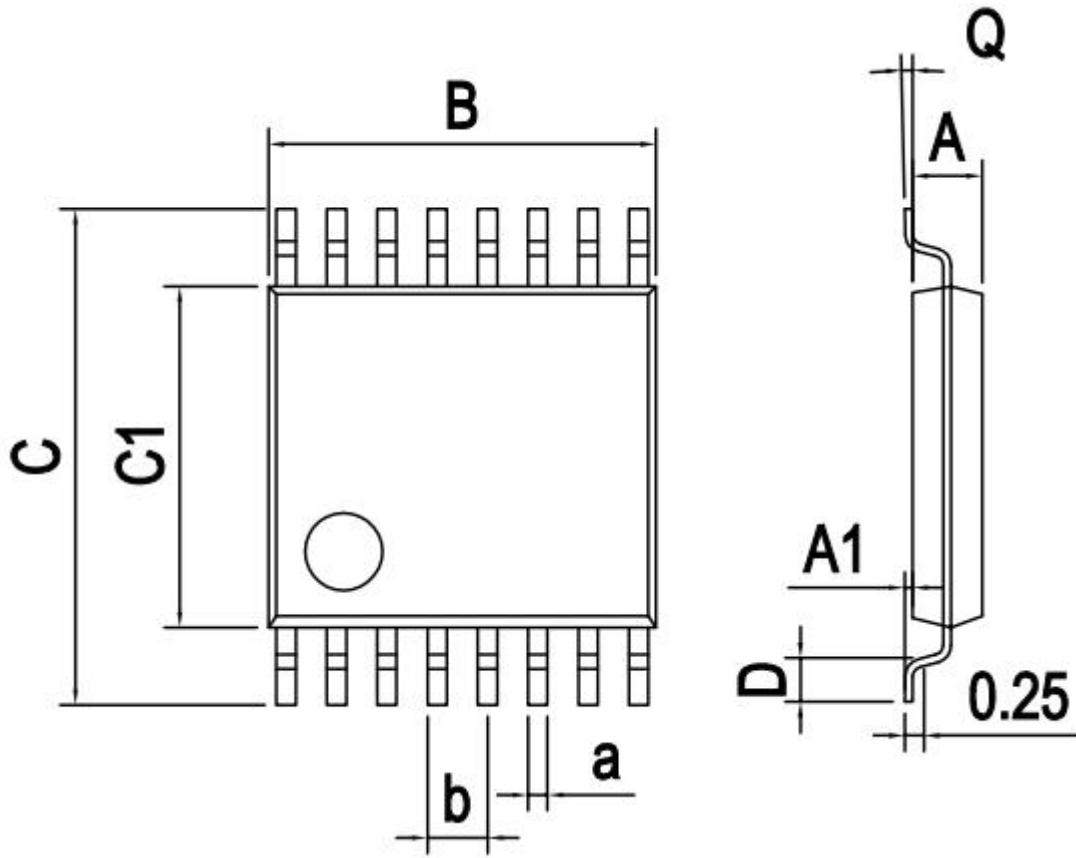
DIP-16 包装数据



卷轴规格

P/N	PKG	QTY
CD4017BE-MS	DIP-16	1000

TSSOP-16 包装数据



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	0.800	1.000	D	0.400	0.850
A1	0.050	0.150	Q	0°	8°
B	4.900	5.100	a	0.240 TYP	
C	6.250	6.550	b	0.650 TYP	
C1	4.300	4.500			

卷轴规格

P/N	PKG	QTY
CD4017BMT-MS	TSSOP-16	2500

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