



UM0268 User Manual

STR750-EVAL Evaluation board

Introduction

The **STR750 evaluation board** (STR750-EVAL) is a complete, development platform for STMicroelectronics' ARM® core-based STR75xF microcontrollers. Based on a cost effective, flexible and open design, it allows easy demonstration of STR75xF capabilities and enables rapid evaluation of the microcontroller's peripherals and other features.

It includes the high performance STR750F microcontroller, which is based on the ARM7TDMI-S core and includes USB 2.0 compliant port with full speed data transmission, CAN 2.0A/B compliant interface, 3 UART channels, internal Flash and internal SRAM memory.

The STR750-EVAL features a complete range of connectors and hardware features for developing applications based on STR75xF peripherals including motor control, USB and RS232 connectors, microphone, speaker, joystick, and LCD display.

The STR750-EVAL uses a JTAG standard interface to connect to your host PC via any of a range of in-circuit emulators (ICE) for ARM core-based microcontrollers.



STR750-EVAL
evaluation board

Features

- Three 5V power supply options: Power jack, USB connection or daughter board
- RTC
- Audio play and record
- 3 RS232 connectors, one with hardware flow control
- USB 2.0 compliant with full speed (12Mb/s) data transmission
- CAN 2.0A/B connection
- Inductor Motor Control connector with 6 PWM output and Emergency Stop
- Debug and programming support via 20-pin JTAG connector
- Dot-matrix LCD module
- Joystick with 4-direction control and selector
- Extension connectors for daughter board or wrapping board

About the user manuals...

This user manual provides information about using your STR750-EVAL and its hardware features. For additional information about supporting software and tools, please refer to:

STR75xF Datasheet– Complete information about microcontroller features and peripherals

STR75xF Demonstration Software User Manual– Guide to using the demo software provided with your STR750-EVAL

STR75xF Hardware Development Getting Started– Guide to developing your application hardware

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1 Getting Started

Your **STR750-EVAL** is designed with a full range of hardware features that will help you rapidly evaluate microcontroller peripherals and develop your own applications. Descriptions of hardware features and configurations are provided in [Chapter 2](#).

Demonstration software is preloaded in the board's flash memory for easy demonstration of device peripherals in stand-alone mode. For more information refer to the demonstration software getting started.

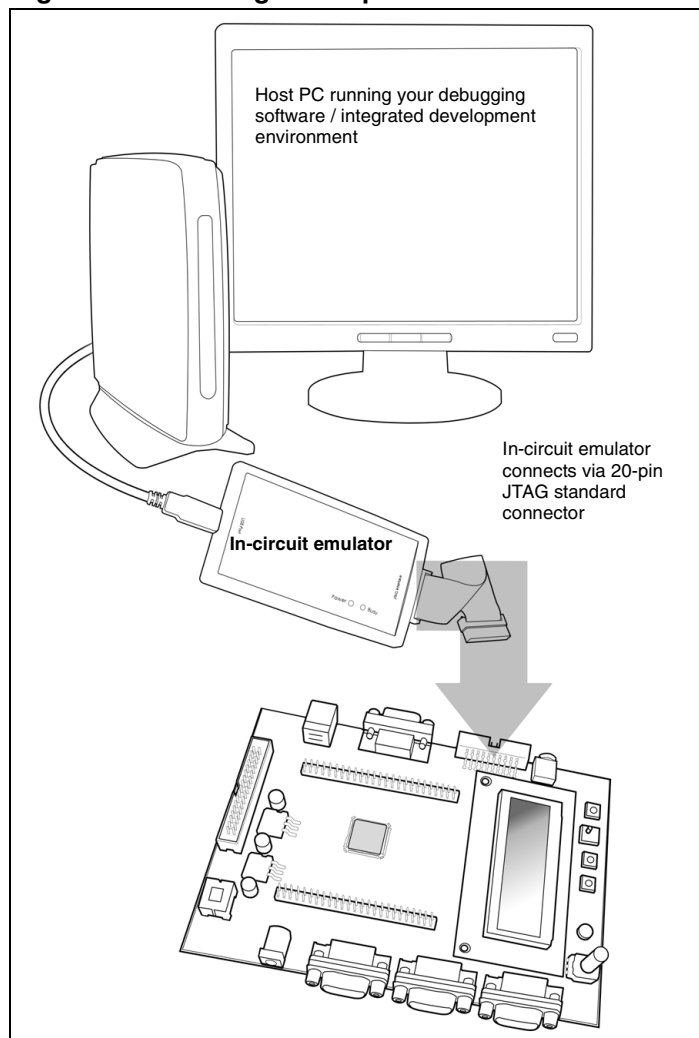
Your STR750-EVAL is also designed for use as an application development platform and reference design, and supports connection to a full range of in-circuit debugging tools and integrated development environments.

To start using your STR750-EVAL evaluation board for application development, you will have to set up your development tools and connect to the STR75xF.

1. Connect to your STR750-EVAL via the 20-pin JTAG connector.
2. Power up the evaluation board.
The board can be powered by 5V from either the jack for external power supply, USB connector, or a daughter board. For additional configuration information, see [Section 2.1](#).
3. Connect to the device from the debugging software on your host PC.

The software files and installation instructions that you will need to update your debugging software are available for free download at www.st.com/mcu. The download includes instructions for creating a new connection to your microcontroller.

Figure 1. Connecting development tools



2 Hardware layout and configuration

The STR750-EVAL is designed around the **STR750Fx** in an LQFP100 (14x14) package. The hardware block diagram of the STR750-EVAL (See [Figure 1](#)) illustrates the layout of the board relative to the STR750F peripherals (LCD, SPI, UART, USB, Audio, CAN, RTC and Motor Control) and [Figure 3](#) will help you locate these features on the actual evaluation board.

Figure 2. Hardware Block Diagram

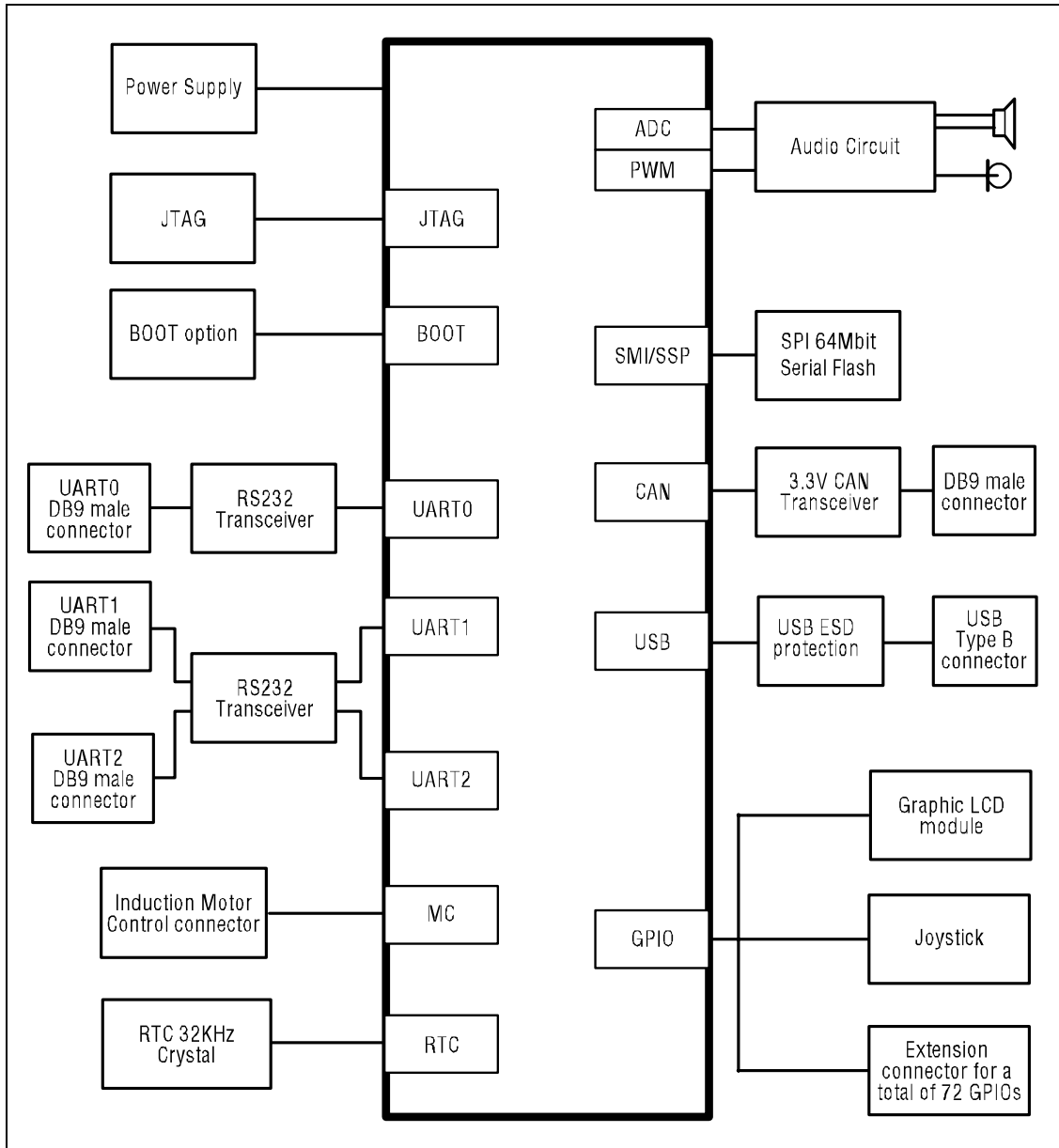
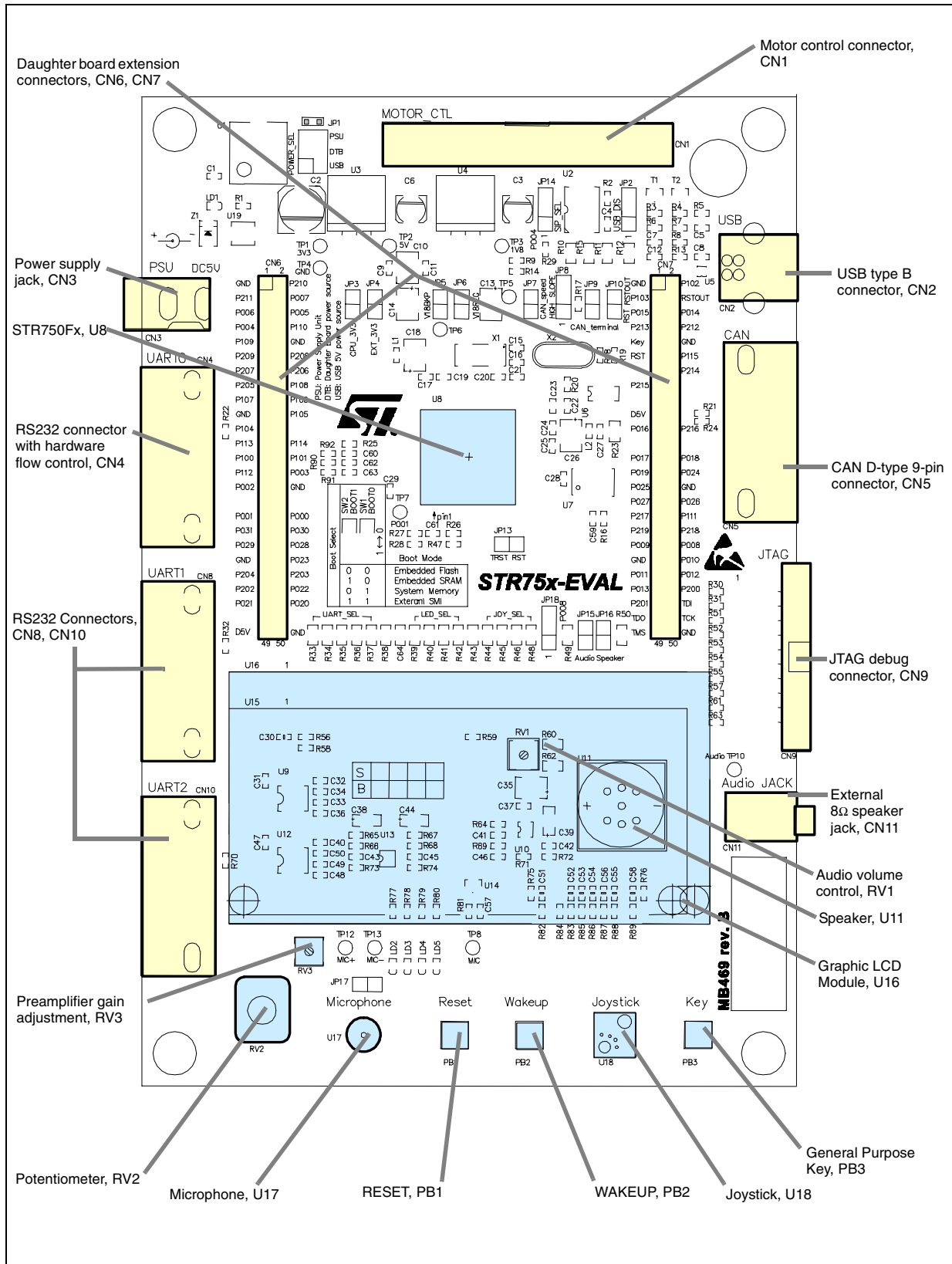


Figure 3. STR750-EVAL evaluation board layout



Hardware configuration

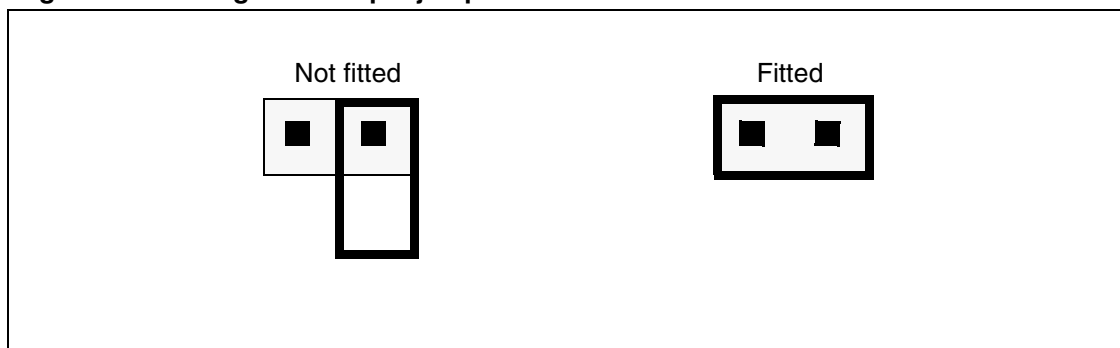
The following sections provide jumper settings for configuring your STR750-EVAL evaluation board and peripherals, including:

- [Power supply](#)
- [Clock source](#)
- [Reset source](#)
- [Audio features](#)
- [Serial Flash](#)
- [CAN](#)
- [RS232](#)
- [Motor Control](#)
- [RTC](#)
- [USB](#)
- [Development and debugging tool support](#)
- [Display and input devices](#)

Two types of jumpers are used on the STR750-EVAL evaluation board:

- 3-pin jumpers with two possible positions, for which the possible settings are presented in schematics in the following sections
- 2-pin jumpers with two possible settings: **Fitted**– the circuit is closed, and **Not fitted**– the circuit is open (see [Figure 4](#).)

Figure 4. Settings for two-pin jumpers



2.1 Power supply

The STR750-EVAL evaluation board is designed to be powered by a 5V DC power supply and is protected from incorrect power supply by a polymer enhanced Zener diode (polyzen, U19) which shuts out the power source if overvoltage occurs. If overvoltage occurs, the power supply must be disconnected from the board and then reconnected in order to reset the polyzen.

It is possible to configure the evaluation board to use any of the following three sources for the power supply:

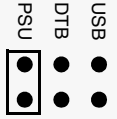
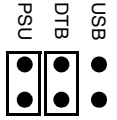
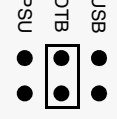
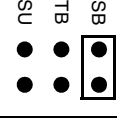
- 5V DC power adapter connected to the **power supply jack** (CN3, or PSU for Power Supply Unit on the silk screen).
- 5V DC power with 500mA limitation via the **USB type-B connector** (CN2, or USB on the silk screen).
- 5V DC power from the **daughter board extension connectors** (CN6 and CN7, DTB for Daughter Board on the silk-screen).

You can power the ARM7TDMI-S core, SRAM, and Flash of the STR750Fx using one of two power supply sources:

- Internal power supply generated by internal Main Voltage Regulator.
- External power supply generated by external 1.8V voltage regulator U4 on the board

The power supply is configured by setting the related jumpers, **JP1**, **JP3**, **JP4**, **JP5** and **JP6** as described in [Table 1](#).

Table 1. Power jumpers

| Jumper | Description |
|----------------------|---|
| JP1 | <p>Selects one of the three possible 5V DC power supply sources:</p> <p>For Power supply jack (CN3) to the STR750-EVAL <u>only</u>, JP1 is set as shown to the right: The daughter board must have its own power supply connected. (Default setting)</p>  |
| | <p>For Power supply jack (CN3) to <u>both</u> STR750-EVAL evaluation board and a daughter board connected to CN6 and CN7, JP1 is set as shown to the right: The daughter board must not have its own power supply connected.</p>  |
| | <p>For power supply from the daughter board connectors (CN6 and CN7), JP1 is set as shown to the right:</p>  |
| | <p>For power supply from USB (CN2), JP1 is set as shown to the right: If a daughter board is connected on CN5 and CN6, it must have its own power supply connected.</p>  |
| JP3 | <p>Enables consumption measurement of STR75xF 3.3V VPLL, VADC and CPU_3V3. Default setting: Fitted</p> <p><i>Note: The Potentiometer (RV2) is also connected to VADC. As a result, measurements of the consumption of the STR75xF include the consumption of the potentiometer (~330 μA).</i></p> <p><i>To determine the actual consumption of the STR75xF either subtract 330 μA from the consumption measurement, or remove (un-solder) the potentiometer from the board.</i></p> |
| JP4, JP5, JP6 | <p>1.8V power can be provided externally or internally depending on the configuration of the jumpers JP4, JP5 and JP6:</p> <ul style="list-style-type: none"> For 1.8V power supply from the external regulator U4 to the STR750Fx, jumpers JP4, JP5 and JP6 should all be fitted. In this mode, JP5 and JP6 can be used for consumption measure of V18BKP and V18 respectively. For 1.8V power supply from the internal Main Regulator, jumpers JP4, JP5 and JP6 should not be fitted. <p>Caution: Do not use configuration patterns of JP4, JP5 and JP6 other than the two described above.</p> <p>Default setting: Not fitted</p> |

The LD1 LED is lit when the STR750-EVAL evaluation board is powered correctly.

2.2 Boot option

The STR750Fx-EVAL evaluation board is able to boot from:

- Embedded User Flash
- Embedded SRAM for debugging
- System memory with boot loader for ISP
- External 64Mbit SPI Interface Flash U2

The boot option is configured by setting switches **SW1** and **SW2** as shown in [Table 2](#). These micro switches have two possible positions:

Figure 5. Switch positions

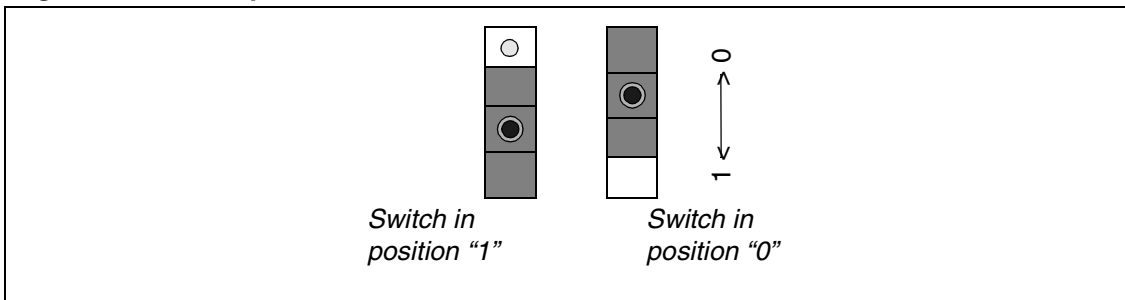


Table 2. Boot mode selection

| Jumper | Description | |
|----------|--|--|
| SW1, SW2 | To boot from Embedded User Flash , set switches SW1 and SW2 as shown to the right. (Default setting) | |
| | To boot from Embedded SRAM , set switches SW1 and SW2 as shown to the right. | |
| | To boot from System Memory , set switches SW1 and SW2 as shown to the right. | |
| | To boot from External SPI Interface Flash , set switches SW1 and SW2 as shown to the right. | |

2.3 Clock source

Three clock sources are available on the STR750-EVAL evaluation board for the microcontroller, USB and RTC.

- **X1**– 32KHz crystal for embedded RTC
- **X2**– 4MHz crystal for STR750Fx microcontroller
- **U7**– 48MHz oscillator for USB

USB is also able to run using the 48MHz clock from the STR750Fx. The option of using a 48MHz oscillator (U7) is only a backup option for the USB peripheral. The oscillator is not present on the board, but can be added if necessary.

2.4 Reset source

The reset signal of STR750-EVAL evaluation board is low active.

The reset sources include:

- Power On Reset from STM1818 (U14)
- Reset button (PB1)
- Debugging tools via the connector CN9
- Daughter board via the connector CN7

Table 3. Reset jumpers

| Jumper | Description |
|--------|---|
| JP13 | Enables reset of the STR750Fx embedded JTAG TAP controller each time a system reset occurs. JP13 connects the TRST signal from the JTAG connection with the system reset signal RESET#. Default setting: Fitted |

2.5 Audio features

STR750-EVAL evaluation board supports both audio recording and playback. This can be disabled or enabled by setting of jumpers **JP16** and **JP17**.

Potentiometers for audio control include:

- Volume control using the potentiometer RV1.
- Gain control on the micro preamplifier using the potentiometer RV3.

The connector CN11 allows the connection of an external 8Ω speaker. When an external speaker is connected, the speaker (U11) on the evaluation board is disconnected.

Table 4. Audio jumpers

| Jumper | Description |
|--------|--|
| JP16 | Audio power amplifier TS4871 is forced into standby mode when JP16 (SPEAKER on the silk-screen) is not fitted. Default setting: Fitted |

Table 4. Audio jumpers

| Jumper | Description |
|-------------|--|
| JP17 | Microphone pre-amplifier MAX4061 is forced into shutdown mode when JP17 (MIC on the silk-screen) is fitted. Default setting: Not fitted |
| JP15 | Audio play circuit is connected to P1.02 of STR750Fx when JP15 (Audio on the silk-screen) is fitted. Default setting: Fitted |

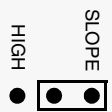
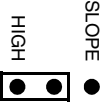
2.6 Serial Flash

64Mbit SPI interface flash is available on the STR750-EVAL evaluation board. The evaluation board can be booted from SPI interface flash. For jumper configurations related to boot modes, refer to [Section 2.2](#).

2.7 CAN

STR750-EVAL evaluation board supports CAN2.0A/B compliant bus communication based on the 3.3V CAN transceiver. Both high-speed mode and slope-control mode are available and can be selected by setting **JP8**.

Table 5. CAN jumpers

| Jumper | Description |
|------------|---|
| JP8 | CAN transceiver functions in slope-control mode when JP8 (HIGH or SLOPE on silk-screen) is set as shown to the right:  |
| | CAN transceiver functions in high-speed mode when JP8 is set as shown on the right: (Default setting)  |
| JP9 | CAN terminal resistor is enabled when JP9 (CAN_terminal on the silk-screen) is fitted. Default setting: Not fitted |

2.8 RS232

A total of three channels for RS232 communication are available on the STR750-EVAL evaluation board.

UART0 uses the RS232 transceiver U9 and the male D-type 9-pin connector CN4. This channel implements UART hardware flow control.

Two channels UART1 and UART2, use the RS232 transceiver U12 and two male D-type 9-pin connectors CN8 and CN10.

2.9 Motor Control

STR750-EVAL evaluation board supports induction motor control via a 34-pin connector CN1, which provides all required control and feedback signals to and from a motor power-drive board. Available signals on this connector include emergency stop, motor speed, 3-phase motor current, bus voltage, Heatsink temperature from the motor drive board and 6 channels of PWM control signals going to the motor drive circuit.

Motor current sampling is enabled by setting jumper **JP7**.

Table 6. Motor control jumpers

| Jumper | Description |
|------------|--|
| JP7 | Motor current sampling operation is enabled when JP7 is fitted (P1.08 connected to P0.29). The I/O pins P1.08 and P0.29 are disconnected and can be used by a daughter board when JP7 is not fitted. Default setting: Fitted |

2.10 RTC

A 32KHz crystal X1 is available for the embedded RTC inside the STR750Fx.

2.11 USB

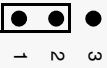
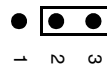
STR750-EVAL evaluation board supports USB 2.0A/B compliant full speed communication via a USB type-B connector (CN2). The evaluation board and daughter board can be powered from this USB connection at 5V DC with a 500mA current limitation.

Two clock sources are available for USB:

- PLL generated clock from the STR750Fx
- External oscillator U7

USB Connect/Disconnect Simulation allows the application software to simulate the connection or disconnection of a USB apparatus to connector CN2 of the STR750-EVAL. This feature is implemented by connecting P0.09 of the STR75xF to the transistor that controls the connection of the USB 1.5K pull-up resistor (R6) on the USB_D+ line. The *USB Connect/Disconnect Simulation* feature is enabled or disabled by setting **JP2** as shown in [Table 7](#).

Table 7. USB Connect/Disconnect Simulation

| Jumper | Description |
|------------|--|
| JP2 | <p>When JP2 is set as shown to the right, <i>USB Connect/Disconnect Simulation</i> is disabled. In this case, the USB 1.5K pull-up resistor is connected to the USB_D+ line and P0.09 is not use for USB.</p>  <p>When JP2 is set as shown to the right, <i>USB Connect/Disconnect Simulation</i> is enabled. P0.09 of the STR75xF is connected to the transistor that controls the connection/disconnection of the USB 1.5K pull-up resistor (R6) on the USB_D+ line.</p>  <p>When <i>USB Connect/Disconnect Simulation</i> is enabled, by default the USB 1.5K pull-up resistor (R6) is in a “disconnect” state (i.e. as if no USB apparatus were connected to CN2). (Default setting)</p> |

2.12 Joystick

STR750-EVAL evaluation board includes a 4-position joystick (U18). When used, the joystick “up position” is connected to P0.08 of the STR750Fx. Otherwise this pin can be used to drive an I²C component via the daughter board connectors. Use of pin P0.08 for either of these two functions is controlled using **JP18**.

Table 8. Joystick jumper

| Jumper | Description |
|-------------|---|
| JP18 | P0.08 is connected to the joystick when JP18 is set as shown to the right: (Default setting) |
| | P0.08 is used in its alternate function I2C_SCL and connected to the daughter board connector (CN7, pin 38) when JP18 is set as shown on the right: |



2.13 Development and debugging tool support

The STR750-EVAL evaluation board supports connection to In-Circuit Emulators (ICE) via a 20-pin standard JTAG interface (CN9).

2.14 Display and input devices

122x32 pixel graphic LCD and 4 general purpose LED's (LD2, 3, 4, 5) are available as display devices. A 4-direction joystick with selection key, a general purpose button (PB3) and a wake up button (PB2) are available as input devices.

STR750-EVAL also supports a second optional 2x16 character LCD that can be mounted on the connector U15.

Table 9. LCD modules

| Graphic LCD U16 (default) | | | Character LCD U15 (optional) | | |
|---------------------------|-------------|----------------|------------------------------|-------------|----------------|
| Pin on U16 | Description | Pin on STR750F | Pin on U15 | Description | Pin on STR750F |
| 1 | GND | GND | 1 | GND | GND |
| 2 | VDD | 3.3V | 2 | VDD | 3.3V |
| 3 | VO | | 3 | VO | |
| 4 | RS | P2.03 | 4 | RS | P2.02 |
| 5 | NC | | 5 | RW | P2.01 |
| 6 | E2 | P2.00 | 6 | E | P2.00 |
| 7 | NC | | 7 | DB0 | P2.10 |
| 8 | E1 | P2.01 | 8 | DB1 | P2.11 |
| 9 | RW | P2.02 | 9 | DB2 | P2.12 |
| 10 | DB0 | P2.10 | 10 | DB3 | P2.13 |
| 11 | DB1 | P2.11 | 11 | DB4 | P2.14 |

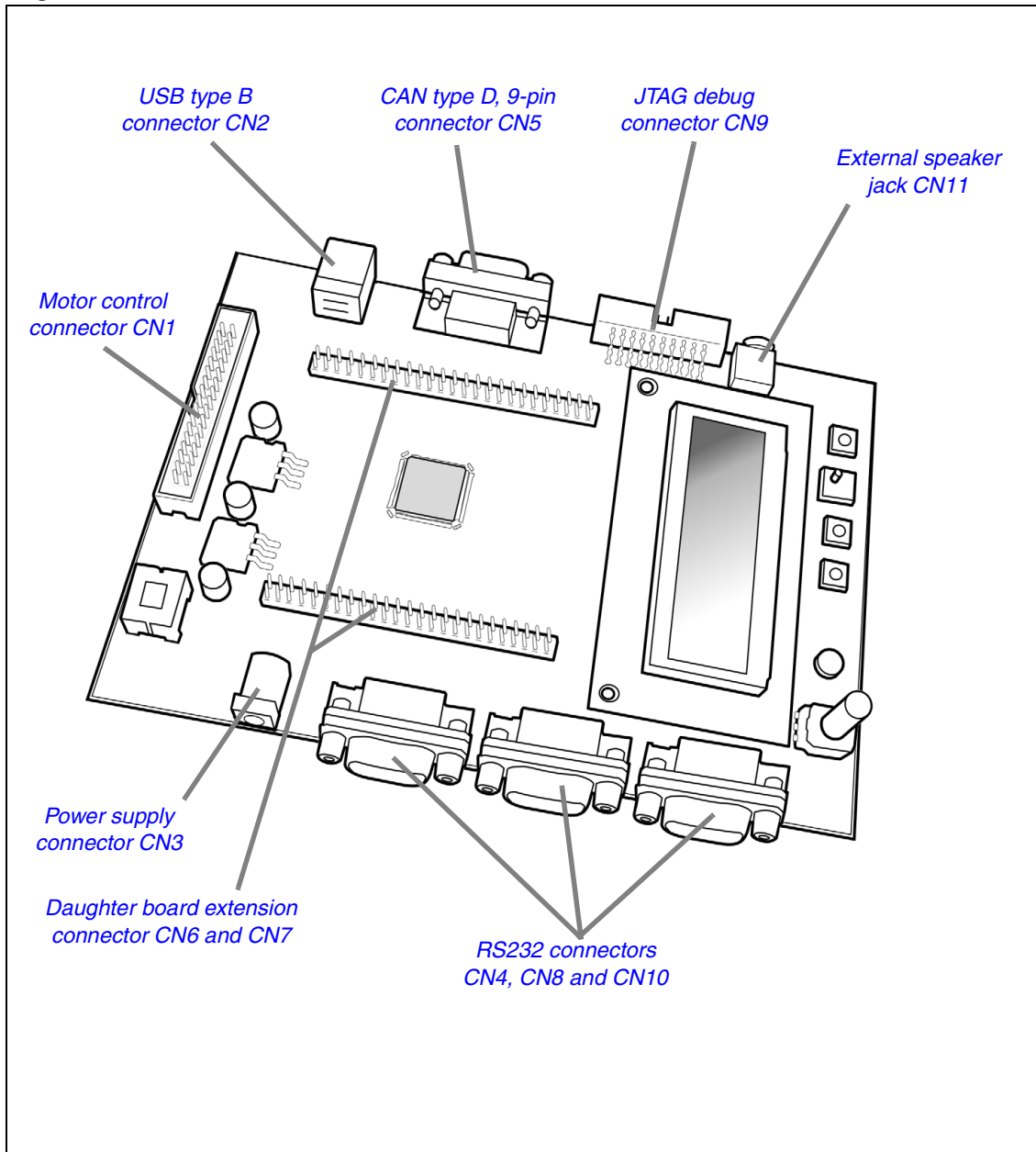
Table 9. LCD modules

| Graphic LCD U16 (default) | | | Character LCD U15 (optional) | | |
|---------------------------|-------------|----------------|------------------------------|-------------|----------------|
| Pin on U16 | Description | Pin on STR750F | Pin on U15 | Description | Pin on STR750F |
| 12 | DB2 | P2.12 | 12 | DB5 | P2.15 |
| 13 | DB3 | P2.13 | 13 | DB6 | P2.16 |
| 14 | DB4 | P2.14 | 14 | DB7 | P2.17 |
| 15 | DB5 | P2.15 | 15 | A | +5V |
| 16 | DB6 | P2.16 | 16 | K | GND |
| 17 | DB7 | P2.17 | | | |
| 18 | RST | RESET# | | | |
| 19 | A | +5V | | | |
| 20 | K | GND | | | |

3 Connectors

The following sections provide pin descriptions for the STR750-EVAL evaluation board connectors shown in [Figure 6](#):

Figure 6. STR750-EVAL evaluation board connectors



3.1 Motor control connector CN1

Figure 7. Motor control connector (CN1)

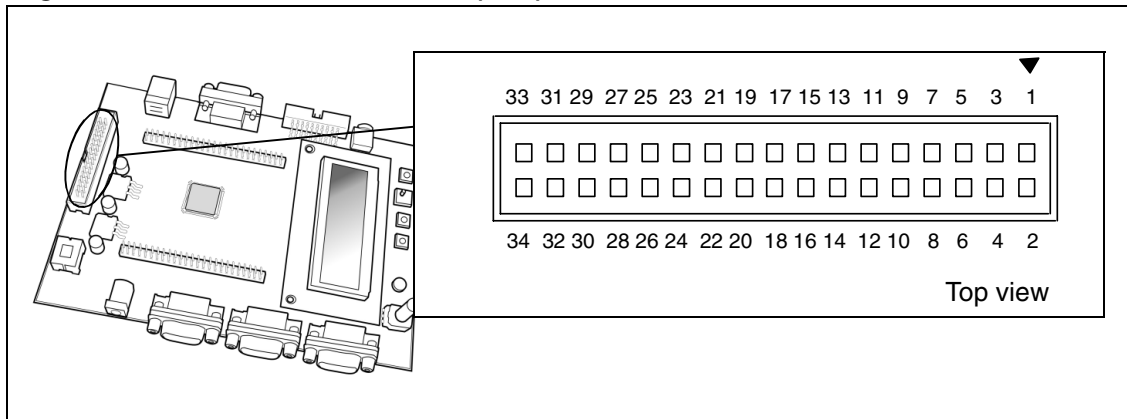


Table 10. Motor control connector (CN1)

| Pin on STR750F | Pin on CN1 | Description | Pin on STR750F | Pin on CN1 | Description |
|----------------|------------|-----------------------|----------------|------------|----------------------|
| P1.10 | 1 | EMERGENCY STOP | | 2 | GND |
| P1.09 | 3 | PWM-UH | | 4 | GND |
| P2.09 | 5 | PWM-UL | | 6 | GND |
| P2.08 | 7 | PWM-VH | | 8 | GND |
| P2.07 | 9 | PWM-VL | | 10 | GND |
| P2.06 | 11 | PWM-WH | | 12 | GND |
| P2.05 | 13 | PWM-WL | P0.27 | 14 | BUS VOLTAGE |
| P1.08 | 15 | PHASE A CURRENT | | 16 | GND |
| P1.06 | 17 | PHASE B CURRENT | | 18 | GND |
| P1.04 | 19 | PHASE C CURRENT | | 20 | GND |
| P2.04 | 21 | NTC BYPASS RELAY | | 22 | GND |
| P1.00 | 23 | DISSIPATIVE BRAKE PWM | | 24 | GND |
| | 25 | +5V power | P0.23 | 26 | Heatsink temperature |
| P0.31 | 27 | PFC SYNC | | 28 | 3.3V power |
| P0.30 | 29 | PFC PWM | | 30 | GND |
| P0.03 | 31 | Encoder A | | 32 | GND |
| P1.03 | 33 | Encoder B | P0.01 | 34 | Encoder Index |

3.2 USB type B connector CN2

Figure 8. USB type B connector (CN2)

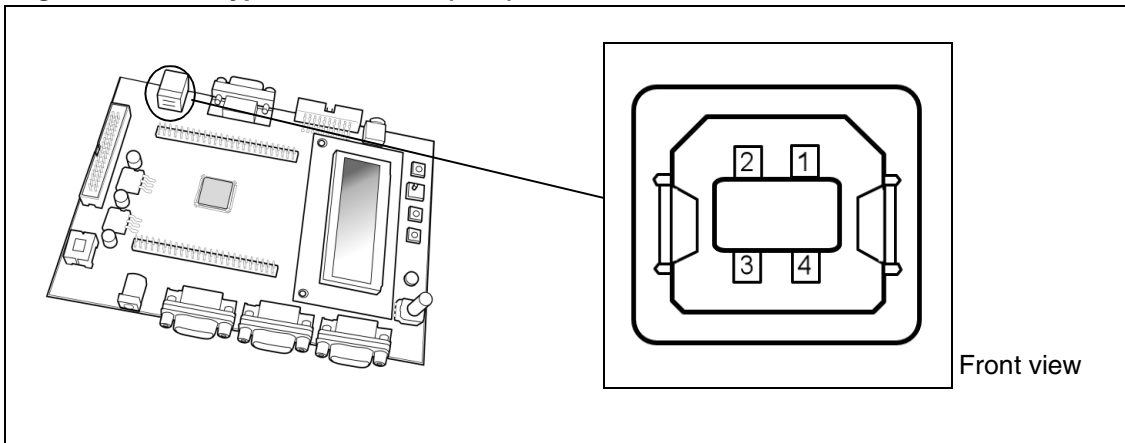


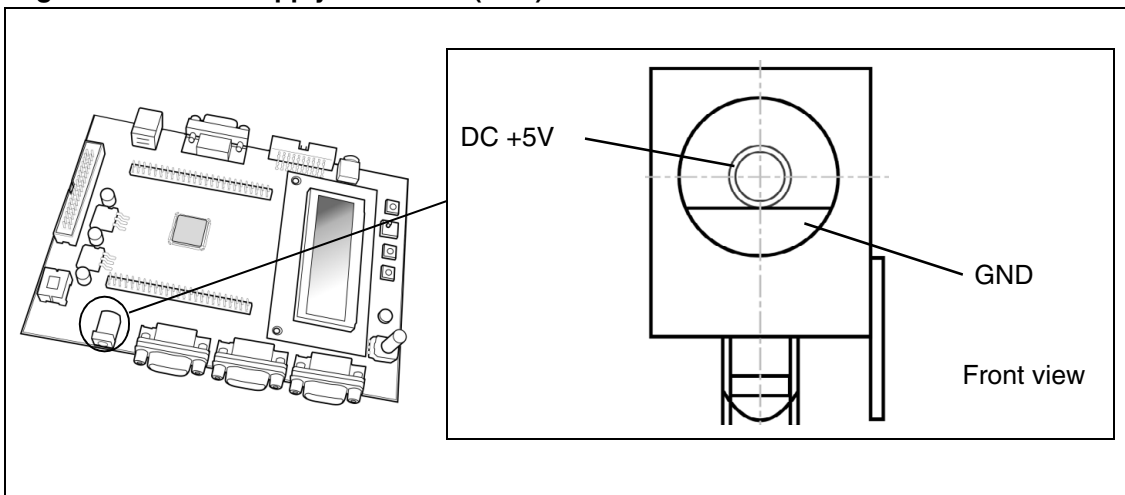
Table 11. USB type B connector (CN2)

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

3.3 Power supply connector CN3

Your STR750-EVAL evaluation board can be powered from a DC 5V power supply via the external power supply jack (CN3) shown in [Figure 9](#). The central pin of CN3 must be positive. For power supply jumper configurations, refer to [section 2.1](#).

Figure 9. Power supply connector (CN3)



3.4 RS232 connectors CN4, CN8 and CN10

Your STR750-EVAL evaluation board includes three connectors (CN4, CN8, CN10) implementing the UART features for RS232 communication, including one connector (CN4) implementing UART hardware flow control.

Figure 10. RS232 connectors (CN4, CN8 and CN10)

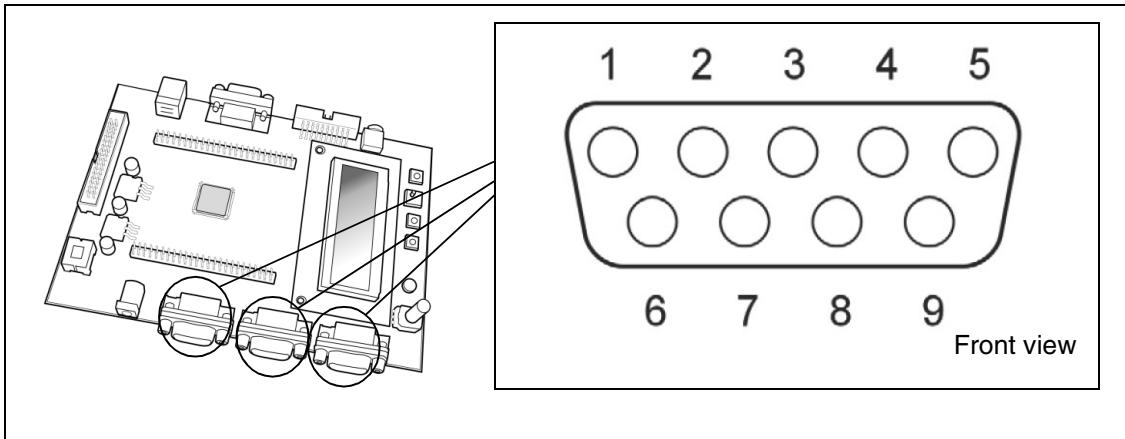


Table 12. RS232 connectors (CN4, CN8, CN10)

| Pin Number | Description | Pin Number | Description |
|--------------------------------|-------------|------------|-------------|
| CN4 (with flow control) | | | |
| 1 | | 2 | UART0_RXD |
| 3 | UART0_TXD | 4 | |
| 5 | GND | 6 | |
| 7 | UART0_RTS | 8 | UART0_CTS |
| 9 | | | |
| CN8 | | | |
| 1 | NC | 2 | UART1_RXD |
| 3 | UART1_TXD | 4 | |
| 5 | GND | 6 | |
| 7 | | 8 | |
| 9 | NC | | |
| CN10 | | | |
| 1 | NC | 2 | UART2_RXD |
| 3 | UART2_TXD | 4 | |
| 5 | GND | 6 | |
| 7 | | 8 | |
| 9 | NC | | |

3.5 CAN type D, 9-pin connector CN5

Figure 11. CAN type D, 9-pin male connector (CN5)

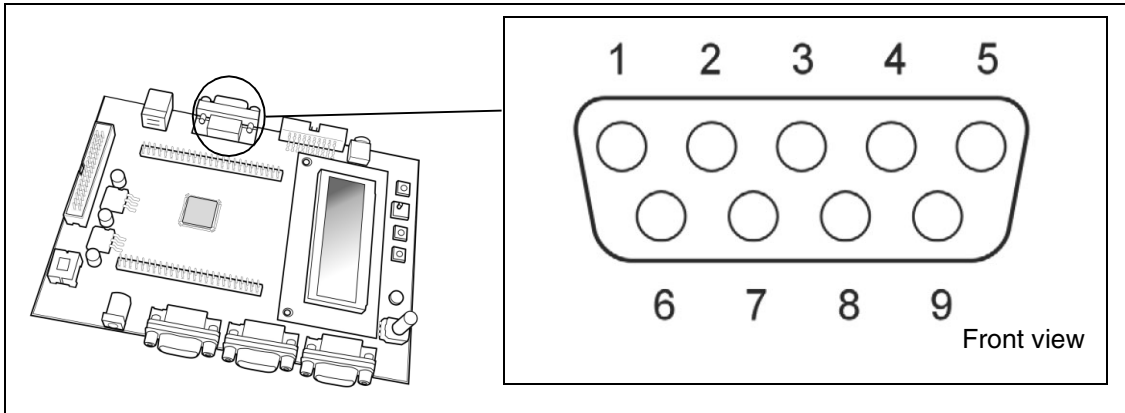


Table 13. CAN type D, male 9-pin connector (CN5)

| Pin Number | Description | Pin Number | Description |
|------------|-------------|------------|--------------|
| 1, 4, 5 | NC | 7 | CANH |
| 2 | CANL | 9 | CANV+ (3.3V) |
| 3, 6, 8 | GND | | |

3.6 JTAG debug connector CN9

Figure 12. JTAG debug connector (CN9)

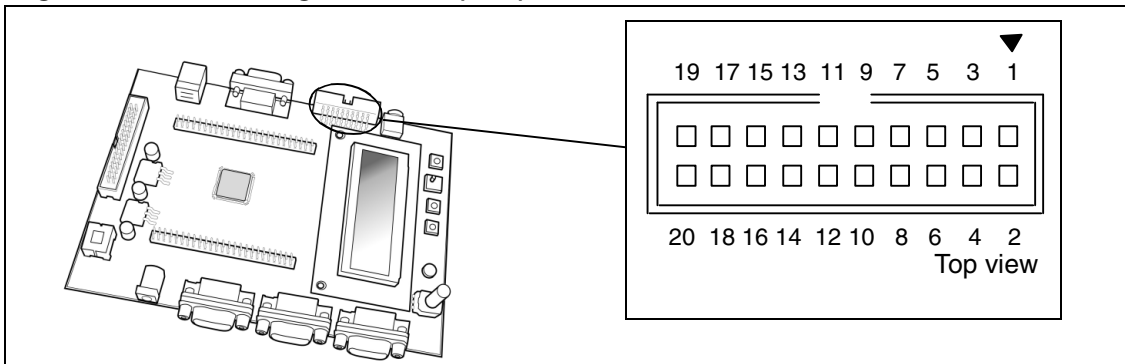


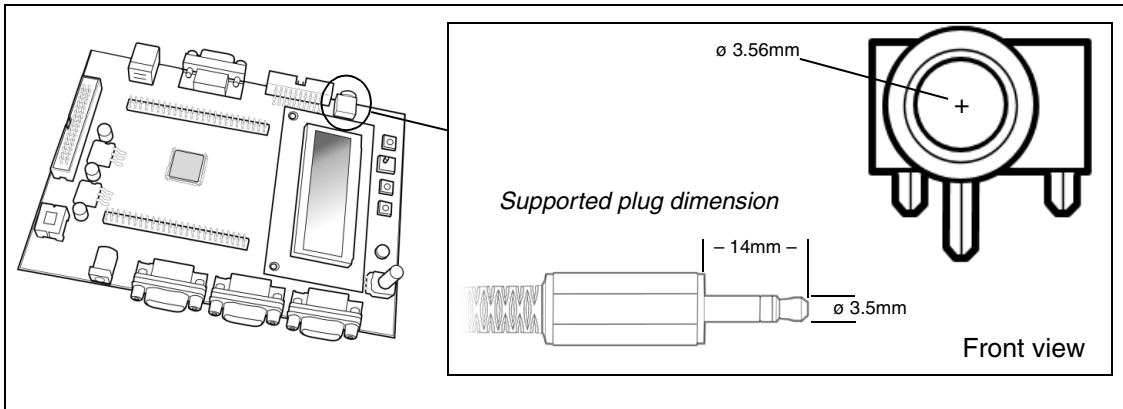
Table 14. JTAG debug connector (CN9)

| Pin Number | Description | Pin Number | Description |
|------------|-------------|------------|-------------|
| 1 | 3.3V power | 2 | 3.3V power |
| 3 | TRST | 4 | GND |
| 5 | TDI | 6 | GND |
| 7 | TMS | 8 | GND |
| 9 | TCK | 10 | GND |
| 11 | RTCK | 12 | GND |
| 13 | TDO | 14 | GND |
| 15 | nSRST | 16 | GND |
| 17 | DBGRRQ | 18 | GND |
| 19 | DBGACK | 20 | GND |

3.7 External speaker jack CN11

Your STR750-EVAL evaluation board includes a Mono, Ø3.5mm audio jack (CN11) for connecting an external 8Ω speaker shown in [Figure 13](#). For information about audio circuit controls, refer to section [Section 2.5](#).

Figure 13. Power supply connector (CN3)



3.8 Daughter board extension connector CN6 and CN7

Two 50-pin male headers CN6 and CN7 can be used to connect a daughter board or standard wrapping board to STR750-EVAL evaluation board. All 72 GPI/Os and the EMI interface control signals are available on these connectors. Each pin on CN5 and CN6 can be used by a daughter board after disconnecting it from the corresponding function block on STR750-EVAL evaluation board. Please refer to [Table 15](#) and [Table 16 on page 23](#) for details.

Table 15. Daughter board extension connector (CN6)

| Pin Number | Description | Alternate Function | To disconnect from the STR750-EVAL function block |
|------------|-------------|--------------------|--|
| 1 | GND | | |
| 3 | P2.11 | LCD | Remove LCD module |
| 5 | P0.06 | SPI Flash | Remove R15 |
| 7 | P0.04 | SPI Flash | Remove R10 |
| 9 | P1.09 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 11 | P2.09 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 13 | P2.07 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 15 | P2.05 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 17 | P1.07 | Joystick (down) | Remove R48 |
| 19 | GND | No | - |
| 21 | P1.04 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 23 | P1.13 | Joystick (right) | Remove R45 |
| 25 | P1.00 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 27 | P1.12 | Joystick (left) | Remove R44 |

Table 15. Daughter board extension connector (CN6)

| Pin Number | Description | Alternate Function | To disconnect from the STR750-EVAL function block |
|------------|-------------|--------------------|---|
| 29 | P0.02 | Joystick (select) | Remove R46 |
| 31 | NC | No | - |
| 33 | P0.01 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 35 | P0.31 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 37 | P0.29 | Motor control | JP7 is Not fitted |
| 39 | GND | No | - |
| 41 | P2.04 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 43 | P2.02 | LCD | Remove LCD module |
| 45 | P0.21 | UART1_TXD | - |
| 47 | NC | - | - |
| 49 | D5V | - | - |
| 2 | P2.10 | LCD | Remove LCD module |
| 4 | P0.07 | SPI Flash | - |
| 6 | P0.05 | SPI Flash | - |
| 8 | P1.10 | Motor Control | Remove R11 |
| 10 | GND | - | - |
| 12 | P2.08 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 14 | P2.06 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 16 | P1.08 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board JP7 is Not fitted |
| 18 | P1.06 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 20 | P1.05 | Key PB3 | Remove R49 |
| 22 | NC | - | - |
| 24 | P1.14 | Microphone | Remove R38 |
| 26 | P1.01 | LED0 | Remove R39 |
| 28 | P0.03 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 30 | GND | - | - |
| 32 | NC | - | - |
| 34 | P0.00 | BOOT | - |
| 36 | P0.30 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 38 | P0.28 | - | - |
| 40 | P0.23 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 42 | P2.03 | LCD | Remove LCD module |
| 44 | P0.22 | - | - |
| 46 | P0.20 | UART1_RXD | Remove R34 |
| 48 | NC | - | - |
| 50 | GND | - | - |

Table 16. Daughter board extension connector (CN7)

| Pin Number | Description | Alternate Function | To disconnect from the STR750-EVAL function block |
|------------|-------------|----------------------|--|
| 1 | GND | No | - |
| 3 | P1.03 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 5 | P0.15 | CAN_TX | - |
| 7 | P2.13 | LCD | Remove LCD module |
| 9 | P1.05 | PB3 | - |
| 11 | RESET# | - | - |
| 13 | NC | - | - |
| 15 | P2.15 | LCD | Remove LCD module |
| 17 | NC | - | - |
| 19 | D5V(note1) | - | - |
| 21 | P0.16 | LED1 | Remove R40 |
| 23 | NC | - | - |
| 25 | P0.17 | Potentiometer RV2 | Remove R33 |
| 27 | P0.19 | USB 48MHz oscillator | Remove U7 |
| 29 | P0.25 | UART2_TXD | - |
| 31 | P0.27 | Motor Control | Disconnect STR750Fx-EVAL evaluation board from motor power drive board |
| 33 | P2.17 | LCD | Remove LCD module |
| 35 | P2.19 | LED3 | Remove R42 |
| 37 | P0.09 | USB disconnection | Remove R12 |
| 39 | GND | - | - |
| 41 | P0.11 | BOOT | - |
| 43 | P0.13 | RTCK | Remove R50 |
| 45 | P2.01 | LCD | Remove LCD module |
| 47 | P1.17 | TDO | - |
| 49 | P1.19 | TMS | - |
| 2 | P1.02 | Speaker | JP15 is not fitted |
| 4 | RST_OUT | - | - |
| 6 | P0.14 | CAN_RX | Remove R23 |
| 8 | P2.12 | LCD | Remove LCD module |
| 10 | GND | - | - |
| 12 | P1.15 | Wake up | Remove R43 |
| 14 | P2.14 | LCD | Remove LCD module |
| 16 | NC | - | - |
| 18 | NC | - | - |
| 20 | NC | - | - |
| 22 | P2.16 | LCD | Remove LCD module |
| 24 | NC | - | - |
| 26 | P0.18 | - | - |
| 28 | P0.24 | UART2_RXD | Remove R35 |
| 30 | GND | - | - |
| 32 | P0.26 | - | - |

Table 16. Daughter board extension connector (CN7)

| Pin Number | Description | Alternate Function | To disconnect from the STR750-EVAL function block |
|------------|-------------|--------------------|---|
| 34 | P1.11 | UART2_TXD | - |
| 36 | P2.18 | LED2 | Remove R41 |
| 38 | P0.08 | Joystick (up) | Set JP18 to positions 2 & 3 |
| 40 | P0.10 | UART0_RXD | Remove R36 |
| 42 | P0.12 | UART0_CTS | Remove R37 |
| 44 | P2.00 | LCD | Remove LCD module |
| 46 | P1.16 | TDI | - |
| 48 | P1.18 | TCK | - |
| 50 | GND | - | - |

4 Schematics

This section provides design schematics for the STR750-EVAL key features, which are provided to help users implement these features in their own application designs. Schematics are provided for:

- STR750F microcontroller connections ([Figure 15](#))
- Power supply ([Figure 16](#))
- UART connectors ([Figure 17](#))
- USB and CAN connectors ([Figure 18](#))
- Audio record and playback features ([Figure 19](#))
- JTAG and motor control connectors ([Figure 20](#))
- LCD and joystick features ([Figure 21](#))

Schematics have versions, as do major versions of the evaluation board. Schematic version numbers are made up of a letter-number combination (e.g. A.1, A.2, B.1, B.2, ...), which is found in the information block on each schematic page. In these version numbers, the letter indicates the version of the evaluation board that the drawings correspond to, where as the number indicates the revision of the schematics for a given version of the evaluation board. One (1) indicates that the schematics for the specified board are in their initial version (have not been revised).

Figure 14. Find the version of your evaluation board

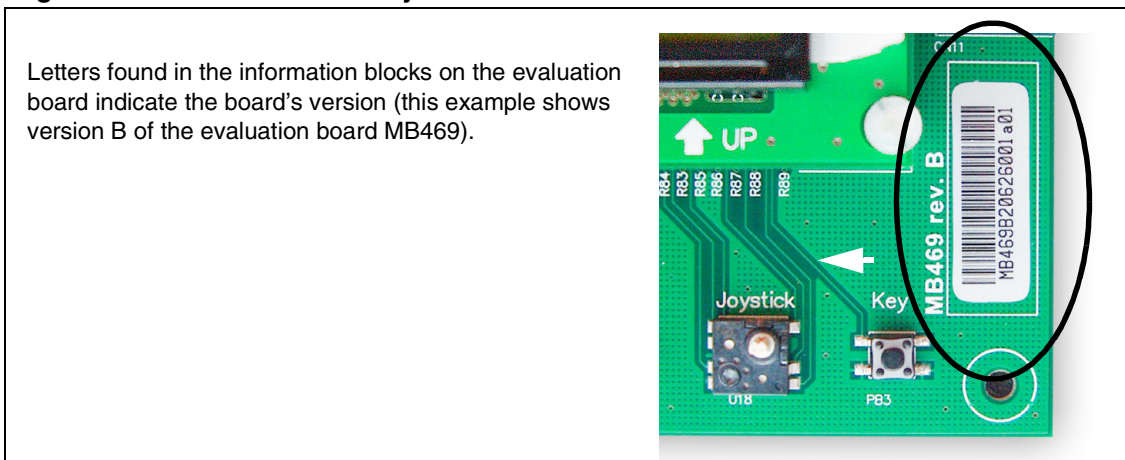


Figure 15. STR750F microcontroller connections

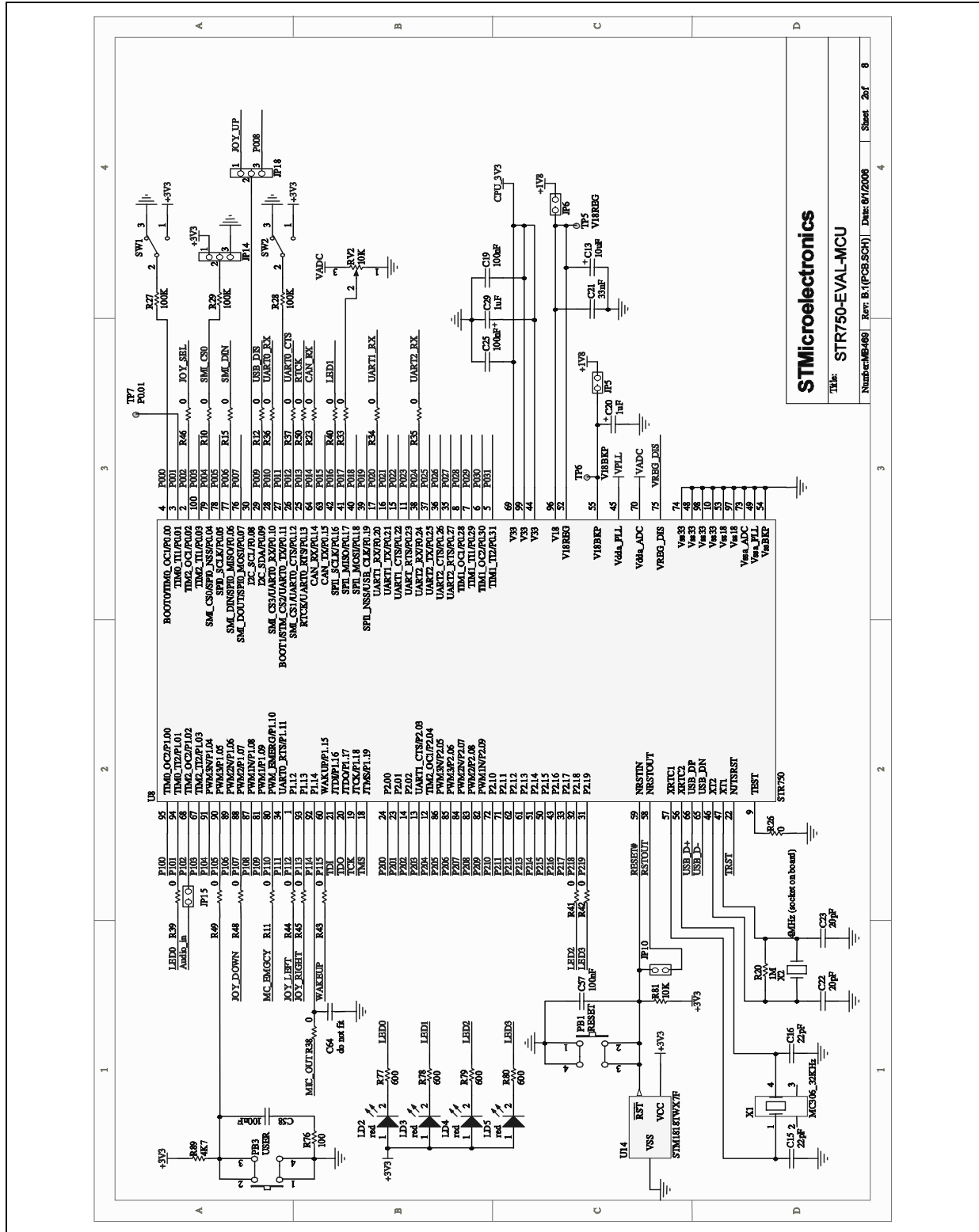
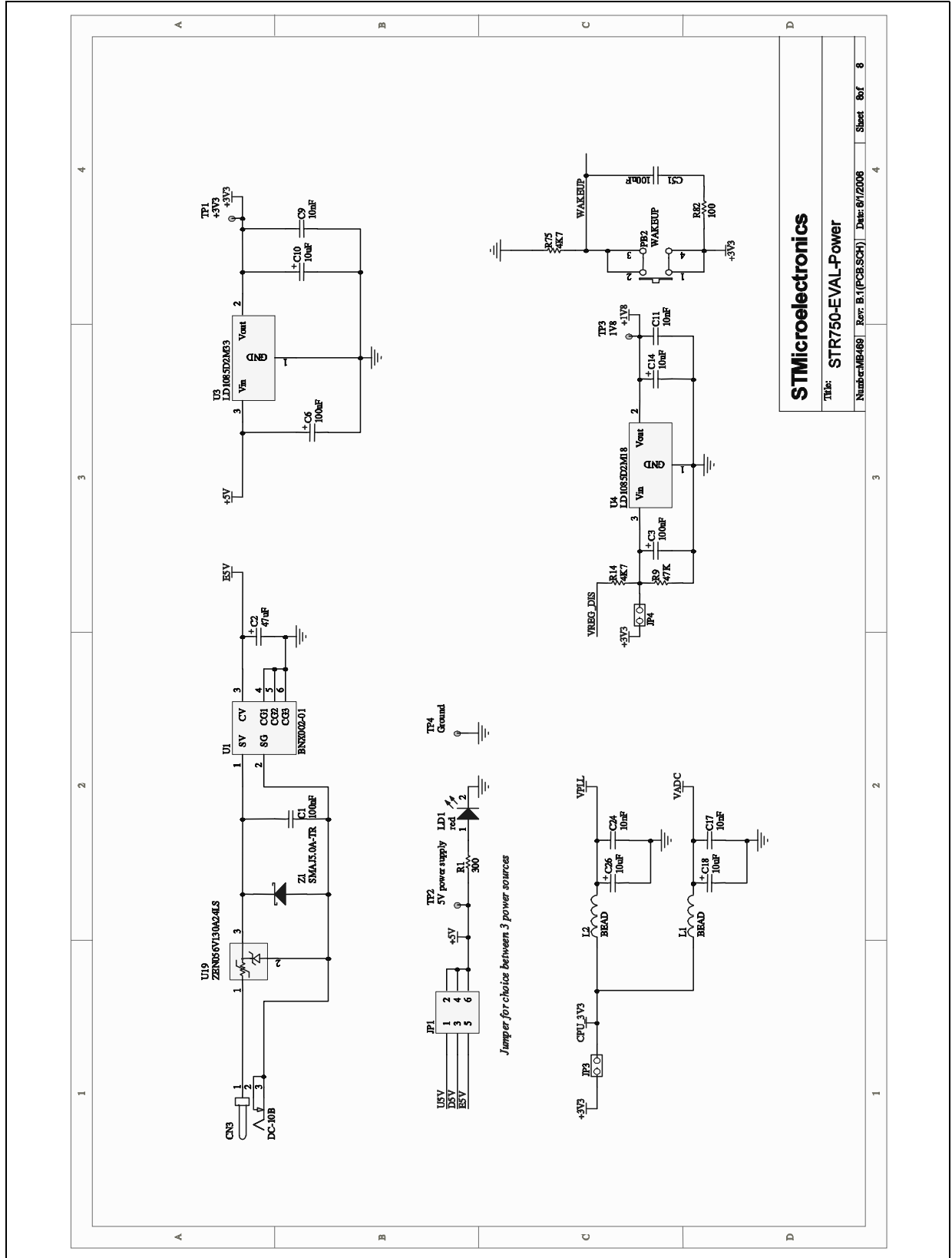


Figure 16. Power supply



| | |
|---------------------------|--------------------|
| STMicroelectronics | |
| Title: STR750-EVAL-Power | |
| Number: MB489 | Rev: B.1 (PCB SCH) |
| Date: 01/2006 | Sheet: 8 of 8 |

Figure 17. UART connections

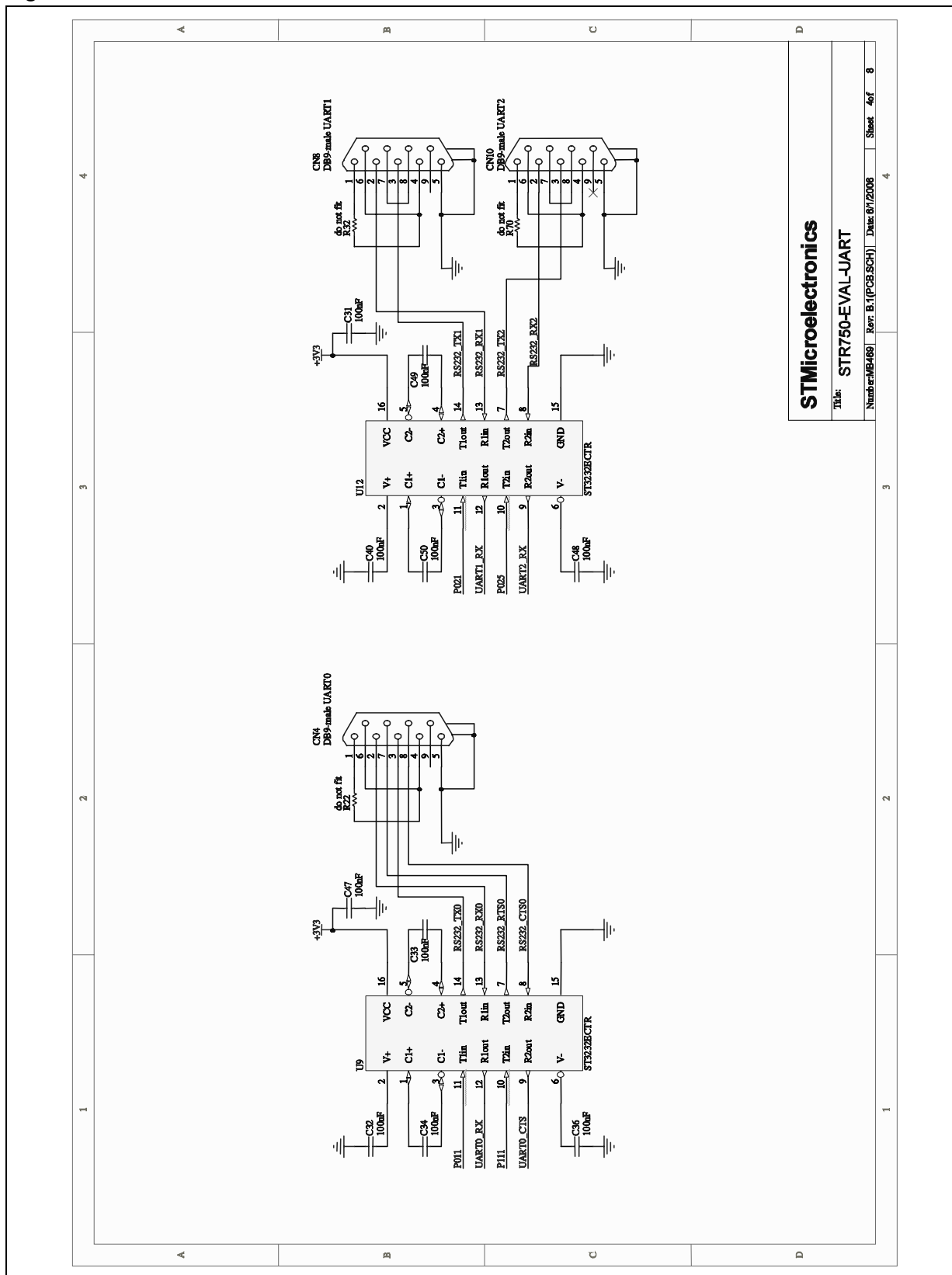


Figure 18. USB and CAN peripherals

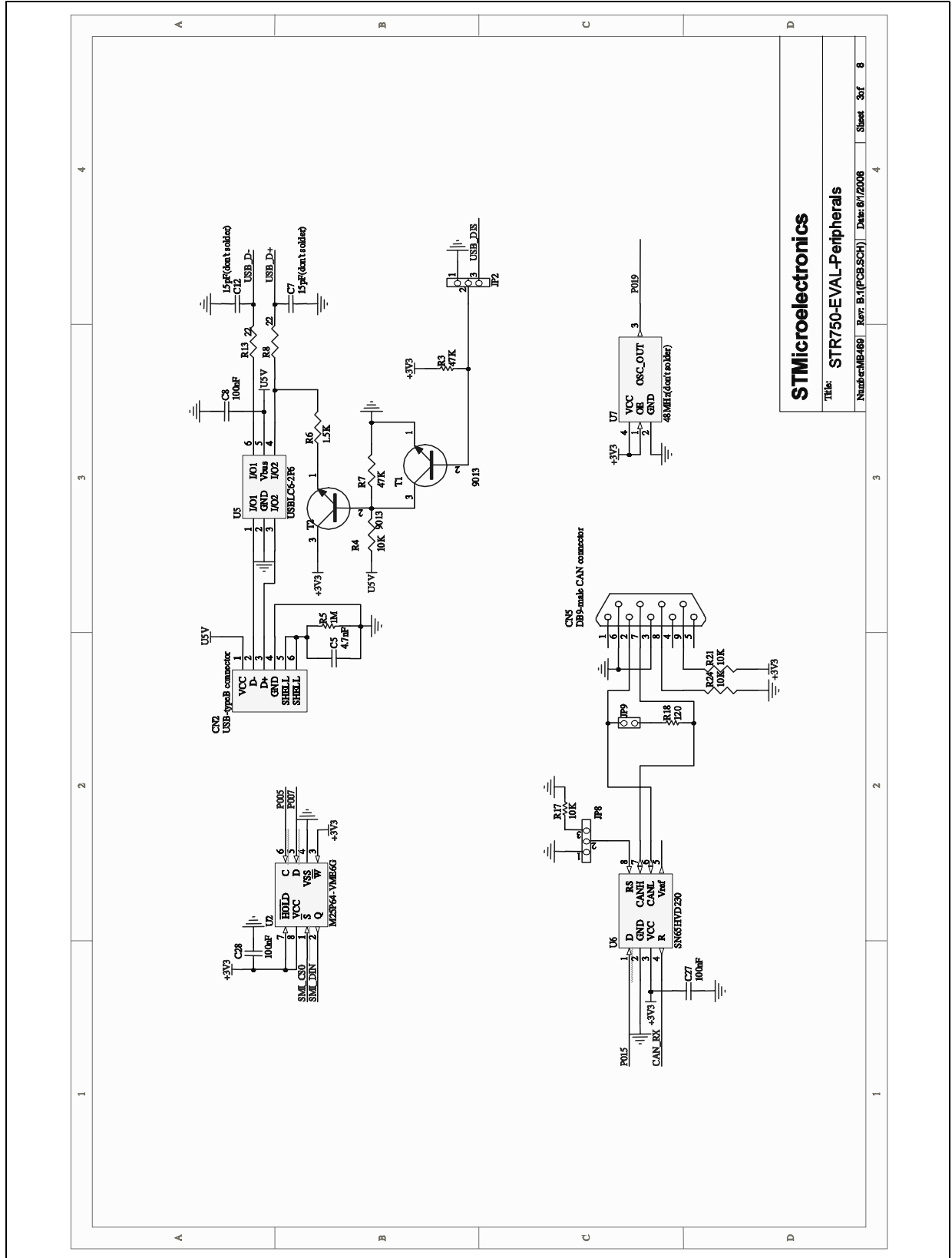
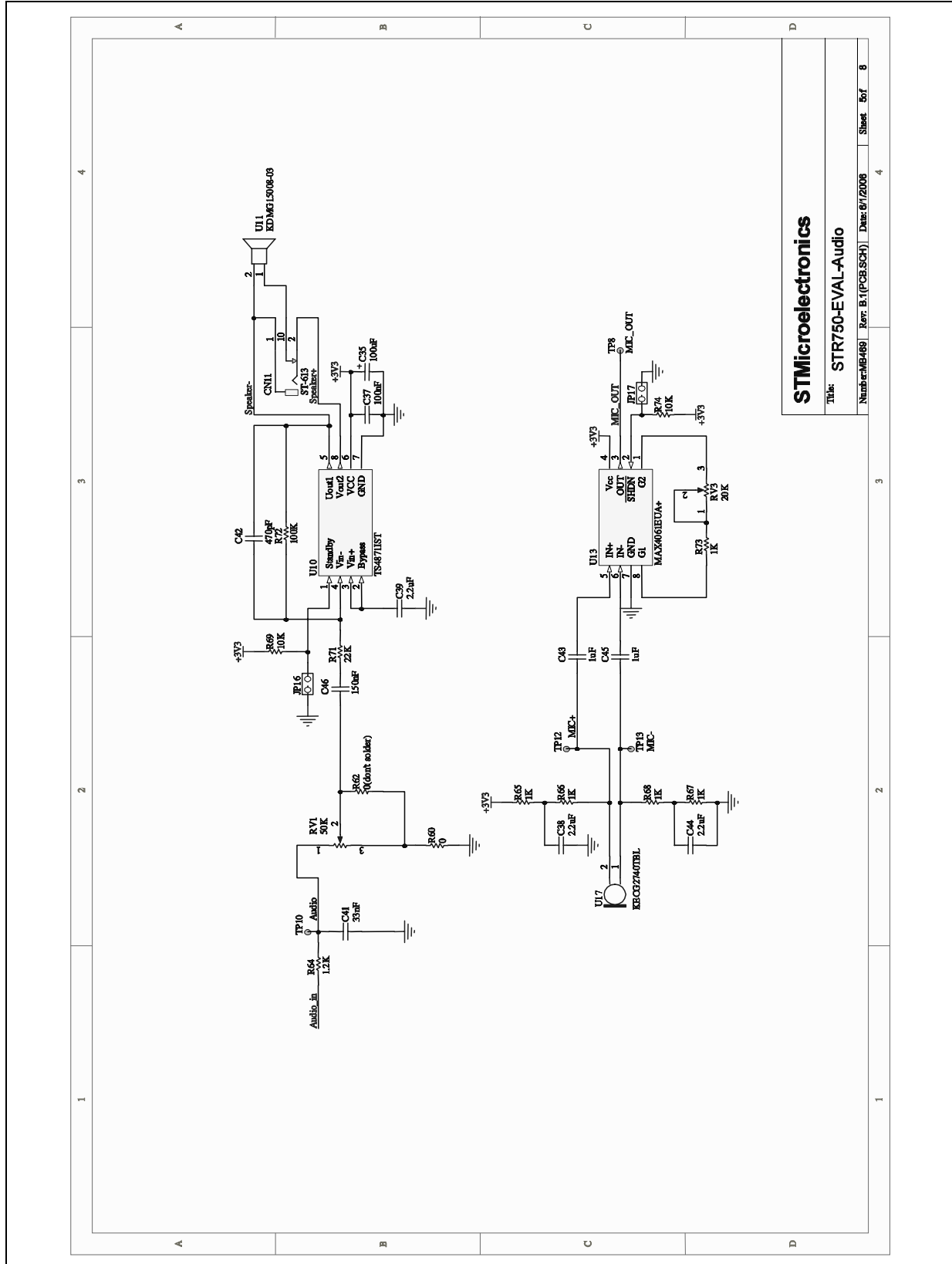


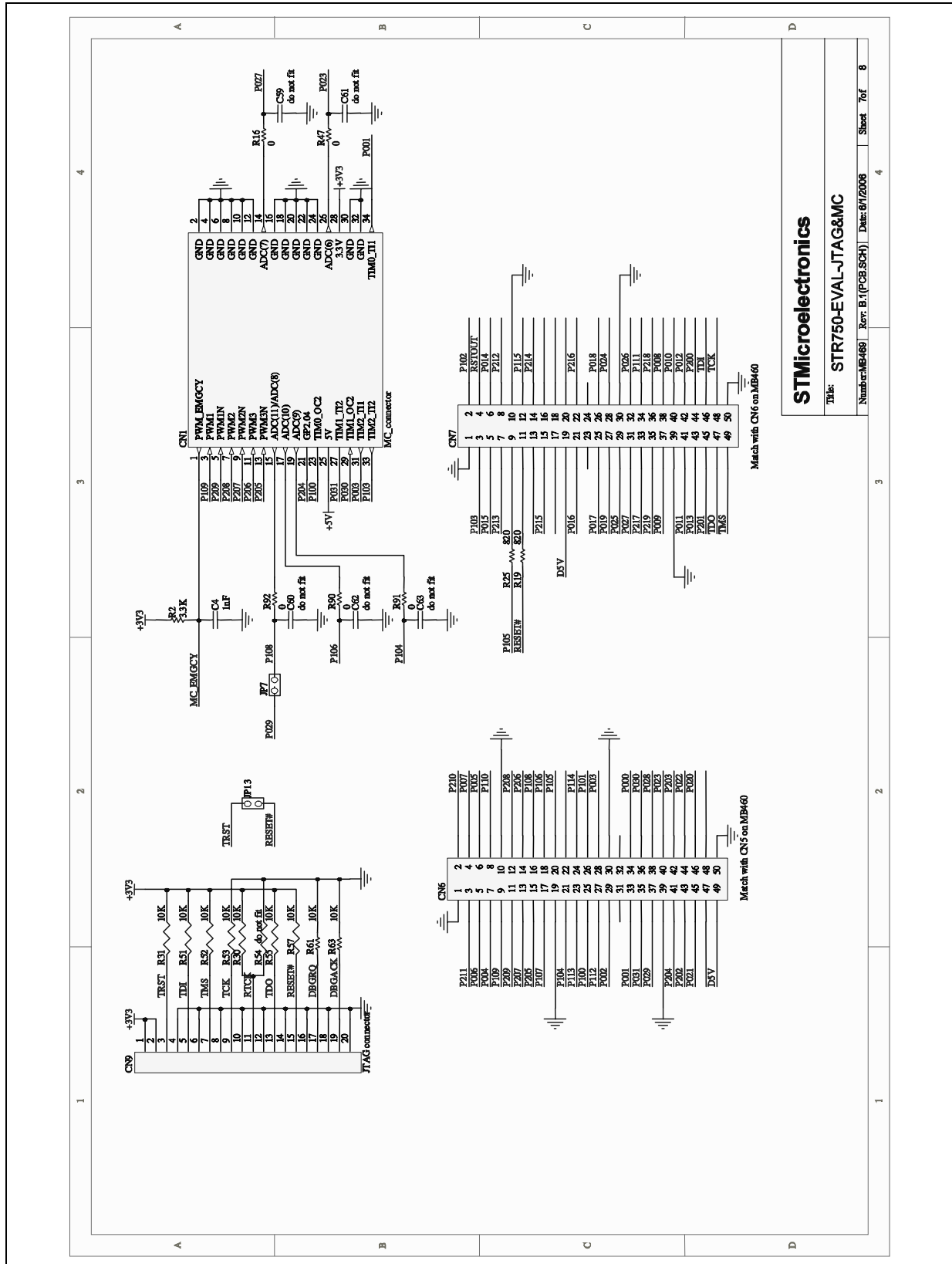
Figure 19. Audio peripheral



| | |
|---------------------------|--------------------|
| STMicroelectronics | |
| Title: STR750-EVAL-Audio | |
| Number: MB468 | Rev: B.1 (PCB SCH) |
| Date: 01/2006 | Sheet: 6 of 8 |



Figure 20. JTAG, motor control and daughter board connections



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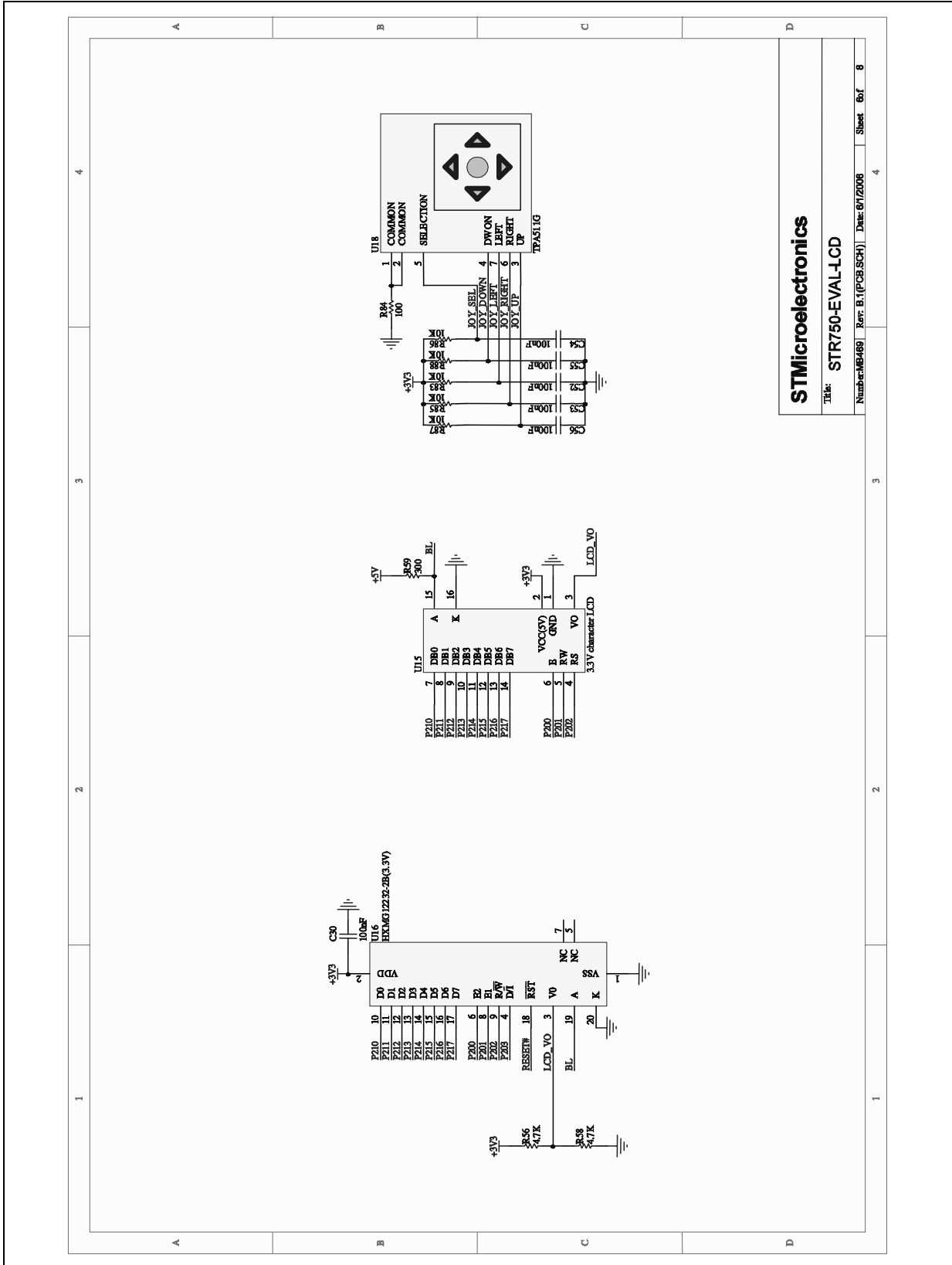
Title: STR750-EVAL-JTAG&MC

Number: MB460 Rev: B.1 (PCB SCH) Date: 8/2008

Sheet 7 of 8



Figure 21. LCD and joystick



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TRM: STR750-EVAL-LCD

Number: 468 Rev: B.1 (PCB SCH) Date: 01/2008 Sheet 6 of 8



Appendix A Implemented pin functions of STR750F

The STR750-Eval peripheral implementation requires the use of several alternate pin functions. Table shows primary and alternate pin functions for the **STR750F** used in the application board design. The table indicates the pin functions used for STR750-EVAL peripherals in gray.

Table 17. Implemented pin functions of STR750F

| Pin # | Pin Name | External interrupt | Alternate functions | | | | Boot/Test | For peripheral function... |
|-------|----------|--------------------|---------------------|-----------|----------------------------|----------------------------|----------------|----------------------------|
| | | | 1 | 2 | 3 <i>software remap</i> | 4 <i>software remap</i> | | |
| 4 | P0.00 | | TIM1_OC1 | | | | BOOT0 | Boot0 |
| 3 | P0.01 | | TIM1_T11 | MCO | | | | MC pin34 |
| 2 | P0.02 | EXT_IT[0] | TIM3_OC1 | ADC_IN(0) | | | | Joystick_sel |
| 100 | P0.03 | | TIM3_T11 | ADC_IN(1) | | | | MC pin31 |
| 79 | P0.04 | | SPI0_NSS | | SMI_CS0 | TIM1_OC2 | | Flash_cs |
| 78 | P0.05 | EXT_IT[1] | SPI0_SCLK | | SMI_CK | TIM1_T12 | | Flash_ck |
| 77 | P0.06 | | SPI0_MISO | | SMI_DIN | TIM3_OC2 | | Flash_din |
| 76 | P0.07 | EXT_IT[2] | SPI0_MOSI | | SMI_DOUT | TIM3_T12 | | Flash_dout |
| 30 | P0.08 | EXT_IT[3] | I2C_SCL | | | SPI1_SCLK | | Joystick_up |
| 29 | P0.09 | | I2C_SDA | | | SPI1_MISO | | USB_DIS |
| 28 | P0.10 | EXT_IT[4] | UART0_RX | | SMI_CS3 | SPI1_MOSI | | RS232 1 RX |
| 27 | P0.11 | | UART0_TX | | SMI_CS2 | SPI1_NSS | BOOT1 / DMA | RS232 1 TX/ boot1/DMA |
| 26 | P0.12 | | UART0-CTS | ADC_IN(2) | SMI_CS1 | UART2_RX | | RS232 1 CTS |
| 25 | P0.13 | | UART0-RTS | | | UART2_TX | RTCK | JTAG RTCK |
| 64 | P0.14 | EXT_IT[5] | CAN_RX | | | UART1_RX | | CAN RX |
| 63 | P0.15 | | CAN_TX | | | UART1_TX | | CAN TX |
| 42 | P0.16 | | SPI1_SCLK | | | | | LED1 |
| 41 | P0.17 | | SPI1_MISO | ADC_IN(3) | | | | Potentiometer |
| 40 | P0.18 | | SPI1_MOSI | | | | | |

Table 17. Implemented pin functions of STR750F

| | | | | | | | | |
|----|-------|------------|-----------|------------|--------|--|--|---------------|
| 39 | P0.19 | EXT_IT[6] | SPI1_NSS | ADC_IN(4) | USB_CK | | | USB CK |
| 17 | P0.20 | | UART1_RX | | | | | RS232 2 RX |
| 16 | P0.21 | | UART1_TX | | | | | RS232 2 TX |
| 15 | P0.22 | | UART1_CTS | ADC_IN(5) | | | | |
| 11 | P0.23 | | UART1_RTS | ADC_IN(6) | | | | MC pin26 |
| 38 | P0.24 | | UART2_RX | | | | | RS232 3 RX |
| 37 | P0.25 | | UART2_TX | | | | | RS232 3 TX |
| 36 | P0.26 | | UART2_CTS | | | | | |
| 35 | P0.27 | | UART2_RTS | ADC_IN(7) | | | | MC pin14 |
| 8 | P0.28 | | TIM2_OC1 | | | | | |
| 7 | P0.29 | | TIM2_T11 | ADC_IN(8) | | | | MC pin15 |
| 6 | P0.30 | | TIM2_OC2 | | | | | MC pin29 |
| 5 | P0.31 | | TIM2_T12 | | | | | MC pin27 |
| | | | | | | | | |
| 95 | P1.00 | | TIM1_OC2 | | | | | MC pin23 |
| 94 | P1.01 | | TIM1_T12 | | | | | LED0 |
| 68 | P1.02 | | TIM3_OC2 | | | | | Speaker |
| 67 | P1.03 | | TIM3_T12 | | | | | MC pin 33 |
| 91 | P1.04 | | PWM3N | ADC_IN(9) | | | | MC pin19 |
| 90 | P1.05 | EXT_IT [7] | PWM3 | | | | | User button |
| 89 | P1.06 | | PWM2N | ADC_IN(10) | | | | MC pin17 |
| 88 | P1.07 | EXT_IT[8] | PWM2 | | | | | Joystick down |
| 87 | P1.08 | | PWM1N | ADC_IN(11) | | | | MC pin 15 |
| 81 | P1.09 | EXT_IT[9] | PWM1 | | | | | MC pin3 |
| 80 | P1.10 | EXT_IT[10] | PWM_EMGCY | | | | | MC pin1 |
| 34 | P1.11 | EXT_IT[11] | UART0_RTS | ADC_IN(12) | | | | RS232 1 RTS |

Table 17. Implemented pin functions of STR750F

| | | | | | | | | |
|----|-------|---|-----------|------------|--|--|------|----------------|
| 1 | P1.12 | EXT_IT [12] | | ADC_IN(13) | | | | Joystick left |
| 93 | P1.13 | EXT_IT [13] | | ADC_IN(14) | | | | Joystick right |
| 92 | P1.14 | | | ADC_IN(15) | | | | Audio IN |
| 60 | P1.15 | WAKUP | | | | | | Wake up button |
| 21 | P1.16 | To be used as an I/O, the software has to configure a dedicated control register. In this case, the debug and test of this I/Os is not possible | | | | | JTDI | JTAG TDI |
| 20 | P1.17 | | | | | | JTDO | JTAG TDO |
| 19 | P1.18 | | | | | | JTCK | JTAG TCK |
| 18 | P1.19 | | | | | | JTMS | JTAG TMS |
| 24 | P2.00 | | | | | | | LCD |
| 23 | P2.01 | | | | | | | |
| 14 | P2.02 | | | | | | | |
| 13 | P2.03 | | UART1_RTS | | | | | |
| 12 | P2.04 | | TIM3_OC1 | | | | | MC pin21 |
| 86 | P2.05 | | PWM3N | | | | | MC pin13 |
| 85 | P2.06 | | PWM3 | | | | | MC pin11 |
| 84 | P2.07 | | PWM2N | | | | | MC pin9 |
| 83 | P2.08 | | PWM2 | | | | | MC pin7 |
| 82 | P2.09 | | PWM1N | | | | | MC pin5 |
| 72 | P2.10 | | | | | | | LCD |
| 71 | P2.11 | | | | | | | |
| 62 | P2.12 | | | | | | | |
| 61 | P2.13 | | | | | | | |
| 51 | P2.14 | | | | | | | |
| 50 | P2.15 | | | | | | | |

Table 17. Implemented pin functions of STR750F

| | | | | | | | | |
|----|-------|--|-----------|--|--|--|--|------|
| 43 | P2.16 | | | | | | | LCD |
| 33 | P2.17 | | UART2_RTS | | | | | |
| 32 | P2.18 | | | | | | | LED2 |
| 31 | P2.19 | | | | | | | LED3 |

Appendix B Product Support

If you experience any problems with this product, or if you need spare parts or repairs, contact the distributor or the STMicroelectronics sales office where you purchased the product. Phone numbers for major sales regions are provided at www.st.com. You will also find a complete listing of products, documentation, software downloads and user discussion groups to help you answer questions and stay up to date with our latest product developments.

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All our latest software and related documentation are available for download from the ST Internet site, www.st.com/mcu. For information about firmware and hardware revisions, call your distributor or ST using the contact list provided in at www.st.com.

For software support and updates for third-party toolsets, please refer to your third-party tool supplier.

Hardware spare parts

Some tool components and accessories can be bought separately if you need additional ones. You can order extra components, such as sockets and adapters, from STMicroelectronics, from the component manufacturer or from a distributor.

To help you find what you need, a listing of accessories for ST development tools is available on the ST internet site, www.st.com/mcu.

Sockets

Complete documentation and ordering information for P/TQFP sockets from Yamaichi, Ironwood, CAB and Enplas are provided on the internet site of the respective third-party component provider.

Connectors

Complete documentation and ordering information for connectors is provided on the Samtec internet site.

Getting prepared before you call

Collect the following information about the product before contacting ST or your distributor:

1. Name of the company where you purchased the product.
2. Date of purchase.
3. Order Code: Refer to the product's packaging. The order code may depend on the region in which it was ordered (i.e. the UK, Continental Europe or the USA).
4. Serial Number: typically included on a sticker on evaluation or demonstration boards.
5. Target Device: The sales type of the ST microcontroller you are using in your application.

Appendix C Revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 20-Sep-2006 | 1 | Initial release. |
| 13-Nov-2006 | 2 | Added note to Table 1 about microcontroller consumption measurement |

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