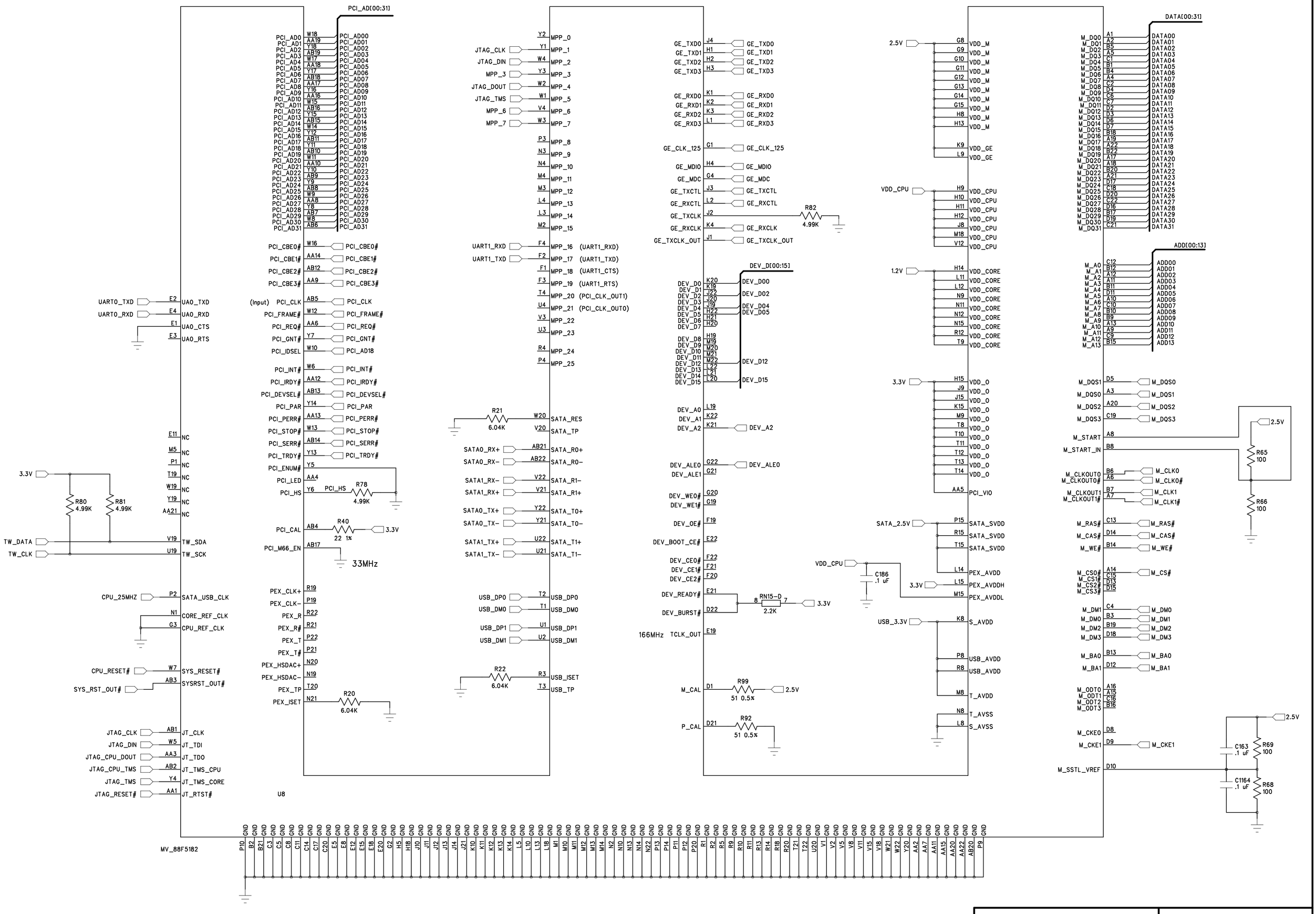
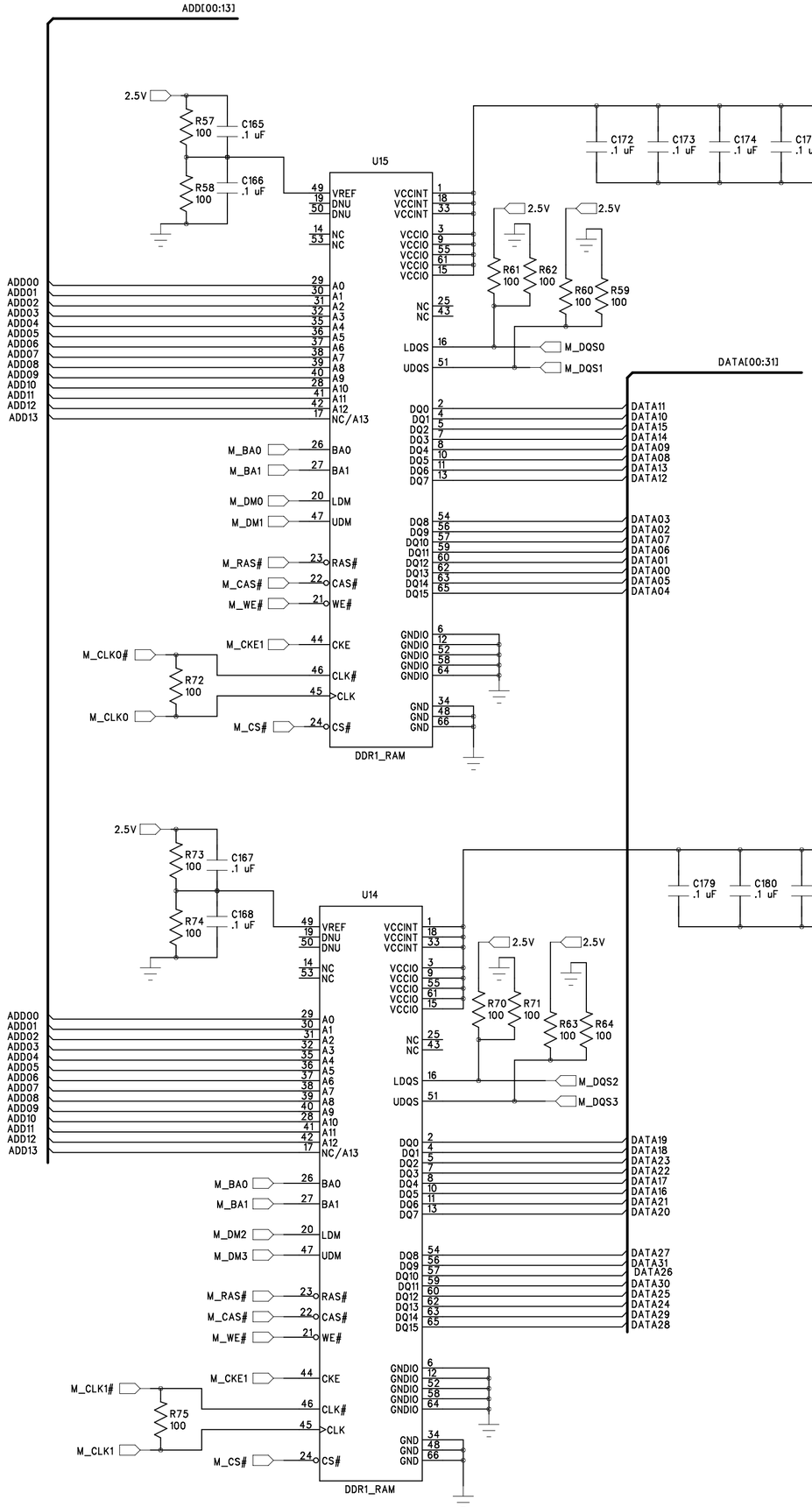
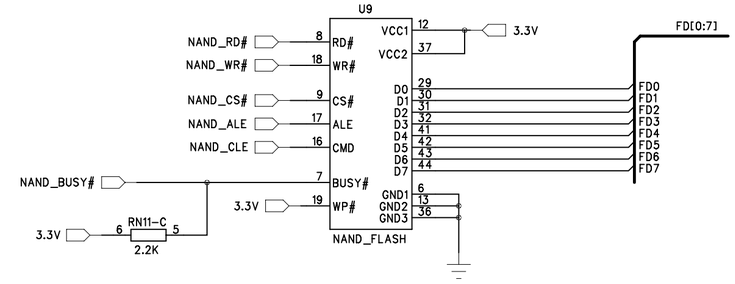


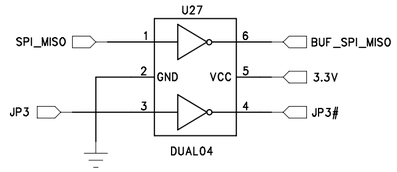
Technologic Systems	Date Jan. 28, 2008	
Title: TS-7800_P1 Marvell 88F5182 CPU		
Rev:	Designer RLM	Sheet 1 of 8

DDR1 SDRAM

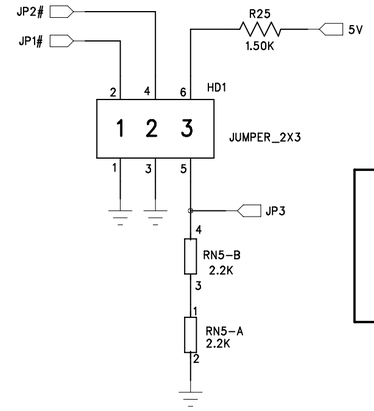


NAND Flash





Jumpers

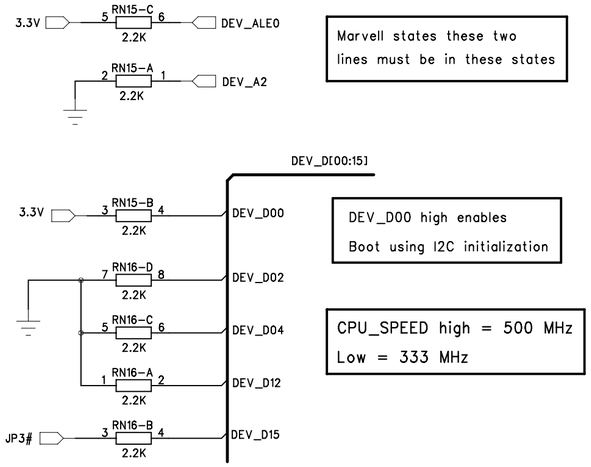


JP1 = Fast Boot to NAND Flash

JP2 = Enable console on COM1

JP3 = CPU Speed is 333 MHz

CPU Initialization

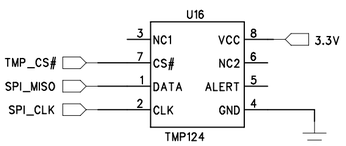


Marvell states these two lines must be in these states

DEV_D00 high enables Boot using I2C initialization

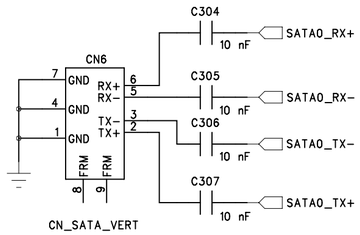
CPU_SPEED high = 500 MHz
Low = 333 MHz

Temp Sensor

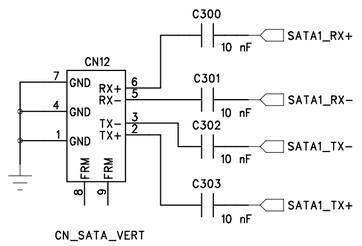


Technologic Systems		Date Jan. 28, 2008
Title: TS-7800 DDR RAM Flash		
Rev:	Designer	Sheet 2 of 8

SATA 0

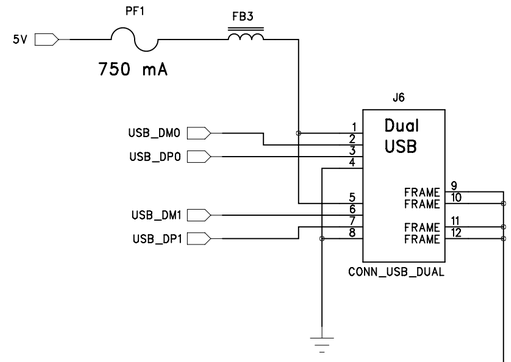


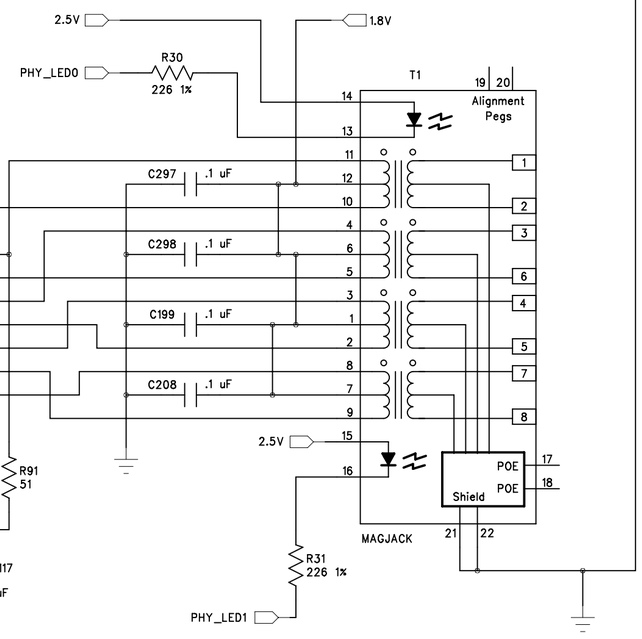
SATA 1



10/100/1000 Ethernet

USB Ports





Technologic Systems	Date Jan. 28, 2008	
Title: TS-7800 Ethernet, USB, SATA		
Rev:	Designer RLM	Sheet 3 of 8

5V Tolerant CPLD

U19

JTAG_CLK 24 TCK
JTAG_FPGA_DOUT 2 TDI
JTAG_PHY_DIN 74 TDO
JTAG_TMS 52 TMS
PLD_CLK 38 CLK1
SYS_RST_OUT# 39 CLK2
JP2# 88 CLK3
CTS1 89 CLK4

DSR1 91 IO
CTS3 73 I
DCD1 77 I
RXD3 84 IO
12 I
49 IO

PLD_A0 50 IO
PLD_A1 48 IO
PLD_A2 41 IO
PLD_RD# 44 IO
PLD_WR# 62 I
ISA_B32 100 IO
94 IO
JP3# 36 IO
JP1# 27 I
LOW_VOLT# 23 I
SD_WP 64 IO
93 IO

DIO_01 29 IO
DIO_03 53 IO
DIO_04 34 IO
DIO_05 87 IO
DIO_07 31 IO
DIO_08 42 IO
DIO_09 15 IO
DIO_11 14 IO
DIO_13 8 IO
DIO_15 6 IO
DIO_[01:15]

PLD_D0 47 IO
PLD_D1 3 IO
55 IO
37 IO
PLD_D4 56 IO
PLD_D5 59 IO
PLD_D[0:5]

1 GND
7 GND
18 GND
26 GND

MACH4064ZC

VCCIO 13 3.3V
VCCIO 33
VCCIO 45
VCCIO 63
VCCIO 83
VCCIO 95
VCCINT 25 1.8V
VCCINT 40
VCCINT 75
VCCINT 90

3.3V
D1 Green LED
K
A
R32 226 1%

IO 81
IO 86
IO 80 TXD3
IO 72
IO 58
IO 5
IO 78 EN_SD_POWER#
IO 71 SD_POW_SINK#
IO 35
IO 70 IRQ6
IO 66 IRQ7
IO 92 IRQ11
IO 69 IRQ12
IO 60 IRQ14
IO 61 IRQ15
IO 4
IO 54 SPARE1
IO 99 TMP_CS#
IO 79
IO 85 CPU_RESET#
IO 98 AVR_MISO
IO 67 AVR_RST#
IO 65 AVR_SCK
IO 97 AVR_MOSI

3.3V
8
RN14-D 2.2K
7

IO 19 LCD_03
IO 17 LCD_04
IO 16 LCD_05
IO 20 LCD_06
IO 43 LCD_07
IO 30 LCD_08
IO 11 LCD_09
IO 21 LCD_10
IO 9 LCD_11
IO 22 LCD_12
IO 10 LCD_13
IO 28 LCD_14
LCD_[03:14]

GND 32
GND 46
GND 51
GND 57
GND 68
GND 76
GND 82
GND 96

Enable Resistor Pull-ups on all pins (Global option)

SPI Serial Flash

U20

CS# 1 VCC 8 3.3V
DOUT 2 HOLD# 7
DIN 5 WP# 3
CLK 6 GND 4

STMICRO_FLASH
M25P40
512K bytes

CONFIG_CLK
RN11-B 2.2K
RN11-A 2.2K

SPI Fast Mode is selected when pin M16 is biased low

Config_CLK is output in SPI Mode and is an input in Serial Config Mode
SPI Mode requires resistor pull-down

Pin K11 is Data Input for Ser. Config
It is the Serial Flash CS# for SPI Mode

ISA_DAT[00:15]
PCI_AD[00:31]
ISA_A[01:31]
ISA_C[01:10]
FD[0:7]
ISA_B[02:30]
ISA_D[01:17]

ISA_DAT00 R11 PB48B
ISA_DAT01 T11 PB51A
ISA_DAT02 P11 PB50B
ISA_DAT03 T10 PB48A
ISA_DAT04 T13 PB53A
ISA_DAT05 R13 PB54A
ISA_DAT06 M8 PB26B_CLK5-
ISA_DAT07 M9 PB47B
ISA_DAT08 C9 PT33A
ISA_DAT09 A9 PT35B
ISA_DAT10 B9 PT35A
ISA_DAT11 A10 PT36A
ISA_DAT12 B10 PT36B
ISA_DAT13 A11 PT48A
ISA_DAT14 B11 PT48B
ISA_DAT15 F10 PR9A

ISA_A01 K6 PB3A
ISA_A10 M16 PR29A_FAST#
ISA_A11 K16 PR21A_PLL_FB+
ISA_A12 G16 PR13B_CLK2-
ISA_A13 F15 PR11B
ISA_A14 D16 PR7B
ISA_A15 C16 PR5B
ISA_A16 B16 PR5A
ISA_A17 J16 PR20B_PLL_IN-
ISA_A18 H13 PR17A_DLL_IN+
ISA_A19 H15 PR16B
ISA_A20 F14 PR11A
ISA_A21 E13 PR2A
ISA_A22 F12 PR12A
ISA_A23 D13 PT51A
ISA_A24 C14 PT51B
ISA_A25 E12 PT53B
ISA_A26 A14 PT52A
ISA_A27 C13 PT50B
ISA_A28 A12 PT49A
ISA_A29 E11 PT55A
ISA_A30 D11 PT47B
ISA_A31 F11 PT55B

ISA_C01 P15 PR30B
ISA_C02 L16 PR27A
ISA_C03 K14 PR24B
ISA_C04 J13 PR18B_DLL_FB-
ISA_C05 K15 PR21B_PLL_FB-
ISA_C06 J12 PR18A_DLL_FB+
ISA_C07 L14 PR26A
ISA_C08 N16 PR29B
ISA_C09 J15 PR20A_PLL_IN+
ISA_C10 G15 PR13A_CLK2+

FD7 G13 PR10A
FD6 N7 PB26A_CLK5+
FD5 T7 PB34B
FD4 R7 PB34A
FD3 T6 PB32B
FD2 R6 PB23B
FD1 P6 PB23A
FD0 T5 PB32A
T4 PB24B
A8 PT34B
D14 PR4A
DTR1 D10 PT37B
RTS3 H11 PR15B_CLK3-
RTC_IRQ# L8 PB35A
XTAL_25MHZ R4 PB24A
RTS1 G11 PR12B

PT26A B3 PCI_AD00
PT25A B2 PCI_AD01
PL2A C3 PCI_AD02
PL7A B1 PCI_AD03
PL5A D3 PCI_AD04
PL2B C2 PCI_AD05
PL4B E4 PCI_AD06
PL7B C1 PCI_AD07
PL5B D2 PCI_AD08
PL11A F3 PCI_AD09
PL10A D1 PCI_AD10
PL8B G4 PCI_AD11
PL10B E1 PCI_AD12
PL12A F2 PCI_AD13
PL12B F1 PCI_AD14
PL18A_DLL_FB+ J4 PCI_AD15
PL18B_DLL_FB- J5 PCI_AD16
PL25A K2 PCI_AD17
PL26A L4 PCI_AD18
PL25B K1 PCI_AD19
PL24B L3 PCI_AD20
PB21A N5 PCI_AD21
PB25A L6 PCI_AD22
PL27A L1 PCI_AD23
PB21B N6 PCI_AD24
PL28A N2 PCI_AD25
PB5B P4 PCI_AD26
PL27B M1 PCI_AD27
PB22A T2 PCI_AD28
PL28B P2 PCI_AD29
PB5A R3 PCI_AD30
PL29B P1 PCI_AD31

PL30A R1 PCI_INT#
PL8A F4 PCI_CBE0#
PL13B_CLK7- G1 PCI_CBE1#
PL21B_PLL_FB- J2 PCI_CBE2#
PL24A L2 PCI_CBE3#
PL29A N1 PCI_GNT#
PL30B R2 PCI_REQ#
PL20B_PLL_IN- K3 PCI_STOP#
PL26B L5 PCI_FRAME#
PL21A_PLL_FB+ J1 PCI_IRDY#
PL20A_PLL_IN+ K4 PCI_TRDY#
PL17B_DLL_IN- H1 PCI_PERR#
PL17A_DLL_IN+ H2 PCI_DEVSEL#
PL13A_CLK7+ G2 PCI_SERR#
PL11B G3 PCI_PAR
PB31B_CLK4- R8 PCI_CLK
PB22B T3 MPP_7
PB31A_CLK4+ P7 MPP_6
PB2B M6 MPP_3
PR17B_DLL_IN- H12
PB51B T12 BUF_IRQ10
PT33B D9 BUF_IRQ5
PT23A C6 TXEN2_485
PT34A B8 TXD2_485
PB49A P10 RTC_CS#
PL15B_CLK6- H5
PB47A N9 NAND_BUSY#
PB33A T8 NAND_RD#
PB37A R9 NAND_WR#
PB37B R10 NAND_ALE
PB33B T9 NAND_CS#
PB36A P8 NAND_CLE

U10

3.3V G8 VCC_AUX
H10 VCC_AUX
J7 VCC_AUX
K9 VCC_AUX
T15 VCCIO8
E3 VCCIO7
G5 VCCIO7
K5 VCCIO6
M3 VCCIO6
M7 VCCIO5
P5 VCCIO5
M10 VCCIO4
P12 VCCIO4
K12 VCCIO3
M14 VCCIO3
E14 VCCIO2
G12 VCCIO2
C12 VCCIO1
E10 VCCIO1
C5 VCCIO0
E7 VCCIO0
1.2V G7 V_CORE
G9 V_CORE
G10 V_CORE
H7 V_CORE
J10 V_CORE
K8 V_CORE
K10 V_CORE
3.3V K7 VCC_JTAG
JTAG_FPGA_DOUT P3 TDO
JTAG_TMS N3 TMS
JTAG_CLK M4 TCK
JTAG_CPU_DOUT N4 TDI
CONFIG_CLK R14 CONFIG_CLK
FPGA_DONE# M13 DONE#
PROGRAM# N13 PROGRAM#
L12 INIT#
N15 MODE_0
N14 MODE_1
R15 MODE_2
JTAG_CLK M5 PB2A
JTAG_CPU_DOUT L13 PR26B
RXD1_485 C7 PT24B
RXD2_485 C10 PT37A
TW_CLK A3 PT26B
TW_DATA A2 PT25B

PT32B B7 SD_D0
PT30B_CLK1- A6 SD_D1
PT21A B4 SD_D2
PT27A A4 SD_D3
PT27B A5 SD_CMD
PT30A_CLK1+ B6 SD_FULL_CLK
PT24A D7 SD_MICRO_CLK
PT32A A7 SPI_CLK
PL4A D4 SPI_MOSI
PT31A D8 BUF_SPI_MISO
PT21B C4 SPI_FRAME
PR15A_CLK3+ J11

PB25B L7 ISA_B02
PB36B N8 ISA_B04
PB53B T14 ISA_B06
PR30A P14 ISA_B08
PR27B L15 ISA_B11
PR16A H16 ISA_B12
PR8B F16 ISA_B13
PR8A E16 ISA_B14
PR7A D15 ISA_B15
PR4B C15 ISA_B16
PT54A B15 ISA_B17
PT54B A15 ISA_B18
PR10B G14 ISA_B19
PR2B F13 ISA_B20
PT52B B14 ISA_B25
PT50A B13 ISA_B26
PT49B A13 ISA_B27
PT53A D12 ISA_B28
PT47A C11 ISA_B30
PT31B E9
PT22B F7 SPARE1
PL15A_CLK6+ H6 PLD_CLK

PR28B R16 ISA_D01
PR28A P16 ISA_D02
PB55B M12 ISA_D09
PB55A N12 ISA_D10
PB52B L11 ISA_D11
PB54B P13 ISA_D12
PB50A N11 ISA_D13
PB52A M11 ISA_D14
ISA_D15
PB49B N10 ISA_D17
PB35B L9
PT2B D5 PLD_D0
PT22A F6 PLD_D1
PT28B_CLK0- F8 TXEN1_485
PL16B H3 TXD1_485
PT28A_CLK0+ E8 PLD_D4
PR9B F9 PLD_D5

PT2A E5 PLD_A0
PL9A F5 PLD_A1
PL16A H4 PLD_A2
PT23B D6 PLD_WR#
PL9B G6 PLD_RD#
SPI_CS#_PR25A K11
SPI_MISO_PR25B L10
SPI_MOSI_PR24A K13

PLLCAP_LEFT J6
PLLCAP_RIGHT J14
X_RES E6

R84 10K 1%

LATTICE_ECP2_256

GND1 A1 GND2 A16 GND3 B12 GND4 B5 GND5 C8 GND6 E2 GND7 E15 GND8 H8 GND9 H9 GND10 H14 GND11 J3 GND12 J8 GND13 J9 GND14 M2 GND15 M15 GND16 P9 GND17 R5 GND18 R12 GND19 T1 GND20 T16

All PBxx pins have PCI clamp diodes
These are all in Bank4 and Bank5

Technologic Systems	Date Jan. 28, 2008	
Title: TS-7800 FPGA and PLD		
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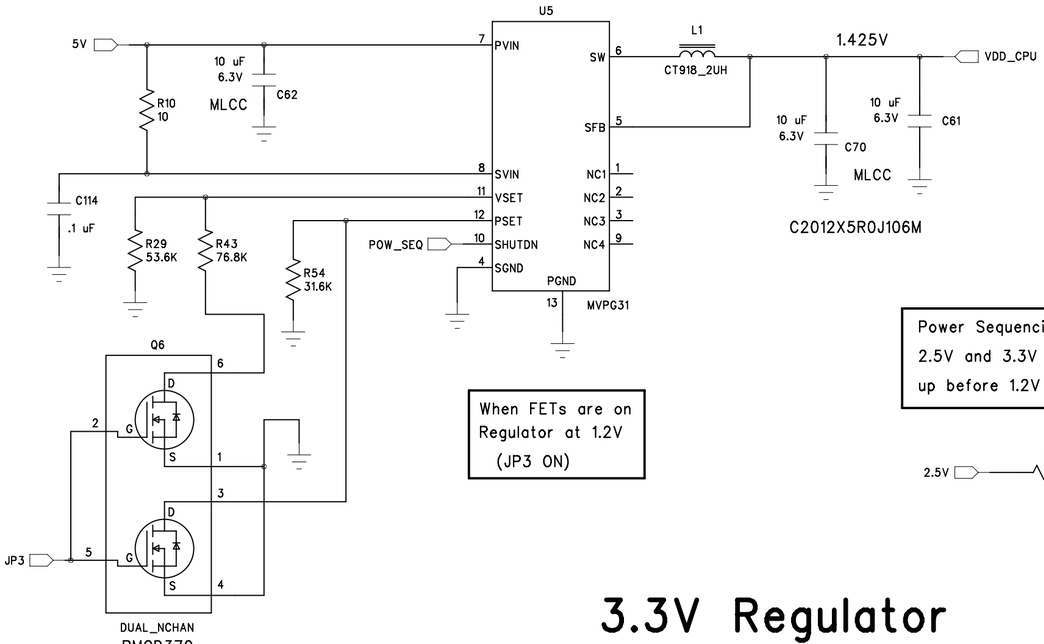
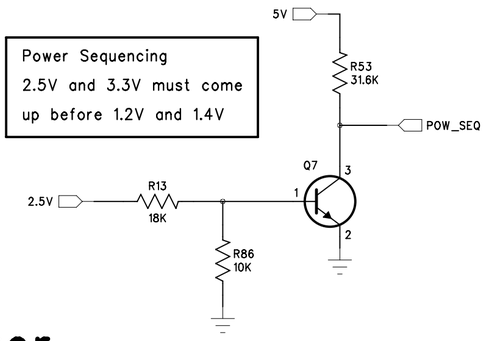
1.2V or 1.42V Power Supply

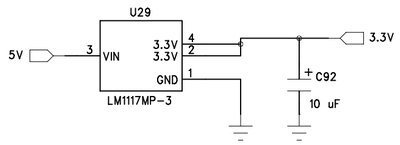


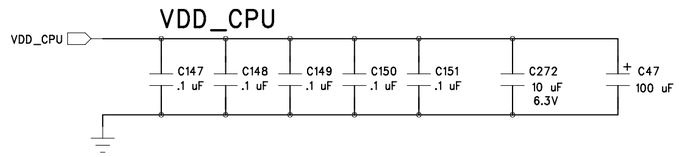
When FETs are on Regulator at 1.2V (JP3 ON)

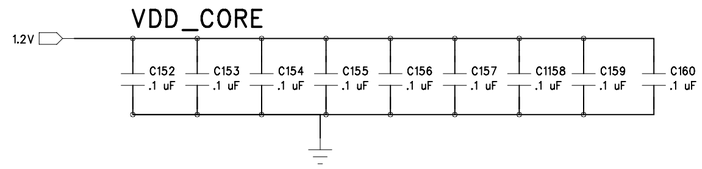
Power Sequencing
2.5V and 3.3V must come up before 1.2V and 1.4V

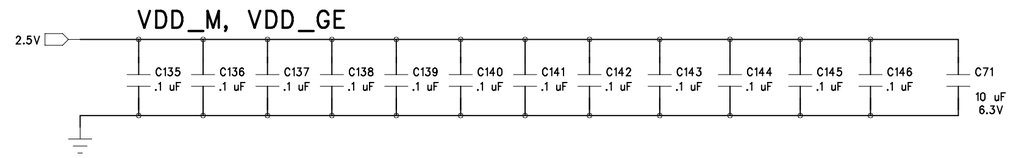


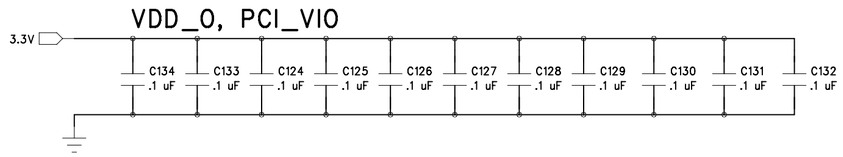
3.3V Regulator

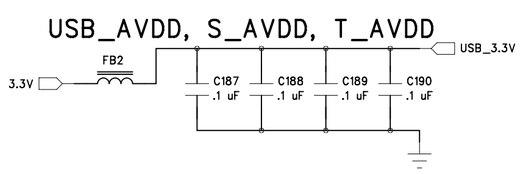


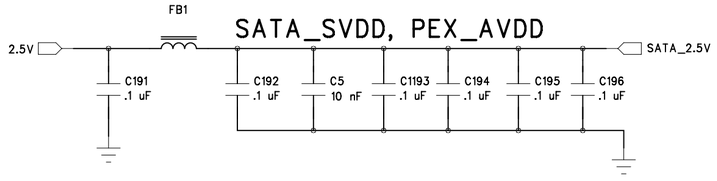




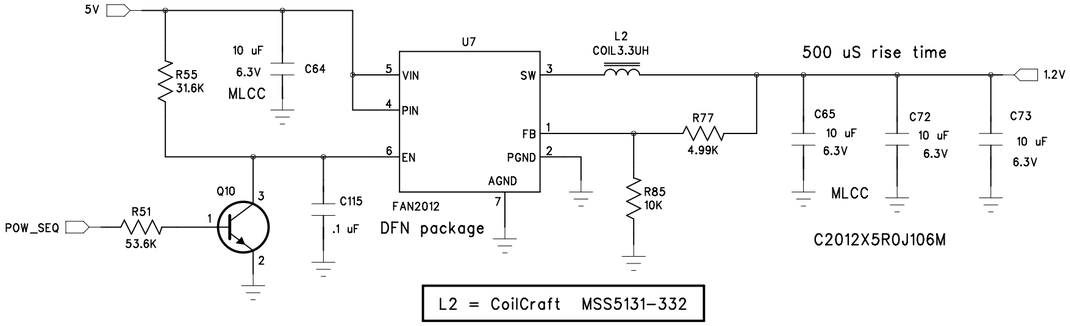






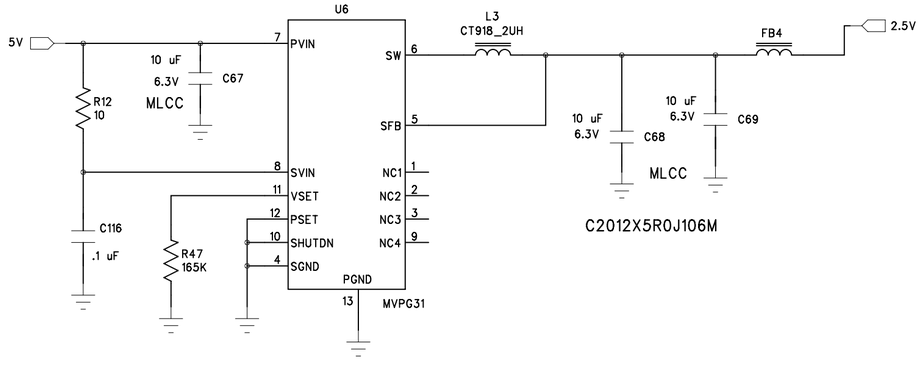


1.2V Power Supply up to 1500 mA

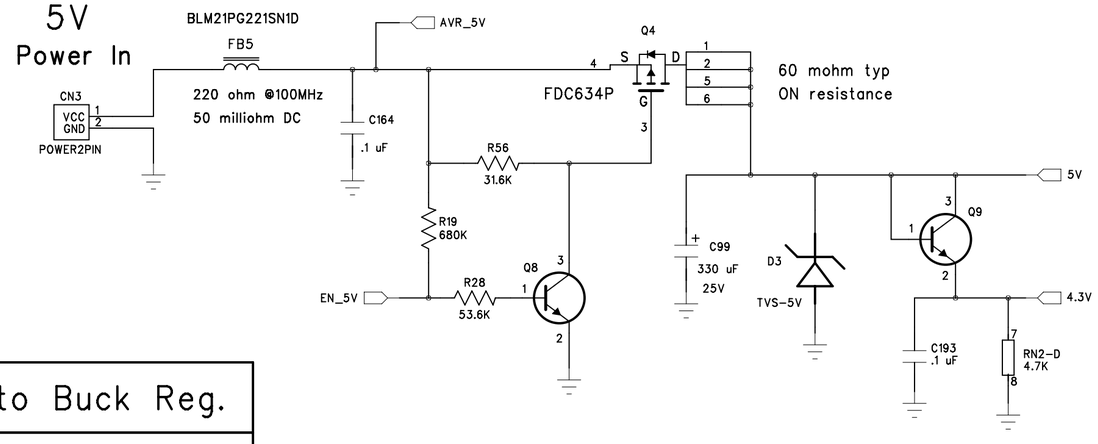


L2 = CoilCraft MSS5131-332

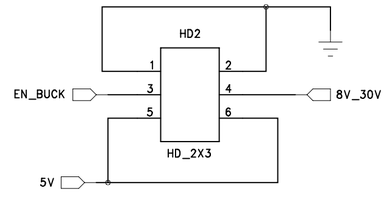
2.5V Power Supply



5V Switch

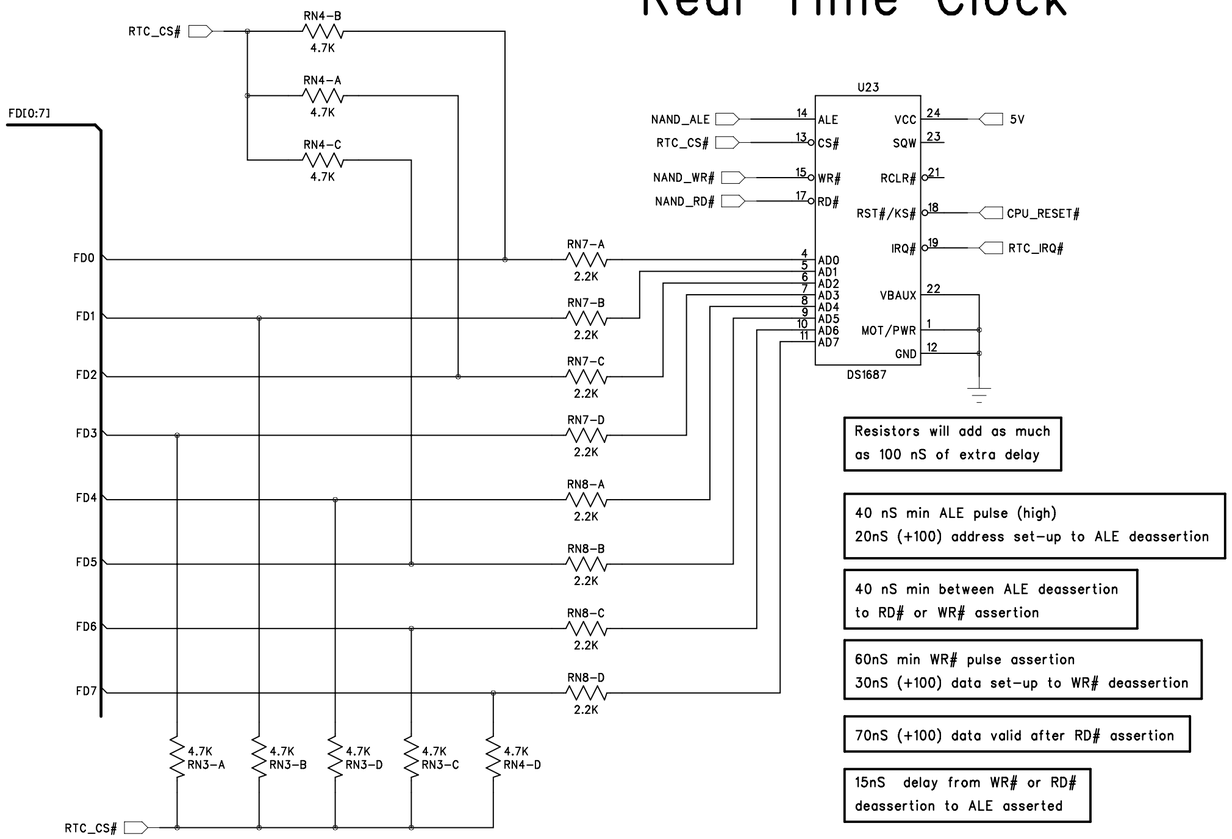


Interface to Buck Reg.



Technologic Systems		Date Jan. 28, 2008
Title: TS-7800 Power		
Rev:	Designer	Sheet 5 of 8

Real Time Clock



Resistors will add as much as 100 nS of extra delay

40 nS min ALE pulse (high)
20nS (+100) address set-up to ALE deassertion

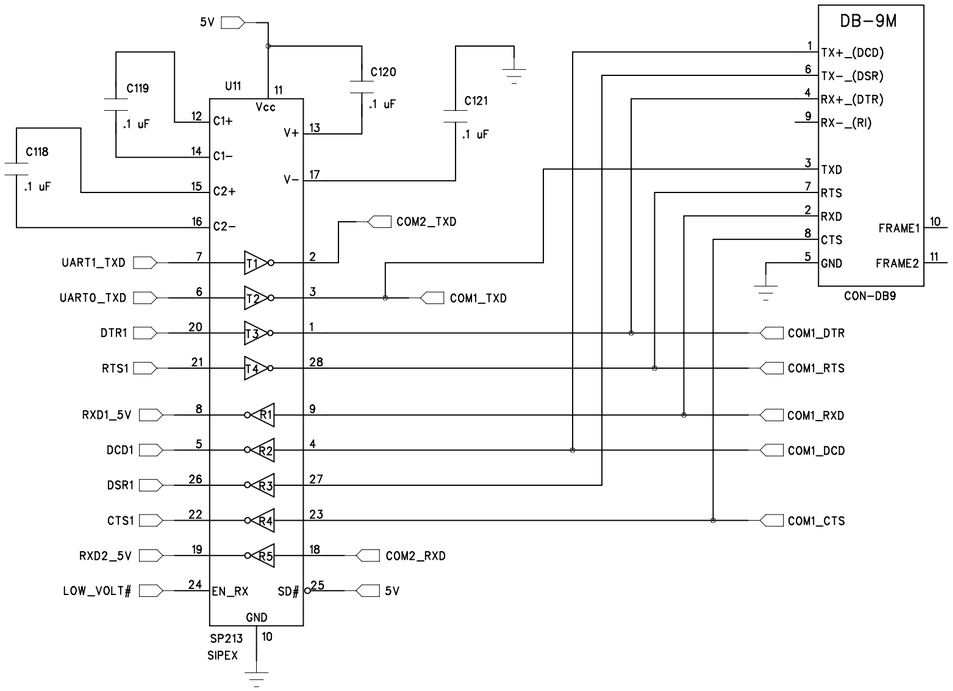
40 nS min between ALE deassertion to RD# or WR# assertion

60nS min WR# pulse assertion
30nS (+100) data set-up to WR# deassertion

70nS (+100) data valid after RD# assertion

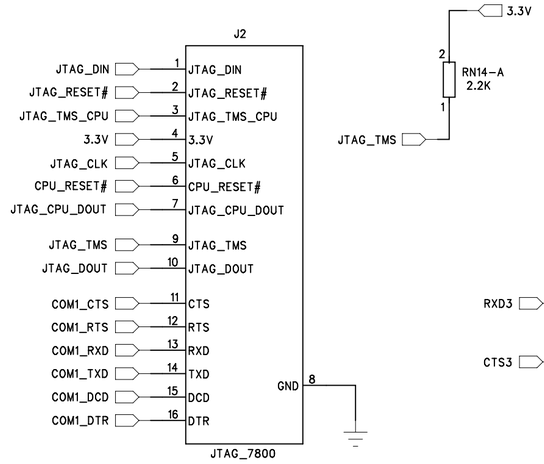
15nS delay from WR# or RD# deassertion to ALE asserted

COM1
RS-232 Transceiver

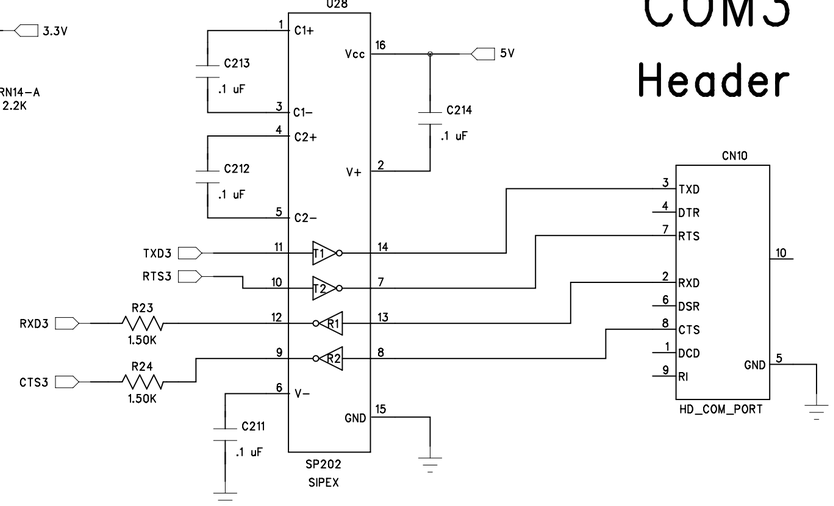


COM1
DB9M

JTAG
Header

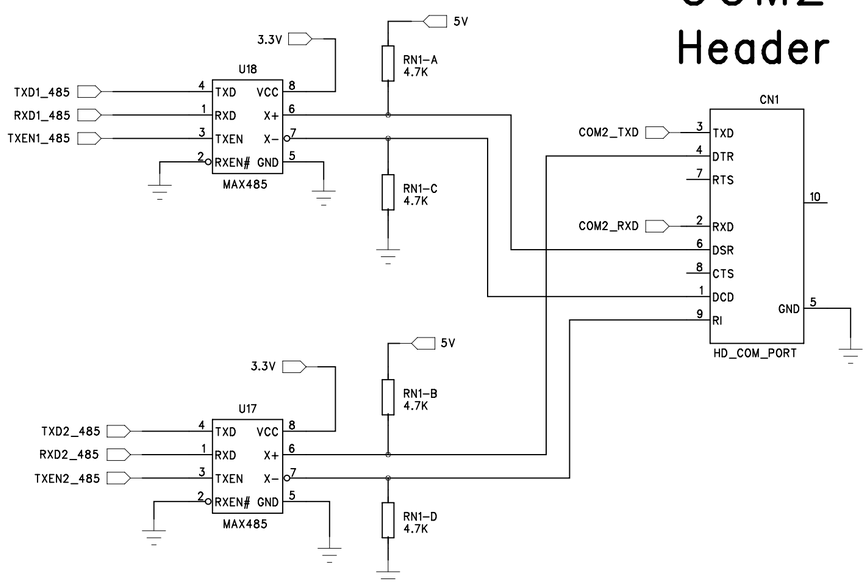


COM3
Header



RS-485 Drivers

COM2
Header



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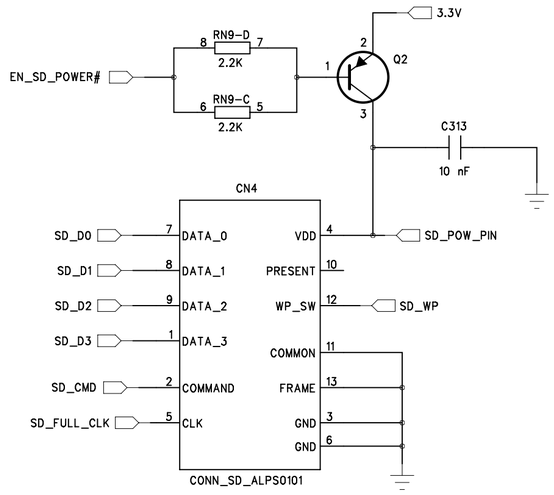
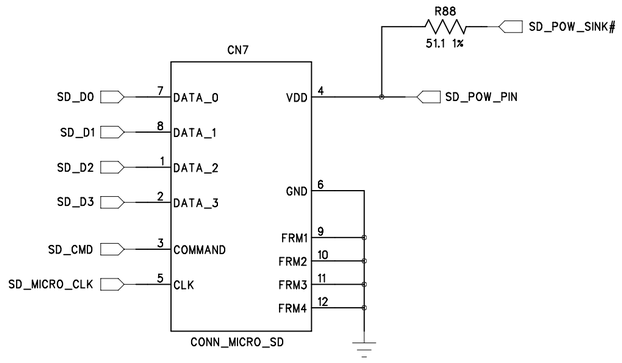
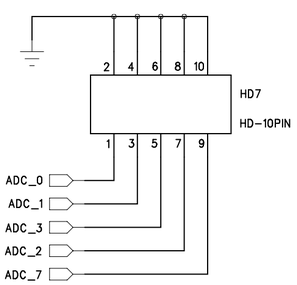


Full-Size SD Card Socket



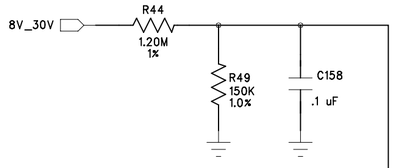
Micro SD Card Socket

5 Channel 10-bit A/D



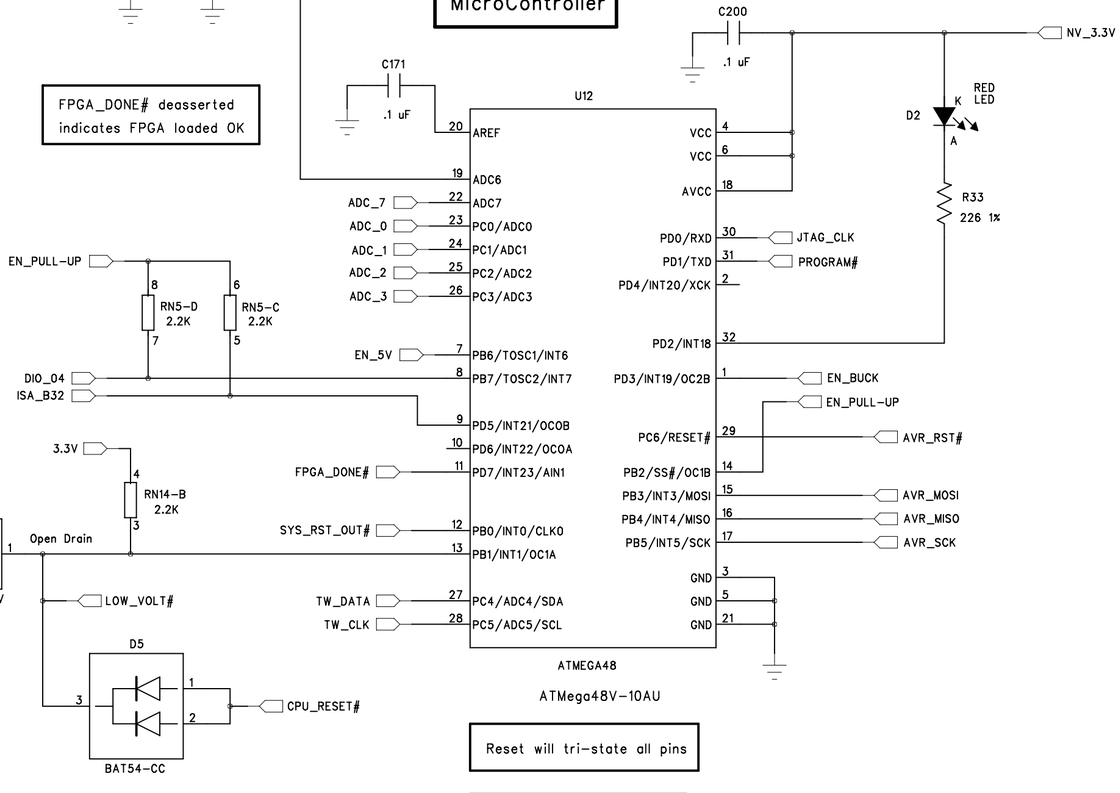
Must enable pull-up resistors for these pins:

- SD card D0-D3
- SD Power#
- SD card WP



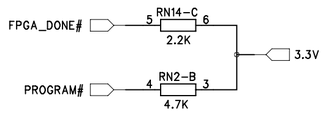
FPGA_DONE# deasserted indicates FPGA loaded OK

AVR MicroController

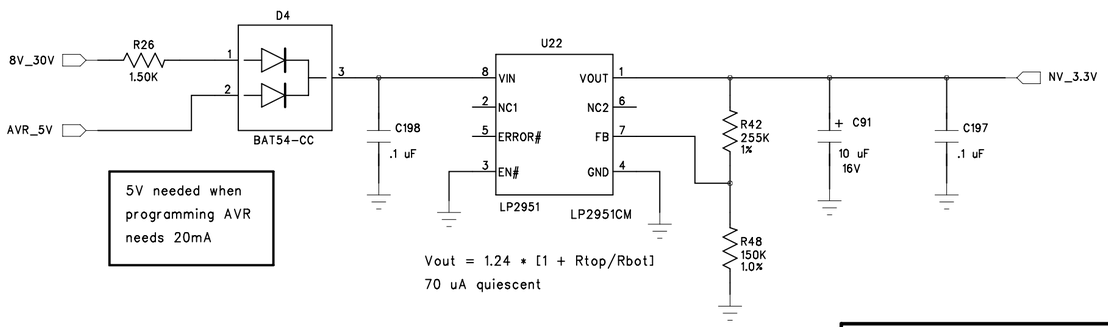


Reset will tri-state all pins

DIO_04 or ISA_32 can can wake up AVR



NV 3.3V Regulator for AVR



5V needed when programming AVR needs 20mA

Vout = 1.24 * [1 + Rtop/Rbot]
70 uA quiescent

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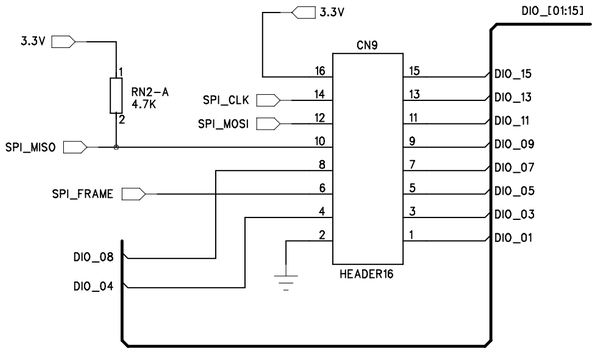
DIO Port



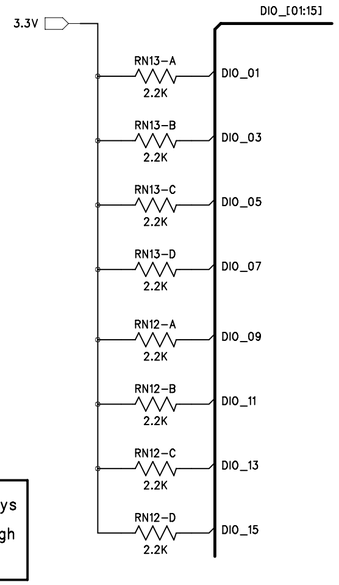
provides 5V tolerance

SPI_MISO is 5V tolerant
MOSI, CLK, and Frame
are 3.3V level outputs

DIO_08 initializes to an input
when output, active high-low
It is programmable In or out

DIO_01 thru DIO_15 (odds) are always
open drain outputs, initialized to high
They can be used as inputs

DIO_04 is always input
AVR drives pull-up on this pin

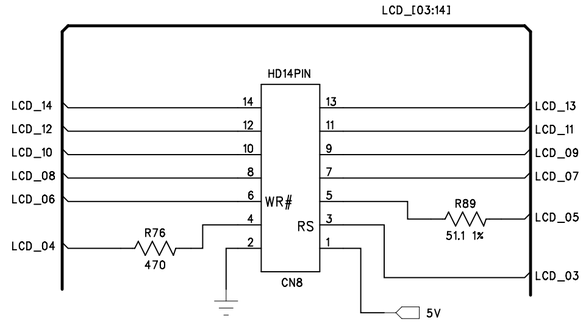


Pull-up resistors for
the open drain outputs

Open drain outputs can
sink 8 mA, but only source
current thru resistor

All DIO lines are 5V tolerant

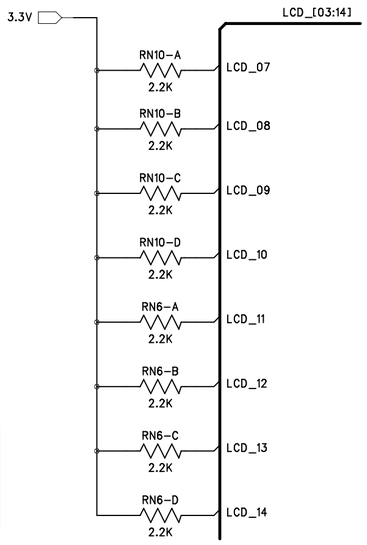
LCD Port



LCD03, LCD05, LCD06 init to inputs
when outputs, active high-low
These are programmable I/O

LCD07 thru LCD14 are always open
drain outputs, initialized to high
They can be used as inputs

LCD04 is always output
active high-low, init to zero

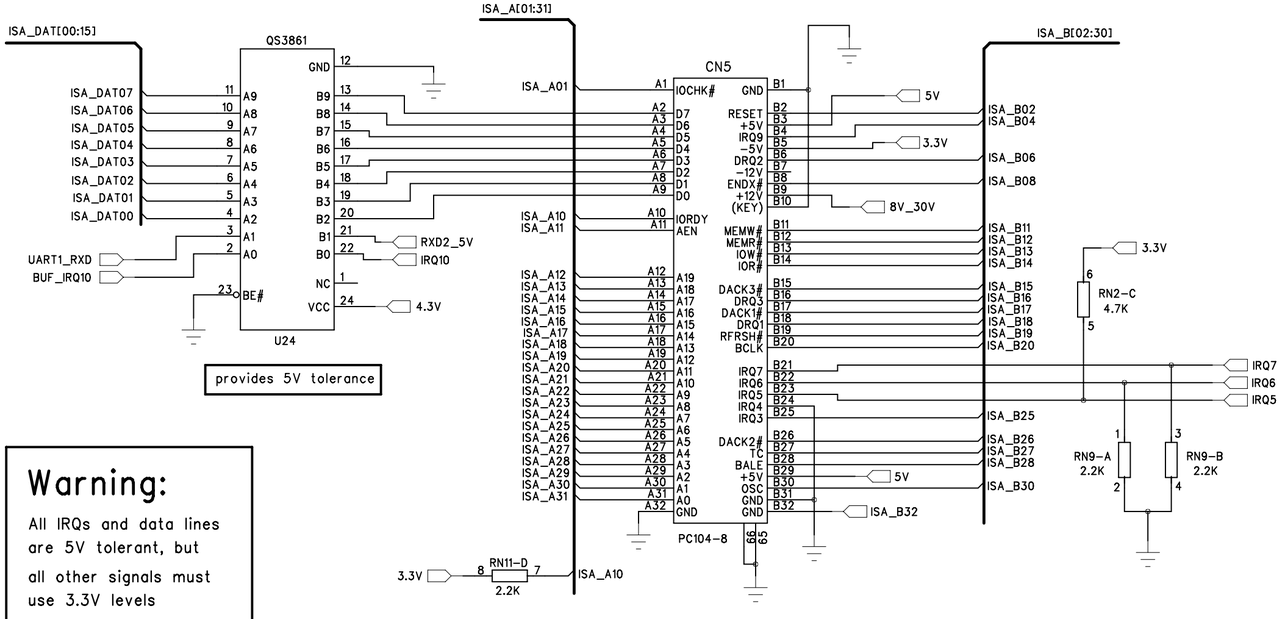


Pull-up resistors for
the open drain outputs

All LCD lines are 5V tolerant

Open drain outputs can
sink 8 mA, but only source
current thru resistor

PC/104 64-pin Connector



provides 5V tolerance

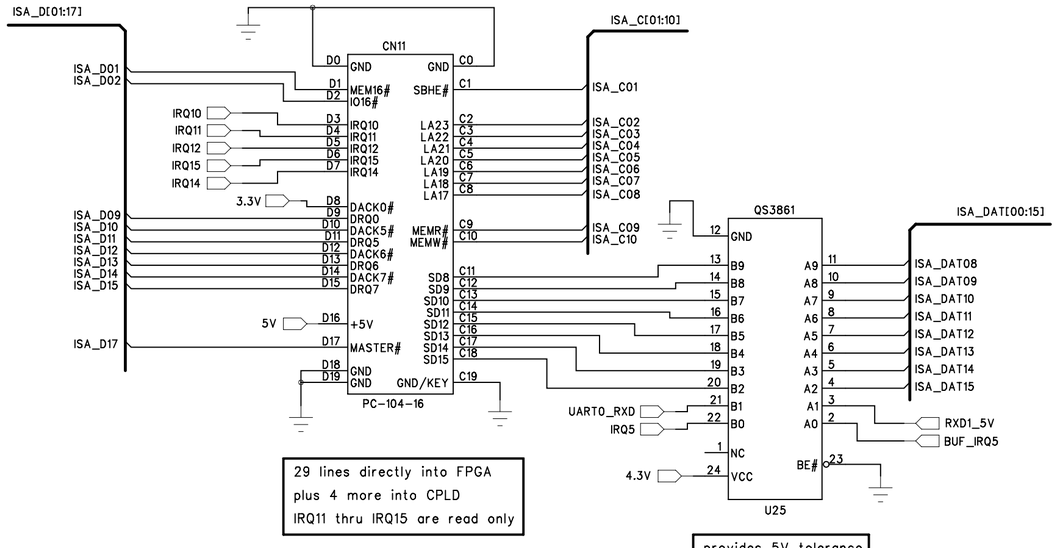
Warning:

All IRQs and data lines
are 5V tolerant, but
all other signals must
use 3.3V levels

IRQ3 must be 3.3V levels

51 lines directly into FPGA
plus 3 more into CPLD (read only)
(IRQ6, IRQ7 and ISA_32)

PC/104 40-pin Connector



29 lines directly into FPGA
plus 4 more into CPLD
IRQ11 thru IRQ15 are read only

provides 5V tolerance

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