

模块参数		
参数名称	参数值	备注
模块型号	TLC14	
模块类型	开关电容滤波器	
供电电压	±5V	
模块电流	7mA	
模块控制方式	时钟控制	默认板载RC时钟，可以外部输入时钟
模块时钟频率	3.5MHz (MAX)	
滤波器类型	低通	
滤波器阶数	四阶	
低通截止频率范围	20Hz-35KHz	
输入信号形式	单端	
输入通道	1通道	可级联
输入信号电压范围	4Vpp (MAX)	
输入频率范围	0.1Hz-35KHz	
模块增益范围	无	
输入输出信号特点	直流输入输出	输出带直流分量，接入射频设备请加隔直器 也可直接使用示波器测量。 由于是开关电容滤波器，输出信号为锯齿状。
模块输入输出接口	SMA	24小时镀盐雾抗氧化
模块保护	无	无反接保护，无限流保护
模块特点	多种	程控滤波器、多功能滤波器、通用可调滤波器
模块应用	多种	电力系统、传感器信号处理、发射接收机、信号发生器
模块规格	50*36*15mm	长*宽*高-PCB尺寸
模块重量	12.5g	
模块工作温度	0-75℃	民用级

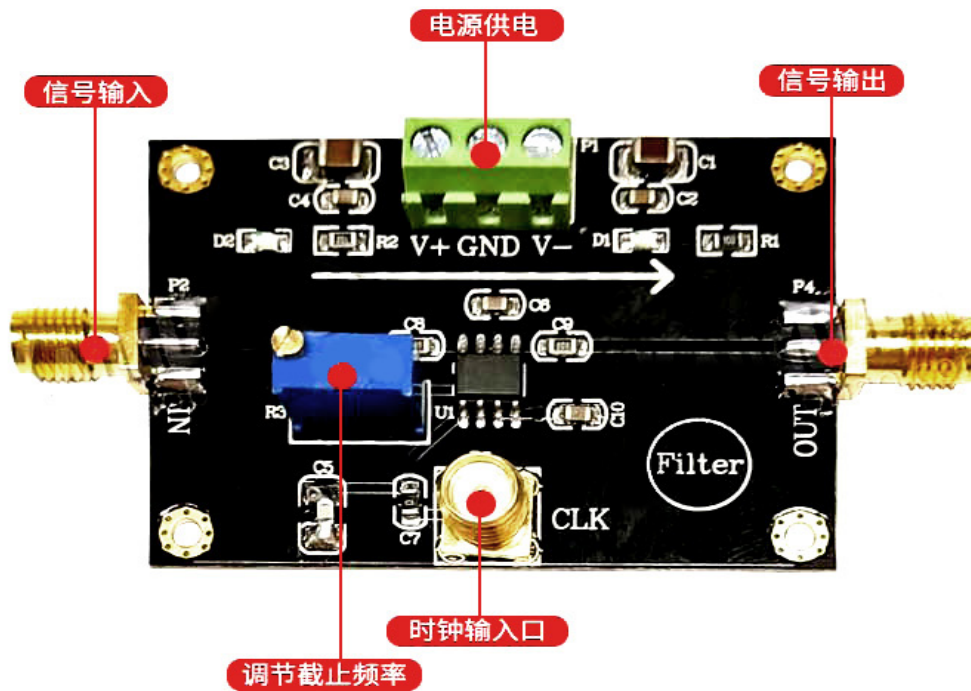
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## 模块描述

TLC14模块是巴特沃斯低通开关电容滤波器。模块作为一种低成本易于使用的设备提供精确的四阶低通滤波器设计配置功能的电路。滤波器的功能的截止频率的稳定性都只依赖于外部时钟频率稳定性。截止频率是时钟可调的，模块的时钟截止频率比为100:1并且误差小于±1%，一般用于电力系统、传感器信号处理、发射接收机、信号发生器处理等。

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## 模块接口图

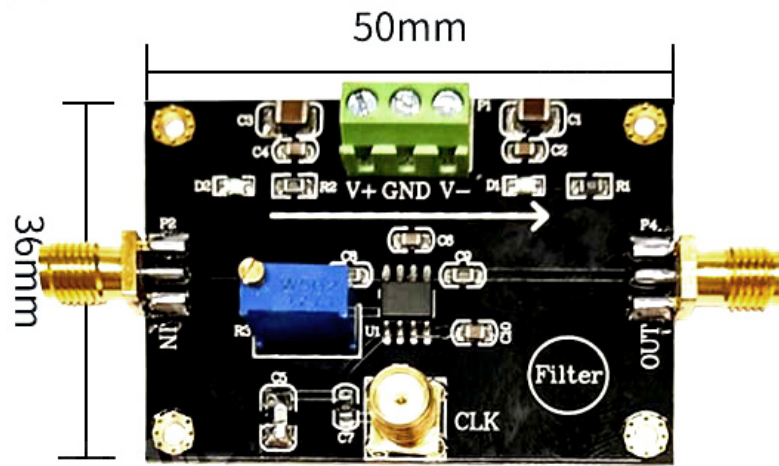


下表为C5为不同电容值时对应的截止频率范围：

C5	截止频率范围
473(47nF)	20Hz~80Hz
103(10nF)	80Hz~250Hz
312(3.1nF)	250Hz~850Hz
102(1nF)	850Hz~3.3KHz
220pF	3.3KHz~10KHz
64pF	10KHz~22KHz
24pF	22KHz~35KHz

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模块尺寸图



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## 模块使用注意事项

- (1) 模块供电电源为正负双电源，电压不可超过正负5.5V。
- (2) 由于模块是高精度器件，为了避免不必要的干扰，建议使用线性电源供电。
- (3) 输出信号建议使用SMA转BNC的线输入输出信号，使用示波器观测效果，接触不良或劣质的线材可能导致信号衰减或者噪声过大。
- (4) 滤波器测量一般采用示波器点频法，有条件的可以使用扫频仪或者矢量网络分析仪测试。
- (5) 如需简单测试模块功能，正常供电即可，如要输入外部时钟控制需要断开板子上的RC时钟电路。

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## 常见问题解答

Q:模块输出波形为锯齿状，噪声比较重，效果对吗？

A: TLC14是开关电容滤波器，波形上会呈现开关频率的锯齿，一般时钟频率比较低的时候看起来比较明显，建议使用良好的线材，或者输出再加一级模拟低通滤波器会使波形好很多，模块都是检测后发货，正常驱动效果就没有问题的。

Q:模块可以级联吗？

A:模块可以直接级联，滤波效果是直接叠加的。

Q: 外部时钟输入幅度是多少？

A:建议输入2Vpp以上的方波作为时钟信号。

**TLC04/MF4A-50, TLC14/MF4A-100**  
**BUTTERWORTH FOURTH-ORDER LOW-PASS**  
**SWITCHED-CAPACITOR FILTERS**  
 SLAS021A – NOVEMBER 1986 – REVISED MARCH 1995

- Low Clock-to-Cutoff-Frequency Ratio Error  
 TLC04/MF4A-50 . . .  $\pm 0.8\%$   
 TLC14/MF4A-100 . . .  $\pm 1\%$
- Filter Cutoff Frequency Dependent Only on External-Clock Frequency Stability
- Minimum Filter Response Deviation Due to External Component Variations Over Time and Temperature
- Cutoff Frequency Range From 0.1 Hz to 30 kHz,  $V_{CC\pm} = \pm 2.5$  V
- 5-V to 12-V Operation
- Self Clocking or TTL-Compatible and CMOS-Compatible Clock Inputs
- Low Supply-Voltage Sensitivity
- Designed to be Interchangeable With National MF4-50 and MF4-100

D OR P PACKAGE  
 (TOP VIEW)



#### description

The TLC04/MF4A-50 and TLC14/MF4A-100 are monolithic Butterworth low-pass switched-capacitor filters. Each is designed as a low-cost, easy-to-use device providing accurate fourth-order low-pass filter functions in circuit design configurations.

Each filter features cutoff frequency stability that is dependent only on the external-clock frequency stability. The cutoff frequency is clock tunable and has a clock-to-cutoff frequency ratio of 50:1 with less than  $\pm 0.8\%$  error for the TLC04/MF4A-50 and a clock-to-cutoff frequency ratio of 100:1 with less than  $\pm 1\%$  error for the TLC14/MF4A-100. The input clock features self-clocking or TTL- or CMOS-compatible options in conjunction with the level shift (LS) terminal.

The TLC04C/MF4A-50C and TLC14C/MF4A-100C are characterized for operation from 0°C to 70°C. The TLC04I/MF4A-50I and TLC14I/MF4A-100I are characterized for operation from -40°C to 85°C. The TLC04M/MF4A-50M and TLC14M/MF4A-100M are characterized over the full military temperature range of -55°C to 125°C.

AVAILABLE OPTIONS

T <sub>A</sub>	CLOCK-TO-CUTOFF FREQUENCY RATIO	PACKAGE	
		SMALL OUTLINE (D)	PLASTIC DIP (P)
0°C to 70°C	50:1	TLC04CD/MF4A-50CD	TLC04CP/MF4A-50CP
	100:1	TLC14CD/MF4A-100CD	TLC14CP/MF4A-100CP
-40°C to 85°C	50:1	TLC04ID/MF4A-50ID	TLC04IP/MF4A-50IP
	100:1	TLC14ID/MF4A-100ID	TLC14IP/MF4A-100IP
-55°C to 125°C	50:1		TLC04MP/MF4A-50MP
	100:1		TLC14MP/MF4A-100MP

The D package is available taped and reeled. Add the suffix R to the device type (e.g., TLC04CDR/MF4A-50CDR).



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