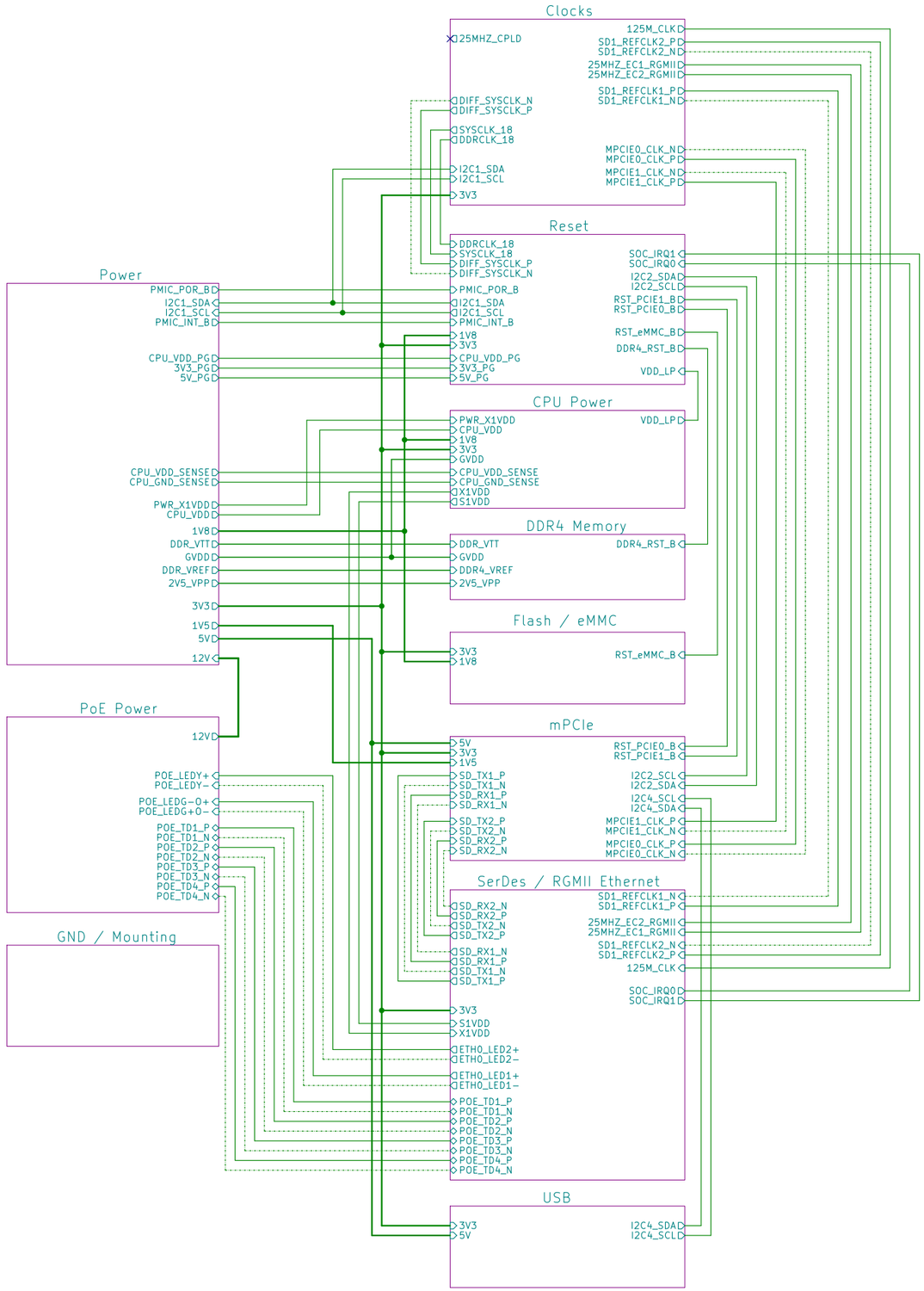
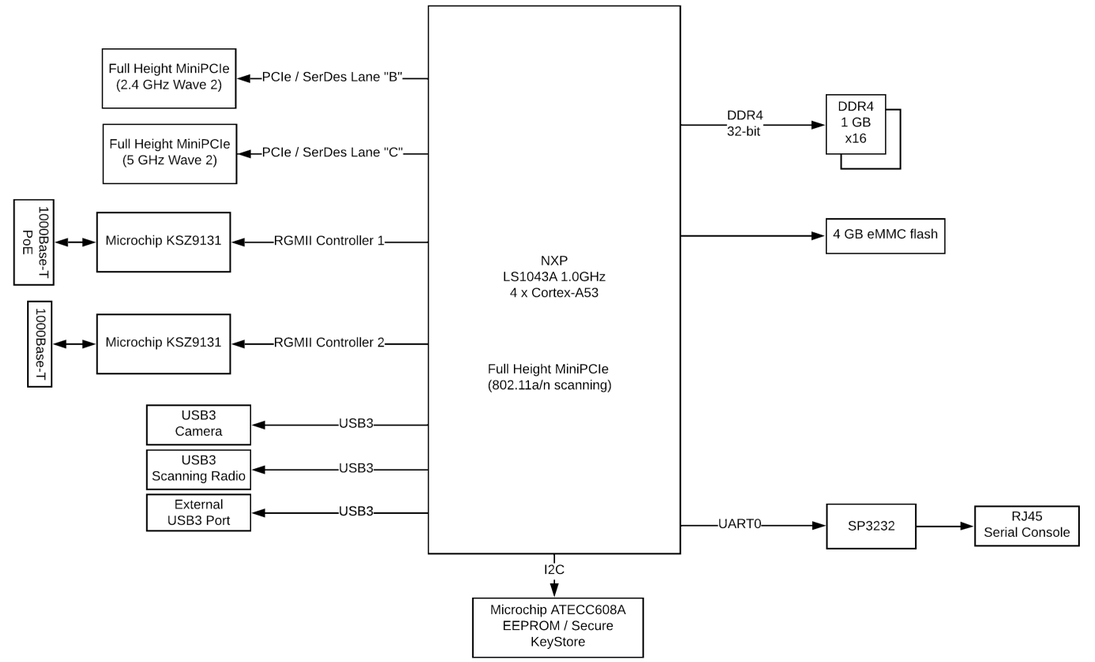



# ImageStream AP2100v2
# System Architecture

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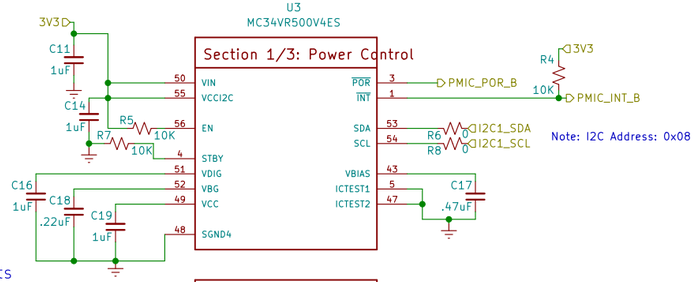
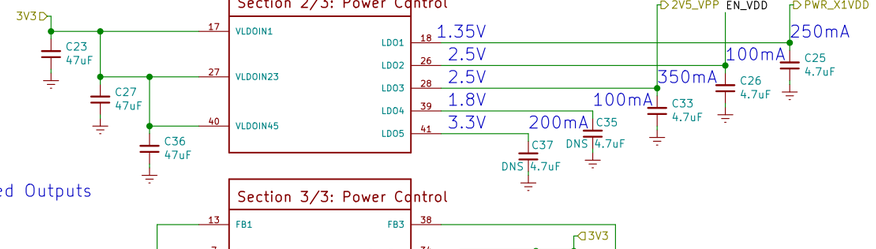
| | | |
|---|---|---|
| **ISis ImageStream Internet Solutions, Inc.** | | |
| Sheet: / | | |
| File: AP2100.kicad_sch | | |
| ***Title: AP2100*** | | |
| Size: USLedger | Date: 2020−10−06 | **Rev: 1** |
| KiCad E.D.A. kicad 5.99.0−unknown−4b436fa57104ubuntu20.04.1 | | Id: 1/12 |

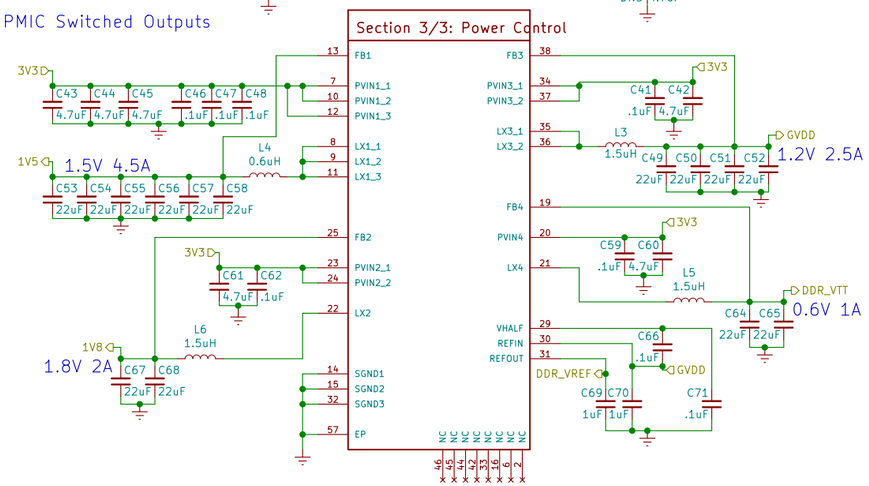
## PMIC Control



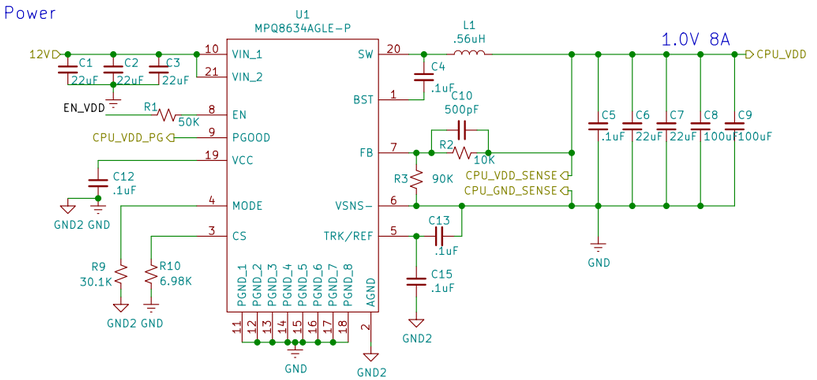

## PMIC LDO Outputs



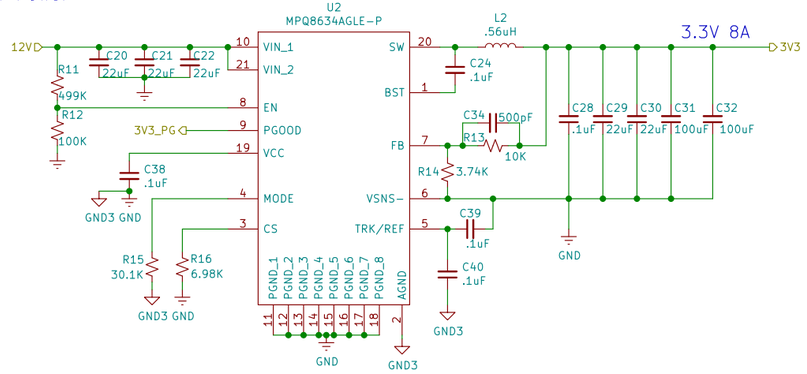

## PMIC Switched Outputs



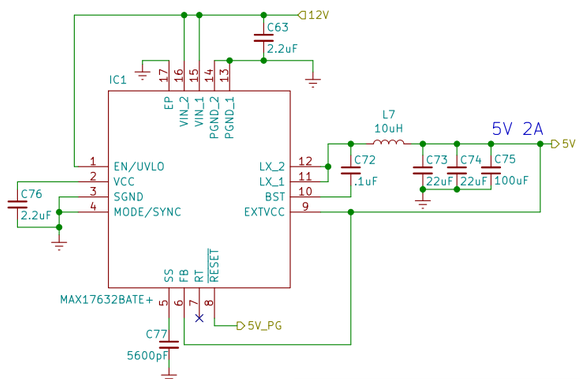

## CPU VDD Power




## 3.3V Power




## 5V Power

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Sheet: /Power/
File: Power.kicad_sch

**Title: AP2100**

| Size: USLedger | Date: 2020-10-06 | **Rev: 1** |
|---|---|---|
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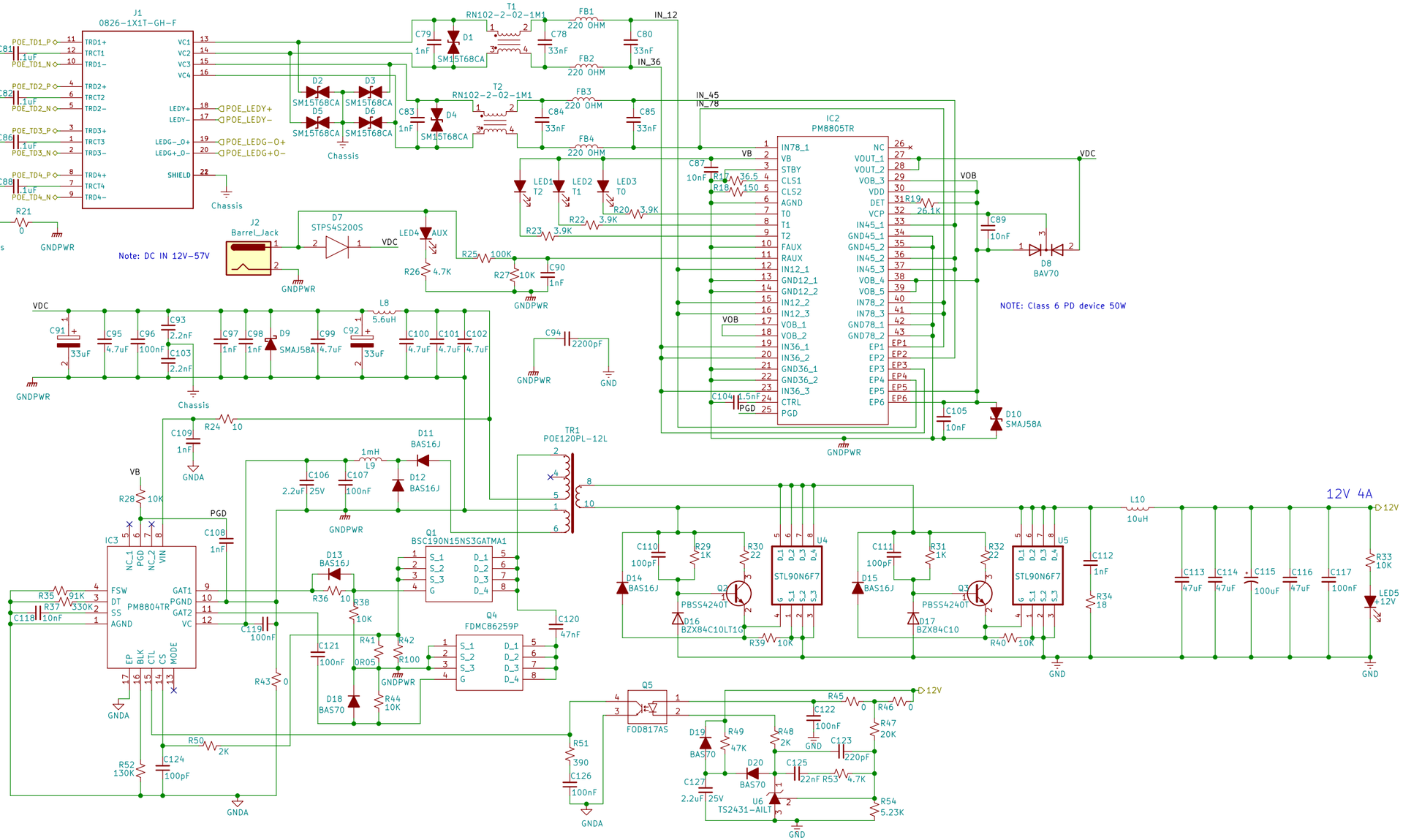


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|---|---|
| ISis ImageStream Internet Solutions, Inc. | |
| Sheet: /PoE Power/ | |
| File: poe.kicad_sch | |
| **Title: AP2100** | |
| Size: USLedger Date: 2020-10-06 | **Rev: 1** |
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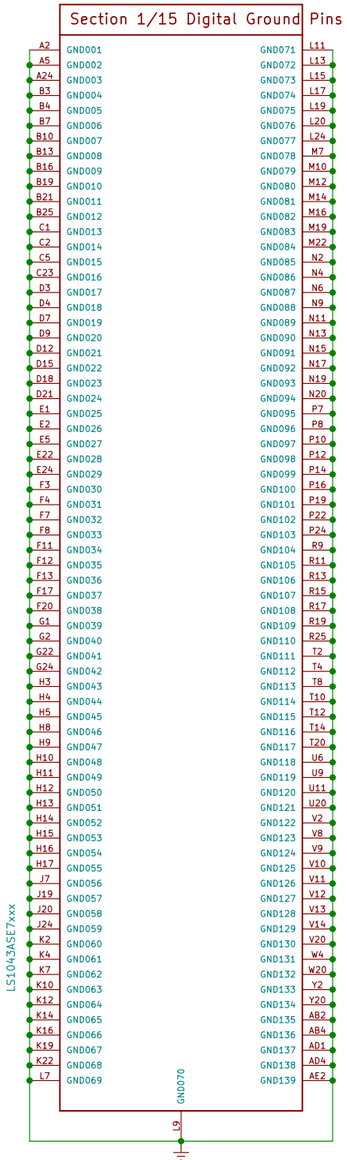


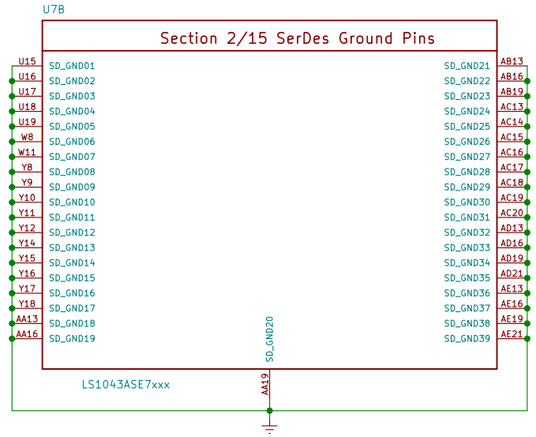


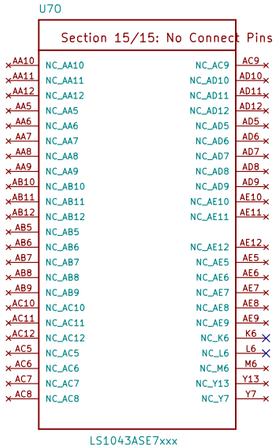

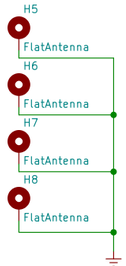


ISis ImageStream Internet Solutions, Inc.

Sheet: /GND / Mounting/

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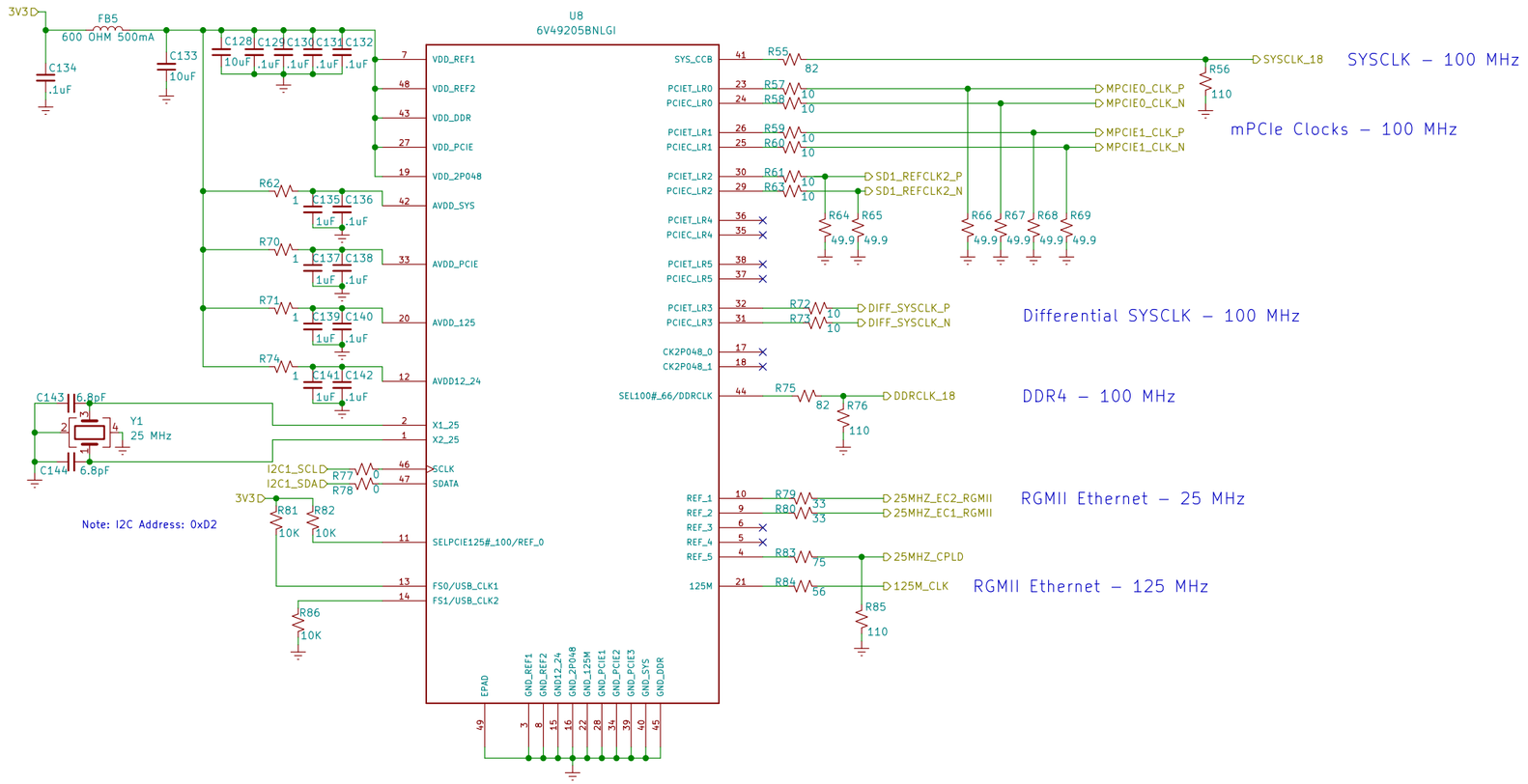
**Title: AP2100**

| Size: USLedger | Date: 2020-10-06 | **Rev: 1** |
|---|---|---|
| KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | | Id: 4/12 |




ISis ImageStream Internet Solutions, Inc.

Sheet: /Clocks/
File: clock.kicad_sch

**Title: AP2100**

Size: USLedger | Date: 2020-10-06 | **Rev: 1**

KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | Id: 5/12

U7E
LS1043ASE7xxx

## Section 5/15: JTAG, UARTs, Interrupts and Miscellaneous Functions

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| F15 | IRQ00 | (OVDD: 1.8V) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_17/UART1_SIN | H2 | UART_RX |
| G15 | IRQ01 | (OVDD: 1.8V) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_15/UART1_SOUT | H1 | UART_TX |
| J6 | IRQ02 | (OVDD: 1.8V) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_21/UART1_CTS | J1 | UART_CTS |
| V5 | IRQ11/GPIO1_31 | (LVDD: 2.5V/1.8V) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_19/UART1_RTS | J2 | UART_RTS |
| J3 | IRQ03/GPIO1_23 | (DVDD: 3.3V/1.8V) (Note 1) | | | | | |
| J4 | IRQ04/GPIO1_24 | (DVDD: 3.3V/1.8V) (Note 1) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_18/UART2_SIN | K1 | RST_PCIE0 |
| J5 | IRQ05/GPIO1_25 | (DVDD: 3.3V/1.8V) (Note 1) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_16/UART2_SOUT | L2 | RST_PCIE1 |
| K5 | IRQ06/GPIO1_26 | (DVDD: 3.3V/1.8V) (Note 1) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_22/UART2_CTS | M2 | |
| L5 | IRQ07/GPIO1_27 | (DVDD: 3.3V/1.8V) (Note 1) | (Note 1) | (DVDD: 3.3V/1.8V) | GPIO1_20/UART2_RTS | L1 | RESET_BTN_B |
| M5 | IRQ08/GPIO1_28 | (DVDD: 3.3V/1.8V) (Note 1) | | | | | |
| N5 | IRQ09/GPIO1_29 | (DVDD: 3.3V/1.8V) (Note 1) | | (DVDD: 3.3V/1.8V) | IIC1_SCL | N1 | I2C1_SCL |
| P4 | IRQ10/GPIO1_30 | (DVDD: 3.3V/1.8V) (Note 1) | | (DVDD: 3.3V/1.8V) | IIC1_SDA | M1 | I2C1_SDA |
| G16 | TA_TMP_DETECT | (OVDD: 1.8V) | | (OVDD: 1.8V) | ASLEEP/GPIO1_13/CFG_SOIC_USE | E9 | |
| G19 | TA_BB_TMP_DETECT | (TA_BB_VDD: 0.9V/1V) | | | | | |
| G20 | TA_BB_RTC | (TA_BB_VDD: 0.9V/1V) | | (OVDD: 1.8V) | TBSCAN_EN | C21 | |
| | | | | (OVDD: 1.8V) | TEST_SEL | E21 | |
| G7 | RESET_REQ | (OVDD: 1.8V) | | | | | |
| G10 | HRESET | (OVDD: 1.8V) | | (Analog) | TD1_ANODE | R6 | |
| F10 | PORESET | (OVDD: 1.8V) | | (Analog) | TD1_CATHODE | P6 | |
| F9 | SYSCLK | (OVDD: 1.8V) | | | | | |
| F19 | DDRCLK | (OVDD: 1.8V) | (Note 1) | (DVDD: 2.5V/1.8V) | GPIO4_02/IIC2_SCL | K3 | I2C2_SCL |
| | | | (Note 1) | (DVDD: 2.5V/1.8V) | GPIO4_03/IIC2_SDA | L3 | I2C2_SDA |
| G8 | DIFF_SYSCLK | (OVDD: 1.8V) | | | | | |
| G9 | DIFF_SYSCLK | (OVDD: 1.8V) | | (OVDD: 1.8V) | EVT0 | E10 | |
| | | | | (OVDD: 1.8V) | EVT1 | E13 | |
| G17 | CLK_OUT | (OVDD: 1.8V) | | (OVDD: 1.8V) | EVT2 | E8 | |
| P5 | TH_TPA | (Analog) | | (OVDD: 1.8V) | EVT3 | E12 | |
| F16 | RTC/GPIO1_14 | (OVDD: 1.8V) | | (OVDD: 1.8V) | EVT4 | E11 | |
| | | | | (OVDD: 1.8V) | EVT9 | H7 | |
| G18 | TDI | (OVDD: 1.8V) | | (OVDD: 1.8V) | CKSTP_OUT | H18 | |
| E20 | TDO | (OVDD: 1.8V) | | (OVDD: 1.8V) | SCAN_MODE | A21 | |
| E18 | TCK | (OVDD: 1.8V) | | (OVDD: 1.8V) | JTAG_BSR_VSEL | F21 | |
| F18 | TMS | (OVDD: 1.8V) | | (Reserved, Analog) | FA_ANALOG_PIN | T7 | |
| E19 | TRST | (OVDD: 1.8V) | | (Reserved, Analog) | FA_ANALOG_G_V | U7 | |

Note1: This pin has other functions not listed here.

## JTAG

J3
Conn_ARM_JTAG_SWD_10

## Reset Logic

IC4
MIC2774N-29YM5-TR

PWRLED

## Real Time Clock

IC5
PCF2129T_2,518

Note: I2C Address: 0x51

## CPU Temp

U10
SA56004EDP,118

Note: I2C Address: 0x4C

100 ohm = 1.6MHZ Cutoff

## Serial Console

U11
SP3232EBEY-L/TR

J4
RJ45

## LEDs

## Crypto / Key Storage

U18
ATECC608A-MAHDA

Note: I2C Address: 0x60

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Sheet: /Reset/
File: reset.kicad_sch

**Title: AP2100**

Size: USLedger | Date: 2020-10-06 | **Rev: 1**
KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | Id: 6/12

U7C
LS1043ASE7xxx

Section 3/15 Power Pins

U7D
LS1043ASE7xxx

Section 4/15: Power Pins

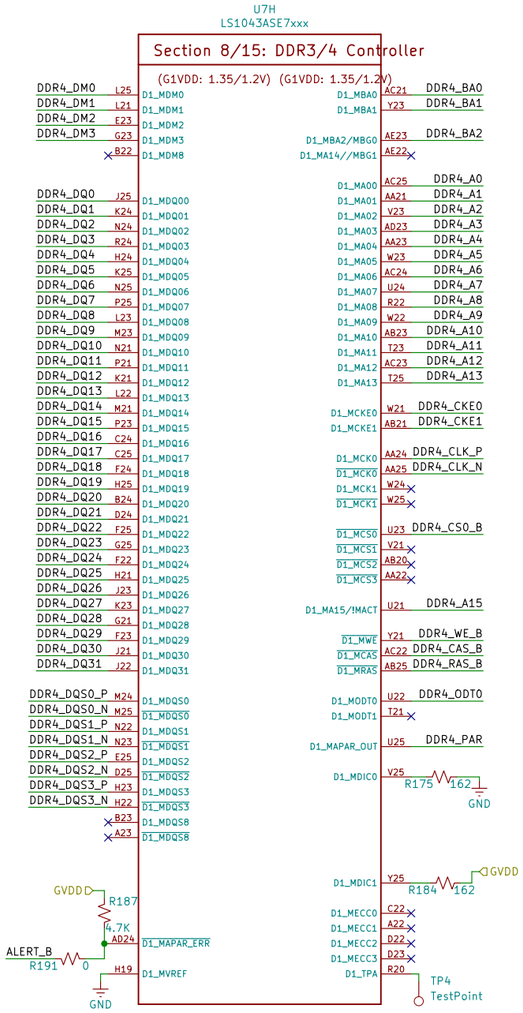
ISis ImageStream Internet Solutions, Inc.

Sheet: /CPU Power/
File: CPU_power.kicad_sch

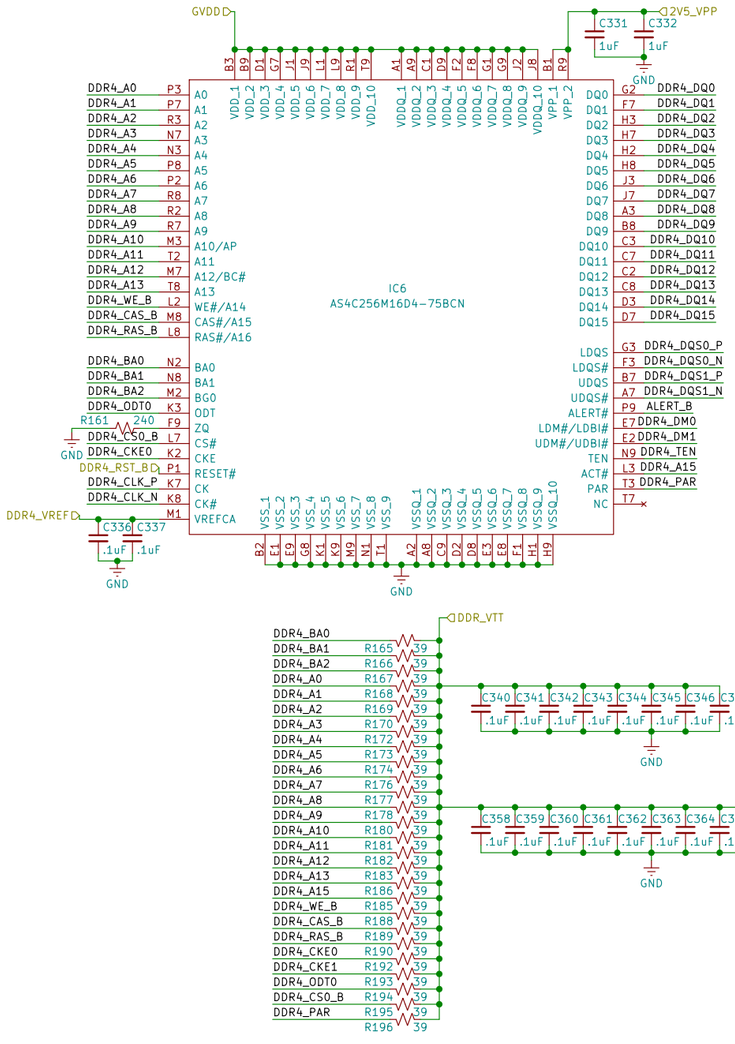
**Title: AP2100**

Size: USLedger | Date: 2020-10-06 | **Rev: 1**
KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | Id: 7/12

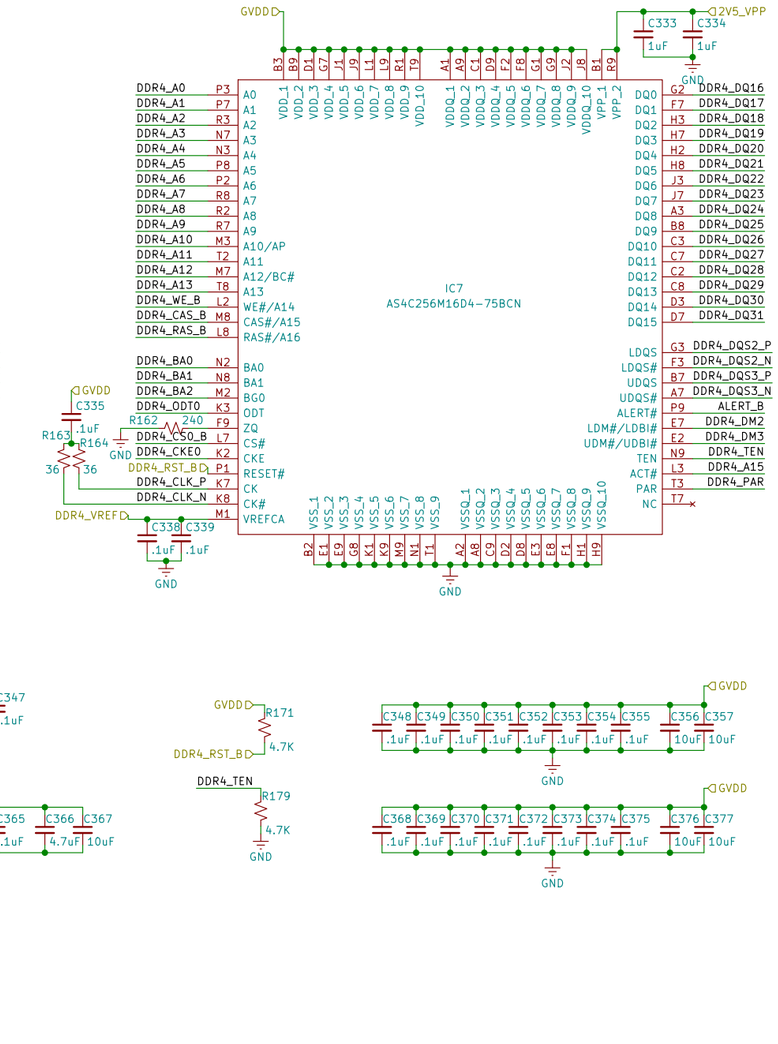
# 1GB DDR4 Memory




# DDR4 256Mx16




# DDR4 256Mx16

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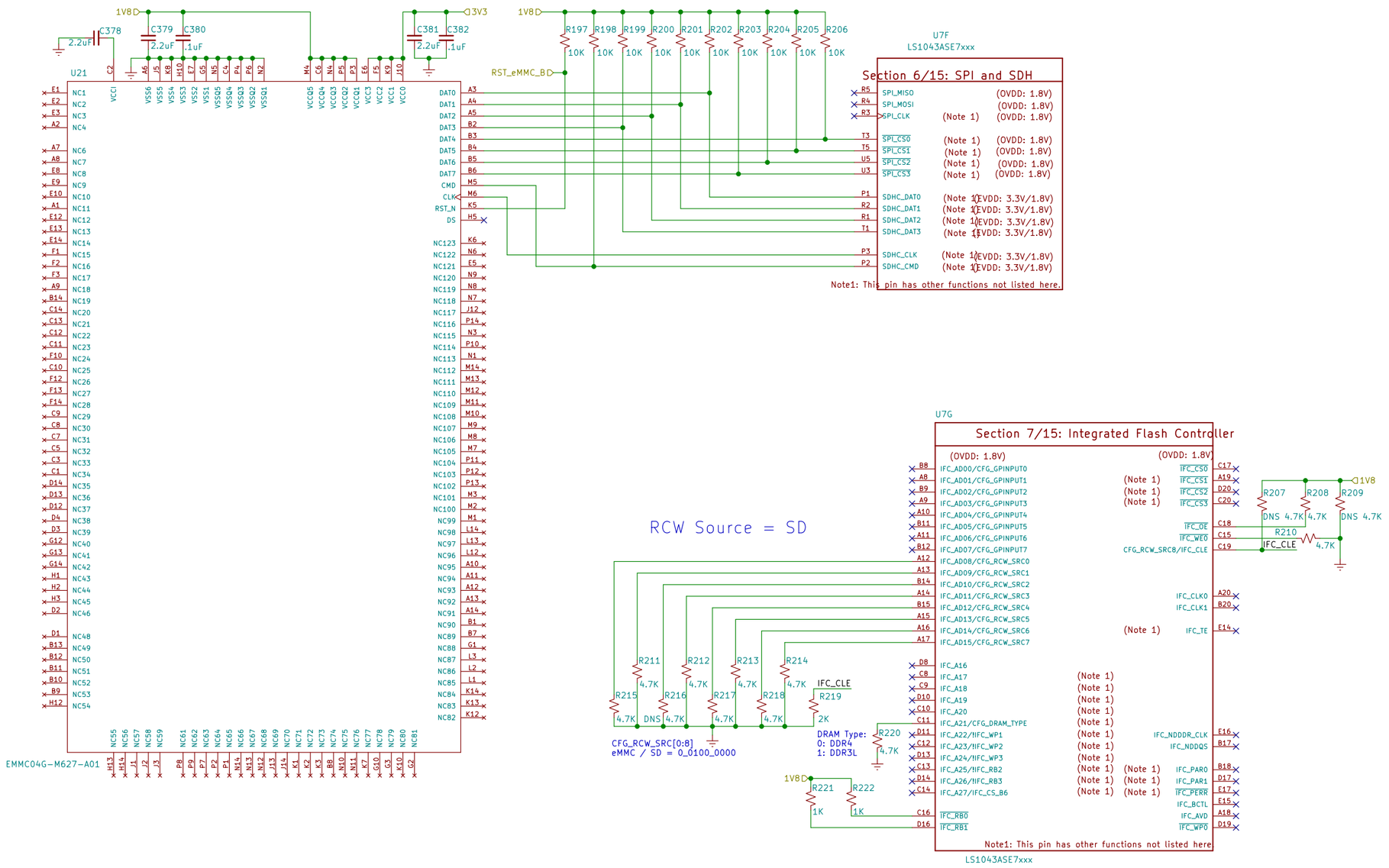
| **Title: AP2100** | | |
| Size: USLedger | Date: 2020-10-06 | **Rev: 1** |
| KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | | Id: 8/12 |

# 4GB eMMC Flash

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| ISis ImageStream Internet Solutions, Inc. | |
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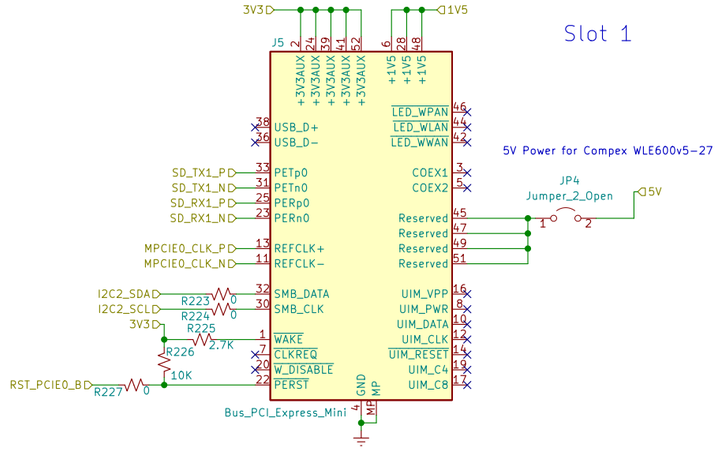
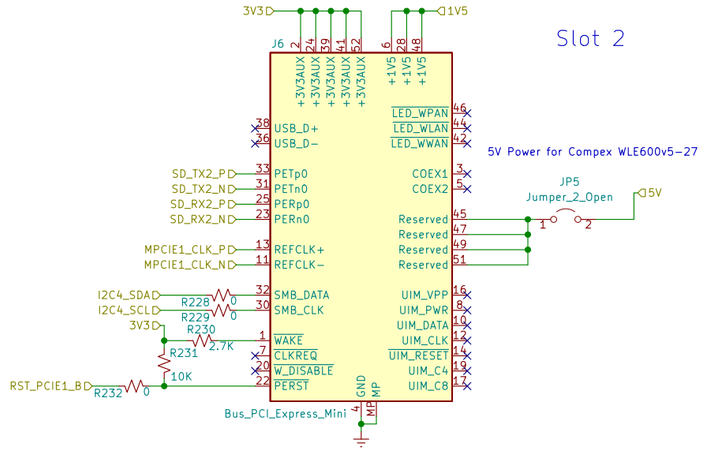
| File: eMMC.kicad_sch | |
| **Title: AP2100** | |
| Size: USLedger Date: 2020-10-06 | **Rev: 1** |
| KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | Id: 9/12 |

# Mini PCI Express

## Slot 1




## Slot 2

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| ISis ImageStream Internet Solutions, Inc. | |
| Sheet: /mPCIe/ | |
| File: PCIe.kicad_sch | |
| **Title: AP2100** | |
| Size: USLedger | Date: 2020−10−06 |
| KiCad E.D.A. kicad 5.99.0−unknown−4b436fa57104ubuntu20.04.1 | Id: 10/12 |

**Rev: 1**

## Ethernet 0 (PoE In)

U7L

Section 12/15: Ethernet Controller 1

(LVDD: 2.5V/1.8V)

EC1_RXD0 W2
EC1_RXD1 W1
EC1_RXD2 V1
EC1_RXD3 U2
EC1_RX_DV Y1
EC1_RX_CLK U1
EC1_TXD0 Y3
EC1_TXD1 W3
EC1_TXD2 V4
EC1_TXD3 V3
EC1_TX_EN Y4
EC1_GTX_CLK U4
EMI1_MDIO W5
EMI1_MDC Y5
EC1_GTX_CLK125 AA3

Note1: All pin have other functions not listed here.

LS1043ASE7xxx

3V3 → NTA4151P Q6 → R233 0 → LDO_O

IC8 KSZ9131RNXC

AVDDL_1 4, AVDDL_2 9, AVDDL_PLL 44, DVDDL_1 18, DVDDL_2 23, DVDDL_3 26, DVDDL_4 30, DVDDL_5 39
AVDDH_1 1, AVDDH_2 12, DVDDH_1 16, DVDDH_2 34, DVDDH_3 40

RXD0/MODE0 32 ← R236 22 ← P0_RXD0
RXD1/MODE1 31 ← R237 22 ← P0_RXD1
RXD2/MODE2 28 ← R238 22 ← P0_RXD2
RXD3/MODE3 27 ← R241 22 ← P0_RXD3
TXD0 19
TXD1 20
TXD2 21
TXD3 22
RX_CTL/CLK125_EN 33 ← R242 22 ← P0_RX_CTL/CLK125_EN
TX_CTL 25
MDIO 37
MDC 36
INT_N/PME_N2/ALLPHYAD 38 ← R245 1K ← 3V3
RXC/PHYAD2 35 ← R246 22 ← P0_RX_CLK ← SOC_IRQ0
TXC 24
XO 45
XI 46 ← 25MHZ_EC1_RGMII
NC_1 13, NC_2 14, NC_3 47
VSS 29, P_VSS 49, ISET 48 → R261 6.04K

TXRXP_A 2 → POE_TD1_P
TXRXM_A 3 → POE_TD1_N
TXRXP_B 5 → POE_TD2_P
TXRXM_B 6 → POE_TD2_N
TXRXP_C 7 → POE_TD3_P
TXRXM_C 8 → POE_TD3_N
TXRXP_D 10 → POE_TD4_P
TXRXM_D 11 → POE_TD4_N

LED1/PME_N1//PHYAD0 17 → P0_LED1 → R243 220 → 3V3 ETH0_LED1+
LED2/PHYAD1 15 → P0_LED2 → R244 220 → 3V3 ETH0_LED2+
ETH0_LED1−
ETH0_LED2−

CLK125_NDO/LED_MODE 41 → R247 10K → 3V3
RESET_N 42 → R248 100K

NOTE: LED Mode is Individual

NOTE: 125MHz Output Clock is Disabled
P0_RX_CTL/CLK125_EN → R249 1K

NOTE: Mode is 1110 = 10/100 F/H, 1000BT Full (RGMII)

3V3 → R253 10K, R254 10K, R255 10K, R256 DNP 10K
P0_RXD3, P0_RXD2, P0_RXD1, P0_RXD0
R262 DNP 1K, R263 DNP 1K, R264 DNP 1K, R265 1K

NOTE: PHY Address is 01h

3V3 → R257 DNP 10K, R258 DNP 10K, R259 10K
P0_RX_CLK, P0_LED2, P0_LED1
R266 1K, R267 1K, R268 DNP 1K

Mode [3:0] Description
1000 10/100 Full and Half, 1000BT Full (RGMII), PME Enable on LED1
1010 10/100 Full and Half, 1000BT Full (RGMII), PME Enable on INT_N
1100 1000BT Full (RGMII)
1110 10/100 Full and Half, 1000BT Full (RGMII)

U7N

Section 14/15: SerDes

NOTE: 10G interface unused
SD1_REFCLK1_P, SD1_REFCLK1_N → R240 4.7K, R239 4.7K

SD1_REFCLK1_P W10 → SD1_REF_CLK1_P
SD1_REFCLK1_N W9 → SD1_REF_CLK1_N
SD1_REFCLK2_P AE20 → SD1_REF_CLK2_P
SD1_REFCLK2_N AD20 → SD1_REF_CLK2_N

TP5 V16 → SD1_PLL1_TPA
TP6 V15 → SD1_PLL1_TPD
TP7 V18 → SD1_PLL2_TPA
TP8 V17 → SD1_PLL2_TPD

X1VDD, S1VDD → R250 R251 698 200 → SD1_IMP_CAL_TX W19, SD1_IMP_CAL_RX W13

SD1_TX0_P AA14, SD1_TX0_N AB14
SD1_RX0_P AE14, SD1_RX0_N AD14 → R235 4.7K, R234 4.7K
SD1_TX1_P AA15 → SD_TX1_P, SD1_TX1_N AB15 → SD_TX1_N
SD1_RX1_P AE15 → SD_RX1_P, SD1_RX1_N AD15 → SD_RX1_N
SD1_TX2_P AA17 → SD_TX2_P, SD1_TX2_N AB17 → SD_TX2_N
SD1_RX2_P AE17 → SD_RX2_P, SD1_RX2_N AD17 → SD_RX2_N
SD1_TX3_P AA18, SD1_TX3_N AB18
SD1_RX3_P AE18 → R260 4.7K, SD1_RX3_N AD18 → R252 4.7K

LS1043ASE7xxx

## Ethernet 1

U7M

Section 13/15: Ethernet Controller 2

(LVDD: 2.5V/1.8V)

EC2_RXD0 AC2
EC2_RXD1 AC1
EC2_RXD2 AB1
EC2_RXD3 AA2
EC2_RX_DV AD2
EC2_RX_CLK AA1
EC2_TXD0 AD3
EC2_TXD1 AC4
EC2_TXD2 AC3
EC2_TXD3 AB3
EC2_TX_EN AE3
EC2_GTX_CLK AA4
EMI2_MDIO W6
TVDD: 1.2V
EMI2_MDC Y6
(LVDD: 2.5V/1.8V)
EC2_GTX_CLK125 AE4

Note1: All pin have other functions not listed here.

LS1043ASE7xxx

3V3 → NTA4151P Q7 → R269 0 → LDO_O

IC9 KSZ9131RNXC

AVDDL_1 4, AVDDL_2 9, AVDDL_PLL 44, DVDDL_1 18, DVDDL_2 23, DVDDL_3 26, DVDDL_4 30, DVDDL_5 39
AVDDH_1 1, AVDDH_2 12, DVDDH_1 16, DVDDH_2 34, DVDDH_3 40

RXD0/MODE0 32 ← R270 22 ← P1_RXD0
RXD1/MODE1 31 ← R271 22 ← P1_RXD1
RXD2/MODE2 28 ← R272 22 ← P1_RXD2
RXD3/MODE3 27 ← R273 22 ← P1_RXD3
TXD0 19
TXD1 20
TXD2 21
TXD3 22
RX_CTL/CLK125_EN 33 ← R274 22 ← P1_RX_CTL/CLK125_EN
TX_CTL 25
MDIO 37
MDC 36
INT_N/PME_N2/ALLPHYAD 38 ← R277 1K ← 3V3
RXC/PHYAD2 35 ← R278 22 ← P1_RX_CLK ← SOC_IRQ1
TXC 24
XO 45
XI 46 ← 25MHZ_EC2_RGMII
NC_1 13, NC_2 14, NC_3 47
VSS 29, P_VSS 49, ISET 48 → R282 6.04K

TXRXP_A 2 → C383 1uF → J7 TRD1+ 11, TRCT1 12, TRD1− 10
TXRXM_A 3
TXRXP_B 5 → C384 1uF → J7 TRD2+ 4, TRCT2 6, TRD2− 5
TXRXM_B 6
TXRXP_C 7 → C385 1uF → J7 TRD3+ 3, TRCT3 1, TRD3− 2
TXRXM_C 8
TXRXP_D 10 → C386 1uF → J7 TRD4+ 8, TRCT4 7, TRD4− 9
TXRXM_D 11

LED1/PME_N1//PHYAD0 17 → P1_LED1 → R275 220 → 3V3 → YELLOW
LED2/PHYAD1 15 → P1_LED2 → R276 220 → GRN, ORG

NOTE: LED Mode is Individual

CLK125_NDO/LED_MODE 41 → R279 10K → 3V3
RESET_N 42 → R280 100K

NOTE: 125MHz Output Clock is Disabled
P1_RX_CTL/CLK125_EN → R281 1K

NOTE: Mode is 1110 = 10/100 F/H, 1000BT Full (RGMII)

3V3 → R283 10K, R284 10K, R285 10K, R286 DNP 10K
P1_RXD3, P1_RXD2, P1_RXD1, P1_RXD0
R290 DNP 1K, R291 DNP 1K, R292 DNP 1K, R293 1K

NOTE: PHY Address is 02h

3V3 → R287 DNP 10K, R288 10K, R289 DNP 10K
P1_RX_CLK, P1_LED2, P1_LED1
R294 1K, R295 DNP 1K, R296 1K

Mode [3:0] Description
1000 10/100 Full and Half, 1000BT Full (RGMII), PME Enable on LED1
1010 10/100 Full and Half, 1000BT Full (RGMII), PME Enable on INT_N
1100 1000BT Full (RGMII)
1110 10/100 Full and Half, 1000BT Full (RGMII)

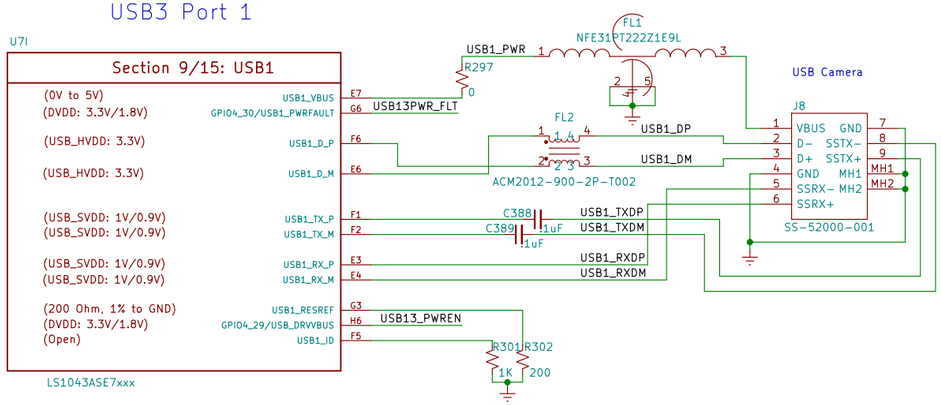
J7 L836-1J1T-43

SHIELD

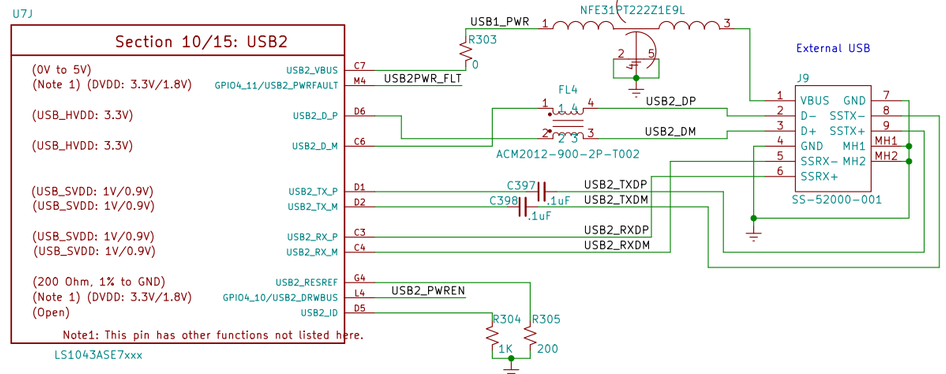
| | |
|---|---|
| ISIs ImageStream Internet Solutions, Inc. | |
| Sheet: /SerDes / RGMII Ethernet/ | |
| File: SerDes_RGMII.kicad_sch | |
| **Title: AP2100** | |
| Size: USLedger | Date: 2020-10-06 |
| KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | Id: 11/12 |

Rev: 1

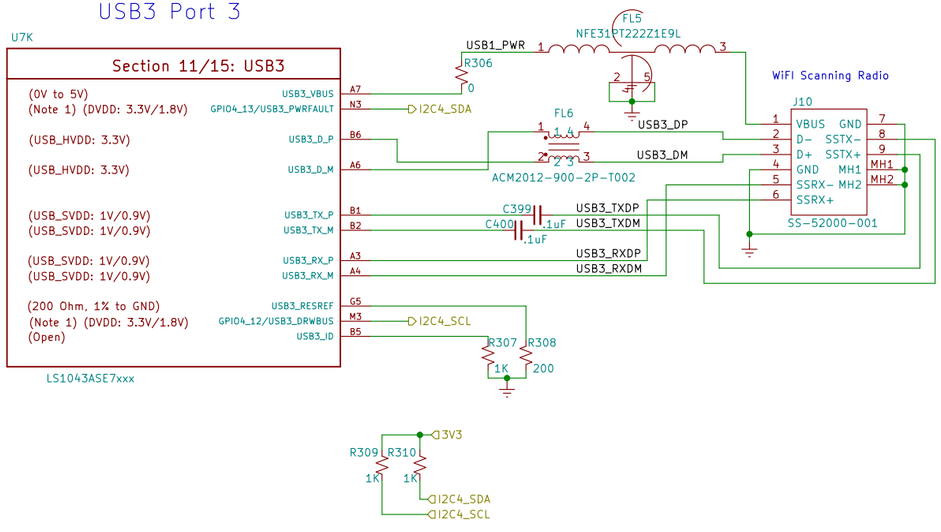
## USB3 Port 1



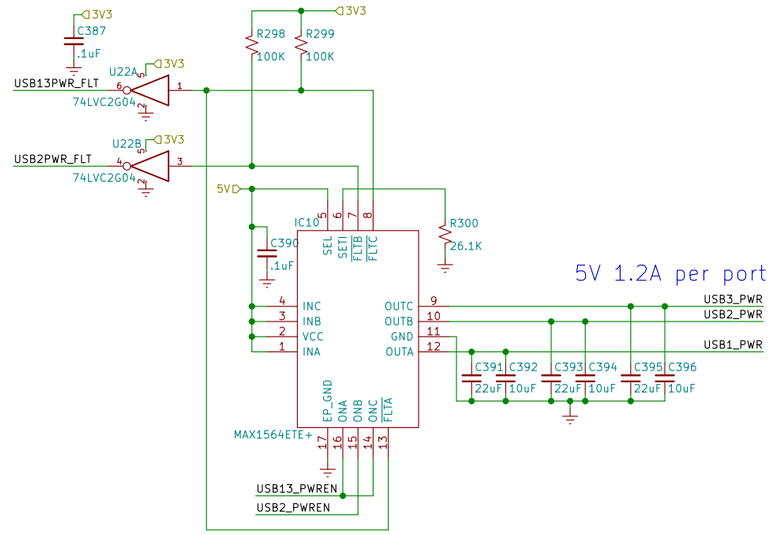

## USB3 Port 2



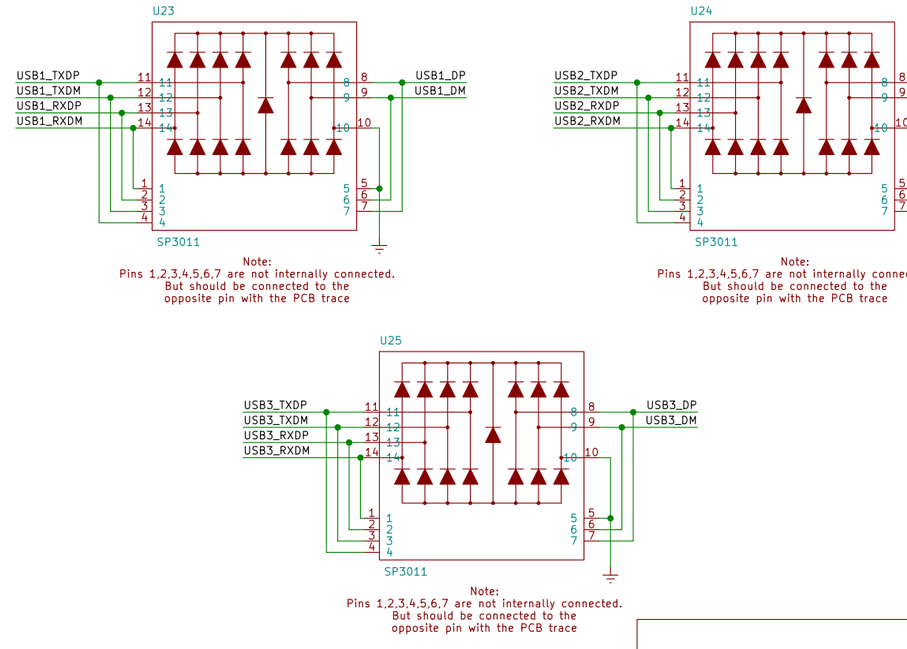

## USB3 Port 3




## USB Power




## ESD Protection

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Sheet: /USB/

File: USB.kicad_sch

**Title: AP2100**

| Size: USLedger | Date: 2020-10-06 | **Rev: 1** |
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| KiCad E.D.A. kicad 5.99.0-unknown-4b436fa57104ubuntu20.04.1 | | Id: 12/12 |