

## **MSP430-JTAG-ISO-MK2** **professional MSP430 programmer/debugger**

### **USER'S MANUAL**

Preliminary, August 2012  
Designed by OLIMEX Ltd, 2012



All boards produced by Olimex LTD are ROHS compliant

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

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**NOTE! THIS IS A PRELIMINARY MANUAL VERSION! IT IS  
NOT COMPLETE! THE FIRMWARE OF THE PROGRAMMER IS  
UNDER REVISION!**

## CHAPTER 1: OVERVIEW

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### 1. Introduction to the chapter

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Thank you for choosing the MSP430-JTAG-ISO-MK2 debugger/programmer! This document provides a user's guide for the Olimex MSP430-JTAG-ISO-MK2. As an overview, this chapter gives the scope of this document and lists the board's features. The document's organization is then detailed.

The MSP430-JTAG-ISO-MK2 programmer/debugger development board enables code uploading of applications running on MSP430 microcontrollers, manufactured by Texas Instruments.

The product is our most sophisticated MSP430 programmer/debugger and has many improvements over the our previous MSP430 tools.

#### 1.1 Features

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- Supports both JTAG and SWD interfaces
- LCD display for convenient navigation between different modes of operation
- 1,76 GB internal memory available for custom code (Stand alone mode) or mass storage
- 3-different modes of operation – Debugger, Mass storage, Stand alone
- Can be powered either by external power or the USB interface
- Extended firmware features – target voltage display, target current consumption display
- Sleek and solid black case
- Sophisticated custom-made front panel
- 14-pin JTAG ribbon cable included
- Dimensions: 75mm x 111mm (2.95" x 4.37")

#### 1.2 Target market and purpose of the device

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MSP430-JTAG-ISO-MK2 is suitable for programming and debugging all Texas Instruments MSP430 microcontrollers which support JTAG or SBW (Spy-Bi-Wire) interfaces. The device is recommended for all MSP430 fans. It is especially convenient for mass production due to the ease of stand-alone programming.

## **1.3 Organization of this document**

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Each section in this document covers a separate topic, organized as follow:

- Chapter 1 is an overview of the board usage and features
- Chapter 2 lists the additional software and hardware means you might need for proper use of the device
- Chapter 3 contains detailed description of the board peripherals and the basic controls
- Chapter 4 describes the modes of operation: the MSP430-JTAG-ISO-MK2 microcontroller
- Chapter 5 is an explanation of the file format used for stand-alone programming
- Chapter 6 shows the dimensions of MSP430-JTAG-ISO-MK2
- Chapter 7 contains the revision history, the useful web links and support information

## CHAPTER 2: REQUIREMENTS AND FIRST START-UP

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### 2. Introduction to the chapter

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This section helps you set up the MSP430-JTAG-ISO-MK2 development board for the first time. Please consider first the electrostatic warning to avoid damaging the board, then discover the hardware and software required to operate the board.

The procedure to power up the board is given, and a description of the default board behavior is detailed.

#### 2.1 Electrostatic warning

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MSP430-JTAG-ISO-MK2 is shipped in a protective anti-static package. The board must not be exposed to high electrostatic potentials. A grounding strap or similar protective device should be worn when handling the board. Avoid touching the component pins or any other metallic element.

#### 2.3 Hardware requirements

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The board can be powered either by the USB or by +12V external source. If you use the USB note that the connector is type B – to connect to a personal computer you will probably need USB-A to USB-B cable which is not included in the package. You can purchase such a cable from us, the code is:

**USB-CABLE** - USB standard type A to USB standard type B cable

Powering the board from external source is very convenient for stand alone mode since you don't need to be connected to a personal computer once you have uploaded the needed files.

#### 2.4 Software requirements

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## **2.5 First time start-up**

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Setting up the MSP430-JTAG-ISO-MK2 for development purposes might vary between different users. However, at least a personal computer with a working USB port and a cable USB type A to USB type B are required.

Connect the device to the computer via the cable. A new device should be recognized by your device manager. Go



## CHAPTER 3: MSP430-JTAG-ISO-MK2 BOARD DESCRIPTION

### 3. Introduction to the chapter

Here you get acquainted with the main parts of the board and their location on the case. Some of the elements are named near their position on the case of MSP430-JTAG-ISO-MK2.

#### 3.1 Basic device description

In the table below are show the main parts of the board and their positioning on the case.

MSP430-JTAG-ISO-MK2 description		
#	Function	
1	Display	
2	Power LED	
3	Status LED	
4	Communication LED	
5	Up/Increment button	
6	Select button	
7	Down/Decrement button	
8	Mode/Back button	
9	USB connector	
10	JTAG/SBW connector	
11	External power connector	

The functions supported are further explained in the next chapters of this document.

The LEDs functions are detailed in the table below

LED COLOR	MODE OF OPERATION	MEANING
RED	ON	INPUT POWER PRESENT
GREEN	ON	INDICATES THE DEVICE IS PROPERLY WORKING
	BLINKING	ERROR or UNDEFINED PROGRAMMER/DEBUGGER STATE
YELLOW	BLINKING	USB OR JTAG/SBW COMMUNICATION

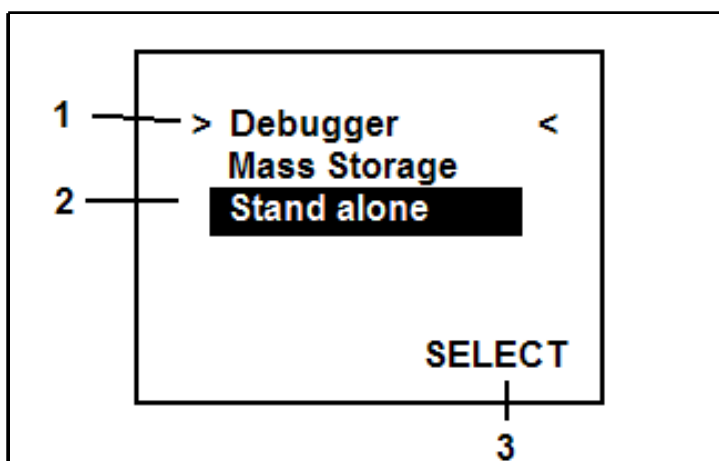
It is not recommended to power down the board when the YELLOW LED is blinking.

## CHAPTER 4: MODES OF OPERATION

### 4. Introduction of the chapter

In this chapter we will explain the mode options of MSP430-JTAG-ISO-MK2. Furthermore, a step-by-step guide to each option will be provided. Each option will be explained.

MSP430-JTAG-ISO-MK2 has three modes of operation. Upon powering the device from external source of power (12V) or via the USB(5V) the screen should look like the image below



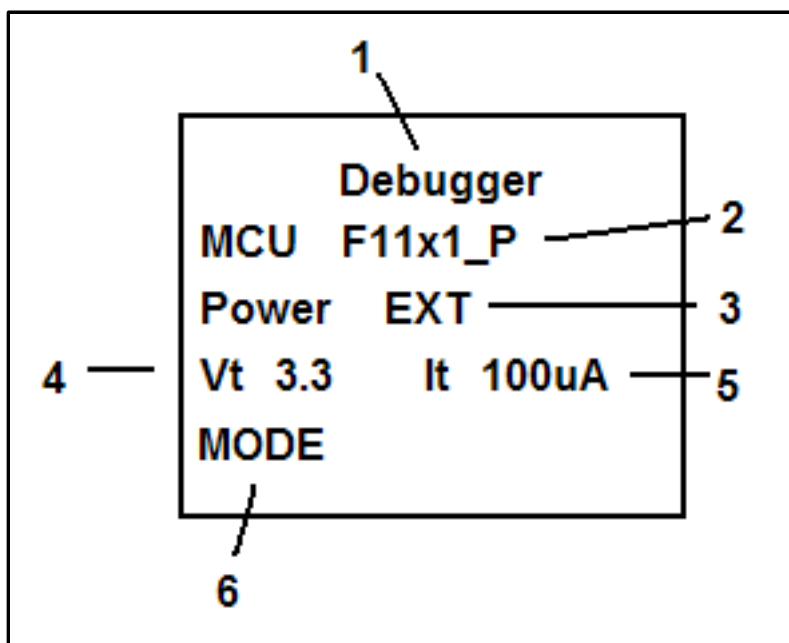
The three marked sections have different meaning:

1. Mode select (up arrow key/increment button, down arrow key/decrement button) – mode select maker is used to navigate to desired new mode – the available modes are: Debugger, Mass Storage, Stand Alone
2. Current mode – current mode highlights the mode lastly used
3. Confirm selection (right arrow key/select button) – confirms our selected by mode-select choice

Each of the modes selected are explained in the next sub-chapters.

## 4.2 Debugger mode

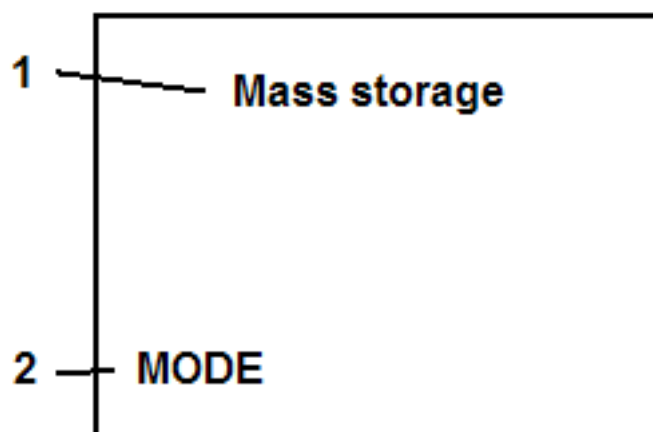
Debugger mode is used when you have connected



1. Work mode
2. Microcontroller type
3. Source of power
  - EXT – shows the target is powered from external source (different than MSP430-JTAG-ISO-MK2)
  - INT – means the target is powered by our debugger/programmer ISO-MK2
4. Shows microcontroller power
5. Shows current consumption – only if powering the target from the MSP430-JTAG-ISO-MK2
6. Change the mode (button Mode/Back button)

### 4.3 Mass storage mode

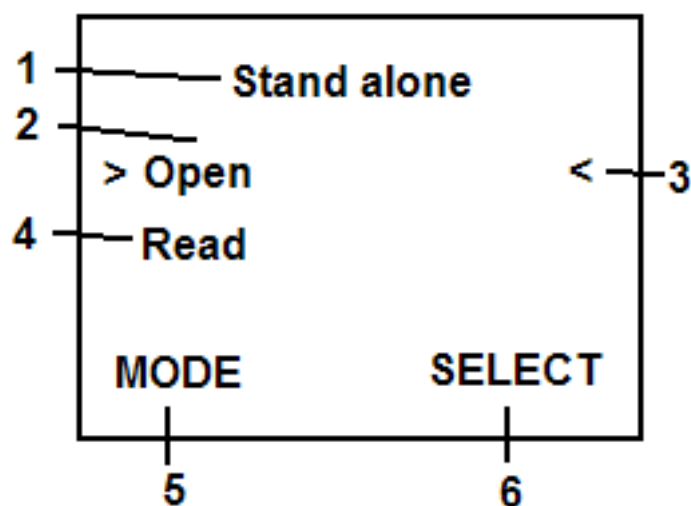
---



1. Mode of operation – mass storage
2. Change mode (Mode/Back button)

### 4.4 Stand alone mode

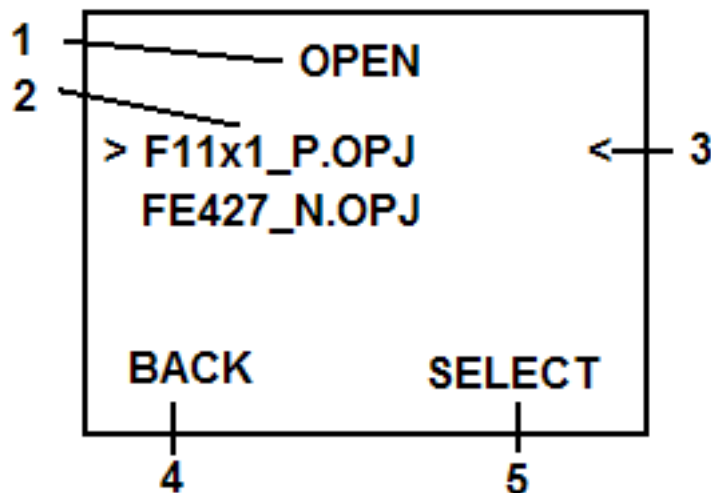
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1. Mode of operation – Stand alone mode
2. Open an existing (previously saved) project
3. Highlighted operation (Up/Increment button, Down/Decrement button)
4. Create new project
5. Change mode (Mode/Back button)
6. Select the highlighted operation (Select button)

#### 4.4.1 Opening an existing project

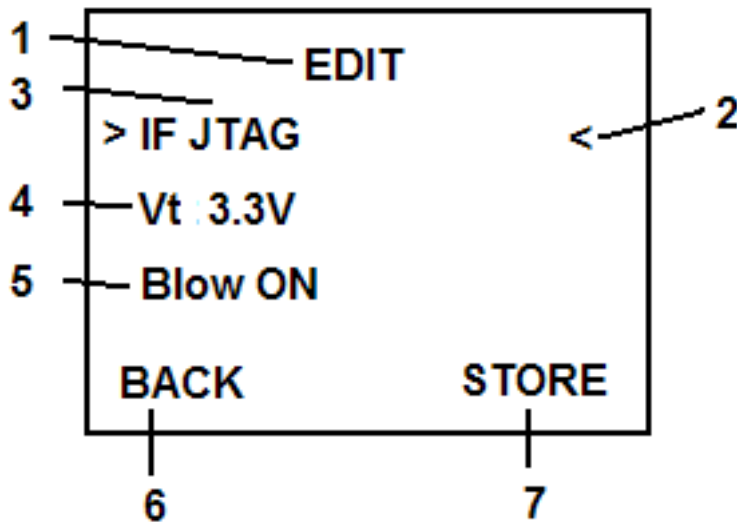
---



1. Sub-menu "OPEN"
2. Available projects
3. Highlight (Up/Increment button, Down/Decrement button)
4. Back to the upper menu (Mode/Back button)
5. Select the highlighted project (Select button)

#### 4.4.2 Editing the open project

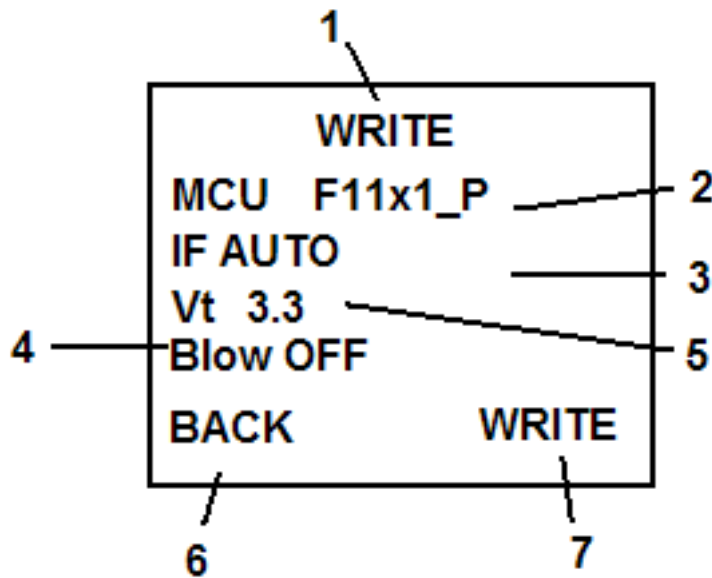
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1. Sub-menu “EDIT”
2. Highlighted operation (Up/Increment button, Down/Decrement button)
3. Choosing the default programmer interface
  - JTAG
  - SBW
  - AUTO – automatically chooses JTAG or SBW interface is available
4. Shows the current voltage of the microcontroller
5. Blows the READ fuse of the target (ON/OFF)
6. Back to the “Open” sub-menu (Mode/Back button)
7. Store the changes in the project (Select button)

#### 4.4.3 Writing in an existing project

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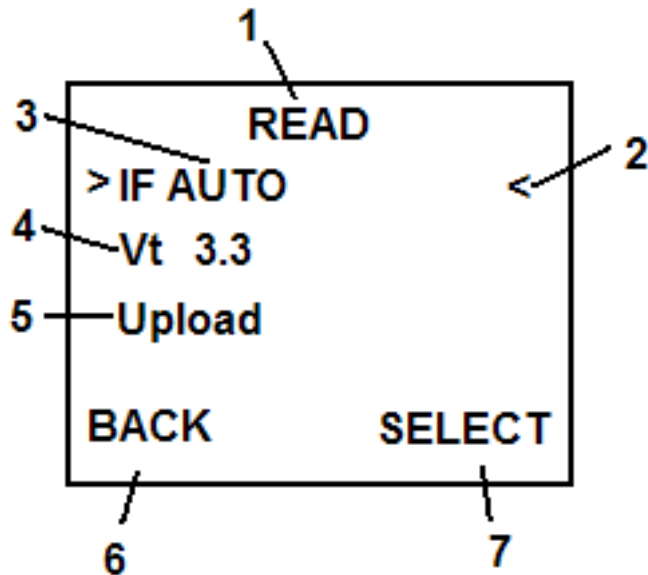


1. Sub-menu "WRITE"
2. Microcontroller type
3. Interface used
4. READ protection fuse
5. Voltage of the microcontroller
6. Back to "EDIT" sub-menu (Mode/Back button)
7. Store (Select button)



#### 4.4.4 Reading from a microcontroller “READ”

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1. Sub-menu “READ”
2. Highlighted operation (Up/Increment button, Down/Decrement button)
3. Programming interface
4. Voltage of the microcontroller
5. Reading the program from the microcontroller and creating a project file named the type of the microcontroller and consecutive number
6. Back to the main menu (Mode/Back button)
7. Select the highlighted operation (Select button)

## CHAPTER 5: OPJ FILE FORMAT

### Форма на OPJ файла

<?xml version="1.0" encoding="UTF-8"?>	- xml header
<ISO_V2>	- ISO V2 секция
<!--Device ID-->	- ID на контролера
<!--Device interface – JTAG,SWD,AUTO-->	- тип на интерфейса
<!--Device voltage 1800-3600 mV-->	- захранващо напрежение на контролера
<Target Id="15" IF="JTAG" Vt="3000"/>	- операции ON/OFF
<!--Erase device – 0/1-->	- изтриване
<!--Blank check device – 0/1-->	- Blank check
<!--Programming device – 0/1-->	- програмиране
<!--Verify device – 0/1-->	- проверка
<!--Blow device – 0/1-->	- защита от четене
<!--File name-->	- име на TXT или HEX файла с програмата за запис
<Programming Erase="1" Blank="1" Write="1" Verify="1" Blow="0" File="test.txt"/>	
<!--Serializing enable – 0/1-->	- сериализация ON/OFF
<!--Serial number format – HEX,BDC-->	- тип на серийния номер
<!--Serial number endian – LE,BE32,BE8-->	- тип представянето на номера
<!--Serial number size - 1:4 bytes-->	- размер на серийния номер
<!--Serial number start address-->	- стартов адрес на серийния номер
<!--Serial number-->	- текущия серийен номер
<!--Last serial number-->	- последен серийен номер
<SN Enable="1" Format="HEX" Endian="LE" Size="4" Addr="1024" Count="0x80000000" Last="0xFFFFFFFF"/>	
<!--Sections preserve-->	- описание на секциите които не се модифицират
<Section>	
<!--Section start address-->	- стартов адрес
<!--Section size-->	- размер на секцията
<Entry Start="0x11111111" Size="0x21111111"/>	
<Entry Start="0x31111111" Size="0x41111111"/>	
<Entry Start="0x51111111" Size="0x61111111"/>	
<Entry Start="0x71111111" Size="0x81111111"/>	
<Entry Start="0x91111111" Size="0xA1111111"/>	
<Entry Start="0xB1111111" Size="0xC1111111"/>	

<Entry Start="0xD1111111" Size="0xE1111111"/>

<Entry Start="0xF1111111" Size="0xFFFFFFFF"/>

</Section>

</ISO\_V2>

## CHAPTER 6: DIMENSIONS

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### 6. Introduction to the chapter

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In this chapter are located the schematics describing logically and physically MSP430-JTAG-ISO-MK2.

Note that all dimensions are in mils.

TO BE ADDED LATER

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## CHAPTER 7: REVISION HISTORY, WEB LINKS AND SUPPORT

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### 7. Introduction to the chapter

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In this chapter you will find the current and the previous version of the document you are reading. Also the web-page for your device is listed. Be sure to check it after a purchase for the latest available updates and examples.

#### 7.1 Document revision

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Revision	Changes	Modified Page#
A, 01.08.12	Preliminary revision	All

#### 7.2 Device revision

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Revision	Notable Changes
K	Initial release of the device

### 7.3 Useful web links and purchase codes

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The web page you can visit for more info on your device is <https://www.olimex.com/dev/MSP430-JTAG-ISO-MK2.html>.

#### **ORDER CODES:**

**MSP430-JTAG-ISO-MK2** – professional programmer featuring LCD, SD card, stand-alone mode, 12V target supply

**USB-CABLE** - USB type A to USB type B cable

The latest price list can be found at <http://olimex.com/dev/pricelist.html>.

How to order?

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

Check <http://www.olimex.com/> and <http://olimex.com/dev/order.html> for more info.

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## 7.4 Product support

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For product support, hardware information and error reports mail to: [support@olimex.com](mailto:support@olimex.com). Note that we are primarily a hardware company and our software support is limited.

Please consider reading the paragraph below about the warranty of Olimex products.

### Warranty and returns:

Our boards have lifetime warranty against manufacturing defects and components.

During development work it is not unlikely that you can burn your programmer or development board. This is normal, we also do development work and we have damaged A LOT of programmers and boards during our daily job so we know how it works. If our board/programmer has worked fine then stopped, please check if you didn't apply over voltage by mistake, or shorted something in your target board where the programmer was connected etc. Sometimes boards might get damaged by ESD shock voltage or if you spill coffee on them during your work when they are powered.

Please note that warranty do not cover problems caused by improper use, shorts, over-voltages, ESD shock etc.

**If the board has warranty label it should be not broken. Broken labels void the warranty, same applies for boards modified by the customer, for instance soldering additional components or removing components - such boards will be not be a subject of our warranty.**

If you are positive that the problem is due to manufacturing defect or component you can return the board back to us for inspection.

When we receive the board we will check and if the problem is caused due to our fault and we will repair/replace the faulty hardware free of charge, otherwise we can quote price of the repair.

Note that all shippings back and forth have to be covered by the customer. Before you ship anything back you need to ask for RMA. When you ship back please attach to it your shipping address, phone, e-mail, RMA# and brief description of the problem. All boards should be sent back in antistatic package and well packed to prevent damages during the transport.



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