

Main components

- STR710F processor running at 48 MHz
- EMI SRAM 4 Mbytes (2Mx16)
- EMI flash 4 Mbytes (2Mx16)
- SPI serial flash
- I²C EEPROM
- LCD display

Features

- Support for the following interfaces:
 - USB
 - CAN
 - RS232
- LED displays
- Buzzer
- Test buttons
- JTAG connector

Description

The STR710-EVAL board is a complete development platform for the STR71x series. The STR710-EVAL board is a cost effective, flexible and open design to demonstrate the capability of the STR71x series of flash micro-controllers and to enable rapid evaluation of the STR71x devices and available peripherals. It includes the high performance STR710FZ2T6 ARM7TDMI™ device that boasts 256 Kbytes embedded flash with “best-in-class” random access time, 64 Kbytes on-chip high speed SRAM as well as up to 10 serial communication interfaces, including USB and CAN.

The STR710-EVAL board includes SRAM and flash memory on the EMI to enable full freedom in development of large programs before custom hardware is designed. It integrates a 2x16 LCD, LEDs, UART, CAN, USB interfaces, piezo buzzer and test buttons to create a versatile stand-alone test platform. A wide choice of development tool support is readily available, including tools from: STMicroelectronics, ARM, Ashling, Green Hills, Hitex, IAR and PLS.

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1 Introduction

STMicroelectronics is a global independent semiconductor company that designs, develops, manufactures and markets a broad range of semiconductor integrated circuits and discrete devices used in a wide variety of applications.

The STR710-EVAL board is based on the STR710FZ2T6, a highly integrated microcontroller, running at 48 MHz that combines the popular ARM7TDMI™ 32-bit RISC CPU with 256 Kbytes of embedded flash, 64 Kbytes of high speed SRAM, and numerous on-chip peripherals.

This board is intended as low cost development platform to demonstrate the capability of the STR71x series of flash micro-controllers and to enable rapid evaluation of the STR71x devices and available peripherals.

The STR710-EVAL board has 4 Mbytes of SRAM, and 4 Mbytes of flash on EMI, 1-Mbit SPI serial flash and 8-kbits EEPROM. It supports USB, CAN and RS232 interfaces. The on-board chip STR710FZ2T6 is an ARM7TDMI™ 32-bit RISC micro-controller.

This board includes a 2x16 programmable LCD display supported by reset, next and select push buttons.

Because the STR710FZ2T6 is the superset of the STR71xF series, with 144-pin, EMI, 256 Kbytes of flash and 64 Kbytes of SRAM, an alternative use of the STR710-EVAL board is as an evaluation platform for STR711F and STR712F devices.

The hardware platform of the STR710F series is supported by an extensive software support package, including device drivers in ANSI C source form and demonstration software. It is flashed with a demonstration application that shows the basic features of the device. Development tools are readily available. This is complimented by a range of third party real-time OS and middleware.

Design schematics can also be supplied in electronic format to those customers with compatible design environments.

1.1 Processor and memory devices on this board

- STR710FZ2T6 ARM7TDMI™ processor running at 48 MHz, IC13:
 - 144-pin TQFP version,
 - 256 Kbytes flash program memory (100,000 cycles endurance),
 - 64 Kbytes RAM,
 - embedded 1.8 V voltage regulator for core supply (options to use the on-board 1.8 V regulator allows full speed operations,
 - nested interrupt controller.
- External memory interface:
 - flash (bank 0) 4 Mbytes arranged as 2M x 16: IC12,
 - SRAM (bank 1) 4 Mbytes arranged as 2M x 16: IC14, IC15.
- Clocking:
 - +3.3 V surface mounted 16 MHz oscillator provides the main clock source,
 - RTC real-time clock for wakeup from standby mode with embedded 32 KHz oscillator.
- Serial ROMs:
 - 1-Mbit SPI serial flash connected to the buffered serial peripheral interface (BSPi): IC11,
 - I²C EEPROM: 8-kbit EEPROM connected to the I²C0 interface: IC9.

1.2 Board interface connections

Diagrams and wiring descriptions for these connectors are provided in [Section 4: Schematics on page 16](#). The following connections are supported by the board:

- USB, support USB device using a type B connector: CN3
- CAN uses a single 9 D-type connector with microswitch selectable low or high speed transceiver: CN1
- UART0 (Rx and Tx only) connected to a 9-way male D-type RS232 connector: CN7
- UART1 and 2 (Rx and Tx only) switch selectable, connected to a 9-way male D-type RS232 connector: CN8
- Piezo buzzer: SPKR1
- variable resistor, voltage range 0 to 2.5 V: R63
- prototype area: GD1
- test points, various test points are located throughout the board, for details see [Section 4: Schematics on page 16](#)
- external analog: CN6
- main power supply: CN2

1.3 Push buttons

The following push buttons are provided:

- reset, board reset: SW12
- wakeup, push button to bring processor out of low power mode: SW11
- select, programmable switch: SW4
- next, programmable switch: SW3

1.4 Displays

The following LCD and LEDs are provided:

- LCD display, 2x16 LCD display connected to a parallel EMI LCD interface; green back light display: LCD1
- surface mount red, +5 V and +3.3 V power indicators: LD1, LD2
- surface mount orange, USB powered: LD7
- surface mount orange indicates standby status: LD21
- bi-color red/green: LD20
- low consumption LEDs red: LD3, LD4, LD5, LD6, LD8, LD9, LD10, LD11, LD12, LD13, LD14, LD15, LD16, LD17, LD18, LD19

Note: The LCD I²C0 connection may be used, although the I²C0 connector is not fitted.

2 Hardware

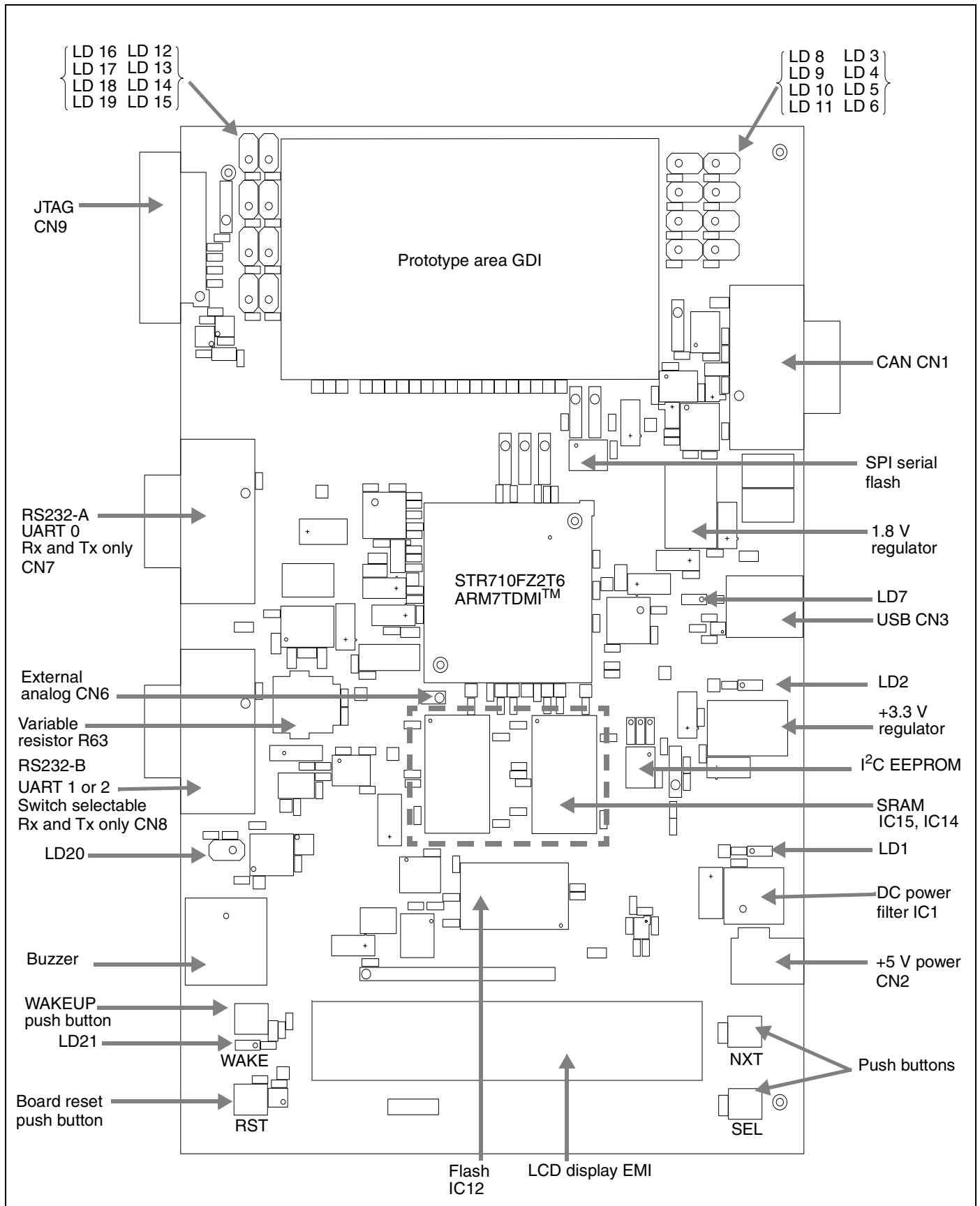


Figure 1: STR710-EVAL board layout block diagram

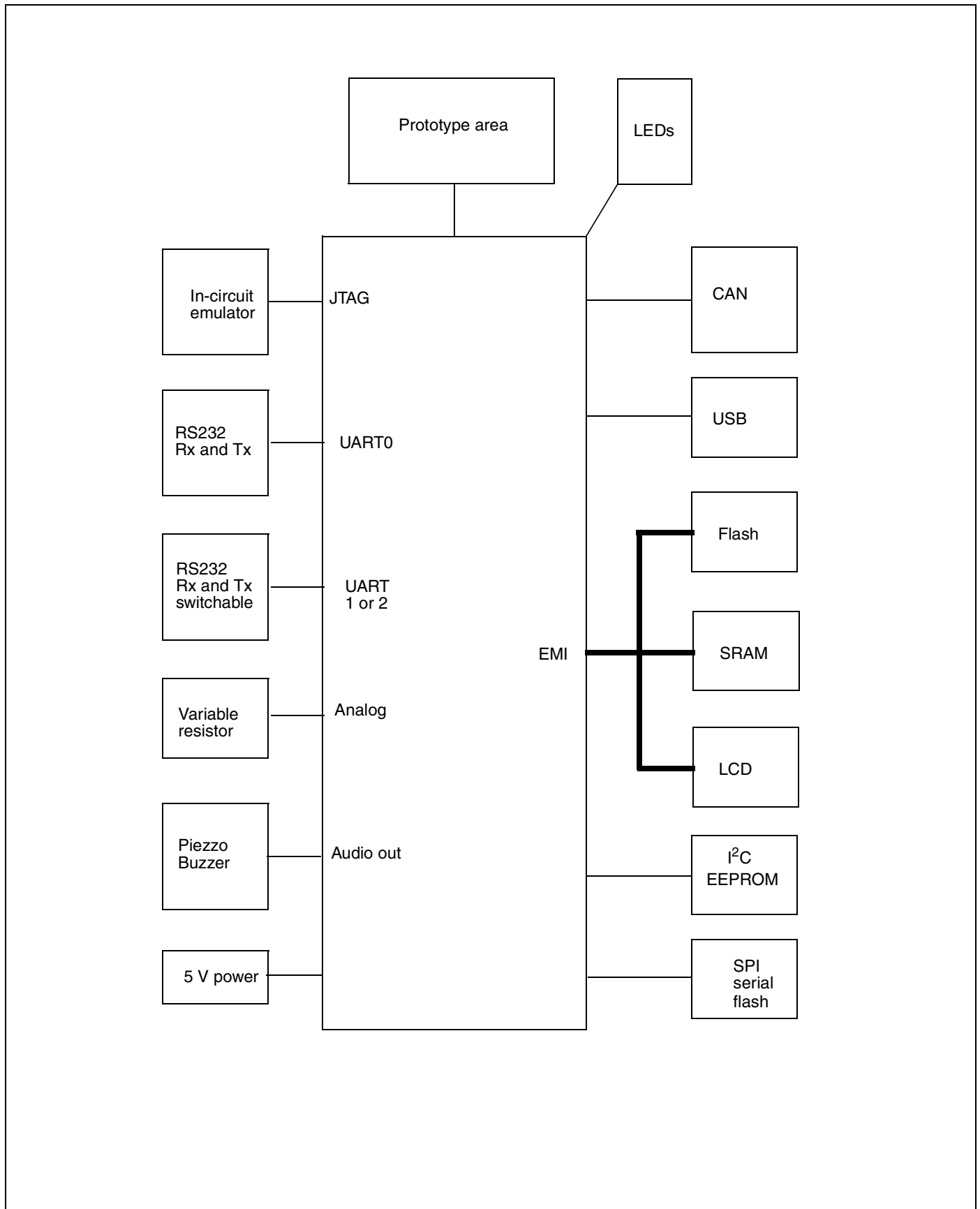


Figure 2: STR710-EVAL board system block diagram

2.1 Overview

The STR710-EVAL board is a general purpose evaluation platform with USB, CAN (controller area network), and RS232 interfaces.

2.2 Processor

The board supports the STR710FZ2T6 ARM7TDMI™ silicon - 144-pin TQFP version. This chip runs at a frequency of 48 MHz.

Boot modes and configuration options are set using micro switches.

2.3 Debug

Software debug is via a standard 20-pin JTAG connection. This may connect to a standard USB to JTAG in-circuit emulator.

2.4 Prototype area

A 2.54x2.54mm gridded area of 1mm holes is available for prototyping using wire wrap or similar prototyping techniques.

2.5 Reset

The Reset sources are:

- power on reset,
- push button reset,
- JTAG reset from an in-circuit emulator.

2.6 Memory

| Region | Usage | Memory map used | Region space available |
|--------|-------------------|--|---------------------------|
| 3 | Unused | Not applicable | 0x6600 0000 - 0x67FF FFFF |
| 2 | LCD | Address 2 is used as the LCD register address signal | 0x6400 0000 - 0x65FF FFFF |
| 1 | SRAM | 0x6200 0000 - 0x623F FFFF | 0x6200 0000 - 0x62FF FFFF |
| 0 | flash (boot bank) | 0x6000 0000 - 0x603F FFFF | 0x6000 0000 - 0x60FF FFFF |

Table 1: STR710-EVAL board EMI memory map

2.7 Power supplies

Power to the board is supplied using a lump in cord power supply providing 5 V to the board. All other required voltages are provided by on-board voltage regulators or voltage convertors.

2.8 USB 1.1 interface

USB 1.1 device supported via type B connector. The USB clock uses a separate 48 MHz oscillator. See [Section 3.1: USB on page 14](#).

2.9 CAN interface

A general purpose, asynchronous serial I/O data port connected through a 9-pin D-type male connector with micro switch selectable low speed (L9669) or high speed (L9615 or L9616) receiver. See [Section 3.2: CAN bus connector on page 14](#).

2.10 RS232 serial interfaces

Two general purpose, asynchronous serial I/O data ports are connected through 9-pin D-type male connectors refer to [Section 3.4: RS232 serial data connector on page 15](#).

RS232-A connects directly to UART0, transmit and receive only. RS232-B connects to either UART1 or UART2 via switch 9, transmit and receive only.

RTS is shorted to CTS and DTR is shorted to DSR at the connector for both interfaces.

2.11 External analog

An external analog input connector is provided, see [Section 3.3: External analog on page 14](#) and [Figure 11: STR710-EVAL board top-level page 1 of 2 on page 16](#).

2.12 Analog input

The analog input to ADC is demonstrated by the variable resistor R63. Although there is a thermistor connected up to the analogue input AIN.1 in the schematics [Figure 11: STR710-EVAL board top-level page 1 of 2 on page 16](#), it is not functional and has been removed from the product.

2.13 LEDs

Software controlled LEDs

The LEDs in [Table 2](#) are software controlled via PIO pins. See the schematic in [Figure 11 on page 16](#).

| LED | Description | Color |
|------|-------------|-----------|
| LD20 | LED_P1_2 | Red/Green |
| LD3 | LED_PO_3 | Red |
| LD4 | LED_PO_2 | |
| LD5 | LED_PO_1 | |
| LD6 | LED_PO_0 | |
| LD8 | LED_PO_12 | |
| LD9 | LED_P1_15 | |
| LD10 | LED_P2_9 | |
| LD11 | LED_P2_10 | |
| LD12 | LED_P2_11 | |
| LD13 | LED_P2_12 | |
| LD14 | LED_P2_13 | |
| LD15 | LED_P2_14 | |
| LD16 | LED_P2_15 | |
| LD17 | LED_P1_6 | |
| LD18 | LED_P1_5 | |
| LD19 | LED_P1_4 | |

Table 2: Software controlled LEDs

Status LEDs

| LED | Description | Schematic |
|------|-------------|--------------------------------------|
| LD1 | +5 V | Figure 12 on page 17 |
| LD2 | +3.3 V | Figure 12 on page 17 |
| LD7 | Vbus | Figure 15 on page 20 |
| LD21 | not STDBY | Figure 11 on page 16 |

Table 3: Status LEDs

2.14 Option jumper placement

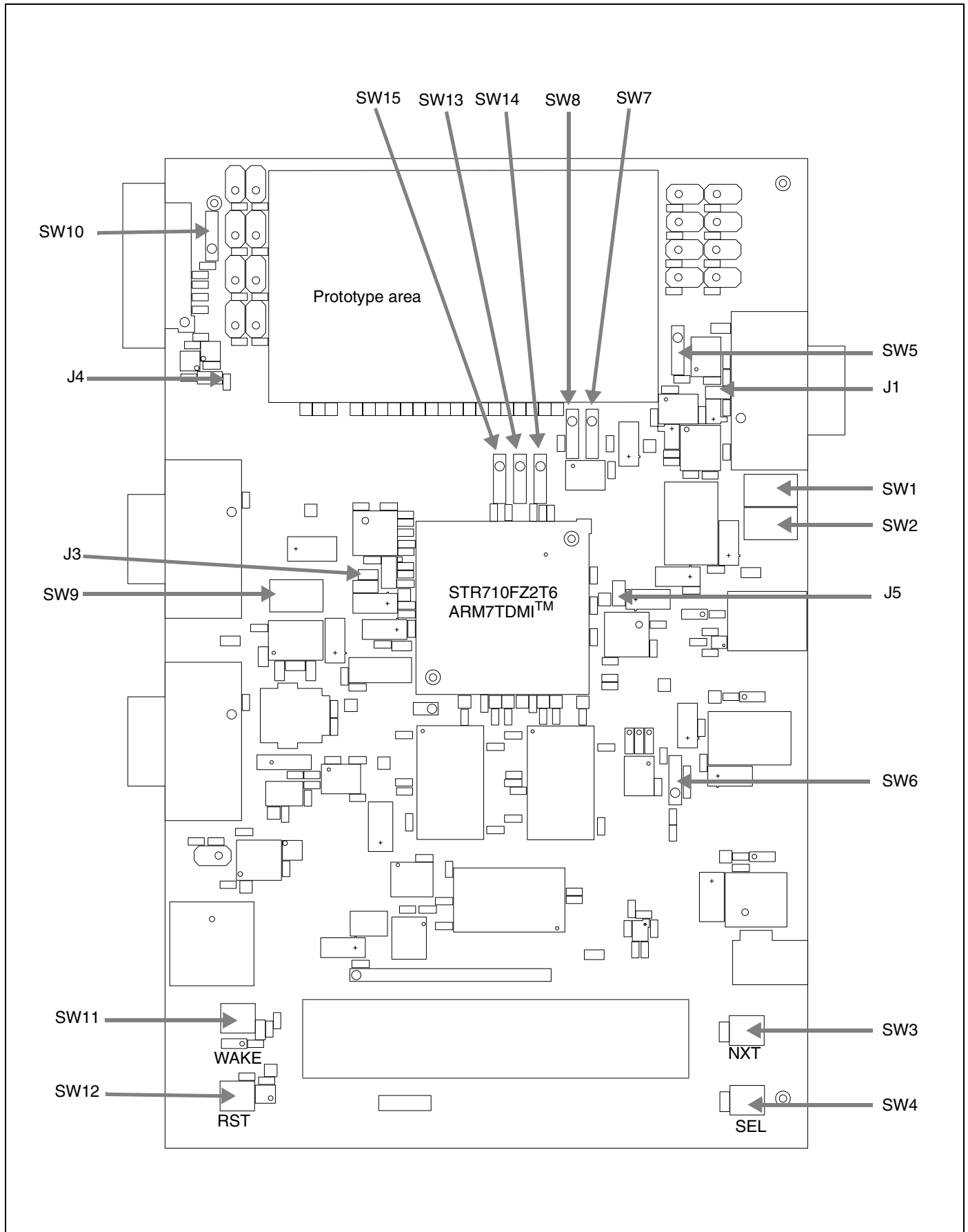
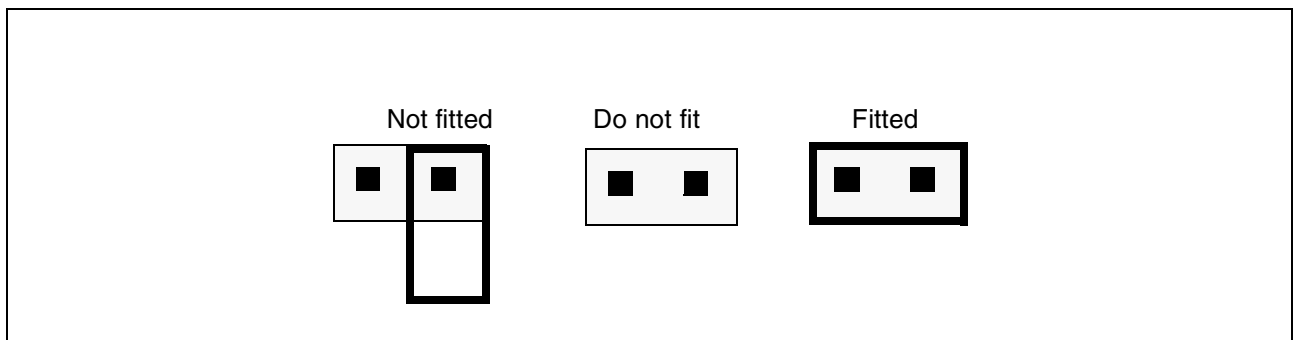


Figure 3: Option jumpers, resistors and switches

| Jumper | Figure | Description | Default |
|--------|--------------------------------------|---|------------|
| J1 | Figure 16 on page 21 | CAN link: not fitted / fitted (default) | Fitted |
| J3 | Figure 12 on page 17 | VBKP supply: internal / board (default)) | Fitted |
| J4 | Figure 19 on page 24 | notJRst / notReset link: connected / open (default) | Not fitted |
| J5 | Figure 12 on page 17 | +1.8 V Supply: external / +1.8 V source (default) | Fitted |

Table 4: Option jumpers

Jumpers are fitted as shown in figure [Figure 4](#):

**Figure 4: Jumper positions**

2.15 Option switch settings

| Switch | Schematic | Description | Default |
|--------|--------------------------------------|---|---------|
| SW1 | Figure 16 on page 21 | CAN device select: L9669 / L9616 (default) Note SW1 and SW2 must be changed together. 1 = L9669 A = L9616 | ON |
| SW2 | | | ON |
| SW3 | Figure 11 on page 16 | LCD Select | PTM |
| SW4 | Figure 11 on page 16 | LCD Next | PTM |
| SW5 | Figure 16 on page 21 | L9616 ASC speed: 1-2 = pull down = high speed 2-3 = pull up = low speed | 2-3 |
| SW6 | Figure 17 on page 22 | I ² C EEPROM write control (notWC): 1-2 = pull down = enable writes to EEPROM 2-3 = pull up = disable writes to EEPROM | 2-3 |
| SW7 | Figure 17 on page 22 | SPI flash notHOLD: 1-2 = pull down = SPI flash in "hold mode" 2-3 = pull up = SPI flash in "normal mode" | 2-3 |
| SW8 | Figure 17 on page 22 | SPI flash notW: 1-2 = pull down = Write protect 2-3 = pull up = Write enabled | 2-3 |
| SW9 | Figure 11 on page 16 | RS232 source select: 1 = UART1 connected to RS232-B A = UART2 connected to RS232-B | 1 |
| SW10 | - | Not fitted: do not fit | - |
| SW11 | Figure 11 on page 16 | Wake up | PTM |
| SW12 | Figure 11 on page 16 | Reset | PTM |
| SW13 | Figure 11 on page 16 | Boot mode 1, see Table 6 on page 13 . | 2-3 |
| SW14 | Figure 11 on page 16 | Boot mode 0, see Table 6 on page 13 . | 1-2 |
| SW15 | Figure 11 on page 16 | Boot EN, see Table 6 on page 13 . | 2-3 |

Table 5: Option switch settings

For switch position details see [Figure 5: Switch positions on page 13](#).

| Boot EN (SW15) | Boot1 B1 (SW13) | Boot0 B0 (SW14) | Mode | Boot memory mapping | Notes | |
|----------------|-----------------|-----------------|--------|------------------------|---|--|
| 1-2 | any | any | USER | flash mapped at 0h | System executes code from flash | |
| 2-3 | 1-2 | 1-2 | | | | |
| 2-3 | 1-2 | 2-3 | BOOT | BOOTFLASH mapped at 0h | System executes a "primary boot loader (ST-firmware)" from Boot-FLASH then jumps to RAM Clock FROZEN | |
| 2-3 | 2-3 | 1-2 | RAM | RAM mapped at 0h | System executes code from internal RAM For Lab development | |
| 2-3 | 2-3 | 2-3 | EXTMEM | EXTMEM mapped at 0h | System executes code from external memory | |

Table 6: Boot modes

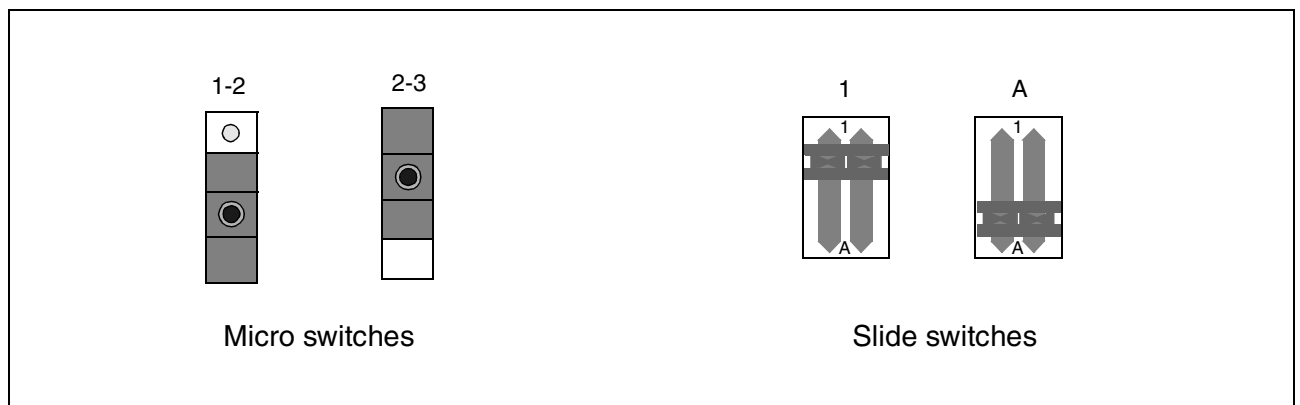


Figure 5: Switch positions

3 Connectors

3.1 USB

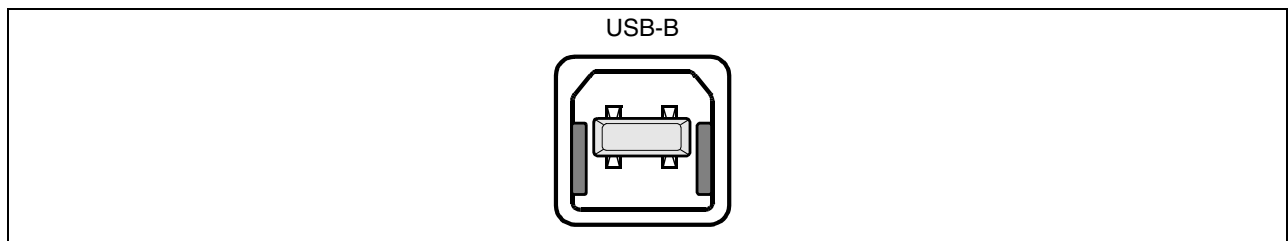


Figure 6: USB-B connector: CN3

| Pin | Description | Pin | Description | Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|-----|-------------|-----|-------------|
| 1 | VBUS | 2 | DM | 3 | DP | 4 | GND |

Table 7: USB-B connector pinout: CN3

3.2 CAN bus connector

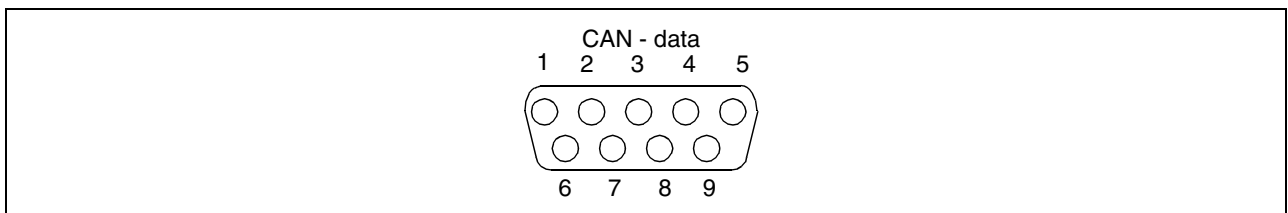


Figure 7: CAN connector 9 pin male D-type: CN1

| Pin | Description | Pin | Description | Pin | Description |
|-----|-----------------------------|-----|---------------|-----|------------------------------|
| 1 | Not connected | 4 | Not connected | 7 | CAN H2, high side bus output |
| 2 | CAN L2, low side bus output | 5 | Not connected | 8 | Pull down to GROUND |
| 3 | Ground | 6 | GROUND | 9 | Pull up to +3.3 V |

Table 8: CAN connector pinout: CN1

3.3 External analog

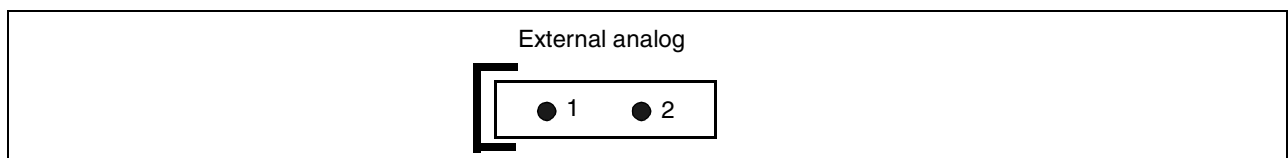


Figure 8: External analog connector: CN6

| Pin | Description | Pin | Description |
|-----|--------------|-----|-------------|
| 1 | Analog input | 2 | Ground |

Table 9: External analog connector pinout: CN6

3.4 RS232 serial data connector

9-pin general purpose D-type male connectors



Figure 9: RS232 transmit and receive connectors: CN7, CN8

| Pin | Description | Pin | Description | Pin | Description |
|-----|--------------------------------|-----|------------------------|-----|------------------|
| 1 | Shorted to pin 4 and 6 | 4 | Shorted to pin 1 and 6 | 7 | Shorted to pin 8 |
| 2 | R1IN (port A), R2IN (port B) | 5 | GROUND | 8 | Shorted to pin 7 |
| 3 | T1OUT (port A), T2OUT (port B) | 6 | Shorted to pin 1 and 4 | 9 | Not connected |

Table 10: RS232 connector pinout: CN7, CN8

3.5 DEBUG

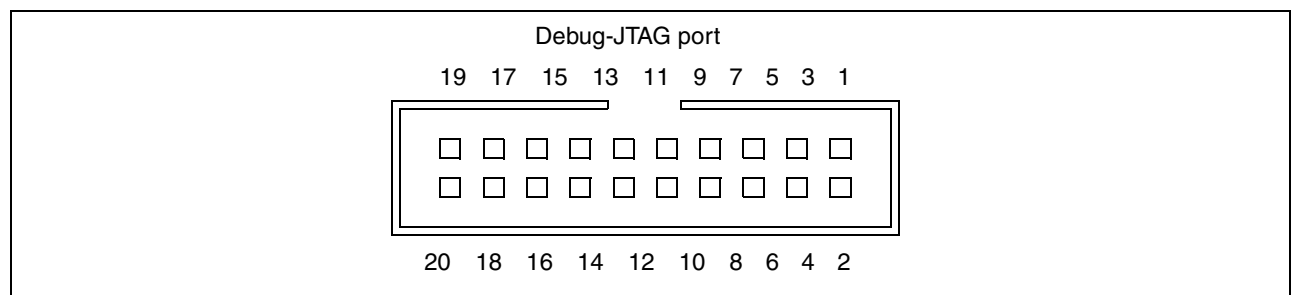


Figure 10: JTAG standard interface: CN9

| Pin | Description | Pin | Description | Pin | Description |
|-----------|----------------|-----|---------------|-----|-----------------------|
| Even pins | Ground | 5 | TDI | 13 | TD0 |
| 1 | VTref +3.3 V | 7 | TMS | 15 | noTRreset |
| 2 | Vsupply +3.3 V | 9 | TCK | 17 | DBG RQS - pulled down |
| 3 | notTRST | 11 | RTCK (GROUND) | 19 | Pulled down |

Table 11: JTAG interface pinout: CN9

4 Schematics

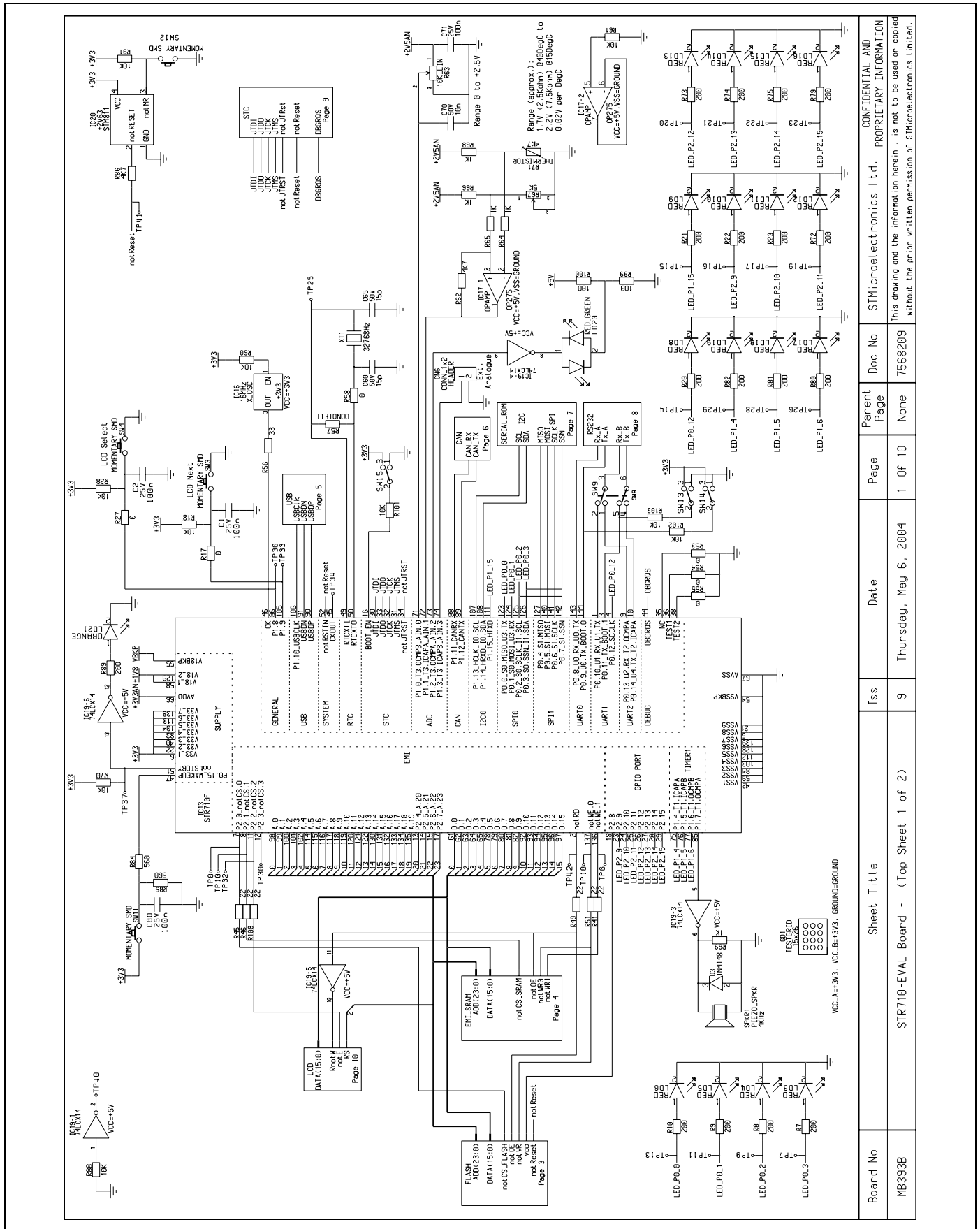


Figure 11: STR710-EVAL board top-level page 1 of 2

| Board No | Sheet Title | Iss | Date | Page | Parent Page | Doc No | CONFIDENTIAL AND PROPRIETARY INFORMATION |
|----------|--|-----|-----------------------|---------|-------------|---------|--|
| MB3393B | STR710-EVAL Board - (Top Sheet 1 of 2) | 9 | Thursday, May 6, 2004 | 1 Of 10 | None | 7558Z09 | This drawing and the information herein, is not to be used or copied without the prior written permission of STMicroelectronics Limited. |

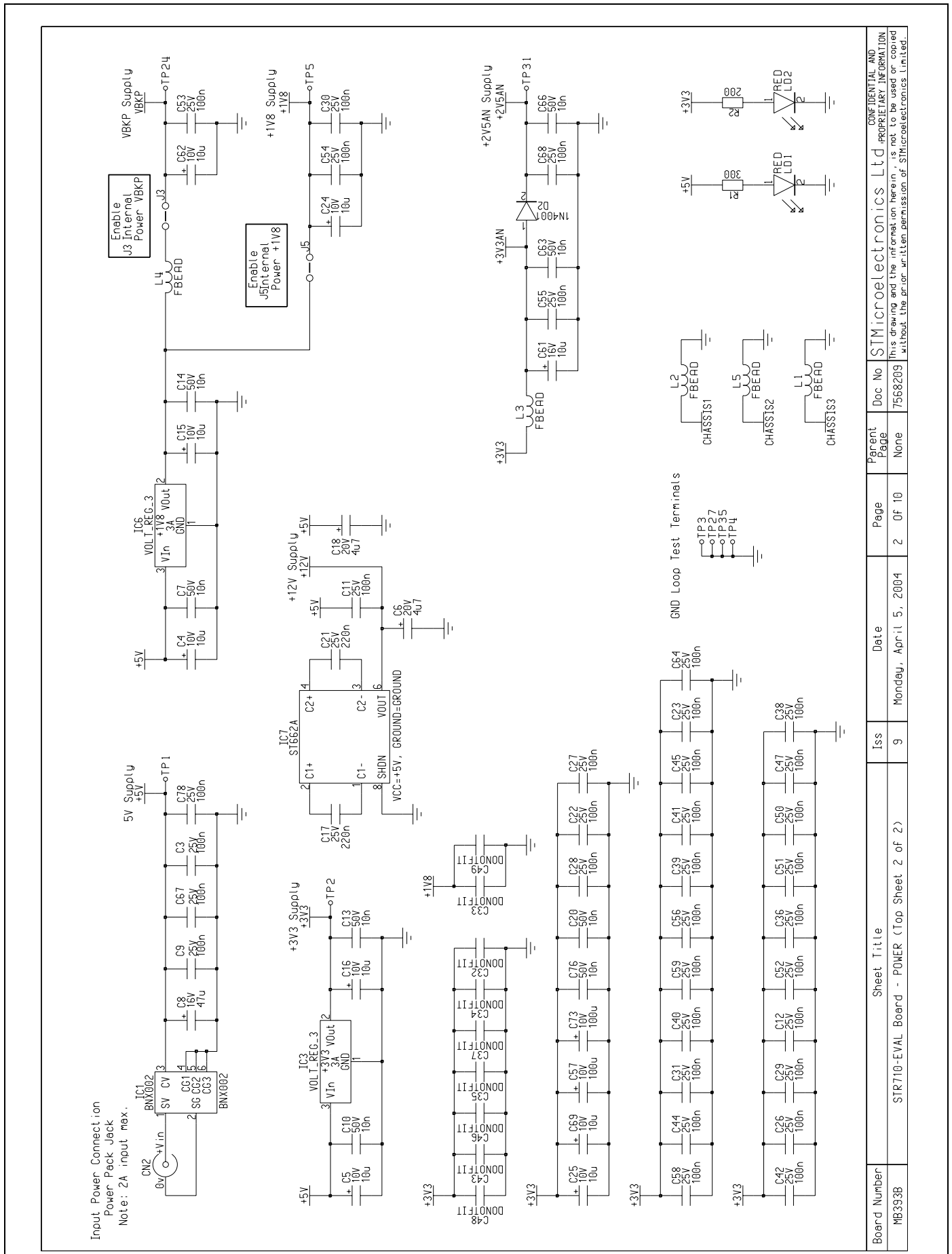


Figure 12: STR710-EVAL board top-level page 2 of 2

| Board Number | Sheet Title | Iss | Date | Page | Parent Page | Doc No | CONFIDENTIAL AND PROPRIETARY INFORMATION |
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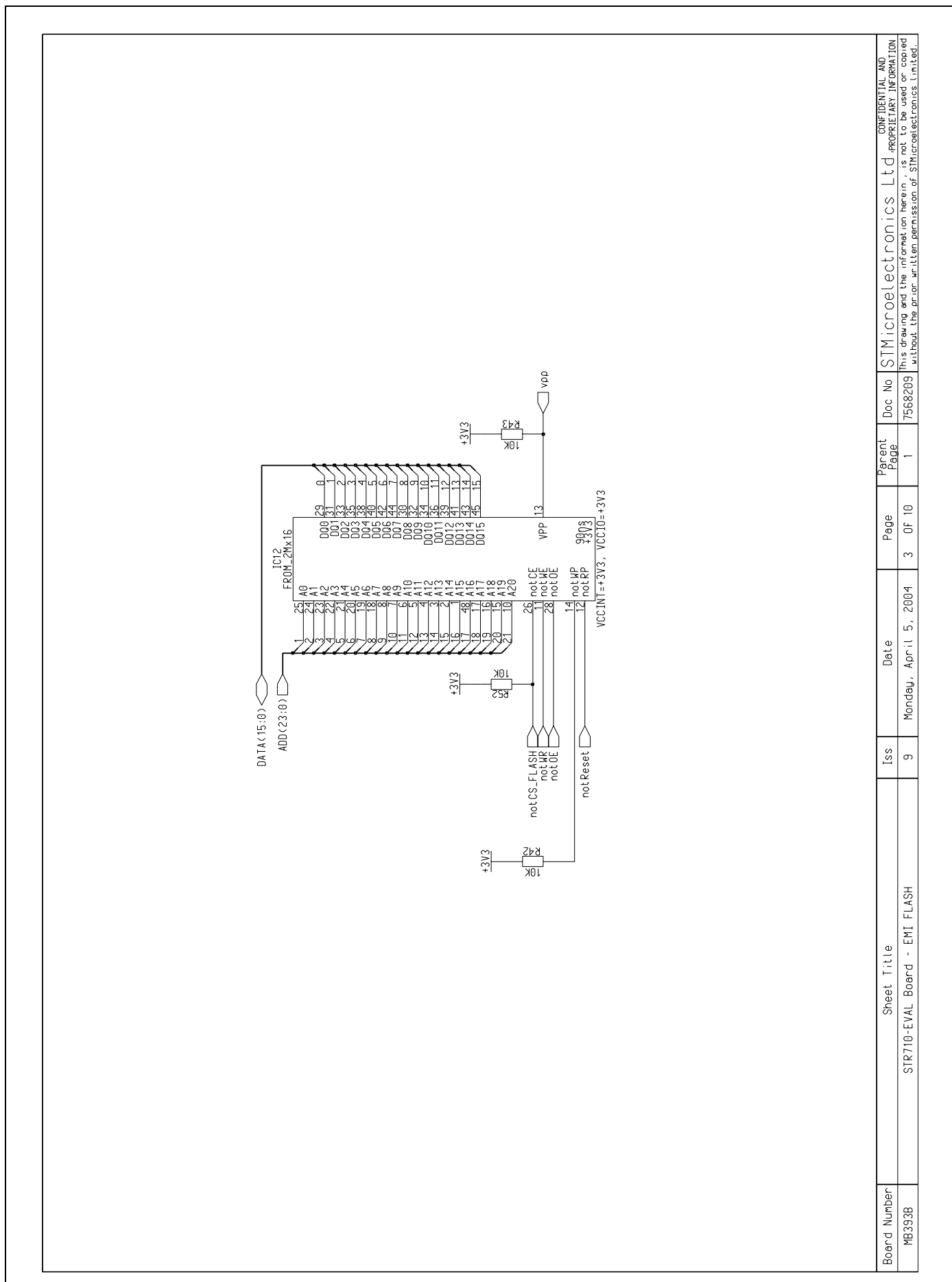


Figure 13: EMI flash

| | | | | | | | | | | | | | | | |
|--------------|-------------------------------|-----|---|------|-----------------------|------|---|----|----|-------------|---|--------|---------|------------------------|--|
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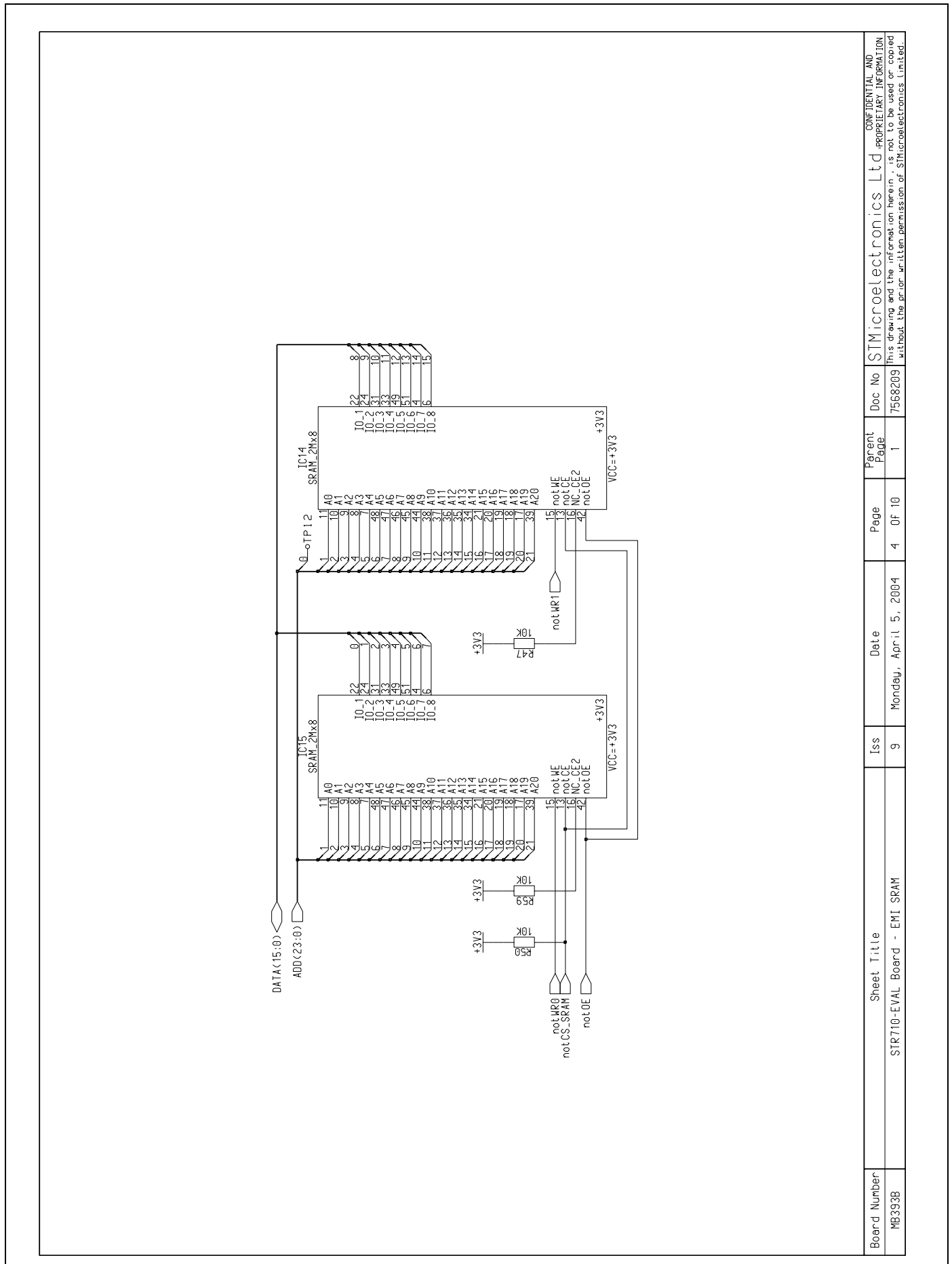


Figure 14: EMI SRAM

| | | | | | | | |
|--------------|------------------------------|-----|-----------------------|---------|-------------|---------|--|
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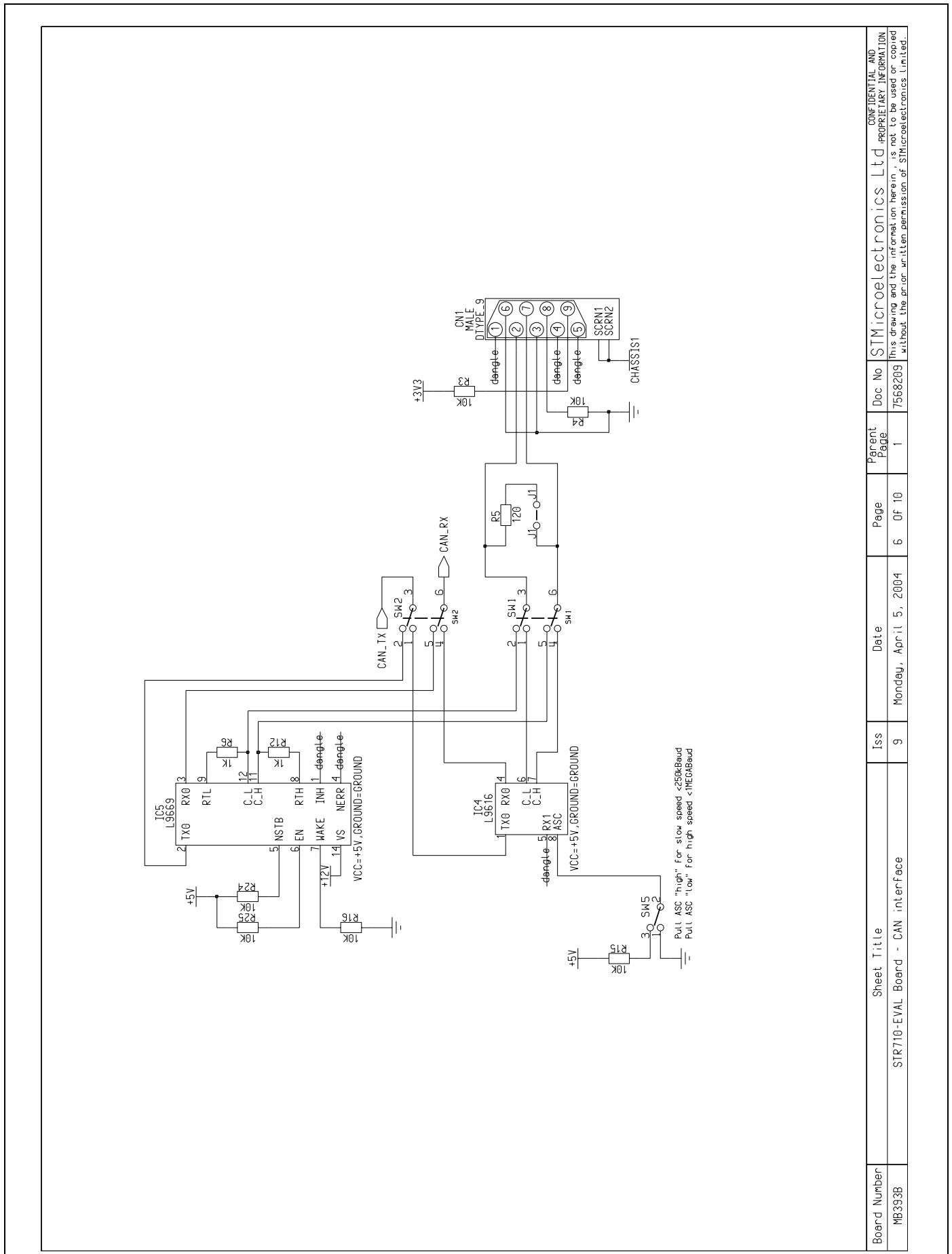


Figure 16: CAN interface

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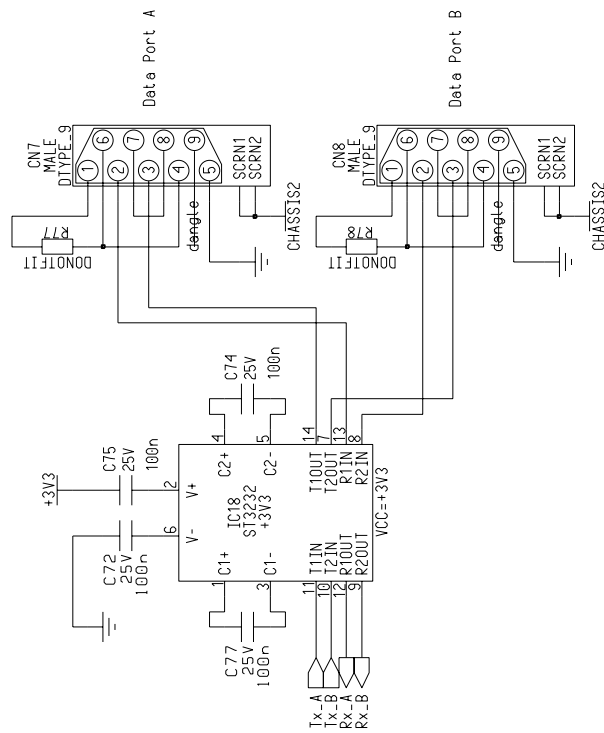
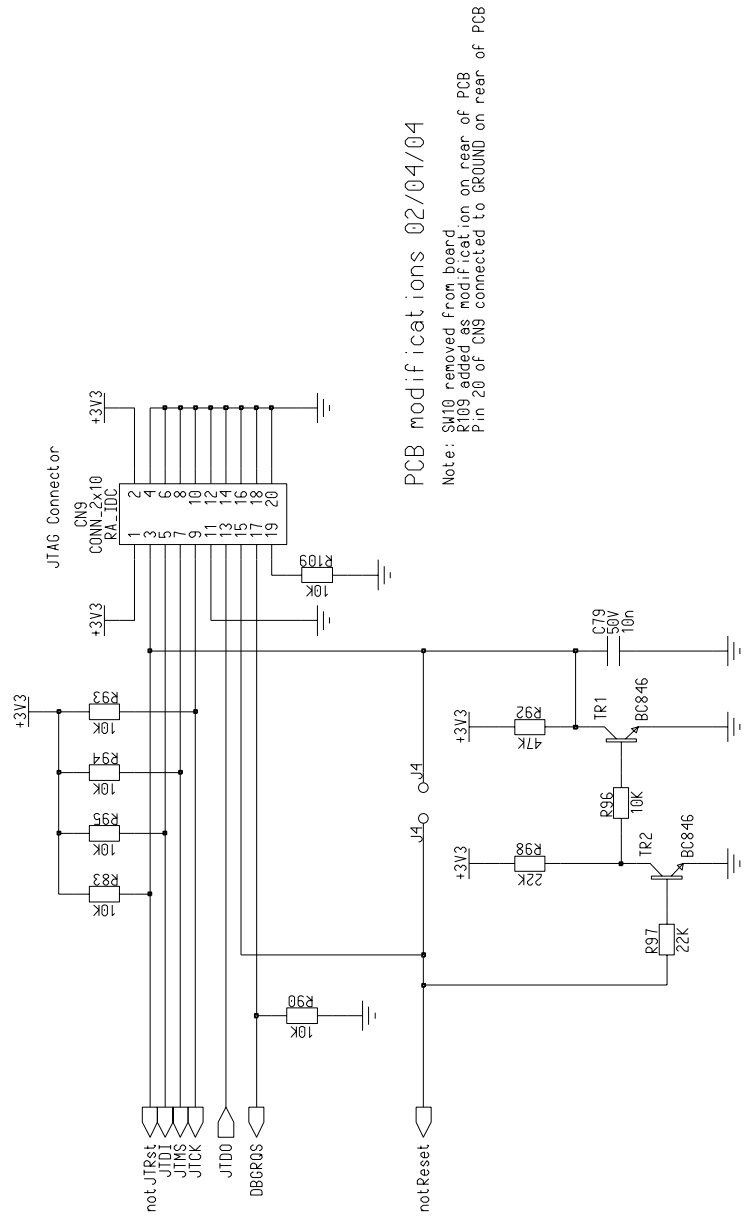


Figure 18: RS232 Interface

| | | | | | | | |
|--------------|-------------------------------------|-----|-----------------------|---------|-------------|---------|---|
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PCB modifications 02/04/04

Note: SM10 removed from board.
R109 added as modification on rear of PCB.
Pin 20 of CN9 connected to GROUND on rear of PCB

| | | | | | | | | | | | | | | |
|--------------|--------|-------------|--|-----|---|------|-----------------------|------|---------|-------------|---|--------|---------|--|
| Board Number | MS333B | Sheet Title | STR710-EVAL Board - ARM JTAG Interface | Iss | 9 | Date | Monday, April 5, 2004 | Page | 9 OF 10 | Parent Page | 1 | Doc No | 7568209 | CONFIDENTIAL AND PROPRIETARY INFORMATION |
|--------------|--------|-------------|--|-----|---|------|-----------------------|------|---------|-------------|---|--------|---------|--|

Figure 19: ARM JTAG Interface

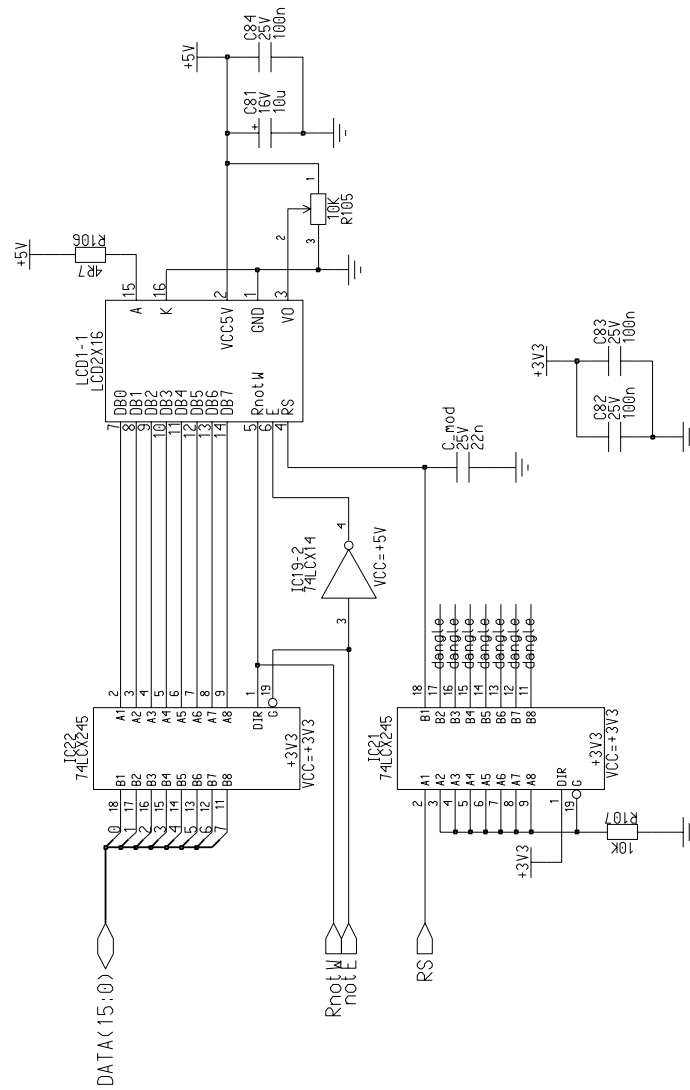


Figure 20: LCD Interface

| | | | | | | | |
|------------------------|--|----------|--------------------------------|------------------|---------------------|-------------------|--|
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Revision history

| Version | Date | Comments |
|---------|----------|---|
| A | April 04 | First complete version, submitted to ADCS |
| 0.1 | March 04 | Initial draft |

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