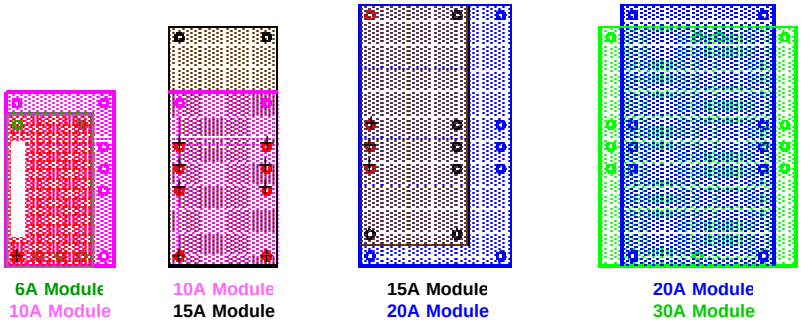
PR221

Virtex™-II Design 3

Module-based (PTHxxxx series) Power Management Solution Providing I_{CCINT} = 15 A from V_{IN} = 5.0 V and Featuring Sequential Sequencing

FEATURES:

- Simple to use plug-in modules enables fast time-to-market
- High efficiency minimizes heat
- Interchange modules to support
  - 6A to 30A load currents
  - If current requirements decrease, easy to use dual footprints allow cost reduction without redesign



  - 3.3V, 5V, or 12V input supply
- In-rush current (for charging decoupling capacitors and FPGA start-up) that places a demand on the input power supply is minimized by the use of optional:
  - Integrated soft-start provides 5 ms rise time for V_{CCINT} and V_{CCO}
  - Sequencing of V_{CCINT}, V_{CCO}, then V_{CCAUX} using TPS3803 SVSs
- High UVLO trip point and integrated soft-start of the PTH series modules eliminates the need for an external Supply Voltage Supervisor (SVS) to monitor the input rail.
- The design meets Xilinx's V_{CCINT} and V_{CCO} start-up profile requirements, where applicable, including monotonic voltage ramp, in-rush current and power voltage ramp time requirements.

IMPORTANT WEB LINKS:

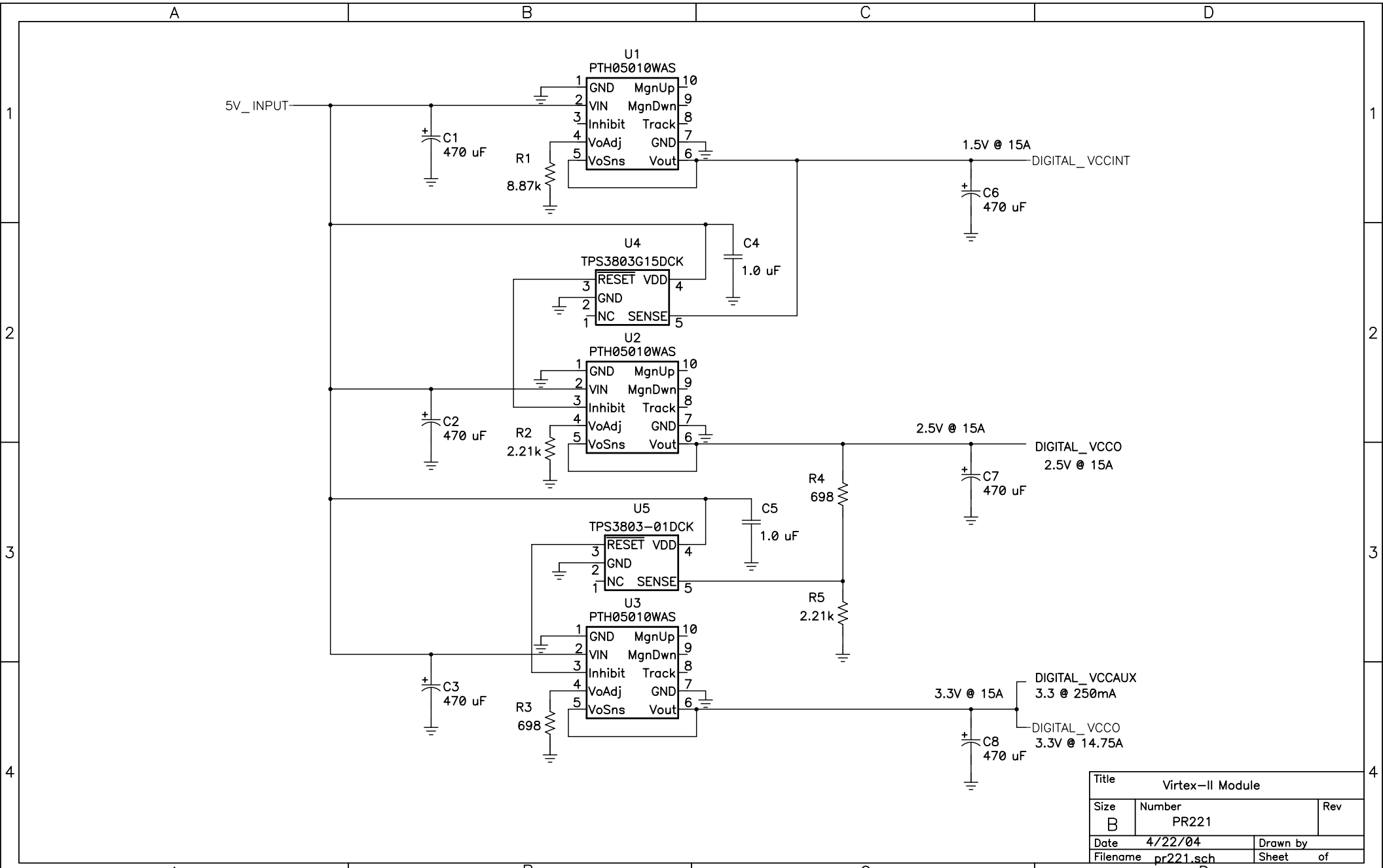
- Link to the TI home page for Xilinx FPGA power management solutions at http://www.ti.com/xilinxfpga for more information and other reference designs.
- Link to datasheets at http://focus.ti.com/lit/ds/symlink/pth05010w.pdf and http://focus.ti.com/lit/ds/symlink/tps3803-01.pdf.

IMPLEMENTATION NOTES:

- **Sequencing:** Although **not** required by Xilinx FPGAs, sequential sequencing (following a short, on the order of milliseconds, time interval between the core and I/O power up, in any order, in order to minimize demand on the input supply) is employed in this design. Simultaneous sequencing using the AutoTrack feature of the PTH series is useful when the core and I/O voltage difference needs to be minimized during power up. If simultaneous sequencing is preferred, please see PR251. If sequencing is not desired, please see PR217.
- **Additional Capacitance:**
  - The PTH05010 input capacitance requirement may change depending on the application. See the minimum input capacitance required at the bottom of page 3, the computation for determining input capacitance on page 5 as well as recommended capacitors on page 6 of the datasheet.
  - The PTH05010 device has a limitation to the amount and type of additional capacitance that can be added to its output. See the specifications for external output capacitance and associated ESR at the bottom of page 3 as well as the application note (including recommended output caps) on page 6 of the datasheet.
- **V_{CCAUX} :** V_{CCAUX} powers time-critical resources in the FPGA, including the Digital Clock Managers (DCMs). Therefore, this supply voltage is especially susceptible to power supply noise. V_{CCAUX} can share a power plane with V_{CCO}, but only if V_{CCO} does not have excessive noise. Changes in V_{CCAUX} voltage beyond 200 mV peak-to-peak should take place no faster than 10 mV per milli-second.

QUESTIONS?

- Send an email to mailto:**fpgasupport@list.ti.com**


A
B
C
D
1
2
3
4
U1
PTH05010WAS
GND MgnUp
VIN MgnDwn
Inhibit Track
VoAdj GND
VoSns Vout
5V_INPUT
C1
470 uF
R1
8.87k
1.5V @ 15A
DIGITAL_VCCINT
C6
470 uF
U4
TPS3803G15DCK
RESET VDD
GND
NC SENSE
C4
1.0 uF
U2
PTH05010WAS
C2
470 uF
R2
2.21k
2.5V @ 15A
DIGITAL_VCCO
2.5V @ 15A
C7
470 uF
R4
698
U5
TPS3803-01DCK
C5
1.0 uF
R5
2.21k
U3
PTH05010WAS
C3
470 uF
R3
698
3.3V @ 15A
DIGITAL_VCCAUX
3.3 @ 250mA
DIGITAL_VCCO
3.3V @ 14.75A
C8
470 uF
Title
Virtex-II Module
Size
B
Number
PR221
Rev
Date
4/22/04
Drawn by
Filename
pr221.sch
Sheet
of

Filename: PR221_bom.xls

Date: 04/22/2004

PR221 BOM

COUNT	RefDes	DESCRIPTION	SIZE	MFR	PART NUMBER
6	C1, C2, C3, C6, C7, C8	Capacitor, Tantalum, 470-uF, 10-V, 120-milliohm, 20%	7343(D)	Vishay	595D477X0010R2T35
2	C4, C5	Capacitor, Ceramic, 1.0-uF, 6.3-V, X5R, 10%	603	muRata	GRM188R60J105KA01
1	R1	Resistor, Chip, 8.87k-Ohms, 1/16-W, 1%	603	Std	Std
2	R2, R5	Resistor, Chip, 2.21k-Ohms, 1/16-W, 1%	603	Std	Std
2	R3, R4	Resistor, Chip, 698-Ohms, 1/16-W, 1%	603	Std	Std
3	U1, U2, U3	Module, Wide Output Adj, 15A, 0.8V to 3.6V, 5V Input	1.370 X 0.620	TI	PTH05010WAS
1	U4	IC, Voltage Supervisor, 1.5-Volts	SOP-5 (DCK)	TI	TPS3803G15DCK
1	U5	IC, Voltage Supervisor, Adj-Volts	SOP-5 (DCK)	TI	TPS3803-01DCK

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