

STM32-P107 development board

User's Manual



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Rev. F, August 2012

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INTRODUCTION

STM32-P107 prototype board provides easy way for developing and prototyping with the new STM32F107VCT6 connectivity line microcontroller, produced by STMicroelectronics. STM32-P107 has JTAG port for programming and debugging, USB_OTG, user button, two status leds, and most of the GPIOs are on extension headers where you can connect your additional circuits.

BOARD FEATURES

- CPU: STM32F107VCT6 32 bit ARM-based microcontroller with 256 KB Flash, 64 KB RAM, USB OTG, Ethernet, 10 timers, 2 CANs, 2 ADCs, 14 communication interfaces
- JTAG connector with ARM 2x10 pin layout for programming/debugging
- USB_OTG
- USB_HOST
- 100Mbit Ethernet
- RS232
- Mini SD/MMC card connector
- UEXT connector
- Power Jack
- Two user buttons
- RESET button and circuit
- Two status leds
- Power-on led
- 3V battery connector
- Extension port connectors for many of microcontrollers pins
- PCB: FR-4, 1.5 mm (0,062"), soldermask, silkscreen component print
- Dimensions: 132.08x96.52mm (5.2x3.8")

ELECTROSTATIC WARNING

The STM32-P107 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](#), you will need LPT cable, if you use [ARM-JTAG-EW](#), [ARM-USB-OCD](#), [ARM-USB-OCD-H](#), [ARM-USB-TINY](#), or [ARM-USB-TINY-H](#) you will need 1.8 meter USB A-B cable, for ARM-USB-OCD and ARM-USB-OCD-H you will need RS232 cable, too.

Hardware: Programmer/Debugger – one of the Olimex ARM Programmers: ARM-JTAG, ARM-JTAG-EW, ARM-USB-OCD, ARM-USB-OCD-H, ARM-USB-OCD-TINY, ARM-USB-OCD-H.

Software: ARM C compiler

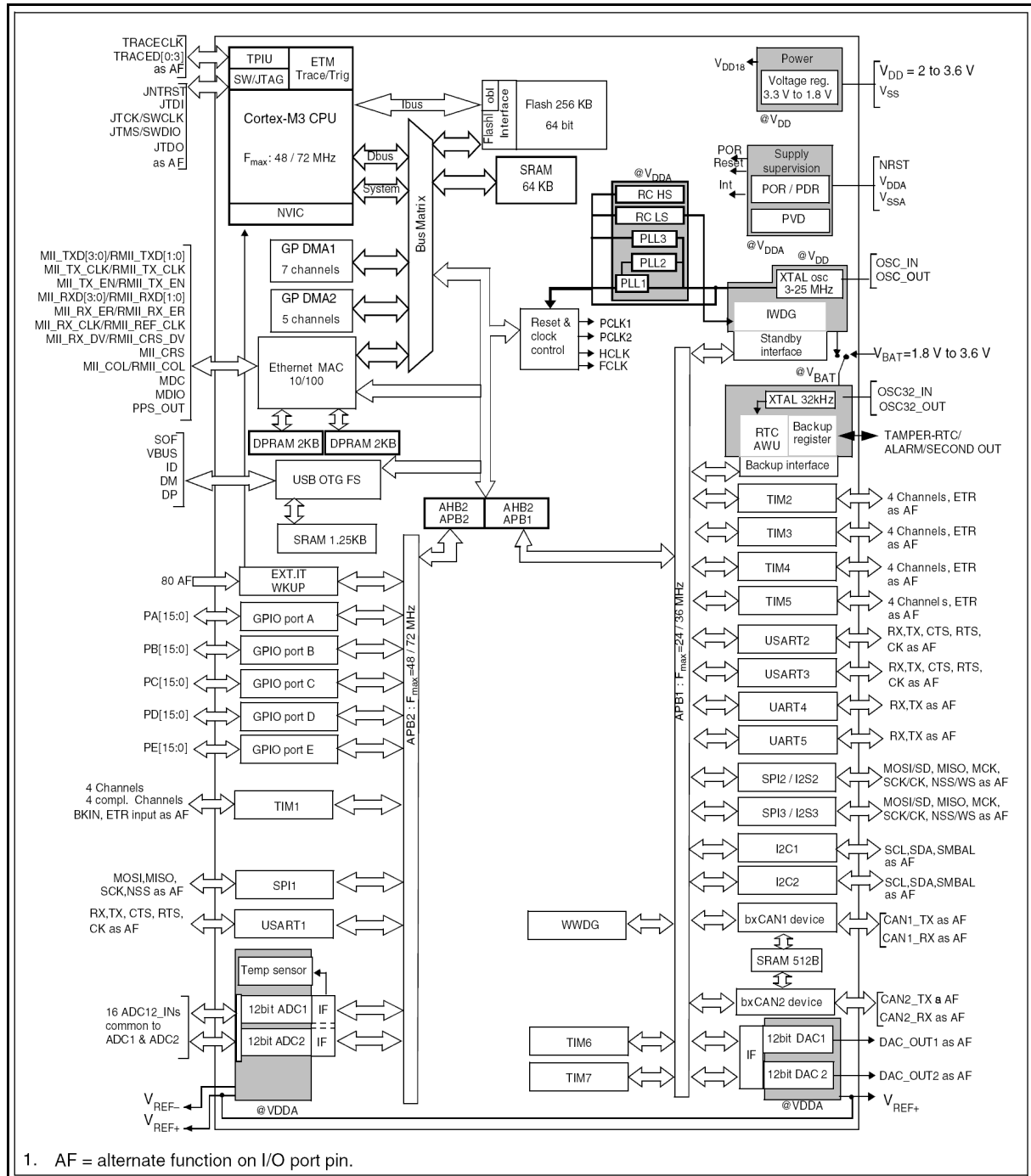
PROCESSOR FEATURES

STM32-P107 board use ARM-based 32-bit microcontroller **STM32F107VCT6** with these features:

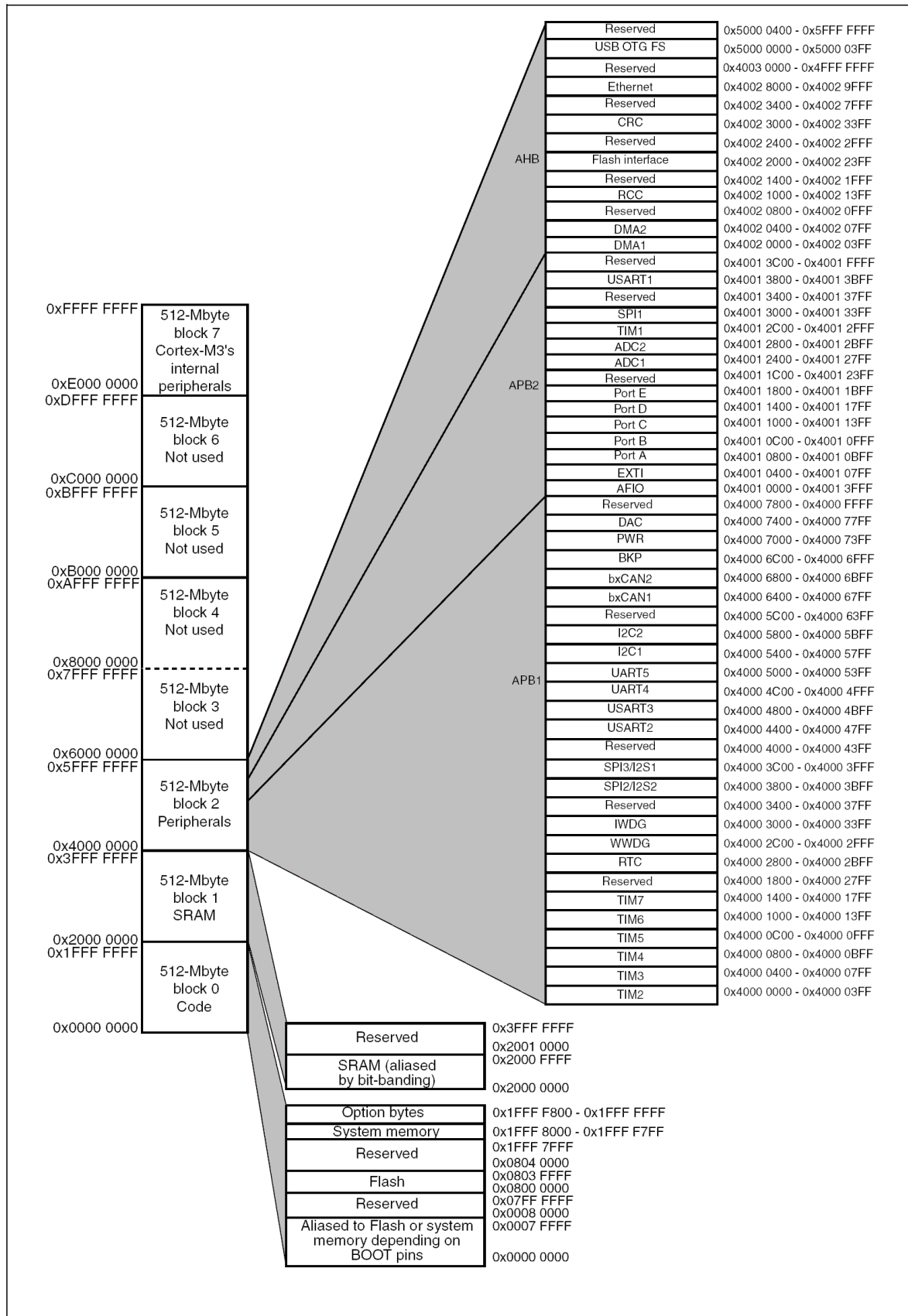
- Core: ARM 32-bit Cortex™-M3 CPU
 - 72 MHz maximum frequency, 1.25 DMIPS/MHz (Dhrystone 2.1) performance at 0 wait state memory access
 - Single-cycle multiplication and hardware division
- Memories
 - 256 Kbytes of Flash memory
 - 64 Kbytes of SRAM
- Clock, reset and supply management
 - 2.0 to 3.6 V application supply and I/Os
 - POR, PDR, and programmable voltage detector (PVD)
 - 25 MHz crystal oscillator
 - Internal 8 MHz factory-trimmed RC
 - Internal 40 kHz RC with calibration
 - 32 kHz oscillator for RTC with calibration
- Low power
 - Sleep, Stop and Standby modes
 - VBAT supply for RTC and backup registers
- 2 × 12-bit, 1 μs A/D converters (16 channels)
 - Conversion range: 0 to 3.6 V
 - Sample and hold capability
 - Temperature sensor
 - up to 2 MSps in interleaved mode
- 2 × 12-bit D/A converters
- DMA: 12-channel DMA controller

- Supported peripherals: timers, ADCs, DAC, I²Ss, SPIs, I²Cs and USARTs
- Debug mode
 - Serial wire debug (SWD) & JTAG interfaces
 - Cortex-M3 Embedded Trace Macrocell™
- 80 fast I/O ports
 - 80 I/Os, all mappable on 16 external interrupt vectors and almost all 5 V-tolerant
- 10 timers
 - four 16-bit timers, each with up to 4 IC/OC/PWM or pulse counter and quadrature (incremental) encoder input
 - 1 × 16-bit motor control PWM timer with dead-time generation and emergency stop
 - 2 × watchdog timers (Independent and Window)
 - SysTick timer: a 24-bit downcounter
 - 2 × 16-bit basic timers to drive the DAC
- 14 communication interfaces
 - 2 × I²C interfaces (SMBus/PMBus)
 - 5 USARTs (ISO 7816 interface, LIN, IrDA capability, modem control)
 - 3 SPIs (18 Mbit/s), 2 with a multiplexed I²S interface that offers audio class accuracy via advanced PLL schemes
 - 2 × CAN interfaces (2.0B Active) with 512 bytes of dedicated SRAM
 - USB 2.0 full-speed device/host/OTG controller with on-chip PHY that supports HNP/SRP/ID with 1.25 Kbytes of dedicated SRAM
 - 10/100 Ethernet MAC with dedicated DMA and SRAM (4 Kbytes): IEEE1588 hardware support, MII/RMII available on all packages
- CRC calculation unit, 96-bit unique ID

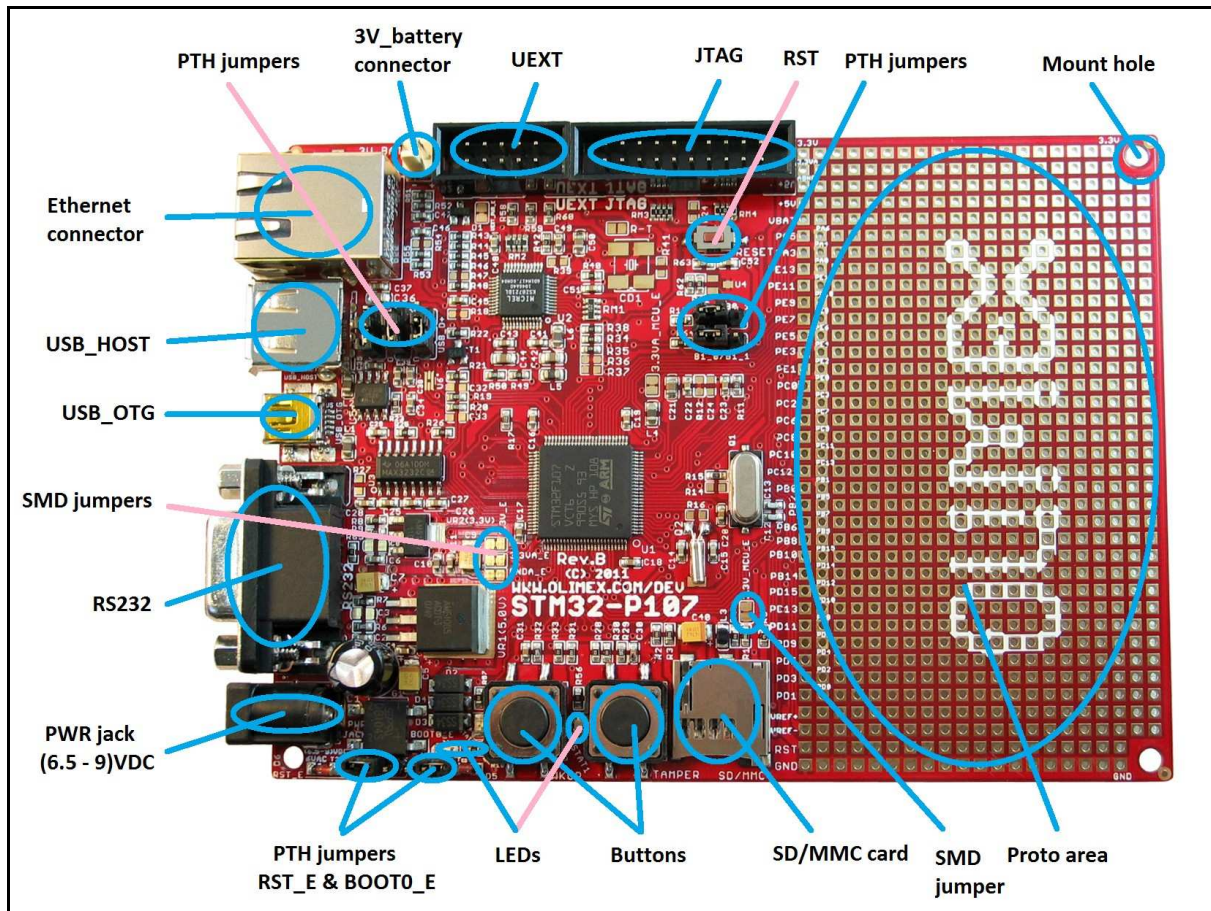
BLOCK DIAGRAM



MEMORY MAP



BOARD LAYOUT



POWER SUPPLY CIRCUIT

STM32-P107 can take power from three sources:

- PWR connector where (6.5-9)V DC or 6V AC is applied by external power source.
- +5V_OTG-PWR from USB OTG
- +5V_JTAG from JTAG

The programmed board power consumption is about 70 mA.

RESET CIRCUIT

STM32-P107 reset circuit includes JTAG connector pin 15, U2 (STE101P) pin 28 (RESET), R73(10k), R74(330Ohm), R75(100Ohm/1%), C55(100nF), STM32F107 pin 14 (NRST) and RESET button.

CLOCK CIRCUIT

Quartz crystal 25 MHz is connected to **STM32F107** pin 12 (OSC_IN) and pin 13 (OSC_OUT).

Quartz crystal 32.768kHz is connected to **STM32F107** pin 8 (PC14/OSC32_IN) and pin 9 (PC15/OSC32_OUT).

JUMPER DESCRIPTION

PWR_SEL



5-6

When position 1-2 is shorted – the board is power supplied from JTAG.



3-4

When position 3-4 is shorted – the board is power supplied from USB_OTG.



1-2

When position 5-6 is shorted – the board is power supplied from External power source.

Default state is – position 5-6 – shorted.

B0_0/B0_1



When this jumper is in position B0_1 – BOOT0 is connected to 3.3V, and when the jumper is in position B0_0 – BOOT0 is connected to GND.

Default state is B0_0.

B1_0/B1_1



When this jumper is in position B1_1 – BOOT1 is connected to 3.3V, and when the jumper is in position B1_0 – BOOT1 is connected to GND.

Default state is B1_0.

VBUS



O H

When is in position “H” - connects +5V_HOST_PWR to OTG_VBUS.

When is in position “O” - connects +5V_OTG_PWR to OTG_VBUS.

Default state is “O”.

USB_D+



O H

When is in position “H” - connects USB_HOST_D+ to OTG_DP.

When is in position “O” - connects USB_OTG_D+ to OTG_DP.

Default state is “O”.

USB_D-



O H

When is in position “H” - connects USD_HOST_D- to OTG_DM.

When is in position “O” - connects USB_OTG_D- to OTG_DM.

Default state is “O”.

PWDW_D



When is closed – disables Ethernet transceiver (STE101P) Power Down Mode. STE101P is active.

Default state is closed.

3.3V_MCU_E



Enable microcontroller 3.3V power supply

Default state is closed.

3.3V_E



Enable regulator VR2 (3.3V) - LM1117

Default state is closed.

3.3VA_E



Enables board 3.3V analog power supply.

Default state is closed.

3.3VA_MCU_E



Enables microcontroller 3.3V analog power supply.

Default state is closed.

GNDA_E



Enables board analog GND.

Default state is closed.

R-T



Connects RST to TRST

Default state is open.

RST_E, BOOT_E jumpers



Note that it is recommended to move those jumpers together – either both should be open or both should be closed.

When both are closed RS232 boot is enabled.

Default states are RST_E – open; BOOT_E – open.

INPUT/OUTPUT

Status LED1 (green) with name **STAT1** connected to STM32F107 pin 63 (PC6/I2S2_MCK/TIM3_CH1).

Status LED2 (yellow) with name **STAT2** connected to STM32F107 pin 64 (PC7/I2S3_MCK/TIM3_CH2).

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

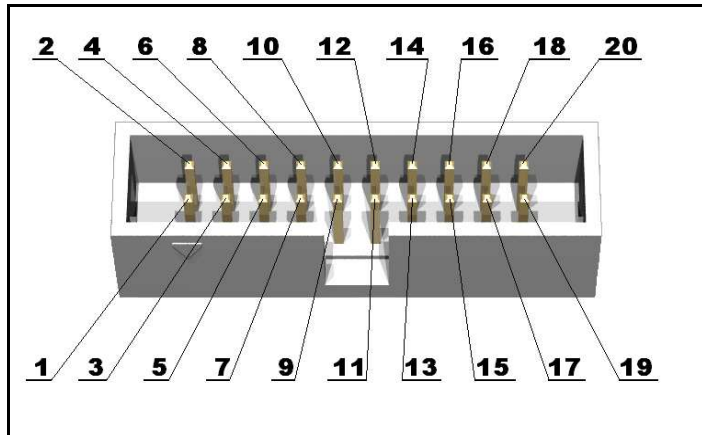
User button with name **WKUP** connected to STM32F107 pin 23 (PA0/WKUP).

User button with name **TAMPER** connected to STM32F107 pin 7 (PC13/TAMPER-RTC).

Reset button with name **RESET** connected to STM32F107 pin 14 (NRST).

CONNECTOR DESCRIPTIONS

JTAG



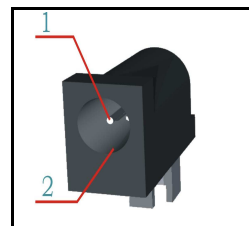
The JTAG connector allows the software debugger to talk via a JTAG (Joint Test Action Group) port directly to the core. Instructions may be inserted and executed by the core thus allowing STM32F107 memory to be programmed with code and executed step by step by the host software.

For more details refer to IEEE Standard 1149.1 - 1990 Standard Test Access Port and Boundary Scan Architecture and STM32F107 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 | PULL-DOWN | 12 | GND |
| 13 | TDO | 14 | GND |
| 15 | RST | 16 | GND |
| 17 | PULL-DOWN | 18 | GND |
| 19 | +5V_JTAG | 20 | GND |

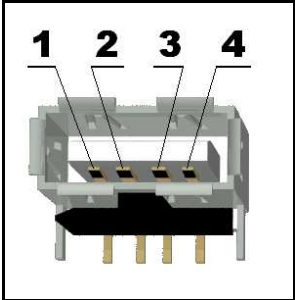
PWR JACK

| Pin # | Signal Name |
|-------|-------------|
| 1 | Power Input |
| 2 | GND |



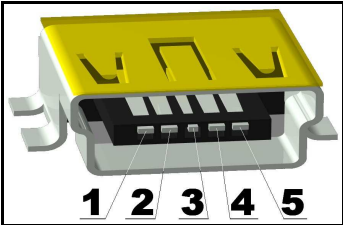
USB HOST

| Pin # | Signal Name |
|-------|--------------|
| 1 | +5V_HOST_PWR |
| 2 | USB_HOST_D- |
| 3 | USB_HOST_D+ |
| 4 | GND |



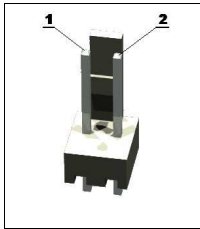
USB OTG

| Pin # | Signal Name |
|-------|-------------|
| 1 | +5V_OTG_PWR |
| 2 | USB_OTG_D- |
| 3 | USB_OTG_D+ |
| 4 | OTG_ID |
| 5 | GND |



3V BAT

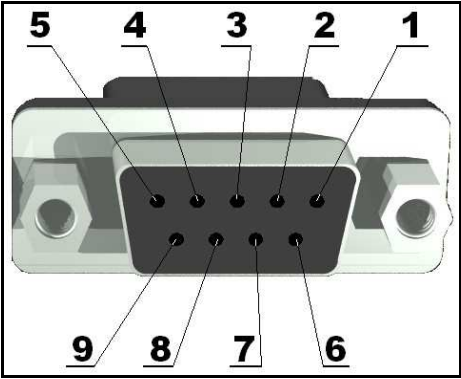
| Pin # | Signal Name |
|-------|-------------|
| 1 | VBAT |
| 2 | GND |



RS232

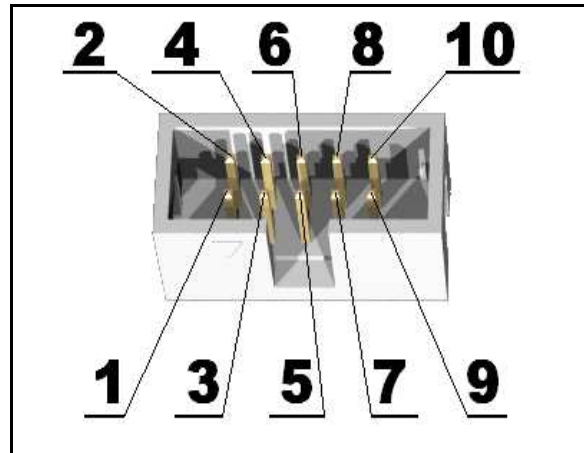
The RS232 port can be used for communication when in bootloader mode. To enter bootloader mode you need to close RST_E and BOOT0_E jumpers. Note that the default position of those jumpers is closed, e.g. bootloader mode disabled.

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

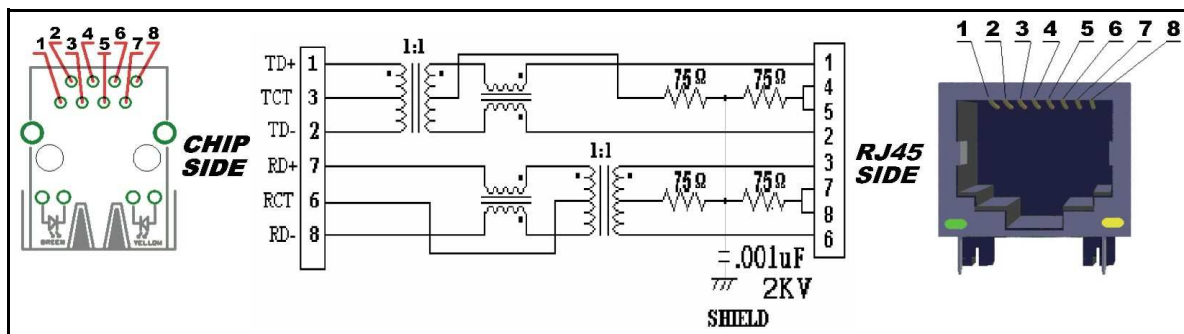


UEXT

| Pin # | Signal Name |
|-------|-------------|
| 1 | 3.3V |
| 2 | GND |
| 3 | USART2_TX |
| 4 | USART2_RX |
| 5 | I2C1_SCL |
| 6 | I2C1_SDA |
| 7 | SPI3_MISO |
| 8 | SPI3_MOSI |
| 9 | SPI3_SCK |
| 10 | CS_UEXT |



LAN

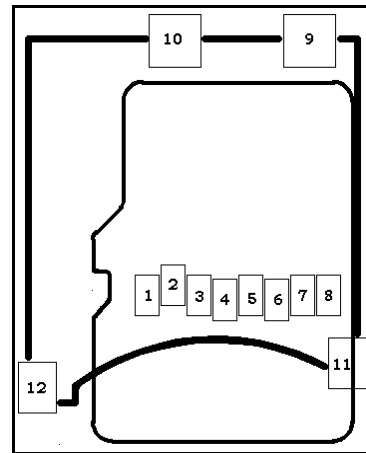


| Pin # | Signal Name Chip Side | Pin # | Signal Name Chip Side |
|-------|-----------------------|-------|-----------------------|
| 1 | TX+ | 5 | Not Connected (NC) |
| 2 | TX- | 6 | VDD |
| 3 | VDD | 7 | RX+ |
| 4 | Not Connected (NC) | 8 | RX- |

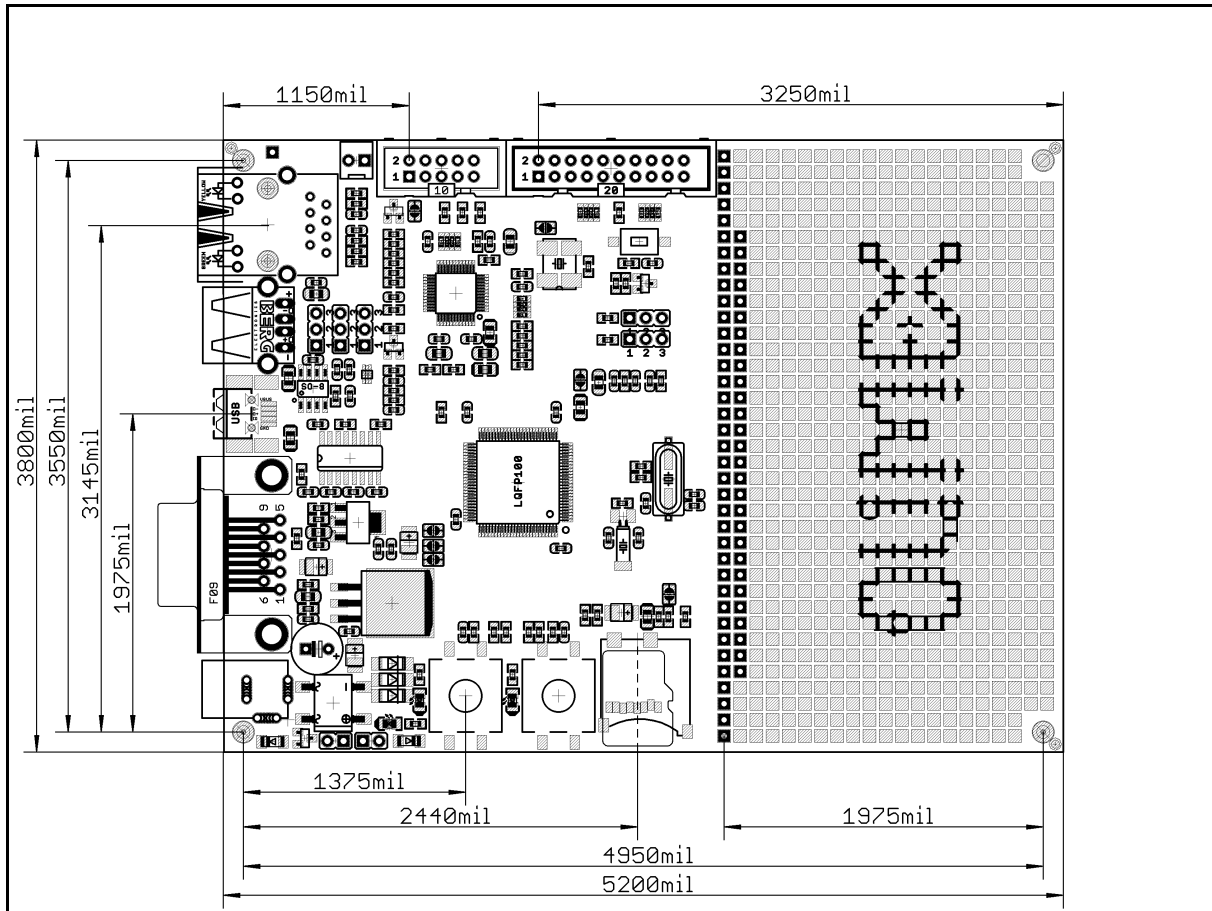
| LED | Color | Usage |
|-------|--------|-----------------|
| Right | Green | Link status |
| Left | Yellow | Activity status |

SD/MMC

| Pin # | Signal Name |
|-------|---------------|
| 1 | MCIDAT2 |
| 2 | CS_MMC |
| 3 | SPI3_MOSI |
| 4 | 3.3V |
| 5 | SPI3_SCK |
| 6 | GND |
| 7 | SPI3_MISO |
| 8 | MCIDAT1 |
| 9 | Not connected |
| 10 | Not connected |
| 11 | Not connected |
| 12 | Not connected |



MECHANICAL DIMENSIONS



All measures are in mils.

AVAILABLE DEMO SOFTWARE

- [NEW STM32-P107 demo package](#) with Micrel PHY
- [Blinking LED](#) Demo software for EW-ARM 5.50
- [Ethernet](#) Demo software for EW-ARM 5.50
- [USB](#) Demo software for EW-ARM 5.50
- [SD card](#) Demo software for EW-ARM 5.50

ORDER CODE

STM32-P107 – assembled and tested

How to order?

You can order to us directly or by any of our distributors.

Check our web www.olimex.com/dev for more info.

Manual revision history:

| | |
|--------------|---|
| REV. Initial | - created December 2009 |
| REV. A | - edited by TU December 2010 |
| REV. B | - demo software added and mechanical dimensions detailed |
| REV. C | - Rev. A schematic and added more programmers in BOARD USE REQUIREMENTS. |
| REV. D | - edited June 2011 – changed schematic |
| REV. E | - changed schematics to rev. B, added board revision history |
| REV.F | - added BOOT0_E, RST_E description, changed dimensions, updated revision B pictures, updated disclaimer |

Board revision history:

rev.A

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1. ST2052BD is exchanged with LM3526-L.
2. SD/MMC signals are changed as follows:

| | | |
|-----------|----|-----------|
| SPI1_MOSI | -> | SPI3_MOSI |
| SPI1_SCK | -> | SPI3_SCK |
| SPI1_MISO | -> | SPI3_MISO |

and SPI1_NSS renamed to CS_MMC

3. Changed the polarity to + of C36

In Rev.B

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1. All libraries are updated
2. Ethernet PHY is changed from STE101P to MICREL's one - KS8721BLMM
3. All 10uF/6.3V/TANT are changed to 0805 and a lot of element names are changed.
4. PWR_SEL jumpers are replaced by diodes.
5. USART3 is connected to UEXT while USART2 is connected to RS232 and bootloader functionality is enabled!
Two additional jumpers are added!!!
6. Added UEXT_PWR_E jumper!
7. A lot jumpers are added into jumpers description table

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The software is released under GPL.

It is possible that the pictures in this manual differ from the latest revision of the board.

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