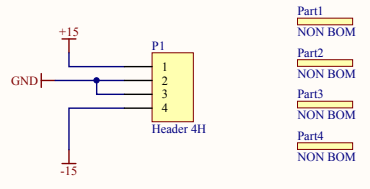
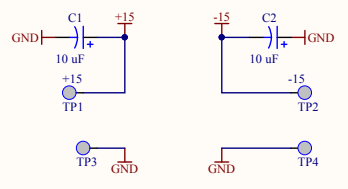
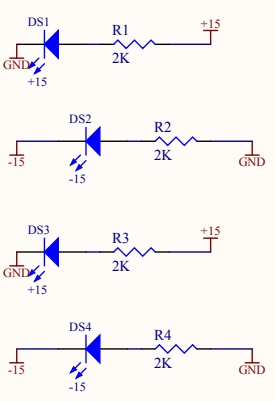
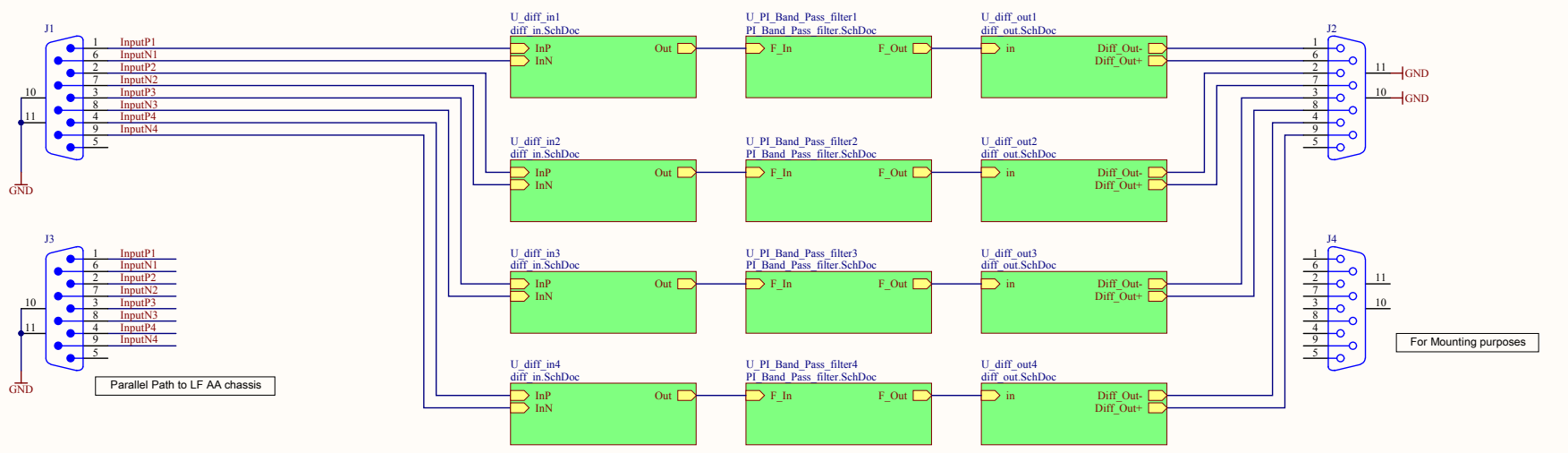


1 2 3 4 5 6



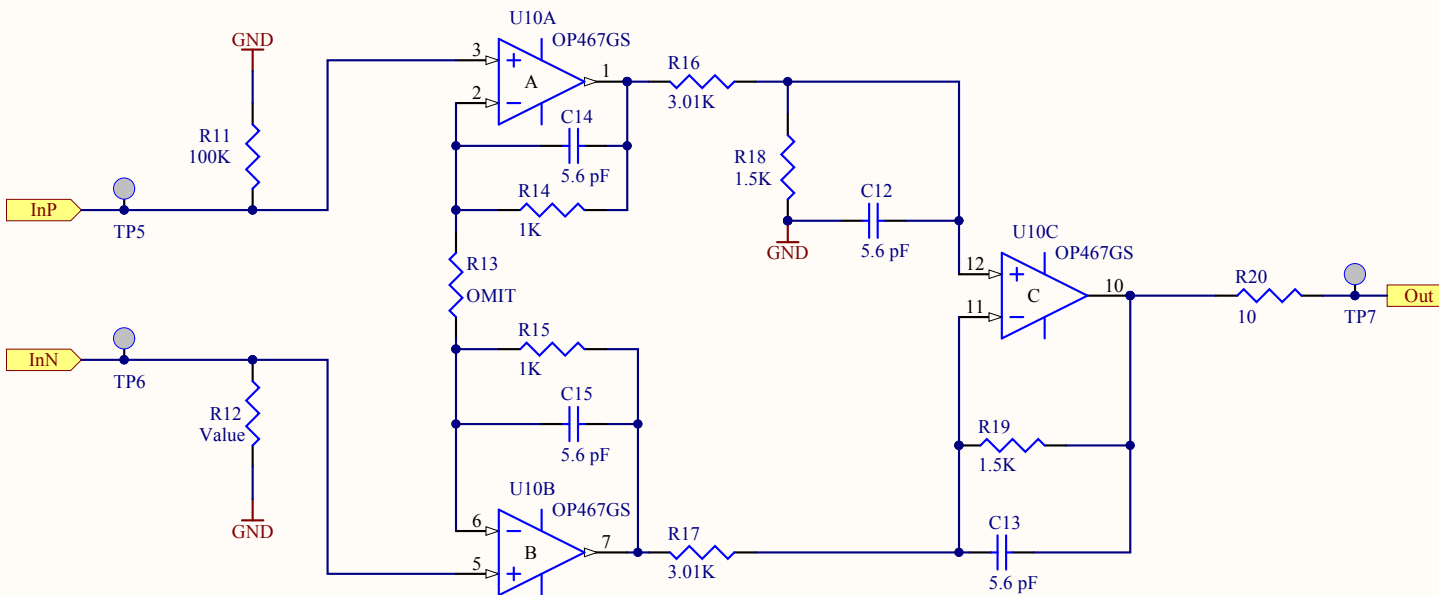
- Part1
NON BOM
- Part2
NON BOM
- Part3
NON BOM
- Part4
NON BOM

Change History
Version. 1 - Initial Release

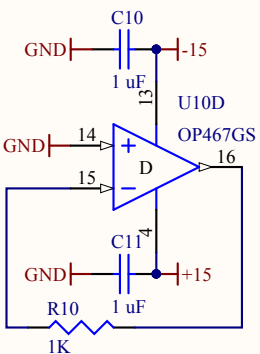
Last Edited: 5/14/2015

Title PI Band Pass Filter		LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		LIGO	
Size: B	DCC Number: D1500172	Revision: v1	Engineer: Carl Adams	Date: 7/8/2015	
File: C:\Users\Public\Documents\Altium\Altium\AD\LIGO_Altium_files\PI Band Pass Filter\PI Band Pass filter Mainv2.SchDoc				Time: 4:38:10 PM	
				Sheet 1 of 4	

1 2 3 4 5 6



Gain = -6dB up to 7MHz, $f_c = 15\text{MHz}$



Last Edited:

Title
Differential Receiver

LIGO Laboratory
California Institute of Technology
Massachusetts Institute of Technology

LIGO

Size: A DCC Number: D1500172

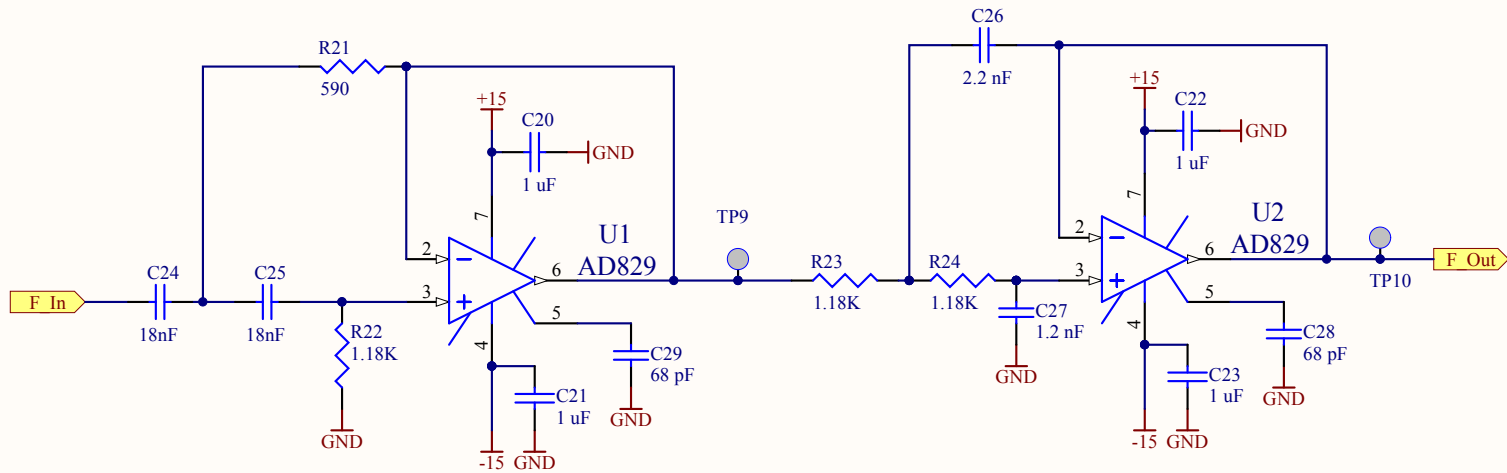
Revision: v1

Engineer: Carl Adams

Date: 7/8/2015

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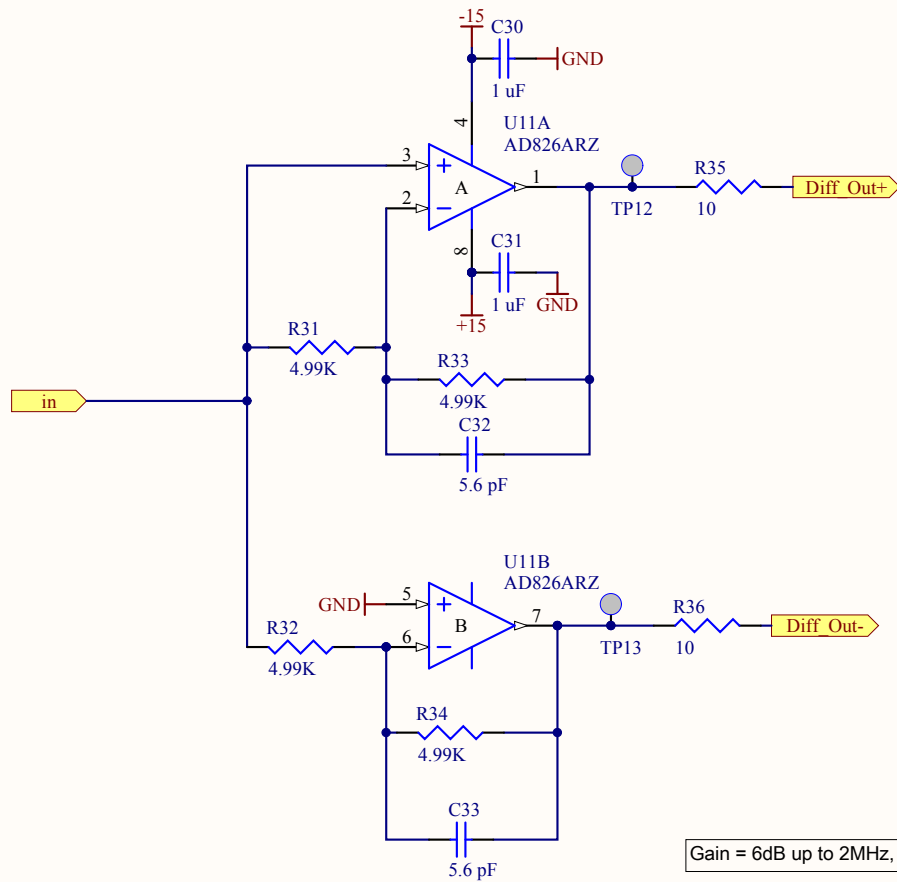
Time: 4:38:11 PM
Sheet 2 of 4



2 Stage Sallen - Key Bandpass Butterworth filter using cascaded High pass and Low pass filters.
 Pass band -3 dB frequencies = 10.2KHz - 81.3KHz, Gain = -233 mdB
 Stop Band 40 dB/dec roll off

Last Edited:

Title PI Band Pass Filter		LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		LIGO	
Size: A	DCC Number: D1500172	Revision: v1	Engineer: Carl Adams	Date: 7/8/2015	
File: C:\Users\Public\Documents\Altium\Altium\AD\LIGO_Altium_files\PI Band Pass Filter\PI Band Pass filter.SchDoc			Sheet 3 of 4		

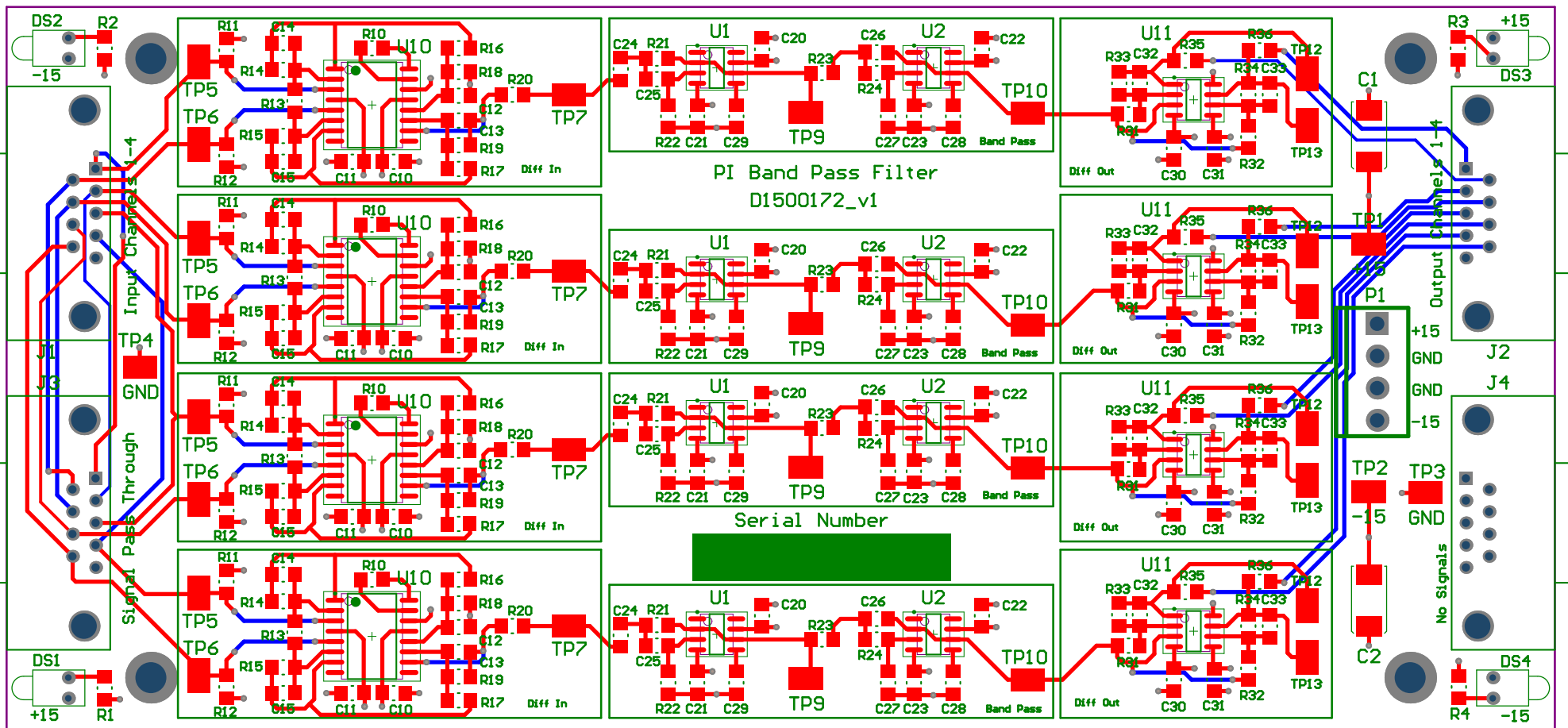


Gain = 6dB up to 2MHz, $f_c = 12.6\text{MHz}$

Last Edited:

Title Differential Driver		LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		Date: 7/8/2015 Time: 4:38:11 PM Sheet 4 of 4
Size: A	DCC Number: D1500172	Revision: v1	Engineer: Carl Adams	
File: C:\Users\Public\Documents\Altium\Altium\AD\LIGO_Altium_files\PI Band Pass Filter\diff out.SchDoc				





LIGO Bill of Materials

Source Data From: P1_Band_Pass_Filter.PjgPcb
 Board Designed By: Carl Adams
 Board Number: D160172
 Board Revision: v1
 Variant: None

Creation Date: 7/8/2015 4:38:14 PM
 Print Date: 08-26-15 4:38:19 PM

U, J, C	Designator	Comment	Description	Digikey Part Number	Manufacturers Part Number	Quantity
J2, J4		Manufacturer Part Number	Receptacle Assembly, 9 Position, Right Angle, 8.08mm Series, Amplitude	5788796-2ND	5788796-2	2
J1, J3		Manufacturer Part Number	Plug Assembly, Size 1, 9 Position, Right Angle, 8.08mm Series, Amplitude	A35123-ND	5788792-1	2
	U11_U_diff_out1, U11_U_diff_out2	AD826ARZ	AD826ARZREELCTND	AD826ARZREEL		4
	U11_U_diff_out3, U11_U_diff_out4	5.6 pF	Operational Amplifier	478-1485-1-ND	1005658RNCAT2A	2
	C12_U_diff_in1, C12_U_diff_in2		Capacitor	PCF1180CT-ND		24
	C12_U_diff_in3, C12_U_diff_in4					
	C13_U_diff_in1, C13_U_diff_in2					
	C13_U_diff_in3, C13_U_diff_in4					
	C14_U_diff_in1, C14_U_diff_in2					
	C14_U_diff_in3, C14_U_diff_in4					
	C15_U_diff_in1, C15_U_diff_in2					
	C15_U_diff_in3, C15_U_diff_in4					
	C32_U_diff_out1, C32_U_diff_out2					
	C32_U_diff_out3, C32_U_diff_out4					
	C33_U_diff_out1, C33_U_diff_out2					
	C33_U_diff_out3, C33_U_diff_out4					
	C24_U_P1_Band_Pass_Site1	18pF	Capacitor	PCF1180CT-ND		8
	C24_U_P1_Band_Pass_Site2					
	C24_U_P1_Band_Pass_Site3					
	C24_U_P1_Band_Pass_Site4					
	C25_U_P1_Band_Pass_Site1					
	C25_U_P1_Band_Pass_Site2					
	C25_U_P1_Band_Pass_Site3					
	C25_U_P1_Band_Pass_Site4					
	C26_U_P1_Band_Pass_Site1	2.2 nF	Capacitor	PCF1332CT-ND		4
	C26_U_P1_Band_Pass_Site2					
	C26_U_P1_Band_Pass_Site3					
	C26_U_P1_Band_Pass_Site4					
	C27_U_P1_Band_Pass_Site1	1.2 nF	Capacitor	PCF1343CT-ND	RCW-U1122JNS	4
	C27_U_P1_Band_Pass_Site2					
	C27_U_P1_Band_Pass_Site3					
	C27_U_P1_Band_Pass_Site4					
	C28_U_P1_Band_Pass_Site1	68 pF	Capacitor	478-1479-1-ND		8
	C28_U_P1_Band_Pass_Site2					
	C28_U_P1_Band_Pass_Site3					
	C28_U_P1_Band_Pass_Site4					
	C29_U_P1_Band_Pass_Site1					
	C29_U_P1_Band_Pass_Site2					
	C29_U_P1_Band_Pass_Site3					
	C29_U_P1_Band_Pass_Site4					
	C30_U_P1_Band_Pass_Site1					
	C30_U_P1_Band_Pass_Site2					
	C30_U_P1_Band_Pass_Site3					
	C30_U_P1_Band_Pass_Site4					
	H1	Header 4H	Header, 4-Pin, Typical RED DSA's LED	TYM822-ND	X0890404	1
	R51, D52, D53, D54	+15, -15, +15, -15	OP467GSS	OP467GSSREELCTND	OP467GSS	4
	U10_U_diff_in1, U10_U_diff_in2		Precision Operational Amplifier			
	U10_U_diff_in3, U10_U_diff_in4					
	C10_U_diff_in1, C10_U_diff_in2	1 uF	CAP, 1.0UF, 50V, CERAMIC P1006	PC22234CT-ND		
	C10_U_diff_in3, C10_U_diff_in4					
	C11_U_diff_in1, C11_U_diff_in2					
	C11_U_diff_in3, C11_U_diff_in4					
	C20_U_P1_Band_Pass_Site1					
	C20_U_P1_Band_Pass_Site2					
	C20_U_P1_Band_Pass_Site3					
	C20_U_P1_Band_Pass_Site4					
	C21_U_P1_Band_Pass_Site1					
	C21_U_P1_Band_Pass_Site2					
	C21_U_P1_Band_Pass_Site3					
	C21_U_P1_Band_Pass_Site4					
	C22_U_P1_Band_Pass_Site1					
	C22_U_P1_Band_Pass_Site2					
	C22_U_P1_Band_Pass_Site3					
	C22_U_P1_Band_Pass_Site4					
	C23_U_P1_Band_Pass_Site1					
	C23_U_P1_Band_Pass_Site2					
	C23_U_P1_Band_Pass_Site3					
	C23_U_P1_Band_Pass_Site4					
	C30_U_diff_out1, C30_U_diff_out2					
	C30_U_diff_out3, C30_U_diff_out4					
	C31_U_diff_out1, C31_U_diff_out2					
	C31_U_diff_out3, C31_U_diff_out4					
	R10_U_diff_in1, R10_U_diff_in2	1K		311-1-02KRECT-ND	RC1206FR-071K	12
	R10_U_diff_in3, R10_U_diff_in4					
	R14_U_diff_in1, R14_U_diff_in2					
	R14_U_diff_in3, R14_U_diff_in4					
	R15_U_diff_in1, R15_U_diff_in2					
	R15_U_diff_in3, R15_U_diff_in4					
	R11_U_diff_in1, R11_U_diff_in2	100K, 100K, 100K, 100K	Resistor	CRT1206-BY-100SELPCT-ND	CRT1206-BY-100SELP	8
	R11_U_diff_in3, R11_U_diff_in4	Value, Value, Value, Value				
	R12_U_diff_in1, R12_U_diff_in2					
	R12_U_diff_in3, R12_U_diff_in4					
	R13_U_diff_in1, R13_U_diff_in2	DMIT	Resistor	DMIT		4
	R13_U_diff_in3, R13_U_diff_in4					
	R16_U_diff_in1, R16_U_diff_in2	3.01K	Resistor	311-3-01KRECT-ND	RC1206FR-073K01L	8
	R16_U_diff_in3, R16_U_diff_in4					
	R17_U_diff_in1, R17_U_diff_in2					
	R17_U_diff_in3, R17_U_diff_in4					
	R18_U_diff_in1, R18_U_diff_in2	1.5K	Resistor	311-1-5KACCT-ND	311-1-5KACCT	8
	R18_U_diff_in3, R18_U_diff_in4					
	R19_U_diff_in1, R19_U_diff_in2					
	R19_U_diff_in3, R19_U_diff_in4					
	R20_U_diff_in1, R20_U_diff_in2	10	Resistor	S41-2062-1-ND	311-2062-1	12
	R20_U_diff_in3, R20_U_diff_in4					
	R36_U_diff_out1, R36_U_diff_out2					
	R36_U_diff_out3, R36_U_diff_out4					
	R37_U_diff_out1, R37_U_diff_out2					
	R37_U_diff_out3, R37_U_diff_out4					
	R38_U_diff_out1, R38_U_diff_out2					
	R38_U_diff_out3, R38_U_diff_out4					
	R21_U_P1_Band_Pass_Site1	560	Resistor	P560CCT-ND		4
	R21_U_P1_Band_Pass_Site2					
	R21_U_P1_Band_Pass_Site3					
	R21_U_P1_Band_Pass_Site4					
	R22_U_P1_Band_Pass_Site1	1.18K	Resistor	311-1-18KACCT-ND	311-1-18KACCT	12
	R22_U_P1_Band_Pass_Site2					
	R22_U_P1_Band_Pass_Site3					
	R22_U_P1_Band_Pass_Site4					
	R23_U_P1_Band_Pass_Site1					
	R23_U_P1_Band_Pass_Site2					
	R23_U_P1_Band_Pass_Site3					
	R23_U_P1_Band_Pass_Site4					
	R24_U_P1_Band_Pass_Site1					
	R24_U_P1_Band_Pass_Site2					
	R24_U_P1_Band_Pass_Site3					
	R24_U_P1_Band_Pass_Site4					
	R34_U_P1_Band_Pass_Site1	4.99K	Resistor	311-4-99KACCT-ND	311-4-99KACCT	16
	R34_U_P1_Band_Pass_Site2					
	R34_U_P1_Band_Pass_Site3					
	R34_U_P1_Band_Pass_Site4					
	R31_U_diff_out1, R31_U_diff_out2					
	R31_U_diff_out3, R31_U_diff_out4					
	R32_U_diff_out1, R32_U_diff_out2					
	R32_U_diff_out3, R32_U_diff_out4					
	R33_U_diff_out1, R33_U_diff_out2					
	R33_U_diff_out3, R33_U_diff_out4					
	R34_U_diff_out1, R34_U_diff_out2					
	R34_U_diff_out3, R34_U_diff_out4					
	U1_U_P1_Band_Pass_Site1	AD829	Video Operational Amplifier	AD829ARZREELCTND		8
	U1_U_P1_Band_Pass_Site2					
	U1_U_P1_Band_Pass_Site3					
	U1_U_P1_Band_Pass_Site4					
	U2_U_P1_Band_Pass_Site1					
	U2_U_P1_Band_Pass_Site2					
	U2_U_P1_Band_Pass_Site3					
	U2_U_P1_Band_Pass_Site4					
	R1, R2, R3	2K	Solid Tantalum Chip Capacitor	P2-200CT-ND	311-200CT	4
	C1, C2	10 uF	Solid Tantalum Chip Capacitor	718-1273-1-ND	718-1273-1	2
	TP1, TP2, TP3, TP4, TP5_U_diff_in1	+15, -15, GND, GND, TEST	PCB Testpoint	5016KCT-ND	5016	2
	TP5_U_diff_in2, TP5_U_diff_in3					
	TP5_U_diff_in4, TP5_U_diff_in5					
	TP6_U_diff_in1, TP6_U_diff_in2					
	TP6_U_diff_in3, TP6_U_diff_in4					
	TP6_U_diff_in5, TP6_U_diff_in6					
	TP7_U_diff_in1, TP7_U_diff_in2					
	TP7_U_diff_in3, TP7_U_diff_in4					
	TP8_U_P1_Band_Pass_Site1					
	TP8_U_P1_Band_Pass_Site2					
	TP8_U_P1_Band_Pass_Site3					
	TP8_U_P1_Band_Pass_Site4					
	TP9_U_P1_Band_Pass_Site1					
	TP9_U_P1_Band_Pass_Site2					
	TP9_U_P1_Band_Pass_Site3					
	TP9_U_P1_Band_Pass_Site4					
	TP10_U_P1_Band_Pass_Site1					
	TP10_U_P1_Band_Pass_Site2					
	TP10_U_P1_Band_Pass_Site3					
	TP10_U_P1_Band_Pass_Site4					
	TP12_U_diff_out1, TP12_U_diff_out2					
	TP12_U_diff_out3, TP12_U_diff_out4					
	TP13_U_diff_out1, TP13_U_diff_out2					
	TP13_U_diff_out3, TP13_U_diff_out4					