

STM32L562E-DK

MB1373

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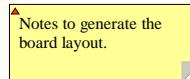
U_MB1373_TOP
MB1373_TOP.SchDoc

Legend

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

Text to be added to silkscreen.

Warning text.

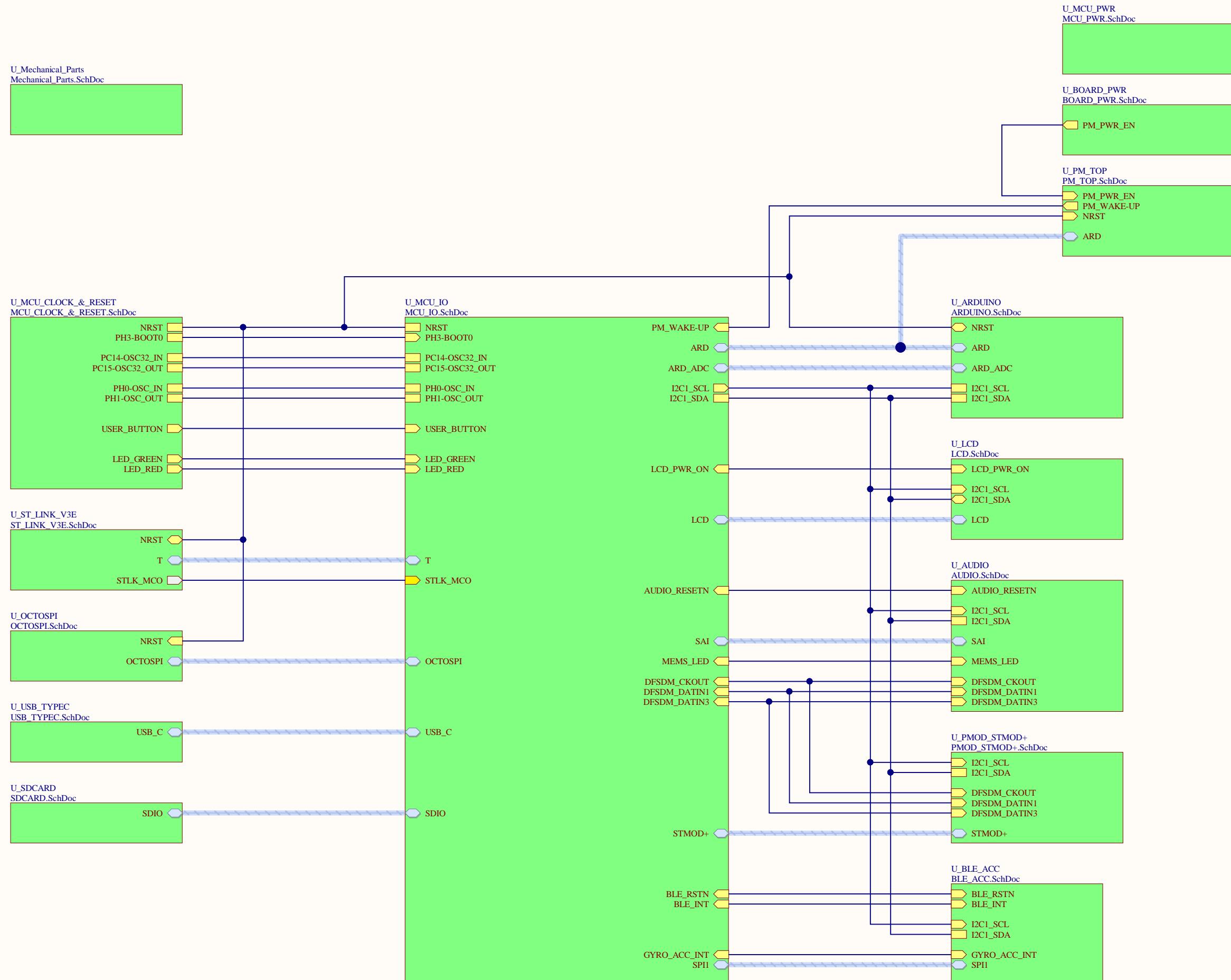


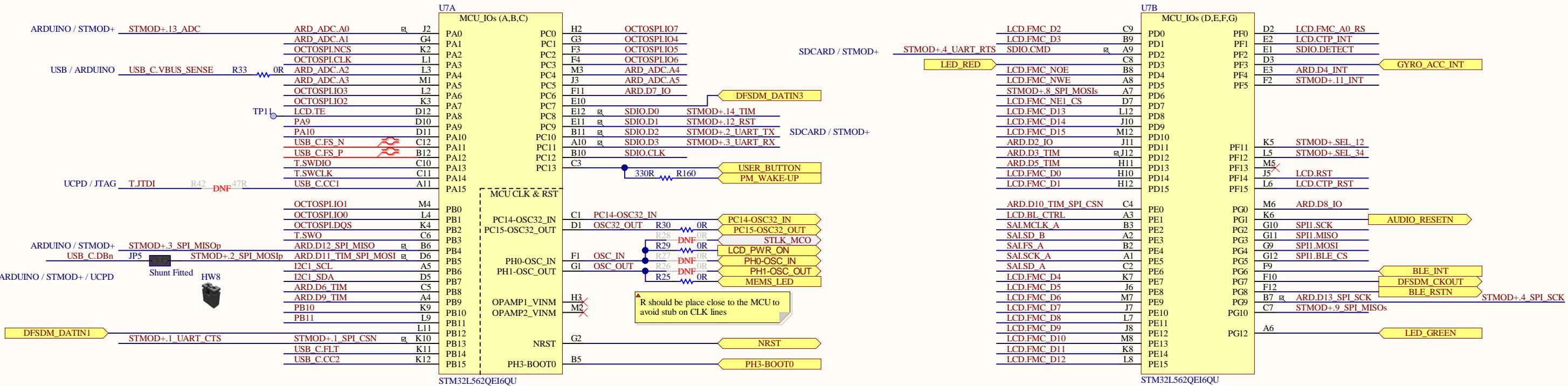
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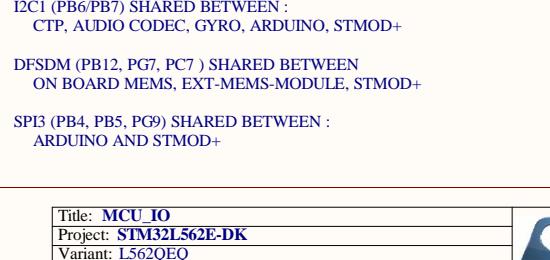
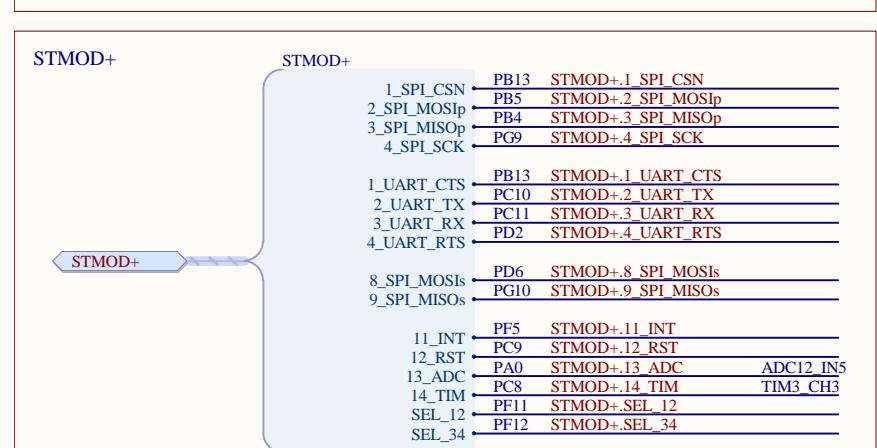
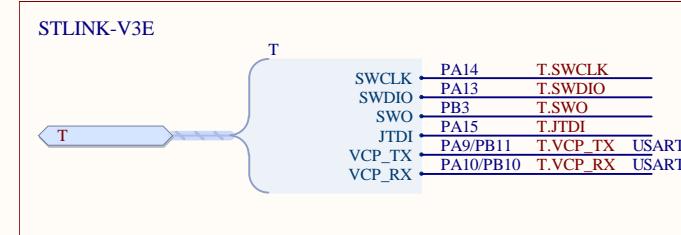
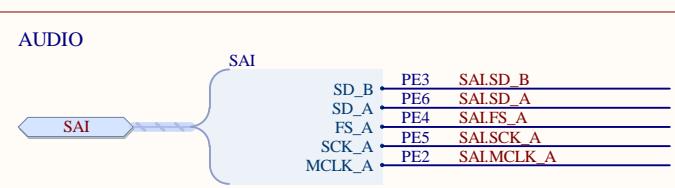
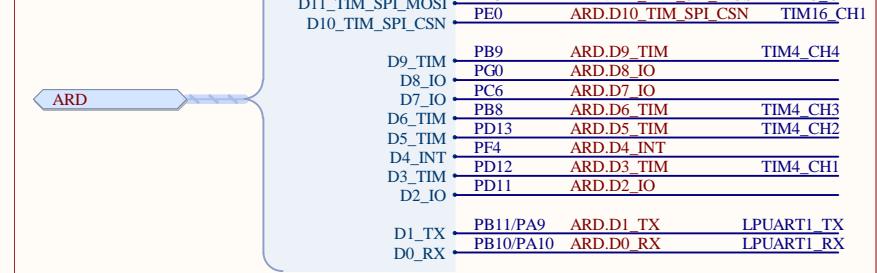
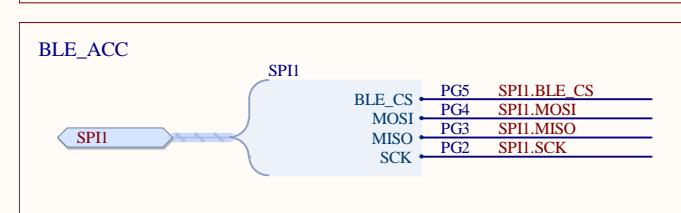
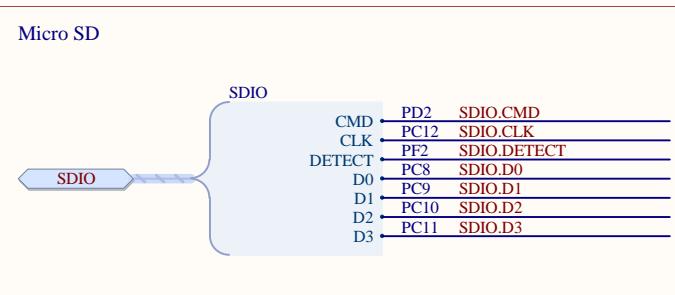
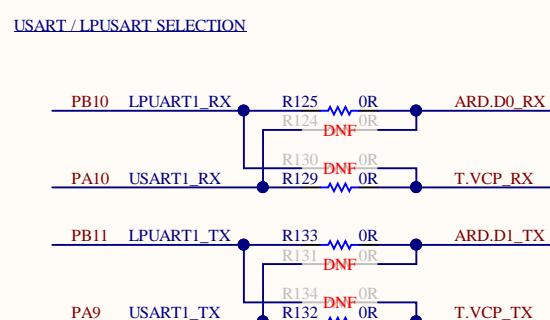
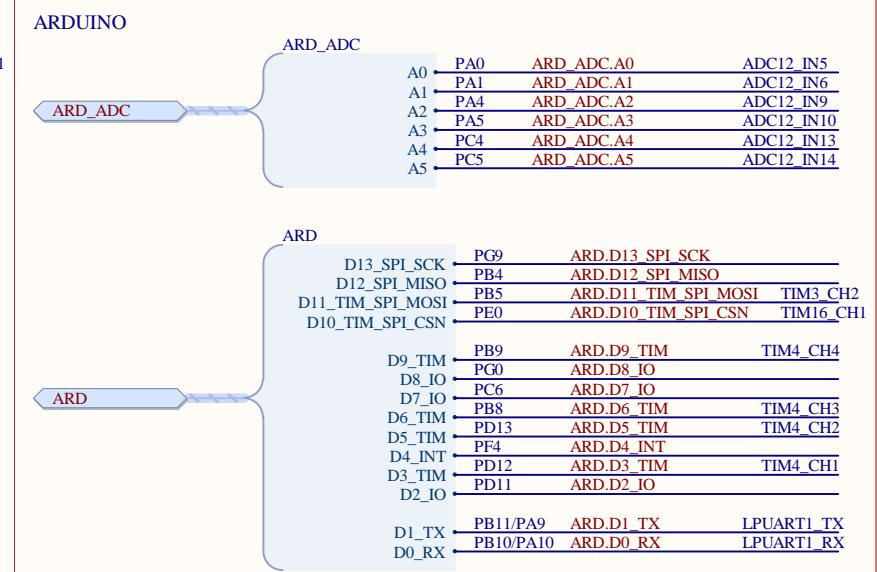
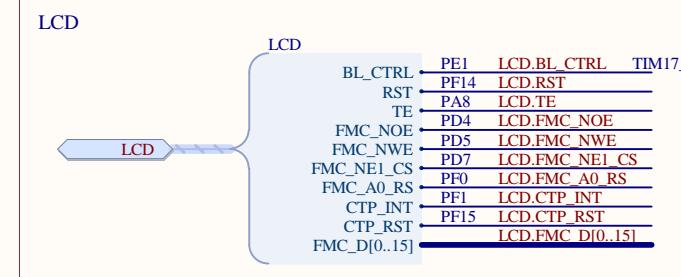
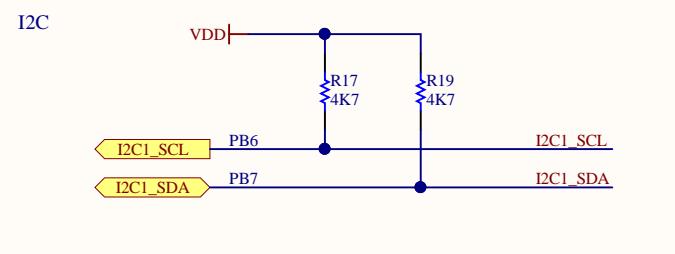
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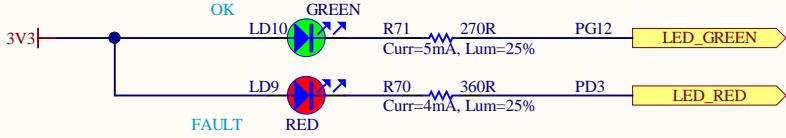


IT TABLE

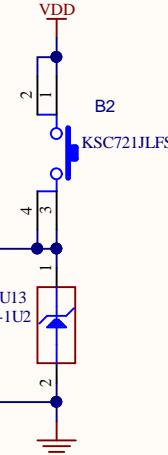
INT1 - PF1 - LCD-TOUCH-PANEL
 INT2 - PF2 - SDCARD-DETECT
 INT3 - PF3 - GYRO-ACCELEROMETER
 INT4 - PF4 - ARDUINO
 INT5 - PF5 - PMOD/STMOD+
 INT11 - PD11 - Power Measurement / ARD.D2_IO
 INT12 - PD12 - Power Measurement / ARD.D3_TIM
 INT13 - PC13 - USER_BUTTON or ENERGY METER WAKE-UP



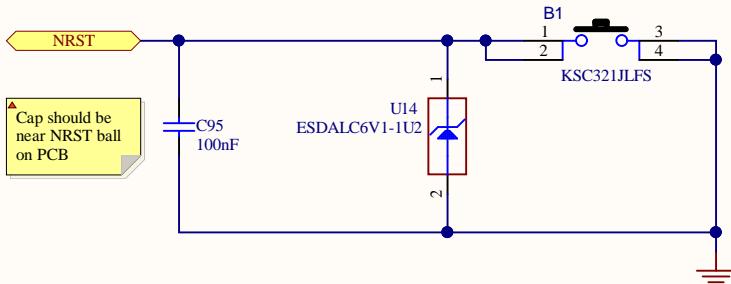
USER LEDs



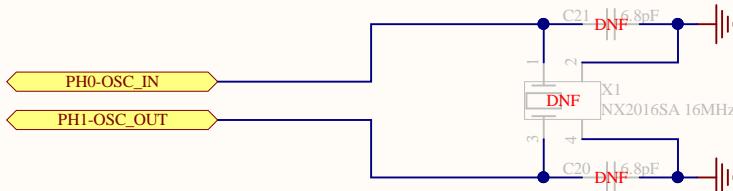
USER BUTTON



RESET FUNCTION



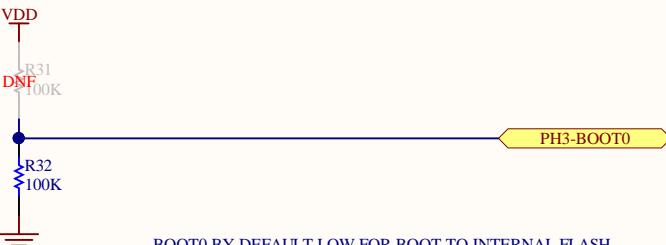
EXTERNAL HSE CLK



EXTERNAL LSE CLK



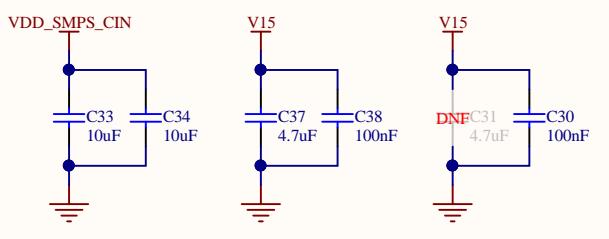
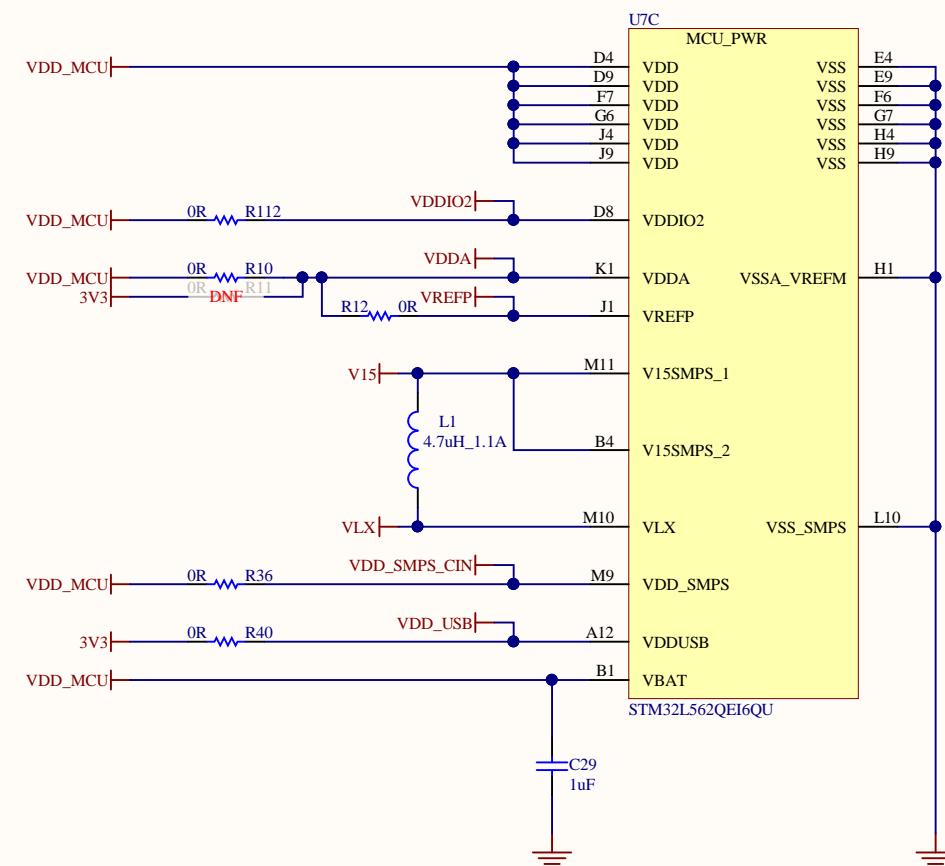
PH3_BOOT0



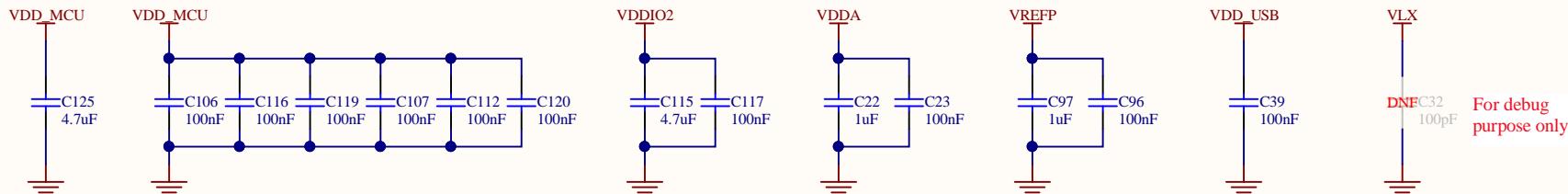
BOOT0 BY DEFAULT LOW FOR BOOT TO INTERNAL FLASH

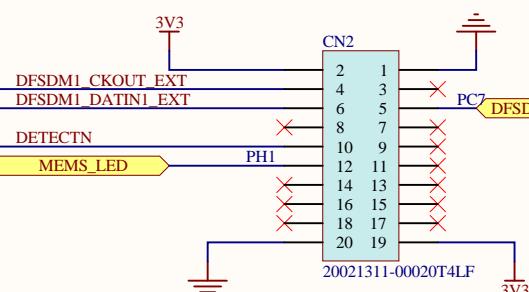
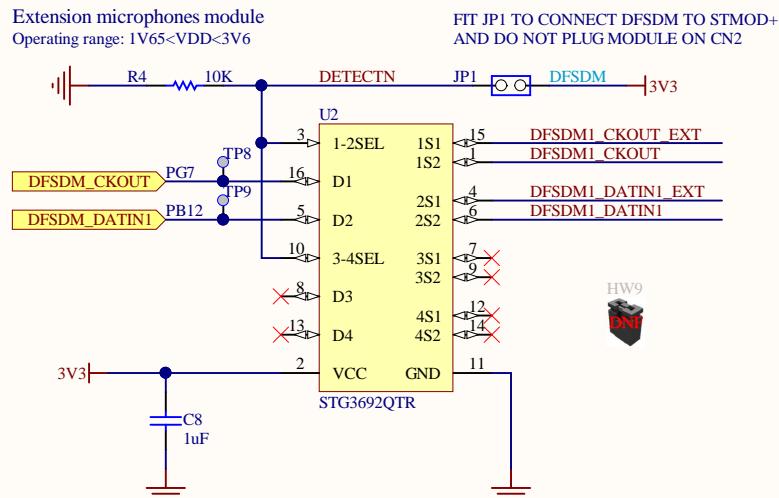
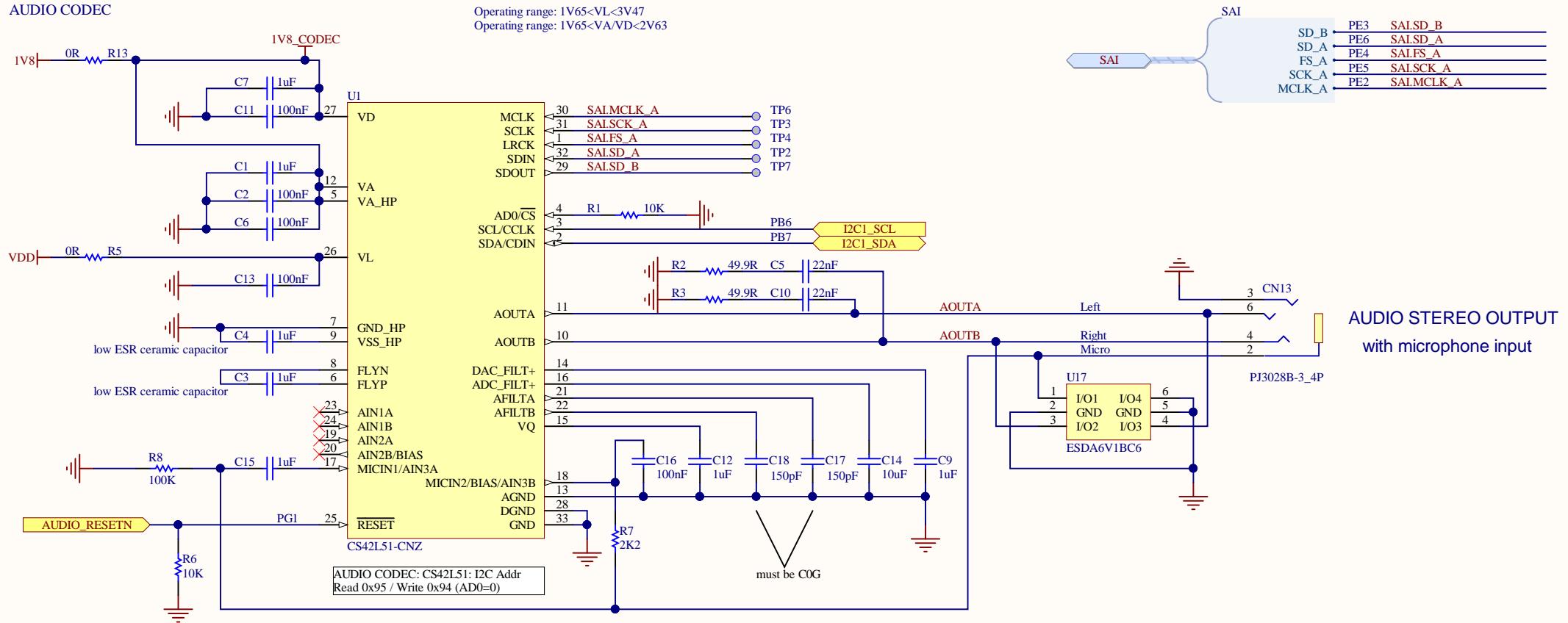
STM32L5xx MCU PWR

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: $1V71 < VDD_SMPS < 3V6$

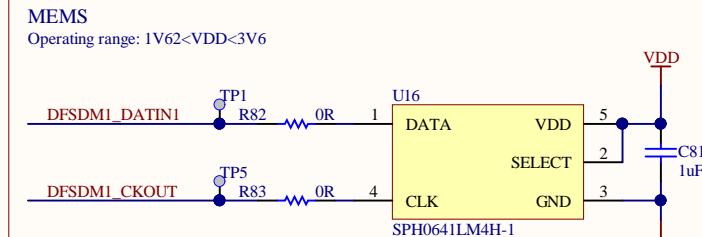


MCU DECAPS
 Ceramic capacitor (Low ESR, ESR<1ohm)





Receptacle connector pin 1 connected to header connector pin 2



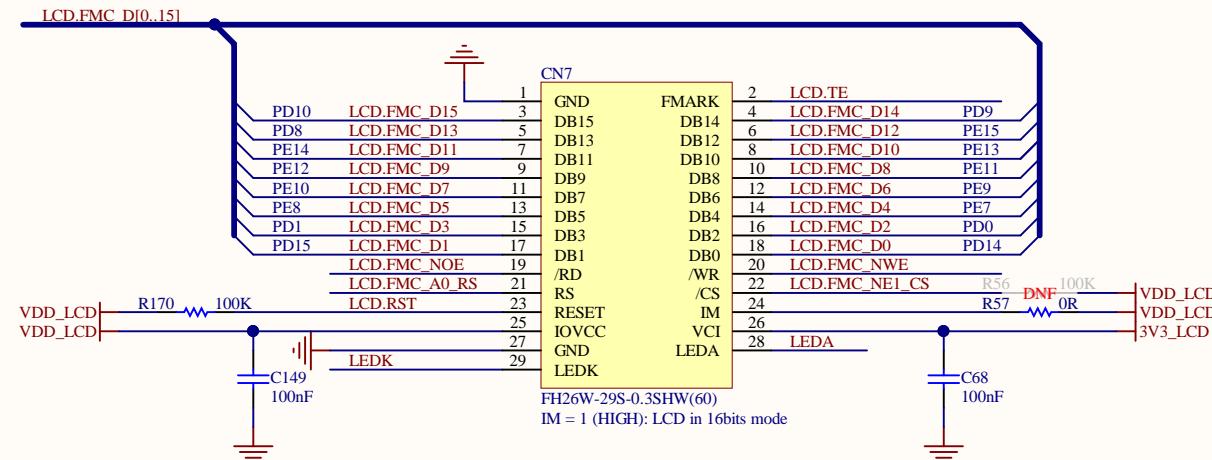
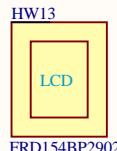
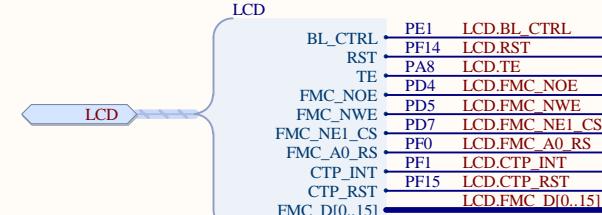
LIMITATION :

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 J1P1 should be set to connect DFSDM signals to STMOD+ module.

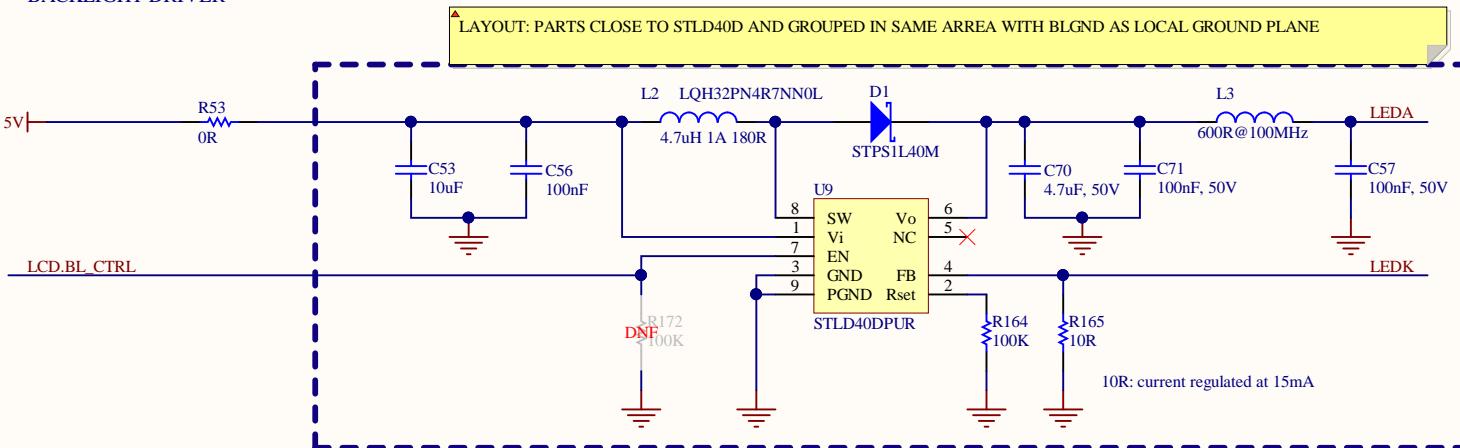
TFT LCD

Operating range: 1V65<IOVCC<3V3

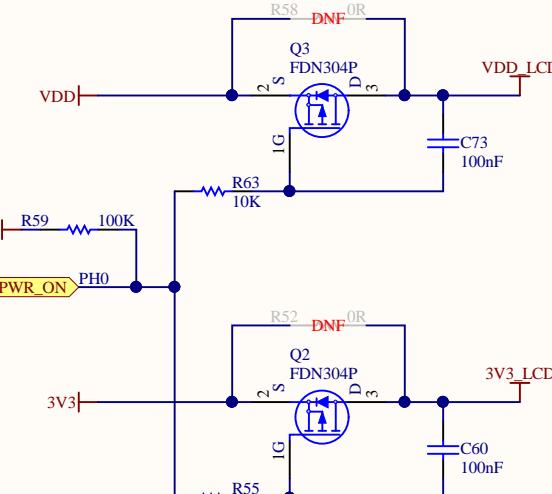
Operating range: 2V4<VCI<3V3



BACKLIGHT DRIVER



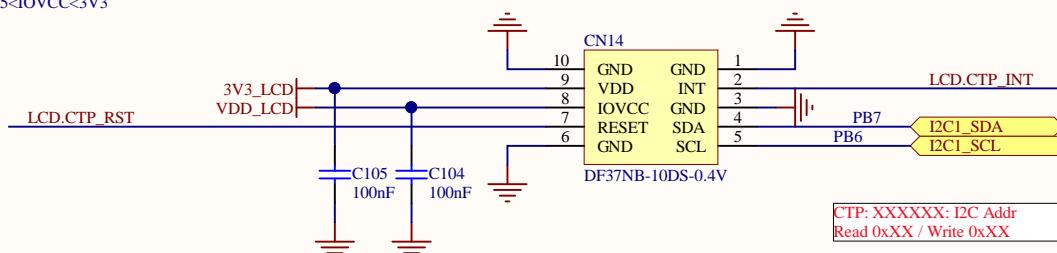
LCD_PWR_ENABLE



TOUCH PANEL CONNECTOR

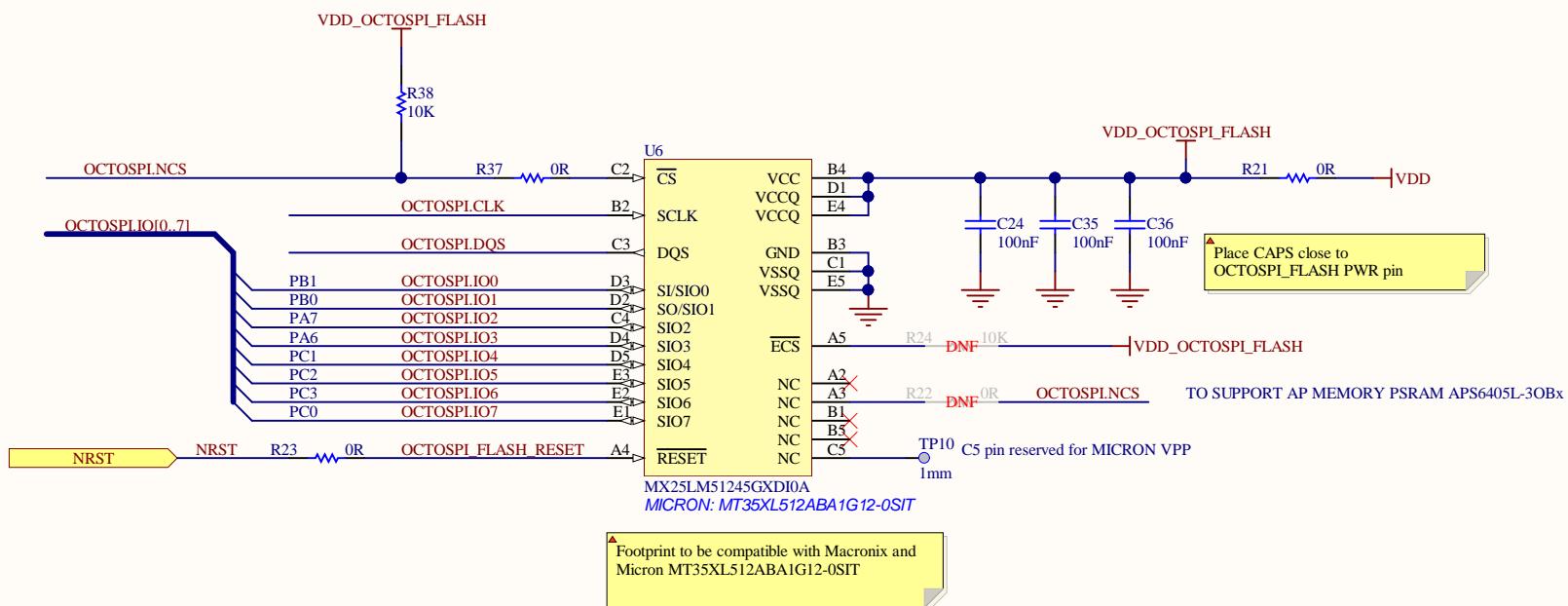
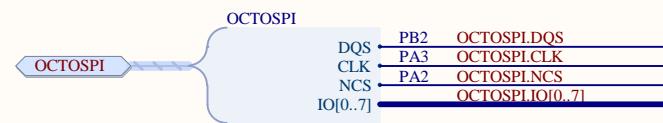
Operating range: 2V4<VDD<3V3

Operating range: 1V65<IOVCC<3V3

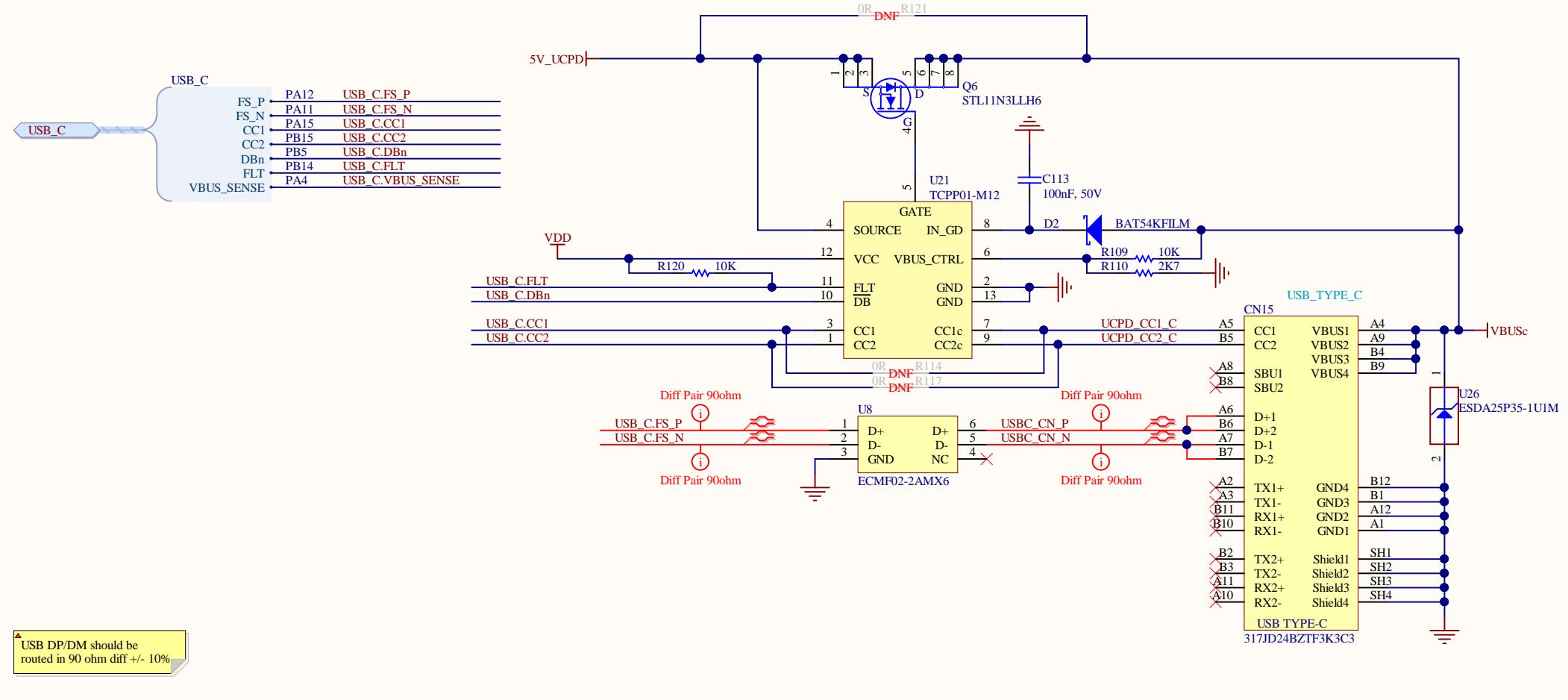


Title: LCD
Project: STM32L562E-DK
Variant: L562QE
Revision: C-01
Size: A4

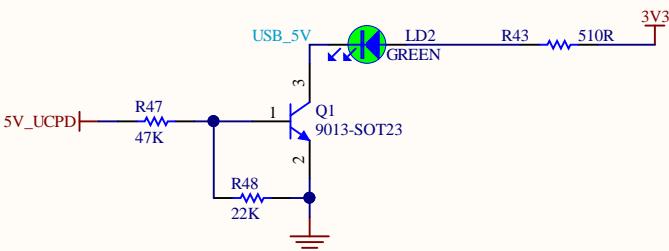




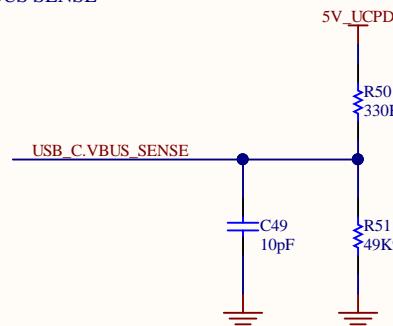
USB_C



5V_USB_LED



VBUS SENSE

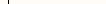


LIMITATION :

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.

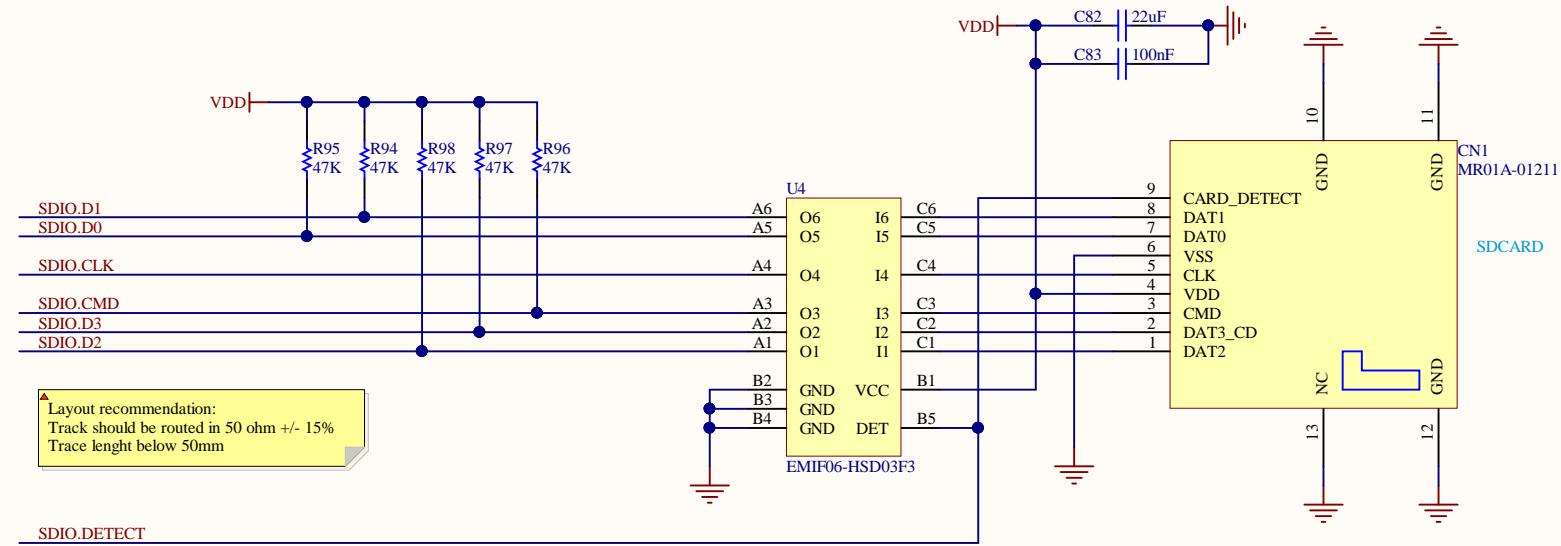
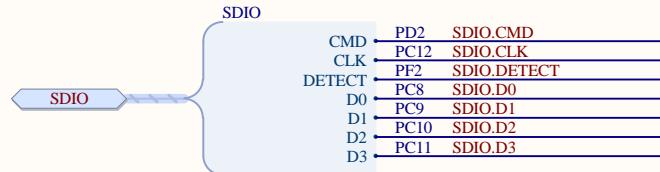
Some ARDUINO signals are multiplexed with JTAG: CC1
In case JTDI is used, USB TYPE C should be disconnected.
User need to check that multiplexed signals are not used on both features

Title: USB_TYPEC		
Project: STM32L562E-DK		
Variant: L562QEQ		
Revision: C-01	Reference: MB1373	
Size: A4	Date: 14-JUNE-2019	Sheet: 9 of 21



SDCARD

Operating range: 2V7<VDD<3V6



LIMITATION :

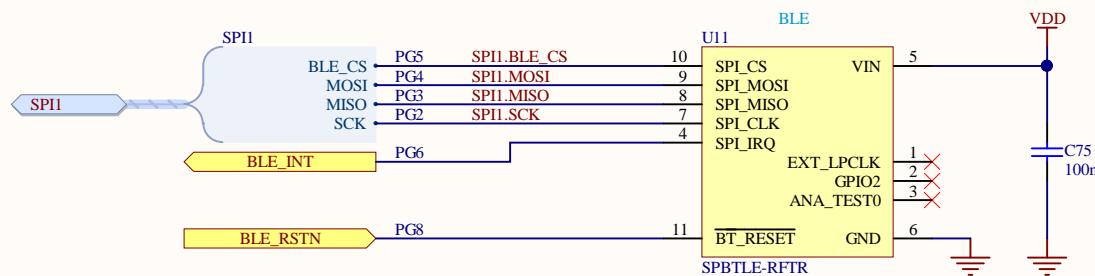
Some SDCARD signals are multiplexed with PMOD / STMOD+. In case SDCARD is plugged, PMOD / STMOD+ signals can be disconnected. Or user need to check that multiplexed signals are not used on both features simultaneously.

Title: **SDCARD**
Project: **STM32L562E-DK**
Variant: **L562QEQ**
Revision: **C-01** Reference: **MB1373**
Size: **A4** Date: **14-JUNE-2019** Sheet: **10 of 21**



BLE

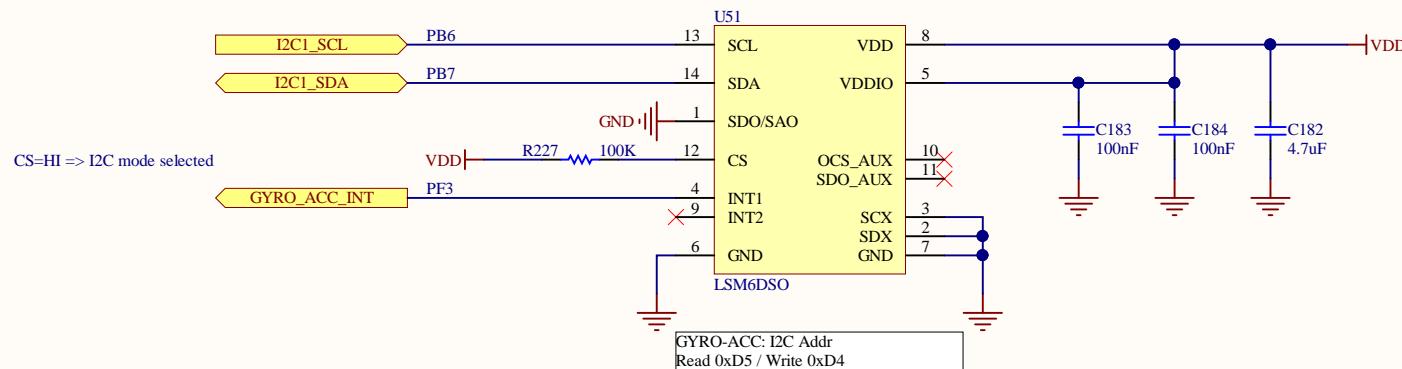
Operating range: 1V7<VDD<3V6

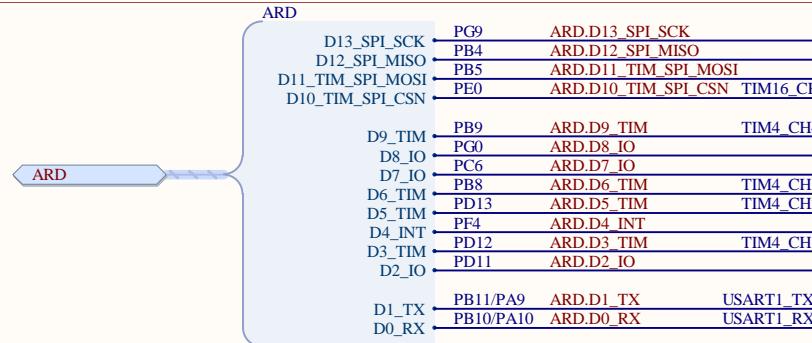
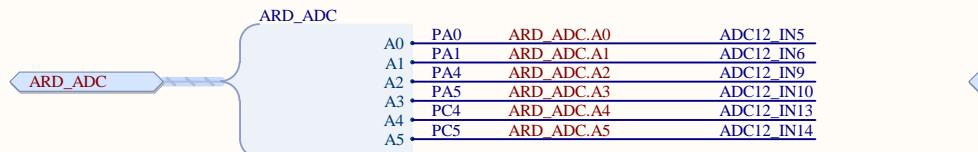


3D ACCELEROMETER & GYROSCOPE

Operating range: 1V7<VDD<3V6

Operating range: 1V62<VDDIO<3V6

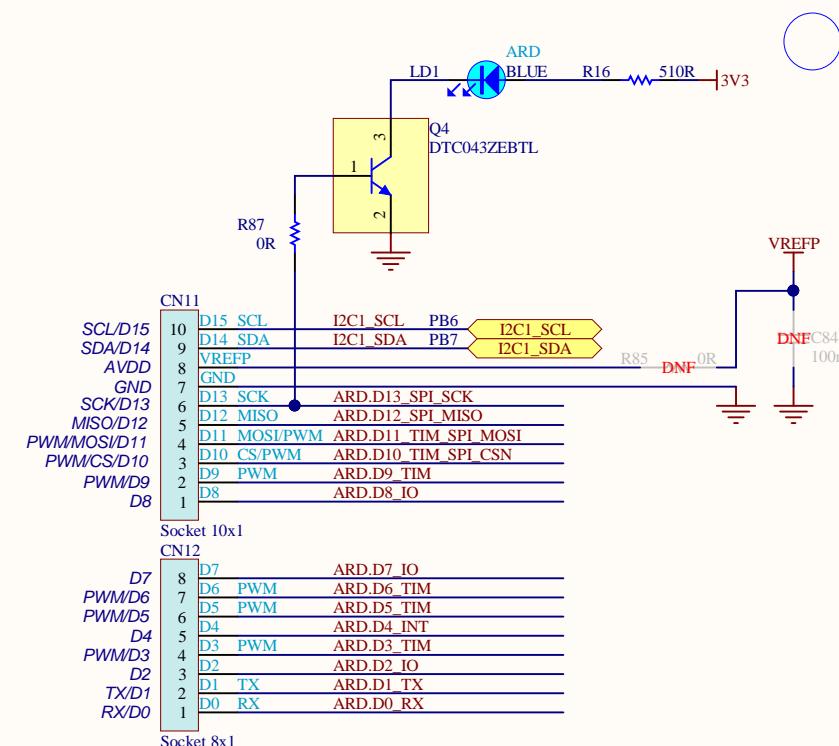
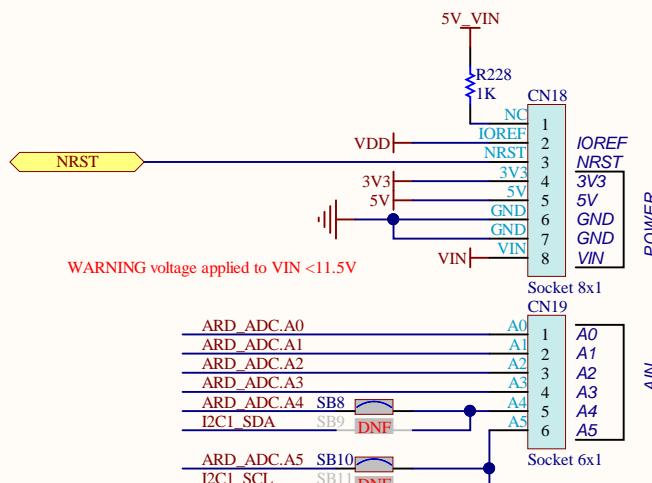


**LIMITATION :**

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.

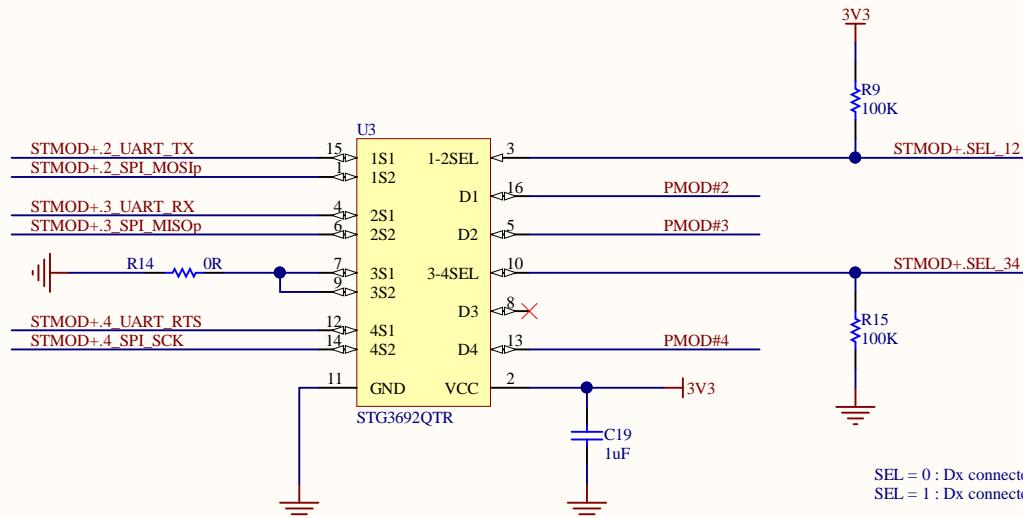
Some ARDUINO signals are multiplexed with STMOD+ signals: A0
 In case ARDUINO SHIELD is plugged, STMOD+ must be disconnected.
 User need to check that multiplexed signals are not used on both features simultaneously.

SPI_MISO, SPI_MOSI and SPI_SCLK can be used simultaneously.



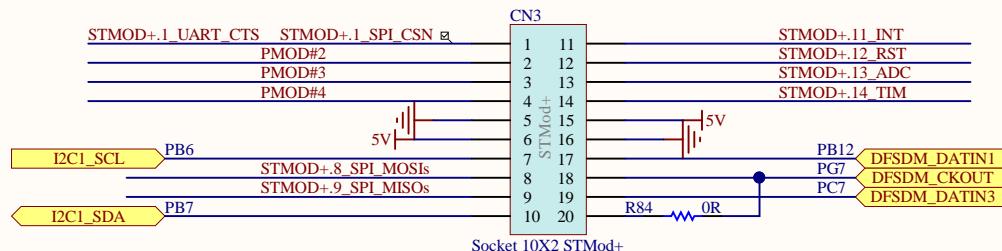
PMOD / STMOD+ SWITCH

STMOD+	
1_SPI_CS_N	PB13 STMOD+.1 SPI CSN
2_SPI_MOSI_p	PB5 STMOD+.2 SPI MOSIp
3_SPI_MISO_p	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

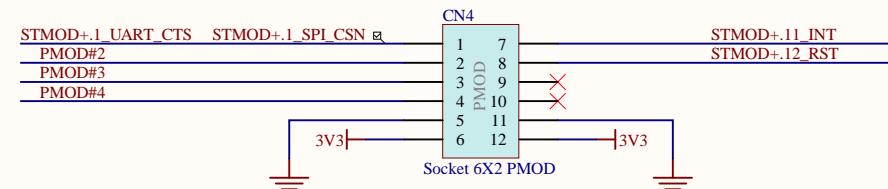


SPI	SPI/UART (*)	UART
STMOD+.1-2SEL	0	1 (*)
STMOD+.3-4SEL	0	0 (*)
PMOD#1	NSS	NSS
PMOD#2	MOSIp	TX
PMOD#3	MISOp	RX
PMOD#4	SCK	SCK
		RTS
		CTS

STMOD+



PMOD



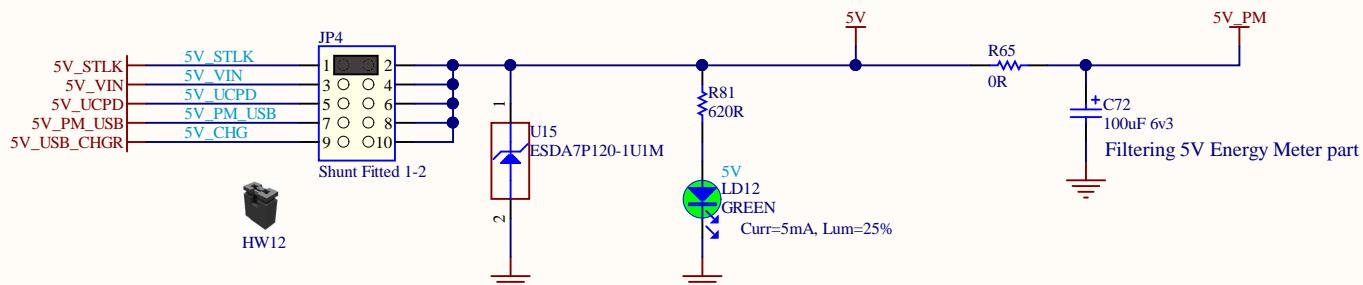
LIMITATION :

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

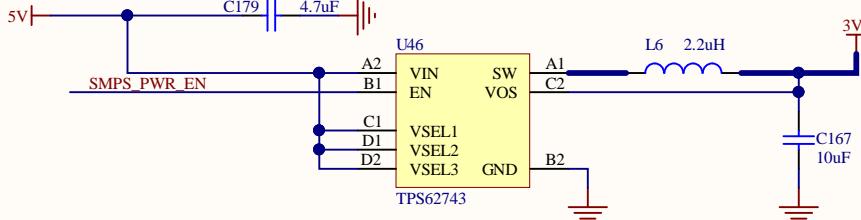
Some ARDUINO signals are multiplexed with PMOD / STMOD+ signals:
In case ARDUINO SHIELD is plugged, STMOD+ must be disconnected.
User need to check that multiplexed signals are not used on both features simultaneously.

SPI_MISO, SPI_MOSI and SPI_SCLK can be used simultaneously.

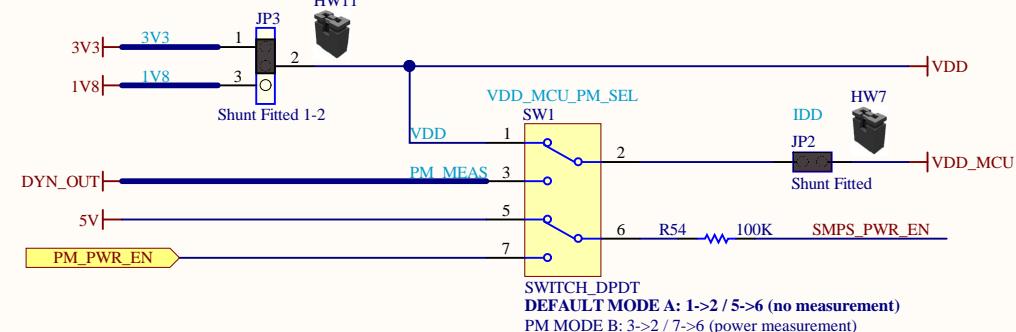
5V PWR SOURCE SELECTION



3V3 PWR SOURCE: 3V3 / 300mA

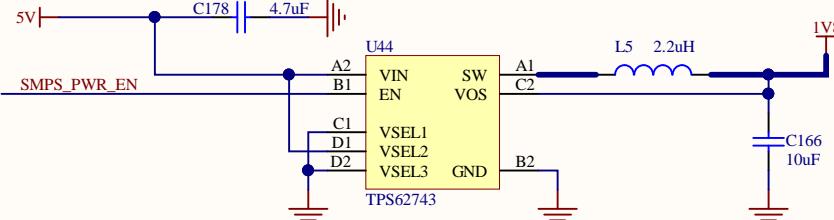


VDD PWR SOURCE SELECTION: 1V8 / 3V3 / DYN_OUT

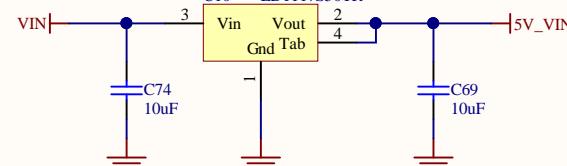


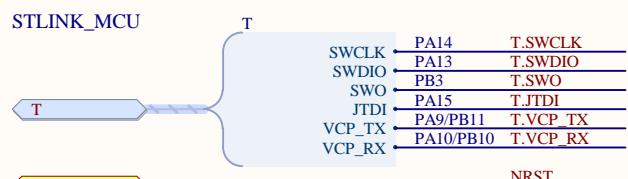
DYN_OUT is the supply used for current measurement
When DYN_OUT is used, VDD should be aligned for IO compatibility 1V8 / 3V3
When DYN_OUT is used on CN20 (external power measurement) SW1 should be set in mode A

1V8 PWR SOURCE: 1V8 / 300mA



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

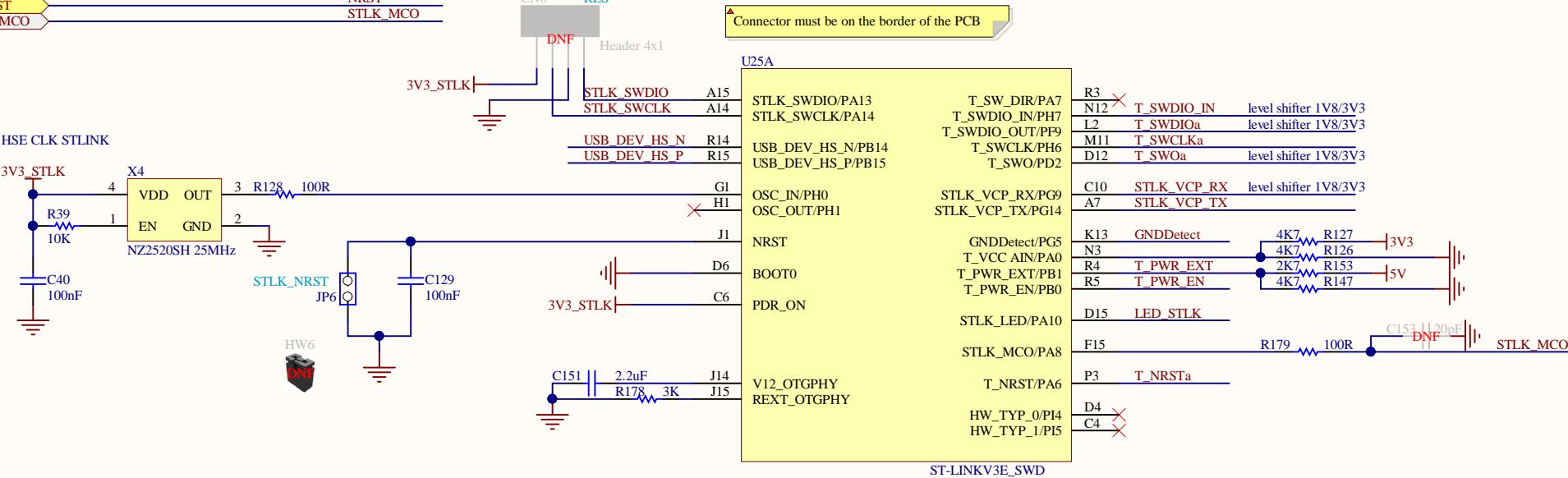




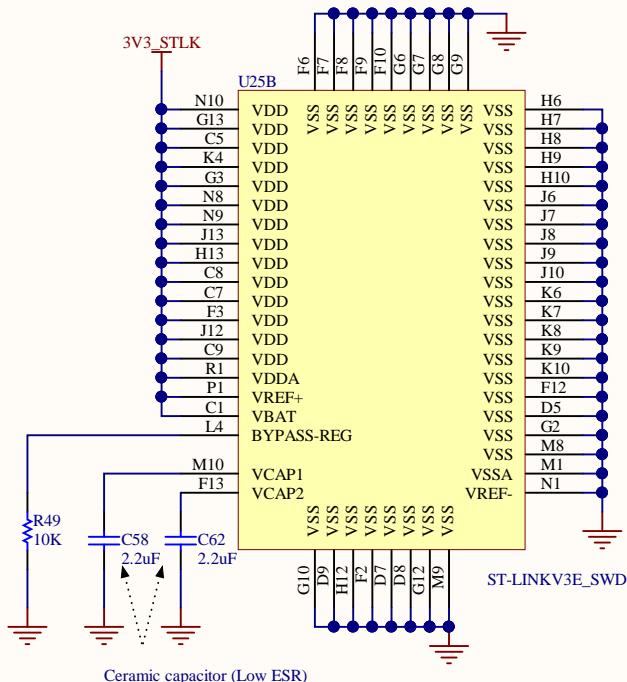
LIMITATION :

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.

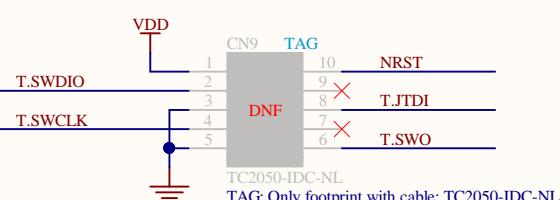
The routing of the tracks must be done on continuity from ST-LINK to 22ohm resistors and from resistors to Target MCU to avoid stub noises and EMC approach. (22ohm resistors must be very close to STDC14)



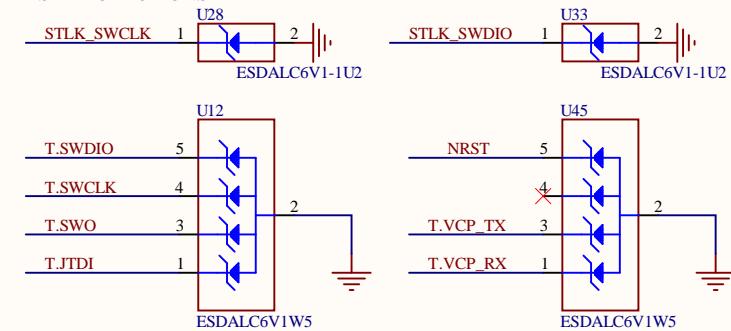
ST-LINK POWER



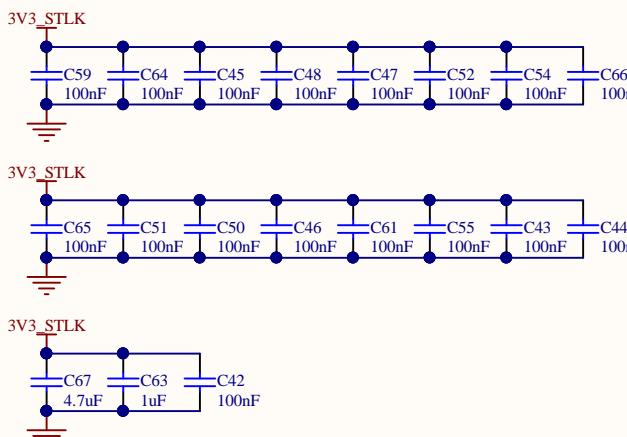
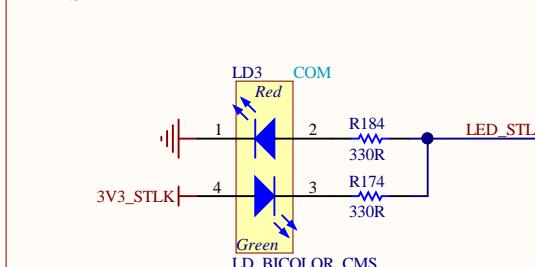
TAG CONNECTOR



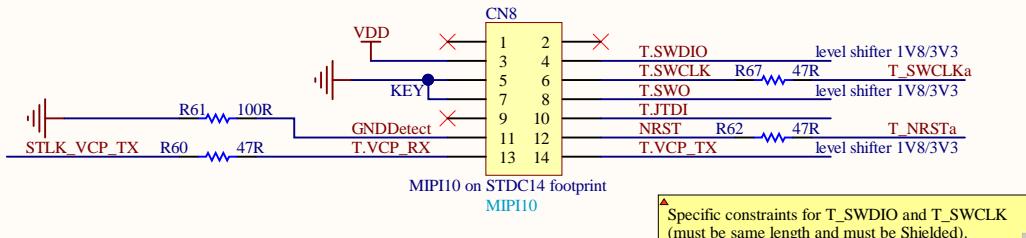
ESD PROTECTIONS



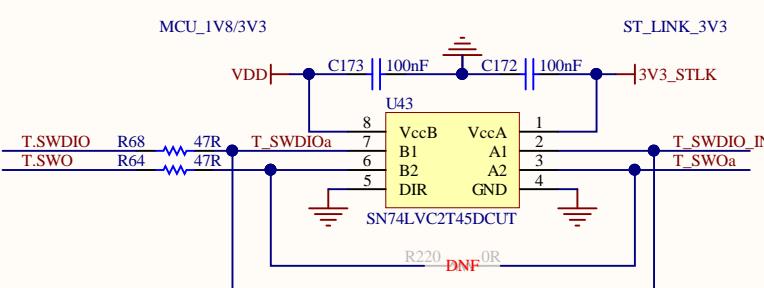
LED STLK



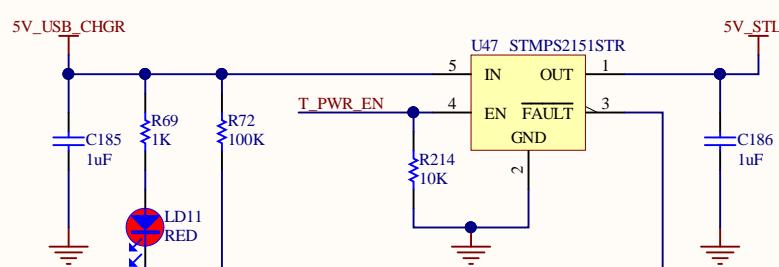
STDC14 RECEIVER



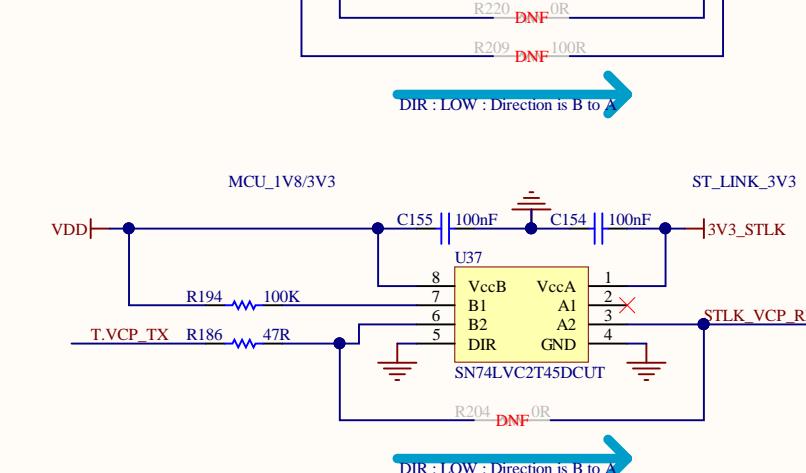
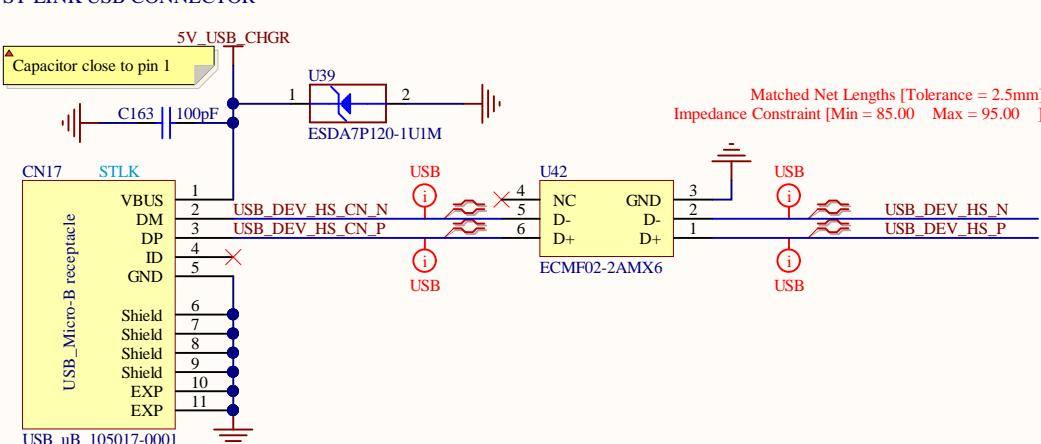
SW LEVEL SHIFTER FOR MCU_1V8



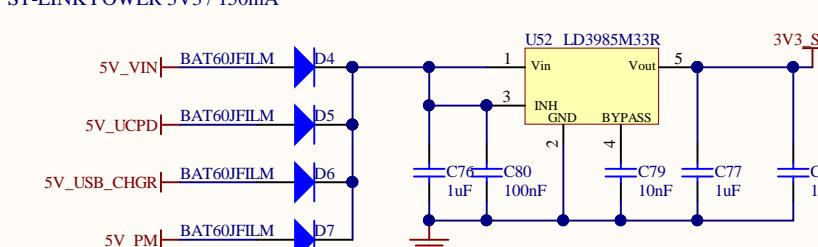
5V ST-LINK PROTECTION

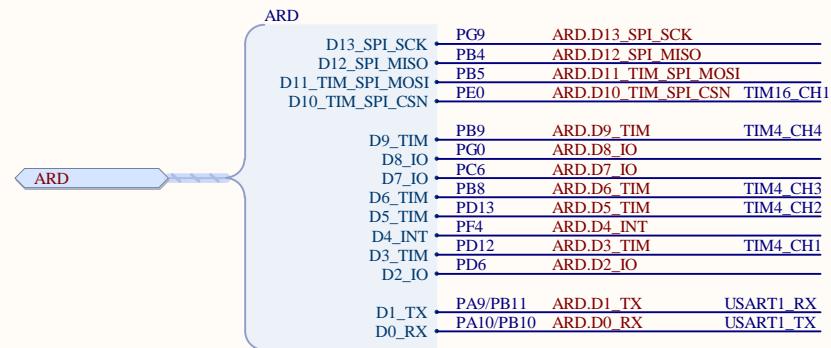
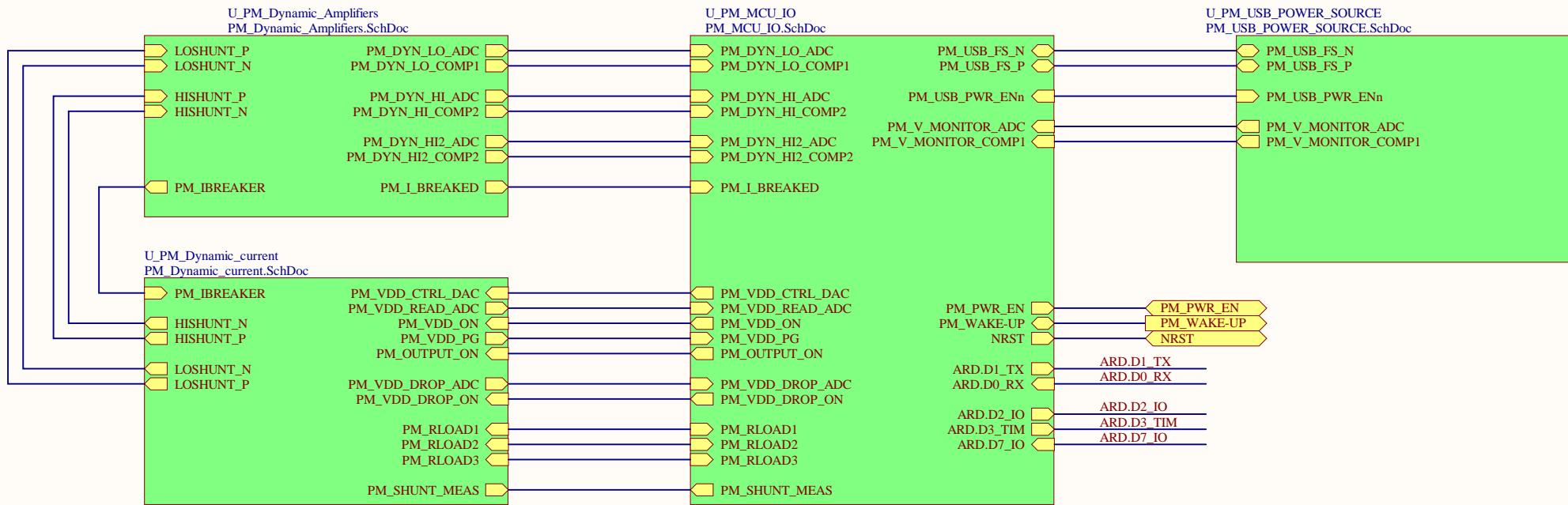


ST-LINK USB CONNECTOR



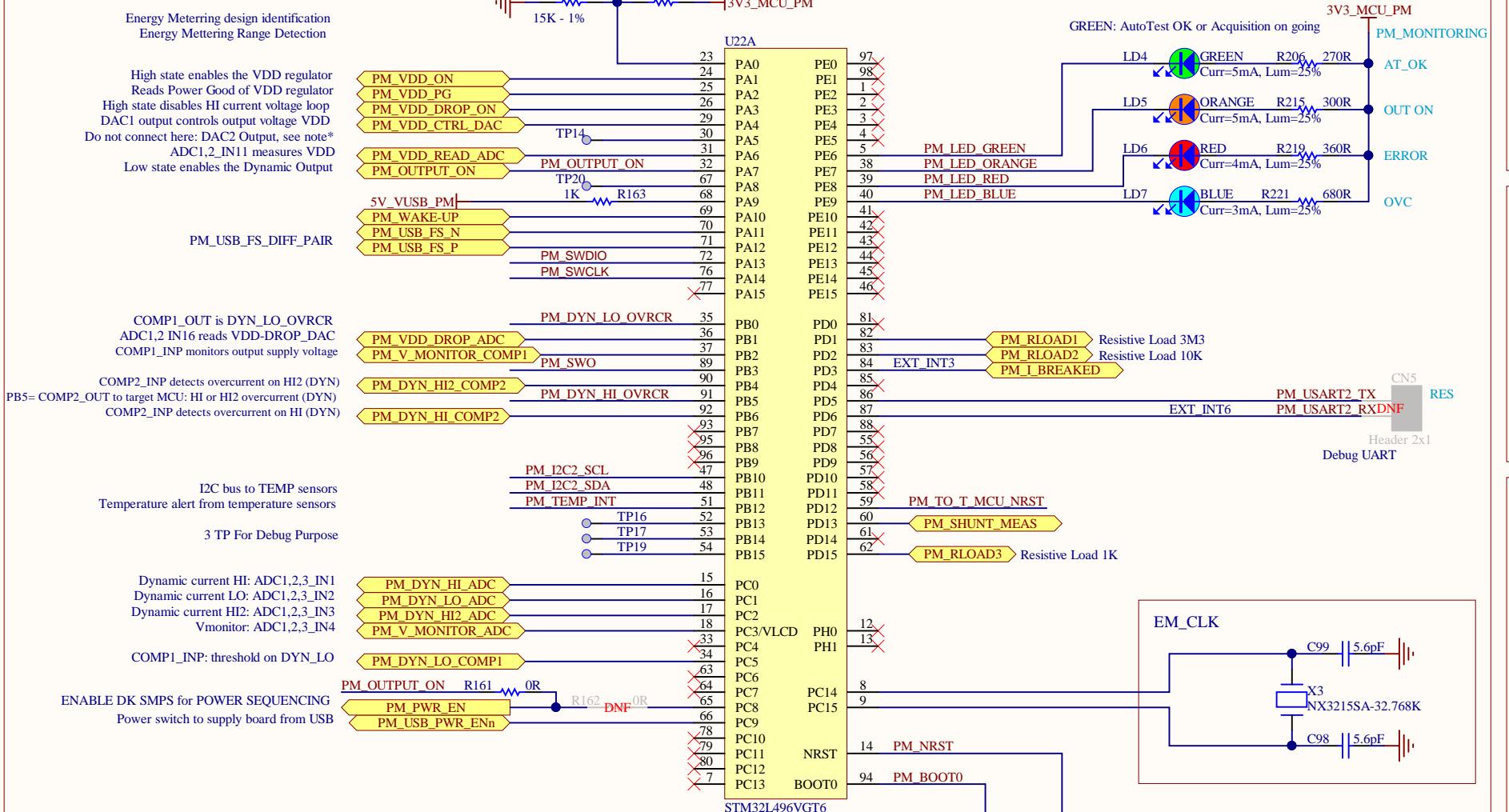
ST-LINK POWER 3V3 / 150mA





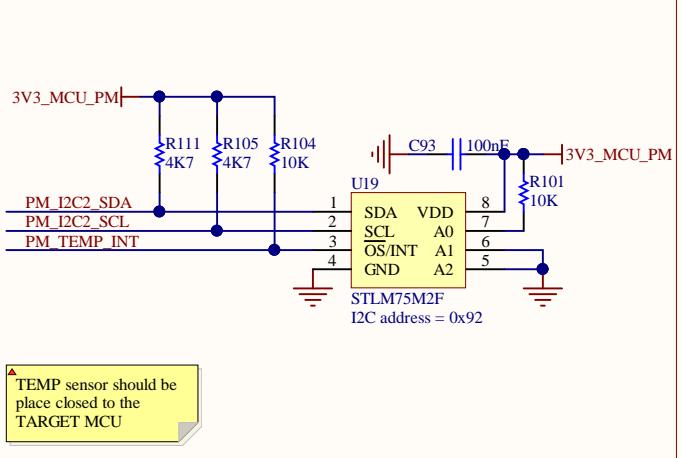
PATENT PENDING

EM MCU_IO

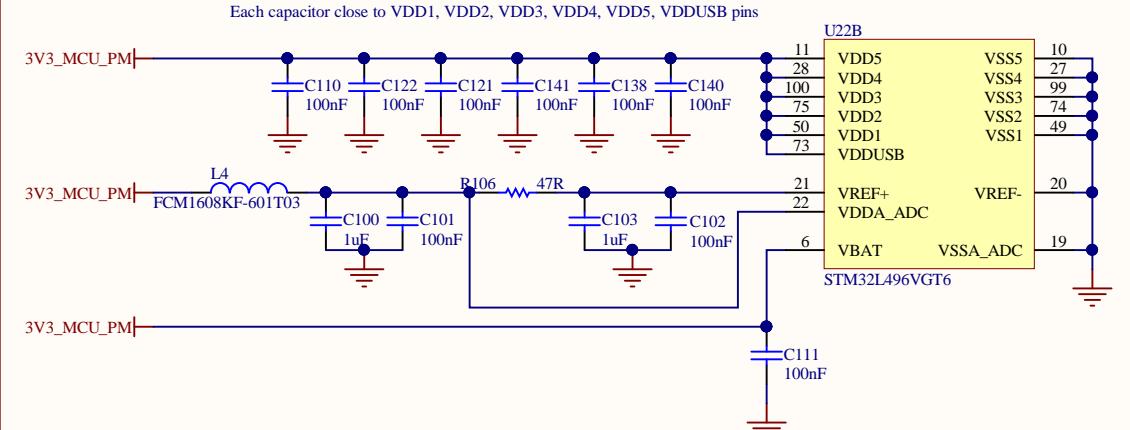


GPIOs interrupt vectors:
EXTI0
EXTI1
EXTI2
EXTI3: PD3_I_BREAKED
EXTI4
EXTI6: PD6 interrupt input from Arduino connector pin D1
EXTI12 : PB12 interrupt input for Temperature sensor

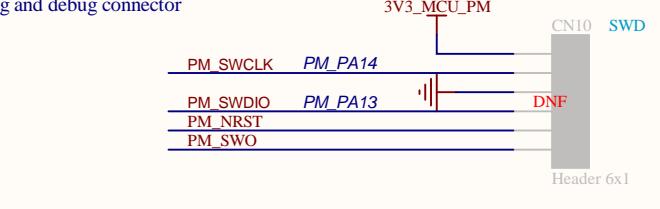
TEMPERATURE SENSOR



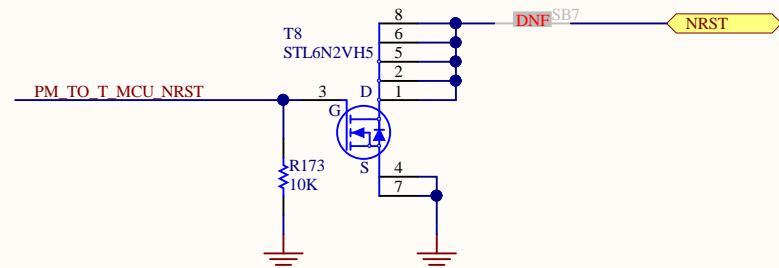
PM_MCU_DECAPS



Programming and debug connector

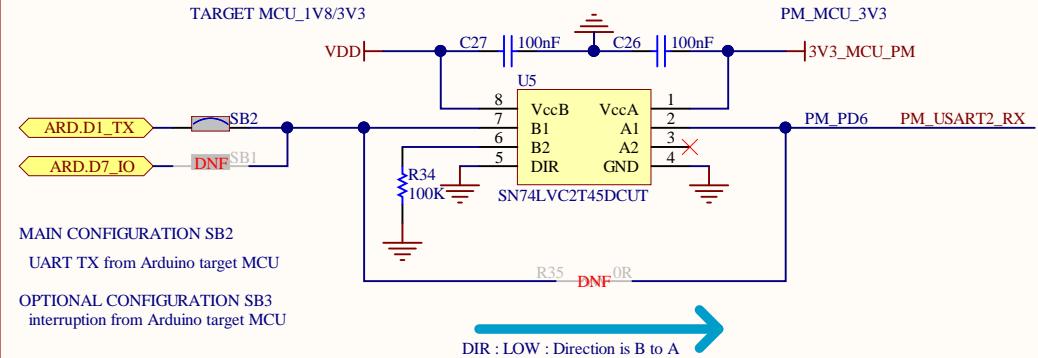


TARGET MCU RESET

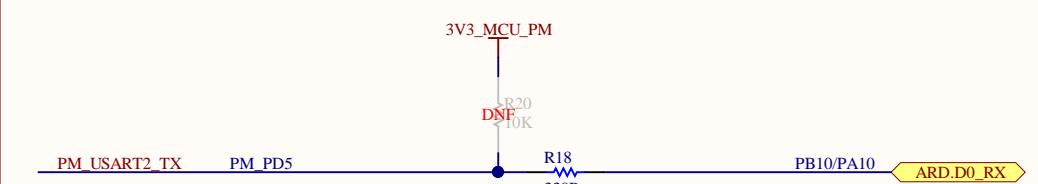


UART LINK BETWEEN PM AND TARGET MCU

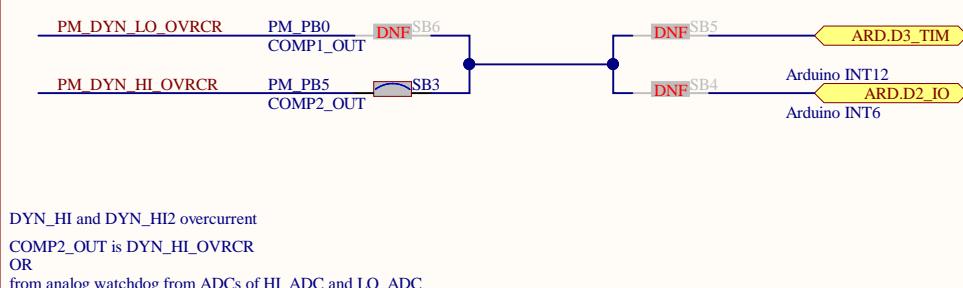
TARGET TX to PM RX: need LS for 1V8 mode



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

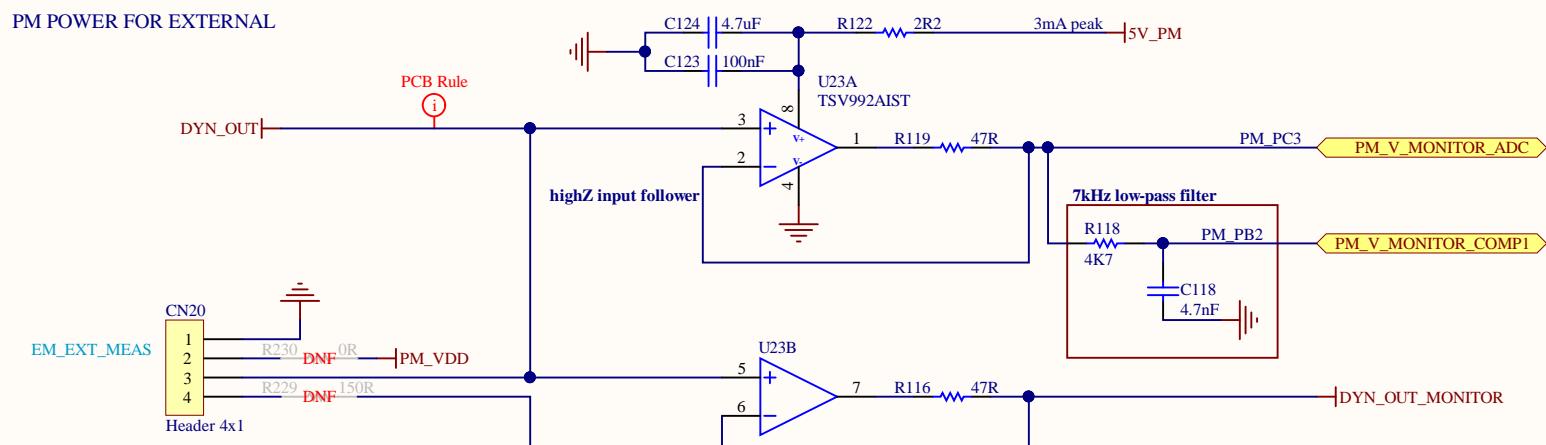
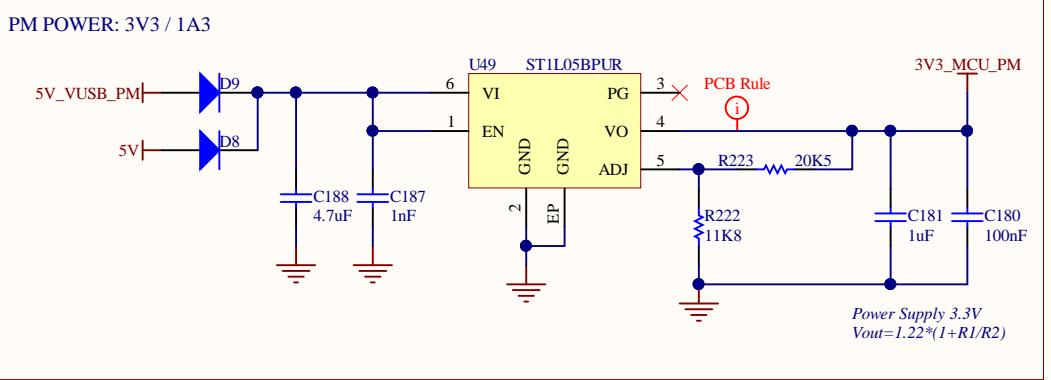
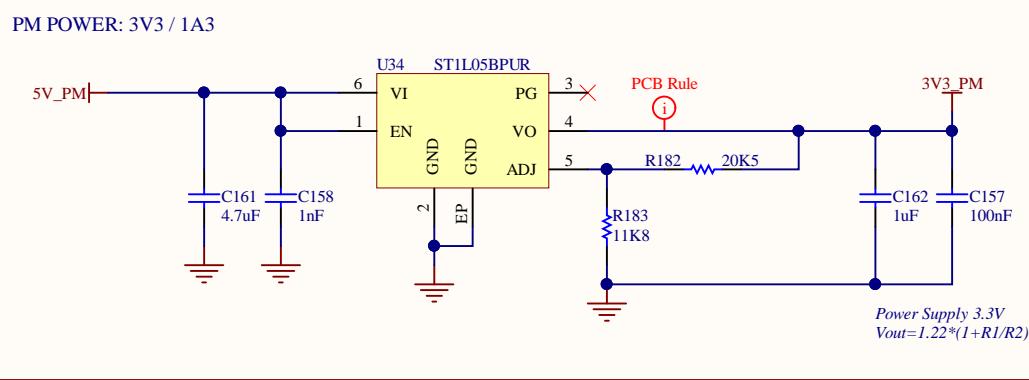
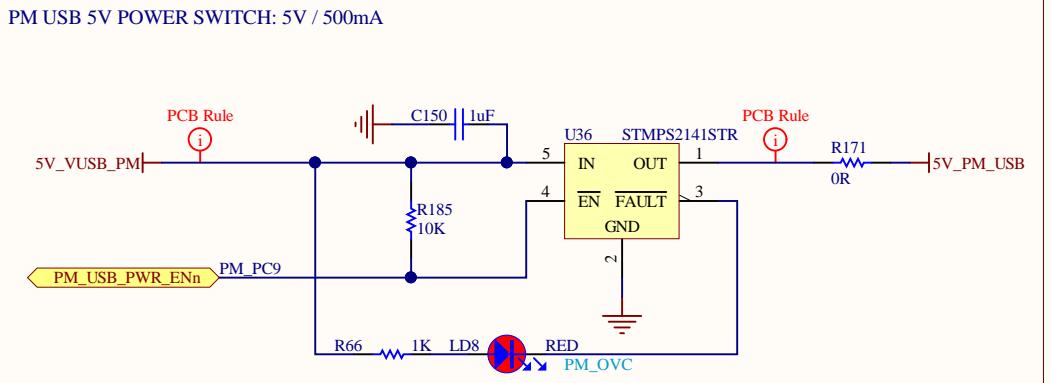
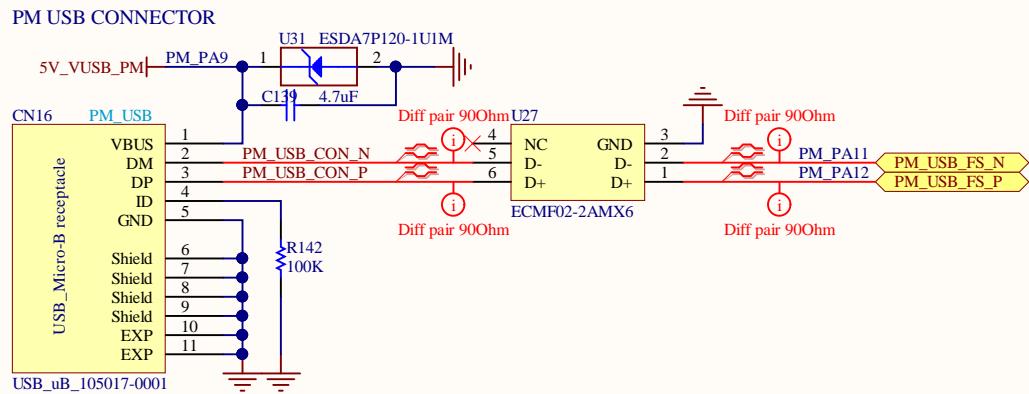


IT to target MCU for Overconsumption Detection



PATENT PENDING

Title: PM_MCU_IO
Project: STM32L562E-DK
Variant: L562QE
Revision: C-01
Size: A3
Date: 14-JUNE-2019
Reference: MB1373
Sheet: 17 of 21



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 150R 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.

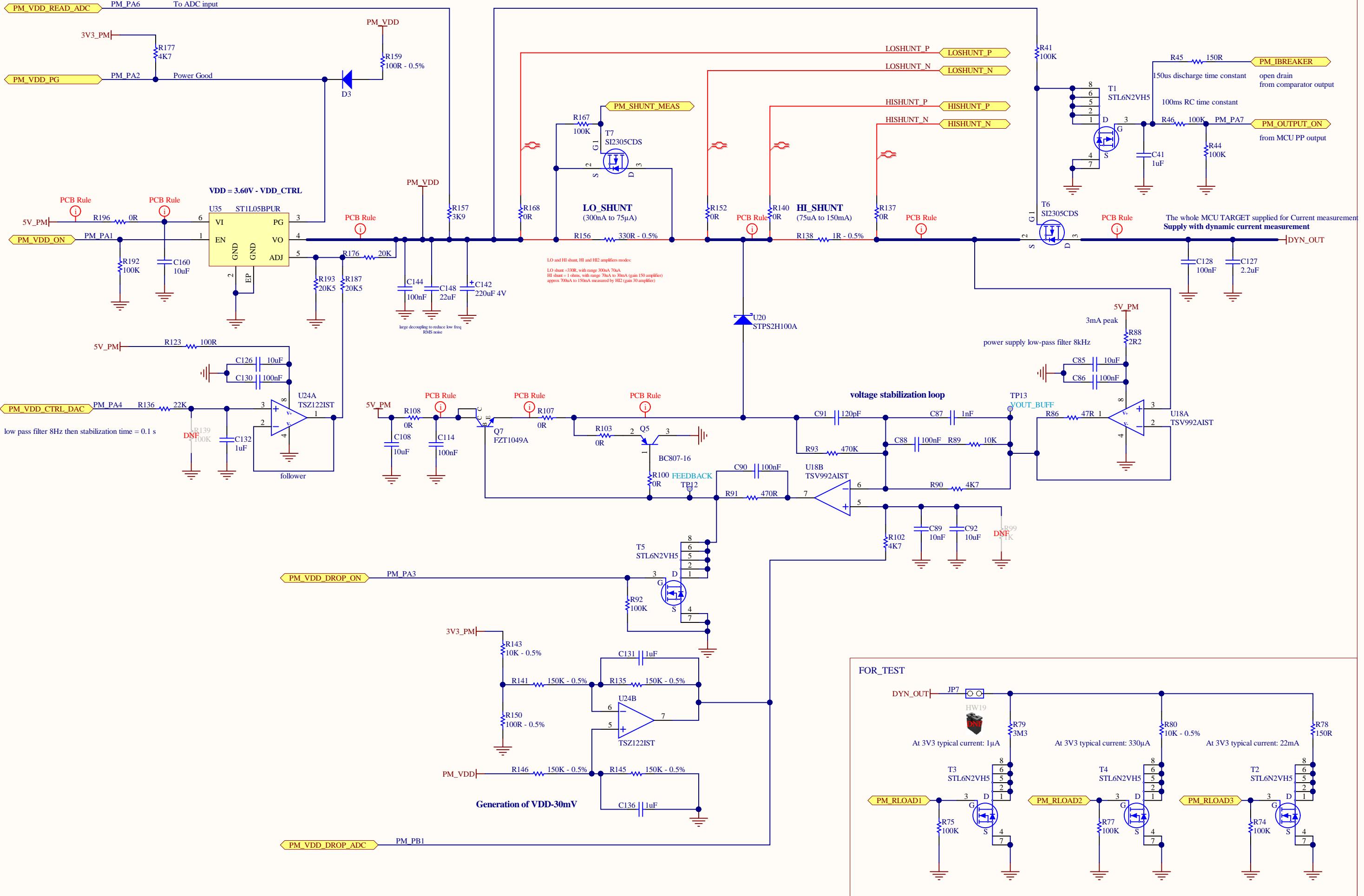
PM_VDD give DYN_OUT to supplies the target MCU and make current measurement

PATENT PENDING

Title: **PM_USB_POWER_SOURCE**
 Project: **STM32L562E-DK**
 Variant: **L562QE**
 Revision: **C-01** Reference: **MB1373**
 Size: **A4** Date: **14-JUNE-2019** Sheet: **18 of 21**

 life.augmented

PM DYNAMIC CURRENT MEASUREMENT



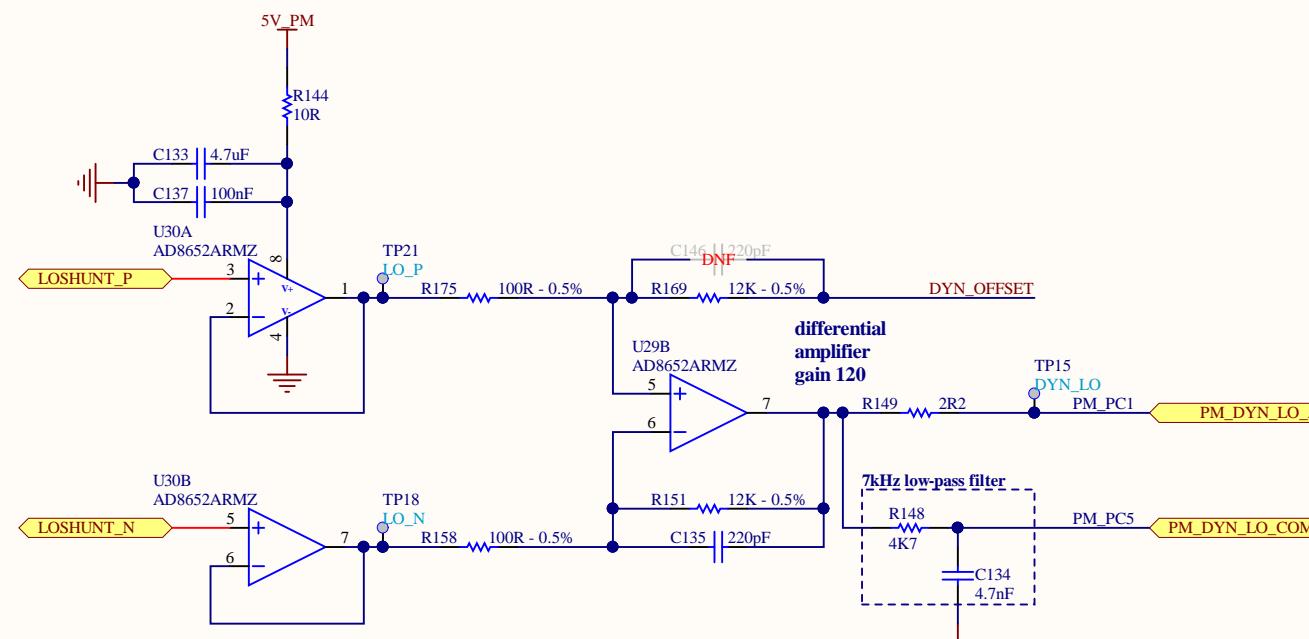
PATENT PENDING

Title: PM_Dynamic_current
Project: STM32L562E-DK
Variant: L562QEQQ
Revision: C-01
Reference: MB1373
Size: A3
Date: 14-JUNE-2019
Sheet: 19 of 21



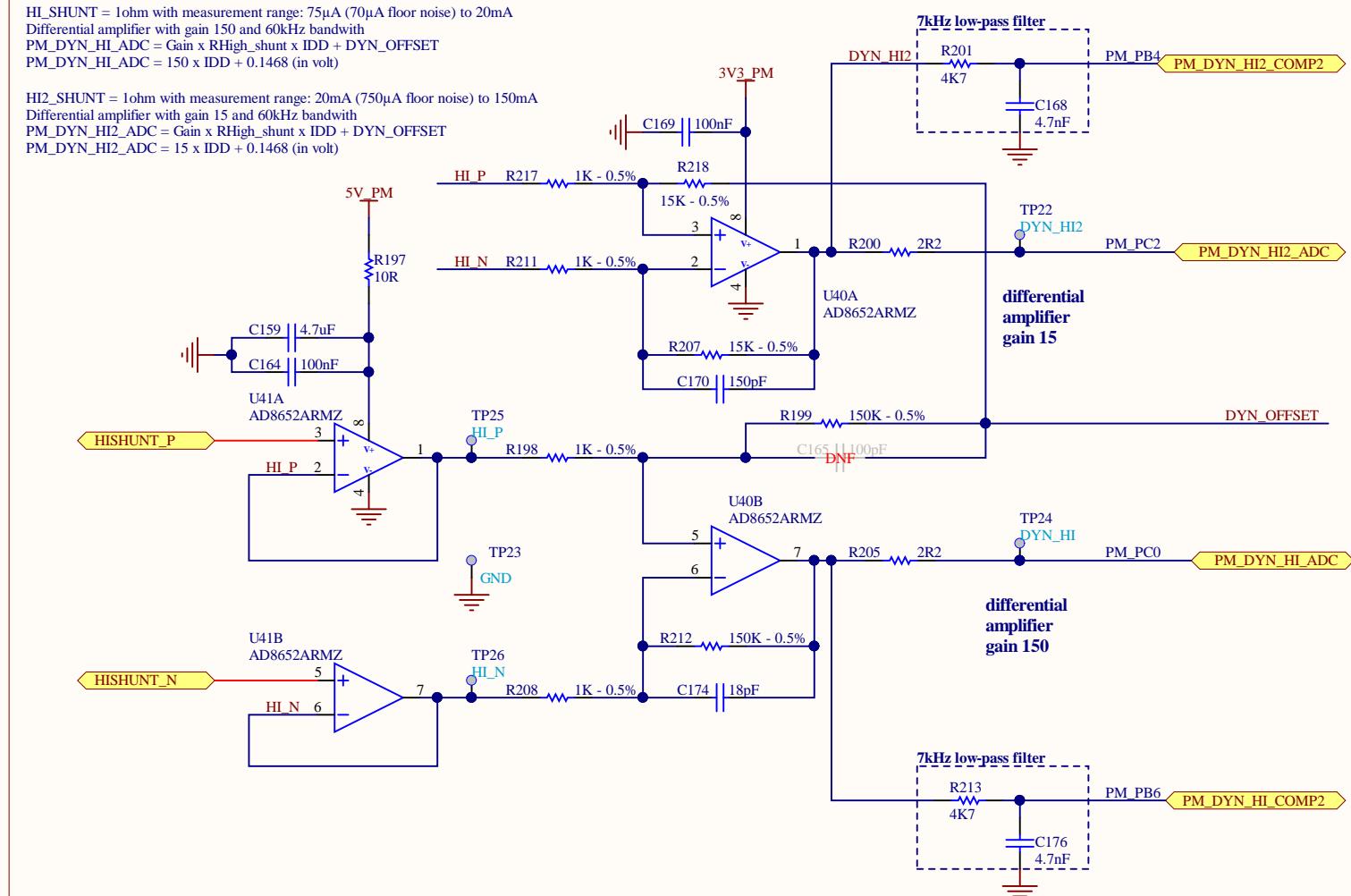
LOW CURRENT RANGE MEASUREMENTS

LO_SHUNT = 330ohm with measurement range: 300nA (300nA floor noise) to 75 μ A
 Differential amplifier with gain 120 and 60kHz bandwith
 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

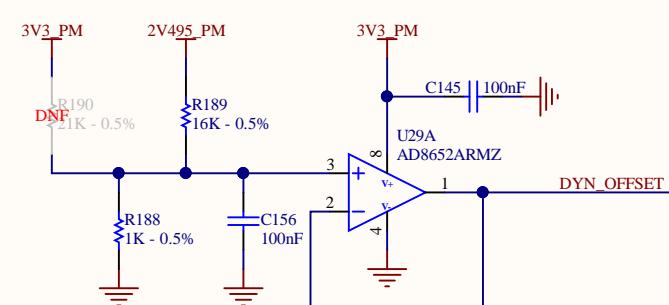
HI_SHUNT = 1ohm with measurement range: 75 μ A (750 μ A floor noise) to 20mA
 Differential amplifier with gain 150 and 60kHz bandwith
 PM_DYN_HI_ADC = Gain x RHigh_shunt x IDD + DYN_OFFSET
 PM_DYN_HI2_ADC = 150 x IDD + 0.1468 (in volt)



DC OFFSET GENERATOR

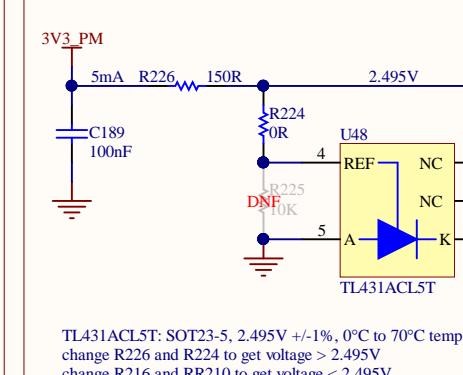
DYN_OFFSET = 146.8mV

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



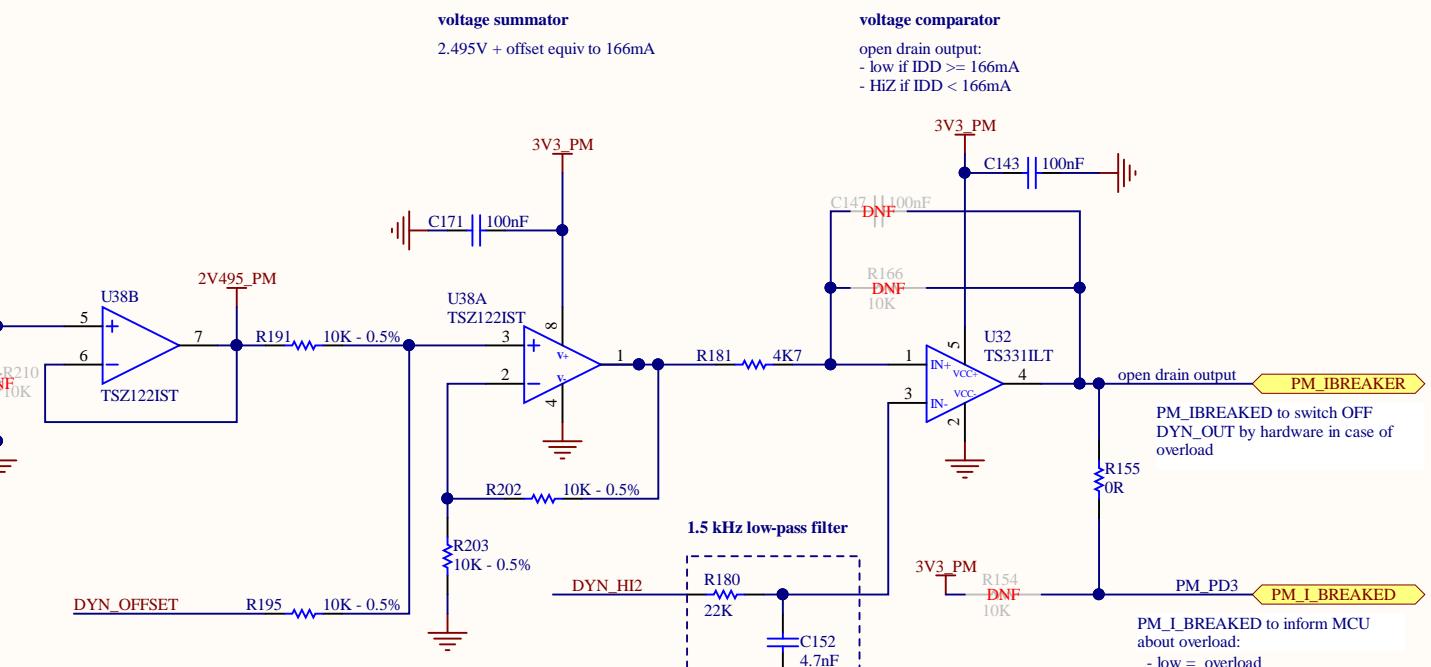
CIRCUIT BREAKER

166mA overload and short circuit protection



voltage summarizer

2.495V + offset equiv to 166mA



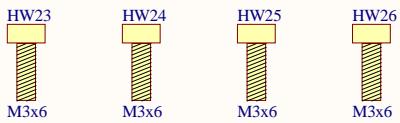
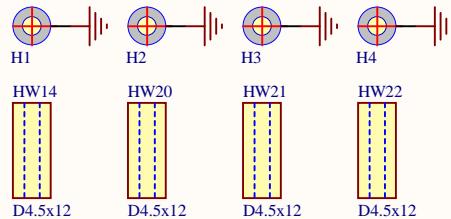
PATENT PENDING

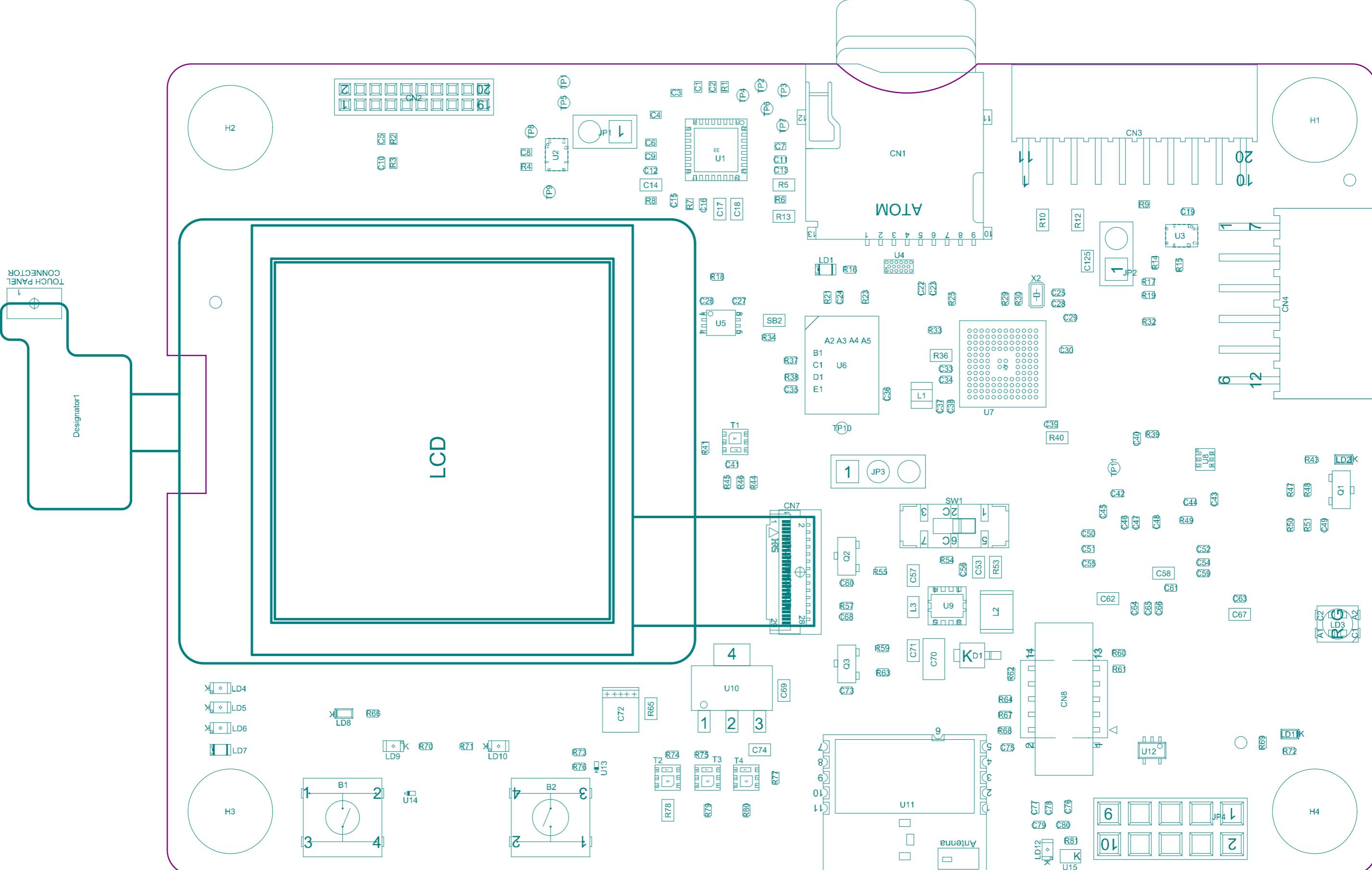
HW1
BOARD QR CODE
QR code

HW2
BOARD CPN
Board CPN

HW10
PCB
MB1373C

HW5 HW3 HW4
LOGO ST LOGO CE LOGO ROHS





Project: STM32L562E-DK

Layer: M14-Top Assembly

Gerber: .GM14

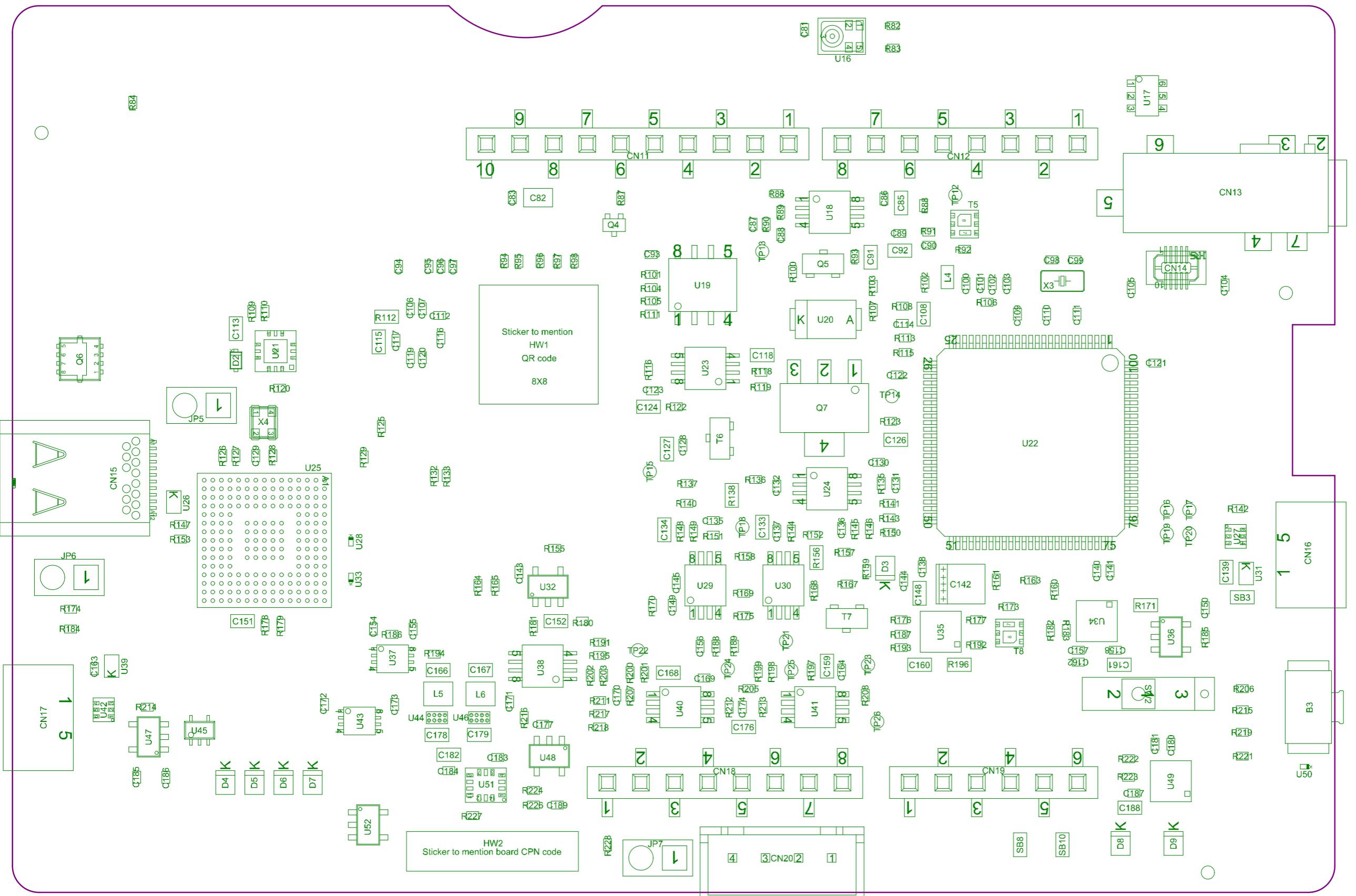
Variant: L562QEQ

Ref: MB1373

Date: 19-JUN-14

Rev: C





Project: STM32L562E-DK

Layer: M15-Bottom Assembly

Gerber: GM15

Variant: L562QEQ

Ref: MB1373

Date: 19-JUN-14

Rev. C



