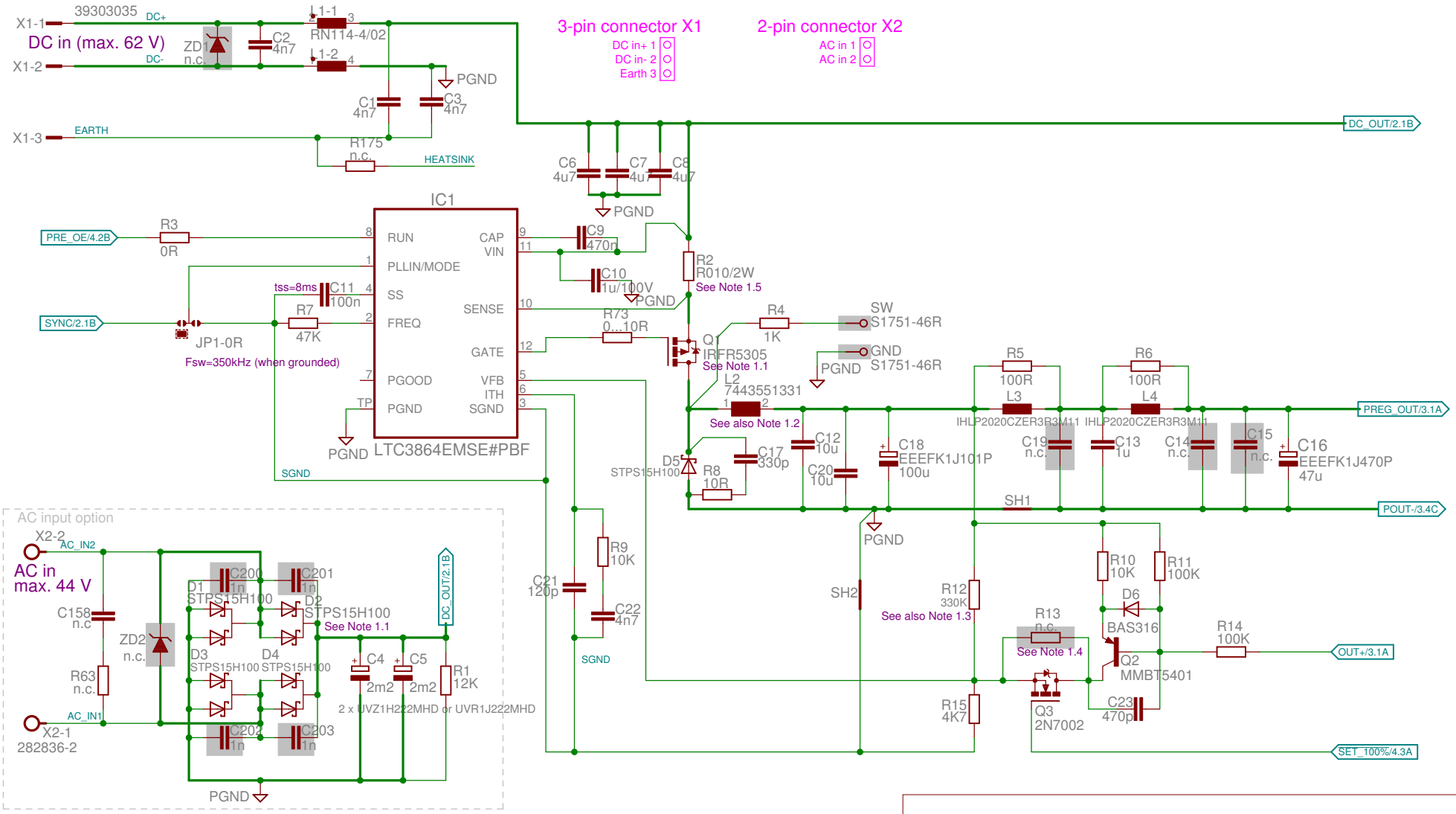

Note 1.1: Possible alternative AUIRFR5305, SUD19P06-60, SPD30P06P or other with similar or lower input capacitance
Note 1.2: WE 7447709330, WE 7443551331, Coilcraft MSS1210-333, Coilcraft XAL1510-333, Vishay IHLP4040DZER470M11, etc.
Note 1.3: Use 240K for 30 VAC main transformer
Note 1.4: Install 0R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

SMPS power pre-regulator with 100% duty cycle

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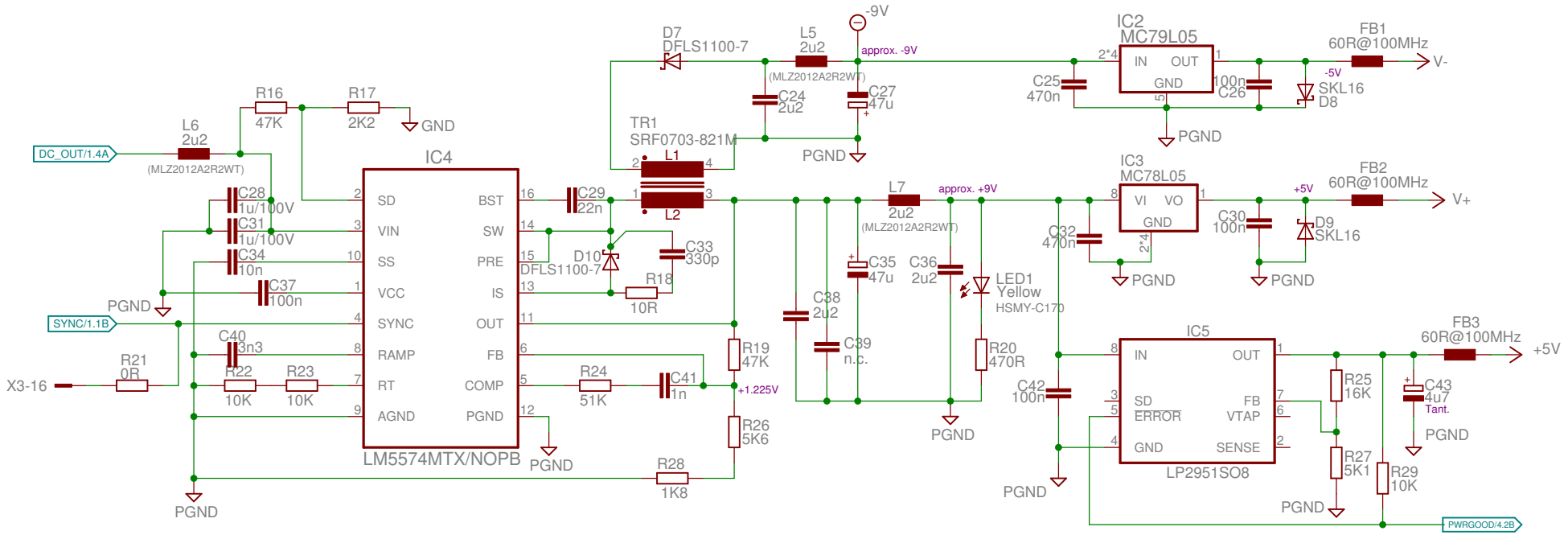

Bias power supply with SMPS pre-regulator

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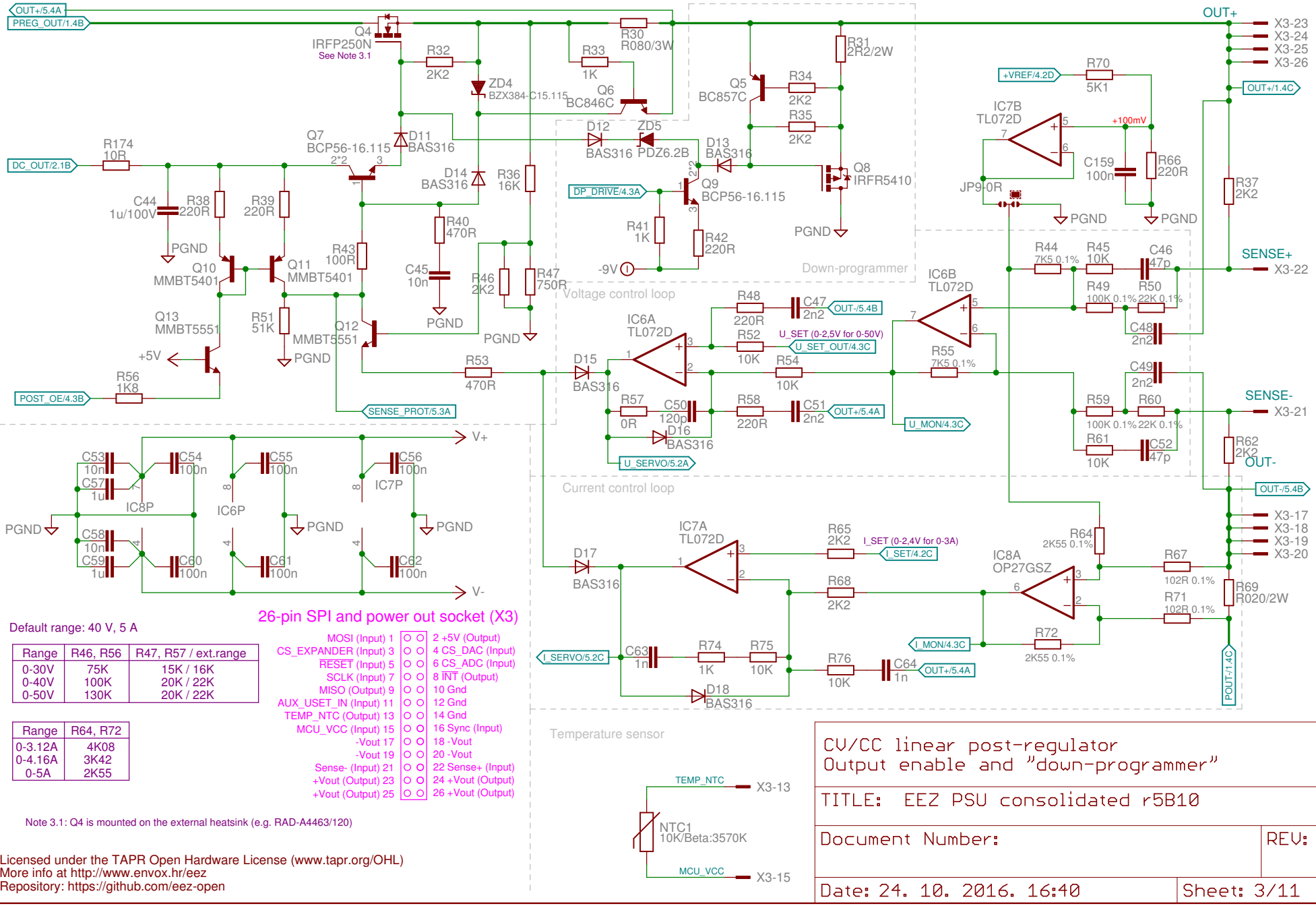

Default range: 40 V, 5 A

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)

CV/CC linear post-regulator
Output enable and "down-programmer"

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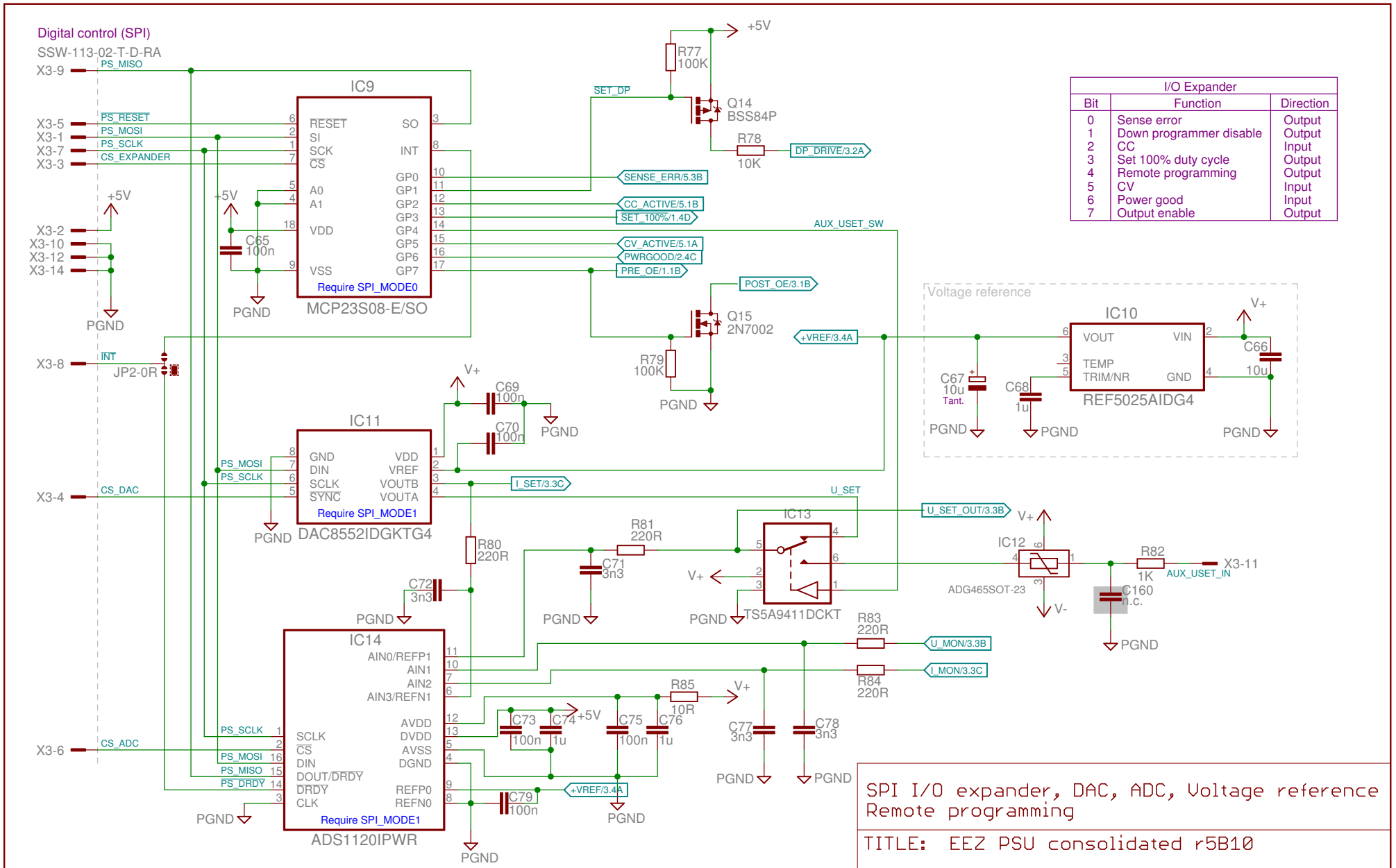

I/O Expander		
Bit	Function	Direction
0	Sense error	Output
1	Down programmer disable	Output
2	CC	Input
3	Set 100% duty cycle	Output
4	Remote programming	Output
5	CV	Input
6	Power good	Input
7	Output enable	Output

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

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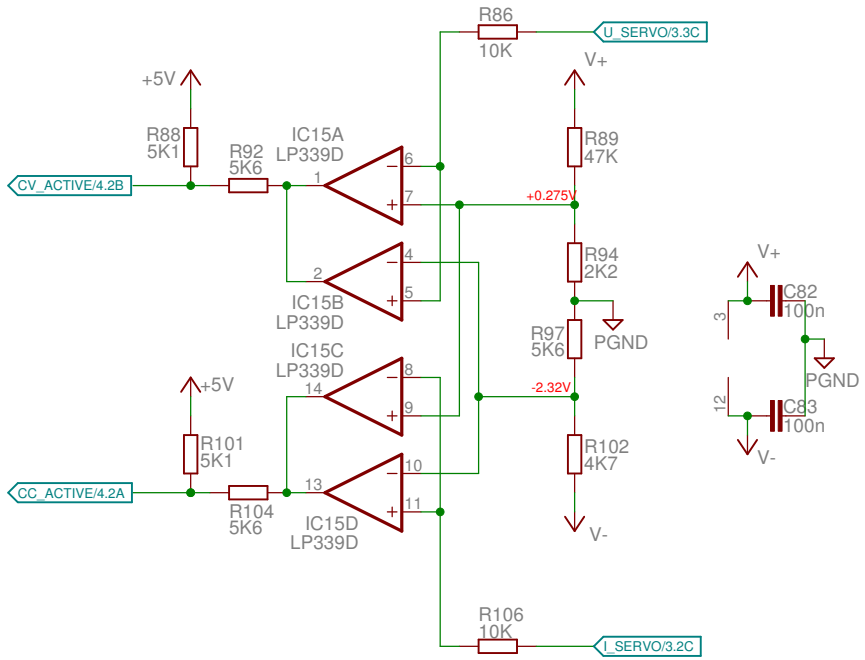
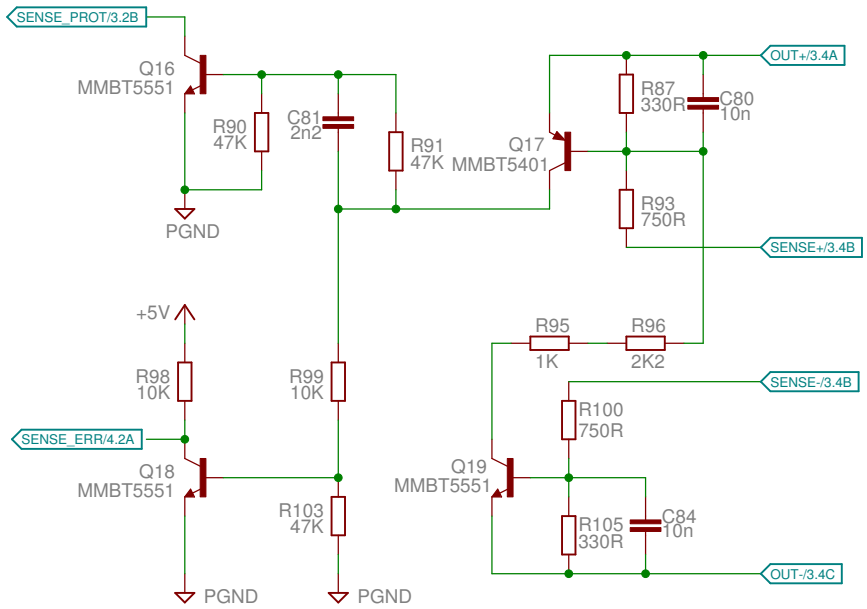
Constant Voltage (CV) and Constant Current (CC) mode indicator



Remote sense reverse polarity detection



CC/CV indicators, Sense error detection	
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Document Number:	REV:
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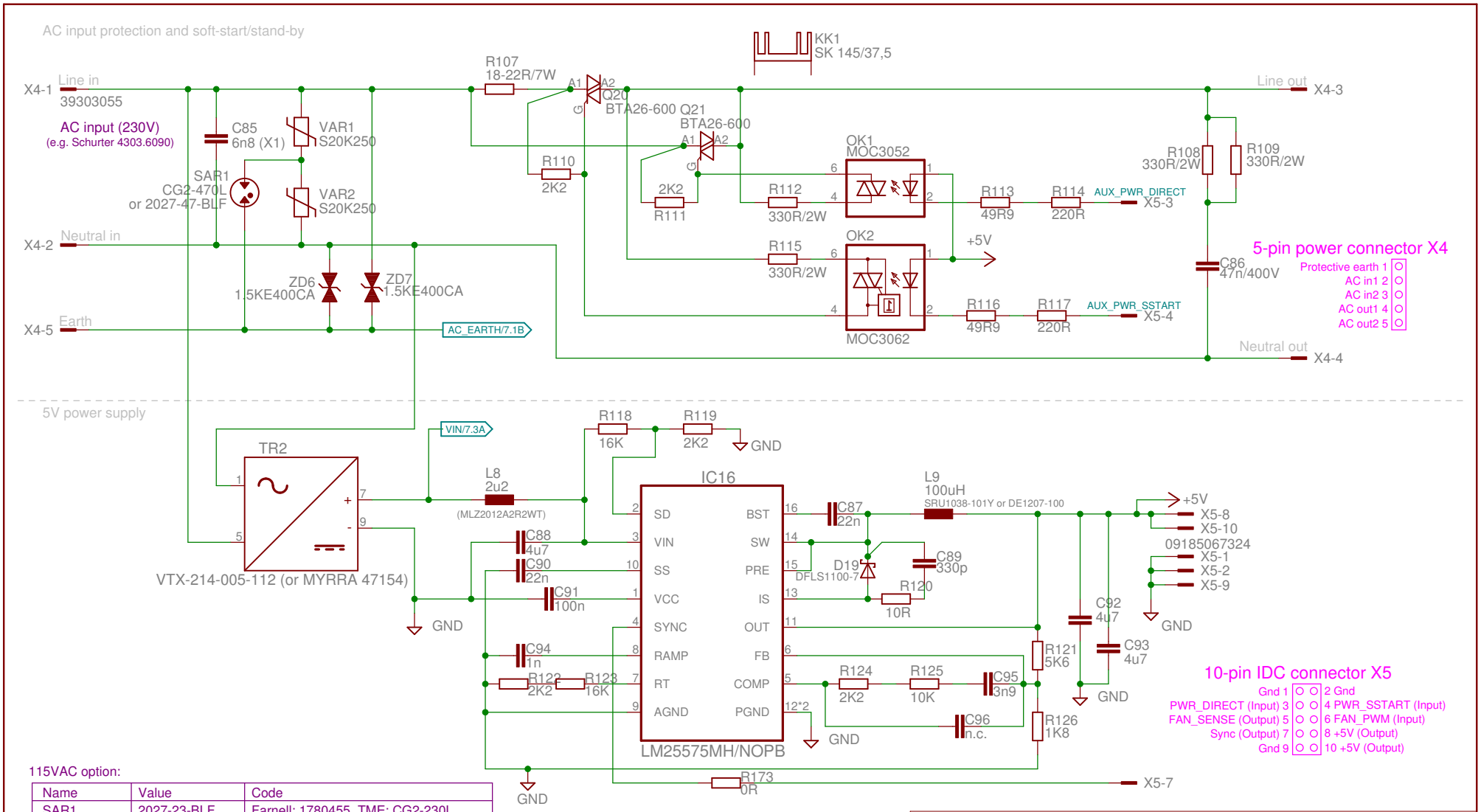

115VAC option:

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

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

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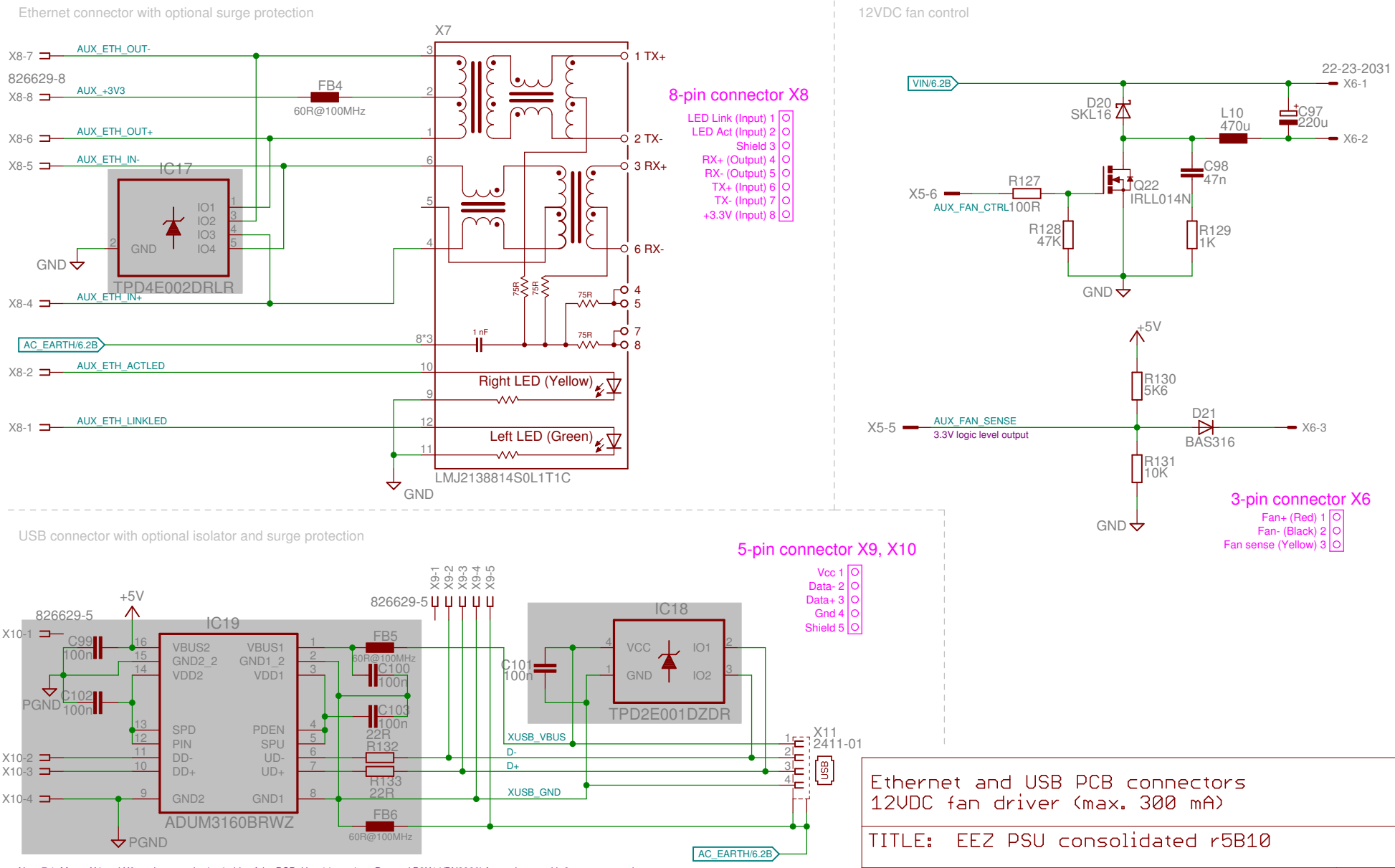

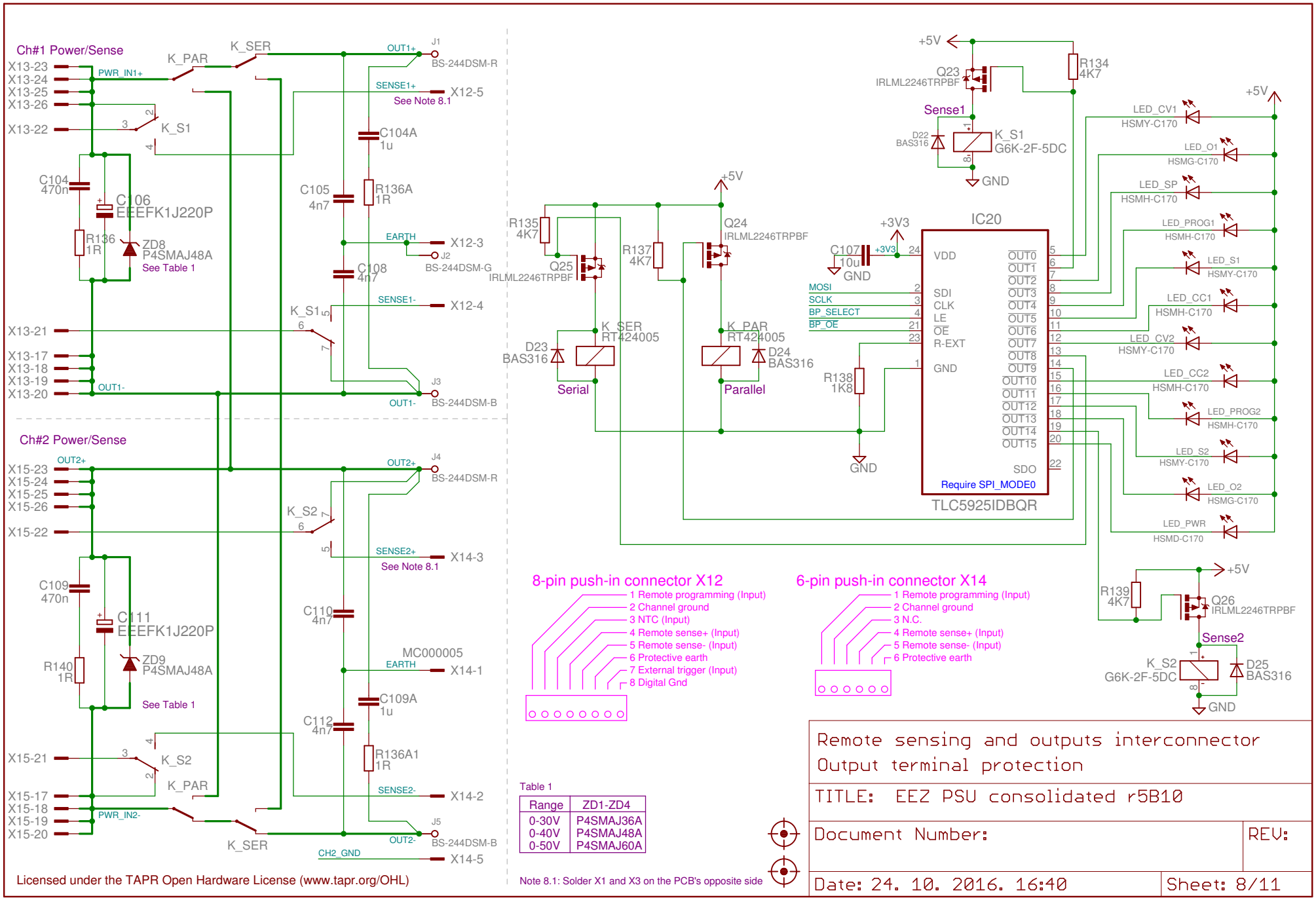
Ch#1 Power/Sense
X13-23
X13-24
X13-25
X13-26
X13-22
PWR_IN1+
K_PAR
K_SER
OUT1+
J1
BS-244DSM-R
SENSE1+
See Note 8.1
X12-5
K_S1
C104
470n
C106
EEEFK1J220P
R136
1R
ZD8
P4SMAJ48A
See Table 1
C104A
1u
C105
4n7
R136A
1R
EARTH
X12-3
J2
BS-244DSM-G
C108
4n7
SENSE1-
X12-4
X13-21
X13-17
X13-18
X13-19
X13-20
OUT1-
J3
BS-244DSM-B
Ch#2 Power/Sense
OUT2+
X15-23
X15-24
X15-25
X15-26
X15-22
K_S2
J4
SENSE2+
X14-3
C109
470n
C111
EEEFK1J220P
R140
1R
ZD9
P4SMAJ48A
C110
4n7
MC000005
X14-1
C109A
1u
C112
4n7
R136A1
1R
X15-21
X15-17
X15-18
X15-19
X15-20
PWR_IN2-
SENSE2-
X14-2
J5
CH2_GND
X14-5
Licensed under the TAPR Open Hardware License (www.tapr.org/OHL)
+5V
Q23
IRLML2246TRPBF
R134
4K7
Sense1
D22
BAS316
K_S1
G6K-2F-5DC
GND
R135
4K7
Q25
IRLML2246TRPBF
R137
4K7
Q24
IRLML2246TRPBF
K_SER
RT424005
K_PAR
RT424005
D23
BAS316
D24
BAS316
Serial
Parallel
+3V3
C107
10u
IC20
VDD
SDI
CLK
LE
OE
R-EXT
GND
SDO
MOSI
SCLK
BP_SELECT
BP_OE
R138
1K8
Require SPI_MODE0
TLC5925IDBQR
OUT0
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
OUT8
OUT9
OUT10
OUT11
OUT12
OUT13
OUT14
OUT15
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
R139
4K7
Q26
IRLML2246TRPBF
Sense2
K_S2
G6K-2F-5DC
D25
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
6-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
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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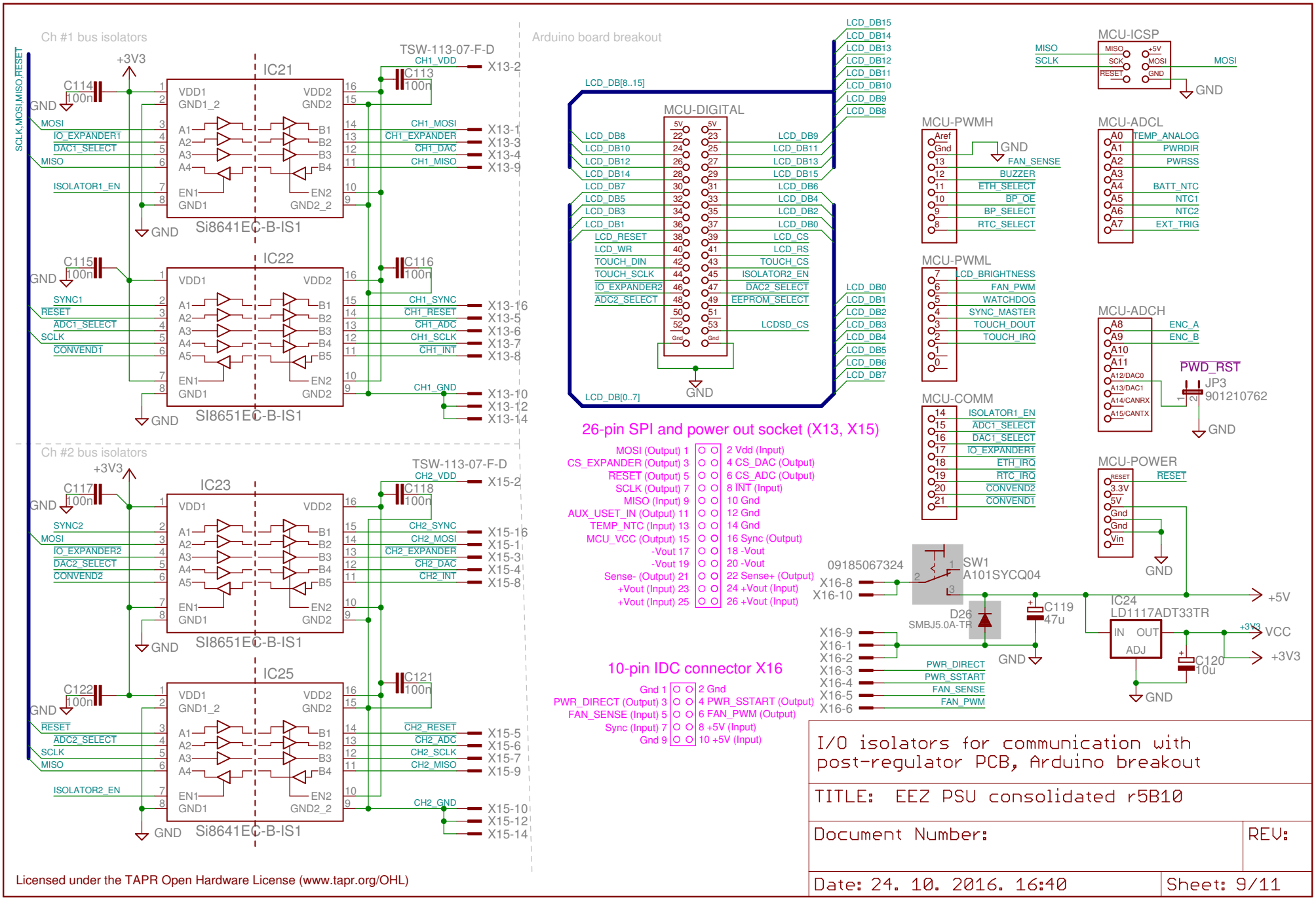

I/O isolators for communication with post-regulator PCB, Arduino breakout

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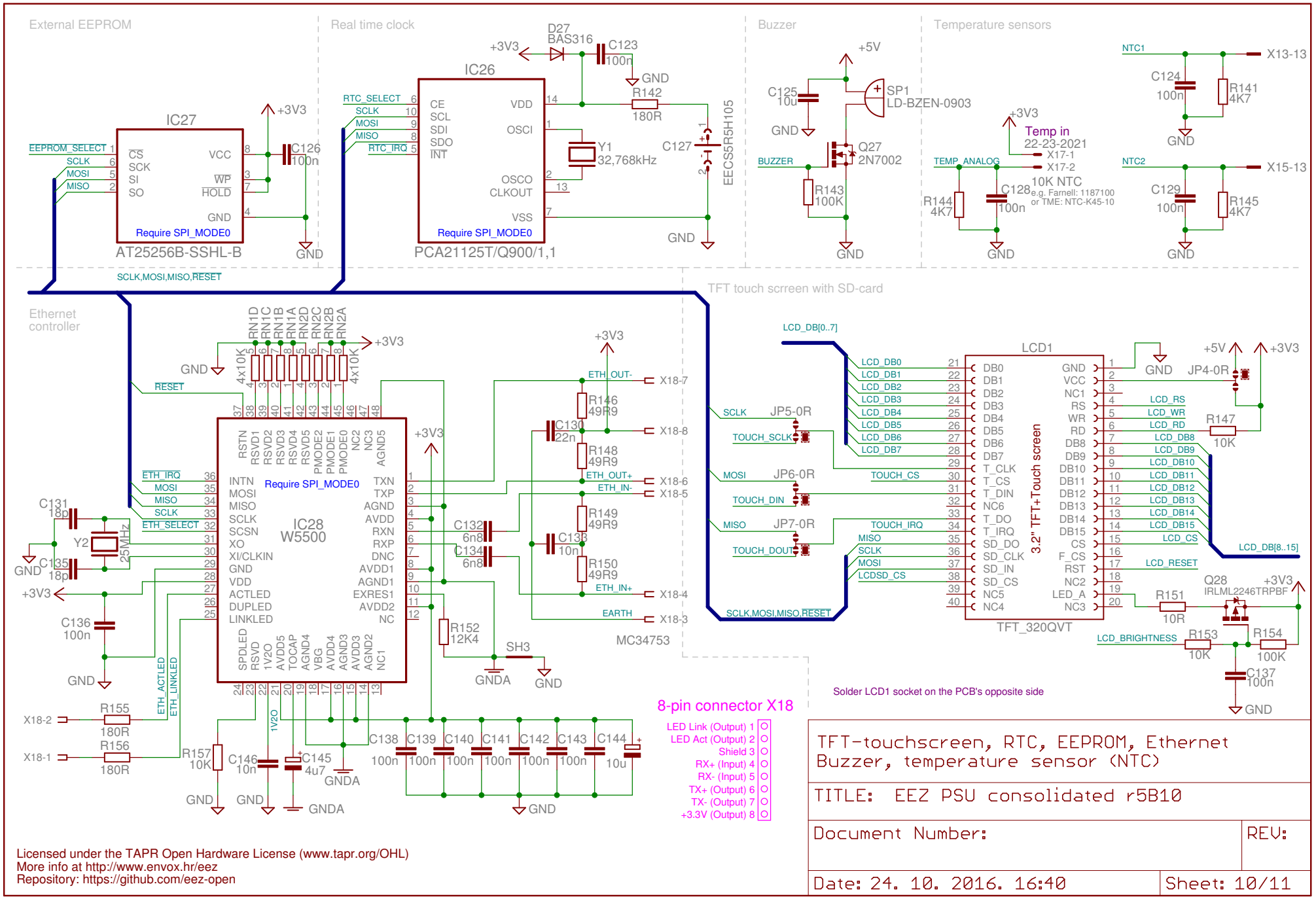

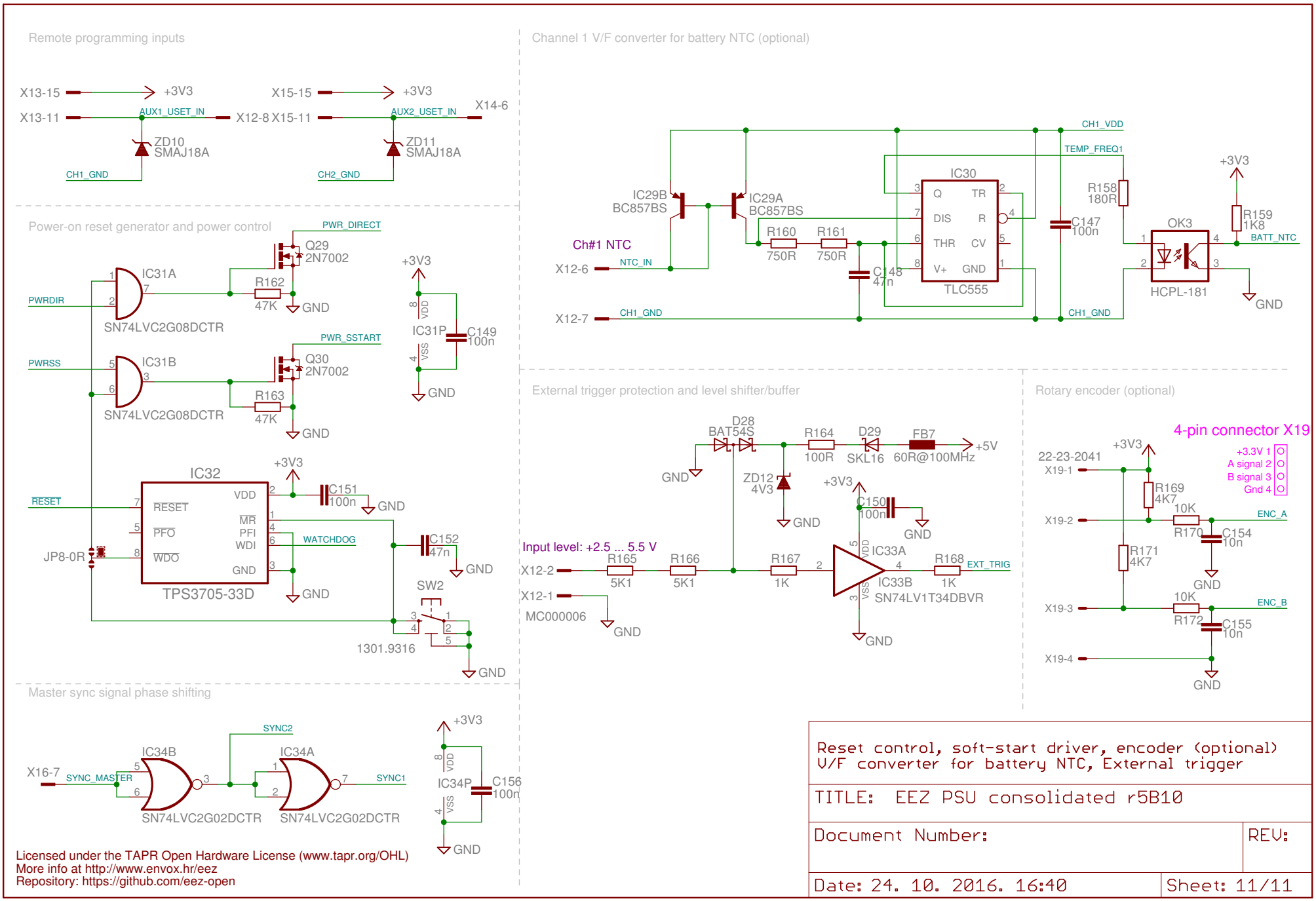
Remote programming inputs
X13-15
+3V3
X13-11
AUX1_USET_IN
X12-8
ZD10
SMAJ18A
CH1_GND
X15-15
+3V3
X15-11
AUX2_USET_IN
X14-6
ZD11
SMAJ18A
CH2_GND
Power-on reset generator and power control
PWR_DIRECT
Q29
2N7002
IC31A
PWRDIR
R162
47K
GND
SN74LVC2G08DCTR
+3V3
IC31P
C149
100n
PWR_SSTART
Q30
2N7002
IC31B
PWRSS
R163
47K
GND
SN74LVC2G08DCTR
IC32
+3V3
C151
100n
RESET
VDD
RESET
PFO
WDO
MR
PFI
WDI
GND
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
R160
750R
R161
750R
Ch#1 NTC
X12-6
NTC_IN
C148
47n
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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