UM0561
User Manual

STR710-EVAL evaluation board for STR71xF

Introduction

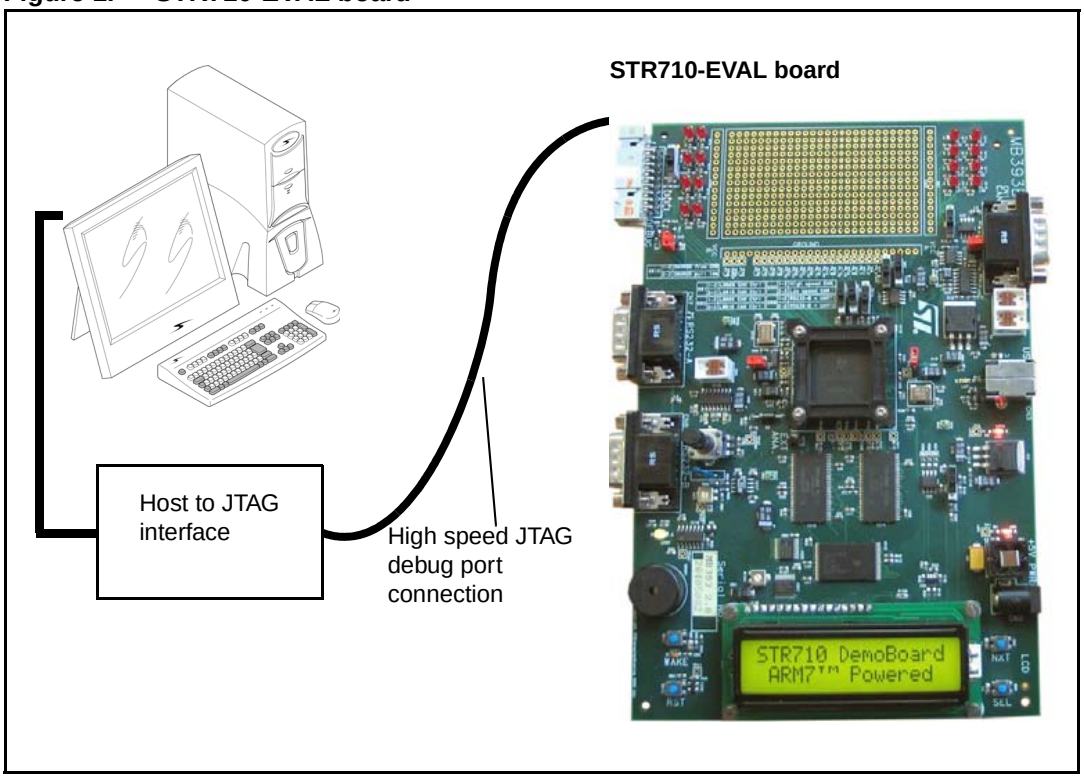
The STR710-EVAL board is a complete development platform for the STR71x series. It is a cost effective, flexible and open design to demonstrate the capability of the STR71x series of Flash microcontrollers and to enable rapid evaluation of the STR71x devices and available peripherals.

It includes the high performance STR710FZ2T6 ARM7TDMITM processor running at 48 MHz with 256 Kbytes embedded Flash with best-in-class random access time as well as 64 Kbytes on-chip high speed SRAM, EMI SRAM 4 Mbytes (2M x 16), EMI Flash 4 Mbytes (2M x 16), SPI serial Flash, I2C EEPROM and an LCD display.

The board can be used as a versatile stand-alone test platform, supporting SRAM and Flash memory on the EMI to enable full freedom in the development of large programs before designing custom hardware. It also features up to 10 serial communication interfaces, including USB, CAN and a UART RS-232 interface, LED displays, 2 x 16 LCDs, piezo buzzer, test buttons, a JTAG connector.

A wide choice of third party development tools are readily available, in addition to those available from STMicroelectronics.

Figure 1. STR710-EVAL board



Contents

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 RS-232 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 the 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.

Note: ARM® and ARM7TDMI™ are registered trademarks of ARM Limited in the EU and other countries.

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,
  - I^2C EEPROM: 8-kbit EEPROM connected to the I^2C0 interface: IC9.

1.2 Board interface connections

Diagrams and wiring descriptions for these connectors are provided in *Section 4: Schematics on page 17*. 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 RS-232 connector: CN7,
- UART1 and 2 (Rx and Tx only) switch selectable, connected to a 9-way male D-type RS-232 connector: CN8,
- JTAG, 20 pin IDC connector: CN9,
- 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 17*,
- 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 I^2C0 connection may be used, although the I^2C0 connector is not fitted.

2 Hardware

Figure 2. STR710-EVAL board layout block diagram

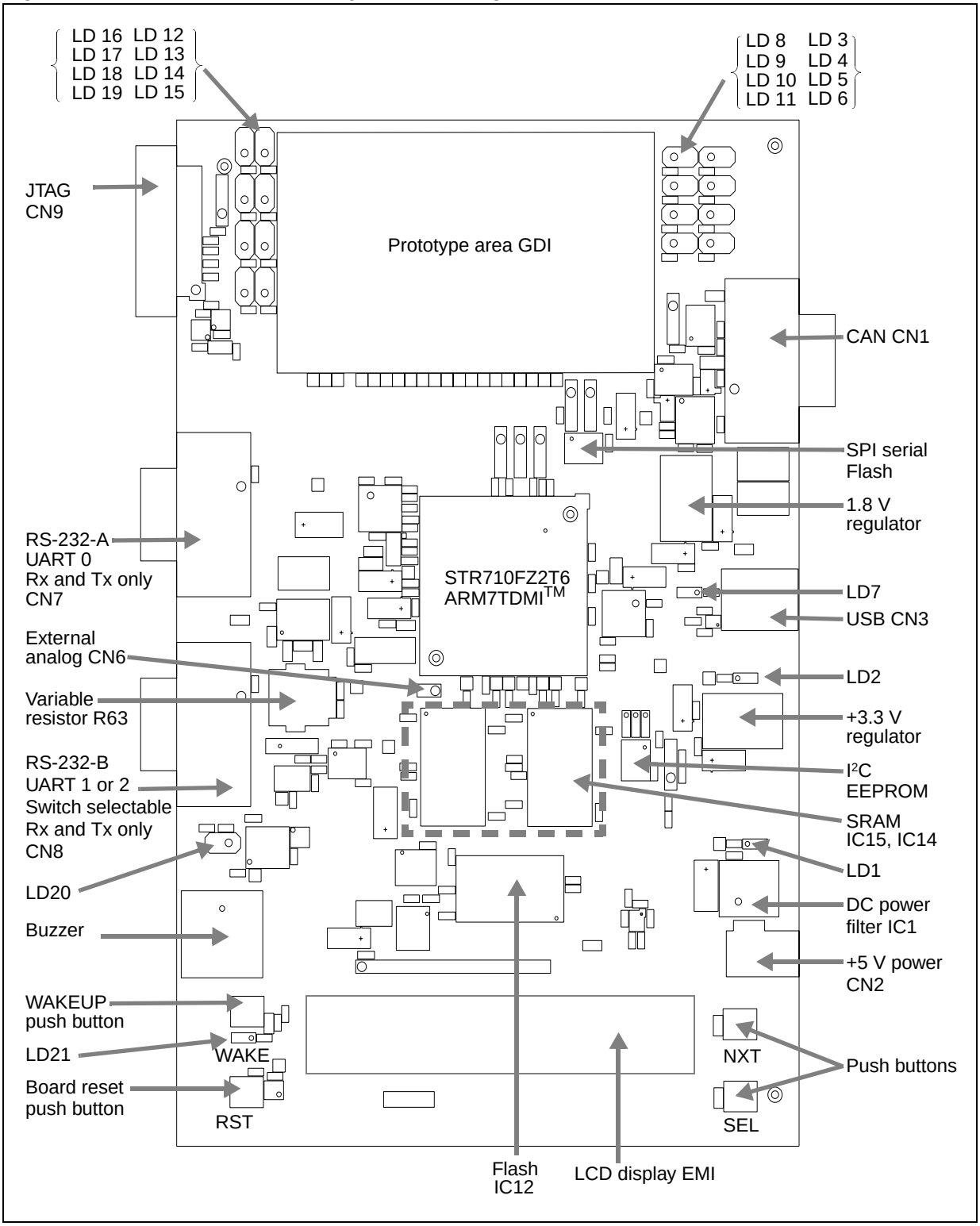
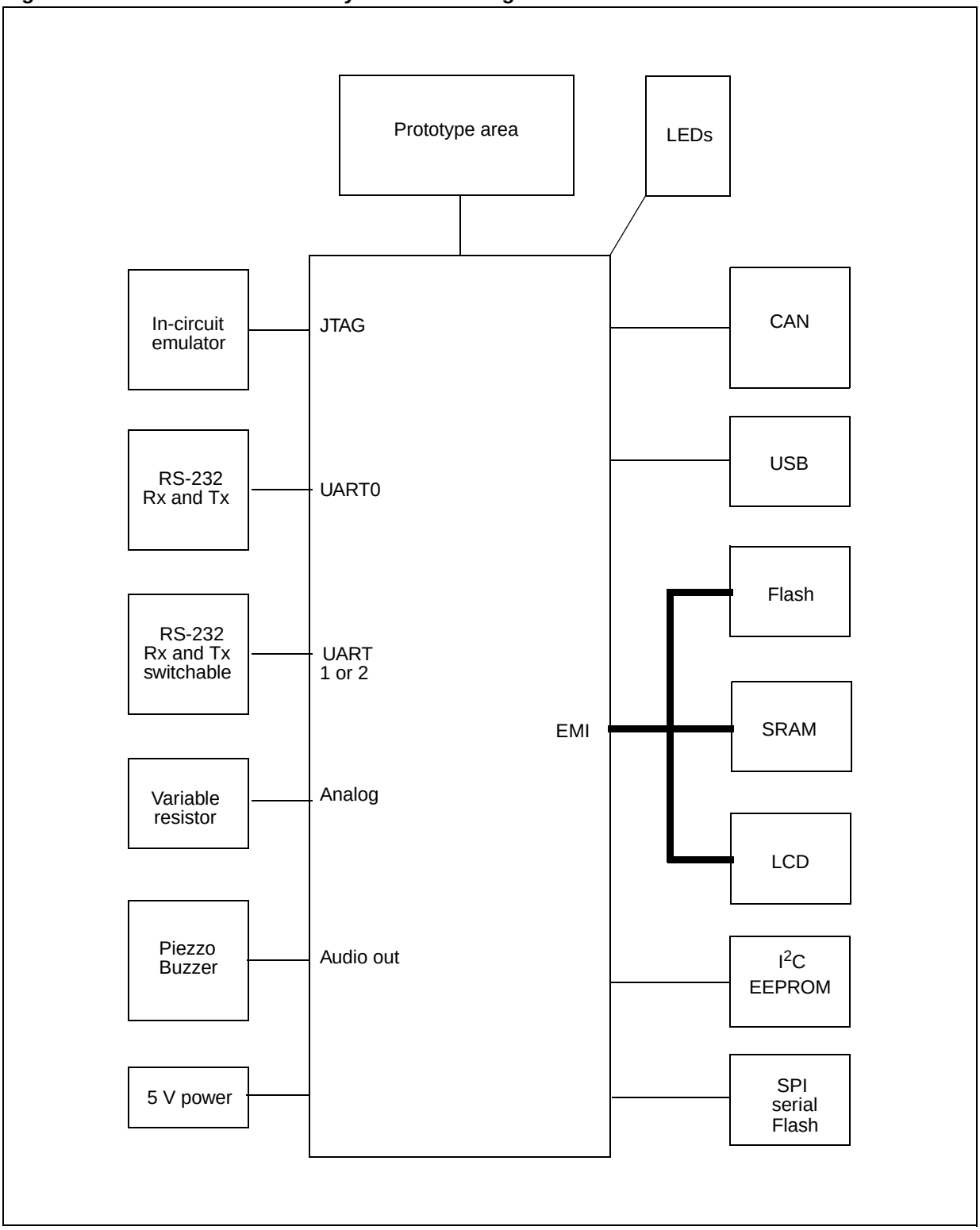


Figure 3. STR710-EVAL board system block diagram



2.1 Overview

The STR710-EVAL board is a general purpose evaluation platform with USB, CAN (controller area network) and RS-232 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 microswitches.

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

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

The reset sources are:

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

2.3 Power supplies

Table 1. STR710-EVAL board EMI memory map

Region	Use	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

Power to the board is supplied using a fixed external (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.

2.4 USB full speed interface

USB full speed interface device supported by a type B connector.

The USB clock uses a separate 48 MHz oscillator.

See *Section 3.1: USB on page 15*.

2.5 CAN interface

A general purpose, asynchronous serial I/O data port connected through a 9-pin D-type male connector with microswitch selectable low speed fault tolerant transceiver (L9669) or low or high speed selectable transceiver (L9615 or L9616). See *Section 3.2: CAN bus connector on page 15*.

Caution: The board schematic for the CAN interface detailed in *Figure 17: CAN interface on page 22*, is not a reference design and should not be copied. To design a CAN interface with the STR710 please refer to the “STR71x Hardware Development Getting Started Guide AN1775”.

2.6 RS-232 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: RS-232 serial data connector on page 16*.

RS-232-A connects directly to UART0, transmit and receive only. RS-232-B connects to either UART1 or UART2 through switch 9, transmit and receive only.

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

2.7 External analog

An external analog input connector is provided, see *Section 3.3: External analog on page 15* and *Figure 12: STR710-EVAL board top level page 1 of 2 on page 17*.

2.8 Analog input

The analog input to ADC is demonstrated by the variable resistor R63. Although there is a thermistor connected up to the analog input AIN.1 in the schematics *Figure 12: STR710-EVAL board top level page 1 of 2 on page 17*, it is not functional and has been removed from the product.

2.9 LEDs

2.9.1 Software controlled LEDs

The LEDs in *Table 2* are software controlled by PIO pins.

See the schematic in *Figure 10 on page 16*.

Table 2. Software controlled LEDs

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	

2.9.2 Status LEDs

Table 3. Status LEDs

LED	Description	Schematic
LD1	+5 V	*Figure 13 on page 18*
LD2	+3.3 V	*Figure 13 on page 18*
LD7	Vbus	*Figure 16 on page 21*
LD21	not STDBY	*Figure 12 on page 17*

2.10 Option jumper placement

Figure 4. Option jumpers, resistors and switches

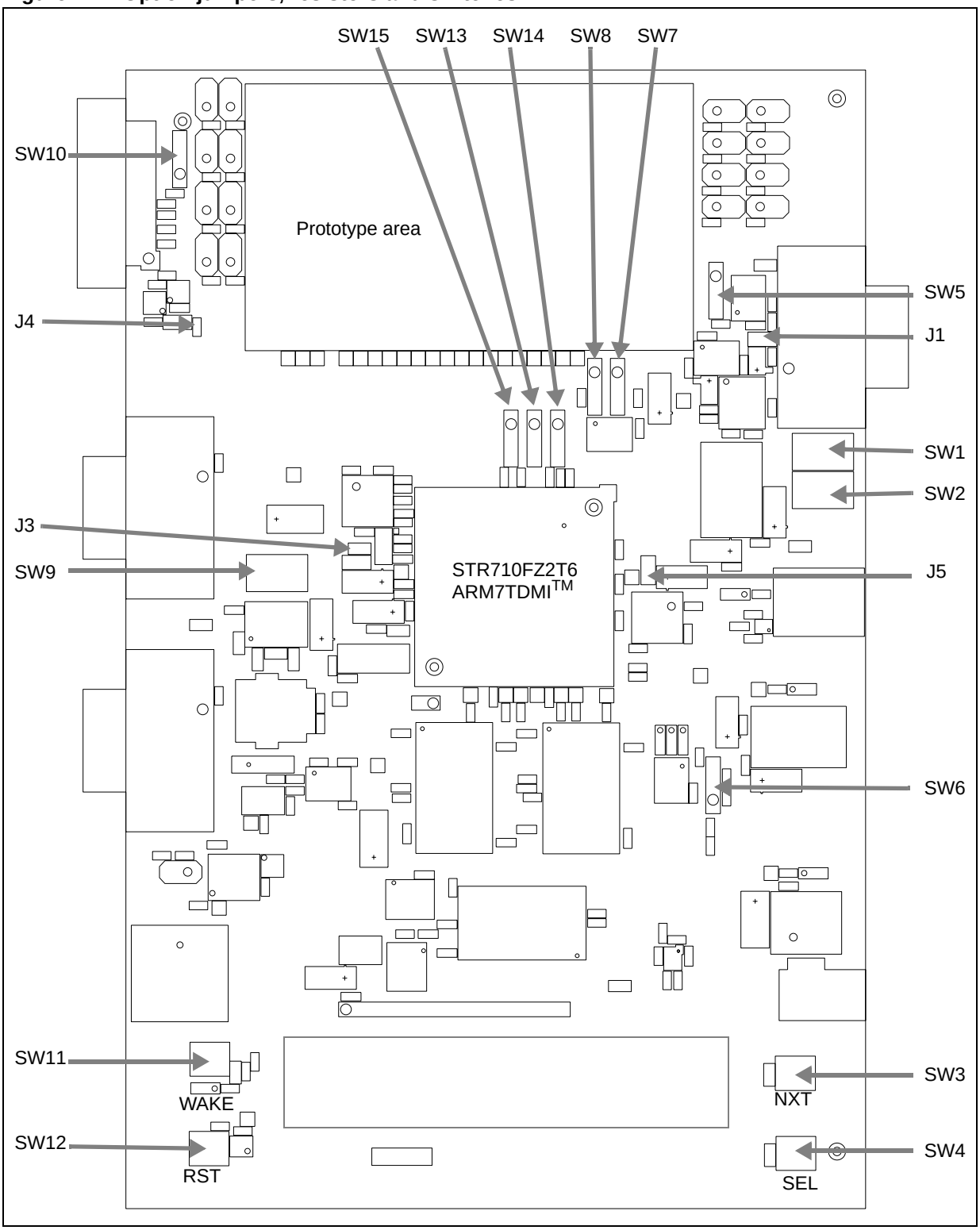
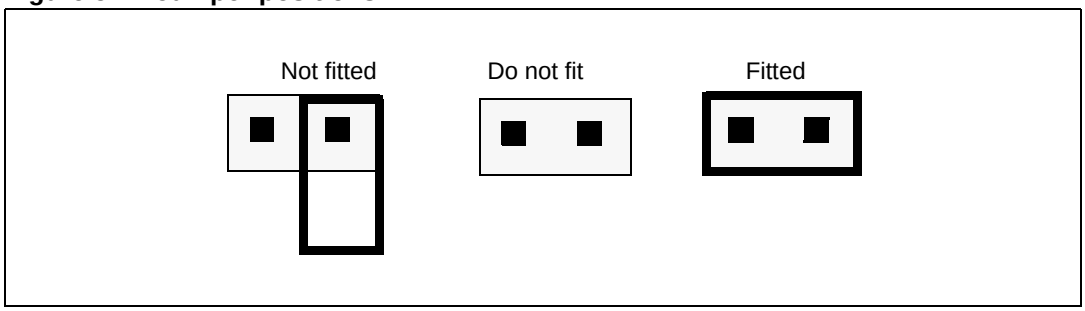


Table 4. Option jumpers

Jumper	Figure	Description	Default
J1	*Figure 17 on page 22*	CAN link: not fitted / fitted (default)	Fitted
J3	*Figure 13 on page 18*	VBKP supply: internal / board (default))	Fitted
J4	*Figure 20 on page 25*	notJRst / notReset link: connected / open (default)	Not fitted
J5	*Figure 13 on page 18*	Not fitted	Do not fit

Jumpers are fitted as shown in *Figure 5*.

Figure 5. Jumper positions



2.11 Option switch settings

Table 5. Option switch settings

Switch	Schematic	Description	Default
SW1	*Figure 17 on page 22*	CAN transceiver select: L9669 / L9616 (default) Note SW1 and SW2 must be changed together. 1 = L9669 A = L9616	ON
SW2			ON
SW3	*Figure 12 on page 17*	LCD Select	PTM
SW4	*Figure 12 on page 17*	LCD Next	PTM
SW5	*Figure 17 on page 22*	L9616 ASC speed: 1-2 = pull down = high speed 2-3 = pull up = low speed	2-3
SW6	*Figure 18 on page 23*	I^2C EEPROM write control (notWC): 1-2 = pull down = enable writes to EEPROM 2-3 = pull up = disable writes to EEPROM	2-3
SW7	*Figure 18 on page 23*	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 18 on page 23*	SPI Flash notW: 1-2 = pull down = Write protect 2-3 = pull up = Write enabled	2-3

Table 5. Option switch settings (continued)

Switch	Schematic	Description	Default
SW9	*Figure 12 on page 17*	RS-232 source select: 1 = UART1 connected to RS-232-B A = UART2 connected to RS-232-B	1
SW10	-	Not fitted: do not fit	-
SW11	*Figure 12 on page 17*	Wake upL	PTM
SW12	*Figure 12 on page 17*	Reset	PTM
SW13	*Figure 12 on page 17*	Boot mode 1, see *Table 6 on page 13*.	2-3
SW14	*Figure 12 on page 17*	Boot mode 0, see *Table 6 on page 13*.	1-2
SW15	*Figure 12 on page 17*	Boot EN, see *Table 6 on page 13*.	2-3

For switch position details, see *Figure 4: Option jumpers, resistors and switches on page 11*.

Figure 6. Switch positions

Table 6. Boot modes

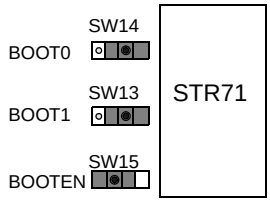
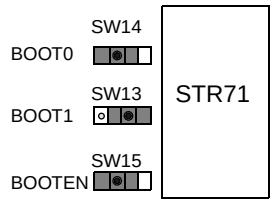
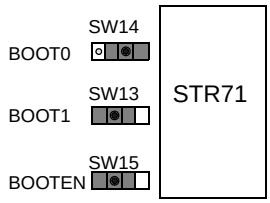
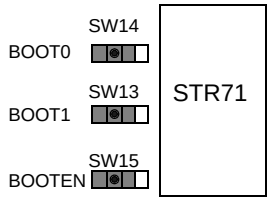
Boot EN (SW15)	Boot1 B1 (SW13)	Boot0 B0 (SW14)	Mode	Boot memory mapping	Notes	
1-2	any	any	USER	Flash mapped at 0h	System executes code from Flash	
2-3	1-2	1-2				
2-3	1-2	2-3	BOOT	BOOTFLASH mapped at 0h	System executes a “primary boot loader (ST-firmware)” from Boot-FLASH then jumps to RAM. Clock FROZEN	

Table 6. Boot modes (continued)

Boot EN (SW15)	Boot1 B1 (SW13)	Boot0 B0 (SW14)	Mode	Boot memory mapping	Notes	
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 oh	System executes code from external memory	

3 Connectors

3.1 USB

Figure 7. USB-B connector: CN3

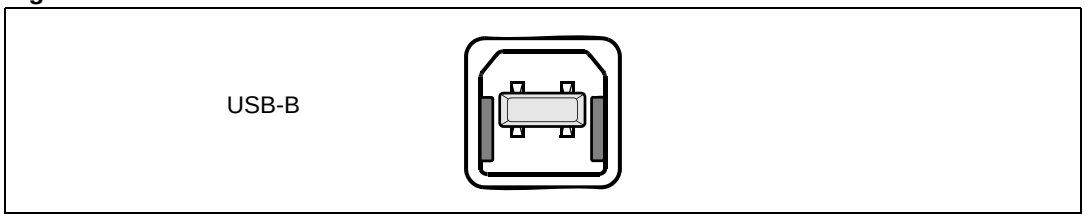


Table 7. USB-B connector pinout: CN3

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

3.2 CAN bus connector

Figure 8. CAN connector 9 pin male D-type: CN1

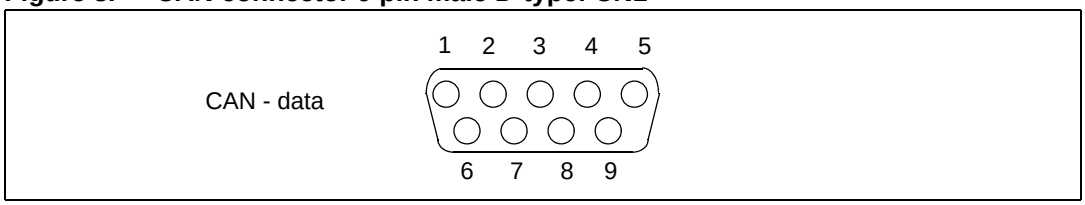


Table 8. CAN connector pinout: CN1

Pin	Description	Pin	Description	Pin	Description
1	Not connected	4	Not connected	7	CAN H, high side bus output
2	CAN L, low side bus output	5	Not connected	8	Pull down to GROUND
3	GROUND	6	GROUND	9	Pull up to +3V3 V

3.3 External analog

Figure 9. lExternal analog connector: CN6

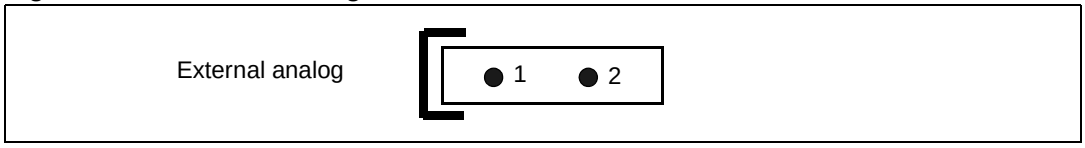


Table 9. External analog connector pinout: CN6

Pin	Description	Pin	Description
1	Analog input	2	Ground

3.4 RS-232 serial data connector

9-pin general purpose D-type male connectors

Figure 10. RS-232 transmit and receive connectors: CN7, CN8

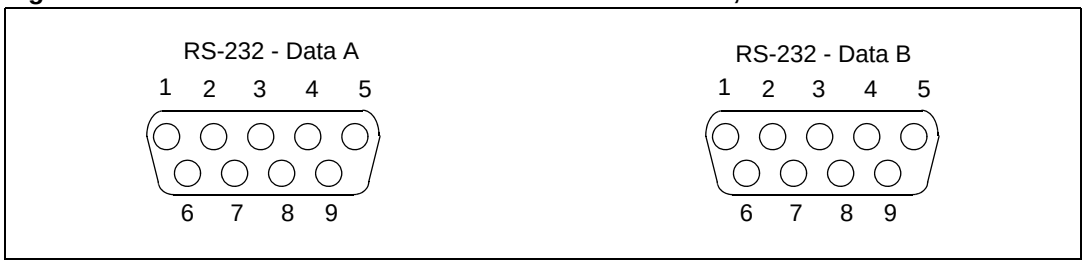


Table 10. RS-232 connector pinout: CN7, CN8

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

3.5 Debug

Figure 11. JTAG standard interface: CN9

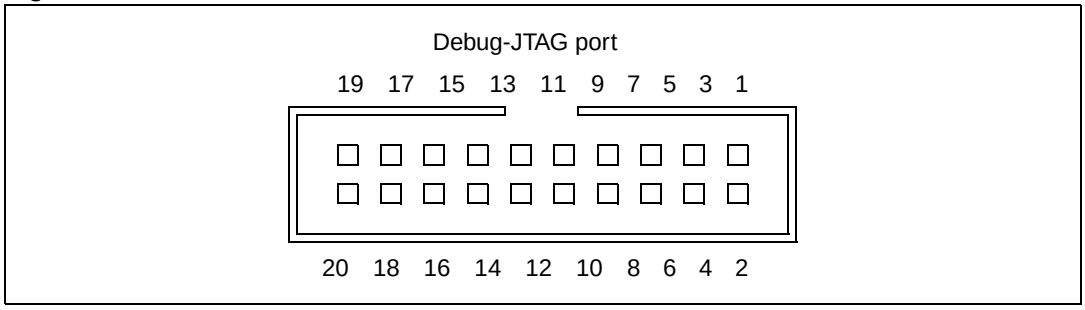


Table 11. JTAG interface pinout: CN9

Pin	Description	Pin	Description
4, 6, 8, 10, 12, 14, 16, 18, 20	GROUND	9	TCK
1	VTref+3.3 V	11	RTCK (GROUND)
2	Vsupply +3.3 V	13	TD0
3	notTRST	15	notTReset
5	TDI	17	DBGRQS pulled down
7	TMS	19	Pulled down

4 Schematics

Figure 12. STR710-EVAL board top level page 1 of 2

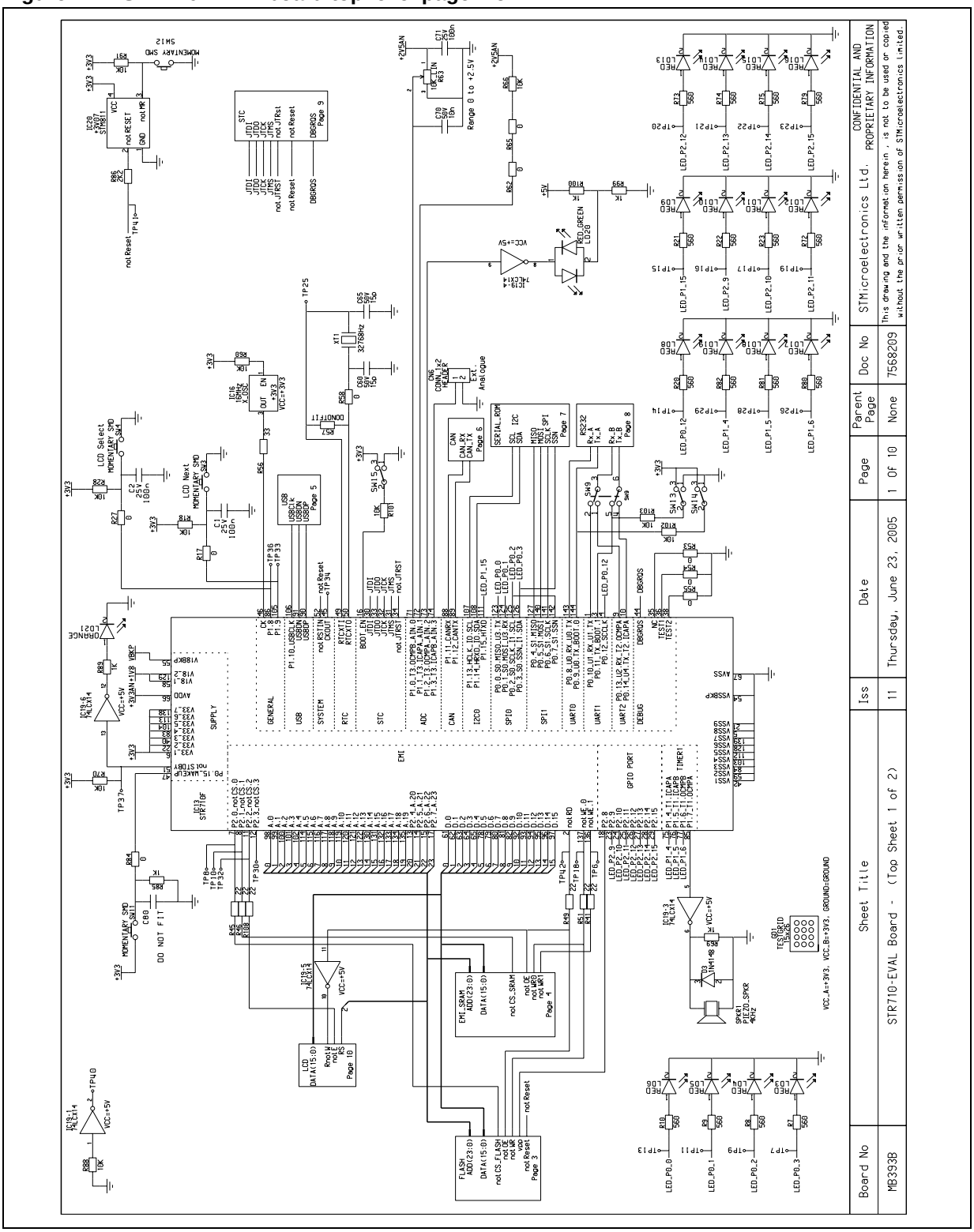


Figure 13. STR710-EVAL board top level page 2 of 2

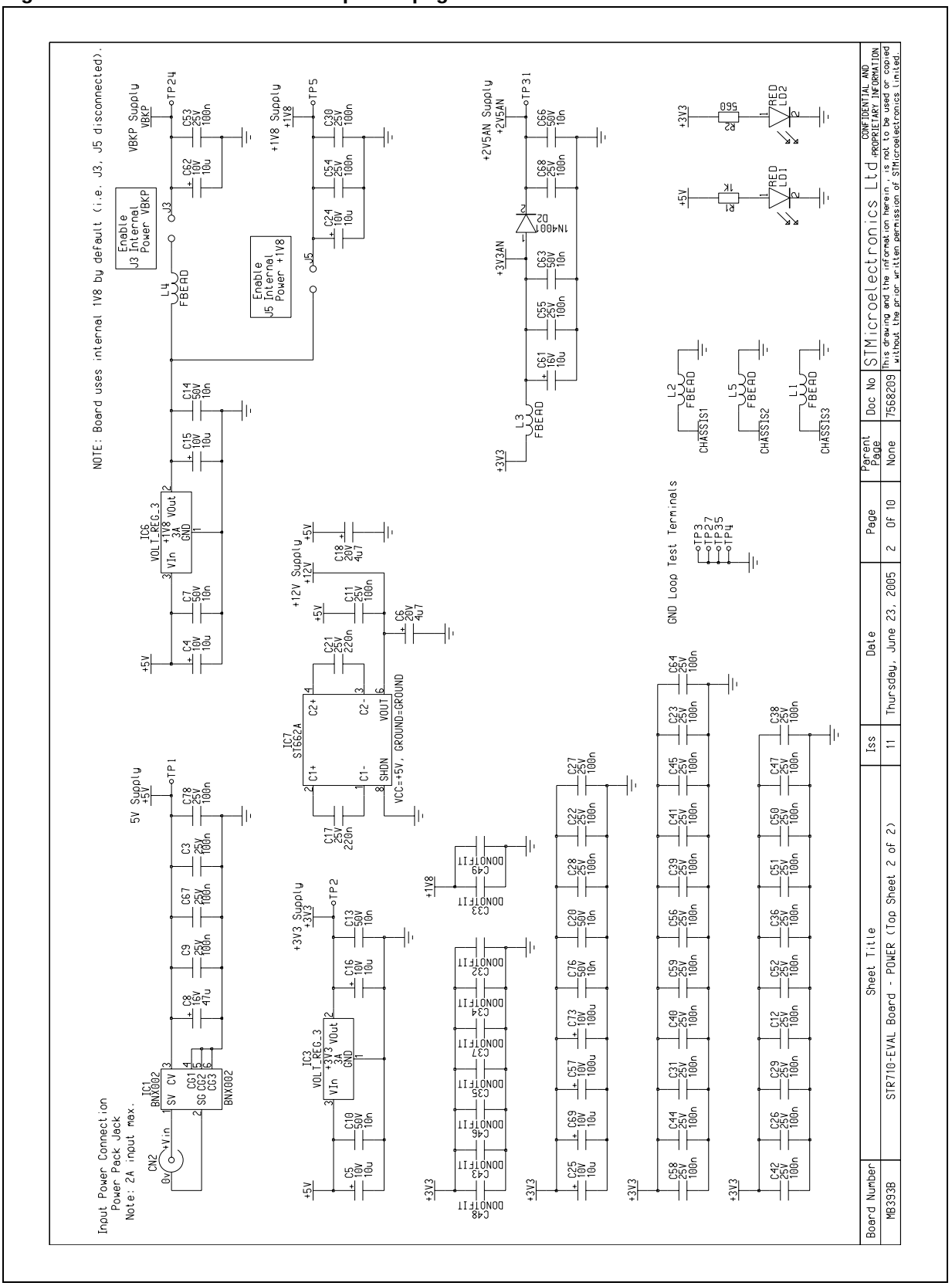


Figure 14. EMI Flash

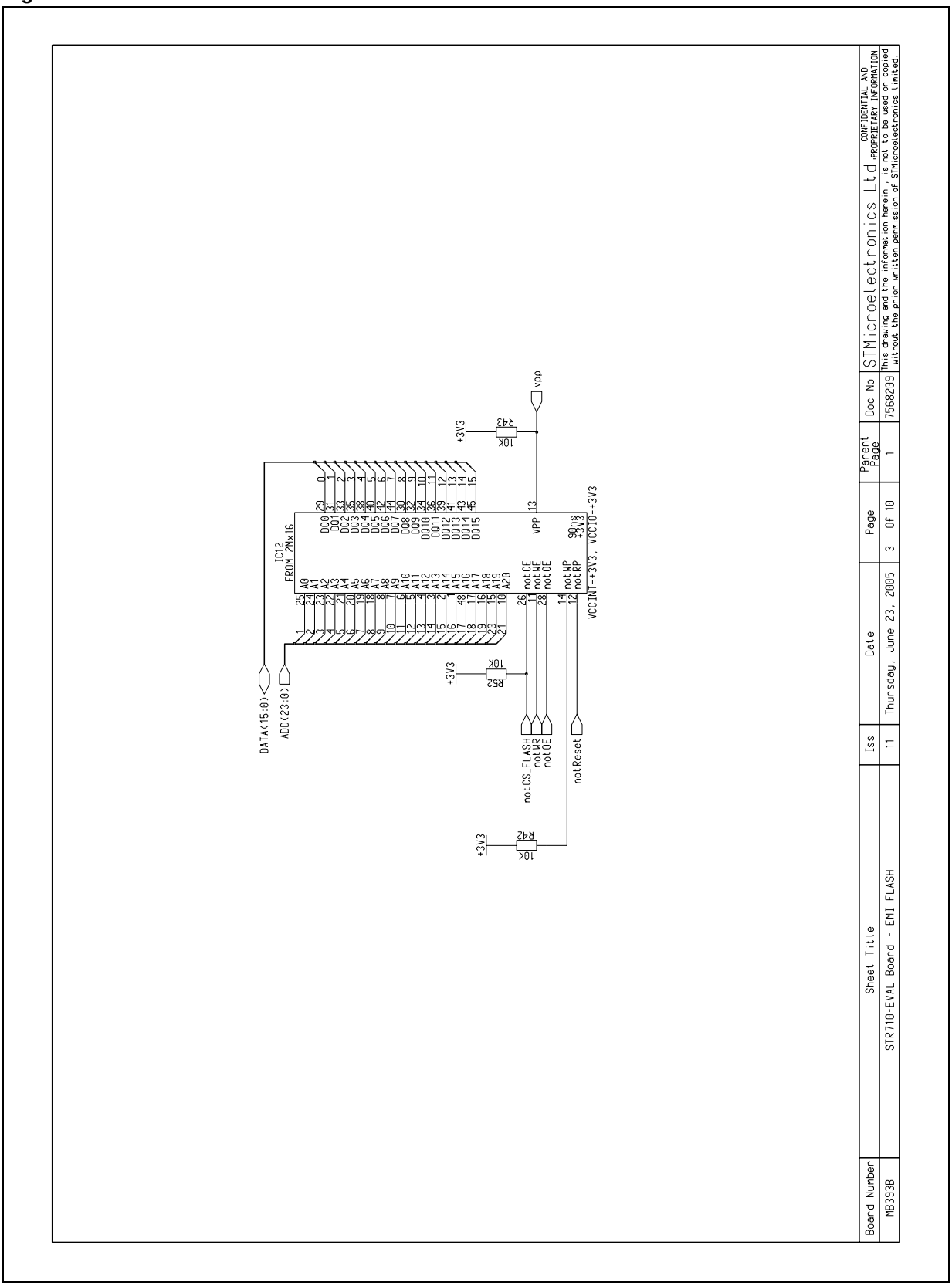


Figure 15. EMI SRAM

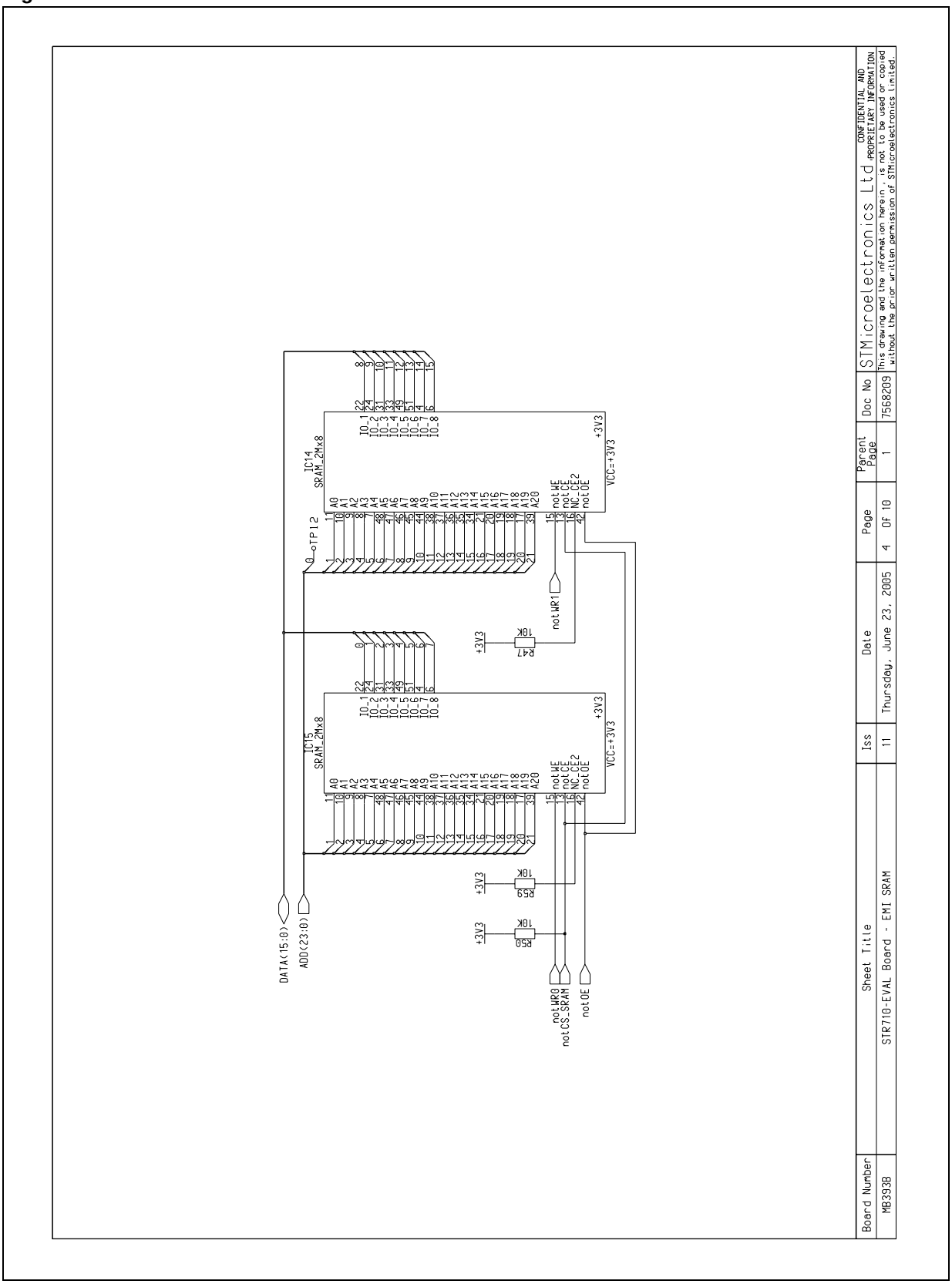


Figure 16. USB interface

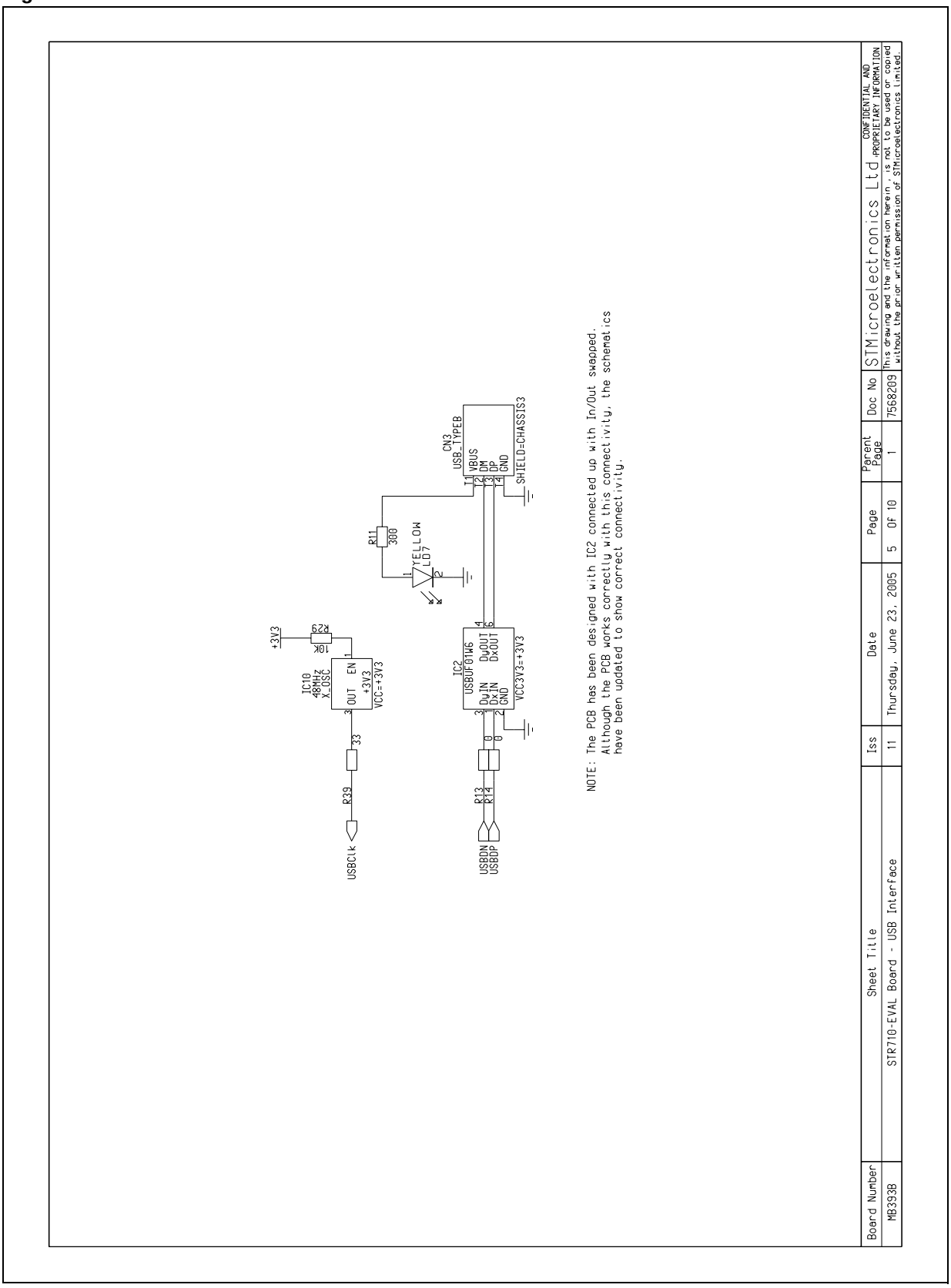


Figure 17. CAN interface

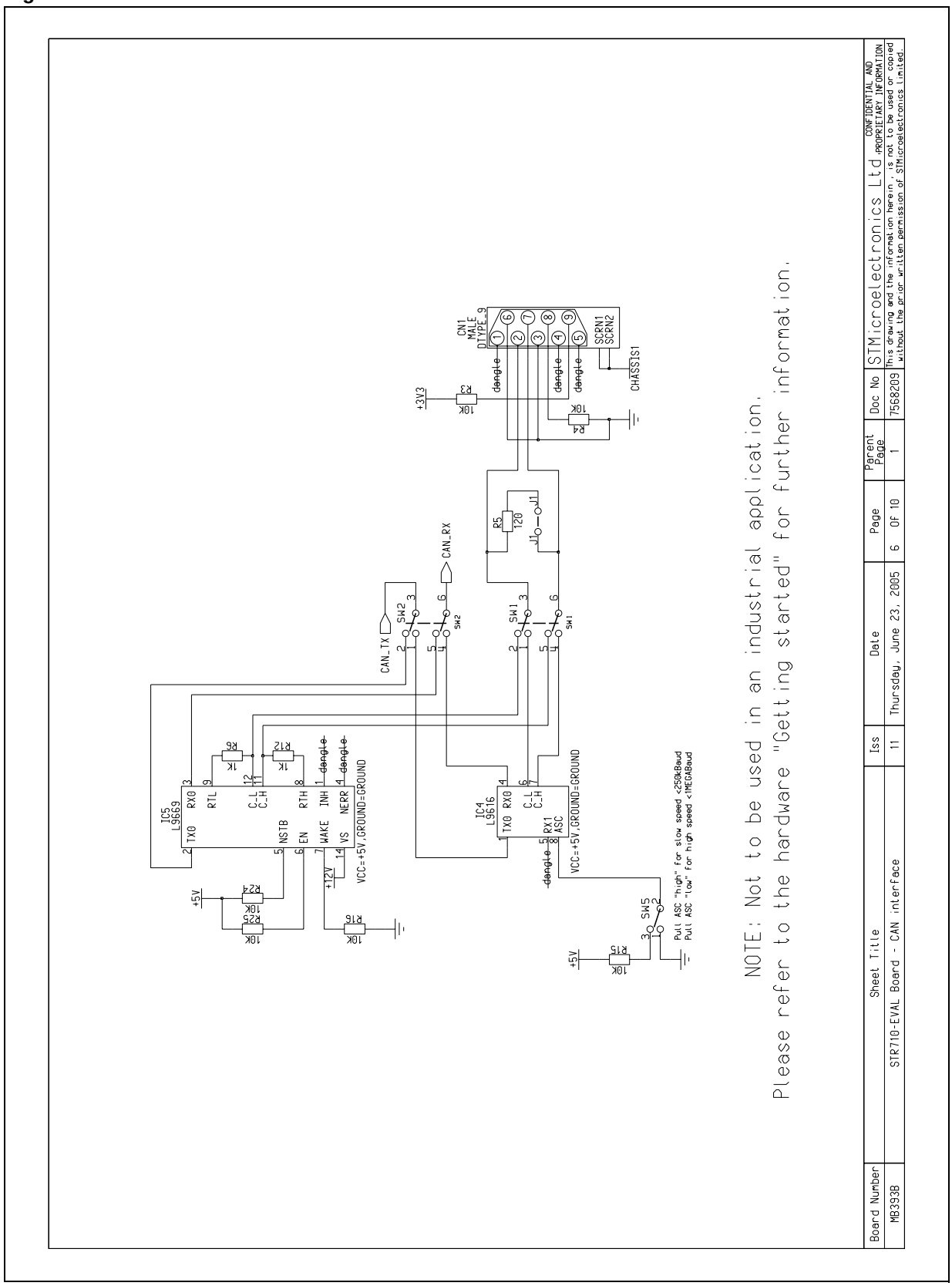


Figure 18. Serial ROM interface

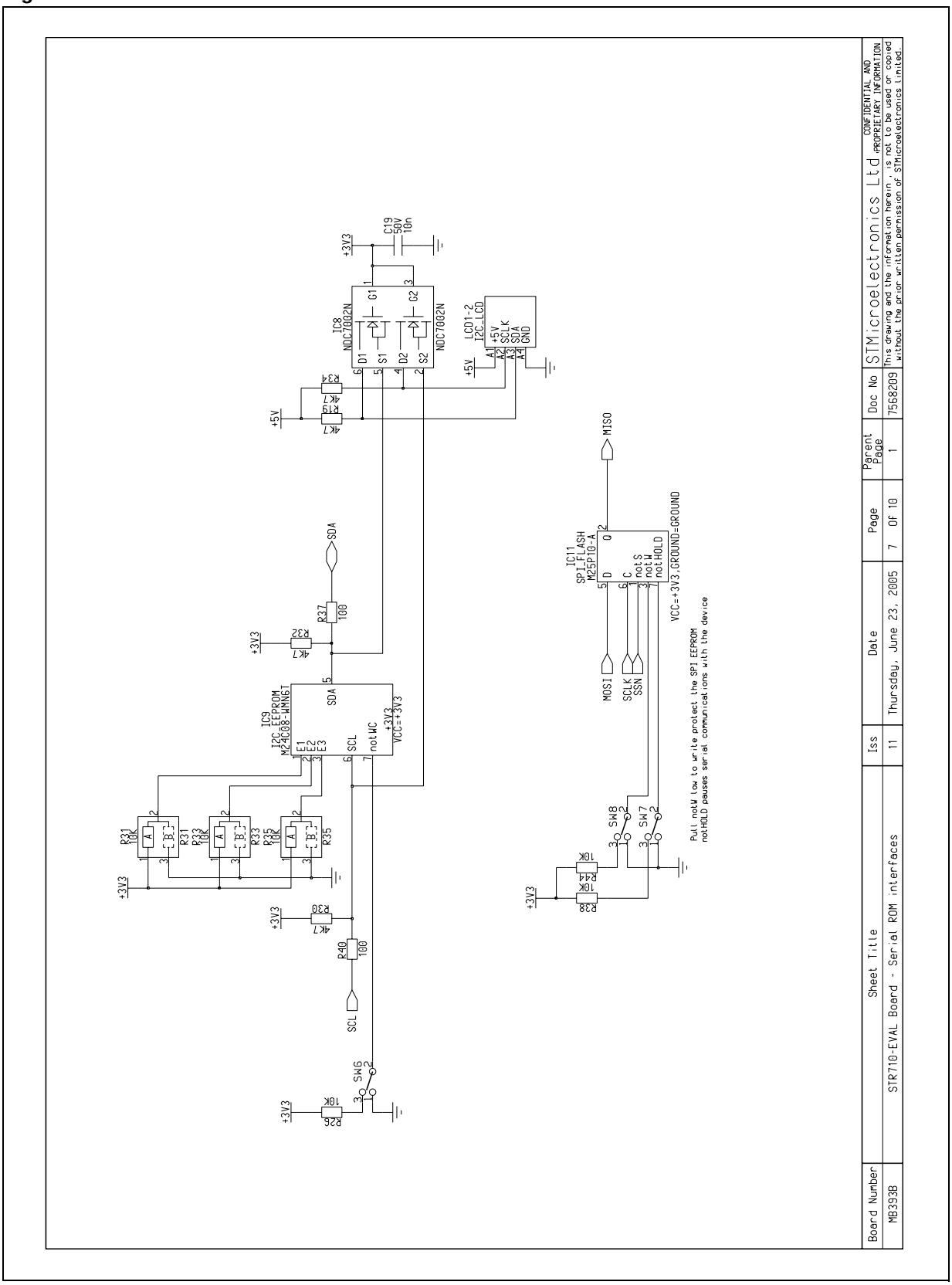


Figure 19. RS-232 interface

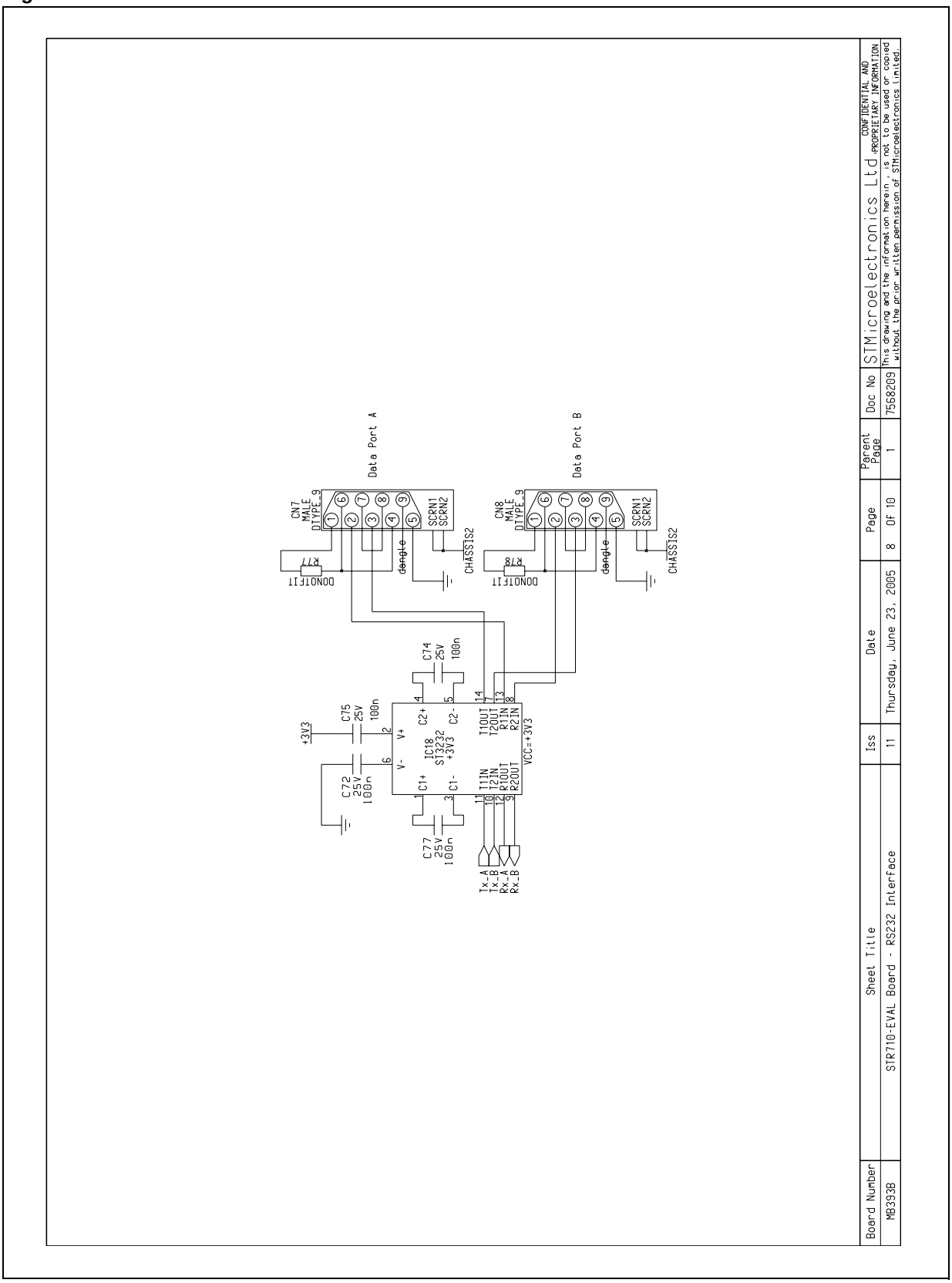


Figure 20. ARM JTAG interface

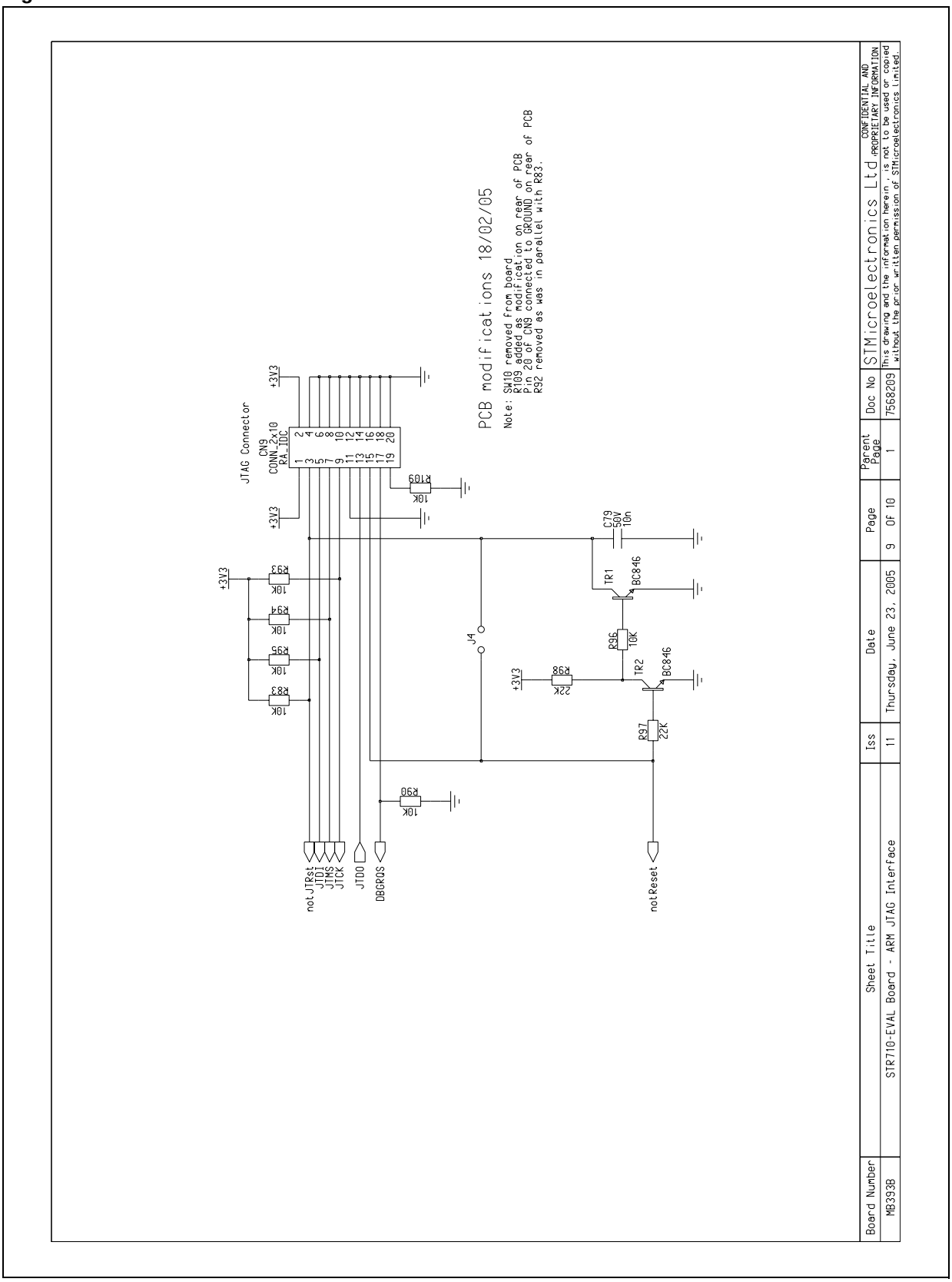
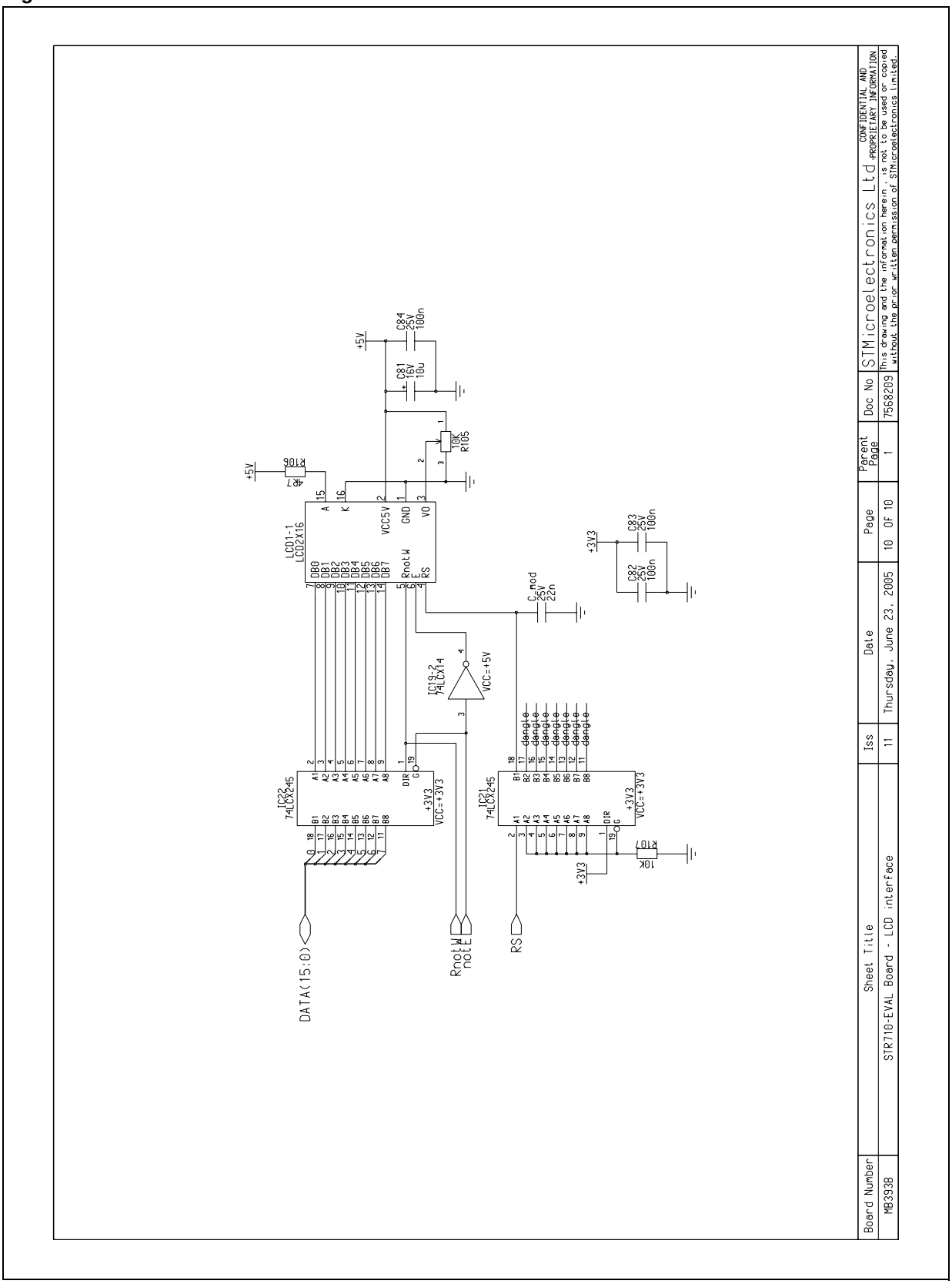


Figure 21. LCD interface



5 Revision history

Table 12. Document revision history

Date	Revision	Changes
07-Jul-2008	1	Initial release.

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