

## Introduction

The STM32072B-EVAL evaluation board is designed as complete demonstration and development platform for STMicroelectronics ARM cortex-M0 core-based STM32F072VBT6 microcontroller with two I2C, two SPI, four USART, one CAN, 12bit ADC, 12bit DAC, two GP comparators, internal 16KB SRAM and 128KB Flash, USB FS, Touch sensing, CEC, SWD debugging support.

The full range of hardware features on the board is designed for the evaluation of all the peripherals (for example the motor control connector, USB full-speed, RS232, RS485, Audio DAC, microphone ADC, Touch sensing buttons, TFT LCD, CAN, IrDA, IR LED, IR receiver, LDR, MicroSD card, CEC on two HDMI connectors, Smart card slot, RF E2PROM and the temperature sensor) and for the development of user-specific applications. Extension headers are used to easily connect a daughter board or wrapping board for the user-specific applications.

The ST-LINK/V2 is integrated on the board as embedded in-circuit debugger and programmer for the STM32 MCU.

Figure 1. STM32072B-EVAL evaluation board picture <sup>(1)</sup>



1. Picture not contractual

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# 1 Overview

## 1.1 Features

- Four 5 V power supply options: power jack, ST-LINK/V2 USB connector, user USB connector or daughter board
- Stereo audio jack which supports a headset with microphone connected to DAC and ADC of STM32F072VBT6.
- 2 G Byte (or more) SPI interface MicroSD card
- I2C compatible serial interface temperature sensor
- RF E2PROM
- RS232 and RS485 communication
- IrDA transceiver
- IR LED and IR receiver
- SWD debug support, ST-LINK/V2 embedded
- 240x320 TFT color LCD connected to SPI interface of STM32F072VBT6
- Joystick with 4-direction control and selector
- Reset and tamper buttons
- Four color user LEDs and two LEDs as MCU low power alarm
- Extension connector for daughter board or wrapping board
- MCU voltage choice fixed 3.3 V or adjustable from 1.65 V to 3.6 V
- USB full-speed connector
- Touch sensing buttons
- RTC with backup battery
- CAN2.0A/B compliant connector
- Light Dependent Resistor (LDR)
- Potentiometer
- Two HDMI connectors with DDC and CEC
- Smart Card slot
- Motor control connector

## 1.2 Demonstration software

The demonstration software is preloaded in the board Flash memory for easy demonstration of the device peripherals in stand-alone mode. For more information and to download the latest version available, please refer to the STM32072B-EVAL demonstration software available on [www.st.com](http://www.st.com).

## 1.3 Order code

To order the STM32F072VBT6 evaluation board, use the order code STM32072B-EVAL.

## 1.4 Delivery recommendations

Before using the board for the first time, please verify that nothing was damaged during shipment and that no components are unplugged or lost.

When extracting the board from its plastic container, please check that no component remains in the bag.

The main components to verify are the following:

1. The 8 MHz crystal (X2) which may have been removed from its socket by a shock.
2. The MicroSD card which may have been ejected from the CN9 connector (right side of the board).
3. The dual-interface EEPROM board (ANT7-M24LR-A) which may have been unplugged from the CN2 connector (top left corner of the board).

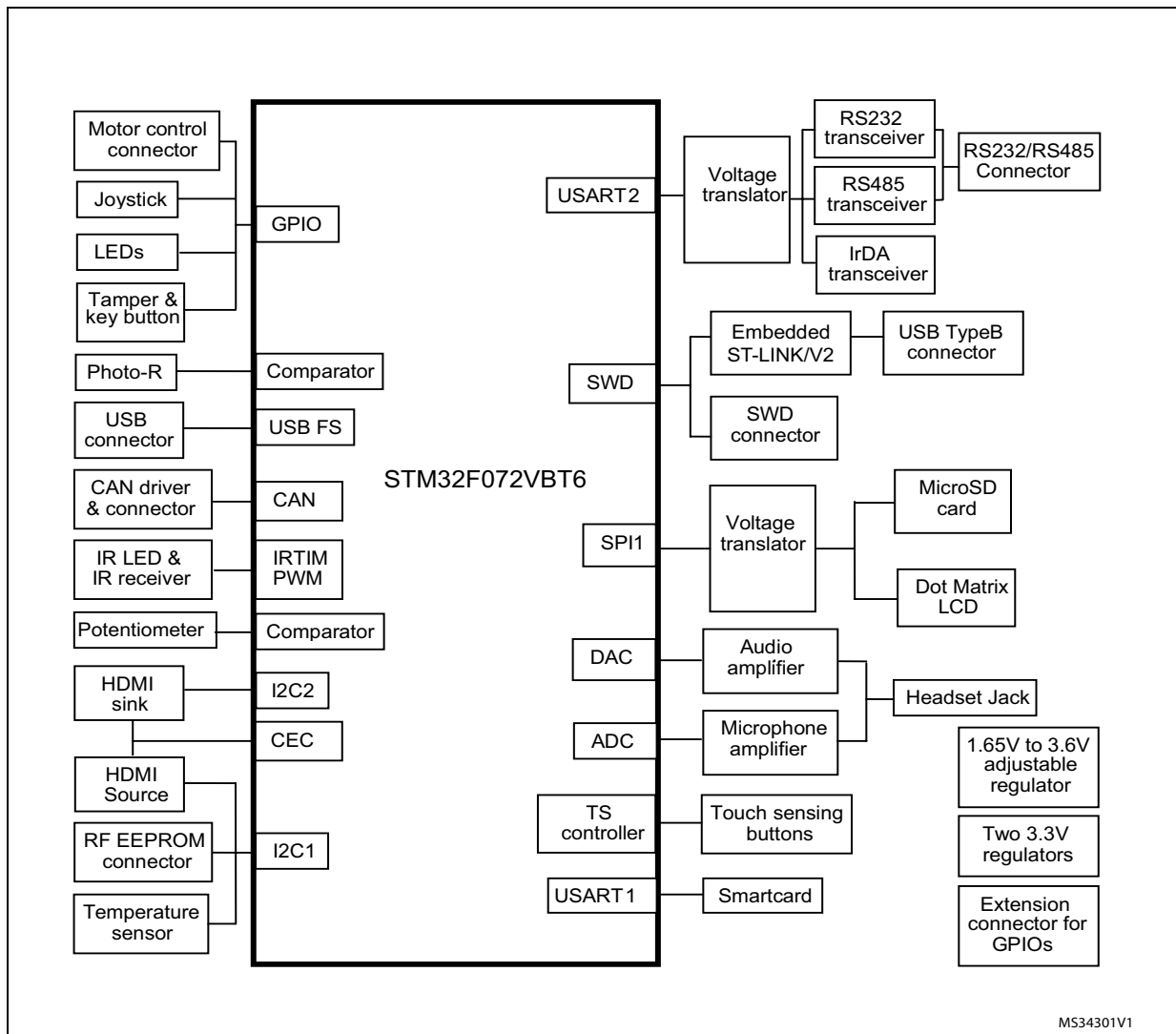
For all information concerning the version of the MCU used on the board, its specification and possible related limitations, please visit the company web site to download the relevant data sheet and errata sheet.



## 2 Hardware layout and configuration

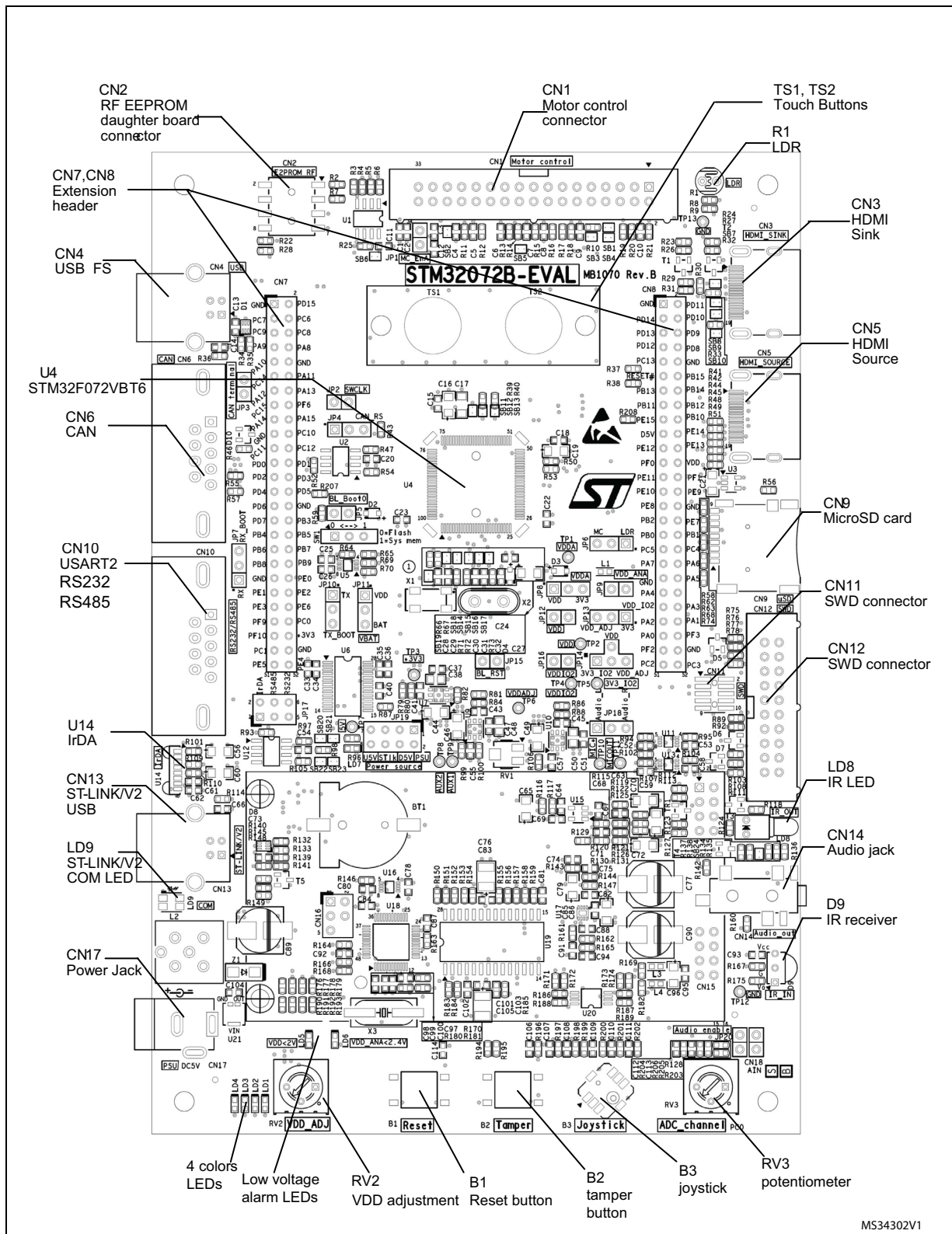
The STM32072B-EVAL evaluation board is designed around the STM32F072VBT6 (100-pin LQFP package). The hardware block diagram *Figure 2* illustrates the connection between STM32F072VBT6 and peripherals such as motor control connector, USB full-speed connector, RS232, RS485, Audio DAC, microphone ADC, Touch sensing buttons, TFT LCD, CAN, IrDA, IR LED, IR receiver, LDR, MicroSD card, CEC on two HDMI connectors, Smart card slot, RF E2PROM and Temperature sensor. The *Figure 3* will help you locate these features on the evaluation board.

Figure 2. Hardware block diagram



MS34301V1

Figure 3. STM32072B-EVAL evaluation board layout



## 2.1 Development and debug support

The version 2 of the ST-LINK called ST-LINK/V2 is embedded on the board. This tool is used for program loading and debugging of the STM32F072VBT6 on board using the SWD interface. The third-party debug tools are also supported by SWD with connectors CN11 and CN12.

A specific driver needs to be installed on your PC for the communication with the embedded ST-LINK/V2. The install shield called ST-LINK\_V2\_USBdriver.exe is available on the company website. To download and install this driver, please refer to the software and development tools page for STM32F0 family available on [www.st.com](http://www.st.com).

The third-party tool chains, Atollic TrueSTUDIO, KEIL ARM-MDK, IAR EWARM and the Tasking VX-Toolset support ST-LINK/V2 according to [Table 1](#).

**Table 1. Third-party support of ST-LINK/V2**

| Third party       | Toolchain    | Version |
|-------------------|--------------|---------|
| Atollic           | TrueSTUDIO   | 2.1     |
| IAR               | EWARM        | 6.20    |
| Keil              | MDK-ARM      | 4.20    |
| TaskingVX-Toolset | ARM Cortex-M | 4.0.1   |

The embedded ST-LINK/V2 is connected to the PC via a standard USB cable connected to connector CN13. The bicolor LED LD9 (COM) indicates the status of the communication as follows:

- Slow blinking Red/Off: at power on before USB init
- Fast blinking Red/Off: after the first correct communication between the PC and ST-LINK/V2 (enumeration)
- Red Led On: when initialization between PC and ST-LINK/V2 is successfully complete
- Green Led On: after successful target communication initialization
- Blinking Red/Green: during communication with target
- Red On: communication finished and OK
- Orange On: communication failure

*Note:* It is possible to power the board via CN13 (embedded ST/LINK/V2 USB connector) even if an external tool is connected to CN11 (high-density SWD connector) or CN12 (SWD connector).

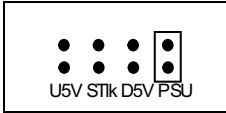
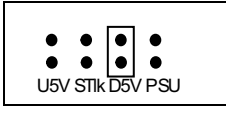
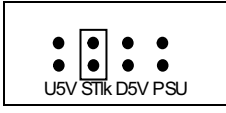
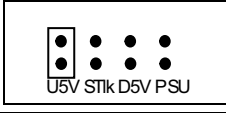
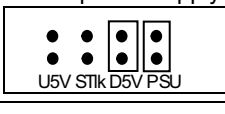
## 2.2 Power supply

The STM32072B-EVAL evaluation board is power supplied by 5V DC supply and protected by PolyZen in case of wrong power plug-in event. It is possible to configure the evaluation board to use any of the four following sources for the power supply:

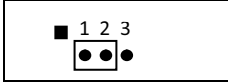
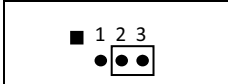
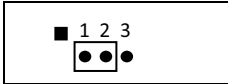
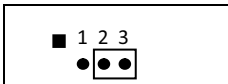
- 5V DC power adapter connected to CN17, the Power Jack on the board (Power Supply Unit (PSU) on silk screen of JP19). The external power supply is not provided with the board.
- 5V DC power with 500 mA limitation from CN13, the USB type B connector of ST-LINK/V2 (USB 5 V power source (STIk) on silk screen of JP19).
- 5V DC power with 500 mA limitation from CN4, the USB type B connector (USB 5 V power source (U5V) on silk screen of JP19).
- 5V DC power from CN8, the extension connector for daughter board (daughter board power source (D5V) on silk screen of JP19).

The power source is selected by setting the related jumpers JP19, JP11 and JP14 as described in [Table 2](#).

**Table 2. Power source related jumpers**

| Jumper | Description  |
|--------|--|
| JP19   | <p>JP19 is used to select one of the four possible power supply resources.</p> <p>For <b>power supply jack</b>(CN17) to the STM32072B-EVAL <u>only</u>, JP19 is set as shown below</p>                                 |
|        | <p>For power supply from the <b>daughter board connectors</b>(CN8) to STM32072B-EVAL <u>only</u>, JP19 is set as shown below:</p>    |
|        | <p>For power supply from USB (CN13) of ST-LINK/V2 to STM32072B-EVAL <u>only</u>, JP19 is set as shown below (default setting):</p>   |
|        | <p>For power supply from USB (CN4) to STM32072B-EVAL <u>only</u>, JP19 is set as shown below:</p>    |
|        | <p>For power supply from power supply jack(CN17) to both STM32072B-EVAL and daughter board connected on CN7 and CN8, JP19 is set as shown below (the daughter board must not have its own power supply connected)</p>  |

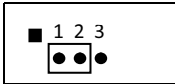
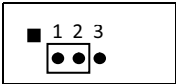
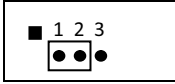
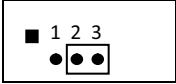
**Table 2. Power source related jumpers (continued)**

| Jumper | Description   |
|--------|---|
| JP11   | The Vbat pin of STM32F072VBT6 is connected to VDD when JP11 is set as shown below (default setting):<br>    |
|        | The Vbat pin of STM32F072VBT6 is connected to 3V battery when JP11 is set as shown below:<br>               |
| JP14   | The VDDIO2 pin of STM32F072VBT6 is connected to 3.3V when JP14 is set as shown below (default setting):<br> |
|        | The VDDIO2 pin of STM32F072VBT6 is connected to VDD_ADJ when JP14 is set as shown below:<br>                |

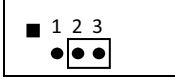
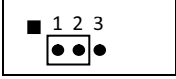
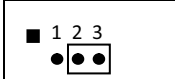
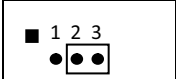
Three power modes in total are supported on the board, and can be configured by setting the related jumpers JP8, JP9, JP12, JP13 and JP16 as described in [Table 3](#) and the following notes.

- Mode1: The VDD and VDDA was connected together & powered by fixed 3.3V.
- Mode2: The VDD and VDDA was connected together & powered by adjustable voltage from 1.65V to 3.6V.
- Mode3: The VDD is powered by adjustable voltage from 1.65V to 3.6V while VDDA is powered by fixed 3.3V.

**Table 3. Power-mode related Jumpers**

| Power mode | Power mode configuration  |   | VDD_MCU Idd measurement (on JP12) |
|------------|---|---|-----------------------------------|
|            | JP13  | JP8   |                                   |
| Mode1      |  |  | OK                                |
|            |  |  | NOT allowed                       |

**Table 3. Power-mode related Jumpers**

| Power mode | Power mode configuration  |   | VDD_MCU Idd measurement (on JP12) |
|------------|---|---|-----------------------------------|
|            | JP13  | JP8   |                                   |
| Mode2      |  |  | OK                                |
| Mode3      |  |  | NOT allowed                       |

*Note:* VDD\_MCU Idd measurement can be done by the current Ammeter which is mounted on JP12 when it is open. VDDIO2 Idd measurement can be done by the current Ammeter which is mounted on JP16 when it is open.

JP9 must be open (to disconnect VDDA from all analog power VDD\_ANA which is connected to analog circuits on the board) for MCU Idd measurement.

LD5 is lit when VDD<2V and in this case MCU is not functional. LD6 is lit when VDDA<2.4V and in this case analogue parts in STM32F072VBT6 are not functional.

The LED LD7 is lit when the STM32072B-EVAL evaluation board is powered by the 5V.

Table 4 shows the low-voltage limitations that might apply depending on the characteristics of some peripheral components. The components may work incorrectly when the power level is lower than the limitation.

**Table 4. Low-voltage limitation**

| Peripheral           | Component | IO name      | Low-voltage limitation |
|----------------------|-----------|--------------|------------------------|
| Audio amplifier      | U17       | Audio input  | 2.2V(VDDA)             |
| Microphone amplifier | U15       | Audio output | 2.7V(VDDA)             |
| USB                  | CN4       | USB          | 3V(VDDIO2)             |
| CAN                  | CN6       | CAN          | 3V(VDDIO2)             |
| Smart Card           | CN19      | USART1       | 2.7V(VDDIO2)           |

**Caution:** JP12 and JP16 must not be opened; otherwise STM32F072VBT6 will be damaged due to the lack of power supply on its power pins.

**Caution:** There is a risk of explosion if the battery is replaced with the wrong type of battery. Dispose of used batteries according to the instructions.

## 2.3 Clock source

Two clock sources are available on STM32072B-EVAL evaluation board for STM32F072VBT6 and RTC embedded.

- X1, 32 kHz crystal for embedded RTC
- X2, 8 MHz crystal with socket for STM32F072VBT6 microcontroller, it can be removed from the socket when an internal RC clock is used.

**Table 5. 32 kHz crystal X1 related solder bridges**

| Jumper | Description   |
|--------|---|
| SB14   | PC14 is connected to 32 kHz crystal when SB14 is open. (Default setting)  |
|        | PC14 is connected to the extension connector CN7 when SB14 is closed. In this case R71 must be removed to avoid any disturbance due to the 32 kHz quartz. |
| SB15   | PC15 is connected to the 32 kHz crystal when SB15 is open. (Default setting)  |
|        | PC15 is connected to the extension connector CN7 when SB15 is closed. In this case R72 must be removed to avoid any disturbance due to the 32 kHz quartz  |

**Table 6. 8 MHz crystal X2 related solder bridges**

| Jumper | Description   |
|--------|---|
| SB16   | PF0 is connected to the 8 MHz crystal when SB16 is open. (Default setting)  |
|        | PF0 is connected to the extension connector CN8 when SB16 is closed. In this case C31 and X2 must be removed.   |
| SB17   | PF1 is connected to the 8 MHz crystal when SB17 is open. (Default setting)  |
|        | PF1 is connected to the extension connector CN8 when SB17 is closed. In such case R73 must be removed to avoid any disturbance due to the 8 MHz quartz. |

## 2.4 Reset source

The reset signal of STM32072B-EVAL evaluation board is low active and the reset sources include the following:

- Reset button B1
- Debugging tools from SWD connector CN11 and CN12
- Daughter board from CN8
- Embedded ST-LINK/V2
- RS232 connector CN10 for ISP.

*Note:* The jumper JP15 is to be closed for RESET handled by pin8 of RS232 connector CN10 (CTS signal), please look in [Section 2.7](#) for details.




## 2.5 Boot option

The STM32072B-EVAL evaluation board is able to boot from the following:

- Embedded user Flash
- System memory with boot loader for ISP
- Embedded SRAM for debugging

The boot option is configured by setting the switch SW1 (BOOT0) and one option bit in Small Information block (SIF). The BOOT0 can be configured also via RS232 connector CN10.

**Table 7. Boot-related switch**

| Switch configuration   | Bit12 in user option bytes | Boot from  |
|--|----------------------------|--|
| 0 <-> 1<br> SW1   | X                          | STM32072B-EVAL boot from <b>User Flash</b> when SW1 and bit12 in user option bytes set as shown on the left. (Default setting) |
| 0 <-> 1<br> SW1   | 0                          | STM32072B-EVAL boot from <b>Embedded SRAM</b> when SW1 and bit12 in user option bytes set as shown on the left.                |
| 0 <-> 1<br> SW1 | 1                          | STM32072B-EVAL boot from <b>System Memory</b> when SW1 and bit12 in user option bytes set as shown on the left.                |

**Table 8. Boot0-related jumpers**

| Jumper | Description   |
|--------|---|
| JP5    | The Bootloader_BOOT0 is managed by pin 6 of connector CN10 (RS232 DSR signal) when JP5 is closed. This configuration is used for boot loader application only.<br>Default Setting: Not fitted |

## 2.6 Audio

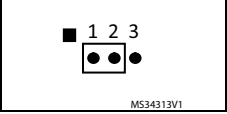
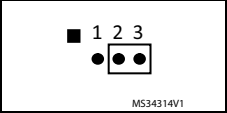
The STM32072B-EVAL evaluation board supports stereo audio playback and microphone recording by an external headset connected on the audio jack CN14. Audio play is connected to DAC output of STM32F072VBT6 through an audio amplifier and the microphone on headset is connected to ADC input of STM32F072VBT6 through a microphone amplifier. The audio amplifier can be enabled or disabled by setting JP20. Mono/stereo playback is selected by setting JP18. Refer to [Table 9](#) for detail.

**Table 9. Audio-related jumpers**

| Jumper | Description  |
|--------|--|
| JP20   | Speaker amplifier U17 is enabled when JP20 is closed (Default setting) |
|        | Speaker amplifier U17 is disabled when JP20 is open                    |



**Table 9. Audio-related jumpers (continued)**

| Jumper | Description   |
|--------|---|
| JP18   | Mono playback is enabled when JP18 is set as shown below (default setting): <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">  </div> |
|        | Stereo playback is enabled when JP18 is set as shown below: <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">  </div>                 |

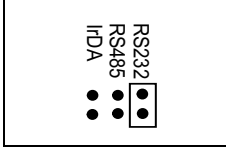
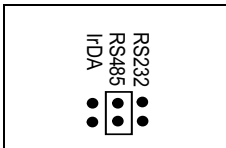
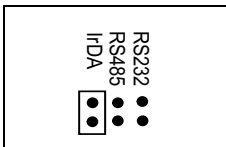
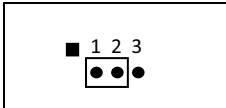
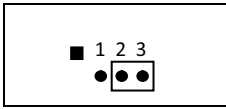
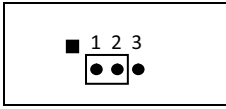
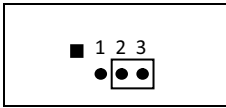
The audio amplifier operates correctly when  $VDDA > 2.2V$  and the microphone amplifier operates correctly when  $VDDA > 2.7V$ .

## 2.7 RS232, RS485 and IrDA

The communication of RS232 (with hardware flow control CTS and RTS) and RS485 is supported on D-type 9-pin connector CN10. An IrDA transceiver (U14) is connected to USART2 of the STM32F072VBT6. The signals Bootloader\_RESET (shared with CTS signal) and Bootloader\_BOOT0 (shared with DSR signal) are added on RS232 connector CN10 for ISP support.

The RS232 connector CN10 may be connected to either IOs of PD5 (USART2\_TX) and PD6 (USART2\_RX) or IOs of PA14 (TX) and PA15 (RX) on STM32F072VBT6 MCU thanks to the configuration jumpers JP7 and JP10. The bootloader is available only when RS232 connector is connected to PA14 and PA15. Please refer to [Table 10](#) for details.

Table 10. RS232 and IrDA related jumpers

| Jumper | Description  |
|--------|--|
| JP17   | RS232_RX is connected to RS232 transceiver and RS232 communication is enabled when JP17 is set as shown below (default setting):   |
|        | RS485_RX is connected to RS485 transceiver and RS485 communication is enabled when JP17 is set as shown below:   |
|        | IrDA_RX is connected to IrDA transceiver and IrDA communication is enabled when JP17 is set as shown below:    |
| JP10   | PD5 is connected as TX signal when JP10 is set as shown to below (default setting):  <p><i>Note: bootloader is not supported with such configuration</i></p>               |
|        | PA14 is connected as TX signal when JP10 is set as shown below (JP2 must be open in this case):  <p><i>Note: bootloader is supported with such configuration</i></p>       |
| JP7    | PD6 is connected as RX signal when JP7 is set as shown below (default setting):  <p><i>Note: bootloader is not supported with such configuration</i></p>                   |
|        | PA15 is connected as RX signal <b>with</b> bootloader being supported when JP7 is set as shown below:  <p><i>Note: bootloader is supported with such configuration</i></p> |
| JP2    | SWCLK is connected to PA14 when JP2 is fitted.<br>Default setting: Fitted  |

The RS485 communication is supported by RS485 transceiver ST3485EBDR which is connected to pin4 and pin9 of D-type 9-pins connectors CN10 (shared with USART2).

**Table 11. RS485 related solder bridges**

| Jumper    | Description   |
|-----------|---|
| SB20,SB22 | The external fail safe biasing are enabled when solder bridges SB20 and SB22 was closed<br>Default setting: Not fitted            |
| SB23      | The bus termination is enabled when solder bridge SB23 is closed.<br>Default setting: Not fitted                                  |
| SB21      | The AC termination is disabled when solder bridge SB21 is closed for high baud rate communication.<br>Default setting: Not fitted |

## 2.8 Touch sensing buttons

Two touch sensing buttons are supported on STM32072B-EVAL evaluation board. These are connected to three capacitive sensing channels (PD[12:14]) in group 8 with active shield being connected to two capacitive sensing channels (PE4 and PE5) in group 7.

**Table 12. Touch sensing buttons related solder bridges**

| Solder Bridge | Description  |
|---------------|--|
| SB12          | PD13 is used as Touch sensing button TS2 when SB12 is open. (Default setting)  |
|               | PD13 is connected to the extension connector CN8 when SB12 is closed so touch sensing button TS2 is not usable. If necessary R39 can be removed to avoid any noise.  |
| SB13          | PD12 is used as Touch sensing button TS1 when SB13 is open (Default setting)   |
|               | PD12 is connected to the extension connector CN8 when SB12 is closed so touch sensing button TS1 is not usable. If necessary R40 can be removed to avoid any noise.  |
| SB11          | PD14 is disconnect from the extension connector CN8 when SB11 is open (default setting). In such case this IO is used as charge transfer pin connected to C17 for the touch sensing application. (Default setting) |
|               | PD14 is connected to extension connector CN8 when SB11 is closed. In such case C17 must be removed to avoid disturbance due to the capacitor   |
| SB19          | PE4 is disconnect from extension connector CN7 when SB19 is open (default setting). In such case this IO is used as active shield for Touch sensing buttons TS1 & ST2.   |
|               | PE4 is connected to the extension connector CN7 when SB19 is closed. In such case R66 must be removed to avoid disturbance due to the shield   |
| SB18          | PE5 is disconnect from the extension connector CN7 when SB18 is open (default setting). In such case this IO is used to manage the Shield capacitor C28 for the touch sensing application.                         |
|               | PE5 is connected to the extension connector CN7 when SB19 is closed. In this case R67 must be removed to avoid any disturbance due to the capacitor  |

*Note: the touch sensing buttons are fully functional only when STM32072B-EVAL is powered in power mode 1 (both VDD & VDDA is connected to fixed 3.3 V). It is potentially necessary to adjust the capacitor value of C28 and the firmware to adapt them to the voltage range from 1.65 V to 3.6 V of VDD in power modes 2 and 3.*

## 2.9 MicroSD card

The 2 GB (or more) MicroSD card is available on the board. It is connected to SPI1 port (shared with color LCD) of STM32F072VBT6. The MicroSD card detection is managed by the standard IO port PB15 and it should be set with internal pull-up.

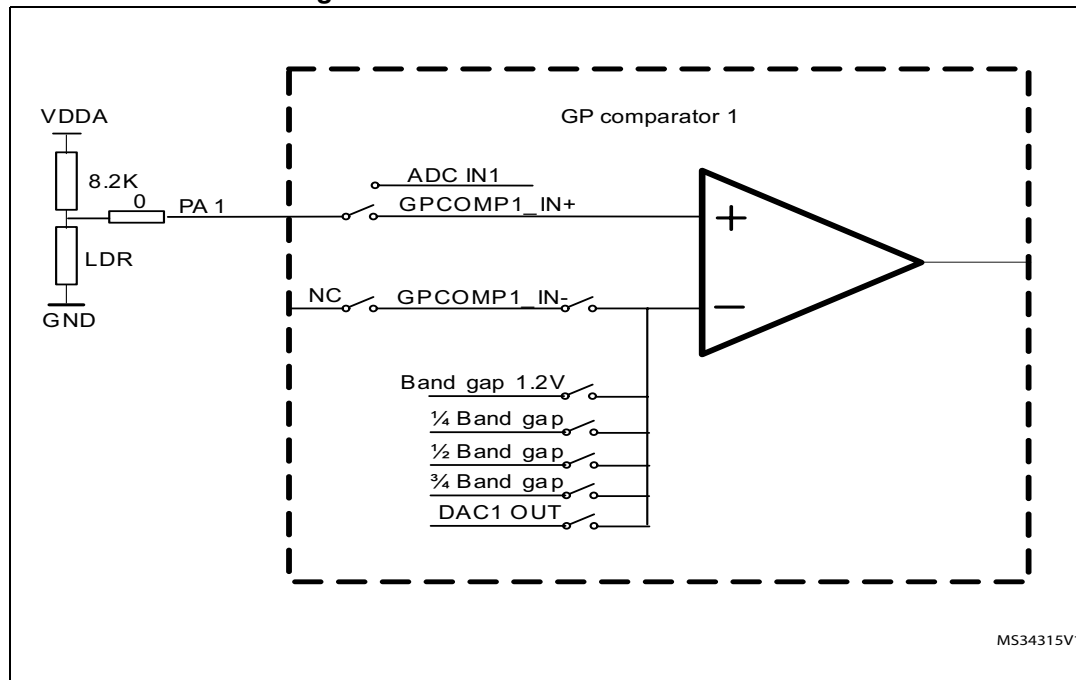
## 2.10 Analog input

The two-pin header CN18 and the 10K ohm potentiometer RV3 are connected to PC0 of STM32F072VBT6 as analog input. A low pass filter can be implemented by replacing R206 and C113 with the right values of resistor and capacitor as requested by end user application.

## 2.11 LDR (Light Dependent Resistor)

The VDDA is divided by the resistor bridge of LDR VT9ON1 and 8.2K resistor, and connected to PA1 (COM1\_IN+/ADC IN1) as shown below on the STM32072B-EVAL evaluation board.

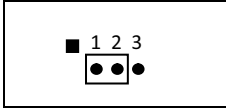
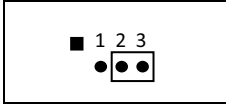
Figure 4. The LDR on STM32072B-EVAL



It is possible to compare LDR output with 1/4 band gap, 1/2 band gap, 3/4 band gap, band gap and DAC1 OUT, and to connect LDR output to ADC IN1 for AD conversion.

PA1 is also shared with the motor control bus voltage signal and its input source can be selected by setting JP6 in [Table 13](#).

**Table 13. LDR related jumpers**

| Jumper | Description   |
|--------|---|
| JP6    | PA1 is used as LDR input when JP6 is set as shown below (default setting):<br>      |
|        | PA1 is used as motor control Bus Voltage signal when JP6 is set as shown below:<br> |

## 2.12 Temperature sensor

A temperature sensor STLM75M2F is connected to I2C1 bus of STM32F072VBT6, and shares the same I2C1 bus with RF E2PROM and DDC on HDMI\_Source connector CN5.

The I2C address of the temperature sensor is 0b100100x, where x can be 0 or 1 depending on the setting of SB6.

**Table 14. Temperature sensor related solder bridge**

| Solder Bridge | Description   |
|---------------|---|
| SB6           | I2C address A0 is 0 when SB6 is open. (Default setting) |
|               | I2C address A0 is 1 when SB6 is closed.                 |

*Note:* the temperature result measured from STLM75M2F can be a little higher than the ambient temperature due to the power dissipation of the components on the board.

## 2.13 USB

STM32072B-EVAL evaluation board supports USB2.0 compliant full speed communication via a USB type B connector (CN4). The evaluation board can be powered by this USB connection at 5 V DC with 500 mA current limitation.

USB operates correctly when VDDIO2>3V.

## 2.14 Smart card

STMicroelectronics smart card interface circuit ST8024L is used on STM32072B-EVAL evaluation board for asynchronous 1.8 V, 3 V and 5 V smart cards. It performs all the supply protection and control functions based on the connections with STM32F072VBT6 listed in [Table 15](#).

**Table 15. Connection between ST8024L and STM32F072VBT6**

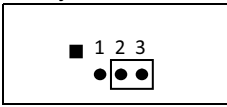
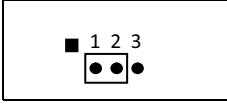
| Signals of ST8024L | Description   | Connect to STM32F072VBT6 |
|--------------------|---|--------------------------|
| 5V/3V              | Smart card power supply selection pin   | PC11                     |
| I/OUC              | MCU data I/O line   | PA9                      |
| XTAL1              | Crystal or external clock input   | PA8                      |
| OFF                | Detect presence of a card, Interrupt to MCU   | PC12                     |
| RSTIN              | Card Reset Input from MCU   | PA10                     |
| CMDVCC             | Start activation sequence input (Active Low)  | PD2                      |
| 1.8V               | 1.8 V Vcc operation selection. Logic high selects 1.8 V operation and overrides any setting on the 5V/3V pin. | PC10                     |

The smart card operates correctly when VDDIO2>2.7V.

## 2.15 CAN

STM32072B-EVAL evaluation board supports one channel of CAN2.0A/B compliant CAN bus communication based on 3.3V CAN transceiver. The High-speed mode, standby mode and slope control mode are available and can be selected by setting JP4.

**Table 16. CAN related jumpers**

| Jumper | Description  |
|--------|--|
| JP4    | CAN transceiver is working in standby mode when JP4 is set as shown below:<br>                      |
|        | CAN transceiver is working in high-speed mode when JP4 is set as shown below: (default setting)<br> |
|        | CAN transceiver is working in slope control mode when JP4 is open.   |
| JP3    | CAN terminal resistor is enabled when JP3 is fitted.<br>Default setting: Not fitted  |

CAN operates correctly when VDDIO2>3V.

## 2.16 RF E2PROM

An RF E2PROM module ANT7-M24LR-A is mounted on connector CN2 and connected to I2C1 bus of STM32F072VBT6, this bus shares the same I2C1 bus with the temperature sensor U1 and DDC on HDMI\_Source connector CN5.

## 2.17 HDMI CEC

Two HDMI connectors CN3 and CN5 are available on STM32072B-EVAL board.

- The connector CN3 is HDMI sink connector with the following:
  - DDC connected to I2C2 of STM32F072VBT6
  - HPD controlled by IO PD15 through transistor T1
  - CEC connected to PB8 through transistor T2.
- The connector CN5 is HDMI source connector with the following:
  - DDC connected to I2C1 of STM32F072VBT6 and shared with the temperature sensor and RF E2PROM
  - HPD controlled by IO PE0
  - CEC connected to PB8 through the transistor T2
  - HDMI 5 V powered by power switch U3

The signals TDMS D+[0..2], TDMS\_CLK+, TDMS D-[0..2], TDMS\_CLK- on these two HDMI connectors are connected together.

The CEC injector mode can be enabled by some PCB reworks for debugging purpose only:

- Remove resistors R29, R31, R33, R42, R44, R48 and R51.
- Close solder bridges SB7, SB8, SB9 and SB10.

*Note:* the I/O PD15 must be set in open-drain output mode by firmware when working as an HPD signal control on the HDMI sink connector CN3.

## 2.18 IR LED and IR receiver

The IR receiver TSOP34836 is connected to PC6 of STM32F072VBT6 and a current around 100 mA on IR LED is driven by PB9 through the transistors T3 and T4 on the board.

*Note:* the IR LED may be driven by PB9 directly with 20 mA current when SB24 is closed and R138 is removed.

## 2.19 Motor control

STM32072B-EVAL evaluation board supports both asynchronous and synchronous three-phase brushless motor control via a 34-pins connector CN1 that provides all the required control and feedback signals to and from the motor power-driving board. The available signals on this connector include emergency stop, motor speed, three phase motor currents, bus voltage, heat sink temperature coming from the motor driving board and six channels of PWM control signal going to the motor driving circuit.

**Table 17. Motor control related jumpers**

| Jumper | Description  |
|--------|--|
| JP6    | The description of JP6 is in <a href="#">Section 2.11: LDR (Light Dependent Resistor)</a>  |
| JP1    | JP1 should be kept on open when the encoder signal is from pin31 of the motor control connector CN1 while it should be kept on close when the analog signal is from pin31 of CN1 for the special motor.<br>Default setting: Not fitted |
| SB1    | The pin1 of motor connector CN1 is connected to PA1 as MC_EmergencySTOP3 when SB1 is closed.<br>Default setting: open  |
| SB2    | The special motor current sampling operation is enabled when SB2 is closed (PC8 connected to PF3). The IO pins PC8 and PF3 are disconnected and can be used by the daughter board when SB2 is open.<br>Default setting: open           |
| SB3    | The pin14 of motor connector CN1 is connected to PC3 as MC_BusVoltage2 when SB3 is closed. In such case R10 should be removed.<br>Default setting: open  |
| SB4    | The pin1 of motor connector CN1 is connected to PA3 as MC_EmergencySTOP2 when SB4 is closed.<br>Default setting: open  |
| SB5    | The pin17 of motor connector CN1 is connected to PA3 as MC_CurrentB2 when SB5 is closed.<br>Default setting: open  |

*Note:* the solder bridges SB4 and SB5 must not be closed at the same time. Also, SB1 and R10 must not be fitted at the same time.

## 2.20 Display and input devices

The 2.4" color TFT LCD connected to SPI1 port of STM32F072VBT6 and the four general purpose color LEDs (LD 1,2,3,4) are available as display device. Two push buttons (B1 Reset, B2 tamper) and one joystick are available. The selection key of the joystick is connected to PA0 which supports the wake-up feature.

**Table 18. LCD modules**

| 2.4" TFT LCD connector CN15 |             |                |     |             |                |
|-----------------------------|-------------|----------------|-----|-------------|----------------|
| Pin                         | Description | Pin connection | Pin | Description | Pin connection |
| 1                           | CS          | PE6            | 9   | VDD         | 3.3V           |
| 2                           | SCL         | PB3            | 10  | VCI         | 3.3V           |
| 3                           | SDI         | PE15           | 11  | GND         | GND            |
| 4                           | RS          | -              | 12  | GND         | GND            |
| 5                           | WR          | -              | 13  | BL_VDD      | 5V             |
| 6                           | RD          | -              | 14  | BL_Control  | 5V             |



Table 18. LCD modules (continued)

| 2.4" TFT LCD connector CN15 |             |                |     |             |                |
|-----------------------------|-------------|----------------|-----|-------------|----------------|
| Pin                         | Description | Pin connection | Pin | Description | Pin connection |
| 7                           | SDO         | PE14           | 15  | BL_GND      | GND            |
| 8                           | RESET       | RESET#         | 16  | BL_GND      | GND            |

*Note:* A bidirectional voltage translator (U13) is implemented on SPI\_MOSI signal between the MCU and LCD in order to support the 3-wire serial interface required by several TFT-LCD controllers. The direction of the voltage translator is controlled by IO PB2 (the IO PE15 is working as MOSI when PB2 is high or as MISO when PB2 is LOW).

### 3 Connectors

#### 3.1 Motor control connector CN1

Figure 5. Motor control connector CN1

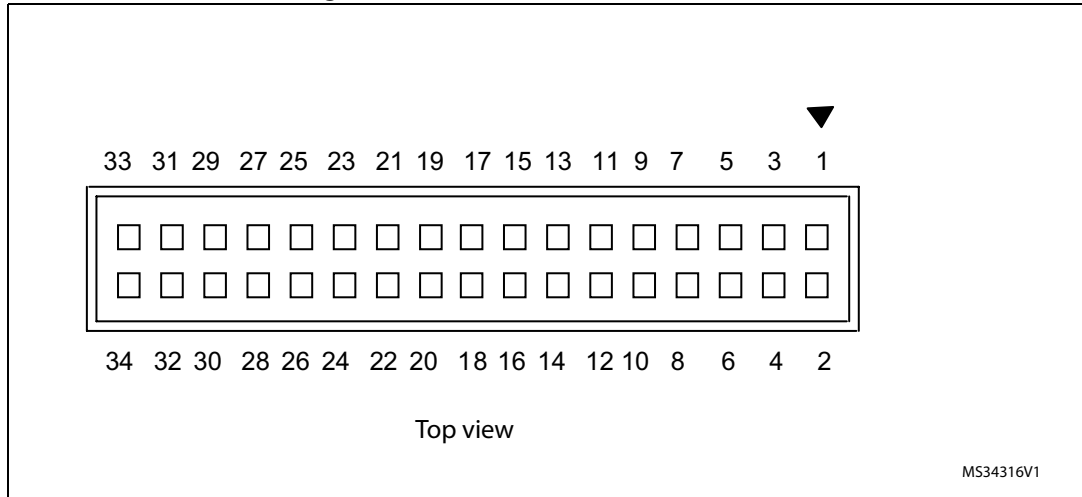


Table 19. Motor control connector CN1<sup>(1)</sup>

| Description      | Pin of STM32F072VB            | Pin number of CN1 | Pin number of CN1 | Pin of STM32F072VB           | Description  |
|------------------|-------------------------------|-------------------|-------------------|------------------------------|--------------|
| Emergency STOP   | PB12 (R20 mounted by default) | 1                 | 2                 |                              | GND          |
| Emergency STOP2  | PA3 (to close SB4)            |                   |                   |                              |              |
| Emergency STOP3  | PA1 (to close SB1)            |                   |                   |                              |              |
| PWM-UH           | PE9                           | 3                 | 4                 |                              | GND          |
| PWM-UL           | PE8                           | 5                 | 6                 |                              | GND          |
| PWM-VH           | PE11                          | 7                 | 8                 |                              | GND          |
| PWM-VL           | PE10                          | 9                 | 10                |                              | GND          |
| PWM-WH           | PE13                          | 11                | 12                |                              | GND          |
| PWM-WL           | PE12                          | 13                | 14                | PA1 (R10 mounted by default) | BUS VOLTAGE  |
|                  |                               |                   |                   | PC3 (to close SB3)           | BUS VOLTAGE2 |
| PHASE A CURRENT  | PA2                           | 15                | 16                |                              | GND          |
| PHASE B CURRENT  | PC5 (R14 mounted by default)  | 17                | 18                |                              | GND          |
| PHASE B CURRENT2 | PA3 (to close SB5)            |                   |                   |                              |              |

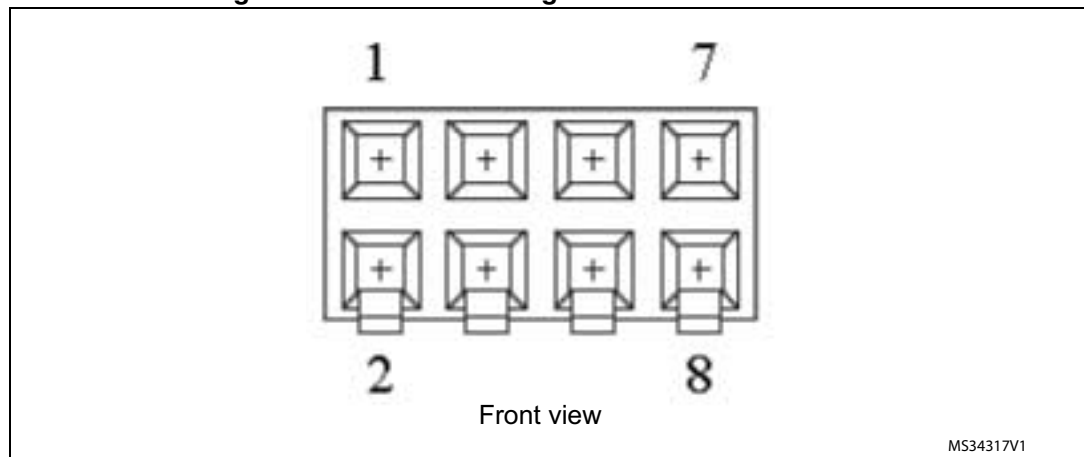
**Table 19. Motor control connector CN1<sup>(1)</sup> (continued)**

| Description           | Pin of STM32F072VB        | Pin number of CN1 | Pin number of CN1 | Pin of STM32F072VB | Description          |
|-----------------------|---------------------------|-------------------|-------------------|--------------------|----------------------|
| PHASE C CURRENT       | PC4                       | 19                | 20                |                    | GND                  |
| NTC BYPASS RELAY      | PE7                       | 21                | 22                |                    | GND                  |
| DISSIPATIVE BRAKE PWM | PB11                      | 23                | 24                |                    | GND                  |
| +5V power             |                           | 25                | 26                | PC2                | Heatsink temperature |
| PFC SYNC2             | PC8 (Always be connected) | 27                | 28                |                    | 3.3V power           |
| PFC SYNC1             | PF3 (to close SB2)        |                   |                   |                    |                      |
| PFC PWM               | PC9                       | 29                | 30                |                    | GND                  |
| Encoder A             | PA6                       | 31                | 32                |                    | GND                  |
| Encoder B             | PA7                       | 33                | 34                | PB0                | Encoder Index        |

1. The signals in the grey table cells are not connected by default.

### 3.2 RF E2PROM connector CN2

**Figure 6. RF EEPROM daughter board connector CN2**



**Table 20. RF E2PROM connector CN2**

| Pin number | Description    | Pin number | Description |
|------------|----------------|------------|-------------|
| 1          | I2C1_SDA (PB7) | 5          | +5V         |
| 2          | NC             | 6          | NC          |
| 3          | I2C1_SCL (PB6) | 7          | GND         |
| 4          | EX_RESET(PD7)  | 8          | NC          |

### 3.3 HDMI sink connector CN3

Figure 7. HDMI Sink connectors CN3

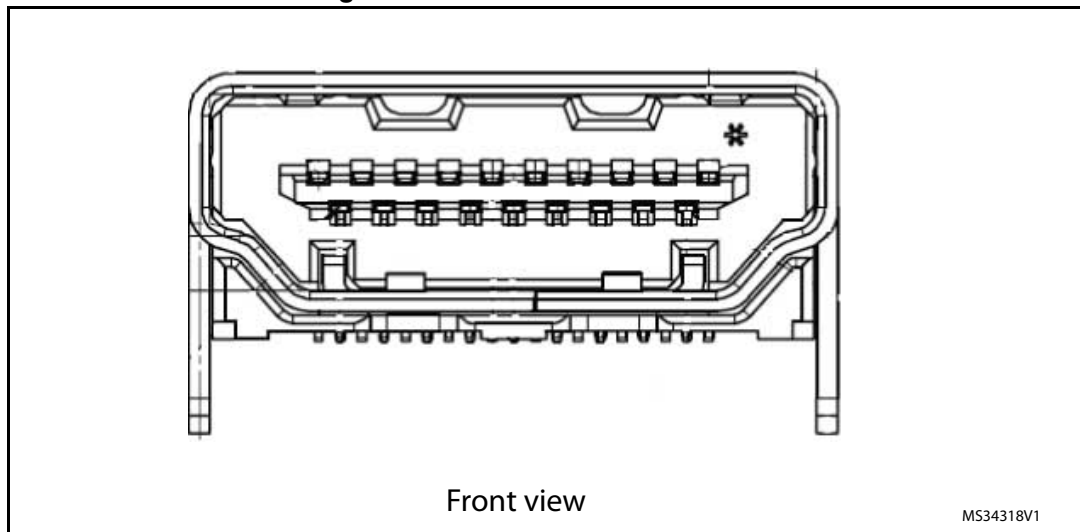


Table 21. HDMI Sink connectors CN3

| Pin number        | Description                                    | Pin number  | Description                   |
|-------------------|--|-------------|-------------------------------|
| 1,3,4,6,7,9,10,12 | TMDS differential signal pair connected to CN5 | 16          | I2C2_SDA (PB14)               |
| 13                | CEC (PB8)                                      | 2,5,8,11,17 | GND                           |
| 14                | NC   | 18          | HDMI_5V_Sink                  |
| 15                | I2C2_SCL (PB13)                                | 19          | HPD (PD15 through transistor) |

### 3.4 User USB type B connector CN4

Figure 8. USB type B connector CN4

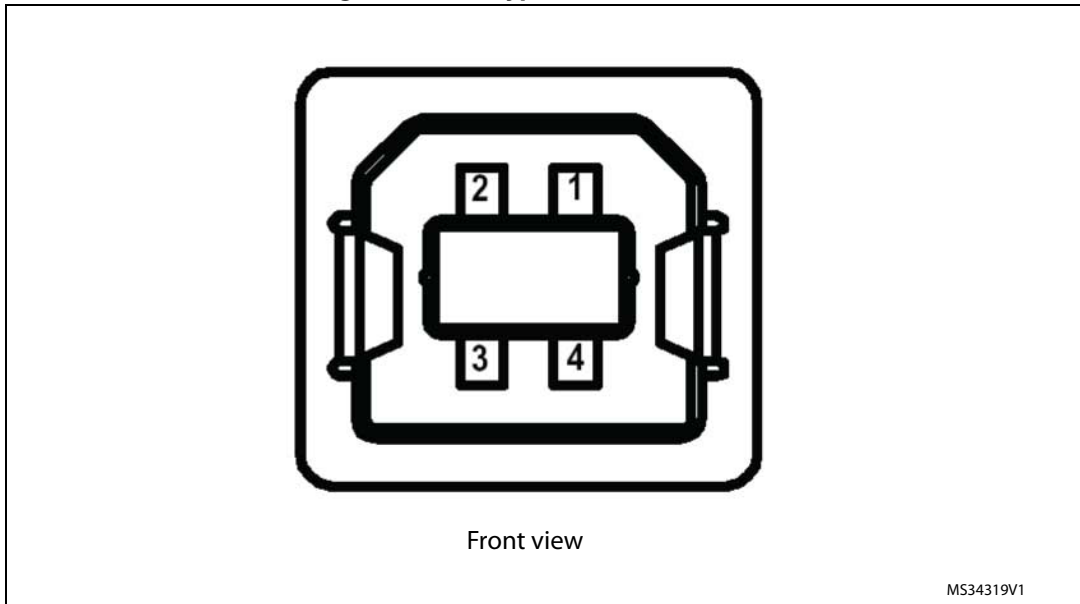
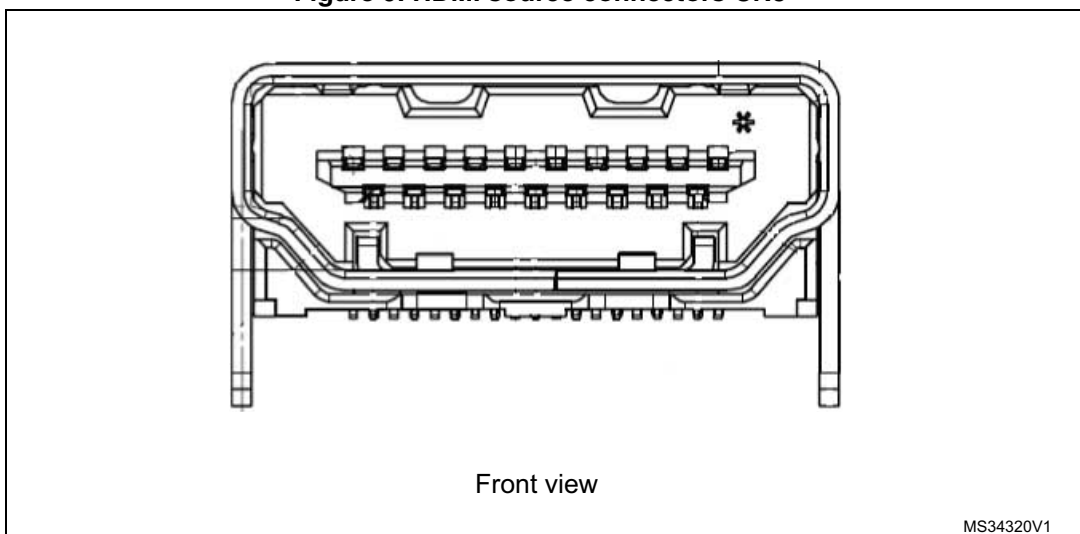


Table 22. USB type B connector CN4

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1          | VBUS(power) | 4          | GND         |
| 2          | DM(PA11)    | 5,6        | Shield      |
| 3          | DP(PA12)    |            |             |

### 3.5 HDMI source connector CN5

Figure 9. HDMI source connectors CN5

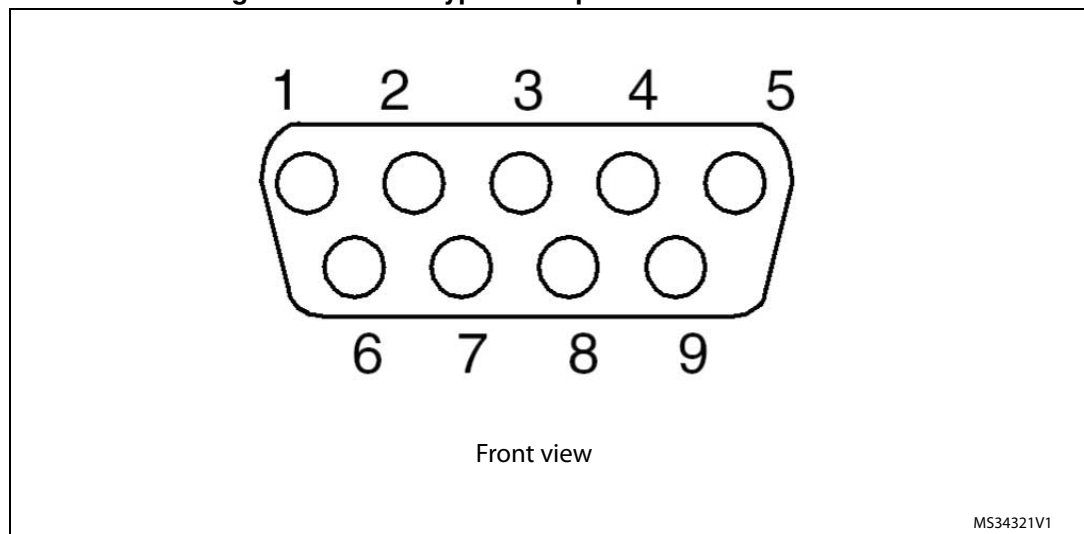


**Table 23. HDMI Source connectors CN5**

| Pin number        | Description                                    | Pin number  | Description                         |
|-------------------|--|-------------|-------------------------------------|
| 1,3,4,6,7,9,10,12 | TMDS differential signal pair connected to CN3 | 16          | I2C1_SDA (PB7)                      |
| 13                | CEC (PB8)                                      | 2,5,8,11,17 | GND                                 |
| 14                | NC   | 18          | HDMI_5V_Source from power switch U3 |
| 15                | I2C1_SCL (PB6)                                 | 19          | HPD (PE0)                           |

### 0.1 CAN D-type and 9-pin male connector CN6

**Figure 10. CAN D-type and 9-pin male connector CN6**



**Table 24. CAN D-type and 9-pin male connector CN6**

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1,4,8,9    | NC          | 7          | CANH        |
| 2          | CANL        | 3,5,6      | GND         |

### 3.6 Daughter board extension connector CN7 and CN8

Two 52-pin male headers CN7 and CN8 can be used to connect with the daughter board or with the standard wrapping board to STM32072B-EVAL evaluation board. All GPI/Os are available on the connector. The space between these two connectors and position of power, GND and RESET pin are defined as a standard, allowing the development of common daughter boards for several evaluation boards. The standard width between CN7 pin1 and CN8 pin1 is 2700mils (68.58mm). The standard was implemented on the majority of evaluation boards.

Each pin on CN7 and CN8 can be used by a daughter board after disconnecting it from the corresponding function block on STM32072B-EVAL evaluation board. Please look at [Table 25](#) and [Table 26](#) for details.

**Table 25. Daughter board extension connector CN7**

| Pin | Description | Alternative function     | How to disconnect with function block on STM32072B-EVAL board |
|-----|-------------|--------------------------|---|
| 1   | GND         | -                        | -   |
| 3   | PC7         | -                        | -   |
| 5   | PC9         | MC_PFCpwm                | Disconnect MC power board from CN1                            |
| 7   | PA9         | SmartCard_IO             | Remove R152   |
| 9   | PA10        | SmartCard_RST            | Remove R155   |
| 11  | PC14        | OSC32_IN                 | Remove R71, Close SB14  |
| 13  | PA12        | USB_DP                   | Remove R34  |
| 15  | PC15        | OSC32_OUT                | Remove R72, Close SB15  |
| 17  | PA14        | SWCLK/<br>USART2_TX_BOOT | Keep JP2, JP10 open   |
| 19  | GND         | -                        | -   |
| 21  | PC11        | SmartCard_3/5V           | Remove R184   |
| 23  | PD0         | CAN_RX                   | Remove R47  |
| 25  | PD2         | SmartCard_CMDVCC         | Remove R156   |
| 27  | PD4         | USART2_RTS/RS485_DIR     | Remove R65  |
| 29  | PD6         | USART2_RX                | Keep JP7 open   |
| 31  | PD7         | EX_RESET                 | Remove R28  |
| 33  | PB4         | -                        | -   |
| 35  | PB6         | I2C1_SCL                 | Remove R5,R7,R41,R42  |
| 37  | PB8         | HDMI_CEC                 | Remove R27  |
| 39  | GND         | -                        | -   |
| 41  | PE1         | -                        | -   |
| 43  | PE3         | JOY_RIGHT                | Remove R202   |
| 45  | PF9         | JOY_UP                   | Remove R200   |
| 47  | PF10        | JOY_DOWN                 | Remove R197   |
| 49  | PC1         | Audio_IN                 | Remove R129   |
| 51  | PE5         | SHIELD_CT                | Remove R67, Close SB18  |
| 2   | PD15        | HDMI_HPD_SINK            | Remove R23  |
| 4   | PC6         | IR_IN                    | Remove R175   |
| 6   | PC8         | MC_PFCsync2              | Disconnect MC power board from CN1, Keep SB2 open             |
| 8   | PA8         | SmartCard_CK             | Remove R153   |

Table 25. Daughter board extension connector CN7 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32072B-EVAL board |
|-----|-------------|----------------------|---|
| 10  | GND         | -                    | -   |
| 12  | PA11        | USB_DM               | Remove R35  |
| 14  | PA13        | SWDAT                | Remove R76  |
| 16  | PF6         | -                    | -   |
| 18  | PA15        | USART2_RX_BOOT       | Keep JP7 open   |
| 20  | PC10        | SmartCard_1.8V       | Remove R159   |
| 22  | PC12        | SmartCard_OFF        | Remove R154   |
| 24  | PD1         | CAN_TX               | Remove R54  |
| 26  | PD3         | USART2_CTS           | Remove R87  |
| 28  | PD5         | USART2_TX            | Remove R69  |
| 30  | GND         | -                    | -   |
| 32  | PB3         | SPI1_SCK             | Remove R95  |
| 34  | PB5         | TempSensor_INT       | Remove R4   |
| 36  | PB7         | I2C1_SDA             | Remove R2,R6,R44,R45  |
| 38  | PB9         | IR_OUT               | Remove R135   |
| 40  | PE0         | HDMI_HPD_Source      | Remove R49  |
| 42  | PE2         | JOY_LEFT             | Remove R199   |
| 44  | PE6         | LCD_CS               | Remove R113   |
| 46  | PC0         | Potentiometer        | Remove R204   |
| 48  | +3V3        | -                    | -   |
| 50  | GND         | -                    | -   |
| 52  | PE4         | SHIELD               | Remove R66, Close SB19  |

Table 26. Daughter board extension connector CN8

| Pin | Description | Alternative Function | How to disconnect with function block on STM32072B-EVAL board |
|-----|-------------|----------------------|---|
| 1   | GND         | -                    | -   |
| 3   | PD14        | TS_CT                | Remove C17, Close SB11  |
| 5   | PD13        | TS2                  | Remove R39, Close SB12  |
| 7   | PD12        | TS1                  | Remove R40, Close SB13  |
| 9   | PC13        | TAMPER_KEY           | Remove R194   |
| 11  | RESET#      | -                    | -   |
| 13  | PB13        | I2C2_SCL             | Remove R30  |
| 15  | PB11        | MC_Dissipativebrake  | Disconnect MC power board from CN1                            |



Table 26. Daughter board extension connector CN8 (continued)

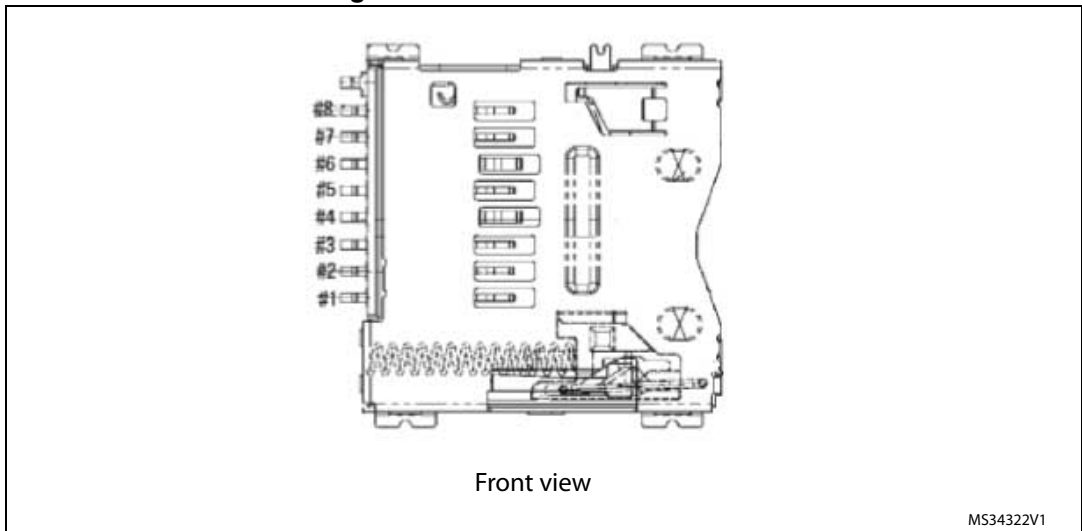
| Pin | Description | Alternative Function | How to disconnect with function block on STM32072B-EVAL board |
|-----|-------------|----------------------|---|
| 17  | PE15        | SPI1_MOSI            | Remove R104   |
| 19  | D5V         | -                    | -   |
| 21  | PE12        | MC_WL                | Disconnect MC power board from CN1                            |
| 23  | PF0         | OSC_IN               | Remove X2,C31, Close SB16                                     |
| 25  | PE11        | MC_VH                | Disconnect MC power board from CN1                            |
| 27  | PE10        | MC_VL                | Disconnect MC power board from CN1                            |
| 29  | PE8         | MC_UL                | Disconnect MC power board from CN1                            |
| 31  | PB2         | SPI1_MOSI_DIR        | Remove R102   |
| 33  | PB0         | MC_Erindex           | Disconnect MC power board from CN1                            |
| 35  | PC5         | MC_Current B         | Remove R14  |
| 37  | PA7         | MC_Encoder B         | Disconnect MC power board from CN1                            |
| 39  | GND         | -                    | -   |
| 41  | PA4         | Audio_OUT_LEFT       | Keep JP18 open  |
| 43  | VDD_IO2     | -                    | -   |
| 45  | PA2         | MC_Current A         | Remove R16  |
| 47  | PA0         | JOY_SEL              | Remove R198   |
| 49  | PF2         | MicroSD_CS           | Remove R74  |
| 51  | PC2         | MC_headsinkTemp      | Remove R11  |
| 2   | PD11        | LED4                 | Remove R176   |
| 4   | PD10        | LED3                 | Remove R177   |
| 6   | PD9         | LED2                 | Remove R178   |
| 8   | PD8         | LED1                 | Remove R179   |
| 10  | GND         | -                    | -   |
| 12  | PB15        | SDcard_detect        | Remove R56  |
| 14  | PB14        | I2C2_SDA             | Remove R32  |
| 16  | PB12        | MC_EmergencySTOP     | Remove R20  |
| 18  | PB10        | USB_VBUS_detection   | Remove R50,R53  |
| 20  | PE14        | SPI1_MISO            | Remove R58  |
| 22  | PE13        | MC_WH                | Disconnect MC power board from CN1                            |
| 24  | VDD         | -                    | -   |
| 26  | PF1         | OSC_OUT              | Remove R73, Close SB17  |
| 28  | PE9         | MC_UH                | Disconnect MC power board from CN1                            |
| 30  | GND         | -                    | -   |
| 32  | PE7         | MC_NTC               | Disconnect MC power board from CN1                            |

**Table 26. Daughter board extension connector CN8 (continued)**

| Pin | Description | Alternative Function                         | How to disconnect with function block on STM32072B-EVAL board |
|-----|-------------|--|---|
| 34  | PB1         | -  | -   |
| 36  | PC4         | MC_Current C                                 | Remove R13  |
| 38  | PA6         | MC_Encoder A                                 | Keep JP1 open, Disconnect MC power board from CN1             |
| 40  | PA5         | Aduio_OUT_RIGHT                              | Keep JP18 open  |
| 42  | NC          | -  | -   |
| 44  | PA3         | MC_Current B2/<br>MC_Emergency_STOP2         | Keep SB4,SB5 open   |
| 46  | PA1         | LDR_IN/MC_BusVoltage /<br>MC_Emergency_STOP3 | Keep JP6 open   |
| 48  | PF3         | MC_PFCsync1                                  | Keep SB2 open   |
| 50  | GND         | -  | -   |
| 52  | PC3         | MC_BusVoltage2                               | Keep SB3 open   |

### 3.7 MicroSD connector CN9

**Figure 11. MicroSD connector CN9**



**Table 27. MicroSD connector CN9**

| Pin number | Description           | Pin number | Description            |
|------------|-----------------------|------------|------------------------|
| 1          | NC                    | 5          | MicroSDcard_CLK (PB3)  |
| 2          | MicroSDcard_CS (PF2)  | 6          | Vss/GND                |
| 3          | MicroSDcard_DIN(PE15) | 7          | MicroSDcard_DOUT(PE14) |

Table 27. MicroSD connector CN9 (continued)

| Pin number | Description | Pin number | Description               |
|------------|-------------|------------|---------------------------|
| 4          | +3V3        | 8          | NC                        |
|            |             | 10         | MicroSDcard_detect (PB15) |

### 3.8 RS232 and RS485 connector CN10

Figure 12. RS232 and RS485 connector CN10

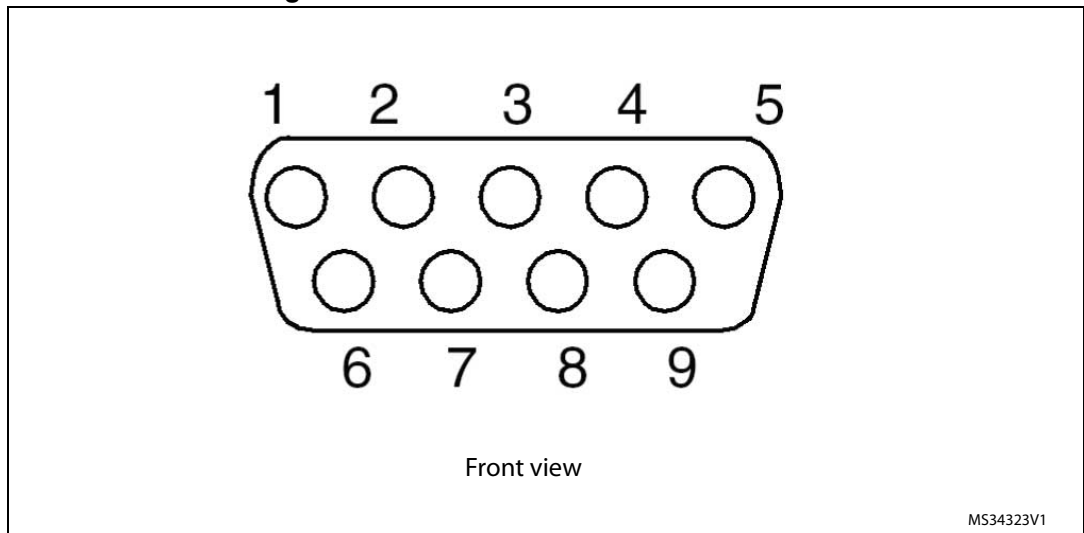


Table 28. RS232 and RS485 connector CN10

| Pin number | Description               | Pin number | Description                     |
|------------|---------------------------|------------|---------------------------------|
| 1          | NC                        | 6          | Bootloader_BOOT0                |
| 2          | RS232_RX<br>(PD6 or PA15) | 7          | RS232_RTS(PD4)                  |
| 3          | RS232_TX<br>(PD5 or PA14) | 8          | RS232_CTS(PD3)/Bootloader_RESET |
| 4          | RS485_A                   | 9          | RS485_B                         |
| 5          | GND                       |            |                                 |

### 3.9 High-density SWD connector CN11

Figure 13. High-density SWD debugging connector CN11

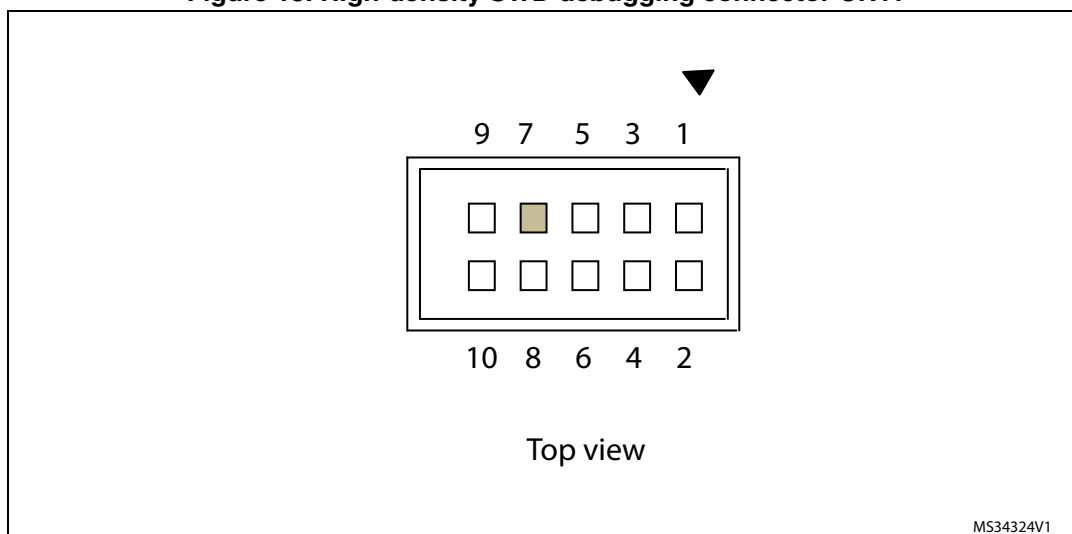


Table 29. High-density SWD debugging connector CN11

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1          | VDDIO2      | 2          | SWDAT(PA13) |
| 3          | GND         | 4          | SWCLK(PA14) |
| 5          | GND         | 6          | NC          |
| 7          | KEY         | 8          | NC          |
| 9          | GND         | 10         | RESET#      |

### 3.10 Standard SWD connector CN12

Figure 14. Standard SWD debugging connector CN12

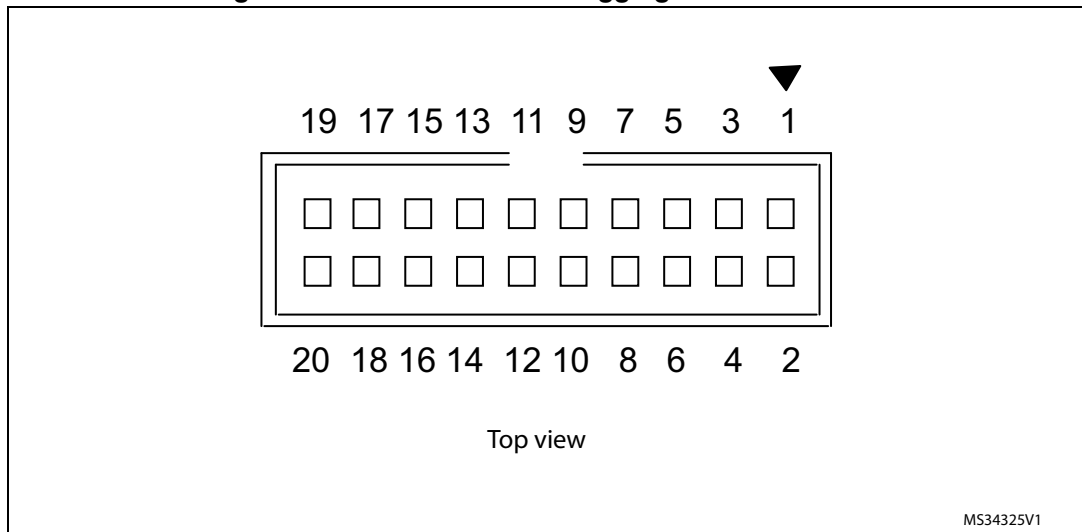


Table 30. Standard SWD debugging connector CN12

| Pin number | Description   | Pin number | Description |
|------------|---------------|------------|-------------|
| 1          | VDDIO2        | 2          | VDDIO2      |
| 3          | NC            | 4          | GND         |
| 5          | NC            | 6          | GND         |
| 7          | SWDAT(PA13)   | 8          | GND         |
| 9          | SWCLK(PA14)   | 10         | GND         |
| 11         | 10K pull-down | 12         | GND         |
| 13         | NC            | 14         | GND         |
| 15         | RESET#        | 16         | GND         |
| 17         | 10K pull-down | 18         | GND         |
| 19         | 10K pull-down | 20         | GND         |

### 3.11 ST-LINK/V2 USB type B connector CN13

The USB connector CN13 is used to connect embedded ST-LINK/V2 to PC for debugging of board.

Figure 15. USB type B connector CN13

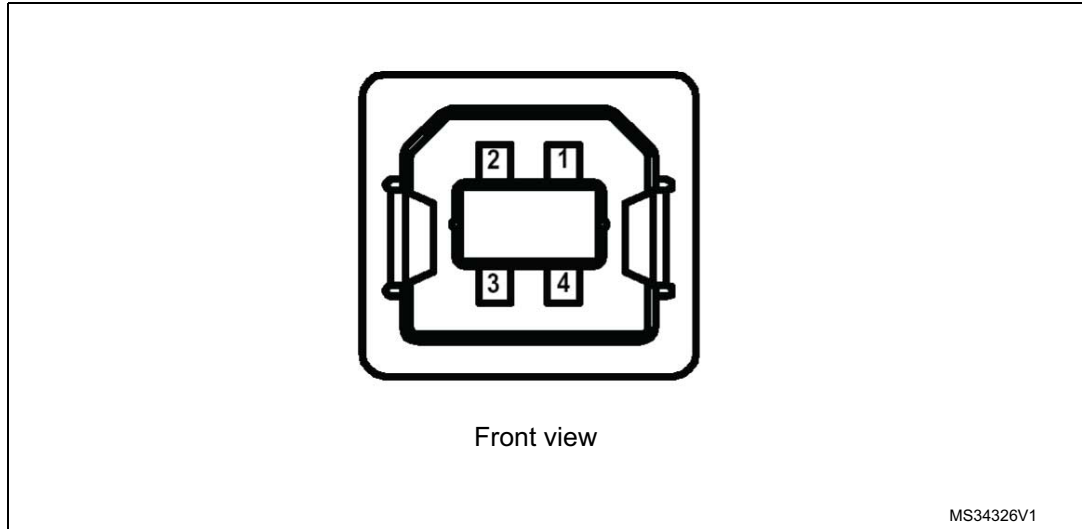


Table 31. USB type B connector CN13

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

### 3.12 Audio jack CN14

A 3.5 mm stereo audio jack CN14 is available on STM32072B-EVAL board. It is connected to audio DAC and ADC.

### 3.13 TFT LCD connector CN15

A TFT color LCD board is mounted on CN15. Please refer to [Section 2.20](#) for details.

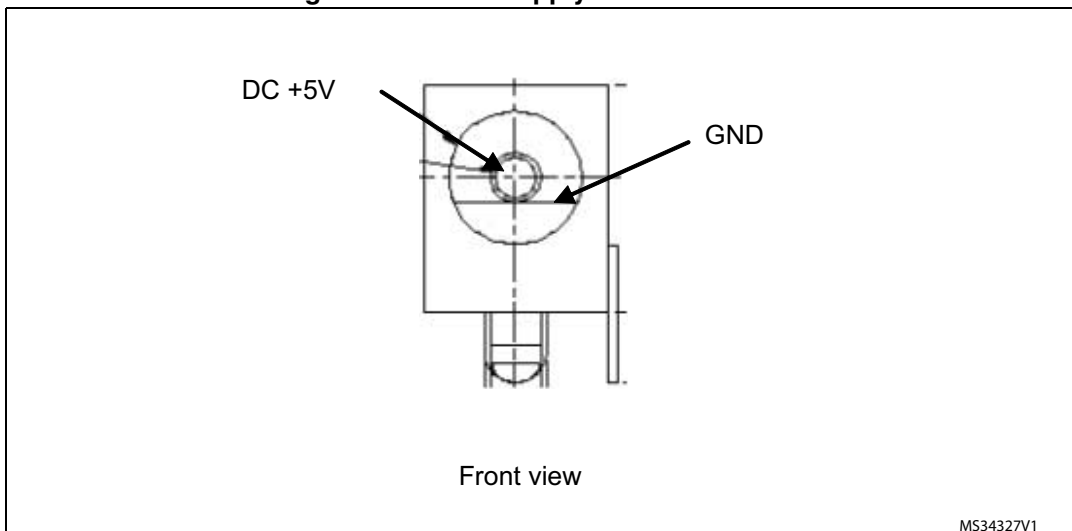
### 3.14 ST-LINK/V2 programming connector CN16

The connector CN16 is used only for the embedded ST-LINK/V2 programming during board manufacture. It is not populated by default and not for end users.

### 3.15 Power connector CN17

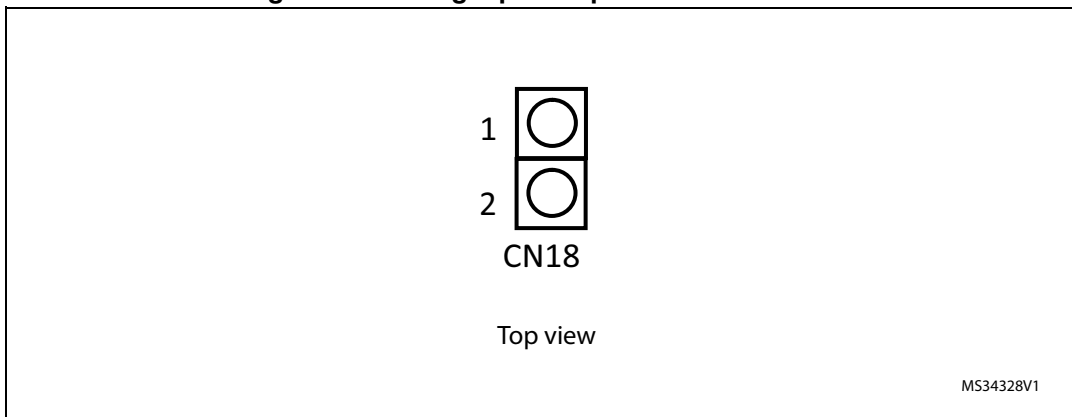
The STM32072B-EVAL evaluation board can be powered from a DC 5V power supply via the external power supply jack (CN17) shown in *Figure 16*. The central pin of CN17 must be positive.

**Figure 16. Power supply connector CN17**



### 3.16 Analog input connector CN18

**Figure 17. Analog input-output connector CN18**



**Table 32. Analog input-output connector CN18**

| Pin number | Description             | Pin number | Description |
|------------|-------------------------|------------|-------------|
| 1          | Analog input-output PC0 | 2          | GND         |

### 3.17 Smart card connector CN19

Figure 18. Smart card connector CN19

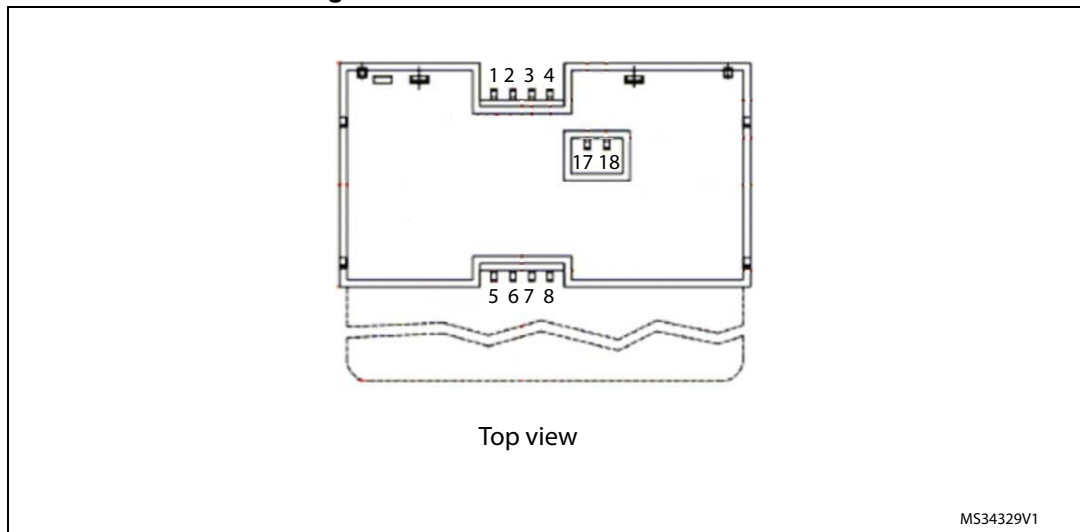


Table 33. Smart card connector CN19

| Pin number | Description                    | Pin number | Description                    |
|------------|--------------------------------|------------|--------------------------------|
| 1          | VCC                            | 5          | GND                            |
| 2          | RST                            | 6          | NC                             |
| 3          | CLK                            | 7          | I/O                            |
| 4          | NC                             | 8          | NC                             |
| 17         | Detection pin of card presence | 18         | Detection pin of card presence |



## 4 Schematics

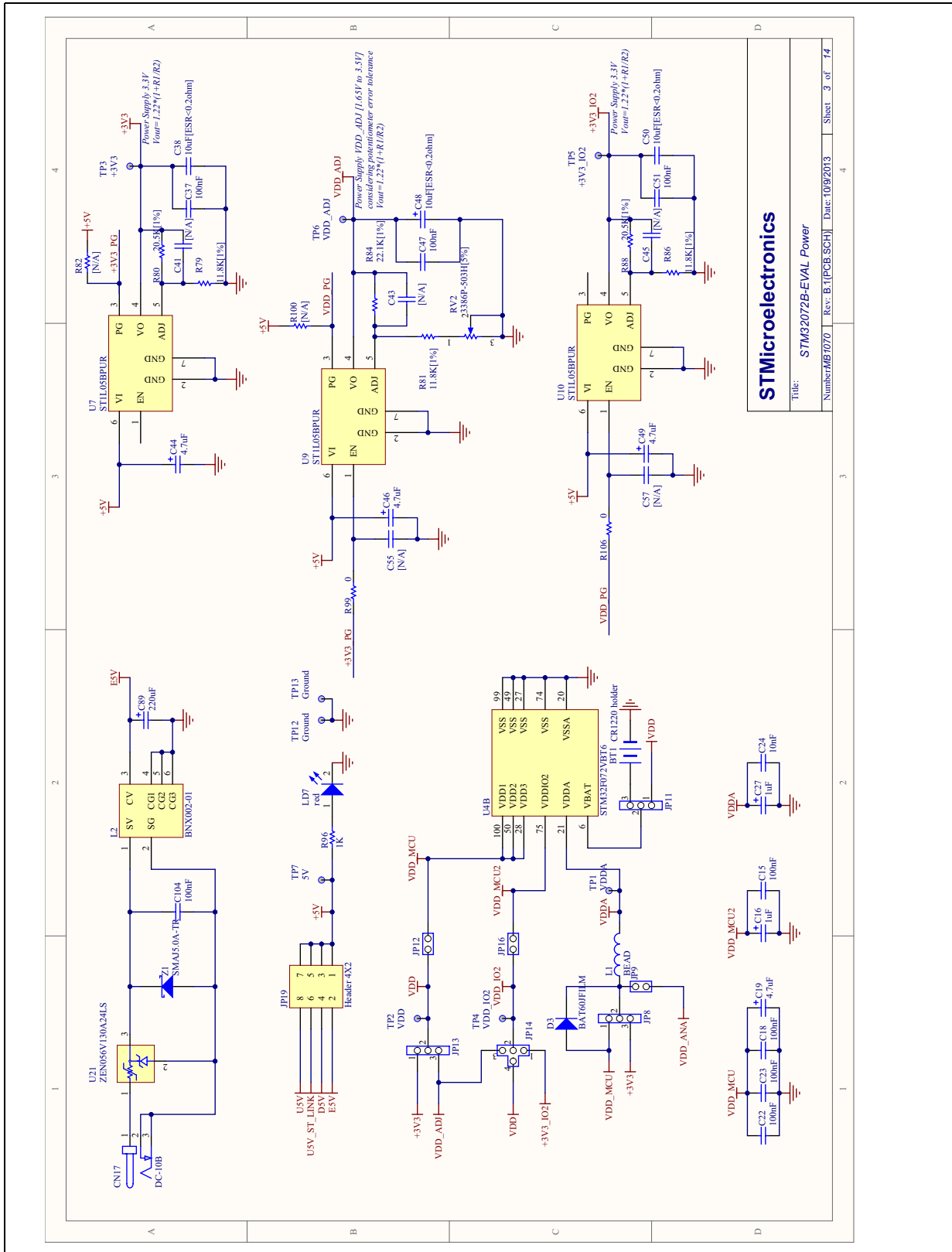
The schematics of STM32072B-EVAL are shown in the [Figure 19](#) to [Figure 32](#).

The schematic of the TFT LCD daughter board is shown in [Figure 33](#).





Figure 21. STM32072B-EVAL schematic 3

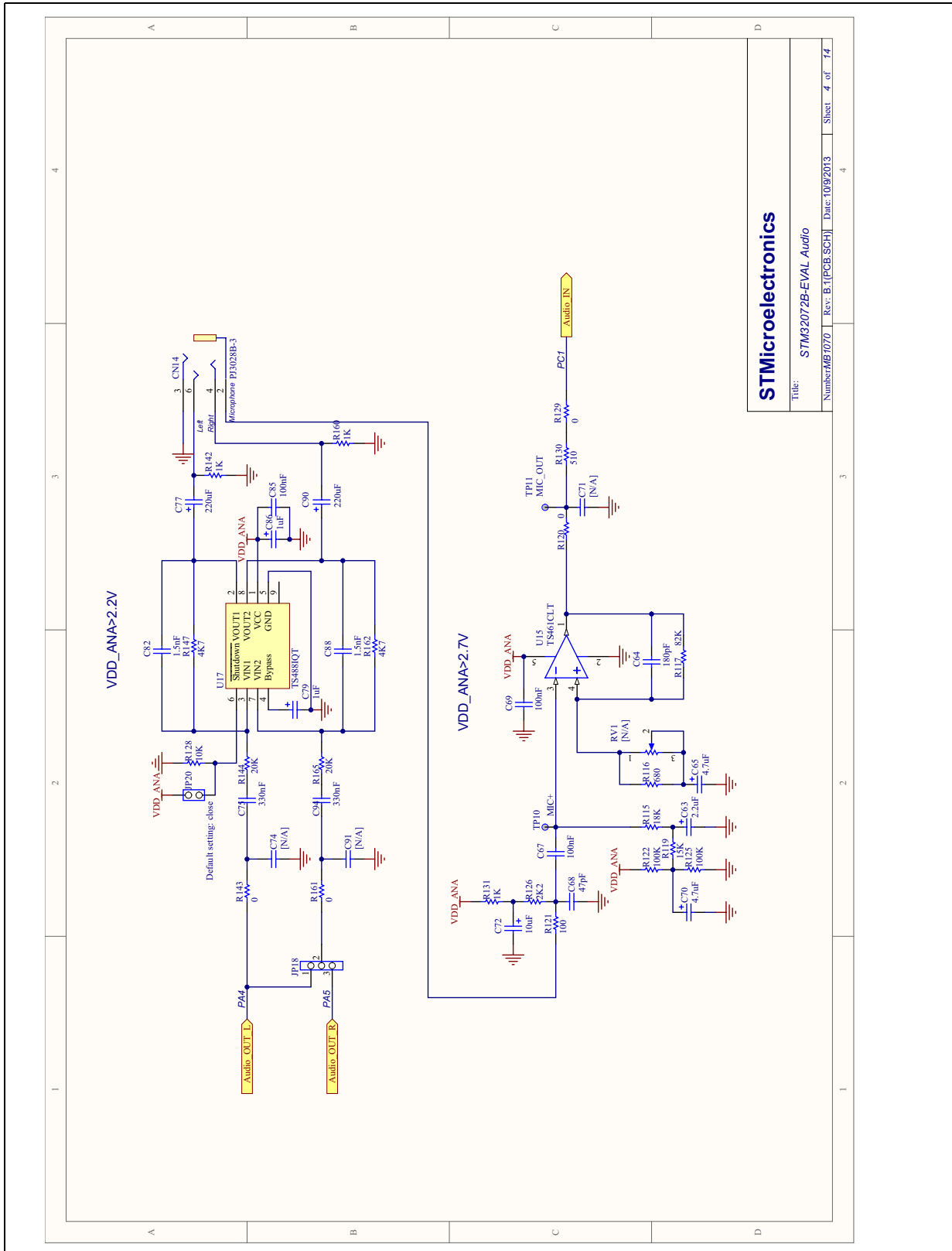


STMicroelectronics

Title: STM32072B-EVAL Power  
Number: M51070 Rev: B.1 (PCB SCH) Date: 10/9/2013 Sheet: 3 of 14



Figure 22. STM32072B-EVAL schematic 4



**STMicroelectronics**

Title: STM32072B-EVAL Audio

Number: MB1070 Rev: B.1 (PCB.SCH) Date: 10/9/2013 Sheet: 4 of 14





Figure 24. STM32072B-EVAL schematic 6

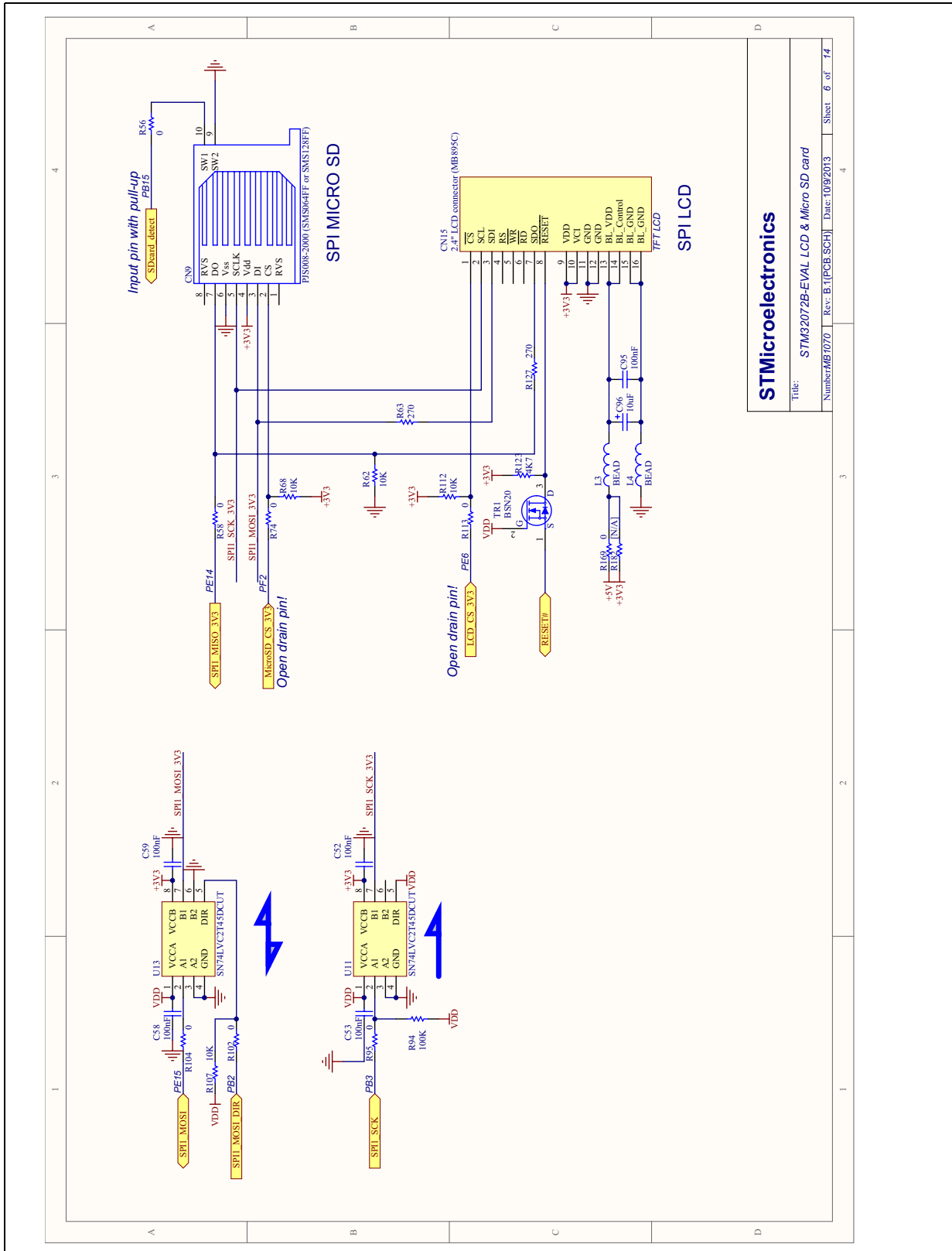


Figure 25. STM32072B-EVAL schematic 7

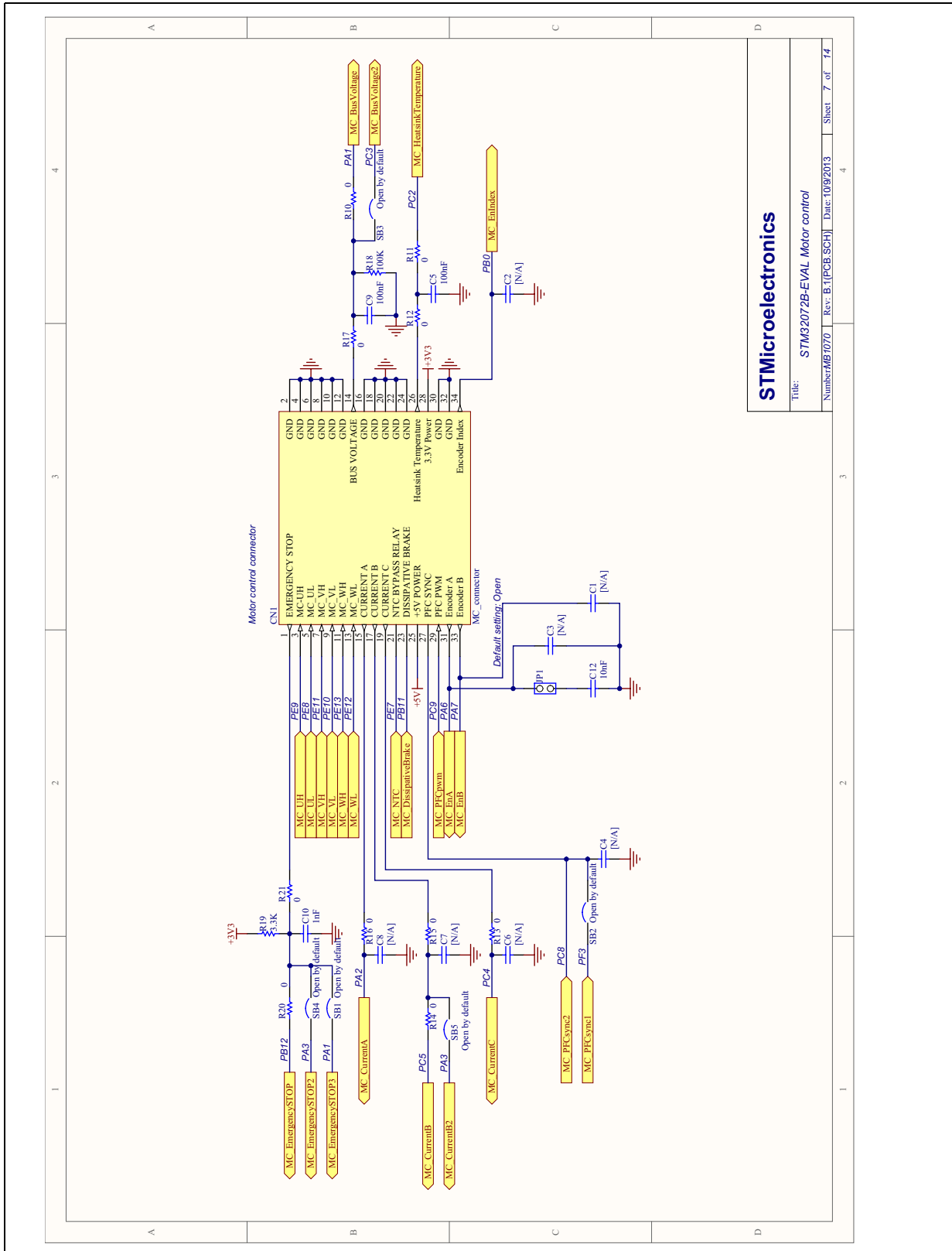




Figure 26. STM32072B-EVAL schematic 8

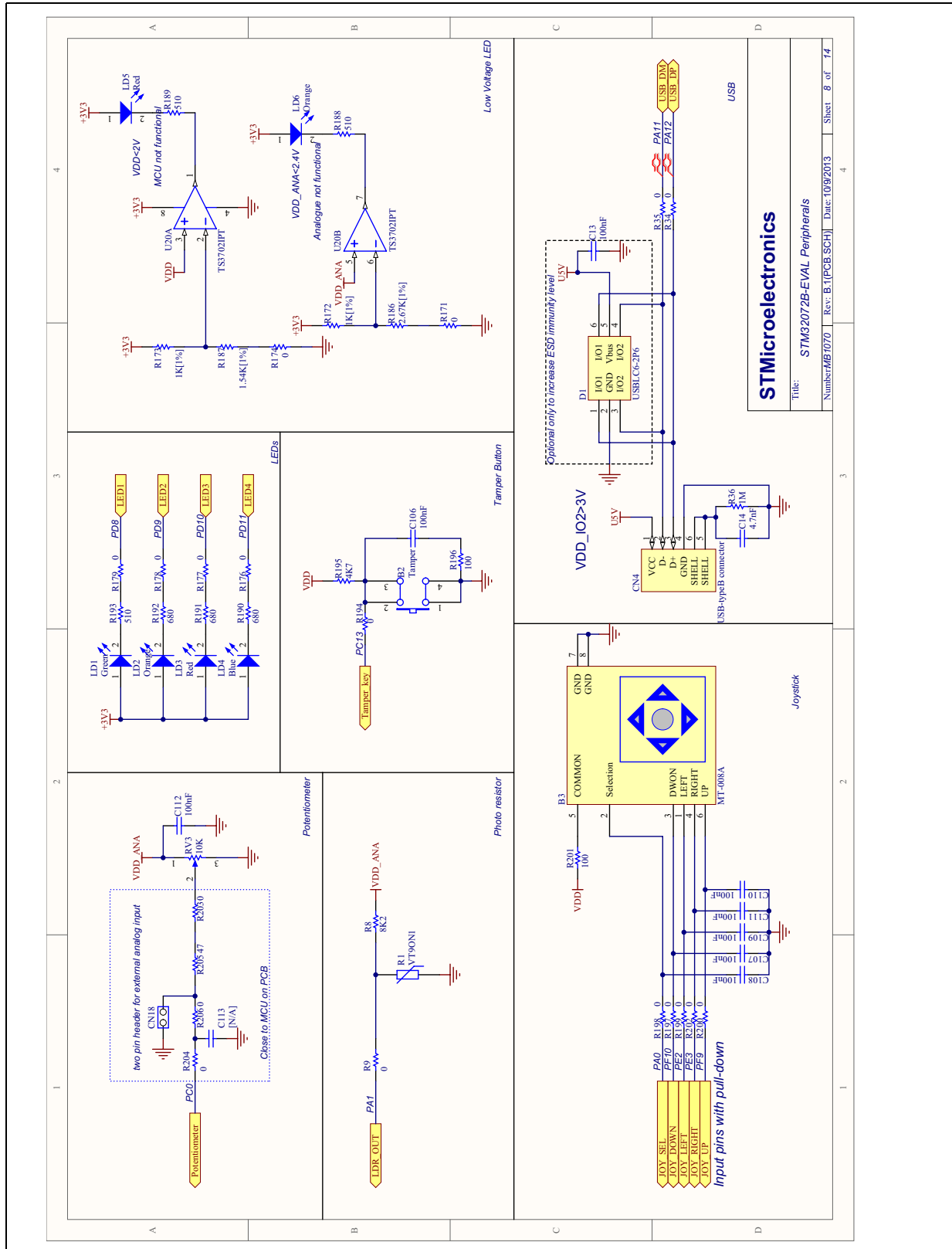
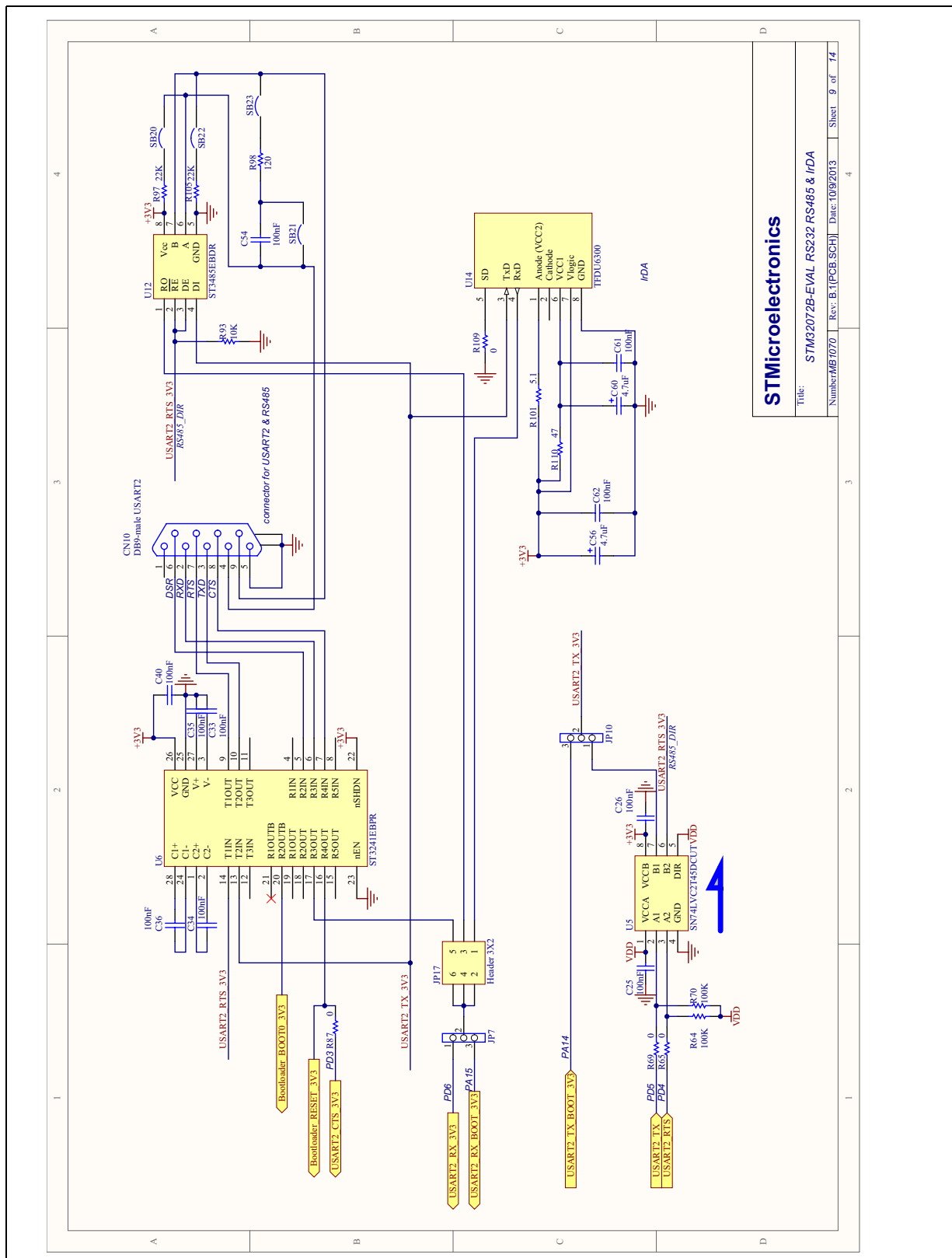


Figure 27. STM32072B-EVAL schematic 9



**STMicroelectronics**  
 Title: STM32072B-EVAL RS232 RS485 & I2C  
 Number: M61070 Rev: B.1 (PCB.SCH) Date: 10/9/2013 Sheet: 9 of 14



Figure 28. STM32072B-EVAL schematic 10

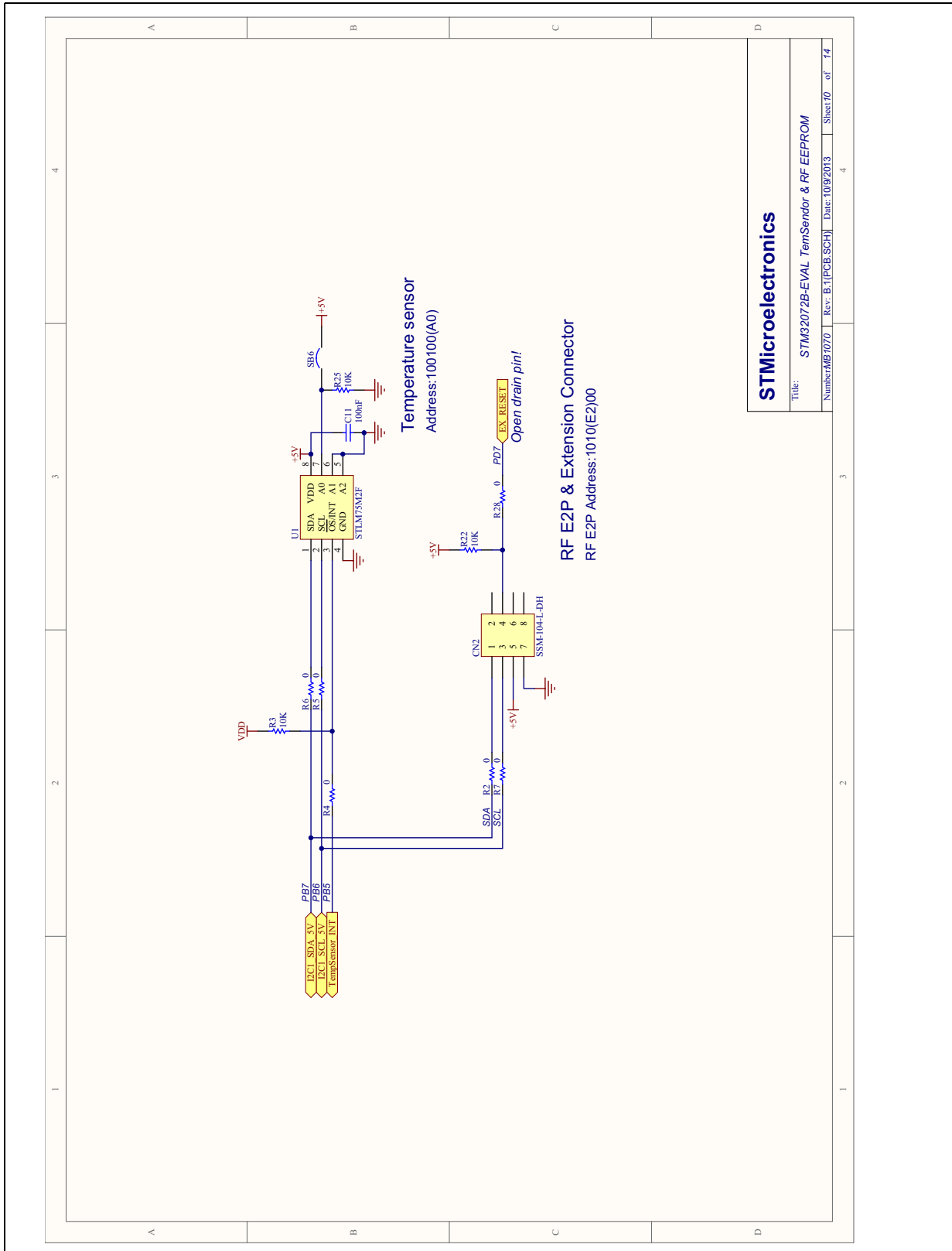






Figure 31. STM32072B-EVAL schematic 13

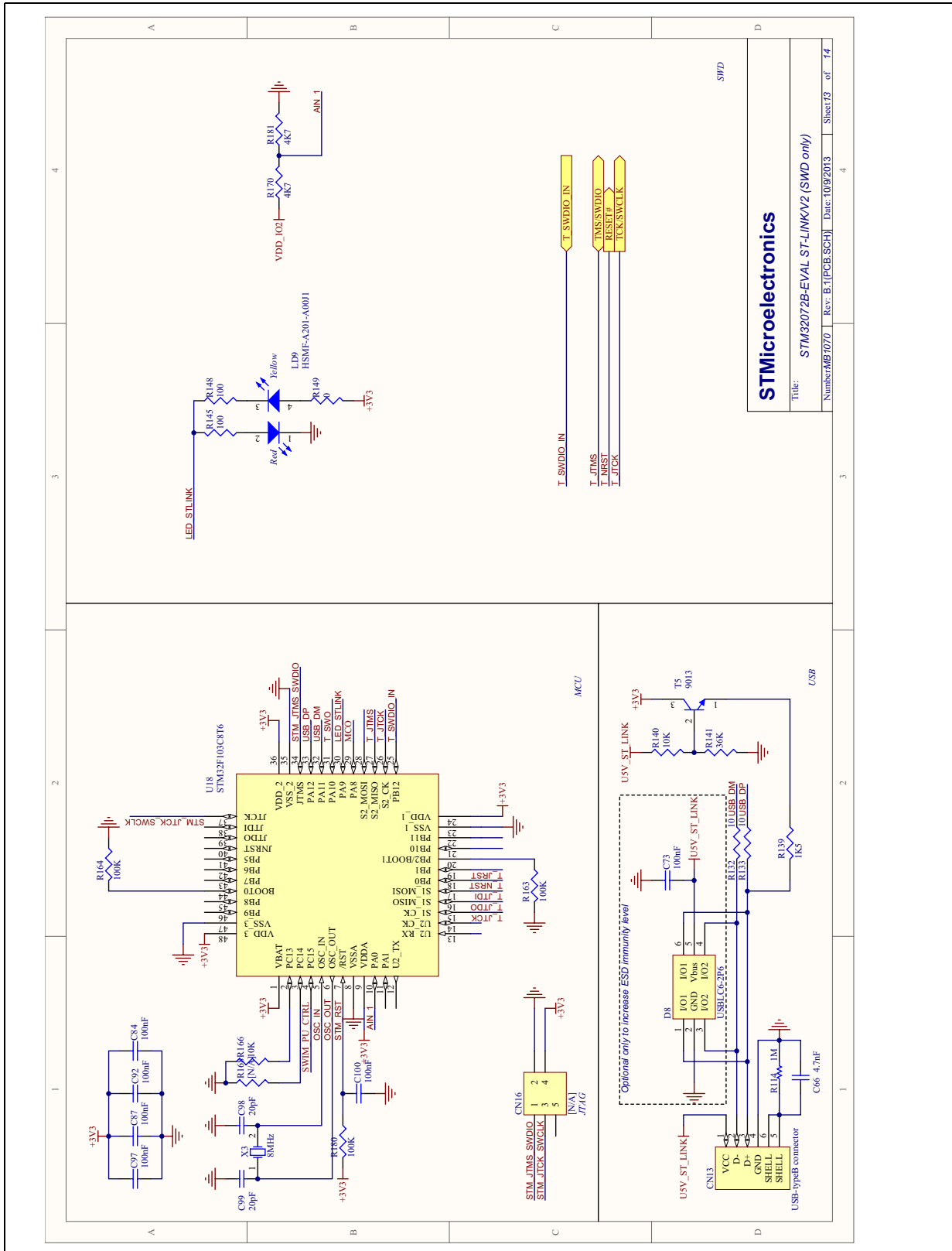


Figure 32. STM32072B-EVAL schematic 14

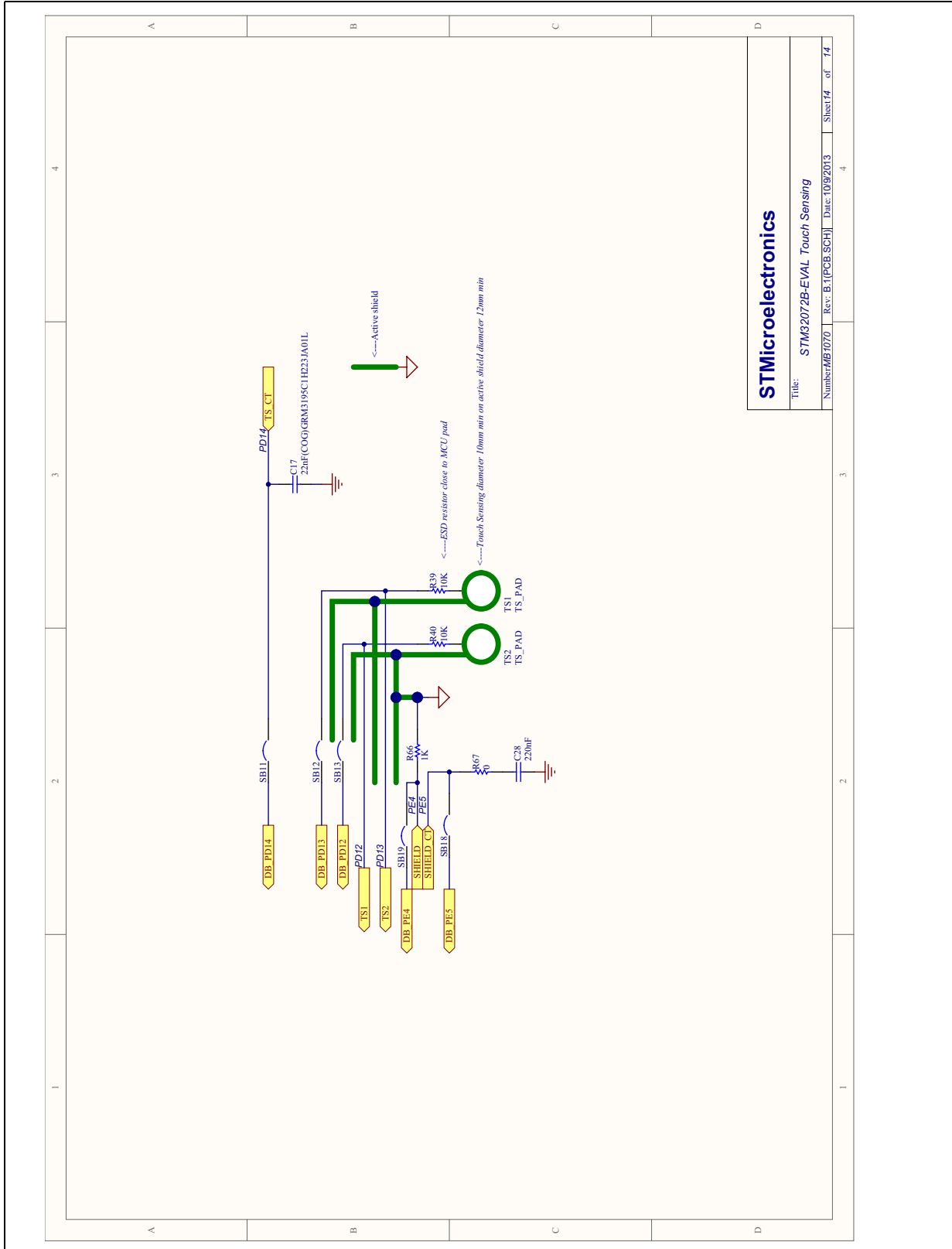
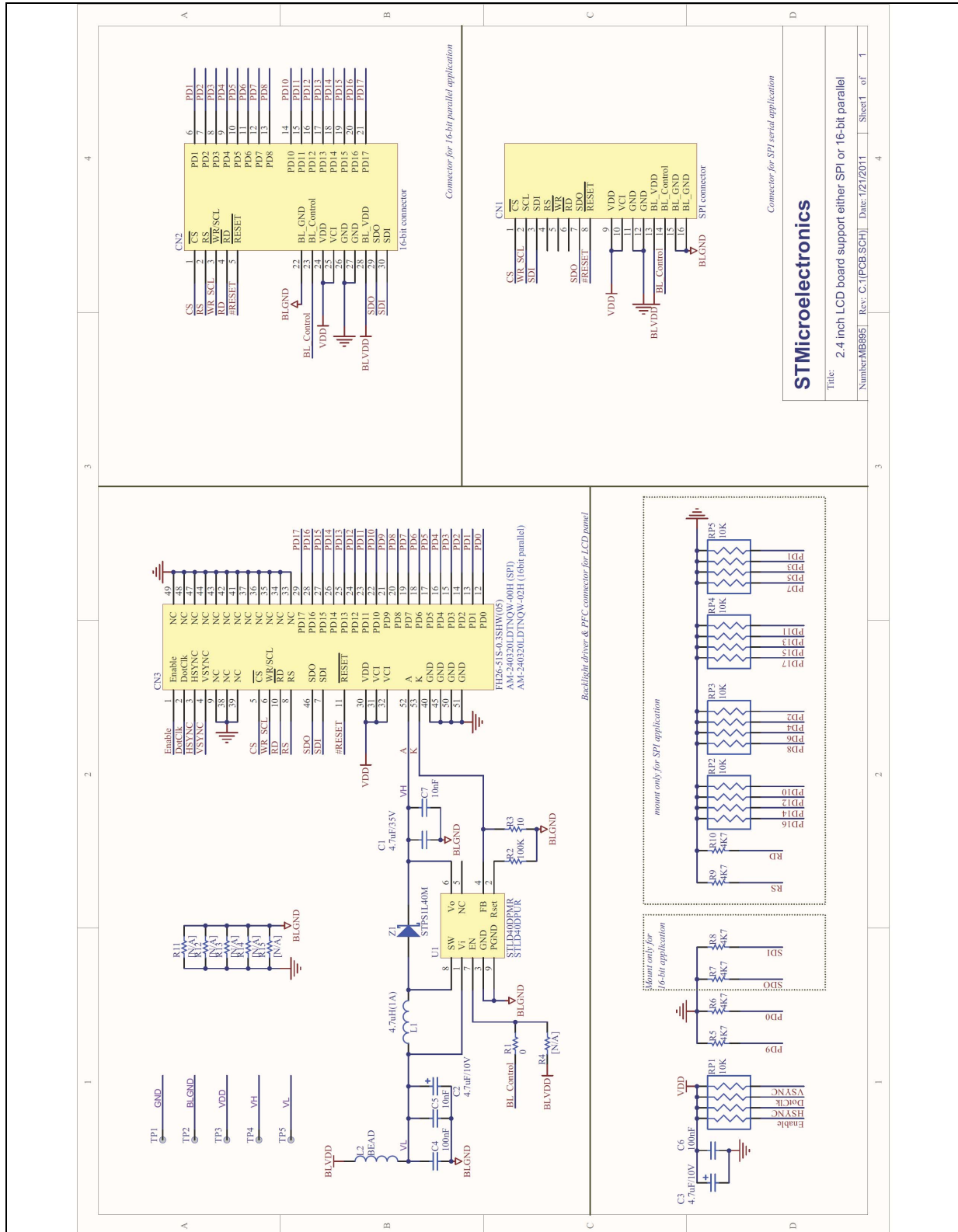


Figure 33. TFT LCD daughter board MB895





## Appendix A STM32072B-EVAL IO assignment

Table 34. STM32072B-EVAL IO assignment

| Pin No. | Pin name           | STM32072B-EVAL general IO assignment | STM32072B-EVAL motor control IO assignment |
|---------|--------------------|--------------------------------------|--|
| 1       | PE2                | JOY_LEFT                             |  |
| 2       | PE3                | JOY_RIGHT                            |  |
| 3       | PE4                | SHIELD                               |  |
| 4       | PE5                | SHIELD_CT                            |  |
| 5       | PE6                | LCD_CS                               |  |
| 6       | VBAT               | VBAT                                 |  |
| 7       | PC13               | TAMPER_KEY                           |  |
| 8       | PC14-<br>OSC32_IN  | OSC32_IN                             |  |
| 9       | PC15-<br>OSC32_OUT | OSC32_OUT                            |  |
| 10      | PF9                | JOY_UP                               |  |
| 11      | PF10               | JOY_DOWN                             |  |
| 12      | PF0-OSC_IN         | OSC_IN                               |  |
| 13      | PF1-<br>OSC_OUT    | OSC_OUT                              |  |
| 14      | NRST               | NRST                                 |  |
| 15      | PC0                | Potentiometer                        |  |
| 16      | PC1                | Audio_IN                             |  |
| 17      | PC2                |                                      | MC_headsinkTemp                            |
| 18      | PC3                |                                      | MC_BusVoltage2                             |
| 19      | PF2                | MicroSD_CS                           |  |
| 20      | VSSA               |                                      |  |
| 21      | VDDA               |                                      |  |
| 22      | PF3                |                                      | MC_PFCsync1                                |
| 23      | PA0                | JOY_SEL                              |  |
| 24      | PA1                | LDR_OUT                              | MC_BusVoltage /<br>Emergency_STOP3         |
| 25      | PA2                |                                      | MC_Current A                               |
| 26      | PA3                |                                      | MC_Current B2/<br>Emergency_STOP2          |
| 27      | VSS_3              |                                      |  |

Table 34. STM32072B-EVAL IO assignment (continued)

| Pin No. | Pin name | STM32072B-EVAL general IO assignment | STM32072B-EVAL motor control IO assignment |
|---------|----------|--------------------------------------|--|
| 28      | VDD_3    |                                      |  |
| 29      | PA4      | Audio_OUT_LEFT                       |  |
| 30      | PA5      | Aduio_OUT_RIGHT                      |  |
| 31      | PA6      |                                      | MC_Encoder A                               |
| 32      | PA7      |                                      | MC_Encoder B                               |
| 33      | PC4      |                                      | MC_Current C                               |
| 34      | PC5      |                                      | MC_Current B                               |
| 35      | PB0      |                                      | MC_Encoder index                           |
| 36      | PB1      |                                      |  |
| 37      | PB2      | SPI1_MOSI_DIR                        |  |
| 38      | PE7      |                                      | MC_NTC                                     |
| 39      | PE8      |                                      | MC_UL                                      |
| 40      | PE9      |                                      | MC_UH                                      |
| 41      | PE10     |                                      | MC_VL                                      |
| 42      | PE11     |                                      | MC_VH                                      |
| 43      | PE12     |                                      | MC_WL                                      |
| 44      | PE13     |                                      | MC_WH                                      |
| 45      | PE14     | SPI1_MISO                            |  |
| 46      | PE15     | SPI1_MOSI                            |  |
| 47      | PB10     | USB_VBUS_detection                   |  |
| 48      | PB11     |                                      | MC_DissipativeBrake                        |
| 49      | VSS_2    |                                      |  |
| 50      | VDD_2    |                                      |  |
| 51      | PB12     |                                      | MC_EmergencySTOP                           |
| 52      | PB13     | I2C2_SCL                             |  |
| 53      | PB14     | I2C2_SDA                             |  |
| 54      | PB15     | SDcard_detect                        |  |
| 55      | PD8      | LED1                                 |  |
| 56      | PD9      | LED2                                 |  |
| 57      | PD10     | LED3                                 |  |
| 58      | PD11     | LED4                                 |  |
| 59      | PD12     | TS1                                  |  |

Table 34. STM32072B-EVAL IO assignment (continued)

| Pin No. | Pin name | STM32072B-EVAL general IO assignment | STM32072B-EVAL motor control IO assignment |
|---------|----------|--------------------------------------|--|
| 60      | PD13     | TS2                                  |  |
| 61      | PD14     | TS_CT                                |  |
| 62      | PD15     | HDMI_HPD_Sink                        |  |
| 63      | PC6      | IR_IN                                |  |
| 64      | PC7      |                                      |  |
| 65      | PC8      |                                      | MC_PFCsync2                                |
| 66      | PC9      |                                      | MC_PFCpwm                                  |
| 67      | PA8      | SmartCard_CLK                        |  |
| 68      | PA9      | SmartCard_IO                         |  |
| 69      | PA10     | SmartCard_RST                        |  |
| 70      | PA11     | USB_DM                               |  |
| 71      | PA12     | USB_DP                               |  |
| 72      | PA13     | SWDAT                                |  |
| 73      | PF6      |                                      |  |
| 74      | VSS      |                                      |  |
| 75      | VDDIO2   |                                      |  |
| 76      | PA14     | SWCLK / USART2_TX_BOOT               |  |
| 77      | PA15     | USART2_RX_BOOT                       |  |
| 78      | PC10     | SmartCard_1V8                        |  |
| 79      | PC11     | SmartCard_3/5V                       |  |
| 80      | PC12     | SmartCard_OFF                        |  |
| 81      | PD0      | CAN_RX                               |  |
| 82      | PD1      | CAN_TX                               |  |
| 83      | PD2      | SmartCard_CMDVCC                     |  |
| 84      | PD3      | USART2_CTS                           |  |
| 85      | PD4      | USART2_RTS / RS485_DIR               |  |
| 86      | PD5      | USART2_TX                            |  |
| 87      | PD6      | USART2_RX                            |  |
| 88      | PD7      | EX_RESET                             |  |
| 89      | PB3      | SPI1_SCK                             |  |
| 90      | PB4      |                                      |  |
| 91      | PB5      | TempSensor_INT                       |  |

Table 34. STM32072B-EVAL IO assignment (continued)

| Pin No. | Pin name | STM32072B-EVAL general IO assignment | STM32072B-EVAL motor control IO assignment |
|---------|----------|--------------------------------------|--|
| 92      | PB6      | I2C1_SCL                             |  |
| 93      | PB7      | I2C1_SDA                             |  |
| 94      | BOOT0    | BOOT0                                |  |
| 95      | PB8      | HDMI_CEC                             |  |
| 96      | PB9      | IR_OUT                               |  |
| 97      | PE0      | HDMI_HPD_Source                      |  |
| 98      | PE1      |                                      |  |
| 99      | VSS_1    |                                      |  |
| 100     | VDD_1    |                                      |  |

## Appendix B Mechanical dimensions

Figure 34. STM32072B-EVAL mechanical dimensions

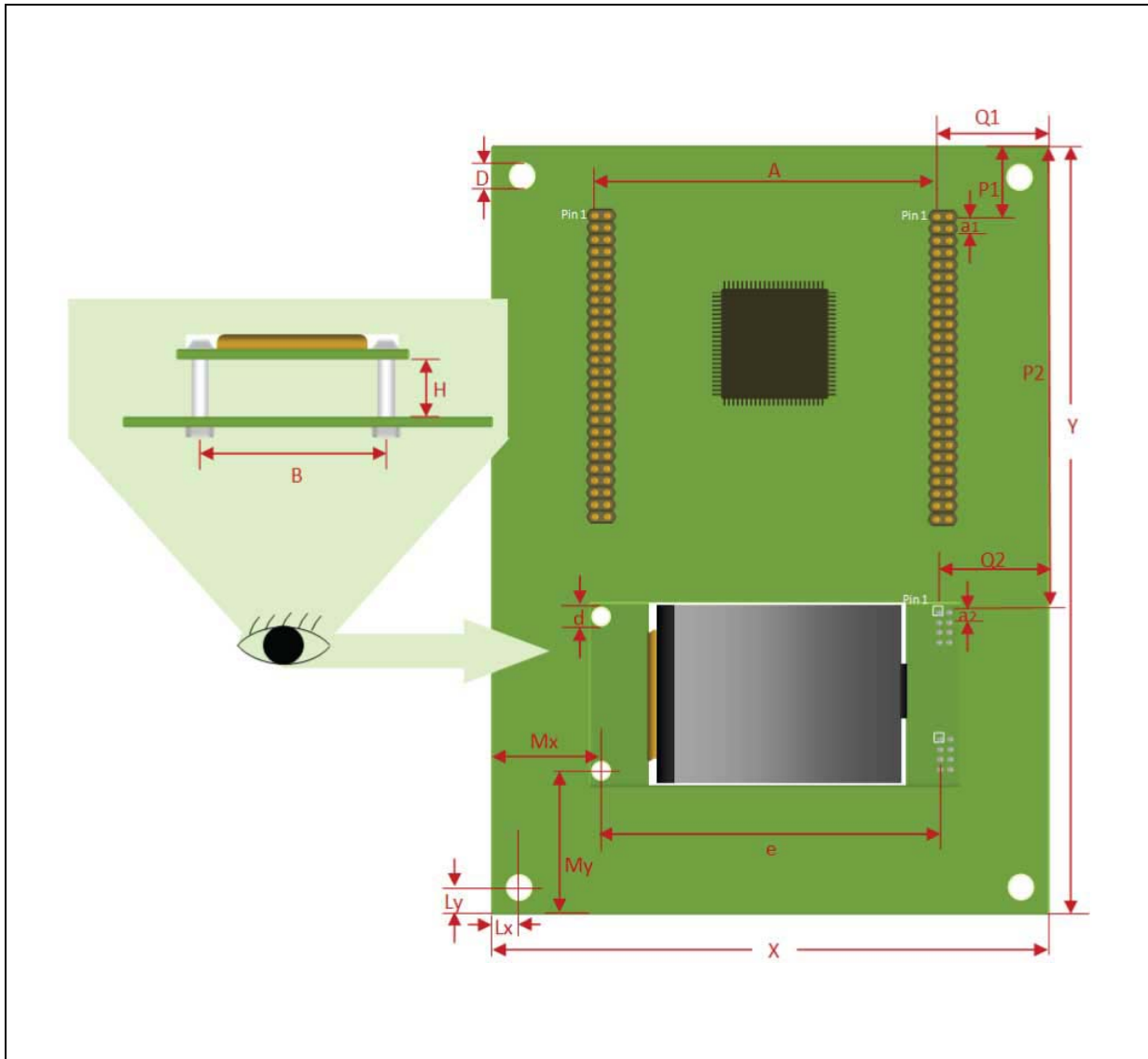


Table 35. STM32072B-EVAL mechanical dimensions

| Symbol | Size (mm) | Symbol | Size (mm) | Symbol | Size (mm) |
|--------|-----------|--------|-----------|--------|-----------|
| A      | 68.58     | e      | 77.44     | P1     | 26.67     |
| a1     | 2.54      | H      | 11        | P2     | 111.76    |
| a2     | 2.54      | Lx     | 5.715     | Q1     | 24.12     |
| B      | 36        | Ly     | 5.715     | Q2     | 17.70     |
| D      | 3.5       | Mx     | 19.08     | X      | 114.3     |
| d      | 3.2       | My     | 23.81     | Y      | 172.72    |

# Revision history

**Table 36. Document revision history**

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 13-Jan-2014 | 1        | Initial release. |

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