

# STM32U5x9NJH6Q Discovery

MB1829

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## Legend

General comment such as function title, configuration, ...

Text to be added to silkscreen.

Warning text.

A

Notes to generate the board layout.

## Open Platform License Agreement

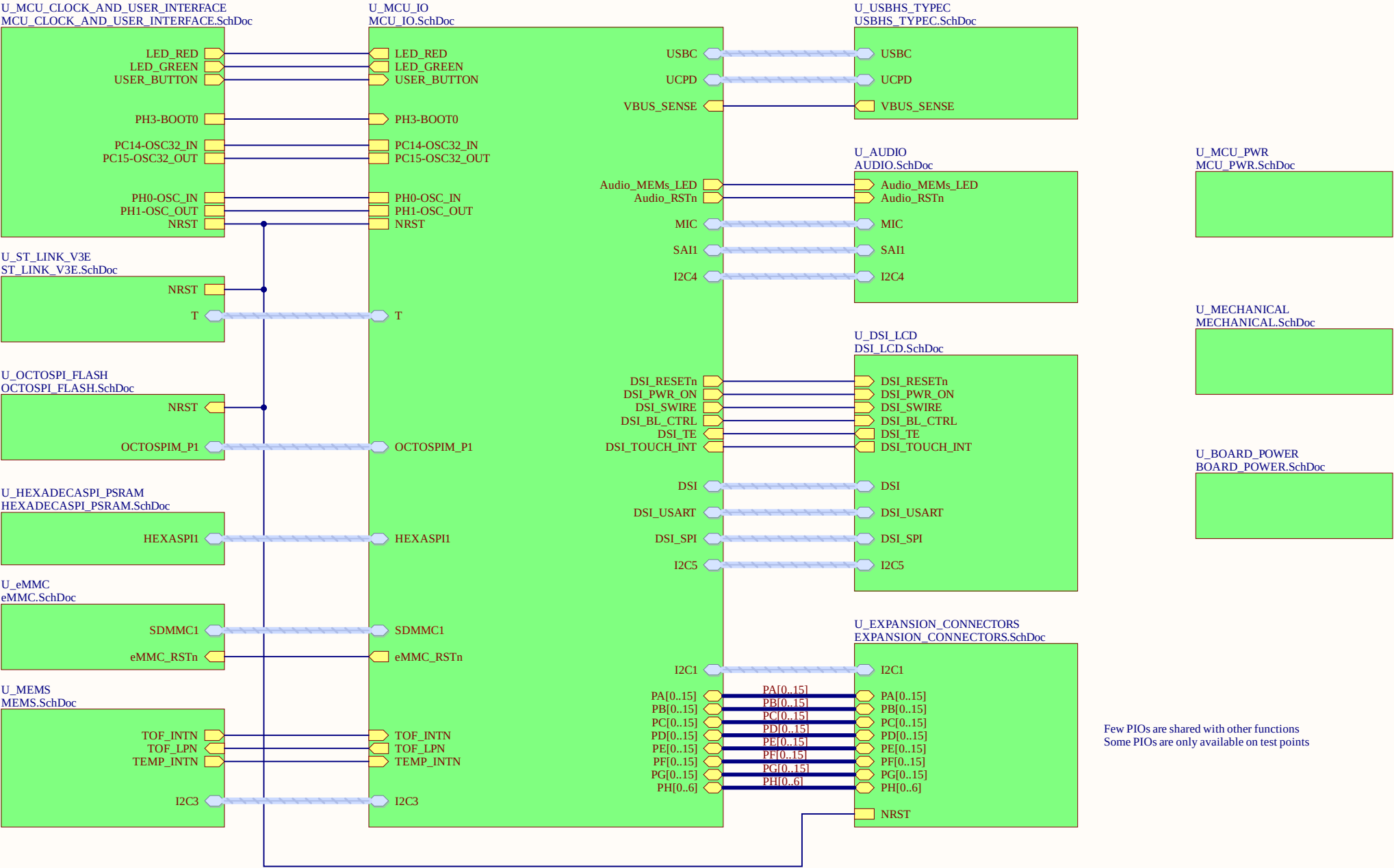
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U\_MB1829\_TOP  
MB1829\_TOP.SchDoc

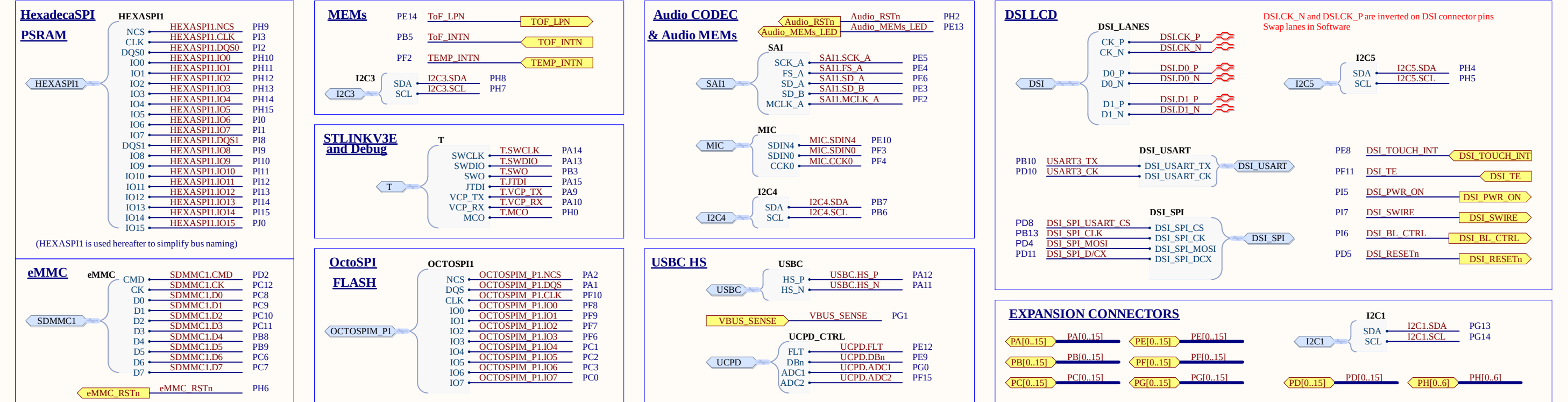
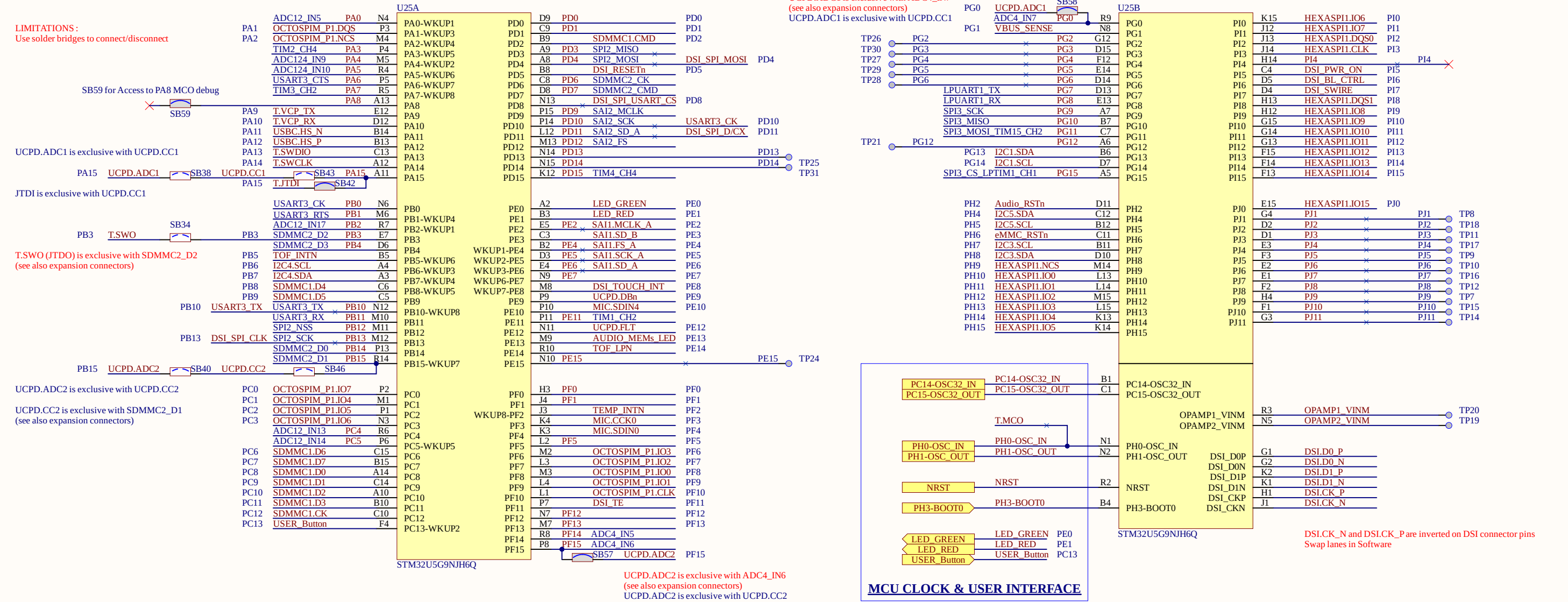




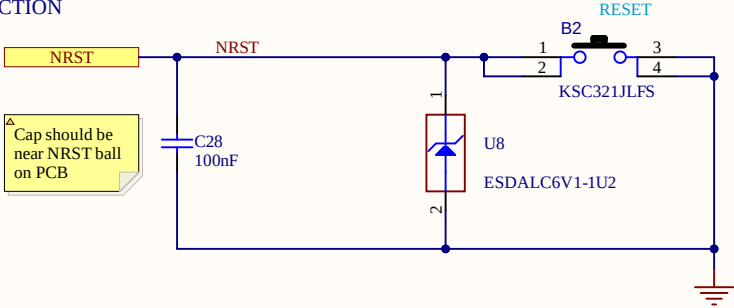


STM32 MCU I/Os

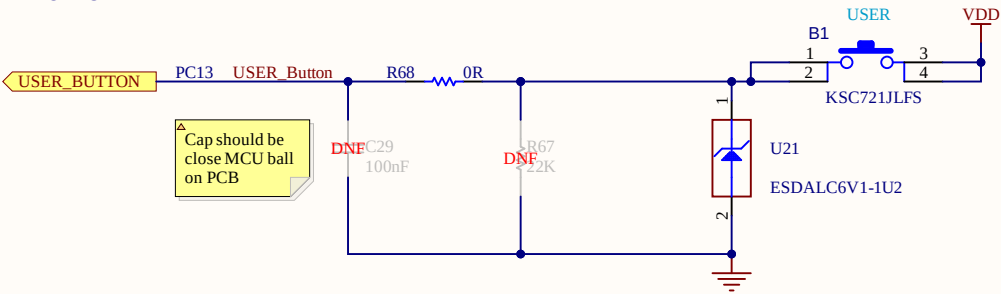
LIMITATIONS :  
Use solder bridges to connect/disconnect



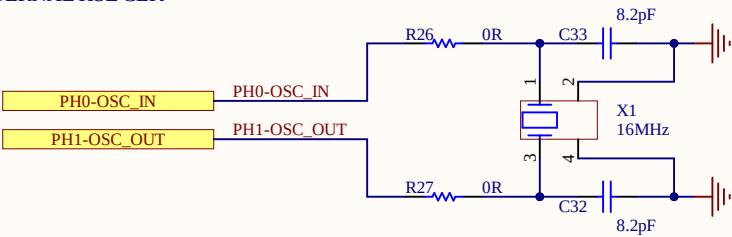
RESET FUNCTION



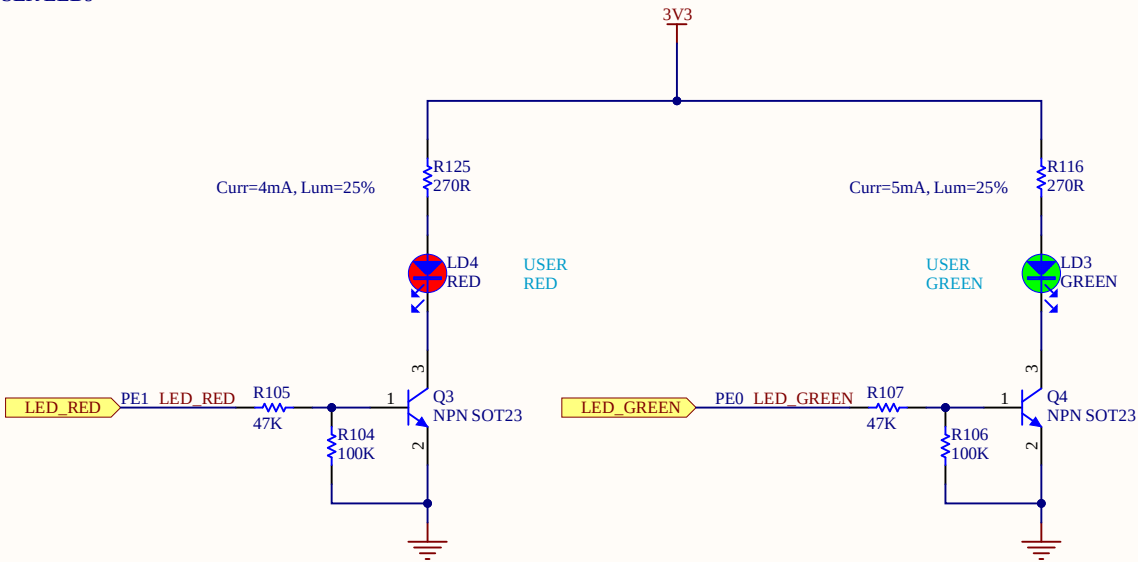
USER BUTTON



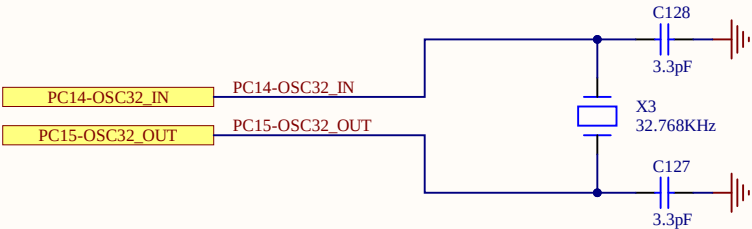
EXTERNAL HSE CLK



USER LEDs

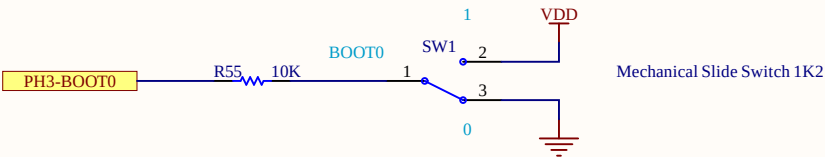


EXTERNAL LSE CLK



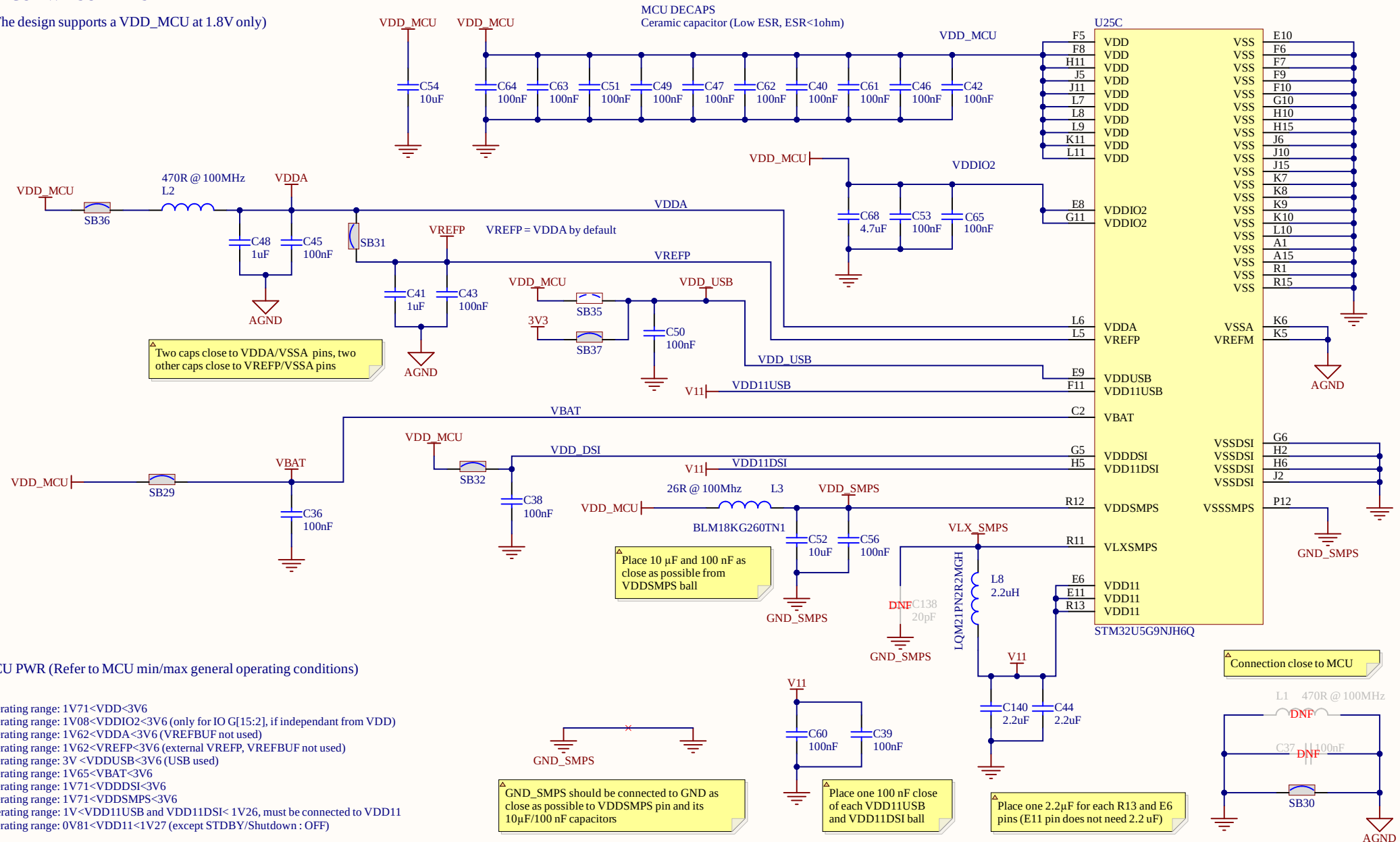
PH3\_BOOT0

BOOT0 Low by default to boot from internal Flash



Switch active position is indicated by white side switch position

(The design supports a VDD\_MCU at 1.8V only)



MCU PWR (Refer to MCU min/max general operating conditions)

Operating range: 1V71<VDD<3V6  
Operating range: 1V08<VDDIO2<3V6 (only for IO G[15:2], if independent from VDD)  
Operating range: 1V62<VDDA<3V6 (VREBUF not used)  
Operating range: 1V62<VREFP<3V6 (external VREFP, VREBUF not used)  
Operating range: 3V <VDDUSB<3V6 (USB used)  
Operating range: 1V65<VBAT<3V6  
Operating range: 1V71<VDDDSI<3V6  
Operating range: 1V71<VDDSMPS<3V6  
Operating range: 1V<VDD11USB and VDD11DSI< 1V26, must be connected to VDD11  
Operating range: 0V81<VDD11<1V27 (except STDBY/Shutdown : OFF)

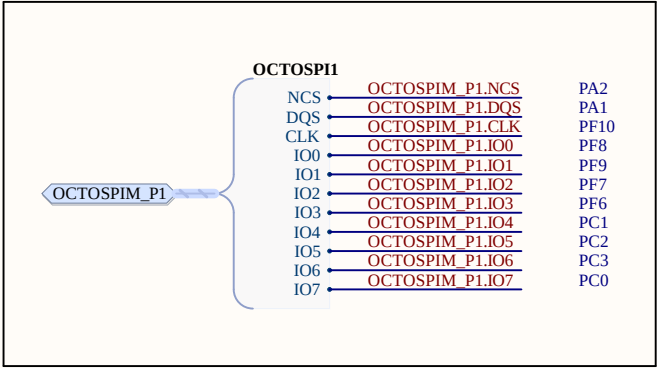
⚠ GND\_SMPS should be connected to GND as close as possible to VDDSMPS pin and its 10μF/100 nF capacitors

Place one 100 nF close of each VDD11USB and VDD11DSI ball

Place one 2.2 $\mu$ F for each R13 and E6 pins (E11 pin does not need 2.2 uF)

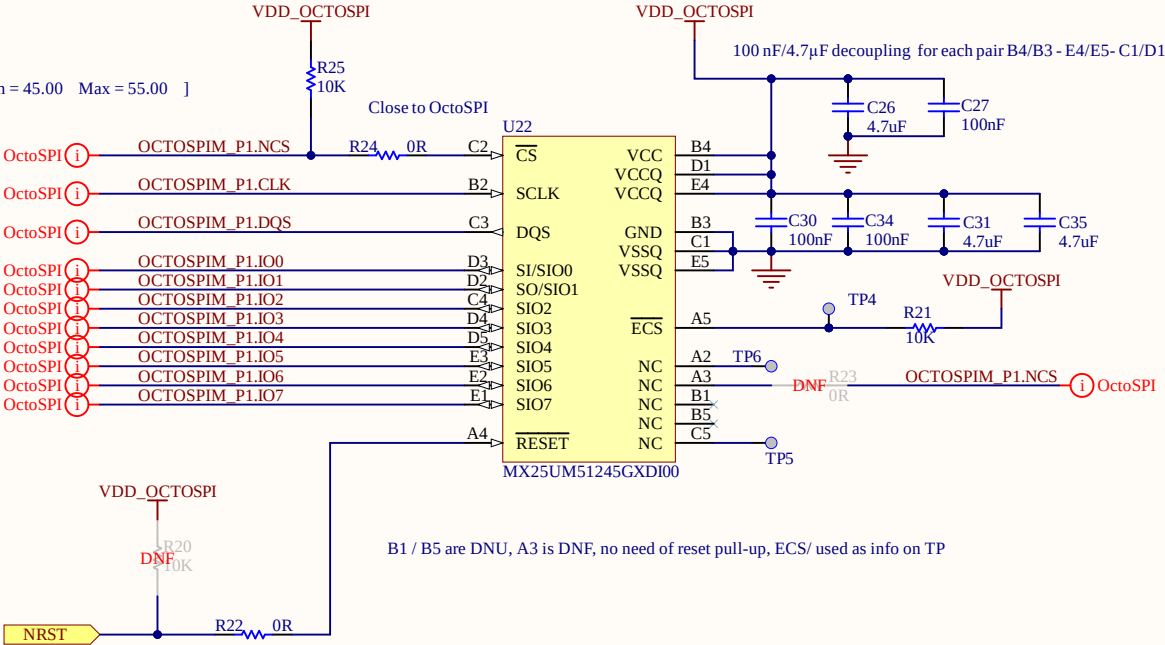
Connection close to MCU

OctoSPI Flash Memory



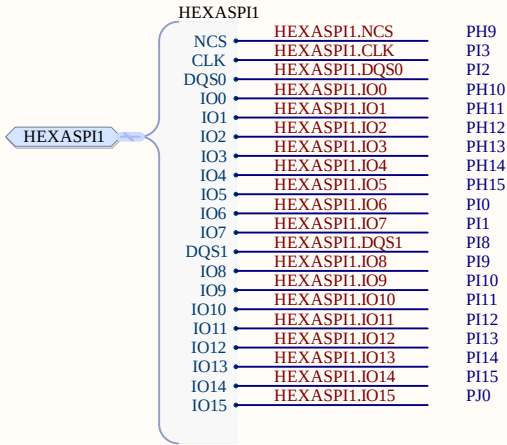
▲ Length equalization ( include BGA package length ) :  
- DQS0 with IO0..7 (Byte0) , and CLK , all in 50 mils  
- NCS length can be in the range of up to CLK length +/- 750 mils

OCTOSPI  
Impedance Constraint [Min = 45.00 Max = 55.00 ]



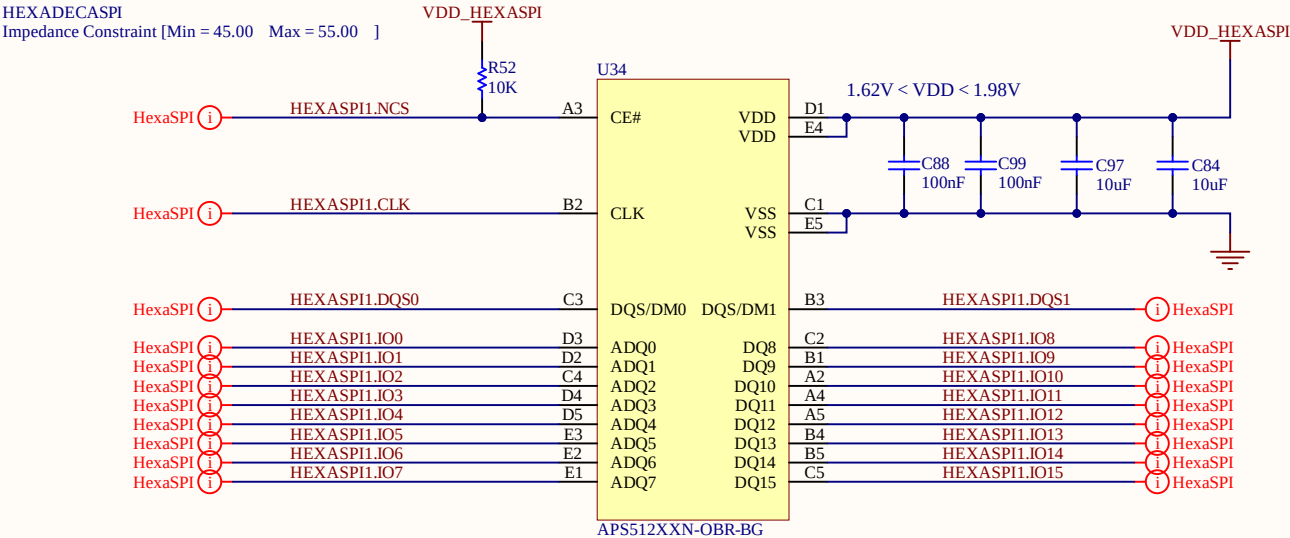
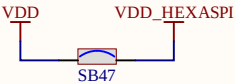
HexadecaSPI PSRAM Memory

HexadecaSPI1 (HEXASPI1 is used hereafter to simplify bus naming)

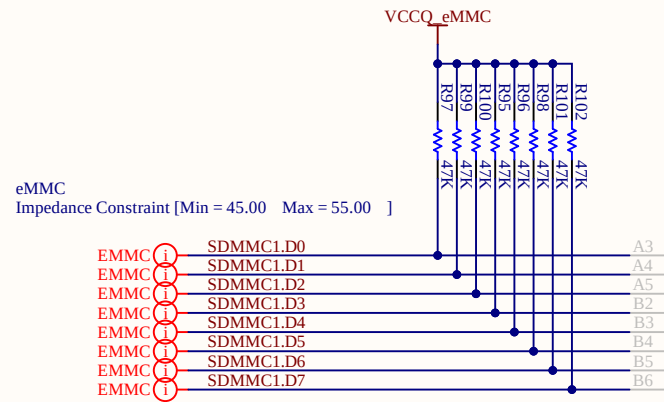
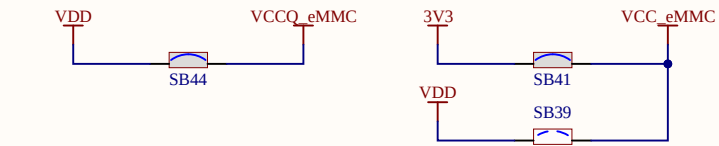
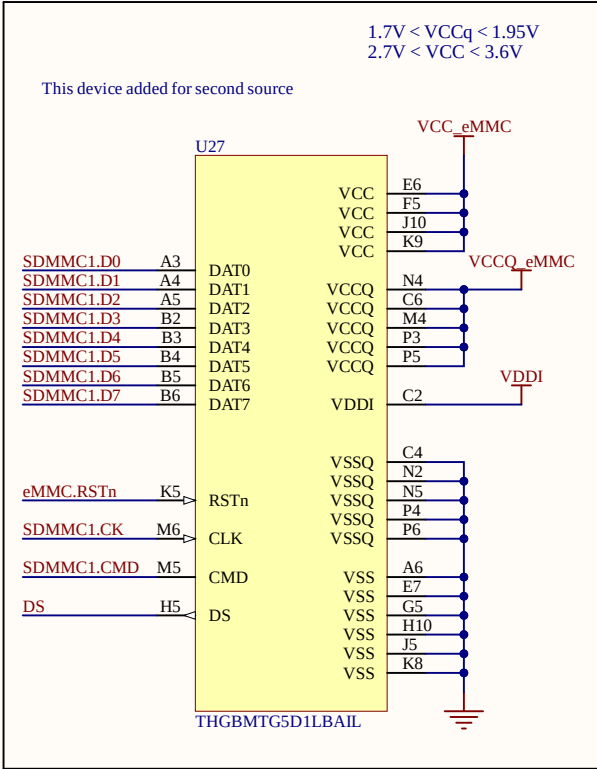


Match length (including BGA package length)

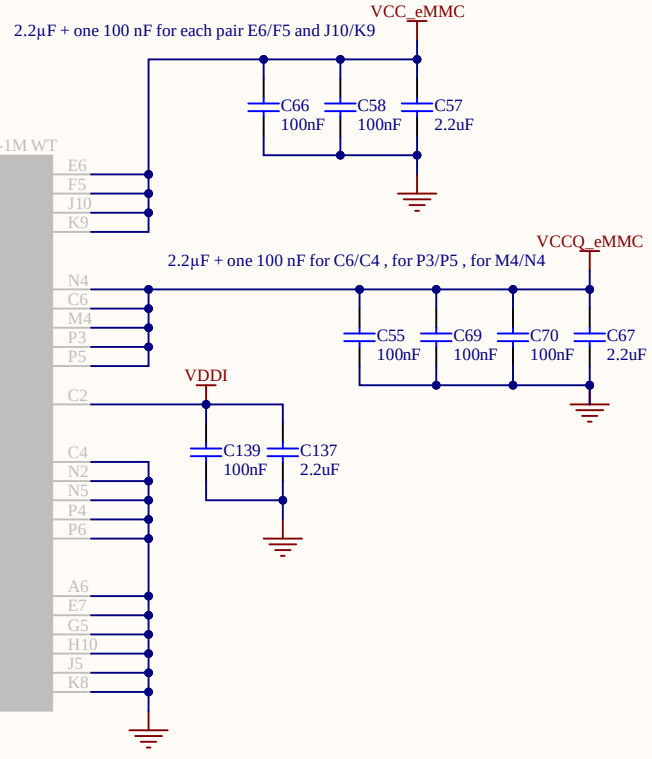
- DQS0 with IO0..7 (Byte0), all in 50 mils,
- DQS1 with IO8..15 (Byte1), all in 50 mils,
- CLK is 100 mils from any signal of Byte0 or Byte1
- NCS can be CLK +/- 700 mils



eMMC Memory



1.65V < VCCq < 1.95V  
2.7V < VCC < 3.6V

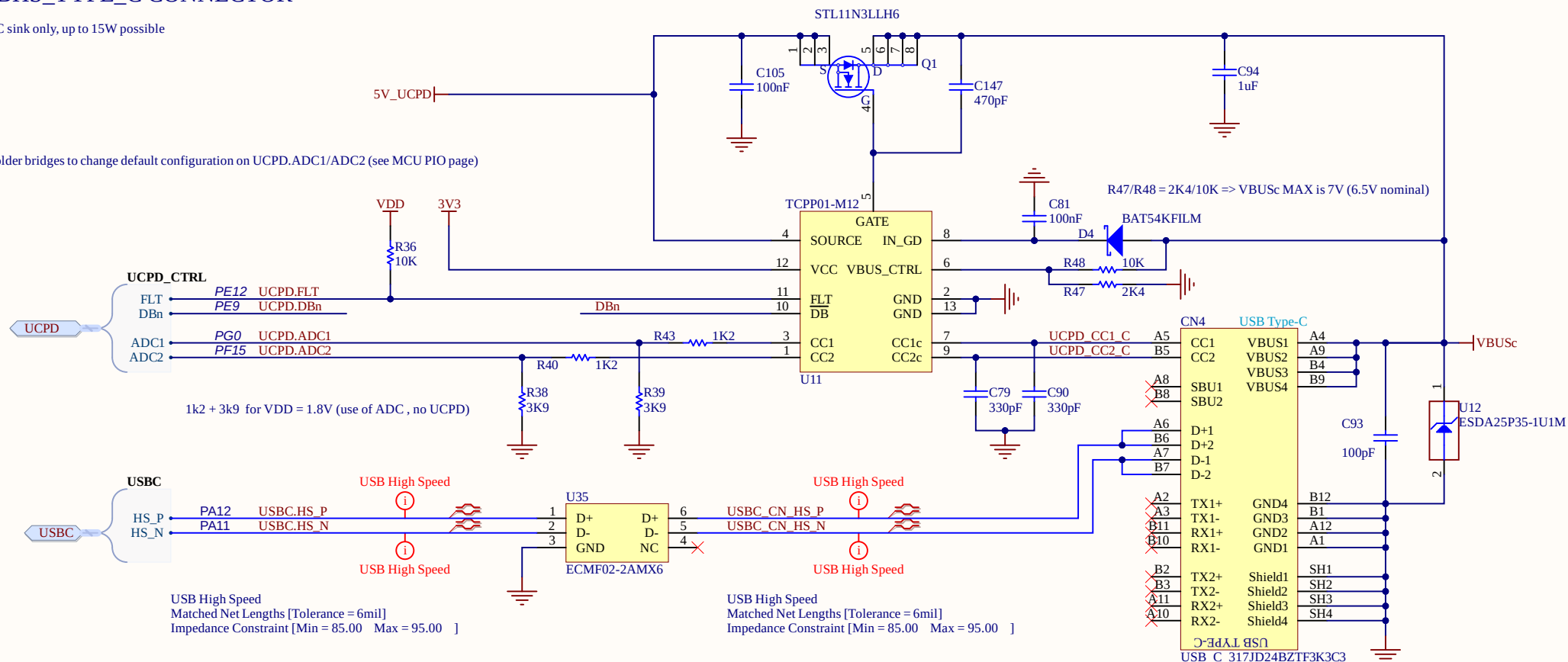


Match length ( including BGA package length ) :  
- D0-D7 (Byte0) , CK, CMD all in 50 mils

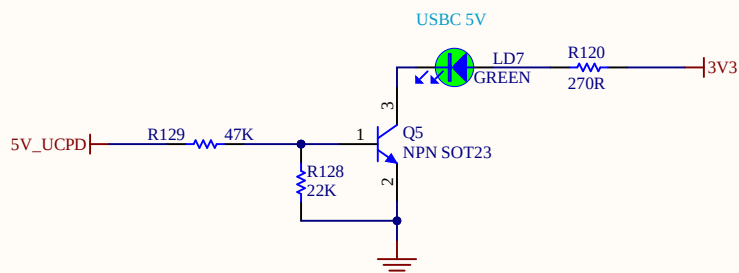


USB-C sink only, up to 15W possible

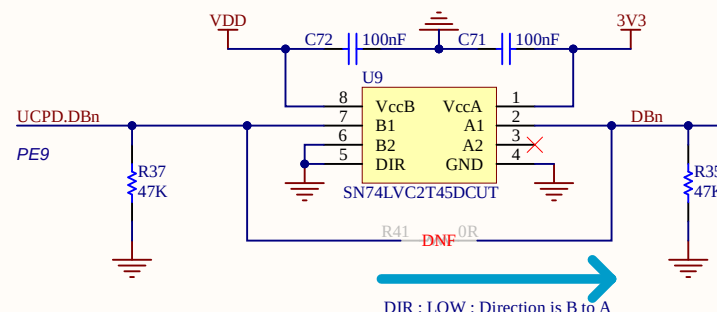
Use solder bridges to change default configuration on UCPD.ADC1/ADC2 (see MCU PIO page)



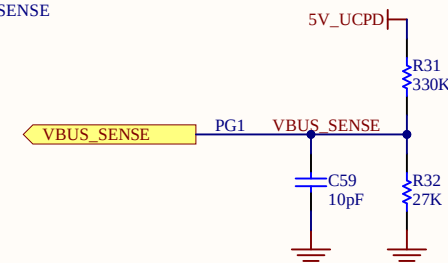
## 5V\_USB\_LED



## UCPD.DBn Level shifter



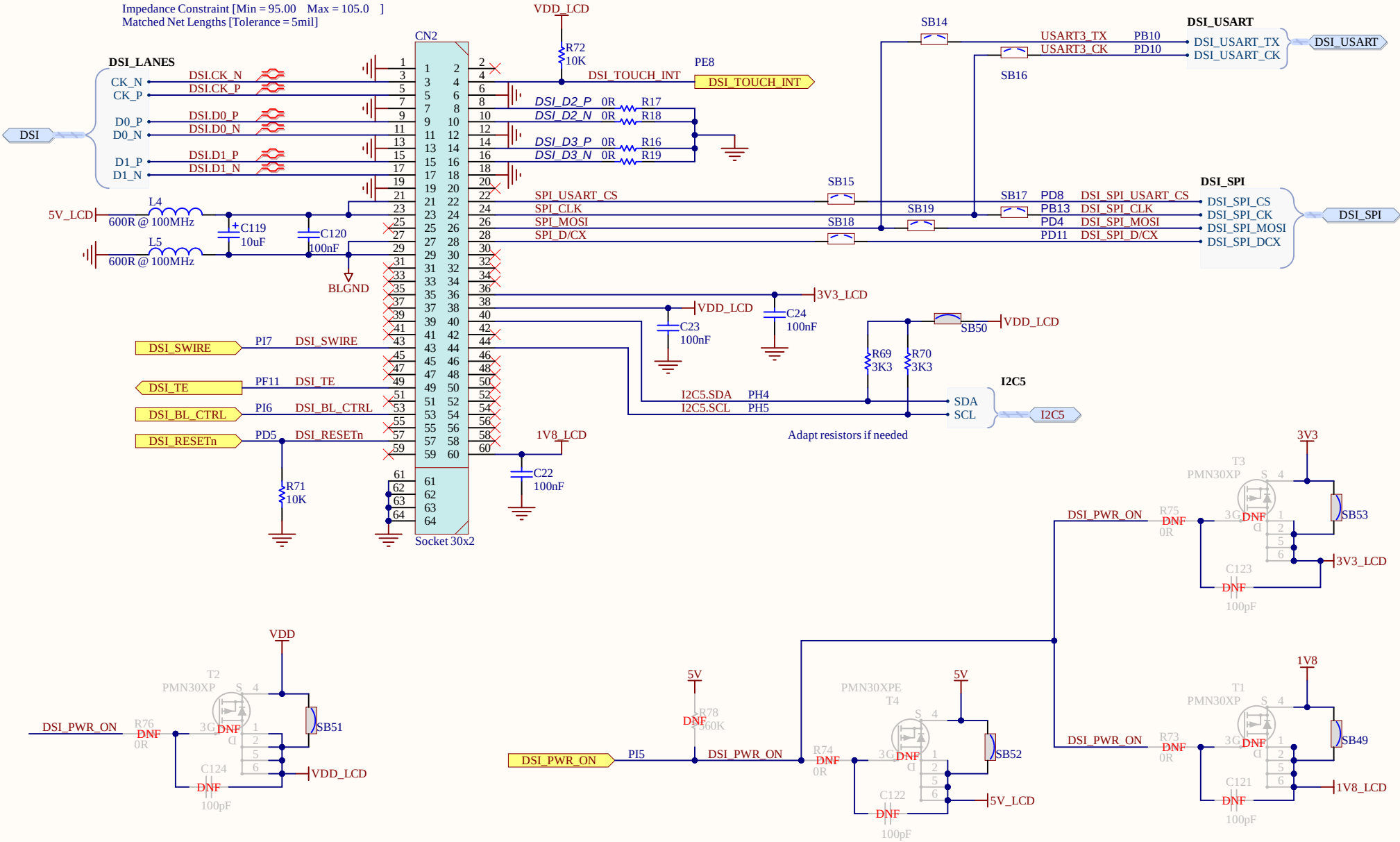
## VBUS SENSE



DSI LCD

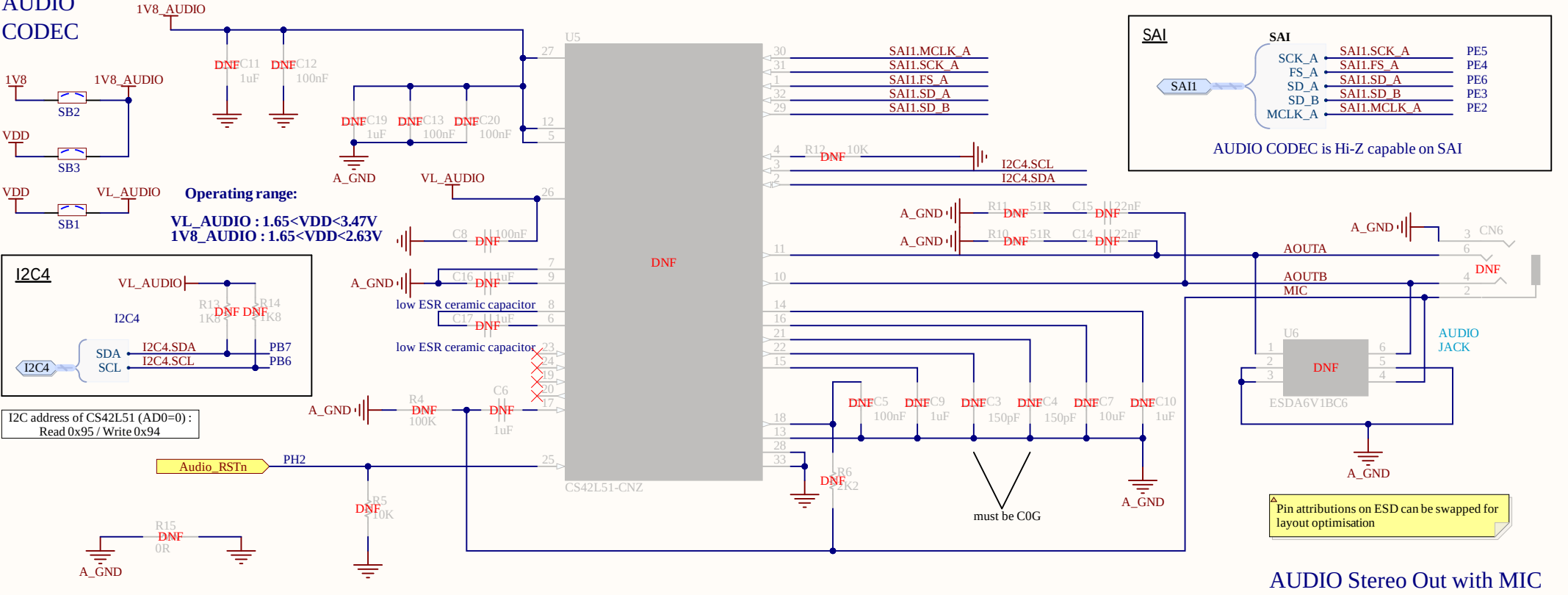
DSI.CK\_N and DSI.CK\_P are inverted on DSI connector pins : swap lanes in Software

Impedance Constraint [Min = 95.00 Max = 105.0 ]  
Matched Net Lengths [Tolerance = 5mil]



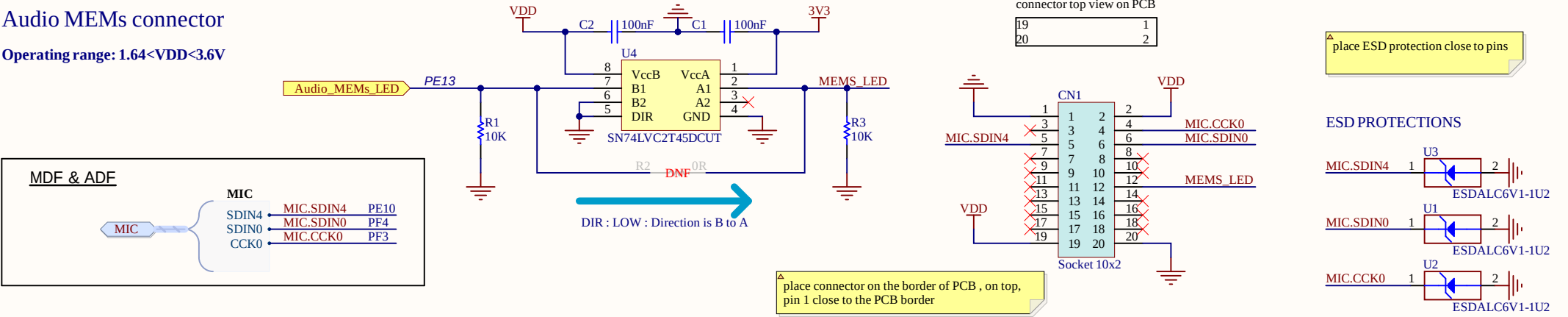


AUDIO CODEC



Audio MEMs connector

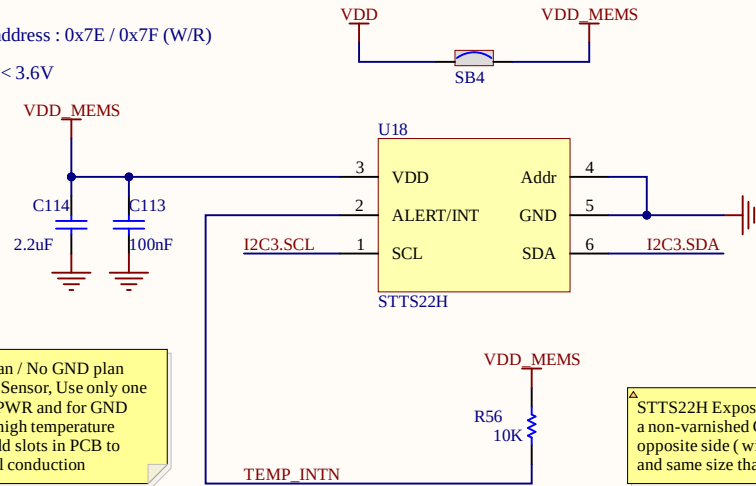
Operating range: 1.64<VDD<3.6V



## MEMs

## TEMPERATURE SENSOR

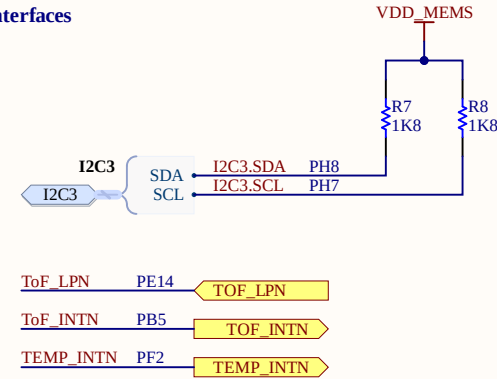
I2C Default address : 0x7E / 0x7F (W/R)

$$1.5V < V_{DD} < 3.6V$$


▲ No Power Plan / No GND plan under TEMP Sensor, Use only one PTH via for PWR and for GND  
Isolate from high temperature places and add slots in PCB to break thermal conduction

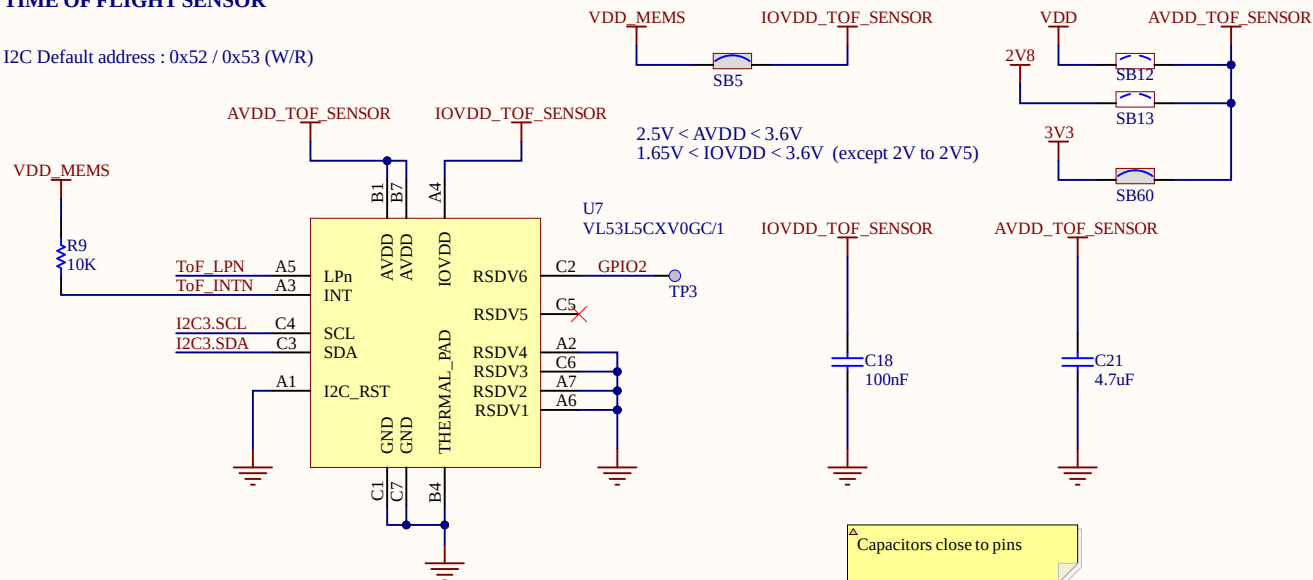
STTS22H Exposed Pad : linked to a non-varnished Copper plan on opposite side ( with two PTH vias and same size than EP)

## Interfaces



## TIME OF FLIGHT SENSOR

I2C Default address : 0x52 / 0x53 (W/R)



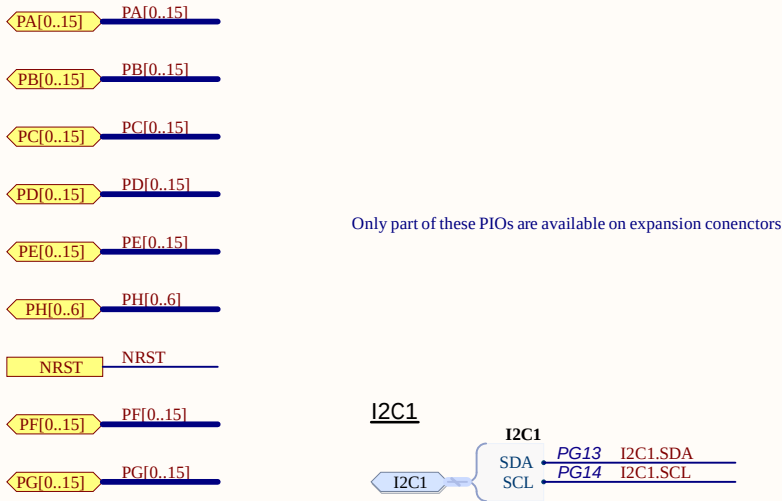
Capacitors close to pins

|                                          |                          |                               |
|------------------------------------------|--------------------------|-------------------------------|
| Title: <b>MEMS</b>                       |                          |                               |
| Project: <b>STM32U5x9NJH6Q Discovery</b> |                          |                               |
| Variant: <b>U5G9NJQ</b>                  |                          |                               |
| Revision: <b>B-02</b>                    |                          | Reference: <b>MB1829</b>      |
| Size: <b>A4</b>                          | Date: <b>19-Jul-2023</b> | Sheet: <b>12</b> of <b>16</b> |



EXPANSION CONNECTORS

EXPANSION CONNECTORS, MCU INTERFACES

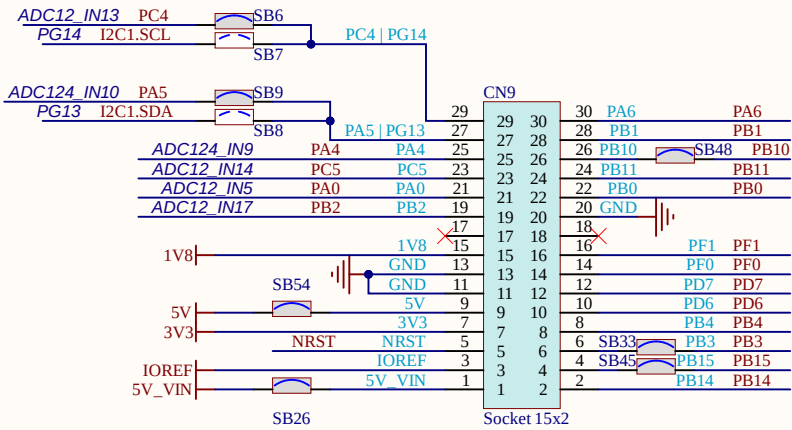


EXPANSION CONNECTORS

EXPANSION CONNECTORS : VDD is 1.8V Default, VREFP / VDDA are 1.8V default



ADC inputs are referenced to VREFP (1.8V default)



LIMITATION :

ADC4\_IN6 & ADC4\_IN7 are exclusive with UCPD.ADC1/ADC2  
Use solder bridges to connect/disconnect (on MCU page also)

USART3\_CTS  
USART3\_RTS  
USART3\_TX  
USART3\_RX  
USART3\_SCLK

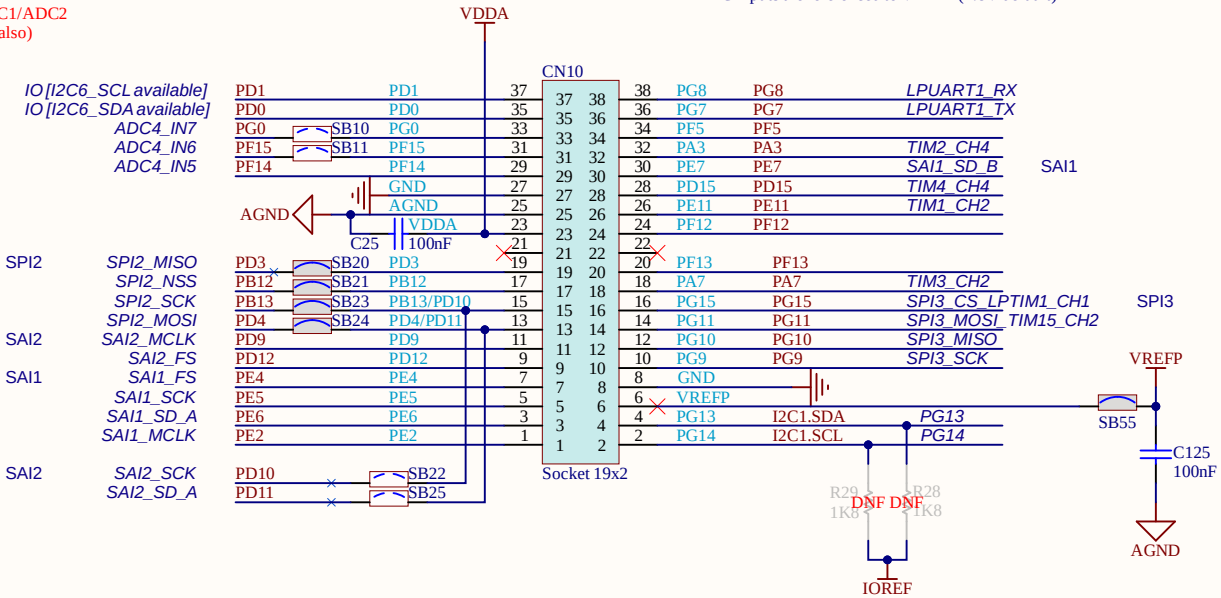
IO [I2C2\_SCL available]  
IO [I2C2\_SDA available]  
SDMMC2\_CMD  
SDMMC2\_CK  
SDMMC2\_D3  
SDMMC2\_D2 or T.SWO (JTDO)  
SDMMC2\_D1 or UCPD.CC2  
SDMMC2\_D0

LIMITATION :

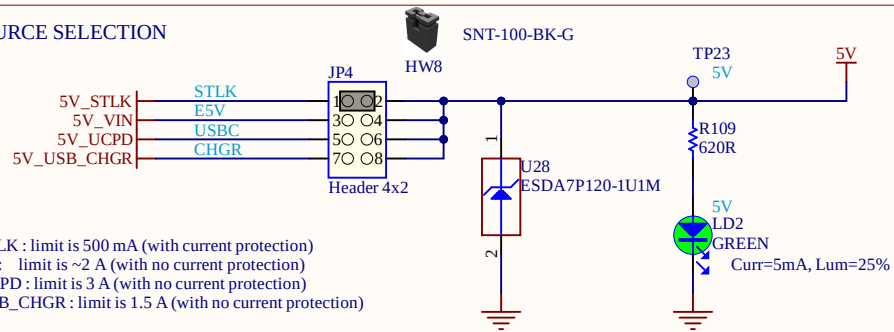
SDMMC2\_D2 is exclusive with T.SWO (JTDO) on STLINK/DEBUG/TAG  
SDMMC2\_D1 is exclusive with UCPD.CC2  
Use solder bridges to connect/disconnect (on MCU page also)

VDDA is used by COMP and OPAMP functions (multiplexed on many IOs)

ADC inputs are referenced to VREFP (1.8V default)

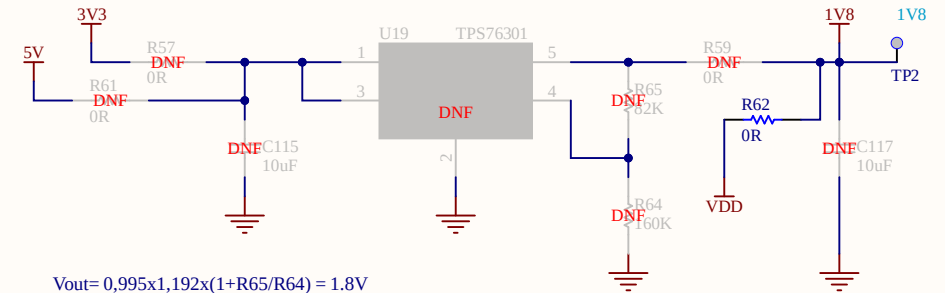


## 5V PWR SOURCE SELECTION



## 1V8 POWER SOURCE / 150mA

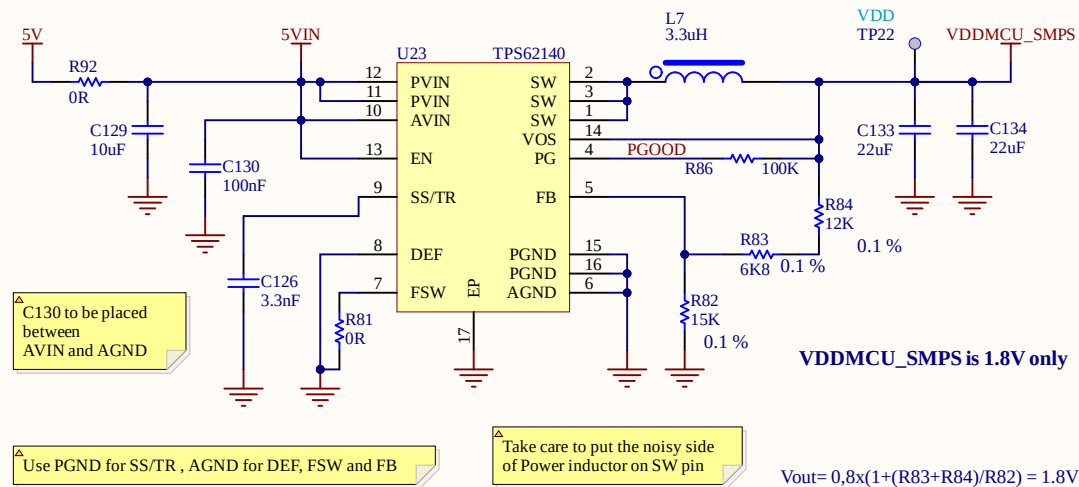
## 1V8 fixed LDO unused (AUDIO\_CODEC, DSI\_V3 connector and Expansion connectors)



## VDD\_MCU POWER SOURCE / 800mA

### 1.8V Default

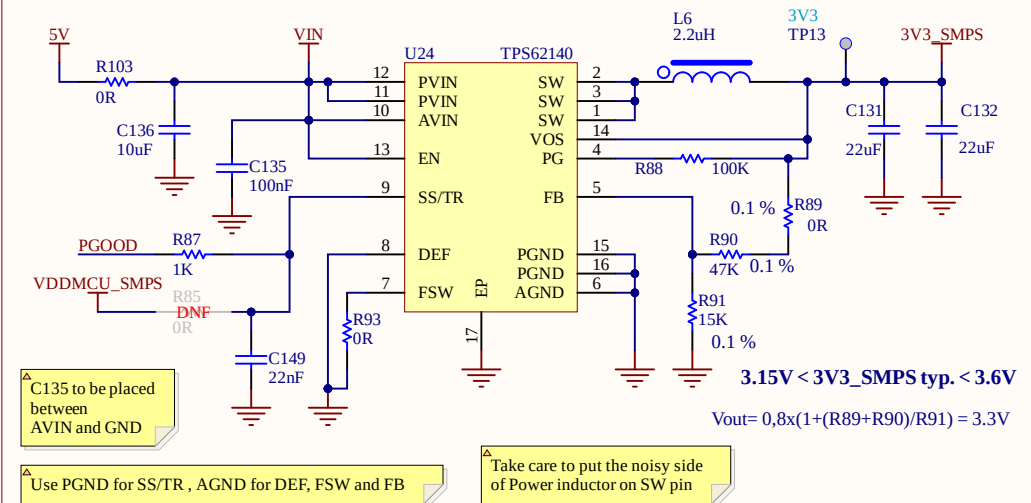
### 1.8V converter for MCU Power and Peripherals



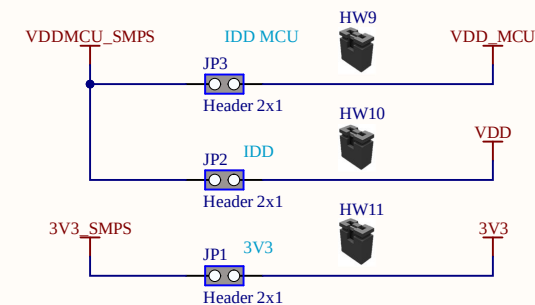
## 3V3 POWER SOURCE / 800 mA

### 3.3V Default

### 3.3V converter for MCU and Peripherals

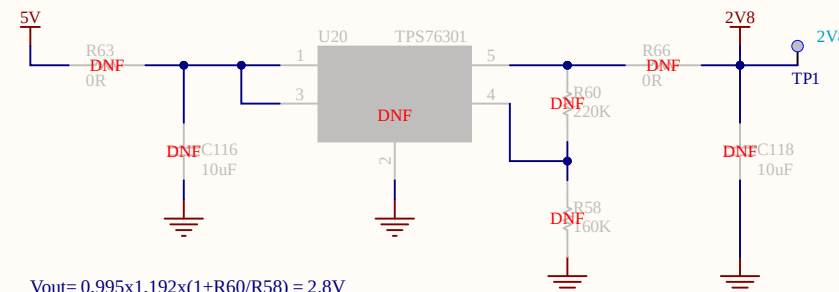


## CURRENT MEASUREMENTS

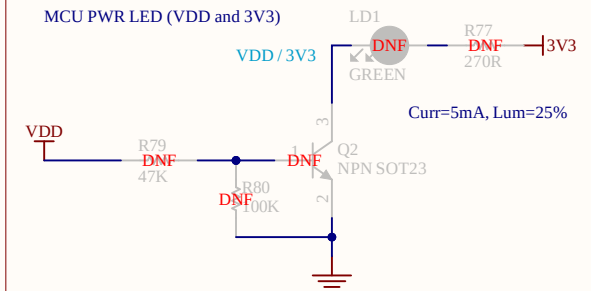


## 2V8 POWER SOURCE / 150mA

### 2V8 fixed LDO unused



## MCU PWR LED (VDD and 3V3)



Title: **BOARD Power**

Project: **STM32U5x9N6Q Discovery**

Variant: **U5G9NJQ**

Revision: **B-02**

Size: **A4**

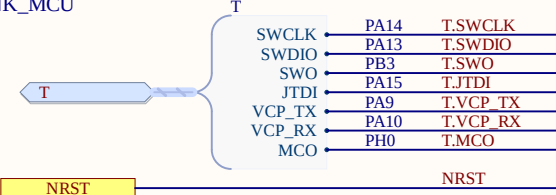
Date: **19-Jul-2023**

Reference: **MB1829**

Sheet: **14 of 16**



## STLINK\_MCU

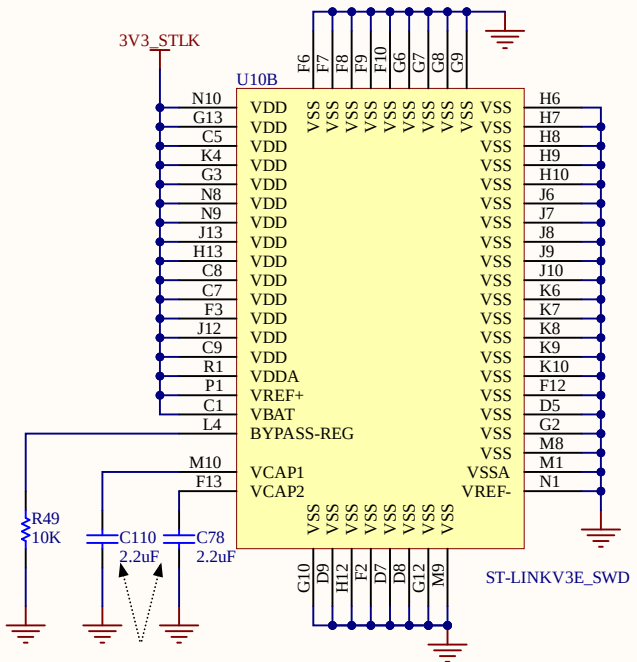


**LIMITATION :** Use solder bridges to connect/disconnect (see MCU page also)

**T.SWO (JTDO) is exclusive with SDMMC2\_D2 of Expansion connectors.  
Please ensure those multiplexed signals are not used on both features simultaneously**

The routing of the tracks must be done on continuity from ST-LINK to 47ohm resistors and from resistors to Target MCU to avoid stub noises and EMC approach. (47ohm resistors must be very close to STDC14)

## ST-LINK POWER



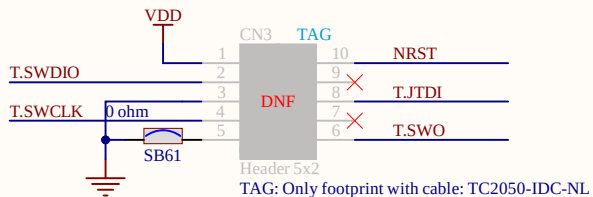
Ceramic capacitor (Low ESR)

## TAG CONNECTOR

Use SWD mode by default (JTAG 4 wire mode needs modification)

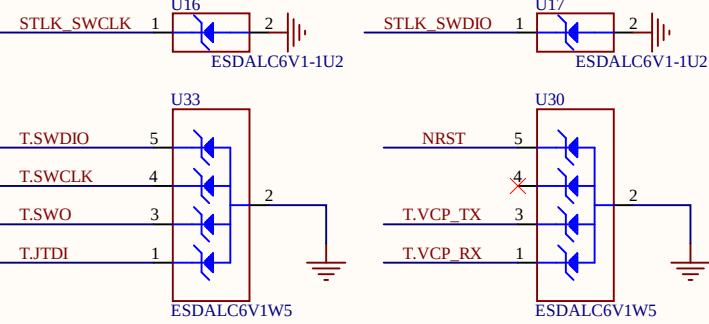
T.SWO (JTDO) is exclusive with SDMMC2\_D2 of Expansion connectors  
Use solder bridges to connect/disconnect (see MCU page also)

JTDI is exclusive with CC1 of USB Type-C UCPD



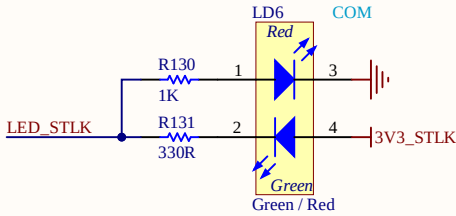
Remove the solder bridge if the debugger probe provides power supply on pin 5

## ESD PROTECTIONS



Pin attributions on ESD can be swapped for layout optimisation

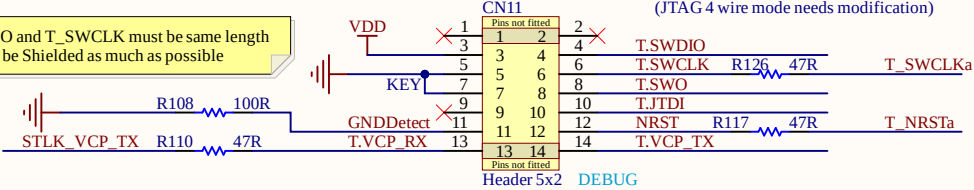
## LED STLK



## MIPI10 DEBUG

Use SWD mode by default  
(JTAG 4 wire mode needs modification)

T\_SWDIO and T\_SWCLK must be same length and must be Shielded as much as possible

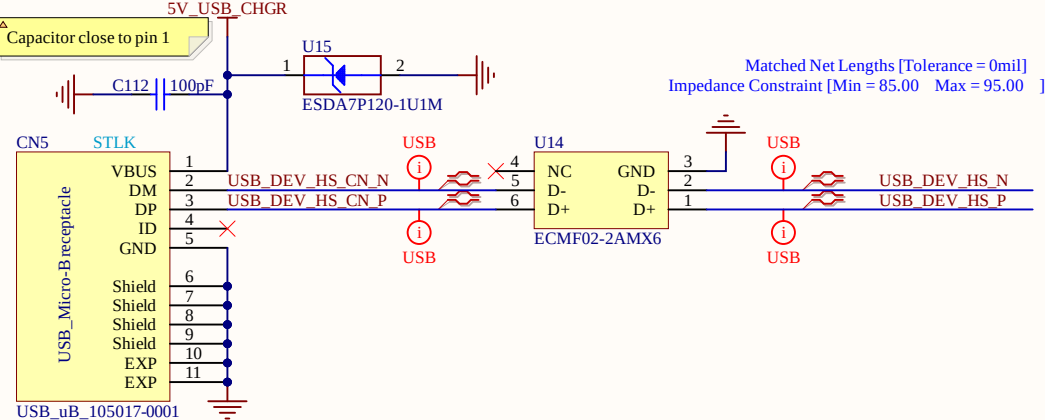


T.SWO (JTDO) is exclusive with SDMMC2\_D2 of Expansion connectors  
Use solder bridges to connect/disconnect (see MCU page also)

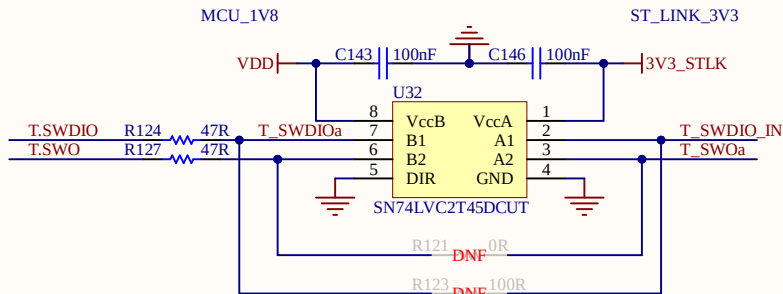
JTDI is exclusive with CC1 of USB Type-C UCPD

## ST-LINK USB CONNECTOR

Capacitor close to pin 1



## SW LEVEL SHIFTER FOR MCU\_1V8



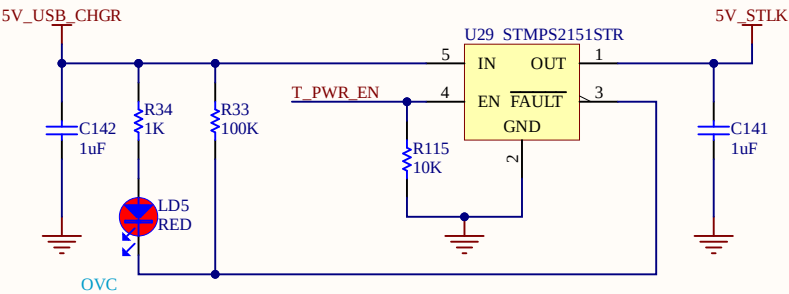
**T.SWO (JTDO) is exclusive with SDMMC2\_D2 of Expansion connectors**

Use solder bridge to connect/disconnect  
(see MCU page also)

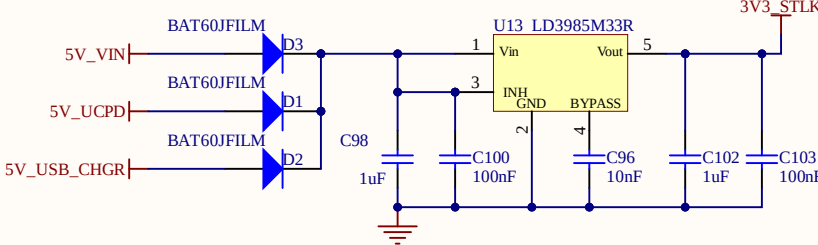
DIR : LOW : Direction is B to A

DIR : LOW : Direction is B to A

## 5V ST-LINK PROTECTION



## ST-LINK POWER 3V3 / 150mA

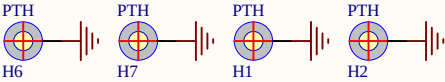


HW7  
PCB  
MBxxxxy

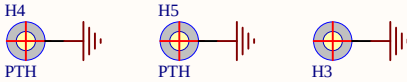
HW3  
STICKER BOARD  
Sticker board

HW1  
STICKER PRODUCT  
Sticker product

HW2  
DNF  
Sticker ES

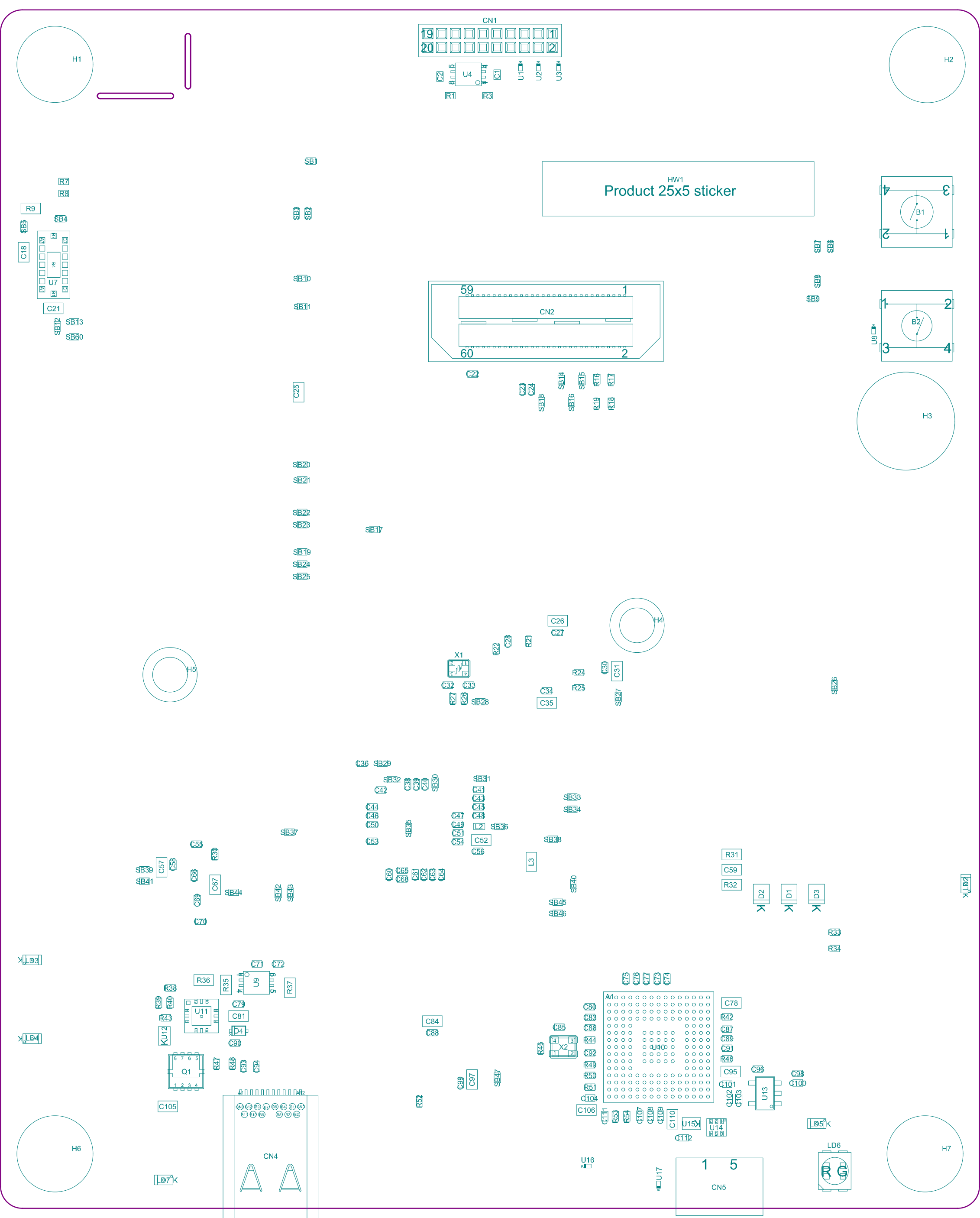


Parts for MB1829 corner holes



Parts for different daughter boards holes





|                                            |                      |                                                                                       |
|--------------------------------------------|----------------------|---------------------------------------------------------------------------------------|
| Project: STM32U5x9N <b>J</b> H6Q Discovery |                      |  |
| Layer: <b>M14-Top Assembly</b>             | Gerber: <b>.GM14</b> |                                                                                       |
| Variant: U5G9N <b>J</b> Q                  | Ref: MB1829          |                                                                                       |
| Date: 19-Jul-2023                          | Rev: B               |                                                                                       |







