

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## CD4051

### 产品规格手册

## 概述

CD4051B 是一款采用先进 CMOS 技术设计的单个 8 通道多路复用器。是一个单刀八掷配置形式的模拟开关。具有三个二进制通道控制输入 (A、B、C) 以及一个使能输入 INH。二进制输入信号，控制 8 个通道中的一个通道开启，其余通道关闭。

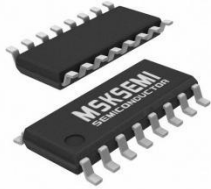

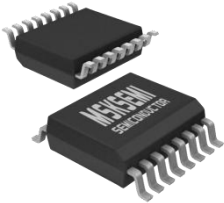
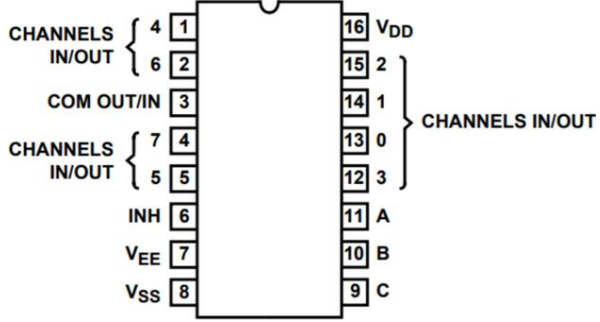
## 产品用途

- 模拟和数字多路复用与解复用
- 数字寻址信号的逻辑电平转换
- 信号选通
- 其它应用领域

## 特征

- 低输入电流:  $I_{IN} \leq 1\mu A$ , @ $V_{IN}=V_{DD}-V_{SS}=15V$ ,  $T_a=25^\circ C$
- 低静态功耗:  $I_{DD}=0.2\mu A$  (典型) @ $V_{DD}-V_{SS}=15V$ ,  $T_a=25^\circ C$
- 低通电阻:  $60\Omega$  (典型) @ $V_{DD}-V_{SS}=V_{DD}-V_{EE}=15V$ ,  $T_a=25^\circ C$
- 通道漏电流:  $\pm 100nA$  (典型) @ $V_{DD}-V_{EE}=15V$
- 宽工作电压  $V_{DD}-V_{SS}$  范围:  $3V \sim 15V$
- 先断后通切换消除了通道重迭开启
- 单刀八掷配置形式的模拟开关
- 封装形式: DIP-16、SOP-16、TSSOP-16

## 参考信息

封装图			脚位信息
			
SOP-16	DIP-16	TSSOP-16	管脚功能定义

## 封装形式和管脚功能定义

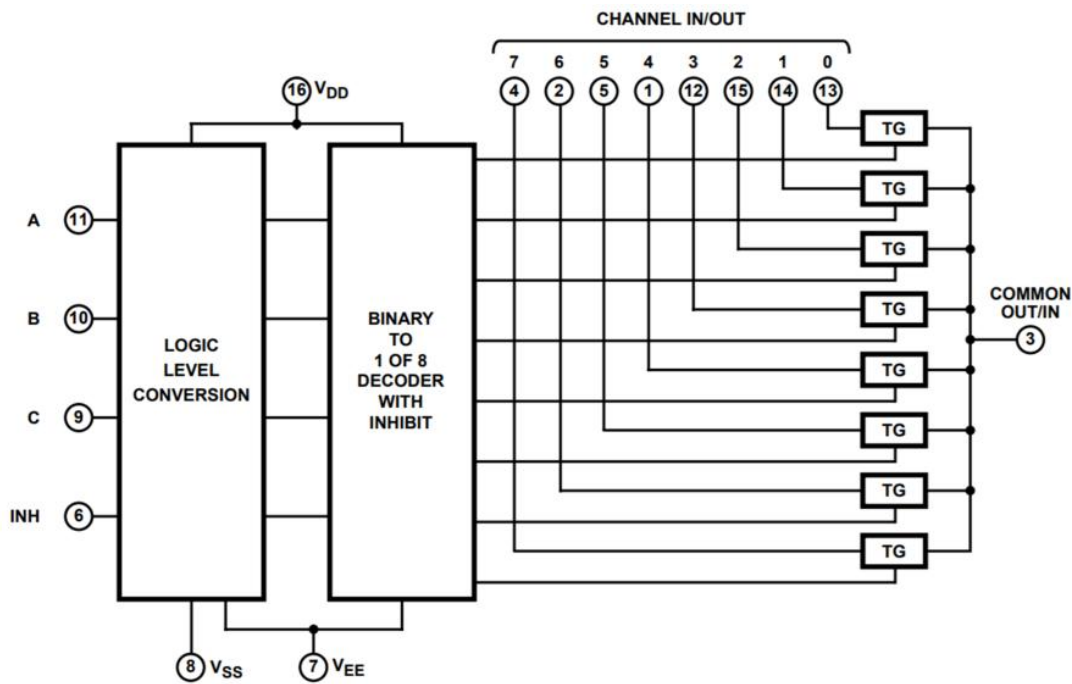
管脚序号	管脚定义	说明	管脚序号	管脚定义	说明
1	4	4 通道	16	VDD	电源正
2	6	6 通道	15	2	2 通道
3	COM OUT/IN	通道公共端	14	1	1 通道
4	7	7 通道	13	0	0 通道
5	5	5 通道	12	3	3 通道
6	INH	使能控制	11	A	通道控制输入 A
7	VEE	模拟开关负电源	10	B	通道控制输入 B
8	VSS	电源地	9	C	通道控制输入 C

**极限值**

参数	符号	极限值	单位
直流电源电压	$V_{DD}-V_{SS}$	-0.5~18	V
模拟电源电压	$V_{DD}-V_{EE}$	18	V
直流输入电压	$V_{IN}$	-0.5+ $V_{SS}$ ~ $V_{DD}+0.5V$	V
功耗	$P_D$	500	mW
工作温度	$T_A$	-40~85	°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。如果超过此极限值, 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。

**原理逻辑图**



**真值表**

INPUTS				OUTPUTS
INH	C	B	A	"ON" CHANNEL (S)
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1		×	×	None

×:任意值

推荐工作条件

项目	符号	最小值	典型值	最大值	单位
直流电源电压	$V_{DD}-V_{SS}$	3		15	V
控制输入电压	$V_{IS}$	0		$V_{DD}-V_{SS}$	V
模拟电源电压	$V_{DD}-V_{EE}$	0		15	V
模拟输入输出电压	$V_{IN}$ 、 $V_{OUT}$	0		$V_{DD}-V_{EE}$	V
工作温度	$T_A$	-40		85	°C

电学特性

**直流电学特性:** ( $V_{IS}=V_{IN}-V_{SS}$ ,  $V_{EE}=V_{SS}$ ,  $R_L = 3k\Omega$ ,  $T_A=25^\circ C$  除非特别指定)

符号	项目	测试条件	VDD (V)	最小值	典型值	最大值	单位
$V_{IH}$	高电平有效 输入电压	$V_{IH}=V_{DD}$ through 1k $V_{EE}=V_{SS}$ , $R_L=1k\Omega$ to $V_{SS}$ ,	5	3.5			V
			10	7			V
			15	11			V
$V_{IL}$	低电平有效 输入电压	$V_{IL}=V_{DD}$ through 1k $I_{IS}<2\mu A$ on all OFF Channels	5			1.5	V
			10			3	V
			15			4	V
$R_{ON}$	导通电阻	$0 \leq V_{IS} \leq V_{DD}$	5		150		Ω
			10		80		
			15		60		
$\Delta R_{ON}$	相邻通道导通电 阻差		5		15		Ω
			10		10		
			15		5		
$I_{OFF}$	漏电流	输入输出通道关闭, $INH=V_{DD}$	18			±100	nA
$I_{IN}$	输入电流	$V_{IN}=V_{DD}$ or $V_{SS}$	18		0.01	±0.1	uA
$I_{DD}$	静态电流	$V_{IN}=V_{DD}$ or $V_{SS}$	5		0.01	5	uA
			10		0.01	10	uA
			15		0.01	20	uA
$C_{IN}$	输入电容	任意输入端			5	7.5	pF
$C_{IS}$	通道输入电容				5		pF
$C_{OS}$	输出电容				9		pF
$C_{IOS}$	导通电容				0.2		pF

**交流电学特性:** ( $V_{SS}=V_{EE}$ ,  $T_A=25^\circ C$ ,  $t_r=t_f=20ns$ ,  $t_{pd}$  包含  $t_{PHL}$ 、 $t_{PLH}$ , 见测试方法, 除非特别指定)

项目	符号	测试条件	VDD	最小值	典型值	最大值	单位
传输延迟时间 Signal Input to Output	$t_{pd}$	$V_{IS}=V_{DD}$ , $R_L=200k$ , $CL=50pF$	5		15		ns
			10		10		ns
			15		7		ns
传输延迟时间 Address-to-Signal OUT (Channels ON or OFF)	$t_{pd}$	$CL=50pF$ , $R_L=10k$	5		100		ns
			10		80		ns
			15		50		ns

交流电学特性: (Continues,)

项目	符号	测试条件	VDD	最小值	典型值	最大值	单位
传输延迟时间 Inhibit-to-Signal OUT (Channel Turning ON)	t <sub>pd</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =1k	5		100		ns
			10		50		ns
			15		30		ns
传输延迟时间 Inhibit-to-Signal OUT (Channel Turning OFF)	t <sub>pd</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =10k	5		100		ns
			10		50		ns
			15		30		ns

测试方法

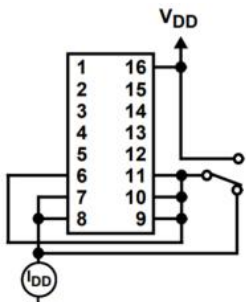


Fig.1 静态电流

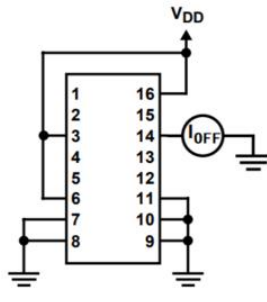


Fig.2 相邻通道关闭漏电流

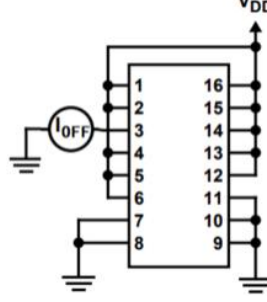


Fig.3 所有通道关闭漏电流

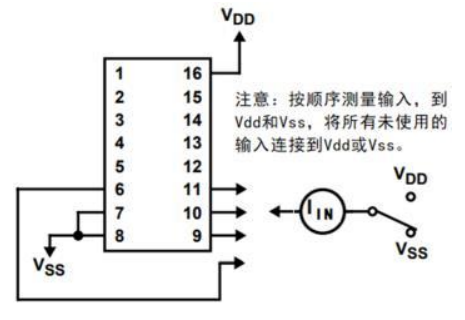


Fig.4 输入电流

注意：按顺序测量输入，到V<sub>DD</sub>和V<sub>SS</sub>，将所有未使用的输入连接到V<sub>DD</sub>或V<sub>SS</sub>。

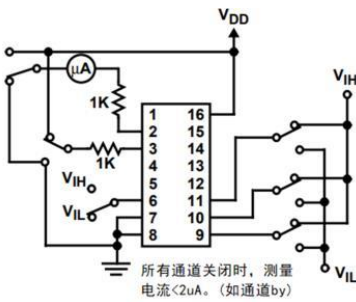


Fig.5 输入逻辑电平电压

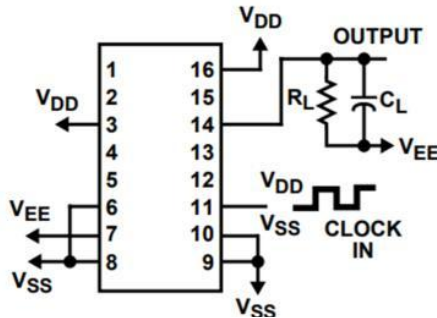


Fig.6 传播延迟-通道控制输入 to 开关输出

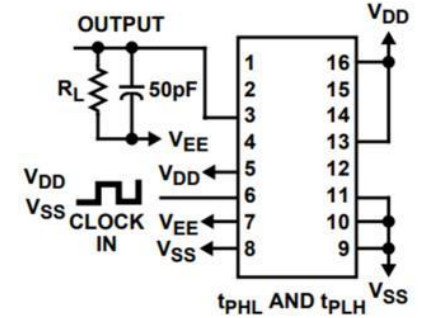


Fig.7 传播延迟-使能输入 to 开关输出

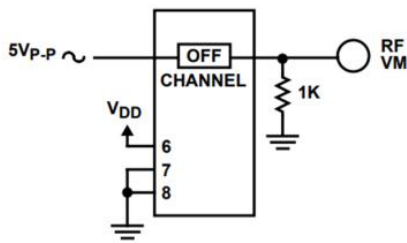


Fig.8 所有通道关闭信号串扰

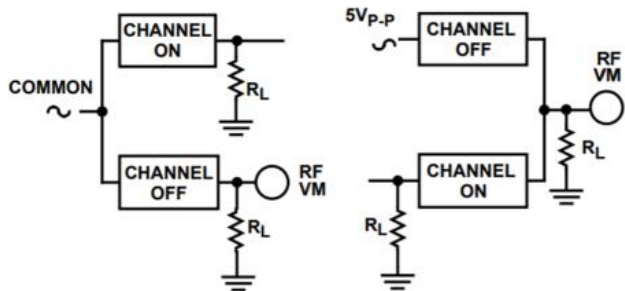
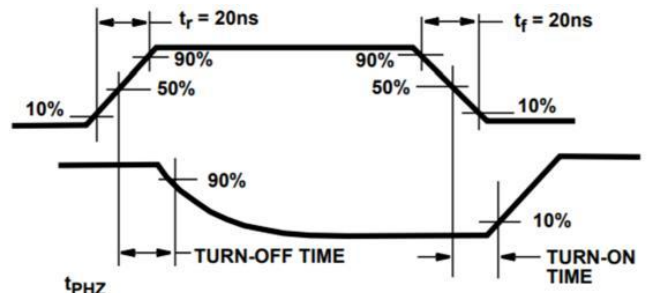
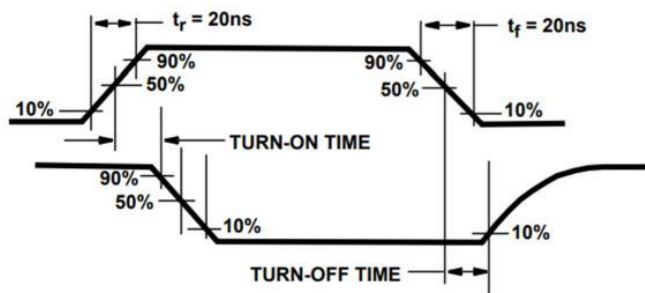


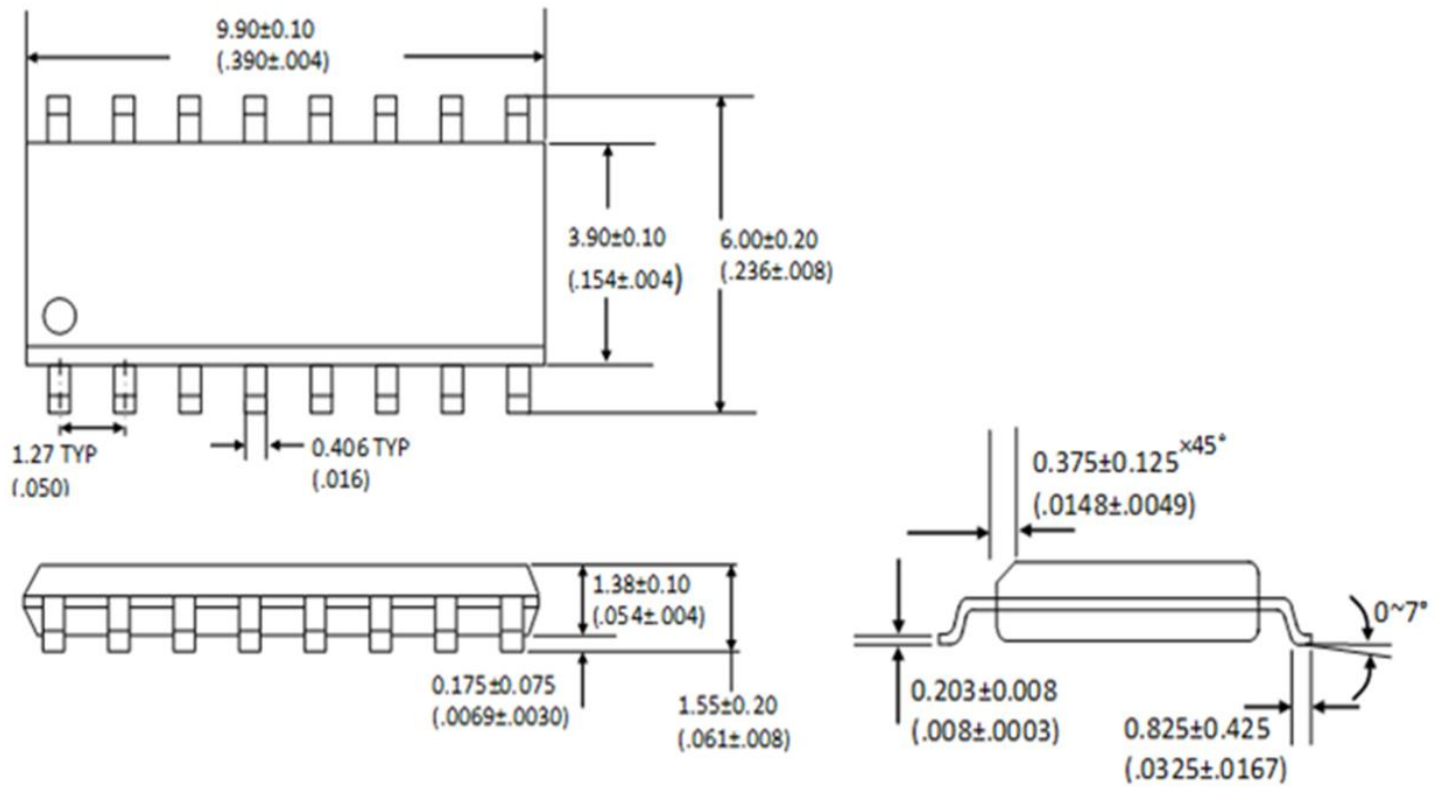
Fig.9 同一通道信号串扰

波形测量示意图



SOP-16 包装数据

单位：毫米 / 英寸

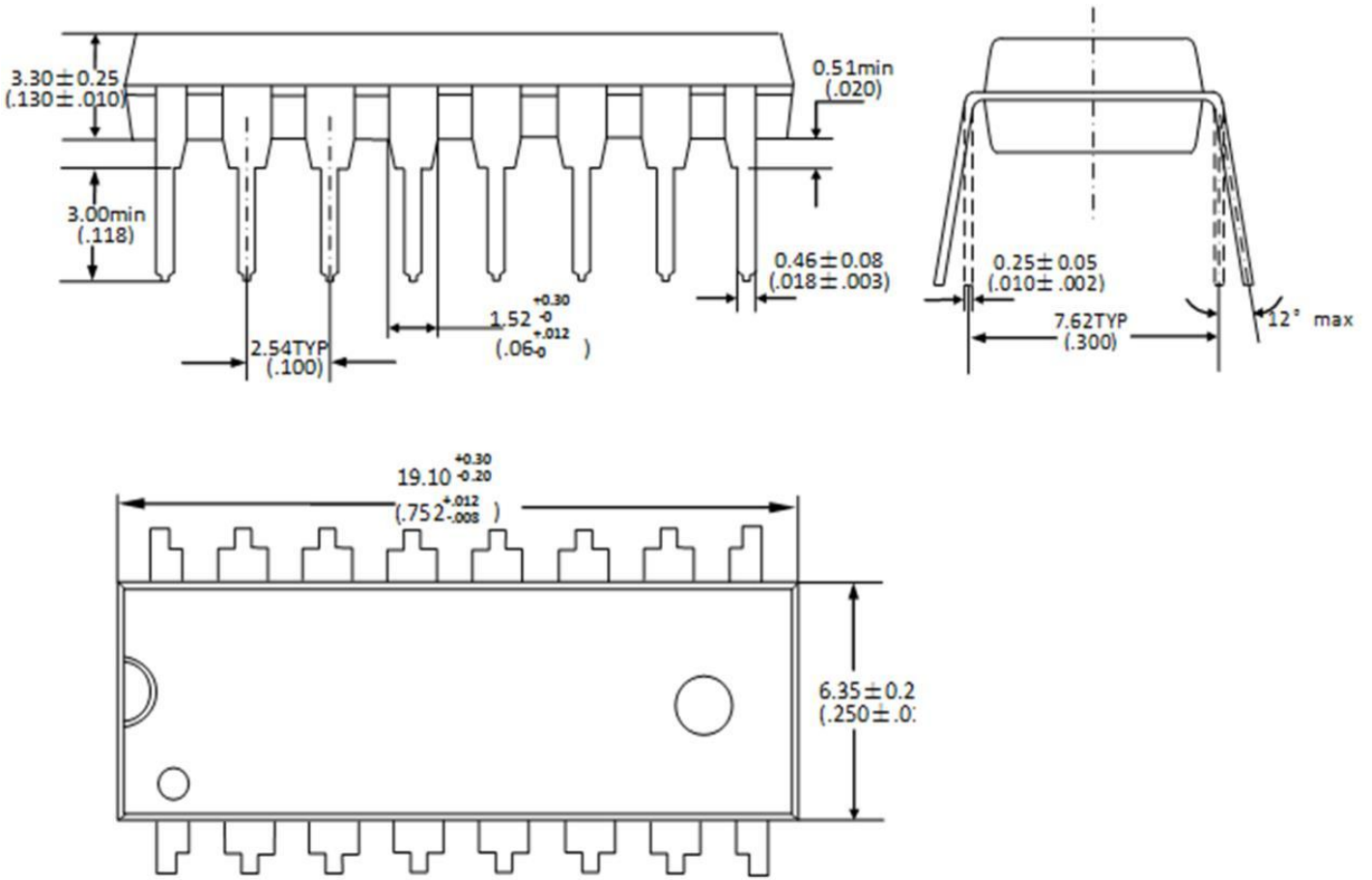


卷轴规格

P/N	PKG	QTY
CD4051BM-MS	SOP-16	2500

DIP-16 包装数据

单位：毫米 / 英寸

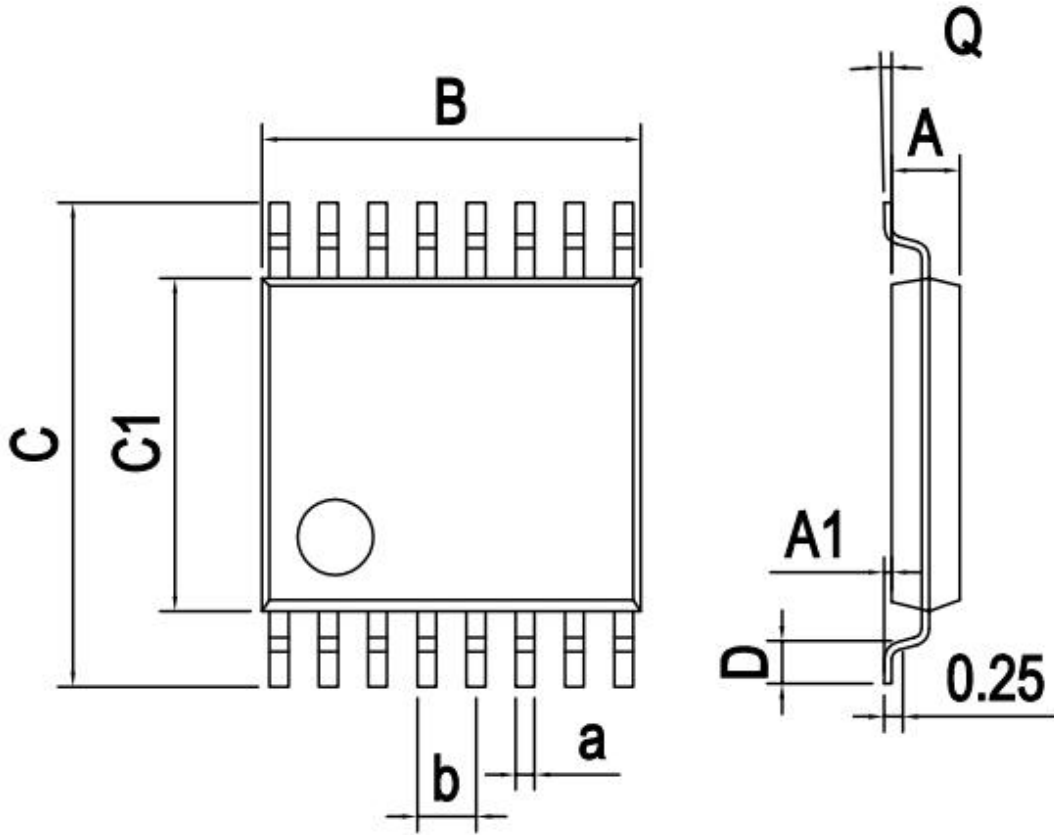


卷轴规格

P/N	PKG	QTY
CD4051BE-MS	DIP-16	1000

TSSOP-16 包装数据

单位：毫米 / 英寸



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

卷轴规格

P/N	PKG	QTY
CD4051BMT-MS	TSSOP-16	2500



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