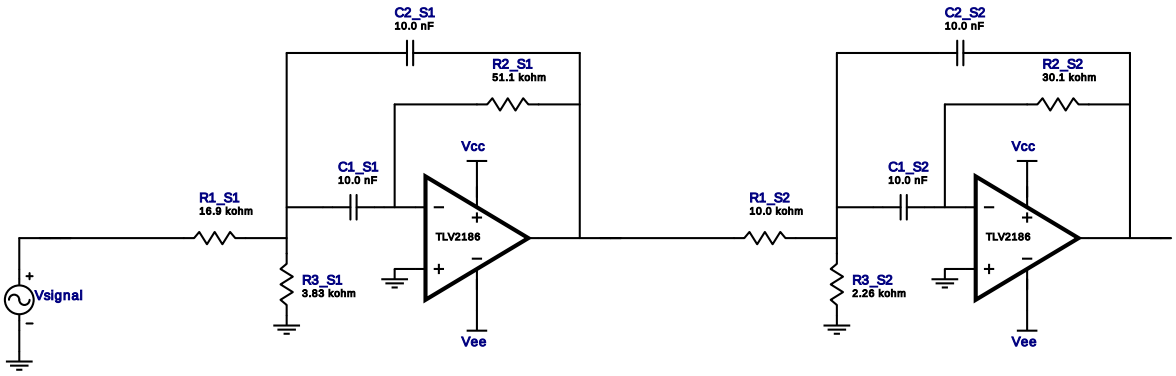
Type : Bandpass
Response : Butterworth
Order : 4
Number of Stages : 2

Filter Design Report

Design : Bandpass Filter - 4th order Butterworth
Design ID: 4

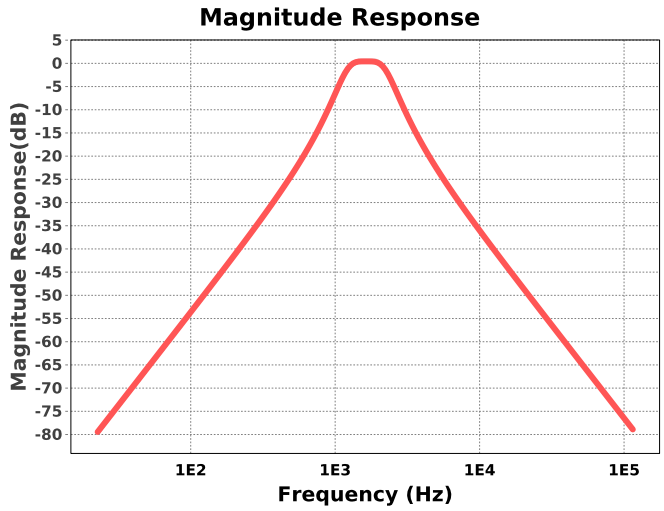


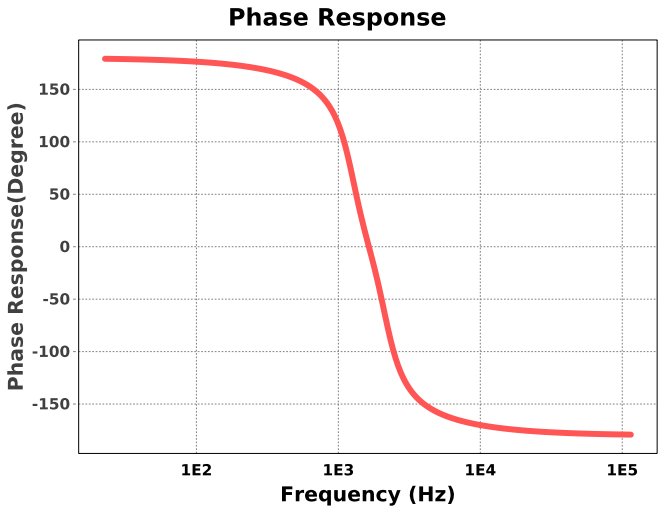
Electrical BOM

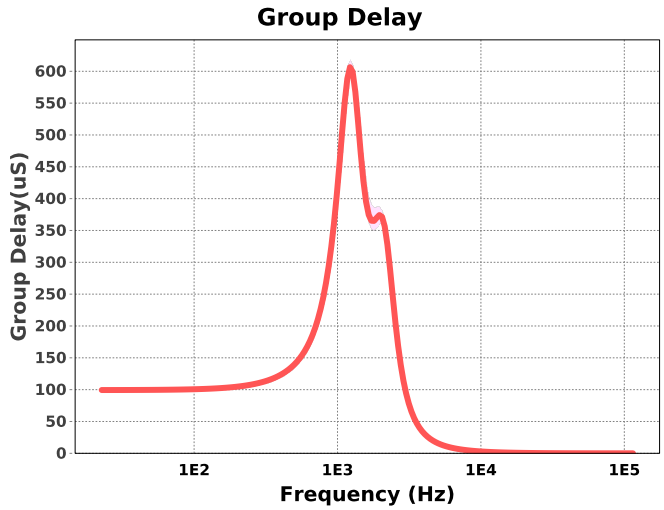
#	Name	Manufacturer	Part Number	Properties	Qty
1.	A1_S1	Texas Instruments Inc.	TLV2186	GbwTyp= 0.75MHz VccMax= 24V VccMin= 4.5V	1
2.	A1_S2	Texas Instruments Inc.	TLV2186	GbwTyp= 0.75MHz VccMax= 24V VccMin= 4.5V	1
3.	C1_S1	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
4.	C1_S2	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
5.	C2_S1	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
6.	C2_S2	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
7.	R1_S1	Generic	Ideal	Res= 16900.0ohm Tolerance= 2%	1
8.	R1_S2	Generic	Ideal	Res= 10000.0ohm Tolerance= 2%	1
9.	R2_S1	Generic	Ideal	Res= 51100.0ohm Tolerance= 2%	1
10.	R2_S2	Generic	Ideal	Res= 30100.0ohm Tolerance= 2%	1
11.	R3_S1	Generic	Ideal	Res= 3830.0ohm Tolerance= 2%	1
12.	R3_S2	Generic	Ideal	Res= 2260.0ohm Tolerance= 2%	1

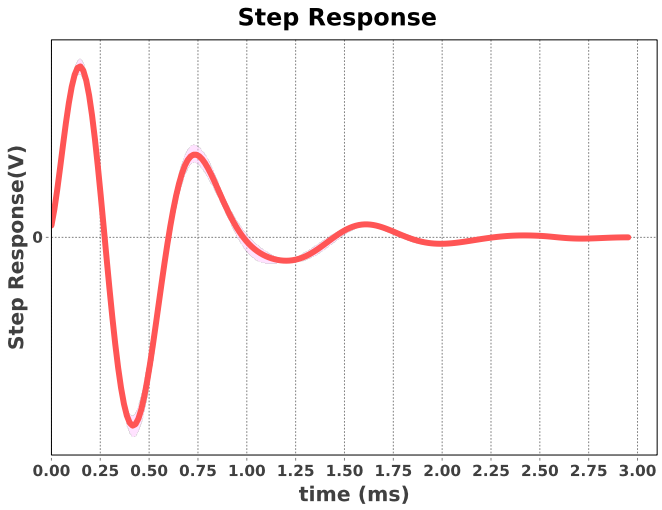
Sensitivity Analysis

#	Name	Series	Tolerance
1.	Cap	E96	1%
2.	Res	E48	2%









Design Inputs

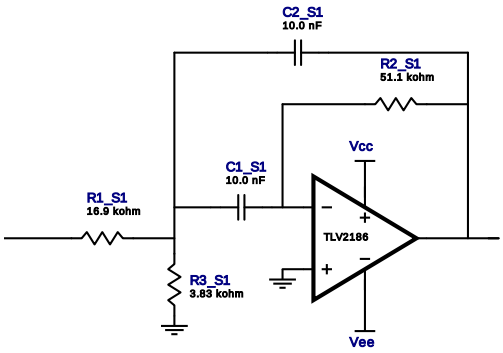
#	Name	Value	Description
1.	FilterType	bandpass	
2.	FilterResponse	Butterworth	
3.	FilterOrder	4.0	
4.	FilterTopology	Multiple Feedback	
5.	NumberOfStages	2.0	
6.	CenterFrequency	1.65 k	
7.	StopbandAttenuation	-40.001	
8.	PassbandBandwidth	1.2 k	
9.	StopbandBandwidth	12.0 k	
10.	Gain	1.0	
11.	DualSupply	+/-5.00 V	Power supply(s) to active chips
12.	ResistorTolerance	E48	Resistor series - 2% Passive resistor tolerance
13.	CapacitorTolerance	E96	Capacitor series - 1% Passive capacitor tolerance

Design Assistance

1. **TLV2186** Product Folder : http://www.ti.com/product/TLV2186 : contains the data sheet and other resources.

Filter Stage :1

Cutoff Frequency	1.26 kHz
Min GBW Reqd	373.612 kHz
Stage Gain	1.512 V/V
Stage Q	2.023
Stage Topology	Multiple Feedback



Electrical BOM

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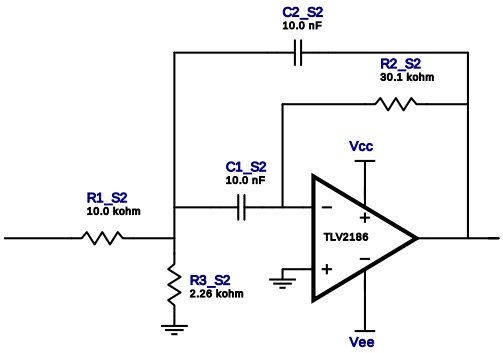
3.	C2_S1	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
4.	R1_S1	Generic	Ideal	Res= 16900.0ohm Tolerance= 2%	1
5.	R2_S1	Generic	Ideal	Res= 51100.0ohm Tolerance= 2%	1
6.	R3_S1	Generic	Ideal	Res= 3830.0ohm Tolerance= 2%	1

Filter Stage :2

Cutoff Frequency	2.137 kHz
Min GBW Reqd	631.491 kHz
Stage Gain	1.505 V/V
Stage Q	2.02
Stage Topology	Multiple Feedback



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty
1.	A1_S2	Texas Instruments Inc.	TLV2186	GbwTyp= 0.75MHz VccMax= 24V VccMin= 4.5V	1
2.	C1_S2	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
3.	C2_S2	Generic	Ideal	Cap= 10.0 nF Tolerance= 1.0 %	1
4.	R1_S2	Generic	Ideal	Res= 10000.0ohm Tolerance= 2%	1
5.	R2_S2	Generic	Ideal	Res= 30100.0ohm Tolerance= 2%	1
6.	R3_S2	Generic	Ideal	Res= 2260.0ohm Tolerance= 2%	1