

# AVR JTAG ICE and AVR ISP 2in1 V2.5

Fire version: V1.0  
Hardware version: V2.5



Please look at user guide carefully before you use this emulator and programmer. Notice: You need to install driver and connect it to your target board, and power on your board before you use it.

This programmer auto judge your target board interface is JTAG or ISP by PIN4, VCC for JTAG, ISP for GND.

Keywords: AVR, JTAG ICE, ISP, ATMEL, Programmer, Debugger.

Thanks for your choose our product.

[www.avrvi.com](http://www.avrvi.com)

# Directory

1. Introduction.....	3
2. Supported devices .....	3
3. LED state.....	4
4. USB driver install.....	5
5. Connecting to target board .....	5
6. Use AVR Studio for Program and Debug.....	8
7. Troubleshooting Guide.....	11
9. Service and support .....	13

## 1. Introduction

AVR JTAGICE and AVR ISP 2in1 V2.5 is a tool for AVR chips On-Chip Debugging and Program, it compatible with ATMEL AVR JTAGICE and AVR ISP, work with AVR Studio, communicate through serial COM port or USB interface.

It support JTAG On-Chip Debugging and JTAG program for most common AVR chips with JTAG interface, and ISP program for all AVR chips and AT89S51/2 with ISP interface. It is a tool with high quality and low price for AVR development.

### Features:

1. Full compatible with ATMEL AVR JTAGICE
2. Full compatible with ATMEL AVR ISP
3. JTAG and ISP function in the same tool, easy and convenient for use
4. Auto detect target interface is JTAG or ISP
5. AVR Studio Compatible
6. Emulates all Digital and Analog On-Chip Functions
7. Complex Breakpoints Like Break on Change of Program Flow
8. Data and Program Memory Breakpoints
9. Supports Assembler and HLL Source Level Debugging
10. Programming interface to flash, eeprom, fuses and lock bits.
11. RS232 Interface and USB to PC for Programming and Control
12. Regulated Power Supply for 9-15V DC Power
13. ISP Programming of all AVR Devices with ISP interface

### Packing list

- 1 AVR JTAGICE and AVR ISP 2in1 V2.5
- 1 USB Cable A to B
- 1 Serial Cable
- 1 CD with software and user guide 1

## 2. Supported devices

### Support devices introduce:

1. JTAG program and debug, support for most common AVR chips with JTAG interface
2. ISP program, support all AVR chips with ISP interface

Note: support devices with different power lever , with L or V supported too.

**ISP program:** support all AVR chips with ISP interface

AT90S series:

AT90S1200、AT90S2313、AT90S/LS2323、AT90S/LS2343、AT90S/LS2333、AT90S4414、  
AT90S/LS4433、AT90S/LS4434、AT90S8515、AT90S/LS8535

ATtiny series:

ATtiny12、ATtiny13、ATtiny15、ATtiny22、ATtiny2313、ATtiny24、ATtiny25、ATtiny26、  
ATtiny44、ATtiny45、ATtiny461、ATtiny84、ATtiny85、ATtiny861

**ATmega series:**

ATmega8、ATmega16、ATmega32、ATmega48、ATmega48P、ATmega64、ATmega88、ATmega103、ATmega128、ATmega1280、ATmega1281、ATmega161、ATmega162、ATmega163、ATmega164P、ATmega165、ATmega165P、ATmega168、ATmega169、ATmega169P、ATmega323、ATmega324P、ATmega325、ATmega325P、ATmega329、ATmega329P、ATmega644P、ATmega645、ATmega649、ATmega2560、ATmega2561、ATmega3250、ATmega3250P、ATmega3290、ATmega3290P、ATmega6450、ATmega6490、ATmega8515、ATmega8535

**Others:**

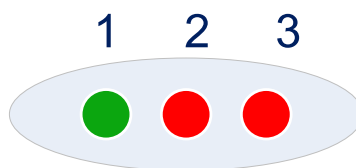
AT86RF401、AT89S51、AT89S52、AT90CAN32、AT90CAN64、AT90CAN128、AT90PWM2、AT90PWM2B、AT90PWM3、AT90PWM3B、AT90USB162、AT90USB646、AT90USB647、AT90USB1286、AT90USB1287

Note: those data are under AVRstudio4.13, new version AVRstudio should different.

**JTAG program and debut:** support some common AVR chips with JTAG interface

ATmega16、ATmega162、ATmega32、ATmega323、ATmega64、ATmega128、ATmega169、AT90CAN128、ATmega16L、ATmega162L、ATmega32L、ATmega323L、ATmega64L、ATmega128L、ATmega169L、AT90CAN128L。

### 3. LED state



ID	Color	Function	Description
1	Green	Work state for the tool	Flash when free, off after connect to AVR Studio, and flash when have data transfer.
2	Red	Wore mod	Off at ISP mode, and on at JTAG mode.
3	Red	Programmer power	On when the programmer is power up.

Several common working states:

**A. Free**

Conn USB, not connect target board, led 3 on, led 1 and 2 flash, it is the default state.

**B. JTAG debug or program**

Connect to your target board JTAG interface , and power on it, if the interface is correct, the led state comes to all leds on, when connect to AVR studio, led 1 off, and flash when have data transfer.


**C: ISP program**

Connect to your target board ISP interface, and power on it, if the interface is correct, the led 并 state comes to only led 3 on , and led 1 will flash when have data transfer.

## 4. USB driver install

AVR JTAG JTAGICE and AVR ISP 2IN1 V2.5 use the most stable and expensive USB to serial chip FT232 for USB connect, there are two methods for driver install:

1. Use the exe file ftdi\_ft232\_drive.exe, found it on the CD and double click it for run, then

connect the programmer to PC through USB, the PC will finish it auto. 

2. Connect the programmer to the PC, follow the “Find new hardware wizard”, choose the .INF file from the right folder, and search, this need two times.

The driver can download from our site or FTDI, or find in CD.

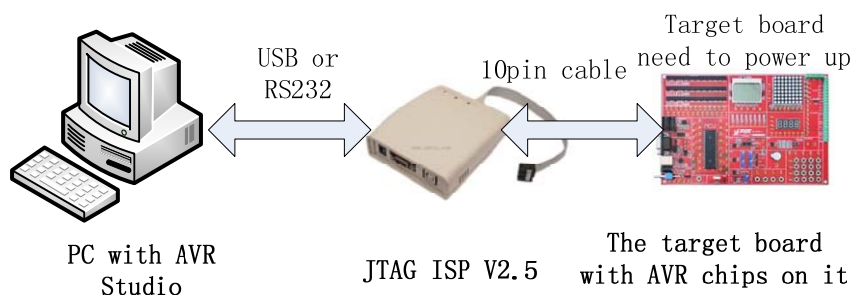
When you finish the USB drive install, you can see the USB Serial Port (COMn) as the follow picture show, the COM port may is large than 4, you should change it in to 4, in order to work ok when choose auto at AVR studio.



## 5. Connecting to target board

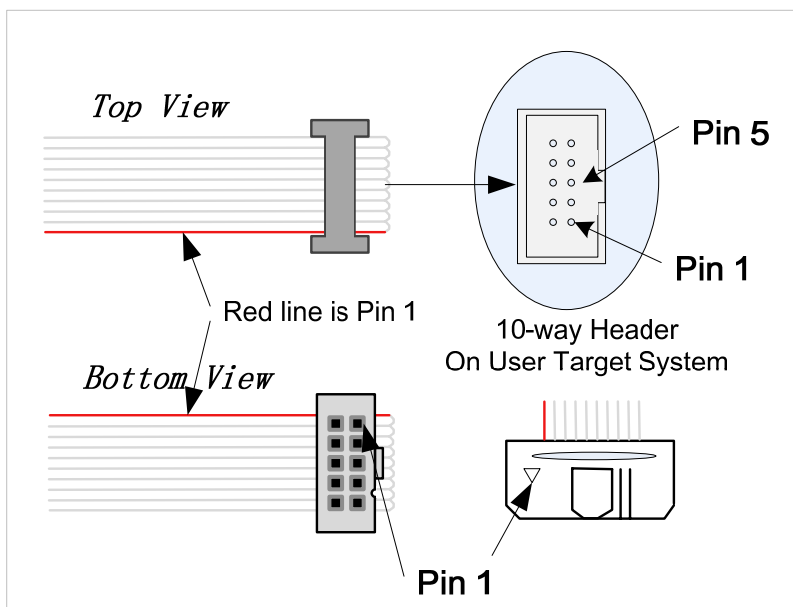
### Introduce

One of AVR MCU's benefit is it allow online program (JTAG and ISP) and on-chip debug (JTAG). A complete AVR development hardware should like this , show on the picture follow. The relation and difference form JTAG ISP and debugWIRE, please search on website.



**Connector pin out define**

AVRJTAG ISP V2.5 use 10 pin cable for both JTAG and ISP interface, auto detect target board by the difference of the interface PIN4. PIN4 VCC for JTAG and GND for ISP, the follow picture show how to know PIN1 to PIN10 , the red line is PIN1 and the protruding one is PIN5, Have prominent small triangle on is PIN1.



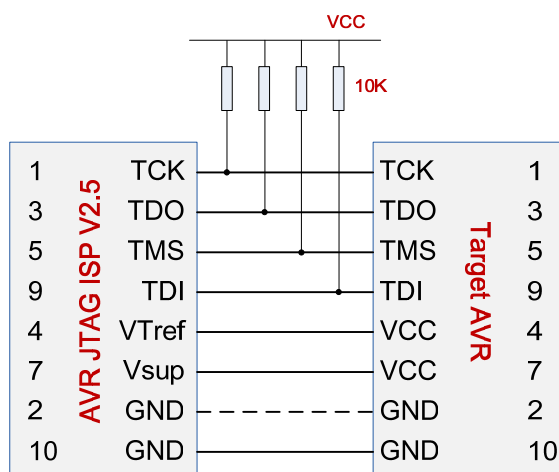
When use as AVR JTAGICE , it's interface define like the left image, and when work as AVR ISP the define like the right image.

	For JTAG			For ISP			
TCK	1	2	GND	MOSI	1	2	VTG
TDO	3	4	Vtref	NC	3	4	GND
TMS	5	6	NsRST	RST	5	6	GND
Vsup	7	8	nTRST	SCK	7	8	GND
TDI	9	10	GND	MISO	9	10	GND

**Connect for JTAG**

The figure below shows which JTAG lines should be connected to the target AVR to ensure correct operation. To avoid drive contention on the lines it is recommended that series resistors are placed between the JTAG lines and external circuitry. The value of the resistor we advice 10K,

Note: PIN4 and PIN7 must connect to VCC, and PIN10 to GND.

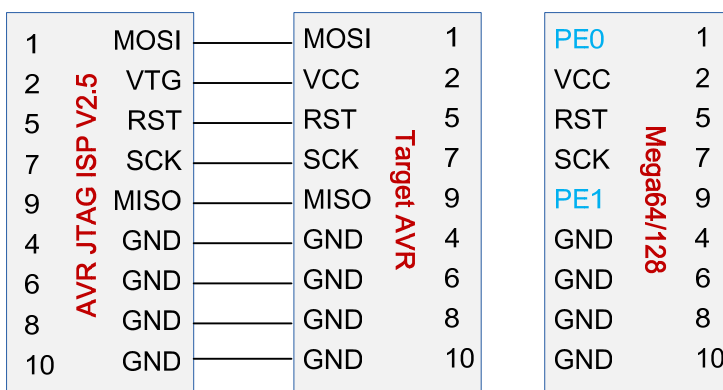


### Connect to ISP interface

ISP means In System Program, almost all AVR chips has ISP interface, can program through ISP. Most AVR chip use SCK MOSI MISO and RESET for ISP, but a few chips did not, For example, ATmega64 and ATmega128 use SCK PDI PDO RESET, please pay note on it.

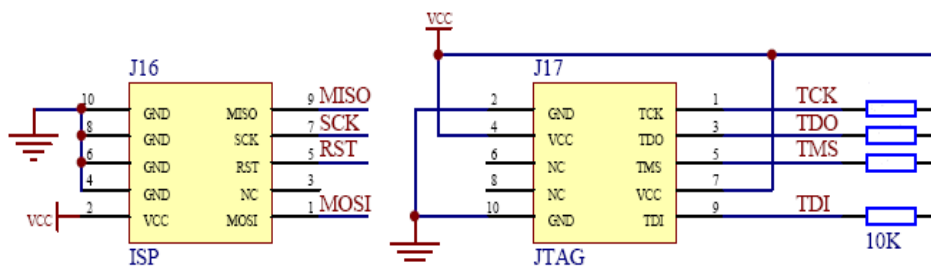
Connect as the follow figure, VTG to VCC, SPI lines to the corresponding pins, disconnect pin3, and 4 6 8 10 to GND.

Note: The AVRISP lines should be connected directly to the AVR pins, without any series resistors. To enter programming mode the programmer needs to pull RESET low. It is important that the external pull-up resistor on RESET pin is not so strong that it forces (holds) the pin high. To avoid this problem it is recommended that the RESET pull-up resistor should be no less than 4.7 kOhm.




### Reference circuit

The below picture show the schematic diagram on our demo development board, it shows how to make JTAG and ISP 10pin interface, please connect it like this.

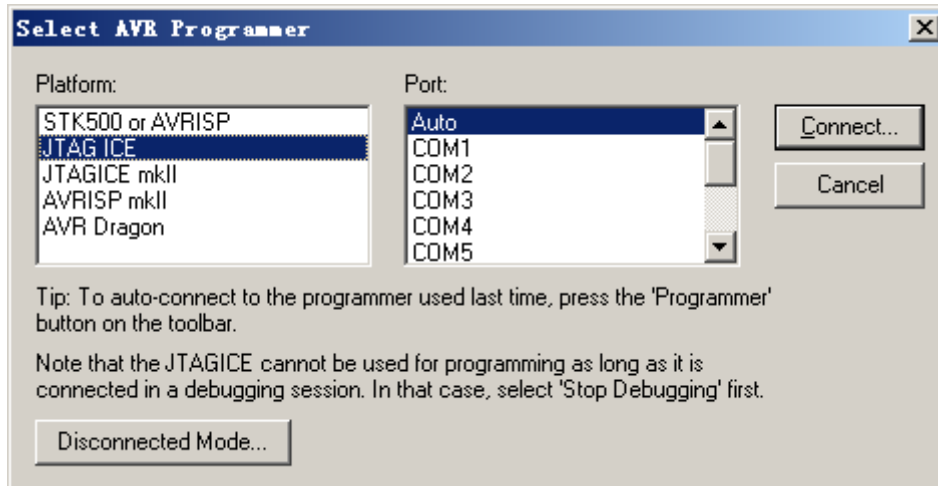


## 6. Use AVR Studio for Program and Debug

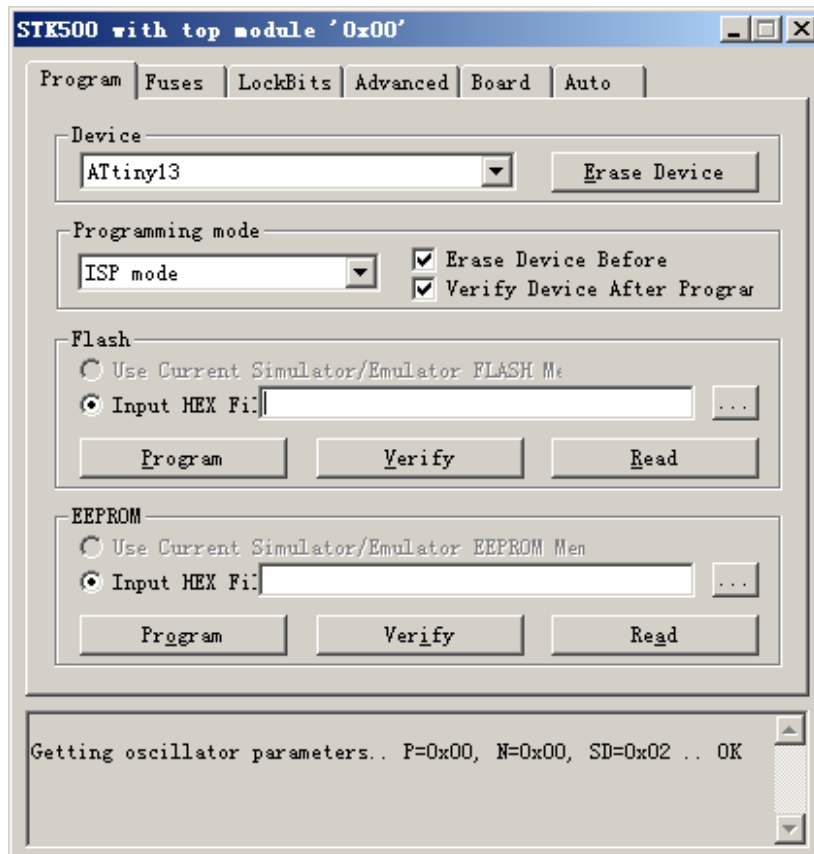
### JTAG/ISP Program

Open AVR studio, Open menu, Tools -> Program AVR -> Connect , or click the button under the menu named con like this , go to the screen like below

Note: we advise you use AVR studio 4.13 or 4.14.

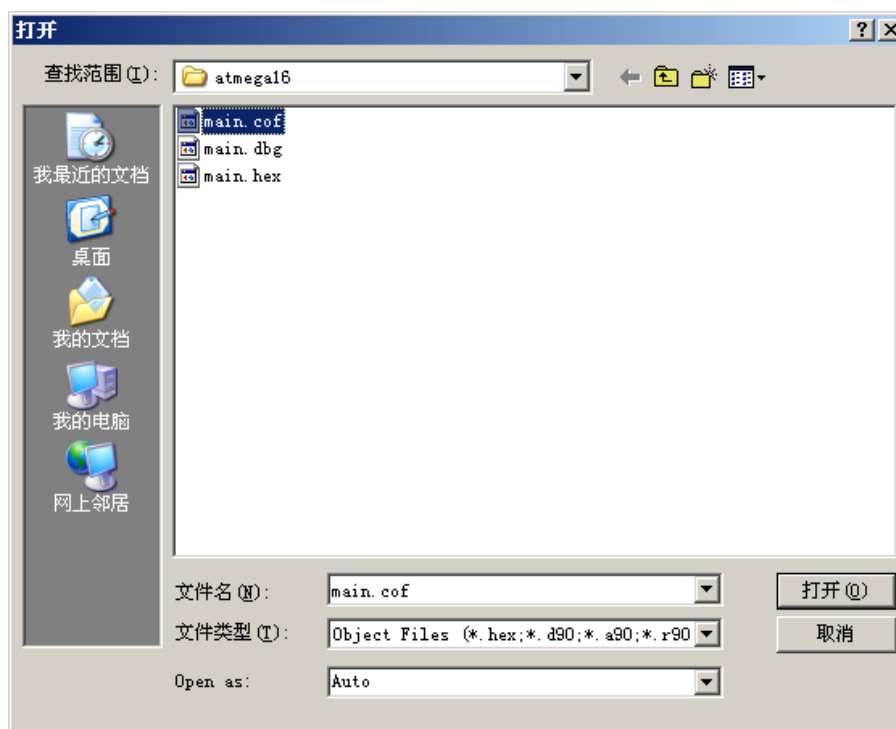


Choose the right tool (For JTAG choose JTAGICE, For ISP choose STK500 and AVRISP),and then click Connect, go to the program window like the follow picture, then program flash EEPROM fuses and lock bits etc on the window. The ISP and JTAG program window looks very similar.

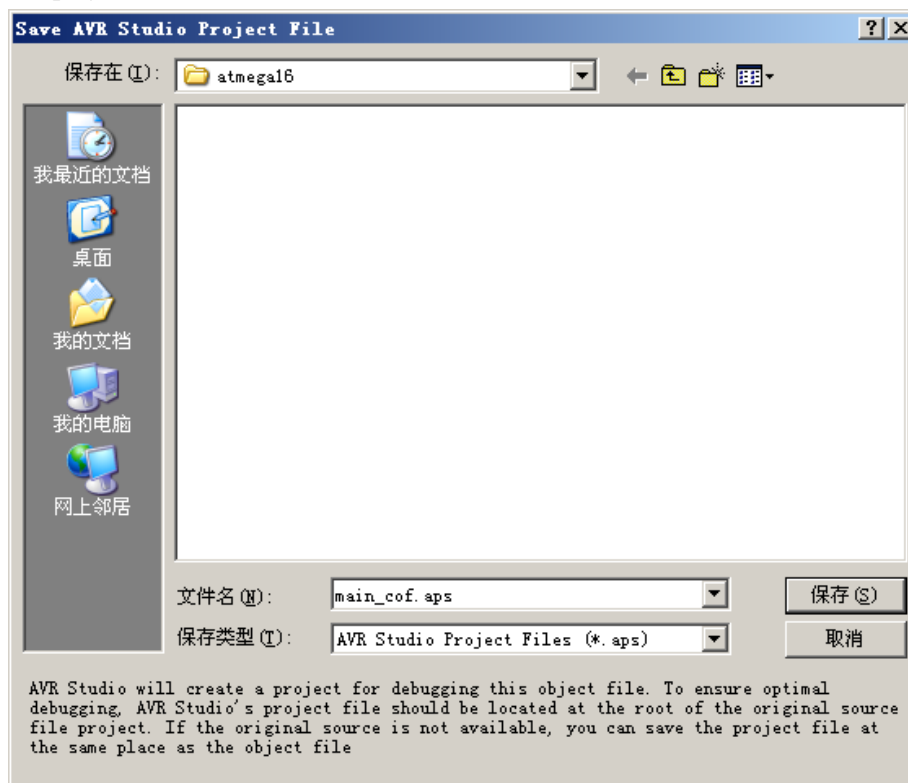


## JTAG online debug

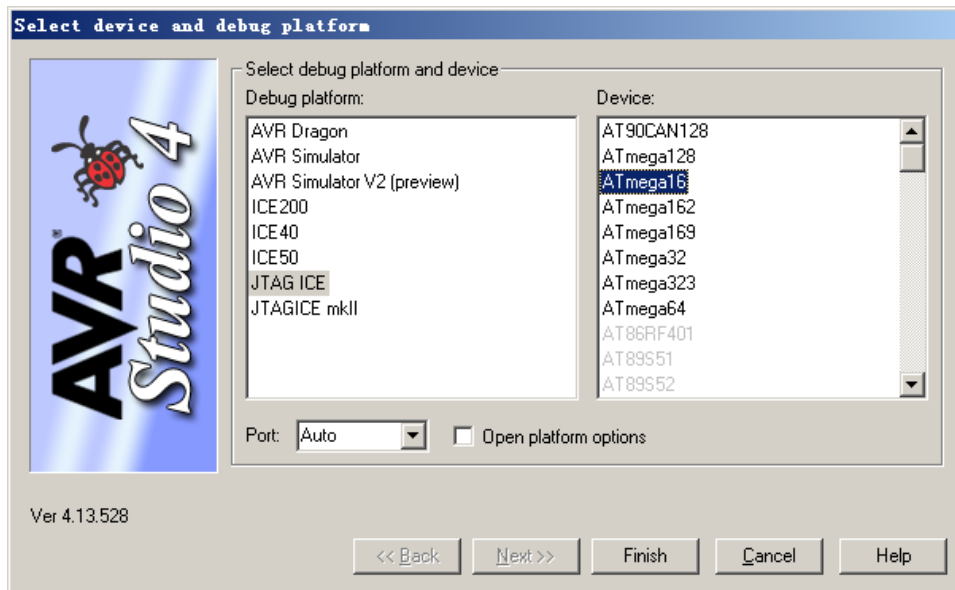
Run AVRstudio ,open the project file such as hex,d90,a90,r90,elf,cof format.



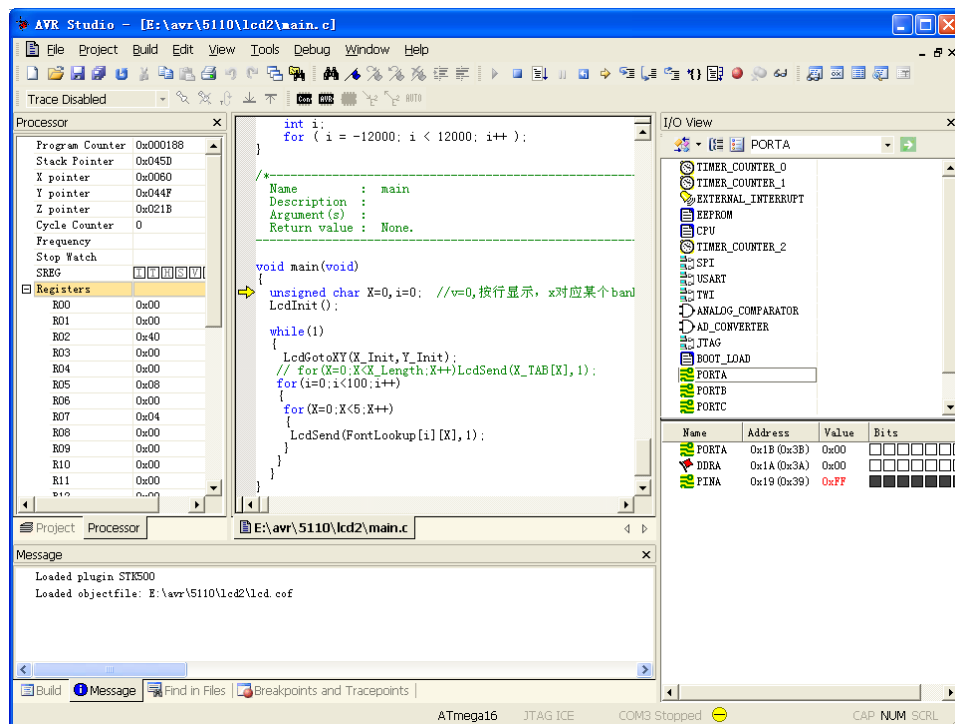
When you open a project which was not make by AVR Studio, it will suggest you to save AVR Studio project.



Click save, and choose JTAGICE tool , the right chip and port at the follow screen.



Click Finish , you will go to the debug platform, begin your debug here.



You can control Run, Break, Single step, Step Over, Step out, Run to Cursor and Auto Step in AVRstudio.

Also make breakpoint and watch the value of actual variables port state etc.

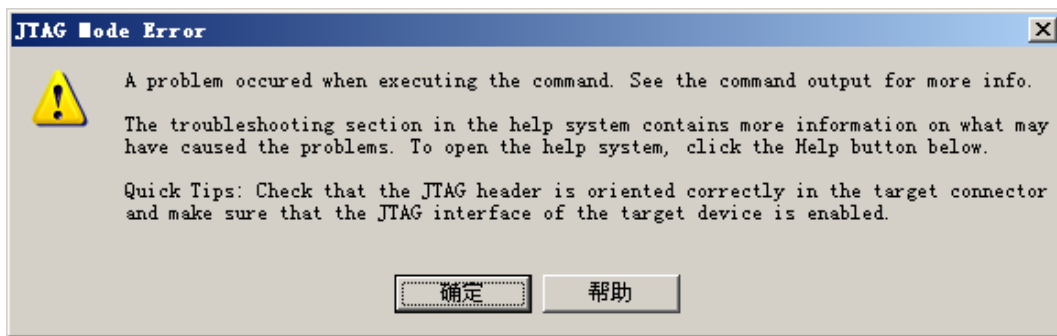
More information of AVR JTAGICE, AVR ISP, AVRstudio usage, you can see help in AVRstudio menu.

## 7. Troubleshooting Guide

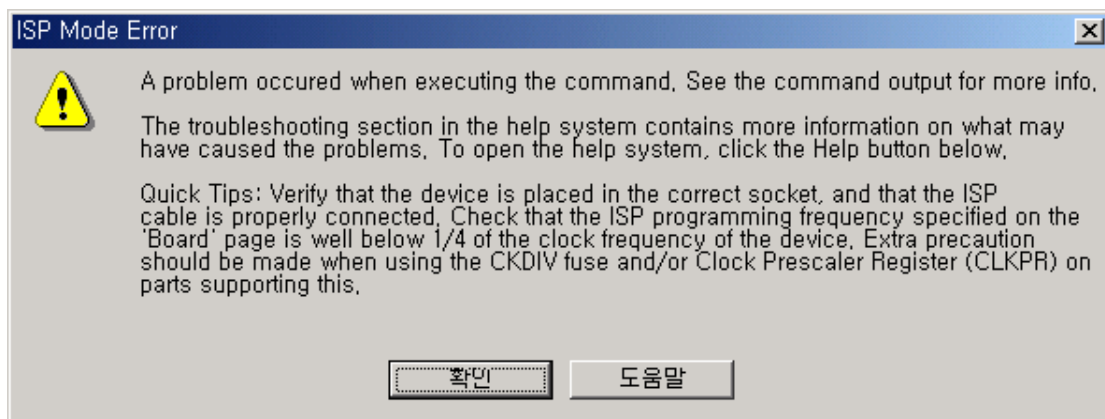
Problem	Reason	Solution
The leds flash all the time.	No target board connected or connect not right or target board has not power on.	Confirm you have connect the programmer to your board correct and the target board has power on.
Can't connect in AVRstudio	<ol style="list-style-type: none"> <li>1. Has no driver</li> <li>2. The connect not right</li> <li>3. Wrong AVRstudio version</li> <li>4. Use serial for communications, but did not power programmer</li> </ol>	<ol style="list-style-type: none"> <li>1. Install USB driver, and make sure the COM port in COM4.</li> <li>2. Check the connection</li> <li>3. We advise you use AVRstudio 4.13 or 4.14</li> <li>4. When use serial for communications ,please supply power for the programmer , inside is VCC and out is GND , DC 7~9V</li> </ol>
JTAG mode error	<ol style="list-style-type: none"> <li>1. Connection is not right</li> <li>2. JTAGEN not enable</li> <li>3. Hardware to ISP, but choose JTAGICE</li> <li>4. Target power is low</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the connection, when use JTAG, PIN4 and PIN7 must connect to VCC.</li> <li>2. Program JTAGEN fuse</li> <li>3. Choose the correct tool in AVRstudio.</li> <li>4. Check your target power</li> </ol>
Can not use JTAG Debug	<ol style="list-style-type: none"> <li>1. JTAGEN fuse is not programmed</li> <li>2. You have open the Program window</li> </ol>	<ol style="list-style-type: none"> <li>1. Program JTAGEN fuse</li> <li>2. You can use only one function between Program and debug at the same time.</li> </ol>
ISP mode error	<ol style="list-style-type: none"> <li>1. SPIEN fuse is not programmed</li> <li>2. SPI line has other parts</li> <li>3. The communicate Speed not less than Fcpu/4</li> </ol>	<ol style="list-style-type: none"> <li>1. Program SPIEN fuse use JTAG or</li> <li>2. Check the connect line.</li> <li>3. Change the communicate Speed to less than Fcpu/4</li> </ol>
Low power	<ol style="list-style-type: none"> <li>1. Target board has not power on</li> <li>2. Connction is not right</li> </ol>	<ol style="list-style-type: none"> <li>1. Power on your target board</li> <li>2. Check your connect</li> </ol>
JTAG and ISP both can not work	<ol style="list-style-type: none"> <li>1. The Power or connection is not right</li> <li>2. The Fuse is not correct</li> <li>3. The reset line is in disable state</li> </ol>	<ol style="list-style-type: none"> <li>1. Check Power and connection</li> <li>2. Use an other programming program reset Fuse</li> <li>3. Use an other programming program reset Fuse</li> </ol>
Check error	Error as flash byte address 0x0000 is 0xff (should be 0x0c)	Try erase before program. Check you connect line
Other	Other reports	Check if your AVR chip is run at the right station.

Some pictures has mentioned in above table:

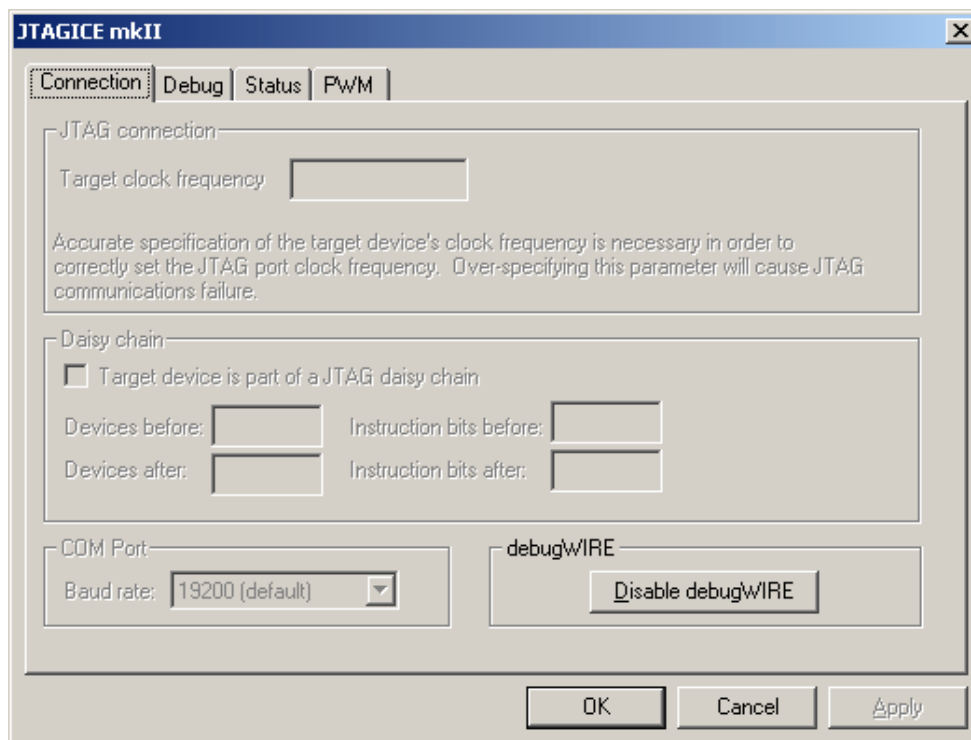
JTAG mode error



ISP mode error



Disable debugWIRE



## 9. Service and support

### Technology support:

AVRVI website: <http://www.avrvi.com>

<http://www.avrvi.net>

AVRVI forum: <http://bbs.avrvi.com>

AVRVI shop: <http://shop.avrvi.com>

Support emails: [support@avrvi.com](mailto:support@avrvi.com) [avrvi@hotmail.com](mailto:avrvi@hotmail.com)

When ask for help, please supply follow information:

1. Your order information
2. Your AVR Studio version, you can see detail in AVRstudio help menu.
3. The programmer's model number, you can see it at the back of programmer.
4. Your AVR full name , such as ATmega16L-8PU.
5. Detail description for your problem and question.

### Warranty terms

1. Service time: A moth exchange, One year warranty.
2. Free warranty: Under the correct use of quality problem, free warranty
3. Warranty with charge: Damage by improperly use, we need charge for repair.
4. If need shipping cost, it pay by customers.

### The copyright notice

This manual copyright belongs to AVRVI.

Because IT market is changing rapidly, and limited edit time, we do not guarantee in this manual has no mistakes, so this manual is only for reference, we do not provide any form of guarantee. The company reserves the right to revise this content of products and software and hardware revision.

### Trademark:

In this manual are used other company's registered trademark, the statement is as follows:

Microsoft and Windows is registered trademark belongs to Microsoft.

AVR、 AVR Studio is registered trademark belongs to ATMEL.

Other product name is used in this manual or belongs to their respective company.

**Revision information:**

English Version 1.0 at 2009-09-21