TechNexion

4/16/2012

SOM

TDM-3730 System on Module

TechNexion

TDM-3730

TDM-3730 System on Module

and its Baseboards

User's Guide

Rev 0.94

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).

TechNexion Ltd.

17F-1 No. 16 Jian Ba Road
Chung Ho City, 23511, Taipei, Taiwan R.O.C.
Phone : +886-2-8227 3585
Fax : +886-2-8227 3590

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 TDM-3730 System on Module (SOM) is a small computer that can be clicked in a baseboard with several IO's to form a full computer. Each base board can be developed with IO's in different places and with different functions. The Idea behind the product is that anyone can develop a base board suitable for their needs and just plug in the SOM. This will make the system very flexible and faster to develop and cheaper than developing a single board solution, because all the hard work is already completed within the SOM module.

Anybody can buy a TDM-3730 and a Baseboard from our website.

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

The TDM-3730 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 Blizzard baseboard XL (7" LCD)

This guide describes how to put the TDM-3730W module and the Blizzard interface board together, how to connect the LCD and power up the board.

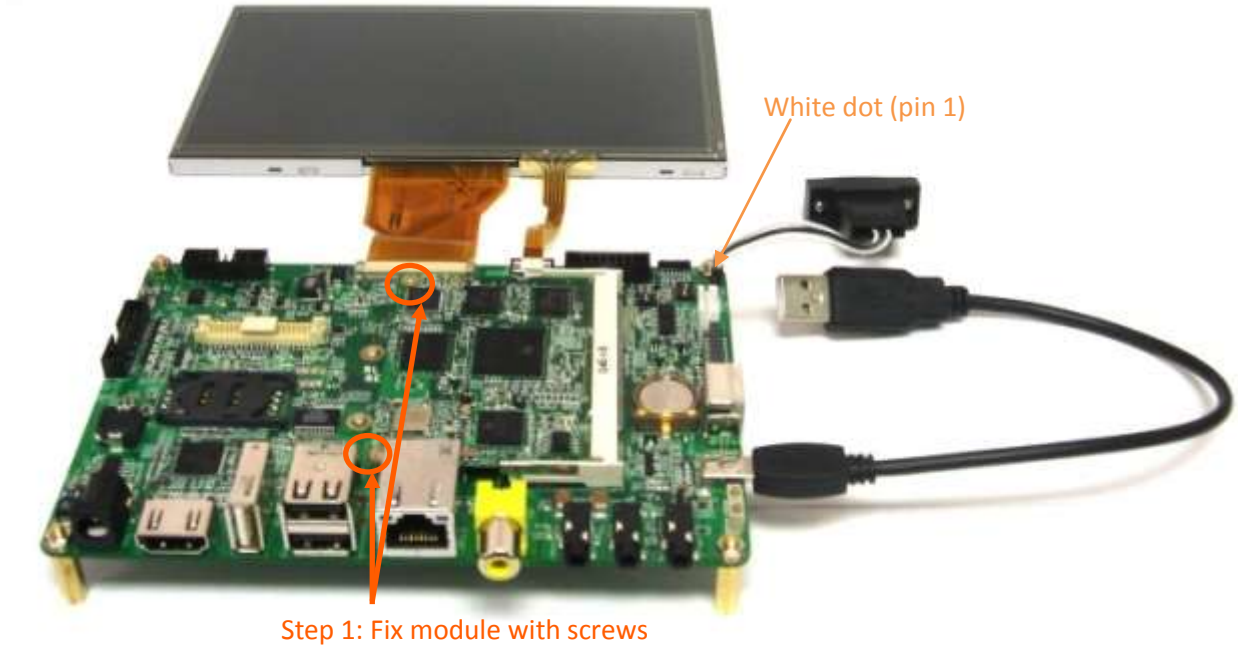


Figure 1

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 Blizzard interface board should be done by following the following steps.

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

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

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

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

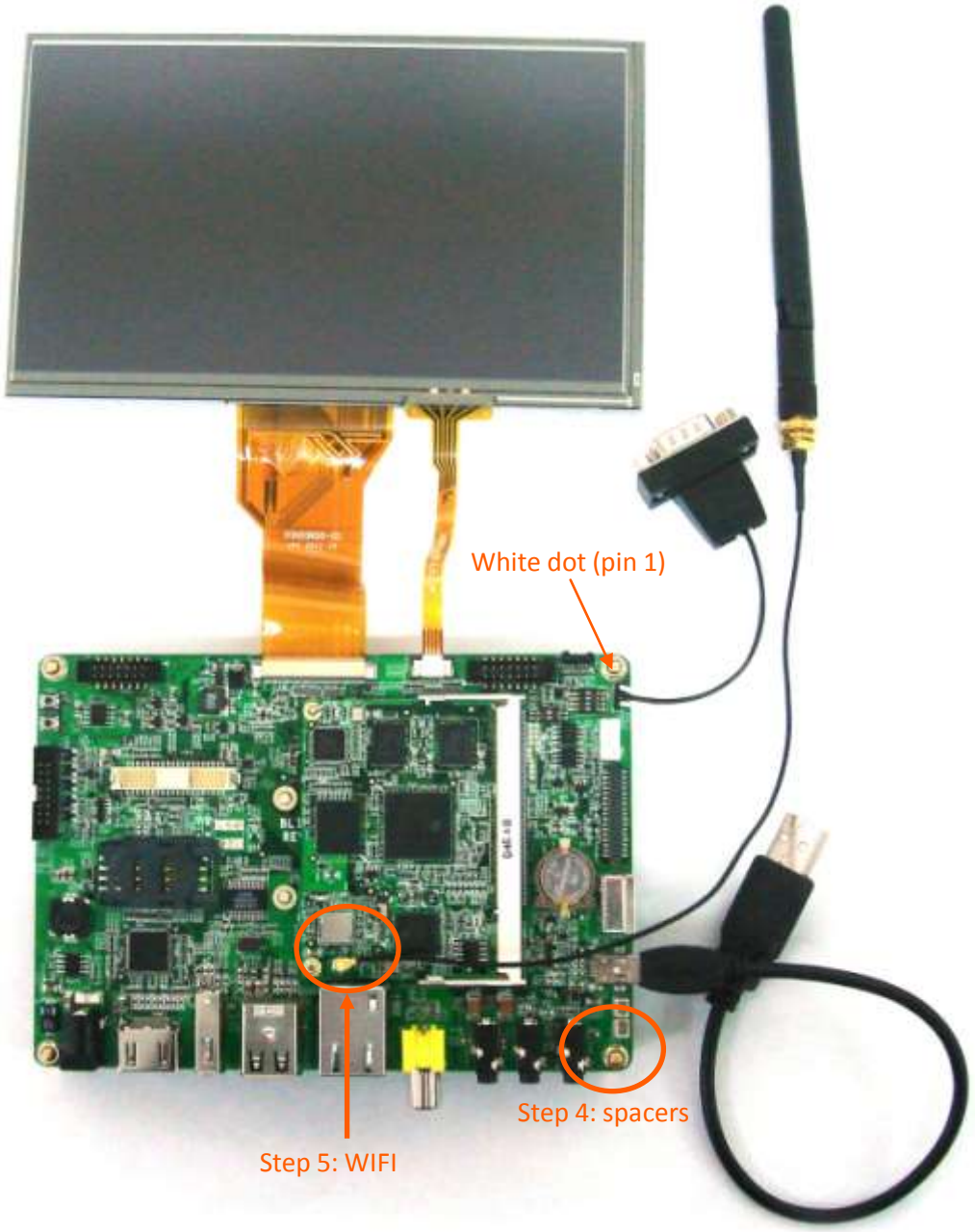


Figure 4: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

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

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

Step 5: for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TDM-3730W module.

4.2 First time use Blizzard baseboard (4.3" LCD)

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

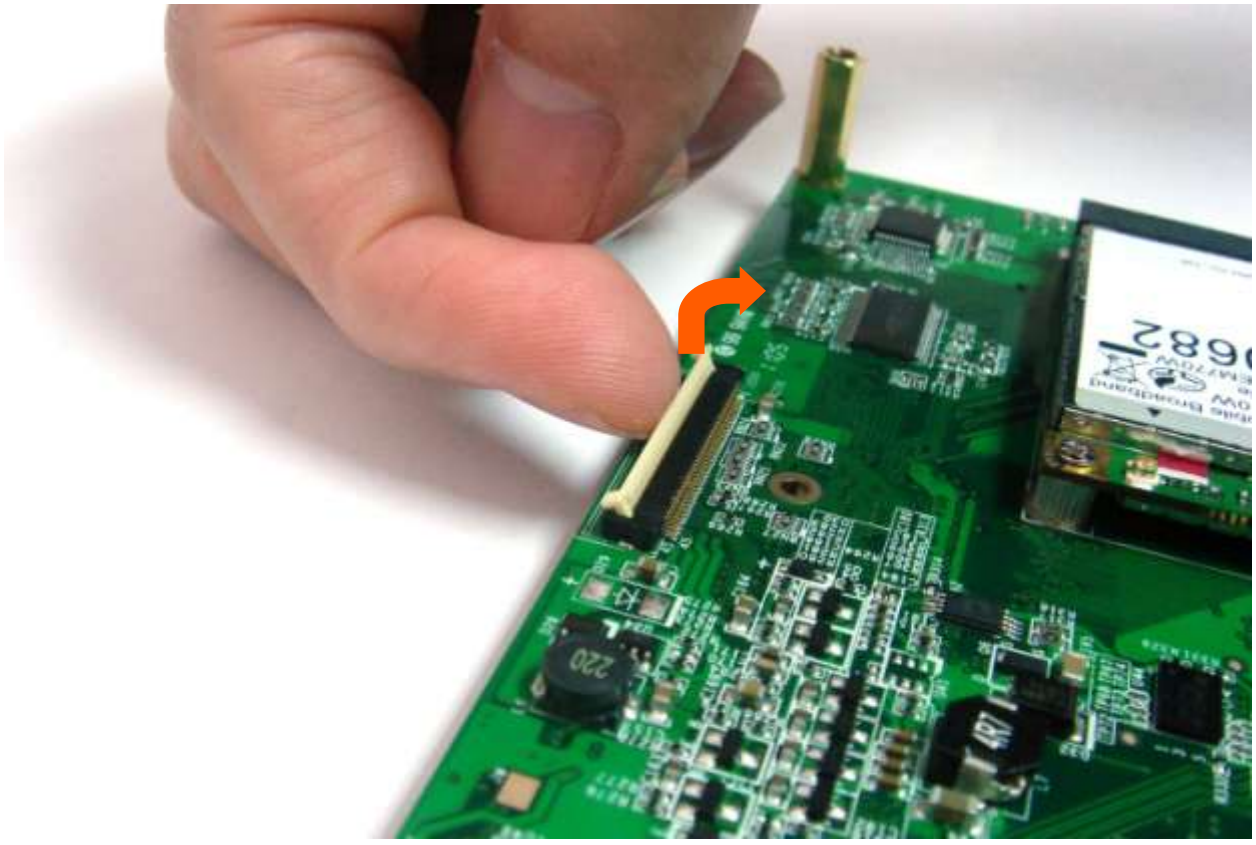


Figure 5: Step 2a - Turn the connector at the bottom side of the Blizzard baseboard upward open with your nail. The black flip-type will stand up in an angle of about 90 degrees

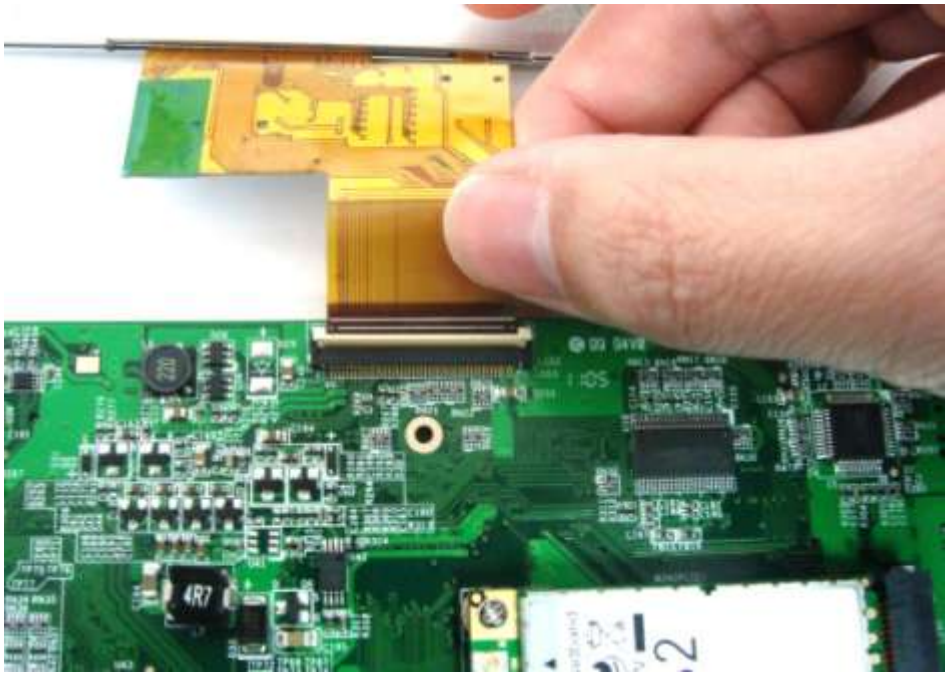


Figure 6: Step 2b - Insert the LCD panel FPC. There are 2 white horizontal lines on the end of the connector. The first line will nearly go into the connector but still remain visible. The line should be parallel to the connector itself.

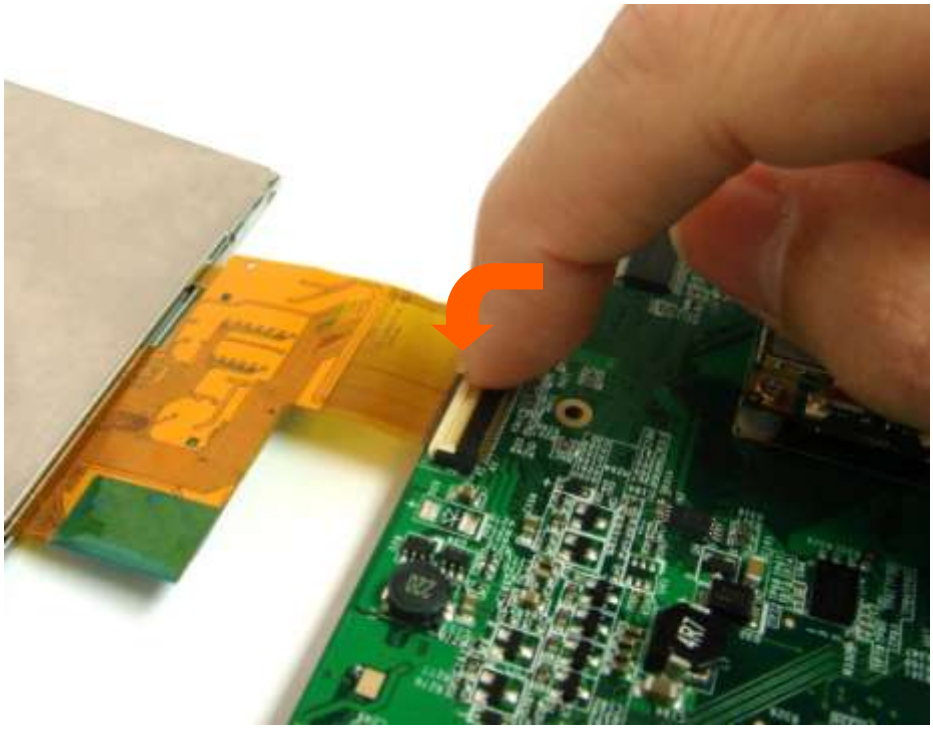


Figure 7: Step 2c - Close the connector to firmly lock the connection and avoid the panel to come loose.

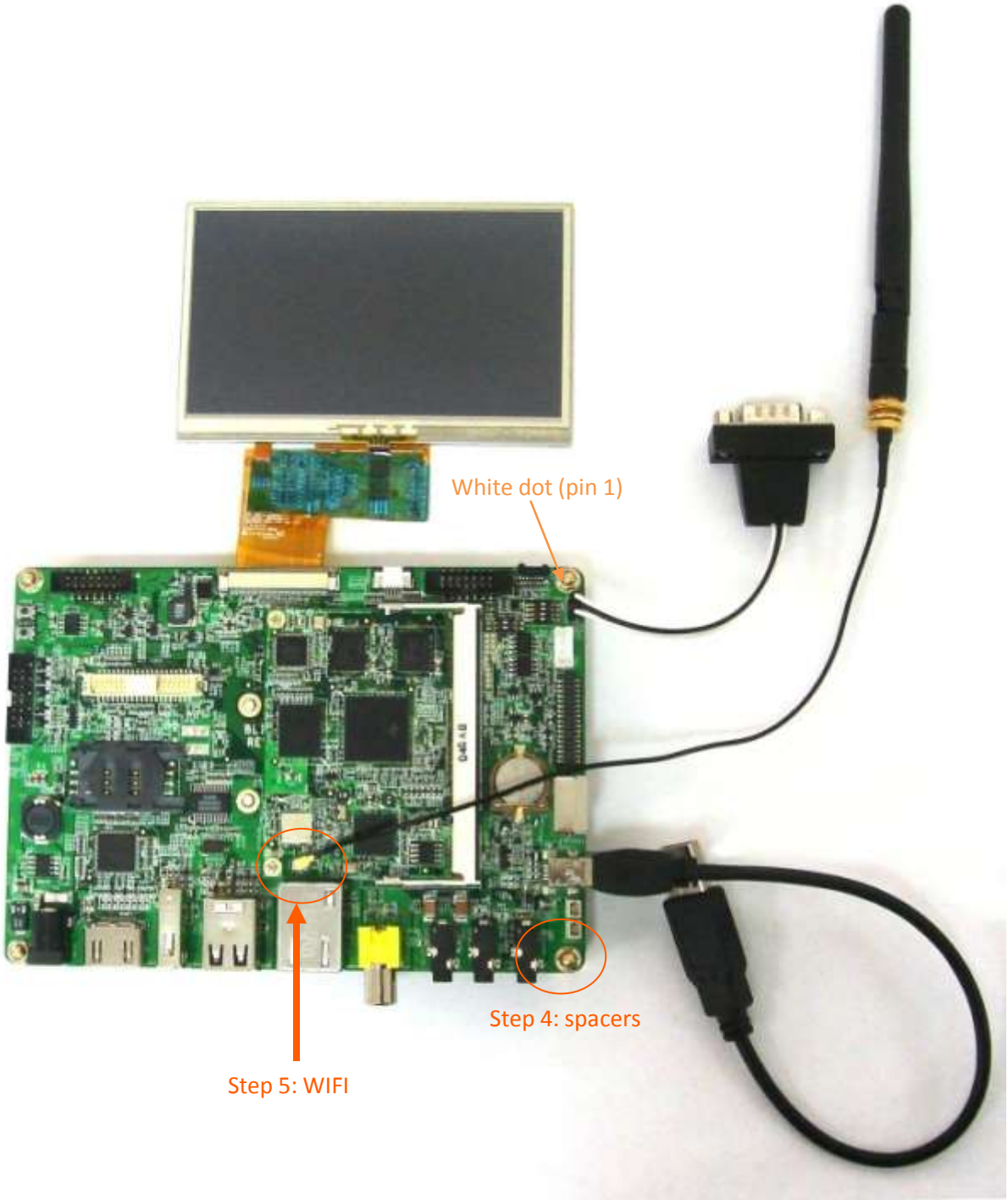


Figure 8: Step 3a - Connect the RS-232 serial console cable as on the picture above. (Note: RS-232 serial console cable might need a gender changer when connected to, for example, a null-modem. One can also reverse the connected cable)

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 Blizzard interface board and the LCD. (The power cord is not included in the pack; please get one with a plug that fits your local power outlet)

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

Step 5: for better WIFI reception connect the antenna to the U.FL (IPEX) connector on the TDM-3730W module

4.3 Explanation of the TDM-3730W System on Module

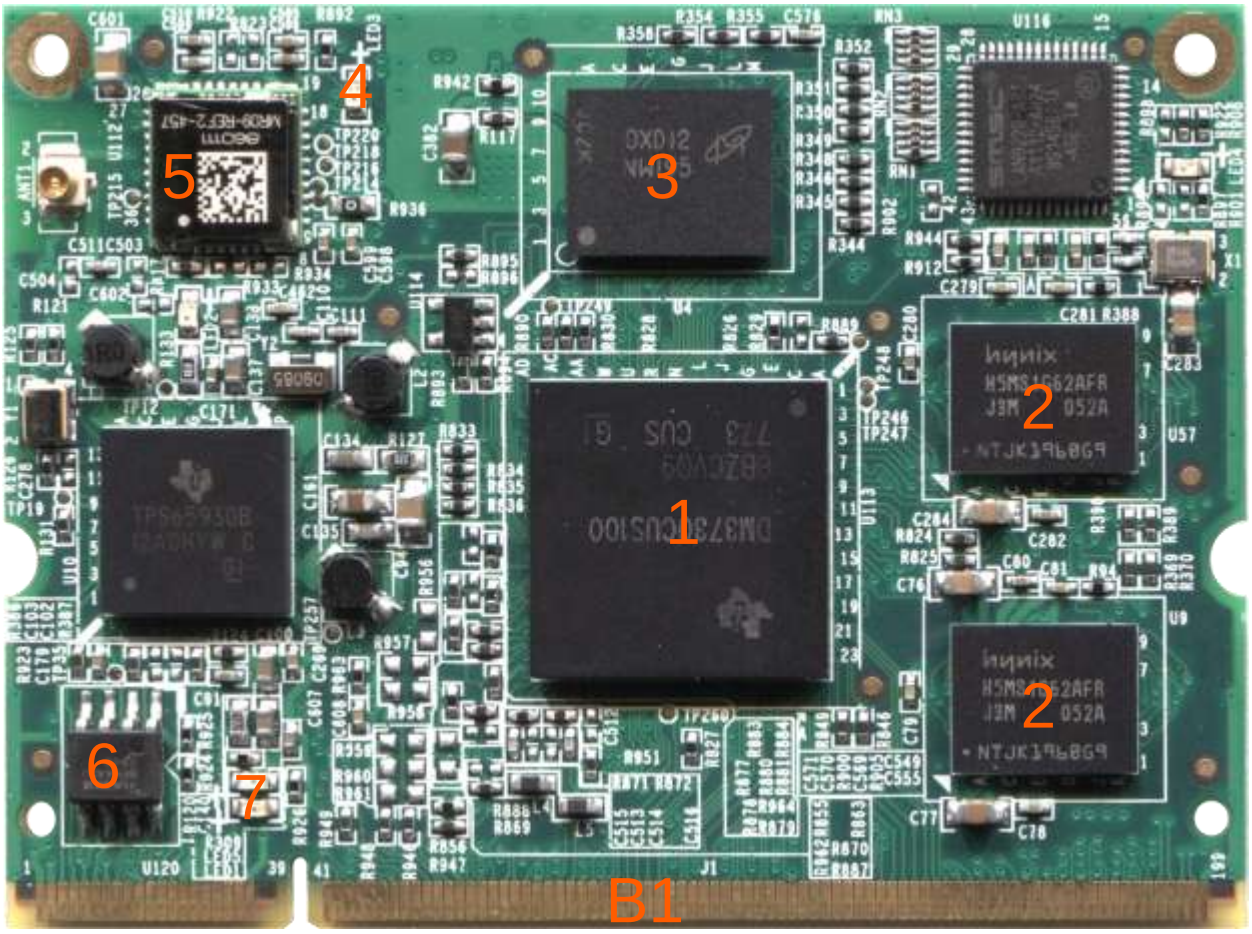


Figure 9: TDM-3730 top view

Top view

1 CPU

2 Memory

3 NAND Flash

4 LED: Wi-Fi

5 Wireless LAN 802.11b/g by SDIO MMC2 with IPEX U.FL connector (TDM-3730W = wireless)

6 EEPROM

7 LED: Power

B1 200 pin SO-DIMM connector

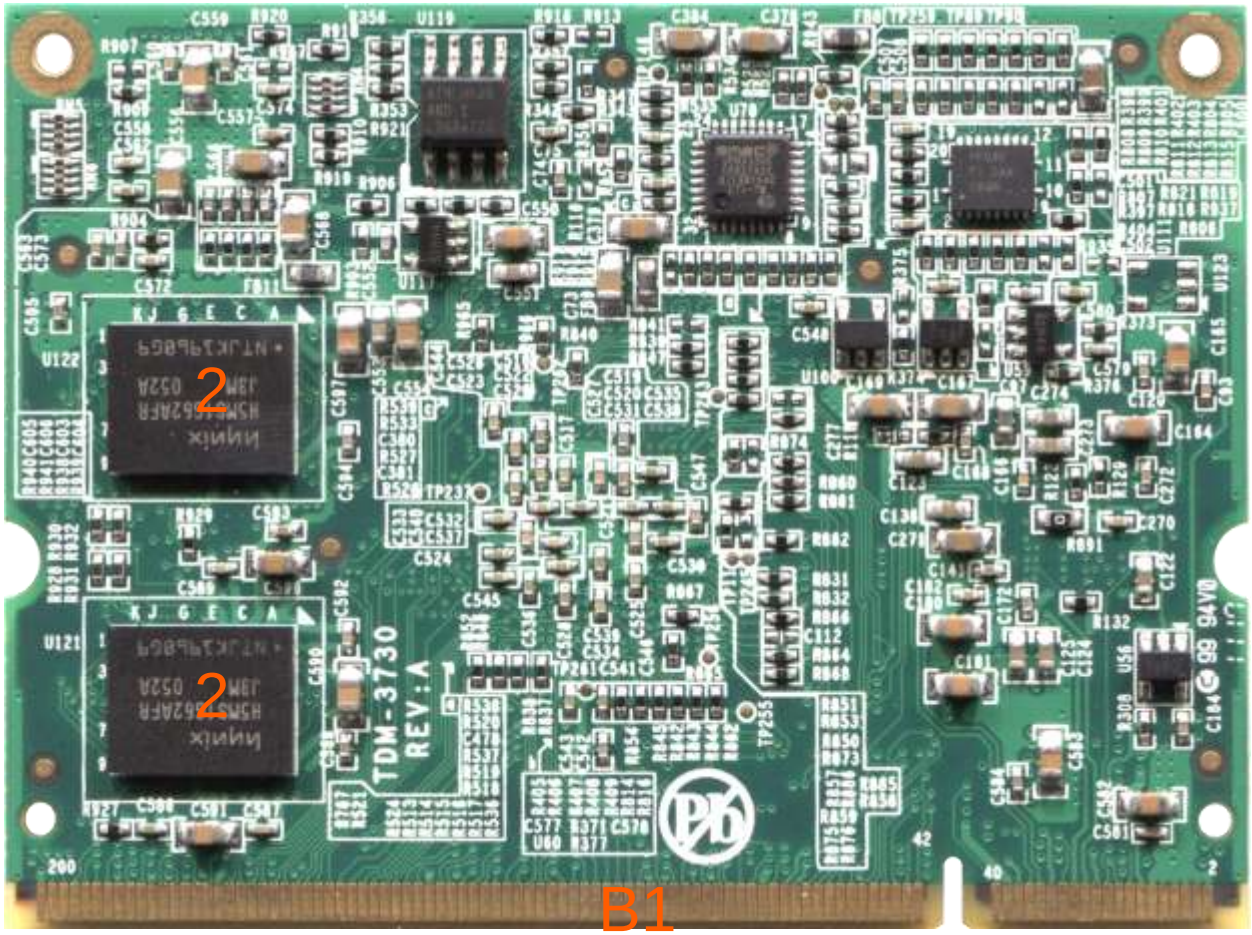


Figure 10: TDM-3730 bottom view

Bottom view

B1 200 pin SO-DIMM connector

4.4 Explanation of the Blizzard Baseboard

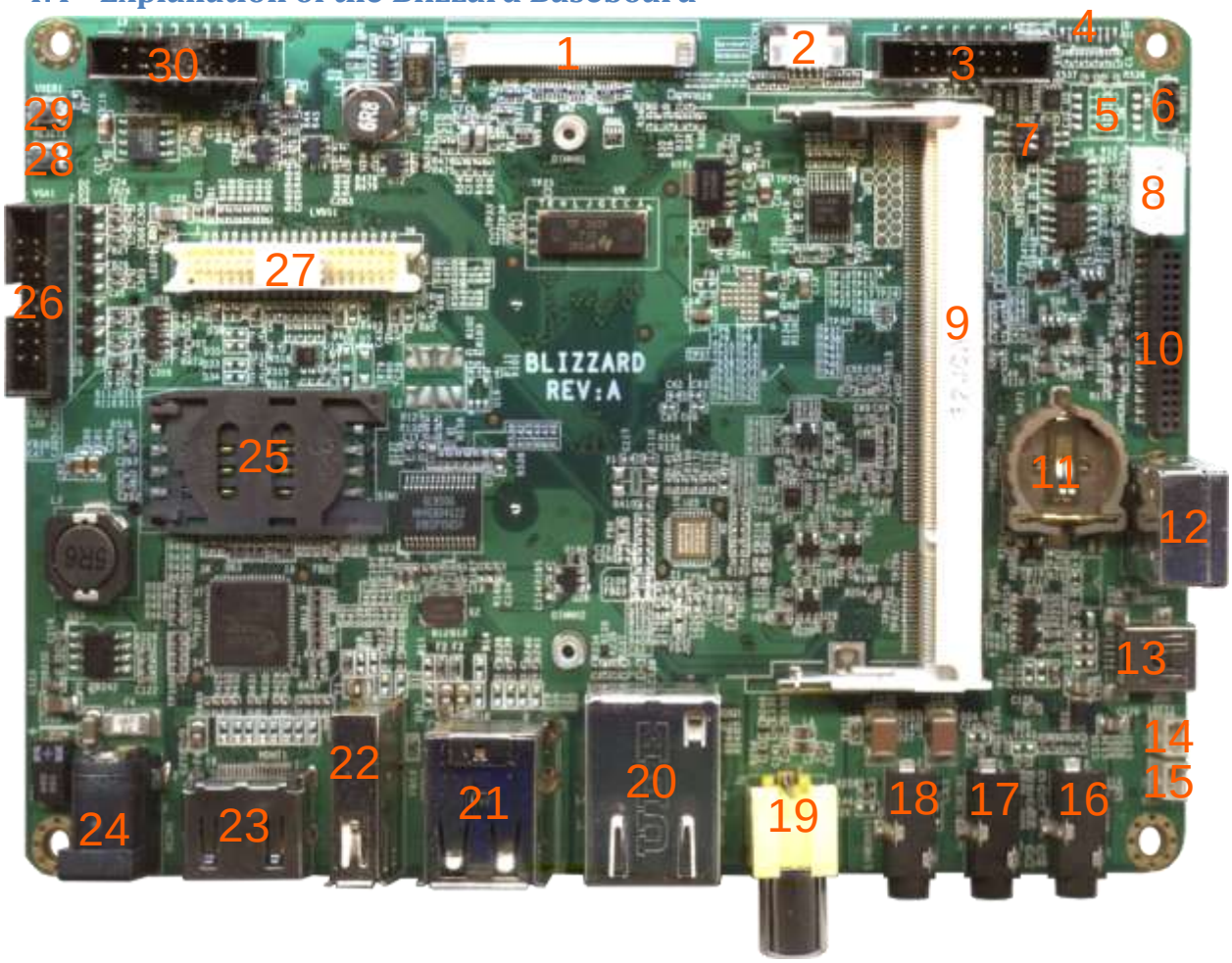


Figure 11: Blizzard Baseboard top view

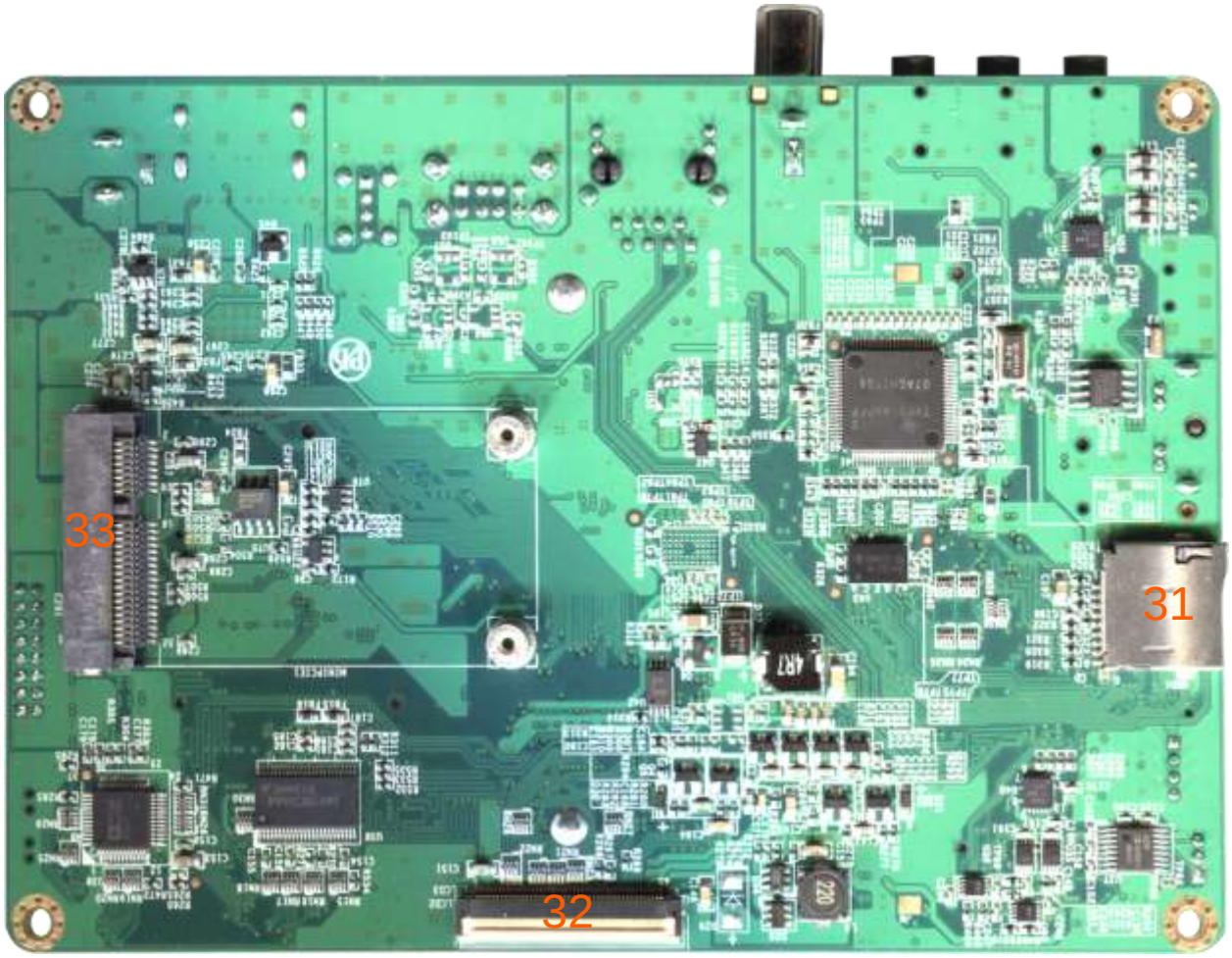


Figure 12: Blizzard Baseboard bottom view

1 LCD TTL Flat panel connector with touch screen to connect to 7 inch LCD panel

2 Connector for 4 wire touch panel of LCD panel

3 Pin header for front connector

4 Infrared sensor

5 Switch select UART1/UART3

6 Pin header for RS-232 (UART1/UART3)

7 Switch select RS-422/485

8 RS-422/485

9 Connector to the TDM-3730 CPU module (DDR2 SO-DIMM 200 pin SMT, standard, H:6.5 mm, e.g. Foxconn AS0A426-N6SN-4F)

10 Camera expansion connector

11 RTC Battery (CR-1220)

12 S-video out

13 USG OTG

14 Speaker left

15 Speaker right

16 Microphone

17 Line in

18 Line out

19 RCA Composite Video in connector

20 LAN

21 USB HOST (2x)

22 USB HOST (1x)

23 HDMI connector

24 12 V DC power connector

25 SIM card slot (to use in combination with a 3G card in the PCIe slot)

26 Pin header for VGA connector

27 LVDS connector for LCD panel

28 Power button

29 User definable button (back button in Android)

30 Keypad connector

31 Micro SD card slot

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

33 PCIe slot (to connect for example a 3G card)

5 Mechanical Dimensions

5.1 TDM-3730 dimensions

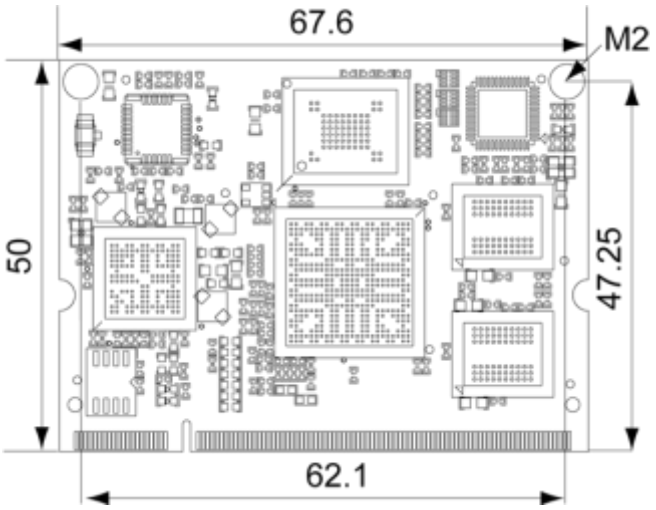


Figure 13: TDM-3730 dimensions (Dimensions in mm)

5.2 Blizzard Baseboard dimensions

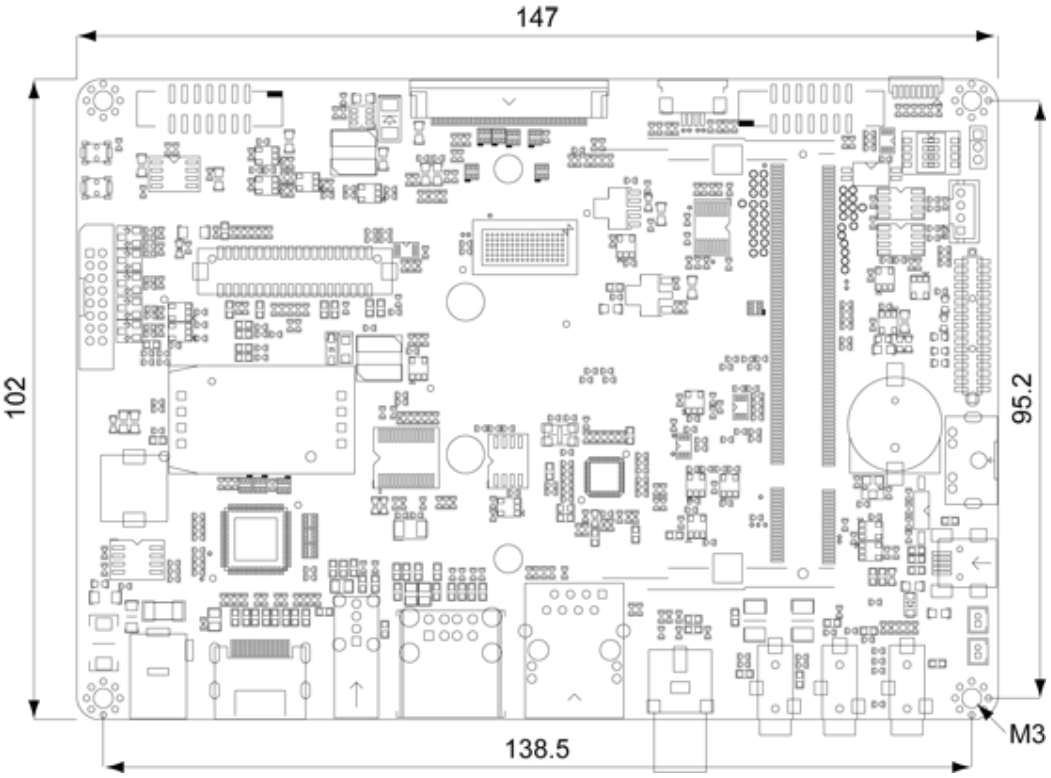


Figure 14: Blizzard Baseboard dimensions (Dimensions in mm)

Note: 2D DXF-files and 3D STEP-files are available at the download center.

6 Optional 3G module and SIM placement

Figure 15: Place an optional 3G module in the connector (at bottom side) as shown above and fix it with screws.

Connect the antennas and insert a SIM card in the slot on the other side (topside) of the board.

7 Optional Camera module placement

Figure 16: Place an optional camera module (TCM-500A) in the connector (at top side) as shown above.

8 Downloads and drivers

Drivers and other download can be found at the TechNexion website > Support > Download Center

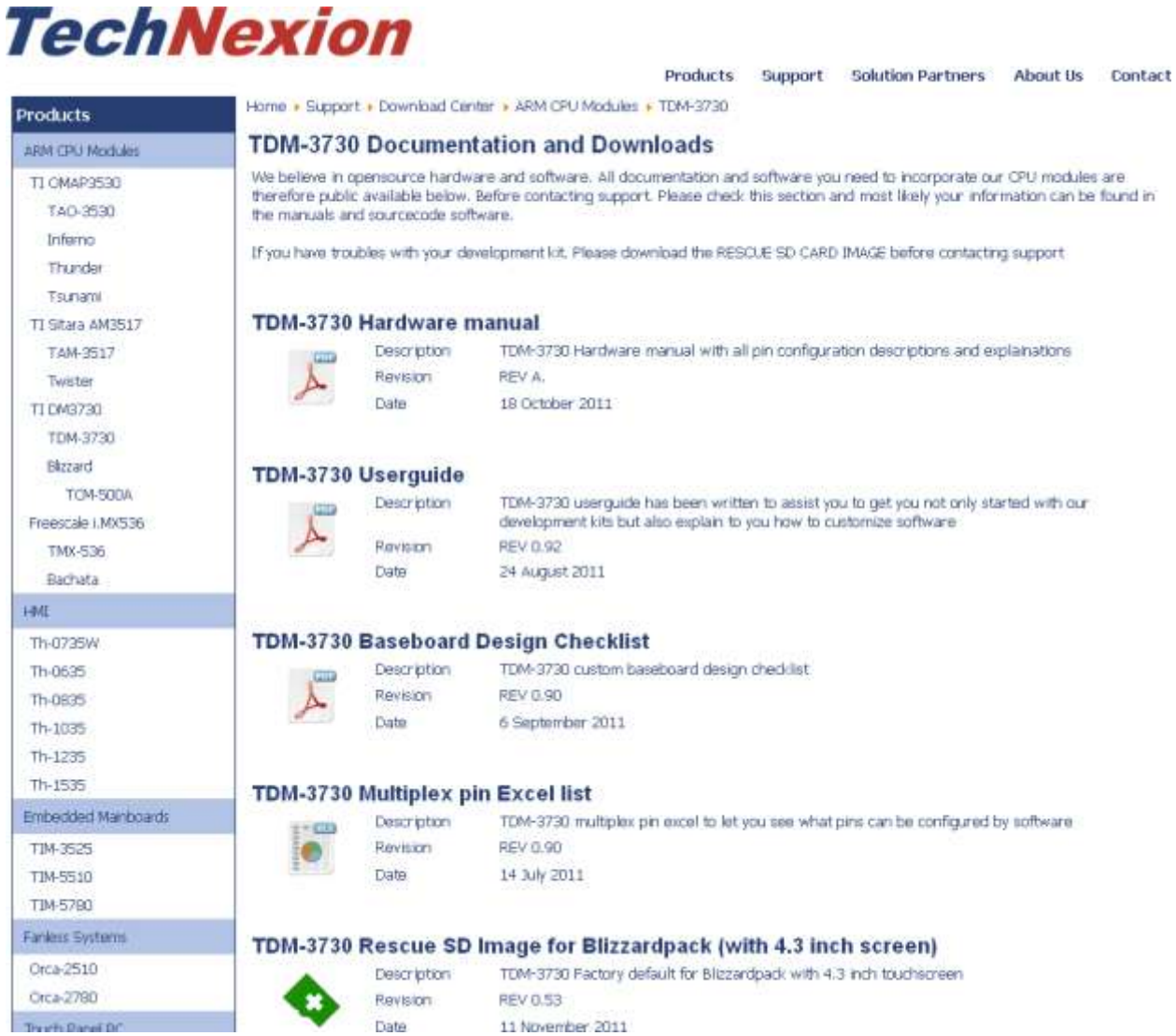


Figure 17: The Download Center at the TechNexion website

9 Software – Factory Default Screen

Figure 18: 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 9.4)

9.1 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.

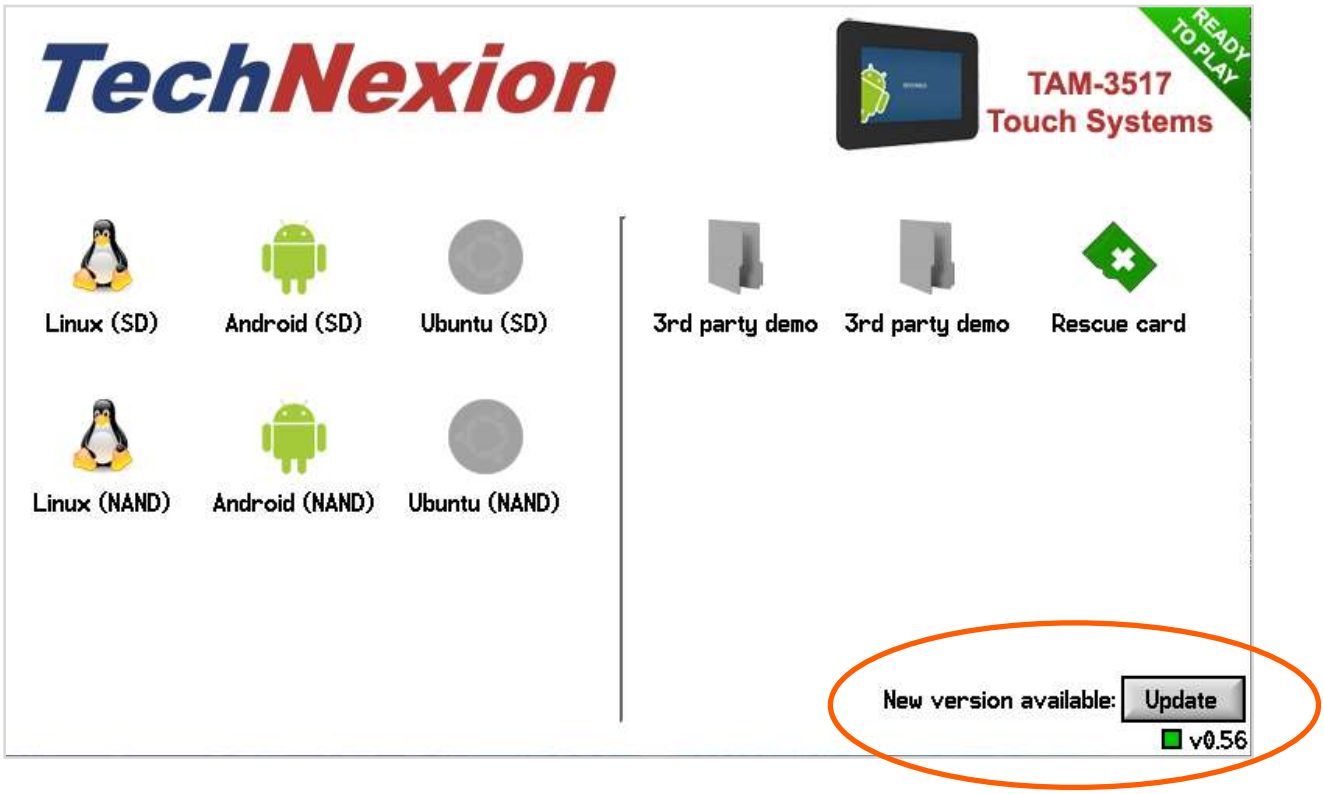


Figure 19 : the location of the factory default screen update button

9.2 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.

9.3 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.

9.4 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 20 : the rescue images on the download center. Make sure you choose the correct image.

9.4.1 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

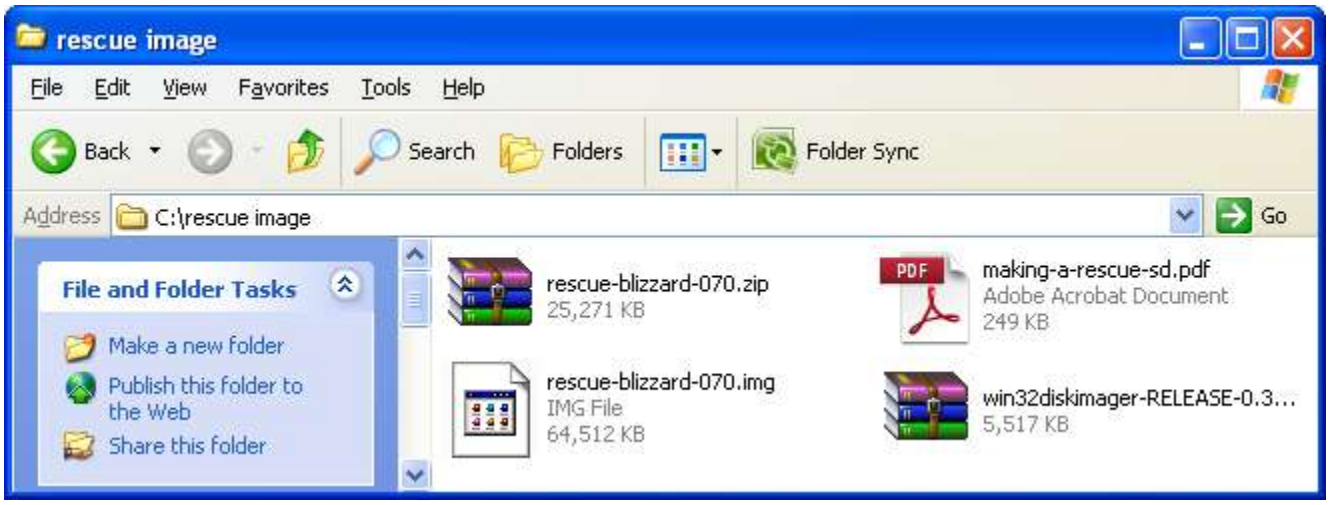


Figure 21: Extracted files

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-blizzard-070.img	Rescue image for Blizzard baseboard with 7" LCD

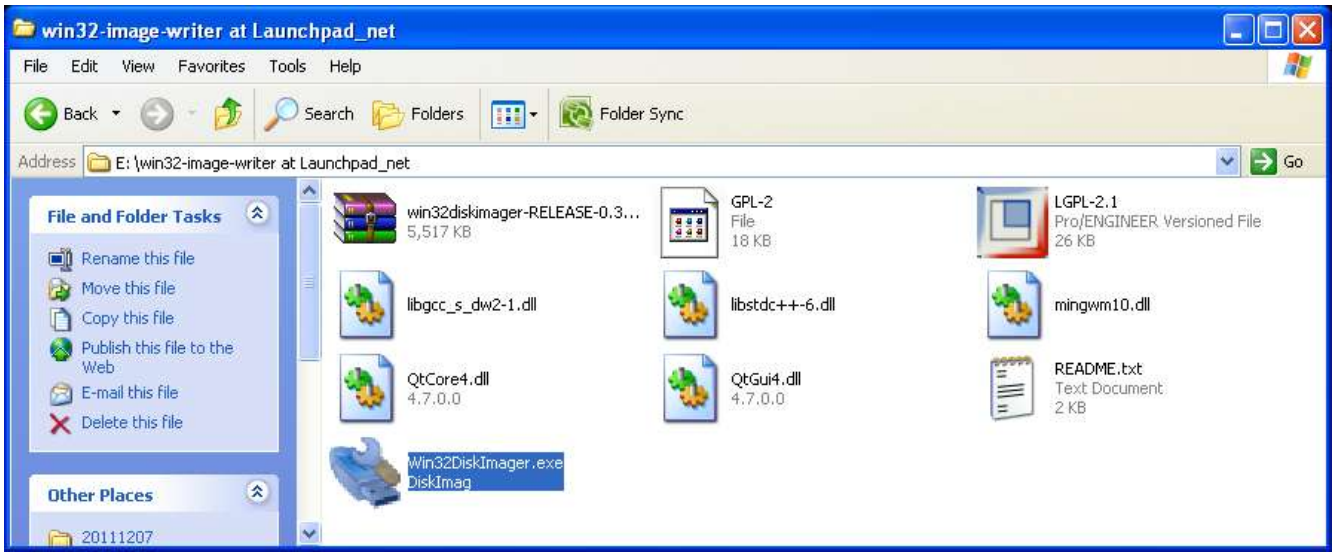


Figure 22: Extract and execute the win32-disk-imager to prepare the rescue image creation

Figure 23: example of converters to plug the Micro-SD in your computer

After inserting the SD-card click the Refresh icon

Figure 24: Select the SD-card (in your computer) as device

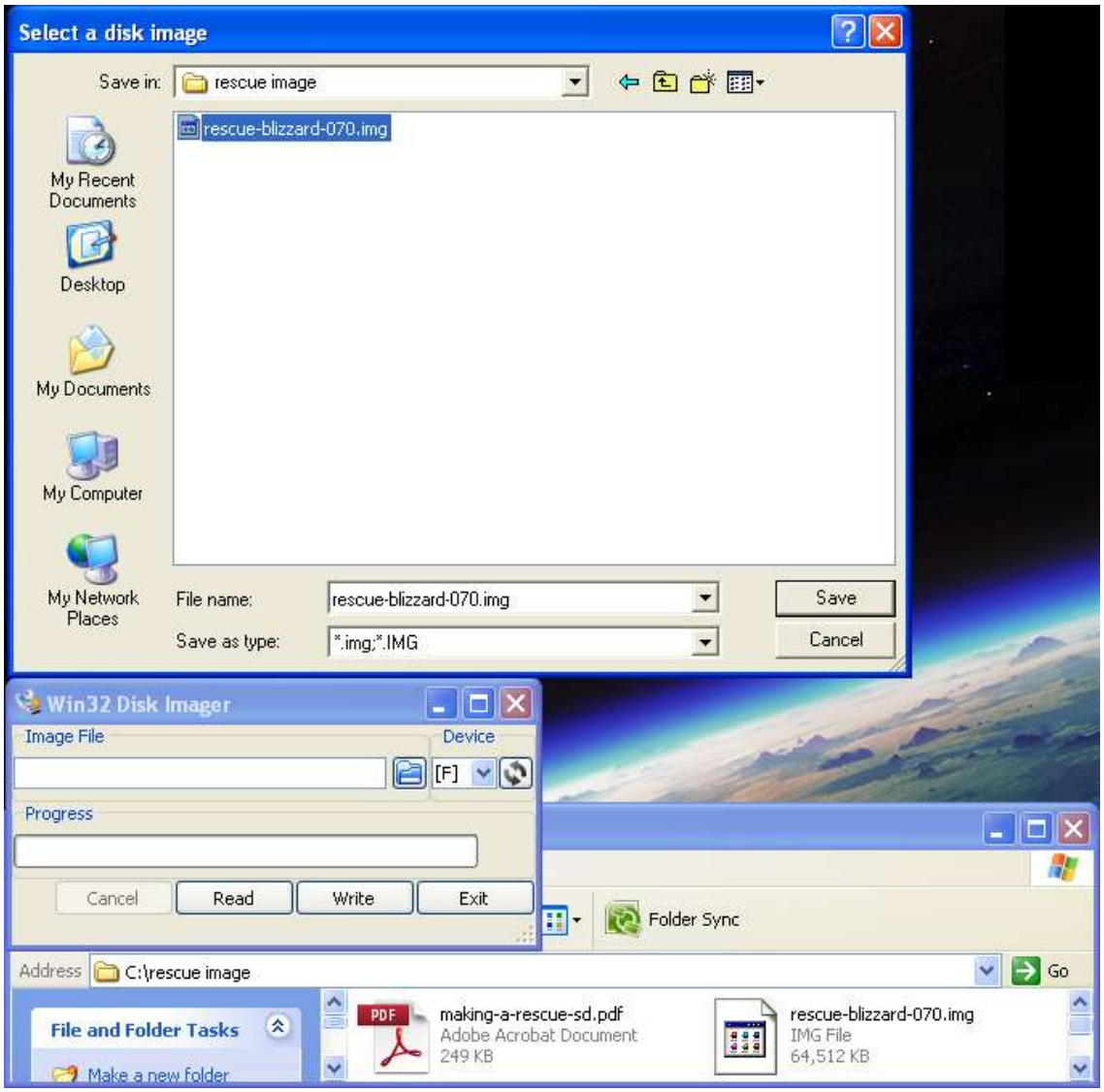


Figure 25: Select, browse and locate the rescue- image file

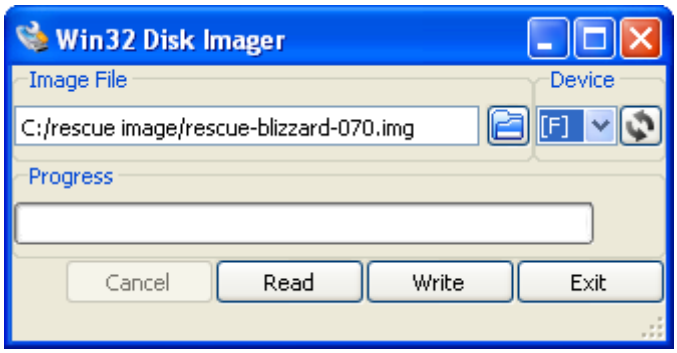


Figure 26: Click the write button to create the rescue-image SD-card

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.

9.4.2 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

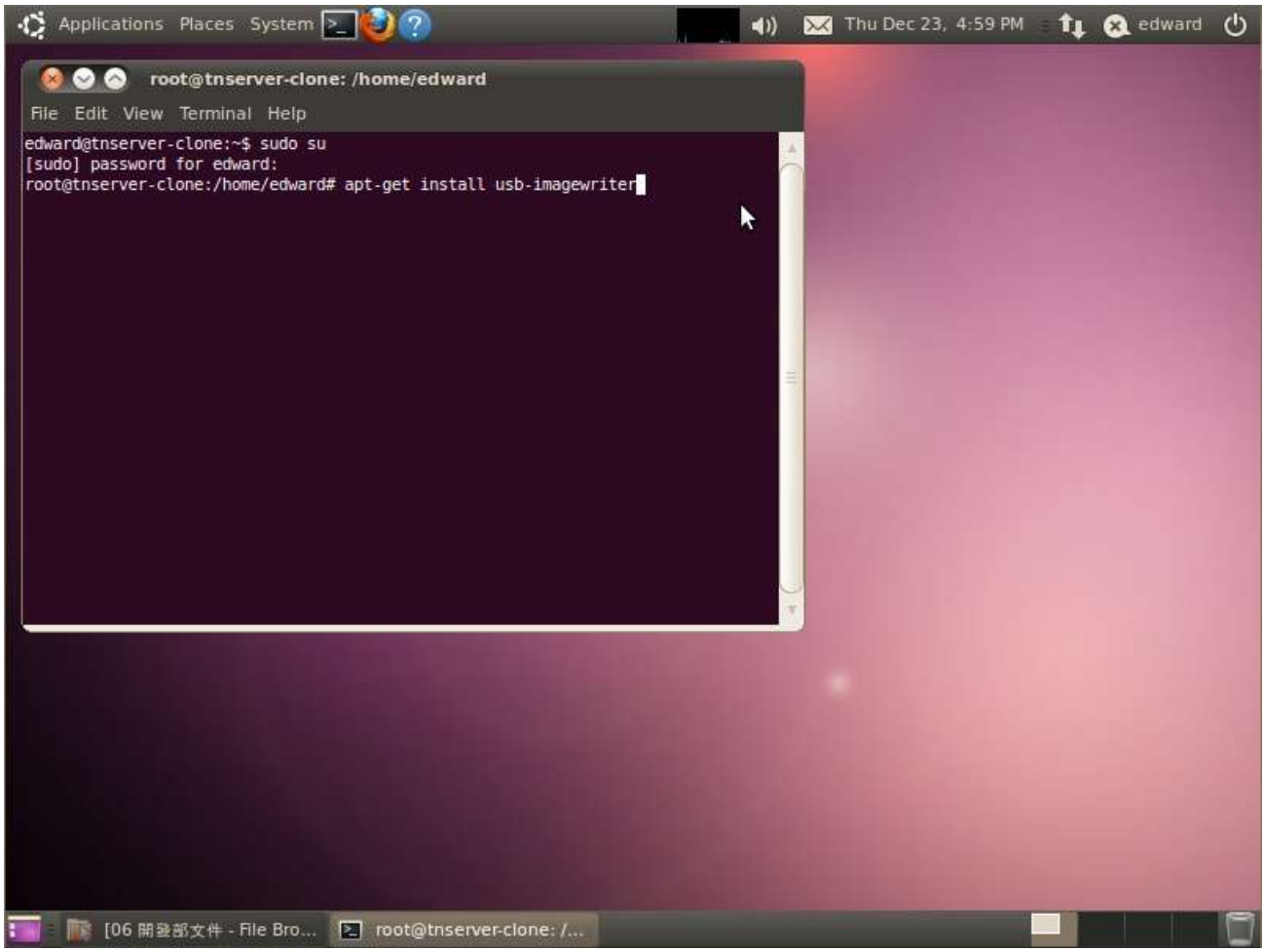


Figure 27: Install the image writer on your Linux computer

Install the image writer:

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

Figure 28: Start image writer (Applications>accessories>imagewriter)

Figure 29: Select the downloaded image and destination (SD-card in your computer), click write to device

Figure 30: Press the "OK" button to confirm

9.4.3 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 31 to Figure 34).

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 31: Installing the rescue image (factory default)

Figure 33: Installing the rescue image – Synchronizing File System

Figure 32: Installing the rescue image – Copying files

Figure 34: Installation complete - Take out the SD card and reboot.

9.4.4 Factory Default Home Screen

Figure 35: Factory Default Home Screen

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

10 Connecting a null modem cable

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

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

10.1 Connecting a null-modem cable

Figure 36: The cable (RS-232 to USB) with yellow mini-gender-changer-block connected to the UART1 (5) connector (see orange arrow for position of the white dot)

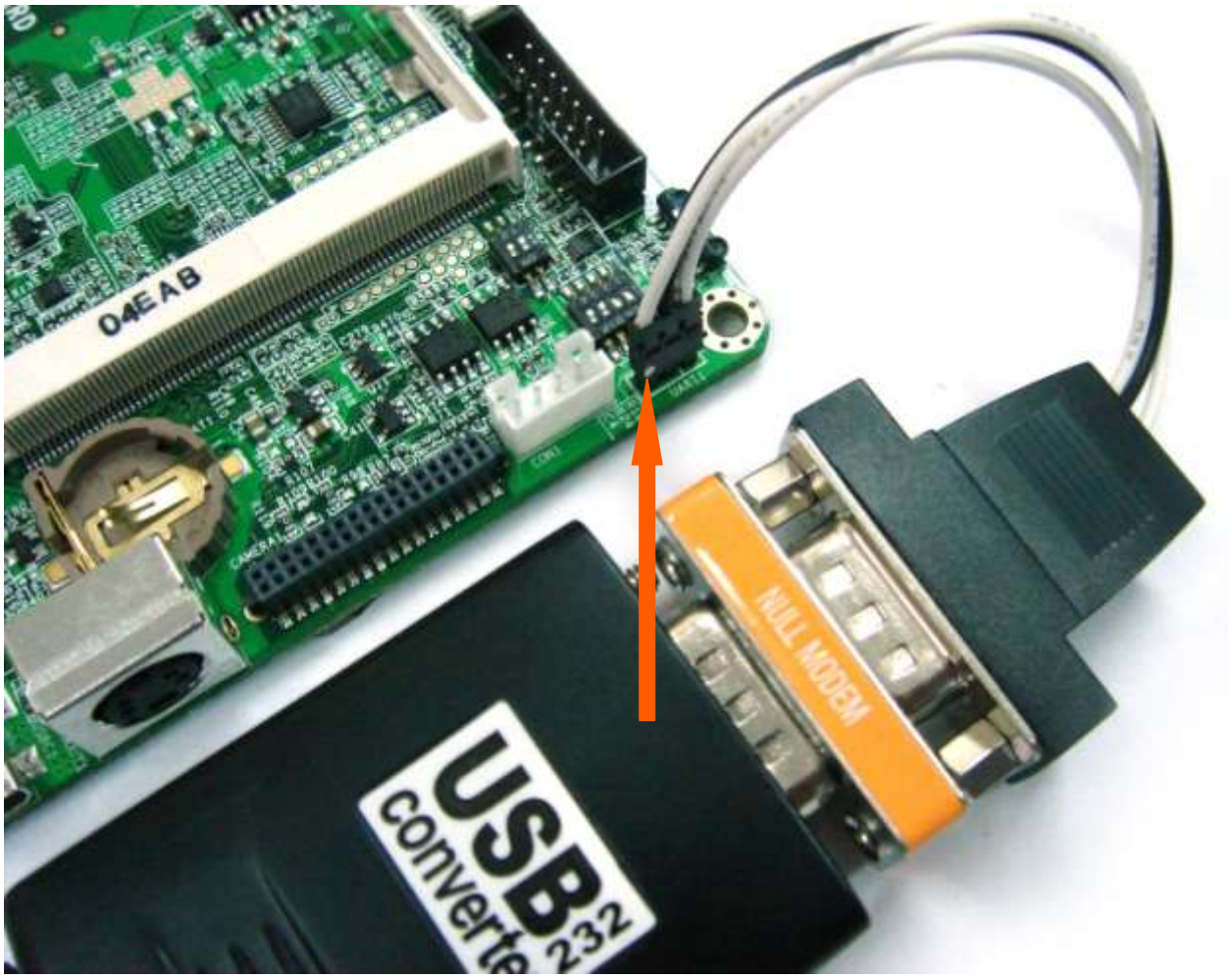


Figure 37: The cable (RS-232 to USB) with null-modem-block connected to the UART1 (5) connector (see orange arrow for position of the white dot (note: turned 180 degrees))

Start PuTTY on your computer and make sure the "Options controlling local serial lines" are as in figure 3:

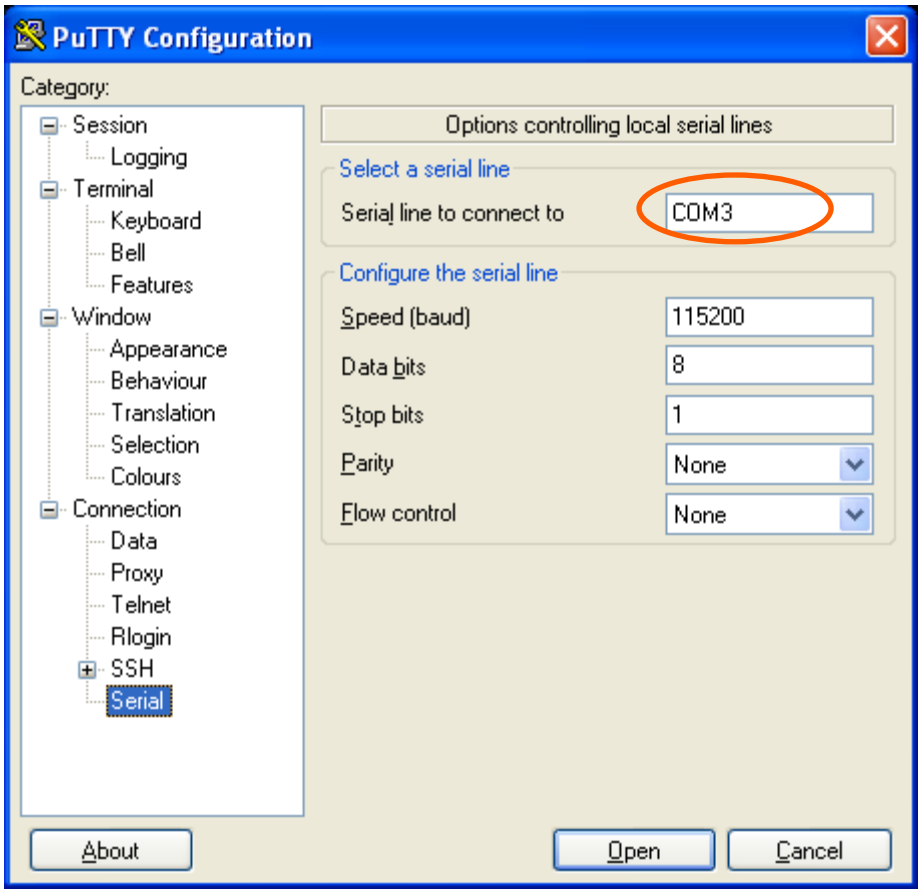


Figure 38: Settings

For computers running a Windows Operating System more steps (see figure 4 to 6) might be required in order to check which serial line is used (see orange circle in figure 3):

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

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

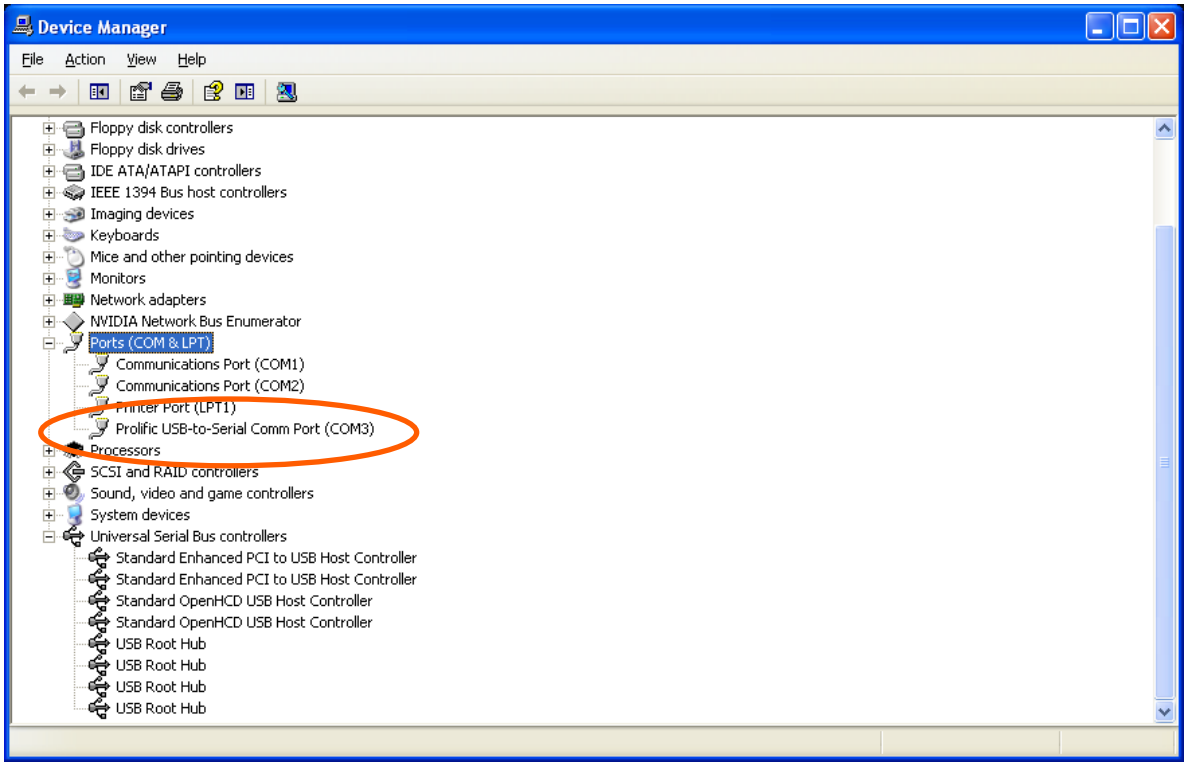


Figure 41: Under Ports (COM & LPT) you will see the baseboard connected with the null modem cable (in this picture COM3), this means in Putty the serial line should be changed into COM3.

- Go to Session and check if "specify the destination you want to connect to " is on Serial (See figure 7)
- Push open and a window will pop up (see figure 8)

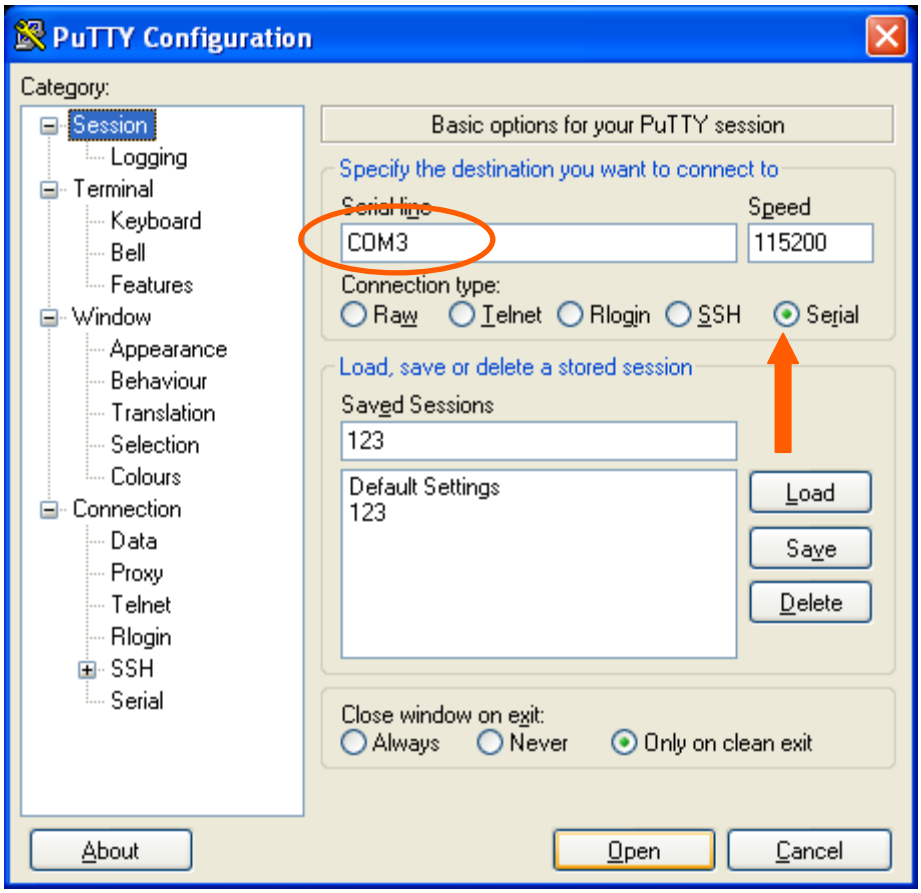


Figure 42: check if serial is selected and then select open

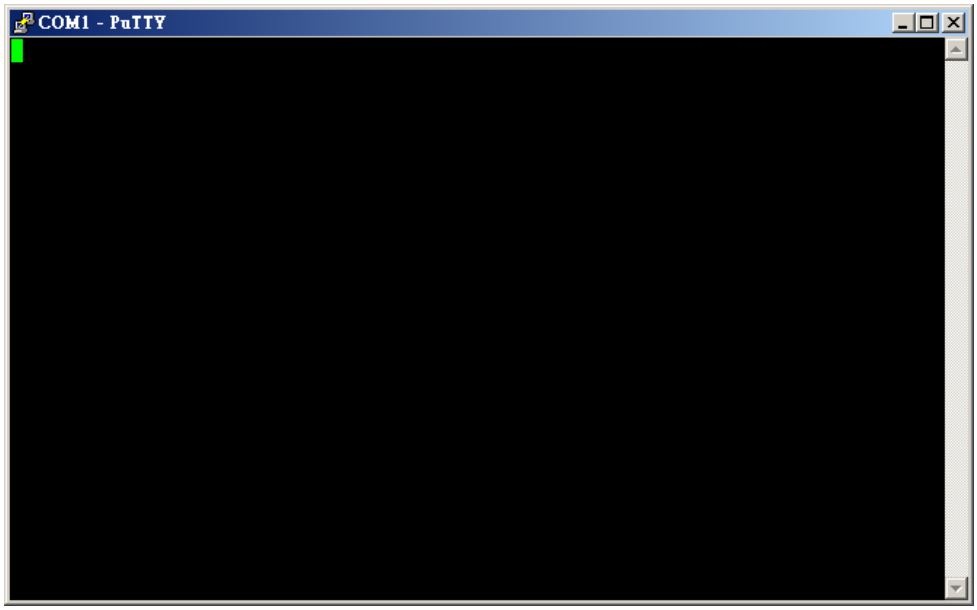


Figure 43: PuTTY terminal window

- 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. Also check the settings of the UART1/3 switch. Sometimes cables are not inverted, which can be solved by turning around the connector to the UART1 pin header (white dot turns 180 degrees: pin 1 becomes pin 3, pin 3 becomes pin 1).

11 Software – Linux

11.1 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 TDM-3730 Linux
- *Host#*: Refers to commands executed at PC

11.1 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.

11.2 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.

11.2.1 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.

11.2.2 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.

11.2.3 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

11.2.4 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.

11.3 Compiling for TDM-3730

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 TDM-3730 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/tdm3730-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
```

11.3.1 QT

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

11.4 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)

11.5 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
```

11.6 How to

11.6.1 How to calibrate the touch screen in Linux

The first time the unit is powered on after installation, the touch screen calibration appears. After calibration the unit will reboot for the settings to take effect.

Calibration can always be done by pushing the Touchscreen calibration icon:

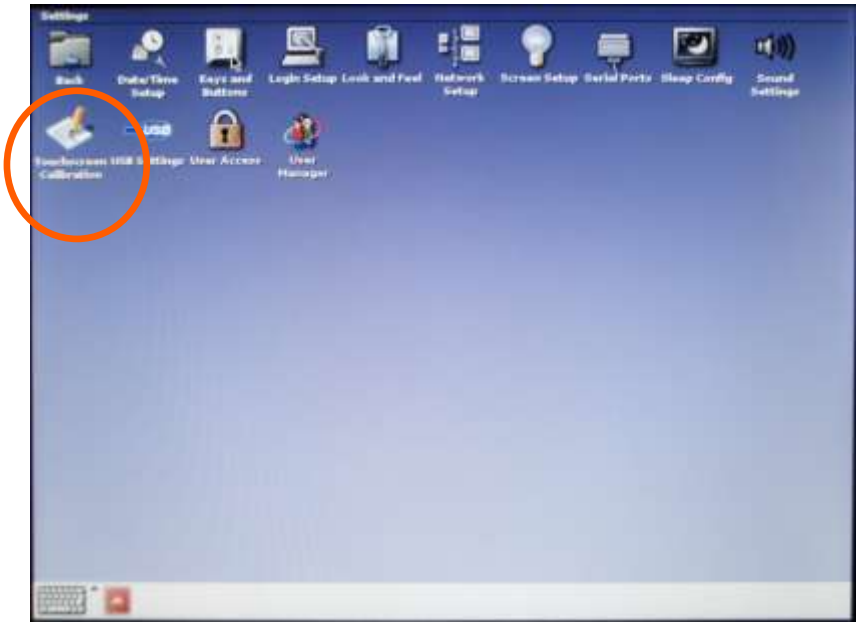


Figure 44 : settings > Touchscreen Calibration

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

11.6.1.1 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

11.6.1.2 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

11.6.2 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)

11.6.3 How to enable wireless

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

11.6.3.1 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

11.6.3.2 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

11.6.3.3 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?

11.6.4 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]
```

11.6.5 How to enable display on the DVI instead of LCD

Include omapdss.def-disp=dvi in bootarguments.

Setting the displays:

Default:

U-Boot# **set video_mode ' '**

DVI:

U-Boot# **set video_mode $dvi_mode**

TV:

U-Boot# **set video_mode $tv_mode**

If you want to keep these settings

U-Boot# **save**

Boot TDM

U-Boot# **boot**

Note: # **set video_mode $dvi_mode** is similar to: # **set dvi_mode 'omapdss.def_disp=dvi omapfb.mode=dvi:1280x720-16@60 vram=5M'** and the resolution can be changed to:

640x480-16@60
640x480-24@60
800x600-16@60
800x600-24@60
1024x768-16@60
1024x768-24@60
1280x720-16@60
1280x720-24@60
1280x1024-16@60 (not supported by some display)

11.6.6 How to switch Pins to act as GPIO

There are a large number of pins with dual function within the TDM-3730. Most useful ones are the CAM pins that are also exposed on the expansion pin header on Inferno and Thunder.

Under Linux you can switch the pins towards GPIO's (1.8V) by modifying U-Boot and after that call the GPIO's under Linux.

1.) Check U-boot source, and make sure the pin (any pin) is in its GPIO mode at boot. To modify the behavior of the pins, use this header file:

<source of u-boot>/board/technexion/tao3530/tao3530.h

For example, the pin CAM_D0, which is default, CAMERA data line 0.

Change this line:

MUX_VAL(CP(CAM_D0), (IEN | PTD | DIS | M0)) /*CAM_D0*/\

To be:

MUX_VAL(CP(CAM_D0), (IEN | PTD | DIS | M4)) /*Gpio 99 */\

All info can be found in the OMAP3530 Technical Reference Manual which can be found on the TI homepage

2.) Recompile u-boot, and flash.

11.6.7 How to reset U-Boot Parameters

In some circumstance, you might need to reset the U-boot parameter. You can do it by:

U-Boot# **env default -f**

U-Boot# **saveenv**

It will return to default.

11.6.8 How to adjust CPU Performance Scheme

Precondition: Use a terminal. You select the four different performance schemes with the following commands:

On demand (Default):

/etc/init.d/cpufreq_pm ondemand

Performance:

/etc/init.d/cpufreq_pm performance

Powersave:

/etc/init.d/cpufreq_pm powersave

Conservative:

/etc/init.d/cpufreq_pm conservative

12 Software – Android

12.1 How to install an Android application with the File Manager

Things to know in advance:

- The user definable button (number 5 in paragraph 4.4) can be used as the back button and the "home" button goes to the first page.
- Plug a USB-keyboard in the baseboard, the "backspace" is the "back" button.
- 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 **Error! Reference ource not found.**)

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

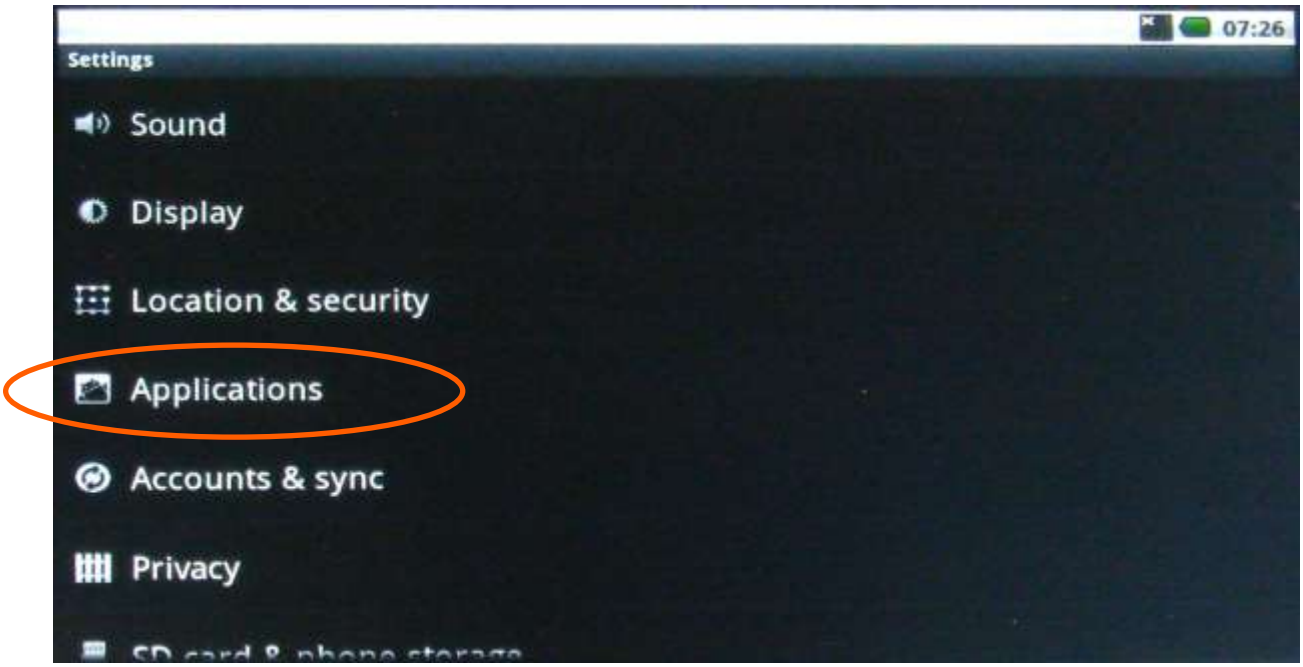


Figure 47: Scroll to the Applications and press on it

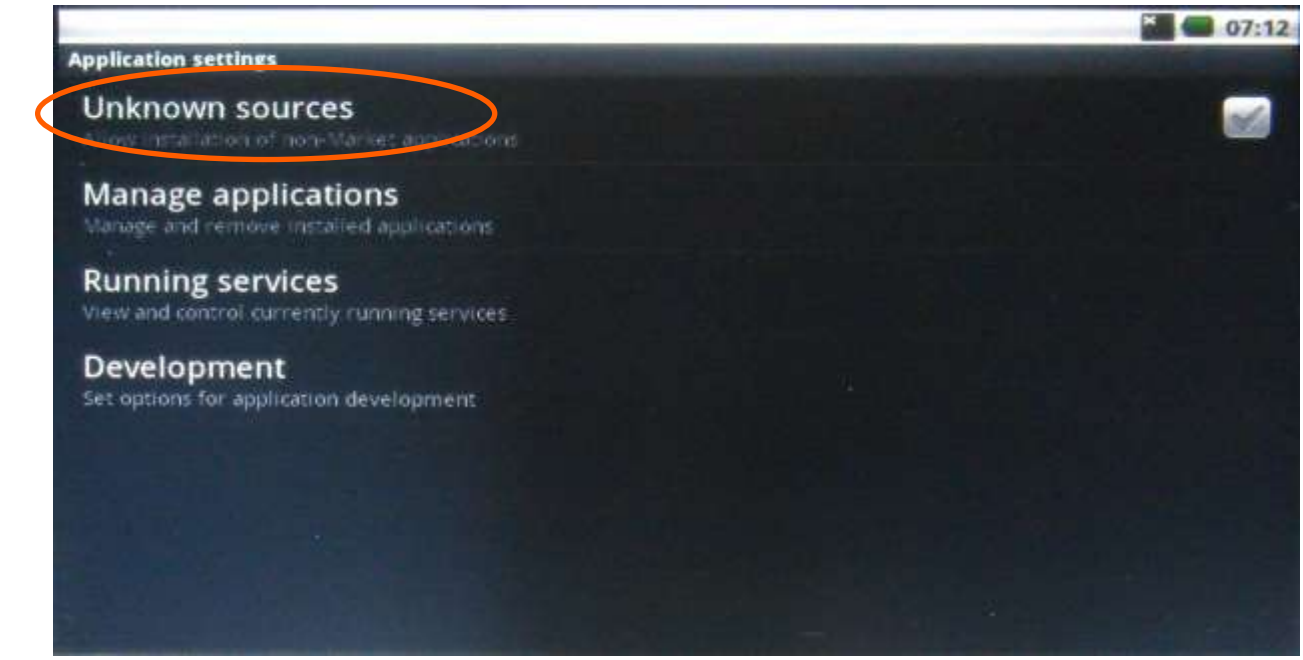


Figure 48: press on "Unknown sources"

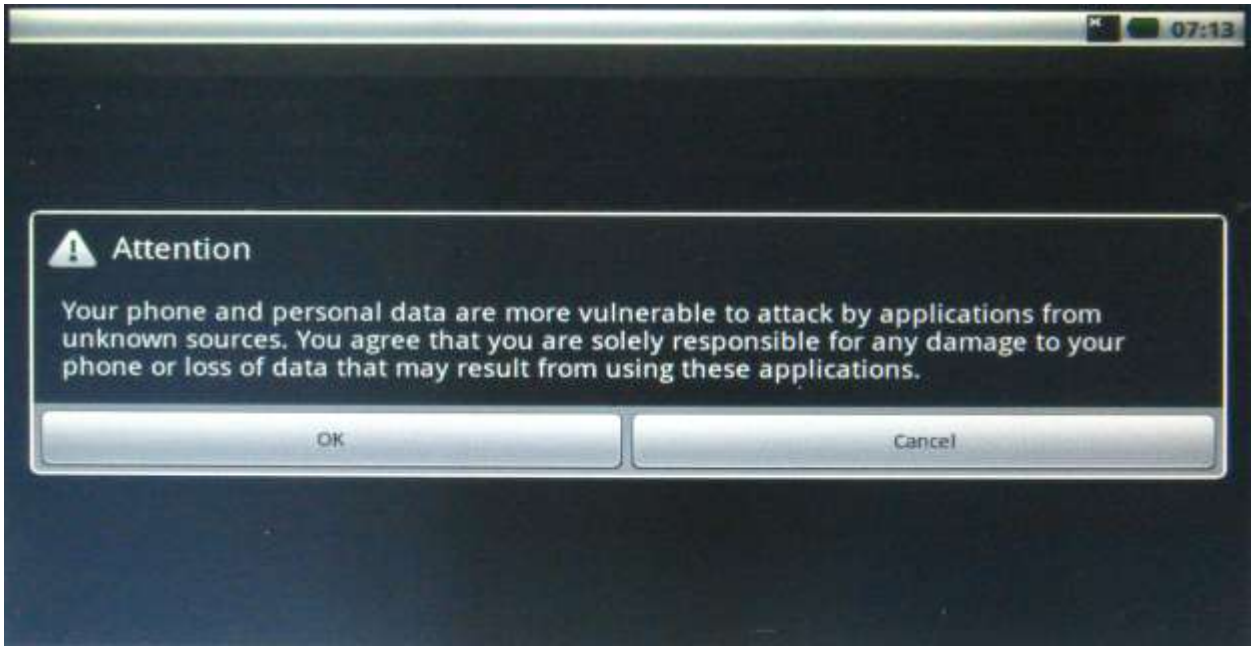


Figure 49: Confirm OK

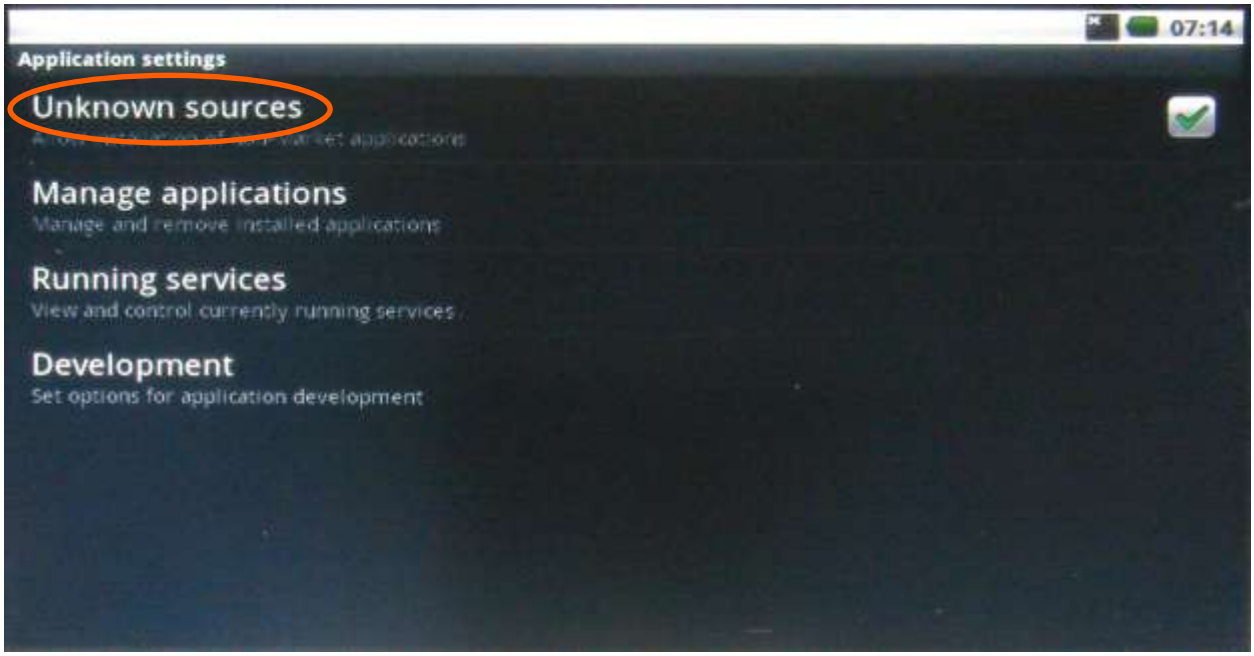


Figure 50: The "Unknown sources" will now show a green icon. It will now install application even if the sources are unknown.

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 12.2)

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)

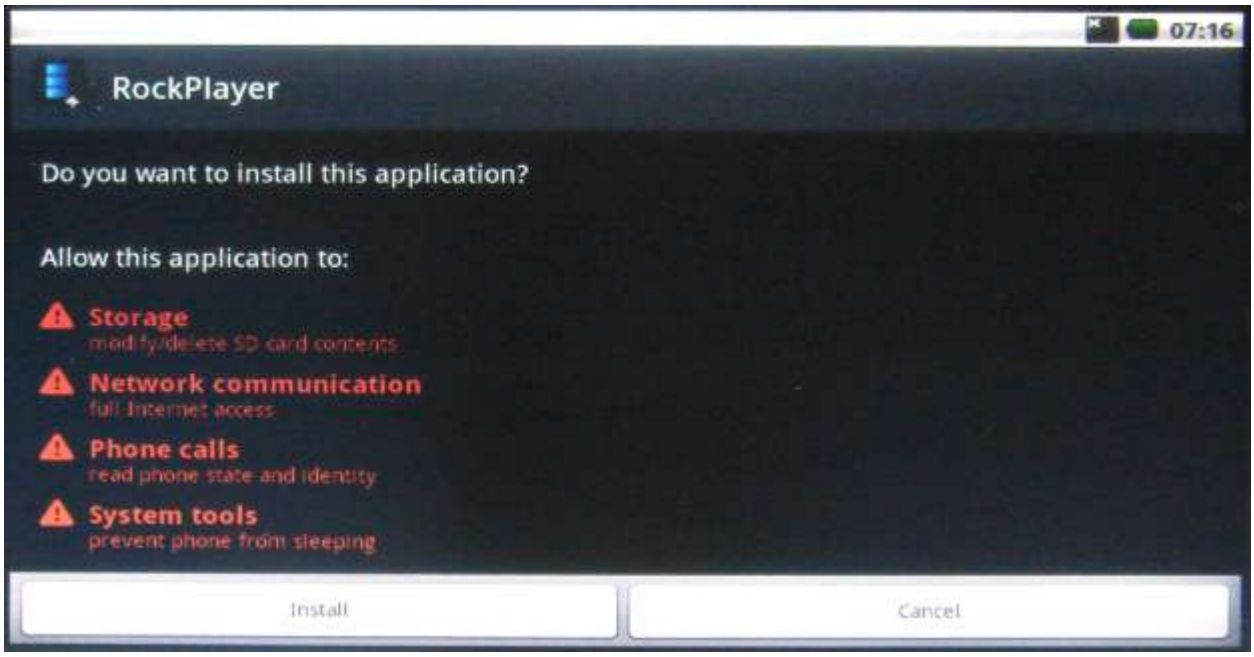


Figure 53: Press install

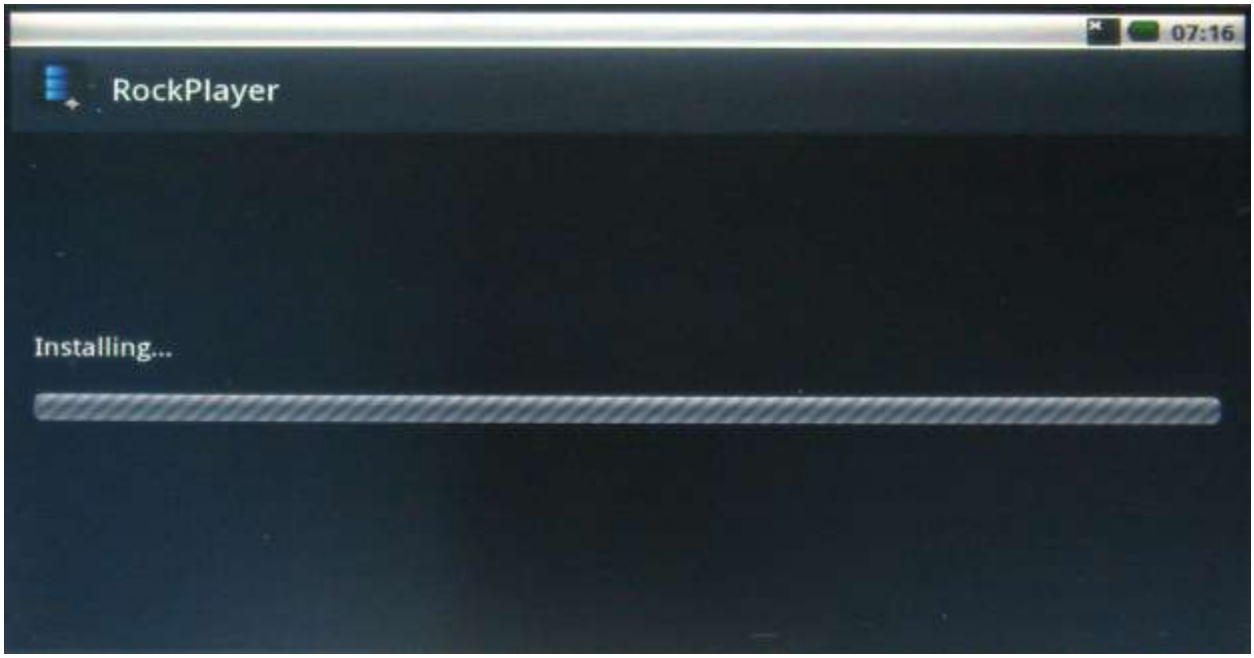


Figure 54: The application will install

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

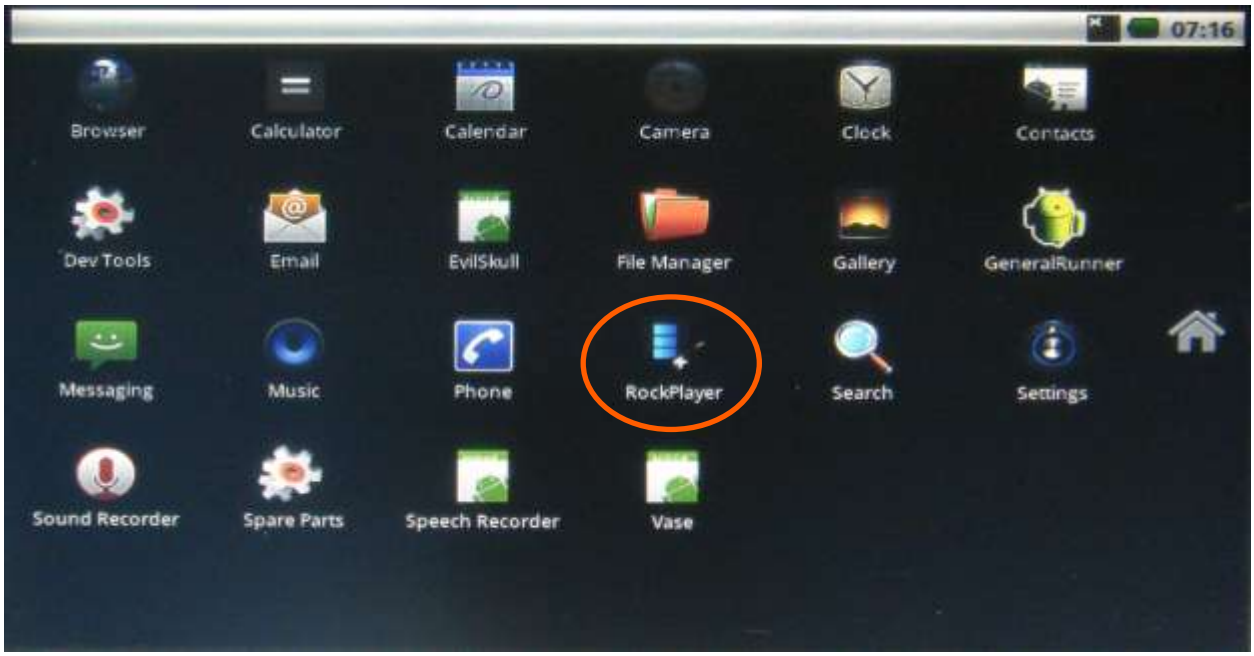


Figure 56: The main menu will now show the Rockplayer application icon. To start the application, just press the icon.

12.2 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.

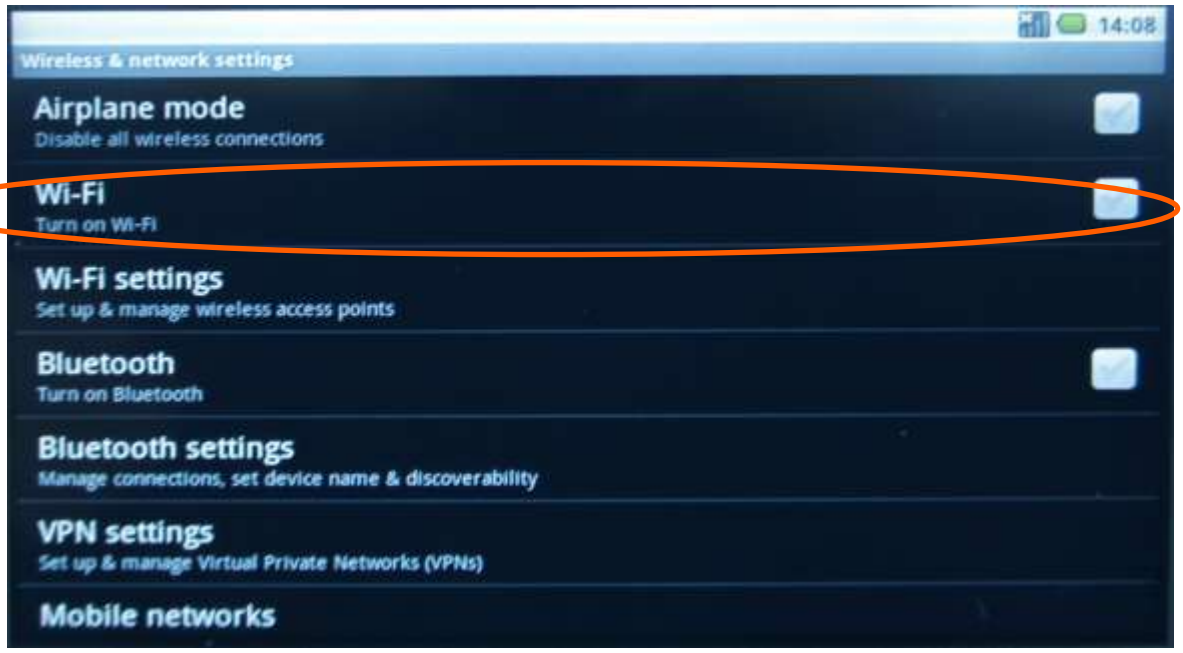


Figure 57: in "Settings", switch on Wi-Fi:

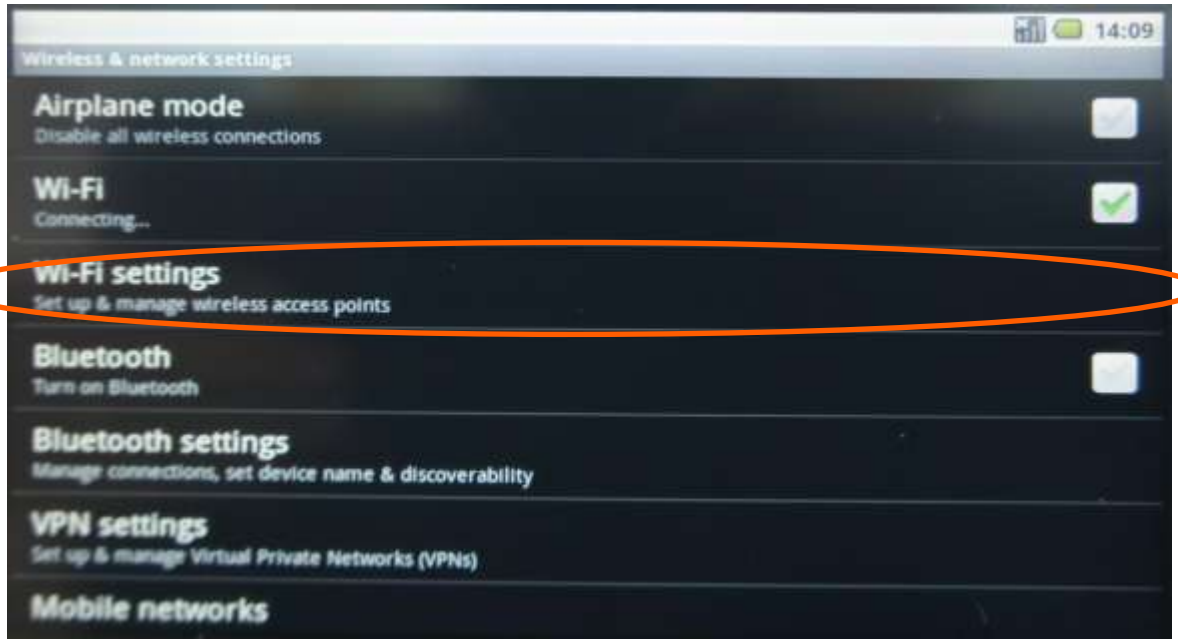


Figure 58: Go to Wi-Fi settings:

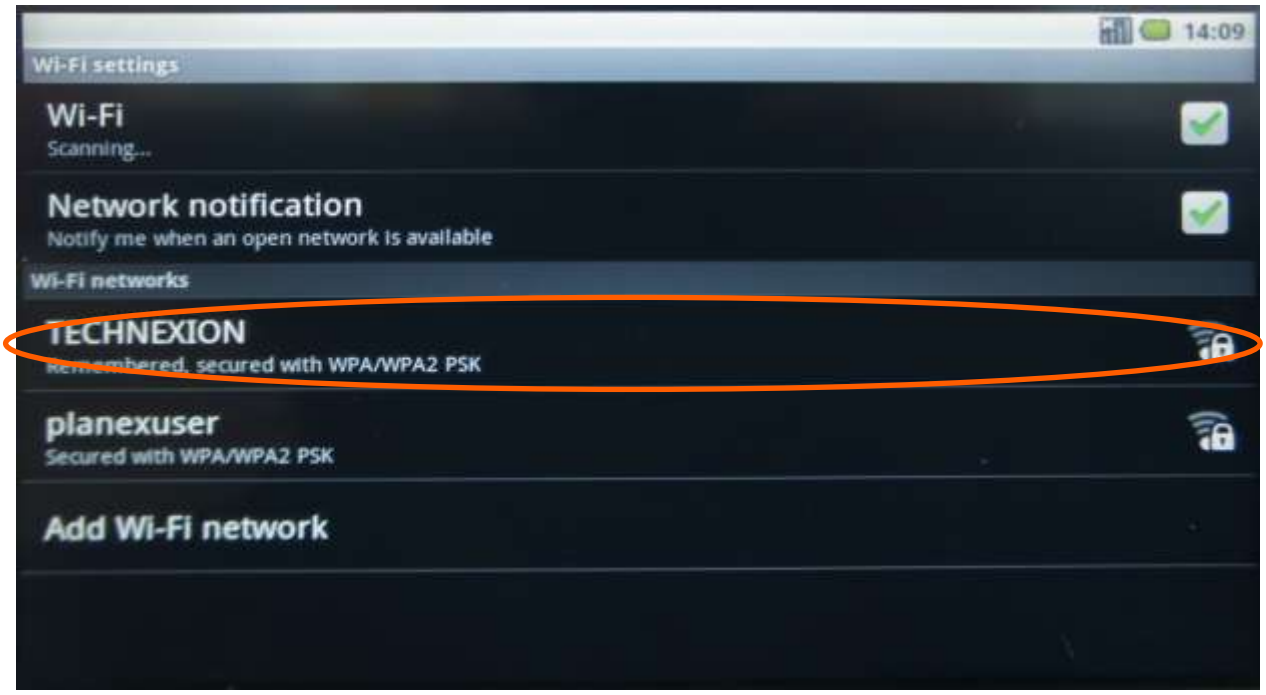


Figure 59: Select a network

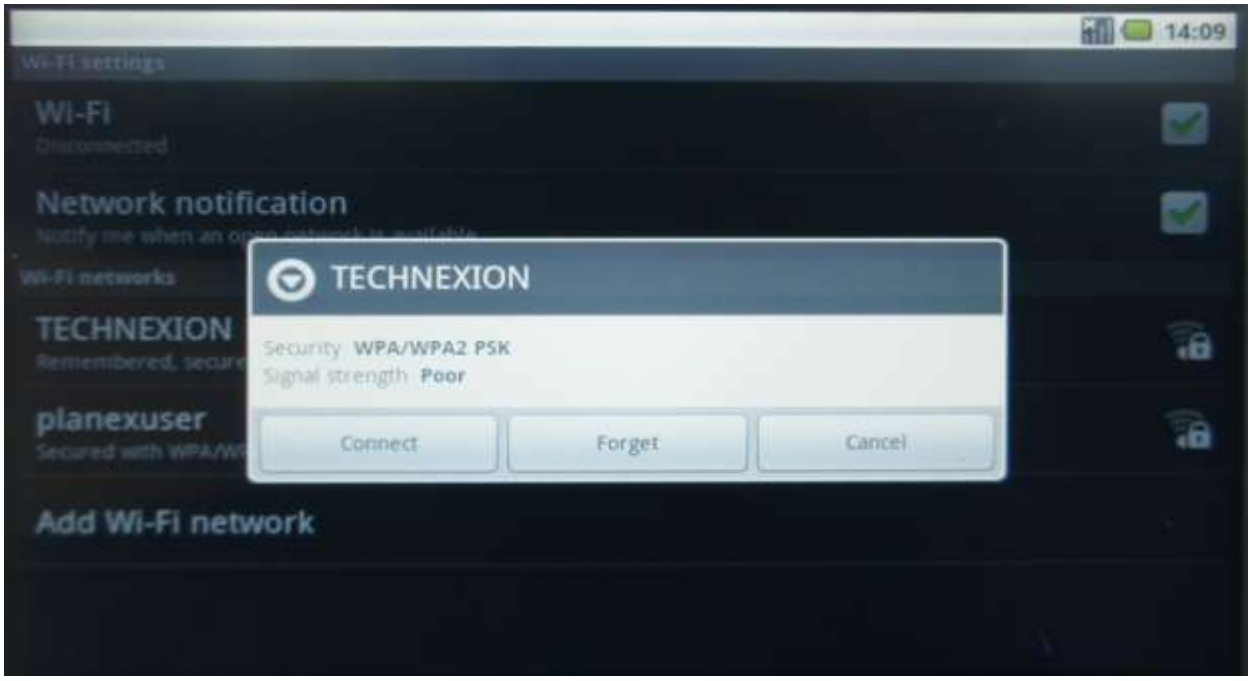


Figure 60 : Choose connect and, if necessary, enter a password.

Figure 61 : Open the browser in the main menu

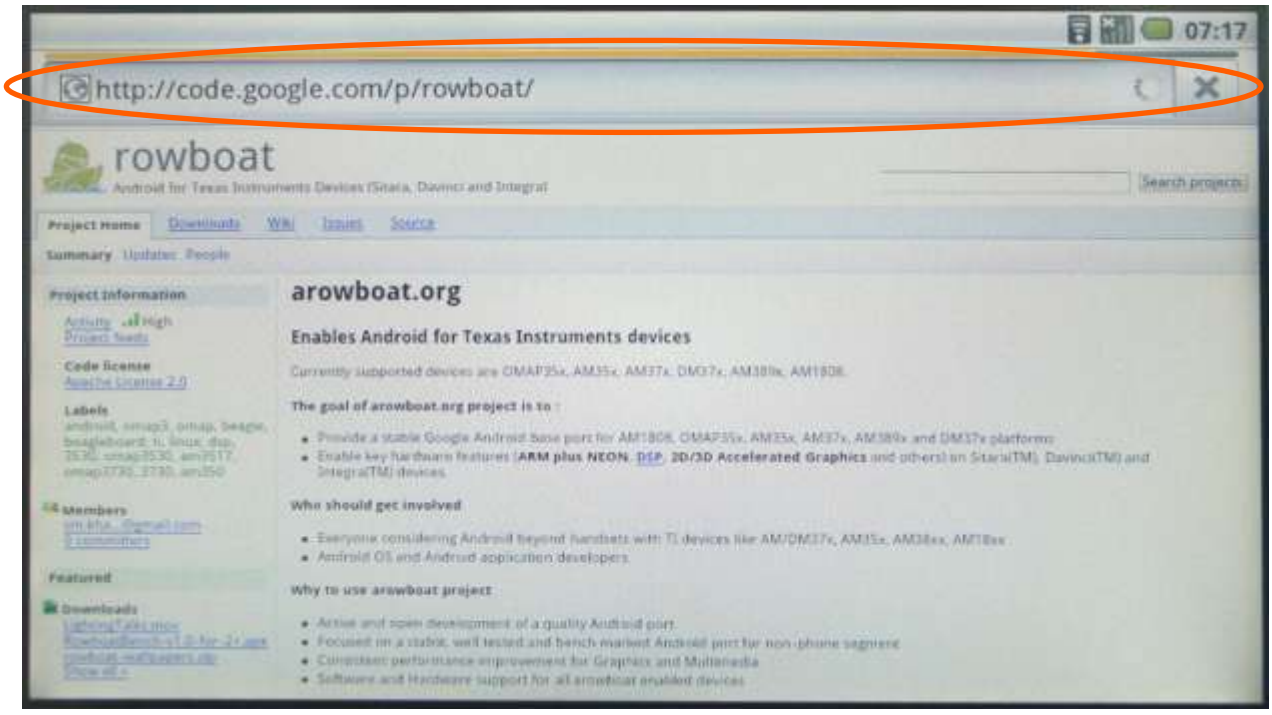


Figure 62 : Press the internet address bar and the onscreen keyboard will appear, or Insert an USB-keyboard.

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

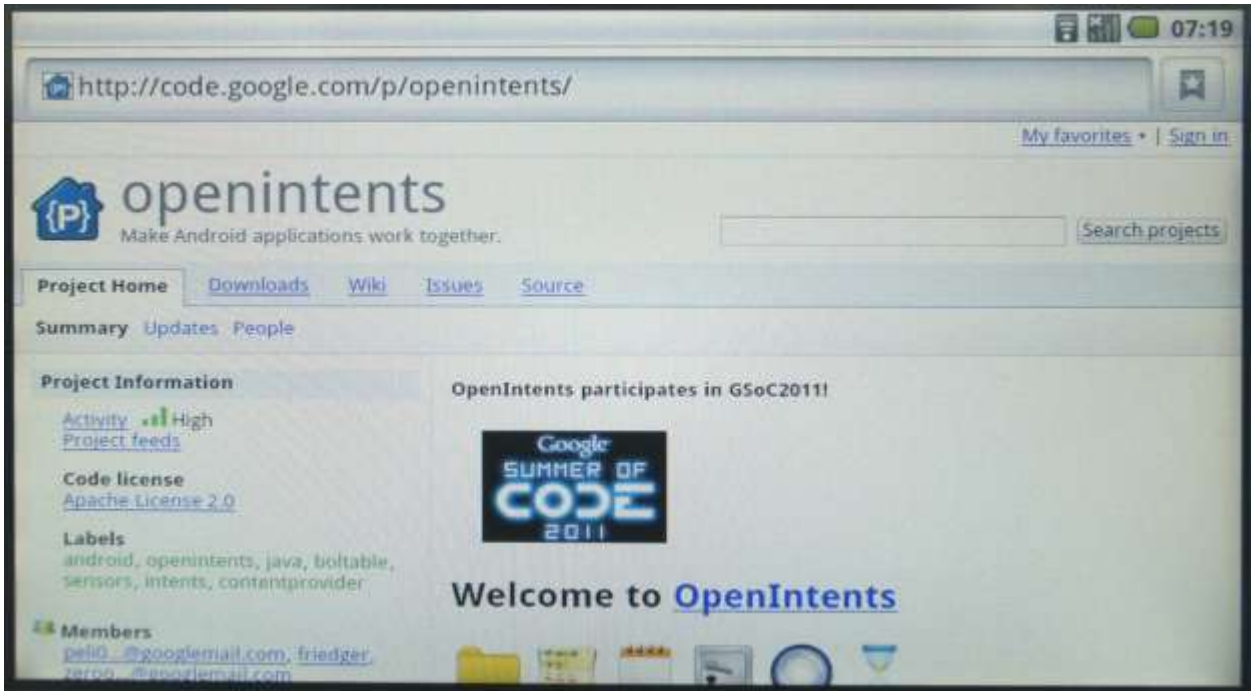


Figure 64 : Another option is:: http://www.openintents.org and you will also find the File Manager

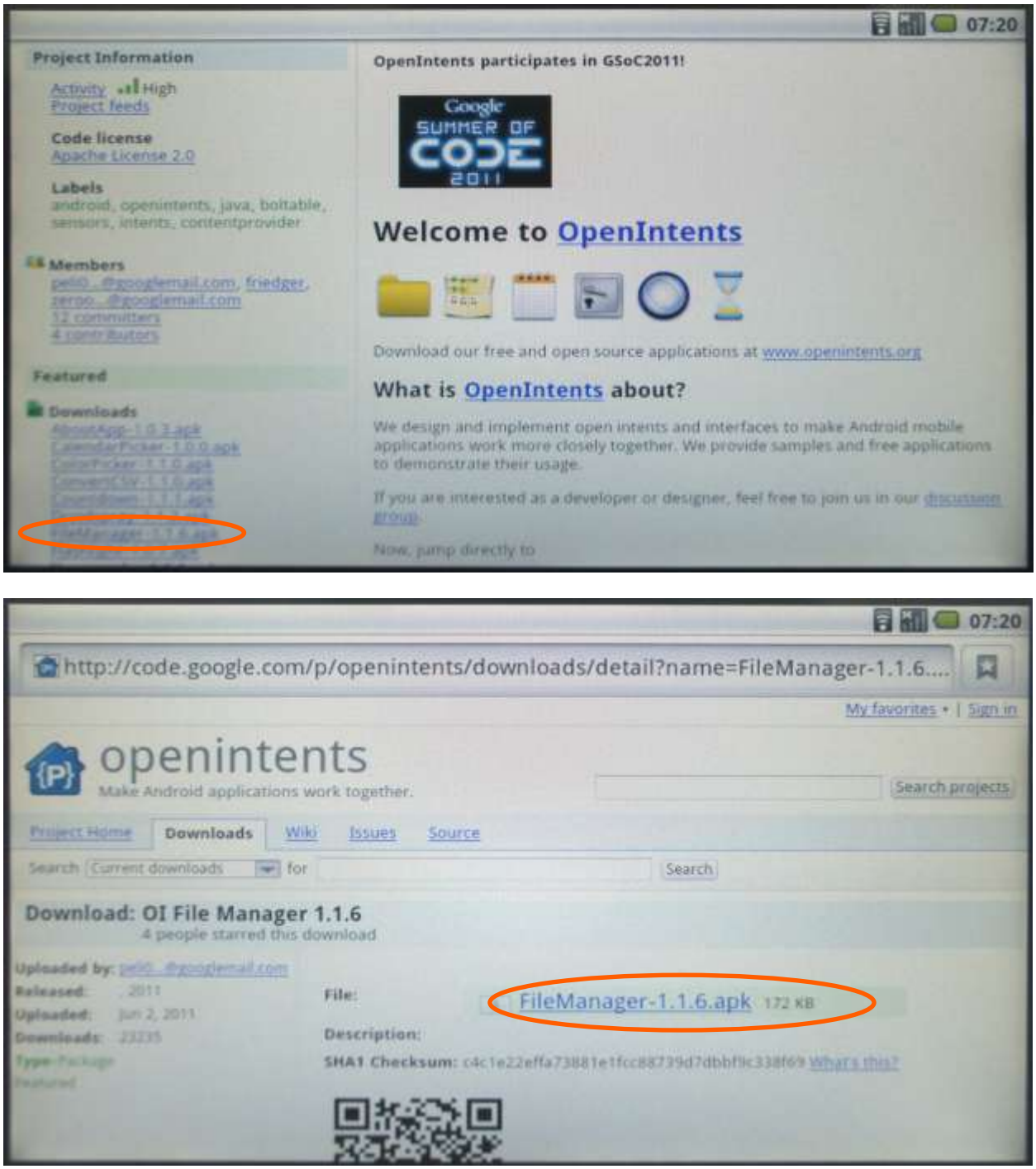


Figure 65 : Click the file manager link; it might appear like nothing happens, but just go to the main screen and pull the bar on top down.

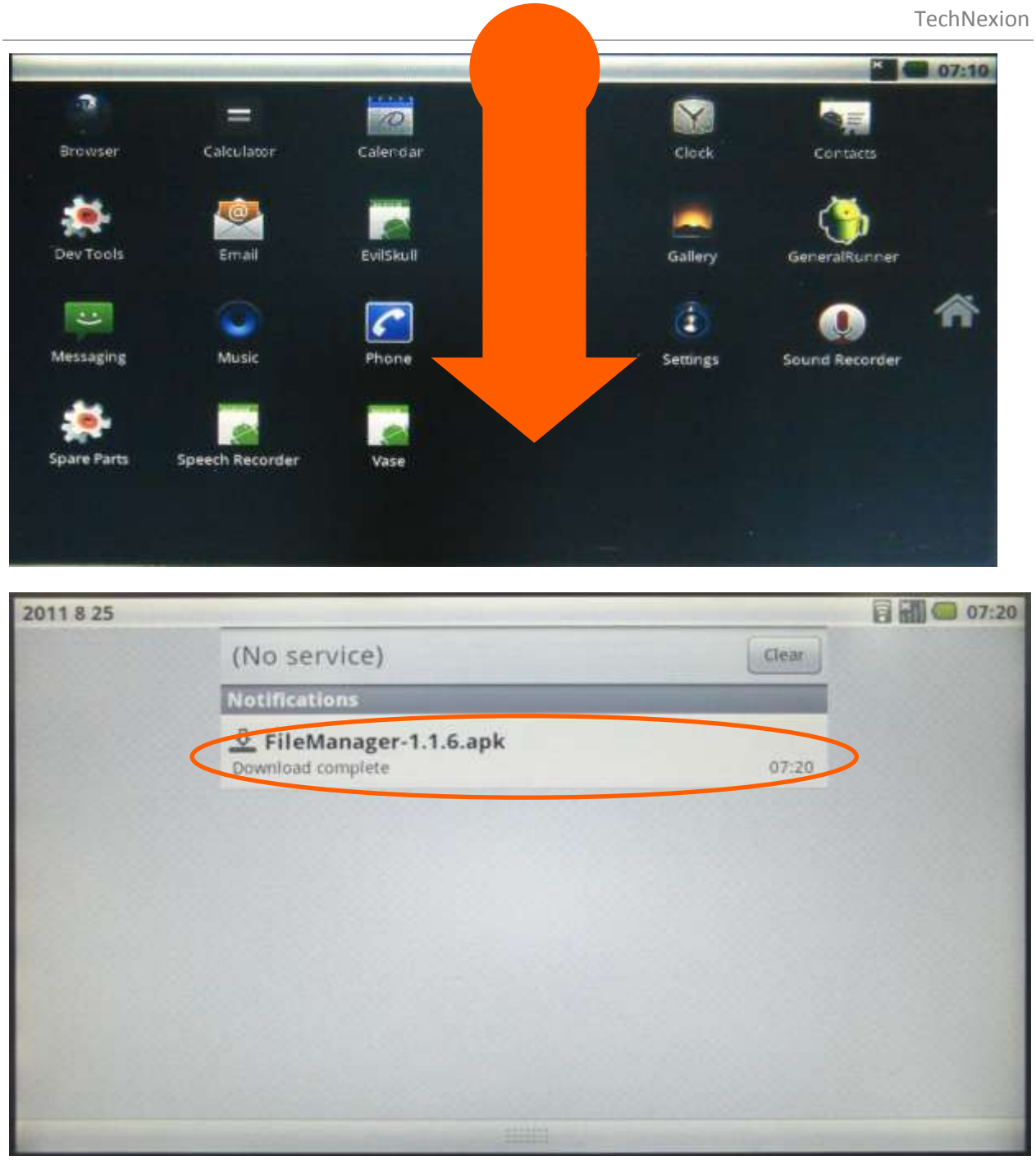


Figure 66: You will see the download when it has finished downloading

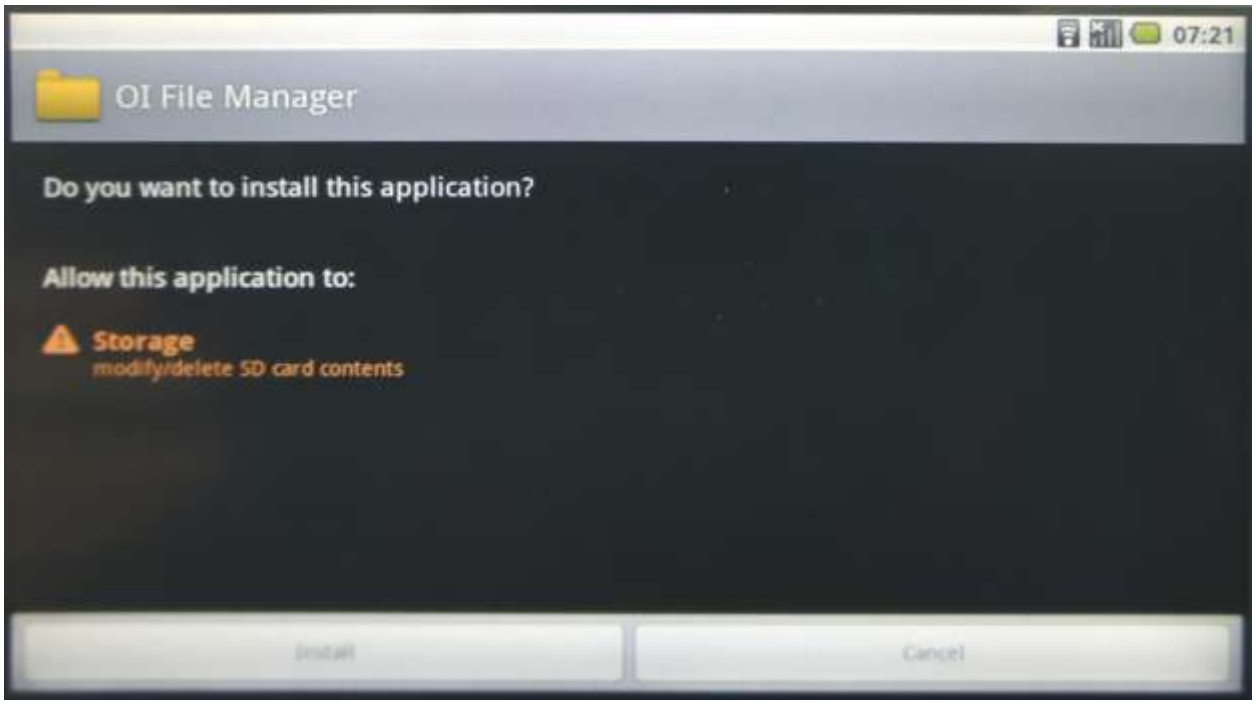


Figure 67 : Press the download and it will ask to install or cancel, Install will install the application, and Cancel will delete the file

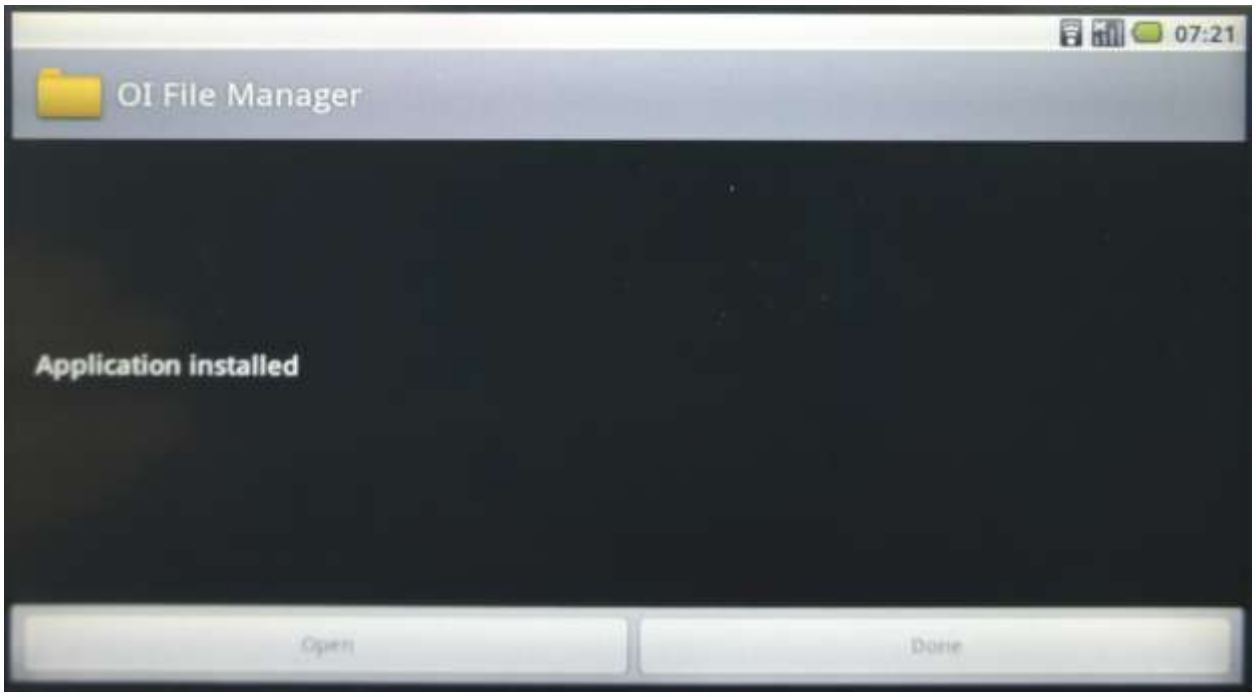


Figure 68 : You now have a file manager and it will make it easier to install apk's that are placed on a SD card

12.3 ADB - Installing applications

12.3.1 Windows

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

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

12.3.1.1 What is ADB

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

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

12.3.1.2 How to Install ADB

Step 1: Installing the Android SDK

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

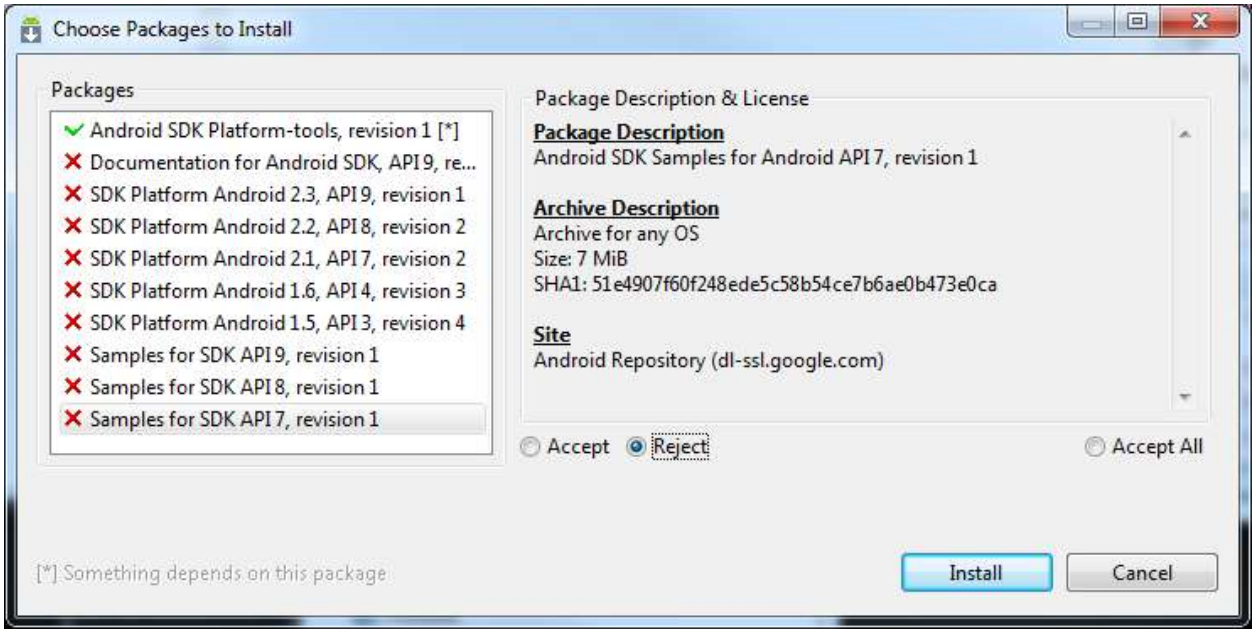
The first step is to download the SDK. Use the link given at the end of this post and download the latest version of the Android SDK from there. There are versions available for Microsoft Windows, Linux and Mac OS X. In case of Windows, both an installer and a zip file are available but there isn't any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

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

Step 2: Downloading the SDK Platform Tools

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

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



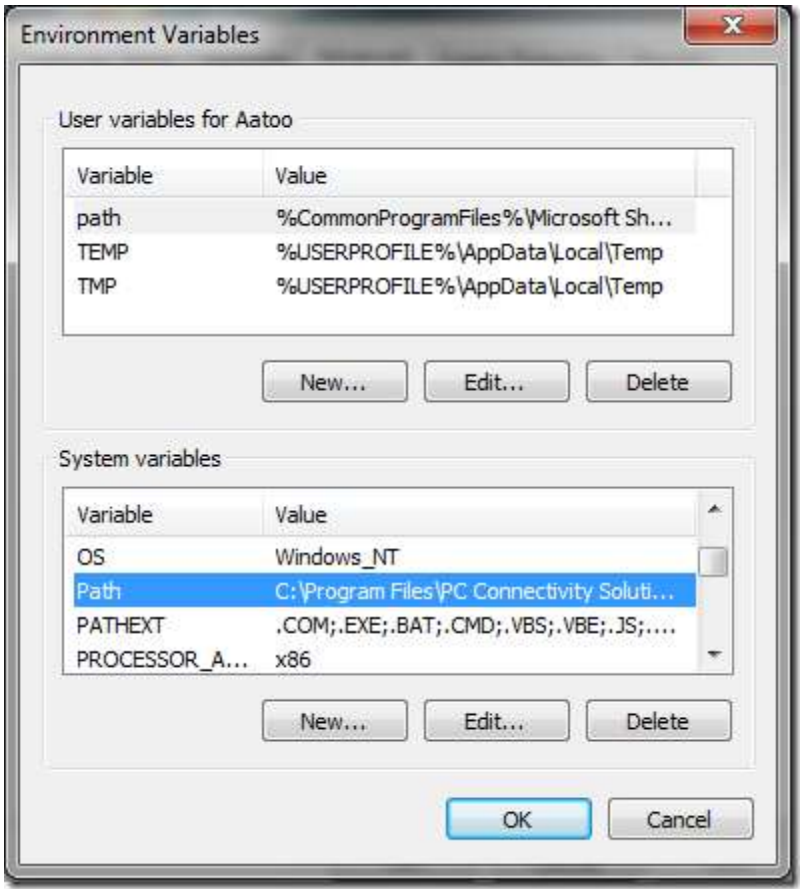
Now simply click 'Install' and wait till the platform tools are installed. Once the process is done, you will have a 'platform-tools' folder inside your SDK folder. That folder will include ADB and all its dependencies.

Step 3: Setting the Path variable

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

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

- In the 'System Properties' window, click the 'Environment Variables' button on the 'Advanced' tab.



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

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

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

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

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

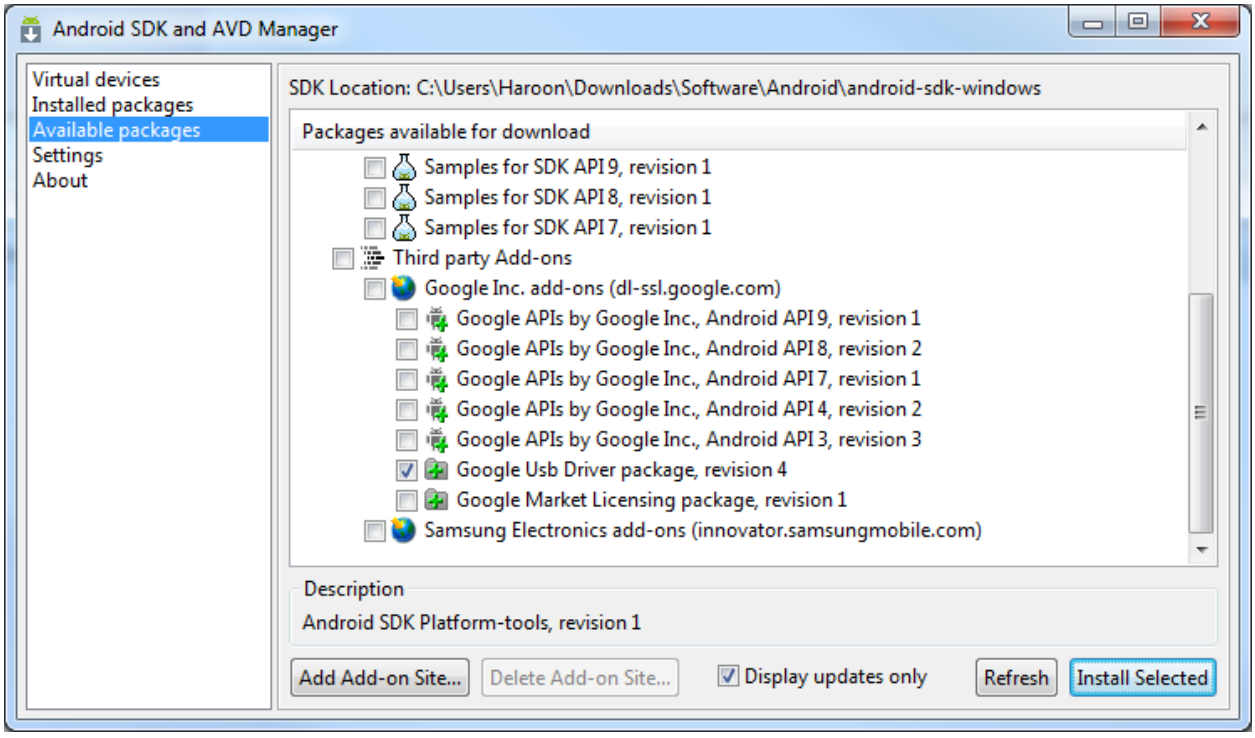
Don't worry if yours does not include some of the other text – what is important is the way the new entry should be added to the existign one, and the way the previous entries MUST be left unchanged. Notice that the semi-colons are necessary to separate each path variable entry from the next and previous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

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

Step 4: Installing the USB drivers

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

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



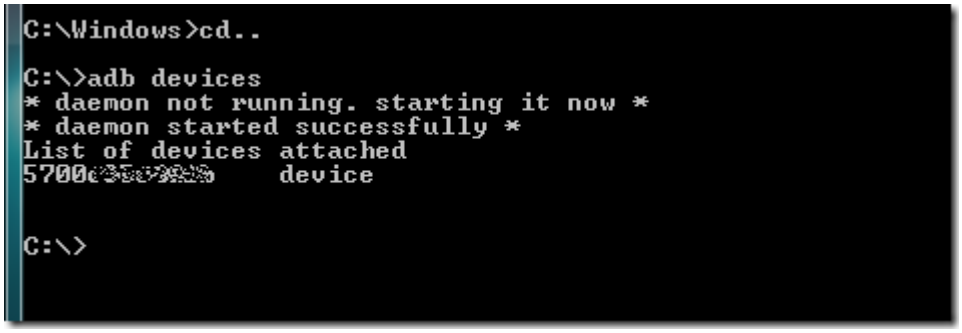
- Click 'Install Selected' and in the window that pops up, click the 'Accept all' radio button followed by the 'Install' button. Wait patiently while the USB drivers are downloaded and installed in the Android SDK.
- The drivers for both 32 bit and 64 bit systems will now be present in the SDK folder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

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

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

12.3.1.3 How to Use ADB

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



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

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

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

12.3.1.4 Summary

Download (http://dl.google.com/android/installer_r08-windows.exe)

Download JRE/JDK (http://www.oracle.com/technetwork/java/javase/downloads/index.html)

Above two will install the Android SDK.

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

12.3.2 Linux

Download (http://dl.google.com/android/android-sdk_r08-linux_86.tgz)

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

The folder structure should be

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

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

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

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

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

12.3.2.1 Connect by USB

Connect USB-otg on TAO to host machine

Turn on USB Debug

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

Setup Host Machine

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

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

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

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

Verify the adb connectivity between host and target board:

```
host#> adb devices
```

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

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

Login use ADB

```
host#> adb shell
```

12.3.2.2 Connect by Ethernet

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

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

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

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

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

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

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

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

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

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

Verify for device connectivity, by executing the following commands

```
host#> adb devices
```

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

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

Login use ADB

```
host#> adb shell
```

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

12.3.3 ADB Functions

12.3.3.1 Application Install/Remove

Install

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

Remove

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

12.3.3.2 File Operation

To Device

$> adb push <local_file_path> <remote_path>

From Device

$> adb pull <remote_file_path> <local_path>

12.3.3.3 Shell Operation

$> adb shell

12.3.3.4 Show Devices

$> adb devices

13 Software – Windows Embedded Compact 7

Important! To install Windows CE, you need a null modem to follow process.

13.1 Update to the latest Windows Embedded Compact 7

Make sure you have downloaded all patches for Windows Embedded Compact 7. The Patches can be found at the Microsoft website

13.2 Get the BSP

13.2.1 Download the BSP from the web-Site

Go to www.technexion.com > Support > download Center > ARM_CPU_Modules> TDM-3730; and download the TDM-3730 Windows Embedded Compact 7 BSP".

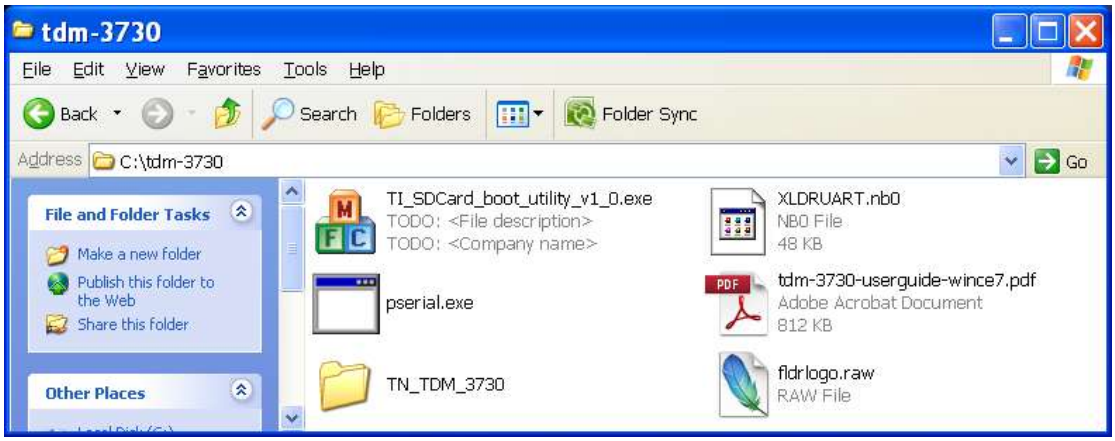


Figure 69: Decompress the downloaded file.

13.2.2 Install BSP to "Platform Builder"

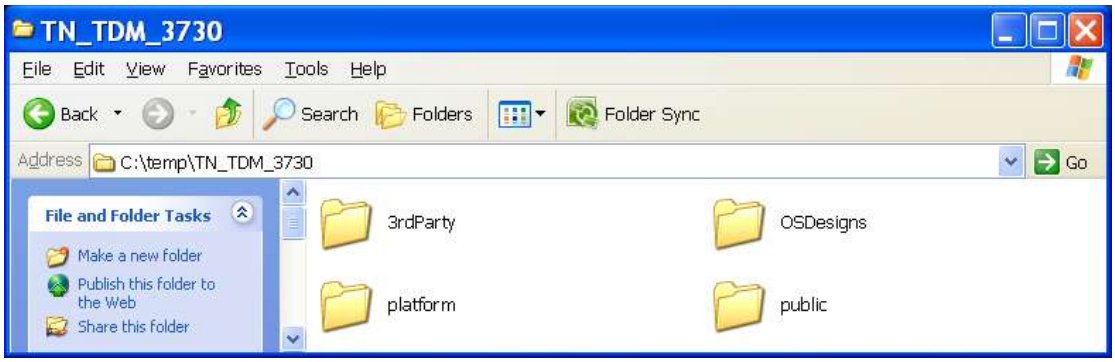


Figure 70: After entering the "TN_TDM_3730" folder, copy all folders, and paste the folders into c:\WINCE700\ (overwrite is OK)

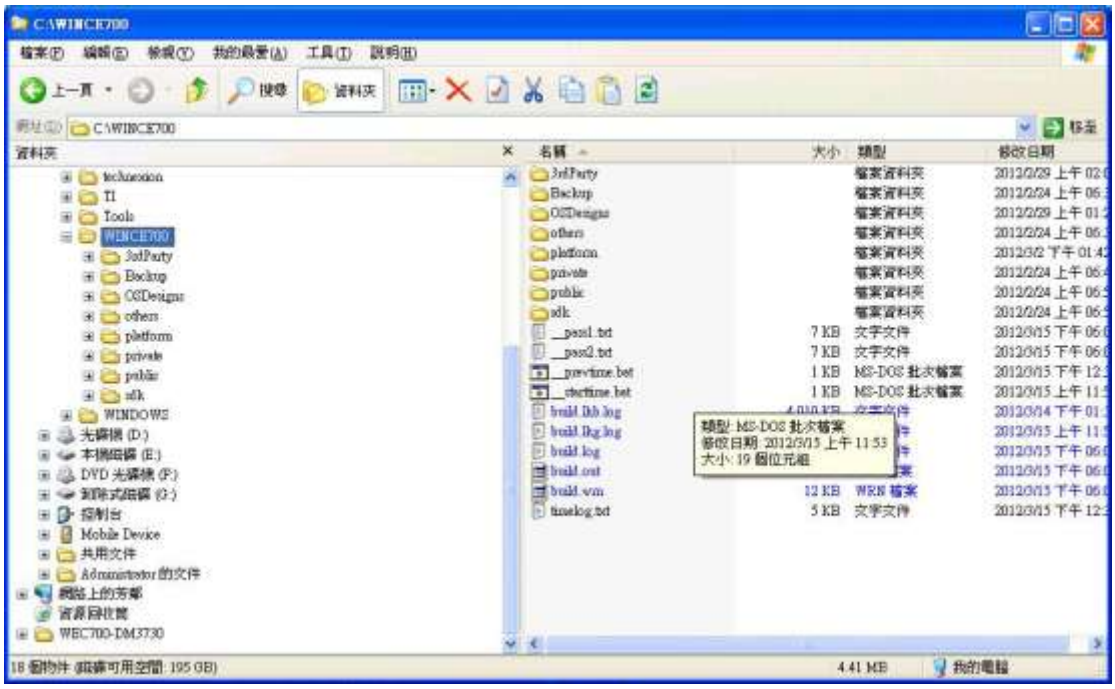


Figure 71: the folders in c:\WINCE700\

13.3 Create the files for a SD card

The following chapter describes how to create the files that will be placed on a SD card.

- Open "Microsoft Visual Studio 2008".

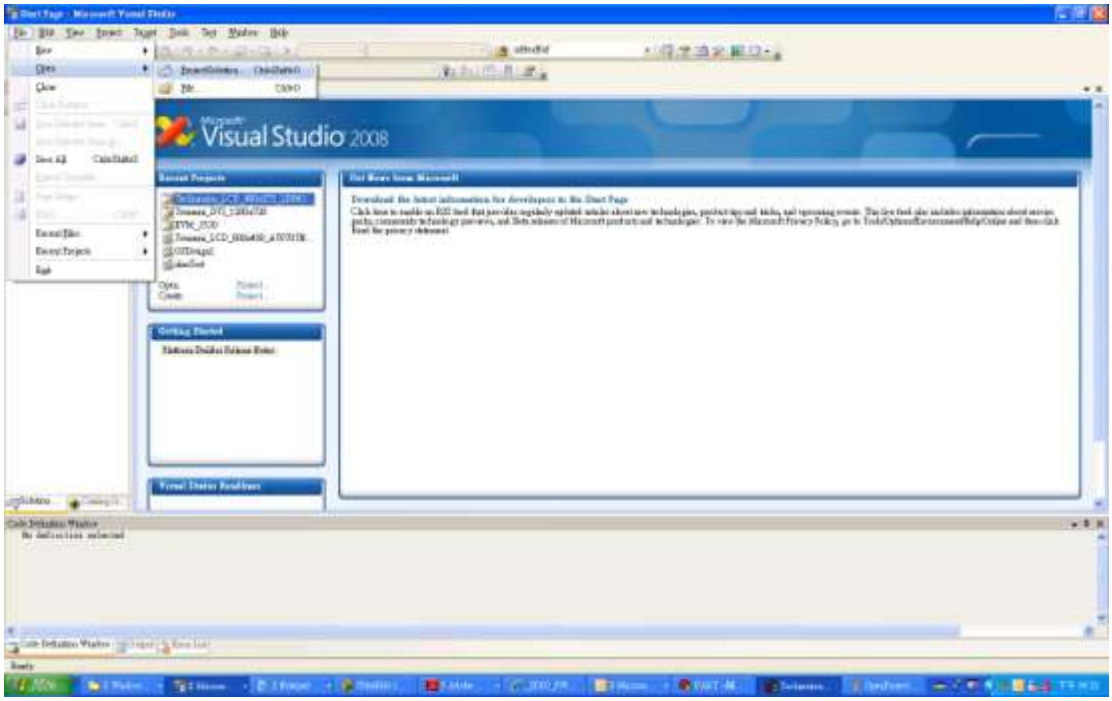


Figure 72: Click "File → Open → Project Solution"

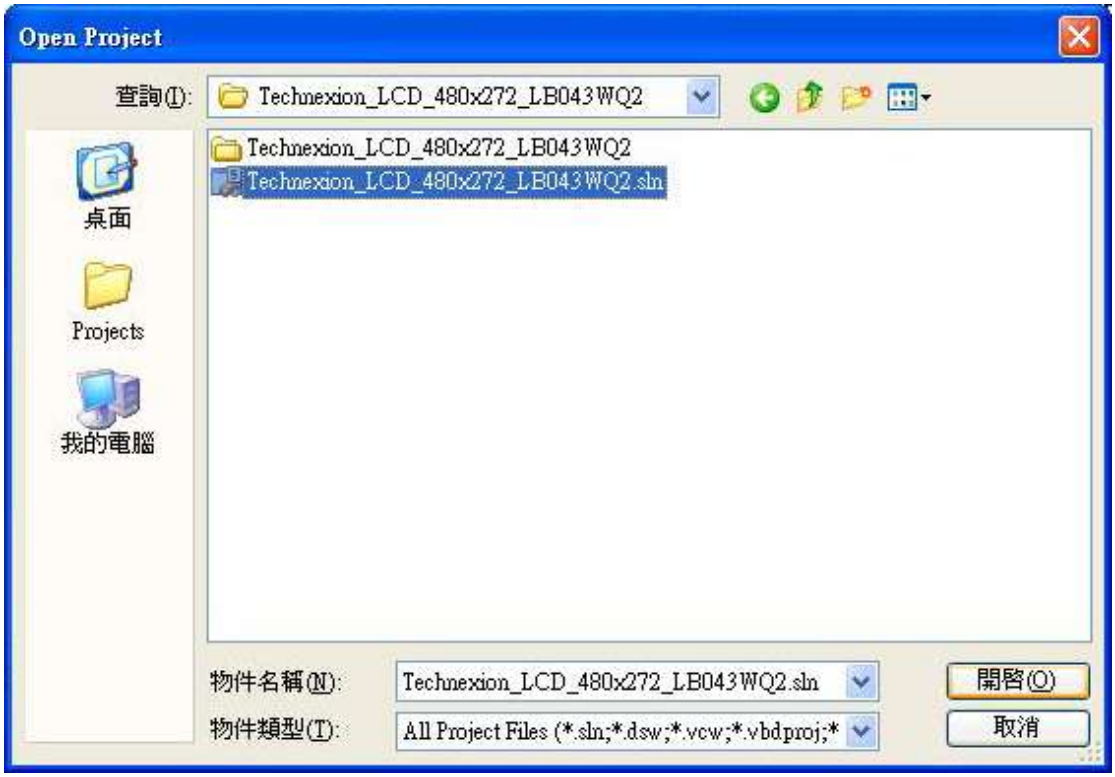


Figure 73: Go into the folder and open the SLN-file of your board (As example in this manual we use "Technexion_LCD_480x272_LB043WQ2")

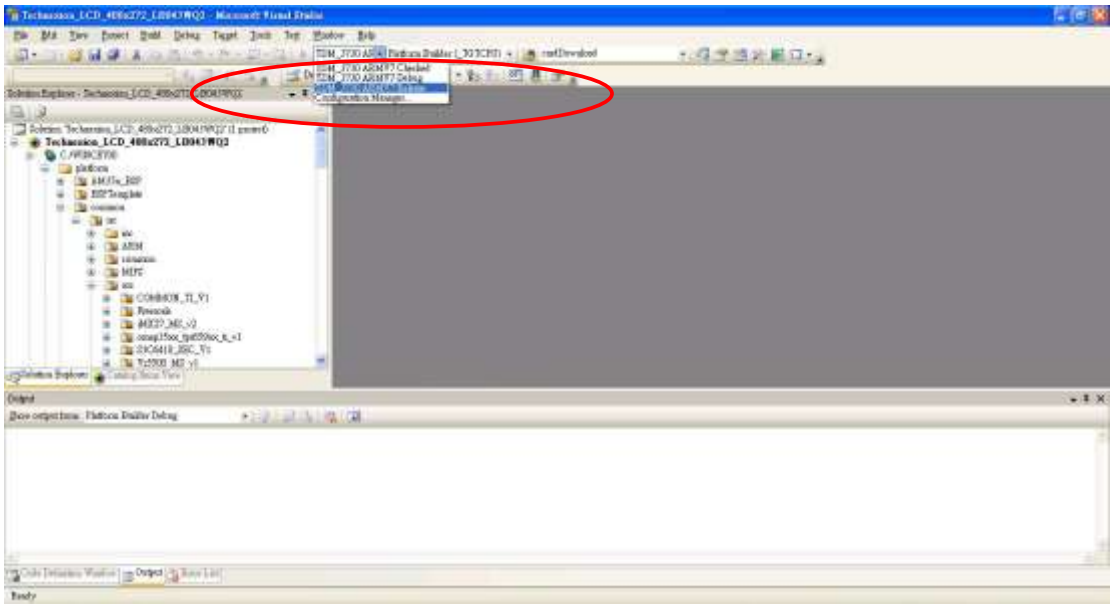


Figure 74: Before building, choose the TDM-3730 ARMV7 Release mode

In the menu click "build/advanced build command/Clean Sysgen" (Figure 75) this will take approximately 30 minutes, after which you will see "build complete" (Figure 76)

Warning! Be patient: let "clean sysgen" finish, this can take up to **30** minutes

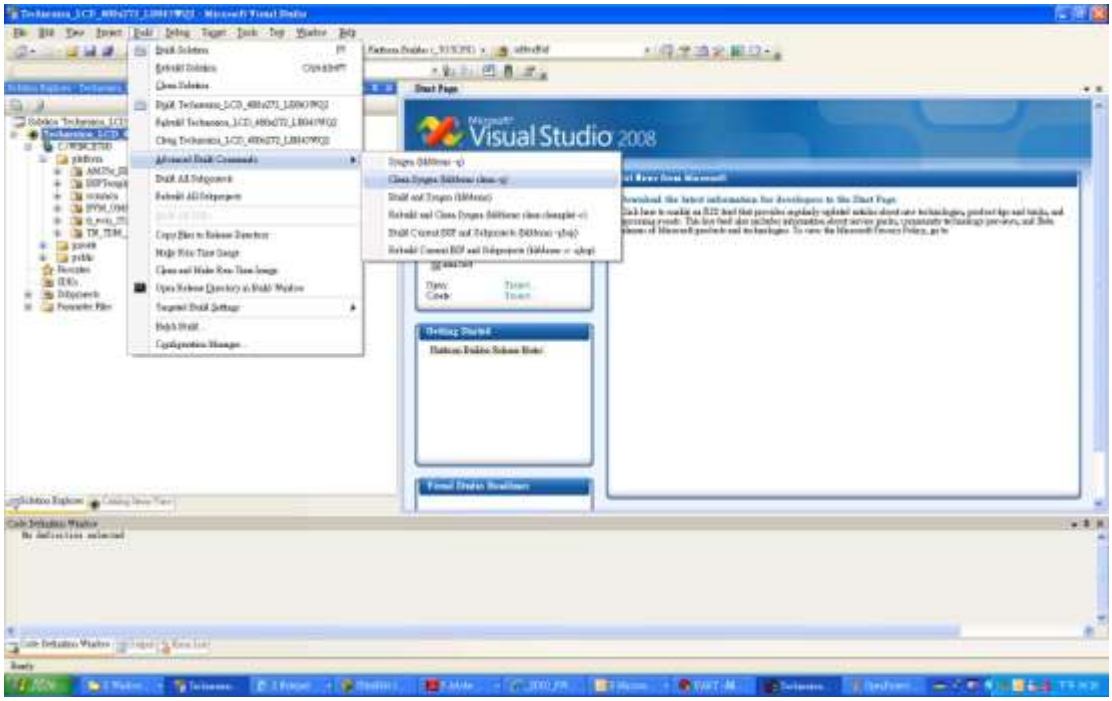


Figure 75: build/advanced build command/Clean Sysgen

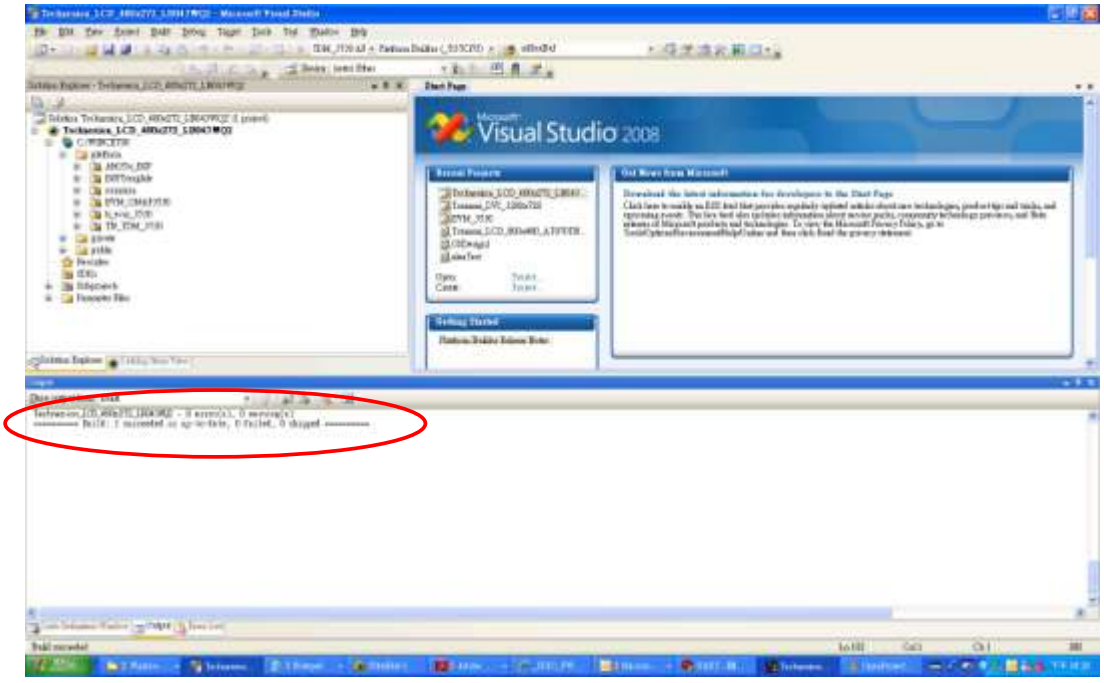


Figure 76: build complete

13.4 Creating the SD card

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

Figure 77: An example of an USB card reader

Go to:
C:\WINCE700\OSDesigns\Technexion_LCD_480x272_LB043WQ2\Technexion_LCD_480x272_LB043WQ2\RelDir\TN_TDM_3730_ARMV7_Release

Open the folder. The folder contains files named: MLO, EBOOTSD.nb0, NK.bin (These files are needed for a bootable SD-card)

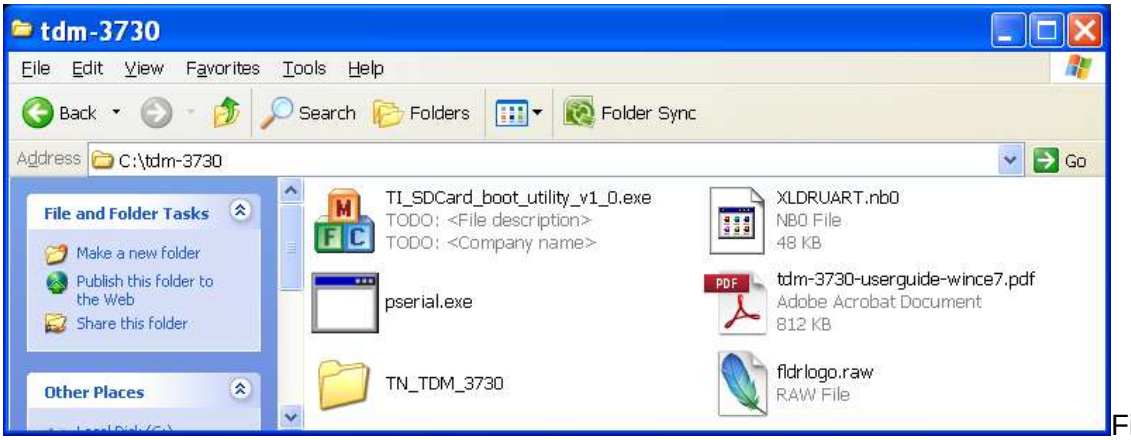


Figure 78: Step 1 - tdm-3730.zip contains these files (in this example extracted on "c :")

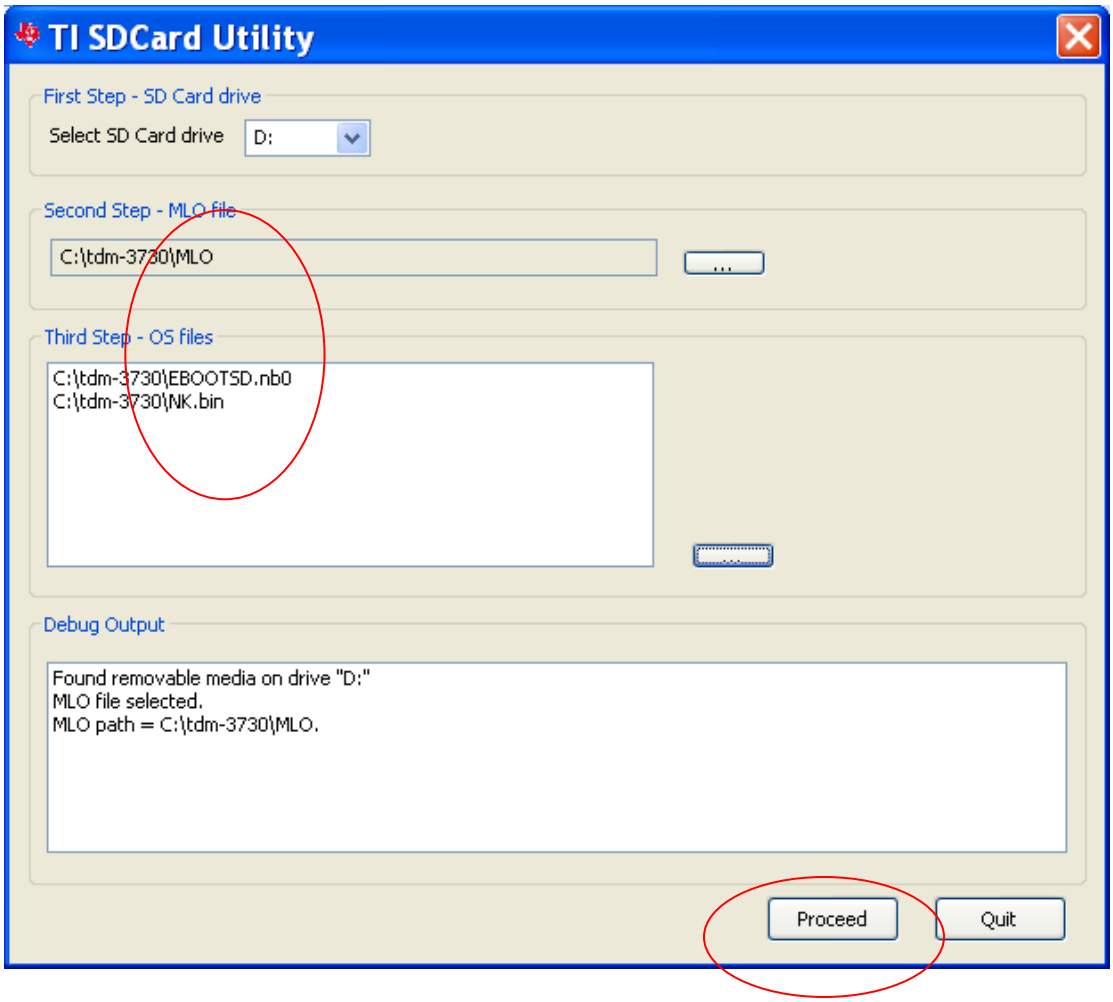


Figure 79: Step 2 -Use the "TI_SDCard_boot_utility_v1_0.exe" tool to format the SD card and copy the files (MLO, EBOOTSD.nb0, and NK.bin). Press the "Proceed" Button

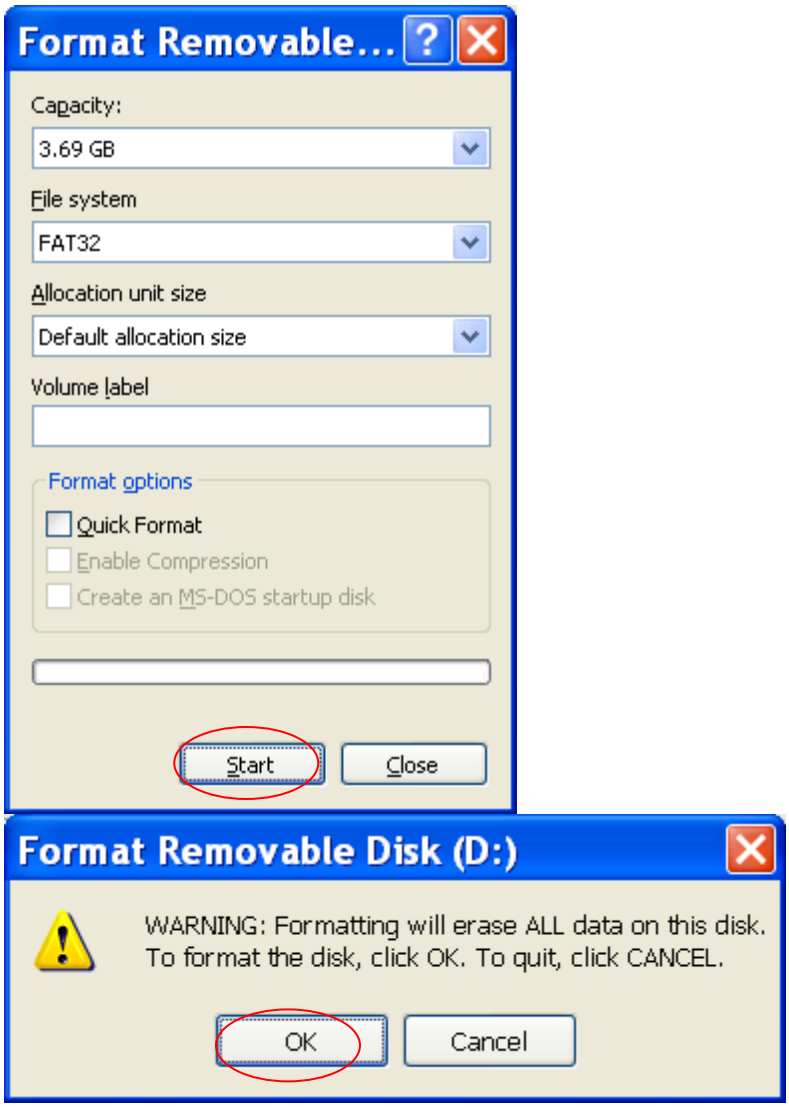


Figure 80: Step 3 - Press "Start" Button and then press the "OK" button

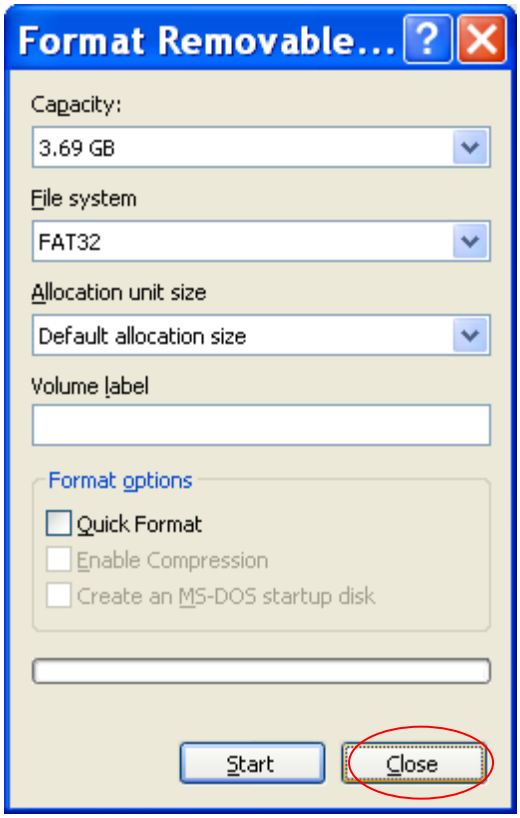


Figure 81: Step 4 - After format is complete press "OK" button" and then press "close"

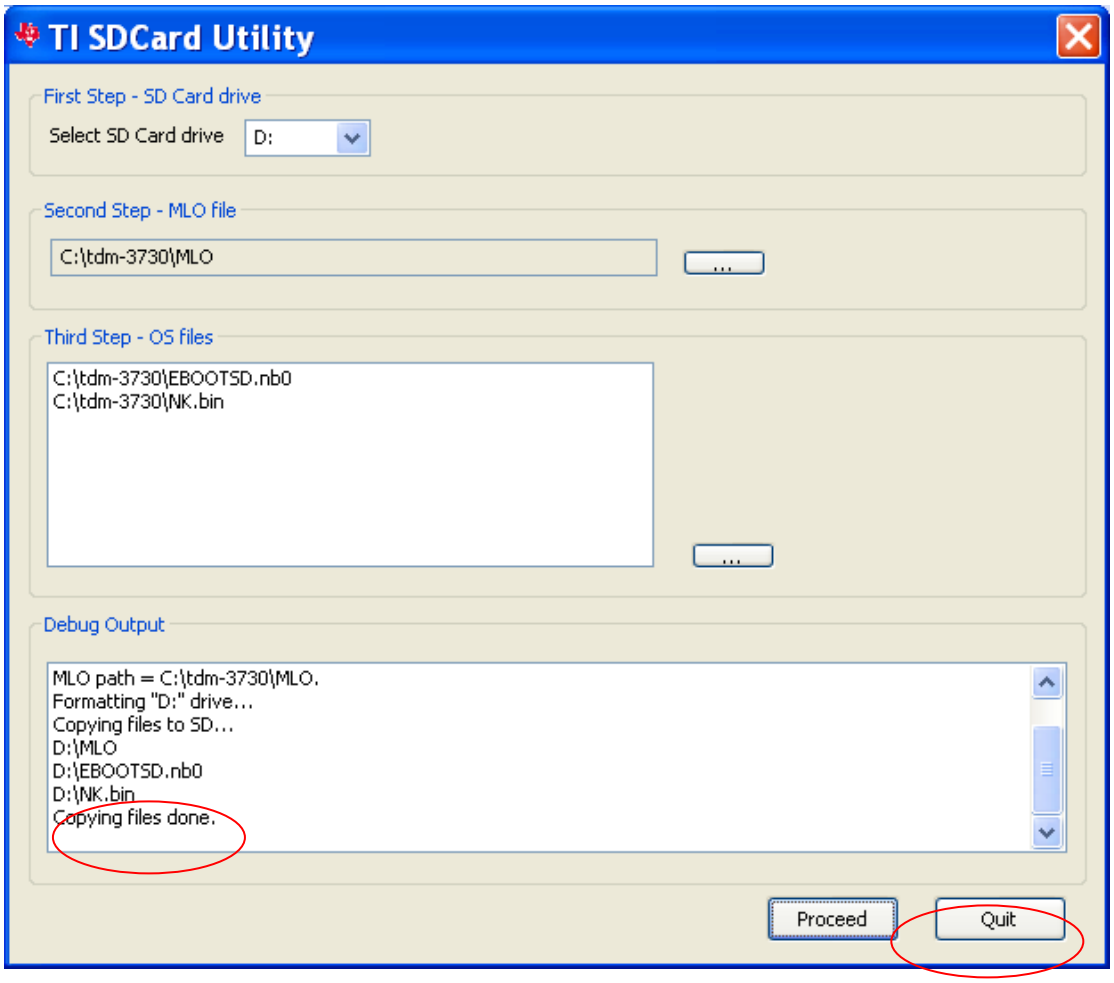


Figure 82: Step 5 - Wait until the copying of the files to the SD is done, then Press Quit

13.5 Starting HyperTerminal

Figure 83: Step 6 -Execute HyperTerminal

(This requires the use of a null-modem, if you are not sure how this works then please read the chapter about connecting the null-modem)

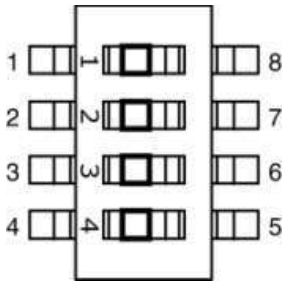


Figure 84: set all the switches on SW1 to "ON"

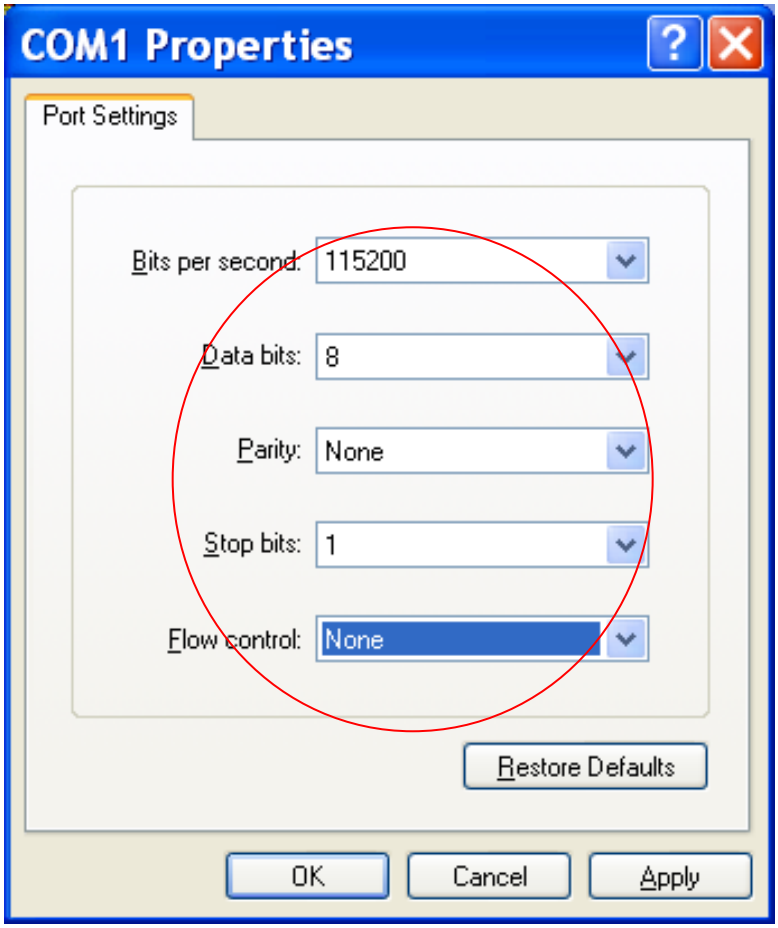


Figure 85: And configure the same port settings.

13.5.1 Checking if the NAND of the Development kit is empty

Power ON the development kit, then Press any key, you can see one of the following messages on the hyper terminal:

13.5.1.1 The development kit runs Linux or the Default Screen

Ease the NAND in u-boot:

```
u-boot#                    nand erase.chip
```

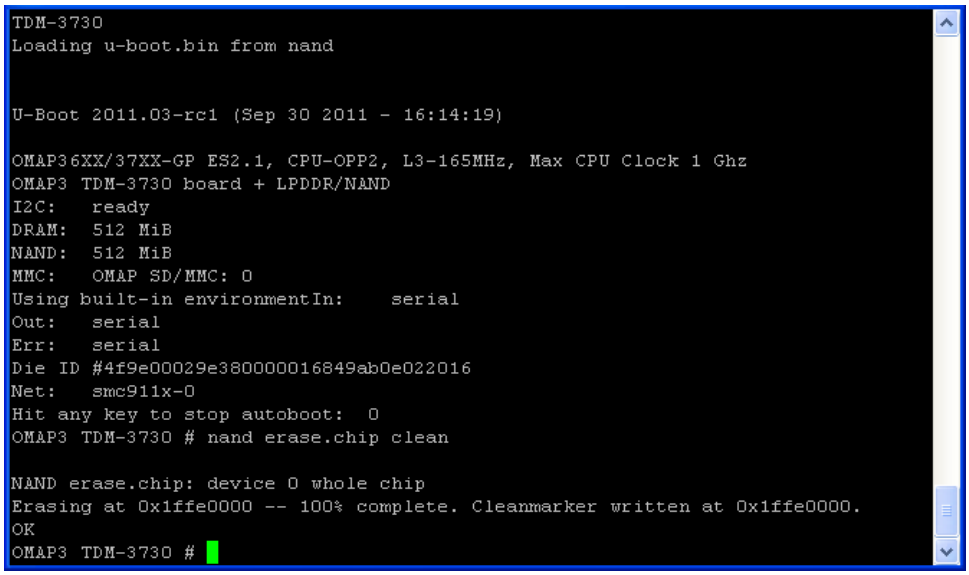


Figure 86: press any key to enter u-boot and do a nand erase.chip

13.5.1.2 The development kit runs a version of windows

```
>>> 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] Flash Management
 [6] Set Device ID
 [7] Save Settings
 [8] Enable/Disable OAL Retail Messages
 [9] Select Display Resolution
 [a] Select OPP Mode
 [0] Exit and Continue

 Selection:
```

Figure 87: Step 7b - Output on the terminal when the TDM-3730 has a "windows" image in NAND

Step 8 - To clean the NAND, key in the following:

- Key in "5" (Flash management)
- Key in "4" (Erase Block Range)
- Key in "0" and press Enter (First Block)
- Key in "3999" and press Enter (Last Block)
- Key in "y" (continue)

```
 Selection: 5

--------------------------------------------------------------------------------

 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] Enable flashing NK.bin
 [9] Set ECC mode
 [0] Exit and Continue

 Selection: 4

 First Block Number: 0

 Last Block Number: 3999
```

Figure 88: erasing the blocks and enter"y" to confirm.

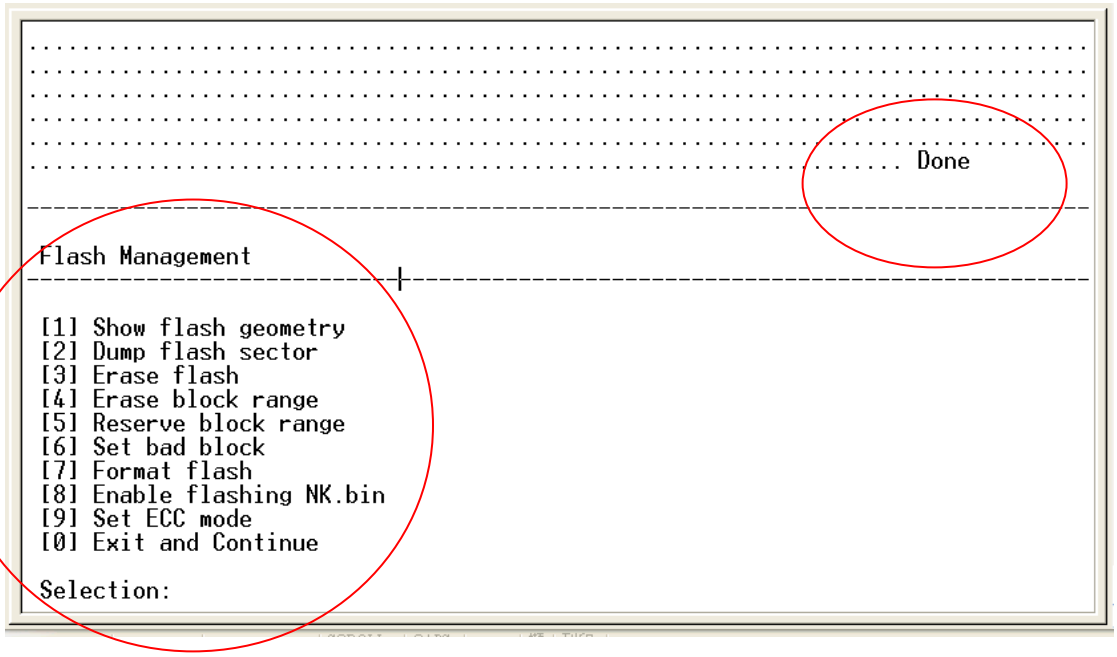


Figure 89: erasing of the blocks finished

Remove the power cable and reinsert the power cable again

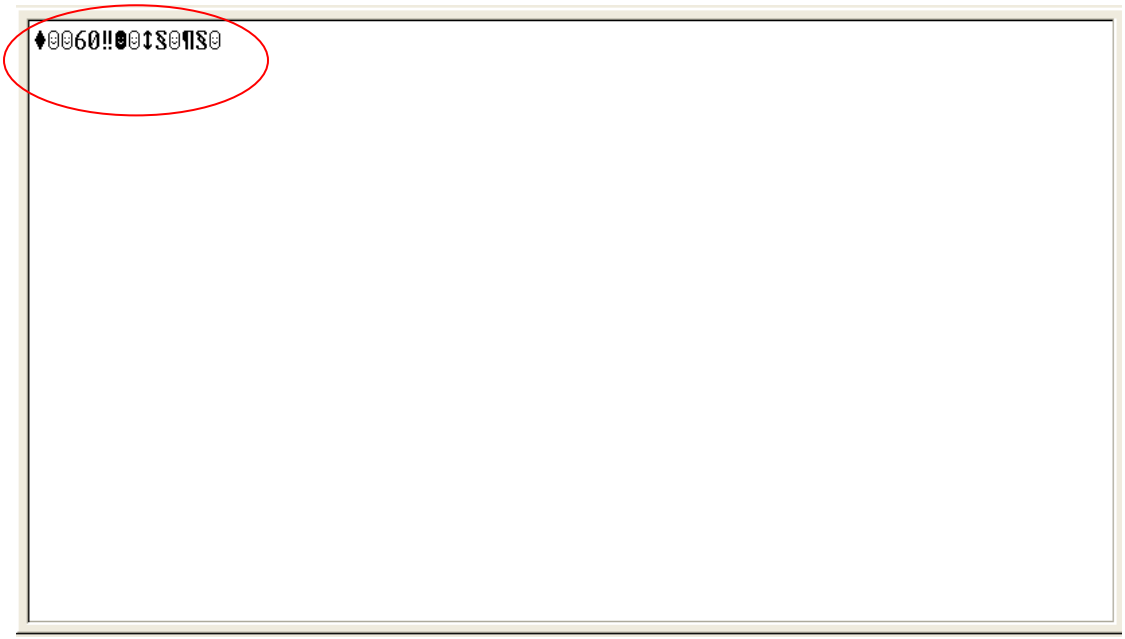
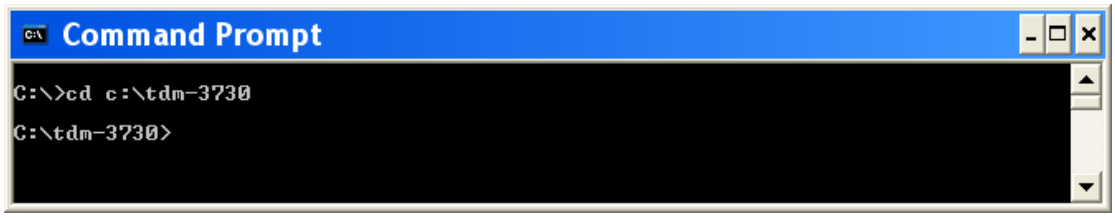


Figure 90: Step 7a - Output on the terminal when the TDM-3730 has no image in NAND.

13.6 Establish a serial connection

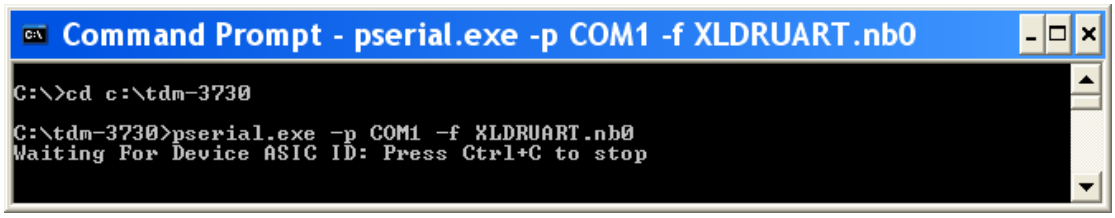
Step 9 - Execute the "All Programs>Accessoiries>Command Prompt" (console), and enter the Path: cd c:/tdm3730 (It means changing to the directory of tdm-3730).



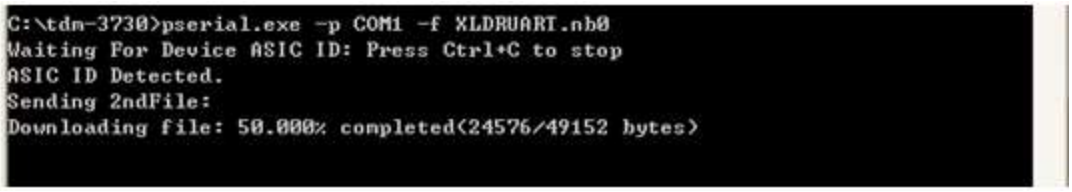
Step 10 - Terminate the hyper terminal

Step 11 - Execute this command:

```
pserial.exe -p COM1 -f XLDRUART.nb0   (enter)
```

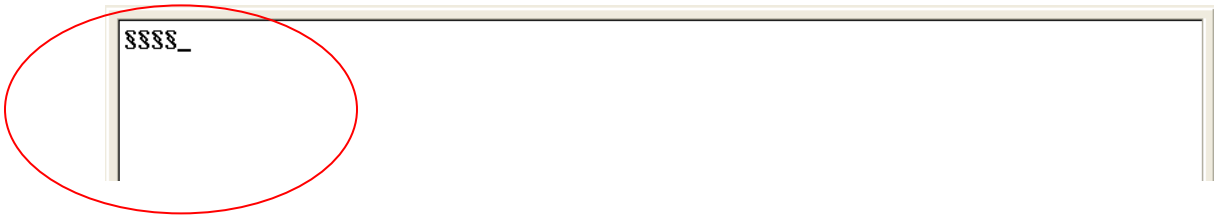


Then remove the power cable from the development kit, and reinsert it, to reboot.



13.6.1 Transfer a file to the development kit

Step 12 - Execute the Hyper terminal, you can see these characters every 10 seconds



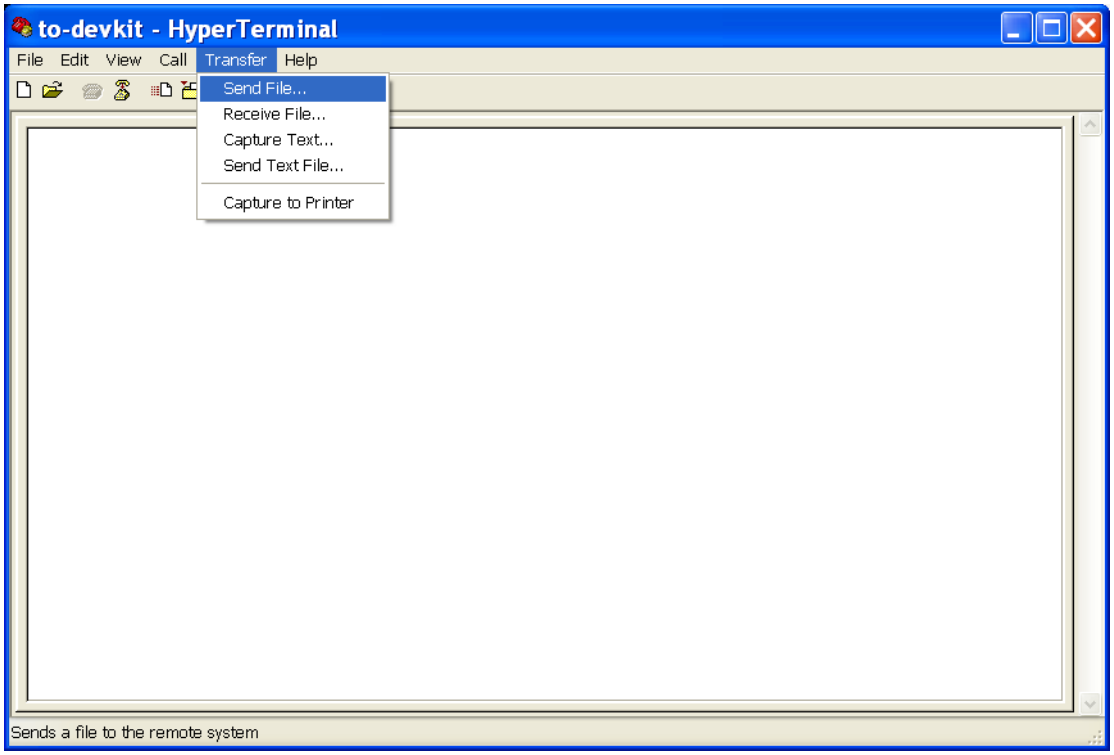


Figure 91: Start HyperTerminal and transfer files by using "send file".

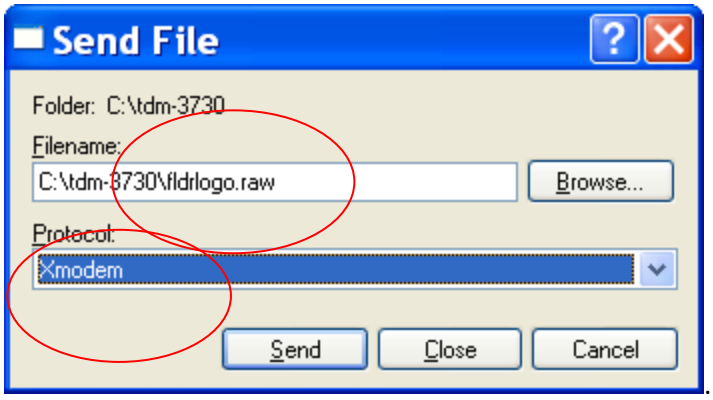


Figure 92: Select Xmodem and select the file (fldrlogo.raw),

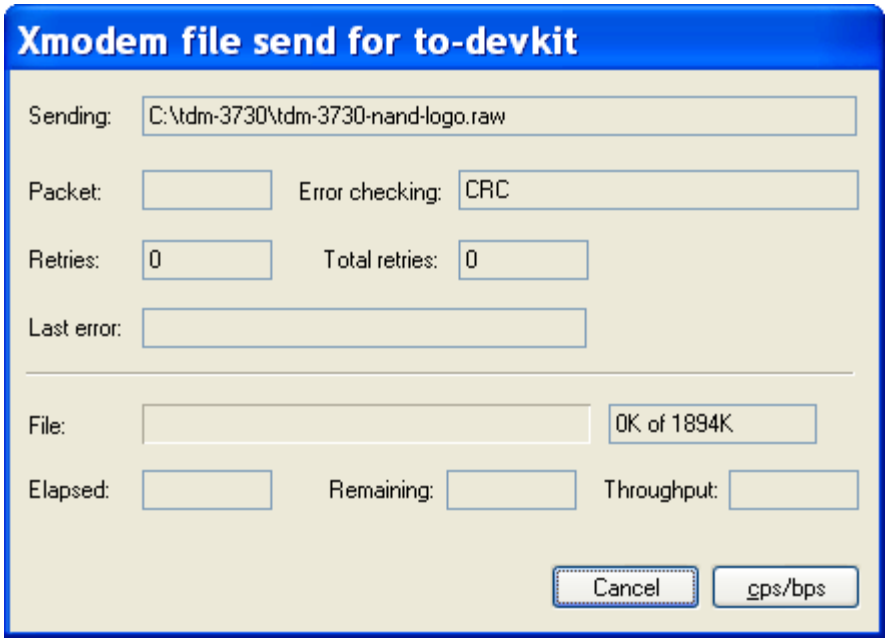


Figure 93: Wait for the transfer to finish

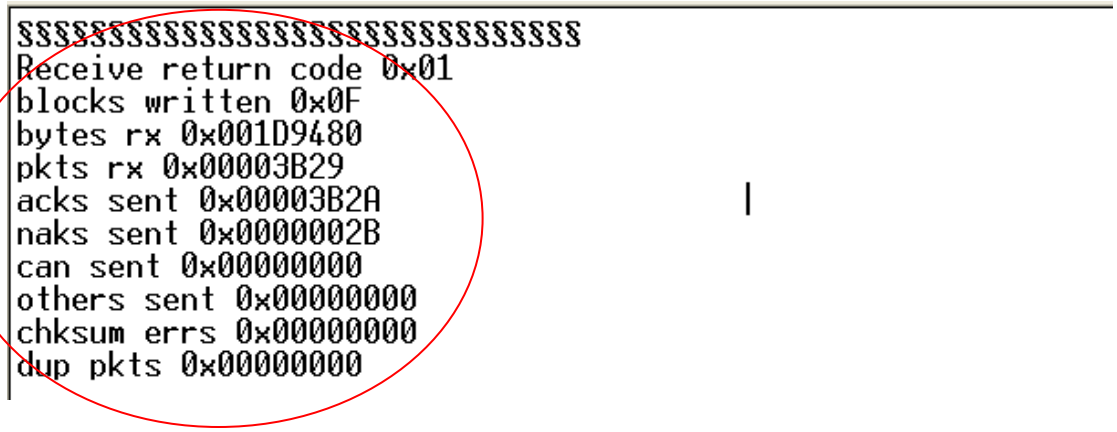


Figure 94: When the download finishes, you can see this message.

Step 13 - Power OFF, and again Power ON the tdm-3730 board. You will see the following.

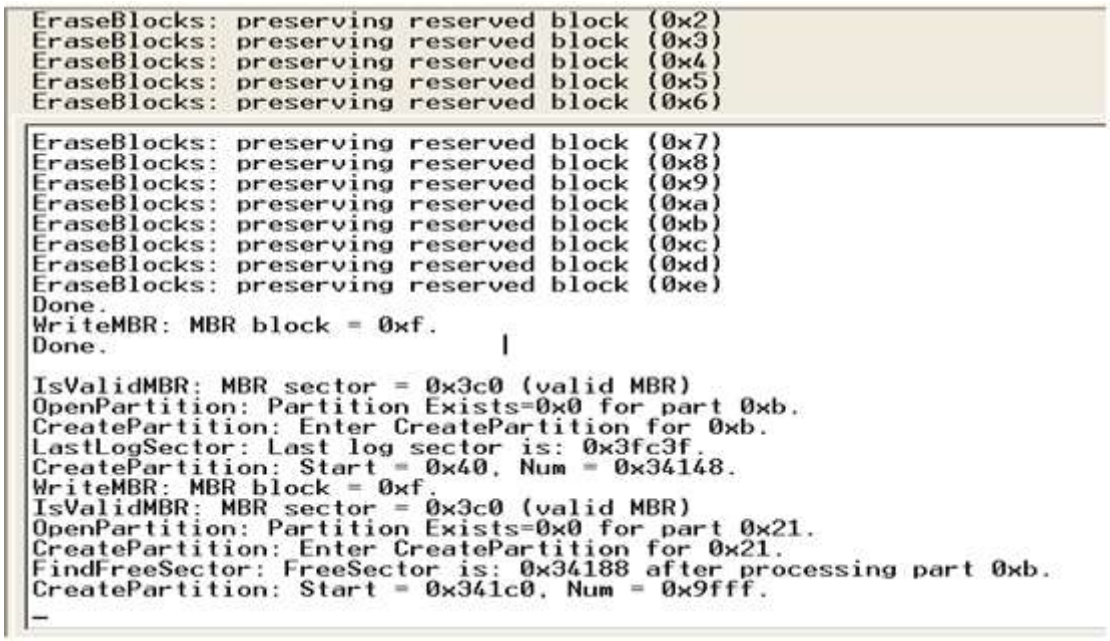


Figure 95 : partitioning

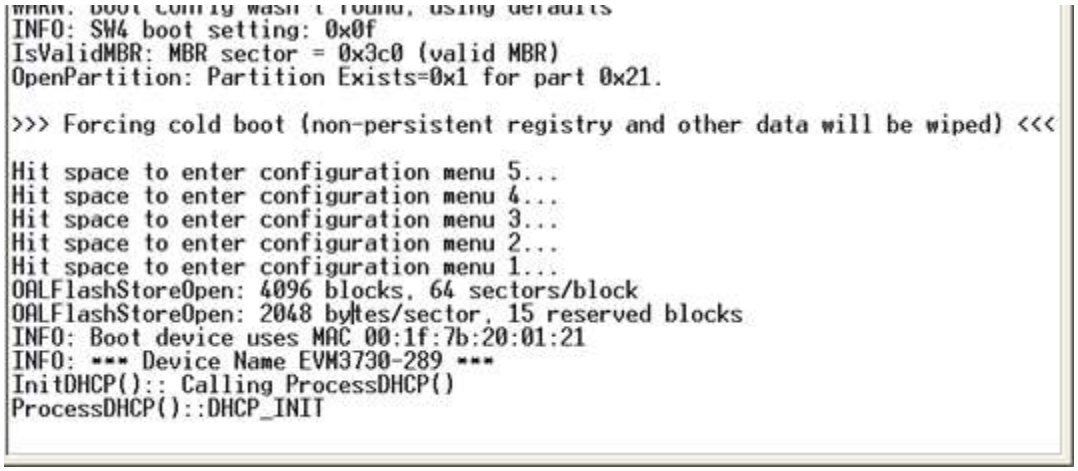


Figure 96: partitioning finished

13.7 Boot from SD-card

Step 14 - Insert SD card (the one created in step 2 to step 5), then keep tdm-3730 board's user1 button pressed, and power ON again (with USER1 button is still pressed), and after this press any key

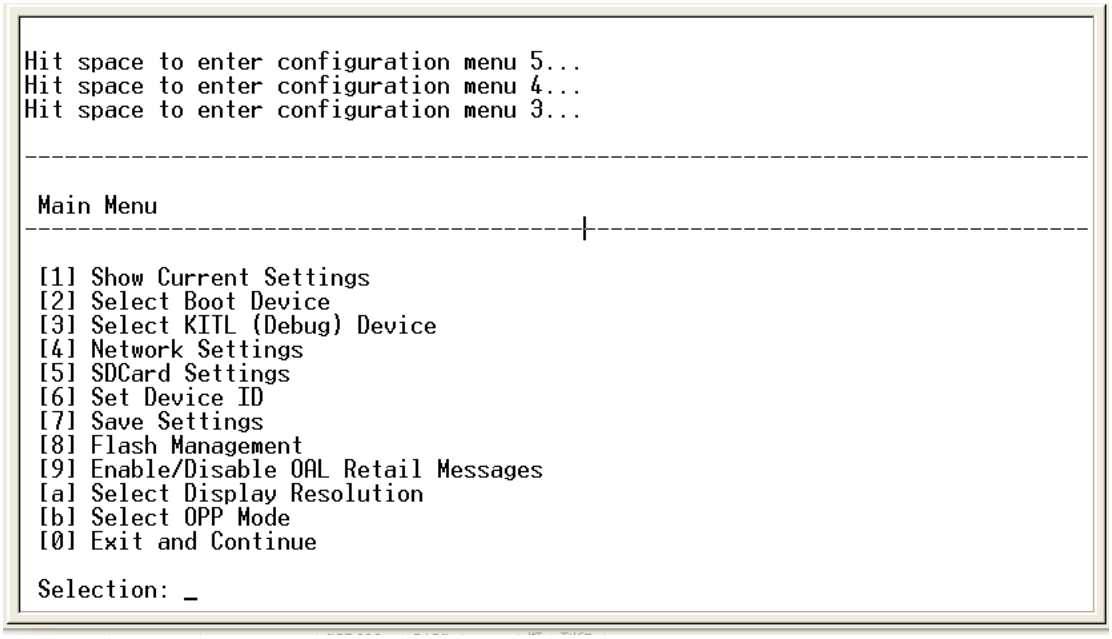


Figure 97: pressing any key on your PC's keyboard will show the menu

- Key in "2" (select boot device)
- Key in "3" (NK from SD card file)
- Key in "8" (Flash management)
- Key in "8" (enable flashing nk.bin)
- then key in "y" (to confirm)
- Key in "9" (set ecc mode)
- then key in "0" (hamming bit)
- Key in "0" (Exit and continue)
- Key in "a" (select display resolution)
- then key in"e" (LCD 800x480 60Hz) (this is the 7" LCD)
- Key in "7" (save settings)
- then key in "y" (to confirm)
- key in "0" (Exit and continue)

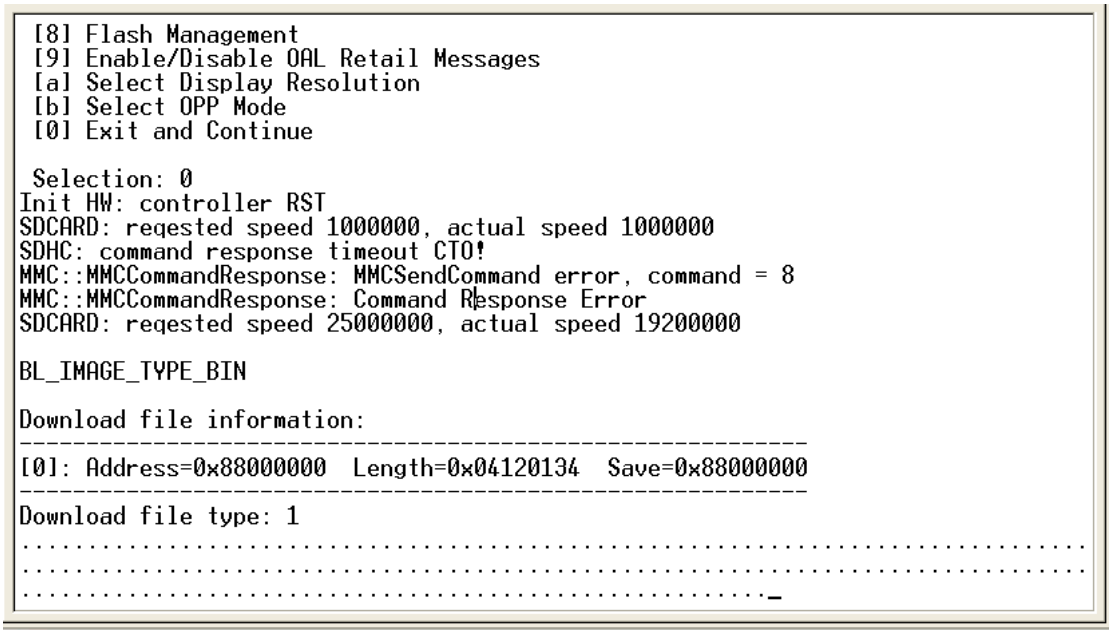


Figure 98: After this you can see the Windows Embedded Compact 7's desktop. (This is still booting from the SD-card).

13.8 Enable the development kit to boot from NAND

Step 15 - Reboot tdm-3730, and then press any key.

- Key in "2" (select boot device)
- key in "3" (NK from NAND)
- Key in "7" (save settings)
- Then key in "y" (to confirm)
- key in "0" (Exit and continue)
- The development kit can now reboot from NAND.

13.9 How to - change the USB functions

13.9.1 How to see the development kit as storage device via USB OTG

Place the following lines of code to the end of the platform.reg :

```
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"=-                                   ; erase previous default
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"="Mass_Storage_Class"                ;; USB Storage
```

The storage will appear on the PC as a disk.

The link to the PC will appear on the development kit as "mounted volume"; when the device is unplugged this "mounted volume" will disappear.

13.9.2 How to use Active Sync with USB OTG

Place the following lines of code to the end of the platform.reg :

```
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"=-                                    ; erase previous default
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"="Serial_Class"                       ; ActiveSync
```

13.9.3 How to use Ethernet via USB OTG

Place the following lines of code to the end of the platform.reg :

```
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"=-                                    ; erase previous default
[HKEY_LOCAL_MACHINE\Drivers\USB\FunctionDrivers]
  "DefaultClientDriver"="RNDIS"                              ; USB RNDIS
```

13.10 How to - change the Screen orientation

13.10.1 Option 1 - Change the screen orientation (rotation) in patform.reg:

Around line 309

```
[HKEY_LOCAL_MACHINE\System\GDI\Rotation

"Angle"=dword:0
```

The green 0 can be changed into:

- 0 0 degrees rotation
- 5a 90 degrees rotation
- B4 180 degrees rotation
- 10e 270 degrees rotation

13.10.2 Option 2 - Change the screen orientation (rotation) on the development kit

Run `regedit:`

- Select HKEY local

- Select System
- Select GDI
- Select Rotation
- Click on Angle and type for example 5a

Restart the development kit and the screen will be rotated 90 degrees

13.11 How to - test the serial port

- Set the switch SW2 to UART1
- Connect a UART cable to the PC, open HyperTerminal and set COM1 (115200, 8, none, 1, none)
- Open the command prompt (run CMD) on the development kit:

```
cd \windows

testserial com1:
```

When typing on the PC it will return the typed characters, without the cable it will not.

13.12 How to - change the logo that you see during boot up

During the installation of Windows Embedded Compact 7you will be asked to transfer a file called tdm-3730-nand-logo.raw. This raw-file will, during boot up, show a screen with a TechNexion logo. This section will describe how to make your own logo appear.

13.12.1 Preparing the BMP

- You will need to prepare a BMP with your logo.
- Place the BMP at the following directory: :\WINCE700\PLATFORM\ TN_TDM_3730\FILES

13.12.2 Change the makefile.inc

- Open a text editor (for instance Notepad)
- Open makefile.inc, which is in the directory: C:\WINCE700\PLATFORM\ TN_TDM_3730\SRC\BOOTLOADER\XLDR\NAND
- Change the orange part in the following line with the name of your BMP: Copy /b $(_TGT)\OMAP35xx-nand.raw + $(_FILES)\TechNexion.bmp $(_TGT)\OMAP35xx-nand-logo.raw
- Save makefile.inc in the same directory

13.12.3 Change image-cfg.h

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

C:\WINCE700\PLATFORM\TN_TDM_3730\SRC\INC

- Change the green number, with the number 0x00280000, in the following line (this size is enough for 15" (1024x768) and will be suitable for all smaller screen sizes :

#define IMAGE_BOOTLOADER_BITMAP_SIZE 0x00280000

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

13.12.4 Compile

- Open Microsoft Visual Studio 2008
- Open your project (For example: Technexion_LCD_480x272_LB043WQ2)
- Use the menu: Build\advanced build commands\clean sysgen
- You will now find a fldrlogo.raw in the following directory:

C:\WINCE700\OSdesigns\ Technexion_LCD_480x272_LB043WQ2\
Technexion_LCD_480x272_LB043WQ2\RelDir\TN_RDM_3730_ARMV7_Release

14 Appendix – Module

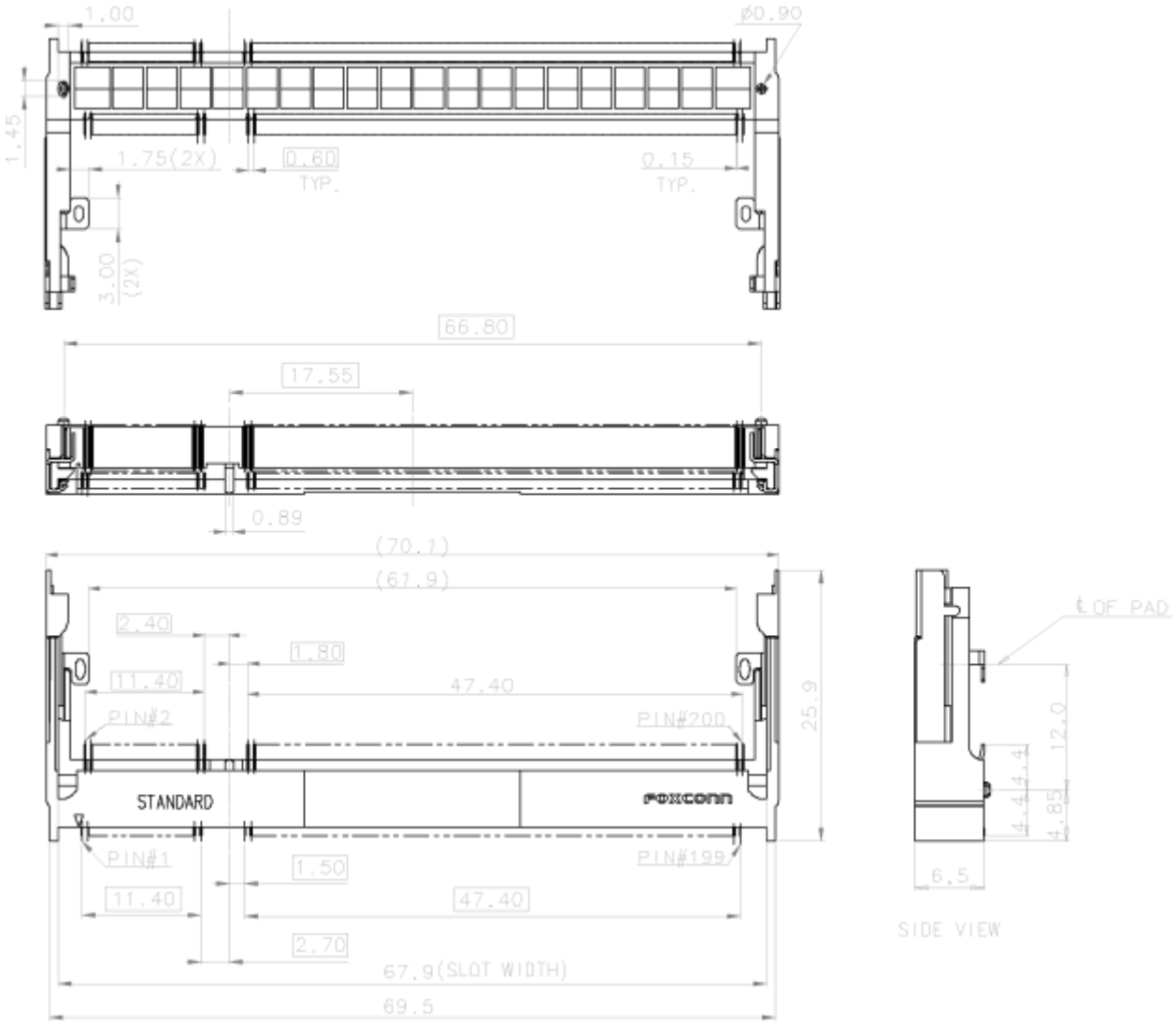
14.1 Module Connector DDR2 SO-DIMM for TDM-3730

To mount the TDM-3730 module on the baseboard it isrecommended to use a connector with the following specifications:

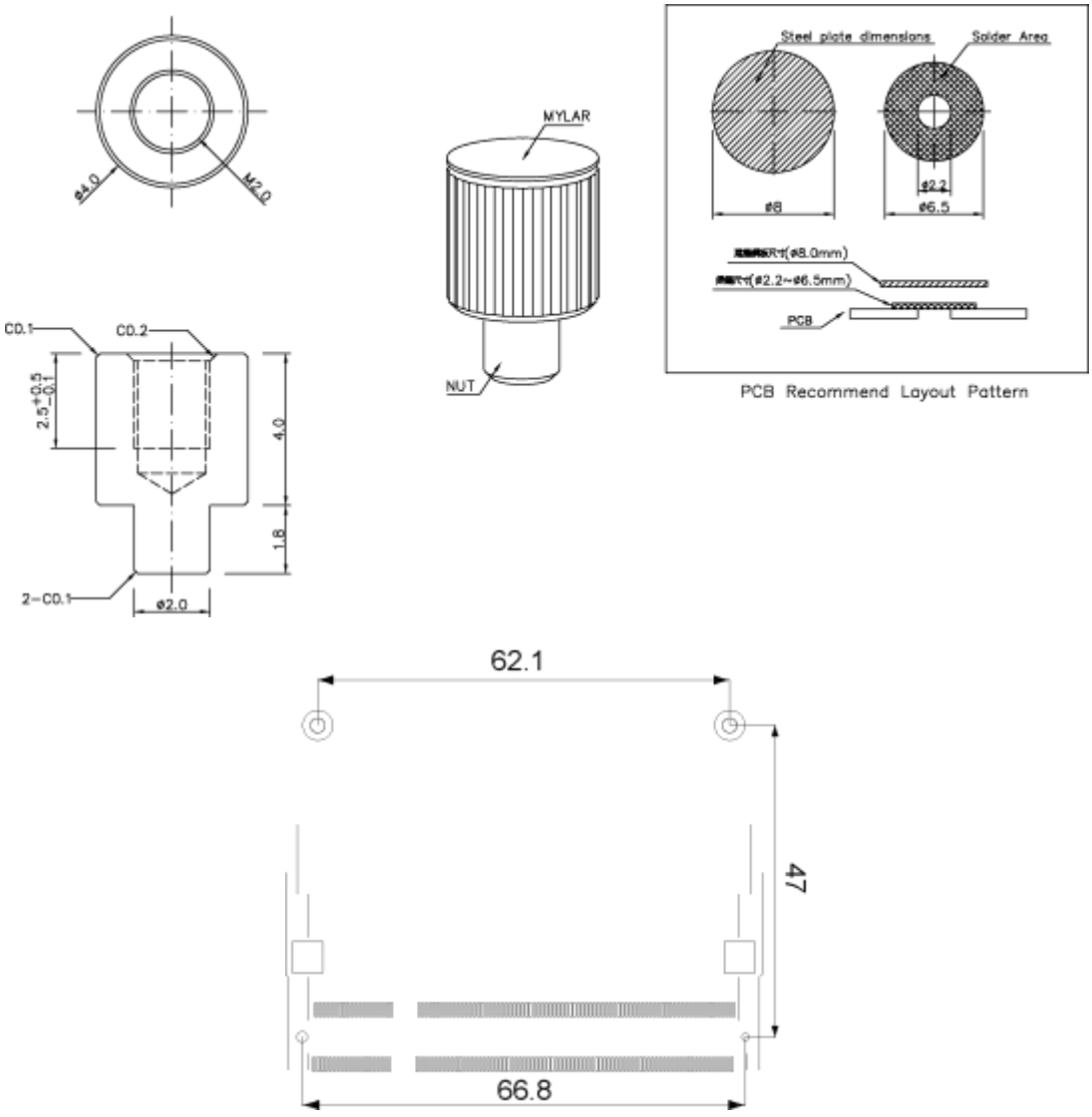
- DDR II SO-DIMM 200pin SMT
- Standard
- Recommended height 6.5 mm

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.



14.2 Nut to Fix TDM-3730 Module to the Baseboard



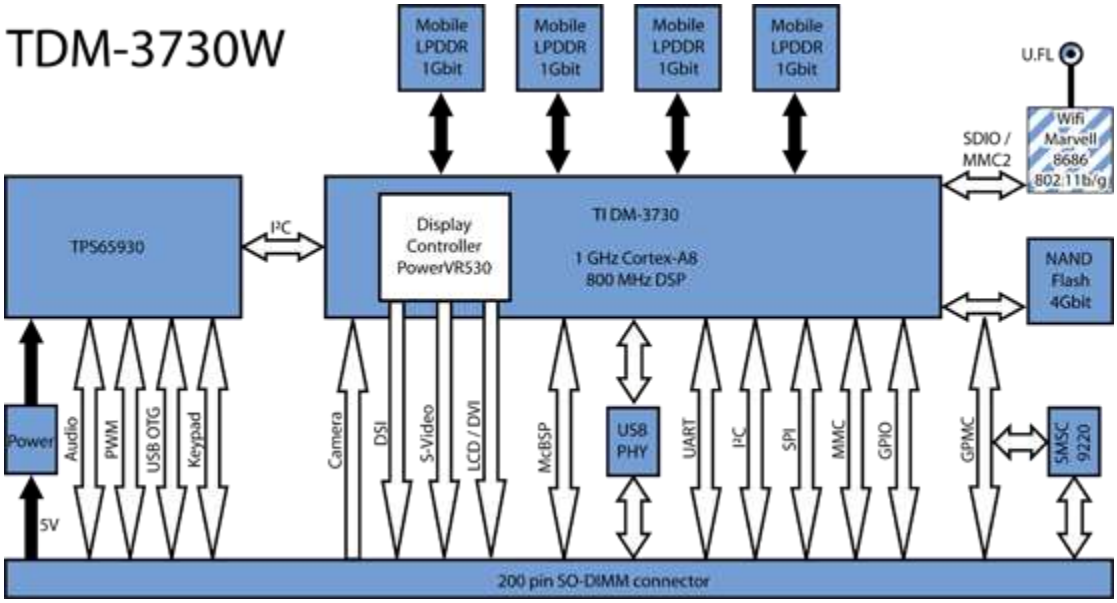
Placement of nuts and connector

Note 1: Always design the above mounting nut/pose on your custom baseboard and fasten the TDM-3730 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.

14.3 Block diagram

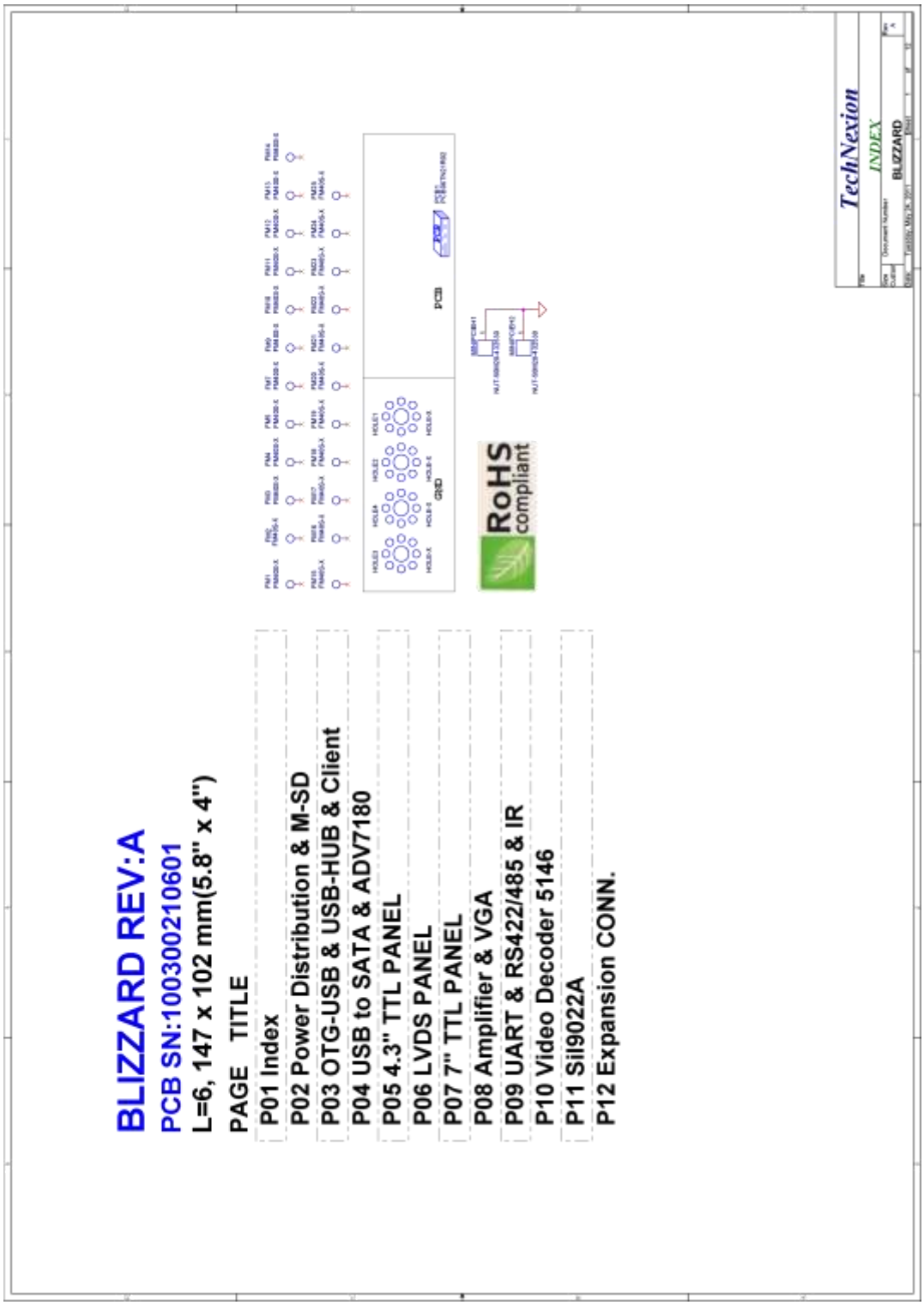


14.4 TPS65930 Power

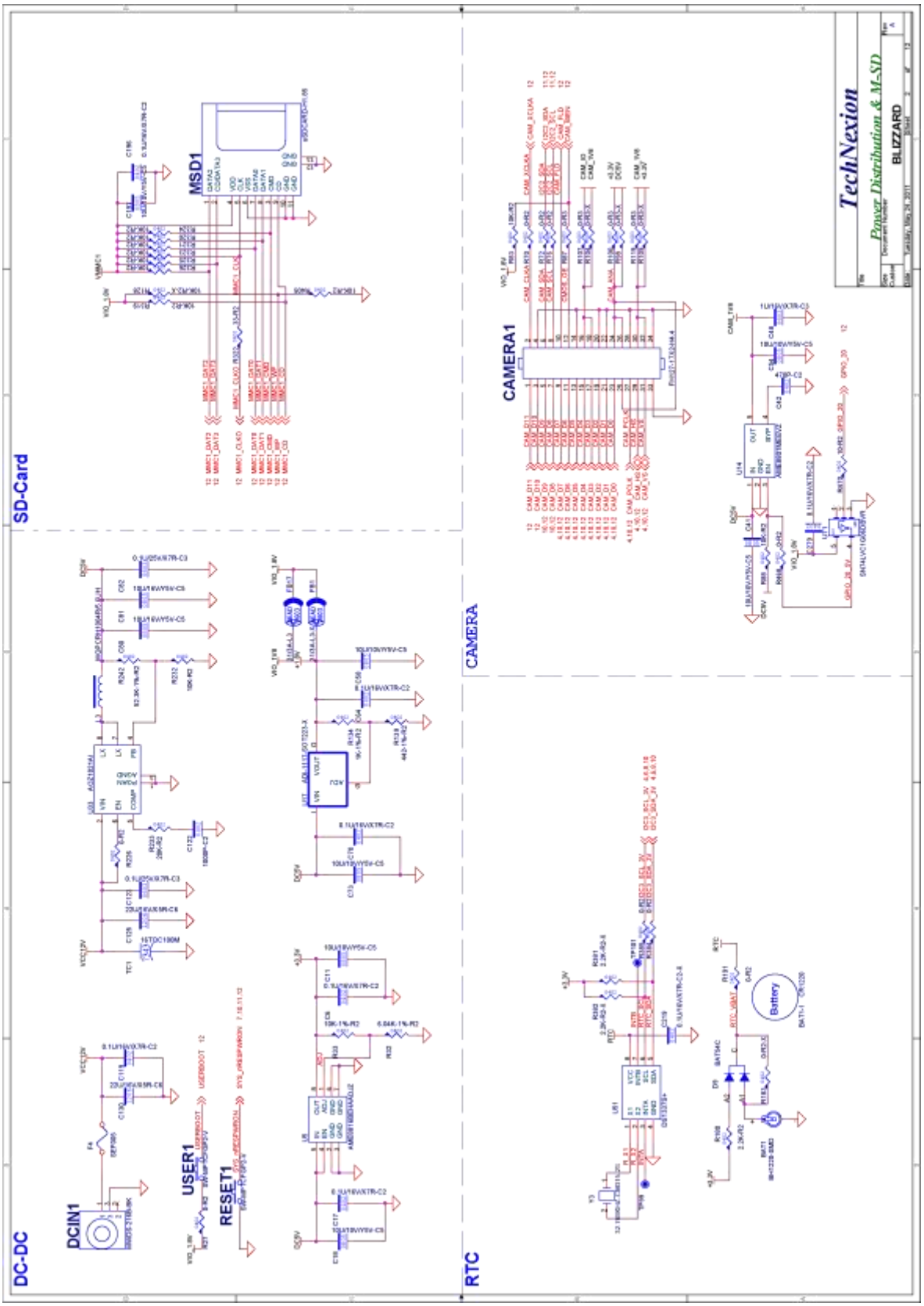
Domain	Type	Voltage	Current
External			
VDD1	SMPS	0.6V to 1.45V	1100mA
VDD2	SMPS	0.6V to 1.45V/1.5V	600mA
VIO	SMPS	1.8V /1.85V	600mA
VBUS	CP	4.8V	100mA
VAUX2	LDO	1.0V/1.2V/1.5V/1.8V/2.5V/2.8V	100mA
VMMC1	LDO	1.85V/2.85V/3.0V/3.15V	220mA
VMIC1	LDO	1.8V	10mA
VMIC2	LDO	1.8V	10mA
VDAC	LDO	1.2V/1.3V/1.8V	65mA
VPLL1	LDO	1.0V/1.2V/1.3V/1.8V	40mA
Internal			
VUSB	LDO	3.1V	15mA
VUSB_1P5	LDO	1.5V	30mA
VUSB_1P8	LDO	1.8V	30mA
VINTDIG	LDO	1.5V	50mA
VINANA1	LDO	1.5V	50mA
VINANA2	LDO	2.5V/2.75V	250mA
VRTC	LDO	1.5V	

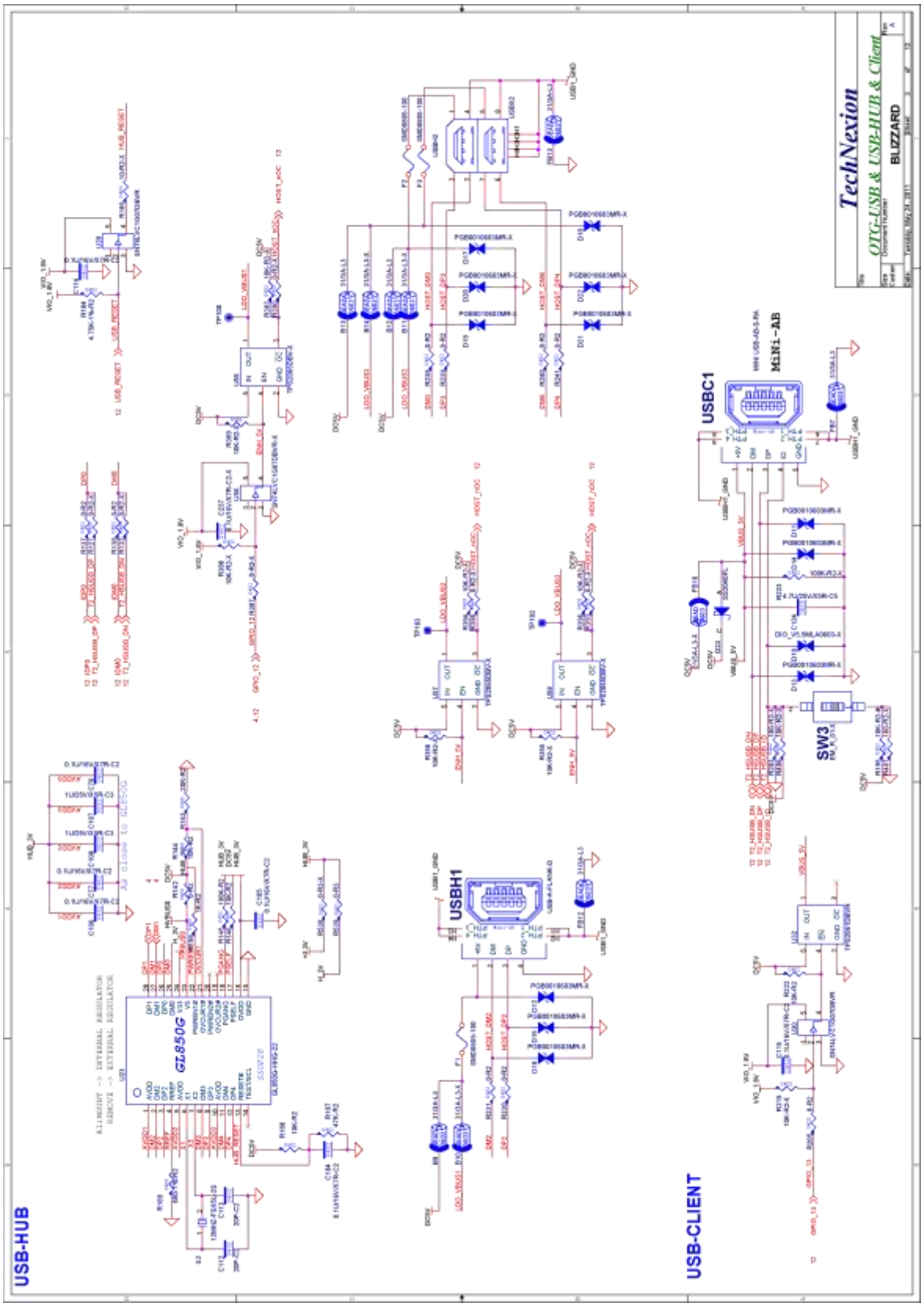
15 Appendix - Schematics

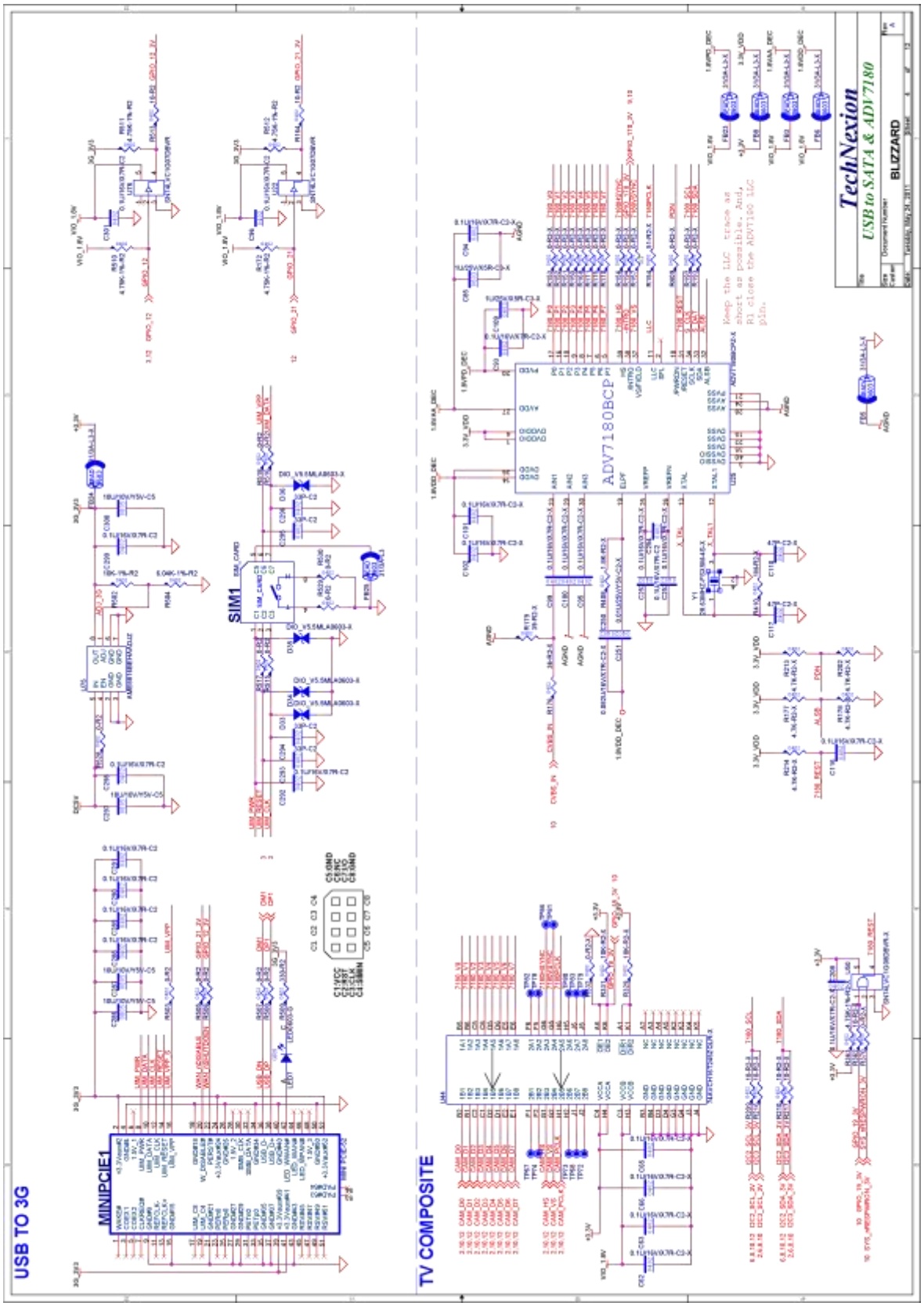
15.1 Blizzard baseboard schematics



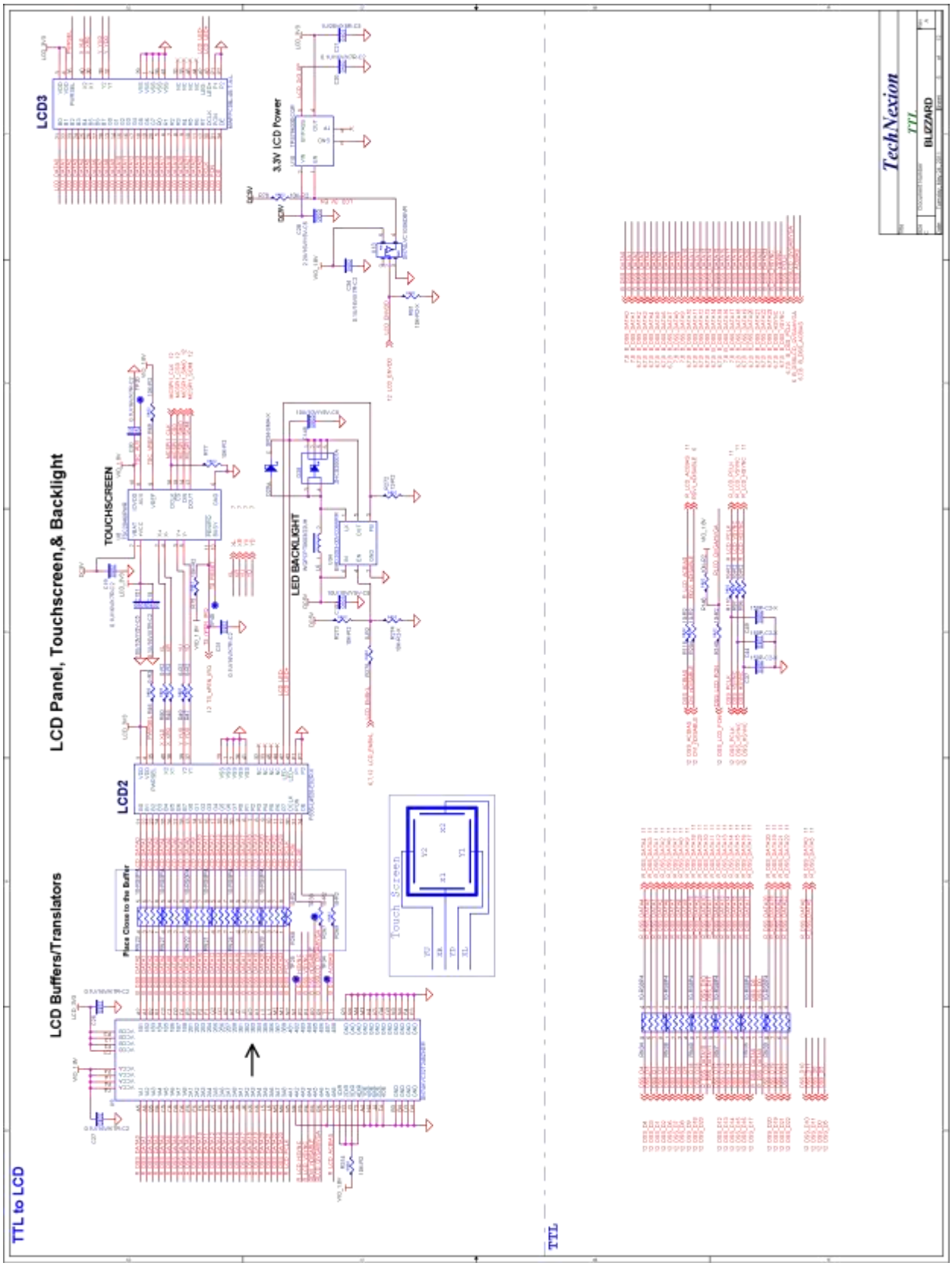
If you are designing your own baseboard then please contact sales@technexion.com for OrCAD files

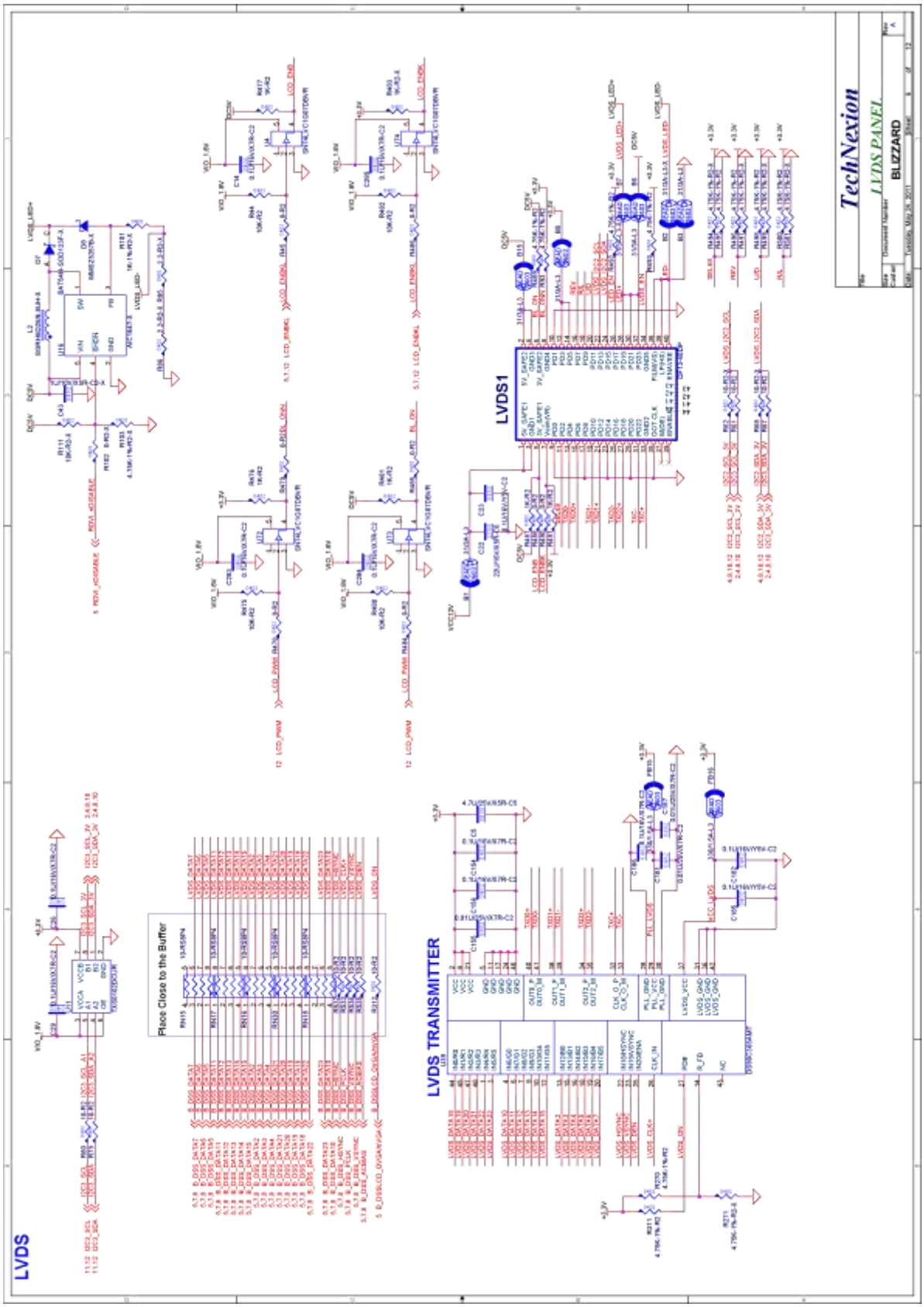

SD-Card
MSD1
CAMERA
CAMERA1
TechNexion
Power Distribution & M-SD
BLIZZARD
DC-DC
DCIN1
USER1
RESET1
RTC
Battery

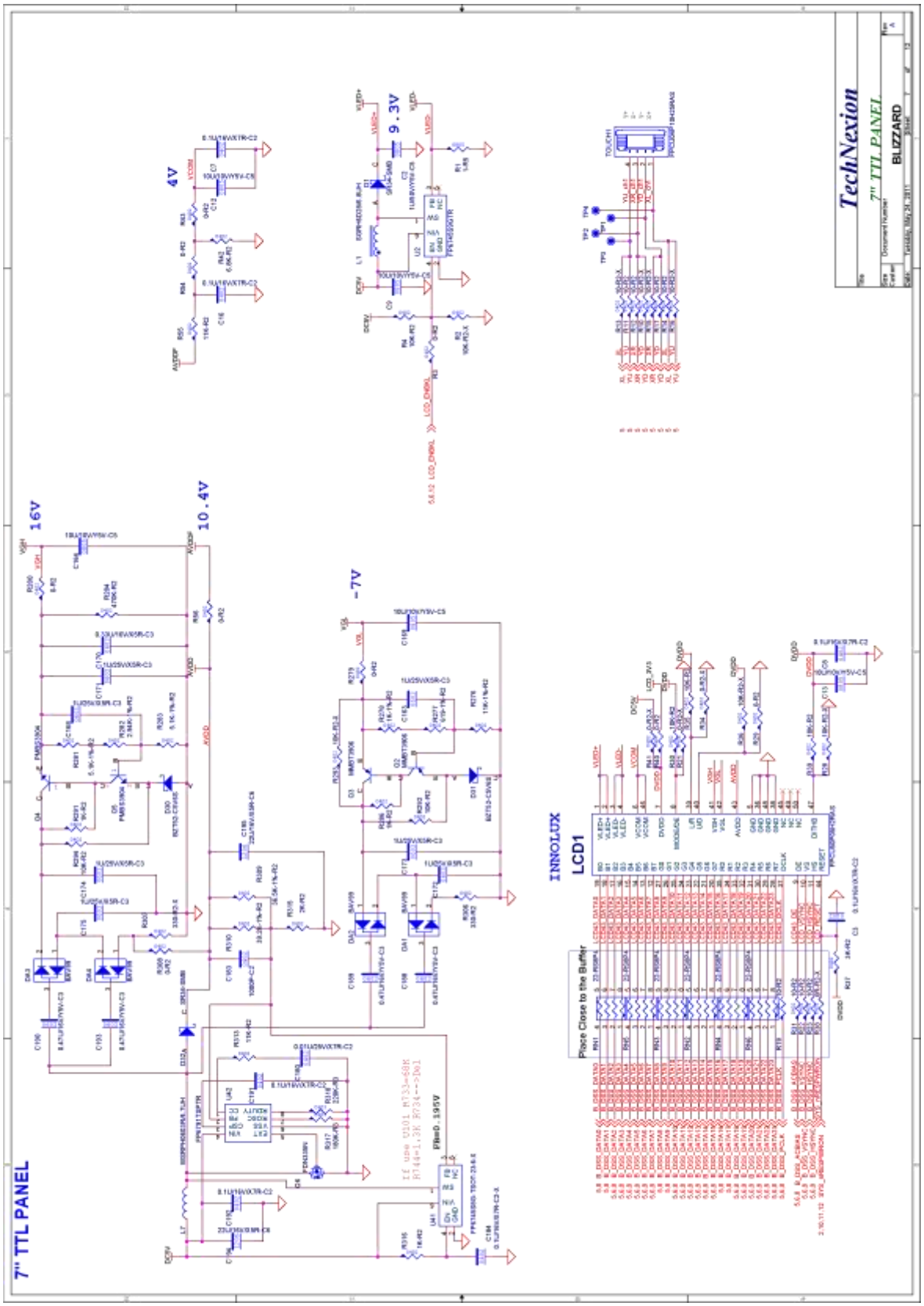


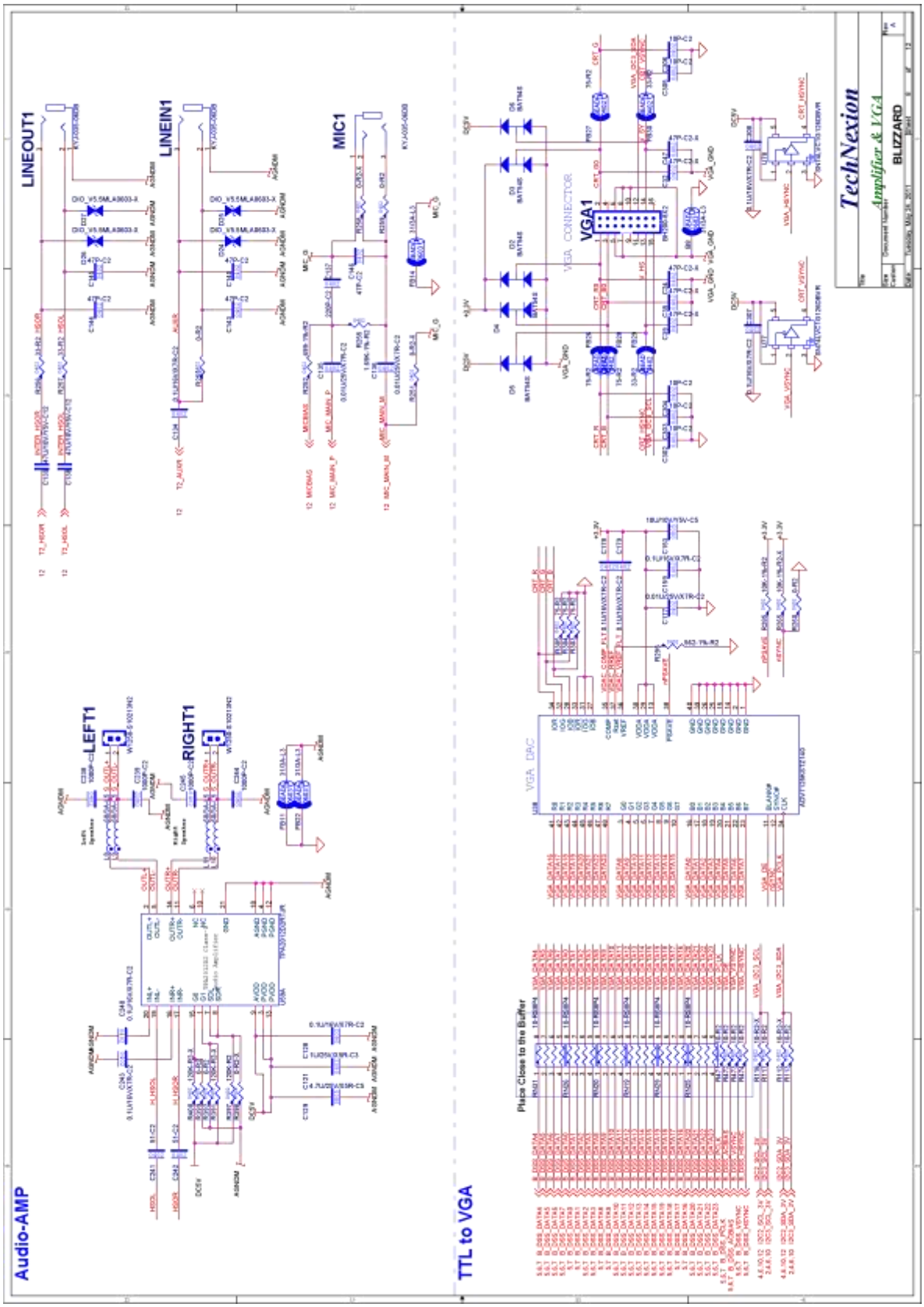


If you are designing your own baseboard then please contact sales@technexion.com for OrCAD files

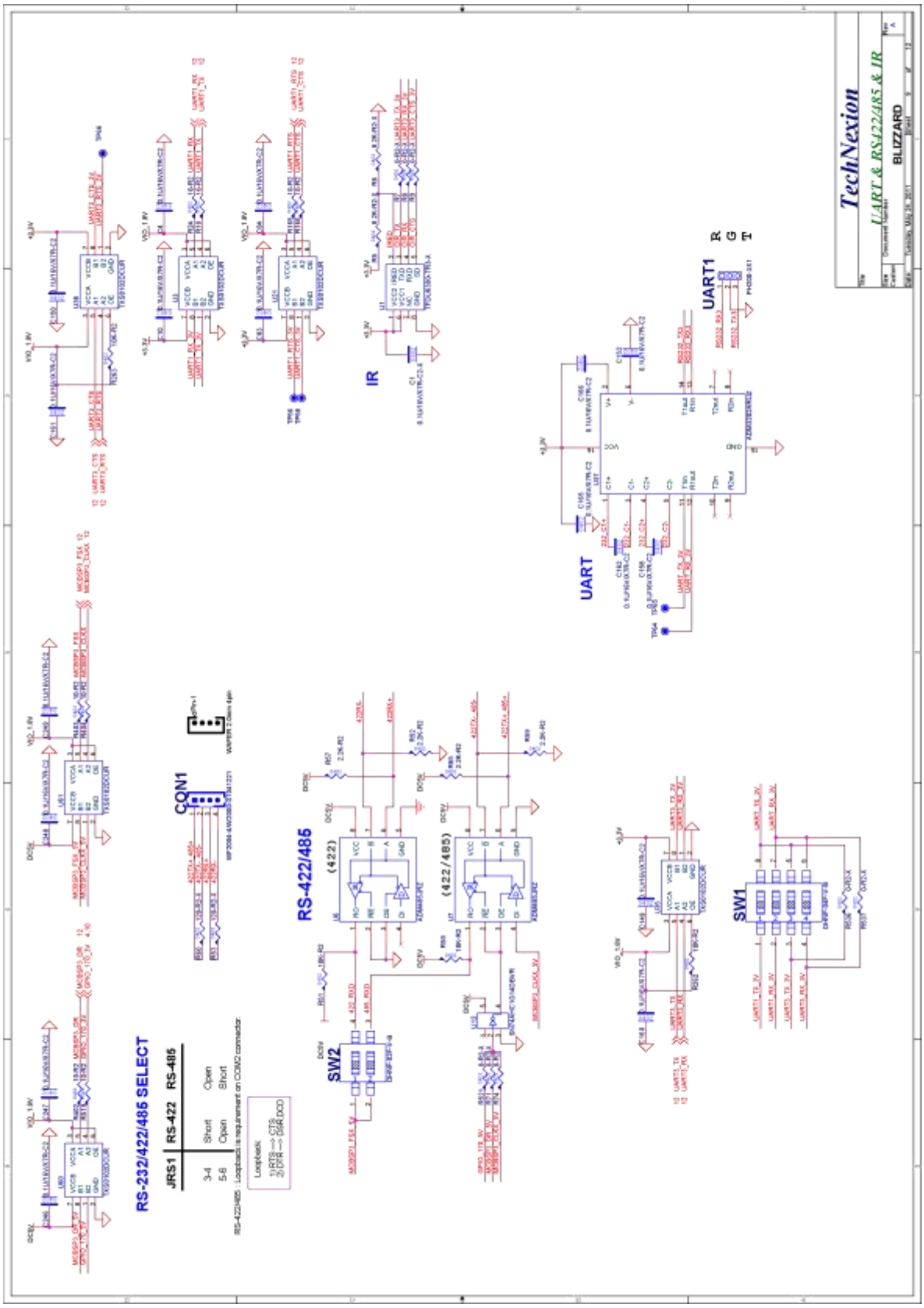

TTL to LCD
LCD Panel, Touchscreen,& Backlight
LCD Buffers/Translators
LCD3
LCD2
3.3V LCD Power
TOUCHSCREEN
LED BACKLIGHT
Place Close to the Buffer
Touch Screen
TTL
TechNexion
TTL
BLIZZARD

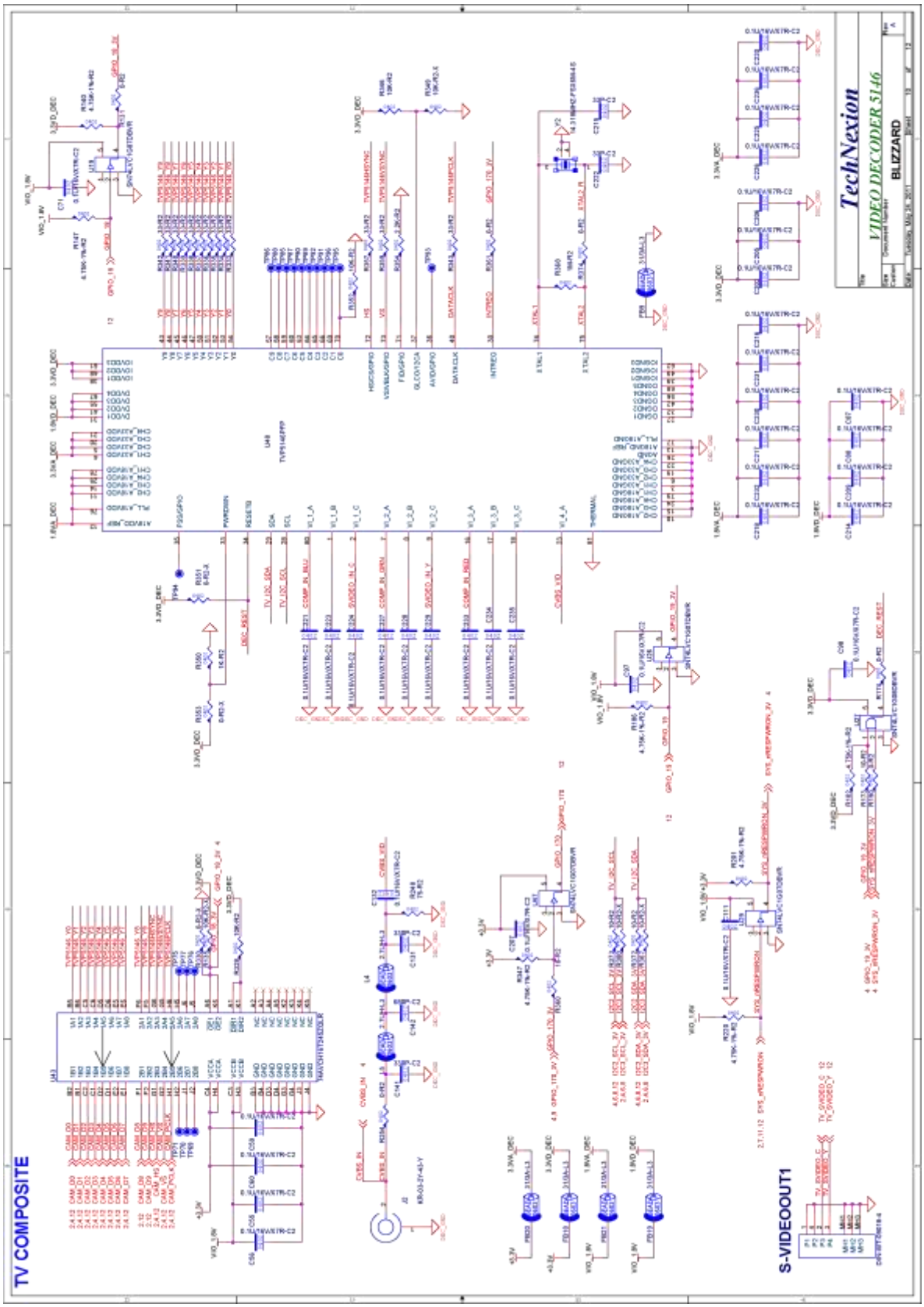



TechNexion
7" TTL PANEL
BLIZZARD
9.3V
4V
16V
10.4V
-7V
INNOLUX
LCD1
7" TTL PANEL

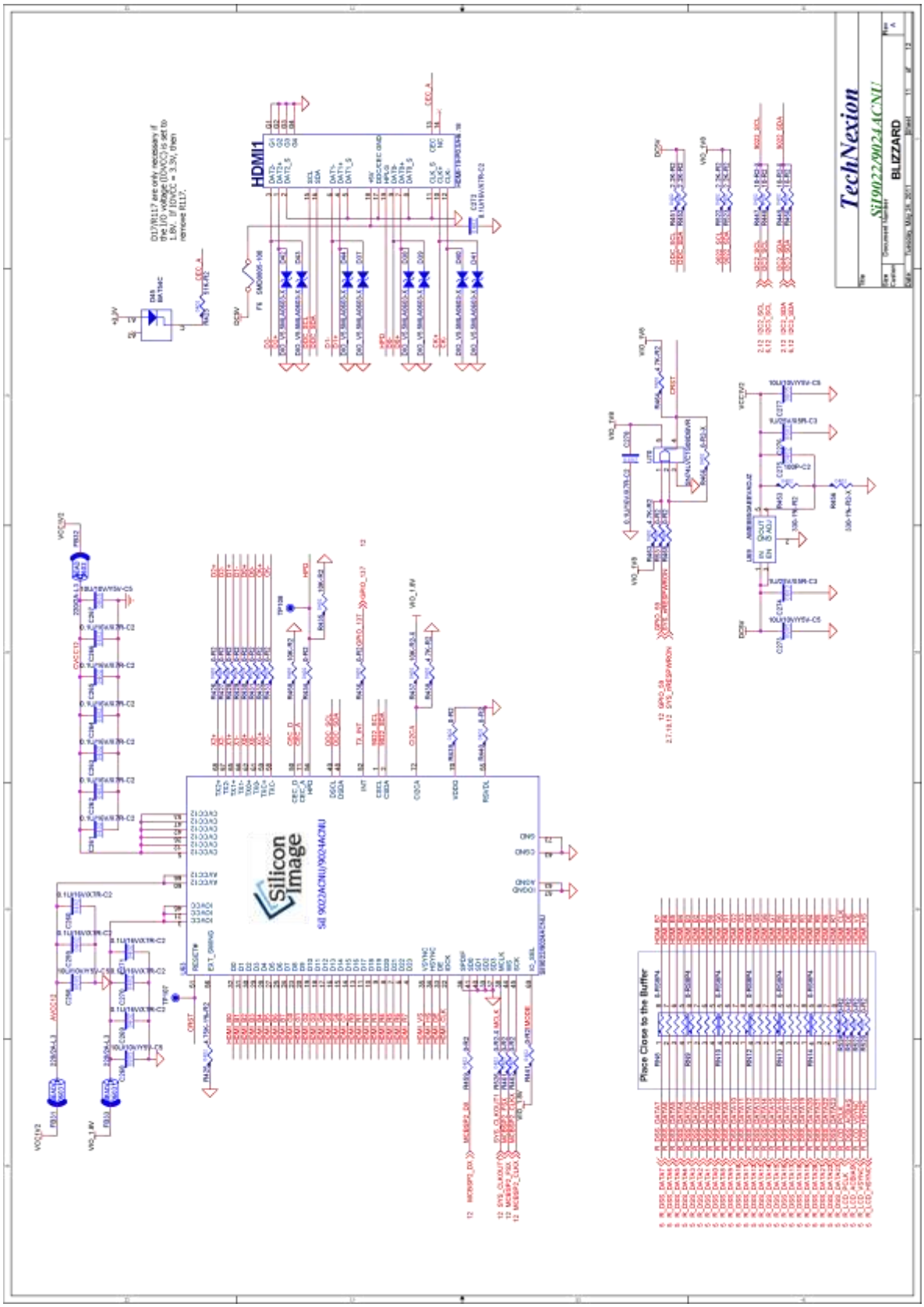


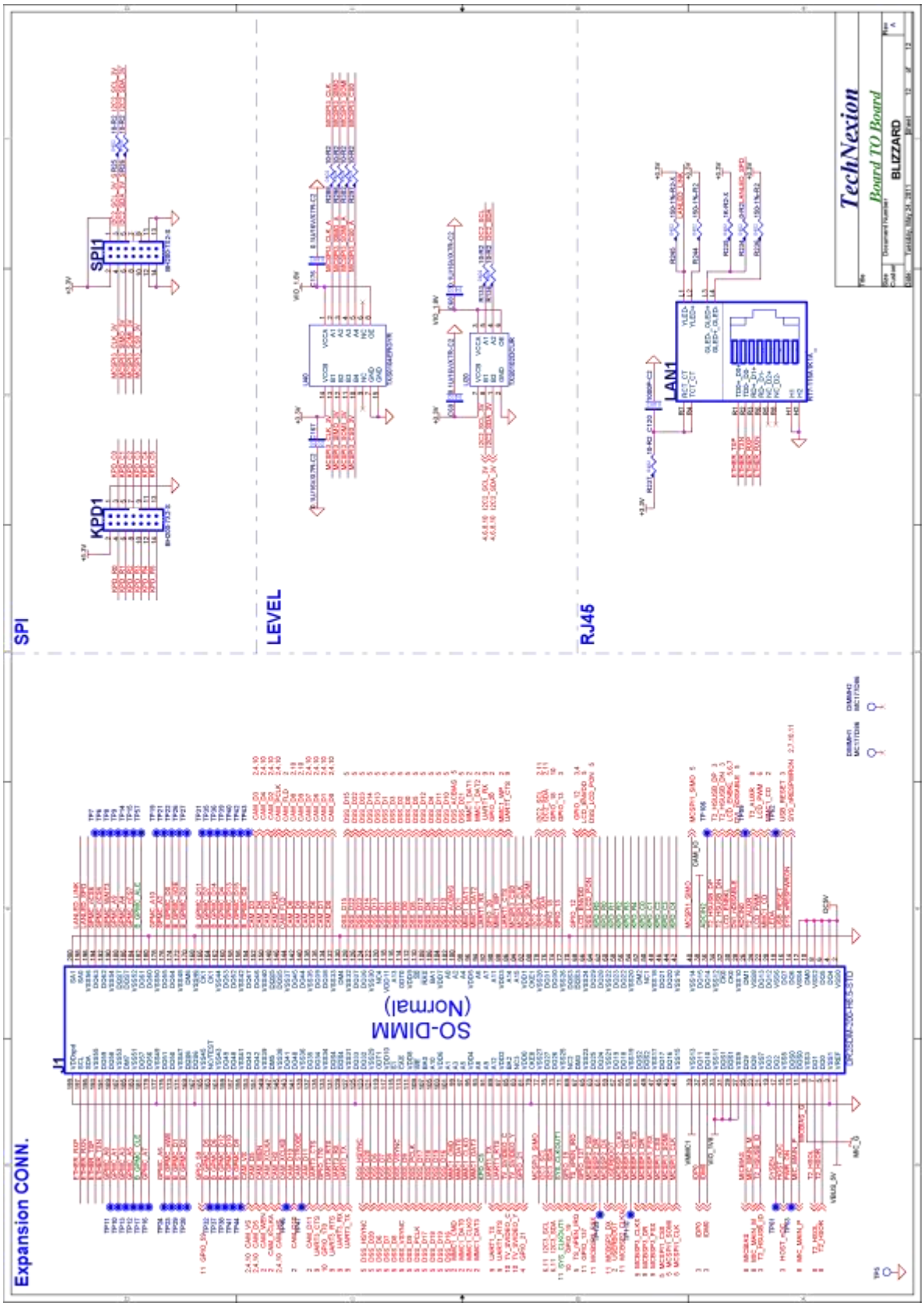
If you are designing your own baseboard then please contact sales@technexion.com for OrCAD files


TechNexion
UART & RS422/485 & IR
BLIZZARD
UART
UART1
IR
RS-422/485
(422)
(422/485)
CON1
SW1
SW2
RS-232/422/485 SELECT
JRS1 RS-232 RS-422 RS-485
3-4 Short Open
5-6 Open Short
Loopback:
1) RTS --> CTS
2) DTR --> DSR (DCD)



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

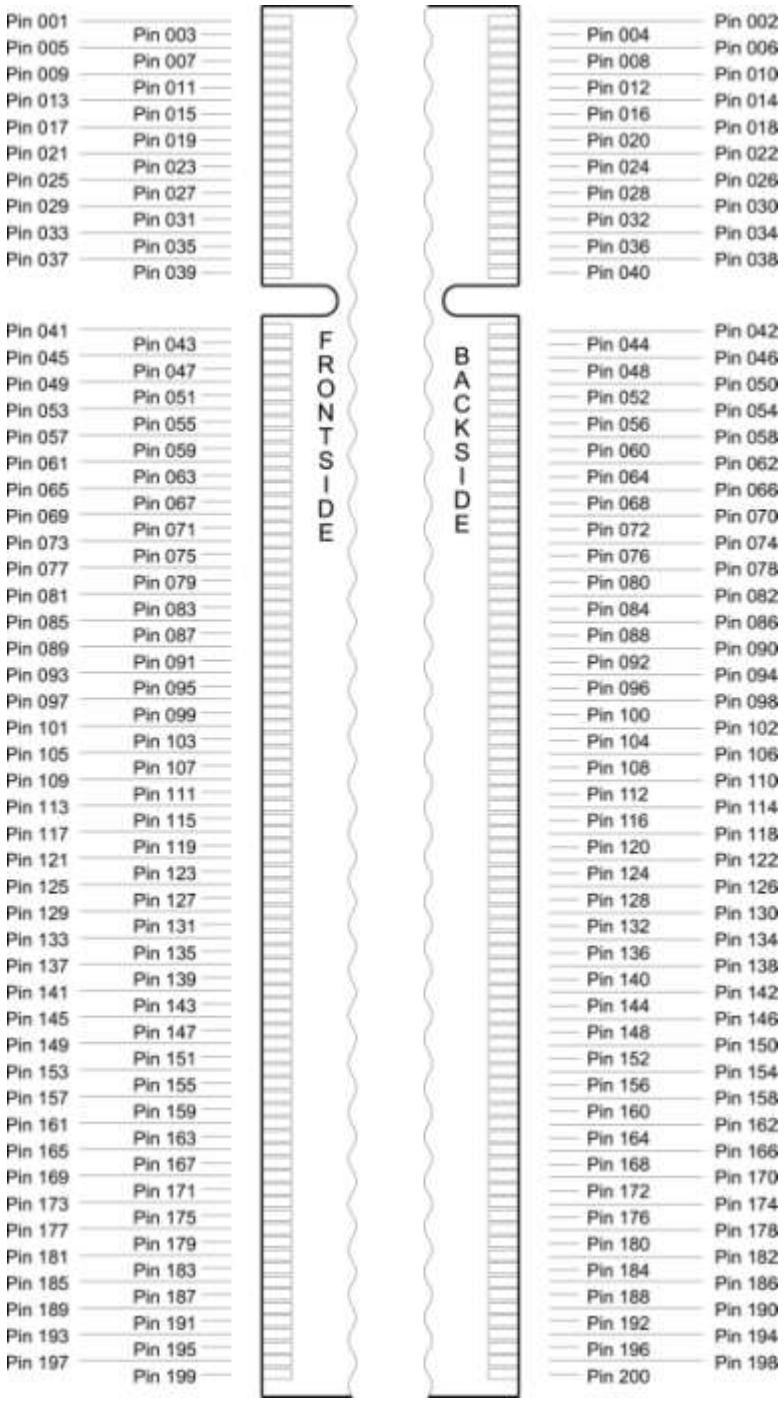

HDMI1
Silicon Image
Place Close to the Buffer
TechNexion
BLIZZARD



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

16 Appendix - Pin outs

16.1 Module connector



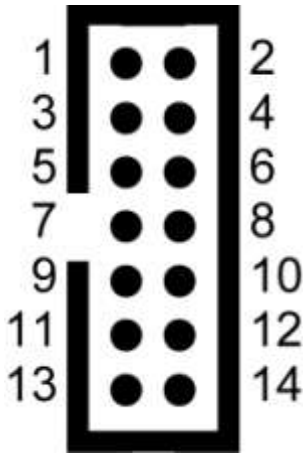
1	DC 5V	2	DC 5V
3	GND	4	DC 5V
5	T2 HSOR	6	DC 5V

7	T2 HSOL	8	DC 5V
9	MICBIAS G	10	DC 5V
11	MIC MAIN P	12	DC 5V
13	PWR ON	14	SYS nRESPWRON
15	HOST nOC	16	USB RESET
17	SYSEN	18	LEDA
19	GND	20	MMC1 CD
21	T2 HSUSB ID	22	LCD PWM
23	MIC MAIN M	24	T2 AUXR
25	MIC BIAS	26	ADCIN0
27	VIO 1V8	28	DVI nDISABLE
29	VIO 1V8	30	LCD ENBKL
31	VIO 1V8	32	T2 HSUSB DN
33	VIO 1V8	34	T2 HSUSB DP
35	IDM0	36	ADCIN2
37	IDP0	38	CAM IO
39	VMMC1	40	MCSPI1 SIMO
41	MCSPI1 CLK	42	KPD C4
43	MCSPI1 SOMI	44	KPD C3
45	MCSPI1 CS0	46	KPD C2
47	MCSPI3 FSX	48	KPD C1
49	MCSPI3 DR	50	KPD C0
51	MCSPI3 CLKX	52	KPD R4
53	MCSPI3 DX	54	KPD R3
55	DSS DX22	56	KPD R2
57	USERBOOT	58	KPD R1
59	DSS DX21	60	KPD R0
61	DSS DX19	62	DSS DX23
63	DSS DX20	64	DSS LCD PON
65	GPIO 137	66	LCD ENVDD
67	TS nPEN IRQ	68	GPIO 12
69	GPIO 19	70	GND
71	SYS CLKOUT1	72	GPIO 13
73	I2C3 SDA	74	GPIO 18
75	I2C3 SCL	76	I2C2 SDA
77	MCSPI3 SIMO	78	I2C2 SCL
79	GND	80	MCSPI3 SOMI
81	GPIO 21	82	MCSPI3 CLK
83	TV SVIDEO Y	84	MCSPI3 CS0
85	TV SVIDEO C	86	UART1 CTS
87	UART1 RTS	88	MMC1 WP
89	UART1 TX	90	GPIO 20

91	DSS DX18	92	UART1 RX
93	MMC1 DAT3	94	MMC1 DAT2
95	MMC1 CLK0	96	MMC1 DAT1
97	MMC1 DAT0	98	DSS D21
99	MMC1 CMD	100	DSS ACBIAS
101	DSS D16	102	DSS D10
103	DSS D19	104	DSS D11
105	DSS D18	106	DSS D4
107	DSS D17	108	DSS D12
109	DSS PCLK	110	DSS D5
111	DSS D9	112	DSS D0
113	DSS VSYNC	114	DSS D2
115	DSS D8	116	DSS D3
117	DSS D7	118	DSS D1
119	DSS D6	120	DSS D13
121	DSS D20	122	DSS D14
123	DSS HSYNC	124	DSS D23
125	GND	126	DSS D22
127	UART3 TX	128	DSS D15
129	UART3 RX	130	GND
131	UART3 RTS	132	CAM D0
133	GPIO 170	134	CAM D1
135	UART3 CTS	136	CAM D6
137	CAM D11	138	CAM D7
139	CAM STROBE	140	CAM D9
141	CAM D10	142	CAM D8
143	CAM XCLKB	144	CAM FLD
145	CAM HS	146	CAM PCLK
147	CAM XCLKA	148	CAM D2
149	CAM WEn	150	CAM D4
151	CAM D5	152	CAM D3
153	CAM VS	154	B GPMC D8
155	B GPMC D9	156	B GPMC D15
157	B GPMC D10	158	B GPMC D13
159	B GPMC D12	160	B GPMC D4
161	B GPMC D6	162	B GPMC D14
163	B GPMC D5	164	B GPMC D7
165	GPMC CLK	166	B GPMC D11
167	GND	168	GND
169	B GPMC D2	170	B GPMC D3
171	B GPMC D1	172	B GPMC nOE
173	B GPMC new	174	B GPMC D0

175	GPMC A6	176	GPMC A2
177	GND	178	GPMC A10
179	GPMC A7	180	GND
181	B GPMC CLE	182	B GPMC ALE
183	GPMC A5	184	GPMC nCS7
185	GPMC A3	186	GPMC A4
187	GPMC A1	188	GPMC A9
189	GPMC A8	190	GPMC WAIT3
191	ETHER TXN	192	GPMC nCS4
193	ETHER TXP	194	GPMC nCS6
195	ETHER RXN	196	LANLED_SPD
197	ETHER RXP	198	LANLED_LINK
199	GND	200	GND

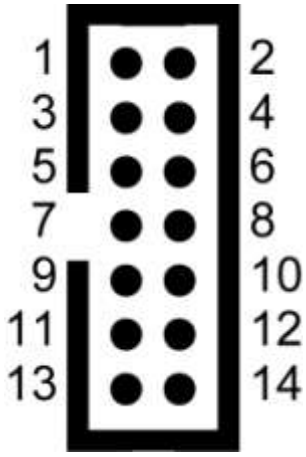
16.2 SPI1



Marking on main board: SPI1

1	+3.3V	2	+3.3V
3	MCBSP3 CLKX 3V	4	MCSPI3 CLK 3V
5	MCBSP3 DR 3V	6	MCSPI3 SIMO 3V
7	MCBSP3 DX 3V	8	MCSPI3 SOMI 3V
9	MCBSP3 FSX 3V	10	MCSPI3 CS0 3V
11	GND	12	GND
13	I2C2 SDA 3V	14	I2C2 SCL 3V

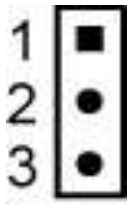
16.3 Keypad



Marking on main board: KPD1

1	+3.3V	2	+3.3V
3	KPD C0	4	KPD R0
5	KPD C1	6	KPD R1
7	KPD C2	8	KPD R2
9	KPD C3	10	KPD R3
11	KPD C4	12	KPD R4
13	GND	14	GND

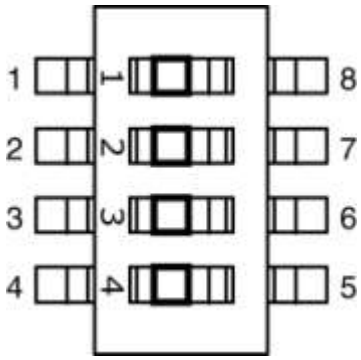
16.4 UART 1/UART 3



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)

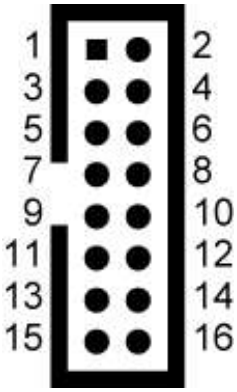
Switch between UART1 and UART3



Marking on main board: SW1

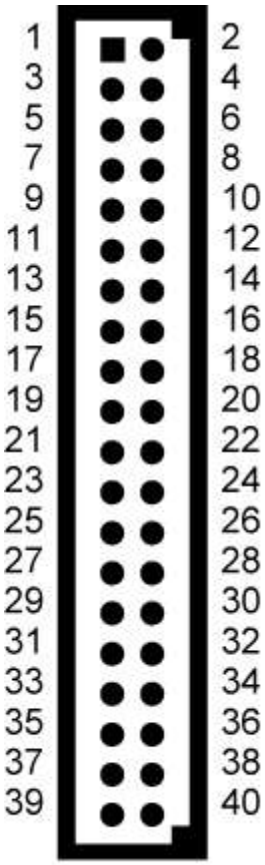
1&2 on, 3&4 off	UART1 (debug port)
1&2 off, 3&4 on	UART3

16.5 Pin header for VGA connector



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

16.6 LVDS connector



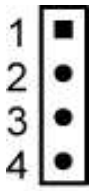
Data connector is 40 pin

Marking on main board: LVDS1

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

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

16.7 RS-422/485 connector

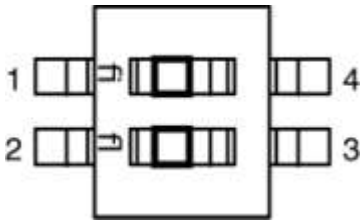


1 422TX+ 485+

2 422TX- 485-

3 422RX+

3 422RX-

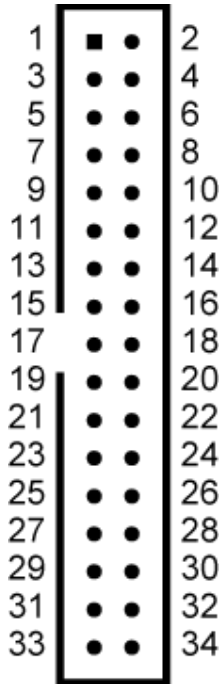


Marking on main board: SW1

1 on 2 off RS-422

2 on 1 off RS-485

16.8 Camera expansion connector

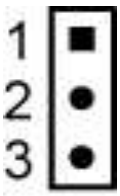


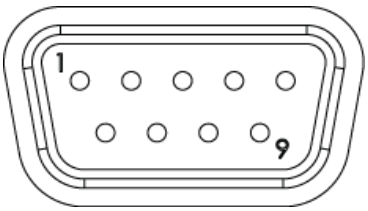
Marking on main board: CAMERA1

1	CAM D11	2	CAM CLKA
3	CAM D10	4	GND
5	CAM D9	6	CAM SDA
7	CAM D8	8	CAM SCL
9	CAM D7	10	CAM FLD
11	CAM D6	12	CMOS OE
13	CAM D5	14	GND
15	CAM D4	16	CAM IO voltage
17	CAM D3	18	CAM IO voltage
19	CAM D2	20	GND
21	CAM D1	22	GND
23	CAM D0	24	CAM 3V3
25	CAM ANA	26	CAM 3V3
27	CAM PCLK	28	GND
29	CAM HS	30	CAM 1V8
31	CAM VS	32	CAM 1V8
33	GND	34	GND

16.9 RS-232 cable

Accessory





1 (white dot)	3
2	5
3	2

16.10 JTAG Solder points

Solder at the orange pads