UM2033
User manual

Discovery kit with STM32F769NI MCU

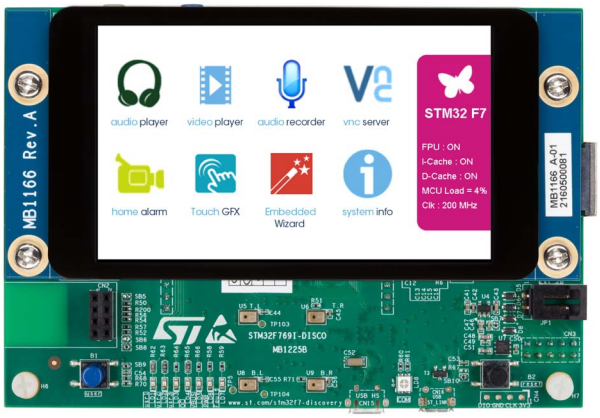
Introduction

The 32F769IDISCOVERY discovery kit is a complete demonstration and development platform for STMicroelectronics ARM® Cortex®-M7 core-based STM32F769NIH6 microcontroller. This microcontroller features four I^2Cs, six SPIs with three multiplexed simplex I^2S, 2xSDMMC, four USARTs, four UARTs, three CAN buses, three 12-bit ADCs, two 12-bit DACs, two SAIs, 8- to 14-bit digital camera module interface, internal 512+4-Kbyte SRAM and 2-Mbyte Flash memory, USB HS OTG and USB FS OTG, Ethernet MAC, FMC interface, Quad-SPI interface, SWD debugging support. This discovery kit offers everything required for users to get started quickly and develop applications easily.

The full range of hardware features on the 32F769IDISCOVERY discovery kit helps to evaluate almost all peripherals (USB OTG HS, Ethernet 10/100 Mb, microSD card, USART, SAI Audio DAC stereo with two audio jacks for input and output, MEMS digital microphones, SDRAM, Quad-SPI Flash memory, DSI interface LCD with capacitive multi-touch panel, SPDIF input and output, etc.) and to develop applications. Arduino™ Uno V3 connectors make it possible to easily connect extension shields or a daughterboard for specific application. The integrated ST-LINK/V2-1 provides an embedded in-circuit debugger and programmer for the STM32.

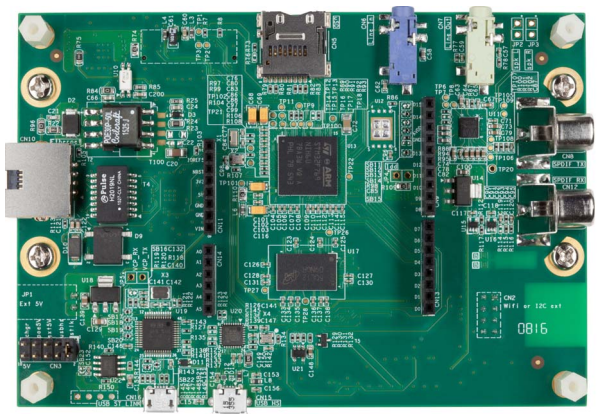
The 32F769IDISCOVERY discovery kit (*Figure 1* and *Figure 2*) comes with the STM32 comprehensive software HAL library together with various packaged software examples.

Figure 1. 32F769IDISCOVERY discovery kit



(top view)

Figure 2. 32F769IDISCOVERY discovery kit



(bottom view)

1. Pictures not contractual.

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1 Features

- STM32F769NIH6 microcontroller featuring 2-Mbyte Flash memory and 512+16+4 Kbytes of RAM, in BGA216 package
- On-board ST-LINK/V2-1 supporting USB reenumeration capability
- USB ST-LINK functions: virtual COM port, mass storage, debug port
- 4" capacitive touch LCD display with MIPI® DSI connector
- SAI audio codec
- Two audio line jacks, one for input and one for output
- Stereo speaker outputs
- Four ST MEMS microphones on DFSDM inputs
- Two SPDIF RCA input and output connectors
- Two push-buttons (user and reset)
- 512-Mbit Quad-SPI Flash memory
- 128-Mbit SDRAM
- Connector for microSD card
- Wi-Fi or Ext-EEP daughterboard connector
- USB OTG HS with Micro-AB connector
- Ethernet connector compliant with IEEE-802.3-2002
- Five power supply options:
  - ST LINK/V2-1
  - USB HS connector
  - 5 V from RJ45 (Power Over Ethernet)
  - 5 V from Arduino™ or external connector
  - USB charger
- Power Over Ethernet based on IEEE 802.3af (Powered Device, 48 V to 5 V, 3 W)
- Power supply output for external applications: 3.3 V or 5 V
- Arduino™ Uno V3 connectors
- Comprehensive free software including a variety of examples, part of the STM32Cube package
- Supported by a wide choice of integrated development environments

2 Demonstration software

The demonstration software is preloaded in the STM32F769NIH6 Flash memory. The latest versions of the demonstration source code and associated documentation can be downloaded from www.st.com/stm32f7-discovery.

3 Product marking

Evaluation tools marked as "ES" or "E" are not yet qualified and therefore they are not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference design or in production.

"E" or "ES" marking examples of location:

- On the targeted STM32 that is soldered on the board (for illustration of STM32 marking, refer to the section "Package information" of the STM32 datasheet at *www.st.com*).
- Next to the evaluation tool ordering part number, that is stuck or silkscreen printed on the board

4 Ordering information

To order the discovery kit with the STM32F769NI MCU, use the order code: STM32F769I-DISCO.

5 Technology partners

MICRON:

- 128-Mbit SDRAM, part number MT48LC4M32B2

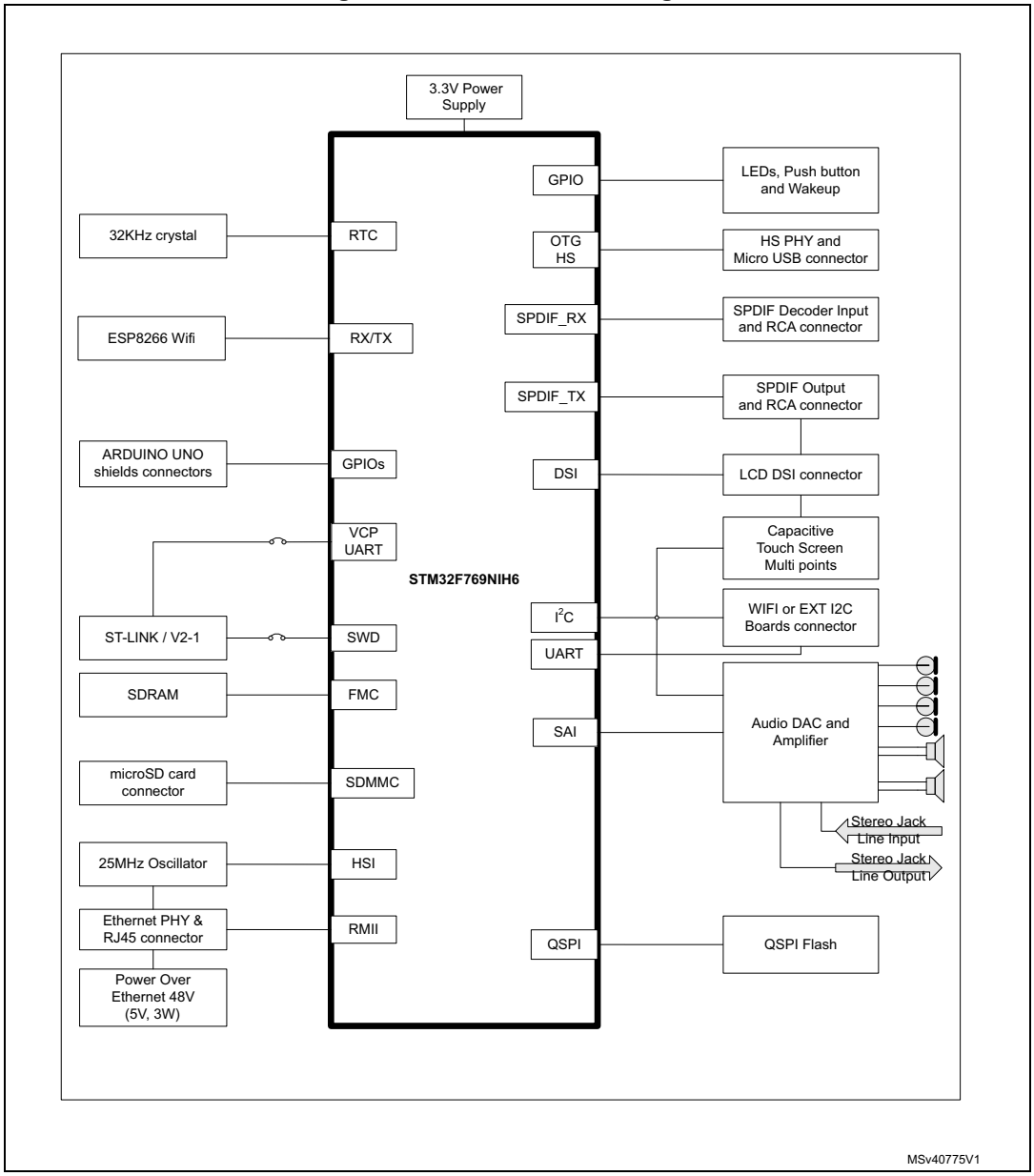
MACRONIX:

- 512-Mbit Quad-SPI NOR Flash memory device, part number MX25L51245G

6 Hardware layout and configuration

The 32F769IDISCOVERY discovery board is designed around the STM32F769NIH6 (216-pin TFBGA package). The hardware block diagram (see *Figure 3*) illustrates the connection between the STM32F769NIH6 and the peripherals (SDRAM, Quad-SPI Flash memory, LCD DSI connector, USB OTG connectors, USART, Ethernet, Audio, SPDIF RCA in, SPDIF RCA out, microSD card, Arduino Uno shields and embedded ST-LINK). *Figure 4* and *Figure 5* will help to locate these features on the actual discovery board. The mechanical dimensions of the board are showed in *Figure 6*.

Figure 3. Hardware block diagram



6.1 The 32F769IDISCOVERY discovery board layout

Figure 4. 32F769IDISCOVERY top layout

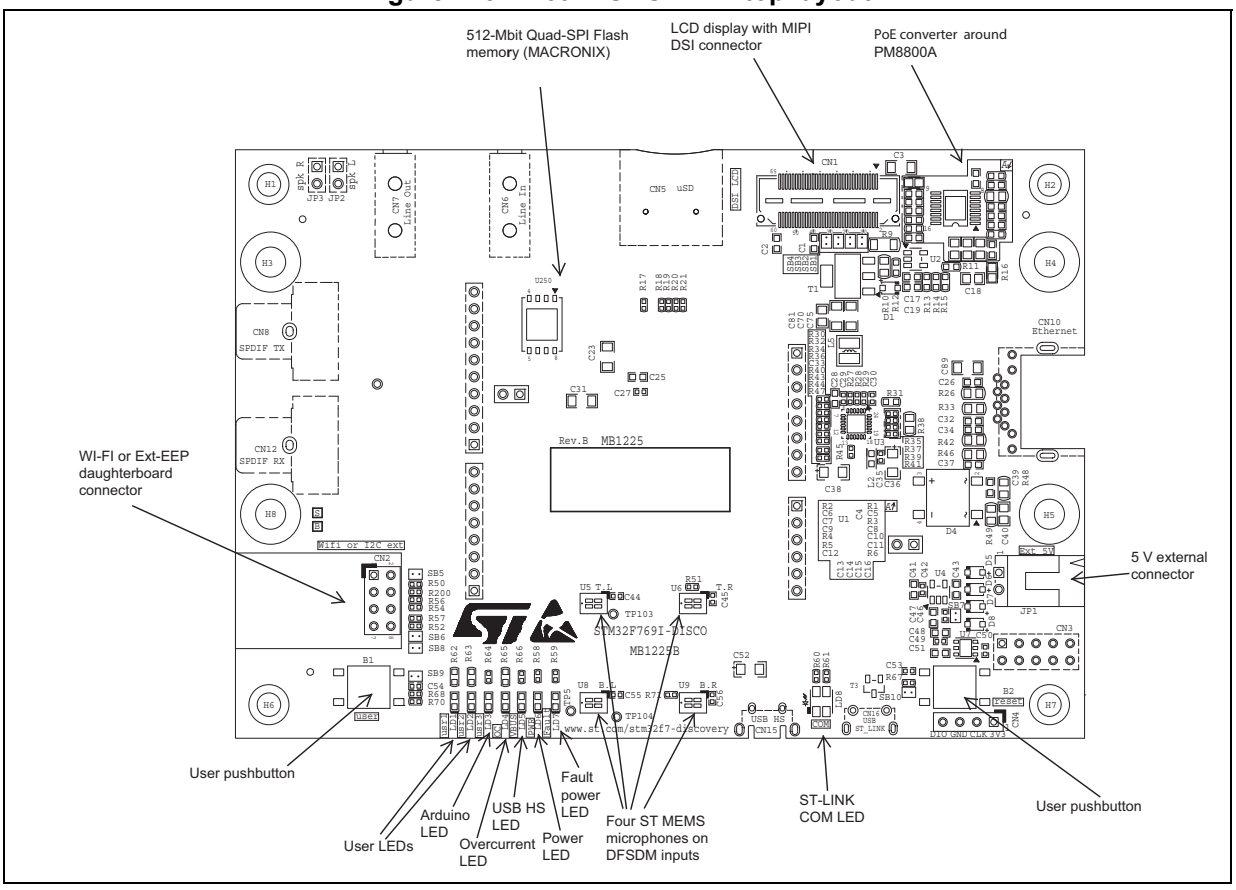
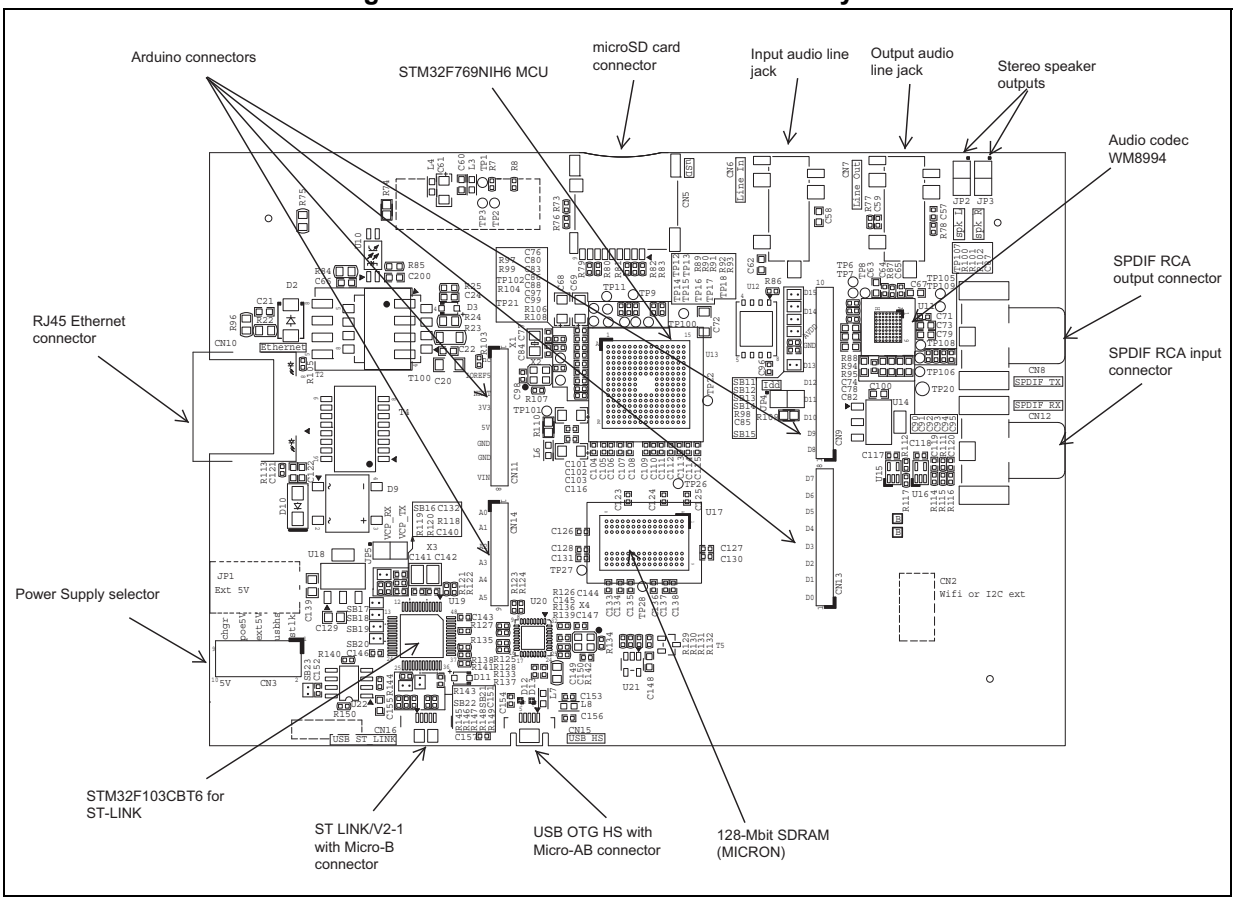
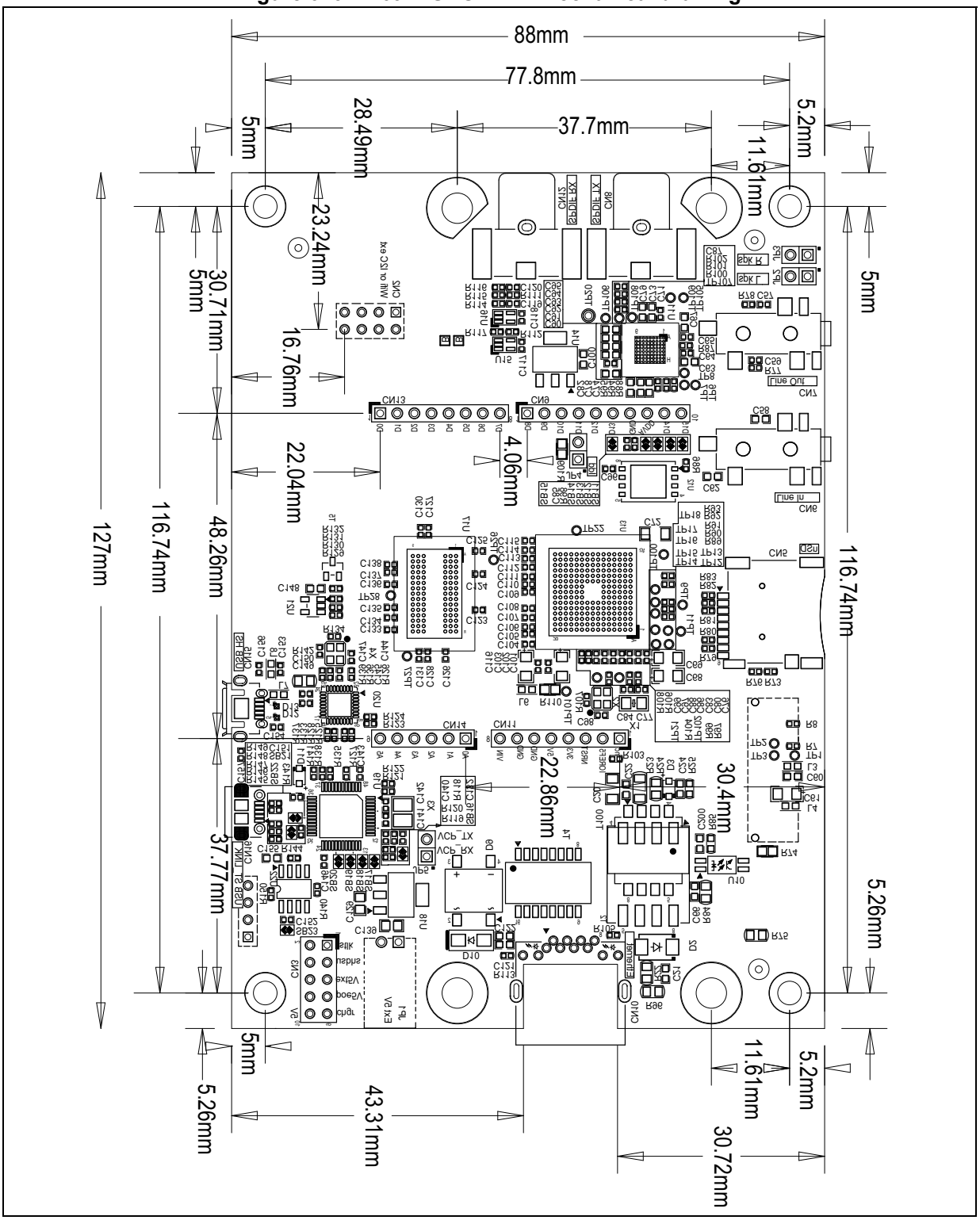


Figure 5. 32F769IDISCOVERY bottom layout



6.2 The 32F769IDISCOVERY discovery board mechanical drawing

Figure 6. 32F769IDISCOVERY mechanical drawing



6.3 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated on the 32F769IDISCOVERY discovery board. Compared to ST-LINK/V2 the changes are listed below.

The new features supported on ST-LINK/V2-1 are:

- USB software re-enumeration
- Virtual Com port interface on USB
- Mass storage interface on USB
- USB power management request for more than 100mA power on USB

These features are no more supported on ST-LINK/V2-1:

- SWIM interface
- Application voltage lower than 3 V

For all general information concerning debugging and programming features common between V2 and V2-1 versions, refer to *ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32* User manual (UM1075).

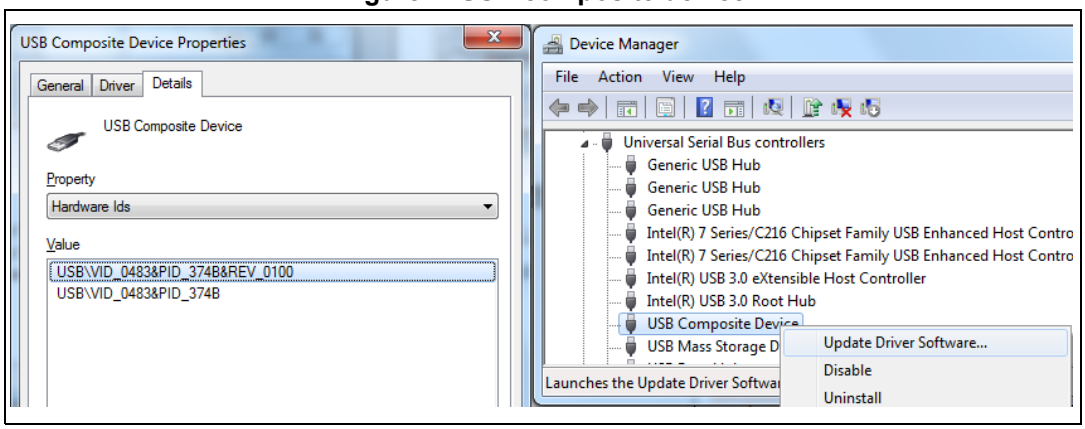
6.3.1 Drivers

The ST-LINK/V2-1 requires a dedicated USB driver, which, for Windows® XP, 7 and 8, can be found at *www.st.com*.

In case the 32F769IDISCOVERY discovery board is connected to the PC before the driver is installed, some 32F769IDISCOVERY interfaces may be declared as "unknown" in the PC device manager. In this case the user must install the driver files, and update the driver of the connected device from the device manager.

Note: Prefer using the "USB Composite Device" handle for a full recovery.

Figure 7. USB composite device



6.3.2 ST-LINK/V2-1 firmware upgrade

The ST-LINK/V2-1 embeds a firmware upgrade mechanism for in-situ upgrade through the USB port. As the firmware may evolve during the life time of the ST-LINK/V2-1 product (for example new functionality, bug fixes, support for new microcontroller families), it is

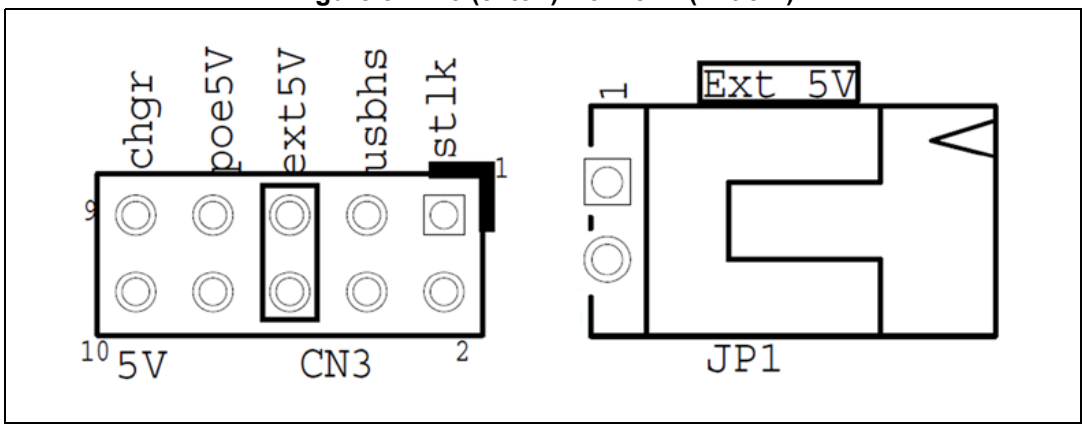
recommended to visit *www.st.com* before starting to use the 32F769IDISCOVERY board and periodically, to stay up-to-date with the latest firmware version.

6.4 Power supply

The 32F769IDISCOVERY discovery board is designed to be powered by the 5 V DC power supply. It is possible to configure the discovery board to use any of the following five sources for the power supply:

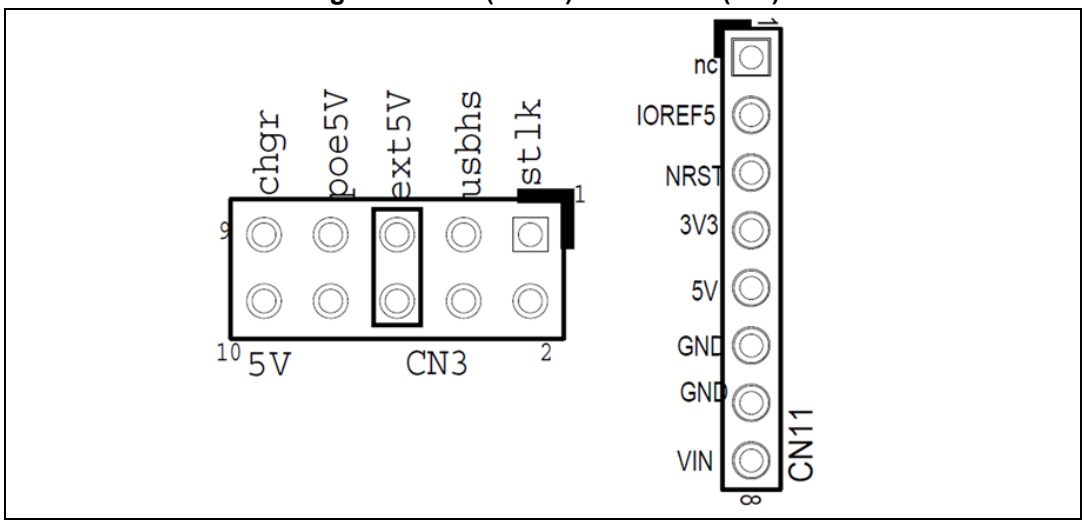
- 5 V DC power adapter connected to JP1 (Ext 5 V). In this case, the 32F769IDISCOVERY discovery board must be powered by a power supply unit or by an auxiliary equipment complying with the standard EN-60950-1: 2006+A11/2009, and must be Safety Extra Low Voltage (SELV) with limited power capability (5 V power source on the silkscreen of JP1 (Ext 5 V). See *Figure 8*:

Figure 8. CN3 (ext5V) from JP1 (Ext 5 V)



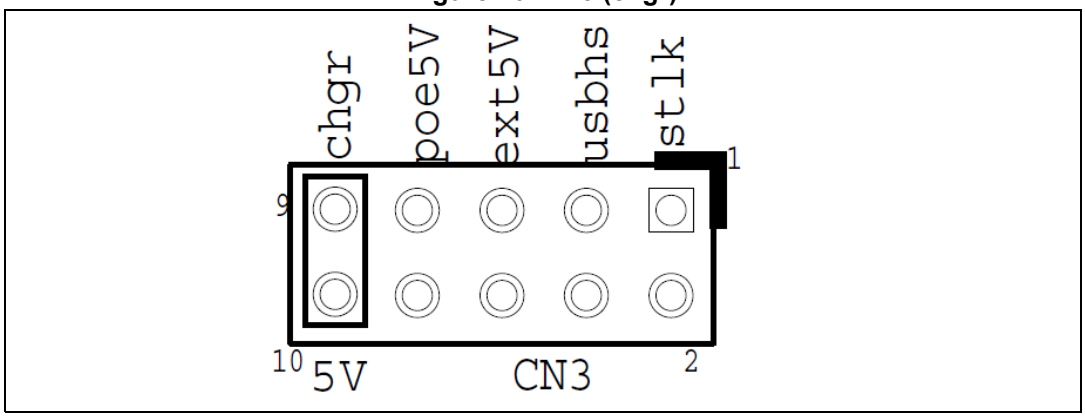
- 7-12 V DC power from CN11 pin named Vin on silkscreen, the extension connectors for Arduino UNO shields or daughterboard (5 V power source on silkscreen of JP1 (Ext 5 V). See *Figure 9*:

Figure 9. CN3 (ext5V) from CN11 (Vin)



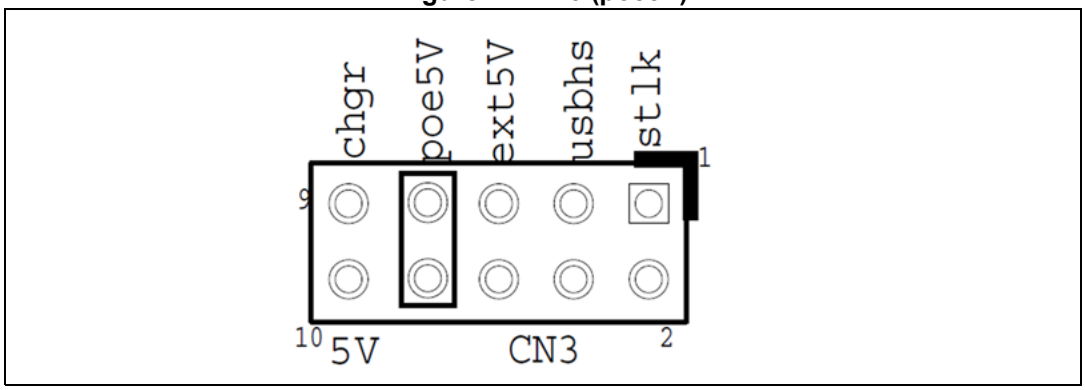
- 5 V DC power charger connected to USB ST-LINK (CN16). In this case, if the 32F769IDISCOVERY discovery board is powered by an external USB charger then the debug is not available. If the board is connected to the PC instead of the charger then the limitation is no more effective and that could damage the PC (5 V power source on silkscreen of CN3 (chgr). See *Figure 10*:

Figure 10. CN3 (chgr)



- 48 V DC power from RJ45 connector CN10 (Ethernet). In this case, the on-board module PoE (Power over Ethernet) generates the 5 V and it is able to provide up to 600 mA. This module is a Powered Device complying with the standard IEEE802.3af, class 1 / 2. The external power supply must be fully IEEE 802.3af compliant (5 V power source on silkscreen of CN3 (poe5V). See *Figure 11*:

Figure 11. CN3 (poe5V)

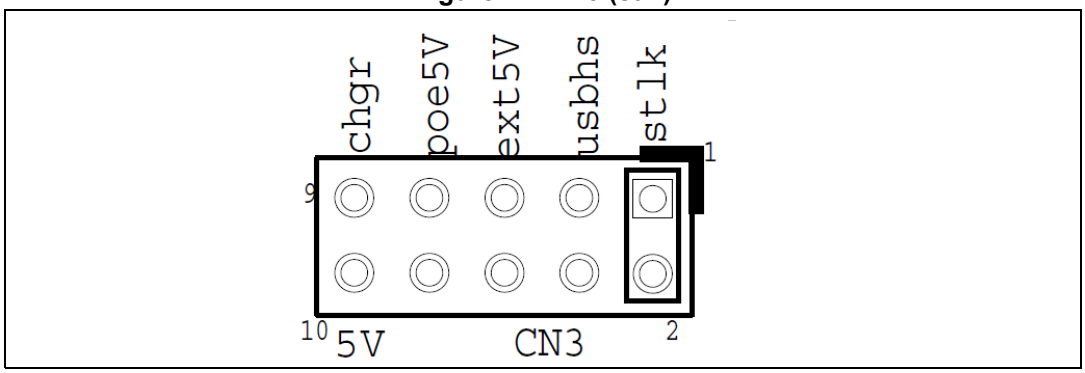


- 5 V DC power with limitation from CN16, the USB type micro-B connector of ST-LINK/V2-1 (USB 5 V power source on silkscreen of CN3 (stlk). It is the default setting. If the USB enumeration succeeds (as explained below), the ST-LINK 5 V link power is enabled, by asserting the PWR_ENn signal. This pin is connected to a power switch ST890, which powers the board. This power switch also features a current limitation to protect the PC in case of a short-circuit on the board (more than 700 mA). See *Figure 12*.

The 32F769IDISCOVERY discovery board can be powered from the ST-LINK USB connector CN16 (stlk), but only the ST-LINK circuit has the power before the USB enumeration, because the host PC only provides 100 mA to the board at that time. During the USB enumeration, the 32F769IDISCOVERY board asks for the 500 mA power to the host PC. If the host is able to provide the required power, the enumeration finishes by a "SetConfiguration" command and then, the power transistor ST890 is switched ON, the red

LED LD6 is turned ON, thus the 32F769IDISCOVERY board can consume maximum 500 mA current, but no more. If the host is not able to provide the requested current, the enumeration fails. Therefore the ST890 remains OFF and the STM32 part including the extension board will not be powered. As a consequence the red LED LD6 remains turned OFF. In this case it is mandatory to use an external power supply.

Figure 12. CN3 (stlk)



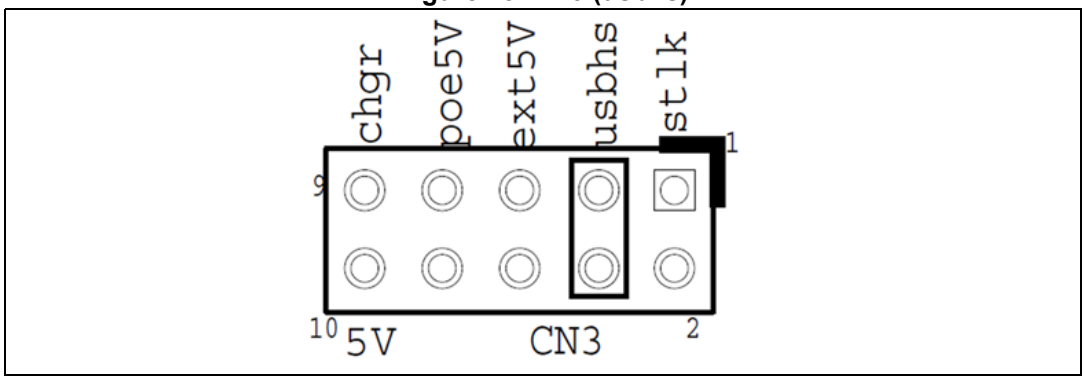
Note: In case the board is powered by a USB charger, there is no USB enumeration, so the led LD2 remains set to OFF permanently and the board is not powered. Only in this specific case, the resistor R138 needs to be soldered, to allow the board to be powered anyway.

The LED LD6 is lit when the 32F769IDISCOVERY discovery board is powered by the 5 V correctly.

Caution: Do not connect the PC to the ST-LINK (CN16) when R138 is soldered. The PC may be damaged or the board not powered correctly.

- 5 V DC power with 500 mA limitation from CN15, the USB OTG HS micro-AB connector (5 V power source on silkscreen of CN3 (usbhs)). See *Figure 13*:

Figure 13. CN3 (usbhs)



6.5 Programing/debugging when the power supply is not from ST-LINK (5 V link)

It is mandatory to power the board first using JP1 (Ext 5 V) or CN11 (Vin) or CN10 (Ethernet) or CN15 (usbhs), then connecting the USB cable to the PC. Proceeding this way ensures that the enumeration succeeds thanks to the external power source.

The following power sequence procedure must be respected:

1. Connect the jumper CN3 on (ext5V) or (usbhs) or (poe5V)
2. Connect the external power source to JP1 or CN11 or CN10 or CN15
3. Check the red LED LD2 is turned ON
4. Connect the PC to USB connector CN16

If this order is not respected, the board may be powered first by VBUS from the ST-LINK, and the following risks may be encountered:

1. If more than 500 mA current is needed by the board, the PC may be damaged or current can be limited by the PC. As a consequence the board is not powered correctly.
2. 500 mA will be requested at the enumeration, so there is a risk that the request is rejected and the enumeration does not succeed if the PC cannot provide such current.

6.6 Clock sources

Up to 3 clock sources as described below:

- X1, 24MHz oscillator for USB OTG HS PHY
- X2, 25MHz oscillator for the STM32F769NIH6 microcontroller and Ethernet PHY
- X3, 32KHz crystal for the STM32F769NIH6 embedded RTC

6.7 Reset sources

The reset signal of the 32F769IDISCOVERY discovery board is active low and the reset sources include:

- Reset button B2
- Arduino Uno shield board from CN11
- Embedded ST-LINK/V2-1

6.8 Audio

An audio codec WM8994ECS/R from CIRRUS with 4 DACs and 2 ADCs is connected to the SAI interface of the STM32F769NIH6. It communicates with the STM32F769NIH6 via I^2C bus shared with the touch panel of the LCD DSI:

- The analog line input is connected to ADC of WM8994ECS/R through the audio jack CN6.
- The analog line output is connected to DAC of WM8994ECS/R via the audio jack CN7.
- Two external speakers can be connected to WM8994ECS/R via the JP2 for the left speaker and JP3 for the right speaker.
- Four digital microphones (ST MEMS microphone) MP34DT01TR are on the 32F769IDISCOVERY discovery board. They are connected to the input digital microphones of the STM32F769NIH6 and are managed by the DFSDM functionality.
- One coaxial connector CN12 is implemented on the 32F769IDISCOVERY to receive an external audio data compatible with SPDIF specification.
- One coaxial connector CN8 is implemented on the 32F769IDISCOVERY to output external audio data compatible with SPDIF specification.

6.9 USB OTG HS

32F769IDISCOVERY discovery board supports USB OTG high speed communication via a USB micro-AB connector and a USB high speed PHY USB3320C-EZK from MICROCHIP for high speed function.

The discovery board can be powered by the USB connectors at 5 V DC with 500 mA current limitation.

A USB power switch is also connected on VBUS and provides power to CN15. The green LED LD5 will be lit in one of these cases:

- Power switch is ON and 32F769IDISCOVERY works as a USB host
- VBUS is powered by another USB host when 32F769IDISCOVERY works as a USB device.

The red LED LD4 will be lit when an overcurrent occurs.

Note: 32F769IDISCOVERY board should be powered by an external power supply when using OTG function.

6.10 microSD card

The 2-Gbyte (or more) microSD card connected to SDMMC2 port of STM32F769NIH6 is supported by the board.

6.11 Ethernet

The 32F769IDISCOVERY discovery board supports 10M/100M Ethernet communication by a PHY LAN8742A-CZ-TR from MICROCHIP and integrated RJ45 connector. Ethernet PHY is connected to the STM32F769NIH6 via RMII interface.

25 MHz clock for the PHY is generated by the oscillator X2, the 50 MHz clock for the STM32F769NIH6 is generated by the PHY RMII_REF_CLK.

6.12 Power over Ethernet

The 32F769IDISCOVERY discovery board integrates a power module that uses Ethernet. This module is an IEEE802.3af compliant, class 1 / 2 PoE converter based on the simple diode rectified Flyback topology around the PM8800A component from ST. This module "Powered Device" accepts input voltage of 48 V and is able to provide 5 V with 600 mA.

6.13 SDRAM memory

128-Mbit SDRAM (MT48LC4M32B2B5-6A from MICRON) is connected to FMC interface of the STM32F769NIH6. This memory is used as 4M x 32bits.

6.14 Quad-SPI NOR Flash memory

512-Mbit Quad-SPI NOR Flash memory (MX25L51245GZ2I-08G from MACRONIX) is connected to the Quad-SPI interface of the STM32F769NIH6.

6.15 Virtual COM port

The serial interface USART3 is directly available as a virtual COM port of the PC connected to the ST-LINK/V2-1 USB connector CN1. The virtual COM port settings are configured as: 115200 b/s, 8 bits data, no parity, 1 stop bit, no flow control.

6.16 LCD display MIPI DSI

The color display on the board MB1166, 4-inch 800x472 LCD-TFT with capacitive touch panel is connected to the MIPI DSI interface of the STM32F769NIH6 (for technical information on the board refer to the *Section Appendix B: Schematics*). The DSI (Display Serial Interface) is a specification of the MIPI Alliance standard and defines the physical interface and the protocol used by the STM32F469NIH6 microcontroller to communicate with such LCD module.

6.17 Buttons and LEDs

The black button B2 located top side is the reset of the microcontroller STM32F769NIH6, refer to the *Figure 4: 32F769IDISCOVERY top layout*. The blue button B1 located top side is available to be used as a digital input or as alternate function Wake-up. When the button is depressed the logic state is 1, otherwise the logic state is 0. Four LEDs located top side are available for the user, refer to the *Figure 4: 32F769IDISCOVERY top layout*. From left to right the LEDs are LD1, LD2, LD3, and LD4 with colors green, orange, red, blue respectively. To light a LED a low logic state 0 should be written in the corresponding GPIO. *Table 1: Control port assignment* gives the assignment of the control ports to the LED indicators.

Table 1. Control port assignment

Reference	Color	Name	Comment
B1	BLUE	USER	Alternate function Wake-up
B2	BLACK	RESET	-
LD1	RED	USER1	PJ13
LD2	GREEN	USER2	PJ5
LD3	GREEN	Arduino	PA12
LD4	RED	OTG overcurrent	PD4
LD5	GREEN	VBUS USB HS	-
LD6	RED	5 V Power	-
LD7	RED	Fault Power	Current upper than 625 mA
LD8	RED/GREEN	STLINK COM	Green when communication

7 Connectors

7.1 Wi-Fi and I²C extension connector CN2

Figure 14. I²C extension connector CN2 (front view)

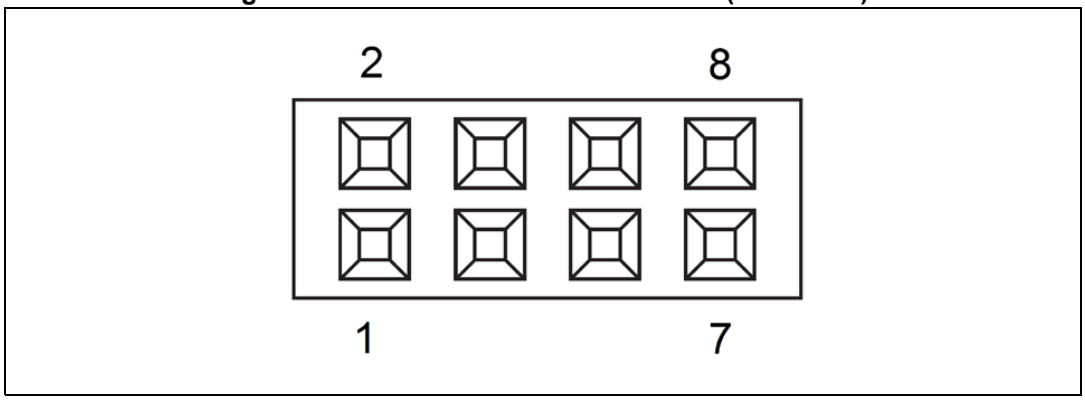
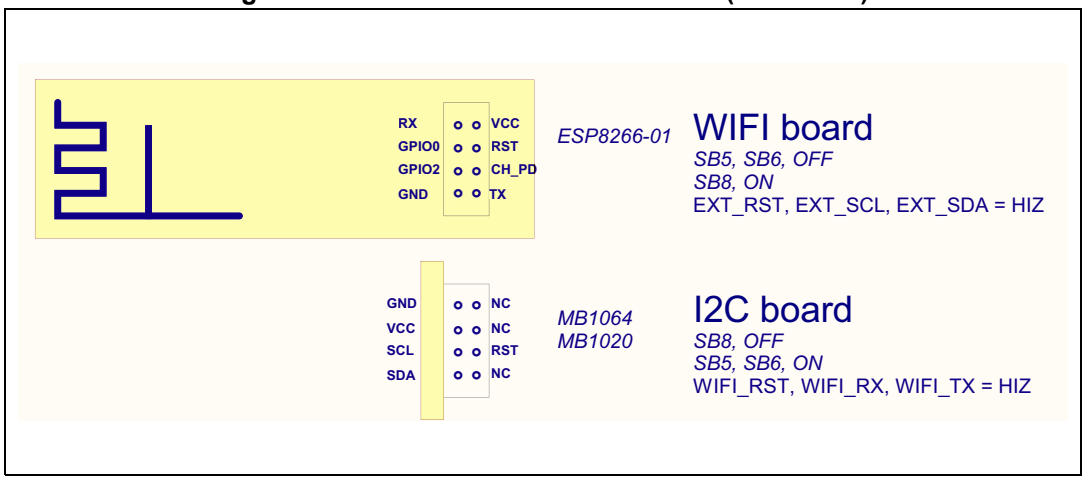


Table 2. Wi-Fi and I²C extension connector CN2

Pin number	Wi-Fi description	Pin number	I²C description
1	WIFI_RX	1	GND
2	3V3	2	NC
3	GPIO0	3	3V3
4	WIFI-RST	4	NC
5	GPIO2	5	EXT_SCL
6	CH_PD	6	EXT_RST
7	GND	7	EXT_SDA
8	WIFI_TX	8	NC

Figure 15. I²C extension connector CN2 (front view)



7.2 Arduino Uno V3 connectors

Table 3. Arduino connectors (CN11, CN14, CN13 and CN9)

Left connectors					-	Right connectors				
CN No.	Pin No.	Pin name	STM32 Pin	Function	-	Function	STM32 Pin	Pin name	Pin No.	CN No.
-					-	I2C1_SCL	PB8	D15	10	CN9 digital
						I2C1_SDA	PB9	D14	9	
						AVDD	-	AREF	8	
						Ground	-	GND	7	
CN11 power	1	NC	-	-		SPI2_SCK	PA12	D13	6	
	2	IOREF	-	3.3 V Ref		SPI2_MISO	PB14	D12	5	
	3	RESET	NRST	RESET		TIM12_CH2, SPI2_MOSI	PB15	D11	4	
	4	+3V3	-	3.3 V input/output		TIM1_CH4, SPI2_NSS	PA11	D10	3	
	5	+5 V	-	5 V output		TIM12_CH1	PH6	D9	2	
	6	GND	-	Ground		-	PJ4	D8	1	
	7	GND	-	Ground		-				
	8	VIN	-	Power input		-	PI3	D7	8	CN13 digital
-						TIM11_CH1	PF7	D6	7	
CN14 analog	1	A0	PA6	ADC1_IN6		TIM3_CH3	PC8	D5	6	
	2	A1	PA4	ADC1_IN4		-	PJ0	D4	5	
	3	A2	PC2	ADC1_IN12		TIM10_CH1	PF6	D3	4	
	4	A3	PF10	ADC3_IN8		-	PJ1	D2	3	
	5	A4	PF8 or PB(1)	ADC3_IN6 (PF8) or I2C1_SDA (PB9)		USART6_TX	PC6	D1	2	
	6	A5	PF9 or PB8(1)	ADC3_IN7 (PF9) or I2C1_SCL (PB8)		USART6_RX	PC7	D0	1	

1. For details refer to the *Table 11: 32F769IDISCOVERY IO assignment*.

7.3 USB OTG HS micro-AB connector CN15

Figure 16. USB OTG micro-AB connector CN15 (front view)

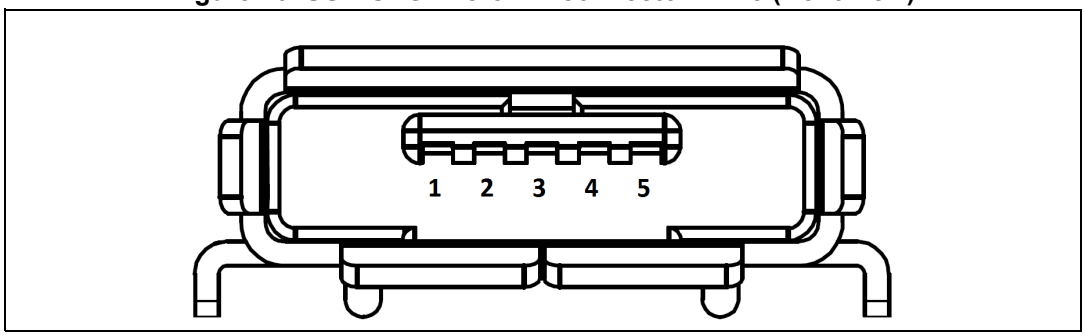


Table 4. USB OTG HS micro-AB CN15

Pin number	Description	Pin number	Description
1	VBUS	4	ID
2	D-	5	GND
3	D+	-	-

7.4 Ethernet RJ45 connector CN10

Figure 17. Ethernet RJ45 connector CN10 (front view)

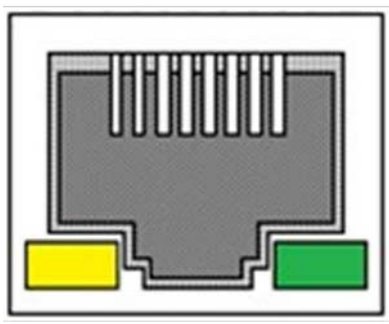


Table 5. Ethernet RJ45 connector CN10

Pin number	Description	Pin number	Description
1	TX+	7	-
2	TX-	8	-
3	RX+	9	K, yellow LED
4	-	10	A, yellow LED
5	-	11	K, green LED
6	RX-	12	A, green LED

7.5 LCD display MIPI DSI connector CN1

Figure 18. LCD display MIPI DSI connector CN1 (front view)

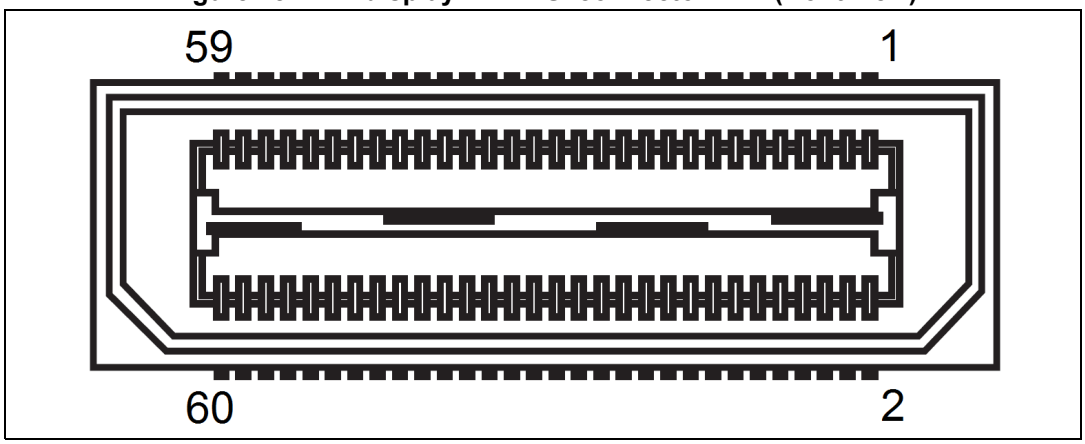


Table 6. LCD display MIPI DSI connector CN1

Pin No.	Description	Pin connection	Pin No.	Description	Pin connection
1	GND	-	2	-	-
3	DSI_CK_P	H12	4	LCD_INT	PI13
5	DSI_CK_N	H13	6	GND	-
7	GND	-	8	DSI_D2_P/GND	-
9	DSI_D0_P	J12	10	DSI_D2_N/GND	-
11	DSI_D0_N	J13	12	GND	-
13	GND	-	14	DSI_D3_P/GND	-
15	DSI_D1_P	F12	16	DSI_D3_N/GND	-
17	DSI_D1_N	F13	18	GND	-
19	GND	-	20	-	-
21	BLVDD(5 V)	-	22	-	-
23	BLVDD(5 V)	-	24	-	-
25	-	-	26	-	-
27	BLGND	-	28	-	-
29	BLGND	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	SCLK/MCLK	nc	36	3.3V	-
37	LRCLK	nc	38	-	-
39	SPDIF_I2S	PD11	40	I2C1_SDA	PB7
41	-	-	42	-	-
43	-	-	44	I2C1_SCL	PD12

Table 6. LCD display MIPI DSI connector CN1 (continued)

Pin No.	Description	Pin connection	Pin No.	Description	Pin connection
45	CEC_CLK	-	46	-	-
47	CEC	-	48	-	-
49	DSI_TE	PJ2	50	-	-
51	-	-	52	-	-
53	BL_CTRL	PI14	54	-	-
55	-	-	56	-	-
57	DSI_RESET	PJ15	58	-	-
59	-	-	60	1V8	-

7.6 microSD connector CN5

Figure 19. microSD connector CN5 (front view)

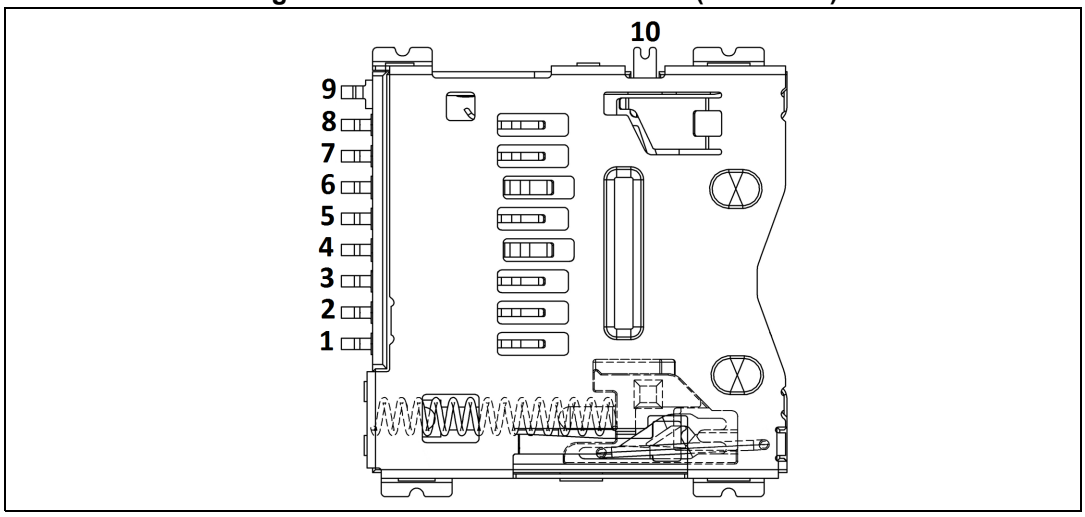


Table 7. microSD connector CN5

Pin number	Description	Pin number	Description
1	SDMMC2_D2	6	Vss/GND
2	SDMMC2_D3	7	SDMMC2_D0
3	SDMMC2_CMD (PD2)	8	SDMMC2_D1
4	+3.3V	9	GND
5	SDMMC2_CK (PC12)	10	microSD card_detect

7.7 ST-LINK/V2-1 USB Micro-B connector CN16

The USB connector CN16 is used to connect the embedded ST-LINK/V2-1 to PC for programming and debugging.

Figure 20. USB Micro-B connector CN16 (front view)

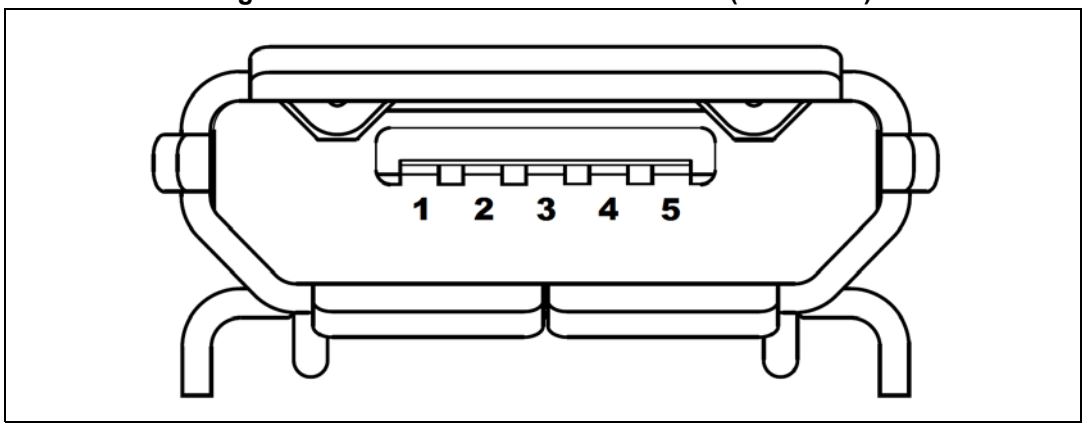


Table 8. USB Micro-B connector CN16

Pin number	Description	Pin number	Description
1	VBUS (power)	4	GND
2	DM	5, 6	Shield
3	DP	-	-

7.8 Audio stereo speakers JP2 and JP3

The stereo audio outputs JP2 and JP3 are available to support the stereo speakers (left and right respectively).

7.9 Audio line output connector jack CN7

A 3.5 mm stereo audio jack output CN10 is available to support the headphone.

7.10 Audio line input connector jack CN6

A 3.5 mm stereo audio jack input CN6 is available to support the audio line input.

7.11 SPDIF input RCA connector CN12

Table 9. SPDIF input RCA connector CN12

Pin number	Description	Pin number	Description
1	SPDIF_RX	2	GND
2	GND	-	-

7.12 SPDIF output RCA connector CN8

Table 10. SPDIF output RCA connector CN8

Pin number	Description	Pin number	Description
1	SPDIF_TX	2	GND
2	GND	-	-

Appendix A 32F769IDISCOVERY IO assignment

Table 11. 32F769IDISCOVERY IO assignment

Pin No.	Pin name	Signal or label	Comment
A1	PE4	SAI1_FS_A	-
A2	PE3	SAI1_SD_B	-
A3	PE2	QUADSPI_BK1_IO2	-
A4	PG14	ETH_TXD1	-
A5	PE1	FMC_NBL1	-
A6	PE0	FMC_NBL0	-
A7	PB8	I2C1_SCL	ARD_D15/SCL
A8	PB5	USB_OTG_HS_ULPI_D7	-
A9	PB4	SDMMC2_D3	-
A10	PB3	SDMMC2_D2	-
A11	PD7	SDMMC2_CMD	-
A12	PC12	UART5_TX	WIFI_RX
A13	PA15	CEC	CEC
A14	PA14	SYS_JTCK-SWCLK	SWCLK
A15	PA13	SYS_JTMS-SWDIO	SWDIO
B1	PE5	SAI1_SCK_A	-
B2	PE6	SAI1_SD_A	-
B3	PG13	ETH_TXD0	-
B4	PB9	I2C1_SDA	ARD_D14/SDA
B5	PB7	I2C4_SDA	-
B6	PB6	QUADSPI_BK1_NCS	-
B7	PG15	FMC_SDNCAS	-
B8	PG11	ETH_TX_EN	-
B9	PJ13	GPIO_Input	LD_USER1
B10	PJ12	GPIO_Input	Audio_INT
B11	PD6	SDMMC2_CK	-
B12	PD0	FMC_D2	-
B13	PC11	DFSDM_DATIN5	-
B14	PC10	QUADSPI_BK1_IO1	-
B15	PA12	SPI2_SCK	ARD_D13/SCK
C1	VBAT	-	-
C2	PI8	GPIO_Input	NC4

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
C3	PI4	FMC_NBL2	-
C4	PK7	GPIO_Input	NC3
C5	PK6	GPIO_Input	NC2
C6	PK5	GPIO_Input	NC1
C7	PG12	SPDIFRX_IN1	-
C8	PG10	SDMMC2_D1	-
C9	PJ14	GPIO_Input	WIFI_RST
C10	PD5	GPIO_Input	RMII_RXER
C11	PD3	DFSDM_CKOUT	-
C12	PD1	FMC_D3	-
C13	PI3	FMC_D27	-
C14	PI2	FMC_D26	-
C15	PA11	SPI2_NSS	ARD_D10/PWM/CS
D1	PC13	RTC_OUT_ALARM	NC6
D2	PF0	FMC_A0	-
D3	PI5	FMC_NBL3	-
D4	PI7	FMC_D29	-
D5	PI10	FMC_D31	-
D6	PI6	FMC_D28	-
D7	PK4	GPIO_Input	NC8
D8	PK3	GPIO_Input	NC7
D9	PG9	SDMMC2_D0	-
D10	PJ15	GPIO_Input	DSI_RESET
D11	PD4	GPIO_Input	OTG_HS_OverCurrent
D12	PD2	UART5_RX	WIFI_TX
D13	PH15	FMC_D23	-
D14	PI1	FMC_D25	-
D15	PA10	USART1_RX	VCP_RX
E1	PC14/OSC32_IN	RCC_OSC32_IN	-
E2	PF1	FMC_A1	-
E3	PI12	GPIO_Input	NC5
E4	PI9	FMC_D30	-
E5	PDR_ON	-	-
E6	BOOT0	-	-
E7	VDD	-	-

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
E8	VDD	-	-
E9	VDD	-	-
E10	VDD	-	-
E11	VCAP_2	-	-
E12	PH13	FMC_D21	-
E13	PH14	FMC_D22	-
E14	PI0	FMC_D24	-
E15	PA9	USART1_TX	VCP_TX
F1	PC15/OSC32_OUT	RCC_OSC32_OUT	-
F2	VSS	-	-
F3	PI11	USB_OTG_HS_ULPI_DIR	-
F4	VDD	-	-
F5	VDD	-	-
F6	VSS	-	-
F7	VSS	-	-
F8	VSS	-	-
F9	VSS	-	-
F10	VSS	-	-
F11	VDD	-	-
F12	DSIHOST_D1P	DSIHOST_D1P	-
F13	DSIHOST_D1N	DSIHOST_D1N	-
F14	PC9	QUADSPI_BK1_IO0	-
F15	PA8	RCC_MCO_1	CEC_CLK
G1	PH0/OSC_IN	RCC_OSC_IN	-
G2	PF2	FMC_A2	-
G3	PI13	GPIO_Input	LCD_INT
G4	PI15	GPIO_Input	uSD_Detect
G5	VDD	-	-
G6	VSS	-	-
G10	VSS	-	-
G11	VDDUSB	-	-
G12	VSSDSI	-	-
G13	VDD	-	-
G14	PC8	TIM3_CH3	ARD_D5/PWM
G15	PC7	USART6_RX	ARD_D0/RX

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
H1	PH1/OSC_OUT	RCC_OSC_OUT	-
H2	PF3	FMC_A3	-
H3	PI14	GPIO_Input	LCD_BL_CTRL
H4	PH4	USB_OTG_HS_ULPI_NXT	-
H5	VDD	-	-
H6	VSS	-	-
H10	VSS	-	-
H11	VDDDSI	-	-
H12	DSIHOST_CKP	DSIHOST_CKP	-
H13	DSIHOST_CKN	DSIHOST_CKN	-
H14	PG8	FMC_SDCLK	-
H15	PC6	USART6_TX	ARD_D1/TX
J1	NRST	-	-
J2	PF4	FMC_A4	-
J3	PH5	FMC_SDNWE	-
J4	PH3	FMC_SDNE0	-
J5	VDD	-	-
J6	VSS	-	-
J10	VSS	-	-
J11	VDD	-	-
J12	DSIHOST_D0P	DSIHOST_D0P	-
J13	DSIHOST_D0N	DSIHOST_D0N	-
J14	PG7	SAI1_MCLK_A	-
J15	PG6	GPIO_Input	EXT_SDA
K1	PF7	TIM11_CH1	ARD_D6/PWM
K2	PF6	TIM10_CH1	ARD_D3/PWM
K3	PF5	FMC_A5	-
K4	PH2	FMC_SDCKE0	-
K5	VDD	-	-
K6	VSS	-	-
K7	VSS	-	-
K8	VSS	-	-
K9	VSS	-	-
K10	VSS	-	-
K11	VDD	-	-

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
K12	VCAPDSI	-	-
K13	PD15	FMC_D1	-
K14	PB13	USB_OTG_HS_ULPI_D6	-
K15	PD10	FMC_D15	-
L1	PF10	ADC3_IN8	ARD_A3
L2	PF9	ADC3_IN7	ARD_A5
L3	PF8	ADC3_IN6	ARD_A4
L4	PC3	DFSDM_DATIN1	-
L5	BYPASS_REG	-	-
L6	VSS	-	-
L7	VDD	-	-
L8	VDD	-	-
L9	VDD	-	-
L10	VDD	-	-
L11	VCAP_1	-	-
L12	PD14	FMC_D0	-
L13	PB12	USB_OTG_HS_ULPI_D5	-
L14	PD9	FMC_D14	-
L15	PD8	FMC_D13	-
M1	VSSA	-	-
M2	PC0	USB_OTG_HS_ULPI_STP	-
M3	PC1	ETH_MDC	-
M4	PC2	ADC1_IN12	ARD_A2
M5	PB2	QUADSPI_CLK	-
M6	PF12	FMC_A6	-
M7	PG1	FMC_A11	-
M8	PF15	FMC_A9	-
M9	PJ4	GPIO_Input	ARD_D8
M10	PD12	I2C4_SCL	-
M11	PD13	QUADSPI_BK1_IO3	-
M12	PG3	GPIO_Input	EXT_SCL
M13	PG2	FMC_A12	-
M14	PJ5	GPIO_Input	LD_USER2
M15	PH12	FMC_D20	-
N1	VREF-	-	-

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
N2	PA1	ETH_REF_CLK	-
N3	PA0/WKUP	SYS_WKUP0	B_USER
N4	PA4	ADC1_IN4	ARD_A1
N5	PC4	ETH_RXD0	-
N6	PF13	FMC_A7	-
N7	PG0	FMC_A10	-
N8	PJ3	GPIO_Input	ARD_D7
N9	PE8	FMC_D5	-
N10	PD11	SAI2_SD_A	-
N11	PG5	FMC_BA1	-
N12	PG4	FMC_BA0	-
N13	PH7	GPIO_Input	EXT_RST
N14	PH9	FMC_D17	-
N15	PH11	FMC_D19	-
P1	VREF+	-	-
P2	PA2	ETH_MDIO	-
P3	PA6	ADC1_IN6	ARD_A0
P4	PA5	USB_OTG_HS_ULPI_CK	-
P5	PC5	ETH_RXD1	-
P6	PF14	FMC_A8	-
P7	PJ2	DSIHOST_TE	DSIHOST_TE
P8	PF11	FMC_SDNRAS	-
P9	PE9	FMC_D6	-
P10	PE11	FMC_D8	-
P11	PE14	FMC_D11	-
P12	PB10	USB_OTG_HS_ULPI_D3	-
P13	PH6	TIM12_CH1	ARD_D9/PWM
P14	PH8	FMC_D16	-
P15	PH10	FMC_D18	-
R1	VDDA	-	-
R2	PA3	USB_OTG_HS_ULPI_D0	-
R3	PA7	ETH_CRS_DV	-
R4	PB1	USB_OTG_HS_ULPI_D2	-
R5	PB0	USB_OTG_HS_ULPI_D1	-
R6	PJ0	GPIO_Input	ARD_D4

Table 11. 32F769IDISCOVERY IO assignment (continued)

Pin No.	Pin name	Signal or label	Comment
R7	PJ1	GPIO_Input	ARD_D2
R8	PE7	FMC_D4	-
R9	PE10	FMC_D7	-
R10	PE12	FMC_D9	-
R11	PE15	FMC_D12	-
R12	PE13	FMC_D10	-
R13	PB11	USB_OTG_HS_ULPI_D4	-
R14	PB14	SPI2_MISO	ARD_D12/MISO
R15	PB15	SPI2_MOSI	ARD_D11/PWM/MOSI

Appendix B Schematics

Figure 21. 32F769IDISCOVERY discovery board interconnection

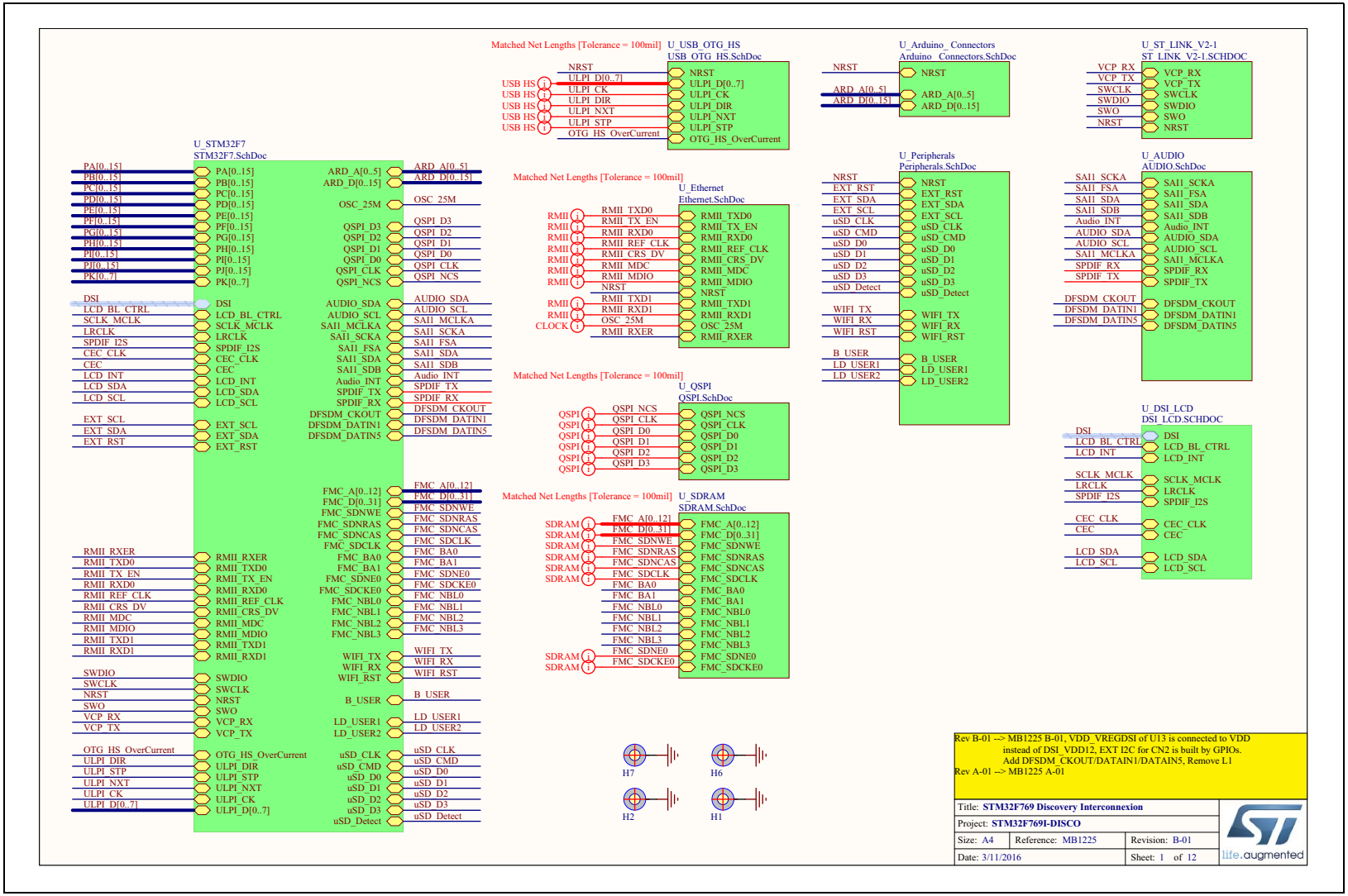


Figure 22. ST-LINK/V2-1 with support of SWD only

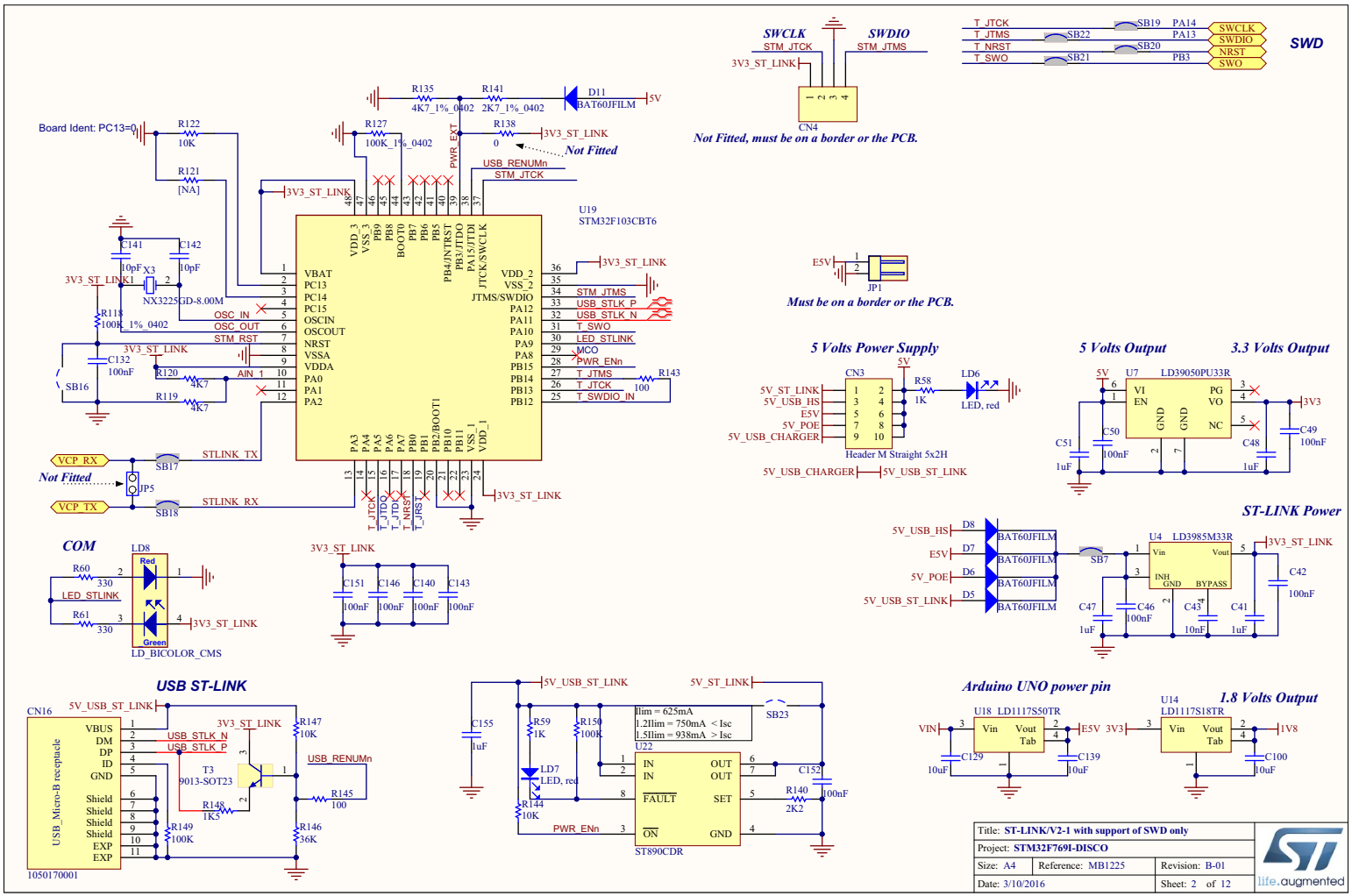


Figure 23. STM32F769NIH6 connection

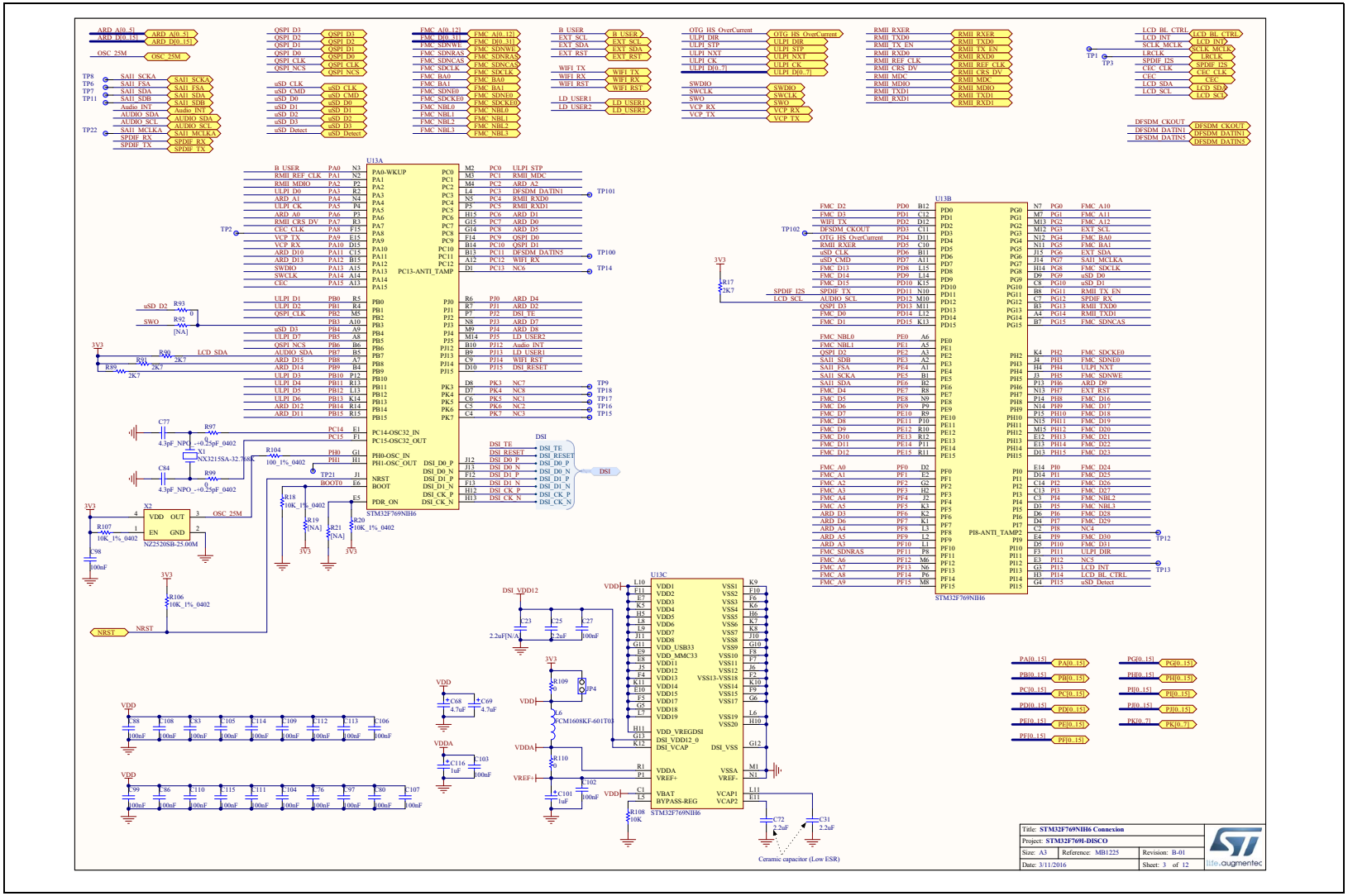


Figure 24. Audio codec WOLFSON and audio connectors

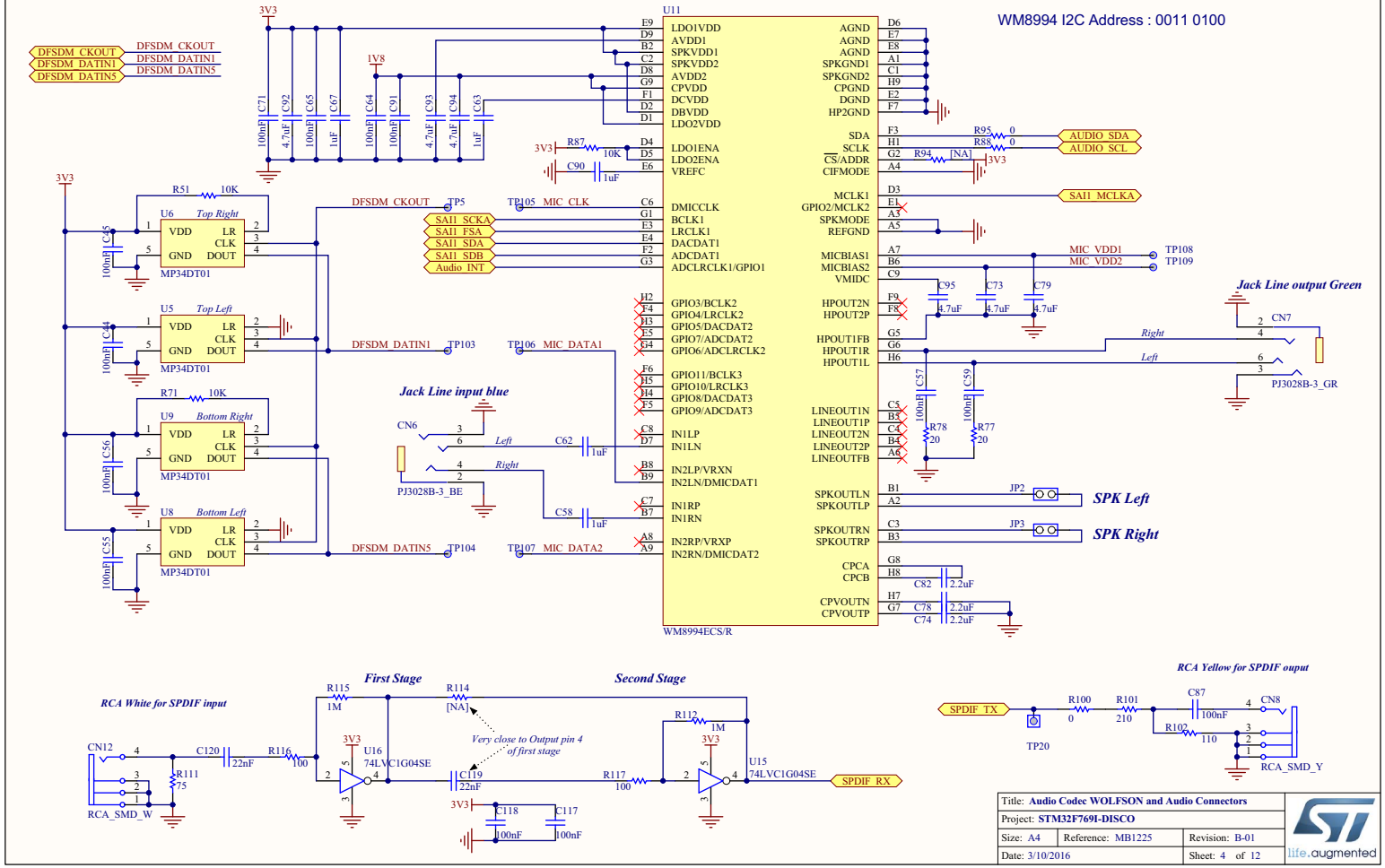


Figure 25. Quad-SPI Flash memory (MICRON)

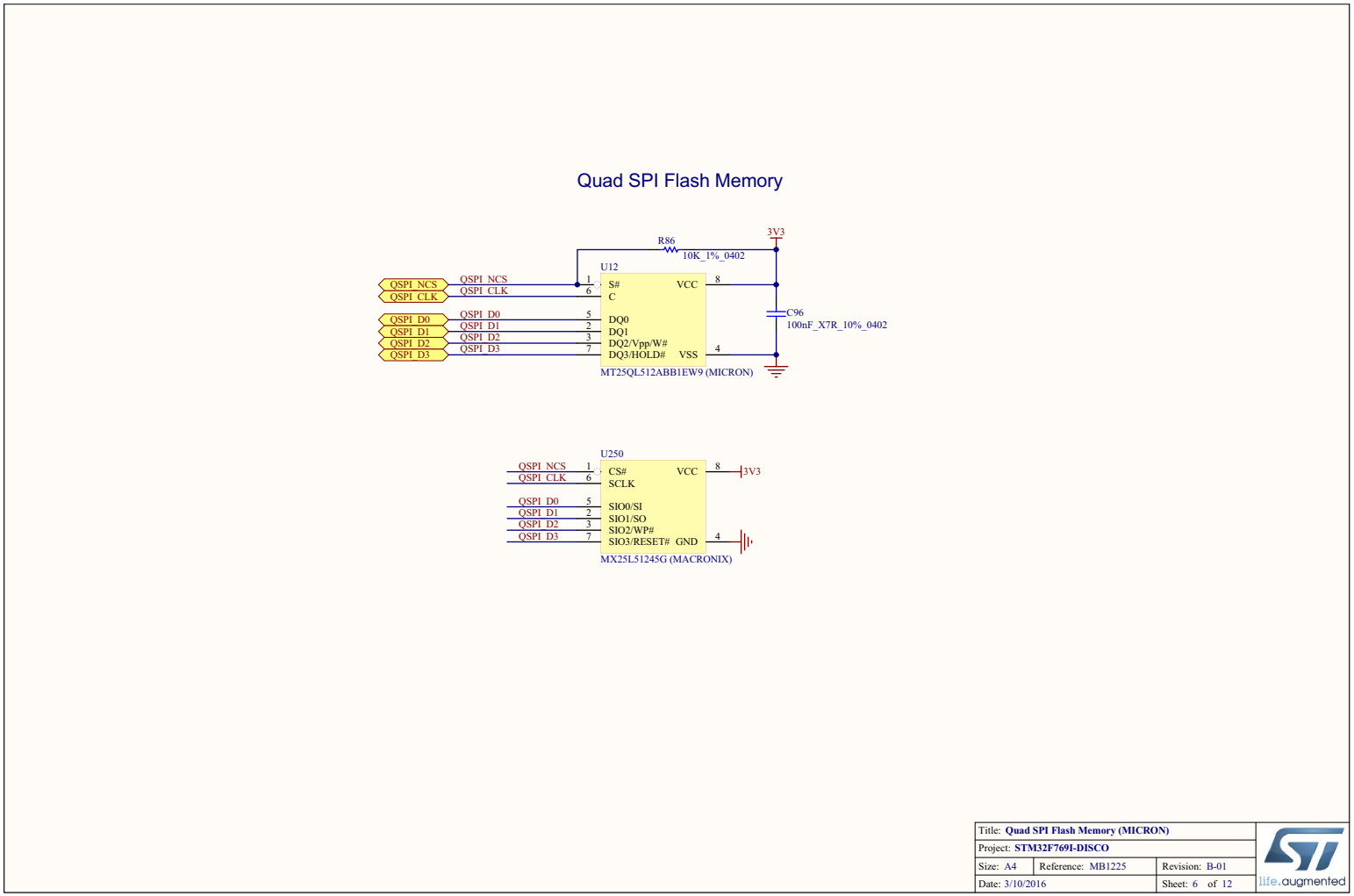


Figure 26. Arduino UNO connectors

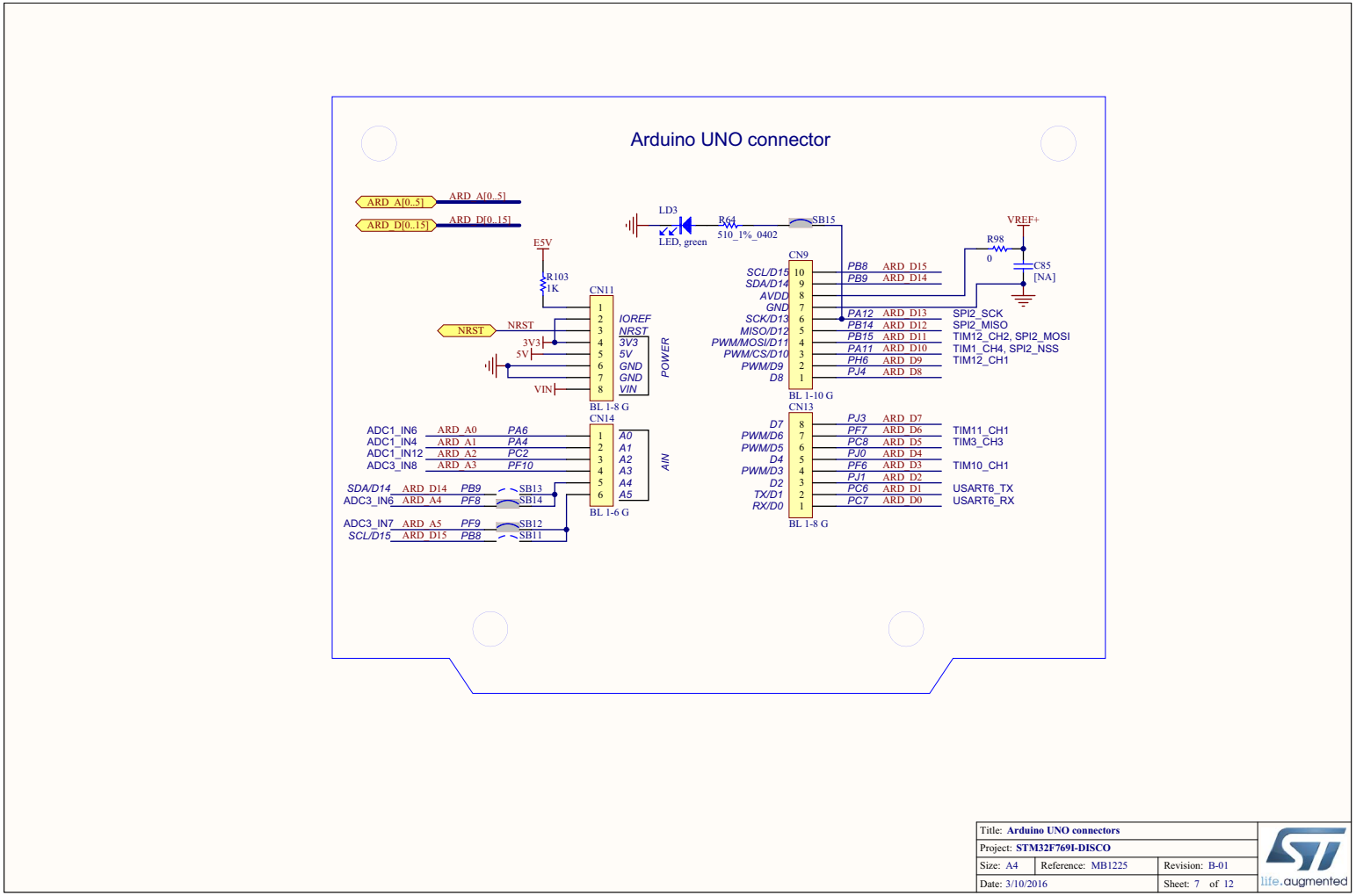


Figure 27. USB OTG HS PHY with micro-AB connector

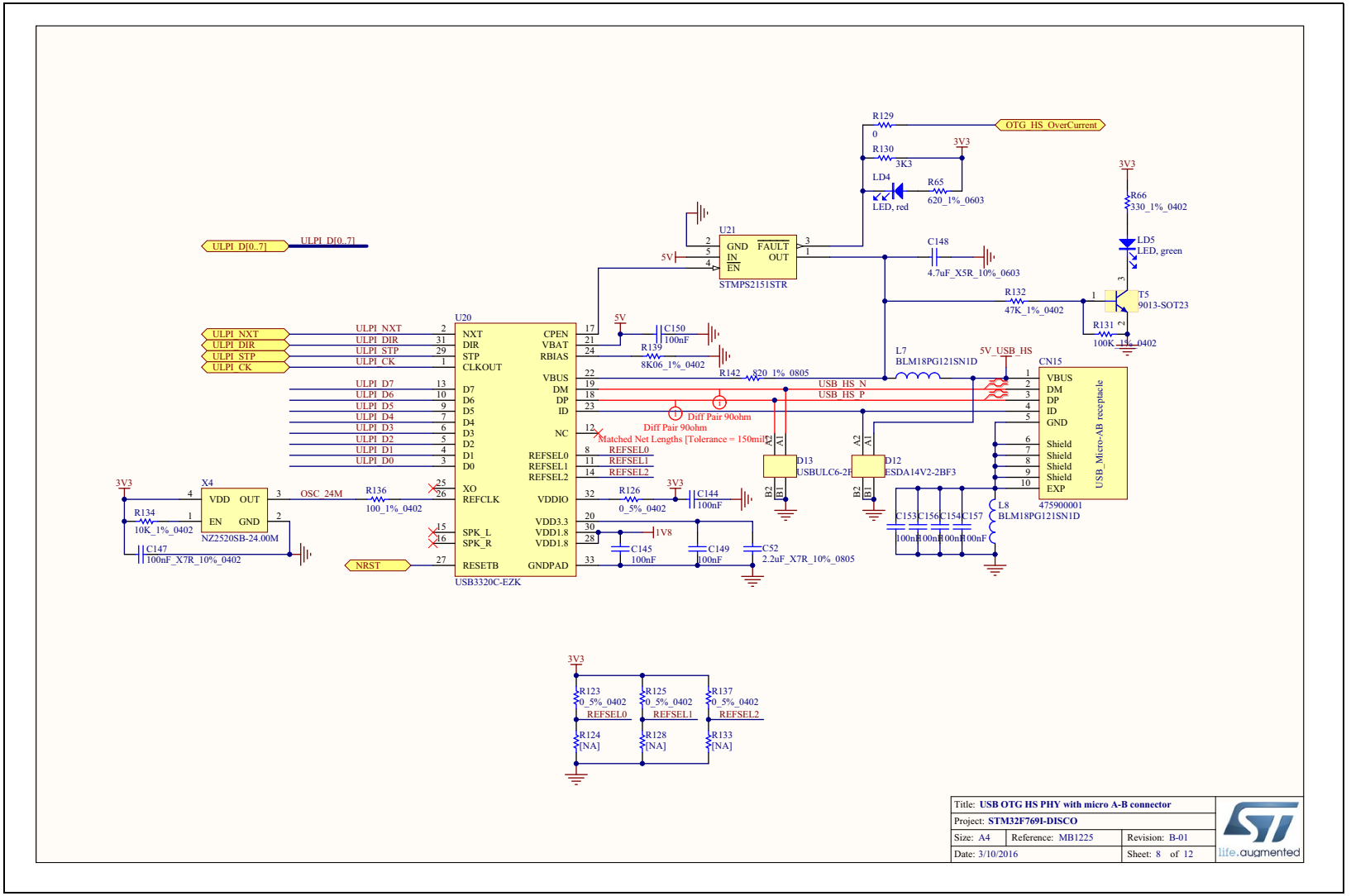


Figure 28. Ethernet PHY with RJ45 connector

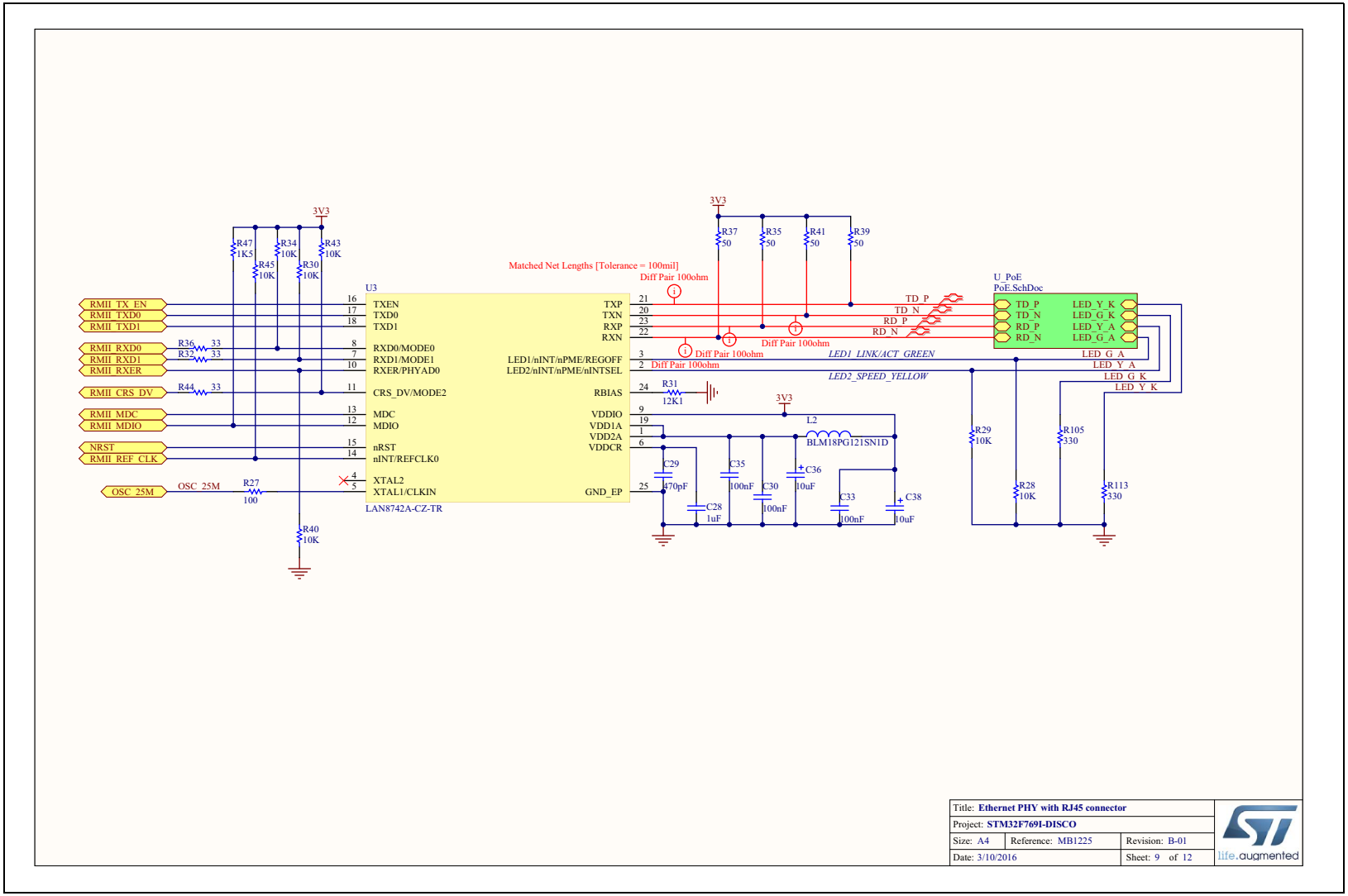


Figure 29. Power over Ethernet 3 W

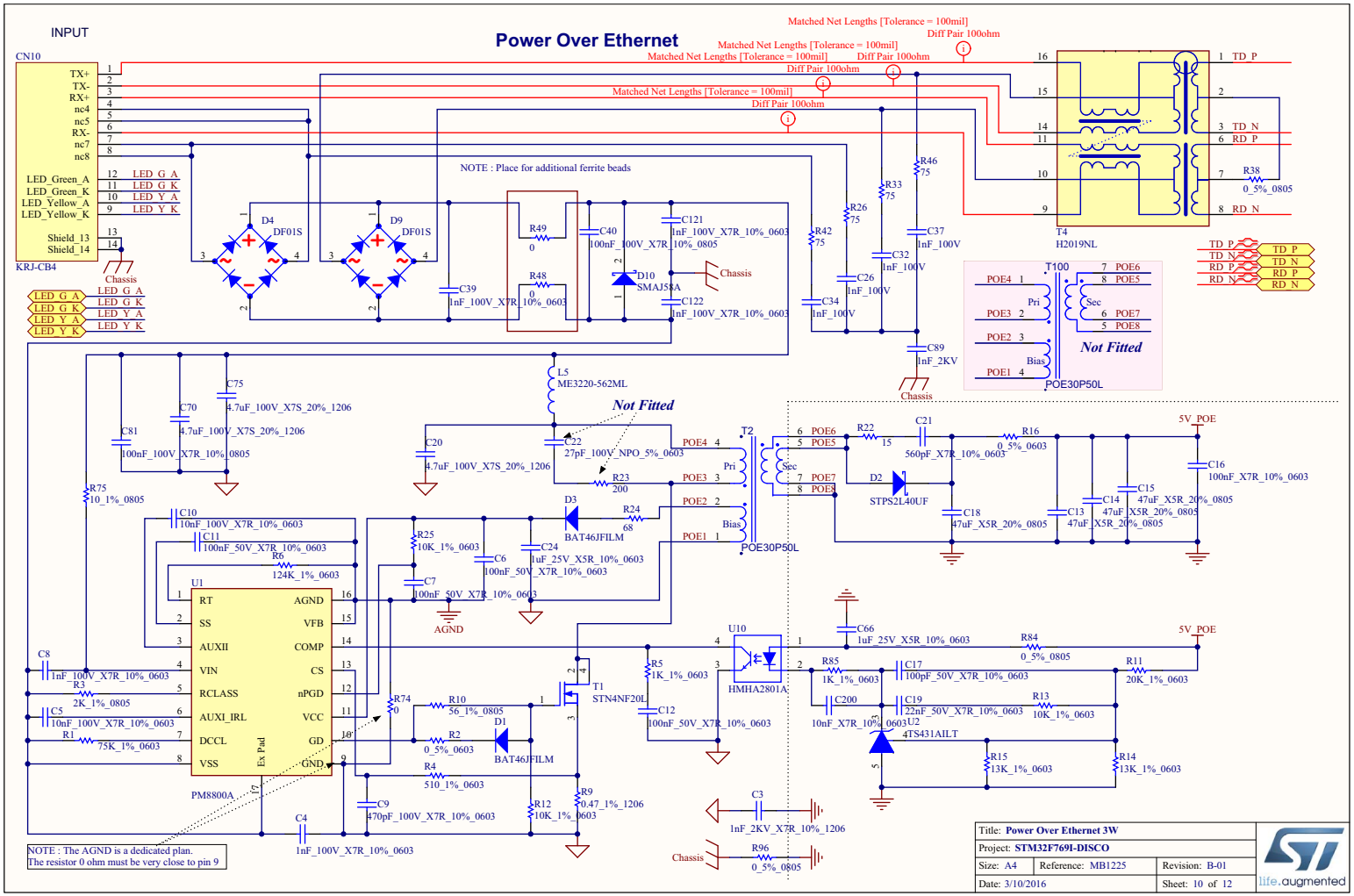


Figure 30. LCD display MIPI DSI connector and HDMI boards

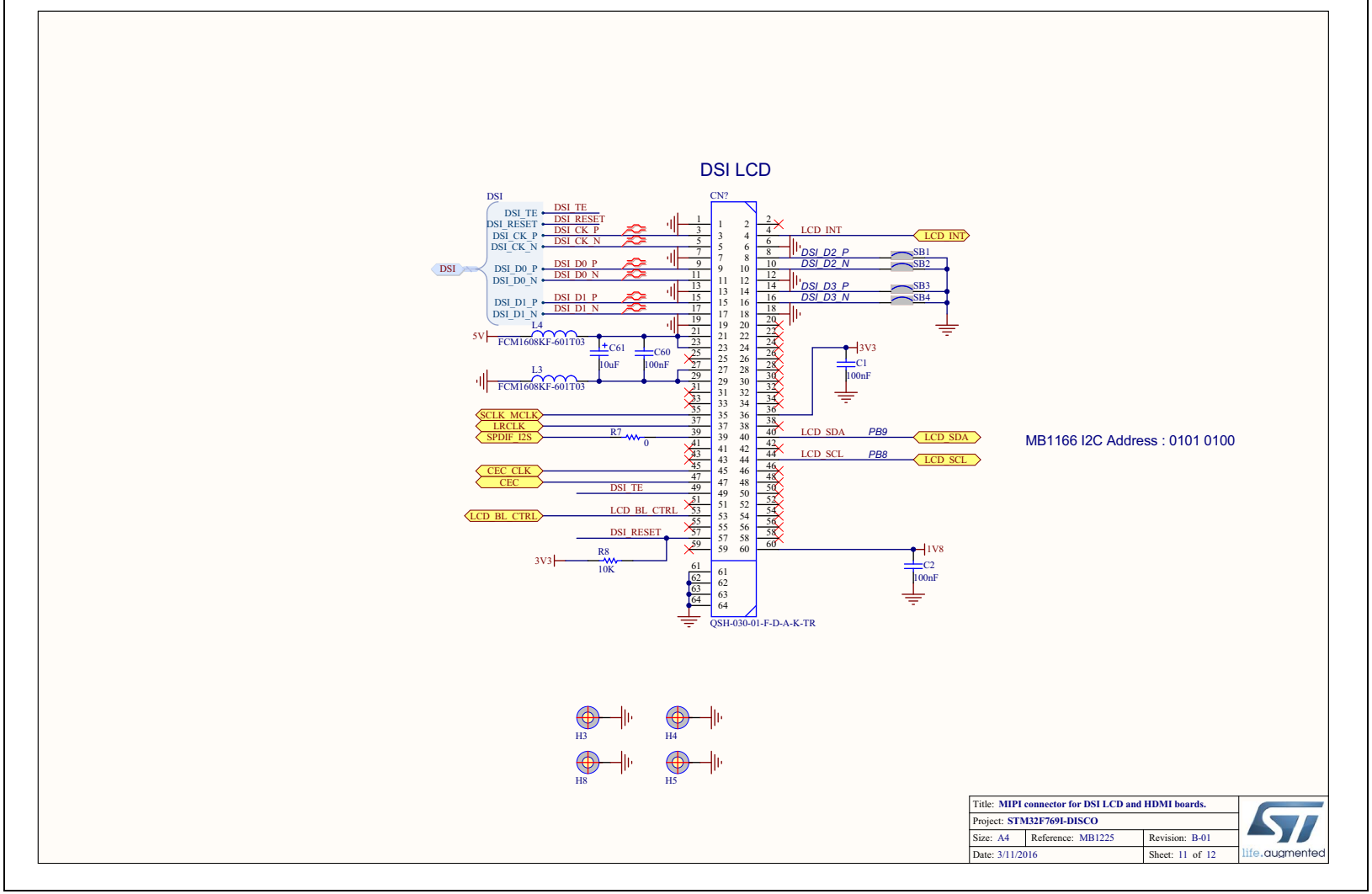
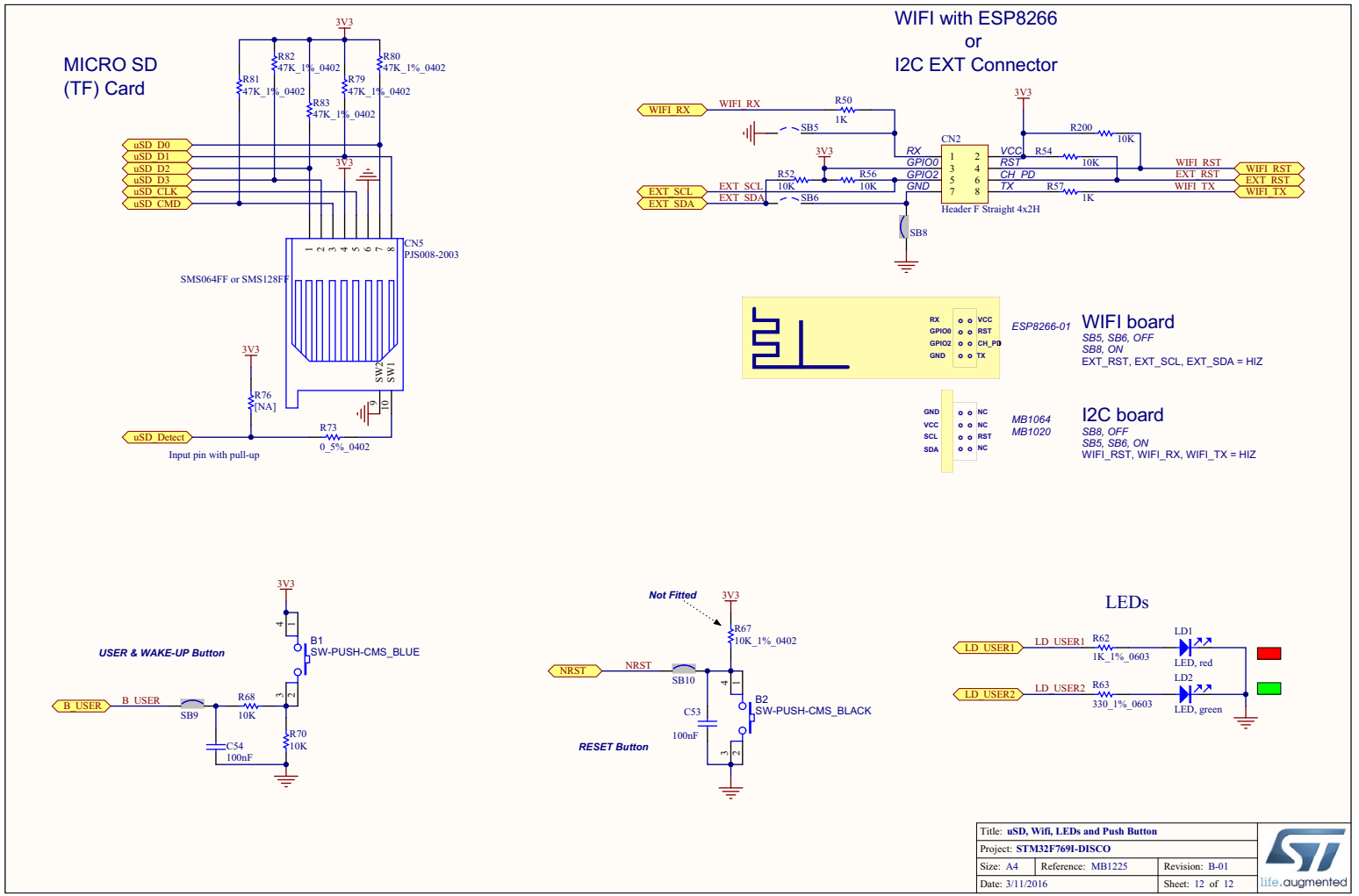


Figure 31. microSD, Wi-Fi, LEDs and push-button



Appendix C Compliance statements

C.1 Federal Communications Commission (FCC) and Industry Canada (IC) Compliance

C.1.1 FCC Compliance Statement

Part 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.105

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

C.1.2 IC Compliance Statement

Compliance Statement

Industry Canada ICES-003 Compliance Label: CAN ICES-3 (B)/NMB-3(B)

Déclaration de conformité

Étiquette de conformité à la NMB-003 d'Industrie Canada: CAN ICES-3 (B)/NMB-3(B)

Revision history

Table 12. Document revision history

Date	Revision	Changes
20-May-2016	1	Initial release.