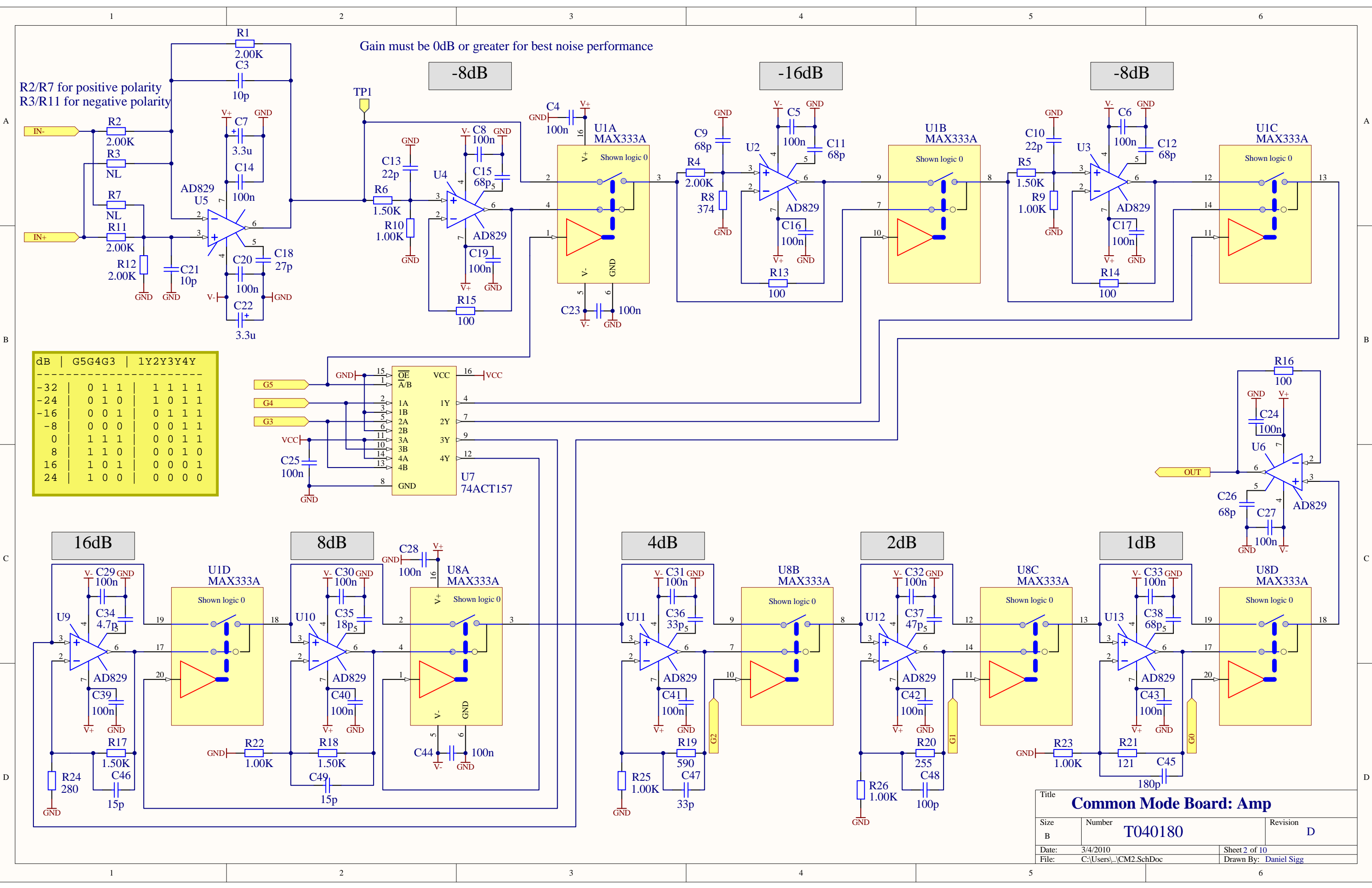


Title		
<b>Common Mode Board</b>		
Size	Number	Revision
B	D040180	D
Date:	3/4/2010	Sheet 1 of 10
File:	C:\Users\...\CM1.SchDoc	Drawn By: Daniel Sigg



Gain must be 0dB or greater for best noise performance

R2/R7 for positive polarity  
R3/R11 for negative polarity

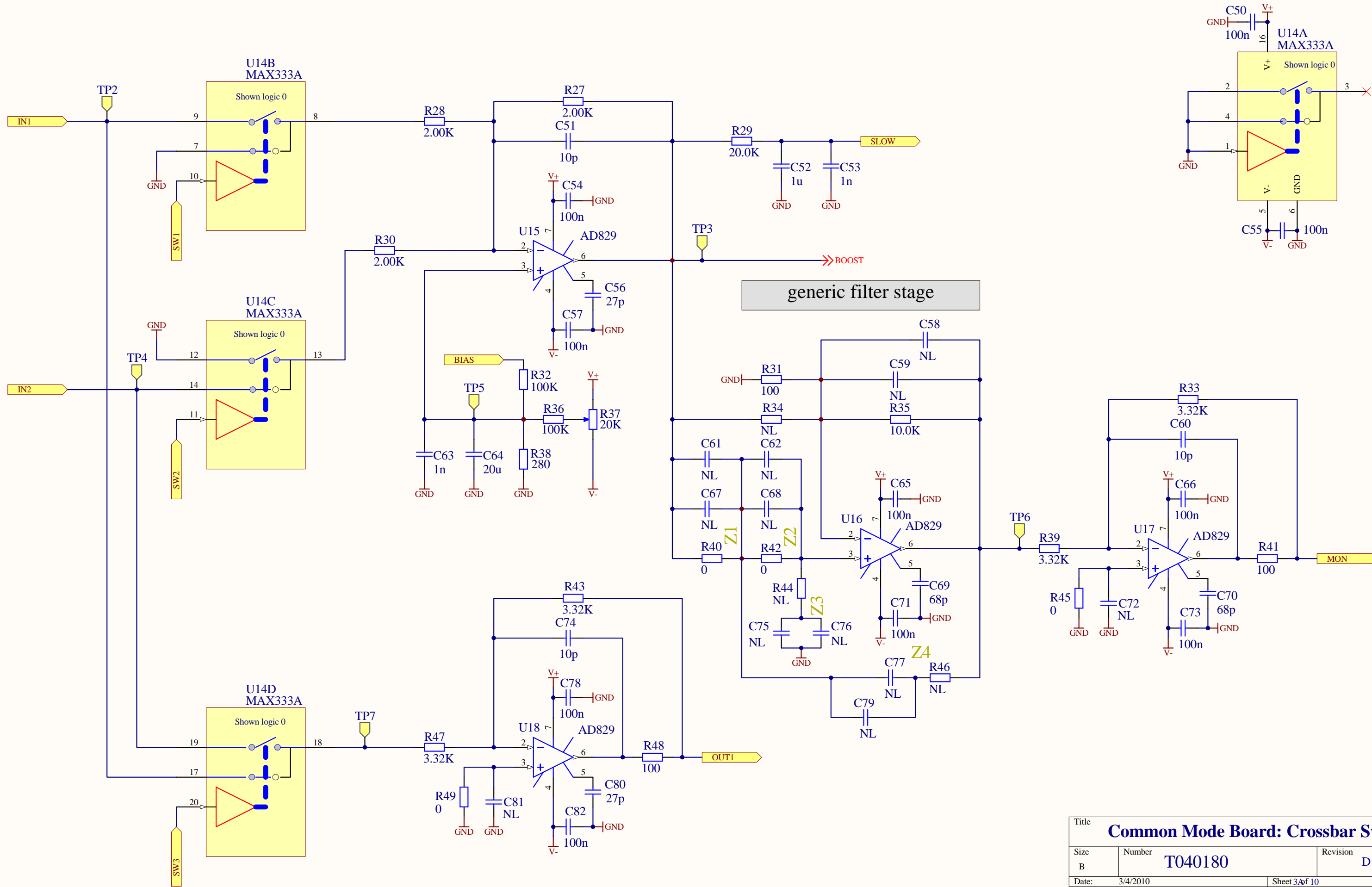
-8dB

-16dB

-8dB

dB	G5G4G3	1Y2Y3Y4Y
-32	0 1 1	1 1 1 1
-24	0 1 0	1 0 1 1
-16	0 0 1	0 1 1 1
-8	0 0 0	0 0 1 1
0	1 1 1	0 0 1 1
8	1 1 0	0 0 1 0
16	1 0 1	0 0 0 1
24	1 0 0	0 0 0 0

Title <b>Common Mode Board: Amp</b>		
Size B	Number <b>T040180</b>	Revision D
Date: 3/4/2010	Sheet 2 of 10	
File: C:\Users\...\CM2.SchDoc	Drawn By: Daniel Sigg	



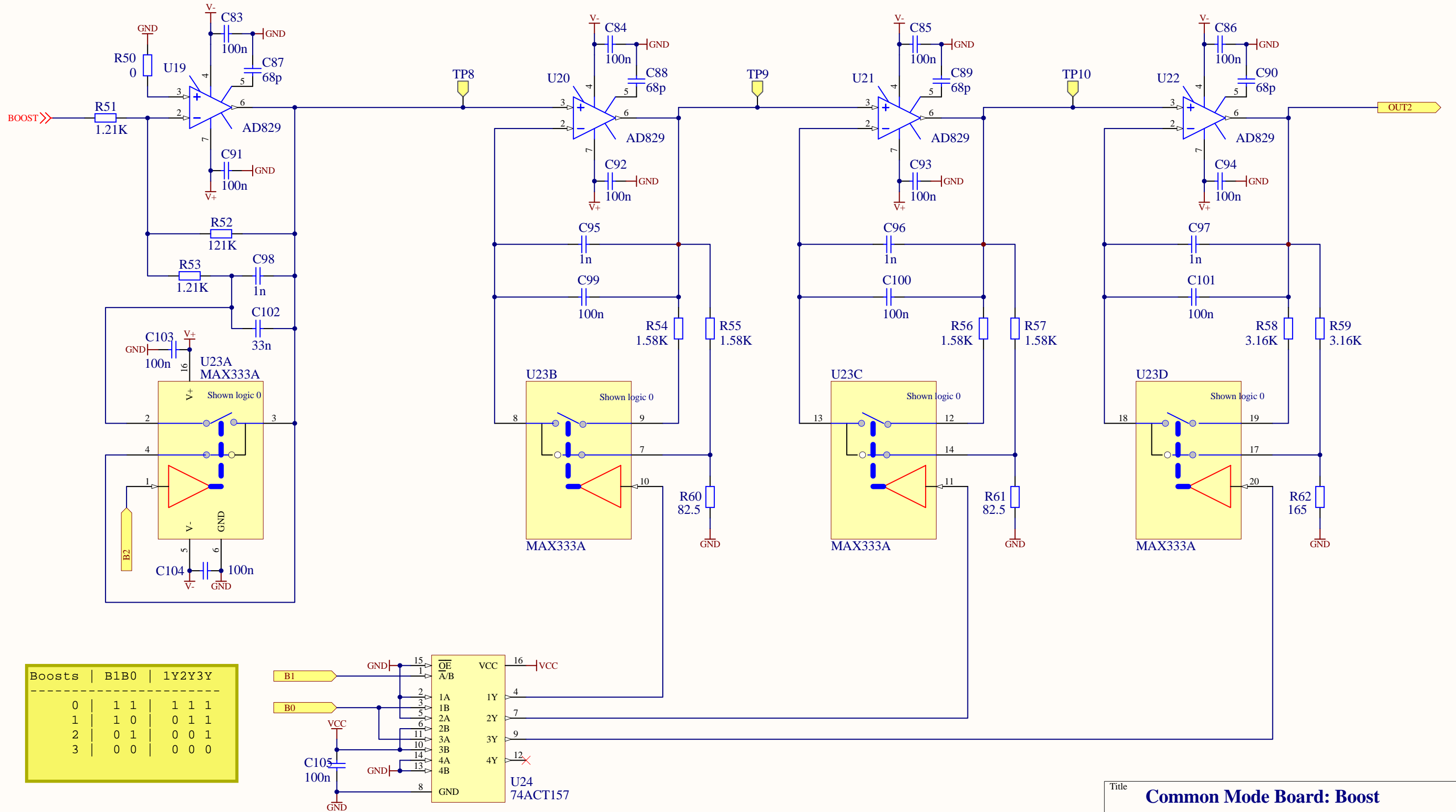
Title		
<b>Common Mode Board: Crossbar Switch</b>		
Size	Number	Revision
B	T040180	D
Date:	3/4/2010	Sheet 3 of 10
File:	C:\Users\...\CM3A.SchDoc	Drawn By: Daniel Sigg

40Hz/4kHz pole/zero pair

1kHz/20kHz pole/zero pair

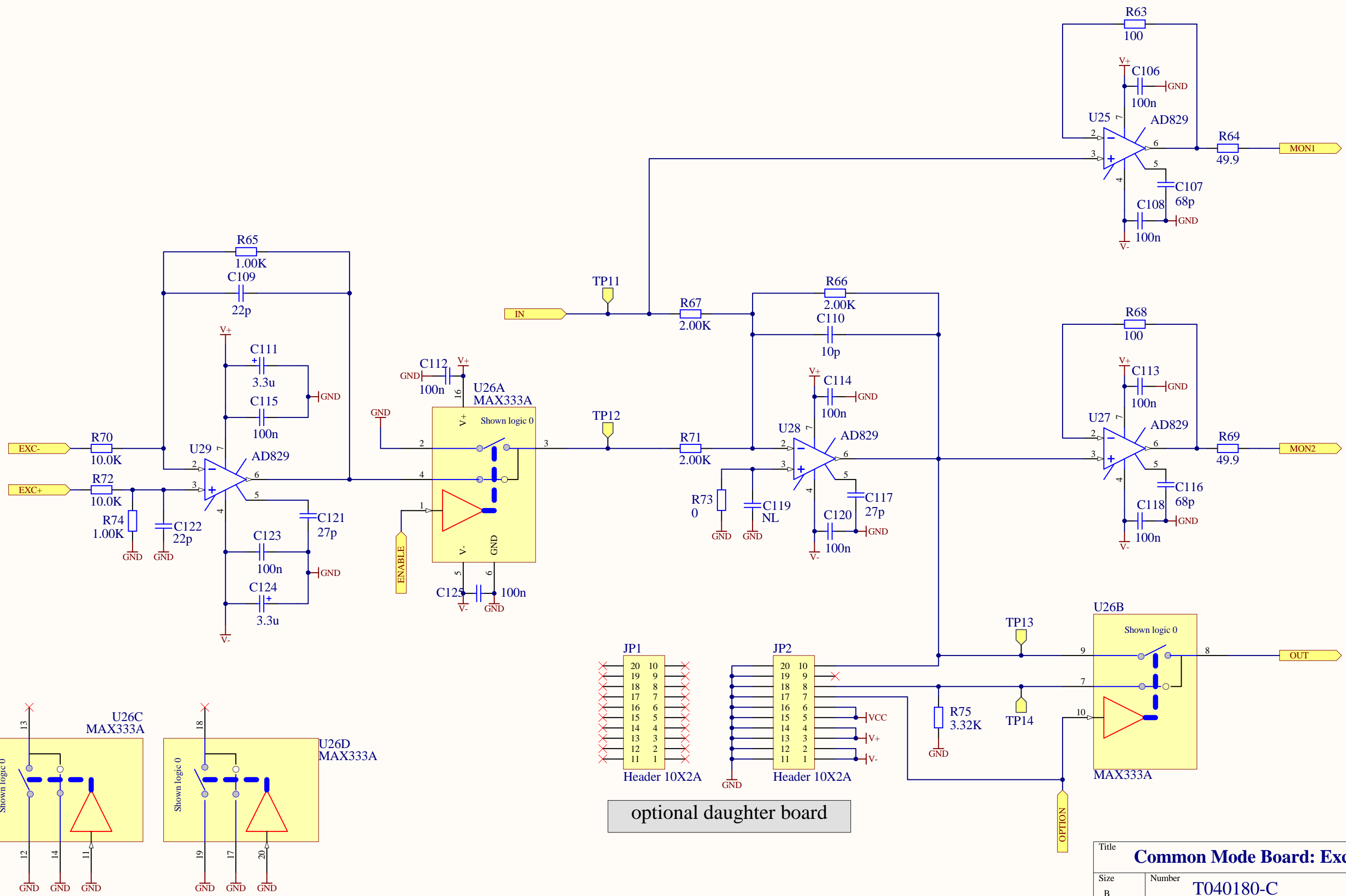
1kHz/20kHz pole/zero pair

500Hz/10kHz pole/zero pair

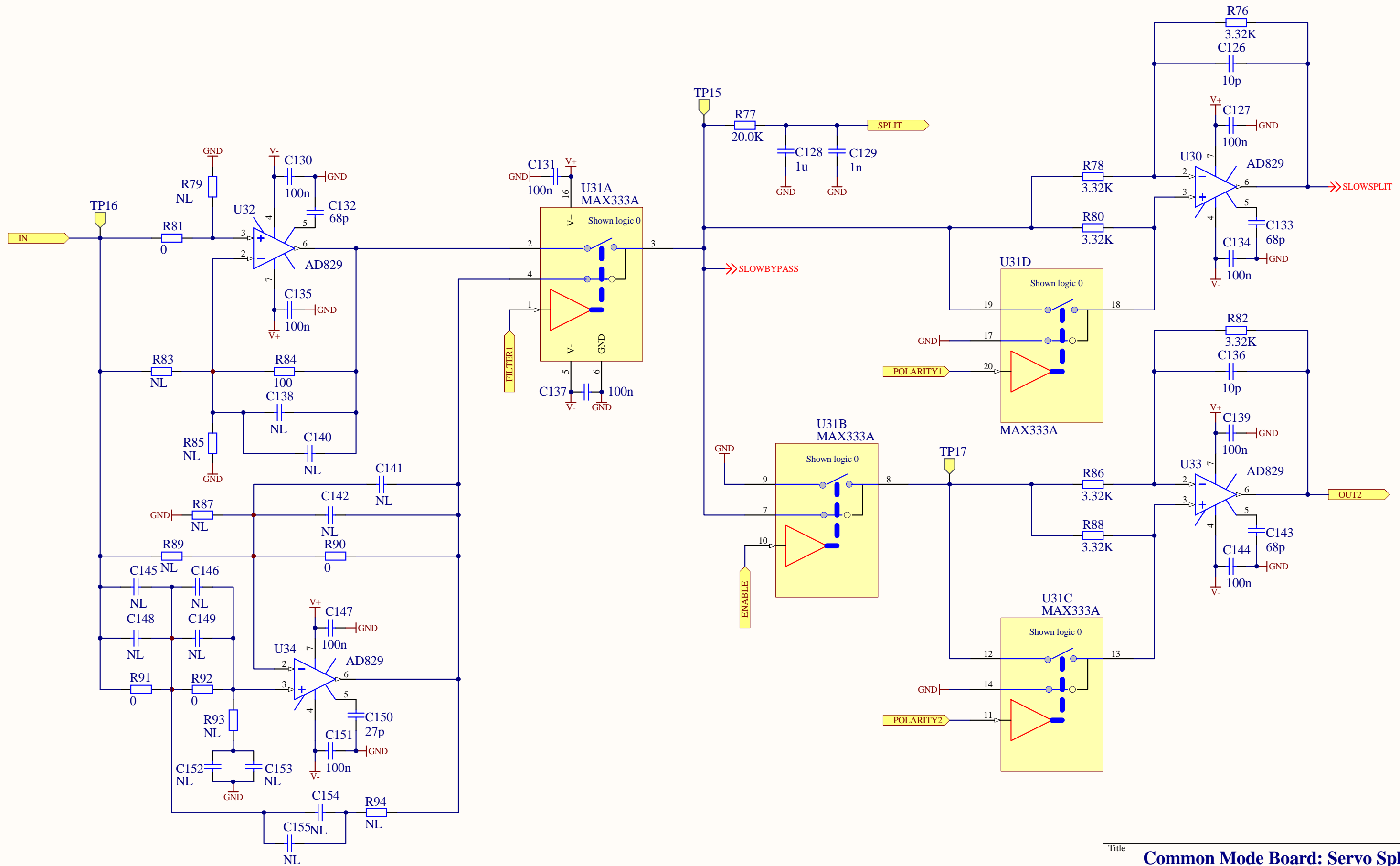


Boosts	B1B0	1Y2Y3Y
0	1 1	1 1 1
1	1 0	0 1 1
2	0 1	0 0 1
3	0 0	0 0 0

Title <b>Common Mode Board: Boost</b>		
Size B	Number <b>T040180-C</b>	Revision D
Date: 3/4/2010	Sheet 3Bf 10	
File: C:\Users\...\CM3B.SchDoc	Drawn By: Daniel Sigg	

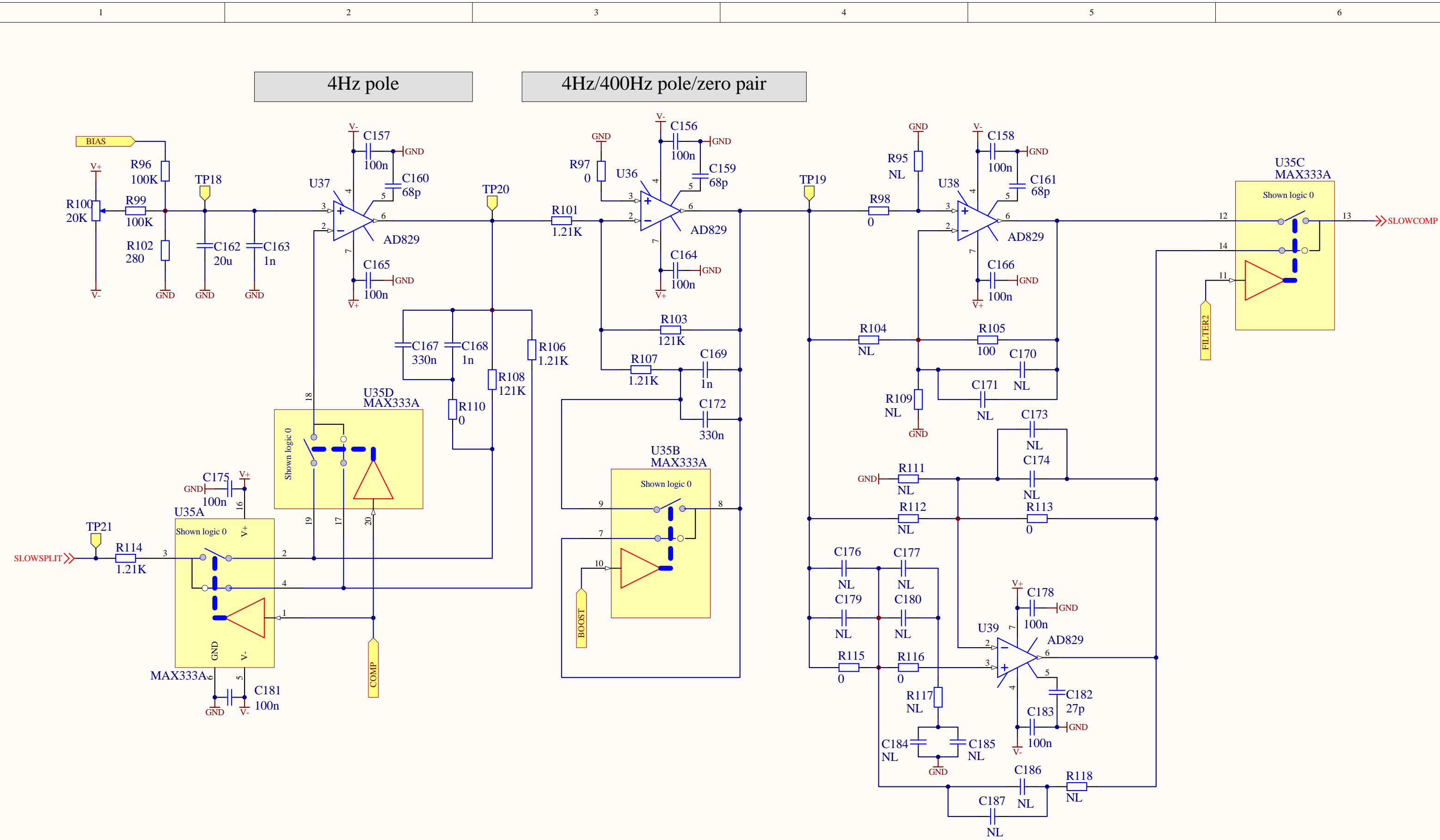


Title <b>Common Mode Board: Excitation Point</b>		
Size B	Number <b>T040180-C</b>	Revision D
Date: 3/4/2010	Sheet 4 of 10	
File: C:\Users\...\CM4.SchDoc	Drawn By: Daniel Sigg	



generic filter stage

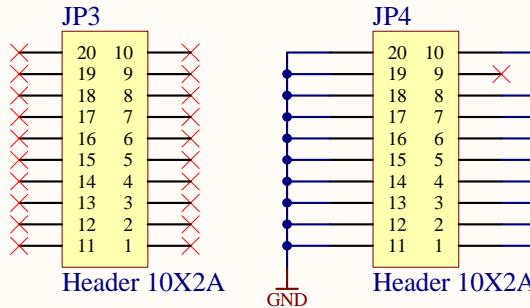
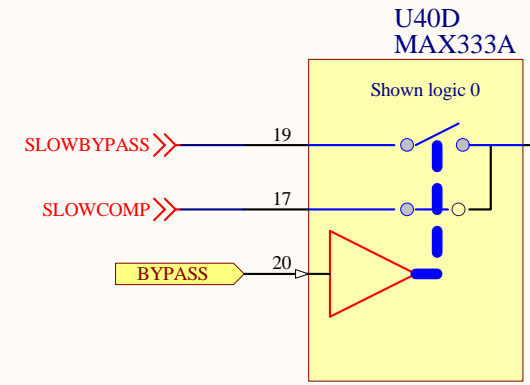
Title			<b>Common Mode Board: Servo Split</b>		
Size	Number	Revision			
B	T040180	D			
Date:	3/4/2010	Sheet 5 of 10			
File:	C:\Users\...\CM5A.SchDoc	Drawn By: Daniel Sigg			



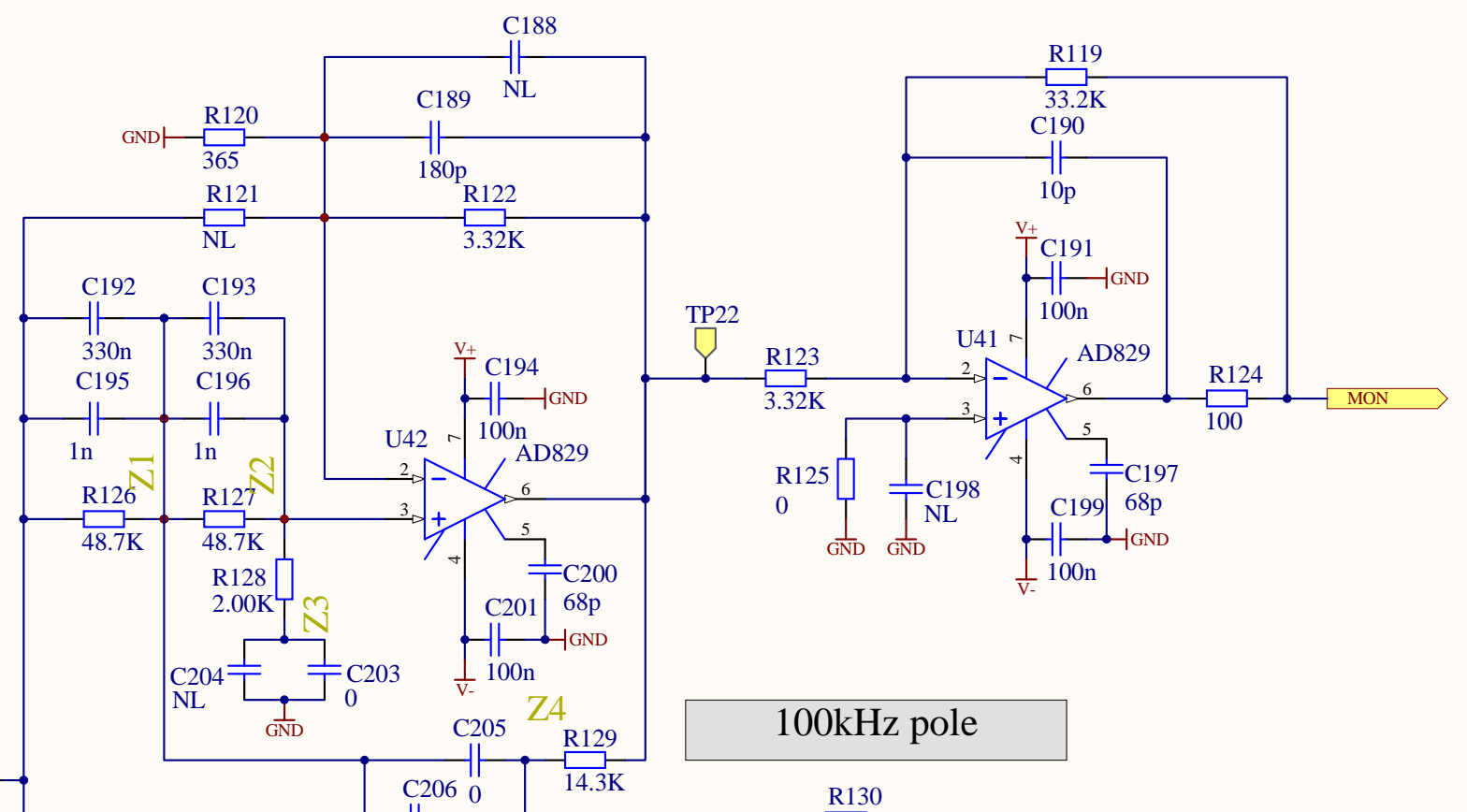
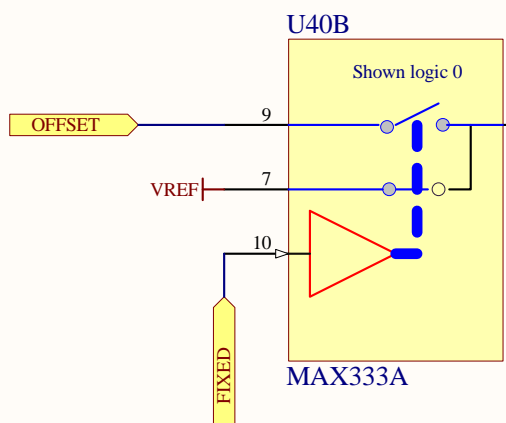
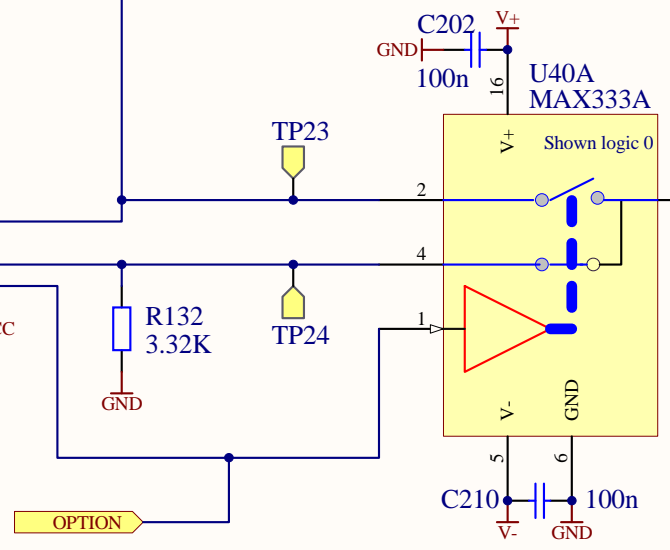
generic filter stage

Title			<b>Common Mode Board: Servo Split</b>		
Size	Number			Revision	
B	T040180			D	
Date:	3/4/2010	Sheet 5B of 10			
File:	C:\Users\d...CM5B.SchDoc	Drawn By: Daniel Sigg			

generic filter stage  
 2 real zeros at 10Hz  
 2 real poles at 100Hz  
 dc gain of 0.1

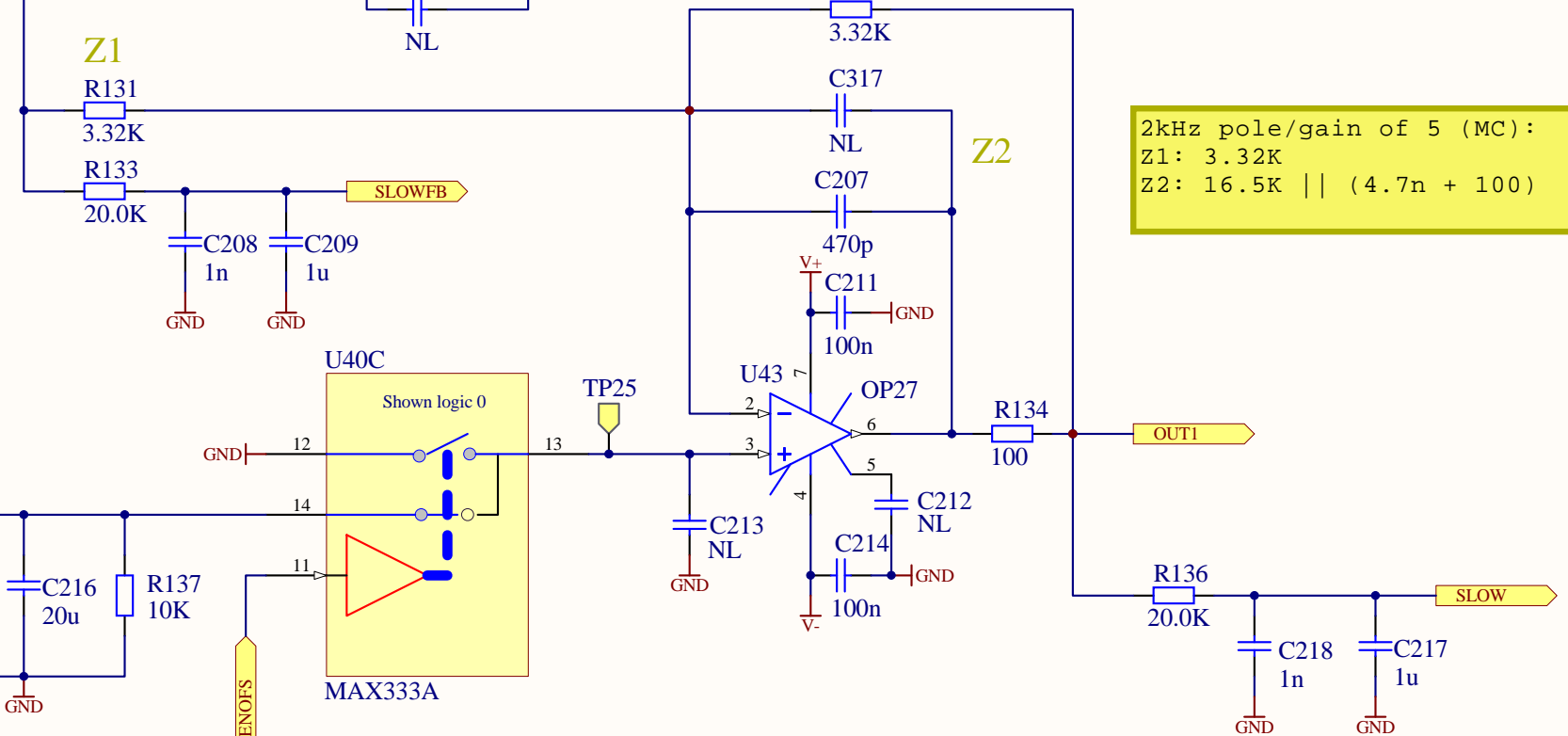


optional daughter board



100kHz pole

2kHz pole/gain of 5 (MC):  
 Z1: 3.32K  
 Z2: 16.5K || (4.7n + 100)

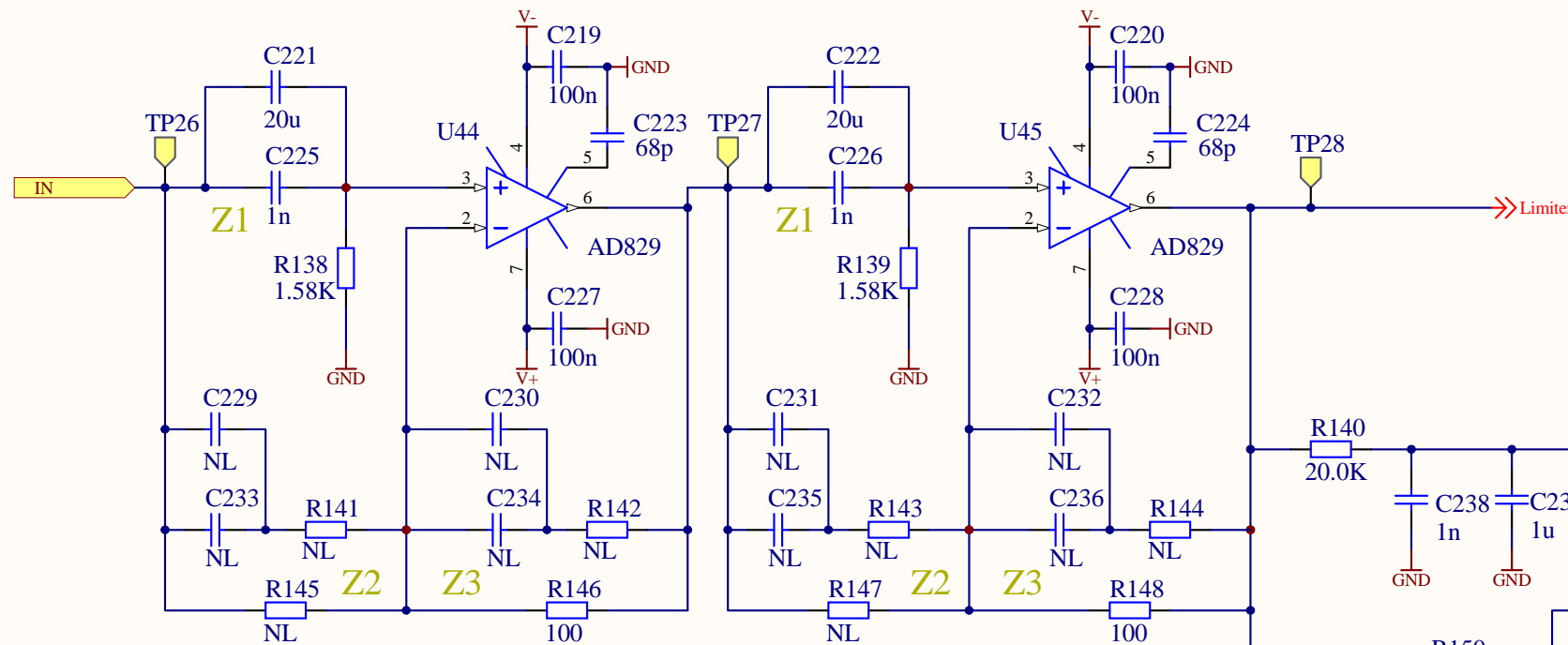


Title <b>Common Mode Board: Servo Split</b>		
Size B	Number <b>T040180</b>	Revision D
Date: 3/4/2010	Sheet 5 of 10	
File: C:\Users\...\CM5C.SchDoc	Drawn By: Daniel Sigg	



5Hz high pass

5Hz high pass



70kHz zero/140kHz pole (MC):  
 Z1: 0 Ohm to ground  
 Z2: (1n + 1.13K) || 1.13K  
 Z3: 1.13K || 10p

voltage follower for MC:  
 Z1: 0 Ohm  
 Z2: NL  
 Z3: 100 Ohm

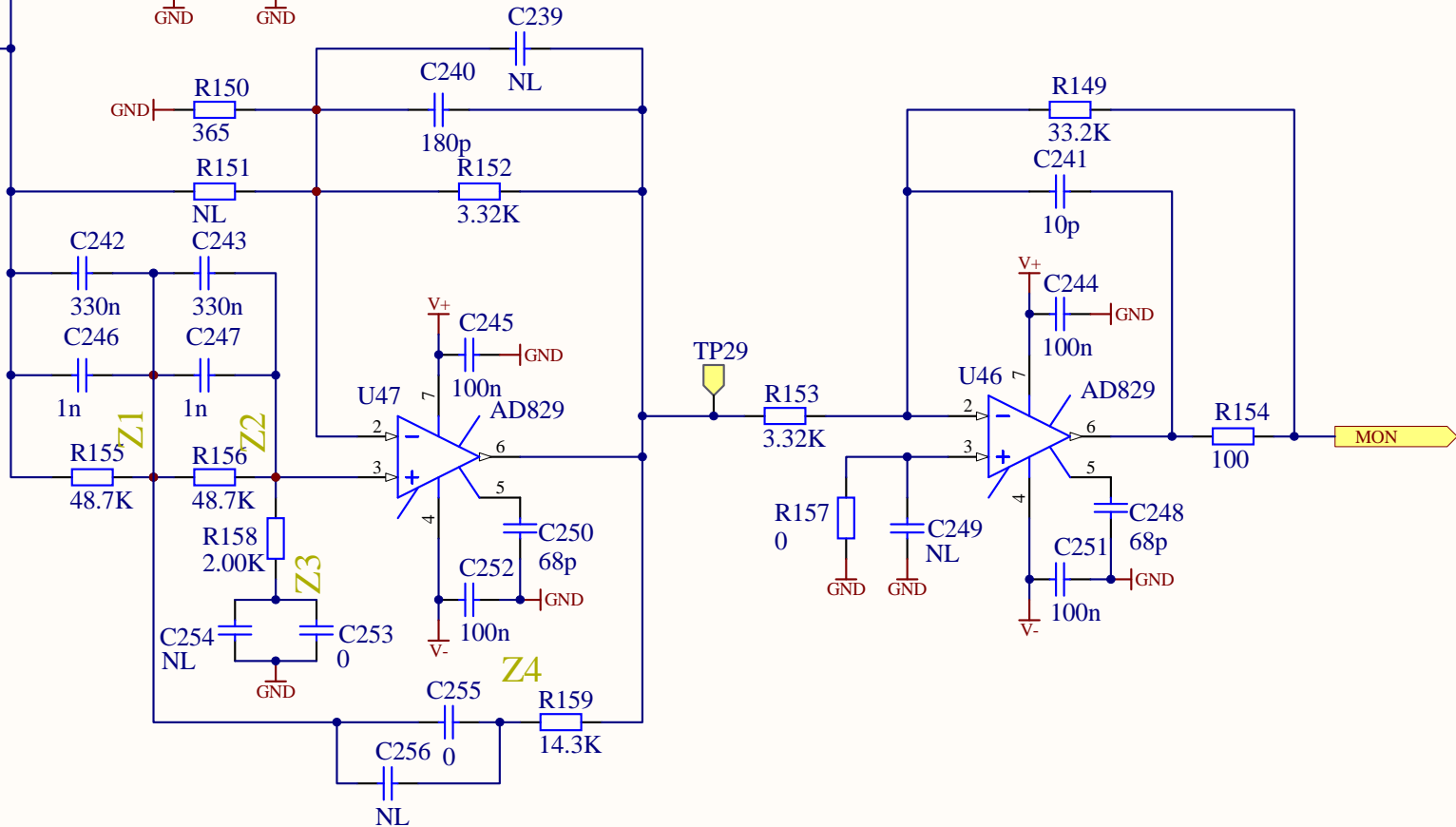
Filter Design Examples:

Butterworth high pass:  $G = 1.586$ ,  $Z1 = Z2 = 1/sC$ ,  $Z3 = Z4 = R$   
 two zeros at 0Hz, two complex poles at  $f = 1/(2 \pi R C)$

Butterworth low pass:  $G = 1.586$ ,  $Z1 = Z2 = R$ ,  $Z3 = Z4 = 1/sC$   
 two complex poles at  $f = 1/(2 \pi R C)$

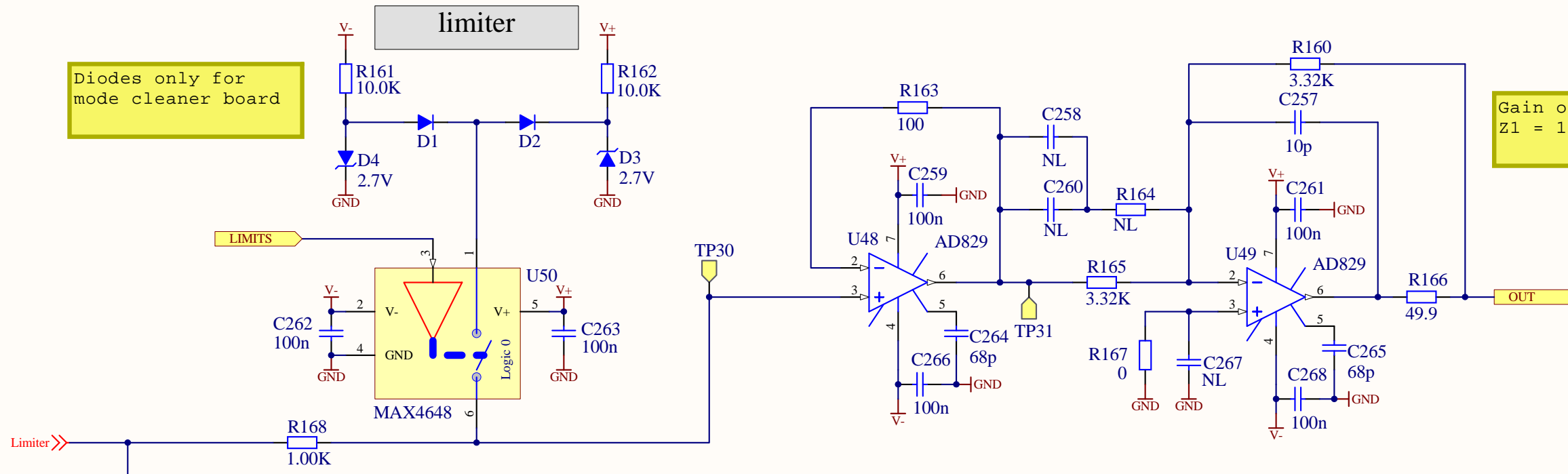
Whitening:  $G = 1$ ,  $Z1 = Z2 = (1/sC) || R2$ ,  $Z3 = Z4 = R1$   
 two real zeros at  $f = 1/(2 \pi R2 C)$ , two real poles at  $f = 1/(2 \pi (R1 || R2) C)$

Dewhiteninig:  $G = 1$ ,  $Z1 = Z2 = R1$ ,  $Z3 = Z4 = 1/sC + R2$   
 two real poles at  $f = 1/(2 \pi (R1 + R2) C)$ , two real zeros at  $f = 1/(2 \pi R2 C)$

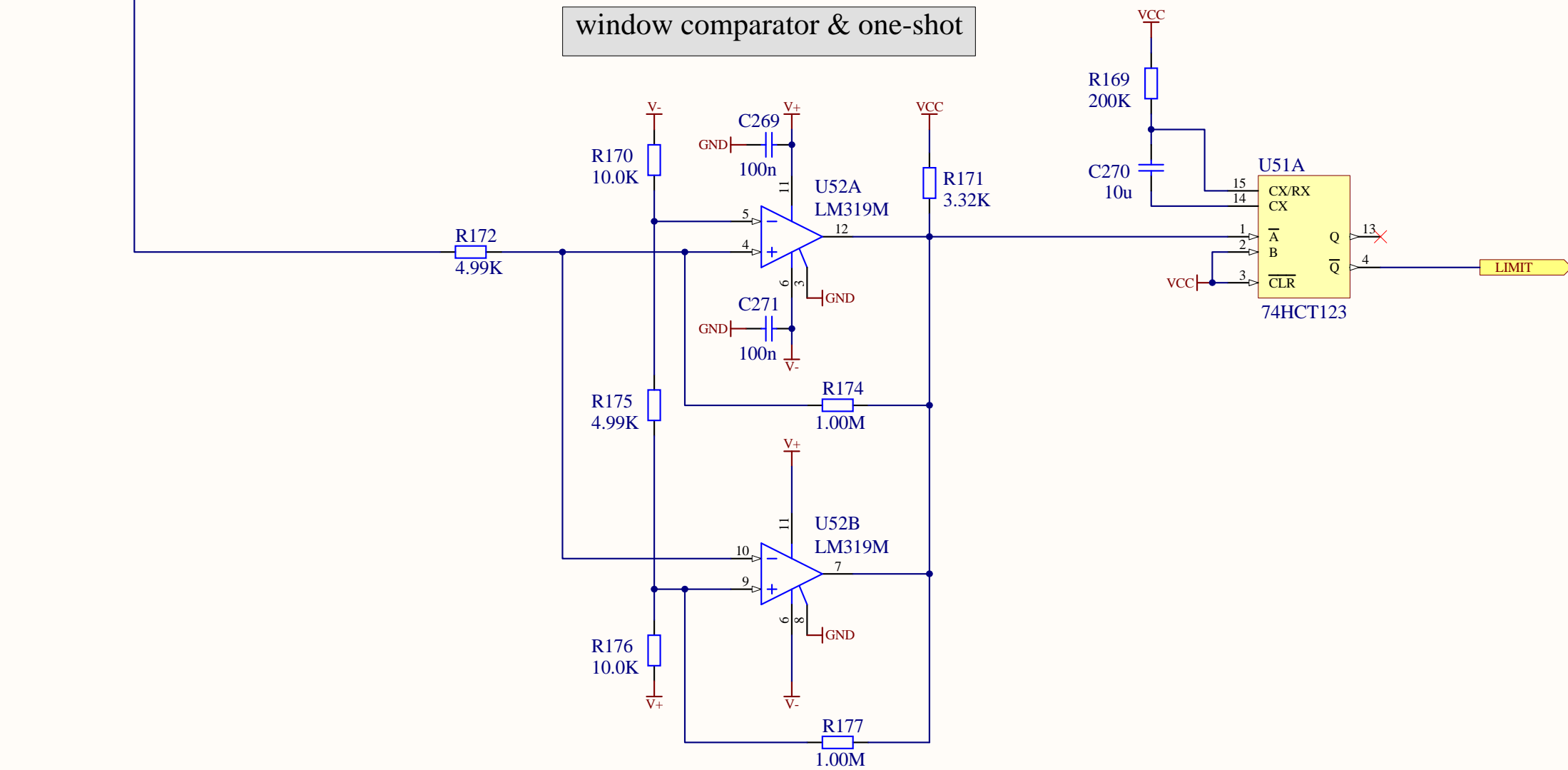


generic filter stage  
 2 real zeros at 10Hz  
 2 real poles at 100Hz  
 dc gain of 0.1

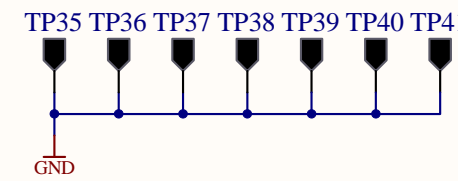
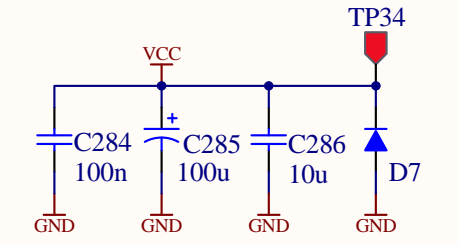
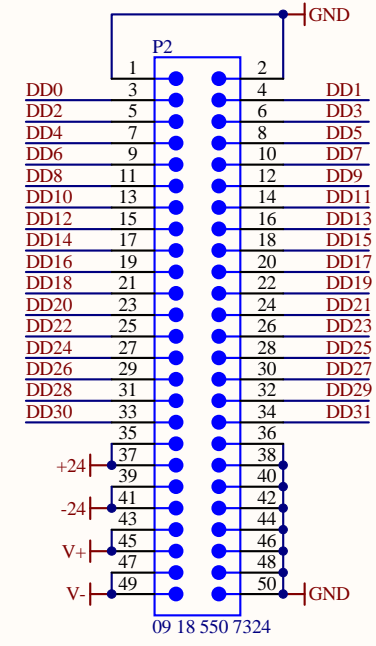
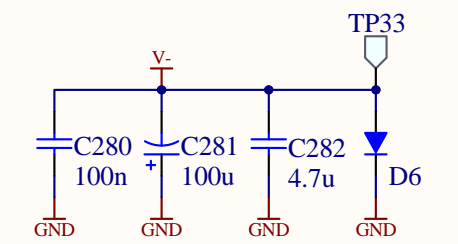
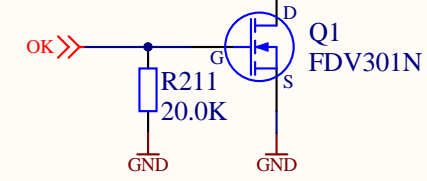
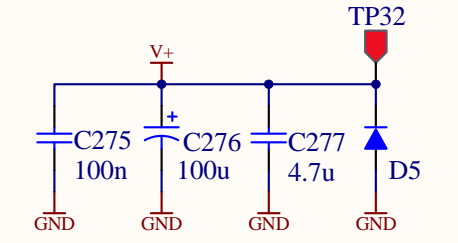
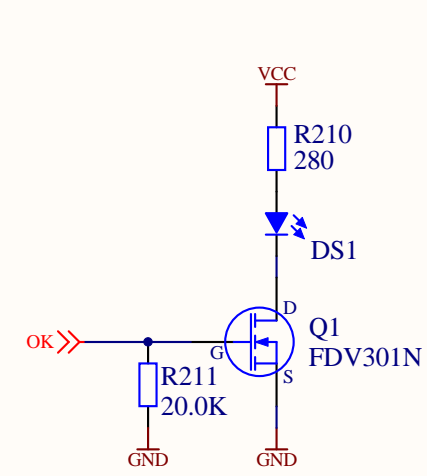
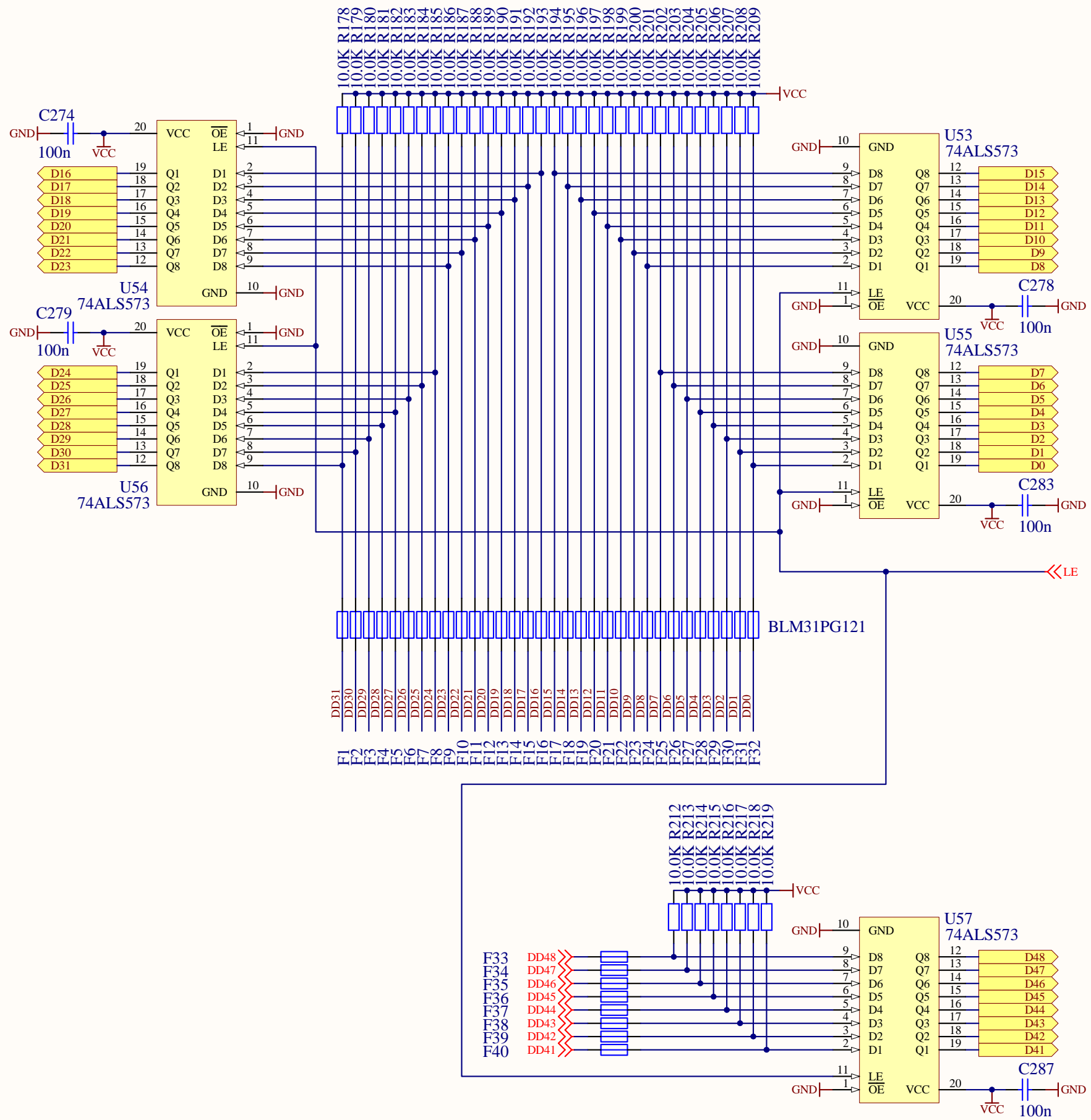
Title		
<b>Common Mode Board: Fast Path</b>		
Size	Number	Revision
B	T040180	D
Date:	3/4/2010	Sheet 6 of 10
File:	C:\Users\d...CM6A.SchDoc	Drawn By: Daniel Sigg



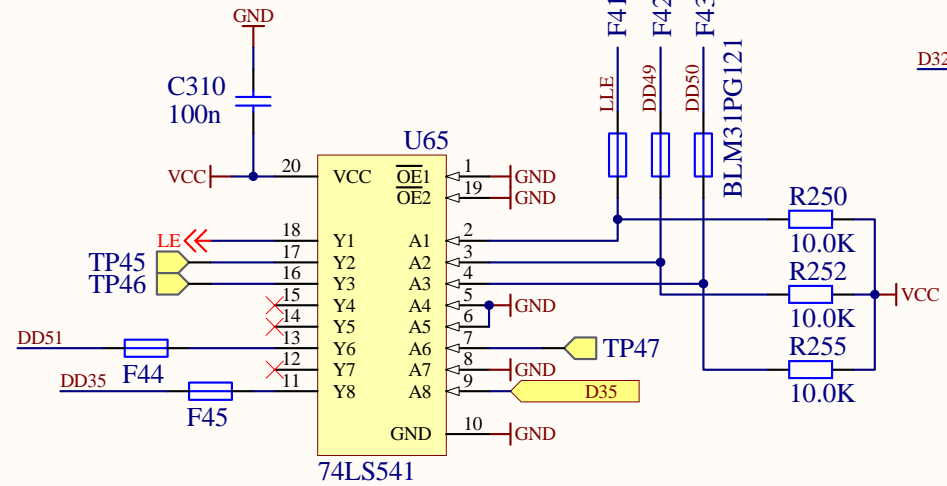
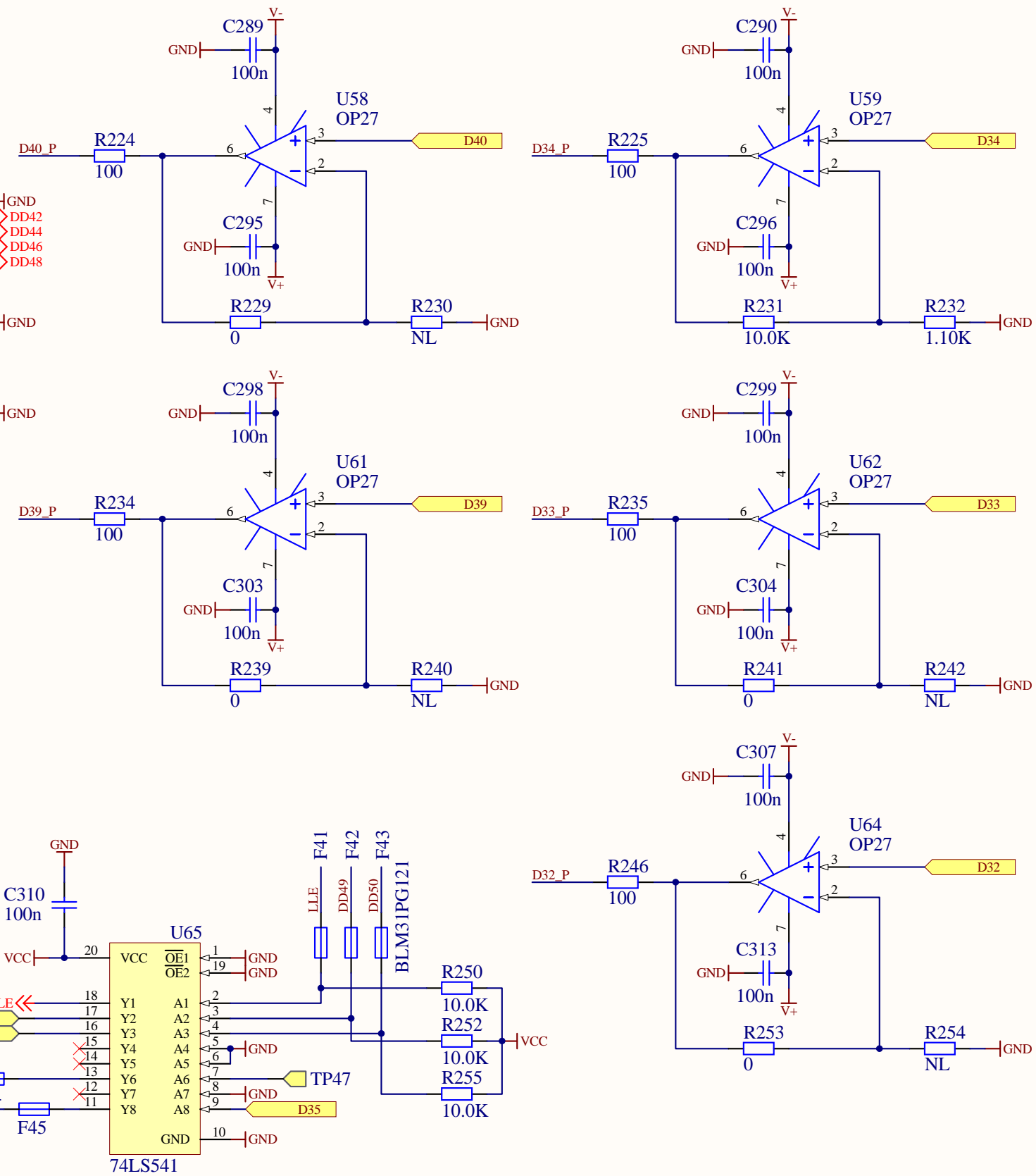
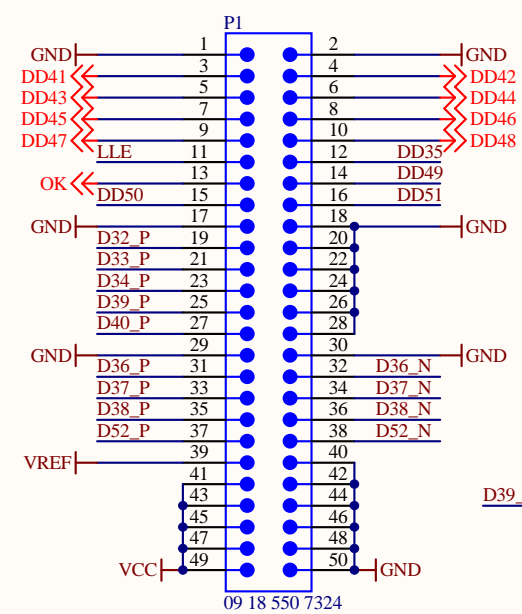
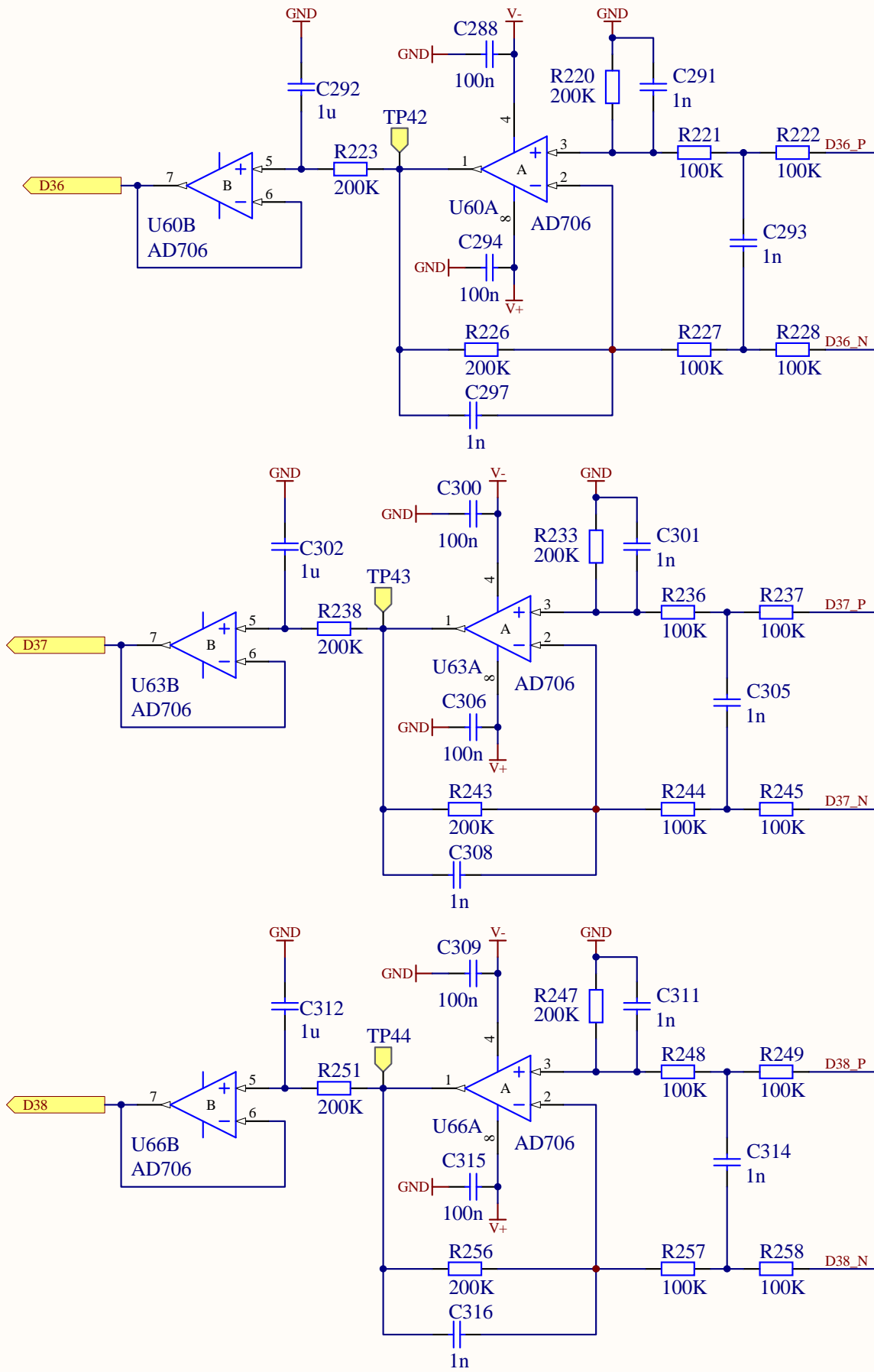
window comparator & one-shot



Title		
<b>Common Mode Board: Output Limiter</b>		
Size	Number	Revision
B	T040180	D
Date:	3/4/2010	Sheet 6Bf 10
File:	C:\Users\...\CM6B.SchDoc	Drawn By: Daniel Sigg



Title <b>Common Mode Board: Backplane(P1)</b>		
Size B	Number <b>T040180</b>	Revision D
Date: 3/4/2010	Sheet 7 of 10	
File: C:\Users\...\CM7A.SchDoc	Drawn By: Daniel Sigg	



Title		
<b>Common Mode Board: Backplane(P2)</b>		
Size	Number	Revision
B	T040180	D
Date:	3/4/2010	Sheet 7Bf 10
File:	C:\Users\...\CM7B.SchDoc	Drawn By: Daniel Sigg