i.MX53 Development Kit

QUICK GUIDE

voipac

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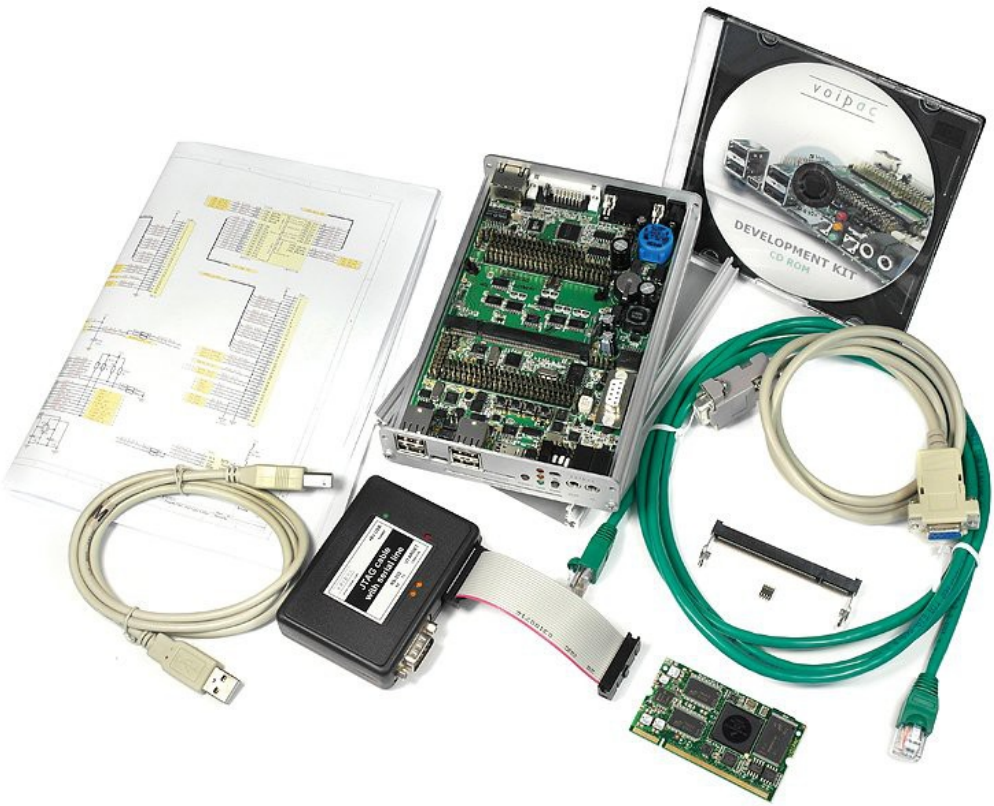
About Voipac i.MX53 Development kit

Voipac i.MX25 SODIMM Baseboard is designed to be used as development platform for the Voipac cross-compatible i.MX53/i.MX51/i.MX25 SODIMM Modules. Together they create a low power system with excellent MIPS/mW performance allowing deployment in situation where power source is limited. Besides the standard PC peripheral interfaces, the system provides numerous communication channels as well as universal expansion slots and connectors.

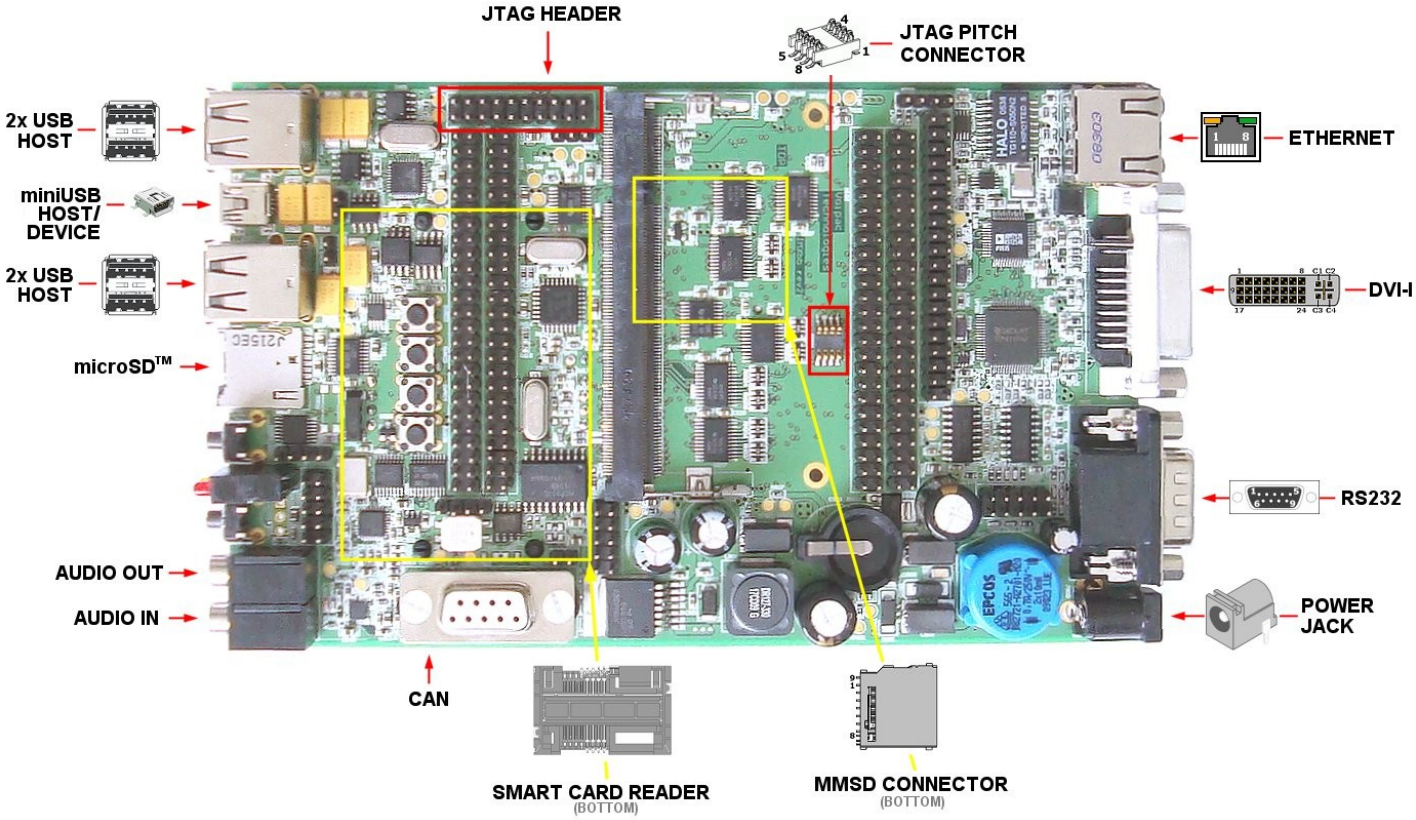
This QuickGuide shows, how to install JTAG Cable, load Linux using TeraTerm. Programs run under Windows XP.

Packing List

COMPONENTS	QUANTITY
SODIMM Base Board	1
SODIMM Module	1
JTAG cable with serial line	1
Support CD	1
Aluminium case set	1
Serial port cable	1
Crossover Ethernet cable	1
SODIMM socket	1
JTAG pitch compression connector	1
SODIMM Module Printed Schematics	1
Mounting Fastener	2
Quickguide Brochure	1
DATAIMAGE TFT display with touchscreen set *(Optional)*	1
OPTREX TFT display with touchscreen set *(Optional)*	1
EDT TFT multitouch capacitive display with mounting ears set *(Optional)*	1



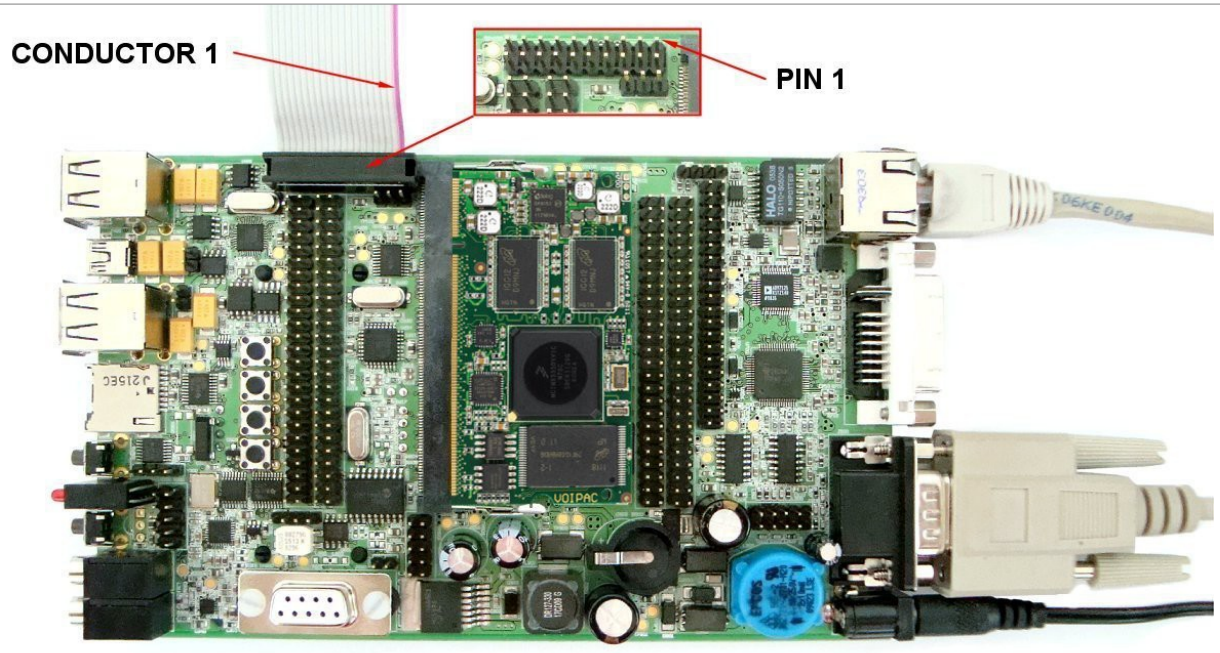
Connector Locations



Connecting the components and cables

Prepare Baseboard and plug in JTAG Cable with Serial line, Ethernet cable and other devices or interfaces you need.

IMPORTANT! Be careful when connecting JTAG`s 20 conductor flat cable to the board. Check if the conductor 1 is connected to Pin 1 (Header connector J901) on the board before you turn on the board.



First Step

The development kit is supplied with pre-installed bootloader, linux kernel and demo file system. The development kit can be controlled over:

Controlling the Development Kit over serial line

Recommended HW:

a) PC with serial port or USB to serial adapter
b) Voipac i.MX53 development kit
c) Voipac serial cable (http://voipac.com/#X25-SPC-000)

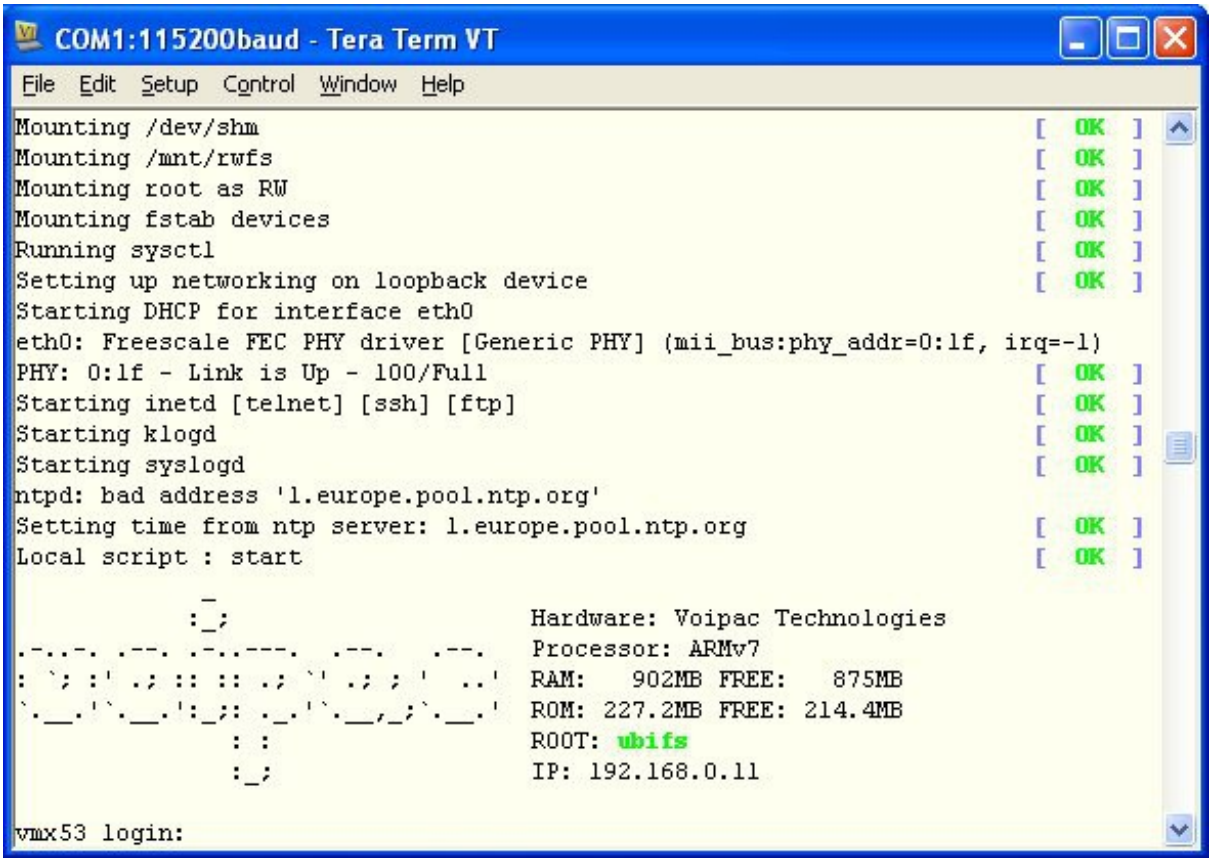
Recommended SW:

Serial line terminal (PUTTY, Minicom, Ckermit, Hyperterminal, TeraTerm, ...)

Default serial port settings:

Speed (baud):	**115200**
Data bits:	**8**
Stop bits:	**1**
Parity:	**None**
Flow control:	**None**

Controlling the development kit using TeraTerm



Using external monitor (or supplied TFT panel) and USB Keyboard

Recommended HW:

a) External monitor with DVI or VGA connector (for VGA monitor is required to use DVI to VGA adapter)
DATAIMAGE TFT Display (optional, http://voipac.com/#27M-TFT-000)
OPTREX TFT Display (optional, http://www.voipac.com/#X51-TFT-000)
EDT TFT Display (optional, http://voipac.com/#X53-TFT-000)

b) Voipac i.MX53 development kit

Recommended SW:

IMPORTANT!
External monitor must support at least one of following resolutions 640x480px, 800x480px, 800x600px, 1024x720px, 1280x800px or 1600x1200px.

Controlling the development kit using external monitor and USB Keyboard

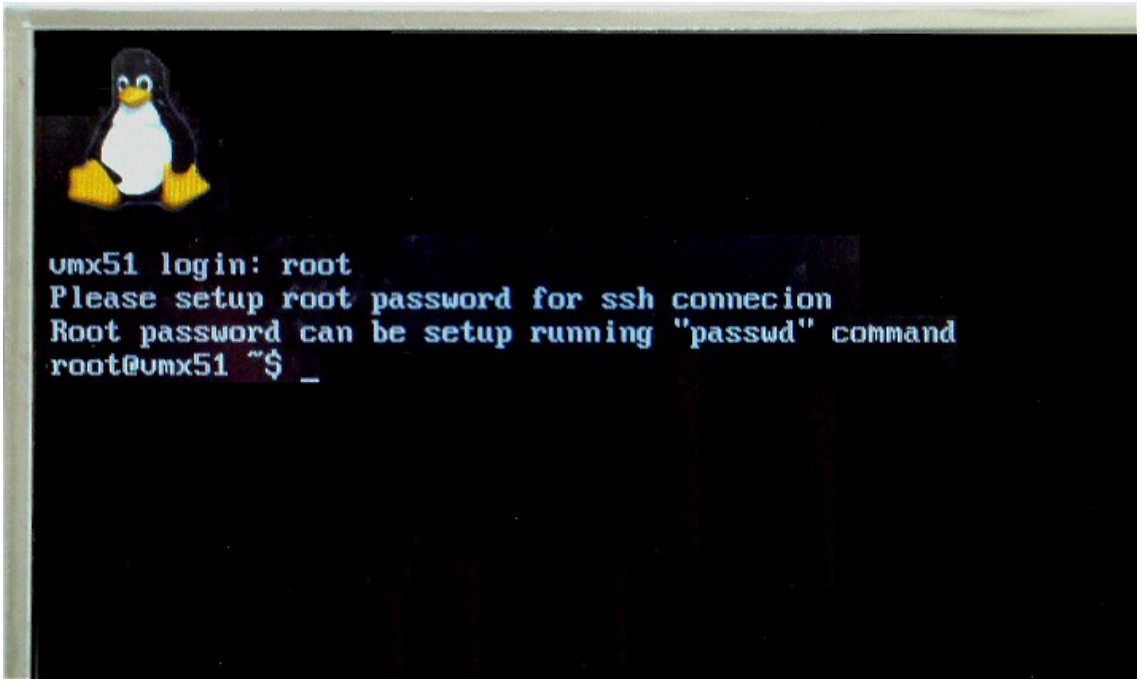


Illustration Photo

Controlling the Development Kit over Ethernet (telnet, ssh, ftp, sftp)

Recommended HW:

a) PC with Ethernet
b) Voipac i.MX53 development kit
c) Ethernet cable (http://voipac.com/#X25-CEC-000)

Recommended SW:

- Telnet client (Telnet, PUTTY, …)
- SSH client (SSH,PUTTY, …)
- FTP client (FTP, Filezilla, BareFTP, ...)
- SFTP client (Filezilla, PUTTY, WinSCP, ...)

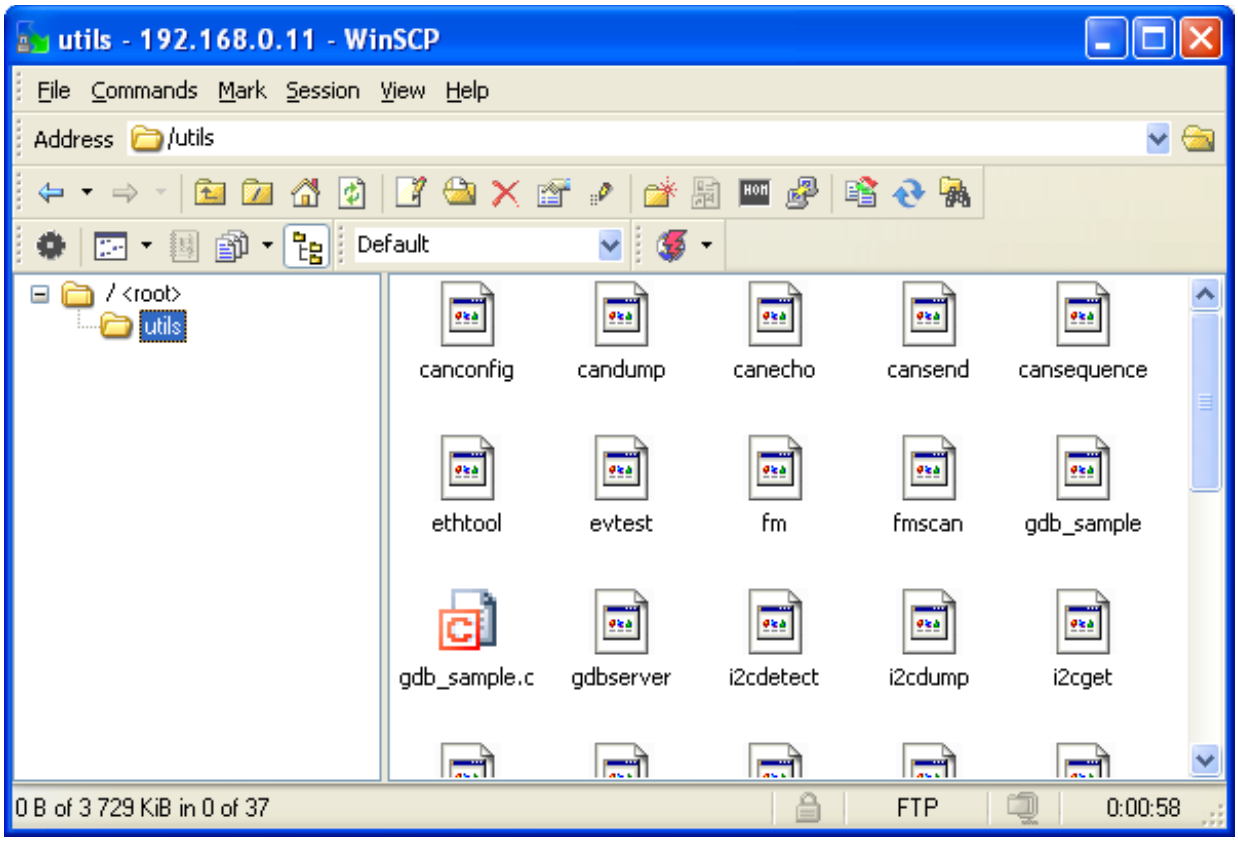
IMPORTANT!

Demo modules are shipped with empty root password.
The default IP address is dynamic and setup by your dhcp server upon boot.

SSH, SFTP require root password to be set up. (“passwd” command)
FTP, SFTP are recommended only for data transfers. (binary mode is recommended)

Controlling the development kit using PUTTY

Controlling the development kit using WinSCP (Explorer Interface)



Open On-Chip Debugger 0.6.0 with Voipac`s JTAG Cable under WinXP

JTAG Cable Installation

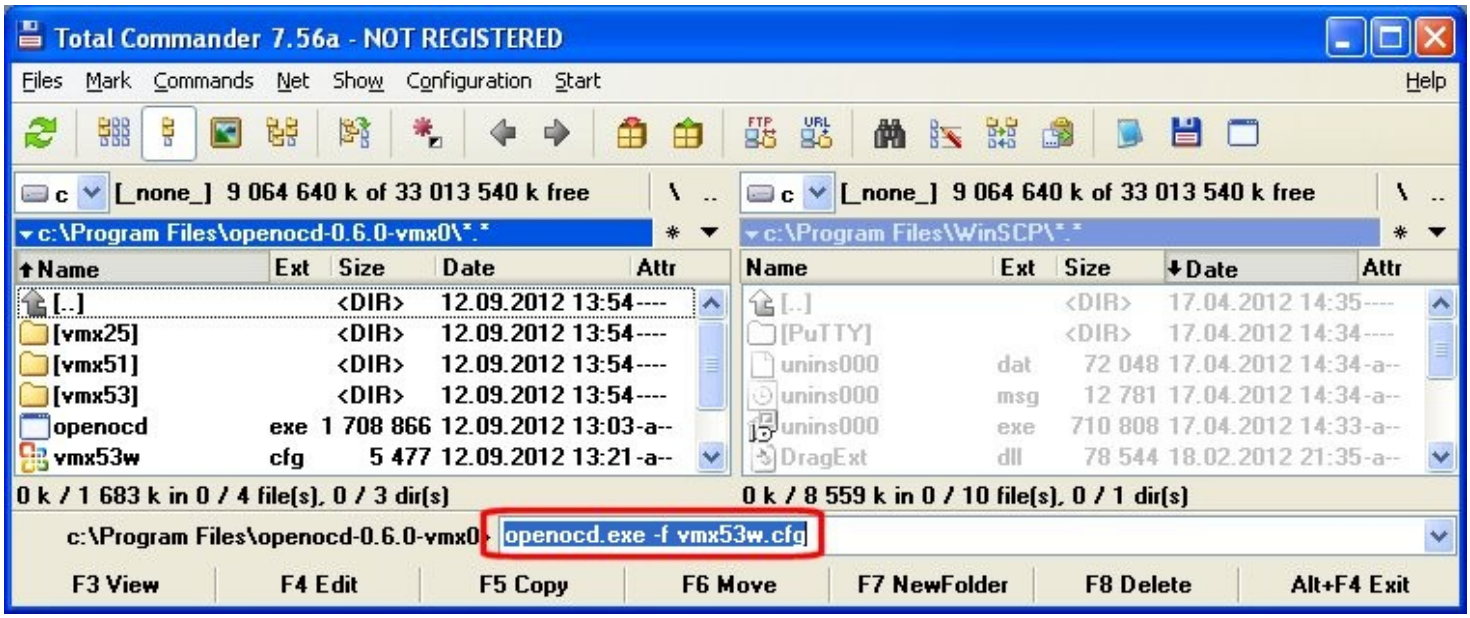
1 STEP Connect JTAG Cable to USB port on your computer. JTAG Cable will be installed automatically and prepared for usage.

2 STEP Download OpenOCD v 0.6.0 (http://www.voipac.com/downloads/imx/jtag/bin/openocd-0.6.0-vmx0.zip).

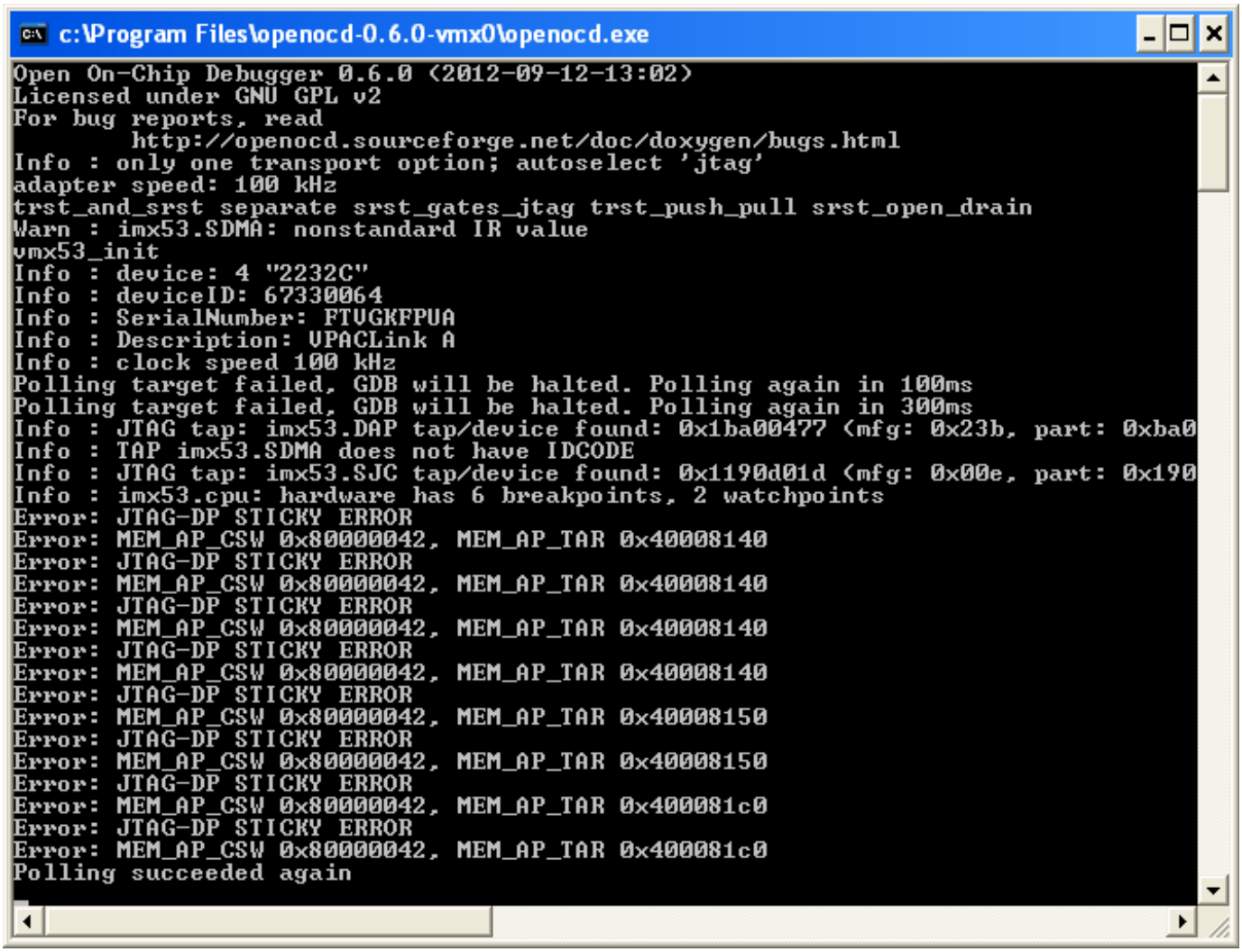
3 STEP Unzip the file and place to the folder you want to.

How to run Open On-Chip Debugger

4 STEP Run OpenOCD using, for example, Total Commander. Open the folder where is placed the unzipped file. Type in command line: **openocd -f vmx53w.cfg**. Press [Enter].

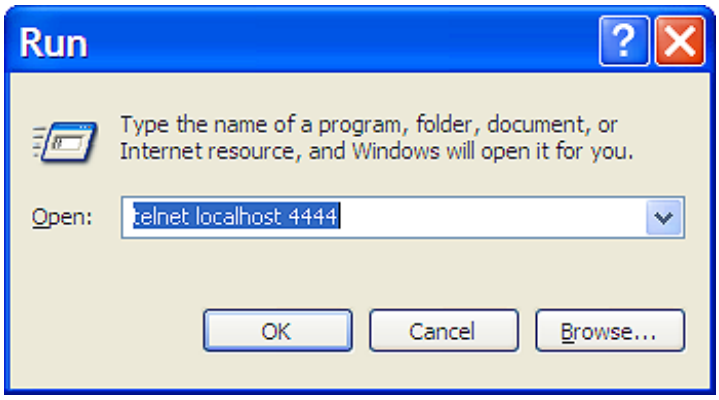


Open On-Chip Debugger is running.

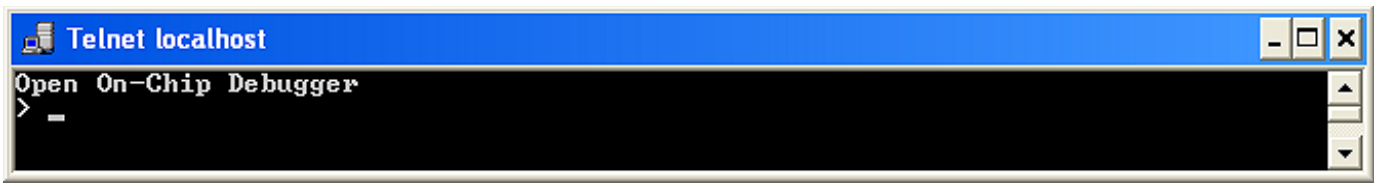


How to connect to Open On-Chip Debugger using Telnet

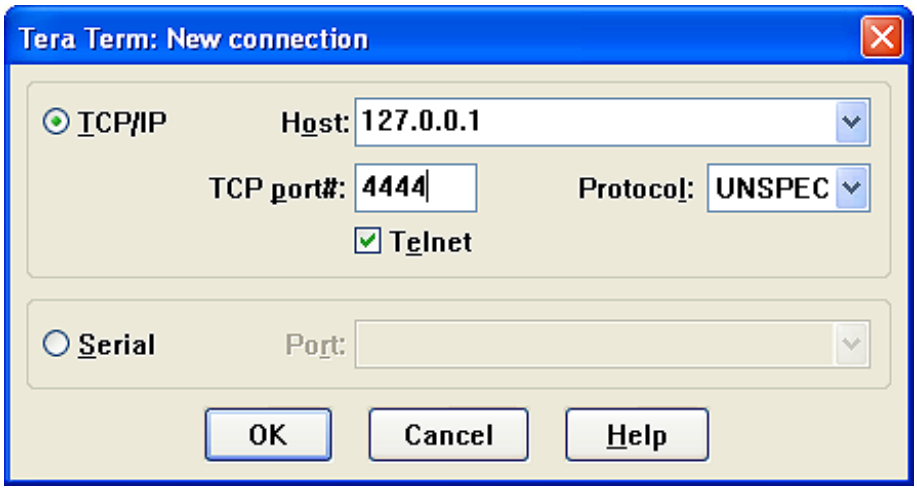
5 STEP Click on Start/Run, type **telnet localhost 4444** and click on OK button.



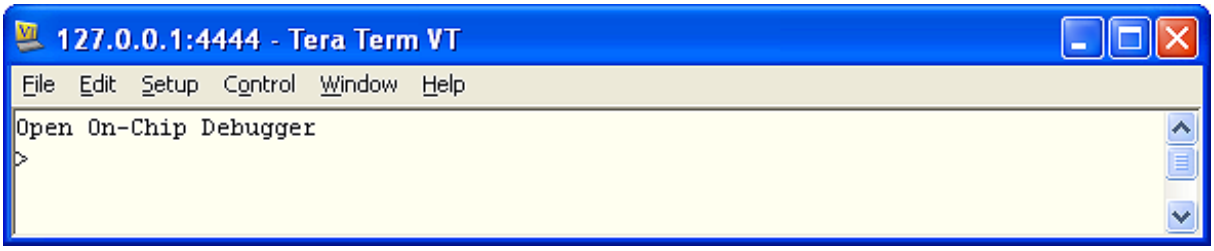
Open On-Chip Debugger is running.



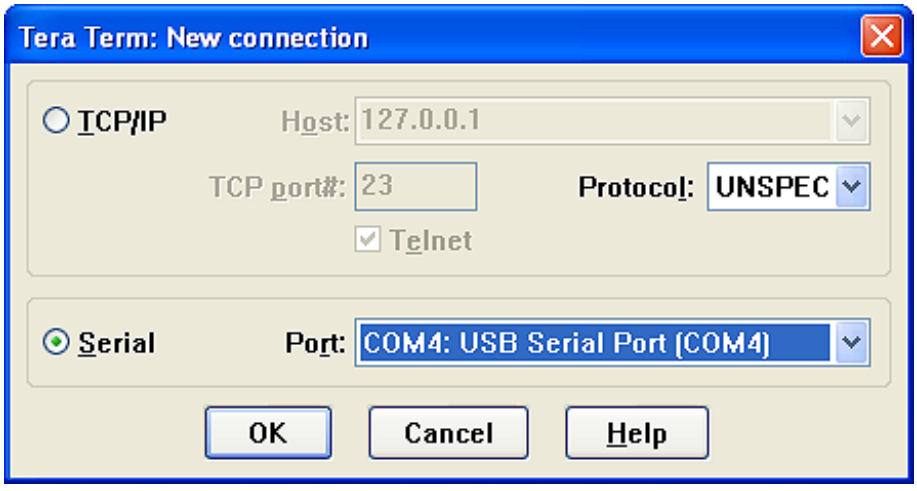
6 STEP Open TeraTerm program, click on File/New Connection, check TCP/IP and type **4444** into TCP port# field. Press OK.



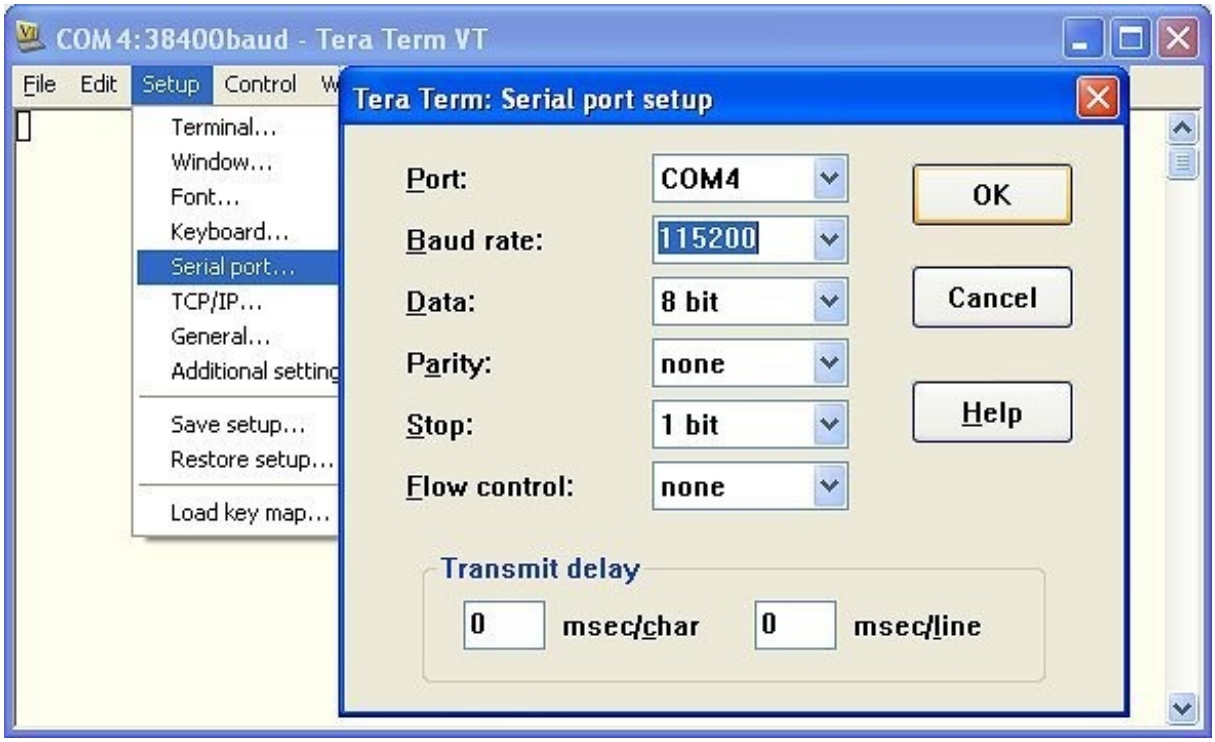
Open On-Chip Debugger over TeraTerm program is running.



7 STEP Open TeraTerm program, click on File/New Connection, check Serial and choose the port where the JTAG cable is connected to a PC.



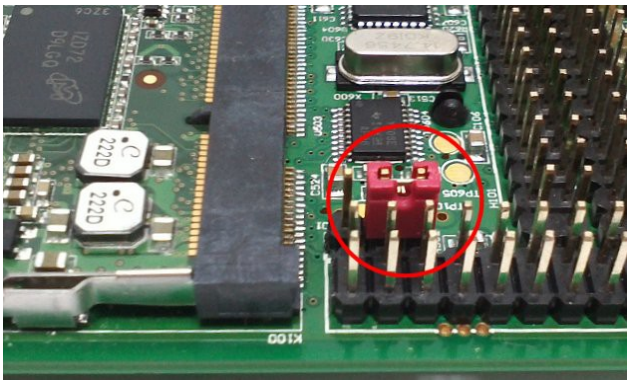
8 STEP Click on Setup, choose Serial port and set Baud rate. (115200, 8n1)



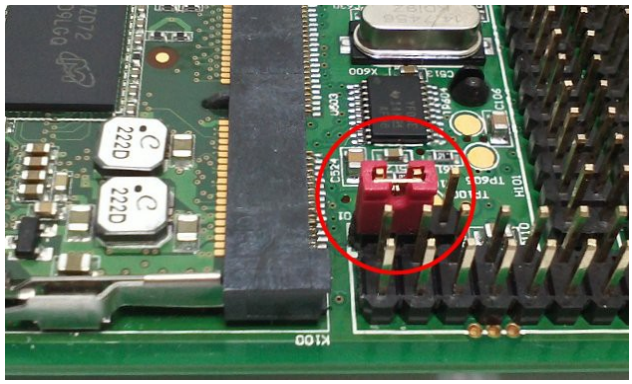
How to load bootloader into i.MX53 SODIMM Module (barebox.bin)

9 STEP Check **H902** jumper (BOOTMODE) on the baseboard to select **Serial boot**, by connecting pins 1 and 2 together.

Direct Boot (Boot from E-Fuses) is selected as the bootmode by connecting pins 2 and 3 together.



Serial Boot

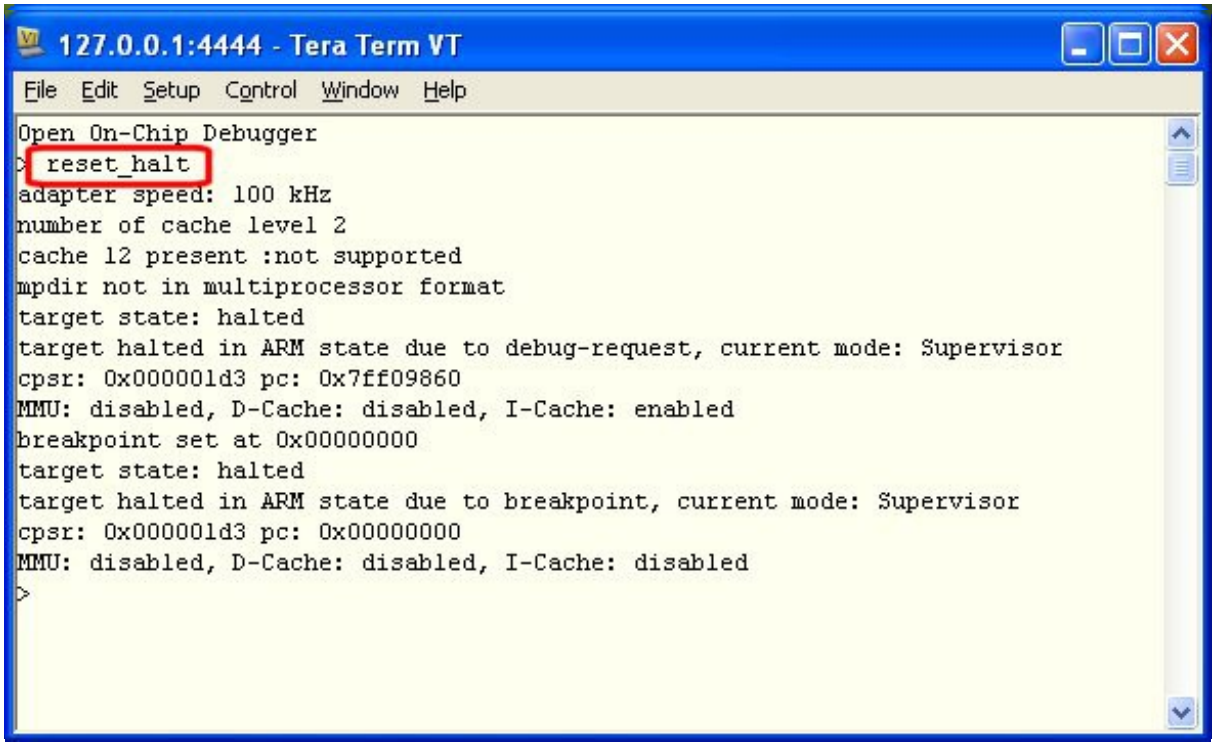


Direct Boot (Boot from E-Fuses)

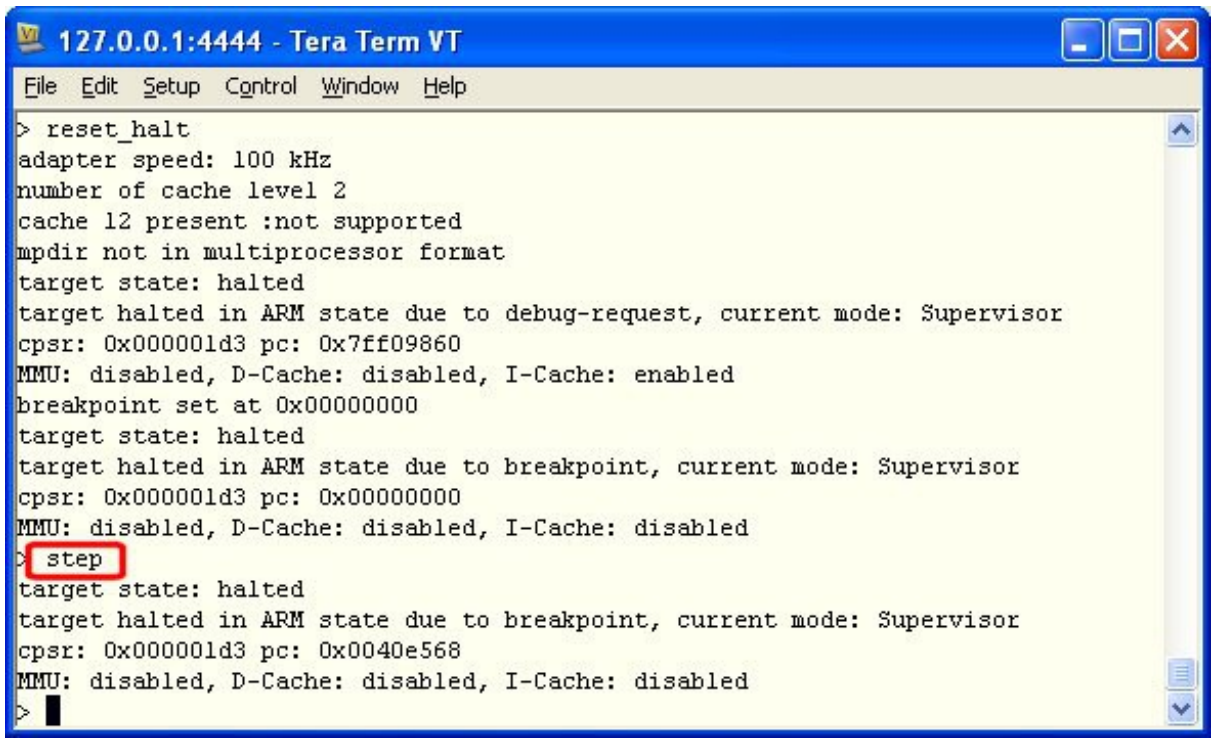
(Note) Serial Boot is for the first flashing of the module or if the image written in the Flash cannot boot.
Direct Boot is for normal module working

10 STEP Type or paste commands into TCP/IP console (Open On-Chip Debugger connection):

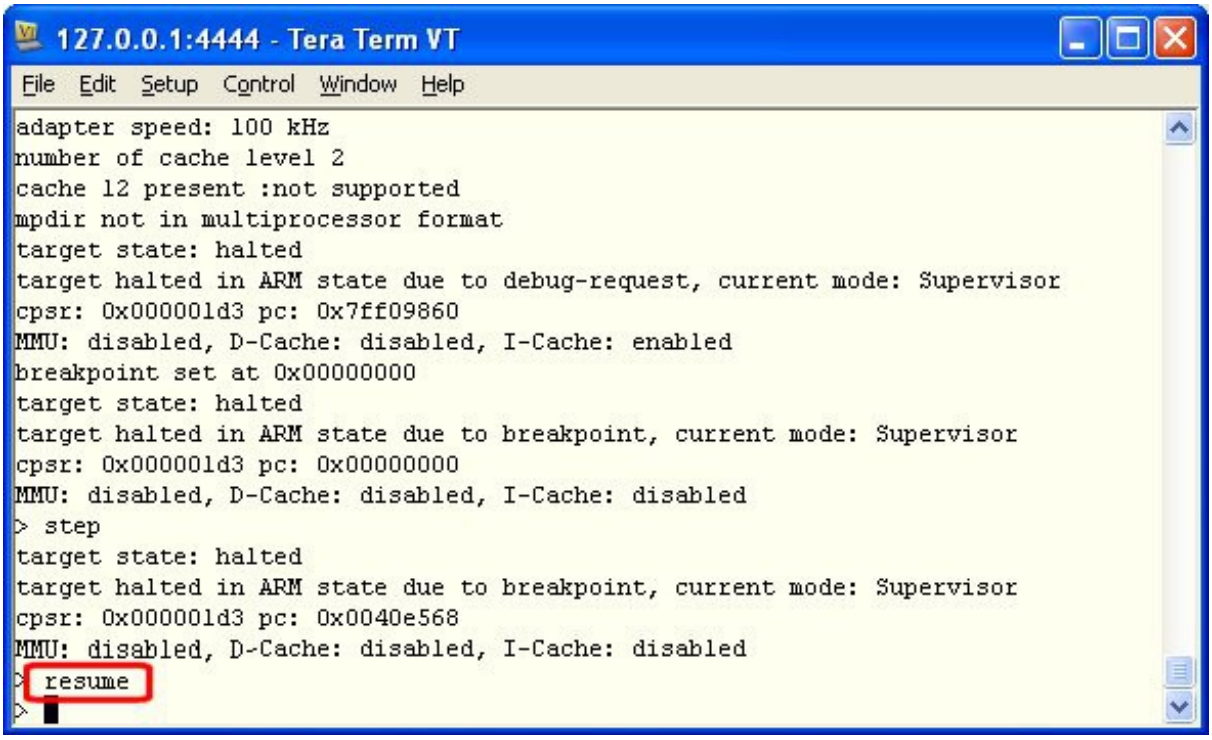
Type **reset_halt** and press [Enter].



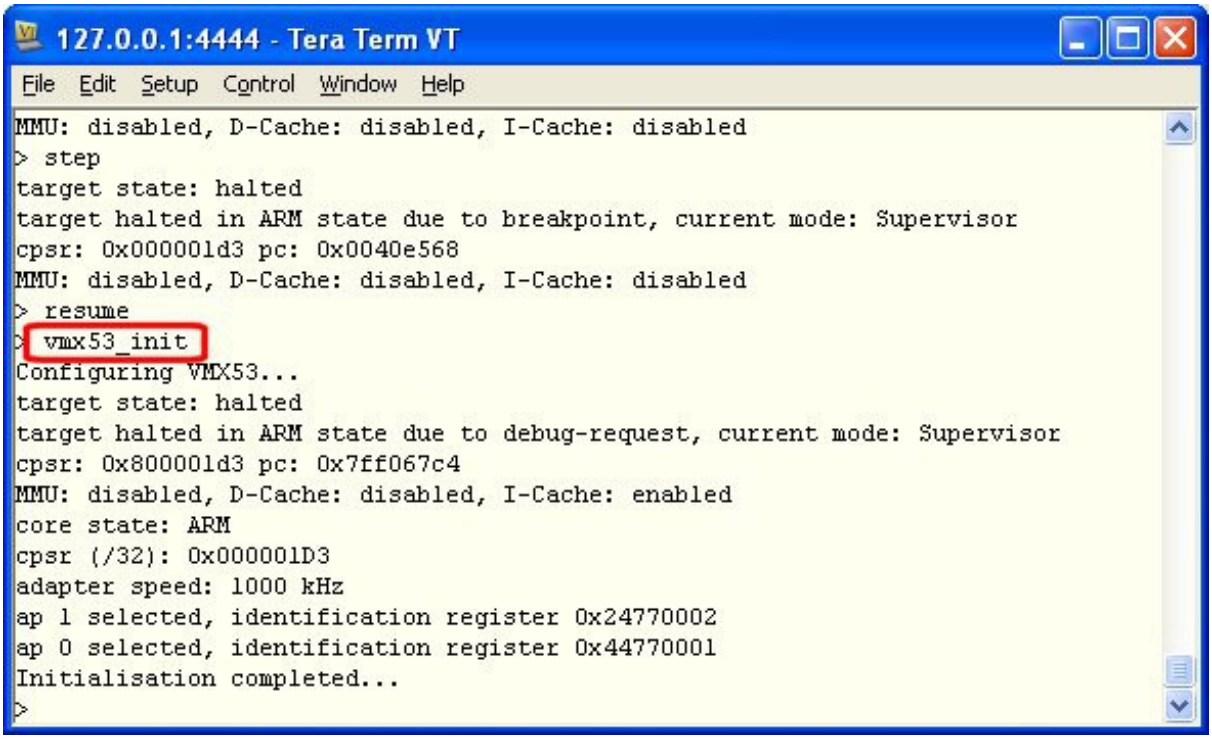
Type **step** and press [Enter].



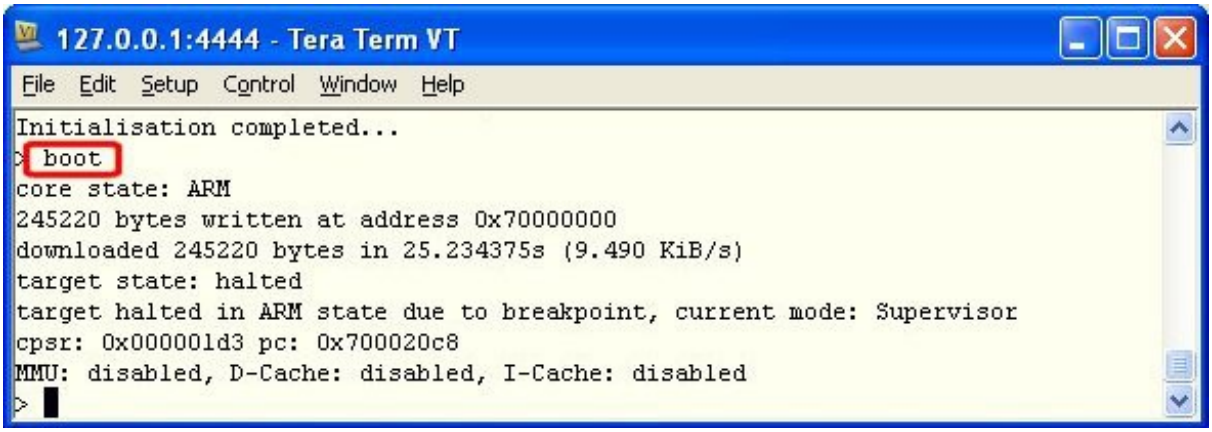
Type **resume** and press [Enter].



Type **vmx53_init** and press [Enter].



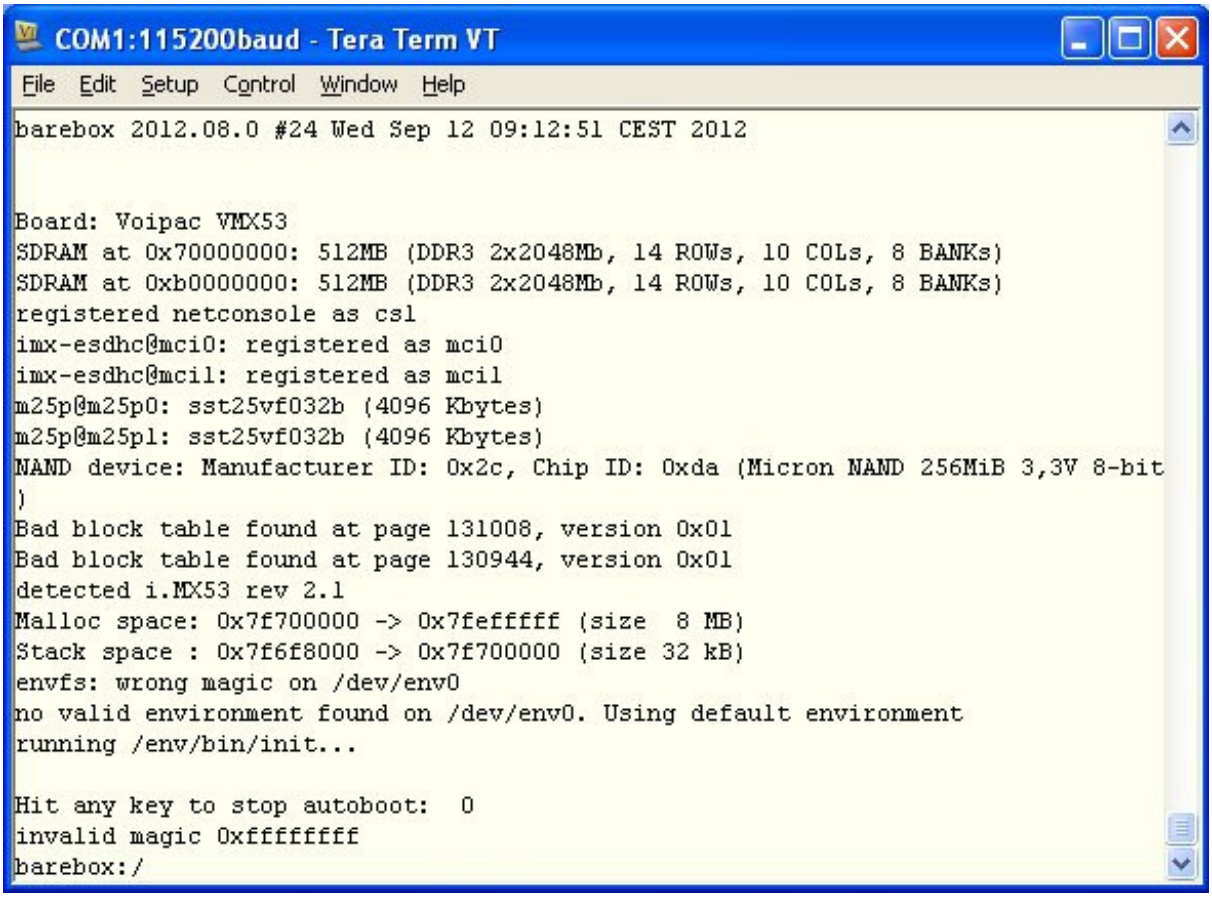
Type **boot** and press [Enter].



Barebox is loaded into the i.MX53 module SRAM.

(Note) After "boot" the barebox is being executed.

The previously loaded bootloader (barebox.bin) is running in Serial console.



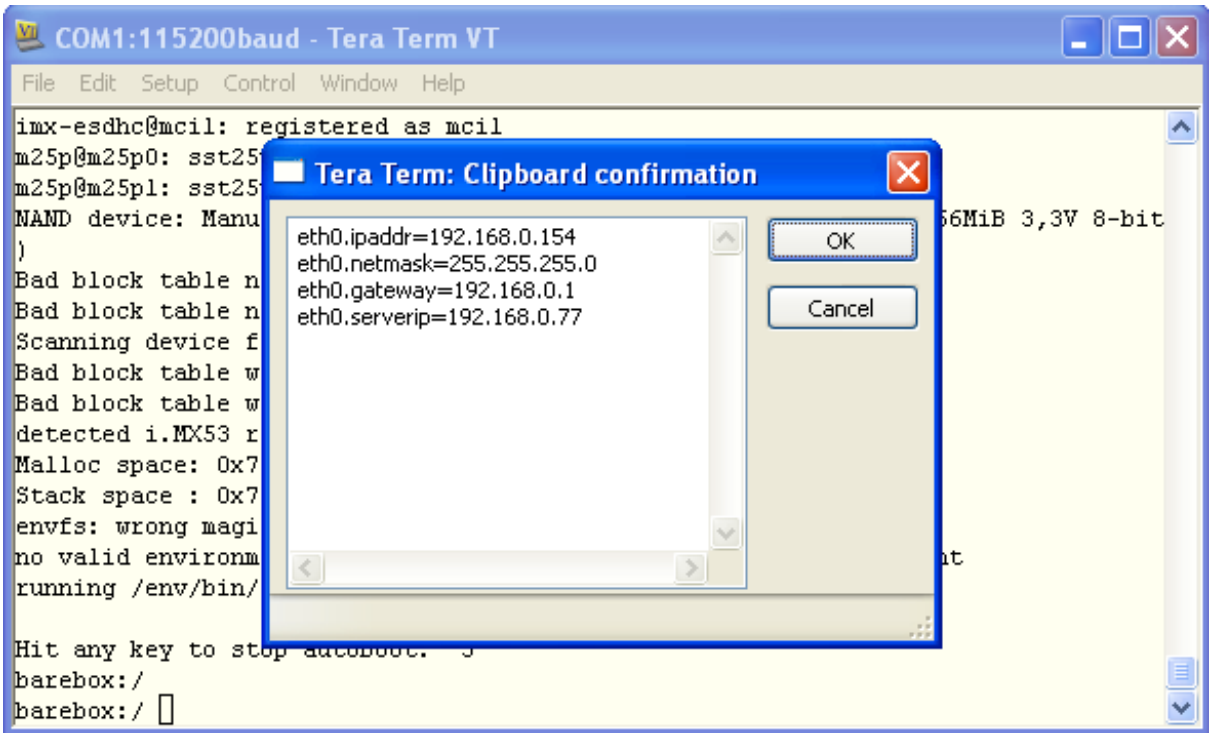
When the module is switched off, barebox is erased. To flash barebox again, it is needed to use the same procedure as shown in Step 10.

OpenOCD must be closed and restarted again to use the same procedure as shown in Step 10.

11 STEP Run TFTP server. Type or paste commands in Serial console to set Ethernet:

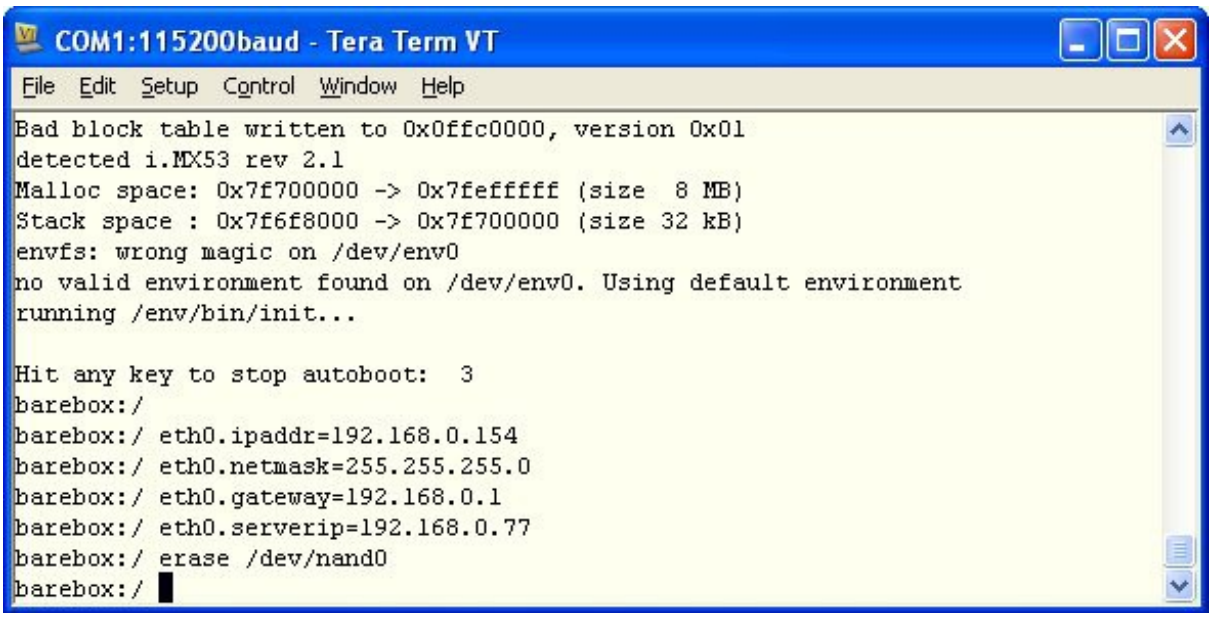
Assign individual IP addresses according to the specifications of your subnet.

eth0.ipaddr=192.168.0.150
eth0.netmask=255.255.255.0
eth0.gateway=192.168.0.1
eth0.serverip=192.168.0.77



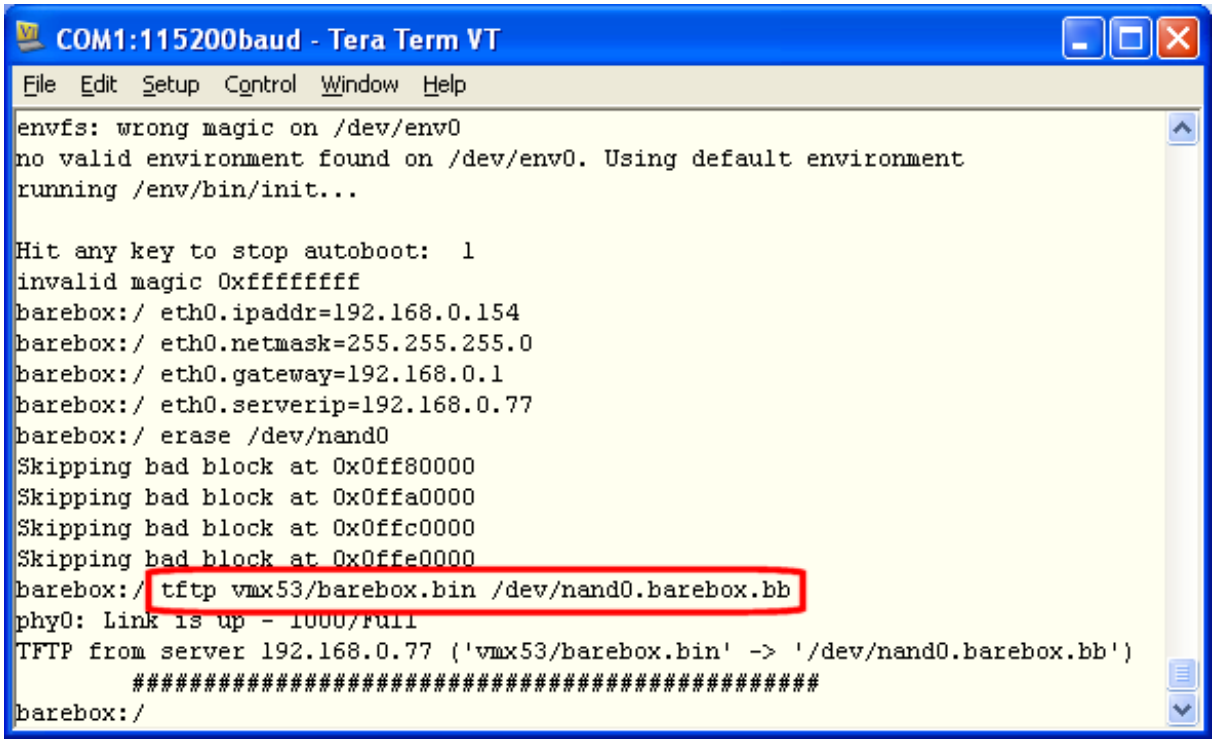
Type or paste commands in Serial console to erase Flash:

erase /dev/nand0

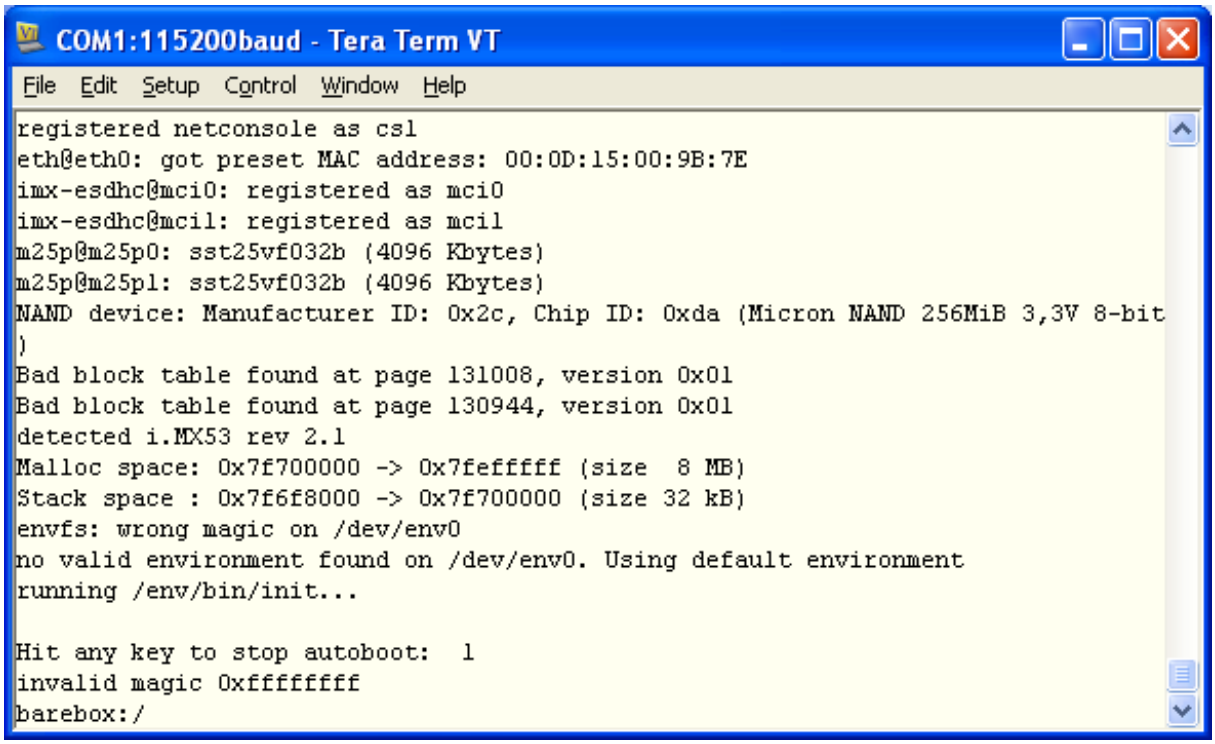


Type or paste command separately in Serial console to load bootloader file barebox.bin:

tftp tftp folder/barebox.bin /dev/nand0.barebox.bb

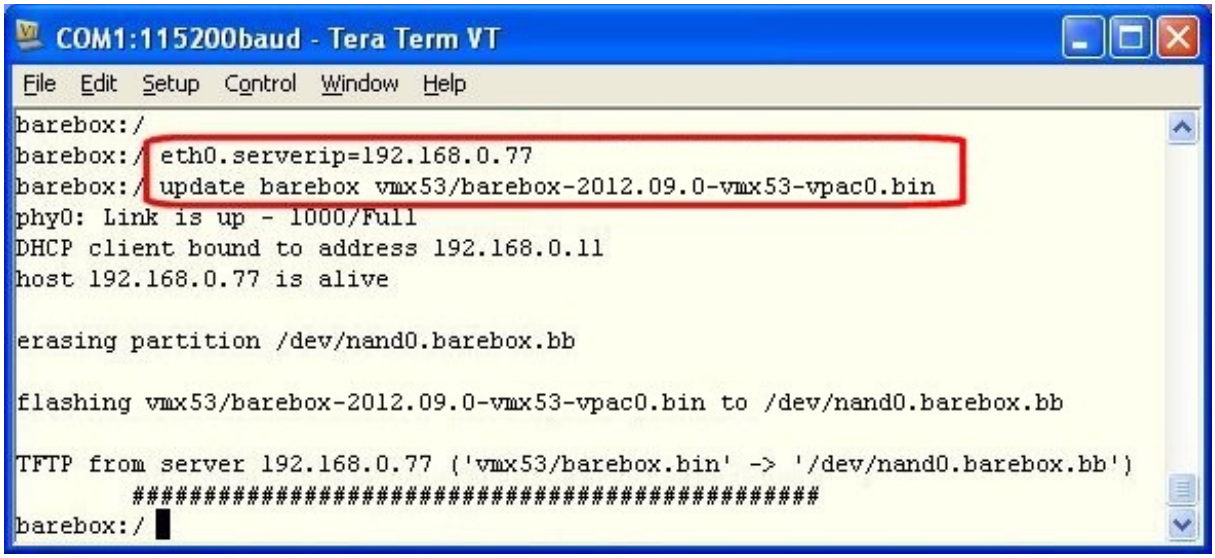


Final step is to power off the board and disconnect the jtag cable. Change **H902** jumper (BOOTMODE) on the baseboard by connecting pins 2 and 3 together.
Power on the board. The module will boot barebox.

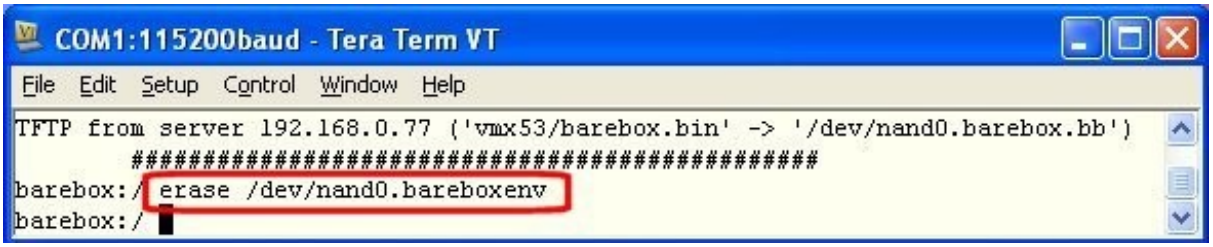


12 STEP Type or paste commands into TCP/IP console (Open On-Chip Debugger connection):

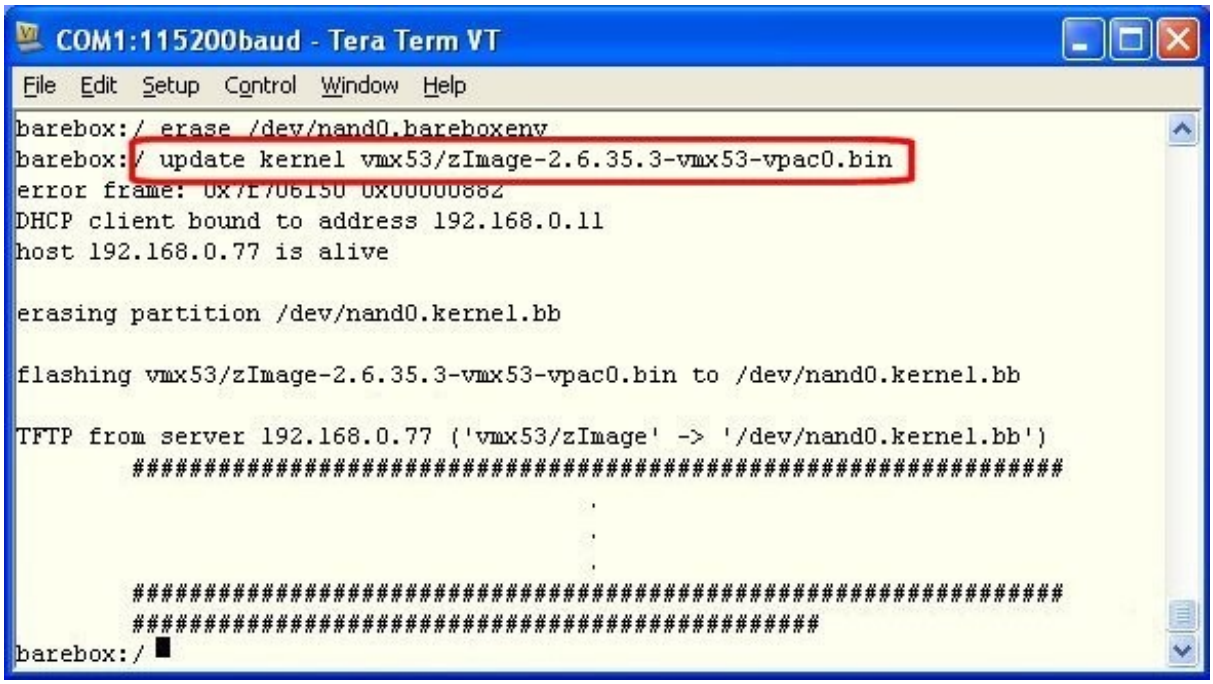
Type: **eth0.serverip=192.168.0.77** (IP address of FTP in case, no DHCP Next-Server in your subnet)
Type: **update barebox tftp folder/barebox-2012.09.0-vmx53-vpac0.bin**



Type **erase /dev/nand0.bareboxenv** and reset the board.

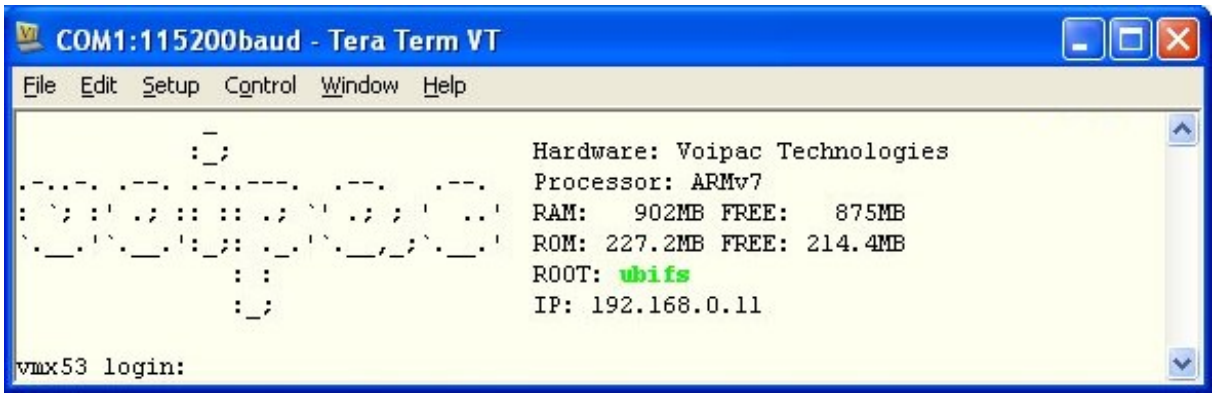


Type **update kernel tftp folder/zImage-2.6.35.3-vmx53-vpac0.bin**.



Type **update rootfs tftp folder/rootfs-ubifs-bb-1-18-vmx53-vpac0.bin**.

Type **reset** or reset the board and module will boot Filesystem. Type vmx53 login "**root**" and press [Enter].



E-Fuses

Voipac i.MX53 SODIMM Module is delivered with e-fuses set to boot from NAND interface defaultly. Upon a customer request, Voipac offers not programmed modules or modules with different boot device. The options are: NAND Flash, microSD/MMC, SPI Flash, I2C EEPROM.

To be able to put pullups on boot configuration pins you have to lock e-fuses configuration by programming the e-fuses using barebox bootloader.

Before programming e-fuses, it is needed to enable e-fuse supply gate:

```
barebox:/ md 0x53fd4064+4
53fd4064: 0000fe62                                        b...
barebox:/ mw 0x53fd4064+4 0xfe72
```

To dump factory e-fuses configuration use barebox command

```
barebox:/ md -b -s /dev/imx_iim_bank0
00000000: 10 10 00 00 01 00 00 02 2b 2b 80 00 02 d9 f4 b1    ........++......
00000010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    ................
```

To write e-fuses use barebox command (example writes MAC address 00:01:02:03:04:05)

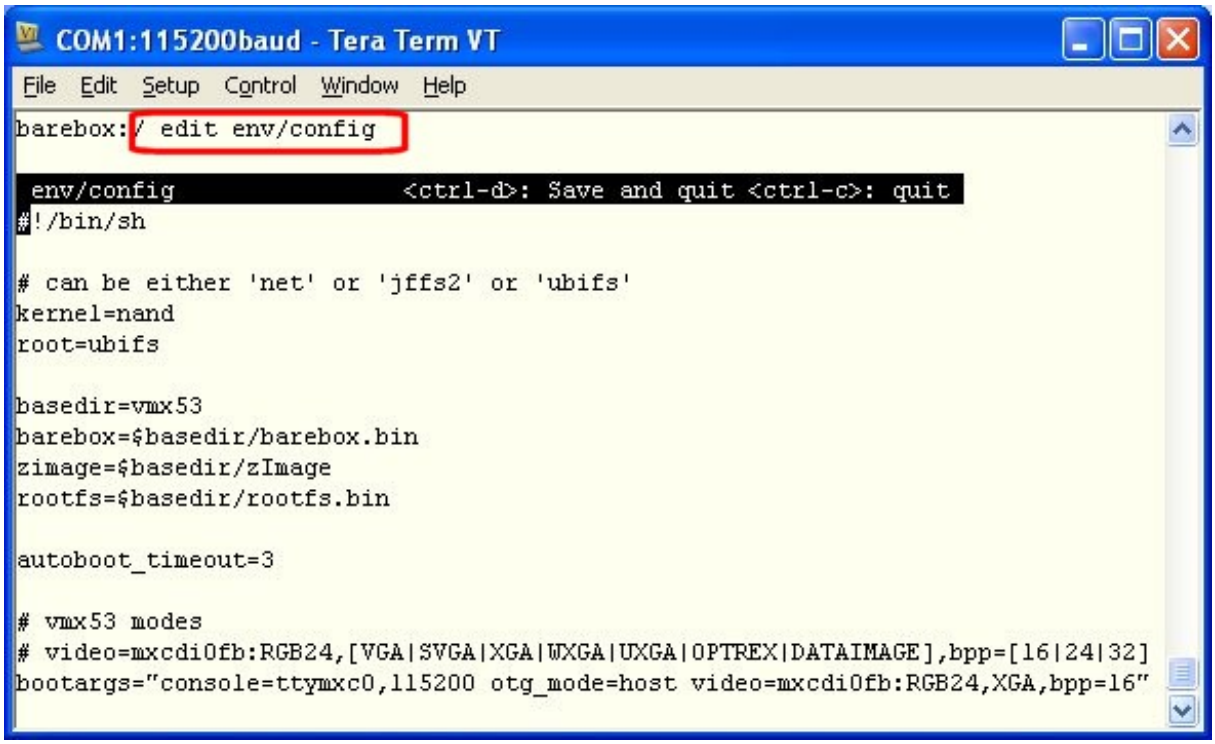
```
barebox:/ imx_iim0.permanent_write_enable=1
barebox:/ mw -b -d /dev/imx_iim_bank1 9+6 0x00 0x01 0x02 0x03 0x04 0x05
barebox:/ md -b -s /dev/imx_iim_bank1
00000000: 01 00 00 00 00 00 00 00 00 00 01 02 03 04 05 00    ........++......
00000010: 00 00 00 00 00 00 00 19 00 00 00 00 00 00 00 00    ................
```

BE AWARE THAT E-FUSES PROGRAMING IS NON REVERSAL PROCESS !!! WARRANTY CLAIM CAUSED BY IMPROPER E-FUSES PROGRAMMING WILL NOT BE ACCEPTED !!!

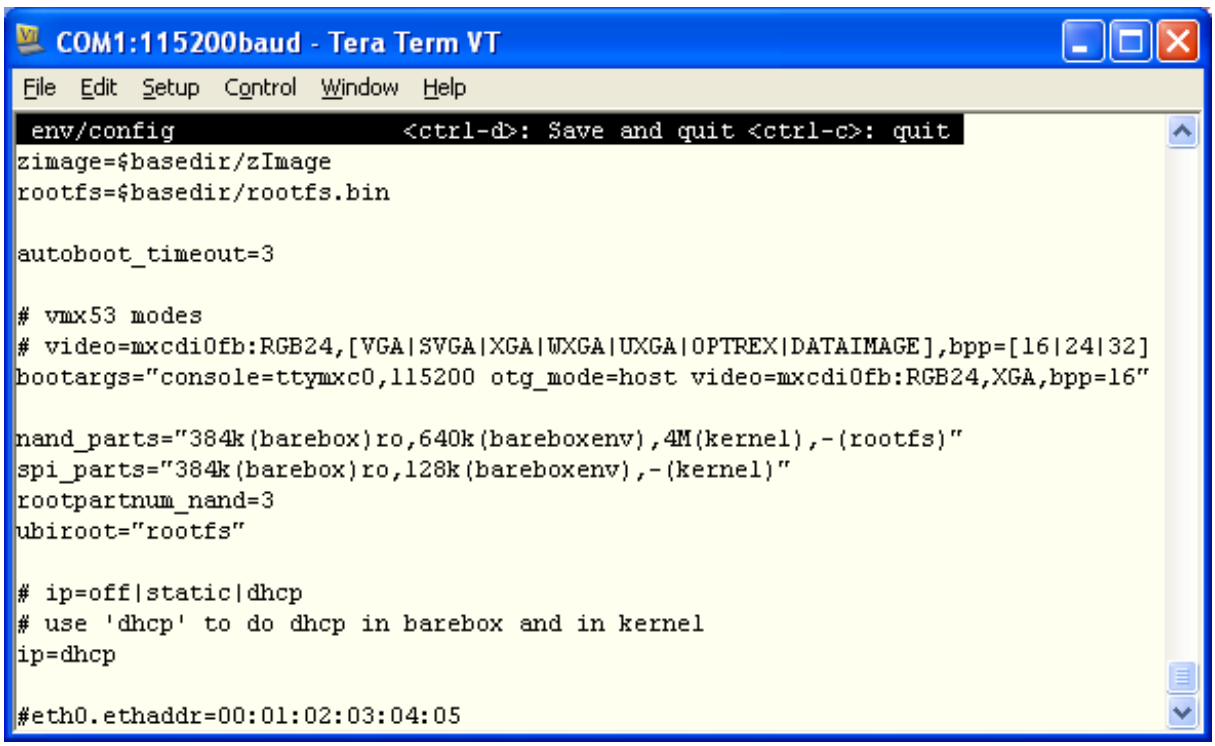
Changing MAC Address

MAC address (indicated on the label of the module) is defaultly written in e-fuses for permanent identifying the module. Customer can change the MAC address using barebox:

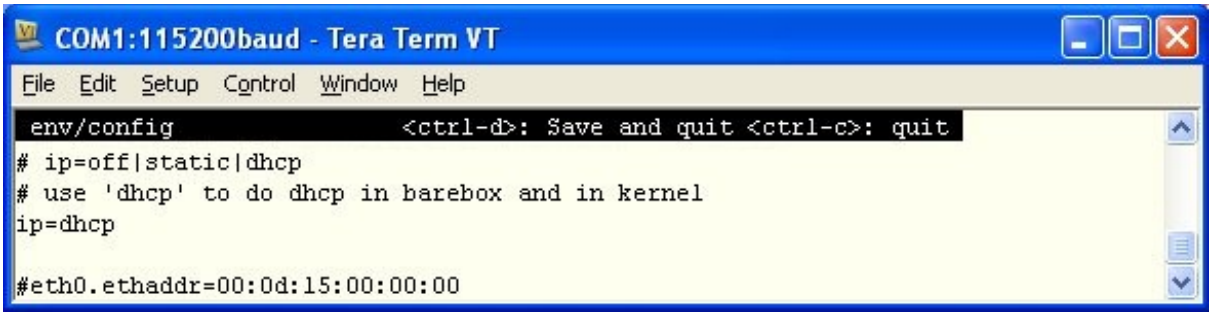
Stop autoboot and write: **edit env/config**



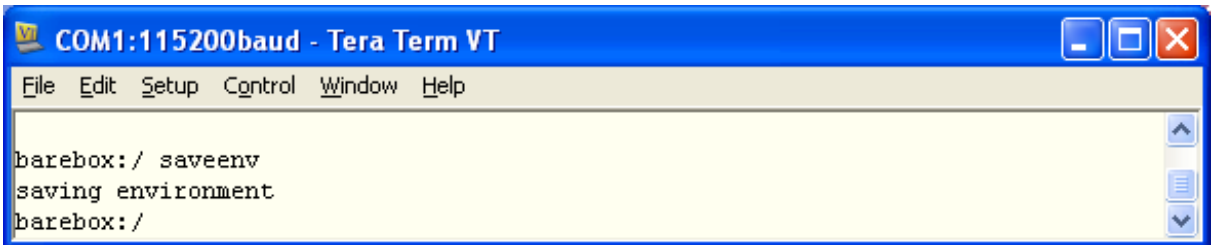
Scroll down to a last line for changing the MAC address: 00:01:02:03:04:05



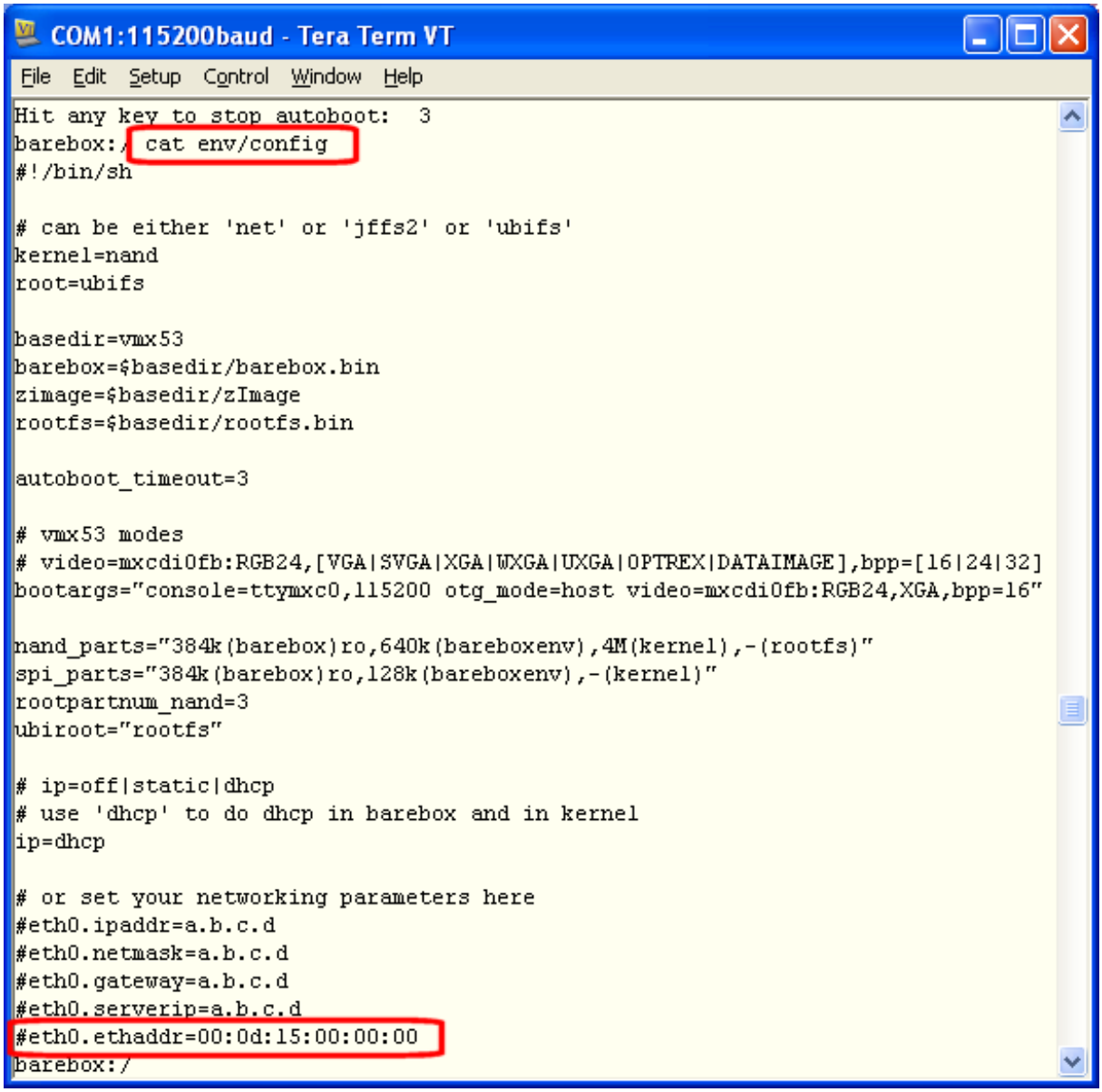
Rewrite the MAC address and and press [CTRL+D]



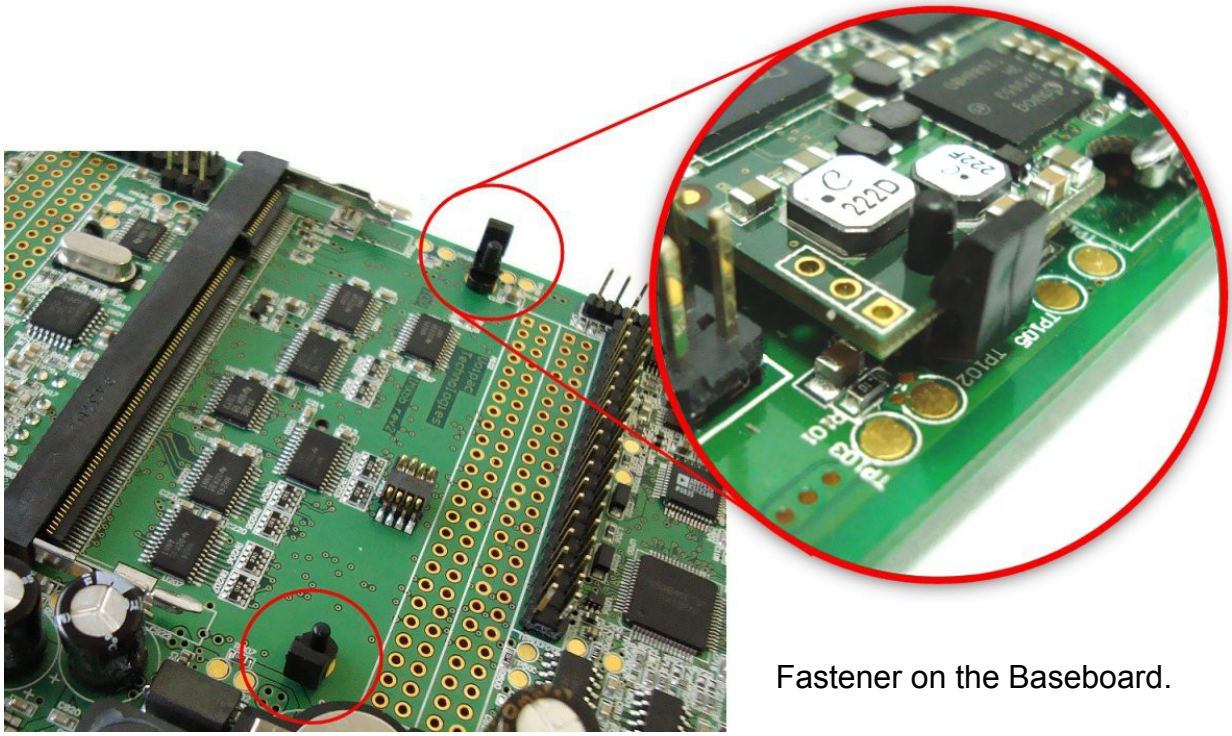
Type **saveenv** and press [Enter]



Reset the board, stop autobooting and type: **cat env/config**. Newly specified MAC address is saved.



Mounting Fasteners



Fastener on the Baseboard.

Additional protection of the SODIMM Module fall out of he 200pin socket, ideal for mobile applications.

Products` Life Cycle Phase

Voipac products are divided into 4 phases:

- **INTRODUCTION PHASE**, **approximately the first 6-12 months.**
  The last software issues are still being resolved.
  Product in this stage is the most suitable for new designs.

- **ACTIVE PHASE**, **the first 1-3 years following the product introduction.**
  Product software packages are stable, additional functions, OS and GUI are being released.
  Product in this stage is suitable for new designs.

- **MATURITY PHASE**, **approximately the first 4-6 years after the introduction.**
  Products are shipped in volumes, additional functions additions declines.
  Product in this stage is no longer recommended for new designs.

- **EOL PHASE**, **approximately 7-10 years after the introduction.**
  Used components availability decreases, although product may still be purchased under specific circumstances.
  The Last Time Buy notification is send to all product users app. 6 months prior to product discontinuation.
  Components stocking service for discontinued products and manufacturing of further production batches is available.

To find out the specific product life cycle phase, visit its product page and check the title color.

CE compliance of Voipac products

The CE label is a mandatory conformity mark for complex electronic devices placed on the market in the European Economic Area and each product sold within the EU needs a CE Certificate of Conformance that ensures that the product conforms to the essential requirements of the applicable EC directives.

However, if such complex electronic devices are produced for further processing by the industry, skilled development teams or system integrators, they do not need to observe the above mentioned CE requirements and consequently do not need any identification either. This applies to the Voipac SODIMM sized Computers On Module, because these are not used as stand-alone devices by the general public.

Anyway, to make sure that Voipac COMs can be used in CE marked devices, they are designed to obey the EC directives and the standard configuration SBCs manufactured by Voipac are tested for Electromagnetic Interference and operating temperature ranges plugged in corresponding Base Board and mounted in the standard Aluminium case provided to Voipac development kits.

Please visit Downloads for the testing reports.

TECHNICAL SUPPORT

HW & SW support: support@voipac.com

Warranty claims: warranty.claim@voipac.com

Voipac I.MX53/51/25 development kits come with prepaid 1 month support packages.
All of the relevant communication between the customer and Voipac should be executed via e-mails preferably.
Response time is up to 48 hours, except state holidays and weekends.
Voipac working hours are: 8:00 - 17:00, Monday - Friday.

Before contacting support, please read the following for the basic information about how to work with a development kit:

www.voipac.com/#Downloads
http://free-electrons.com/training

Besides the free-of-charge support, we provide support for your new designs when it comes to the special drivers for the peripherals not included in the Voipac development kits, design of your own base boards, prototyping, or even new products development.

Please contact: support@voipac.com for more info.

Notes

Warranty:

VOIPAC TECHNOLOGIES s.r.o. Does Not Bear Responsibility for the Following:

- Failure of a product resulting from misuse, accident, modification, unsuitable operating environment, or improper maintenance by user
- Unless otherwise agreed in written, a product does not include technical support and the customer may be able to purchase technical support under separate agreement
- Any technical or other support provided under warranty by VOIPAC TECHNOLOGIES s.r.o. such as assistance, set-up and installation is provided WITHOUT WARRANTY OF ANY KIND.

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