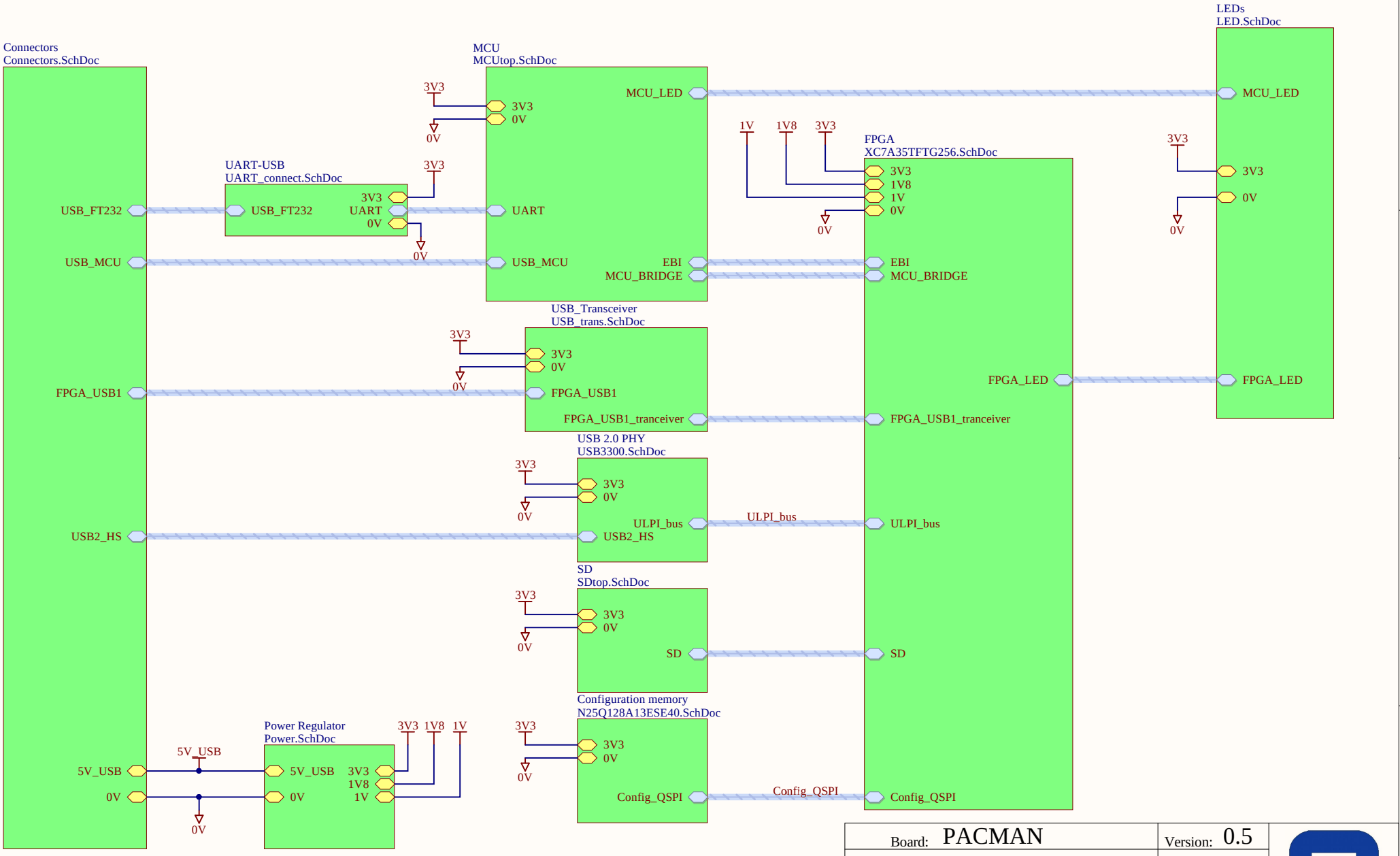
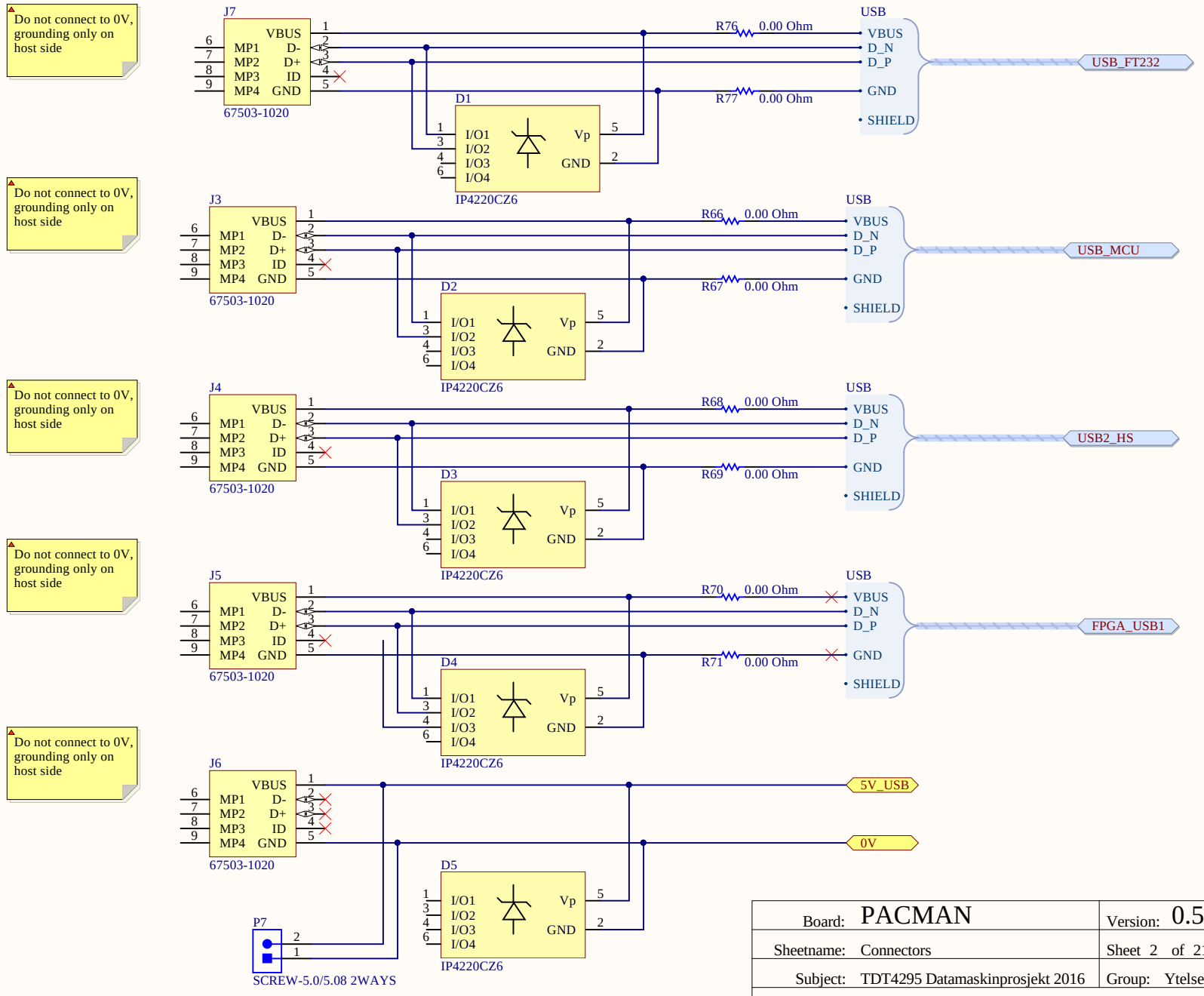
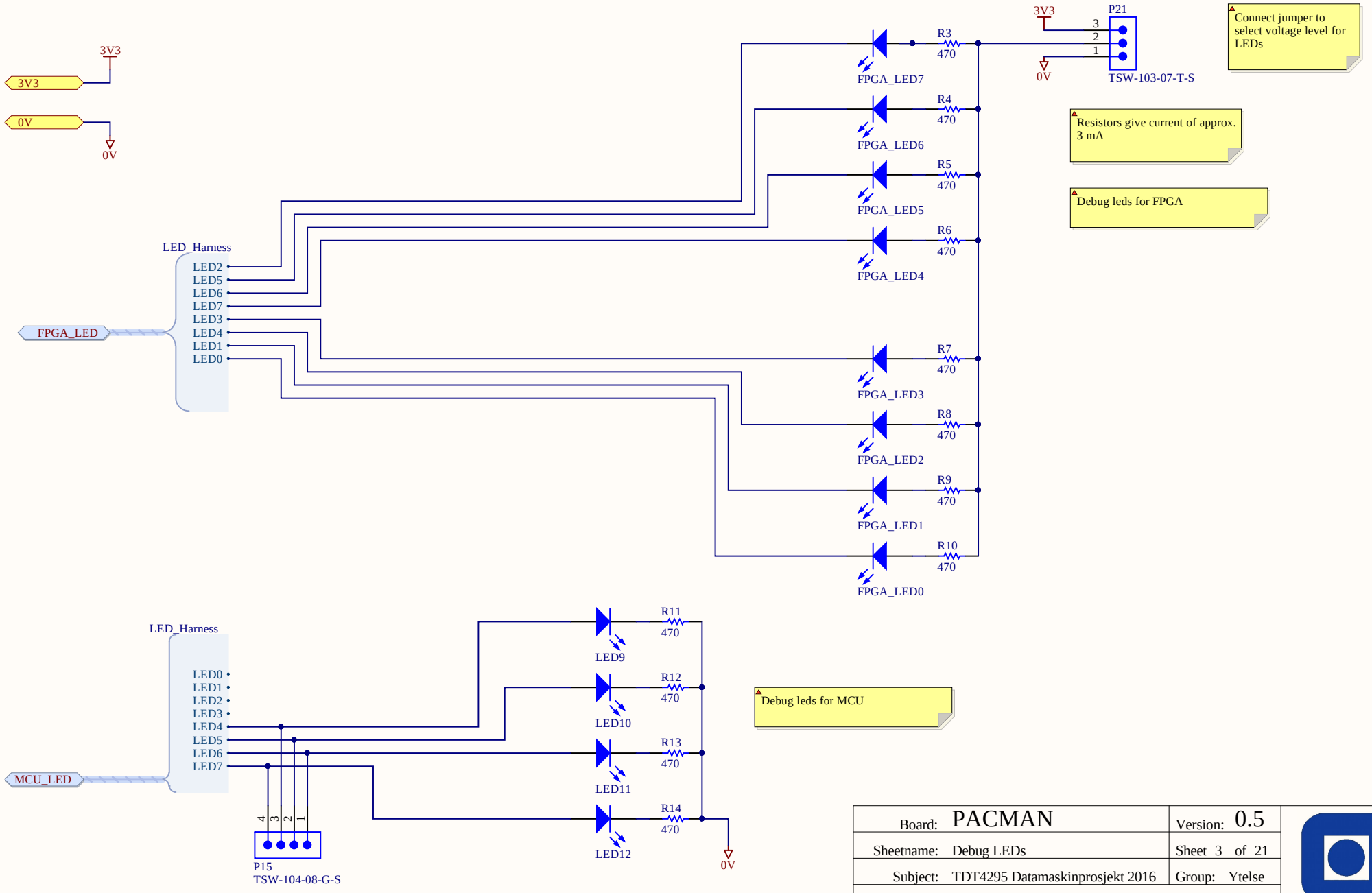
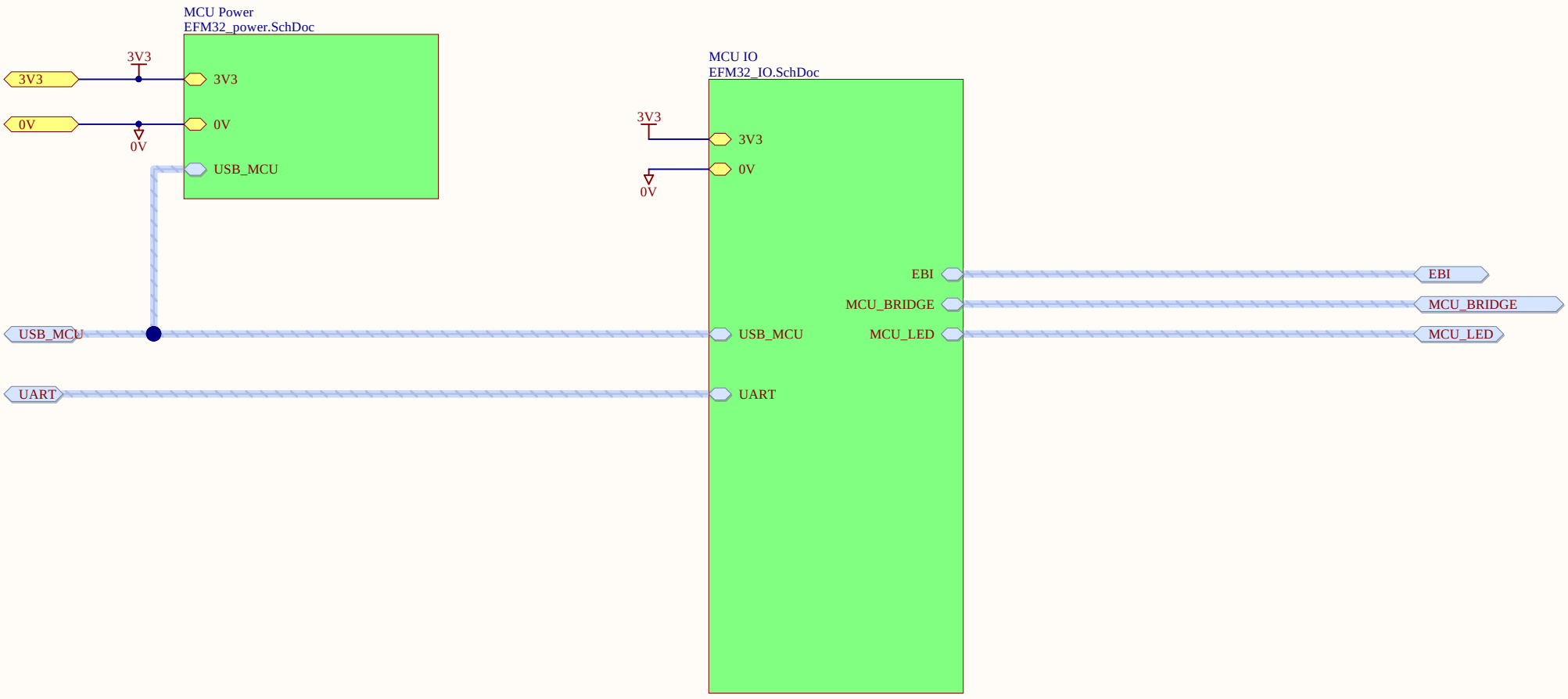


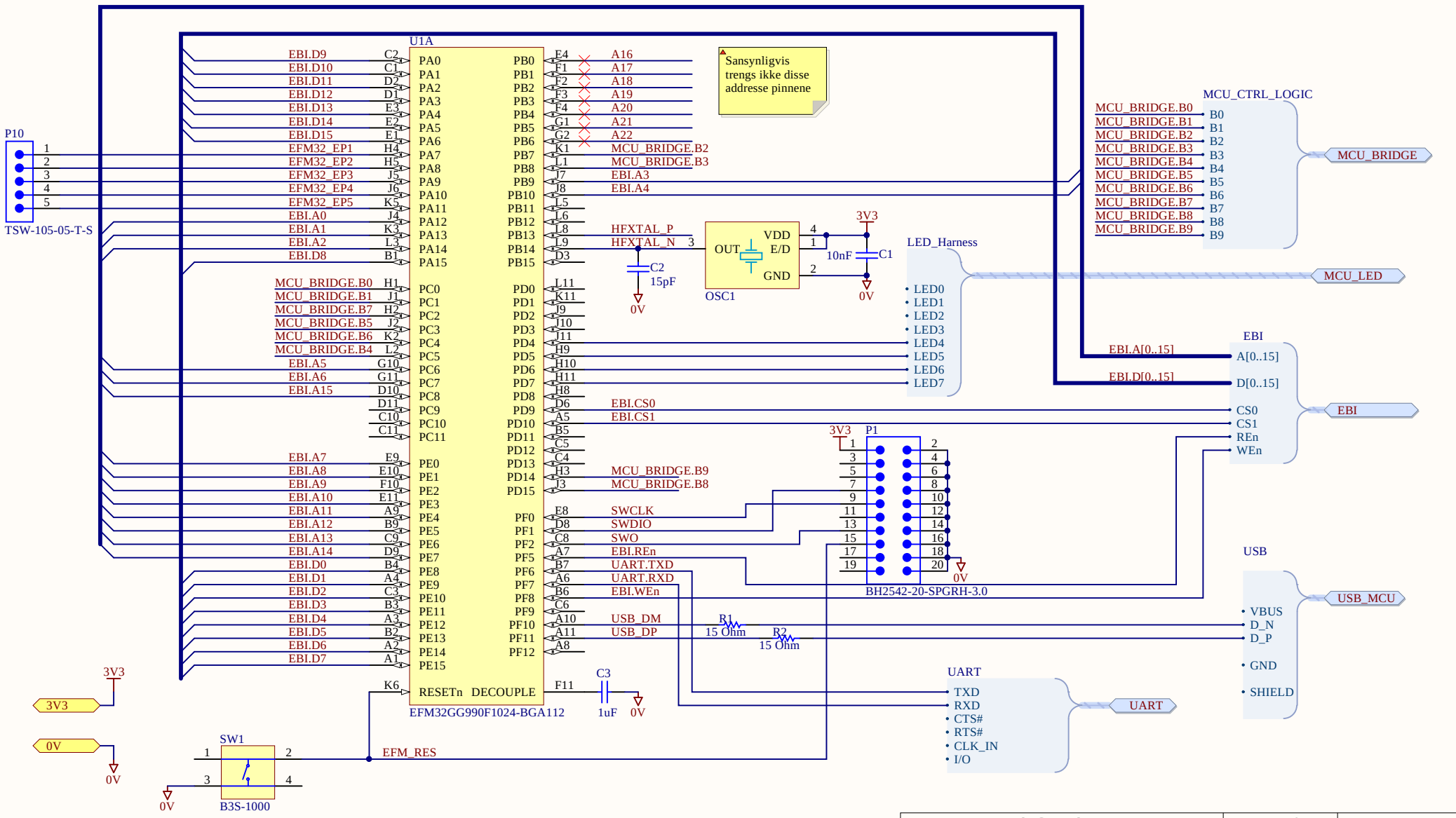
Board:	PACMAN	Version:	0.5
Sheetname:	Top level	Sheet 1 of 21	
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	main.SchDoc		


Do not connect to 0V, grounding only on host side
Do not connect to 0V, grounding only on host side
Do not connect to 0V, grounding only on host side
Do not connect to 0V, grounding only on host side
Do not connect to 0V, grounding only on host side
J7
J3
J4
J5
J6
P7
VBUS
MP1 D-
MP2 D+
MP3 ID
MP4 GND
67503-1020
SCREW-5.0/5.08 2WAYS
D1
D2
D3
D4
D5
I/O1
I/O2
I/O3
I/O4
Vp
GND
IP4220CZ6
R76 0.00 Ohm
R77 0.00 Ohm
R66 0.00 Ohm
R67 0.00 Ohm
R68 0.00 Ohm
R69 0.00 Ohm
R70 0.00 Ohm
R71 0.00 Ohm
USB
VBUS
D_N
D_P
GND
SHIELD
USB_FT232
USB_MCU
USB2_HS
FPGA_USB1
5V_USB
0V
Board: PACMAN
Version: 0.5
Sheetname: Connectors
Sheet 2 of 21
Subject: TDT4295 Datamaskinprosjekt 2016
Group: Ytelse
Shematic file: Connectors.SchDoc

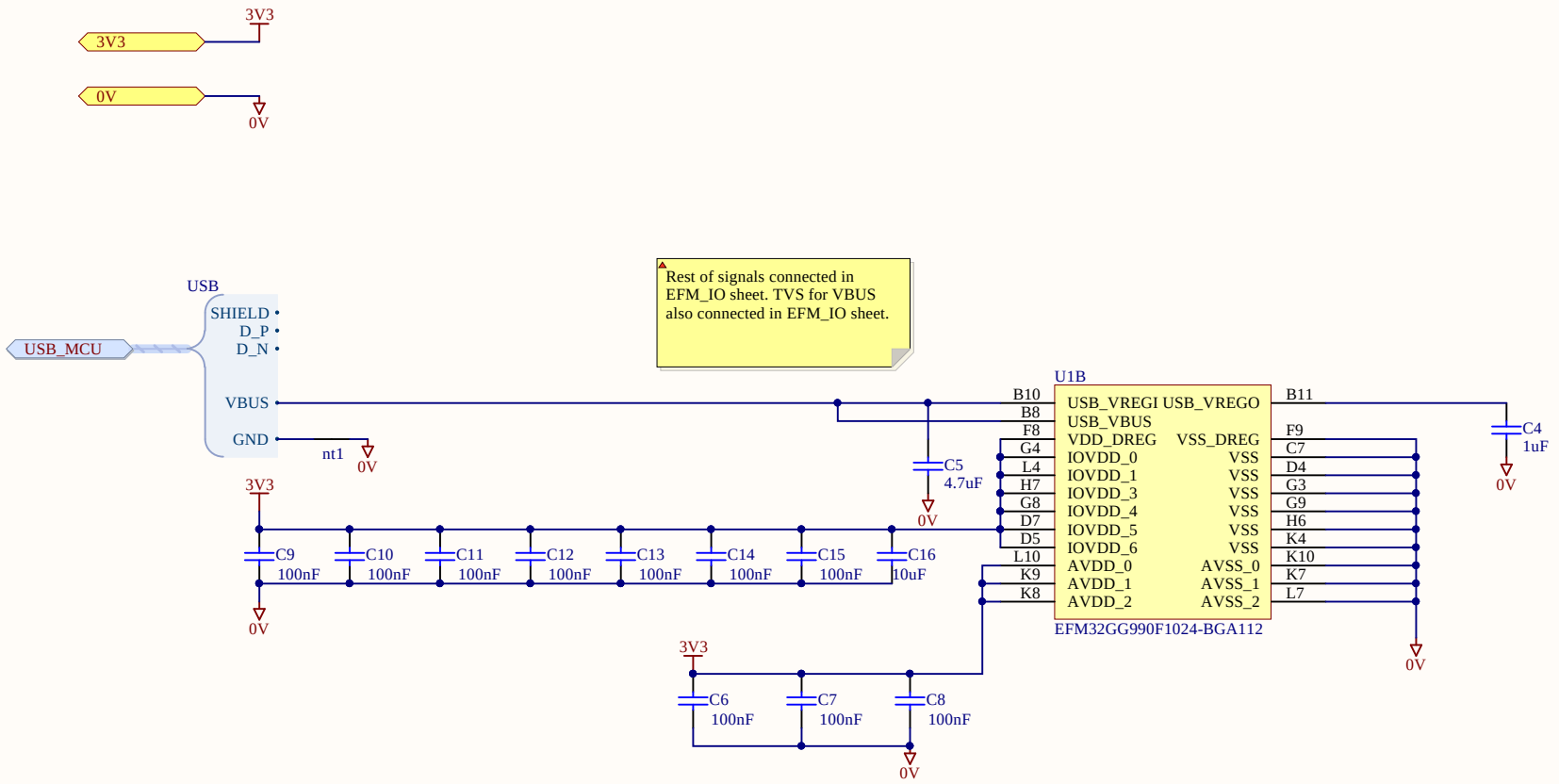

3V3
0V
LED_Harness
FPGA_LED
LED2
LED5
LED6
LED7
LED3
LED4
LED1
LED0
R3 470
R4 470
R5 470
R6 470
R7 470
R8 470
R9 470
R10 470
FPGA_LED7
FPGA_LED6
FPGA_LED5
FPGA_LED4
FPGA_LED3
FPGA_LED2
FPGA_LED1
FPGA_LED0
P21
TSW-103-07-T-S
Connect jumper to select voltage level for LEDs
Resistors give current of approx. 3 mA
Debug leds for FPGA
LED_Harness
MCU_LED
LED0
LED1
LED2
LED3
LED4
LED5
LED6
LED7
R11 470
R12 470
R13 470
R14 470
LED9
LED10
LED11
LED12
P15
TSW-104-08-G-S
Debug leds for MCU
Board: PACMAN
Version: 0.5
Sheetname: Debug LEDs
Sheet 3 of 21
Subject: TDT4295 Datamaskinprosjekt 2016
Group: Ytelse
Shematic file: LED.SchDoc



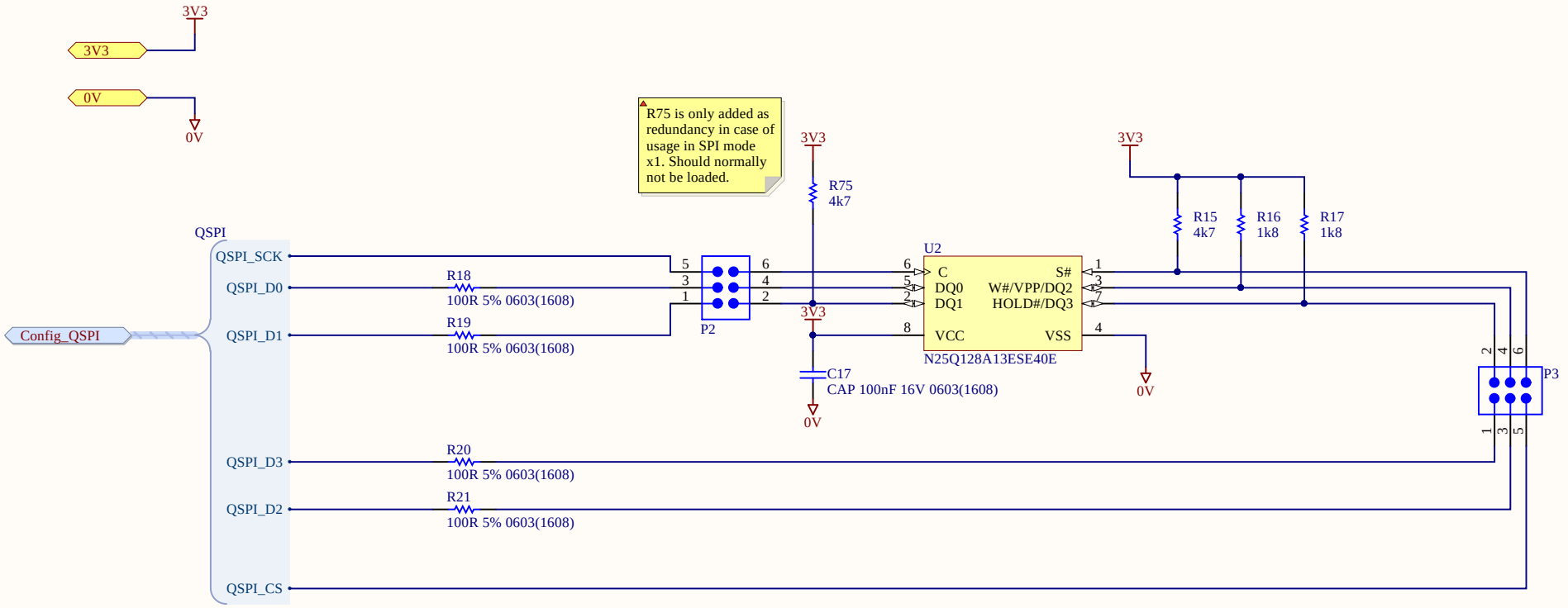
Board:	PACMAN	Version:	0.5
Sheetname:	Microcontroller Top Level	Sheet	4 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	MCUtop.SchDoc		



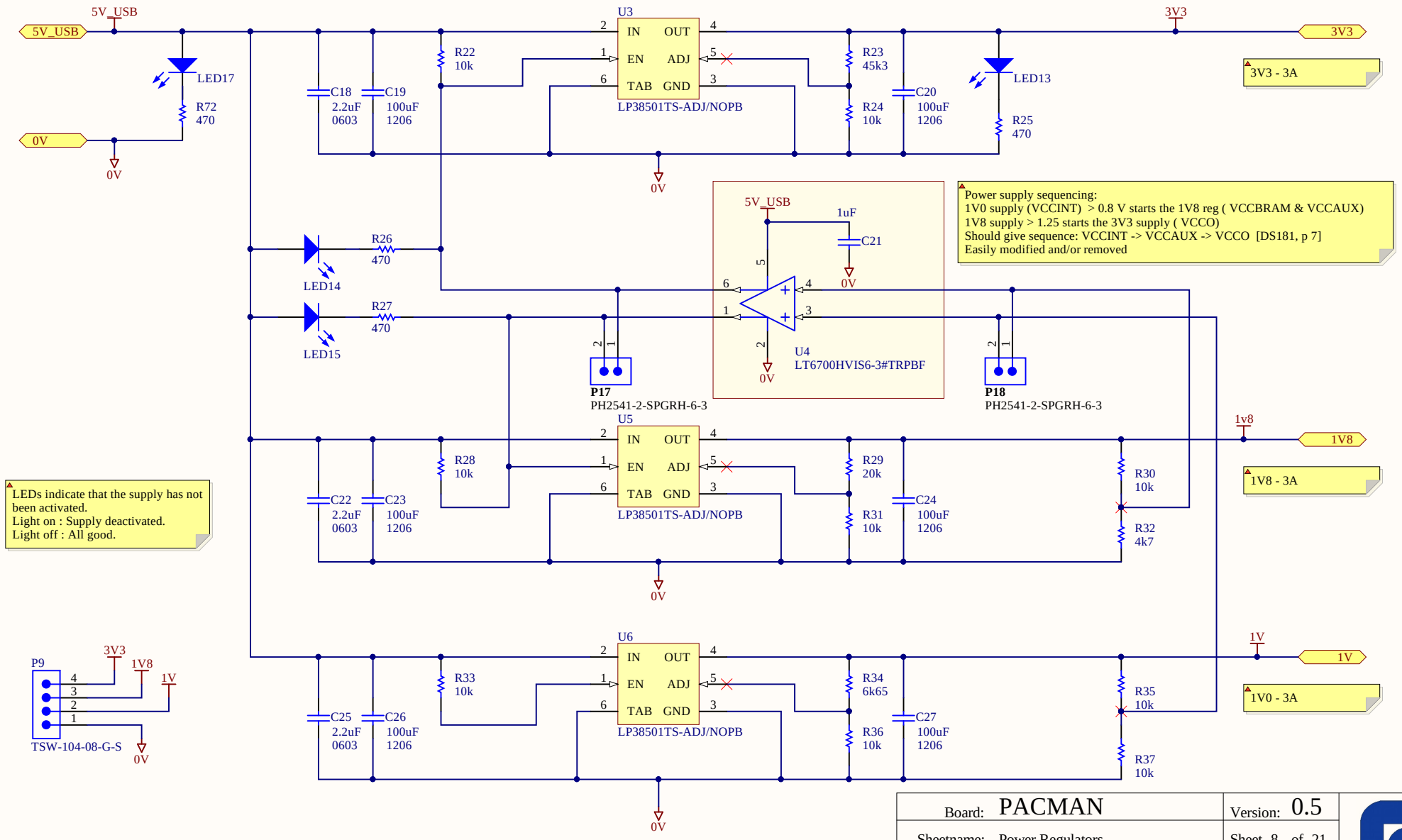
Board:	PACMAN	Version:	0.5
Sheetname:	Microcontroller IO	Sheet	5 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	EFM32_IO.SchDoc		

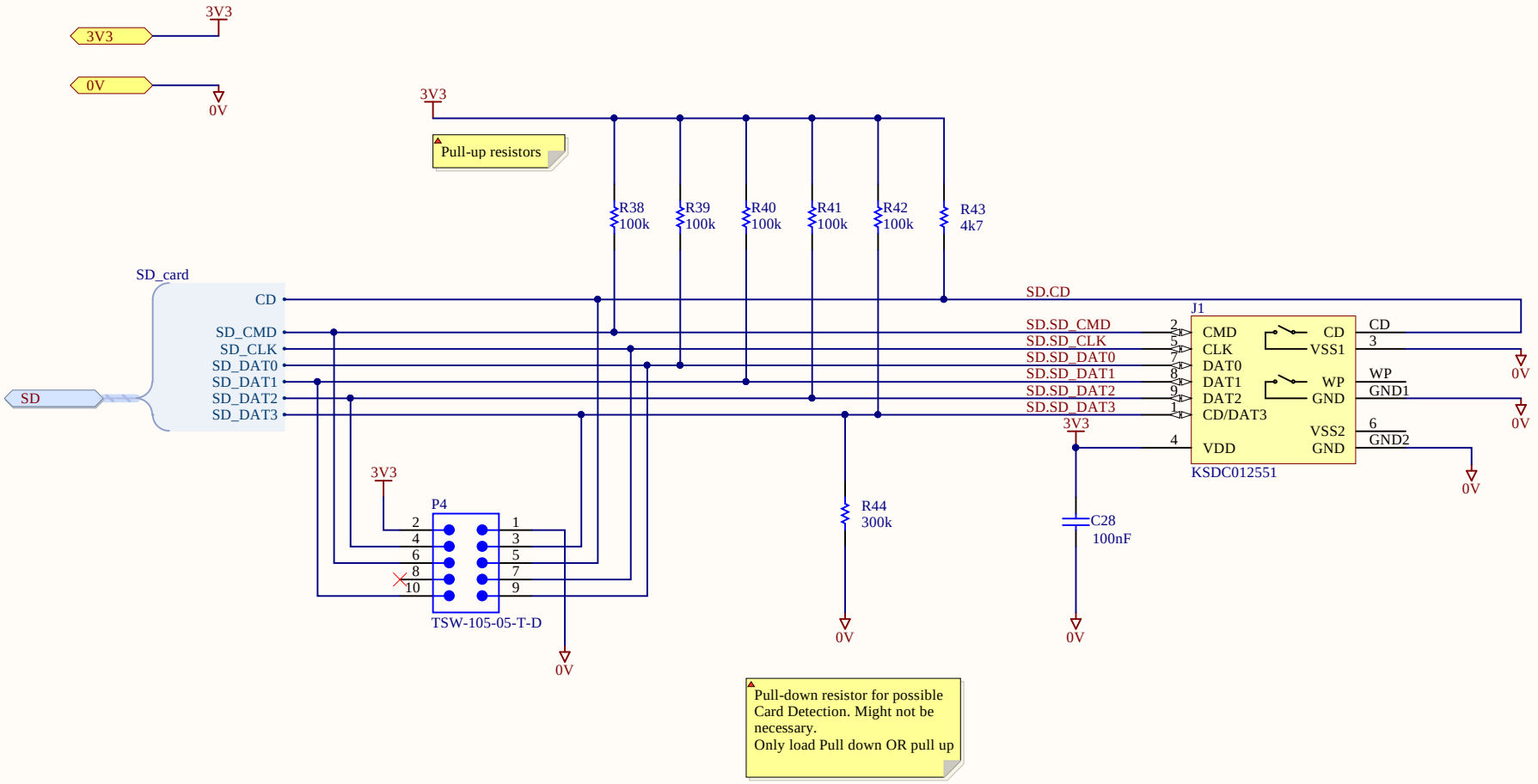


Board:	PACMAN	Version:	0.5
Sheetname:	Microcontroller Power Distribution	Sheet	6 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	EFM32_power.SchDoc		

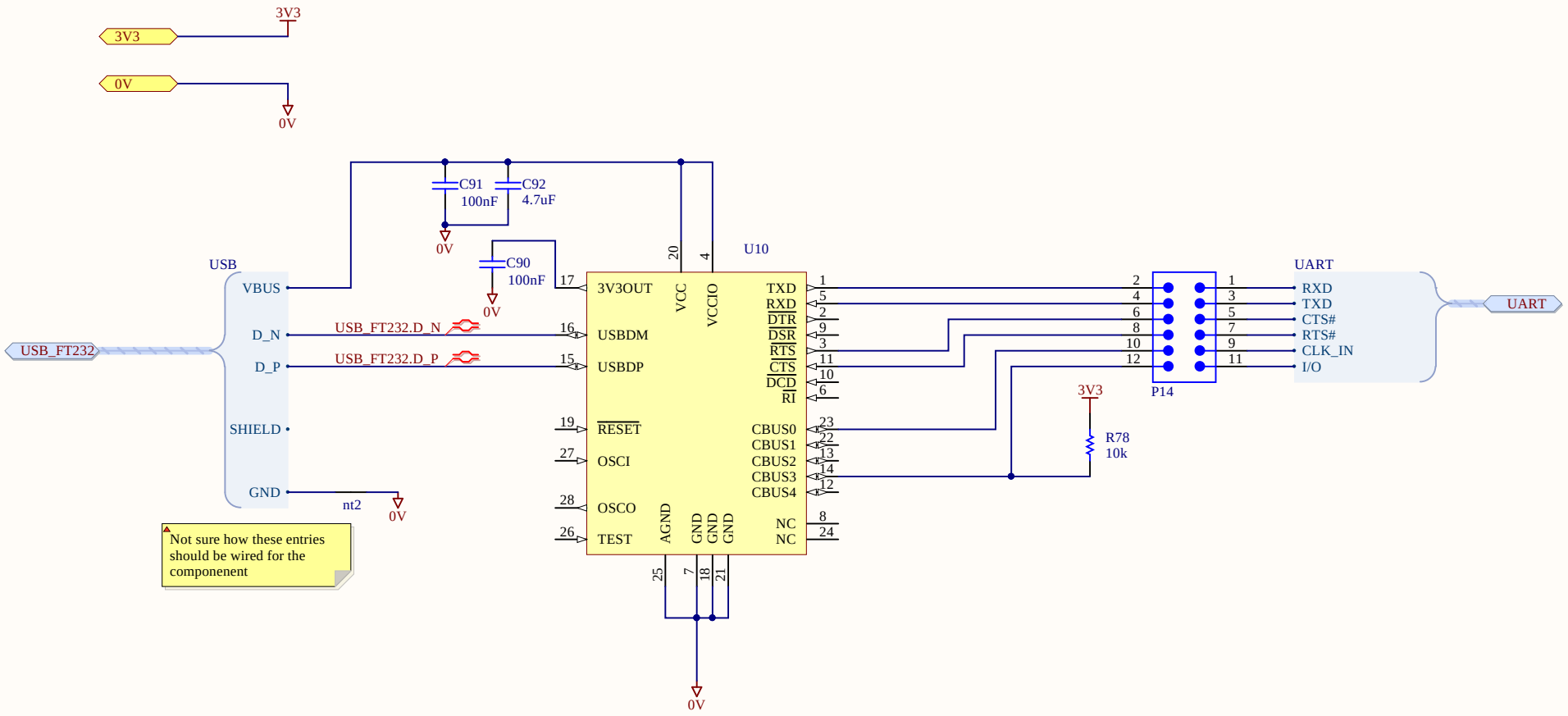


Board:	PACMAN	Version:	0.5
Sheetname:	Configuration Memory	Sheet	7 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	N25Q128A13ESE40.SchDoc		

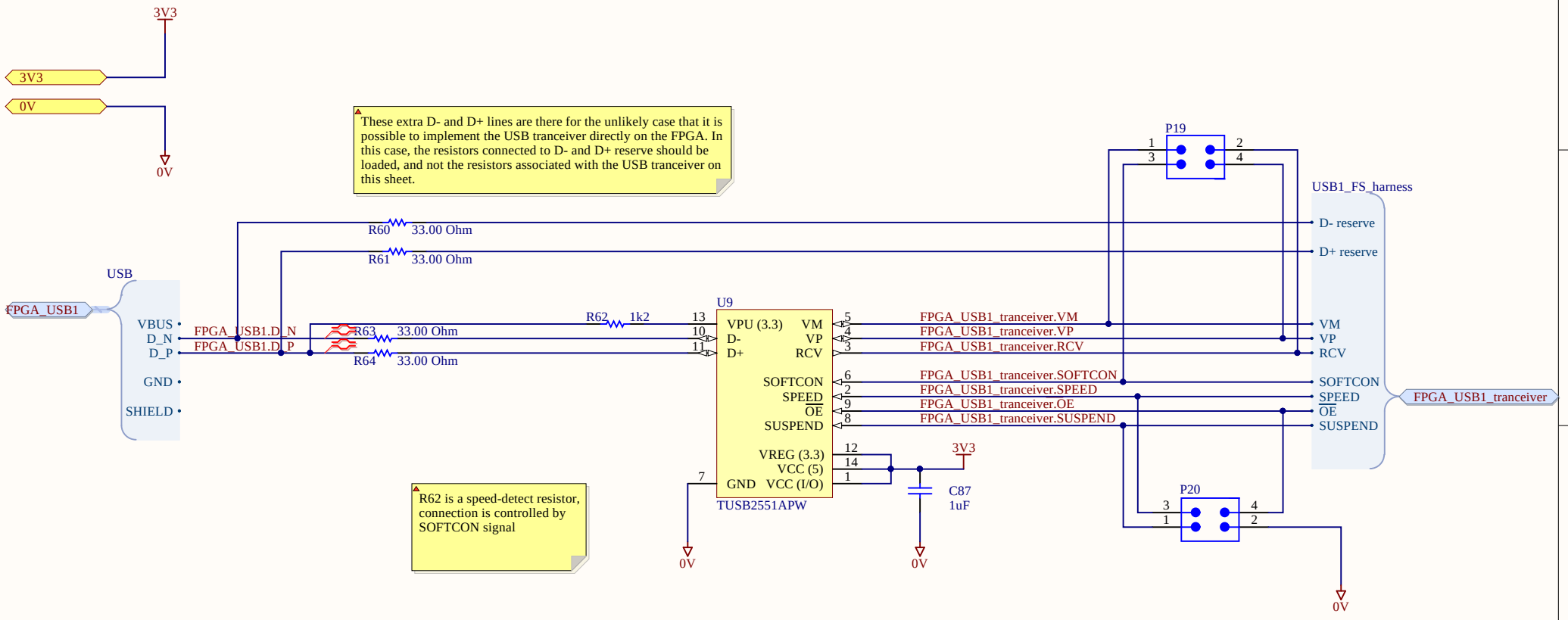

5V_USB
5V_USB
LED17
R72
470
0V
0V
C18
2.2uF
0603
C19
100uF
1206
U3
IN
OUT
EN
ADJ
TAB
GND
LP38501TS-ADJ/NOPB
R22
10k
R23
45k3
R24
10k
C20
100uF
1206
LED13
R25
470
3V3
3V3
3V3 - 3A
0V
R26
470
LED14
R27
470
LED15
5V_USB
1uF
C21
0V
U4
LT6700HVIS6-3#TRPBF
0V
P17
PH2541-2-SPGRH-6-3
P18
PH2541-2-SPGRH-6-3
Power supply sequencing:
1V0 supply (VCCINT) > 0.8 V starts the 1V8 reg (VCCBRAM & VCCAUX)
1V8 supply > 1.25 starts the 3V3 supply (VCCO)
Should give sequence: VCCINT -> VCCAUX -> VCCO [DS181, p 7]
Easily modified and/or removed
LEDs indicate that the supply has not been activated.
Light on : Supply deactivated.
Light off : All good.
U5
LP38501TS-ADJ/NOPB
R28
10k
R29
20k
R31
10k
C22
2.2uF
0603
C23
100uF
1206
C24
100uF
1206
R30
10k
R32
4k7
1v8
1V8
1V8 - 3A
0V
P9
TSW-104-08-G-S
3V3
1V8
1V
0V
U6
LP38501TS-ADJ/NOPB
R33
10k
R34
6k65
R36
10k
C25
2.2uF
0603
C26
100uF
1206
C27
100uF
1206
R35
10k
R37
10k
1V
1V
1V0 - 3A
0V
Board: PACMAN
Version: 0.5
Sheetname: Power Regulators
Sheet 8 of 21
Subject: TDT4295 Datamaskinprosjekt 2016
Group: Ytelse
Shematic file: Power.SchDoc



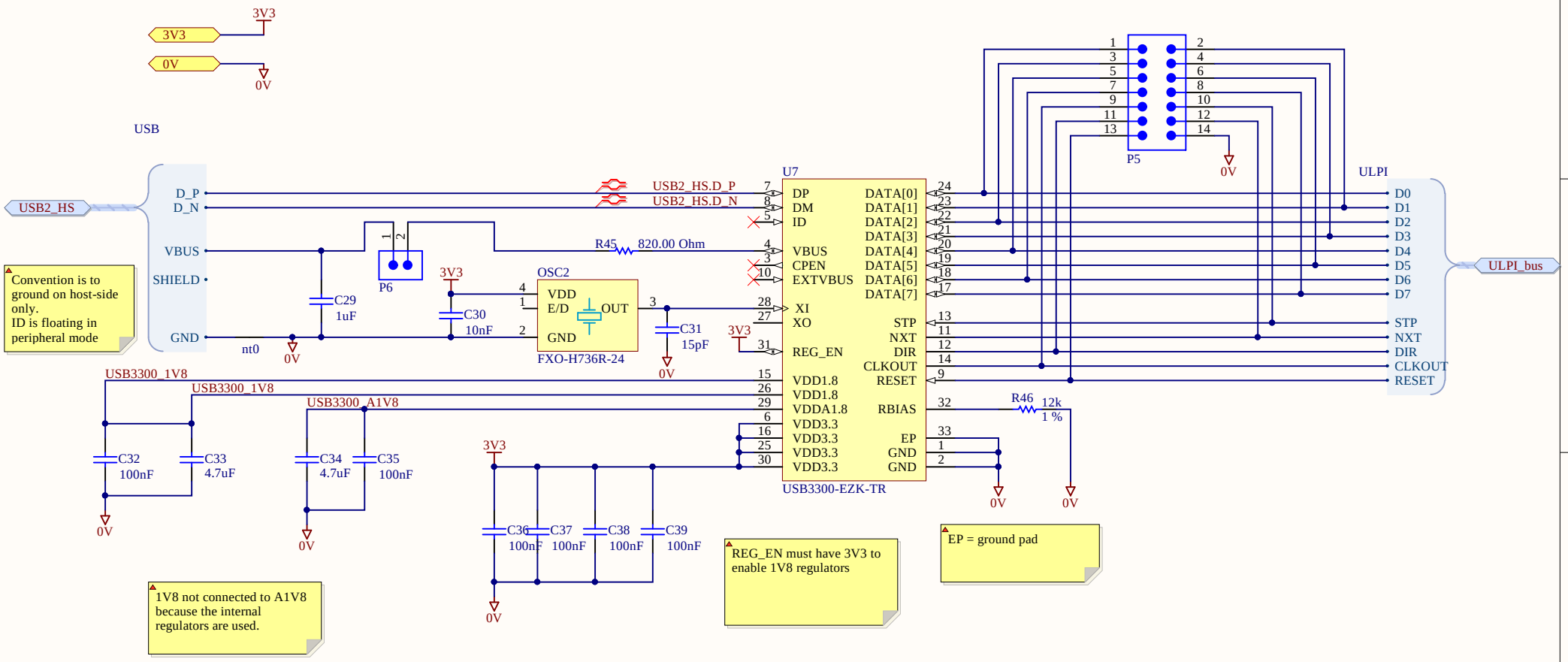
Board:	PACMAN	Version:	0.5
Sheetname:	SD Card	Sheet	9 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	SDtop.SchDoc		



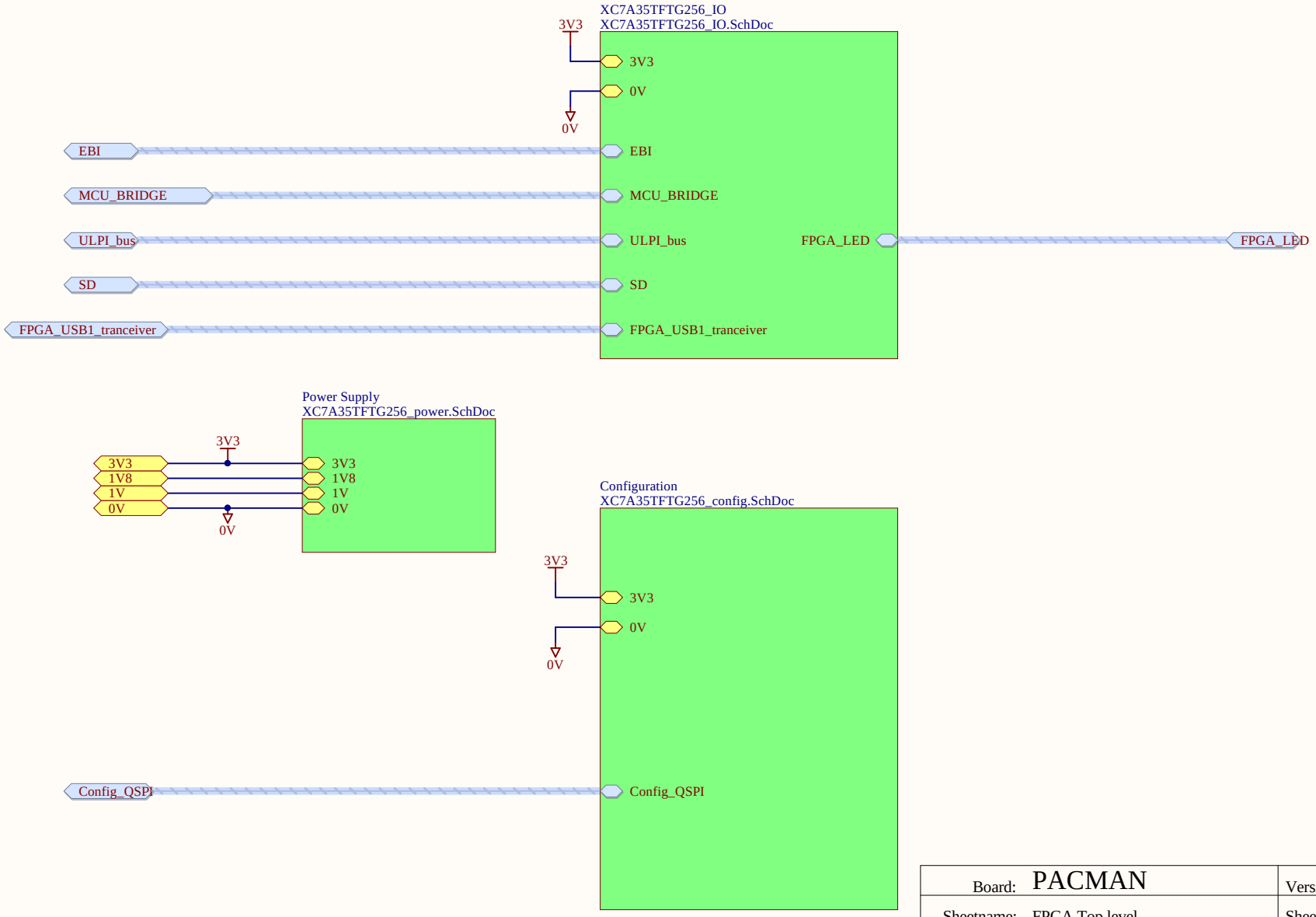
Board:	PACMAN	Version:	0.5
Sheetname:	UART to USB Bridge	Sheet	10 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	UART_connect.SchDoc		



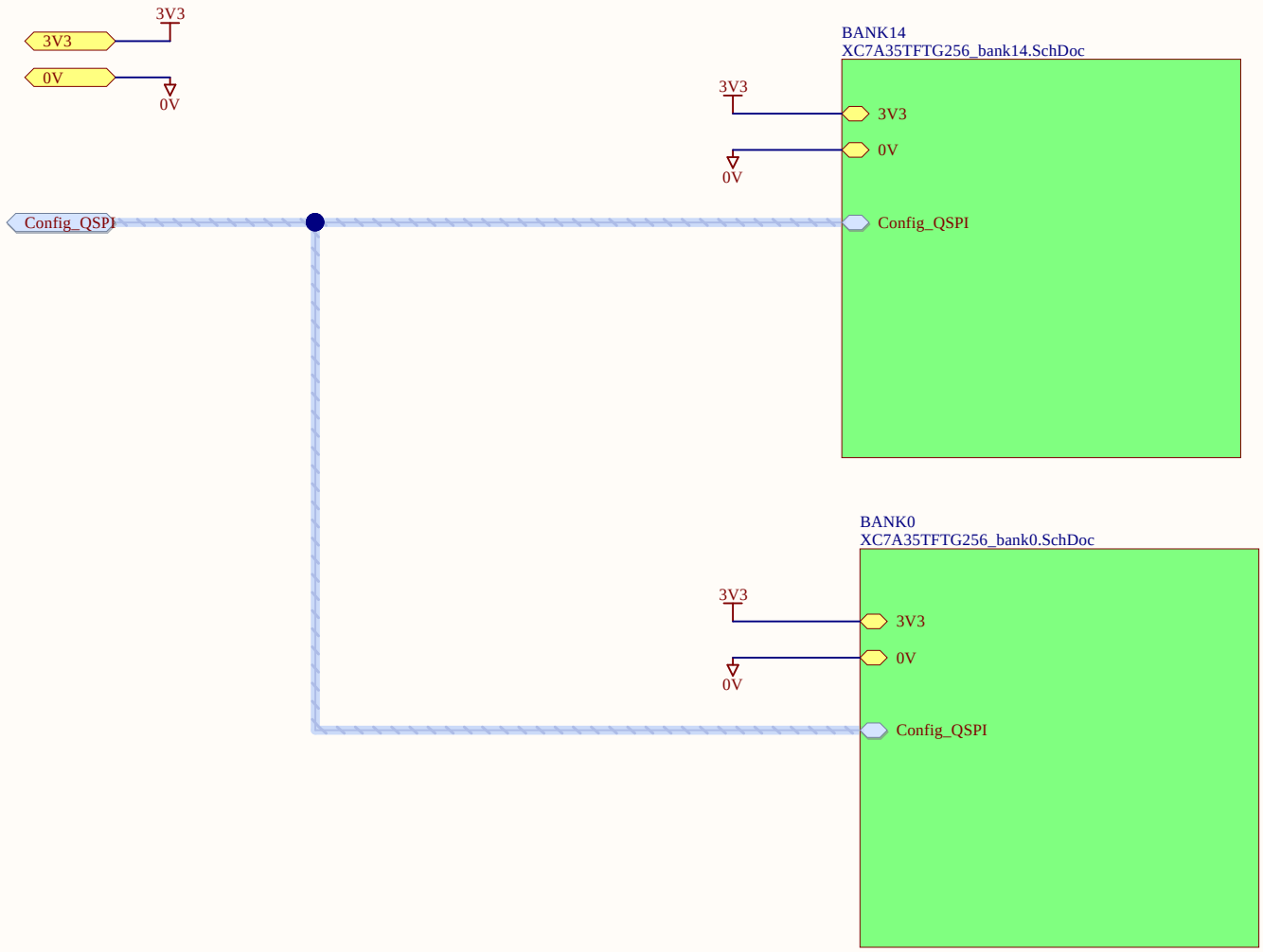
Board:	PACMAN	Version:	0.5
Sheetname:	USB Full Speed tranceiver	Sheet	11 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	USB_trans.SchDoc		



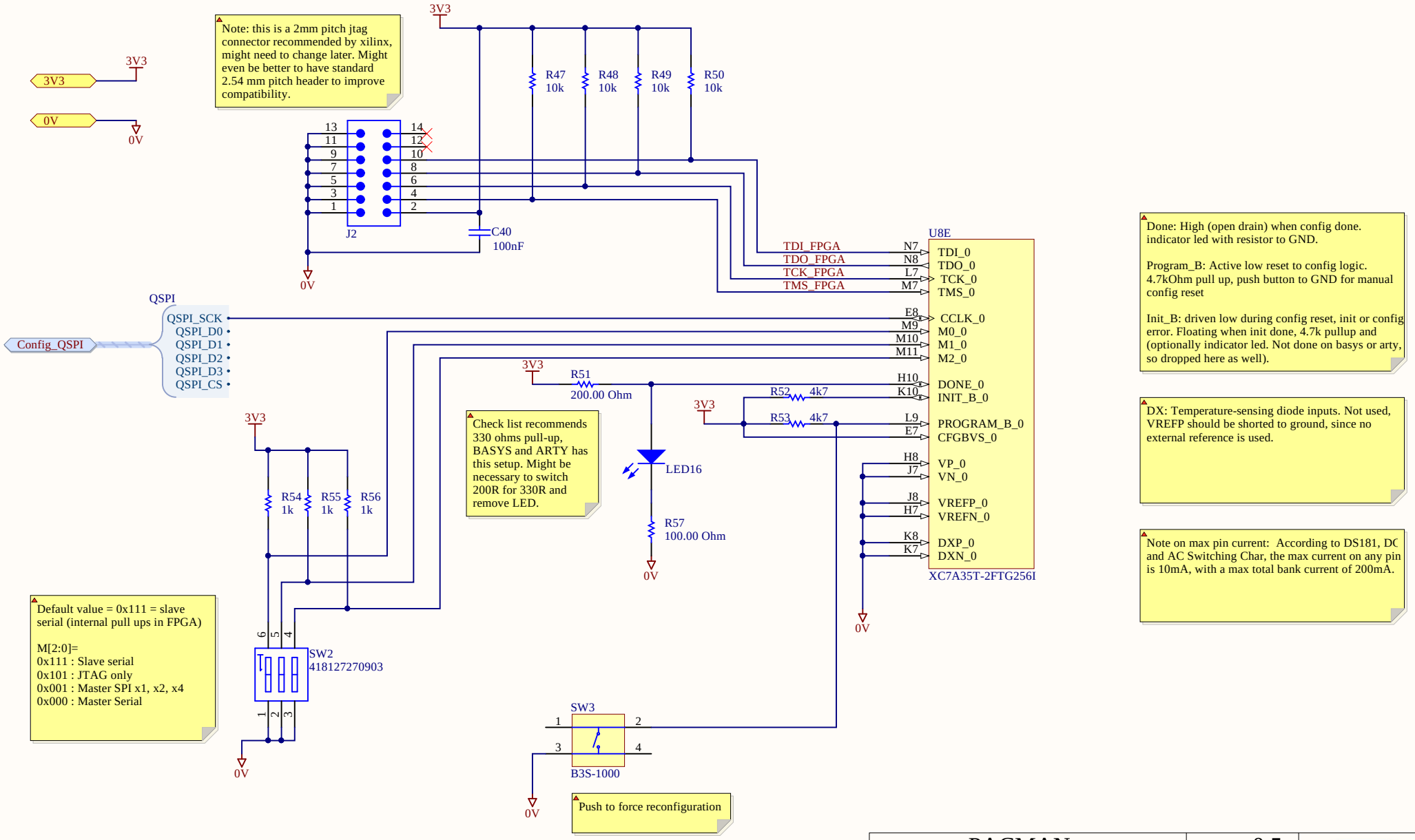
Board:	PACMAN	Version:	0.5
Sheetname:	USB 2.0 HS PHY	Sheet	12 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	USB3300.SchDoc		

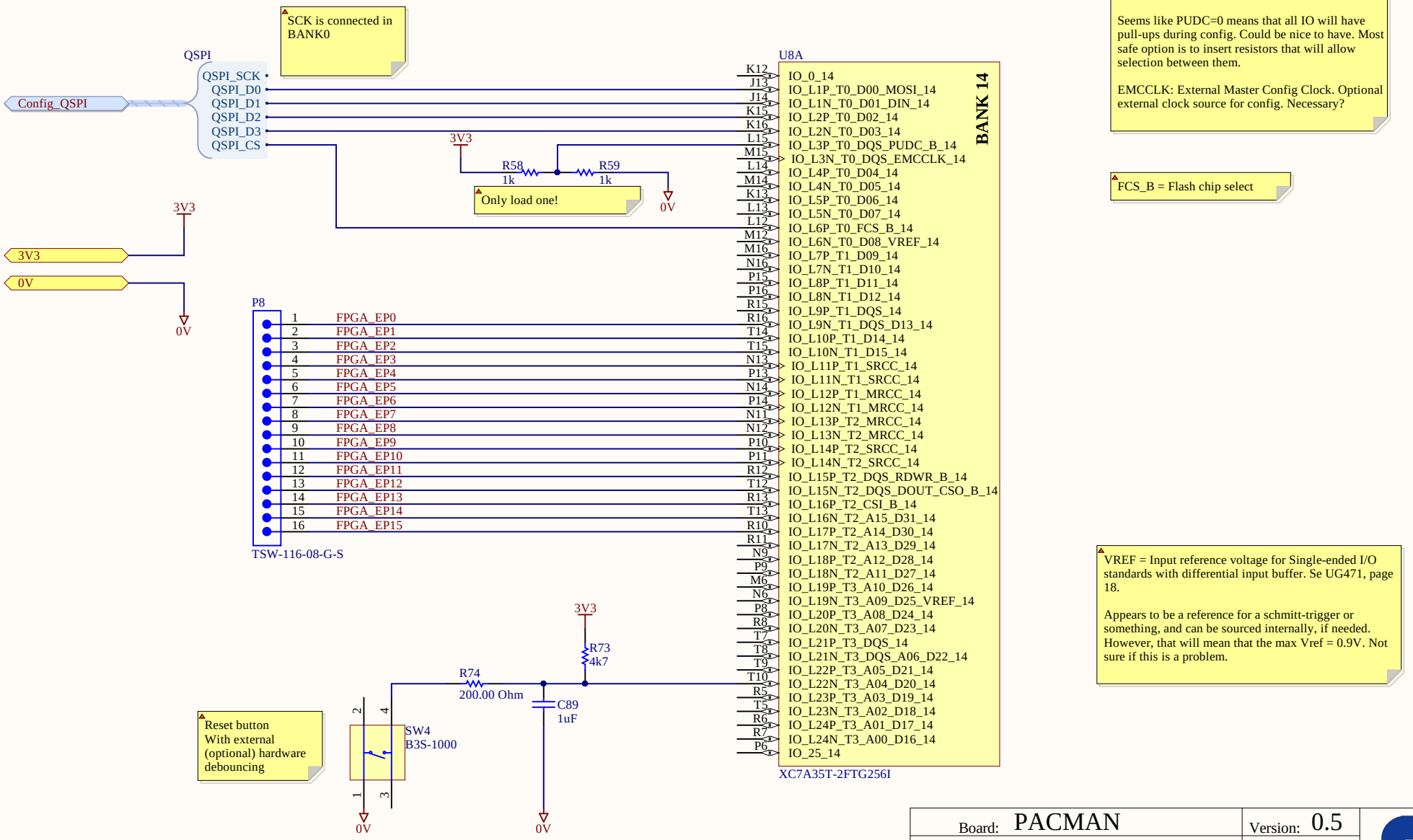


Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Top level	Sheet	13 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256.SchDoc		

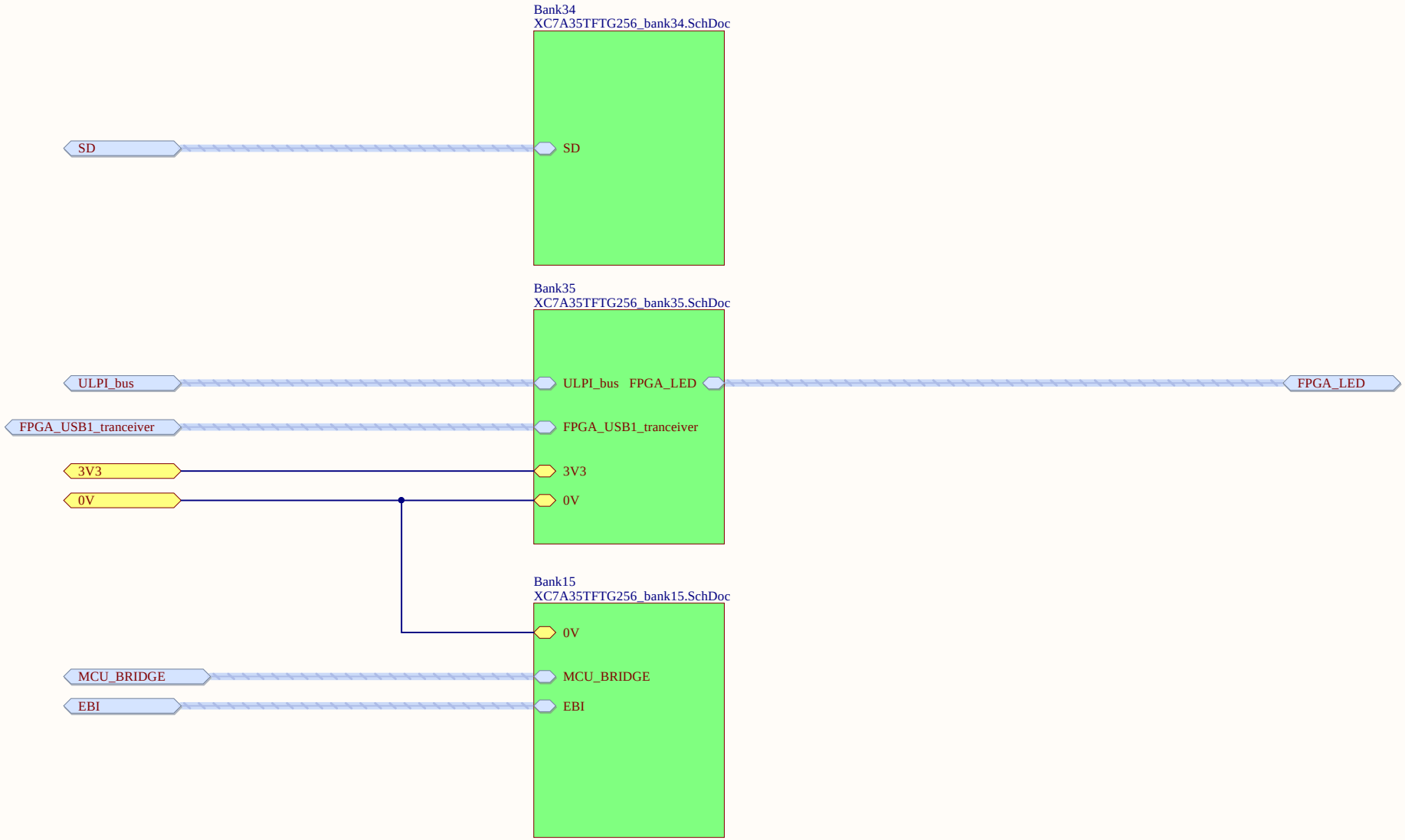


Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Configuration Top Level	Sheet	14 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_config.SchDoc		

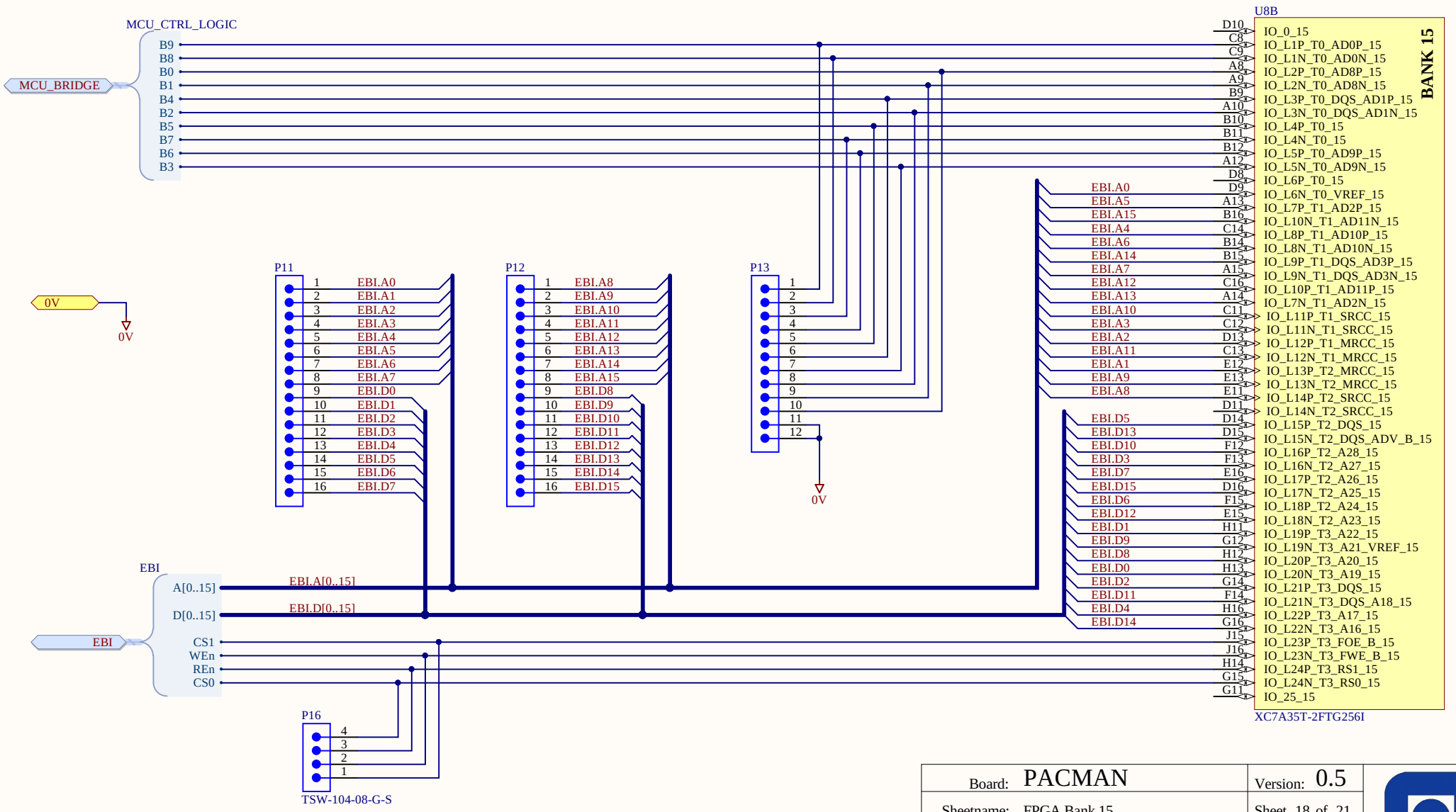

Note: this is a 2mm pitch jtag connector recommended by xilinx, might need to change later. Might even be better to have standard 2.54 mm pitch header to improve compatibility.
3V3
0V
R47 10k
R48 10k
R49 10k
R50 10k
J2
C40 100nF
U8E
TDI_FPGA
TDO_FPGA
TCK_FPGA
TMS_FPGA
TDI_0
TDO_0
TCK_0
TMS_0
CCLK_0
M0_0
M1_0
M2_0
DONE_0
INIT_B_0
PROGRAM_B_0
CFGBVS_0
VP_0
VN_0
VREFP_0
VREFN_0
DXP_0
DXN_0
XC7A35T-2FTG256I
QSPI
Config_QSPI
QSPI_SCK
QSPI_D0
QSPI_D1
QSPI_D2
QSPI_D3
QSPI_CS
R51 200.00 Ohm
R52 4k7
R53 4k7
LED16
R57 100.00 Ohm
Check list recommends 330 ohms pull-up, BASYS and ARTY has this setup. Might be necessary to switch 200R for 330R and remove LED.
R54 1k
R55 1k
R56 1k
SW2 418127270903
Default value = 0x111 = slave serial (internal pull ups in FPGA)
M[2:0]=
0x111 : Slave serial
0x101 : JTAG only
0x001 : Master SPI x1, x2, x4
0x000 : Master Serial
SW3
B3S-1000
Push to force reconfiguration
Done: High (open drain) when config done. indicator led with resistor to GND.
Program_B: Active low reset to config logic. 4.7kOhm pull up, push button to GND for manual config reset
Init_B: driven low during config reset, init or config error. Floating when init done, 4.7k pullup and (optionally indicator led. Not done on basys or arty, so dropped here as well).
DX: Temperature-sensing diode inputs. Not used, VREFP should be shorted to ground, since no external reference is used.
Note on max pin current: According to DS181, DC and AC Switching Char, the max current on any pin is 10mA, with a max total bank current of 200mA.
Board: PACMAN
Version: 0.5
Sheetname: FPGA Bank 0
Sheet 15 of 21
Subject: TDT4295 Datamaskinprosjekt 2016
Group: Ytelse
Shematic file: XC7A35TFTG256_bank0.SchDoc



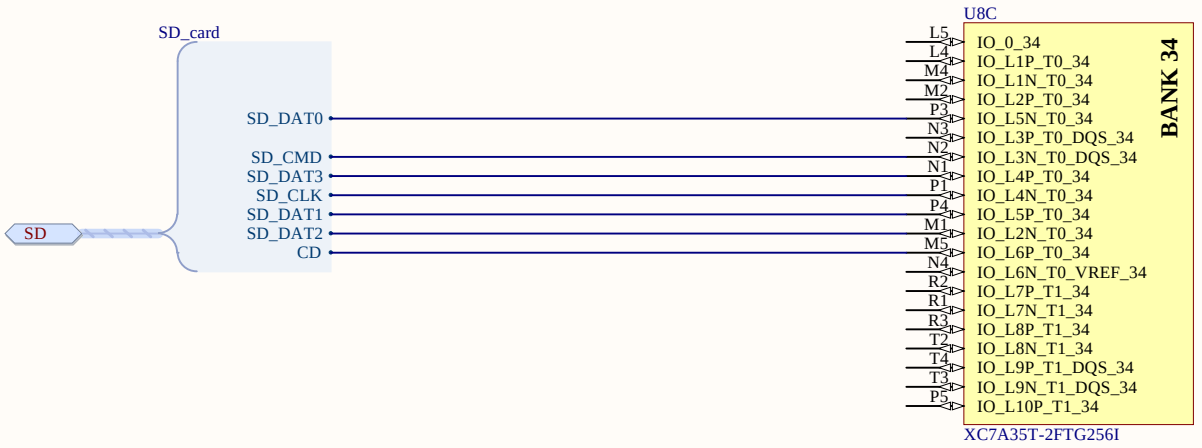
Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Bank 14	Sheet	16 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_bank14.SchDoc		



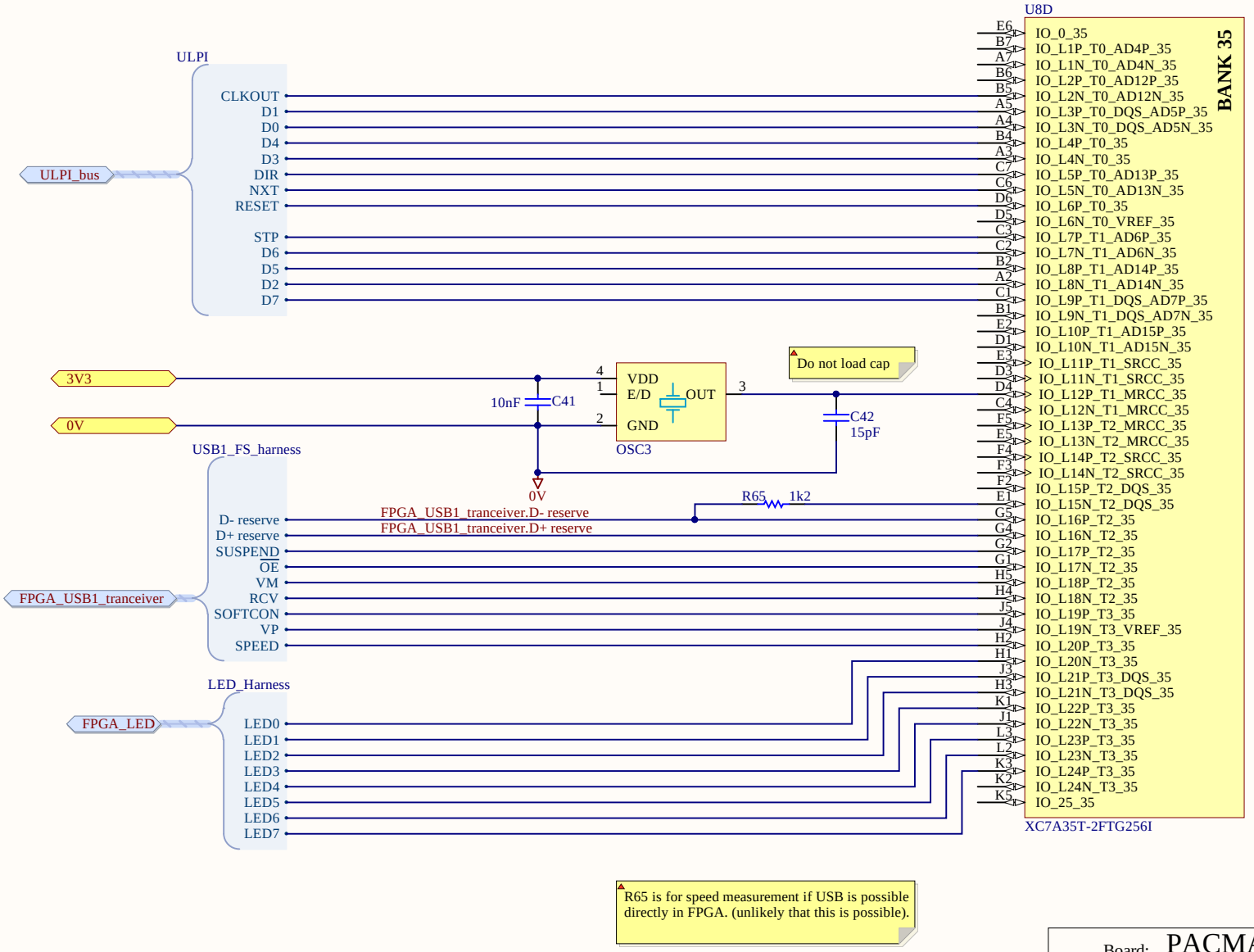
Board:	PACMAN	Version:	0.5
Sheetname:	FPGA IO Top level	Sheet	17 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_IO.SchDoc		



Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Bank 15	Sheet	18 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_bank15.SchDoc		

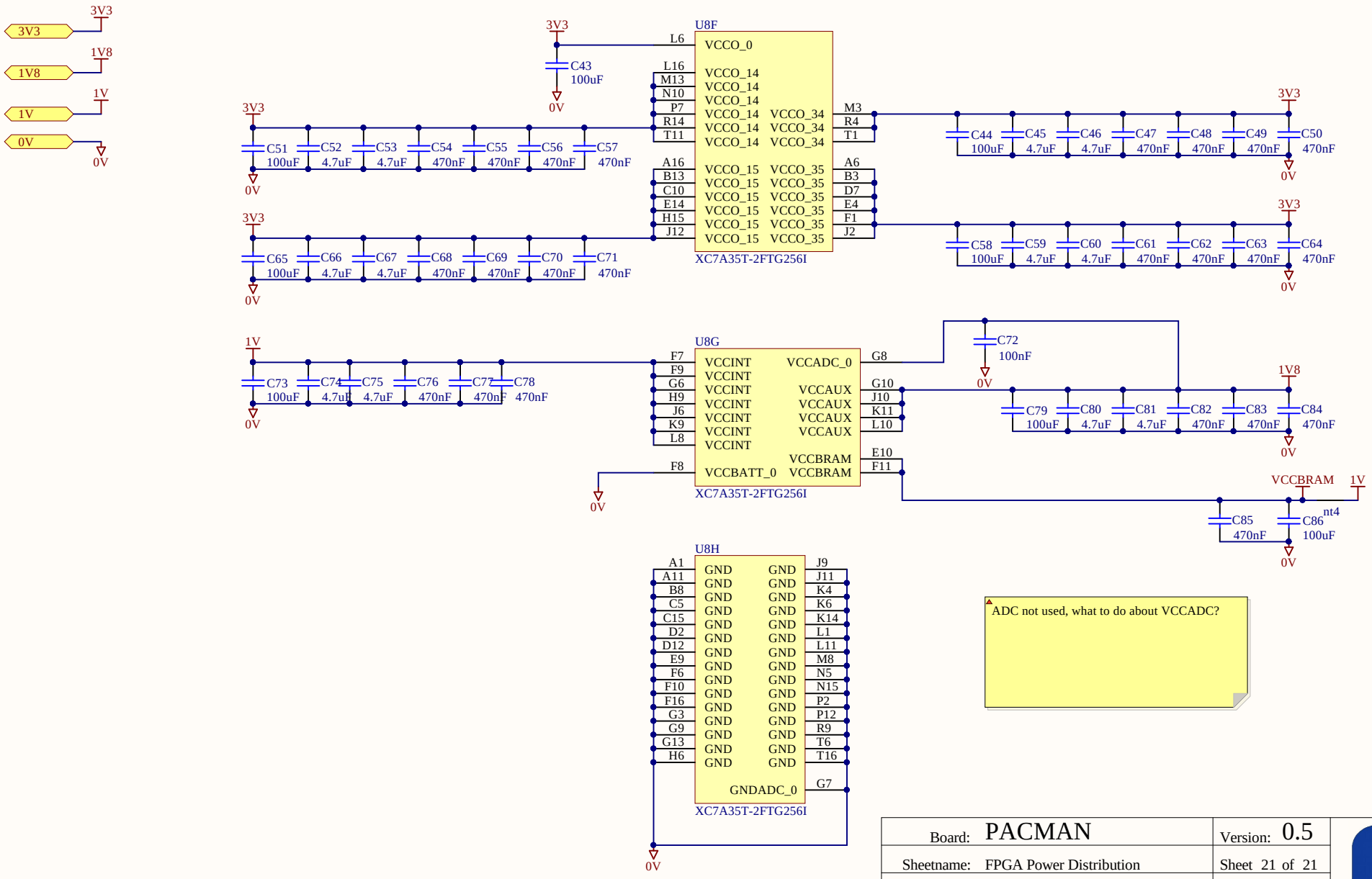


Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Bank 34	Sheet	19 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_bank34.SchDoc		



R65 is for speed measurement if USB is possible directly in FPGA. (unlikely that this is possible).

Board:	PACMAN	Version:	0.5
Sheetname:	FPGA Bank 35	Sheet	20 of 21
Subject:	TDT4295 Datamaskinprosjekt 2016	Group:	Ytelse
Shematic file:	XC7A35TFTG256_bank35.SchDoc		


3V3
1V8
1V
0V
U8F
VCCO_0
VCCO_14
VCCO_34
VCCO_15
VCCO_35
XC7A35T-2FTG256I
C43 100uF
C51 100uF
C52 4.7uF
C53 4.7uF
C54 470nF
C55 470nF
C56 470nF
C57 470nF
C44 100uF
C45 4.7uF
C46 4.7uF
C47 470nF
C48 470nF
C49 470nF
C50 470nF
C65 100uF
C66 4.7uF
C67 4.7uF
C68 470nF
C69 470nF
C70 470nF
C71 470nF
C58 100uF
C59 4.7uF
C60 4.7uF
C61 470nF
C62 470nF
C63 470nF
C64 470nF
U8G
VCCINT
VCCADC_0
VCCAUX
VCCBRAM
VCCBATT_0
C72 100nF
C73 100uF
C74 4.7uF
C75 4.7uF
C76 470nF
C77 470nF
C78 470nF
C79 100uF
C80 4.7uF
C81 4.7uF
C82 470nF
C83 470nF
C84 470nF
C85 470nF
C86 100uF
U8H
GND
GNDADC_0
ADC not used, what to do about VCCADC?
Board: PACMAN
Version: 0.5
Sheetname: FPGA Power Distribution
Sheet 21 of 21
Subject: TDT4295 Datamaskinprosjekt 2016
Group: Ytelse
Shematic file: XC7A35TFTG256_power.SchDoc