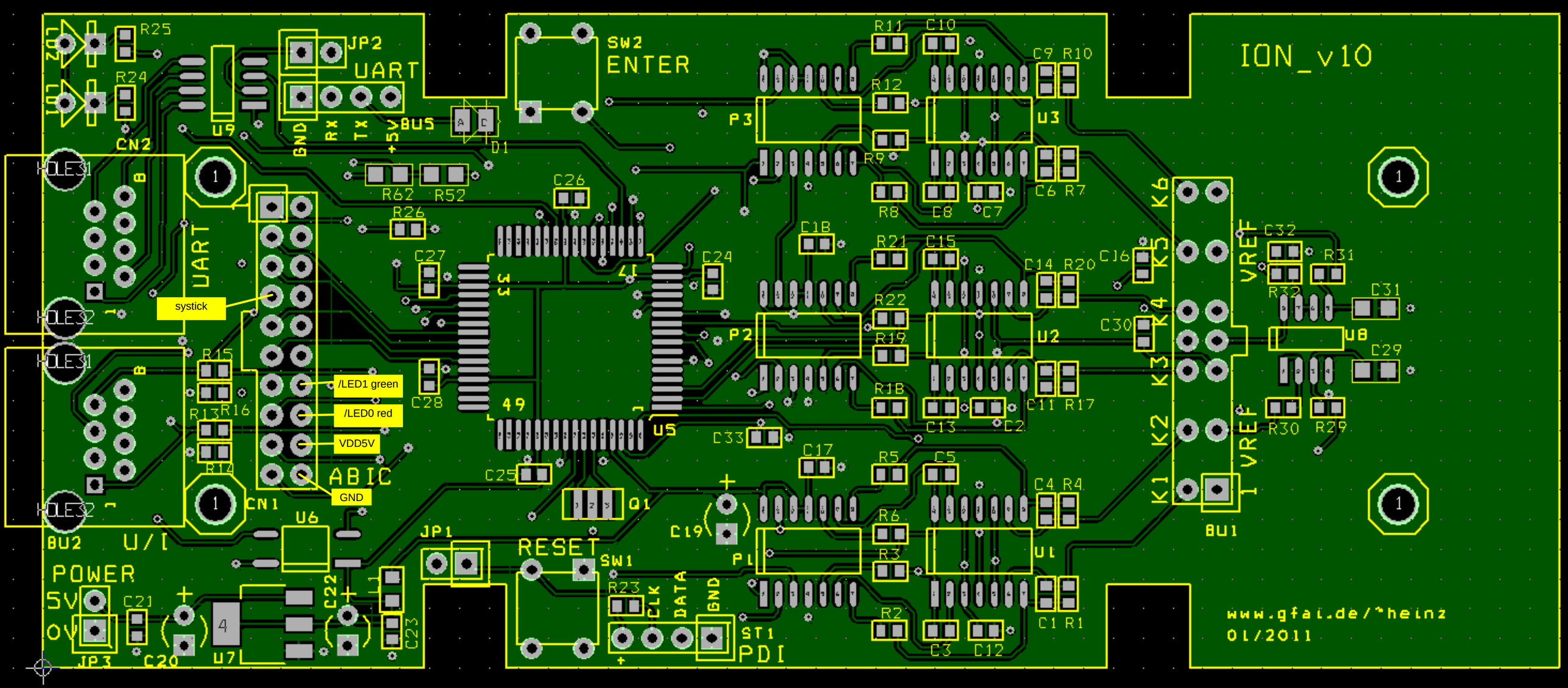
ION_v10
SW2
ENTER
JP2
UART
GND
RX
TX
+5V
BUS
D1
CN2
U9
R25
R24
LED1
LED0
HOLE31
HOLE32
UART
systick
/LED1 green
/LED0 red
VDD5V
GND
ABIC
CN1
U6
BU2
U/I
POWER
5V
0V
JP3
C21
C20
U7
C22
L1
C23
JP1
RESET
SW1
R23
CLK
DATA
GND
ST1
PDI
Q1
C19
P1
U5
C26
C27
C24
C28
C25
C33
R26
R62
R52
R15
R13
R16
R14
P3
P2
U3
U2
U1
R11
C10
C9
R10
R12
R9
R8
C8
C7
C6
R7
C18
R21
C15
C14
R20
R22
R19
R18
C13
C2
C11
R17
C17
R5
C5
C4
R4
R6
R3
R2
C3
C12
C1
R1
C16
K6
K5
K4
K3
K2
K1
VREF
C32
R31
R32
C31
U8
C30
C29
R30
R29
BU1
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Photodioden

VDDA3V3

BU1
CONN_11x2_Ph
ARA

preamp M1
preamp M2
preamp M3
ui_amp M4

M5
control

ADC_PA0 ADC_PA1 ADC_PA2 ADC_PA3 ADC_PA4 ADC_PA5 ADC_PA6 ADC_PA7
ADC_PB0 ADC_PB1 DAC_PB2 DAC_PB3 ADC_PB4 ADC_PB5 ADC_PB6 ADC_PB7
TX_C0 RX_C0

BYP_OUT BYP_GND
SSC_nRESo SSC_nLDo SSC_DO
SSC_DI SSC_CLK SCI_nINTo SCI_DE SCI_RX SCI_TX

BYOUT BYGND
PE4 PE5 PE6 PE7 PE1 PE0 PE3 PE2

CN1
systick
Uschw Ischw VINP VINM
LED green LED red
VDD5V GND
MLW20G
ABIC

A+ A- D+ B+ B- D- C+ C-
Uschw GND VDD5V VINP VINM GND Ischw GND
BU2
RJ45_8x
U/I

M6 power
AREFA AREFB
ARB ARA

VDD3V3
U9
VCC RO DI GND
A nB nZ Y
LTC2851

Input: A, nB
Output: Y, nZ

R100 120
C100 100n

VDD5V BYOUT BYGND GND
A+ A- D+ B+ B- D- C+ C-
CN2
RJ45
UART

Layers:
1 TOP - routing, cp GND
2 BOTTOM - routing, cp GND
3 GND - plane GND
4 PWR - routing, cp GND
*cp: copper pour

VSS GND
VDDA3V3 VDDA3V3
VDD3V3 VDD3V3
VDD5V VDD5V

Title	ION - Spectral Controller ION_v10	
Size A4	Document Number heinz@gfai.de	Rev 1.0
Date: Monday, February 27, 2012	Sheet 1 of 7	

SSC_nRESo
SSC_nRESout
SSC_CLK
SSC_DI
SSC_DO
SSC_nLDo
PE7
PE6
PE5
PE4
SCI_RX
SCI_TX
SCI_nINTo
SCI_DE
PE3
PE2
PE1
PE0

ADC_PA0
ADC_PA1
ADC_PA2
ADC_PA3
PA0
PA1
PA2
PA3
ADC_PA4
ADC_PA5
ADC_PA6
ADC_PA7
PA4
PA5
PA6
PA7
ADC_PB0
ADC_PB1
DAC_PB2
DAC_PB3
PB0
PB1
PB2
PB3
ADC_PB4
ADC_PB5
ADC_PB6
ADC_PB7
PB4
PB5
PB6
PB7

LD1 LED_red
VDD5V
R24 470
LED0
R25 470
LED1
LD2 LED_green

Fast Bypass - STOP = switch on
ton = 3µs
toff = 40µs
BYP_GND
BYP_OUT
U6
TLP181GB
R26 270
nBY
VDD3V3

SSC_nRESout
SW1 RESET
JP1 ST2x1
Jumper zur Programmierung abziehen oder ABIC-Verbinder entfernen
nRES
VDD3V3
R23 10k
CSTCE8M00
Q1
ST1
VREF
CLKnRES
DATA
GND
ST4x1
PDI
See AN AVR1012 Xmega A Schematic Checklist p.15, Fig.6-2
systick: PF6

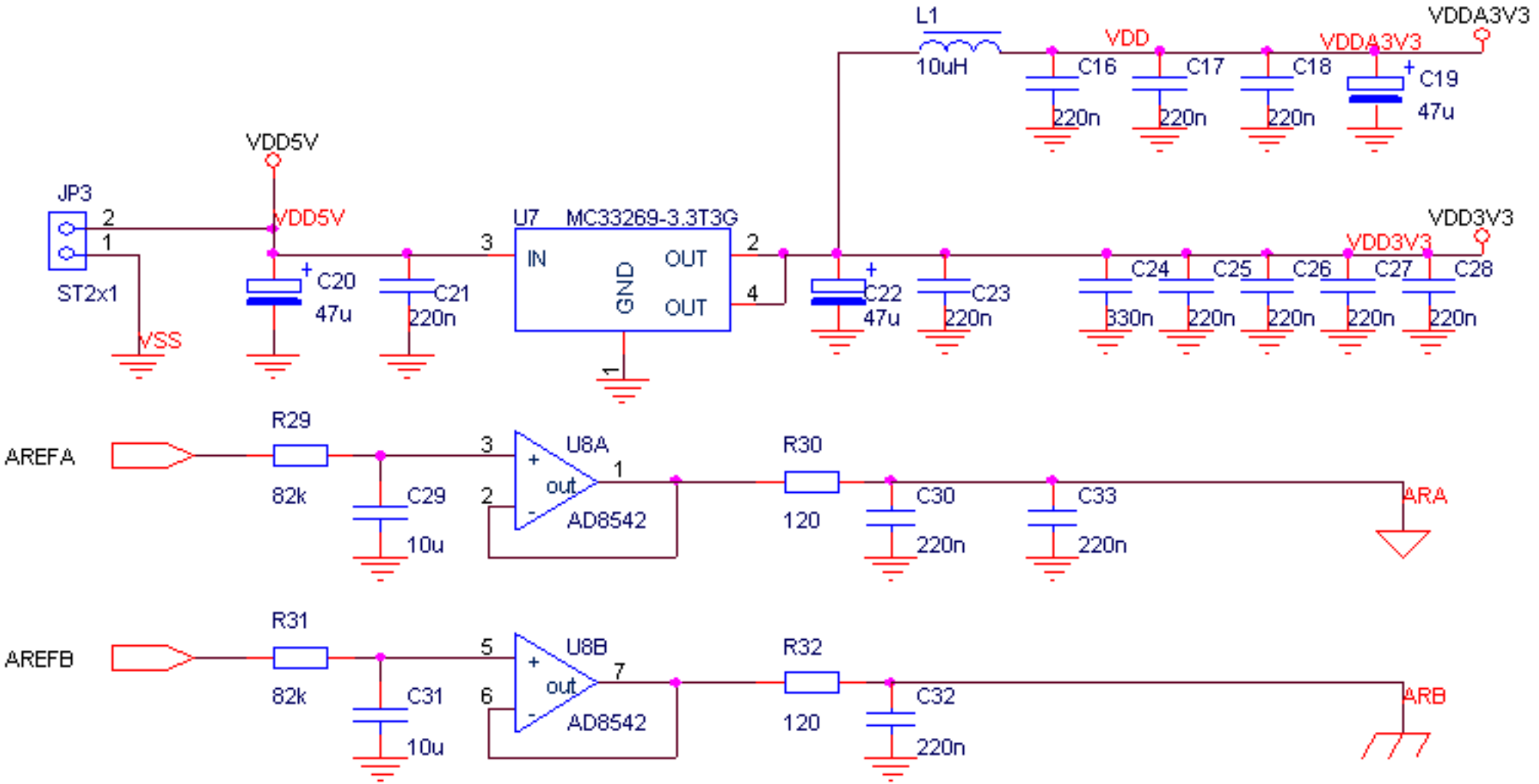
U5
ATxmega192A3_AU-LQFP64
PA3 PA4 PA5 PA6 PA7 PB0 PB1 PB2 PB3 PB4 PB5 PB6 PB7 GND VDD3V3
PA2 PA1 PA0 VDDA3V3 GND PR1_XTAL1 PR0_XTAL2 nRESET_PDI_CLK PDI_DATA PF7 PF6 VCC GND PF5 PF4 PF3
PF2 PF1 PF0 VCC GND PE7 PE6 PE5 PE4 PE3 PE2 PE1 PE0 VCC GND PD7
PC0 PC1 PC2 PC3 PC4 PC5 PC6 PC7 GND VCC PD0 PD1 PD2 PD3 PD4 PD5 PD6
VDD3V3
GND
_SCK PE7 SSC_SCK
_MISO PE6 SSC_DI
_MOSI PE5 SSC_DO
_nSS PE4 SSC_nLDout
toSCI PE3
fromSCI PE2
SCI_INTout PE1
SCI_RSIOout PE0
VDD3V3
GND

SW2 ENTER
BU5
BU4x1
VDD5V
VDD
TX
RX
GND
R62 18k
VDD3V3
TX_C0
RX_C0
D1
TSS4001
R52
820
nBY
RXD0
TXD0
nSS
MOSI
MISO
SCK
GND
VDD3V3
LED0
LED1
ST2x1
JP2

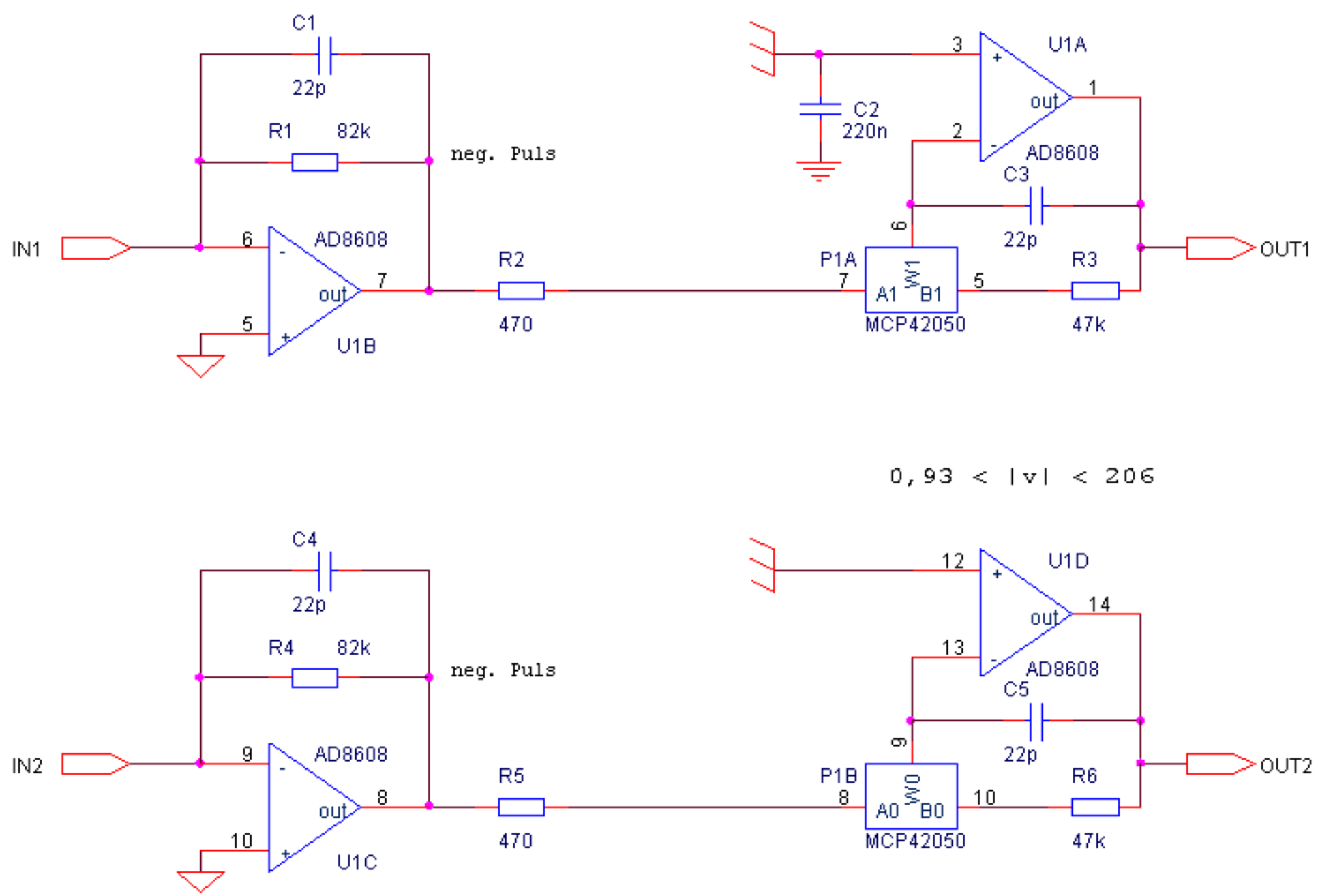
VDDA3V3
MISO
MCP42050
/CS VDD SCK SO SI /SHDN GND /RS
P1C
P2C
P3C
nSS
MOSI
SCK

AREF
VSS
GND
VDDA3V3
VDD3V3
VDD5V

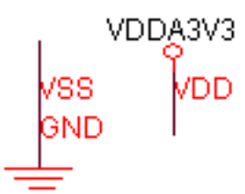
Title: Mikrocontroller		
Size: A4	Document Number: heinz@gfai.de	Rev: 1.0
Date: Friday, September 23, 2011	Sheet 6 of 7	



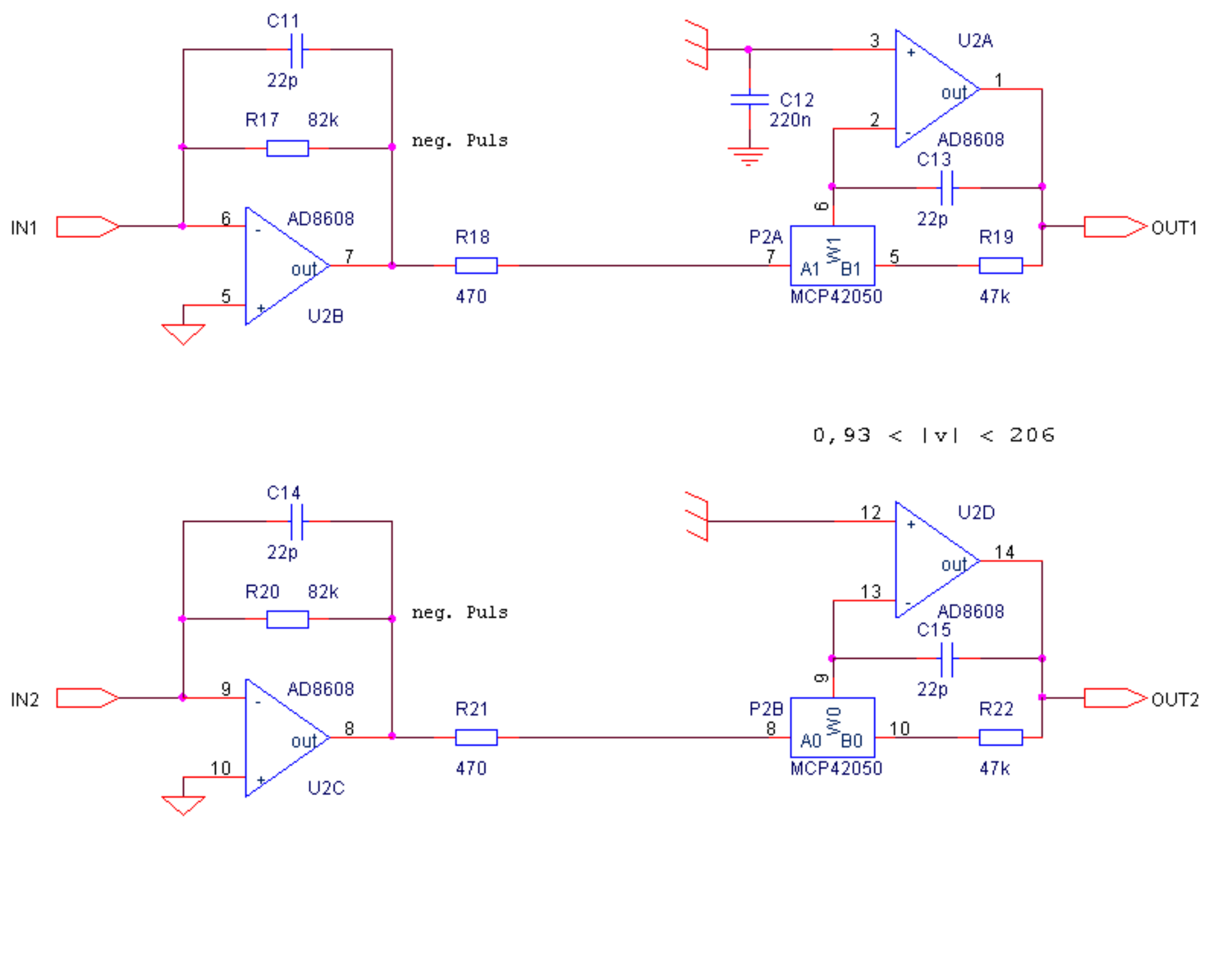
Title	Power Supply 24V to 5V to 3.3V, 1.7V	
Size A4	Document Number heinz@gfai.de	Rev 1.0
Date: Friday, February 25, 2011	Sheet 7 of 7	



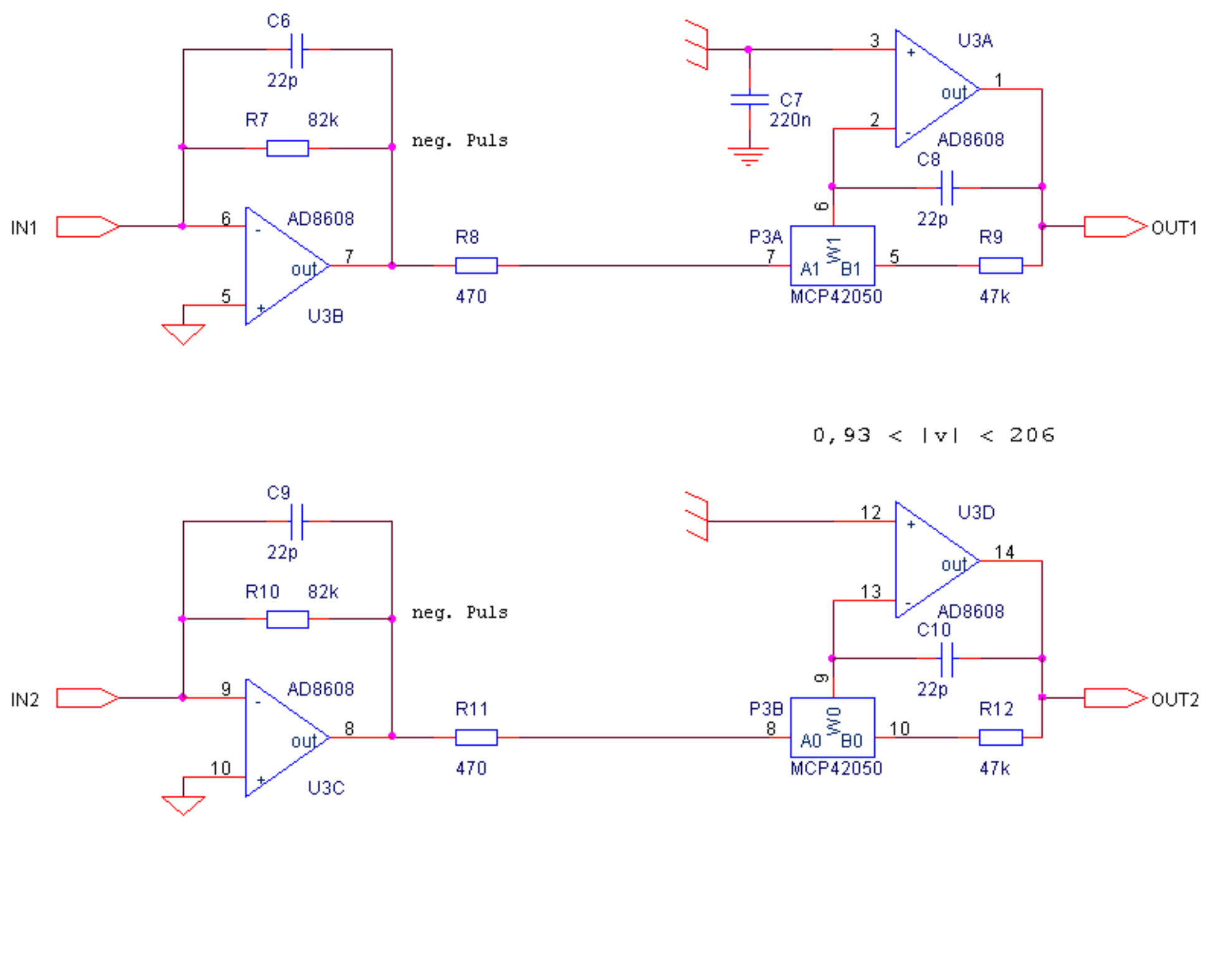
Bei 0x00 ist der Abgriff auf B, minimale Verstärkung;
bei 0xff ist er auf A, maximale Verstärkung



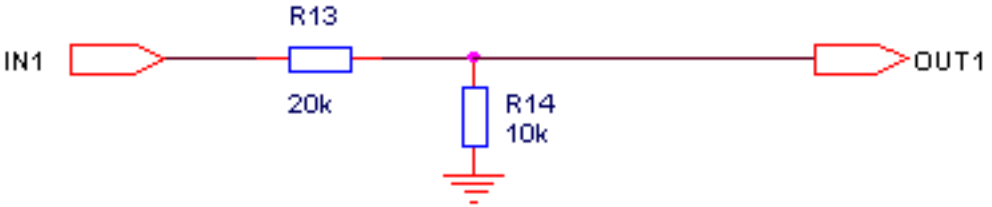
Title: Preamplifier		
Size: A4	Document Number: heinz@gfai.de	Rev: 1.0
Date: Friday, February 25, 2011	Sheet 2 of 7	



Title: Preamplifier		
Size: A4	Document Number: heinz@gfai.de	Rev: 1.0
Date: Friday, February 25, 2011	Sheet 5 of 7	

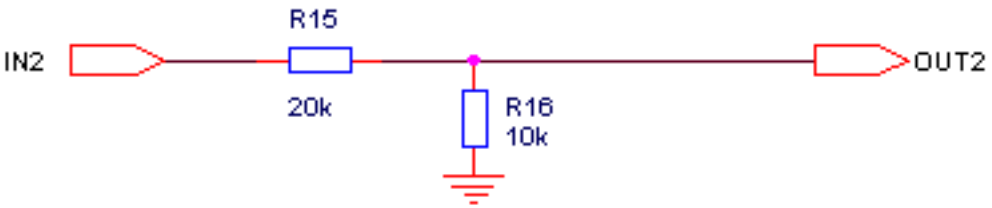


Title: Preamplifier		
Size: A4	Document Number: heinz@gfai.de	Rev: 1.0
Date: Friday, February 25, 2011	Sheet 3 of 7	



Input
0V...10V

Output
0V...3.3V



Ui/Uo = (Ri+Ro)/Ro

Uo = Ui Ro / (Ri+Ro)

Uo = 10V 10KΩ / (20kΩ + 10 kΩ)
= 3,33 V

Title: U-I-Vorteiler 10V auf 3,3V			
Size: A4	Document Number: heinz@gfai.de		Rev: 1.0
Date: Thursday, February 24, 2011		Sheet 4 of 7	

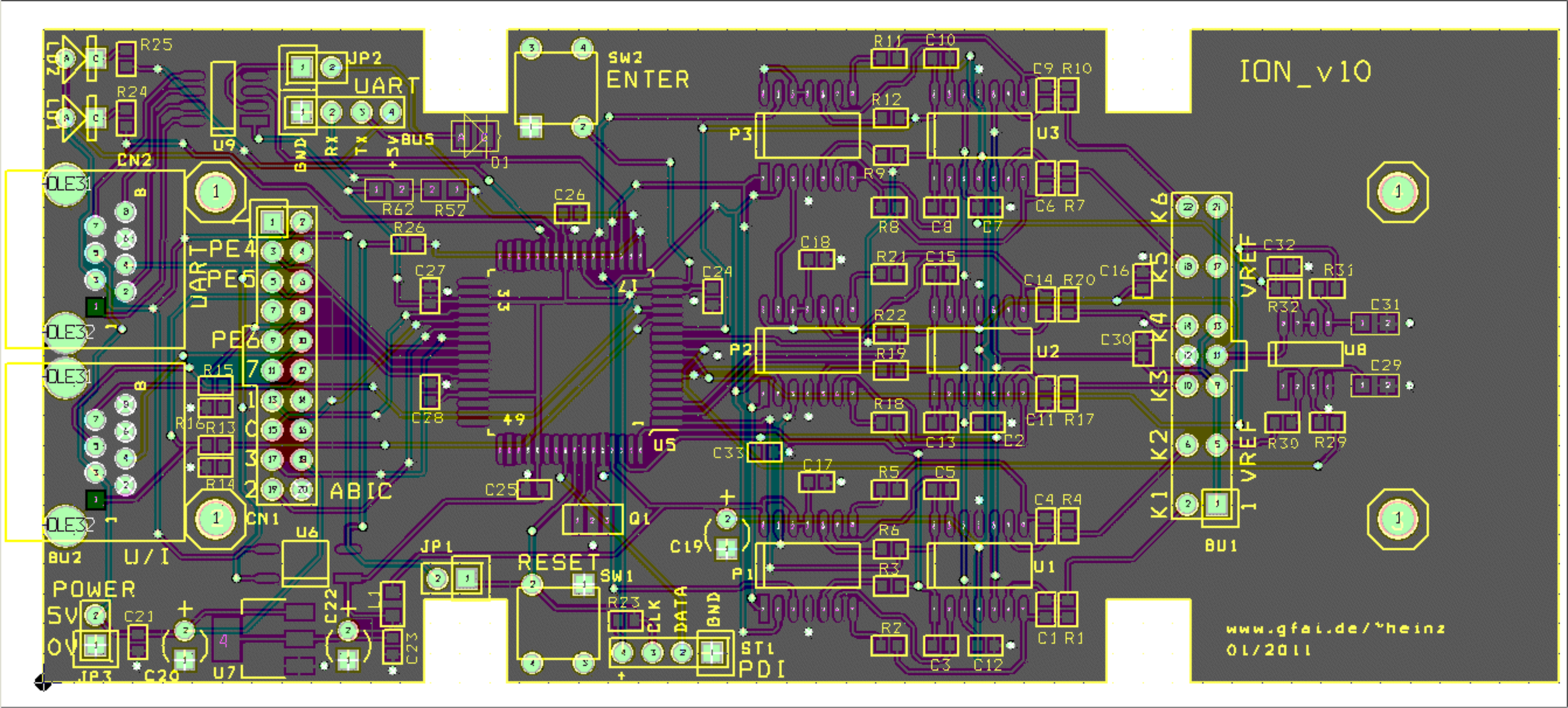
ION - Spectral Controller ION_v10

Revised: Tuesday, March 08, 2011
heinz@gfai.de Revision: 1.0
Tel. 030 814 563 490

Bill Of Materials
March 8,2011 12:52:48 Page1

Bitte nur SMD-Bauteile bestücken und löten!

Item	Quantity	Reference	Part
1	1	BU1	BU11x2 G
2	1	BU2	RJ45 Farnell_9251898
3	1	BU5	BU4x1
4	1	CN1	elpro MLW20G
5	1	CN2	RJ45 Farnell_9251898
6	12	C1,C3,C4,C5,C6,C8,C9,C10,C11,C13,C14,C15	22p 0603
7	15	C2,C7,C12,C16,C17,C18,C21,C23,C25,C26,C27,C28,C30,C32,C33	220n_0603 (100n_0603)
8	3	C19,C20,C22	47u/6V stehend
9	1	C24	220n 0603
10	2	C31,C29	10u/6V Keramik 0805
11	1	D1	TSS4001 0603
12	3	JP1,JP2,JP3	ST2x1
13	2	LD1,LD2	LED rt/gn 3mm
14	1	L1	10uH 0805
15	3	P1,P2,P3	Microchip MCP42050
16	1	Q1	Murata CST-CE8M00_8MHz
17	8	R1,R4,R7,R10,R17,R20,R29,R31	82k 0603
18	8	R2,R5,R8,R11,R18,R21,R24,R25	470 0603
19	6	R3,R6,R9,R12,R19,R22	47k 0603
20	2	R13,R15	20k 0603
21	3	R14,R16,R23	10k 0603
22	1	R26	270 0603
23	2	R30,R32	120 0603
24	1	R52	820 0603
25	1	R62	18k 0603
26	1	ST1	ST4x1
27	1	SW1	BTN
28	1	SW2	BTN
29	3	U1,U2,U3	AD8608-ARZ
30	1	U5	ATxmega192A3_AU-LQFP64
31	1	U6	TLP181GB
32	1	U7	MC33269-3.3T3G
33	1	U8	AD8542-ARZ
34	1	U9	LTC2851-S8


ION_v10
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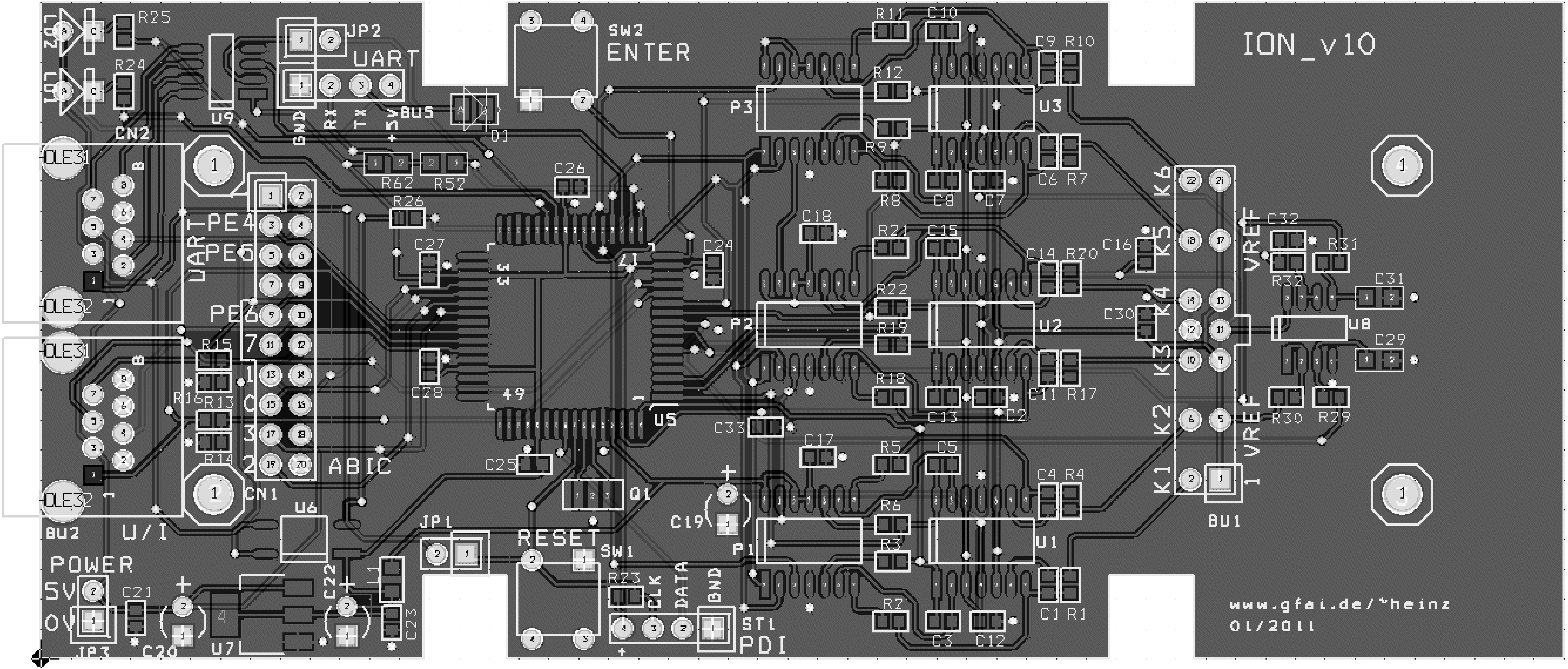
01/2011
UART
ENTER
RESET
PDI
POWER
ABIC
U/I
VREF
PE4
PE5
PE6
SW2
SW1
JP1
JP2
JP3
CN1
CN2
BU1
BU2
P1
P2
P3
ST1
Q1
U1
U2
U3
U5
U6
U7
U8
U9
D1
K1
K2
K3
K4
K5
K6
CLK
DATA
GND
RX
TX
5V
0V


ION_v10
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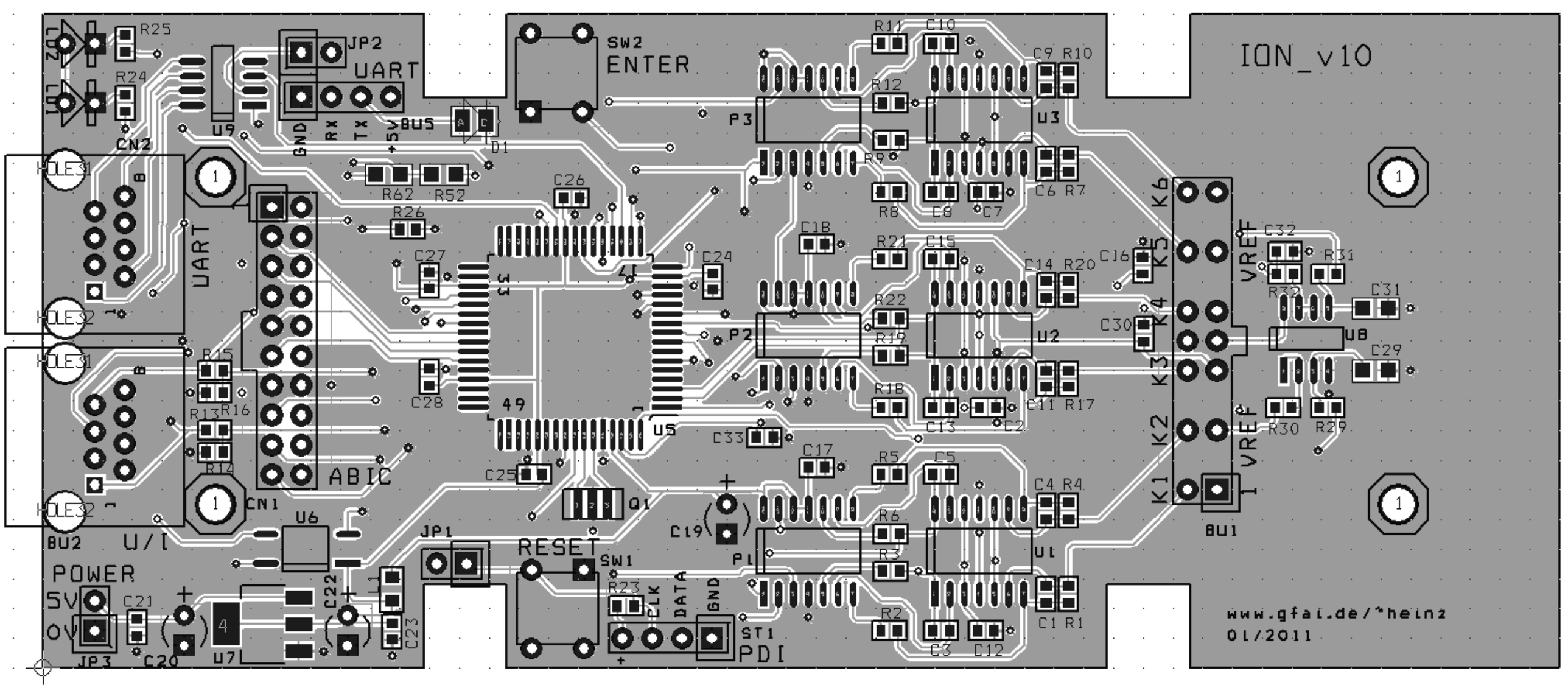
01/2011
UART
SW2
ENTER
RESET
SW1
POWER
5V
0V
JP1
JP2
JP3
GND
RX
TX
5VBUS
PDI
CLK
DATA
GND
ST1
ABIC
U/I
CN1
CN2
BU1
BU2
VREF
K1
K2
K3
K4
K5
K6
P1
P2
P3
U1
U2
U3
U5
U6
U7
U8
U9
Q1
D1


ION_v10
SW2
ENTER
JP2
UART
GND
RX
TX
+5V
>BUS
D1
CN2
U9
UART
ABIC
CN1
U6
U/I
BU2
POWER
5V
0V
JP3
U7
JP1
RESET
SW1
Q1
U5
P1
P2
P3
U1
U2
U3
U8
BU1
VREF
K1
K2
K3
K4
K5
K6
CLK
DATA
GND
ST1
PDI
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AVR PDI-Adapter