

Nucleo-64 SMPS

MB1841

Table of contents

Sheet 1: Project overview (this page)

Sheet 2: MB1841_Top

Sheet 3: STM32 Microcontroller I/Os

Sheet 4: STM32 Microcontroller Power

Sheet 5: Arduino & Extension Connectors

Sheet 6: POWER

Sheet 7: USB USER

Sheet 8: STLINK-V3EC SWD

Sheet 9: External Debugger Interface

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

The Open Platform License Agreement (“Agreement”) is a binding legal contract between you (“You”) and STMicroelectronics International N.V. (“ST”), a company incorporated under the laws of the Netherlands acting for the purpose of this Agreement through its Swiss branch 39, Chemin du Champ des Filles, 1228 Plan-les-Ouates, Geneva, Switzerland.

By using the enclosed reference designs, schematics, PC board layouts, and documentation, in hardcopy or CAD tool file format (collectively, the “Reference Material”), You are agreeing to be bound by the terms and conditions of this Agreement. Do not use the Reference Material until You have read and agreed to this Agreement terms and conditions. The use of the Reference Material automatically implies the acceptance of the Agreement terms and conditions.

The complete Open Platform License Agreement can be found on www.st.com/opla.

U_mb1841_Top
mb1841_Top.SchDoc



HW1

STICKER PRODUCT

Sticker product

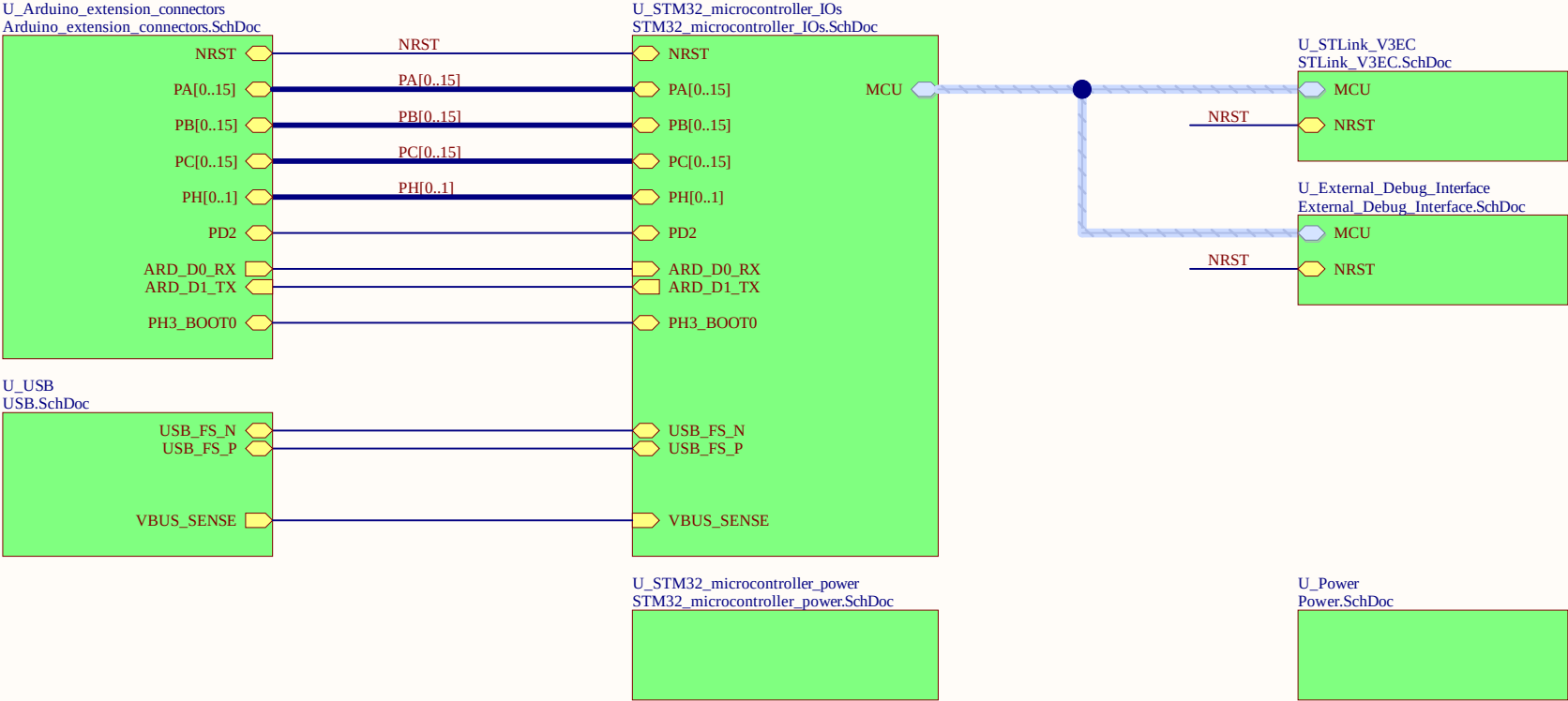
HW7

PCB

MB1841

Title: Project overview		
Project: Nucleo-64 SMPS		
Variant: U385RGQ		
Revision: E-01		Reference: MB1841
Size: A4	Date: 16-DEC-24	Sheet: 1 of 9





USER BUTTON

USER

SW-PUSH-ADTSM644KV

HW17
Blue Hat

B1

VDD

1 2

3 4

R50 0R B_USER

U13 ESDALC6V1-1U2

SR48 100K

PA0 SB22 DNF

PC13 SB24

C72 100nF DNF

(1)

(1)

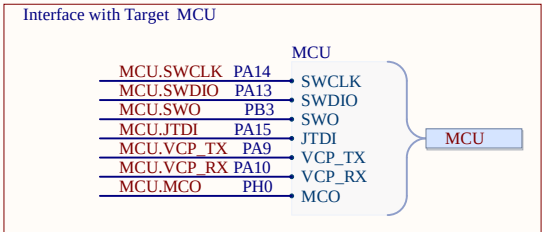
(1): Pull-down resistor and Debounce capacitor are NOT FITTED. These functions are managed by SW.

4.7pF with socket / 6.8pF without socket

The schematic shows a crystal oscillator circuit. A central component is labeled "X2 16MHz". It has four pins: pin 1 is connected to a blue trace; pin 2 is connected to a red trace labeled "GND"; pin 3 is connected to a blue trace labeled "16MHz"; and pin 4 is connected to a red trace labeled "GND". Above the crystal, there is a capacitor labeled "C48 6.8pF" connected between the top blue trace and the top red trace. Below the crystal, there is a capacitor labeled "C51 6.8pF" connected between the bottom blue trace and the bottom red trace.

Figure 10-10 shows the signal connections for USB Full-Speed (FS) signals. The connections are as follows:

- PA[0..15] connects to PD2
- PB[0..15] connects to USB_FS_N
- PC[0..15] connects to USB_FS_P
- PH[0..1] connects to USB_FS_P

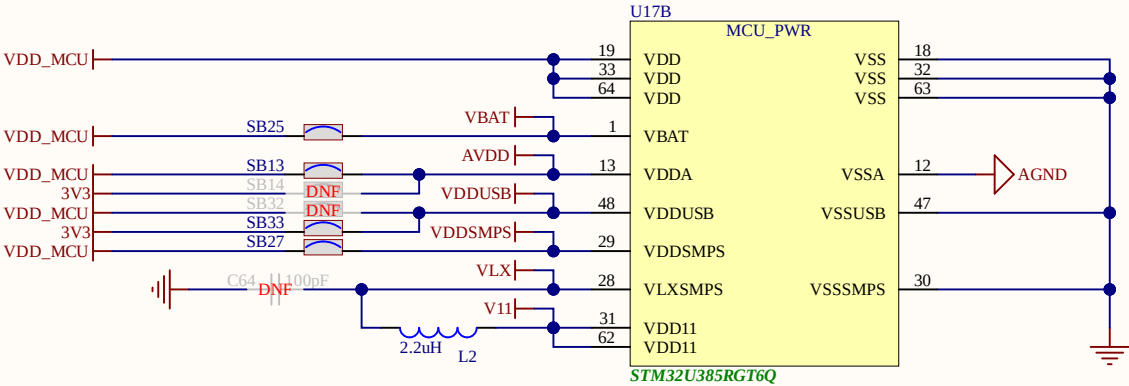


MCU PWR SUPPLIES

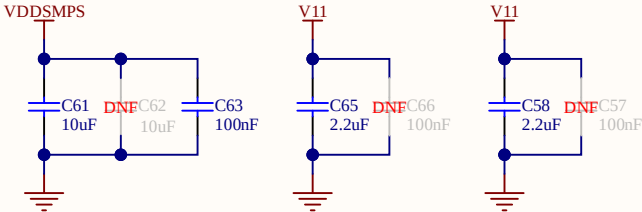
Operating range: $1V71 < VDD < 3V6$
Operating range: $1V65 < VBAT < 3V6$
Operating range: $1V62 < VDDA < 3V6$
Operating range: $1V71 < VDDSMPS < 3V6$

Operating range: $3V0 < VDDUSB < 3V6$

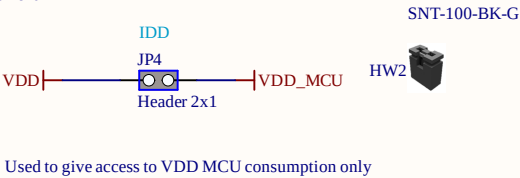
VDDUSB on 3V3 instead of VDD_MCU to be 1V8 compatible



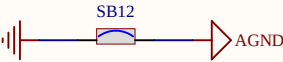
Decoupling capacitors have to be as close as possible from the MCU pins.



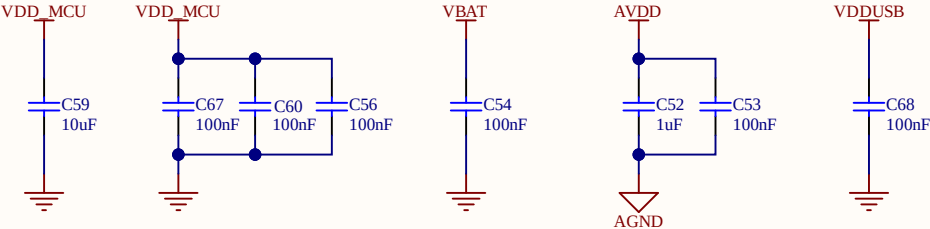
IDD Measurement

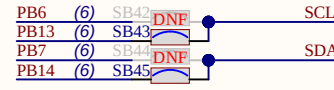
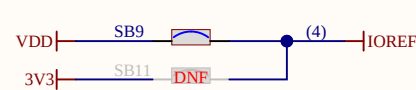


GND / AGND

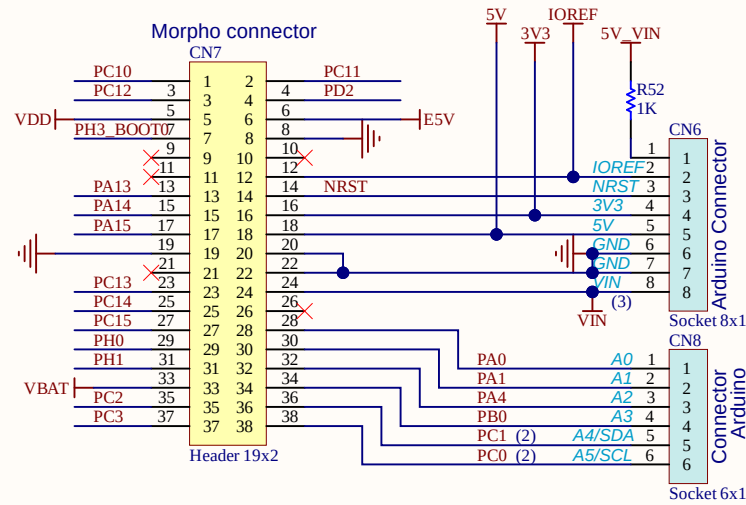
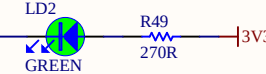


MCU DECAPS
Ceramic capacitor (Low ESR, ESR<1ohm)

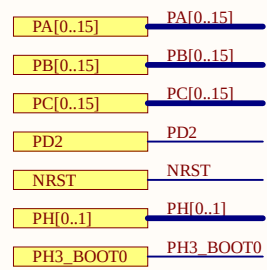
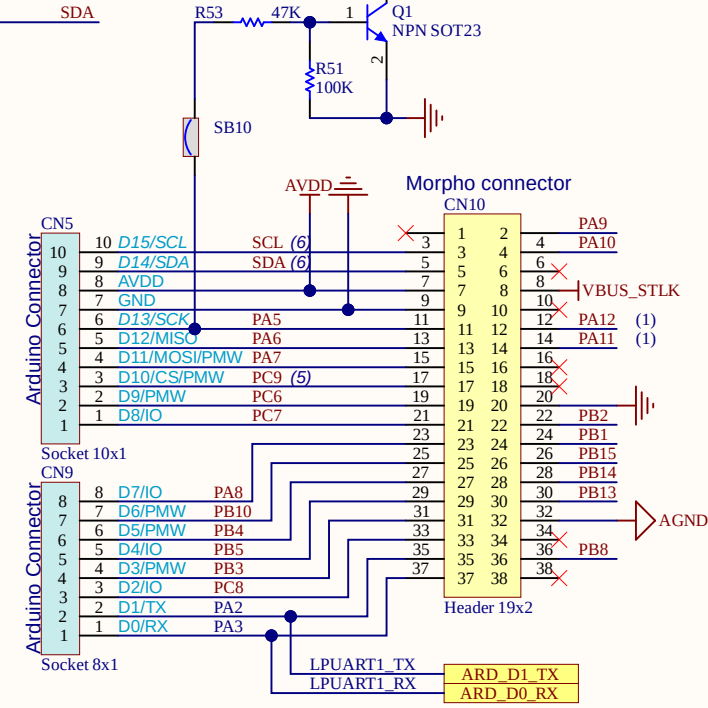




Curr=5mA, Lum=25%



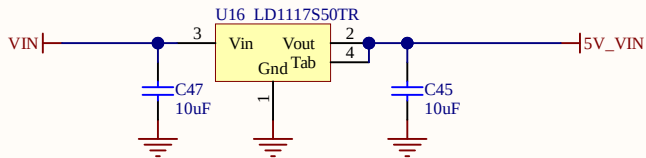
MCU



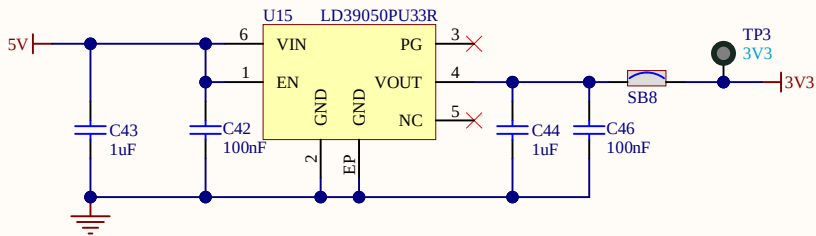
- (1): IO exclusif with USB. SB on sheet 3 disconnected
- (2): PC0/PC1 compatible ADC and I2C
- (3): WARNING voltage applied to VIN <12V
- (4): 1V8 < VDD < 3V3: Default ARDUINO-UNO-V3 only 3V3
- (5): Due to muxing constrainte, the SPI_NSS is not available as an alternate on this IO, so this pin is affected with an I/O function to do the Chip Select
- (6) I2C and I3C feature:
PB6 and PB7 fitted for U5, only I2C supported.
PB13 and PB14 fitted for U3, I2C and I3C compatible.



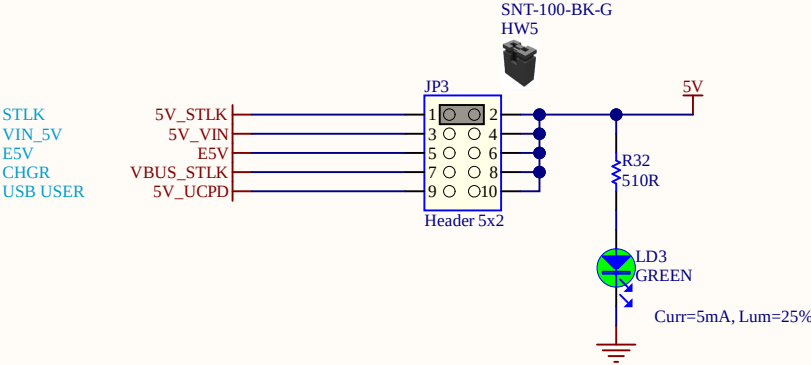
VIN / 5V PWR



3V3 PWR : 500mA

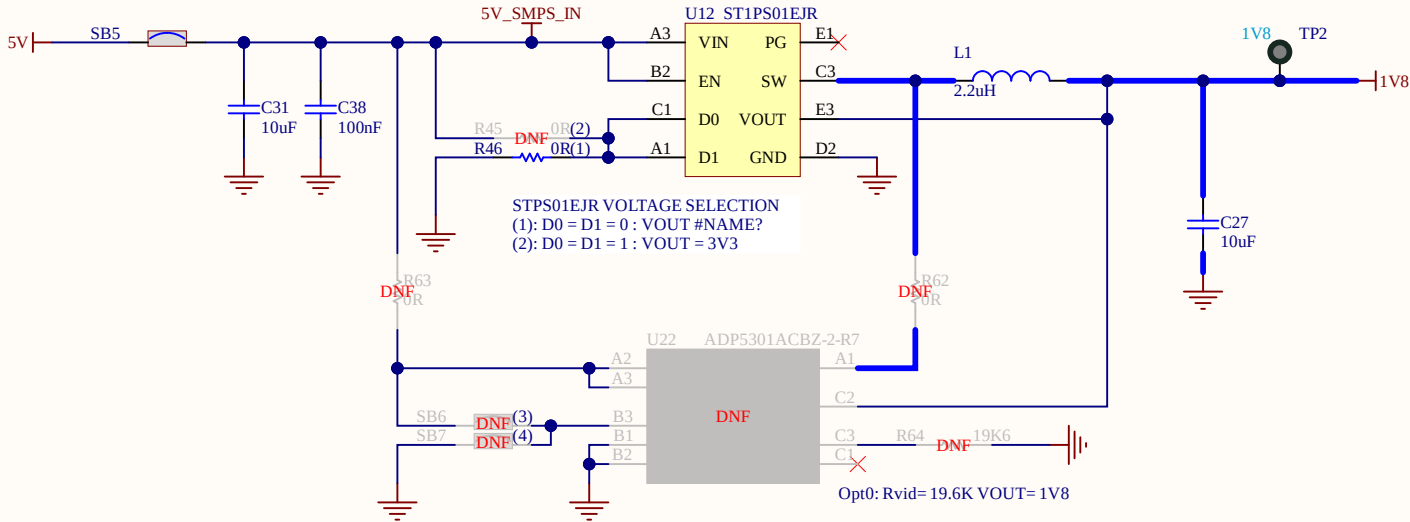


5V PWR SELECTION



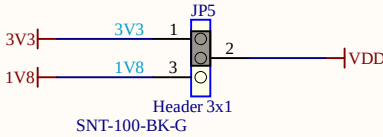
STLK (5V_STLK): 5V from USB-STLINK CONNECTOR WITH VOLTAGE AND CURRENT PROTECTION
VIN (5V_VIN): 5V from ARDUINO VIN (7-12V) WITH VOLTAGE REGULATION TO 5V
E5V (E5V): 5V from MORPHO CONNECTOR
CHGR (VBUS_STLK): 5V from USB-STLINK CONNECTOR WITHOUT VOLTAGE AND CURRENT PROTECTION. CAN BE USED WITH WALL CHARGER.
USB USER (5V_UCPD): 5V from USB USER CONNECTOR

1V8 PWR : 400mA



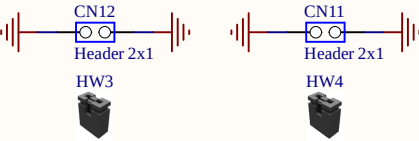
ADP5301 MODE SELECTION
(3): SYNC/MODE = 1 = PWM MODE (500mA)
(4): SYNC/MODE = 0 = HYSTERESIS MODE (50mA)

VDD_SELECTION AND CURRENT MEASUREMENT

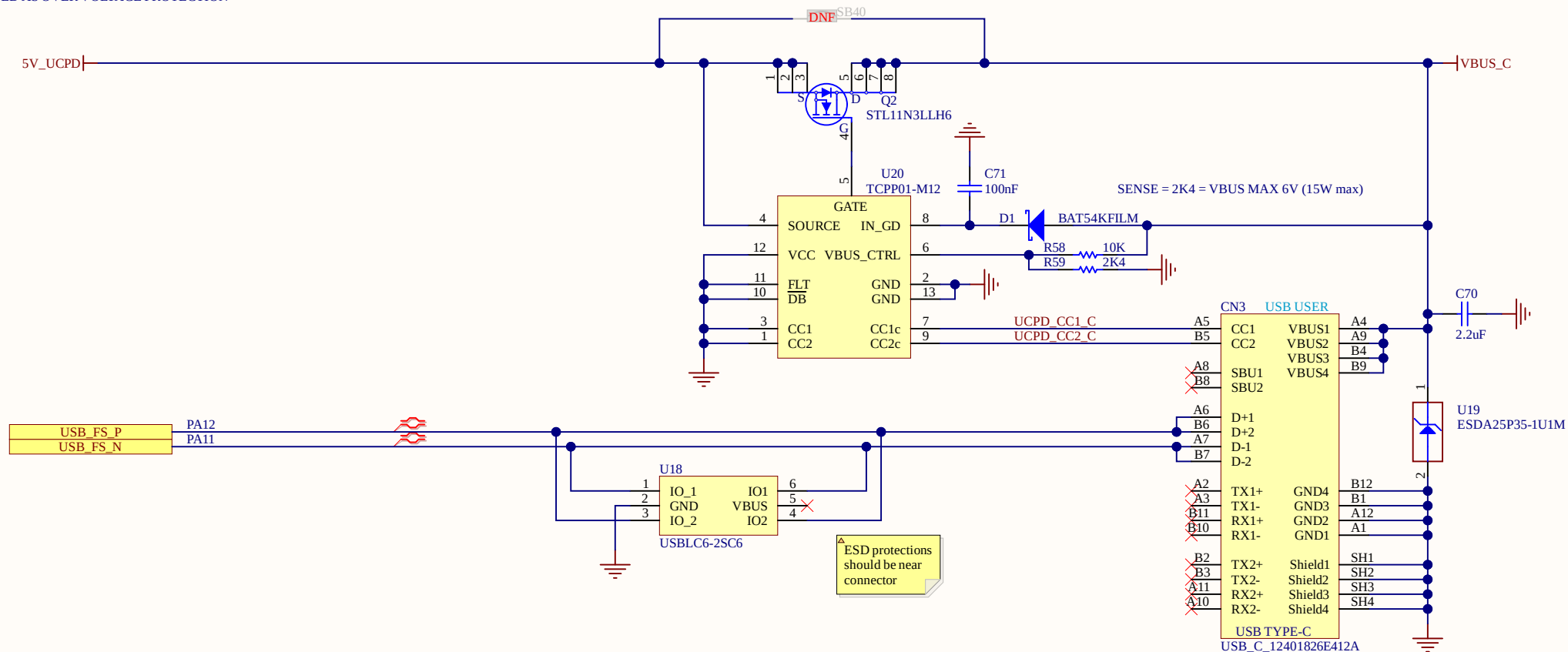


VDD table	JP5
VDD = 3V3	[1-2]
VDD = 1V8	[2-3]

GND



TCPP01 USED AS OVER VOLTAGE PROTECTION



USB_VBUS OK LED
Curr=5mA, Lum=25%

5V_UCPD

R60
47K

R57
10K

T1
NPN SOT23

USB_5V
LD6
GREEN

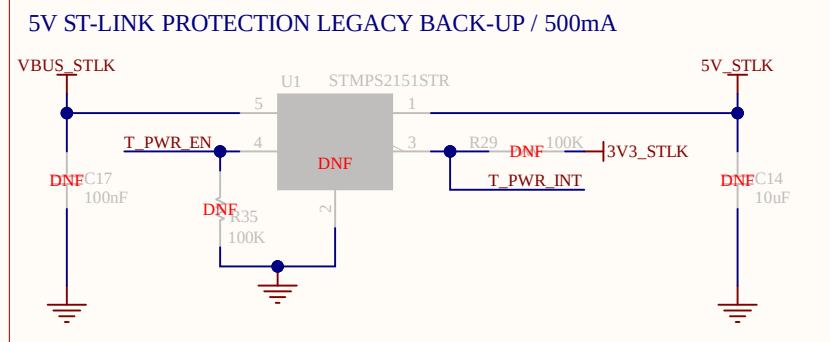
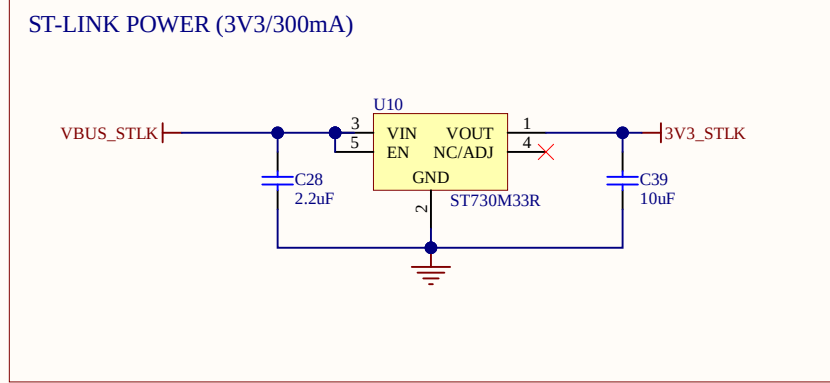
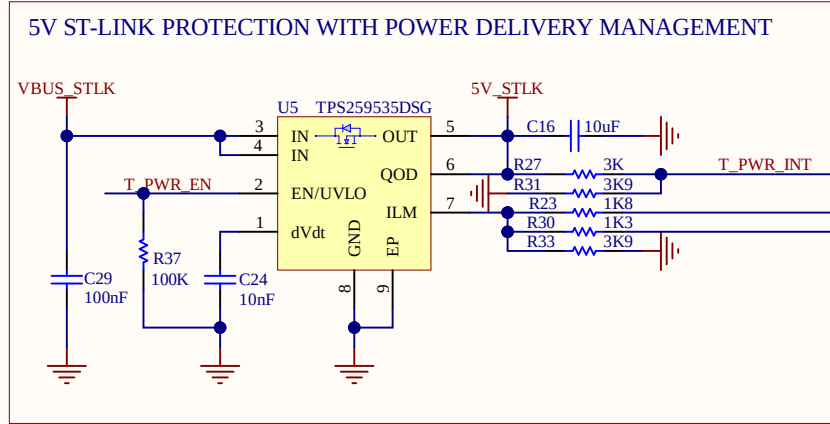
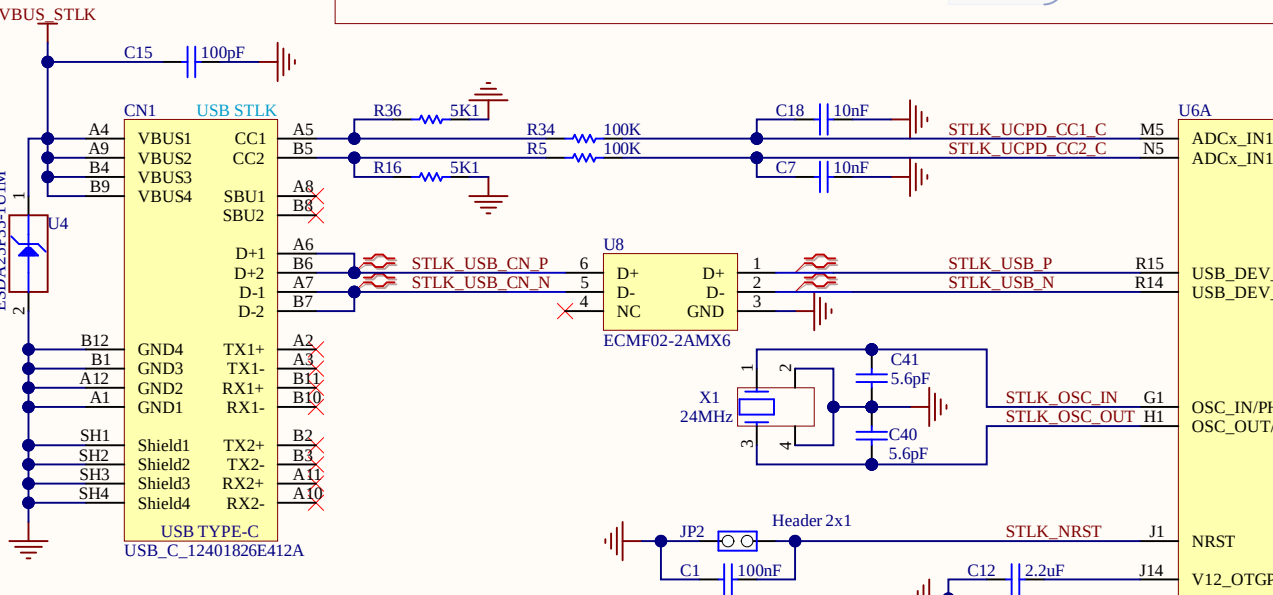
R61
270R

3V3

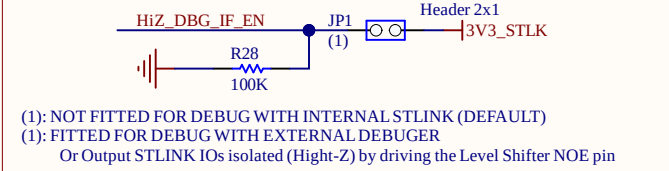
Title: USB USER		
Project: Nucleo-64 SMPs		
Variant: U385RGQ		
Revision: E-01		Reference: MB1841
Size: A4	Date: 16-DEC-24	Sheet: 7 of 9



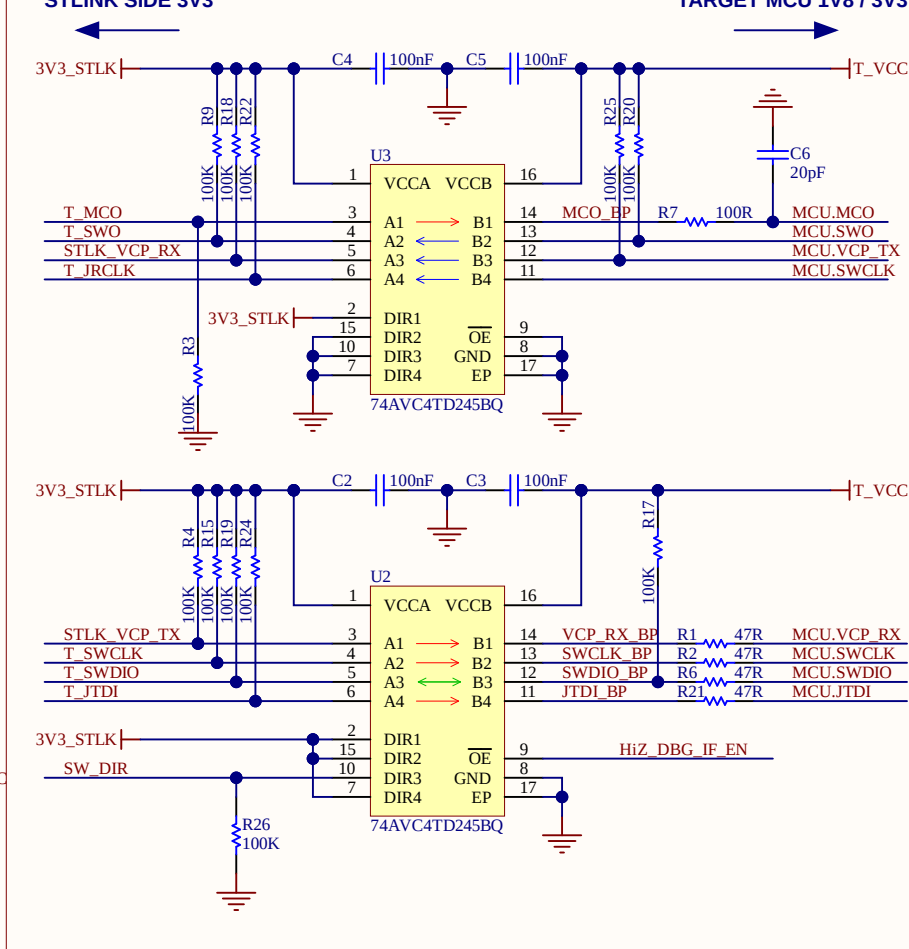
STLINK-V3EC



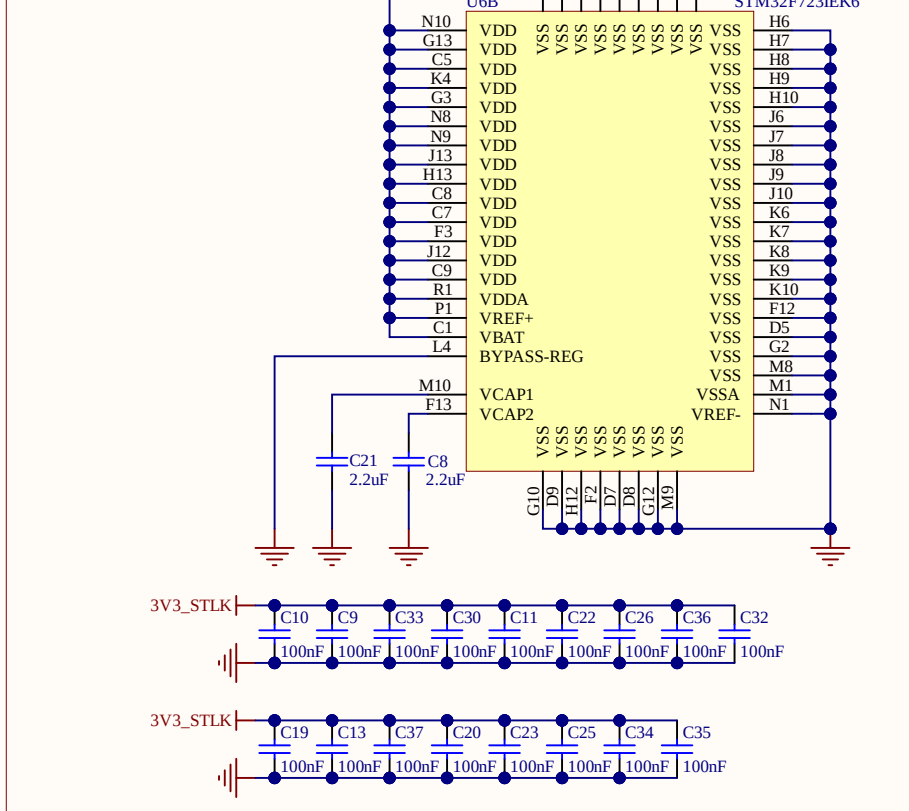
DEBUGGER SELECTION



VOLTAGE LEVEL SHIFTER

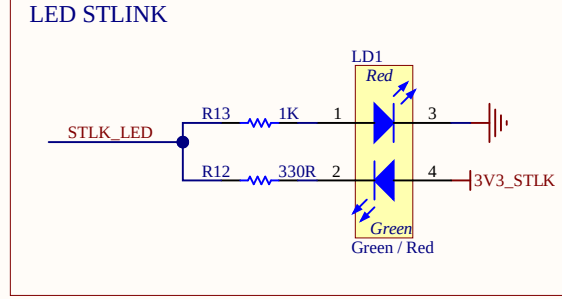
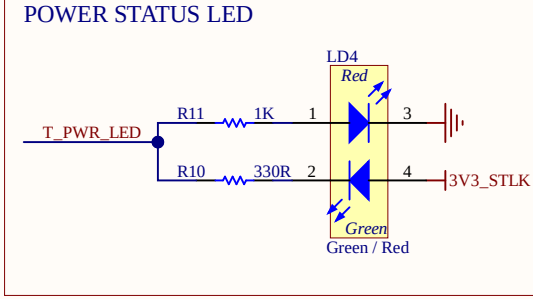


STLINK POWER



	T_PWR_SEL2/PD5	T_PWR_SEL1/PD4
PowerDefault.SNK (current limit: 550mA)	Hi-Z	Hi-Z
Power1.5.SNK (current limit: 1.66A)	Hi-Z	0
Power3.0.SNK (current limit: 3.2A)	0	0

Hi-Z = IO set in high impedance



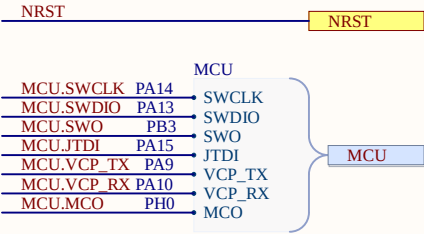
STLINK UNUSED PART	
A9	SPI_NSS/PB4
M3	SPI_MOSI/PC1
M4	SPI_MISO/PC2
E15	SPI_SCK/PA9
A5	I2C_SCL/PB8
B4	I2C_SDA/PB9
C15	CAN_RX/PA11
B15	CAN_TX/PA12
A2	GPIO0/PE2
B1	GPIO1/PE4
B2	GPIO2/PE5
B3	GPIO3/PE6
N13	UART_RTS/PD12
R13	UART_RX/PB11
B14	UART_TX/PC10
N14	UART_CTS/PD11

STM32F723IEK6

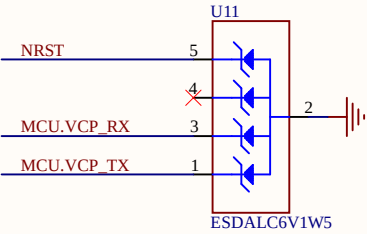
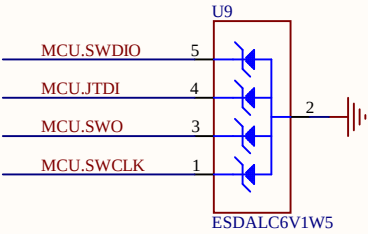
BACK-UP FOR CONFIGURATION WITHOUT LS	
STLINK SIDE 3V3	TARGET MCU 3V3
T_MCO	R102 0R MCO_BP
T_SWO	R103 0R MCU.SWO
STLK_VCP_RX	R104 0R MCU.VCP_TX
T_JRCLK	R105 0R MCU.SWCLK
STLK_VCP_TX	R106 0R VCP_RX_BP
T_SWCLK	R107 0R SWCLK_BP
T_SWCLK	R108 0R SWDIO_BP
T_JTDI	R109 0R JTDI_BP



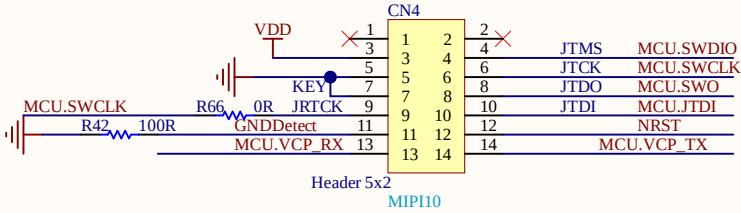
EXTERNAL DEBUGGER INTERFACE



ESD PROTECTIONS

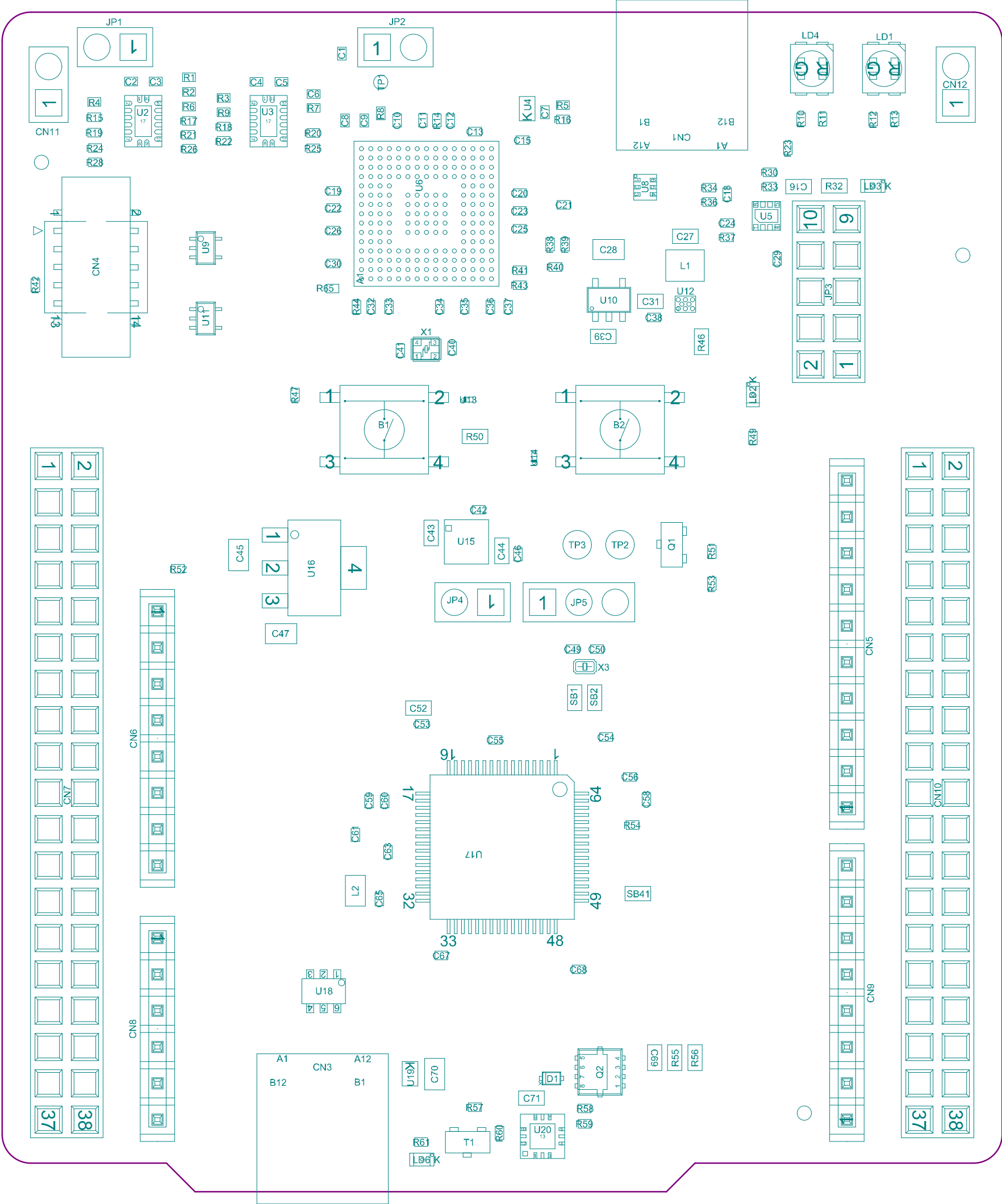


STDC14 RECEIVER

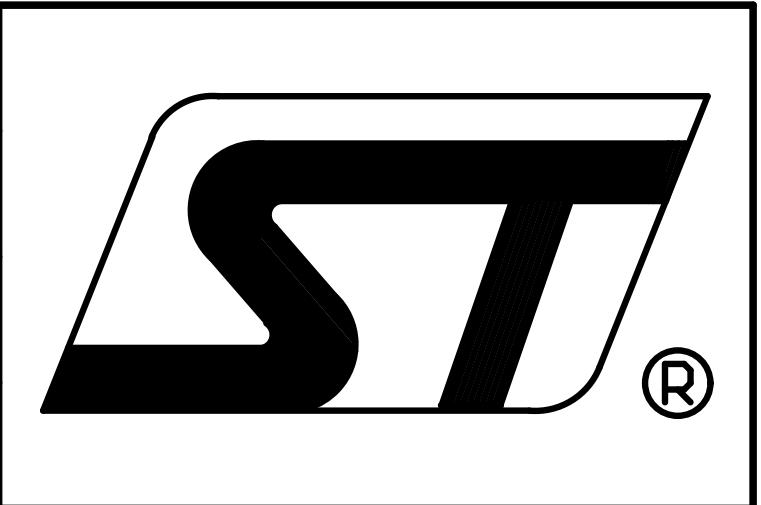


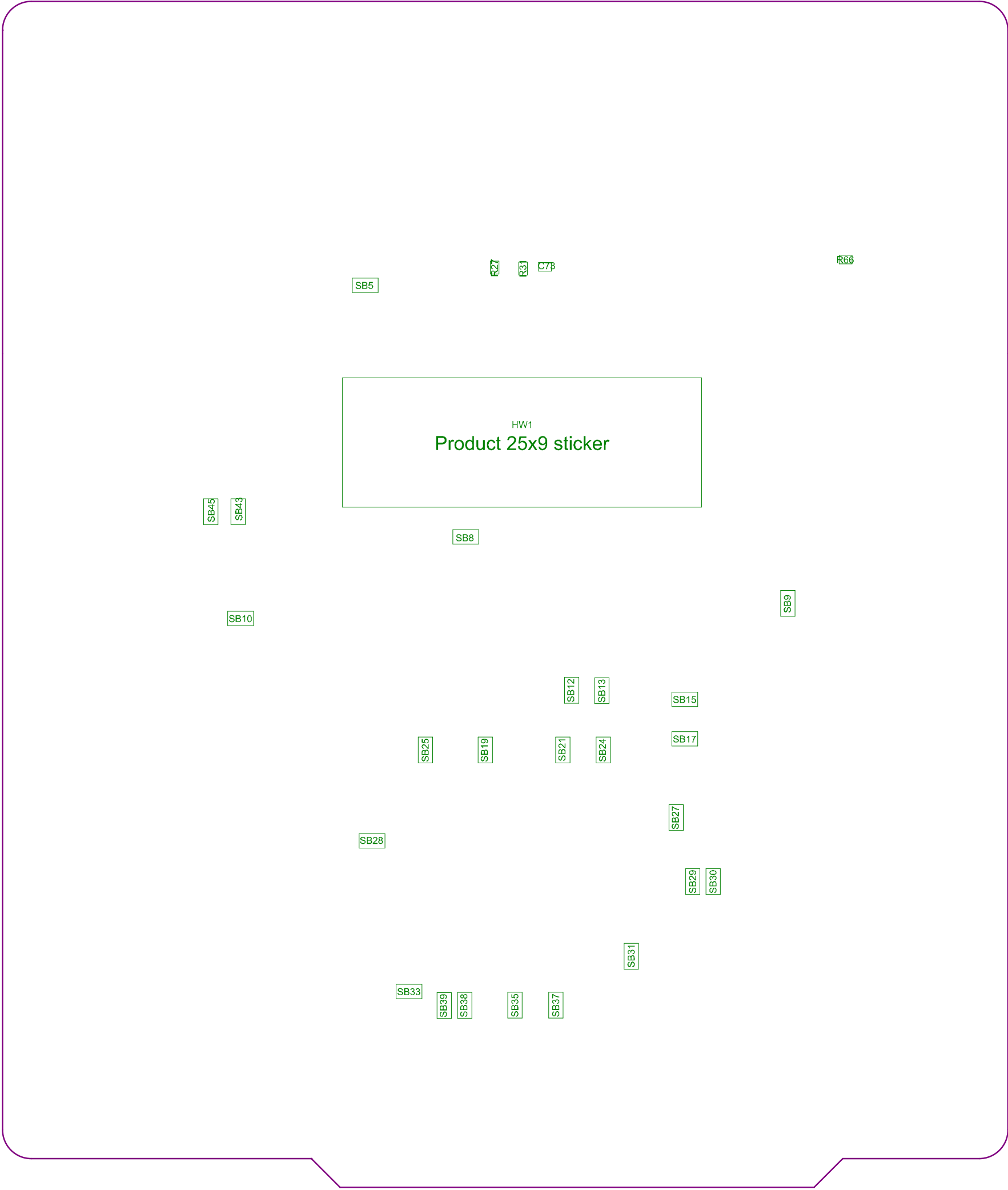
△ Specific constraints for MCU.SWDIO and MCU.SWCLK (must be same length and must be





Project: Nucleo-64 SMPS	
Layer: M14-Top Assembly	Gerber: .GM14
Variant: U385RGQ	MB1841
Date: 16-DEC-24	Rev: E





Project: Nucleo-64 SMPS

Layer: M15-Bottom Assembly

Variant: U385RGQ

Date: 16-DEC-24

Gerber:.GM15

MB1841

Rev: E



