Artix_7A50T	
Avnet Engineering Services	
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Function	**Sheet Number**
LEAD SHEET	1
BLOCK DIAGRAM	2
BANK 15 DDR3 Memory	3
USB, QSPI, SHA, I2C, EEPROM	4
BANK 14 DUAL ETHERNET, UART, GPIO	5
BANK 0, SMT2 JTAG, BOOT MODE	6
BANK 34 SWITCHES, LEDS	7
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7 APR 2015

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Avnet Engineering Services		
Title: 01 - Avnet Lead Sheet_C.SchDoc		
Size: B	Project Name: Artix_7A50T	Rev: C
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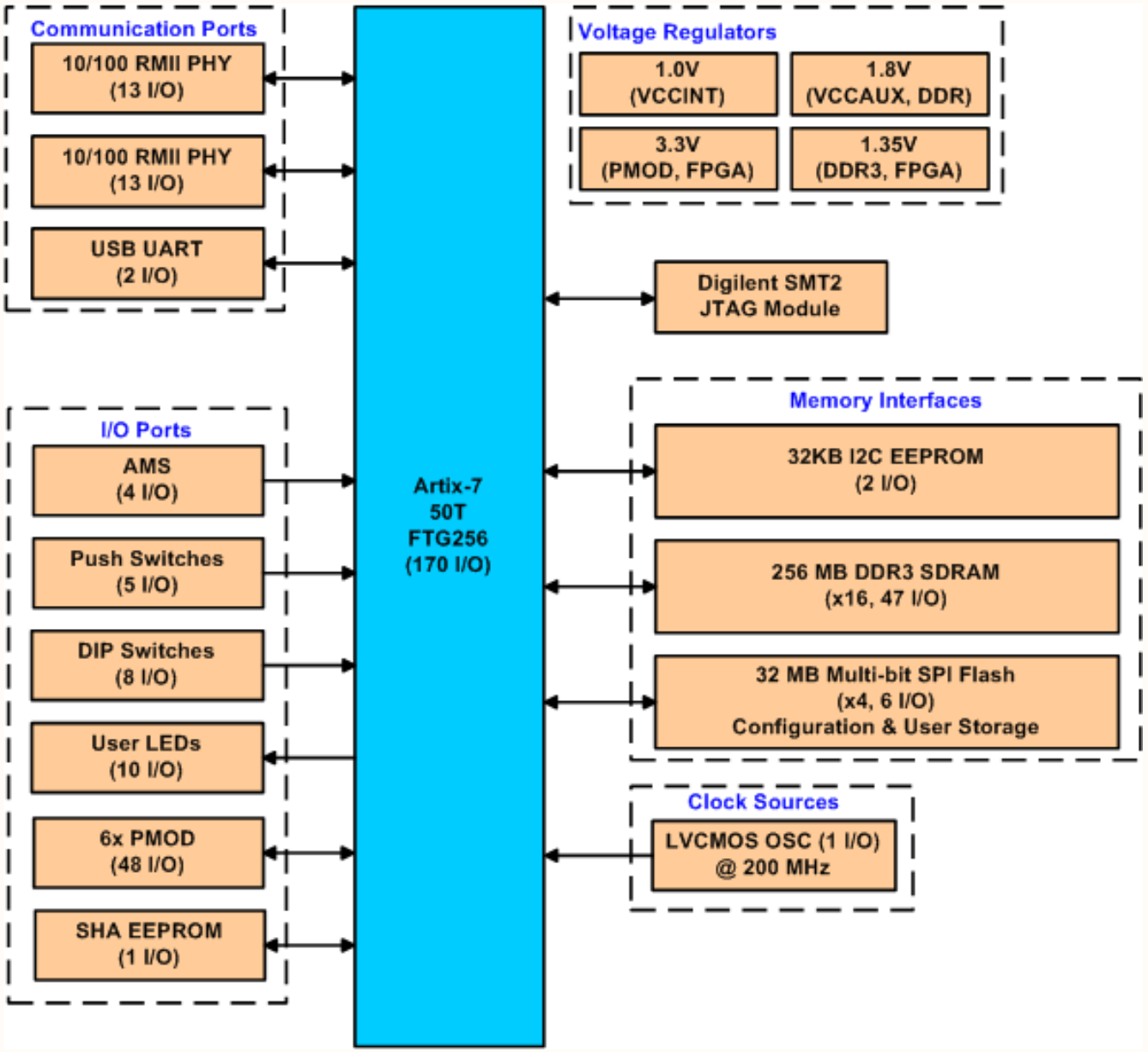
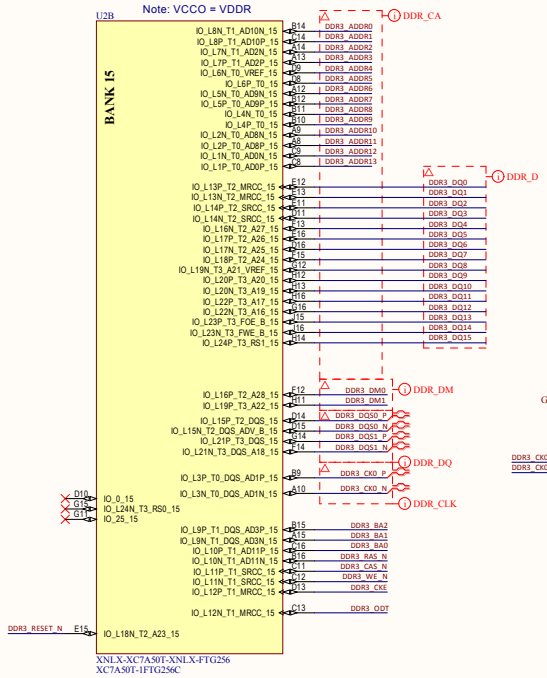
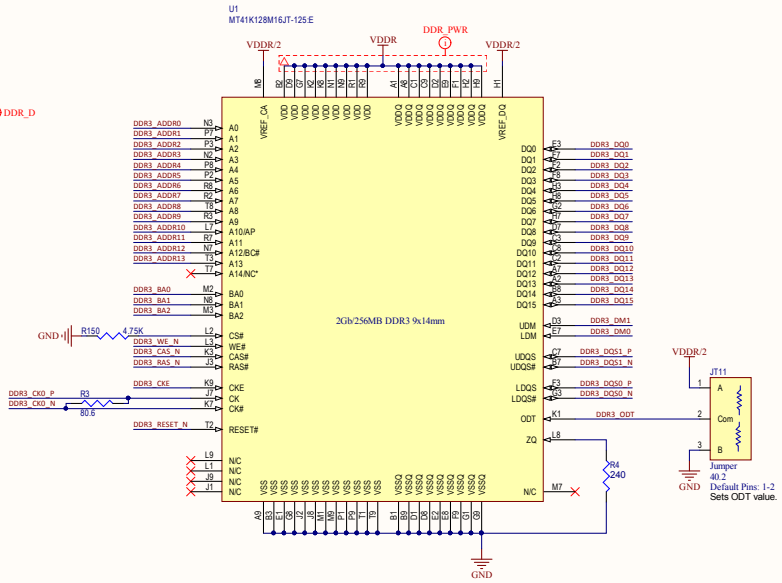
Topology

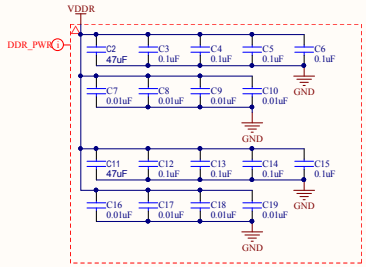


AVNET Avnet Engineering Services		
Title: 02 - Block Diagram.SchDoc		
Size: C	Project Name: Artix_7A50T	Rev: C
Date: 4/7/2015	Sheet 2 of 11	

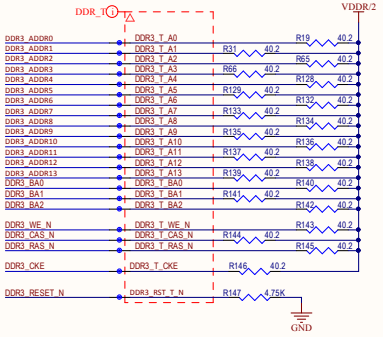


256MB DDR3 1600 MEMORY

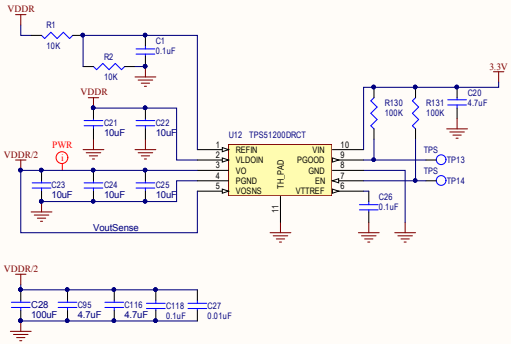




DDR3 ADDR & CNTRL TERMINATION RESISTORS



DDR3 TERMINATION REGULATOR



DDR3 single-ended traces are 40 Ohms impedance
DDR3 Differential traces are 80 Ohms differential impedance

All DDR RAM traces are matched length and less than 2540 mils (25 mm). The below information is general guidance and is pending the FR4 board material composition and stack up.

Address and command trace spacing is 10 mil min for short runs, 4 mils clearance for parallel runs less than 500 mils.
Data trace spacing is 10 mil min for short runs, 4 mils clearance for parallel runs less than 500 mils.

Place clock signals on internal layers to minimize EMI.
Match CK trace length to CK# trace length within +/- 20 mil.
Clock pairs should be equivalent within +/- 20 mil.
Clock and DQS should be length matched.
Clock to Address / Control should be matched within +/-400 mil.

For further information, see Micron's Tech Notes: TN4113 & TN-52-02

Avnet Engineering Services		
Title: 03 - BANK 15 DDR3 Memory.SchDoc		
Size: C	Project Name: Artix_7A50T	Rev: C
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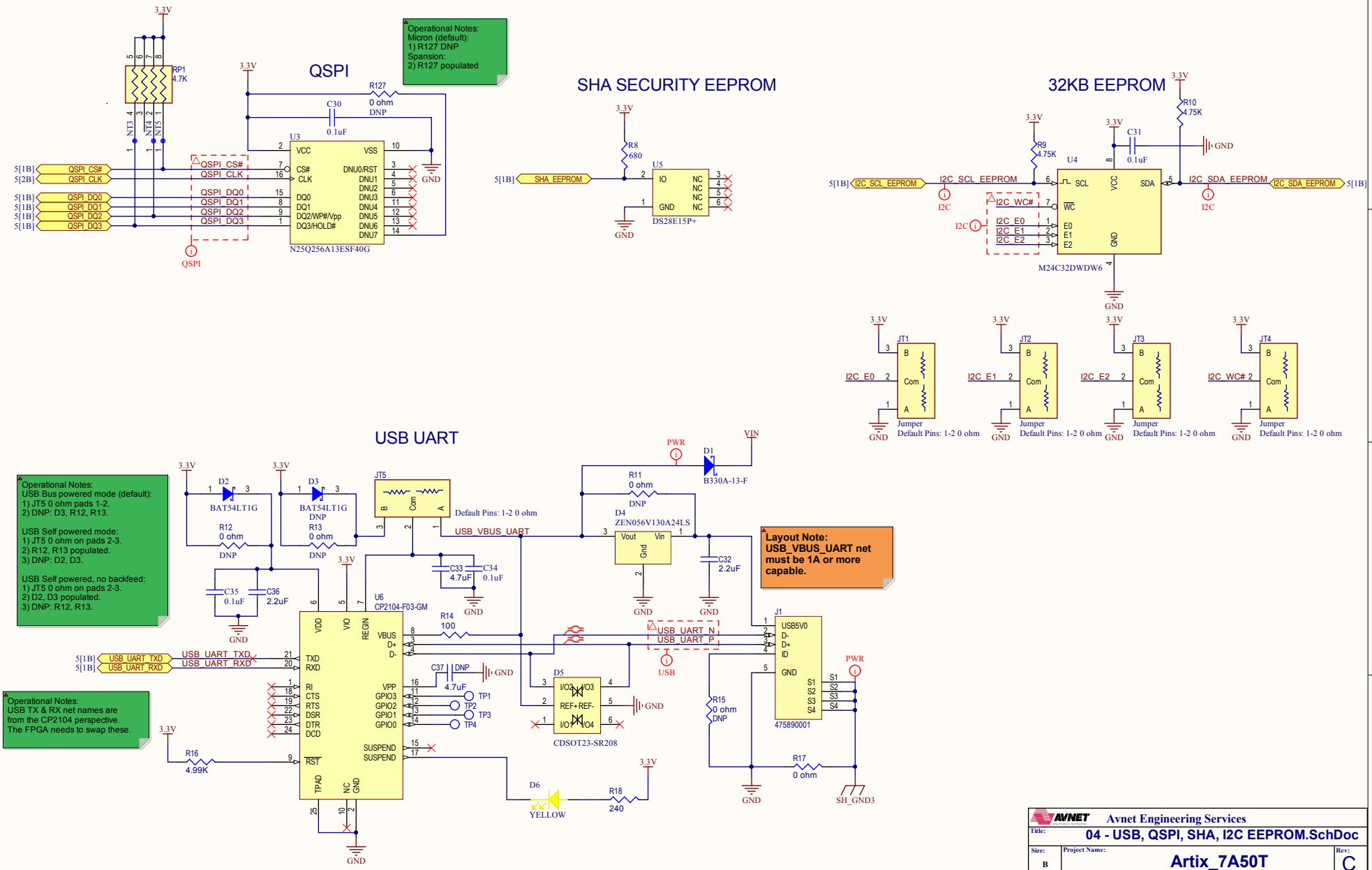
QSPI
SHA SECURITY EEPROM
32KB EEPROM
USB UART
Operational Notes:
Micron (default):
1) R127 DNP
Spansion:
2) R127 populated
N25Q256A13ESF40G
DS28E15P+
M24C32DWDW6
Jumper
Default Pins: 1-2 0 ohm
Operational Notes:
USB Bus powered mode (default):
1) JT5 0 ohm pads 1-2.
2) DNP: D3, R12, R13.
USB Self powered mode:
1) JT5 0 ohm on pads 2-3.
2) R12, R13 populated.
3) DNP: D2, D3.
USB Self powered, no backfeed:
1) JT5 0 ohm on pads 2-3.
2) D2, D3 populated.
3) DNP: R12, R13.
Layout Note:
USB_VBUS_UART net must be 1A or more capable.
Operational Notes:
USB TX & RX net names are from the CP2104 perspective. The FPGA needs to swap these.
CP2104-F03-GM
CDSOT23-SR208
B330A-13-F
ZEN056V130A24LS
BAT54LT1G
475890001
YELLOW
Avnet Engineering Services
Title: 04 - USB, QSPI, SHA, I2C EEPROM.SchDoc
Size: B
Project Name: Artix_7A50T
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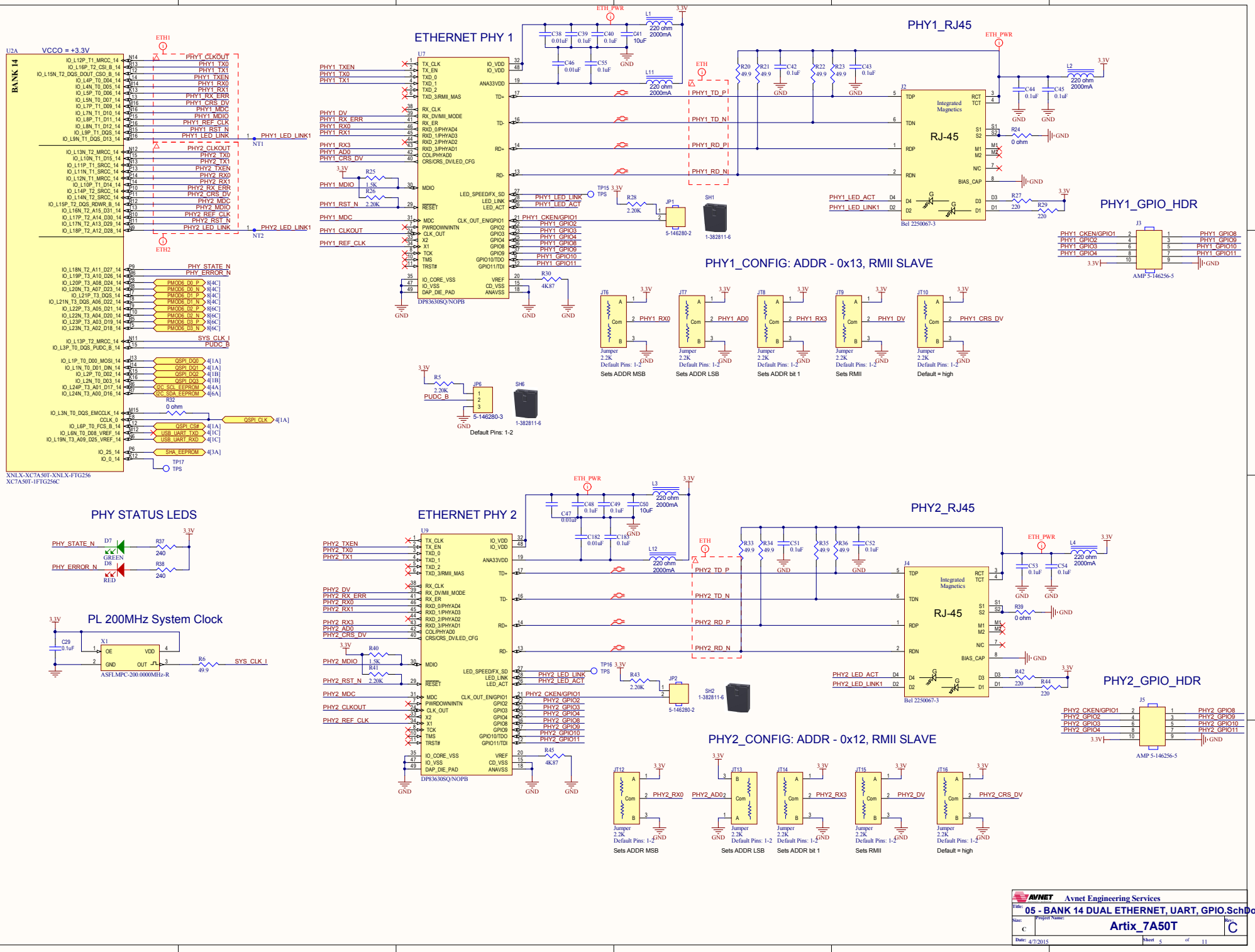
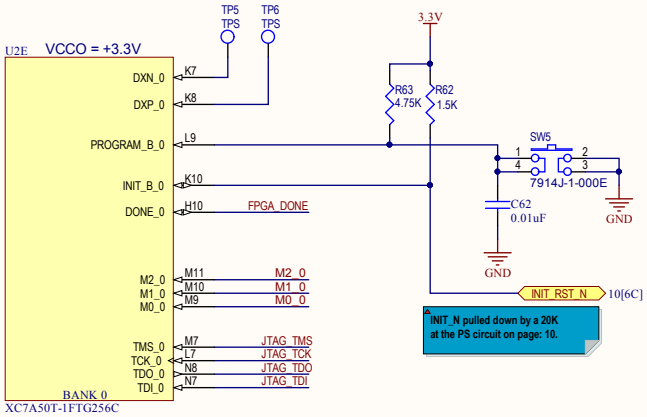
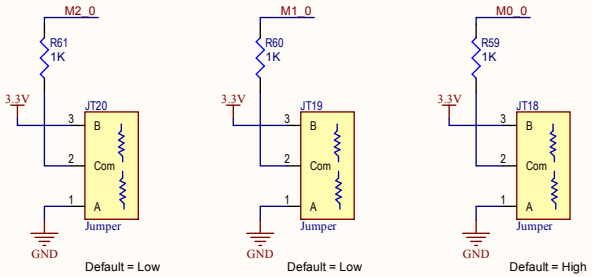

BANK 14
VCCO = +3.3V
XNLX-XC7A50T-XNLX-FTG256
XC7A50T-1FTG256C
ETHERNET PHY 1
DP83630SQ/NOPB
PHY1_RJ45
RJ-45
Integrated Magnetics
Bel 2250067-3
PHY1_GPIO_HDR
AMP 5-146256-5
PHY1_CONFIG: ADDR - 0x13, RMII SLAVE
Sets ADDR MSB
Sets ADDR LSB
Sets ADDR bit 1
Sets RMII
Default = high
PHY STATUS LEDS
PL 200MHz System Clock
ASFLMPC-200.0000MHz-R
ETHERNET PHY 2
PHY2_RJ45
PHY2_GPIO_HDR
PHY2_CONFIG: ADDR - 0x12, RMII SLAVE
Avnet Engineering Services
05 - BANK 14 DUAL ETHERNET, UART, GPIO.SchDoc
Artix_7A50T
4/7/2015
Sheet 5 of 11

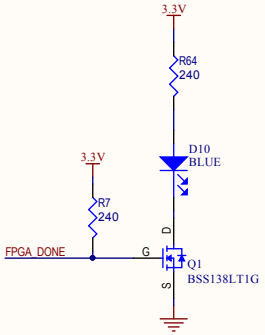
PROG_PB RESET



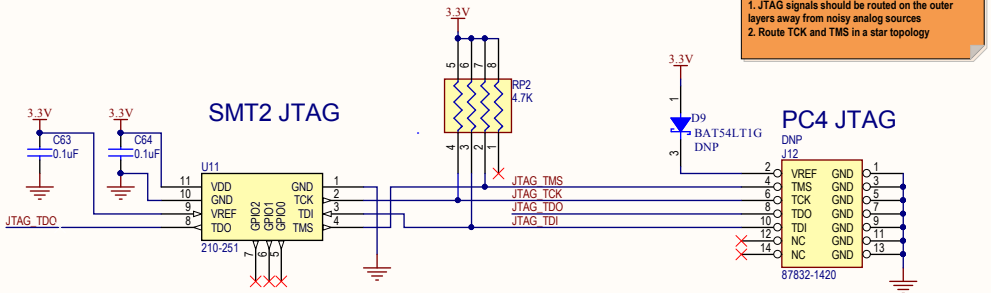
BOOT MODE SELECT



FPGA DONE LED



DUAL JTAG



Layout Note:

JTAG circuit routing should adhere to the following guidelines:
1. JTAG signals should be routed on the outer layers away from noisy analog sources
2. Route TCK and TMS in a star topology

Avnet Engineering Services		
Title: 06 - BANK 0, SMT2 JTAG, BOOT MODE.SchDoc		
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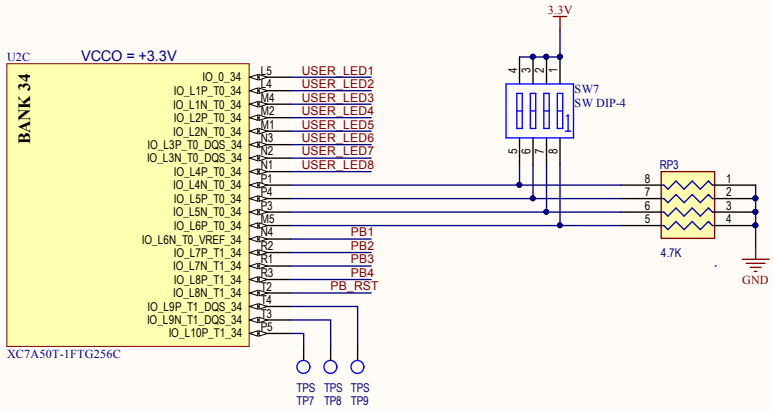
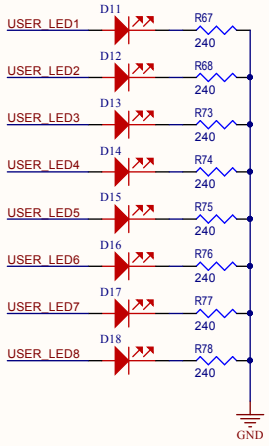
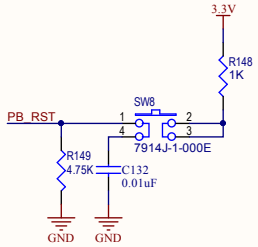
USER SLIDE SWITCHES



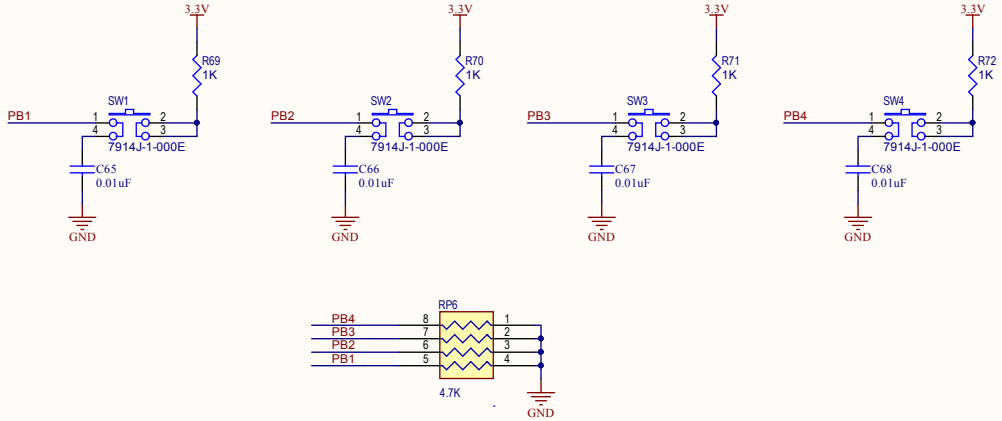
8 USER LEDS



CPU_RST



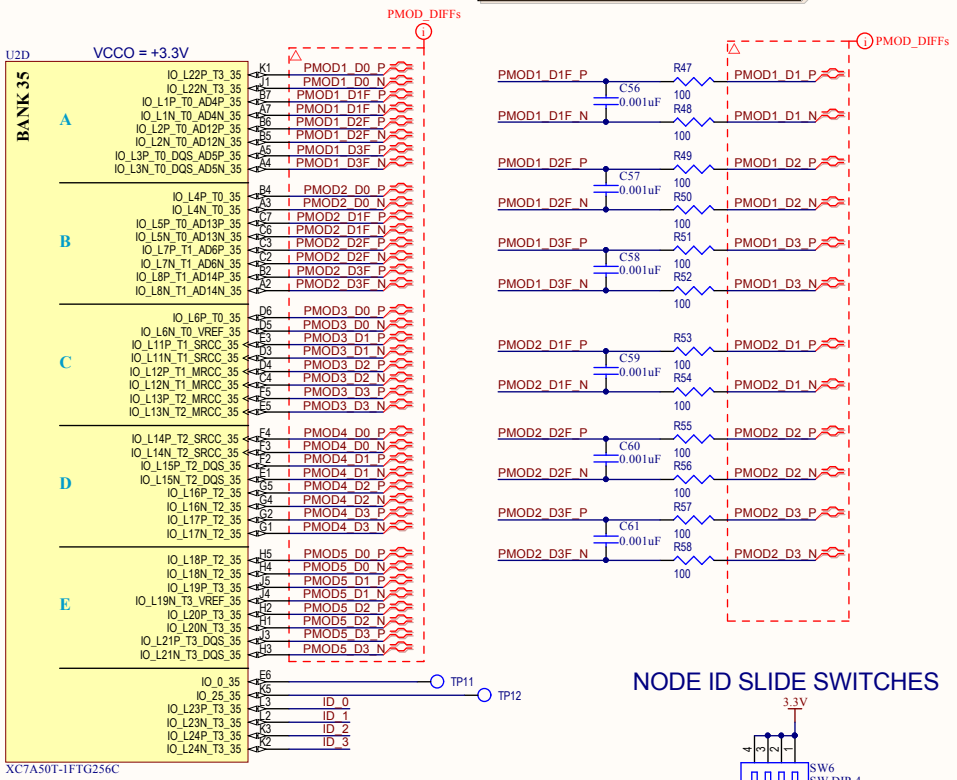
USER_PUSH_BUTTONS



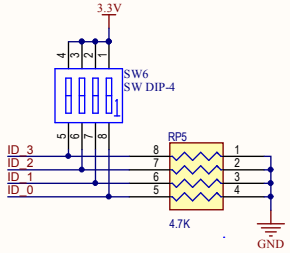
Avnet Engineering Services		
Title: 07 - BANK 34 SWITCHES, LEDs.SchDoc		
Size: B	Project Name: Artix_7A50T	Rev: C
Date: 4/7/2015	Sheet 7 of 11	

LAYOUT NOTE:
All PMOD signals routed differentially (P/N pairs) and length tuned to each other on each header.

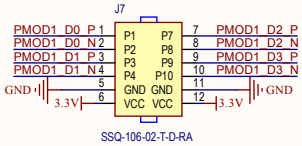
LAYOUT NOTE:
Place resistors and capacitors as close as possible to FPGA.



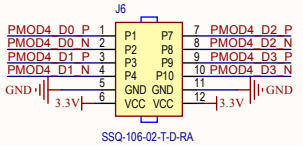
NODE ID SLIDE SWITCHES



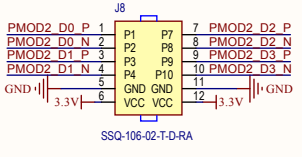
PMOD 1 Interface



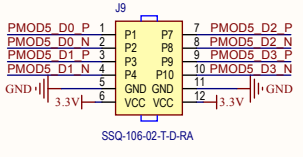
PMOD 4 Interface



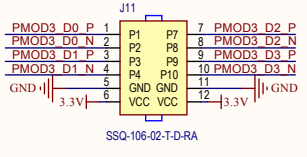
PMOD 2 Interface



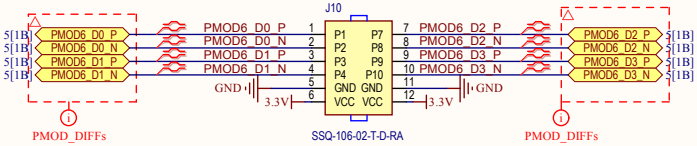
PMOD 5 Interface



PMOD 3 Interface



PMOD 6 Interface



Avnet Engineering Services		
Title: 08 - BANK 35 PMOD Interfaces.SchDoc		
Size: B	Project Name: Artix_7A50T	Rev: C
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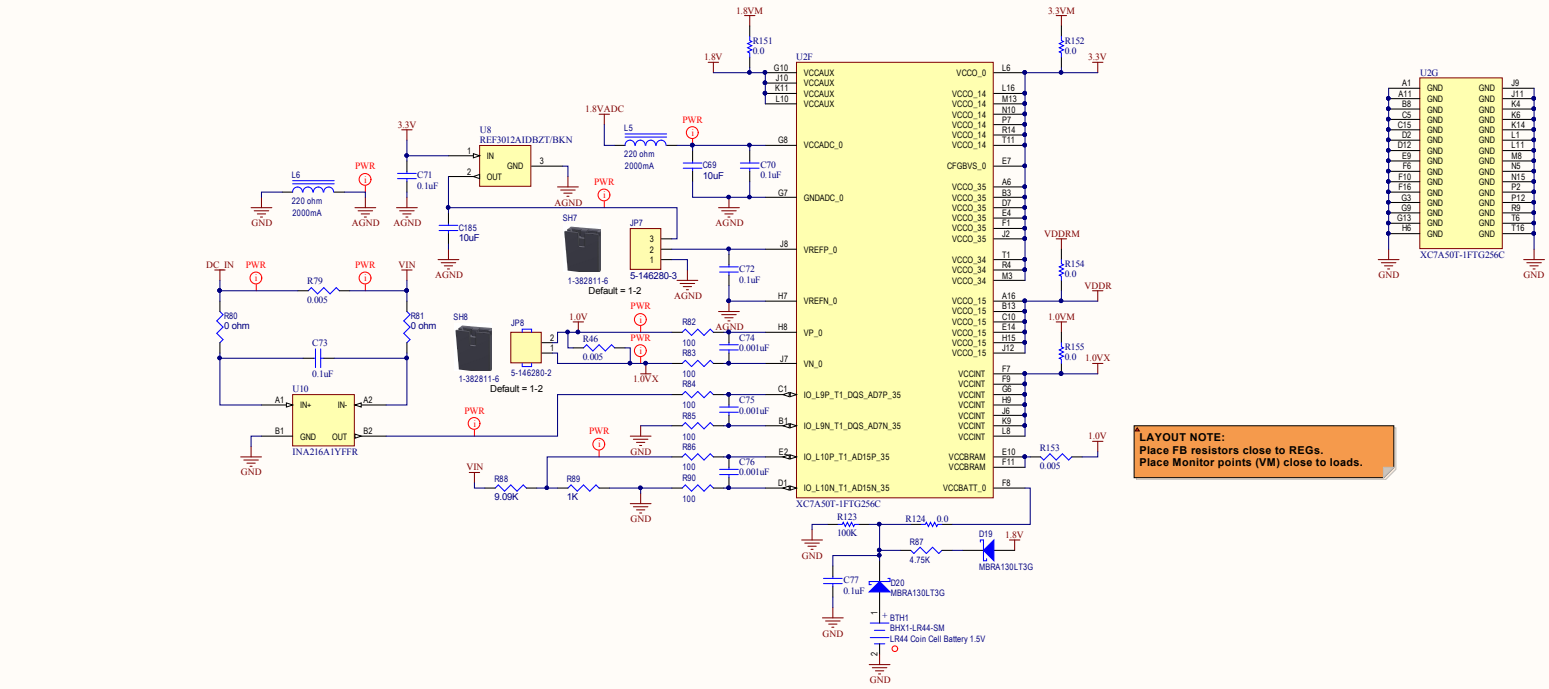
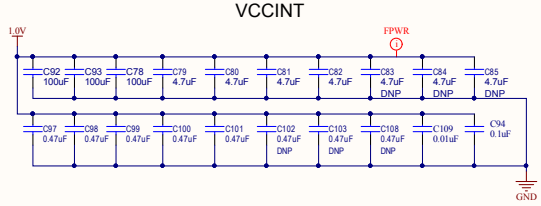
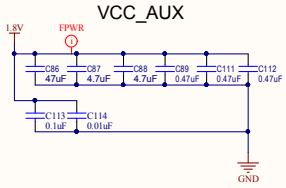
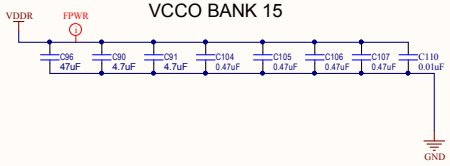
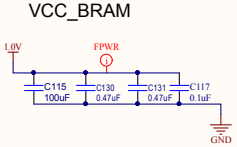
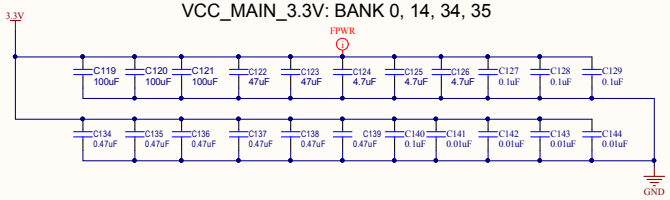




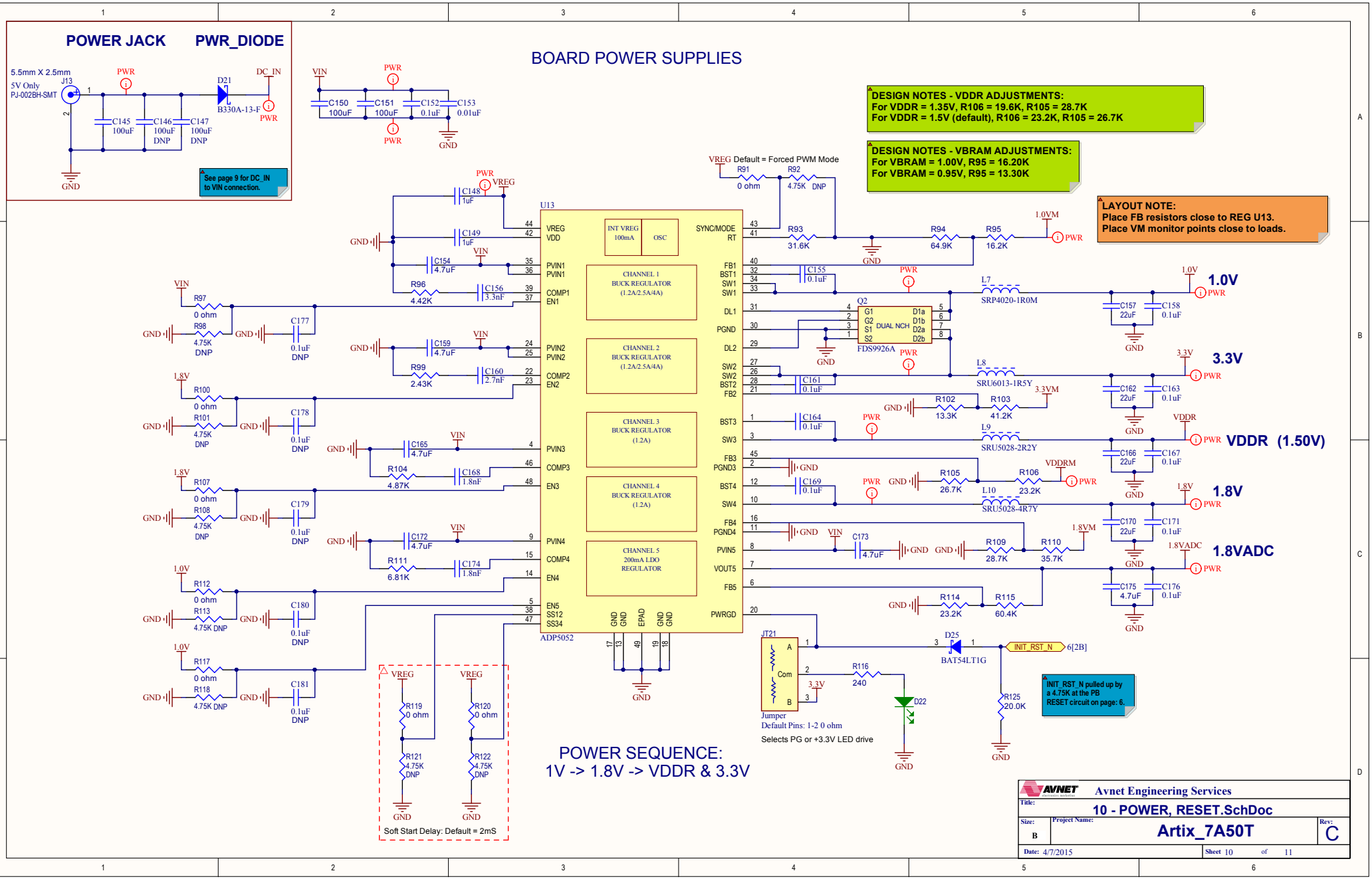








AVNET Avnet Engineering Services		
Title: 09 - FPGA POWER.SchDoc		
Size: C	Project Name: Artix_7A50T	Rev: C
Date: 4/7/2015	Sheet 9 of 11	


POWER JACK
PWR_DIODE
5.5mm X 2.5mm
5V Only
PJ-002BH-SMT
J13
D21
B330A-13-F
DC_IN
C145 100uF
C146 100uF DNP
C147 100uF DNP
See page 9 for DC_IN to VIN connection.
BOARD POWER SUPPLIES
C150 100uF
C151 100uF
C152 0.1uF
C153 0.01uF
DESIGN NOTES - VDDR ADJUSTMENTS:
For VDDR = 1.35V, R106 = 19.6K, R105 = 28.7K
For VDDR = 1.5V (default), R106 = 23.2K, R105 = 26.7K
DESIGN NOTES - VBRAM ADJUSTMENTS:
For VBRAM = 1.00V, R95 = 16.20K
For VBRAM = 0.95V, R95 = 13.30K
LAYOUT NOTE:
Place FB resistors close to REG U13.
Place VM monitor points close to loads.
VREG Default = Forced PWM Mode
R91 0 ohm
R92 4.75K DNP
U13
INT VREG 100mA
OSC
CHANNEL 1 BUCK REGULATOR (1.2A/2.5A/4A)
CHANNEL 2 BUCK REGULATOR (1.2A/2.5A/4A)
CHANNEL 3 BUCK REGULATOR (1.2A)
CHANNEL 4 BUCK REGULATOR (1.2A)
CHANNEL 5 200mA LDO REGULATOR
ADP5052
R93 31.6K
R94 64.9K
R95 16.2K
1.0VM
1.0V
L7 SRP4020-1R0M
Q2 DUAL NCH FDS9926A
C157 22uF
C158 0.1uF
3.3V
L8 SRU6013-1R5Y
C162 22uF
C163 0.1uF
R102 13.3K
R103 41.2K
3.3VM
VDDR
VDDR (1.50V)
L9 SRU5028-2R2Y
C166 22uF
C167 0.1uF
R105 26.7K
R106 23.2K
VDDRM
1.8V
L10 SRU5028-4R7Y
C170 22uF
C171 0.1uF
1.8VM
1.8VADC
R109 28.7K
R110 35.7K
C175 4.7uF
C176 0.1uF
R114 23.2K
R115 60.4K
JT21
Jumper
Default Pins: 1-2 0 ohm
Selects PG or +3.3V LED drive
D25 BAT54LT1G
INIT_RST_N
6[2B]
R116 240
D22
R125 20.0K
INIT_RST_N pulled up by a 4.75K at the PB RESET circuit on page: 6.
POWER SEQUENCE:
1V -> 1.8V -> VDDR & 3.3V
Soft Start Delay: Default = 2mS
Avnet Engineering Services
Title: 10 - POWER, RESET.SchDoc
Size: B
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Mechanicals:

PCB
A7MB-7A50T-PCB-B

PCB Mounting Holes

MTG1
0
MOUNTING HOLE 125mil

MTG2
0
MOUNTING HOLE 125mil

MTG3
0
MOUNTING HOLE 125mil

MTG4
0
MOUNTING HOLE 125mil

Bumper Standoffs

BMPR1
0
SJ61A4
7.9mm Bumper

BMPR2
0
SJ61A4
7.9mm Bumper

BMPR3
0
SJ61A4
7.9mm Bumper

BMPR4
0
SJ61A4
7.9mm Bumper

AVNET Avnet Engineering Services		
Title: 11 - Back Page.SchDoc		
Size: B	Document Number: Artix_7A50_C.PrjPcb	Rev: C
Date: 4/7/2015	Sheet 11 of 11	