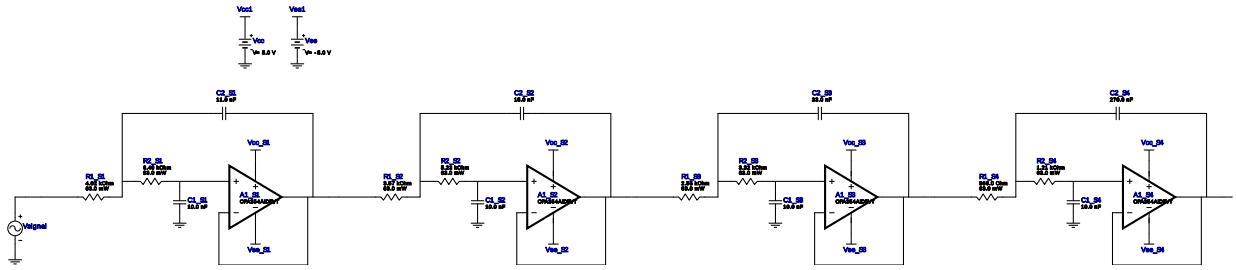
Type : Lowpass
Response : Butterworth
Order : 8
Number of Stages : 4

Device = OPA354AIDBVT
Created = Jul 24 2016 11:11PM

WEBENCH® Design Report

Design : 4738714/9 OPA354AIDBVT
Lowpass, 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^2
2.	A1_S2	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.80	DBV0005A 15 mm^2
3.	A1_S3	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.80	DBV0005A 15 mm^2
4.	A1_S4	Texas Instruments, Inc.	OPA354AIDBVT	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.80	DBV0005A 15 mm^2
5.	C1_S1	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
6.	C1_S2	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
7.	C1_S3	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
8.	C1_S4	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
9.	C2_S1	Samsung Electro-Mechanics	CL32C113JBHNNNE Series= C0G/NP0	Cap= 11.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.10	1210 15 mm^2
10.	C2_S2	Kemet	C0603C153G4GAC7867 Series= C0G/NP0	Cap= 15.0 nF VDC= 16.0 V Tolerance= 2.0 %	1	$0.21	0603 5 mm^2
11.	C2_S3	AVX	08053A332JAT2A Series= C0G/NP0	Cap= 33.0 nF VDC= 25.0 V Tolerance= 5.0 %	1	$0.06	0805 7 mm^2
12.	C2_S4	Kemet	C2220C274J5GACTU Series= C0G/NP0	Cap= 270.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$1.68	2220 54 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	R1_S1	Vishay-Dale	CRCW04024K02FKED Series= CRCW..e3	Res= 4.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	R1_S2	Vishay-Dale	CRCW04023K57FKED Series= CRCW..e3	Res= 3.57 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	R1_S3	Vishay-Dale	CRCW04022K55FKED Series= CRCW..e3	Res= 2.55 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
16.	R1_S4	Vishay-Dale	CRCW0402866RFKED Series= CRCW..e3	Res= 866.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
17.	R2_S1	Vishay-Dale	CRCW04026K49FKED Series= CRCW..e3	Res= 6.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
18.	R2_S2	Vishay-Dale	CRCW04025K23FKED Series= CRCW..e3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
19.	R2_S3	Vishay-Dale	CRCW04023K32FKED Series= CRCW..e3	Res= 3.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
20.	R2_S4	Vishay-Dale	CRCW04021K21FKED Series= CRCW..e3	Res= 1.21 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Design Inputs

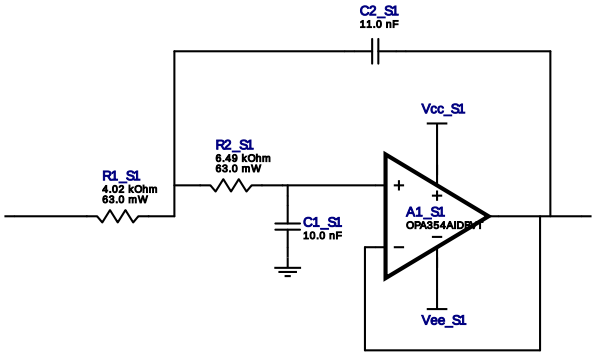
#	Name	Value	Description
1.	FilterType	Lowpass	
2.	FilterResponse	Butterworth	
3.	FilterOrder	8.0	
4.	FilterTopology	Sallen_Key	
5.	NumberOfStages	4.0	
6.	PassbandFrequency	3.0 k	
7.	StopbandAttenuation	-45.0	
8.	StopbandFrequency	6.0 k	
9.	Gain	1.0	
10.	DualSupply	+/-5.0 V	Power supply(s) to active chips
11.	ResistorTolerance	E96	Resistor series - 1% Passive resistor tolerance
12.	CapacitorTolerance	E24	Capacitor series - 5% Passive capacitance tolerance
13.	SeedCapacitance	10.0 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	3.0 kHz
Min GBW Reqd	153.0 kHz
Stage Gain	1.0 V/V
Stage Q	510.0 m
Stage Topology	Sallen_Key

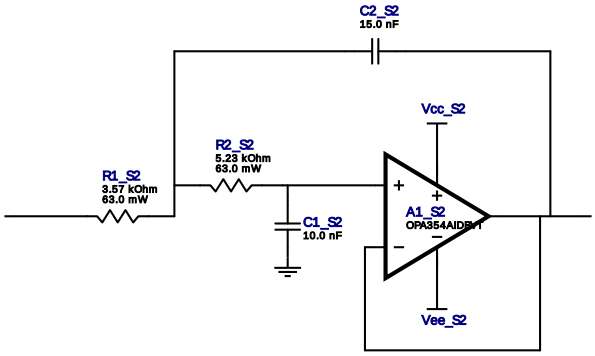


Electrical BOM

#	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^2
2.	C1_S1	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
3.	C2_S1	Samsung Electro-Mechanics	CL32C113JBHNNNE Series= C0G/NP0	Cap= 11.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.10	1210 15 mm^2
4.	R1_S1	Vishay-Dale	CRCW04024K02FKED Series= CRCW..e3	Res= 4.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S1	Vishay-Dale	CRCW04026K49FKED Series= CRCW..e3	Res= 6.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :2

Cutoff Frequency	3.0 kHz
Min GBW Reqd	180.0 kHz
Stage Gain	1.0 V/V
Stage Q	600.0 m
Stage Topology	Sallen_Key

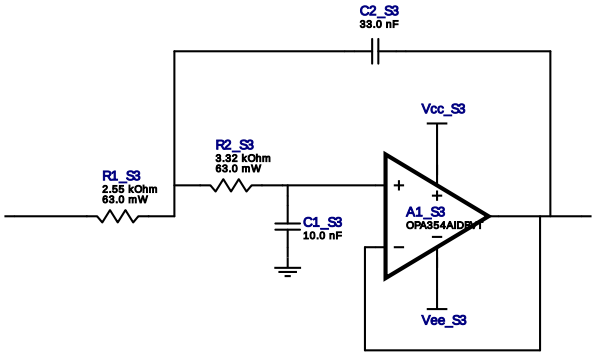


Electrical BOM

#	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^2
2.	C1_S2	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
3.	C2_S2	Kemet	C0603C153G4GAC7867 Series= C0G/NP0	Cap= 15.0 nF VDC= 16.0 V Tolerance= 2.0 %	1	$0.21	0603 5 mm^2
4.	R1_S2	Vishay-Dale	CRCW04023K57FKED Series= CRCW..e3	Res= 3.57 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S2	Vishay-Dale	CRCW04025K23FKED Series= CRCW..e3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :3

Cutoff Frequency	3.0 kHz
Min GBW Reqd	270.0 kHz
Stage Gain	1.0 V/V
Stage Q	900.0 m
Stage Topology	Sallen_Key

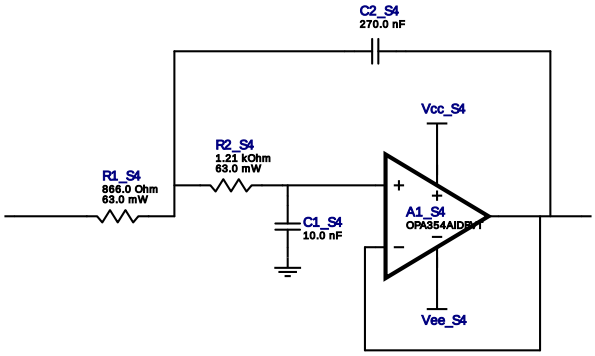


Electrical BOM

#	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^2
2.	C1_S3	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
3.	C2_S3	AVX	08053A332JAT2A Series= C0G/NP0	Cap= 33.0 nF VDC= 25.0 V Tolerance= 5.0 %	1	$0.06	0805 7 mm^2
4.	R1_S3	Vishay-Dale	CRCW04022K55FKED Series= CRCW..e3	Res= 2.55 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S3	Vishay-Dale	CRCW04023K32FKED Series= CRCW..e3	Res= 3.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :4

Cutoff Frequency	3.0 kHz
Min GBW Reqd	768.0 kHz
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 mm²
2.	C1_S4	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
3.	C2_S4	Kemet	C2220C274J5GACTU Series= C0G/NP0	Cap= 270.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$1.68	2220 54 mm²
4.	R1_S4	Vishay-Dale	CRCW0402866RFKED Series= CRCW..e3	Res= 866.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	R2_S4	Vishay-Dale	CRCW04021K21FKED Series= CRCW..e3	Res= 1.21 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²