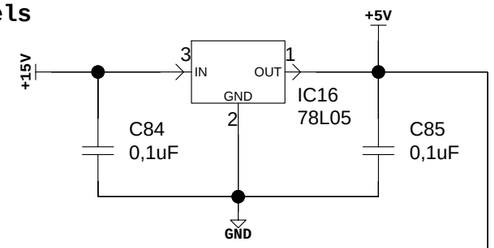
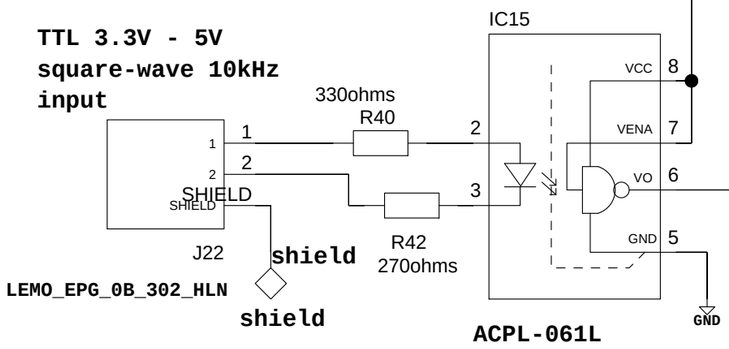
Lemo lib: Niels



TTL 3.3V - 5V
square-wave 10kHz
input



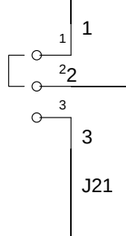
Block_to_Rough-Sine_10kHz

Rough-Sine_out

buff_in

band_pass_filter_ref

BP_in BP_out



sine-wave 10kHz input

dot

use EPG.0B.302
Pieter info: footprints are the same

Exciter_LVDT1

Exciter_LVDT2

Exciter_LVDT3

Exciter_LVDT4

Exciter_LVDT5

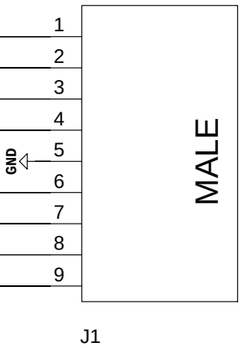
Exciter_LVDT6

Exciter_LVDT7

Exciter_LVDT8

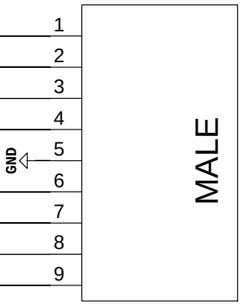
Exct_P
Ref_in
Exct_N

excitation 10kHz outputs
to LVDT 1,2,3,4 primary coils



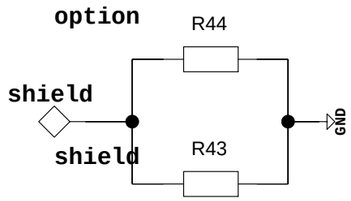
J1

excitation 10kHz outputs
to LVDT 5,6,7,8 primary coils



J2

option



power_connector

15V_POS
15V_NEG

15V_POS
15V_NEG

power_stuff

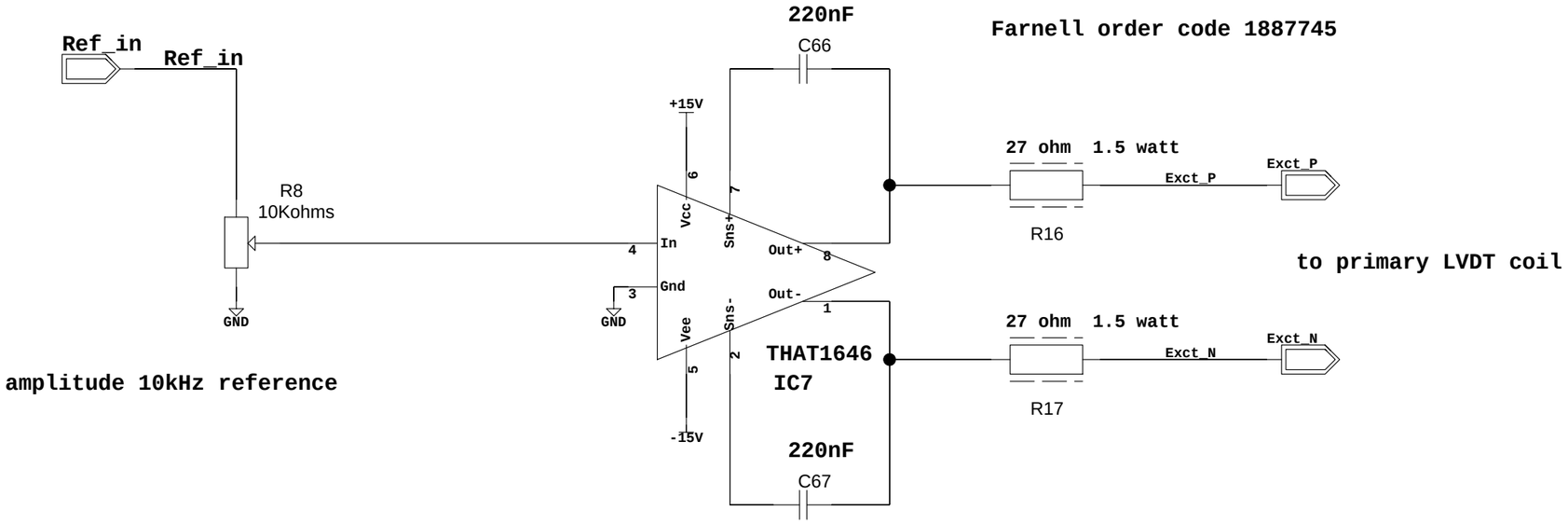
15V_POS
15V_NEG

vrije Universiteit amsterdam
Elektronica Beta VU

? eight Exciters LVDT (Projectname : ?)	
? (Projectnumber : ?)	Schematic1 (Pagename :)
? (Designer : ?)	--/--/-- (Start :)
? (Schematic : ?)	05/12/2014:14:38 (Last modified :)
? (Pcb : ?)	1 (Pagenumber :) of 2

A3

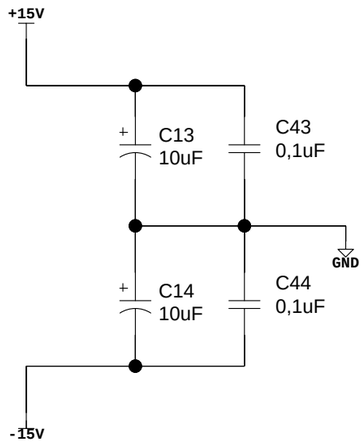
turn right -> increase gain



Farnell order code 1887745

220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

? Projectname : single ended to differential	
? Projectnumber :	Pagename : Ref_THAT1646
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 1

A3

ECO:

Add a resistor of 47k between +input IC3 and -15 Volt

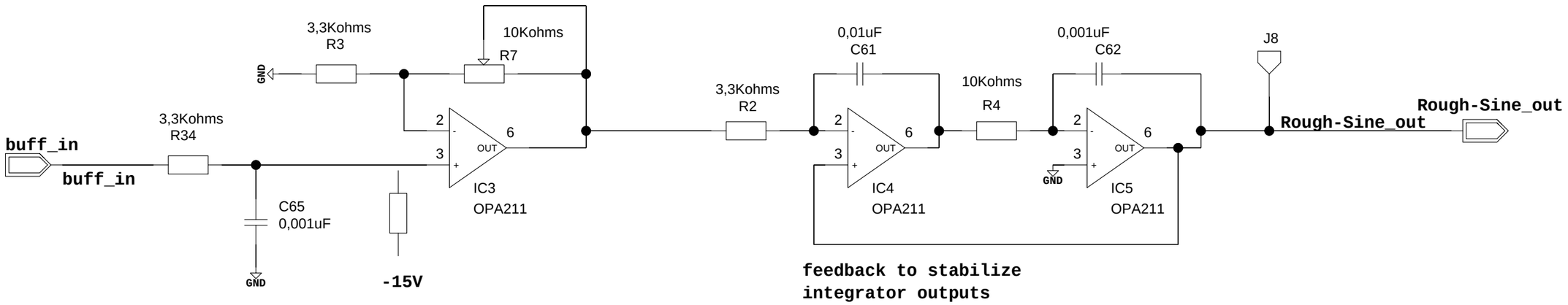
This partly compensates the DC offset of the optocoupler output (IC15)

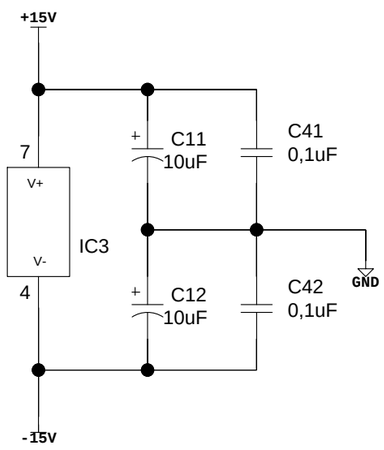
pre amp and buffefr

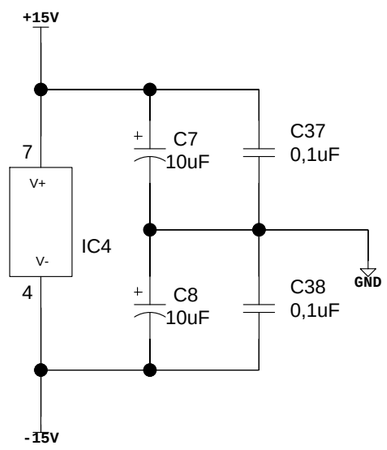
turn right -> increase gain

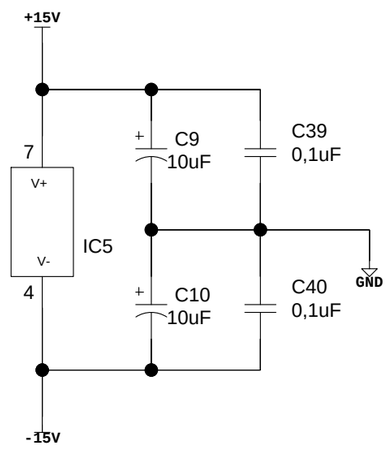
overall amplitude 10kHz reference

squarewave to rounded triangle (rough sine)







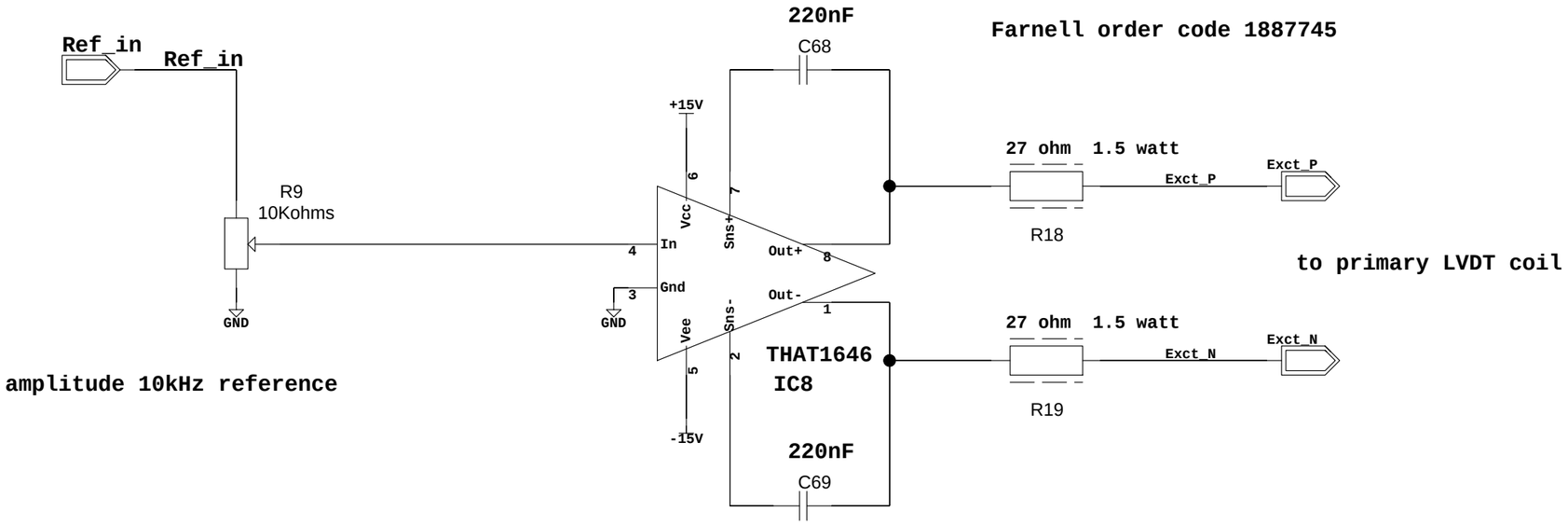


vrije Universiteit amsterdam
Elektronica Beta VU

Projectname : ? Block_to_Rough-Sine_10kHz	
Projectnumber : ?	Pagename : —
Designer : ?	Start : --/--/--
Schematic : ?	Last modified : 05/12/2014:14:37
Pcb : ?	Pagenumber : 1 of 18

A3

turn right -> increase gain



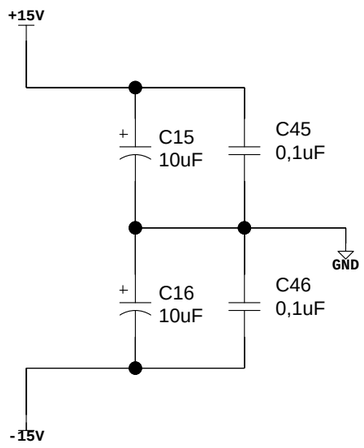
Farnell order code 1887745

to primary LVDT coil

amplitude 10kHz reference

220nF is sufficient for 10kHz

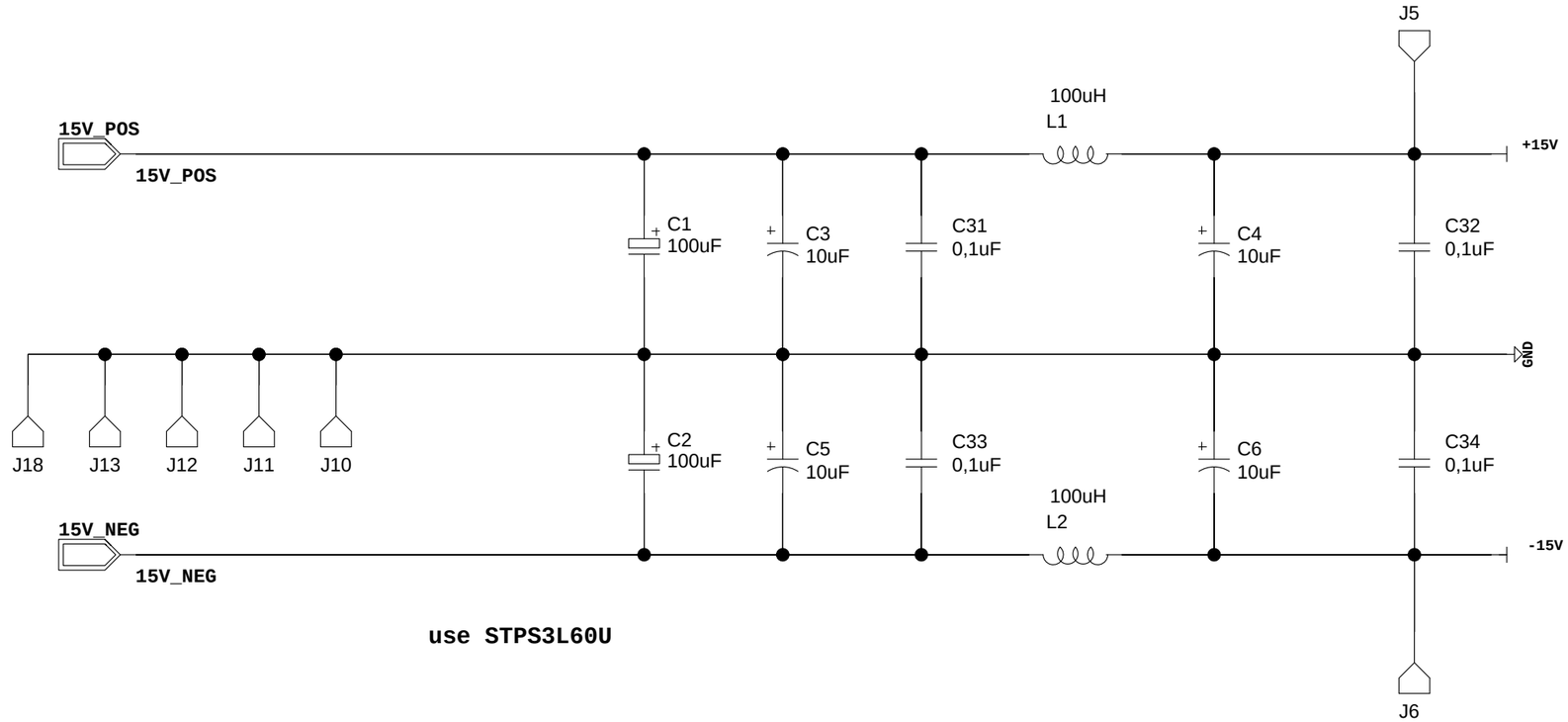
(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

? Projectname : single ended to differential	
? Projectnumber :	Pagename : Ref_THAT1646
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 1

A3

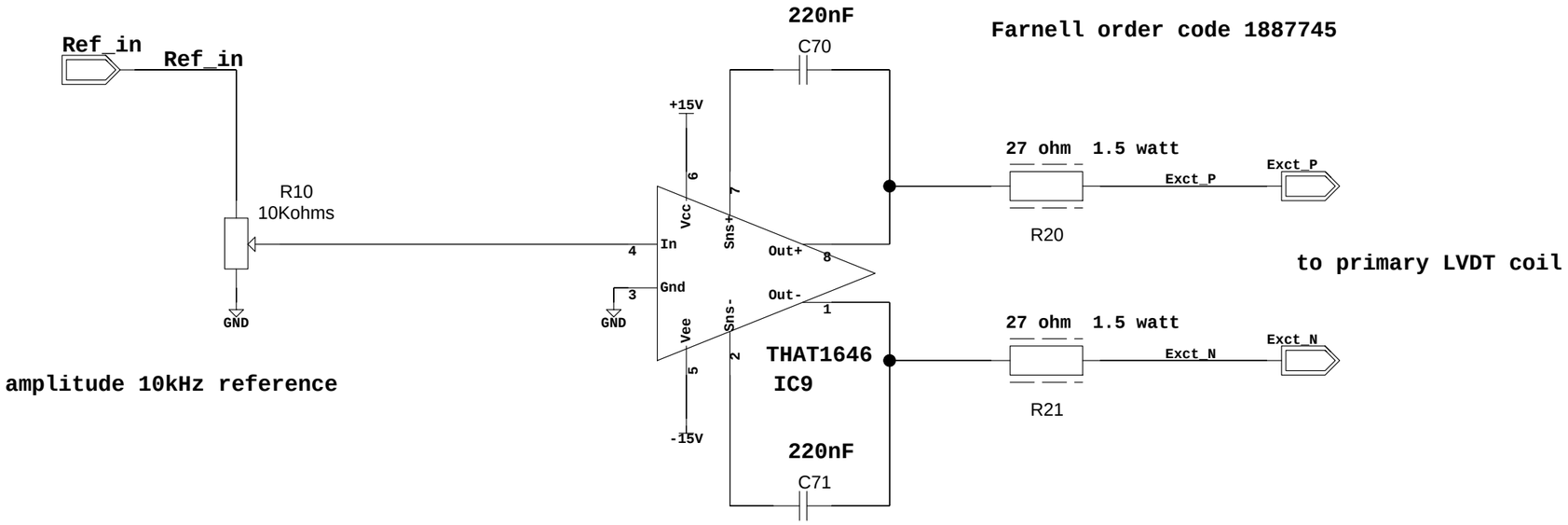


vrije Universiteit amsterdam
Elektronica Beta VU

Projectname : power filtering	
Projectnumber : ?	Pagename : power_stuff
Designer : ?	Start : --/--/--
Schematic : ?	Last modified : 05/12/2014:14:40
Pcb : ?	Pagenumber : 1 of 17

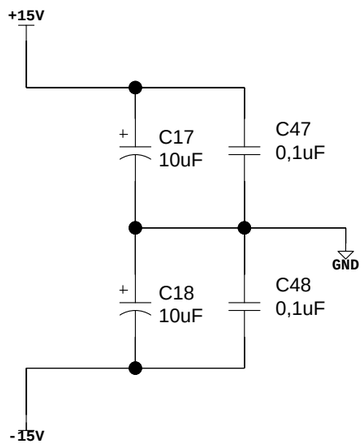
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

? Projectname : single ended to differential	
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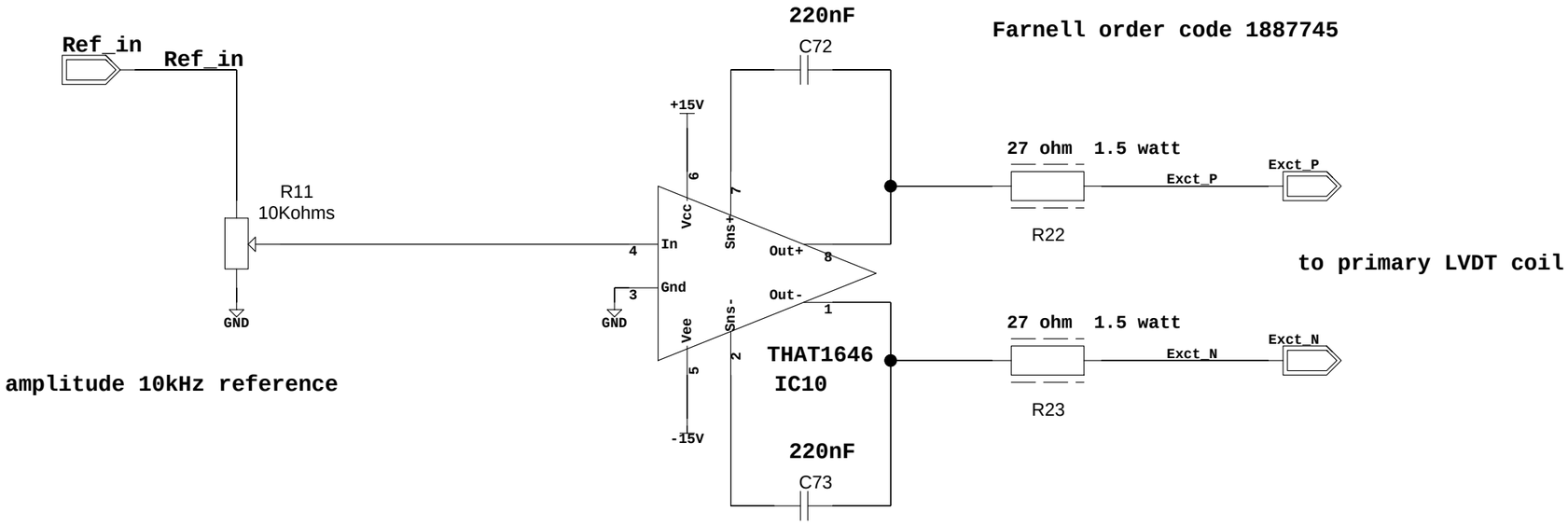
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 22

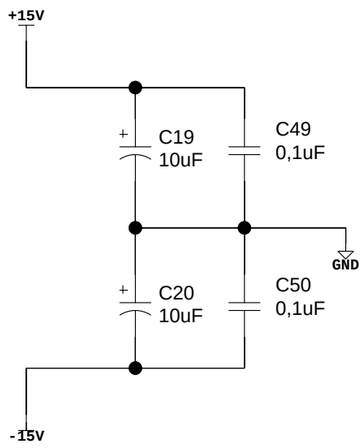
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)

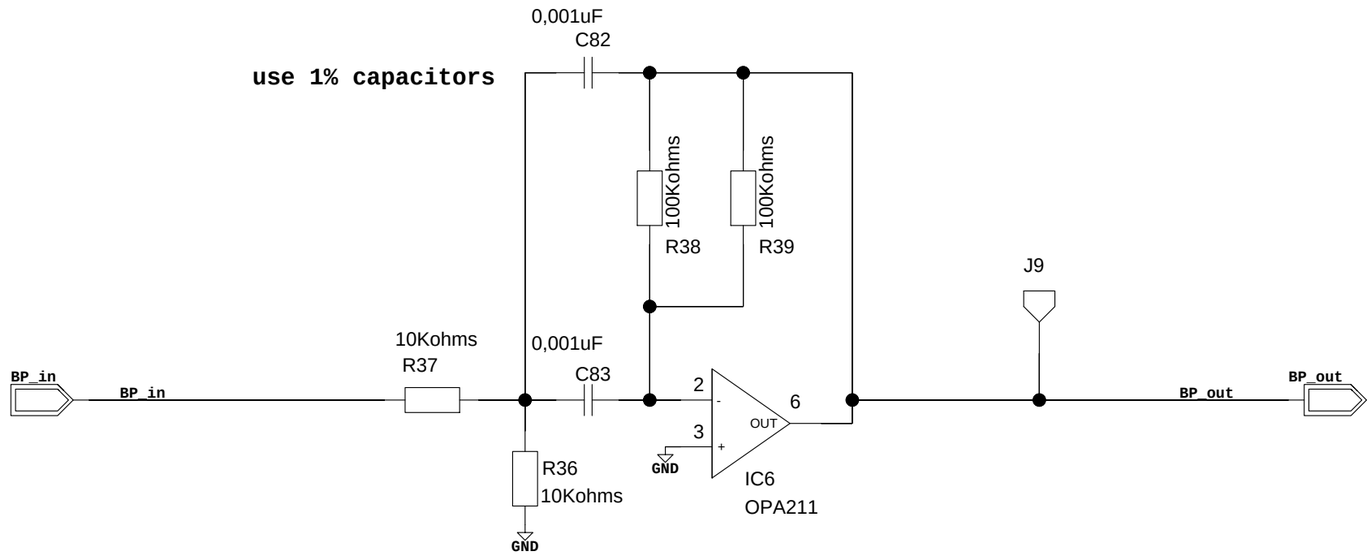


vrije Universiteit amsterdam
Elektronica Beta VU

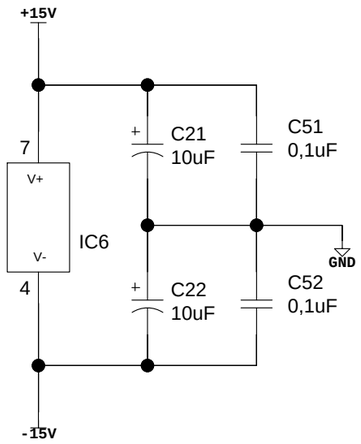
? Projectname : single ended to differential	
? Projectnumber :	Pagename : Ref_THAT1646
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 1

A3

10 kHz band pass filter
according to Delyiannis-friend circuit



f-resonance=10 kHz; gain=2.5x (8dB)

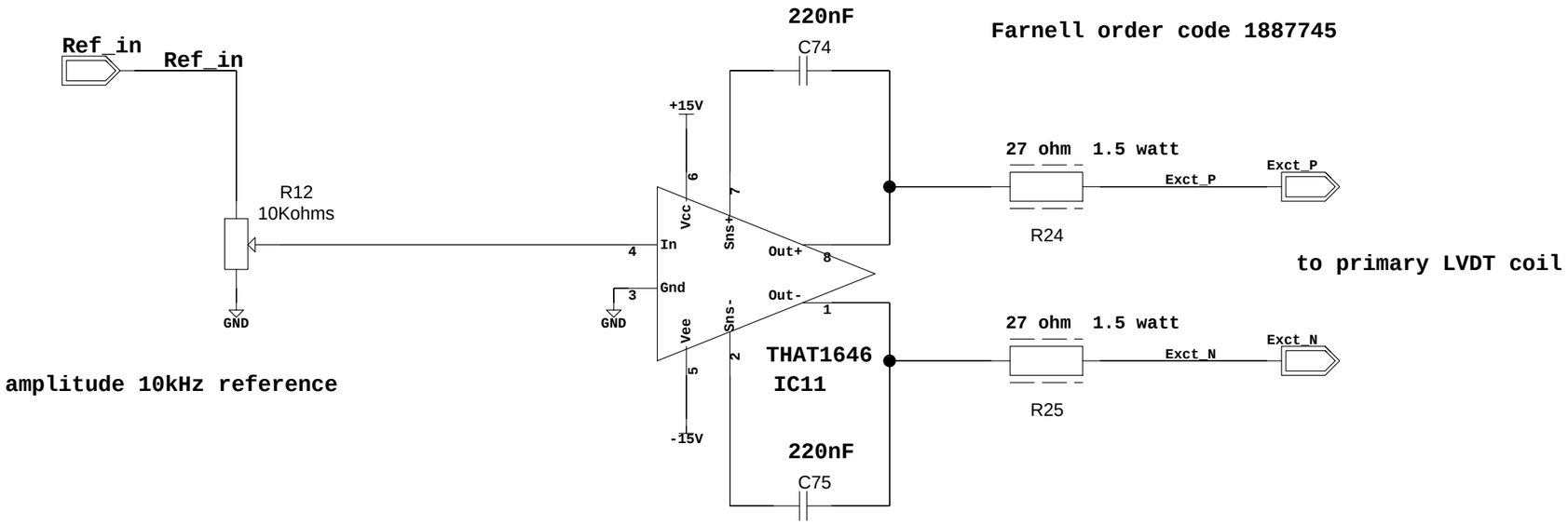


vrije Universiteit amsterdam
Elektronica Beta VU

Projectname : ? **10kHz band pass filter**	
Projectnumber : ?	Pagename : band_pass_filter
Designer : ?	Start : --/--/--
Schematic : ?	Last modified : 05/12/2014:14:34
Pcb : ?	Pagenumber : 1 of 1

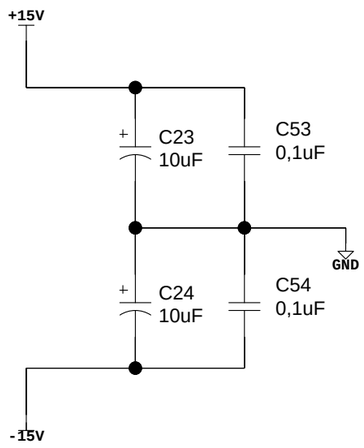
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

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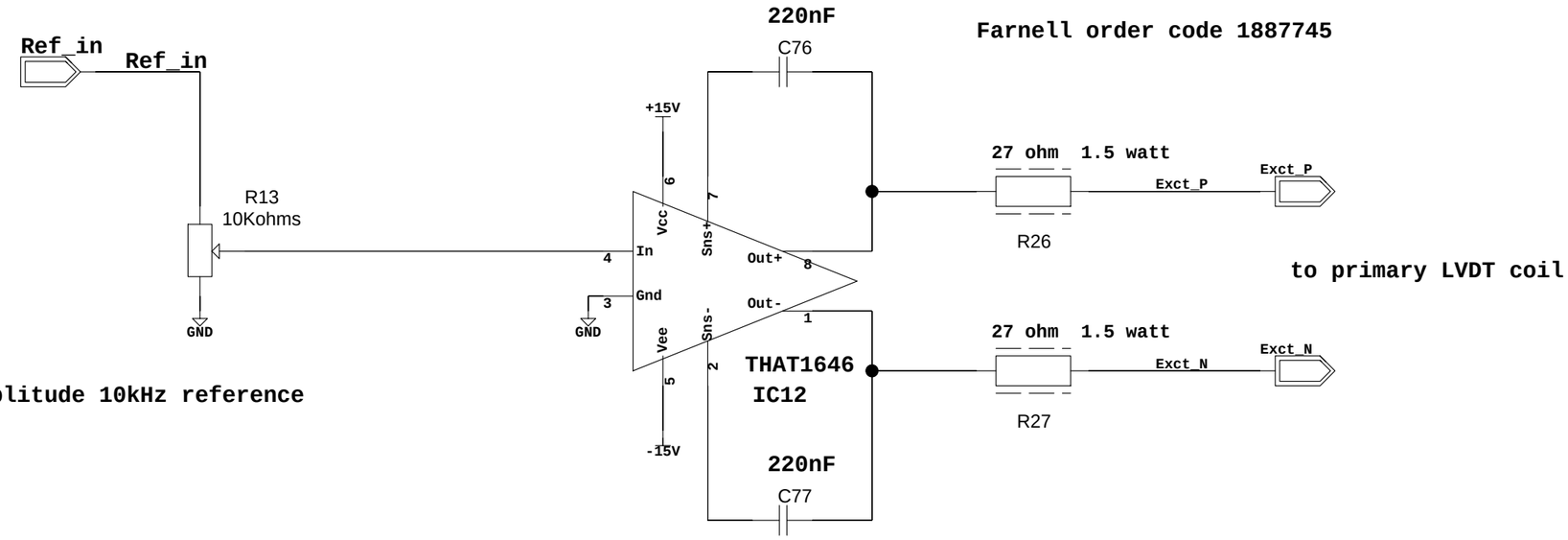
? Pcb :	Pagenumber : 1 of 1

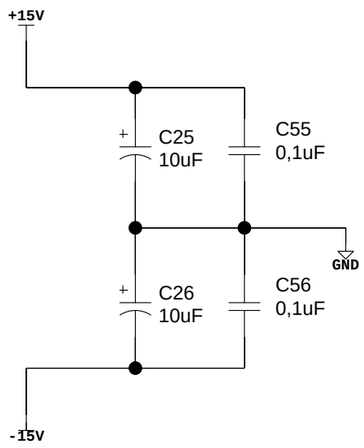
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

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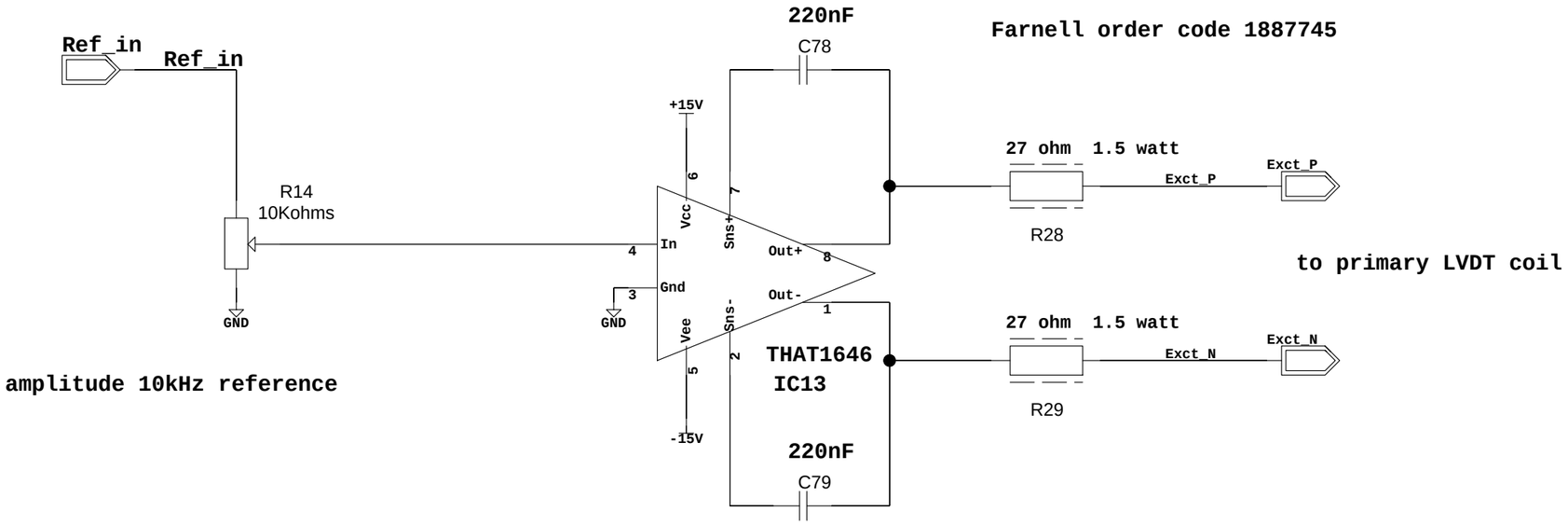
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 1

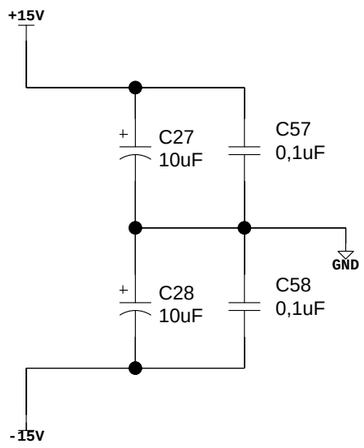
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

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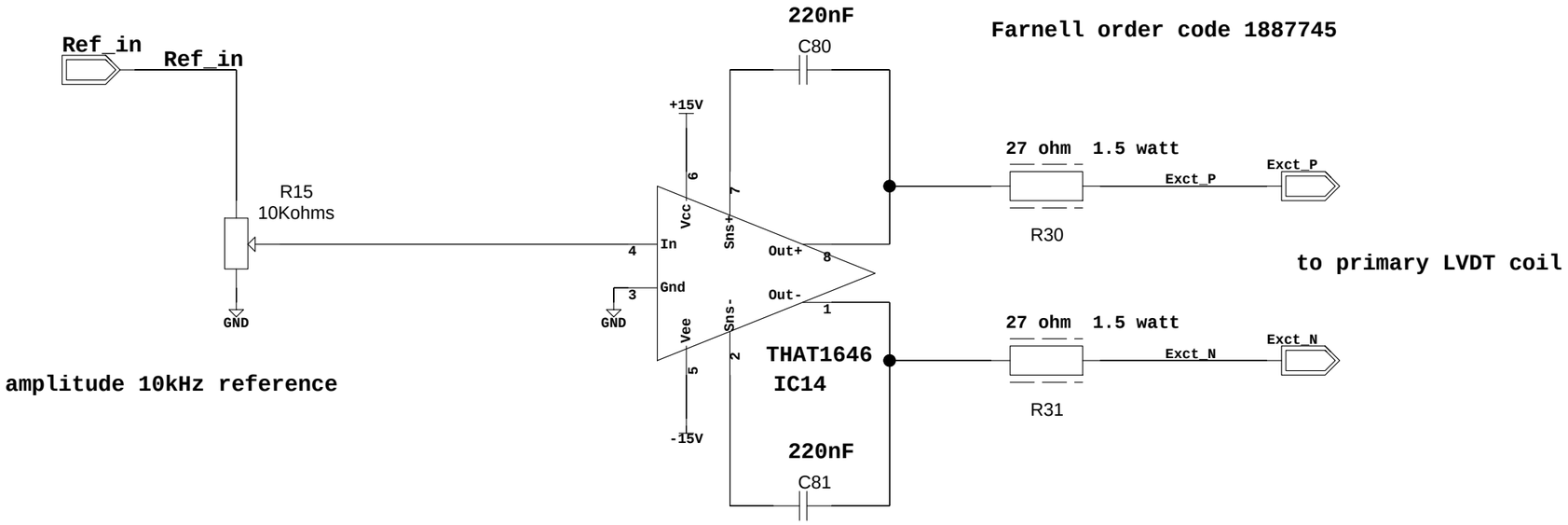
? Designer :	Start : --/--/--
? Schematic :	Last modified : 05/12/2014:14:38
? Pcb :	Pagenumber : 1 of 1

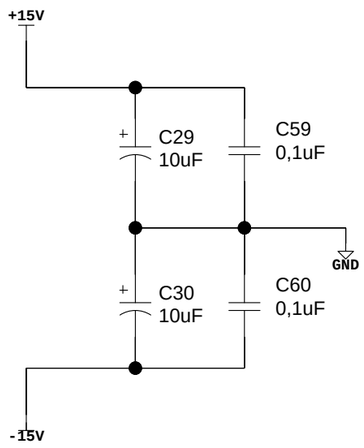
A3

turn right -> increase gain



220nF is sufficient for 10kHz

(avoids common mode offset)



vrije Universiteit amsterdam
Elektronica Beta VU

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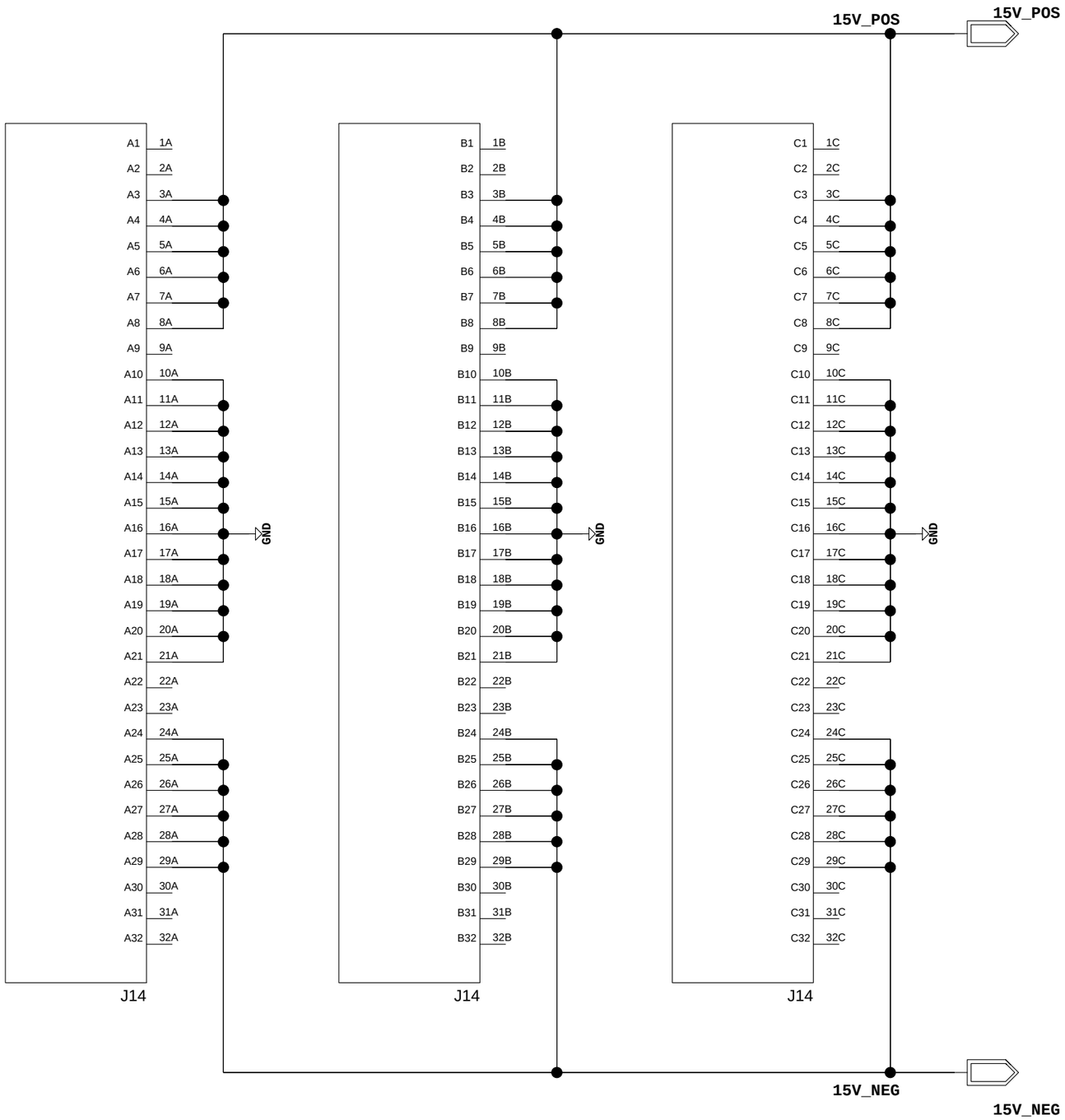
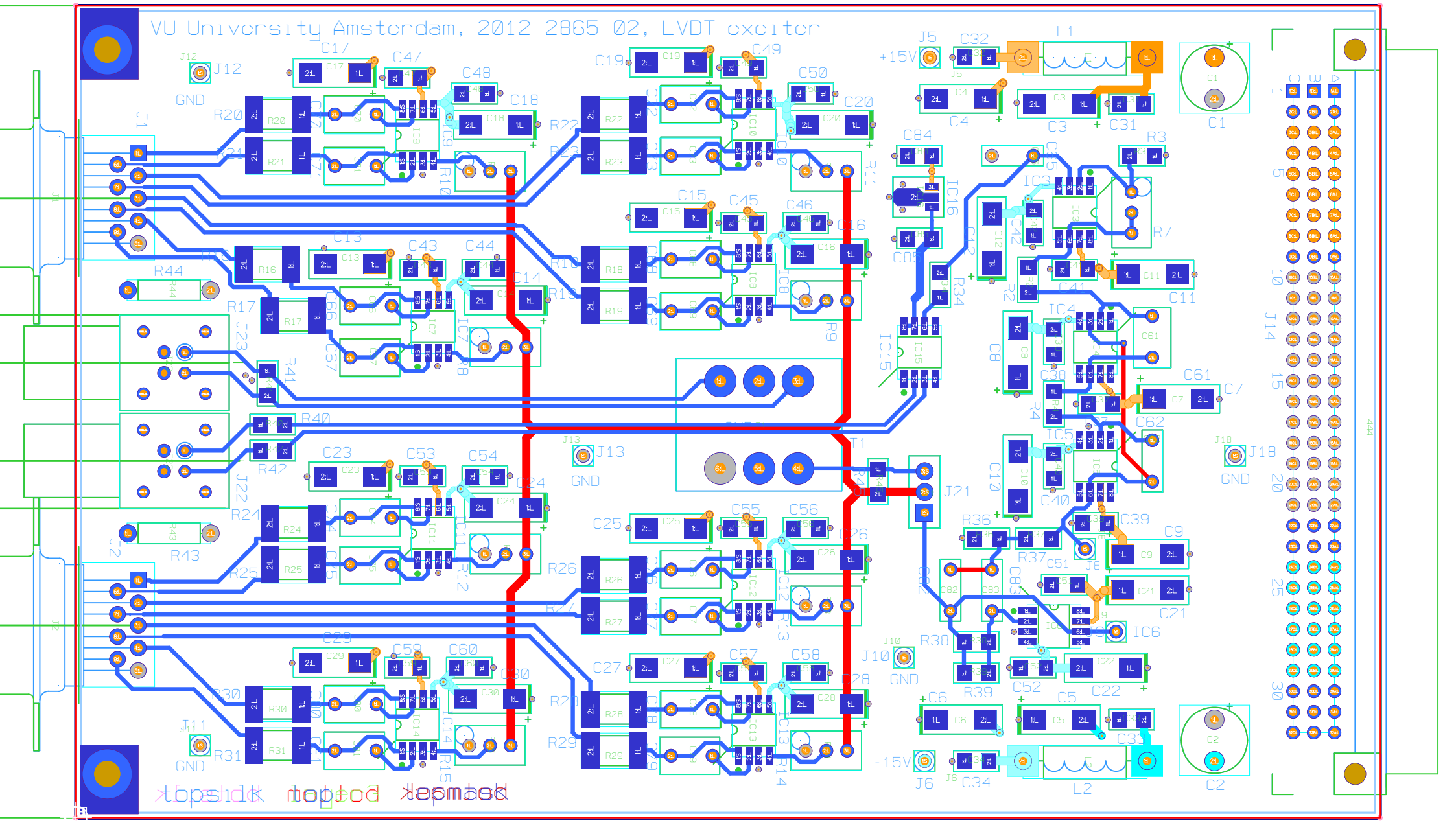
A3

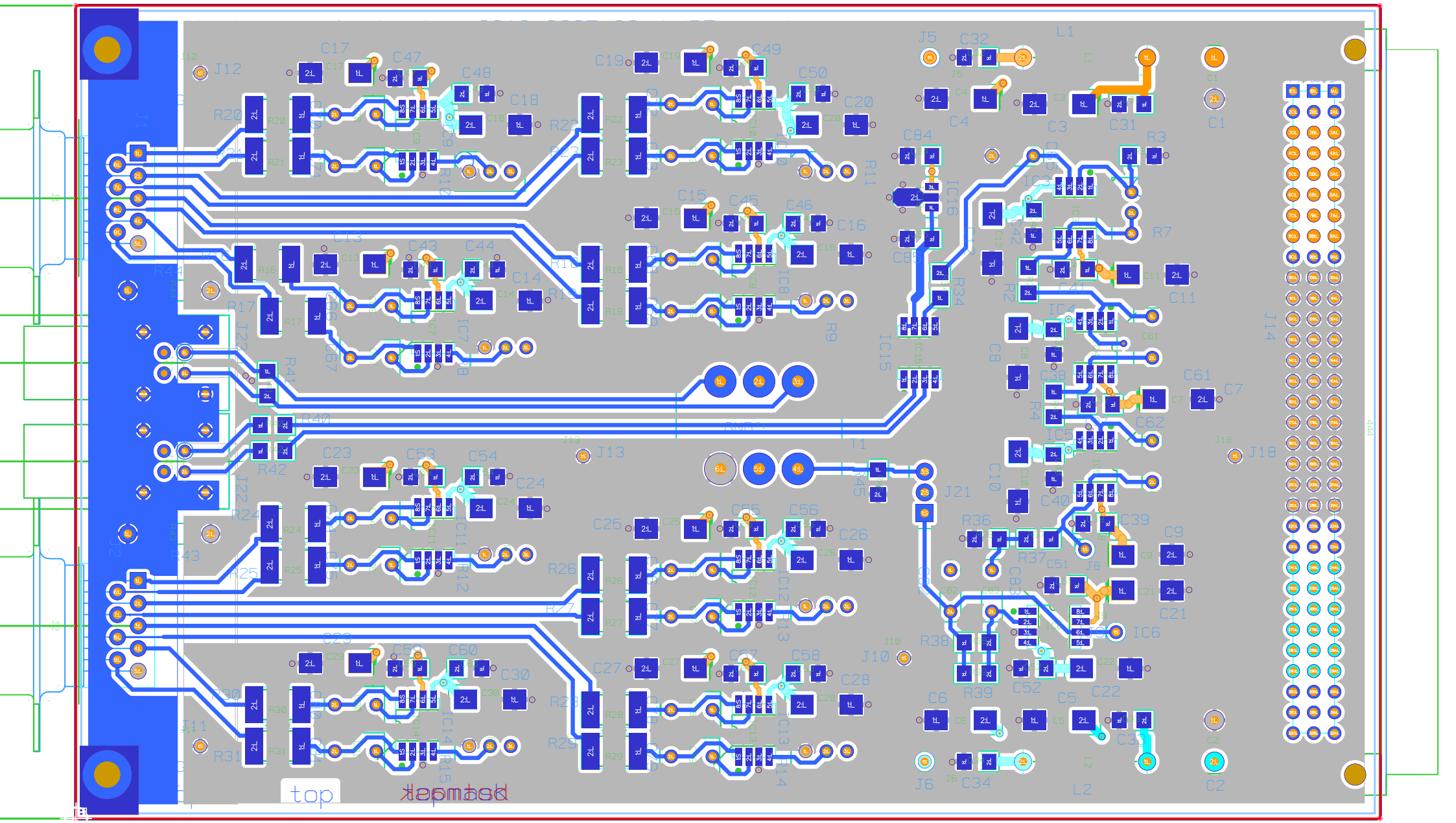


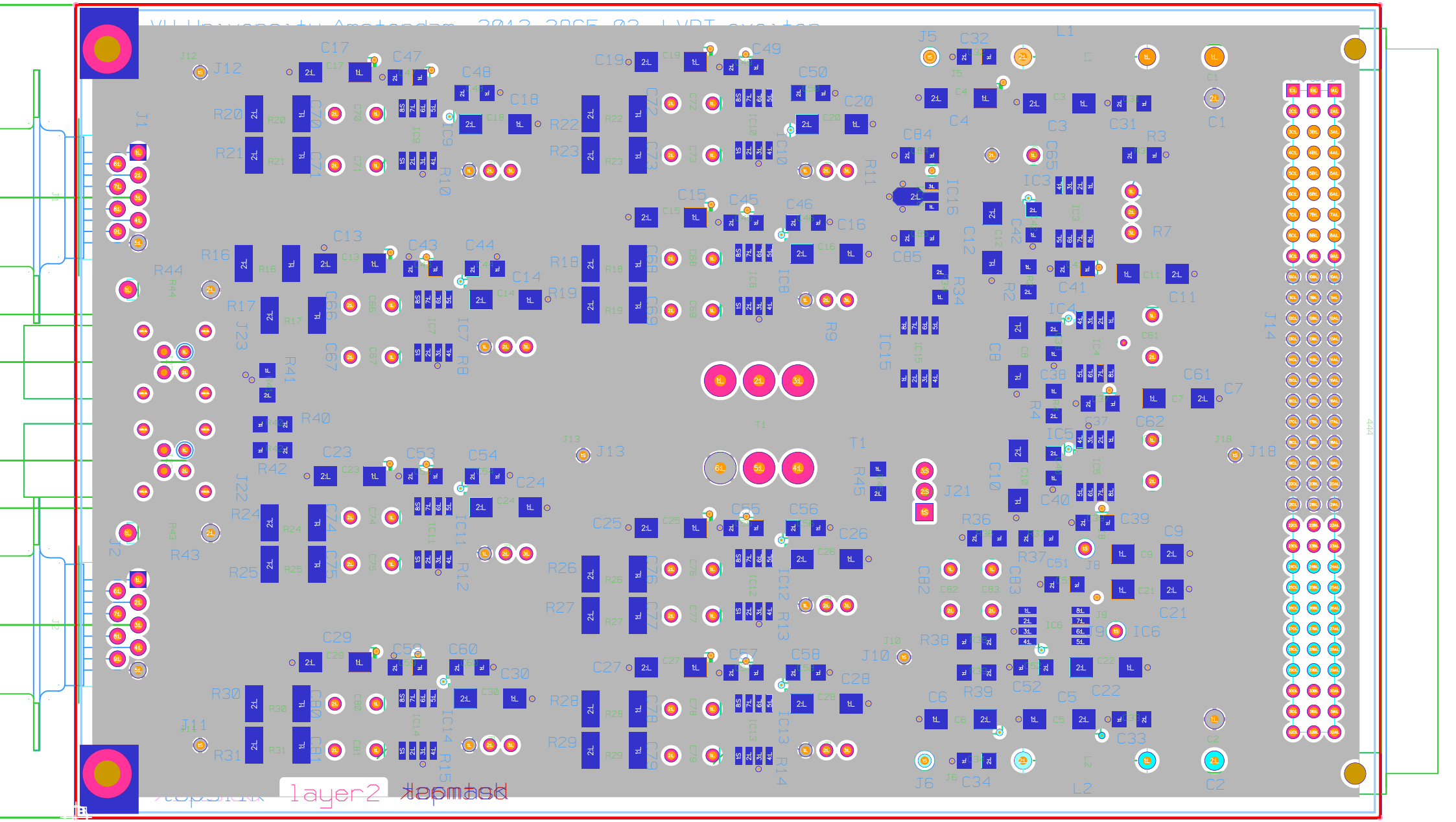
vrije Universiteit amsterdam
Elektronica Beta VU

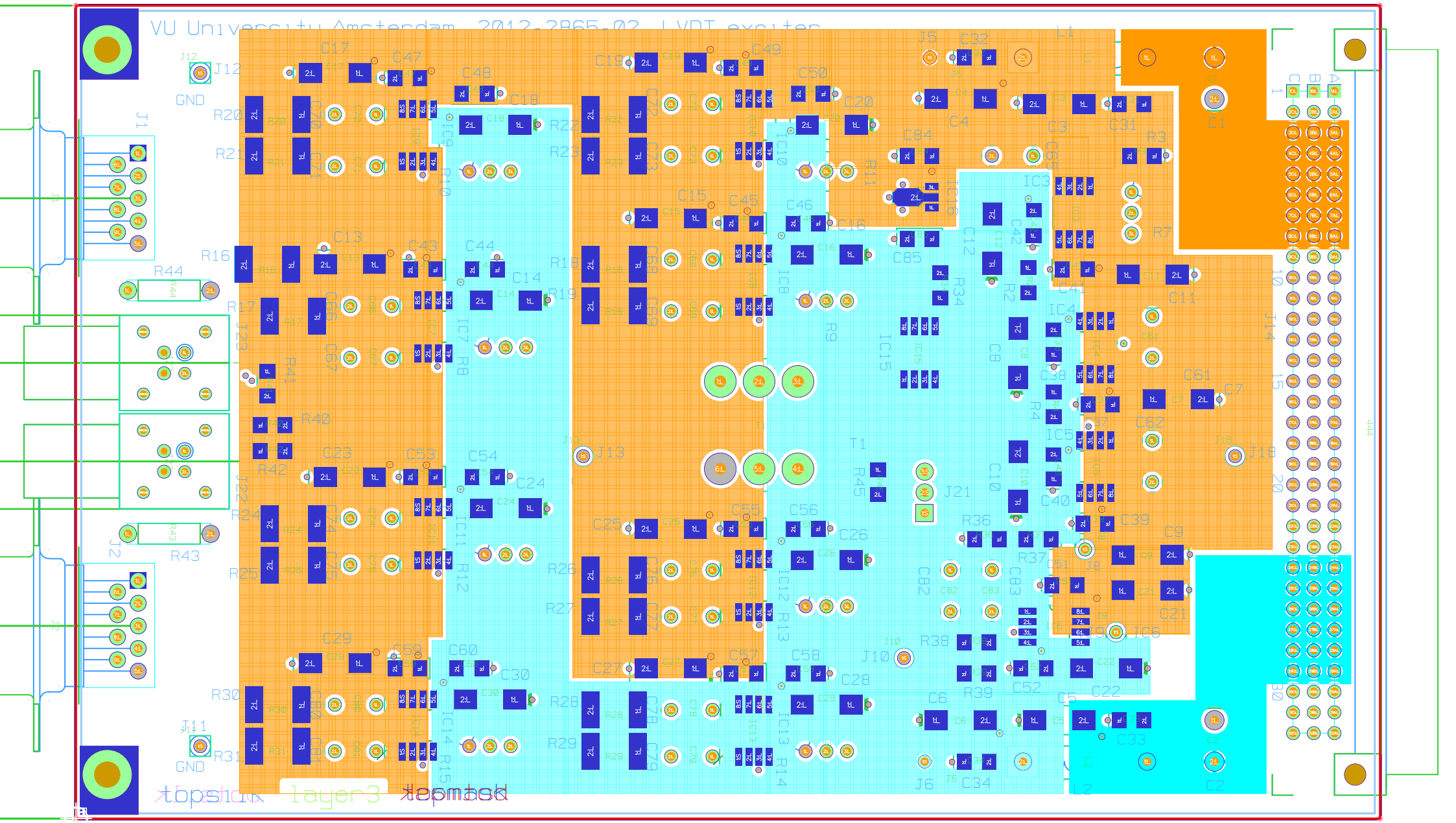
? power connector to backplane (Projectname :)	
? (Projectnumber :)	power_connector (Pagename :)
? (Designer :)	--/--/-- (Start :)
? (Schematic :)	05/12/2014:14:35 (Last modified :)
? (Pcb :)	1 of 13 (Pagenumber :)

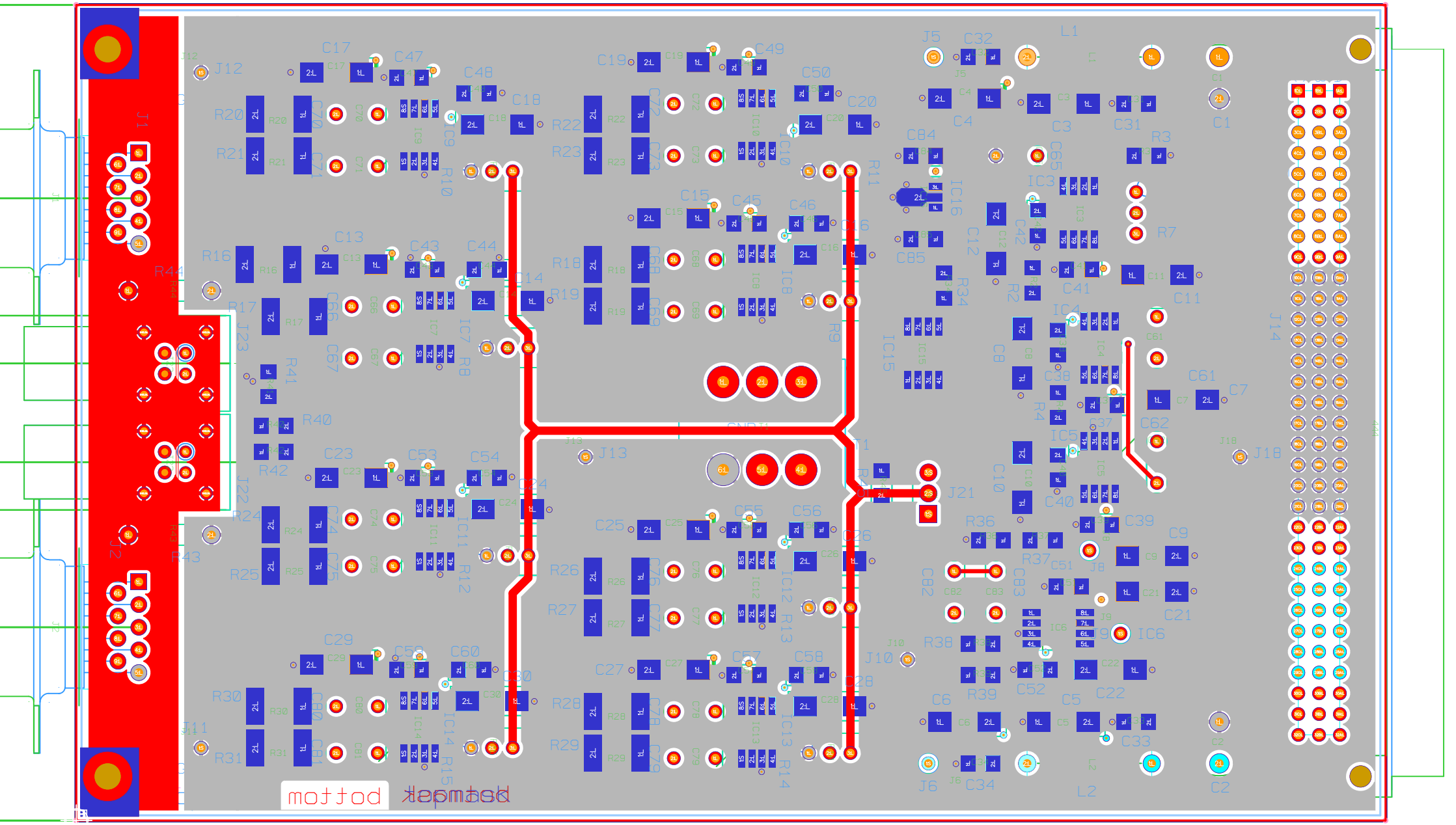
A3


VU University Amsterdam, 2012-2865-02, LVDT exciter
GND
+15V
-15V
J1
J2
J5
J6
J10
J11
J12
J13
J18
J21
J22
J23
T1
L1
L2
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
IC16
topside
bottom
bottom
topside


top
bottom


layer2


VU University Amsterdam 2012-2865-02 LVDT exciter
GND
GND
toplayer
layer3
bottomlayer


bottom
bottom

Bench_LVDT_Advanced_Virgo

Technical Note

vrije Universiteit amsterdam

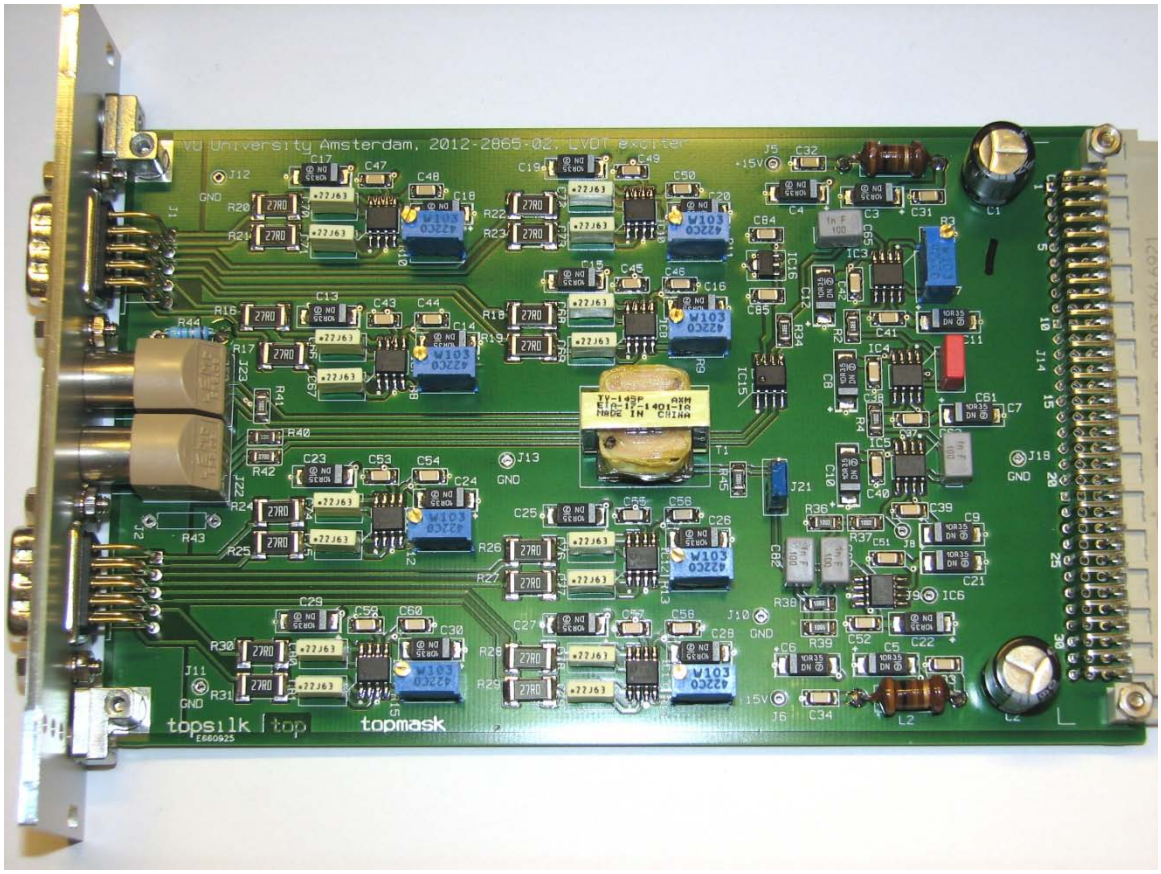
Han Voet, Alessandro Bertolini, October, 2014
Elektronica Bèta VU,
FEW / FALW
Vrije Universiteit *Amsterdam*, the Netherlands

Phone : +31-20-5987432
Fax : +31-20-5987899

Email : j.w.h.voet@vu.nl
Web : http://ele.beta.vu.nl

Project ID : 2012-2865-02
Filename : ExcitersBoard_V2.docx
Pages : 5
Last save : (December 8, 2014)

Table of contents

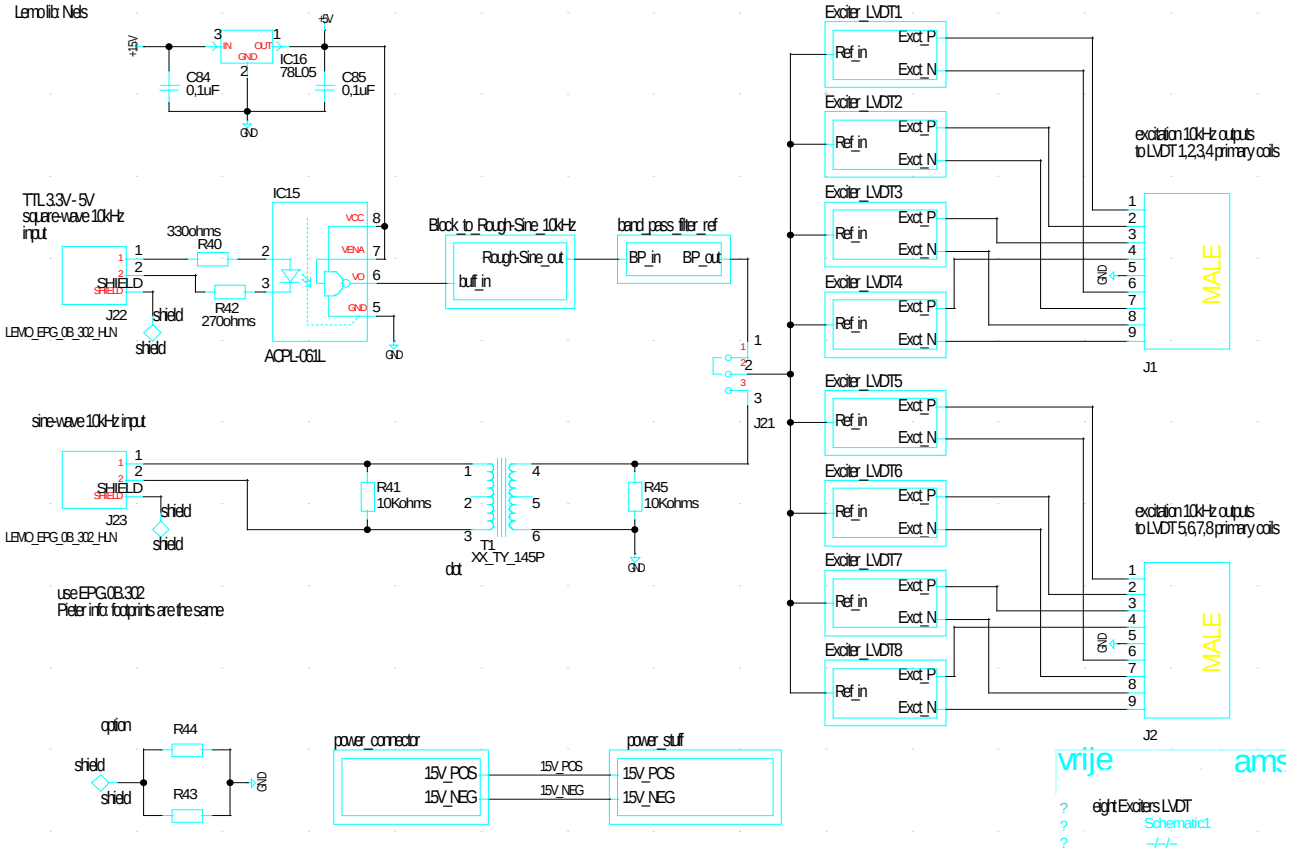


1 Introduction

The purpose of the Exciters board is to produce a 10 kHz sine wave for eight LVDT primary coils.

It is part of a control system which damps the motion of mechanical pendulums caused by seismic disturbances.

2 Description



The board has two LEMO connector inputs. Matching LEMO plug is: FGG.0B.302.CLAD52Z.
With jumper J21 you can make your choice, which one is active.
With the jumper on the lowest two pins, the TTL input is active.
With the jumper on the highest two pins, the sine wave input is active.

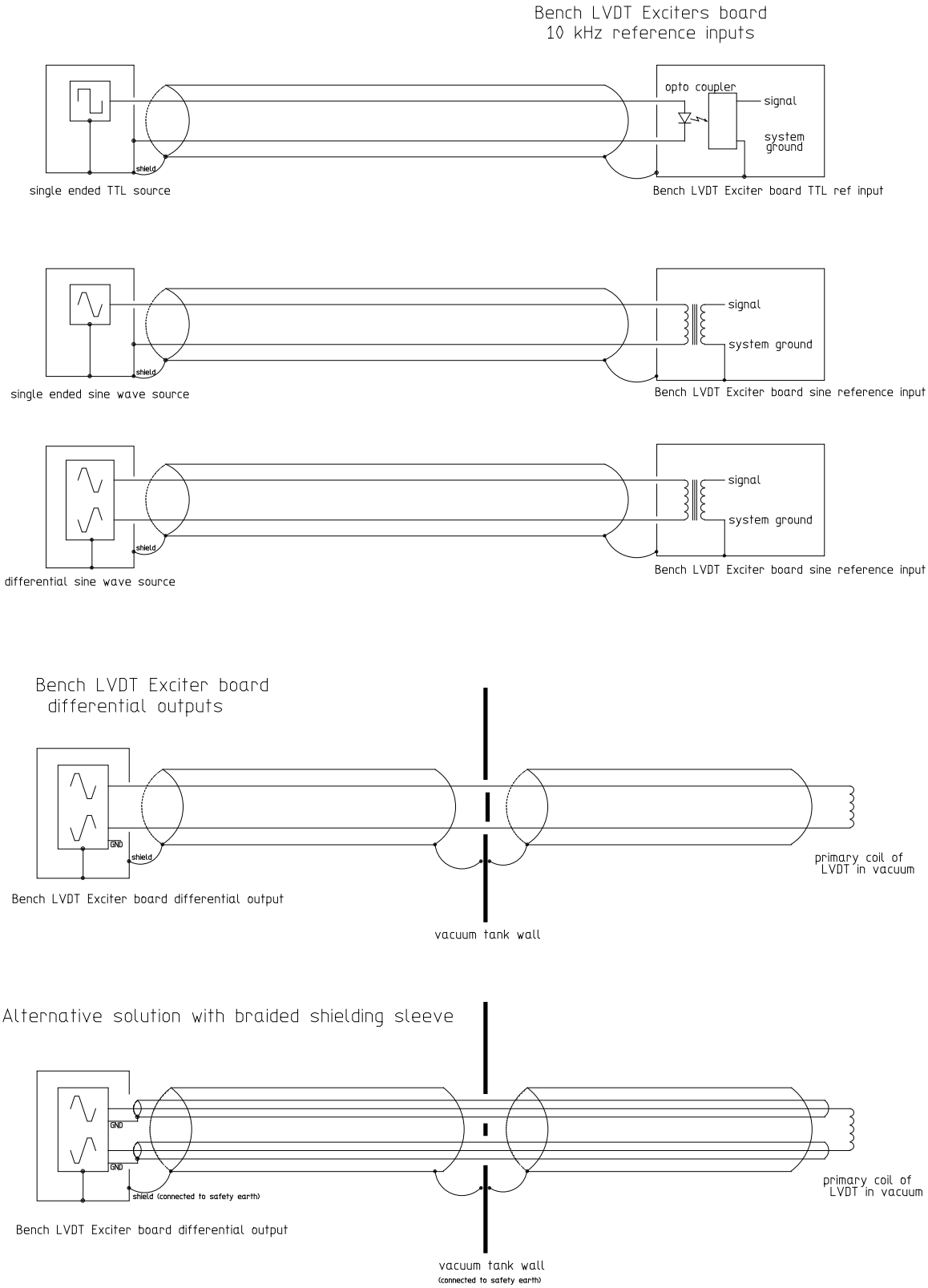
One digital input has an opto coupler. It is best to put a 50% duty cycle square wave on this input. It is converted to a 10 kHz sine wave.
With potentiometer R7 one can set the amplitude.

The other input has a separation transformer (1 : 1).
Here you can connect a 10 kHz sine wave.

The board has eight differential outputs. (9 pins male D-sub connectors).
They should be connected to the primary coils of the LVDT's.
With potentiometers R8 <----> R15 one can set the amplitude.

See for more details the file:
Bench-LVDT-control_Exciters_Schematics_Layout.pdf
On the first page you have rectangles with a double line. Click on it and choose: "Push Schematic" to see the underlying schematic.

3 Suggestions how the connect the device



4 Power supply

The board runs on
+15Volt current 70 mA without load
-15Volt current 60 mA without load

5 Meaning of LVDT

LVDT = Linear Variable Differential Transformer
or
Linear Variable Displacement Transducer

6 Schematics and PCB layouts

See file:
Bench-LVDT-control_Exciters_Schematics_Layout.pdf

On the first page you have rectangles with a double line. Click on it and choose: “Push Schematic” to see the underlying schematic.