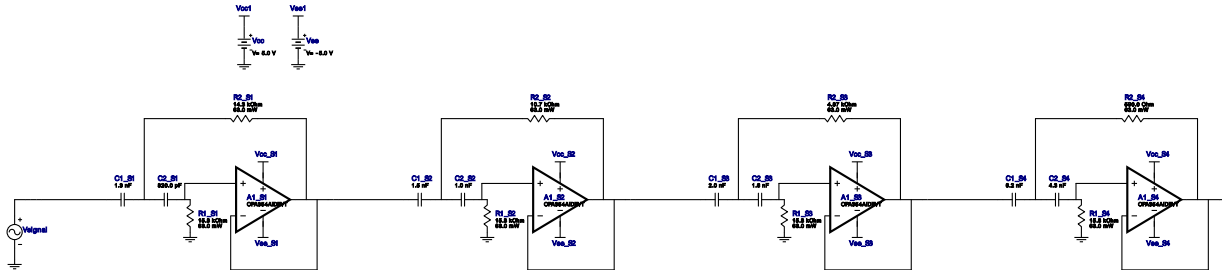


## WEBENCH<sup>®</sup> Design Report

 Design : 4738714/13 OPA354AIDBVT  
 Highpass, Sallen Key, Butterworth


### My Comments

No comments

### Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
2.	A1_S2	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
3.	A1_S3	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
4.	A1_S4	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
5.	C1_S1	MuRata	GRM1885C1E132JA01D Series= C0G/NP0	Cap= 1.3 nF VDC= 25.0 V Tolerance= 5.0 %	1	\$0.02	 0603 5 mm <sup>2</sup>
6.	C1_S2	MuRata	GRM1885C1H152JA01D Series= C0G/NP0	Cap= 1.5 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
7.	C1_S3	MuRata	GRM1885C1H202JA01D Series= C0G/NP0	Cap= 2.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
8.	C1_S4	MuRata	GRM2195C1H622JA01D Series= C0G/NP0	Cap= 6.2 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.04	 0805 7 mm <sup>2</sup>
9.	C2_S1	TDK	C1005C0G1H821J050BA Series= C0G/NP0	Cap= 820.0 pF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0402 3 mm <sup>2</sup>
10.	C2_S2	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	 0402 3 mm <sup>2</sup>
11.	C2_S3	MuRata	GRM1885C1H162JA01D Series= C0G/NP0	Cap= 1.6 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
12.	C2_S4	MuRata	GRM2165C1H432JA01D Series= C0G/NP0	Cap= 4.3 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.04	 0805 7 mm <sup>2</sup>
13.	R1_S1	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
14.	R1_S2	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
15.	R1_S3	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
16.	R1_S4	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
17.	R2_S1	Vishay-Dale	CRCW040214K3FKED Series= CRCW..e3	Res= 14.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
18.	R2_S2	Vishay-Dale	CRCW040210K7FKED Series= CRCW..e3	Res= 10.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
19.	R2_S3	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
20.	R2_S4	Vishay-Dale	CRCW0402590RFKED Series= CRCW..e3	Res= 590.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>

## Design Inputs

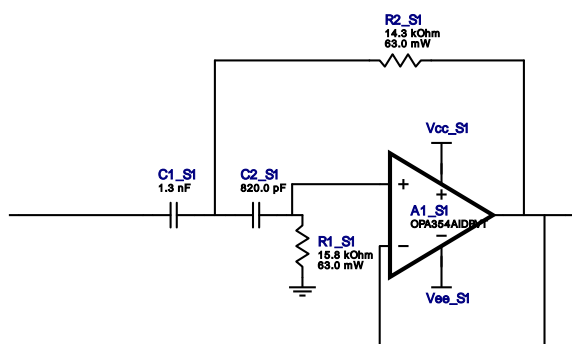
#	Name	Value	Description
1.	FilterType	Highpass	
2.	FilterResponse	Butterworth	
3.	FilterOrder	8.0	
4.	FilterTopology	Sallen_Key	
5.	NumberOfStages	4.0	
6.	PassbandFrequency	10.0 k	
7.	StopbandAttenuation	-45.0	
8.	StopbandFrequency	5.0 k	
9.	Gain	1.0	
10.	DualSupply	+/-5.0 V	Power supply(s) to active chips
11.	ResistorTolerance	E96	Resistor series - 1% Passive resistor tolerance
12.	CapacitorTolerance	E24	Capacitor series - 5% Passive capacitance tolerance
13.	SeedCapacitance	1.0 n	Seed Capacitance to start design of filter

## Design Assistance






1. **OPA354AIDBVT** Product Folder : <http://www.ti.com/product/OPA354> : contains the data sheet and other resources.

## Filter Stage :1

Cutoff Frequency	10.0 kHz
Min GBW Req'd	510.0 kHz
Stage Gain	1.0 V/V
Stage Q	510.0 m
Stage Topology	Sallen_Key

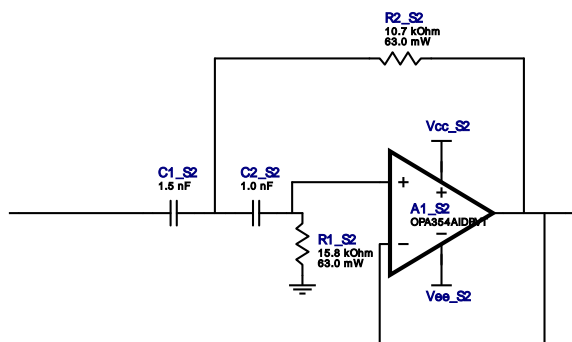


## Electrical BOM






#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
2.	C1_S1	MuRata	GRM1885C1E132JA01D Series= C0G/NP0	Cap= 1.3 nF VDC= 25.0 V Tolerance= 5.0 %	1	\$0.02	 0603 5 mm <sup>2</sup>
3.	C2_S1	TDK	C1005C0G1H821J050BA Series= C0G/NP0	Cap= 820.0 pF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0402 3 mm <sup>2</sup>
4.	R1_S1	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
5.	R2_S1	Vishay-Dale	CRCW040214K3FKED Series= CRCW..e3	Res= 14.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

## Filter Stage :2

Cutoff Frequency 10.0 kHz  
 Min GBW Req'd 600.0 kHz  
 Stage Gain 1.0 V/V  
 Stage Q 600.0 m  
 Stage Topology Sallen\_Key

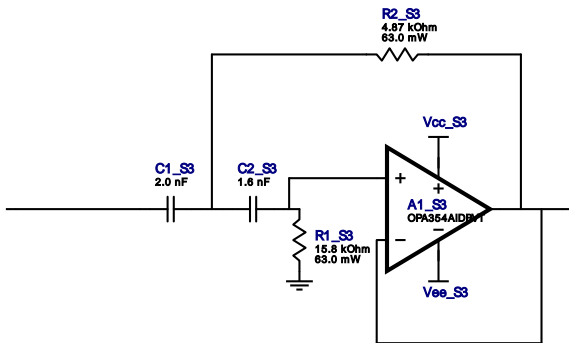


### Electrical BOM






#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S2	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
2.	C1_S2	MuRata	GRM1885C1H152JA01D Series= C0G/NP0	Cap= 1.5 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
3.	C2_S2	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	 0402 3 mm <sup>2</sup>
4.	R1_S2	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
5.	R2_S2	Vishay-Dale	CRCW040210K7FKED Series= CRCW..e3	Res= 10.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

## Filter Stage :3

Cutoff Frequency 10.0 kHz  
 Min GBW Req'd 900.0 kHz  
 Stage Gain 1.0 V/V  
 Stage Q 900.0 m  
 Stage Topology Sallen\_Key

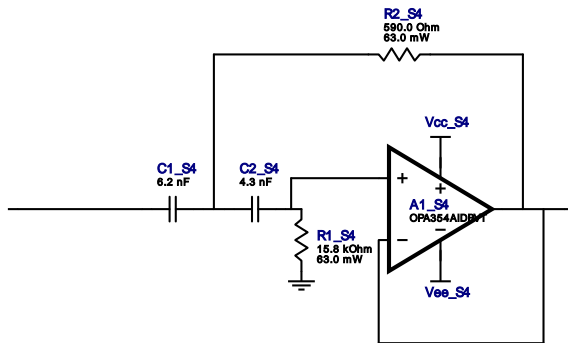


### Electrical BOM






#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S3	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
2.	C1_S3	MuRata	GRM1885C1H202JA01D Series= C0G/NP0	Cap= 2.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
3.	C2_S3	MuRata	GRM1885C1H162JA01D Series= C0G/NP0	Cap= 1.6 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.01	 0603 5 mm <sup>2</sup>
4.	R1_S3	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
5.	R2_S3	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

## Filter Stage :4

Cutoff Frequency	10.0 kHz
Min GBW Req'd	2.56 MHz
Stage Gain	1.0 V/V
Stage Q	2.56
Stage Topology	Sallen_Key



## Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S4	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	\$0.80	 DBV0005A 15 mm <sup>2</sup>
2.	C1_S4	MuRata	GRM2195C1H622JA01D Series= C0G/NP0	Cap= 6.2 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.04	 0805 7 mm <sup>2</sup>
3.	C2_S4	MuRata	GRM2165C1H432JA01D Series= C0G/NP0	Cap= 4.3 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.04	 0805 7 mm <sup>2</sup>
4.	R1_S4	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
5.	R2_S4	Vishay-Dale	CRCW0402590RFKED Series= CRCW..e3	Res= 590.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).