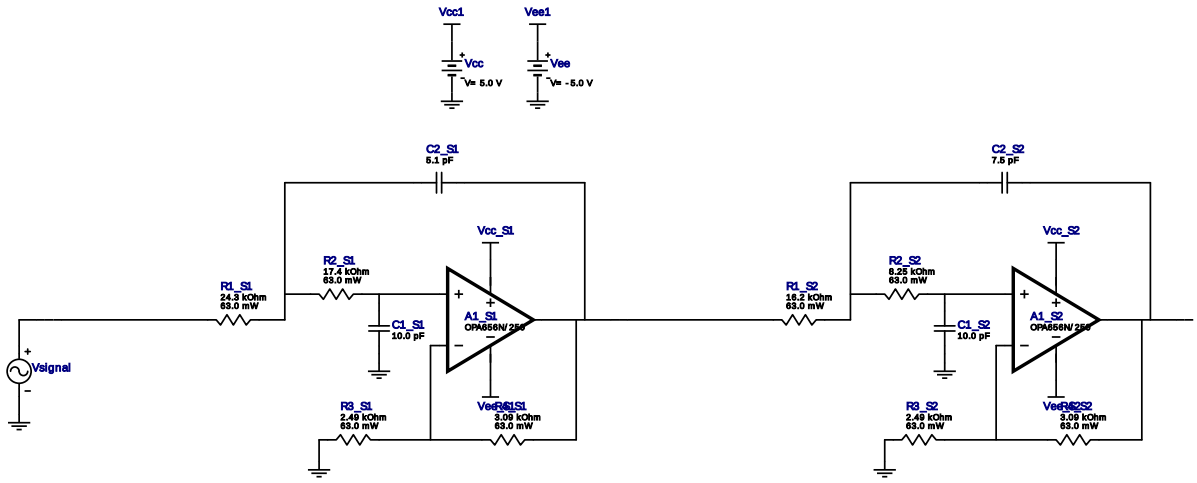
Type : Lowpass
Response : Linear_Phase_005
Order : 4
Number of Stages : 2

Device = OPA656N/250
Created = Jul 15 2015 3:32AM

WEBENCH® Design Report

Design : 3748350/3 OPA656N/250
Lowpass, Sallen Key, Linear Phase 0.05deg



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	A1_S1	Texas Instruments	OPA656N/250	GbwTyp= 500.0 MHz VccMin= 7.0 V VccMax= 13.0 V	1	$5.75	SOT-23 14 mm²
2.	A1_S2	Texas Instruments	OPA656N/250	GbwTyp= 500.0 MHz VccMin= 7.0 V VccMax= 13.0 V	1	$5.75	SOT-23 14 mm²
3.	C1_S1	Kemet	C0402C100J3GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 25.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
4.	C1_S2	Kemet	C0402C100J3GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 25.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
5.	C2_S1	MuRata	GRM1555C1E5R1CA01D Series= C0G/NP0	Cap= 5.1 pF VDC= 25.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
6.	C2_S2	MuRata	GRM1555C1H7R5CA01D Series= C0G/NP0	Cap= 7.5 pF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
7.	R1_S1	Vishay-Dale	CRCW040224K3FKED Series= CRCW..e3	Res= 24.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	R1_S2	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	R2_S1	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	R2_S2	Vishay-Dale	CRCW04028K25FKED Series= CRCW..e3	Res= 8.25 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	R3_S1	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	R3_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
13.	R4_S1	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	R4_S2	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

Design Inputs

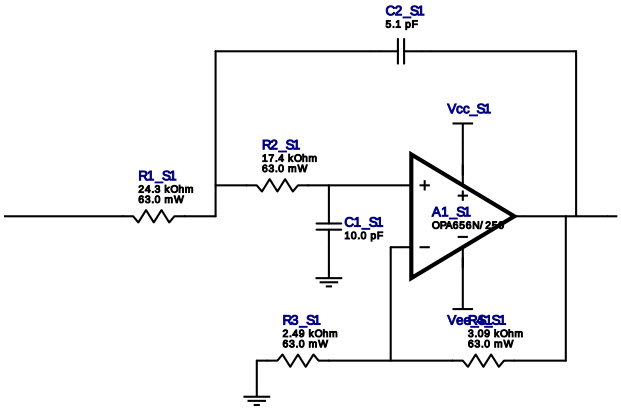
#	Name	Value	Description
1.	FlatnessHigherTestFrequency	400.0	Magnitude Flatness Higher Test Frequency
2.	FlatnessLowerTestFrequency	0.0	Magnitude Flatness Lower Test Frequency
3.	FlatnessMagnitudeFlatnessSpecification	200.0 m	Flatness Specification
4.	GroupDelayFlatnessSpecification	100.0 m	Group Delay Flatness
5.	GroupDelayHigherTestFrequency	400.0	Group Delay Flatness Higher Test Frequency
6.	GroupDelayLowerTestFrequency	0.0	Group Delay Flatness Lower Test Frequency
7.	GroupDelaySpecification	510.0 m	Group Delay Specification
8.	FilterType	Lowpass	
9.	FilterResponse	Linear_Phase_005	
10.	FilterOrder	4.0	
11.	FilterTopology	Sallen_Key	
12.	NumberOfStages	2.0	
13.	PassbandFrequency	1000.0 k	
14.	StopbandAttenuation	-45.0	
15.	StopbandFrequency	5.0 M	
16.	Gain	5.0	
17.	DualSupply	+/-5.0 V	Power supply(s) to active chips
18.	ResistorTolerance	E96	Resistor series - 1% Passive resistor tolerance
19.	CapacitorTolerance	E24	Capacitor series - 5% Passive capacitance tolerance
20.	SeedCapacitance	10.0 p	Seed Capacitance to start design of filter

Design Assistance

1. **OPA656N/250** Product Folder : http://www.ti.com//product/OPA656 : contains the data sheet and other resources.

Filter Stage :1

Cutoff Frequency	1.075 MHz
Min GBW Reqd	134.607 MHz
Stage Gain	2.236 V/V
Stage Q	560.0 m
Stage Topology	Sallen_Key



Electrical BOM

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3.	C2_S1	MuRata	GRM1555C1E5R1CA01D Series= C0G/NP0	Cap= 5.1 pF VDC= 25.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
4.	R1_S1	Vishay-Dale	CRCW040224K3FKED Series= CRCW..e3	Res= 24.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
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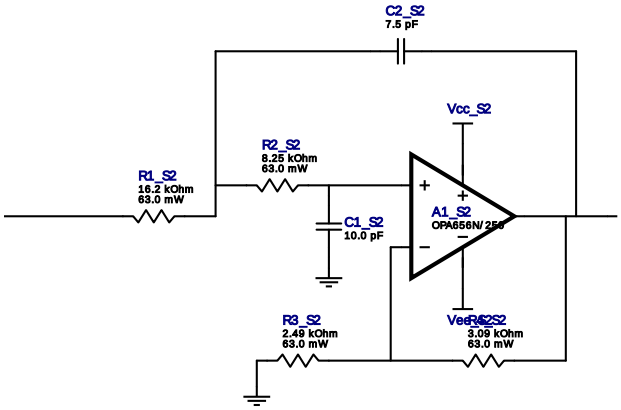
7.	R4_S1	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

Filter Stage :2

Cutoff Frequency	1.586 MHz
Min GBW Reqd	379.454 MHz
Stage Gain	2.236 V/V
Stage Q	1.07
Stage Topology	Sallen_Key



Electrical BOM

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3.	C2_S2	MuRata	GRM1555C1H7R5CA01D Series= C0G/NP0	Cap= 7.5 pF VDC= 50.0 V Tolerance= 5.0 %	1	$0.01	0402 3 mm²
4.	R1_S2	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	R2_S2	Vishay-Dale	CRCW04028K25FKED Series= CRCW..e3	Res= 8.25 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
6.	R3_S2	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	R4_S2	Vishay-Dale	CRCW04023K09FKED Series= CRCW..e3	Res= 3.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2