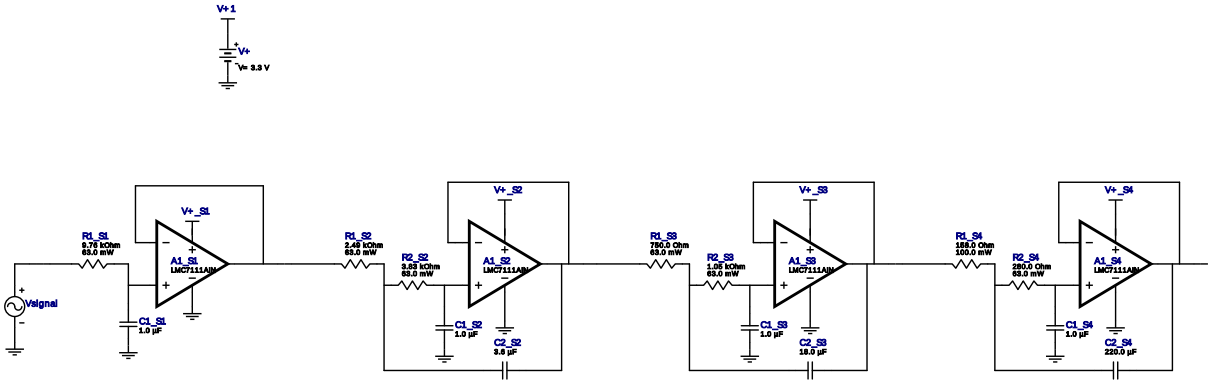
Type : Lowpass
Response : Chebyshev
Order : 7
Number of Stages : 4

Device = LMC7111AIN
Created = Jun 15 2015 6:15PM

WEBENCH® Design Report

Design : 4325536/6 LMC7111AIN
Lowpass, Sallen Key, Chebyshev 0.2 dB



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
2.	A1_S2	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
3.	A1_S3	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
4.	A1_S4	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
5.	C1_S1	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
6.	C1_S2	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
7.	C1_S3	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
8.	C1_S4	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
9.	C2_S2	CUSTOM	CUSTOM Series= ?	Cap= 3.6 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
10.	C2_S3	CUSTOM	CUSTOM Series= ?	Cap= 18.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
11.	C2_S4	CUSTOM	CUSTOM Series= ?	Cap= 220.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
12.	R1_S1	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	R1_S2	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	R1_S3	Vishay-Dale	CRCW0402750RFKED Series= CRCW..e3	Res= 750.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	R1_S4	Vishay-Dale	CRCW0603158RFKEA Series= CRCW..e3	Res= 158.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
16.	R2_S2	Vishay-Dale	CRCW04023K83FKED Series= CRCW..e3	Res= 3.83 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
17.	R2_S3	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
18.	R2_S4	Vishay-Dale	CRCW0402280RFKED Series= CRCW..e3	Res= 280.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Design Inputs

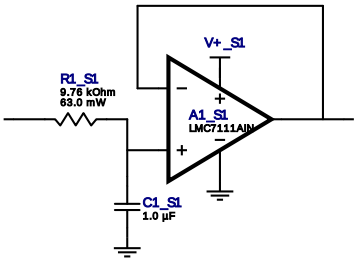
#	Name	Value	Description
1.	FilterType	Lowpass	
2.	FilterResponse	Chebyshev	
3.	FilterOrder	7.0	
4.	FilterTopology	Sallen_Key	
5.	NumberOfStages	4.0	
6.	PassbandFrequency	50.0	
7.	StopbandAttenuation	-60.0	
8.	StopbandFrequency	100.0	
9.	Gain	1.0	
10.	SingleSupply	3.3	Power supply(s) to active chips
11.	ResistorTolerance	E96	Resistor series - 1% Passive resistor tolerance
12.	CapacitorTolerance	E24	Capacitor series - 5% Passive capacitance tolerance
13.	SeedCapacitance	1.0 µ	Seed Capacitance to start design of filter

Design Assistance

1. **LMC7111AIN** Product Folder : http://www.ti.com//product/LMC7111 : contains the data sheet and other resources.

Filter Stage :1

Cutoff Frequency	16.216 Hz
Min GBW Reqd	810.8 Hz
Stage Gain	1.0 V/V
Stage Q	500.0 m
Stage Topology	Real_Pole

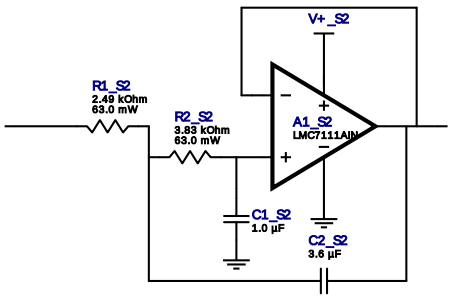


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
2.	C1_S1	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
3.	R1_S1	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :2

Cutoff Frequency	27.085 Hz
Min GBW Reqd	2.511 kHz
Stage Gain	1.0 V/V
Stage Q	927.0 m
Stage Topology	Sallen_Key

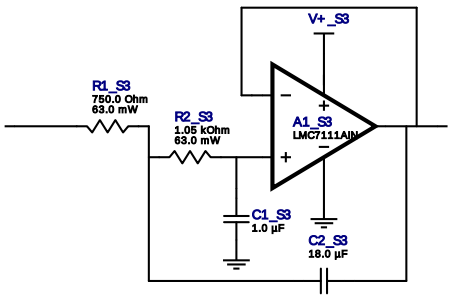


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S2	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
2.	C1_S2	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
3.	C2_S2	CUSTOM	CUSTOM Series= ?	Cap= 3.6 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
4.	R1_S2	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_S2	Vishay-Dale	CRCW04023K83FKED Series= CRCW..e3	Res= 3.83 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :3

Cutoff Frequency	42.321 Hz
Min GBW Reqd	8.858 kHz
Stage Gain	1.0 V/V
Stage Q	2.093
Stage Topology	Sallen_Key

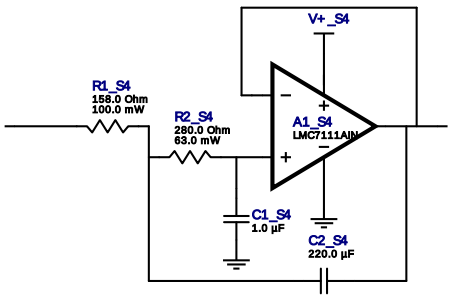


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S3	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm^2
2.	C1_S3	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
3.	C2_S3	CUSTOM	CUSTOM Series= ?	Cap= 18.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm^2
4.	R1_S3	Vishay-Dale	CRCW0402750RFKED Series= CRCW..e3	Res= 750.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	R2_S3	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Filter Stage :4

Cutoff Frequency	51.373 Hz
Min GBW Reqd	36.572 kHz
Stage Gain	1.0 V/V
Stage Q	7.119
Stage Topology	Sallen_Key



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S4	Texas Instruments	LMC7111AIN	GbwTyp= 50.0 mMHz VccMin= 2.7 V VccMax= 11.0 V	1	$0.55	DIP 0 mm²
2.	C1_S4	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm²
3.	C2_S4	CUSTOM	CUSTOM Series= ?	Cap= 220.0 uF VDC= 0.0 V Tolerance= 0.0 %	1	NA	CUSTOM 0 mm²
4.	R1_S4	Vishay-Dale	CRCW0603158RFKEA Series= CRCW..e3	Res= 158.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
5.	R2_S4	Vishay-Dale	CRCW0402280RFKED Series= CRCW..e3	Res= 280.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²