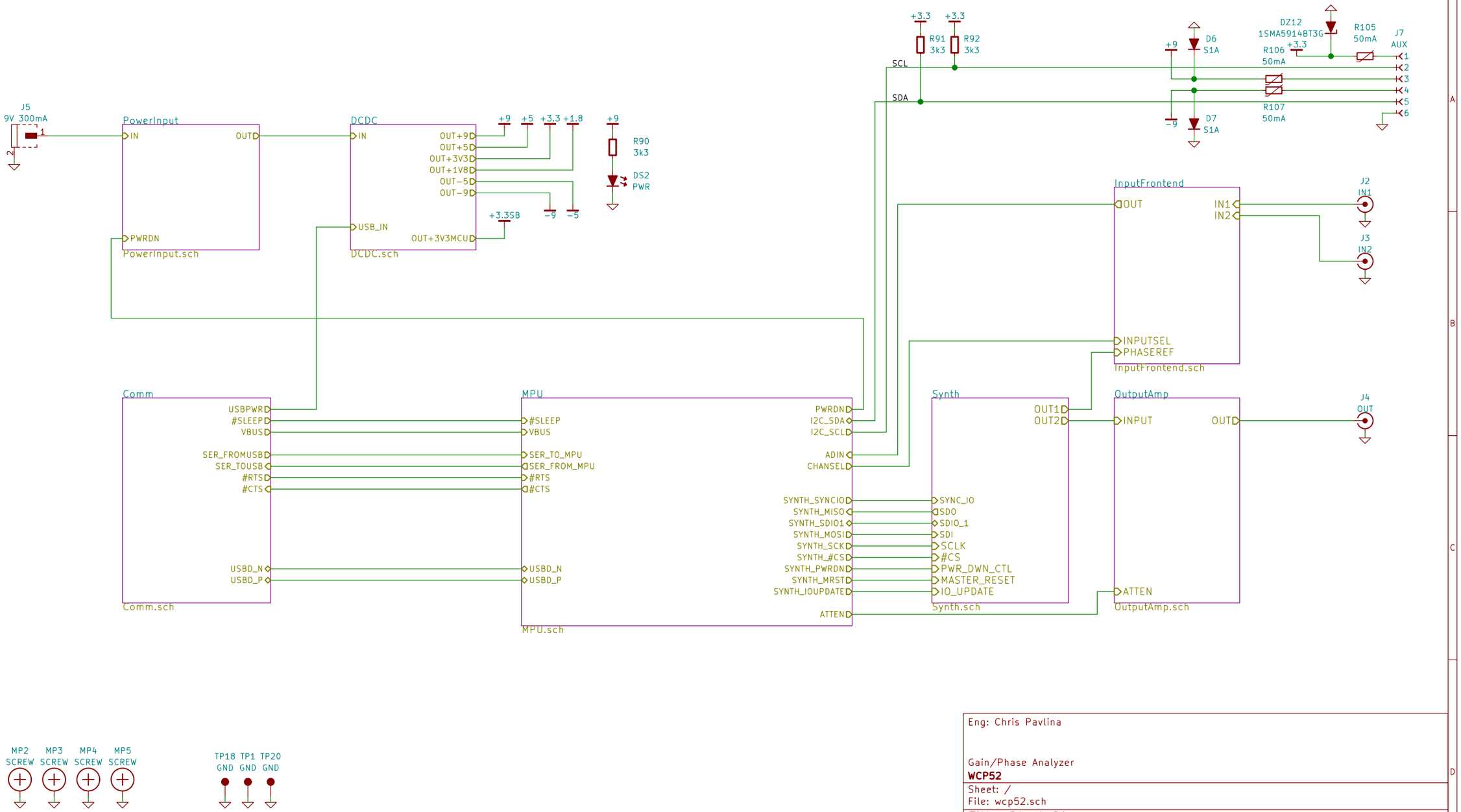
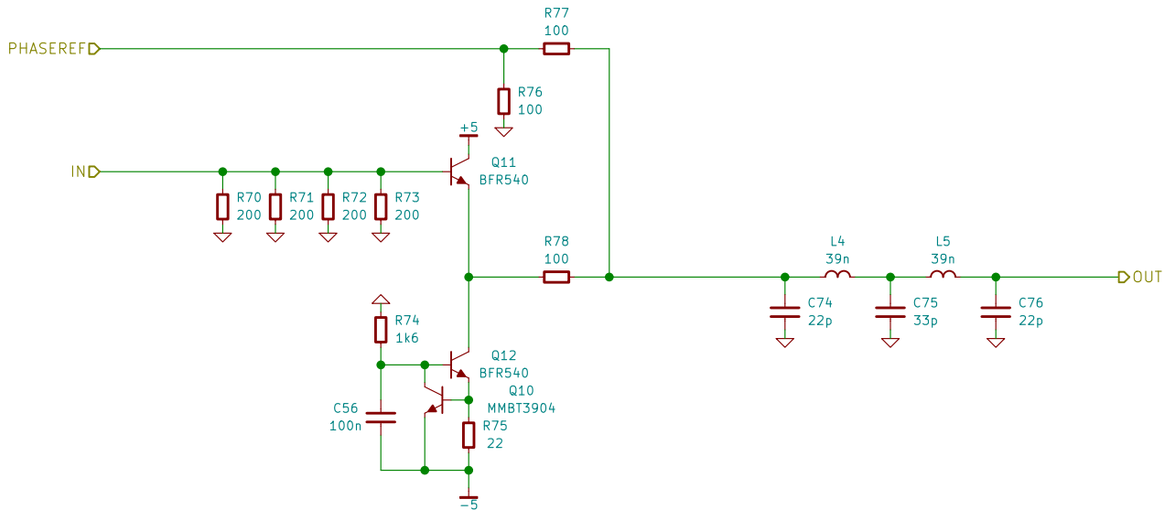
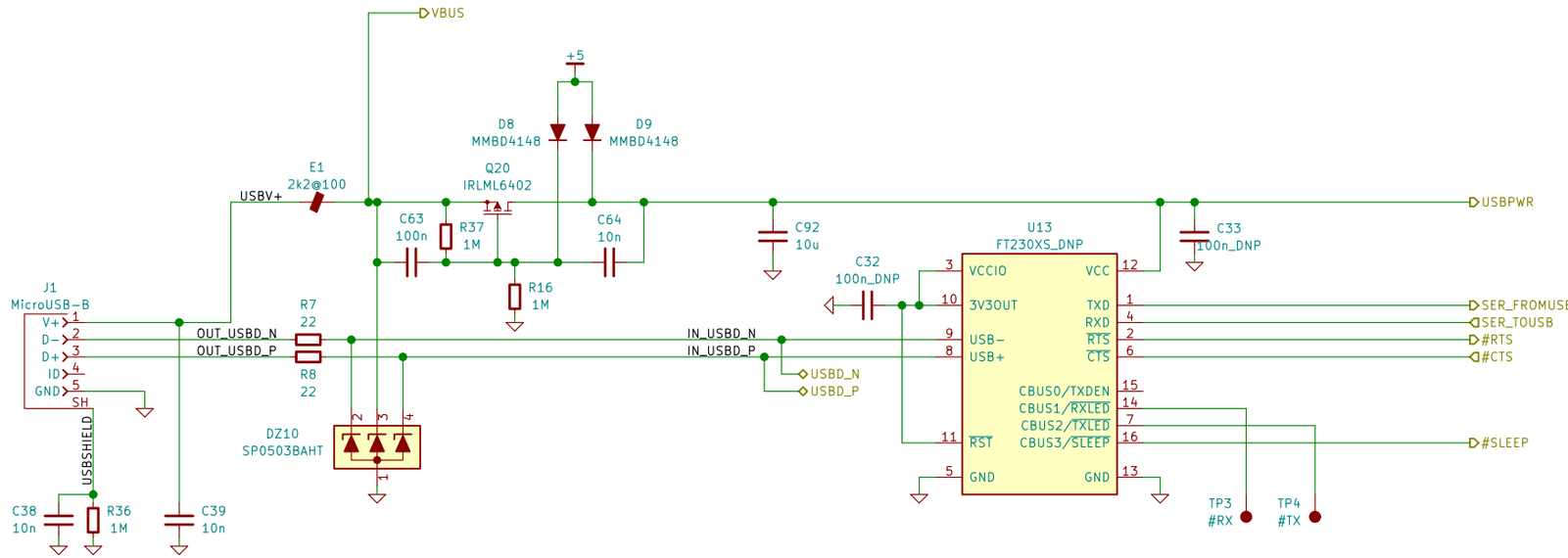


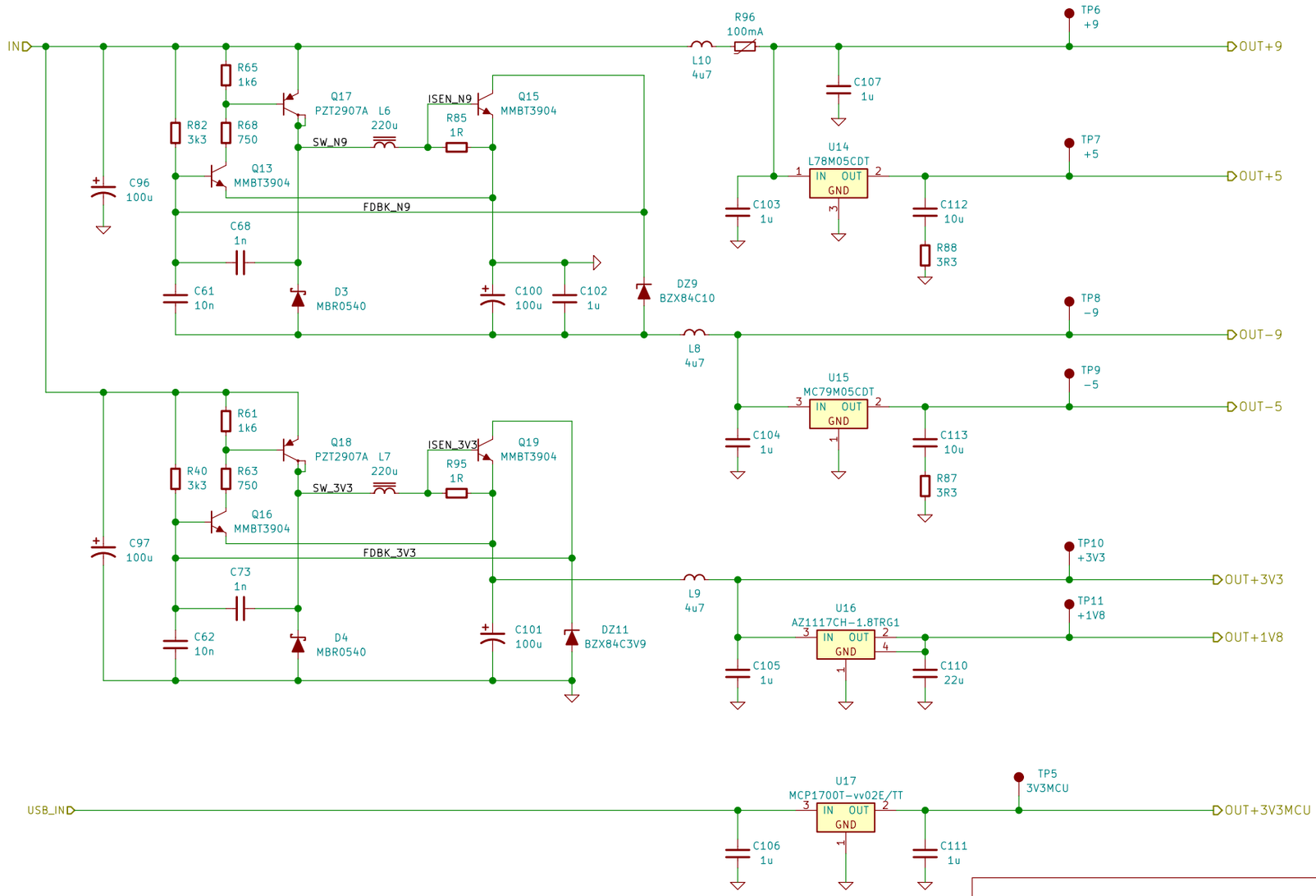
Eng: Chris Pavlina	
Gain/Phase Analyzer	
WCP52	
Sheet: /	
File: wcp52.sch	
Title: Block Diagram	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 1/13



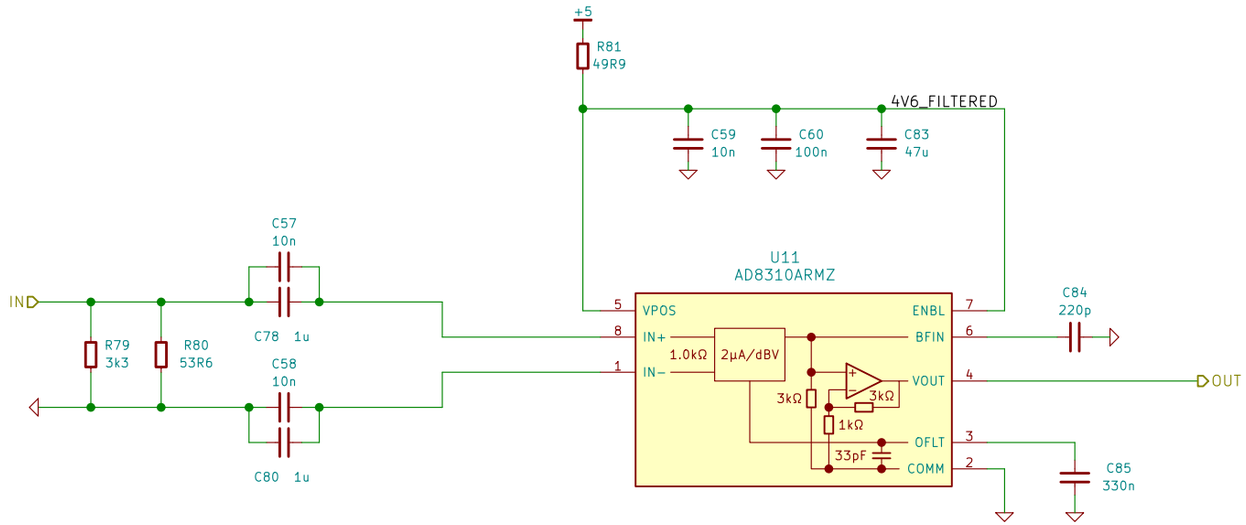
Eng: Chris Pavlina	
Gain/Phase Analyzer **WCP52**	
Sheet: /InputFrontend/Buffer_Filter/ File: Buffer_Filter.sch	
Title: Input Buffer and Filter	
Size: USLegal | Date: 2015-03-10	**Rev:**
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 9/13



Eng: Chris Pavlina		
Gain/Phase Analyzer **WCP52**		
Sheet: /Comm/ File: Comm.sch		
Title:		
Size: USLegal	Date: 2015-03-10	**Rev:**
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product		Id: 2/13

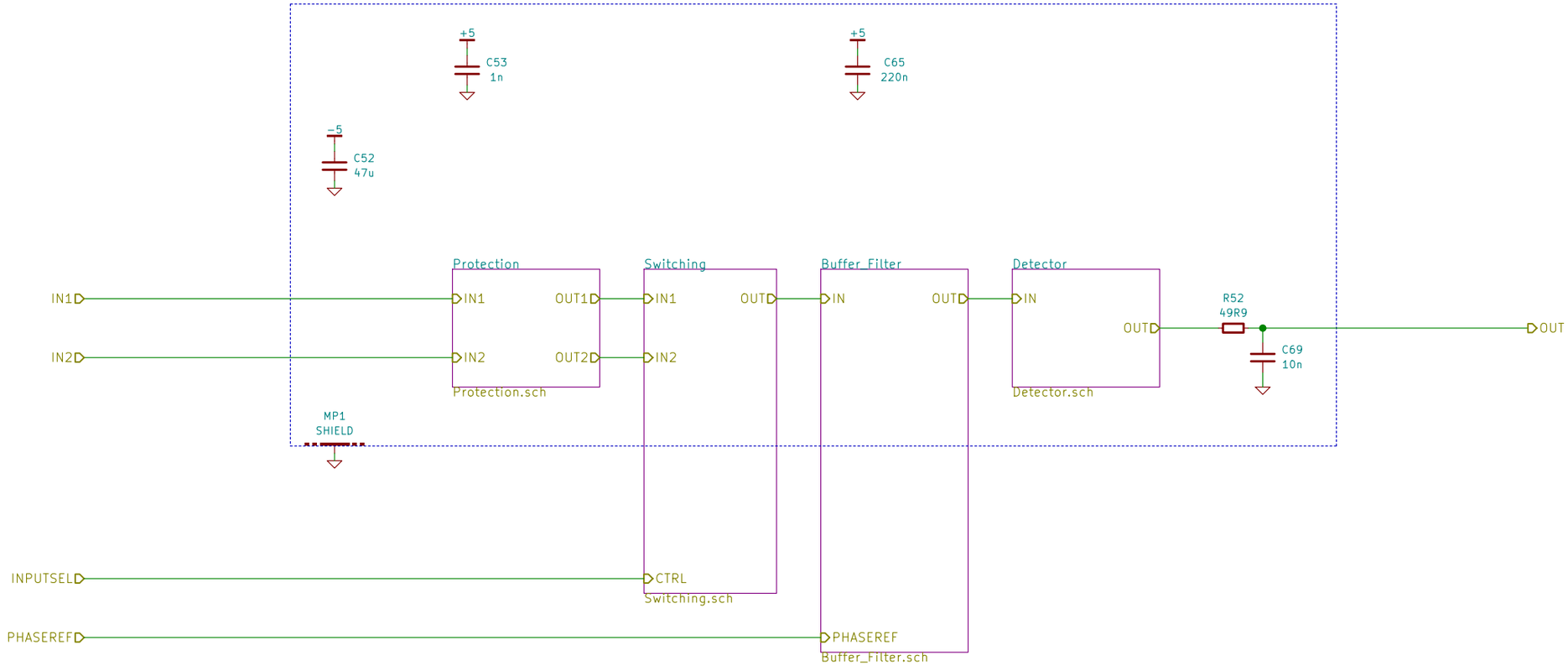


Sheet: /DCDC/	
File: DCDC.sch	
Title:	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 12/13

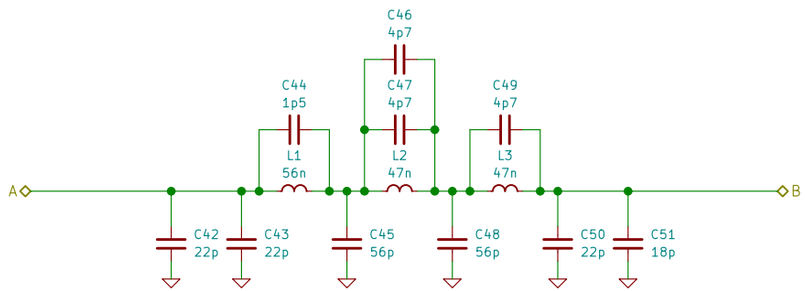


Eng: Chris Pavlina	
Gain/Phase Analyzer **WCP52**	
Sheet: /InputFrontend/Detector/ File: Detector.sch	
Title: Logarithmic Detector	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 10/13

Rev:



Eng: Chris Pavlina	
Gain/Phase Analyzer **WCP52**	
Sheet: /InputFrontend/ File: InputFrontend.sch	
Title: Input Frontend	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 6/13
	Rev:



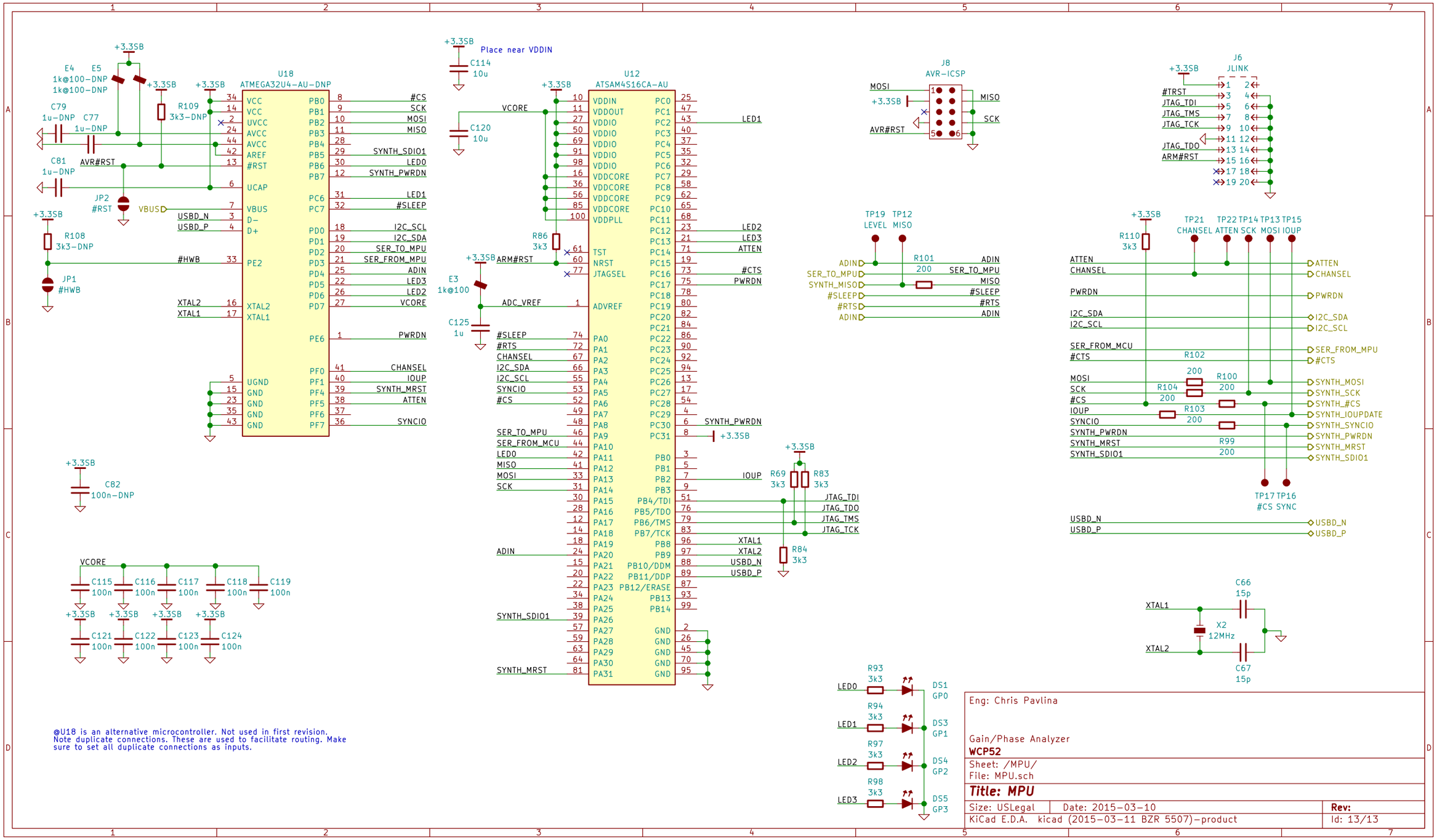
Eng: Chris Pavlina

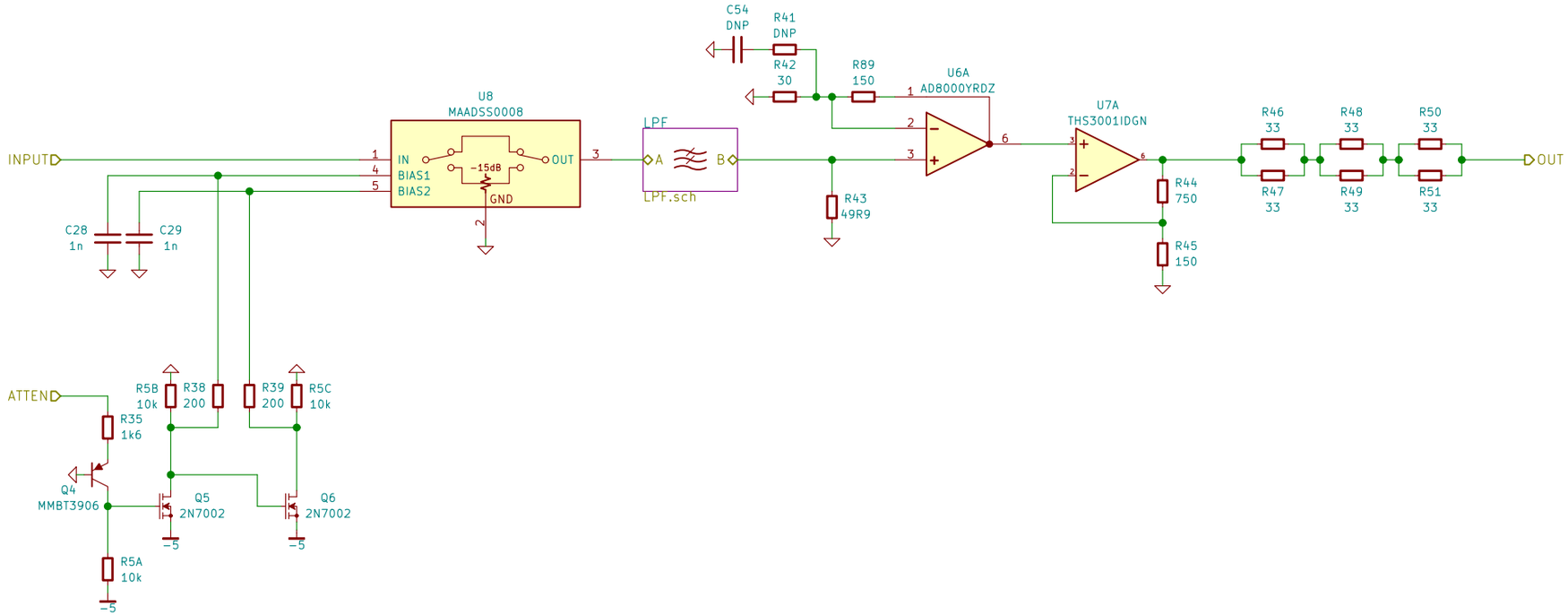
Gain/Phase Analyzer
WCP52

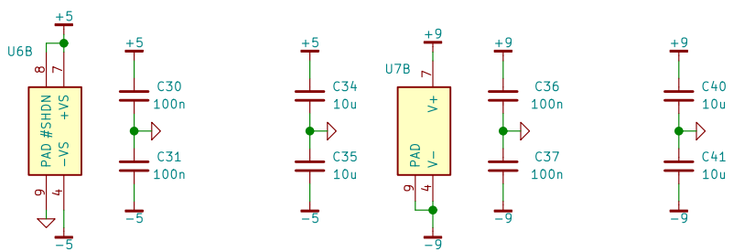
Sheet: /OutputAmp/LPF/
File: LPF.sch

Title: LPF for Output Amplifier

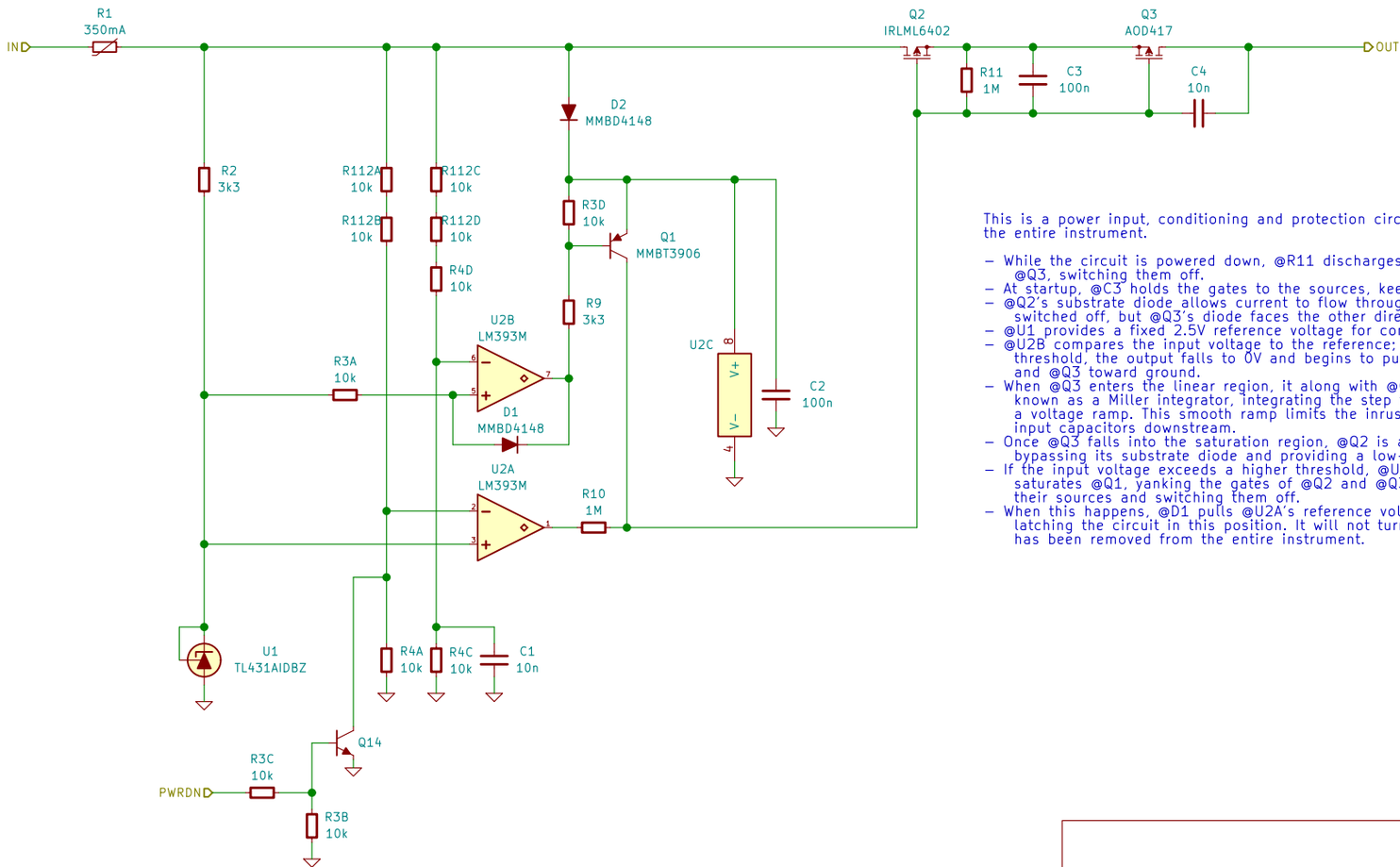
Size: USLegal	Date: 2015-03-10	**Rev:**
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product		Id: 5/13


U18
ATMEGA32U4-AU-DNP
U12
ATSAM4S16CA-AU
Place near VDDIN
J8
AVR-ICSP
J6
JLINK
E4 E5
1k@100-DNP
1k@100-DNP
C79 1u-DNP
C77 1u-DNP
C81 1u-DNP
R109 3k3-DNP
R108 3k3-DNP
JP2 #RST
JP1 #HWB
AVR#RST
VBUS
USBD_N
USBD_P
#HWB
XTAL2
XTAL1
C82 100n-DNP
C114 10u
C120 10u
C125 1u
E3 1k@100
R86 3k3
ARM#RST
ADC_VREF
VCORE
C115 100n
C116 100n
C117 100n
C118 100n
C119 100n
C121 100n
C122 100n
C123 100n
C124 100n
R69 3k3
R83 3k3
R84 3k3
TP19 LEVEL
TP12 MISO
R101 200
R110 3k3
TP21 CHANSEL
TP22 ATTEN
TP14 SCK
TP13 MOSI
TP15 IOUP
R102 200
R104 200
R100 200
R103 200
R99 200
TP17 #CS
TP16 SYNC
C66 15p
C67 15p
X2 12MHz
R93 3k3
R94 3k3
R97 3k3
R98 3k3
DS1 GP0
DS3 GP1
DS4 GP2
DS5 GP3
LED0
LED1
LED2
LED3
@U18 is an alternative microcontroller. Not used in first revision.
Note duplicate connections. These are used to facilitate routing. Make
sure to set all duplicate connections as inputs.
Eng: Chris Pavlina
Gain/Phase Analyzer
WCP52
Sheet: /MPU/
File: MPU.sch
Title: MPU
Size: USLegal
Date: 2015-03-10
Rev:
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product
Id: 13/13





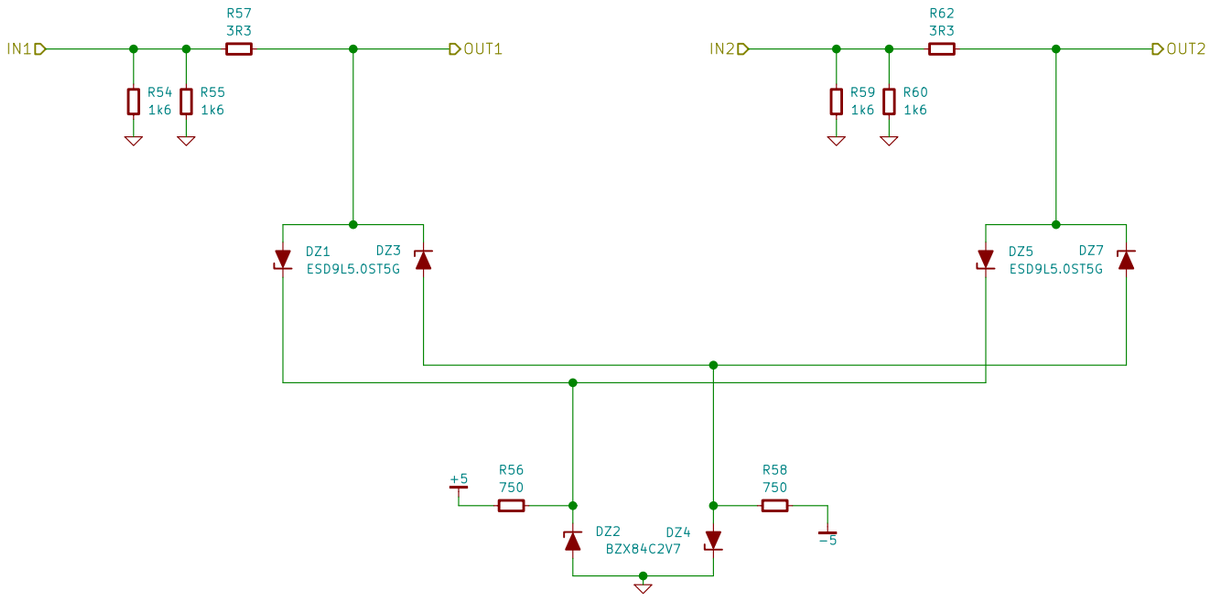
Eng: Chris Pavlina		
Gain/Phase Analyzer **WCP52**		
Sheet: /OutputAmp/ File: OutputAmp.sch		
Title: Output Amplifier		
Size: USLegal	Date: 2015-03-10	**Rev:**
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product		Id: 4/13



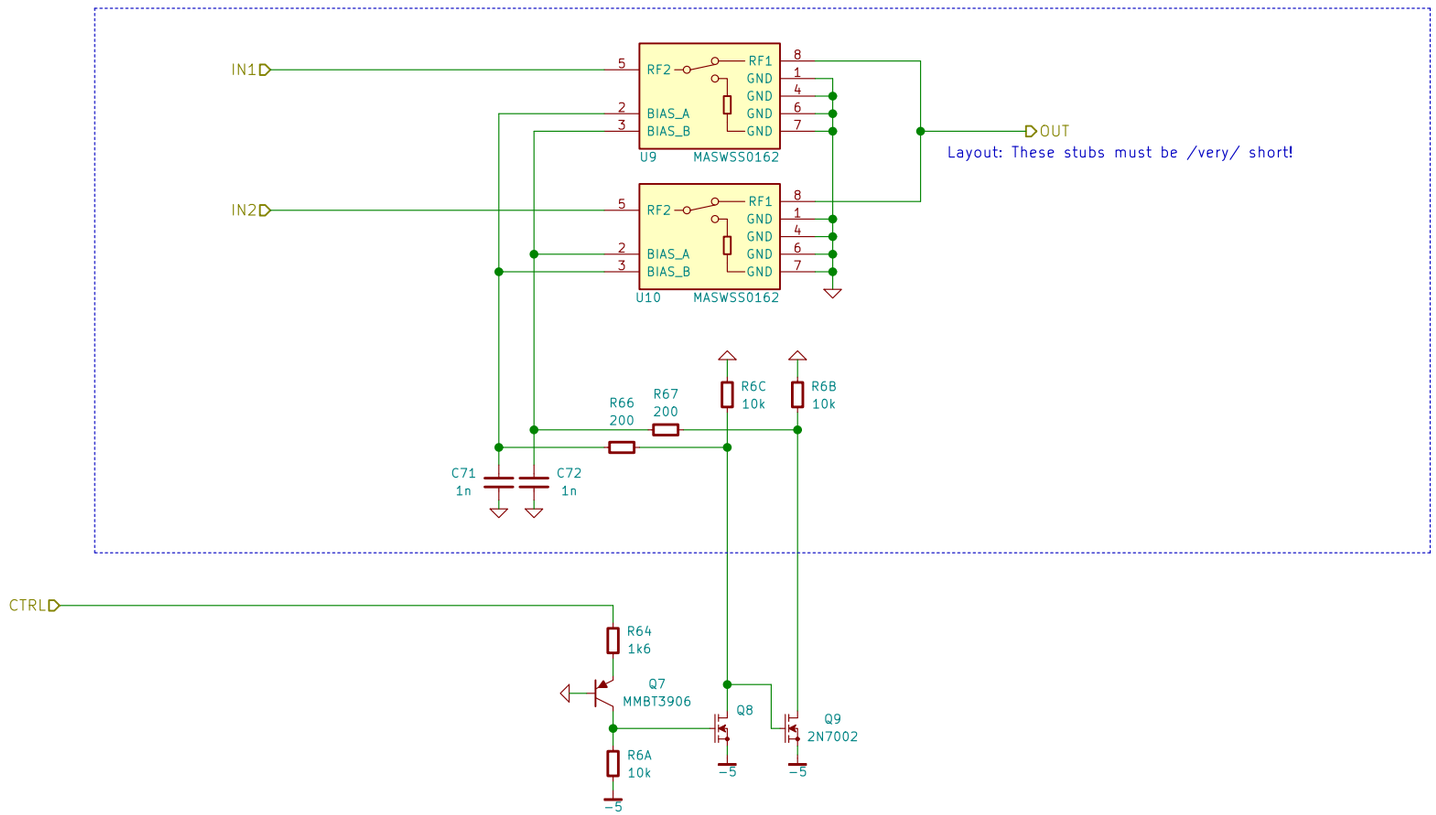
This is a power input, conditioning and protection circuit for the entire instrument.

- While the circuit is powered down, @R11 discharges the gates of @Q2 and @Q3, switching them off.
- At startup, @C3 holds the gates to the sources, keeping them switched off.
- @Q2's substrate diode allows current to flow through despite the FET being switched off, but @Q3's diode faces the other direction and does not.
- @U1 provides a fixed 2.5V reference voltage for comparison.
- @U2B compares the input voltage to the reference; when it exceeds a threshold, the output falls to 0V and begins to pull the gates of @Q2 and @Q3 toward ground.
- When @Q3 enters the linear region, it along with @C4 forms a circuit known as a Miller integrator, integrating the step from @U2B to produce a voltage ramp. This smooth ramp limits the inrush current charging any input capacitors downstream.
- Once @Q3 falls into the saturation region, @Q2 is also in this region, bypassing its substrate diode and providing a low-impedance path for current.
- If the input voltage exceeds a higher threshold, @U2A switches on. This saturates @Q1, yanking the gates of @Q2 and @Q3 back up towards their sources and switching them off.
- When this happens, @D1 pulls @U2A's reference voltage down, latching the circuit in this position. It will not turn back on until power has been removed from the entire instrument.

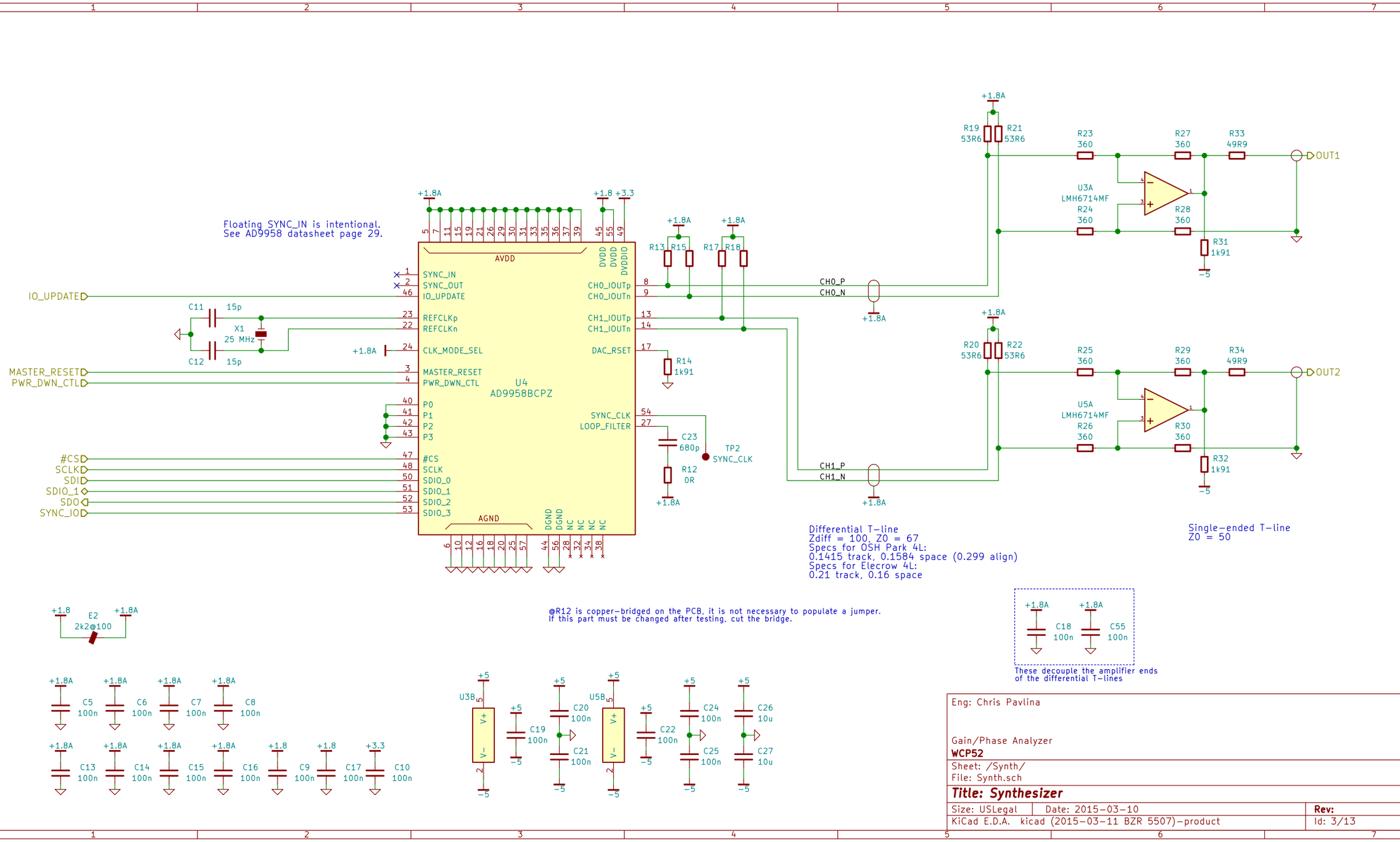
Sheet: /PowerInput/ File: PowerInput.sch		
Title:		
Size: USLegal	Date: 2015-03-10	**Rev:**
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product		Id: 11/13



Eng: Chris Pavlina	
Gain/Phase Analyzer **WCP52**	
Sheet: /InputFrontend/Protection/ File: Protection.sch	
Title: Input Protection	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 7/13
	Rev:



Eng: Chris Pavlina	
Gain/Phase Analyzer **WCP52**	
Sheet: /InputFrontend/Switching/ File: Switching.sch	
Title: Input Switching	
Size: USLegal	Date: 2015-03-10
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product	Id: 8/13
	Rev:


Floating SYNC_IN is intentional.
See AD9958 datasheet page 29.
U4
AD9958BCPZ
AVDD
DVDD
DVDDIO
AGND
DGND
NC
SYNC_IN
SYNC_OUT
IO_UPDATE
REFCLKp
REFCLKn
CLK_MODE_SEL
MASTER_RESET
PWR_DWN_CTL
P0
P1
P2
P3
#CS
SCLK
SDIO_0
SDIO_1
SDIO_2
SDIO_3
CH0_IOUTp
CH0_IOUTn
CH1_IOUTp
CH1_IOUTn
DAC_RSET
SYNC_CLK
LOOP_FILTER
IO_UPDATE
MASTER_RESET
PWR_DWN_CTL
#CS
SCLK
SDI
SDIO_1
SDO
SYNC_IO
X1
25 MHz
C11 15p
C12 15p
R14 1k91
R12 0R
C23 680p
TP2
SYNC_CLK
CH0_P
CH0_N
CH1_P
CH1_N
R19 53R6
R21 53R6
R20 53R6
R22 53R6
R23 360
R24 360
R25 360
R26 360
R27 360
R28 360
R29 360
R30 360
R33 49R9
R34 49R9
R31 1k91
R32 1k91
U3A
LMH6714MF
U5A
LMH6714MF
OUT1
OUT2
Differential T-line
Zdiff = 100, Z0 = 67
Specs for OSH Park 4L:
0.1415 track, 0.1584 space (0.299 align)
Specs for Elecrow 4L:
0.21 track, 0.16 space
Single-ended T-line
Z0 = 50
E2
2k2@100
@R12 is copper-bridged on the PCB, it is not necessary to populate a jumper.
If this part must be changed after testing, cut the bridge.
C18 100n
C55 100n
These decouple the amplifier ends
of the differential T-lines
C5 100n
C6 100n
C7 100n
C8 100n
C13 100n
C14 100n
C15 100n
C16 100n
C9 100n
C17 100n
C10 100n
U3B
C19 100n
C20 100n
C21 100n
U5B
C22 100n
C24 100n
C25 100n
C26 10u
C27 10u
Eng: Chris Pavlina
Gain/Phase Analyzer
WCP52
Sheet: /Synth/
File: Synth.sch
Title: Synthesizer
Size: USLegal
Date: 2015-03-10
Rev:
KiCad E.D.A. kicad (2015-03-11 BZR 5507)-product
Id: 3/13