VIA Embedded

EVALUATION GUIDE

ALTA DS 2

ARTiGO A900

VAB-1000

Android BSP 3.0

1.02-07312015-154000

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Revision History

Version	Date	Remarks
1.00	2015/7/22	Initial external release
1.01	2015/7/24	Added OTA steps
1.02	2015/7/31	Updated back page

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1. Introduction

1.1. Overview

This Evaluation Guide provides a practical introduction for the **ALTA DS2/ARTiGO A900/VAB-1000** platforms. It helps the users to effieicntly install the firmware for evaluation by following this guide. This guide will use VIA Elite E1000 as an example instead of **ALTA DS 2/ARTiGO A900/VAB-1000**, since the VIA Elite E1000 firmware integrated the whole platforms on one single Evaluation Kit.

1.2. Package Content

The package can be downloaded from VIA Embedded website.

EVK (Evaluation Kit): The binary package includes eloader, u-boot, kernel, android and firmware installation package.

EVK	
FirmwareInstall	Firmware installer used to upgrade firmware for the target device. Including below binary files under **bspinst** folder: ● **ELoader:** Primary boot loader used to initialize the hardware. ● **U-Boot:** Second boot loader used to initialize hardware and boot from the operation system. ● **Kernel:** Linux kernel used to provide system program services and manage hardware and software resources. ● **Android:** A mobile operating system based on the Linux kernel and developed by Google.
Tools	🗁 **SmartETK** 🗁 **OTA** 🗁 **S3PCDEditor**

Table 1 EVK content

Document: Includes the Evaluation Guide and any other documents required for the development.

Document
Evaluation Guide
Android Smart ETK SDK Programming Guide

Table 2 Document content

2. Making Android System Booting Media

This chapter describes how to install the firmware for VIA Elite E1000. Users could follow the procedure described in section 2.1 below for installing the firmware provided by the EVK software package. Users could also prepare the firmware installation package for firmware upgrade after the modification on BSP by following the rest of content in this section.

2.1. Requirements

- Linux development computer
- SD/uSD storage card
- EVK package
    - Elite1000 Android4.4.2 EVK*.tgz (Support ext4 SD/uSD)
    - Elite1000 Android4.4.2 FirmwareInstall vfat bspinst*.tgz (Support vfat SD/uSD)

Note:

1. To get more installation process about the vfat EVK installation package, please refer to Appendix B.

2.2. EVK Installation Package

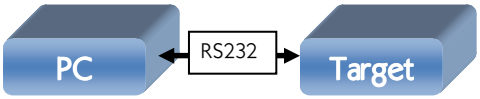
The up-to-date firmware is included in the latest EVK package which could be downloaded from VIA Embedded Website. Users can follow the steps to install the firmware package which is supported in ext4 formatted SD/uSD storage card for evaluation from EVK without building BSP directly.

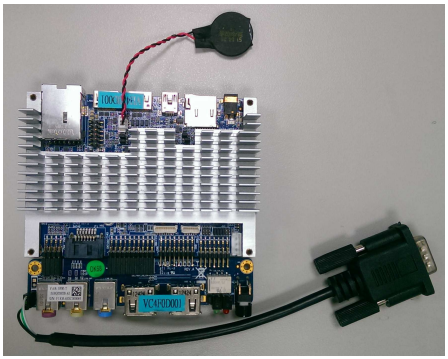
Step 1: Prepare a SD/uSD storage card with ext4 formatted.

Step 2: Copy firmware package from /EVK/FirmwareInstall/*.* to SD/uSD storage card root directory. Users can check content in SD/uSD storage card when finish copying files.

```
#The mount path of SD/uSD storage for this example is /mnt/tmp1
user@ubuntu:~$ ls /mnt/tmp1
bspinst _EXT4_SD_CARD_ONLY_ scriptcmd
```

Step 3: The recommend connection of debug port between device and Linux host computer is shown in Figure 1 . The target device for this example is VAB-1000. For other target device connection; users can download the other device's **User Manual** from VIA Embedded web site.





```
#Seting in Terminal AP, ex:Putty

Baud Rate: 115200
Data: 8 bit
Parity: none
Stop: 1 bit
Flow control: none
```

Figure 1 Debug port connection and setting

The u-boot will wait 3 seconds to stop booting after powering on by pressing any key. When booting is stopped, that prompt sign will show up on terminal screen. Users can skip to access u-boot setting if nothing needs to be changed.

```
#The booting message for this example is VAB-1000

eloader-32.00.01 start up!
board_id:73a1
cpu_freq: 1G
mclk: 667M

Product Version:unspecified
Update List (Commit):unspecified

U-Boot 32.01.00-elite1000 (May 21 2015 - 11:38:29)

Board: ELITE1000 EVM
I2C:   ready
No support HDMI-IN u-boot, Only reserve 8MB for secure boot
DRAM:  2 GiB
MMC:   S3Graphics Elite SD/MMC: 0, S3Graphics Elite SD/MMC: 1, S3Graphics
Elite SD/MMC: 2
connected devices = 0x8000
Bios connect devices is 0x8000.
IGA1 device is 0x8000
IGA2 device is 0x0
Output for IGA1 is: 0x8000
SD/MMC: Select 400KHz as clock rate
mask data:4
elite_mci_command: waiting for status update
mask data:4
elite_mci_command: waiting for status update
SD/MMC: Select 400KHz as clock rate
SD/MMC: Select 50MHz as clock rate
Loading boot logo BMP file w/ 502x302 from eMMC
set mode on IGA[0]->DP5(Preferred Mode)     [OK]
    source mode: 1920x1200, 32 bit
    scaler size: 1920x1200
    dest   mode: 1920x1200@6000
Elite PCIe port 0: pp->base 0    0xd80b0000
RP before 0x250 0x20000007
RP middle 0x250 0x20000003
RP after 0x250 0x20000003
Elite PCIe port 1: pp->base 1    0xd80c0000
RP before 0x250 0x20000006
RP middle 0x250 0x20000002
RP after 0x250 0x20000002
Set 0 norm base address d80b1018 base c0000000, size 00001000
Set 1 perf base address d80b1020 base c0100000, size 00004000
In:    serial
Out:   serial
Err:   serial
press any key to abort fastboot!
 0
Device is locked
lba size = 512
```

```
lba_start      partition_size          name
=========  ======================  ==============
       34       4194304(      4M)  bootlogo
     8226        524288(    512K)  deviceinfo
     9250       2097152(      2M)  devicetree
    13346      16777216(     16M)  misc
    46114      33554432(     32M)  recovery
   111650      33554432(     32M)  boot
   177186     536870912(    512M)  system
  1225762     536870912(    512M)  cache
  2274338    2744630272(   2617M)  userdata
=========  ======================  ==============
info partition magic 0x0 invalid, assuming none
No existing device info found.
Setting serial number from constant (no dieid info)
fastboot serial_number = 00123ABCDEF
Returning key pressed false
boot_method is 1


fbt_preboot: request for a normal boot
Net:   REALTEK RTL8168 @ 0xc0000000
MCFG:  RTL8168G/8111G (0020)
RTL8168
Hit any key to stop autoboot:  3
```

```
#To type “pri” to print out current u-boot parameter or type “boot” to
boot up directly

S3 # pri
androidno=030a3d8408e49475
baudrate=115200
bootargs=console=ttyS1,115200n8 root=/dev/mmcblk0p1
rootflags=errors=remount-ro,commit=0 rootfstype=
ext4 rw init=/init rootdelay=1 androidboot.serialno=030a3d8408e49475
bootargs_default=console=ttyS1,115200n8 root=/dev/mmcblk0p1
bootargs_emmc=setenv bootargs ${kernelargs}
androidboot.serialno=${androidno} root=/dev/mmcblk0p9 ro
otwait rootflags=errors=remount-ro,commit=0 rootfstype=ext4 rw ${mtdparts}
init=/init rw
bootargs_mmc=setenv bootargs ${kernelargs}
androidboot.serialno=${androidno} root=/dev/mmcblk0p1 ro
otwait rootflags=errors=remount-ro,commit=0 rootfstype=ext4 rw ${mtdparts}
init=/init rw
bootargs_nand=setenv bootargs ${kernelargs}
androidboot.serialno=${androidno} root=/dev/mtdblock15 r
ootfstype=yaffs2 init=/init rw
bootcmd=emmc format;run bootargs_mmc; ext4load mmc 0:1 0x0 scriptcmd; if
iminfo 0x0; then source 0;
else run bootcmd_mmc; fi
bootcmd_default=run bootargs_mmc; ext4load mmc 0:1 0x0 scriptcmd; if
iminfo 0x0; then source 0; else
 run bootcmd_mmc; fi
bootcmd_emmc=run bootargs_emmc && ext4load mmc 2:9 0x6000000 elite1000-
emmc.dtb; ext4load mmc 2:9 0x
2800000 uImage; if iminfo 0x2800000; then bootm 0x2800000 - 0x6000000;
```

```
else run bootcmd_nand; fi
bootcmd_mmc=run bootargs_mmc && ext4load mmc 0:1 0x6000000
bspinst/elite1000-emmc.dtb; ext4load mmc
0:1 0x2800000 bspinst/uImage; if iminfo 0x2800000; then bootm 0x2800000 -
0x6000000; else run bootcm
d_emmc; fi
bootcmd_nand=run bootargs_nand; setenv bootcmd "booti boot"; boot;
bootdelay=3
bootdir=/boot
bootfile=uImage
ethact=RTL8168
ethaddr=00:1a:32:b0:12:63
fastboot_unlocked=0
fdt_high=0xffffffff
fdtaddr=0x10000000
fdtfile=undefined
filesize=dc2
initrd_high=0xffffffff
kernelargs=console=ttyS1,115200n8 rootdelay=1
loadaddr=0x80200000
mtdids=nand0=nand
mtdparts=mtdparts=nand:4M(secureboot),4M(secureos),4M(audiofirmware),2M(ub
oot_env),4M(uboot),4M(boot
_logo),4M(nvram),12M(devicetree),32M(otaloader),32M(iploader),16M(device_i
nfo),16M(misc),16M(boot),1
6M(recovery),384M(system),32M(package),384M(cache),-(data)
nand_setup=ext4load mmc 0:1 0x2000000 bspinst/boot_script.uimg; source
0x2000000
other_env=ext4load mmc 0:1 0x1000 bspinst/other_env.uimg; source 0x1000;
rdaddr=0x81000000
setup_bootloader=ext4load mmc 0:1 0x1000 bspinst/bootloader_setup.uimg;
source 0x1000;
setup_emmc=ext4load mmc 0:1 0x1000 bspinst/bootloader_setup.uimg; source
0x1000; ext4load mmc 0:1 0x
1000 bspinst/uboot_emmc_setup.uimg; source 0x1000;
setup_img=ext4load mmc 0:1 0x1000 bspinst/img_setup.uimg; source 0x1000;
setup_nand=ext4load mmc 0:1 0x1000 bspinst/bootloader_setup.uimg; source
0x1000; ext4load mmc 0:1 0x
1000 bspinst/uboot_nand_setup.uimg; source 0x1000;
stderr=serial
stdin=serial
stdout=serial

Environment size: 2791/65531 bytes
S3 # boot
```

Step 4: Assert SD/uSD storage card to target device and then power on. The installation will execute automatically as shown in Figure 2~Figure 3.

Step 5: Remove SD/uSD storage card when the message "Please remove installation media" pops up, as shown in Figure 4. The device will reboot automatically and then bootup Android.

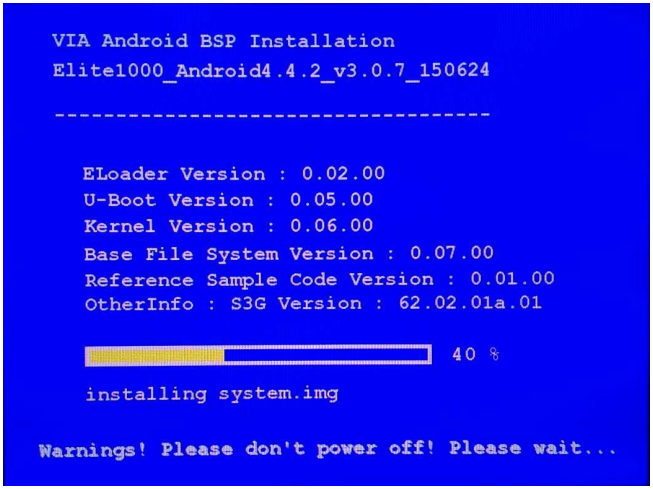


Figure 2 Installation progessing

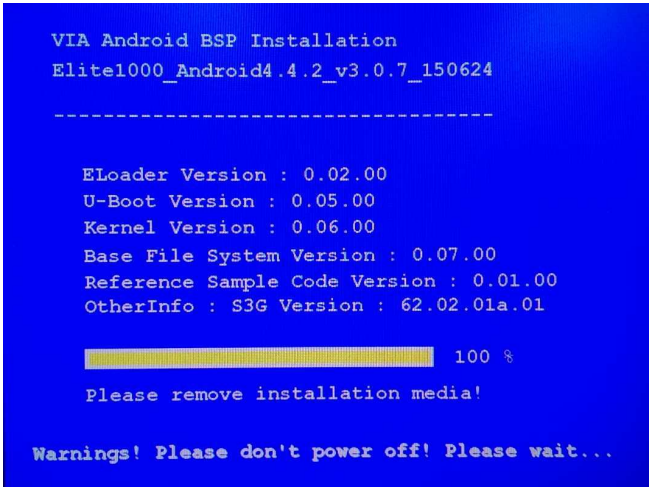


Figure 3 Finish installing and message pops up

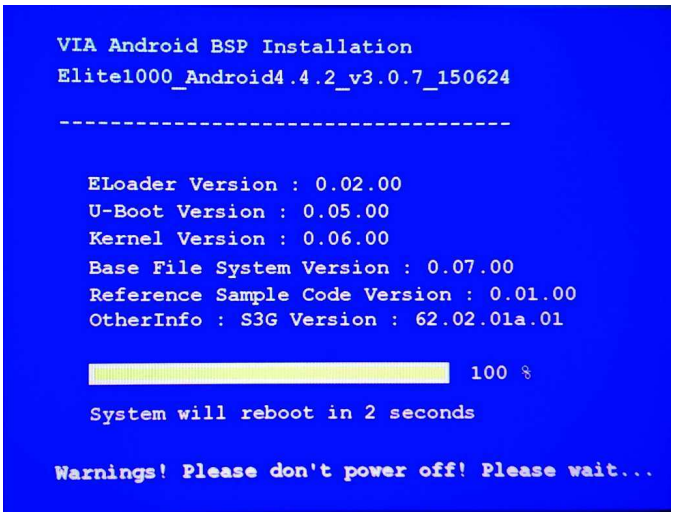


Figure 4 Finish installing and reboot count down procedure

2.3. Update Firmware Package

Users can skip 2.3.1~2.3.6 if it's not needed to update firmware package which built by themselves.

2.3.1. How to update the u-boot

Users could update the u-boot image in SD/uSD storage card then upgrade the firmware for VIA Elite E1000 after the u-boot is modified. Follow the procedure to update the u-boot image in the firmware installation package.

- Refer to "Build U-Boot" section of Development Guide which can be downloaded from VIA Embedded Web Site to get the u-boot.bin
- Copy u-boot.bin to the /bspinst/u-boot.bin into SD/uSD storage card

2.3.2. How to update boot.img

Users would need to update the boot.img image in SD/uSD storage card then upgrade the firmware for VIA Elite E1000 after the Android framework is modified. Follow the procedure to update the boot.img image in the firmware installation package.

- Refer to "Build Android" section of Development Guide which can be downloaded from VIA Embedded Web Site to get the u-boot.img
- Copy boot.img to the /bspinst/boot.img into SD/uSD storage card

2.3.3. How to update system.img

Users would need to update the system.img image in SD/uSD storage card then upgrade the firmware for VIA Elite E1000 after the Android framework is modified. Follow the procedure to update the system.img image in the firmware installation package.

- Refer to "Build Android" section of Development Guide which can be downloaded from VIA Embedded Web Site to get the system.img
- Copy system.img to the /bspinst/system.img of SD/uSD storage card

2.3.4. How to update recovery.img

Users would need to update the recovery.img image in SD/uSD storage card then upgrade the firmware for VIA Elite E1000 after the Android framework is modified. Follow the procedure to update the recovery.img image in the firmware installation package.

- Refer to "Build Android" section of Development Guide which can be downloaded from VIA Embedded Web Site to get the recovery.img

- Copy recovery.img to the /bspinst/recovery.img of SD/uSD storage card

2.3.5. How to update userdata.img

Users would need to update the userdata.img image in SD/uSD storage card then upgrade the firmware for VIA Elite E1000 after the Android framework is modified. Follow the procedure to update the userdata.img image in the firmware installation package.

- Refer to "Build Android" section of Development Guide which can be downloaded from VIA Embedded Web Site to get the userdata.img
- Copy userdata.img to the /bspinst/userdata.img of SD/uSD storage card

2.3.6. How to update version information

Users could set the proper version number by modifying the version file below.

- Modify /bspinst/version in SD/uSD storage card

2.3.7. How to update OTA package (Optional)

Users can update OTA package locally. The OTA package for this example is obtained from EVK/Tools/signed-elite1000-ota-*.zip.

Step1: Copy zip file to the SD/uSD storage card or USB flash drive.

Step2: Insert SD/uSD storage card or USB flash drive to the target device.

Step3: Make sure the debug port is connecting to PC through the RS232 cable.

Step4: Power on the target device and wait for Andorid boot up completely. Users can see the prompt as below:

```
# Press “Enter” key in the terminal applaiction if Android boot up
completely

root@elite1000:/ #
```

Step5: Execute the following command:

```
# Press “Enter” key in the terminal applaiction if Android boot up
completely

root@elite1000:/ #

root@elite1000:/ # mkdir /cache/recovery/

root@elite1000:/ # cp -f /mnt/<<Path of Storage>>/signed-elite1000-ota-
*.zip /cache //File name depend on the real full file name

root@elite1000:/ # echo "--update_package=/cache/signed-elite1000-ota-
*.zip" > /cache/recovery/command

root@elite1000:/ #reboot recovery
```

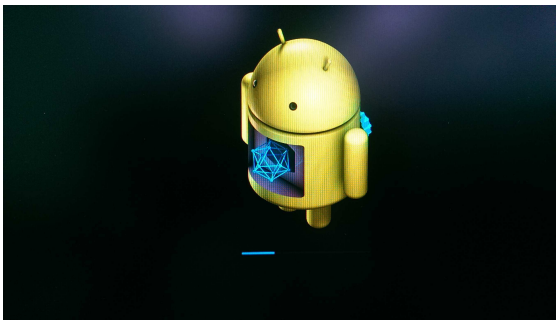


Figure 5 OTA in progress

Step6: System will reboot when OTA finish. Developer can check log file under /cache.

2.4. Setup U-Boot additional environment variables

U-Boot already has its own default environment variables after erasing and flashing u-boot.bin to SPI ROM. If users want to add additional variables, users could modify the script file 'other_env.uimg'. Please prepare an Ubuntu working system and make sure that 'apt-get install uboot-mkimage' has been installed.

- Make sure the uboot-mkimage has been installed.
- Need to download BSP to compile.

2.4.1. How to make 'other_env.uimg'?

Follow U-Boot command rules and store the commands in a plain text file. For example, create a **<my_other_env>.txt** file as follows:

```
1 ##VIA uboot_env_script##
2
3 #setenv <env_name> '<env_contents>'
4 #saveenv
5
6 echo *** VIA UBoot Other ENV Setting Done ***;
```

```
# create U-Boot image script file.

user@ubuntu:~$ mkimage -A arm -T script -C none -d <my_other_env>.txt
other_env.uimg

# copy other_env.uimg to the /bspinst/other_env.uimg in SD/uSD card.
```

2.5. Adjust config file of Firmware Installation Package

To modify **/bspinst/bspinst.cfg**, users can refer to the setting below depending on the platform.

```
#Example
setenv boot-target ds2-2G
<!--
boot-target :
  vab1000       /* vab1000 */,
  a900          /* a900 */,
  ds2-1G        /* ds2-1G */,
  ds2-2G        /* ds2-2G */,
-->
```

3. Functionality

VIA Elite E1000 is designed with enhanced features including UART and Watchdog Timer support. These Functions can be controlled by SmartETK Tool under Android Environment. For more details of SmartETK, please refer to **" Android Smart ETK SDK Programming Guide.pdf"** in the **"Document"** Folder and install the same APK from **/EVK/Tools/SmartETK** for evaluation directly.

4. Platform Specific Setting

4.1. Setting Panel Type through S3 PCD Editor

The platform may embed the VT1636 DVO Control Chip for Touch Panel. The supported VIA Elite E1000 device is listed below.

- VAB-1000

To enable the Panel Support, VIA provides an Editor Tool for changing the supported Panel Type and its related resolution to U-Boot Binary. This section describes the setting strategies for changing the supported Panel Type.

4.1.1. Preparation

The S3 PCD Editor Tool was located in the "TestTool" Folder and named as "S3 PCD Editor.exe". It is a Windows-Based Execution File and needs to be used under Windows OS. To use the S3 PCD Editor, the following Items need to be prepared for S3 PCD Editor Reference:

1. Target U-Boot Binary File
2. The "u-boot.vcd" file which corresponds to Target U-Boot Binary
3. S3 PCD Editor.exe

The Items (1) and (2) will be generated in the root folder of U-Boot Source Code after compiling the U-Boot. Refer to “Build U-Boot” section for details.

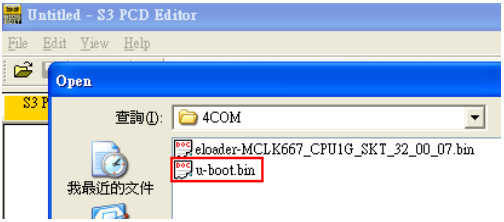
4.1.2. Panel Type Setting Strategy

After preparing the required Items described in Section 4.1.1, you can change the Supported Panel Types by following the Steps:

1. Open the "u-boot.vcd" and modify the Property of "VT1636" in "Supported DVO Devices" Section from "CONST BOOL" to "BOOL". This will allow you to enable the VT1636 DVO Chip Support.

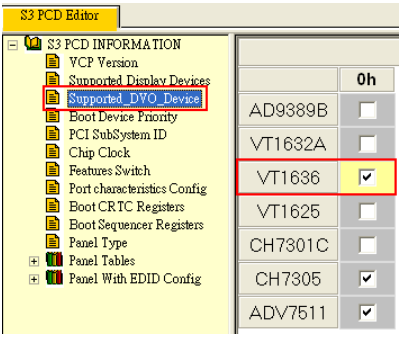
```
;================================================================================
;               Supported DVO Devices (VCP_SupportedDVODeviceType)
;
BeginStruct Supported_DVO_Device 5EA28
     "AD9389B"          CONST BOOL
     "VT1632A"          CONST BOOL
     "VT1636"           BOOL
     "VT1625"           CONST BOOL
     "CH7301C"          CONST BOOL
     "CH7305"           CONST BOOL
     "ADV7511"          CONST BOOL
EndStruct
```

2. Execute the "S3 PCD Editor.exe" and open the "u-boot.bin" of the Target U-Boot Binary.

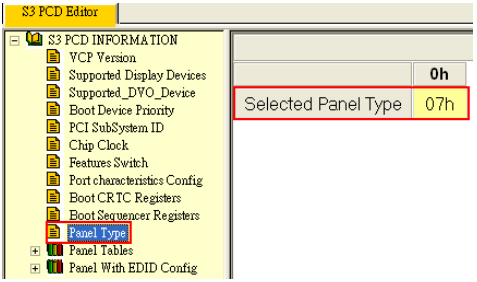


Make sure the corresponding "u-boot.vcd" is located in the same folder of U-Boot Binary.

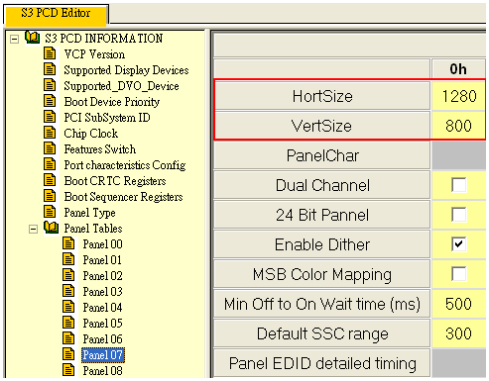
3. Select the "Supported_DVO_Device" Menu and enable the "VT1636" to support the VT1636 DVO Control Chip.



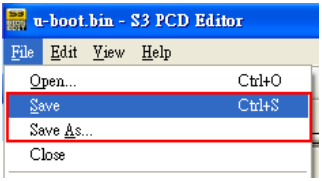
4. Select the "Panel Type" Menu to set the correct Panel Resolution for your Panel.



5. You can select the "Panel Table" Page to check the details of the Panel Setting you used. The Setting can be modified manually for specific purpose.



6. Be sure to "Save" the Setting after exiting the S3 PCD Editor.



Appendix A. Definitions

Android	Android is a trademark of Google Inc.
ARM	ARM is a trademark of ARM Inc.
BSP	Board Support Package
HDMI	High Definition Multimedia Interface
SD	Secure Digital Multimedia Card
uSD	Micro Size Secure Digital Multimedia Card
Elite E1000	The Target Product Name
VIA	VIA Technologies, Inc.

Appendix B. EVK Installation Package through vfat SD/uSD

B.1. Requirements

- Linux development computer
- SD/uSD storage card
- EVK package
    - Elite1000 Android4.4.2 FirmwareInstall vfat bspinst*.tgz (Support vfat SD/uSD)

B.2. EVK Installation Package

Step 1: Prepare a SD/uSD storage card with vfat formatted.

Step 2: Copy firmware package from /EVK/FirmwareInstall_vfat_bspinst/*.* to SD/uSD storage card root directory.

Step 3: Connect debug port between device and Linux host computer.

Step 4: Assert SD/uSD storage card to target device and then power on. Press any key to access u-boot setting.

Step 5: Modify u-boot parameter

```
# Modify u-boot parameter to set fat booting.

setenv bootcmd 'emmc format;run bootargs_mmc; fatload mmc 0:1 0x0
scriptcmd; if iminfo 0x0; then source 0; else run bootcmd_mmc; fi'

setenv bootcmd_default 'run bootargs_mmc; fatload mmc 0:1 0x0 scriptcmd;
if iminfo 0x0; then source 0; else run bootcmd_mmc; fi'

setenv bootcmd_mmc 'run bootargs_mmc && fatload mmc 0:1 0x6000000
bspinst/elite1000-emmc.dtb; fatload mmc 0:1 0x2800000 bspinst/uImage; if
iminfo 0x2800000; then bootm 0x2800000 - 0x6000000; else run bootcmd_emmc;
```

```
fi'

setenv nand_setup 'fatload mmc 0:1 0x2000000 bspinst/boot_script.uimg;
source 0x2000000'

setenv setup_bootloader 'fatload mmc 0:1 0x1000
bspinst/bootloader_setup.uimg; source 0x1000;'

setenv setup_emmc 'fatload mmc 0:1 0x1000 bspinst/bootloader_setup.uimg;
source 0x1000; fatload mmc 0:1 0x1000 bspinst/uboot_emmc_setup.uimg;
source 0x1000;'

setenv setup_nand 'fatload mmc 0:1 0x1000 bspinst/bootloader_setup.uimg;
source 0x1000; fatload mmc 0:1 0x1000 bspinst/uboot_nand_setup.uimg;
source 0x1000;'

setenv setup_img 'fatload mmc 0:1 0x1000 bspinst/img_setup.uimg; source
0x1000;'

setenv setup_bootloader 'fatload mmc 0:1 0x1000
bspinst/bootloader_setup.uimg\; source 0x1000\;'

setenv bootcmd_mmc 'run bootargs_mmc && fatload mmc 0:1 0x6000000
bspinst/elite1000-emmc.dtb\; fatload mmc 0:1 0x2800000 bspinst/uImage\;
bootm 0x2800000 - 0x6000000\;'
```

```
# Boot up after setting.

boot
```

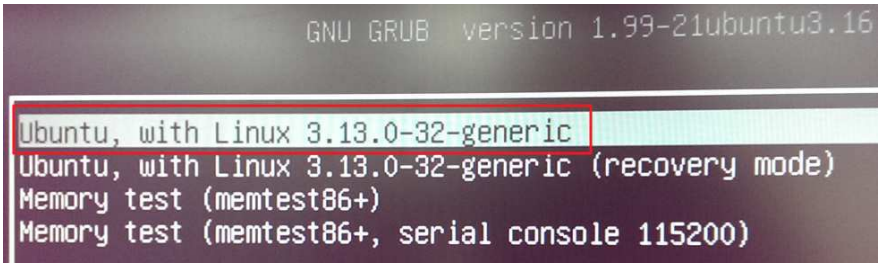
Step 6: The installation will execute automatically.

Step 7: Remove SD/uSD storage card when the message "Please remove installation media" is shown. The device will reboot automatically and then bootup Android.

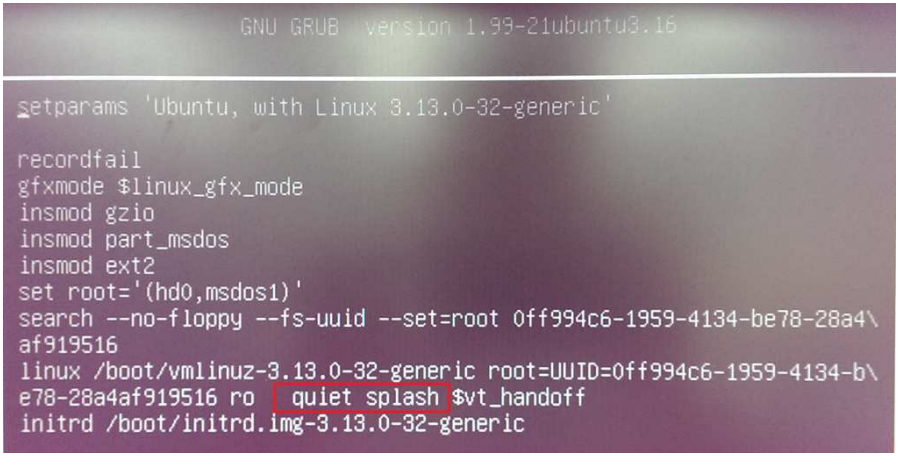
Appendix C. Troubleshooting

C.1. Fail to login X-window or hang on Ubuntu 12.04.x

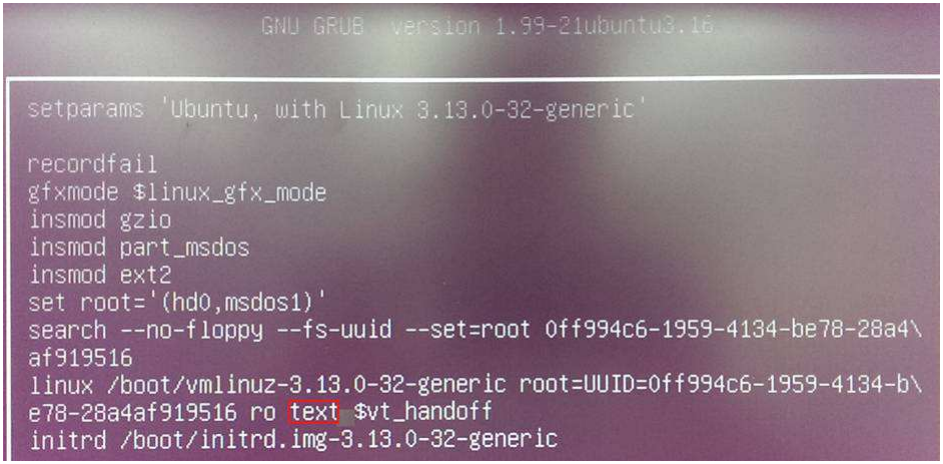
- Symptom:
  - OS may hang when the "login screen" shows when user finish installing OS and reboot for the first time.
  - X window may hang after installing the package "libglapi-mesa:i386" and "libgl1-mesa-dri:i386".
- Workaround:
  - Boot up OS and press "ESC" until Grub screen is shown. (See the PIC, please)



  - Edit the boot command by pressing "e" and then user can enter the edit progress.



- To replace "quite splash" with "text" , press F10 to boot up OS.



- User will enter text mode.
- Be sure the network is workable and user can install xserver-xorg-lts-precise to fix the X-window login issue.

```
$sudo apt-get install xserver-xorg-lts-precise
```

- Reboot OS and user should be able to login into Ubuntu 12.04.x

C.2. Fail to update the Firmware automatically

If it cannot be updated automatically after powering on, users can type the command below in u-boot to update the firmware manually.

```
ext4load mmc 0:1 0 scriptcmd; source 0
(please press any key on normal boot)
press any key to abort fastboot!
fbt_preboot: request for a normal boot
Hit any key to stop autoboot:  0
```

Taiwan Headquarters
1F, 531 Zhong-Zheng Road
Xindian, Taipei, 23148
Taiwan

TEL: 886.2.2218.5452
FAX: 886.2.2218.5453
Email: embedded@via.com.tw

USA
940 Mission Court
Fremont, CA 94539
USA

TEL: 1.510.683.3300
FAX: 1.510.687.4654
Email: embedded@viatech.com

Europe
In den Dauen 6
53117 Bonn
Germany

TEL: 49.228.688565.0
FAX: 49.228.688565.19
Email: embedded@via-tech.eu

China
Tsinghua Science Park Bldg. 7
No. 1 Zongguancun East Road
Haiden District, Beijing, 100084
China

TEL: 86.10.59852288
FAX: 86.10.59852299
Email: embedded@viatech.com.cn

Japan
3-15-7 Ebisu MT Bldg. 6F
Higashi, Shibuya-ku
Tokyo 150-0011
Japan

TEL: 81.3.5466.1637
FAX: 81.3.5466.1638
Email: embedded@viatech.co.jp