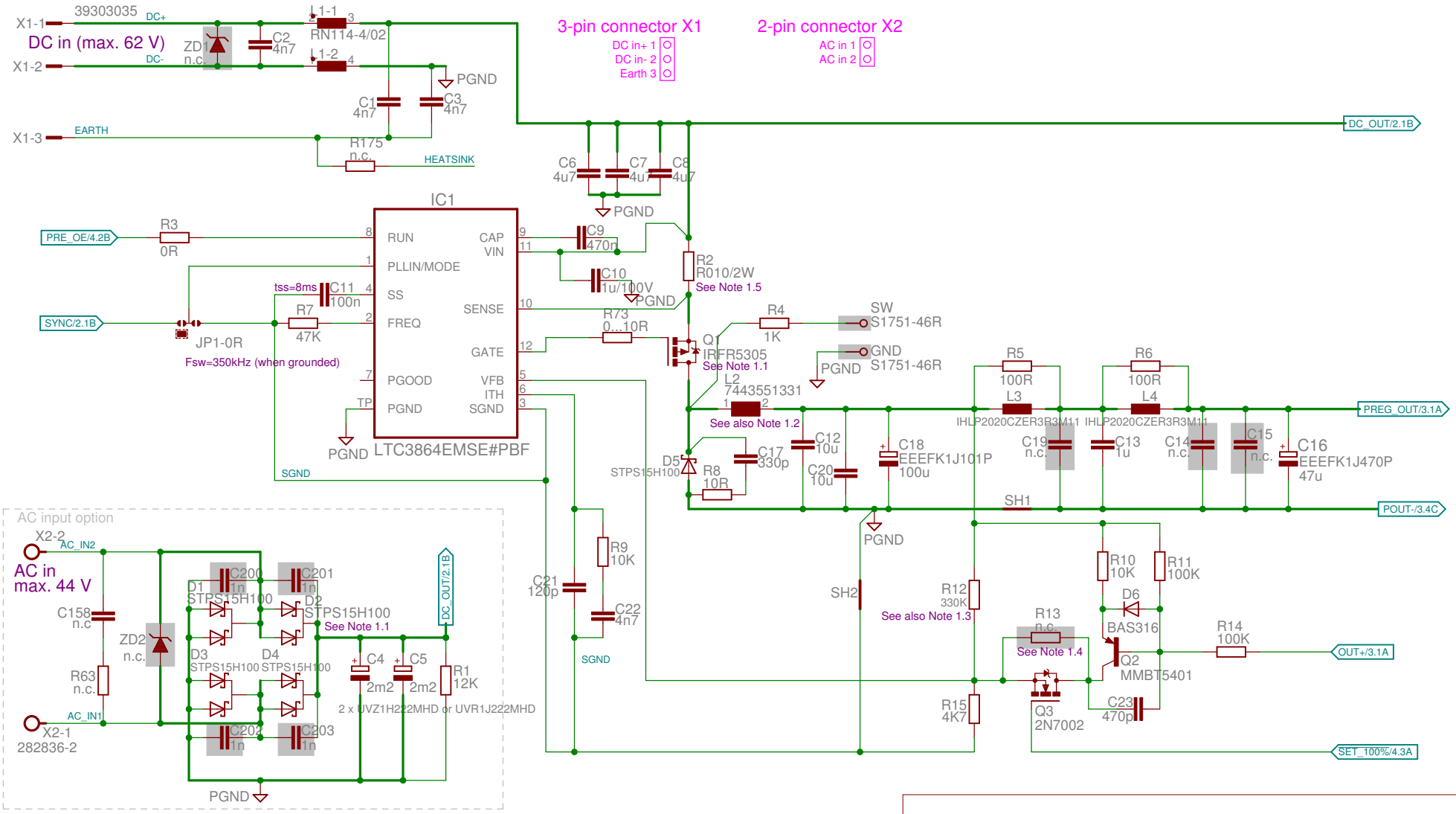

Note 1.1: Possible alternative AUIRFR5305, SUD19P06-60, SPD30P06P or other with similar or lower input capacitance
Note 1.2: WE 7447709330, WE 7443551331, Coilcraft MSS1210-333, Coilcraft XAL1510-333, Vishay IHLP4040DZER470M11, etc.
Note 1.3: Use 240K for 30 VAC main transformer
Note 1.4: Install 0R 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

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SMPS power pre-regulator with 100% duty cycle

TITLE: EEZ PSU consolidated r5B10

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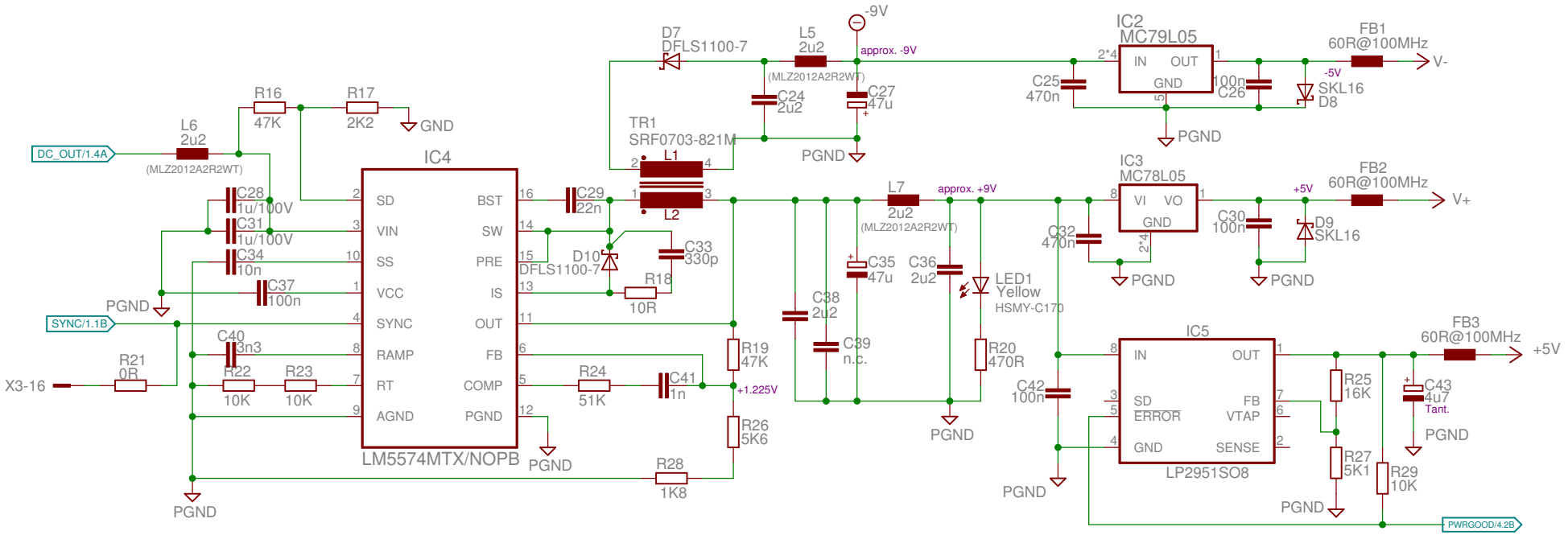

Bias power supply with SMPS pre-regulator

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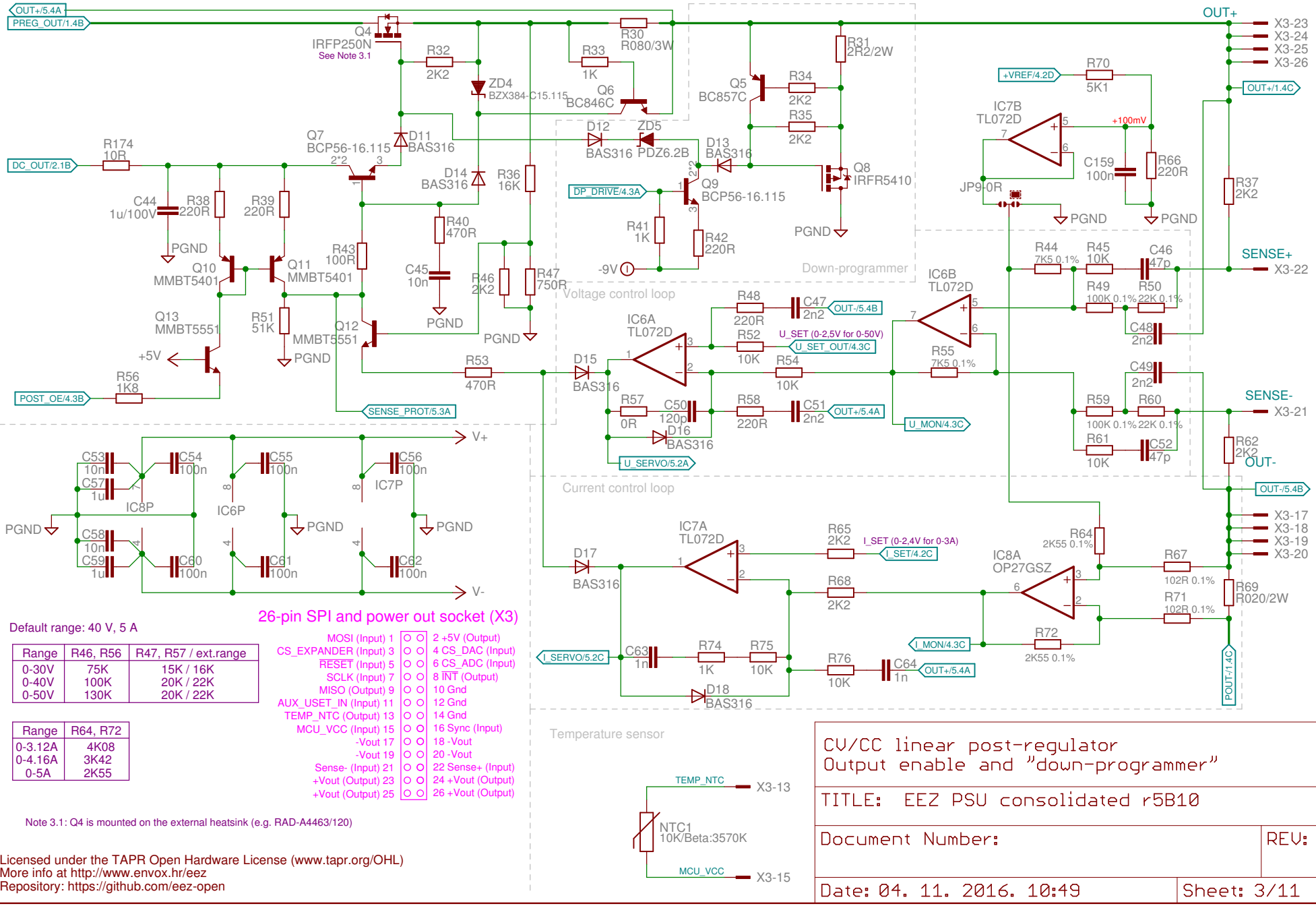
OUT+/5.4A
PREG_OUT/1.4B
Q4
IRFP250N
See Note 3.1
R32
2K2
R33
1K
R30
R080/3W
ZD4
BZX384-C15.115
Q6
BC846C
Q5
BC857C
R34
2K2
R35
2K2
R31
2R2/2W
OUT+
X3-23
X3-24
X3-25
X3-26
+VREF/4.2D
R70
5K1
IC7B
TL072D
+100mV
C159
100n
R66
220R
JP9-0R
PGND
OUT+/1.4C
R37
2K2
SENSE+
X3-22
R174
10R
DC_OUT/2.1B
Q7
BCP56-16.115
2*2
D11
BAS316
D12
BAS316
ZD5
PDZ6.2B
D13
BAS316
Q8
IRFR5410
DP_DRIVE/4.3A
Q9
BCP56-16.115
R41
1K
R42
220R
-9V
Down-programmer
C44
1u/100V
R38
220R
R39
220R
D14
BAS316
R36
16K
R40
470R
C45
10n
R46
2K2
R47
750R
R43
100R
Q10
MMBT5401
Q11
MMBT5401
Q13
MMBT5551
Q12
MMBT5551
R51
51K
+5V
R56
1K8
POST_OE/4.3B
SENSE_PROT/5.3A
R53
470R
Voltage control loop
IC6A
TL072D
R48
220R
C47
2n2
OUT-/5.4B
R52
10K
U_SET (0-2,5V for 0-50V)
U_SET_OUT/4.3C
R54
10K
D15
BAS316
R57
0R
C50
120p
D16
BAS316
R58
220R
C51
2n2
OUT+/5.4A
U_SERVO/5.2A
IC6B
TL072D
R55
7K5 0.1%
U_MON/4.3C
R44
7K5 0.1%
R45
10K
C46
47p
R49
100K 0.1%
R50
22K 0.1%
C48
2n2
C49
2n2
R59
100K 0.1%
R60
22K 0.1%
R61
10K
C52
47p
SENSE-
X3-21
R62
2K2
OUT-
OUT-/5.4B
X3-17
X3-18
X3-19
X3-20
R69
R020/2W
POUT-/1.4C
V+
V-
PGND
C53
10n
C57
1u
C54
100n
IC8P
C55
100n
IC6P
C56
100n
IC7P
C58
10n
C59
1u
C60
100n
C61
100n
C62
100n
Current control loop
IC7A
TL072D
D17
BAS316
R65
2K2
I_SET (0-2,4V for 0-3A)
I_SET/4.2C
R68
2K2
IC8A
OP27GSZ
R64
2K55 0.1%
R67
102R 0.1%
R71
102R 0.1%
R72
2K55 0.1%
I_MON/4.3C
I_SERVO/5.2C
C63
1n
R74
1K
R75
10K
R76
10K
C64
1n
OUT+/5.4A
D18
BAS316
Temperature sensor
TEMP_NTC
X3-13
NTC1
10K/Beta:3570K
MCU_VCC
X3-15
26-pin SPI and power out socket (X3)
MOSI (Input) 1
2 +5V (Output)
CS_EXPANDER (Input) 3
4 CS_DAC (Input)
RESET (Input) 5
6 CS_ADC (Input)
SCLK (Input) 7
8 INT (Output)
MISO (Output) 9
10 Gnd
AUX_USET_IN (Input) 11
12 Gnd
TEMP_NTC (Output) 13
14 Gnd
MCU_VCC (Input) 15
16 Sync (Input)
-Vout 17
18 -Vout
-Vout 19
20 -Vout
Sense- (Input) 21
22 Sense+ (Input)
+Vout (Output) 23
24 +Vout (Output)
+Vout (Output) 25
26 +Vout (Output)
Default range: 40 V, 5 A
Range | R46, R56 | R47, R57 / ext.range
0-30V | 75K | 15K / 16K
0-40V | 100K | 20K / 22K
0-50V | 130K | 20K / 22K
Range | R64, R72
0-3.12A | 4K08
0-4.16A | 3K42
0-5A | 2K55
Note 3.1: Q4 is mounted on the external heatsink (e.g. RAD-A4463/120)
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Repository: https://github.com/eez-open
CV/CC linear post-regulator
Output enable and "down-programmer"
TITLE: EEZ PSU consolidated r5B10
Document Number:
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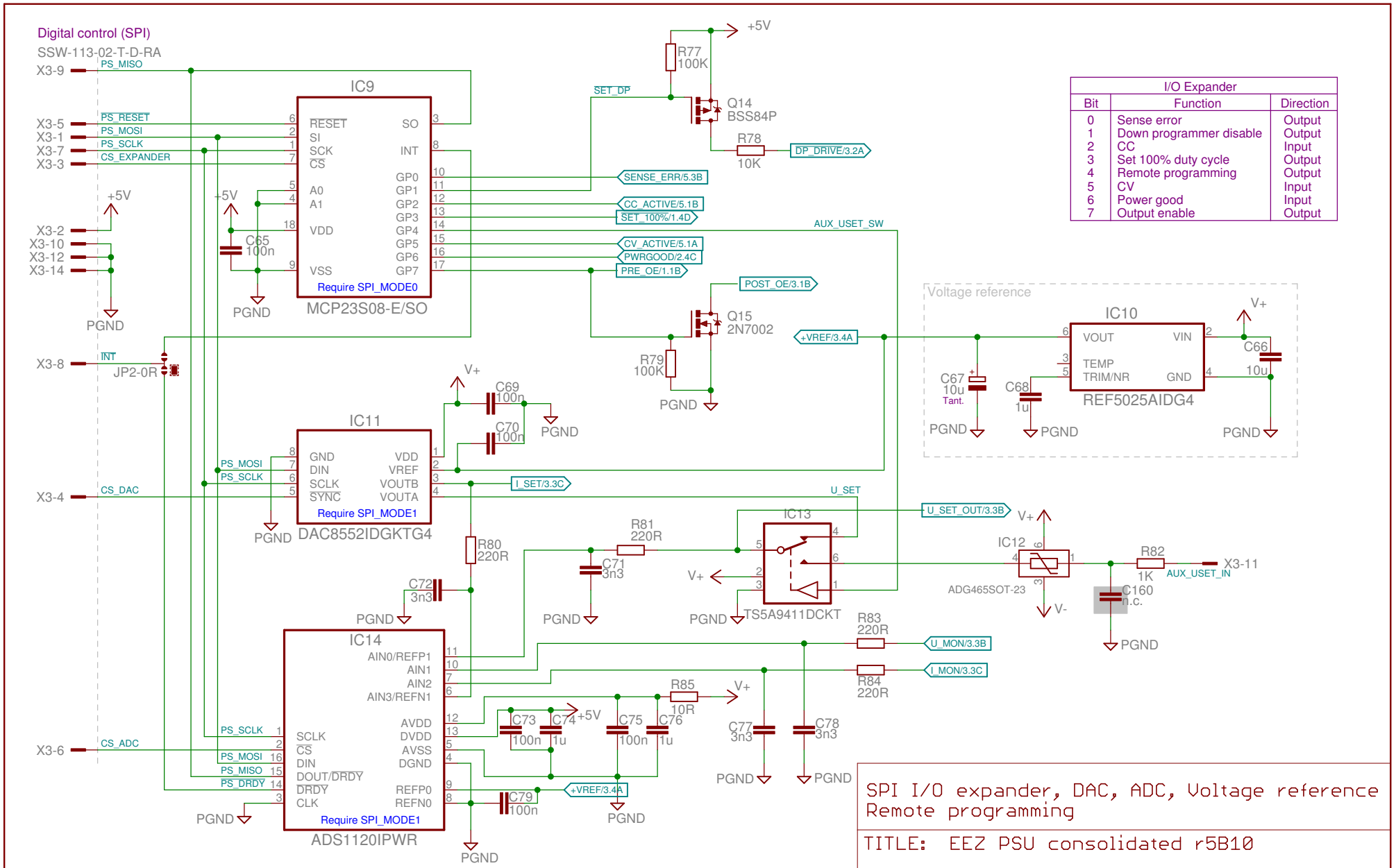

I/O Expander		
Bit	Function	Direction
0	Sense error	Output
1	Down programmer disable	Output
2	CC	Input
3	Set 100% duty cycle	Output
4	Remote programming	Output
5	CV	Input
6	Power good	Input
7	Output enable	Output

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SPI I/O expander, DAC, ADC, Voltage reference
Remote programming

TITLE: EEZ PSU consolidated r5B10

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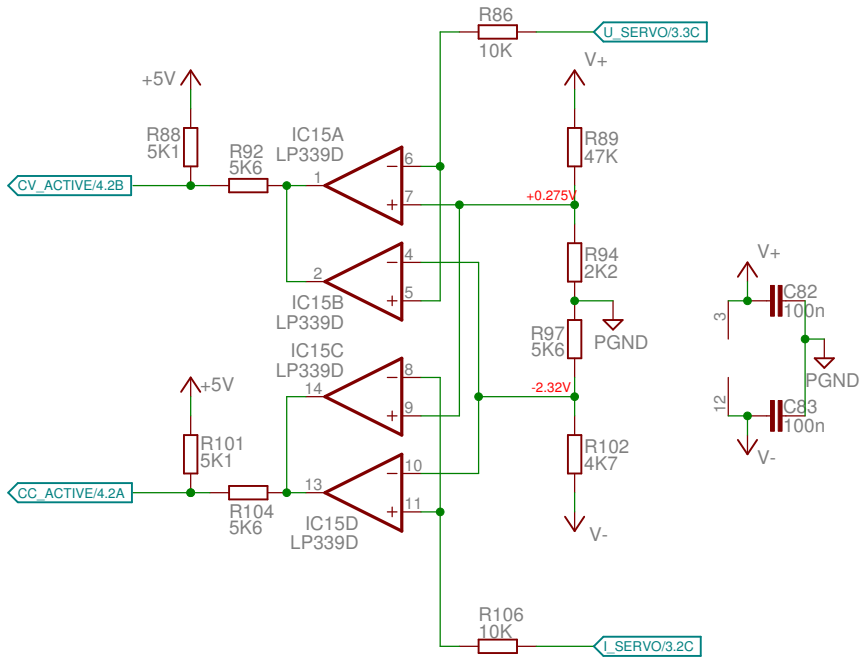
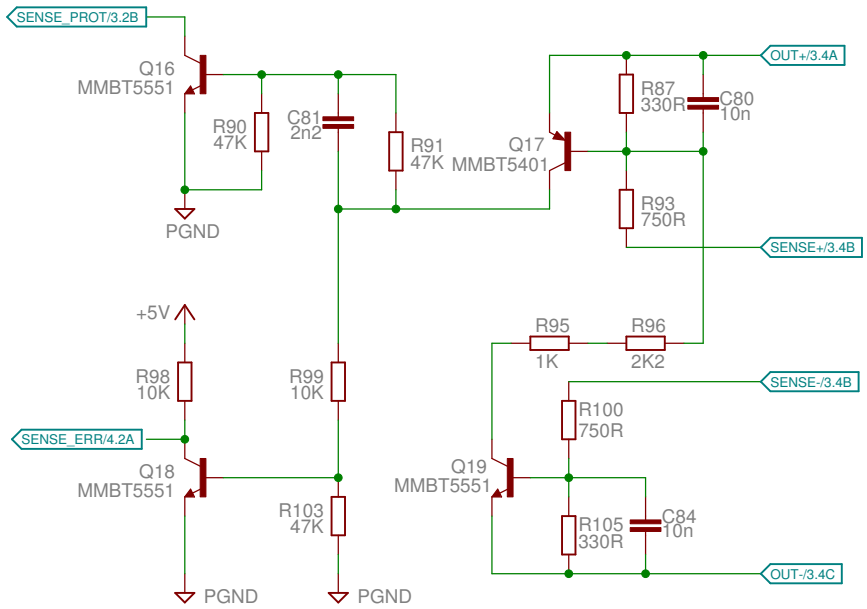
Constant Voltage (CV) and Constant Current (CC) mode indicator



Remote sense reverse polarity detection



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CC/CV indicators, Sense error detection	
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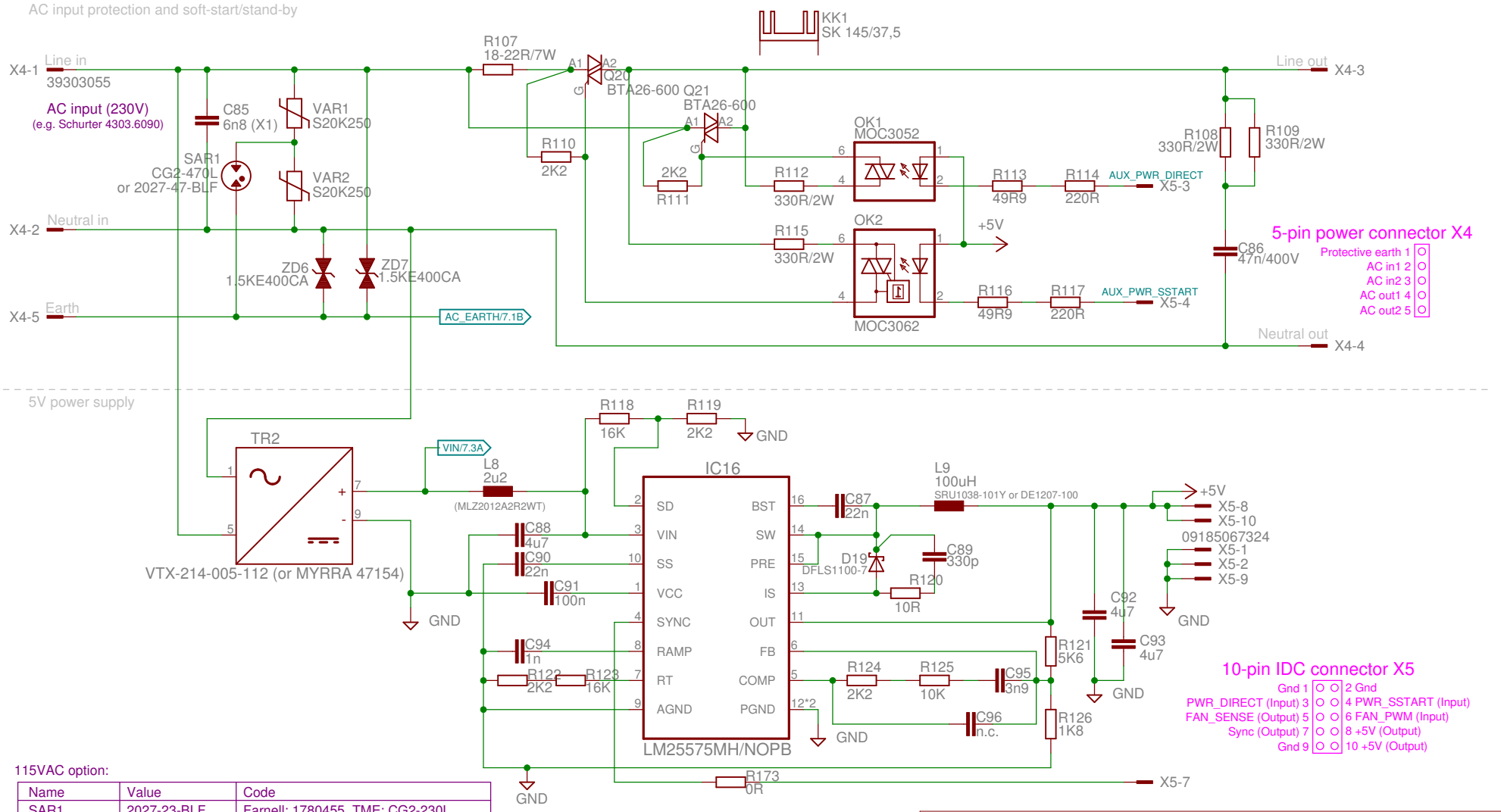

115VAC option:

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

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AC input protection, in-rush current limiter
+5V/1A power supply

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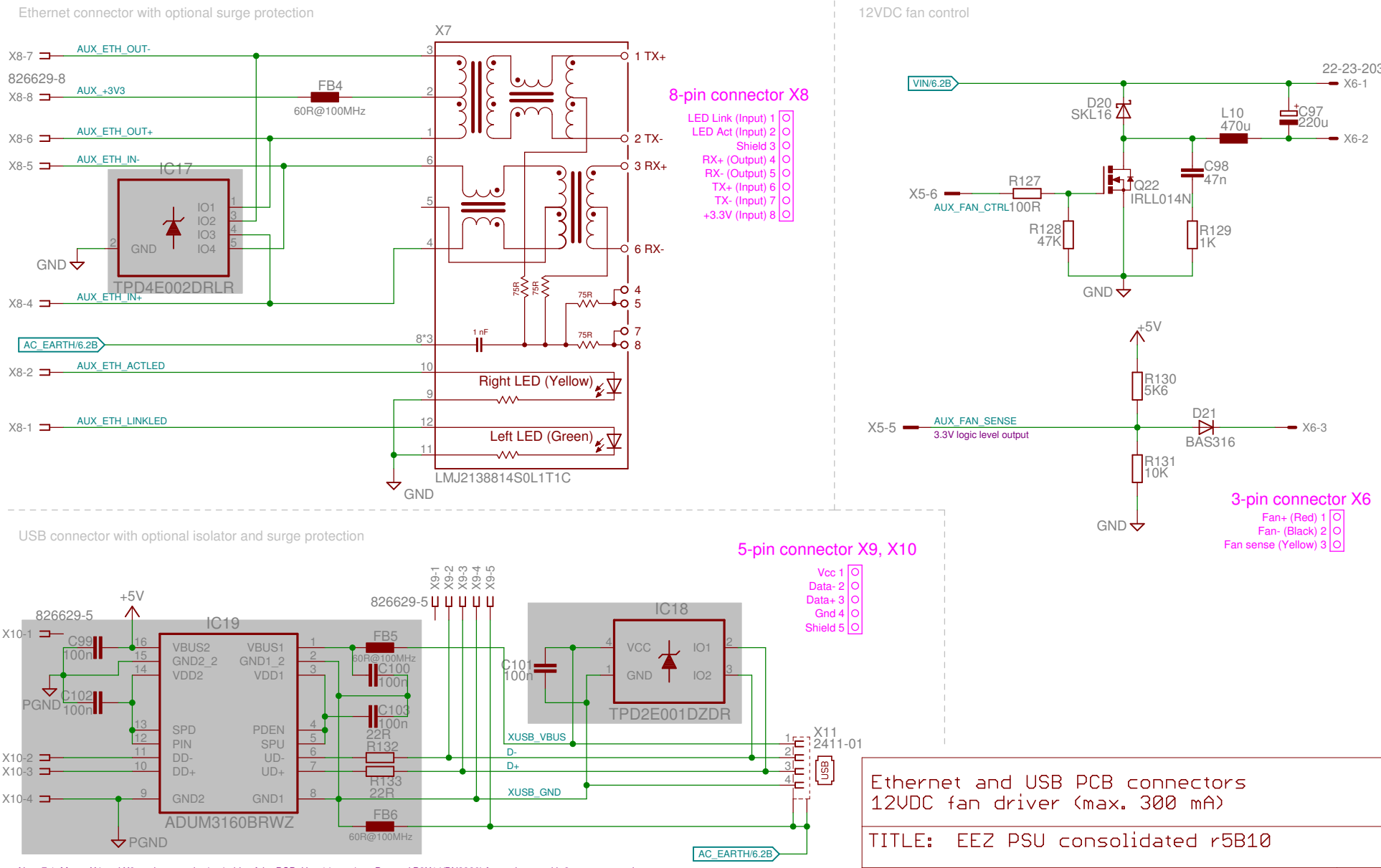

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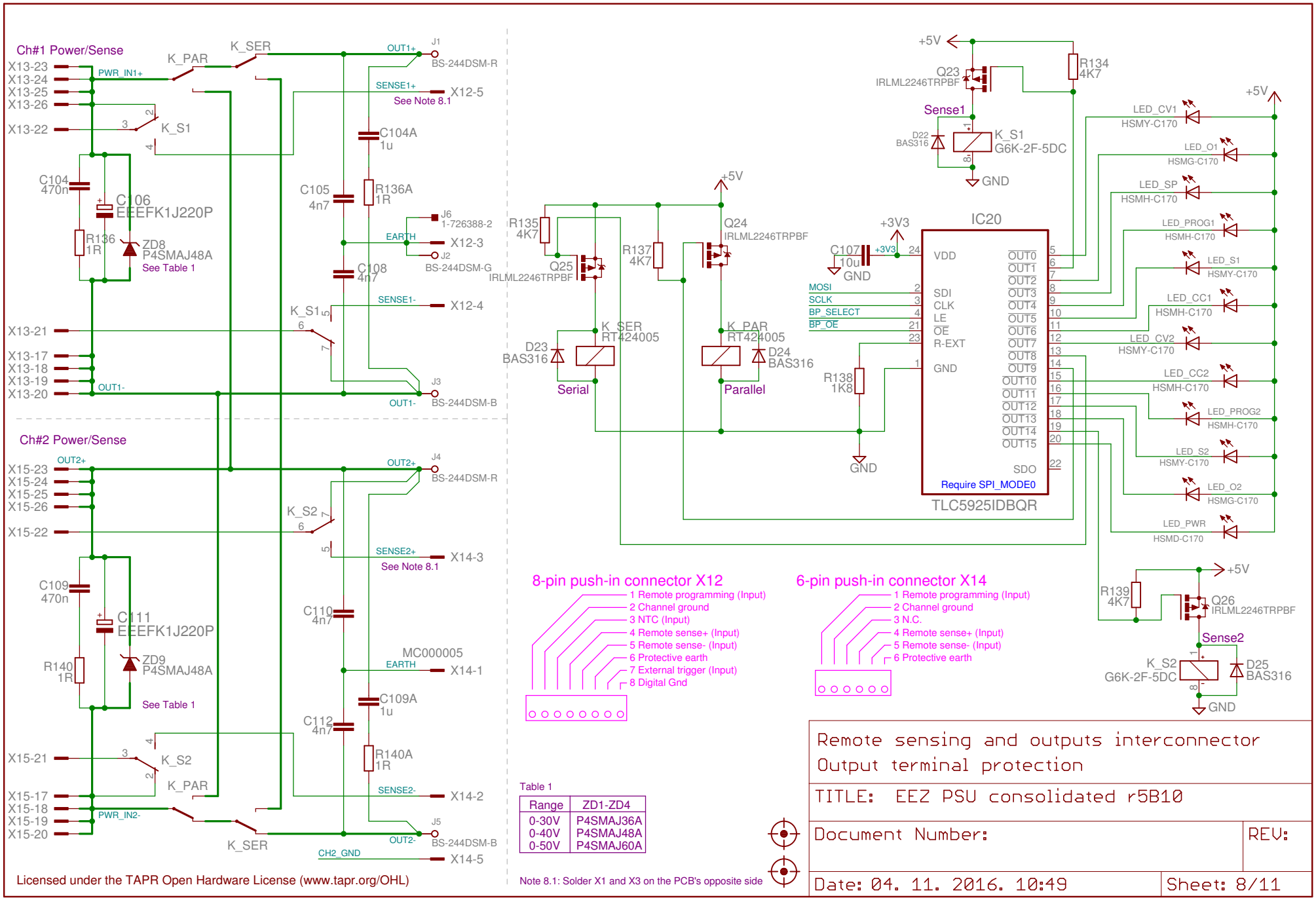

Table 1

Range	ZD1-ZD4
0-30V	P4SMAJ36A
0-40V	P4SMAJ48A
0-50V	P4SMAJ60A

Note 8.1: Solder X1 and X3 on the PCB's opposite side

Remote sensing and outputs interconnector
Output terminal protection

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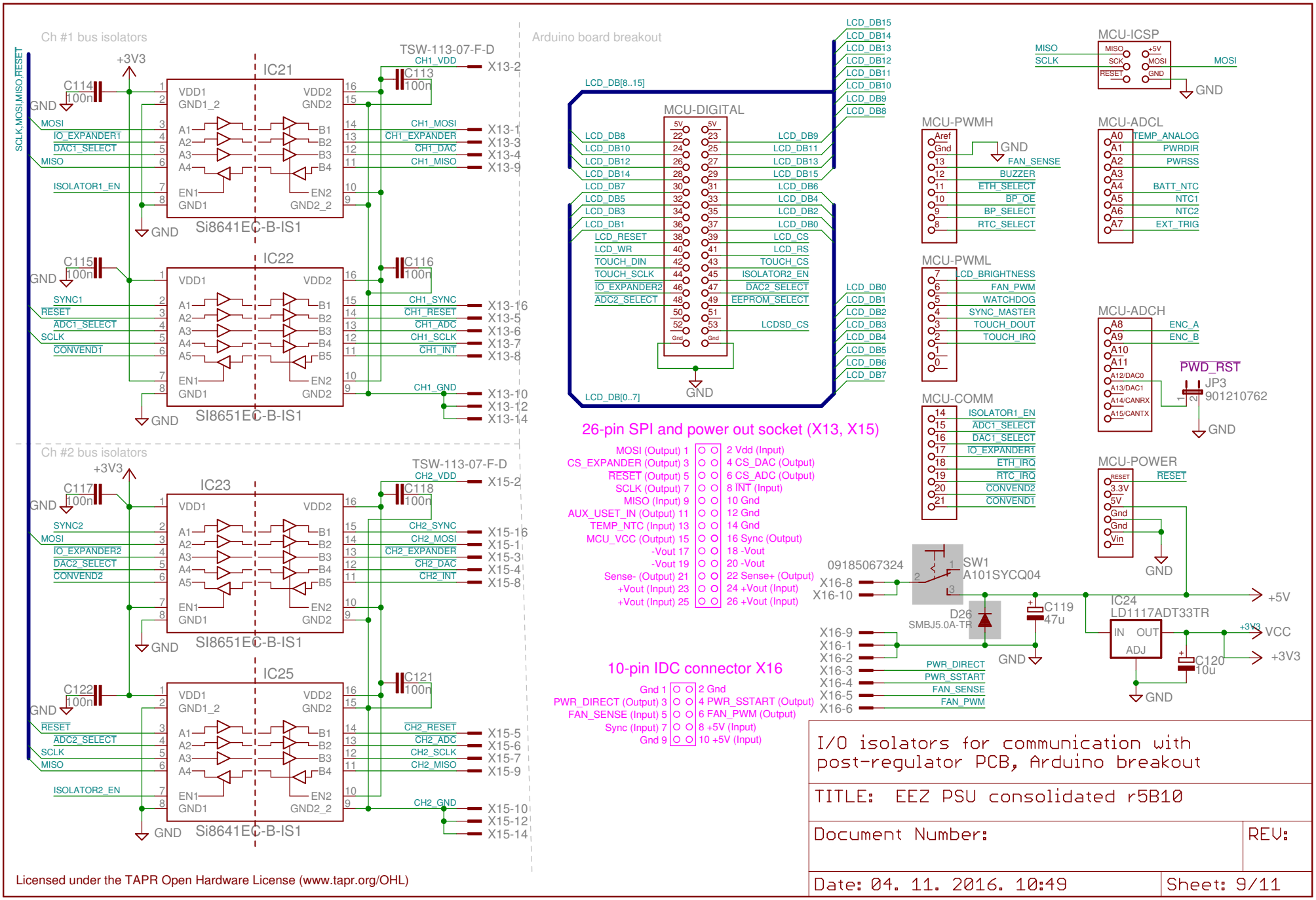

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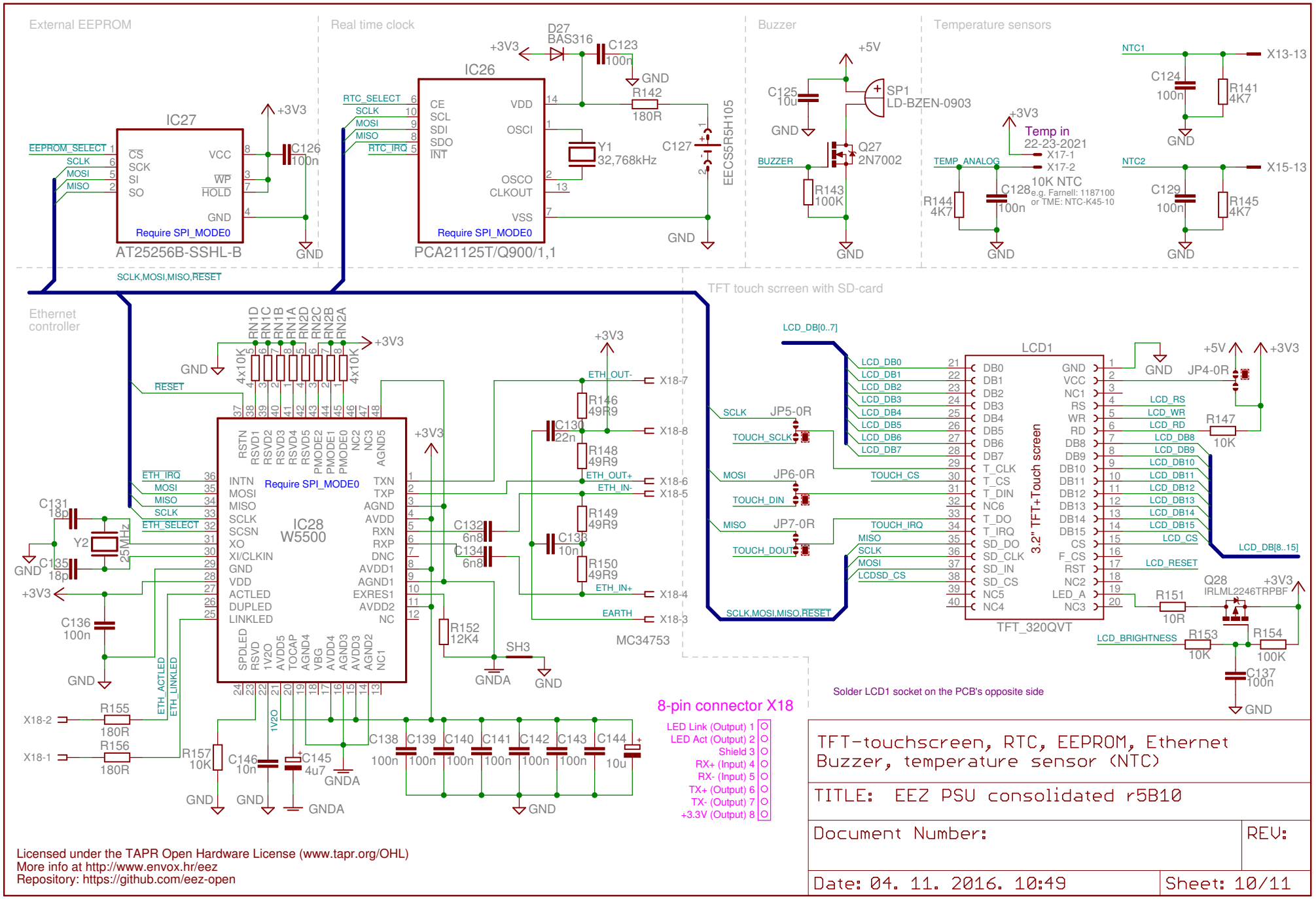

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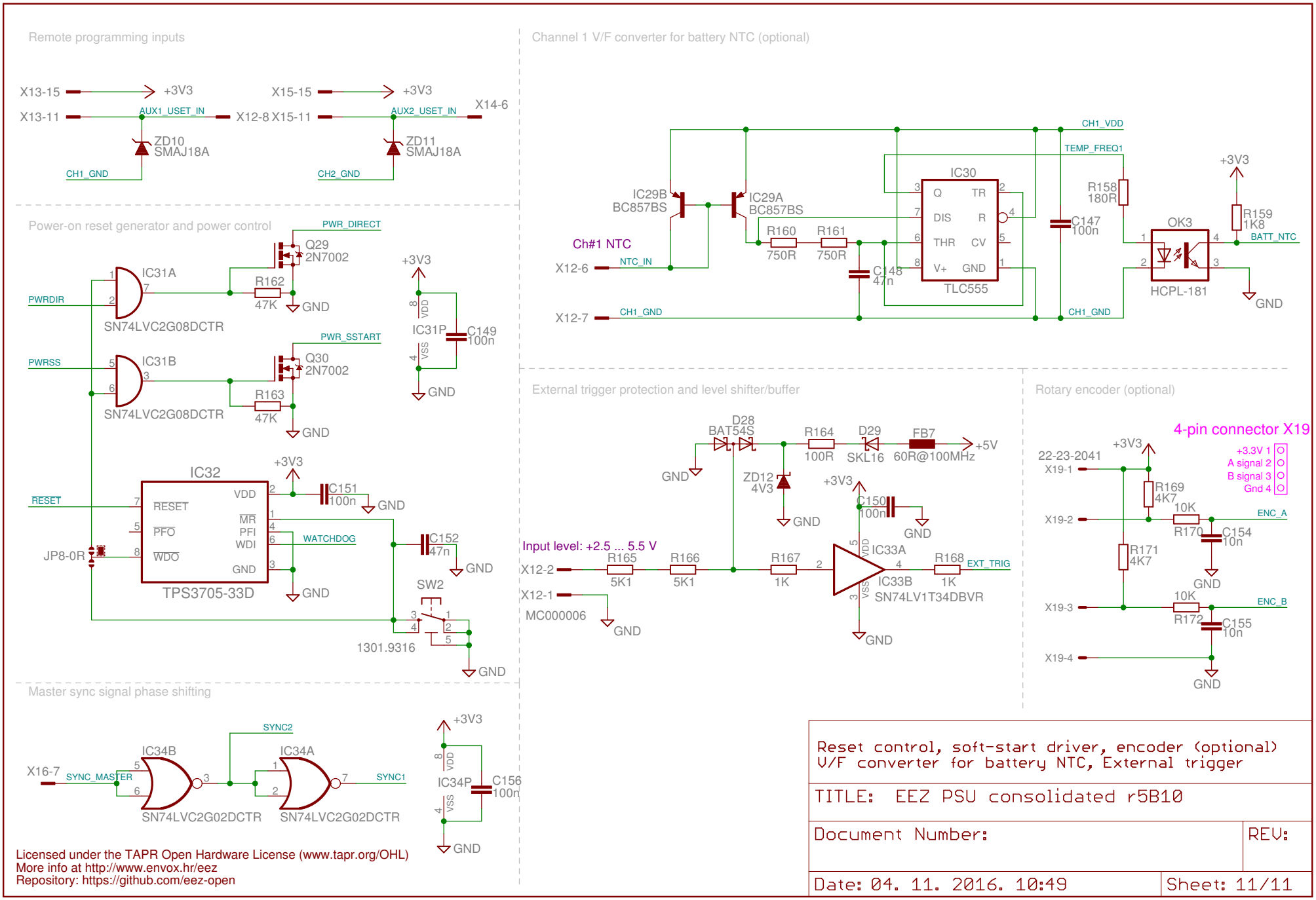
Remote programming inputs
X13-15
+3V3
X13-11
AUX1_USET_IN
X12-8
ZD10
SMAJ18A
CH1_GND
X15-15
+3V3
X15-11
AUX2_USET_IN
X14-6
ZD11
SMAJ18A
CH2_GND
Power-on reset generator and power control
PWR_DIRECT
Q29
2N7002
IC31A
PWRDIR
R162
47K
GND
SN74LVC2G08DCTR
+3V3
IC31P
C149
100n
PWR_SSTART
Q30
2N7002
IC31B
PWRSS
R163
47K
GND
SN74LVC2G08DCTR
IC32
+3V3
C151
100n
RESET
VDD
RESET
MR
PFI
WDI
WDO
GND
PFO
WATCHDOG
JP8-0R
C152
47n
SW2
1301.9316
TPS3705-33D
Master sync signal phase shifting
SYNC2
IC34B
IC34A
X16-7
SYNC_MASTER
SYNC1
SN74LVC2G02DCTR
SN74LVC2G02DCTR
+3V3
IC34P
C156
100n
Channel 1 V/F converter for battery NTC (optional)
CH1_VDD
TEMP_FREQ1
IC30
IC29B
BC857BS
IC29A
BC857BS
Ch#1 NTC
X12-6
NTC_IN
R160
750R
R161
750R
C148
47n
Q
TR
DIS
R
THR
CV
V+
GND
TLC555
R158
180R
C147
100n
OK3
HCPL-181
+3V3
R159
1K8
BATT_NTC
GND
X12-7
CH1_GND
CH1_GND
External trigger protection and level shifter/buffer
D28
BAT54S
R164
100R
D29
SKL16
FB7
60R@100MHz
+5V
GND
ZD12
4V3
GND
+3V3
C150
100n
GND
Input level: +2.5 ... 5.5 V
X12-2
R165
5K1
R166
5K1
R167
1K
IC33A
IC33B
SN74LV1T34DBVR
R168
1K
EXT_TRIG
X12-1
MC000006
GND
GND
Rotary encoder (optional)
4-pin connector X19
22-23-2041
+3V3
+3.3V 1
A signal 2
B signal 3
Gnd 4
X19-1
R169
4K7
X19-2
10K
R170
ENC_A
C154
10n
R171
4K7
GND
X19-3
10K
R172
ENC_B
C155
10n
X19-4
GND
Reset control, soft-start driver, encoder (optional)
U/F converter for battery NTC, External trigger
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