

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

CD4017

产品规格手册


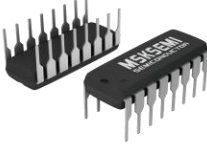
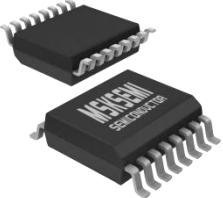
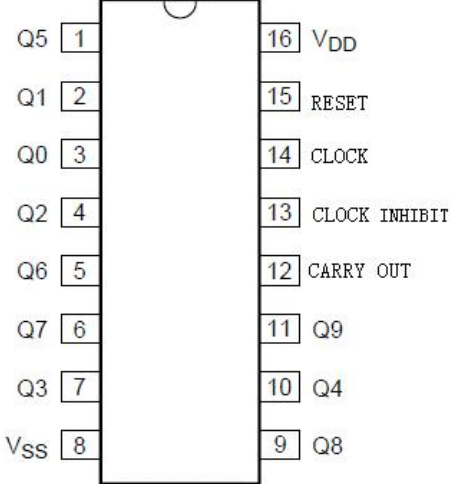
概述

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

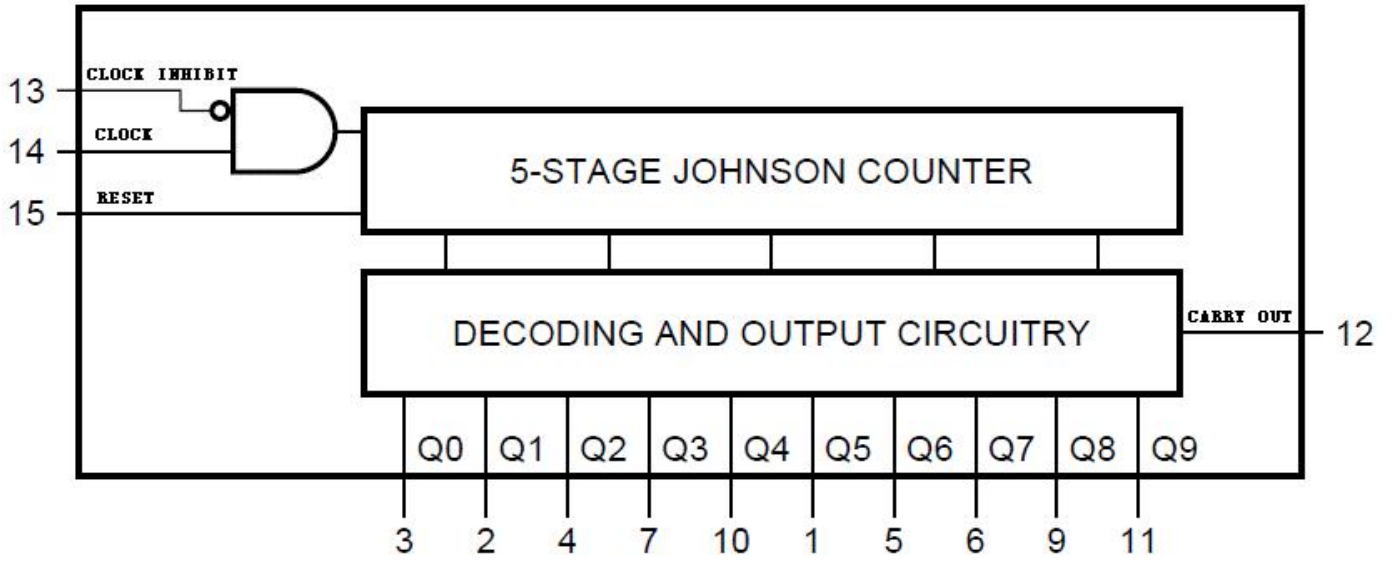
参考消息

封装图			引脚排列图
			
SOP-16	DIP-16	TSSOP-16	管脚排列

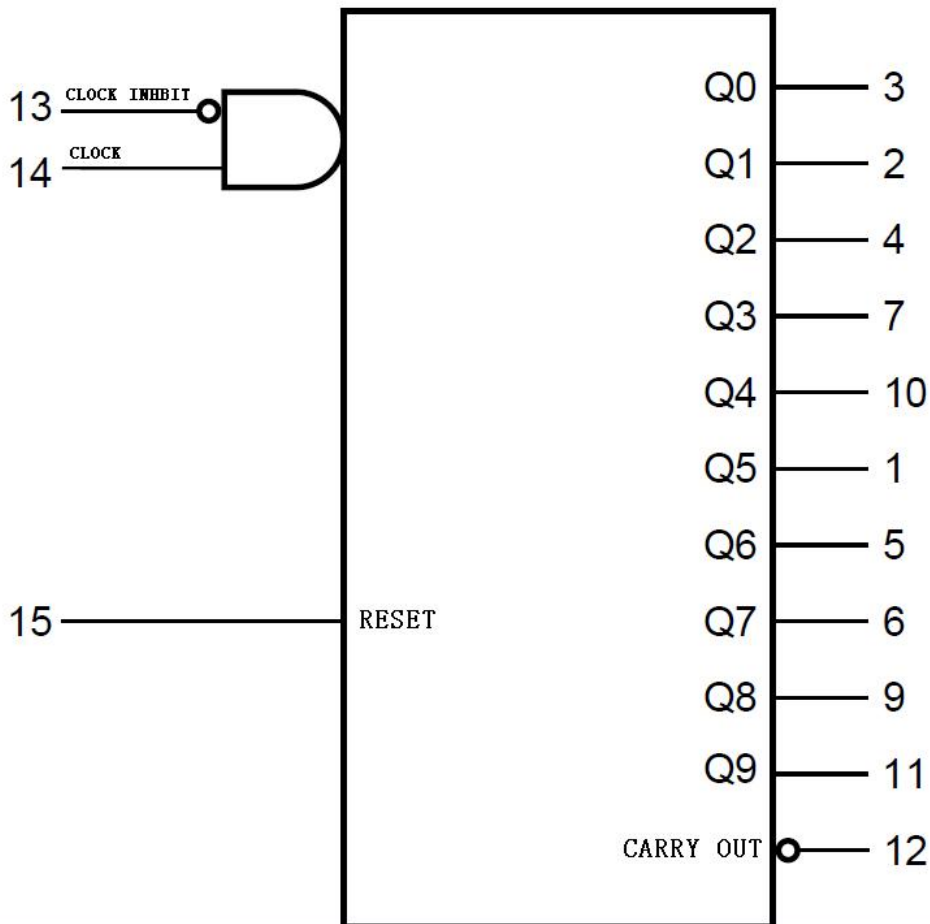
引脚说明

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

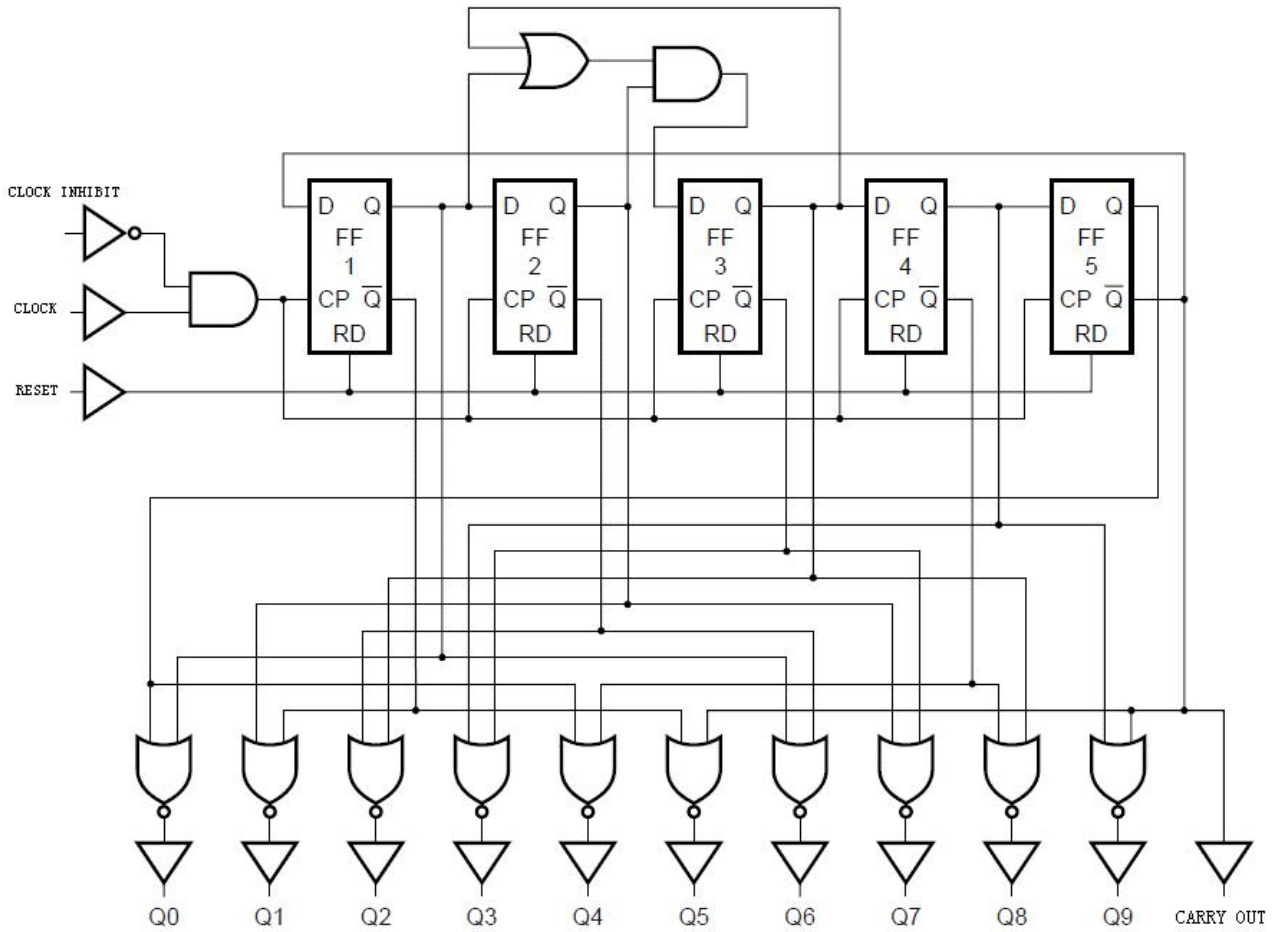
功能框图



逻辑符号



逻辑图

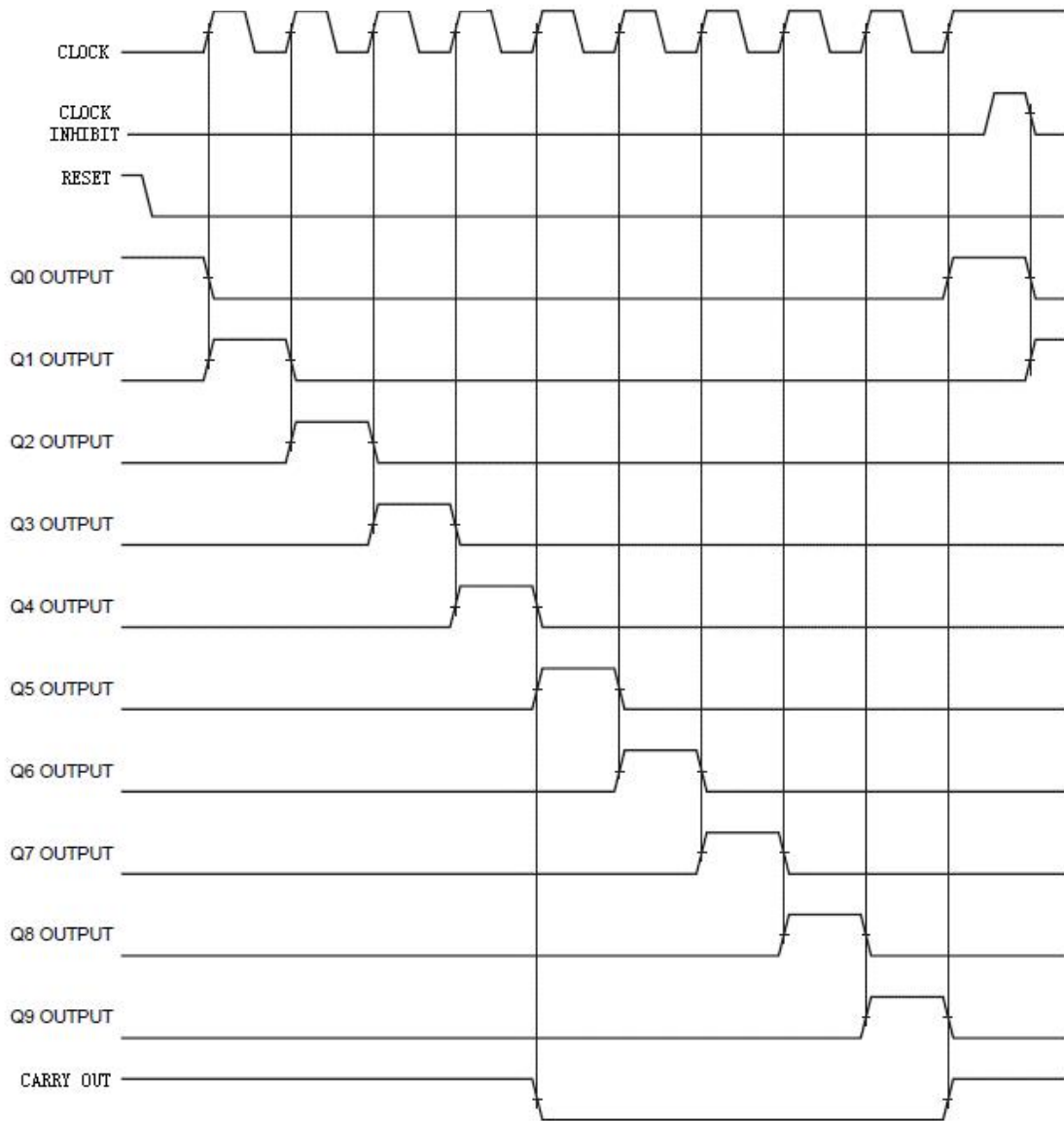


真值表

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

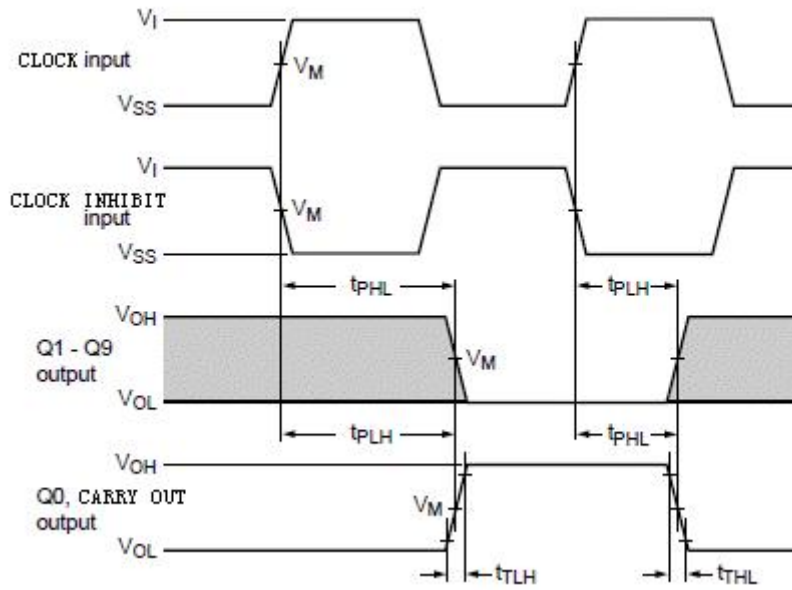


图 1

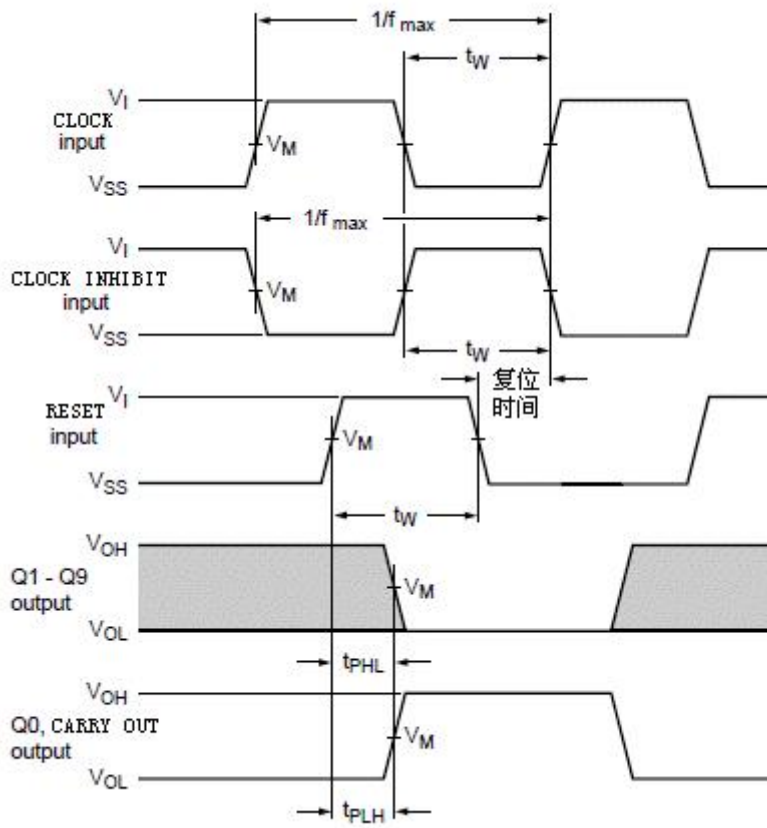


图 2

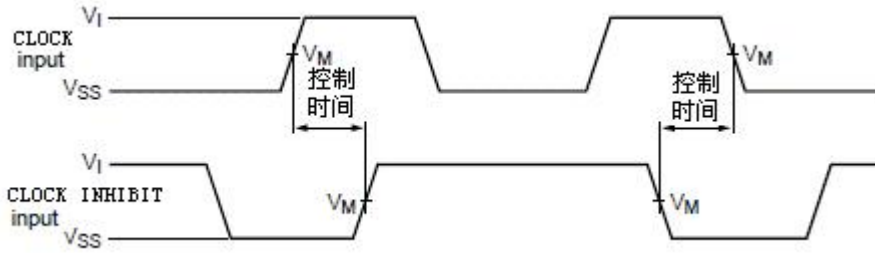


图 3

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

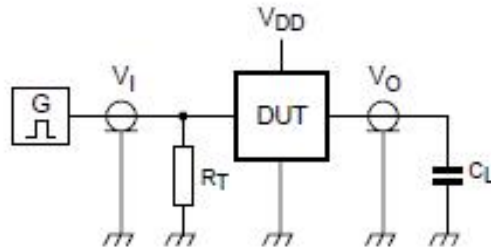
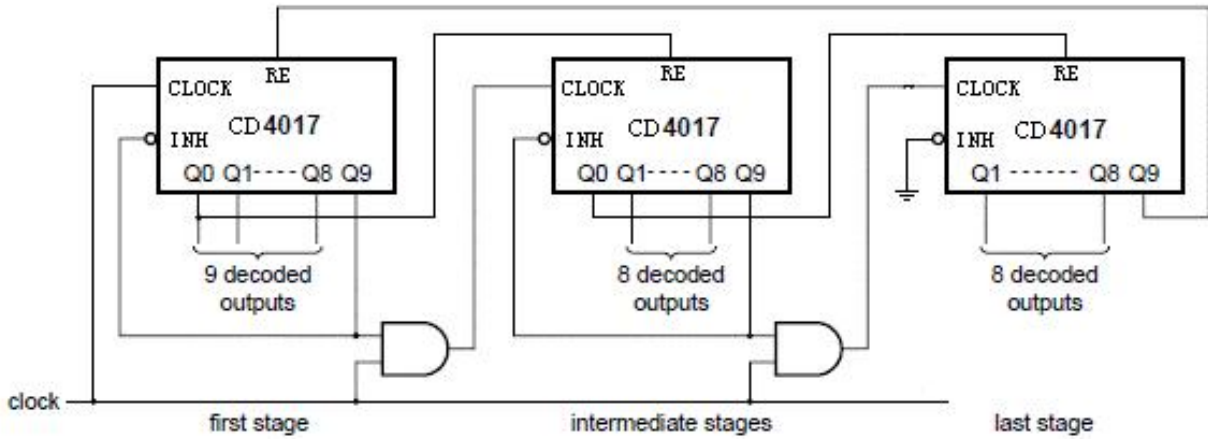


图 4 测试电路

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

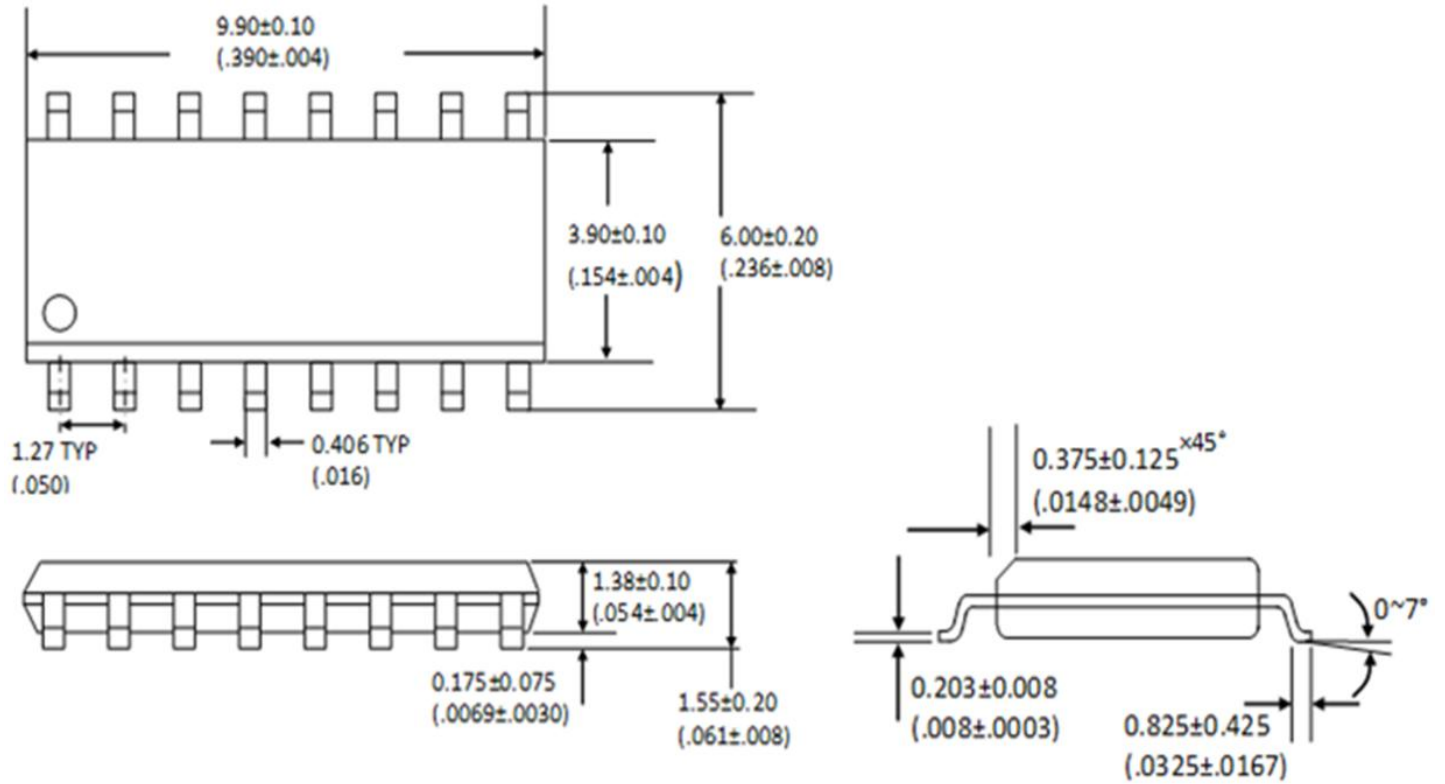
典型应用线路

应用电路图



扩展计数器

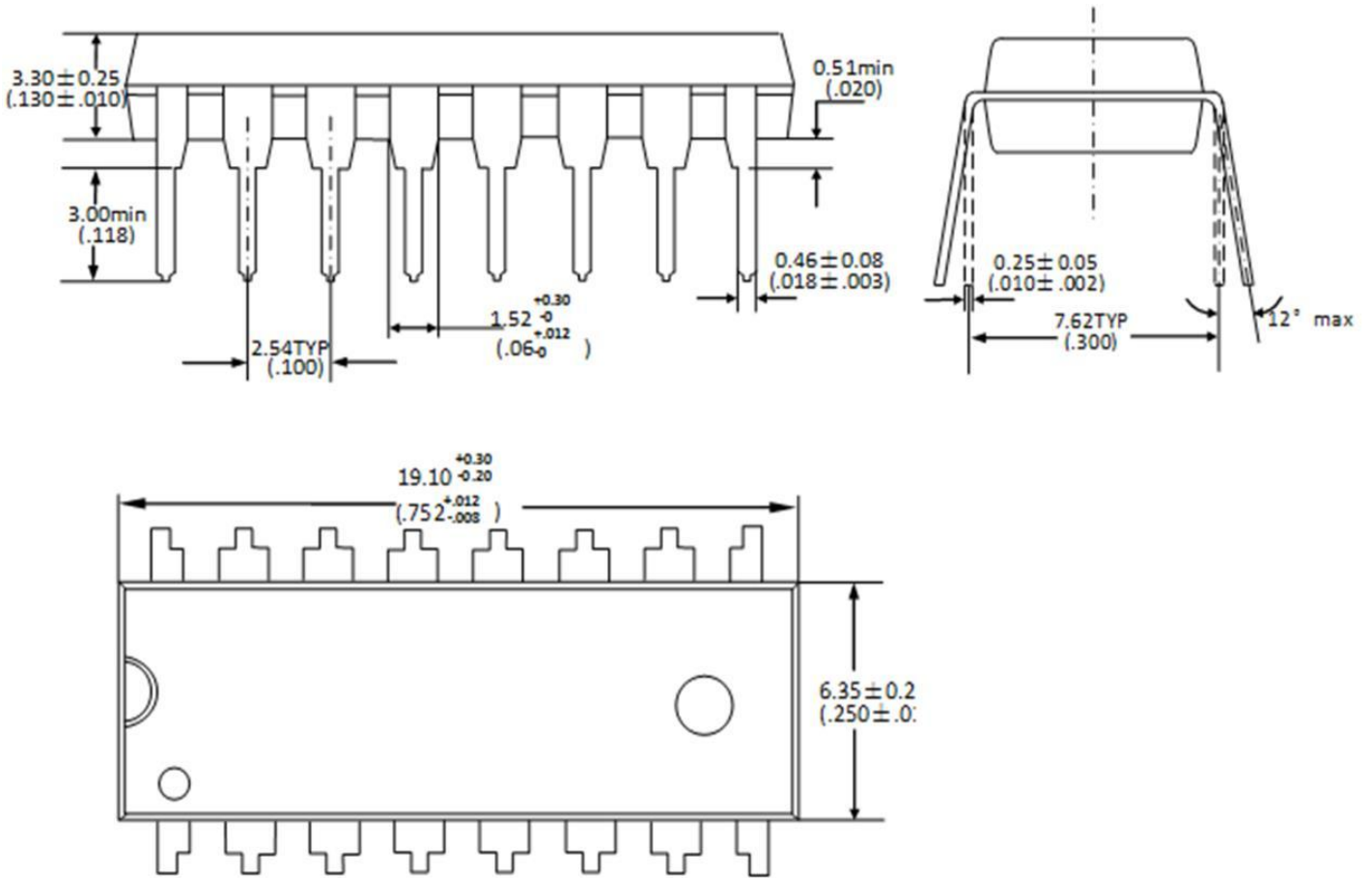
SOP-16 包装数据



卷轴规格

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

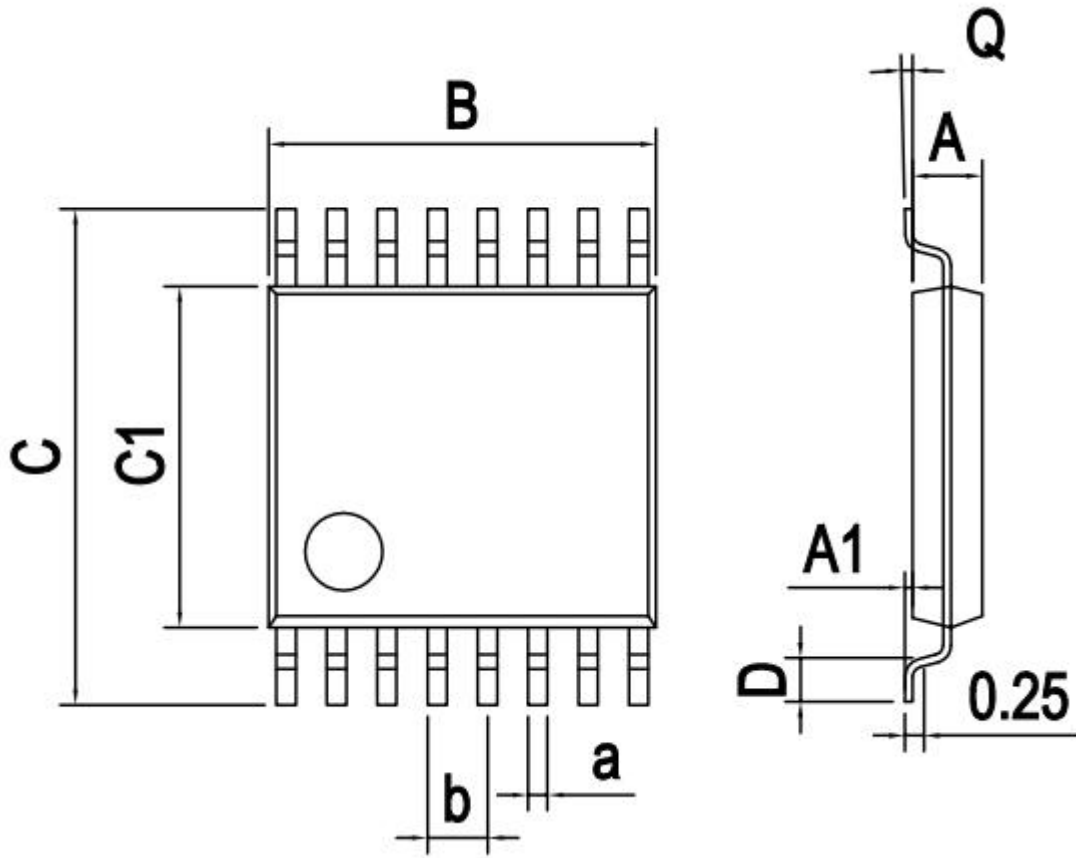
DIP-16 包装数据



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

Attention

- Any and all MSKSEMI Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your MSKSEMI Semiconductor representative nearest you before using any MSKSEMI Semiconductor products described or contained herein in such applications.
- MSKSEMI Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all MSKSEMI Semiconductor products described or contained herein.
- Specifications of any and all MSKSEMI Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- MSKSEMI Semiconductor strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all MSKSEMI Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of MSKSEMI Semiconductor.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. MSKSEMI Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringement of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the MSKSEMI Semiconductor product that you intend to use.