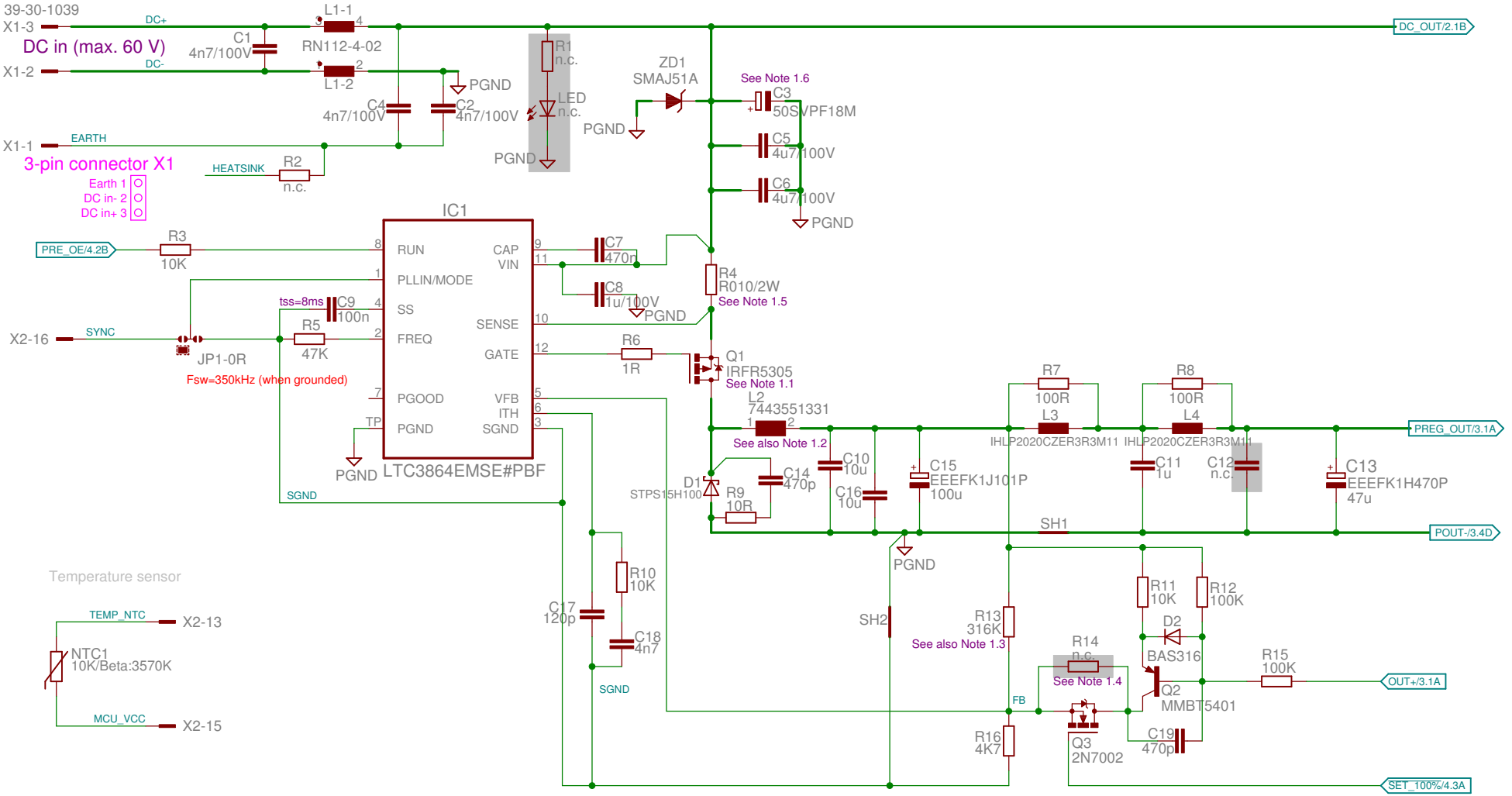


Note 1.1: Possible alternative AUIRFR5305, SUD19P06-60, SPD30P06P or other with similar or lower input capacitance
Note 1.2: WE 7447709330, WE 7443551331, Coilcraft MSS1210-333, Coilcraft XAL1510-333, Vishay IHLP4040DZER470M11, etc.
Note 1.3: Use 240K for 30 VAC main transformer
Note 1.4: Install 0R only if 100% Duty cycle feature for Low Ripple mode is not needed
Note 1.5: Use R020 for 0-3.12 A or R015 for 0-4.16 A range
Note 1.6: Replace ZD1 and C3, C5, C6 if Vin is above 50 V



SMPS power pre-regulator with 100% duty cycle

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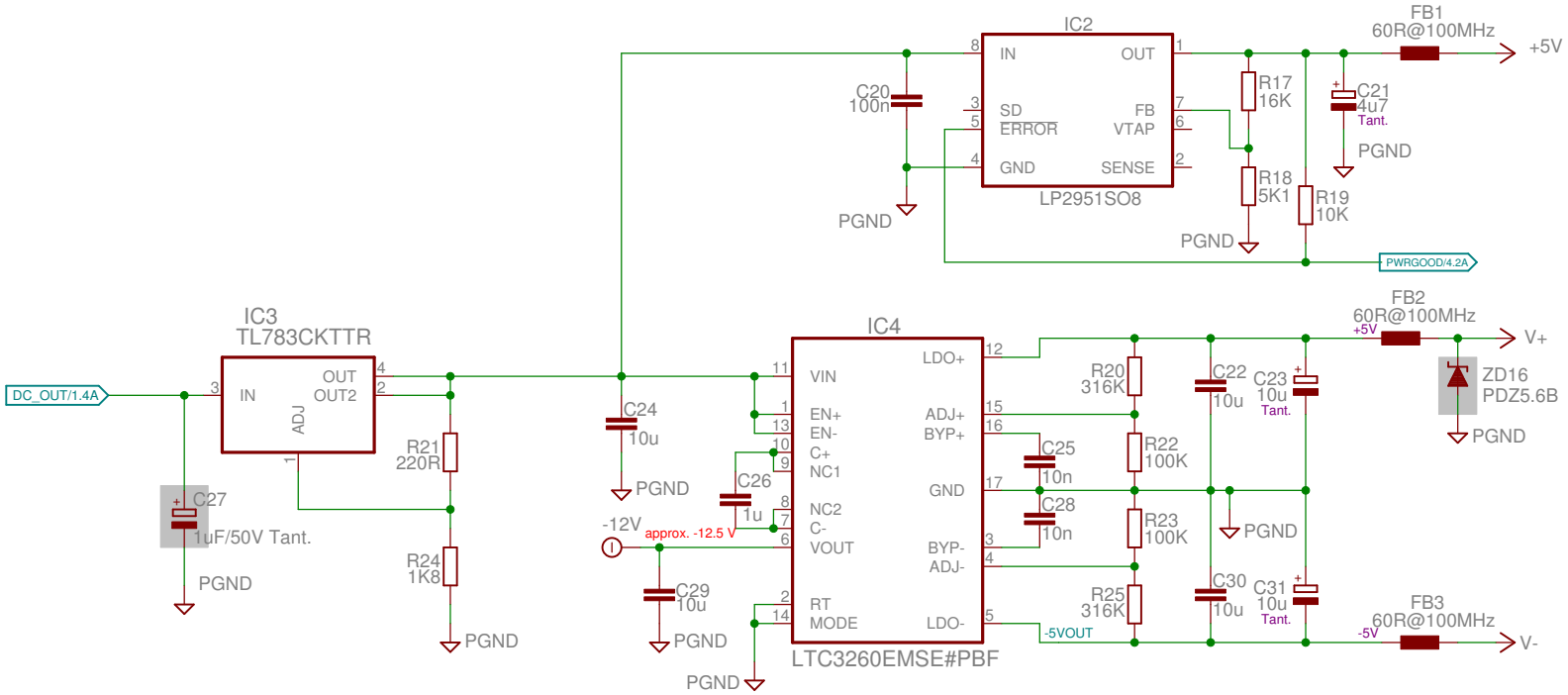
Sheet: 1/12




Bias power supply (+/-5V, +5V, -12V)
Powergood signal

TITLE: EEZ PSU consolidated r5B13

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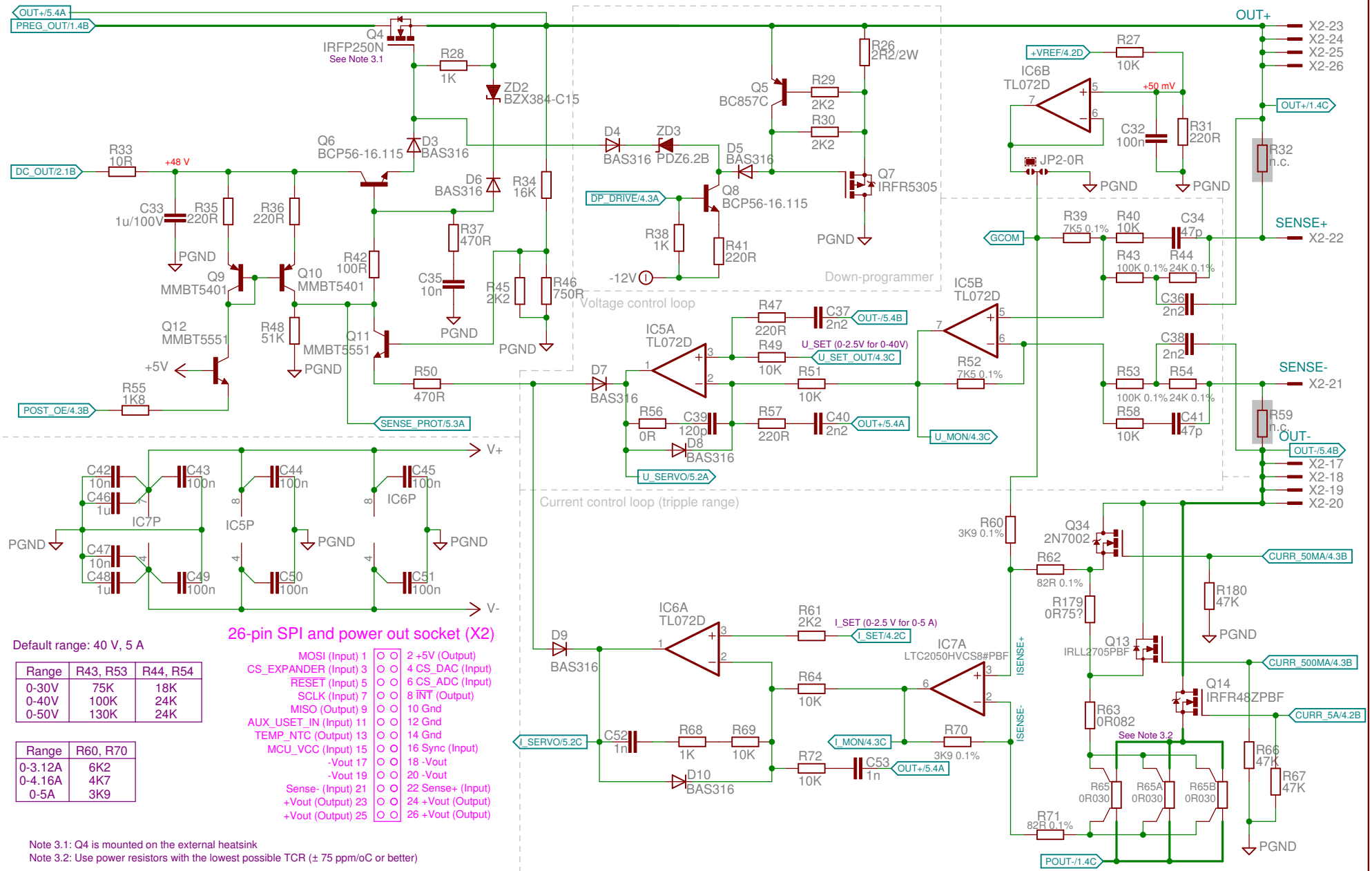



Default range: 40 V, 5 A

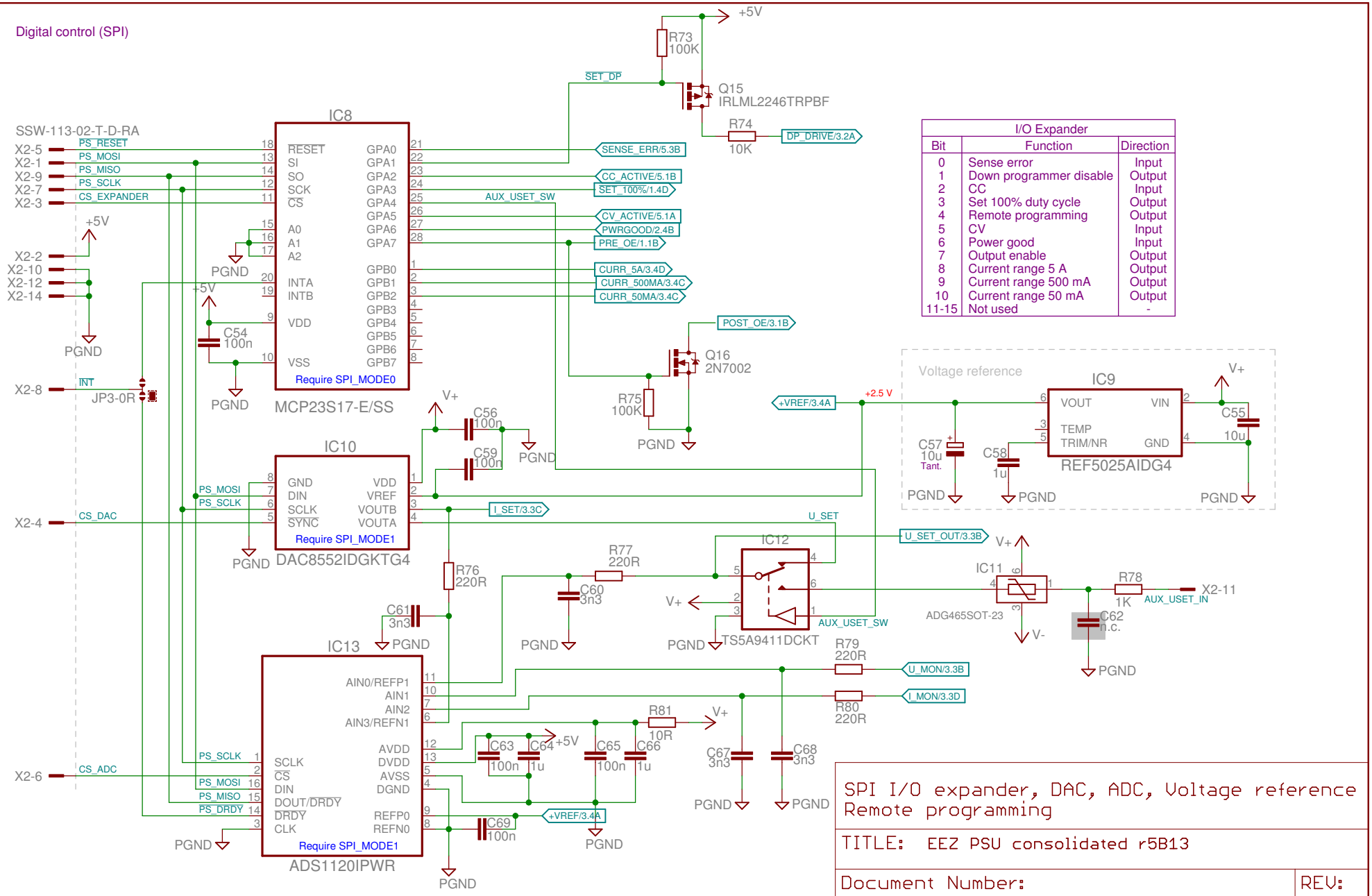
| Range | R43, R53 | R44, R54 |
|---|---|---|
| 0-30V | 75K | 18K |
| 0-40V | 100K | 24K |
| 0-50V | 130K | 24K |

| Range | R60, R70 |
|---|---|
| 0-3.12A | 6K2 |
| 0-4.16A | 4K7 |
| 0-5A | 3K9 |

Note 3.1: Q4 is mounted on the external heatsink
Note 3.2: Use power resistors with the lowest possible TCR (± 75 ppm/oC or better)



CV/CC linear post-regulator, Output enable and "down-programmer"
EEZ PSU consolidated r5B13 - Sheet: 3/12


Digital control (SPI)
SSW-113-02-T-D-RA
X2-5
X2-1
X2-9
X2-7
X2-3
PS_RESET
PS_MOSI
PS_MISO
PS_SCLK
CS_EXPANDER
IC8
MCP23S17-E/SS
Require SPI_MODE0
RESET
SI
SO
SCK
CS
A0
A1
A2
INTA
INTB
VDD
VSS
GPA0
GPA1
GPA2
GPA3
GPA4
GPA5
GPA6
GPA7
GPB0
GPB1
GPB2
GPB3
GPB4
GPB5
GPB6
GPB7
+5V
PGND
C54
100n
X2-2
X2-10
X2-12
X2-14
X2-8
INT
JP3-0R
R73
100K
Q15
IRLML2246TRPBF
R74
10K
SET_DP
DP_DRIVE/3.2A
SENSE_ERR/5.3B
CC_ACTIVE/5.1B
SET_100%/1.4D
AUX_USET_SW
CV_ACTIVE/5.1A
PWRGOOD/2.4B
PRE_OE/1.1B
CURR_5A/3.4D
CURR_500MA/3.4C
CURR_50MA/3.4C
POST_OE/3.1B
Q16
2N7002
R75
100K
I/O Expander
Bit
Function
Direction
0 Sense error Input
1 Down programmer disable Output
2 CC Input
3 Set 100% duty cycle Output
4 Remote programming Output
5 CV Input
6 Power good Input
7 Output enable Output
8 Current range 5 A Output
9 Current range 500 mA Output
10 Current range 50 mA Output
11-15 Not used -
Voltage reference
IC9
REF5025AIDG4
VOUT
VIN
TEMP
TRIM/NR
GND
V+
C55
10u
C57
10u
Tant.
C58
1u
+VREF/3.4A
+2.5 V
IC10
DAC8552IDGKTG4
GND
DIN
SCLK
SYNC
VDD
VREF
VOUTB
VOUTA
C56
100n
C59
100n
I_SET/3.3C
U_SET
U_SET_OUT/3.3B
X2-4
CS_DAC
R76
220R
R77
220R
C60
3n3
C61
3n3
IC12
TS5A9411DCKT
AUX_USET_SW
IC11
ADG465SOT-23
V-
R78
1K
AUX_USET_IN
X2-11
C62
n.c.
R79
220R
R80
220R
U_MON/3.3B
I_MON/3.3D
IC13
ADS1120IPWR
Require SPI_MODE1
AIN0/REFP1
AIN1
AIN2
AIN3/REFN1
AVDD
DVDD
AVSS
DGND
REFP0
REFN0
SCLK
CS
DIN
DOUT/DRDY
DRDY
CLK
X2-6
CS_ADC
PS_DRDY
R81
10R
C63
100n
C64
1u
C65
100n
C66
1u
C67
3n3
C68
3n3
C69
100n
+VREF/3.4A
SPI I/O expander, DAC, ADC, Voltage reference
Remote programming
TITLE: EEZ PSU consolidated r5B13
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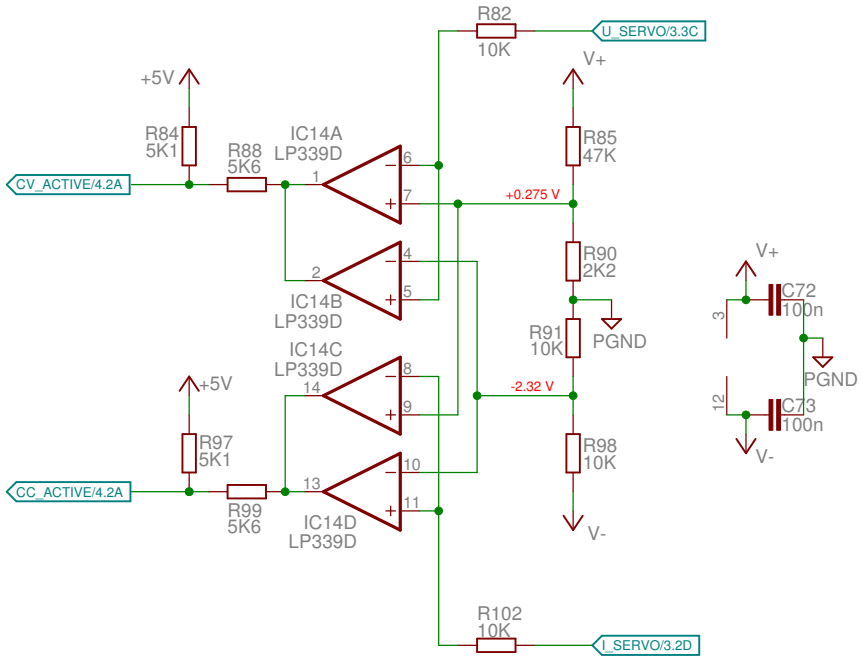
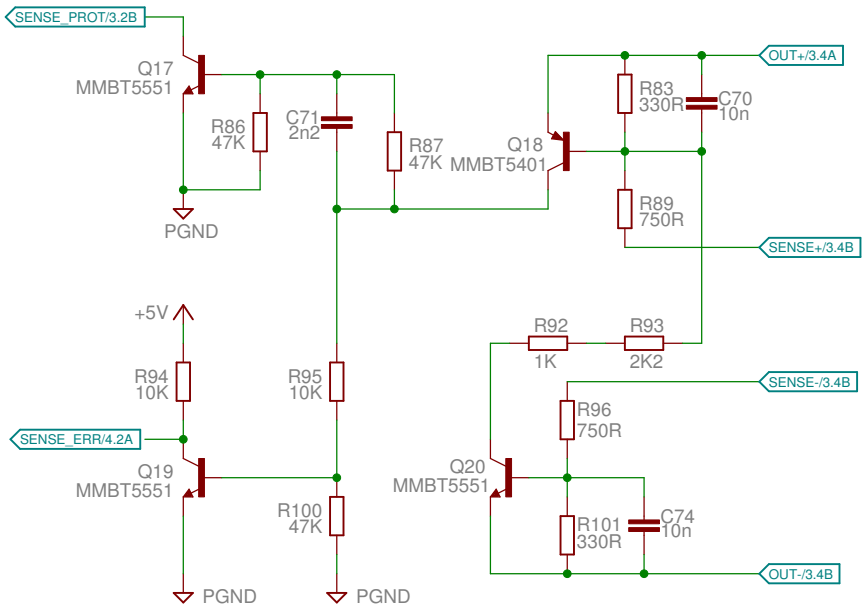
Repository: https://github.com/eez-open

Constant Voltage (CV) and Constant Current (CC) mode indicator

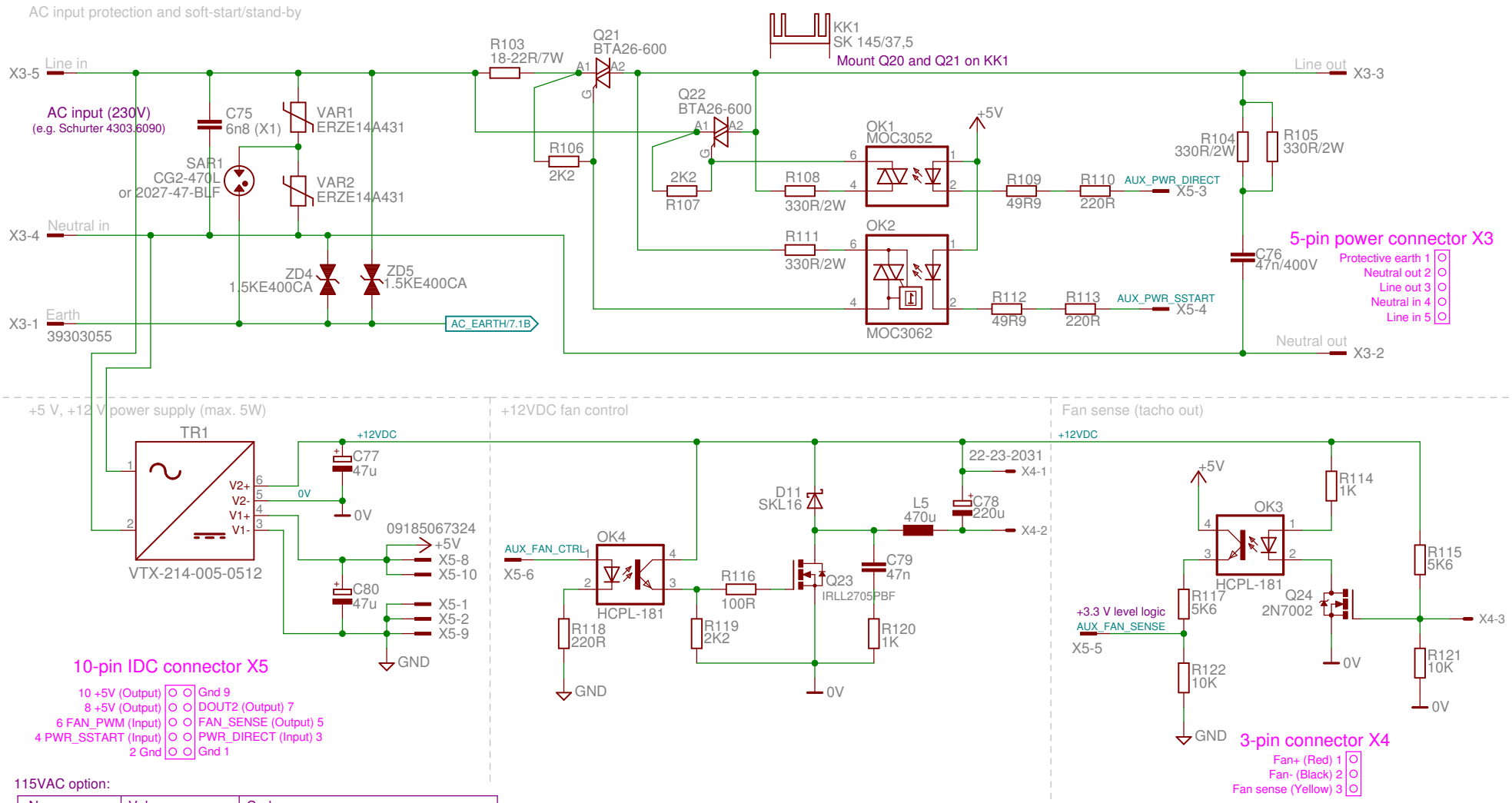



Remote sense reverse polarity detection






| | |
|---|---|
| CC/CV indicators, Sense error detection | |
| TITLE: EEZ PSU consolidated r5B13 | |
| Document Number: | REV: |
| Date: 24. 09. 2017. 13:49 | Sheet: 5/12 |




115VAC option:

| Name | Value | Code |
|---|---|---|
| SAR1 | 2027-23-BLF | Farnell: 1780455, TME: CG2-230L |
| TR2 | VPP24-210 | Digikey: 237-1085-ND<br>Mouser: 553-VPP24-210<br>Newark: 93F8764 |
| | or AC/DC module<br>Myrra 47202 | Farnell: 2469211 |
| VAR1, VAR2 | S20K140 | Farnell: 1004387, TME: SIOV-S20K140 |
| ZD1, ZD2 | 1.5KE200CA | Farnell: 1837117, TME: 1.5KE200CA |



AC input protection, in-rush current limiter
+5V/+12V 5W power supply, fan control

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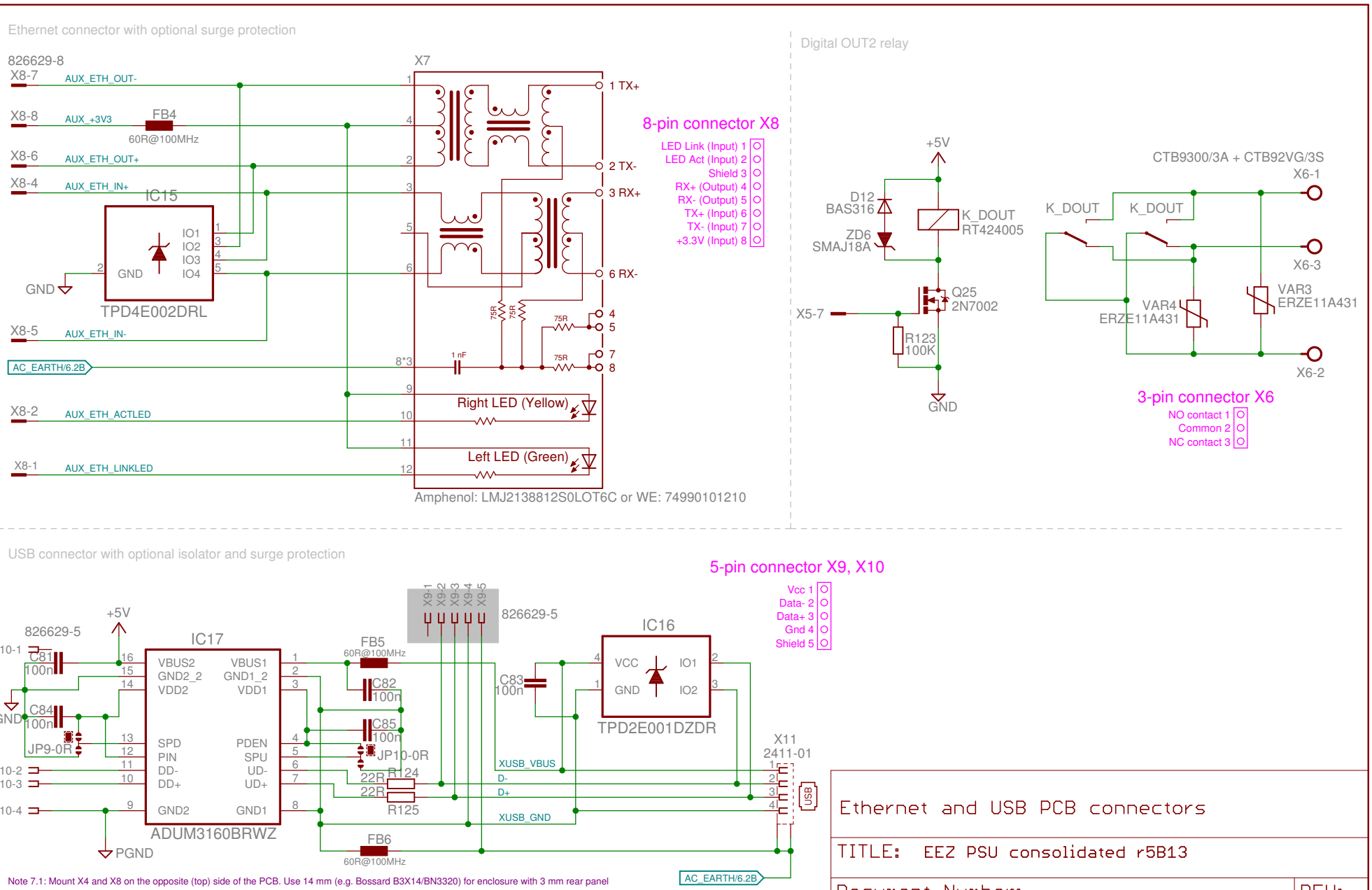

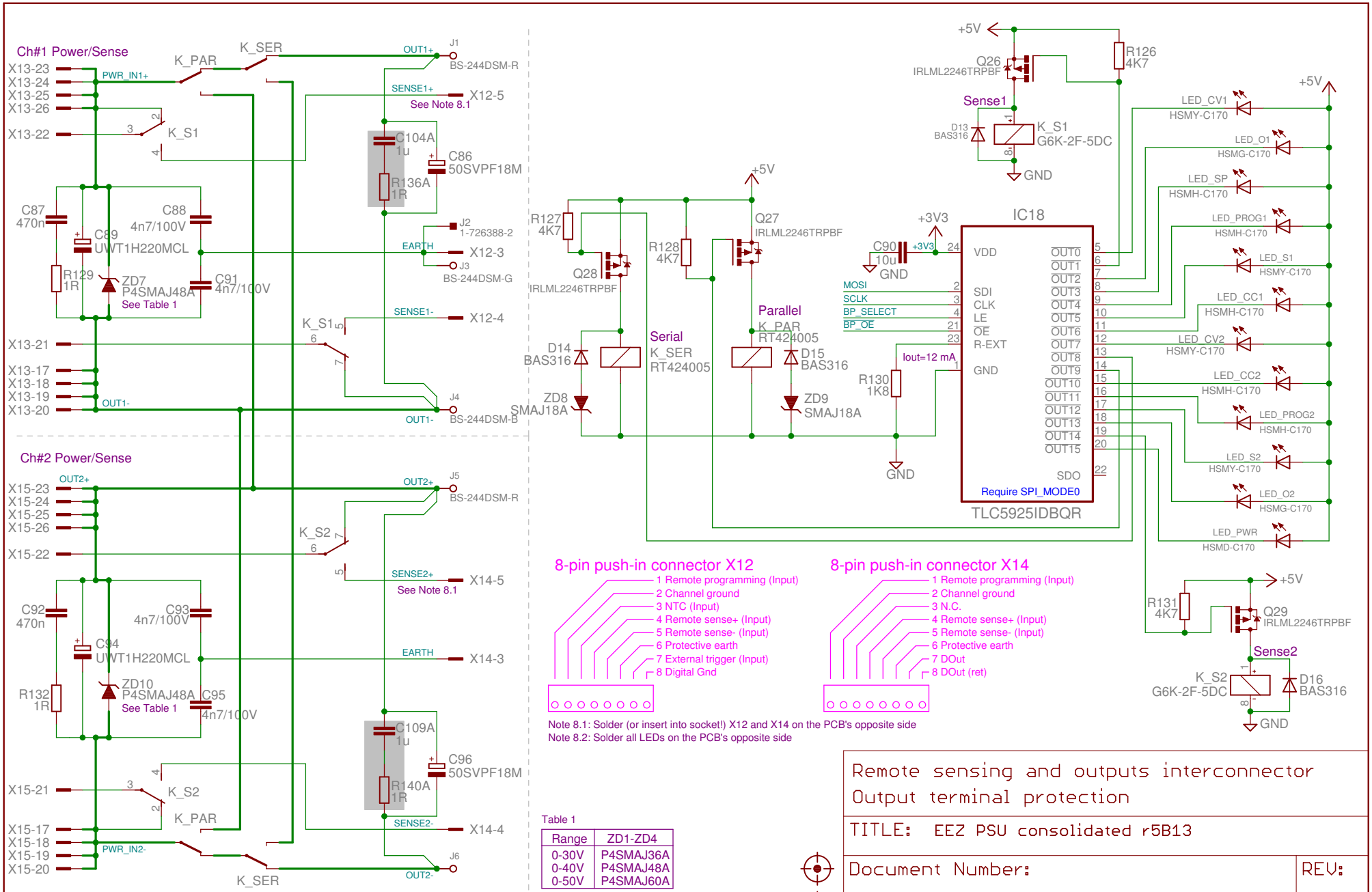
Ch#1 Power/Sense
X13-23
X13-24
X13-25
X13-26
X13-22
X13-21
X13-17
X13-18
X13-19
X13-20
PWR_IN1+
OUT1-
K_PAR
K_SER
K_S1
C87 470n
C88 4n7/100V
C89 UWT1H220MCL
R129 1R
ZD7 P4SMAJ48A
See Table 1
C91 4n7/100V
OUT1+
J1 BS-244DSM-R
SENSE1+
X12-5
See Note 8.1
C104A 1u
R136A 1R
C86 50SVPF18M
J2 1-726388-2
EARTH
X12-3
J3 BS-244DSM-G
SENSE1-
X12-4
J4 BS-244DSM-B
Ch#2 Power/Sense
X15-23
X15-24
X15-25
X15-26
X15-22
X15-21
X15-17
X15-18
X15-19
X15-20
OUT2+
PWR_IN2-
K_S2
K_PAR
K_SER
C92 470n
C93 4n7/100V
C94 UWT1H220MCL
R132 1R
ZD10 P4SMAJ48A
See Table 1
C95 4n7/100V
OUT2+
J5 BS-244DSM-R
SENSE2+
X14-5
See Note 8.1
EARTH
X14-3
C109A 1u
R140A 1R
C96 50SVPF18M
SENSE2-
X14-4
J6
OUT2-
+5V
R127 4K7
Q28 IRLML2246TRPBF
R128 4K7
Q27 IRLML2246TRPBF
Serial
K_SER RT424005
D14 BAS316
ZD8 SMAJ18A
Parallel
K_PAR RT424005
D15 BAS316
ZD9 SMAJ18A
GND
Q26 IRLML2246TRPBF
R126 4K7
Sense1
D13 BAS316
K_S1 G6K-2F-5DC
+3V3
C90 10u
IC18
VDD
SDI
CLK
LE
OE
R-EXT
GND
MOSI
SCLK
BP_SELECT
BP_OE
Iout=12 mA
R130 1K8
OUT0
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
OUT8
OUT9
OUT10
OUT11
OUT12
OUT13
OUT14
OUT15
SDO
Require SPI_MODE0
TLC5925IDBQR
LED_CV1 HSMY-C170
LED_O1 HSMG-C170
LED_SP HSMH-C170
LED_PROG1 HSMH-C170
LED_S1 HSMY-C170
LED_CC1 HSMH-C170
LED_CV2 HSMY-C170
LED_CC2 HSMH-C170
LED_PROG2 HSMH-C170
LED_S2 HSMY-C170
LED_O2 HSMG-C170
LED_PWR HSMD-C170
R131 4K7
Q29 IRLML2246TRPBF
Sense2
K_S2 G6K-2F-5DC
D16 BAS316
8-pin push-in connector X12
1 Remote programming (Input)
2 Channel ground
3 NTC (Input)
4 Remote sense+ (Input)
5 Remote sense- (Input)
6 Protective earth
7 External trigger (Input)
8 Digital Gnd
8-pin push-in connector X14
1 Remote programming (Input)
2 Channel ground
3 N.C.
4 Remote sense+ (Input)
5 Remote sense- (Input)
6 Protective earth
7 DOut
8 DOut (ret)
Note 8.1: Solder (or insert into socket!) X12 and X14 on the PCB's opposite side
Note 8.2: Solder all LEDs on the PCB's opposite side
Table 1
Range | ZD1-ZD4
0-30V | P4SMAJ36A
0-40V | P4SMAJ48A
0-50V | P4SMAJ60A
Remote sensing and outputs interconnector
Output terminal protection
TITLE: EEZ PSU consolidated r5B13
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Sheet: 8/12
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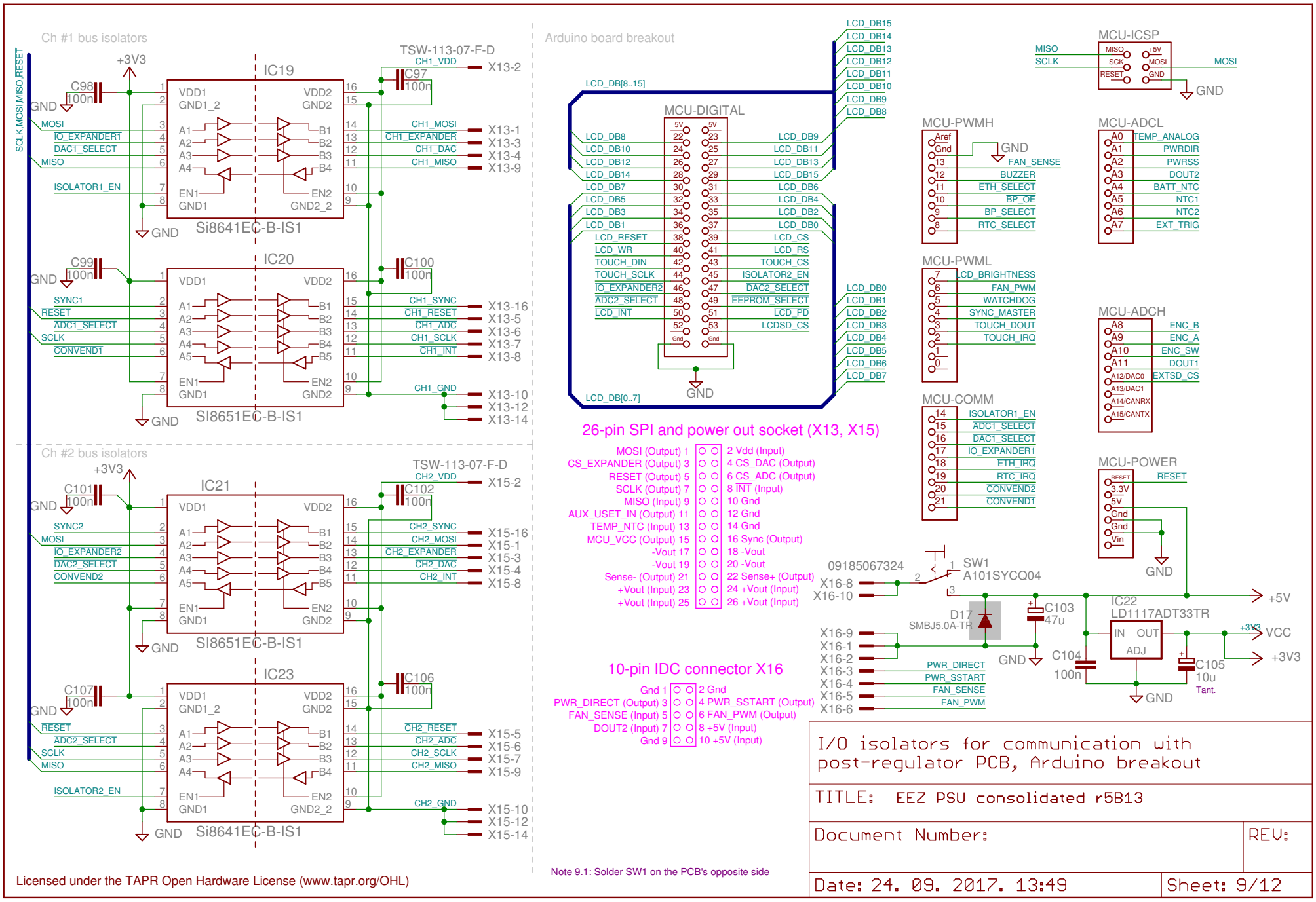
Ch #1 bus isolators
Ch #2 bus isolators
Arduino board breakout
SCLK,MOSI,MISO,RESET
+3V3
GND
IC19
IC20
IC21
IC23
Si8641EC-B-IS1
Si8651EC-B-IS1
TSW-113-07-F-D
MOSI
MISO
SCLK
SYNC1
RESET
CONVEND1
SYNC2
CONVEND2
ISOLATOR1_EN
ISOLATOR2_EN
IO_EXPANDER1
IO_EXPANDER2
DAC1_SELECT
DAC2_SELECT
ADC1_SELECT
ADC2_SELECT
CH1_MOSI
CH1_MISO
CH1_SYNC
CH1_RESET
CH1_ADC
CH1_SCLK
CH1_INT
CH1_GND
CH2_MOSI
CH2_MISO
CH2_SYNC
CH2_RESET
CH2_ADC
CH2_SCLK
CH2_INT
CH2_GND
MCU-DIGITAL
LCD_DB[8..15]
LCD_DB[0..7]
MCU-ICSP
MCU-PWMH
MCU-PWML
MCU-COMM
MCU-ADCL
MCU-ADCH
MCU-POWER
26-pin SPI and power out socket (X13, X15)
10-pin IDC connector X16
09185067324
SW1
A101SYCQ04
D17
SMBJ5.0A-TR
IC22
LD1117ADT33TR
+5V
VCC
+3V3
I/O isolators for communication with post-regulator PCB, Arduino breakout
TITLE: EEZ PSU consolidated r5B13
Document Number:
REV:
Date: 24. 09. 2017. 13:49
Sheet: 9/12
Note 9.1: Solder SW1 on the PCB's opposite side
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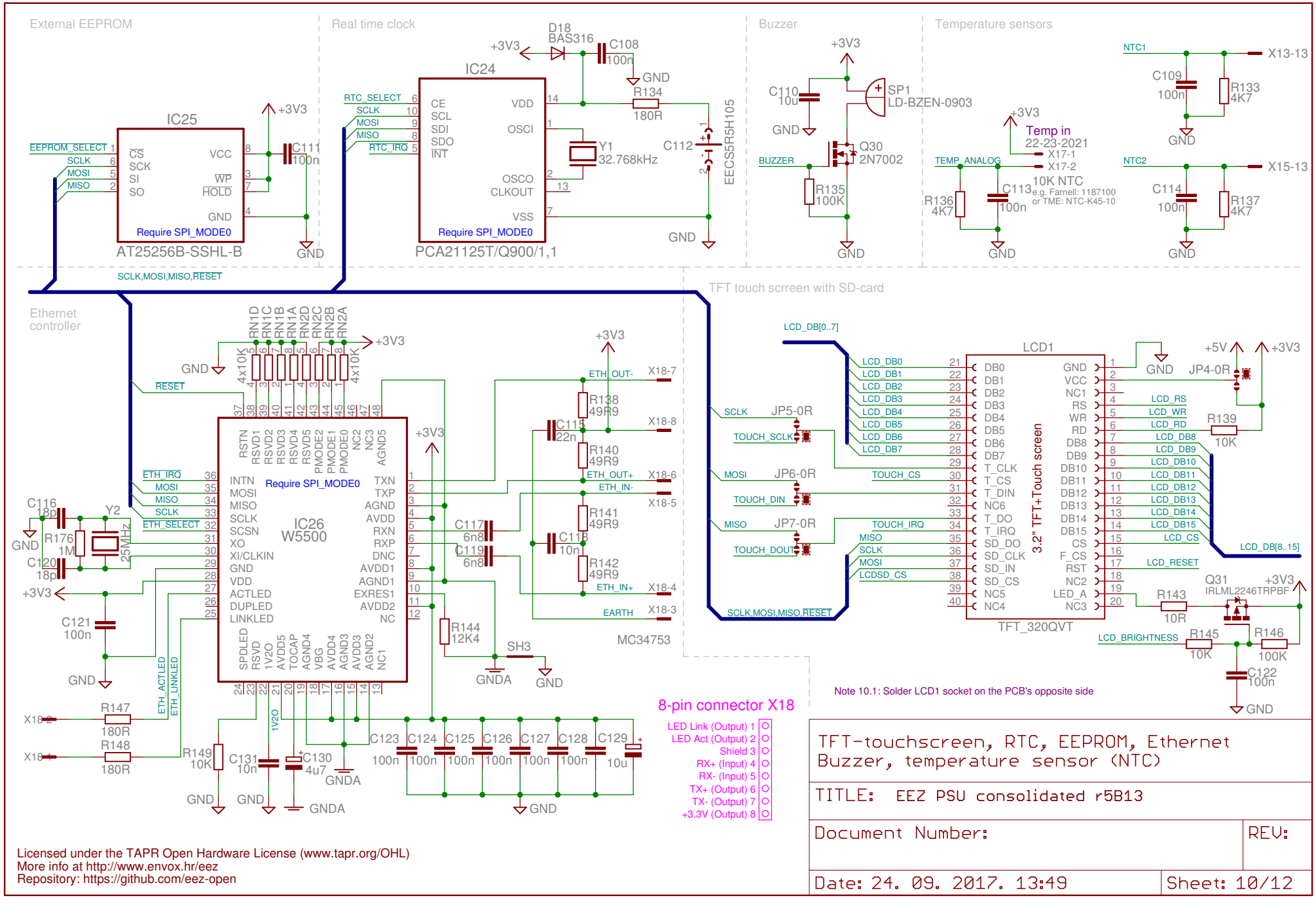
External EEPROM
IC25
AT25256B-SSHL-B
Require SPI_MODE0
Real time clock
IC24
PCA21125T/Q900/1,1
Buzzer
Temperature sensors
Temp in
22-23-2021
10K NTC
e.g. Farnell: 1187100
or TME: NTC-K45-10
SCLK,MOSI,MISO,RESET
Ethernet controller
IC26
W5500
MC34753
TFT touch scrreen with SD-card
LCD1
TFT_320QVT
3.2" TFT+Touch screen
8-pin connector X18
LED Link (Output) 1
LED Act (Output) 2
Shield 3
RX+ (Input) 4
RX- (Input) 5
TX+ (Output) 6
TX- (Output) 7
+3.3V (Output) 8
Note 10.1: Solder LCD1 socket on the PCB's opposite side
TFT-touchscreen, RTC, EEPROM, Ethernet
Buzzer, temperature sensor (NTC)
TITLE: EEZ PSU consolidated r5B13
Document Number:
REV:
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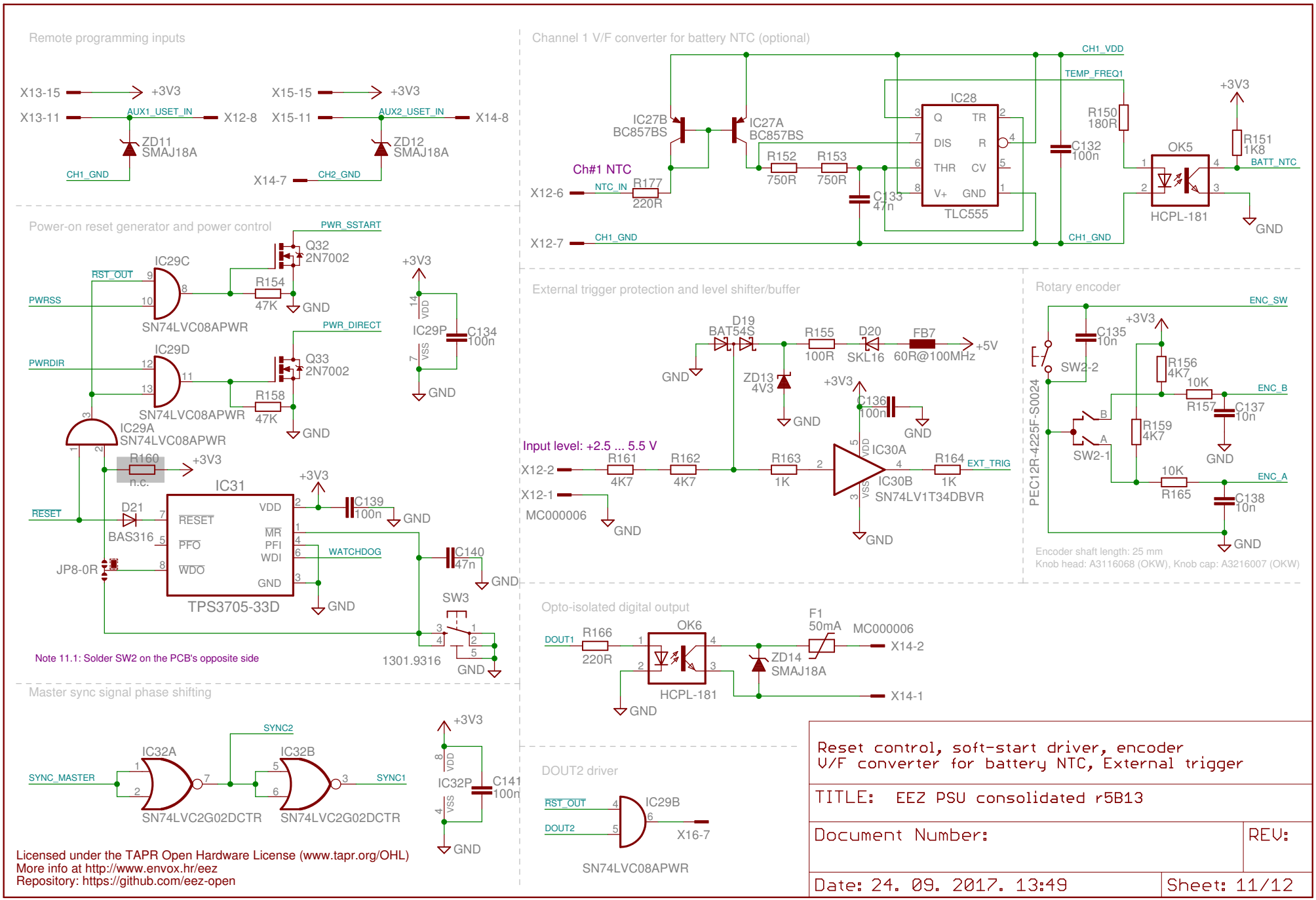
Remote programming inputs
X13-15
+3V3
X13-11
AUX1_USET_IN
X12-8
ZD11
SMAJ18A
CH1_GND
X15-15
+3V3
X15-11
AUX2_USET_IN
X14-8
ZD12
SMAJ18A
X14-7
CH2_GND
Channel 1 V/F converter for battery NTC (optional)
CH1_VDD
TEMP_FREQ1
IC27B
BC857BS
IC27A
BC857BS
IC28
Q
TR
DIS
R
THR
CV
V+
GND
TLC555
R150
180R
C132
100n
OK5
HCPL-181
R151
1K8
BATT_NTC
+3V3
GND
Ch#1 NTC
X12-6
NTC_IN
R177
220R
R152
750R
R153
750R
C133
47n
X12-7
CH1_GND
CH1_GND
Power-on reset generator and power control
PWR_SSTART
Q32
2N7002
IC29C
RST_OUT
PWRSS
SN74LVC08APWR
R154
47K
GND
PWR_DIRECT
IC29D
PWRDIR
Q33
2N7002
SN74LVC08APWR
R158
47K
GND
IC29A
SN74LVC08APWR
R160
n.c.
+3V3
IC31
RESET
VDD
MR
PFI
WDI
PFO
WDO
GND
TPS3705-33D
D21
BAS316
JP8-0R
C139
100n
GND
WATCHDOG
C140
47n
GND
SW3
1301.9316
GND
Note 11.1: Solder SW2 on the PCB's opposite side
+3V3
IC29P
C134
100n
GND
External trigger protection and level shifter/buffer
D19
BAT54S
R155
100R
D20
SKL16
FB7
60R@100MHz
+5V
GND
ZD13
4V3
GND
+3V3
C136
100n
GND
Input level: +2.5 ... 5.5 V
X12-2
R161
4K7
R162
4K7
R163
1K
IC30A
IC30B
SN74LV1T34DBVR
R164
1K
EXT_TRIG
X12-1
MC000006
GND
GND
Rotary encoder
ENC_SW
+3V3
C135
10n
SW2-2
PEC12R-4225F-S0024
R156
4K7
10K
R157
ENC_B
C137
10n
GND
B
A
SW2-1
R159
4K7
10K
R165
ENC_A
C138
10n
GND
Encoder shaft length: 25 mm
Knob head: A3116068 (OKW), Knob cap: A3216007 (OKW)
Opto-isolated digital output
DOUT1
R166
220R
OK6
HCPL-181
GND
F1
50mA
MC000006
X14-2
ZD14
SMAJ18A
X14-1
Master sync signal phase shifting
SYNC2
IC32A
IC32B
SYNC_MASTER
SN74LVC2G02DCTR
SN74LVC2G02DCTR
SYNC1
+3V3
IC32P
C141
100n
GND
DOUT2 driver
RST_OUT
DOUT2
IC29B
X16-7
SN74LVC08APWR
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More info at http://www.envox.hr/eez
Repository: https://github.com/eez-open
Reset control, soft-start driver, encoder
V/F converter for battery NTC, External trigger
TITLE: EEZ PSU consolidated r5B13
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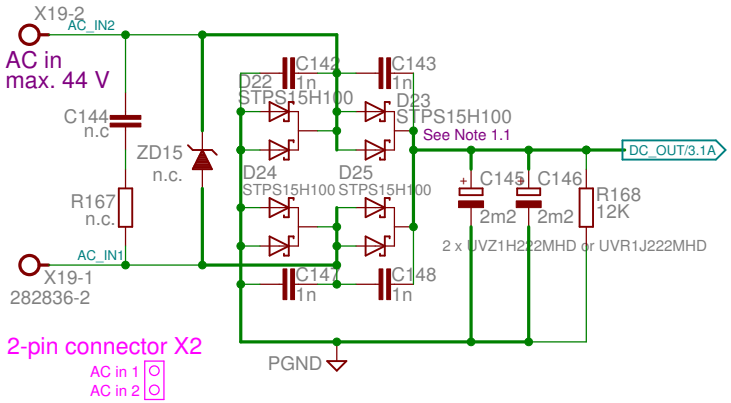
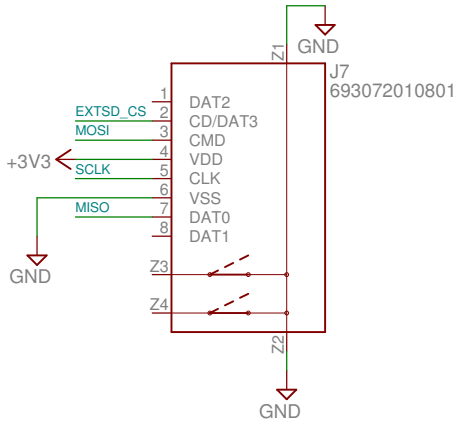
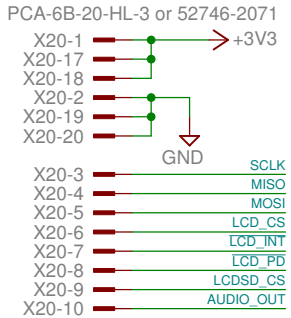
AC input option



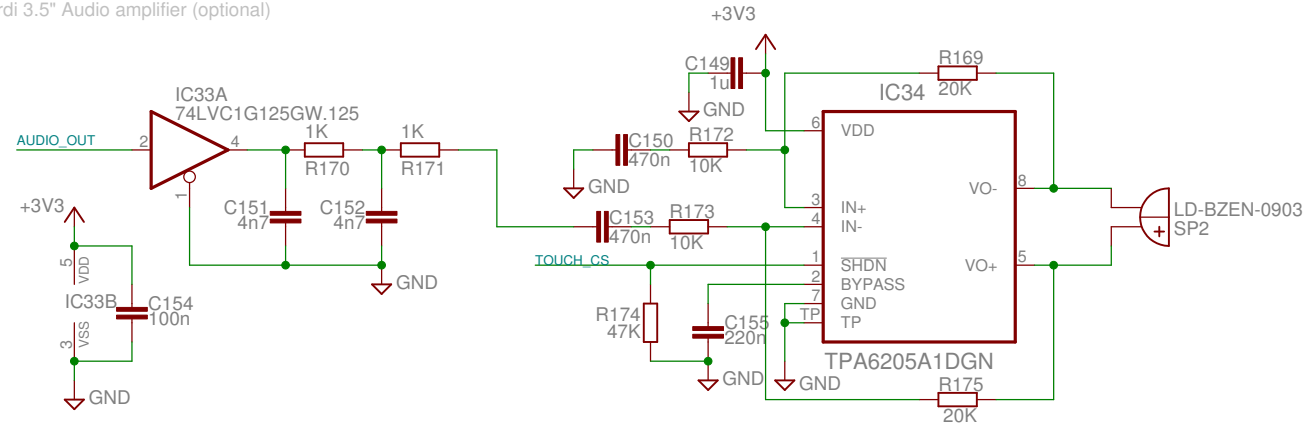

Micro SD card (optional)




Riverdi 3.5" LCD (optional)




Riverdi 3.5" Audio amplifier (optional)




Optional sections: AC input, 20-pin 3.5" TFT display Audio amplifier for 3.5" TFT display, Micro SD card

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