

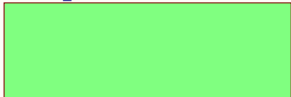
STM32L562E-DK

MB1373

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U_MB1373_TOP
MB1373_TOP.SchDoc

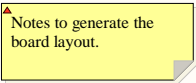


Legend

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

Text to be added to silkscreen.

Warning text.



Open Platform License Agreement

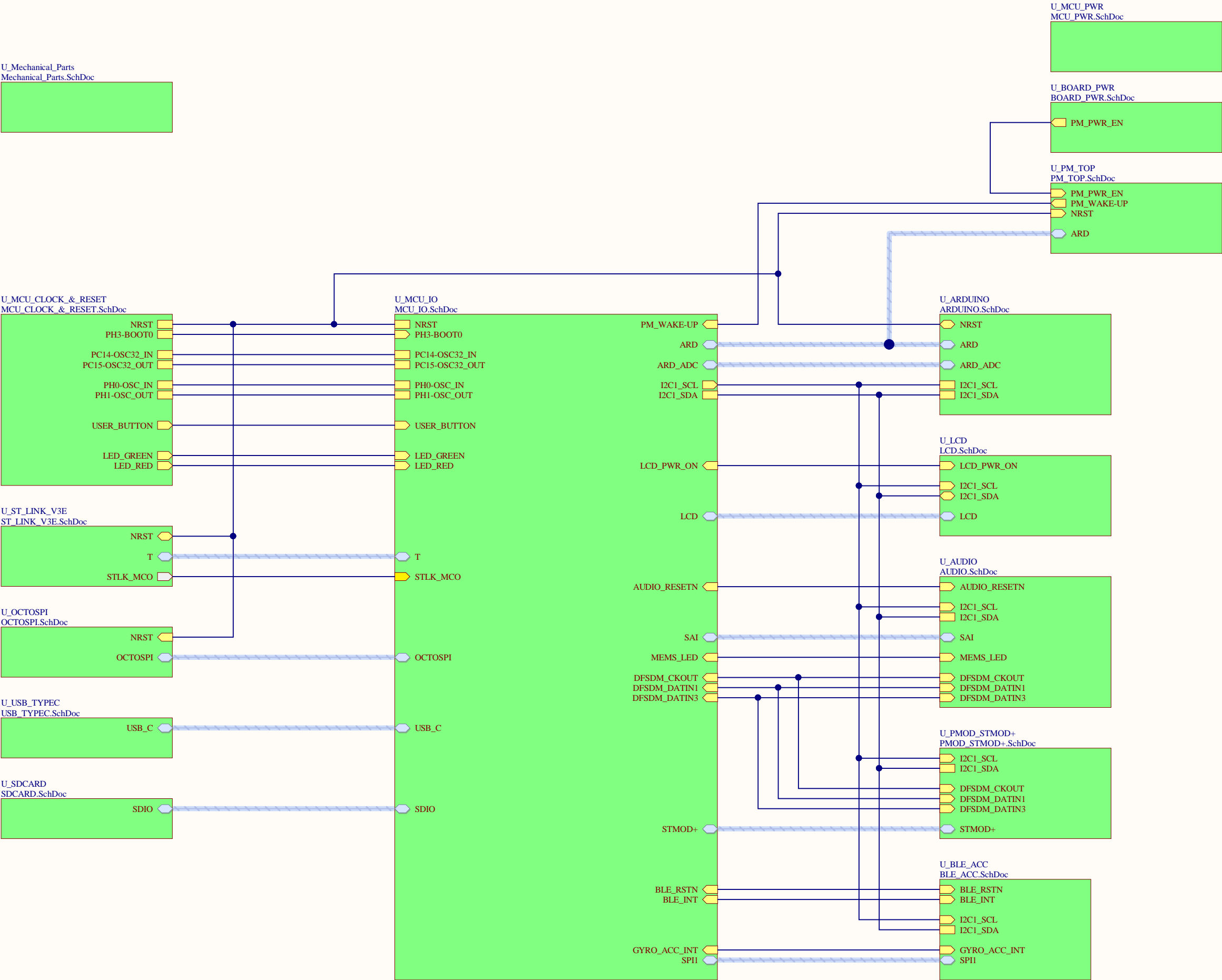
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Title: MB1373_Overview		
Project: STM32L562E-DK		
Variant: L562QEQ		
Revision: C-01	Reference: MB1373	
Size: A4	Date: 14-JUNE-2019	Sheet: 1 of 21





INT1 - PF1 - LCD-TOUCH-PANEL
INT2 - PF2 - SD-CARD-DETECT
INT3 - PF3 - GYRO-ACCELEROMETER
INT4 - PF4 - ARDUINO
INT5 - PF5 - PMOD/STMOD+
INT11 - PD11 - Power Measurement / ARD.D2_IO
INT12 - PD12 - Power Measurement / ARD.D3_TIM
INT13 - PC13 - USER BUTTON or ENERGY METER WAKE-UP

I2C

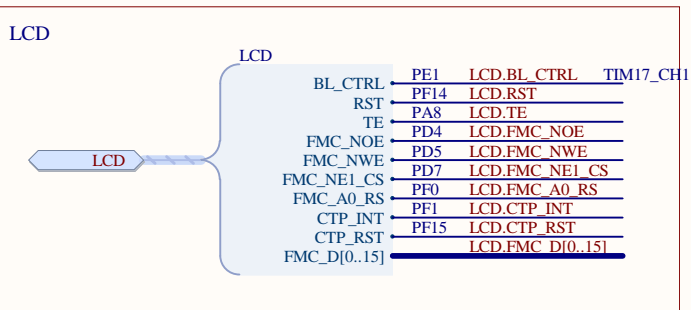
VDD

R17
4K7

R19
4K7

I2C1_SCL PB6

I2C1_SDA PB7



SDIO

Pin	Function
PD2	SDIO.CMD
PC12	SDIO.CLK
PF2	SDIO.DETECT
PC8	SDIO.D0
PC9	SDIO.D1
PC10	SDIO.D2
PC11	SDIO.D3

	PG5	SPI1_BLE_CS
BLE_CS	PG4	SPI1_MOSI
MOSI	PG3	SPI1_MISO
MISO	PG2	SPI1_SCK
SCK		

SAI

- PE3 **SALSD_B**
- SD_B
- SD_A
- PE6 **SALSD_A**
- PE4 **SALFS_A**
- FS_A
- PE5 **SALSCK_A**
- SCK_A
- PE2 **SALMCLK_A**

Pin	Signal	Device Pin
SWCLK	PA14	T.SWCLK
SWDIO	PA13	T.SWDIO
SWO	PB3	T.SWO
JTDI	PA15	T.JTDI
VCP_TX	PA9/PB11	T.VCP_TX / USART1
VCP_RX	PA10/PB10	T.VCP_RX / USART1

OCTOSPI

OCTOSPI

DQS

CLK

NCS

IO[0..7]

PA3

OCTOSPLDQS

OCTOSPLCLK

OCTOSPLNCS

OCTOSPI.IO[0..7]

Diagram illustrating the USB_C pin connections:

USB_C Pin	MCU Pin	Signal Name
FS_P	PA12	USB_C.FS_P
FS_N	PA11	USB_C.FS_N
CC1	PA15	USB_C.CC1
CC2	PB15	USB_C.CC2
DBn	PB5	USB_C.DBn
FLT	PB14	USB_C.FLT
VBUS_SENSE	PA4	USB_C.VBUS_SENSE

ARD_ADC			
A0	PA0	ARD_ADC.A0	ADC12_IN5
A1	PA1	ARD_ADC.A1	ADC12_IN6
A2	PA4	ARD_ADC.A2	ADC12_IN9
A3	PA5	ARD_ADC.A3	ADC12_IN10
A4	PC4	ARD_ADC.A4	ADC12_IN13
A5	PC5	ARD_ADC.A5	ADC12_IN14

ARD			
D13_SPI_SCK	PG9	ARD.D13_SPI_SCK	
D12_SPI_MISO	PB4	ARD.D12_SPI_MISO	
D11_TIM_SPI_MOSI	PB5	ARD.D11_TIM_SPI_MOSI	TIM3_CH2
D10_TIM_SPI_CSN	PE0	ARD.D10_TIM_SPI_CSN	TIM16_CH1
D9_TIM	PB9	ARD.D9_TIM	TIM4_CH4
D8_IO	PG0	ARD.D8_IO	
D7_IO	PC6	ARD.D7_IO	
D6_TIM	PB8	ARD.D6_TIM	TIM4_CH3
D5_TIM	PD13	ARD.D5_TIM	TIM4_CH2
D4_INT	PF4	ARD.D4_INT	
D3_TIM	PD12	ARD.D3_TIM	TIM4_CH1
D2_IO	PD11	ARD.D2_IO	
D1_TX	PB11/PA9	ARD.D1_TX	LPUART1_TX
D0_RX	PB10/PA10	ARD.D0_RX	LPUART1_RX

STM32F103C8T6				
STMOD+	1_SPI_CSN	PB13	STMOD+1_SPI_CSN	
	2_SPI_MOSIp	PB5	STMOD+2_SPI_MOSIp	
	3_SPI_MISOp	PB4	STMOD+3_SPI_MISOp	
	4_SPI_SCK	PG9	STMOD+4_SPI_SCK	
	1_UART_CTS	PB13	STMOD+1_UART_CTS	
	2_UART_TX	PC10	STMOD+2_UART_TX	
	3_UART_RX	PC11	STMOD+3_UART_RX	
	4_UART_RTS	PD2	STMOD+4_UART_RTS	
	8_SPI_MOSIs	PD6	STMOD+8_SPI_MOSIs	
	9_SPI_MISOs	PG10	STMOD+9_SPI_MISOs	
	11_INT	PF5	STMOD+11_INT	
	12_RST	PC9	STMOD+12_RST	
	13_ADC	PA0	STMOD+13_ADC	ADC12_IN5
	14_TIM	PC8	STMOD+14_TIM	TIM3_CH3
	SEL_12	PF11	STMOD+SEL_12	
	SEL_34	PF12	STMOD+SEL_34	

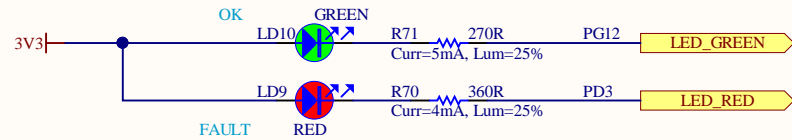
The schematic diagram illustrates the UART1 module with the following components and connections:

- Inputs:**
 - PB10 LPUART1_RX:** Connected to the RX pin of the UART1 module.
 - PA10 USART1_RX:** Connected to the RX pin of the UART1 module.
- Outputs:**
 - PB11 LPUART1_TX:** Connected to the TX pin of the UART1 module.
 - PA9 USART1_TX:** Connected to the TX pin of the UART1 module.
- Resistors:**
 - R125, R124, R130, R129:** 0R (0 Ohm) resistors.
 - R133, R131, R134, R132:** 0R (0 Ohm) resistors.
 - DNF:** Designated Not For Placement (No Pull-Up).
- Connections:**
 - The RX pin is connected to both PB10 and PA10.
 - The TX pin is connected to both PB11 and PA9.
 - The RX pin is connected to the RD0 pin of the ARD module.
 - The TX pin is connected to the RD1 pin of the ARD module.
 - The RX pin is connected to the T.VCP_RX pin of the T.VCP module.
 - The TX pin is connected to the T.VCP_TX pin of the T.VCP module.

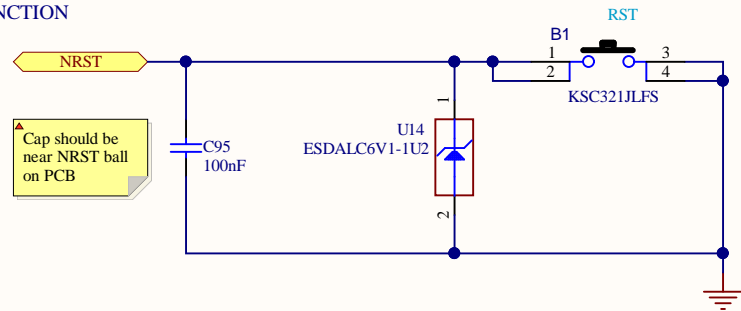
PA4 EXCLUSIF BETWEEN ARDUINO and UCPD
PA0 EXCLUSIF BETWEEN ARDUINO and STMOD+
PA15 EXCLUSIF BETWEEN UCPD and JTAG
PB5 SHARED BETWEEN ARDUINO and STMOD+ and EXCLUSIF WITH UCPD

SPI3 (PB4, PB5, PG9) SHARED BETWEEN :
ARDUINO AND STMOD+

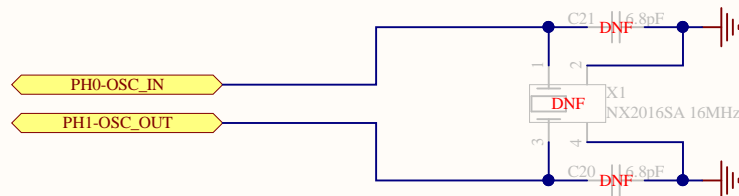
USER LEDs



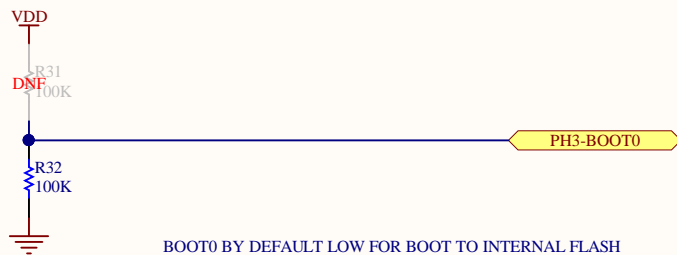
RESET FUNCTION



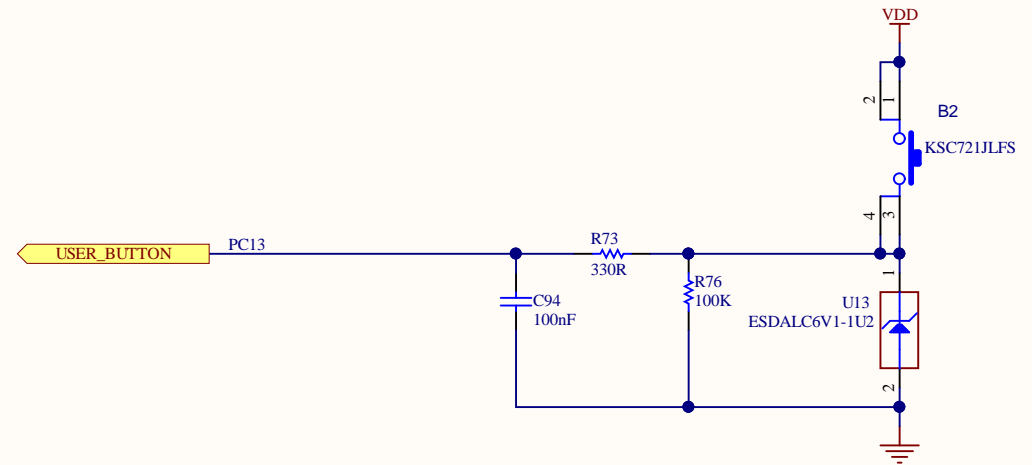
EXTERNAL HSE CLK



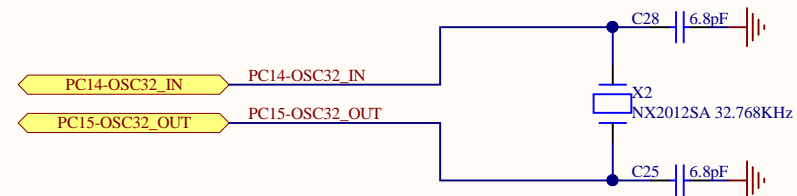
PH3_BOOT0




USER BUTTON



EXTERNAL LSE CLK

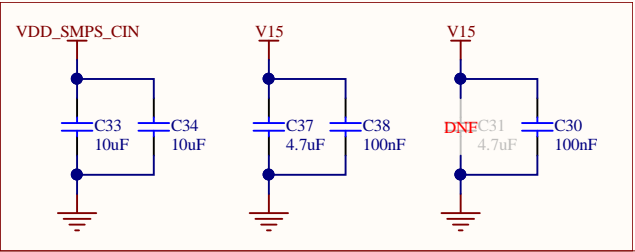


Title: MCU_CLOCK_&_RESET			 life.augmented
Project: STM32L562E-DK			
Variant: L562QE			
Revision: C-01		Reference: MB1373	
Size: A4	Date: 14-JUNE-2019	Sheet: 4 of 21	

STM32L5xx MCU PWR

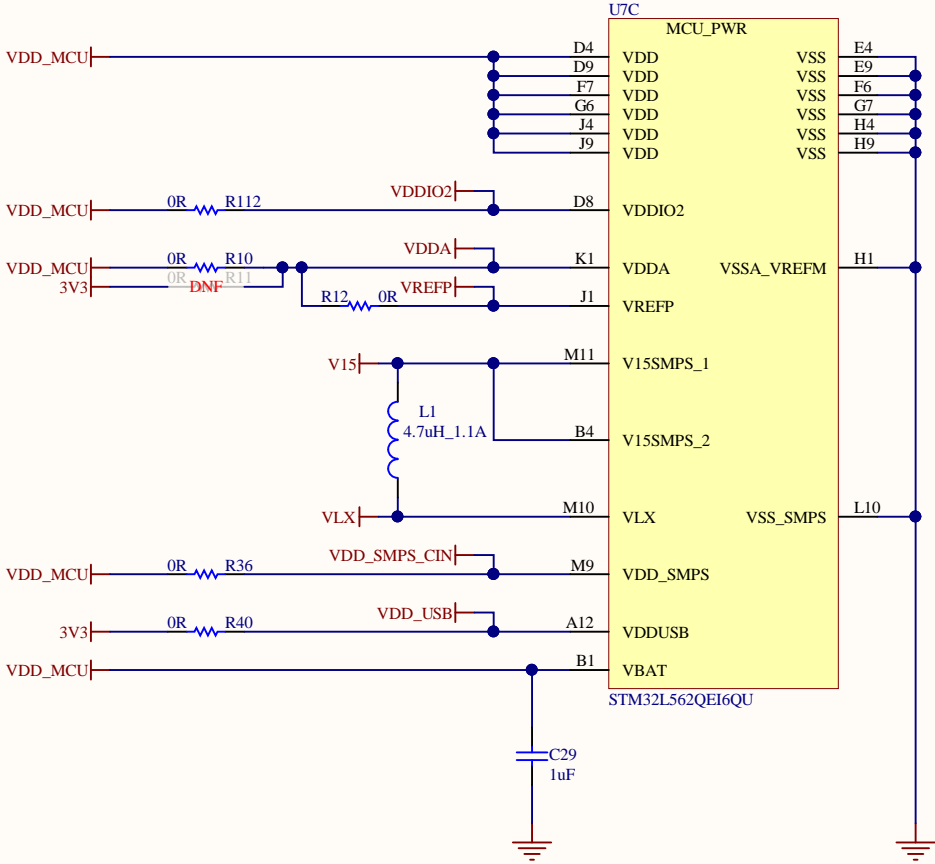
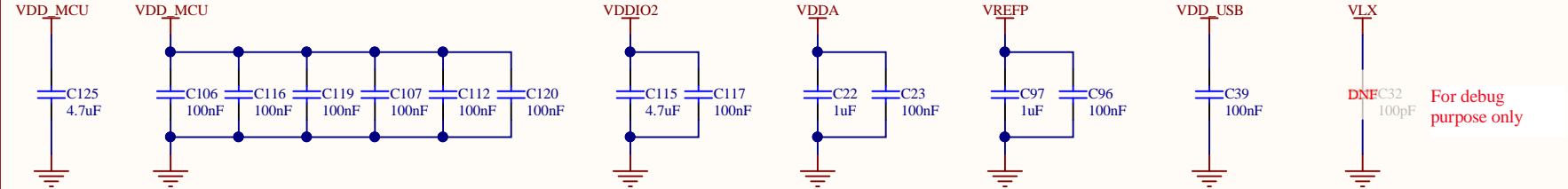
Operating range: 1V71<VDD<3V6
Operating range: 1V08<VDDIO2<3V6 (only for IO G[15:2])
Operating range: 1V55<VBAT<3V6
Operating range: 1V62<VDDA<3V6
Operating range: 1V62<VREF<3V6 (depend of VDDA)
Operating range: 3V0<VDDUSB<3V6
Operating range: 1V71<VDD_SMPS<3V6

"CIN" and "V15" capacitors should be as closed as possible to the MCU associated pad.
V15 4.7µF should be place near Lxx. Or 1 couple of capacitors per pad (4.7µF / 100nF).

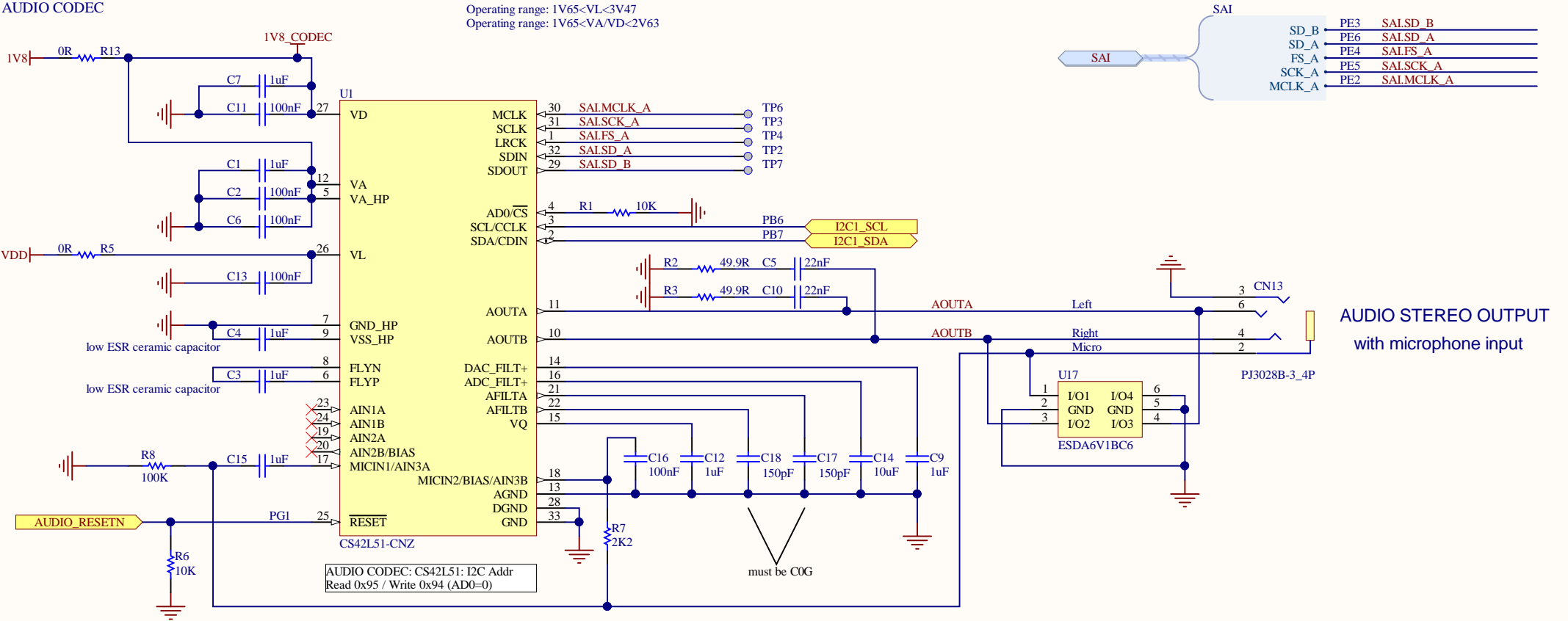


MCU DECAPS

Ceramic capacitor (Low ESR, ESR<1ohm)

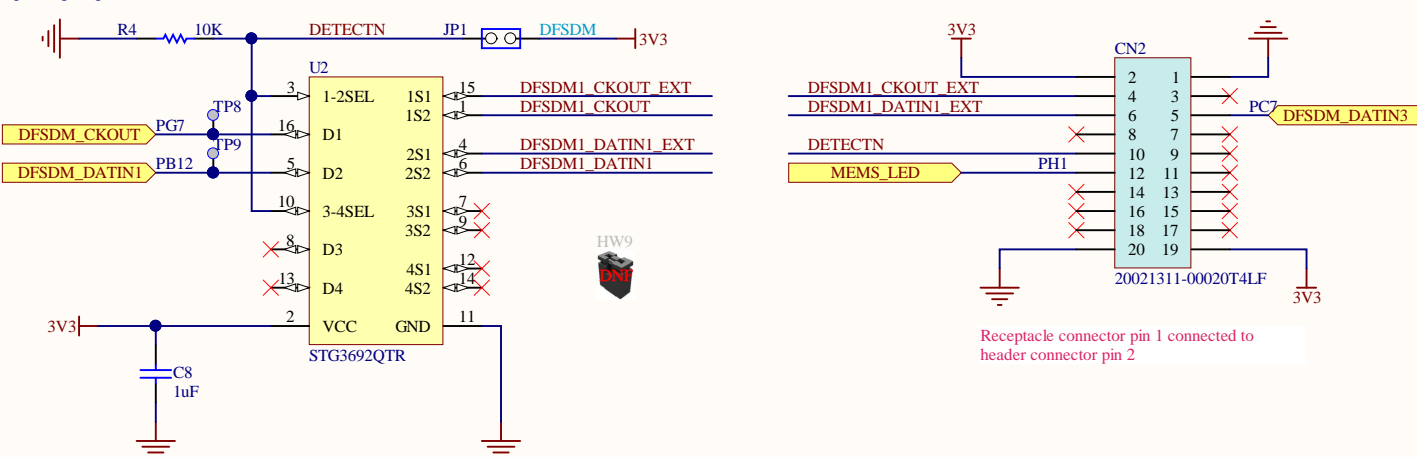


AUDIO CODEC



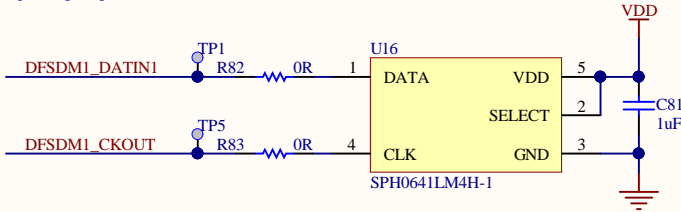
Extension microphones module

Operating range: 1V65<VDD<3V6



MEMS

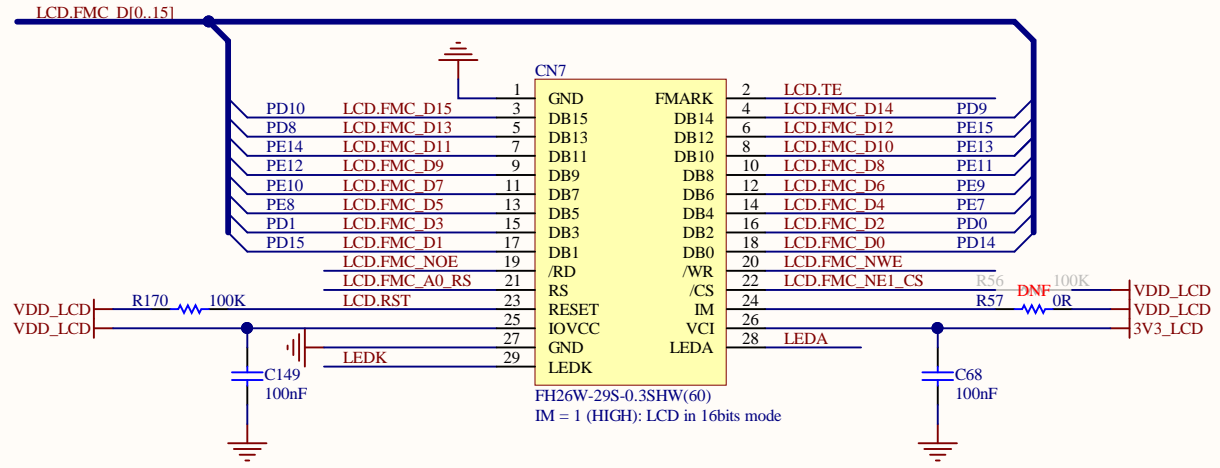
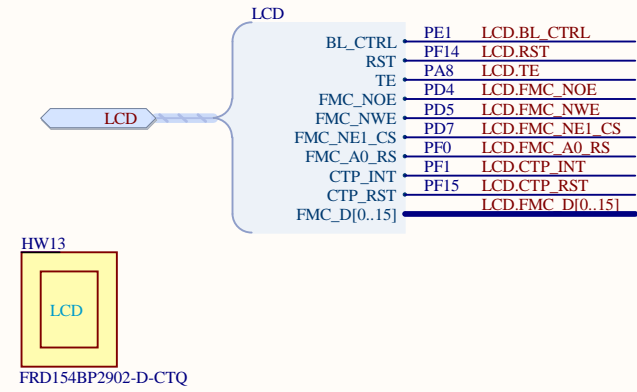
Operating range: 1V62<VDD<3V6



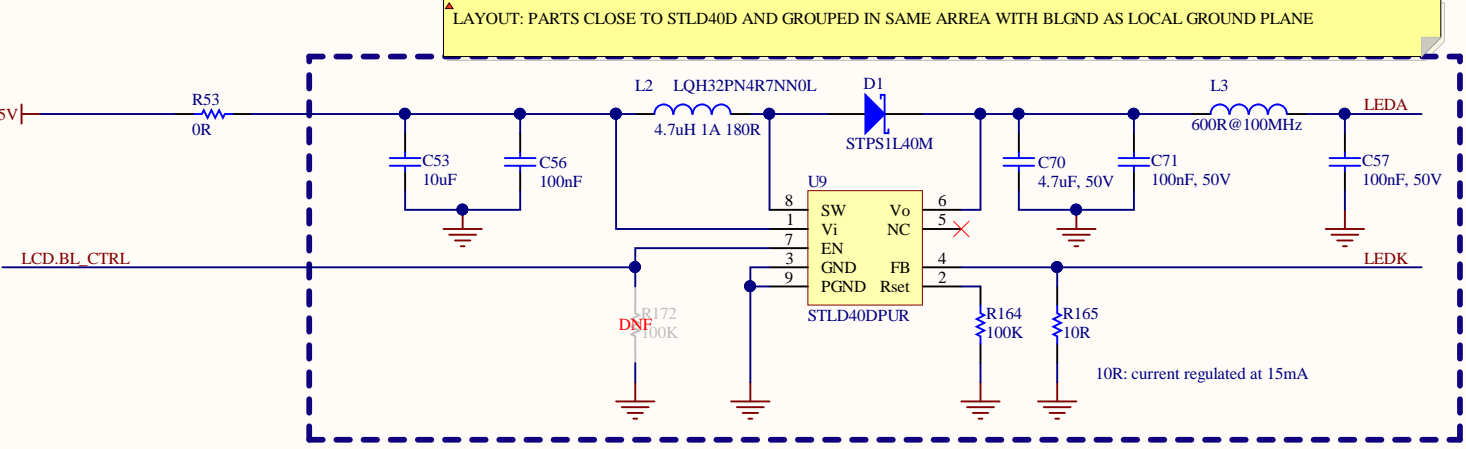
LIMITATION :

Some DFSDM signals are multiplexed with STMOD+, Ext-MEMS Module and on board Microphone.
In case STMOD+ SHIELD is plugged, Ext-MEMS Module should be disconnected, and Jumper JP1 should be set to connect DFSDM signals to STMOD+ module.

TFT LCD
Operating range: 1V65<IOVCC<3V3
Operating range: 2V4<VCI<3V3

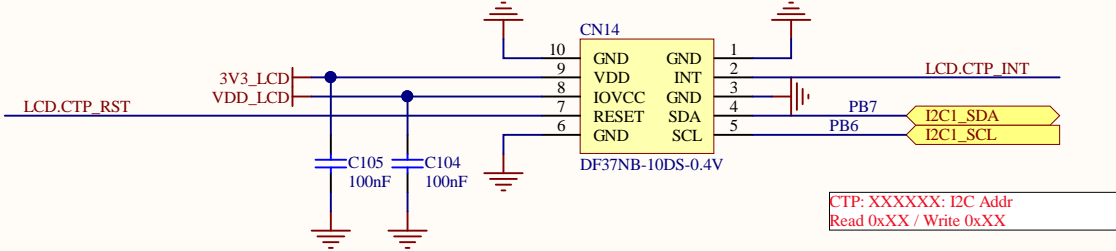


BACKLIGHT DRIVER

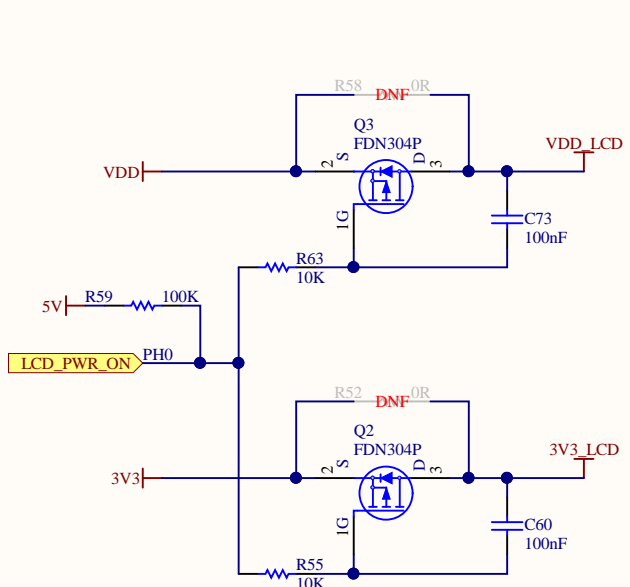


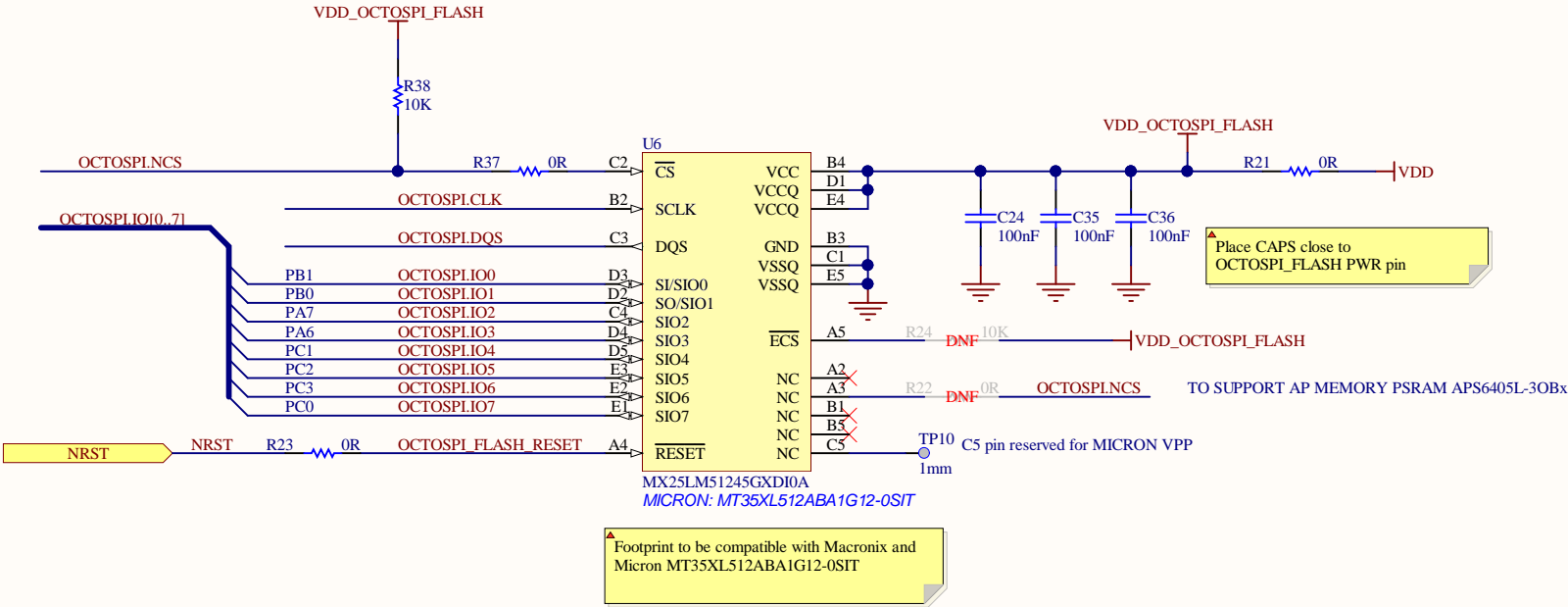
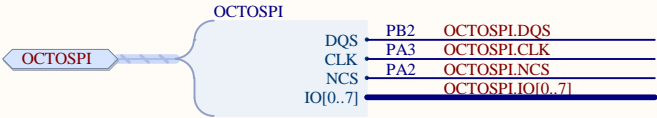
TOUCH PANEL CONNECTOR

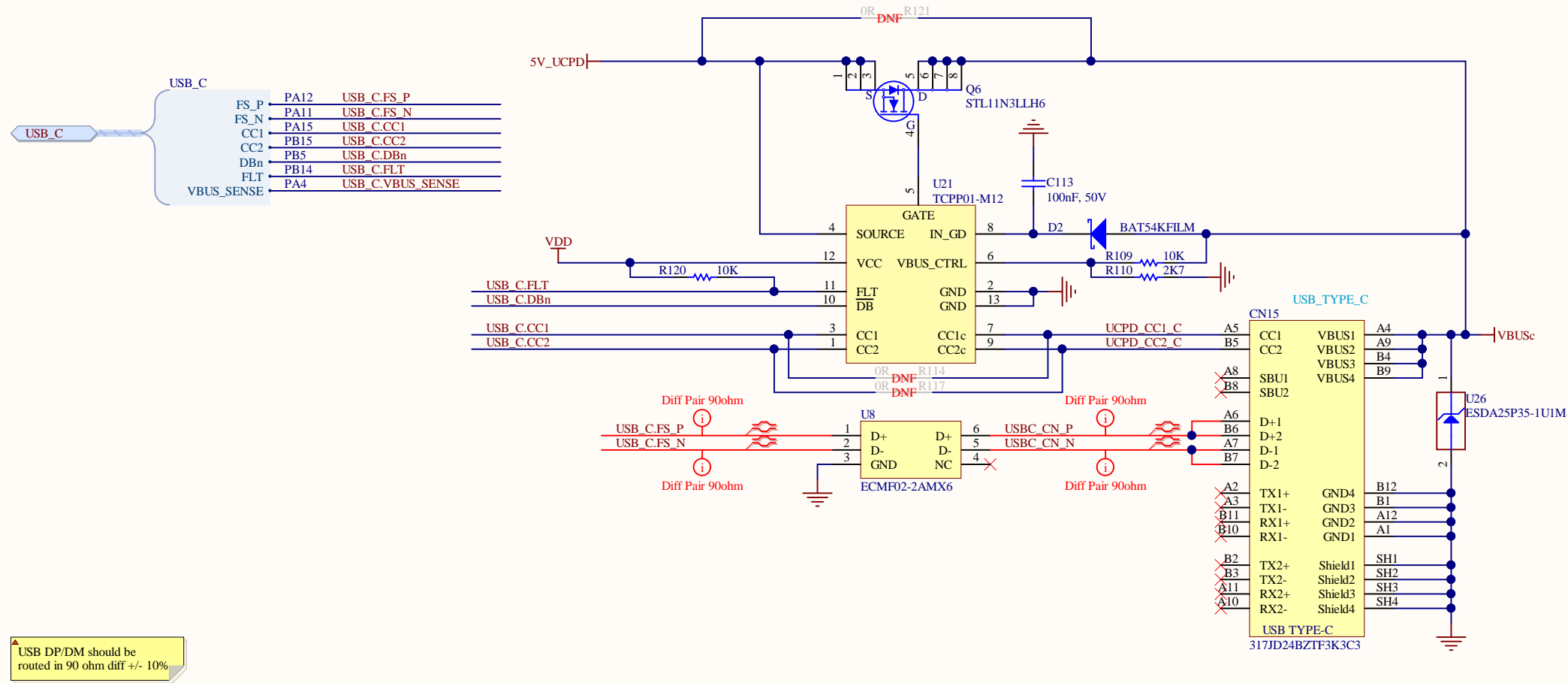
Operating range: 2V4<VDD<3V3
Operating range: 1V65<IOVCC<3V3



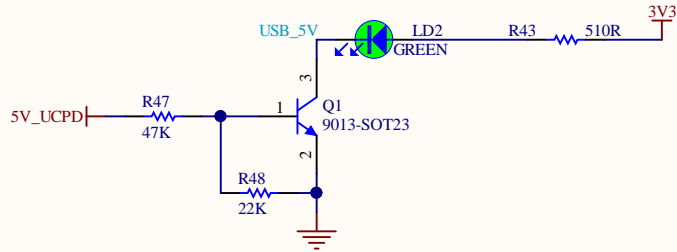
LCD_PWR_ENABLE



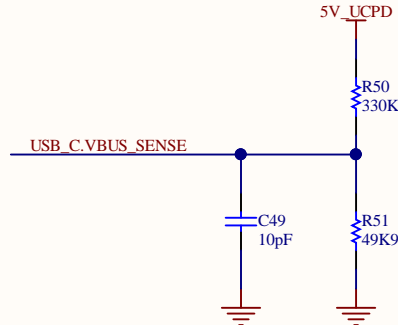




5V_USB_LED



VBUS SENSE



LIMITATION :

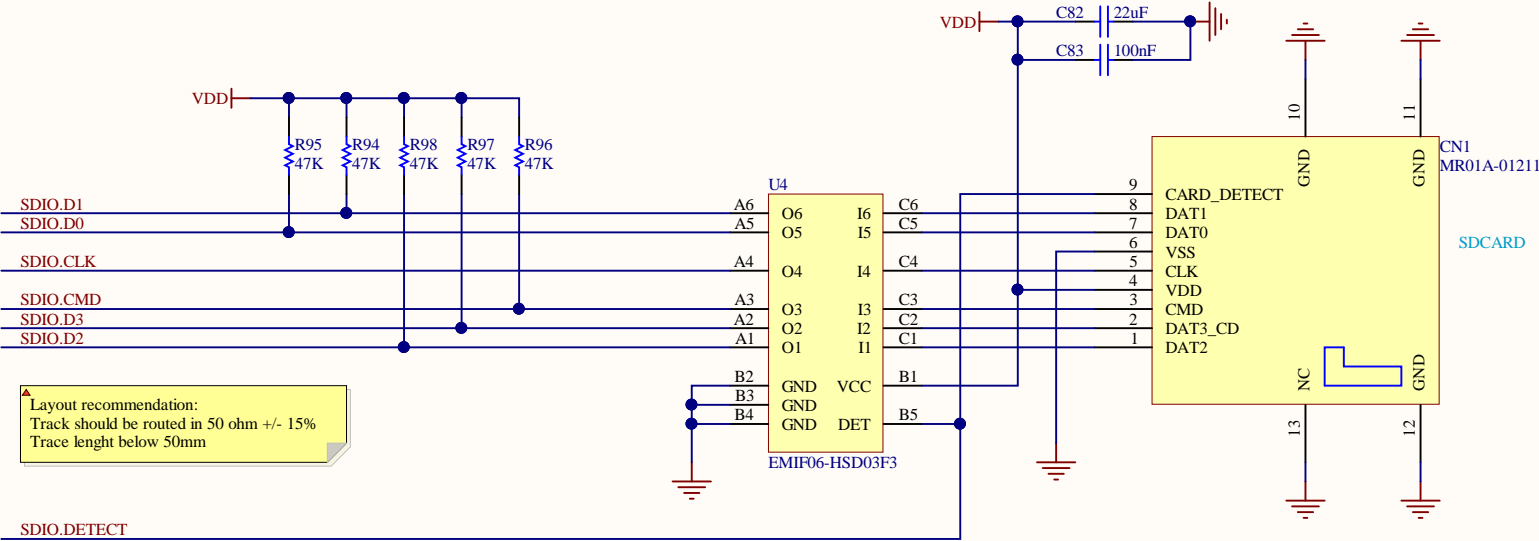
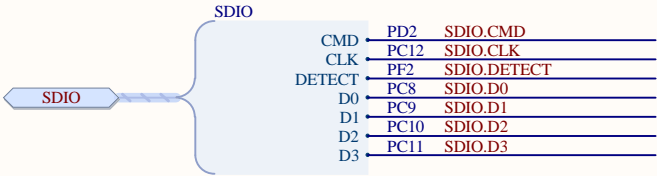
Some UCPD signals are multiplexed with ARDUINO: DBn / VBUS_SENSE
In case ARDUINO SHIELD is plugged, UCPD signals can be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

Some ARDUINO signals are multiplexed with JTAG: CC1
In case JTDI is used, USB TYPE C should be disconnected.
User need to check that multiplexed signals are not used on both features

Title: USB_TYPEC	
Project: STM32L562E-DK	
Variant: L562QEQ	
Revision: C-01	Reference: MB1373
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SDCARD
Operating range: 2V7<VDD<3V6

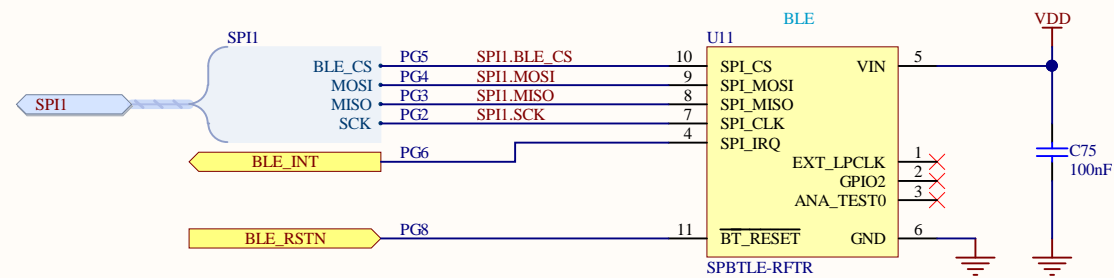


Layout recommendation:
Track should be routed in 50 ohm +/- 15%
Trace lenght below 50mm

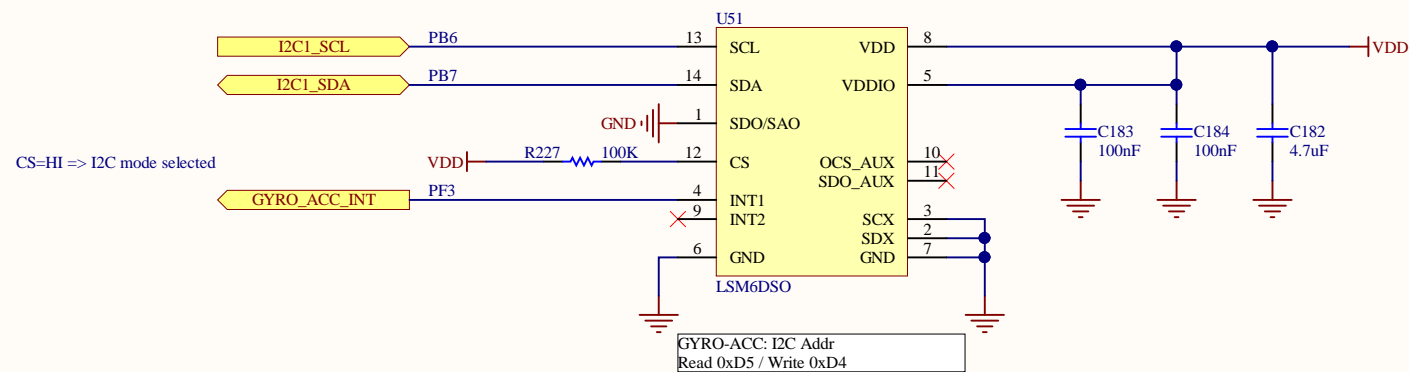
LIMITATION :

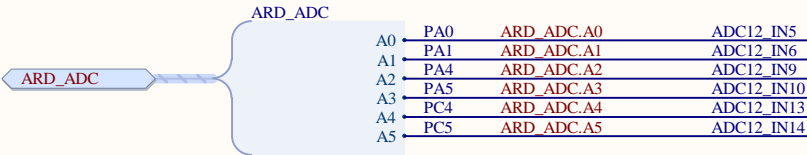
Some SDCARD signals are multiplexed with PMOD / STMOD+
In case SDCARD is plugged, PMOD / STMOD+ signals can be disconnected.
Or user need to check that multiplexed signals are not used on both features simultaneously.

BLE
Operating range: 1V7<VDD<3V6

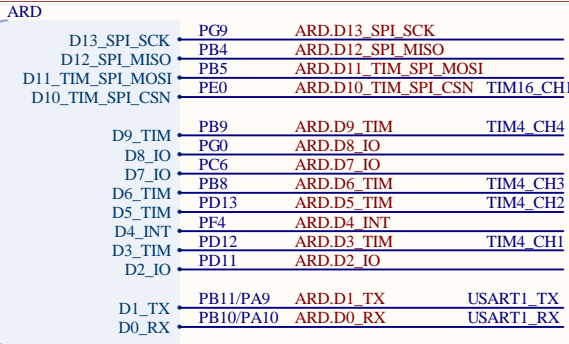


3D ACCELEROMETER & GYROSCOPE
Operating range: 1V7<VDD<3V6
Operating range: 1V62<VDDIO<3V6





ARD

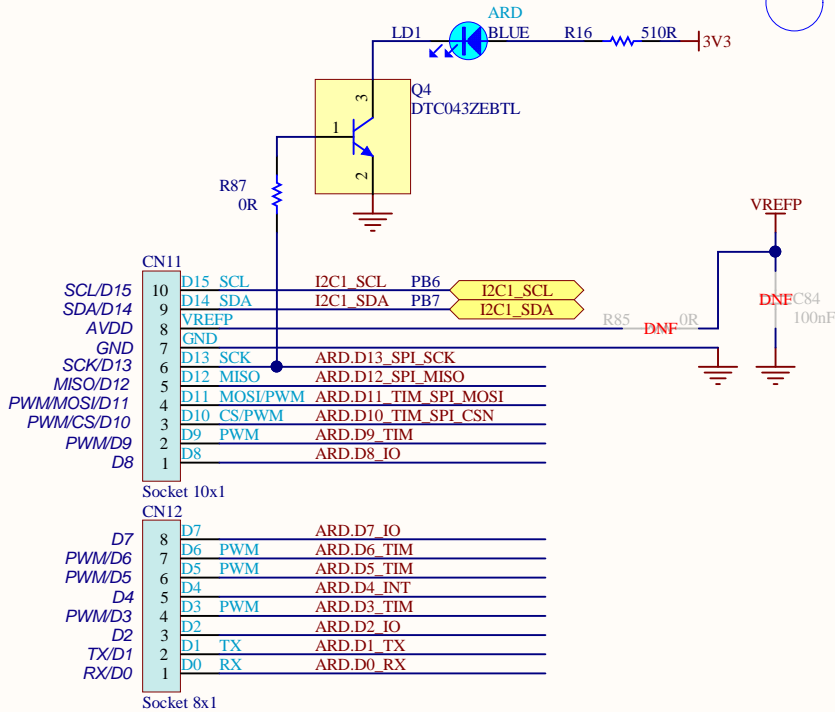
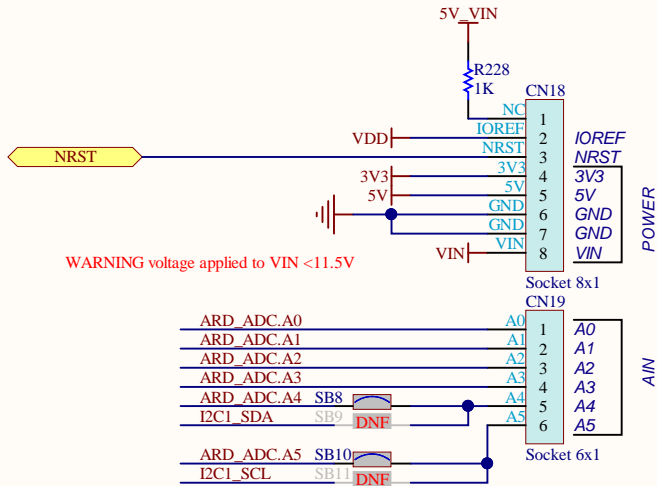


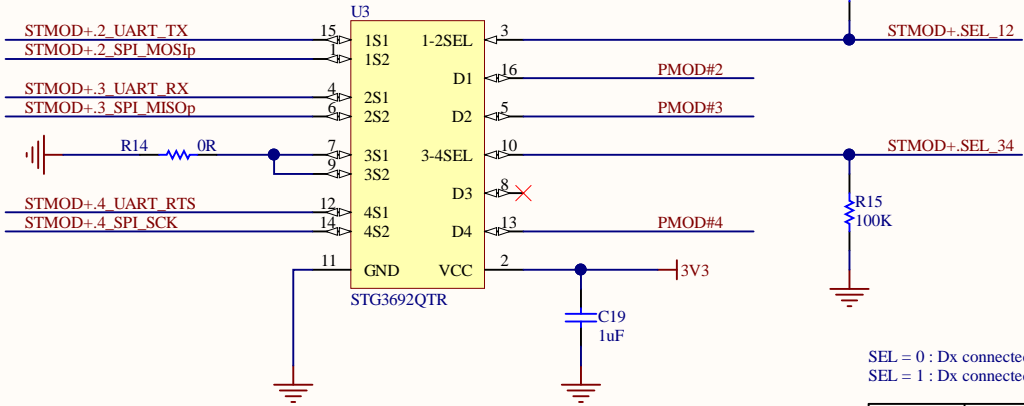
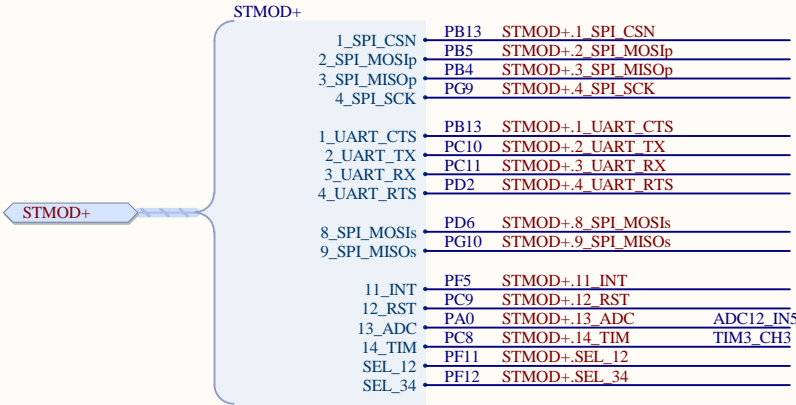
LIMITATION :

Some ARDUINO signals are multiplexed with UCPD: A2/D11
In case ARDUINO SHIELD is plugged, UCPD signals must be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

Some ARDUINO signals are multiplexed with STMOD+ signals: A0
In case ARDUINO SHIELD is plugged, STMOD+ must be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

SPI_MISO, SPI_MOSI and SPI_SCLK can be used simultaneously.

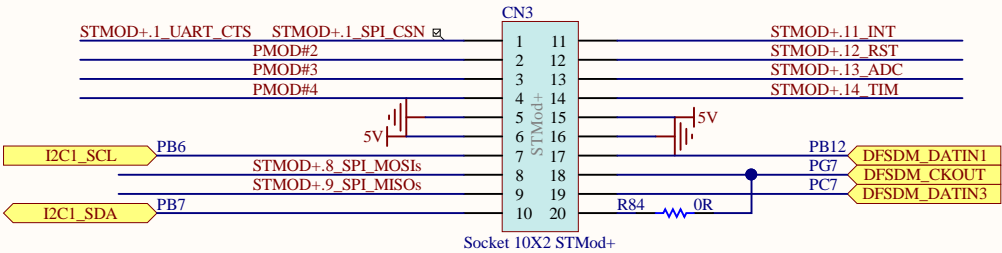




SEL = 0 : Dx connected to xS2
SEL = 1 : Dx connected to xS1

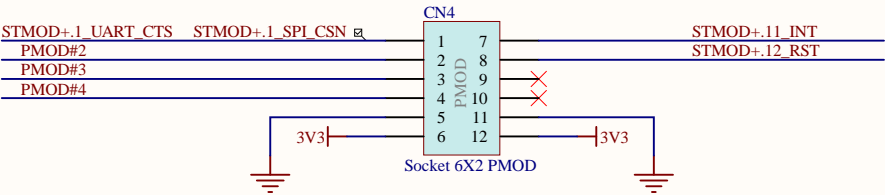
	SPI	SPI/UART (*)	UART
STMOD+ 1-2SEL	0	1 (*)	1
STMOD+ 3-4SEL	0	0 (*)	1
PMOD#1	NSS	NSS	CTS
PMOD#2	MOSIp	TX	TX
PMOD#3	MISOp	RX	RX
PMOD#4	SCK	SCK	RTS

STMOD+



IF DFSDM IS USED ON STMOD+ MODULE
FIT JP1 TO CONNECT DFSDM TO STMOD+
AND DO NOT PLUG MODULE ON CN2

PMOD



LIMITATION :

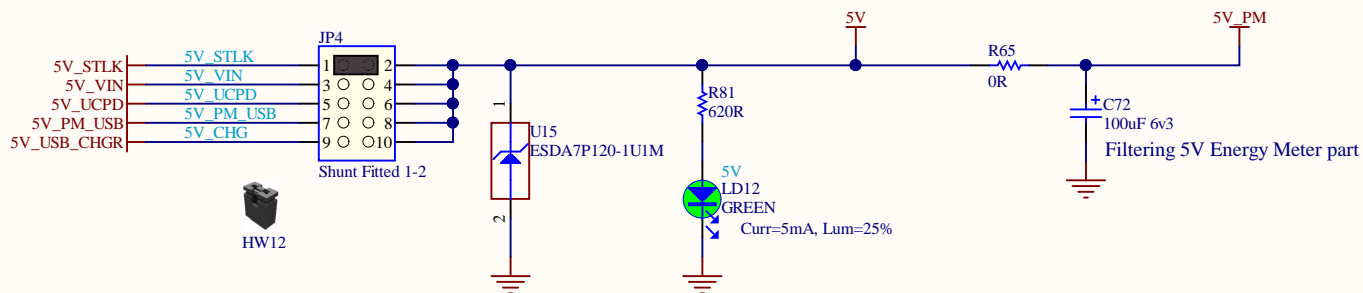
Some SDCARD signals are multiplexed with PMOD / STMOD+
In case SDCARD is plugged, PMOD / STMOD+ signals can be disconnected.
Or user need to check that multiplexed signals are not used on both features simultaneously.

Some ARDUINO signals are multiplexed with PMOD / STMOD+ signals:
In case ARDUINO SHIELD is plugged, STMOD+ must be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

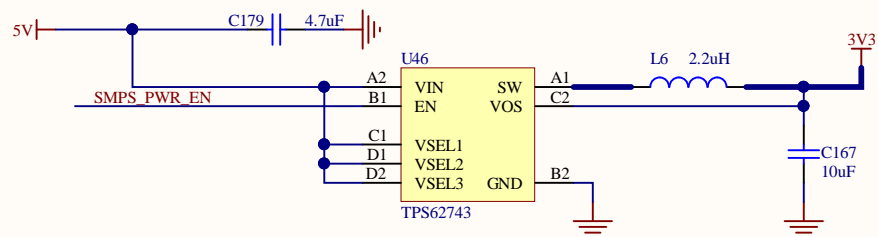
SPI_MISO, SPI_MOSI and SPI_SCLK can be used simultaneously.



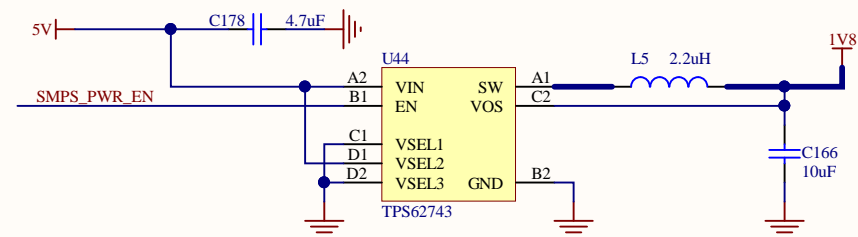
5V PWR SOURCE SELECTION



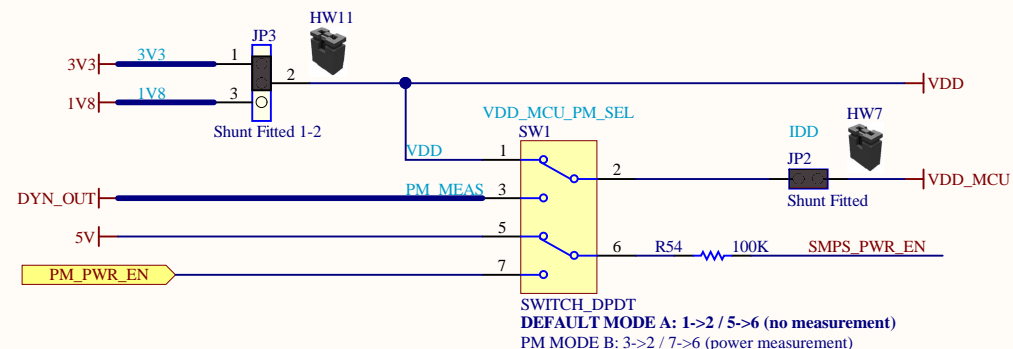
3V3 PWR SOURCE: 3V3 / 300mA



1V8 PWR SOURCE: 1V8 / 300mA

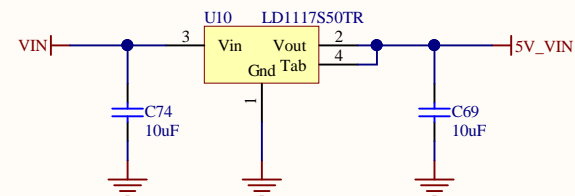


VDD PWR SOURCE SELECTION: 1V8 / 3V3 / DYN OUT

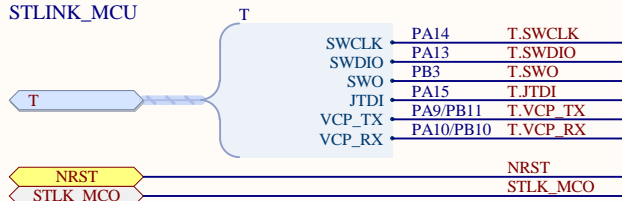


DYN_OUT is the supply used for current measurement
When DYN_OUT is used, VDD should be align for IO compatibility 1V8 / 3V3
When DYN_OUT is used on CN20 (external power measurement) SW1 should be set in mode A

VIN FROM ARDUINO up to 12V: OUTPUT 5V / Up to 800mA (depend of VIN)



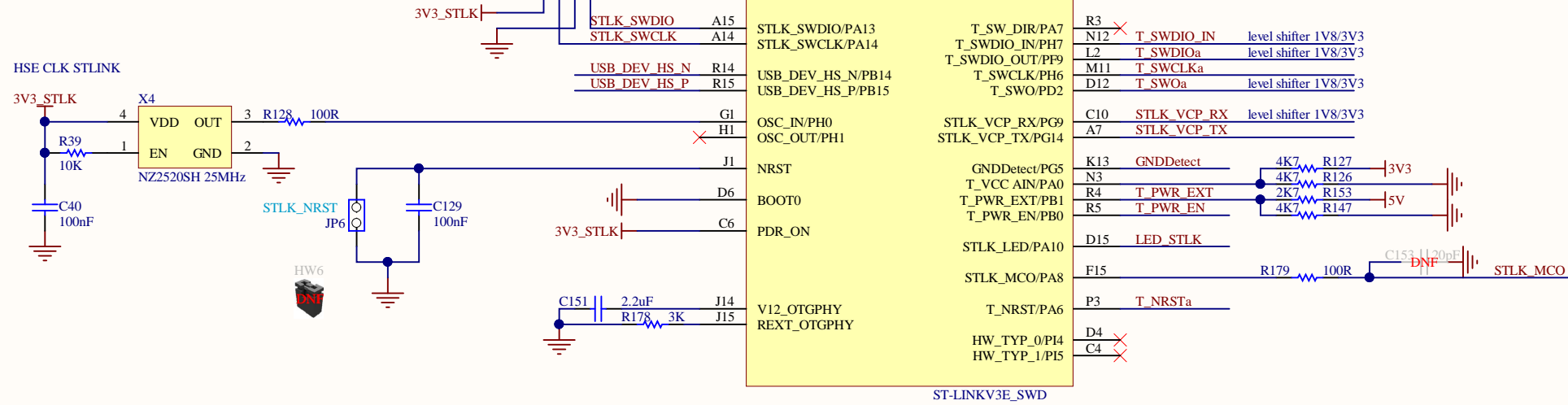
STLINK_MCU



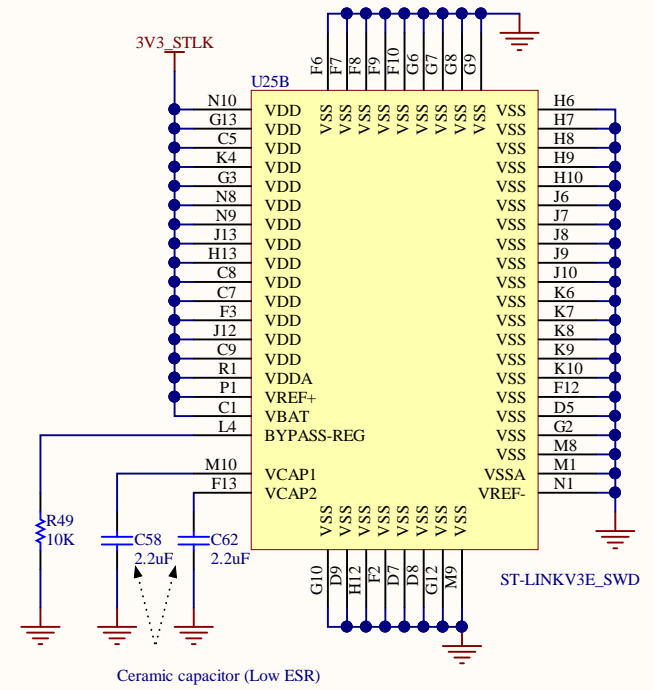
LIMITATION :

Some JTAG signals are multiplexed with UCPD: T_JTDI
In case JTDI is plugged, USB TYPE C connector should be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

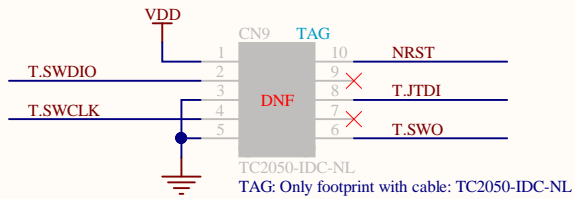
Connector must be on the border of the PCB



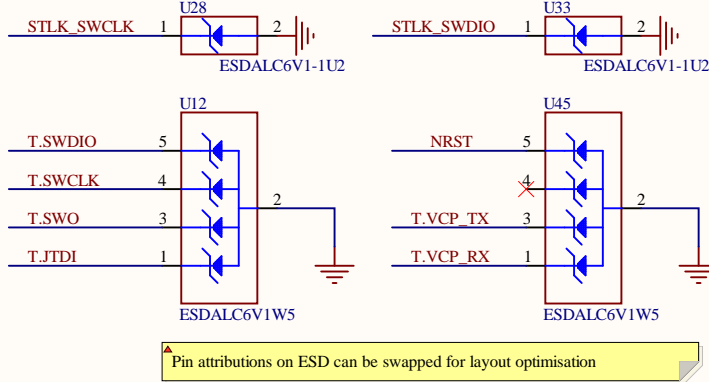
ST-LINK POWER



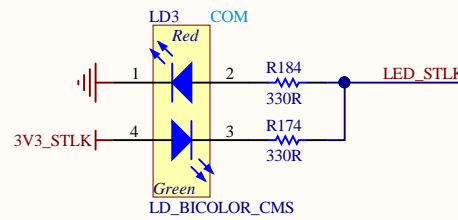
TAG CONNECTOR



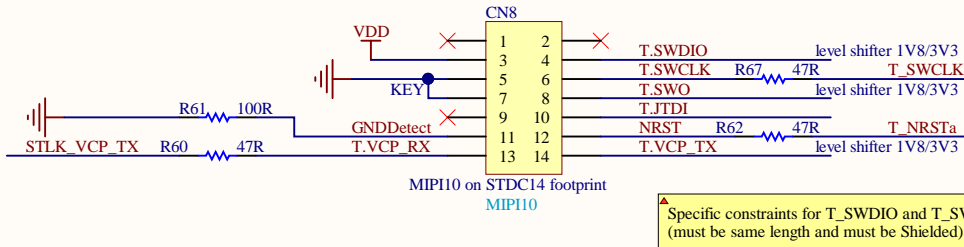
ESD PROTECTIONS



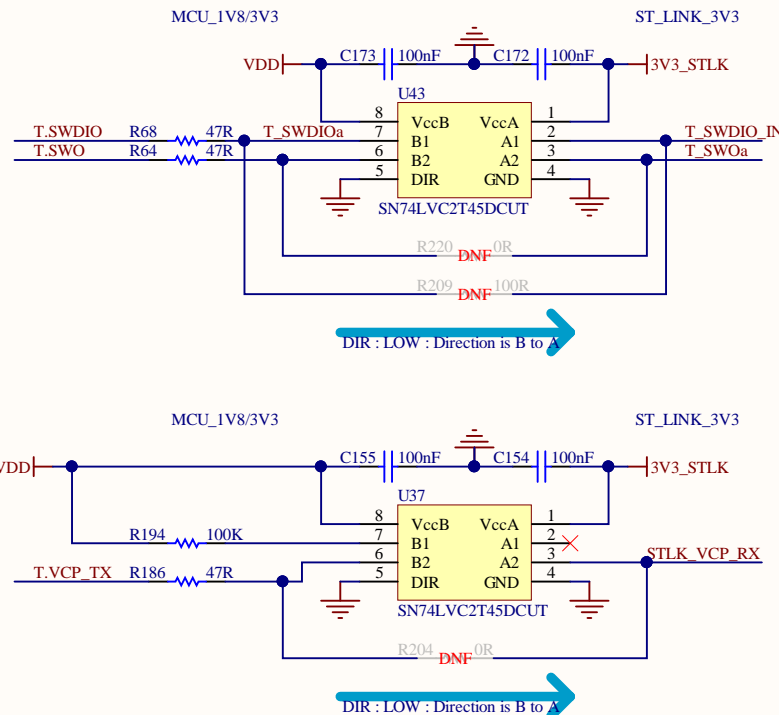
LED STLK



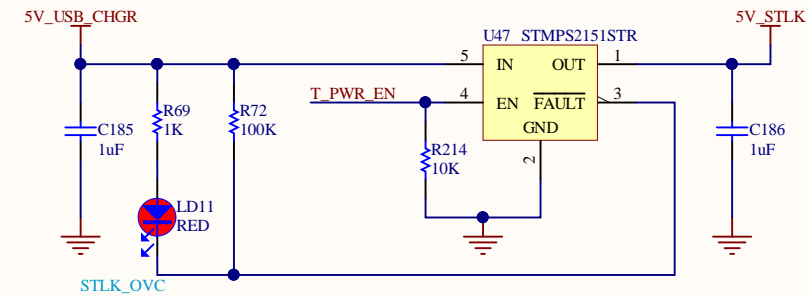
STDC14 RECEIVER



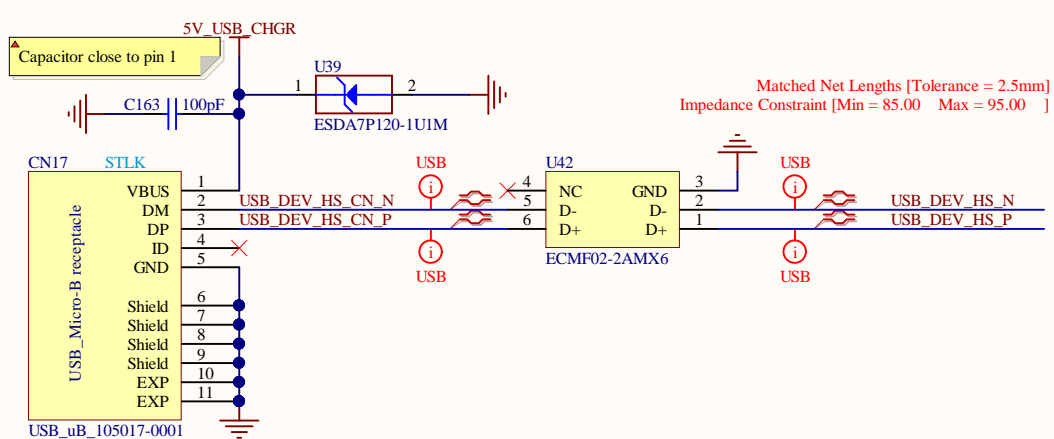
SW LEVEL SHIFTER FOR MCU_IV8



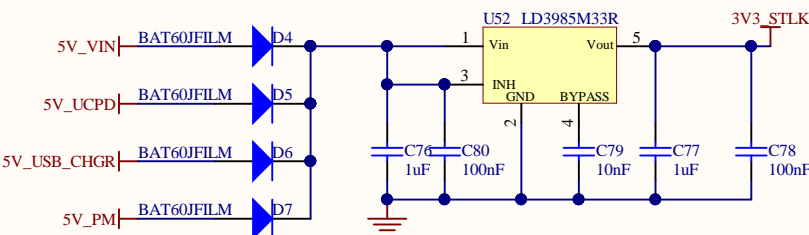
5V ST-LINK PROTECTION

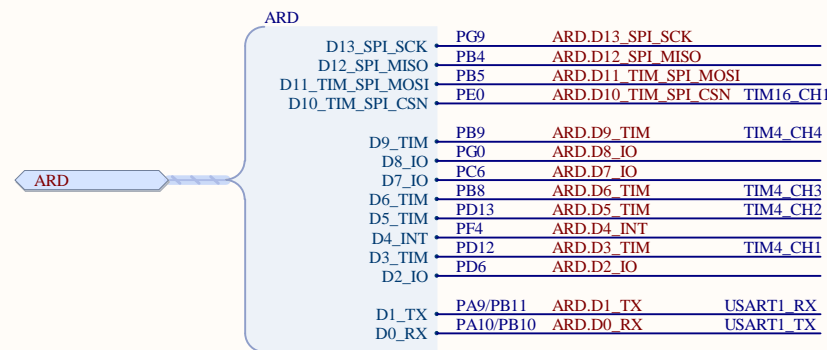
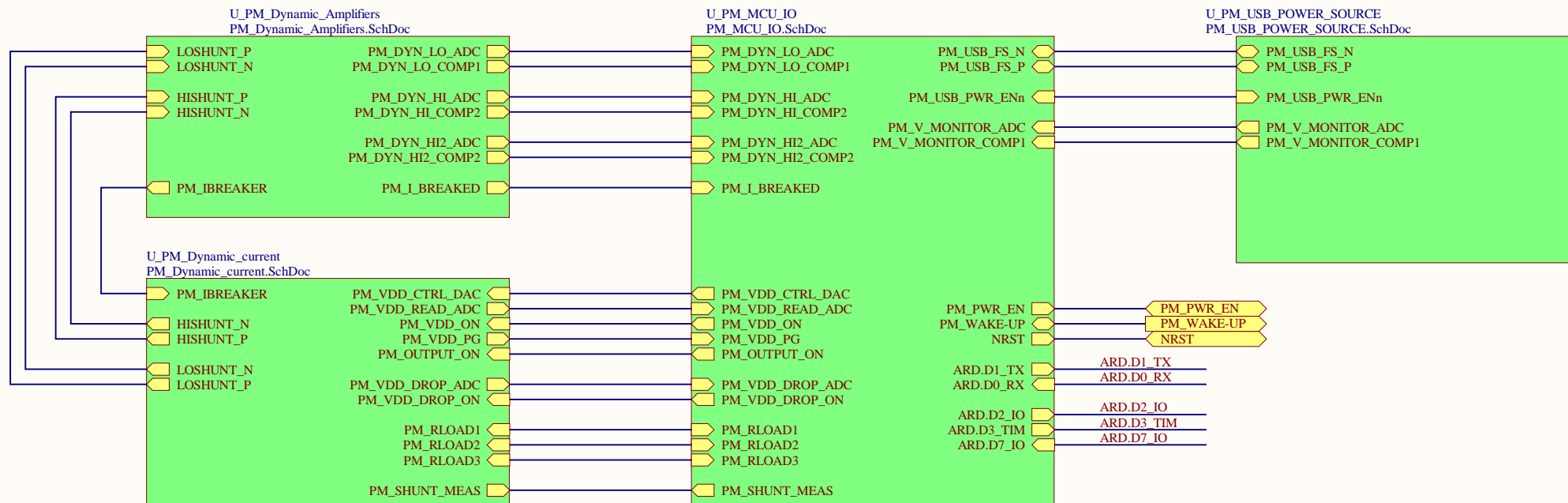


ST-LINK USB CONNECTOR



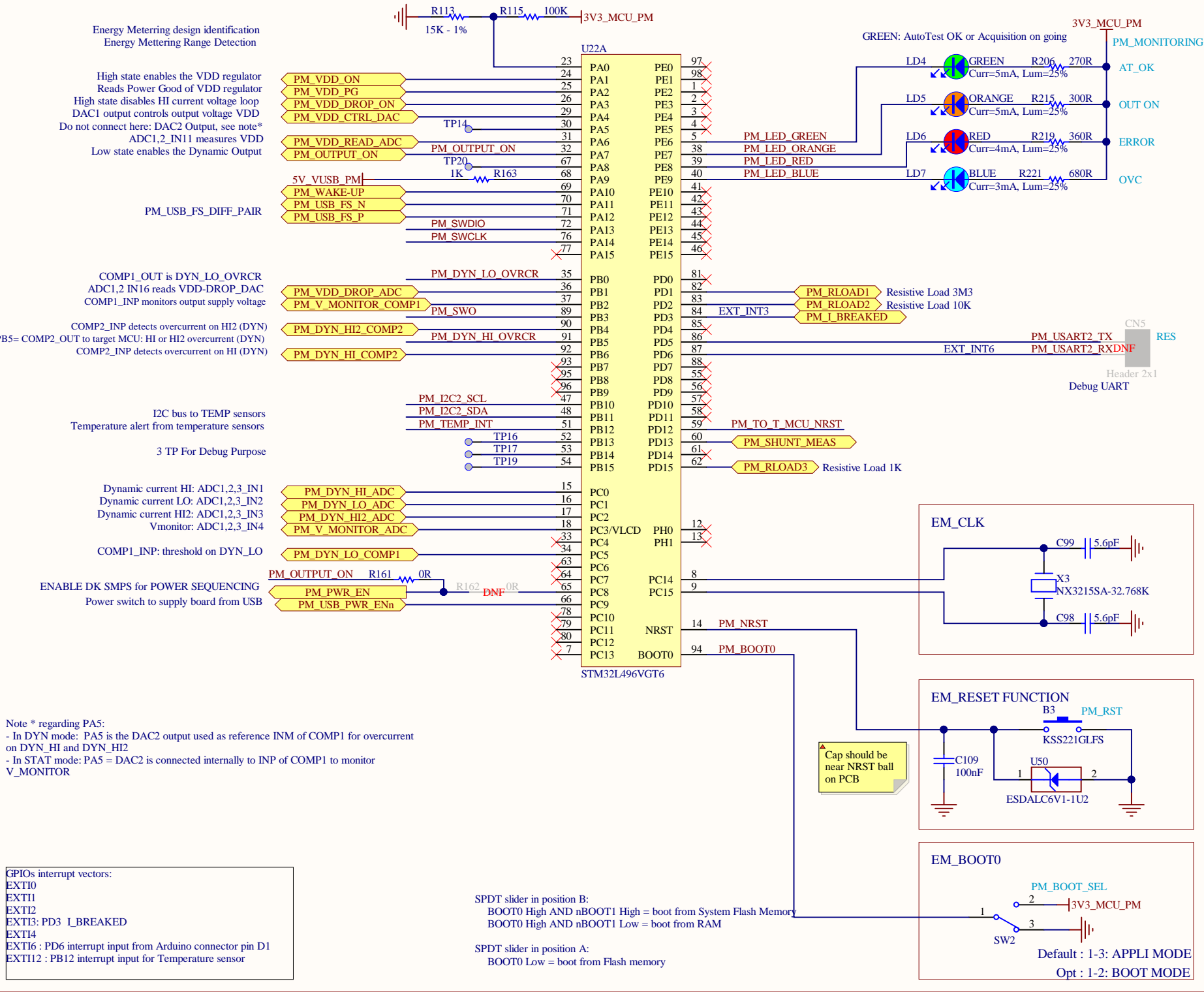
ST-LINK POWER 3V3 / 150mA



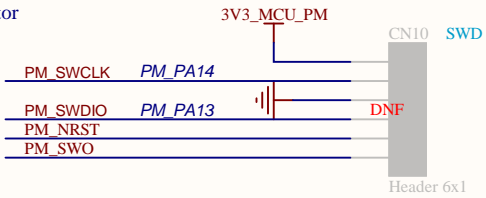


PATENT PENDING

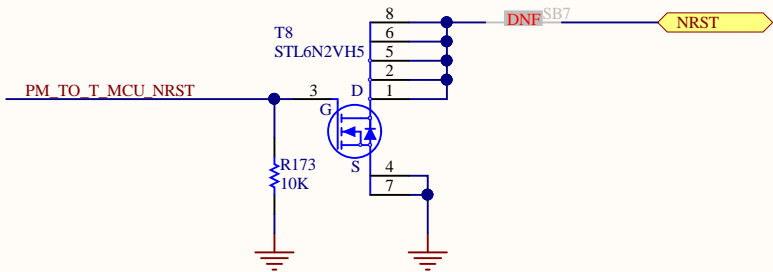
EM_MCU_IO



Programming and debug connector

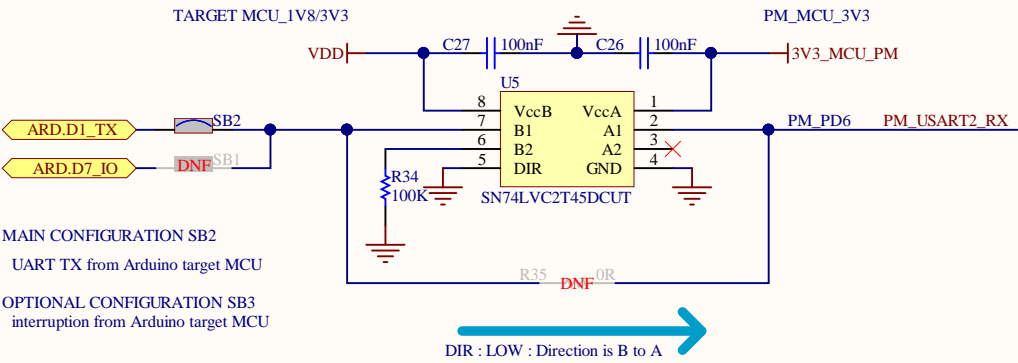


TARGET MCU RESET

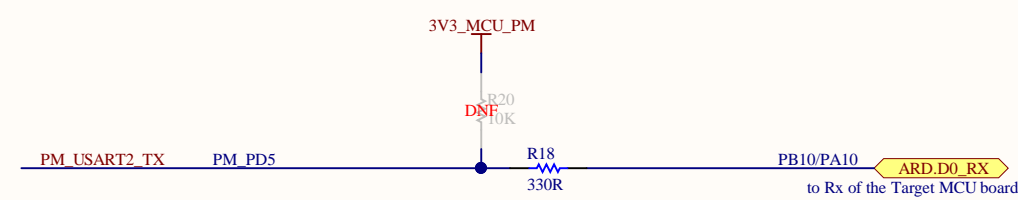


UART LINK BETWEEN PM AND TARGET MCU

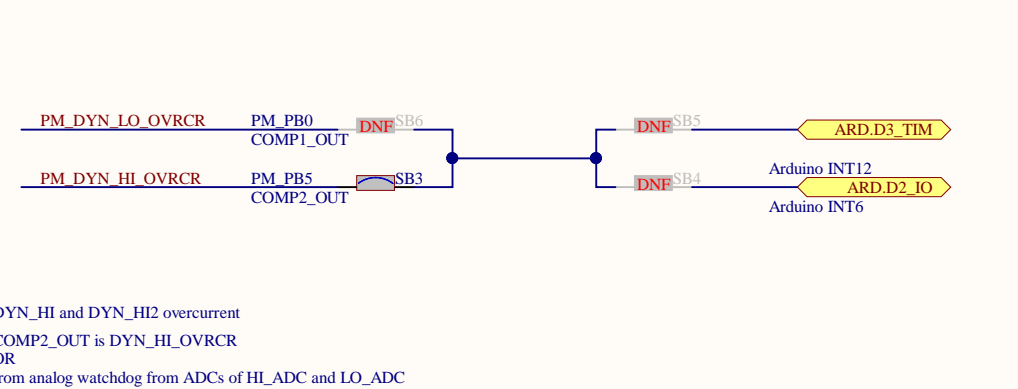
TARGET TX to PM RX: need LS for 1V8 mode



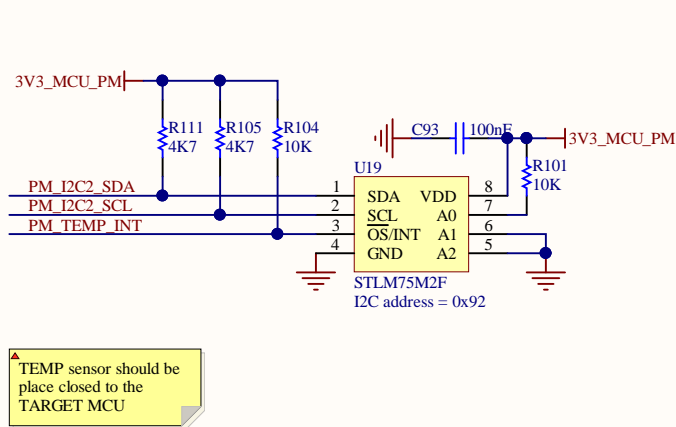
TARGET RX from PM TX: No need LS for 1V8 mode



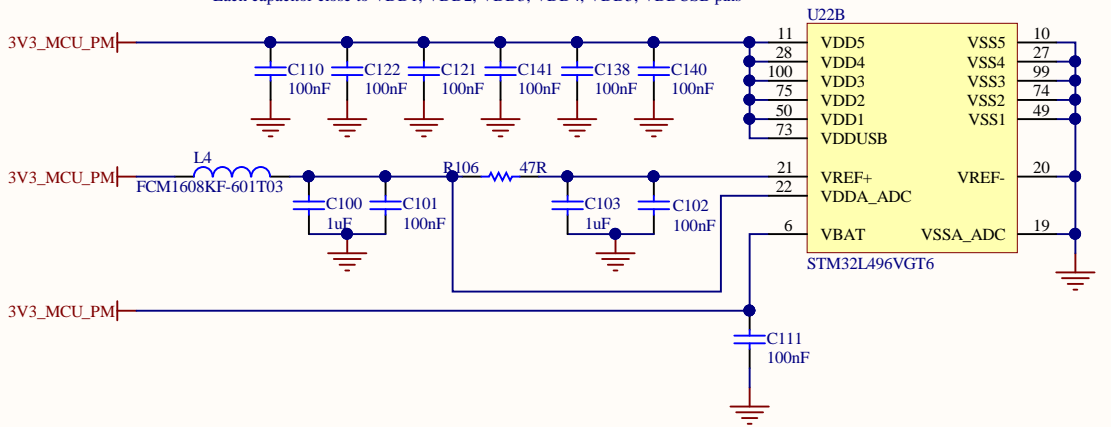
IT to target MCU for Overconsumption Detection



TEMPERATURE SENSOR

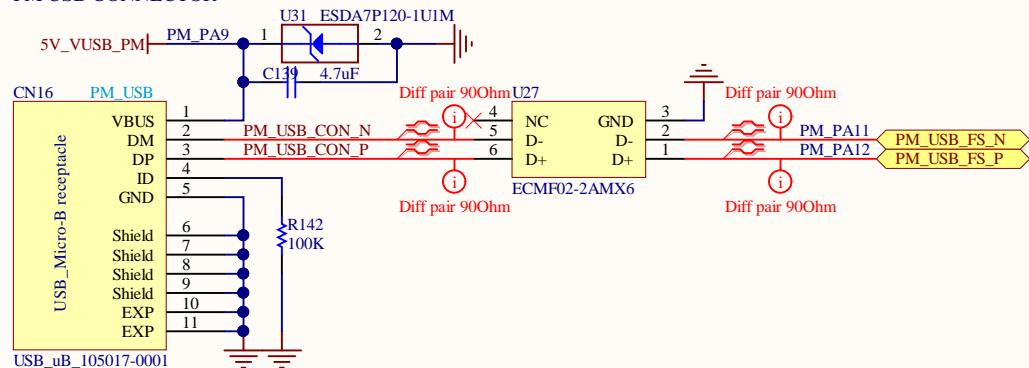


PM_MCU_DECAPS

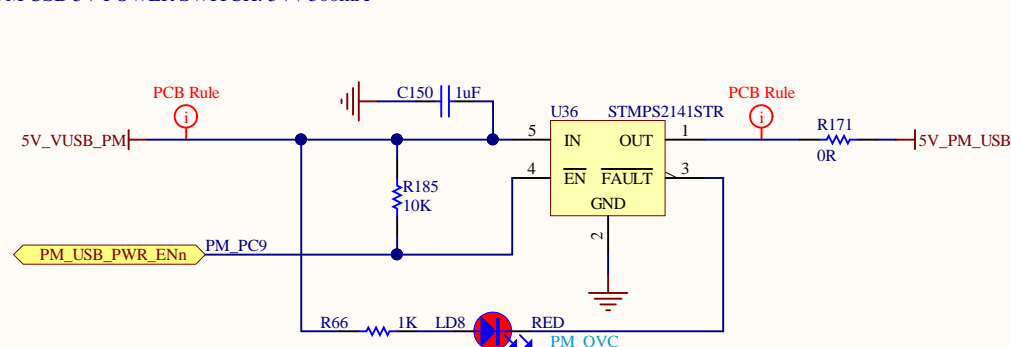


PATENT PENDING

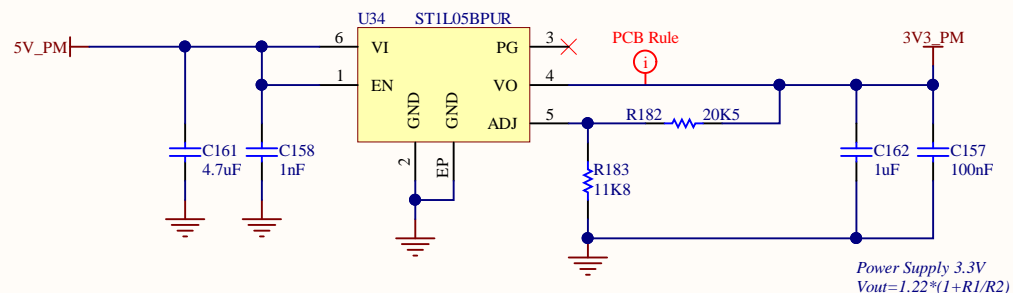
PM USB CONNECTOR



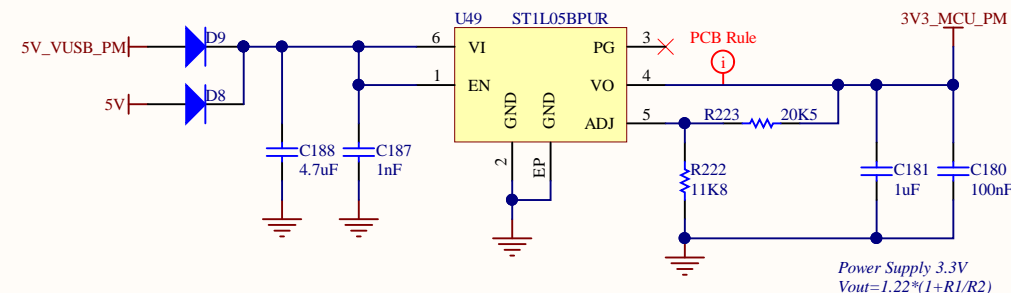
PM USB 5V POWER SWITCH: 5V / 500mA



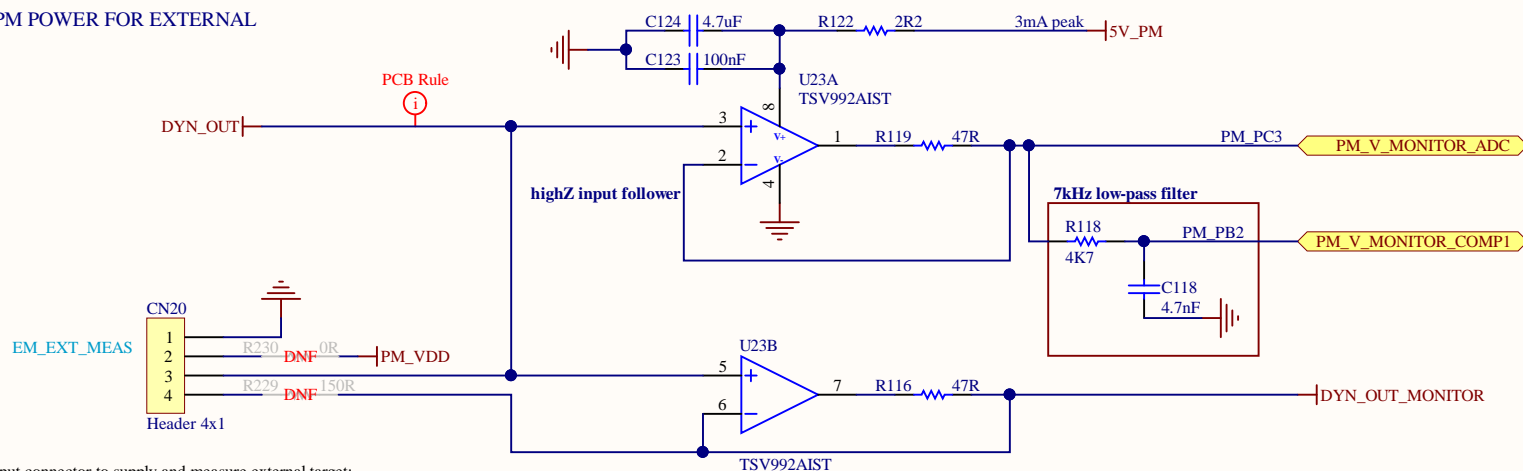
PM POWER: 3V3 / 1A3



PM POWER: 3V3 / 1A3



PM POWER FOR EXTERNAL



Output connector to supply and measure external target:
PIN 1: GND
PIN 2: Voltage source, current is not measured, it is not a copy of output voltage
PIN 3: Output with current measurement
PIN 4: Output voltage copy with 150Ω protection serial resistor, current is not measured

Power supply details:

5V_VUSB_PM: 5V directly from PM USB connector.

5V_PM: 5V supply from USB power switch output


3V3_MCU_PM: supplies the PM MCU STM32L4 only, independently of the other parts of the board.

This is available as soon as one of the 5V source is present. It is supposed to drain less than 100mA on VUSB.

3V3_PM: 3V3 for the other part of PM part excepting the STM32L4

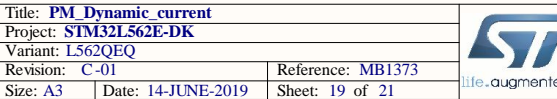
PM_VDD: output of the programmable regulator for Power Measurement.

PM_VDD give DYN_OUT to supplies the target MCU and make current measurement

Title: PM_USB_POWER_SOURCE		 life.augmented
Project: STM32L562E-DK		
Variant: L562QEQ		
Revision: C-01	Reference: MB1373	
Size: A4	Date: 14-JUNE-2019	
Sheet: 18 of 21		

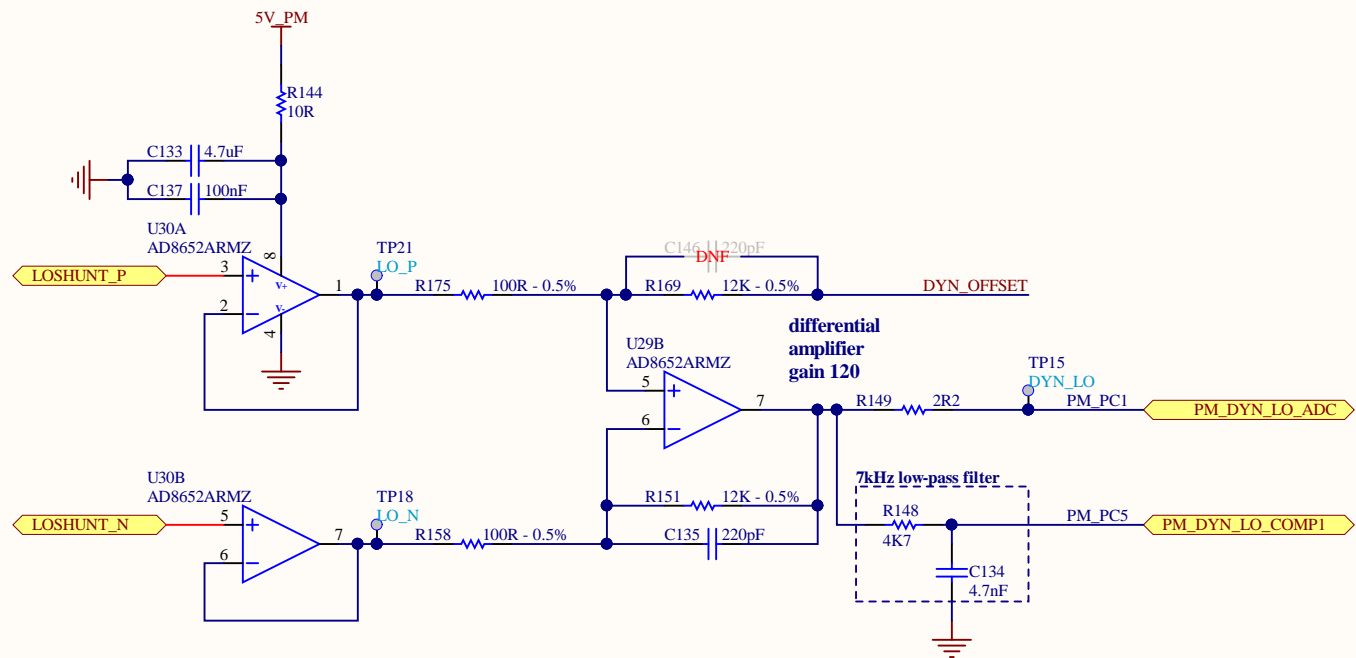
PATENT PENDING

PATENT PENDING



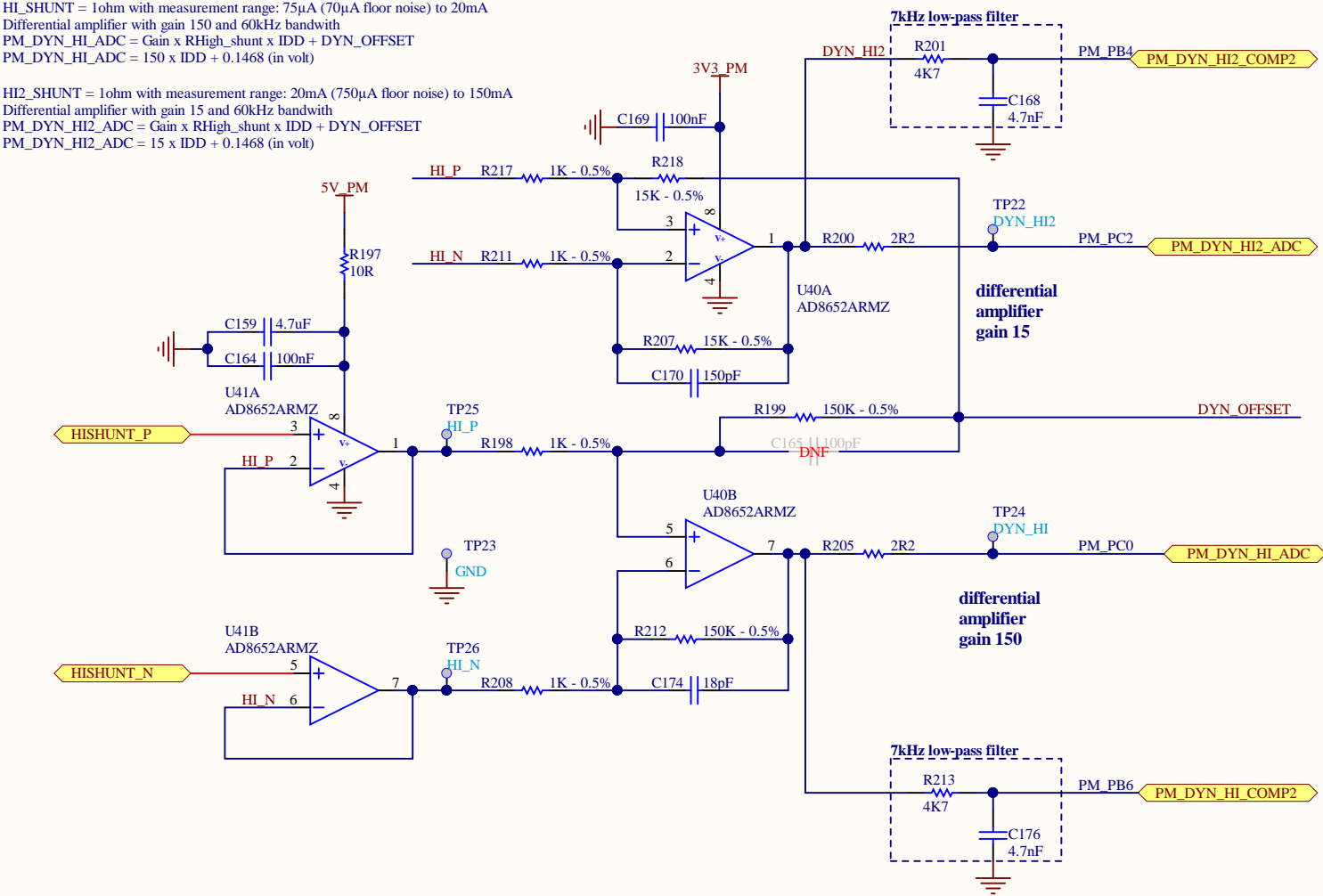
LOW CURRENT RANGE MEASUREMENTS

LO_SHUNT = 330ohm with measurement range: 300nA (300nA floor noise) to 75µA
Differential amplifier with gain 120 and 60kHz bandwidth
PM_DYN_LO_ADC = Gain x Rlow_shunt x IDD + DYN_OFFSET
PM_DYN_LO_ADC = 39600 x IDD + 0.1468 (in volt)



HIGH CURRENT RANGE MEASUREMENTS

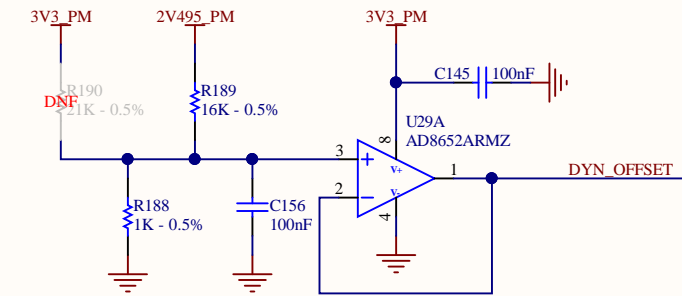
HI_SHUNT = 1ohm with measurement range: 75µA (70µA floor noise) to 20mA
Differential amplifier with gain 150 and 60kHz bandwidth
PM_DYN_HI_ADC = Gain x RHigh_shunt x IDD + DYN_OFFSET
PM_DYN_HI_ADC = 150 x IDD + 0.1468 (in volt)



DC OFFSET GENERATOR

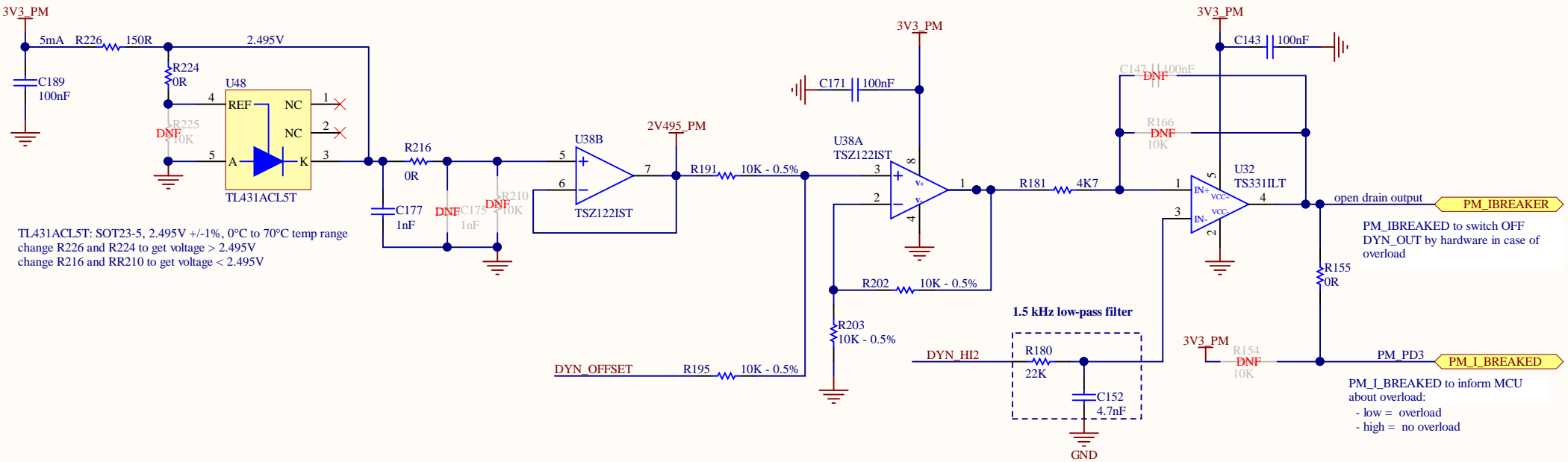
DYN_OFFSET = 146.8mV

DYN_OFFSET used to compensate input offset of DYN_LO and DYN_HI OpAmp
assumption: AD8652 Vio = 0.3mV max; 3xVio/gain = 3x0.3x150=135mV offset voltage min



CIRCUIT BREAKER

166mA overload and short circuit protection



PATENT PENDING

HW1

BOARD QR CODE

QR code

HW2

BOARD CPN

Board CPN

HW10

PCB

MB1373C

HW5


LOGO ST


HW3


LOGO CE


HW4

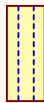
LOGO ROHS

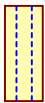

H1

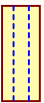

H2



H3

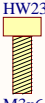

H4

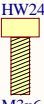

HW14
D4.5x12



HW20
D4.5x12



HW21
D4.5x12

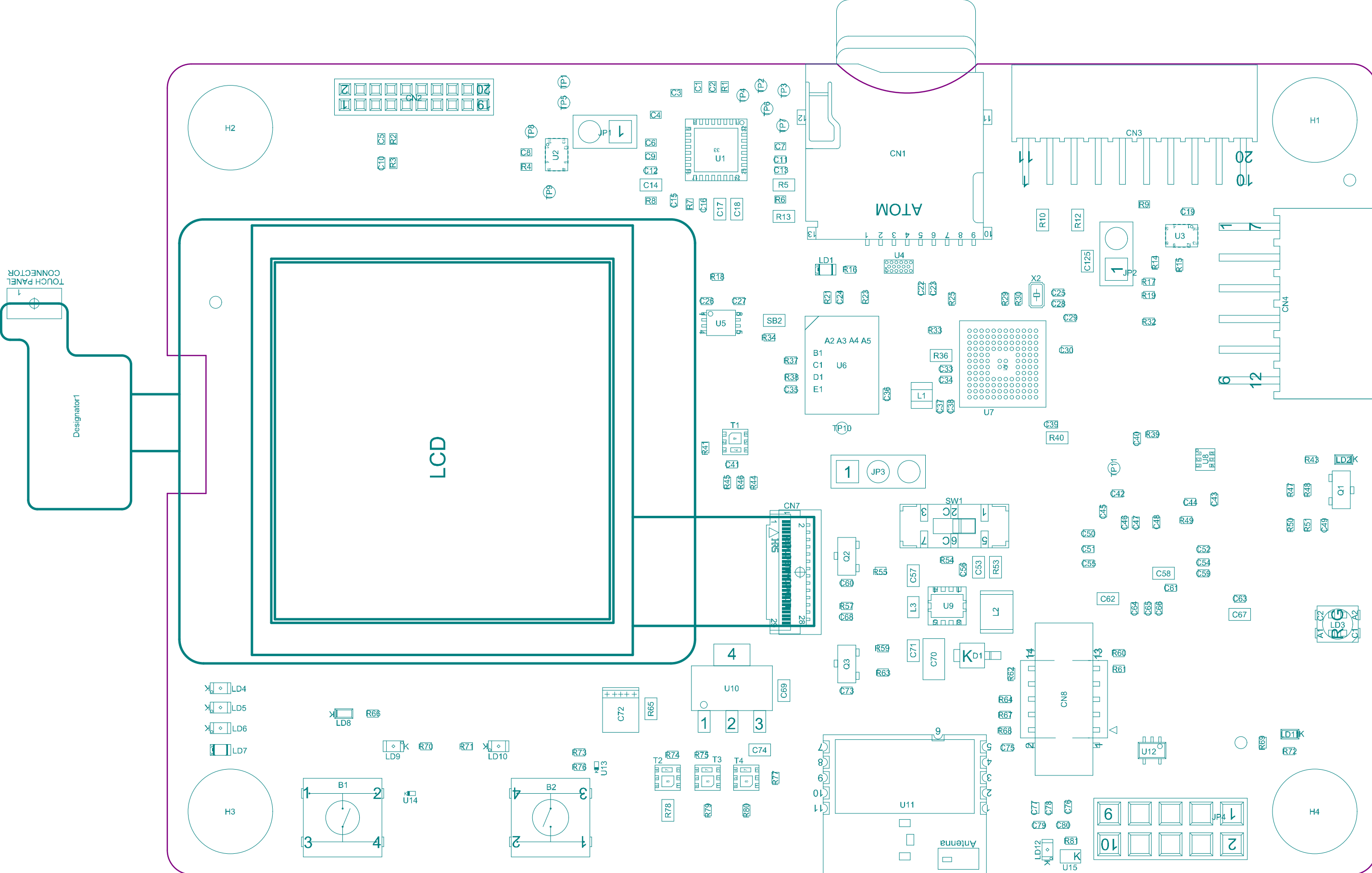

HW22
D4.5x12

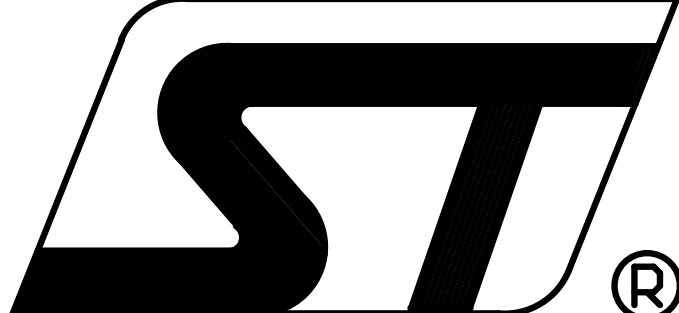

HW23
M3x6

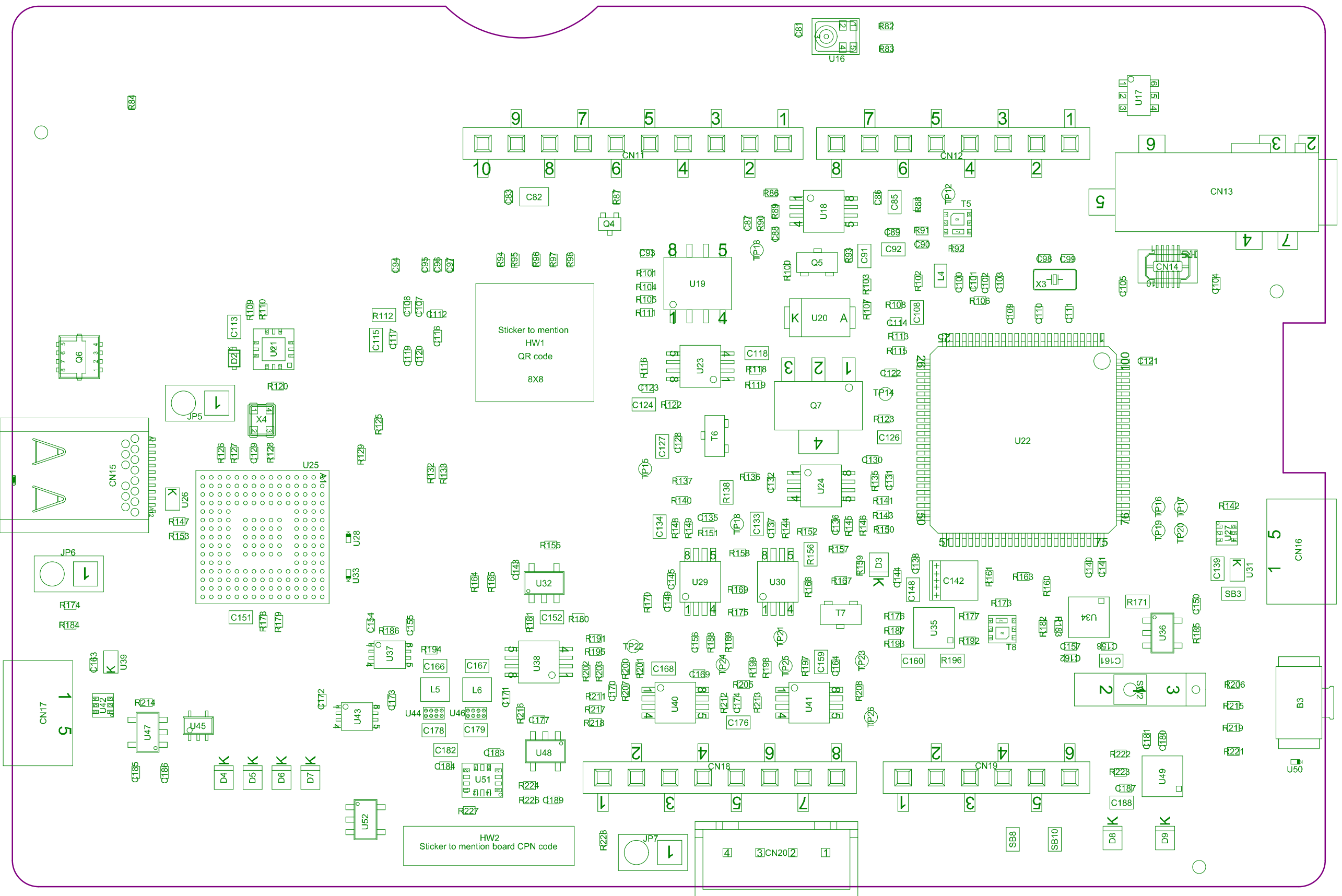

HW24
M3x6


HW25
M3x6


HW26
M3x6



Project: STM32L562E-DK		
Layer: M14-Top Assembly	Gerber: .GM14	
Variant: L562QEQ	Ref: MB1373	
Date: 19-JUN-14	Rev: C	



Project: STM32L562E-DK

Layer: M15-Bottom Assembly

Variant: L562QEQ

Date: 19-JUN-14

Gerber:.GM15

Ref: MB1373

Rev: C



