# Mango24R2 Linux 기본 교육

CRZ TECHNOLOGY

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# 1. 하드웨어 사양

- Hardware Specification
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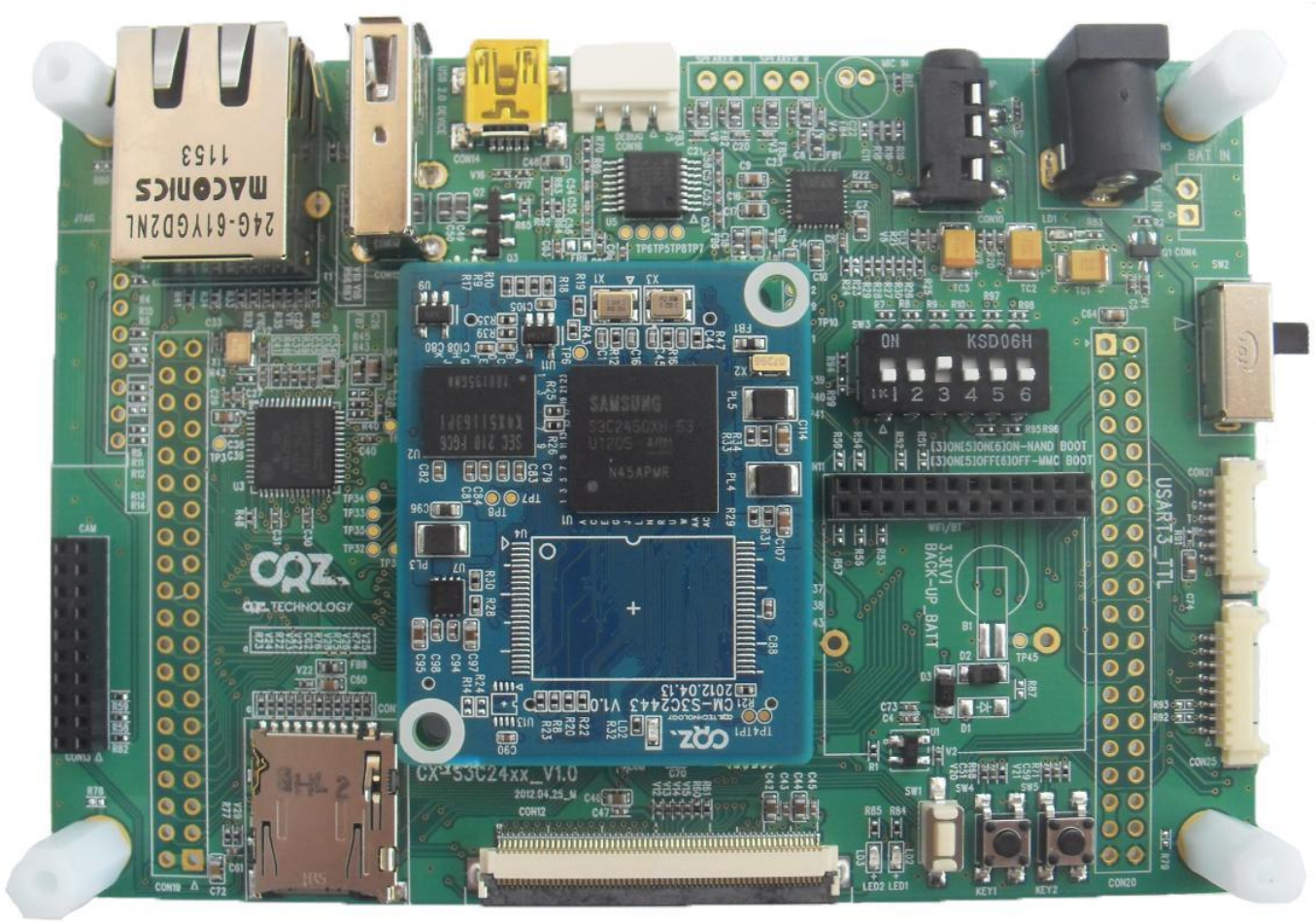
- 부품 배치
- Boot mode

# 1. 하드웨어 사양


MACONICS
SAMSUNG
S3C2450XH-53
ON KSD06H
USART3_TTL
CX-S3C24xx_V1.0

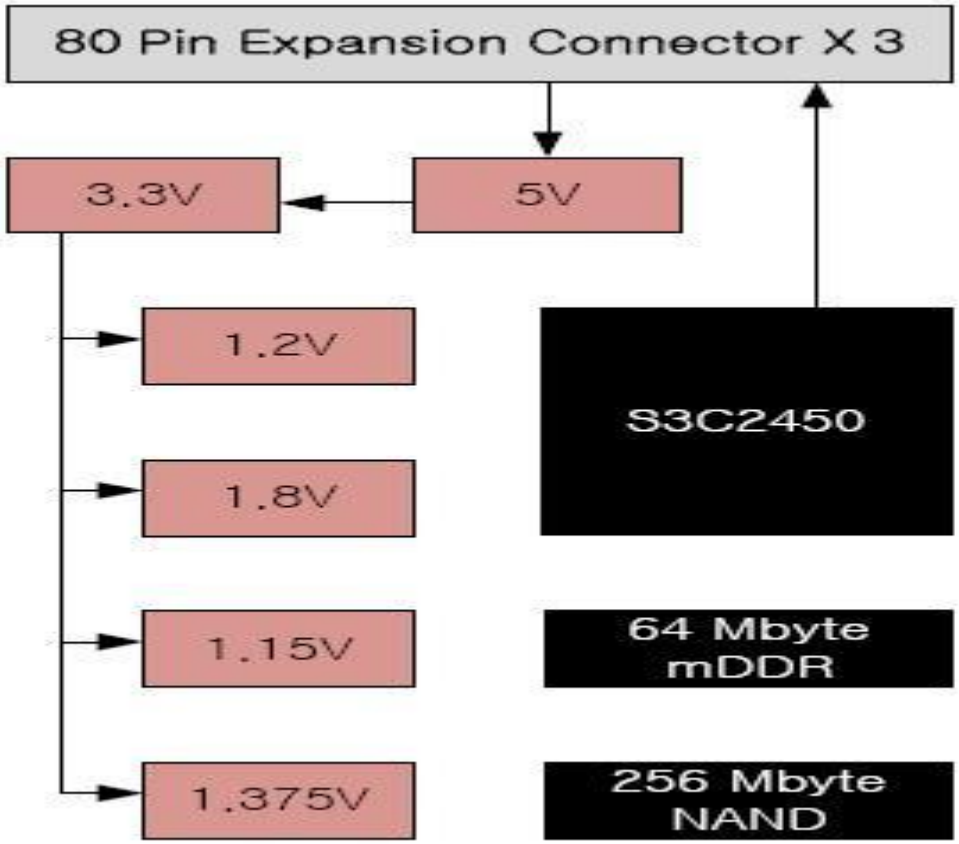
# 1. 하드웨어 사양

## ◆ Hardware Specification

| | |
|---|---|
| Processor | ARM926EJ Samsung S3C2450 533Mhz |
| RAM | Mobile DDR 64MB |
| Flash | SLC NAND Flash 256MB |
| Display | 7” 800x480 with touch |
| Audio | Wolfson WM8960 with 1W Stereo Speaker Amplifier |
| USB Host 1.1 | 1 Port (Full Speed) |
| USB Device 2.0 | 1 Port |
| SD | SD/MMC Port0 (WiFi/BT)<br>SD/MMC Port1 (SD Boot) |
| WiFi/BT | SDIO 0 Channel 802.11B,G,N |
| Camera | 1Port 1.3M Pixel Camera |
| UART | UART0<br>UART1 (Debug)<br>UART2 (Expansion)<br>UART3(GPS) |
| Sensor Interface | I2C 0 Port (3-Axis,Gyro,Light,Remocon etc) |
| Ethernet | SMSC LAN9220 10/100Mps Ethernet Constroller |
| Power | DC-JACK 5V, 1A |
| Button | Reset :1 , Button : 2 |
| Boot Switch | 1 |
| LED indicator | 2 |
| Expansion Connector ( 80x2 ) | EBI,UART,I2C GPIO etc |

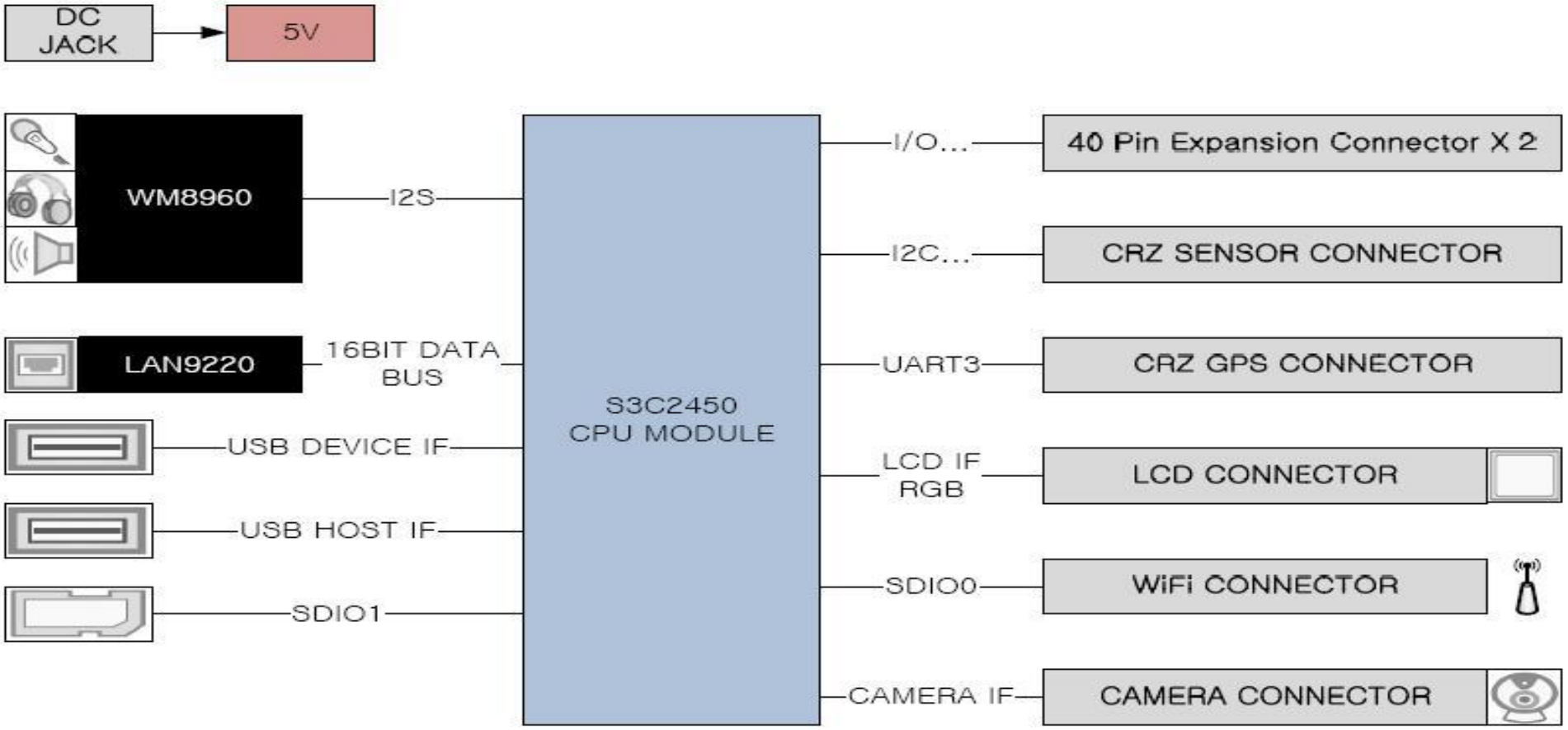
# 1. 하드웨어 사양

## ◆ CM S3C2450 CPU Module Block Diagram

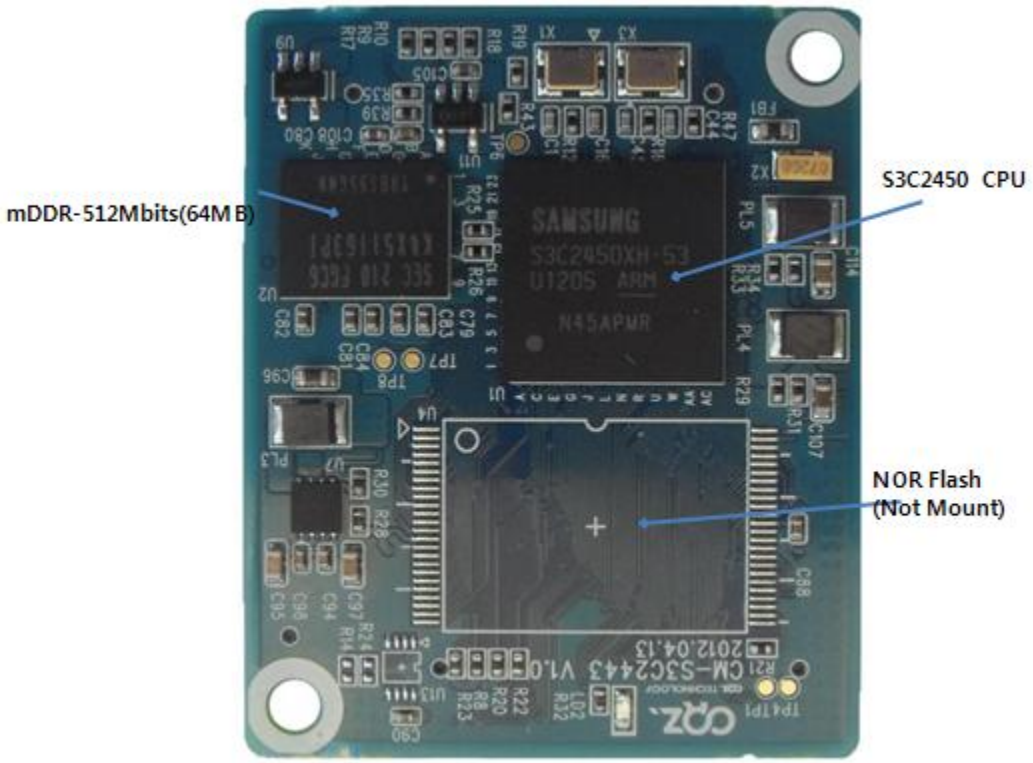


# 1. 하드웨어 사양

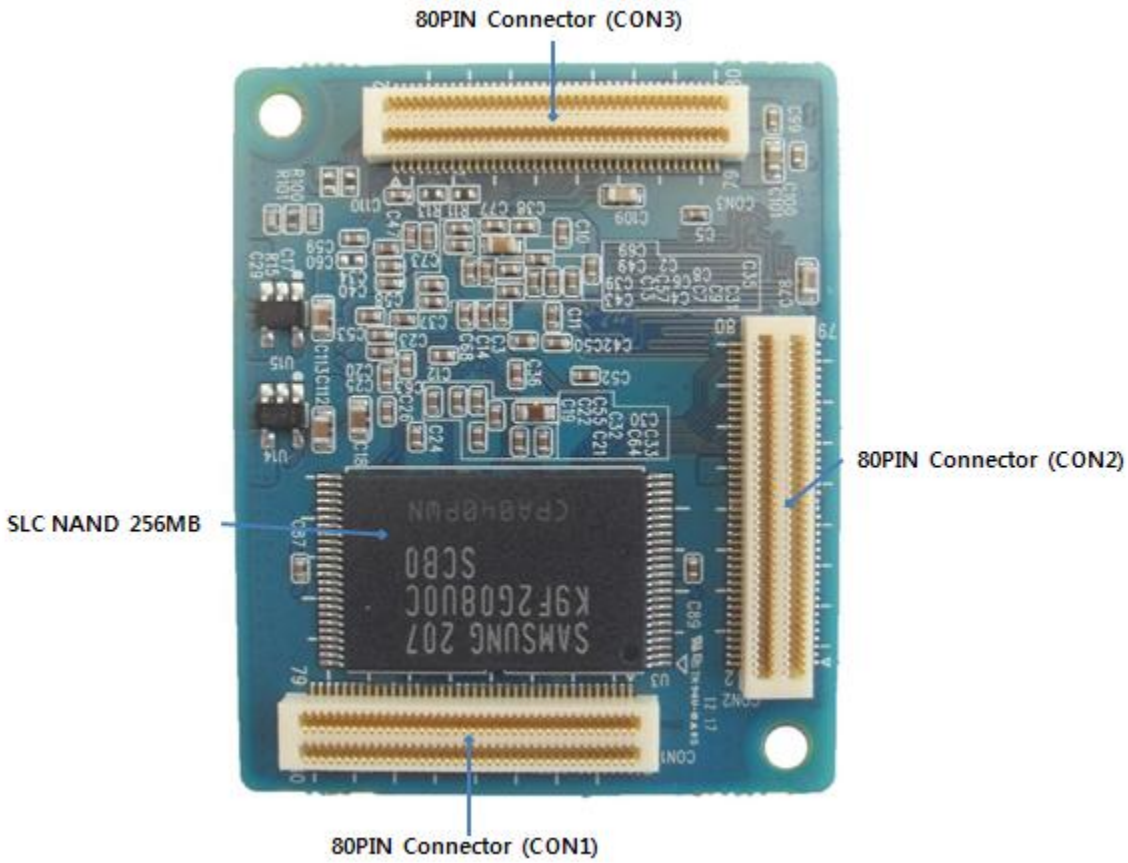
## ◆ CX S3C2450 Base Board Block Diagram



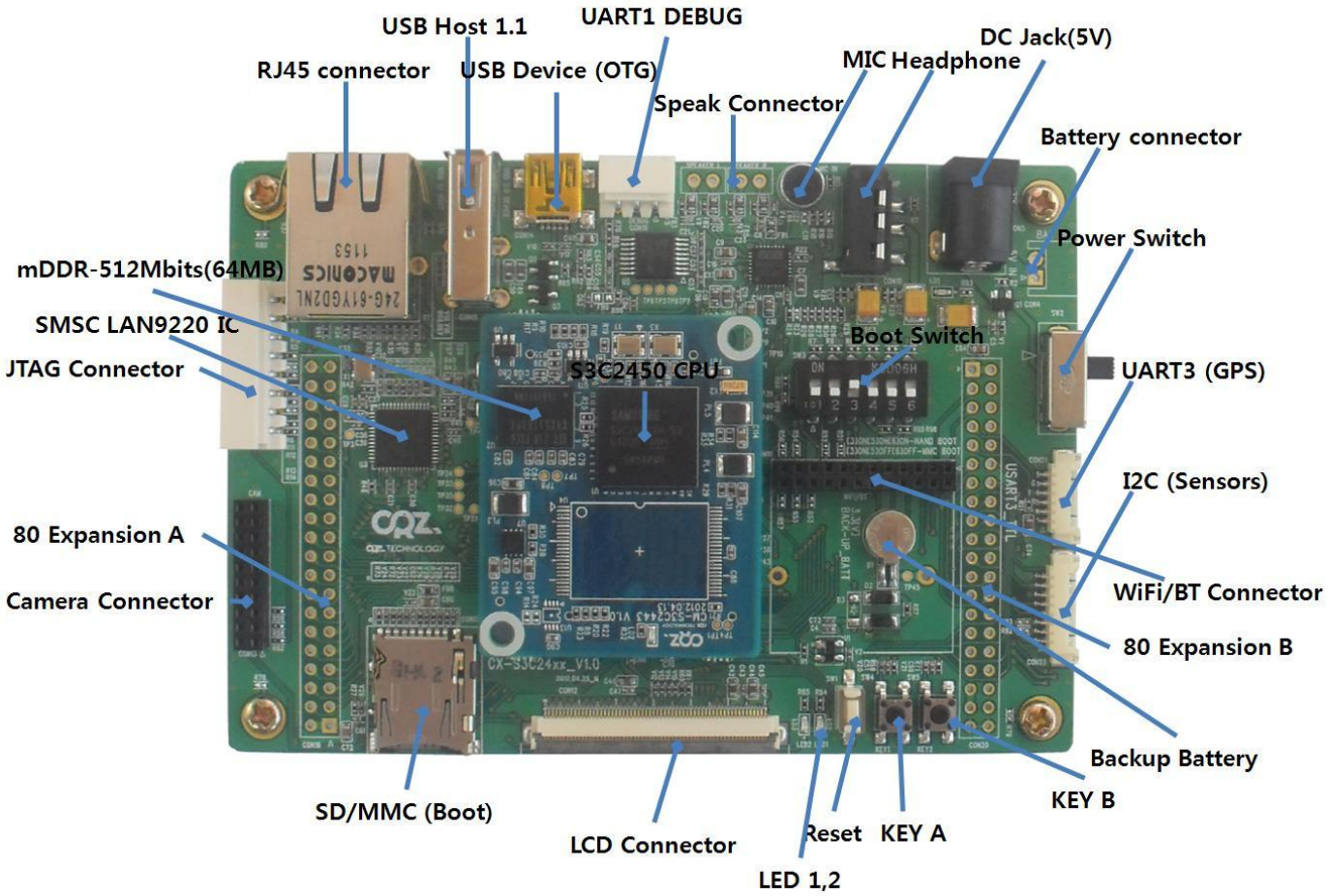
# 1. 하드웨어 사양 (CPU Module)



# 1. 하드웨어 사양(CPU Module)

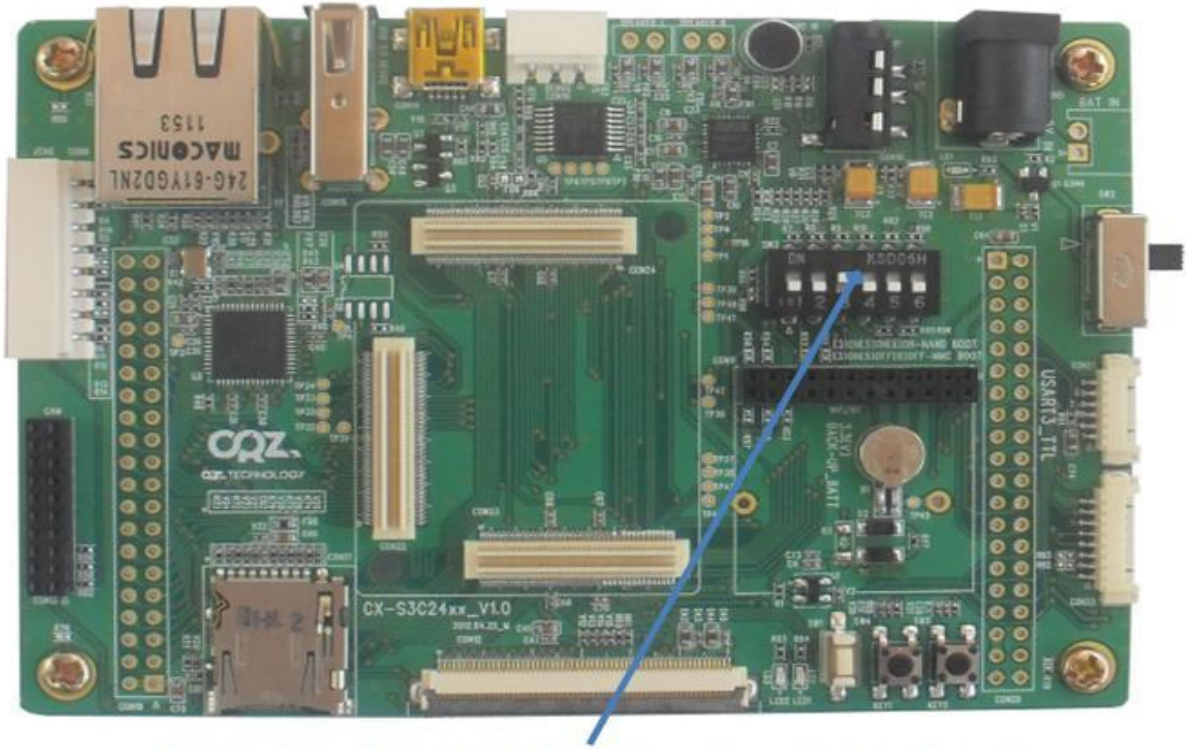


# 1. 하드웨어 사양


USB Host 1.1
UART1 DEBUG
DC Jack(5V)
RJ45 connector
USB Device (OTG)
MIC Headphone
Speak Connector
Battery connector
Power Switch
mDDR-512Mbits(64MB)
SMSC LAN9220 IC
JTAG Connector
Boot Switch
S3C2450 CPU
UART3 (GPS)
I2C (Sensors)
80 Expansion A
Camera Connector
WiFi/BT Connector
80 Expansion B
Backup Battery
KEY B
SD/MMC (Boot)
LCD Connector
Reset
KEY A
LED 1,2

# 1. 하드웨어 사양

## ◆ BOOT MODE




[3] ON [5] ON [6] ON -> NAND BOOT
[3] ON [5] OFF [6] OFF -> MMC BOOT

# 2. 빌드 환경 구축( 우분투 12.04 64bit 기준)

- GCC Setting
- Toolchain Install
- Package install
- TFTP 설정

# 2. 빌드 환경 구축

## ◆ GCC Setting

### Install

```
$ sudo apt-get install gcc-4.5 g++-4.5 build-essential gcc-4.5-multilib g++-4.5-multilib
$ sudo apt-get install gcc-4.5 g++-4.4 build-essential gcc-4.4-multilib g++-4.4-multilib
```

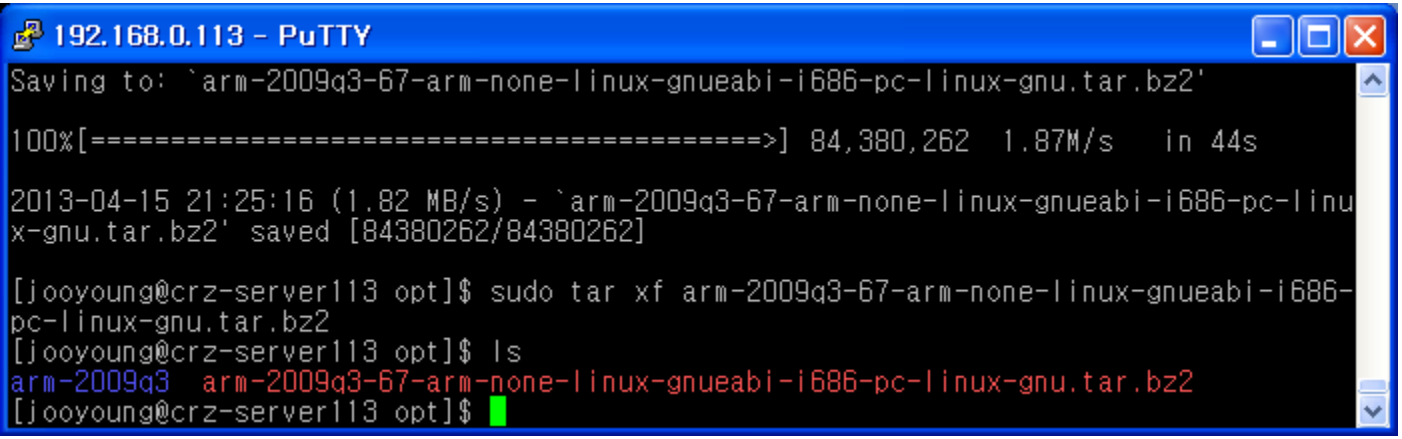
### Setting

```
$ sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-4.6 40 ₩
--slave /usr/bin/g++ g++ /usr/bin/g++-4.6

$ sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-4.5 60 ₩
--slave /usr/bin/g++ g++ /usr/bin/g++-4.5

$ sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-4.4 80 ₩
--slave /usr/bin/g++ g++ /usr/bin/g++-4.4

$ sudo update-alternatives --config gcc
```

# 2. 빌드 환경 구축

## ◆ Toolchain Install

**$ cd /opt**
**$ sudo wget http://crztech.iptime.org:8080/Release/Toolchain/arm-2009q3-67-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2**
**$ sudo tar xvf arm-2009q3-67-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2**



# 2. 빌드 환경 구축

## ◆ Package install

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential
$ sudo apt-get install zip curl libc6-dev x11proto-core-dev
$ sudo apt-get install  libx11-dev:i386 libreadline6-dev:i386 libgl1-mesa-dev:i386
$ sudo apt-get install g++-multilib mingw32 openjdk-6-jdk tofrodos python-markdown
$ sudo apt-get install libxml2-utils xsltproc zlib1g-dev:i386
$ sudo apt-get install gcc-multilib
$ sudo apt-get install libc6-dev-i386
$ sudo apt-get install ia32-libs
$ sudo apt-get install lib32z-dev
$ sudo apt-get install libusb-dev:i386
$ sudo apt-get install git-core bison flex g++ gettext texinfo
$ sudo apt-get install automake


$ sudo apt-get install libncurses5-dev
```

# 2. 빌드 환경 구축

## ◆ TFTP 설정

**$ sudo apt-get install xinetd tftp tftpd**

**$ sudo mkdir /home/tftp**

**$ sudo chmod 777 /home/tftp/**

**$ sudo vi /etc/xinetd.d/tftp**

```
service tftp
{
protocol        = udp
port            = 69
socket_type     = dgram
wait            = yes
user            = nobody
server          = /usr/sbin/in.tftpd
server_args     = /home/tftp
disable         = no
}
```

**$ sudo /etc/init.d/xinetd restart**

**동영상 :** http://youtu.be/WMfb-rPiexE

# 3. 컴파일 방법

- Mango24R2 source Download & install
- Uboot build
- Kernel build
- Buildroot build

# 3. 컴파일 방법

## ◆ Download & install

**$ wget**
**http://crztech.iptime.org:8080/Release/mango24R2_S3C2450/linux/m2450_kernel3.0.22_mrvl8787_Qt_130418_Rel/m2450_kernel3.0.22_mrvl8787_Qt_130418.tgz**

**$ tar xf m2450_kernel3.0.22_mrvl8787_Qt_130418.tgz**
**$ cd m2450_kernel3.0.22_mrvl8787_Qt_130418/**

# 3. 컴파일 방법

## ◆ Uboot build

**$ ./build_uboot clean**

**$ ./build_uboot config**

**$ ./build_uboot**

**동영상 :**

http://youtu.be/4-hhlU9RmDA

```
CPU_JOB_NUM=$(grep processor /proc/cpuinfo | awk '{field=$NF};END{print field+2}')
START_TIME=`date +%s`

case "$1" in
clean)
    echo make -j$CPU_JOB_NUM mrproper
    make -j$CPU_JOB_NUM mrproper
    ;;
config)
    echo make -j$CPU_JOB_NUM mango2450_config
    make -j$CPU_JOB_NUM mango2450_config
    ;;
all|*)
    echo make -j$CPU_JOB_NUM
    make -j$CPU_JOB_NUM
    if [ $? != 0 ] ; then
            exit 1
    fi
    if [ "$2" ] ; then
        INSTALL_BINDIR=$2
    fi
    if [ $INSTALL_BINDIR ] ; then
        echo cp -a $UBOOT_IMAGE $INSTALL_BINDIR/$UBOOT_IMAGE
        cp -a $UBOOT_IMAGE $INSTALL_BINDIR/$UBOOT_IMAGE
    fi
    ;;
esac
```

# 3. 컴파일 방법

## ◆ Kernel build

**$ ./build_kernel defconfig mango2450_defconfig**

**$ ./build_kernel**

◆ **동영상 :** http://youtu.be/ULvpT5SVPvc

# 3. 컴파일 방법

## ◆ Buildroot build

$ ./build_rootFS.sh
동영상
http://youtu.be/-vJparL4Os4

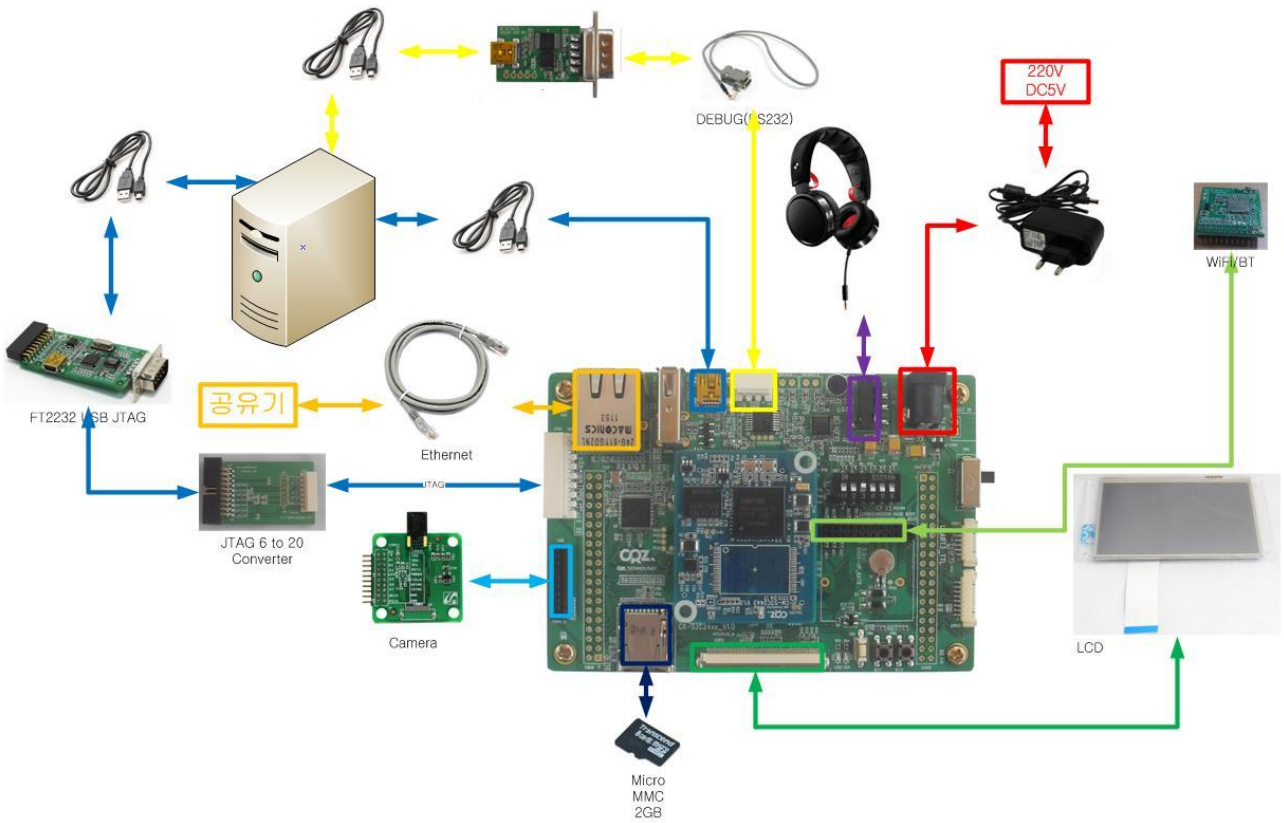
```
#!/bin/bash

CONFIG_FILE=mango2450_config

{

START_TIME=`date +%s`

#mkdir -p ../image

echo "Copy config file"
cp $CONFIG_FILE .config

echo "Build buildroot"
make

echo "Copy build image"
cp -f ./output/images/rootfs.tar ../image/

END_TIME=`date +%s`
echo "Total compile time is $((($END_TIME-$START_TIME)/60)) minutes
$((($END_TIME-$START_TIME)%60)) seconds"

} 2>&1 |tee build.out
```

# 4. 보드에 Write하는 방법

- 연결도
- SD writer
- Openocd JTAG Connect and U-boot 실행
- DNW NAND U-boot How to Fusing
- DNW NAND zImage How to Fusing
- TFTP NAND Uboot How to Fusing
- TFTP NAND zImage How to Fusing
- SD Rootfs writer
- Mango24r2 board에 rootfs writer

# 4. 보드에 Write하는 방법

## ◆ 연결도



# 4. 보드에 Write하는 방법

## ◆ SD writer

Linux PC 에 SD카드 삽입

$ cd image/

```
bl1.bin          mkbl1    rootfs.tar              sdwriter        u-boot.bin
m24r2_signature  rootfs   rootfs_nand_writer.sh   sdwriter_sdhc   zImage
```

$ sudo fdisk –l

```
 Device Boot      Start         End      Blocks   Id  System
/dev/sdb1            2048    13441021     6719487   83  Linux
/dev/sdb2        13441022    15538173     1048576   83  Linux
```

$ sudo ./sdwriter_sdhc sdb 24 all

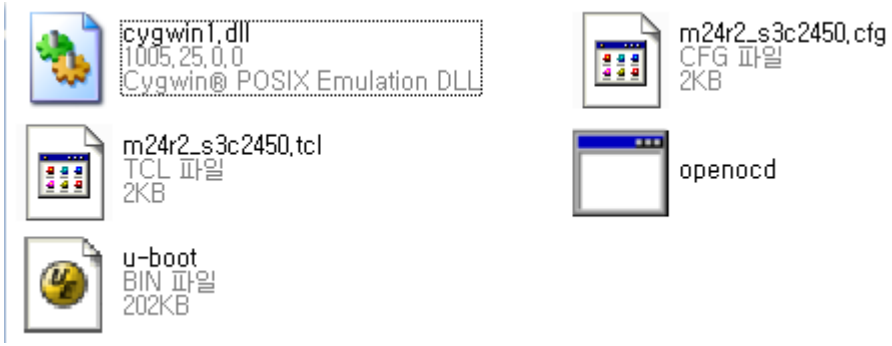
MMC Boot mode  [3]ON 나머지 OFF

동영상 ttp://youtu.be/8sqJRSqG7a4

# 4. 보드에 Write하는 방법

## ◆ Openocd JTAG Connect and U-boot 실행

참고 및 소스다운로드 : http://cafe.naver.com/embeddedcrazyboys/19583




**MMC Boot mode [3]ON 나머지 OFF**

**동영상 :** http://youtu.be/MIlBuyF58Mo

**Dos Command 창 open**
**>openocd.exe –f m24r2_s3c2450.cfg**
**Dos Command 창 open**
**>telnet localhost 4444**

**Open On-Chip Debugger**
**➢script m24r2_s3c2450.tcl**

# 4. 보드에 Write하는 방법(USB : 32bit OS Only)

## ◆ DNW NAND U-boot How to Fusing

**SDboot 나 Openocd를 이용한 Uboot 중 boot mode 에서 입력**

**# nand scrub**

**# nand erase 0 40000**

**# dnw c0000000**

**Uboot.bin 올림**

**# nand write c0000000 0 40000**

◆ **동영상 강좌 : http://youtu.be/gjwMFJ-w_30**

# 4. 보드에 Write하는 방법(USB : 32bit OS Only)

## ◆ DNW NAND zImage How to Fusing

**NAND Boot mode  [3]ON [5]ON [6]ON**

**# nand erase 80000 480000**

**# dnw c0008000**

**zImage 올림**

**# nand write c0008000 80000 480000**

◆ **동영상 : http://youtu.be/U_yUBV8kVtE**

# 4. 보드에 Write하는 방법(TFTP)

## ◆ TFTP NAND Uboot How to Fusing

**Linux PC**

**$ cp -rf image/ /home/tftp/mango24r2_image/**

**$ ifconfig**

**SDboot 나 Openocd를 이용한 Uboot 중 boot mode 에서 입력**

**# setenv ipaddr "192.168.50.10"; setenv gatewayip "192.168.50.1";setenv serverip "192.168.50.5"**

**# saveenv**

**# tftp c0000000 mango24r2_image/u-boot.bin**

**# nand erase 0x0 0x40000**

**# nand write 0xc0000000 0x0 0x40000**

◆ **동영상 : http://youtu.be/YjIpiGw3R88**

# 4. 보드에 Write하는 방법( TFTP )

## ◆ TFTP NAND zImage How to Fusing

**NAND Boot mode  [3]ON [5]ON [6]ON**

**# setenv ipaddr "192.168.50.10"; setenv gatewayip "192.168.50.1";setenv serverip "192.168.50.5"**
**# saveenv**

**# tftp c0008000 mango24r2_image/zImage**
**# nand erase 0x80000 0x480000**
**# nand write 0xc0008000 0x80000 0x480000**

◆ **동영상 :** http://youtu.be/Ao-r_zifdtc

# 4. 보드에 Write하는 방법

## ◆ Mango24r2 board에 rootfs writer

### Boot Mord Setting

```
# setenv bootargs 'noinitrd console=ttySAC1,115200 rw root=/dev/mmcblk0p2 rootfstype=ext4 rootwait'
# Saveenv
# boot
```

### Rootfs NAND writer

```
# ./rootfs_nand_writer.sh
```

실행 완료 후 reboot를 하면 이상 NAND에 설치 완료

*bootargs은 reboot를 하면 초기값으로 변경되어 reboot만 하면 됩니다.

```
flash_erase /dev/mtd2 0 0
ubiattach /dev/ubi_ctrl -m 2
ubimkvol /dev/ubi0 -N rootfs -m
mkdir /mnt/nand
mount -t ubifs ubi0:rootfs /mnt/nand
cd /root
tar xvf rootfs.tar -C /mnt/nand
umount /mnt/nand
```