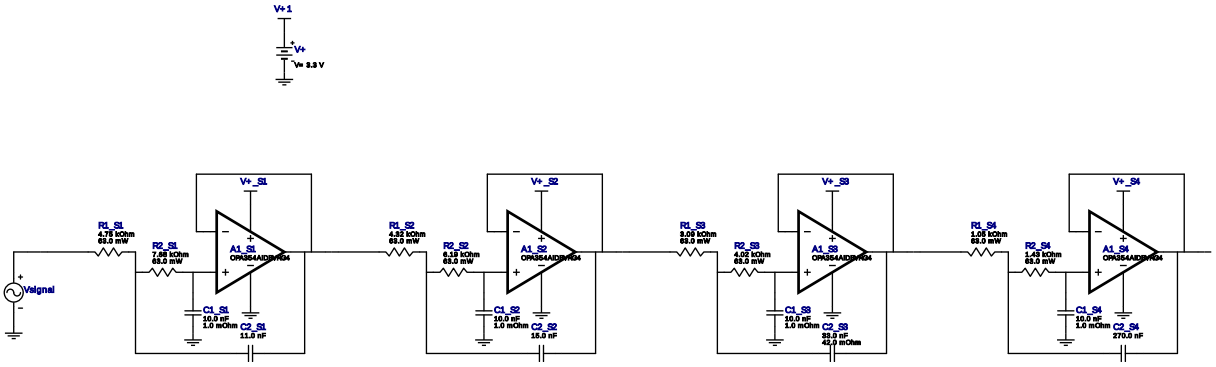
Type : Lowpass
Response : Butterworth
Order : 8
Number of Stages : 0

Device = OPA354AIDBVRG4
Created = May 03 2018 2:59PM

WEBENCH® Design Report

Design : 5322186/4 OPA354AIDBVRG4
Lowpass, Sallen_Key, Butterworth



My Comments

No comments

Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
2.	A1_S2	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
3.	A1_S3	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
4.	A1_S4	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
5.	C1_S1	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
6.	C1_S2	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
7.	C1_S3	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
8.	C1_S4	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
9.	C2_S1	Samsung Electro-Mechanics	CL32C113JBHNNNE Series= C0G/NP0	Cap= 11.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$0.13	1210 15 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	C2_S2	Kemet	C0603C153G4GAC7867 Series= C0G/NP0	Cap= 15.0 nF VDC= 16.0 V Tolerance= 2.0 %	1	$0.26	 0603 5 mm²
11.	C2_S3	AVX	08055C333JAT2A Series= X7R	Cap= 33.0 nF ESR= 42.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.07	 0805 7 mm²
12.	C2_S4	Kemet	C2220C274J5GACTU Series= C0G/NP0	Cap= 270.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$1.85	 2220 54 mm²
13.	R1_S1	Vishay-Dale	CRCW04024K75FKED Series= CRCW..e3	Res= 4.75 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	R1_S2	Vishay-Dale	CRCW04024K32FKED Series= CRCW..e3	Res= 4.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	R1_S3	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	R1_S4	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	R2_S1	Vishay-Dale	CRCW04027K68FKED Series= CRCW..e3	Res= 7.68 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
18.	R2_S2	Vishay-Dale	CRCW04026K19FKED Series= CRCW..e3	Res= 6.19 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	R2_S3	Vishay-Dale	CRCW04024K02FKED Series= CRCW..e3	Res= 4.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	R2_S4	Vishay-Dale	CRCW04021K43FKED Series= CRCW..e3	Res= 1.43 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²

Design Inputs

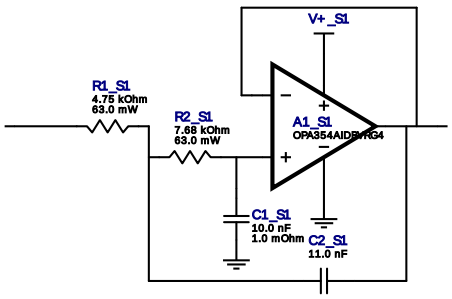
#	Name	Value	Description
1.	FilterType	Lowpass	
2.	FilterResponse	Butterworth	
3.	FilterOrder	8.0	
4.	FilterTopology	Sallen_Key	
5.	NumberOfStages	0.0	
6.	PassbandFrequency	2.5 k	
7.	StopbandAttenuation	-40.0	
8.	StopbandFrequency	4.5 k	
9.	Gain	1.0	
10.	SingleSupply	3.3	Power supply(s) to active chips
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. **OPA354AIDBVRG4** Product Folder : http://www.ti.com//product/OPA354 : contains the data sheet and other resources.

Filter Stage :1

Cutoff Frequency	2.5 kHz
Min GBW Reqd	127.451 kHz
Stage Gain	1.0 V/V
Stage Q	509.796 m
Stage Topology	Sallen_Key

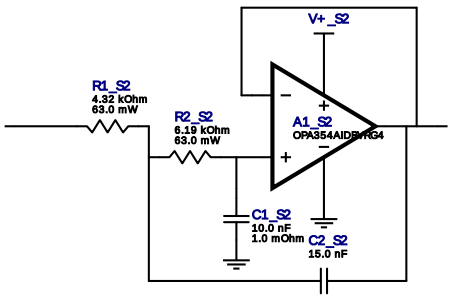


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm^2
2.	C1_S1	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm 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	$0.13	1210 15 mm^2
4.	R1_S1	Vishay-Dale	CRCW04024K75FKED Series= CRCW..e3	Res= 4.75 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S1	Vishay-Dale	CRCW04027K68FKED Series= CRCW..e3	Res= 7.68 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :2

Cutoff Frequency	2.5 kHz
Min GBW Reqd	150.343 kHz
Stage Gain	1.0 V/V
Stage Q	601.348 m
Stage Topology	Sallen_Key

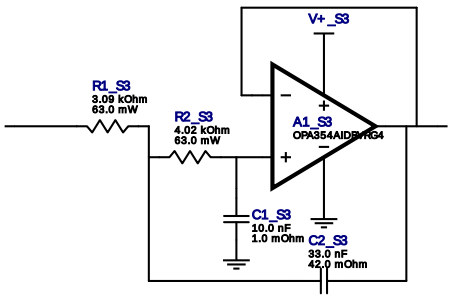


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S2	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
2.	C1_S2	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
3.	C2_S2	Kemet	C0603C153G4GAC7867 Series= C0G/NP0	Cap= 15.0 nF VDC= 16.0 V Tolerance= 2.0 %	1	$0.26	0603 5 mm²
4.	R1_S2	Vishay-Dale	CRCW04024K32FKED Series= CRCW..e3	Res= 4.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	R2_S2	Vishay-Dale	CRCW04026K19FKED Series= CRCW..e3	Res= 6.19 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

Filter Stage :3

Cutoff Frequency	2.5 kHz
Min GBW Reqd	225.001 kHz
Stage Gain	1.0 V/V
Stage Q	899.966 m
Stage Topology	Sallen_Key

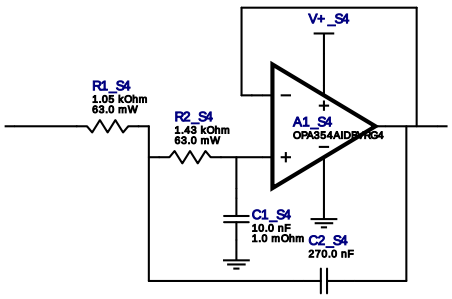


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S3	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm²
2.	C1_S3	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm²
3.	C2_S3	AVX	08055C333JAT2A Series= X7R	Cap= 33.0 nF ESR= 42.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.07	0805 7 mm²
4.	R1_S3	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	R2_S3	Vishay-Dale	CRCW04024K02FKED Series= CRCW..e3	Res= 4.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

Filter Stage :4

Cutoff Frequency	2.5 kHz
Min GBW Reqd	640.718 kHz
Stage Gain	1.0 V/V
Stage Q	2.563
Stage Topology	Sallen_Key



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S4	Texas Instruments, Inc.	OPA354AIDBVRG4	GbwTyp= 250.0MHz VccMin= 2.5 V VccMax= 5.5 V	1	$0.70	0 mm^2
2.	C1_S4	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0603 5 mm^2
3.	C2_S4	Kemet	C2220C274J5GACTU Series= C0G/NP0	Cap= 270.0 nF VDC= 50.0 V Tolerance= 5.0 %	1	$1.85	2220 54 mm^2
4.	R1_S4	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S4	Vishay-Dale	CRCW04021K43FKED Series= CRCW..e3	Res= 1.43 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2