

Schematic: SAMA5D2B-XULT

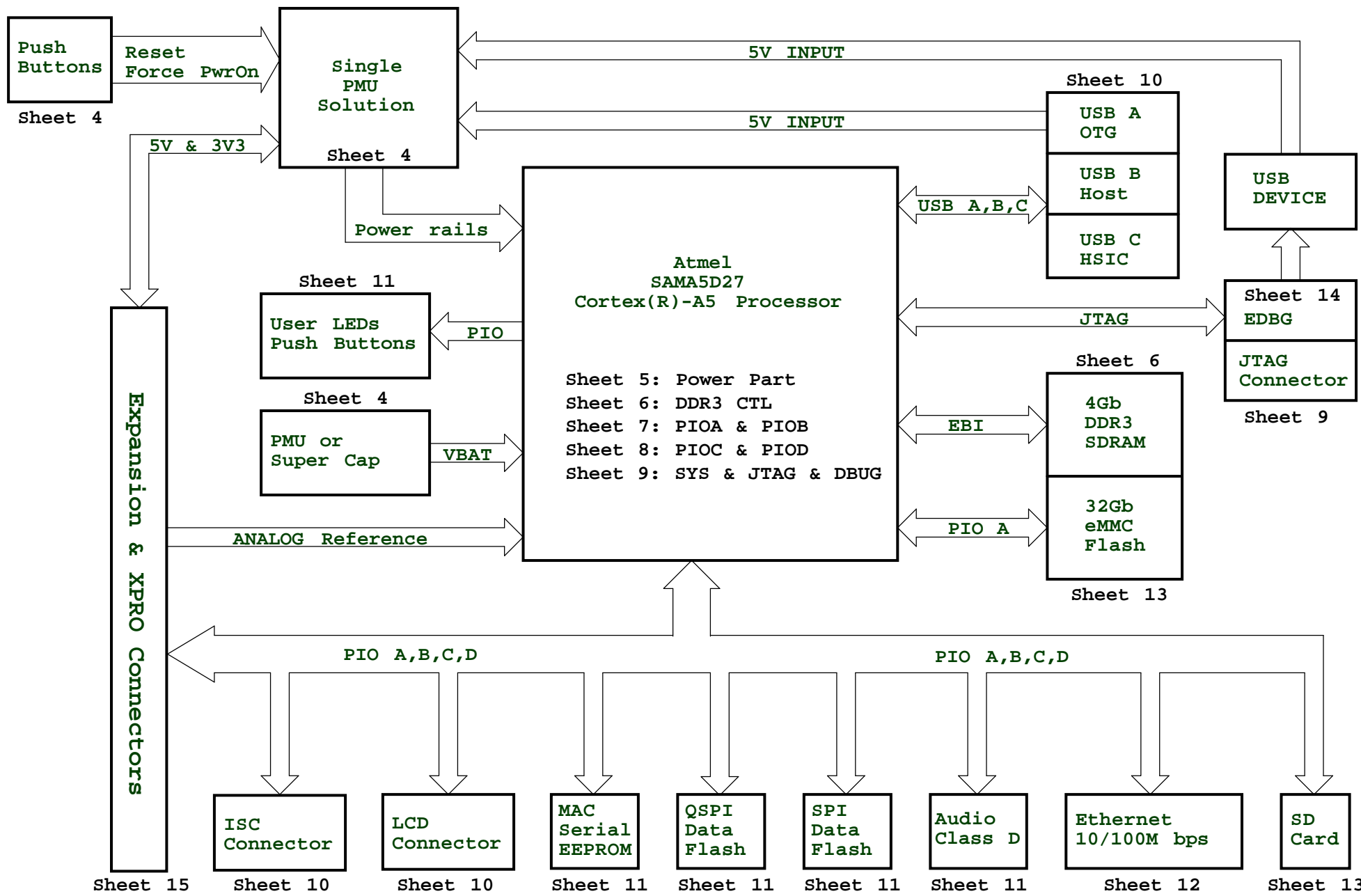
| SHEET | SHEET NAME |
|-------|-----------------------------|
| 01 | Title & Revision History |
| 02 | Block Diagram |
| 03 | PIO Muxing |
| 04 | Power Supply |
| 05 | SAMA5D27- Power |
| 06 | SAMA5D27- DDR3 |
| 07 | SAMA5D27- PIOA & PIOB |
| 08 | SAMA5D27- PIOC & PIOD |
| 09 | SAMA5D27- SYS & JTAG & DBUG |
| 10 | ISC & USB & LCD |
| 11 | Flash & Audio & LED |
| 12 | Ethernet_10/100M |
| 13 | SD & eMMC |
| 14 | EDBG |
| 15 | Expansion & XPRO Connectors |

Revision History

| DATE | REVISION | DESCRIPTION |
|-------------|---------------------------|------------------|
| 22 Sep 2015 | SAMA5D2-XULT RevA-150922 | Official Release |
| 17 Mar 2016 | SAMA5D2B-XULT RevB-160316 | Official Release |
| | | |
| | | |



| | | | | | | | |
|--------------------------|--|-----------|--|--------|--|------------|--|
| SAMA5D2B-XULT | | SCALE 1/1 | | REV. B | | SHEET 1/15 | |
| Title & Revision History | | | | | | | |



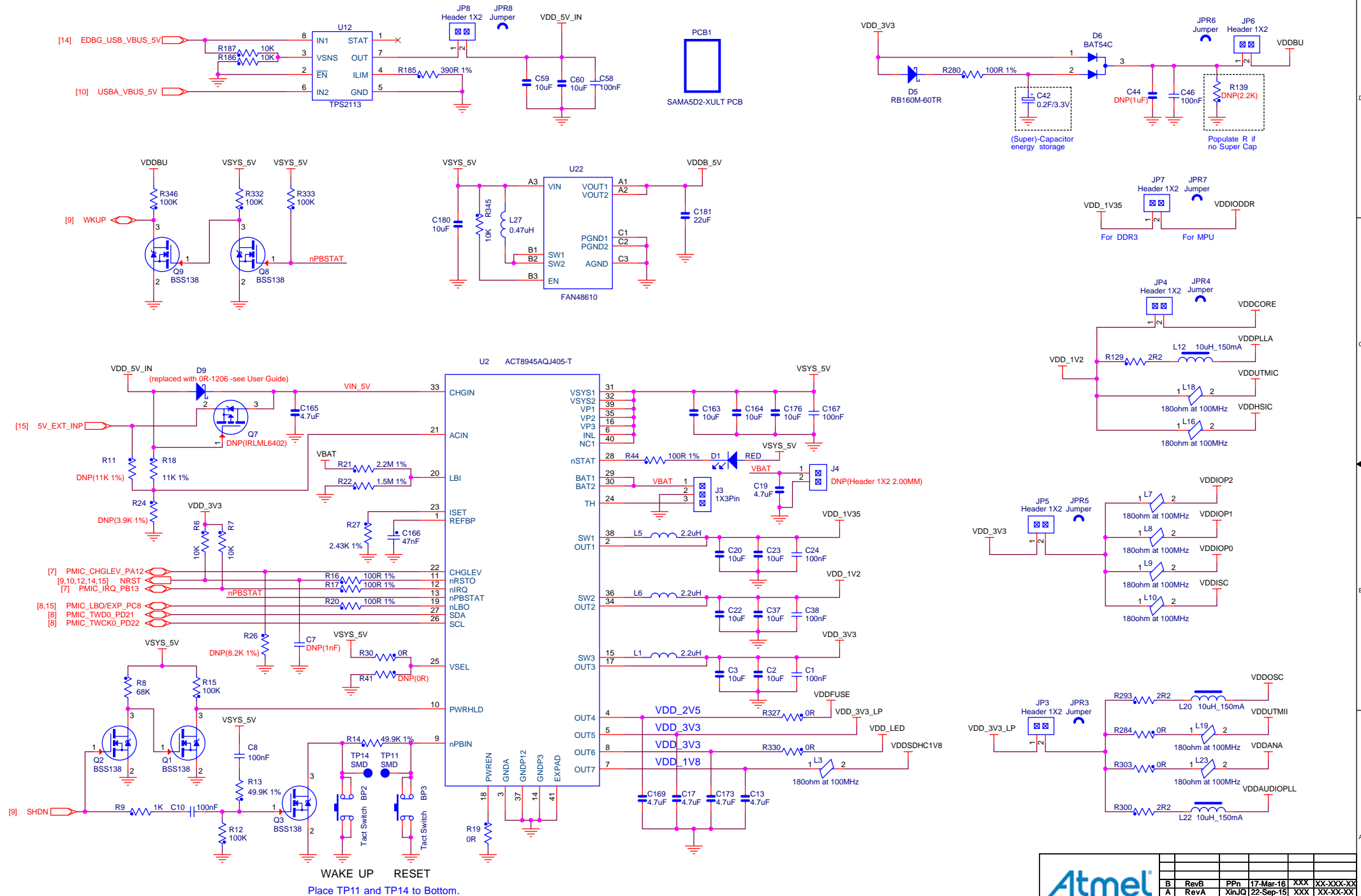
PIO Muxing & Jumper setting

| LCD | |
|-------------------|----|
| ID_SYS | 1 |
| GND | 2 |
| NC | 3 |
| NC | 4 |
| LCDDAT2 | 5 |
| LCDDAT3 | 6 |
| GND | 7 |
| LCDDAT4 | 8 |
| LCDDAT5 | 9 |
| LCDDAT6 | 10 |
| LCDDAT7 | 11 |
| GND | 12 |
| NC | 13 |
| NC | 14 |
| LCDDAT10 | 15 |
| LCDDAT11 | 16 |
| GND | 17 |
| LCDDAT12 | 18 |
| LCDDAT13 | 19 |
| LCDDAT14 | 20 |
| LCDDAT15 | 21 |
| GND | 22 |
| NC | 23 |
| NC | 24 |
| LCDDAT18 | 25 |
| LCDDAT19 | 26 |
| GND | 27 |
| LCDDAT20 | 28 |
| LCDDAT21 | 29 |
| LCDDAT22 | 30 |
| LCDDAT23 | 31 |
| GND | 32 |
| LCDPCK | 33 |
| LCDVSYNC | 34 |
| LCDHSYNC | 35 |
| LCDDEN | 36 |
| SPI1_SPCK/AD0_XP | 37 |
| SPI1_MOSI/AD1_XM | 38 |
| SPI1_MISO/AD2_YP | 39 |
| SPI1_NPCS0/AD3_YM | 40 |
| LCDDISP | 41 |
| TWD1 | 42 |
| TWCK1 | 43 |
| IRQ1 | 44 |
| IRQ2 | 45 |
| LCDPWM | 46 |
| NRST | 47 |
| VCC | 48 |
| VCC | 49 |
| GND | 50 |

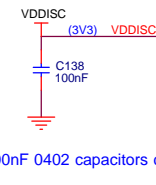
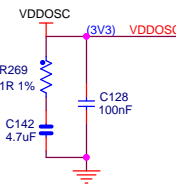
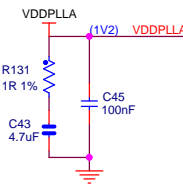
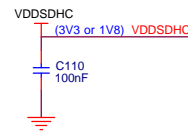
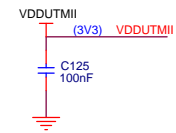
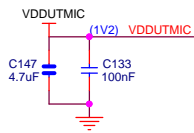
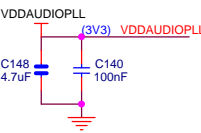
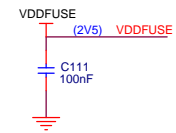
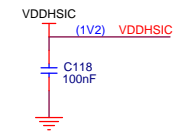
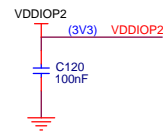
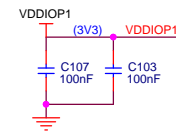
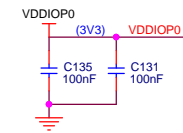
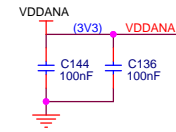
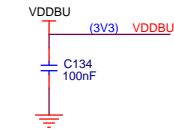
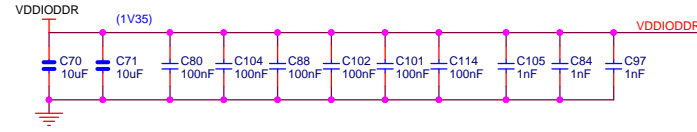
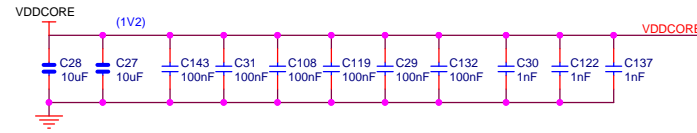
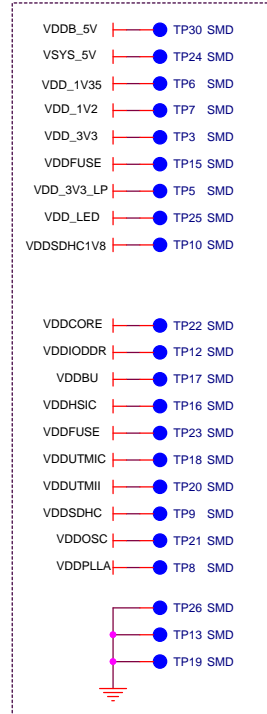
| PIOA | USAGE | PIOA | USAGE | PIOB | USAGE | PIOB | USAGE | PIOC | USAGE |
|------|---------------|------|------------------------|------|--------------------|------|-----------------|------|------------------------|
| PA0 | SDHC0_CK | PA16 | SPI0_MISO/EXP | PB0 | LED_BLUE/LCD_ID | PB16 | ETH_GRXDV | PC0 | ISC_D6/EXP/XPRO |
| PA1 | SDHC0_CMD | PA17 | SPI0_CS0/EXP | PB1 | CLASSD_R0 | PB17 | ETH_GRXER | PC1 | ISC_D7/SPI1_SPCK/EXP |
| PA2 | SDHC0_DAT0 | PA18 | SDHC1_DAT0/EXP | PB2 | CLASSD_R1 | PB18 | ETH_GRX0 | PC2 | ISC_D8/SPI1_MOSI/EXP |
| PA3 | SDHC0_DAT1 | PA19 | SDHC1_DAT1/EXP | PB3 | CLASSD_R2 | PB19 | ETH_GRX1 | PC3 | ISC_D9/SPI1_MISO/EXP |
| PA4 | SDHC0_DAT2 | PA20 | SDHC1_DAT2/EXP | PB4 | CLASSD_R3 | PB20 | ETH_GTX0/EXP | PC4 | ISC_PCK/SPI1_NPCS0/EXP |
| PA5 | SDHC0_DAT3 | PA21 | SDHC1_DAT3/EXP/XPRO | PB5 | LED_GREEN/EXP/XPRO | PB21 | ETH_GTX1/EXP | PC5 | ISC_VSYNC/EXP |
| PA6 | SDHC0_DAT4 | PA22 | SDHC1_CK/QSPI0_SCK/EXP | PB6 | LED_RED/EXP/XPRO | PB22 | ETH_GMDC/EXP | PC6 | ISC_HSYNC/EXP |
| PA7 | SDHC0_DAT5 | PA23 | QSPI0_CS/EXP/XPRO | PB7 | LCD_IRQ1 | PB23 | ETH_GMDIO/EXP | PC7 | ISC_MCK/EXP |
| PA8 | SDHC0_DAT6 | PA24 | QSPI0_IO0/EXP/XPRO | PB8 | LCD_IRQ2 | PB24 | ISC_D10/EXP | PC8 | PMIC_LBO/EXP |
| PA9 | SDHC0_DAT7 | PA25 | QSPI0_IO1/EXP | PB9 | USER_PB/EXP/XPRO | PB25 | ISC_D11/EXP | PC9 | ETH_INT |
| PA10 | SDHC0_RSTN | PA26 | QSPI0_IO2/EXP | PB10 | USBB_EN5V/EXP/XPRO | PB26 | ISC_D0/EXP | PC10 | LCD_DAT2/EXP |
| PA11 | SDHC0_VDDSEL | PA27 | QSPI0_IO3 | PB11 | ISC_RST/EXP | PB27 | ISC_D1/EXP | PC11 | LCD_DAT3/EXP |
| PA12 | PMIC_CHGLEV | PA28 | SDHC1_CMD | PB12 | ISC_PWD/EXP | PB28 | ISC_D2/EXP/XPRO | PC12 | LCD_DAT4 |
| PA13 | SDHC0_CD | PA29 | USBB_OVCUR | PB13 | PMIC_IRQ | PB29 | ISC_D3/EXP/XPRO | PC13 | LCD_DAT5 |
| PA14 | SPI0_SPCK/EXP | PA30 | SDHC1_CD | PB14 | ETH_GTXCK | PB30 | ISC_D4/EXP | PC14 | LCD_DAT6 |
| PA15 | SPI0_MOSI/EXP | PA31 | USBA_VBUS Detection | PB15 | ETH_GTXEN | PB31 | ISC_D5/EXP/XPRO | PC15 | LCD_DAT7 |

| PIOC | USAGE | PIOD | USAGE | PIOD | USAGE |
|------|---------------|------|-----------------------|------|-----------------------|
| PC16 | LCD_DAT10 | PD0 | LCD_PCK | PD16 | JTAG_TDO |
| PC17 | LCD_DAT11 | PD1 | LCD_DEN | PD17 | JTAG_TMS |
| PC18 | LCD_DAT12 | PD2 | DBGU_URXD1 | PD18 | XPRO |
| PC19 | LCD_DAT13 | PD3 | DBGU_UTXD1 | PD19 | LCD_XP/EXP |
| PC20 | LCD_DAT14 | PD4 | LCD/EEP/ISC/EXP_TWD1 | PD20 | LCD_XM/EXP |
| PC21 | LCD_DAT15 | PD5 | LCD/EEP/ISC/EXP_TWCK1 | PD21 | LCD_YP/PMIC_TWD0/EXP |
| PC22 | LCD_DAT18 | PD6 | EXP | PD22 | LCD_YM/PMIC_TWCK0/EXP |
| PC23 | LCD_DAT19 | PD7 | XPRO | PD23 | EXP |
| PC24 | LCD_DAT20 | PD8 | XPRO | PD24 | EXP |
| PC25 | LCD_DAT21 | PD9 | XPRO | PD25 | EXP/XPRO |
| PC26 | LCD_DAT22/EXP | PD10 | XPRO | PD26 | EXP/XPRO |
| PC27 | LCD_DAT23/EXP | PD11 | XPRO | PD27 | EXP/XPRO |
| PC28 | LCD_PWM | PD12 | EXP/XPRO | PD28 | EXP/XPRO |
| PC29 | LCD_DISP | PD13 | EXP/XPRO | PD29 | EXP/XPRO |
| PC30 | LCD_VSYNC | PD14 | JTAG_TCK | PD30 | EXP |
| PC31 | LCD_HSYNC | PD15 | JTAG_TDI | PD31 | EXP |

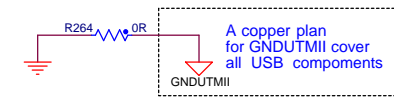
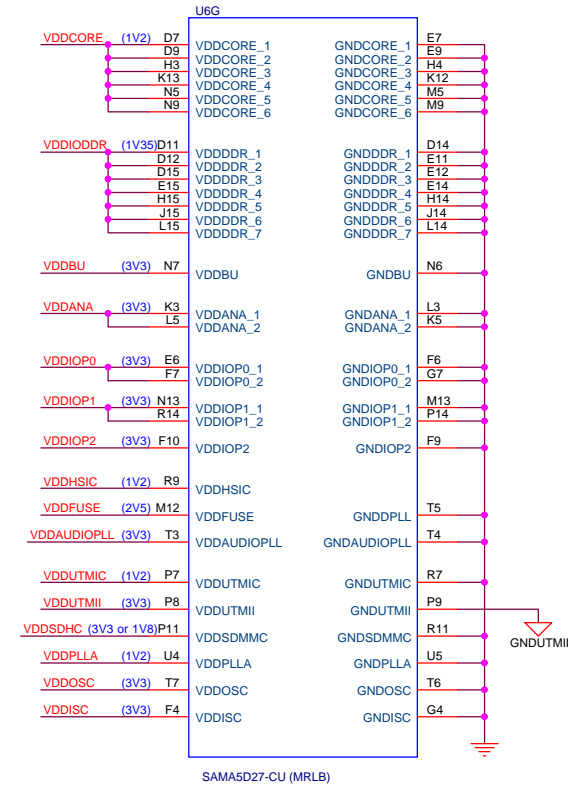
| JUMPER DESCRIPTION | | |
|--------------------|---------|------------------------------------|
| PART | DEFAULT | FUNCTION |
| JP1 | OPEN | Disable EDBG |
| JP2 | OPEN | Disable Debug |
| JP3 | CLOSE | I VDD_3V3_LP Measurement |
| JP4 | CLOSE | I VDDCORE Measurement |
| JP5 | CLOSE | I VDDISC+VDDIOP0/1/2 Measurement |
| JP6 | CLOSE | I VDDBU Measurement |
| JP7 | CLOSE | I VDDIODDR_MPU Measurement |
| JP8 | CLOSE | I VDD_5V_IN Measurement |
| JP9 | OPEN | Disable CS of SPI&QSPI&eMMC Memory |



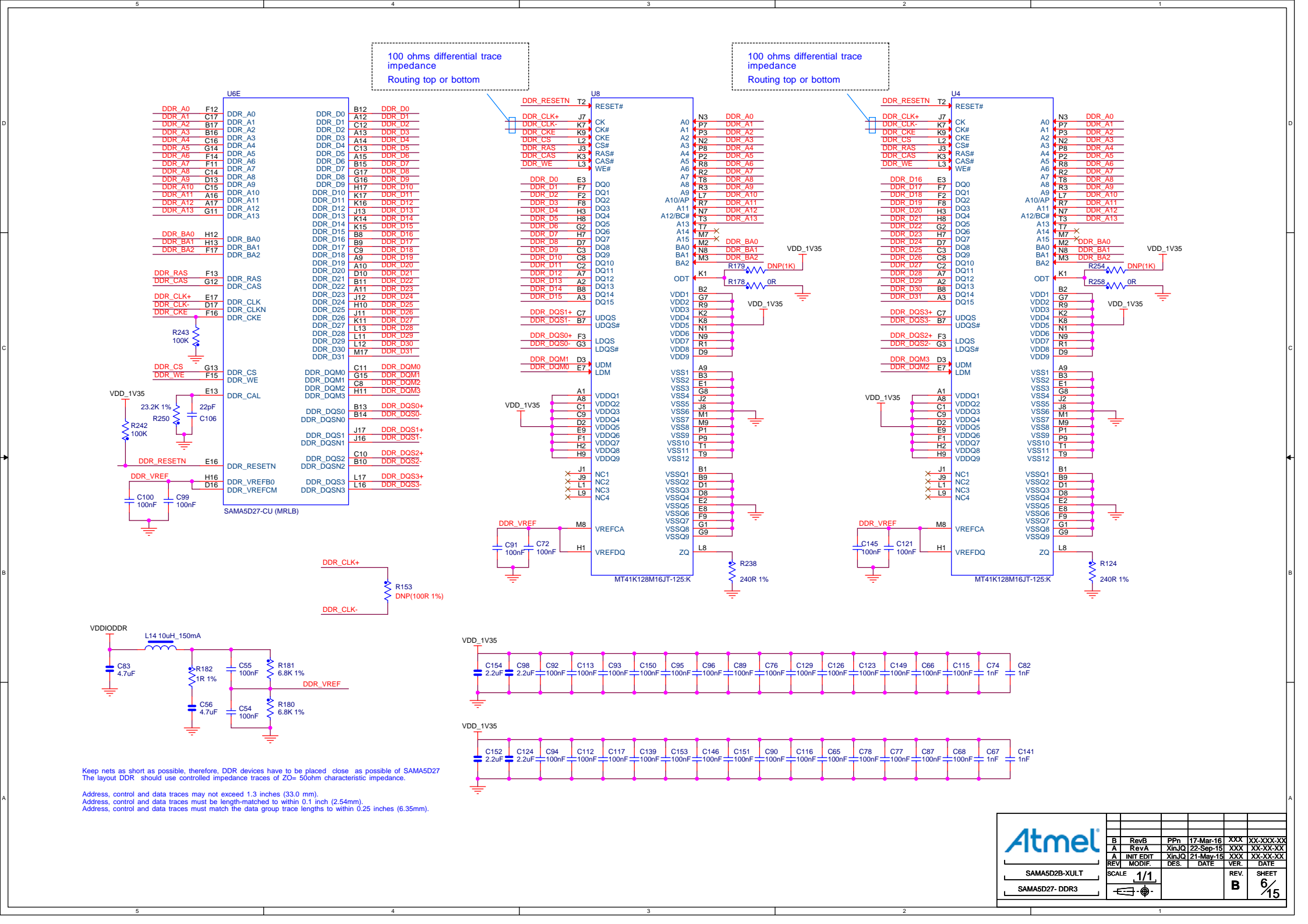
POWER TEST POINTS



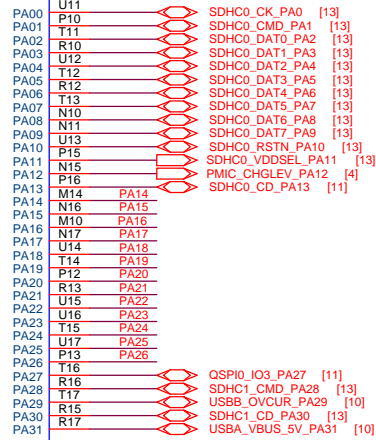
All 100nF 0402 capacitors close to the the Pin of VDD***.



| | | | | | |
|-----------------|-----------|-------|-----------|--------|------------|
| Atmel | | | | | |
| B | RevB | PPn | 17-Mar-16 | XXX | XX-XX-XX |
| A | RevA | XinJQ | 22-Sep-15 | XXX | XX-XX-XX |
| A | INIT EDIT | XinJQ | 21-May-15 | XXX | XX-XX-XX |
| REV | MODIF. | DES. | DATE | VER. | DATE |
| SAMA5D2B-XULT | | SCALE | 1/1 | REV. B | SHEET 5/15 |
| SAMA5D27- Power | | | | | |

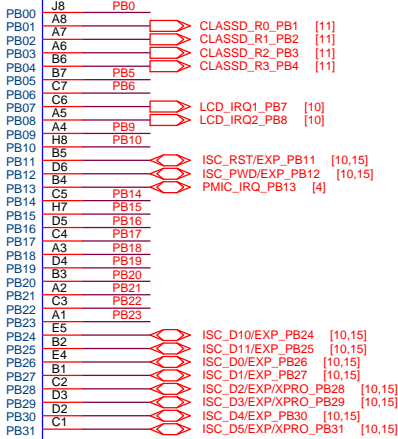


U6A

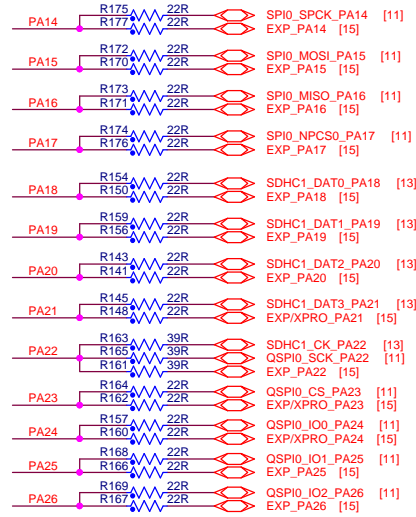


SAMA5D27-CU (MRLB)

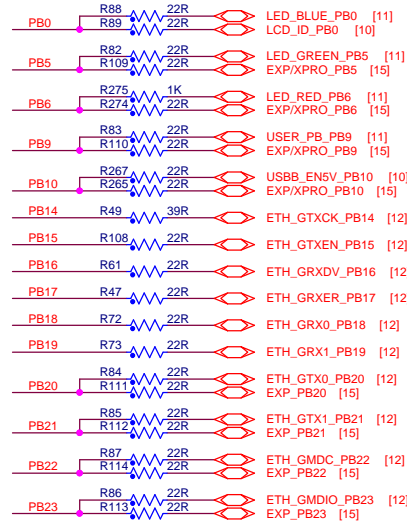
U6B



SAMA5D27-CU (MRLB)

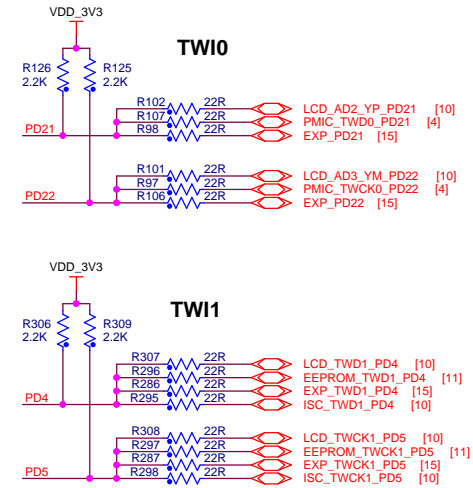
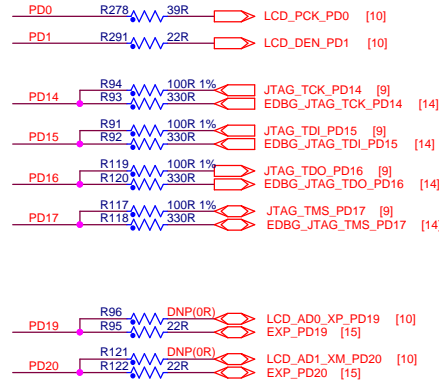
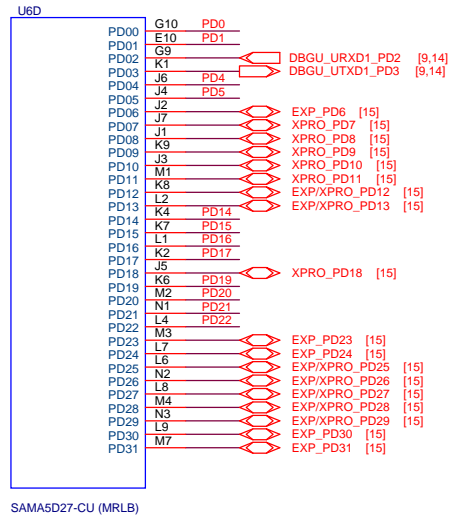
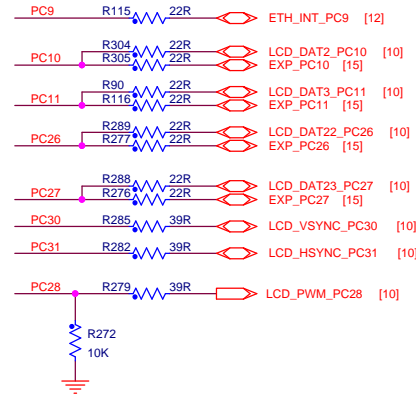
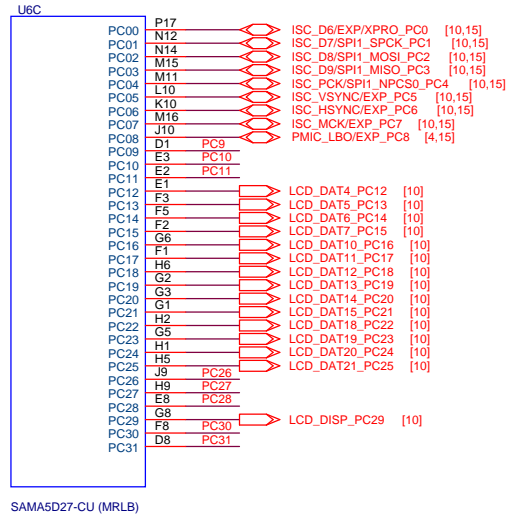


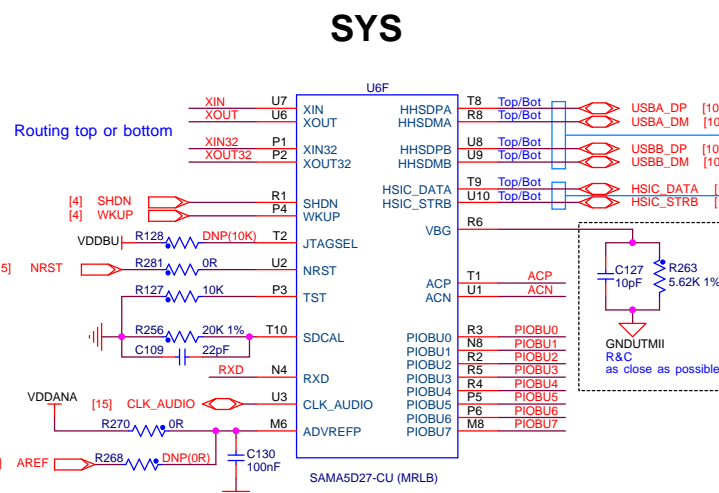
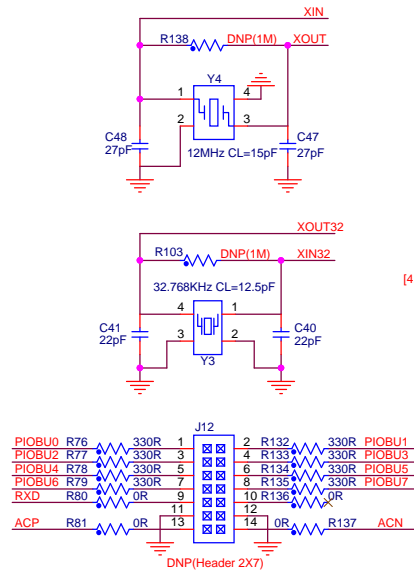
39R on PA22 close to MPU.



| | | | | | |
|------------|--|---------------|--|-----------------------|--|
| Atmel | | SAMA5D2B-XULT | | SAMA5D27- PIOA & PIOB | |
| | | SCALE 1/1 | | REV. B | |
| SHEET 7/15 | | REV. B | | SHEET 7/15 | |

| REV | MODIF. | DES. | DATE | VER. | DATE |
|-----|-----------|-------|-----------|------|----------|
| B | RevB | PPn | 17-Mar-16 | XXX | XX-XX-XX |
| A | RevA | XinJQ | 22-Sep-15 | XXX | XX-XX-XX |
| A | INIT EDIT | XinJQ | 21-May-15 | XXX | XX-XX-XX |





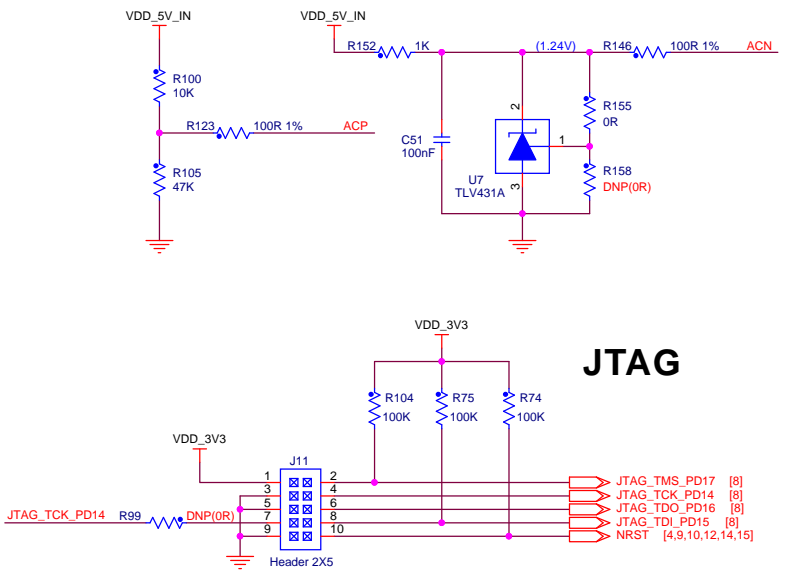
Routing USB

Max trace-length mismatch between USB signals pairs should be no greater than 3.8mm

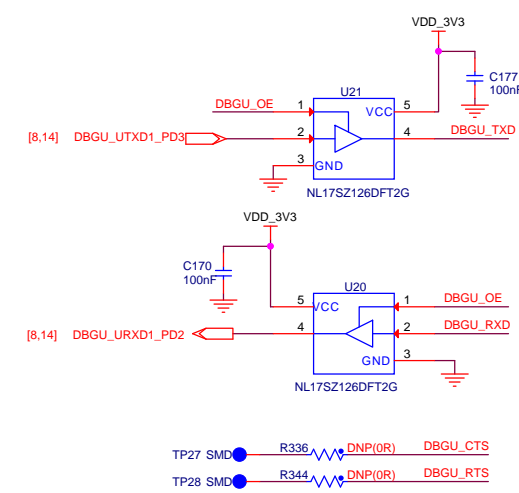
90 ohms differential trace impedance

Routing HSIC

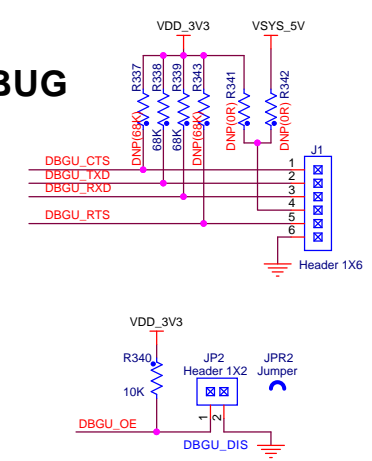
Routing HSIC Refers to Spec





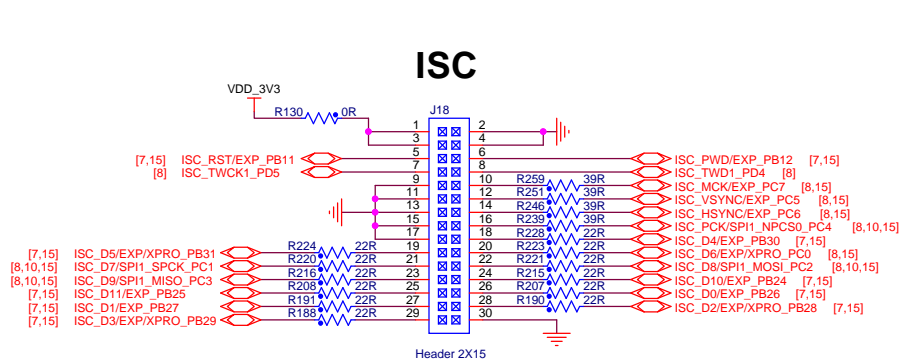
JTAG



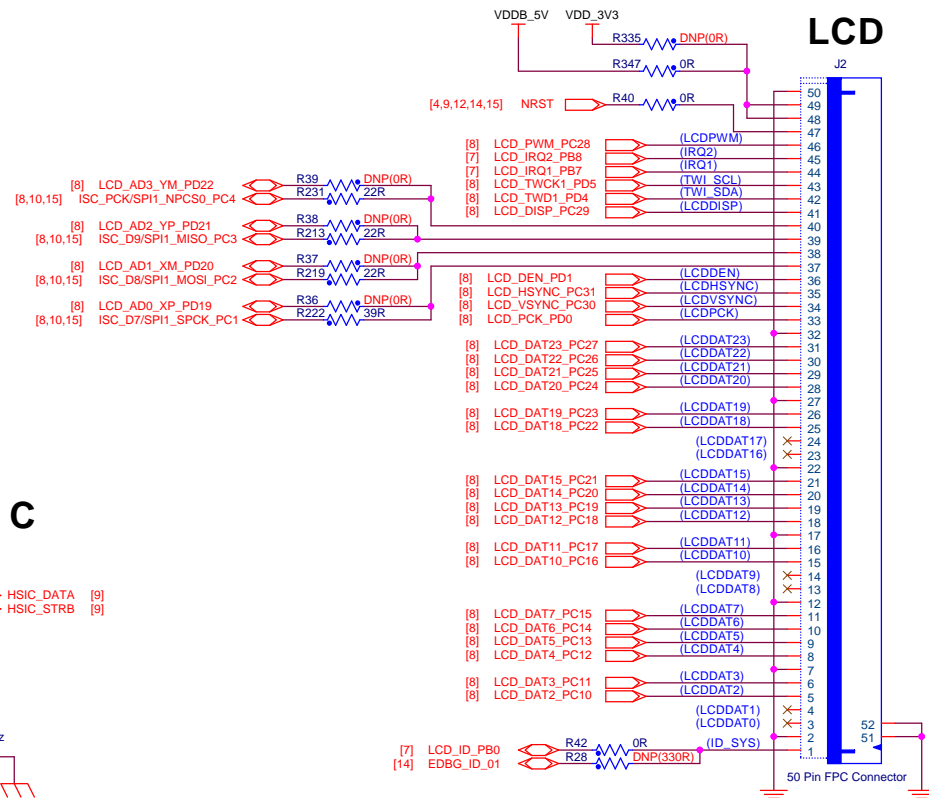
DEBUG



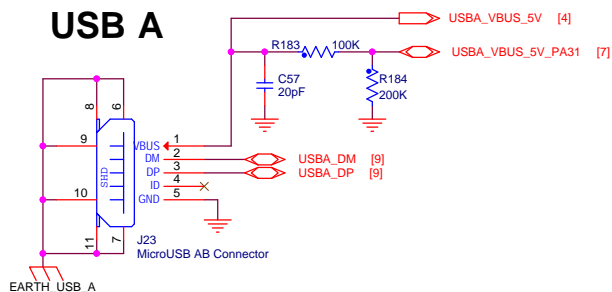
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|---|-----------|---|-----------|------|----------|--------|--|------------|--|--|--|
|  | | | | | | | | | | | |
| | | | | | | | | | | | |
| B | RevB | PPn | 17-Mar-16 | XXX | XX-XX-XX | | | | | | |
| A | RevA | XinJQ | 22-Sep-15 | XXX | XX-XX-XX | | | | | | |
| A | INIT EDIT | XinJQ | 21-May-15 | XXX | XX-XX-XX | | | | | | |
| REV | MODIF. | DES. | DATE | VER. | DATE | | | | | | |
| SAMA5D2B-XULT | | SCALE 1/1 | | | | REV. B | | SHEET 9/15 | | | |
| SAMA5D27- SYS & JTAG & DEBUG | |  | | | | | | | | | |



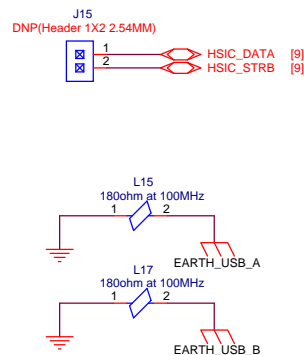
The signal ISC[D11-0], ISC_VSYNC, ISC_HSYNC, ISC_PCK, ISC_MCK on connector J18 are connected through serial resistor 22R from J17.
Like: MPU (ISC) -> J17 -> 22R -> J18



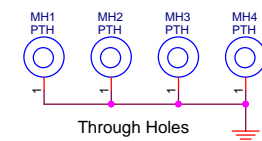
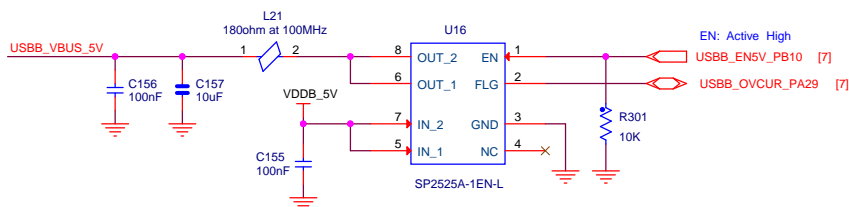
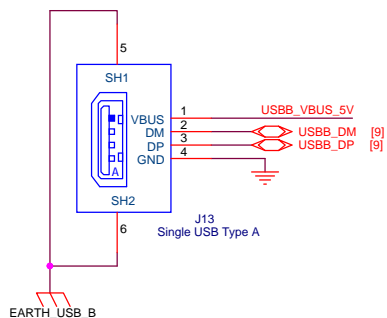
USB A



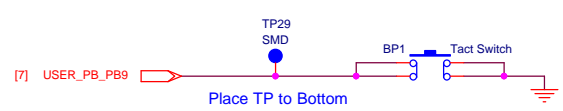
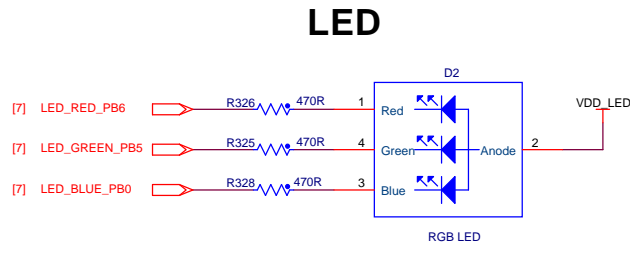
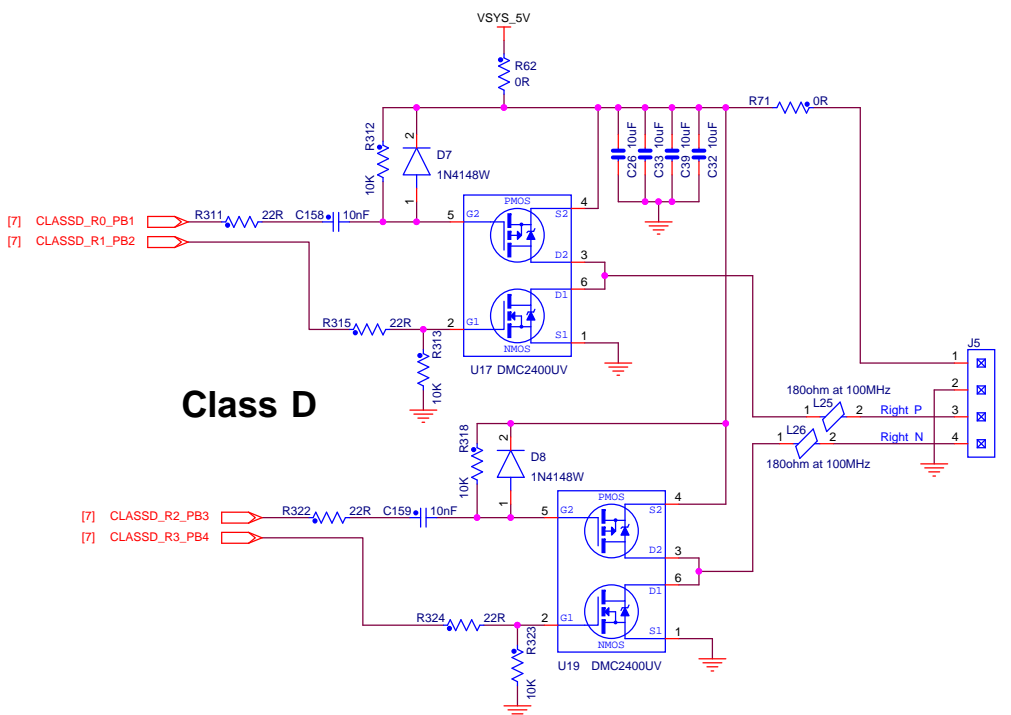
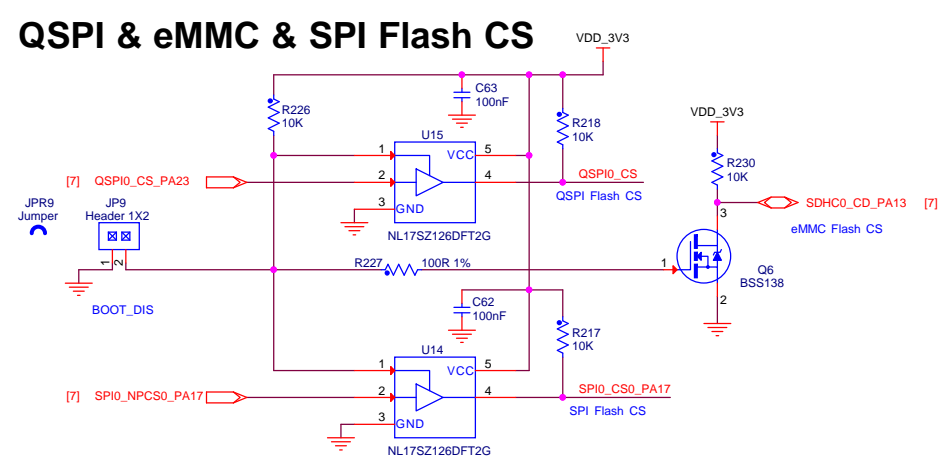
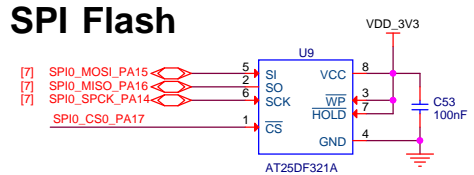
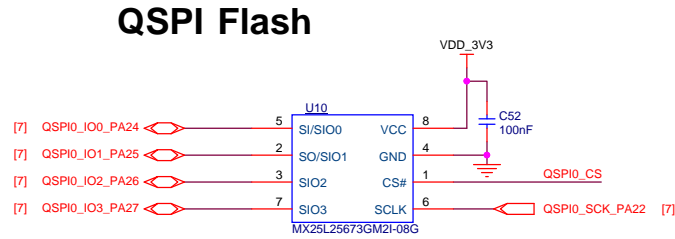
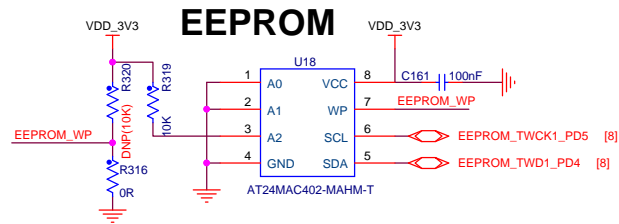
USB C

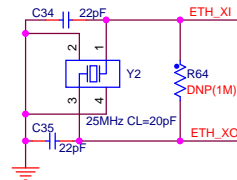
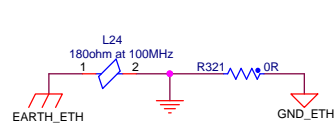
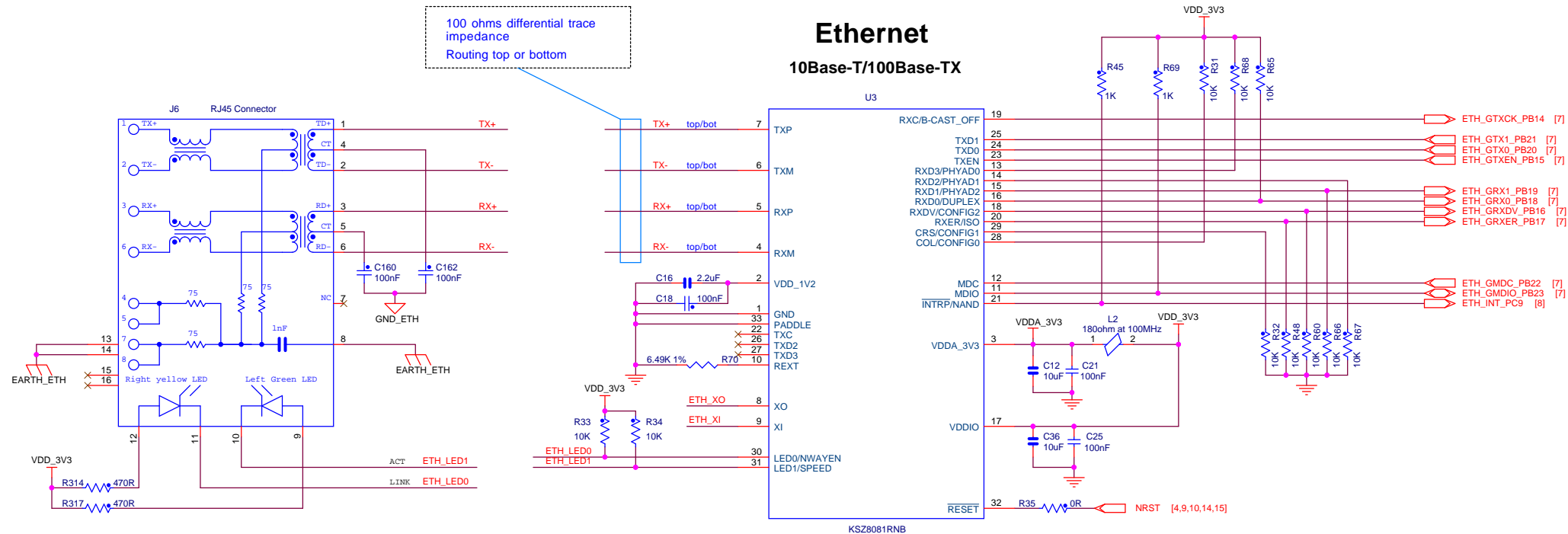


USB B



| | | | | | |
|-----------------|-----------|-------|-----------|------|----------|
| Atmel | | | | | |
| B | RevB | PPn | 17-Mar-16 | XXX | XX-XX-XX |
| A | RevA | XinJQ | 22-Sep-15 | XXX | XX-XX-XX |
| A | INIT EDIT | XinJQ | 21-May-15 | XXX | XX-XX-XX |
| REV | MODIF. | DES. | DATE | VER. | DATE |
| SAMA5D2B-XULT | | SCALE | 1/1 | REV. | SHEET |
| ISC & USB & LCD | | | | B | 10/15 |



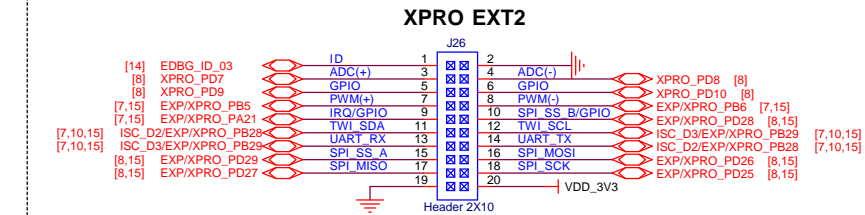
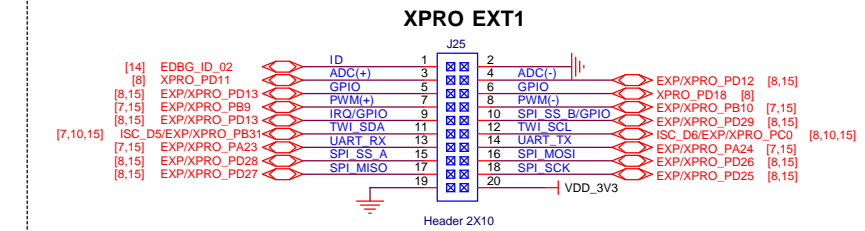
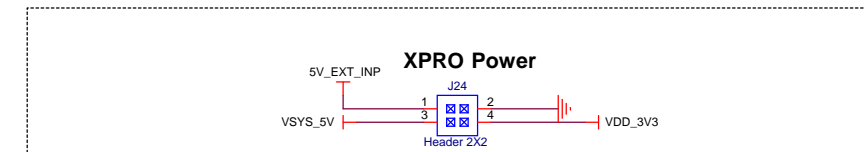
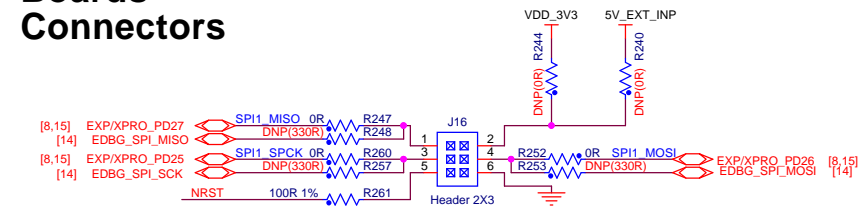


At the De-Assertion of Reset:

PHY ADD[2:0]-pin15/14/13: 001 = 1
CONFIG[2:0]-pin18/29/28:001,RMII mode
Duplex Mode-pin16: 1,Half Duplex
Isolate Mode-pin20: 0,Disable
Speed Mode-pin31: 1,100Mbps
Nway Auto-Negotiation-p30: 1,Enable

| | | | | | |
|-----------|-----|---------------|---|------------------|-------|
| Atmel | | SAMA5D2B-XULT | | Ethernet_10/100M | |
| SCALE | 1/1 | REV. | B | SHEET | 12/15 |
| REV. B | | RevA | | RevA | |
| INIT EDIT | | XinJQ | | XinJQ | |
| MODIF. | | DES. | | DATE | |
| 17-Mar-16 | | 22-Sep-15 | | 21-May-15 | |
| XXX | | XXX | | XXX | |
| XX-XX-XX | | XX-XX-XX | | XX-XX-XX | |

Expansion Boards Connectors



XPRO Connectors

| | | | | | | | |
|--|--------|-----------|-------|-----------|-----------|----------|----------|
| <div>Atmel</div> <div>SAMASD2B-XULT</div> <div>Expansion & XPRO Connectors</div> | | | | | | | |
| | | | | | | | |
| | | B | RevB | PPn | 17-Mar-16 | XXX | XX-XX-XX |
| | | A | RevA | XinJQ | 22-Sep-15 | XXX | XX-XX-XX |
| | A | INIT EDIT | XinJQ | 21-May-15 | XXX | XX-XX-XX | |
| REV | MODIF. | DES. | DATE | VER. | DATE | | |
| SCALE | 1/1 | | | | | REV. | SHEET |
| | | | | | | B | 15/15 |