

## STR750-STK development board

## Users Manual



All boards produced by Olimex are ROHS compliant

Revision A, December 2009

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## **INTRODUCTION**

STR750-STK is development board with high performance STR750F ARM7TDMI-S™ microcontroller from STMicroelectronics. This microcontroller supports serial interfaces such as USB Device, UART, CAN and other. On the board are available JTAG, TFT LCD and SD/MMC card connector, UEXT, EXT, USB, CAN and two RS232 connectors. All this allows you to build a diversity of powerful applications to be used in a wide range of applications.

## **BOARD FEATURES**

- MCU: STR750
- Standard JTAG connector with ARM 2x10 pin layout for programming/debugging with ARM-JTAG
- USB 2.0 device port
- 2x RS232 interface and drivers
- 3x User Buttons
- Trimmer potentiometer
- NOKIA 6610 TFT COLOR LCD display 128x128 pixel 12 bit color with backlight
- UEXT - 10 pin extension connector for Olimex addon peripherals like MP3, RF2.4Ghz, RFID etc. modules
- On board voltage regulators with up to 800mA current
- single power supply: 6-9VDC required
- power supply LED
- power supply filtering capacitor
- RESET circuit
- RESET button
- 4 Mhz crystal
- PCB: FR-4, 1.5 mm (0,062"), soldermask, silkscreen component print
- Dimensions: 110.5 x 101.6 mm (4.35 x 3.99")

## ELECTROSTATIC WARNING

The **STR750-STK** board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

## BOARD USE REQUIREMENTS

**Cables:** The cable you will need depends on the programmer/ debugger you use. If you use [ARM-JTAG-EW](#), you will need USB A-B cable.

**Hardware:** Programmer/Debugger [ARM-JTAG-EW](#) or other compatible programming/ debugging tool if you work with EW-ARM.

You can use also [ARM-USB-OCD](#), [ARM-USB-TINY](#), ARM-USB-OCD-H, [ARM-USB-TINY-H](#), but we don't offer a project for this board with this programmers.

## PROCESSOR FEATURES

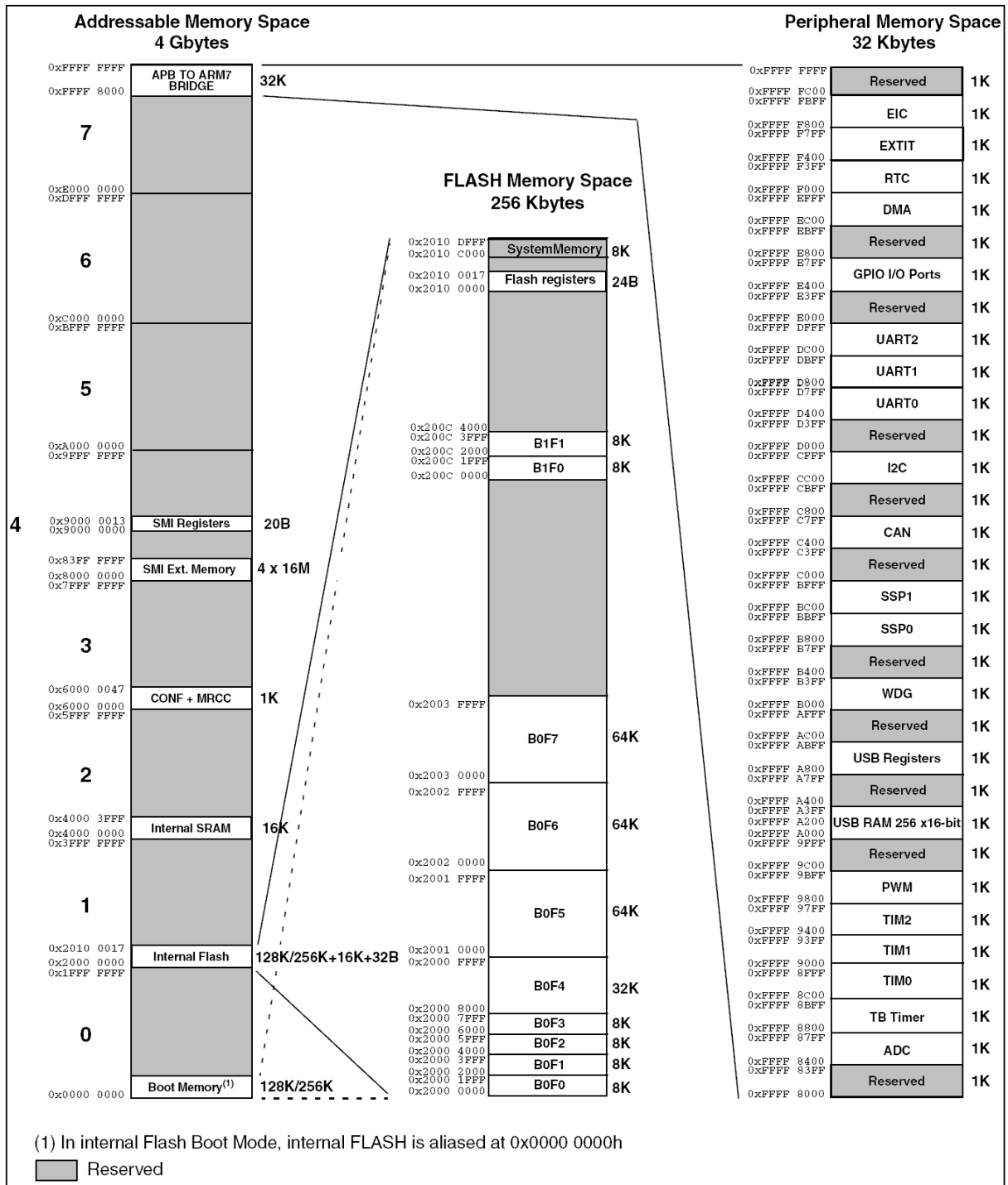
**STR750-STK** board use STR750F ARM7TDMI-S™ microcontroller with on-chip high-speed single voltage FLASH memory and high-speed RAM from STMicroelectronics with these features:

- Core:
  - ARM7TDMI-S 32-bit RISC CPU
  - 56 DMIPS @ 60 MHz
- Memories
  - 256 Kbytes embedded Flash program memory (10k cycles endurance, data retention 20 yrs at 55°C)
  - 16 Kbytes Read While Write Flash for data storage (100k cycles endurance, data retention 20 yrs at 55°C)
  - Flash Data Readout Protection
  - 16 Kbytes embedded SRAM
  - Memory mapped interface to ext. Serial Flash or EEPROM (64 MB) w.boot capability
- Clock, Reset and Supply Management
  - Single supply 3.3V ±10% or 5V ±10%
  - Embedded 1.8V Voltage Regulators with Low Power features
  - Smart Clock Controller with flexible clock generation capability:
    - Internal RC for fast start-up and backup clock mechanism.
    - Up to 60 MHz operation using internal PLL with 4 or 8 MHz crystal/ceramic osc.

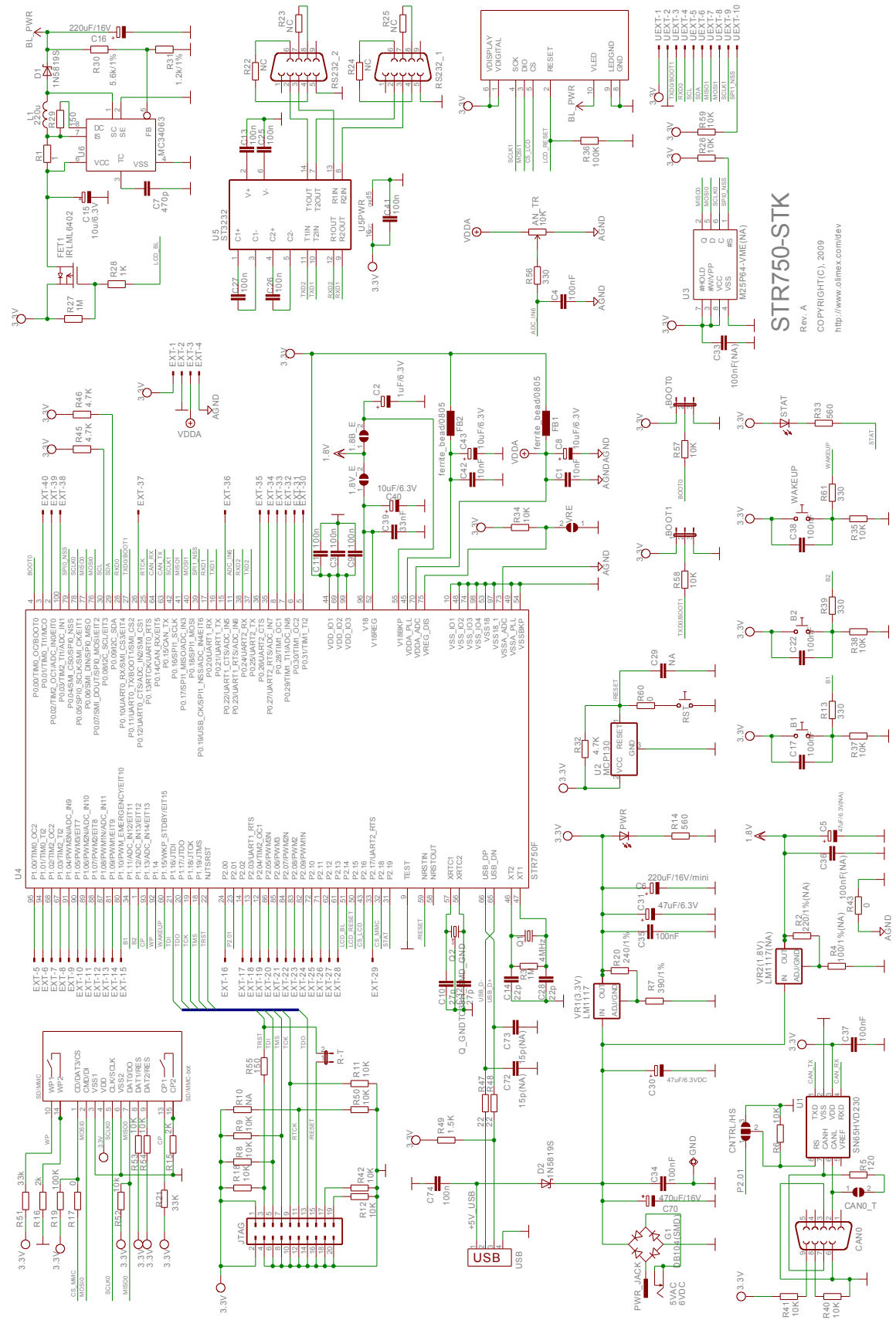
- Smart Low Power Modes: SLOW, WFI, STOP and STANDBY with backup registers.
- Real Time Clock, driven by low power internal RC or 32.768 kHz dedicated osc, for clock-calendar and Auto Wake-up
- Nested interrupt controller
  - Fast interrupt handling with 32 vectors
  - 16 IRQ priorities, 2 maskable FIQ sources
  - 16 external interrupt / wake-up Lines
- DMA
  - 4-channel DMA controller
  - Circular buffer management
  - Support for UART, SSP, Timers, ADC
- 6 Timers
  - 16-bit watchdog timer (WDG)
  - 16-bit timer for system timebase functions
  - 3 Synchronizable timers each with 2 input captures and 2 output compare/PWMs.
  - 16-bit 6-channel synchronizable PWM timer
  - Dead time generation, edge/center-aligned waveforms and emergency stop
- 8 Communications Interfaces
  - 1 I<sup>2</sup>C interface
  - 3 HiSpeed UARTs w. Modem/LIN capability
  - 2 SSP serial interfaces (SPI or SSI)
  - 1 CAN interface (2.0B Active)
  - 1 USB 2.0, full-speed 12 MB/s interface with 8 configurable endpoint sizes.
- 10-bit A/D Converter
  - 16/11 channels with Fast Scan Mode
  - Programmable Analog Threshold Detection
  - Conversion time: min. 3μs
  - Conversion Range: 0 to VDD\_IO
- 72 GPIO lines with High Sink capabilities
- Development Tools Support
  - JTAG interface (ARM Embedded ICE)



# MEMORY MAP

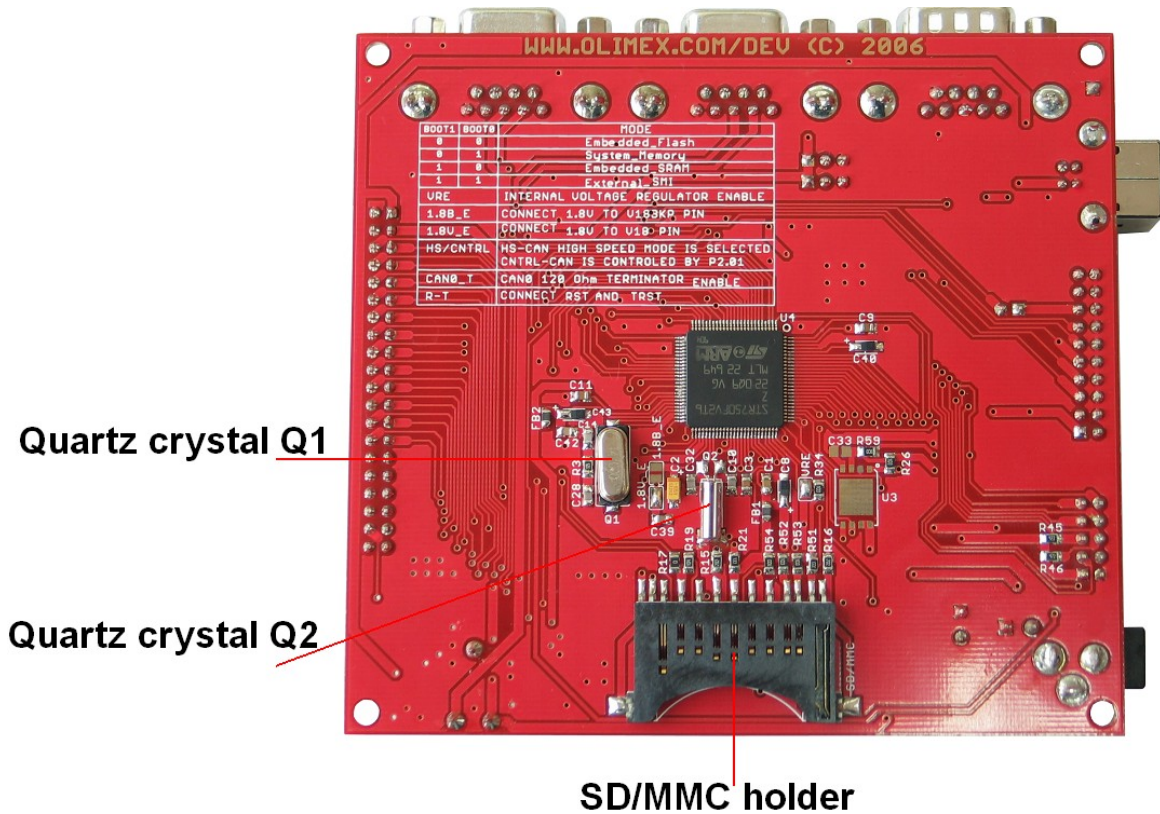
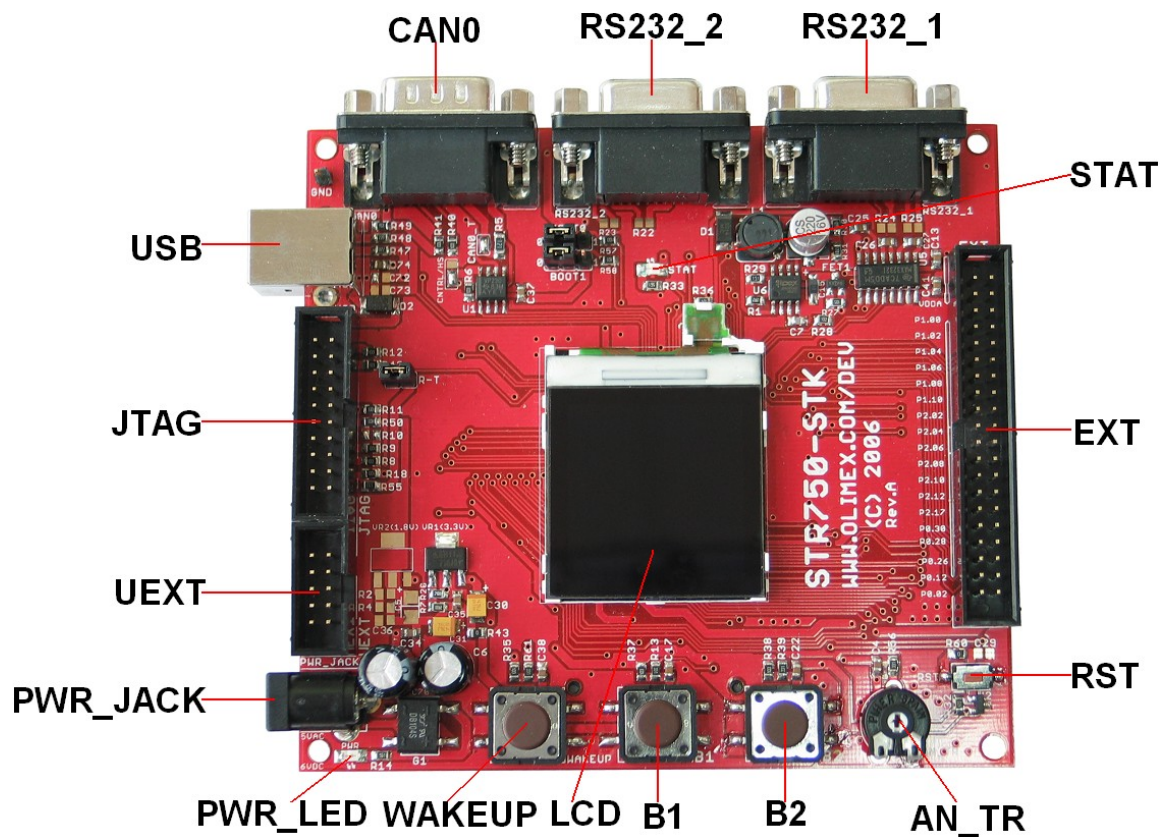


# SCHEMATIC



**STR750-STK**  
 Rev. A  
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<http://www.olimex.com/dev>

# BOARD LAYOUT





## POWER SUPPLY CIRCUIT

STR750-STK can take power (+6 V) from PWR\_JACK, and (+5 V) from USB.

The programmed board power consumption is about 140 mA with all peripherals enabled.

## RESET CIRCUIT

STR750-STK reset circuit includes jumper R-T, pin 15 of JTAG connector, STR750F pin 59 (NRSTIN), U2 (MCP130) and RESET button.

## CLOCK CIRCUIT

Quartz crystal 4 MHz is connected to STR750F pin 46 (XT2) and pin 47 (XT1).

Quartz crystal 32.768 kHz is connected to STR750F pin 56 (XRTC2) and pin 57 (XRTC1).

## JUMPER DESCRIPTION

### CAN0\_T



This jumper assures correct work of the CAN. At each end of the bus it should be closed. This means that if you have only two devices with CAN, the jumpers of both devices should be closed. If you have more than two devices, only the two end-devices should be closed.

Default state is closed.

### 1.8V\_E



Default state is closed.

### 1.8B\_E



Default state is open.

### VRE



Default state is closed.

### CNTRL/HS



Default state is in position CNTRL.

### R-T



Default state is closed.

### BOOT0



Default state is 0.



### BOOT1

Default state is 0.



<b>BOOT1</b>	<b>BOOT0</b>	<b>MODE</b>
<b>0</b>	<b>0</b>	<b>Embedded_Flash</b>
<b>0</b>	<b>1</b>	<b>System_Memory</b>
<b>1</b>	<b>0</b>	<b>Embedded_SRAM</b>
<b>1</b>	<b>1</b>	<b>External_SMI</b>
<b>URE</b>	<b>INTERNAL VOLTAGE REGULATOR ENABLE</b>	
<b>1.8B_E</b>	<b>CONNECT 1.8V TO V18BKP PIN</b>	
<b>1.8V_E</b>	<b>CONNECT 1.8V TO V18 PIN</b>	
<b>CNTRL/HS</b>	<b>HS-CAN HIGH SPEED MODE IS SELECTED CNTRL-CAN IS CONTROLLED BY P2.01</b>	
<b>CAN0_T</b>	<b>CAN0 120 Ohm TERMINATOR ENABLE</b>	
<b>R-T</b>	<b>CONNECT RST AND TRST</b>	

## INPUT/OUTPUT

Status led (red) with name **STAT** connected to STR750F pin 31 (P2.19).

Power-on LED (red) with name **PWR** - this LED shows that +3.3V is applied to the board.

User button with name **B1** connected to STR750F pin 34 (P1.11).

User button with name **B2** connected to STR750F pin 1 (P1.12).

User button with name **WAKEUP** connected to STR750F pin 60 (P1.15/WKP\_STDBY).

User button with name **RESET** connected to STR750F pin 59 (NRSTIN).

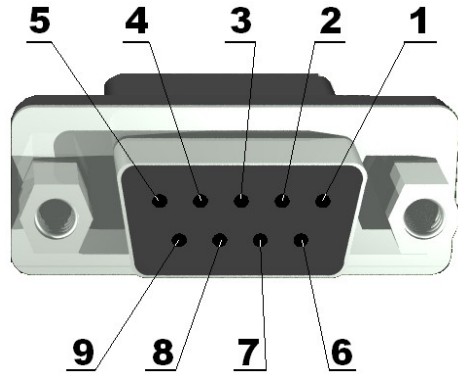
Trimpot with name **AN\_TR** connected to STR750F pin 11 (P0.23/ ADC\_IN6).

TFT LCD - 128x128 12 bit color with backlight.

## EXTERNAL CONNECTORS DESCRIPTION

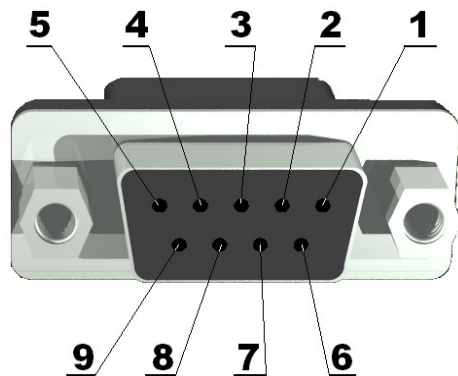
### RS232 1

Pin #	Signal Name
1	NC
2	T2OUT
3	R2IN
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC



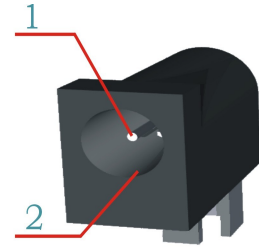
### RS232 2

Pin #	Signal Name
1	NC
2	T1OUT
3	R1IN
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC



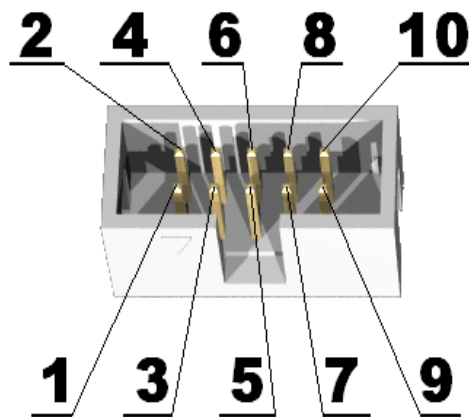
## PWR JACK

Pin #	Signal Name
1	Power Input
2	GND



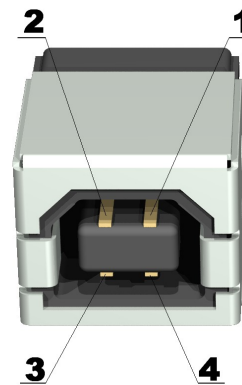
## UEXT

Pin #	Signal Name
1	3.3V
2	GND
3	TXD0/BOOT1
4	RXD0
5	SCL
6	SDA
7	MISO1
8	MOSI1
9	SCLK1
10	SPI1_NSS



## USB

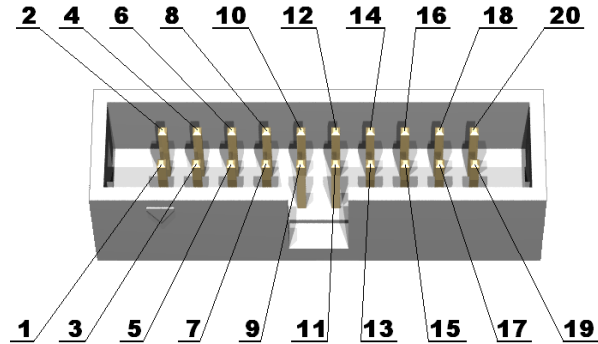
Pin #	Signal Name
1	+5V_USB
2	USB_D-
3	USB_D+
4	GND



## JTAG

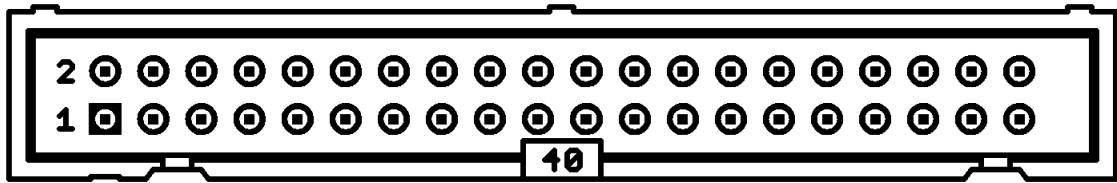
The JTAG connector allows the software debugger to talk via a JTAG (Joint Test Action Group) port directly to the core. Instructions may be inserted and executed by the core thus allowing STR750 memory to be programmed with code and executed step by step by the host software.

For more details refer to IEEE Standard 1149.1 - 1990 Standard Test Access Port and Boundary Scan Architecture and STR750 datasheets and users manual.



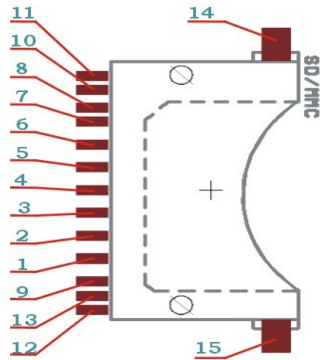
Pin #	Signal Name	Pin #	Signal Name
1	3.3V	2	3.3V
3	TRST	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	RTCK	12	GND
13	TDO	14	GND
15	/RESET	16	GND
17	pull-down	18	GND
19	+5V_J-LINK	20	GND

EXT



Pin #	Signal Name	Pin #	Signal Name
1	3.3V	2	GND
3	AVDD	4	AGND
5	P1.00	6	P1.01
7	P1.02	8	P1.03
9	P1.04	10	P1.05
11	P1.06	12	P1.07
13	P1.08	14	P1.09
15	P1.10	16	P2.00
17	P2.02	18	P2.03
19	P2.04	20	P2.05
21	P2.06	22	P2.07
23	P2.08	24	P2.09
25	P2.10	26	P2.11
27	P2.12	28	P2.13
29	P2.17	30	P0.31
31	P0.30	32	P0.29
33	P0.28	34	P0.27
35	P0.26	36	P0.22
37	P0.12	38	P0.03
39	P0.02	40	P0.01

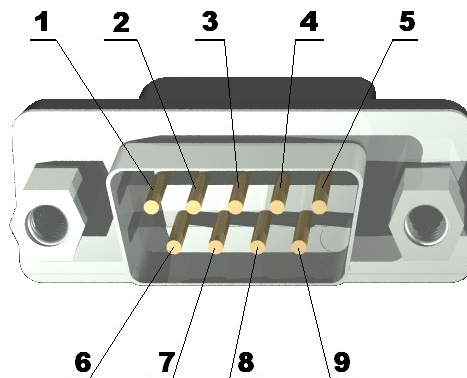
## SD/MMC



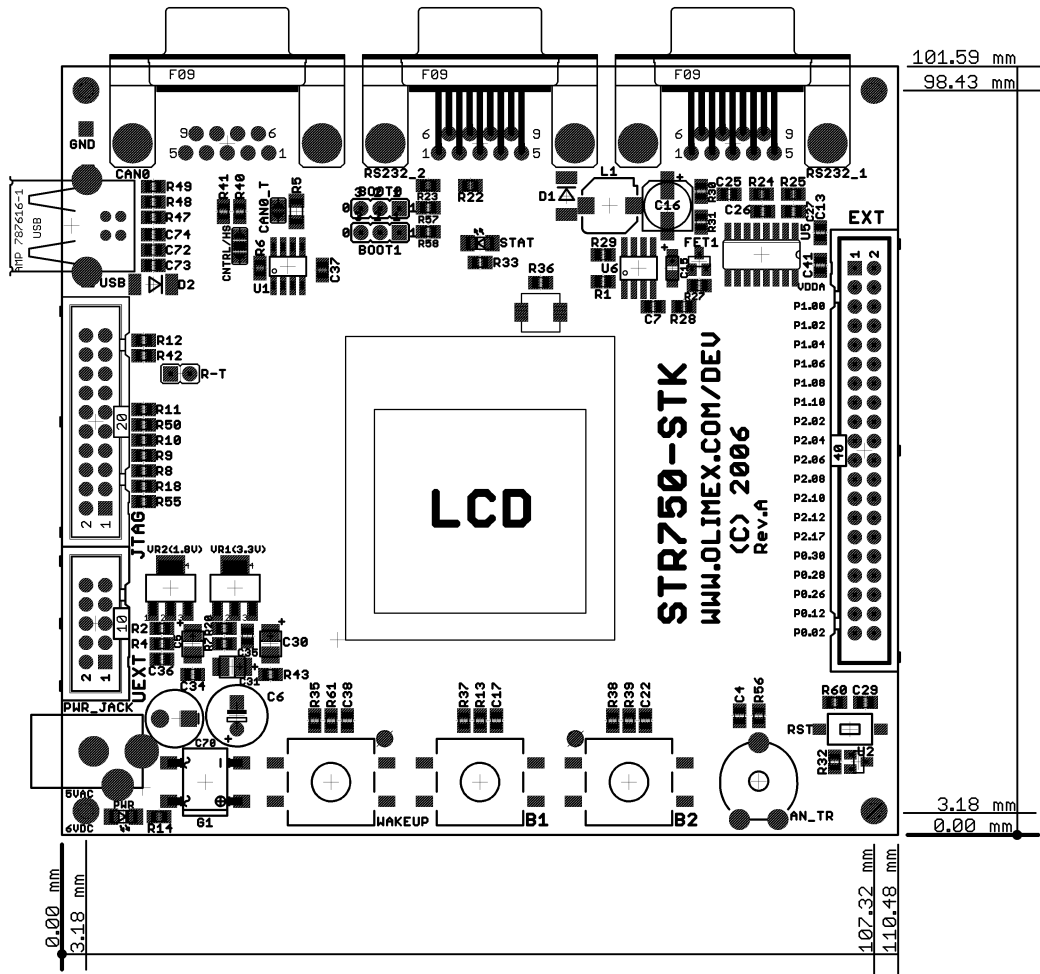
Pin #	Signal Name	Pin #	Signal Name
1	CS_MMC	2	MOSI0
3	GND	4	VDD
5	SCLK0	6	GND
7	MISO0	8	pull-up
9	pull-up	10	WP
11	-	12	-
13	CP	14	pull-down
15	pull-down		

## CAN0

Pin #	Signal Name
1	NC
2	JMP CAN0_T; CANL
3	GND
4	NC
5	NC
6	GND
7	CANH
8	pull-down
9	pull-up



# MECHANICAL DIMENSIONS





## AVAILABLE DEMO SOFTWARE

- Jim Lynch's NOKIA 6610 LCD tutorial
- OpenOCD + Eclipse set of projects 1.00 include flash write make file for STR-750STK.

## **ORDER CODE**

**STR750-STK** - assembled and tested board, includes STR750 microcontroller

### **How to order?**

You can order to us directly or by any of our distributors.  
Check our web [www.olimex.com/dev](http://www.olimex.com/dev) for more info.

## **Revision history**

Revision A, December 2009

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