H1 H2 H3 H4
Mounting Hole_Pad Mounting Hole_Pad Mounting Hole_Pad Mounting Hole_Pad
GNDD

+5V
J7
AltPowerInput
GNDD

+3.3V
C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C32
4.7uF DC6 DC17 DC30 DC39 DC52 DC62 DC72 DC8 DC108 DC121 DC151 DC141 DC95 DC33
GNDD

+3.3VA
GNDA

+3.3V   +3.3VA

LED4
LED3
LED2
LED1
D1 D2 D3 D4
LED LED LED LED
R55 R56 R57 R58
CL   CL   CL   CL
GNDD

NRST
C1
0.1uF
GNDD

R30
10k
BOOT0 138
PWR_FLAG
GNDD
VCAP1
VCAP2
PWR_FLAG
C47 C48
2.2uF 2.2uF
GNDD
VREF+

C49
4.3pF
C50
4.5pF
Y1
NX3225GD
Don't intend to need this crystal circuit
GNDD

25 NRST
143 PDR_ON
BOOT0
71 VCAP1
106 VCAP2
32 VREF+
23 PH0
24 PH1

6 17 30 39 52 62 72 84 108 121 131 144 95 33
VBAT VDD VDD VDD VDD VDD VDD VDD VDD VDD VDD VDD VDD33_USB VDDA

PA0   34 Sen12
PA1   35 Sen11
PA2   36 Sen10
PA3   37 Sen9
PA4   40 Sen8
PA5   41 Sen7
PA6   42 Sen6
PA7   43 Sen5
PA8   100 TP25 TestPoint_Small
PA9   101 TP26 TestPoint_Small
PA10 102 TP27 TestPoint_Small
PA11 103 USB_OTG_FS_D-
PA12 104 USB_OTG_FS_D+
PA13 105 JTMS
PA14 109 JTCK
PA15 110 JTDI

PB0   46 Sen2
PB1   47 Sen1
PB2   48
PB3   133 JTDO
PB4   134 JNTRST
PB5   135
PB6   136
PB7   137
PB8   139
PB9   140
PB10 69
PB11 70
PB12 73
PB13 74
PB14 75 USART1_TX
PB15 76 USART1_RX

PC0   26 Sen14
PC1   27 Sen13
PC2_C 28
PC3_C 29
PC4   44 Sen4
PC5   45 Sen3
PC6   96
PC7   97 USART6_RX
PC8   98 USART6_TX
PC9   99 TP28 TestPoint_Small
PC10 111 LED4
PC11 112
PC12 113 LED3
PC13 7
PC14 8
PC15 9

PD0   114
PD1   115
PD2   116
PD3   117
PD4   118
PD5   119
PD6   122
PD7   123
PD8   77
PD9   78
PD10 79
PD11 80
PD12 81
PD13 82
PD14 85
PD15 86

56 PG0
57 PG1
87 PG2
88 PG3
89 PG4
90 PG5
91 PG6
92 PG7
93 PG8
124 PG9
125 PG10
126 PG11
127 PG12
128 PG13
129 PG14
132 PG15

10 PF0
11 PF1
12 PF2
13 PF3 Sen22
14 PF4 Sen21
15 PF5 Sen20
18 PF6 Sen19
19 PF7 Sen18
20 PF8 Sen17
21 PF9 Sen16
22 PF10 Sen15
49 PF11
50 PF12
53 PF13
54 PF14
55 PF15

TP23 TestPoint_Small
TP24 TestPoint_Small

141 PE0 LED2
142 PE1 LED1
1   PE2
2   PE3
3   PE4
4   PE5
5   PE6
58 PE7
59 PE8
60 PE9
63 PE10
64 PE11
65 PE12
66 PE13
67 PE14
68 PE15

VSS VSS VSS VSS VSS VSS VSS VSS VSS VSSA
16 38 51 61 83 94 107 120 130 31
U0
STM32H743ZIT6
GNDD   GNDA

Sheet: Analog Input
Sen1D Sen1
Sen2D Sen2
Sen3D Sen3
Sen4D Sen4
Sen5D Sen5
Sen6D Sen6
Sen7D Sen7
Sen8D Sen8
Sen9D Sen9
Sen10D Sen10
Sen11D Sen11
Sen12D Sen12
Sen13D Sen13
Sen14D Sen14
Sen15D Sen15
Sen16D Sen16
Sen17D Sen17
Sen18D Sen18
Sen19D Sen19
Sen20D Sen20
Sen21D Sen21
Sen22D Sen22
File: Analog Input.sch

Sheet: RS485
USART6_RX UART_RX
USART6_TX UART_TX
File: RS485.sch

J3
USART1
1 USART1_RX
2 USART1_TX
3
GNDD

J4
USART6
1 USART6_RX
2 USART6_TX
3
GNDD

We don't take 3.3V from the programming header,
because that won't feed VDDA, which violates data
sheet. We must be fed via 12V.

J2
ST-LINK/V2
JNTRST 1 2
JTDI   3 4
JTMS   5 6
JTCK   7 8
       9 10
JTDO   11 12
       13 14
NRST   15 16
       17 18
       19 20
GNDD

+5V
J8
USBPowerJumper
J5
UE27AC5410H
VBUS
D+
D-
Shield GND
GNDD

USB_D+
USB_D-
U9
USBLC6-2SC6
USB_OTG_FS_D+
USB_OTG_FS_D-
GNDD

Vref will be 2.048V, leaving much headroom between it at VDDA at 3.3V.
The resistors need to be chosen to keep (VDDA - R*maxcurrent) >> Vcesat (0.3V).
R*maxcurrent should also be slightly less than Vref, which has to be chosen from
available voltage reference parts.

+5V
U10
MCP1501-20E/SN
1 VDD   FEEDBACK 8
2 GND   OUT   7
3 /SHDN   GND   6
4 GND   GND   5
C51
2.2uF
GNDA
VREF+
R31
50
C52
2.2uF

Monolithic switching regulator 12V->5V
So the linears don't have to drop 8.7V

+5V
U13
3.3V Reg
1 IN   OUT 3
   GND
   2
C55
DC
C53
10uF ELA-GA1V100
+3.3V
C56
DC
C54
22uF ECE-A1HKA220
GNDD

JP0
PWR_FLAG
SolderJumper_2_Bridged
GNDD GNDA

Represents single connection between GNDD and GNDA
near the 5V regulator. Could be cut and choke inserted.

Reference STMicroelectronics Application Note AN4938
for details on basic STMH74x circuits

Sheet: /
File: ADC Board.sch
Title: ADC Board
Size: A3   Date: Rev: A0
KiCad E.D.A. kicad (5.1.7)-1   Id: 1/3

C60
DC

UART_RX

UART_TX

+3.3V

U14
ISL83490

1 VCC
2 RO
3 DI
4 GND

8 A
7 B
6 Z
5 Y

GNDD

R61
120

A
B
Z
Y

+5V

Note that ethernet cables don't flip pins.
Main board MUST connect different pins to the receptacle.

PWR_FLAG
PWR_FLAG
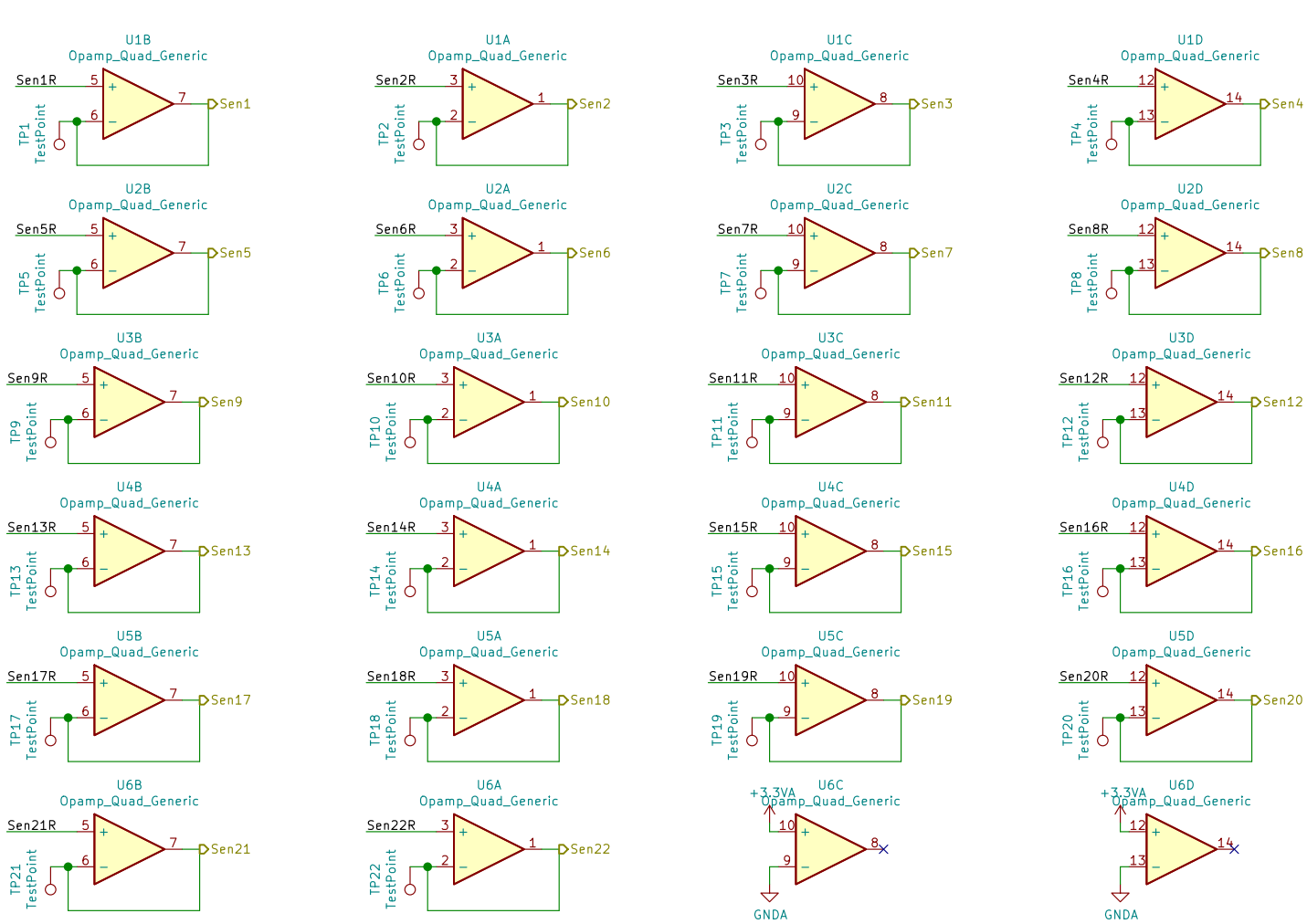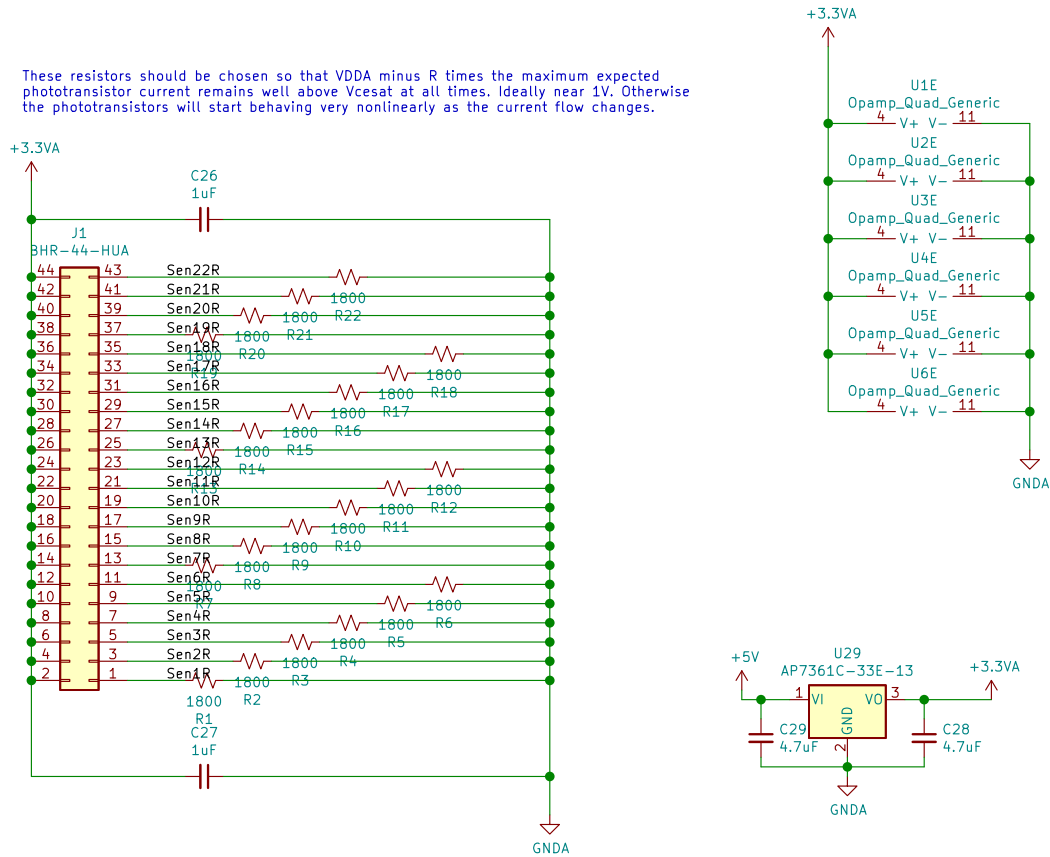
GNDD

8
7
6
5
4
3
2
1

J6
54601-908WPLF

Op amps taking the "raw" voltage off the sense resistors, and buffering it for the ADCs. Also protects the ADC inputs. Op amp output voltage is limited to VDDA, and they're cheap/easy to replace if damaged.

These resistors should be chosen so that VDDA minus R times the maximum expected phototransistor current remains well above Vcesat at all times. Ideally near 1V. Otherwise the phototransistors will start behaving very nonlinearly as the current flow changes.