TechNexion

1/16/2012

SOM

TAM-3517 System on Module

TechNexion

TAM-3517

TAM-3517 System on Module

and its Baseboards

User's Guide

Rev 0.97

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.

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).

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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

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 TAM-3517 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, 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 TAM-3517 and a Baseboard from our website. There are 2 versions: the TAM-3517W with Wi-Fi (used for example in the development kits) and the TAM-3517 without Wi-Fi (used for example in the HMI). Other configurations can be discussed with our sales.

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 TAM-3517 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 Twister baseboard XL (7" LCD)

This guide describes how to put the TAM-3517W module and the Twister interface board together, how to connect the LCD and power up the board.

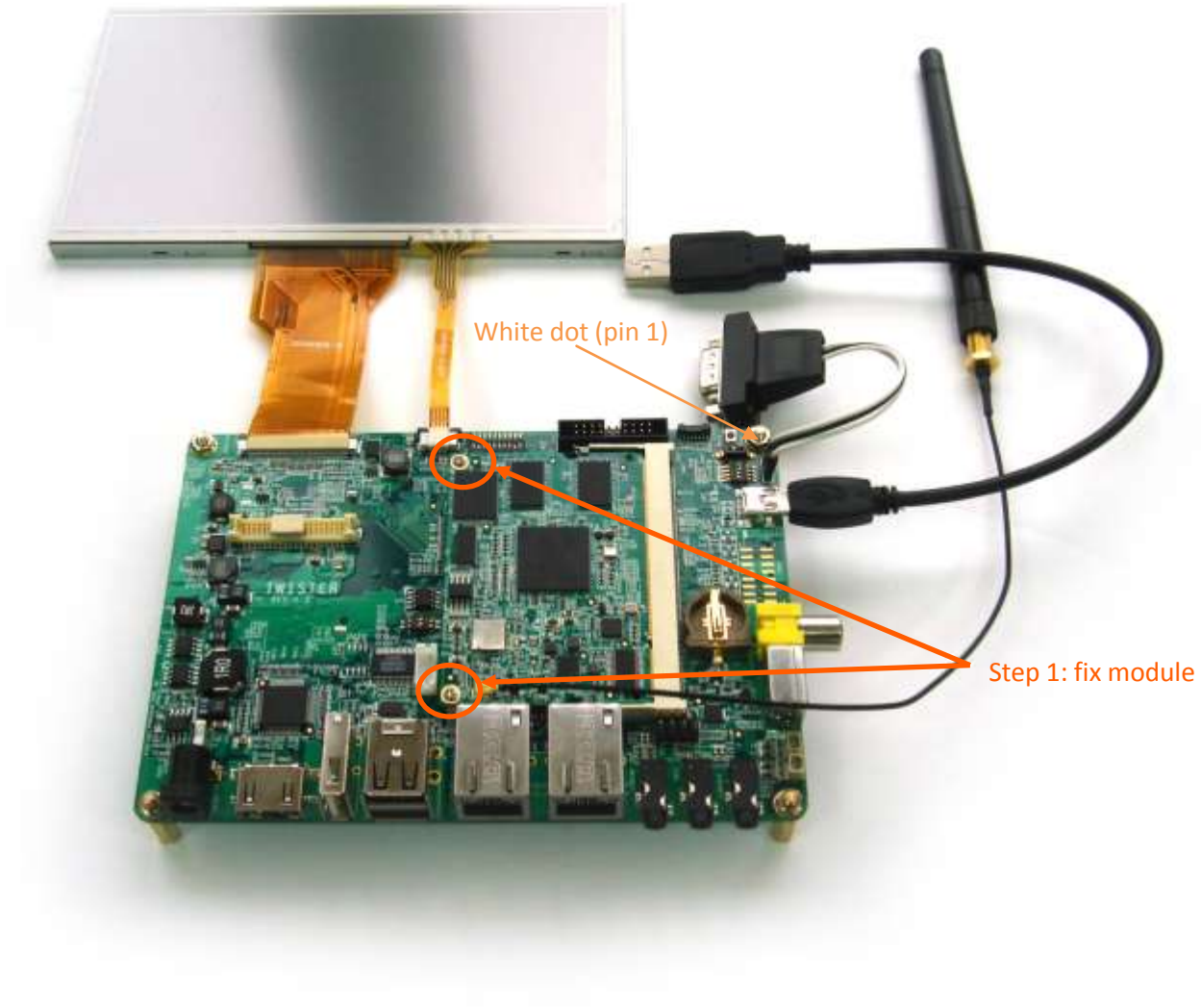


Figure 1: Step 1 - After clicking the module onto the board. Use a small Philips screwdriver and fix the module on the interface board. By doing so you guarantee the connection is firm and solid.

Connecting the 7" LCD touch panel (XL version) to the Twister 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 carefully open with your nail. (NOTE: the board has different connector options; please check if it is a "slide" or "turn" connector before opening. Handling the connector wrong will lead to damage)

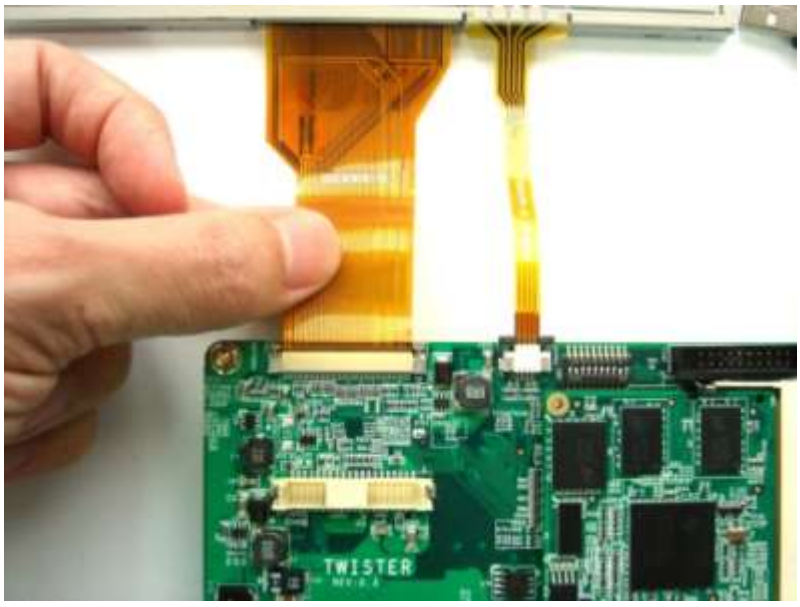


Figure 3: Step 2b - Insert the LCD panel FPC. And push the connector sideways to close

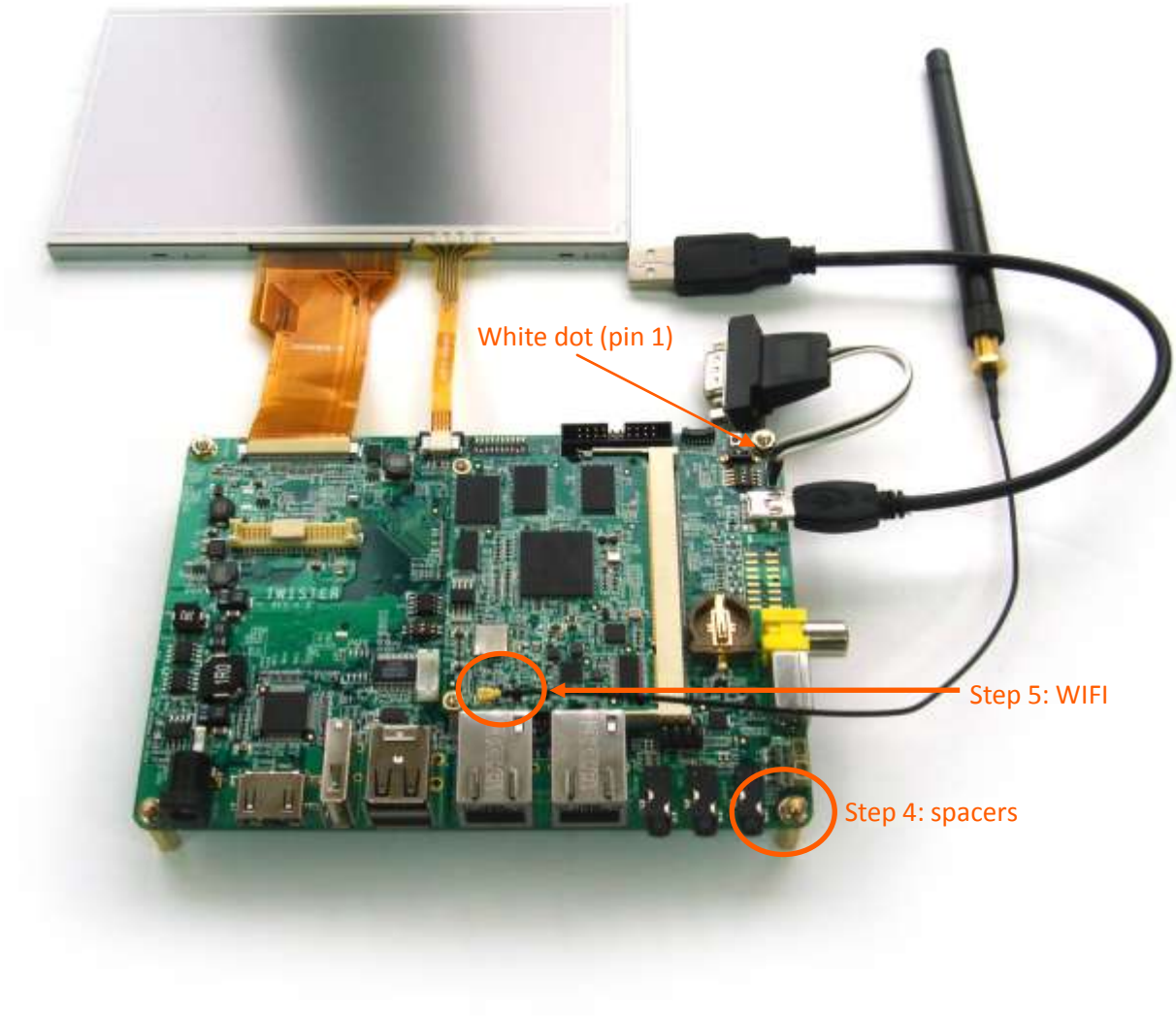


Figure 4: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

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 Twister 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, protect the components on the bottom and to allow free airflow for cooling.

Step 5: for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TAM-3517W module.

Warning! Without the below setting the screen might show unexpected results.

Check if your dip switch (SW3) is set as follows:

3	*2*	*1*	
OFF	*OFF*	*ON*	*7" panel*

4.2 First time use Twister baseboard (4.3" LCD)

Connecting the 4.3" LCD touch panel (Standard version) to the Twister 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.

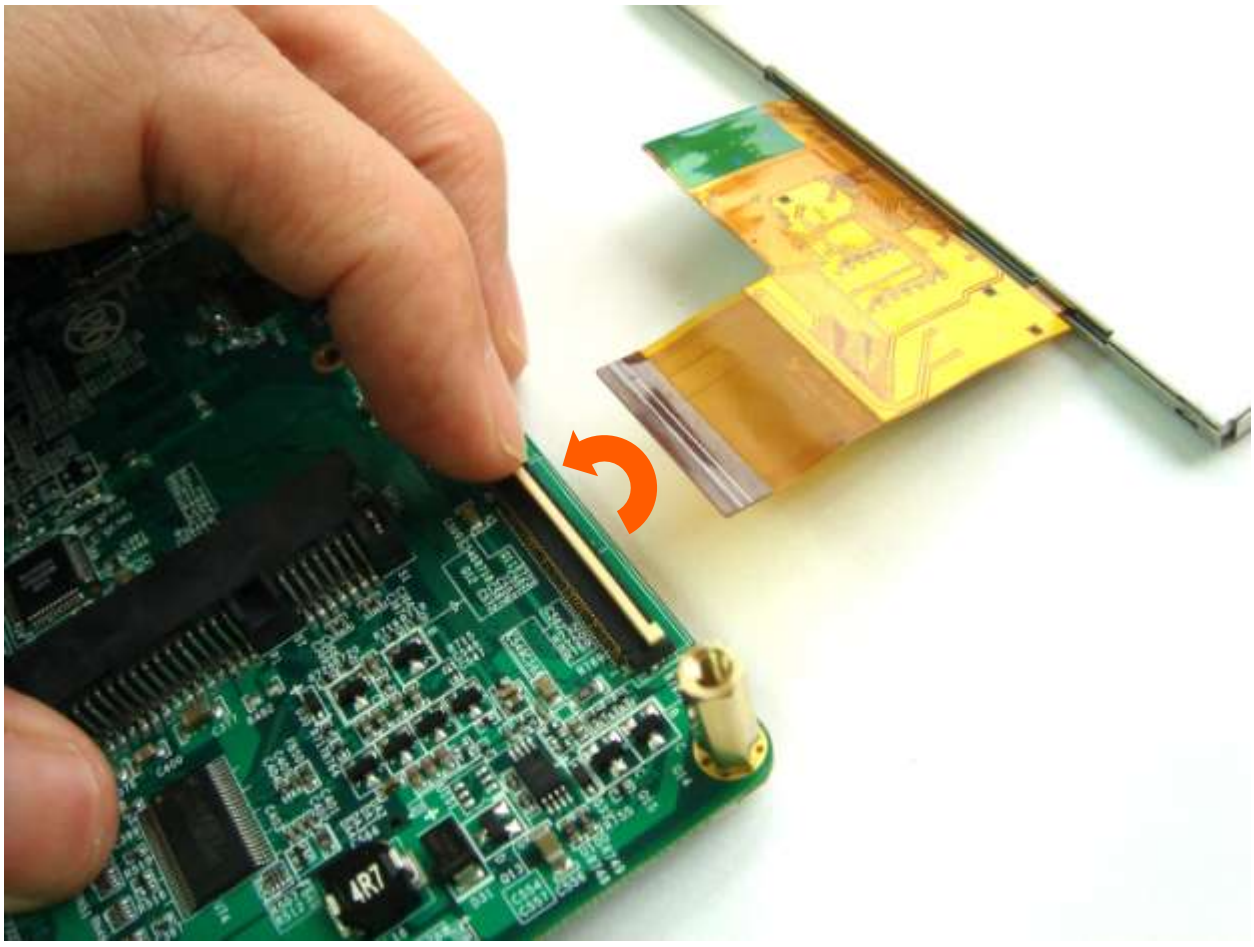


Figure 5: Step 2a - Turn the connector at the bottom side of the Twister baseboard about 90 degrees open with your nail. (NOTE: the board has different connector options; please check if it is a "slide" or "turn" connector before opening. Handling the connector wrong will lead to damage)

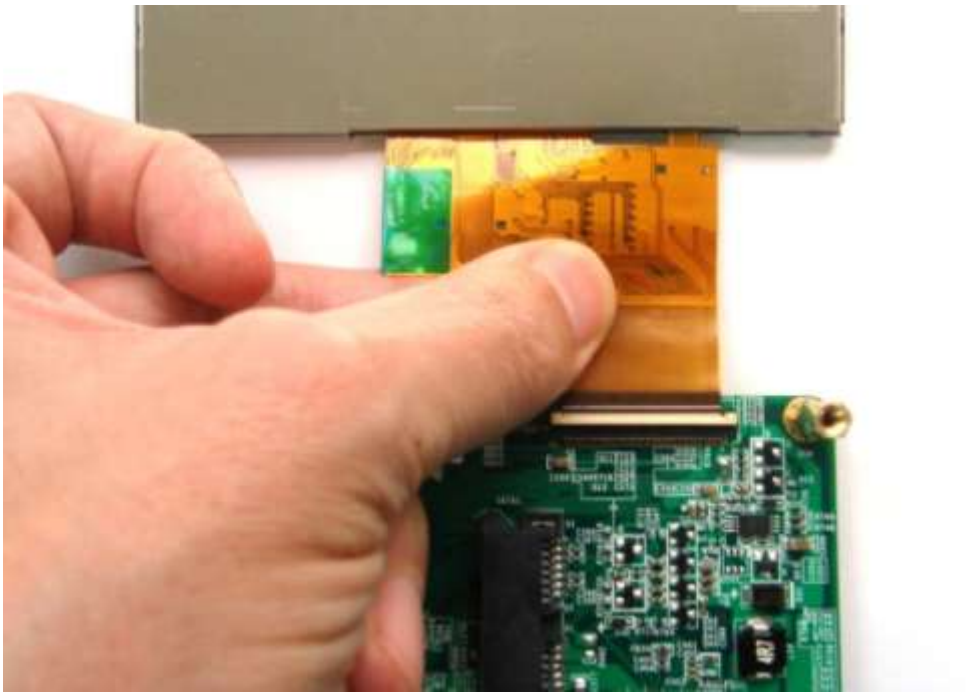


Figure 6: Step 2b - Insert the LCD panel FPC.

Figure 7: And turn the connector down to close

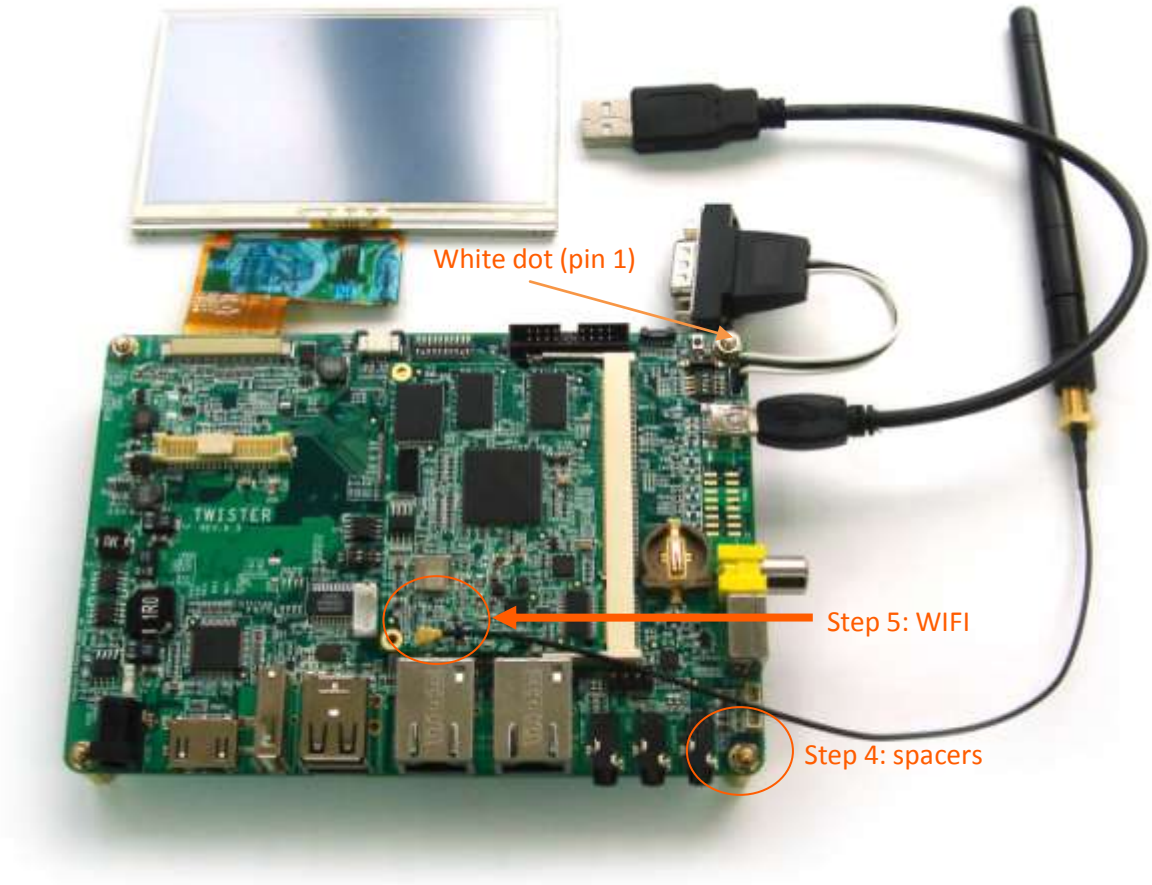


Figure 8 : Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

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 Twister 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, protect the components on the bottom and to allow free airflow for cooling.

Step 5: for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TAM-3517W module.

Warning! Without the below setting the screen might show unexpected results.

Check if your dip switch (SW3) is set as follows:

3	*2*	*1*	
OFF	*OFF*	*OFF*	*4.3" panel*

4.3 Explanation of the TAM-3517W System on Module

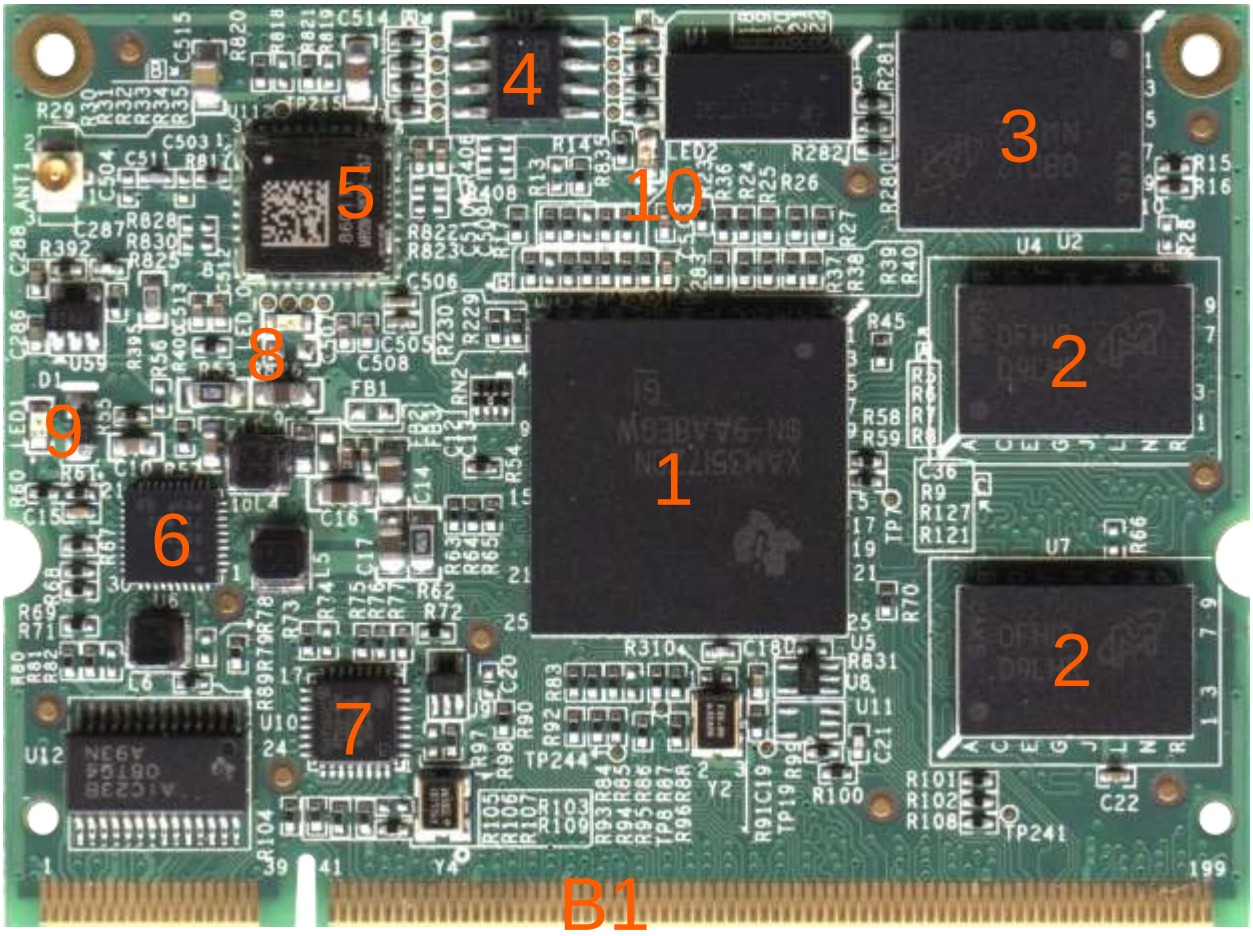


Figure 9: TAM-3517W top view

Top view

1 CPU

2 Memory

3 NAND Flash

4 EEPROM

5 Wireless LAN 802.11b/g by SDIO MMC1 interface with IPEX U.FL connector (TAM-3517W = Wireless)

6 PMIC

7 LAN PHY

8 LED 0: Wireless

9 LED 1: Power

10 LED2: Will flash during software updates

B1 200 pin SO-DIMM connector

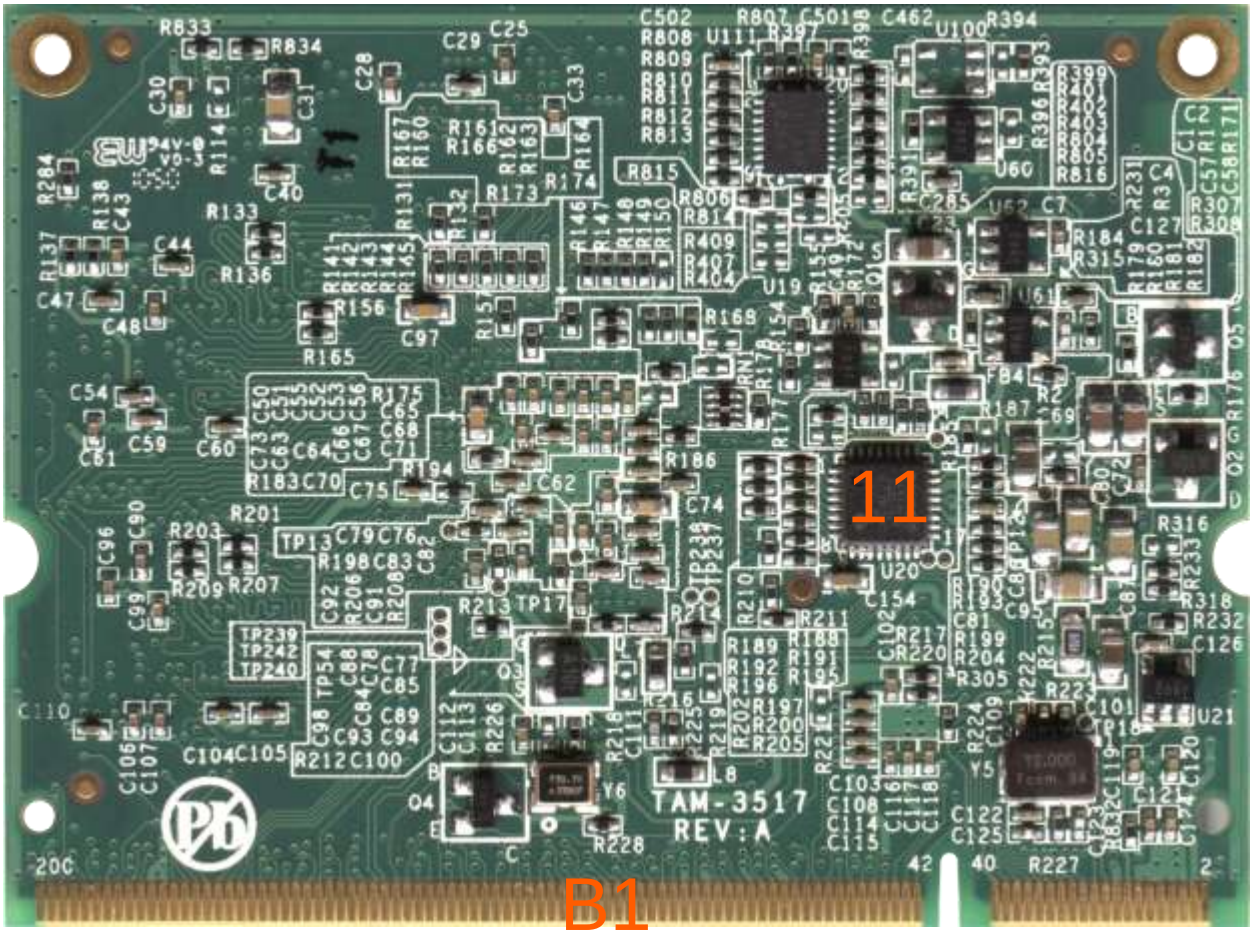


Figure 10: TAM-3517W bottom view

Bottom view

B1 200 pin SO-DIMM connector

11 USB PHY

4.5 Explanation of the Twister Baseboard

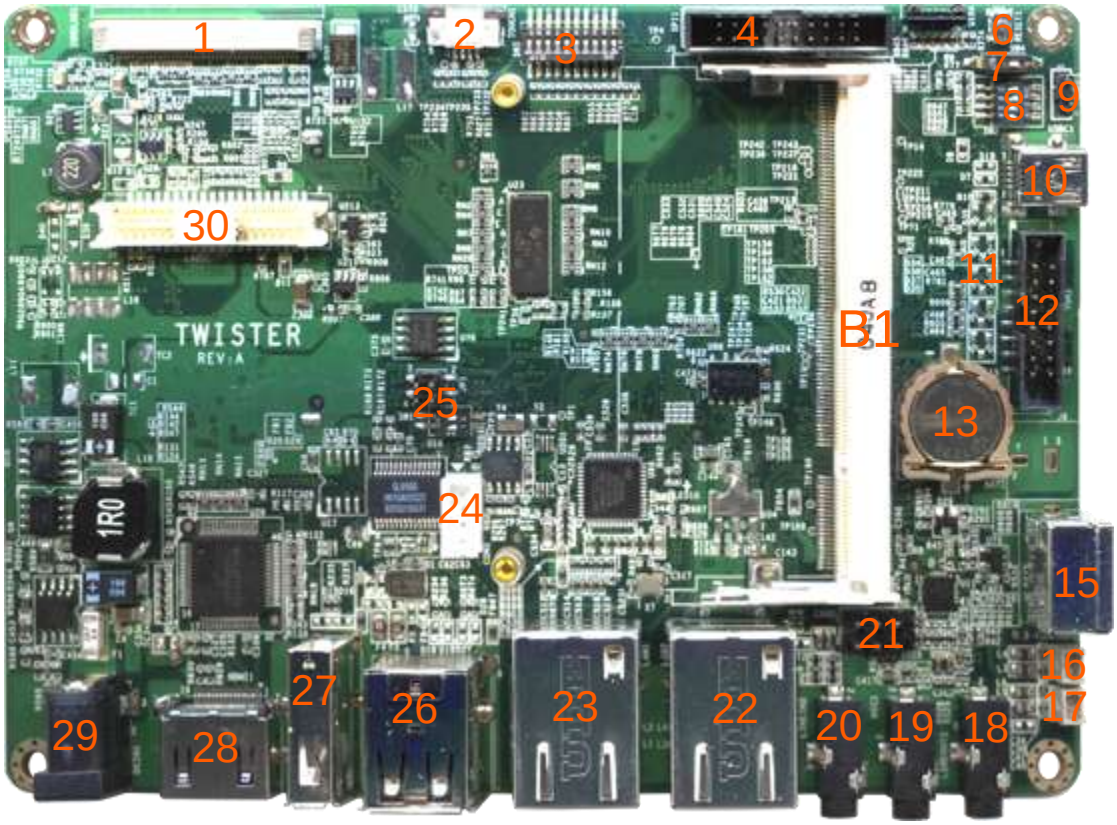


Figure 11: Twister Baseboard top view

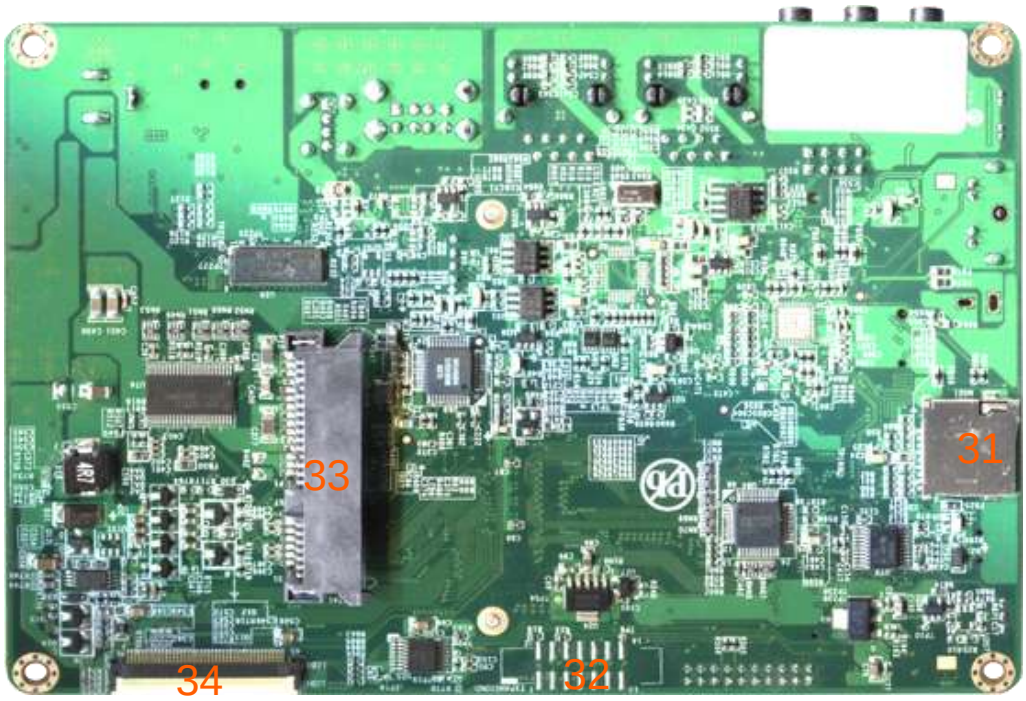


Figure 12: Twister baseboard bottom view

B1 Connector to the TAM-3517 CPU module (DDR2 SO-DIMM 200 pin SMT, standard, H:6.5 mm, e.g. Foxconn AS0A426-N6SN-4F or Tyco 5-1746530-4)

1 connector for 7" LCD panel

2 Connector for 4 wire touch panel of LCD panel

3 GPIO Switch (marked with SW3)

4 Front panel connector

6 Power / reset button

7 USB (10) Switch between host and client

8 RS-232 Switch between UART1 and UART3

9 Pin header for RS-232

10 USB OTG

11 LEDs

12 Pin header for VGA connector

13 RTC Battery (CR-1220)

15 S-video Out

16 Speaker left

17 Speaker right

18 Microphone

19 Line in

20 Line out

21 CAN Bus

22 Integrated LAN

23 SMMC 9220 LAN

24 RS-422, RS-485 Connector

25 RS-422/485 switch

26 USB HOST (2x)

27 USB HOST (1x)

28 DVI-D by HDMI connector

29 12 V DC Power connector

30 LVDS connector for LCD panel

31 Micro SD card slot

32 No function

33 SATA connector for a 2.5" hard disk

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

5 Mechanical Dimensions

5.1 TAM-3517 dimensions

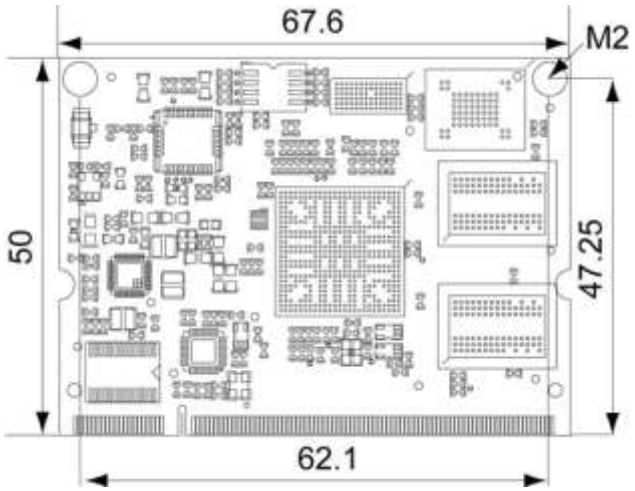


Figure 13: tam-3517 dimensions (Dimensions in mm)

5.2 Twister baseboard dimensions

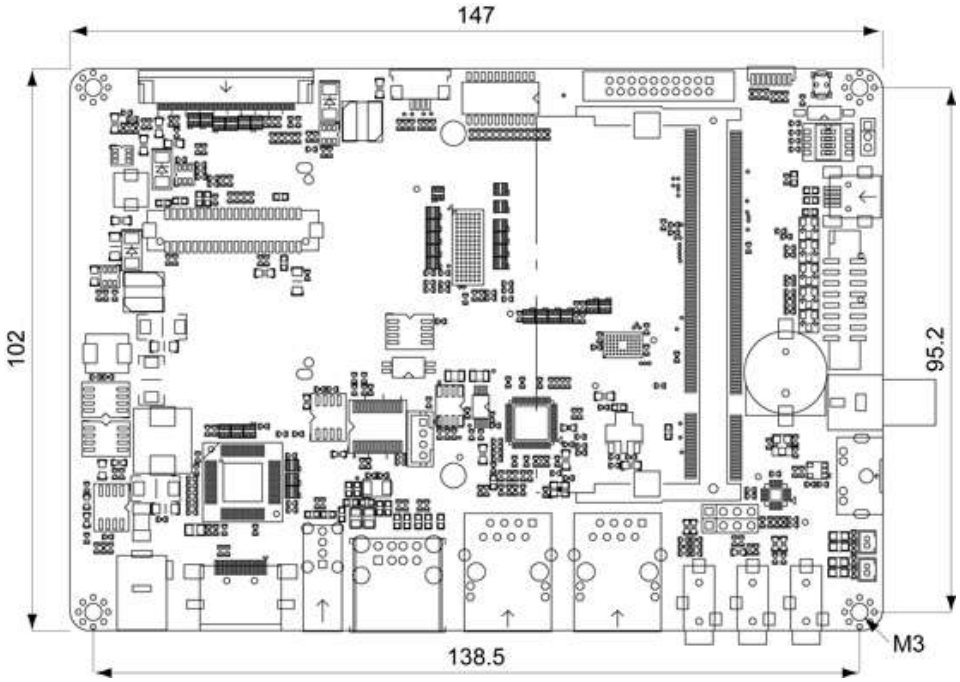


Figure 14: Twister baseboard dimensions (Dimensions in mm)

Note: 2D (DXF) and 3D(STEP) files are available for download at the Technexion website. (Support/ Download Center/)

6 Harddisk placement (Twister)

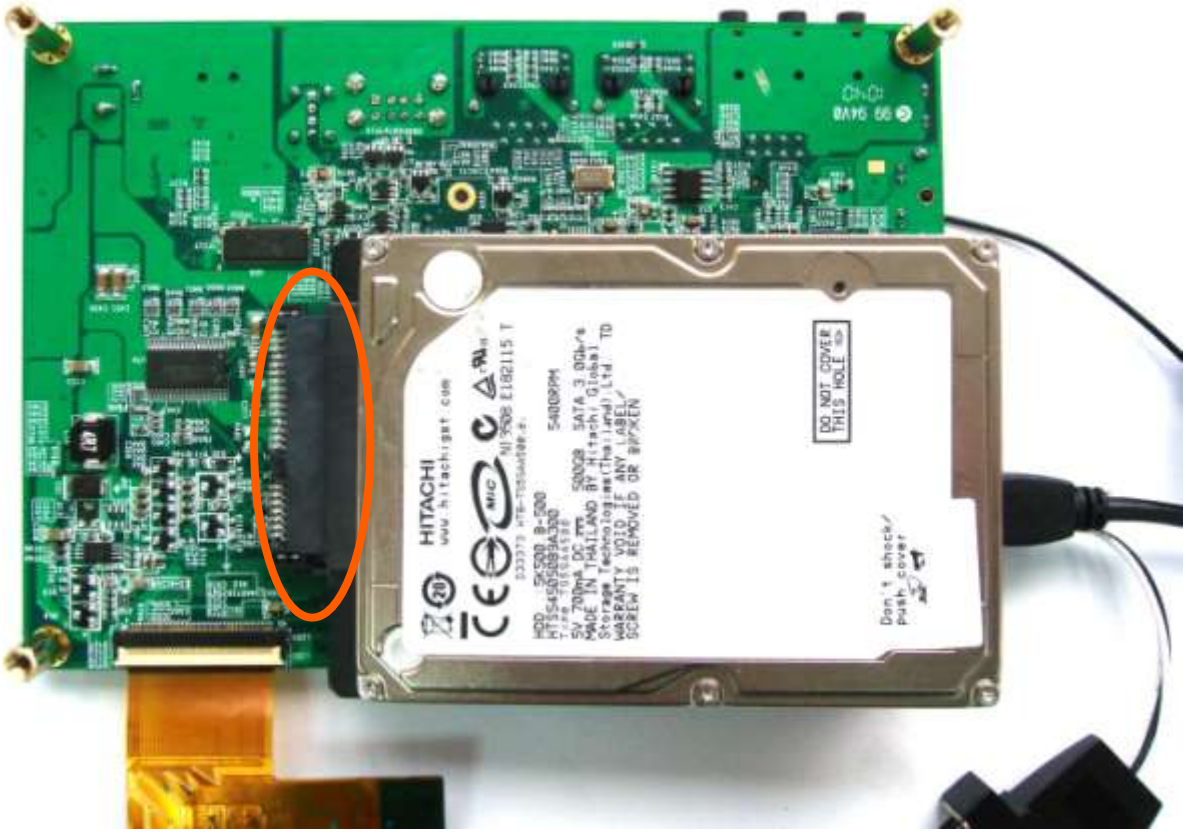


Figure 15: Step1 – Place the 2.5" hard disk in the connector as shown above (you will need to remove one spacer in the bottom right corner).

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

Drivers and other download can be found at the TechNexion webpage (www.technexion.com > Support > download center)

Figure 16: Download Center at the TechNexion website

8 Software – Factory Default Screen

Figure 17: Factory Default Home Screen

All new development kits will show the Factory default Home Screen. We advice 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.

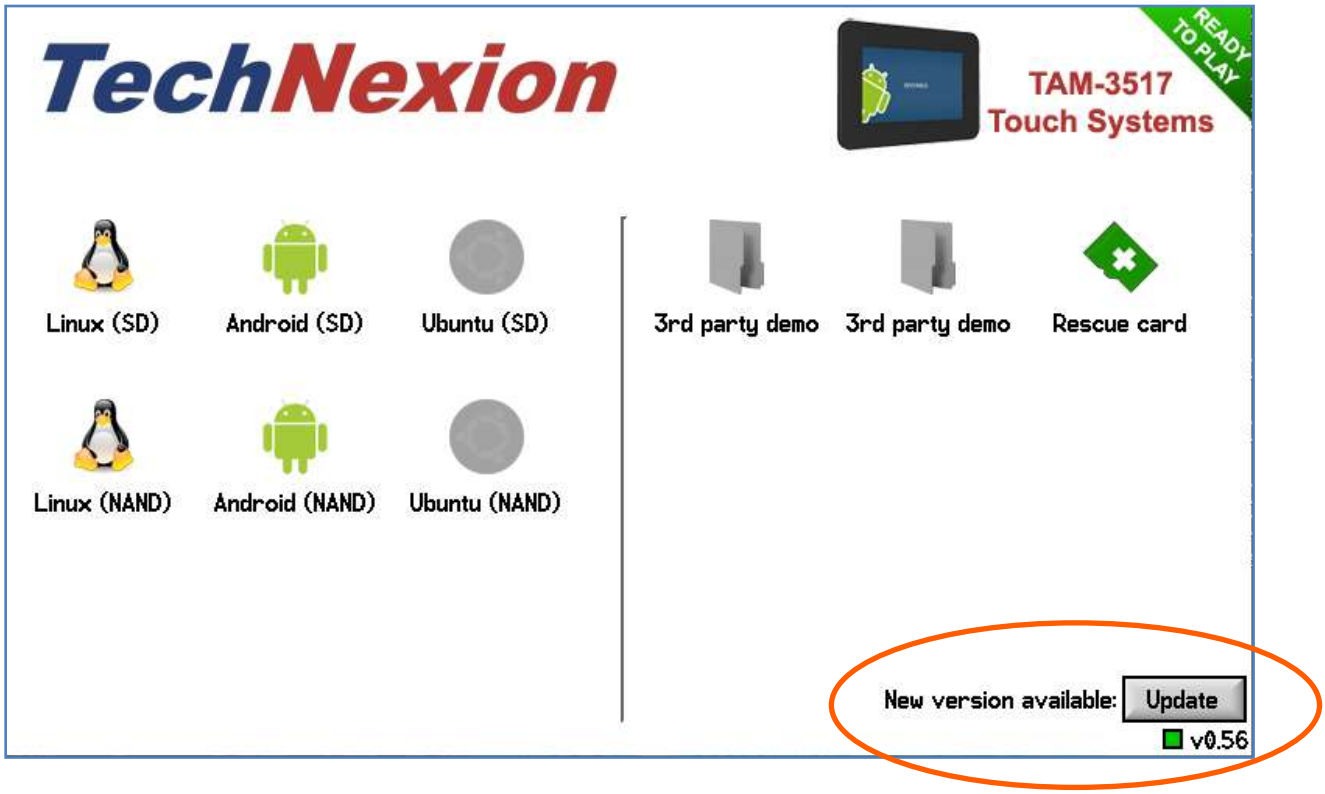


Figure 18 : the location of the factory default screen update button

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.

8.3.1 Special instructions for installing "Android(NAND)"on TAM-3517

Make sure your development kit is connected to the internet

Put the switch8 (on SW3) to "ON"

Press the android (NAND) on the factory default screen

The files will download to SD (this will take a long time), and it will then ask to reboot

It will now install into NAND, when finished it will say: take out SD-card and put switch 8 back to "OFF"

The development kit will now show Android

(This is a special version of the Android software that will clean the NAND, so if you want to go back to the rescue-SD you now also need to use the switch 8 (SW3))

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.

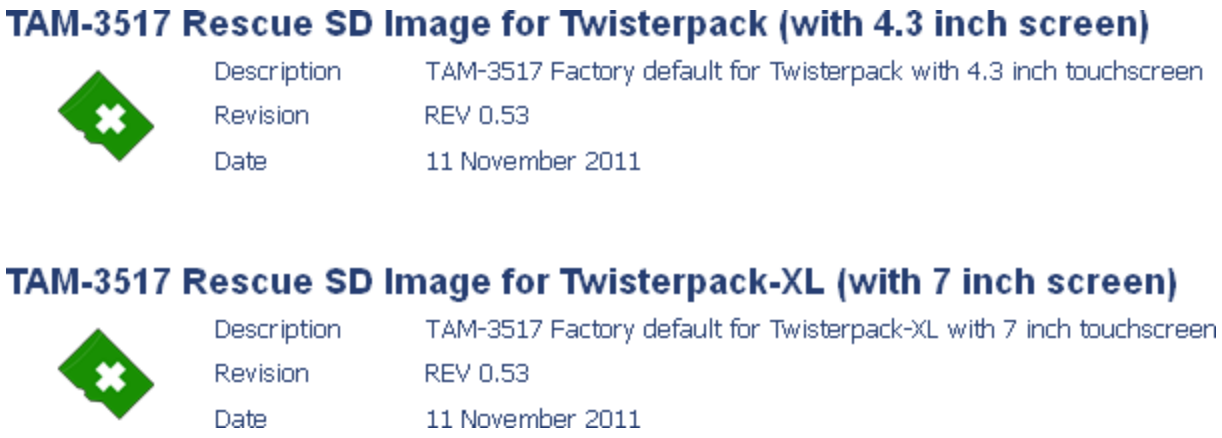


Figure 19 : the rescue images on the download center. Make sure you choose the correct image.

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

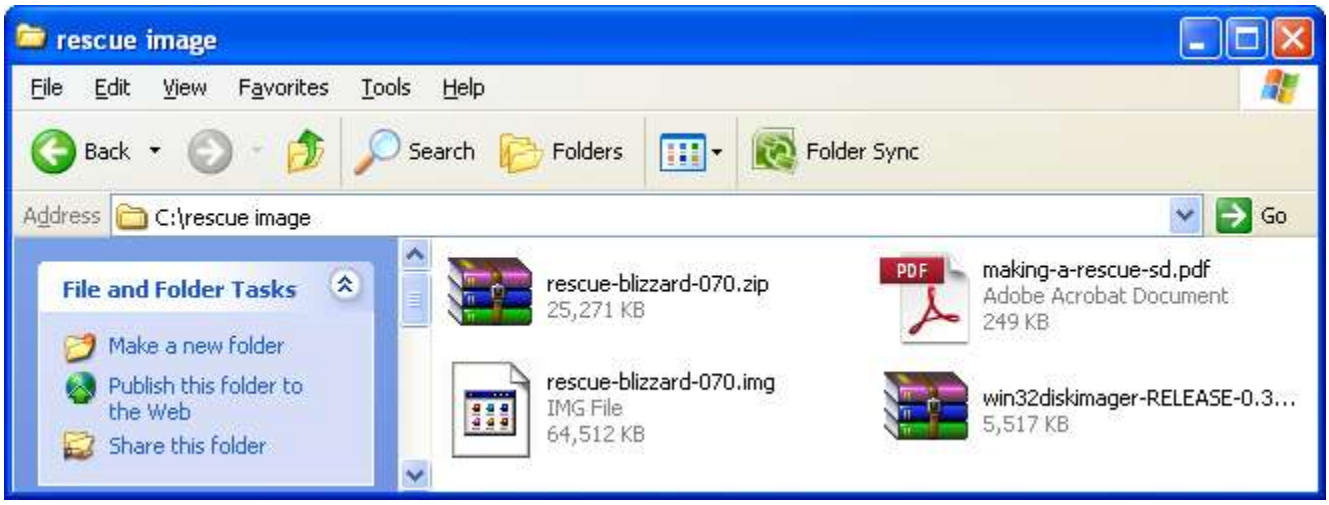


Figure 20: Extracted files

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-twister-070.img	Rescue image for Baseboard with 7" LCD

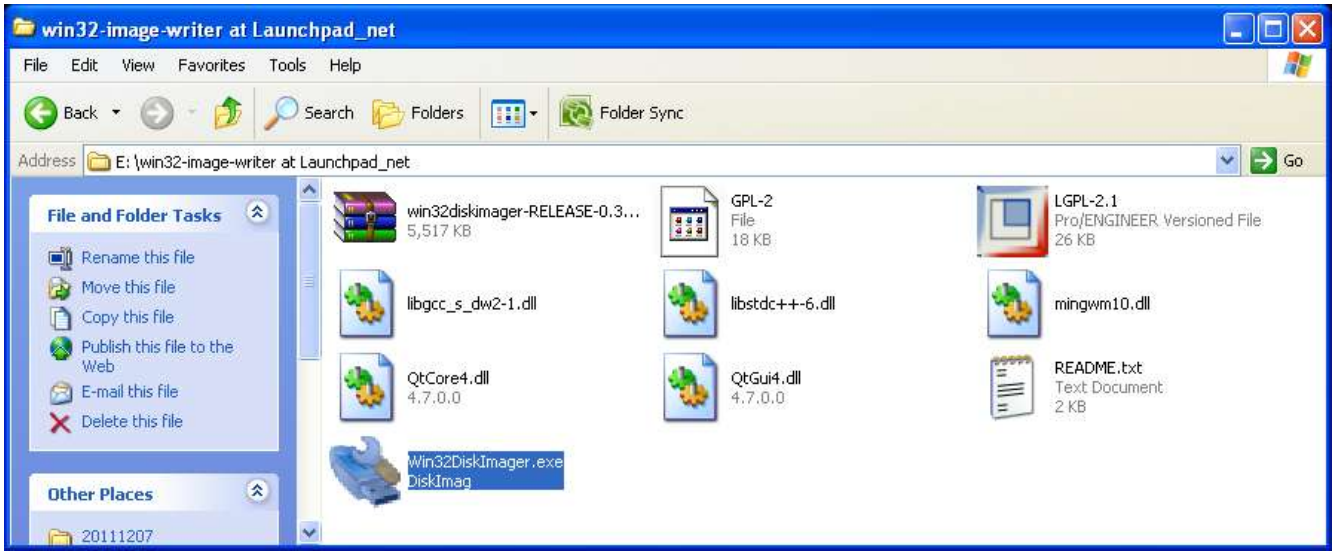


Figure 21: Extract and execute the win32-disk-imager to prepare the rescue image creation

Figure 22: example of converters to plug the Micro-SD in your computer

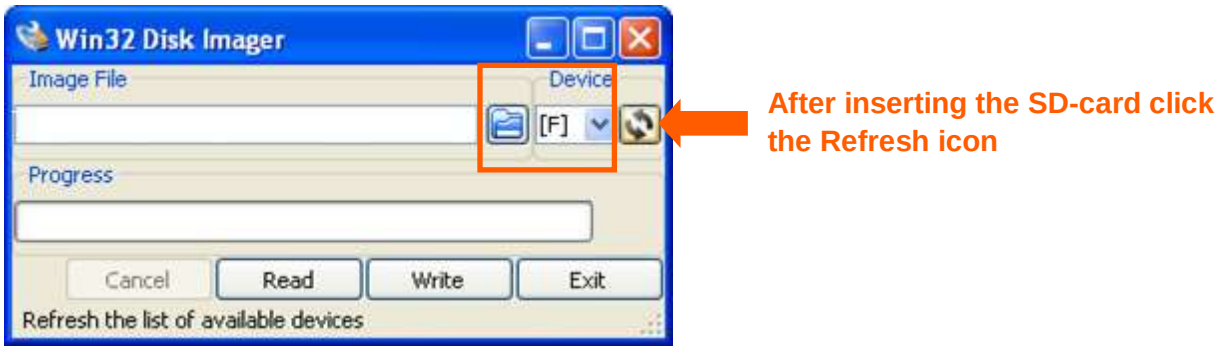


Figure 23: Select the SD-card (in your computer) as device

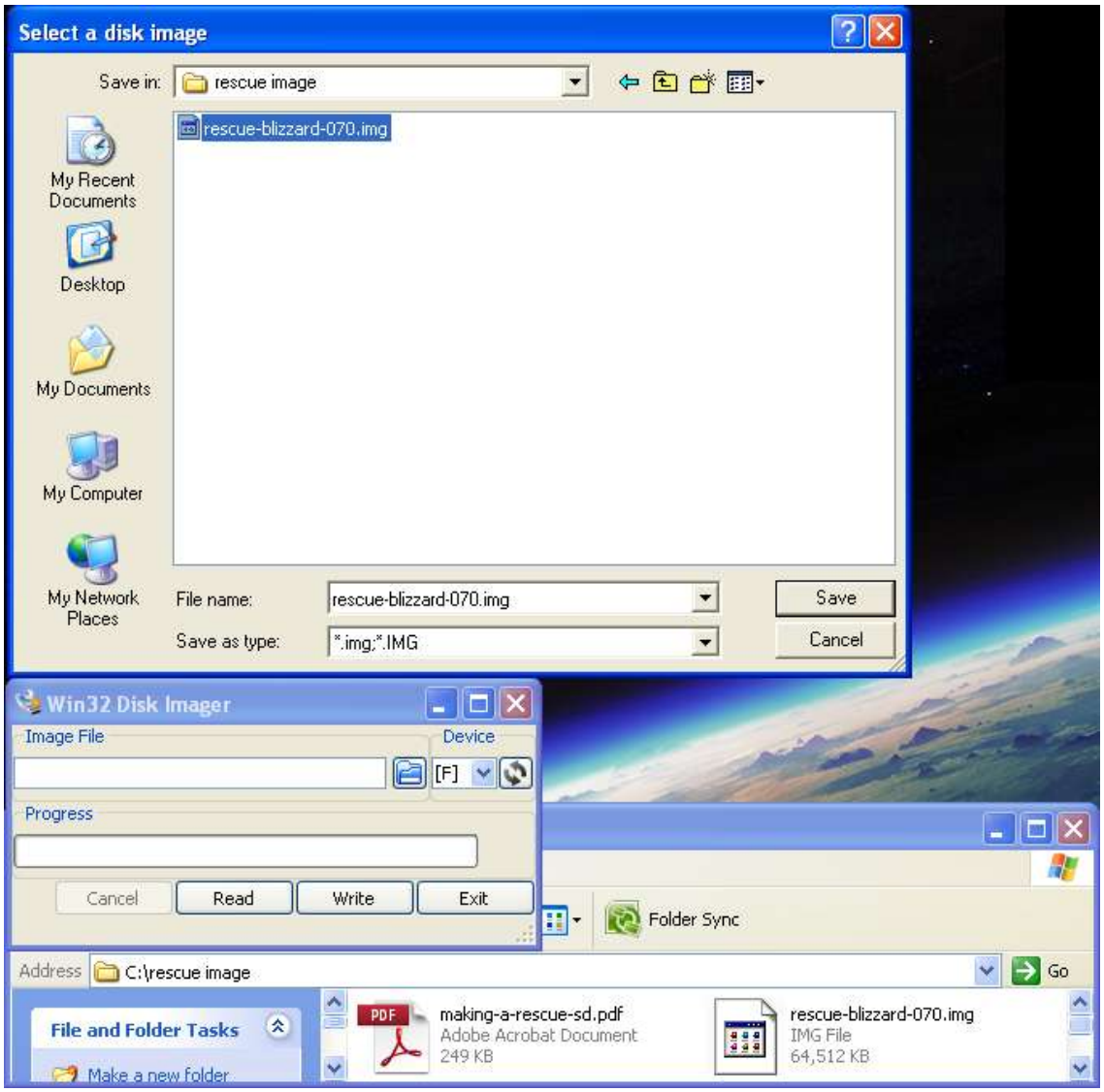


Figure 24: Select, browse and locate the rescue- image file

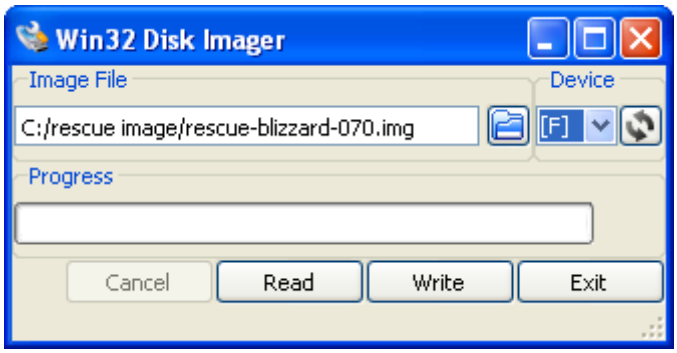


Figure 25: Click the write button to create the rescue-image SD-card

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

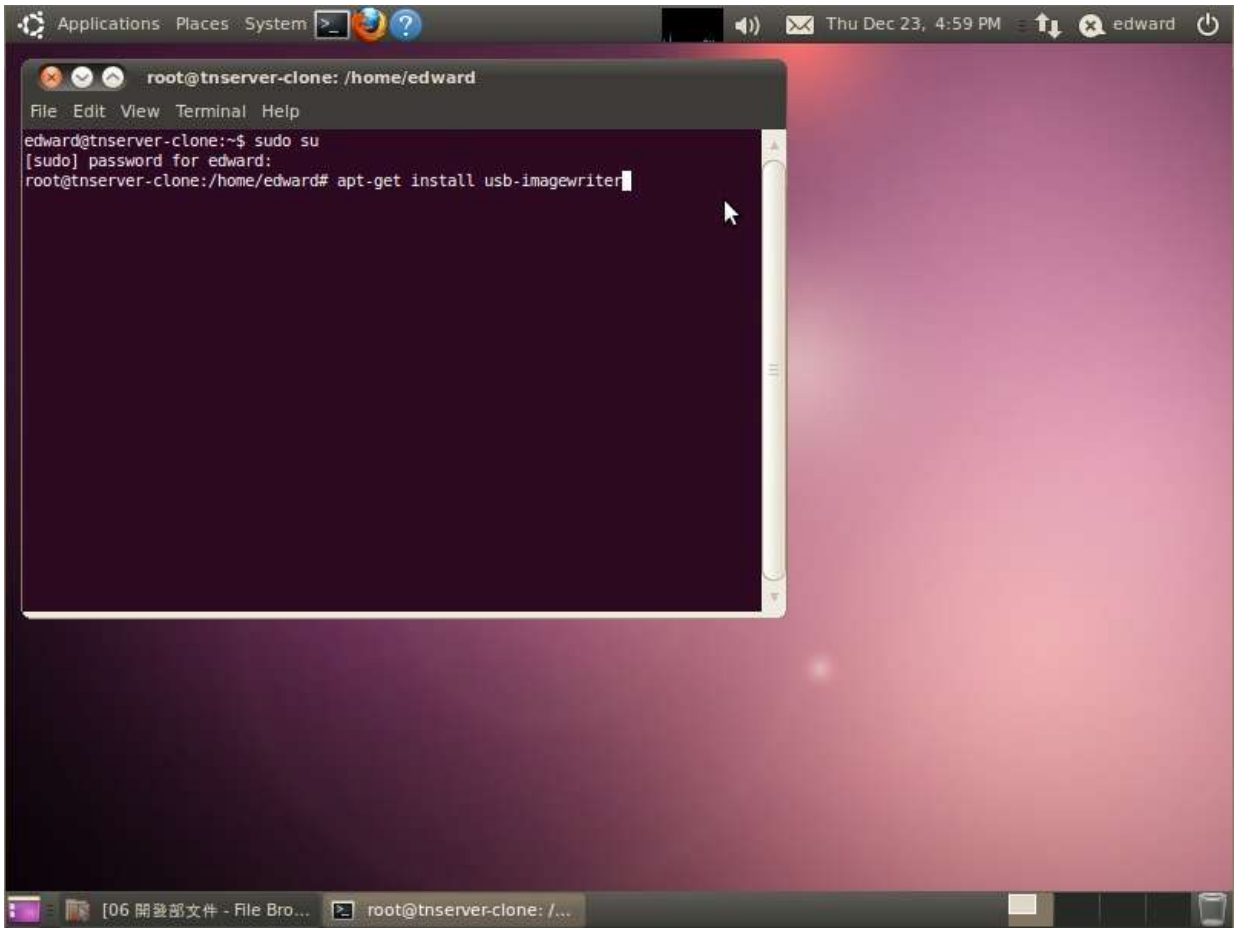


Figure 26: Install the image writer on your Linux computer

Install the image writer:

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

Figure 27: Start image writer (Applications>accessories>imagewriter)

Figure 28: Select the downloaded image and destination (SD-card in your computer), click write to device

Figure 29: 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 30 to Figure 33).

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 30: Installing the rescue image (factory default)

Figure 31: Installing the rescue image – Copying files

Figure 32: Installing the rescue image – Synchronizing File System

Figure 33: Installation complete - Take out the SD card and reboot.

8.4.4 Factory Default Home Screen

Figure 34: Factory Default Home Screen

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

9 Software – Connecting a Null Modem

9.1 Connecting a null-modem cable

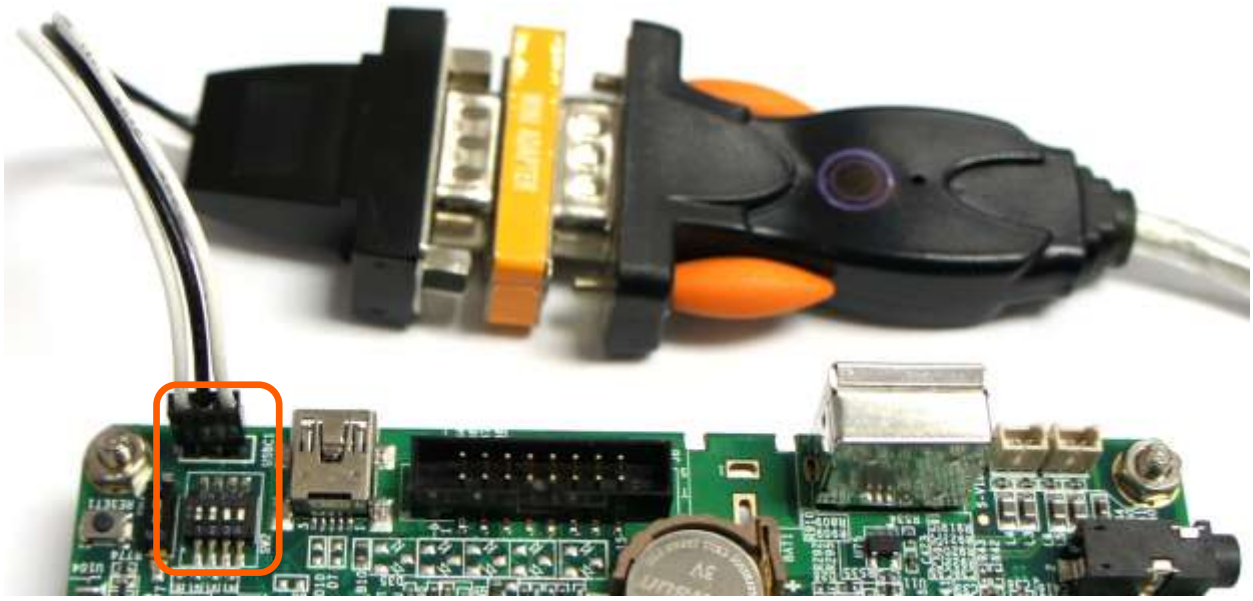


Figure 35 : The Null-modem connected to the UART1 connector Twister baseboard (For debugging the dipswitch (SW2) pin 1 and 2 should be "ON")

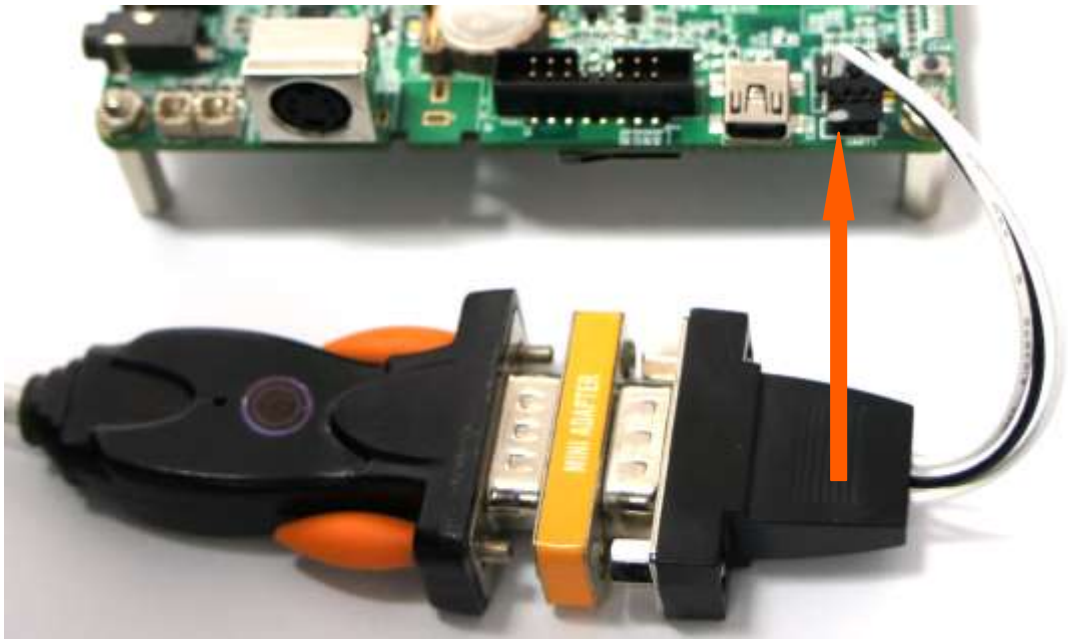


Figure 36 : White dot for the cable (RS-232 to USB) with null-modem-block connected to the UART1 of the Twister baseboard. For a gender-changer-block (yellow) you might need to turn around the connection so the dot is on the other side.

Figure 37: The cable (RS-232 to USB) with yellow mini-gender-changer-block connected to the UART1 connector of the THB-3517 HMI baseboard (see arrow for position of the white dot)

- Start PuTTY on your computer and make sure the "Options controlling local serial lines" are as in Figure 38: Settings in PuTTY:

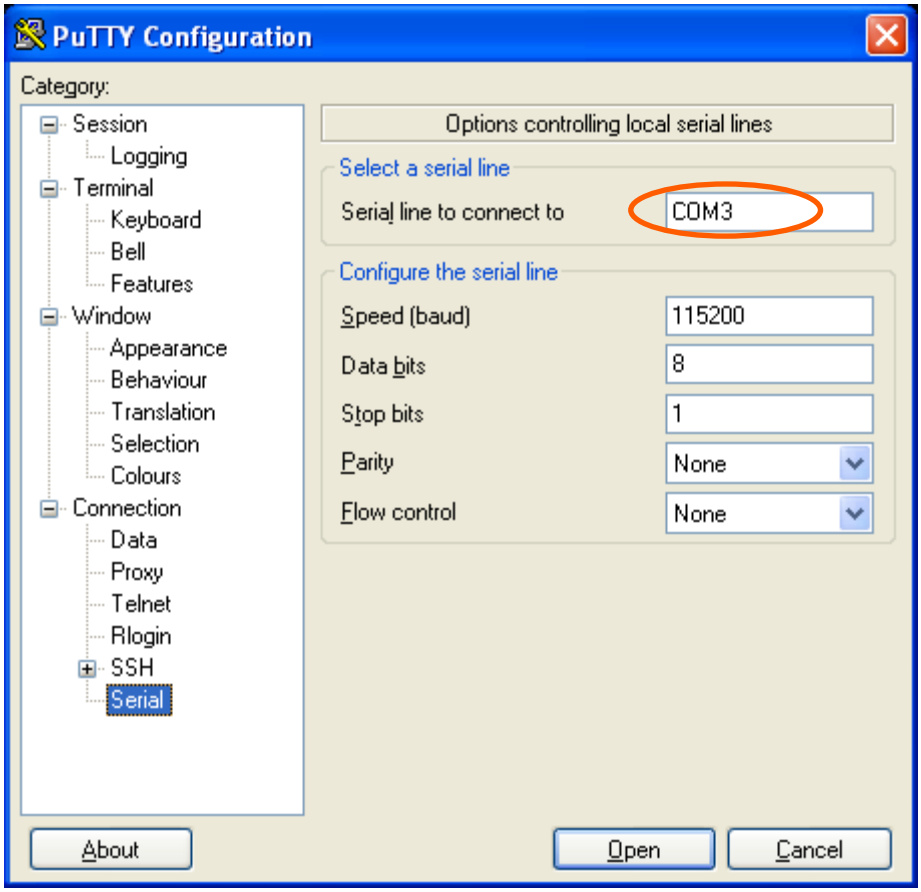


Figure 38: Settings in PuTTY

For computers running a Windows Operating System more steps (see Figure 39 till) might be required in order to check which serial line is used (see orange circles in figures)

Figure 39: Right click on "My Computer" and select Properties

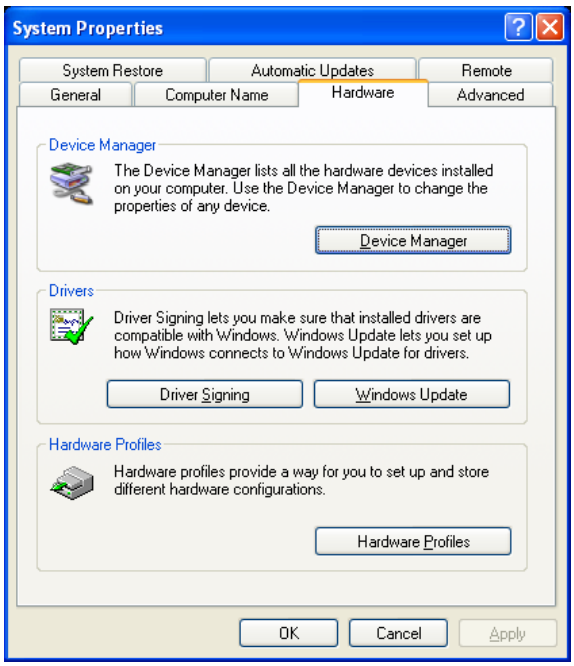


Figure 40: Go to the hardware tab and select "Device manager"

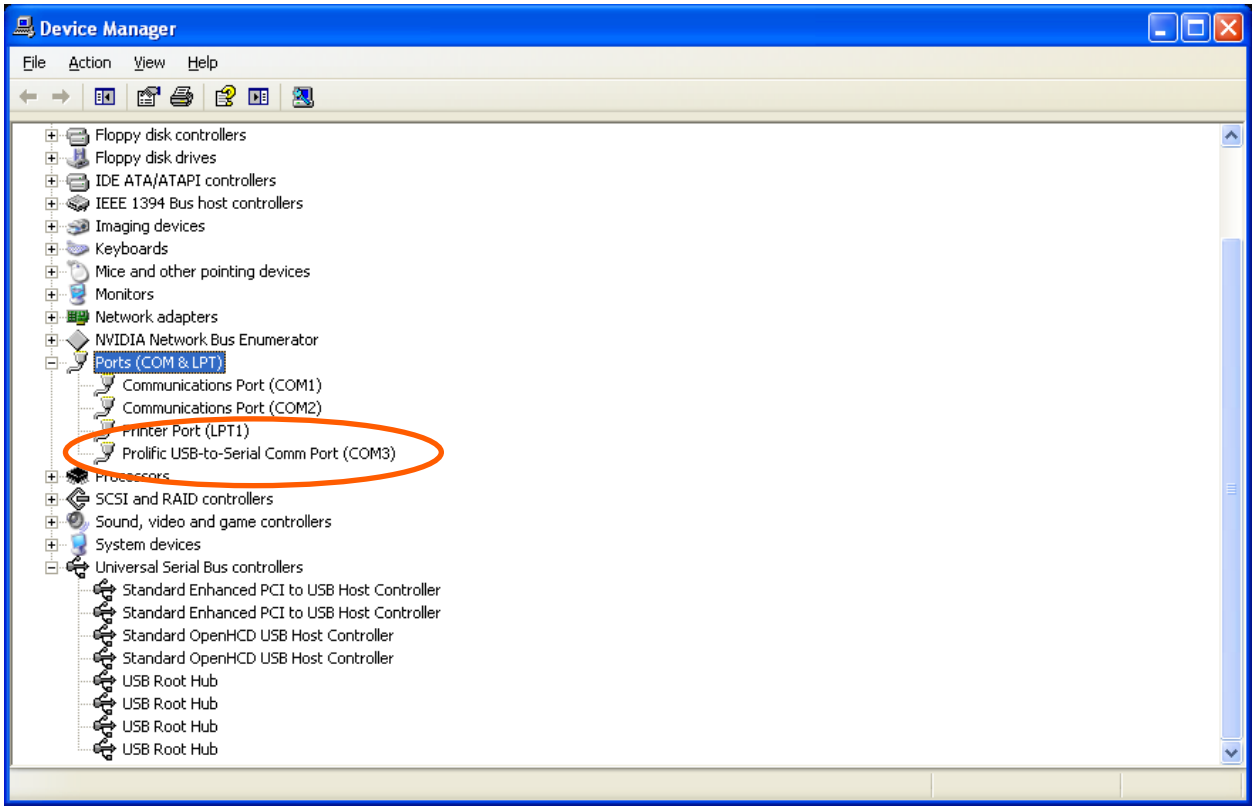


Figure 41: Under Ports (COM & LPT) you will see the baseboard connected with the null modem cable (in this picture COM3), this means in Putty the serial line should be changed into COM3.

- Go to Session and check if "specify the destination you want to connect to " is on Serial (See figure 49)
- Push open and a window will pop up (see figure 50)

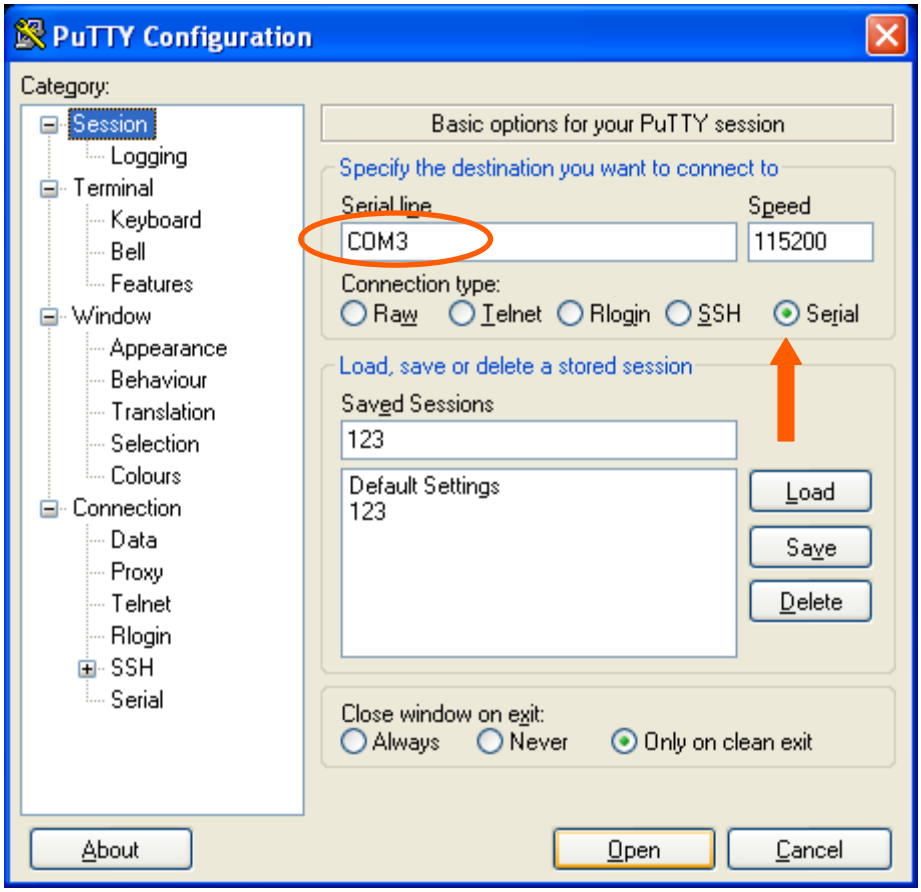


Figure 42: check if serial is selected and then select open

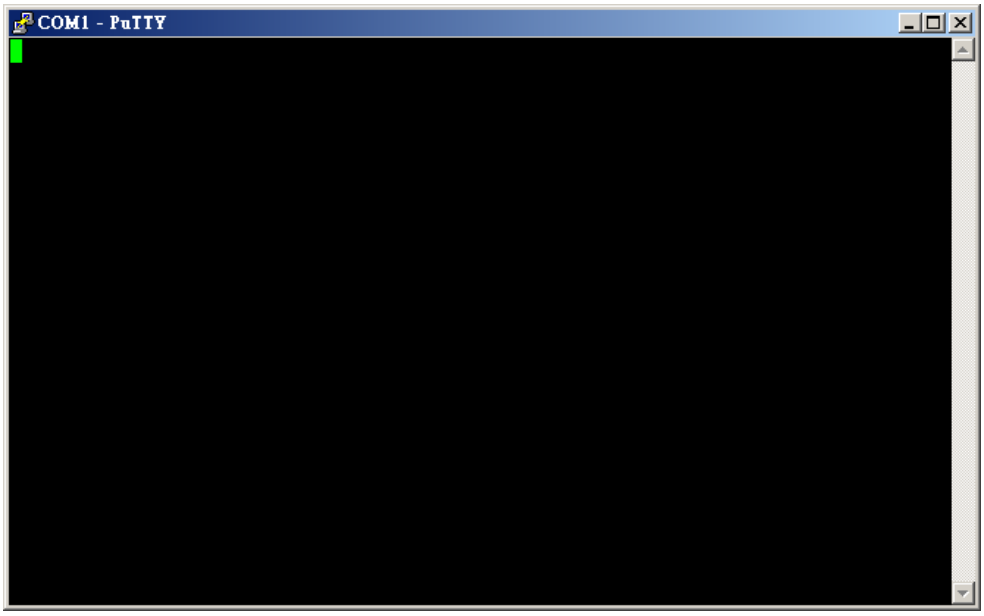


Figure 43: PuTTY terminal window

- 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 UART1 pin header, and check if the dipswitch is on UART1. Sometimes cables are not inverted, which can be solved by turning around the connector to the UART1 pin header (white dot turns 180 degrees).

10 Software – Angstrom (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 TAM-3517 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 TAM-3517

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 TAM-3517 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 44 : settings > Touchscreen Calibration

Figure 45 : 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 46: press (tap it with your finger) on the Settings icon

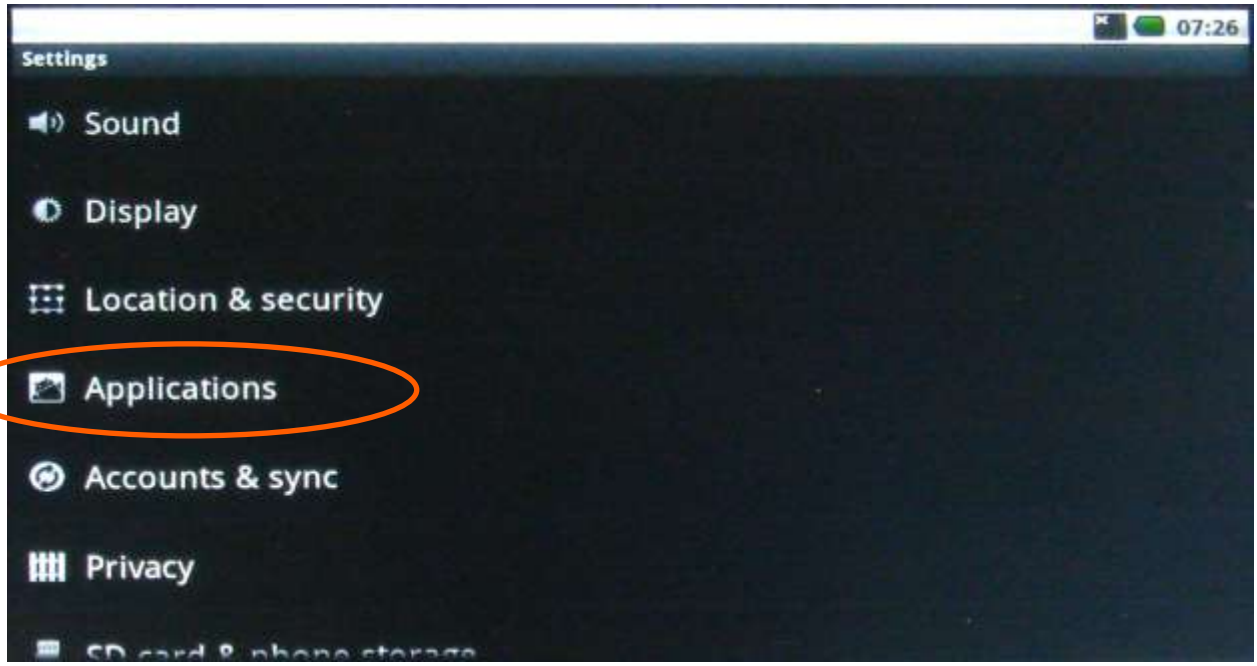


Figure 47: Scroll to the Applications and press on it

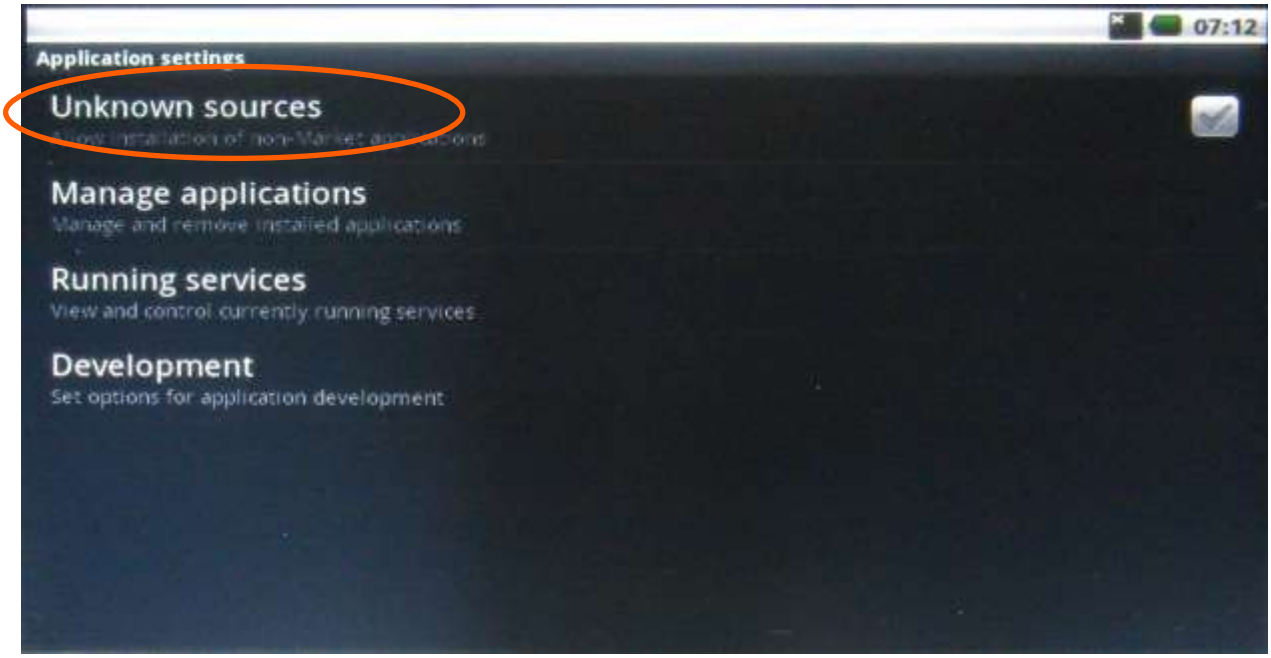


Figure 48: press on "Unknown sources"

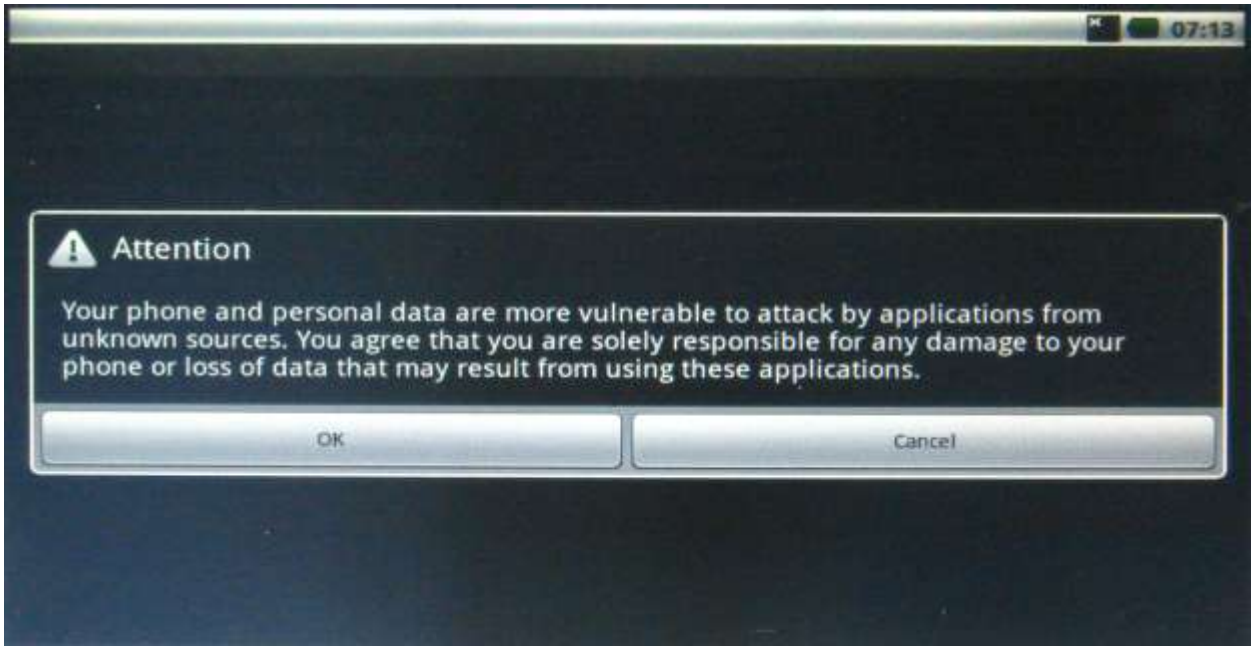


Figure 49: Confirm OK

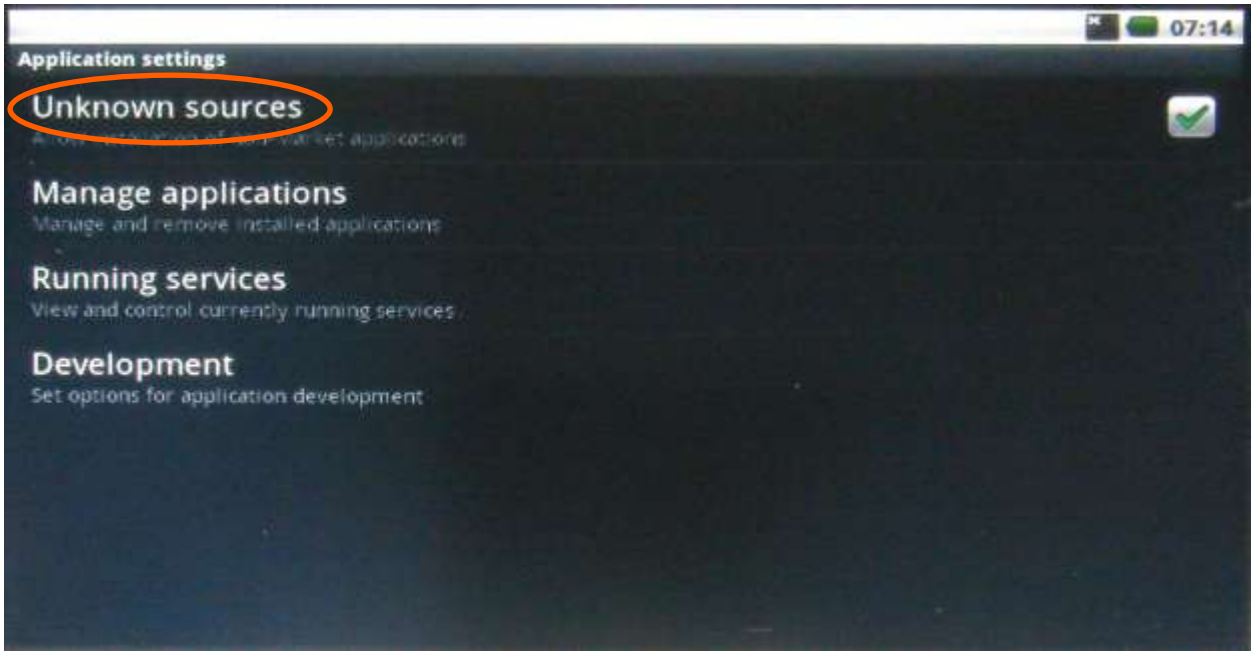


Figure 50: The "Unknown sources" will now show a green icon. It will now install application even if the sources are unknown.

Figure 51: 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)

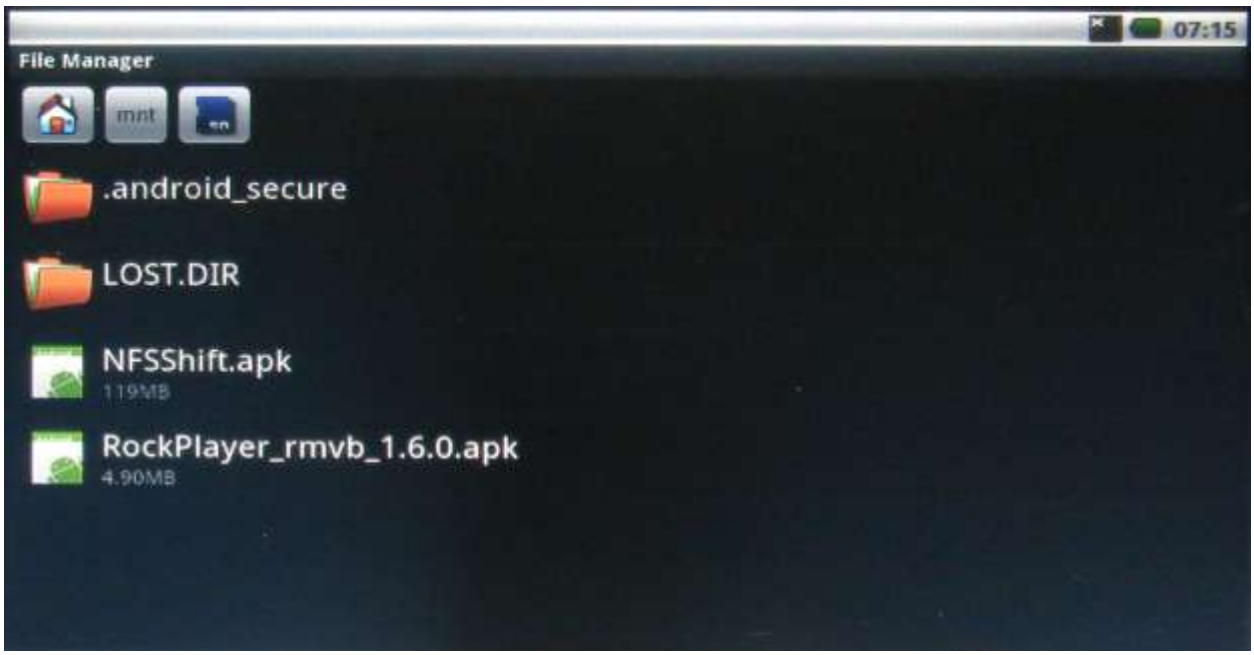


Figure 52: The "File manager" will show the contents of the SD-card. Press on the application that you want to install (for example: Rockplayer)

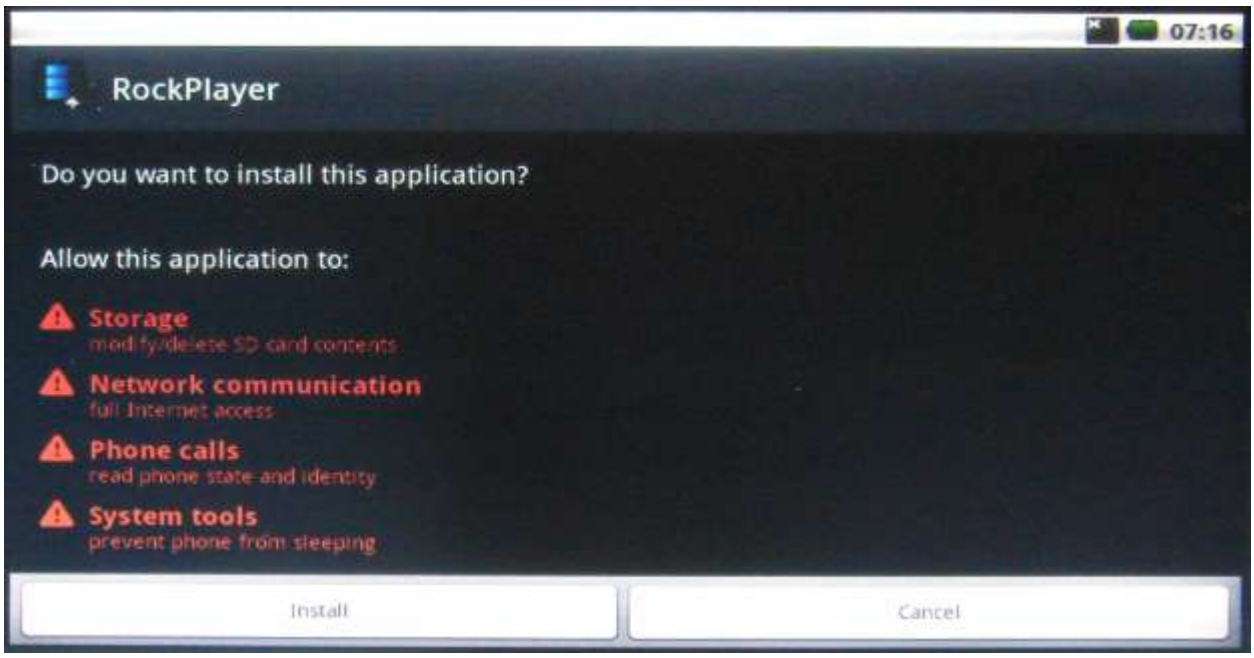


Figure 53: Press install

Figure 54: The application will install

Figure 55: after installation you have the choice to open the application or to go back.

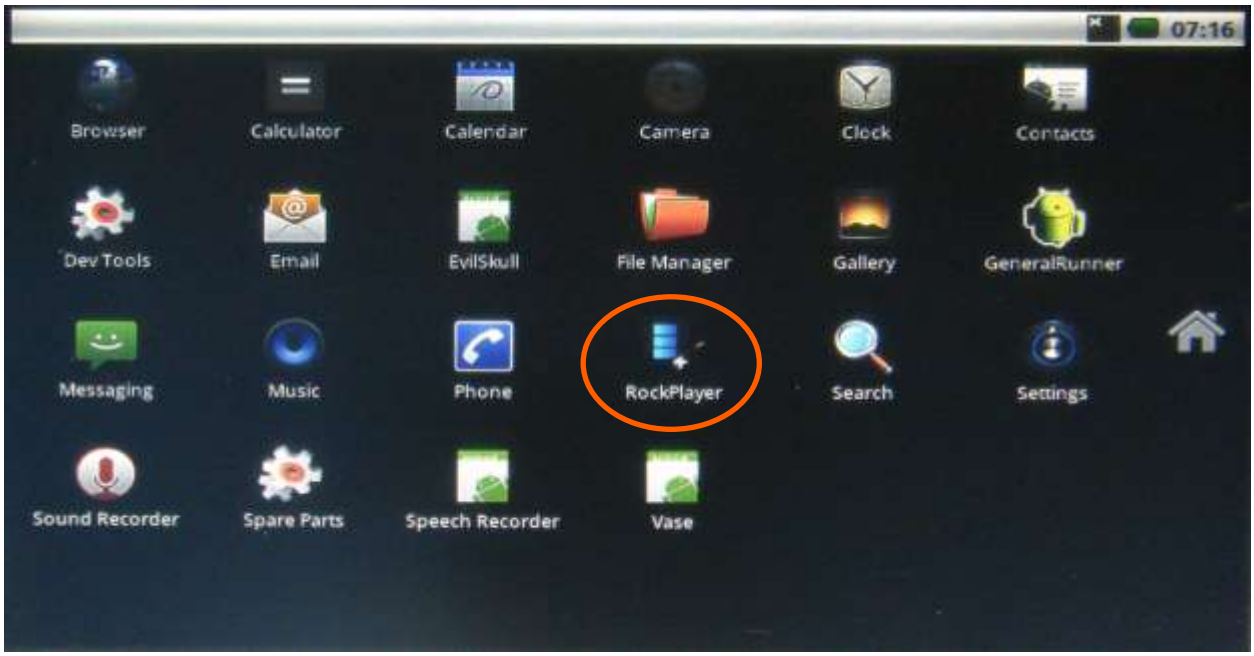


Figure 56: The main menu will now show the Rockplayer application icon. To start the application, just press the icon.

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.

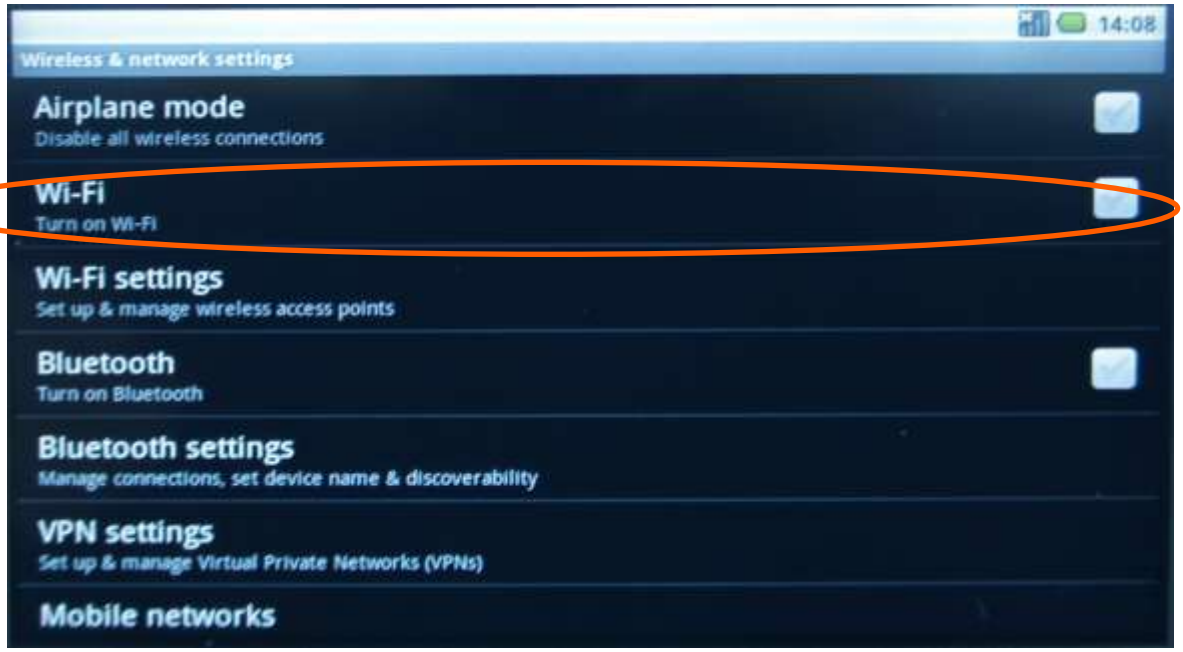


Figure 57: in "Settings", switch on Wi-Fi:

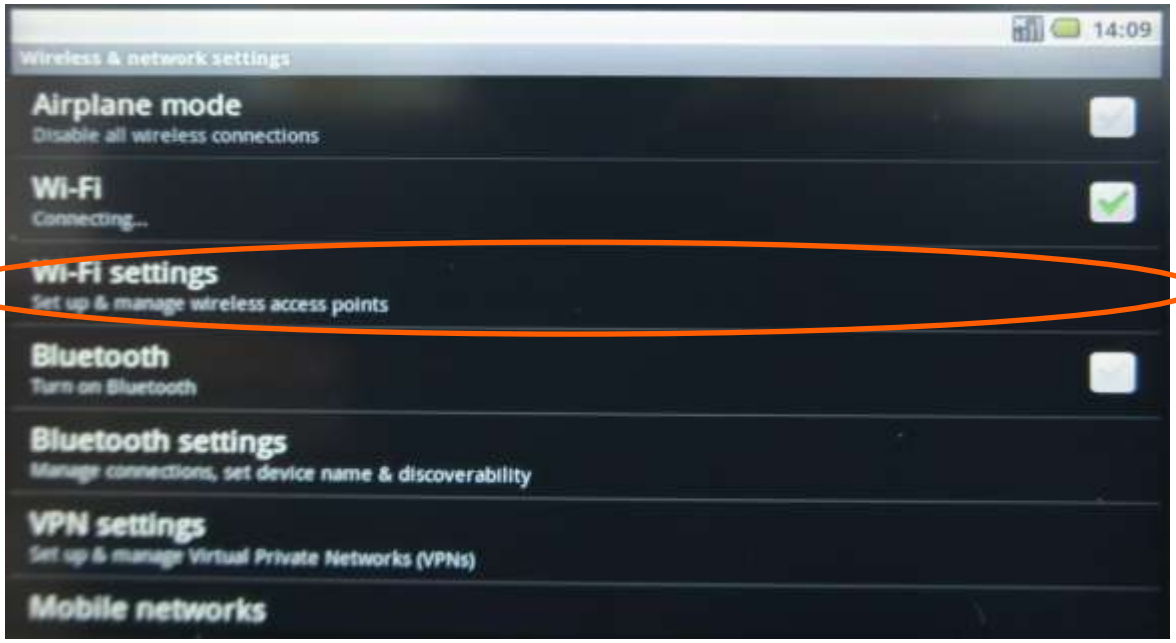


Figure 58: Go to Wi-Fi settings:

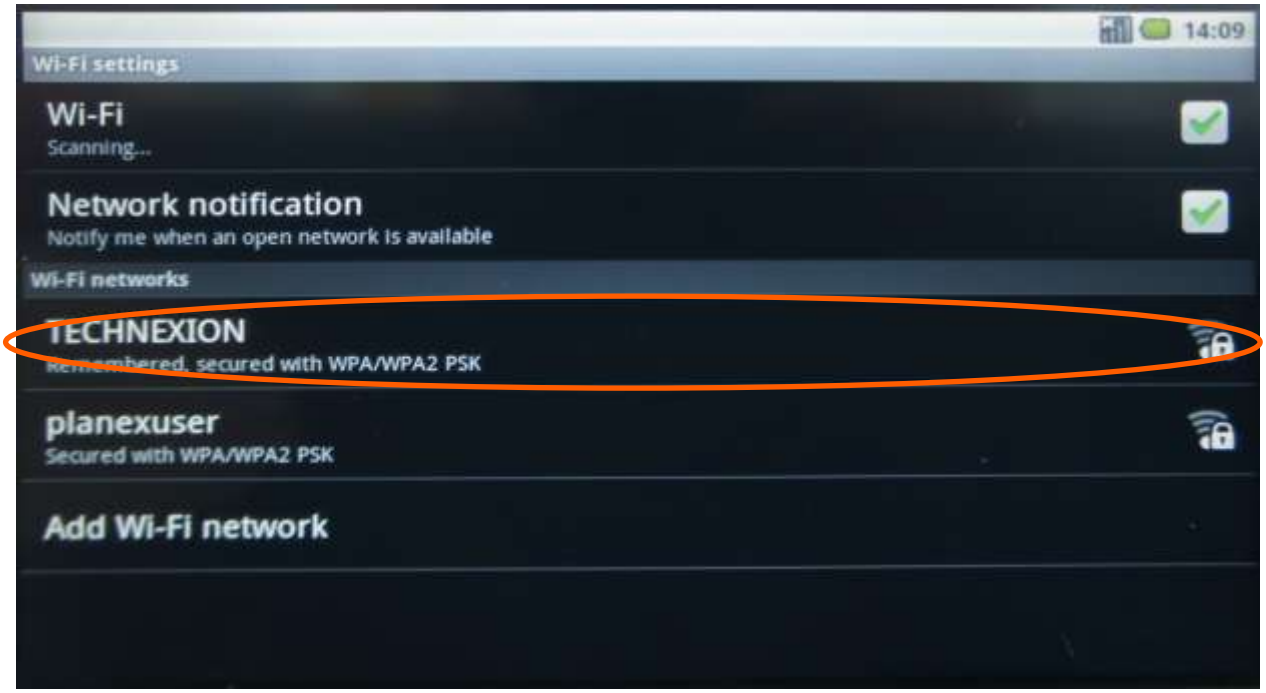


Figure 59: Select a network

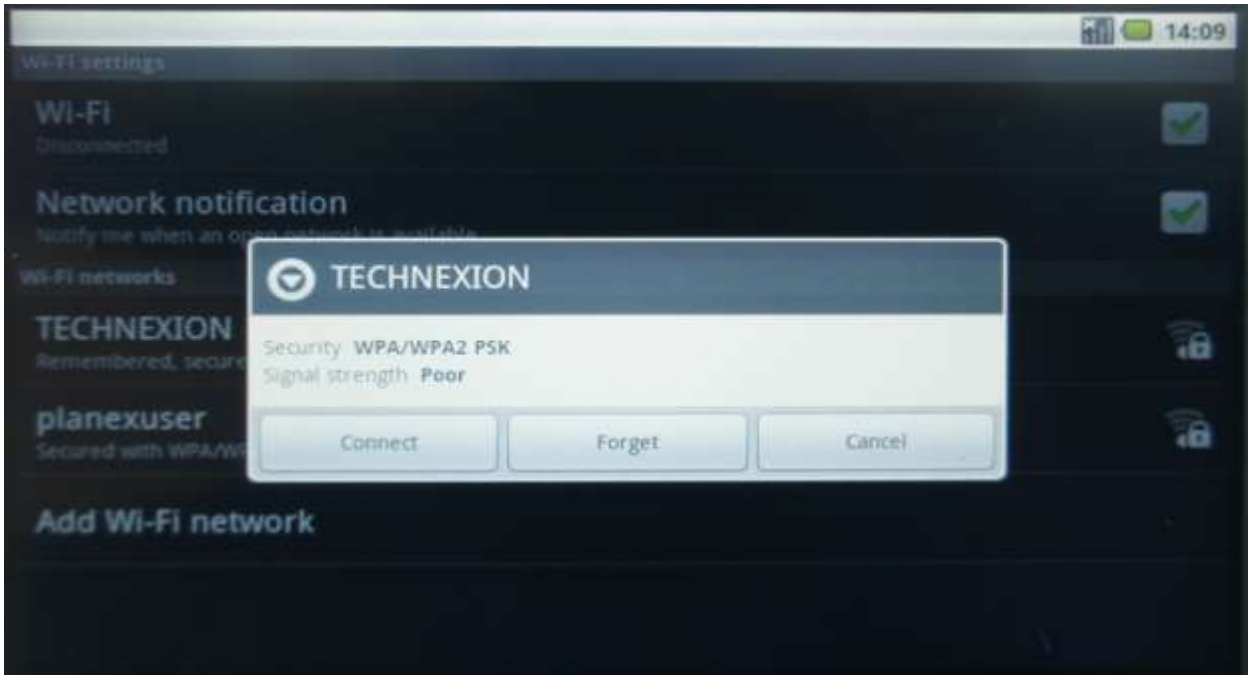


Figure 60 : Choose connect and, if necessary, enter a password.

Figure 61 : Open the browser in the main menu

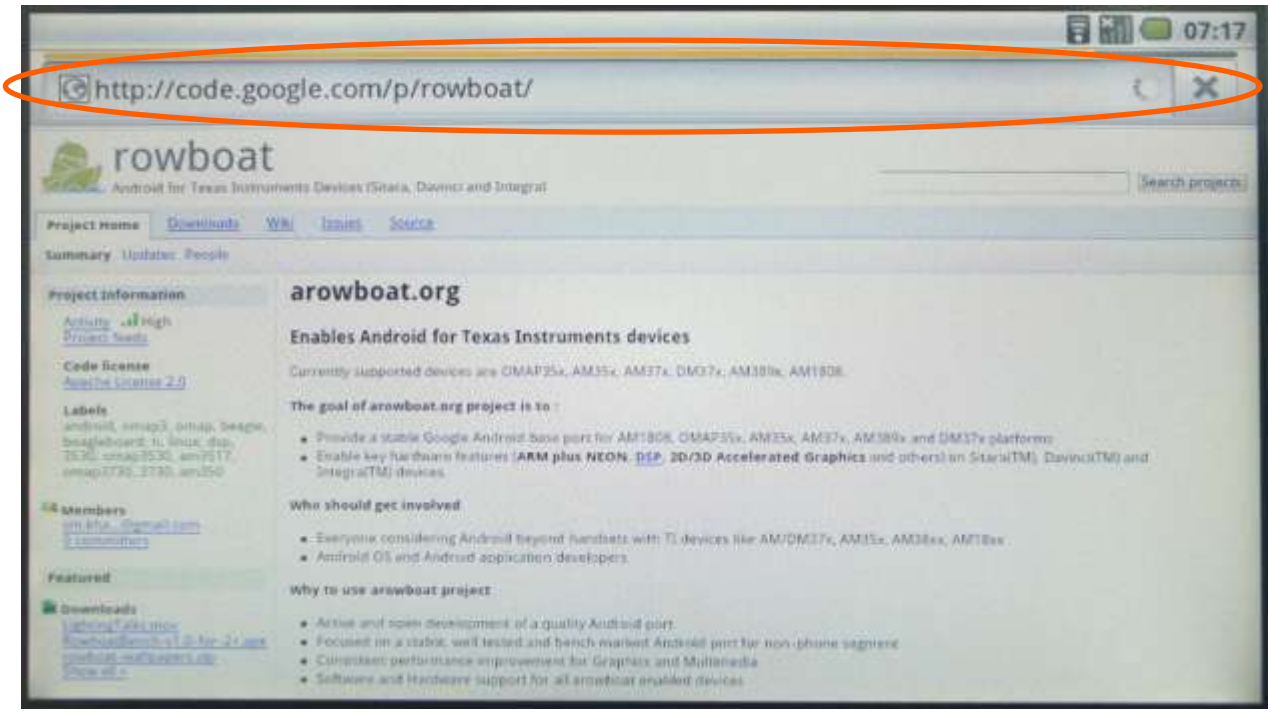


Figure 62 : Press the internet address bar and the onscreen keyboard will appear, or Insert an USB-keyboard.

Figure 63 : Type: http://openintents.googlecode.com press "GO" and you will find the File Manager under the downloads

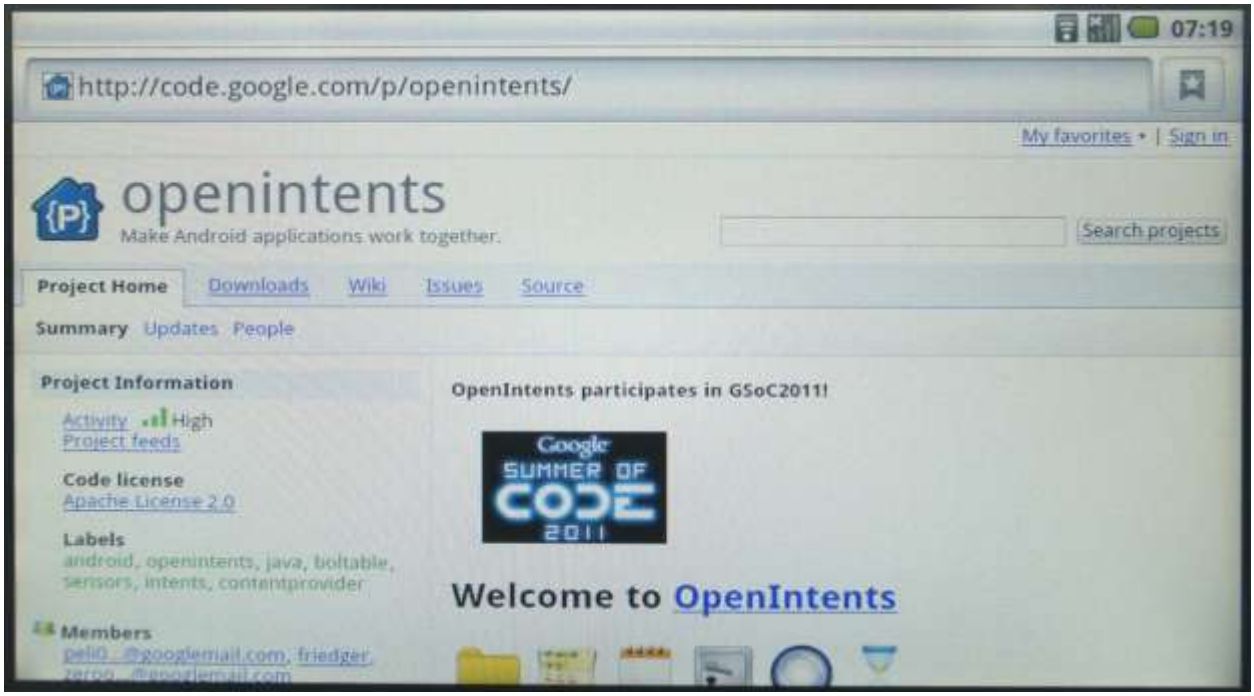


Figure 64 : Another option is:: http://www.openintents.org and you will also find the File Manager

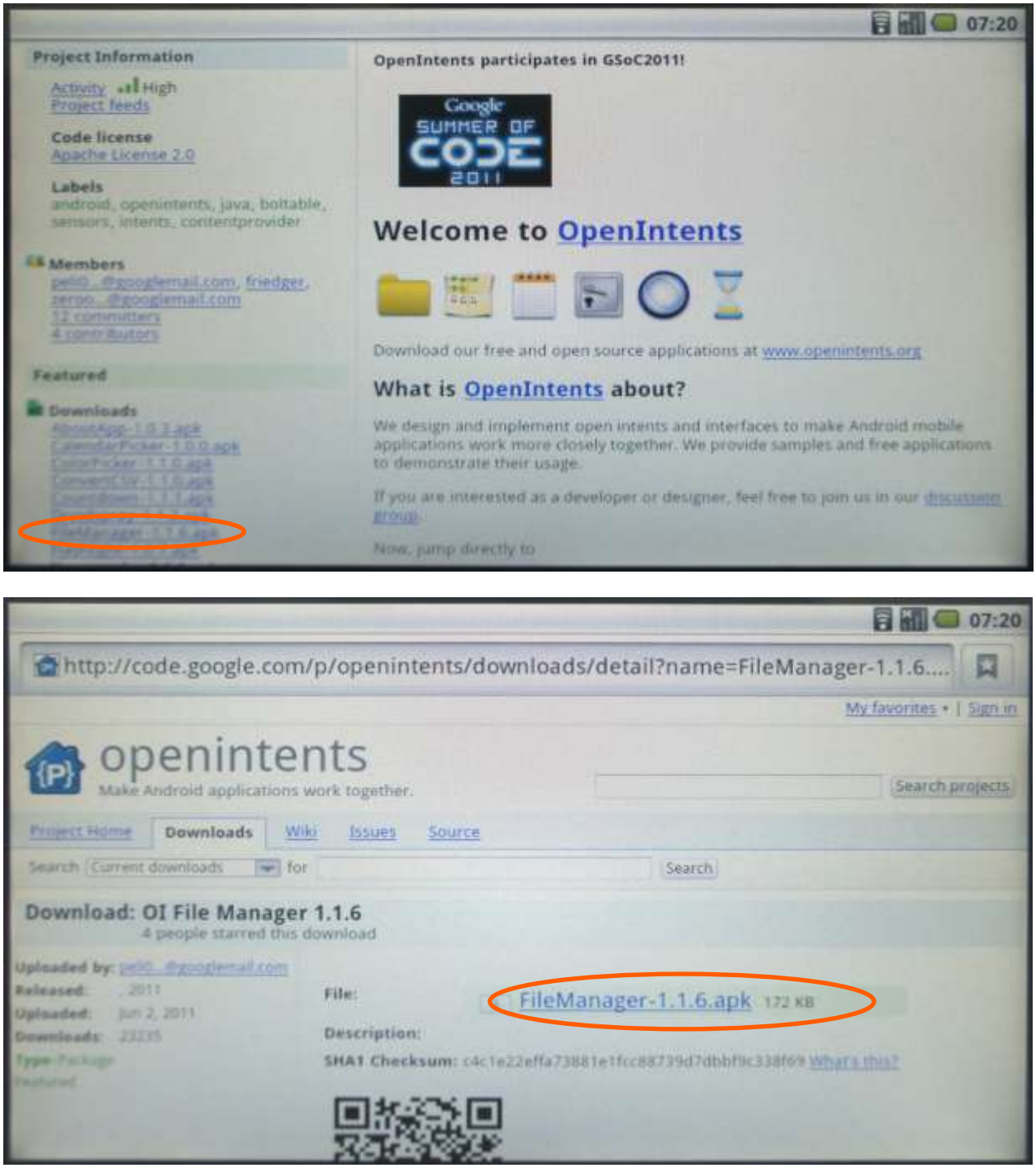


Figure 65 : Click the file manager link; it might appear like nothing happens, but just go to the main screen and pull the bar on top down.

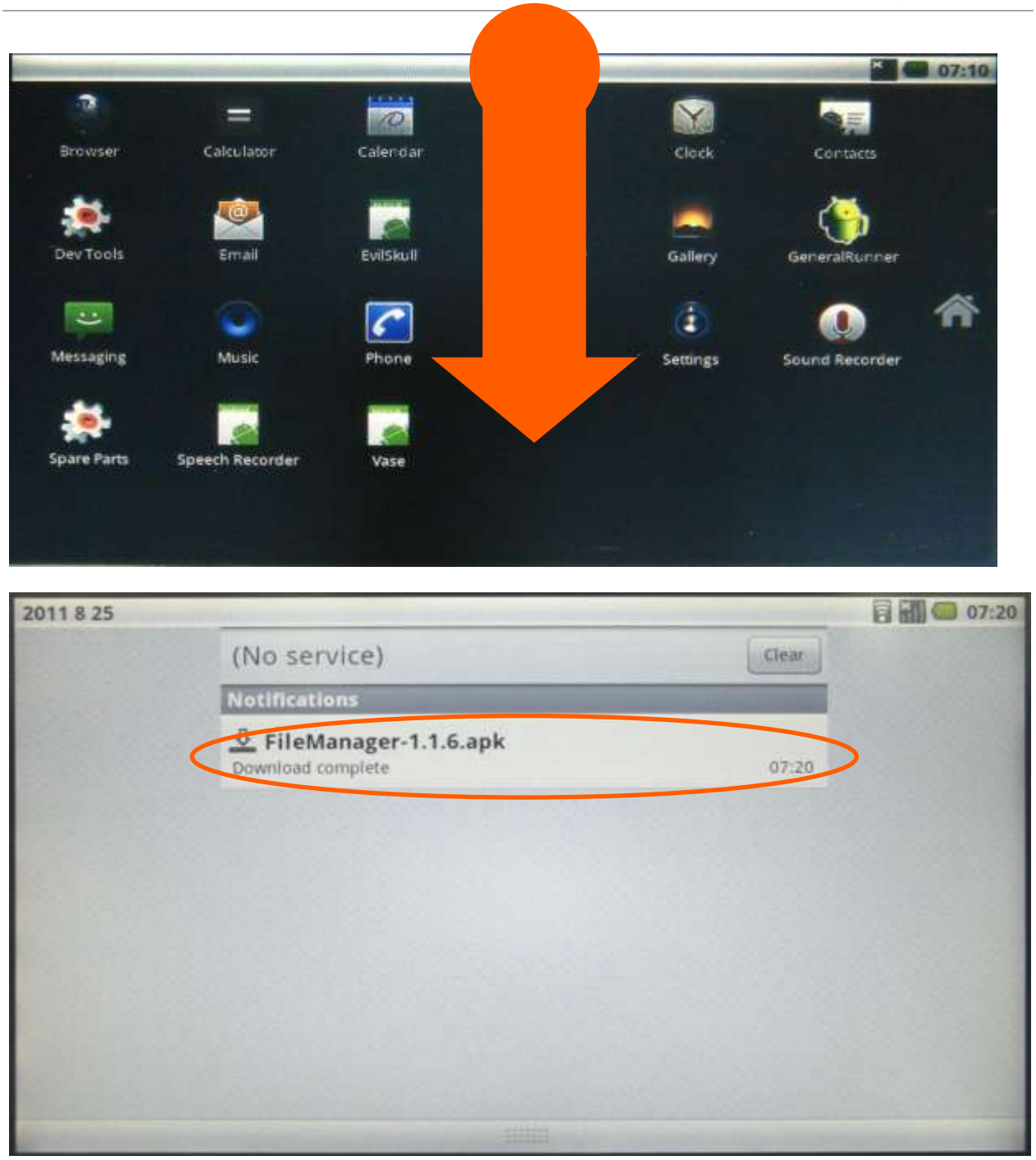


Figure 66: You will see the download when it has finished downloading

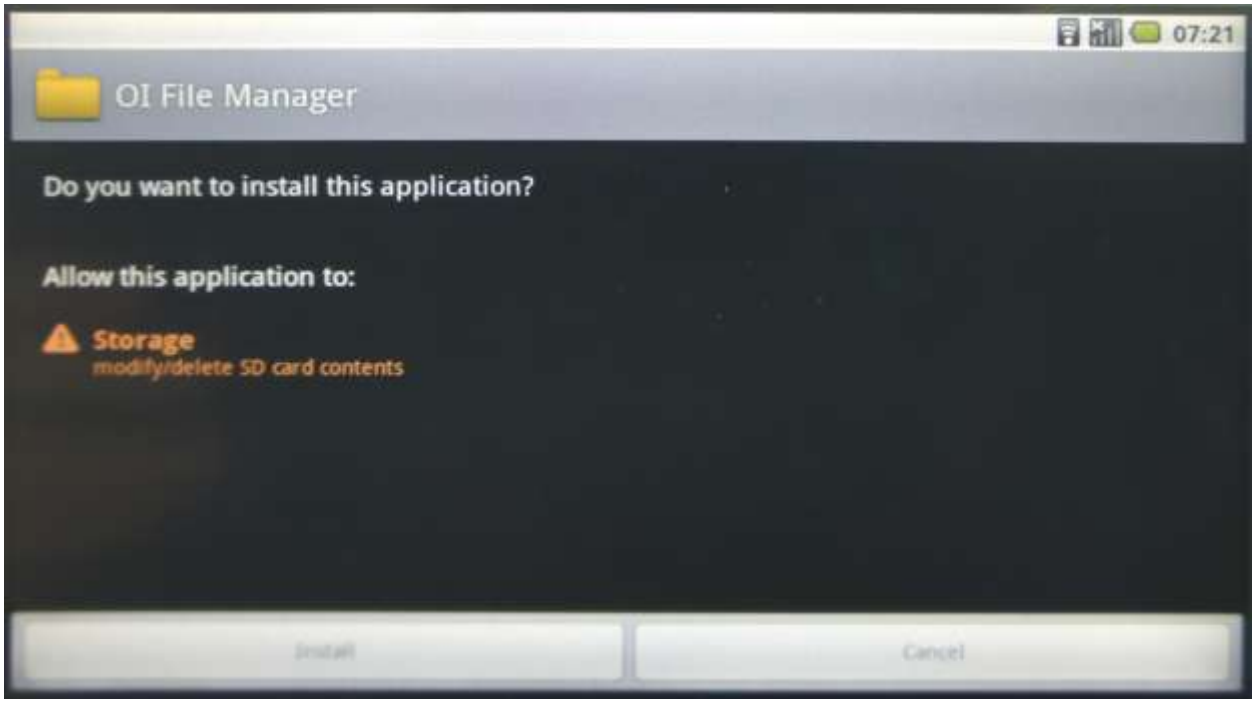


Figure 67 : Press the download and it will ask to install or cancel, Install will install the application, and Cancel will delete the file

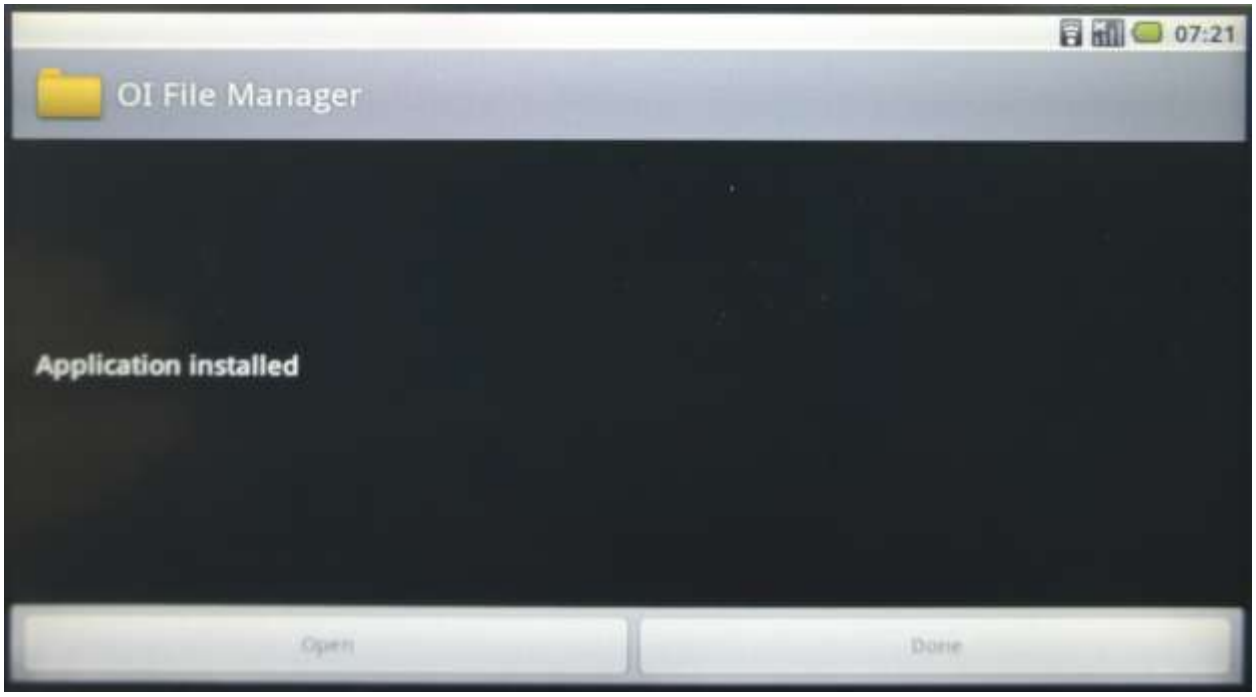


Figure 68 : You now have a file manager and it will make it easier to install apk's that are placed on a SD card

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

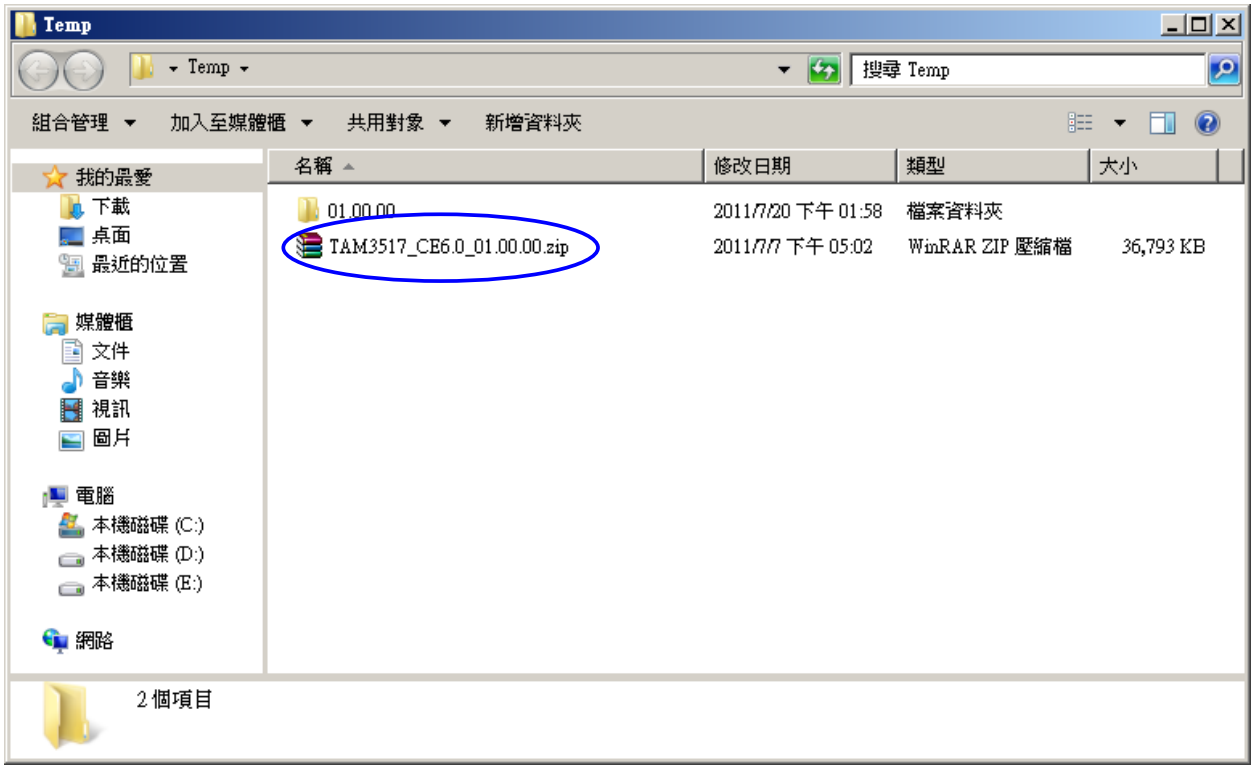
12.3 Get the BSP

12.3.1 Download the BSP from the web-Site

Go to www.technexion.com > Support > download Center > "HMI"; and download "TAM3517_CE6.0_versionnumber"".

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

Decompress the downloaded file. (See Figure 69)


Temp
Temp
搜尋 Temp
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
01.00.00
2011/7/20 下午 01:58
檔案資料夾
TAM3517_CE6.0_01.00.00.zip
2011/7/7 下午 05:02
WinRAR ZIP 壓縮檔
36,793 KB
2 個項目
Figure 69

After entering the "01.00.00\BSP" (version number) folder, copy the "TAM3517" folder to "C:\ WINCE600 \ PLATFORM \". (See Figure 71 and Figure 71)

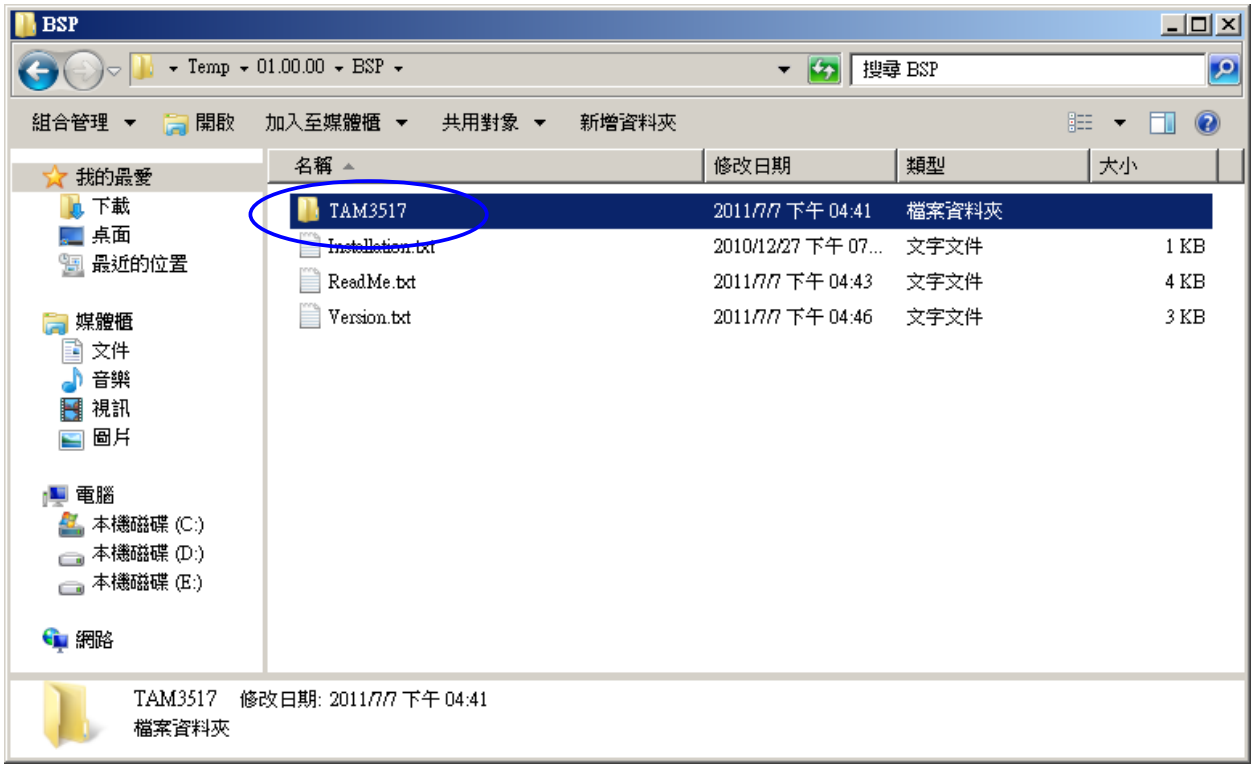


Figure 70

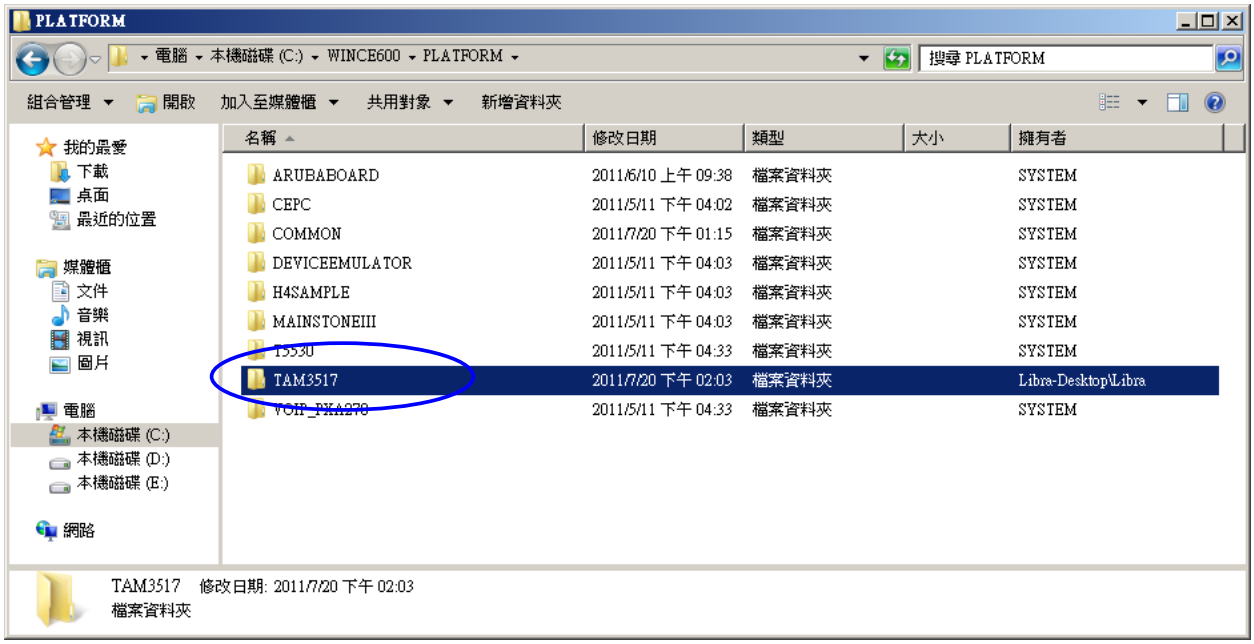


Figure 71

Go back to the decompressed folder "01.00.00" folder, and copy the "OSDesigns" folder to "C:\ WINCE600 \". (See Figure 72 and Figure 73)

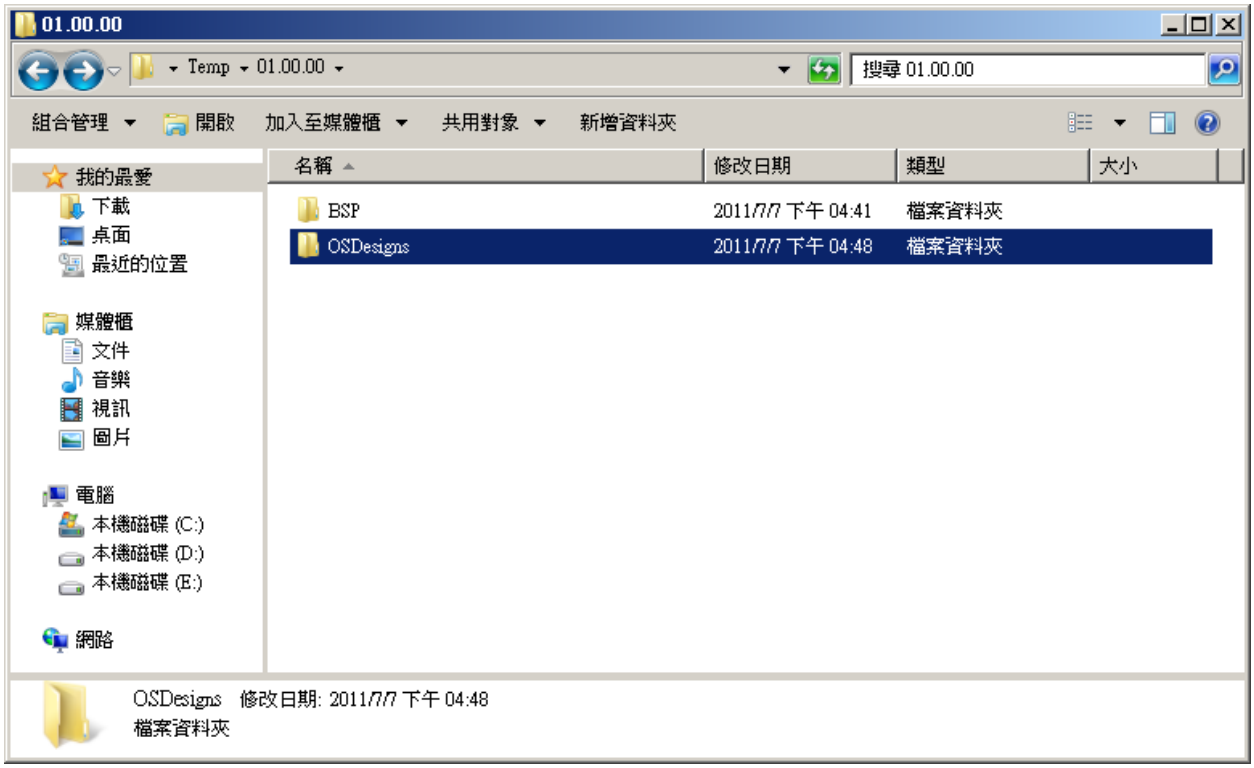


Figure 72

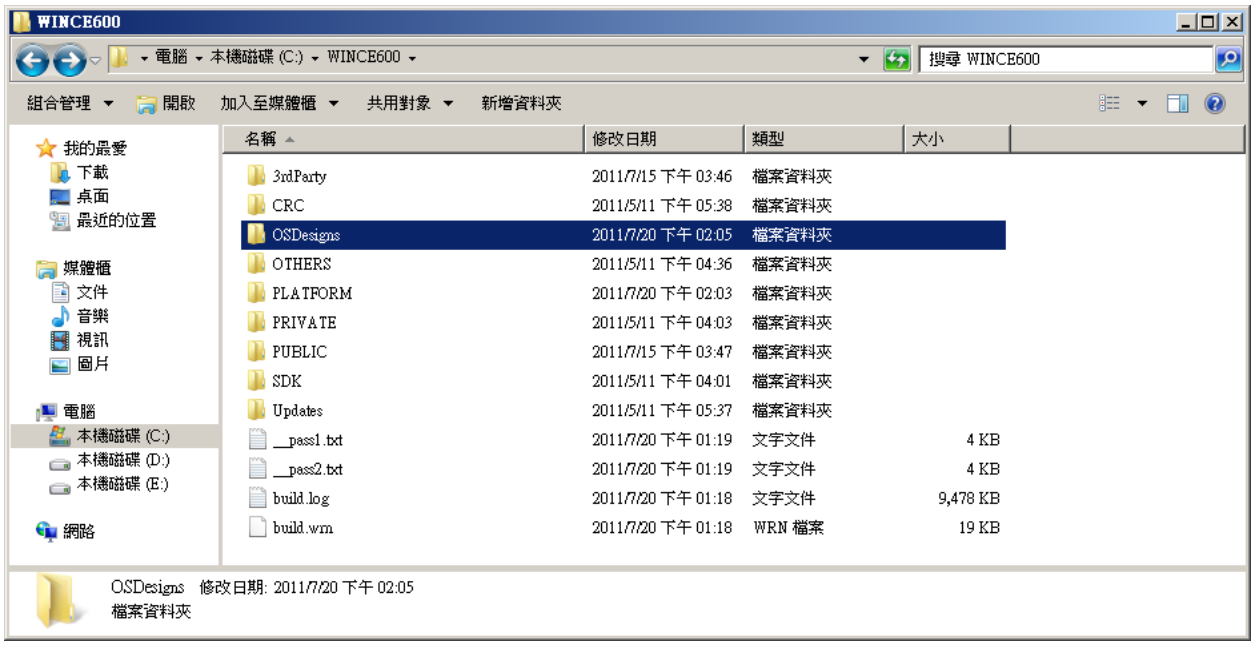


Figure 73

12.4 Create a SD card

This chapter describes how to create a SD card.

- Open "Microsoft Visual Studio 2005". If that already open, Please reopen it.
- Click "File → Open → Project Solution" (See Figure 74)

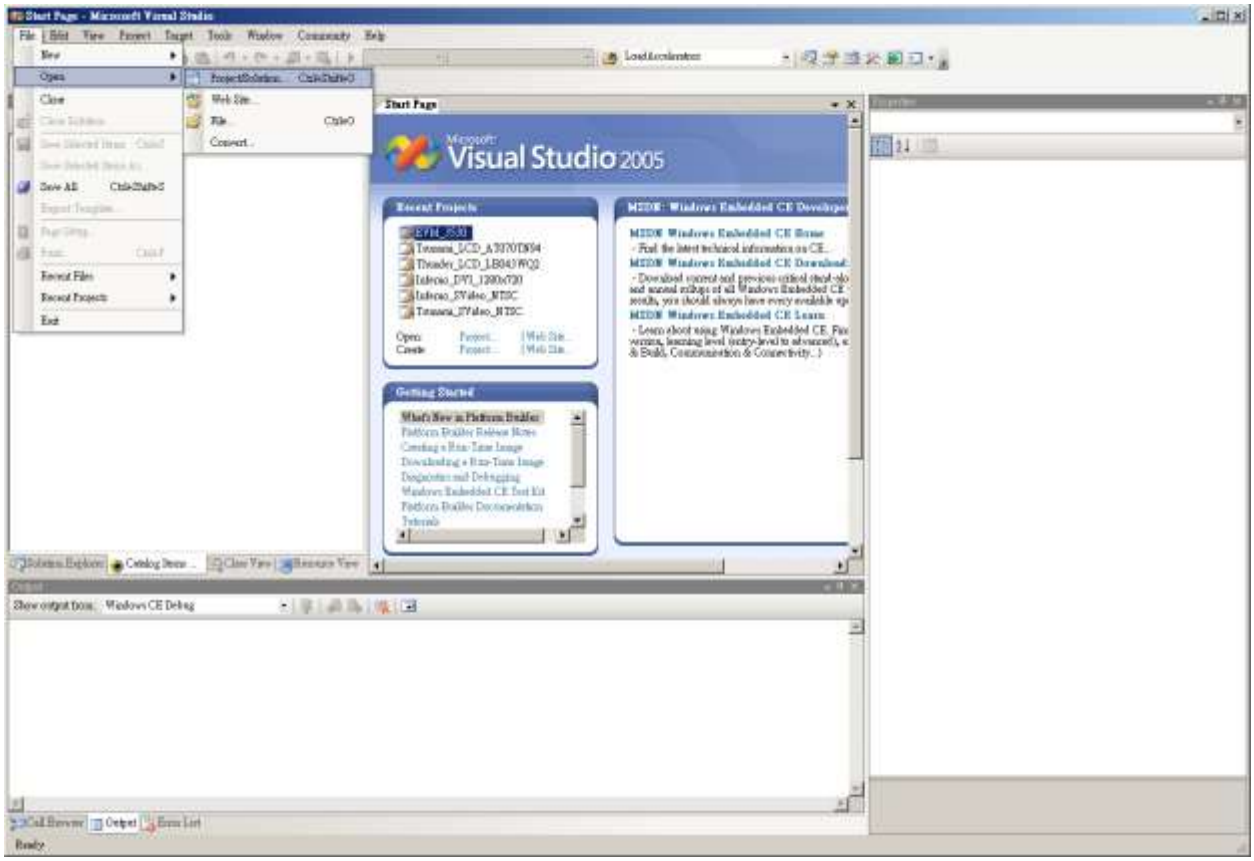


Figure 74

- Go into the folder and open the SLN-file of your HMI (As example in this manual we use "Twister_LCD_7inch") (See Figure 75)

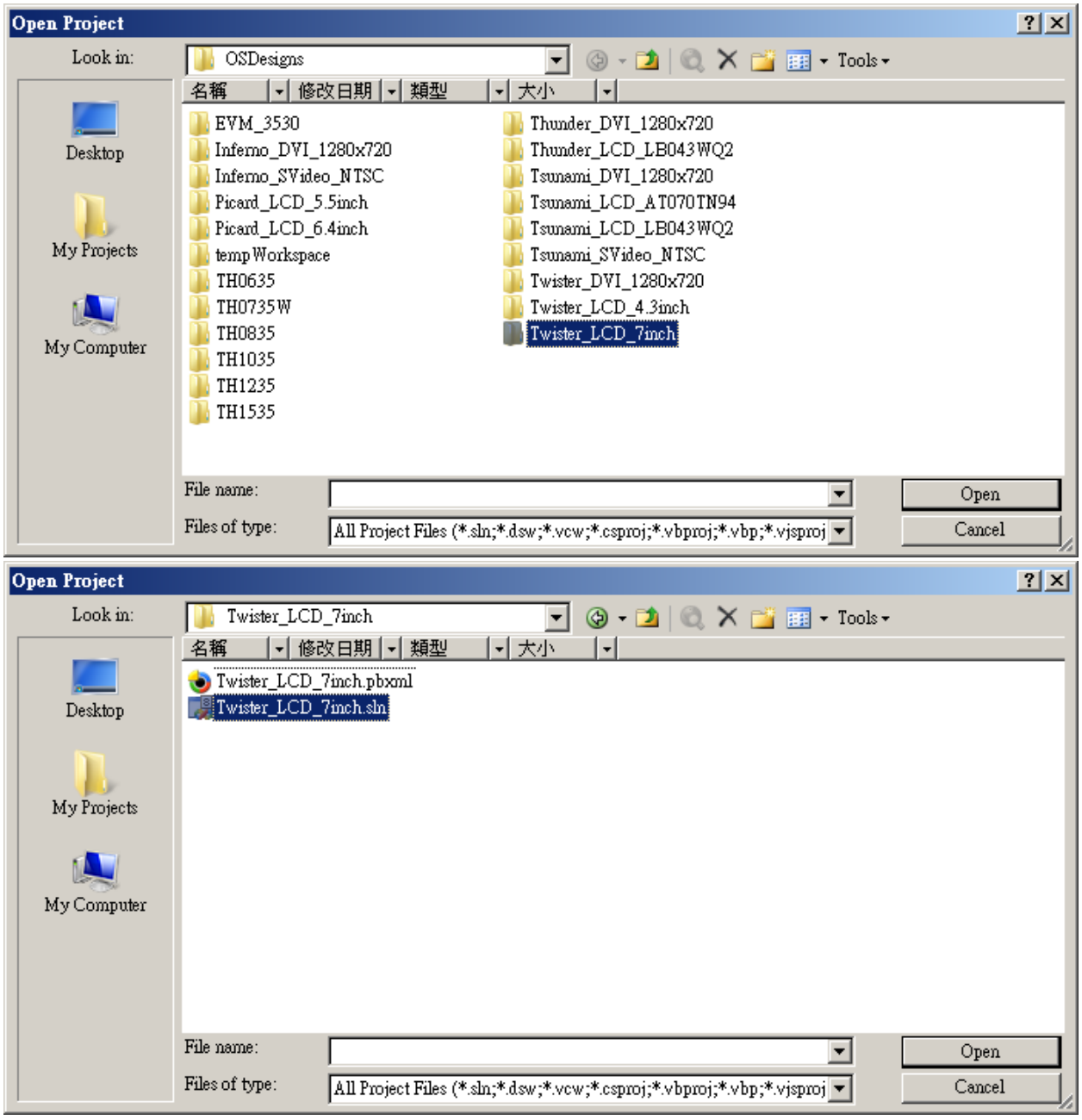


Figure 75

- In the menu click "build/advanced build command/Clean Sysgen" (See Figure 76) This will take approximately 20 minutes, after which you will see "build complete" (see Figure 77)

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

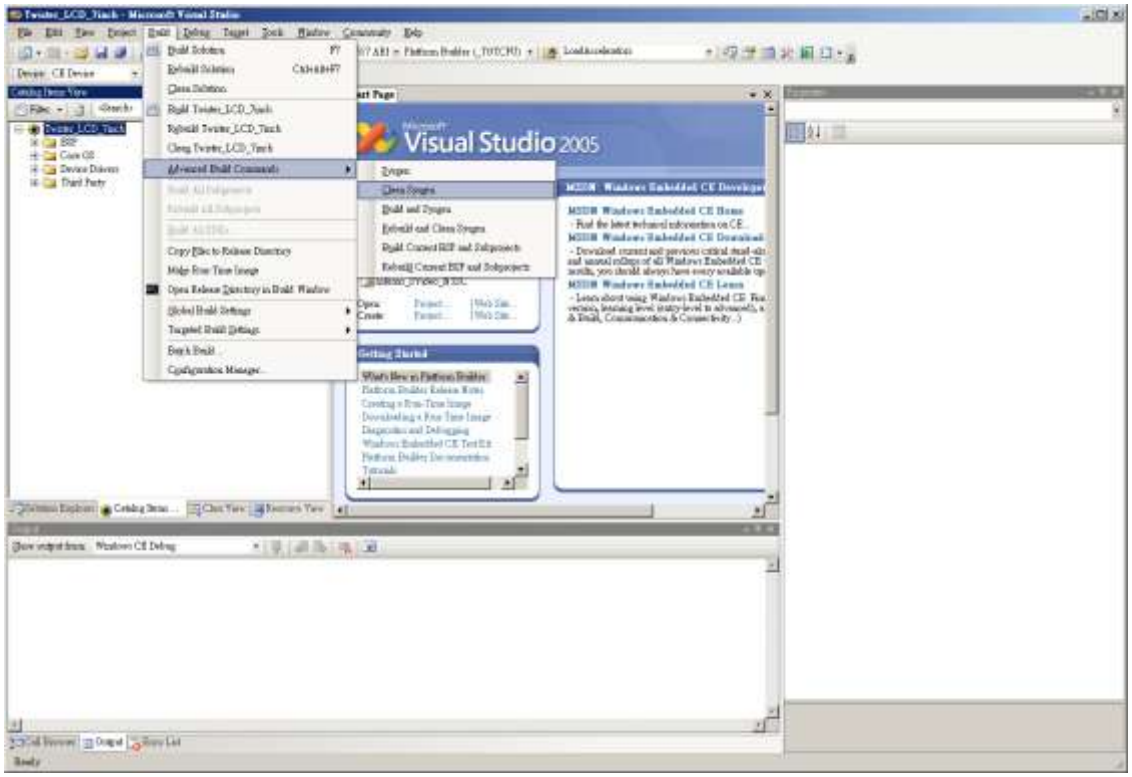


Figure 76

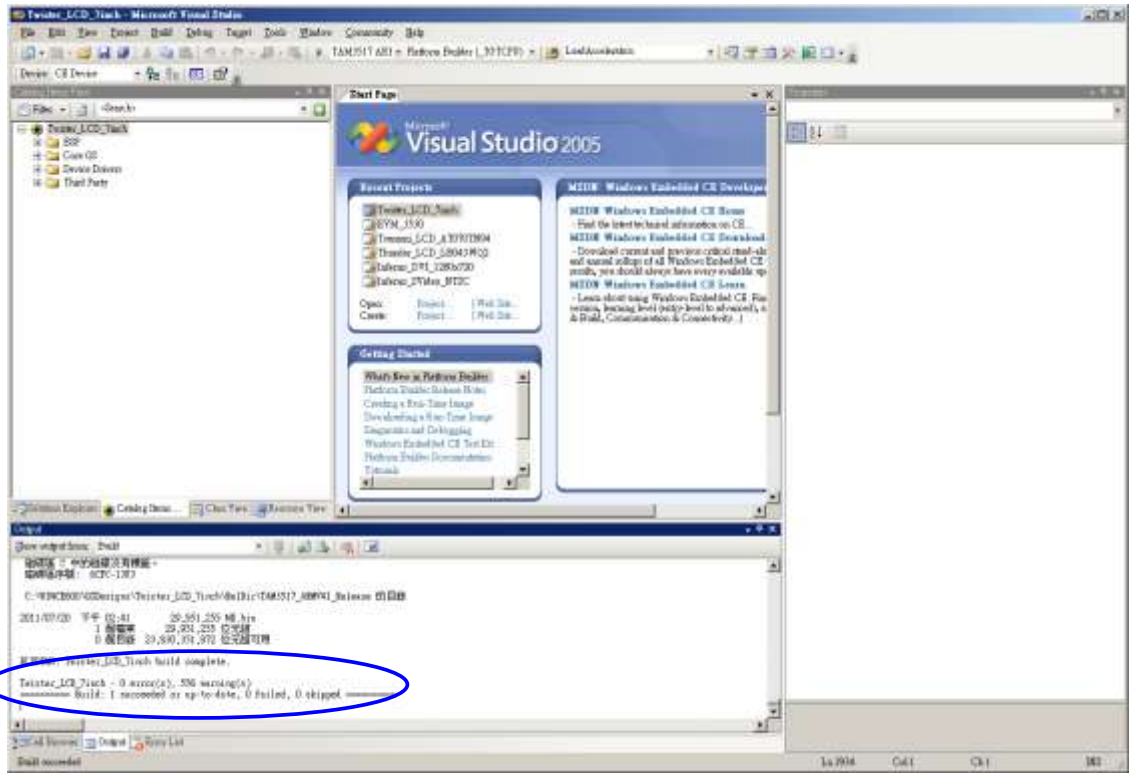


Figure 77

- 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 78)

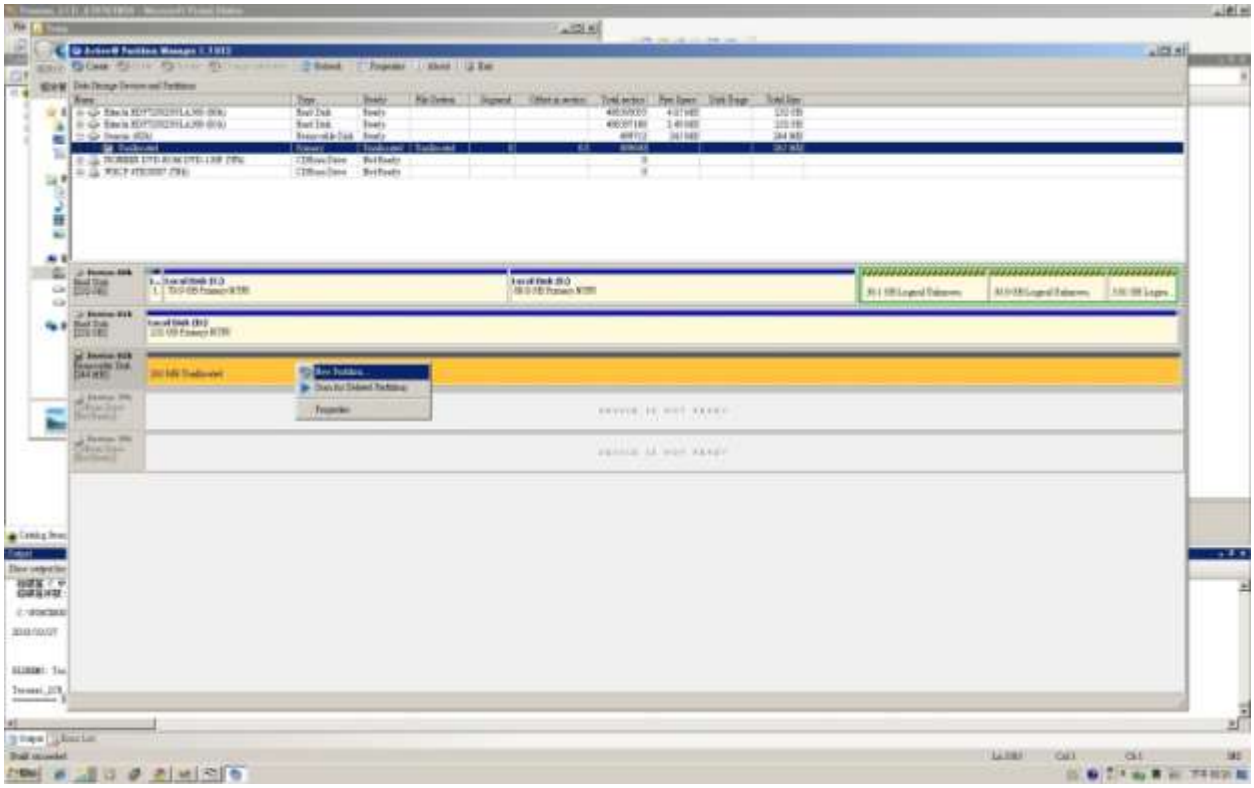


Figure 78

- In the menu mark "partition as active", press OK, it will then show "successful" (see Figure 79)

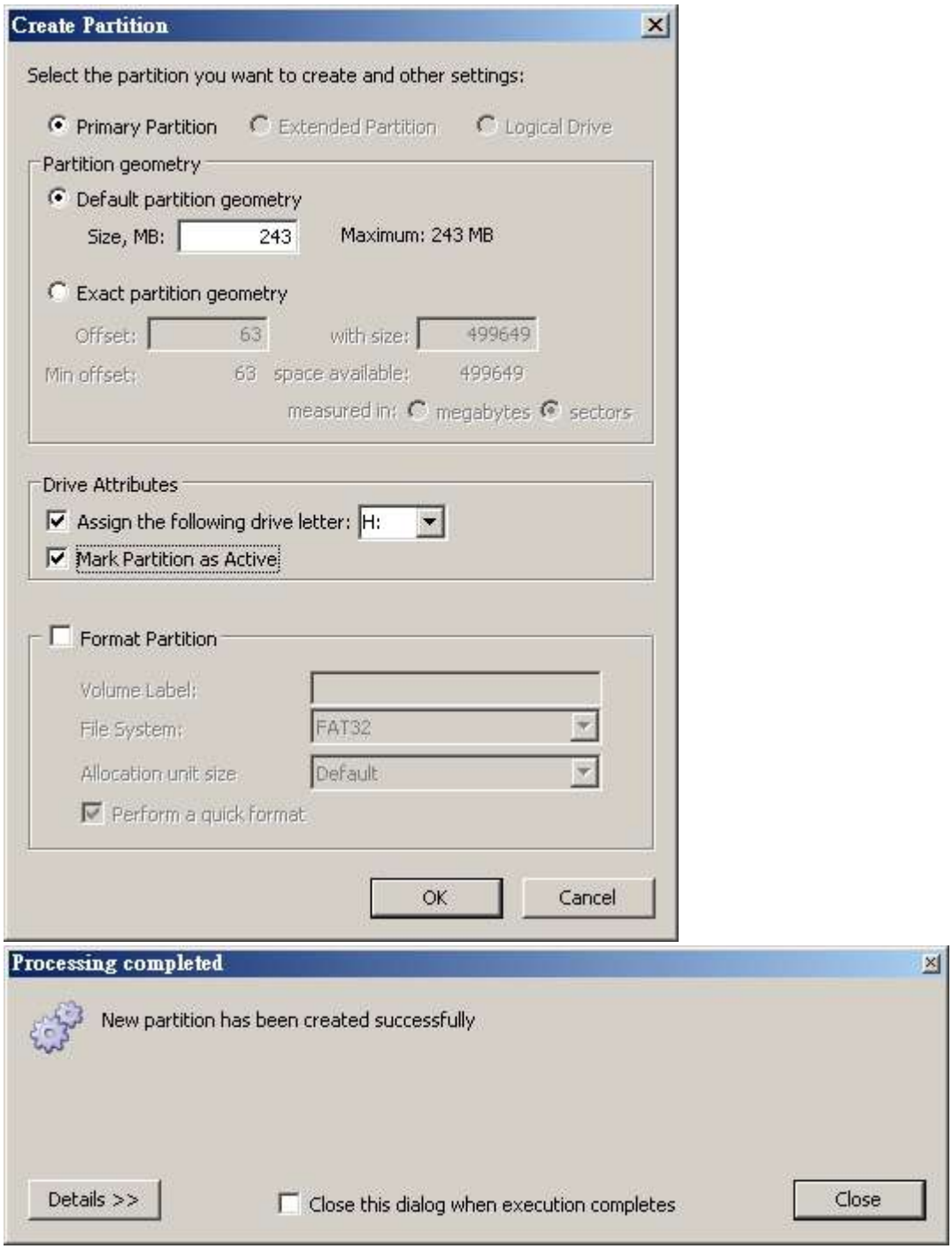


Figure 79

- Right click again and choose format, Click OK, finished (see Figure 80)

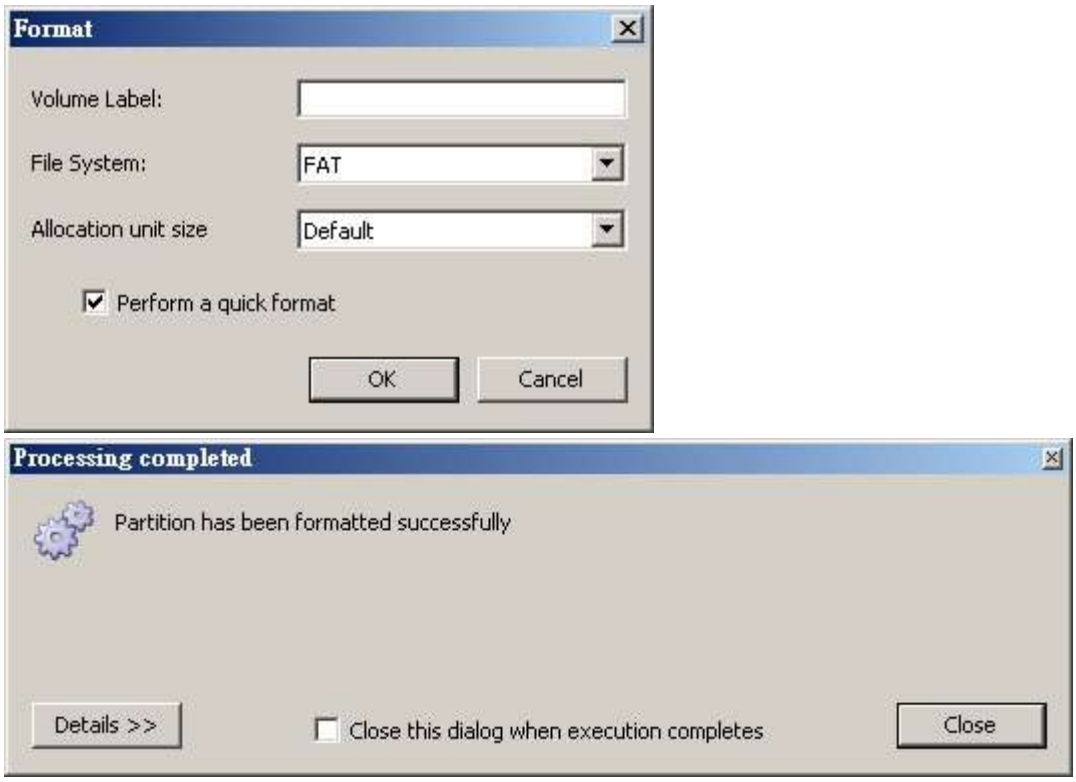


Figure 80

- Go to C:\WINCE600\OSDesigns\Twister_LCD_7inch" and open the folder "TAM_3517_ARMV4I_release" (See Figure 81). The folder contains files named: MLO, EBOOTSD.nb0, NK.bin
  (These files are needed for a bootable SD-card)

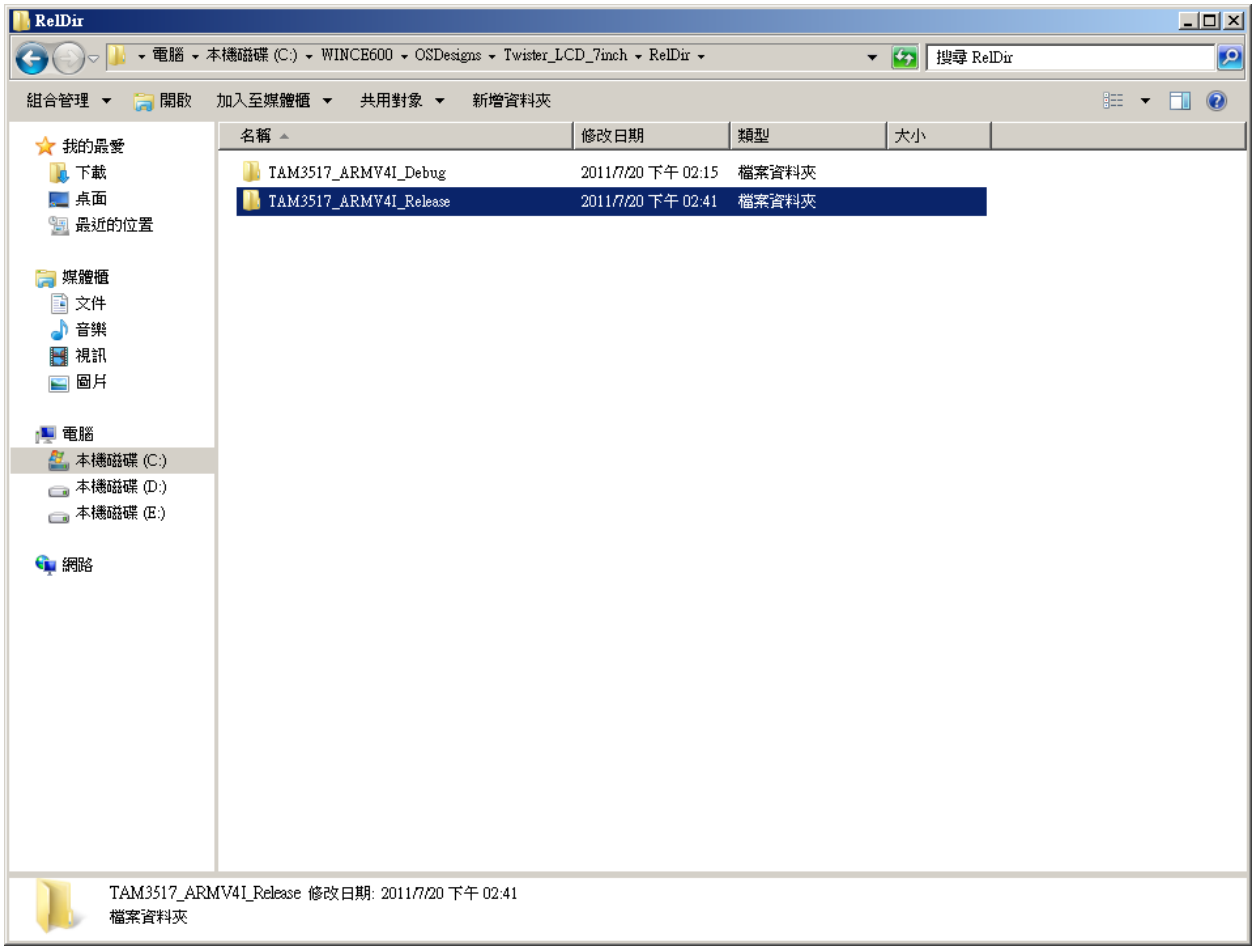


Figure 81

- First copy "MLO" to the microSD card (the order is important)
- Then copy "EBOOTSD.nb0" and "NK.bin" in the microSD card (See Figure 82)
- Remove the MicroSD card

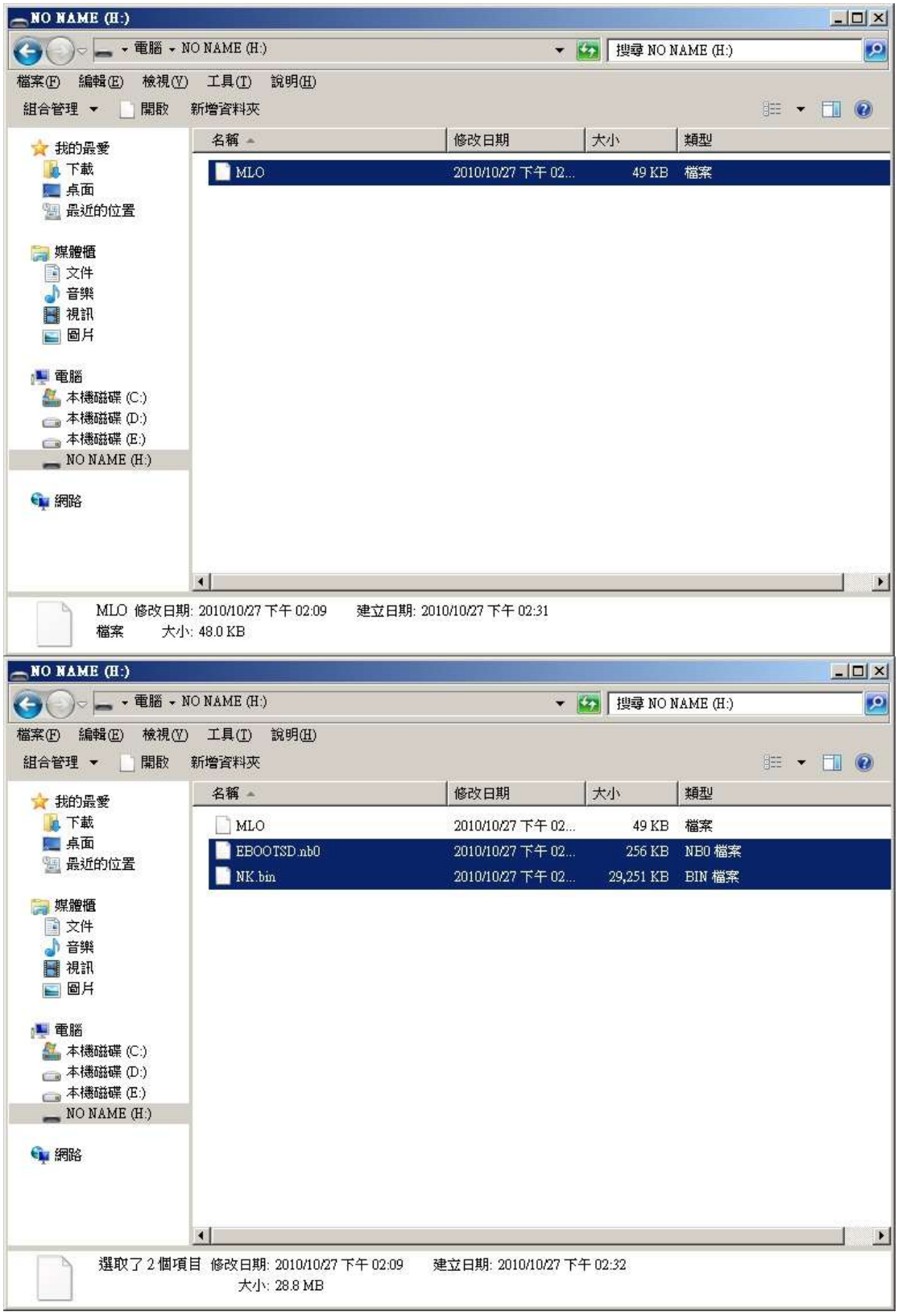

NO NAME (H:)
電腦 ▸ NO NAME (H:)
搜尋 NO NAME (H:)
檔案(F) 編輯(E) 檢視(V) 工具(T) 說明(H)
組合管理 開啟 新增資料夾
我的最愛
下載
桌面
最近的位置
媒體櫃
文件
音樂
視訊
圖片
電腦
本機磁碟 (C:)
本機磁碟 (D:)
本機磁碟 (E:)
NO NAME (H:)
網路
名稱 修改日期 大小 類型
MLO 2010/10/27 下午 02... 49 KB 檔案
MLO 修改日期: 2010/10/27 下午 02:09 建立日期: 2010/10/27 下午 02:31
檔案 大小: 48.0 KB
NO NAME (H:)
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 82

- 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
- Insert the power cable
- The baseboard 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 83)

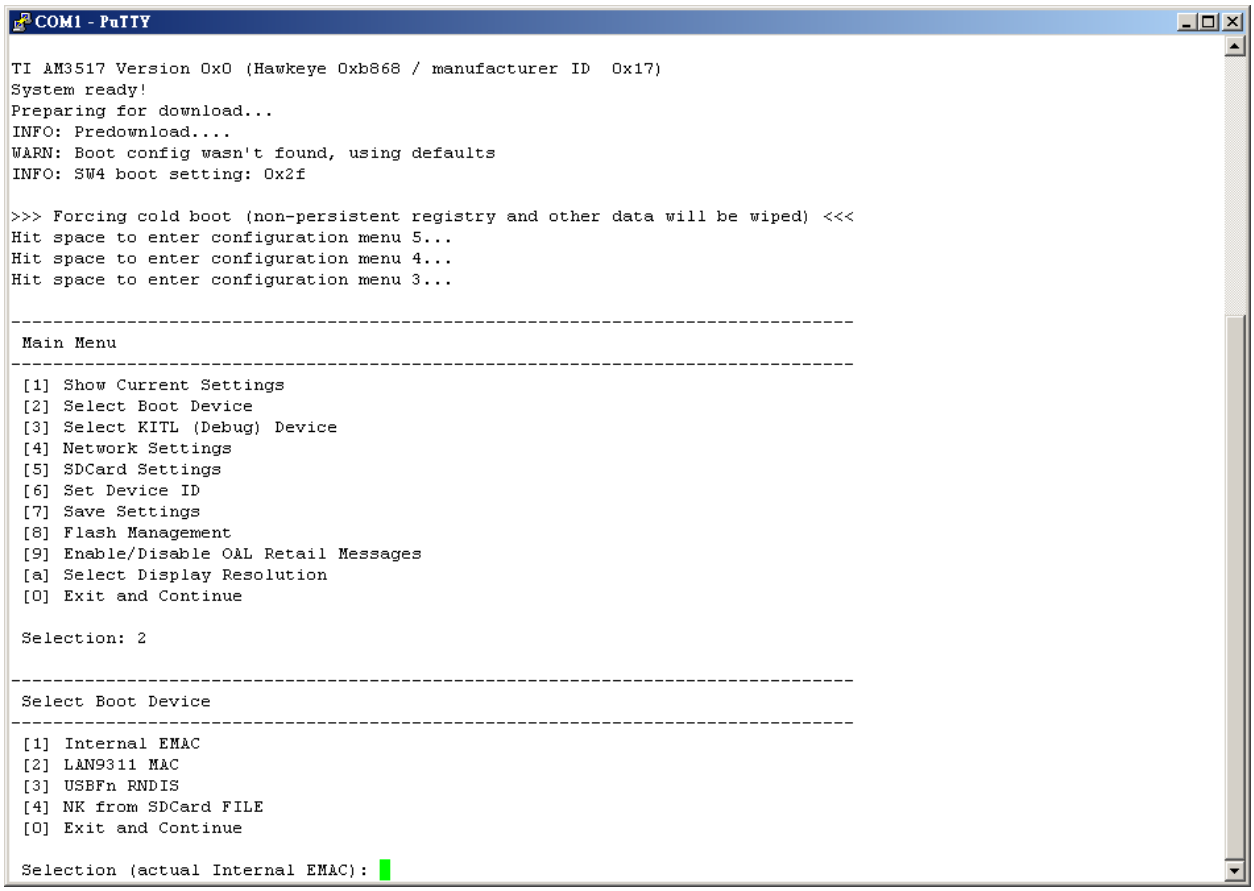


Figure 83

- Select NK from SD Card FILE (See Figure 84)

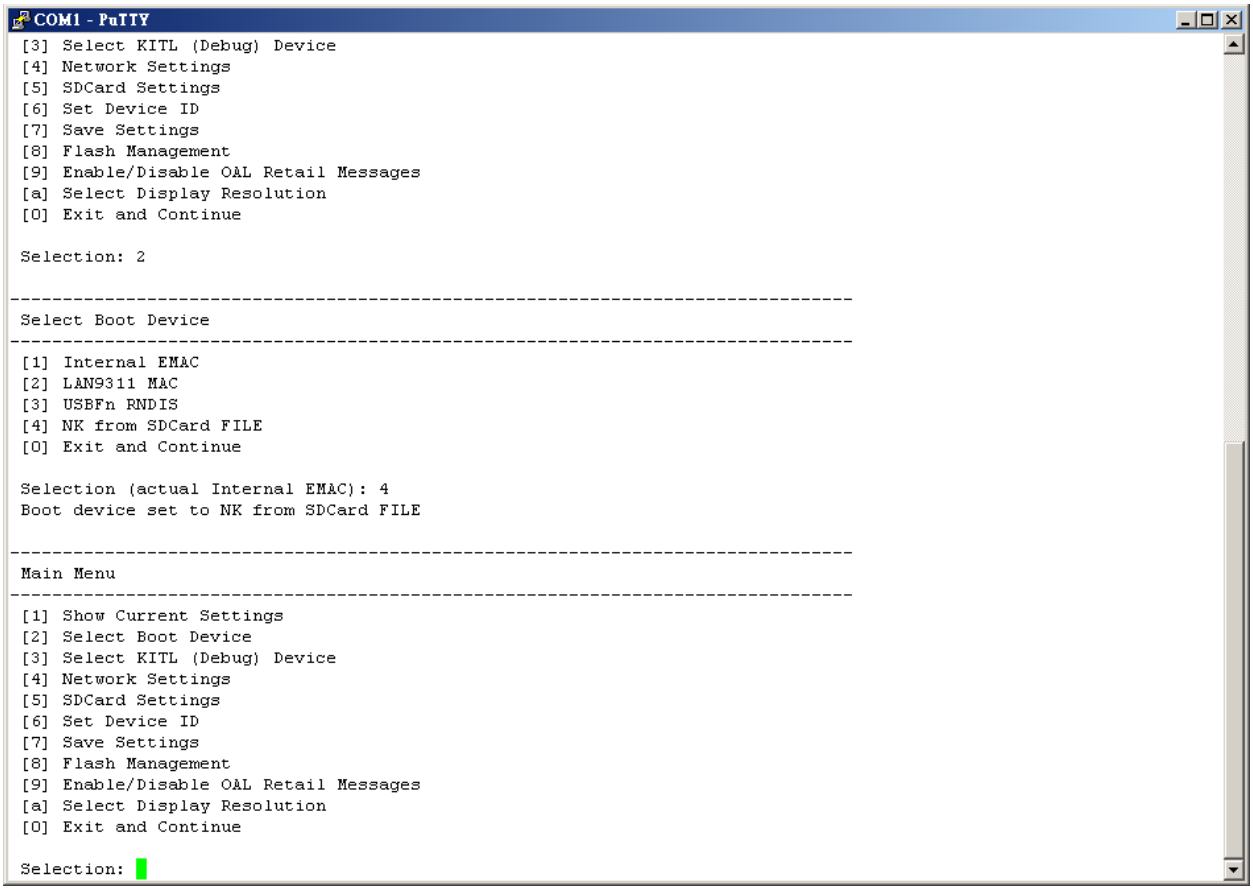


Figure 84

- Select Exit and Continue
- It will start to load the image into the memory (see Figure 85) and the base board will show Windows CE.
- FINISHED

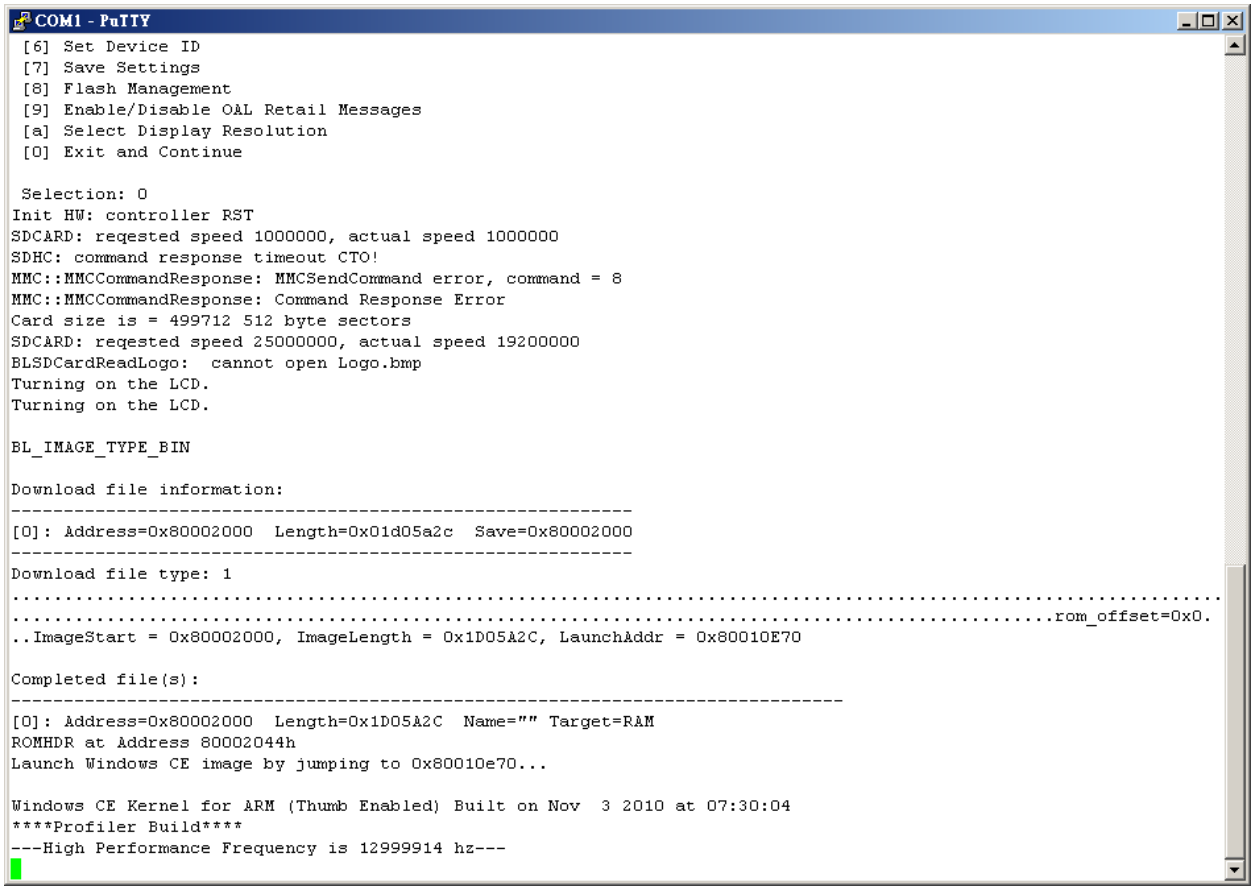

COM1 - PuTTY
[6] Set Device ID
[7] Save Settings
[8] Flash Management
[9] Enable/Disable OAL Retail Messages
[a] Select Display Resolution
[0] Exit and Continue
Selection: 0
Init HW: controller RST
SDCARD: reqested speed 1000000, actual speed 1000000
SDHC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
Card size is = 499712 512 byte sectors
SDCARD: reqested speed 25000000, actual speed 19200000
BLSDCardReadLogo: cannot open Logo.bmp
Turning on the LCD.
Turning on the LCD.
BL_IMAGE_TYPE_BIN
Download file information:
[0]: Address=0x80002000 Length=0x01d05a2c Save=0x80002000
Download file type: 1
rom_offset=0x0.
..ImageStart = 0x80002000, ImageLength = 0x1D05A2C, LaunchAddr = 0x80010E70
Completed file(s):
[0]: Address=0x80002000 Length=0x1D05A2C Name="" Target=RAM
ROMHDR at Address 80002044h
Launch Windows CE image by jumping to 0x80010e70...
Windows CE Kernel for ARM (Thumb Enabled) Built on Nov 3 2010 at 07:30:04
****Profiler Build****
---High Performance Frequency is 12999914 hz---

Figure 85

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 make a SD-card that will put the image in the NAND Flash so you can boot without the SD card.

12.5.1 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\TAM3517_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).
- First copy only the "MLO" file to the SD card. (the order is important) See Figure 86)
- Then copy "EBOOTSD.nb0", "fldr.raw" or "fldrlogo.raw" and "nk.nb0" files to the SD card. (see Figure 87)
- 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. 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 88)

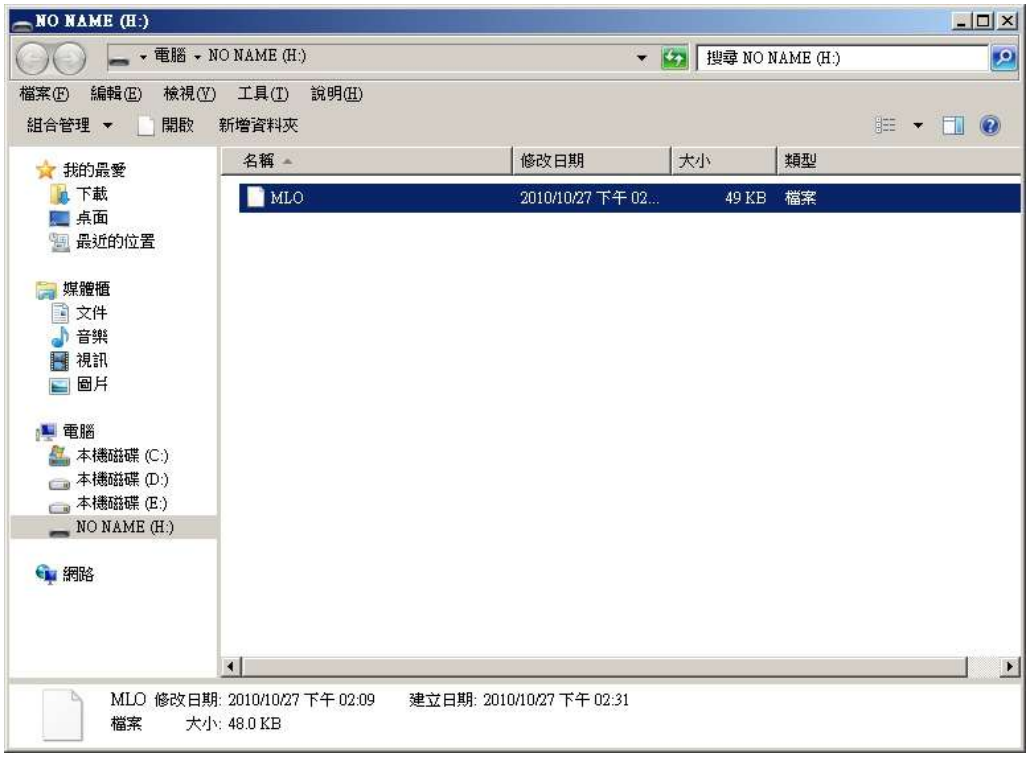


Figure 86

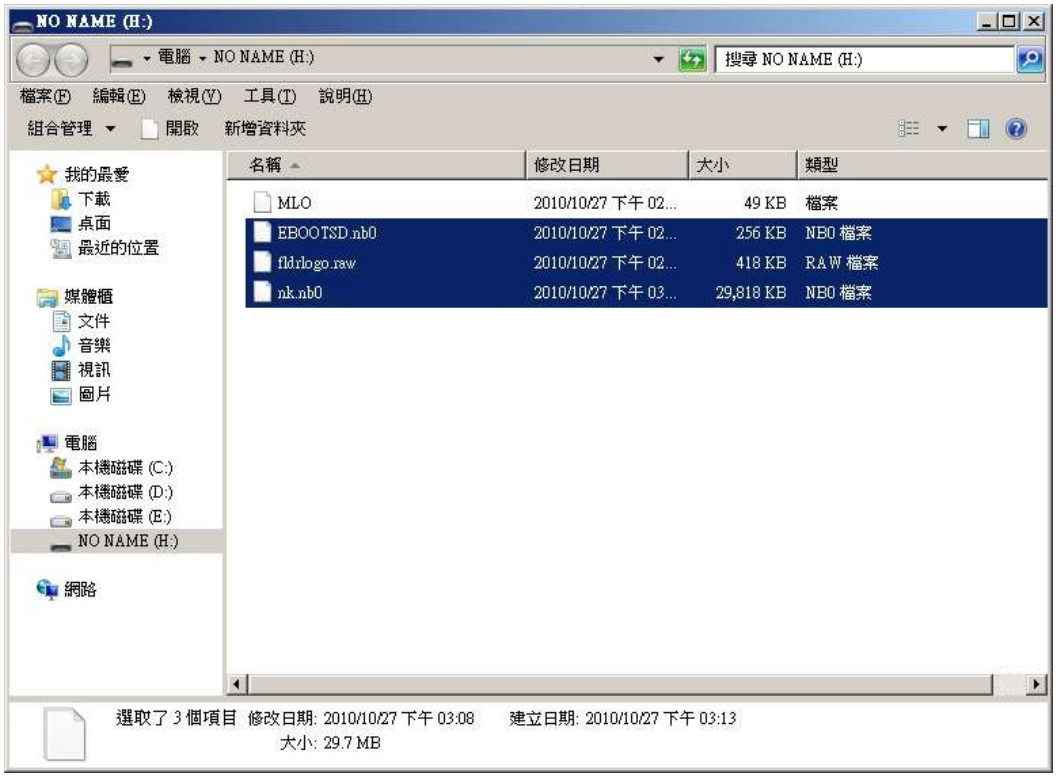


Figure 87

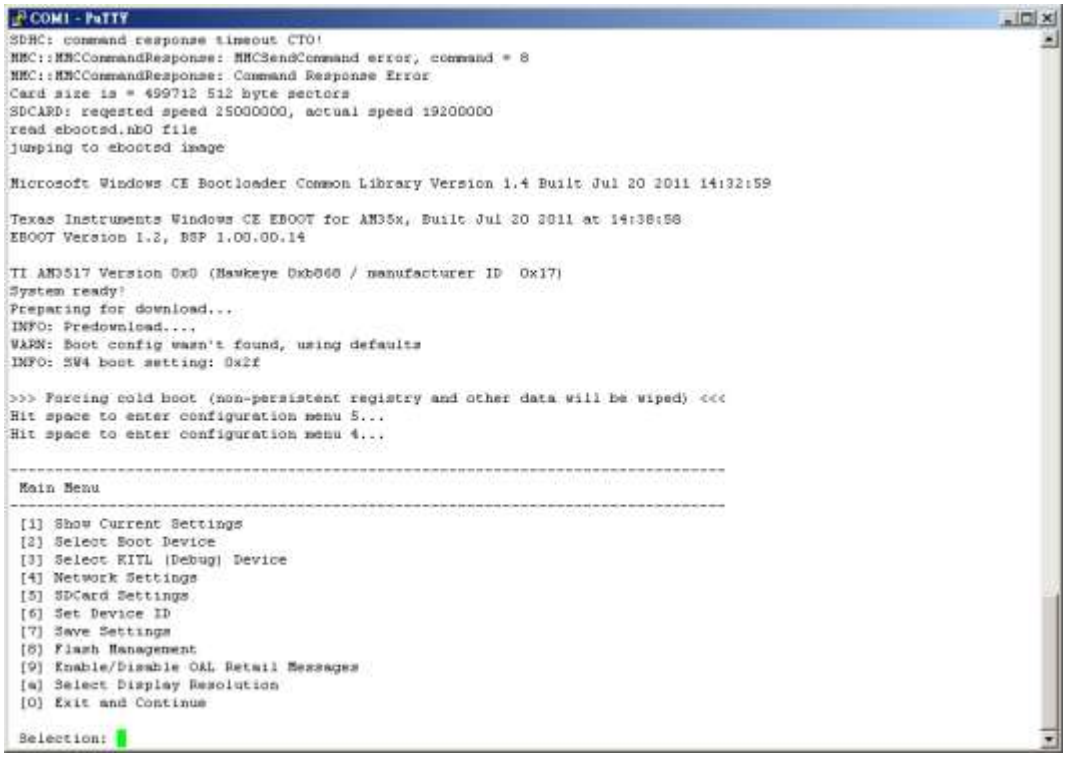

COM1 - PuTTY
SDHC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
Card size is = 499712 512 byte sectors
SDCARD: reqested speed 25000000, actual speed 19200000
read ebootsd.nb0 file
jumping to ebootsd image
Microsoft Windows CE Bootloader Common Library Version 1.4 Built Jul 20 2011 14:32:59
Texas Instruments Windows CE EBOOT for AM35x, Built Jul 20 2011 at 14:38:58
EBOOT Version 1.2, BSP 1.00.00.14
TI AM3517 Version 0x0 (Hawkeye 0xb868 / manufacturer ID 0x17)
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...
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
[a] Select Display Resolution
[0] Exit and Continue
Selection:

Figure 88

- Chose "Flash Management". (See Figure 89)

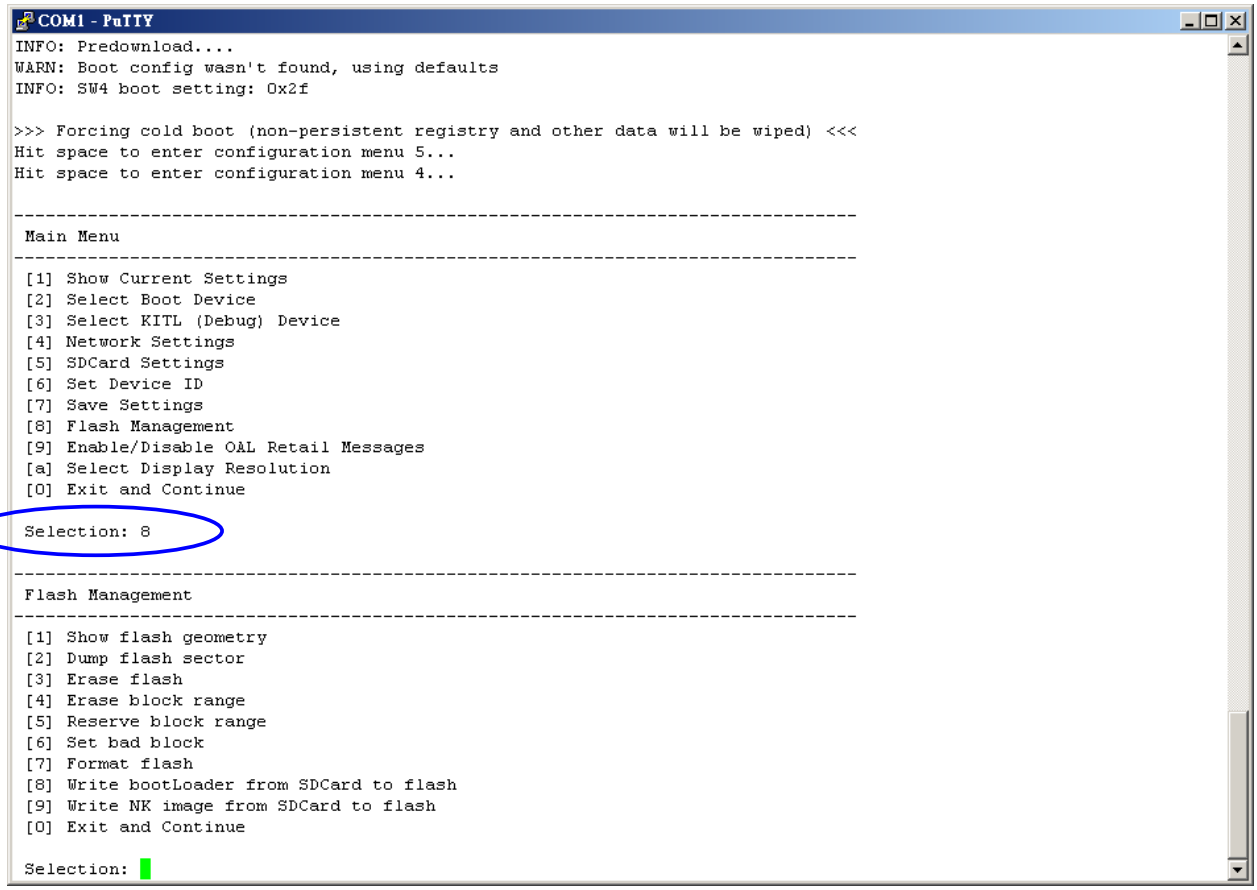


Figure 89

- Chose "Show flash geometry". (See Figure 90)
- It will show:

  Flash Type: NAND
  Blocks: 4096
  Bytes/block: 131072
  Sectors/block: 64
  Bytes/sector: 2048

- Chose "Erase block range". (See Figure 91)
- It will show "First Block Number:" Input "0". Then enter.
- It will show "Last Block Number:" Input "(Blocks – 1)". For example "4096-1=4095", so type 4095 then enter.
- It will show "Do you want erase block 0-4095 [-/y]?" Input "y" (See Figure 92) (You might need to repeat this step, until all blocks are erased)

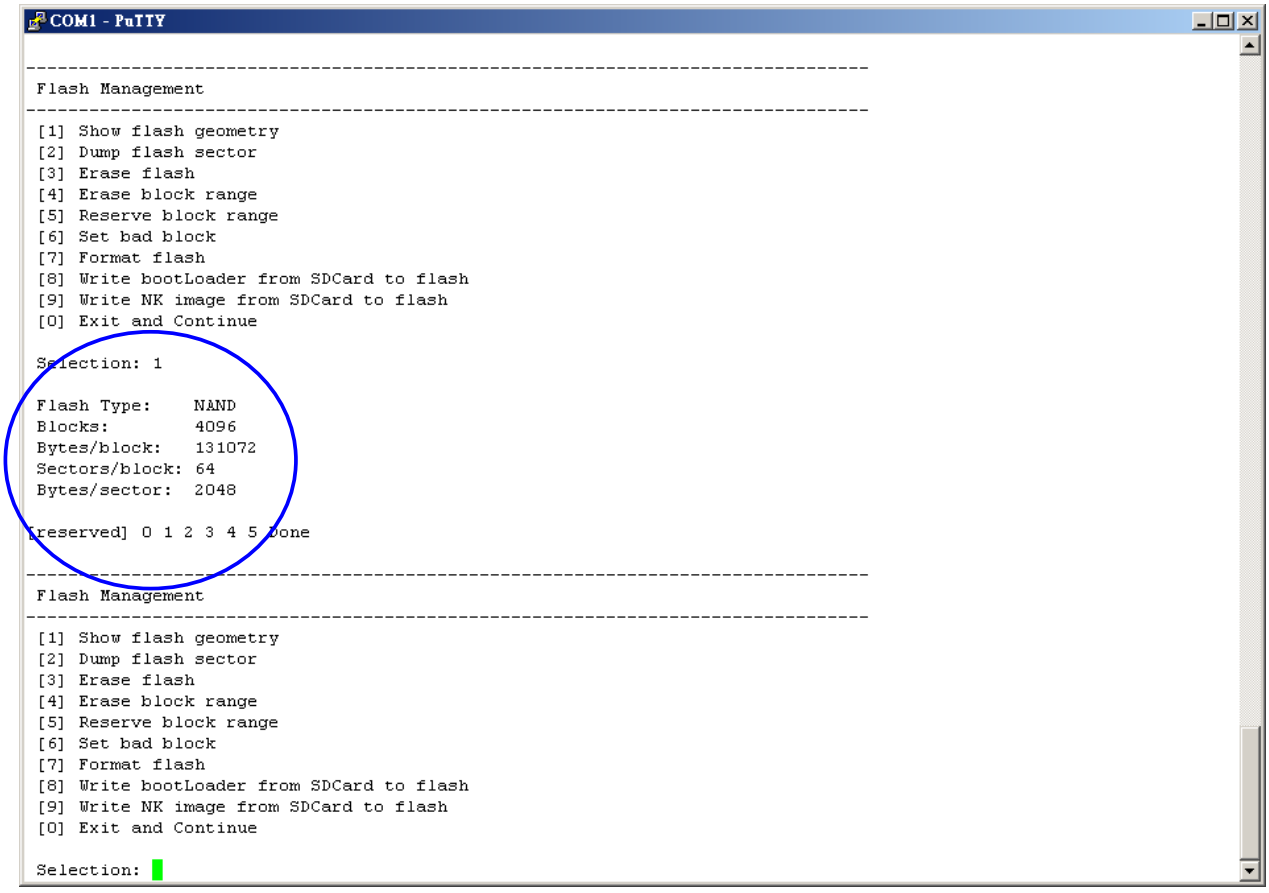


Figure 90

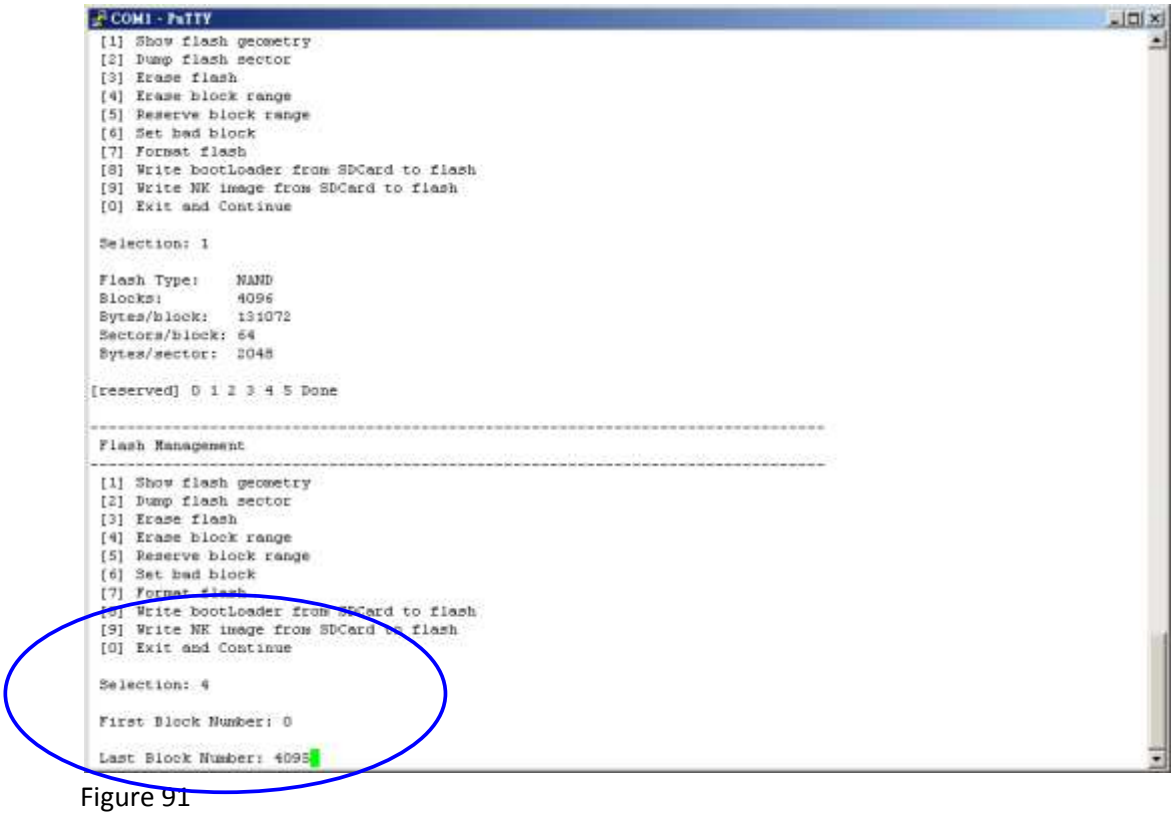


Figure 91

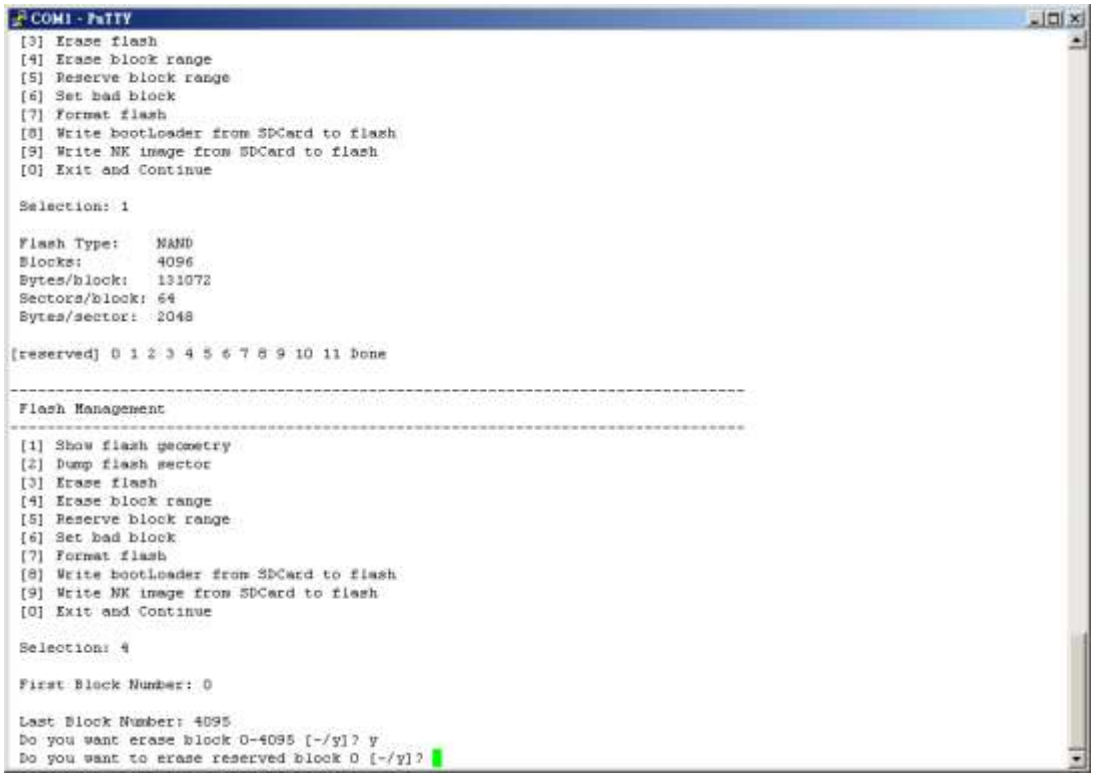


Figure 92

- Chose "Write Bootloader from SD-Card to flash". (See Figure 93)
- It will show "Do you want to write Bootloader to flash [-/y]?" Input "y"
- Then it will show "Bootloader Image written". (See Figure 94)

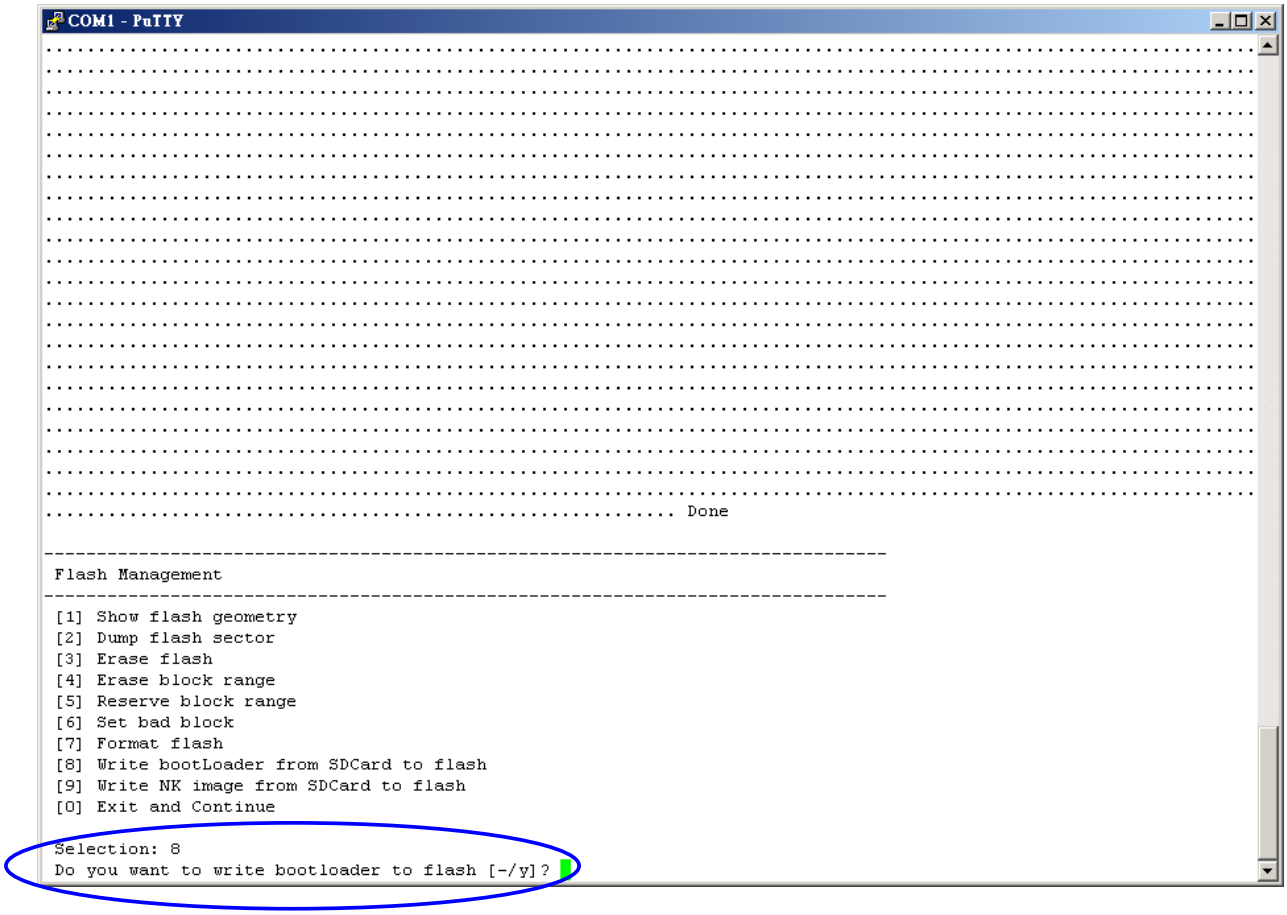


Figure 93

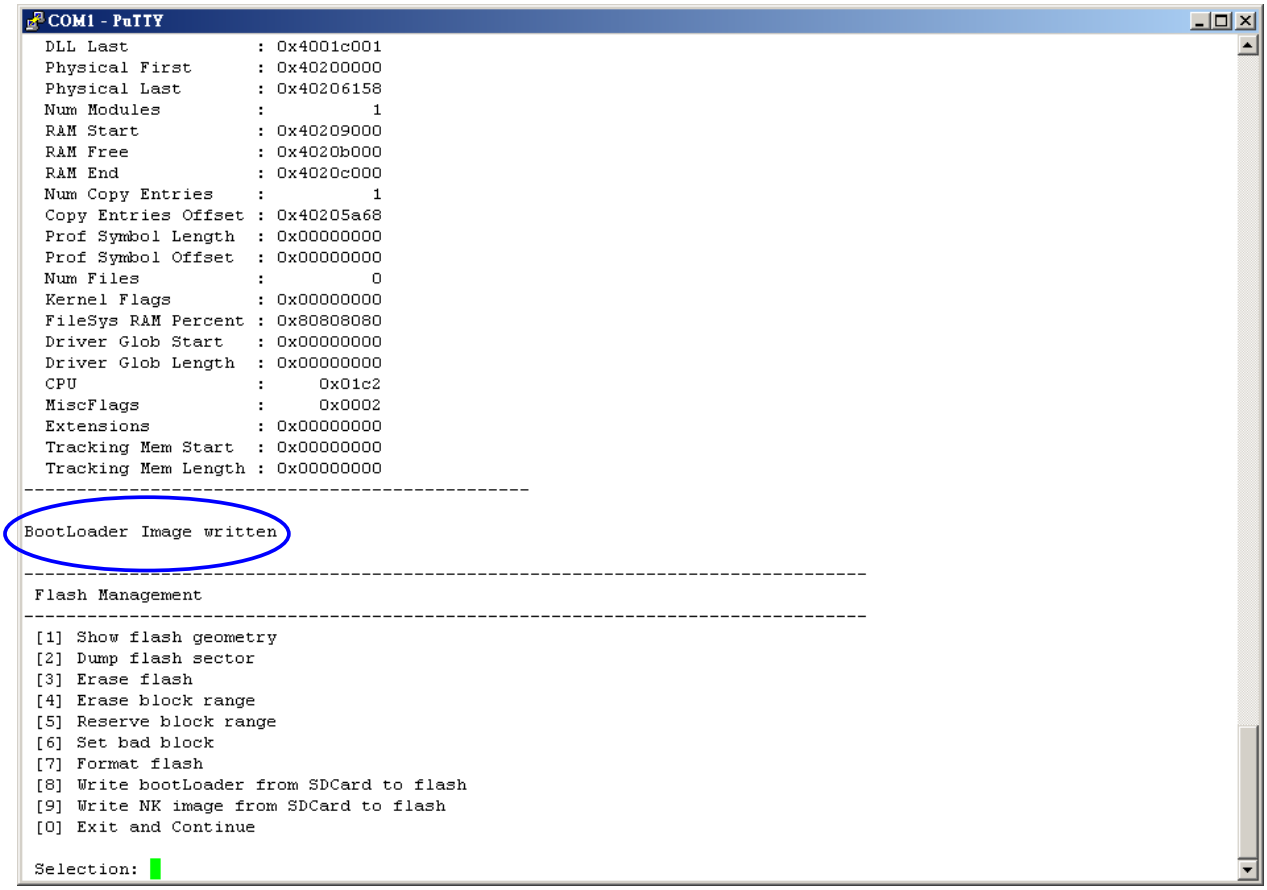

COM1 - PuTTY
DLL Last : 0x4001c001
Physical First : 0x40200000
Physical Last : 0x40206158
Num Modules : 1
RAM Start : 0x40209000
RAM Free : 0x4020b000
RAM End : 0x4020c000
Num Copy Entries : 1
Copy Entries Offset : 0x40205a68
Prof Symbol Length : 0x00000000
Prof Symbol Offset : 0x00000000
Num Files : 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 94

- Take the microSD card out of the Baseboard.
- Reboot from NAND Flash by pushing the reset button on the baseboard (See Figure 95)

- It will make a partition and format and then show "Flash format complete!"

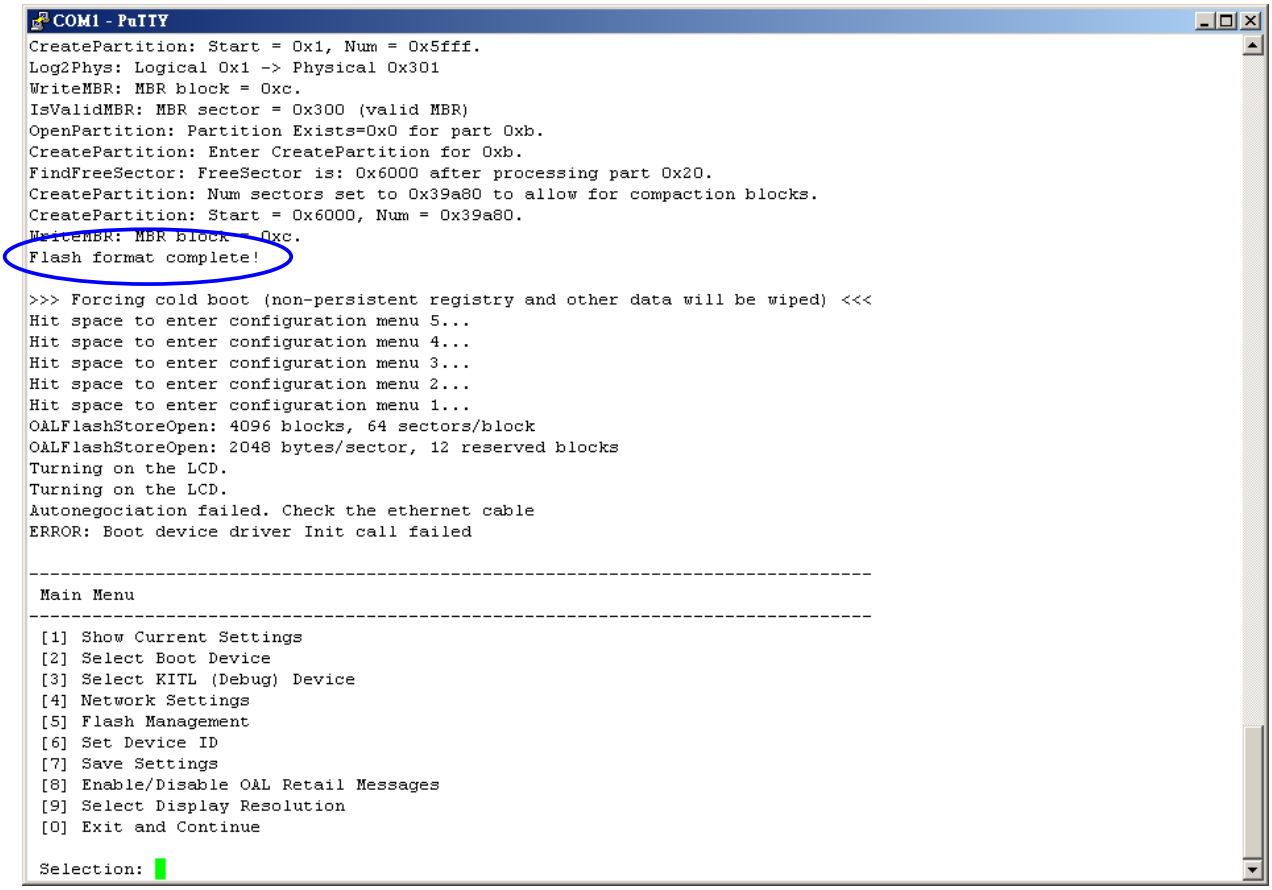


Figure 95

- Put the microSD card back into the baseboard. Unplug the power and insert the power again (=reboot from SD Card) (See Figure 96), or push the reset button.
- When it shows "Hit space to enter configuration menu". Please push space button on the keyboard.

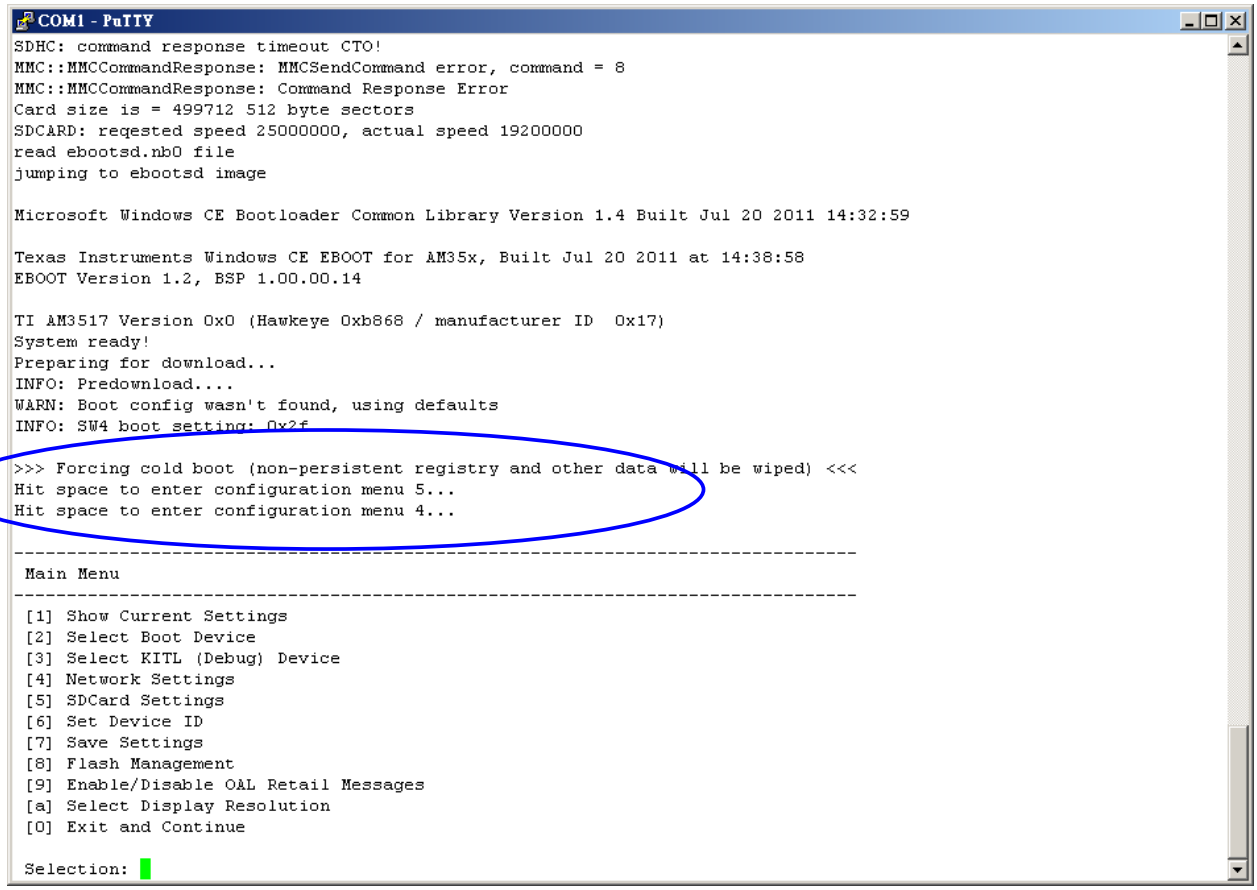

COM1 - PuTTY
SDHC: command response timeout CTO!
MMC::MMCCommandResponse: MMCSendCommand error, command = 8
MMC::MMCCommandResponse: Command Response Error
Card size is = 499712 512 byte sectors
SDCARD: reqested speed 25000000, actual speed 19200000
read ebootsd.nb0 file
jumping to ebootsd image
Microsoft Windows CE Bootloader Common Library Version 1.4 Built Jul 20 2011 14:32:59
Texas Instruments Windows CE EBOOT for AM35x, Built Jul 20 2011 at 14:38:58
EBOOT Version 1.2, BSP 1.00.00.14
TI AM3517 Version 0x0 (Hawkeye 0xb868 / manufacturer ID 0x17)
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...
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
[a] Select Display Resolution
[0] Exit and Continue
Selection:

Figure 96

- Chose "Flash Management". (See Figure 97)
- Chose "Write NK image from SD-Card to flash". (See Figure 97)
- It will show "Do you want to write NK image to flash [-/y]?" Input "y".
- Wait until it will show "NK image written". (See Figure 98)

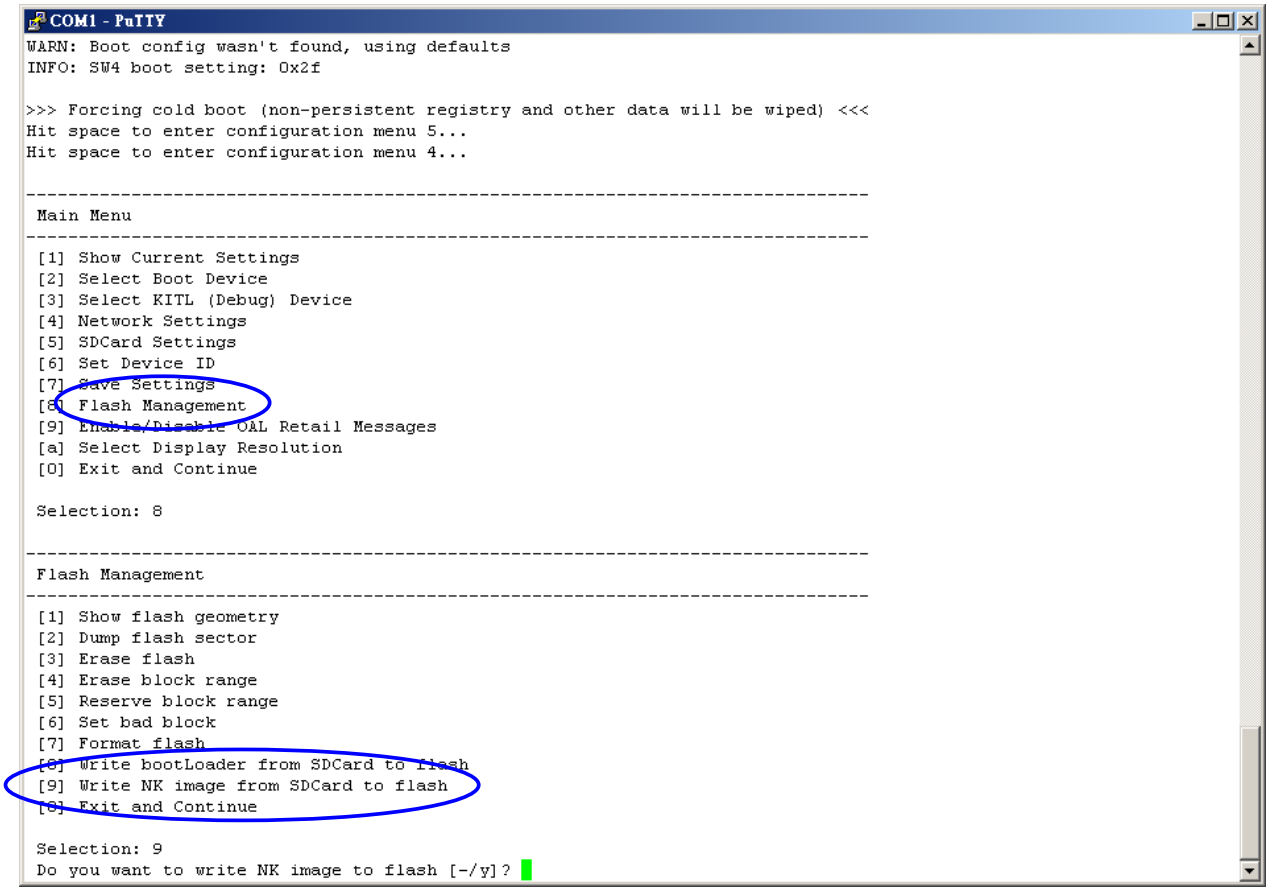


Figure 97

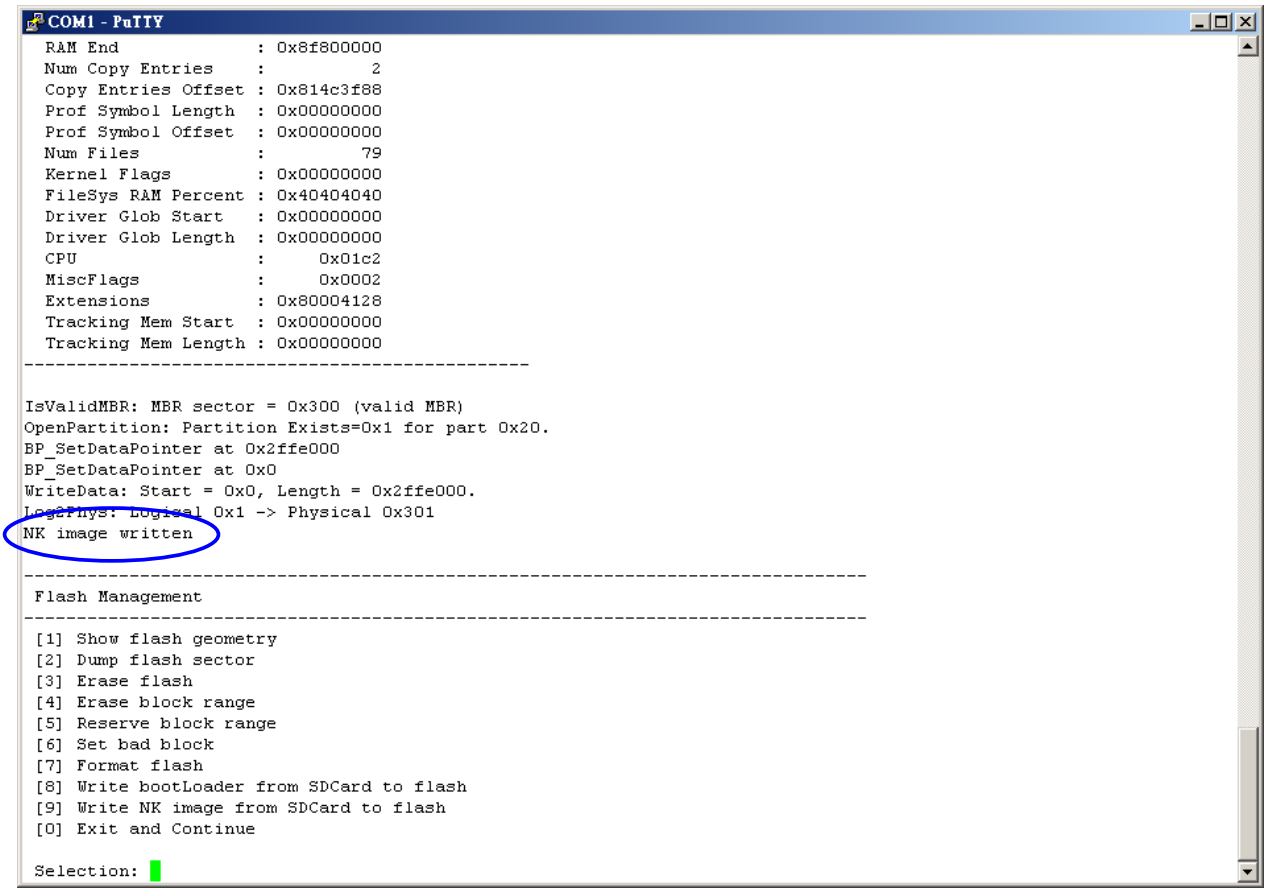

COM1 - PuTTY
RAM End : 0x8f800000
Num Copy Entries : 2
Copy Entries Offset : 0x814c3f88
Prof Symbol Length : 0x00000000
Prof Symbol Offset : 0x00000000
Num Files : 79
Kernel Flags : 0x00000000
FileSys RAM Percent : 0x40404040
Driver Glob Start : 0x00000000
Driver Glob Length : 0x00000000
CPU : 0x01c2
MiscFlags : 0x0002
Extensions : 0x80004128
Tracking Mem Start : 0x00000000
Tracking Mem Length : 0x00000000
IsValidMBR: MBR sector = 0x300 (valid MBR)
OpenPartition: Partition Exists=0x1 for part 0x20.
BP_SetDataPointer at 0x2ffe000
BP_SetDataPointer at 0x0
WriteData: Start = 0x0, Length = 0x2ffe000.
Log2Phys: Logical 0x1 -> Physical 0x301
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 98

12.5.2 Boot from NAND flash.

- Take the MicroSD Card out of 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 99)

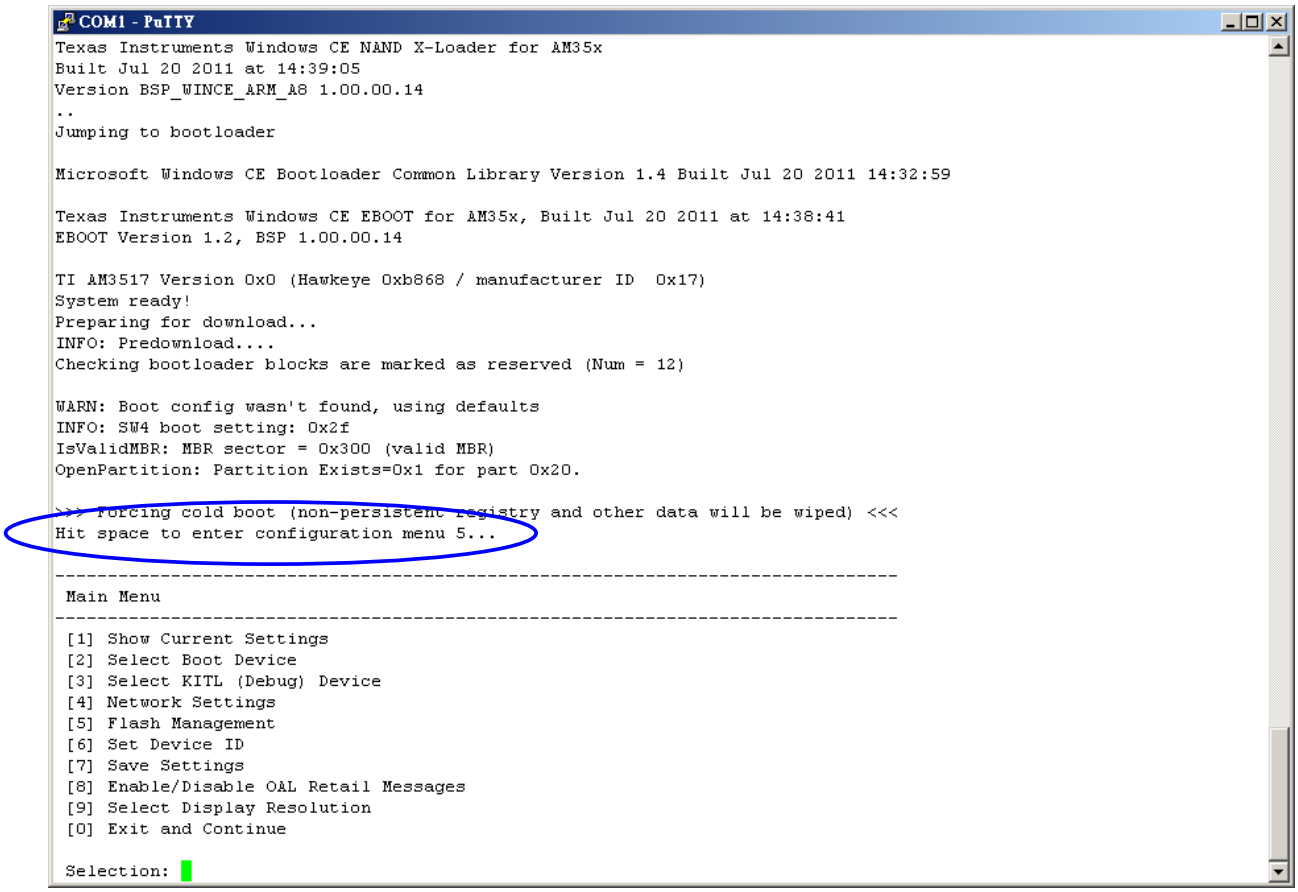


Figure 99

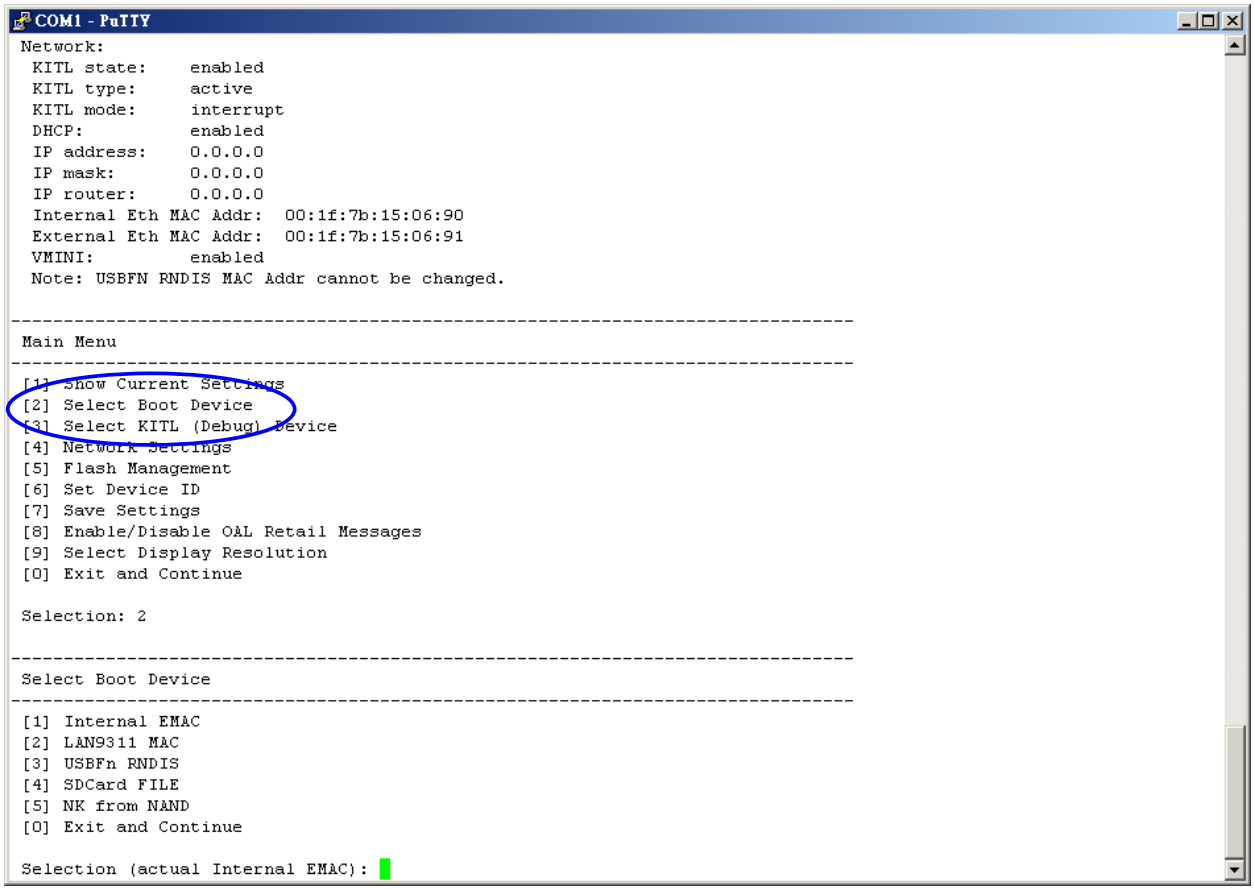


Figure 100: Chose "Select Boot Device".

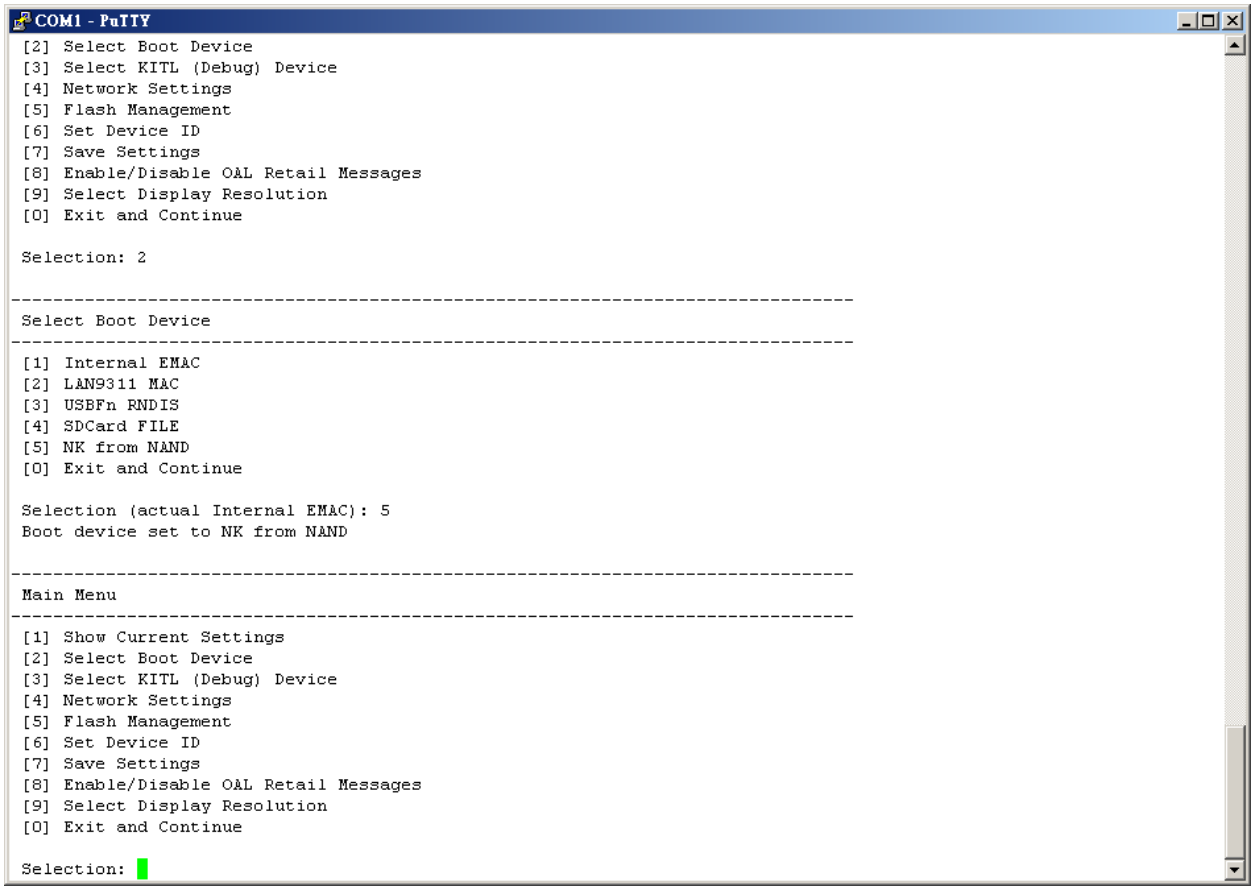


Figure 101: Then chose "NK from NAND"

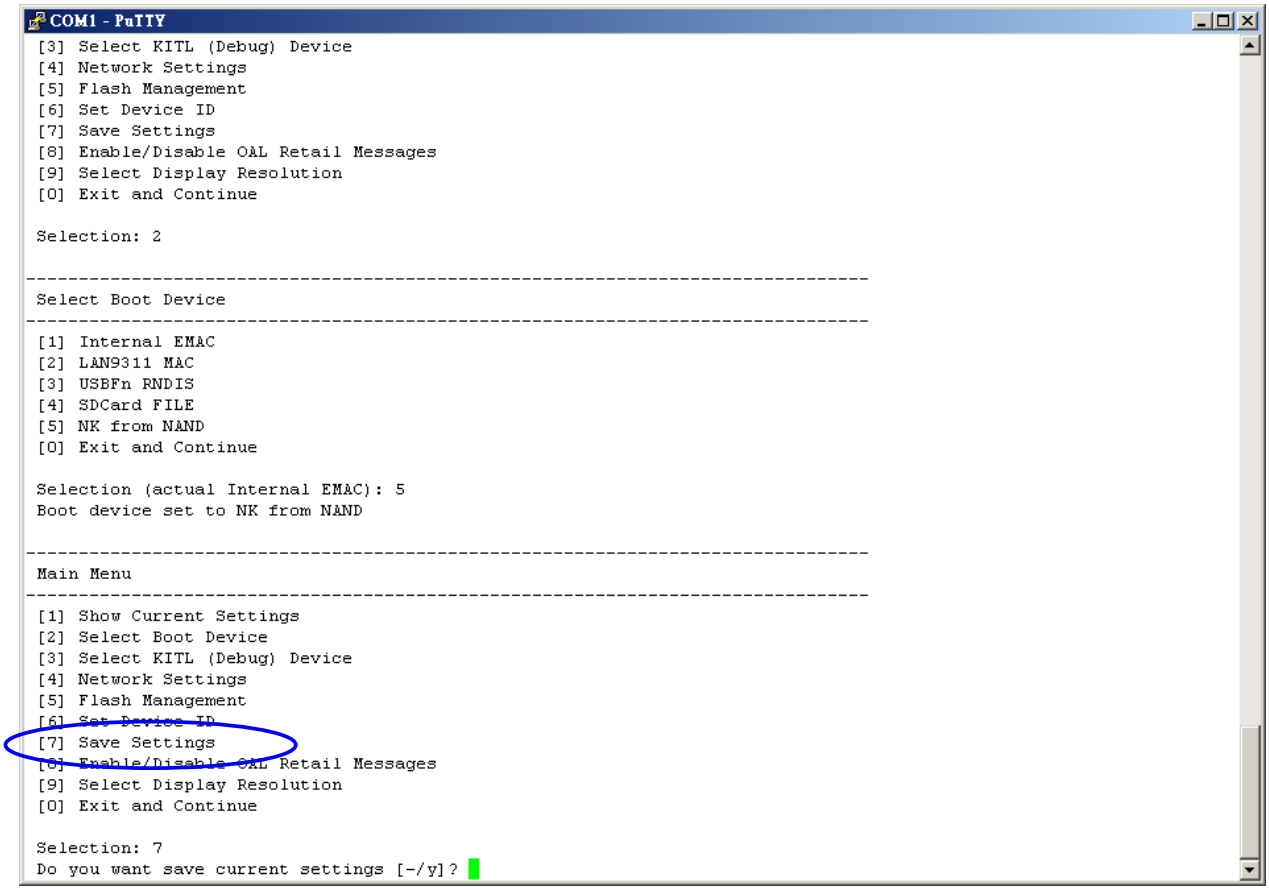


Figure 102：Select save settings

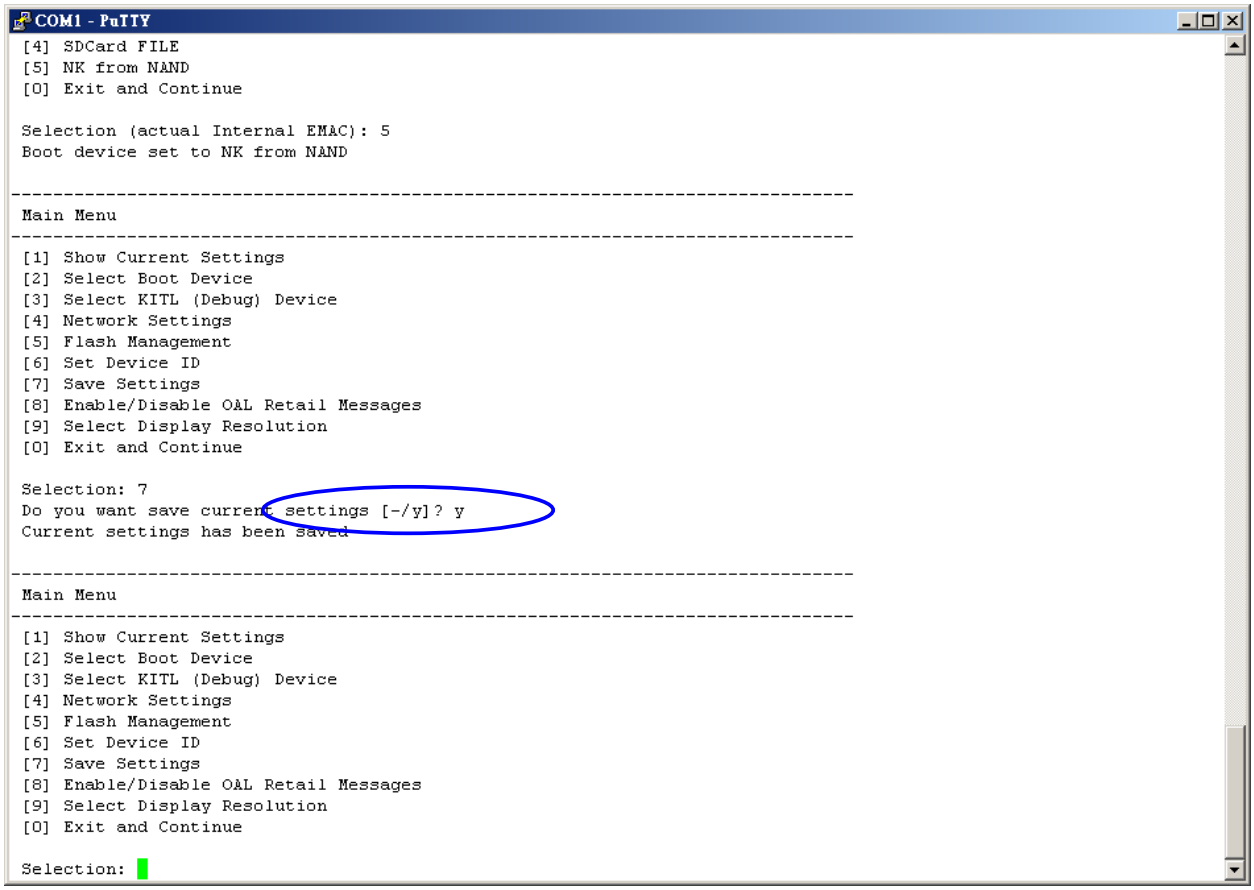


Figure 103 : Confirm selection "y"

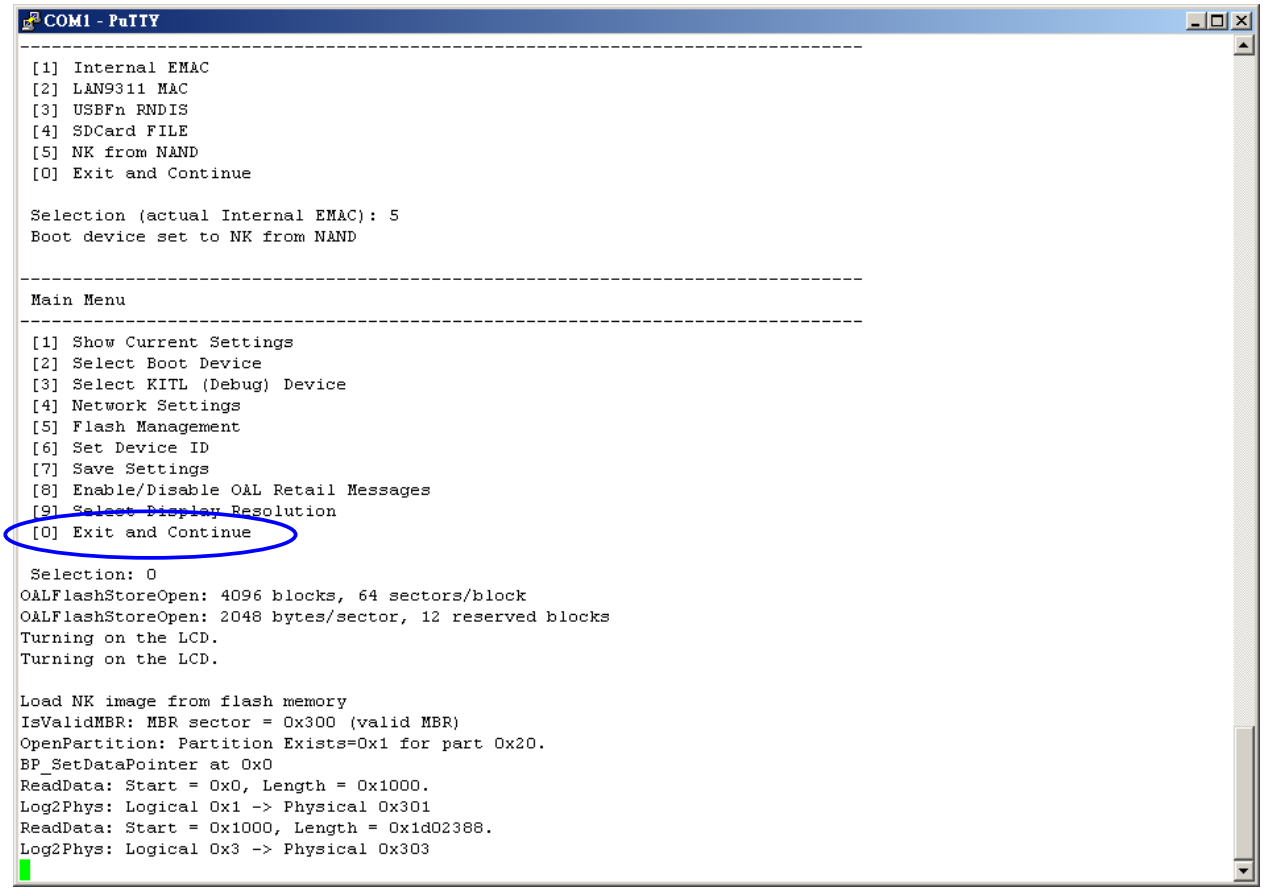


Figure 104: Chose "Exit and Continue".

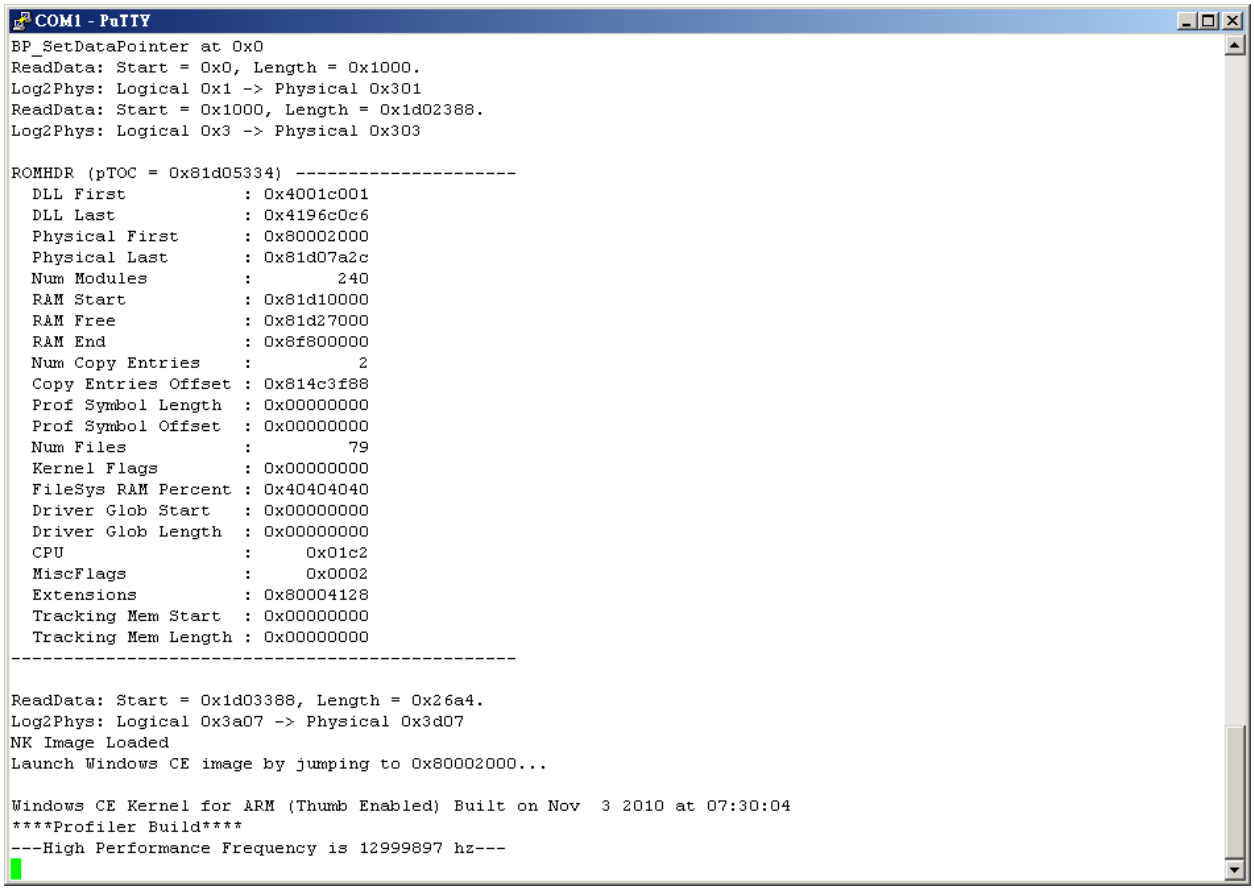


Figure 105: Now it will start booting WinCE.

- FINISHED.

12.6 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 the "write bootloader and OS in NAND paragraph" 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.

12.6.1 Preparing the BMP

- You will need to prepare a BMP with your logo. However the logo needs to be flipped vertical (see Figure 106)

Figure 106

- This can be done with for instance Photoshop (Use: edit \ transform \ flip vertical)
- Place the flipped BMP at the following directory: C:\WINCE600\PLATFORM\TAM3517\FILES
- The final result on your display will be as below (see Figure 107)

Figure 107

12.6.2 Change the makefile.inc

- Open a text editor (for instance Notepad)
- Open makefile.inc, which is in the directory: C:\WINCE600\PLATFORM\TAM3517\SRC\BOOT\XLDR\NAND
- Change the orange part in the following line with the name of your BMP:
  Copy /b $(_TGT)\TIEVM3517-nand.raw + $(_FILES)\TechNexion.bmp $(_TGT)\TIEVM3517-nand-logo.raw
- Save makefile.inc in the same directory

12.6.3 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 is800x480 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 108)

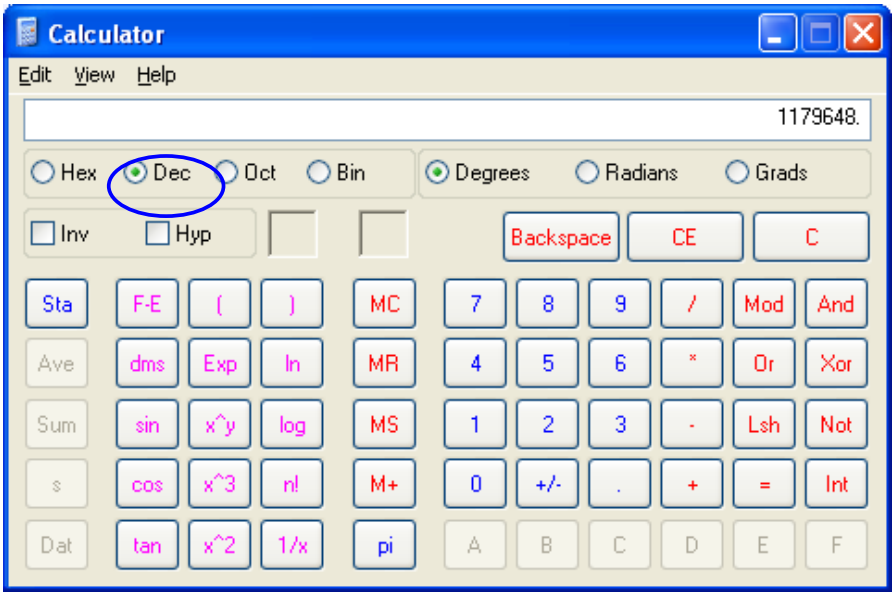


Figure 108

- The outcome in Hexadecimal will be 120000 (See Figure 109)

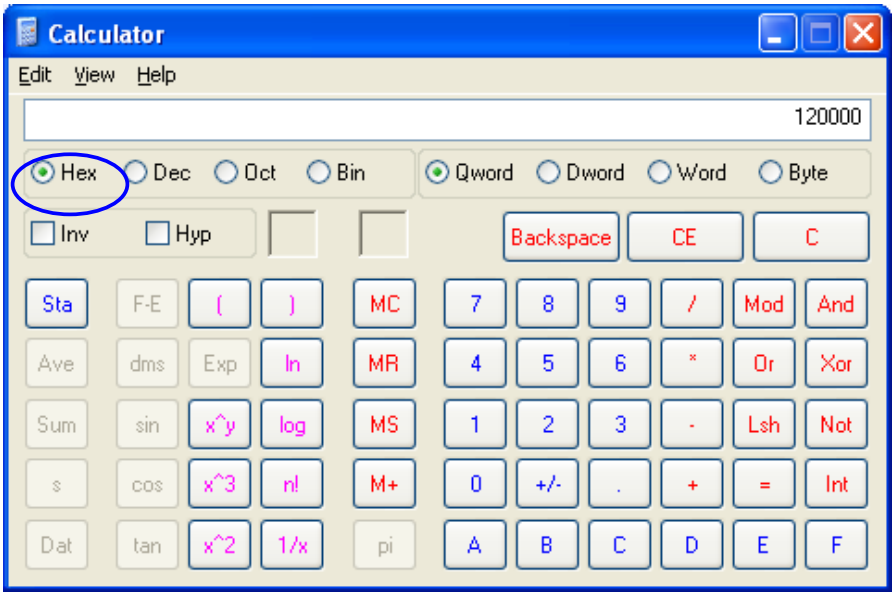


Figure 109

12.6.4 Change image-cfg.h

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

C:\WINCE600\PLATFORM\TAM3517\SRC\INC

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

#define IMAGE_BOOTLOADER_BITMAP_SIZE 0x00120000

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

12.6.5 Compile

- Open Microsoft Visual Studio 2005
- Open your project (For example: Twister_LCD_7inch)
- Use the menu: Build\advanced build commands\clean sysgen
- You will now find a fldrlogo.raw in the following directory:

C:\WINCE600\OSdesigns\Twister_LCD_7inch\RelDir\TAm3517_ARMV4I_Release

12.6.6 Put in NAND

- Follow all the instructions in the "write bootloader and OS in NAND paragraph"
- Finished.

12.7 How to - Install applications in windows CE

12.7.1 What to do with CAB-files?

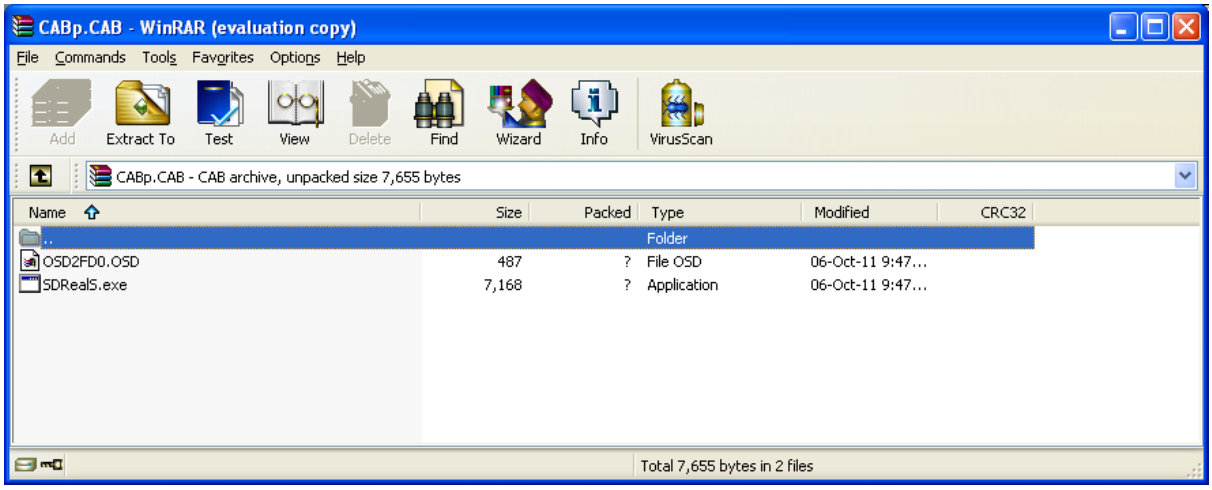


Figure 110: First extract a CAB-file on your PC (with for example WinRAR), then place them on a SD card or copy the files via Active Sync.

12.7.2 Installing with an SD card

Copy your files on a SD-card, then put the SD card in your board or HMI.

Figure 111: Open "my device"

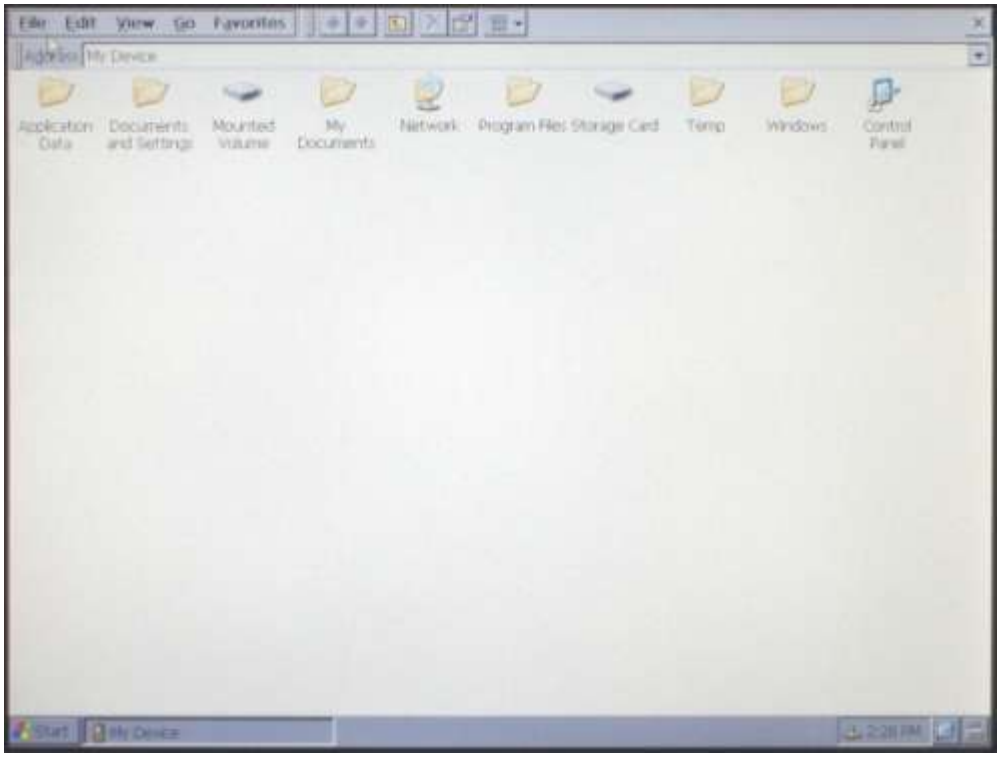


Figure 112 : Open "Storage card"

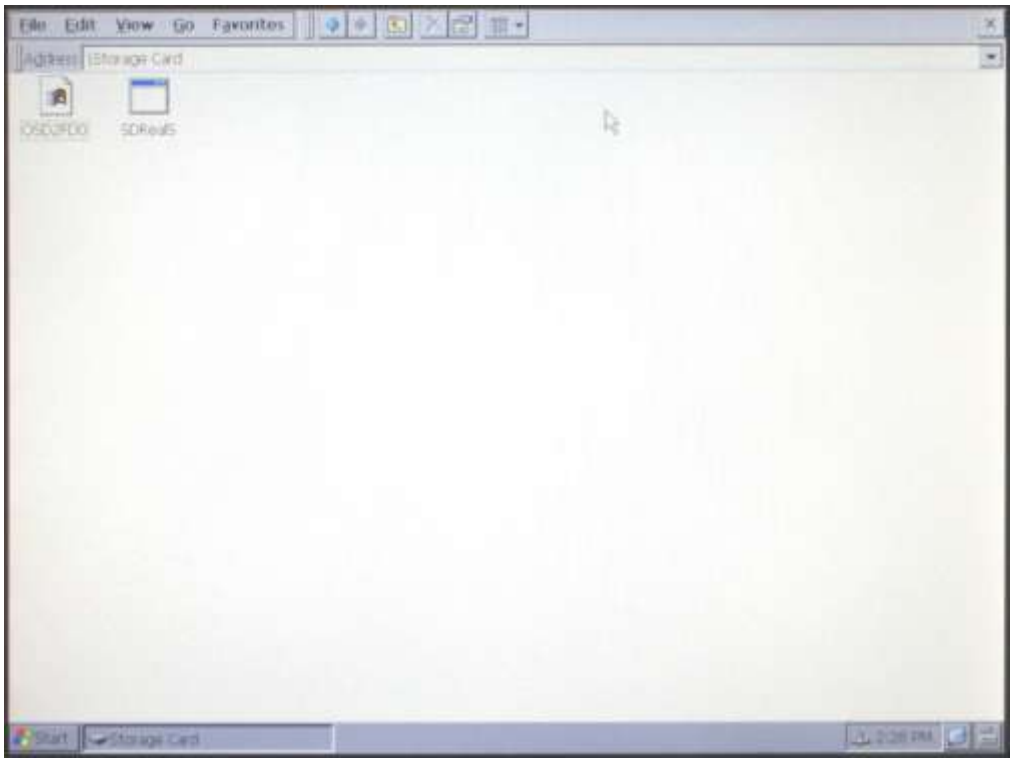


Figure 113: Double click the executable file to start/ install

12.7.3 Installing with Active sync

Connect The USB-OTG on the board to a USB on the PC with a cable

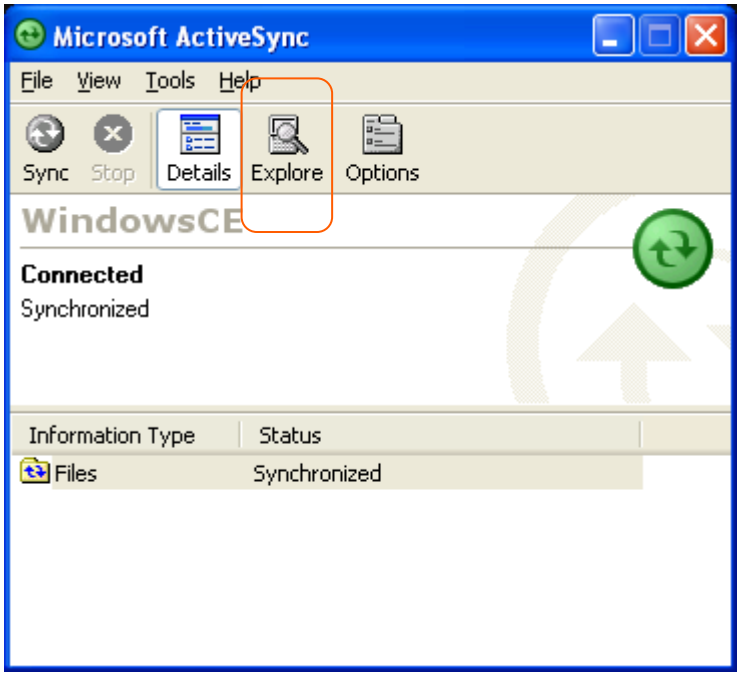


Figure 114: Microsoft Active Sync will detect the board, click on the explore button.

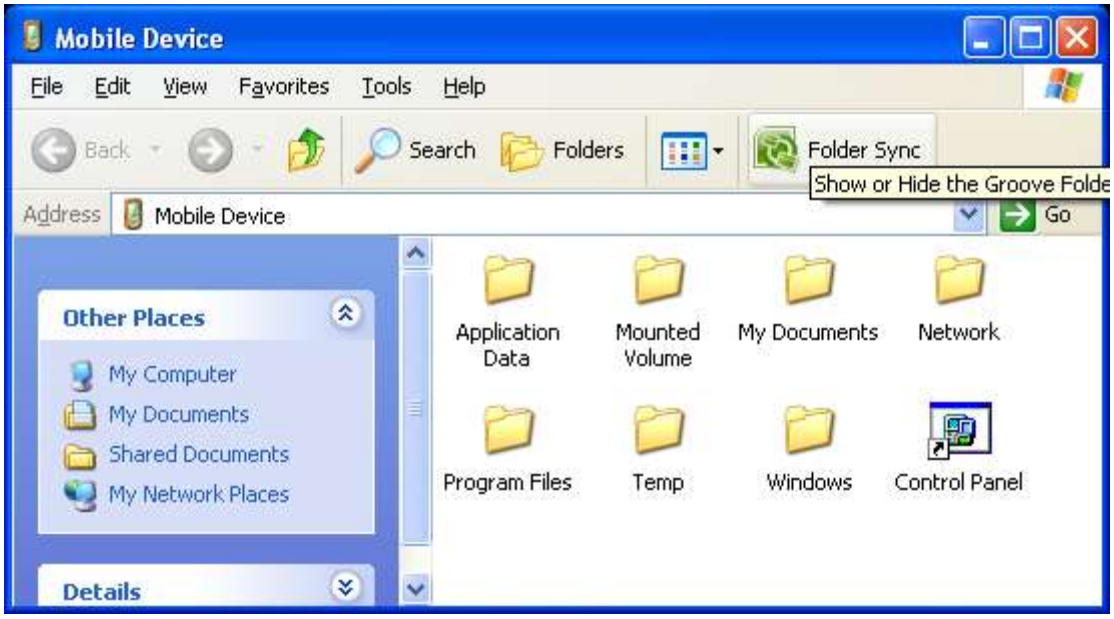


Figure 115: The explore window will pop up

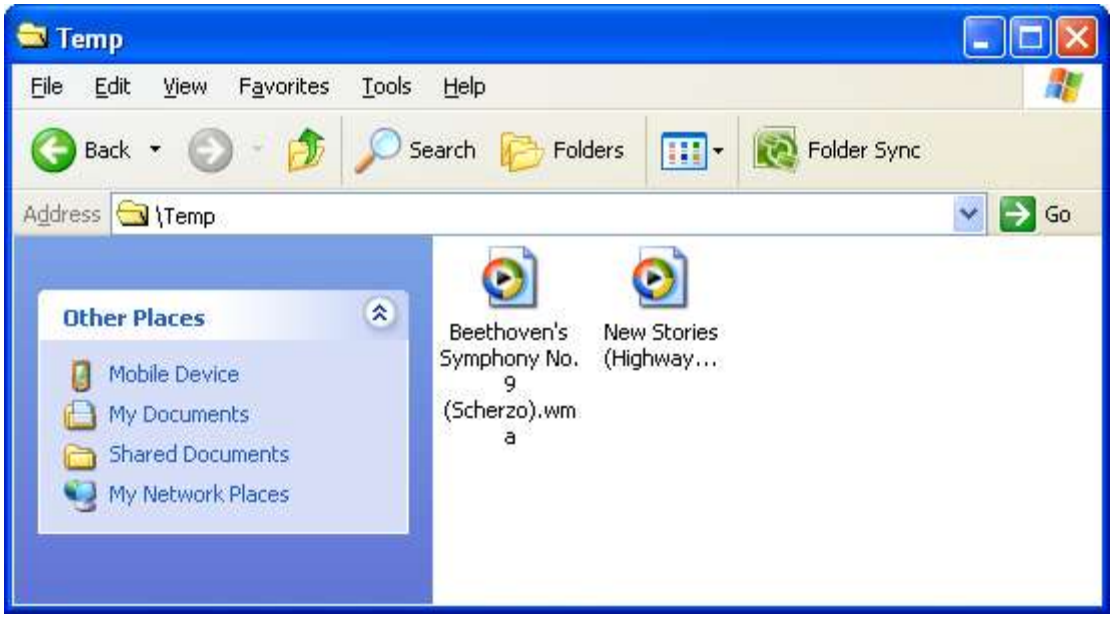


Figure 116: Copy your files into this explore window (in this example they are placed in the TEMP folder)

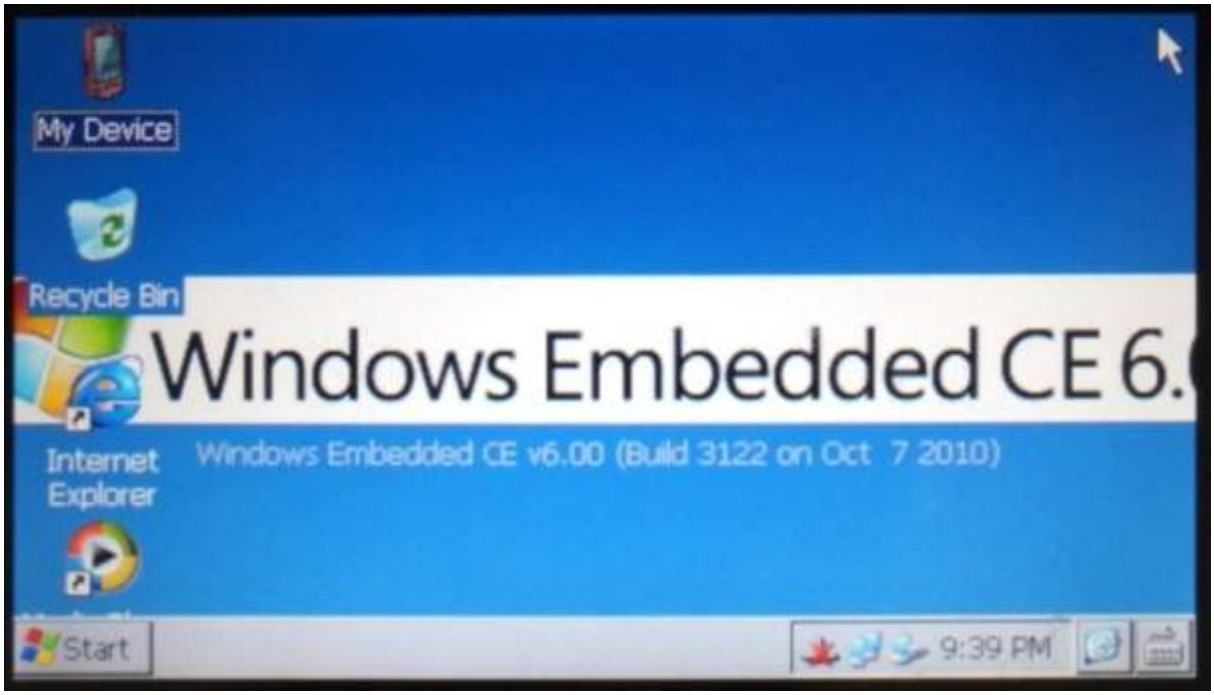


Figure 117 : Open "my device" on your board

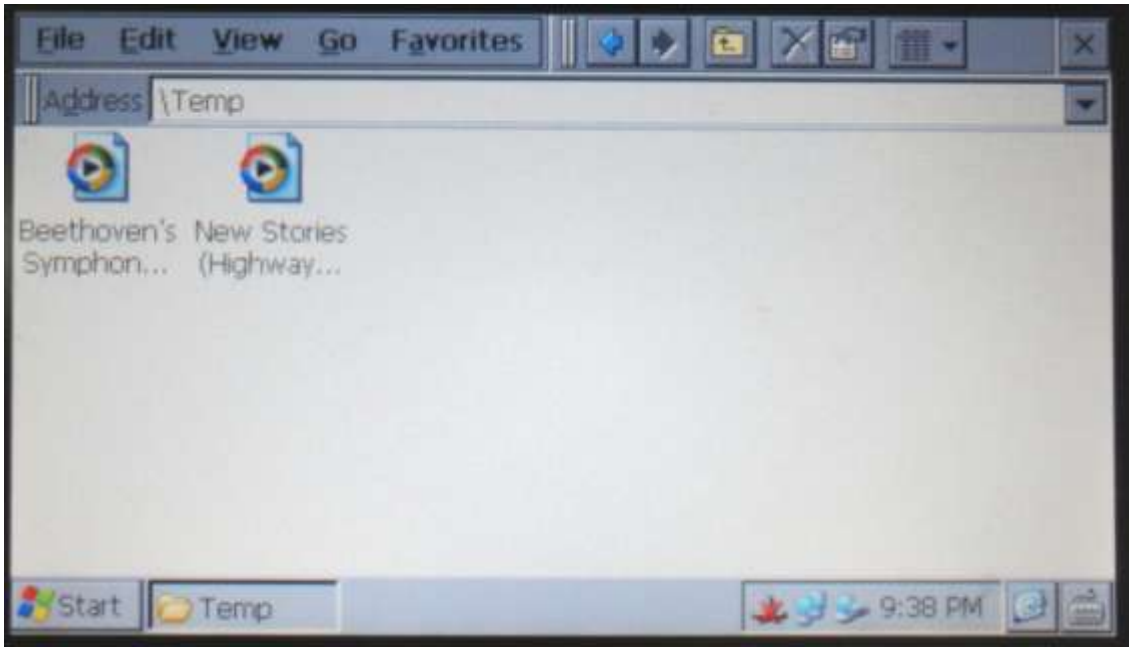


Figure 118: You will find the copied files. Executable files can be installed/ started with a double click

12.8 How to - use the LAN cable instead of Wi-Fi

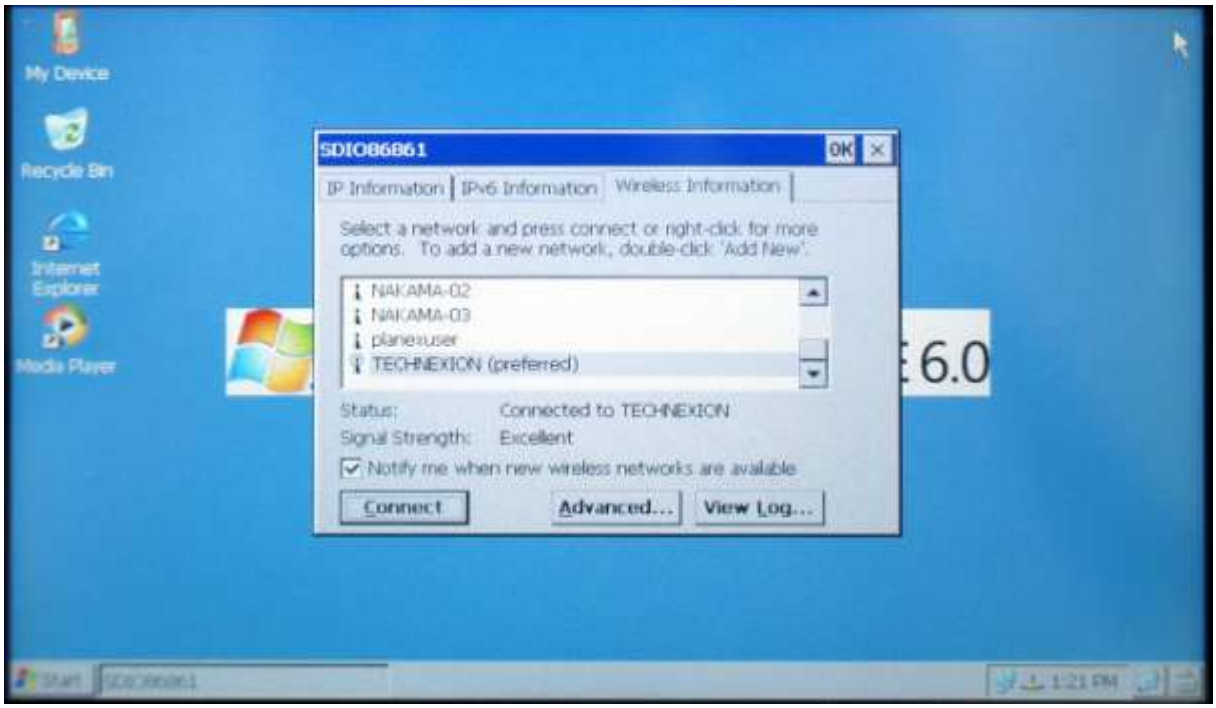


Figure 119: In the default setting the Wi-Fi is on.

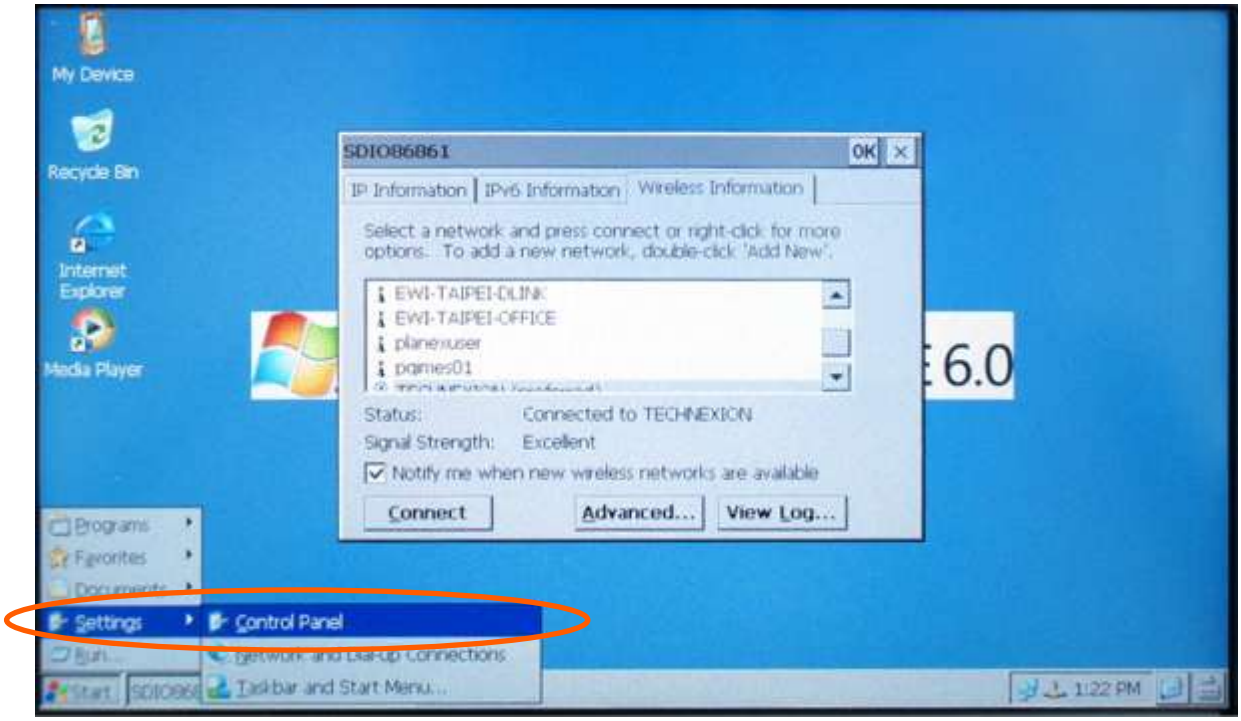


Figure 120: To use the LAN cable, go to Start/settings/Control panel (or go direct to "Network and dial up Connections", see figure 4)

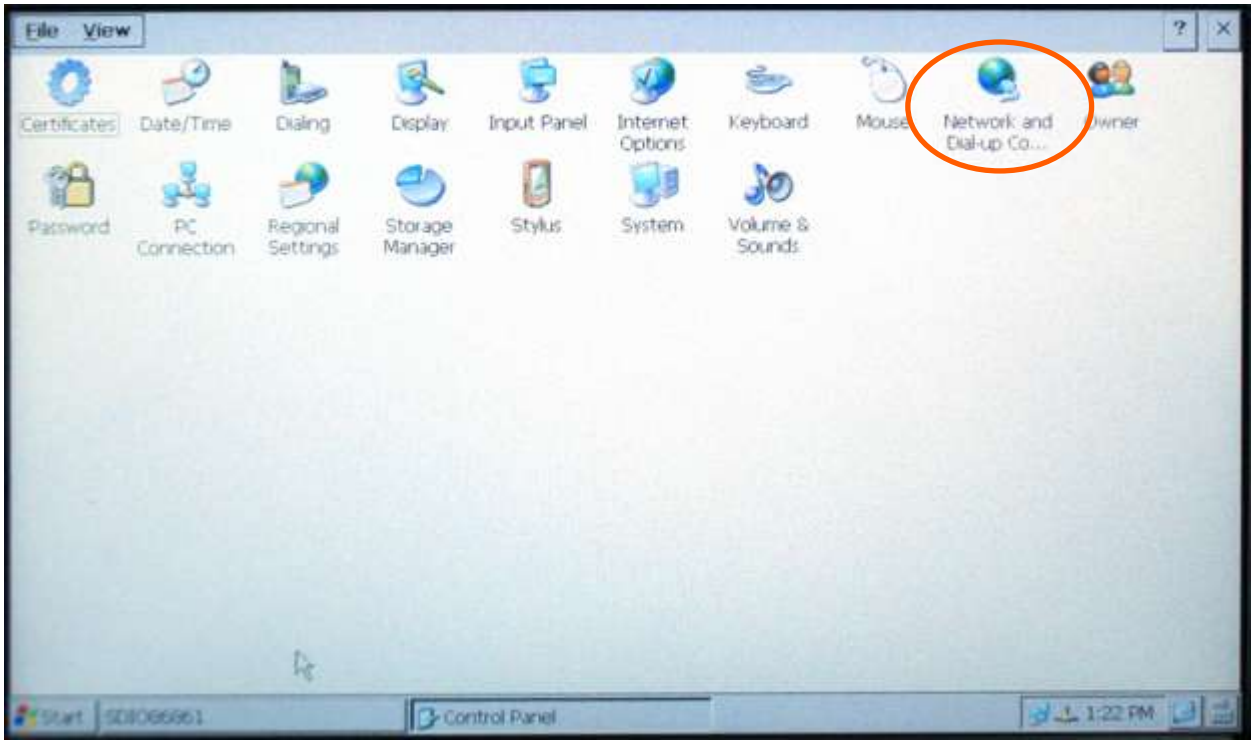


Figure 121: In the control panel chose the "Network and dial up Connections"

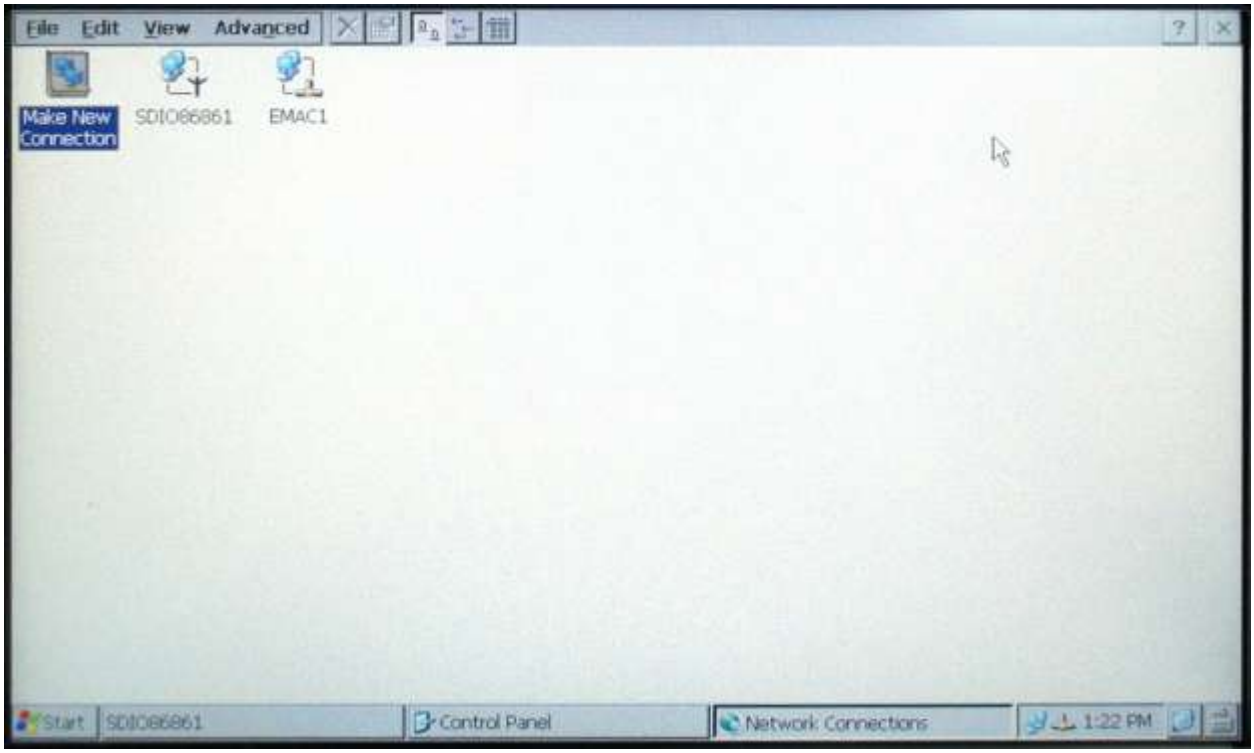


Figure 122: The folder contains Wi-Fi (SDIO86861) and the LAN (EMAC1)

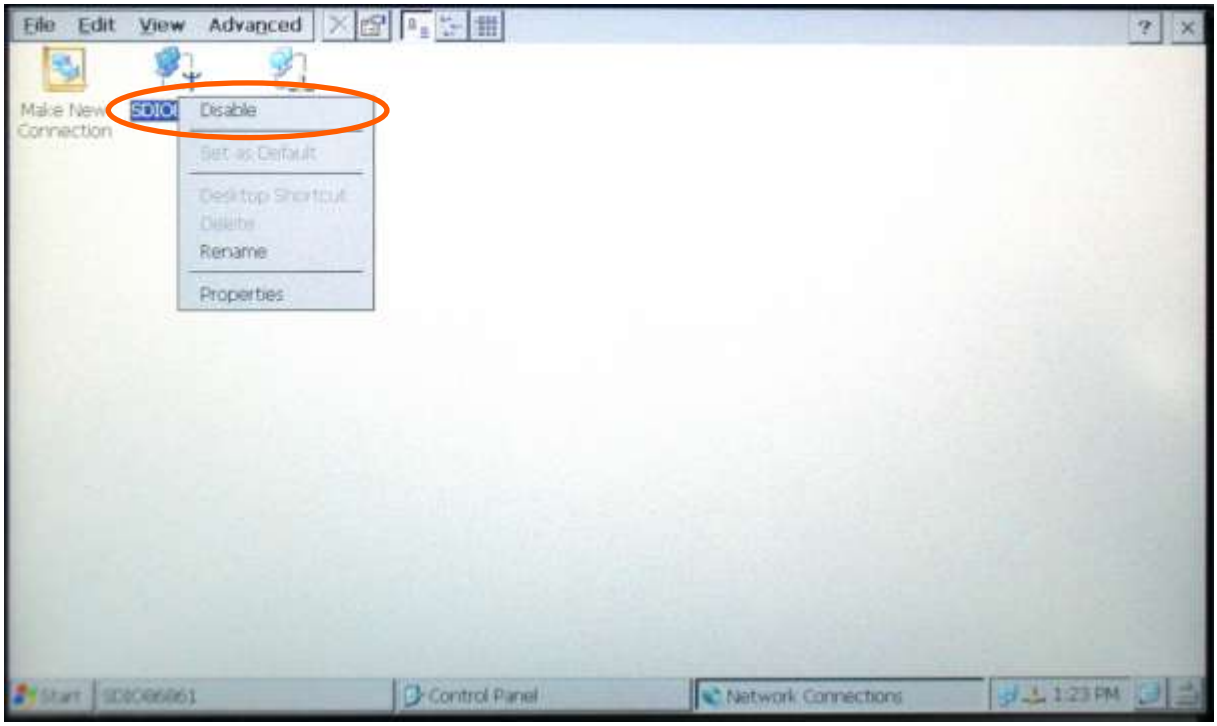


Figure 123: To use the cable connection, disable the Wi-Fi (SDIO86861)

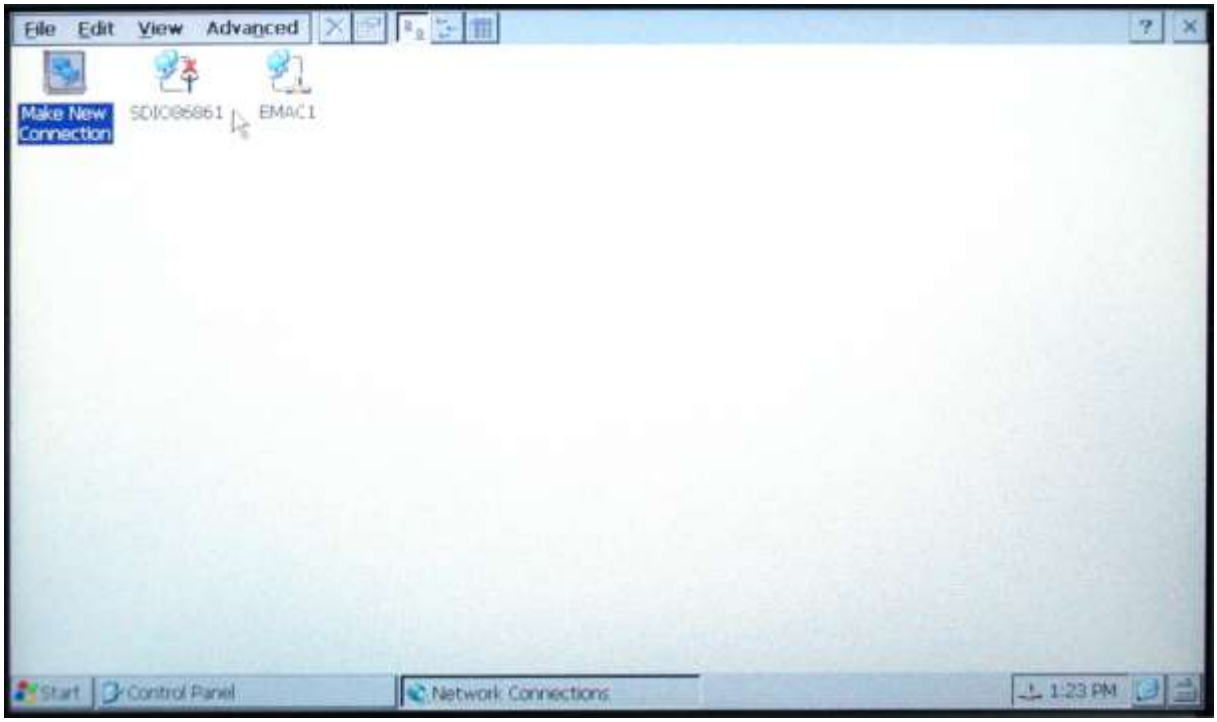


Figure 124: Your HMI will now only use the LAN cable connection

To use the Wi-Fi again you will need to enable and reboot the HMI

12.9 How to - turn backlight on/off

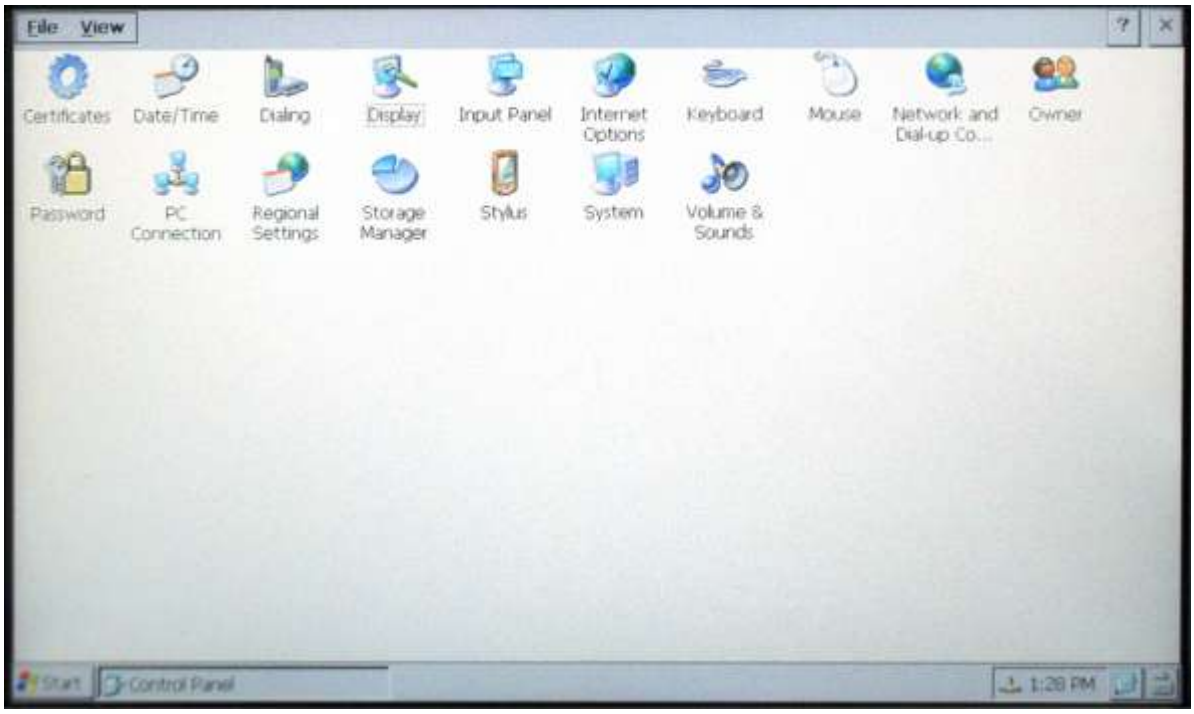


Figure 125: open the control panel and click on "Display"

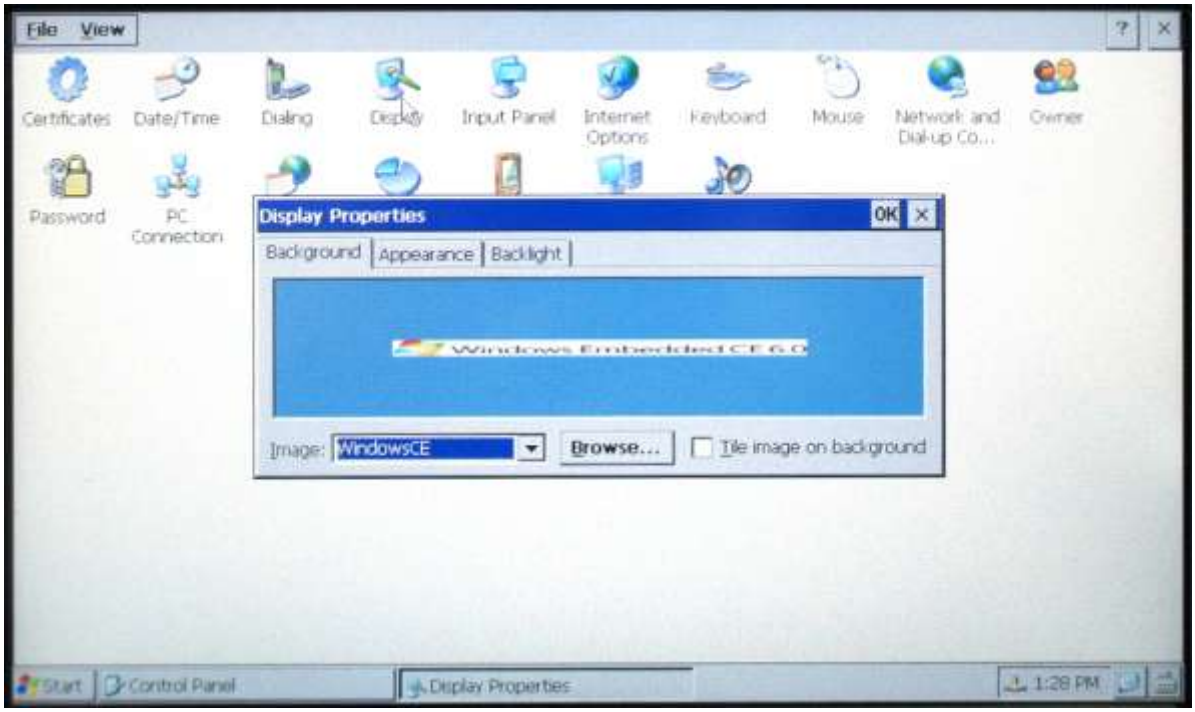


Figure 126: Display properties, go to the backlight tab

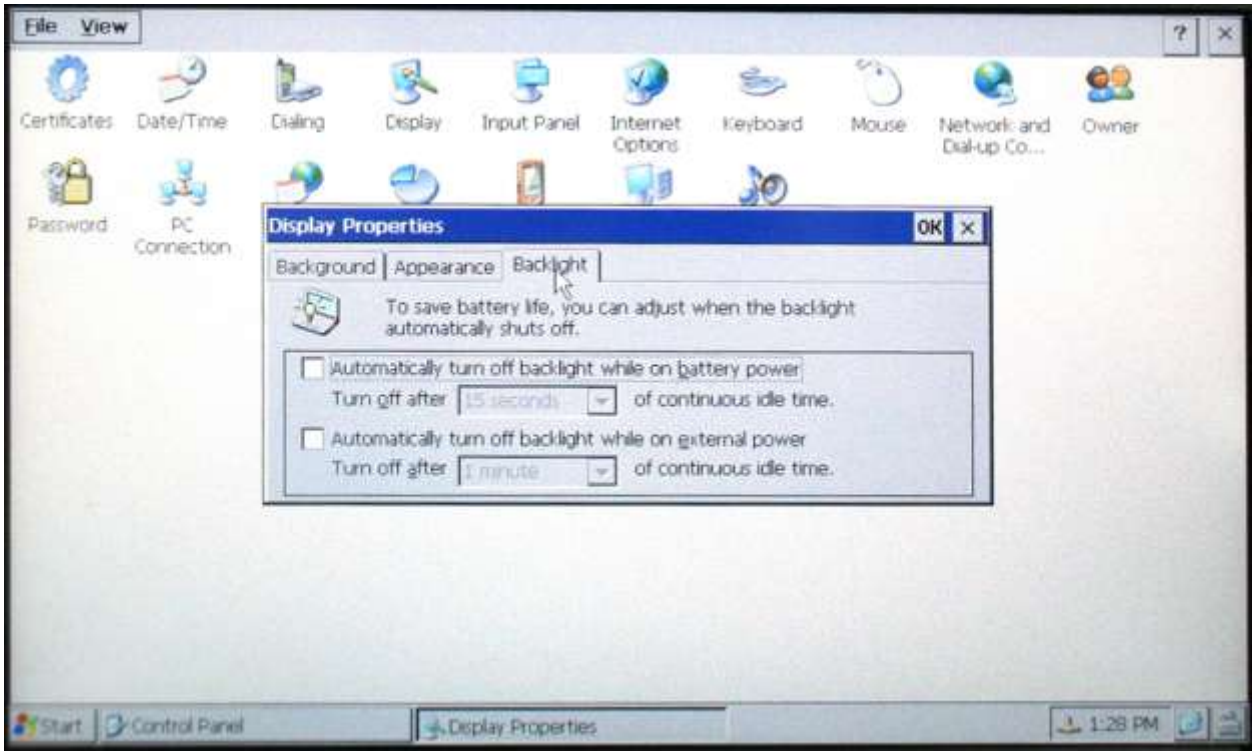


Figure 127: In the Standard Setting the backlight is always on,

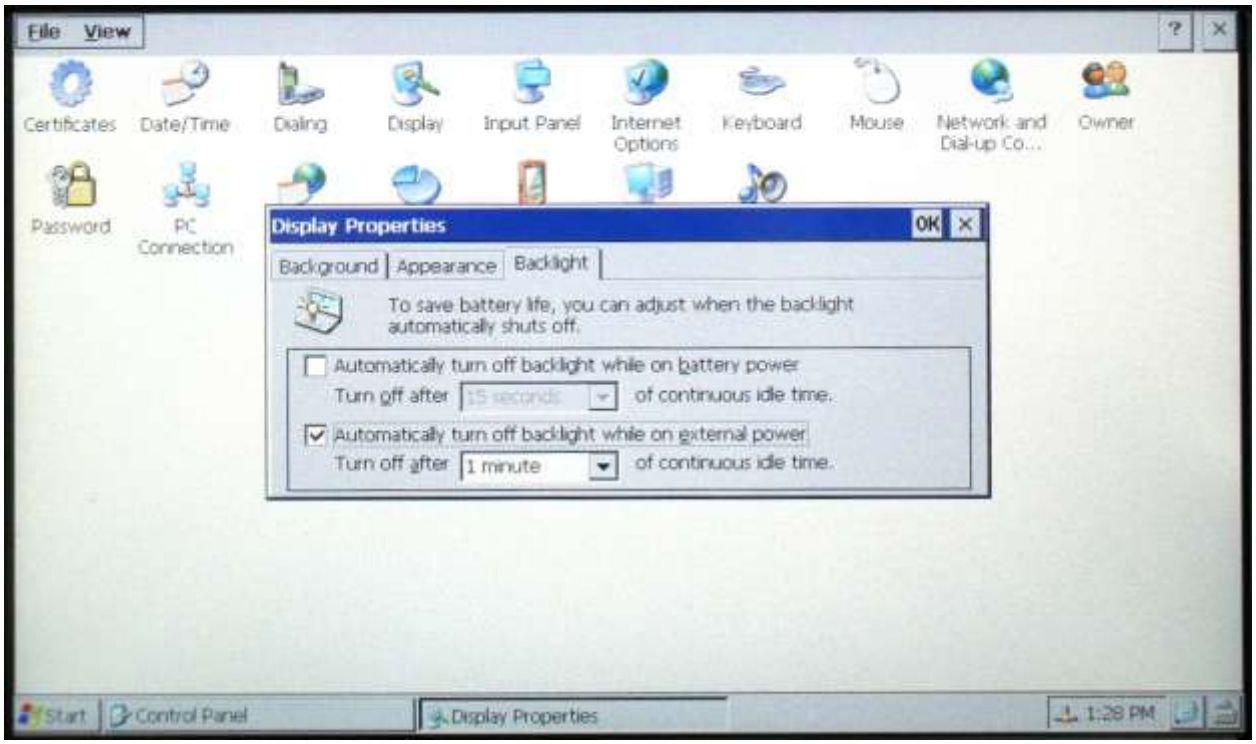


Figure 128: select the backlight

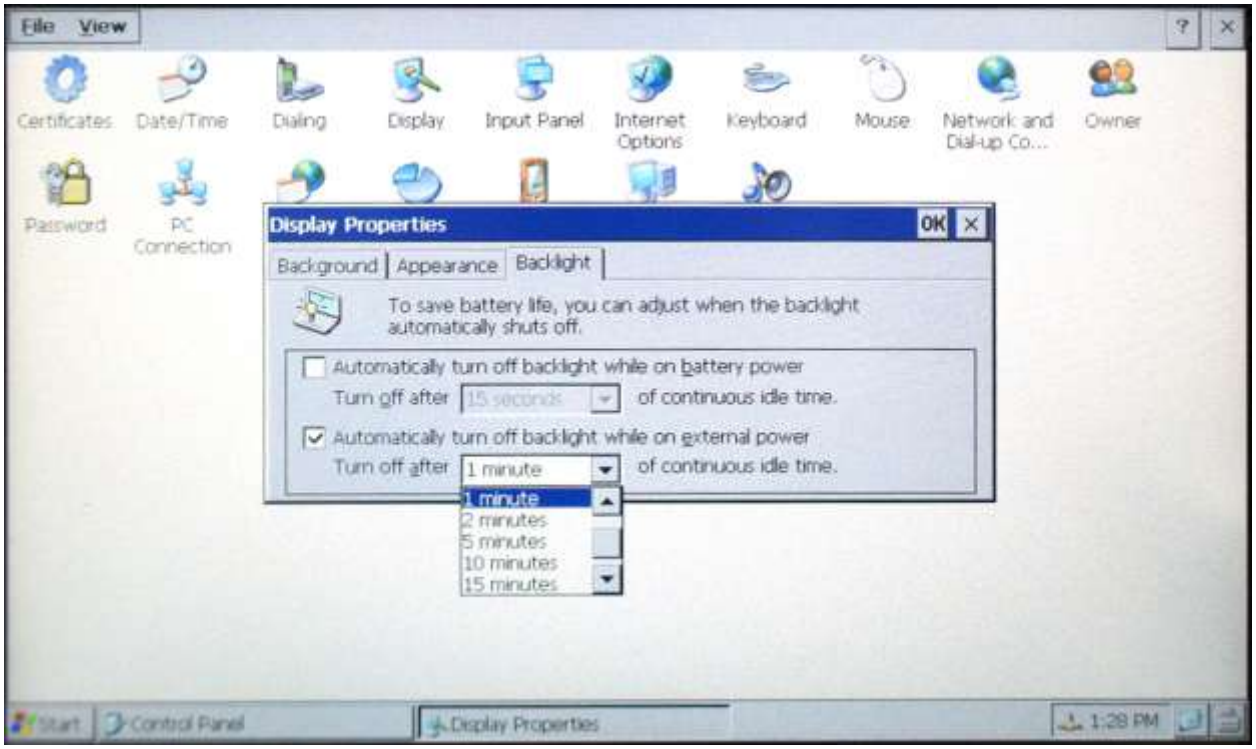


Figure 129: choose the time after which the display will turn off

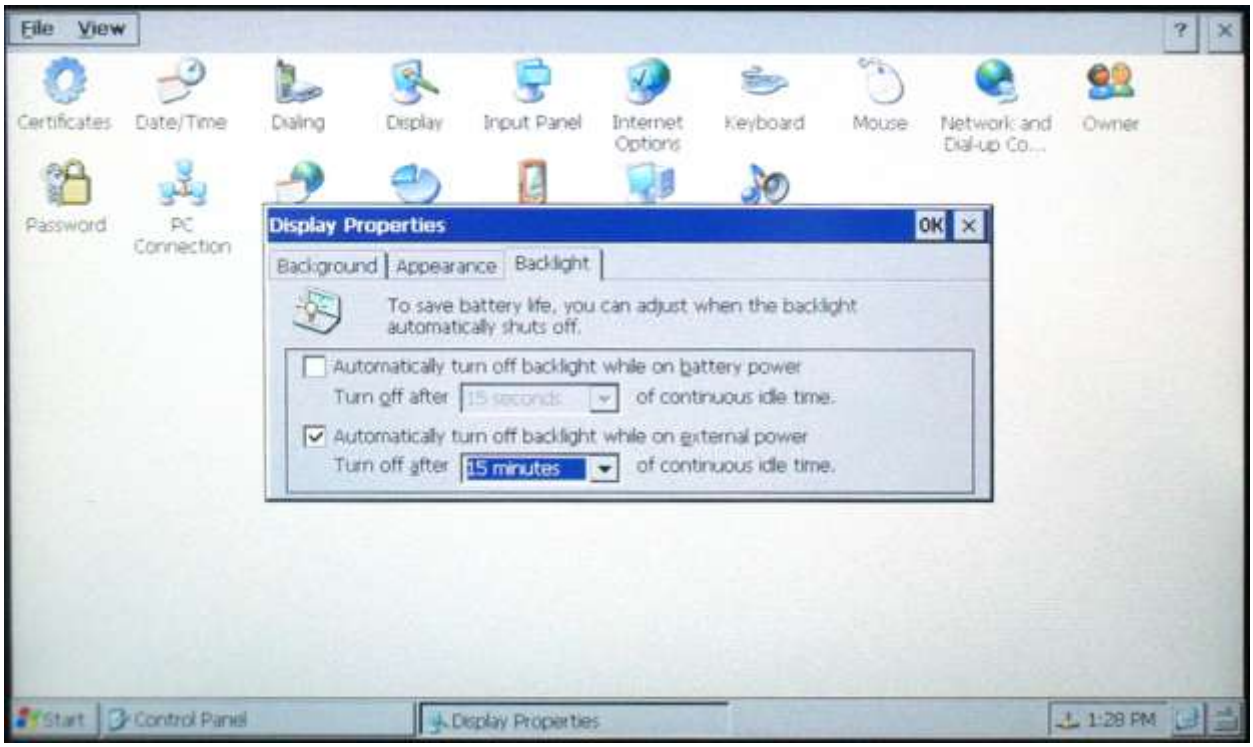


Figure 130: select OK

12.10 How to - calibrate the touch screen in Windows CE

Insert a USB keyboard.

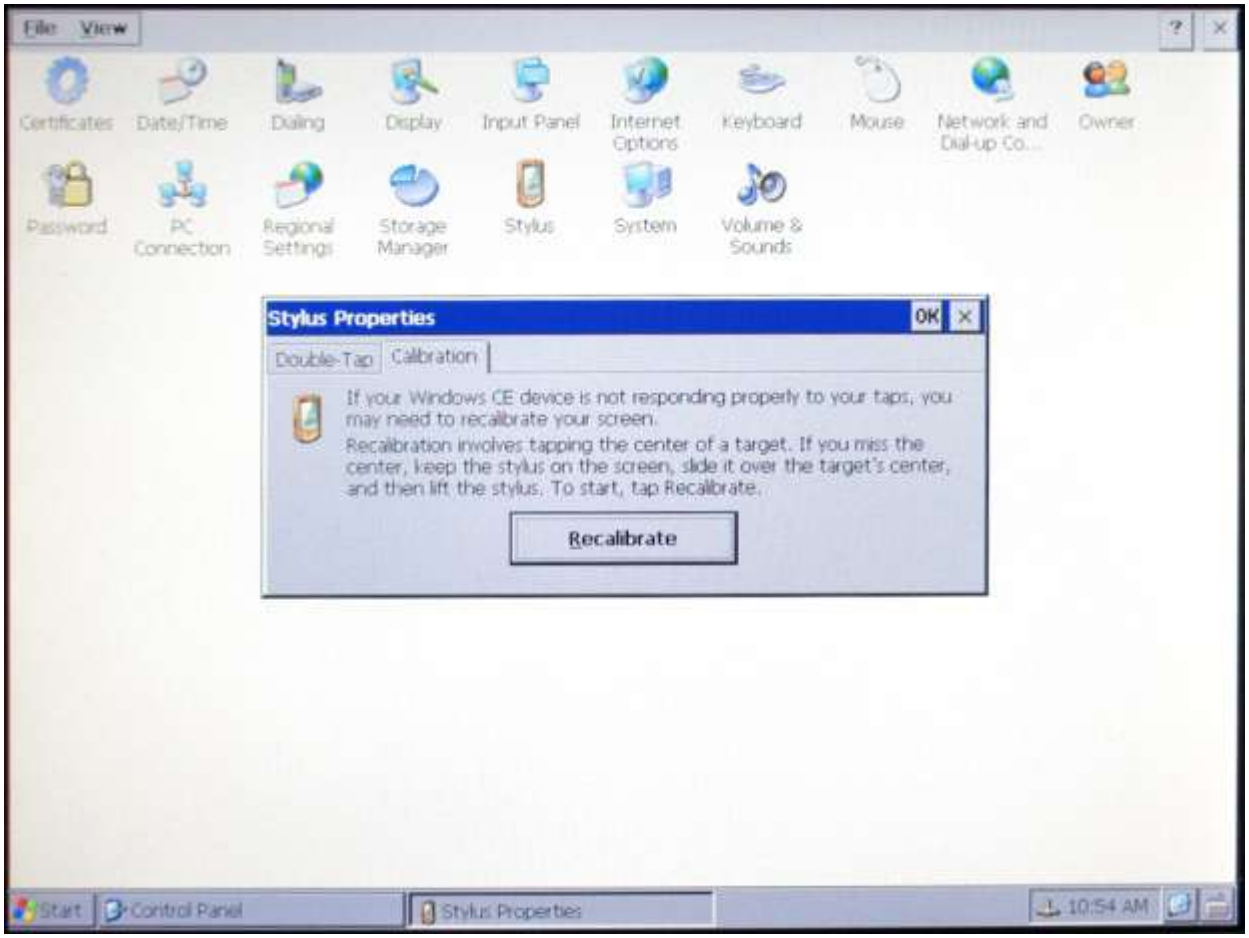


Figure 131: Open the Control Panel and double click Stylus

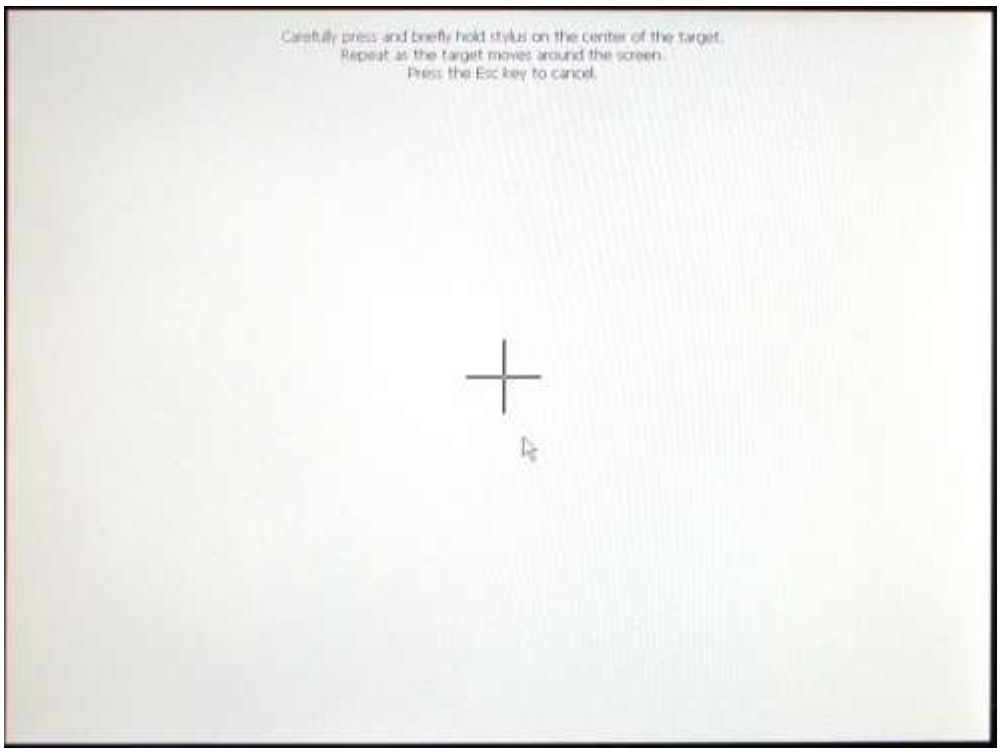


Figure 132: Touch the crosses that appear on the screen

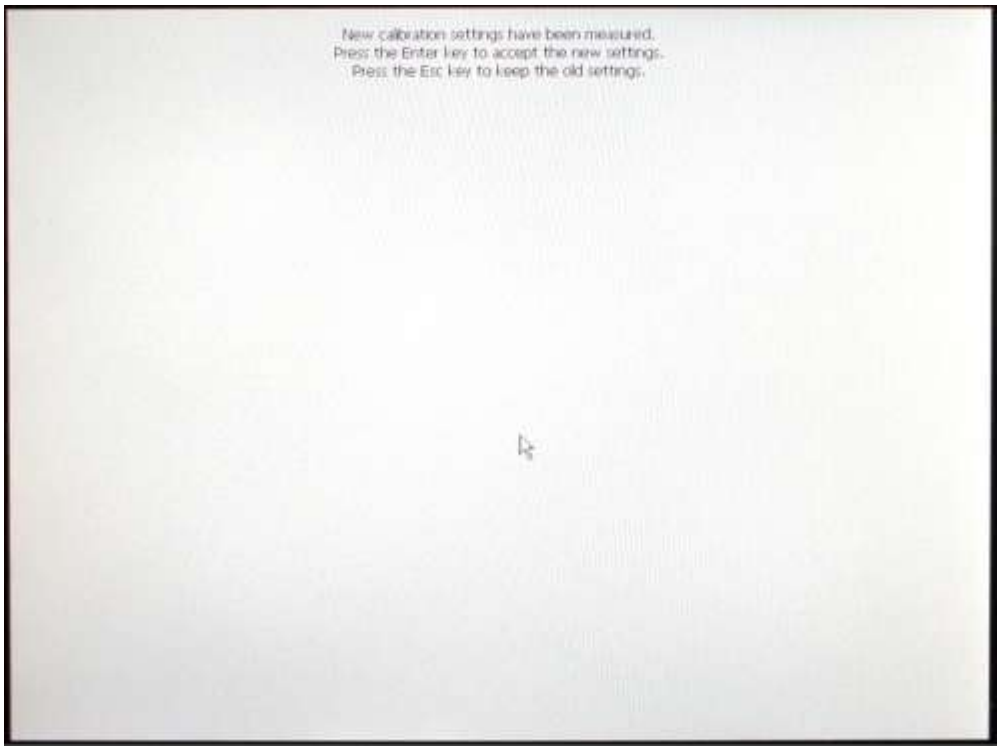


Figure 133: Press enter on the Keyboard.

13 Appendix – Module

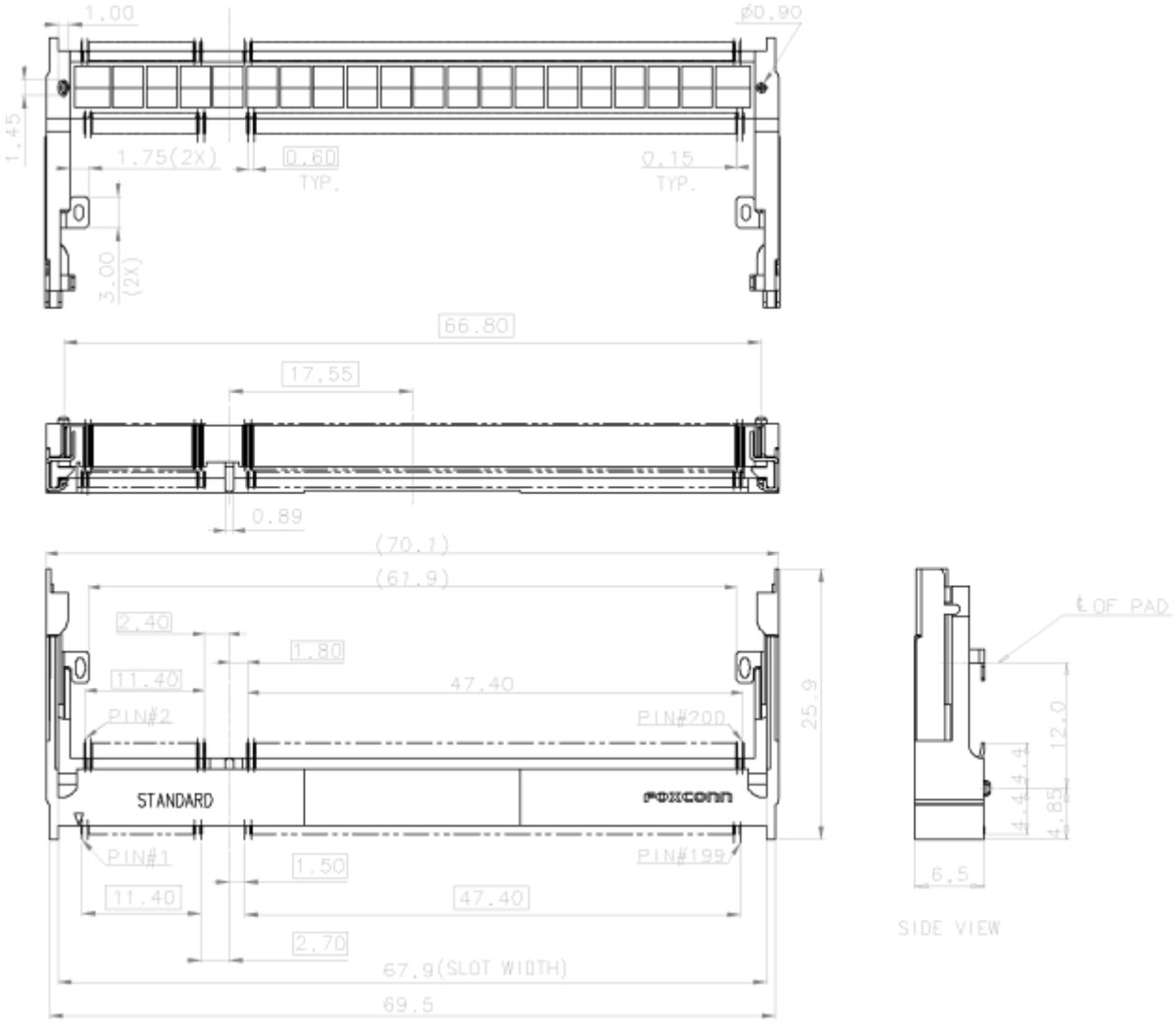
13.1 Module Connector DDR2 SO-DIMM

To mount the TAM-3517 module on the baseboard it isrecommended to use a connector with the following specifications:

- DDR II SO-DIMM 200pin SMT
- Standard
- height 6.5 mm

For example Foxconn AS0A426-N6SN-4F or Tyco 5-1746530-4

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



13.2 Nut to fix TAM-3517 to the baseboard

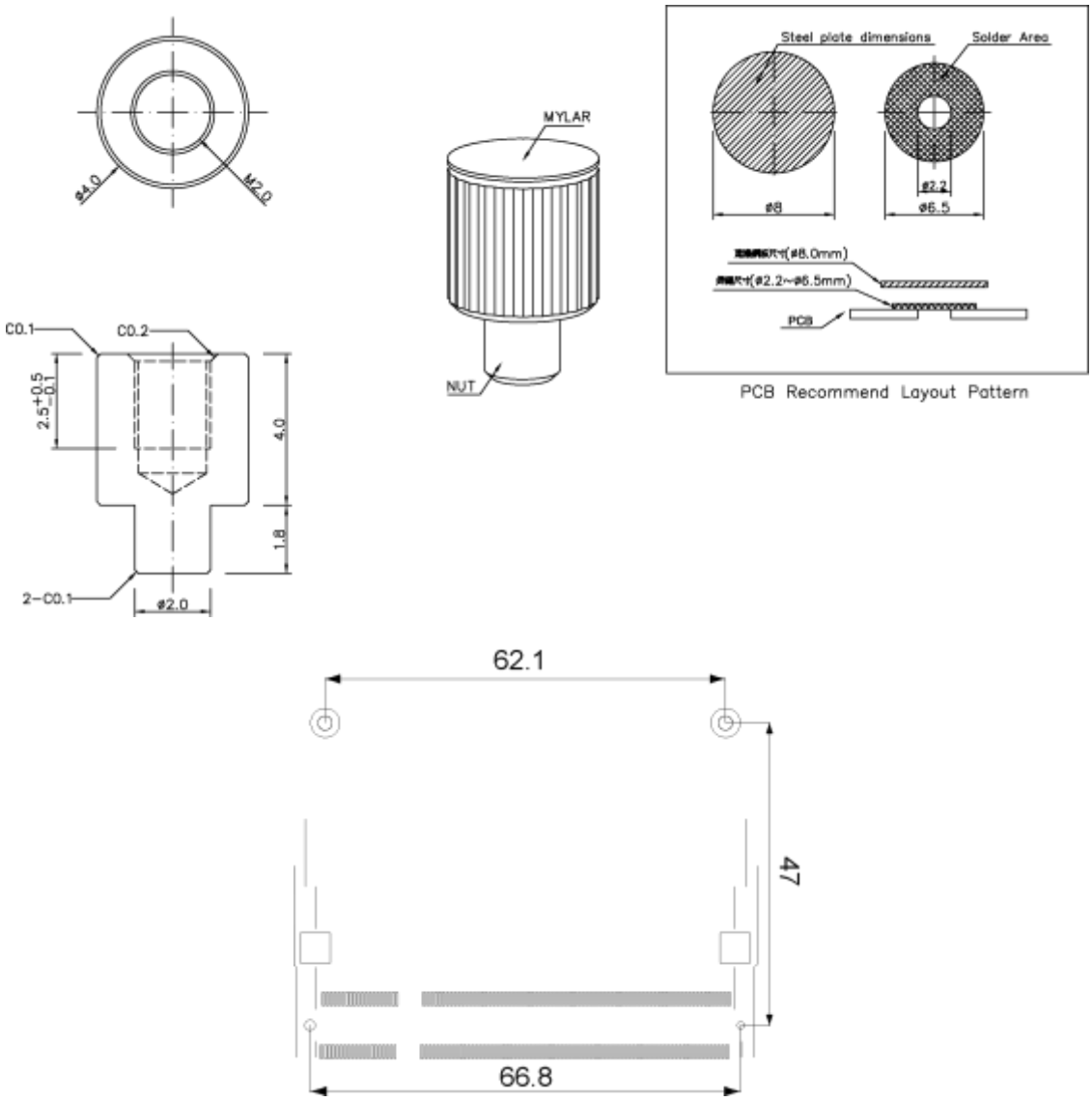


Figure 134 : Placement of nuts and connector

Note 1: Always design the above mounting nut/pose on your custom baseboard and fasten the TAM-3517 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.

14 Appendix – Block Diagram

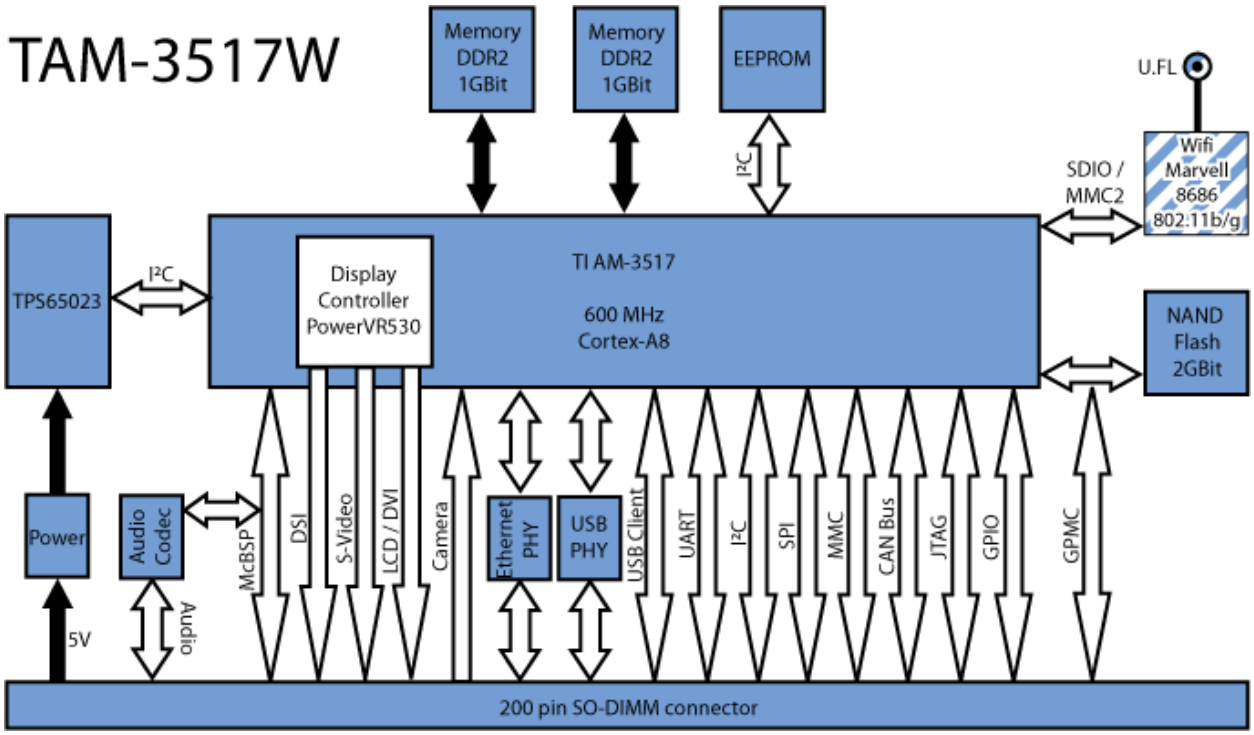
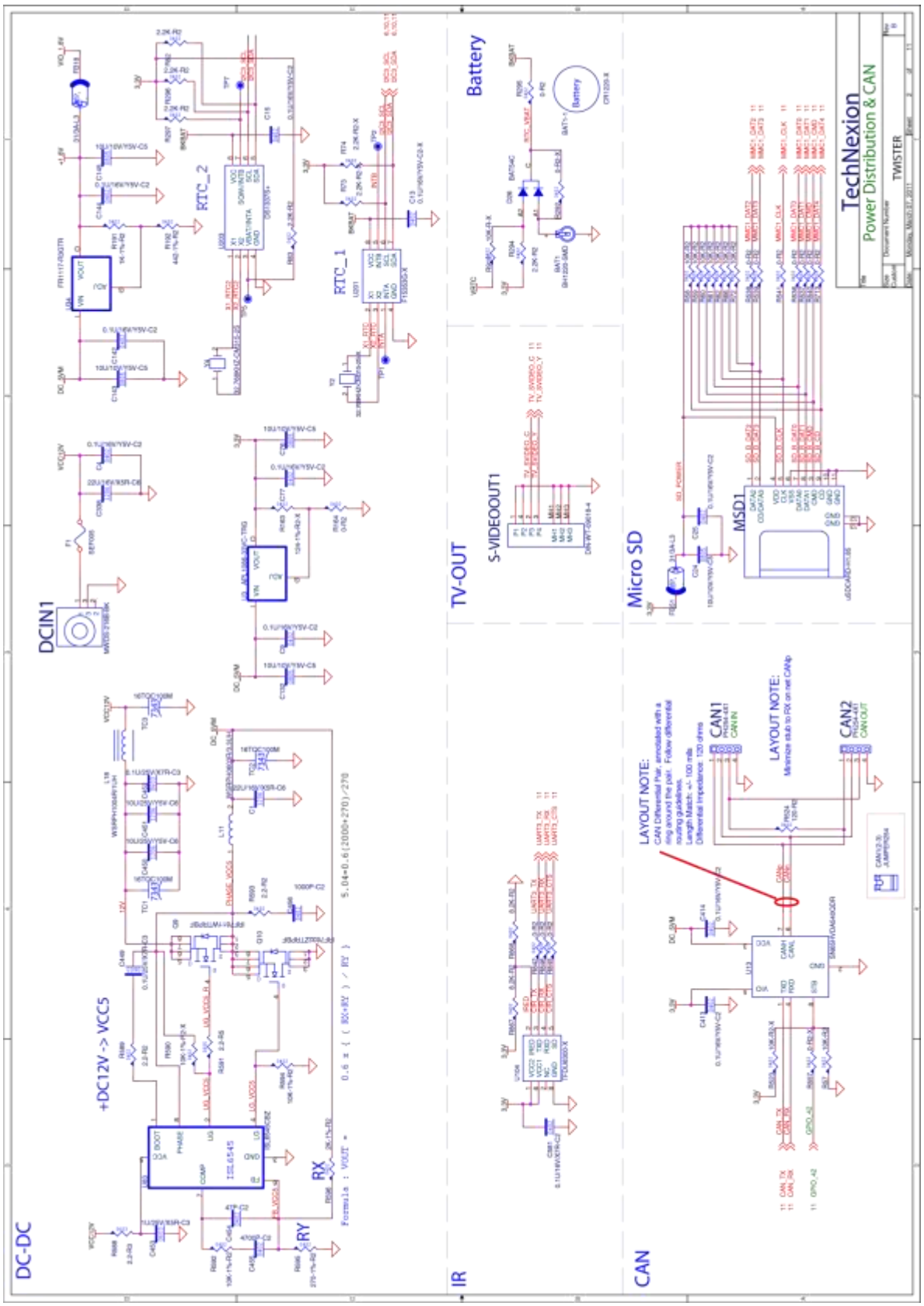


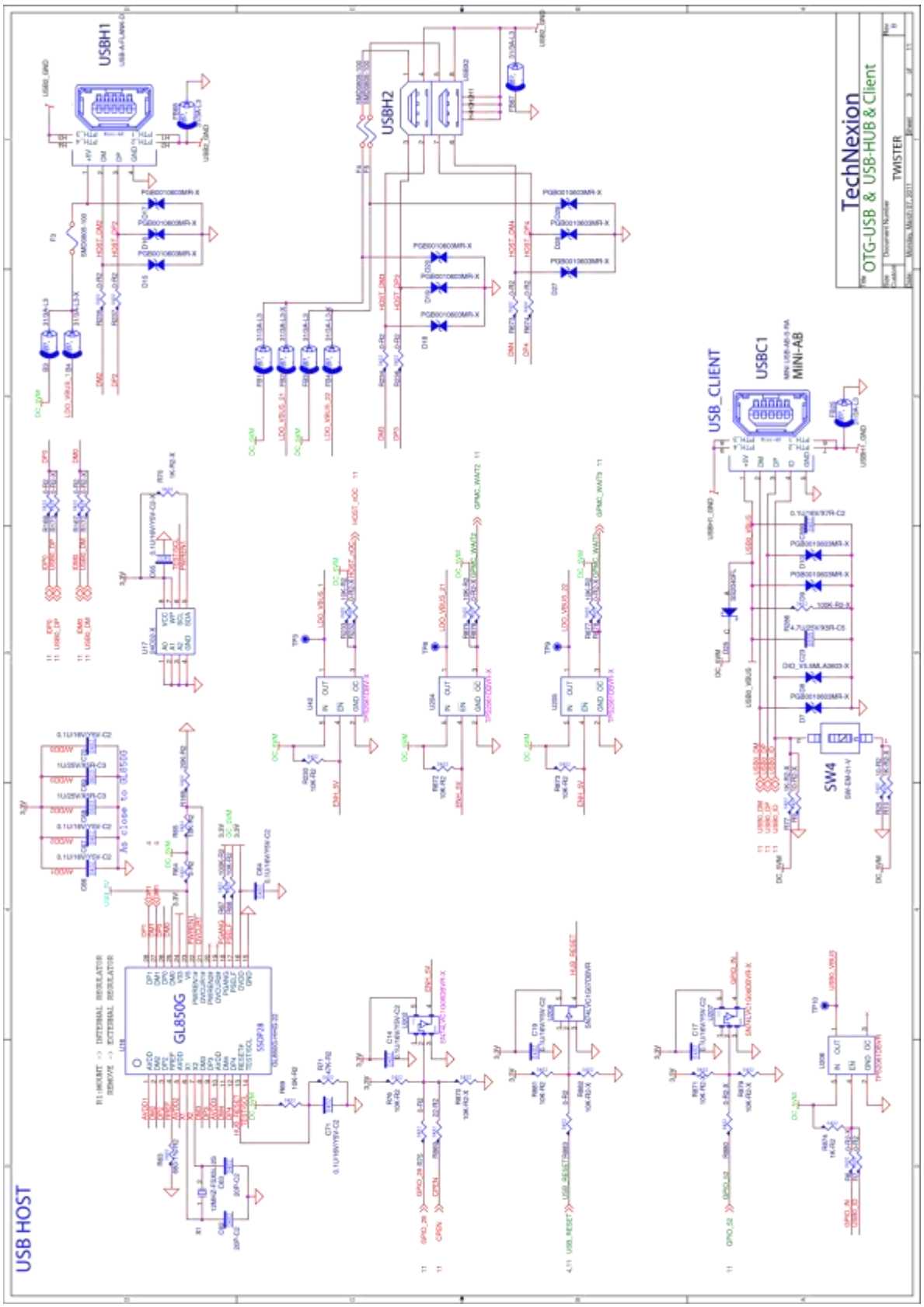
Figure 135 : TAM-3517 Block Diagram

15 Appendix - Schematics

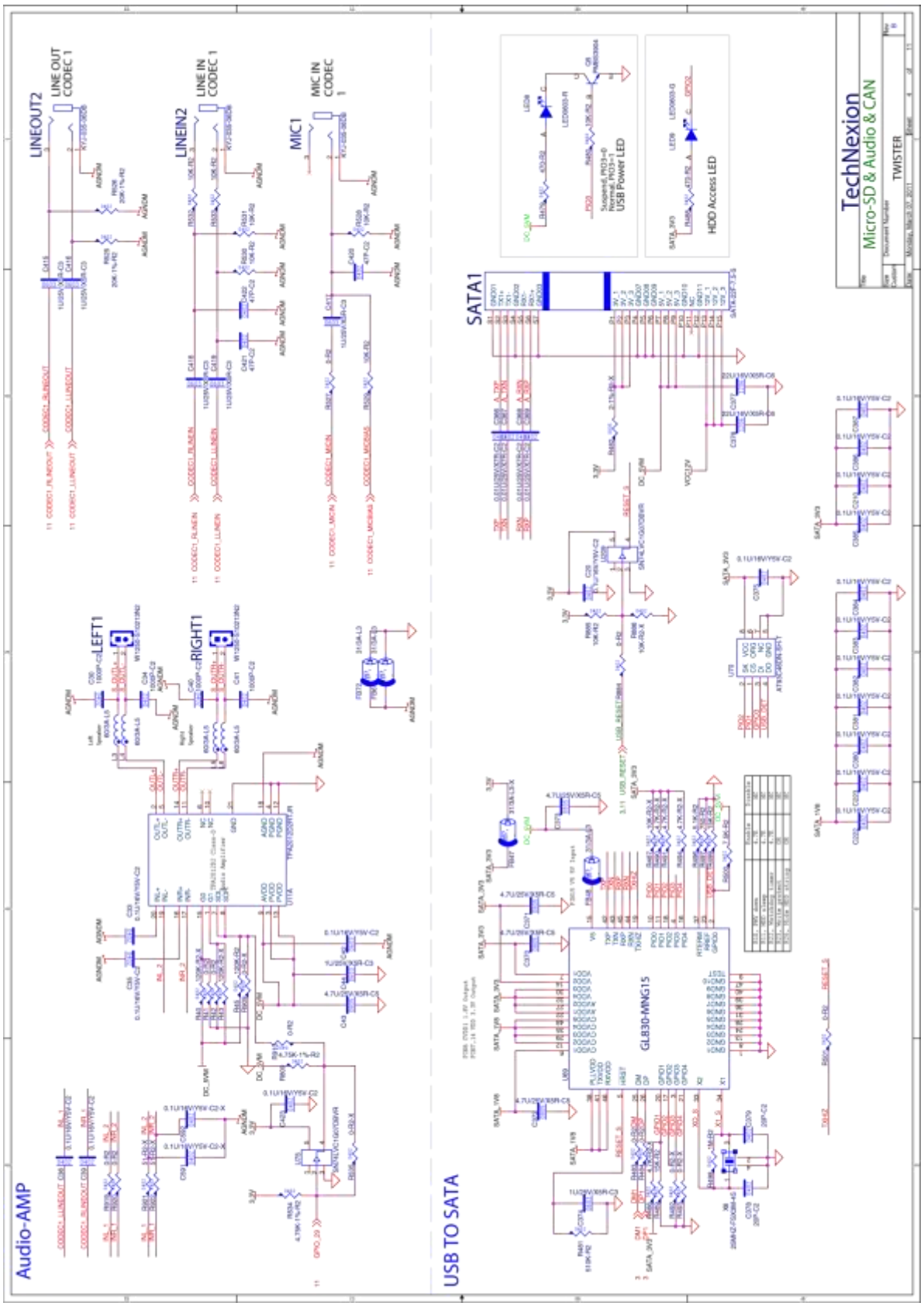
15.1 Twister baseboard schematics

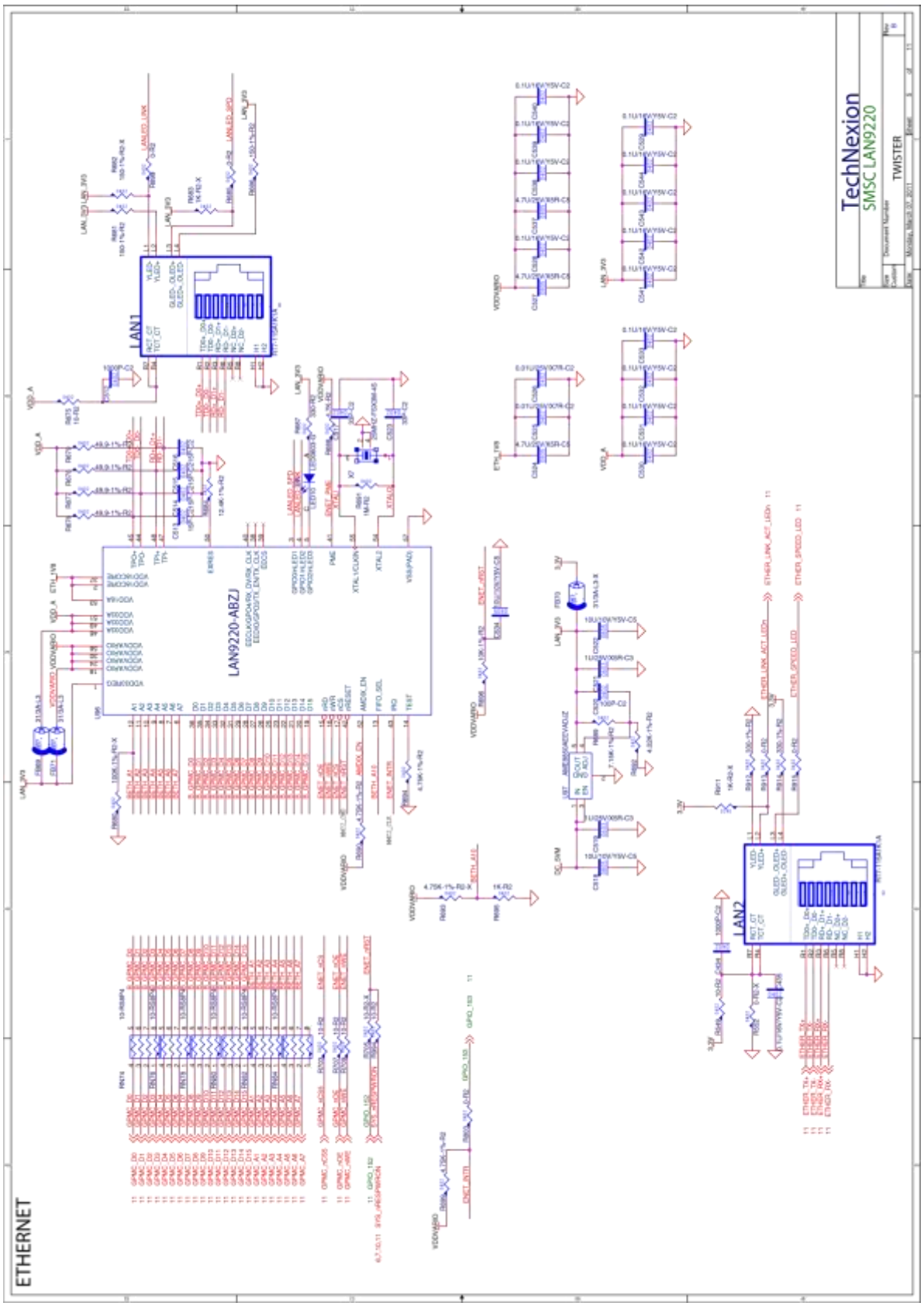
If you are designing your own baseboard then please contact sales@technexion.com for clear design files

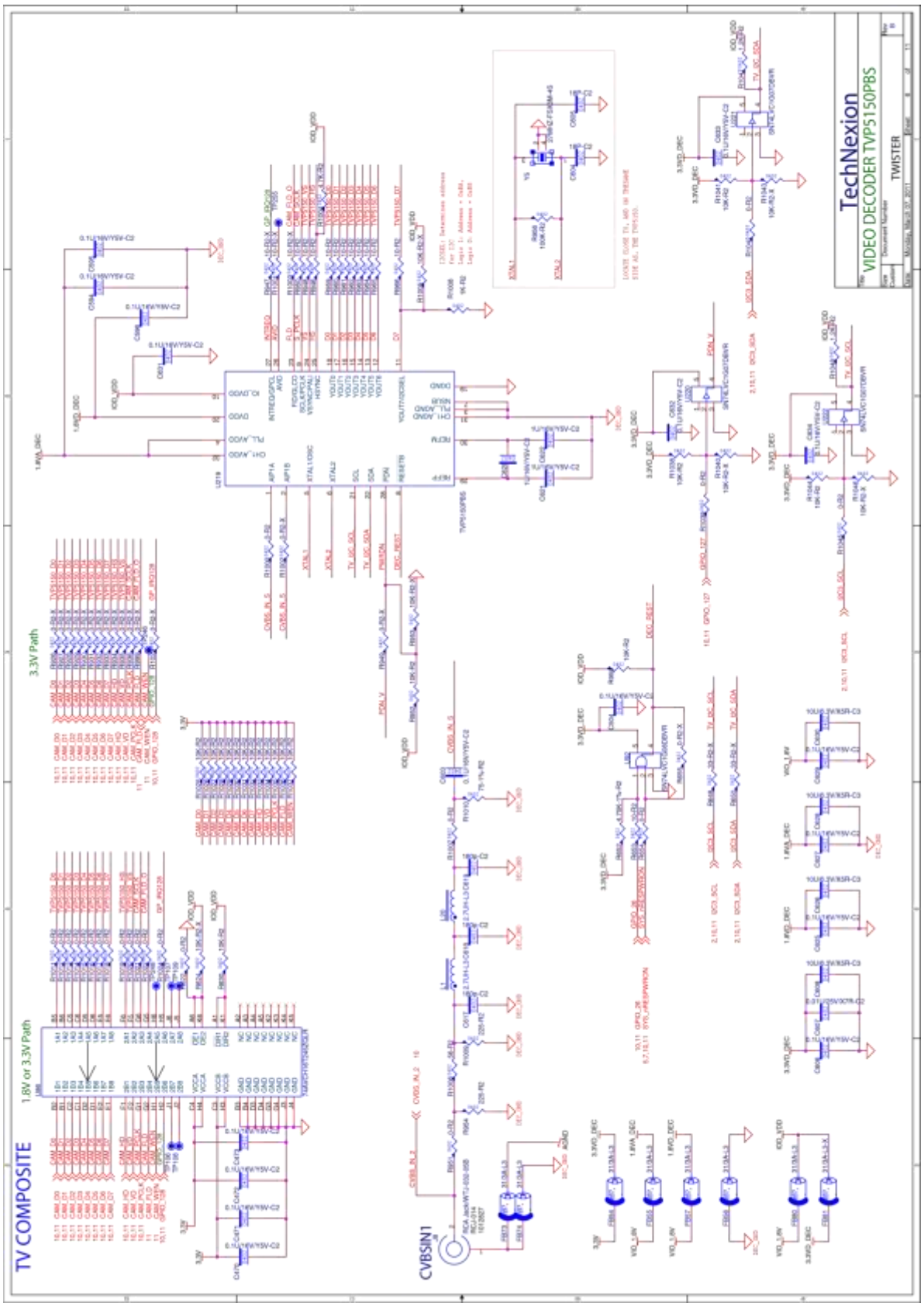

DC-DC
+DC12V -> VCC5
DCIN1
RTC_1
RTC_2
Battery
IR
TV-OUT
S-VIDEOOUT1
Micro SD
MSD1
CAN
CAN1
CAN2
LAYOUT NOTE:
TechNexion
Power Distribution & CAN
TWISTER



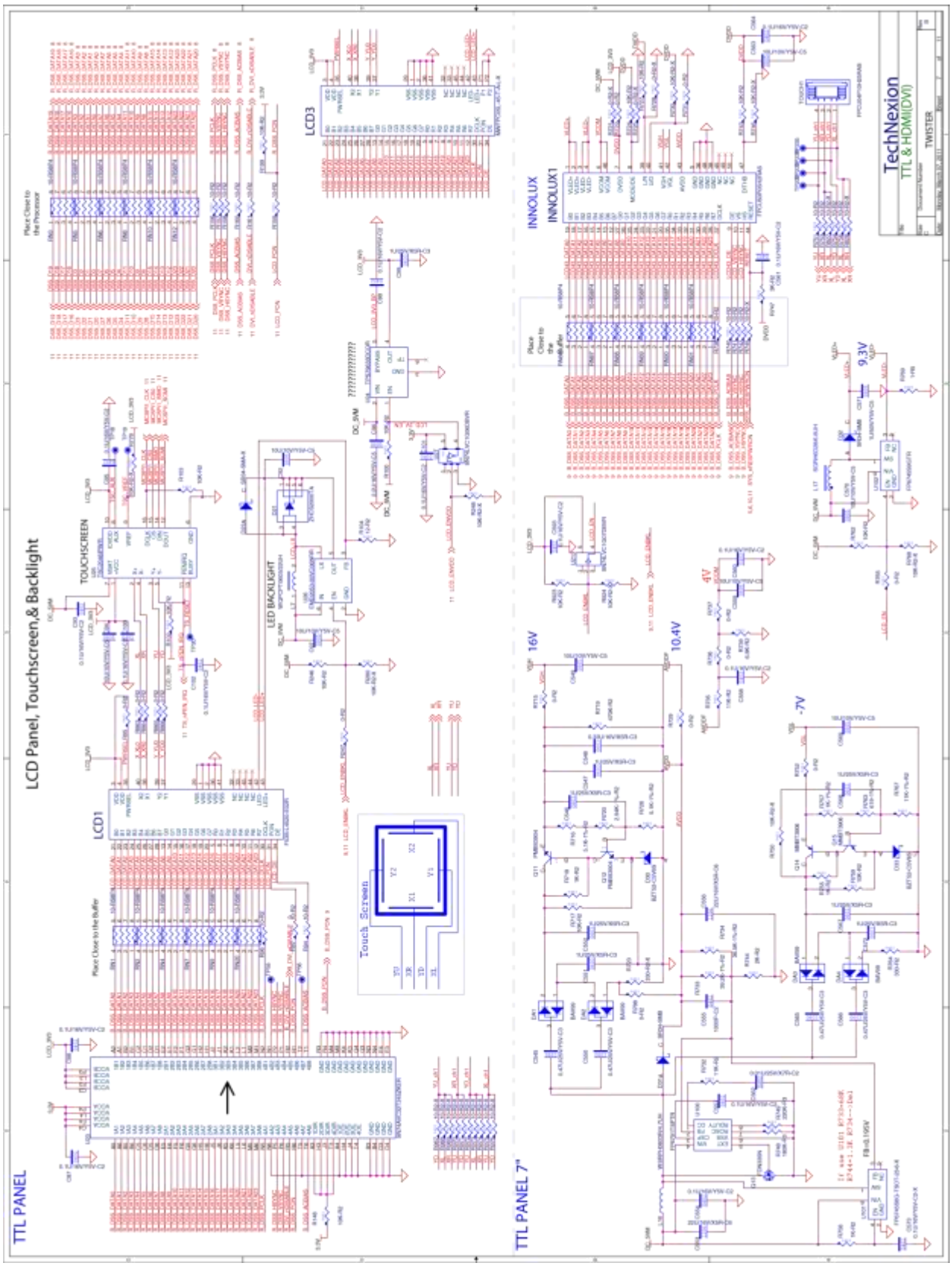
If you are designing your own baseboard then please contact sales@technexion.com for clear design files

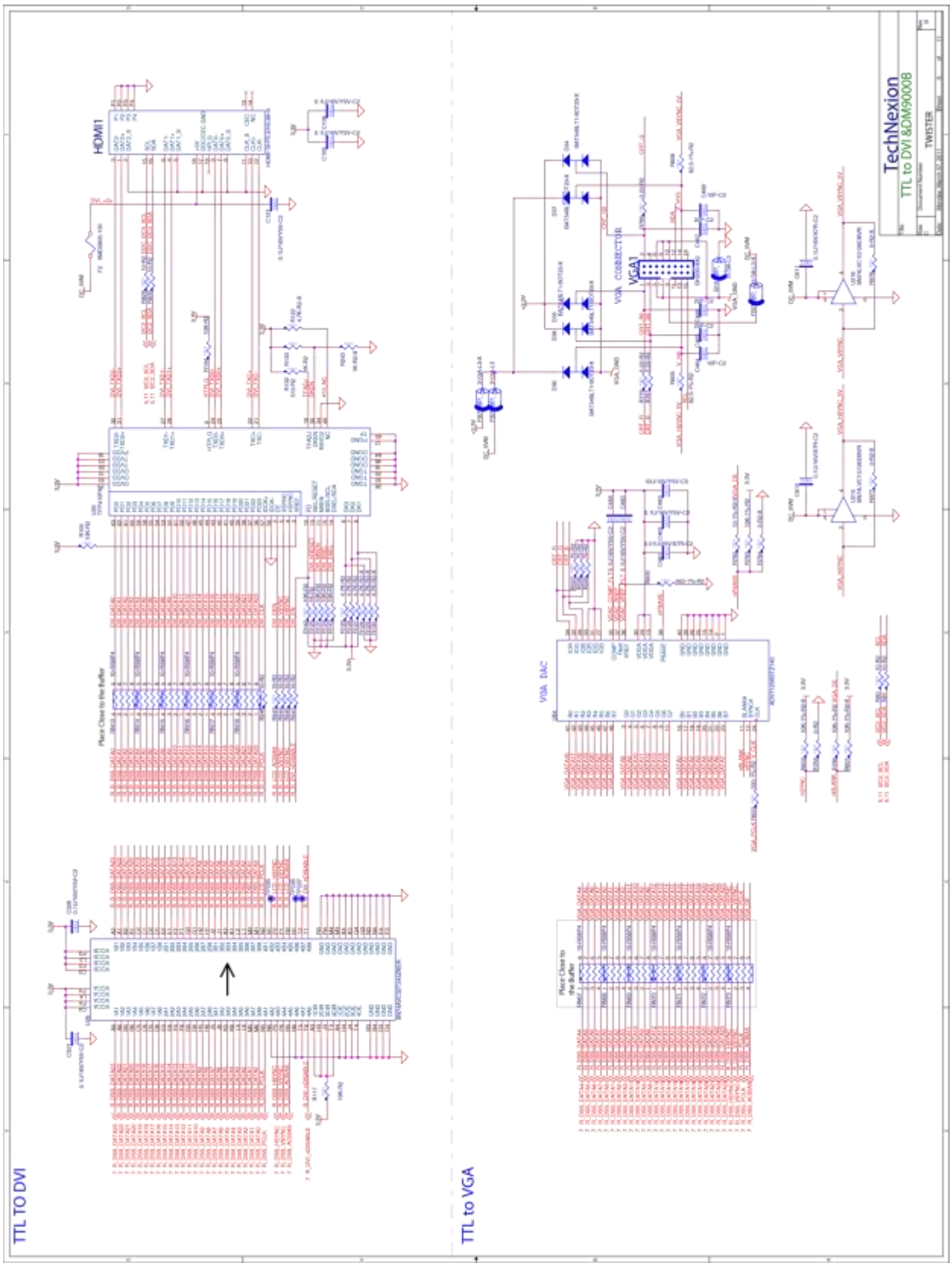

Audio-AMP
USB TO SATA
LINEOUT2
LINE OUT CODEC 1
LINEIN2
LINE IN CODEC 1
MIC1
MIC IN CODEC 1
LEFT1
RIGHT1
SATA1
GL830-MNG15
USB Power LED
HDD Access LED
TechNexion
Micro-SD & Audio & CAN
TWISTER


TechNexion
SMSC LAN9220
TWISTER
LAN1
LAN2
LAN9220-ABZJ
ETHERNET

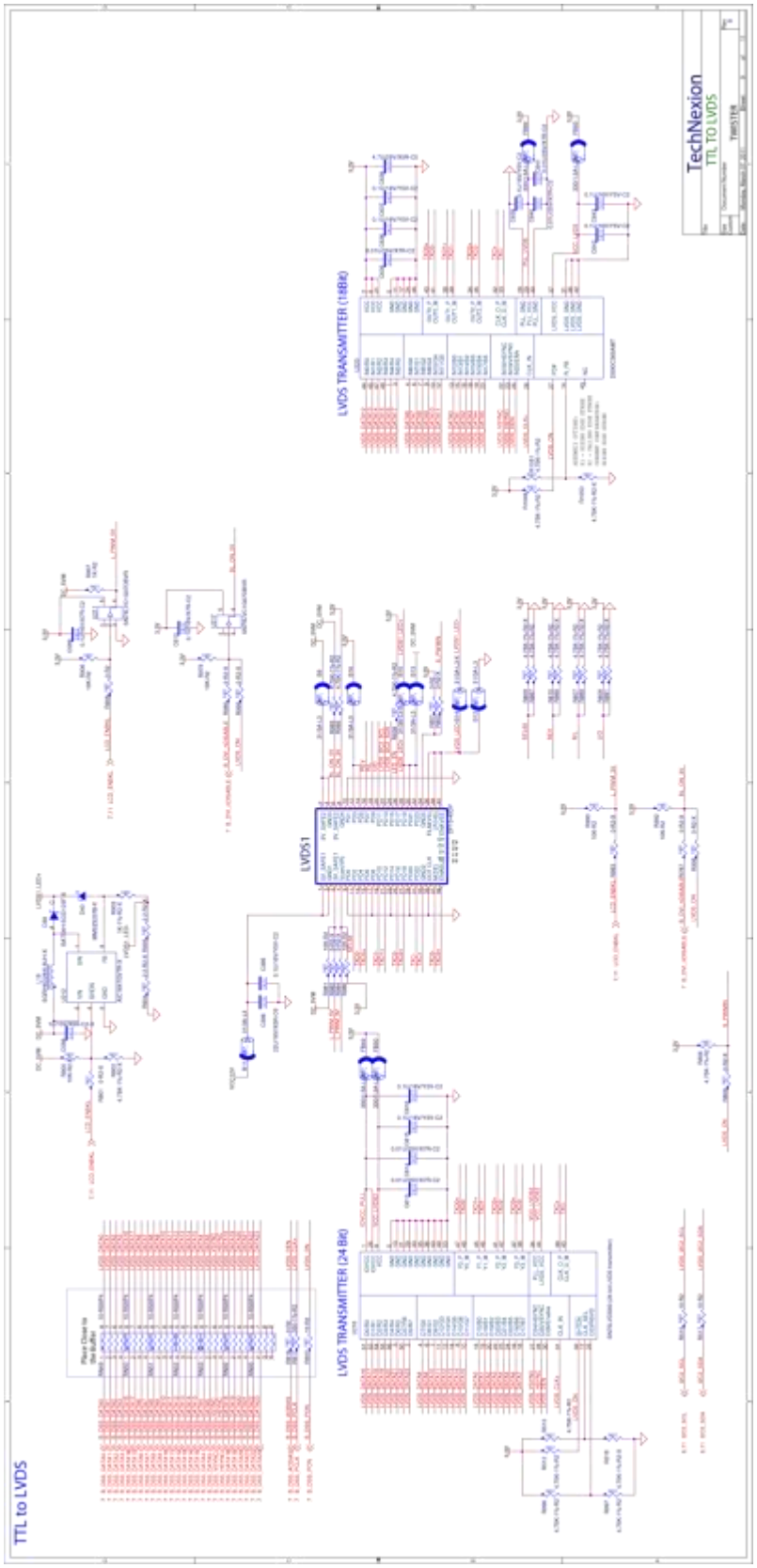


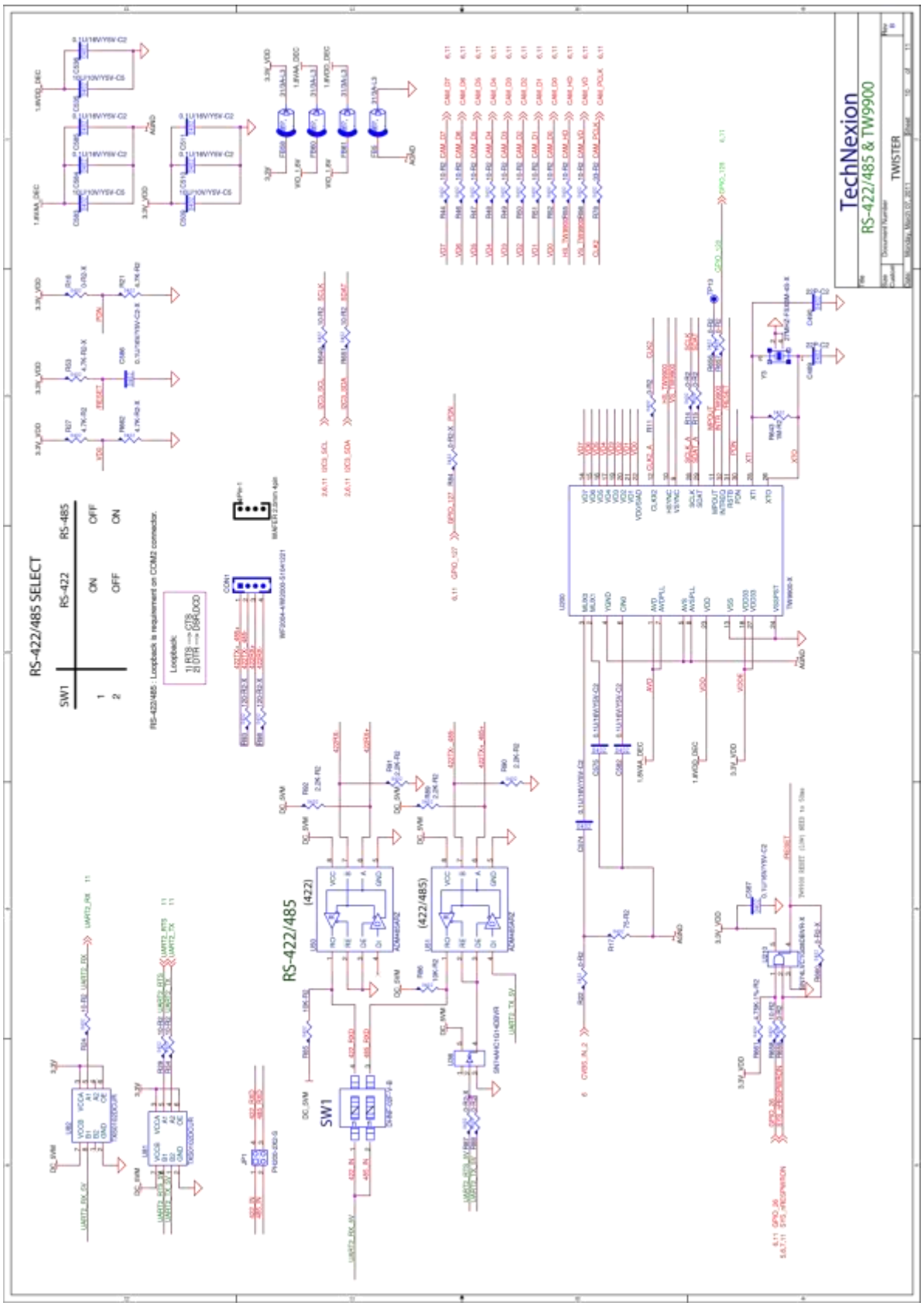
If you are designing your own baseboard then please contact sales@technexion.com for clear design files

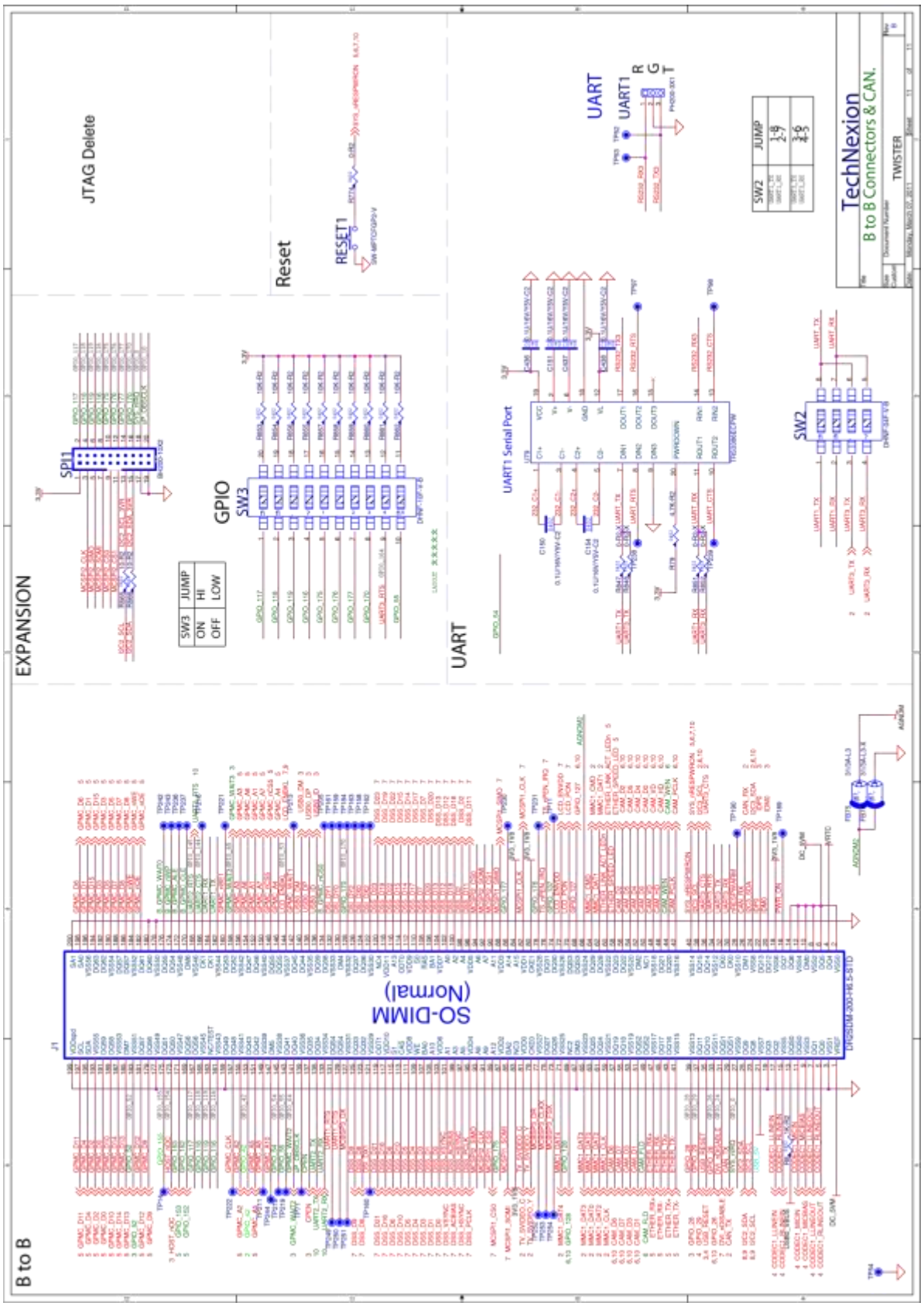

LCD Panel, Touchscreen,& Backlight
TTL PANEL
TTL PANEL 7"
LCD1
LCD3
TOUCHSCREEN
LED BACKLIGHT
INNOLUX
INNOLUX1
Touch Screen
TechNexion
TTL & HDMI(DVI)
TWISTER
16V
10.4V
9.3V
4V
-7V



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

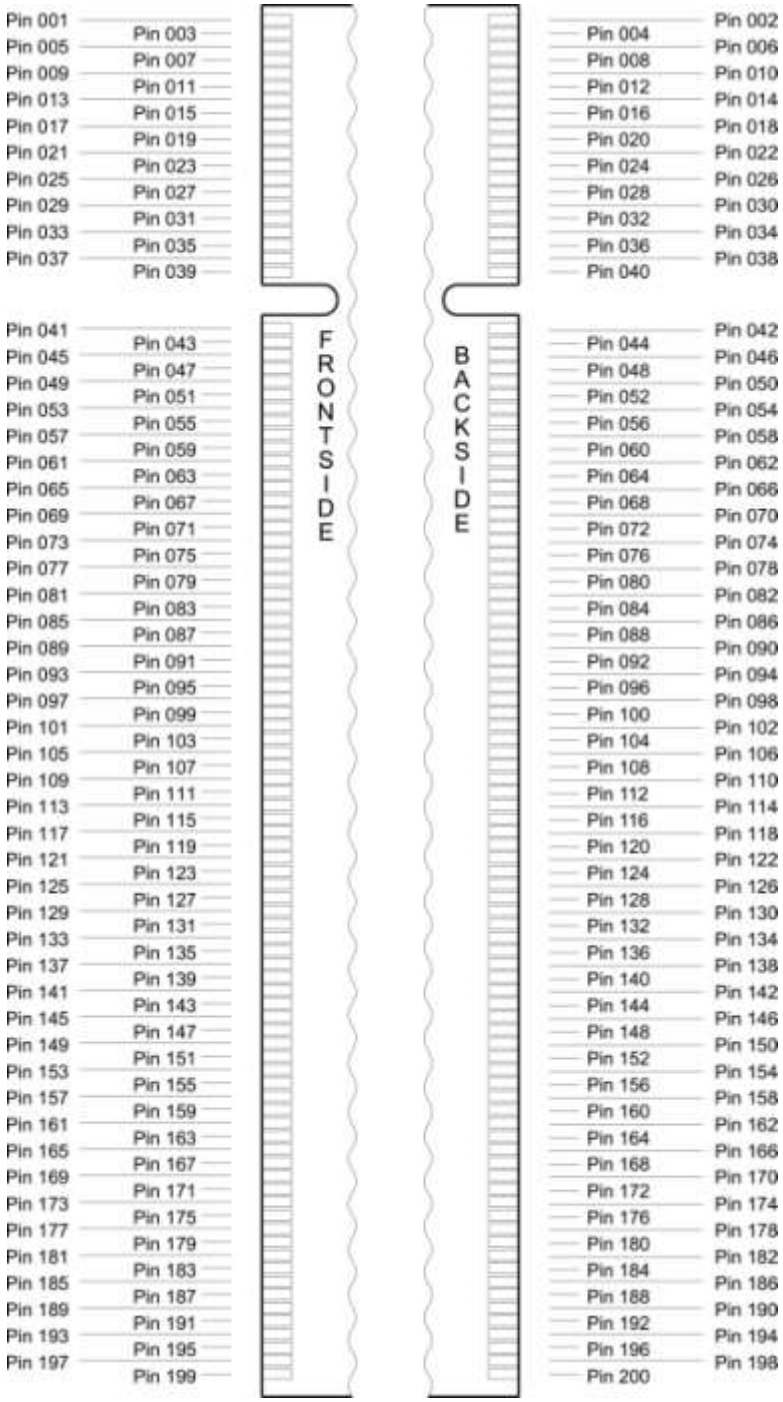

TechNexion
TTL TO LVDS
LVDS TRANSMITTER (18Bit)
LVDS1
LVDS TRANSMITTER (24 Bit)
TTL to LVDS


TechNexion
RS-422/485 & TW9900
TWISTER
RS-422/485 SELECT
SW1
RS-422
RS-485
ON
OFF
OFF
ON
RS-422/485
SW1


B to B
EXPANSION
JTAG Delete
Reset
RESET1
UART
UART1
R
G
T
SW2
JUMP
1-9
2-7
3-6
4-5
TechNexion
B to B Connectors & CAN.
TWISTER
SPI1
GPIO
SW3
SW3 JUMP
ON HI
OFF LOW
UART1 Serial Port
SO-DIMM
(Normal)

16 Appendix - Pin outs

16.1 Module connector



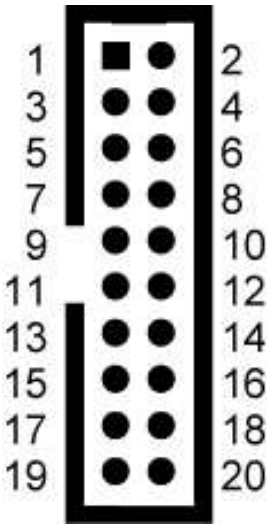
1	DC 5V	2	DC 5V
3	GND	4	VRTC
5	CODEC1 RLINEOUT	6	DC 5V

7	CODEC1 LLINEOUT	8	DC 5V
9	CODEC1 MICBIAS	10	DC 5V
11	CODEC1 MICIN	12	DC 5V
13	USB0 VBUS	14	DC 5V
15	CODEC1_RLINEIN	16	PWR_ON
17	CODEC1_LLINEIN	18	3V3
19	GND	20	IDMO
21	USB_5V	22	IDPO
23	I2C2_SCL	24	I2C3_SDA
25	I2C2_SDA	26	CAN_RX
27	SYS_nIRQ	28	nRESPWARM
29	CAN_TX	30	UART3_RX
31	DVI_nDISABLE	32	UART3_TX
33	GPIO_26	34	UART3_RTS
35	USB_RESET	36	UART3_CTS
37	GPIO_29	38	I2C3_SCL
39	GPIO_28	40	SYS_nRESPWRON
41	ETHER_TX-	42	CAM_PCLK
43	ETHER_TX+	44	CAM_WEN
45	ETHER_RX-	46	CAM_HD
47	ETHER_RX+	48	CAM_VD
49	CAM_FLD	50	CAM_D0
51	CAM_D1	52	CAM_D4
53	CAM_D3	54	CAM_D5
55	CAM_D7	56	CAM_D2
57	CAM_D6	58	ETHER_SPEED_LED
59	MMC1_CLK	60	ETHER_LINK_ACT_LEDn
61	MMC1_DAT2	62	MMC1_DAT1
63	MMC1_DAT0	64	MMC1_CMD
65	MMC1_DAT3	66	AGND
67	GND	68	GPIO_127
69	GPIO_128	70	LCD_PON
71	MMC1_DAT4	72	LCD_ENVDD
73	MCBSP3_FSX	74	GPIO_137
75	MCBSP3_CLKX	76	TS_nPEN_IRQ
77	MCBSP3_DR	78	GPIO_176
79	TV_SVIDEO_Y	80	3V3
81	TV_SVIDEO_C	82	MCSPI1_CLK
83	3V3	84	3V3
85	MCSPI1_SOMI	86	GPIO_177
87	GPIO_175	88	MCSPI1_SIMO

89	MCSPI1_CSO	90	MCSPI2_CS1
91	MCSPI2_CLK	92	MCSPI2_SOMI
93	MCSPI2_SIMO	94	MCSPI2_CS0
95	DSS_PCLK	96	DSS_D11
97	DSS_HSYNC	98	DSS_D2
99	DSS_ACBIAS	100	DSS_D18
101	DSS_VSYNC	102	DSS_D12
103	DSS_D0	104	DSS_D13
105	DSS_D1	106	DSS_D20
107	DSS_D3	108	DSS_D7
109	DSS_D4	110	DSS_D17
111	DSS_D5	112	DSS_D14
113	DSS_D10	114	DSS_D15
115	DSS_D6	116	DSS_D22
117	DSS_D16	118	DSS_D19
119	DSS_D21	120	DSS_D23
121	DSI_DX1	122	DSI_DX2
123	DSS_D8	124	DSI_DX0
125	DSS_D9	126	DSI_DY2
127	MCBSP3_DX	128	GPIO_170
129	UART1_CTS	130	DSI_DY0
131	UART1_RTS	132	DSI_DY1
133	UART2_RX	134	B_GPMC_nCS0
135	UART2_TX	136	USB0_ID
137	CPEN	138	USB0_DP
139	uP_OBSCLK	140	USB0_DM
141	GPMC_WAIT2	142	GPMC_WAIT1
143	GPIO_55	144	LDC_ENBKL
145	GPIO_54	146	GPMC_A4
147	GPMC_A10	148	GPMC_nCS5
149	GPMC_A8	150	GPMC_A7
151	GPMC_A5	152	GPMC_A1
153	GPIO_42	154	GPMC_A6
155	GPMC_A2	156	GPMC_A3
157	GPMC_CLK	158	GPMC_WAIT3
159	GND	160	GPMC_nBE1
161	GPIO_116	162	UART1_TX
163	GPIO_119	164	UART1_RX
165	GPIO_118	166	UART2_CTS
167	GPIO_117	168	UART2_RTS
169	GPIO_152	170	B_GPMC_CLE

171	GPIO_153	172	B_GPMC_ALE
173	HOST_nOC	174	B_GPMC_nWP
175	GPIO_155	176	B_GPMC_WAIT0
177	GND	178	GND
179	GPMC_D9	180	GND
181	GPMC_D12	182	GPMC_nOE
183	GPIO_52	184	GPMC_nWE
185	GPMC_D13	186	GPMC_D8
187	GPMC_D14	188	GPMC_D7
189	GPMC_D10	190	GPMC_D5
191	GPMC_D0	192	GPMC_D3
193	GPMC_D2	194	GPMC_D15
195	GPMC_D4	196	GPMC_D1
197	GPMC_D11	198	GPMC_D6
199	GND	200	GND

16.2 SPI1

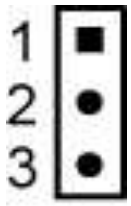


Marking on main board: SPI1

1	+3.3V	2	GPIO_117
3	MCSPI2_CLK	4	GPIO_118
5	MCSPI2_SIMO	6	GPIO_119
7	MCSPI2_SOMI	8	GPIO_116
9	MCSPI2_CS0	10	GPIO_175
11	MCSPI2_CS1	12	GPIO_176
13	I2C2_SCL_3V	14	GPIO_177
15	I2C2_SDA_3V	16	GPIO_170
17	GND	18	SYS_nIRQ
19	GND	20	uP_OBSCLK

NOTE: SPI1 @3.3V

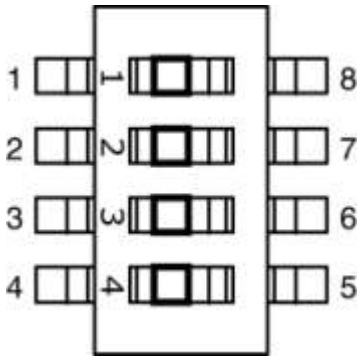
16.3 UART 1/UART 3



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)

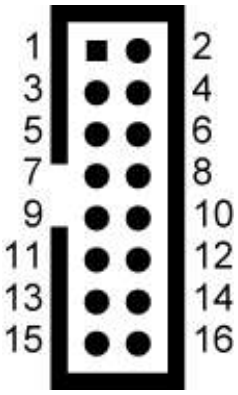
Switch between UART1 and UART3



Marking on main board: SW2

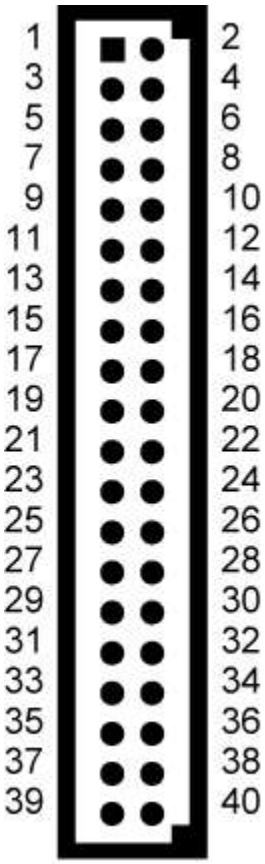
1&2 on, 3&4 off	UART1 (debug port)
1&2 off, 3&4 on	UART3

16.4 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

16.5 LVDS connector



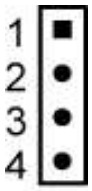
Data connector is 40 pin

Marking on main board: LVDS1

1	Vcc12V	2	DC_5VM
3	Vcc12V	4	DC_5VM
5	LCD Enable @5V	6	Backlight on @5V
7	LCD Enable @3.3V	8	Backlight on @3.3V
9	GND	10	GND
11	SEL68	12	3.3V
13	TXD0-	14	3.3V

15	TXD0+	16	REV
17	GND	18	R/L
19	TXD1-	20	U/D
21	TXD1+	22	LVDS_I2C_SCL
23	GND	24	LVDS_I2C_SDA
25	TXD2-	26	LED Enable @3.3V
27	TXD2+	28	LVDS_LED+ (Backlight Power +)
29	GND	30	LVDS_LED+ (Backlight Power +)
31	TXC-	32	LVDS_LED+ (Backlight Power +)
33	TXC+	34	LVDS Enable @3.3V
35	GND	36	LVDS_LED- (Backlight Power -)
37	TXD 3-	38	LVDS_LED- (Backlight Power -)
39	TXD 3+	40	LVDS_LED- (Backlight Power -)

16.6 RS-422/485 connector

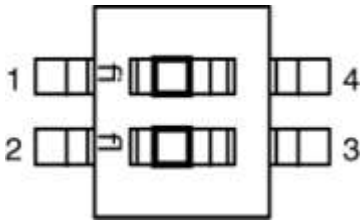


1 422TX+ 485+

2 422TX- 485-

3 422RX+

3 422RX-

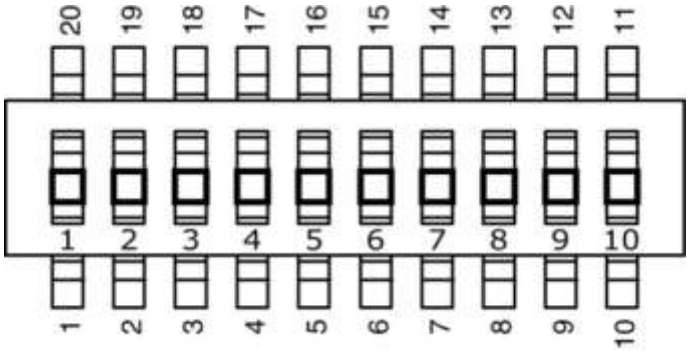


Marking on main board: SW1

1 on 2 off RS-422

2 on 1 off RS-485

16.7 GPIO Switch (SW3)



Marking on main board: SW3

4	3	2	1	Function: Display settings
Off	Off	Off	Off	Panel LG LB043WQ2 (4.3")
Off	Off	Off	ON	Panel Innolux AT070TN93 (7")
Off	Off	ON	Off	LVDS AUO-B089
Off	Off	ON	ON	DVI/ HDMI/ VGA 1280x720@60
Off	ON	Off	Off	TV out NTSC
Off	ON	Off	ON	TV out PAL
Off	ON	ON	Off	LVDS auo-g065vn01 with touch
Off	ON	ON	ON	LVDS auo-g121sn01 with touch
ON	Off	Off	Off	LVDS auo-g150xg01 with touch
ON	Off	Off	ON	LVDS auo-g070vw01 with touch
ON	Off	ON	Off	LVDS auo-g084sn05 with touch
ON	Off	ON	ON	LVDS auo-g104sn02 with touch

7	6	5		Function: System settings
Off	Off	Off		Linux Angstrom
Off	Off	ON		Android

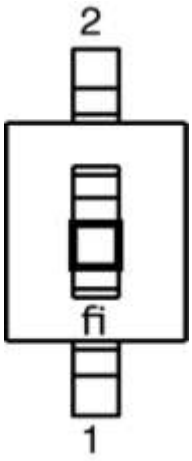
10	9			Function: Root file system path
Off	Off			NAND
Off	ON			MMC
ON	Off			NFS (remote server, default host IP 192.168.1.5, default server IP 192.168.1.4)(can change in u-boot)

16.7.1 Auto Update Procedure

It is possible to automatically update the system that is in the NAND Flash. Chapter 8 to 9 describes how to update.

8			Function: Auto update mode
Off			Normal operation
ON			Auto update from MMC

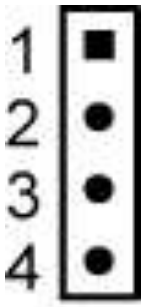
16.8 USB client/host Switch (SW4)



Marking on main board: SW4

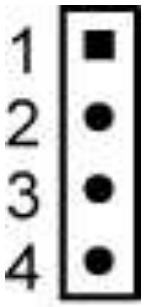
1 on	Host
1 off	Client

16.9 CANBUS



CAN1 (CAN IN)

1	CAN High
2	CAN Low
3	Read Back
4	GND

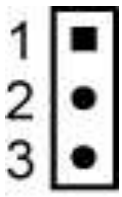


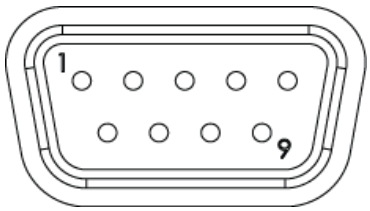
CAN2 (CAN OUT)

1	CAN High
2	CAN Low
3	Read Back
4	GND

16.10 RS-232 Cable

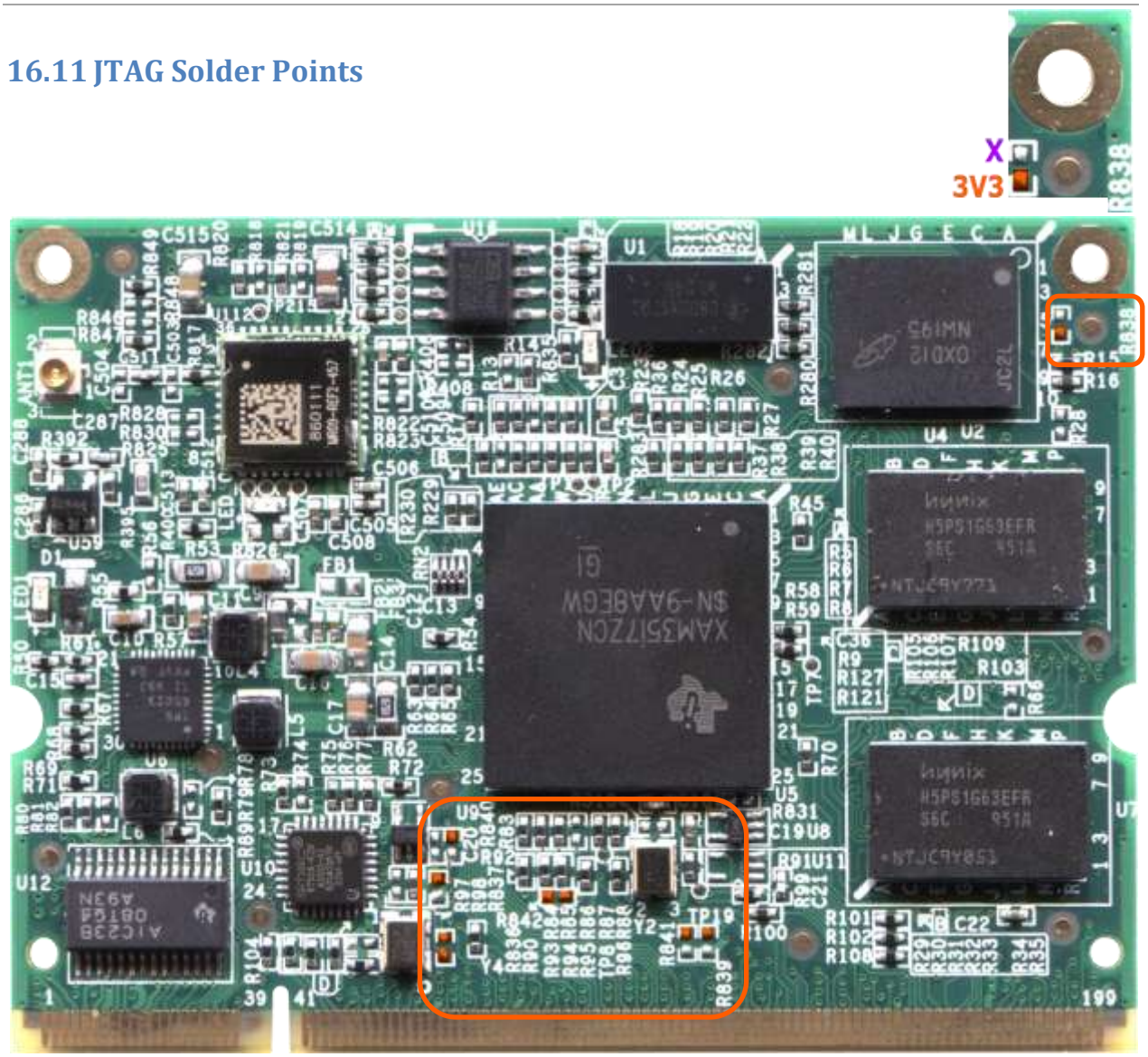
Accessory





1 (white dot)	3
2	5
3	2

16.11 JTAG Solder Points



(Figure: tam-3517_revB) Solder at the orange pads