
STM32429I-EVAL evaluation board for the STM32F429 line

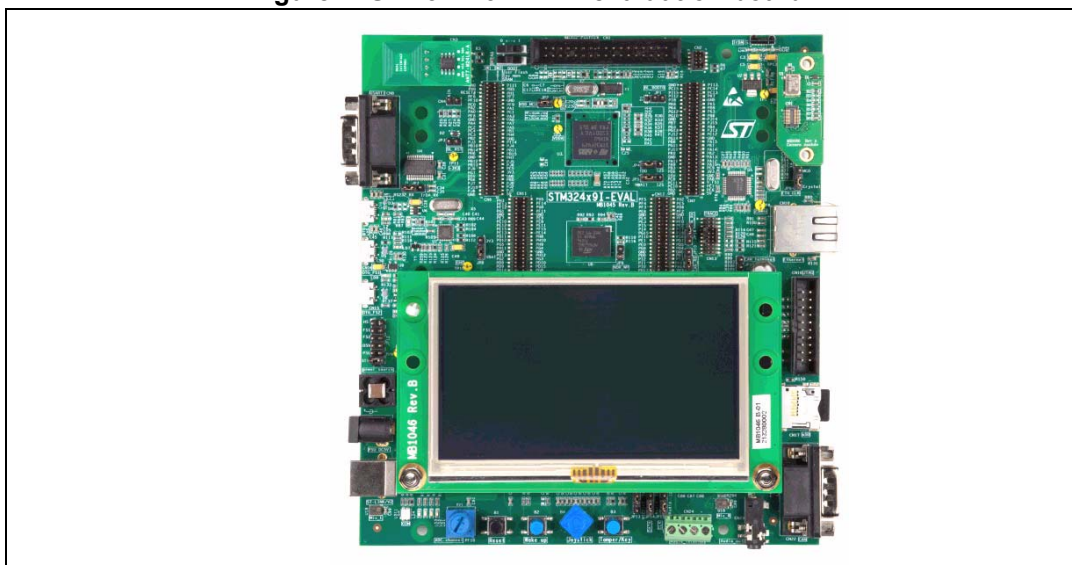
Introduction

The STM32429I-EVAL evaluation board is a complete demonstration and development platform for STMicroelectronics ARM® Cortex™-M4 core-based STM32F429NIH6 microcontrollers. It features three I²C, six SPIs with two muxed full-duplex I²S, SDIO, four USART, four UART, two CAN, three 12-bit ADC, two 12-bit DAC, one SAI, 8- to 14-bit digital camera module interface, internal 256+4 KB SRAM and 2 MB Flash, USB HS OTG and USB FS OTG, Ethernet MAC, FMC interface, JTAG debugging support. This evaluation board can be used as a reference design for user application development but it is not considered as a final application.

The full range of hardware features on the board helps you evaluate all peripherals (USB OTG HS, USB OTG FS, Ethernet, Motor Control, CAN, MicroSD Card, USART, Audio DAC and ADC, digital microphone, IrDA, CAN, RF EEPROM, SRAM, Nor Flash, SDRAM, 4.3" TFT LCD with a resistive touch panel etc.) and develop your own applications. Extension headers make it possible to easily connect a daughterboard for your specific application.

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

Figure 1. STM32429I-EVAL evaluation board (a)



a. Photo not contractual

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1 Overview

1.1 Features

- STM32F429NIH6 microcontroller
- Six 5 V power supply options:
 - Power jack
 - ST-LINK/V2 USB connector
 - User USB HS connector
 - User USB FS1 connector
 - User USB FS2 connector
 - Daughterboard
- SAI Audio DAC, stereo audio jack which supports headset with microphone
- Stereo digital microphone, audio terminal connector used to connect external speakers
- 2 GByte (or more) SDIO interface MicroSD Card
- RF EEPROM on I2C compatible serial interface
- RS-232 communication
- IrDA transceiver
- JTAG/SWD and ETM trace debug support, ST-LINK/V2 embedded
- IEEE-802.3-2002 compliant Ethernet connector
- Camera module
- 8 M x 32-bit SDRAM, 1 M x 16-bit SRAM & 8 M x 16-bit NOR Flash
- 4.3 inch 480 x 272 pixel TFT LCD with resistive touch panel
- Joystick with 4-direction control and selector
- Reset, WakeUp, Tamper or key button
- 4 user color LEDs
- Extension connectors & memory connectors for daughterboard or wrapping board
- USB OTG HS and FS with Micro-AB connectors
- RTC with backup battery
- CAN2.0A/B compliant connection
- Potentiometer
- Motor control connector

1.2 Demonstration software

Demonstration software is preloaded in the board's Flash memory for easy demonstration of the device peripherals in stand-alone mode. For more information and to download the latest version, refer to the STM32429I-EVAL demonstration software on www.st.com.

1.3 Order code

To order the evaluation board based on STM32F429NIH6 MCU and 4.3" TFT LCD, use the order code:STM32429I-EVAL1.

1.4 Delivery recommendations

Some verifications are needed before using the board for the first time to make sure that nothing was damaged during shipment and that no components are unplugged or lost.

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

The main components to verify are:

1. The 25 MHz crystal (X2) & 25 MHz crystal (X4) which may have been removed by a shock from its socket.
2. The MicroSD Card which may have been ejected from the connector CN17 (right side of the board).
3. The dual-interface EEPROM board (ANT7-M24LR-A) which may have been unplugged from the connector CN3 (top left corner of the board).
4. The camera module on the camera daughterboard (MB1066) which may have been unplugged.

Warning: There is an explosion risk if the battery is replaced by an incorrect one.
Make sure to dispose of used batteries according to the instructions.

2

The STM32429I-EVAL evaluation board is designed around the STM32F429NIH6 (216-pin TFBGA package).

The hardware block diagram [Figure 2](#) illustrates the connection between the STM32F429NIH6 and peripherals (SDRAM, SRAM, NOR Flash, camera module, color LCD, USB OTG connectors, motor control connector, USART, IrDA, ethernet, audio, CAN, RF EEPROM, MicroSD Card and embedded ST-LINK) and [Figure 3](#) will help you locate these features on the actual evaluation board.

Figure 2. Hardware block diagram

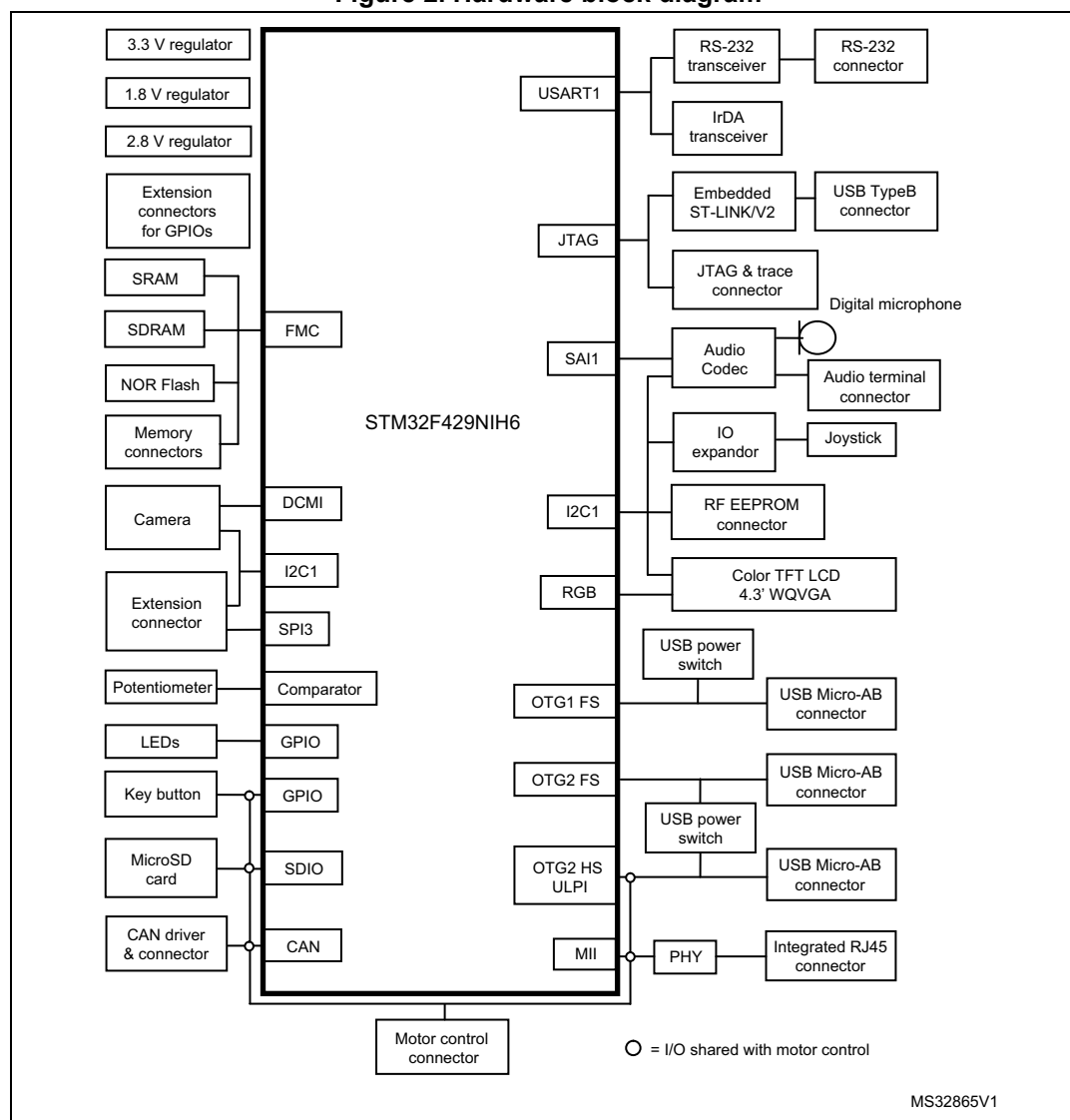
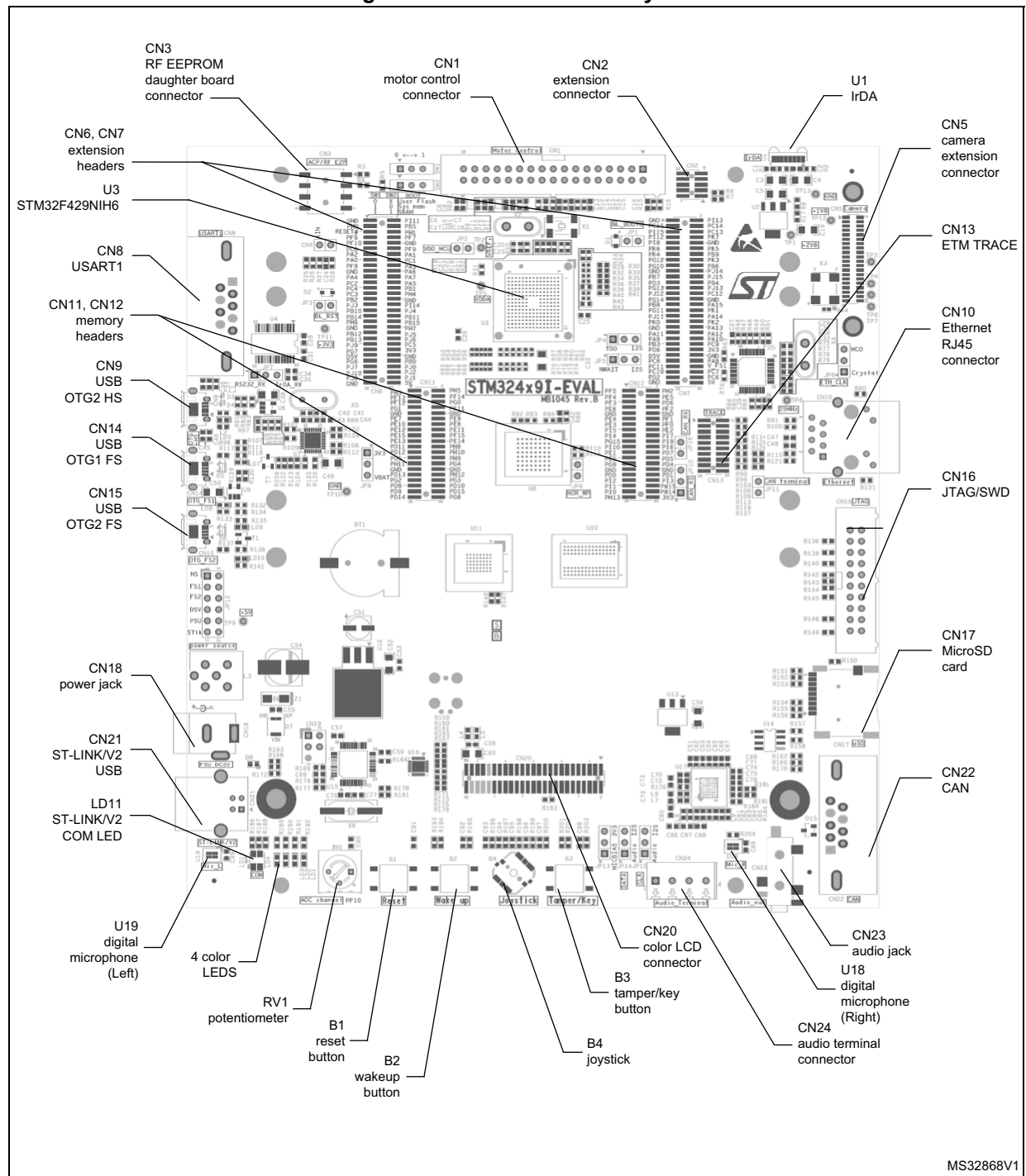


Figure 3. Evaluation board layout



2.1 Development and debug support

Version 2 of the ST-LINK (ST-LINK/V2) is embedded on the board. This tool allows on-board program loading and debugging of the STM32 using a JTAG or SWD interface. Third-party debug tools are also supported by the JTAG/SWD connector, CN16, and ETM Trace connector, CN13.

A specific driver must be installed on your PC to communicate with the embedded ST-LINK/V2. An install shield called *ST-LINK_V2_USBdriver.exe* is available on the web. To download and install this driver, refer to the Software and development tools page for STM32 on www.st.com.

Third-party toolchains, ARM[®] Atollic[®] TrueSTUDIO[®], KEIL[™] MDK-ARM[™], IAR EWARM[®] and Altium[®], TASKING[™] VX-Toolset support ST-LINK/V2 according to the following table:

Table 1. Third-party toolchains

| Third-party | Toolchain | Version |
|-------------|--------------------|---------|
| ARM | Atollic TrueSTUDIO | 2.1 |
| IAR | EWARM | 6.20 |
| Keil | MDK-ARM | 4.20 |
| Altium | Tasking VX-Toolset | 4.0.1 |

The embedded ST-LINK/V2 is connected to the PC via a standard USB cable connected to connector CN21. The bicolor LED LD11 (COM) indicates the status of the communication as follows:

- Red LED slow blinking/Off: At power on before USB initialization
- Red LED fast blinking/Off: After the first correct communication between PC and ST-Link/V2 (enumeration)
- Red LED On: When initialization between PC and ST-LINK/V2 is successfully finished
- Green LED On: After successful target communication initialization
- Red/Green LED blinking: During communication with target
- Red LED On: Communication finished and OK
- Orange LED On: Communication failure

Note: *The board can be powered via CN21 (embedded ST/LINK/V2 USB connector) even if an external tool is connected to CN13 (ETM trace connector) or CN16 (external JTAG & SWD connector).*

By default ETM only works at 50 MHz clock because ETM signals are shared with other peripherals.

If best performance of ETM is required (90 MHz), then R29, R32, R34, R36, R40, R114 and R120 must be removed to reduce the stub on ETM signals. In this case SAI and camera are not functional and NOR Flash and SRAM's addresses are limited on A18.

Caution: When an external high speed debug tool connected to CN13 or CN16 is used for program loading or debugging, it is recommended to remove ESD protections D9 to D13 connected on JTAG signals.

2.2 Power supply

The STM32429I-EVAL evaluation board is designed to be powered by a 5 V DC power supply and is protected by PolyZen from a wrong power plug-in event. It is possible to configure the evaluation board to use any of following six sources for the power supply:

- 5 V DC power adapter connected to CN18, the power jack on the board (Power Supply Unit on silk screen of JP12(E5V)).
- 5 V DC power with 500 mA limitation from CN21, the USB type B connector of ST-LINK/V2 (USB 5 V power source on silkscreen of JP12(STIk)).
- 5 V DC power with 500 mA limitation from CN9, the USB OTG2 HS Micro-AB connector (USB 5V power source on silkscreen of JP12 (HS)).
- 5 V DC power with 500 mA limitation from CN14, the USB OTG1 FS Micro-AB connector (USB 5V power source on silkscreen of JP12 (FS1)).
- 5 V DC power with 500 mA limitation from CN15, the USB OTG2 FS Micro-AB connector (USB 5 V power source on silkscreen of JP12 (FS2)).
- 5 V DC power from CN6 & CN7, the extension connectors for daughterboard (Daughterboard power source on silkscreen of JP12 (D5V)).

The power supply is configured by setting the related jumpers JP2, JP8 and JP12 as described in [Table 2](#).

Table 2. Power related jumpers

| Jumper | Description |
|----------------------------------|--|
| JP2 | JP2 is used to measure MCU current consumption manually by multimeter. Default setting: Fitted |
| JP8 | Vbat is connected to +3.3V when JP8 is set as shown to the right: (Default setting) |
| | Vbat is connected to battery when JP8 is set as shown to the right: |
| JP12 (continued on next page) | JP12 is used to select one of the six possible power supply resources. For power supply from USB connector of ST-LINK/V2 (CN21) to STM32429I-EVAL only, JP12 is set as shown to the right: (Default setting) |
| | For power supply jack (CN18) to the STM32429I-EVAL only, JP12 is set as shown to the right: |
| | For power supply from the daughterboard connectors (CN6 & CN7) to STM32429I-EVAL only, JP12 is set as shown to the right: |

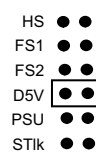
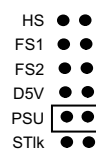


Table 2. Power related jumpers (continued)

| Jumper | Description |
|------------------|--|
| JP12 (continued) | For power supply from USB OTG2 FS (CN15) to STM32429I-EVAL only, JP12 is set as shown to the right: <div> <div> <div>HS</div> <div>FS1</div> <div>FS2</div> <div>D5V</div> <div>PSU</div> <div>STik</div> </div> <div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> </div> </div> |
| | For power supply from USB OTG1 FS (CN14) to STM32429I-EVAL only, JP12 is set as shown to the right: <div> <div> <div>HS</div> <div>FS1</div> <div>FS2</div> <div>D5V</div> <div>PSU</div> <div>STik</div> </div> <div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> </div> </div> |
| | For power supply from USB OTG2 HS (CN9) to STM32429I-EVAL only, JP12 is set as shown to the right: <div> <div> <div>HS</div> <div>FS1</div> <div>FS2</div> <div>D5V</div> <div>PSU</div> <div>STik</div> </div> <div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> </div> </div> |
| | For power supply from power supply jack(CN18) to both STM32429I-EVAL and daughterboard connected on CN6 & CN7, JP12 is set as shown to the right (daughterboard must not have its own power supply connected) <div> <div> <div>HS</div> <div>FS1</div> <div>FS2</div> <div>D5V</div> <div>PSU</div> <div>STik</div> </div> <div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> <div>●</div> </div> </div> |

The LED LD10 is lit when the STM32429I-EVAL evaluation board is powered by the 5 V correctly.

Note:

In order to avoid the impact of USB PHY and Ethernet PHY and get precise results of current consumption on JP2, the following configurations must be implemented:

- *Configure Ethernet PHY in Power Down Mode by setting low level of IO_Expander (EXP_IO1).*
- *Configure USB HS PHY in Low Power Mode (Register Address=04, bit 6 in USB PHY).*

2.3 Clock source

Two clock sources are available on the STM32429I-EVAL evaluation board for the STM32F429NIH6 and embedded RTC.

The camera module, ethernet PHY and USB PHY on the STM32429I-EVAL evaluation board have their own clock sources.

- X1, 32.768 KHz crystal for embedded RTC.
- X2, 25 MHz crystal with socket for STM32F429NIH6 microcontroller, it can be removed from the socket when an internal RC clock is used.
- X3, 24 MHz oscillator for camera module.
- X4, 25 MHz crystal with socket for ethernet PHY.
- X5, 24 MHz crystal for USB OTG2 HS PHY.

Table 3. 32.786 KHz crystal X1 related solder bridges

| Solder bridge | Description |
|---------------|--|
| SB3 | PC14 is connected to 32.786 KHz crystal when SB3 is open. (Default setting) |
| | PC14 is connected to extension connector CN7 when SB3 is closed. In such case R19 must be removed to avoid disturbance due to the 32.786 KHz quartz. |
| SB4 | PC15 is connected to 32.786 KHz crystal when SB4 is open. (Default setting) |
| | PC15 is connected to extension connector CN7 when SB4 is closed. In such case R18 must be removed to avoid disturbance due to the 32.786 KHz quartz. |

Table 4. 25 MHz crystal X2 related solder bridges

| Solder bridge | Description |
|---------------|--|
| SB5 | PH0 is connected to 25 MHz crystal when SB5 is open. (Default setting) |
| | PH0 is connected to extension connector CN6 when SB5 is closed. In such case R20 must be removed to avoid disturbance due to the 25 MHz quartz |
| SB6 | PH1 is connected to 25 MHz crystal when SB6 is open (Default setting). |
| | PH1 is connected to extension connector CN7 when SB6 is closed. In such case C23 & X2 must be removed to avoid disturbance due to the 25 MHz quartz. |

Jumper JP6 for Ethernet clock refer to [Section 2.13](#).

2.4 Reset source

The reset signal of STM32429I-EVAL evaluation board is low active. Reset sources include:

- Reset button B1
- Debugging tools from JTAG/SWD connector CN16 and ETM trace connector CN13
- Daughterboard from CN6
- Embedded ST-LINK/V2


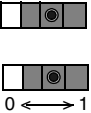
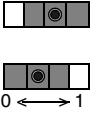
2.5 Boot option

The STM32429I-EVAL evaluation board can boot from:

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

The boot option is configured by setting switch SW1 (BOOT0) and SW2 (BOOT1).

Table 5. Boot related switches

| Switch | Boot description | Switch configuration |
|-----------|---|--|
| SW1 & SW2 | STM32429I-EVAL boots from User Flash when SW1 is set as shown to the right. SW2 is not required in this configuration. (Default setting) |  SW1 0 ↔ 1 |
| | STM32429I-EVAL boots from Embedded SRAM when SW1 and SW2 are set as shown to the right. |  SW1 SW2 0 ↔ 1 |
| | STM32429I-EVAL boots from System Memory when SW1 and SW2 are set as shown to the right. |  SW1 SW2 0 ↔ 1 |

Note: The RS-232 boot loader mechanism is not supported on the STM32429I-EVAL.

2.6 Audio











An audio codec WM8994ECS/R with 4 DACs and 2 ADCs inside is connected to the SAI interface of the STM32F429NIH6 to support the TDM feature on the SAI port. This feature implements audio recording on digital and analog microphone, and audio playback of different audio streams on headphone and line-out at the same time.

It communicates with the STM32F429NIH6 via the I2C1 bus which is shared with the LCD, camera module, RF EEPROM, IO expander and CN2 connector.

The analog microphone on the headset is connected to the ADC of WM8994ECS/R. External speakers can be connected to WM8994ECS/R via audio terminal connector CN24.

There are two digital microphones (MEMs microphone) MP34DT01TR on the STM32429I-EVAL evaluation board. They can be connected to either audio codec or the I2S port of STM32F429NIH6 by setting jumpers as shown in [Table 6](#).

Table 6. Audio related jumpers

| Jumper | Description | |
|--------|---|---|
| JP14 | Data signal on digital microphone is connected to audio codec when JP14 is set as shown to the right (Default setting) |  |
| | Data signal on digital microphone is connected to I2S port of STM32F429NIH6 when JP14 is set as shown to the right (also need to set JP5 according to this table) |  |
| JP15 | Clock signal on digital microphone is connected to audio codec when JP15 is set as shown to the right (Default setting) |  |
| | Clock signal on digital microphone is connected to Timer output (PC7) of STM32F429NIH6 when JP15 is set as shown to the right (also need to set JP4 according to this table) |  |
| JP4 | PB4 is as TDO/SWO signal when JP4 is set as shown to the right (Default setting) |  |
| | PB4 is connected to Timer input(PC6) of STM32F429NIH6 as I2S clock signal when JP4 is set as shown to the right (also need to set JP15 according to this table) |  |
| JP5 | PD6 is as FMC_NWAIT signal when JP5 is set as shown to the right (Default setting) |  |
| | PD6 is connected to digital microphone as I2S data signal when JP5 is set as shown to the right (also need to set JP14 according to this table): |  |
| JP13 | Digital microphone power source is connected to +3.3V power when JP13 is set as shown to the right |  |
| | Digital microphone power source is connected to MICBIAS1 from WM8994ECS/R when JP13 is set as shown to the right. MICBIAS1 setting is requested by digital microphone connected to Codec. (Default setting) |  |

Note: The I2C address of WM8994ECS/R is 0b0011010.

2.7 USB OTG1 FS

The STM32429I-EVAL evaluation board supports USB OTG1 full speed communication via a USB Micro-AB connector (CN14) and USB power switch (U9) connected to VBUS. The evaluation board can be powered by this USB connection at 5 V DC with a 500 mA current limitation.

Green LED LD7 will be lit in one of these cases:

- Power switch (U9) is ON and the STM32429I-EVAL is acting as a USB host.
- VBUS is powered by another USB host and the STM32429I-EVAL is acting as a USB device.

Red LED LD8 will be lit when over-current occurs.

JP16 must be removed when using USB OTG FS as mentioned in [Table 9](#).

2.8 USB OTG2 HS & FS

The STM32429I-EVAL evaluation board supports USB OTG2:

- High speed communication via USB Micro-AB connector (CN9), USB high speed PHY (U7) for high speed function
- Full speed communication via USB Micro-AB connector (CN15)

The evaluation board can be powered by these USB connectors (CN9 or CN15) at 5 V DC with a 500 mA current limitation.

Some OTG2 FS signals are shared with the OTG2 HS ULPI bus, so some PCB rework is needed when using OTG2 FS (CN15) as shown in [Table 7](#).

Table 7. USB OTG2 configuration

| Function | Mount | Remove |
|-----------------------|-----------------|-----------------|
| OTG2 HS-CN9 (Default) | R108, R112, R81 | R260, R264, R83 |
| OTG2 FS-CN15 | R260, R264, R83 | R108, R112, R81 |

A USB power switch (U6) is connected on VBUS and provides power to either:

- CN9 (with R81 mounted and R83 un-mounted)
- CN15 (with R83 mounted and R81 un-mounted)

Green LED LD5 (for CN9) or LD9 (for CN15) will be lit when either:



- Power switch (U6) is ON and STM32429I-EVAL is acting as a USB host.
- VBUS is powered by another USB host, and STM32429I-EVAL is acting as a USB device.

Red LED LD6 is lit if over-current occurs.

2.9 RS-232 & IrDA

RS-232 and IrDA communication is supported by 9-pin RS-232 D-type connector, CN8, and IrDA transceiver, U1, which is connected to USART1 of the STM32F429NIH6 on the STM32429I-EVAL evaluation board.

Table 8. RS-232 & IrDA related jumper

| Jumper | Description |
|--------|--|
| JP7 | USART1_RX is connected to RS-232 transceiver and RS-232 communication is enabled when JP7 is set as shown to the right (Default setting):  |
| | USART1_RX is connected to IrDA transceiver and IrDA communication is enabled when JP7 is set as shown to the right:  |

2.10 MicroSD Card

A 2 GB (or more) MicroSD Card can be connected to the STM32F429NIH6 SDIO port.

MicroSD Card detection is managed by I/O expander GPIO15.

2.11 RF EEPROM

An RF EEPROM daughterboard ANT7-M24LR-A is mounted on CN3 of the STM32429I-EVAL board via the I2C1 bus. The RF EEPROM can be accessed by the microcontroller via the I2C1 bus or by radio frequency (RF) using a 13.56 MHz reader (for example, CR95HF).



The I2C address of RF EEPROM is 0b1010000.

2.12 CAN

The STM32429I-EVAL evaluation board supports one channel of CAN2.0A/B complaint CAN bus communication based on 3.3 V CAN transceiver.

High-speed mode, standby mode and slope control mode are available and are selected by setting JP10.

Table 9. CAN related jumpers

| Jumper | Description |
|--------|---|
| JP10 | CAN transceiver is working in standby mode when JP10 is set as shown to the right:  |
| | CAN transceiver is working in high-speed mode when JP10 is set as shown to the right: (default setting)  |
| | CAN transceiver is working in slope control mode when JP10 is open. |
| JP11 | CAN terminal resistor is enabled when JP11 is fitted. Default setting: Not fitted |
| JP16 | PA11 is only connected with USB FS1 DM signal when JP16 is fitted. (default setting) |
| | PA11 is connected with CAN RX signal when JP16 is fitted. If the CAN function is being used, USB connector CN14 should be disconnected to leave USB FS1_DM signal floating. |

2.13 Ethernet

The STM32429I-EVAL evaluation board supports 10M/100M Ethernet communication by a PHY DP83848CVV (U5) and integrated RJ45 connector (CN10). Ethernet PHY is connected to the STM32F429NIH6 via the MII interface.

A 25 MHz clock can be generated by PHY or provided by MCO from the STM32F429NIH6 by setting jumper JP6 as shown in [Table 10](#).

Table 10. Ethernet related jumper



| Jumper | Description | |
|--------|--|---|
| JP6 | 25 MHz clock is provided by external Crystal X4 when JP5 is set as shown to the right: (Default setting) |  |
| | 25 MHz clock for MII is provided by MCO at PA8 when JP5 is set as shown to the right: |  |

Table 11. Ethernet related solder bridges

| Solder bridges | Description |
|----------------|--|
| SB7 | MII CRS on DP83848CVV is connected to PA0 when SB7 is closed. PA0 is shared with Wakeup button and MC_ENA. Default setting: Open |
| SB8 | MII COL on DP83848CVV is connected to PH3 when SB8 is closed. PH3 is shared with SDRAM chip select SDNE0. Default setting: Open |

Note: Ethernet works properly in the default setting (which RX_ER is not connected to PI10 of STM32F429NIH6) because PI10 is shared with data signal of SDRAM. If RX_ER signal is needed, remove R244 and solder R43.

2.14 Extension connector

An extension connector (CN2) is intended for external board connection to the STM32429I-EVAL evaluation board using cable FFSD-05-D-04.00-01-N.

The external board can exchange data with the STM32F429NIH6 via the I2C1 or SPI3 ports.

2.15 Memories

8 M x 32-bit SDRAM is connected to SDRAM Bank1 of the STM32F429NIH6 FMC interface.

1 Mbit x 16 SRAM is connected to bank1 NOR/PSRAM2 of the FMC interface and both 8-bit and 16-bit access is allowed by BLN0 & BLN1 connected to BLE & BHE of SRAM respectively.

128 Mbit NOR Flash is connected to bank1 NOR/PSRAM1 of the FMC interface. The 16-bit operation mode is selected by the pull-up resistor connected to BYTE pin of NOR Flash. Write protection is enabled or disabled by the setting of jumper JP9:

Table 12. NOR Flash related jumpers

| Jumper | Description |
|--------|--|
| JP9 | Write protection is enabled when JP9 is fitted while write protection is disabled when JP9 is not fitted. Default Setting: Not fitted |
| JP5 | Description of JP5 is in Section 1.6: Audio |

All memory signals are also connected on memory connectors CN11 and CN12 for memory daughterboards.

Some limitations occur when using other peripherals:

1. FMC addressing limitation depending on number of trace data buses used (A18 max for 4-bit ETM to A21 max for 1-bit ETM).
2. NOR Flash addresses limited to A21 when SAI or camera module is used.

In such cases, memory addresses A18 to A21 not connected to FMC are pulled down so memories can be addressed within a limited address range. If A22 is required, the camera board should be removed and SAI1_SDA should be tri-stated. AIF1_TRI (address: 0x300) bit 13 of the W8994 can be used to tri-state ADCDAT1 pin (SAI1_SDA) when it is set to 1.

2.16 Analog input

The two-pin header CN4, and 10 Kohm potentiometer RV1, are connected to PF10 of the STM32F429NIH6 as analog input. A low pass filter can be implemented by replacing R27 and C24 with the resistor and capacitor requested by end user's application.

2.17 Camera module

Connector CN5 (for DCMI signals) on the STM32429I-EVAL evaluation board connects to the camera module daughterboard MB1066.

DCMI signals are duplicated with other peripherals (SAI, I2S, NOR Flash, MicroSD Card, Trace, Ethernet).

These peripherals may not function correctly when the camera module is being used. To avoid SAI1_SDA signal impacting D7, SAI1_SDA should be tri-stated.

Refer to [Section 2.15](#) to see how to tri-state SAI1_SDA.

2.18 Display and input devices

A 4.3 inch 480x272 TFT color LCD with resistive touch panel can be connected to the RGB LCD interface of STM32F429NIH6.

4 general purpose color LED's (LD 1,2,3,4) are available as display devices.

The 4-direction joystick (B4), Wakeup (B2) and Tamper/key button (B3) are available as input devices.

Table 13. LCD modules connector (CN20)

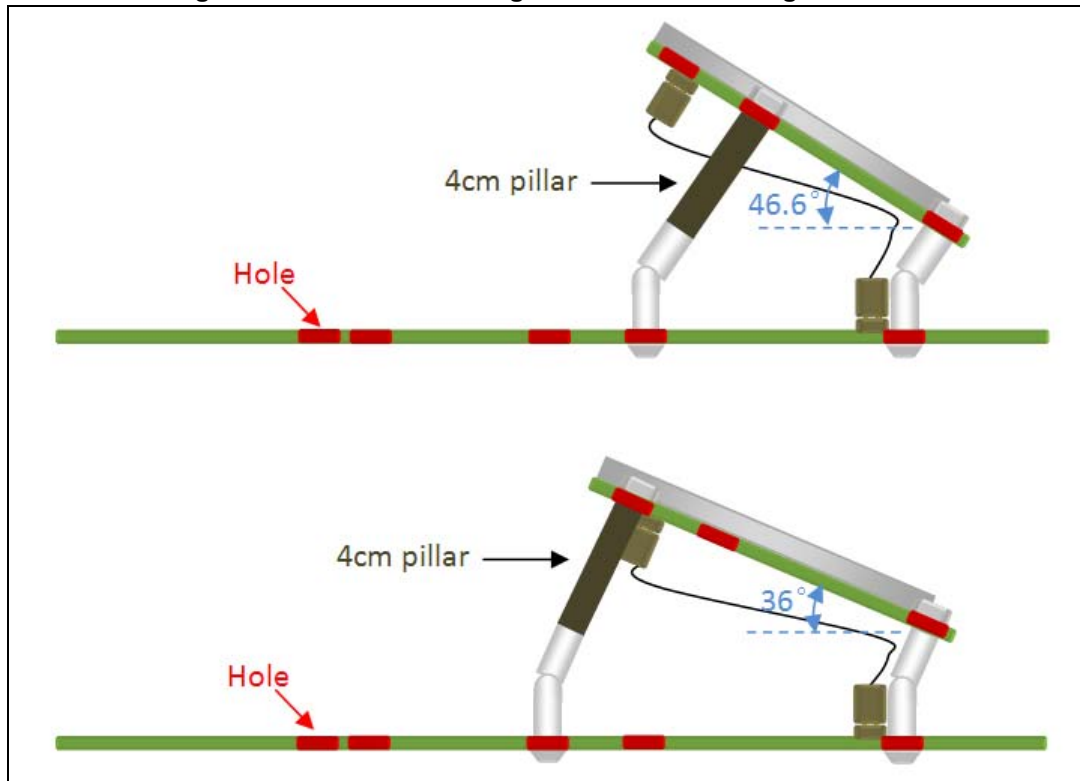
| Pin No. | Description | Pin connection | Pin No. | Description | Pin connection |
|---------|-------------|-------------------|---------|-------------|----------------|
| 1 | GND | | 2 | GND | |
| 3 | R0 | PI15 | 4 | G0 | PJ7 |
| 5 | R1 | PJ0 | 6 | G1 | PJ8 |
| 7 | R2 | PJ1 | 8 | G2 | PJ9 |
| 9 | R3 | PJ2 | 10 | G3 | PJ10 |
| 11 | R4 | PJ3 | 12 | G4 | PJ11 |
| 13 | R5 | PJ4 | 14 | G5 | PK0 |
| 15 | R6 | PJ5 | 16 | G6 | PK1 |
| 17 | R7 | PJ6 | 18 | G7 | PK2 |
| 19 | GND | | 20 | GND | |
| 21 | B0 | PJ12 | 22 | ENB | PK7 |
| 23 | B1 | PJ13 | 24 | - | |
| 25 | B2 | PJ14 | 26 | HSYNC | PI12 |
| 27 | B3 | PJ15 | 28 | VSYNC | PI13 |
| 29 | B4 | PK3 | 30 | GND | |
| 31 | B5 | PK4 | 32 | CLK | PI14 |
| 33 | B6 | PK5 | 34 | GND | |
| 35 | B7 | PK6 | 36 | RESET# | |
| 37 | GND | | 38 | I2C1_SDA | PB9 |
| 39 | INT | IO EXPANDER GPIO4 | 40 | I2C1_SCL | PB6 |
| 41 | - | | 42 | - | |
| 43 | BL_CTRL | PA8 | 44 | - | |
| 45 | 5V | | 46 | - | |
| 47 | BLGND | | 48 | - | |
| 49 | BLGND | | 50 | 3.3V | |

Note: On 4.3-inch daughterboard, BL_CTRL (PA8) can be used to manage on/off of backlight if needed.

Because BL_CTRL is shared with MII_MCO which is in default setting, R279 must be removed and R283 must be soldered with a 0 ohm resistor.

The 4.3 inch LCD daughterboard's orientation can be changed by hinged standoffs and pillars. There are two possible orientations according to holes on the motherboard and LCD daughterboard. Refer to [Figure 4](#) for details.

Figure 4. Orientation setting of 4.3 inch LCD daughterboard



2.19 Motor control

The STM32429I-EVAL evaluation board supports both asynchronous and synchronous three-phase brushless motor control via a 34-pin connector, CN1, which provides all required control and feedback signals to and from motor power-driving board.

Available signals on this connector include emergency stop, motor speed, 3 phase motor current, bus voltage, heatsink temperature coming from the motor driving board and 6 channels of PWM control signal going to the motor driving circuit.

Some PCB rework is needed for motor control application to disconnect peripherals which share I/Os with motor control connector and connect these I/Os to Motor control connector.

- Remove R219, R214, R211, R227, R283, R279, R256, R261, R102, R104, R243, R222, R228, R238, R239, R267, R281, R249, SB7, JP4 (no jumper on pin 2-3), JP15 (no jumper on pin 2-3), JP16.
- Mount R16, R223, R210, R215, R225, R268, R255, R252, R282, R234, R240, R218, R232, R242, R235, R263, R292, R280, R246 with 0 ohm resistors.

All resistors to be removed on the underside of the board are marked in red, while resistors to be soldered are marked in green in [Figure 5](#).

[Figure 6](#) shows all resistors to be removed on the topside of the board marked in red, while resistors to be soldered are marked in green (removal of R102 and R104, and mounting of R16).

| Solder bridges | Description |
|----------------|--|
| SB1 | The special motor current sampling operation is enabled when SB1 is closed (PA12 connected to PA8). The I/O pins PA12 and PA8 are disconnected and can be used by a daughterboard when SB1 is not fitted. Default setting: Open |
| SB2 | SB2 should be kept on open when encoder signal is from pin31 of motor control connector CN1, while it should be kept on close when analog signal is from pin31 of CN1 for a special motor. Default setting: Open |

3 Connectors

3.1 Motor control connector CN1

Figure 7. Motor control connector CN1 (top view)

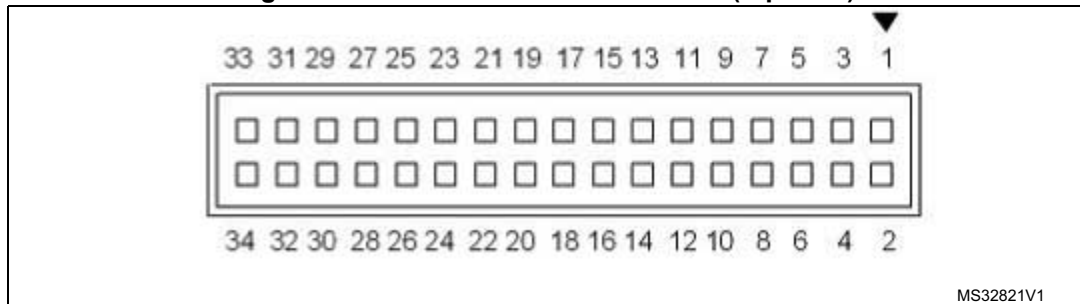


Table 15. Motor control connector CN1

| Description | STM32F429NIH6 pin | CN1 pin number | CN1 pin number | STM32F429NIH6 pin | Description |
|-----------------------|---|----------------|----------------|-------------------|----------------------|
| Emergency stop | PA6 | 1 | 2 | - | GND |
| MC_UH | PC6 | 3 | 4 | - | GND |
| MC_UL | PA7 | 5 | 6 | - | GND |
| MC_VH | PC7 | 7 | 8 | - | GND |
| MC_VL | PB0 | 9 | 10 | - | GND |
| MC_WH | PC8 | 11 | 12 | - | GND |
| MC_WL | PB1 | 13 | 14 | PC4 | Bus voltage |
| current A | PC1 | 15 | 16 | - | GND |
| current B | PC2 | 17 | 18 | - | GND |
| current C | PC3 | 19 | 20 | - | GND |
| NTC bypass relay | PG11 | 21 | 22 | - | GND |
| Dissipative brake PWM | PB8 | 23 | 24 | - | GND |
| +5V power | - | 25 | 26 | PC5 | Heatsink temperature |
| PFC sync | PA12 & PA8. See Table 14 for detail | 27 | 28 | - | 3.3V power |
| PFC PWM | PA11 | 29 | 30 | - | GND |
| Encoder A | PA0 | 31 | 32 | - | GND |
| Encoder B | PA1 | 33 | 34 | PA2 | Encoder Index |

3.2 Extension connector CN2

Figure 8. Extension connector CN2 top view

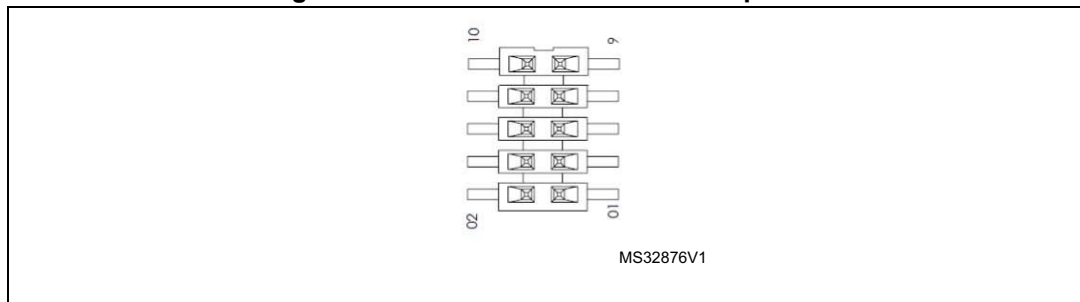


Table 16. Extension connector CN2

| Pin number | Pin name | I2C interface description | SPI interface description |
|------------|----------|---------------------------|---------------------------|
| 1 | PB9 | I2C1_SDA | SPI3_CS |
| 2 | PC11 | - | SPI3_MISO |
| 3 | PB6 | I2C1_SCL | EXT_RESET |
| 4 | PC10 | EXT_RESET | SPI3_SCK |
| 5 | NC | - | - |
| 6 | PC12 | - | SPI3_MOSI |
| 7 | GND | - | - |
| 8 | +5V | - | - |
| 9 | NC | - | - |
| 10 | NC | - | - |

3.3 RF EEPROM daughterboard connector CN3

Figure 9. RF EEPROM daughterboard connector CN3 (front view)

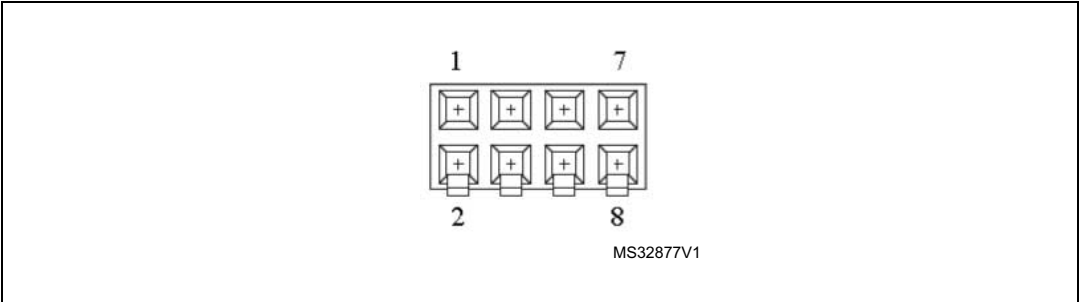


Table 17. RF EEPROM daughterboard connector CN3

| Pin number | Description | Pin number | Description |
|------------|------------------|------------|--------------------------------|
| 1 | I2C1_SDA (PB9) | 5 | +3V3 |
| 2 | SPI3_MISO (PC11) | 6 | Reserved for future use (PC12) |
| 3 | I2C1_SCL (PB6) | 7 | GND |
| 4 | RESET(PC10) | 8 | +5V |

3.4 Analog input connector CN4

Figure 10. Analog input-output connector CN4 (top view)

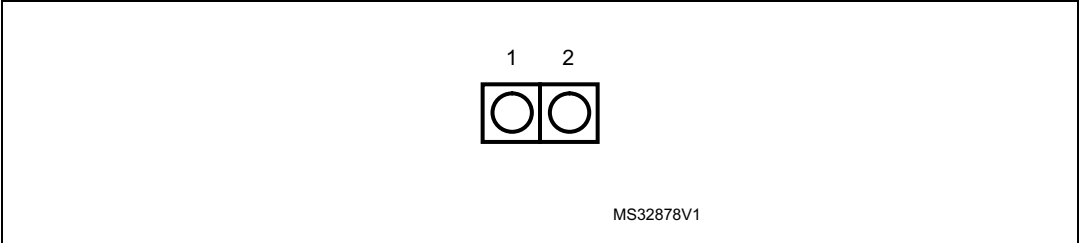


Table 18. Analog input-output connector CN4

| Pin number | Description | Pin number | Description |
|------------|----------------------------|------------|-------------|
| 1 | Analog input-output (PF10) | 2 | GND |

3.5 Camera module connector CN5

Figure 11. Camera module connector CN5 (top view)

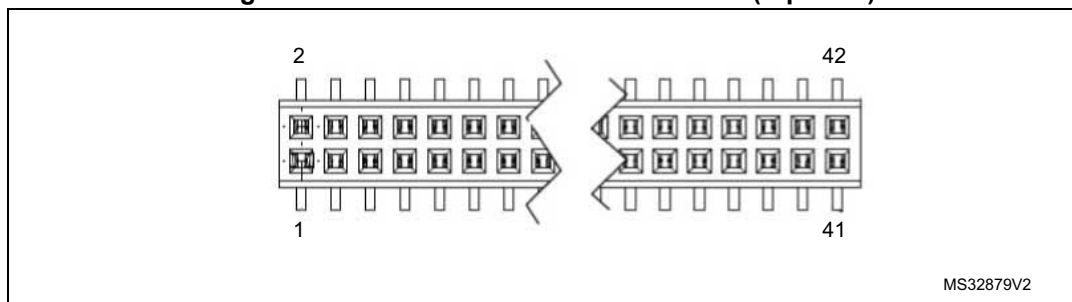


Table 19. Camera module connector CN5

| Pin number | Description | Pin number | Description |
|------------|--------------------|------------|-------------|
| 1 | +1.8 V | 22 | GND |
| 2 | +1.8 V | 23 | D0 (PC6) |
| 3 | GND | 24 | D1 (PC7) |
| 4 | GND | 25 | D2 (PC8) |
| 5 | D10 (PD6) | 26 | D3 (PC9) |
| 6 | D11 (PD2) | 27 | D4 (PC11) |
| 7 | GND | 28 | D5(PD3) |
| 8 | GND | 29 | D6(PB8) |
| 9 | D8(PC10) | 30 | D7(PE6) |
| 10 | D9(PC12) | 31 | HSYNC(PA4) |
| 11 | GND | 32 | VSYNC(PB7) |
| 12 | GND | 33 | PCLK(PA6) |
| 13 | I2C1_SCL(PB6) | 34 | Test point4 |
| 14 | I2C1_SDA(PB9) | 35 | Test point7 |
| 15 | Camera_PLUG(GPIO3) | 36 | Test point6 |
| 16 | GND | 37 | GND |
| 17 | RST IN(GPIO2) | 38 | GND |
| 18 | Test point 3 | 39 | +2.8V |
| 19 | XSDN(GPIO0) | 40 | +2.8V |
| 20 | Camera clock | 41 | GND |
| 21 | GND | 42 | GND |

Note: GPIOx are I/O expander (U16) signals.

3.6 Daughterboard extension connector CN6 and CN7

Two 60-pin male headers CN6 and CN7 can connect a daughterboard or standard wrapping board to the STM32429I-EVAL evaluation board. All GPI/Os are available on them and memory connectors (CN11 & CN12).

The space between these two connectors is defined as a standard which allows common daughterboards to be developed for several evaluations boards.

The standard width between the CN6 pin1 and CN7 pin1 is 2700 mils (68.58 mm).

Each pin on CN6 and CN7 can be used by a daughterboard after it has been disconnected from the corresponding function block on the STM32429I-EVAL evaluation board. Refer to [Table 20](#) and [Table 21](#) for details.

Table 20. Daughterboard extension connector CN6

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|---------------------------------|---|
| 1 | GND | - | - |
| 3 | PH0 | OSC_IN | Remove R20, Close SB5 |
| 5 | RESET# | - | - |
| 7 | PF6 | SAI1_SD_B | - |
| 9 | PF10 | Potentiometer | Remove R28 |
| 11 | PC0 | ULPI_STP | - |
| 13 | PA2 | MII_MDIO/ MC_EnIndex | Remove R211, R215 |
| 15 | PA0 | KEY_WKUP/ MII_CRS/ MC_ENA | Remove R219, R223, SB7 |
| 17 | PF8 | SAI1_SCK_B | - |
| 19 | GND | - | - |
| 21 | PA4 | PAR_HSYNC | Disconnect CN5 |
| 23 | PC2 | MII_TXD2/ MC_CurrentB | Remove R228, R232 |
| 25 | PC4 | MII_RXD0/ MC_BUSVOLTAGE | Remove R235, R239 |
| 27 | PC3 | MII_TX_CLK/ MC_CurrentC | Remove R238, R242 |
| 29 | PB2 | BOOT1 | Remove R5 |
| 31 | PJ3 | LCD_R4 | - |
| 33 | PB10 | ULPI_D3 | - |
| 35 | PB14 | USB_FS2_DM | Remove R302, Disconnect CN15 |
| 37 | PH6 | MII_RXD2 | Remove R47 |
| 39 | GND | - | - |

Table 20. Daughterboard extension connector CN6 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|-------------------------------|---|
| 41 | PB12 | ULPI_D5/ USB_FS2_ID | Remove R108, R260, Disconnect CN15 |
| 43 | PB13 | ULPI_D6/ USB_FS2_VBUS | Remove R112, R264, Disconnect CN15 |
| 45 | PJ9 | LCD_G2 | - |
| 47 | PG7 | LED2 | Remove R191 |
| 49 | D5V | - | - |
| 51 | PG6 | LED1 | Remove R192 |
| 53 | PJ7 | LCD_G0 | - |
| 55 | PJ10 | LCD_G3 | - |
| 57 | PJ8 | LCD_G1 | - |
| 59 | GND | - | - |
| 2 | PI11 | ULPI_DIR | - |
| 4 | PB5 | ULPI_D7 | - |
| 6 | PH1 | OSC_OUT | Remove C23, X2, Close SB6 |
| 8 | PF7 | SAI1_MCLK_B | - |
| 10 | GND | - | - |
| 12 | PF9 | SAI1_FS_B | - |
| 14 | PA1 | MII_RX_CLK/ MC_ENB | Remove R210, R214 |
| 16 | PC1 | MII_MDC/ MC_CurrentA | Remove R218, R222 |
| 18 | PA3 | ULPI_D0 | - |
| 20 | PA6 | MC_EmergencySTOP/ PAR_PCLK | Remove R16, Disconnect CN5 |
| 22 | PA7 | MII_RX_DV/ MC_UL | Remove R225, R227 |
| 24 | PA5 | ULPI_CK | Remove R126 |
| 26 | PB1 | ULPI_D2/ MC_WL | Remove R104, R234 |
| 28 | PH4 | ULPI_NXT | - |
| 30 | GND | - | - |
| 32 | PI14 | LCD_CLK | - |
| 34 | PJ4 | LCD_R5 | - |
| 36 | PB11 | ULPI_D4 | - |
| 38 | PB15 | USB_FS2_DP | Remove R300, Disconnect CN15 |
| 40 | PH7 | MII_RXD3 | Remove R46 |

Table 20. Daughterboard extension connector CN6 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|--------------------------|---|
| 42 | PJ5 | LCD_R6 | - |
| 44 | PJ6 | LCD_R7 | - |
| 46 | PC5 | MII_RXD1/ MC_HEATSINK | Remove R263, R267 |
| 48 | +3V3 | - | - |
| 50 | GND | - | - |
| 52 | PB0 | ULPI_D1/MC_VL | Remove R102, R282 |
| 54 | PJ0 | LCD_R1 | - |
| 56 | PJ2 | LCD_R3 | - |
| 58 | PJ1 | LCD_R2 | - |
| 60 | +5V | - | - |

Table 21. Daughterboard extension connector CN7

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|---|---|
| 1 | GND | - | - |
| 3 | PC15 | OSC32_OUT | Remove R18, Close SB4 |
| 5 | PI15 | LCD_R0 | - |
| 7 | PI12 | LCD_HSYNC | - |
| 9 | PI8 | EXPANDER_INT | Remove R167 |
| 11 | PK6 | LCD_B7 | - |
| 13 | PK4 | LCD_B5 | - |
| 15 | PG12 | LED4 | Remove R189 |
| 17 | PG10 | LED3 | Remove R190 |
| 19 | GND | - | - |
| 21 | PB7 | PAR_VSYNC | Disconnect CN5 |
| 23 | PD3 | PAR_D5 | Disconnect CN5 |
| 25 | PG13 | MII_TXD0 | Remove R233 |
| 27 | PJ12 | LCD_B0 | - |
| 29 | PG14 | MII_TXD1 | Remove R236 |
| 31 | PB8 | MII_TXD3/ MC_DissipativeBrake/ PAR_D6 | Remove R240, R243, Disconnect CN5 |
| 33 | PG11 | MII_TX_EN/ MC_NTC | Remove R246, R249 |
| 35 | PJ11 | LCD_G4 | - |

Table 21. Daughterboard extension connector CN7 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|--------------------------------------|---|
| 37 | PK0 | LCD_G5 | - |
| 39 | GND | - | - |
| 41 | PA11 | CAN1_RX/ USB_FS1_DM/ MC_PFCpwm | Remove R255, R298, Keep JP16 on open |
| 43 | PA9 | RS232_IRDA_TX/ USB_FS1_VBUS | Remove R262, R266 |
| 45 | PB3 | JTDO- SWO/ I2S3_CK | Keep JP4 on open |
| 47 | PD6 | NWAIT/ I2S3_SD/ PAR_D10 | Keep JP5 on open, Disconnect CN5 |
| 49 | D5V | - | - |
| 51 | PC8 | SDCARD_D0/ MC_WH/ PAR_D2 | Remove R280, R281, Disconnect CN5 |
| 53 | PC11 | SDCARD_D3/ SPI3_MISO/ PAR_D4 | Remove R284, Disconnect CN2, CN3, CN5 |
| 55 | PC10 | SDCARD_D2/ SPI3_SCK/ PAR_D8 | Remove R293, Disconnect CN2, CN3, CN5 |
| 57 | PD2 | SDCARD_CMD/ PAR_D11 | Remove R294, Disconnect CN5 |
| 59 | GND | - | - |
| 2 | PI13 | LCD_B1 | - |
| 4 | PC14 | OSC32_IN | Remove R19, Close SB3 |
| 6 | PC13 | TAMPER_KEY | Remove R202 |
| 8 | PK7 | LCD_ENB | Remove R183 |
| 10 | GND | - | - |
| 12 | PK5 | LCD_B6 | - |
| 14 | PB9 | I2C1_SDA | Remove R3, R7, R171 |
| 16 | PK3 | LCD_B4 | - |
| 18 | PB6 | I2C1_SCL | Remove R4, R6, R173 |
| 20 | PJ14 | LCD_B2 | - |
| 22 | PJ15 | LCD_B3 | - |
| 24 | PB4 | JTRST | Remove R127 |
| 26 | PJ13 | LCD_B1 | - |

Table 21. Daughterboard extension connector CN7 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|---|---|
| 28 | PC12 | SDCARD_CK/ SPI3_MOSI/ PAR_D9 | Disconnect CN2, CN3, CN5, CN17 |
| 30 | GND | - | - |
| 32 | PA15 | JTDI | Remove R106 |
| 34 | PK1 | LCD_G6 | - |
| 36 | PA14 | JTCK-SWCLK | Remove R99 |
| 38 | PK2 | LCD_G7 | - |
| 40 | PA13 | JTMS-SWDIO | Remove R90 |
| 42 | PA12 | CAN1_TX/ USB_FS1_DP | Remove R252, R256, R261 |
| 44 | PA10 | RS232_IRDA_RX/ USB_FS1_ID | Remove R117, Keep JP7 on open |
| 46 | PC9 | SDCARD_D1/ PAR_D3 | Remove R265, Disconnect CN5 |
| 48 | +3.3V | - | - |
| 50 | GND | - | - |
| 52 | PA8 | LCD_BL_CTRL/ MII_MCO/ MC_PFCsync1 | Remove R268, R279, R283 |
| 54 | VBUS_FS1 | - | - |
| 56 | PC7 | MC_VH/PAR_D1/ MIC_CK | Disconnect CN1, CN5, Remove R45 |
| 58 | PC6 | MC_UH/PAR_D0/ I2S3_CK | Remove R292, Disconnect CN5, Keep JP4 on open |
| 60 | +5V | - | - |

3.7 RS-232 connector CN8

Figure 12. RS-232 connector (front view)

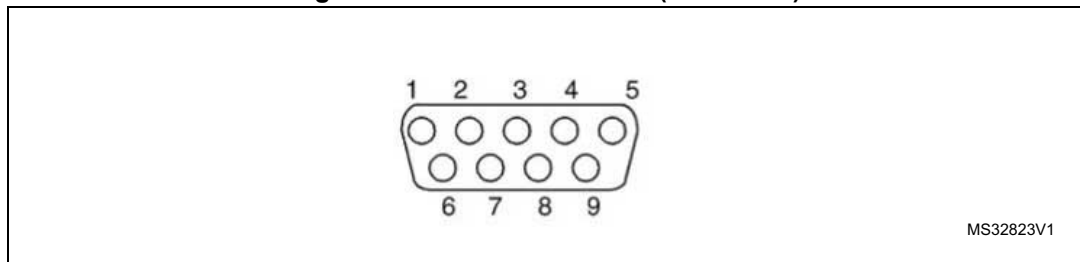


Table 22. RS-232 connector CN8 with ISP support

| Pin number | Description | Pin number | Description |
|------------|-----------------|------------|-------------|
| 1 | NC | 6 | NC |
| 2 | RS232_RX (PA10) | 7 | NC |
| 3 | RS232_TX (PA9) | 8 | NC |
| 4 | NC | 9 | NC |
| 5 | GND | | |

3.8 USB OTG2 HS Micro-AB connector CN9

Figure 13. USB OTG2 HS Micro-AB connector CN9 (front view)

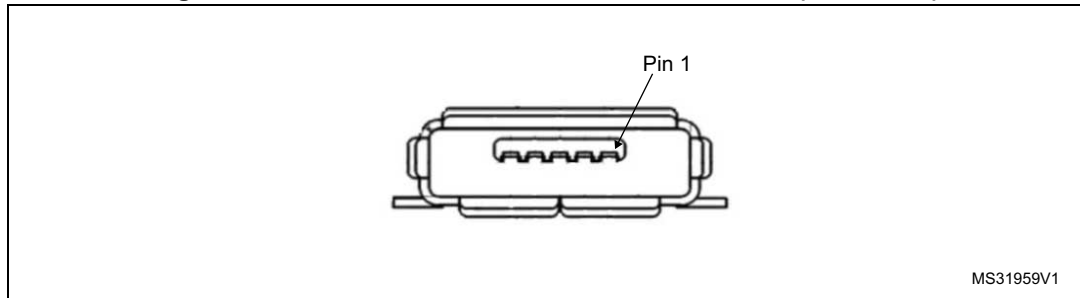


Table 23. USB OTG HS Micro-AB connector CN9

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

3.9 Ethernet RJ45 connector CN10

Figure 14. Ethernet RJ45 connector CN10 (front view)

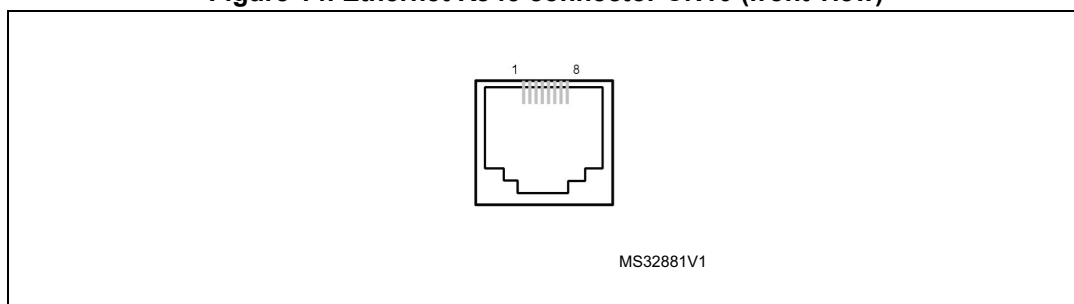


Table 24. RJ45 connector CN10

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1 | TxData+ | 2 | TxData- |
| 3 | RxData+ | 4 | Shield |
| 5 | Shield | 6 | RxData- |
| 7 | Shield | 8 | Shield |

3.10 Memory connectors CN11 and CN12

Two 40-pin male headers CN11 and CN12 can connect to a memory daughterboard. GPIOs (which work as FMC memory signals) not present on CN6 and CN7 are available on these two connectors. The space between these two connectors is defined as a standard which allows common daughterboards to be developed.

The standard width between the CN11 pin1 and CN12 pin1 is 1914 mils (48.62 mm).

For signal assignments refer to [Table 25](#) and [Table 26](#) for detail.

Table 25. Memory connector CN11

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|----------------------|---|
| 1 | PH3 | SDNE0/ MII_COL | Remove SB8 |
| 3 | PF13 | A7 | - |
| 5 | PF12 | A6 | - |
| 7 | PG1 | A11 | - |
| 9 | GND | - | - |
| 11 | PE7 | D4 | - |
| 13 | PE10 | D7 | - |
| 15 | PE12 | D9 | - |
| 17 | PE15 | D12 | - |
| 19 | PE13 | D10 | - |
| 21 | PD11 | A16 | - |
| 23 | PD12 | A17 | - |
| 25 | PG5 | A15/ BA1 | - |
| 27 | PH11 | D19 | - |
| 29 | GND | - | - |
| 31 | PD13 | A18 | - |
| 33 | PG2 | A12 | - |
| 35 | PD8 | D13 | - |
| 37 | PD9 | D14 | - |
| 39 | PD14 | D0 | - |
| 2 | PH5 | SDNWE | - |
| 4 | PF14 | A8 | - |
| 6 | PG0 | A10 | - |
| 8 | PF11 | SDNRAS | - |
| 10 | GND | - | - |
| 12 | PE9 | D6 | - |
| 14 | PE8 | D5 | - |
| 16 | PE11 | D8 | - |
| 18 | PF15 | A9 | - |
| 20 | PE14 | D11 | - |

Table 25. Memory connector CN11 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|-----------------------|---|
| 22 | PH8 | D16 | - |
| 24 | PH10 | D18 | - |
| 26 | PH9 | D17 | - |
| 28 | PG4 | A14/ BA0 | - |
| 30 | GND | - | - |
| 32 | PH12 | D20 | - |
| 34 | PG3 | A13 | - |
| 36 | PD10 | D15 | - |
| 38 | PD15 | D1 | - |
| 40 | PG8 | SDCLK/ MII_PPS_OUT | - |

Table 26. Memory connector CN12

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|--|---|
| 1 | PF5 | A5 | - |
| 3 | PF4 | A4 | - |
| 5 | PF3 | A3 | - |
| 7 | PE6 | A22/ SAI1_SD_A/ TRACED3/ PAR_D7 | Remove R114, R120, R128 |
| 9 | GND | - | - |
| 11 | PE4 | A20/ TRACED1 | Remove R33 |
| 13 | PE3 | A19/ TRACED0 | Remove R39 |
| 15 | PI5 | NBL3 | - |
| 17 | PI4 | NBL2 | - |
| 19 | PG15 | SDNCAS | - |
| 21 | PI10 | D31/ MII_RX_ER | Remove R43 |
| 23 | PE1 | NBL1 | - |
| 25 | PE0 | NBL0 | - |
| 27 | PG9 | NE2 | - |
| 29 | GND | - | - |

Table 26. Memory connector CN12 (continued)

| Pin | Description | Alternative function | How to disconnect with function block on STM32429I-EVAL board |
|-----|-------------|----------------------|---|
| 31 | PD0 | D2 | - |
| 33 | PI2 | D26 | - |
| 35 | PI1 | D25 | - |
| 37 | PI0 | D24 | - |
| 39 | PH13 | D21 | - |
| 2 | PH2 | SDCKE0 | - |
| 4 | PE5 | A21/ TRACED2 | Remove R23 |
| 6 | PD6 | NWAIT / I2S3_SD | Set JP5 on pin1-2 |
| 8 | PF2 | A2 | - |
| 10 | GND | - | - |
| 12 | PF1 | A1 | - |
| 14 | PF0 | A0 | - |
| 16 | PE2 | A23/ TRACECLK | Remove R38 |
| 18 | PI7 | D29 | - |
| 20 | PI9 | D30 | - |
| 22 | PI6 | D28 | - |
| 24 | PD7 | NE1 | - |
| 26 | PD5 | NWE | - |
| 28 | PD4 | NOE | - |
| 30 | GND | - | - |
| 32 | PD1 | D3 | - |
| 34 | PI3 | D27 | - |
| 36 | PH15 | D23 | - |
| 38 | PH14 | D22 | - |
| 40 | +3.3V | - | - |

3.11 ETM trace debugging connector CN13

Figure 15. ETM trace debugging connector CN13 (top view)

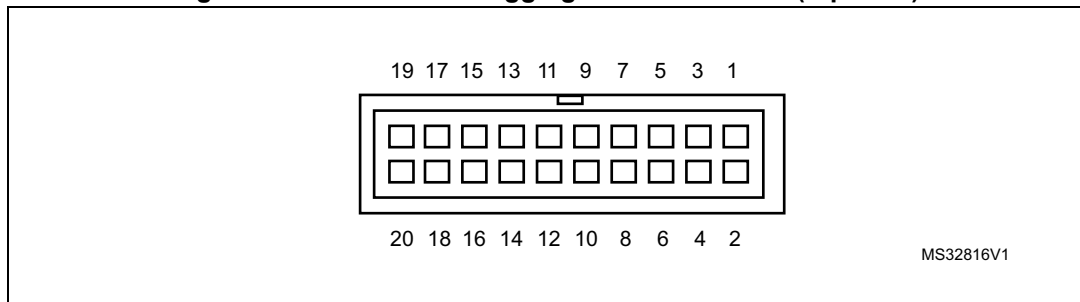


Table 27. ETM trace debugging connector CN13

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|--------------------------|
| 1 | +3.3V | 2 | TMS/PA13 |
| 3 | GND | 4 | TCK/PA14 |
| 5 | GND | 6 | TDO/PB3 |
| 7 | KEY | 8 | TDI/PA15 |
| 9 | GND | 10 | RESET# |
| 11 | GND | 12 | TraceCLK/PE2 |
| 13 | GND | 14 | TraceD0/PE3 or SWO/PB3 |
| 15 | GND | 16 | TraceD1/PE4 or nTRST/PB4 |
| 17 | GND | 18 | TraceD2/PE5 |
| 19 | GND | 20 | TraceD3/PE6 |

3.12 USB OTG1 FS Micro-AB connector CN14

Figure 16. USB OTG1 FS Micro-AB connector CN14 (front view)

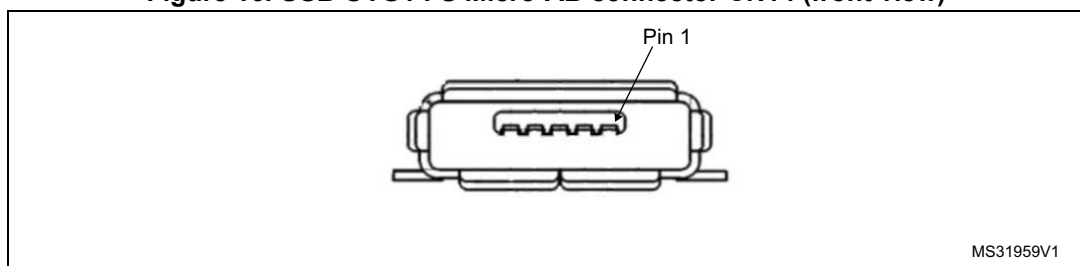


Table 28. USB OTG1 FS Micro-AB connector CN14

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1 | VBUS (PA9) | 4 | ID (PA10) |
| 2 | D- (PA11) | 5 | GND |
| 3 | D+ (PA12) | | |

3.13 USB OTG2 FS Micro-AB connector CN15

Figure 17. USB OTG2 FS Micro-AB connector CN15 (front view)

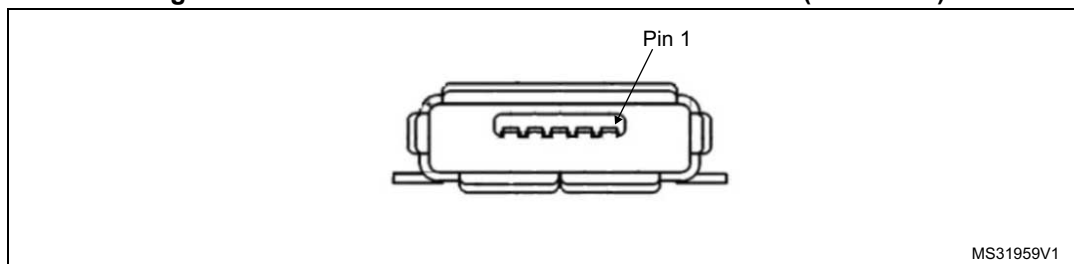


Table 29. USB OTG2 FS Micro-AB connector CN15

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1 | VBUS (PB13) | 4 | ID (PB12) |
| 2 | D- (PB14) | 5 | GND |
| 3 | D+ (PB15) | | |

3.14 JTAG/SWD connector CN16

Figure 18. JTAG/SWD debugging connector CN16 (top view)

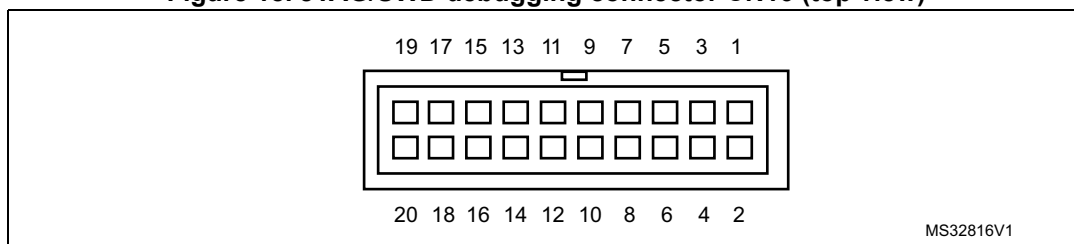


Table 30. JTAG/SWD debugging connector CN15

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1 | +3.3V | 2 | +3.3V |
| 3 | PB4 | 4 | GND |
| 5 | PA15 | 6 | GND |
| 7 | PA13 | 8 | GND |
| 9 | PA14 | 10 | GND |
| 11 | RTCK | 12 | GND |
| 13 | PB3 | 14 | GND |
| 15 | RESET# | 16 | GND |
| 17 | DBGREQ | 18 | GND |
| 19 | DBGACK | 20 | GND |

3.15 MicroSD connector CN17

Figure 19. MicroSD connector CN17 (top view)

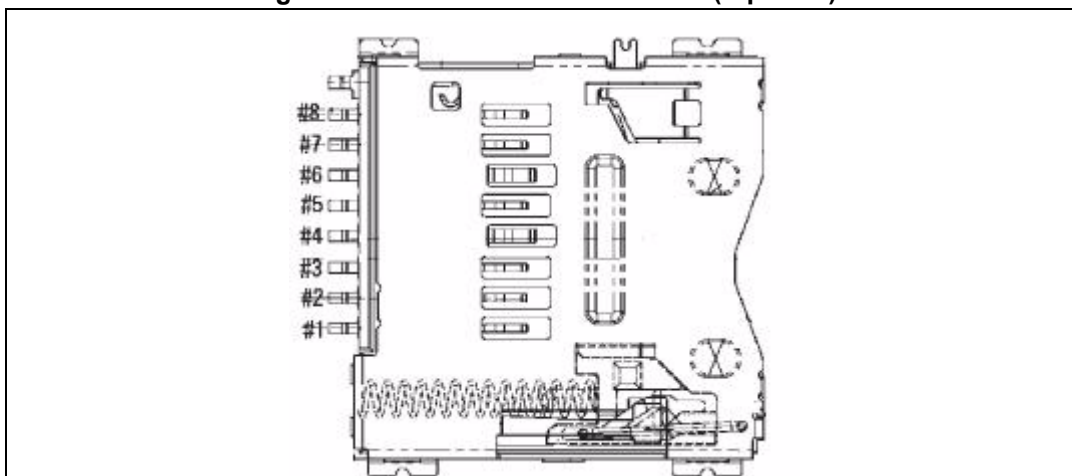


Table 31. MicroSD connector CN17

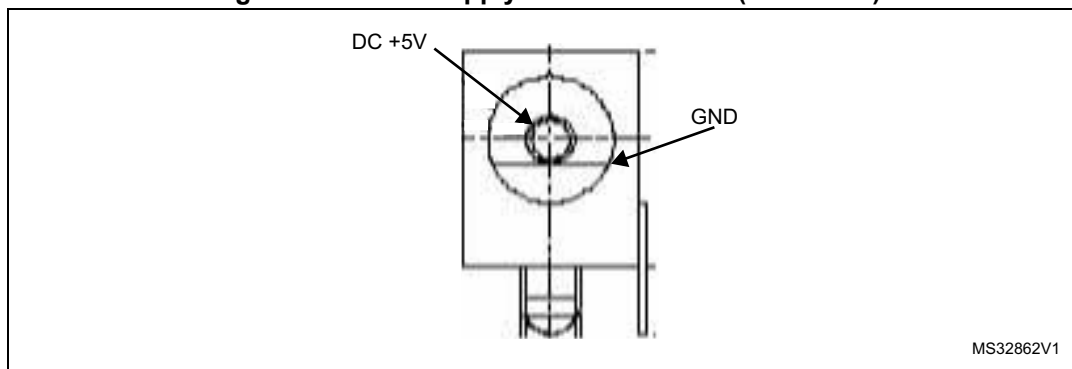
| Pin number | Description | Pin number | Description |
|------------|----------------|------------|-----------------------------|
| 1 | SDIO_D2(PC10) | 6 | Vss/GND |
| 2 | SDIO_D3(PC11) | 7 | SDIO_D0(PC8) |
| 3 | SDIO_CMD(PD2) | 8 | SDIO_D1(PC9) |
| 4 | +3.3V | 9 | GND |
| 5 | SDIO_CLK(PC12) | 10 | MicroSDcard_detect (GPIO15) |

Note: GPIOx are I/O expander (U16) signals.

3.16 Power connector CN18

The STM32429I-EVAL evaluation board can be powered from a DC 5 V power supply via the external power supply jack (CN18) shown in [Figure 20](#). The central pin of CN18 must be positive.

Figure 20. Power supply connector CN18 (front view)



MS32862V1

3.17 ST-LINK/V2 programming connector CN19

The connector CN19 is used only for embedded ST-LINK/V2 programming during board manufacture. It is not populated by default and not for end-user usage.

3.18 TFT LCD connector CN20

A TFT color LCD board is mounted on CN20. Refer to [Section 2.18](#) for detail.

3.19 ST-LINK/V2 USB Type B connector CN21

USB connector CN21 connects the embedded ST-LINK/V2 to PC for board debugging.

Figure 21. USB type B connector CN21 (front view)

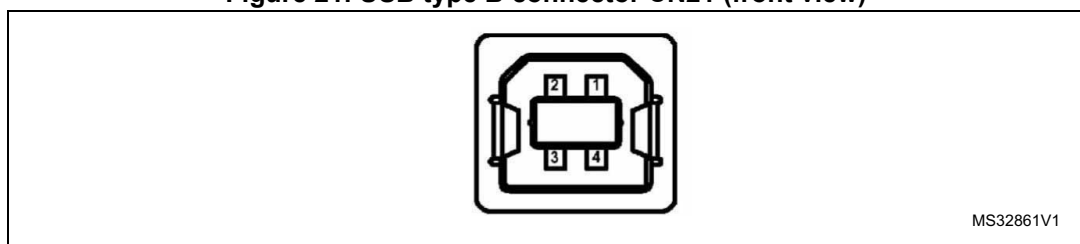


Table 32. USB type B connector CN21

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

3.20 CAN D-type 9-pin male connector CN22

Figure 22. CAN D-type 9-pin male connector CN22 (front view)

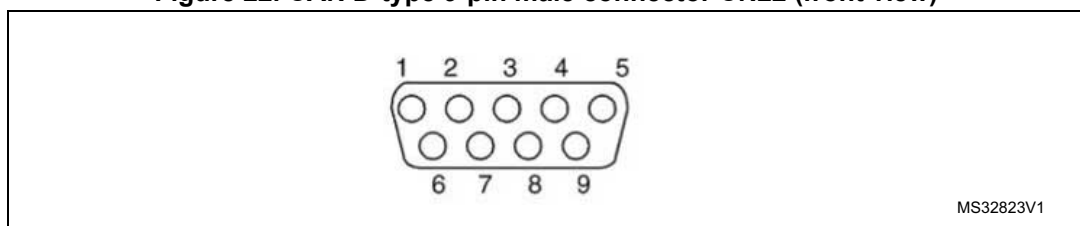


Table 33. CAN D-type 9-pin male connector CN22

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

3.21 Audio jack CN23

A 3.5 mm stereo audio jack CN23 is available on the STM32429I-EVAL evaluation board to support a headset (headphone & microphone integrated).

3.22 Audio terminal CN24

Figure 23. Audio terminal CN24 (front view)

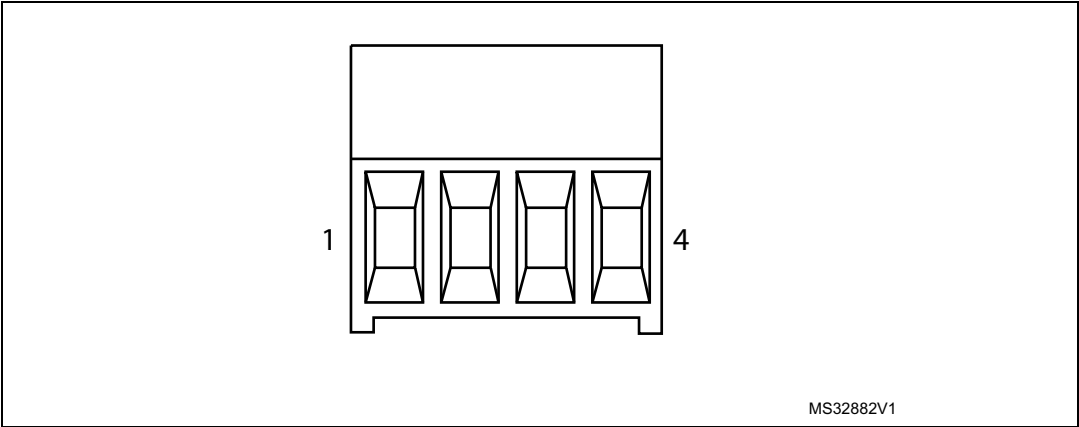


Table 34. Audio terminal CN24

| Pin number | Description | Pin number | Description |
|------------|-------------|------------|-------------|
| 1 | SPKOUT_L_N | 3 | SPKOUT_R_N |
| 2 | SPKOUT_L_P | 4 | SPKOUT_R_P |

3.23 ST-LINK/V2 programming Tag-connector CN25

The connector CN25 is used only by the embedded ST-LINK/V2 programming during board manufacture with Tag-connector (TC2050-IDC).



Figure 25. MCU

Figure 26. Power

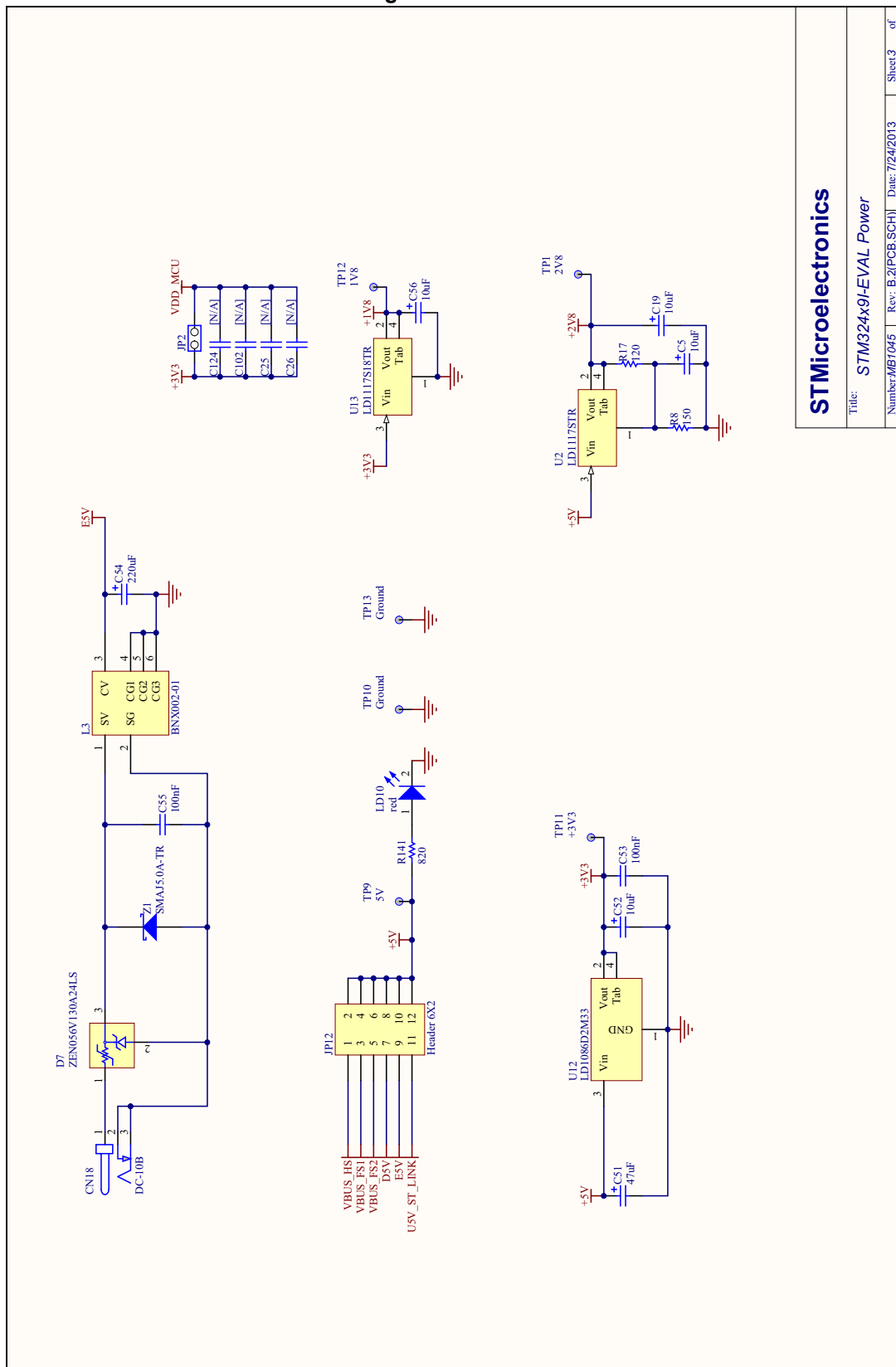


Figure 27. SRAM, Flash and SDRAM

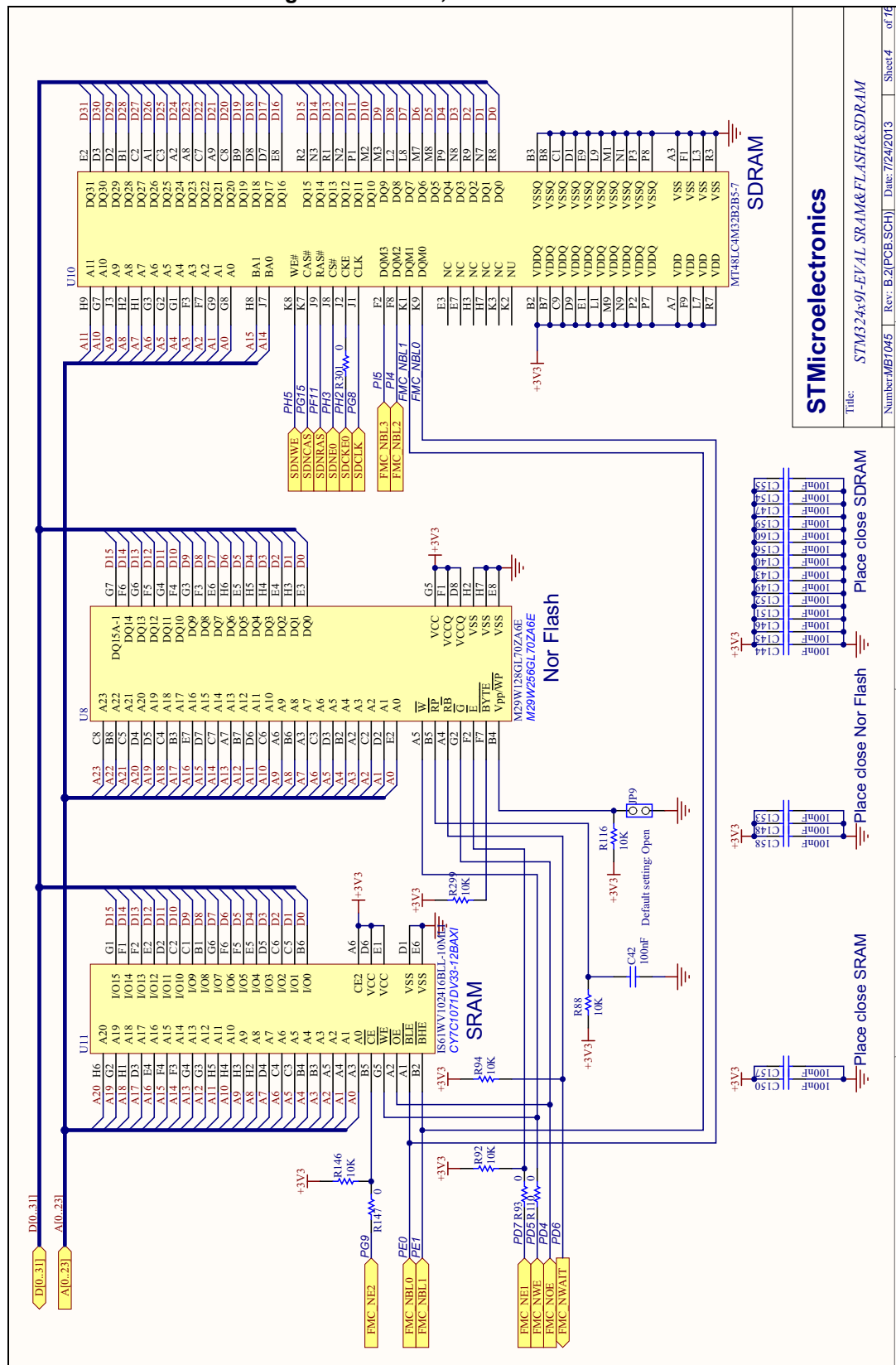
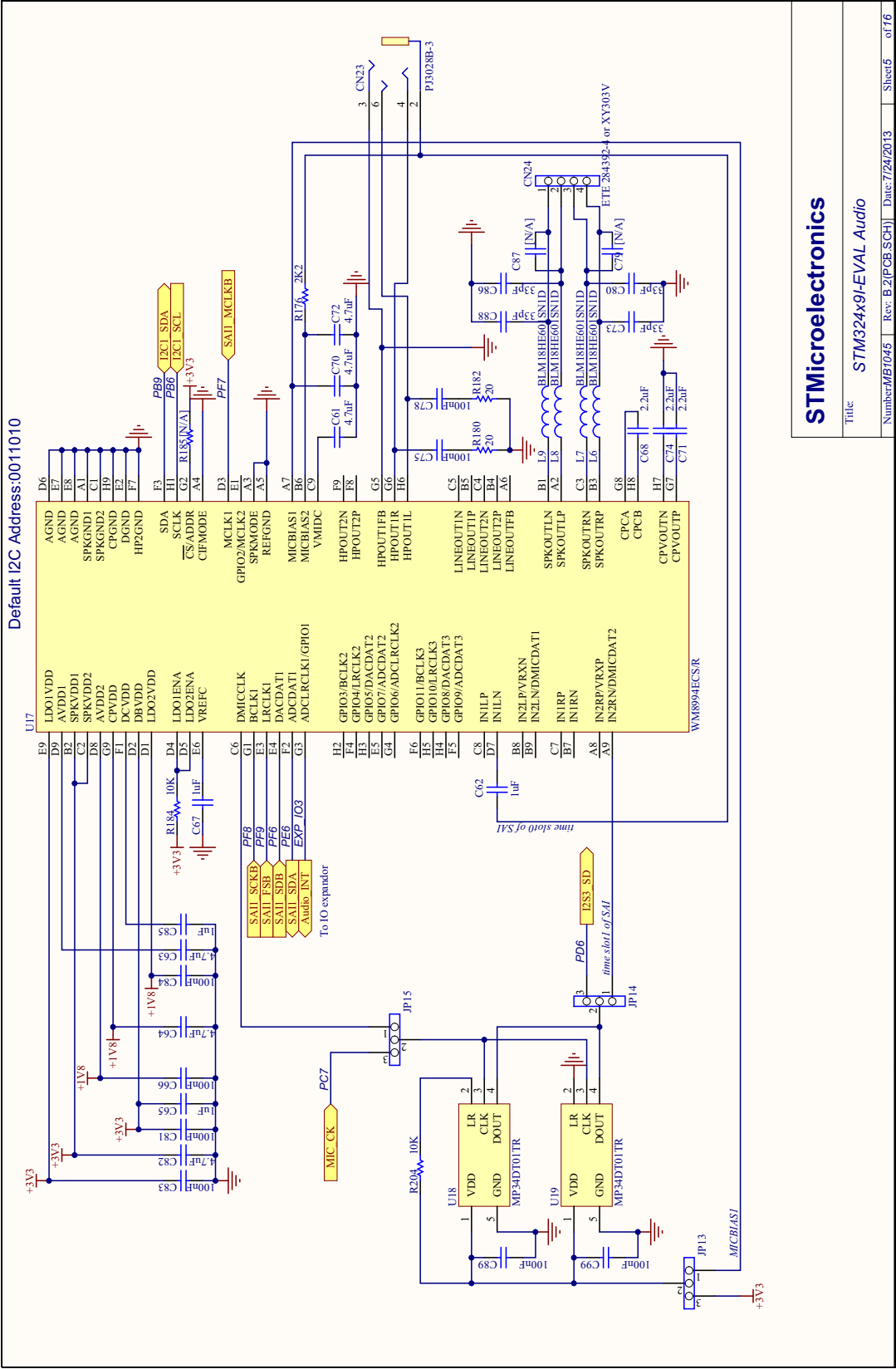


Figure 28. Audio



STMicroelectronics

Title: STM324x9-LEVAL Audio

Number: MB1045 | Rev: B.2 (PCB SCH) | Date: 7/24/2013 | Sheet 5 of 16



Figure 29. LCD, camera and connectors

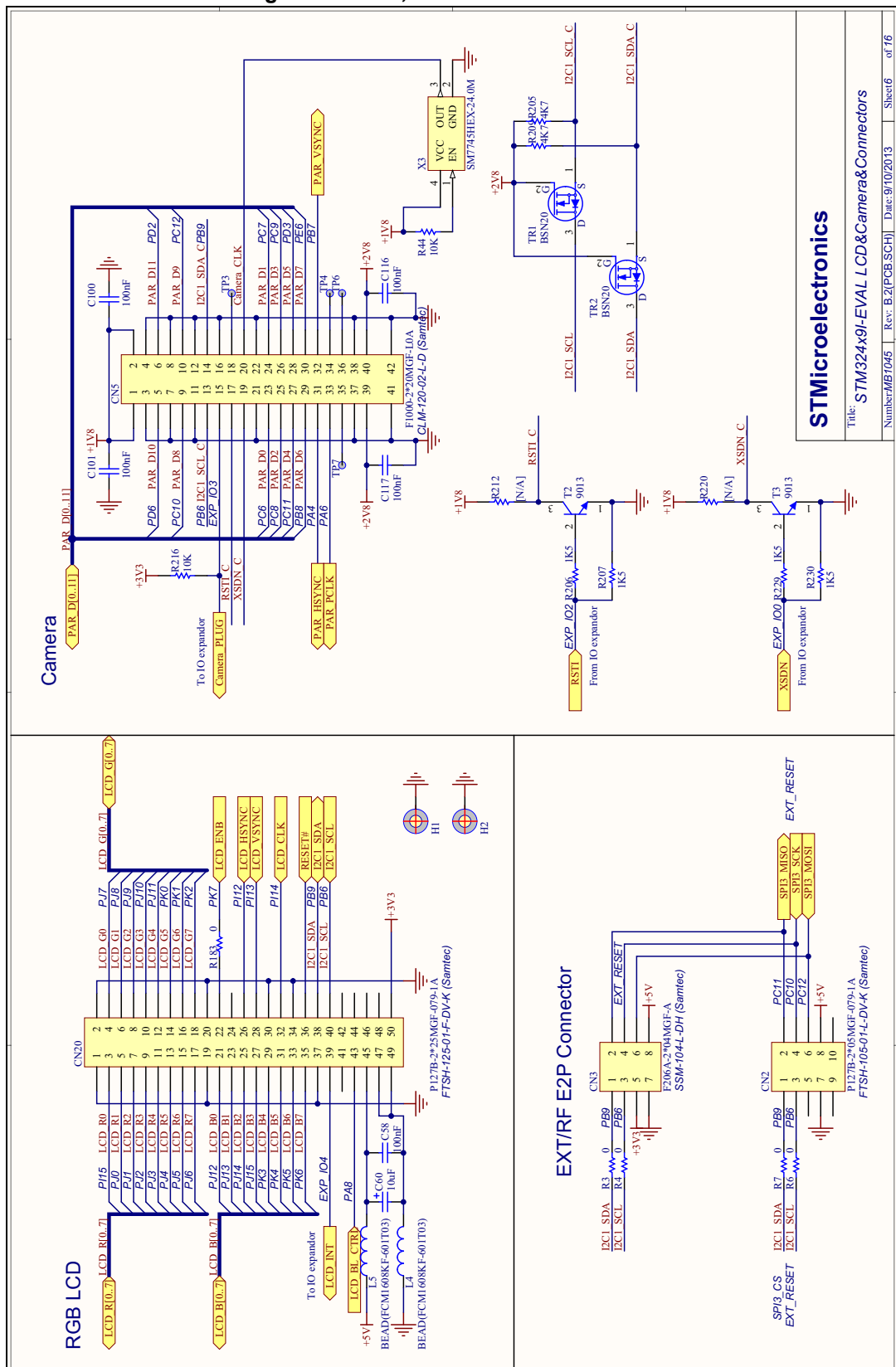


Figure 30. Ethernet

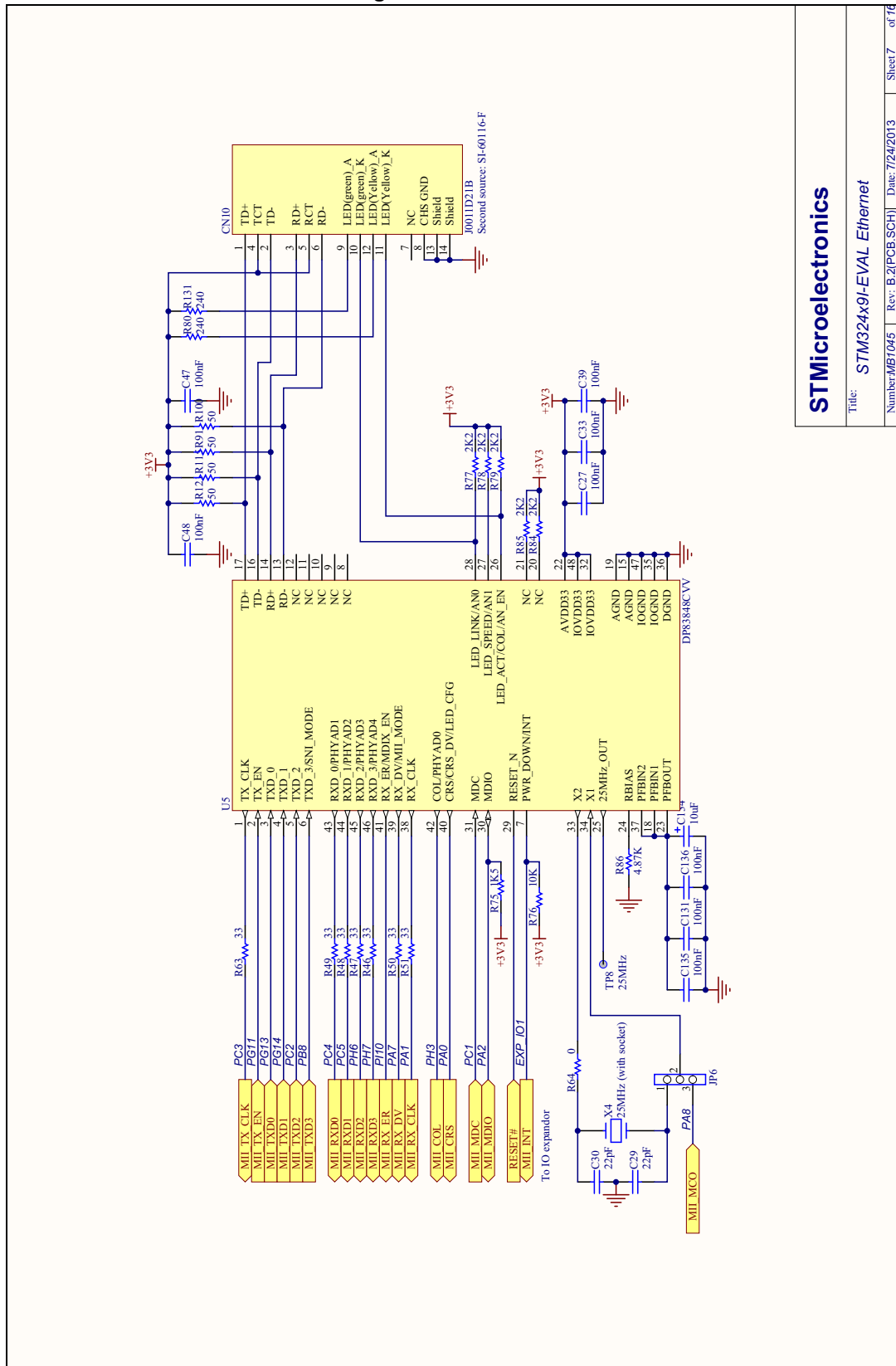


Figure 31. USB OTG HS

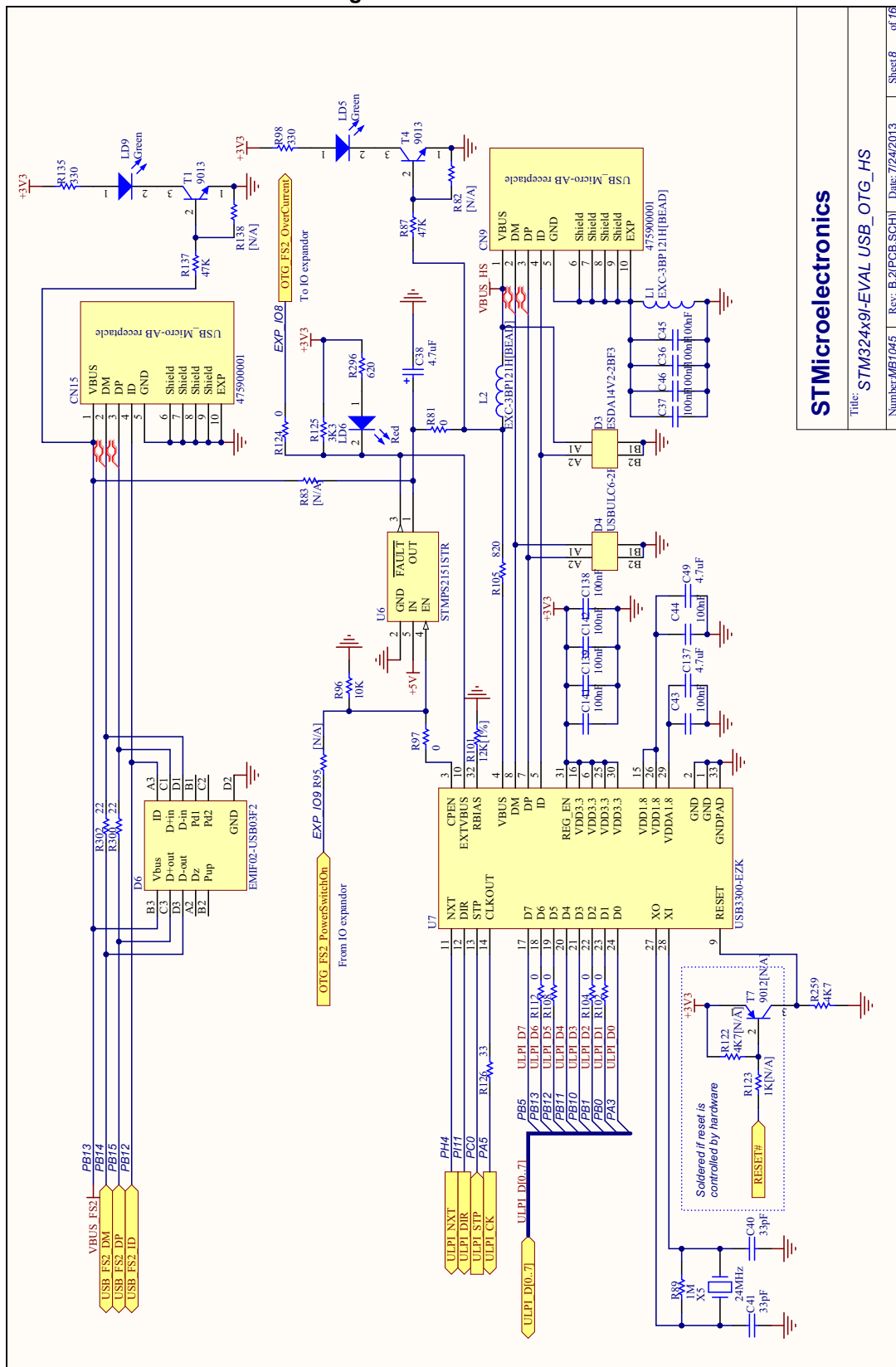


Figure 32. USB OTG FS

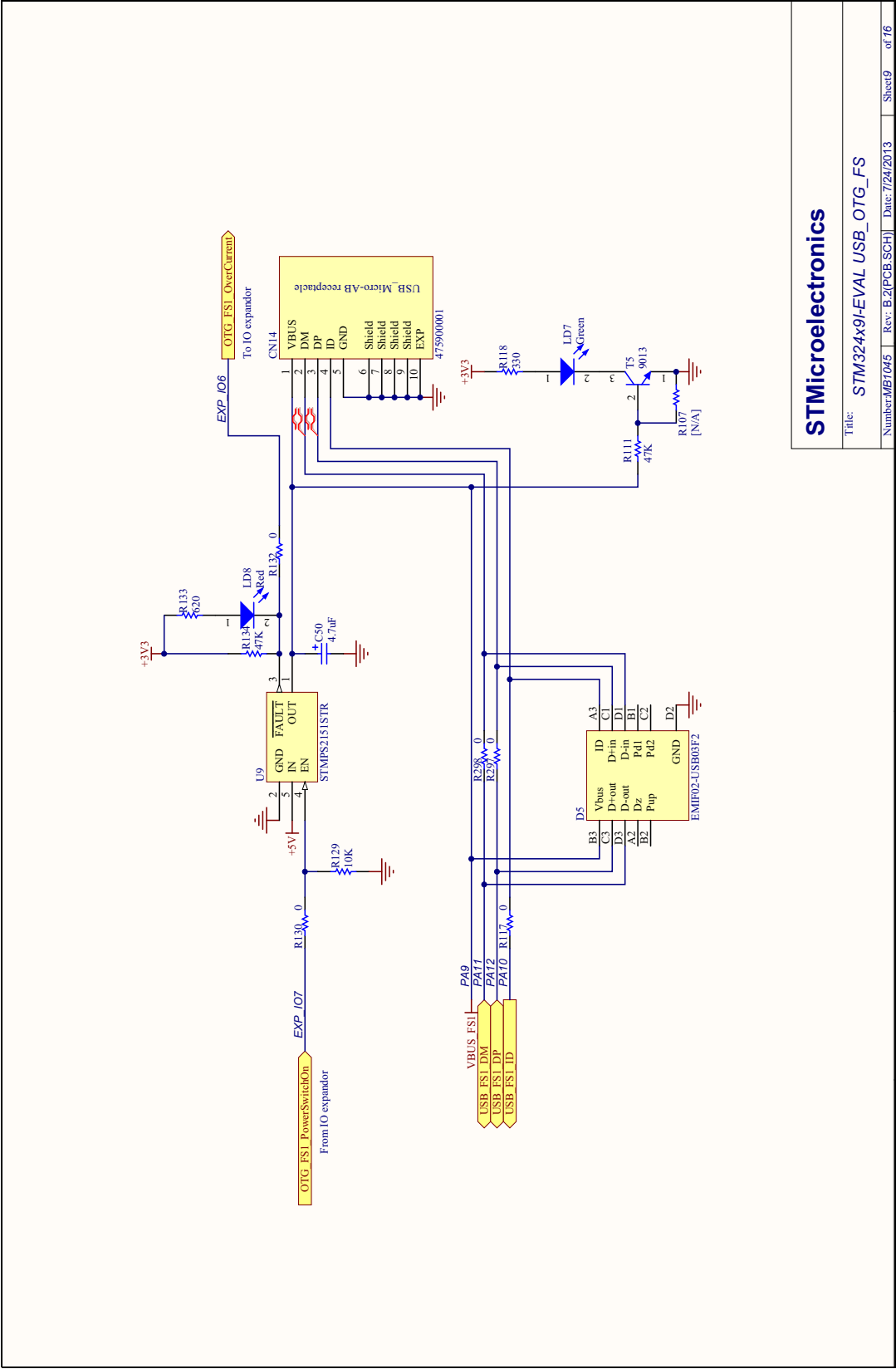
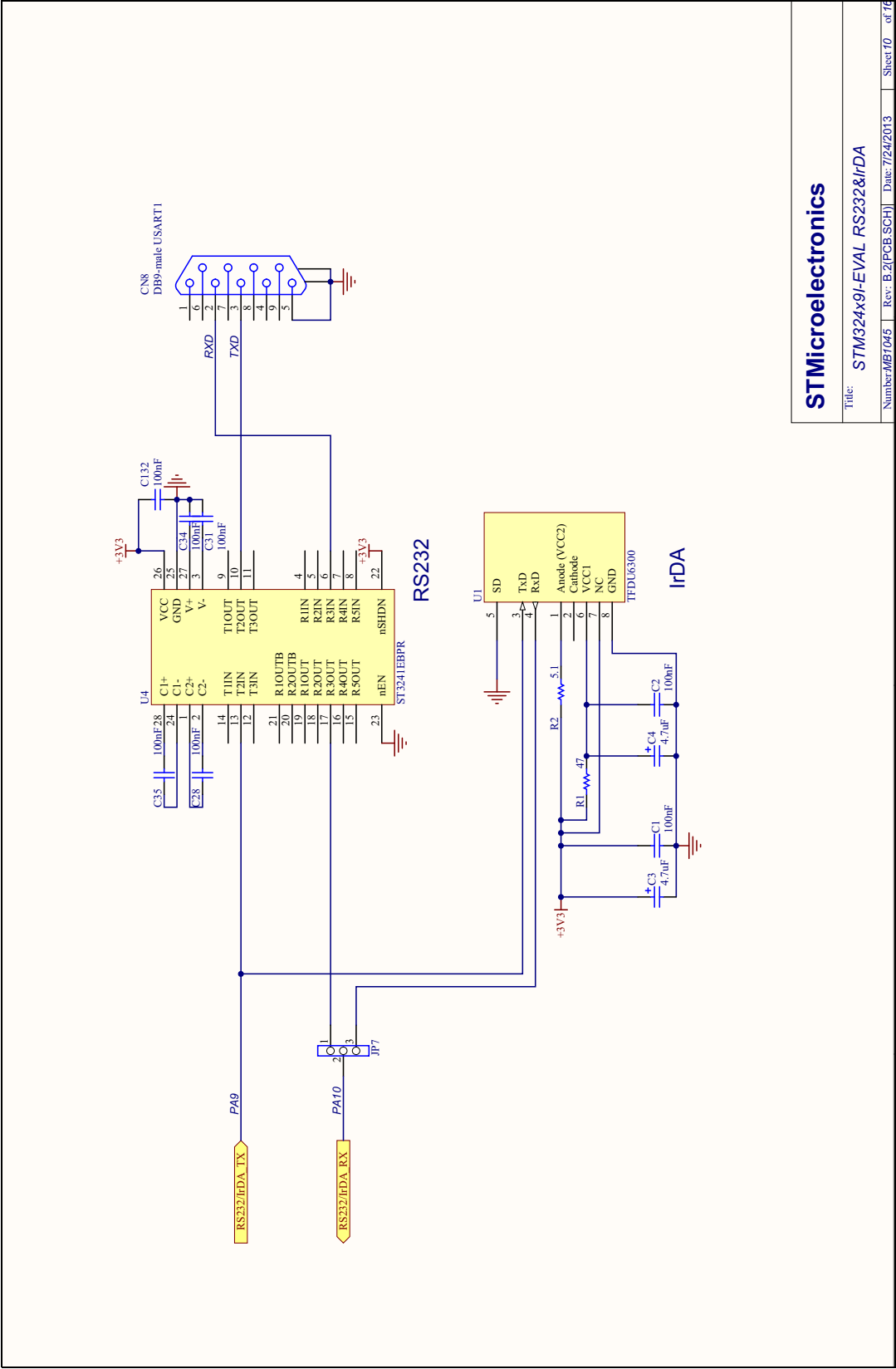


Figure 33. RS-232 and IrDA

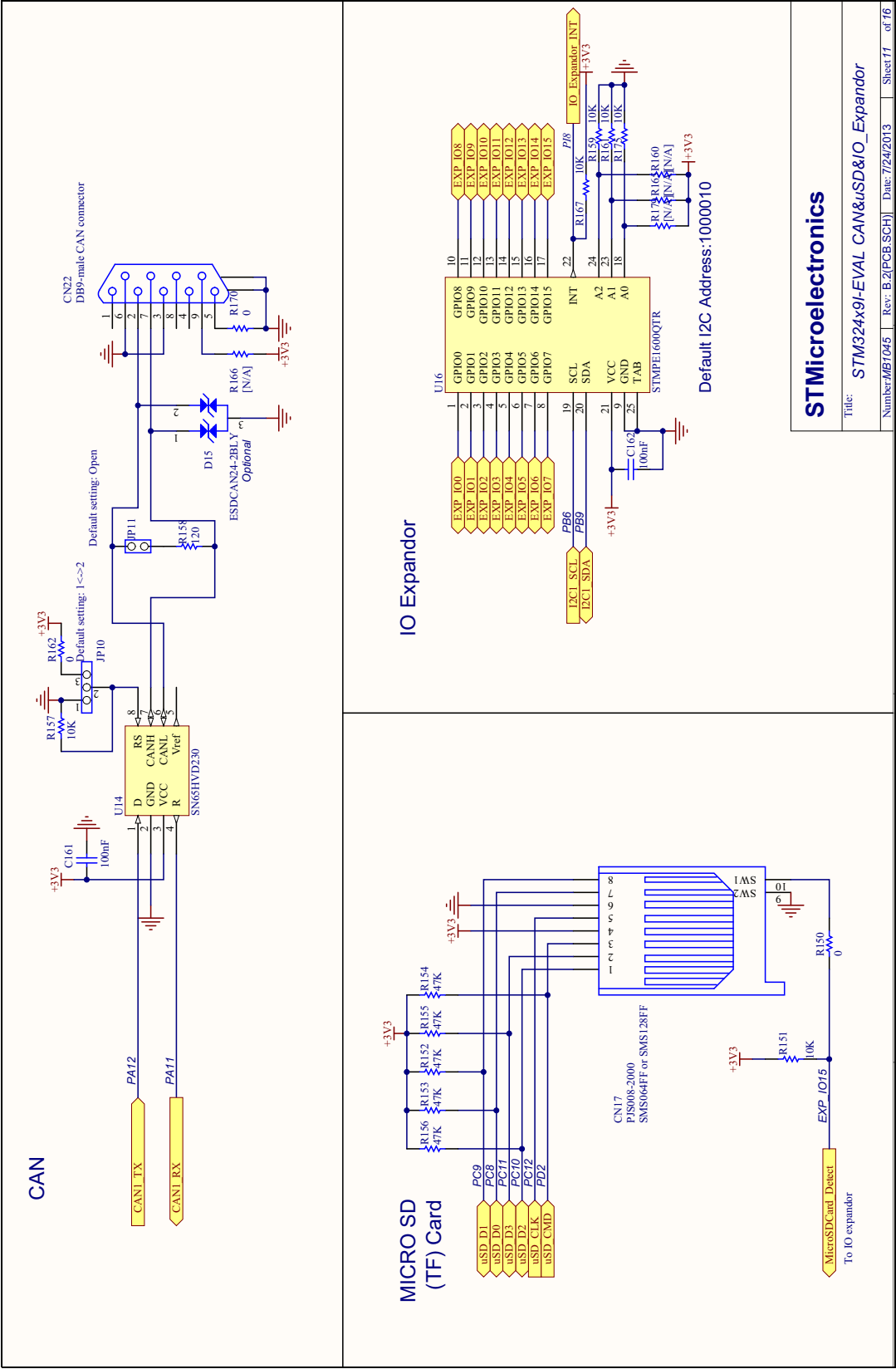


STMicroelectronics

Title: STM324x9I-EVAL RS232&IrDA

Number: MB1045 Rev: B.2(PCB.SCH) Date: 7/24/2013 Sheet 10 of 19

Figure 34. CAN, MicroSD Card and IO expander



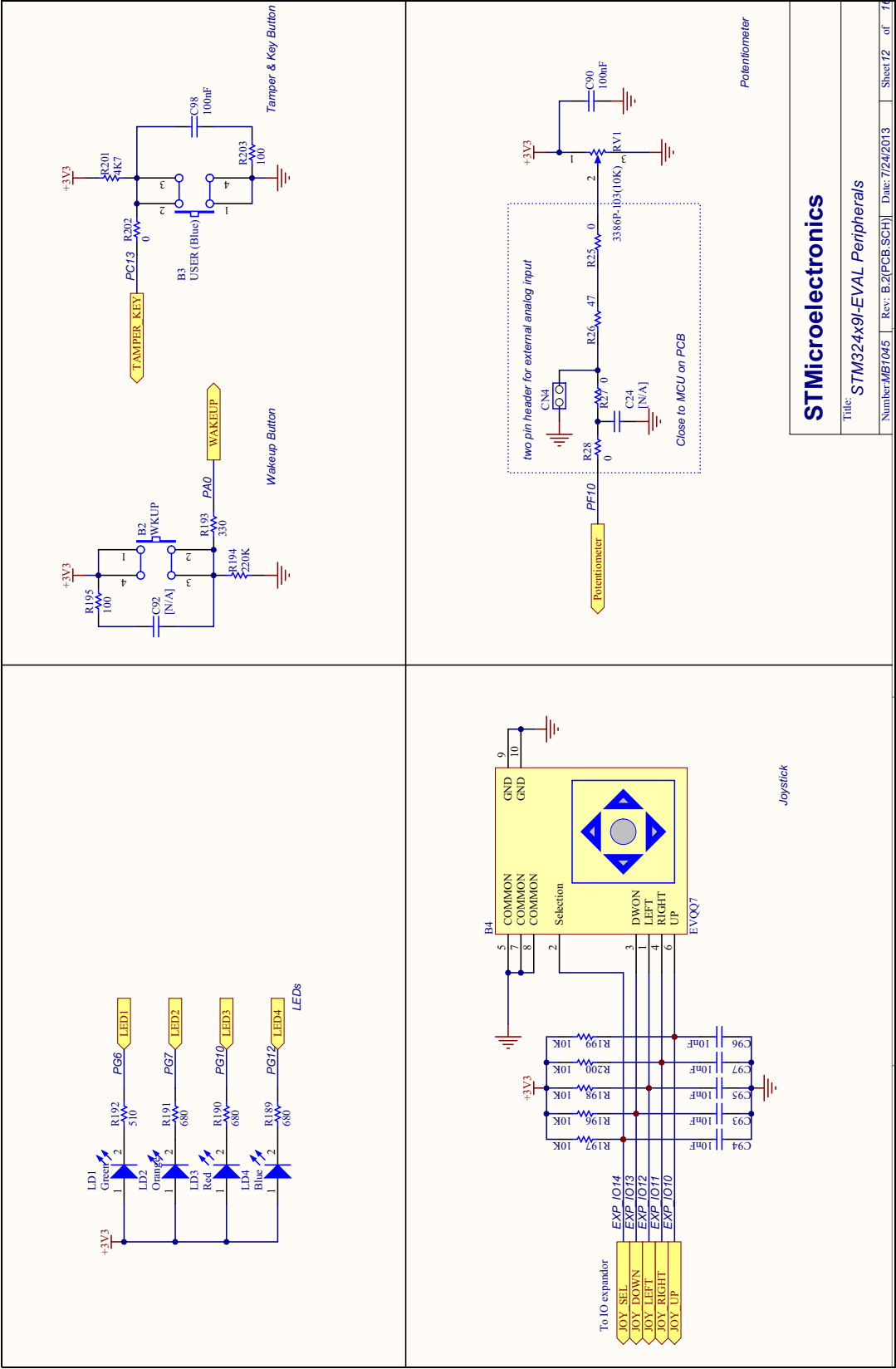
STMicroelectronics

Title: STM324x9/EVAL CAN&USD&IO_Expander

Number: MB1045 Rev: B.2 (PCB.SCH) Date: 7/24/2013 Sheet 11 of 16



Figure 35. Peripherals



STMicroelectronics

Title: STM324x9I-EVAL Peripherals

Number: MB1045 Rev: B.2 (PCB SCH) Date: 7/24/2013 Sheet 12 of 14

Figure 36. Motor control

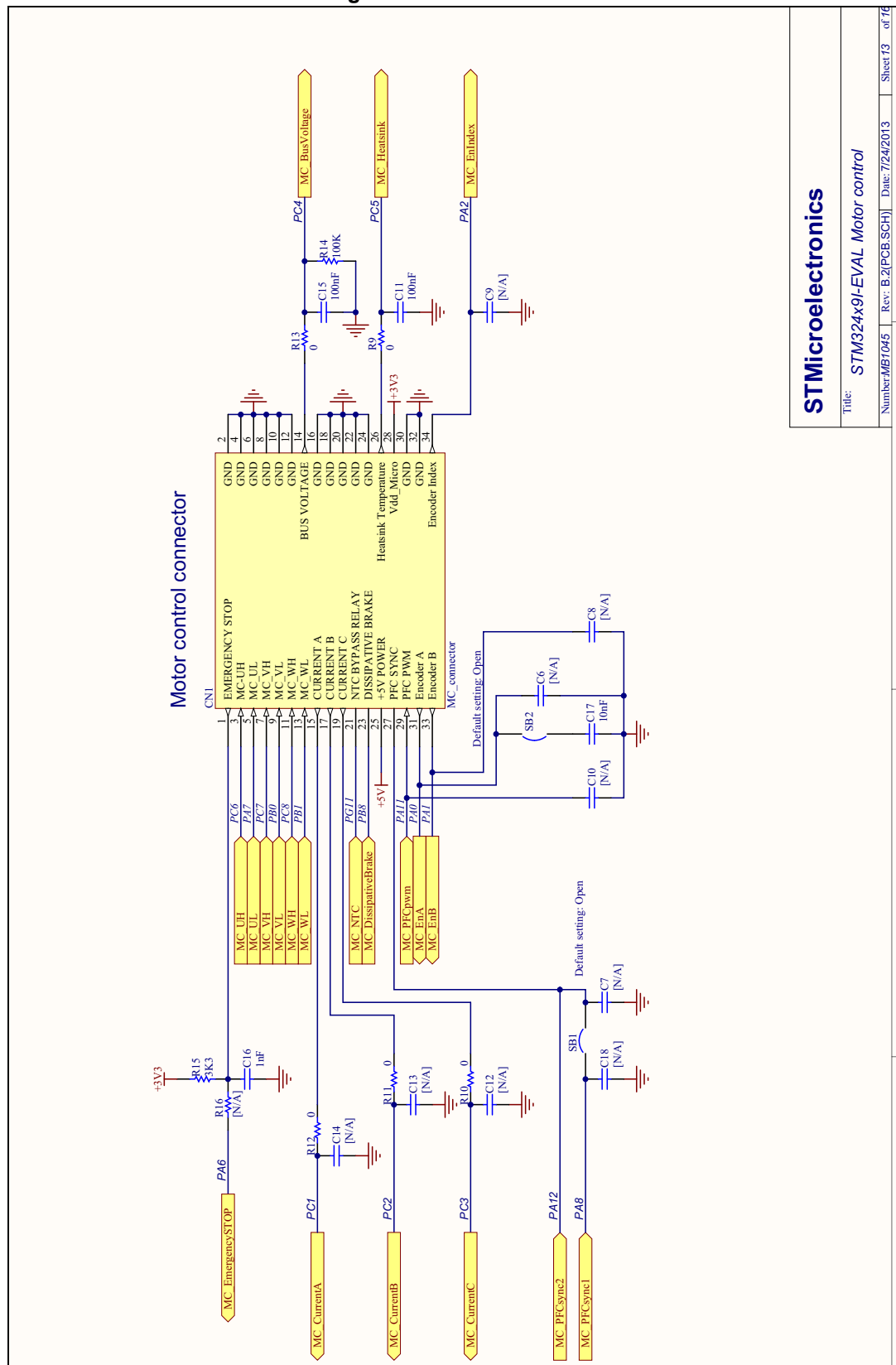
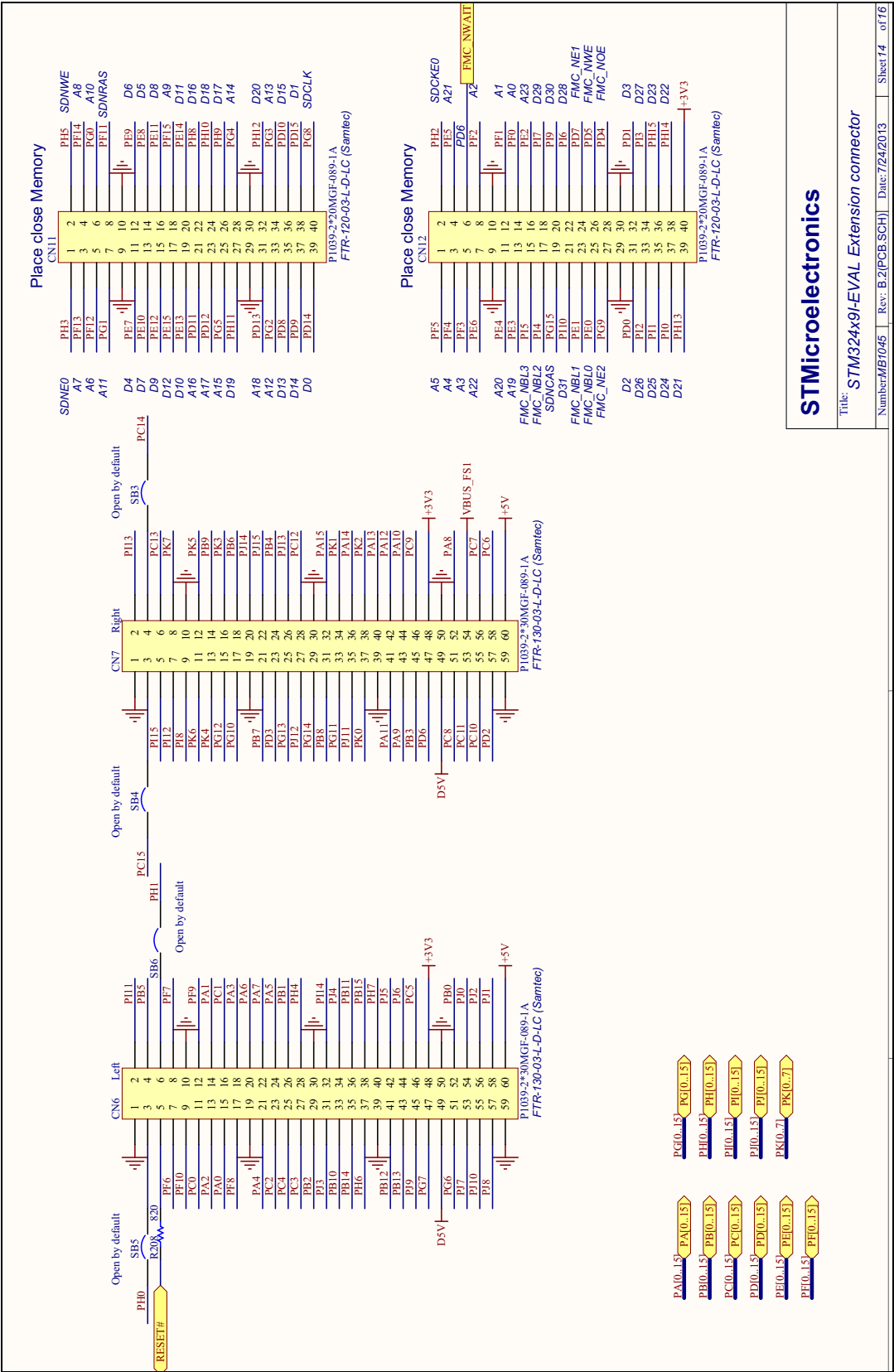


Figure 37. Extension connector



STMicroelectronics

Title: STM324x9I-EVAL Extension connector

Number/Rev: B.2(PCB.SCH) | Date: 7/24/2013 | Sheet 14 of 16



Figure 38. ST-LINK/V2

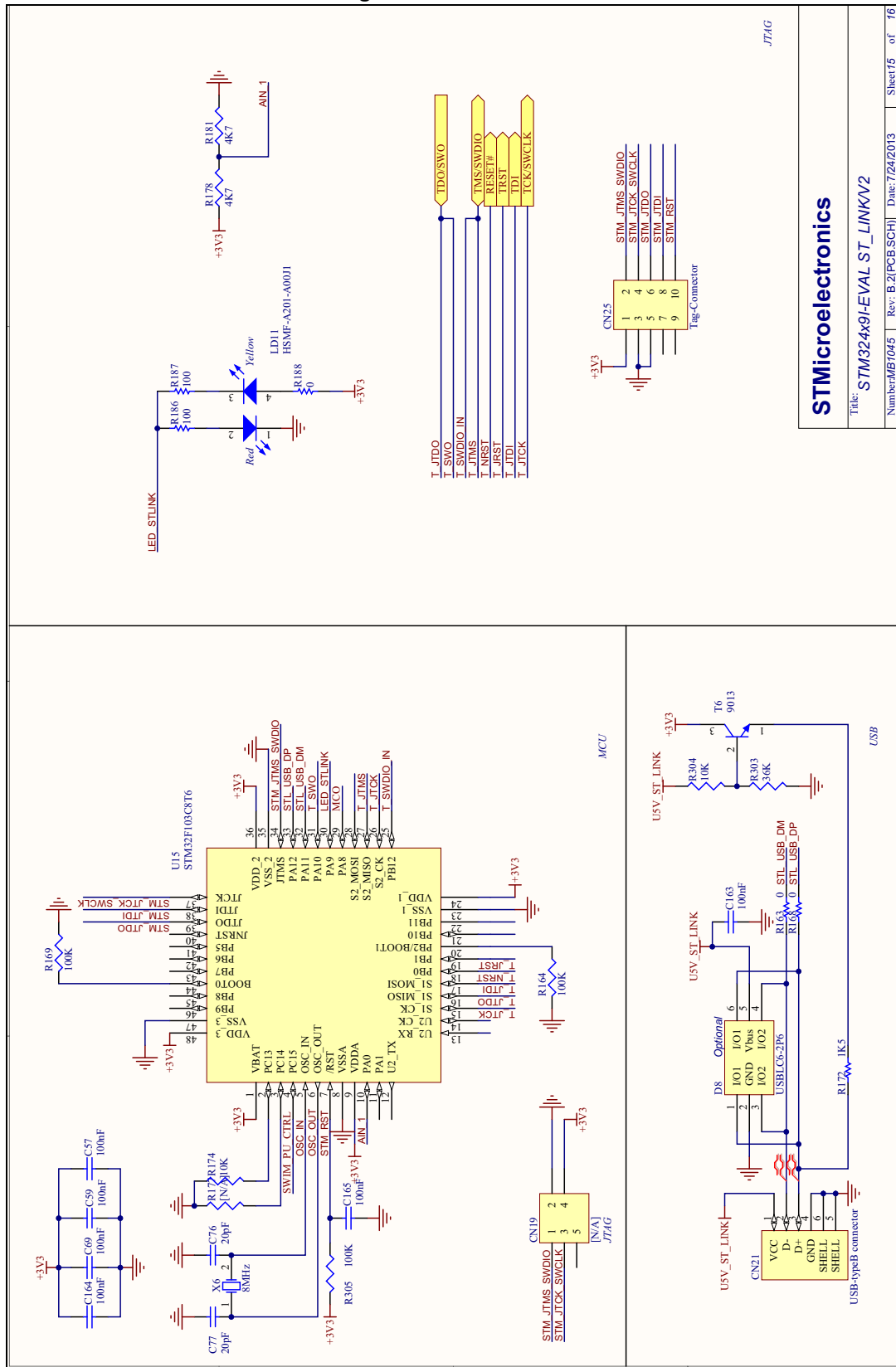
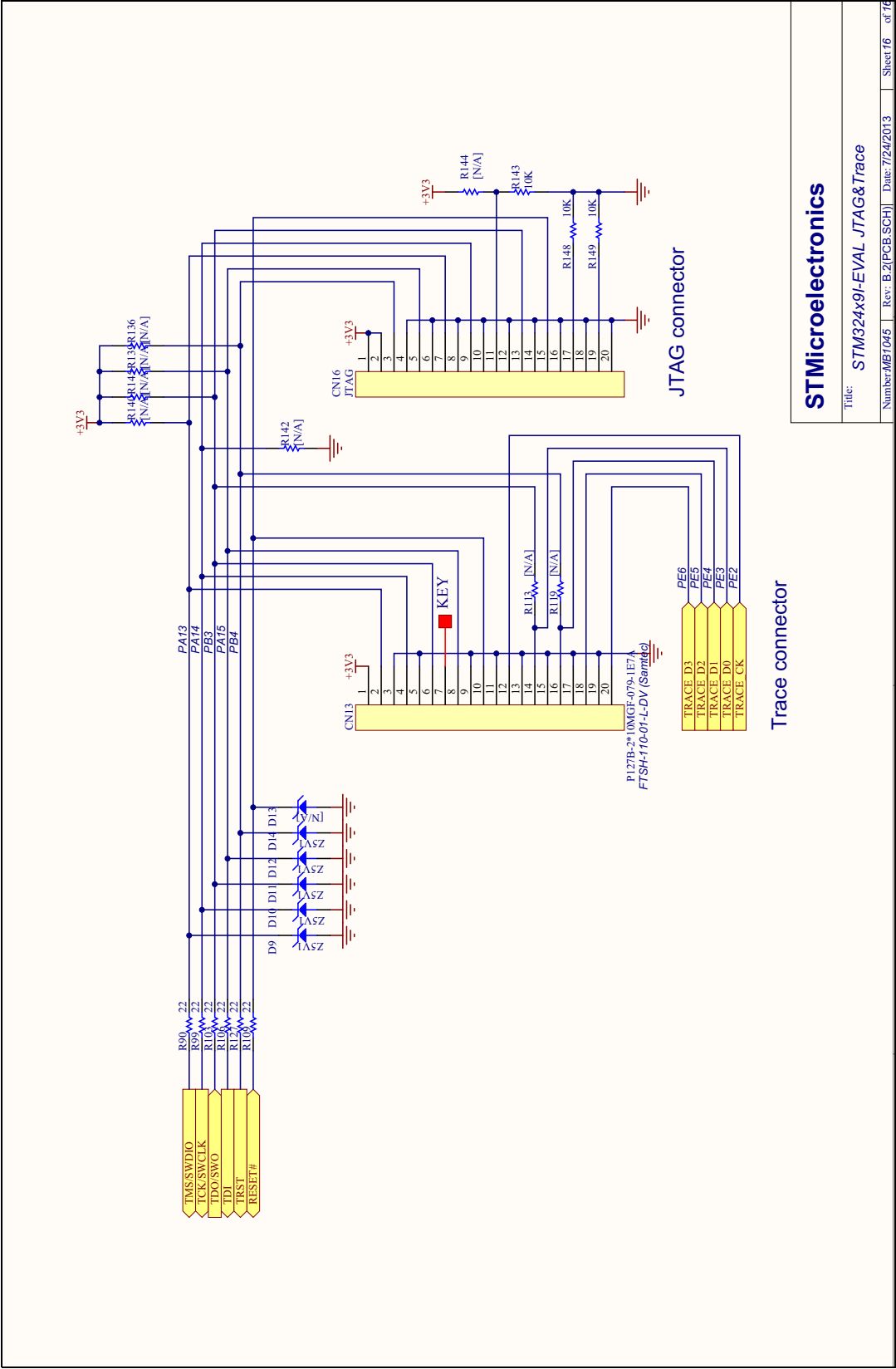


Figure 39. JTAG and trace



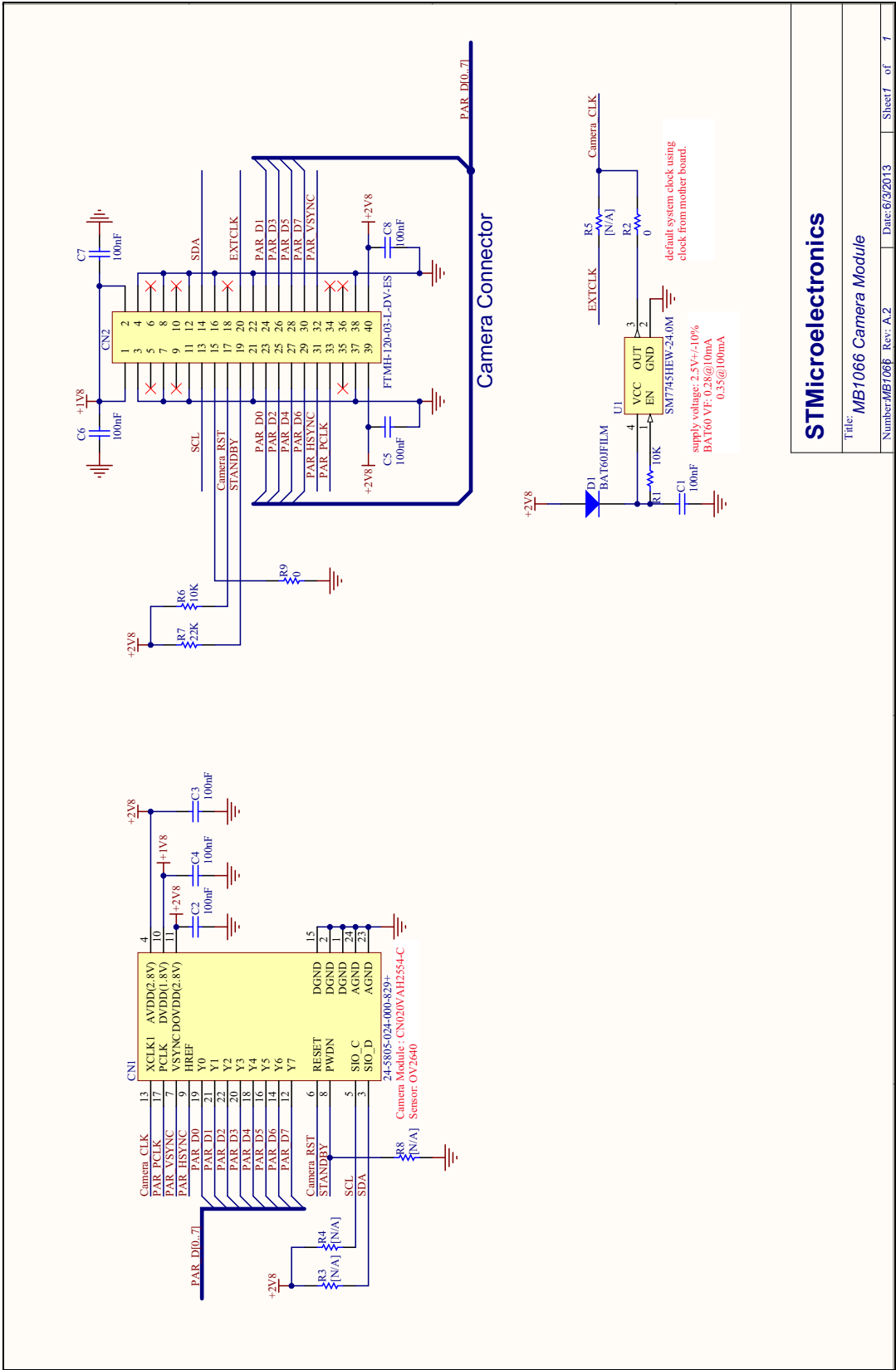
STMicroelectronics

Title: STM324x9I-EVAL JTAG&Trace

Number: MB1045 | Rev: B.2(PCB SCH) | Date: 7/24/2013 | Sheet 16 of 19

DocID025150 Rev 1

Figure 41. Camera daughter board MB1066



Appendix A STM32429I-EVAL I/O assignment

Table 35. STM32429I-EVAL I/O assignment

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|----------|-------------------------------|-----------------------|----------------|
| A1 | PE4 | A20/ TRACED1 | - | - |
| A2 | PE3 | A19/ TRACED0 | - | - |
| A3 | PE2 | TRACECLK | - | - |
| A4 | PG14 | MII_TXD1 | - | - |
| A5 | PE1 | NBL1 | - | - |
| A6 | PE0 | NBL0 | - | - |
| A7 | PB8 | MII_TXD3 | DISSIPATIVE_BRAKE | D6 |
| A8 | PB5 | ULPI_D7 | - | - |
| A9 | PB4 | JTRST | - | - |
| A10 | PB3 | JTDO-SWO/ I2S3_CK | - | - |
| A11 | PD7 | NE1 | - | - |
| A12 | PC12 | SDCARD_CK/ SPI3_MOSI | - | D9 |
| A13 | PA15 | JTDI | - | - |
| A14 | PA14 | JTCK-SWCLK | - | - |
| A15 | PA13 | JTMS-SWDIO | - | - |
| B1 | PE5 | A21/ TRACED2 | - | - |
| B2 | PE6 | A22/ SAI1_SD_A/ TRACED3 | - | D7 |
| B3 | PG13 | MII_TXD0 | - | - |
| B4 | PB9 | I2C1_SDA | - | - |
| B5 | PB7 | | - | VSYNC |
| B6 | PB6 | I2C1_SCL | - | - |
| B7 | PG15 | SDNCAS | - | - |
| B8 | PG11 | MII_TX_EN | NTC_BYPASS_IO | - |
| B9 | PJ13 | LCD_B1 | - | - |
| B10 | PJ12 | LCD_B0 | - | - |
| B11 | PD6 | NWAIT/ I2S3_SD | | D10 |

Table 35. STM32429I-EVAL I/O assignment (continued)

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|--------------------|-------------------------|-----------------------|----------------|
| B12 | PD0 | D2 | | |
| B13 | PC11 | SDCARD_D3/ SPI3_MISO | | D4 |
| B14 | PC10 | SDCARD_D2/ SPI3_SCK | | D8 |
| B15 | PA12 | CAN1_TX/ USB_FS1_DP | PFC_SYNC2 | |
| C1 | VBAT | VBAT | | |
| C2 | PI8- ANTI TAMP2 | EXPANDER_INT | | |
| C3 | PI4 | NBL2 | | |
| C4 | PK7 | LCD_DE | | |
| C5 | PK6 | LCD_B7 | | |
| C6 | PK5 | LCD_B6 | | |
| C7 | PG12 | LED4 | | |
| C8 | PG10 | LED3 | | |
| C9 | PJ14 | LCD_B2 | | |
| C10 | PD5NWE | | | |
| C11 | PD3 | | | D5 |
| C12 | PD1 | D3 | | |
| C13 | PI3 | D27 | | |
| C14 | PI2 | D26 | | |
| C15 | PA11 | CAN1_RX/ USB_FS1_DM | PFC_PWM | |
| D1 | PC13 | KEY_TAMP_1 | | |
| D2 | PF0 | A0 | | |
| D3 | PI5 | NBL3 | | |
| D4 | PI7 | D29 | | |
| D5 | PI10 | D31/ MII_RX_ER | | |
| D6 | PI6 | D28 | | |
| D7 | PK4 | LCD_B5 | | |
| D8 | PK3 | LCD_B4 | | |
| D9 | PG9 | NE2 | | |
| D10 | PJ15 | LCD_B3 | | |
| D11 | PD4 | NOE | | |

Table 35. STM32429I-EVAL I/O assignment (continued)

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|-----------|---|-----------------------|----------------|
| D12 | PD2 | SDCARD_CMD | | D11 |
| D13 | PH15 | D23 | | |
| D14 | PI1 | D25 | | |
| D15 | PA10 | RS232_IRDA_RX/ USB_FS1_VBUS/ USB_FS1_ID | | |
| E1 | PC14 | OSC32_IN | | |
| E2 | PF1 | A1 | | |
| E3 | PI12 | LCD_HSYNC | | |
| E4 | PI9 | D30 | | |
| E5 | PDR_ON | | | |
| E6 | BOOT0 | BOOT0 | | |
| E7 | VDD_3 | | | |
| E8 | VDD_11 | | | |
| E9 | VDD_10 | | | |
| E10 | VDD_15 | | | |
| E11 | VCAP2 | | | |
| E12 | PH13 | D21 | | |
| E13 | PH14 | D22 | | |
| E14 | PI0 | D24 | | |
| E15 | PA9 | RS232/ IRDA_USART1_TX/ USB_FS1_VBUS | | |
| F1 | PC15 | OSC32_OUT | | |
| F2 | VSS_13_18 | | | |
| F3 | PI11 | ULPI_DIR | | |
| F4 | VDD_13 | | | |
| F5 | VDD_17 | | | |
| F6 | VSS_3 | | | |
| F7 | VSS_11 | | | |
| F8 | VSS_10 | | | |
| F9 | VSS_15 | | | |
| F10 | VSS 2 | | | |
| F11 | VDD_2 | | | |
| F12 | PK1 | LCD_G6 | | |

Table 35. STM32429I-EVAL I/O assignment (continued)

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|----------|-------------------------|-----------------------|----------------|
| F13 | PK2 | LCD_G7 | | |
| F14 | PC9 | SDCARD_D1 | | D3 |
| F15 | PA8 | LCD_BL_CTRL | PFC_SYNC1 | |
| G1 | PH0 | OSC_IN | | |
| G2 | PF2 | A2 | | |
| G3 | PI13 | LCD_VSYNC | | |
| G4 | PI15 | LCD_R0 | | |
| G5 | VDD_18 | | | |
| G6 | VSS_17 | | | |
| G10 | VSS_9 | | | |
| G11 | VDD_9 | | | |
| G12 | PJ11 | LCD_G4 | | |
| G13 | PK0 | LCD_G5 | | |
| G14 | PC8 | SDCARD_D0 | WH | D2 |
| G15 | PC7 | | VH | D1 |
| H1 | PH1 | OSC_OUT | | |
| H2 | PF3 | A3 | | |
| H3 | PI14 | LCD_CLK | | |
| H4 | PH4 | ULPI_NXT | | |
| H5 | VDD_5 | | | |
| H6 | VSS_5 | | | |
| H10 | VSS_20 | | | |
| H11 | VDD_20 | | | |
| H12 | PJ8 | LCD_G1 | | |
| H13 | PJ10 | LCD_G3 | | |
| H14 | PG8 | SDCLK/ MII_PPS_OUT | | |
| H15 | PC6 | LCD_ON_OFF | UH | D0 |
| J1 | NRST | NRST | | |
| J2 | PF4 | A4 | | |
| J3 | PH5 | SDNWE | | |
| J4 | PH3 | SDNE0/ MII_COL | | |
| J5 | VDD_12 | | | |
| J6 | VSS_12 | | | |

Table 35. STM32429I-EVAL I/O assignment (continued)

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|----------------|--------------------------|-----------------------|----------------|
| J10 | VSS_8 | | | |
| J11 | VDD_8 | | | |
| J12 | PJ7 | LCD_G0 | | |
| J13 | PJ9 | LCD_G2 | | |
| J14 | PG7 | LED2 | | |
| J15 | PG6 | LED1 | | |
| K1 | PF7 | SAI1_MCLK_B | | |
| K2 | PF6 | SAI1_SD_B | | |
| K3 | PF5 | A5 | | |
| K4 | PH2 | SDCKE0 | | |
| K5 | VDD_4 | | | |
| K6 | VSS_4 | | | |
| K7 | VSS_6 | | | |
| K8 | VSS_7 | | | |
| K9 | VSS_1 | | | |
| K10 | VSS_14 | | | |
| K11 | VDD_14 | | | |
| K12 | PJ6 | LCD_R7 | | |
| K13 | PD15 | D1 | | |
| K14 | PB13 | ULPI_D6/ USB_FS2_VBUS | | |
| K15 | PD10 | D15 | | |
| L1 | PF10 | Potentiometer | | |
| L2 | PF9 | SAI1_FS_B | | |
| L3 | PF8 | SAI1_SCK_B | | |
| L4 | PC3 | MII_TX_CLK | CURRENT_C | |
| L5 | BYPASS_RE G | | | |
| L6 | VSS_19 | | | |
| L7 | VDD_19 | | | |
| L8 | VDD_6 | | | |
| L9 | VDD_7 | | | |
| L10 | VDD_1 | | | |
| L11 | VCAP1 | | | |
| L12 | PD14 | D0 | | |

Table 35. STM32429I-EVAL I/O assignment (continued)

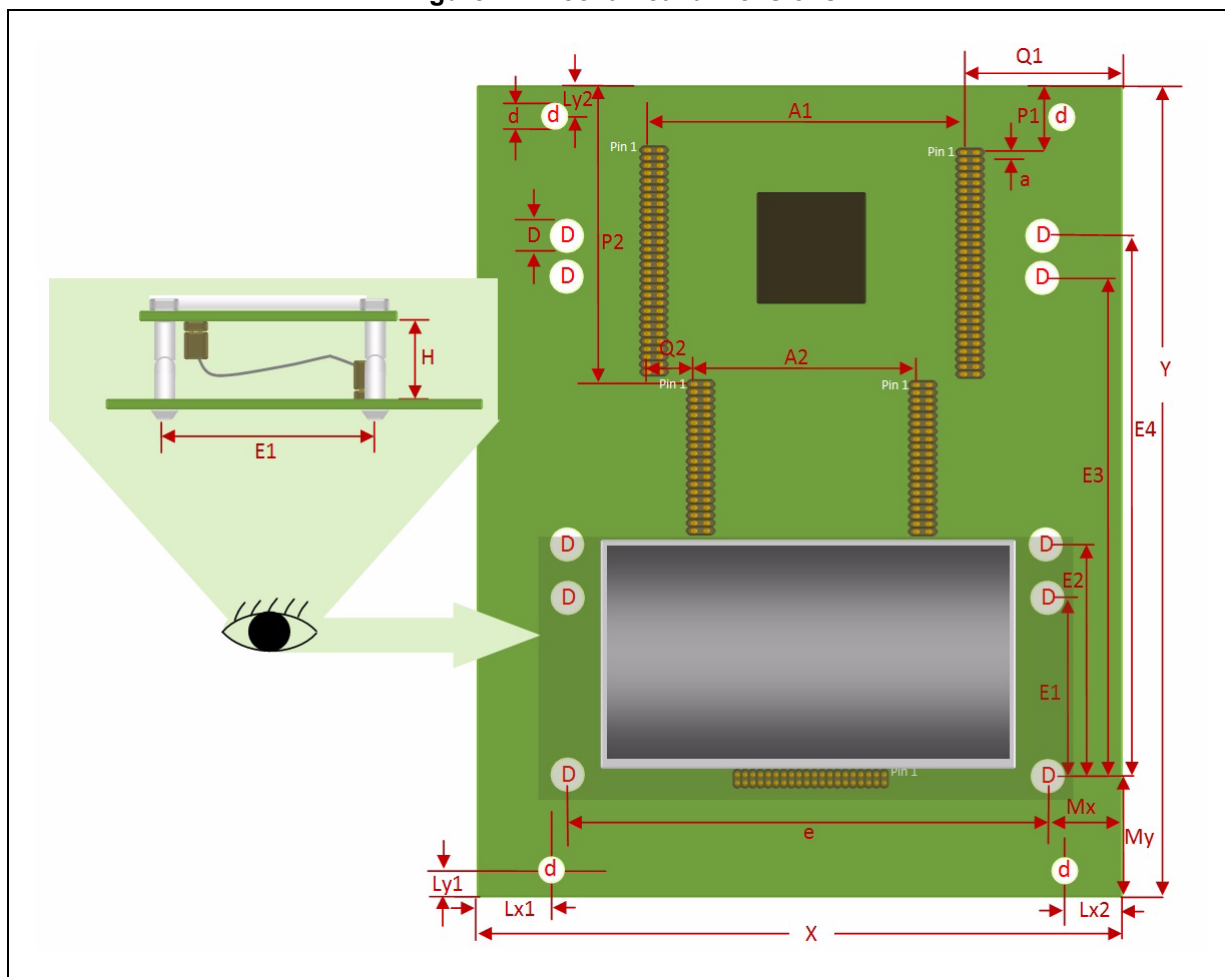
| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|----------|-------------------------|-----------------------|----------------|
| L13 | PB12 | ULPI_D5/ USB_FS2_ID | | |
| L14 | PD9 | D14 | | |
| L15 | PD8 | D13 | | |
| M1 | VSSA | | | |
| M2 | PC0 | ULPI_STP | | |
| M3 | PC1 | MII_MDC | CURRENT_A | |
| M4 | PC2 | MII_TXD2 | CURRENT_B | |
| M5 | PB2 | BOOT1 | | |
| M6 | PF12 | A6 | | |
| M7 | PG1 | A11 | | |
| M8 | PF15 | A9 | | |
| M9 | PJ4 | LCD_R5 | | |
| M10 | PD12 | A17 | | |
| M11 | PD13 | A18 | | |
| M12 | PG3 | A13 | | |
| M13 | PG2 | A12 | | |
| M14 | PJ5 | LCD_R6 | | |
| M15 | PH12 | D20 | | |
| N1 | VREF- | | | |
| N2 | PA1 | MII_RX_CLK | ENCODER_B | |
| N3 | PA0 | KEY_WKUP/ MII_CRS | ENCODER_A | |
| N4 | PA4 | | DAC_OUT1 | HSYNC |
| N5 | PC4 | MII_RXD0 | BUSVOLTAGE | |
| N6 | PF13 | A7 | | |
| N7 | PG0 | A10 | | |
| N8 | PJ3 | LCD_R4 | | |
| N9 | PE8 | D5 | | |
| N10 | PD11 | A16 | | |
| N11 | PG5 | A15/ BA1 | | |
| N12 | PG4 | A14/ BA0 | | |
| N13 | PH7 | MII_RXD3 | | |

Table 35. STM32429I-EVAL I/O assignment (continued)

| Pin number | Pin name | STM32429I-EVAL standard | Motor control variant | Camera variant |
|------------|----------|-------------------------|-----------------------|----------------|
| N14 | PH9 | D17 | | |
| N15 | PH11 | D19 | | |
| P1 | VREF+ | | | |
| P2 | PA2 | MII_MDIO | INDEX | |
| P3 | PA6 | | STOP | PIXCK |
| P4 | PA5 | ULPI_CK | DAC_OUT2 | |
| P5 | PC5 | MII_RXD1 | HEATSINK | |
| P6 | PF14 | A8 | | |
| P7 | PJ2 | LCD_R3 | | |
| P8 | PF11 | SDNRAS | | |
| P9 | PE9 | D6 | | |
| P10 | PE11 | D8 | | |
| P11 | PE14 | D11 | | |
| P12 | PB10 | ULPI_D3 | | |
| P13 | PH6 | MII_RXD2 | | |
| P14 | PH8 | D16 | | |
| P15 | PH10 | D18 | | |
| R1 | VDDA | | | |
| R2 | PA3 | ULPI_D0 | | |
| R3 | PA7 | MII_RX_DV | UL | |
| R4 | PB1 | ULPI_D2 | WL | |
| R5 | PB0 | ULPI_D1 | VL | |
| R6 | PJ0 | LCD_R1 | | |
| R7 | PJ1 | LCD_R2 | | |
| R8 | PE7 | D4 | | |
| R9 | PE10 | D7 | | |
| R10 | PE12 | D9 | | |
| R11 | PE15 | D12 | | |
| R12 | PE13 | D10 | | |
| R13 | PB11 | ULPI_D4 | | |
| R14 | PB14 | USB_FS2_DM | | |
| R15 | PB15 | USB_FS2_DP | | |

Appendix B Mechanical dimensions

Figure 42. Mechanical dimensions

**Table 36. Mechanical dimensions**

| Symbol | Size (mm) | Symbol | Size (mm) | Symbol | Size (mm) |
|--------|-----------|--------|-----------|--------|-----------|
| A1 | 68.58 | E3 | 114.18 | Mx | 20.1 |
| A2 | 48.62 | E4 | 122 | My | 24.43 |
| a | 1.27 | e | 116.5 | P1 | 16.94 |
| D | 4.5 | H | 25 | P2 | 55.37 |
| d | 3.5 | Lx1 | 21.36 | Q1 | 46.77 |
| E1 | 55 | Lx2 | 32.64 | Q2 | 9.98 |
| E2 | 68 | Ly1 | 5 | X | 157 |
| | | Ly2 | 6.4 | Y | 172.72 |

Revision history

Table 37. Document revision history

| Date | Revision | Changes |
|--------------|----------|-----------------|
| 12-Sept-2013 | 1 | Initial release |



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