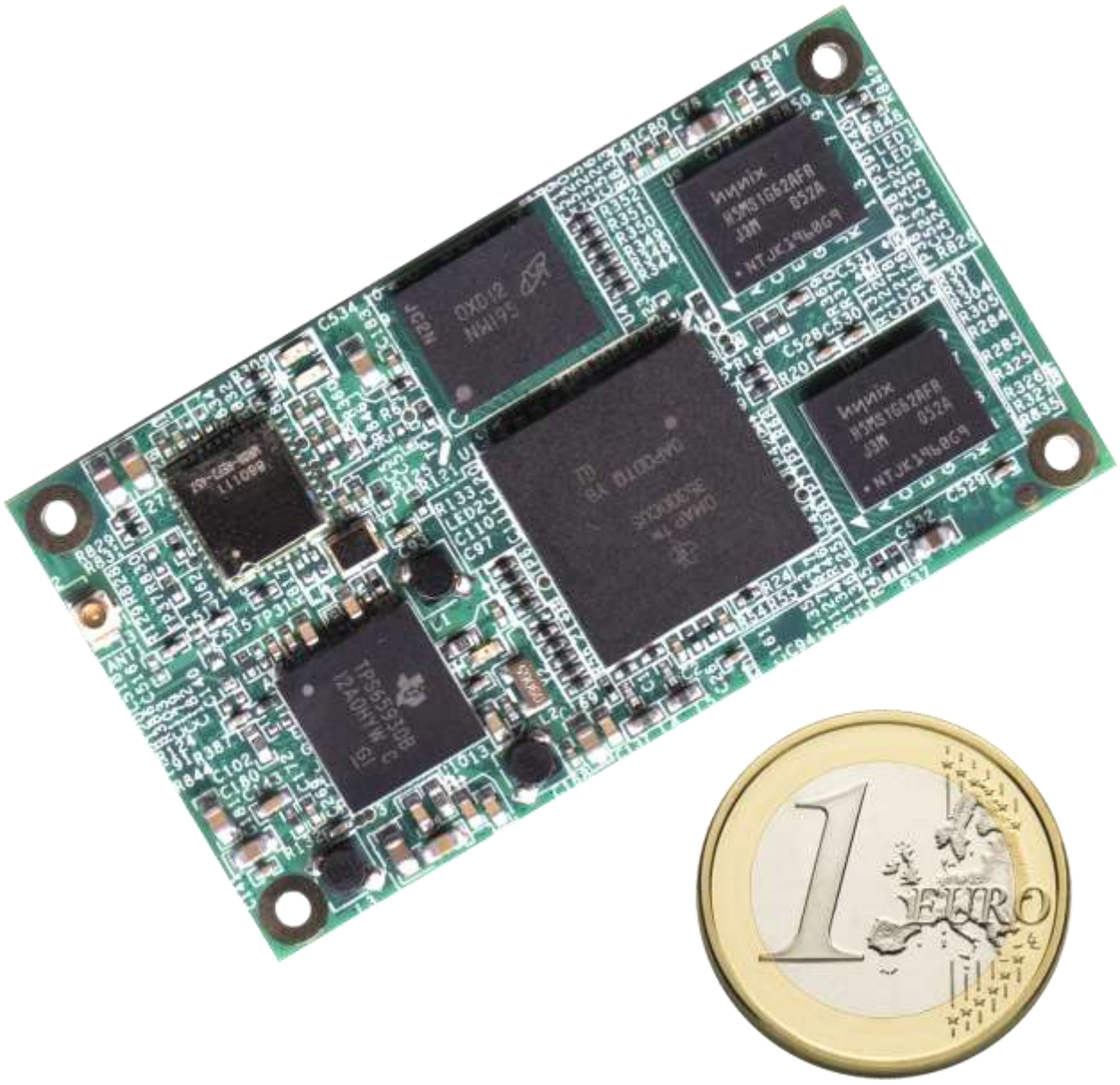
TechNexion

1/17/2012



SOM

TAO-3530 System on Module

TechNexion

TAO-3530

TAO-3530 System on Module

and its Baseboards

User's Guide

Rev 0.96

1 Contents

2 Care and maintenance

2.1 General

Your device is a product of superior design and craftsmanship and should be treated with care. The following suggestions will help you.

- Keep the device dry. Precipitation, humidity, and all types of liquids or moisture can contain minerals that will corrode electronic circuits. If your device does get wet, allow it to dry completely.
- Do not use or store the device in dusty, dirty areas. Its moving parts and electronic components can be damaged.
- Do not store the device in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the device in cold areas. When the device returns to its normal temperature, moisture can form inside the device and damage electronic circuit boards.
- Do not attempt to open the device.
- Do not drop, knock, or shake the device. Rough handling can break internal circuit boards and fine mechanics.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the device.
- Do not paint the device. Paint can clog the moving parts and prevent proper operation.
- Unauthorized modifications or attachments could damage the device and may violate regulations governing radio devices.

These suggestions apply equally to your device, battery, charger, or any enhancement. If any device is not working properly, take it to the nearest authorized service facility for service.

2.2 Regulatory information

Disposal of Waste Equipment by Users in Private Household in the European Union

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

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The Compliance of RoHS New Requirement

According to the new requirements in directive 2002/95/EC, DecaBDE is added with specification starting by July 1, 2008 as follows:

Cadmium (Cd)	: Under 100ppm
Lead (Pb)	: Under 1000ppm
Mercury (Hg)	: Under 1000ppm
Hexavalent Chromium (Cr6)	: Under 1000ppm
PBB	: Under 1000ppm
PBDE (include DecaBDE)	: Under 1000ppm

Please confirm and send back, thanks.

RoHS Compliance Statement

We aware the change in this directive and our product can meet this new specification as above.

Company Stamp

We hereby declare that the product is in compliance with the essential requirements and other relevant provisions of European Directive 1999/5/EC (radio equipment and telecommunications terminal equipment Directive).

Federal Communications Commission (FCC) Unintentional emitter per FCC Part 15

This device 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 or television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and 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 or more of the following measures:

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

WARNING! To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to contact the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by the International Standard for Safety of Information Technology Equipment (IEC 60950).

3 Introduction

The TAO-3530 System on Module (SOM) is a small computer that can be clicked in a baseboard with several IO's to form a full computer. Each base board can be developed with IO's in different places and with different functions. The Idea behind the product is that anyone can develop a base board suitable for their needs and just plug in the SOM. This will make the system very flexible and faster to develop and cheaper than developing a single board solution, because all the hard work is already completed within the SOM module.

Anybody can buy a TAO-3530 and a Baseboard from our website.

The development kits are meant to test your software on the platform. In the same time you can develop your own baseboard with the IO's on the place you need. When your own baseboard is ready, the module can be plugged into your own baseboard to complete the project.

The TAO-3530 system and its baseboards come in different versions, the user's guide is meant as a general guide for all these versions. Pictures and details of the device can differ from the actual purchased product. All specifications are subject to change without notice.

One can always check our website (www.technexion.com) for more details, to download this user guide or to see other information.

4 Get started

4.1 First time use Tsunami baseboard XL (7" LCD)

This guide describes how to put the TAO-3530W module and the Tsunami interface board together, how to connect the LCD and power up the board.

Figure 1: Step 1 -After clicking the module onto the board. Use a small Philips screwdriver and fix the module on the interface board. By doing so you guarantee the connection is firm and solid.

Connecting the 7" LCD touch panel (XL version) to the Tsunami interface board should be done by following the following steps.

Please make sure to gently open/close the connector and handle the FPC connector at the LCD and the LCD panel itself with care.

(Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

Figure 2: Step 2a - Pull the connector, on the topside of the PCB, sideward open with your nail.

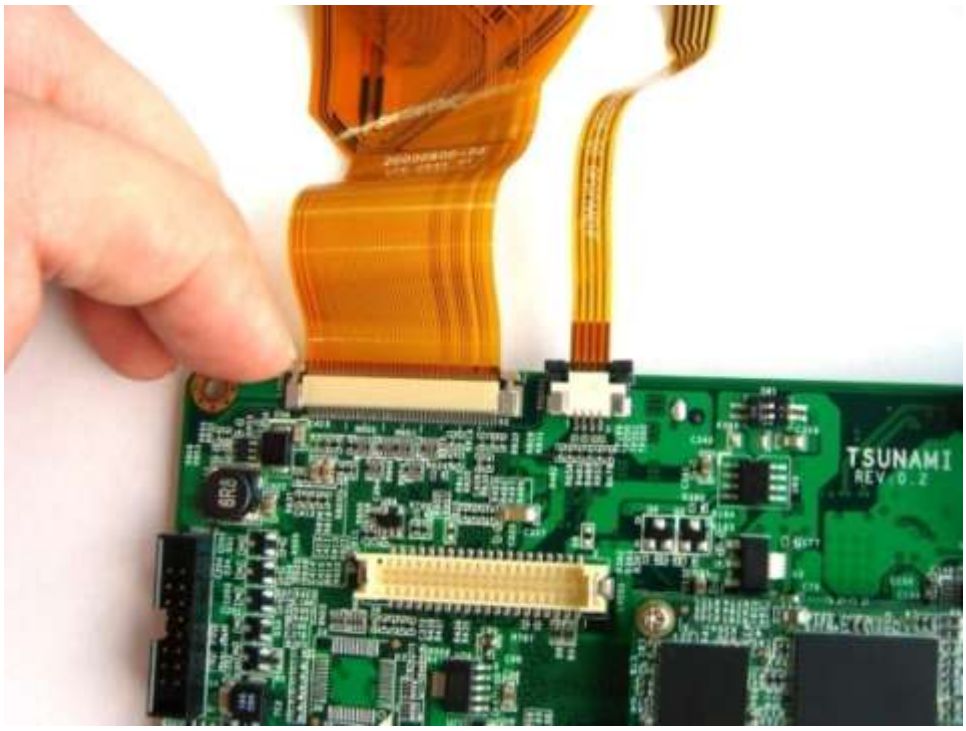


Figure 3: Step 2b - Insert the LCD panel FPC. And push the connector sideways to close

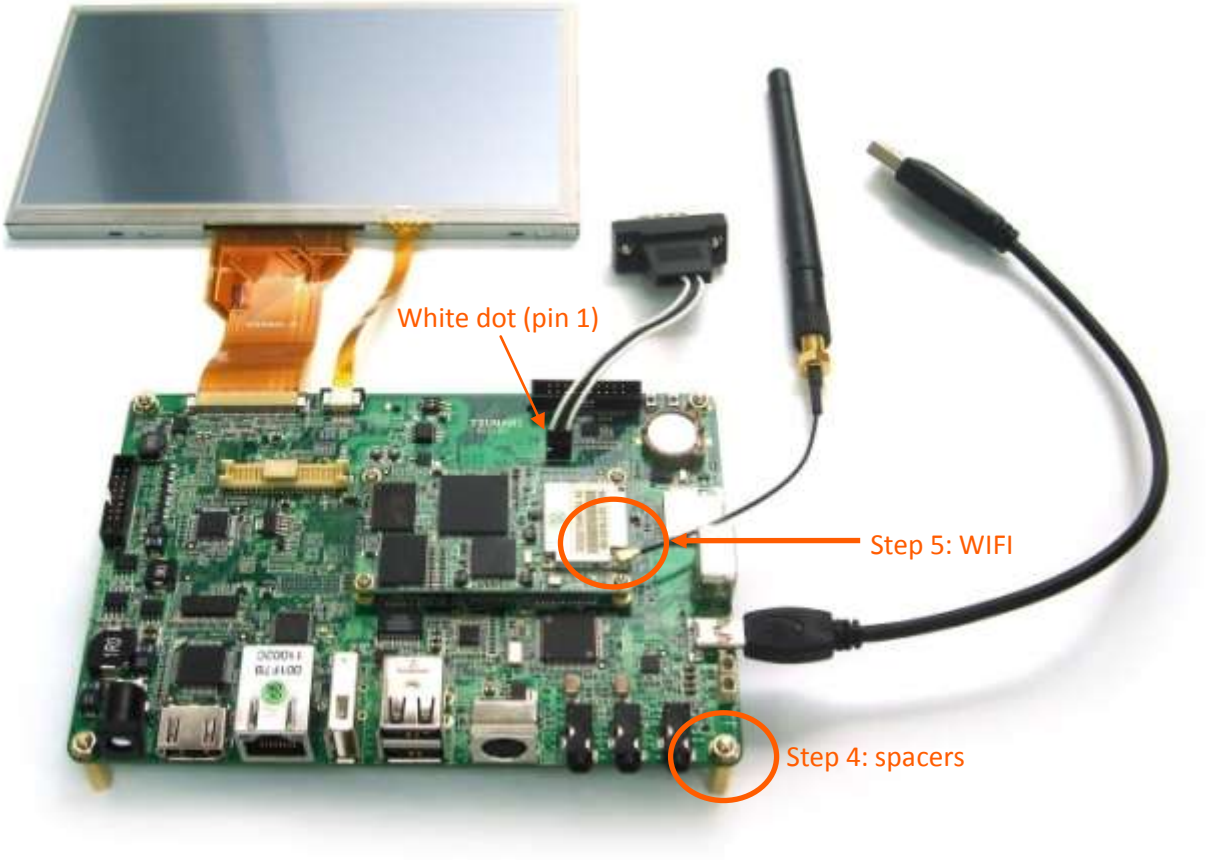


Figure 4: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

Step 3b - Use the USB cable and connect to a USB or computer system. The cable should only be inserted into the USB port shown above. Connect the adapter to power the Tsunami interface board and the LCD. (The power cord is not included in the pack; please get one with a plug that fits your local power outlet)

Step 4 - Use the spacers (stand offs) for a stable placement, to prevent shorts on conducting surfaces and to allow free airflow for cooling.

Step 5 - for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TAO-3530W module.

4.2 First time use Tsunami baseboard (4.3" LCD)

Connecting the 4.3" LCD touch panel (Standard version) to the Tsunami interface board should be done by following the following steps.

Please make sure to gently open/close the connector and handle the FPC connector at the LCD and the LCD panel itself with care.

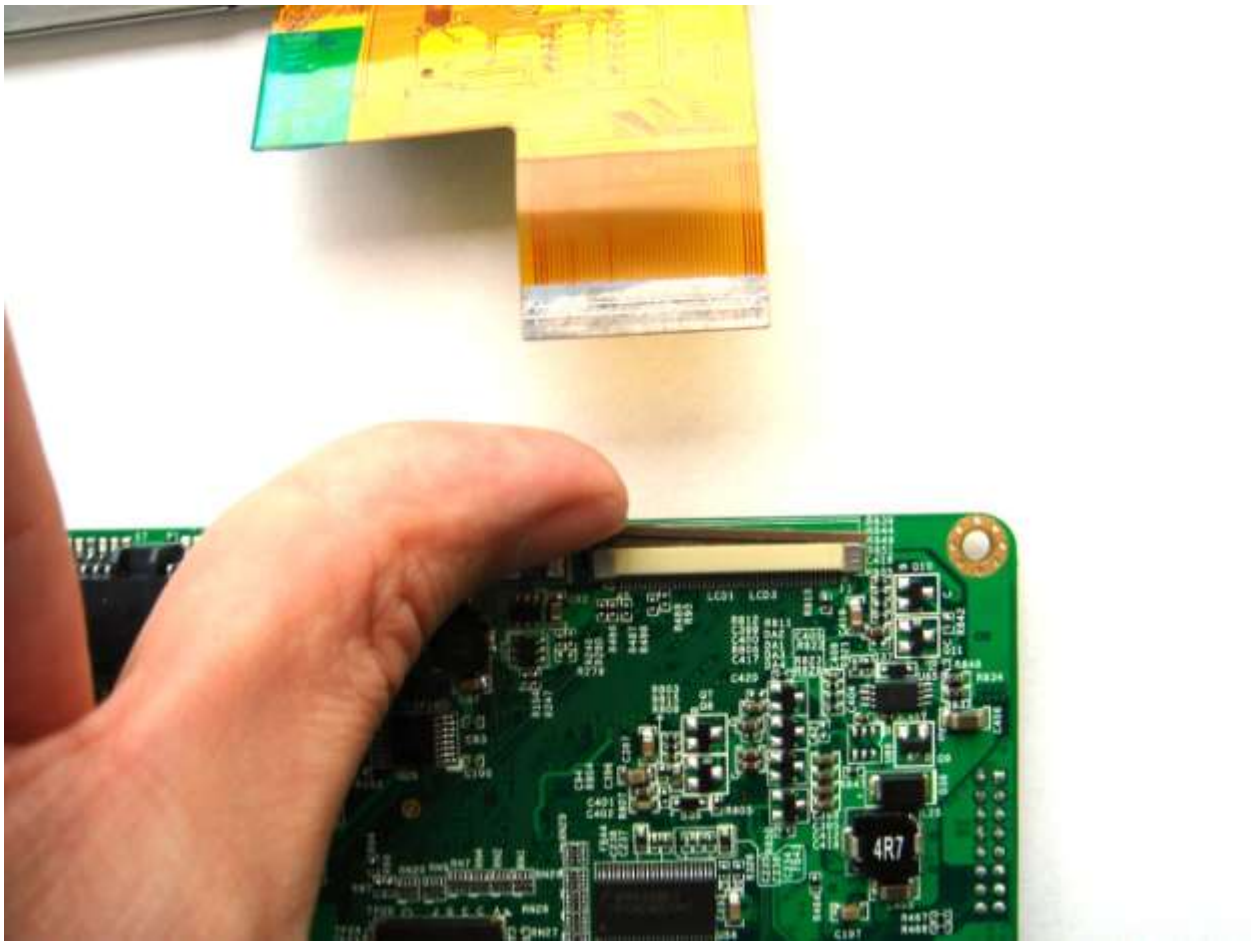


Figure 5: Step 2a - Pull the connector at the bottom side of the Tsunami baseboard sideward open with your nail.

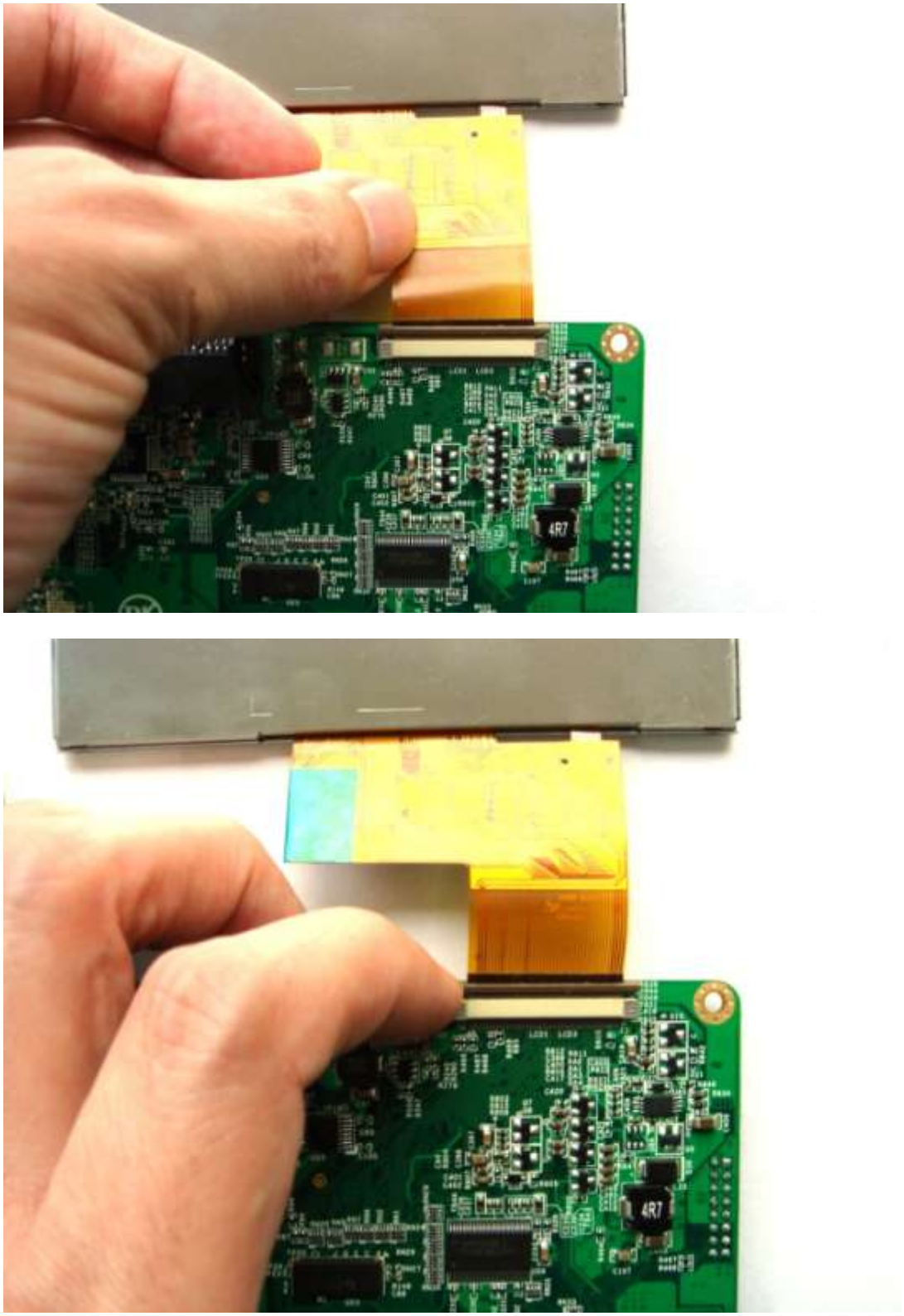


Figure 6: Step 2b - Insert the LCD panel FPC. And push the connector sideways to close

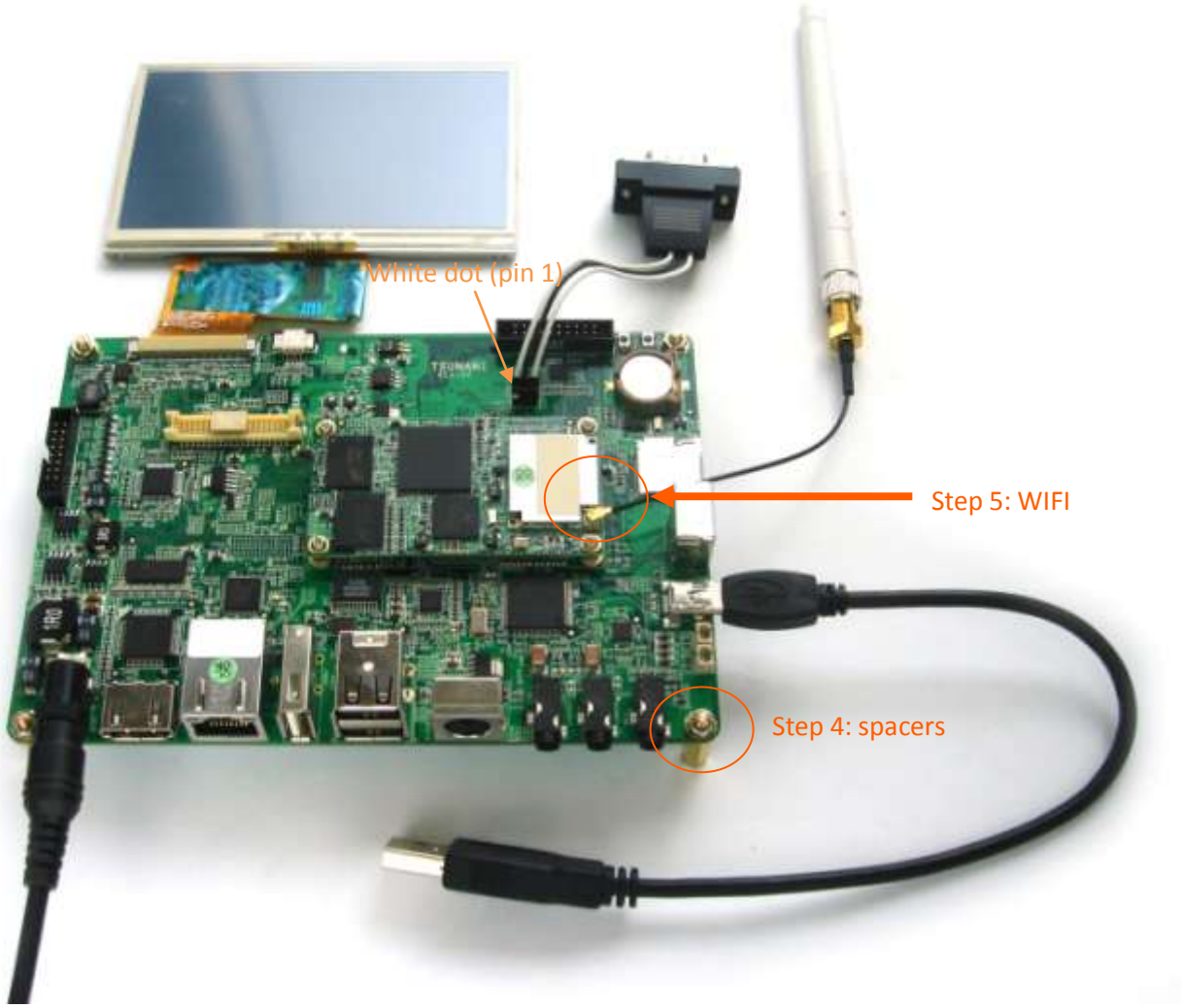


Figure 7: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

Step 3b - Use the USB cable and connect to a USB or computer system. The cable should only be inserted into the USB port shown above. Connect the adapter to power the Tsunami interface board and the LCD. (The power cord is not included in the pack; please get one with a plug that fits your local power outlet)

Step 4 - Use the spacers (stand offs) for a stable placement, to prevent shorts on conducting surfaces and to allow free airflow for cooling.

Step 5 - for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TAO-3530W module.

4.3 First time use Thunder baseboard

This guide describes how to put the TAO-3530W module and the Thunder interface board together, how to connect the LCD and power up the board.

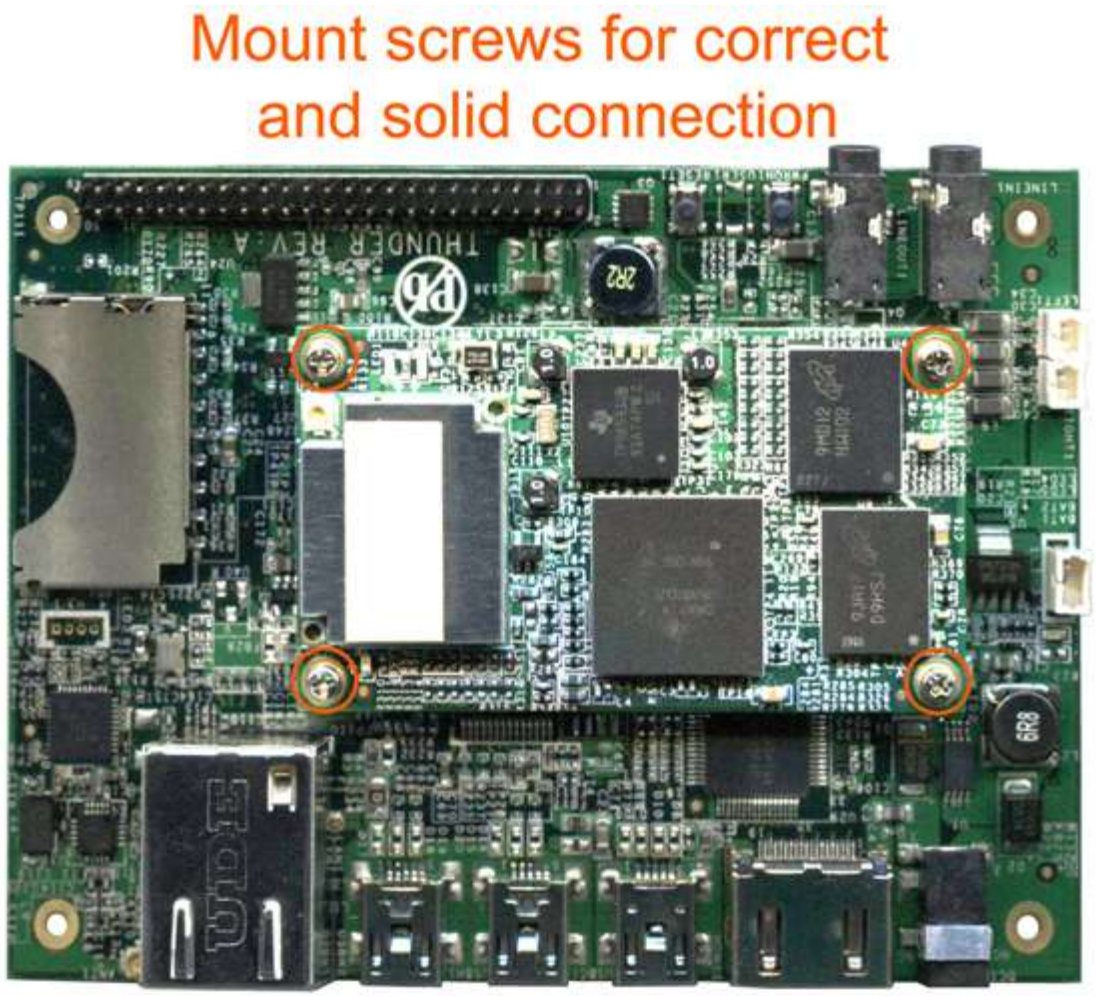


Figure 8: Step 1 - After clicking the module onto the board. Use a small Philips screwdriver and fix the module on the interface board. By doing so you guarantee the connection is firm and solid.

Connecting the LCD touch panel to the thunder interface board should be done by following the following steps.

Please make sure to gently open/close the connector and handle the FPC connector at the LCD and the LCD panel itself with care.

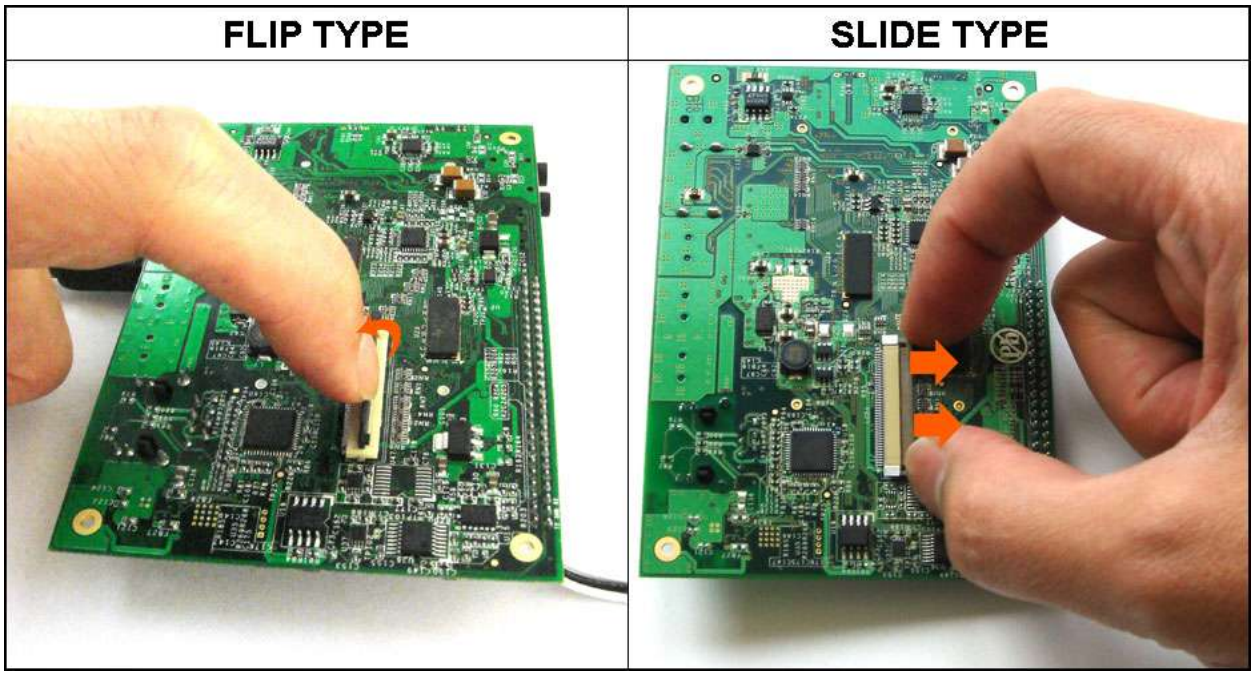


Figure 9: Step 2a - Open the connector with your nail. The black flip-type will stand up in an angle of about 90 degrees. The brown slide-type will open a little more than a millimeter

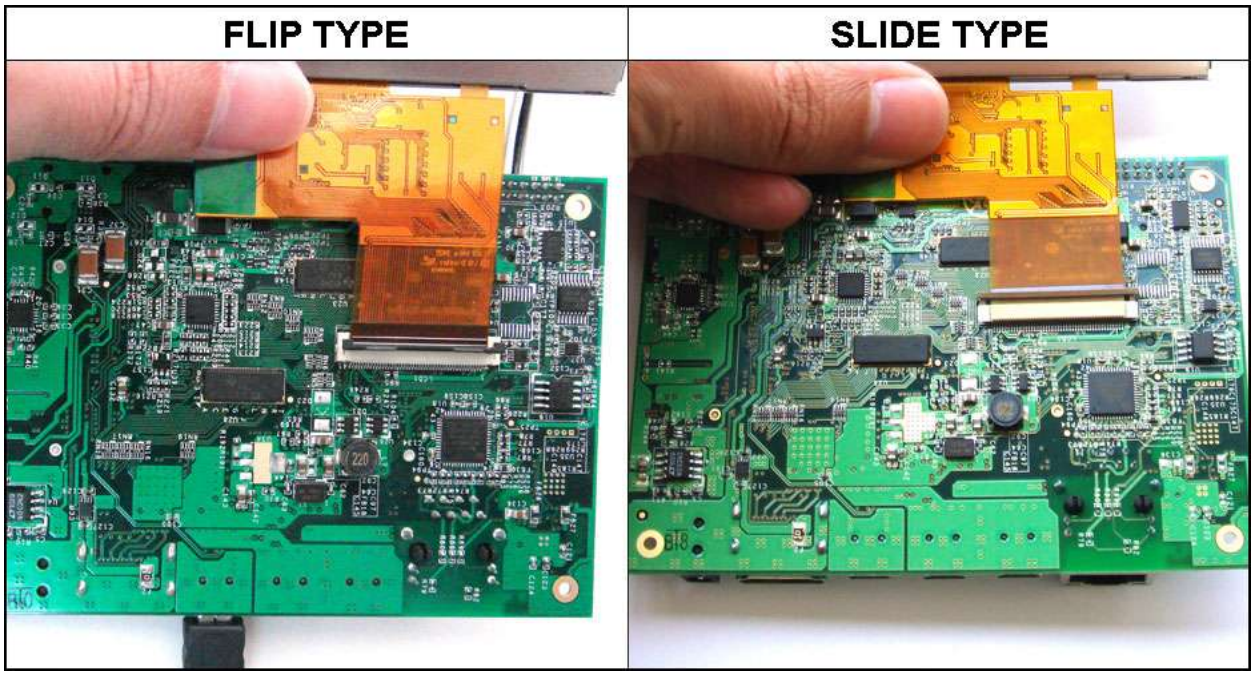


Figure 10: Step 2b - Insert the LCD panel FPC. There are 2 white horizontal lines on the end of the connector. The first line will nearly go into the connector but still remain visible. The line should be parallel to the connector itself.

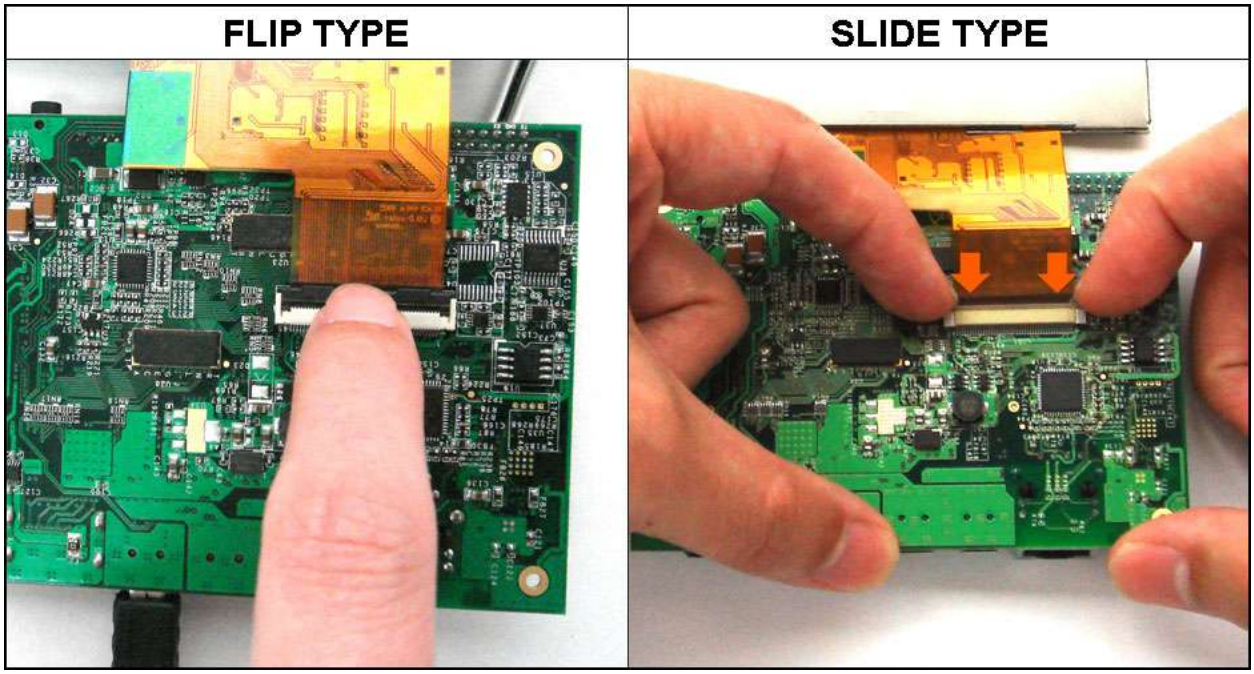


Figure 11: Step 2c - Close the connector to firmly lock the connection and avoid the panel to come loose.

Figure 12: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Outer row of pin header last 3 pins of the connector header). (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

Step 3b - Use the USB cable and connect to a powered USB hub or computer system to power the thunder interface board and the LCD. The cable should only be inserted into the USB port shown above.

Step 4 - Use the spacers (stand offs) for a stable placement, to prevent shorts on conducting surfaces and to allow free airflow for cooling.

Figure 13: Step 5 - for better WIFI reception, connect the antenna to the U.FL (IPEX) connector on the TAO-3530W module.

4.4 First time use Inferno baseboard

This guide describes how to put the TAO-3530 module and the Inferno interface board together and how to connect cables to your development system.

Step 1 - After clicking the module onto the board. Use a small Philips screwdriver and fix the module on the interface board. By doing so you guarantee the connection is firm and solid.

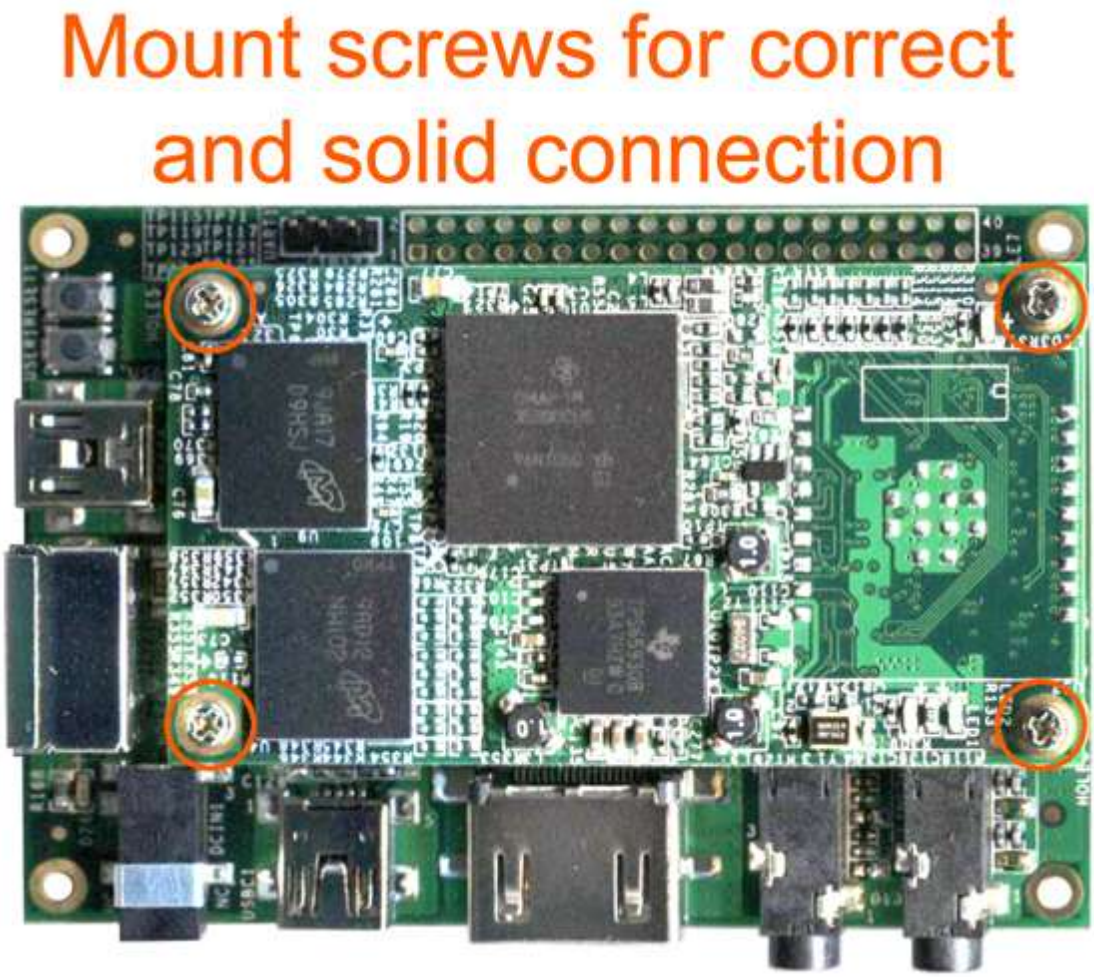


Figure 14: Step 2a - Connect the RS-232 serial console cable as on the picture below. (Outer pin header row last 3 pins of the connector header). (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

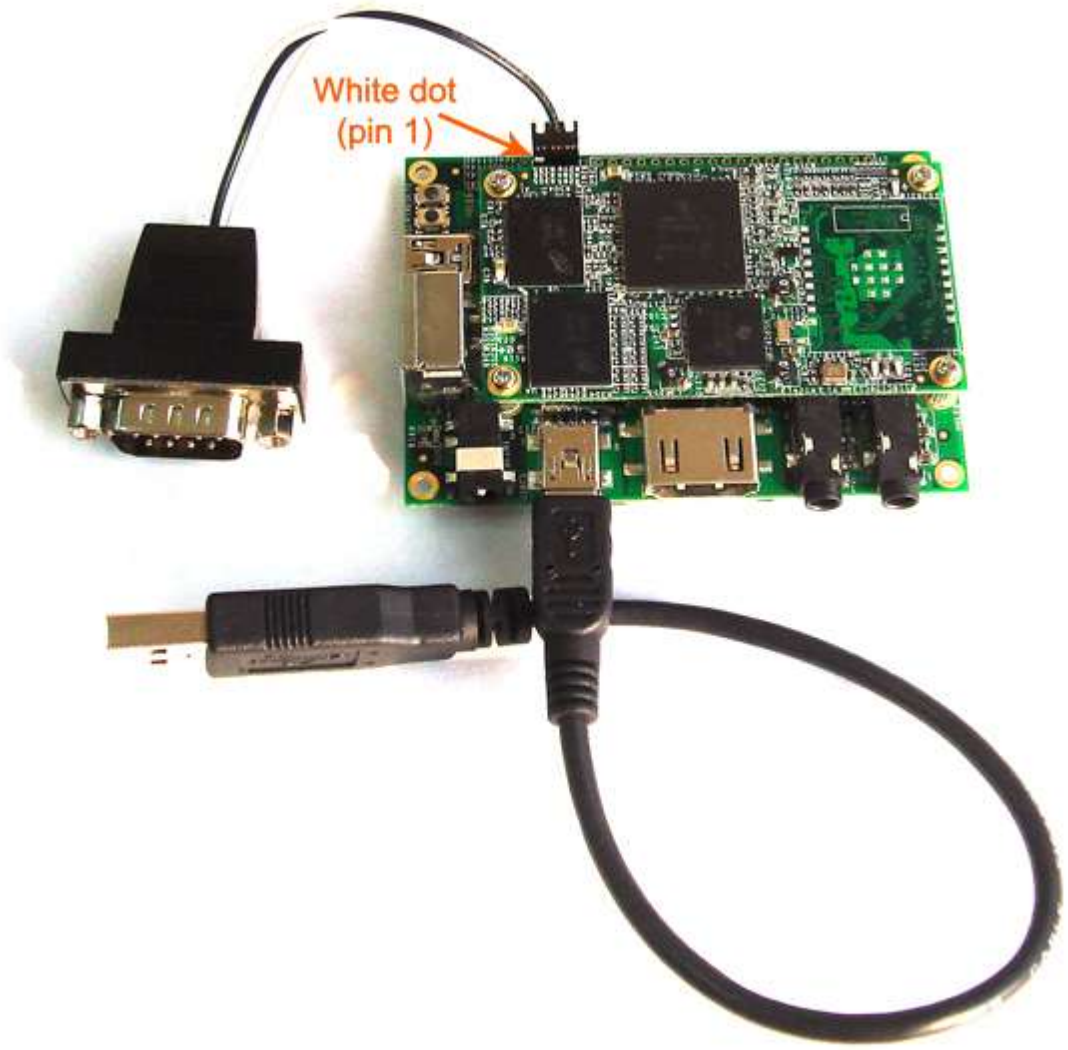


Figure 15: Step 2b - Use the USB cable and connect to a powered USB hub or computer system to power the thunder interface board and the LCD. The cable should only be inserted into the USB port as shown in the photo.

Figure 16: Step 3 - Use the spacers for a stable placement, to prevent shorts on conducting surfaces and to allow free airflow for cooling.

4.5 Explanation of the TAO-3530W System on Module

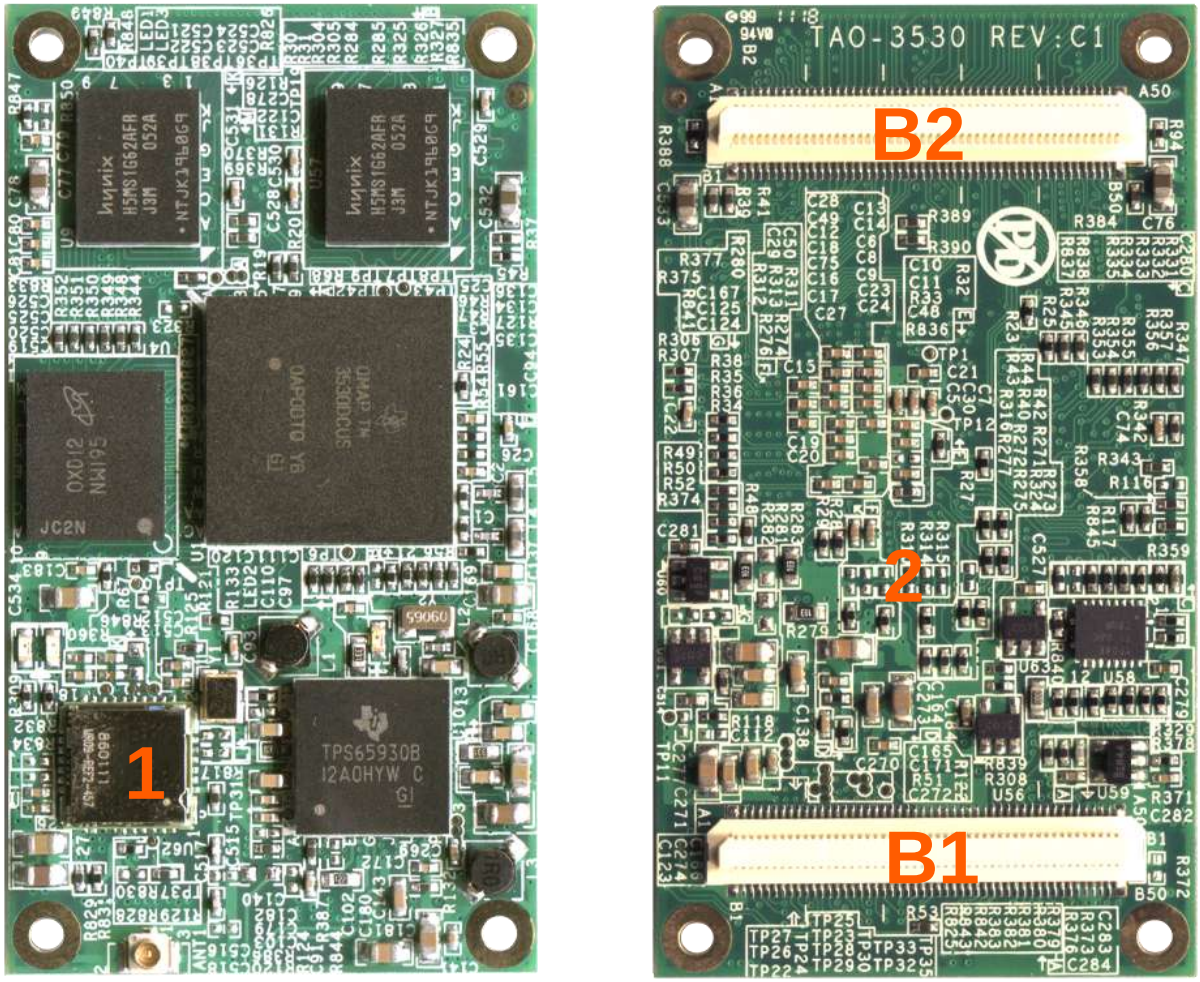


Figure 17: top and bottom view of TAO-3530W with wireless module

Top view

1 Wireless LAN 802.11b/g by SDIO MMC1 interface with IPEX U.FL connector (TAO-3530W = Wireless)

Bottom view

B1 100 pin NAIS connector (Panasonic AXK5S00247YG) (http://www.panasonic-electric-works.com/catalogues/downloads/connectors/en_ds_65305_0000.pdf)

B2 100 pin NAIS connector (Panasonic AXK5S00247YG) (http://www.panasonic-electric-works.com/catalogues/downloads/connectors/en_ds_65305_0000.pdf)

2 JTAG header

4.6 Explanation of the TAO-3530 System on Module

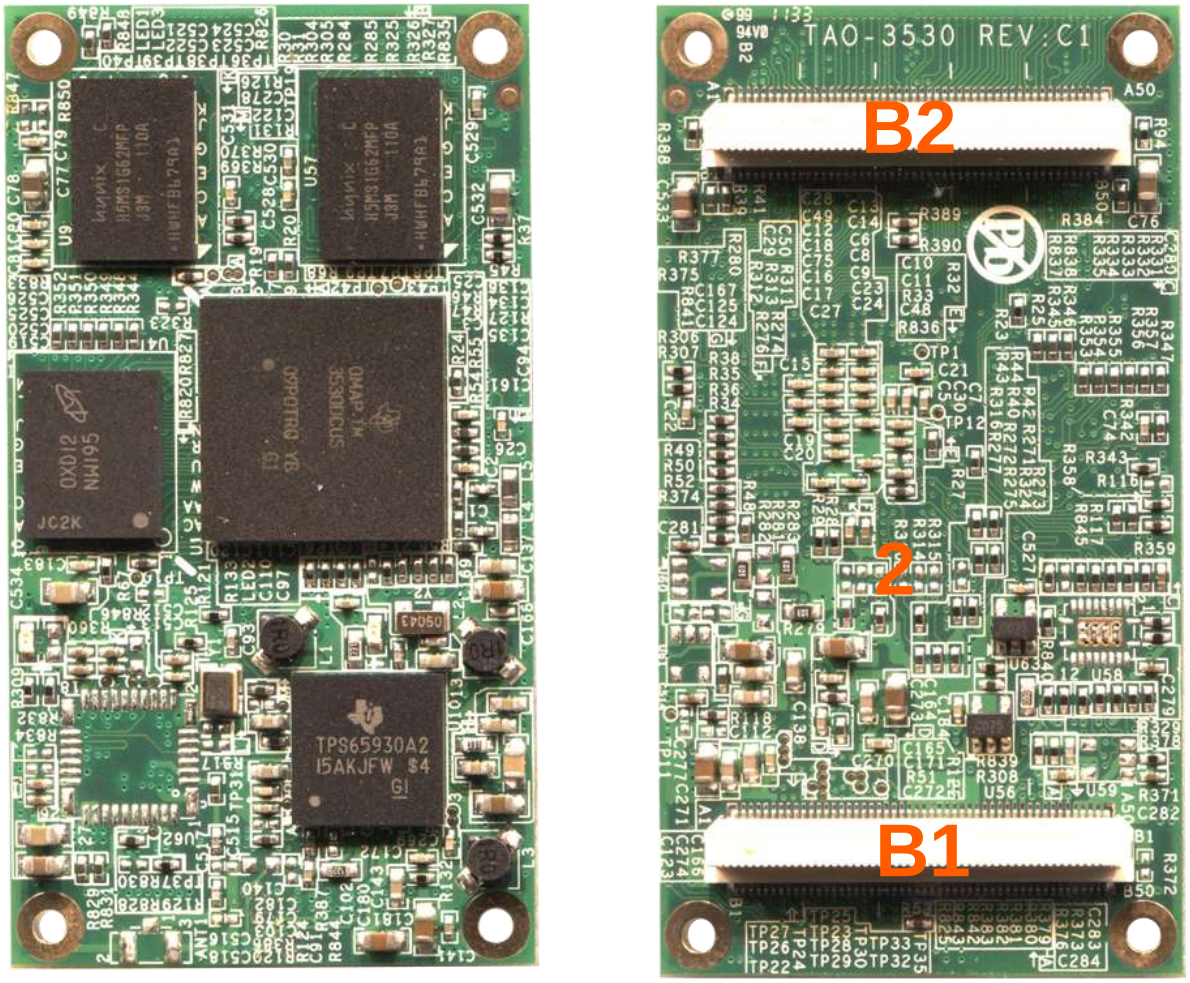


Figure 18: top and bottom view of TAO-3530

Top view

1 -

Bottom view

B1 100 pin NAIS connector (Panasonic AXK5S00247YG) (http://www.panasonic-electric-works.com/catalogues/downloads/connectors/en_ds_65305_0000.pdf)

B2 100 pin NAIS connector (Panasonic AXK5S00247YG) (http://www.panasonic-electric-works.com/catalogues/downloads/connectors/en_ds_65305_0000.pdf)

2 JTAG header

4.7 Explanation of the Tsunami Baseboard

Figure 19: top view Tsunami Baseboard

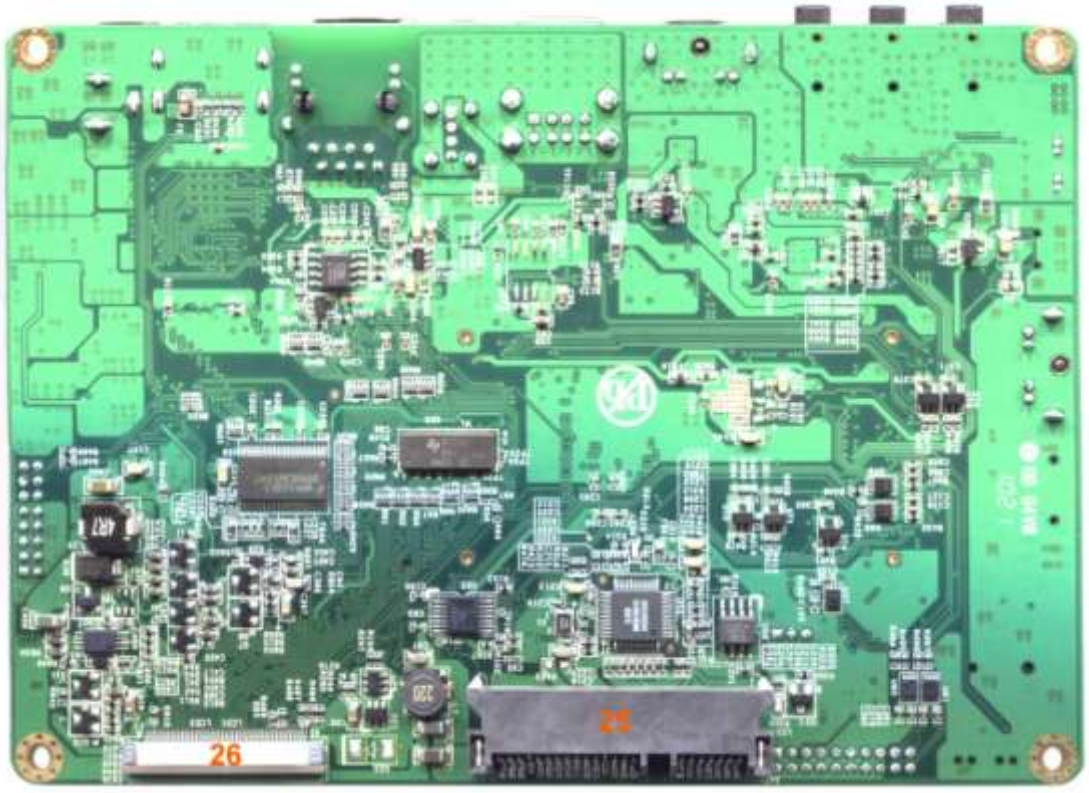


Figure 20: bottom view Tsunami Baseboard

B1 Connector to the TAO-3530 CPU module

B2 Connector to the TAO-3530 CPU module

1 connector for 7" LCD panel

2 Connector for 4 wire touch panel of LCD panel

3 Pin header for front connector

4 Power button

5 User definable button (in Android this can be used as the BACK button)

6 Pin header for RS-232

7 RTC Battery (CR-1220)

8 Mini SD card slot

9 S-video out

10 USG OTG

11 Speaker left

12 Speaker right

13 Microphone

14 Line in

15 Line out

16 S-video in

17 USB HOST (2x)

18 USB HOST (1x)

19 LAN

20 DVI-D by HDMI connector

21 12 V DC Power connector

22 Pin header for VGA connector

23 LVDS connector for LCD panel

24 LVDS Power Select switch

25 SATA connector for a 2.5" hard disk

26 LCD TTL Flat panel connector with touch screen to connect to 4.3 inch LCD panel

4.8 Explanation of the Thunder Baseboard

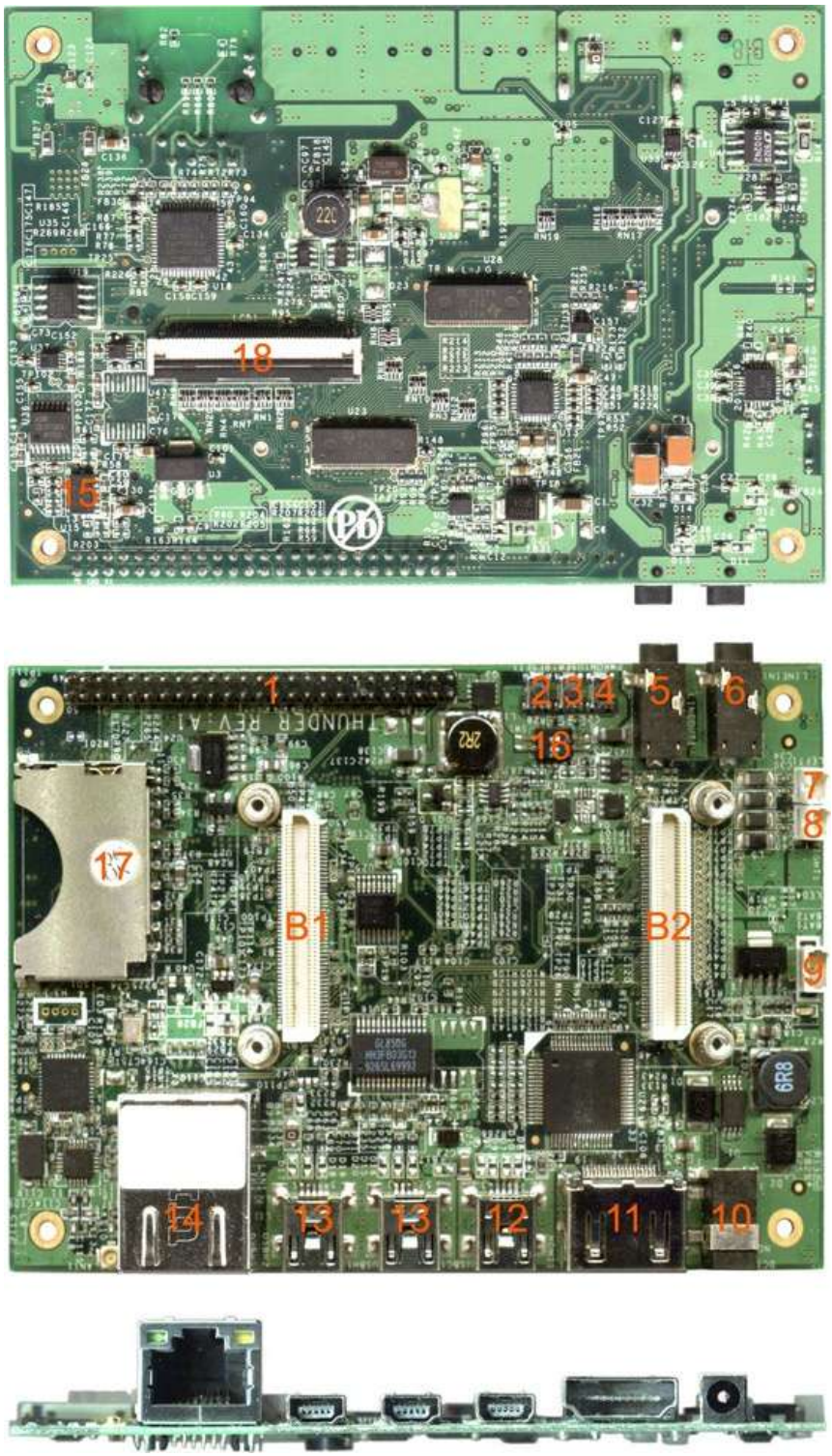


Figure 21: views of the Thunder Baseboard

B1 Connector to the TAO-3530 CPU module

B2 Connector to the TAO-3530 CPU module

1 Expansion header

2 Reset Button

3 User Definable Button

4 Power Button

5 Stereo audio out

6 Audio in

7 Speaker Left

8 Speaker Right

9 Battery interface

10 DC 5V input

11 DVI-D by HDMI connector

12 USG OTG + power functions

13 USB Host

14 RJ-45 LAN

15 3 axis G-Sensor

16 DC / Battery power switch

17 SD Card slot

18 LCD TTL Flat panel connector with touch screen to connect to 4.3 inch LCD panel

4.9 Explanation of the Inferno Baseboard

Figure 22: views of the Inferno Baseboard

B1	Connector to the TAO-3530 CPU module
B2	Connector to the TAO-3530 CPU module
1	Expansion header
2	Audio in
3	Stereo audio out
4	DVI-D by HDMI connector
5	USB OTG + power functions
6	DC 5V input
7	S-Video
8	USB Host
9	User Definable button
10	Reset button
11	Pin header for RS-232
12	SD Card slot

5 Mechanical Dimensions

5.1 Inferno Baseboard dimensions

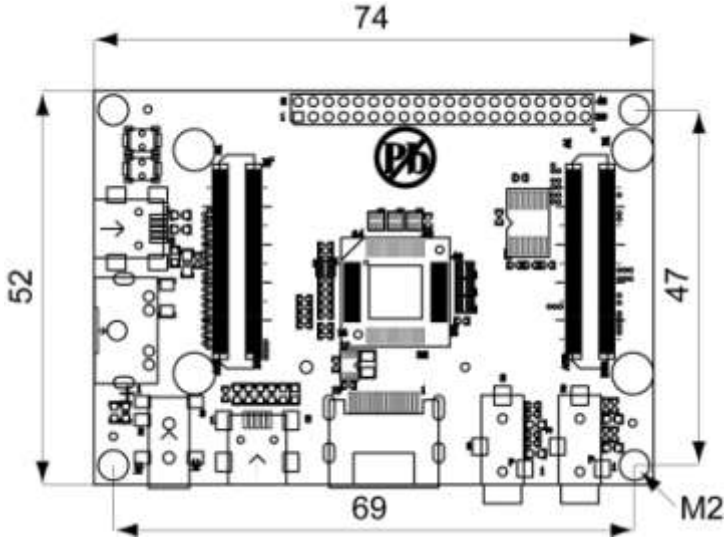


Figure 23: Inferno Baseboard dimensions (Dimensions in mm)

5.2 Thunder Baseboard dimensions

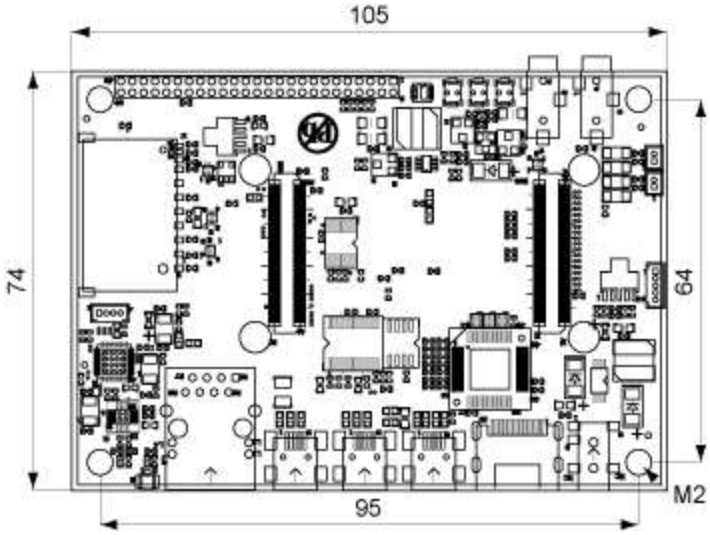


Figure 24: Thunder Baseboard dimensions (Dimensions in mm)

5.3 Tsunami Baseboard dimensions

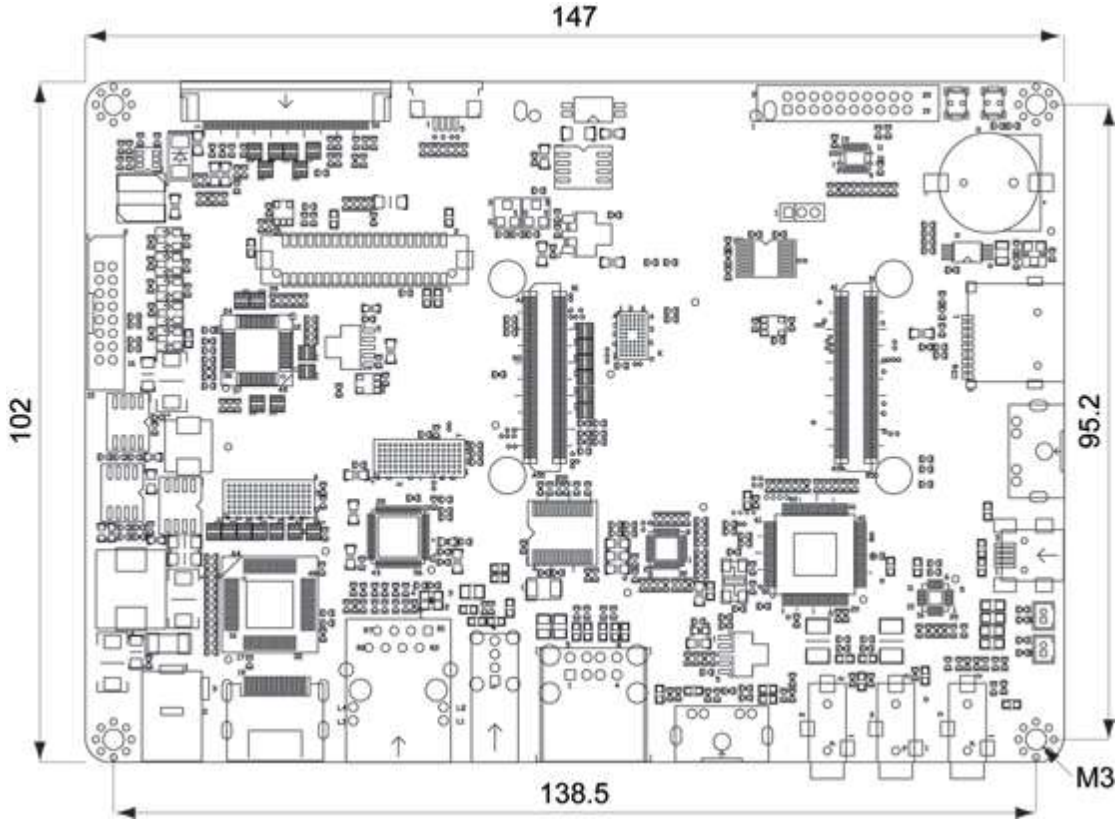


Figure 25: Tsunami Baseboard dimensions (Dimensions in mm)

6 Harddisk placement (Tsunami)

Figure 26: Step1 – Place the 2.5" hard disk in the connector as shown above.

Be careful not to break the connector, for example, when placing the PCB at the table or when taking it of the table. To relief the stress on the connector one can also buy an extension cable at a local electronics store.

7 Downloads and drivers

Downloads and other information can be found at the TechNexion website (www.technexion.com > support > download center)

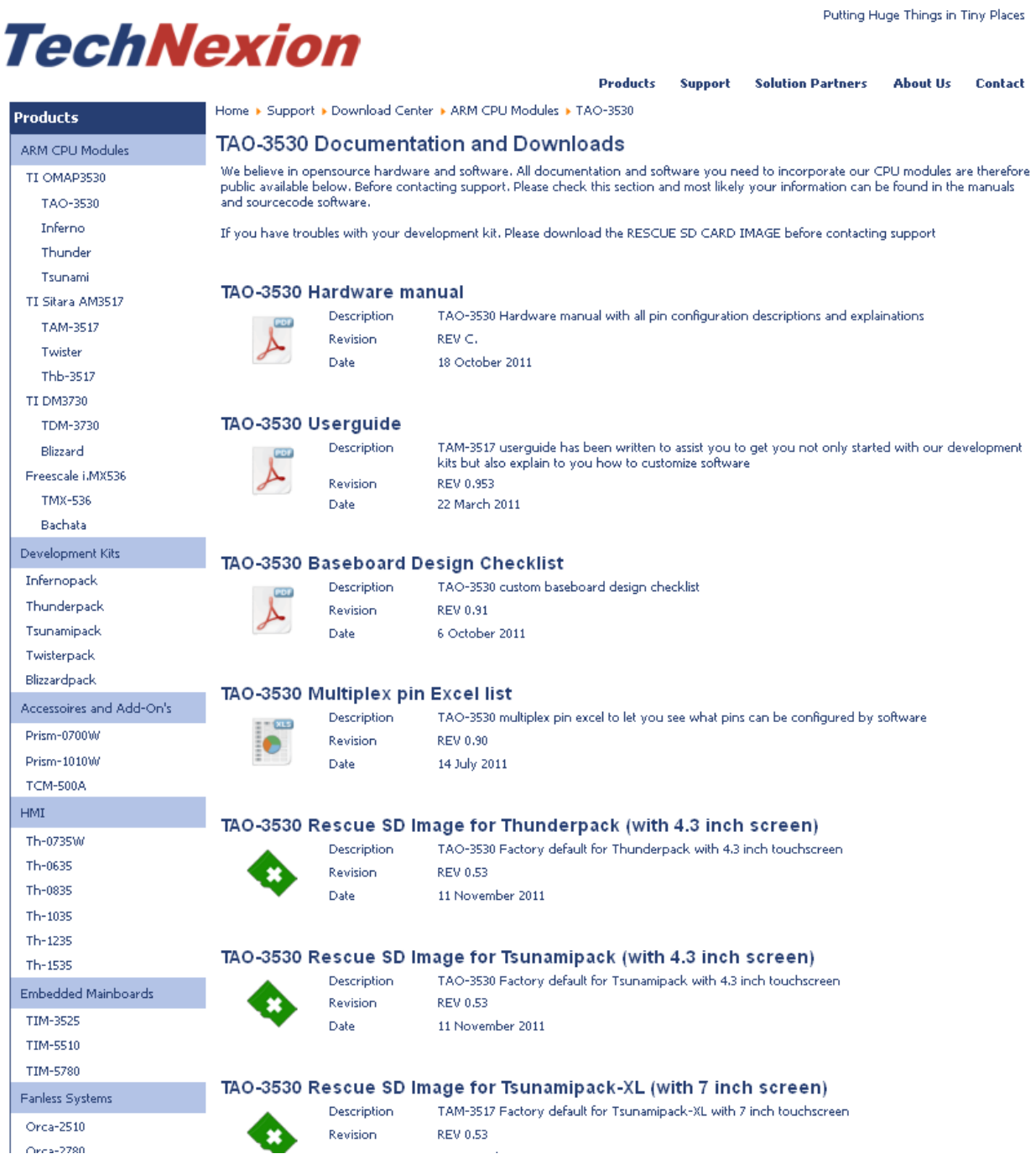


Figure 27: The Download Center at the TechNexion website

8 Software – Factory Default Screen

Figure 28: Factory Default Home Screen

All new development kits will show the Factory default Home Screen. We advise to make a Rescue-SD card by pressing the  icon. Please store this in a safe place, so restoring to the factory default is always possible.

In case the development kit does not have the factory default screen or the rescue-SD, is lost, then the rescue SD-card can always be created by downloading the rescue-SD image from the download center (see paragraph 8.4)

8.1 Automatic check for updates

The software is downloaded from the TechNexion servers to ensure you always have the most recent software.

The factory default screen will check automatically if it needs to be updated. The version number is shown in the bottom right corner. If the square is red it needs to check the server. When an update to the default screen is available it will prompt "new version available", please press the "Update" button.

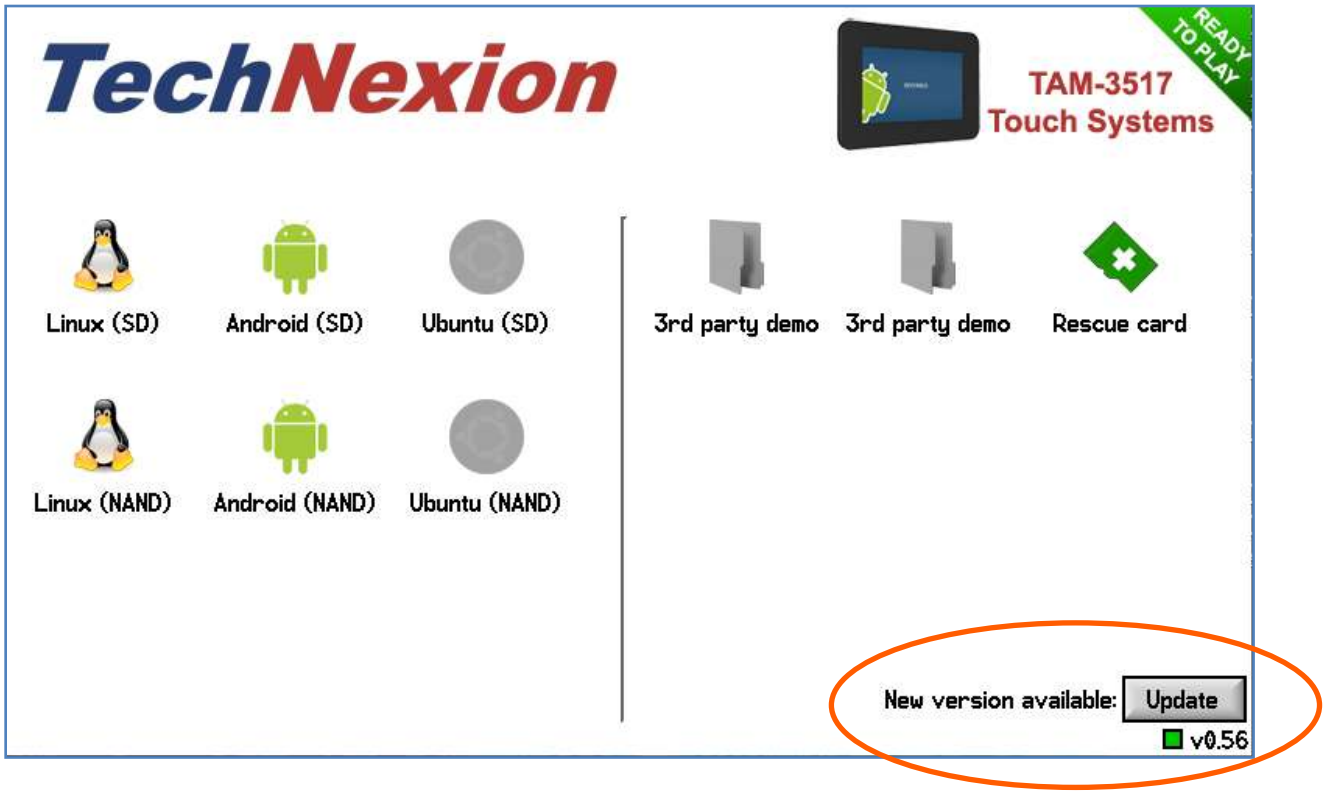


Figure 29 : the location of the factory default screen update button

8.2 Installing Linux

To install for example Linux; just press the Linux icon (make sure you are connected to the internet (with a LAN cable and DHCP) and insert an empty SD-card).

- "Linux (SD)" will make a SD-bootable card.
- "Linux (NAND)" will install in NAND Flash via the SD-card.

8.3 Installing Android

To install for example Android; just press the Android icon (make sure you are connected to the internet (with a LAN cable and DHCP) and insert an empty SD-card).

- "Android (SD)" will make a SD-bootable card.
- "Android (NAND)" will install in NAND Flash via the SD-card.

8.4 What to do if your development kit does not have the factory default screen

In case the development kit does not have the factory default screen or the rescue-SD, is lost, then the rescue SD-card can always be created by downloading the rescue-SD image from the download center at the TechNexion website (see below). Make sure you choose the correct image depending on the size of the LCD that comes with your development kit.

TAO-3530 Rescue SD Image for Thunderpack (with 4.3 inch screen)

Description	TAO-3530 Factory default for Thunderpack with 4.3 inch touchscreen
Revision	REV 0.53
Date	11 November 2011

TAO-3530 Rescue SD Image for Tsunamipack (with 4.3 inch screen)

Description	TAO-3530 Factory default for Tsunamipack with 4.3 inch touchscreen
Revision	REV 0.53
Date	11 November 2011

TAO-3530 Rescue SD Image for Tsunamipack-XL (with 7 inch screen)

Description	TAM-3517 Factory default for Tsunamipack-XL with 7 inch touchscreen
Revision	REV 0.53
Date	11 November 2011

Figure 30 : the rescue images on the download center. Make sure you choose the correct image.

8.4.1 Create the SD-card with the rescue image in a Windows environment

After downloading the rescue-image for your baseboard; extract it on your Windows computer

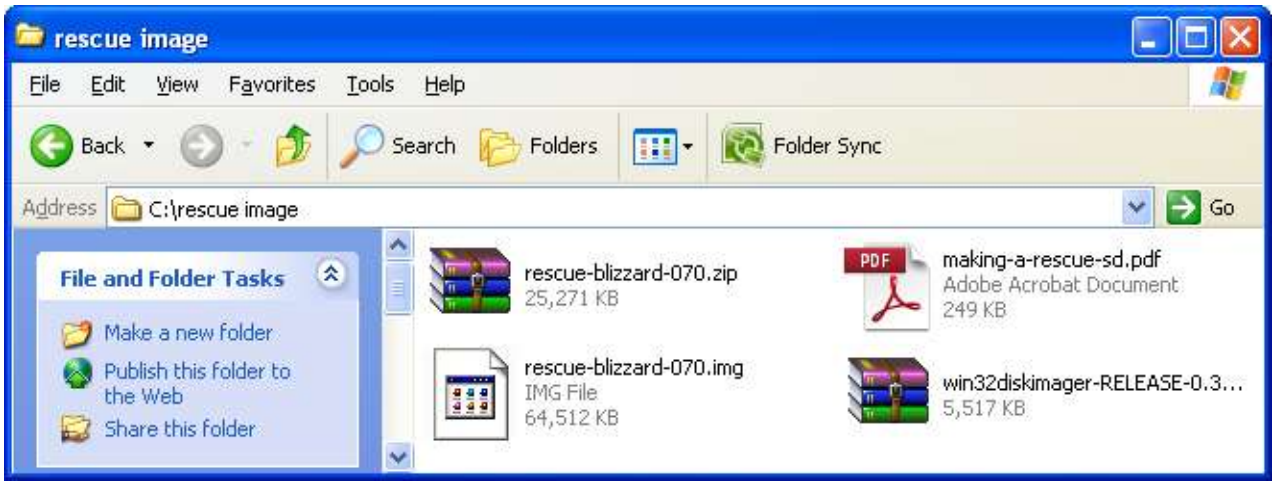


Figure 31: Extracted files

Content of the zip-file:	Explanation
Making-a rescue-sd.pdf	This PDF document
Win32diskimager-release-0.3	Utility to write the image on a SD-card
Rescue-tsunami-070.img	Rescue image for Baseboard with 7" LCD

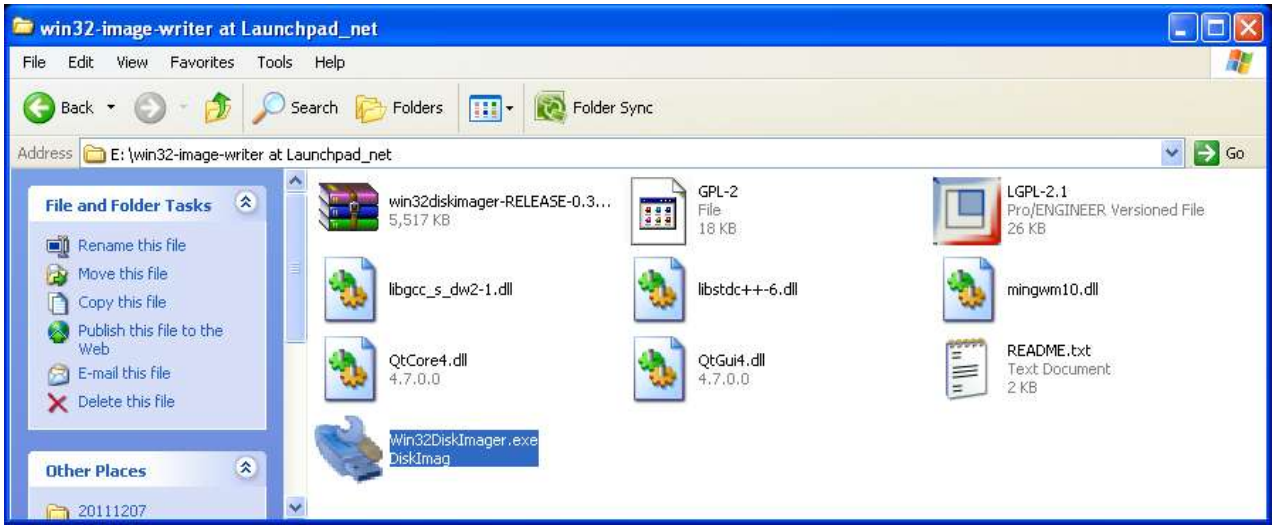


Figure 32: Extract and execute the win32-disk-imager to prepare the rescue image creation

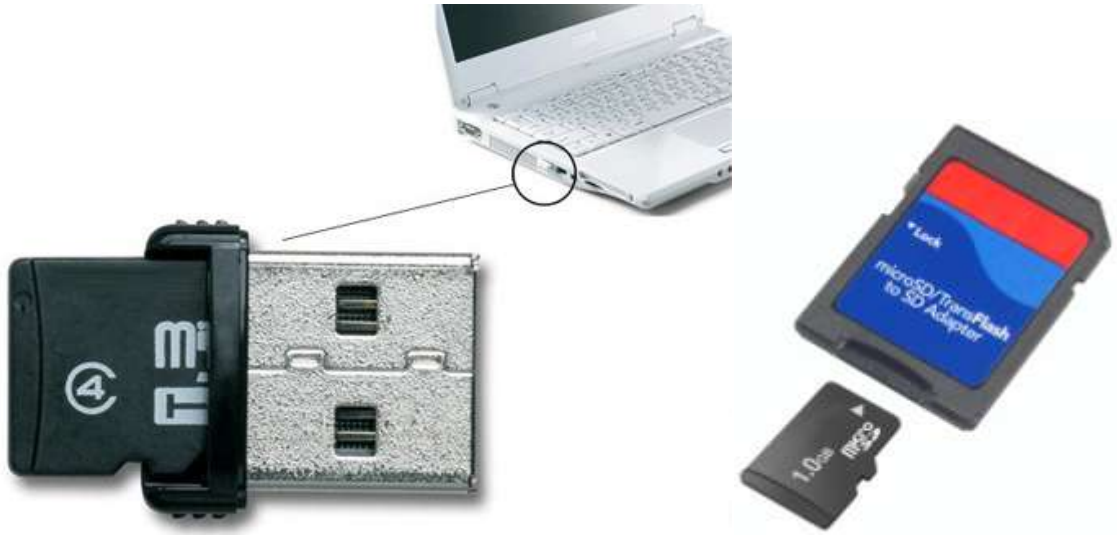


Figure 33: example of converters to plug the Micro-SD in your computer

Figure 34: Select the SD-card (in your computer) as device

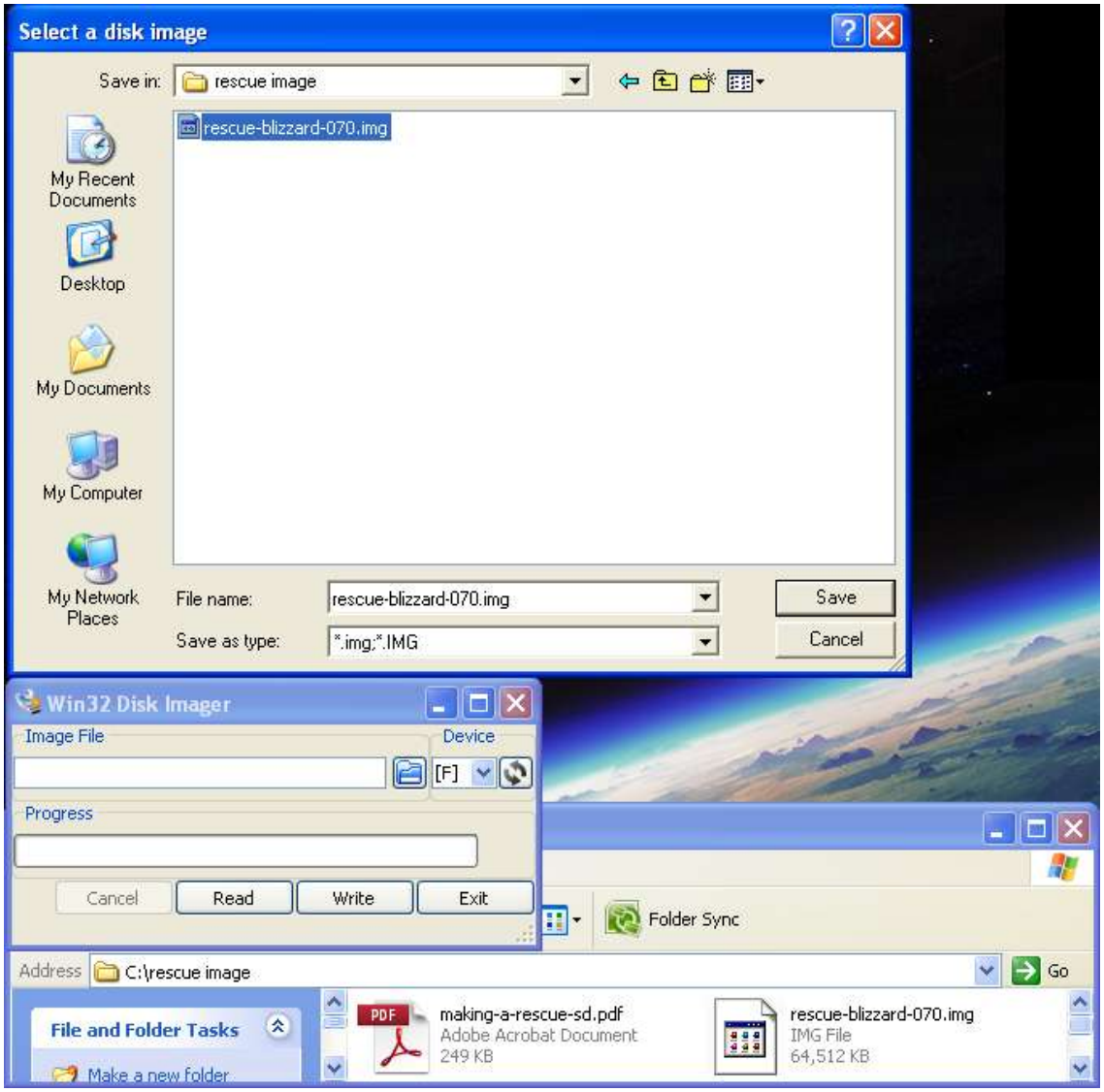


Figure 35: Select, browse and locate the rescue- image file

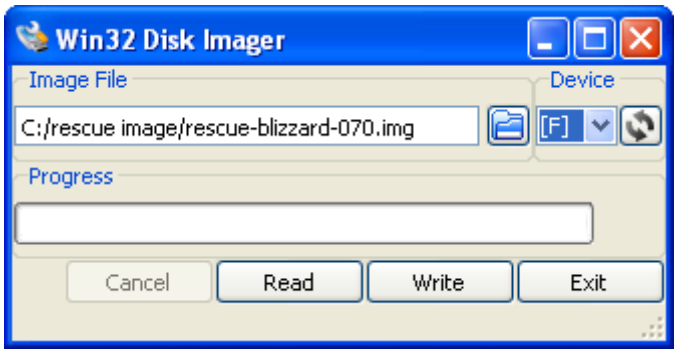


Figure 36: Click the write button to create the rescue-image SD-card

After creating the SD-card on your Windows based Computer, take out the SD-card and proceed to chapter 2 of this guide, to install it on your development kit.

8.4.2 Create the SD-card with the rescue image in a Linux environment

After downloading the rescue-image for your baseboard; extract it on your Linux computer

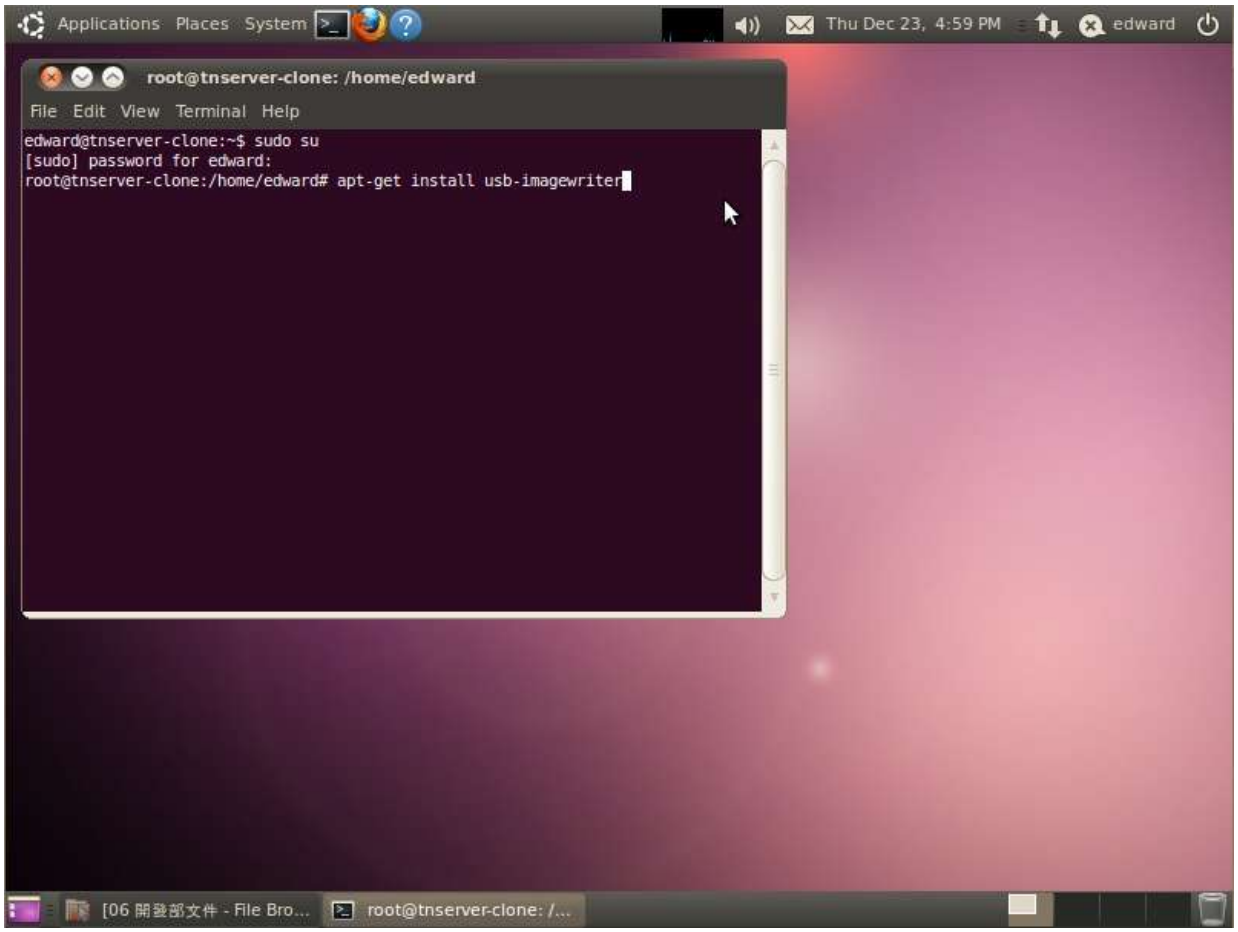


Figure 37: Install the image writer on your Linux computer

Install the image writer:

```
# apt-get install usb-imagewriter
```

Figure 38: Start image writer (Applications>accessories>imagewriter)

Figure 39: Select the downloaded image and destination (SD-card in your computer), click write to device

Figure 40: Press the "OK" button to confirm

8.4.3 Installing the rescue image on the baseboard with the SD-card

Notice! The following procedure can take up to **5 minutes** to complete.

Insert the newly created SD-card in your development kit and connect the power. The following screens will appear and complete the installation of the rescue-software automatically (See Figure 41 to Figure 44).

Notice! If your image does not run automatically, please do the following:

1. Disconnect the power to the board
2. Press the "User1" button and keep it pressed
3. Reapply the power to the board
4. Keep "User1' button pressed for 10 seconds

Figure 41: Installing the rescue image (factory default)

Figure 42: Installing the rescue image – Copying files

Figure 43: Installing the rescue image – Synchronizing File System

Figure 44: Installation complete - Take out the SD card and reboot.

8.4.4 Factory Default Home Screen

Figure 45: Factory Default Home Screen

The installation of the rescue-image is finished and the development kit will show the Factory default Home Screen.

9 Connecting a null modem cable

Warning! Installing software is not easy. Finish the procedure completely and be patient to let the compilation and installation finish.

Important! To install Windows CE or Linux, you need a null modem to see what is going on.

Connecting a null-modem cable

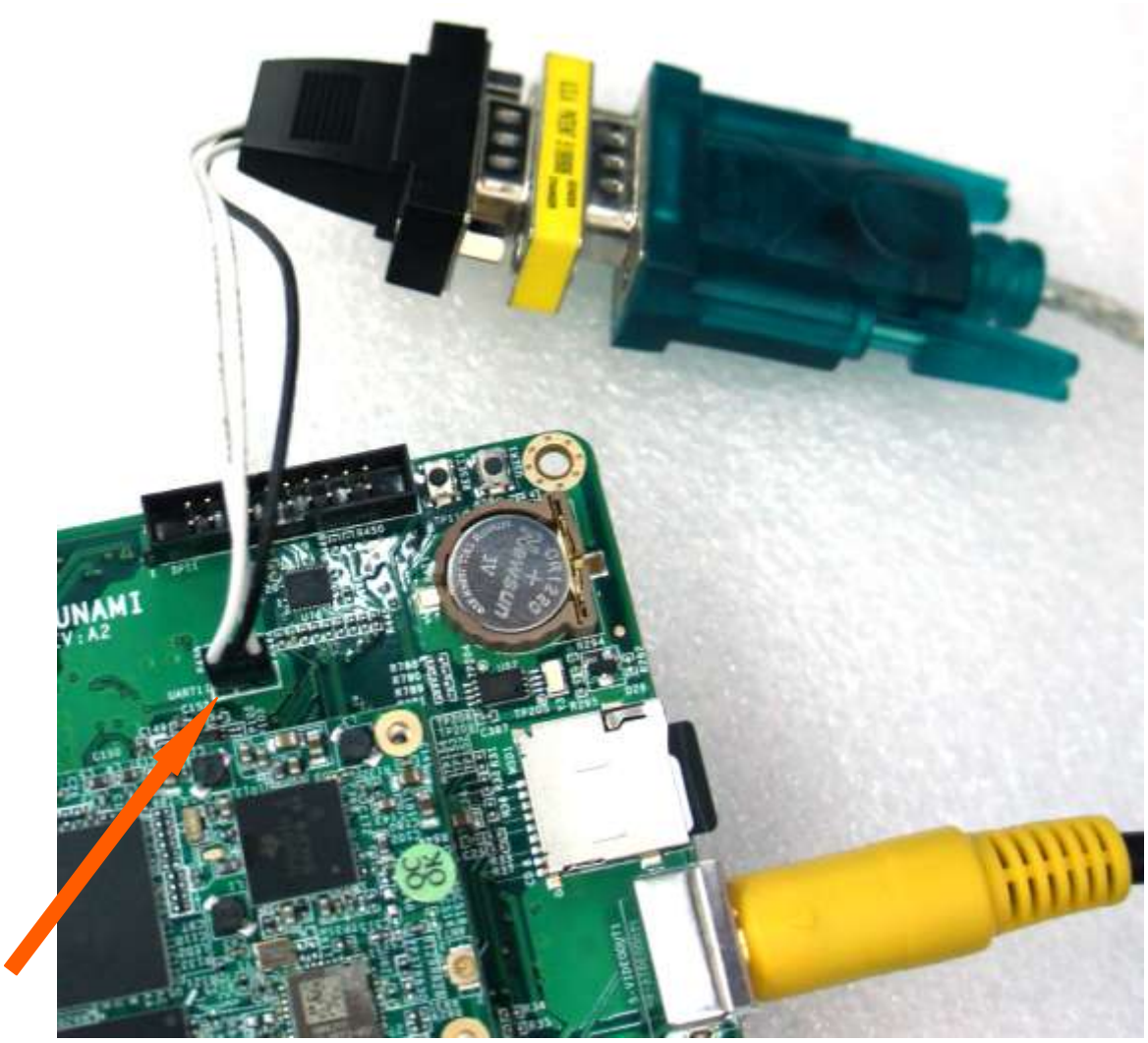


Figure 46: The cable (RS-232 to USB) with yellow mini-gender-changer-block connected to the Debug connector (see orange arrow for position of the white dot)

Figure 47: The cable (RS-232 to USB) with null-modem-block connected to the debug connector (see orange arrow for position of the white dot (note: turned 180 degrees))

Start PuTTY on your computer and make sure the "Options controlling local serial lines" are as Figure 48:

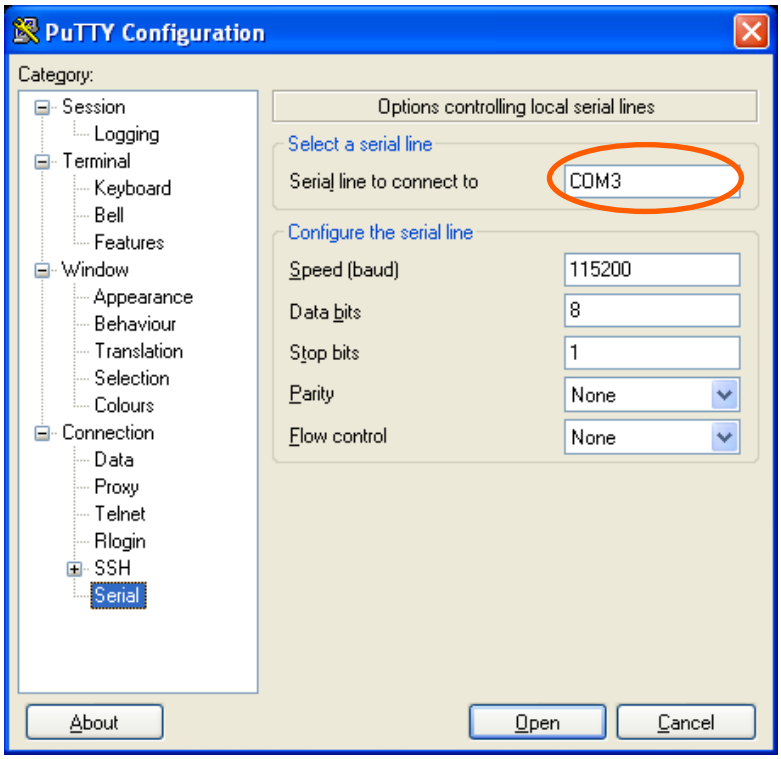


Figure 48: Settings

For computers running a Windows Operating System more steps (see Figure 49 to Figure 51) might be required in order to check which serial line is used (see orange circle in Figure 48):

Figure 49: Right click on "My Computer" and select Properties

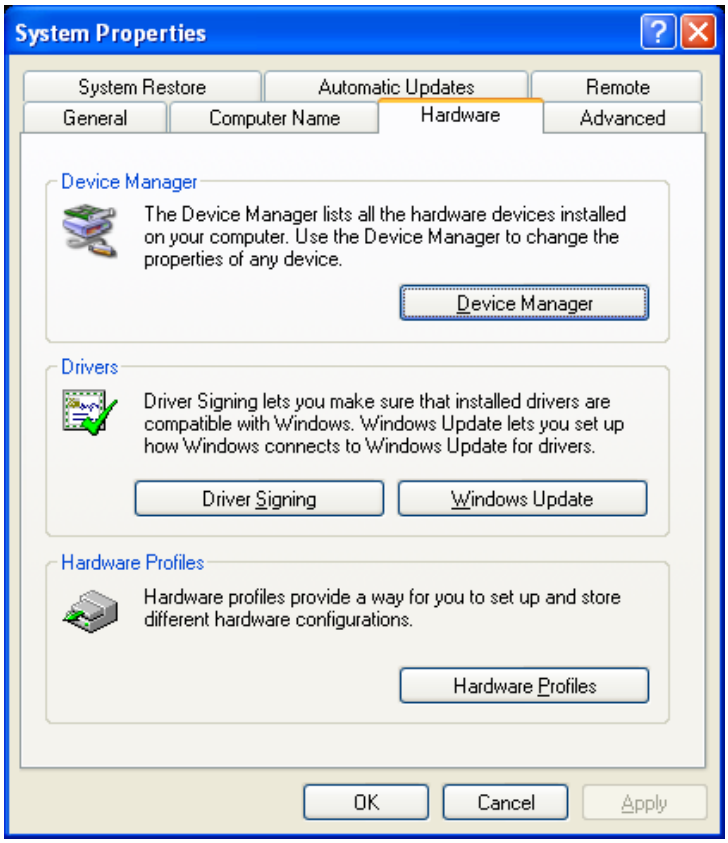


Figure 50: Go to the hardware tab and select "Device manager"

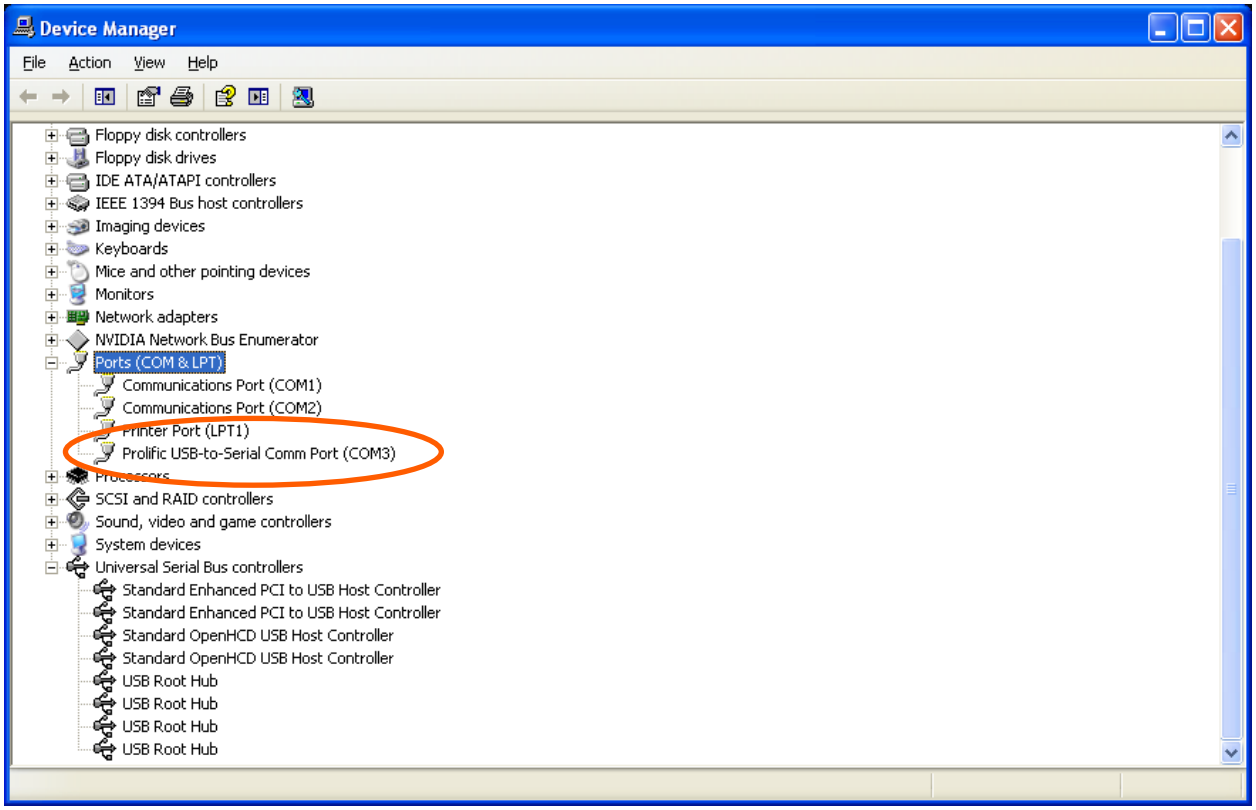


Figure 51: Under Ports (COM & LPT) you will see the baseboard connected with the null modem cable (in this picture COM3), this means in Putty the serial line should be changed into COM3.

- Go to Session and check if "specify the destination you want to connect to " is on Serial (See Figure 52)
- Push open and a window will pop up (see Figure 53)

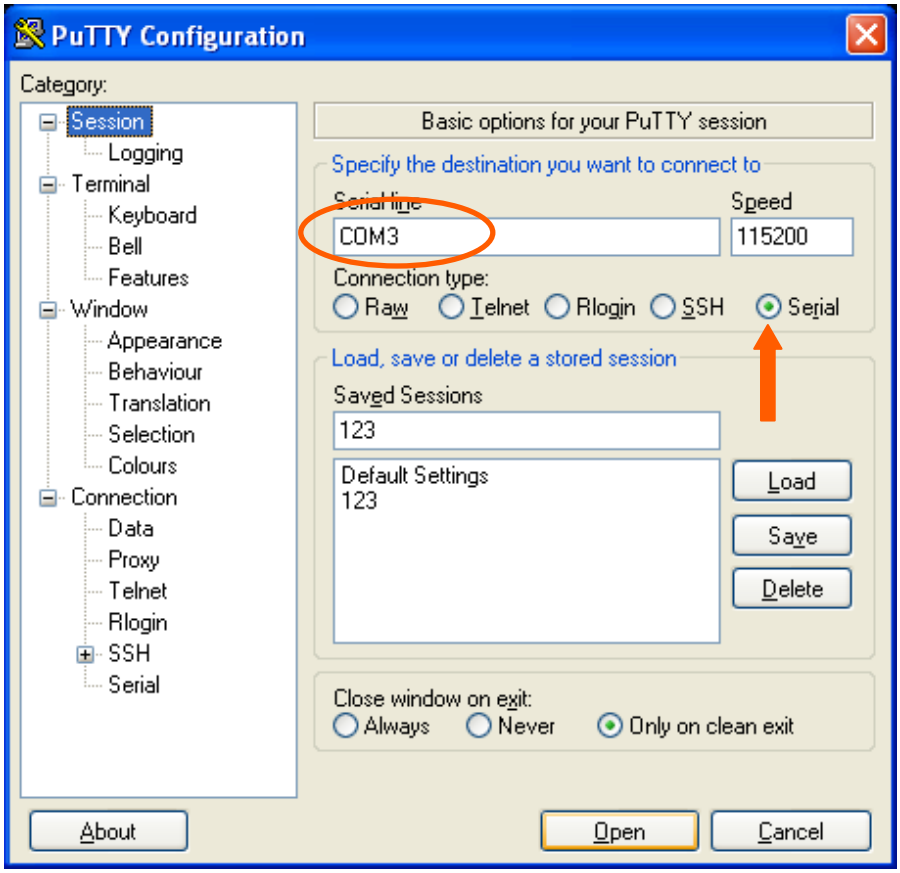


Figure 52: check if serial is selected and then select open

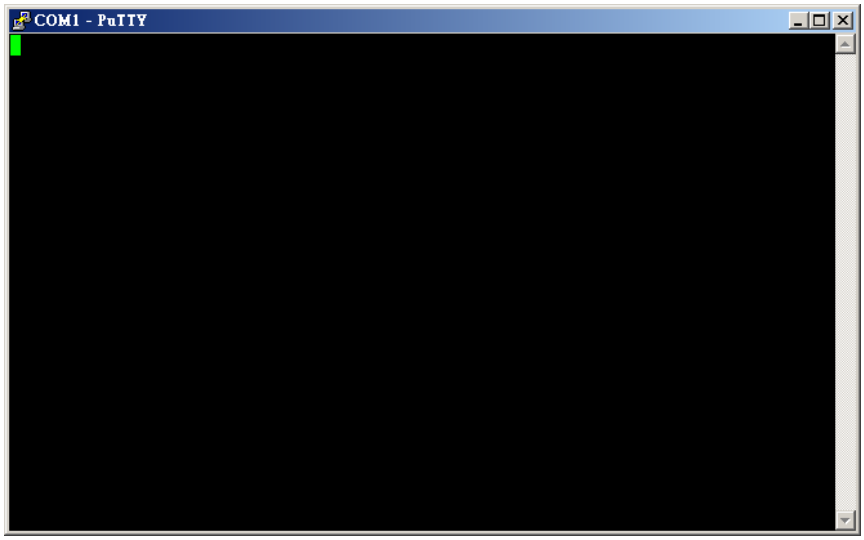


Figure 53: PuTTY terminal window

- You will now be able to see what is going on during the installation.

- If nothing happens then please check the settings and check if the cable is correctly connected to the debug pin header. Sometimes cables are not inverted, which can be solved by turning around the connector to the debug pin header (white dot turns 180 degrees: pin 1 becomes pin 3, pin 3 becomes pin 1).

10 Software – Linux

10.1 Introduction

This Chapter explains how to use Linux and will mostly use a null modem and terminal to issue commands to the board. Technical Software knowledge is required.

For much easier installation of Linux please read the "factory default screen" chapter

Things to know in advance:

- We use Code Sourcery G++ 2010.09-50 (gcc 4.5.1)

  Remember to use cross compile versions of all bintools:

```
export CC=arm-none-linux-gnueabi-gcc
export AS=arm-none-linux-gnueabi-as
export CPP=arm-none-linux-gnueabi-cpp
etc.
```

- It is recommended to use a PC with a Linux environment (for example: Ubuntu, Fedora)

- *U-boot#*: Refers to commands executed under U-boot
- *devkit#*: Refers to commands executed under TAO-3530 Linux
- *Host#*: Refers to commands executed at PC

10.1 Quick install guide for installing a cross-compiler.

1. Choose your cross compiler.

TechNexion engineering uses CodeSourcery C++ Lite 2010.09-50:

https://sourcery.mentor.com/sgpp/lite/arm/portal/release1600

Other versions can work too: CodeSourcery C++ Lite 2009q1 is a popular version in the community.

2. Once installed, add the bin folder of the toolchain to your PATH

If your toolchain is installed in /opt/arm-2010.09, you should add /opt/arm-2010.09/bin/ to PATH

i.e:

```
PATH=/usr/bin:/bin:/opt/arm-2010.09/bin:.
```

Note: check that you added the right bin folder: do not add '/opt/arm-2010.09/arm-none-linux-gnueabi/bin/' !

3. Set your CROSS_COMPILE variable to the ABI prefix:

```
CROSS_COMPILE=arm-none-linux-gnueabi-
```

(or 'CROSS_COMPILE=ccache arm-none-linux-gnueabi' if ccache is used)

4. Set the architecture variable to arm: ARCH=arm

Both ARCH and CROSS_COMPILE can be set compile time, but it is often easier to set them once in the working shell.

10.2 XUKR build instructions

(From the XUKR-20120103 for TDM3730, TAO3530 and TAM3517 Release candidate)

This file contains build reference for x-loader, u-boot and kernel, and a sample Angstrom Linux root file system / userland.

It is assumed a cross-compiling environment is already set up.

Prebuilt binaries can be found in the prebuilt/ folder.

10.2.1 X-loader

For TAO-3530 based boards, compile using:

```
% make distclean && make tao3530_config && make -j 2
```

Similarly, for TDM-3730 based boards, the command is:

```
% make distclean && make tdm3730_config && make -j 2
```

And for TAM-3517 based boards, the command is:

```
% make distclean && make tam3517_config && make -j 2
```

The resulting binary is named MLO.

10.2.2 U-boot

To set display size, you need to (unfortunately) edit the relevant configuration file. For 4.3" panel, set the define

```
#define TN_PANEL 043
```

in include/configs/tao3530.h

(For tao3530 - for tdm3730 the file is named tdm3730.h etc)

Similarly, for 7" LCD the variable is to be set to

```
#define TN_PANEL 070
```

instead.

For TAO-3530 based boards:

```
% make distclean && make tao3530_config && make -j 2 tao3530
```

For TDM-3730 based boards:

```
% make distclean && make tdm3730_config && make -j 2 tdm3730
```

For TAM-3517 based boards:

```
% make distclean && make tam3517_config && make -j 2 tam3517
```

The resulting binary is named u-boot.bin

For THB based boards the SW3 switch define must be enabled for LCD "detection" to work.

10.2.3 Kernel

The kernel configuration depends on both CPU module, baseboard and display.

For TAO-3530 on a Tsunami baseboard:

```
% make distclean && make tao3530_tsunami_defconfig && make -j 2 uImage && make modules
```

For TAO-3530 on a Thunder baseboard:

```
% make distclean && make tao3530_thunder_defconfig && make -j 2 uImage && make modules
```

For TDM-3730 on a Blizzard baseboard:

```
% make distclean && make tdm3730_blizzard_defconfig && make -j 2 uImage && make modules
```

For TAM-3517 on a Twister baseboard:

```
% make distclean && make tam3517_twister_defconfig && make -j 2 uImage && make modules
```

For TAM-3517 on a THB baseboard:

```
% make distclean && make tam3517_thb_defconfig && make -j 2 uImage && make modules
```

The resulting kernel binary is arch/arm/boot/uImage

10.2.4 Root filesystem

The root filesystem is based on the Angstrom-distribution. There are two things to keep in mind before booting with this:

1. For TAO-3530 the default console is ttyO2 and not ttyO0 – change this in /etc/inittab

2. The wireless kernel module, and the PowerVR modules need to be placed in the /boot folder of the root filesystem.

10.3 Compiling for TAO-3530

While strictly not necessary; the following steps are for getting the most out of your DM3730

Enable floating point using the Neon SIMD DPS by:

```
-mfpu=neon -funsafe-math-optimizations -mfloat-abi=softfp
```

The switch enabling unsafe floating point should be used with care, however it is necessary for gcc to generate Neon instructions (Neon is not 100% compatible with IEEE standards)

Soft-fp ABI switch is to enable FP instructions, but use software emulated fp calling conventions.

The TAO-3530 contains an ARM Cortex A8 core, which supports ARMv7-A instructions

```
-marm -mcpu=cortex-a8 -march=armv7-a
```

Misc flags:

```
-ftree-vectorize
```

is not included in -O2, and allows gcc to auto-generate SIMD code for Neon

All-in-all:

```
arm-none-linux-gnueabi-gcc -marm -mcpu=cortex-a8 -march=armv7-a -mfpu=neon -funsafe-math-optimizations -ftree-vectorize -mfloat-abi=softfp
```

or:

```
setenv ARMROOT /usr/src/tmp/tam3517-default/rootfs/usr

setenv CC arm-none-linux-gnueabi-gcc

setenv AS arm-none-linux-gnueabi-as

setenv CPP arm-none-linux-gnueabi-cpp

setenv CFLAGS "-O2 -fwhole-program -marm -mcpu=cortex-a8 -march=armv7-a -mfpu=neon -funsafe-math-optimizations -ftree-vectorize -mfloat-abi=softfp -I${ARMROOT}/include -L${ARMROOT}/lib"

configure --prefix=$ARMROOT --host=i686 --target=arm
```

10.3.1 QT

QT libraries come precompiled in the Ångström root file system provided.

10.4 Basic components of a bootable Linux SD card:

- Boot partition (a FAT 32 LBA partition) containing

  X-loader, binary (MLO)

u-boot, boot loader

uImage, Linux kernel

- A root file system (a Linux file system, like ext3).

To prepare a bootable SD card, one needs to:

1. Partition the SD card into two partitions (FAT and, say EXT3)

2. Format the partitions

3. Copy the boot files to the FAT partition

4. Copy the rootfs files to the EXT3 partition

Note1: copying the rootfs must often be done as root, to preserve ownership and permissions of files.

Note2: if you want your SD card to be bootable no matter what, it must contain a special boot/partition signature. In this case we recommend you to reuse the partition table from one of TechNexion's Angstrom SD card images, and if needed resize the EXT3 partition.

(Do NOT use the rescue card image bootsector, it is special and not for general purpose)

10.5 Manual NAND Installation

This paragraph explains how to install Linux to NAND from a bootable SD-card.
1. Stop at the u-boot prompt, and issue the following commands:

```
nand erase.chip clean

env default -f

setenv bootdelay 1

saveenv


mmc rescan 0
```

```
fatload mmc 0:1 $loadaddr MLO
nandecc hw ; nand erase 0 80000
nand write $loadaddr 0 80000

fatload mmc 0:1 $loadaddr u-boot.bin
nandecc sw ; nand erase 80000 160000
nand write $loadaddr 80000 160000

fatload mmc 0:1 $loadaddr uImage
nand erase 280000 400000
nand write $loadaddr 280000 400000

run mmcboot
```

The development kit boots into Linux.

2. Once at the kernel prompt, login as root (no password required) and issue the following commands:

```
flash_erase /dev/mtd4 0 0
ubiattach /dev/ubi_ctrl -p /dev/mtd4
ubimkvol -N rootfs -m /dev/ubi0
mount ubi0:rootfs /mnt/ubi -t ubifs
rsync -az --exclude=/mnt --exclude=/lost+found --exclude=/proc --exclude=/sys / /mnt/ubi/
mkdir -p /mnt/ubi/proc /mnt/ubi/sys /mnt/ubi/mnt/
/bin/sync
umount /mnt/ubi
ubidetach /dev/ubi_ctrl -p /dev/mtd4
poweroff
```

10.6 How to

10.6.1 How to calibrate the touch screen in Linux

Figure 54 : settings > Touchscreen Calibration

Figure 55 : touch the crosshairs on the screen. After Calibration it will reboot to store the settings

In case the calibration is incorrect, you have two options to initiate the calibration process

10.6.1.1 Recover the touch calibration with a USB keyboard.

1. Plug in the USB keyboard

2. Press Ctrl+Alt+F1 (the terminal-screen will open)

3. Type "root" and press return

4. Type "ts_calibrate" and press return

5. Calibrate the screen

6. Type "reboot" and press return

10.6.1.2 Recover the touch calibration with a USB mouse

1. Power off the unit

2. Insert a USB mouse

3. Click on "settings" and then "tocuhscreen calibration"

4. Calibrate by using the mouse to click on the crosshairs

5. The unit will reboot

10.6.2 How to use OPKG

First connect your development kit to the internet. Then, use

opkg update	(to update the repository locations etc.)

Then use

opkg list-installed	(to list the installed packages)
opkg list	(to list the available packages (use grep! the list is long))
opkg install <package>	(to install <package>)
opkg remove <package>	(to uninstall a package.)

A few more useful commands:

opkg search <full/path/filename>	(tells you which package provides the named file)

10.6.3 How to enable wireless

Wireless can be enabled using a terminal in the following two ways.

10.6.3.1 The easy way

1. Open a terminal

2. # wireless.sh

3. You will be shown a list of networks in range, and asked to type in the name of the network

4. Once an existing network has been typed in, you will be asked for a passphrase (if you are prompted for the net name again, it means you mistyped something)

Note: it can be enough to type in a part of the network name -- if that part is not a part in any other nearby network SSID

5. After these steps, the system tries to connect to the network

10.6.3.2 If the easy way does not work

In case the above does not work (due to different network settings etc), you can use the command line tools to connect manually:

1. Use 'insmod /boot/libertas_sdio.ko' to load the wireless driver

2. Use 'ifconfig wlan0 up' to enable the wireless interface

3. Use 'iwlist wlan0 scan', to scan the networks

4. Use 'wpa_passphrase' to generate the WPA psk for an SSID

5. Edit a wpa_supplicant configuration file containing your network settings

6. Use 'wpa_supplicant -Dnl80211 -iwlan0 -c file' to connect to the SSID in file

7. Use 'udhcpc -i wlan0' to request and IP adress, gateway and DNS server

10.6.3.3 Common errors

Problem: you see the error message "assoc: bss (null) not in scan results"

Reason: Wireless chip sees no networks

Solution1: Attach an antenna :-)

Solution2: Did you forget 'ifconfig wlan0 up' before scanning?

10.6.4 How to do low level debugging (advanced)

To write to OMAP/Sitara UART:

Send character to physical adress

0x4806A000 == UART1

0x4806C000 == UART2

0x49020000 == UART3

Hope somebody else has set up baud rate etc ;-)

Instructions to write a 'T' to UART3

```
ldr     r8, =0x49020000
mov     r7, #'T'
strb    r7, [r8, #0]
```

11 Software - Android

11.1 How to install an Android application on TechNexion baseboards

Things to know in advance:

- Plug a USB-keyboard in the baseboard, the "backspace" is the "back" button and the "home" button goes to the first page.
- On the HMI the back button is the top button on the right backside of the HMI
- The application (*.apk) should be placed on a micro-SD card.
- If you do not have a file-manager, Astro, etc. please read paragraph 11.2)

Figure 56: press (tap it with your finger) on the Settings icon

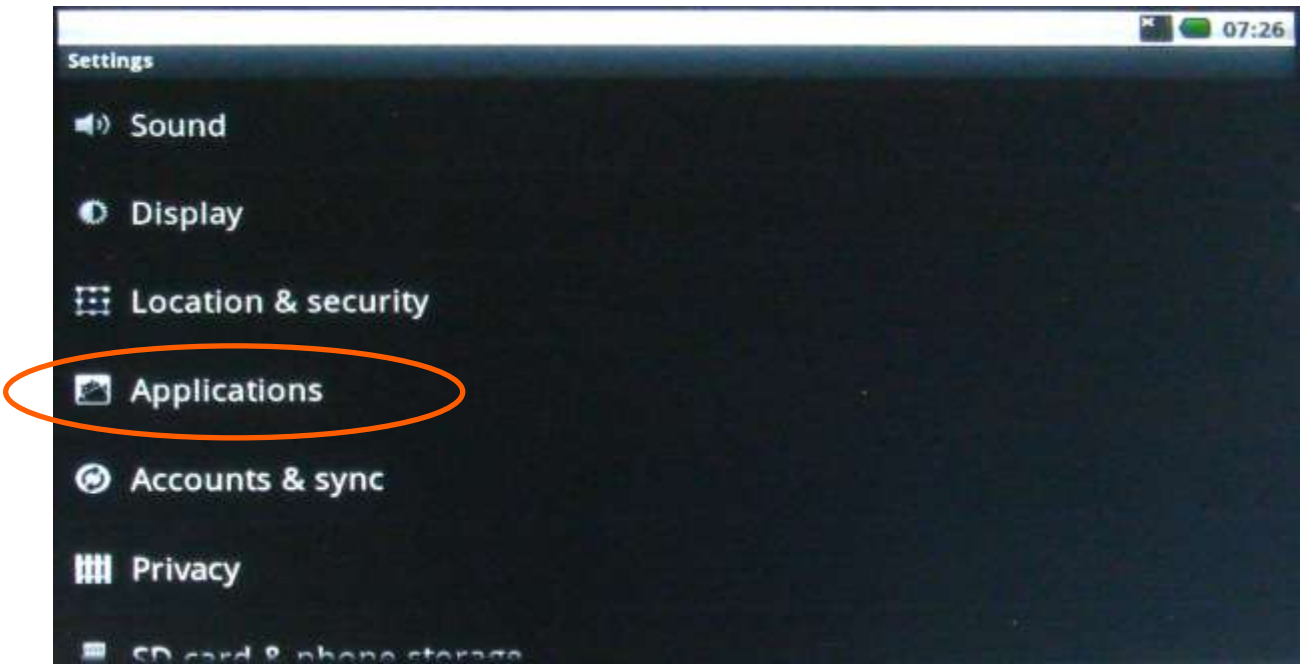


Figure 57: Scroll to the Applications and press on it

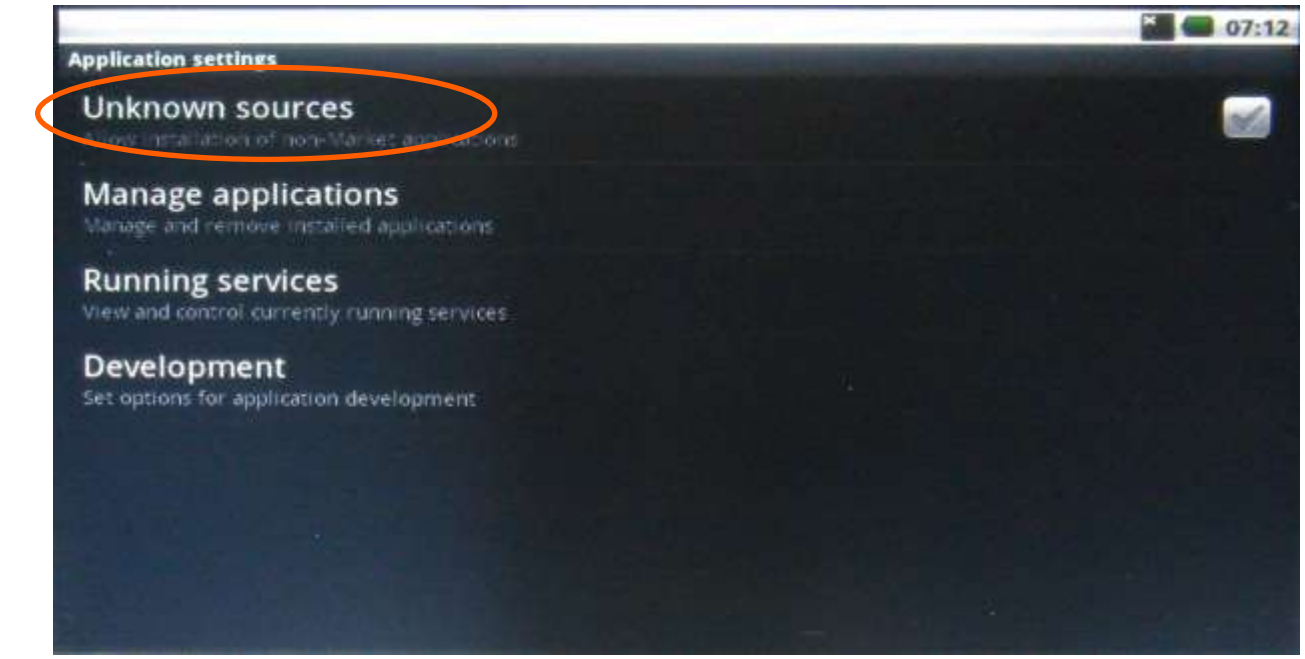


Figure 58: press on "Unknown sources"

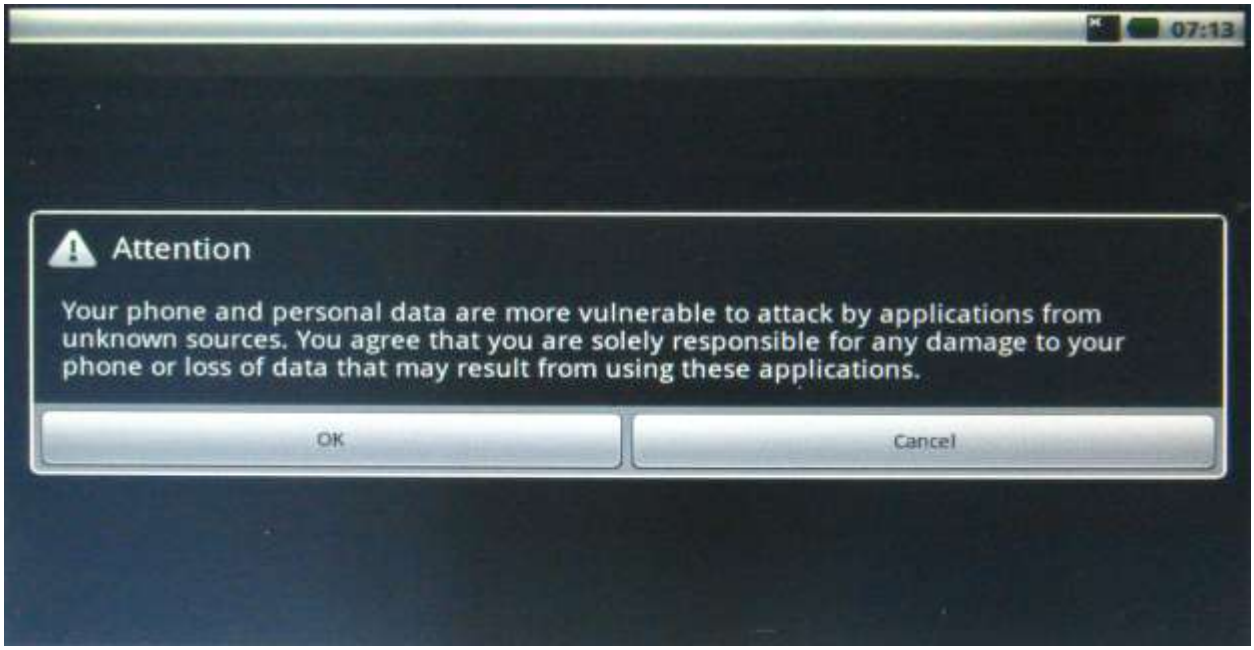


Figure 59: Confirm OK

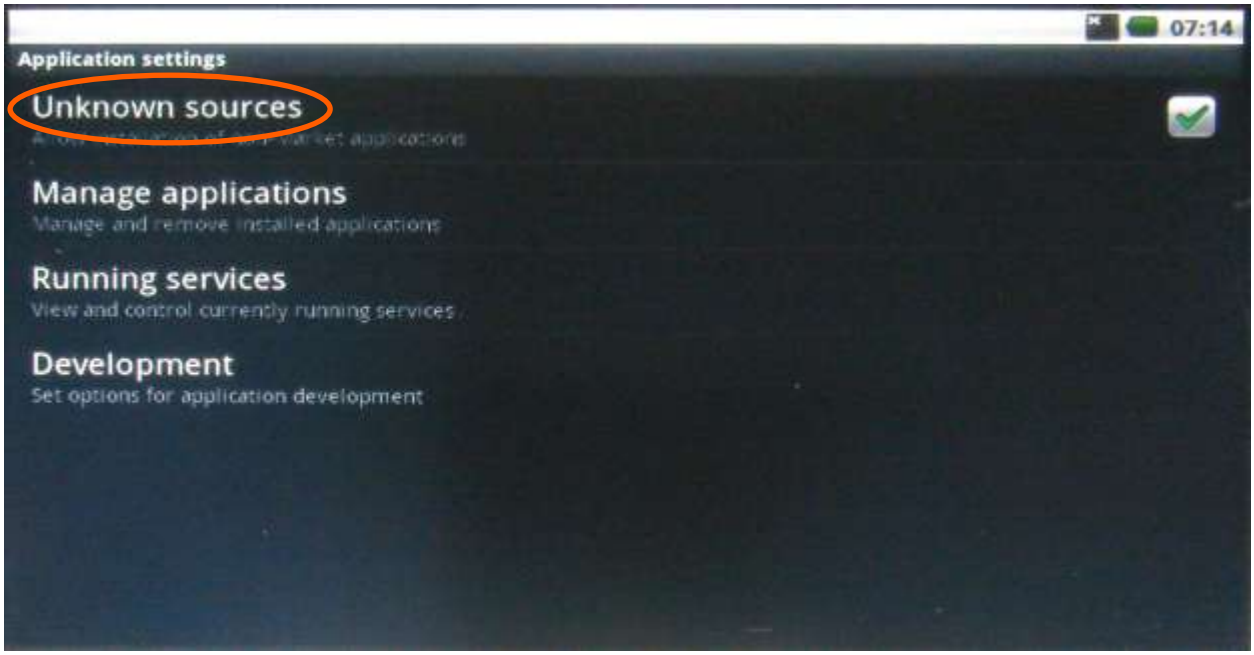


Figure 60: The "Unknown sources" will now show a green icon. It will now install application even if the sources are unknown.

Figure 61: Use the "left arrow" button on the USB-keyboard to go BACK to the main menu. Insert a micro-SD card with the application on it in the baseboard. In the top left it will show "preparing SD card" which will disappear after the SD-card is detected. Press on the "File manager". (If you do not have FileManager or Astro then go to the next paragraph 11.2)

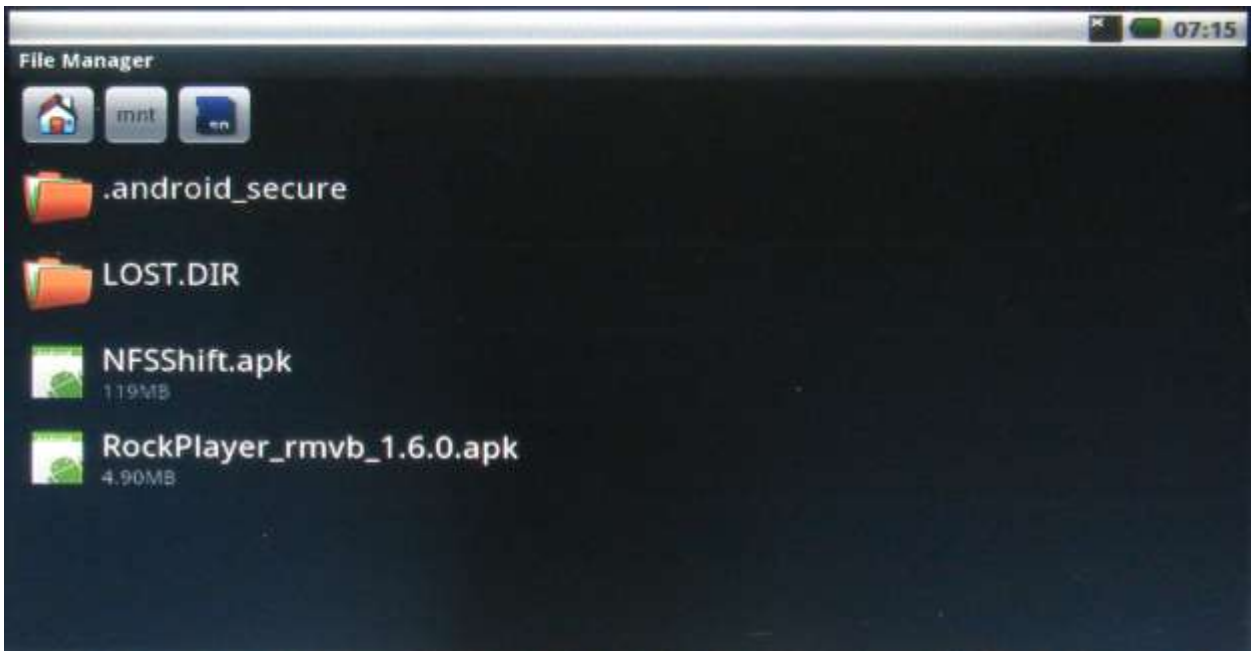


Figure 62: The "File manager" will show the contents of the SD-card. Press on the application that you want to install (for example: Rockplayer)

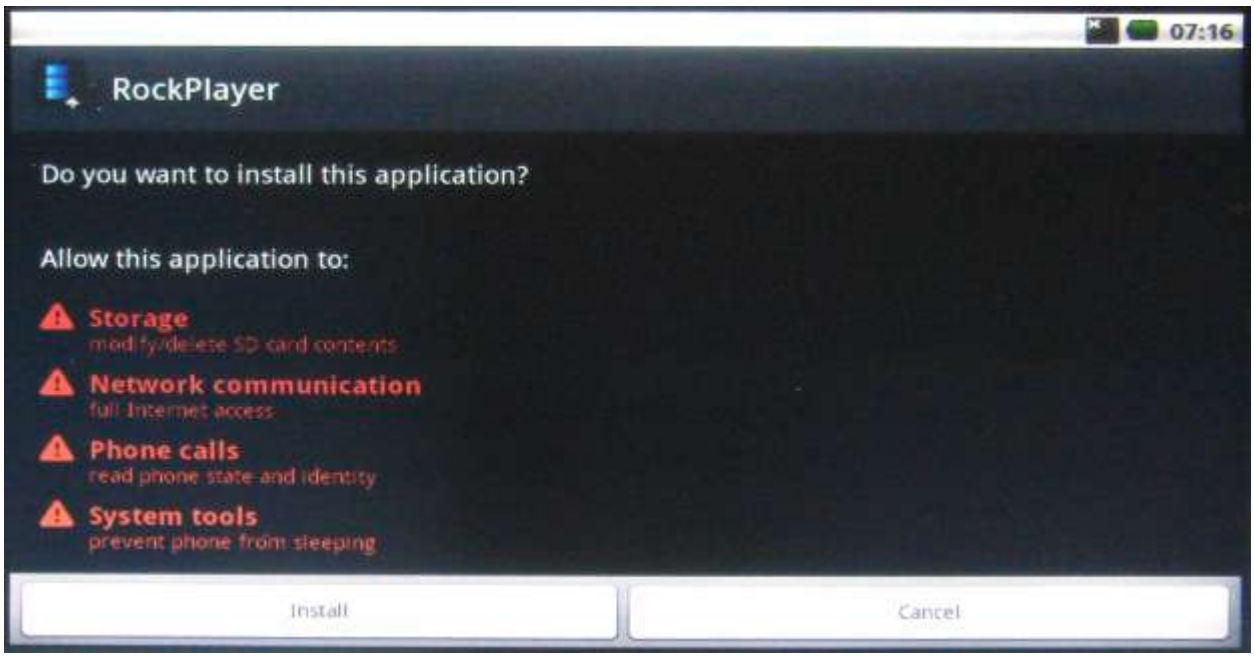


Figure 63: Press install

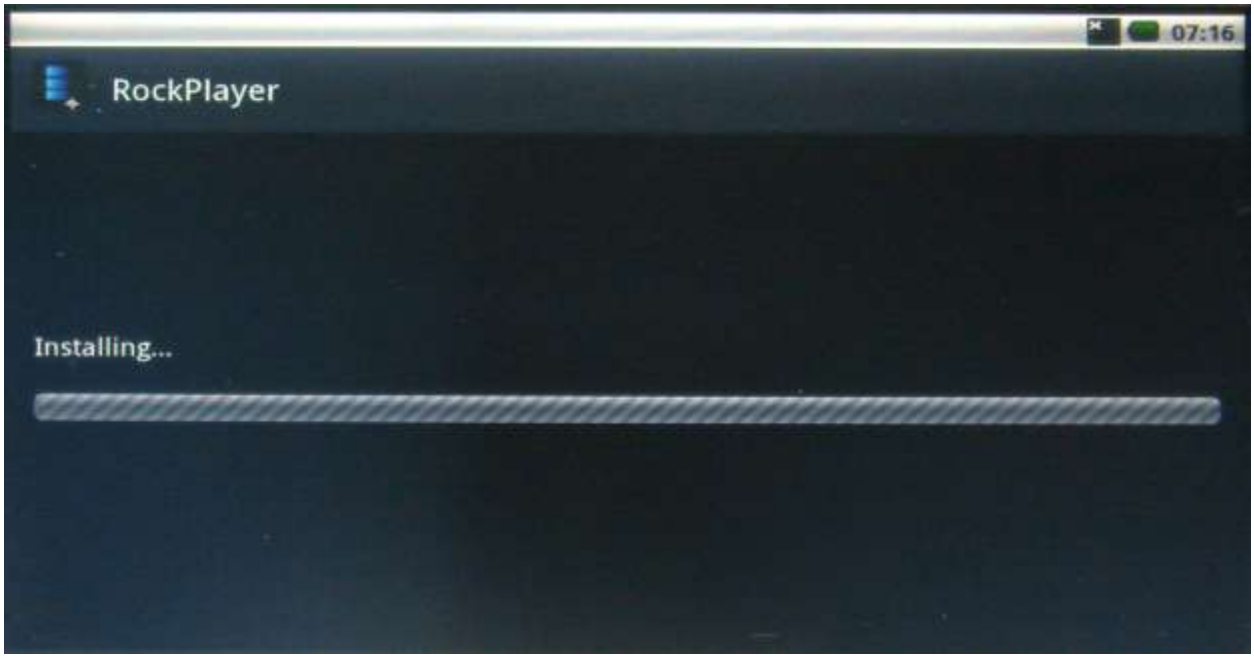


Figure 64: The application will install

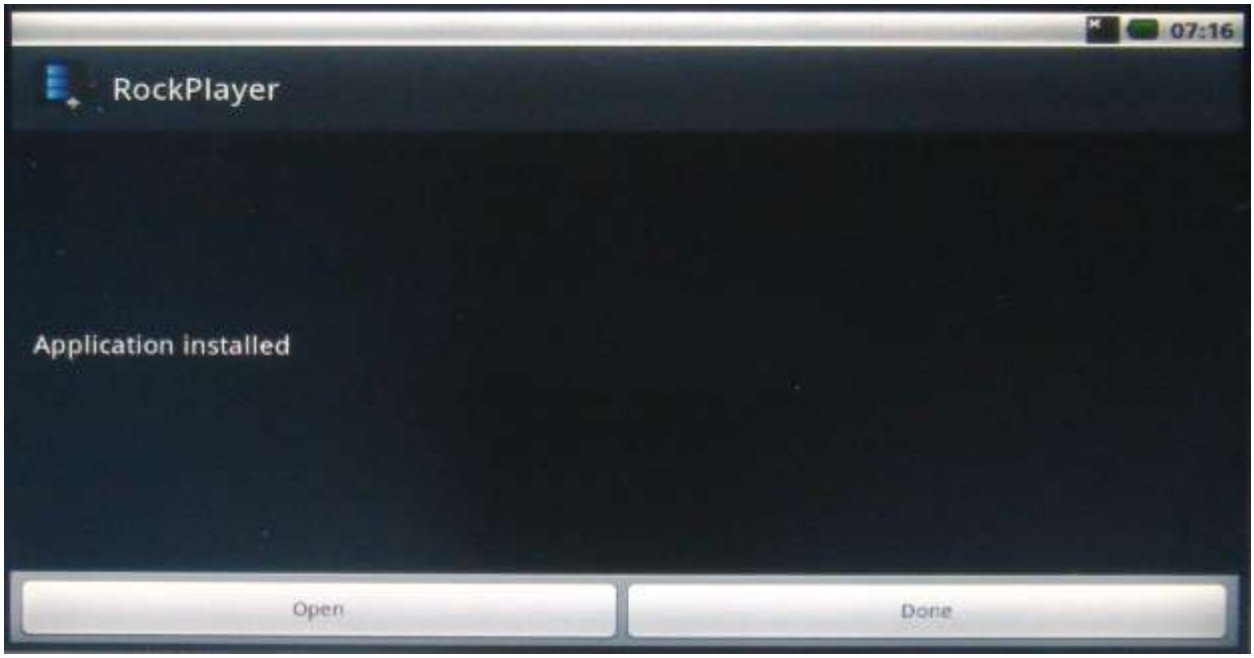


Figure 65: after installation you have the choice to open the application or to go back.

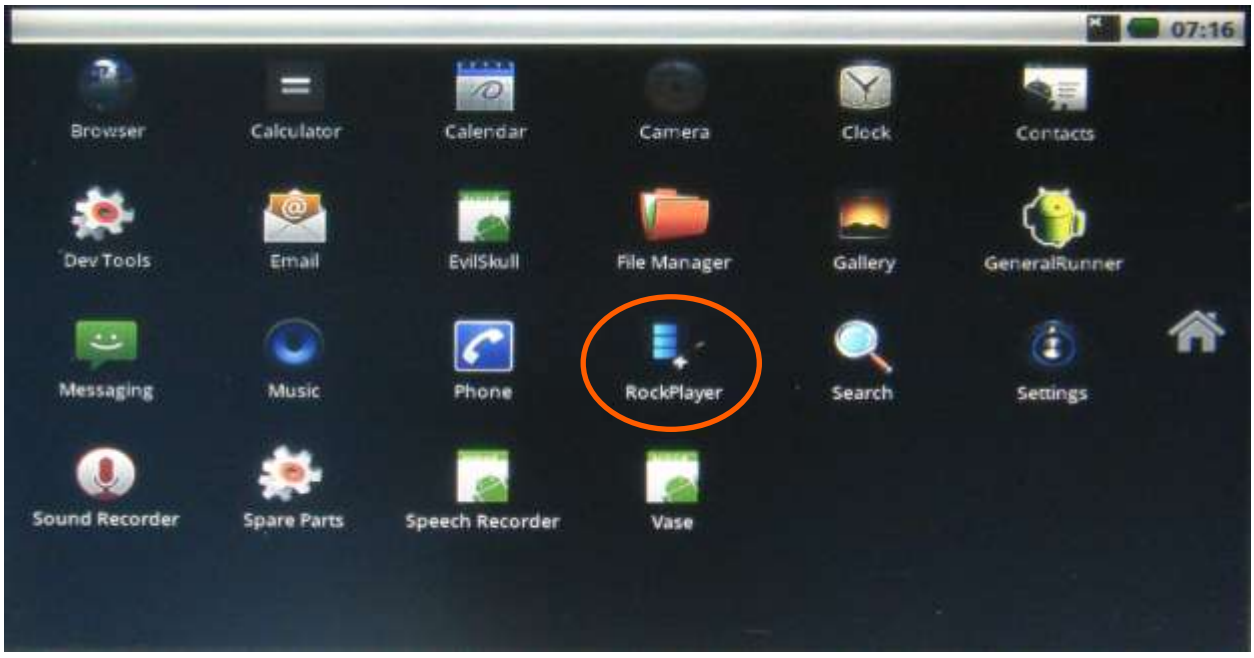


Figure 66: The main menu will now show the Rockplayer application icon. To start the application, just press the icon.

11.2 How to install an android application with an internet connection

In case you have no file manager, you can install this (or any other application) via an internet connection. In this example we use the wireless internet, but you can also use a LAN connection.

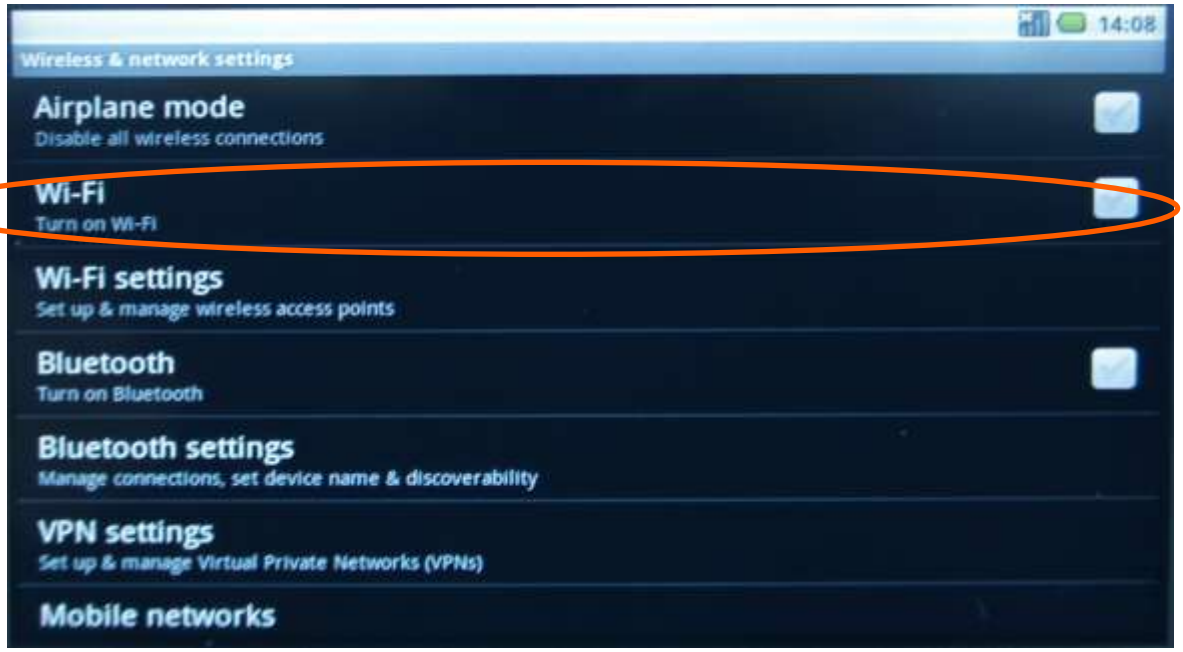


Figure 67: in "Settings", switch on Wi-Fi:

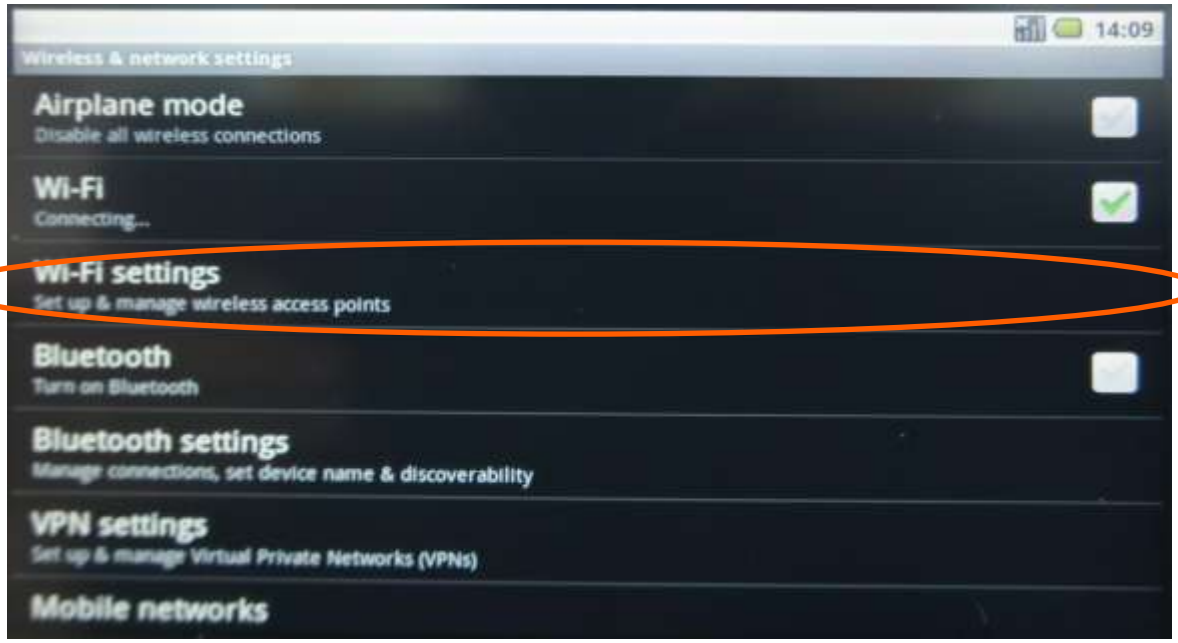


Figure 68: Go to Wi-Fi settings:

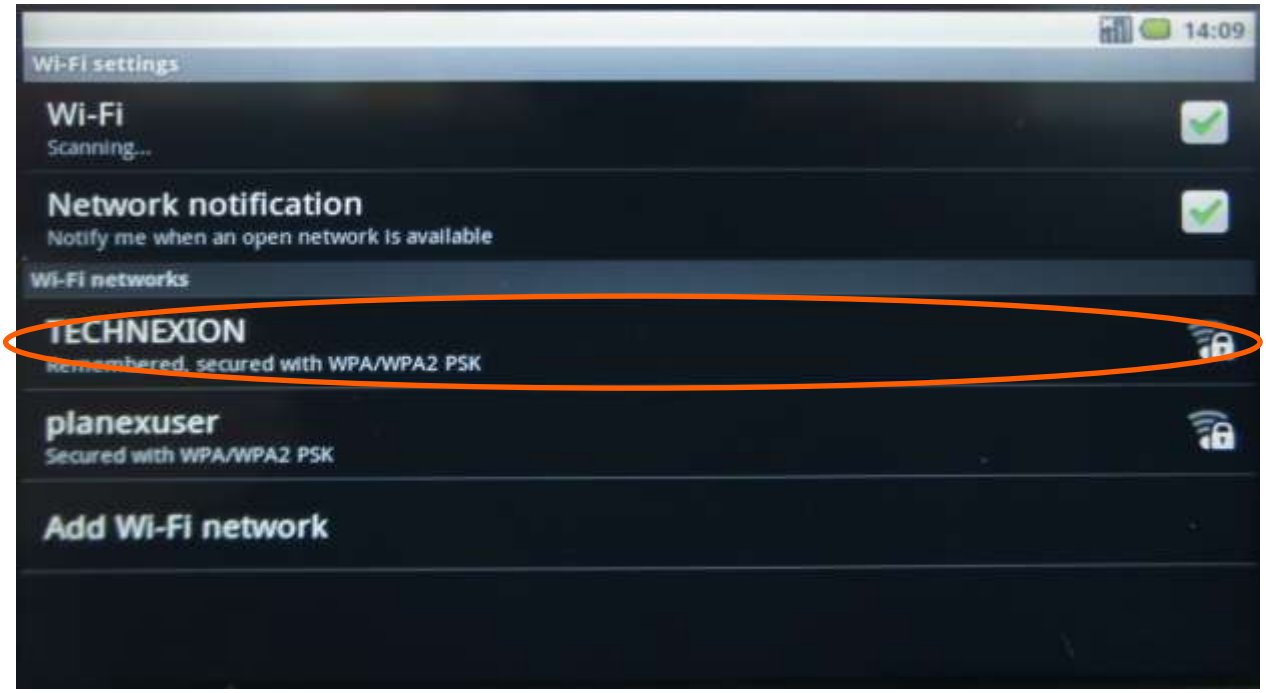


Figure 69: Select a network

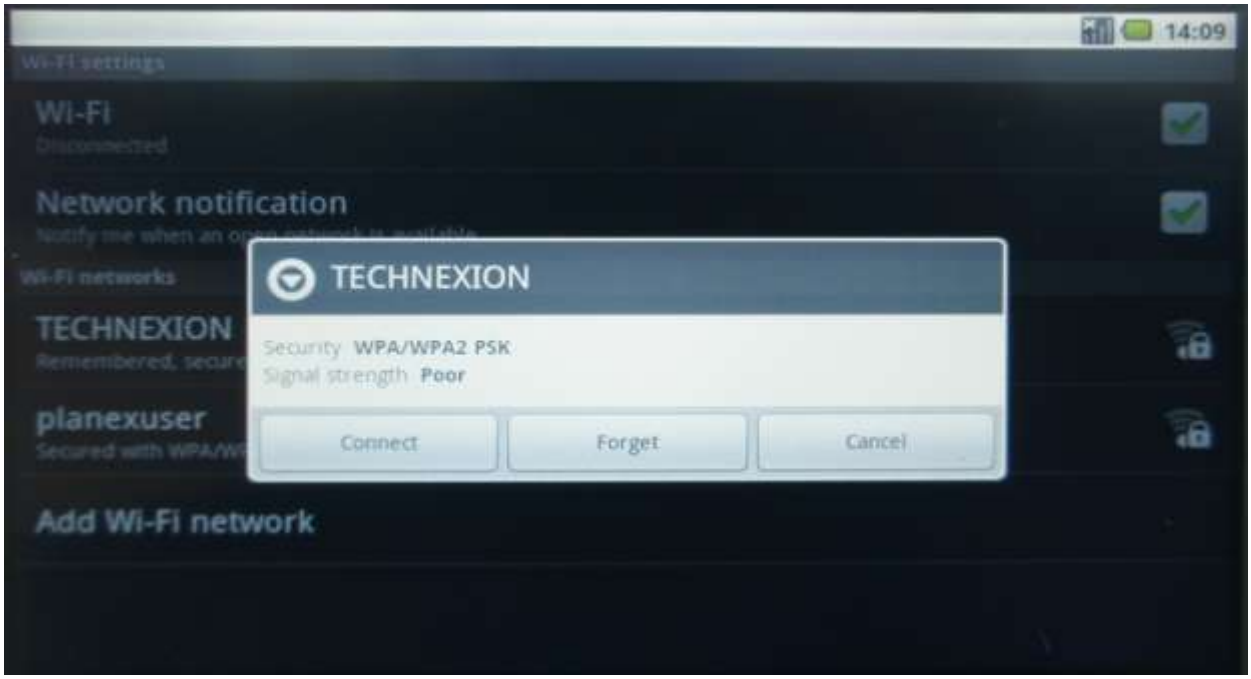


Figure 70 : Choose connect and, if necessary, enter a password.

Figure 71 : Open the browser in the main menu

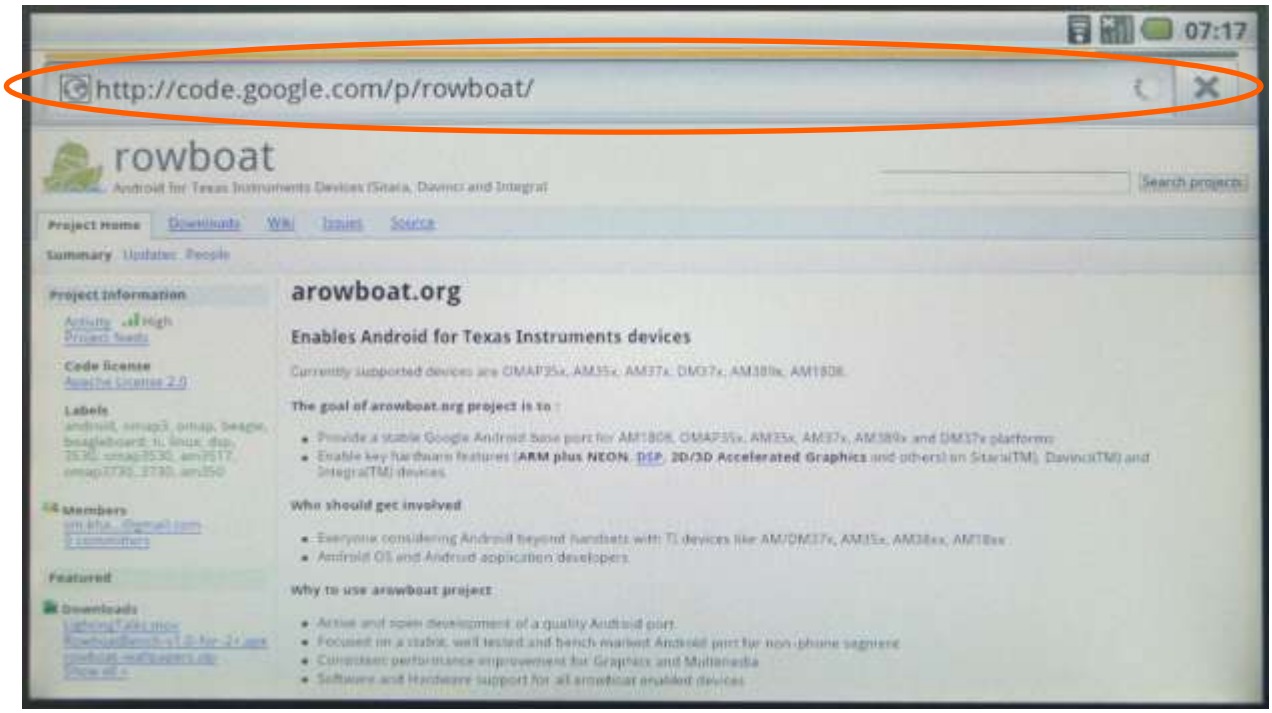


Figure 72 : Press the internet address bar and the onscreen keyboard will appear, or Insert an USB-keyboard.

Figure 73 : Type: http://openintents.googlecode.com press "GO" and you will find the File Manager under the downloads

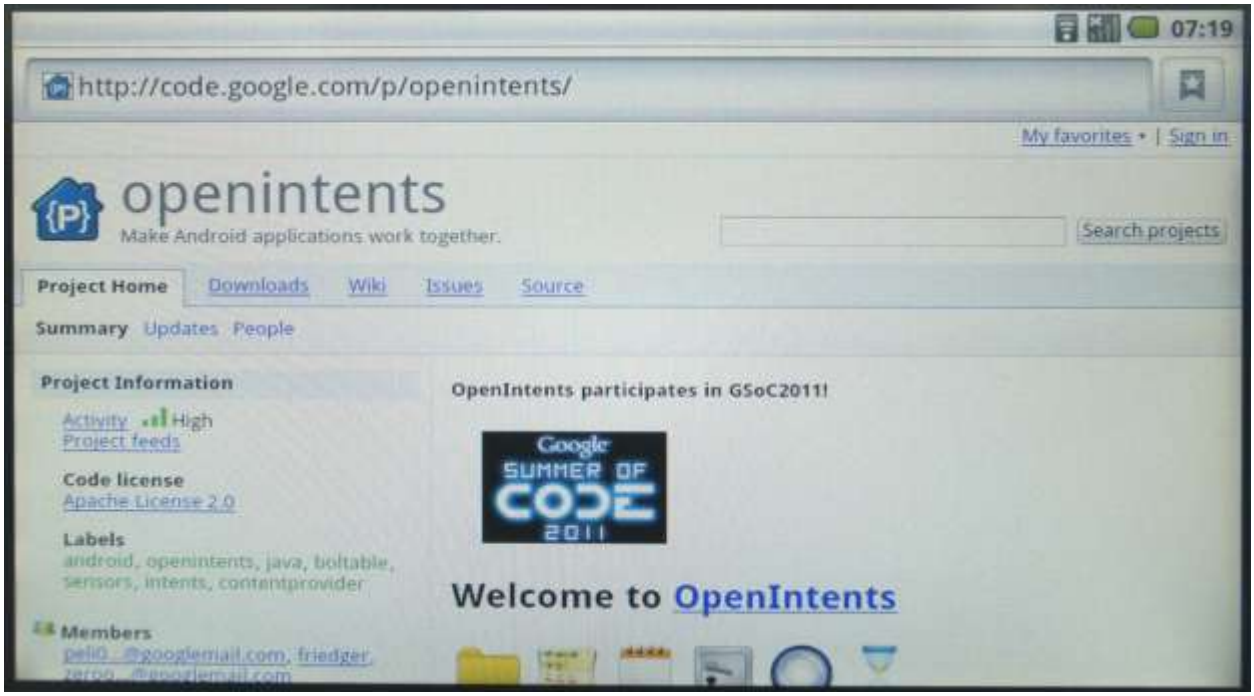


Figure 74 : Another option is:: http://www.openintents.org and you will also find the File Manager

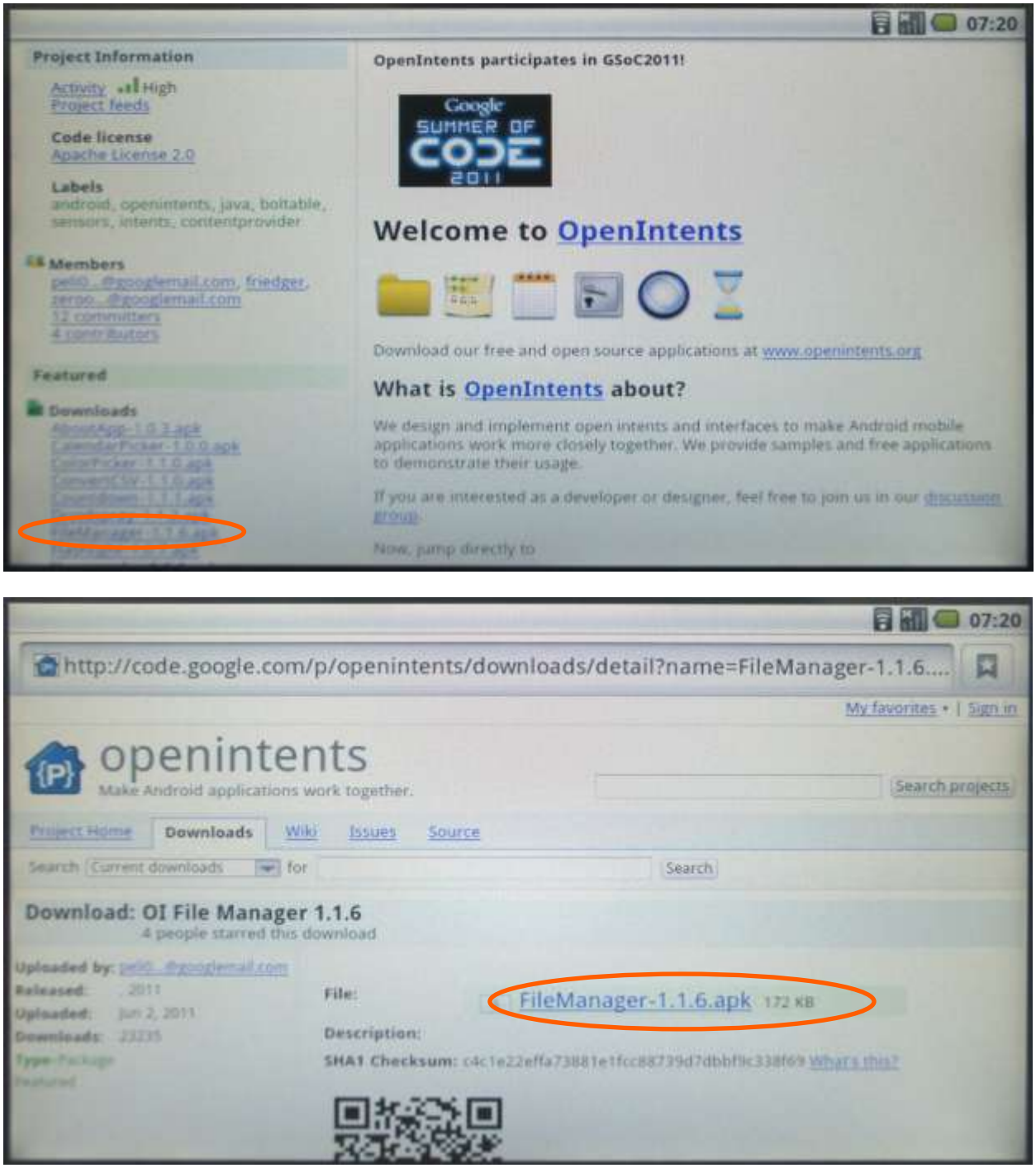


Figure 75 : Click the file manager link; it might appear like nothing happens, but just go to the main screen and pull the bar on top down.

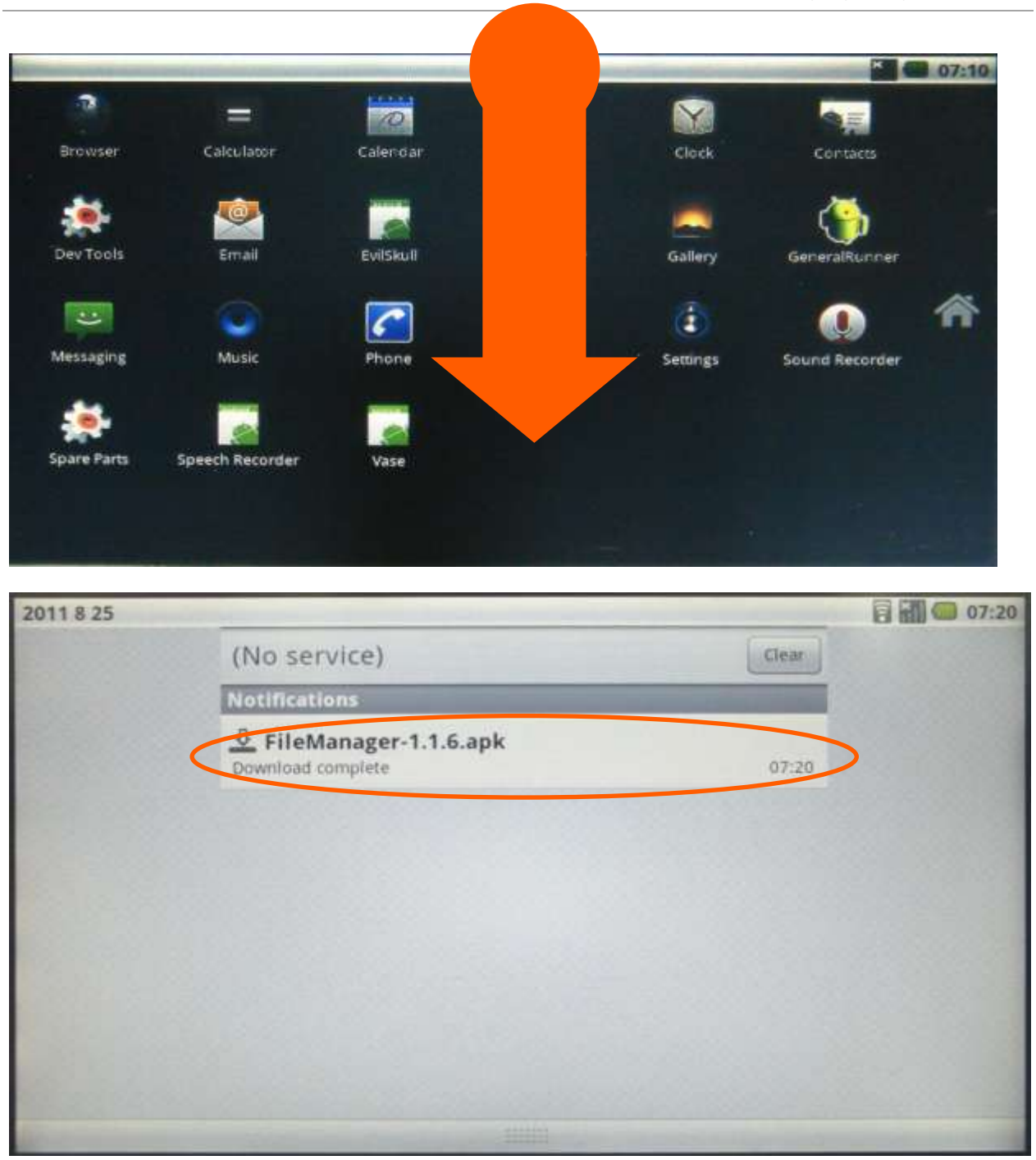


Figure 76: You will see the download when it has finished downloading

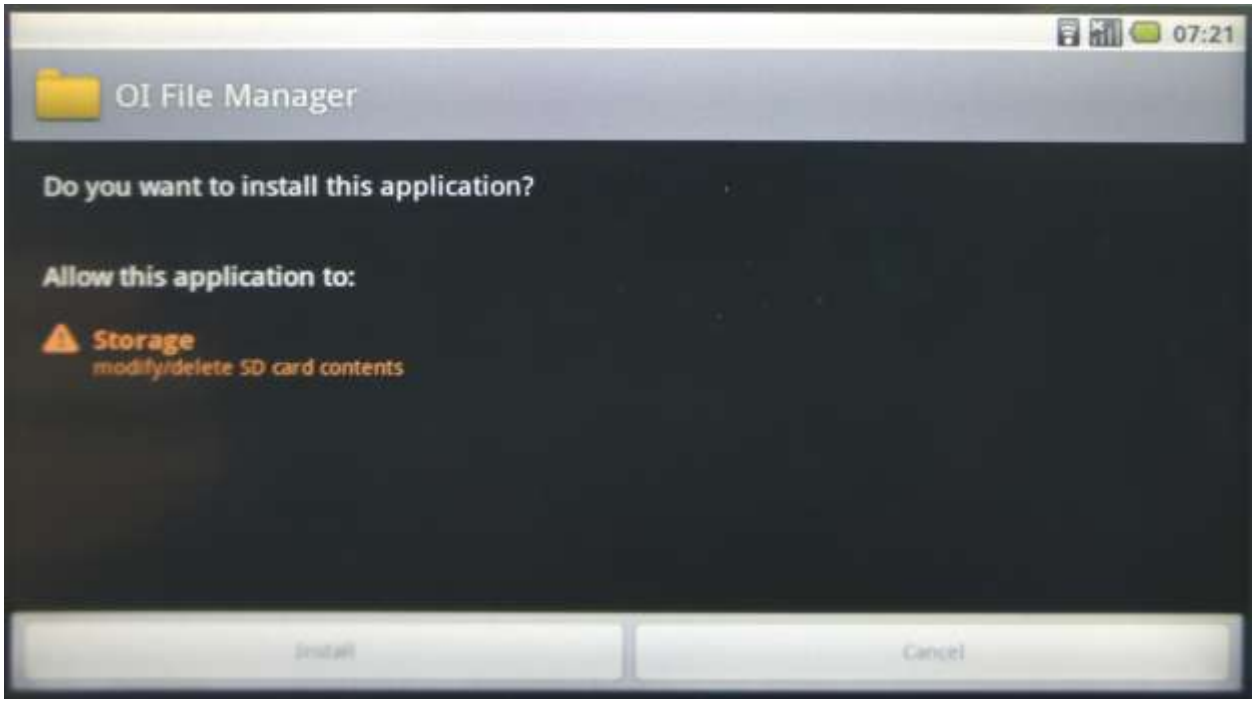


Figure 77 : Press the download and it will ask to install or cancel, Install will install the application, and Cancel will delete the file

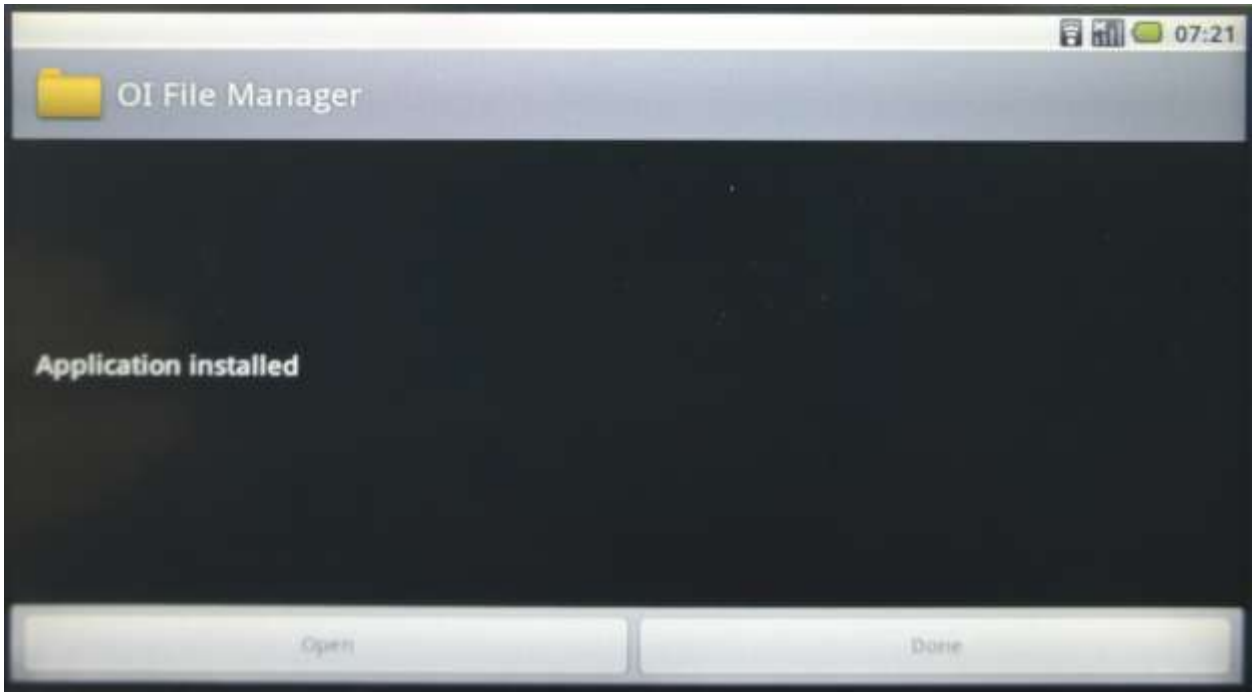


Figure 78 : You now have a file manager and it will make it easier to install apk's that are placed on a SD card

11.3 ADB - Installing applications

11.3.1 Windows

Source of information (in this paragraph): [1]

When it comes to Android modding, most novice users are confused or left wondering by reference over reference to a certain "ADB". This is especially true when you are looking up something on modding your device, or root it in particular. ADB is the wonder toy of Android and everyone seems to love it, so let's have a look at understanding what it is and why you need it, and how you can get it.

11.3.1.1 What is ADB

ADB stands for Android Debug Bridge. It comes as a part of the standard Android SDK, which you can grab here. Basically, it provides a terminal-based interface for interacting with your phone's file system. Since Android platform is based on Linux, command-line is ~~the only way to obtain and manipulate root access~~ often required to perform certain advanced operations on your device using root access.

While these things can be done directly on the device itself using some terminal emulator, it will be rather difficult to execute complex commands on such a small screen. ADB provides the bridge between your machine and your computer.

11.3.1.2 How to Install ADB

Step 1: Installing the Android SDK

Note: At the time of updating this guide, the latest version of the Android SDK available is r8 and we shall be using it throughout the rest of the guide. The tools will work the same way however, even if you get a later version. In case of earlier versions though, the location of some of the tools was different and it is recommended that you get the latest available version.

The first step is to download the SDK. Use the link given at the end of this post and download the latest version of the Android SDK from there. There are versions available for Microsoft Windows, Linux and Mac OS X. In case of Windows, both an installer and a zip file are available but there isn't any need to use the installer as a formal installation is not required.

Once you have downloaded the SDK, simply extract the compressed file to a location on your computer. In our case, we have extracted it to the root of our C drive and that makes *C:\android-sdk-windows* the installation location of the SDK. From here onwards, we shall be referring to this location as the 'SDK folder'.

Step 2: Downloading the SDK Platform Tools

Previously, ADB used to be included in the SDK by default in the 'tools' sub-folder but now, it has been relocated to the 'platform-tools' sub-folder which needs to be downloaded as an SDK package. Fortunately, this is quite easy:

Just browse to the SDK folder and launch SDK Manager. When launching it for the first time, it will present you with a window to choose packages to install. The first option begins with 'Android SDK Platform-tools'. Make sure it is checked, and uncheck all the other packages for now. You can check/uncheck a package by clicking on its name and then selecting the Accept/Reject radio button. Your window should look like this:

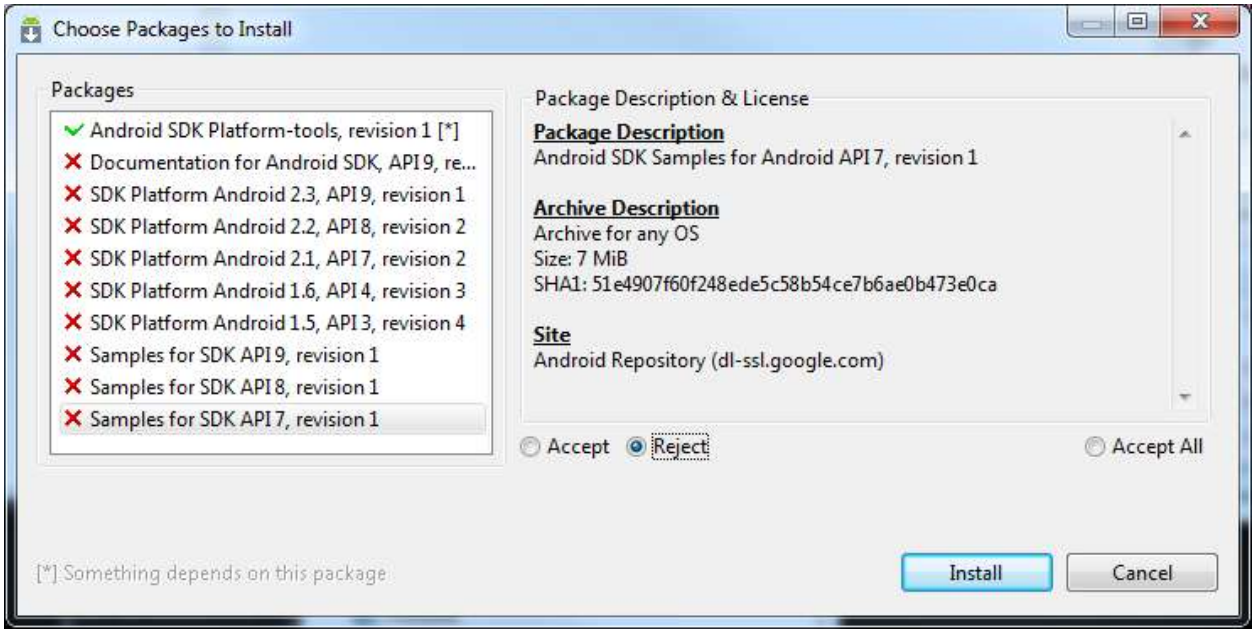


Figure 79

Now simply click 'Install' and wait till the platform tools are installed. Once the process is done, you will have a 'platform-tools' folder inside your SDK folder. That folder will include ADB and all its dependencies.

Step 3: Setting the Path variable

Now you have ADB installed but using it this way will require you to either use the complete path of the ADB command (*C:\android-sdk-windows\platform-tools\adb*) or to first change directory to the platform-tools subfolder of the SDK folder each time, and this can become quite a hassle. To make ADB along with other Android SDK tools and platform tools easily accessible from anywhere at the command line, we shall add their paths to the PATH environment variable. This method will apply to Windows users only. If you are a Linux or Mac user, add the 'tools' and 'platform-tools' sub-folders of the Android SDK to your system's PATH variable using the standard method for your operating system.

- If you have no experience with editing system environment variables, make a System Restore point now so that you can revert back to it in case something goes wrong.
- If you are using Windows 7, right-click the 'Computer' icon and click 'Properties'. Now click 'Advanced System Settings' from the options in the left pane to bring up the 'System Properties' window. Windows XP users will directly get this window when they right-click 'My Computer' and click 'Properties'.
- In the 'System Properties' window, click the 'Environment Variables' button on the 'Advanced' tab.

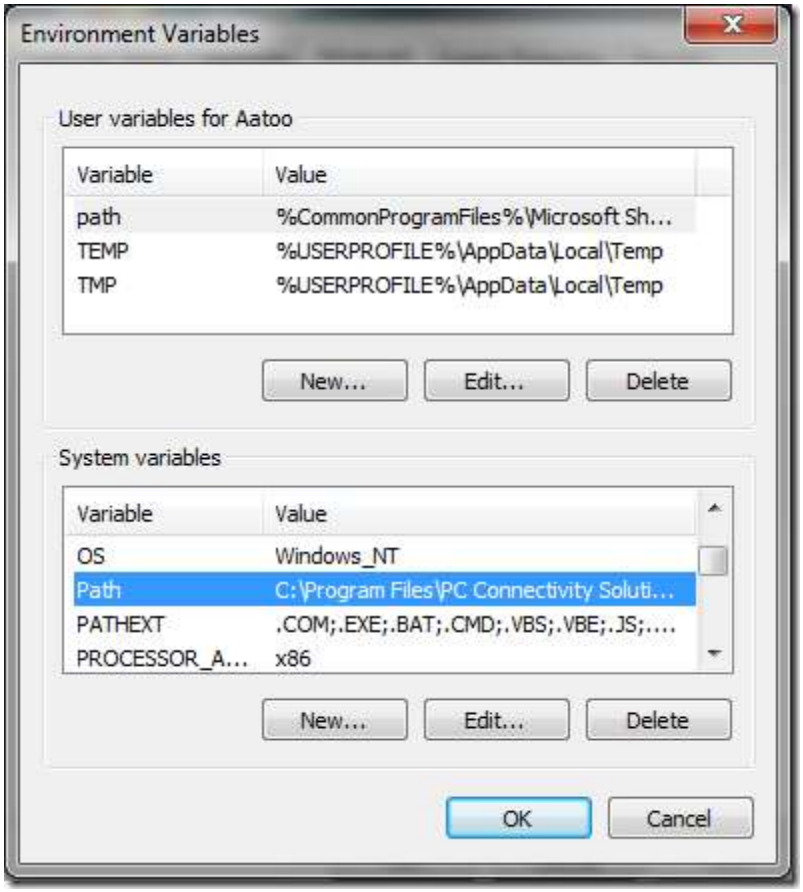


Figure 80

- Find 'Path' in the 'System variables' section and double-click it to edit it.
- Make sure NOT to delete the existing entry in 'Variable value' or it will mess up things on your computer. Just add the following string to the end of it, including both the semi-colons:

```
;c:\android-sdk-windows\tools;c:\android-sdk-windows\platform-tools
```

  If you have extracted the SDK's contents to another directory, make sure to use that one for your PATH variable.

After adding the string, this is what my Path variable looks like:

```
C:\Program Files\Common Files\Microsoft Shared\Windows Live;C:\Program Files
(x86)\Common Files\Microsoft Shared\Windows
Live;%SystemRoot%\system32;%SystemRoot%;%SystemRoot%\System32\Wbem;%SYSTEMROO
T%\System32\WindowsPowerShell\v1.0\;C:\Program Files (x86)\ATI
Technologies\ATI.ACE\Core-Static;C:\Program Files (x86)\Windows
Live\Shared;C:\Program Files\Java\jdk1.6.0_23\bin;C:\Program Files
(x86)\Java\jdk1.6.0_23\bin;C:\android-sdk-windows\tools;C:\android-sdk-
windows\platform-tools
```

Don't worry if yours does not include some of the other text – what is important is the way the new entry should be added to the existign one, and the way the previous entries MUST be left unchanged. Notice that the semi-colons are necessary to separate each path variable entry from the next and previous ones. Once you have added the path, your machine may require a reboot.

In case you messed up while editing the Path variable and ended up deleting the previously existing entries, just restore the System Restore point you made and retry, being more careful this time.

Step 4: Installing the USB drivers

Finally, you need to install the USB drivers. You may or may not need to perform this step, depending on your device. If you are using a device that ships with stock Android operating system such as the Nexus One, this will be necessary. In case of other devices that ship with their custom version of Android and some tools to sync the device with the PC, such as devices from HTC that ship with HTC Sync or devices by Samsung that ship with Samsung's own software, the suitable driver for your device will be automatically installed with that software package.

- The first step will be to download the USB drivers. To do this, launch SDK Manager from the SDK folder and click on 'Available packages' in the left pane.
- Expand 'Third party Add-ons' followed by 'Google Inc. add-ons' and check 'Google Usb Driver package', as shown in this image:

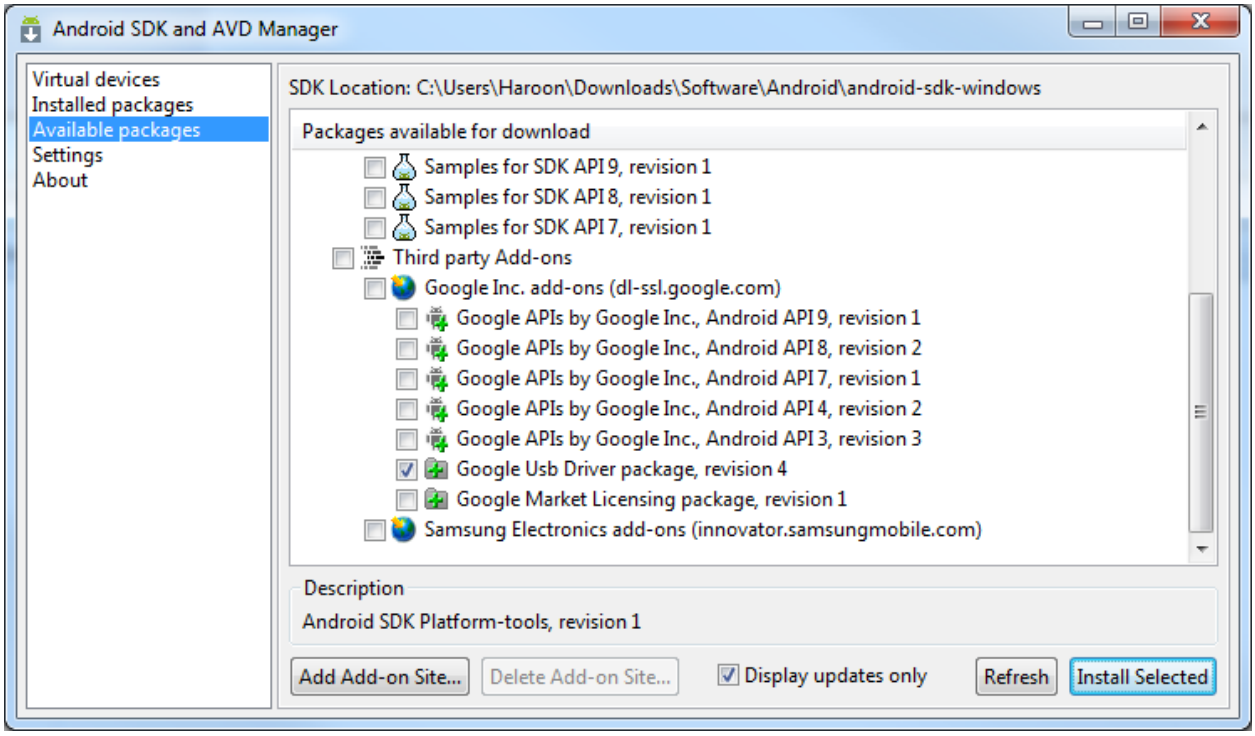


Figure 81

- Click 'Install Selected' and in the window that pops up, click the 'Accept all' radio button followed by the 'Install' button. Wait patiently while the USB drivers are downloaded and installed in the Android SDK.
- The drivers for both 32 bit and 64 bit systems will now be present in the SDK folder under 'usb_driver\x86′ and 'usb_driver\x64′ sub-folders respectively.

Now that the USB drivers have been downloaded, you can install them to your computer as follows:

- On the device, go to home screen, press **Menu**, select **Applications** > **Development**, and enable **USB Debugging**.
- Now connect your phone to the PC via USB. New hardware installation should kick in, and it will start looking for the drivers.
- Manually point the drivers to the folder suitable for your operating system and let them install.
- Once drivers have installed, you can verify successful installation by going to Device Manager. Your phone should be showing under 'ADB Interface', like in this example:

Figure 82

11.3.1.3 How to Use ADB

At this point, the setting is done. Here on you can simply use adb to manipulate your phone in whatever way you like. On Windows, the best way to do so is using command prompt. To ensure that adb has been set up properly, run command prompt and type 'adb devices' and hit enter. Your connected device should show up with a serial number.

Figure 83

~~This is it for this guide. We would like to emphasize that playing with your phone at this level can be dangerous if you don't know what you are doing, and can even render the phone completely useless. Please do it at your own risk.~~

For a complete list of adb commands, check out the official adb guide here.

Editor's Note: ADB is for advanced users only. If you need ADB with a Graphical User Interface, check out QtADB.

11.3.1.4 Summary

Download

Download JRE/JDK

Above two will install the Android SDK.

When plug in our device, Windows will prompt that a new device is found, and asks for driver. Please install with the drivers we provide.

11.3.2 Linux

Download

```
tar zxvf ~/android-sdk_r08-linux_86.tgz
cd android-sdk-linux_86
```

The folder structure should be

```
Add-ons
Platforms
SDK Readme.txt
Tools
```

Most of the utilities are basic, so you need to update:

```
./tools/android update SDK
```

It will launch a GUI interface. Install all the packages you need.

Now the "ADB" is in the folder "platform-tools", you can add it to your path.

11.3.2.1 Connect by USB

Connect USB-otg on TAO to host machine

Turn on USB Debug

MENU->Settings->Applications->Development and then enable the "USB debugging" option.

Setup Host Machine

Log in as root and create this file: /etc/udev/rules.d/51-android.rules

For Gusty/Hardy, edit the file to read:
SUBSYSTEM=="usb", SYSFS{idVendor}=="18d1", MODE="0666"
For Dapper, edit the file to read:
SUBSYSTEM=="usb_device", SYSFS{idVendor}=="18d1", MODE="0666"

Execute the following to change the user mode for the rules file:

```
host#> chmod a+r /etc/udev/rules.d/51-android.rules
```

Verify the adb connectivity between host and target board:

```
host#> adb devices
```

If device is connected, then output on screen should list the device, example:

```
List of devices attached
20100720    device
```

Login use ADB

```
host#> adb shell
```

11.3.2.2 Connect by Ethernet

Please make sure Ethernet on both TAO and the host machine are connected to same network
Check Ethernet configuration for the board

```
tao #> netcfg
        lo      UP    127.0.0.1       255.0.0.0       0x00000049
        eth0    UP    192.168.70.135  255.255.255.0   0x00001043
```

If Ethernet was not configured, configure Ethernet of the board using ifconfig/netcfg as shown below.

```
tao #> netcfg eth0 dhcp
```

Configure the ADB Daemon to use an Ethernet connection using setprop as shown below.

```
tao #> setprop service.adb.tcp.port 5555
```

If network is configured successfully (above steps) then restart service adbd on the target,

```
tao #> stop adbd
tao #> start adbd
```

On the host machine use following commands to establish the ADB connection

```
host#> export ADBHOST=<target's ip address>
host#> adb kill-server
host#> adb start-server
```

Verify for device connectivity, by executing the following commands

```
host#> adb devices
```

If connected, find the device name listed as an "emulator"

```
List of devices attached
emulator-5554    device
```

Login use ADB

```
host#> adb shell
```

For more information about adb commands, see Android Debug Bridge page at
http://developer.android.com/guide/developing/tools/adb.html

11.3.3 ADB Functions

11.3.3.1 Application Install/Remove

Install

```
$> adb install <package>.apk
```

Remove

```
$> adb uninstall <package>.apk
```

11.3.3.2 File Operation

To Device

```
$> adb push <local_file_path> <remote_path>
```

From Device

```
$> adb pull <remote_file_path> <local_path>
```

11.3.3.3 Shell Operation

```
$> adb shell
```

11.3.3.4 Show Devices

```
$> adb devices
```

12 Software - Windows CE

12.1 Warning

Warning! Installing software is not easy. Finish the procedure completely and be patient to let the compilation and installation finish.

Important! To install Windows CE, you need a null modem to see what is going on.

12.2 Update to Windows Embedded CE6.0 R3

Make sure you have downloaded all R3 patches for Windows Embedded 6.0. The Patches can be found at Windows Embedded CE6.0 R3 on the Microsoft website.

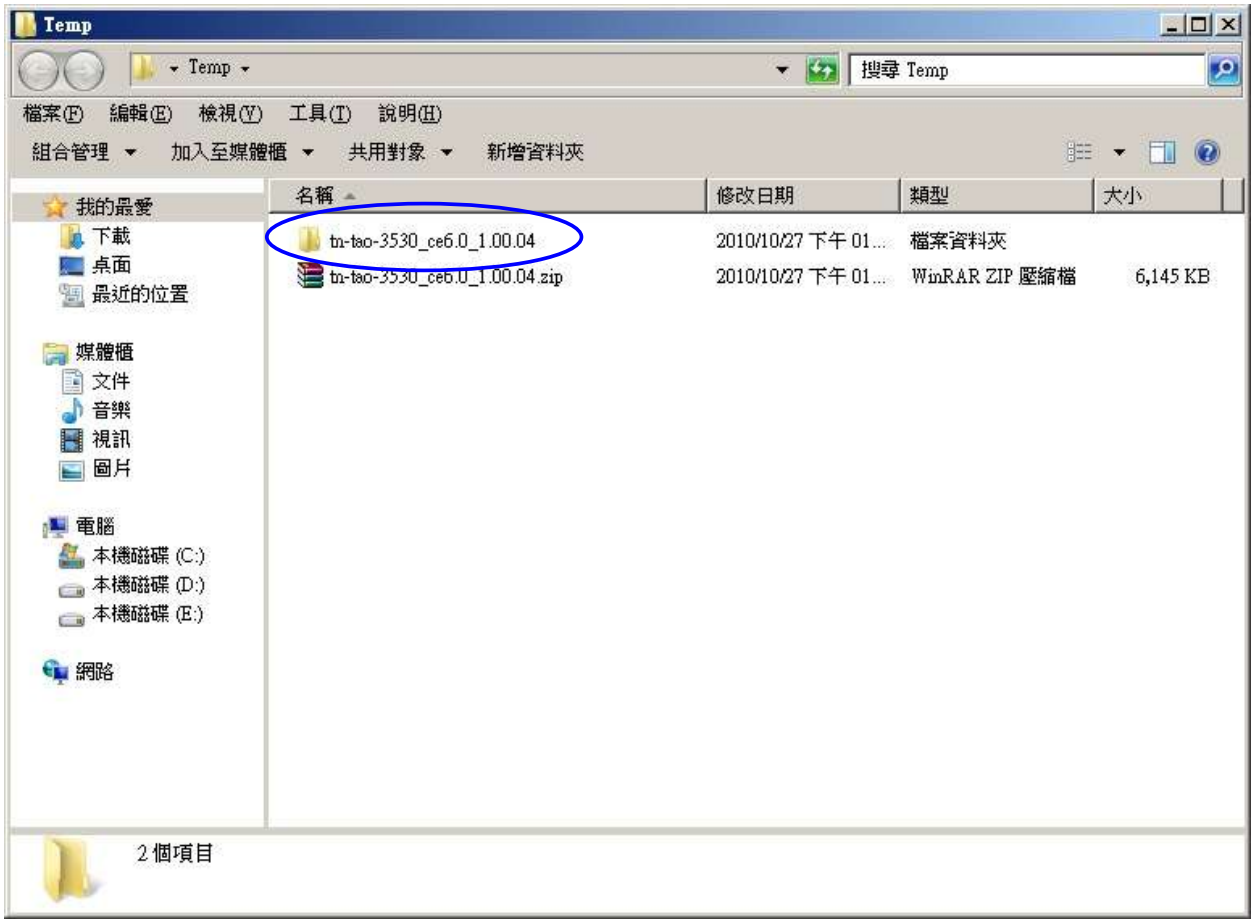
12.3 Get the BSP

12.3.1 Download the BSP from the web-Site

Go to www.technexion.com > Support > Download Center and download TAO-3530_WinCE 6_versionnumber.

12.3.2 Install BSP to "Platform Builder for CE 6.0".

Decompress the downloaded file. (See Figure 84)


Temp
Temp
搜尋 Temp
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 加入至媒體櫃 共用對象 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
網路
名稱
修改日期
類型
大小
tn-tao-3530_ce6.0_1.00.04
2010/10/27 下午 01...
檔案資料夾
tn-tao-3530_ce6.0_1.00.04.zip
2010/10/27 下午 01...
WinRAR ZIP 壓縮檔
6,145 KB
2 個項目
Figure 84

After entering the "TN-TAO-3530_CE6.0_1.00.04 / 1.0014 / TN-TAO-3530_BSP" folder, copy the "TN_TAO_3530" folder to "C:\ WINCE600 \ PLATFORM \". (See Figure 85 and Figure 86)

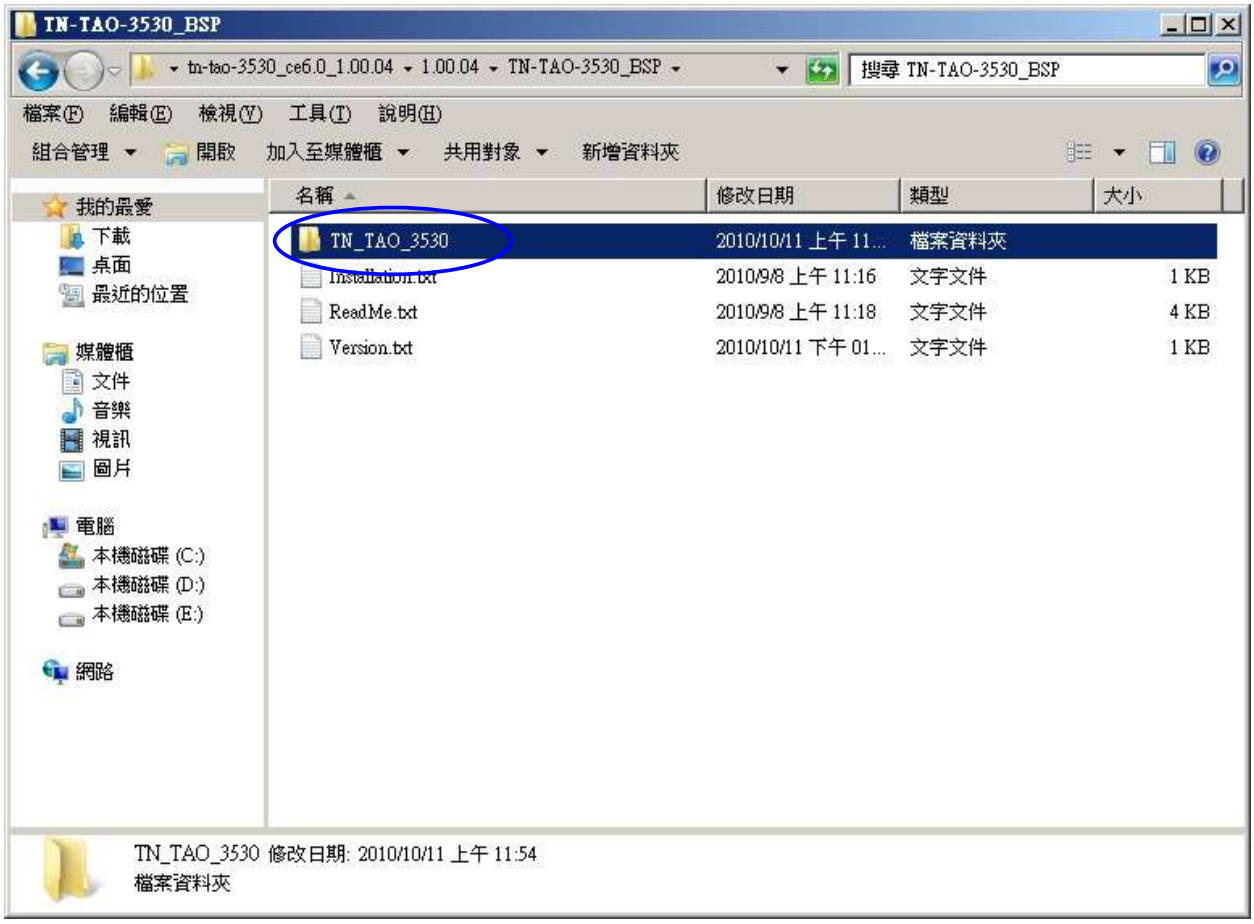


Figure 85

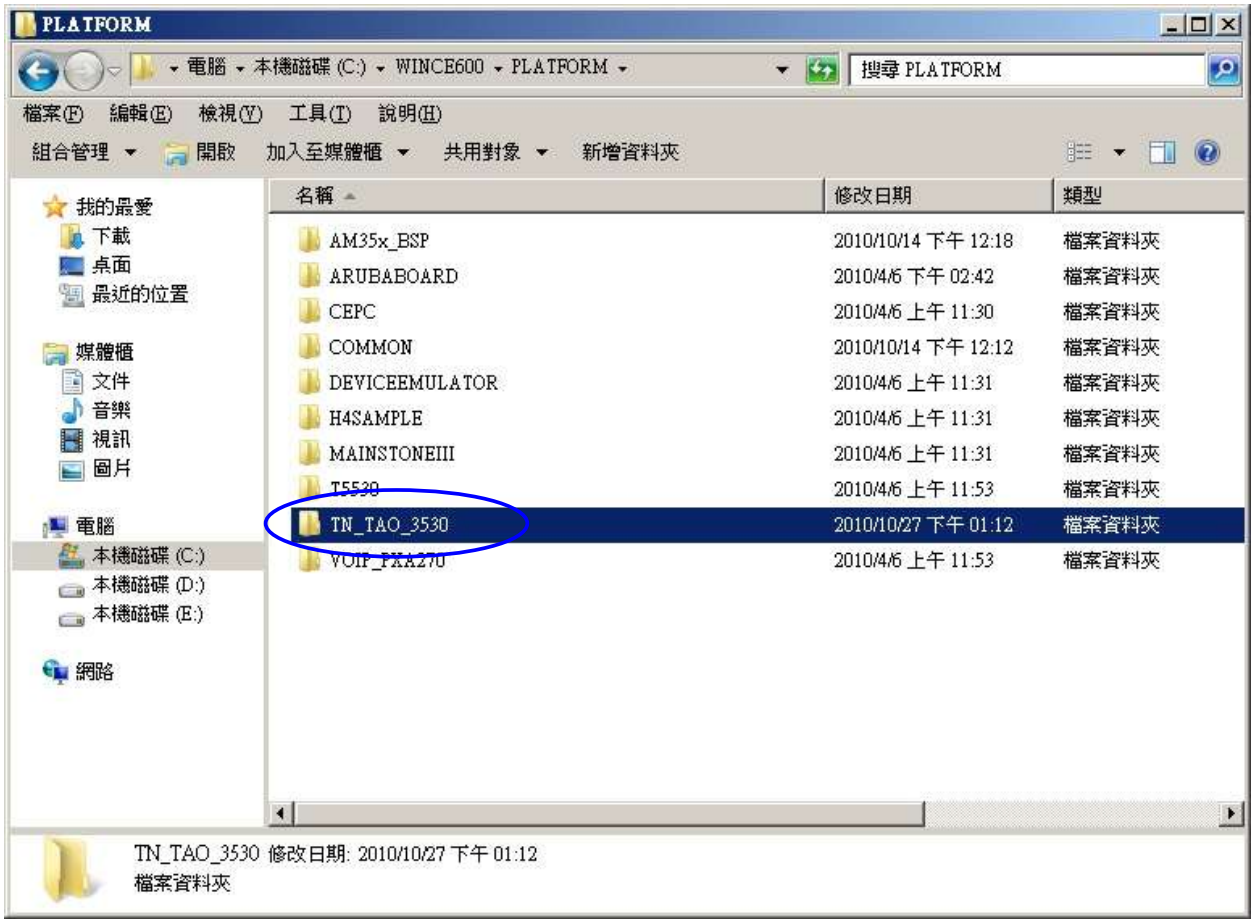
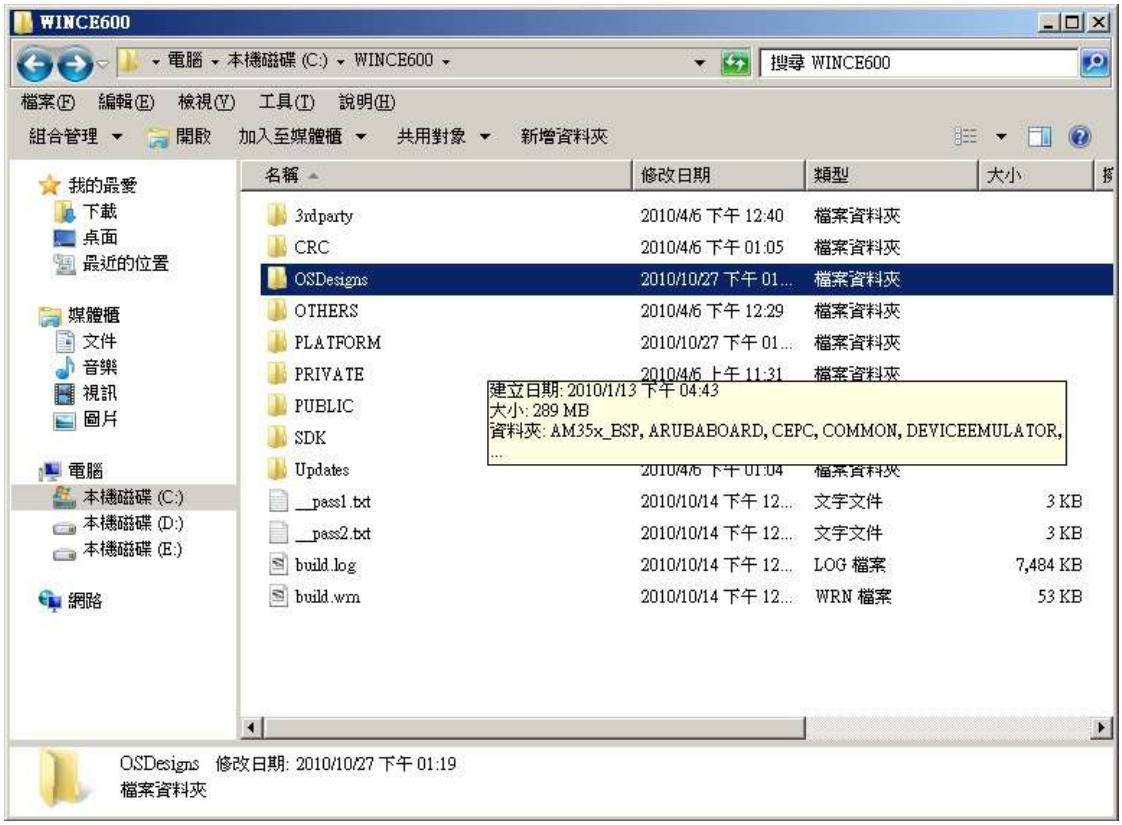

PLATFORM
電腦 ▸ 本機磁碟 (C:) ▸ WINCE600 ▸ PLATFORM ▸
搜尋 PLATFORM
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 開啟 加入至媒體櫃 共用對象 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
網路
名稱
修改日期
類型
AM35x_BSP 2010/10/14 下午 12:18 檔案資料夾
ARUBABOARD 2010/4/6 下午 02:42 檔案資料夾
CEPC 2010/4/6 上午 11:30 檔案資料夾
COMMON 2010/10/14 下午 12:12 檔案資料夾
DEVICEEMULATOR 2010/4/6 上午 11:31 檔案資料夾
H4SAMPLE 2010/4/6 上午 11:31 檔案資料夾
MAINSTONEIII 2010/4/6 上午 11:31 檔案資料夾
T5530 2010/4/6 上午 11:53 檔案資料夾
TN_TAO_3530 2010/10/27 下午 01:12 檔案資料夾
VOIP_PXA270 2010/4/6 上午 11:53 檔案資料夾
TN_TAO_3530 修改日期: 2010/10/27 下午 01:12
檔案資料夾

Figure 86

Go back to the decompressed folder "TN-TAO-3530_CE6.0_1.00.04 / 1.0014 / " folder, and copy the "OSDesigns" folder to "C:\ WINCE600 \". (See Figure 87 and Figure 88)

Figure 87


WINCE600
電腦 ▸ 本機磁碟 (C:) ▸ WINCE600 ▸
搜尋 WINCE600
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 開啟 加入至媒體櫃 共用對象 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
網路
名稱
修改日期
類型
大小
3rdparty 2010/4/6 下午 12:40 檔案資料夾
CRC 2010/4/6 下午 01:05 檔案資料夾
OSDesigns 2010/10/27 下午 01... 檔案資料夾
OTHERS 2010/4/6 下午 12:29 檔案資料夾
PLATFORM 2010/10/27 下午 01... 檔案資料夾
PRIVATE 2010/4/6 下午 11:31 檔案資料夾
PUBLIC
SDK
Updates
建立日期: 2010/1/13 下午 04:43
大小: 289 MB
資料夾: AM35x_BSP, ARUBABOARD, CEPC, COMMON, DEVICEEMULATOR, ...
__pass1.txt 2010/10/14 下午 12... 文字文件 3 KB
__pass2.txt 2010/10/14 下午 12... 文字文件 3 KB
build.log 2010/10/14 下午 12... LOG 檔案 7,484 KB
build.wrn 2010/10/14 下午 12... WRN 檔案 53 KB
OSDesigns 修改日期: 2010/10/27 下午 01:19
檔案資料夾
Figure 88

12.4 Create a SD card

This chapter describes making a SD card with the standard panel solutions. If you want to make a SD card for your own custom panel (a new project), then please read chapter 12.6.

- Open "Microsoft Visual Studio 2005". If that already open, Please reopen it.
- Click "File → Open → Project Solution" (See Figure 89)

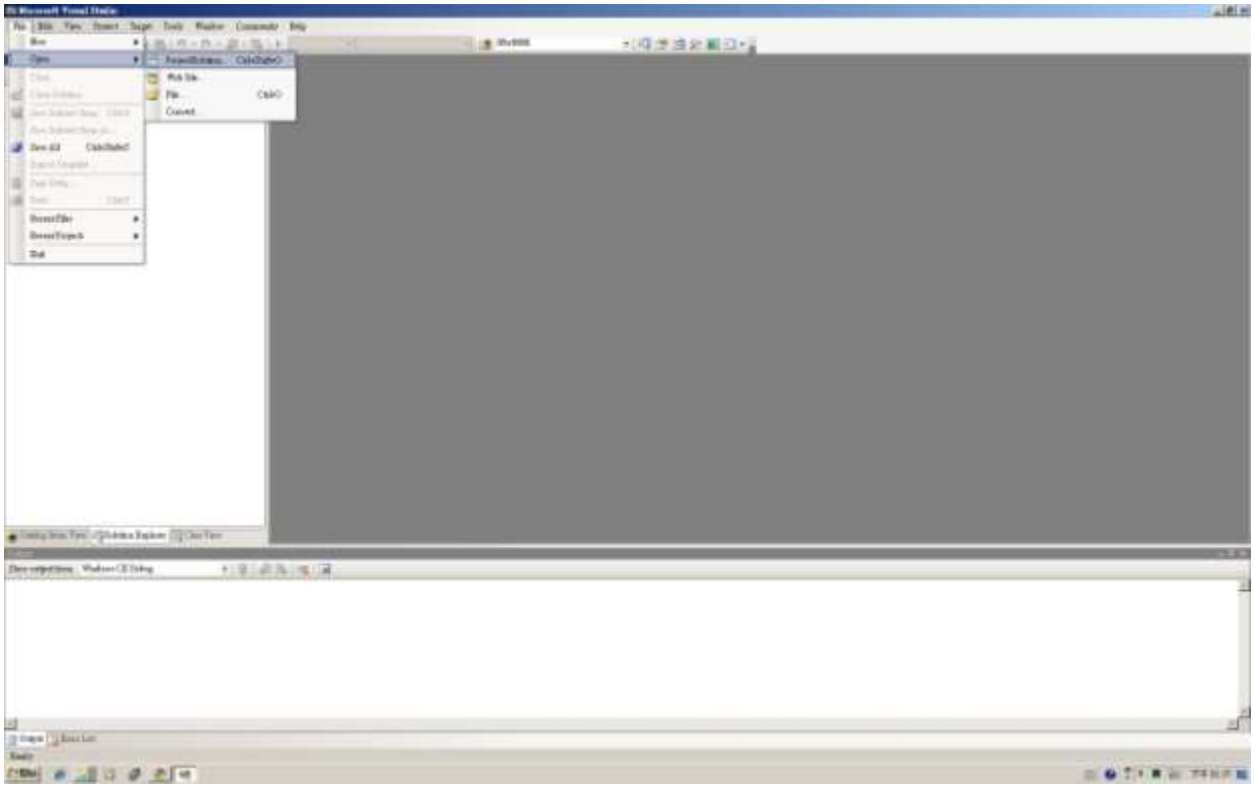


Figure 89

- Go into the folder and open the SLN-file (As example in this manual we use "Tsunami_LCD_AT070TN94") (See Figure 90)

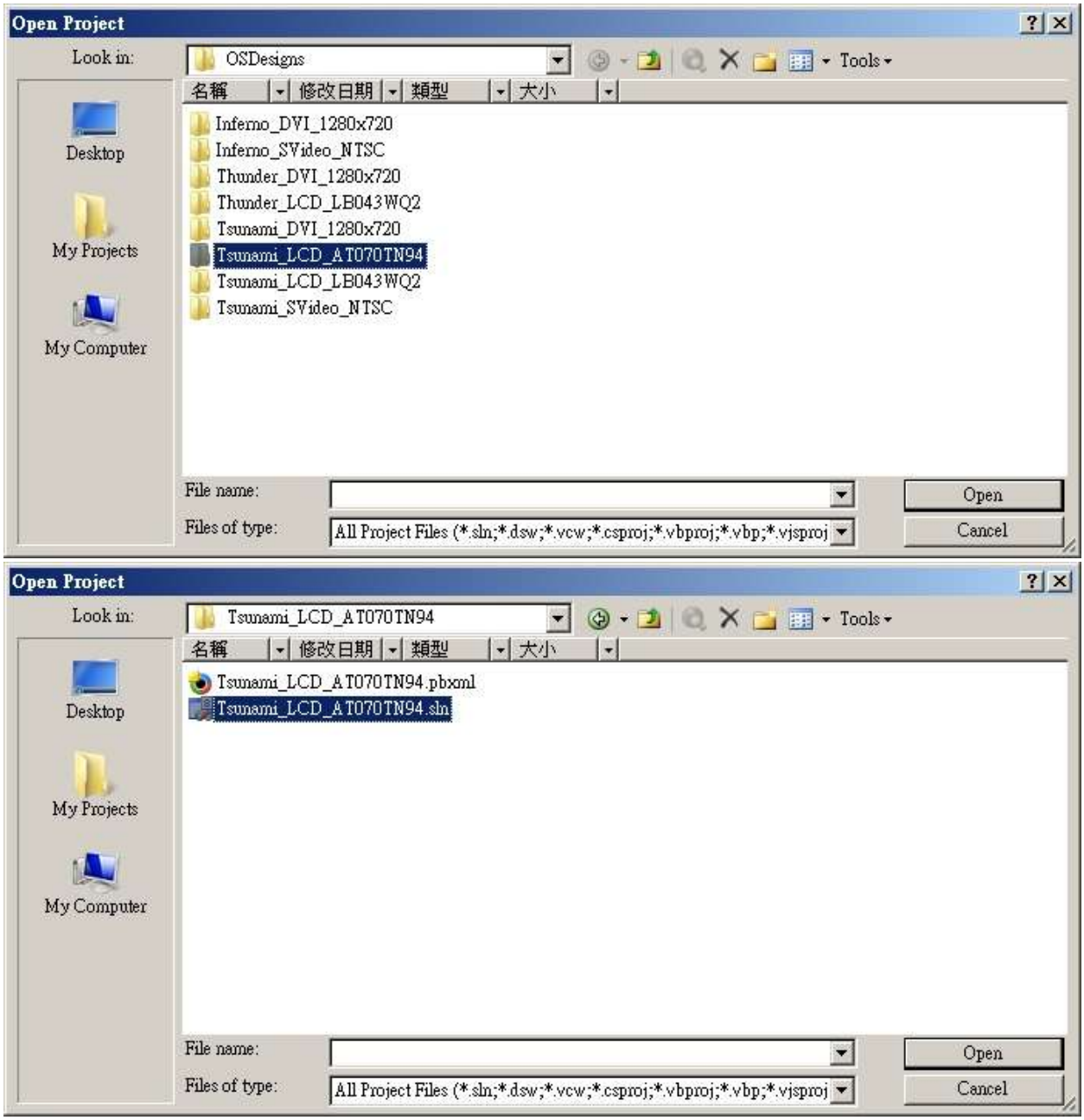

Open Project
Look in:
OSDesigns
Tools
名稱
修改日期
類型
大小
Desktop
My Projects
My Computer
Inferno_DVI_1280x720
Inferno_SVideo_NTSC
Thunder_DVI_1280x720
Thunder_LCD_LB043WQ2
Tsunami_DVI_1280x720
Tsunami_LCD_AT070TN94
Tsunami_LCD_LB043WQ2
Tsunami_SVideo_NTSC
File name:
Files of type:
All Project Files (*.sln;*.dsw;*.vcw;*.csproj;*.vbproj;*.vbp;*.vjsproj
Open
Cancel
Open Project
Look in:
Tsunami_LCD_AT070TN94
Tools
名稱
修改日期
類型
大小
Desktop
My Projects
My Computer
Tsunami_LCD_AT070TN94.pbxml
Tsunami_LCD_AT070TN94.sln
File name:
Files of type:
All Project Files (*.sln;*.dsw;*.vcw;*.csproj;*.vbproj;*.vbp;*.vjsproj
Open
Cancel

Figure 90

In the menu click "build/advanced build command/sysgen" (See Figure 91); this will take approximately 20 minutes, after which you will see "build complete" (see Figure 92)
[The older version of the BSP has a naming mistake, so even though we install a 7 inch panel you will sometimes see "LB043WQ2" mentioned in the log]

Warning! Be patient: let "clean sysgen" finish, this will take **20** minutes

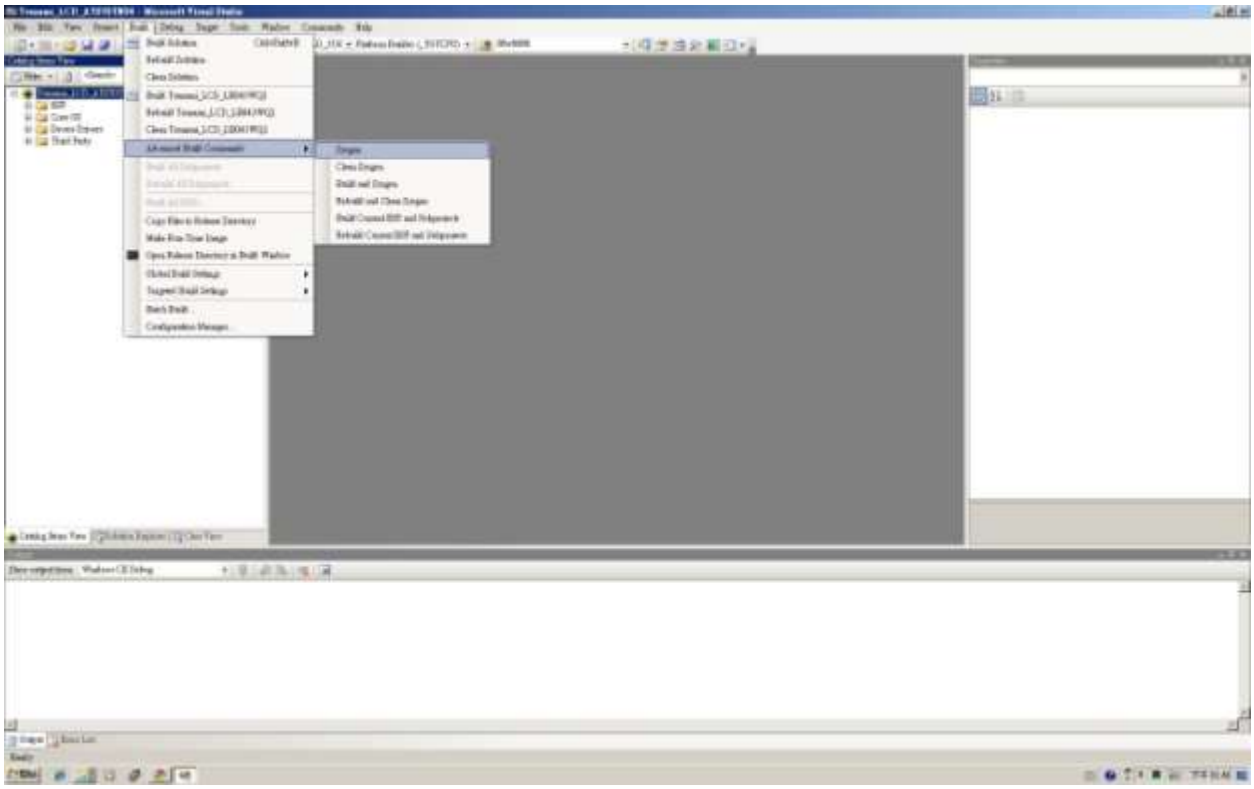


Figure 91

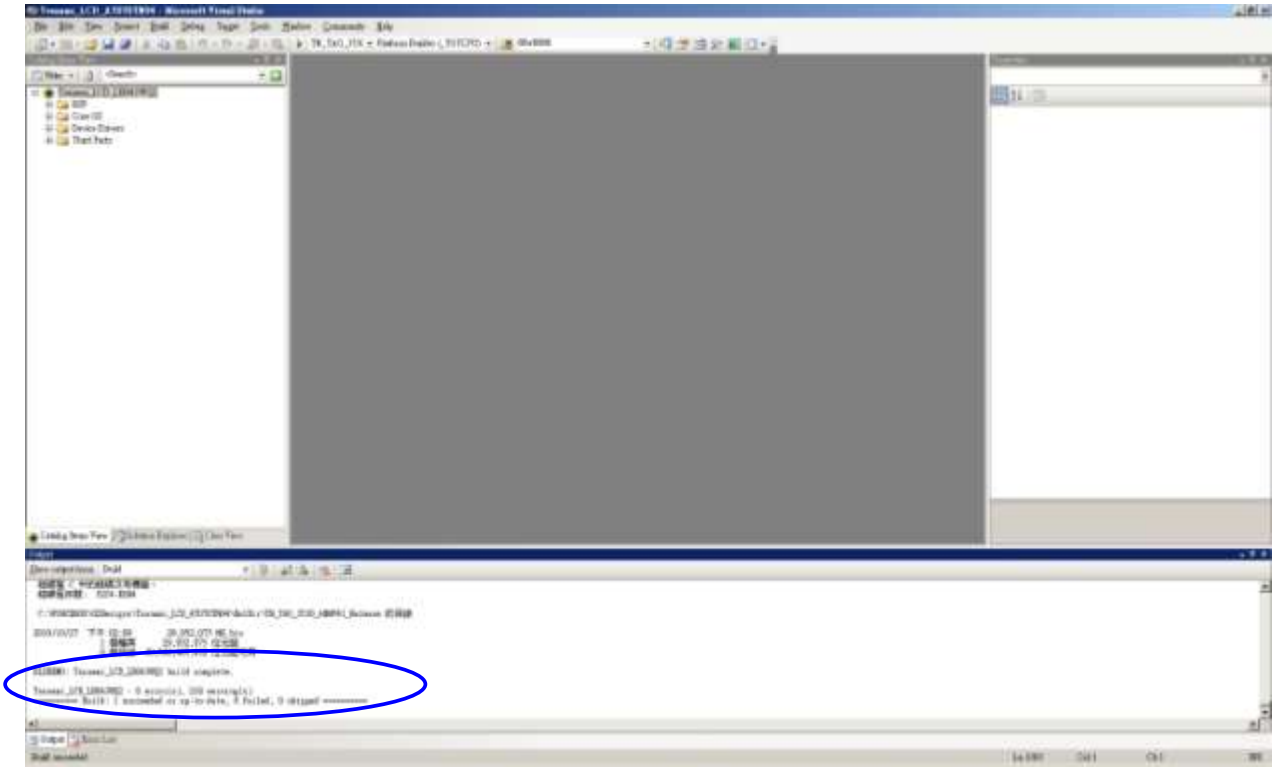


Figure 92

- Plug an microSD in your computer (with for instance a USB card reader)

- Open "active@partition manager" (freeware at www.pcdisk.com)
- Right click on removable disk and choose "new partition" (see Figure 93)

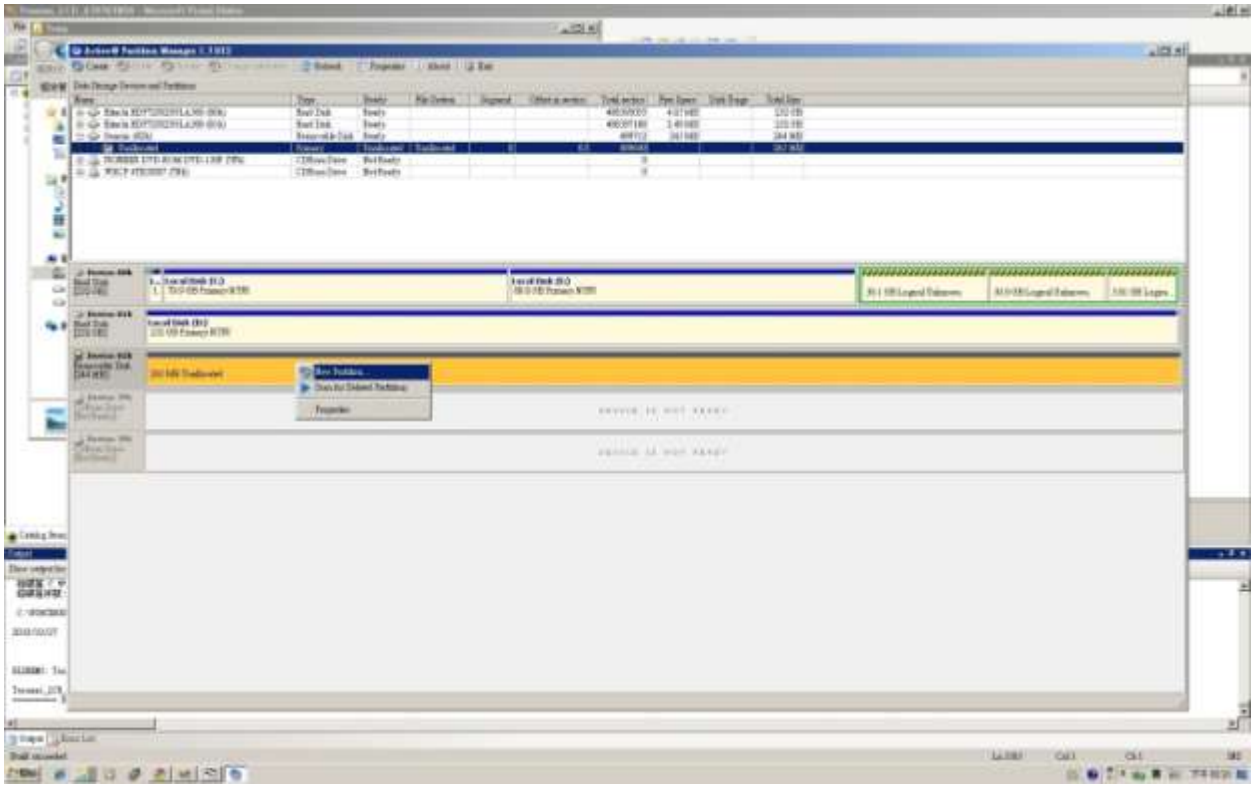


Figure 93

- In the menu mark "partition as active", press OK, it will then show "successful" (see Figure 94)

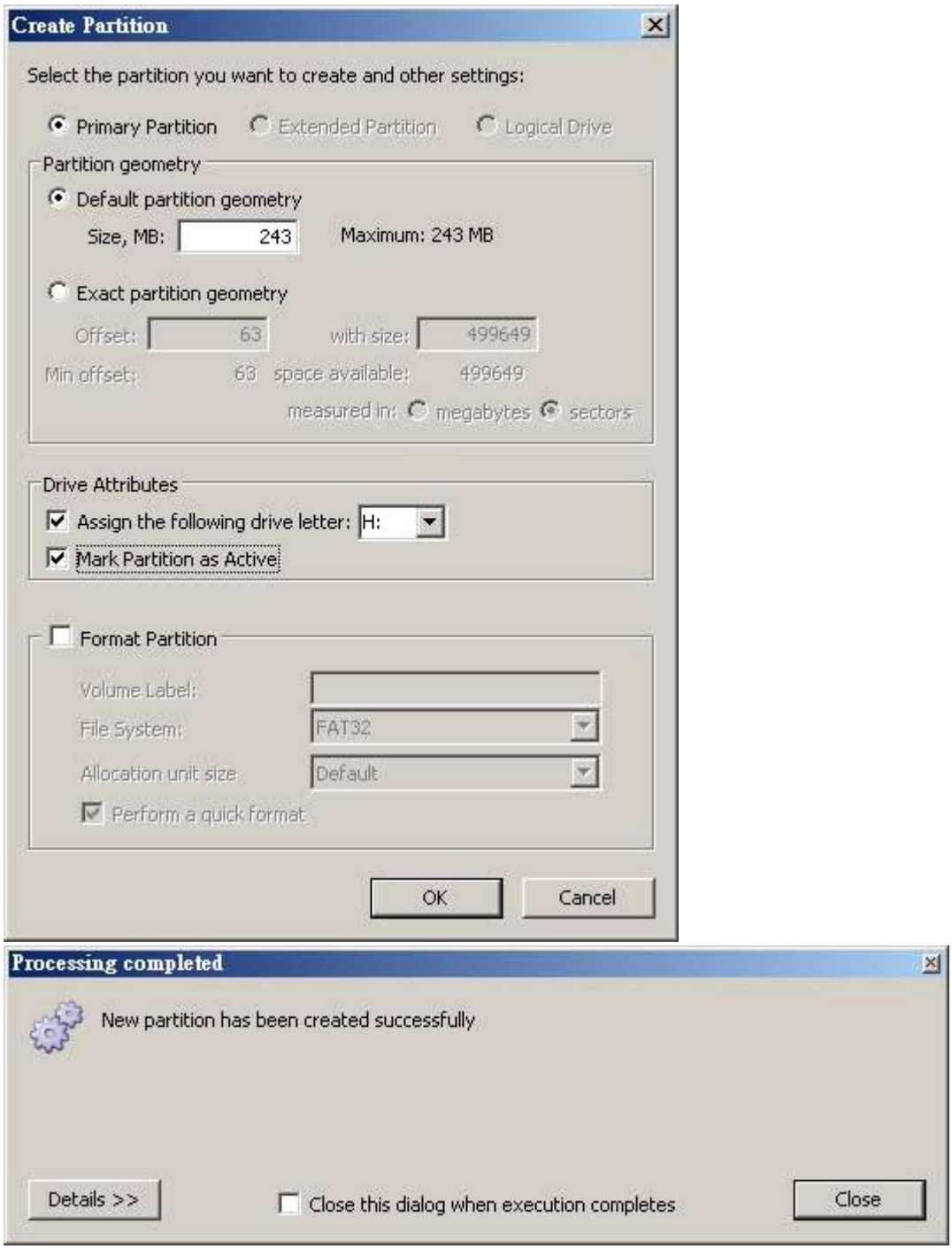


Figure 94

- Right click again and choose format, Click OK, finished (see Figure 95)

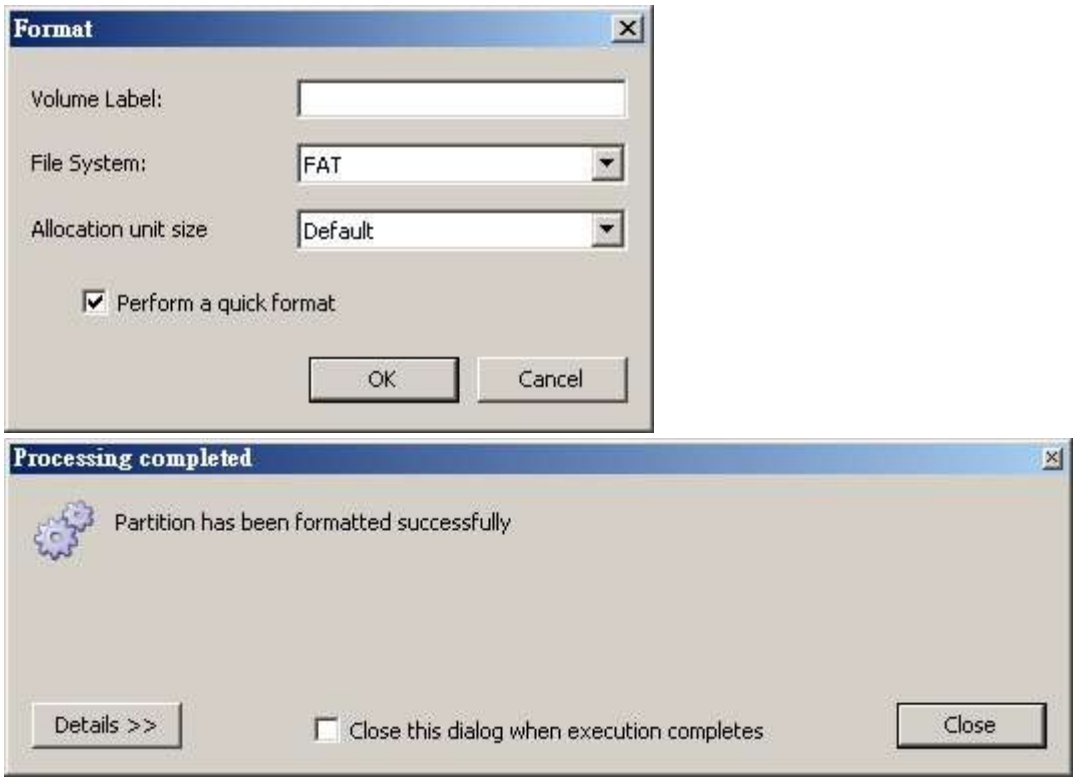


Figure 95

- Go to C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\RelDir" and open the folder "TN_TAO_3530_ARMV41_release" (See Figure 96). The folder contains files named: MLO, EBOOTSD.nb0, NK.bin
  (These files are needed for a bootable SD-card)

Figure 96

- First copy "MLO" to the microSD card (the order is important)
- Then copy "EBOOTSD.nb0" and "NK.bin" in the microSD card (See Figure 97)
- Remove the MicroSD card

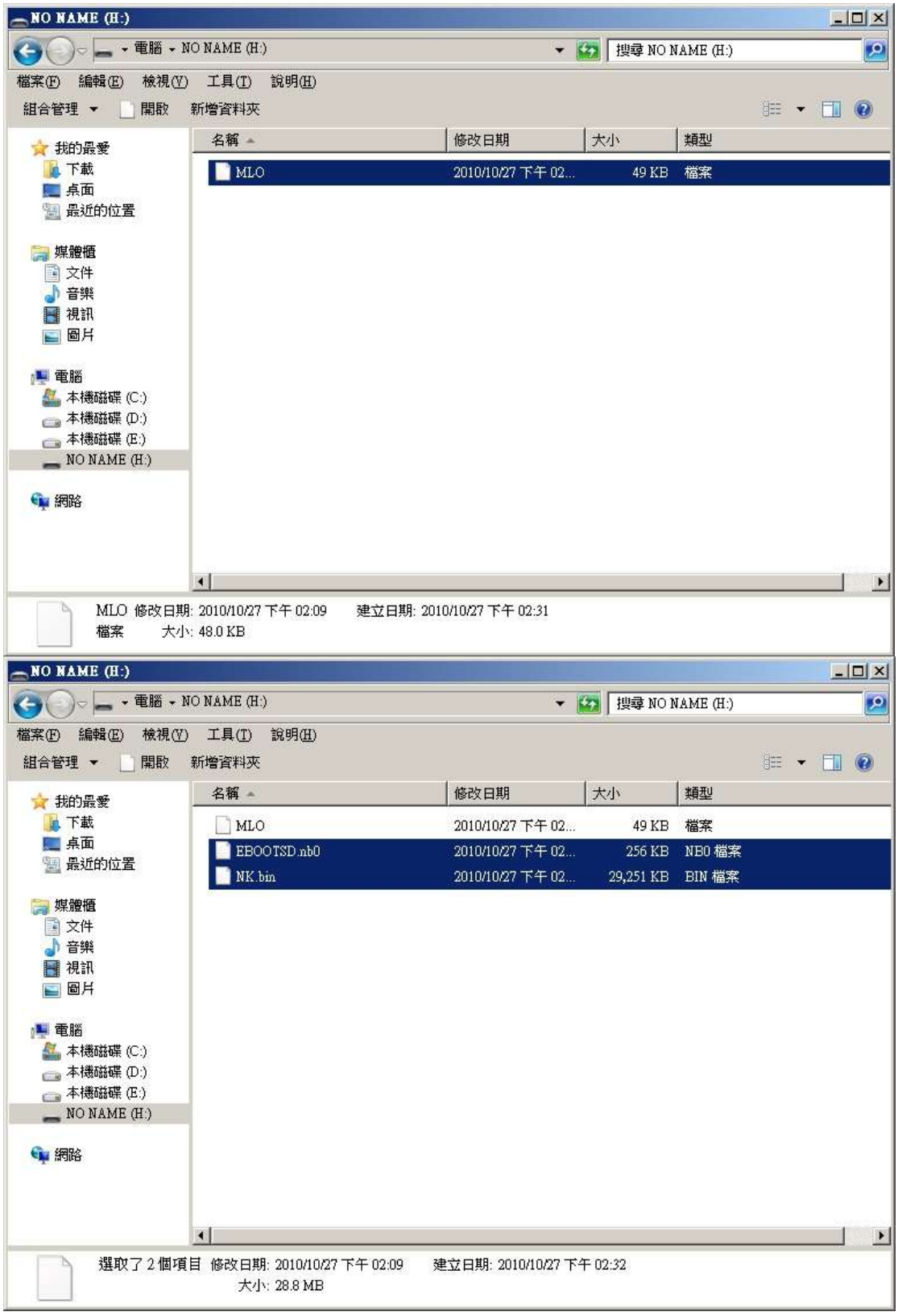

NO NAME (H:)
電腦 ▸ NO NAME (H:)
搜尋 NO NAME (H:)
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 開啟 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
NO NAME (H:)
網路
名稱 修改日期 大小 類型
MLO 2010/10/27 下午 02... 49 KB 檔案
MLO 修改日期: 2010/10/27 下午 02:09 建立日期: 2010/10/27 下午 02:31
檔案 大小: 48.0 KB
NO NAME (H:)
電腦 ▸ NO NAME (H:)
搜尋 NO NAME (H:)
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 開啟 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
NO NAME (H:)
網路
名稱 修改日期 大小 類型
MLO 2010/10/27 下午 02... 49 KB 檔案
EBOOTSD.nb0 2010/10/27 下午 02... 256 KB NB0 檔案
NK.bin 2010/10/27 下午 02... 29,251 KB BIN 檔案
選取了 2 個項目 修改日期: 2010/10/27 下午 02:09 建立日期: 2010/10/27 下午 02:32
大小: 28.8 MB

Figure 97

- Open a terminal (Hyperterminal or PuTTY). In this manual we use PuTTY.
- Make sure the terminal cable is connected
- Select a com port (for example COM1) and check that the settings are OK:

Baud rate	115200
Data bit	8
Stop bits	1
Parity	none
Flow control	none

- Press "Load"

- Now insert the microSD in your Baseboard
- Keep the user button on the baseboard pressed and insert the power cable
- It will boot from SD
- You'll see "Hit space to enter configuration menu 5..." in PuTTY.
  Please push space key on the keyboard of PC.
  You'll see "Main Menu" in PuTTY.
- In the terminal choose option Select Boot Device (See Figure 98)

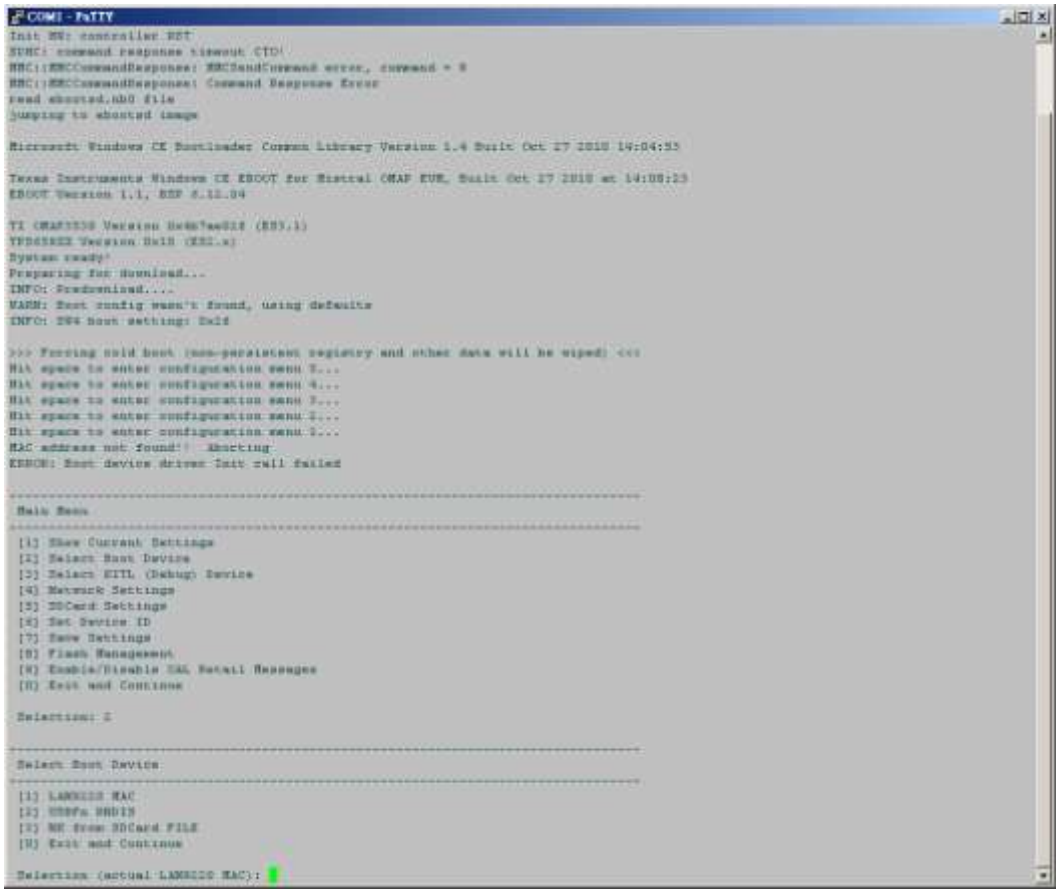


Figure 98

- Select NK from SD Card FILE (See figure 16)

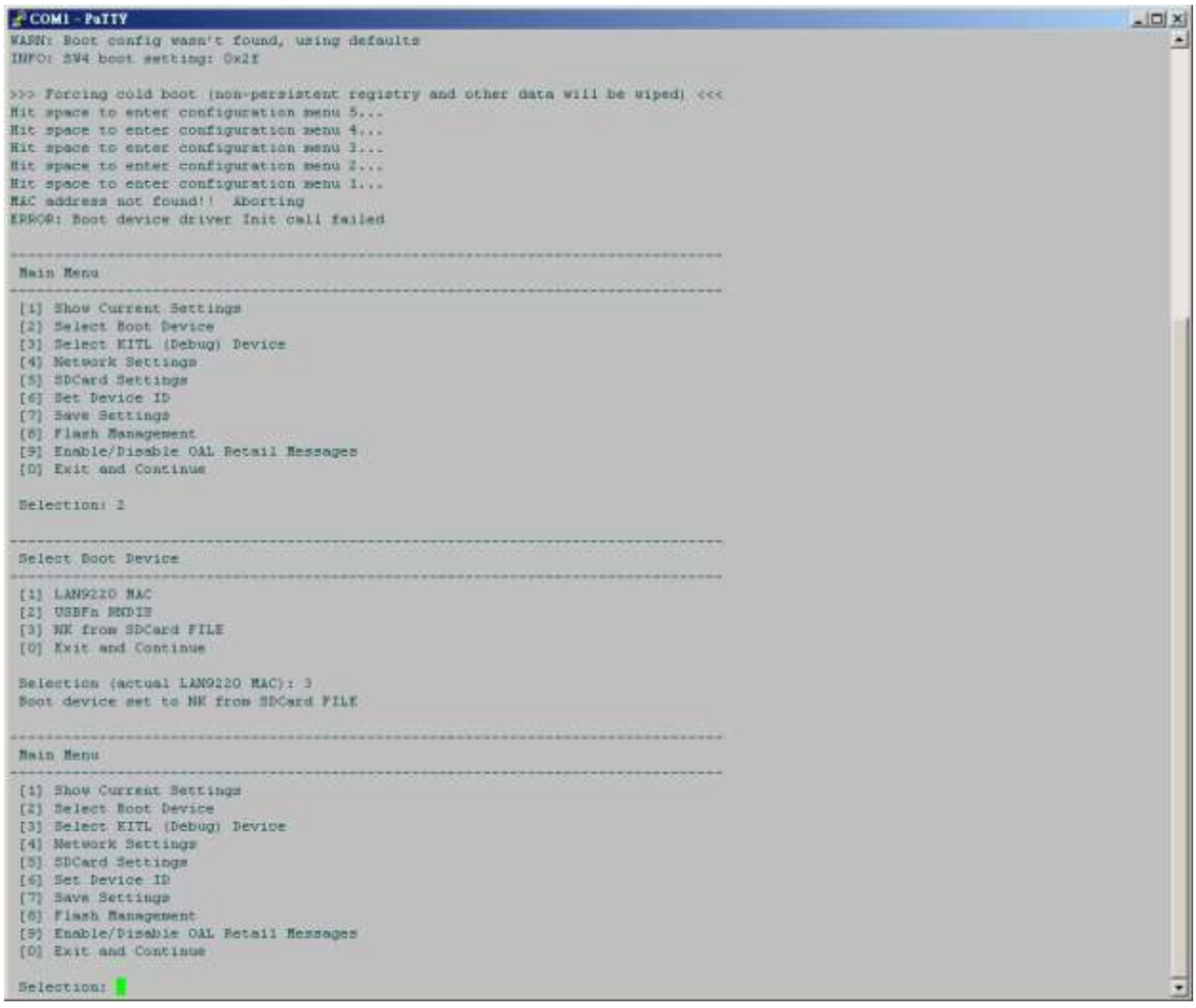


Figure 99

- Select Exit and Continue
- It will start to load the image into the memory (see Figure 100) and the base board will show Windows CE.
- FINISHED

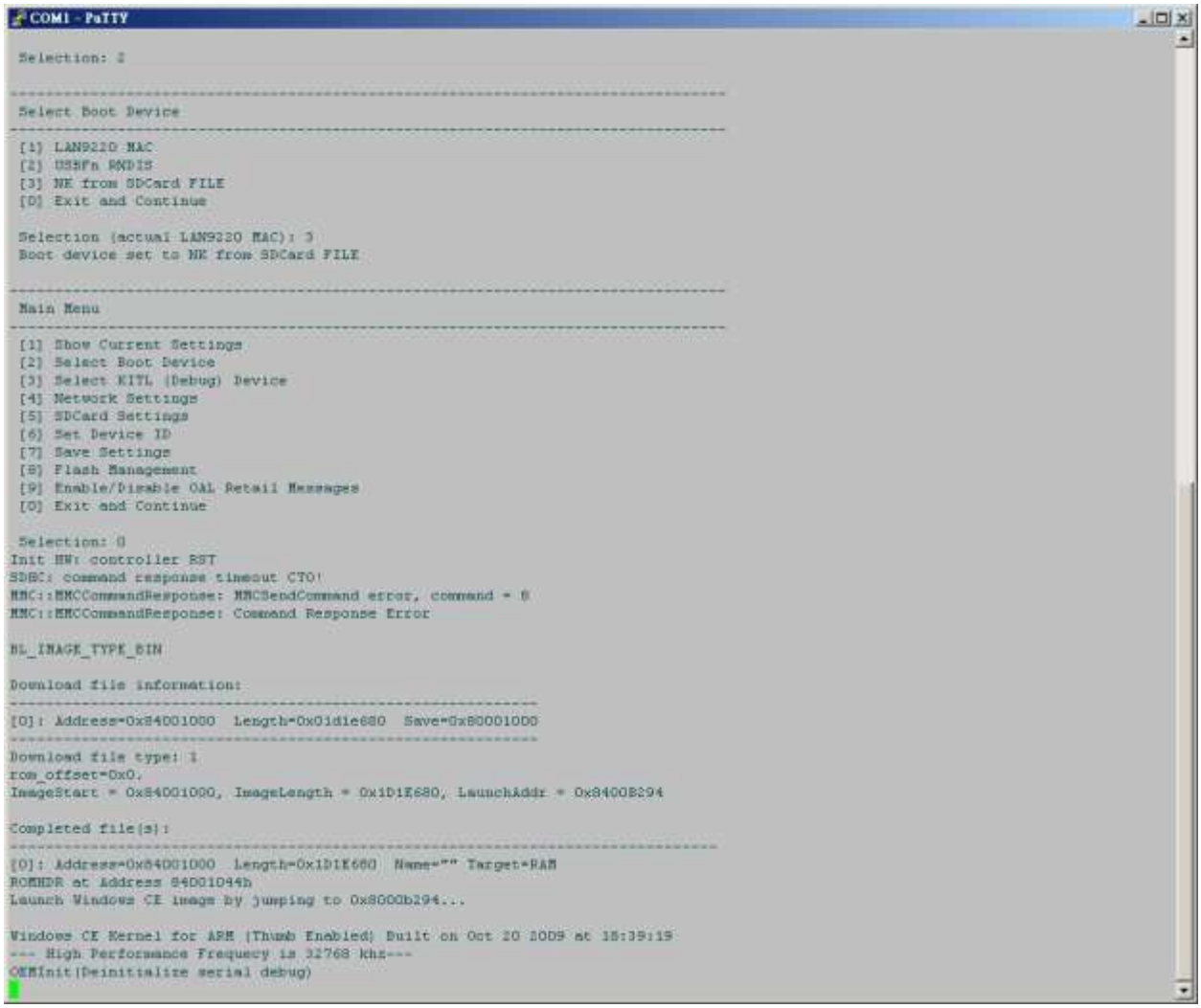

COM1 - PuTTY
Selection: 3
Select Boot Device
[1] LAN9220 MAC
[2] USBFn RNDIS
[3] NK from SDCard FILE
[0] Exit and Continue
Selection (actual LAN9220 MAC): 3
Boot device set to NK from SDCard FILE
Main Menu
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection: 0
Init HW: controller RST
SDBC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
BL_IMAGE_TYPE_BIN
Download file information:
[0]: Address=0x84001000 Length=0x01d1e680 Save=0x80001000
Download file type: 1
rom_offset=0x0.
ImageStart = 0x84001000, ImageLength = 0x1D1E680, LaunchAddr = 0x8400B294
Completed file(s):
[0]: Address=0x84001000 Length=0x1D1E680 Name="" Target=RAM
ROMHDR at Address 84D01944h
Launch Windows CE image by jumping to 0x8000b294...
Windows CE Kernel for ARM (Thumb Enabled) Built on Oct 20 2009 at 15:39:19
--- High Performance Frequency is 32768 khz---
OEMInit(Deinitialize serial debug)

Figure 100

12.5 How to put the WinCE image in the NAND Flash

In the previous section we showed how to boot from a SD card. Now we explain how to put the image in the NAND Flash so you can boot without the SD card.

12.5.1 Create file "NK.nb0".

- Click "Build → Open Release Directory in Build Window". (See Figure 101)
- It will open a console window. (See figure 19)

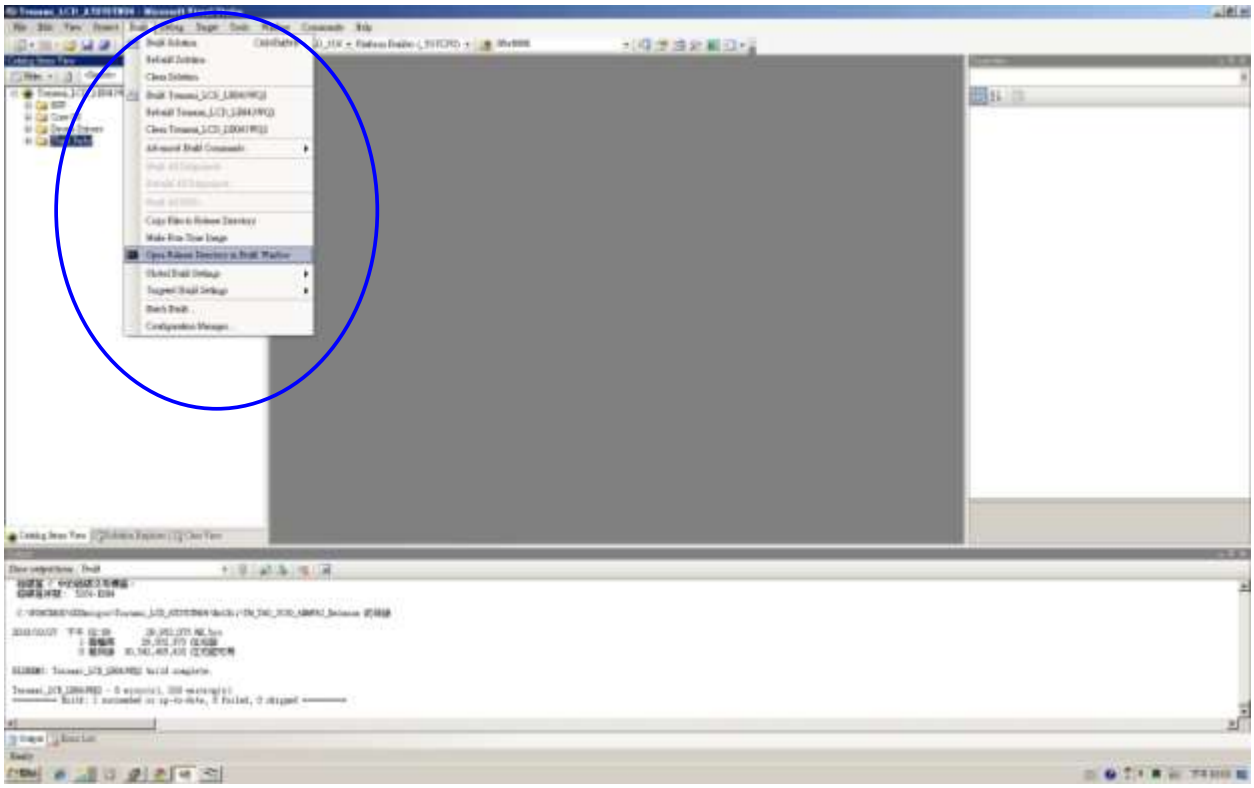


Figure 101

- Type "viewbin nk.bin". (See Figure 102)
- It will show "Image Start = address, length = size".
  (Example "Image Start = 0x84001000, length = 0x01D1E680")
- Type "cvrtbin -r -w 32 -a Image Start -l length nk.bin".
  (Example "cvrtbin -w 32 -r -a 0x84001000 -l 0x01d1e680 nk.bin"). (See Figure 103)

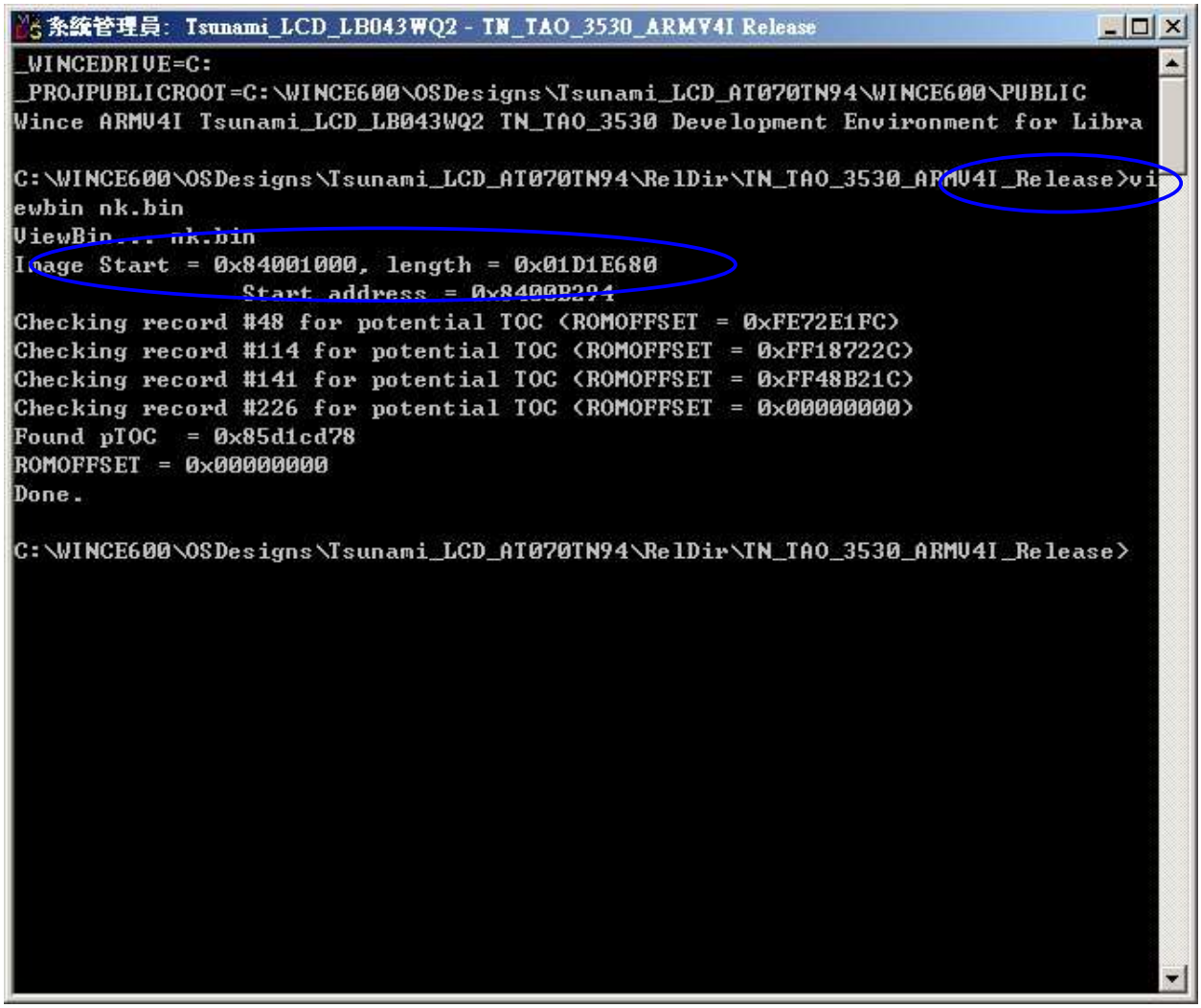
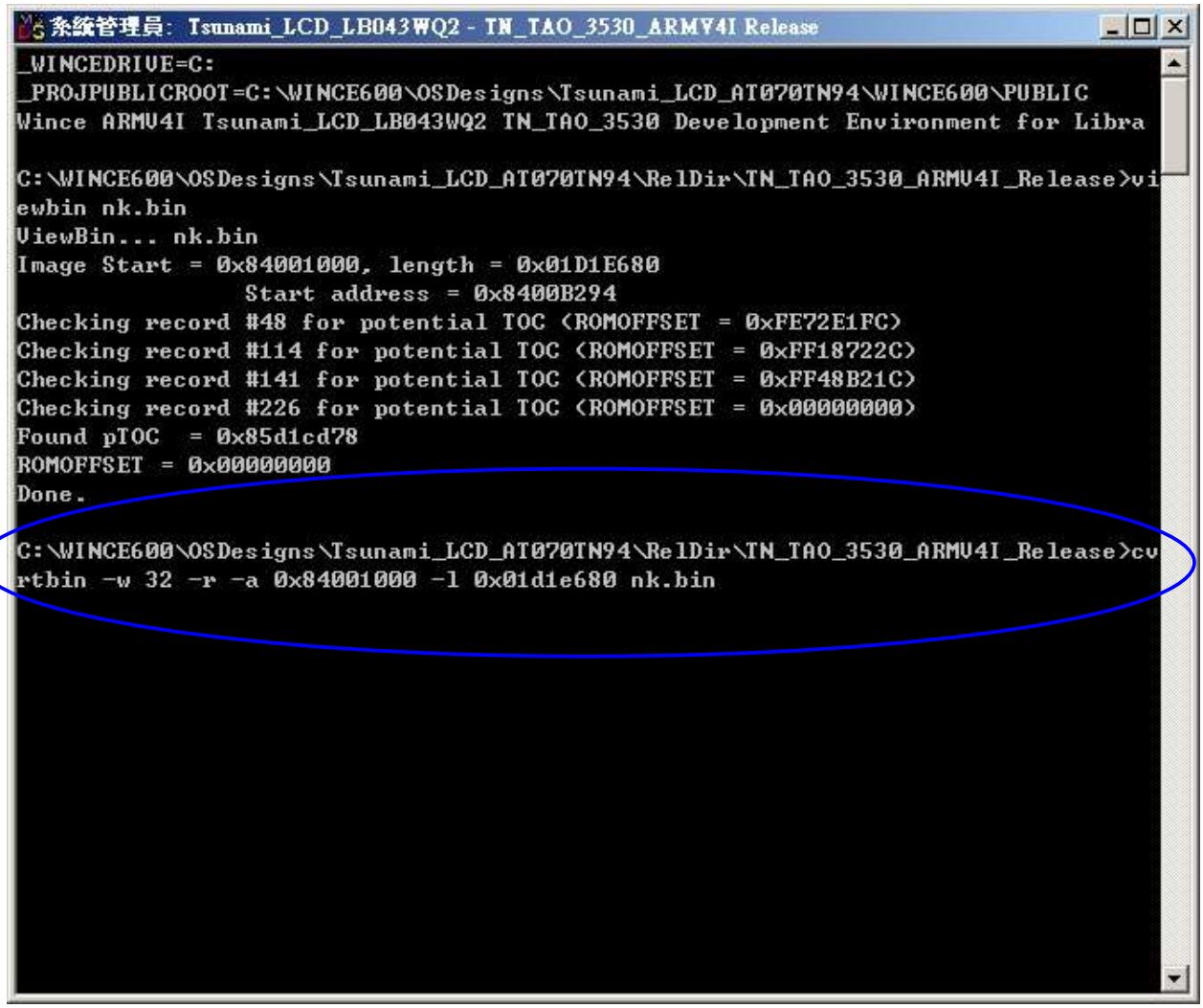

系統管理員: Tsunami_LCD_LB043WQ2 - TN_TAO_3530_ARMV4I Release
_WINCEDRIVE=C:
_PROJPUBLICROOT=C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\WINCE600\PUBLIC
Wince ARMV4I Tsunami_LCD_LB043WQ2 TN_TAO_3530 Development Environment for Libra
C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\RelDir\TN_TAO_3530_ARMV4I_Release>vi
ewbin nk.bin
ViewBin... nk.bin
Image Start = 0x84001000, length = 0x01D1E680
Checking record #48 for potential TOC (ROMOFFSET = 0xFE72E1FC)
Checking record #114 for potential TOC (ROMOFFSET = 0xFF18722C)
Checking record #141 for potential TOC (ROMOFFSET = 0xFF48B21C)
Checking record #226 for potential TOC (ROMOFFSET = 0x00000000)
Found pTOC = 0x85d1cd78
ROMOFFSET = 0x00000000
Done.
C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\RelDir\TN_TAO_3530_ARMV4I_Release>

Figure 102


系統管理員: Tsunami_LCD_LB043WQ2 - TN_TAO_3530_ARMV4I Release
_WINCEDRIVE=C:
_PROJPUBLICROOT=C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\WINCE600\PUBLIC
Wince ARMV4I Tsunami_LCD_LB043WQ2 TN_TAO_3530 Development Environment for Libra
C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\RelDir\TN_TAO_3530_ARMV4I_Release>vi
ewbin nk.bin
ViewBin... nk.bin
Image Start = 0x84001000, length = 0x01D1E680
Start address = 0x8400B294
Checking record #48 for potential TOC (ROMOFFSET = 0xFE72E1FC)
Checking record #114 for potential TOC (ROMOFFSET = 0xFF18722C)
Checking record #141 for potential TOC (ROMOFFSET = 0xFF48B21C)
Checking record #226 for potential TOC (ROMOFFSET = 0x00000000)
Found pTOC = 0x85d1cd78
ROMOFFSET = 0x00000000
Done.
C:\WINCE600\OSDesigns\Tsunami_LCD_AT070TN94\RelDir\TN_TAO_3530_ARMV4I_Release>cv
rtbin -w 32 -r -a 0x84001000 -l 0x01d1e680 nk.bin
Figure 103

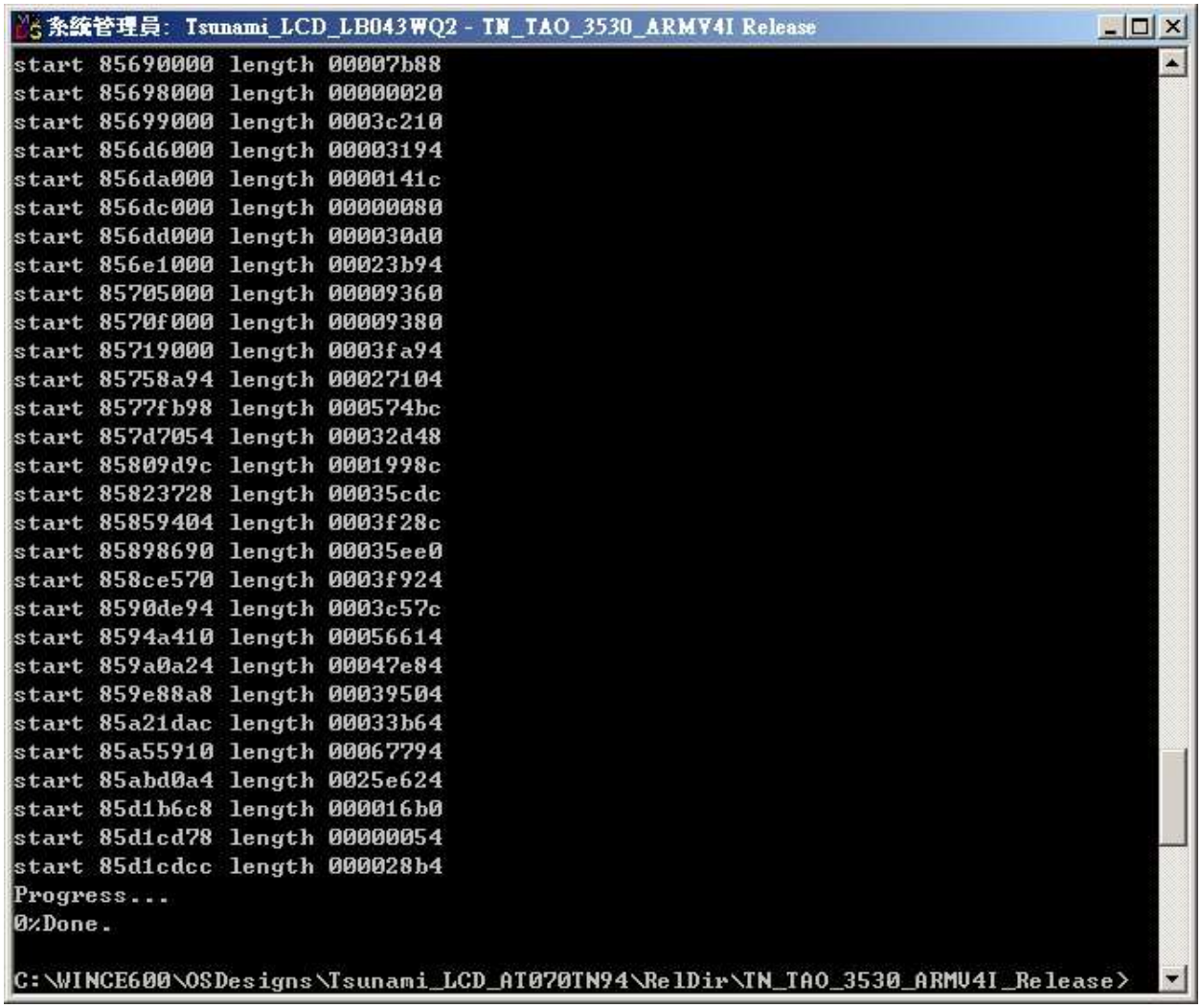


Figure 104

- FINISHED. (See Figure 104)
- You will now be able to find the file"NK.nb0" in the directory: RelDir/TN_TAO_3530_AMV41_Release

12.5.2 Write the Bootloader and OS image to the NAND Flash.

- Format the SD Card with the USB Card Reader in the computer, using "Active@ Partition Manager" or another utility.
- Mark "partition as active"
- This needs "MLO", "EBOOTSD.nb0", "fldr.raw" or "fldrlogo.raw" and "nk.nb0". These are in "C:\WINCE60\OSDesigns\Project Name\ RelDir\TN_TAO_3530_ARMV4I_Release\".

  (Note: for installing into NAND we need the **nk.nb0**, this is different from the nk.bin we used for the bootable SD-card)

- You can choose between "fldr.raw" or "fldrlogo.raw" (the end result will be the same). Fldr.raw will, during boot up, show a screen divided in four different colors. Fldrlogo.raw will, during boot up, show a dark screen with a TechNexion logo. If you want your own logo to appear then please read chapter 12.7.
- First copy only the "MLO" file to the SD card. (the order is important) See Figure 105)
- Then copy "EBOOTSD.nb0", "fldr.raw" or "fldrlogo.raw" and "nk.nb0" files to the SD card. (see Figure 106)
- Connect the UART cable. Open terminal setting:

  Chose Serial port: COM1 or other

Speed:	115200
Data bits:	8
Stop bits:	1
Parity:	None
Flow Control:	None

- Insert SD Card into the target board. Keep USER1 bottom pushed in. Then connect the power cable.
- When it shows "Hit space to enter configuration menu". Please push space button on the keyboard.
- It will show "Main Menu" in the terminal. (See Figure 107)

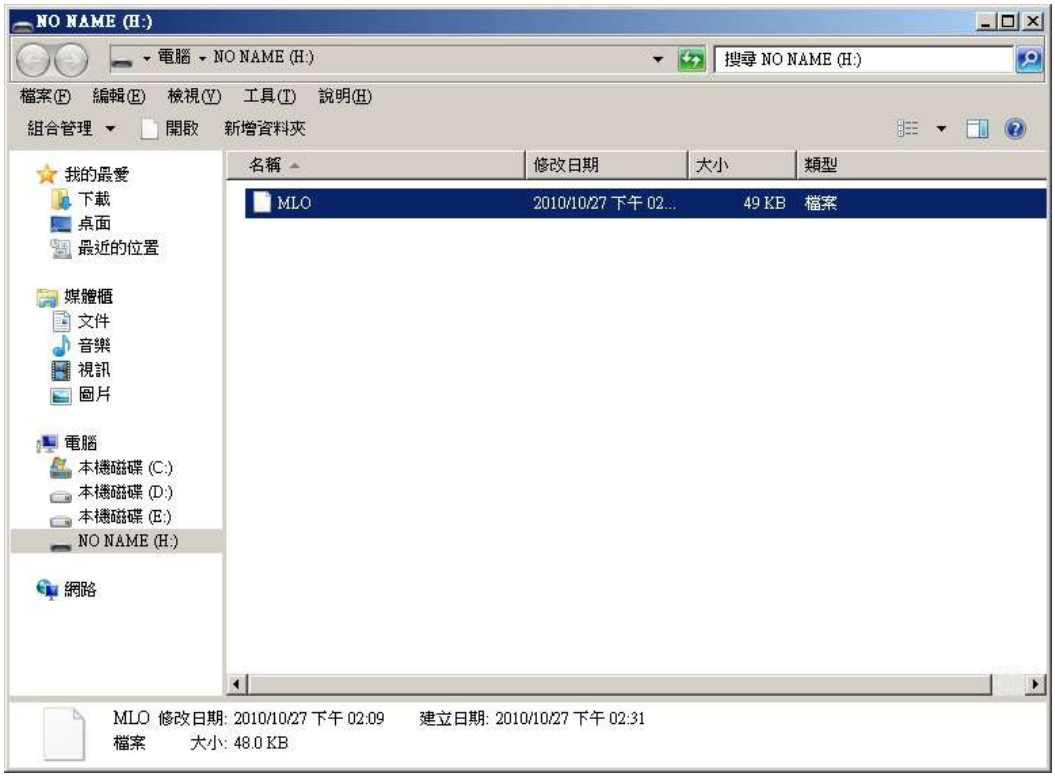


Figure 105

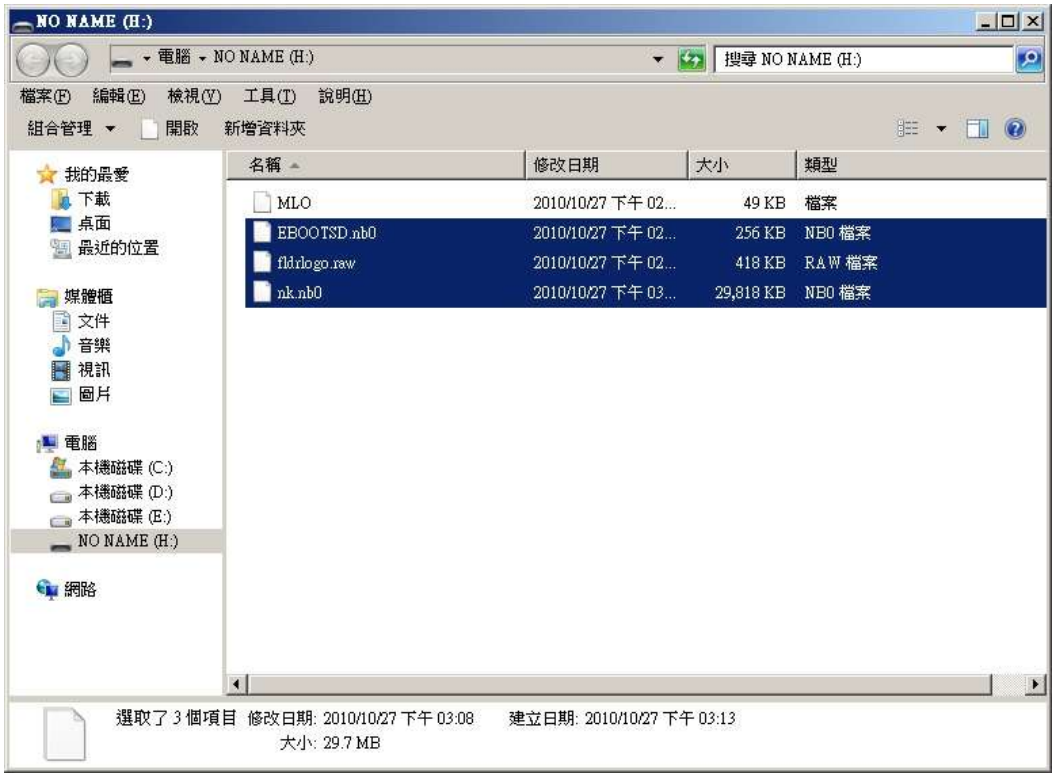


Figure 106

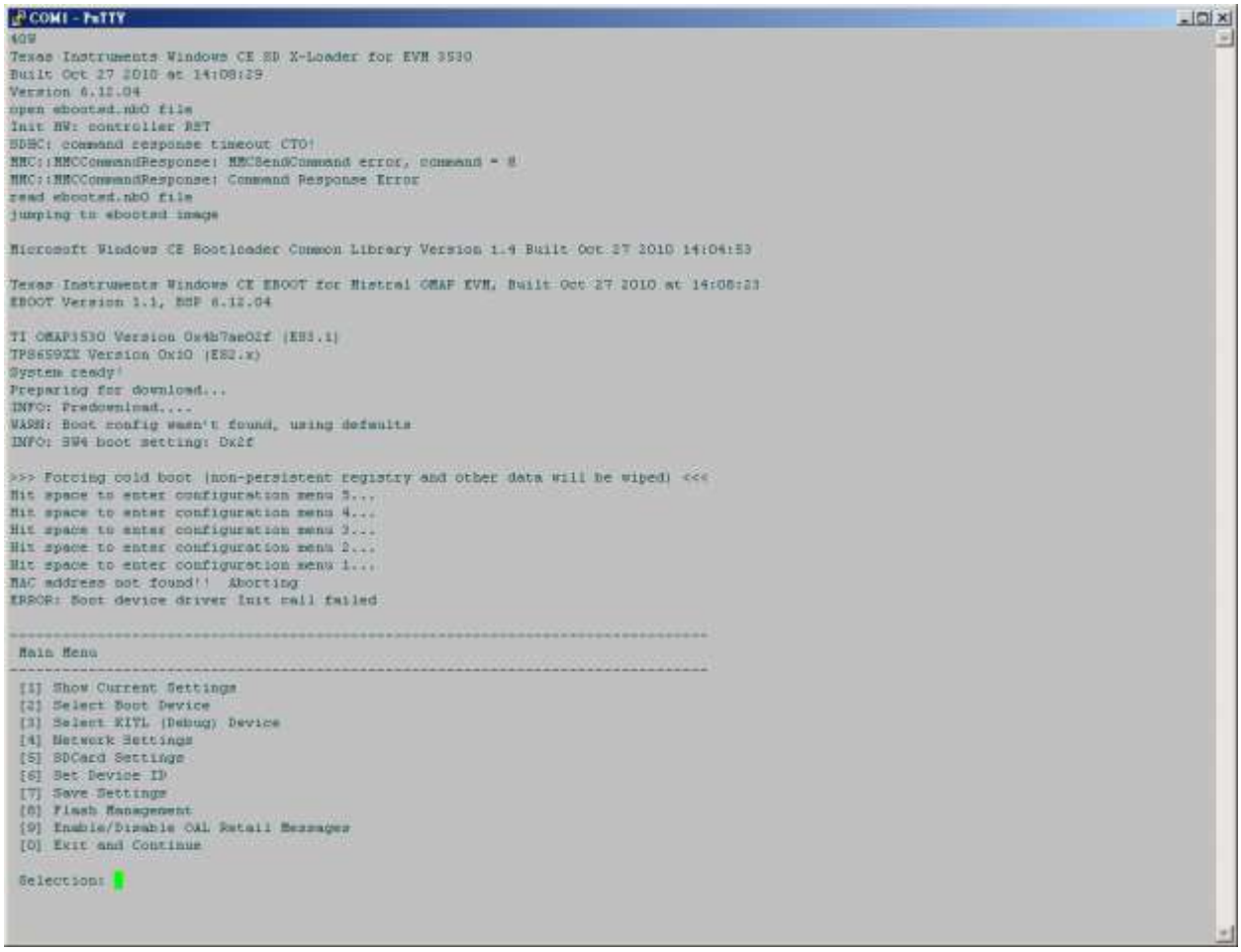

COM1 - PuTTY
409
Texas Instruments Windows CE SD X-Loader for EVM 3530
Built Oct 27 2010 at 14:08:29
Version 6.12.04
open ebootsd.nb0 file
Init HW: controller RST
SDHC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
read ebootsd.nb0 file
jumping to ebootsd image
Microsoft Windows CE Bootloader Common Library Version 1.4 Built Oct 27 2010 14:04:53
Texas Instruments Windows CE EBOOT for Mistral OMAP EVM, Built Oct 27 2010 at 14:08:23
EBOOT Version 1.1, BSP 6.12.04
TI OMAP3530 Version 0x4b7ae02f (ES3.1)
TPS659XX Version 0x10 (ES2.x)
System ready!
Preparing for download...
INFO: Predownload....
WARN: Boot config wasn't found, using defaults
INFO: SW4 boot setting: 0x2f
>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<
Hit space to enter configuration menu 5...
Hit space to enter configuration menu 4...
Hit space to enter configuration menu 3...
Hit space to enter configuration menu 2...
Hit space to enter configuration menu 1...
MAC address not found!! Aborting
ERROR: Boot device driver Init call failed
Main Menu
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection:

Figure 107

- Chose "Flash Management". (See Figure 108)

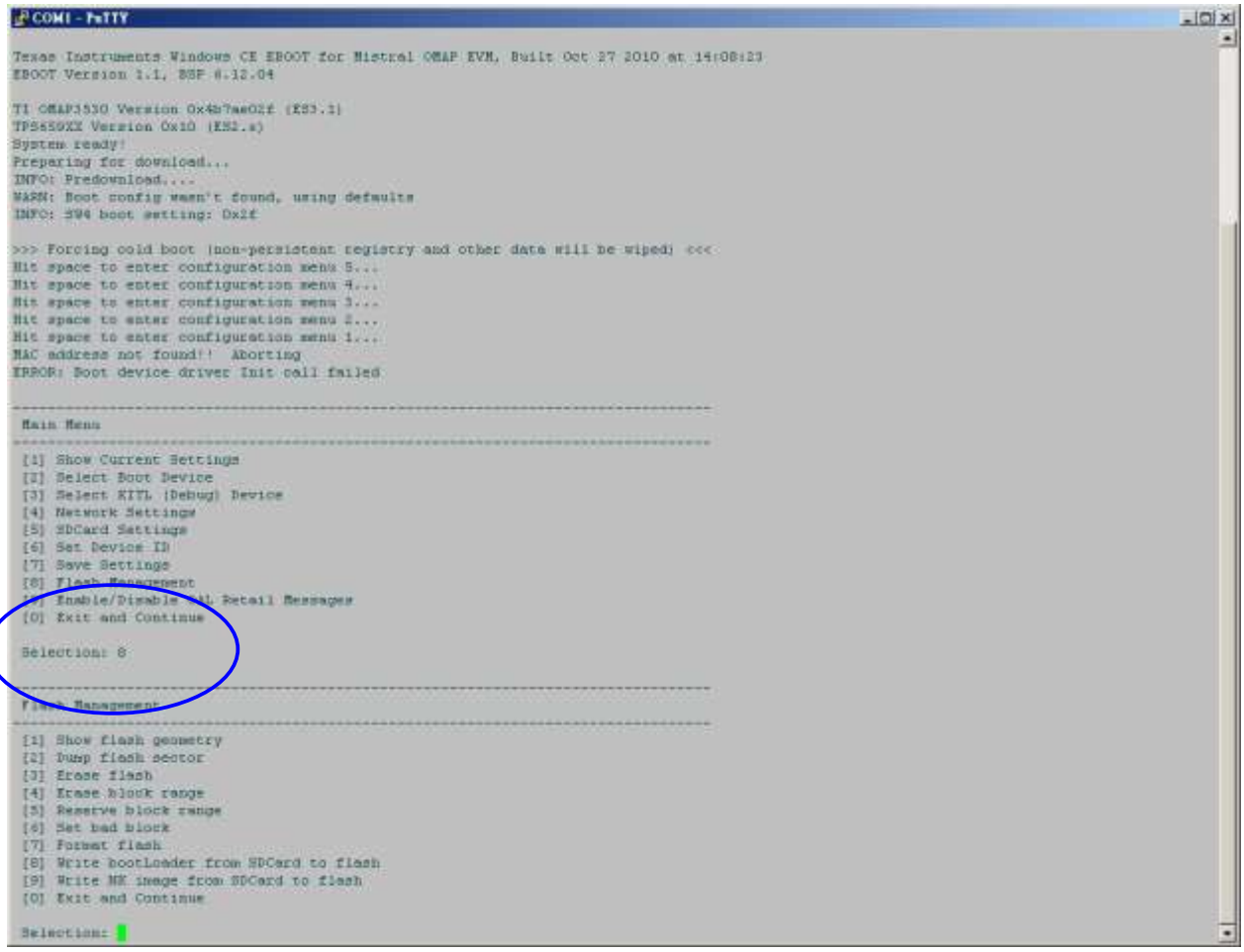


Figure 108

- Chose "Show flash geometry". (See Figure 109)
- It will show:
  Flash Type: NAND
  Blocks: 2048
- Chose "Erase block range". (See Figure 110)
- It will show "First Block Number:" Input "0". Then enter.
- It will show "Last Block Number:" Input "(Blocks – 1)". For example "2048-1=2047", so type 2047 then enter.
- It will show "Do you want erase block 0-2047 [-/y]?" Input "y" (See Figure 111)

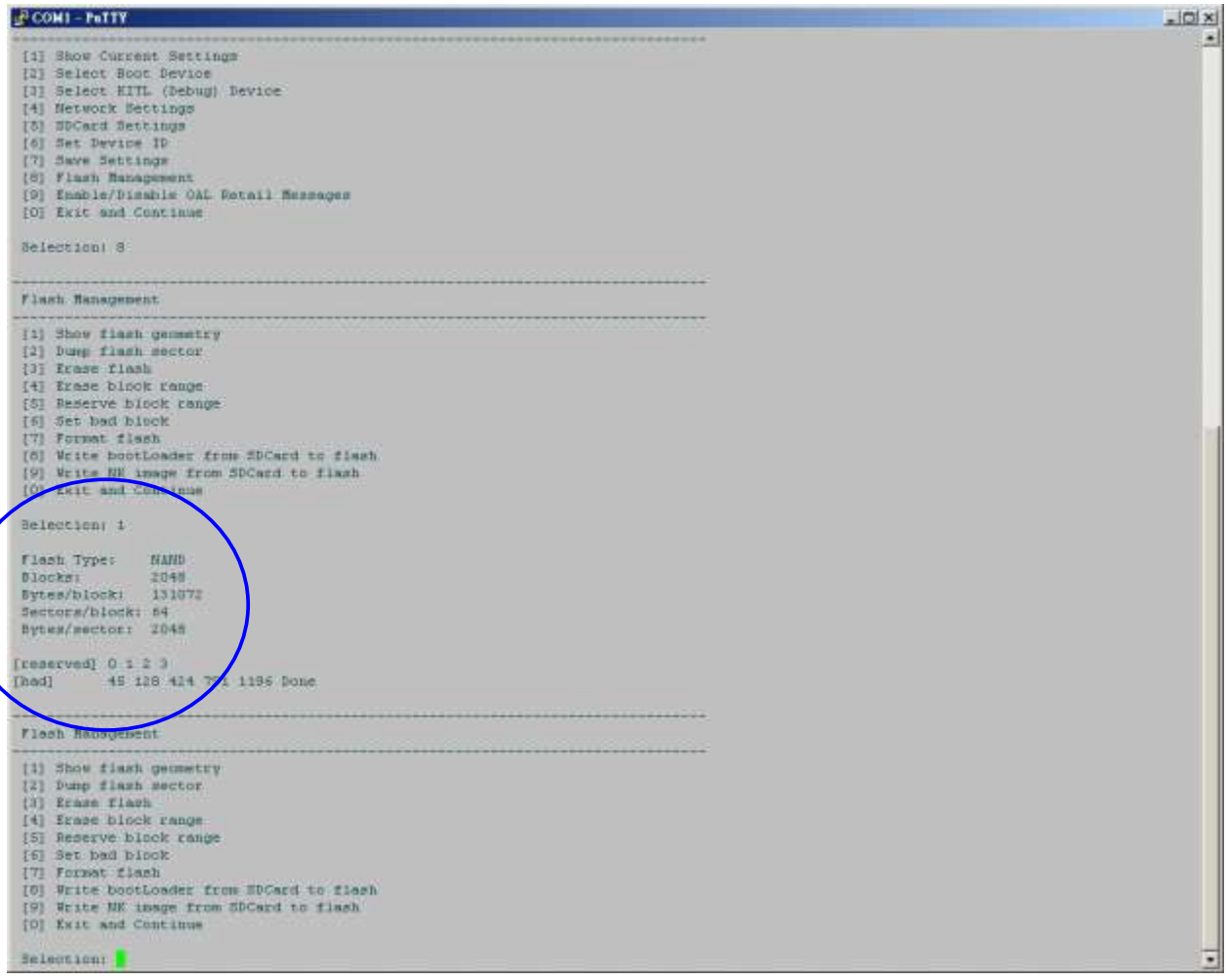


Figure 109

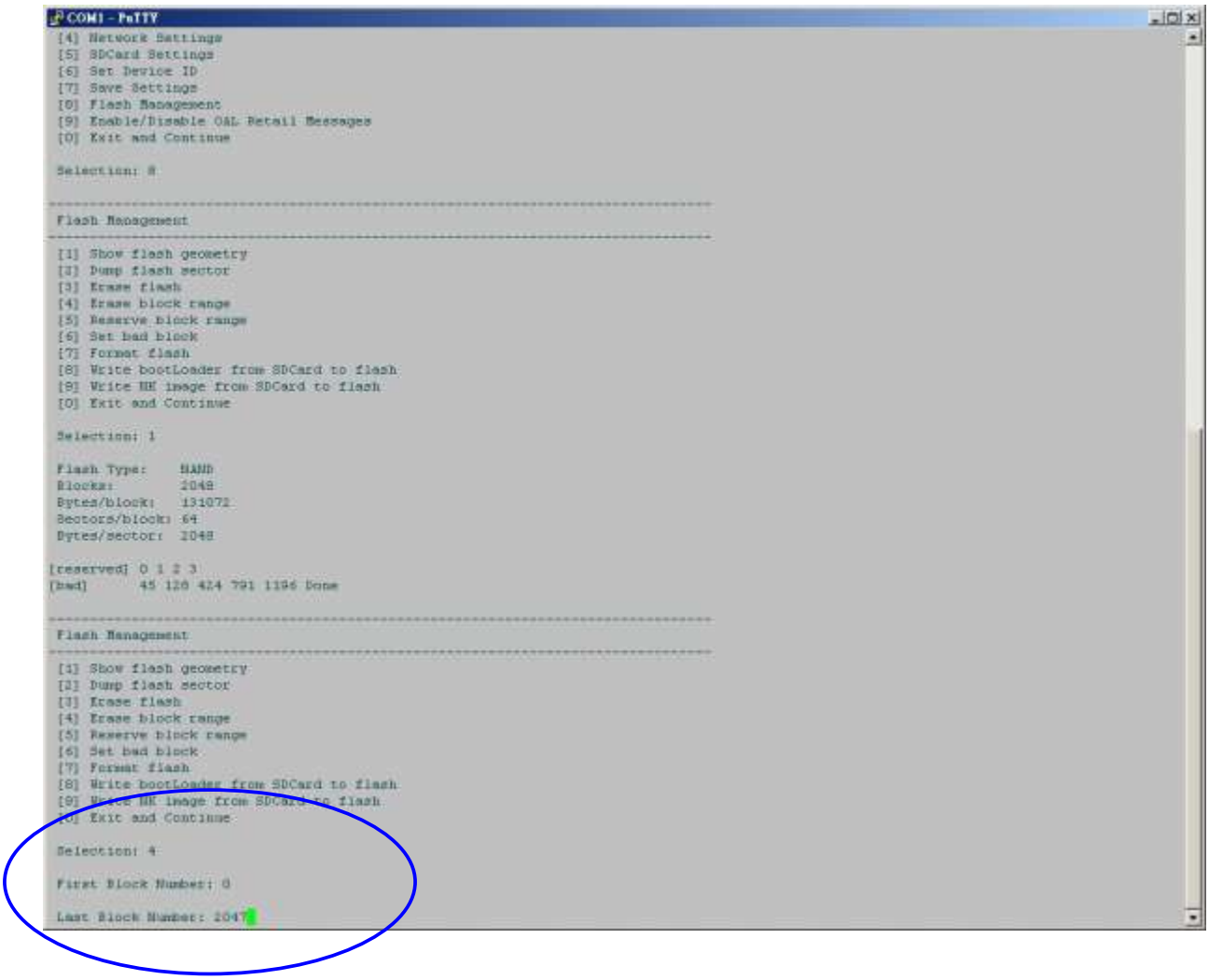

COM1 - PuTTY
[4] Network Settings
[5] SDCard Settings
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection: 8
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection: 1
Flash Type: NAND
Blocks: 2048
Bytes/block: 131072
Sectors/block: 64
Bytes/sector: 2048
[reserved] 0 1 2 3
[bad] 45 126 424 791 1196 Done
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection: 4
First Block Number: 0
Last Block Number: 2047

Figure 110

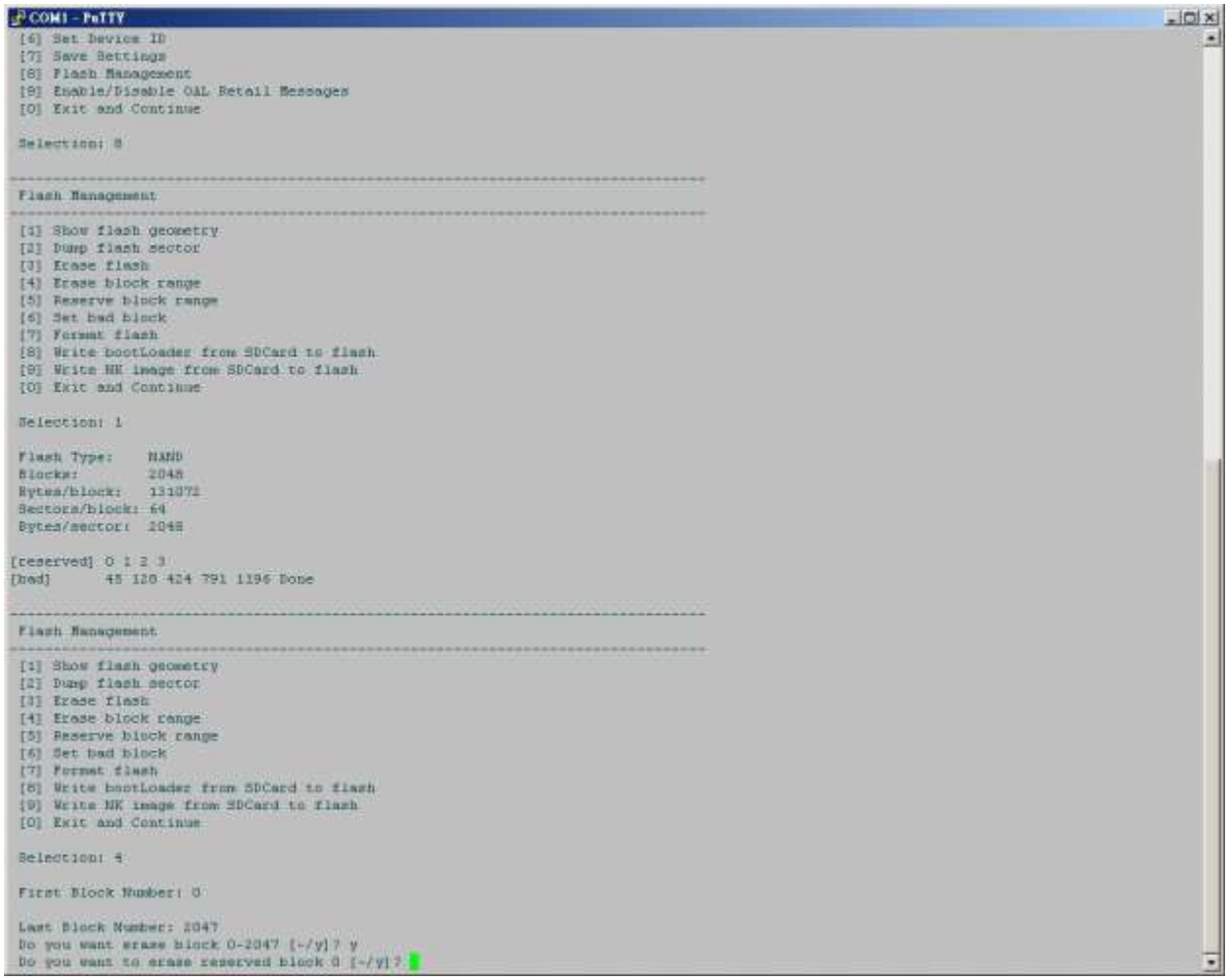

COM1 - PuTTY
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection: 8
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection: 1
Flash Type: NAND
Blocks: 2048
Bytes/block: 131072
Sectors/block: 64
Bytes/sector: 2048
[reserved] 0 1 2 3
[bad] 45 120 424 791 1196 Done
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection: 4
First Block Number: 0
Last Block Number: 2047
Do you want erase block 0-2047 [-/y]? y
Do you want to erase reserved block 0 [-/y]?

Figure 111

- Chose "Write Bootloader from SD-Card to flash". (See Figure 112)
- It will show "Do you want to write Bootloader to flash [-/y]?" Input "y"
- Then it will show "Bootloader Image written". (See Figure 113)

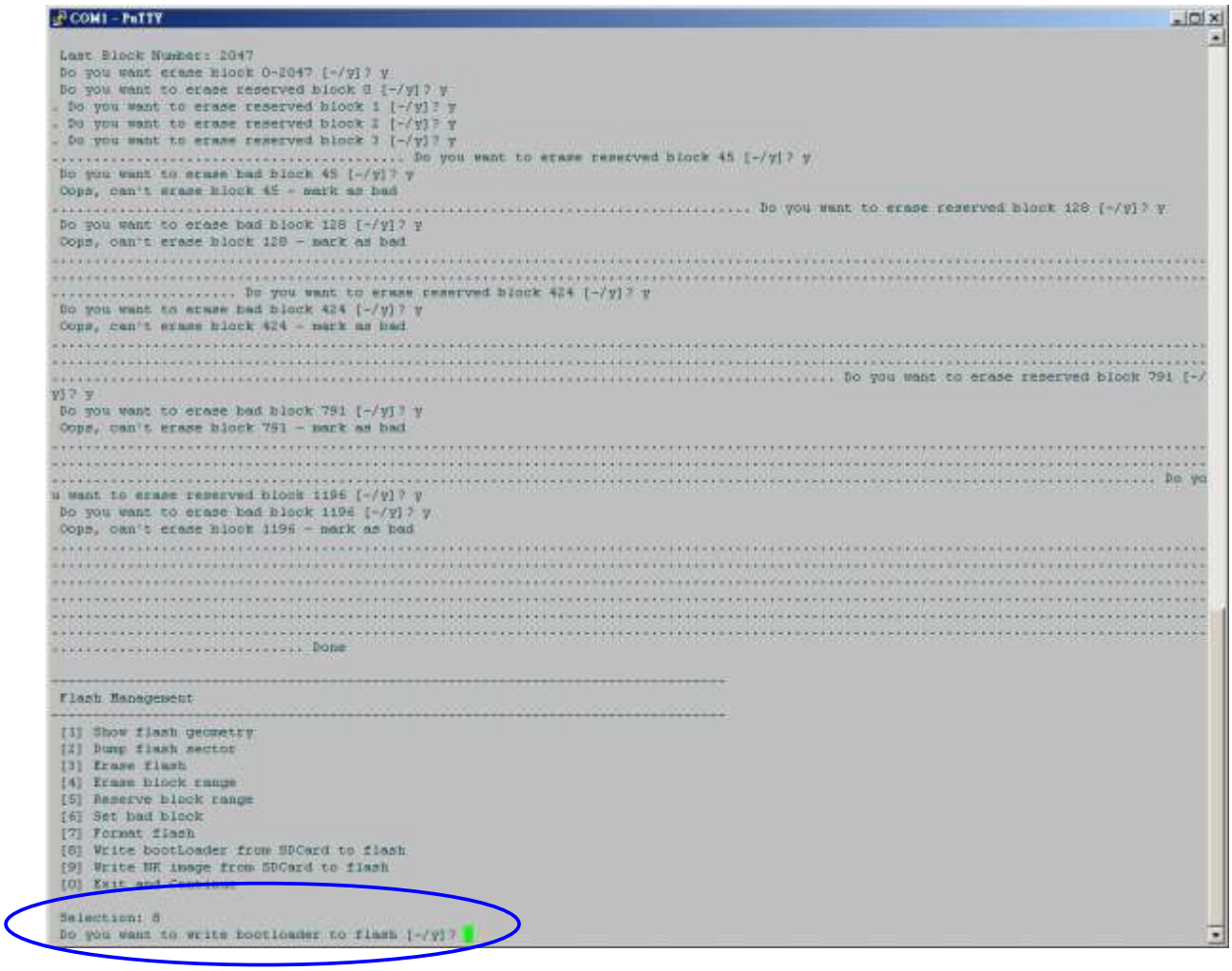


Figure 112

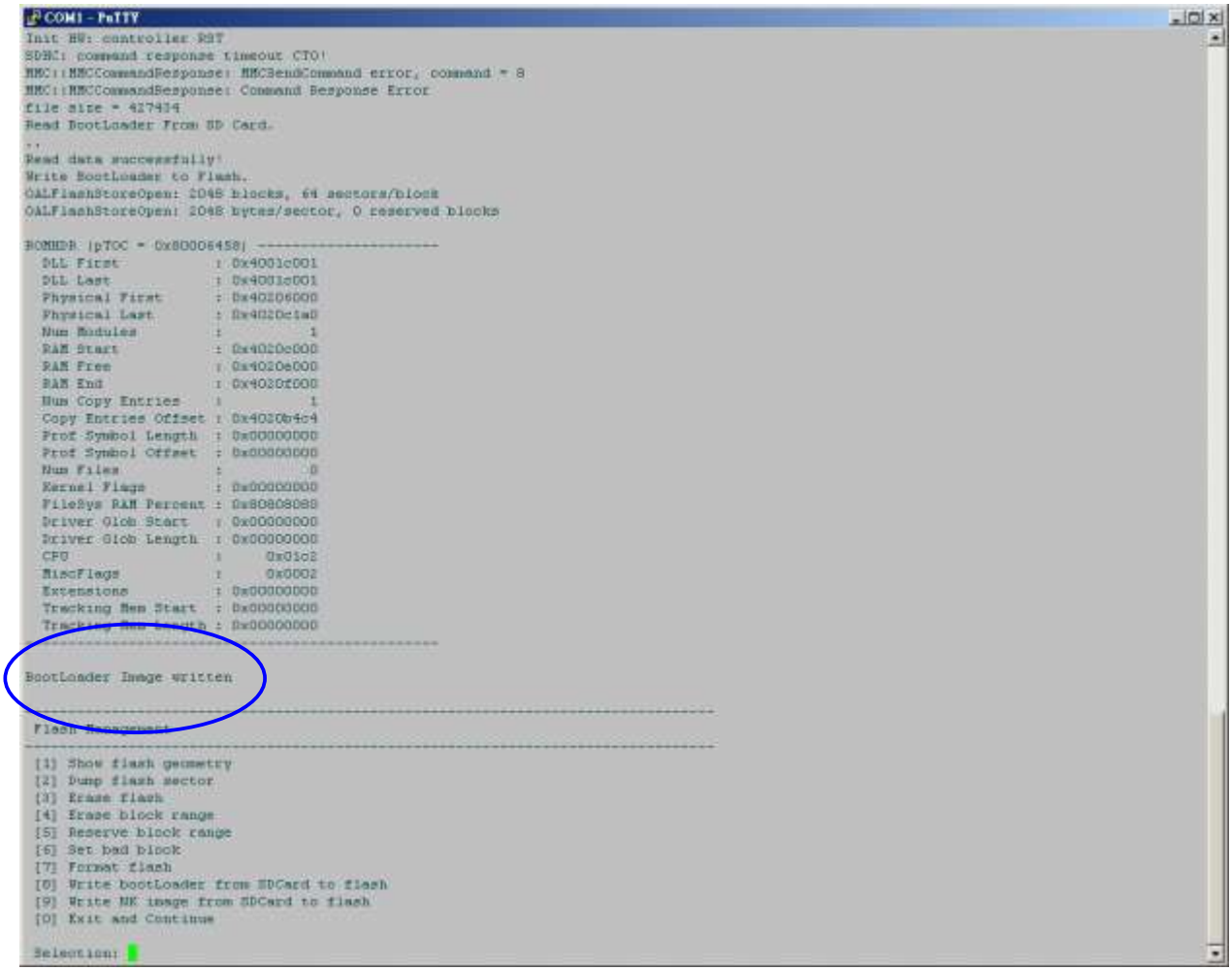

COM1 - PuTTY
Init HW: controller RST
SDHC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
file size = 427424
Read BootLoader from SD Card.
..
Read data successfully!
Write BootLoader to Flash.
OALFlashStoreOpen: 2048 blocks, 64 sectors/block
OALFlashStoreOpen: 2048 bytes/sector, 0 reserved blocks
BOOTCFG (pTOC = 0x80006458) ----------
DLL First : 0x4001c001
DLL Last : 0x4001c001
Physical First : 0x40206000
Physical Last : 0x4020c1a0
Num Modules : 1
RAM Start : 0x4020c000
RAM Free : 0x4020e000
RAM End : 0x4020f000
Num Copy Entries : 1
Copy Entries Offset : 0x4020b4c4
Prof Symbol Length : 0x00000000
Prof Symbol Offset : 0x00000000
Num Files : 0
Kernel Flags : 0x00000000
FileSys RAM Percent : 0x80808080
Driver Glob Start : 0x00000000
Driver Glob Length : 0x00000000
CPU : 0x01c2
MiscFlags : 0x0002
Extensions : 0x00000000
Tracking Mem Start : 0x00000000
Tracking Mem Length : 0x00000000
BootLoader Image written
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection:

Figure 113

- Take the microSD card out of the Baseboard.
- Reboot from NAND Flash by pushing the reset button on the baseboard (See Figure 114).
- It will make a partition and format and then show "Flash format complete!"

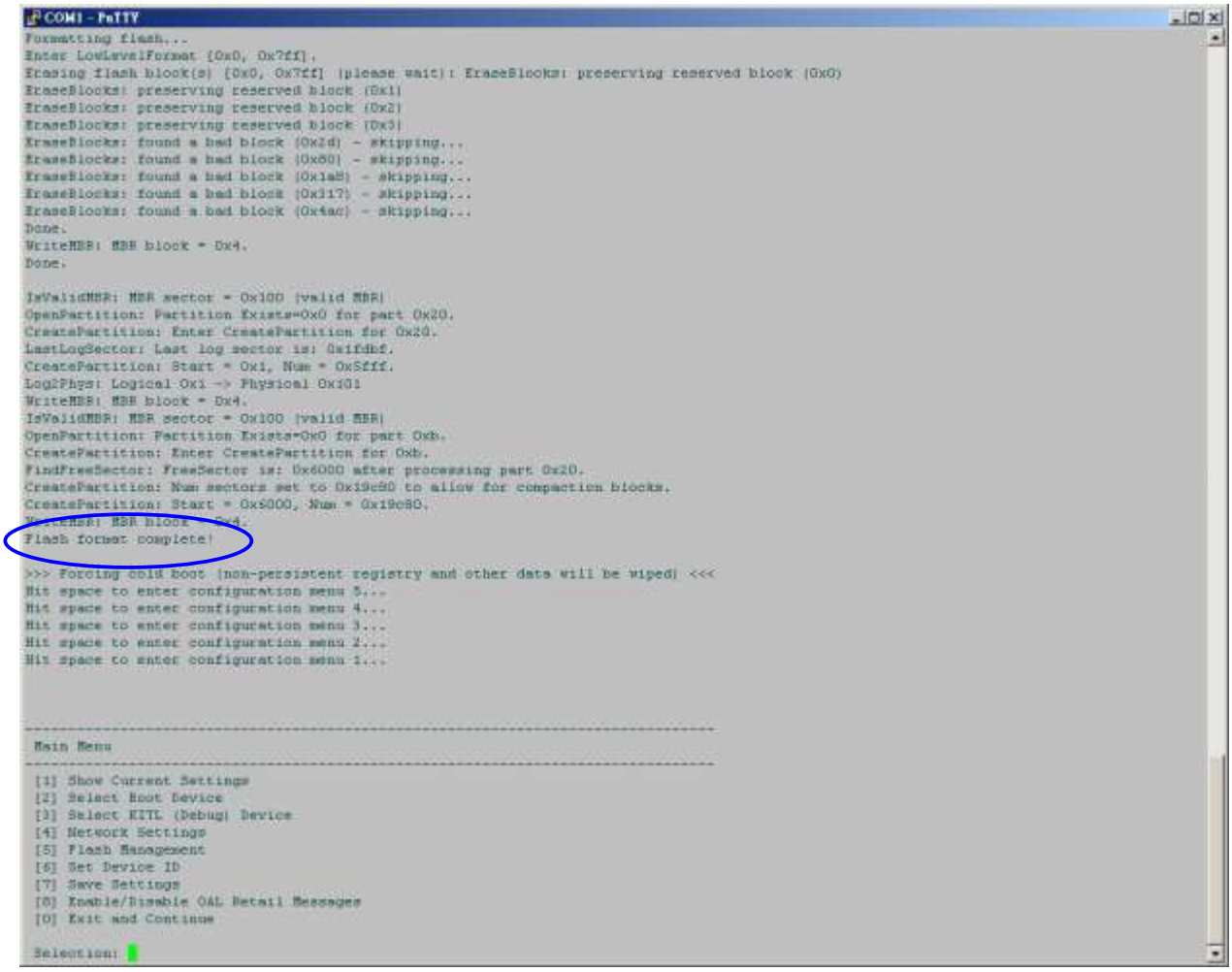


Figure 114

- Put the microSD card back into the baseboard. Unplug the power, push the User button while inserting the power again (=reboot from SD Card) (See Figure 115)
- When it shows "Hit space to enter configuration menu". Please push space button on the keyboard.

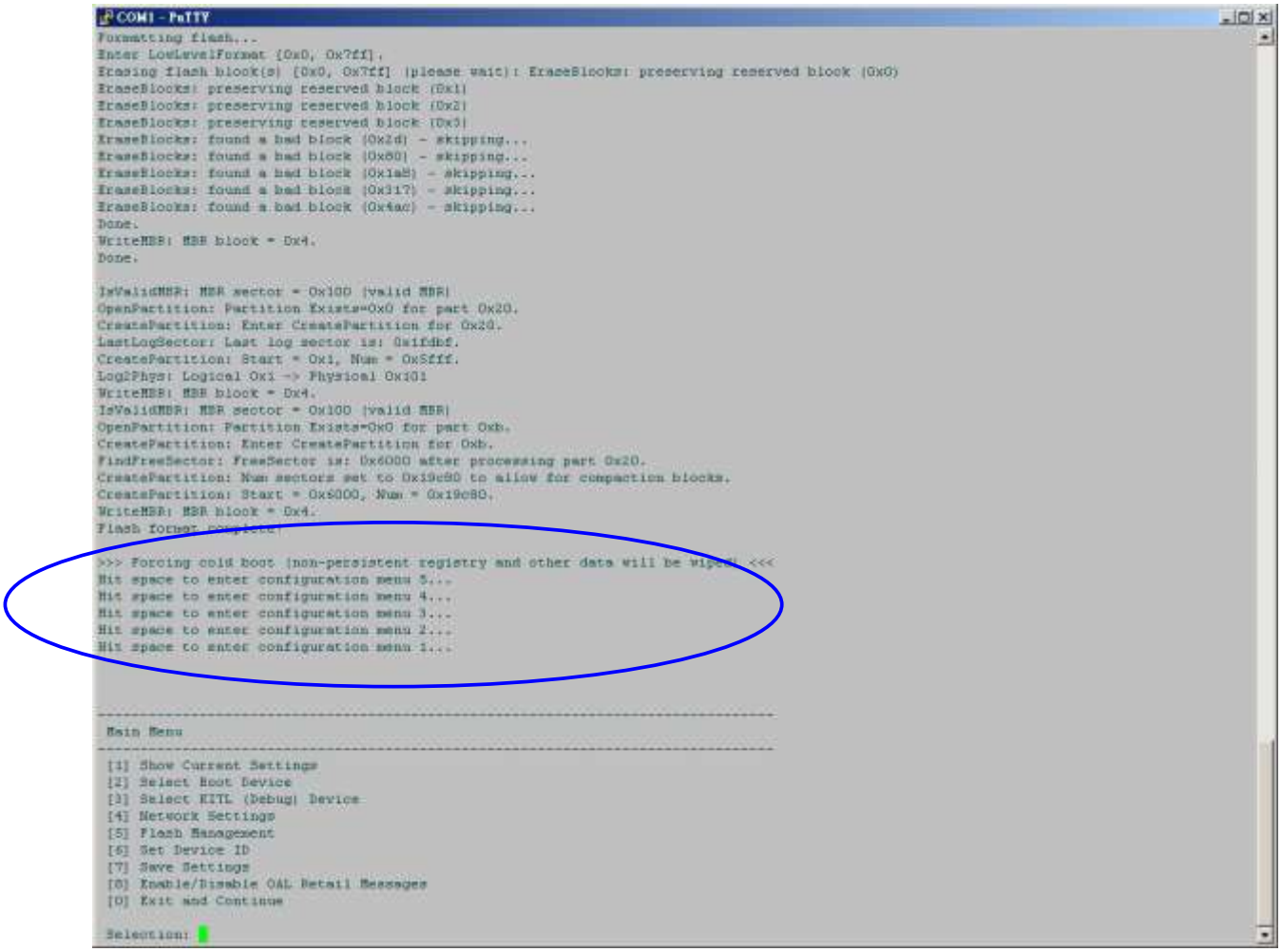

COM1 - PuTTY
Formatting flash...
Enter LowLevelFormat [0x0, 0x7ff],
Erasing flash block(s) [0x0, 0x7ff] (please wait): EraseBlocks: preserving reserved block (0x0)
EraseBlocks: preserving reserved block (0x1)
EraseBlocks: preserving reserved block (0x2)
EraseBlocks: preserving reserved block (0x3)
EraseBlocks: found a bad block (0x2d) - skipping...
EraseBlocks: found a bad block (0x60) - skipping...
EraseBlocks: found a bad block (0x1a8) - skipping...
EraseBlocks: found a bad block (0x317) - skipping...
EraseBlocks: found a bad block (0x4ac) - skipping...
Done.
WriteMBR: MBR block = 0x4.
Done.
IsValidMBR: MBR sector = 0x100 (valid MBR)
OpenPartition: Partition Exists=0x0 for part 0x20.
CreatePartition: Enter CreatePartition for 0x20.
LastLogSector: Last log sector is: 0x1fdbf.
CreatePartition: Start = 0x1, Num = 0x5fff.
Log2Phys: Logical 0x1 -> Physical 0x101
WriteMBR: MBR block = 0x4.
IsValidMBR: MBR sector = 0x100 (valid MBR)
OpenPartition: Partition Exists=0x0 for part 0xb.
CreatePartition: Enter CreatePartition for 0xb.
FindFreeSector: FreeSector is: 0x6000 after processing part 0x20.
CreatePartition: Num sectors set to 0x19c80 to allow for compaction blocks.
CreatePartition: Start = 0x6000, Num = 0x19c80.
WriteMBR: MBR block = 0x4.
Flash format complete!
>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<
Hit space to enter configuration menu 5...
Hit space to enter configuration menu 4...
Hit space to enter configuration menu 3...
Hit space to enter configuration menu 2...
Hit space to enter configuration menu 1...
Main Menu
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection:

Figure 115

- Chose "Flash Management". (See Figure 116)
- Chose "Write NK image from SD-Card to flash". (See Figure 116)
- It will show "Do you want to write NK image to flash [-/y]?" Input "y".
- It will show "NK image written". (See Figure 117)

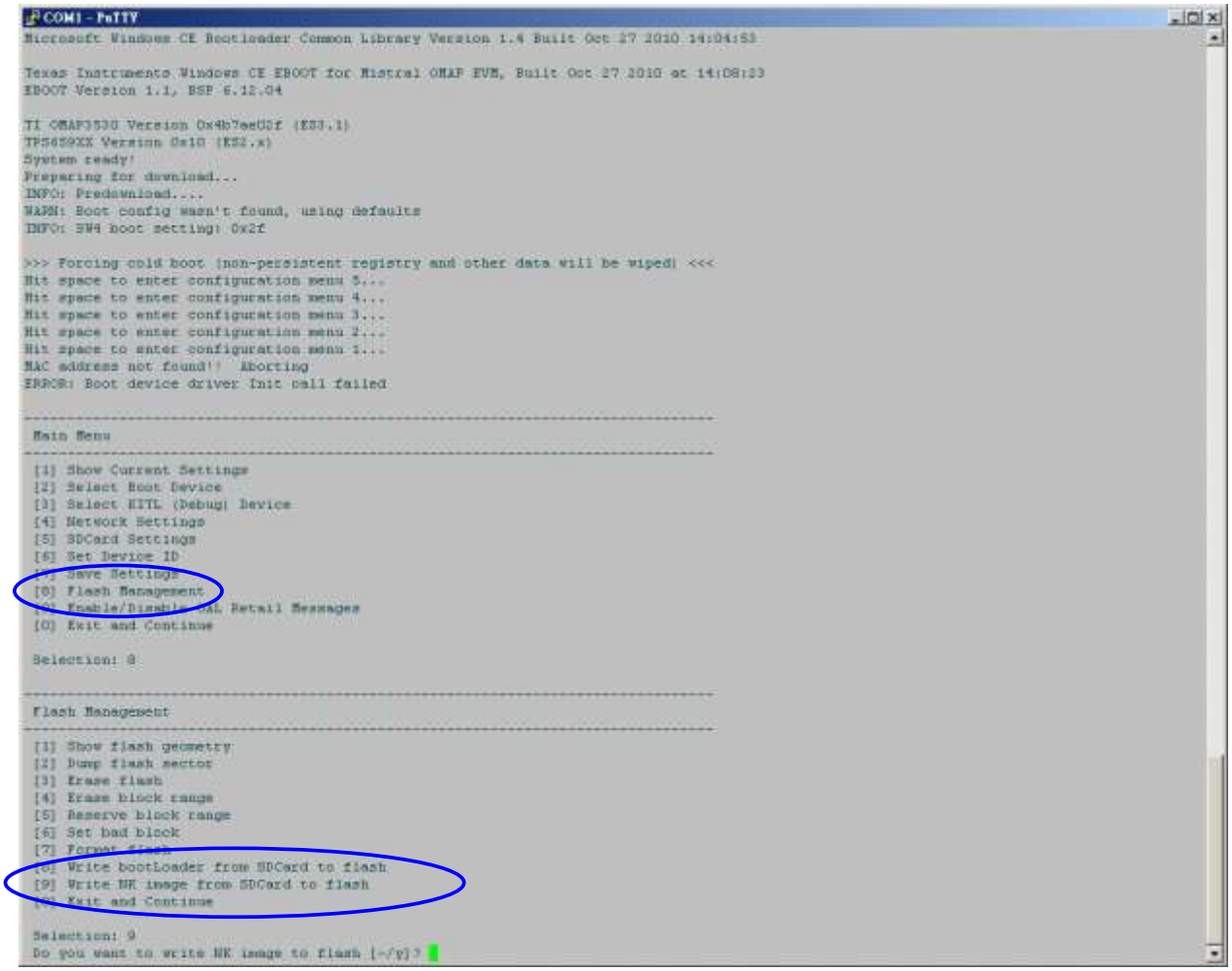


Figure 116

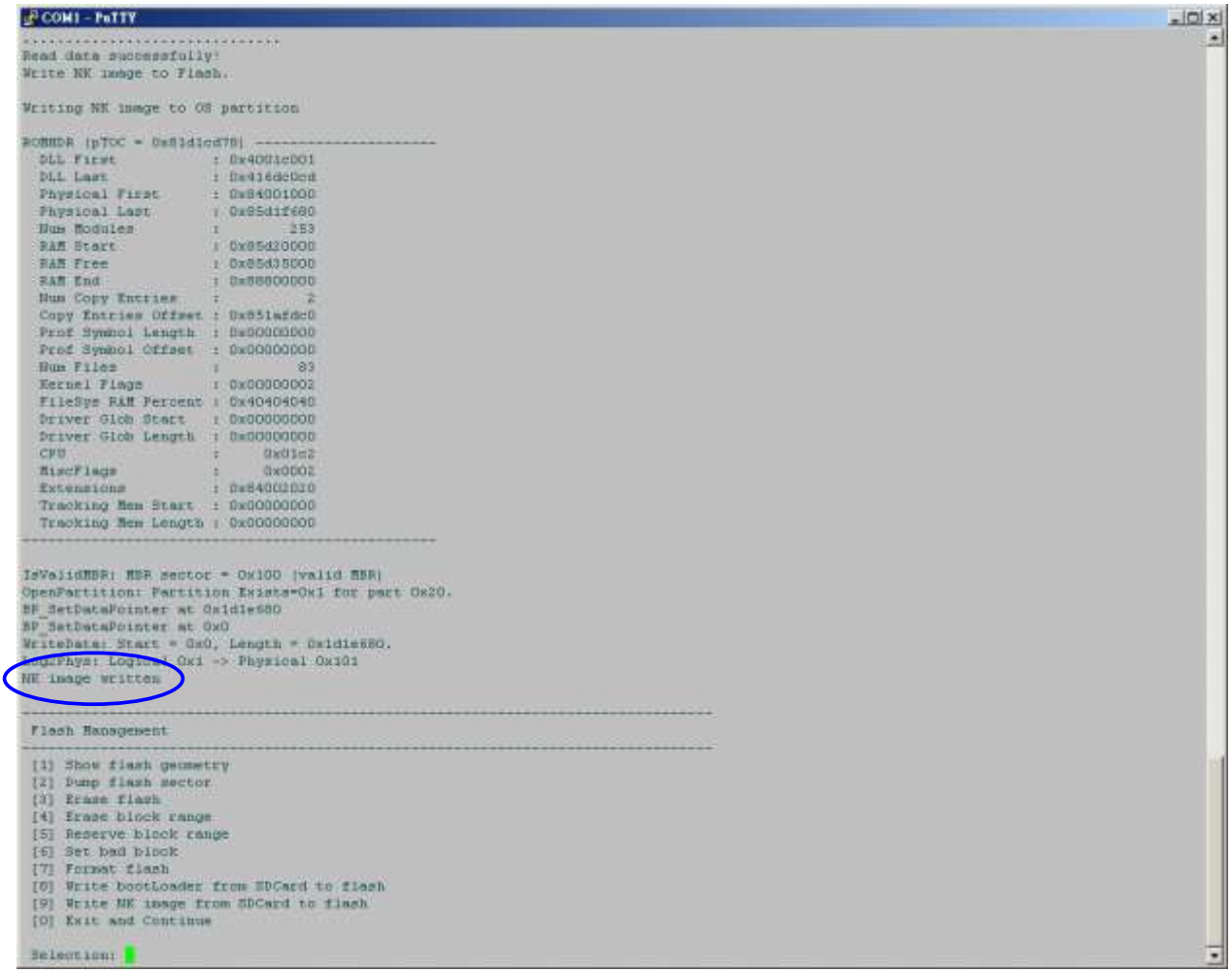

COM1 - PuTTY
Read data successfully!
Write NK image to Flash.
Writing NK image to OS partition
NK image written
Flash Management
[1] Show flash geometry
[2] Dump flash sector
[3] Erase flash
[4] Erase block range
[5] Reserve block range
[6] Set bad block
[7] Format flash
[8] Write bootLoader from SDCard to flash
[9] Write NK image from SDCard to flash
[0] Exit and Continue
Selection:

Figure 117

12.5.3 Boot from NAND flash.

- Take out the MicroSD Card from the Baseboard
- Press the reset button on the baseboard
- When it shows "Hit space to enter configuration menu". Please push space button on the keyboard. (See Figure 118)

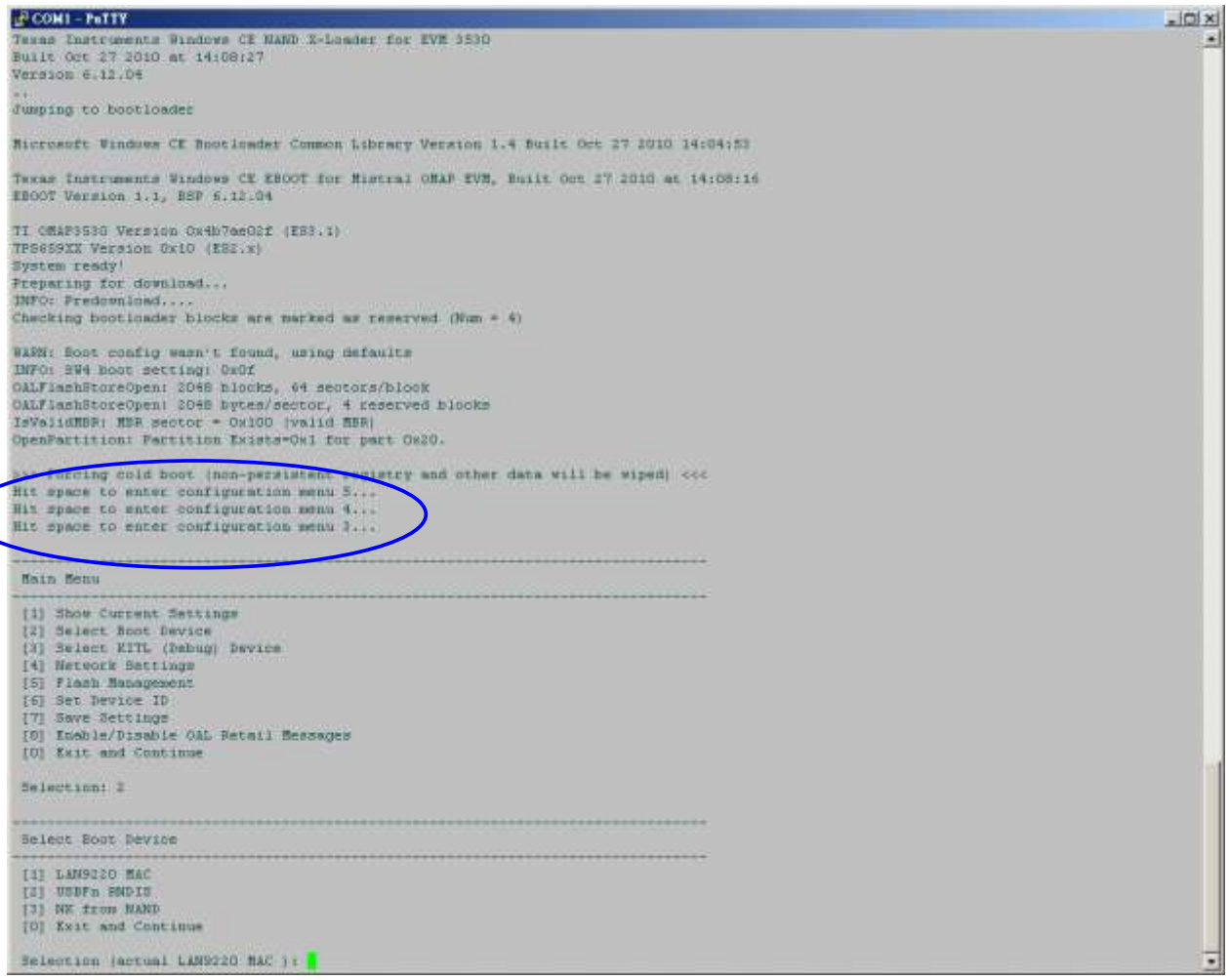


Figure 118

- Chose "Select Boot Device". (See Figure 119)
- It will show "Selection (actual (NULL)):" Then chose "NK from NAND" (see Figure 120)

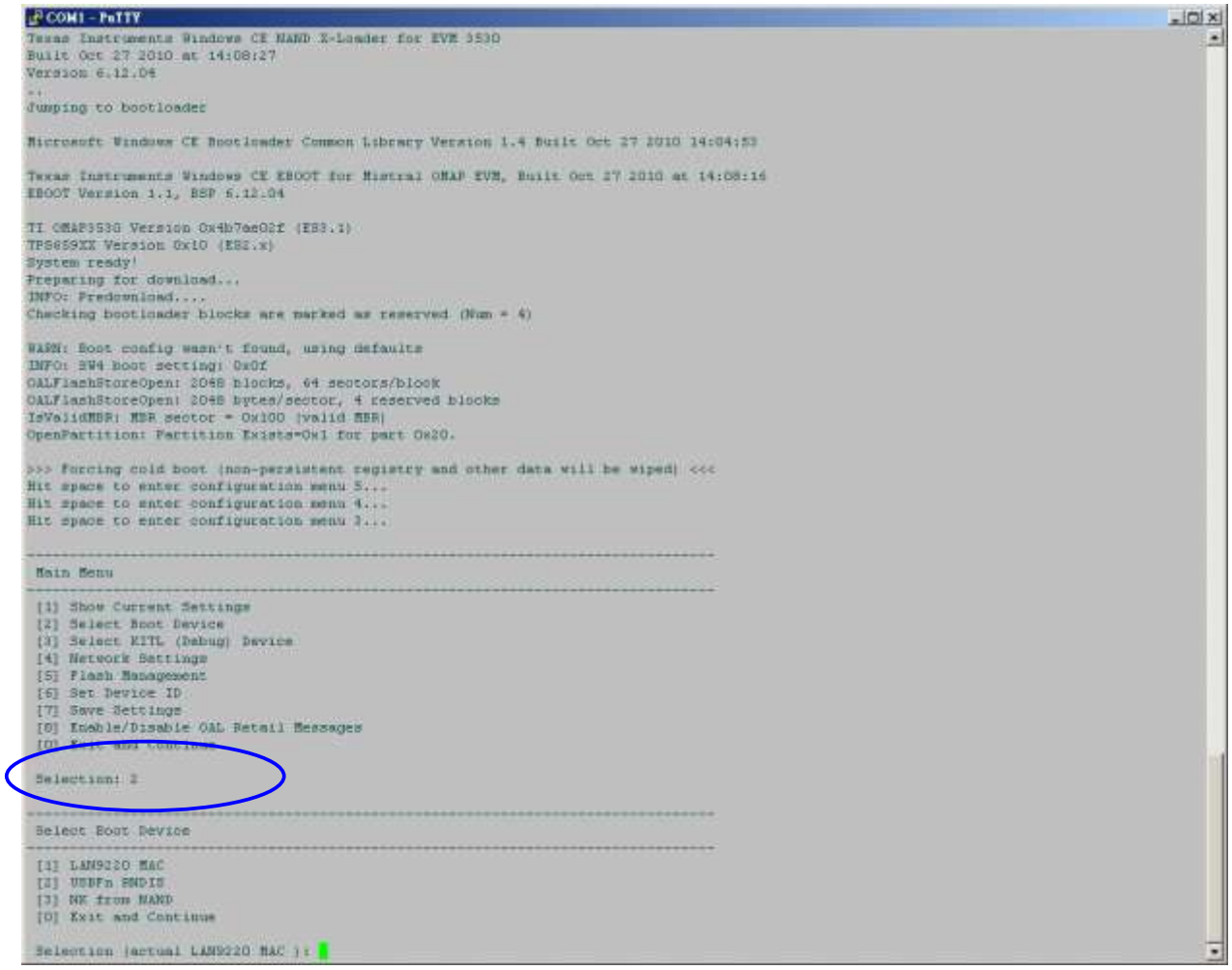


Figure 119

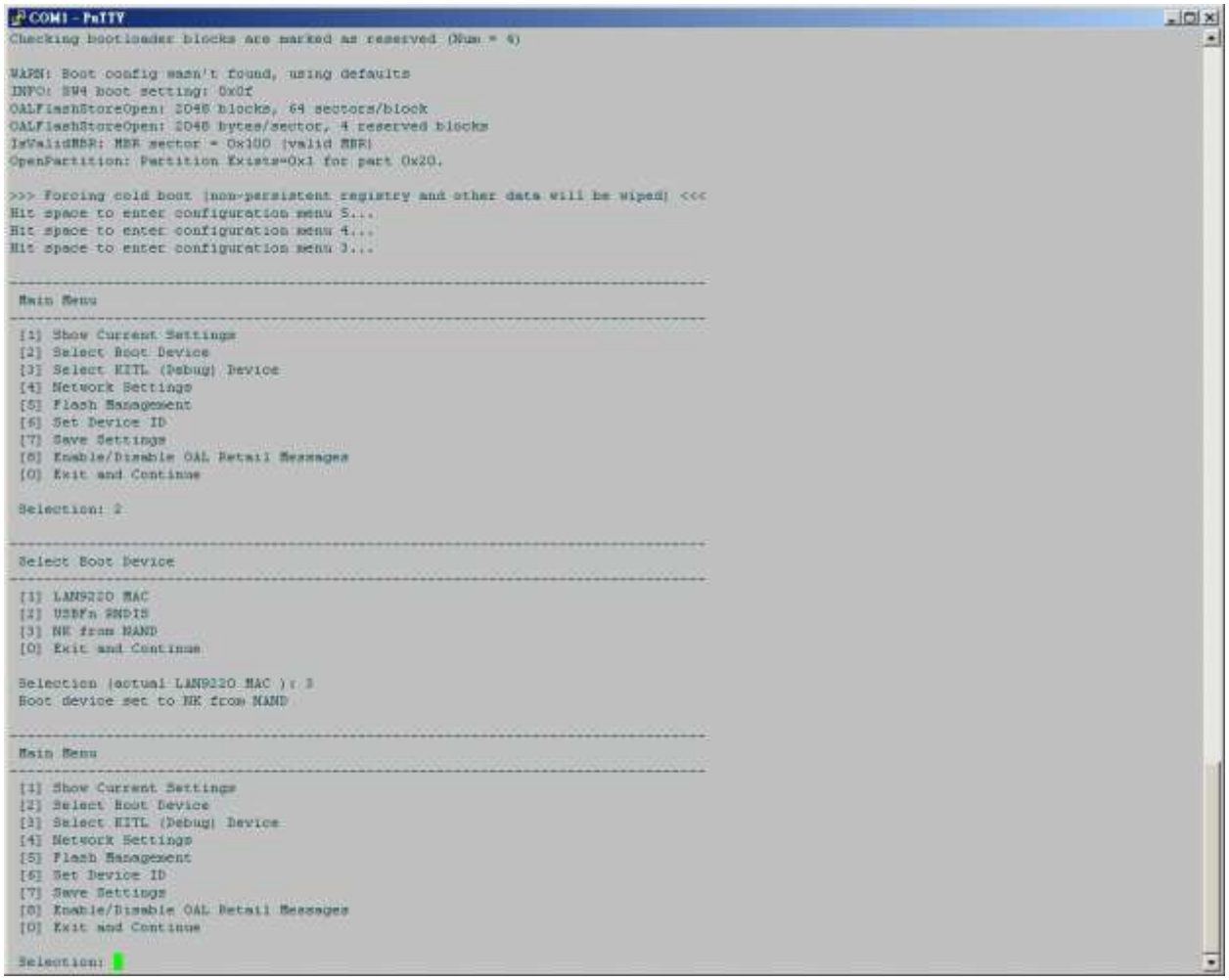

COM1 - PuTTY
Checking bootloader blocks are marked as reserved (Num = 6)
WARN: Boot config wasn't found, using defaults
INFO: BW4 boot setting: 0x0f
OALFlashStoreOpen: 2048 blocks, 64 sectors/block
OALFlashStoreOpen: 2048 bytes/sector, 4 reserved blocks
IsValidMBR: MBR sector = 0x100 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
>>> Forcing cold boot (non-persistent registry and other data will be wiped) <<<
Hit space to enter configuration menu 5...
Hit space to enter configuration menu 4...
Hit space to enter configuration menu 3...
Main Menu
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection: 2
Select Boot Device
[1] LAN9220 MAC
[2] USBFn RNDIS
[3] NK from NAND
[0] Exit and Continue
Selection (actual LAN9220 MAC): 3
Boot device set to NK from NAND
Main Menu
[1] Show Current Settings
[2] Select Boot Device
[3] Select KITL (Debug) Device
[4] Network Settings
[5] Flash Management
[6] Set Device ID
[7] Save Settings
[8] Enable/Disable OAL Retail Messages
[0] Exit and Continue
Selection:

Figure 120

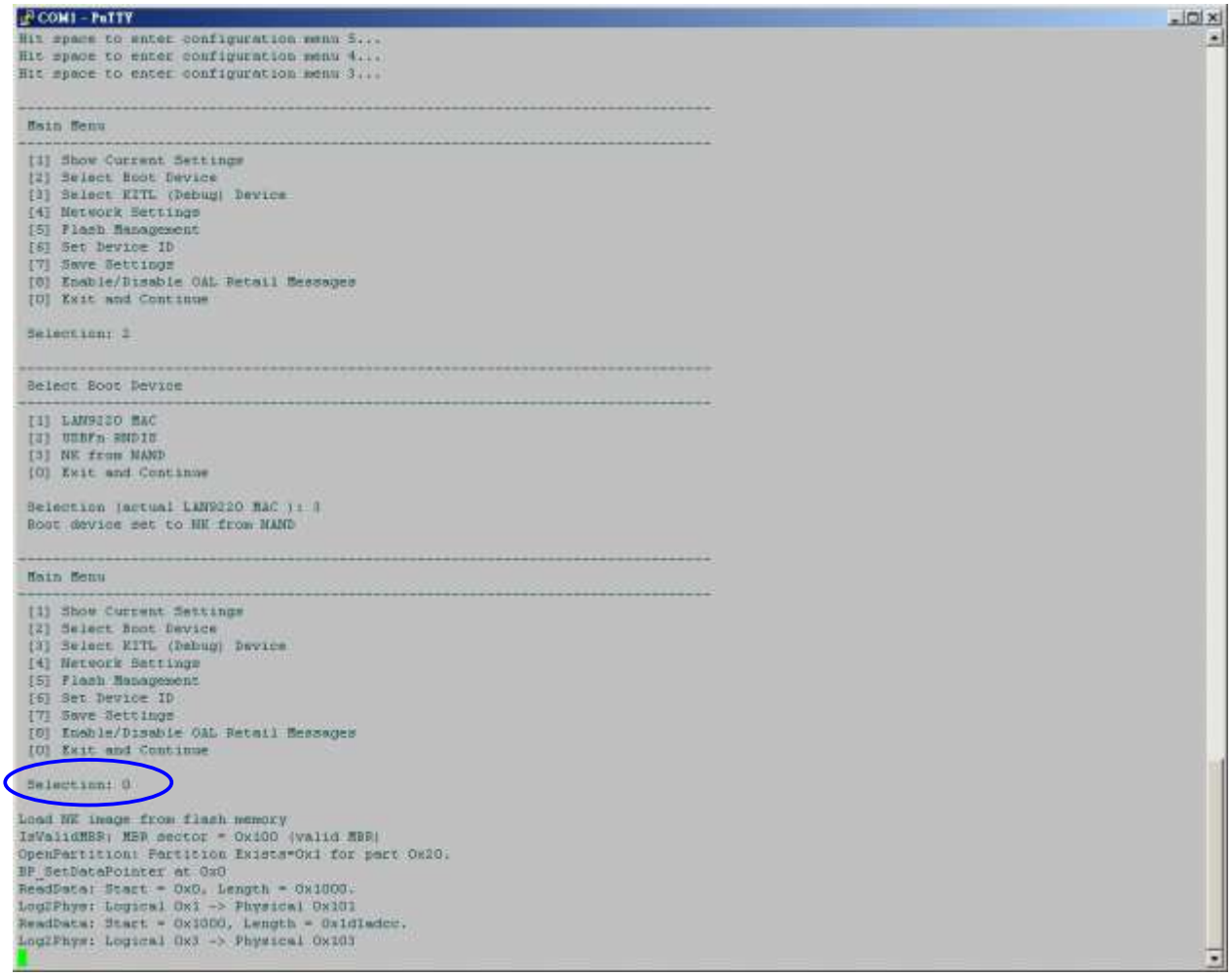


Figure 121: Chose "Exit and Continue".

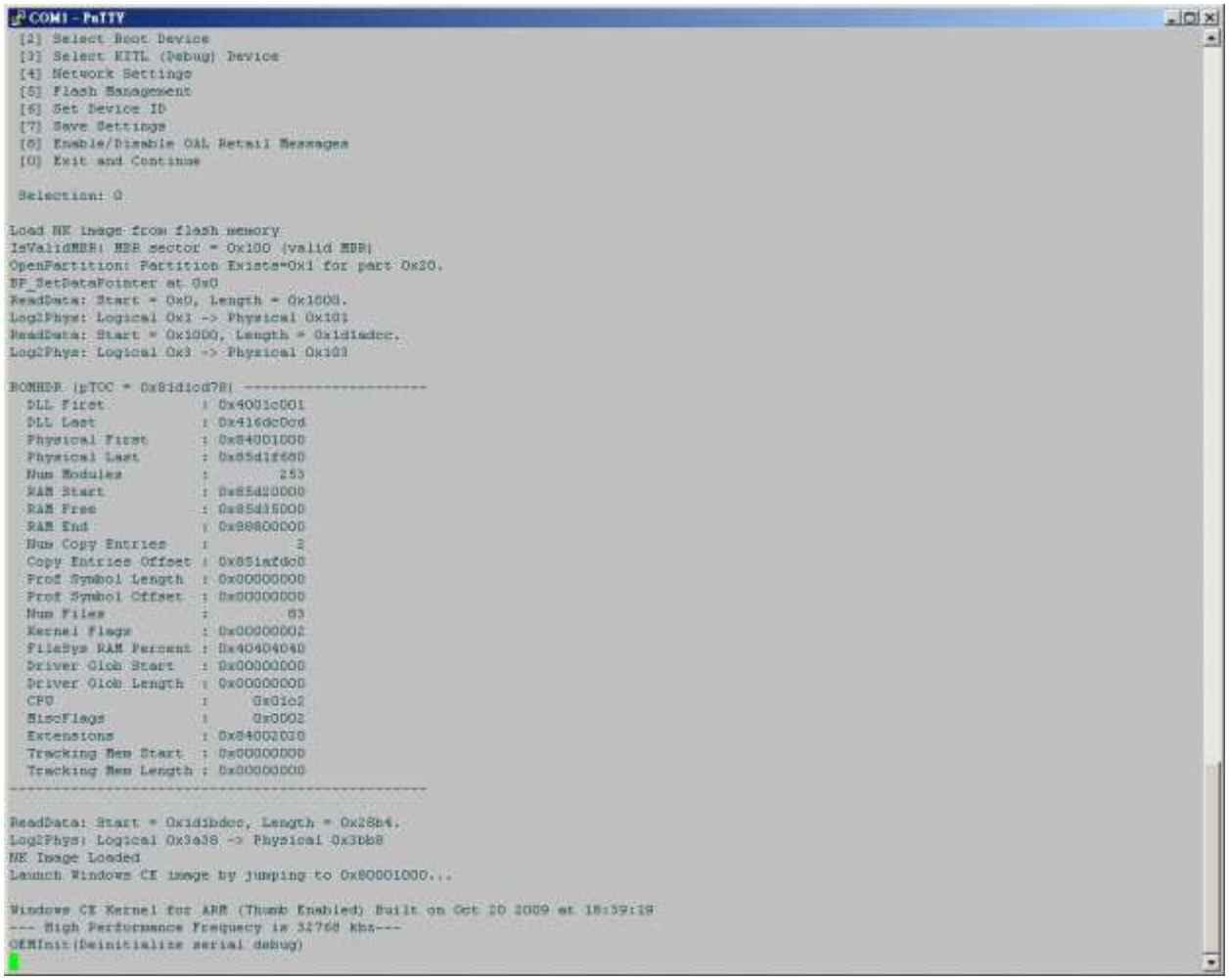


Figure 122 : Now it will start booting WinCE

- FINISHED.

12.6 Create a new project using TN_TAO_3530 BSP

This chapter describes how to create a new project, for example when you have your own custom LCD panel.

- Open "Microsoft Visual Studio 2005". If that already open, Please reopen it.
- Click "File → New → Project..." (See Figure 123)

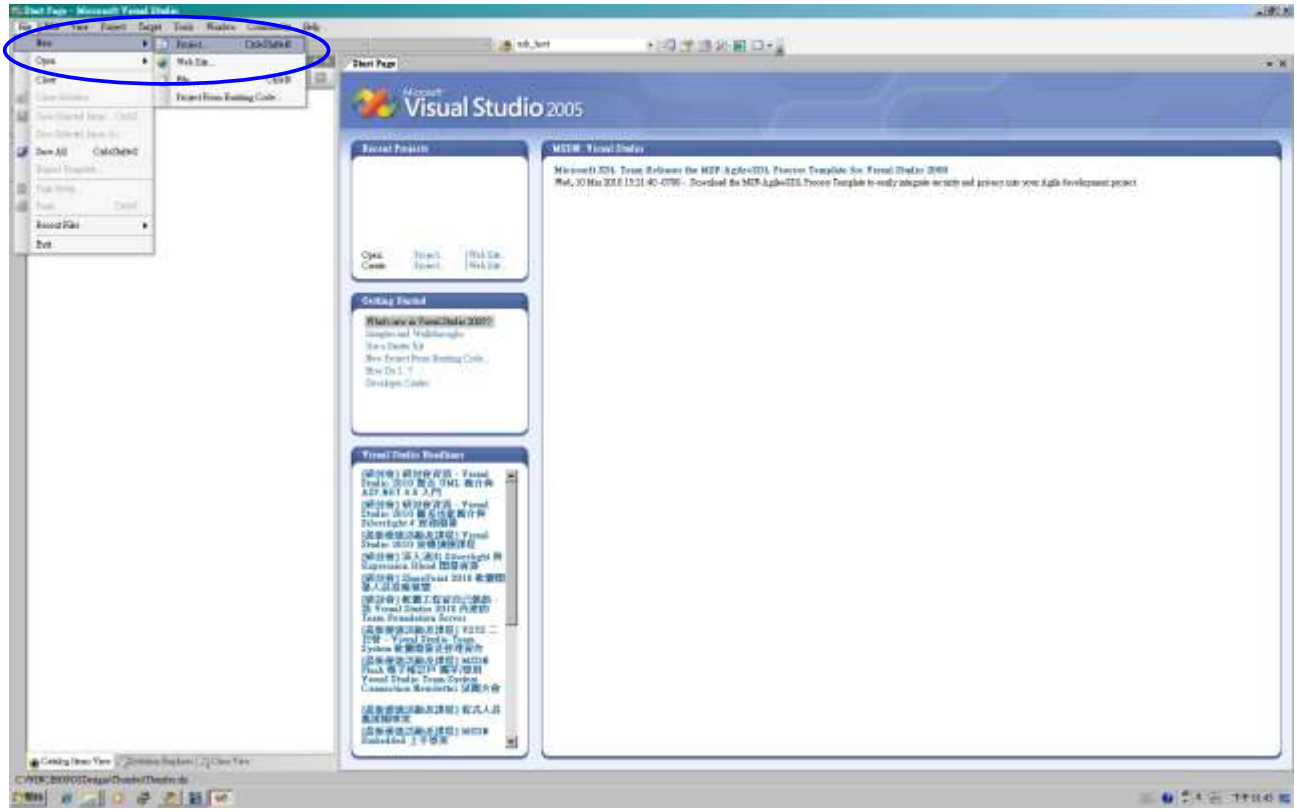


Figure 123

- Chose "Platform Builder for CE 6.0". Then input project name in the "Name:" box. For example "Thunder". (See Figure 124)
- Click the "OK" button.

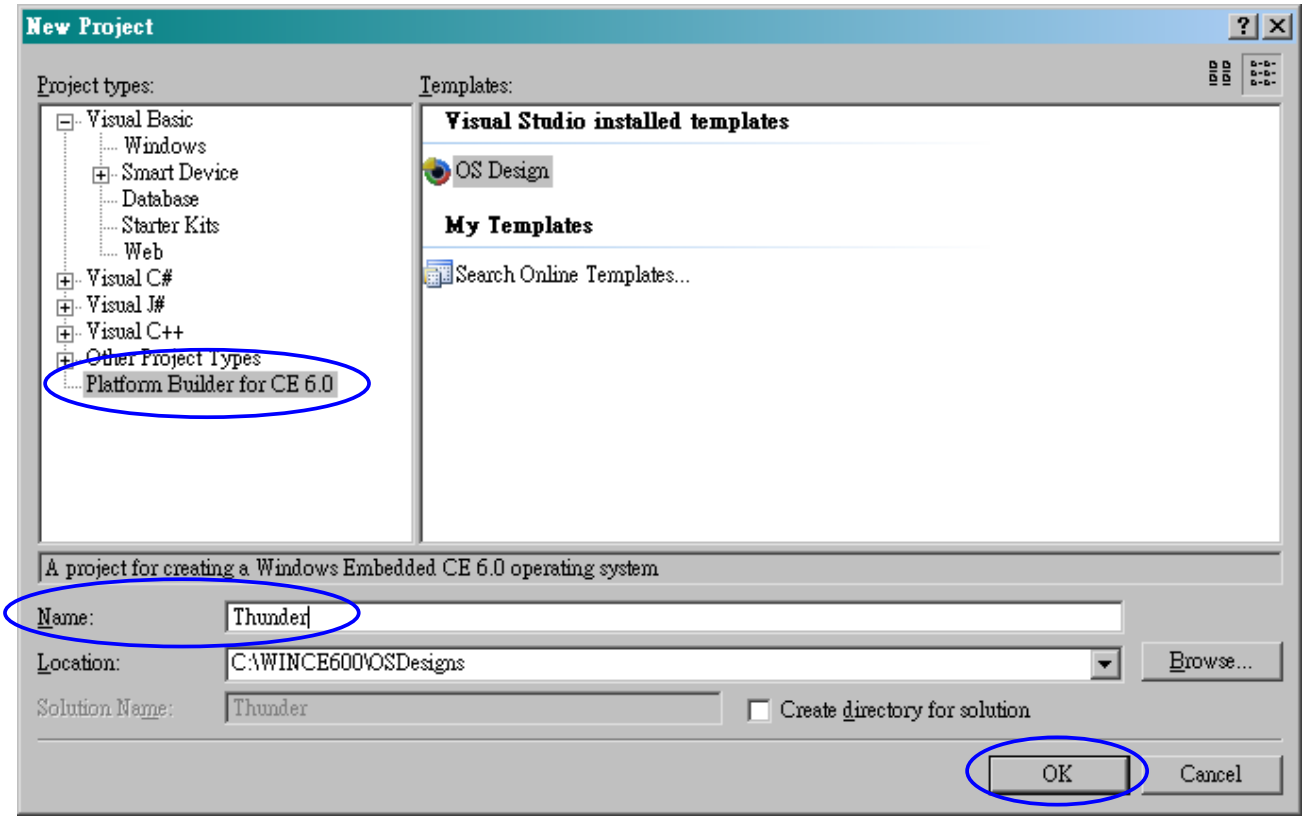


Figure 124

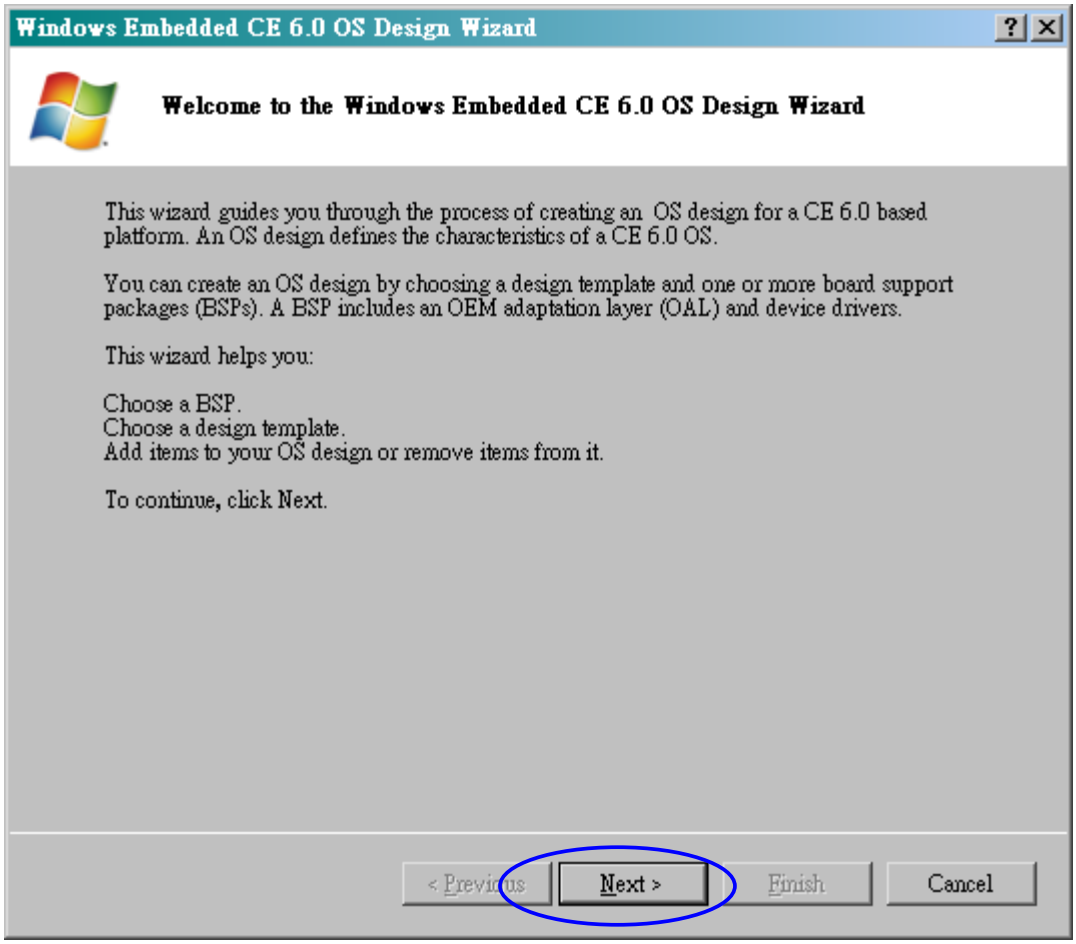


Figure 125: Click the "Next >" button.

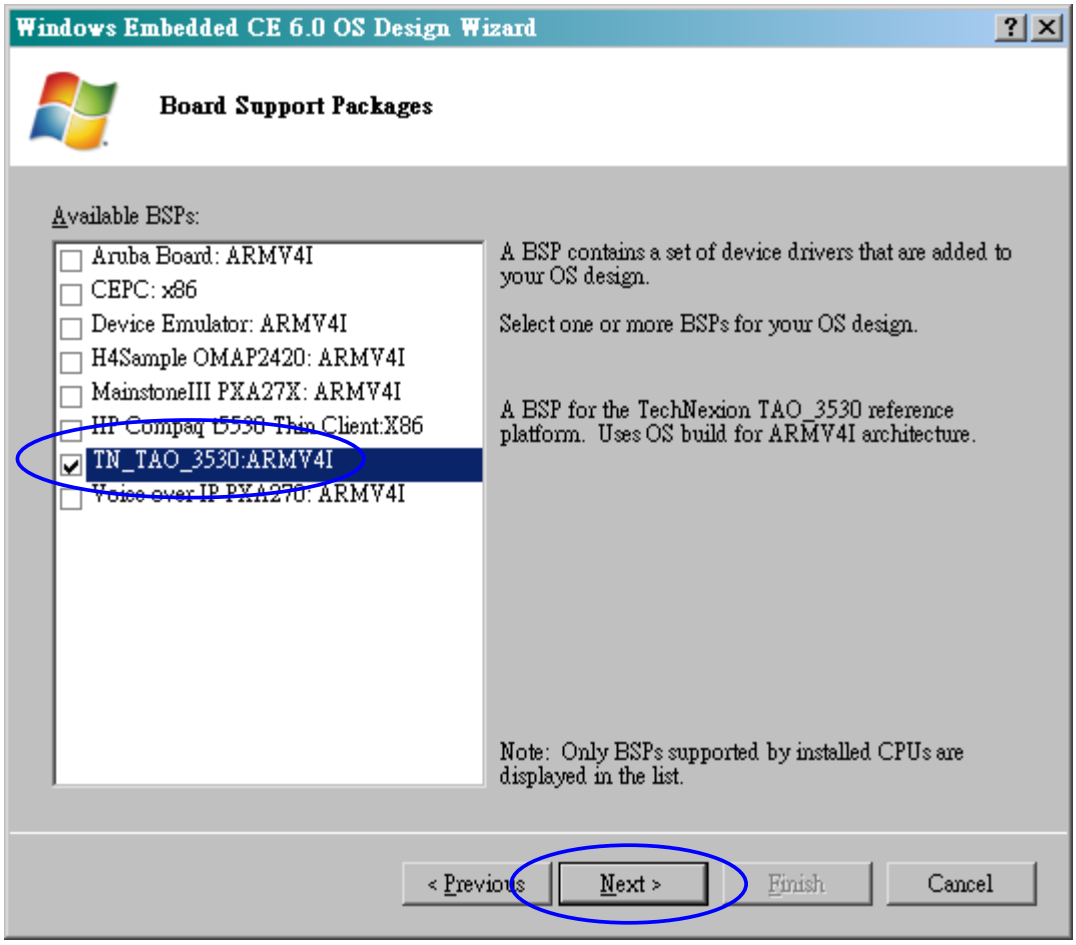


Figure 126: Chose "TN_TAO_3530:ARMV4I". Then click "Next >" button.

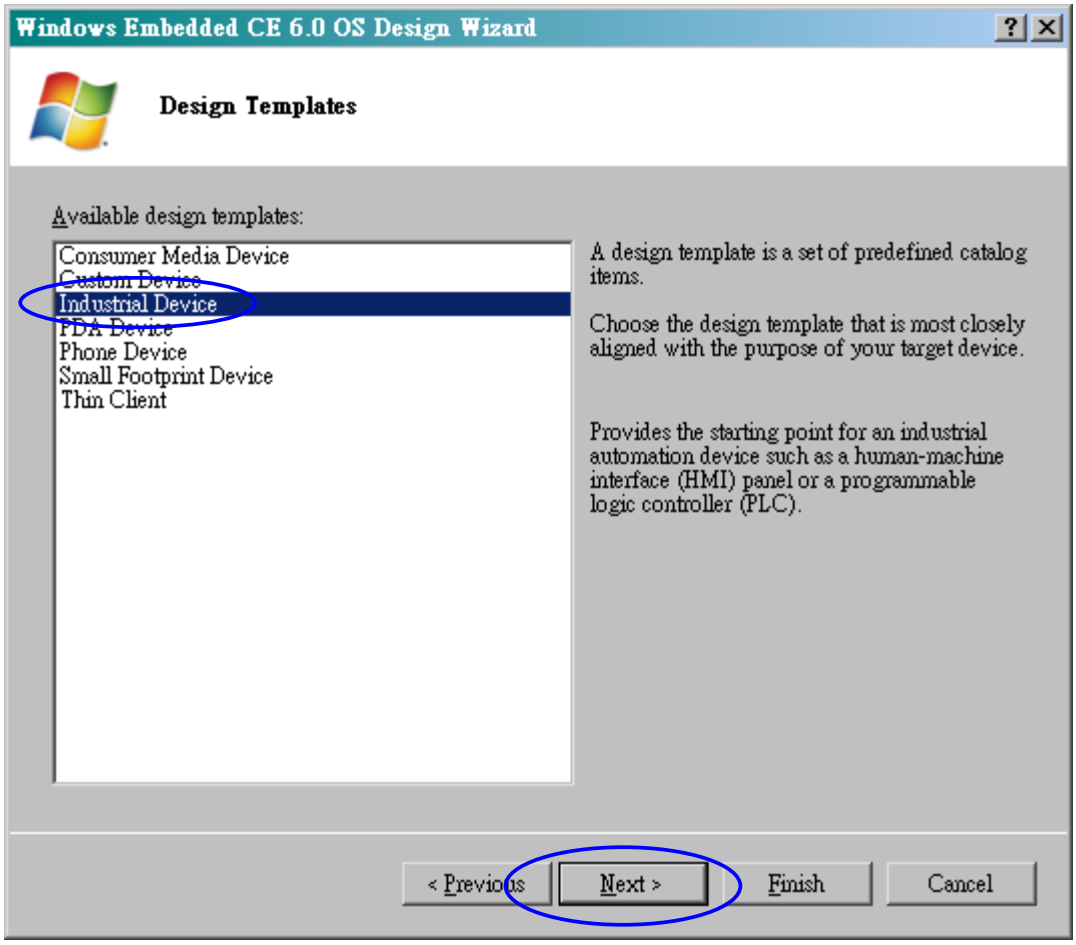


Figure 127 : Chose "Industrial Device". Then click "Next >" button.

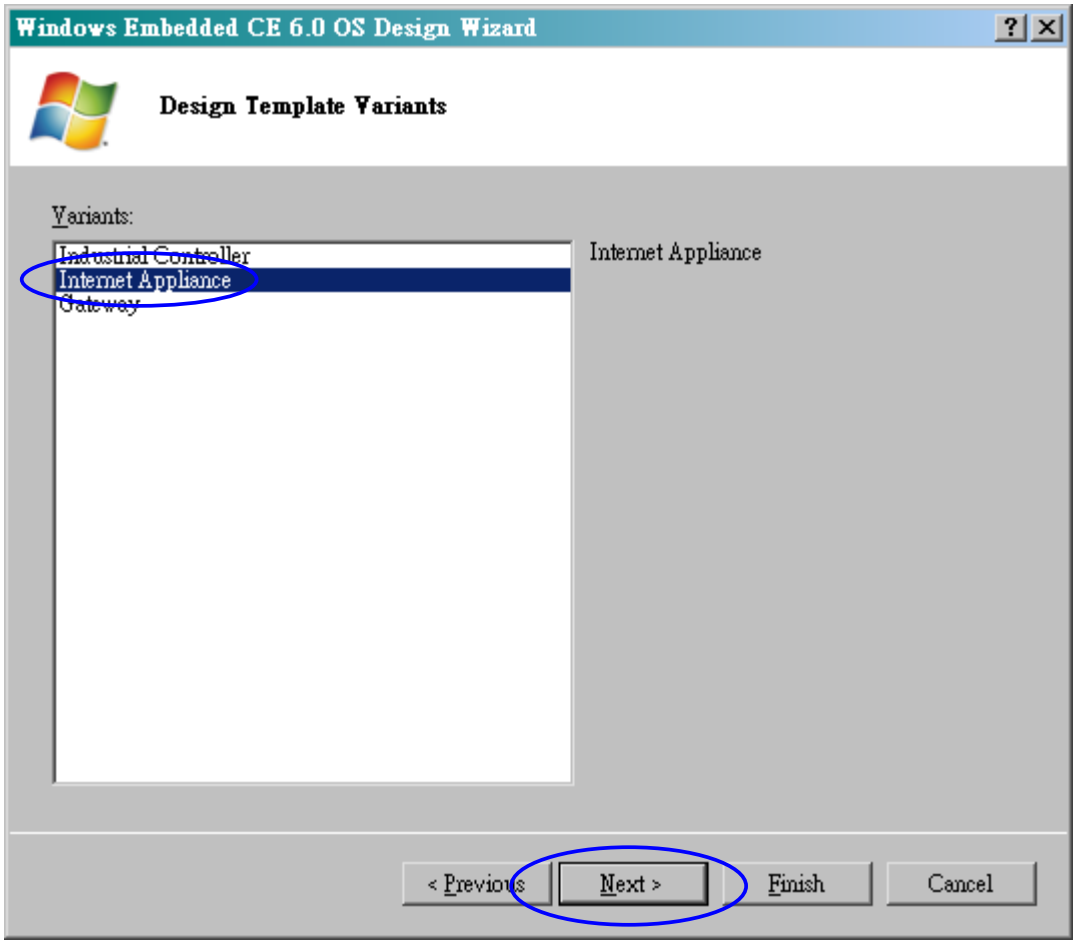


Figure 128 : Chose "Internet Appliance". Then click the "Next >" button.

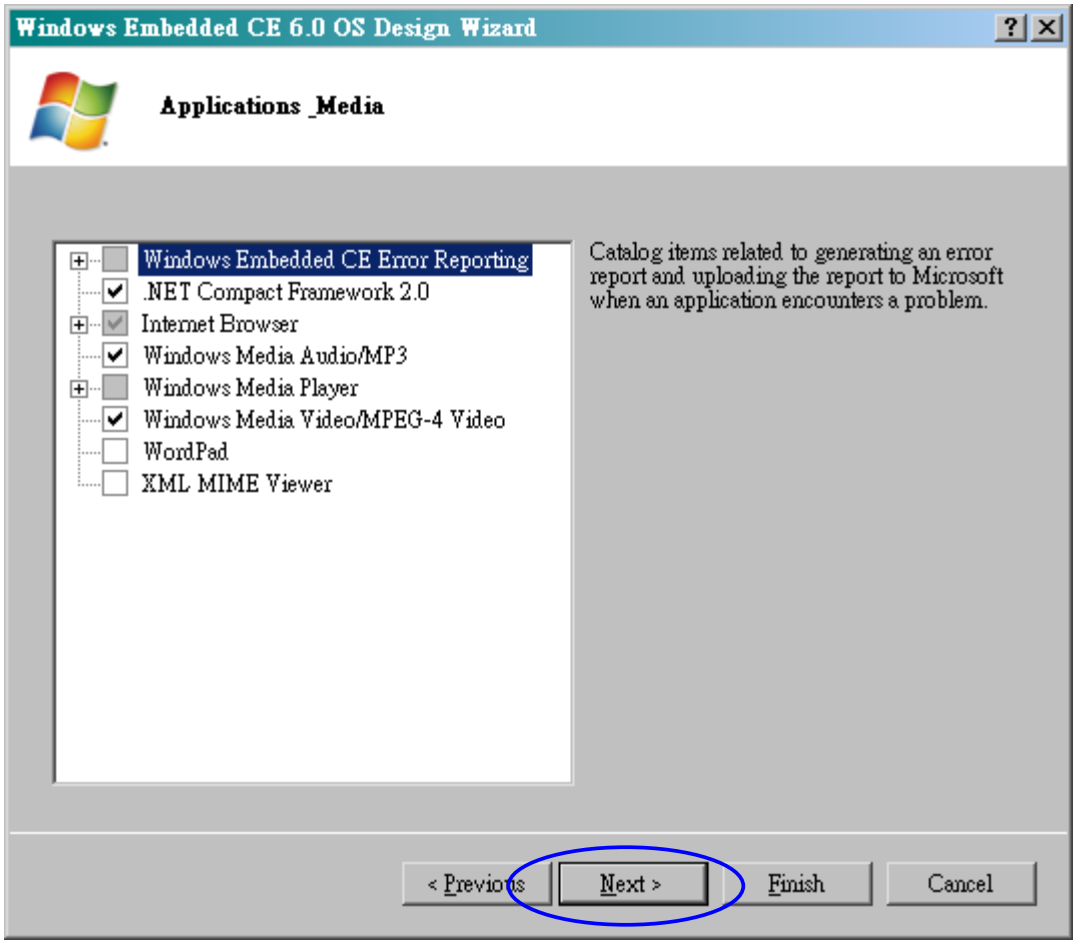


Figure 129 : Click the "Next >" button.

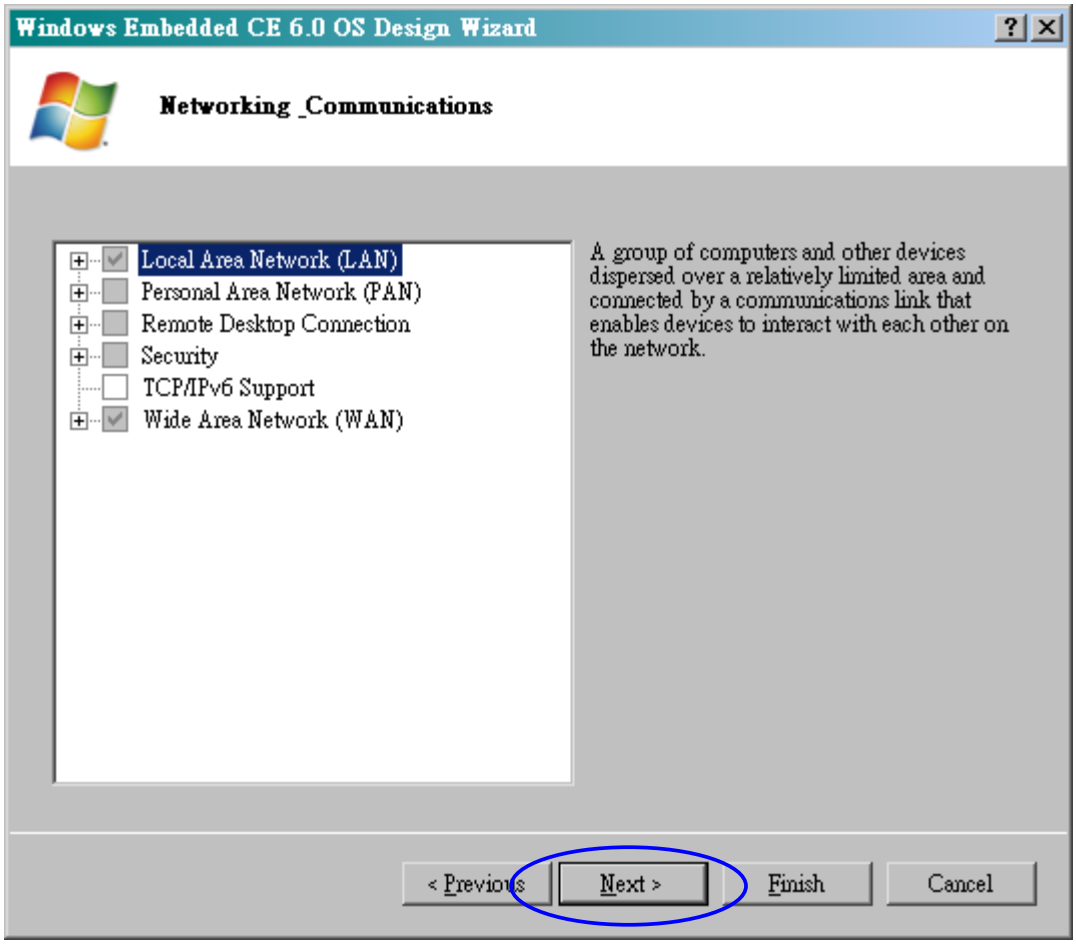


Figure 130 : Click the "Next >" button.

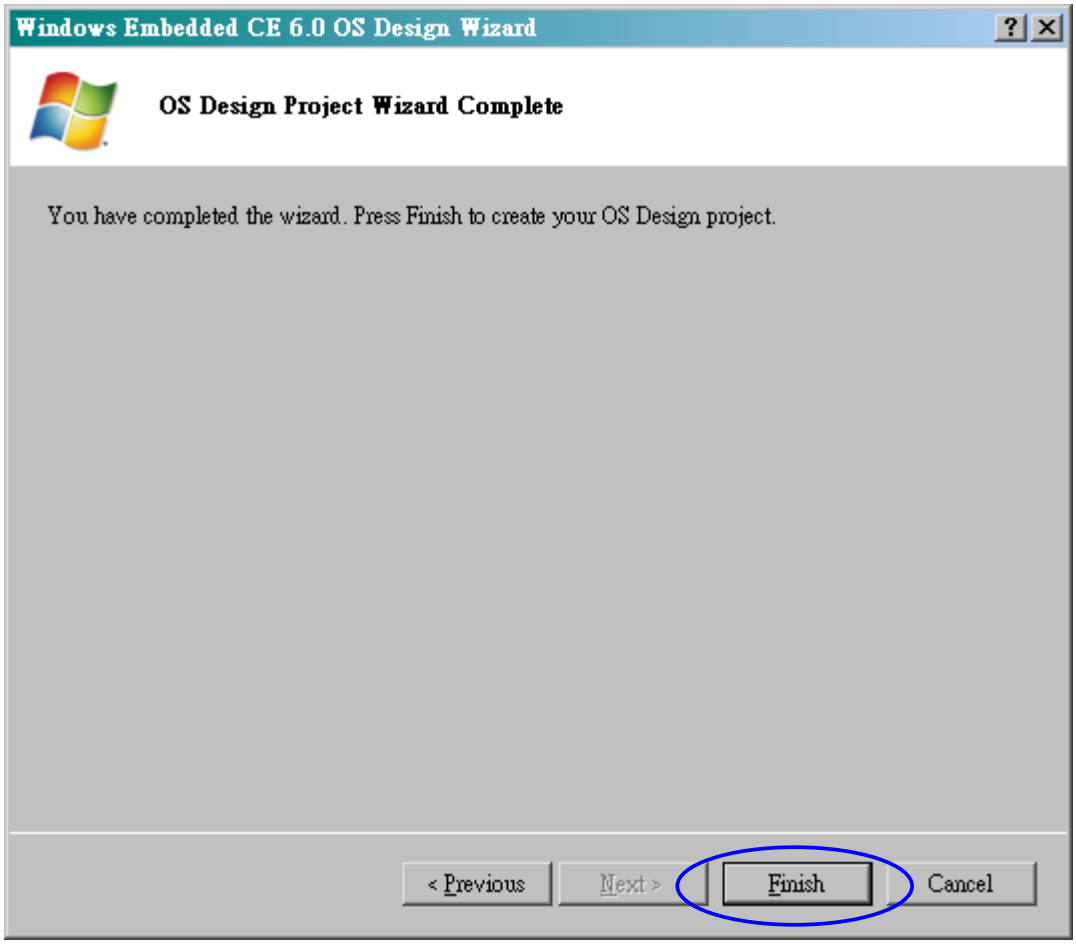


Figure 131 : Click the "Finish" button.

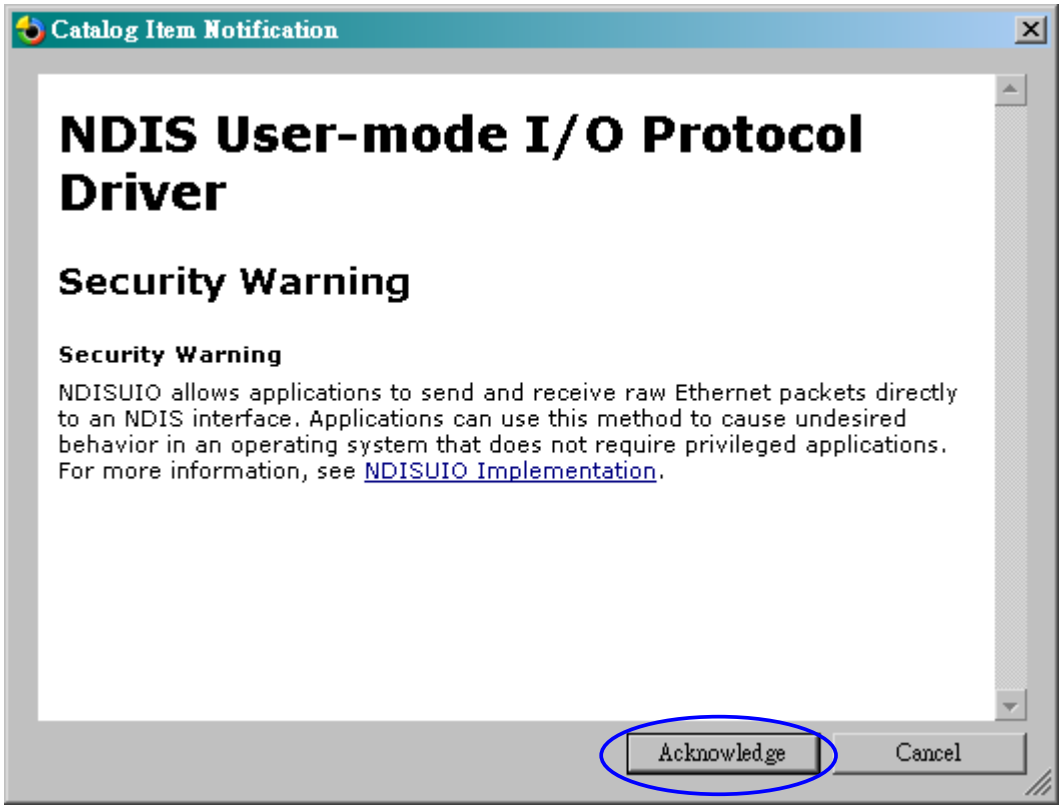


Figure 132 : Click the "Acknowledge" button.

- Chose function for "Thunder" board in the "Catalog Items View". (See Figure 133 and Figure 134)

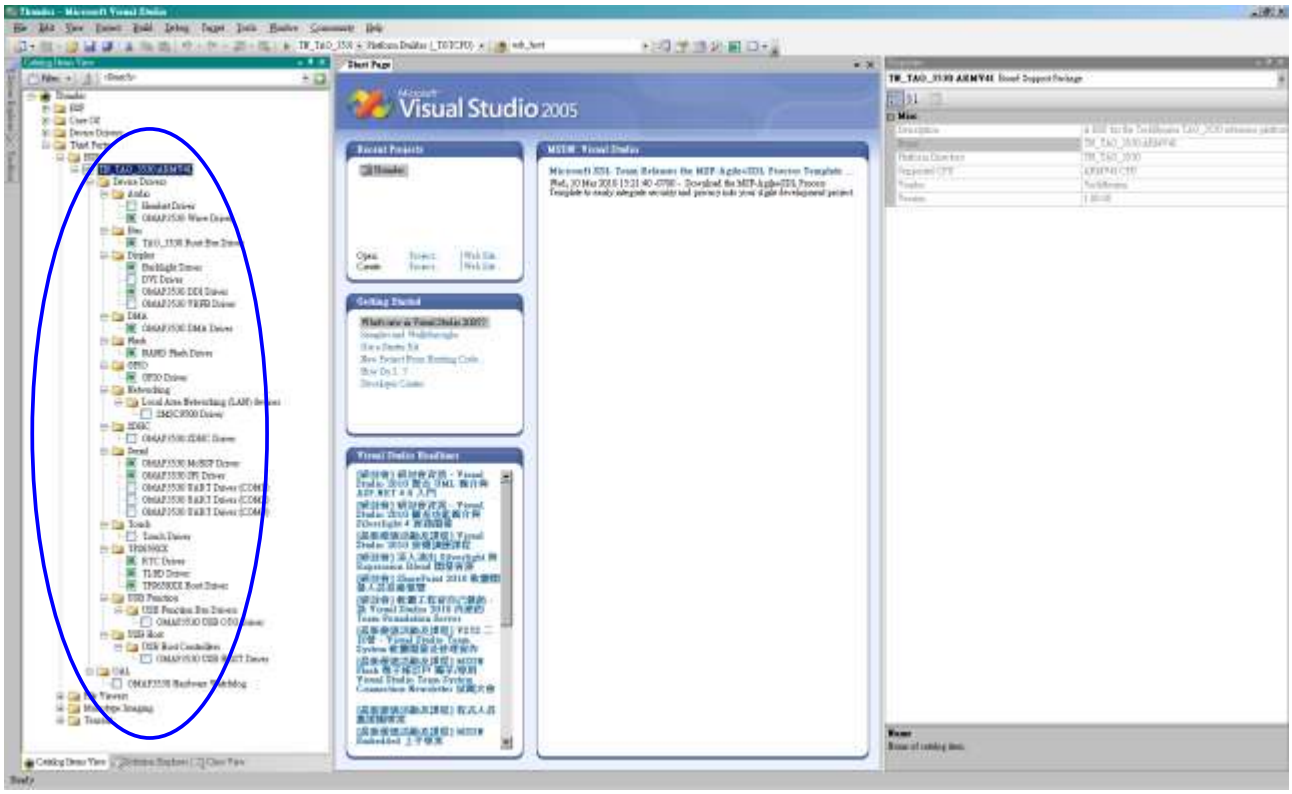


Figure 133

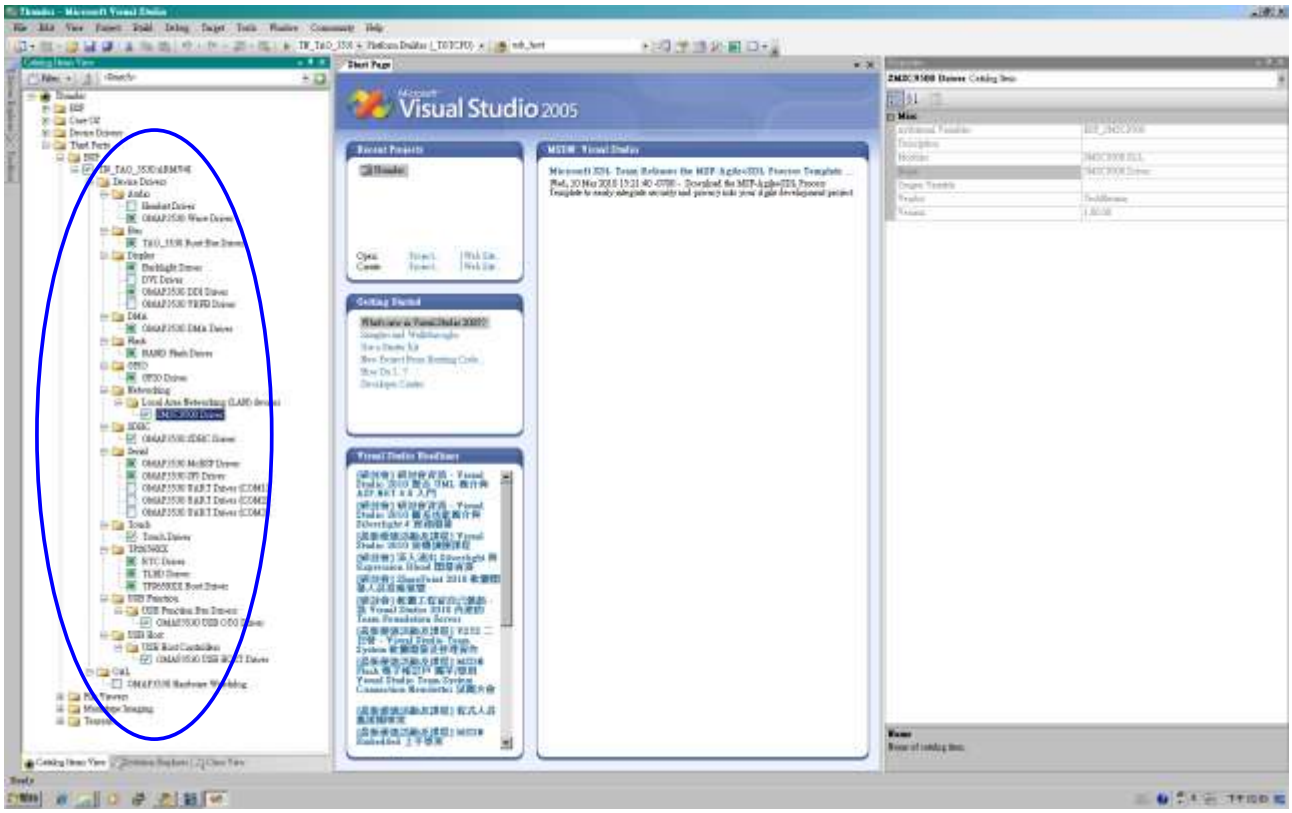


Figure 134

12.6.1 Compile project.

- Chose "TN_TAO_3530_ARMV4I Release". (See Figure 135)

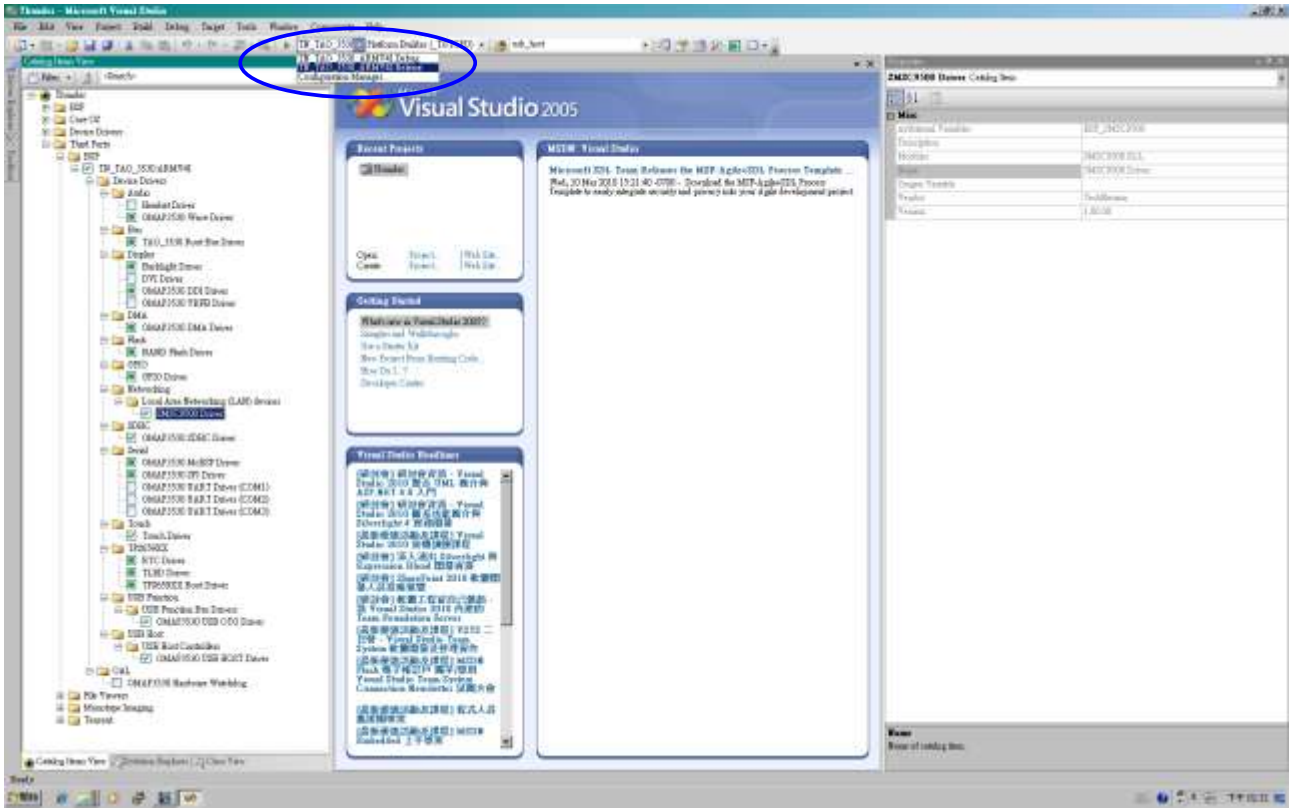


Figure 135

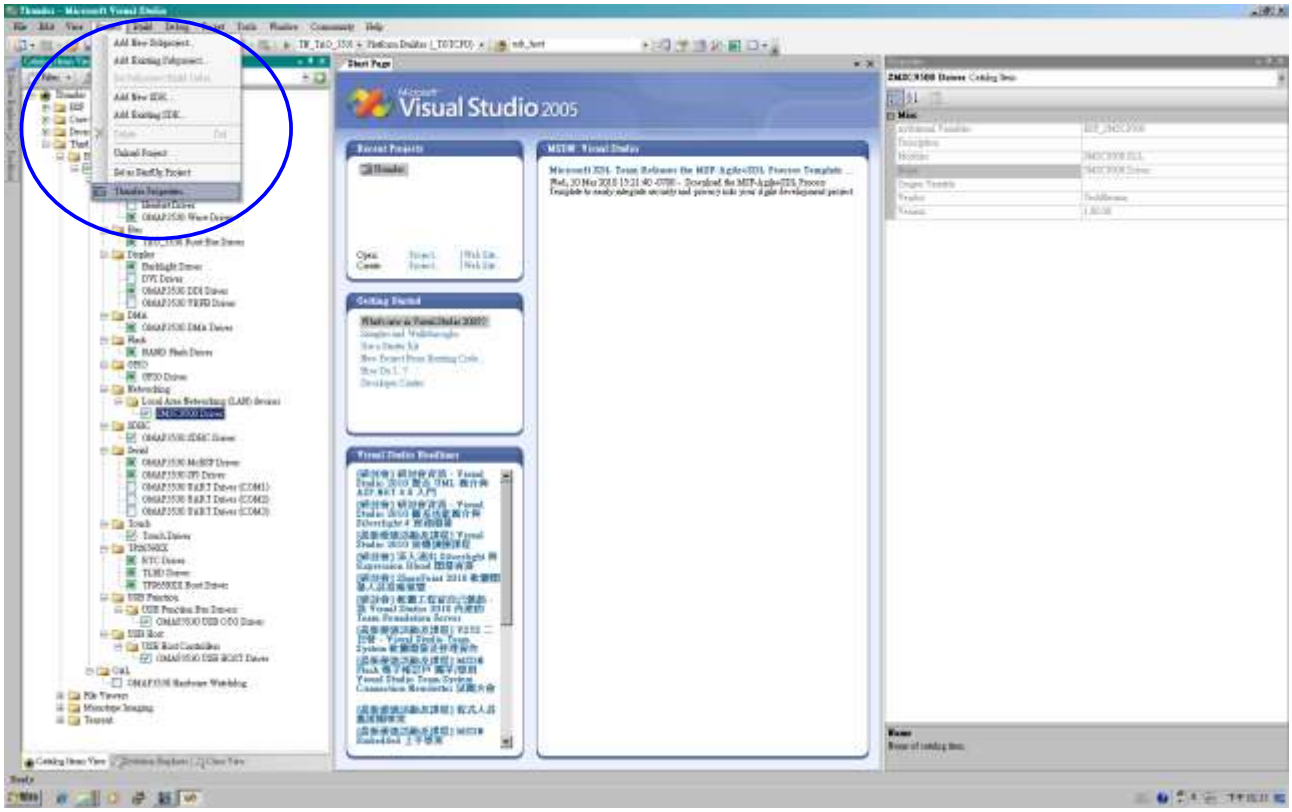


Figure 136 : Click "Project → Thunder Properties..."

- Click "Configuration Properties → Build Options". (See Figure 137)
- Cancel "Enable KITL (no IMGNOKITL=1)" option.
- Chose "Run-time image can be larger than 32 MB (IMGRAM64=1)" option.
- Click "Apply (A)". Then click "OK" option.

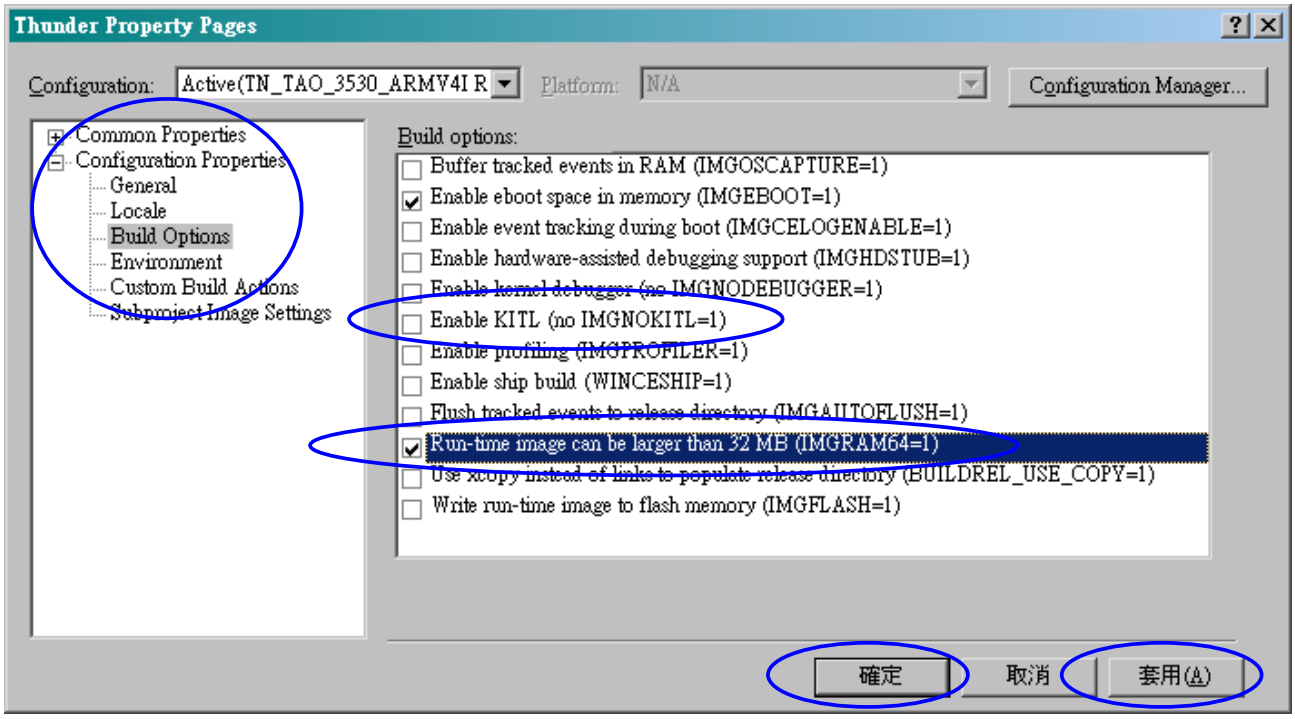


Figure 137

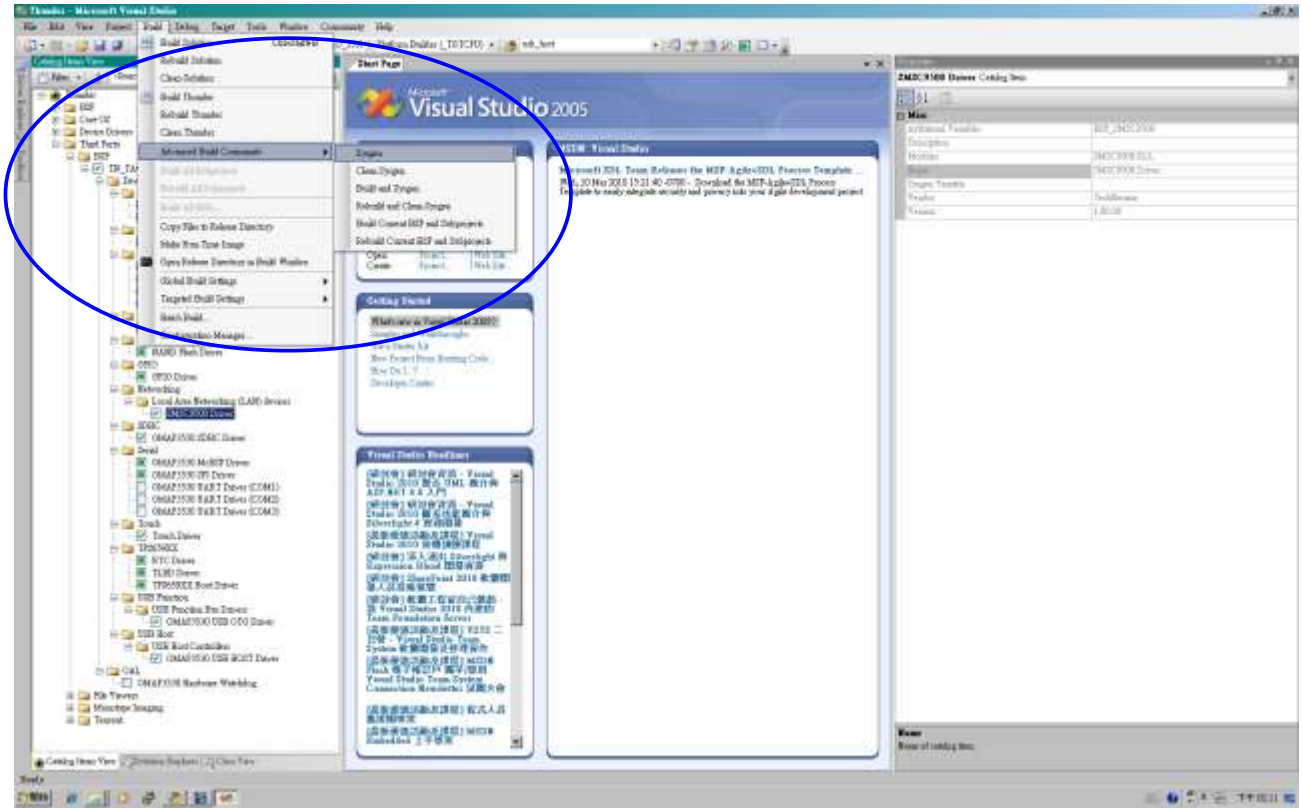


Figure 138 : Click "Build → Advanced Build Commands → Sysgen".

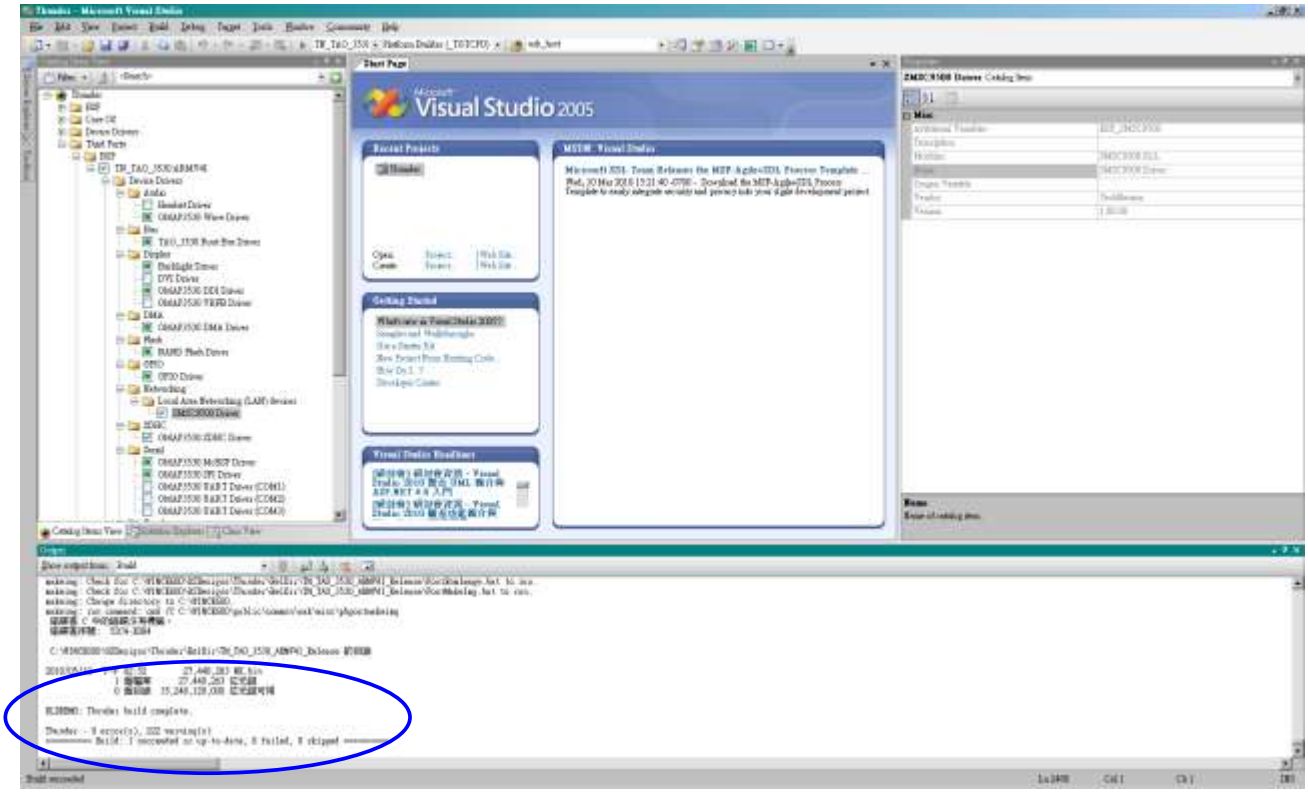


Figure 139 : When the compilation is successful the following screen will appear.

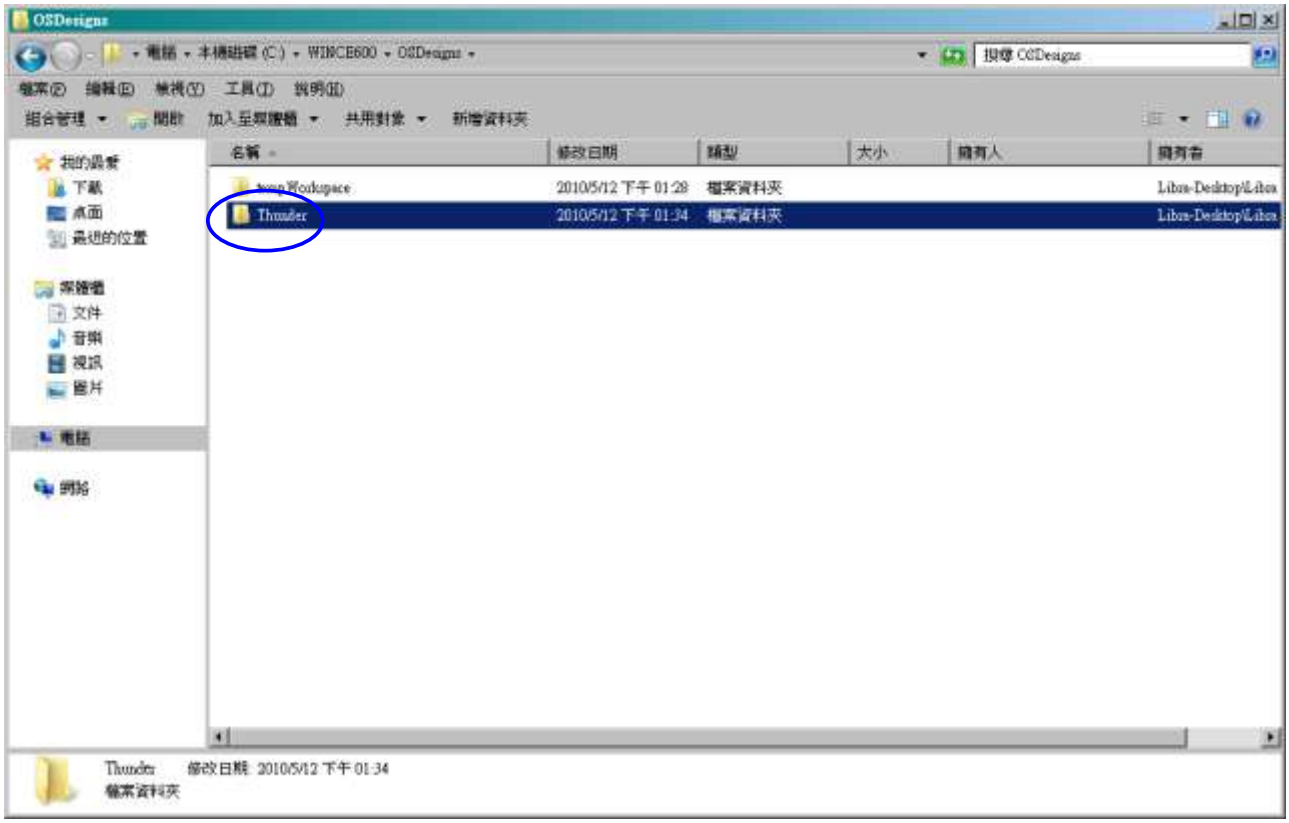


Figure 140 : Project folder in the %_WINCEROOT%\OSDesigns\.

12.7 How to change the logo that you see during boot up

During boot up you will see a TechNexion logo or a screen with four colored squares. As shown in 12.5.2 you can choose between "fldr.raw" and "fldr-logo.raw". Fldr.raw will, during boot up, show a screen divided in four squares with different colors. Fldrlogo.raw will, during boot up, show a dark screen with a TechNexion logo. This section will describe how to make your own logo to appear.

12.7.1 Preparing the BMP

- You will need to prepare a BMP with your logo. However the logo needs to be flipped vertical (see Figure 141)

Figure 141

- This can be done with for instance Photoshop (Use: edit \ transform \ flip vertical)
- Place the flipped BMP at the following directory: C:\WINCE600\PLATFORM\TN_TAO_3530\FILES
- The final result on your display will be as below (see Figure 142)

Figure 142

12.7.2 Change the makefile.inc

- Open a text editor (for instance Notepad)
- Open makefile.inc, which is in the directory: C:\WINCE600\PLATFORM\TN_TAO_3530\SRC\BOOT\XLDR\NAND
- Change the orange part in the following line with the name of your BMP: Copy /b $(_TGT)\TIEVM3530-nand.raw + $(_FILES)\TechNexion.bmp $(_TGT)\TIEVM3530-nand-logo.raw
- Save makefile.inc in the same directory

12.7.3 Calculate the needed blocks

- You need to calculate the needed blocks in your NAND Flash to store the logo.
- For instance the TechNexion logo is 292x39 pixels and in RGB color(x3), that means it is using: 292x39x3=34164 bytes.
- This is 34164/1024= 33.36kB
- The NAND Flash blocks are 128kB in size so it will fit in 1 block

- If you want to make a logo that fits the whole 7" screen it is 800x480 pixels and in RGB color(x3).
- That means it is using: 800x480x3= 1152000 bytes.
- 1152000/1024=1025kb
- This will use 1125kB/128kB=8.789 blocks, so it will fit in 9 blocks
- 9 full blocks x 128kB is 1152kB
- 1152kb x 1024=1179648 bytes
- This we need to convert from decimal to hexadecimal
- Open your calculator (View Scientific) and type the number and then select Hex(See Figure 143)

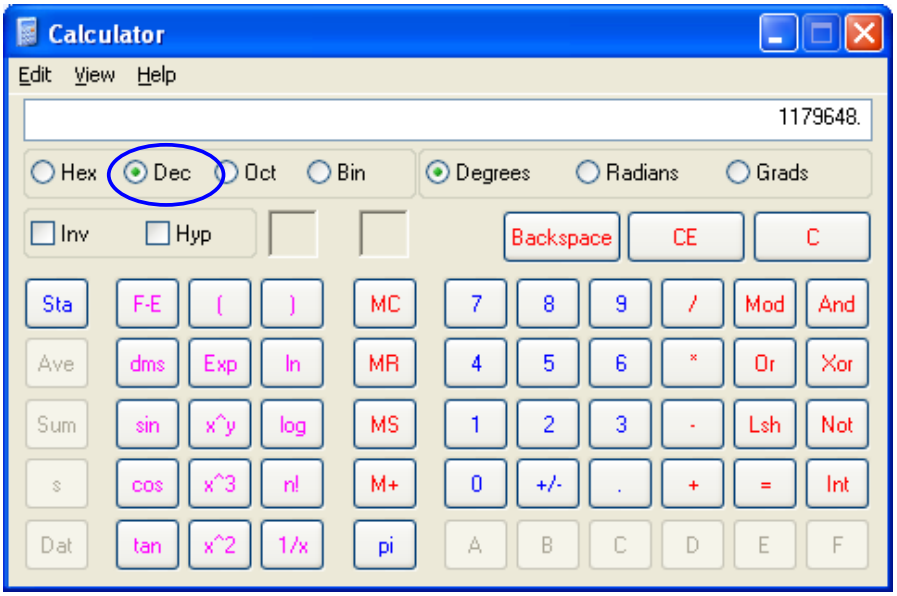


Figure 143

- The outcome in Hexadecimal will be 120000 (See Figure 144)

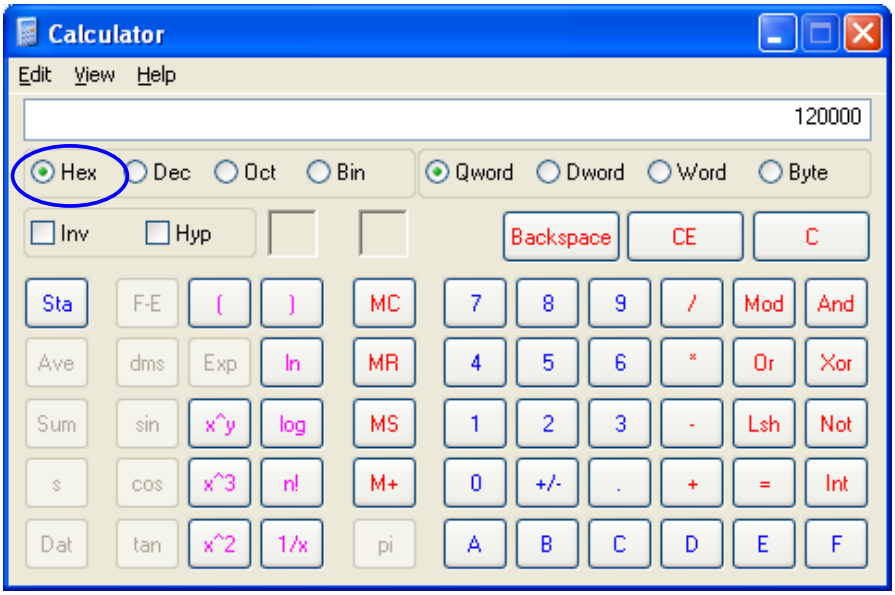


Figure 144

12.7.4 Change image-cfg.h

- Open a text editor (for instance Notepad)
- Open image-cfg.h which is in the following directory:

C:\WINCE600\PLATFORM\TN_TAO_3530\SRC\INC

- Change the green number, with the number calculated in 12.7.3, in the following line:

#define IMAGE_BOOTLOADER_BITMAP_SIZE 0x00120000

- (please keep beginning and length (10 characters) the same)

12.7.5 Compile

- Open Microsoft Visual Studio 2005
- Open your project (For example: tsunami_LCD_AT070TN94)
- Use the menu: Build\advanced build commands\clean sysgen
- You will now find a fldr-log.raw in the following directory:

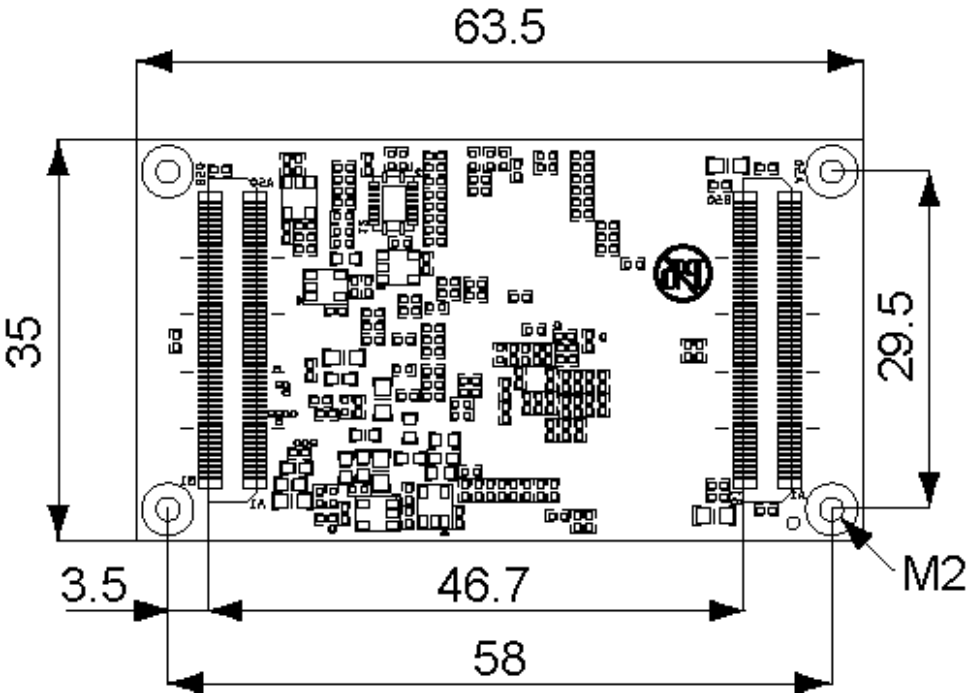
C:\EINCE600\OSdesigns\tsunami_LCD_AT070TN94\RelDir\TN_TAO_3530_ARMV41_RELEASE

12.7.6 Put in NAND

- Follow all the instructions in 12.5.2
- Finished.

13 Appendix – Module

13.1 TAO-3530 System on Module Dimensions



Dimensions in mm, tolerance +/- 0.2 mm

Note: 2D (DXF) and 3D(STEP) files are available for download at the Technexion website. (Service and support/ Downloads/ ARM CPU Modules/ TAO-3530)

13.2 Module Connectors

To mount the TAO-3530 module on the baseboard it isrecommended to use a connector with the following specifications:

- 100 pin NAIS connector
- Mated height 4.5 mm

For example Panasonic AXK5S00247YG

P5KS: Mated height 4.5mm type

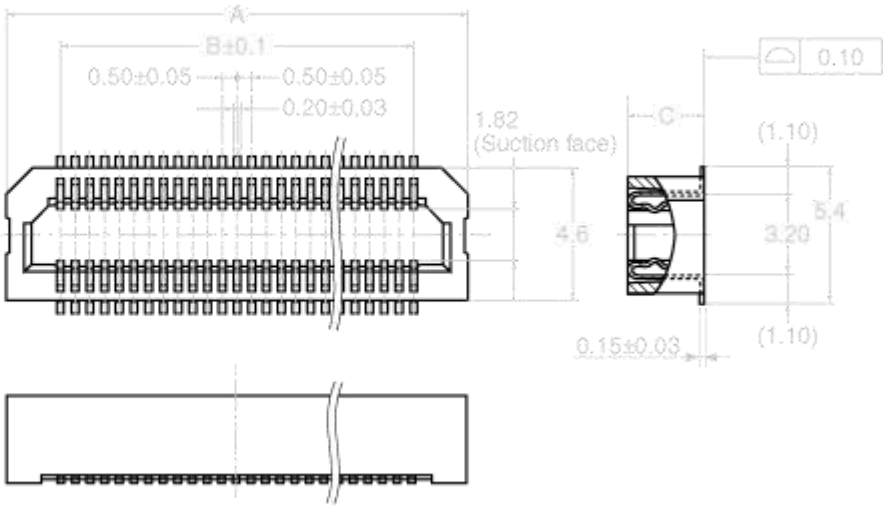
• Socket

CAD Data

Dimension table (mm)

No. of contacts	A	B
100	28.20	24.50

Mated height	C
4.5 mm	3.55

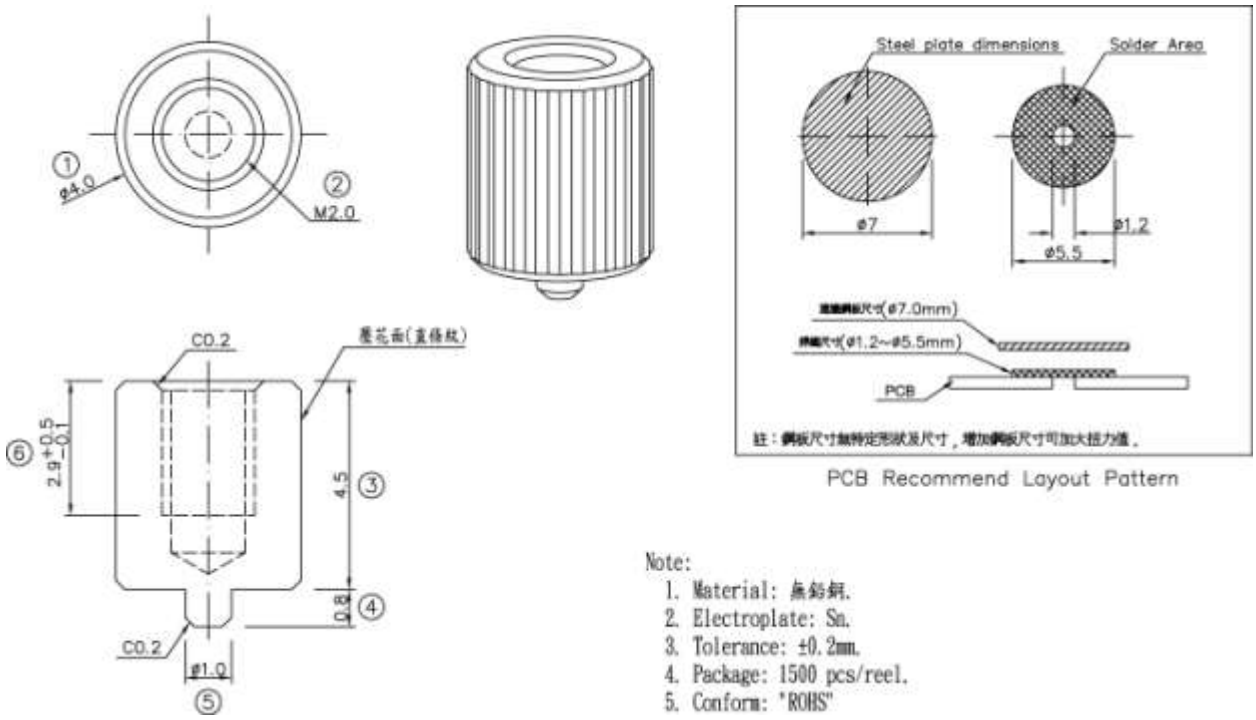


Panasonic Electric Works

General tolerance: ±0.2

If you have difficulty purchasing these parts please contact sales@technexion.com, for assistance.

13.3 Nut to Fix TAO-3530 Module to the Baseboard



Note 1: Always design the above mounting nut/pose on your custom baseboard and fasten the TAO-3530 to ensure a solid connection and counter vibration prone applications.

Note 2: On a custom baseboard always connect the mounting nut/pose to the baseboard general system GND section.

If you have difficulty purchasing these parts please contact sales@technexion.com, for assistance.

13.4 TAO-3530 JTAG Solder points

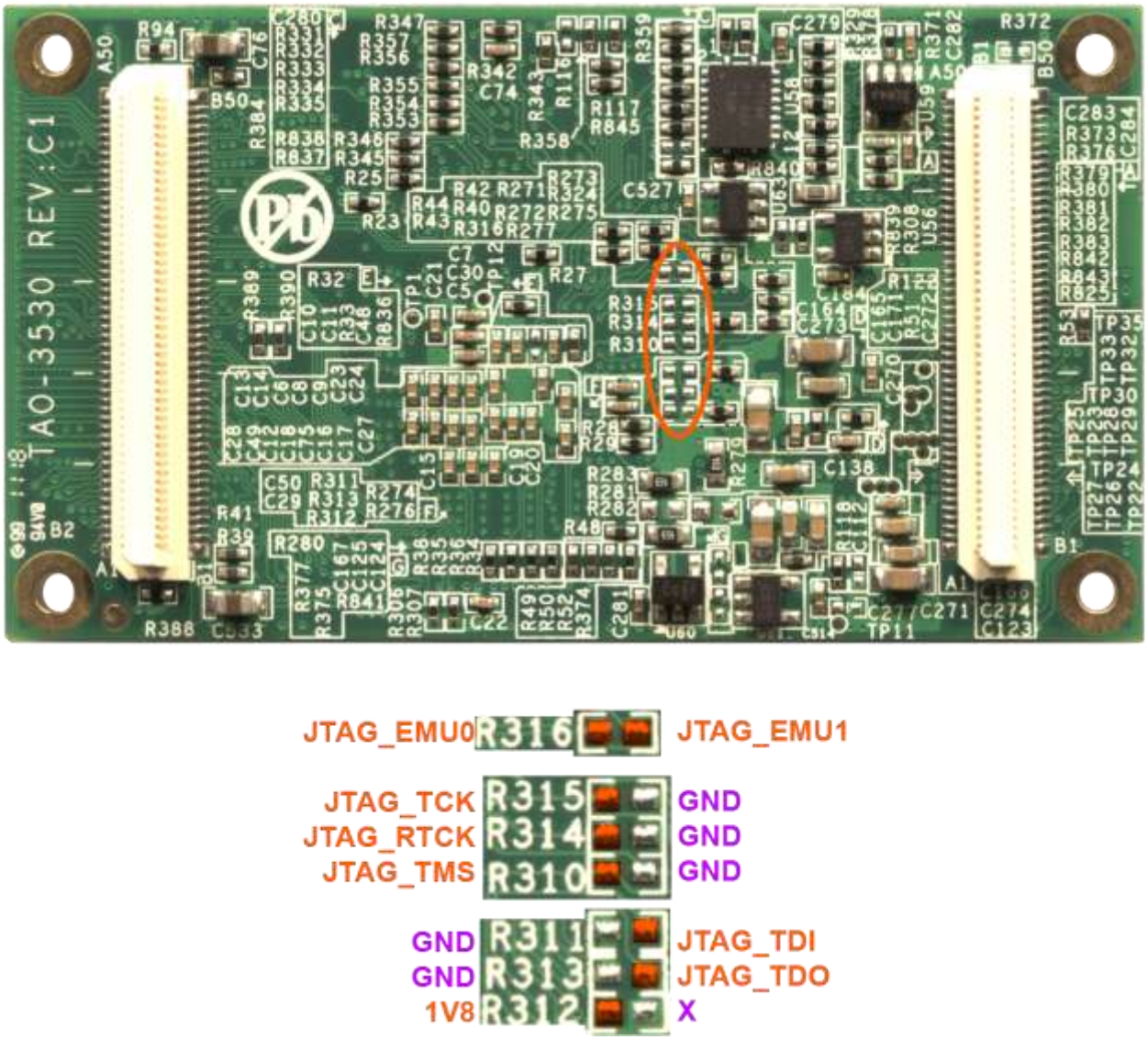
Need to connect a JTAG debugger to our module (revision A & B)?

There are solder points as indicated in above picture. There are 7 pairs; their function is described in the table below.

JTAG TMS (R310)	JTAG TDI (R311)	1.8V (R312)	JTAG TDO (R313)	JTAG RTCK (R314)	JTAG TCK (R315)	JTAG EMU0 (R316)
JTAG nTRST	GND	NC	GND	GND	GND	JTAG EMU1

Table: Description of JTAG solder points (same direction as photo)

JTAG header in TAO-3530-rev-C1

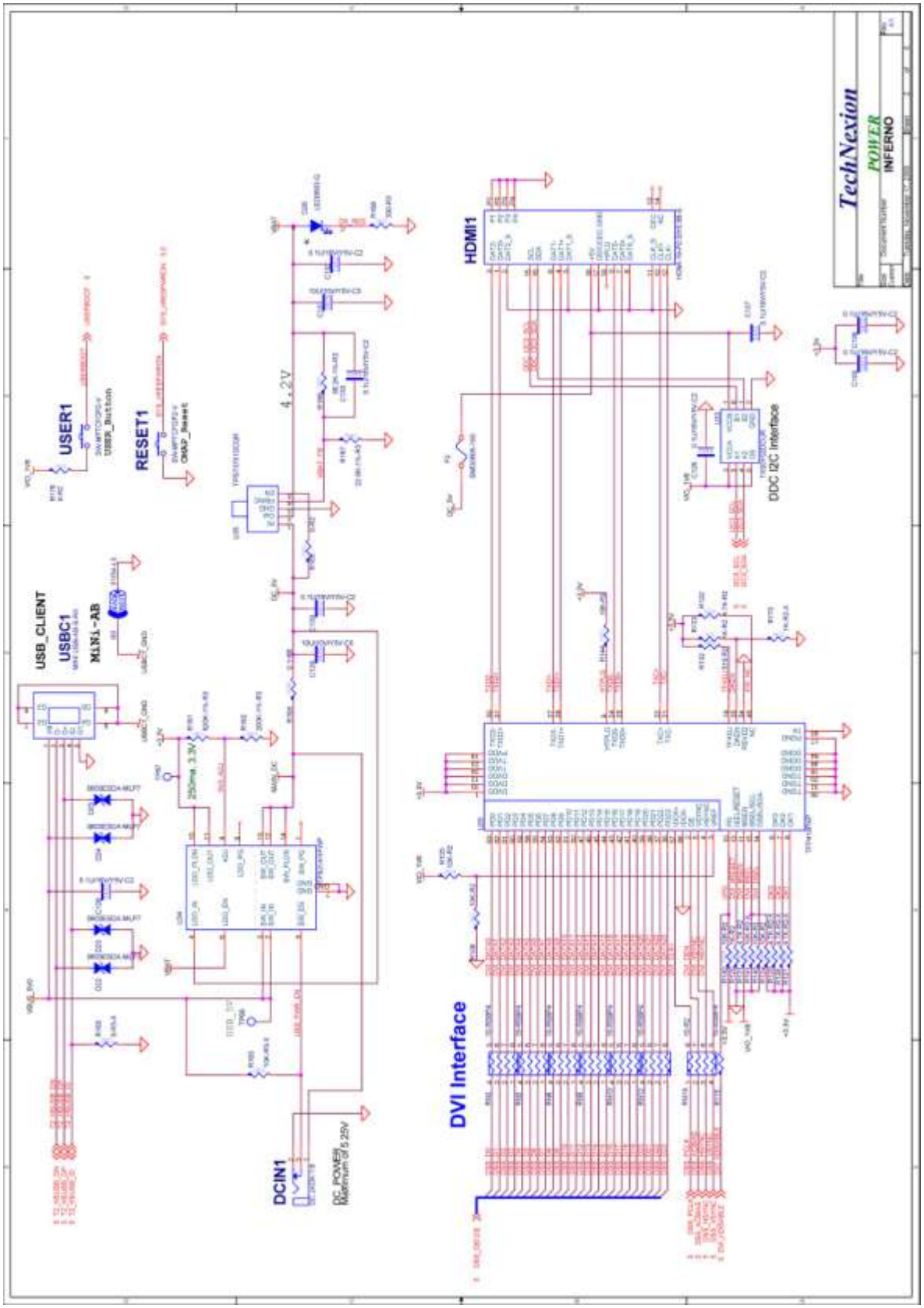


Solder at the orange pads

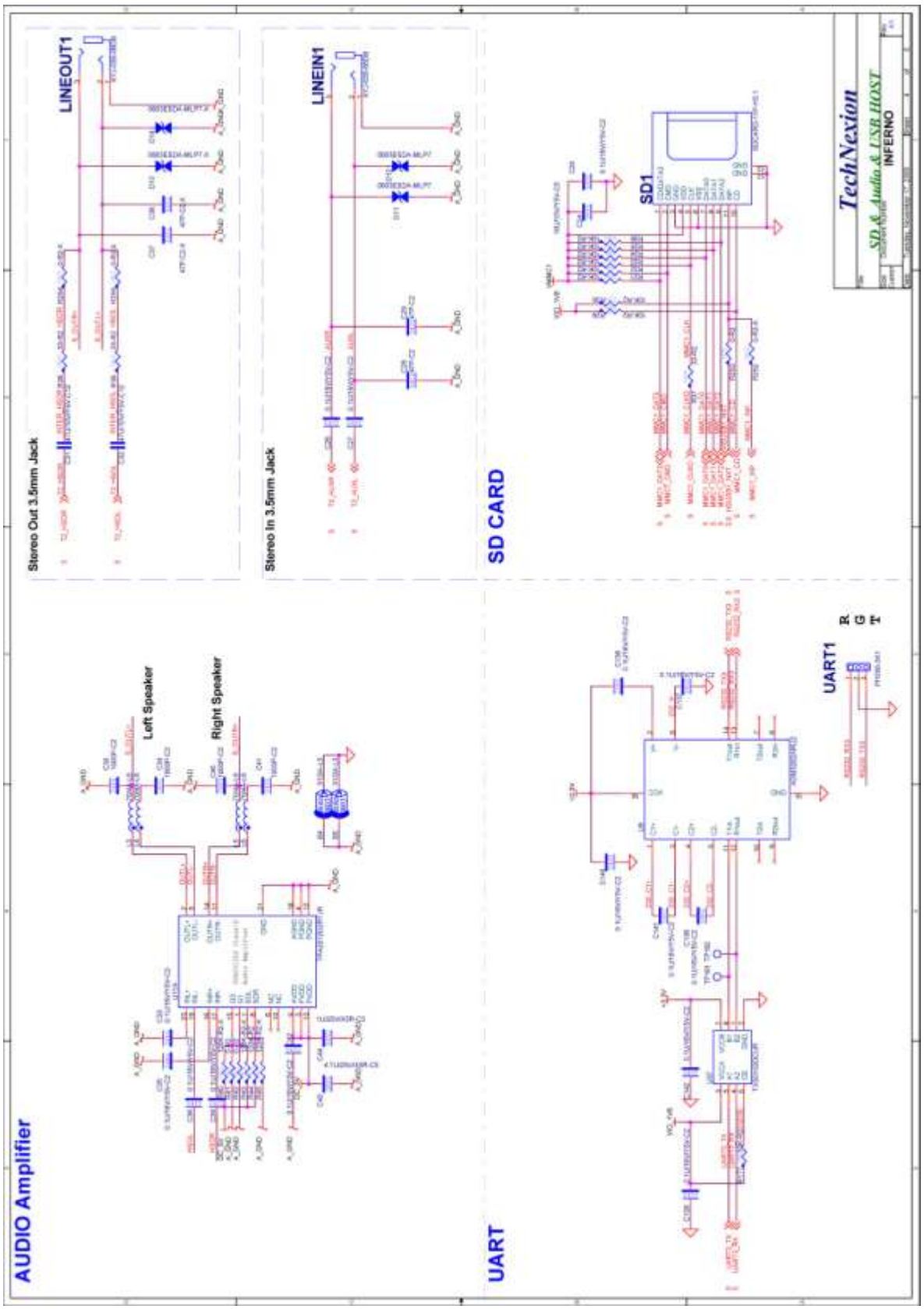
14 Appendix - Schematics

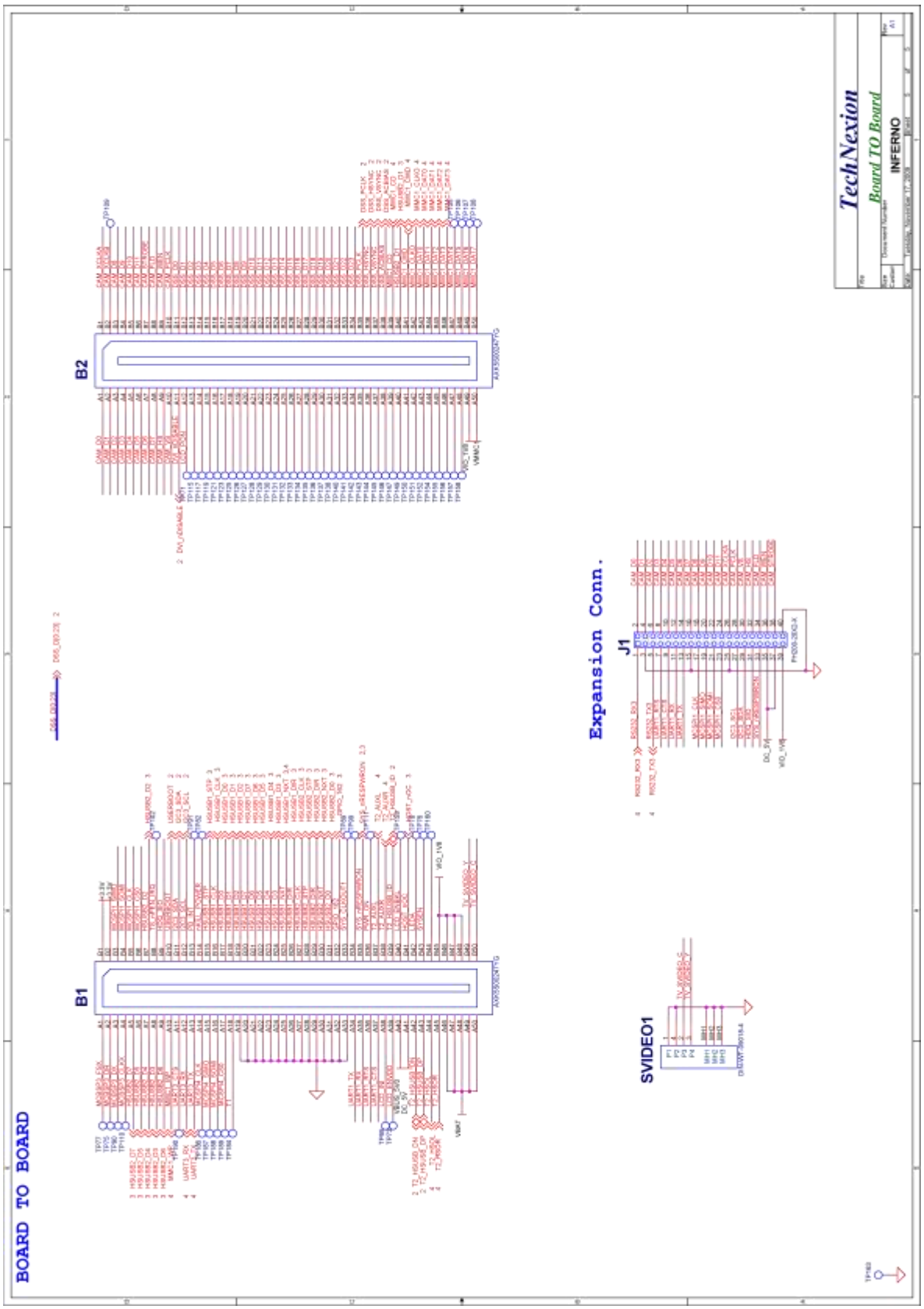
14.1 Inferno baseboard schematics

If you are designing your own baseboard then please contact sales@technexion.com for clear design files


TechNexion
POWER
INFERNO
HDMI1
USER1
RESET1
USB_CLIENT
USBC1
DDC I2C Interface
DVI Interface
DCIN1
DC_POWER
Maximum of 5.25V

If you are designing your own baseboard then please contact sales@technexion.com for clear design files

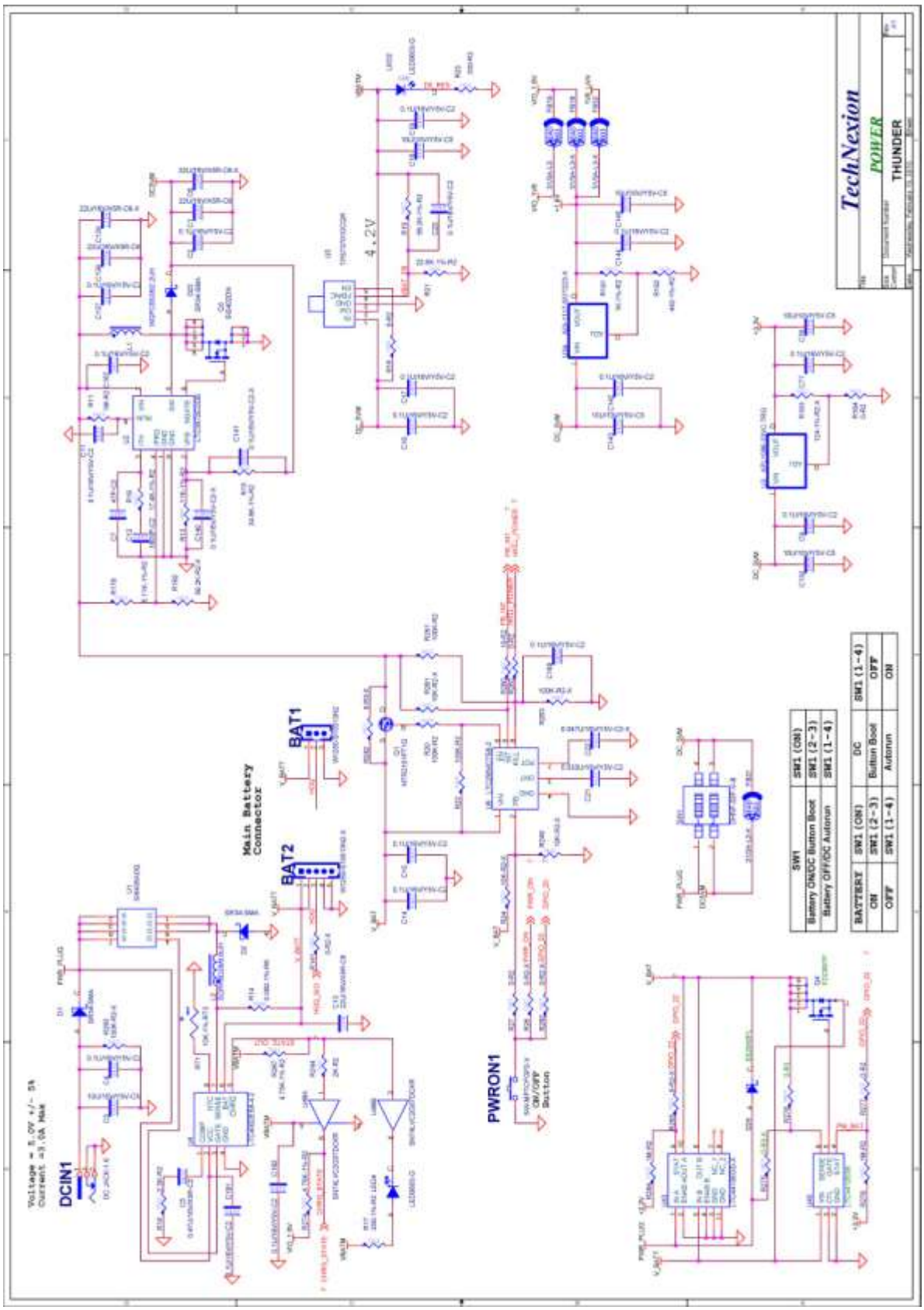

LINEOUT1
Stereo Out 3.5mm Jack
LINEIN1
Stereo In 3.5mm Jack
SD CARD
SD1
TechNexion
SD & Audio & USB HOST
INFERNO
AUDIO Amplifier
Left Speaker
Right Speaker
UART
UART1
R
G
T

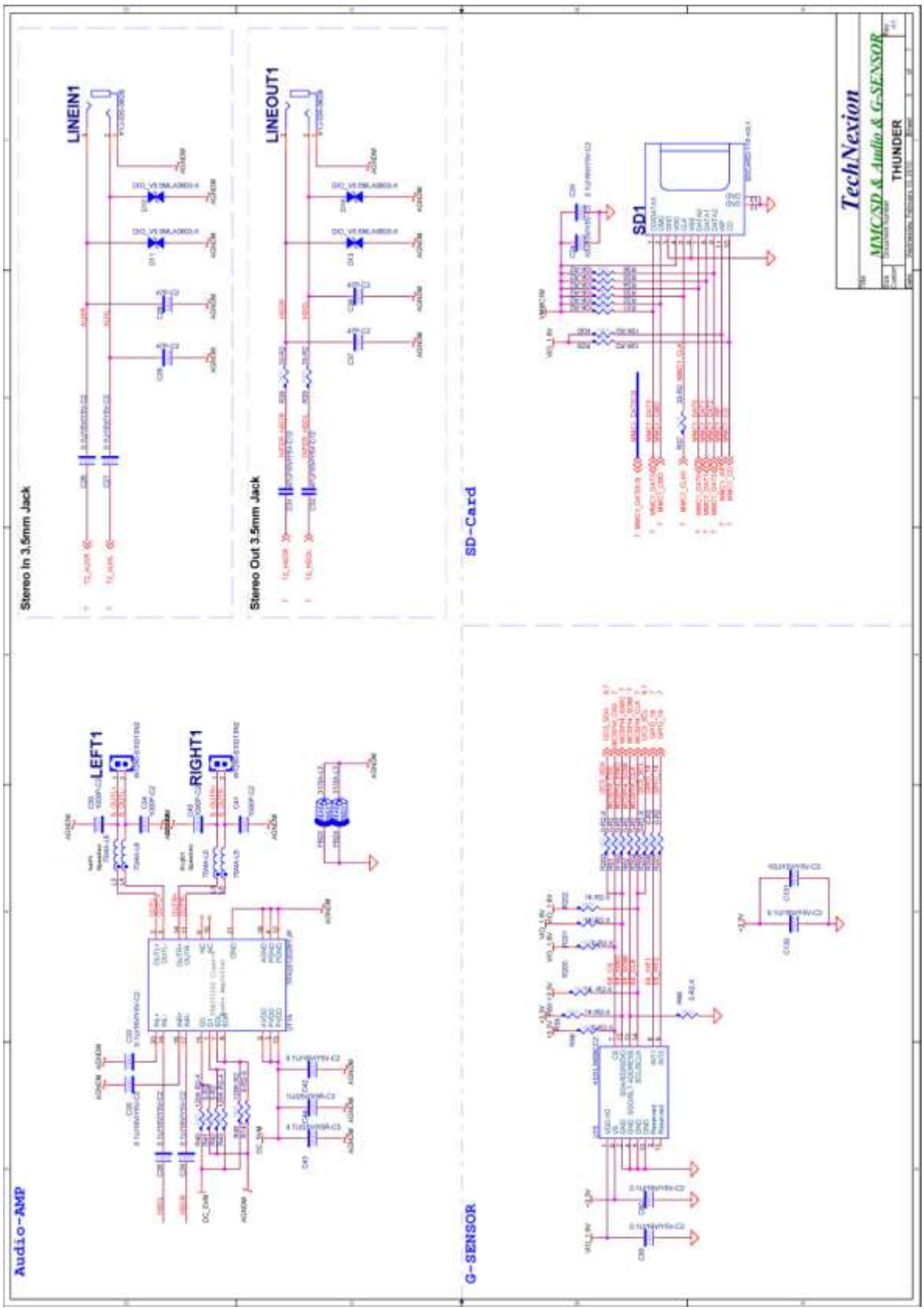


If you are designing your own baseboard then please contact sales@technexion.com for clear design files

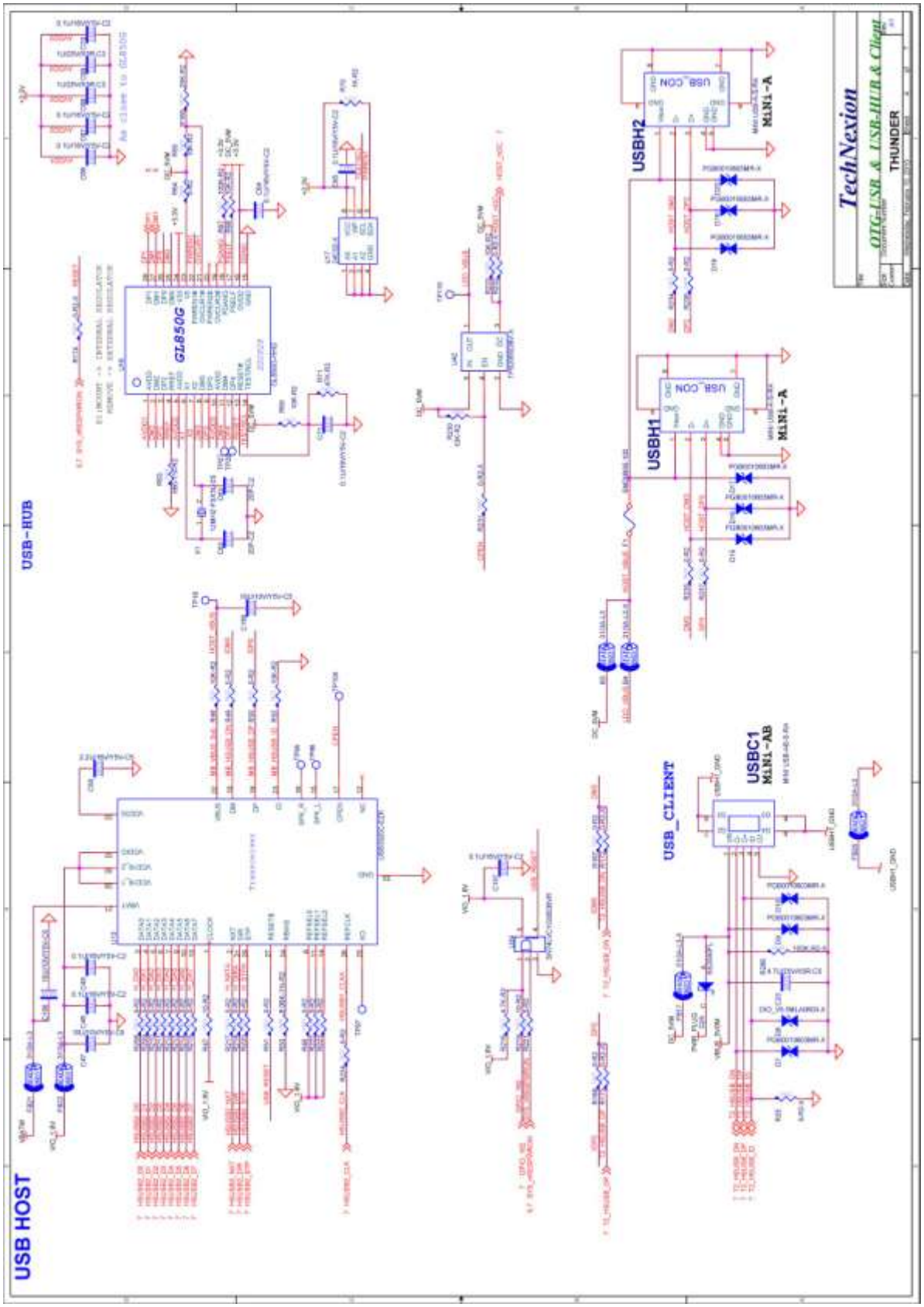
14.2 Thunder baseboard schematics

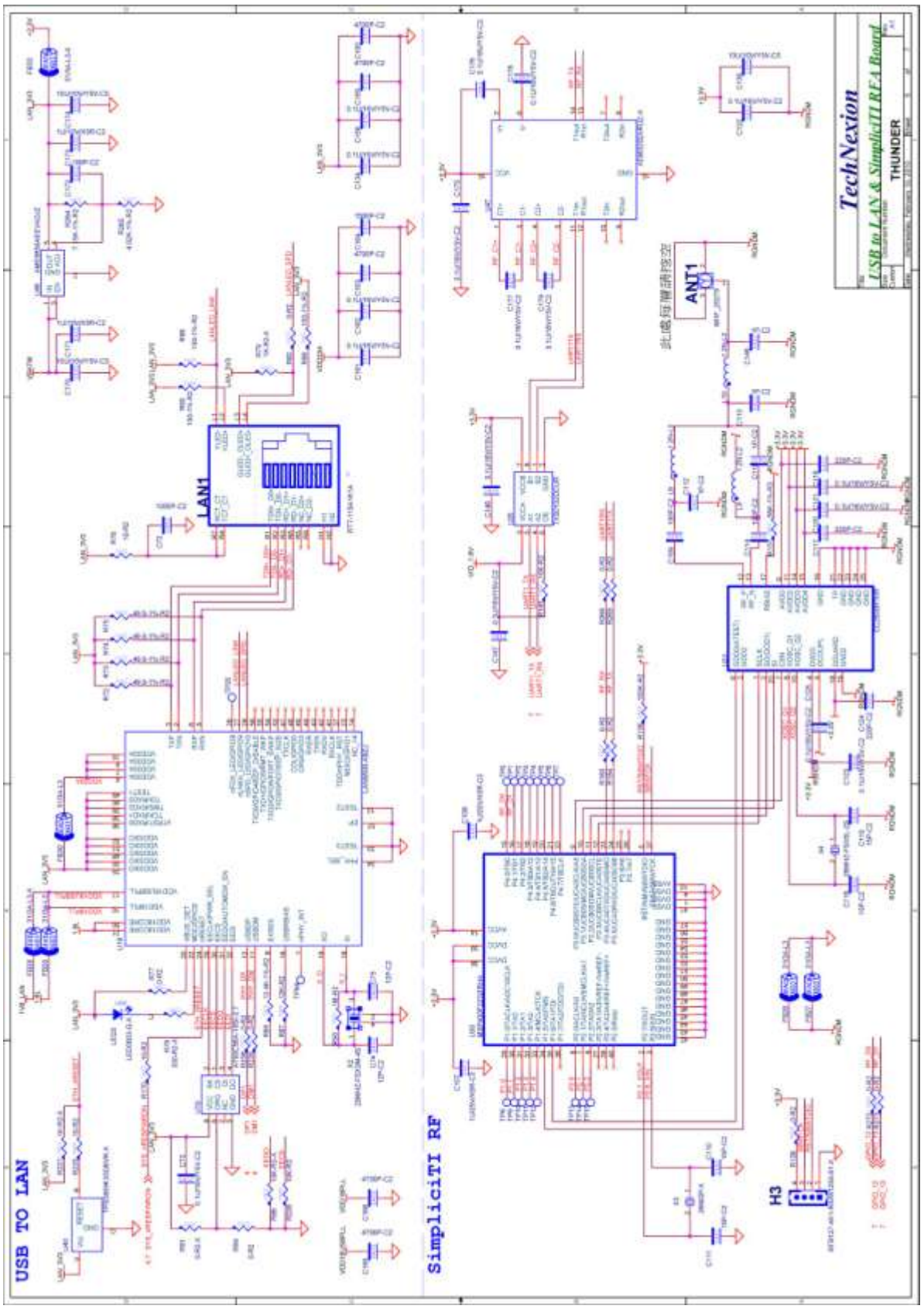
If you are designing your own baseboard then please contact sales@technexion.com for clear design files


TechNexion
POWER
THUNDER
4.2V
BAT1
BAT2
Main Battery Connector
DCIN1
PWRON1
SW1
Battery ON/DC Button Boot
Battery OFF/DC Autorun
SW1 (ON)
SW1 (2-3)
SW1 (1-4)
DC
Button Boot
Autorun
BATTERY
ON
OFF

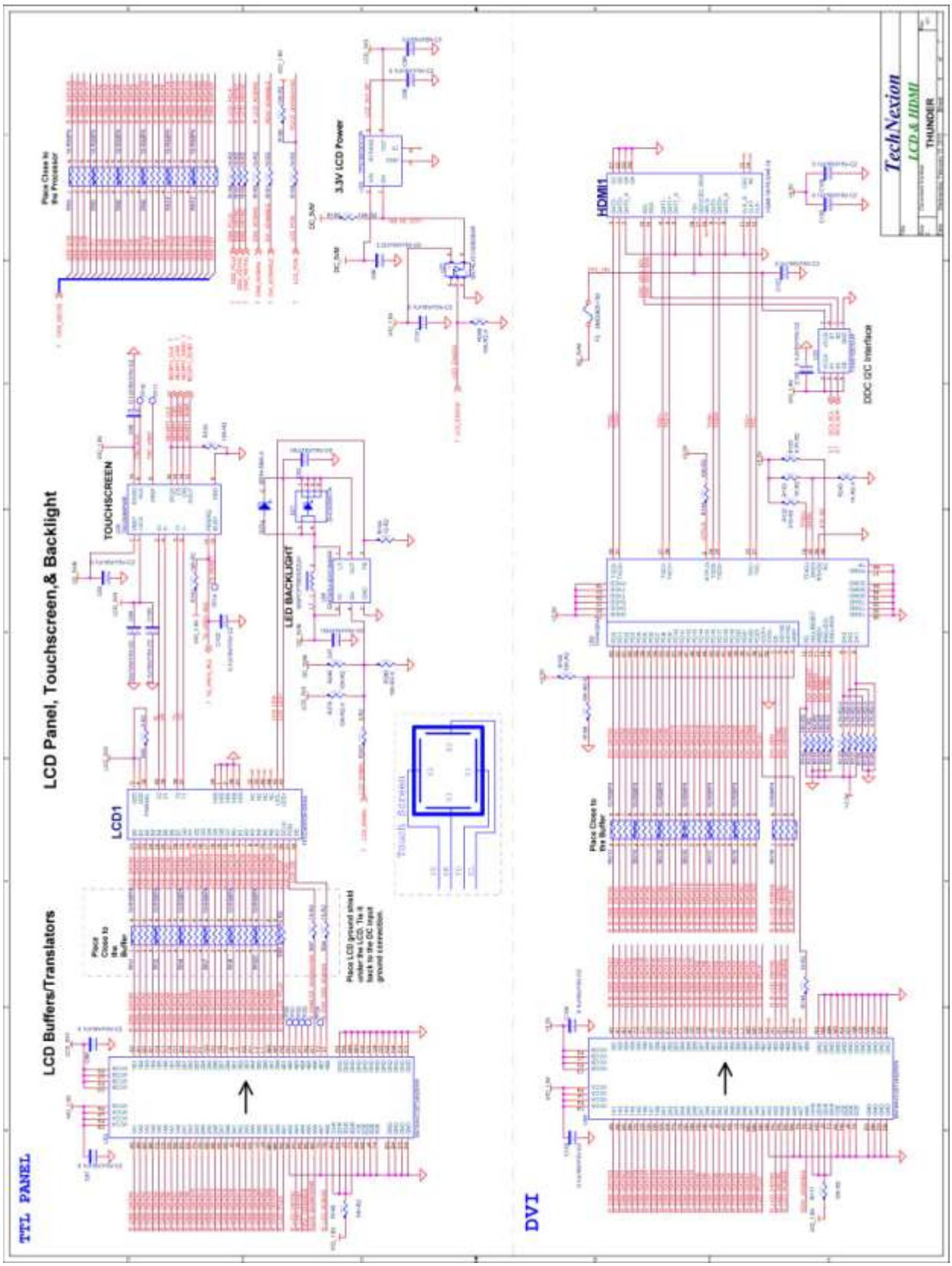


If you are designing your own baseboard then please contact sales@technexion.com for clear design files

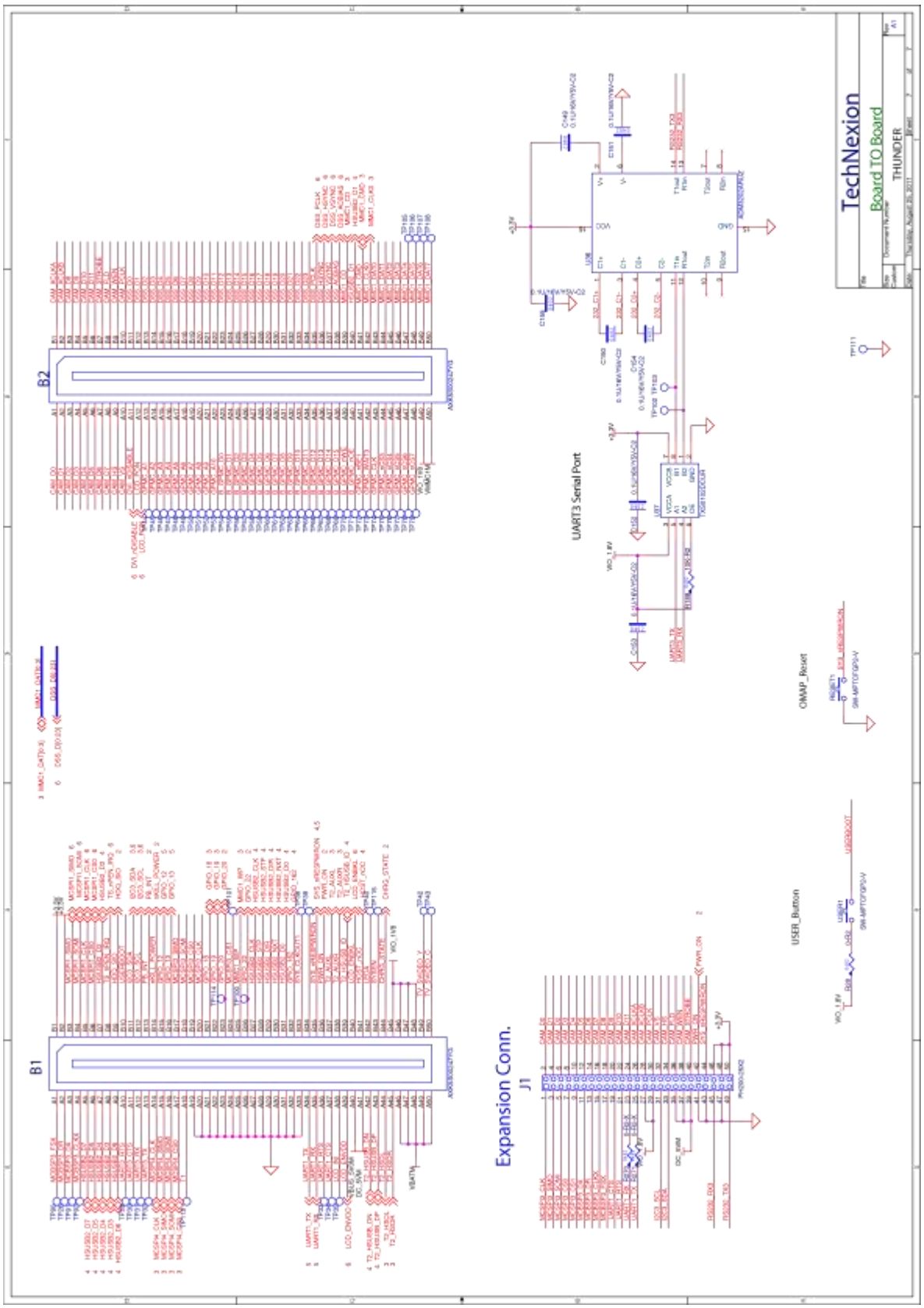

TechNexion
OTG+USB-A+USB-HUB+Client
THUNDER
USB-HUB
USB HOST
USB_CLIENT
USBH2
USBH1
USBC1
MINI-A
MINI-AB
GL850G



If you are designing your own baseboard then please contact sales@technexion.com for clear design files



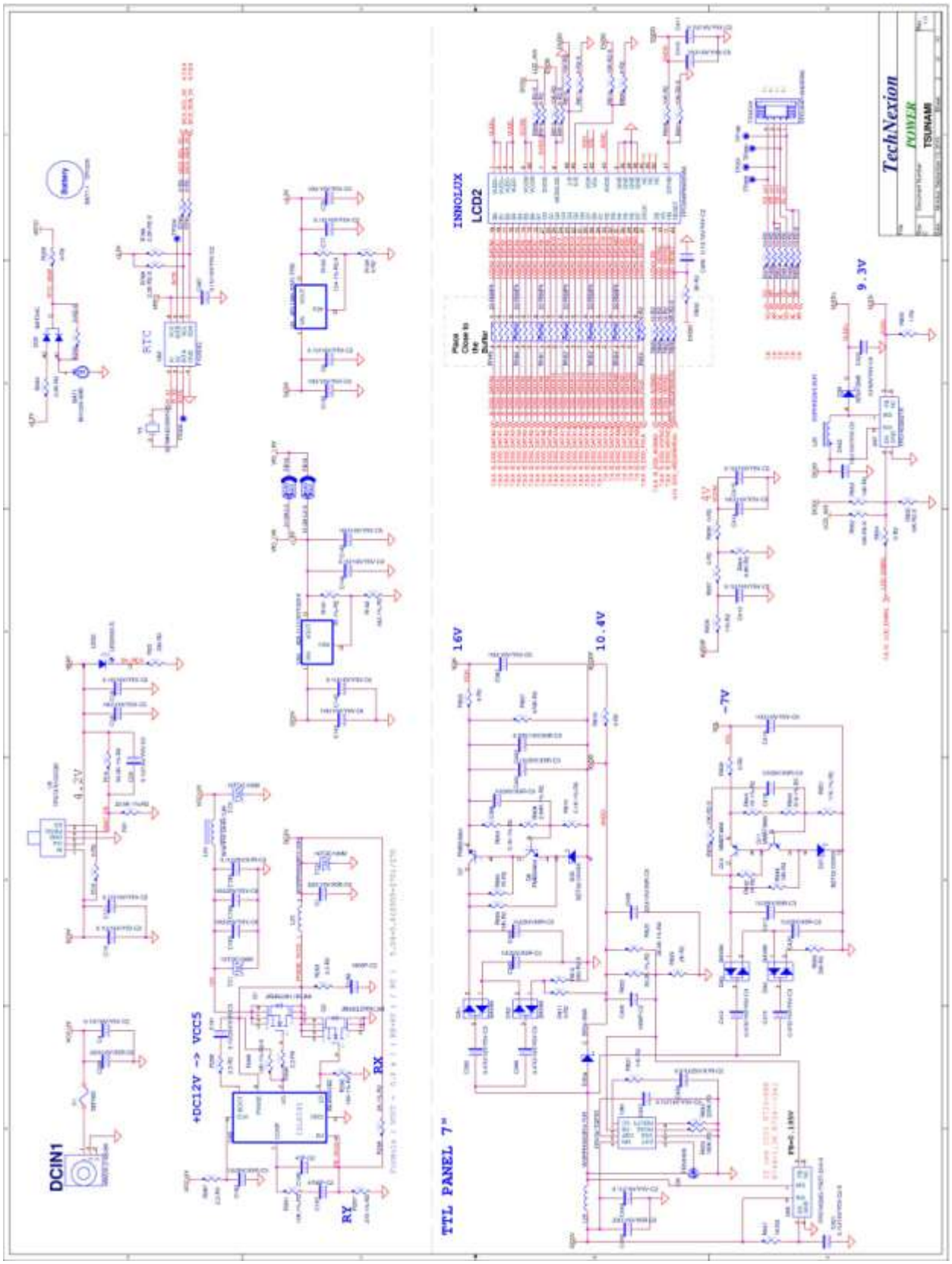
If you are designing your own baseboard then please contact sales@technexion.com for clear design files



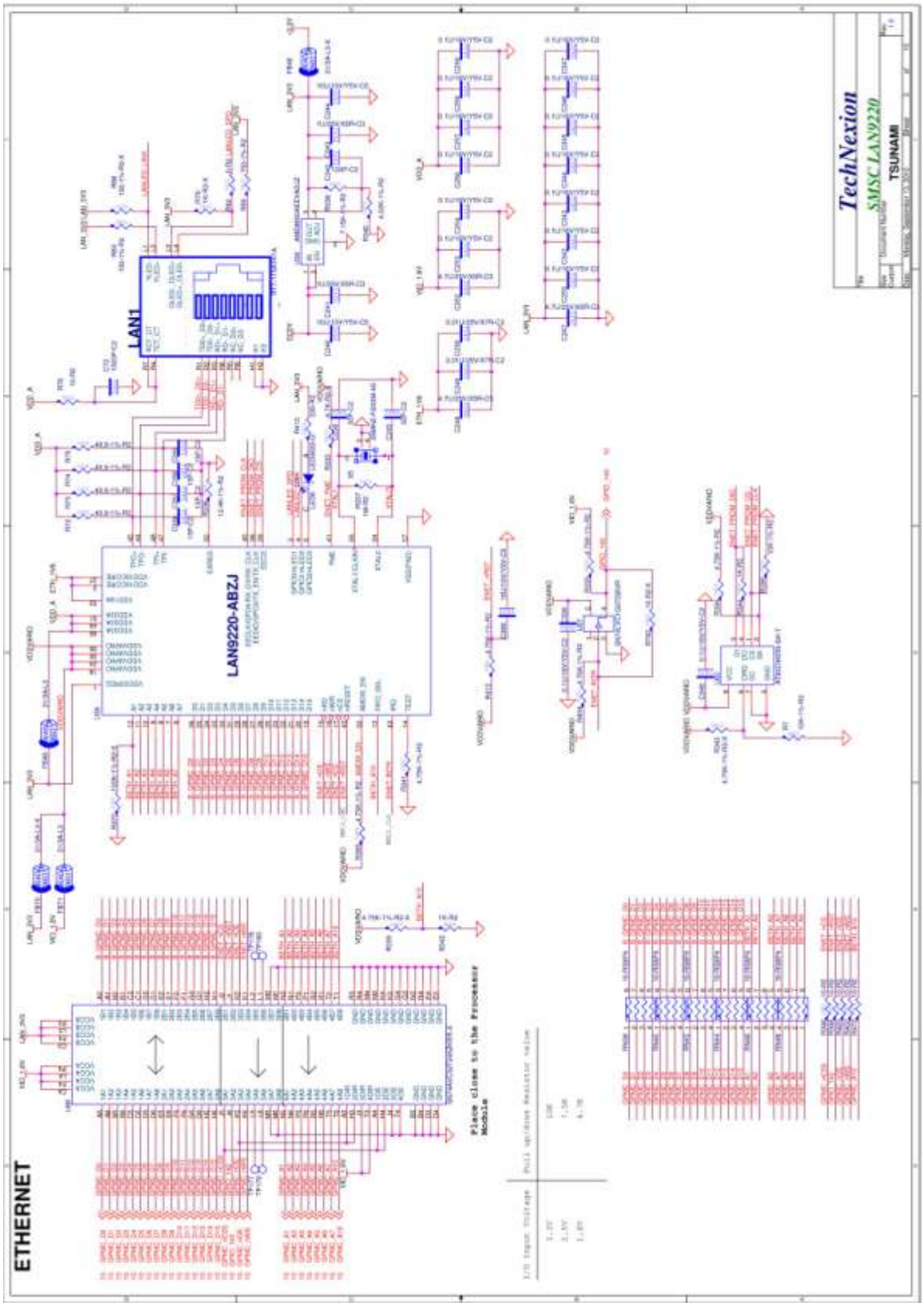
If you are designing your own baseboard then please contact sales@technexion.com for clear design files

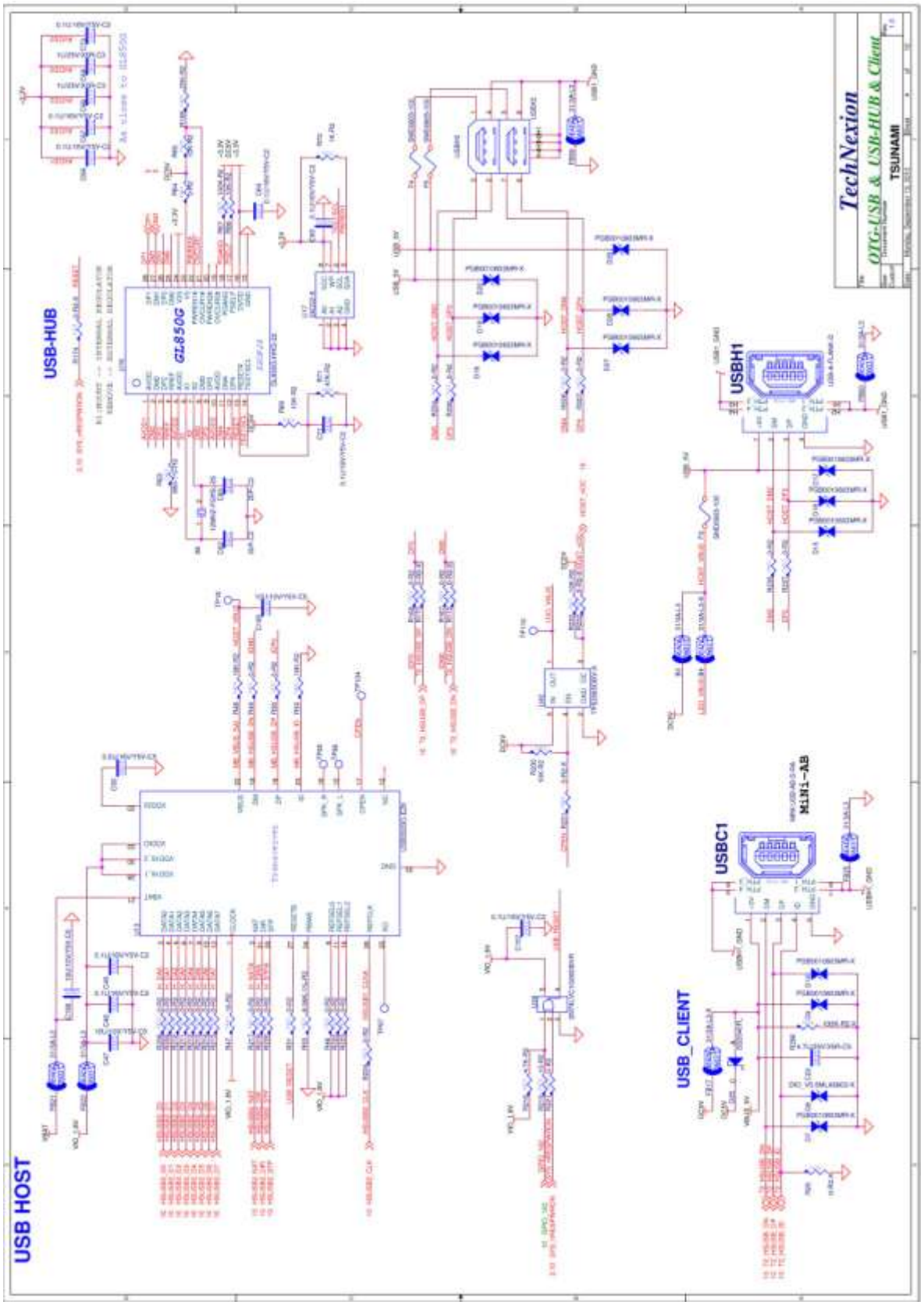
14.3 Tsunami baseboard schematics

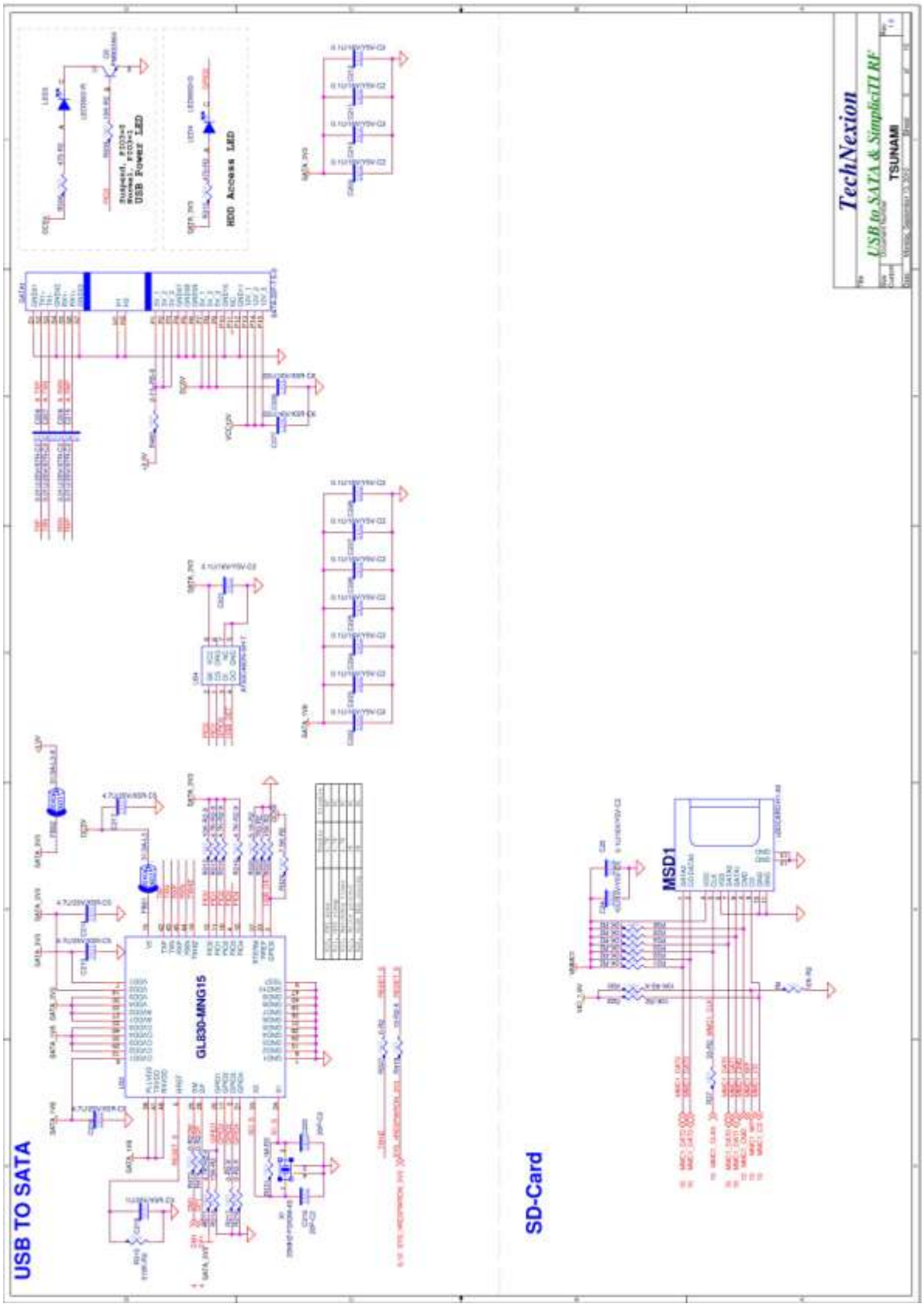
If you are designing your own baseboard then please contact sales@technexion.com for clear design files



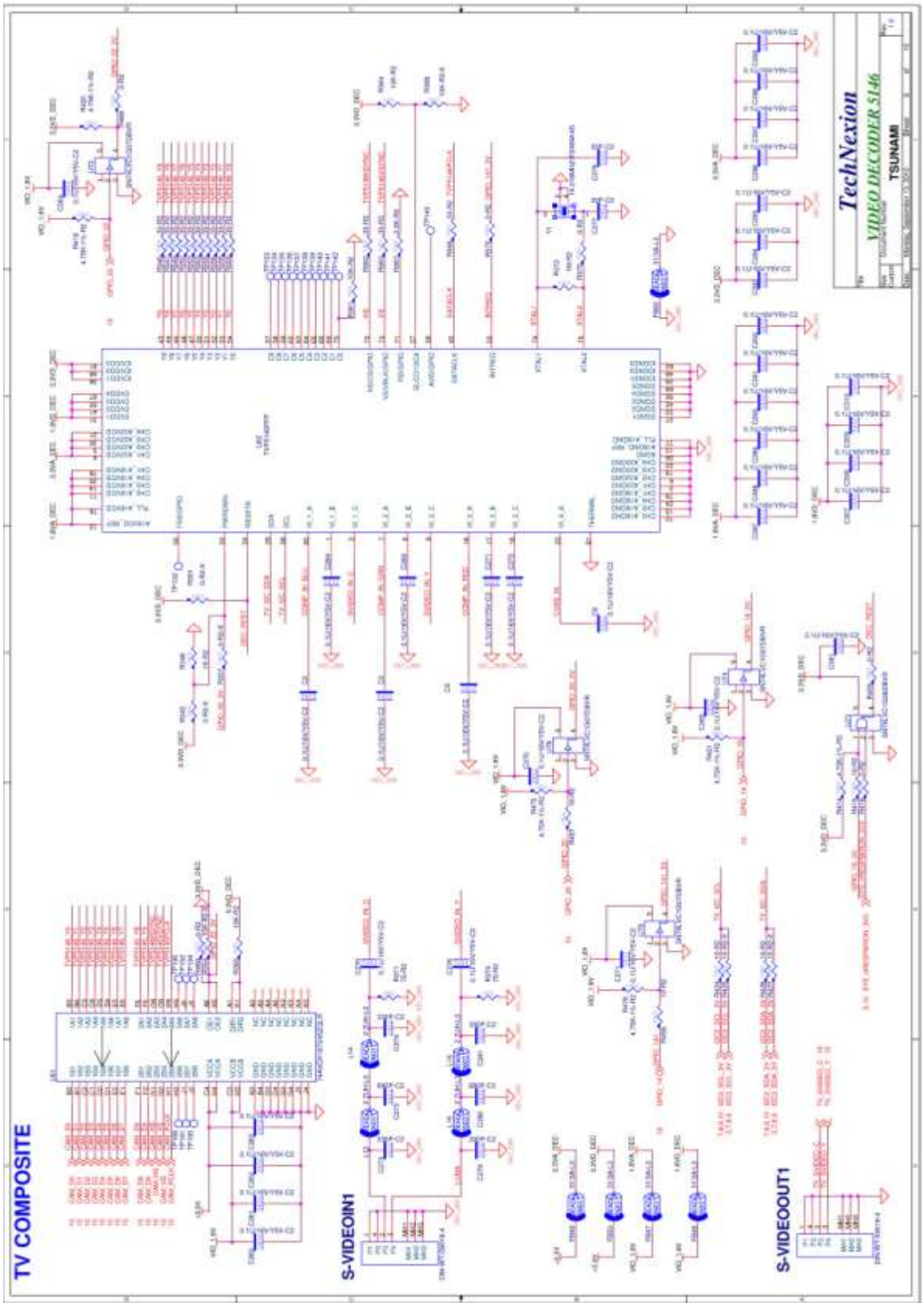
If you are designing your own baseboard then please contact sales@technexion.com for clear design files


TechNexion
SMSC LAN9220
TSUNAMI
LAN1
LAN9220-ABZJ
ETHERNET
Place close to the Processor Module

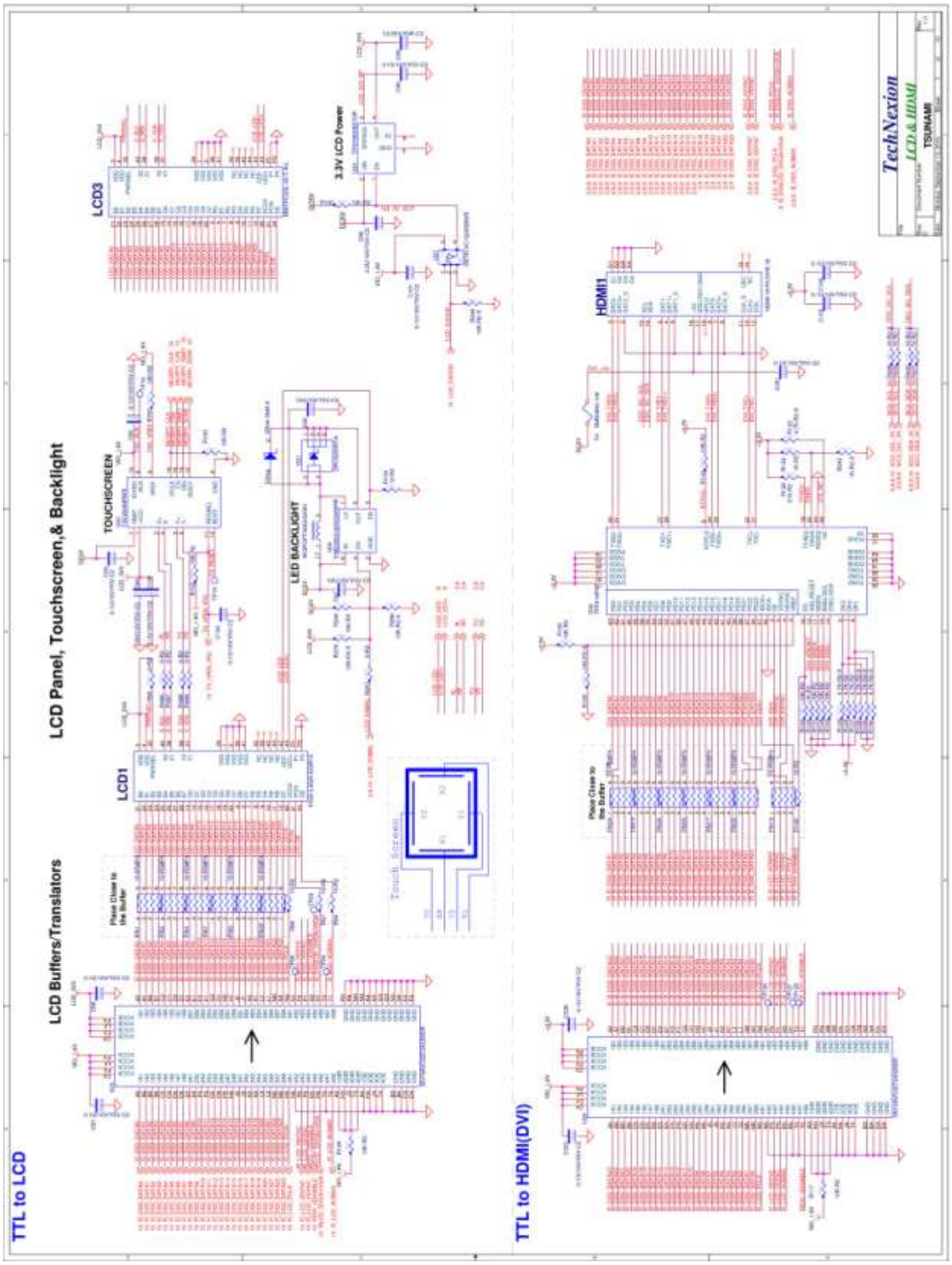

TechNexion
OTG-USB & USB-HUB & Client
TSUNAMI
USB-HUB
GL850G
USBH1
USBC1
Mini-AB
USB_CLIENT
USB HOST



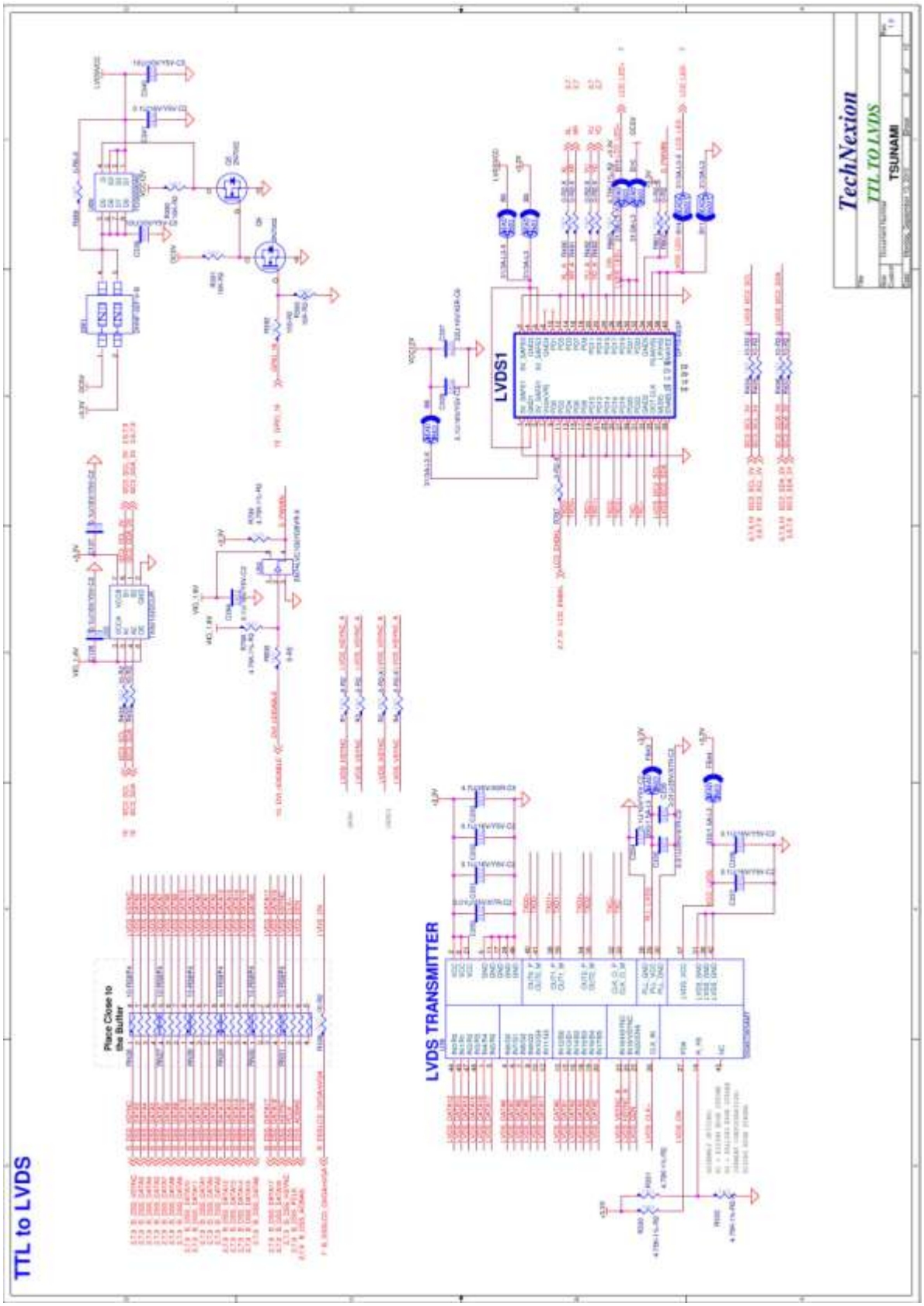
If you are designing your own baseboard then please contact sales@technexion.com for clear design files



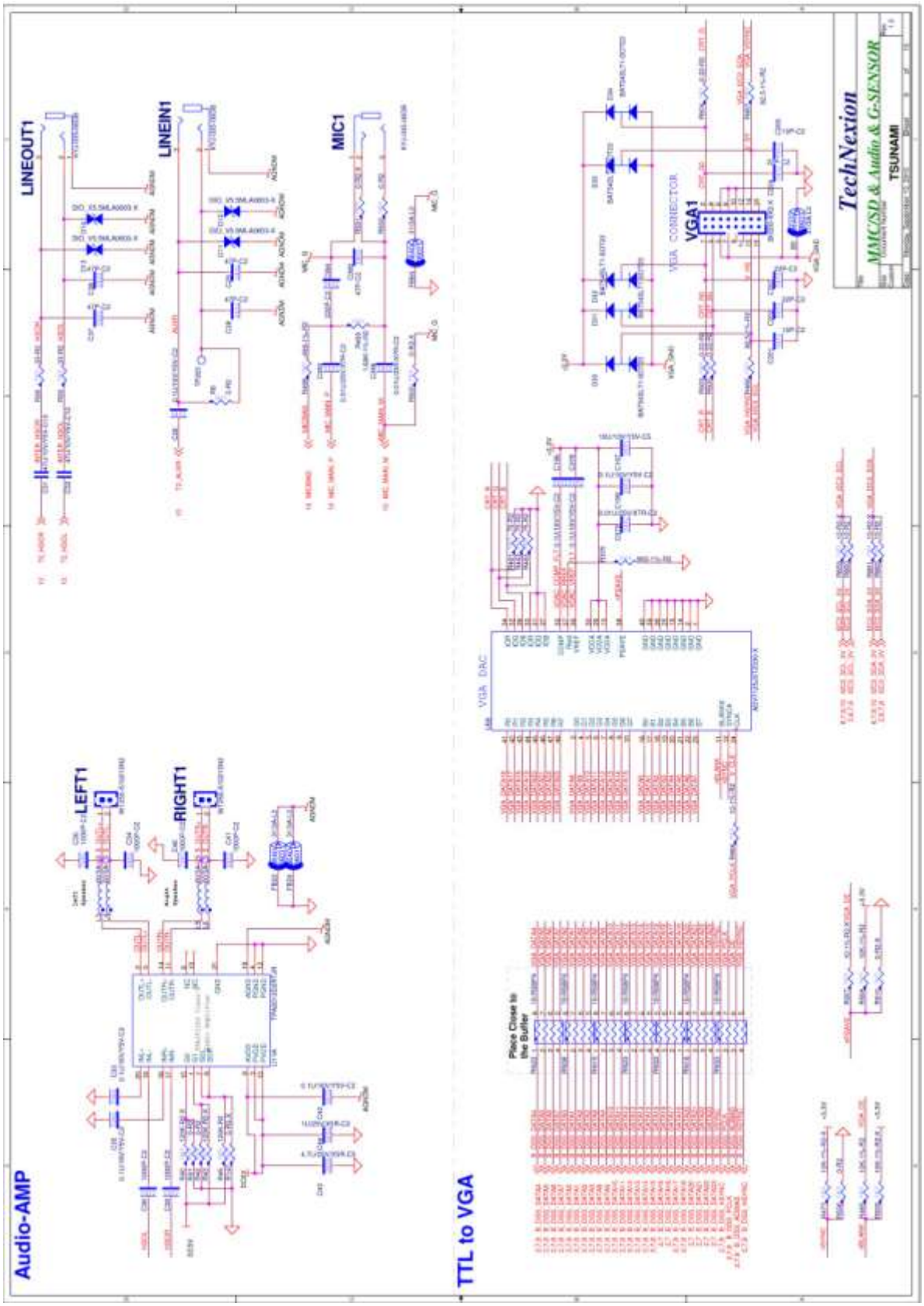
If you are designing your own baseboard then please contact sales@technexion.com for clear design files



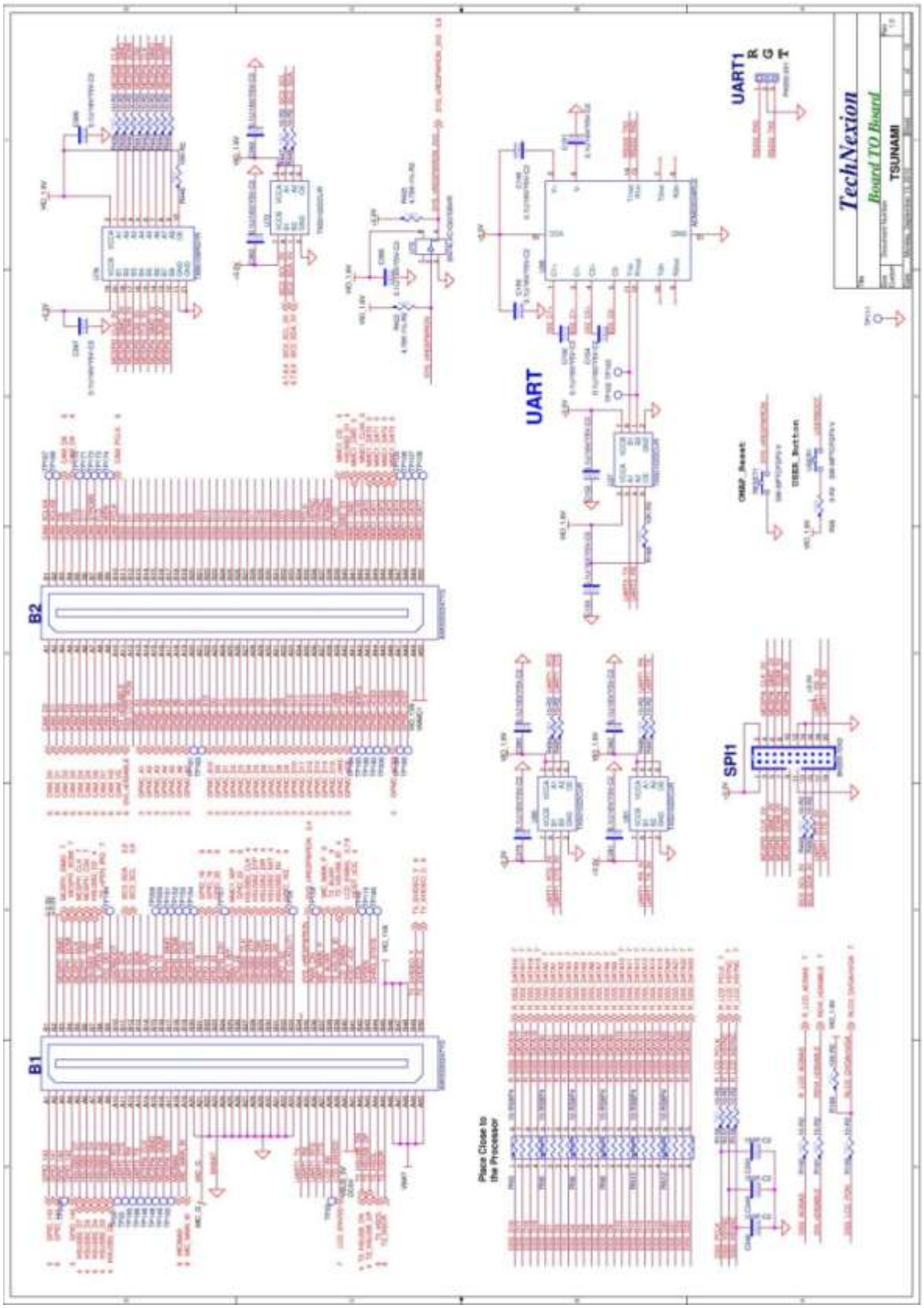
If you are designing your own baseboard then please contact sales@technexion.com for clear design files



If you are designing your own baseboard then please contact sales@technexion.com for clear design files

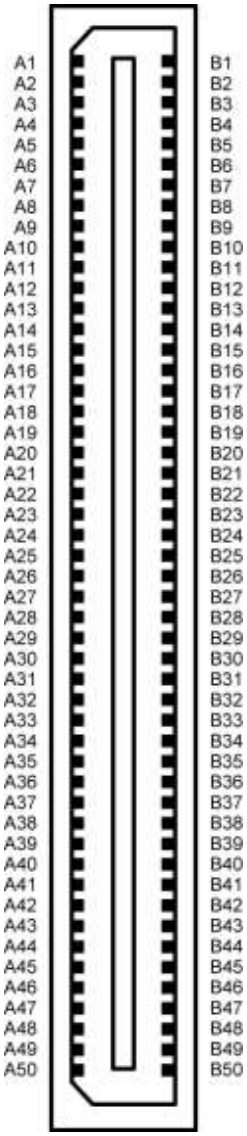


If you are designing your own baseboard then please contact sales@technexion.com for clear design files


UART1
UART
SPI1
B2
B1
TechNexion
Board TO Board
TSUNAMI

15 Appendix - Pin outs

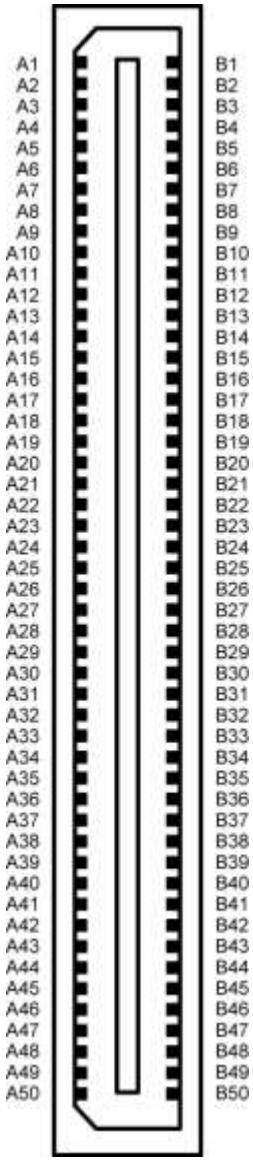
15.1 Module connector B1



A1	MCBSP3_FSX	B1	3.3V
A2	MCBSP3_DR	B2	3.3V
A3	MCBSP3_DX	B3	MCSPI1_SIMO
A4	MCBSP3_CLKX	B4	MCSPI1_SOMI
A5	HSUSB2_D7	B5	MCSPI1_CLK
A6	HSUSB2_D5	B6	MCSPI1_CS0
A7	HSUSB2_D4	B7	HSUSB2_D2
A8	HSUSB2_D3	B8	TS_nPEN_IRQ
A9	HSUSB2_D6	B9	HDQ_SIO

A10	UART3_RTS	B10	USERBOOT
A11	UART3_CTS	B11	I2C3_SDA
A12	UART3_RX	B12	I2C3_SCL
A13	UART3_TX	B13	I2C2_SDA
A14	MCSPI4_CLK	B14	I2C2_SCL
A15	MCSPI4_SIMO	B15	GPIO_12
A16	MCSPI4_SOMI	B16	GPIO_13
A17	MCSPI4_CS0	B17	MCSPI3_SIMO
A18	MICBIAS	B18	MCSPI3_SOMI
A19	MIC_MAIN_M	B19	MCSPI3_CS0
A20	GND	B20	MCSPI3_CLK
A21	MIC_G	B21	GPIO_18
A22	GND	B22	GPIO_19
A23	BKBAT	B23	GPIO_20
A24	GND	B24	MCSPI3_CS1
A25	GND	B25	MMC1_WP
A26	GND	B26	GPIO_22
A27	GND	B27	HSUSB2_CLK
A28	GND	B28	HSUSB2_STP
A29	GND	B29	HSUSB2_DIR
A30	GND	B30	HSUSB2_NXT
A31	GND	B31	HSUSB2_D0
A32	GND	B32	GPIO_162
A33	GND	B33	SYS_CLKOUT1
A34	UART1_TX	B34	ADCIN2
A35	UART1_RX	B35	SYS_nRESPWRON
A36	UART1_RTS	B36	PWR_ON
A37	UART1_CTS	B37	MIC_MAIN_P
A38	LCD_INI	B38	T2_AUXR
A39	LCD_ENVDD	B39	T2_HSUSB_ID
A40	VBUS_5V0M	B40	LCD_ENBKL
A41	DC_5VM	B41	HOST_nOC
A42	T2_HSUSB_DN	B42	LEDA
A43	T2_HSUSB_DP	B43	SYSEN
A44	T2_HSOL	B44	CHRG_STATE
A45	T2_HSOR	B45	VIO_1V8
A46	VBATM	B46	VIO_1V8
A47	VBATM	B47	VIO_1V8
A48	VBATM	B48	VIO_1V8
A49	VBATM	B49	TV_SVIDEO_Y
A50	VBATM	B50	TV_SVIDEO_C

15.2 Module connector B2



A1	CAM_D0	B1	CAM_XCLKA
A2	CAM_D1	B2	CAM_XCLKB
A3	CAM_D2	B3	CAM_D8
A4	CAM_D3	B4	CAM_D9
A5	CAM_D4	B5	CAM_D10
A6	CAM_D5	B6	CAM_D11
A7	CAM_D6	B7	CAM_STROBE
A8	CAM_D7	B8	CAM_FLD
A9	CAM_HS	B9	CAM_WEN
A10	CAM_VS	B10	CAM_PCLK

A11	DVI_nDISABLE	B11	DSS_D0
A12	LCD_PON	B12	DSS_D1
A13	GPMC_A1	B13	DSS_D2
A14	GPMC_A2	B14	DSS_D3
A15	GPMC_A3	B15	DSS_D4
A16	GPMC_A4	B16	DSS_D5
A17	GPMC_A5	B17	DSS_D6
A18	GPMC_A6	B18	DSS_D7
A19	GPMC_A7	B19	DSS_D8
A20	GPMC_A8	B20	DSS_D9
A21	GPMC_A9	B21	DSS_D10
A22	GPMC_A10	B22	DSS_D11
A23	B_GPMC_D0	B23	DSS_D12
A24	B_GPMC_D1	B24	DSS_D13
A25	B_GPMC_D2	B25	DSS_D14
A26	B_GPMC_D3	B26	DSS_D15
A27	B_GPMC_D4	B27	DSS_D16
A28	B_GPMC_D5	B28	DSS_D17
A29	B_GPMC_D6	B29	DSS_D18
A30	B_GPMC_D7	B30	DSS_D19
A31	B_GPMC_D8	B31	DSS_D20
A32	B_GPMC_D9	B32	DSS_D21
A33	B_GPMC_D10	B33	DSS_D22
A34	B_GPMC_D11	B34	DSS_D23
A35	B_GPMC_D12	B35	DSS_PCLK
A36	B_GPMC_D13	B36	DSS_HSYNC
A37	B_GPMC_D14	B37	DSS_VSYNC
A38	B_GPMC_D15	B38	DSS_ACBIAS
A39	B_GPMC_nWE	B39	MMC1_CD
A40	B_GPMC_nOE	B40	HSUSB2_D1
A41	GPMC_nBE1	B41	MMC1_CMD
A42	GPMC_WAIT3	B42	MMC1_CLK0
A43	GPMC_CLK	B43	MMC1_DAT0
A44	GPMC_nCS3	B44	MMC1_DAT1
A45	GPMC_nCS4	B45	MMC1_DAT2
A46	GPMC_nCS5	B46	MMC1_DAT3
A47	GPMC_nCS6	B47	MMC1_DAT4
A48	GPMC_nCS7	B48	MMC1_DAT5
A49	VIO_1V8	B49	MMC1_DAT6
A50	VMMC1M	B50	MMC1_DAT7

Above schematic block are the 2 connectors from the module towards your interface base board. Keep note of the following requirements.

1. Provide 5VDC on the signals requesting them.

2. Provide 4.2VDC on the VBAT pins towards the module. (you need provide this from your baseboard)

3. When using TAO-3530W (with wireless) you also need to provide 3.3VDC. If you don't have wireless. You can ignore this requirement.

4. Connect all GND pins to GROUND.

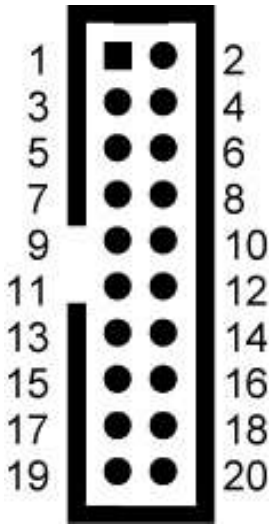
5. If you don't have a BKBAT please connect A23 on connector B1 to GND. Don't let it floating.

6. If you don't implement microphone function. Please connect pin A19 and A21 on connector B1 to GND

All 1.8V signals are generated on the module and are OUTPUTS from the module towards the interface base boards. They will be used towards the GPIO's for example.

For the Pin out and for changing the signals on the pins, it is recommended to read the TAO-3530-hardware-manual, which describes how signals can be multiplexed.

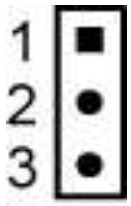
15.3 SPI1



Marking on main board: SPI1

1	+3.3V	2	+3.3V
3	MCSPI3_CLK_3V	4	MCSPI4_CLK_3V
5	MCSPI3_SIMO_3V	6	MCSPI4_SIMO_3V
7	MCSPI3_SOMI_3V	8	MCSPI4_SOMI_3V
9	MCSPI3_CS0_3V	10	MCSPI4_CS0_3V
11	GND	12	GND
13	I2C2_SCL_3V	14	GND
15	I2C2_SDA_3V	16	+3.3V
17	UART1_RTS_3V	18	UART1_RX_3V
19	UART1_CTS_3V	20	UART1_TX_3V

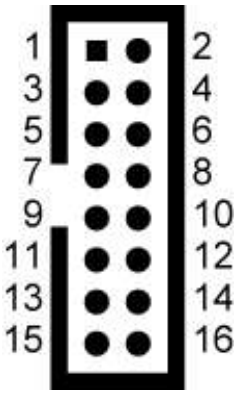
15.4 UART 3



1	RS232_RX3
2	GND
3	RS232_TX3

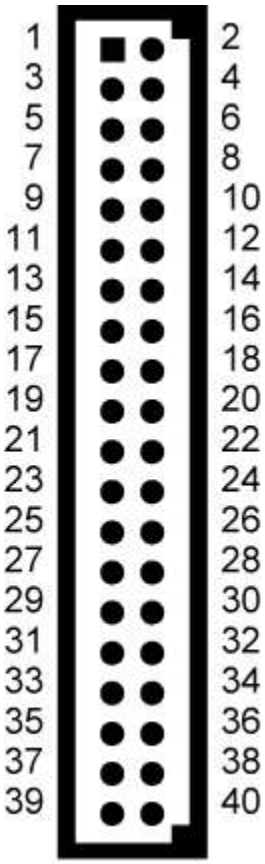
Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable (pin 1 becomes 3 and pin 3 becomes 1)

15.5 Pin header for VGA connector



1	CRT_R	2	CRT_G
3	CRT_B	4	X
5	GND	6	GND
7	GND	8	GND
9	X	10	GND
11	X	12	VGA_I2C3_SDA
13	VGA_HSYNC	14	VGA_VSYNC
15	VGA_I2C3_SCL	16	x

15.6 LVDS connector

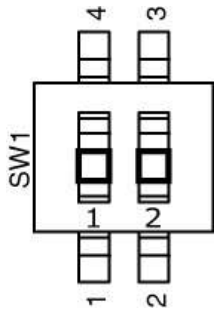


Data connector is 40 pin

Marking on main board: LVDS1

1	GND	2	GND
3	+3.3V	4	+3.3V
5	+12V	6	+3.3V
7	x	8	x
9	GND	10	x
11	LCD_ENBKL	12	GND
13	TXD0-	14	XL (Touch screen)

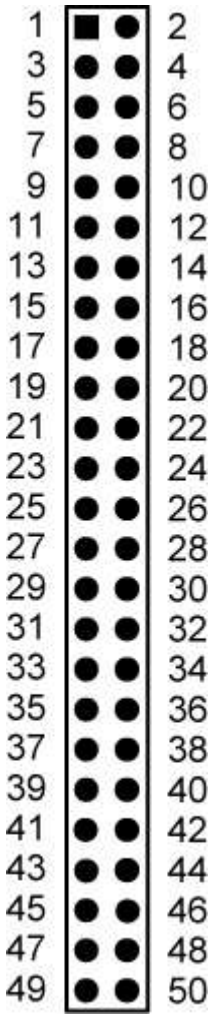
15	TXD0+	16	XR (Touch screen)
17	GND	18	GND
19	TXD1-	20	YU (Touch screen)
21	TXD1+	22	YD (Touch screen)
23	GND	24	GND
25	TXD2-	26	Backlight Control Enable
27	TXD2+	28	LVDS_LED+ (Backlight Power +)
29	GND	30	LVDS_LED+ (Backlight Power +)
31	TXC-	32	LVDS_LED+ (Backlight Power +)
33	TXC+	34	Backlight Power Control
35	GND	36	LVDS_LED- (Backlight Power -)
37	LVDS_I2C_SCL	38	LVDS_LED- (Backlight Power -)
39	LVDS_I2C_SDA	40	LVDS_LED- (Backlight Power -)



LVDS Power Select Switch

1 on 2 off	5V
2 on 1 off	3.3V

15.7 Thunder expansion pin header

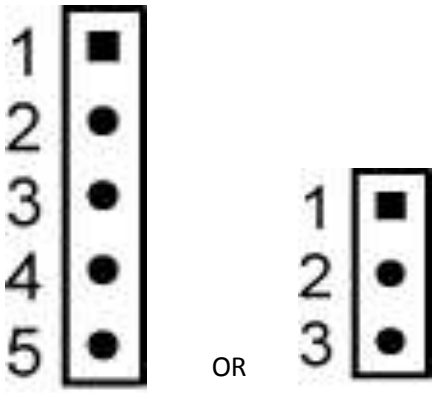


Pitch of connector is 2.00 mm

1	MSCPI3_CLK	2	CAM_D0
3	MCSPI3_SIMO	4	CAM_D1
5	MCSPI3_SOMI	6	CAM_D2
7	MCSPI3_CS0	8	CAM_D3
9	MCSPI3_CS1	10	CAM_D4
11	MCBSP3_DX	12	CAM_D5

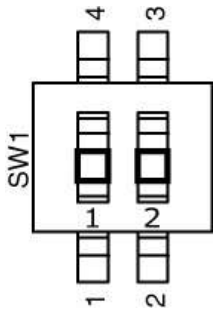
13	MCBSP3_DR	14	CAM_D6
15	MCBSP3_CLKX	16	CAM_D7
17	MCBSP3_FSX	18	CAM_D8
19	UART1_CTS	20	CAM_D9
21	UART1_RTS	22	CAM_D10
23	UART1_RX	24	CAM_D11
25	UART1_TX	26	CAM_XCLKA
27	VIO_1V8	28	CAM_XCLKB
29	VIO_1V8	30	CAM_PCLK
31	I2C3_SCL	32	CAM_VS
33	I2C3_SDA	34	CAM_HS
35	DC_5V	36	CAM_FLD
37	DC_5V	38	CAM_WEN
39	DC_5V	40	CAM_STROBE
41	GND	42	PWR_ON
43	GND	44	SYS_nRESPWRON
45	RS232_RX3	46	VIO_3V3
47	GND	48	VIO_3V3
49	RS232_TX3	50	VIO_3V3

15.8 Battery connector



Marking on main board: BAT2		Marking on main board: BAT1	
1	VBATT		
2	VBATT	1	VBATT
3	HDQ	2	HDQ
4	GND	3	GND
5	GND		

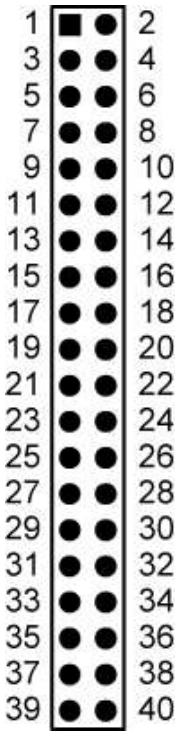
To operate on battery power and to enable the charging circuit you need to put the switches located next to the user buttons as follows:



Battery powered & charging enabled:
switch 1 off
switch 2 on

Only DC power enabled:
switch 1 on
switch 2 off

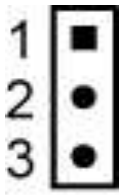
15.9 Inferno Expansion Pin Header

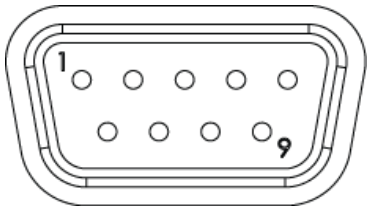


1	RS232_RX3	2	CAM_D0
3	GND	4	CAM_D1
5	RS232_TX3	6	CAM_D2
7	UART1_RTS	8	CAM_D3
9	UART1_CTS	10	CAM_D4
11	UART1_RX	12	CAM_D5
13	UART1_TX	14	CAM_D6
15	GND	16	CAM_D7
17	MCSPI1_CLK	18	CAM_D8
19	MCSPI1_SIMO	20	CAM_D9
21	MCSPI1_SOMI	22	CAM_D10
23	MCSPI1_CS0	24	CAM_D11
25	GND	26	CAM_XCLKA
27	I2C3_SCL	28	CAM_PCLK
29	I2C3_SDA	30	CAM_VS
31	HDQ_SIO	32	CAM_HS
33	SYS_nRESPWRON	34	CAM_FLD
35	DC_5V	36	CAM_WEN
37	DC_5V	38	CAM_STROBE
39	VIO_1V8	40	GND

15.10 RS-232 cable

Accessory





1 (white dot)	3
2	5
3	2