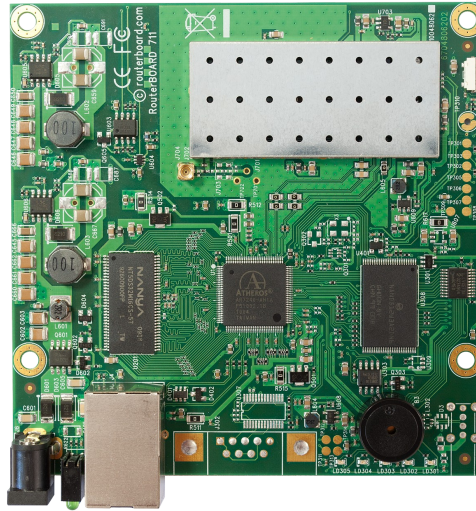


RouterBOARD 711

User's Manual (20-Oct-2010)



Copyright

Copyright MikroTiks SIA. This manual contains information protected by copyright law. No part of it may be reproduced or transmitted in any form without prior written permission from the copyright holder.

Trademarks

RouterBOARD, RouterOS, RouterBOOT and MikroTik are trademarks of MikroTiks SIA. All trademarks and registered trademarks appearing in this manual are the property of their respective holders.

Limited Warranty

Copyright and Trademarks. Copyright MikroTiks SIA. This manual contains information protected by copyright law. No part of it may be reproduced or transmitted in any form without prior written permission from the copyright holder. RouterBOARD, RouterOS, RouterBOOT and MikroTik are trademarks of MikroTiks SIA. All trademarks and registered trademarks appearing in this manual are the property of their respective holders.

Hardware. MikroTik warrants all RouterBOARD series equipment for the term of fifteen (15) months from the shipping date to be free of defects in materials and workmanship under normal use and service, except in case of damage caused by mechanical, electrical or other accidental or intended damages caused by improper use or due to wind, rain, fire or other acts of nature.

To return failed units to MikroTik, you must perform the following RMA (Return Merchandise Authorization) procedure. Follow the instructions below to save time, efforts, avoid costs, and improve the speed of the RMA process.

- 1.If you have purchased your product from a MikroTik Reseller, please contact the Reseller company regarding all warranty and repair issues, the following instructions apply **ONLY** if you purchased your equipment directly from MikroTik in Latvia.
2. We do not offer repairs for products that are not covered by warranty. Exceptions can be made for RB1000.
3. Out-of-warranty devices and devices not covered by warranty sent to Mikrotikls will be returned to the sender at sender's cost.

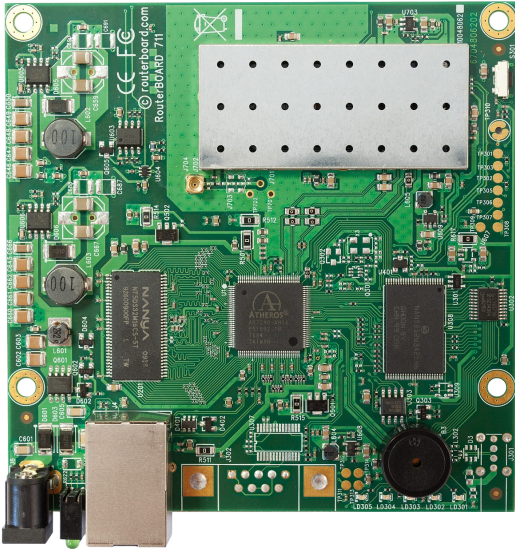
Instructions are located on our webpage here: <http://rma.mikrotik.com>

Manual. This manual is provided "as is" without a warranty of any kind, expressed or implied, including, but not limited to, the implied warranty of merchantability and fitness for a particular purpose. The manufacturer has made every effort to ensure the accuracy of the contents of this manual, however, it is possible that it may contain technical inaccuracies, typographical or other errors. No liability is assumed for any inaccuracy found in this publication, nor for direct or indirect, incidental, consequential or other damages that may result from such an inaccuracy, including, but not limited to, loss of data or profits. Please report any inaccuracies found to support@mikrotik.com.

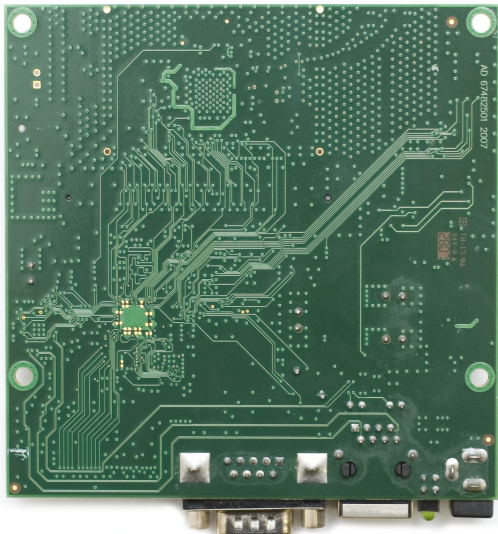
Table of Contents

Copyright	1
Trademarks	1
Limited Warranty	1
System Board View	3
System Board Layout	3
Specifications	4
Hardware Guide	4
Memory and Storage Devices	4
Onboard Memory	4
Onboard NAND Storage Device	4
Extension Slots	4
MiniPCI Slots	4
Input/Output Ports	4
LAN1 Port with PoE	4
Onboard 802.11b/g wireless card	4
DB9 Serial Port	5
LEDs	5
Power LED	5
User LED	5
Status LEDs	5
User's Guide	5
Assembling the Hardware	5
Powering	5
Booting options	6
Onboard NAND Storage Device	6
Booting from network	6
RouterBOOT	6
Boot Loader Configuration	6
Configurable Options	7
Boot Loader Upgrading	7
Operating System Support	7
Connector Index	8
Button Index	8
Ethernet Cables	8
Federal Communication Commission Interference Statement (FCC ID: TV7RB711-5HN)	9
List of approved antennas	9

System Board View

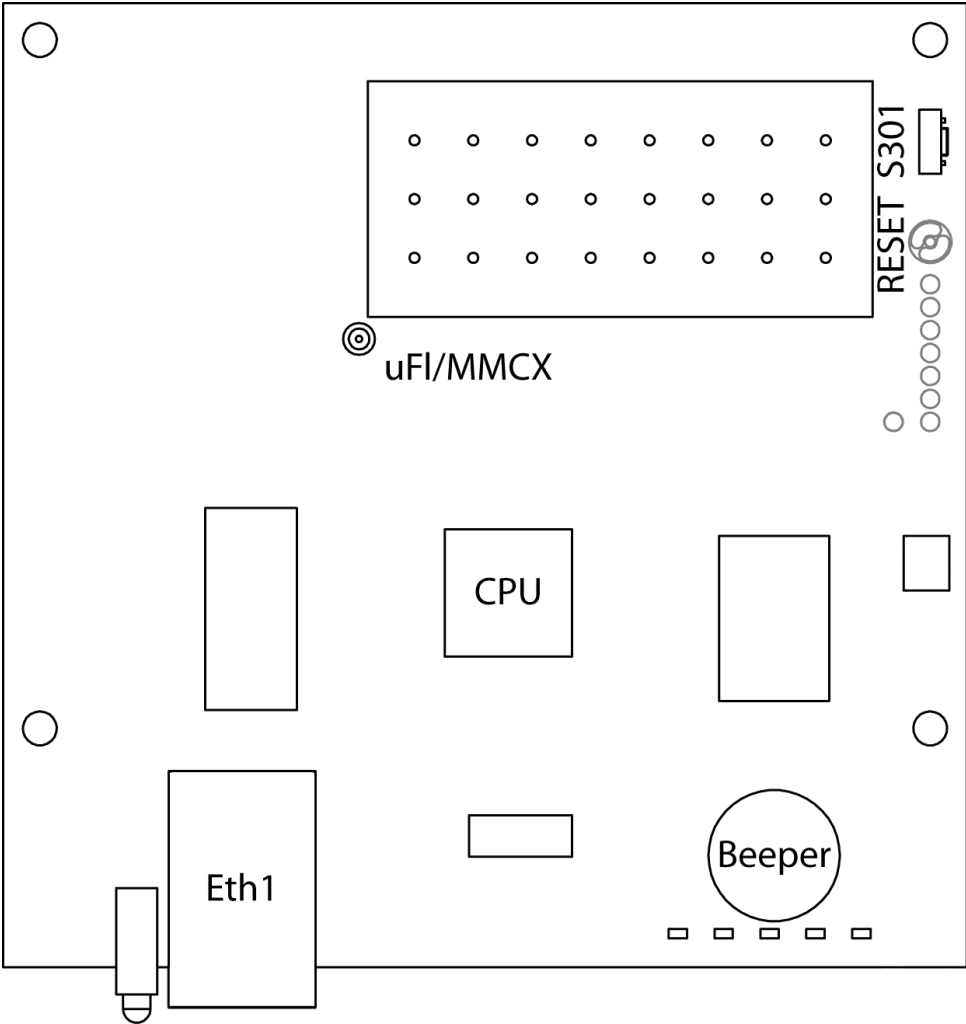


Top view



Bottom view

System Board Layout



Specifications

	RouterBOARD 711
CPU	MIPS24k based, Atheros AR7240 400MHz CPU
Memory	32MB SDRAM onboard memory (64MB on RB711A)
Boot loader	RouterBOOT
Data storage	64MB onboard NAND memory chip
Ethernet	One 10/100 Mbit/s Fast Ethernet port supporting Auto-MDI/X
Wireless	One built-in wireless card AR9280 802.11a/n wireless device
MiniPCI slot	none
Serial port	none
LEDs	Power and User LED, 5 status LEDs
Speaker	Mini PC-Speaker
Power options	Power over Ethernet: 10..28V DC (except power over datalines) Power jack: 10..28V DC (RB711A only)
Dimensions	105mm x 105mm
Weight	82 g (2.9 oz)
Temperature	Operational: -20°C to +65°C (-4°F to 149°F)
Humidity	Operational: up to 70% relative humidity (non-condensing)
Power consumption	280mA (345mA max) at 12V
RouterOS license	Level3 (Level4 on RB711A)

Hardware Guide

Memory and Storage Devices

Onboard Memory

The board is equipped with 64 MB DDR onboard memory.

Onboard NAND Storage Device

The boards are equipped with one 64MB NAND nonvolatile memory chip.

Extension Slots

MiniPCI Slots

None

Input/Output Ports

LAN1 Port with PoE

It is compatible with passive (non-standard) Power over Ethernet. The board accepts voltage input from 10 to 28 V DC. It is suggested to use higher voltages for power over long cables because of better efficiency (less power is lost in the cable itself and power supply is more efficient).

See **Connector Index** for pinout of the standard cable required for PoE. All cables made to EIA/TIA 568A/B cable specifications will work correctly with PoE. Note that this port supports automatic cross/straight cable correction (Auto MDI/X), so you can use either straight or cross-over cable for connecting to other devices.

Onboard 802.11a/n 5GHz wireless card

This RouterBOARD model has a built-in 802.11a/n 5GHz wireless device based on the **AR9280** Atheros chipset. It doesn't support turbo mode.

MMCX/uFL (depends on model) antenna connector is located to the left of the card, as seen in the diagram of page 3.

RX sensitivity	802.11a: -92 dBm @ 6Mbps to -76 dBm @ 54 Mbps HT20: -92 dBm @ MCS0 to -73 dBm @ MCS7 HT40: -88dBm @ MCS0 to -70 dBm @ MCS7
TX power	802.11a: 23dBm @ 6Mbps, 19dBm @ 54Mbps HT20: 22 dBm @ MCS0, 16dBm @ MCS7 HT40: 21 dBm @ MCS0, 15dBm @ MCS7

DB9 Serial Port

None

LEDs

Power LED

Power LED is on when the board is powered.

User LED

User LED may be programmed at user's option. It is lit by default when the board starts up, then it is turned off when the bootloader runs kernel.

Status LEDs

Five LEDs (LD 301-305) are located to the right of the Serial port. Their functions are as follows:

- LED 1-5 are all user programmable
- LED 4 when not programmed shows Bootloader activity
- LED 5 when not programmed shows NAND activity

User's Guide

Assembling the Hardware

First to use the board:

- Install the board in a case;
- Connect antenna to the MMCX/uFL connector (depending on model)
- Connect the PoE powered Ethernet cable or plug the Power jack. Note! Antenna should be connected before powering on the device

Powering

- Power over Ethernet (PoE) on the Ethernet port:
10..28V DC (12..28 V suggested) non-standard PoE powering support
- Power jack 10..28V (12..28V suggested), RB711A model only.

RouterBOARD 711 series boards are compatible with non-standard (passive) Power over Ethernet injectors (except power over datalines) and accept powering over up to 100m (330 ft) long Ethernet cable connected to the Ethernet port (**J4**). The board **does not** work with IEEE802.3af compliant 48V power injectors.

Booting options

First, RouterBOOT loader is started. The loader may be configured to boot the system from the onboard NAND module or from Ethernet network. See the respective section of this manual for how to configure booting sequence and other boot loader parameters.

To reset RouterOS, or start booting from network, use the reset button. See *Button Index*

Onboard NAND Storage Device

The RouterBOARD may be started from the onboard NAND storage chip. As there is no partition table on the device, the boot loader assumes the first 4MiB form a YAFFS filesystem, and executes the file called "kernel" stored in the root directory on that partition.

Booting from network

Network boot works similarly to PXE or EtherBoot protocol, and allows you to boot a RouterBOARD 711 series device from an executable image stored on a TFTP server. It uses BOOTP or DHCP (configurable in boot loader) protocol to get a valid IP address, and TFTP protocol to download an executable (ELF) kernel image combined with the initial RAM disk (inserted as an ELF section) to boot from (the TFTP server's IP address and the image name must be sent by the BOOTP/DHCP server).

To boot the RouterBOARD computer from Ethernet network you need the following:

- An ELF kernel image for the loader to boot from (you can embed the kernel parameters and initrd image as ELF sections called *kernparm* and *initrd* respectively)
- A TFTP server which to download the image from
- A BOOTP/DHCP server (may be installed on the same machine as the TFTP server) to give an IP address, TFTP server address and boot image name

See the *Button Index* section on how to configure loader to boot from network.

Note that you must connect the RouterBOARD you want to boot, and the BOOTP/DHCP and TFTP servers to the same broadcast domain (i.e., there must not be any routers between them).

RouterBOOT

The RouterBOOT firmware (also referred as "boot loader" here) provides minimal functionality to boot an Operating System. RouterBOOT can be configured from the RouterOS `"/system routerboard"` menu. The loader supports booting from the onboard NAND device and from a network server (see the respective section for details on this protocol).

Boot Loader Configuration

As this device doesn't have a serial port, the Bootloader parameters may be configured through RouterOS `"/system routerboard"` menu.

Boot Loader Upgrading

The boot loader is needed to initialize all the hardware and boot the system up. Newer loader versions might have support for more hardware, so it's generally a good idea to upgrade the loader once a newer version is available.

The boot loader upgrading is supported from MikroTik RouterOS. Upload the FWF file to RouterOS files menu, and run the `"/system routerboard upgrade"` command. The procedure is described in detail in the MikroTik RouterOS manual.

Operating System Support

Currently tested operating system is MikroTik RouterOS (starting from version v4.11). Downgrading the device to older RouterOS versions can cause malfunction and License issues.

Connector Index

J4	RJ45 Fast Ethernet 100Base-TX port LAN1 with passive PoE extension	
	1	Data TX+
	2	Data TX-
	3	Data RX+
	4	PoE power +
	5	PoE power +
	6	Data RX-
	7	PoE power -
	8	PoE power -
J704	MMCX/uFL wireless connector for attaching pigtail adapter or small indoor antenna with MMCX connector.	

Button Index

S301	Bootloader reset button. Holding this button during boot time will make RB711 look for Netinstall servers. Release the button after the LED light goes out.
RESET	RouterOS reset jumper hole (RESET, marked with a black circle in the diagram above, below S301) – resets RouterOS software to defaults. Must short circuit the metallic sides of the hole (with a screwdriver, for example) and boot the device. Hold screwdriver in place until RouterOS configuration is cleared.

Ethernet Cables

RJ45 Pin	Color	Function	RJ45 pin for Straight cable (MDI, EIA/TIA568A)	RJ45 pin for Crossover cable (MDI-X, EIA/TIA568B)
1	Green	TX+ Data	1	3
2	Green/White	TX- Data	2	6
3	Orange	RX+ Data	3	1
4	Blue	-	4	4
5	Blue/White	-	5	5
6	Orange/White	RX- Data	6	2
7	Brown	-	7	7
8	Brown/White	-	8	8

Federal Communication Commission Interference Statement (FCC ID: TV7RB711-5HN)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.

IMPORTANT: Exposure to Radio Frequency Radiation.

20 cm minimum distance has to be maintained between the antenna and the occupational user and 45 cm to general public. Under such configuration, the FCC radiation exposure limits set forth for a population/uncontrolled environment can be satisfied.

List of approved antennas.

- 5.47-5.85GHz 12dBi Omnidirectional Antenna OD58-12
- 5.15-5.85GHz 23dBi Panel Antenna ARC-5823P

Installer shall be responsible for ensuring that the proper antenna is employed so that the limits stated in FCC Part 15 are not exceeded.