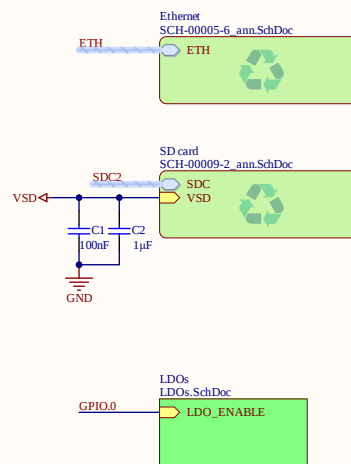
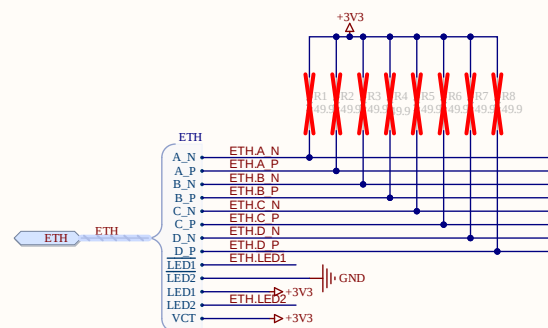
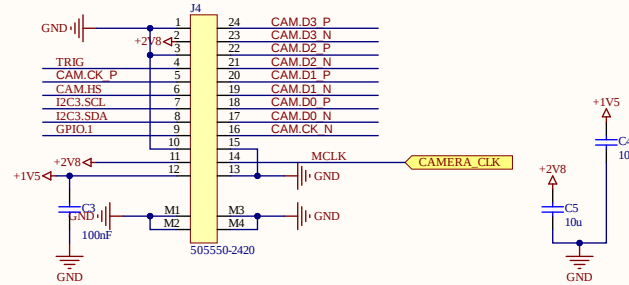


|                                                |                                             |                                                                                       |                                                                                       |
|------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Title: <b>Portenta Vision Shield</b>           |                                             |  |  |
| ID: <b>SL-ASX00021</b>                         | Revision <b>4.0</b>                         |                                                                                       |                                                                                       |
| Date: <b>1/26/2021</b> Time: <b>4:36:36 PM</b> | Sheet <b>1</b> of <b>9</b>                  |                                                                                       |                                                                                       |
| File: <b>TOPView_SchDoc</b>                    | Author: <b>Francesca Cenna</b> Rev author * |                                                                                       |                                                                                       |



## HM01B0 (F view)



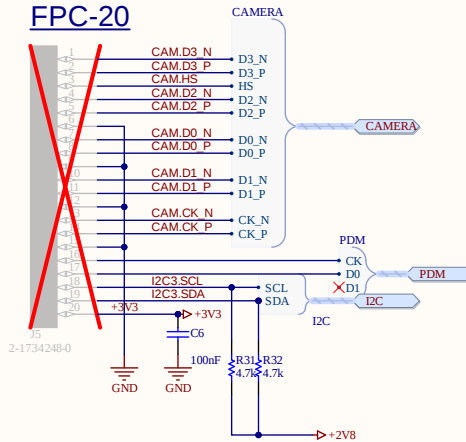
## HM01B0 Pinout

| Pin no. | Pin name | Type   | Description                                             |
|---------|----------|--------|---------------------------------------------------------|
| 1       | AGND     | Ground | Analog ground.                                          |
| 2       | AVDD28   | Power  | Analog power. (2.8V)                                    |
| 3       | DGND     | Ground | Digital ground.                                         |
| 4       | TRIG     | In     | Frame trigger input. (Internal pull down / Active high) |
| 5       | FLVD     | Out    | Frame valid output.                                     |
| 6       | LVL      | Out    | Line valid output.                                      |
| 7       | SCL      | In     | I2C serial clock.                                       |
| 8       | SDA      | In/Out | Serial data I/O. (Open drain)                           |
| 9       | INT      | Out    | Interrupt output. (Active high)                         |
| 10      | DGND     | Ground | Digital ground.                                         |
| 11      | IOVDD18  | Power  | IO power. (1.8V)                                        |
| 12      | DVDD15   | Power  | Core digital power. (1.5V)                              |
| 13      | DGND     | Ground | Digital ground.                                         |
| 14      | MCLK     | In     | Master clock input.                                     |
| 15      | DGND     | Ground | Digital ground.                                         |
| 16      | PLCK     | Out    | Pixel clock                                             |
| 17      | D0       | Out    | Data 0 output.                                          |
| 18      | D1       | Out    | Data 1 output.                                          |
| 19      | D2       | Out    | Data 2 output.                                          |
| 20      | D3       | Out    | Data 3 output.                                          |
| 21      | D4       | Out    | Data 4 output.                                          |
| 22      | D5       | Out    | Data 5 output.                                          |
| 23      | D6       | Out    | Data 6 output.                                          |
| 24      | D7       | Out    | Data 7 output.                                          |

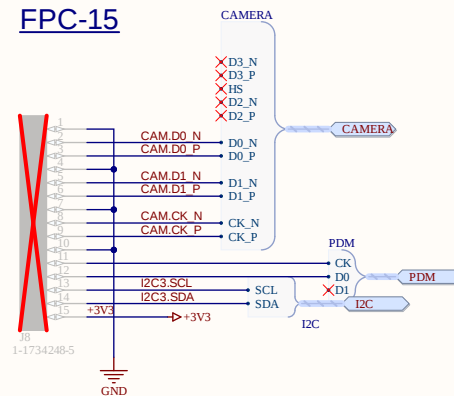
Note: (1) HM01B0 sensor default slave address: 0x24.

Table 2.1: Pin map and description of camera module

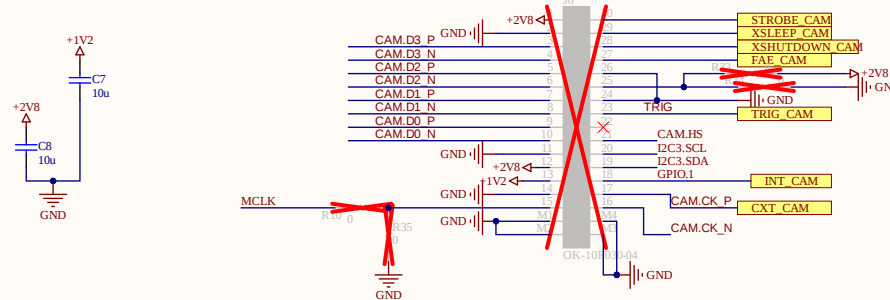
## FPC-20



## FPC-15



## HM0360 (F View)



## HM0360 Pinout

| Pin no. | Pin name  | Type   | Description                                                                                                  |
|---------|-----------|--------|--------------------------------------------------------------------------------------------------------------|
| 1       | AVDD      | Power  | Analog power. (2.8V)                                                                                         |
| 2       | D7        | Out    | Data 7 output.                                                                                               |
| 3       | D6        | Out    | Data 6 output.                                                                                               |
| 4       | D5        | Out    | Data 5 output.                                                                                               |
| 5       | D4        | Out    | Data 4 output.                                                                                               |
| 6       | D3        | Out    | Data 3 output.                                                                                               |
| 7       | D2        | Out    | Data 2 output.                                                                                               |
| 8       | D1        | Out    | Data 1 output.                                                                                               |
| 9       | D0        | Out    | Data 0 output.                                                                                               |
| 10      | GND       | Ground | Ground.                                                                                                      |
| 11      | IOVDD     | Power  | IO power. (1.8V / 2.8V)                                                                                      |
| 12      | DVDD      | Power  | Digital power. (1.2V)                                                                                        |
| 13      | GND       | Ground | Ground.                                                                                                      |
| 14      | MCLK      | In     | Master clock input. (Connected to DGND when using internal oscillator)                                       |
| 15      | PLCK      | Out    | Pixel clock / Serial clock output.                                                                           |
| 16      | CXT_SEL   | In     | Context switching selection. (Internal pull low)                                                             |
| 17      | INT       | Out    | Interrupt output. (Active high)                                                                              |
| 18      | SDA       | In/Out | Serial Data I/O. (Open drain)                                                                                |
| 19      | SCL       | In     | I2C serial clock.                                                                                            |
| 20      | HVLD      | Out    | Line valid output.                                                                                           |
| 21      | FVLD      | Out    | Frame valid output.                                                                                          |
| 22      | TRIGGER   | In     | Frame trigger input. (Internal pull low / Active high)                                                       |
| 23      | GND       | Ground | Ground.                                                                                                      |
| 24      | CLK_SEL   | In     | Clock source select. (Internal pull low, Low: Oscillator, High: MCLK, connect to ground for oscillator mode) |
| 25      | RTC       | In     | Real time clock source input. (Must not be left floating, connected to DGND without RTC clock input)         |
| 26      | FAE       | In     | Exposure meter enable pin. (Internal pull low / Active high)                                                 |
| 27      | XSHUTDOWN | In     | Reset and power down control pin. (Active low)                                                               |
| 28      | XSLEEP    | In     | Low power sleep mode. (Active low)                                                                           |
| 29      | STROBE    | Out    | Strobe output.                                                                                               |

Note: (1) HM0360 sensor default slave address: 0x24.

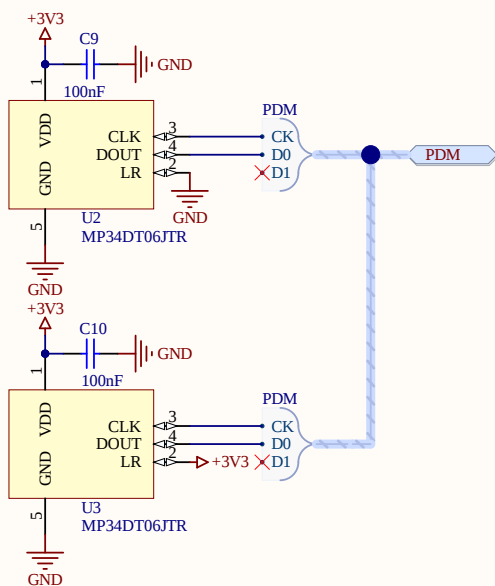
Table 2.1: Pin map and description of camera module

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|--------------------------------------|--------------------------------|----------------------------|--------------------|
| Title: <b>Portenta Vision Shield</b> |                                | Revision: <b>4.0</b>       |                    |
| Date: <b>1/26/2021</b>               | Time: <b>4:36:38 PM</b>        | Sheet <b>3</b> of <b>9</b> |                    |
| File: <b>CameraSchDoc</b>            | Author: <b>Francesca Cenna</b> |                            | Rev: <b>author</b> |



# Mics



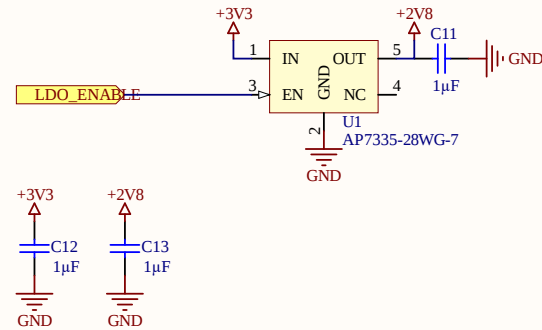
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|-------------------------------|-----------------------|------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Title: Portenta Vision Shield |                       |            |  |  |
| ID: *                         | Revision4.0           |            |                                                                                       |                                                                                       |
| Date: 1/26/2021               | Time: 4:36:39 PM      | Sheet of 9 | RevAuthor: *                                                                          |                                                                                       |
| File: Mics.SchDoc             | AuthorFrancesca Cenna |            |                                                                                       |                                                                                       |

# LDOs

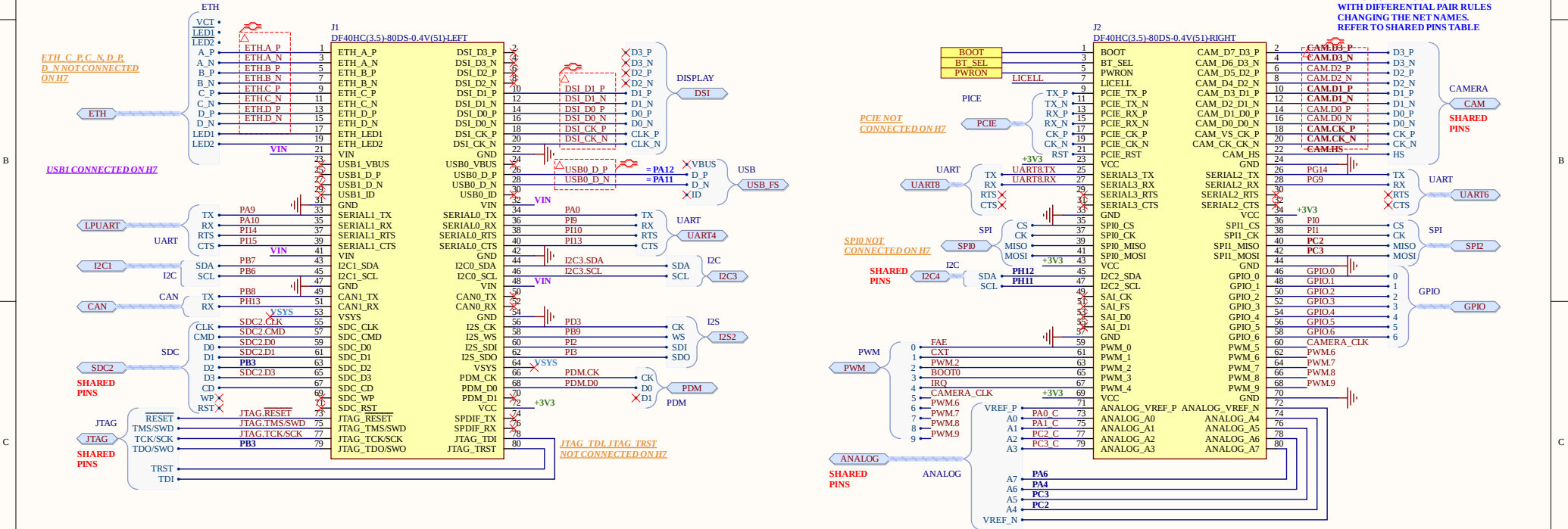
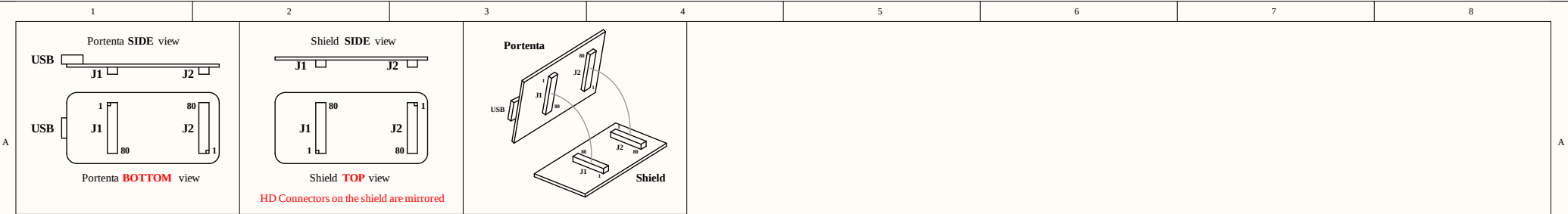


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|--------------------------------------|--------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Title: <b>Portenta Vision Shield</b> |                                |  |  |
| ID: *                                | Revision <b>4.0</b>            |                                                                                       |                                                                                       |
| Date: <b>1/26/2021</b>               | Time: <b>4:36:40 PM</b>        |                                                                                       |                                                                                       |
| Sheet <b>5</b> of <b>9</b>           |                                | RevAuthor: *                                                                          |                                                                                       |
| File: <b>LDOs.SchDoc</b>             | Author: <b>Francesca Cenna</b> |                                                                                       |                                                                                       |



SHARED PINS TABLE

| NET      | BUS 1  | BUS 2  |
|----------|--------|--------|
| PB3      | JTAG   | SDC2   |
| CAM.D1_N | CAM    | I2C4   |
| CAM.D1_P | CAM    | SAI2A  |
| CAM.CK_P | CAM    | SAI2A  |
| CAM.D3_N | CAM    | SAI2A  |
| CAM.D3_P | CAM    | SAI2A  |
| CAM.HS   | CAM    | ANALOG |
| CAM.CK_N | CAM    | ANALOG |
| PC2      | CAM    | ANALOG |
| PC3      | ANALOG | SP1Z   |

POWER NETS TABLE

| NET    | TYPE                     | RANGES                                           | DESCRIPTION                                                                                                       |
|--------|--------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| VIN    | PORTENTA INPUT           | 4.1V to 6V.                                      | Default 3.3V, PMIC (U10) programmable output.                                                                     |
| +3V3   | PORTENTA OUTPUT          | 1.1V to 3.3V in steps, max 1A.                   | Default 3.3V, PMIC (U10) programmable output.                                                                     |
| VSYS   | PORTENTA RESERVED OUTPUT | RESERVED, DO NOT USE<br>3.5V to 4.2V, max 600mA. | Default 4.2V, PMIC (U10) programmable output which is also the input voltage of the bucks inside the PMIC itself. |
| LICELL | PORTENTA INPUT           | Coin cell max 3.6V, max 46uA.                    | Max 4uA with PMIC (U10) in coin cell mode, max 46uA with PMIC in standby/suspend mode.                            |

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Title: Portenta Vision Shield

ID: \*

Date: 1/26/2021 Time: 4:36:41 PM Sheet: \* of 9

File: HDConn\_SchDoc

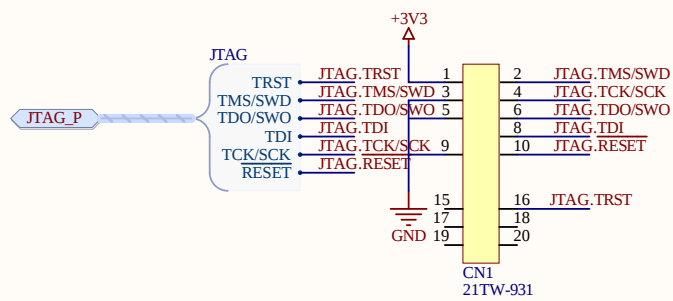
Revision: 4.0

Author: \*

RevAuthor:

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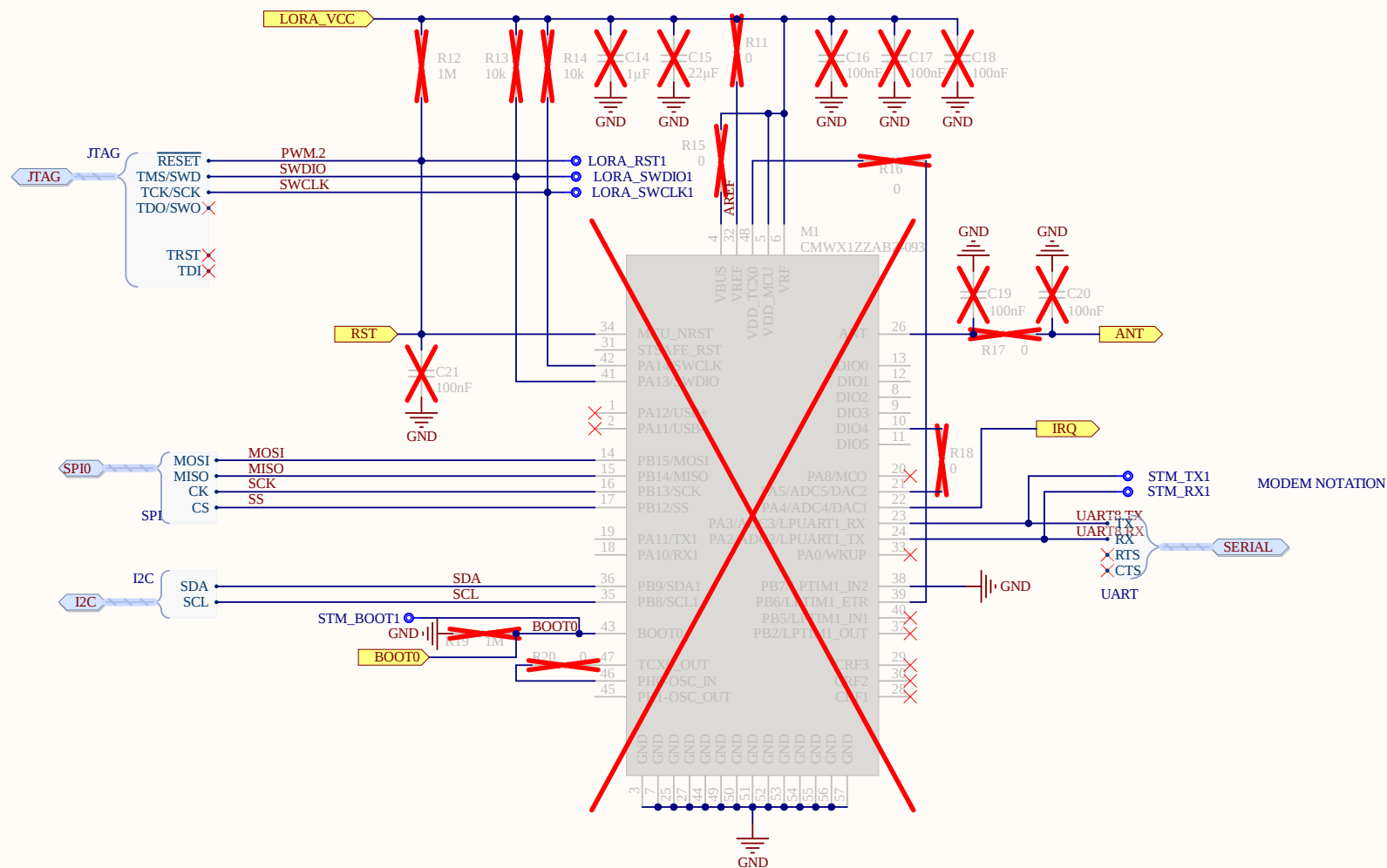


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|--------------------------------------|--------------------------------|-------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Title: <b>Portenta Vision Shield</b> |                                |                   |  |  |
| ID: *                                | Revision: <b>4.0</b>           |                   |                                                                                       |                                                                                       |
| Date: <b>1/26/2021</b>               | Time: <b>4:36:42 PM</b>        | Sheet <b>of 9</b> |                                                                                       |                                                                                       |
| File: <b>JTAG.SchDoc</b>             | Author: <b>Francesca Cenna</b> | RevAuthor: *      |                                                                                       |                                                                                       |

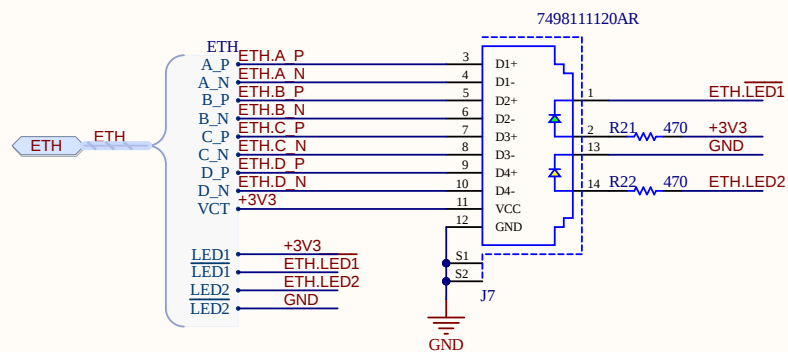


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|------------------------------|------------------|--------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Title LORA MODULE            |                  |              |  |  |
| Size:                        | Number: *        | Revision: *  |                                                                                       |                                                                                       |
| Date: 1/26/2021              | Time: 4:36:43 PM | Sheet * of 9 |                                                                                       |                                                                                       |
| File: SCH-00004-7 ann.SchDoc | Author *         | Rev author   |                                                                                       |                                                                                       |

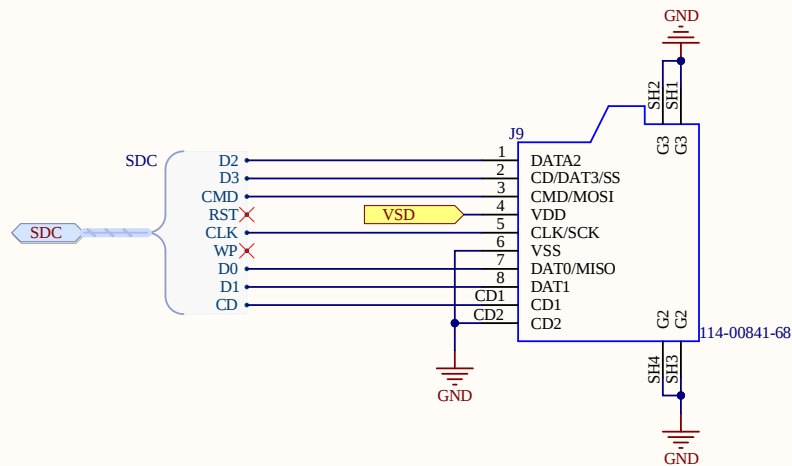


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|------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Title: Ethernet 7498111120AR |                  |   |              |
| ID: *                        | Revision: *      |                                                                                                                                                                             |              |
| Date: 1/26/2021              | Time: 4:36:44 PM | Sheet of 9                                                                                                                                                                  | RevAuthor: * |
| File: SCH-00005-6_ann.SchDoc |                  | Author:                                                                                                                                                                     |              |



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|------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Title: CameraShield          |                  |   |              |
| ID: *                        | Revision: *      |                                                                                                                                                                             |              |
| Date: 1/26/2021              | Time: 4:36:45 PM | Sheet of 9                                                                                                                                                                  | RevAuthor: * |
| File: SCH-00009-2_ann.SchDoc |                  | Author: Francesca Cenna                                                                                                                                                     |              |