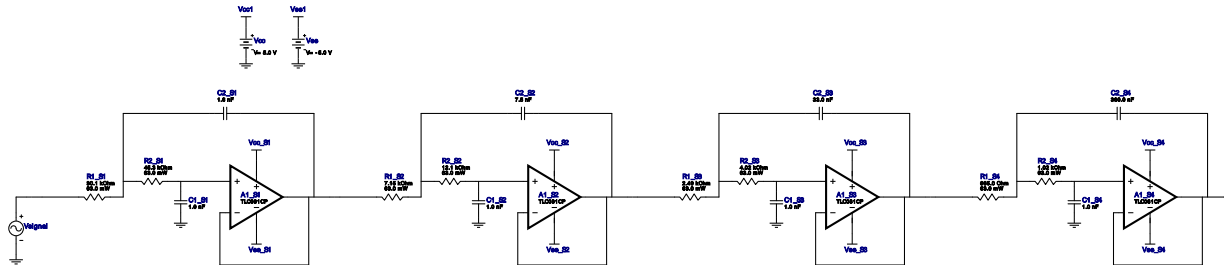


WEBENCH[®] Design Report

 Design : 4038822/9 TLC081CP
 Lowpass, Sallen Key, Chebyshev 0.2 dB


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
2.	A1_S2	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
3.	A1_S3	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
4.	A1_S4	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
5.	C1_S1	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 mm ²
6.	C1_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 ²
7.	C1_S3	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 mm ²
8.	C1_S4	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 mm ²
9.	C2_S1	MuRata	GRM1885C1H162JA01D Series= C0G/NP0	Cap= 1.6 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.02	0603 5 mm ²
10.	C2_S2	MuRata	GRM2195C1H752JA01D Series= C0G/NP0	Cap= 7.5 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.06	0805 7 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	CUSTOM	CUSTOM Series= ?	Cap= 360.0 nF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm ²
13.	R1_S1	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
14.	R1_S2	Vishay-Dale	CRCW04027K15FKED Series= CRCW..e3	Res= 7.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
15.	R1_S3	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
16.	R1_S4	Vishay-Dale	CRCW0402665RFKED Series= CRCW..e3	Res= 665.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
17.	R2_S1	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
18.	R2_S2	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
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 mm ²
20.	R2_S4	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

Design Inputs

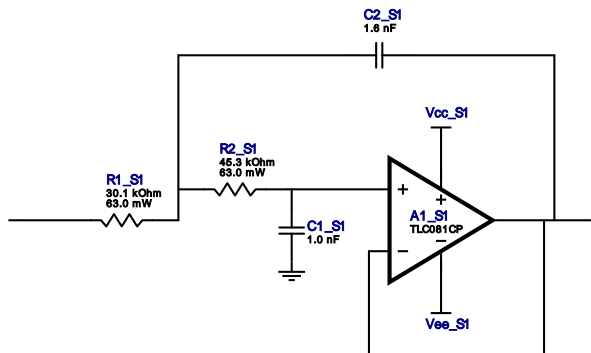
#	Name	Value	Description
1.	FilterType	Lowpass	
2.	FilterResponse	Chebyshev	
3.	FilterOrder	8.0	
4.	FilterTopology	Sallen_Key	
5.	NumberOfStages	4.0	
6.	PassbandFrequency	10.0 k	
7.	StopbandAttenuation	-45.0	
8.	StopbandFrequency	15.0 k	
9.	Gain	1.0	
10.	DualSupply	+/-5.0 V	Power supply(s) to active 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. **TLC081CP** Product Folder : <http://www.ti.com//product/TLC081> : contains the data sheet and other resources.

Filter Stage :1

Cutoff Frequency 3.434 kHz
 Min GBW Req'd 212.592 kHz
 Stage Gain 1.0 V/V
 Stage Q 619.0 m
 Stage Topology Sallen_Key

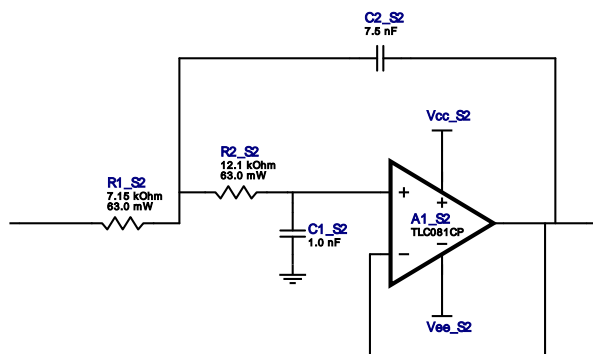


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
2.	C1_S1	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 mm ²
3.	C2_S1	MuRata	GRM1885C1H162JA01D Series= C0G/NP0	Cap= 1.6 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.02	0603 5 mm ²
4.	R1_S1	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	R2_S1	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

Filter Stage :2

Cutoff Frequency 6.233 kHz
 Min GBW Req'd 826.548 kHz
 Stage Gain 1.0 V/V
 Stage Q 1.326
 Stage Topology Sallen_Key

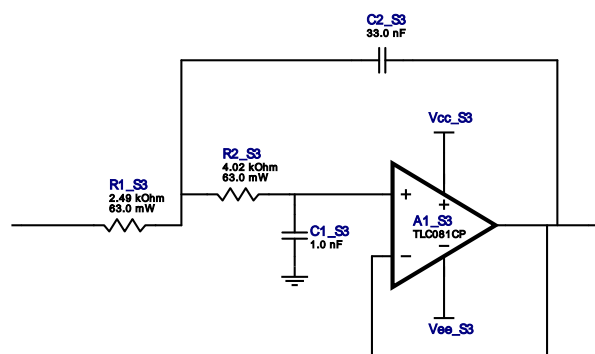


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S2	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
2.	C1_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 ²
3.	C2_S2	MuRata	GRM2195C1H752JA01D Series= C0G/NP0	Cap= 7.5 nF VDC= 50.0 V Tolerance= 5.0 %	1	\$0.06	0805 7 mm ²
4.	R1_S2	Vishay-Dale	CRCW04027K15FKED Series= CRCW..e3	Res= 7.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	R2_S2	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

Filter Stage :3

Cutoff Frequency 8.782 kHz
 Min GBW Req'd 2.455 MHz
 Stage Gain 1.0 V/V
 Stage Q 2.796
 Stage Topology Sallen_Key

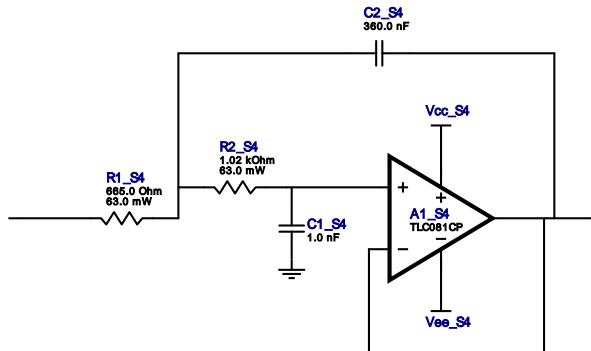


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S3	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
2.	C1_S3	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 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	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
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 mm ²

Filter Stage :4

Cutoff Frequency	10.207 kHz
Min GBW Req'd	9.447 MHz
Stage Gain	1.0 V/V
Stage Q	9.255
Stage Topology	Sallen_Key



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S4	Texas Instruments	TLC081CP	GbwTyp= 10.0 MHz VccMin= 4.5 V VccMax= 16.0 V	1	\$0.45	DIP 0 mm ²
2.	C1_S4	Samsung Electro-Mechanics	CL05C102JO5NNNC Series= C0G/NP0	Cap= 1.0 nF VDC= 16.0 V Tolerance= 5.0 %	1	\$0.01	0402 3 mm ²
3.	C2_S4	CUSTOM	CUSTOM Series= ?	Cap= 360.0 nF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm ²
4.	R1_S4	Vishay-Dale	CRCW0402665RFKED Series= CRCW..e3	Res= 665.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	R2_S4	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

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