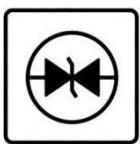




ESD



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

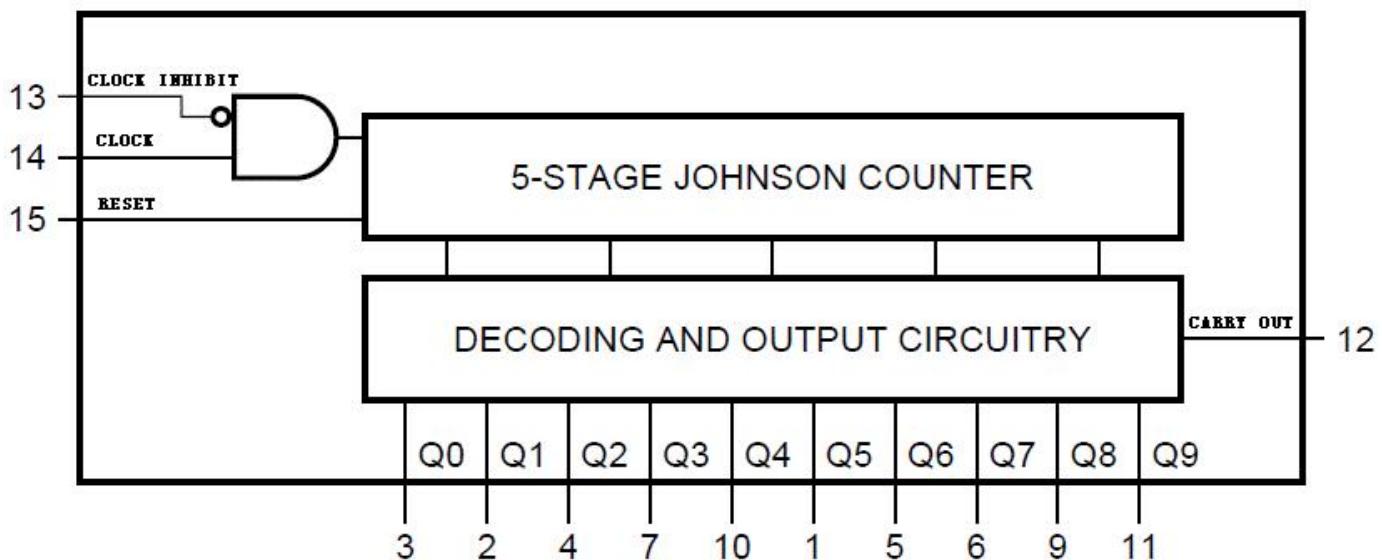
参考消息

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

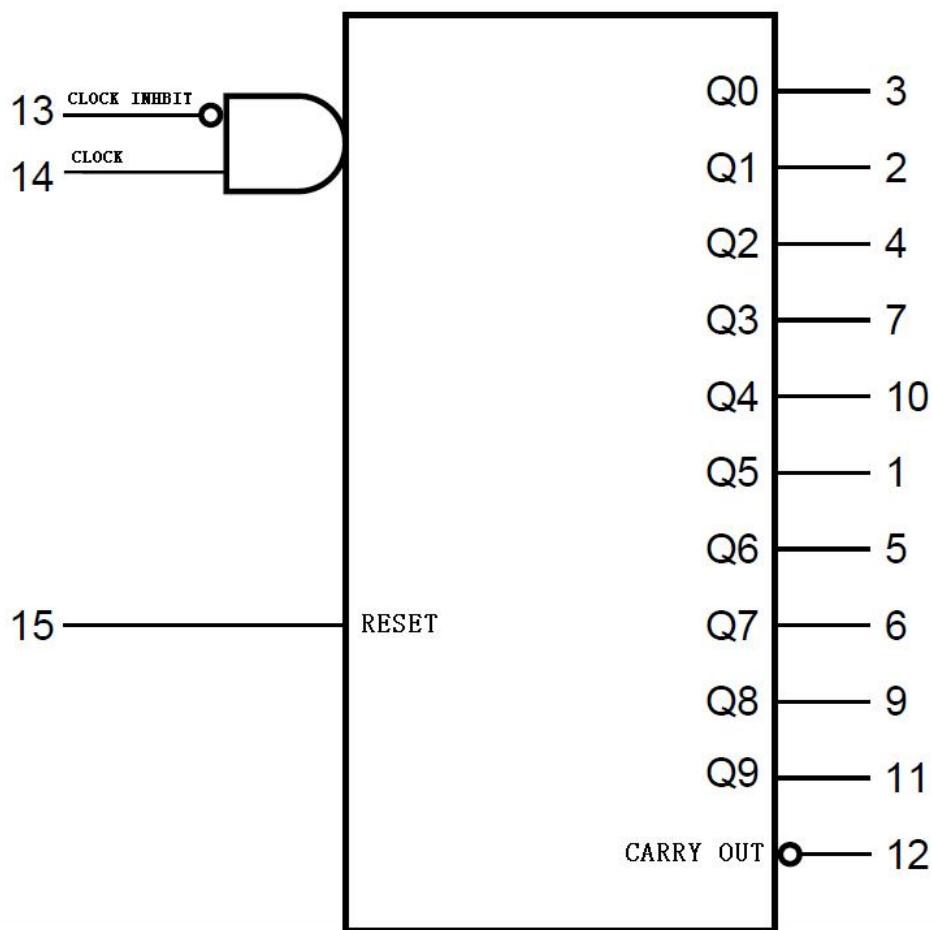
引脚说明

| 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 |

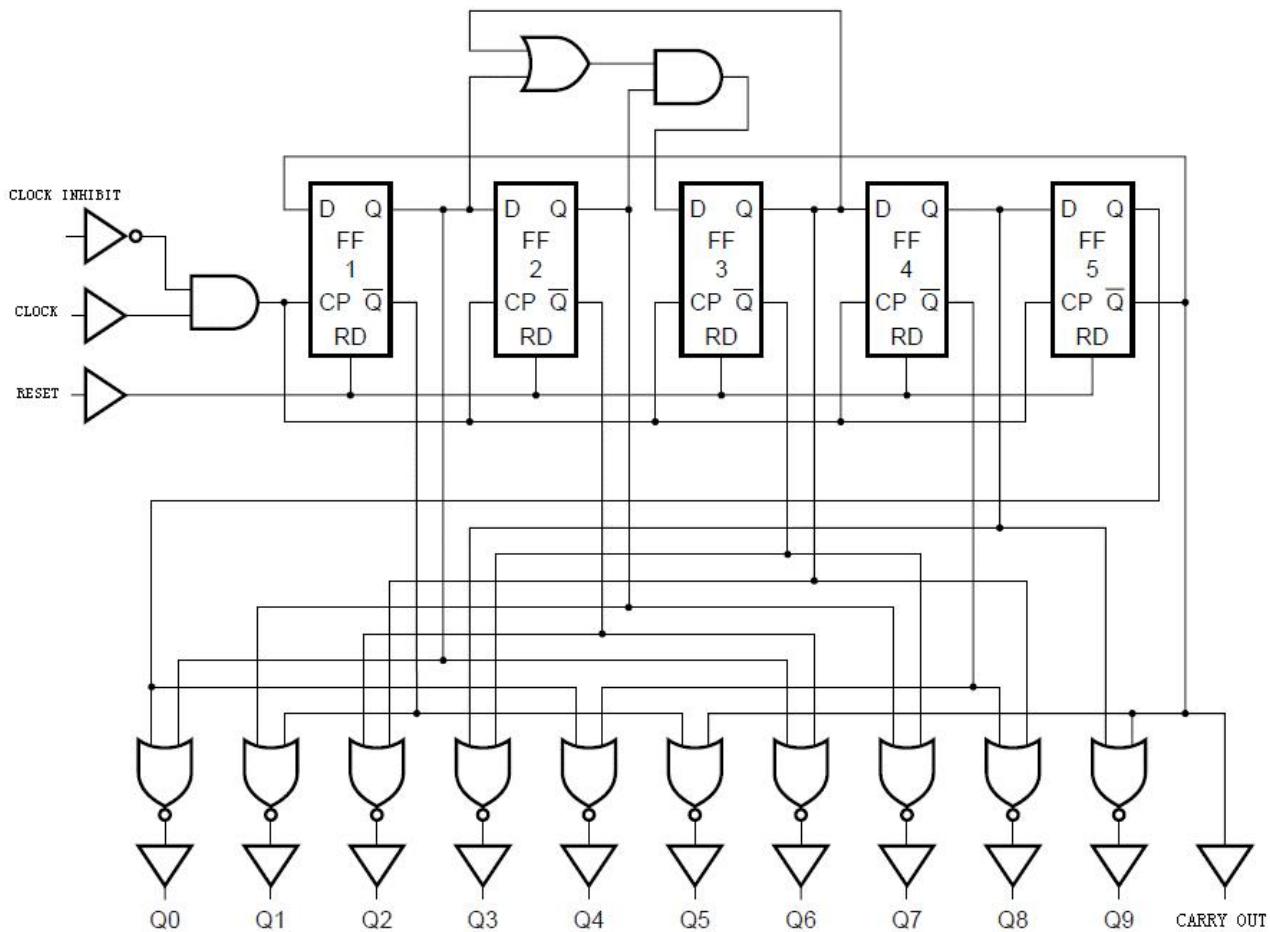
功能框图



逻辑符号



逻辑图

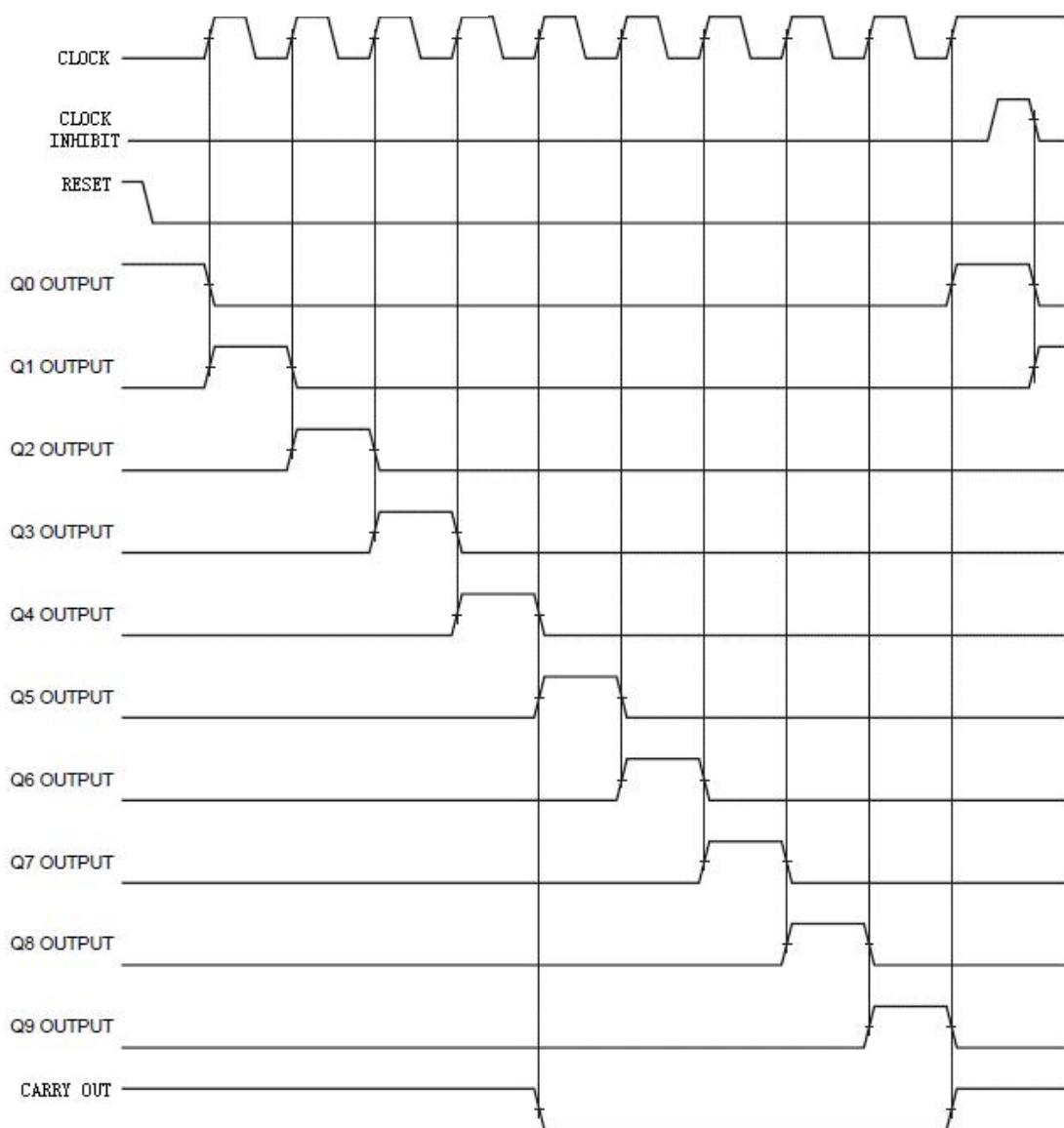


真值表

| RESET | CLOCK | CLOCK INHIBIT | 功能 |
|-------|-------|---------------|---|
| H | X | X | $Q_0 = \text{CARRY OUT} = H; Q_0 - Q_9 = L$ |
| 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, Tamb=25°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 | ±I | | ± 10 | mA |
| 功耗 | P _D | Tamb = -40 to +85°C | 500 | mW |
| 输出功耗 | P | | 100 | mW |
| 工作环境温度 | T _{amb} | | -40~+85 | °C |
| 贮存温度 | T _{stg} | | -65~+150 | °C |
| 焊接温度 | T _L | 10 秒 | DIP 封装电路 | 245 |
| | | | SOP 封装电路 | 250 |
| | | | | °C |

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 | 无限制 | | | |
| | 15 | 无限制 | | | |

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

| 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$ | $V_{DD}=5\text{V}$ | | | 5 |
| | | | $V_{DD}=10\text{V}$ | | | 10 |
| | | | $V_{DD}=15\text{V}$ | | | 20 |
| 输出低电平电压 | V_{OL} | $V_I=V_{SS}$ 或 V_{DD} , $ I_O <1\mu\text{A}$ | $V_{DD}=5\text{V}$ | | | 0.05 |
| | | | $V_{DD}=10\text{V}$ | | | 0.05 |
| | | | $V_{DD}=15\text{V}$ | | | 0.05 |
| 输出高电平电压 | V_{OH} | $V_I=V_{SS}$ 或 V_{DD} , $ I_O <1\mu\text{A}$ | $V_{DD}=5\text{V}$ | 4.95 | | |
| | | | $V_{DD}=10\text{V}$ | 9.95 | | |
| | | | $V_{DD}=15\text{V}$ | 14.95 | | |
| 输入低电平 | V_{IL} | $V_O=0.5\text{V}$ 或 4.5V , $ I_O <1\mu\text{A}$ | $V_{DD}=5\text{V}$ | | | 1.5 |
| | | | $V_{DD}=10\text{V}$ | | | 3.0 |
| | | | $V_{DD}=15\text{V}$ | | | 4.0 |
| 输入高电平 | V_{IH} | $V_O=0.5\text{V}$ 或 4.5V , $ I_O <1\mu\text{A}$ | $V_{DD}=5\text{V}$ | 3.5 | | |
| | | | $V_{DD}=10\text{V}$ | 7.0 | | |
| | | | $V_{DD}=15\text{V}$ | 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 , Tamb=25°C。)

| 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 |
| | | | 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 _{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 _{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 _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 _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 | |
| | | 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 | |
| | | 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 | mA |
| 输入漏电流 | I _{IN} | V _{IN} =0 或 18V , V _{DD} =18V | V _{DD} =15V | | | ±0.1 |

(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 $18V$, $VDD=18V$ | $V_{DD}=15V$ | | ± 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} | $V_{DD}=5V$ | | 325 | 650 | ns |
| | $V_{DD}=10V$ | | 135 | 270 | ns |
| | $V_{DD}=15V$ | | 85 | 170 | ns |
| 译码输出 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

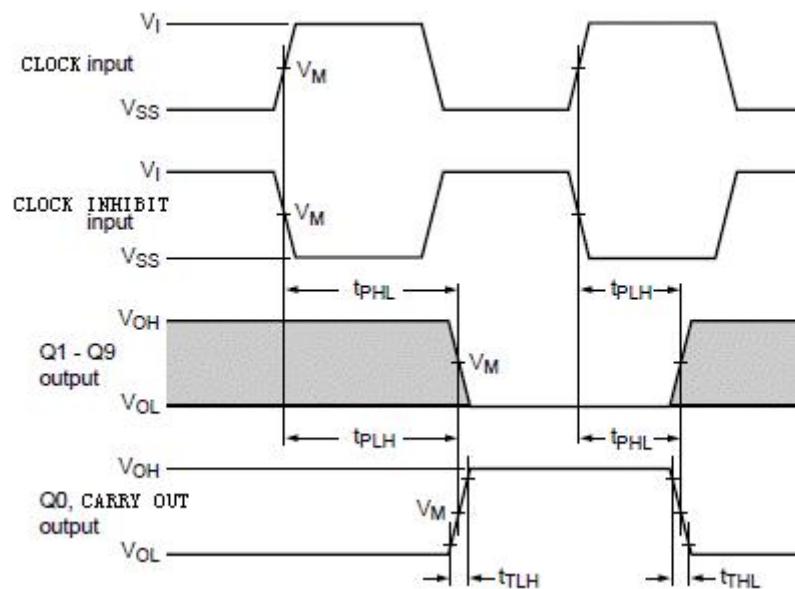


图 1

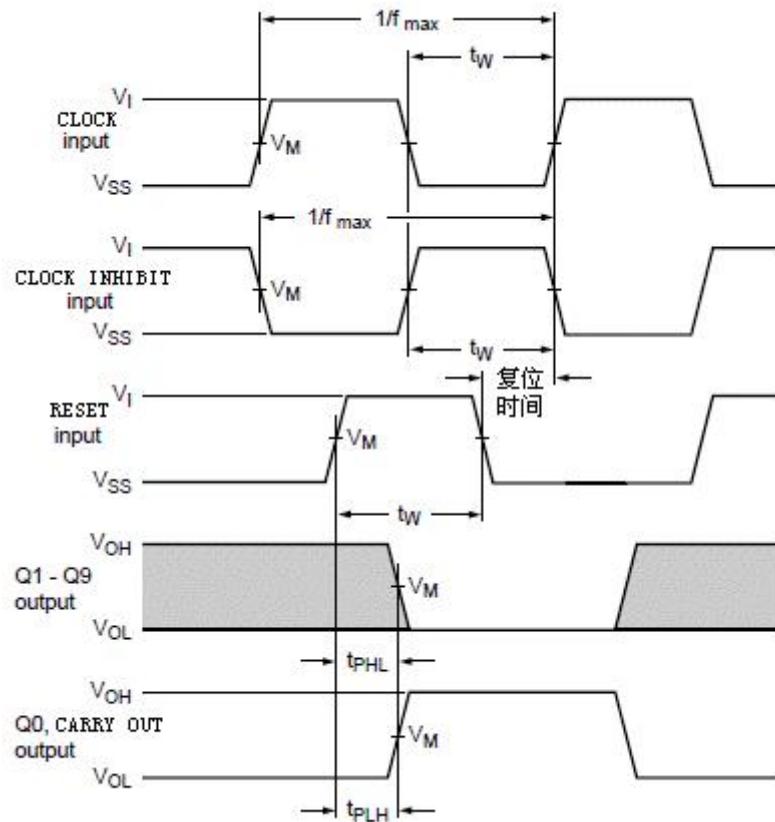


图 2

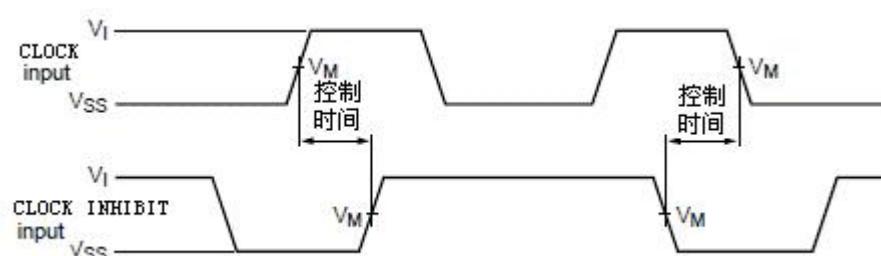


图 3

说明：图 1~图 3 中 $VDD=5\sim15V$, 输入 $VM=0.5VDD$, 输出 $VM=0.5VDD$

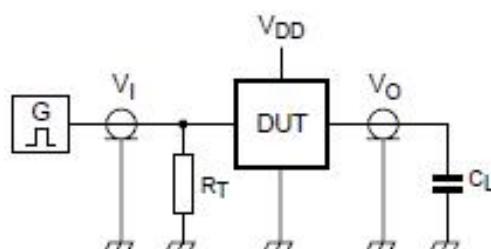
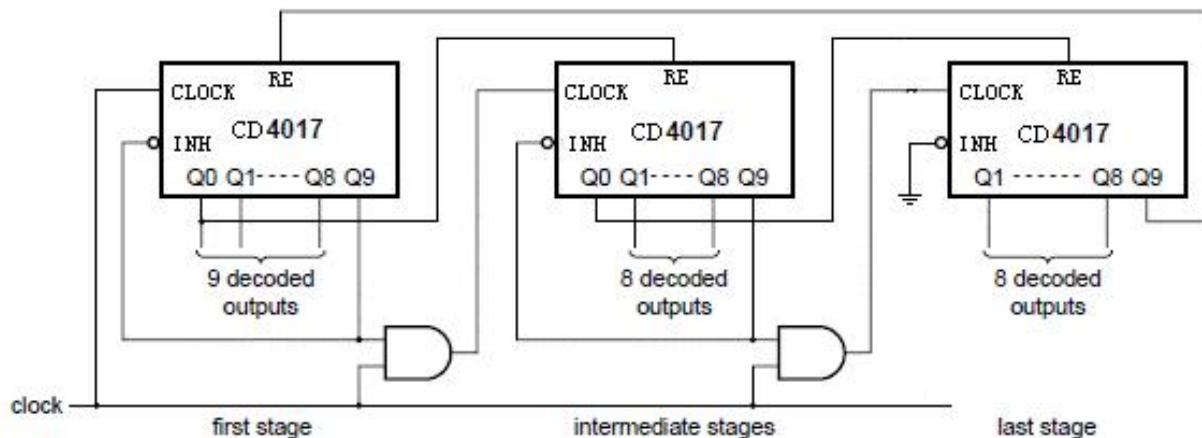


图 4 测试电路

说明：图 4 中 $VDD=5\sim15V$, 输入 $VI=VDD$ 或者 VSS , 输入 $tr = tf \leq 20ns$, $CL=50pF$ 。

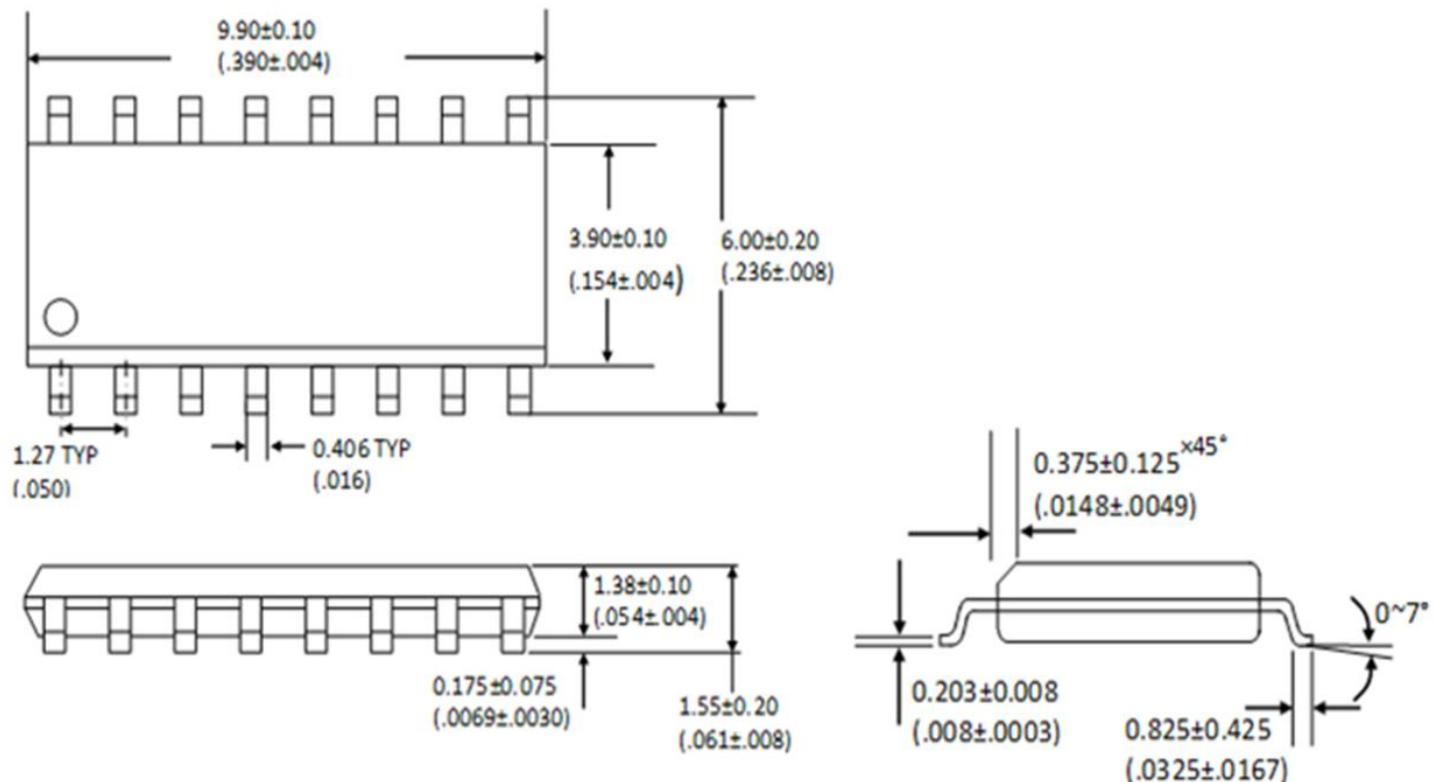
典型应用线路

应用电路图



扩展计数器

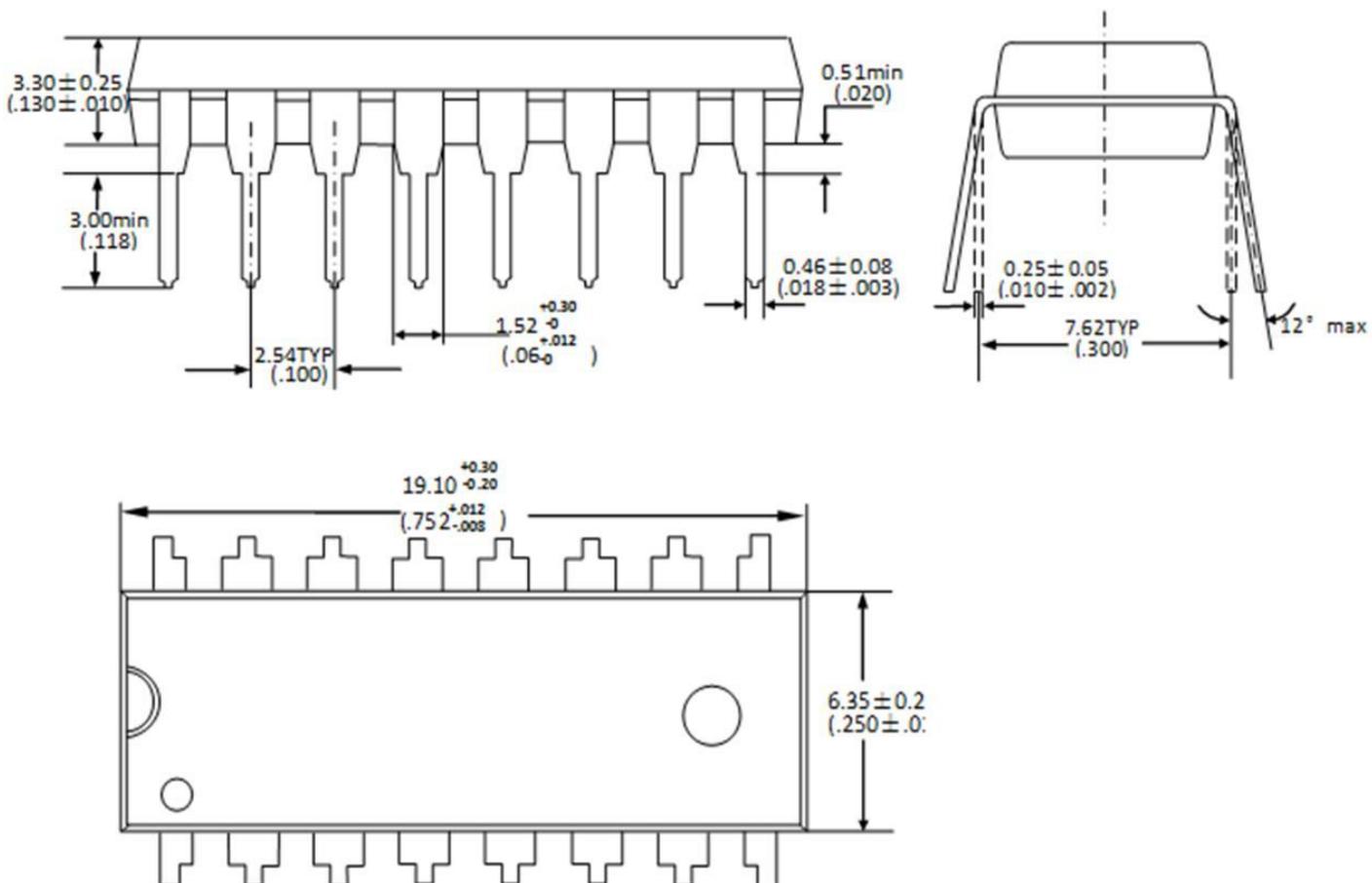
SOP-16 包装数据



卷轴规格

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

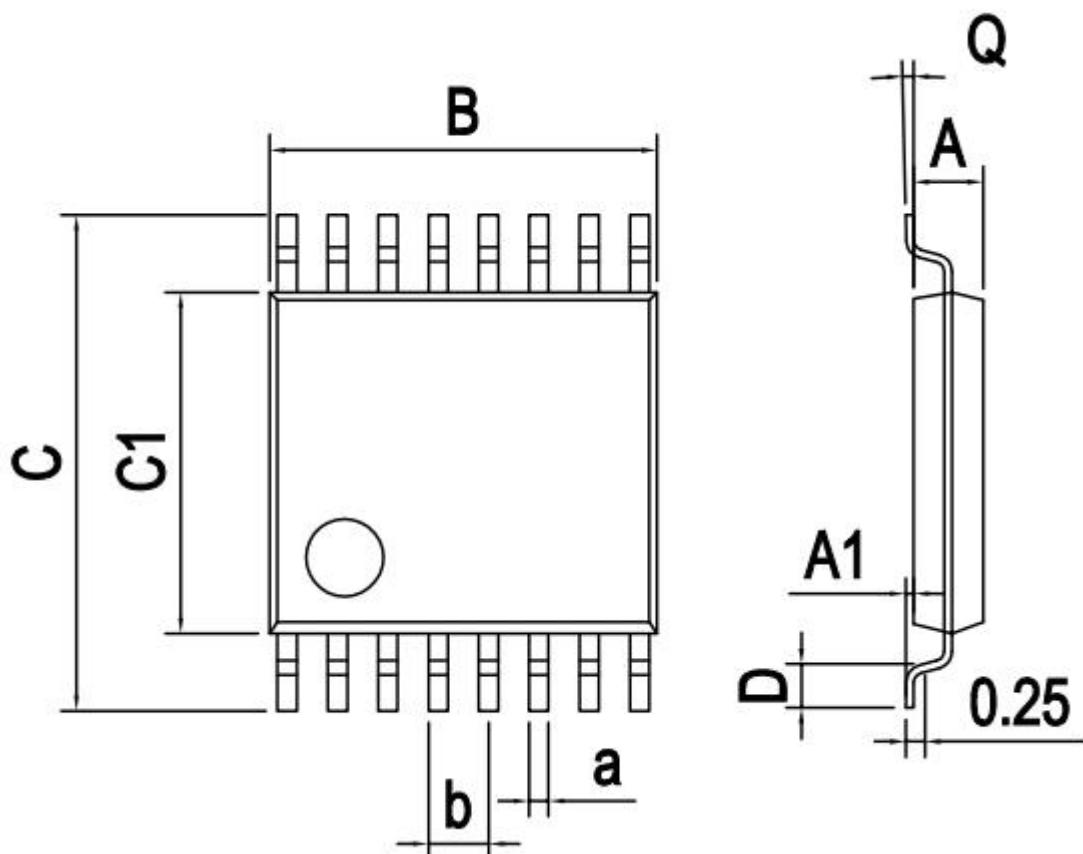
DIP-16 包装数据



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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