Mango-IMX6Q Test 메뉴얼

http://www.mangoboard.com/
http://cafe.naver.com/embeddedcrazyboys
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Document History

Revision	Date	Change note
Init	2015-11-05	전종인

1. 리눅스 PC 에서 Mango-IMX6Q 이미지 Write 하기

최신이미지 아래 링크에서 다운로드하시면 됩니다.

http://crztech.iptime.org:8080/Release/mango-imx6q/linux/

이미지 압축을 풉니다.

리눅스 PC에 Micro SDHC 8GB Card 삽입합니다.

```
$ wget http://crztech.iptime.org:8080/Release/mango-imx6q/linux/20151103/mango-imx6-kernel-3.14.38-20151103-image.tgz
$ tar xf mango-imx6-kernel-3.14.38-20151103-image.tgz
$ cd image
```

"image" 이동합니다.

리눅스 PC에서 Micro SD 카드가 인식이 되었는지 확인 합니다.

```
$ dmesg | tail
[73191.454383] usb 2-1.4: USB disconnect, device number 6
[74227.022092] usb 2-1.4: new high-speed USB device number 7 using ehci_hcd
[75682.107522] usb 2-1.4: USB disconnect, device number 7
[78604.645630] sd 7:0:0:0: [sdg] 15628288 512-byte logical blocks: (8.00 GB/7.45 GiB)
[78604.647235] sd 7:0:0:0: [sdg] No Caching mode page present
[78604.647237] sd 7:0:0:0: [sdg] Assuming drive cache: write through
[78604.649356] sd 7:0:0:0: [sdg] No Caching mode page present
[78604.649358] sd 7:0:0:0: [sdg] Assuming drive cache: write through
[78604.650858]  sdg: sdg1
[79721.159452] usb 2-1.4: new high-speed USB device number 8 using ehci_hcd
```

"dmesg" 명령으로 디바이스 노드를 확인 후

```
$ sudo ./sdwriter sdg imx6q
```

실행 결과

```
$ sudo ./sdwriter sdg imx6q
Mango SD Writer V1.0
 TFLASH_SECTORS: 15628288
START_ROOTFS=1044480
SIZE_FAT=1024000
```

Unmount all : success

Partition Create : success

OFFSET_UBOOT: 2 Write imx6q uboot : success
Writing kernel and DTB's...

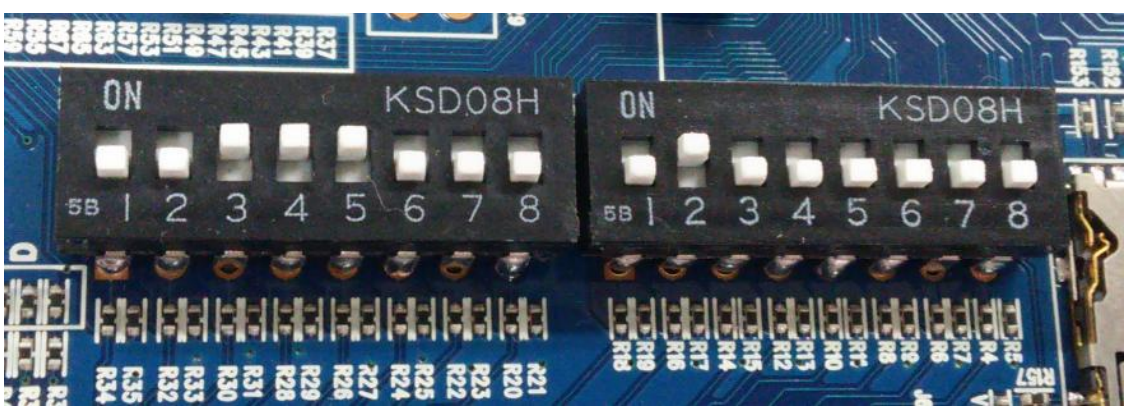
Linux Filesystem Create : success

Unmount all : success

Success

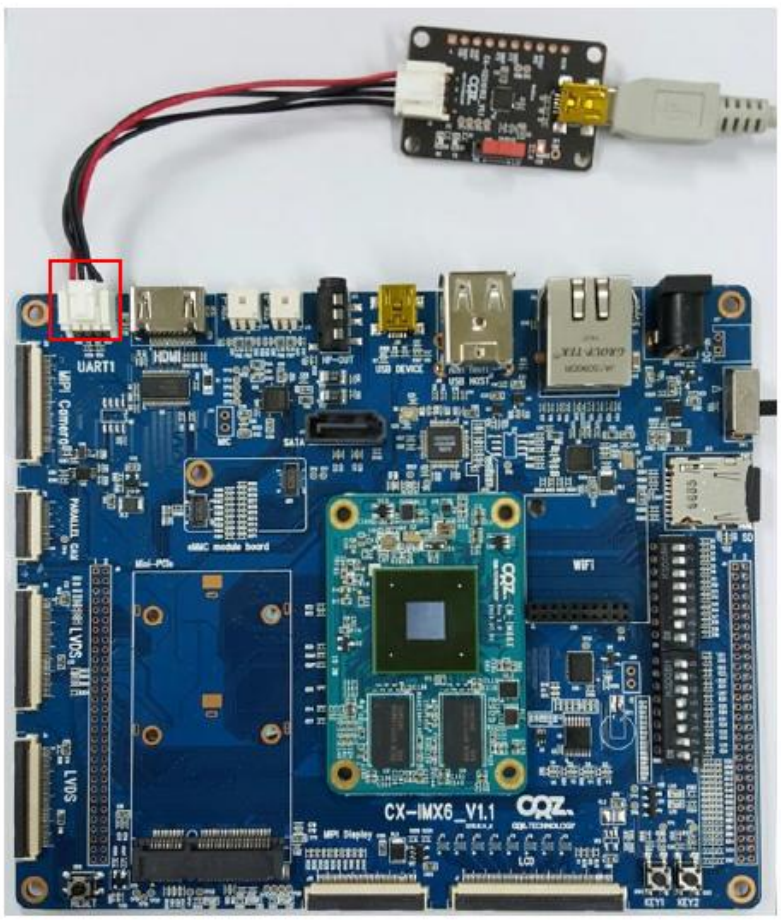
2. SD 부팅 모드 설정

SW2 : 3,4,5 ON 나머지 OFF
SW1 : 2 ON, 나머지 OFF

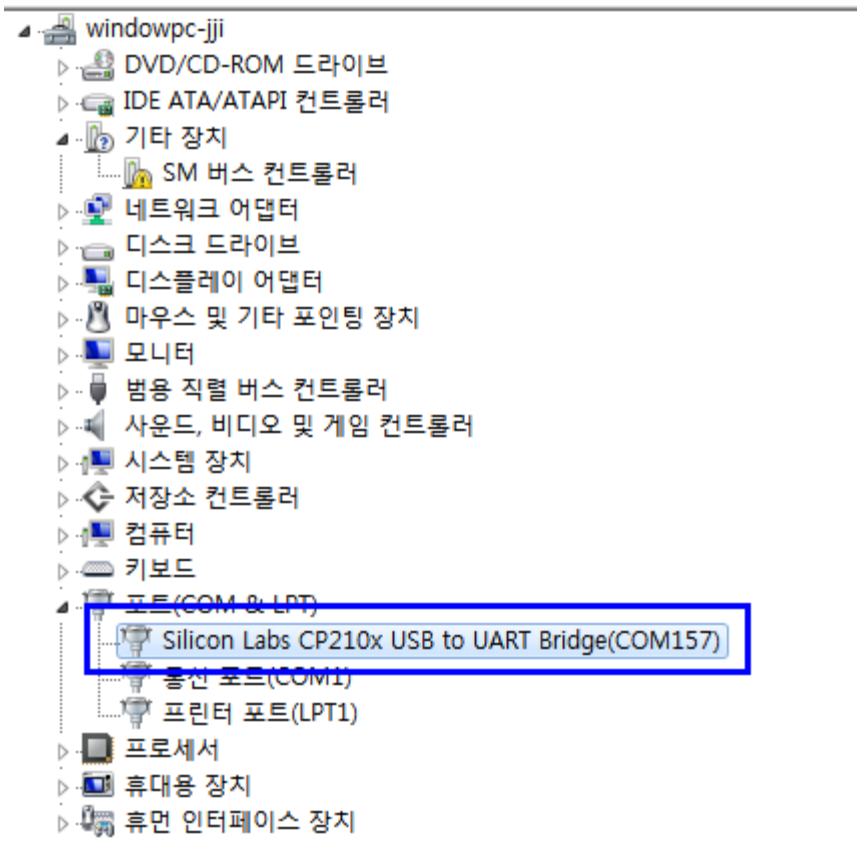


3. Debug UART 메시지 보기

보드는 아래와 같이 연결을 합니다.



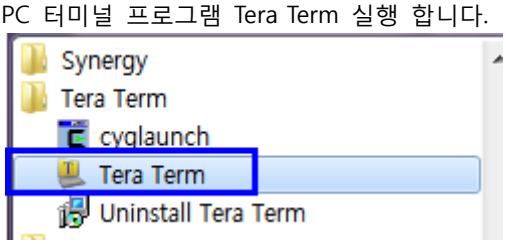
Window PC 장치관리자에서 COM Port 확인

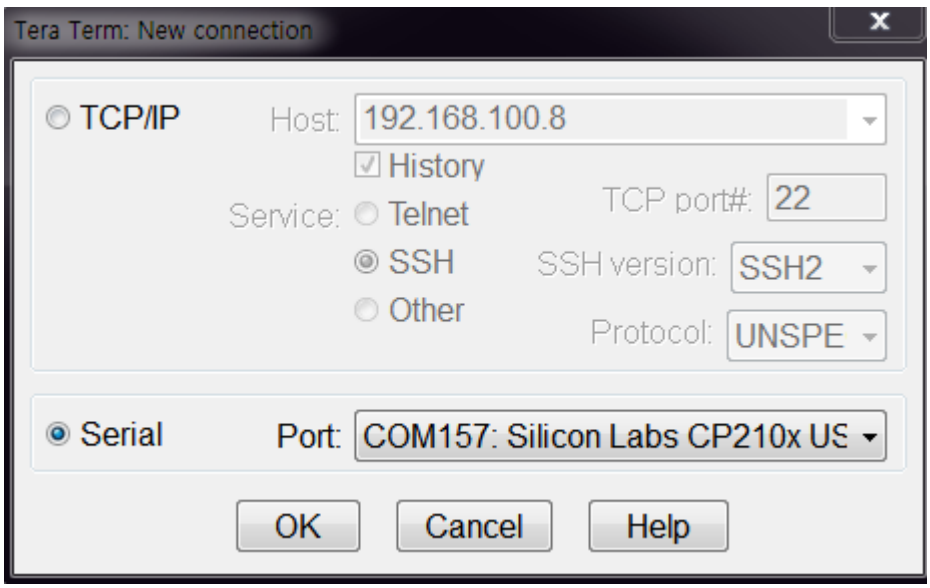


위와 같이 보이지 않으면, 드라이버 설치합니다.

https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

PC 터미널 프로그램 Tera Term 실행 합니다.





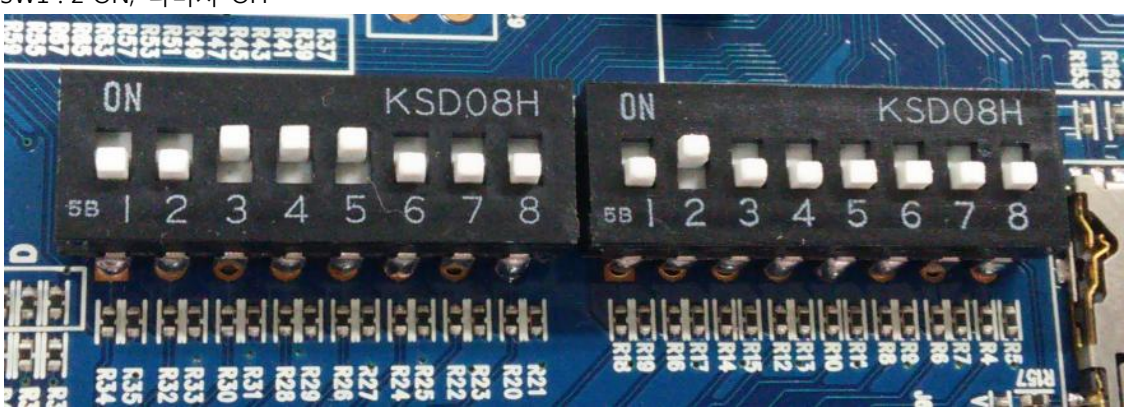
부팅 후 로그인 메시지가 출력이 되면 됩니다.

4. 디바이스 검증

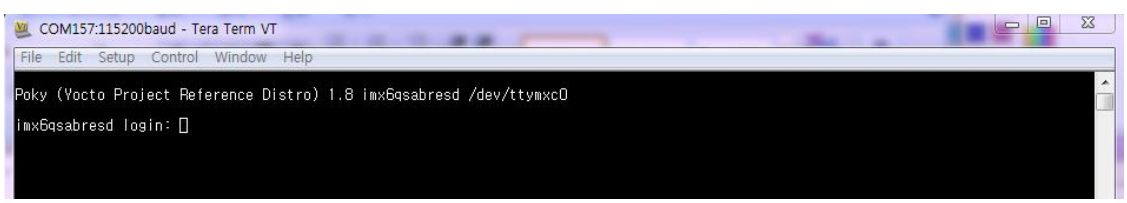
4.1. Bring-up

부팅 이미지가 Write된 Micro SD 카드 보드에 삽입
부팅 모드는 아래와 같이 세팅

SW2 : 3,4,5 ON 나머지 OFF
SW1 : 2 ON, 나머지 OFF



전원을 인가하고 디버깅 창에 아래와 같이 나오면 됩니다.



4.2. 7인치 정전식 LCD 검증

LCD 인터페이스 보드와 FFC Cable을 장착하고 부팅을 합니다.

부팅 후 아래와 같이 명령을 입력하고, 화면이 나오고 터치기 되면 됩니다.
ts_calibrate
/usr/share/qt/examples/touch/pinchzoom/pinchzoom -qws &

4.3. 7인치 감압식 LCD 검증

LCD 인터페이스 보드와 FFC Cable을 장착하고 부팅을 합니다.
부팅 후 아래와 같이 명령을 입력하고, 화면이 나오고 터치기 되면 됩니다.
ts_calibrate
/usr/share/qt/examples/touch/pinchzoom/pinchzoom -qws &

4.4. 코덱 테스트

이어폰을 꽂아서 테스트
[root@localhost ~]# speaker-test

aplay heartattack.wav

4.5. PCIe 테스트

[root@localhost ~]# lspci -v
00:00.0 Class 0604: 16c3:abcd
01:00.0 Class 0280: 14e4:43d9

4.6. USB Host

Port가 2개가 있습니다. Usb storage를 삽입 시 아래와 같이 인식하면 됩니다.

```
# usb 1-1.2: new high-speed USB device number 3 using ci_hdrc
usb-storage 1-1.2:1.0: USB Mass Storage device detected
```

```
scsi1 : usb-storage 1-1.2:1.0

[root@localhost ~]# scsi 1:0:0:0: Direct-Access     JetFlash Transcend 8GB      8.07 PQ: 0 ANSI: 4
sd 1:0:0:0: [sda] 15679488 512-byte logical blocks: (8.02 GB/7.47 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
 sda: sda1
sd 1:0:0:0: [sda] Attached SCSI removable disk
```

```
[root@localhost ~]# df
Filesystem           Size  Used Avail Use% Mounted on
rootfs               6.7G  202M  6.2G   4% /
/dev/root            6.7G  202M  6.2G   4% /
devtmpfs             849M     0  849M   0% /dev
tmpfs               1009M     0 1009M   0% /dev/shm
tmpfs               1009M  512K 1009M   1% /tmp
/dev/sda1            7.5G   11M  7.5G   1% /media/Transcend
```

4.7. 이더넷 테스트

```
# udhcpc -ieth0
# ifconfig -a
# ping 192.168.0.1
```

테스트 결과

```
[root@localhost ~]# ifconfig -a
eth0      Link encap:Ethernet  HWaddr 56:0B:42:4E:C6:9A
          inet addr:192.168.0.12  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::540b:42ff:fe4e:c69a/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:46 errors:0 dropped:0 overruns:0 frame:0
          TX packets:30 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:5867 (5.7 KiB)  TX bytes:4003 (3.9 KiB)
```

```
lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

sit0      Link encap:IPv6-in-IPv4
          NOARP  MTU:1480  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

[root@localhost ~]# ping 192.168.0.1
PING 192.168.0.1 (192.168.0.1): 56 data bytes
64 bytes from 192.168.0.1: seq=0 ttl=64 time=0.889 ms

--- 192.168.0.1 ping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
round-trip min/avg/max = 0.889/0.889/0.889 ms
[root@localhost ~]# iperf -c 192.168.0.2 -t 1 -i 1
connect failed: Connection refused
[root@localhost ~]# iperf -c 192.168.0.2 -t 1 -i 1
------------------------------------------------------------
Client connecting to 192.168.0.2, TCP port 5001
TCP window size: 43.8 KByte (default)
------------------------------------------------------------
[  3] local 192.168.0.12 port 46186 connected with 192.168.0.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 1.0 sec  53.2 MBytes   447 Mbits/sec
[  3]  0.0- 1.0 sec  53.4 MBytes   440 Mbits/sec
[root@localhost ~]# iperf -c 192.168.0.2 -t 10 -i 1
------------------------------------------------------------
Client connecting to 192.168.0.2, TCP port 5001
```

```
TCP window size: 43.8 KByte (default)
------------------------------------------------------------
[  3] local 192.168.0.12 port 46187 connected with 192.168.0.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 1.0 sec  53.2 MBytes   447 Mbits/sec
[  3]  1.0- 2.0 sec  50.0 MBytes   419 Mbits/sec
[  3]  2.0- 3.0 sec  49.8 MBytes   417 Mbits/sec
[  3]  3.0- 4.0 sec  49.8 MBytes   417 Mbits/sec
[  3]  4.0- 5.0 sec  49.5 MBytes   415 Mbits/sec
[  3]  5.0- 6.0 sec  50.6 MBytes   425 Mbits/sec
[  3]  6.0- 7.0 sec  49.8 MBytes   417 Mbits/sec
[  3]  7.0- 8.0 sec  49.9 MBytes   418 Mbits/sec
[  3]  8.0- 9.0 sec  49.1 MBytes   412 Mbits/sec
[  3]  9.0-10.0 sec  50.0 MBytes   419 Mbits/sec
[  3]  0.0-10.0 sec   502 MBytes   421 Mbits/sec
```

4.8. Marvell8787 WiFi 테스트

테스트 결과

```
root@imx6qsabresd:~# ls
bt8787.ko   mlan.ko   sd8787.ko   sd8787_uapsta.bin
root@imx6qsabresd:~# insmod ./mlan.ko
root@imx6qsabresd:~# insmod sd8787.ko
root@imx6qsabresd:~# ifconfig –a
mlan0       Link encap:Ethernet   HWaddr AC:3F:A4:4F:9B:78
            BROADCAST MULTICAST   MTU:1500   Metric:1
            RX packets:0 errors:0 dropped:0 overruns:0 frame:0
            TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:0 (0.0 B)   TX bytes:0 (0.0 B)
root@imx6qsabresd:~# ifconfig mlan0 up
IPv6: ADDRCONF(NETDEV_UP): mlan0: link is not ready
root@imx6qsabresd:~# iwconfig mlan0 essid CRZ_icanjji
iwlan: SCAN COMPLETED: scanned AP count=1
IPv6: ADDRCONF(NETDEV_CHANGE): mlan0: link becomes ready
```

```
root@imx6qsabresd:~# iwconfig
uap0      IEEE 802.11-DS  ESSID:""
          Mode:Master  Frequency:2.437 GHz  Access Point: Not-Associated
          Encryption key:off
          Link Quality:0  Signal level:0  Noise level:0
          Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0

sit0      no wireless extensions.

lo        no wireless extensions.

mlan0     IEEE 802.11-DS  ESSID:"CRZ_icanjji"
          Mode:Managed  Frequency=2.462 GHz  Access Point: 00:26:66:1A:55:AC
          Bit Rate:52 Mb/s  Tx-Power=15 dBm
          Retry limit:9  RTS thr=2347 B  Fragment thr=2346 B
          Encryption key:off
          Power Management:on
          Link Quality=2/5  Signal level=-77 dBm  Noise level=-106 dBm
          Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:547
          Tx excessive retries:10  Invalid misc:29  Missed beacon:0

eth0      no wireless extensions.

wfd0      IEEE 802.11-DS  ESSID:""
          Mode:Managed  Access Point: Not-Associated  Bit Rate:1 Mb/s
          Tx-Power=15 dBm
          Retry limit:9  RTS thr=2347 B  Fragment thr=2346 B
          Encryption key:off
          Power Management:on
          Link Quality=0/5  Signal level=0 dBm  Noise level=0 dBm
          Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:547
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0

root@imx6qsabresd:~# udhcpc -imlan0
udhcpc (v1.23.1) started
Sending discover...
Sending discover...
```

```
Sending select for 192.168.100.2...
Lease of 192.168.100.2 obtained, lease time 7200
/etc/udhcpc.d/50default: Adding DNS 168.126.63.1
/etc/udhcpc.d/50default: Adding DNS 168.126.63.2
root@imx6qsabresd:~# iperf -c 192.168.100.12 -t 10 -i 1
------------------------------------------------------------
Client connecting to 192.168.100.12, TCP port 5001
TCP window size: 43.8 KByte (default)
------------------------------------------------------------
[  3] local 192.168.100.2 port 57982 connected with 192.168.100.12 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 1.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  1.0- 2.0 sec   128 KBytes  1.05 Mbits/sec
[  3]  2.0- 3.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  3.0- 4.0 sec   128 KBytes  1.05 Mbits/sec
[  3]  4.0- 5.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  5.0- 6.0 sec   128 KBytes  1.05 Mbits/sec
[  3]  6.0- 7.0 sec   128 KBytes  1.05 Mbits/sec
[  3]  7.0- 8.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  8.0- 9.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  9.0-10.0 sec  0.00 Bytes  0.00 bits/sec
[  3] 10.0-11.0 sec  0.00 Bytes  0.00 bits/sec
[  3] 11.0-12.0 sec  0.00 Bytes  0.00 bits/sec
[  3]  0.0-12.4 sec   640 KBytes   422 Kbits/sec
```

SDIO 클럭 50MHz 임.

4.9. Key Button 테스트

수정 사항

"arch/arm/boot/dts/imx6qdl-sabresd.dtsi" 수정

```
gpio-keys {
                compatible = "gpio-keys";
                pinctrl-names = "default";
                pinctrl-0 = <&pinctrl_gpio_keys>;
```

```
            power {
                label = "Power Button";
                gpios = <&gpio3 27 1>;
                gpio-key,wakeup;
                linux,code = <KEY_POWER>;
            };

            back {
                label = "Back Button";
                gpios = <&gpio3 28 1>;
                gpio-key,wakeup;
                linux,code = <KEY_BACK>;
            };

        };
```

키를 누르면 아래와 같이 로그가 나옵니다.

```
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 158 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Back Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Back Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 158 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Back Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 116 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 116 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 116 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 116 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
[CRZ] drivers/input/keyboard/gpio_keys.c (340) gpio_keys_gpio_report_event: 116 Pressed
[CRZ] drivers/input/keyboard/gpio_keys.c (371) gpio_keys_gpio_isr: Power Button
```

4.10. LED 테스트

"arch/arm/boot/dts/imx6qdl-sabresd.dtsi" 수정

```
leds {
                compatible = "gpio-leds";
                pinctrl-names = "default";
                pinctrl-0 = <&pinctrl_gpio_leds>;

                mango-led1 {
                        label = "MANGO-LED1";
                        gpios = <&gpio2 30 0>;
                        linux,default-trigger = "timer";
                        status = "okay";
                };
                mango-led22 {
                        label = "MANGO-LED2";
                        gpios =  <&gpio2 31 0>;
                        linux,default-trigger = "timer";
                        status = "okay";
                };
```

테스트 결과

LED 가 1초에 한번 깜박거리는 것을 볼 수 있다.

4.11. RTC 테스트

이더넷 연결한 후 테스트

```
rtc-pcf8563 2-0051: chip found, driver version 0.4.3
rtc-pcf8563 2-0051: rtc core: registered rtc-pcf8563 as rtc0
```

```
root@imx6qsabresd:~# rdate -s time.bora.net
root@imx6qsabresd:~# date
Mon Jun 20 06:51:05 UTC 2016
root@imx6qsabresd:~# hwclock    --systohc -u
root@imx6qsabresd:~# date
Mon Jun 20 06:51:12 UTC 2016
root@imx6qsabresd:~# hwclock
Mon Jun 20 06:51:15 2016    0.000000 seconds
```

4.12. SATA 테스트

SATA 커넥터에 SATA를 연결합니다.
다시 부팅하면 아래와 같이 인식하면 됩니다.

```
root@imx6qsabresd:~# df
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/root         7177368   1144116   5668660  17% /
devtmpfs           899388        72    899316   1% /dev
tmpfs                  40         0        40   0% /mnt/.psplash
tmpfs            1030632       244   1030388   1% /run
tmpfs            1030632       396   1030236   1% /var/volatile
/dev/mmcblk3p1    511720      7056    504664   2% /media/mmcblk3p1
/dev/mmcblk2p1   4986484         4   4986480   1% /media/mmcblk2p1
/dev/mmcblk2p2   1015704    399072    600248  40% /media/mmcblk2p2
/dev/mmcblk2p3   1038704     34112    951828   4% /media/mmcblk2p3
/dev/mmcblk2p4    300224     16576    268152   6% /media/mmcblk2p4
/dev/sda1      307532728    126208 291761704   1% /media/sda1
```

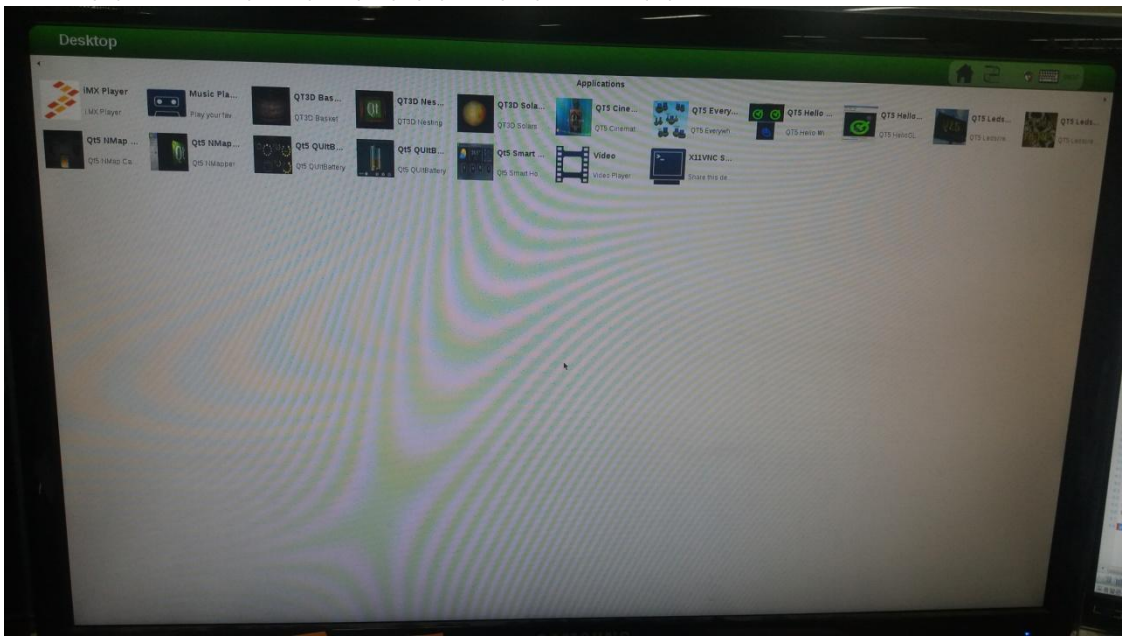
4.13. HDMI 테스트

u-boot에서

```
=> setenv mmcargs setenv bootargs console=${console},${baudrate} ${smp} root=${mmcroot}
video=mxcfb0:dev=hdmi,1920x1080M@60,fbpix=RGB24,bpp=24

=> save
=> reset
```

HDMI 케이블을 연결하고 화면이 아래와 같이 나오면 됩니다.



4.14. eMMC 테스트

```
[    4.629465] mmc2: new high speed DDR MMC card at address 0001
[    4.635215] mmcblk2: mmc2:0001 M8G2FA 7.20 GiB
[    4.639148] mmcblk2boot0: mmc2:0001 M8G2FA partition 1 512 KiB
[    4.644296] mmcblk2boot1: mmc2:0001 M8G2FA partition 2 512 KiB
[    4.649524] mmcblk2rpmb: mmc2:0001 M8G2FA partition 3 128 KiB
[    4.656689]  mmcblk2: p1 p2 p3 p4
[    4.663607]  mmcblk2boot1: unknown partition table
[    4.670401]  mmcblk2boot0: unknown partition table
```

아래와 같이 인식하는 것도 볼 수 있습니다.

```
root@imx6qsabresd:~# df
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/root         7177368 1144116   5668660  17% /
devtmpfs           899388       72    899316   1% /dev
tmpfs                  40        0        40   0% /mnt/.psplash
```

```
tmpfs                1030632       244    1030388   1% /run
tmpfs                1030632       396    1030236   1% /var/volatile
/dev/mmcblk3p1        511720      7056     504664   2% /media/mmcblk3p1
/dev/mmcblk2p1       4986484         4    4986480   1% /media/mmcblk2p1
/dev/mmcblk2p2       1015704    399072     600248  40% /media/mmcblk2p2
/dev/mmcblk2p3       1038704     34112     951828   4% /media/mmcblk2p3
/dev/mmcblk2p4        300224     16576     268152   6% /media/mmcblk2p4
```

4.15. Camera 테스트

/unit_tests/mxc_v4l2_overlay.out -iw 640 -ih 480 -ow 800 -oh 480 -r 4 -fr 30

4.16. 이더넷 테스트