

### Introduction

The 32L496GDISCOVERY Discovery kit is a complete demonstration and development platform for the STMicroelectronics ARM® Cortex®-M4 core-based STM32L496AG16 microcontroller. Thanks to the innovative ultra-low-power oriented features, extended RAM and graphics performance (Chrom-ART Accelerator™) offered by the STM32L496AG, the 32L496GDISCOVERY kit is designed to enable easy prototyping for many applications, including audio and graphics, with state-of-the-art energy efficiency. For even more user-friendliness, the on-board ST-LINK/V2-1 debugger provides out-of-the-box loading and debugging capabilities. The microcontroller features the following interfaces: four I<sup>2</sup>Cs, three SPIs, one SDIO, FMC and Quad-SPI. It also features five USARTs, one ULP UART, two CAN buses, three 12-bit ADCs, two 12-bit DACs, two SAs, two ULP analog comparators, two Op Amps, LCD 8 × 40 or 4 × 44 with step-up converter, four digital filters for sigma delta modulator and SWP, 8- to 14-bit camera interface, USB 2.0 OTG FS, JTAG and SWD debugging support. This 32L496GDISCOVERY Discovery kit offers everything required for users to get started quickly and develop applications easily.

The full range of hardware features on the board helps users to evaluate almost all peripherals (USB OTG FS, microSD™ card, 8-bit camera, 8-Mbit PSRAM, IDD measurement, full-duplex I<sup>2</sup>S with an audio CODEC and stereo jack for headset including analog microphone, DFSDM with a pair of MEMS digital microphones on board, Quad-SPI Flash memory device, 1.54-inch TFT LCD using FMC interface with capacitive touch panel and others) and develop applications. Arduino™ Uno V3, PMOD and STMod+ connectors allow easy connection of extension shields or daughterboards for specific applications.

The integrated ST-LINK/V2-1 provides an embedded in-circuit debugger and programmer for the STM32 MCU.

The 32L496GDISCOVERY Discovery kit comes with the STM32 comprehensive software HAL library and LL APIs together with various packaged software examples.

Figure 1. 32L496GDISCOVERY (top view)

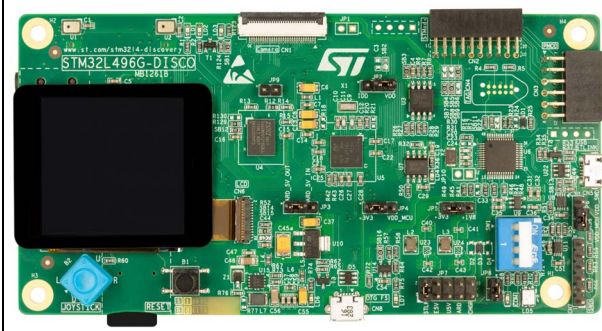
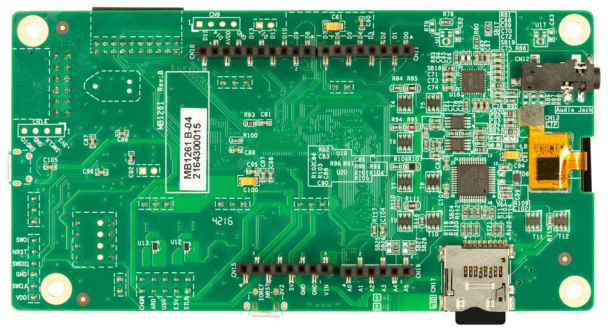


Figure 2. 32L496GDISCOVERY (bottom view)



1. Pictures are not contractual.

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# 1 Features

- STM32L496AGI6 microcontroller featuring 1 Mbyte of Flash memory and 320 Kbytes of RAM in an UFBGA169 package
- 1.54-inch 240 x 240 pixel-TFT color LCD with parallel interface
- SAI Audio CODEC, with a stereo headset jack, including analog microphone input
- Stereo digital MEMS microphones
- 8-Mbit PSRAM
- IDD measurement
- 64-Mbit Quad-SPI Flash
- 8 LEDs
- Reset push button
- 4-direction joystick with selection
- microSD™ card connector (card included)
- Camera 8-bit connector
- STMod+ and PMOD connectors
- USB OTG FS with Micro-AB connector
- Compatible Arduino™ Uno V3 connectors
- 5 source options for power supply
  - ST-LINK/V2-1 USB connector
  - User USB FS connector
  - VIN from Arduino™ connector
  - 5 V from Arduino™ connector
  - USB charger
- 2 possible supply voltages for the MCU: 1.8 V and 3.3 V
- On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: mass storage, virtual COM port
- Comprehensive free software including a variety of examples, part of the STM32Cube package

## 2 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](http://www.st.com)).
- Next to the evaluation tool ordering part number, that is stuck or silkscreen printed on the board

## 3 System requirements

- Windows® OS (XP, 7, 8, 10), Linux or macOS™
- USB Type-A to Micro-B cable

## 4 Development toolchains

- Keil® MDK-ARM<sup>(a)</sup>
- IAR™ EWARM<sup>(a)</sup>
- GCC-based IDEs including free SW4STM32 from AC6

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a. On Windows® only.



## 5 Demonstration software

The demonstration software is preloaded in the STM32L496AGI6 Flash memory for easy demonstration of the device peripherals. This demonstration software as well as a detailed guide explaining how to reload it into the STM32L496AGI6 Flash memory are available. For all the details refer to the dedicated board technical documentation from [www.st.com/stm32l4-discovery](http://www.st.com/stm32l4-discovery).

## 6 Ordering information

To order the 32L496GDISCOVERY Discovery kit, refer to [Table 1](#).

**Table 1. Ordering Information**

Order Code	Target STM32
STM32L496G-DISCO	STM32L496AGI6

## 7 Technology partners

### MACRONIX:

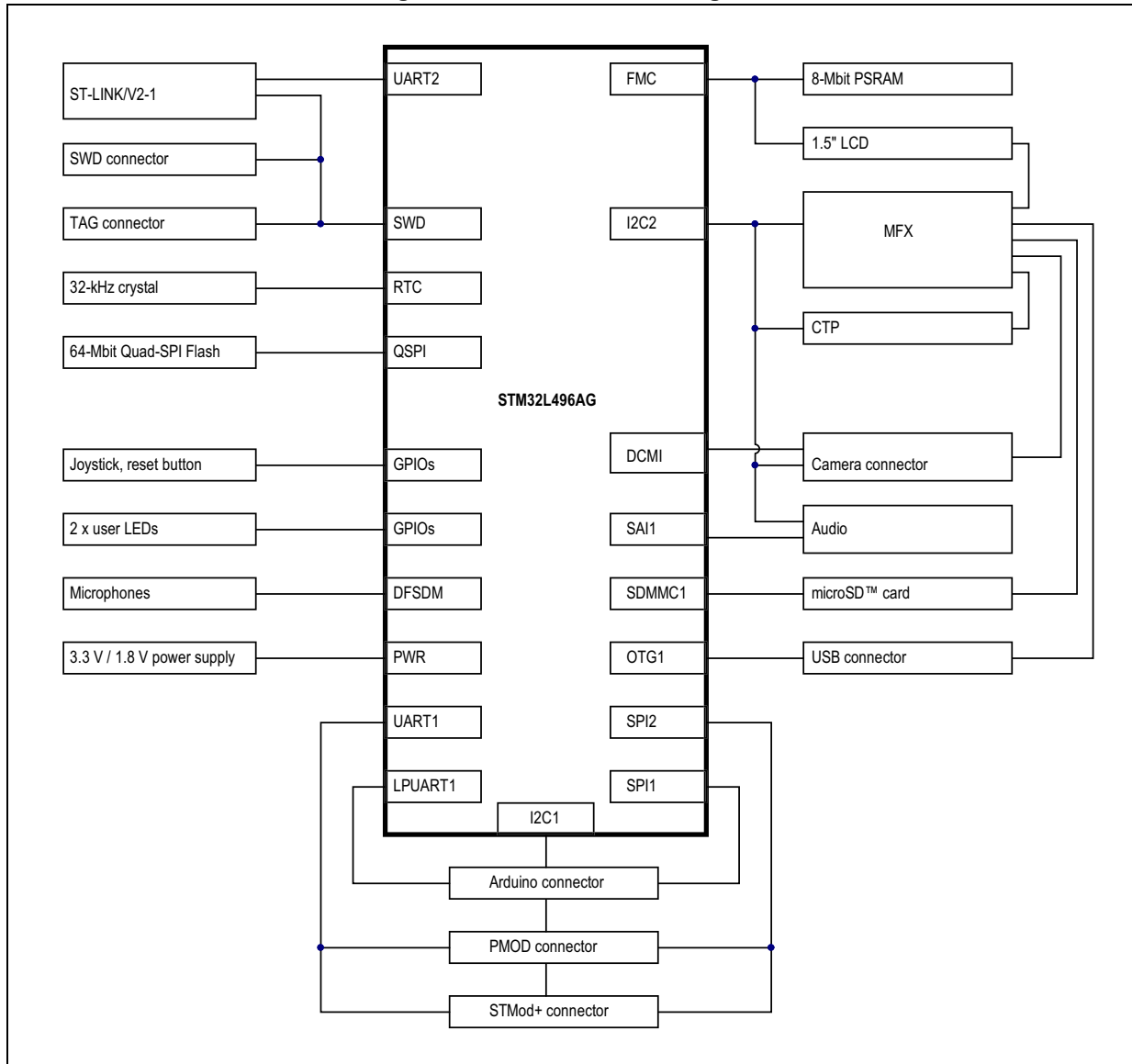
- 64-Mbit Quad-SPI NOR Flash memory device, part number MX25R6435FM2IL0

## 8 Hardware layout and configuration

The 32L496GDISCOVERY Discovery kit is designed around the STM32L496AGI6 (169-ball UFBGA package). The hardware block diagram (see [Figure 3](#)) illustrates the connection between STM32L496AGI6 and peripherals (PSRAM, Quad-SPI Flash memory, color LCD, USB OTG FS connector, USART, audio, camera connector, IDD measurement, joystick, microSD™ card, Arduino™ Uno V3, PMOD and STMod+ shields and embedded ST-LINK).

[Figure 4](#) and [Figure 5](#) help users to locate these features on the 32L496GDISCOVERY board. The mechanical dimensions of the 32L496GDISCOVERY board are shown in [Figure 6](#).

**Figure 3. Hardware block diagram**

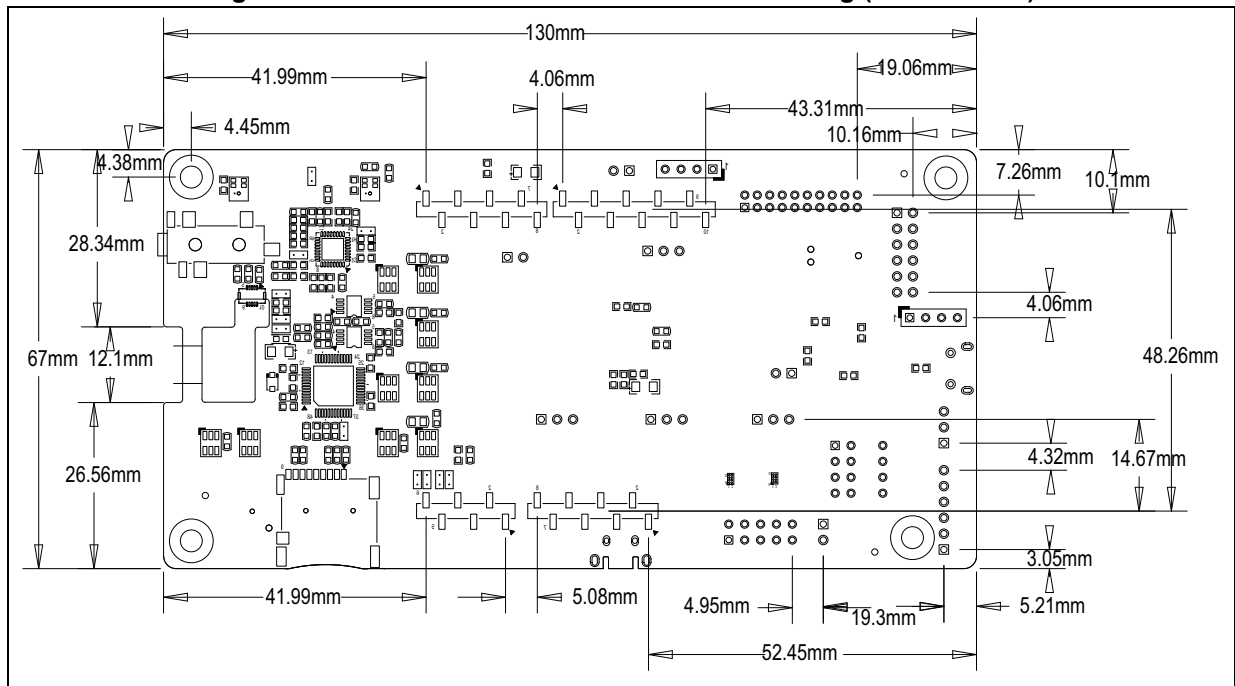






## 8.2 The 32L496GDISCOVERY Discovery kit mechanical drawing

Figure 6. 32L496GDISCOVERY mechanical drawing (bottom view)



### 8.3 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated on the 32L496GDISCOVERY 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 3V

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

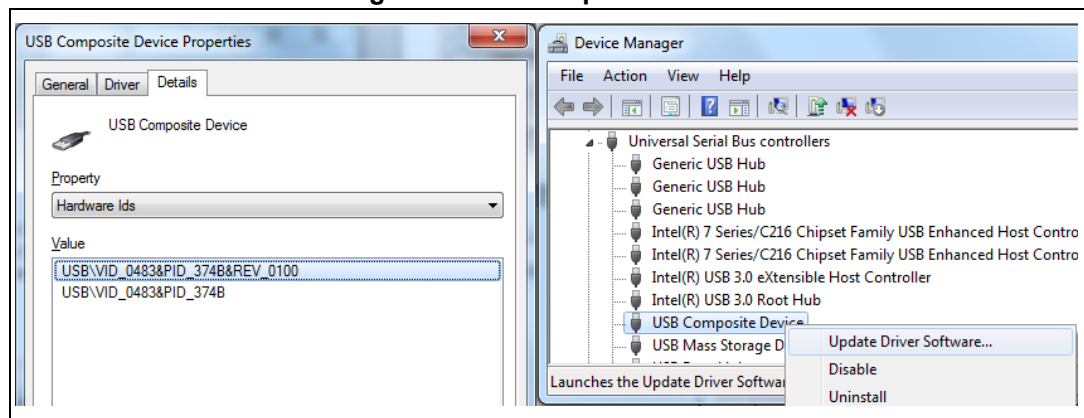
#### 8.3.1 Drivers

Before connecting the 32L496GDISCOVERY board to a Windows® 7, Windows® 8 or Windows® XP PC via USB, a driver for ST-LINK/V2-1 must be installed. It can be downloaded from the [www.st.com](http://www.st.com) website.

In case the 32L496GDISCOVERY board is connected to the PC before installing the driver, the PC device manager may report some 32L496GDISCOVERY board interfaces as “Unknown”. To recover from this situation, after installing the dedicated driver, the association of “Unknown” USB devices found on the 32L496GDISCOVERY board to this dedicated driver, must be manually updated in the device manager.

*Note: It is recommended to proceed using USB Composite Device, as shown in Figure 7.*

**Figure 7. USB composite device**



### 8.3.2 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 a new functionality, bug fixes, support for new microcontroller families), it is recommended to visit the [www.st.com](http://www.st.com) website before starting to use the 32L496GDISCOVERY board and periodically, to stay up-to-date with the latest firmware version.

## 8.4 Low power consumption state

The 32L496GDISCOVERY board can be set in a low-power state with a maximum current kept below 20  $\mu$ A at 5 V.

The low-power mode is reached when the following conditions are satisfied:

1. The connections between the ST-LINK/V2-1 and the MCU are manually disconnected by means of the micro switch SW1. This especially controls the for pull-up on RST, the pull-up on SWDIO, the VDD detection circuit and the 5 V detection circuit.
2. The peripherals (including LCD, CTP and PSRAM) are unpowered by means of the MOSFET that is controlled by the PH0 signal of STM32L496AGI6.
3. Jumper JP8 is disconnected so that the 5-V power LED is powered down.
4. Peripherals are setup by FW to reach the power down mode
  - a) Set QSPI to low-power mode
  - b) Set MFX to sleep mode
  - c) Remove the microSD™ card from the socket
  - d) Set all the audio lines to low

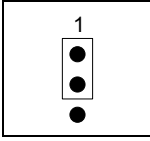
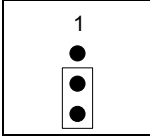
## 8.5 TAG and SWD

One TAG interface footprint is reserved on the 32L496GDISCOVERY board. It can be used to debug and program the on-board MCU.

One 6-pin header was added to the 32L496GDISCOVERY board. This header connects to the on board ST-LINK SWD that can be used to debug and program an external MCU. In such a configuration, the VDD power supply from the external board can be either 1.8 V or 3.3 V thanks to the on-board voltage converter.

[Table 2](#) describes the use of jumper JP6 for selecting between on-board and external MCU.

**Table 2. JP6 (VDD\_STL) jumper description**

Jumper	Description
JP6 VDD_STL setting	<p><b>Default setting:</b> VDD_STL gets power from the 32L496GDISCOVERY board. ST-LINK can be used to program the on-board MCU. The jumper connects pins 1 and 2.</p> 
	<p>VDD_STL gets externally supplied power through connector CN7. ST-LINK can be used to program the external MCU. The jumper connects pins 2 and 3.</p> 

## 8.6 Power supply

The 32L496GDISCOVERY board is designed to be powered by a selection of sources according to the position of jumper JP7 as described in [Table 3](#).

**Table 3. 32L496GDISCOVERY board power configuration**

JP7 configuration	Power connector	Power source
STLK	CN5	STLINK/V2-1
E5V	CN15 (VIN)	Arduino™
U5V	CN8	USB OTG
ARD	CN15 (5 V)	Arduino™
CHGR	CN5	DC power charger

*Note:* The 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.

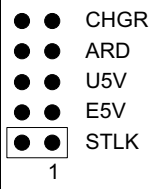
### 8.6.1 Supplying the board through ST-LINK/V2-1 USB connector CN5

In this mode, STLK from the CN5 ST-LINK/V2-1 USB connector is used. The corresponding setting is described in [Table 4](#). The LD8 green LED is on to confirm the presence of 5 V supply.

*Note:* This mode is limited to 500 mA.



Table 4. JP7 (STLK) jumper description

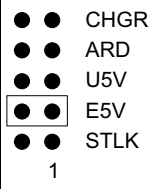
Jumper	Description
JP7 Power source selector	<p><b>Default setting</b> The 32L496GDISCOVERY board is supplied through the CN5 Micro-B ST-LINK/V2-1 connector. The jumper connects STLK pins 1 and 2.</p> 

### 8.6.2 Supplying the board through VIN from Arduino™ connector CN15

In this mode, 6 V to 9 V DC is supplied through the VIN pin of Arduino™ compatible connector CN15. The corresponding setting is described in [Table 5](#). The LD8 green LED is lit to confirm the presence of 5 V supply.

*Note:* The voltage is limited to 9 V so that the temperature of regulator U10 is kept within the safe thermal area.

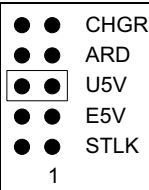
Table 5. JP7 (E5V) jumper description

Jumper	Description
JP7 Power source selector	<p>The 32L496GDISCOVERY board is supplied through the CN15 Arduino™ compatible connector (VIN). The jumper connects E5V pins 3 and 4.</p> 

### 8.6.3 Supplying the board through USB OTG FS connector CN8

In this mode, 5 V DC is supplied through the user USB FS connector CN8. The corresponding setting is described in [Table 6](#). The LD8 green LED is lit to confirm the presence of 5 V supply.

Table 6. JP7 (U5V) jumper description

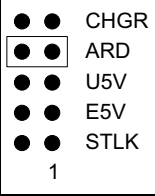
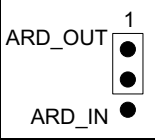
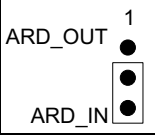
Jumper	Description
JP7 Power source selector	<p>The 32L496GDISCOVERY board is supplied through the CN8 USB OTG connector. The jumper connects U5V pins 5 and 6.</p> 

### 8.6.4 Supplying the board through +5V of Arduino™ connector CN15

In this mode, 5 V DC is supplied through the +5V of Arduino™ compatible connector CN15. The corresponding setting is described in [Table 7](#). The LD8 green LED is lit to confirm the presence of 5 V supply.

*Note:* Jumper JP3 must connect pins 2 and 3 of the input/output voltage selection so that the 32L496GDISCOVERY board is supplied 5 V through connector CN15 (default setting).

**Table 7. JP7 (ARD) jumper description**

Jumper	Description
<p>JP7 Power source selector</p>	<p>5 V is supplied through Arduino™ compatible connector CN15 (+5V). Jumper JP7 connects ARD pins 7 and 8.</p> 
<p>JP3 ARD 5V input/output voltage selection</p>	<p>The 32L496GDISCOVERY board supplies 5 V through Arduino™ compatible connector CN15 (+5V) to an external board. Jumper JP3 connects ARD pins 1 and 2.</p> 
	<p><b>Default setting</b> The 32L496GDISCOVERY board is supplied 5 V through Arduino™ compatible connector CN15 (+5V). Jumper JP3 connects ARD pins 2 and 3.</p> 

### 8.6.5 Supplying the board through a charger connected to ST-LINK

In this mode, a 5 V-DC power charger is connected to USB STLINK CN5 connector. The corresponding setting is described in [Table 8](#). The LD8 green LED is lit to confirm the presence of 5 V supply.

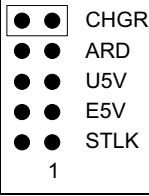
*Note:* Debug is not available if the 32L496GDISCOVERY board is supplied power by an external USB charger. This limitation does not apply when power is supplied by a PC.

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**Warning:** In this mode, the 32L496GDISCOVERY board is not protecting a PC supplying power through connector CN15 against electrical damage.

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**Table 8. JP7 (CHGR) jumper description**

Jumper	Description
JP7 Power source selector	<p>The 32L496GDISCOVERY board is supplied through the CN5 connector. The jumper connects CHGR pins 9 and 10.</p> 

### 8.6.6 MCU power supply options

The 32L496GDISCOVERY board offers the possibility to supply the MCU with 1.8 V or 3.3 V. A jumper must be placed at the 1V8 location of JP5 (connecting pins 2 and 3) to supply the MCU with 1.8 V,. The jumper must be placed at the 3V3 location of JP5 (connecting pins 1 and 2) to supply the MCU with 3.3 V.

### 8.6.7 Supplying the board through ST-LINK/V2-1 USB

In this mode, the USB Host (a PC) is connected to the standard Micro-B USB receptacle of the 32L496GDISCOVERY board by means of a USB cable. The connection event starts the USB enumeration procedure.

In the initial phase of the enumeration procedure, the current supply capability of the USB port of the host is limited to 100 mA. This value is high enough for normal operation since only the ST-LINK/V2-1 part of 32L496GDISCOVERY draws power during that phase. If the solder bridge SB11 is opened (default configuration), the ST890 U7 power switch is set to the OFF position: this isolates the rest of 32L496GDISCOVERY from the power source.

In the next phase of the enumeration procedure, the host PC informs the ST-LINK/V2-1 facility of its capability to supply up to 500 mA. If this is accepted, the ST-LINK/V2-1 sets the ST890 U7 switch to the ON position to supply power to the rest of the 32L496GDISCOVERY board. If the PC USB port is not capable of supplying up to 500 mA, another power source should be used like the VIN pin of connector CN15.

Should a short-circuit occur on the board, the ST890 power switch protects the USB port of the host against current demand exceeding 600 mA, In such an event, the FAULT LD4 red LED lights on.

The 32L496GDISCOVERY board can also be supplied power by a USB power source that is not supporting enumeration, such as a USB charger. In such a particular case, the SB11 solder bridge must be closed. ST-LINK/V2-1 turns the ST890 power switch ON regardless of the enumeration procedure result and passes the power unconditionally to the board.

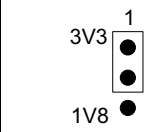
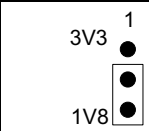
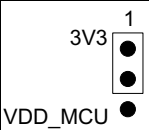
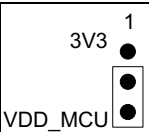
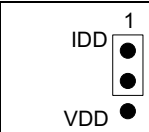
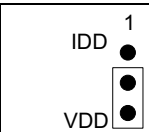
The LD8 green LED is lit whenever the whole board is powered.

### 8.6.8 Measurement of current consumption by the microcontroller

The JP2 jumper, labeled IDD, allows the consumption of the STM32L496AGI6 to be measured directly by a built-in MCU current ammeter circuit capable of measuring from 60 nA to 50 mA or by removing the jumper and connecting an external ammeter.

It needs the MCU run SW to let this current test circuit get into low power mode.

**Table 9. IDD measurement jumper settings**

Jumper	Description
<p>JP5 VDD_MCU voltage selection</p>	<p><b>Default setting</b> The STM32L496AGI6 is supplied with 3.3 V. Jumper JP5 connects pins 1 and 2.</p> 
	<p>The STM32L496AGI6 is supplied with 1.8 V. Jumper JP5 connects pins 2 and 3.</p> 
<p>JP4 VDD_USB source selection</p>	<p><b>Default setting</b> The VDD_USB power pin of the STM32L496AGI6 is supplied with 3.3 V. Jumper JP4 connects pins 1 and 2.</p> 
	<p>The VDD_USB power pin of the STM32L496AGI6 is supplied with VDD_MCU. Jumper JP4 connects pins 2 and 3.</p> 
<p>JP2 VDD_MCU measure</p>	<p><b>Default setting</b> IDD measurement: use of an on-board module that is designed to measure from 60 nA to 50 mA by using several MOSFETs and that automatically switches depending on the range of the measured value.  No jumper in this configuration: an ammeter must be connected to measure the STM32L496AGI6 current through pins 1 and 2. If no ammeter is connected to pins 1 and 2, the STM32L496AGI6 is unpowered.</p> 
	<p>The STM32L496AGI6 is powered by VDD. Jumper JP2 connects pins 2 and 3.</p> 

## 8.7 Programming/debugging when the power supply is not from ST-LINK/V2-1

It is mandatory to power the board first using the user USB FS connector CN8 or the VIN pin of the Arduino™ connector CN15 before connecting the USB cable from ST-LINK/V2-1 CN5 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 jumper JP7 on U5V pins to use power from user USB CN8 or on E5V pins to use power from VIN of Arduino™ connector CN15.
2. Connect the corresponding external power source
3. Check that the LD8 green LED is turned ON
4. Connect the PC to ST-LINK/V2-1 USB connector CN5

If this order is not respected, the 32L496GDISCOVERY board may be powered by  $V_{BUS}$  first from 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 the current can be limited by the PC. As a consequence the board is not powered correctly.
2. 500 mA is requested at enumeration: if the PC cannot provide such current, there is a risk that the request is rejected and that the enumeration does not succeed.

## 8.8 Clock source

One clock source is available as described below:

- X1, 32-kHz crystal for STM32L496AGI6 embedded RTC

## 8.9 Reset sources

The reset signal of the 32L496GDISCOVERY board is active low and the reset sources include:

- Reset button B1
- Arduino™ Uno V3 shield board from CN15
- Embedded ST-LINK/V2-1

## 8.10 Boot configuration

The boot configuration of the STM32L496AGI6 microcontroller is controlled by the BOOT0 signal on pin PH3.

BOOT0 is by default grounded through the R20 pull-down resistor.

It is possible to set BOOT0 high by removing resistor R20 and soldering resistor R21.

## 8.11 Audio codec

An audio codec CS42L51-CNZ from Cirrus (U18) is connected to the SAI1 interface of the STM32L496AGI6. It communicates with STM32L496AGI6 via an I<sup>2</sup>C bus and offers the possibility to connect a stereo headphone or a headset with a mono analog microphone.

The I<sup>2</sup>C-bus address of CS42L51-CNZ is 94h.

## 8.12 Stereo headset and headphone jack

A stereo headphone or a stereo headset with analog microphone can be plugged into the 3.5 mm standard jack socket CN12.

If a headset is plugged into CN12, the bias of the microphone is driven by the output MICBIAS1 of the codec and the analog audio enters the codec by pin AIN3A.

## 8.13 DFSDM

Two STMicroelectronics MP34DT01TR MEMs digital microphones U1 and U2 are available on the 32L496GDISCOVERY board. The two microphones are separated by a distance of 21 mm. The microphones are connected to the DFSDM of the STM32L496AGI6 by the port PC2 generating the clock and by the port PC7 collecting the PDM interleaved data. Both are powered by MIC\_VDD (PH1 of STM32L496AGI6).

## 8.14 USB OTG FS

The 32L496GDISCOVERY board supports USB OTG full speed communication via a USB Micro-AB connector (CN8) and USB power switch (U14) connected to V<sub>BUS</sub>.

The LD6 green LED is lit in one of these cases:

- Power switch (U14) is ON and the 32L496GDISCOVERY board works as a USB host
- V<sub>BUS</sub> is powered by another USB host when the 32L496GDISCOVERY board works as a USB device.

The LD7 red LED is lit in case of overcurrent.

*Note 1: When the 32L496GDISCOVERY board is powered by the ST-LINK then the OTG function provides up to 100 mA.*

*Note 2: When the 32L496GDISCOVERY board is powered by an external power supply then the OTG function provides more than 100 mA, according to the external power supply capability.*

*Note 3: When the 32L496GDISCOVERY board is powered by an external power supply through USB FS connector (CN8), in device mode, do not use a PC as power source (refer to [Section 8.6.3](#)).*

### 8.14.1 32L496GDISCOVERY as an USB Device

When the 32L496GDISCOVERY board is used as a USB Device, the board can be powered by the 5 V DC of the USB OTG FS connection (jumper JP7 connecting pins 5 and 6).

The LD6 VBUS and LD8 PWR green LEDs are lit to confirm the 5 V presence.

### 8.14.2 32L496GDISCOVERY as an USB Host

When the 32L496GDISCOVERY board is used as a USB Host, it supplies the 5 V for the USB peripheral using one of the following sources:

- ST-LINK/V2-1 USB Micro-B connector CN5 when a jumper connects the pins at the STLK location of JP7.
- An external 5 V source connected to pin 5 of the extension connector CN15 when a jumper connects the pins at the ARD location of JP7.
- An external source between 7 V and 11 V connected to the VIN pin of the Arduino™ connector CN15 when a jumper connects the pins at the E5V location of JP7.

The LD8 green LED is lit to confirm the presence of the 5 V source.

The STMPS2141STR power switch is controlled by port MFX\_GPIO3 to deliver the 5 V power to the USB Device connected to the USB connector CN8. When MFX\_GPIO3 is pulled down to ground, the power switch is closed, and the LD6 green LED confirms the 5 V to the USB Device. The LD7 FAULT red LED is lit in case of over-current.

For more details refer to [Section 8.6: Power supply on page 16](#).

### 8.15 PSRAM memory

An 8-Mbit PSRAM is connected to the NOR\_RAM of the FMC interface of the STM32L496AGI6. The data bus is shared with the LCD.

*Note:* The PSRAM is only working when the STM32L496AGI6 is supplied with 3.3 V.

### 8.16 Quad-SPI Flash memory

A 64-Mbit Quad-SPI Flash memory (MX25R6435FM2IL0 from MACRONIX) is connected to the Quad-SPI interface of the STM32L496AGI6.

### 8.17 Virtual COM port

The serial interface USART2 is directly available as a virtual COM port of the PC connected to the ST-LINK/V2-1 USB connector CN5. The virtual COM port settings are configured as: 115200 b/s, 8-bit data, no parity, 1 stop bit, no flow control.

### 8.18 Joystick and LEDs

The blue button B2 is a four-direction joystick with a selection mode when pressed in the center. The logic state is high when one of the five-position switch (Left, Right, Up, Down, Selection) is pressed. The center position is connected to a wake-up pin of the microcontroller PC13. This offers the possibility to wake-up the microcontroller by pressing the center of the joystick.

Two LEDs located near camera connectors CN1 are available for the user. Refer to [Figure 4: 32L496GDISCOVERY top layout on page 11](#) for details. The LEDs are LD1, LD2,

from left to right with colors orange and green respectively as presented in [Table 10](#). To light a LED, a low logic state 0 must be written in the corresponding GPIO.

**Table 10. 32L496GDISCOVERY user LEDs**

LED	Control MCU port	Color
LD1	MFx_GPIO4	Orange
LD2	PB13	Green



## 9 Connectors

### 9.1 Arduino™ Uno V3 compatible connectors

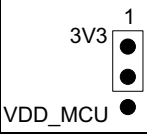
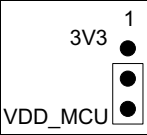
CN10, CN11, CN15, and CN16 are female connectors compatible with Arduino™ Uno V3 standard. Most shields designed for Arduino™ Uno V3 are also supported by the 32L496GDISCOVERY board.

The Arduino™ connectors on the 32L496GDISCOVERY board support the Arduino™ Uno V3.

There are three possible power sources for VREF+:

- From the 32L496GDISCOVERY board VDDA. The related jumper settings are detailed in [Table 11](#). In this case, a 0 Ω resistor must be mounted on R18.

**Table 11. JP4 (VDDA) jumper description**

Jumper	Description
JP4 VDDA source selection	<p><b>Default setting</b></p> <p>VDDA is supplied from 3.3 V. Jumper JP4 connects pins 1 and 2.</p> 
	<p>VDDA is supplied from VDD_MCU. Jumper JP4 connects pins 2 and 3.</p> 

**Warning:** There is a high leakage and a risk of damage in the following configuration: VDDA = VDD\_MCU = 1.8 V and 3.3V connected to ADC input IO.

- From an external shield through Arduino™ connector CN10.  
In this case, a 0 Ω resistor must be mounted on SB2 and a 100 nF capacitor must be mounted on C3.
- From the STM32L496AGI6 MCU (default).

**Caution:** The I/Os of STM32 microcontroller are 3.3 V compatible instead of 5 V for Arduino™ Uno V3.

Arduino™ compatible connectors are detailed in [Table 12](#).



*Note 1: the 3.3 V supply on ARD connector PIN4 is not a power input for 32L496GDISCOVERY board in order to keep the power architecture simple.*

*Note 2: The external voltage applied to pin VIN should be in the range of 6 V to 9 V at 25 °C ambient temperature. The U10 regulator risks overheating and can be damaged if a higher voltage is applied.*

*Note 3: By default pin 5 and pin 6 of connector CN16 are connected to MCU ports PC0 and PA1 respectively. By default, they are enabled by the default configuration of solder bridges: SB28 and SB26 closed, SB27 and SB25 opened. In case an I<sup>2</sup>C interface is needed on pins 5 and 6 of CN16 instead of ADC inputs, SB28 and SB26 must be opened and SB27 and SB25 must be closed.*

## 9.2 PMOD connector CN3

The standard PMOD connector is available on 32L496GDISCOVERY board to support flexibility in small form factor applications. The PMOD connector is implementing PMOD types 2A and 4A on 32L496GDISCOVERY board. PMOD connector is detailed in [Table 13](#).

**Table 13. PMOD connector CN3**

Pin number	Description	Pin number	Description
1	SS/CTS (PG11)	7	INT (PH2)
2	MOSI/TXD (PB15/PB6)	8	RESET (PB2)
3	MISO/RXD (PI2/PG10)	9	NA
4	SCK/RTS (PI1/PG12)	10	NA
5	GND	11	GND
6	3V3	12	3V3

Refer to [Section Appendix C: PMOD and STMod+ schematic table](#) to find more information about PMOD pins.

## 9.3 STMod+ connector CN2

The STMod+ connector is available on 32L496GDISCOVERY board to support flexibility in small form factor applications. The STMod+ connector extends SPI and spare I/Os for different peripheral expansion. It is described in [Table 14](#).

**Table 14. STMod+ connector CN2**

Pin number	Description	Pin number	Description
1	SS/CTS (PG11)	11	INT (PH2)
2	MOSI/TXD (PB15/PB6)	12	RESET (PB2))
3	MISO/RXD (PI2/PG10)	13	ADC (PA4)
4	SCK/RTS (PI1/PG12)	14	PWM (PA0)
5	GND	15	+5V
6	+5V	16	GND

Table 14. STMod+ connector CN2 (continued)

Pin number	Description	Pin number	Description
7	I2C_SCL (PB8)	17	DFSDM-DATA3 (PC7)
8	MOSIs (PI3)	18	DFSDM-CK (PC2)
9	MISOs (PD3)	19	DFSDM-DATA1 (PB12)
10	I2C_SDA (PB7)	20	DFSDM-CK (PC2)

Refer to [Section Appendix C: PMOD and STMod+ schematic table](#) to find more information about STMod+ signals.

## 9.4 TAG connector CN4

TAG connector is a 10-pin footprint supporting SWD mode. It is used to connect to the STM32L496AGI6 for programming or debugging purposes.

Figure 8. TAG connector top view (CN4)

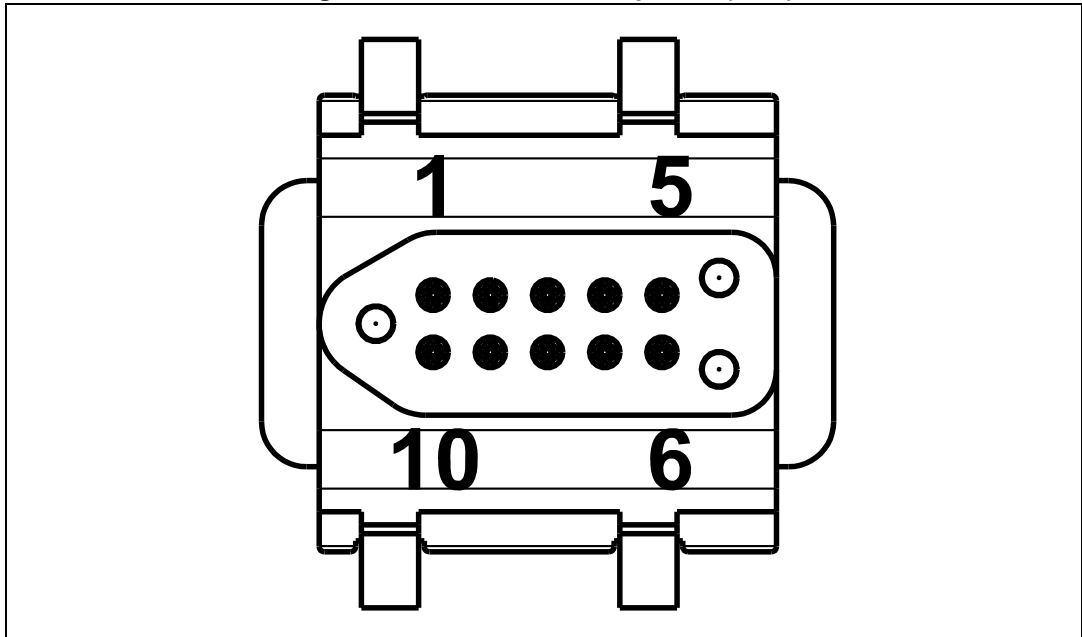


Table 15. TAG connector CN4

Pin number	Description	Pin number	Description
1	VDD	10	RESET#
2	SWDIO (PA13)	9	NA
3	GND	8	NA
4	SWCLK (PA14)	7	NA
5	GND	6	SWO (PB3)

## 9.5 SWD connector CN7

SWD can be used to program or debug on an MCU in an external application board using a cable connected to SWD connector CN7. In such a case, jumper JP6 must connect pins 2 and 3 of the JP6 location.

When SWD is used to program or debug the STM32L496AGI6, jumper JP6 must connect pins 1 and 2 of the JP6 location (default setting).

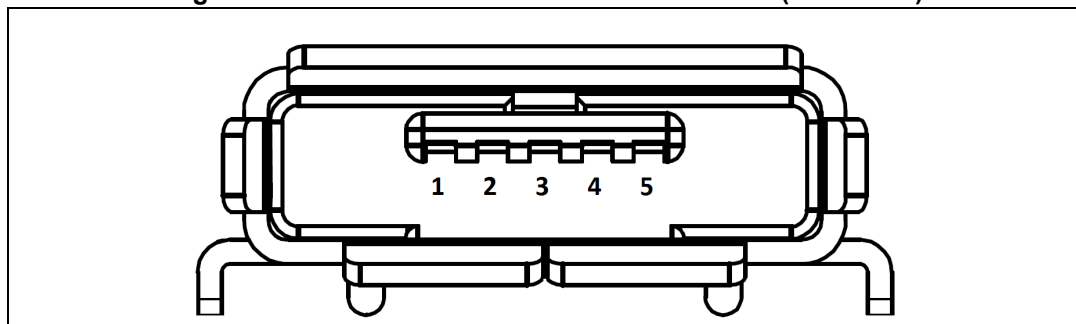
**Table 16. SWD connector CN7**

Pin number	Description	Pin number	Description
1	VDD	4	SWDIO
2	SWCLK	5	NRST
3	GND	6	SWO

## 9.6 USB OTG FS Micro-AB connector CN8

USB OTG full speed interface is available on 32L496GDISCOVERY at USB Micro-AB connector CN8.

**Figure 9. USB OTG FS Micro-AB connector CN8 (front view)**



**Table 17. USB OTG FS Micro-AB connector CN8**

Pin number	Description	Pin number	Description
1	V <sub>BUS</sub> (PA9)	4	ID (PA10)
2	DM (PA11)	5	GND
3	DP (PA12)	-	-

## 9.7 Camera module connector CN1

The 32L496GDISCOVERY offers the possibility to connect a camera module on connector CN1 as detailed in [Figure 10](#) and [Table 18](#).

*Note:* The camera is only working when the STM32L496AGI6 is supplied with 3.3 V.

Figure 10. Camera module connector CN1 (front view)

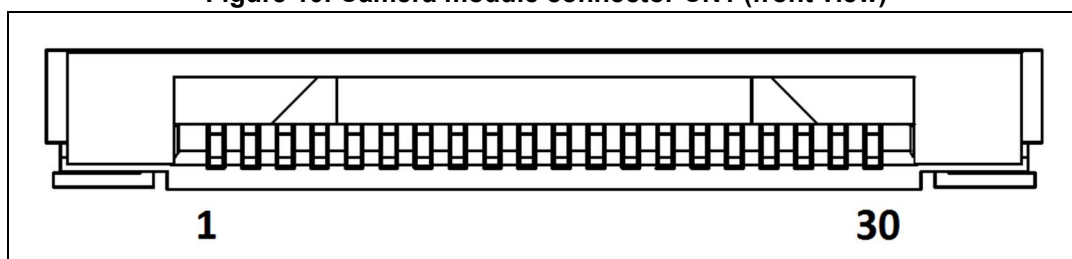


Table 18. Camera module connector CN1

Pin number	Description	Pin number	Description
1	GND	16	GND
2	NC	17	DCMI_HSYNC (PH8)
3	NC	18	NC
4	DCMI_D0 (PH9)	19	DCMI_VSYNC (PI5)
5	DCMI_D1 (PH10)	20	VDD
6	DCMI_D2 (PH11)	21	Camera_CLK (MCU PA8)
7	DCMI_D3 (PH12)	22	NC
8	DCMI_D4 (PH14)	23	GND
9	DCMI_D5 (PI4)	24	NC
10	DCMI_D6 (PE5)	25	DCMI_PWR_EN (MFX_GP6)
11	DCMI_D7 (PI7)	26	RESET#
12	NC	27	DCMI_SDA (PB14)
13	NC	28	DCMI_SCL (PH4)
14	GND	29	GND
15	DCMI_PIXCK (PH5)	30	VDD

## 9.8 microSD™ card

microSD™ cards with 4GB or more capacity can be inserted in the receptacle CN17. 4 bits of the SDIO interface including CLK and CMD signals of the STM32L496AG are used to communicate with the Micro SD card. The card detection is read by the MFX\_GPIO8: when a microSD™ card is inserted, the logic level is 0, otherwise it is 1. The CN17 connector is detailed in [Figure 11](#) and [Table 19](#).

*Note:* The microSD™ card is only working when the STM32L496AGI6 is supplied with 3.3 V.

Figure 11. microSD™ card connector CN17 (top view)

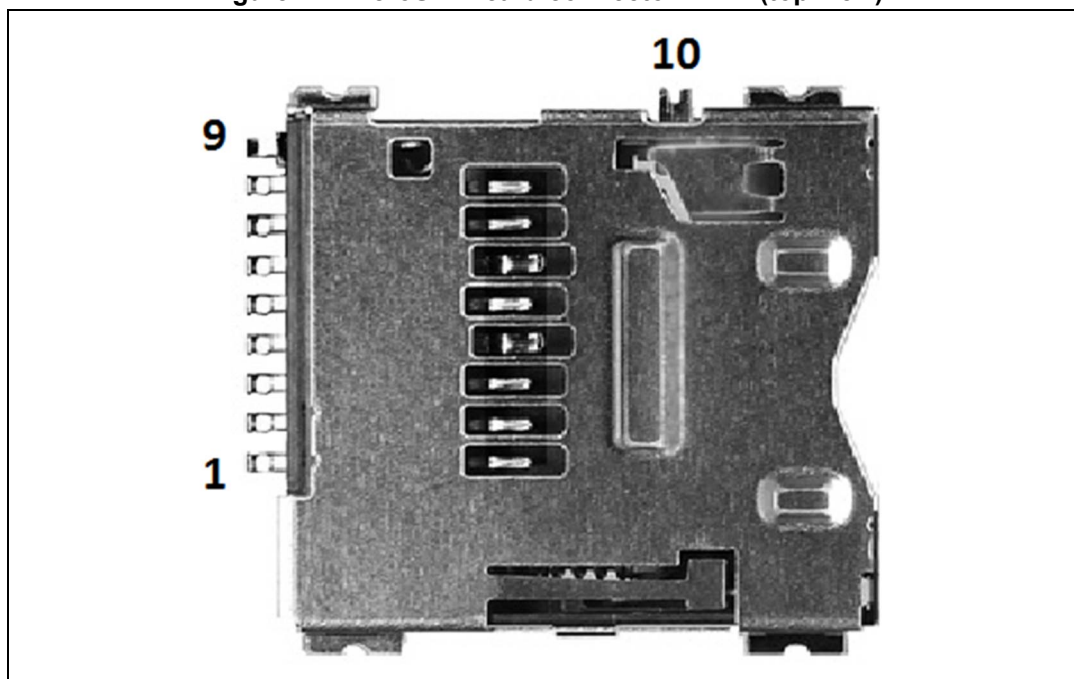


Table 19. microSD™ card connector CN17

Pin number	Description	Pin number	Description
1	SDIO_D2 (PC10)	6	GND
2	SDIO_D3 (PC11)	7	SDIO_D0 (PC8)
3	SDIO_CMD (PD2)	8	SDIO_D1 (PC9)
4	3V3	9	GND
5	SDIO_CLK (PC12)	10	MicroSD card_detect (MFX_GPIO8)

## 9.9 LCD display

The display is a 1.54-inch 240 x 240 pixels TFT color LCD with capacitive touch panel. It can display up to 262 Kcolors. The LCD parallel interface is connected to the FMC of the STM32L496AGI6 by the CN6 connector. By default, the solder bridge SB15 is opened and the solder bridge SB14 is closed. It sets the IM of the LCD to high, enabling the LCD display data bus in 16-bit mode. To use the LCD in 8-bit mode, SB15 must be closed and SB14 opened.

The selection of the LCD is performed by the FMC\_NE1 (PD7) signal. The write enable signal is FMC\_NWE (PD5) and the read enable signal is FMC\_NOE (PD4). The FMC address A18 signal is used to select data/command access to the LCD.

The PH7 port must be used as an input of the microcontroller connected to the LCD signal TE (Tearing Effect). The TE signal is used to synchronize the refresh of the LCD memory by the microcontroller with the LCD scan. Such a synchronization allows to avoid visible artifacts on the display.

The LCD\_RESET (MFX\_GPIO2) signals gives the possibility to reset the LCD by the microcontroller. [Table 20](#) details the signals of LCD connector CN6.

**Table 20. LCD connector CN6**

CN6 pin	Signal name	Description	MCU pin involved
1	GND	Ground	GND
2	LCD_TE	Tearing Effect output pin to interrupt of MCU	PH7
3	D15	Data connected to FMC	PD10
4	D14	Data connected to FMC	PD9
5	D13	Data connected to FMC	PD8
6	D12	Data connected to FMC	PE15
7	D11	Data connected to FMC	PE14
8	D10	Data connected to FMC	PE13
9	D9	Data connected to FMC	PE12
10	D8	Data connected to FMC	PE11
11	D7	Data connected to FMC	PE10
12	D6	Data connected to FMC	PE9
13	D5	Data connected to FMC	PE8
14	D4	Data connected to FMC	PE7
15	D3	Data connected to FMC	PD1
16	D2	Data connected to FMC	PD0
17	D1	Data connected to FMC	PD15
18	D0	Data connected to FMC	PD14
19	/RD	Read of LCD connected to FMC_NOE	PD4
20	/WR	Write of LCD connected to FMC_NWE	PD5
21	RS	Data/Command select connected to A18	PD13
22	/CS	Chip Select of LCD connected to FMC_NE1	PD7
23	RESET	LCD RESET	MFX_GP2
24	IM	8 bits (low)/16bits (high) mode selection pin	n/a
25	IOVCC	LCD I/Os power supply connected to VDD	n/a
26	VCI	Power supply connected to +3V3	n/a
27	GND	Ground	GND
28	LEDA	Anode of backlight LED	n/a
29	LEDK	Cathode of backlight LED	n/a



## 9.10 Backlight

The LEDK and LEDA signals of the LCD module are the cathode and anode of the backlight LEDs.

The backlight LEDs require a current source supply of typically 15 mA capable to deliver a voltage up to 10 V. This function is handled by the backlight driver circuit STLD40DPUR that is a switching mode boost converter powered by the 5 V rail of the board.

A high level of the LCD\_BLCTRL (PI0) signal switches the backlight on. It is possible to dim backlight intensity by applying a low frequency PWM signal to LCD\_BLCTRL (from 1 kHz to 10 kHz typically).

## 9.11 Touch panel

The touch panel is a capacitive touch panel using an I<sup>2</sup>C interface. The CN13 10-pin connector of the touch panel is located on the bottom side of the 32L496GDISCOVERY board. The I<sup>2</sup>C SDA line is connected to PB14 and the I<sup>2</sup>C SCL line is connected to PH4. The CTP\_INT interrupt output is connected to port PG14 as an interruption input of the microcontroller. Port MFX\_GPIO1 is the reset of the capacitive touch panel.

**Table 21. Touch panel connector CN13**

Pin number	Description	Pin number	Description
1	GND	6	GND
2	INT (PG14)	7	RESET (MFX_GPIO1)
3	GND	8	VDD
4	SDA (PB14)	9	VDD
5	SCL (PH4)	10	GND

## 9.12 ST-LINK/V2-1 USB Micro-B connector CN5

USB connector CN5 is used to connect embedded ST-LINK/V2-1 to PC for the programming and the debugging of the STM32L496AGI6 microcontroller.

**Figure 12. USB Micro-B connector CN5 (front view)**

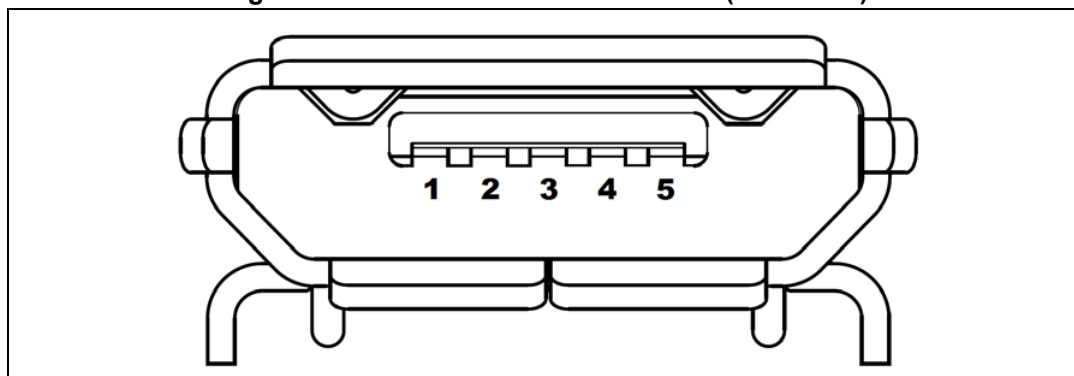


Table 22. USB Micro-B connector CN5

Pin number	Description	Pin number	Description
1	V <sub>BUS</sub> (power)	4	GND
2	DM	5, 6	Shield
3	DP	-	-

## Appendix A 32L496GDISCOVERY board I/O assignment

Table 23. 32L496GDISCOVERY Discovery board I/O assignment

Pin name	Pin number	Signal or label	Note
PA0	K3	TIM2_CH1	-
PA1	N2	ARD_A4	-
PA2	N1	UART2_TX	-
PA3	M2	QSPI_CLK	-
PA4	L3	ADC12_IN9	-
PA5	K4	ARD_D13	ARD_SPI1_CLK
PA6	M4	QSPI_BK1_IO3	-
PA7	L4	QSPI_BK1_IO2	-
PA8	G8	DCMI_CLK	-
PA9	F10	USB_VBUS	-
PA10	F9	USB_ID	-
PA11	E13	USB_DM	-
PA12	D13	USB_DP	-
PA13	A11	STLK_JTMS	SWDIO
PA14	A10	STLK_JTLK	SWCLK
PA15	A9	ARD_D10	SPI1_NSS/TIM2_CH1
PB0	K5	QSPI_BK1_IO1	-
PB1	L5	QSPI_BK1_IO0	-
PB2	N5	PMOD+ RESET	-
PB3	A6	STLK_JTDO	TRACESWO
PB4	A5	ARD_D12	ARD_SPI1_MISO
PB5	B5	ARD_D11	ARD_SPI1_MOSI
PB6	C5	UART1_TX	-
PB7	D5	ARD_D14	I2C1_SDA
PB8	C4	ARD_D15	I2C1_SCL
PB9	D4	ARD_D5	TIM4_CH4
PB10	N9	SAI1_SCK_A	-
PB11	H8	QSPI_BK1_NCS	-
PB12	N12	DFSDM_DATA1	-
PB13	N13	LED1	-
PB14	M13	I2C2_SDA	-
PB15	M12	SPI2_MOSI	-

Table 23. 32L496GDISCOVERY Discovery board I/O assignment (continued)

Pin name	Pin number	Signal or label	Note
PC0	J2	ARD_A5	-
PC1	J3	ARD_A1	-
PC2	J4	DFSDM_CKOUT	-
PC3	K1	ARD_A2	-
PC4	H5	ARD_A0	-
PC5	J5	MFY_WAKEUP	-
PC6	F11	AUDIO_RST	-
PC7	G12	DFSDM_DATA3	-
PC8	G10	SD_D0	-
PC9	G9	SD_D1	-
PC10	D9	SD_D2	-
PC11	E9	SD_D3	-
PC12	F8	SD_CLK	-
PC13	E1	JOY_SEL	WAKEUP
PC14 OSC32_IN	F1	OSC32_IN	-
PC15 OSC32_OUT	G1	OSC32_OUT	-
PD0	B8	PSRAM_D2	LCD_D2
PD1	C8	PSRAM_D3	LCD_D3
PD2	D8	SD_CMD	-
PD3	E8	SPI2_MISO	-
PD4	C7	PSRAM_NOE	LCD_NOE
PD5	D7	PSRAM_NWE	LCD_NWE
PD6	E7	UART2_RX	-
PD7	F7	LCD_NE1	-
PD8	L11	PSRAM_D13	LCD_D13
PD9	L10	PSRAM_D14	LCD_D14
PD10	J13	PSRAM_D15	LCD_D15
PD11	K12	PSRAM_A16	-
PD12	K11	PSRAM_A17	-
PD13	K13	PSRAM_A18	LCD_RS
PD14	K10	PSRAM_D0	LCD_D0
PD15	H11	PSRAM_D1	LCD_D1
PE0	A4	PSRAM_NBL0	-
PE1	B4	PSRAM_NBL1	-
PE2	D3	SAI1_MCLK_A	-

Table 23. 32L496GDISCOVERY Discovery board I/O assignment (continued)

Pin name	Pin number	Signal or label	Note
PE3	D2	SAI1_SD_B	-
PE4	D1	SAI1_FS_A	-
PE5	E4	DCMI_D6	-
PE6	E3	SAI1_SD_A	-
PE7	L7	PSRAM_D4	LCD_D4
PE8	K7	PSRAM_D5	LCD_D5
PE9	J7	PSRAM_D6	LCD_D6
PE10	H7	PSRAM_D7	LCD_D7
PE11	N8	PSRAM_D8	LCD_D8
PE12	M8	PSRAM_D9	LCD_D9
PE13	L8	PSRAM_D10	LCD_D10
PE14	K8	PSRAM_D11	LCD_D11
PE15	J8	PSRAM_D12	LCD_D12
PF0	F5	PSRAM_A0	LCD_RS
PF1	F4	PSRAM_A1	-
PF2	F3	PSRAM_A2	-
PF3	G3	PSRAM_A3	-
PF4	G4	PSRAM_A4	-
PF5	G5	PSRAM_A5	-
PF10	H4	ARD_A3	-
PF11	M5	JOY_RIGHT	-
PF12	N6	PSRAM_A6	-
PF13	M6	PSRAM_A7	-
PF14	L6	PSRAM_A8	-
PF15	K6	PSRAM_A9	-
PG0	J6	PSRAM_A10	-
PG1	H6	PSRAM_A11	-
PG2	J12	PSRAM_A12	-
PG3	J11	PSRAM_A13	-
PG4	J10	PSRAM_A14	-
PG5	J9	PSRAM_A15	-
PG6	G11	ARD_D7	-
PG7	H10	ARD_D1	LPUART1_TX
PG8	H9	ARD_D0	LPUART1_RX
PG9	B7	PSRAM_NE2	-

Table 23. 32L496GDISCOVERY Discovery board I/O assignment (continued)

Pin name	Pin number	Signal or label	Note
PG10	D6	UART1_RX	-
PG11	E6	UART1_CTS	SPI2_NSS
PG12	F6	UART1_RTS	-
PG13	G7	ARD_D2	-
PG14	G6	CTP_INT	-
PG15	C6	ARD_D8	-
PH0	H1	LCD_PWR_ON	-
PH1	G1	MIC_VDD	-
PH2	A2	PMOD_INT	-
PH3	E5	BOOT0	-
PH4	K9	I2C2_SCL	-
PH5	L9	DCMI_PIXCLK	-
PH6	E11	MFX_INT	-
PH7	D12	LCD_TE	-
PH8	N10	DCMI_HSYNC	-
PH9	D11	DCMI_D0	-
PH10	M9	DCMI_D1	-
PH11	M10	DCMI_D2	-
PH12	B13	DCMI_D3	-
PH13	C9	ARD_D9	TIM8_CH1N
PH14	A13	DCMI_D4	-
PH15	B12	ARD_D3	TIM8_CH3N
PI0	A12	LCD_BL	TIM5_CH4
PI1	B11	SPI2_CLK	-
PI2	B10	SPI2_MISO	-
PI3	C10	SPI2_MOSI	-
PI4	D10	DCMI_D5	-
PI5	E10	DCMI_VSYNC	-
PI6	B9	ARD_D6	TIM8_CH2
PI7	B2	DCMI_D7	-
PI8	C11	JOY_UP	-
PI9	B1	JOY_LEFT	-
PI10	A1	JOY_DOWN	-
PI11	C3	ARD_D4	-

## Appendix B Electrical schematics

This section provides design schematics of the features for the 32L496GDISCOVERY Discovery board and design schematics of the Fanout board:

- 32L496GDISCOVERY Discovery board interconnections ([Figure 13](#))
- Power ([Figure 14](#))
- Arduino™ Uno V3 connectors ([Figure 15](#))
- ST-LINK/V2-1 ([Figure 16](#))
- Quad-SPI Flash memory ([Figure 17](#))
- Peripherals ([Figure 18](#))
- USB OTG FS ([Figure 19](#))
- LCD interface ([Figure 20](#))
- IDD measurement and MFX ([Figure 21](#))
- MCU ([Figure 22](#))
- PSRAM ([Figure 23](#))
- Camera ([Figure 24](#))
- STMod+ interface ([Figure 25](#))
- Audio and DFSDM ([Figure 26](#))
- Fanout board ([Figure 27](#))





Figure 14. Power

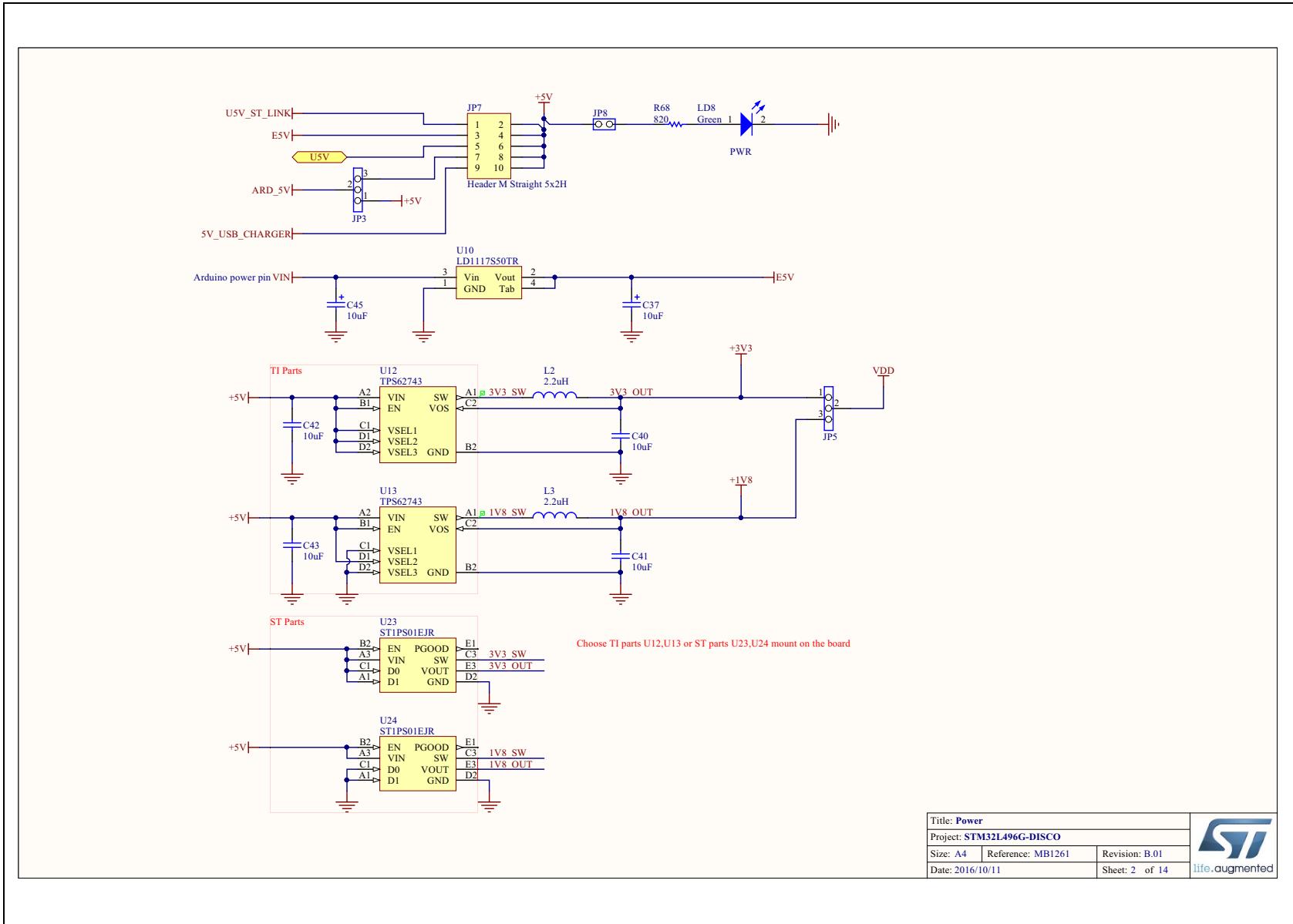
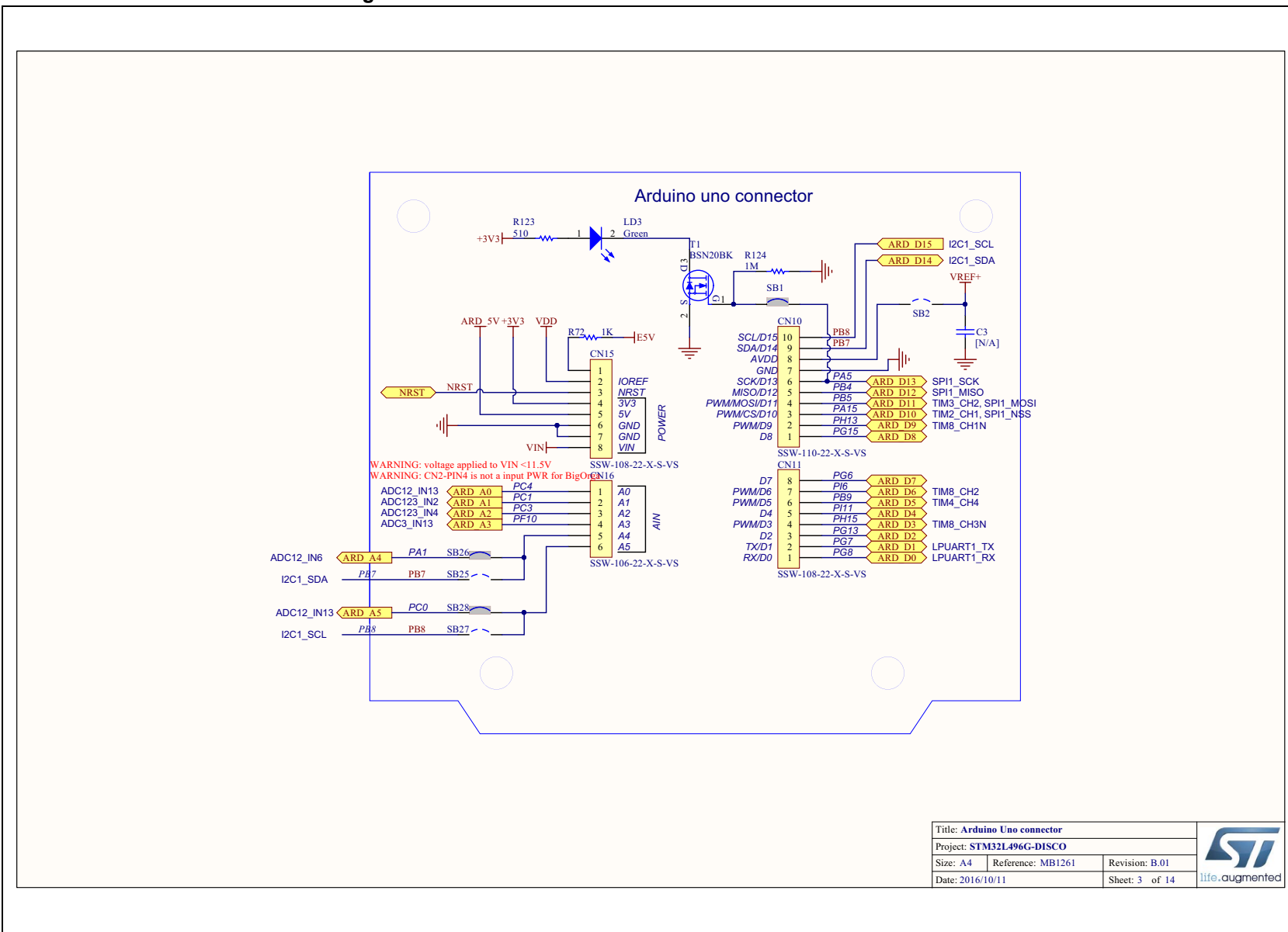




Figure 15. 32L496DISCOVERY Arduino™ Uno V3 connectors



Title: Arduino Uno connector		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 3 of 14	



Figure 16. ST-LINK/V2-1

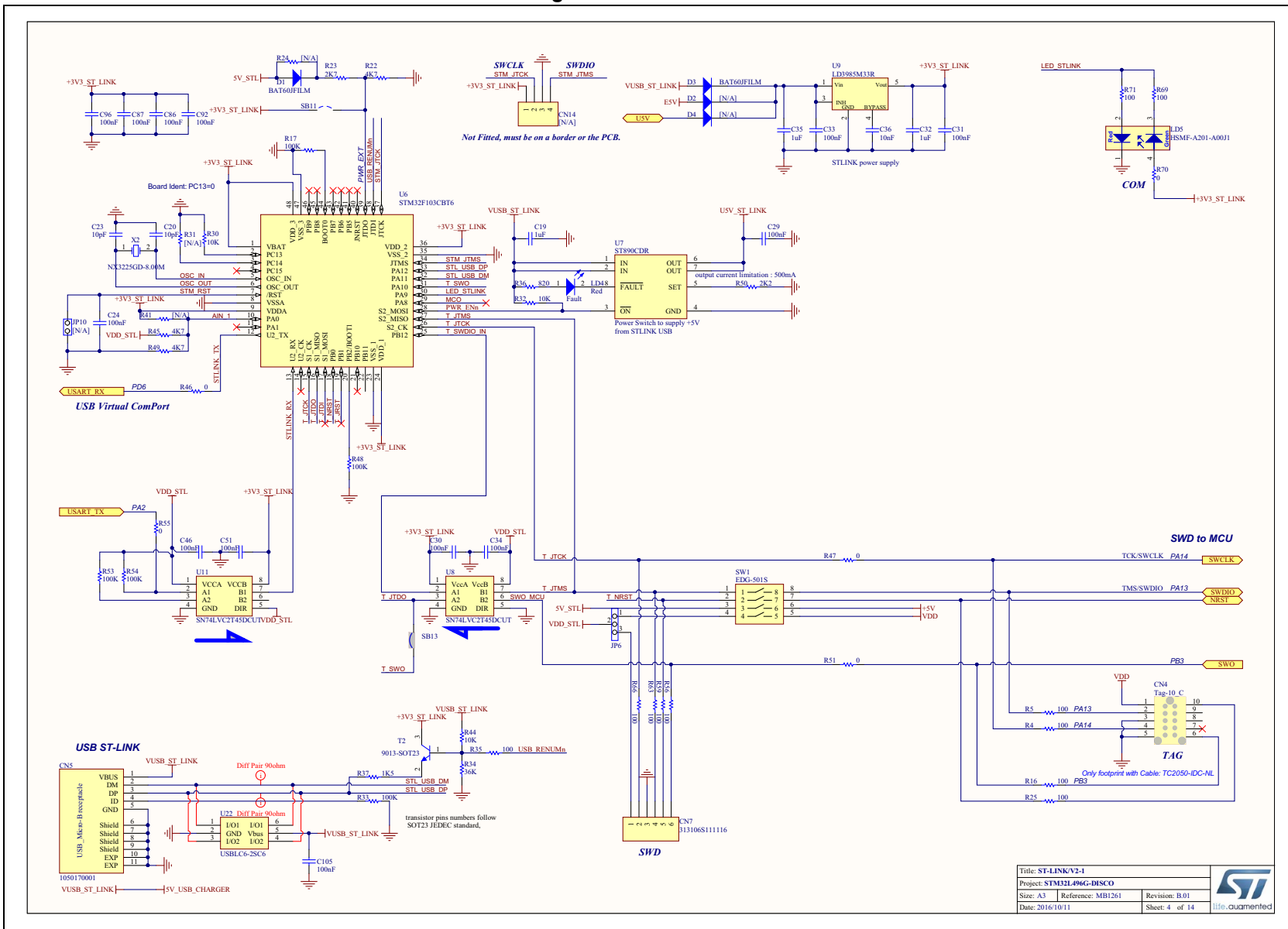
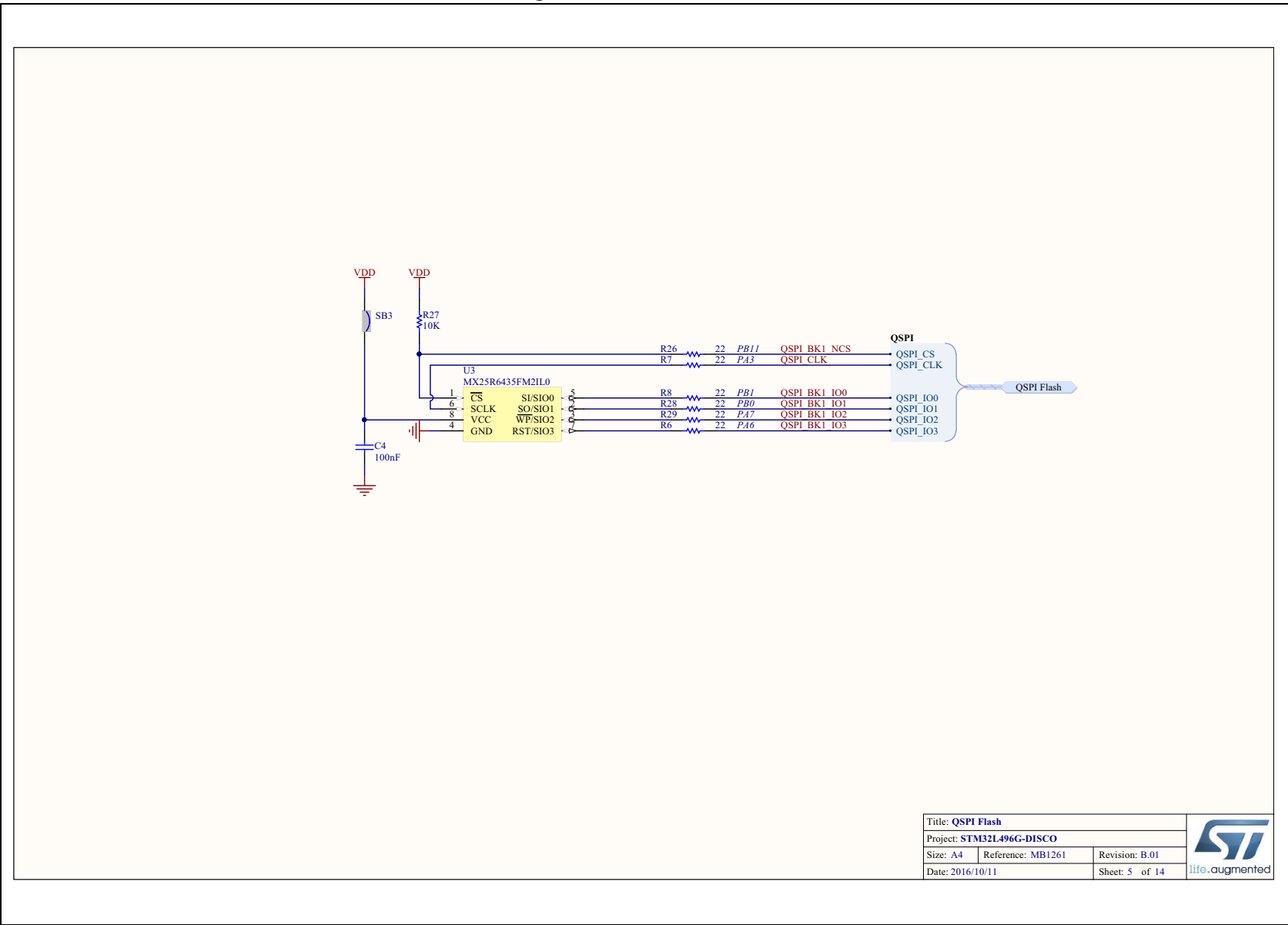


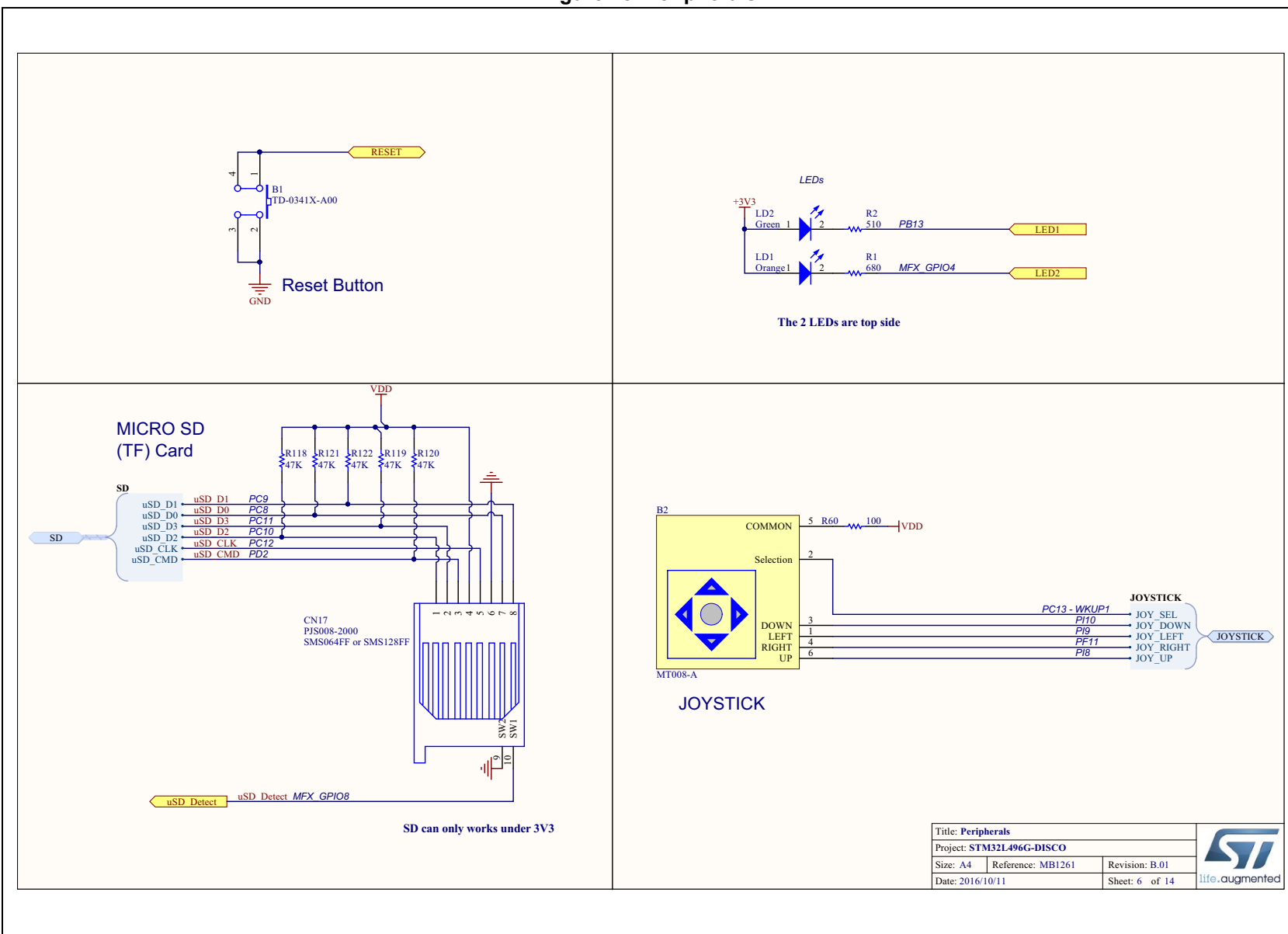
Figure 17. Quad-SPI Flash



Title: QSPI Flash		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 5 of 14	lifo.augmented



Figure 18. Peripherals

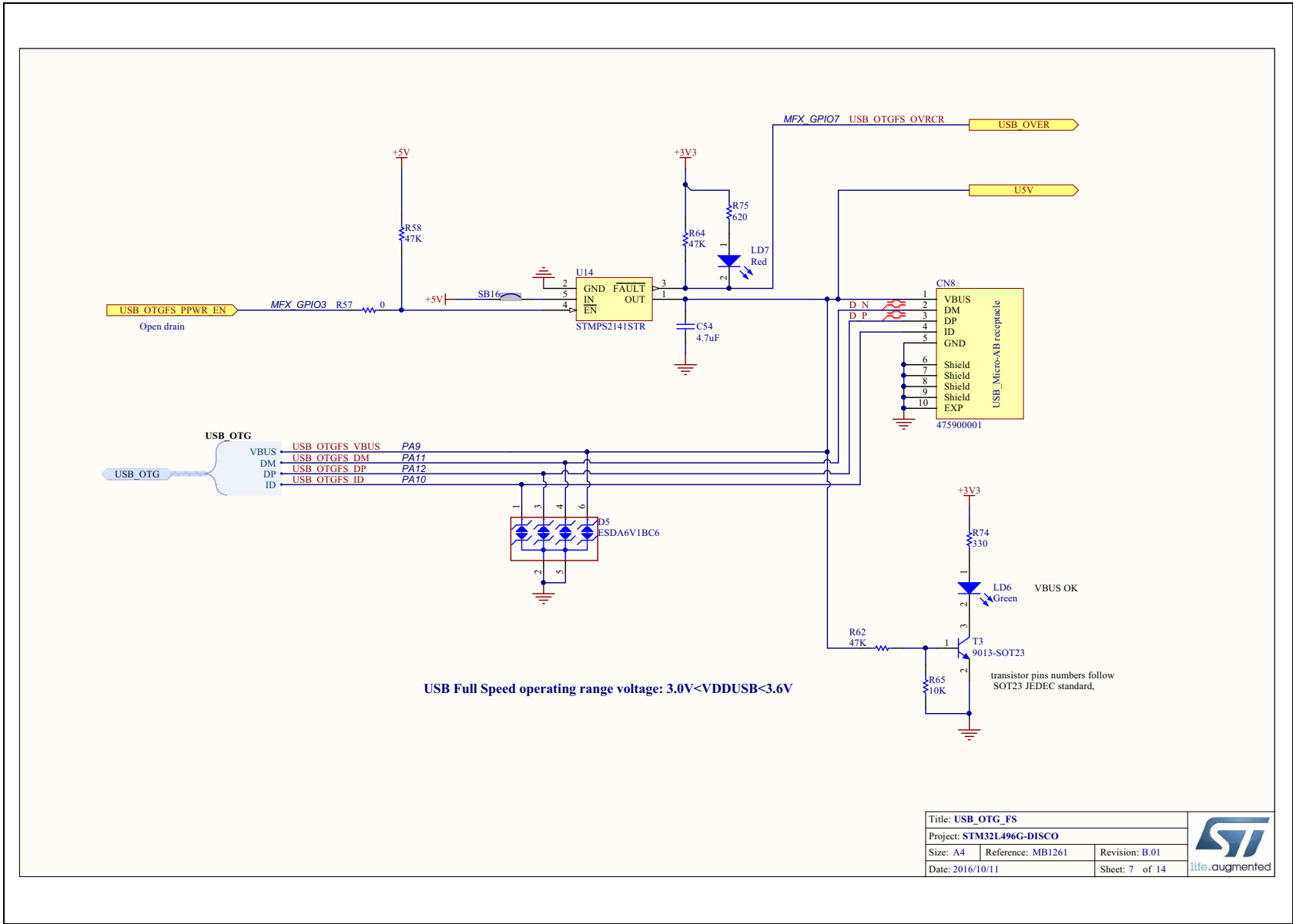


Title: Peripherals		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 6 of 14	





Figure 19. USB OTG FS



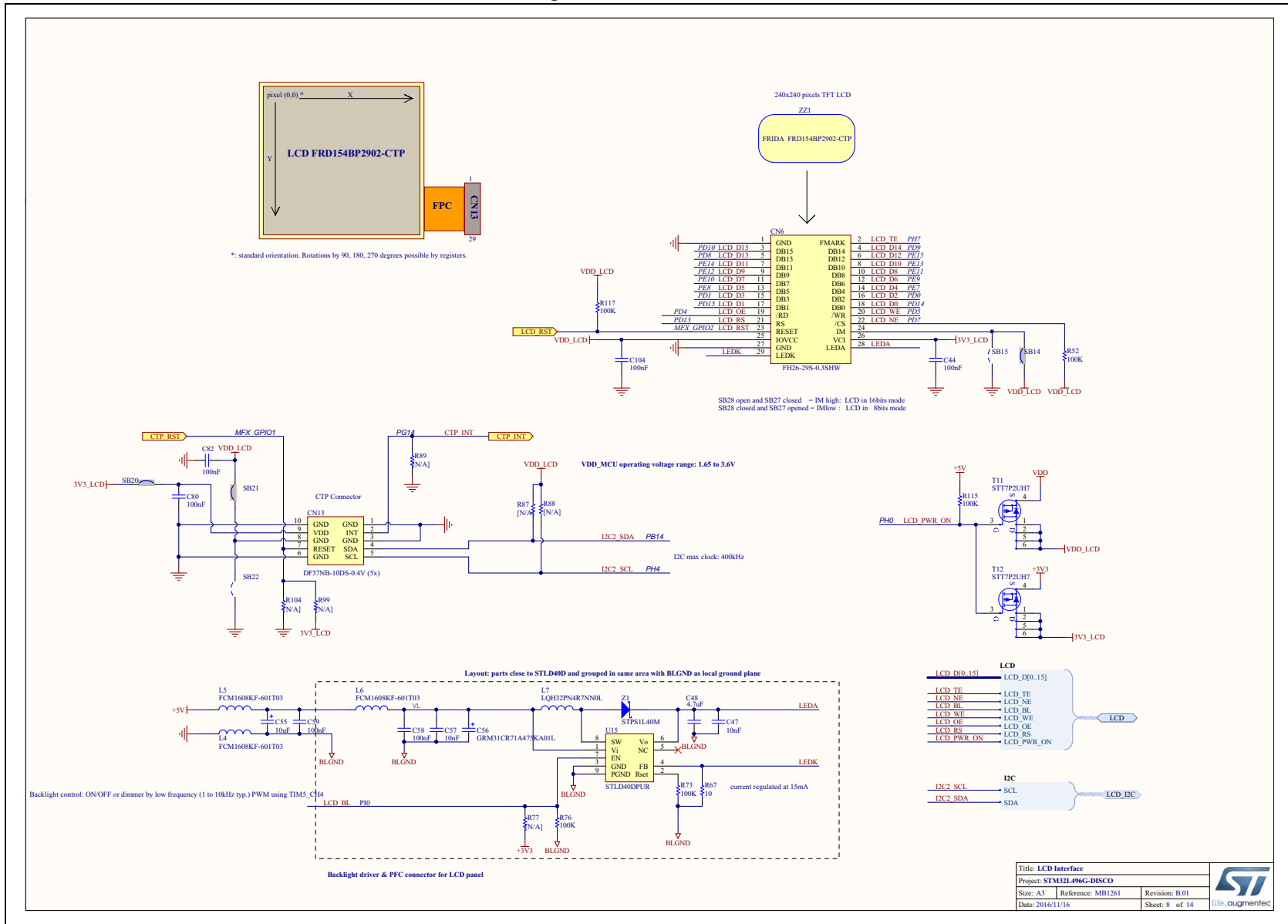
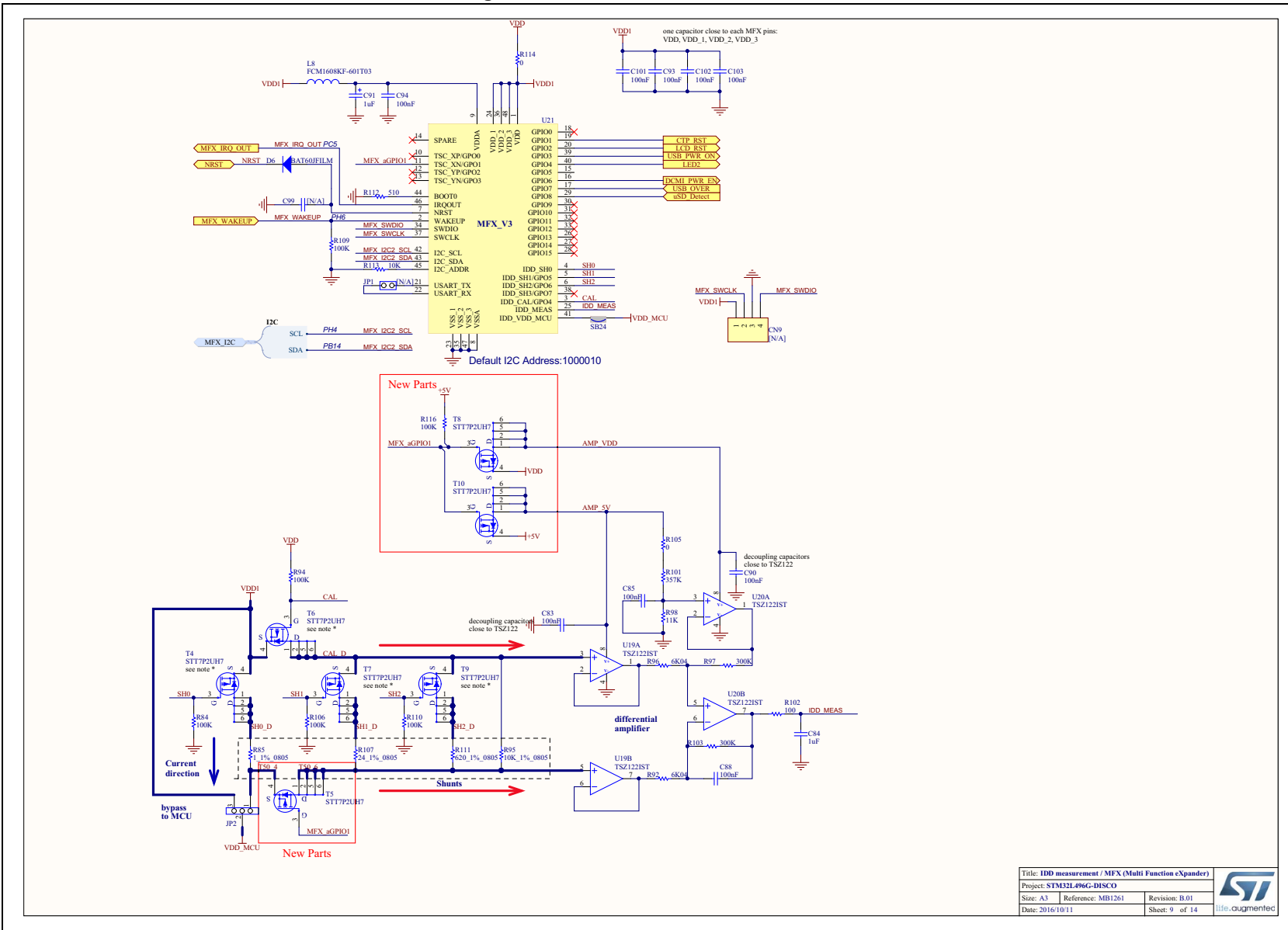
**Figure 20. LCD interface**




Figure 21. IDD measurement and MFX



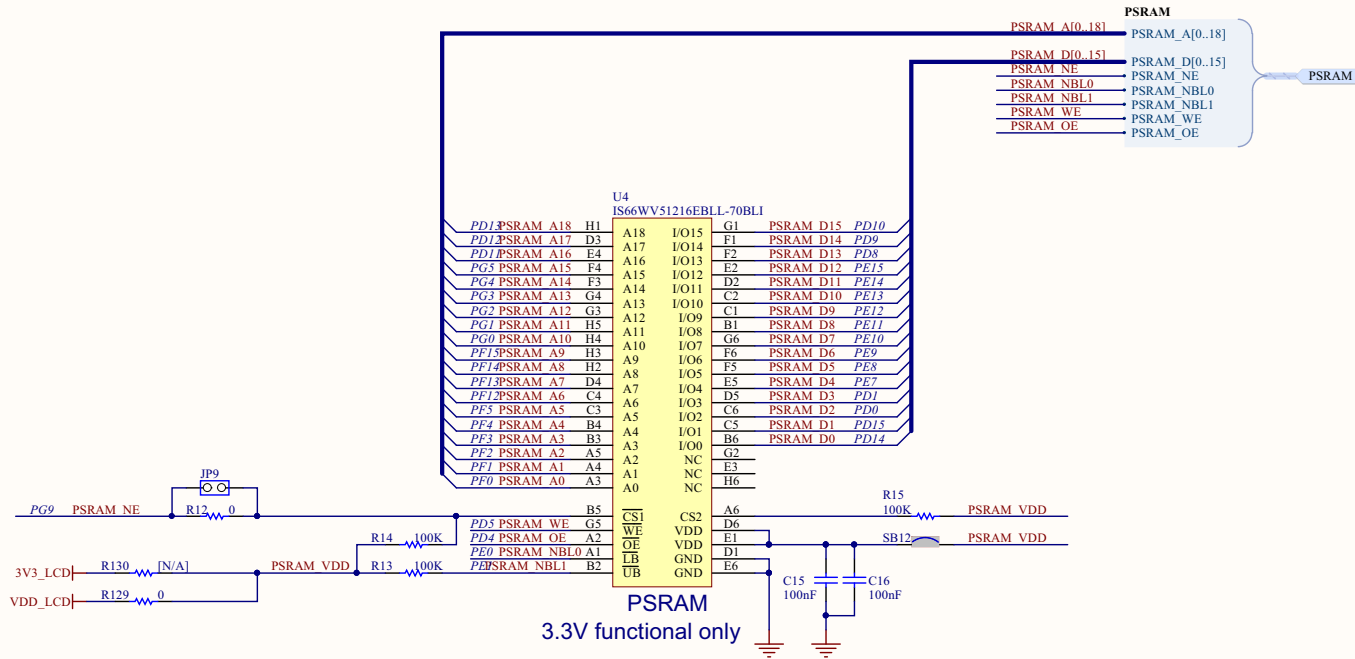
Title: IDD measurement / MFX (Multi Function xPander)			
Project: STM32L496G-DISCO			
Size: A3	Reference: MB1261		Revision: B.01
Date: 2016/10/11			Sheet: 9 of 14







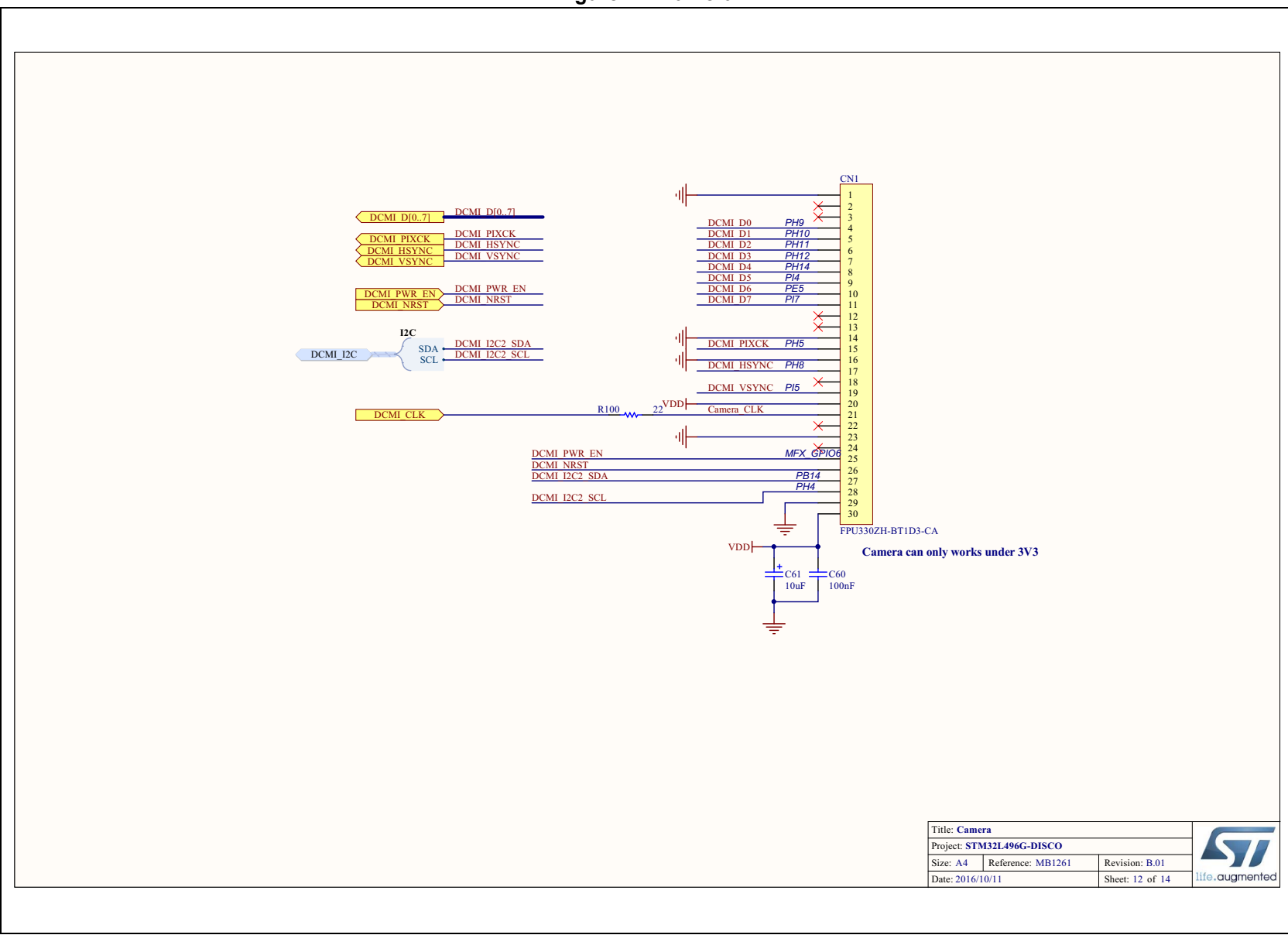
Figure 23. PSRAM



Title: PSRAM		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 11 of 14	life.augmented



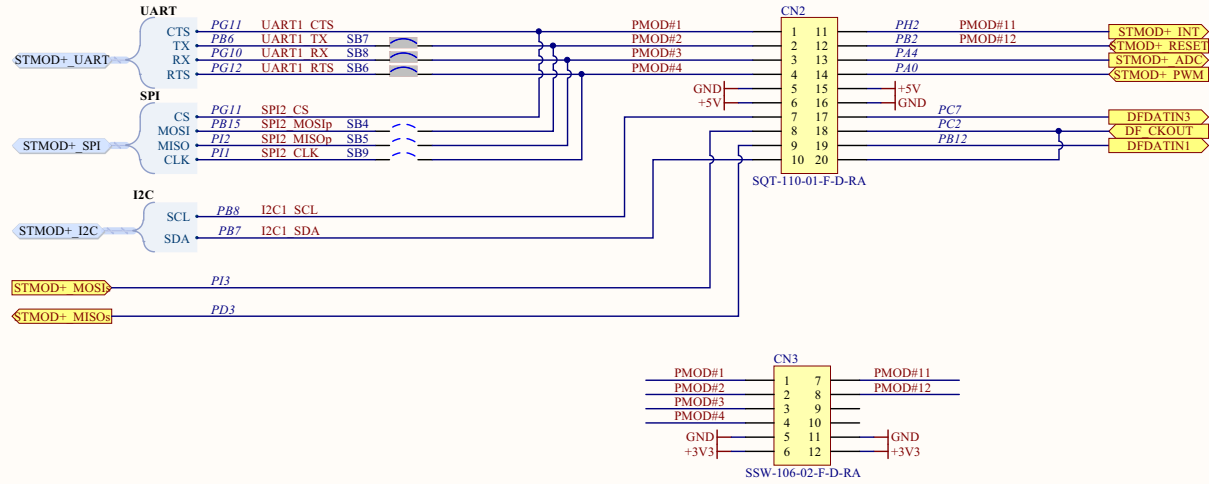
Figure 24. Camera



Title: Camera			 life.augmented
Project: STM32L496G-DISCO			
Size: A4	Reference: MB1261	Revision: B.01	
Date: 2016/10/11	Sheet: 12 of 14		

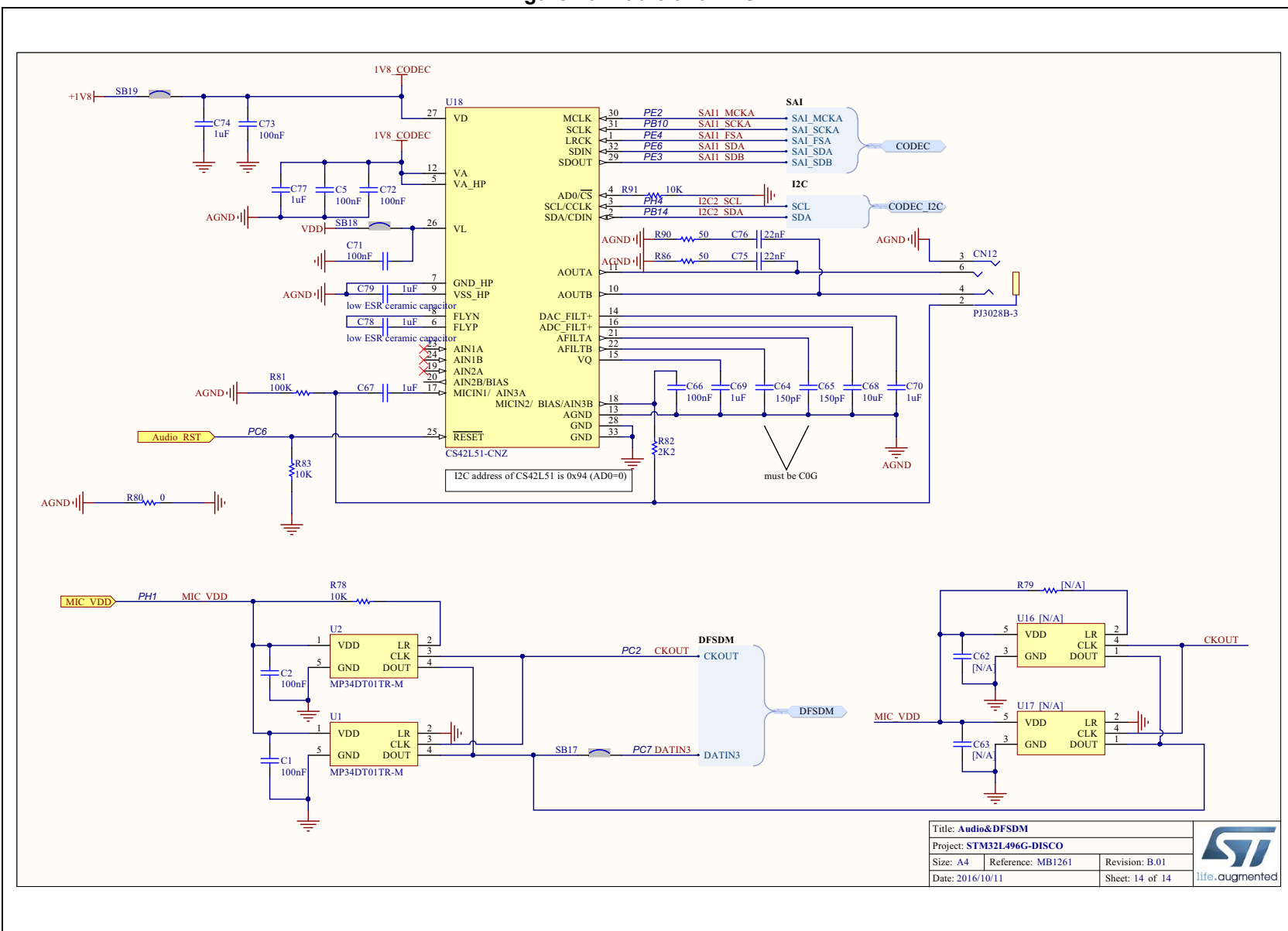


Figure 25. STMod+ interface



Title: STMOD+ Interface		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 13 of 14	life.augmented

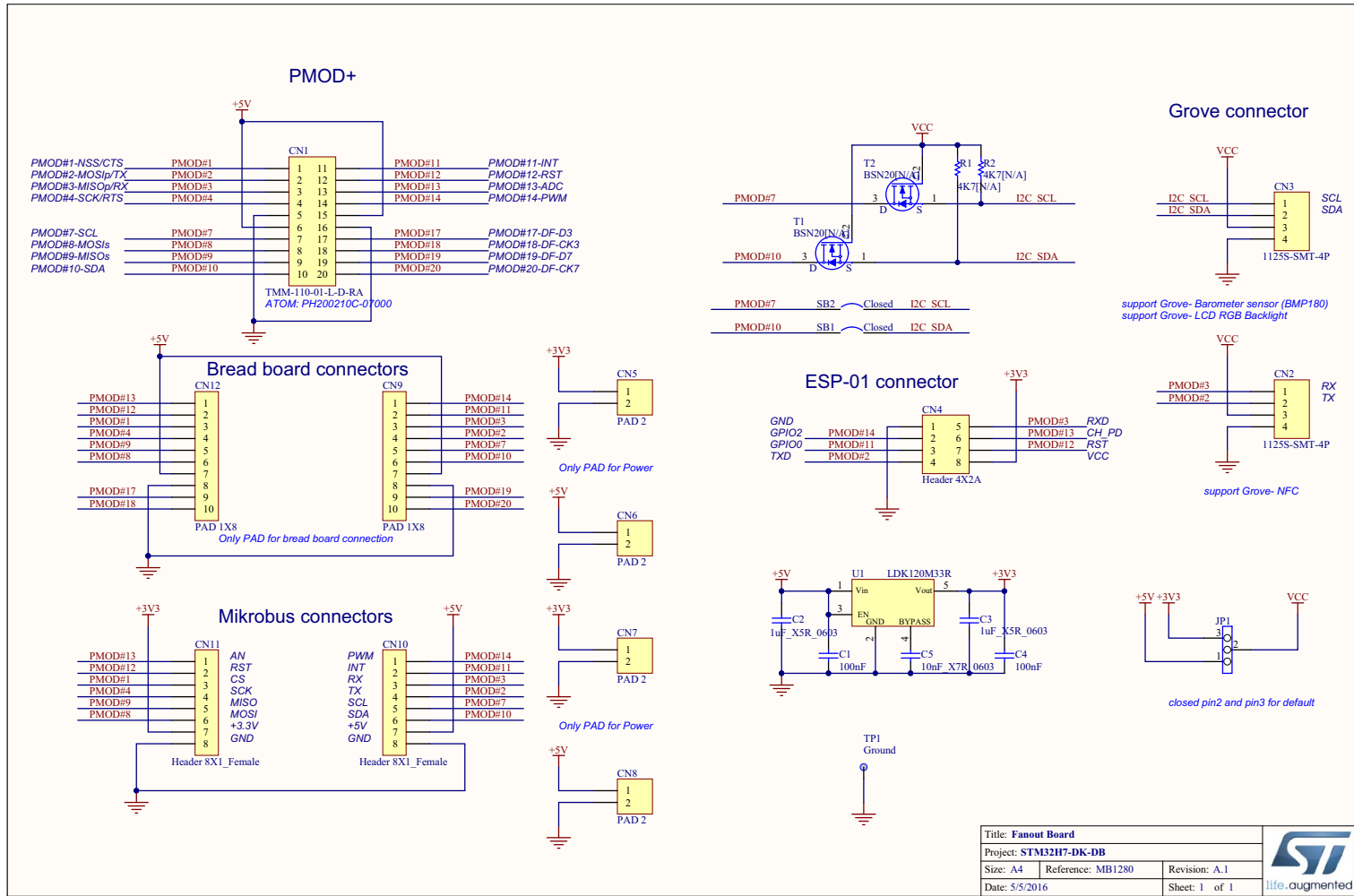


**Figure 26. Audio and DFSDM**


Title: Audio&DFSDM		
Project: STM32L496G-DISCO		
Size: A4	Reference: MB1261	Revision: B.01
Date: 2016/10/11	Sheet: 14 of 14	



Figure 27. Fanout board



Title: Fanout Board		
Project: STM32H7-DK-DB		
Date: 5/5/2016	Revision: A.1	
Sheet: 1 of 1	life.augmented	

## Appendix C PMOD and STMod+ schematic table

[Table 24](#) gives the description of the signals available on the STMod+ connector. It also shows which signal is shared with other board connectors (such as PMOD or Arduino™ Uno V3 as listed in columns PMOD and ARD respectively). When the I<sup>2</sup>C bus (pins 7 and 10) is shared with built-in discovery slave devices, it is recommended to check the device slave address when adding it to the bus. Refer to the following list of acronyms before reading [Table 24](#):

- NSS2 stands for SPI2\_NSS
- LT2.O stands for LPTIM2\_OUT
- LT1.2 stands for LPTIM1\_IN2
- LT1.E stands for LPTIM1\_ETR
- T15.2 stands for TIM15 CH2
- SCL4 stands for I2C4\_SCL
- SDA1 stands for I2C1\_SDA
- DFS1.D5 stands for DFSDM1\_DATIN5
- DFS1.CI2 stands for DFSDM1\_CKIN2
- DFS1.CO stands for DFSDM1\_CKOUT
- RX1 stands for USART1\_RX
- UCK3 stands for USART3\_CK
- CTS2 stands for USART2\_CTS
- LRTS1 stands for LPUART\_RTS1
- CRX1 stands for CAN1\_RX



Table 24. STMod+ connector signals

-	-	-	STMod+							-	-	-	
ARD	PMOD	Some other alternate functions	Basic	SB	Port	Pin	Port	SB	Basic	Some other alternate functions	PMOD	ARD	
-	<b>CTS/NSS</b>	<b>LT1.2/T15.2</b>	<b>CTS1/NSS2</b>	-	PG11	1	11	PH2	-	INT	-	INT	-
-	<b>TX</b>	<b>LT1.E/T4.1/SCL1/SCL4/DFS1.D5</b>	<b>TX1</b>	7	<b>PB6</b>	2	12	PB2	-	RST	RTC_OUT/LT1.O/DFS1.CI0	RST	-
-	MOSI	DFS1.C2/T15.2/RTC_REFIN	MOSI2p	4	PB15								
-	<b>RX</b>	<b>LT1.1/T15.1</b>	<b>RX1</b>	8	<b>PG10</b>	3	13	PA4	-	ADC	CK2/LT2.O	-	-
-	MISO	T8.4	MISO2p	5	PI2								
-	<b>RTS</b>	<b>LT1.E</b>	<b>RTS1</b>	6	<b>PG12</b>	4	14	PA0	-	PWM	T2.1/T5.1/T8.E/CTS2/TX4/T2.E/RTC_TAMP2/WKUP1	-	-
-	SCK	-	SCK2	9	PI1								
-	-	-	GND	-	GND	5	15	+5V	-	+5V	-	-	-
-	-	-	+5V	-	+5V	6	16	GND	-	GND	-	-	-
SCL1	-	T4.3/SCL1/DFS1.D6/T16.1/CRX1	SCL1	-	PB8	7	17	PC7	-	GPIO	T3.2/T8.2/ DFS1.D3	-	-
-	-	T8.E	MOSI2s	-	PI3	8	18	PC2	-	GPIO	LT1.2/MISO2/DFS1.CO	-	-
-	-	SCK2/DFS1.D0	MISO2s	-	PD3	9	19	PBI2	-	GPIO	NSS2/DFS1.D1/UCK3/LRTS1	-	-
SDA1	-	LT1.2/T4.2/SDA1/DFS1.CI5/RX1	SDA1	-	PB7	10	20	PC2	-	GPIO	Same as pin 18	-	-

Note: SB stands for solder bridge. Text in bold refers to default (USART).



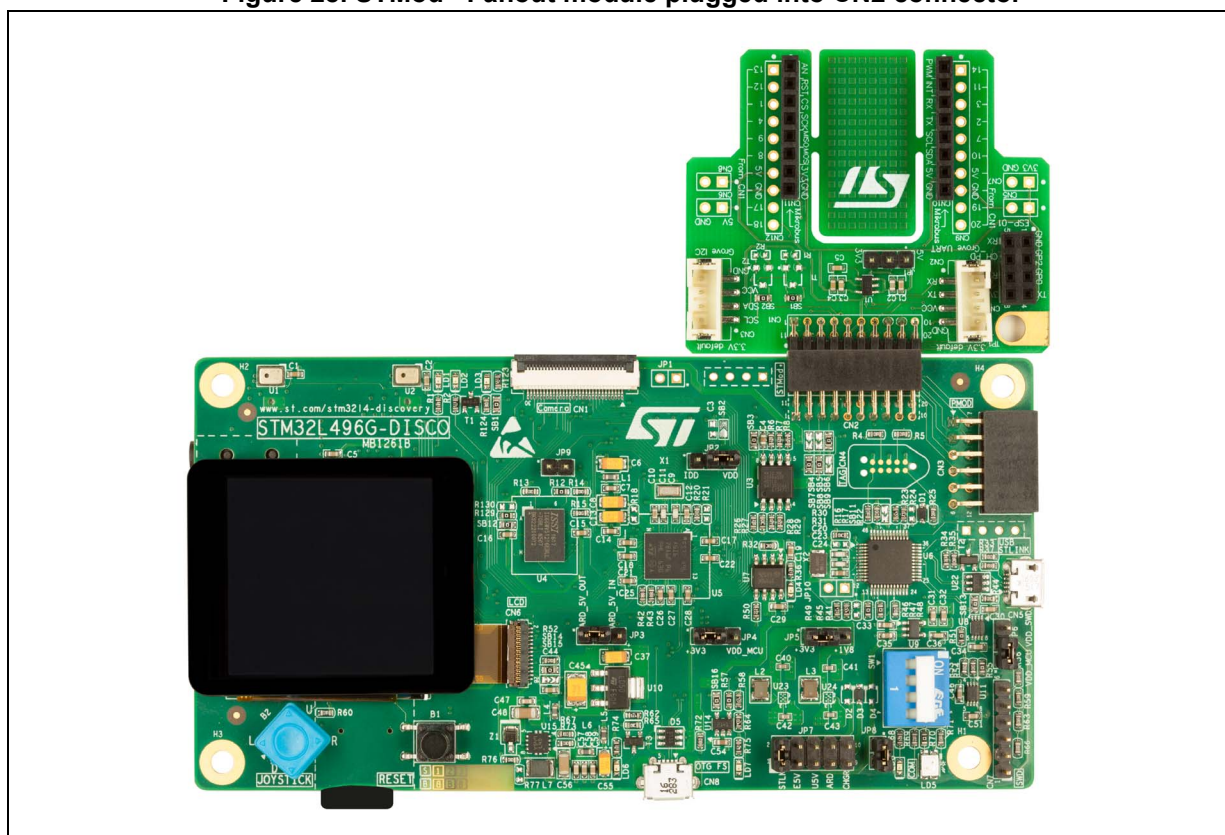
## Appendix D Fanout board

The Fanout board comes with the 32L496GDISCOVERY Discovery board.

It is connected to STMod+ connector (CN2) and it provides access to:

- MikroElektronika Mikrobus Click-board compatible connectors (CN10 and CN11: two 1x8-pin male connectors)
- ESP-01 compatible connector (CN4: 2x4-pin male connector)
- Seeed Studio™ Grove compatible connectors (CN3 and CN2: two 1x4-pin male connectors)
- Reserved standard 2.54 mm pitch of STMod+ pin header for breadboard.

**Figure 28. STMod+ Fanout module plugged into CN2 connector**



### D.1 MikroElektronika mikroBUS™ compatible connector (Fanout CN10 and CN11)

The mikroBUS™ compatible connector is 2.54" pitch with a pair of 1x8-pin female connectors. [Table 25](#) below shows the definition of the pins.

Table 25. Description of the mikroBUS™ connector pins

STMod+ connector CN11 number	Function of mikroBUS	Pin number	Pin number	Function of mikroBUS	STMod+ connector CN10 number
STMod+#13-ADC <sup>(1)</sup>	AN	1	1	PWM	STMod+#14-PWM <sup>(1)</sup>
STMod+#12-RST	RST	2	2	INT	STMod+#11-INT
STMod+#1-NSS	CS	3	3	RX	STMod+#3-RX
STMod+#4-SCK	SCK	4	4	TX	STMod+#2-TX
STMod+#9-MISOs	MISO	5	5	SCL	STMod+#7-SCL <sup>(2)</sup>
STMod+#8-MOSIs	MOSI	6	6	SDA	STMod+#10-SDA <sup>(2)</sup>
-	+3.3 V	7	7	+5 V	-
-	GND	8	8	GND	-

1. Exclusive use: Arduino™ or STMod+.
2. Shared with Arduino™.

The mikroBUS™ pinout assignment is available at the: <http://mikroe.com> website.

## Appendix E Federal Communications Commission (FCC) and Industry Canada (IC) Compliance

This kit is designed to allow:

- (1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and
- (2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of 47 CFR, Chapter I (“FCC Rules”), the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

## Revision history

**Table 26. Document revision history**

Date	Revision	Changes
02-Mar-2017	1	Initial release

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