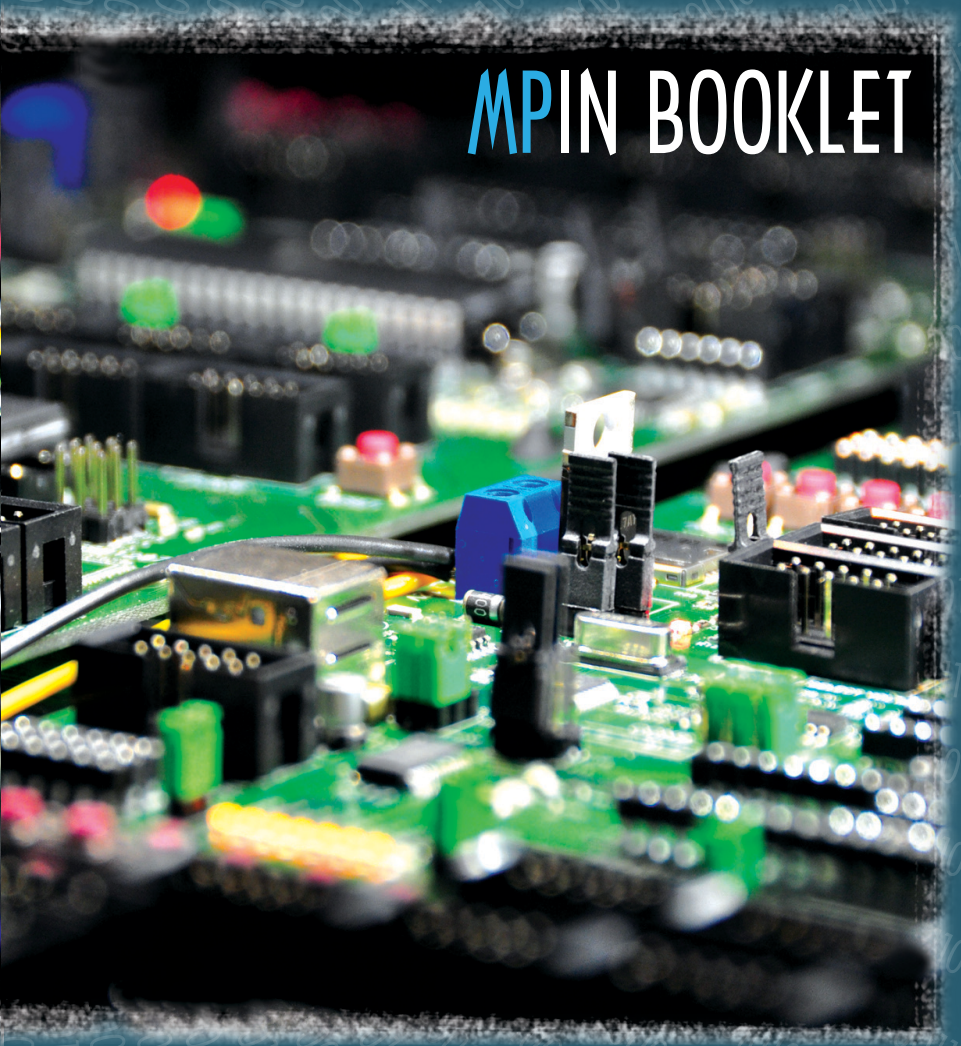
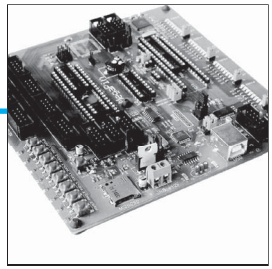
# MPIN BOOKLET

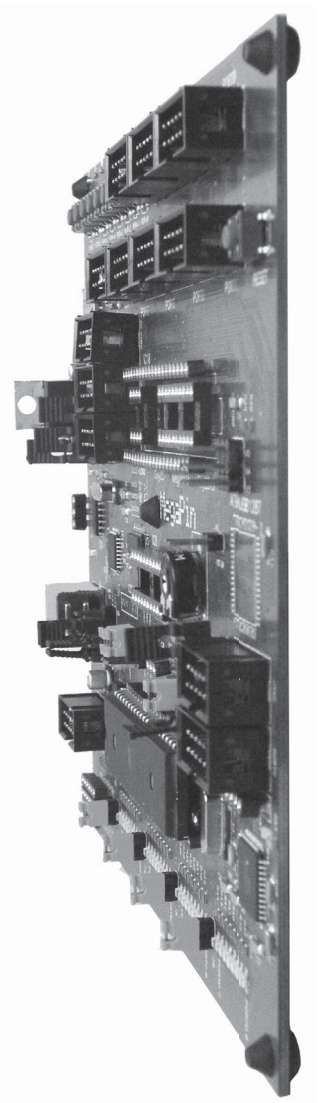


AVR TOOLKIT

ax d.o.o., slovenia







## Dear MegaPin user!

I am proud that you have purchased our MegaPin development board. I trust that you will be same enthusiastic as myself when using it. When programming micro controllers for more than 15 years I have seen & tested many development boards, but none so far was so user friendly. I hope that you will also find MegaPin easy to use too. Please read this User manual carefully and explore all possibilities of MegaPin usage.

AX ELEKTRONIKA
JURIJ MIKELN, B.SC.E.E., OWNER

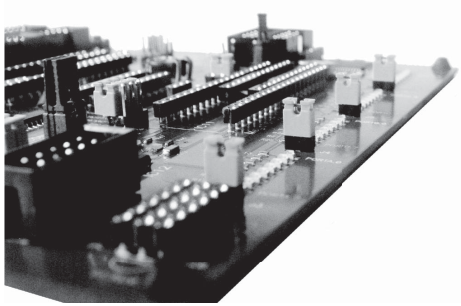
## Key features:

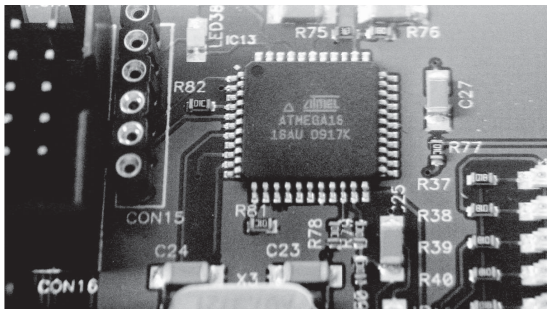
- supports 8-pin, 20-pin, 28-pin and 40-pin DIL AVRs,
- supports AT90USB1287 USB AVR microcontroller,
- built-in fast USB 2.0 programmer,
- in-circuit programming of target microcontroller,
- supports JTAG programming/debugging*,
- powers from USB or 12V DC,
- protection from wrong polarity,
- selectable power supply for target microcontroller: 3,3 or 5 V,
- power-on LED,
- programmed OK LED,
- built in UART<>USB communication,
- 4x8 LEDs to indicate status of I/O ports,
- 6x 1Wire DS18S20 sockets,
- built-in MicroSD memory card socket,
- 8 independent buttons which can be connected to any I/O port,
- built-in protection resistors at each button,
- built-in crystal oscillator (without x-tal),
- built-in socket for 32,768 kHz RTC quartz crystal for ATmega 8/16/32,
- built-in socket for ceramic resonator,
- built-in trimmer for setting external AREF voltage,
- built-in socket for STK200 input/output,
- expansion sockets for ports PortA, PortB, PortB, PortD, PortE, PortF,
- RESET button.

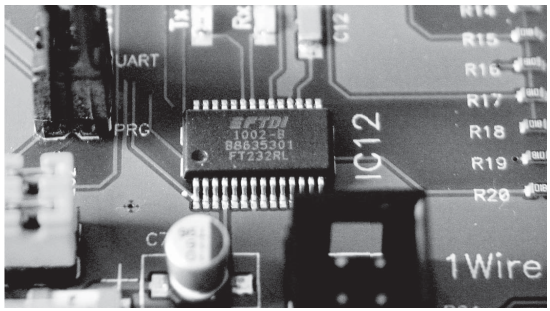
*with additional JTAG adapter

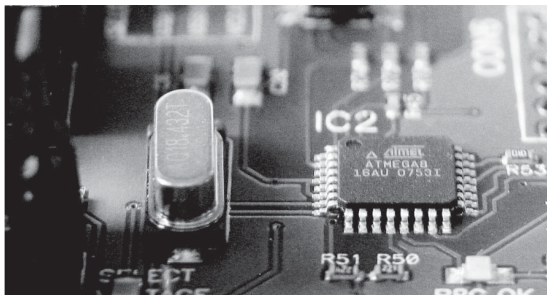
MegaPin is a modern development board which reflects experience of many users in programming microcontrollers. It's user friendly, very compact and yet offers many possibilities at developing microcontroller programs.

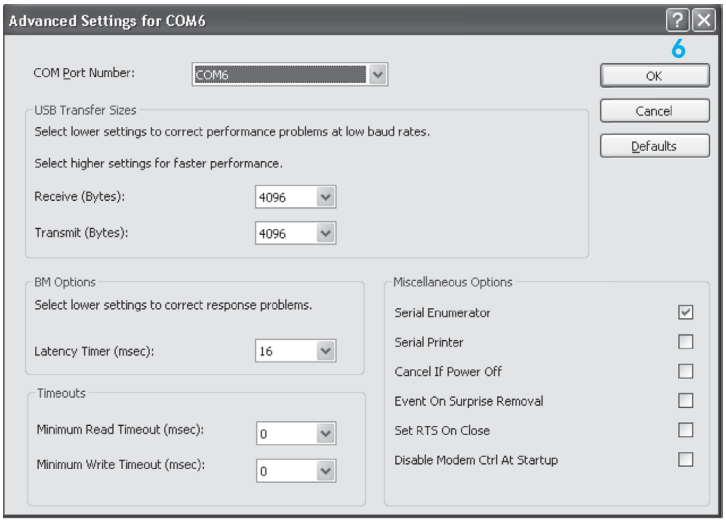
MegaPin development board for AVR microcontrollers supports all 8-pin, 20-pin, 28-pin and 40-pin DIL AVRs, including with AT90USB1287 USB AVR. MegaPin features jumpers which select connection to USB: either with built-in FT232RL chip or directly to AT90USB1287, which does not neet additional USB interface chip. With a help of Bascom USB Add-on Library one can make its own USB chips. In case that you need your own VID or PID you can order them at MCS company which is being represented by AX elektronika.

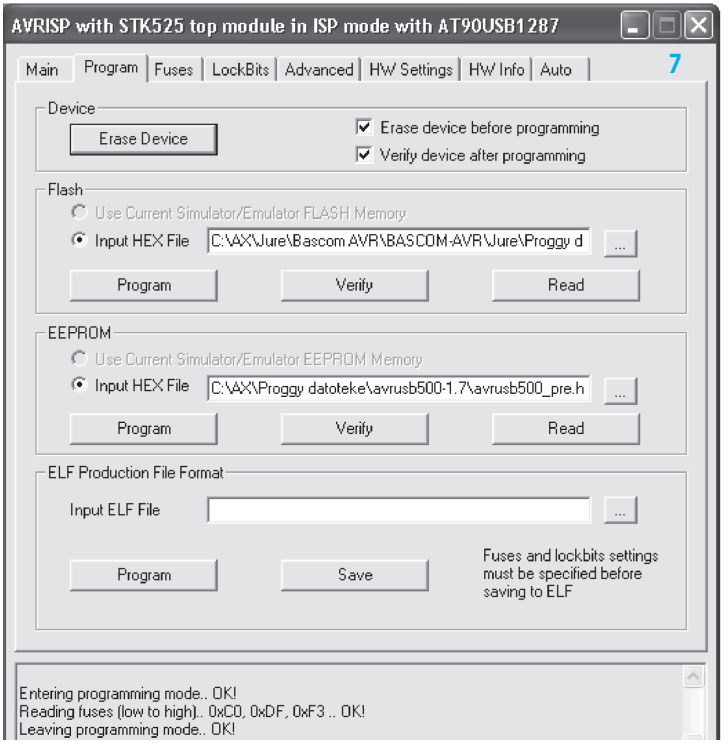



IC13
R75
R76
R82
ATMEGA16
16AU 0917K
C27
R77
R37
R38
R39
R40
C25
R81
CON15
C24
C23
R78
CON16


UART
PRG
FTDI
1002-B
B6B35301
FT232RL
IC12
R15
R16
R17
R18
R19
R20
1Wire

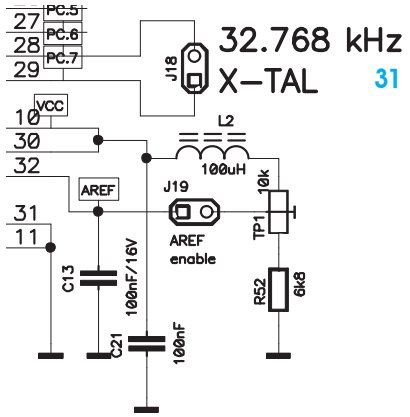

IC2
ATMEGA8
16AU 0753I
R51
R50


Advanced Settings for COM6
6
COM Port Number:
COM6
OK
Cancel
Defaults
USB Transfer Sizes
Select lower settings to correct performance problems at low baud rates.
Select higher settings for faster performance.
Receive (Bytes):
4096
Transmit (Bytes):
4096
BM Options
Select lower settings to correct response problems.
Latency Timer (msec):
16
Timeouts
Minimum Read Timeout (msec):
0
Minimum Write Timeout (msec):
0
Miscellaneous Options
Serial Enumerator
Serial Printer
Cancel If Power Off
Event On Surprise Removal
Set RTS On Close
Disable Modem Ctrl At Startup


AVRISP with STK525 top module in ISP mode with AT90USB1287
Main
Program
Fuses
LockBits
Advanced
HW Settings
HW Info
Auto
7
Device
Erase Device
Erase device before programming
Verify device after programming
Flash
Use Current Simulator/Emulator FLASH Memory
Input HEX File
C:\AX\Jure\Bascom AVR\BASCOM-AVR\Jure\Proggy d
Program
Verify
Read
EEPROM
Use Current Simulator/Emulator EEPROM Memory
Input HEX File
C:\AX\Proggy datoteke\avrusb500-1.7\avrusb500_pre.h
Program
Verify
Read
ELF Production File Format
Input ELF File
Program
Save
Fuses and lockbits settings must be specified before saving to ELF
Entering programming mode.. OK!
Reading fuses (low to high).. 0xC0, 0xDF, 0xF3 .. OK!
Leaving programming mode.. OK!

## AREF and 32,768 kHz quartz crystal

MegaPin has built in external reference voltage, which can be enabled with J19 (AREF Enable). With TP1 user can set AREF from nearly 5V down to 2.5 Volts. External AREF is handy when performing analog to digital conversion (A/D) with voltages between 2.5 and 5.0 Volts. AVRs have built in 5V and 2.5V reference voltage. At 5V reference voltage resolution at 10-bit A/D conversion is 4.88 milivolts. If we perform A/D conversion of input voltage 3.0 V providing that we require best resolution we would quickly calculate that 5V reference is not suitable. With 3.0 V reference voltage we can achieve resolution of 2.93 milivolts, which is nearly twice better that with 5.0 V reference voltage, picture 31.






**32,768 kHz crystal** is very handy with AVRs that have Timer2 which can operate in asynchronous mode. With a little Bascom code and 32,768 kHz XTAL we can then make clock with date & time running and not using too much of microcontroller resources. RTC (Real Time Clock) clock routines can also wake up AVR while in the Powersave mode is conserving battery. For Bascom sample program please see "Bascom AVR program samples to be used with MegaPin" section of this manual.

NOTE: with ATMega8 and ATMega168 connect 32,768 kHz crystal to socket J12 and set fuse bits to "Ext. Low freq. crystal"!

## Input & Outputs on MegaPin

MegaPin features:

- supports all AVR microcontrollers in 8-pin, 20-pin, 28-pin & 40 pin DIL packages + AT90USB1287,
- built in 6 sockets for 1Wire DS18S20 temperature sensors that can be connected to any I/O Port,
- built in socket for Micro SD card that can be connected to any I/O Port via CON9,
- suitable circuit enables SD card to operate from 3.3 or 5V,
- 4x8 LEDs on four I/O ports (PortA, PortB, PortC & PortD),
- 6 I/O connectors for ports: (PortA, PortB, PortC, PortD, PortE & PortF),
- built in voltage regulator. Output voltage is selectable for 5V or 3.3V supply voltage,
- can be powered from USB directly or from 12V DC,
- built in 250 mA fuse to protect USB from short circuit on board,
- built in 2.0 USB fast serial programmer compatible to STK500 - programmer works directly from AVR Studio,
- preplaced components for JTAG ICE programmer/debugger,
- built in possibility to use same board for programming and for connection of microcontroller's UART to the PC via USB. If customer wants to send data via $\mu$C' serial port it can be done through USB without reconnecting USB cable to another socket,
- built in oscillator circuit to clock microcontroller from external quartz crystal,

- built in 3-pin socket for ceramic resonator,
- built in 2-pin socket for 32,768 kHz quartz crystal,
- built in external adjustable reference voltage when using internal ADC in AVR,
- built in SMD pads for 90USB1287 microcontroller which has USB already built it. Just solder 90USB1287 on the MegaPin board and you can start using it. It's programming is possible via ISP, JTAG or USB FLIP SW,
- built in keyboard (8 buttons) that can be connected to any I/O Port,
- built in STK200 socket for customers who want to have compatibility with STK200,
- built in protection against wrong polarity of 12V DC power supply voltage,
- built in Power-ON LED,
- built in indication of serial communication Tx/Rx LEDs.

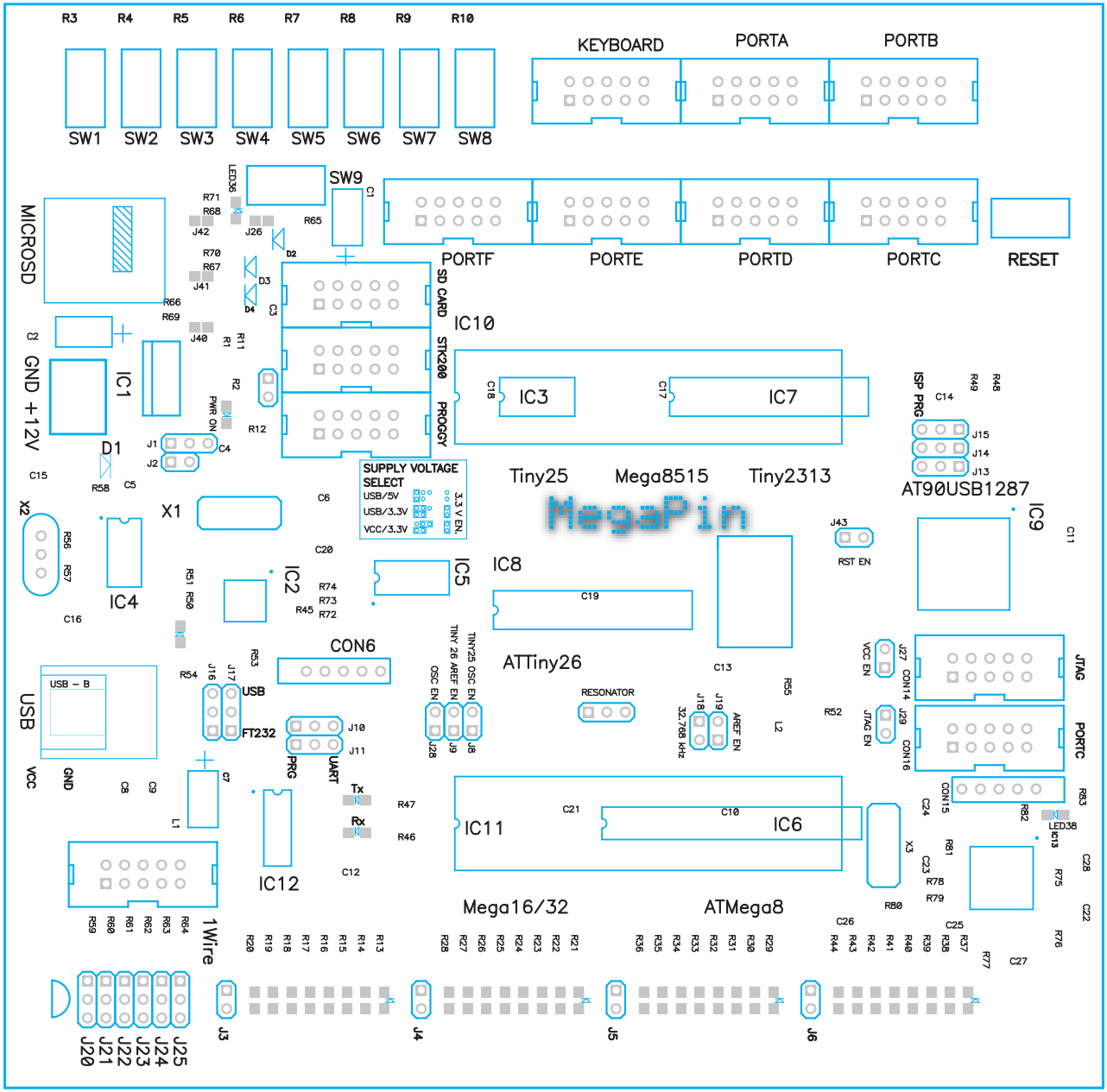


## Bascom-AVR program samples to be used on MegaPin

We have prepared few sample programs to be used with MegaPin:

- 1Wire_1.BAS: single 1Wire sensor on a bus, temperature is displayed on LCD,
- 1Wire_2.BAS: program displays 1Wire ID of two sensors on the bus,
- 1Wire_3.BAS: same as 1Wire_2.BAS but ID of sensors are stored in EEPROM,
- 1Wire_4.BAS: multiple 1Wire sensors, one on each Port,
- For_loop.BAS: simple FOR-Next loop for testing LEDs on all ports,
- GLCD_1.BAS: use of graphical LCD with table drawn on LCD and 8x8 font,
- GLCD_2.BAS: GLCD with fonts that can be placed anywhere on GLCD,
- GLCD_3.BAS: GLCD with use of touch panel including simple calibration of touch panel,
- GLCD_4.BAS: GLCD with improved calibration for touch panel,
- LCD8x2.bas: simple program to display characters on blue 8x2 LCD, including PWM for controlling backlight,
- Megaclock.bas: clock with 32,768 kHz XTAL and 8x2 LCD,
- Megaclock1.bas: same as Megaclock.bas with simple routines to set hour/min/sec,
- PWM1.bas: simple PWM using hardware PWM in AVR,
- USB-ADC2.bas: acquires analogue voltage and converts it with A/D, then transmits it to USB and to LCD. You can see transmitted voltage value in Hyperterminal within Bascom-AVR.

**We wish you successful programming with MegaPin development board!**


R3 R4 R5 R6 R7 R8 R9 R10
SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8
KEYBOARD
PORTA
PORTB
SW9
PORTF
PORTE
PORTD
PORTC
RESET
MICROSD
SD CARD
STK200
PROGGY
IC10
IC1
GND +12V
IC3
IC7
ISP PRG
AT90USB1287
IC9
SUPPLY VOLTAGE SELECT
USB/5V
USB/3.3V
VCC/3.3V
3.3 V EN.
Tiny25
Mega8515
Tiny2313
MegaPin
X1
X2
IC4
IC2
IC5
IC8
RST EN
ATTiny26
RESONATOR
32.768 KHz
CON6
USB
FT232
PRG
UART
JTAG
PORTC
VCC EN
JTAG EN
IC11
IC6
IC12
Mega16/32
ATMega8
1Wire
J3
J4
J5
J6
J20 J21 J22 J23 J24 J25