SBC6300X WinCE 6.0 User Manual

TimLL ®

Revision history

Rev	Date	Description
1.0.0	2009-10-24	Initial version
1.0.1	2010-10-27	

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Chapter I. Introduction of the Manual

This Manual mainly expounds the burning of WinCE 6.0 system image files of SBC6300X main board and the system customization based on SBC6300X WinCE 6.0 BSP.

1.1 Terms and definitions

Development Workstation Development Workstation means X86 PC installed with Windows XP operating system, Microsoft Visual Studio 2005 and Windows Embedded CE 6.0 development environment. This PC must have a serial port and a USB port.

NAND flash   NAND flash the 8-bit 128MB SAMSUNG K9F1G08UB NAND flash module on SBC6300X main board.

SDRAM   SDRAM means the extended 64MB SDRAM on SBC6300X main board, which consists of 2 pieces of 16-bit 32MB HY57V581620FTP-HKOR.

SRAM   SRAM means the 16KB SRAM inside AT91SAM9263 chip that SBC6300X main board uses.

DNW   The serial port tool running on development workstation.

1.2 Disclaimer

Timll Technic Inc. doesn't provide any expressly or implied warranty for all source code, software, data and documents of the program that are included in this CD, including but not limited to the guarantee for any specific purpose. All risks are borne by the users of the CD. If any defect is found the program, any expenses arising of servicing, modifying or correcting the defects will also be borne by the users.

Chapter II. Introduction of WinCE 6.0 system

2.1 Image files related to SBC6300X WinCE 6.0 system

If WinCE system is customized using SBC6300X WinCE 6.0 BSP that we provide and the compilation is successfully finished, the system will generate 6 image files, i.e.: FIRSTBOOT.nb0, EBOOT.nb0, NK.nb0, FIRSTBOOT.bin, EBOOT.bin, NK.bin, of which 4 files are usually used in burning processes, i.e.: FIRSTBOOT.nb0, EBOOT.nb0, NK.nb0, NK.bin. The files generated in .nb0 format will finally be burnt to NAND flash, and they can directly run in SDRAM; while the files in .bin format must first be converted into .nb0 files by EBOOT running on SBC6300X main board nb0, then they are burnt to NAND flash.

2.2 Working principles of SBC6300X WinCE 6.0 system

At present, our SBC6300X WinCE 6.0 BSP supports two booting modes, i.e.: NAND flash. Figure 2.1 is their rough booting flow chart:
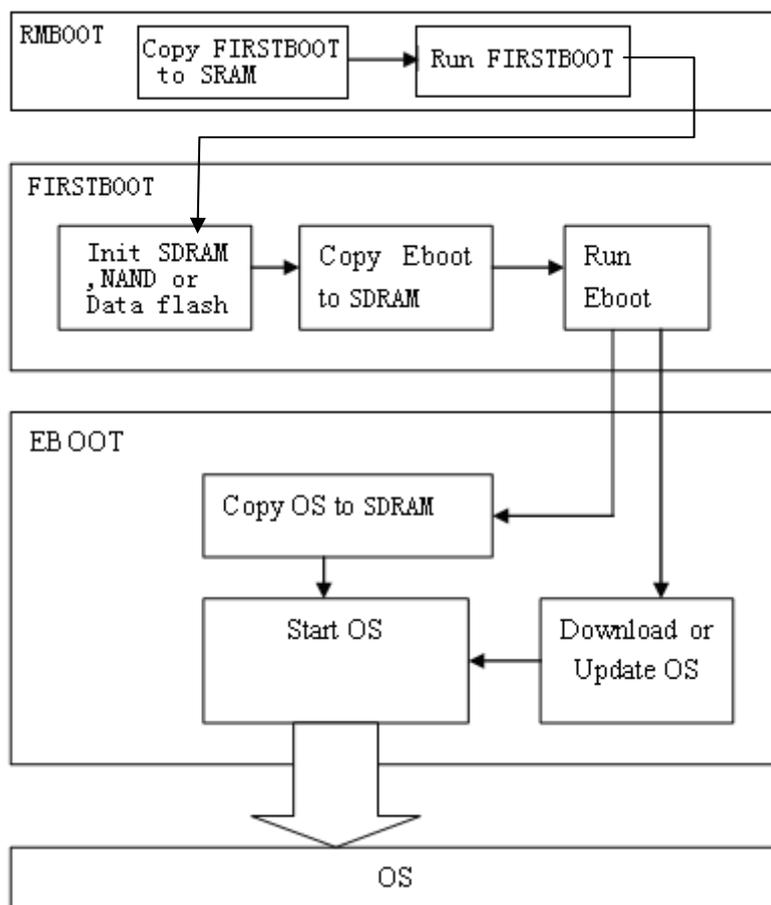
RMBOOT: Copy FIRSTBOOT to SRAM → Run FIRSTBOOT

FIRSTBOOT: Init SDRAM, NAND or Data flash → Copy Eboot to SDRAM → Run Eboot

EBOOT: Copy OS to SDRAM → Start OS; Download or Update OS

OS

Figure 2.1

2.2.1 Principles on the booting of SBC6300X WinCE 6.0 system from NAND flash

After power on the system is fixed inside CPU of AT91SAM9263, ROMBOOT will automatically copy FIRSTBOOT image, the first-level user booting code from SPI NANDflash 0x00000000 address to SRAM inside CPU of AT91SAM9263 and execute it. FIRSTBOOT's role is to initialize SDRAM memory, SPI NANDflash in AT91SAM9263 CPU and SBC6300X main board, and copy EBOOT, the second-level user booting code from SPI NANDflash 0x00020000 address of SBC6300X main board to SDRAM of SBC6300X main board and execute it; FIRSTBOOT also copy Logo from NANDflash 0x00080000 address of SBC6300X main board to SDRAM. In default state, EBOOT will automatically copy WinCE system image NK from NAND flash 0x00200000 address to SDRAM of SBC6300X main board, and hand over system control to operating system. In addition, EBOOT undertakes the management operations of underlying hardware and settings of the data shared with operating system.

2.3 The address of SBC6300X WinCE 6.0 image files in NAND flash

If you choose to boot from NAND flash, FIRSTBOOT is located at the beginning of 0x00000000 address of Nand flash, the capacity of FIRSTBOOT is 4KB; EBOOT is located at the beginning of 0x00020000 address of Nand flash, the capacity of EBOOT is 200KB; the Logo is saved at 0x00080000 of Nand flash; WinCE system images are located in NAND flash in an area of 40MB starting from 0x00200000 address. The area in NAND flash after 0x2860000 address will provide clients for use as NAND flash hard disk under WinCE system. Therefore, client can customize WinCE system of no more than 40MB. If you need store WinCE system of bigger than 40MB or need reduce the NAND flash partition reserved for WinCE system images, please feel free to contact our technicians.
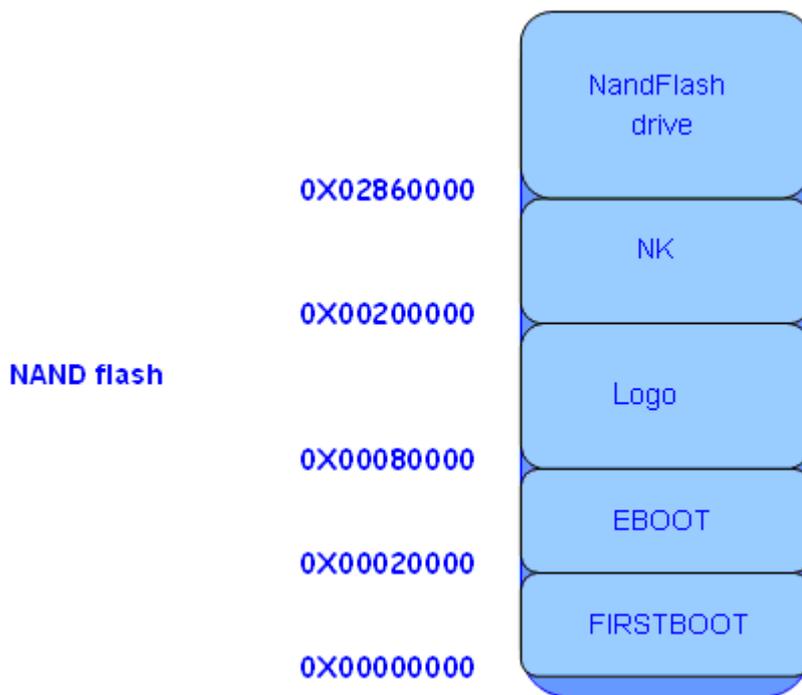

Figure 2.3

Chapter III. Burning of WinCE system

3.1 Introduction of burning SBC6300X WinCE 6.0 system image files

Now our SBC6300X WinCE 6.0 BSP supports two burning modes, first, burn FIRSTBOOT, EBOOT and WinCE system image NK using the SAM-BA software that ATMEL provides; second, connect VS2005 WinCE 6.0 development environment installed on client development workstation or other TFTP servers (e.g.: CEDownload.exe) to SBC6300X main board, burn WinCE system image files NK via net cable using the EBOOT on SBC6300X (the EBOOT that SBC6300X WinCE 6.0 BSP of current version generates doesn't support for the burning of user booting codes FIRSTBOOT and EBOOT, it can only burn WinCE system image file NK.bin) .

Important: if you use EBOOT, the user booting code on SBC6300X main board to WinCE system image file NK, the actual process will be, EBOOT, the user booting code on SBC6300X main board will first download WinCE system image file NK.bin that VS2005 WinCE 6.0 generates from TFTP server running on development workstation to SDRAM onSBC6300X main board via net cable, then the file will be converted into NK.nb0 before being burnt to NAND flash. The TFTP server mentioned here can be the server provided in VS2005 WinCE 6.0 development environment or other TFTP servers. Please note that the port parameter of the TFTP server that you use is 980 instead of 69, the standard TFTP port. The software CEDownload.exe, which we will describe in Section 3.4 below is a TFTP server software, which has changed the default TFTP port from 69 into 980.

3.2 Burn SBC6300X WinCE 6.0 system image through SAM-BA

3.2.1 Install SAM-BA software

Install the application \03 WinCE 6.0 Kit\04 Tools \Install AT91-ISP v1.12.exe in SBC6300X CD on your development workstation as the default path and configurations of AT91-ISP v1.12.exe program. After the installation is finished, you will see the icon of SAM-BA v2.8 (see Figure 3.1) appearing on the desktop :

Figure 3.1

3.2.2 Burn SBC6300X system image through SAM-BA software

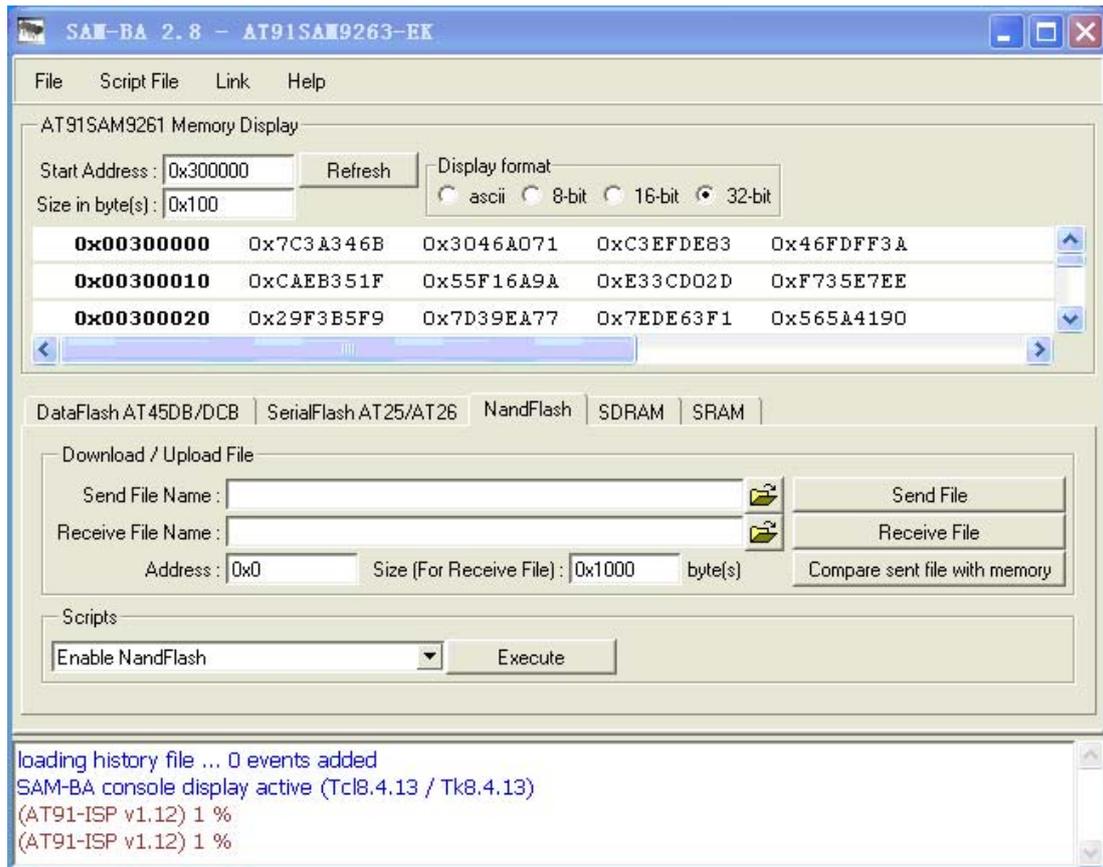1. Put the Jump J24 in open status. As shown in Figure 3.16, select NandFlash header in SAM-BA v2.8.

Figure 3.16

2. As shown in Figure 3.16 in the <u>Scripts</u> pulldown menu of SAM-BA v2.8, select <u>Enable NandFlash</u>, and click <u>Execute</u> button in the column <u>Scripts</u> to enable NAND flash on SBC6300X main board. After the Enable operation is successful, the interface as shown in Figure 3.17 will appear:
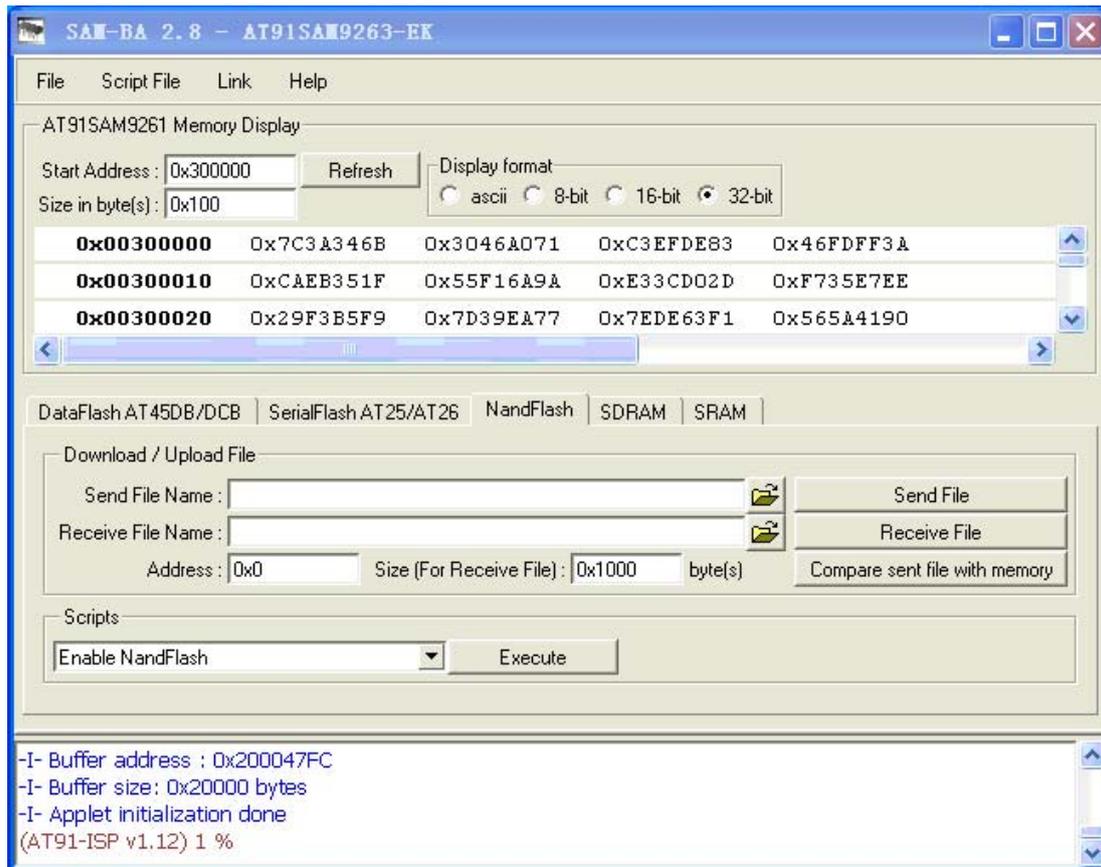
Figure 3.17

3. As shown in Figure 3.18 in the Scripts pulldown menu of SAM-BA v2.8, select Erase All, click Execute button in SAM-BA v2.8, SAM-BA v2.8 will automatically erase entire NAND flash. After the Erase operation is successful, the interface as shown in Figure 3.19 will appear:
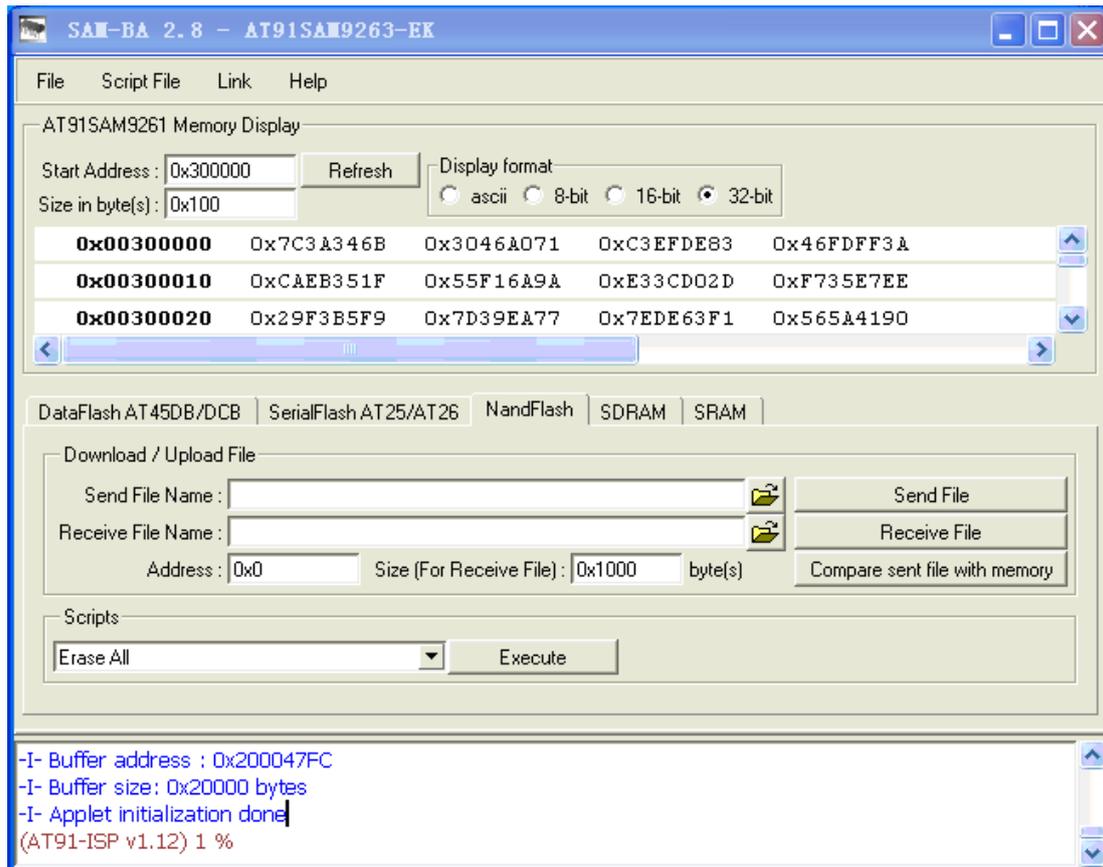
Figure 3.18
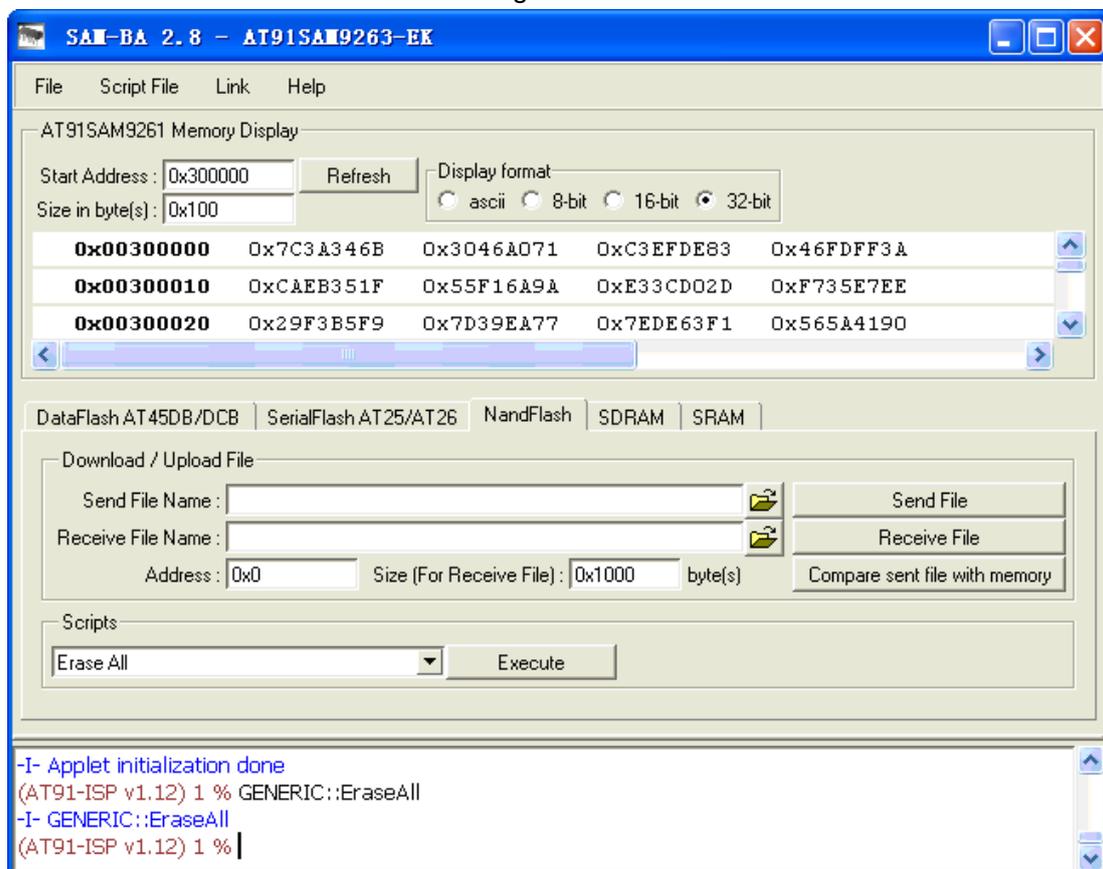
Figure 3.19

4. Select <u>Send Boot File</u> button in the <u>Scripts</u> pulldown menu of SAM-BA v2.8, click <u>Execute</u>

button in SAM-BA v2.8, an <u>open file</u> dialog box as shown in Figure 3.20 will pop up in <u>SAM-BA v2.8</u>:
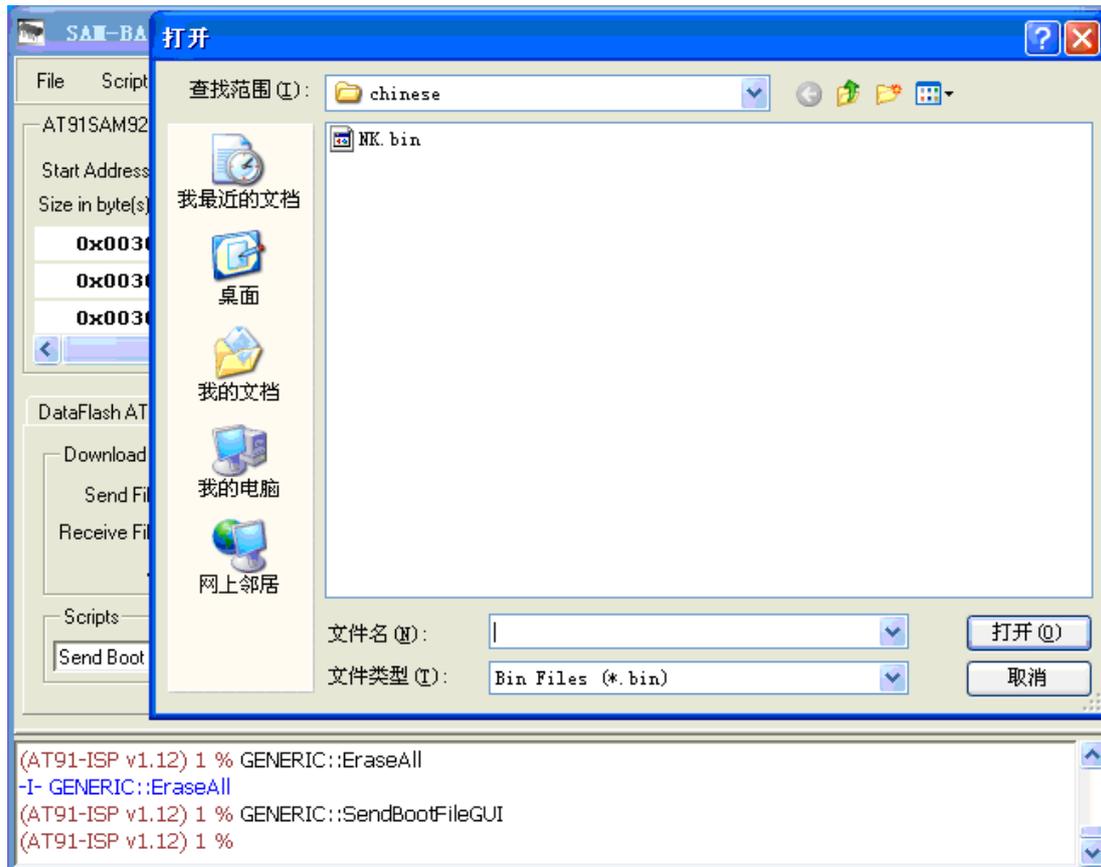
Figure 3.20

5. As shown in Figure 3.21, select <u>FIRSTBOOT_NAND.nb0</u> file under the path <u>\03 WinCE 6.0 Kit\00 Image\</u> in SBC6300X CD in the <u>open file</u> dialog box of SAM-BA v2.8, then click <u>Open</u> button in <u>open file</u> dialog box of SAM-BA v2.8, <u>SAM-BA v2.8</u> will automatically start burning <u>FIRSTBOOT_NAND.nb0</u> file to the beginning of 0x00000000 address of NAND flash on SBC6300X main board. After the burning is successful, the interface as shown in Figure 3.22 will appear<u>.</u>
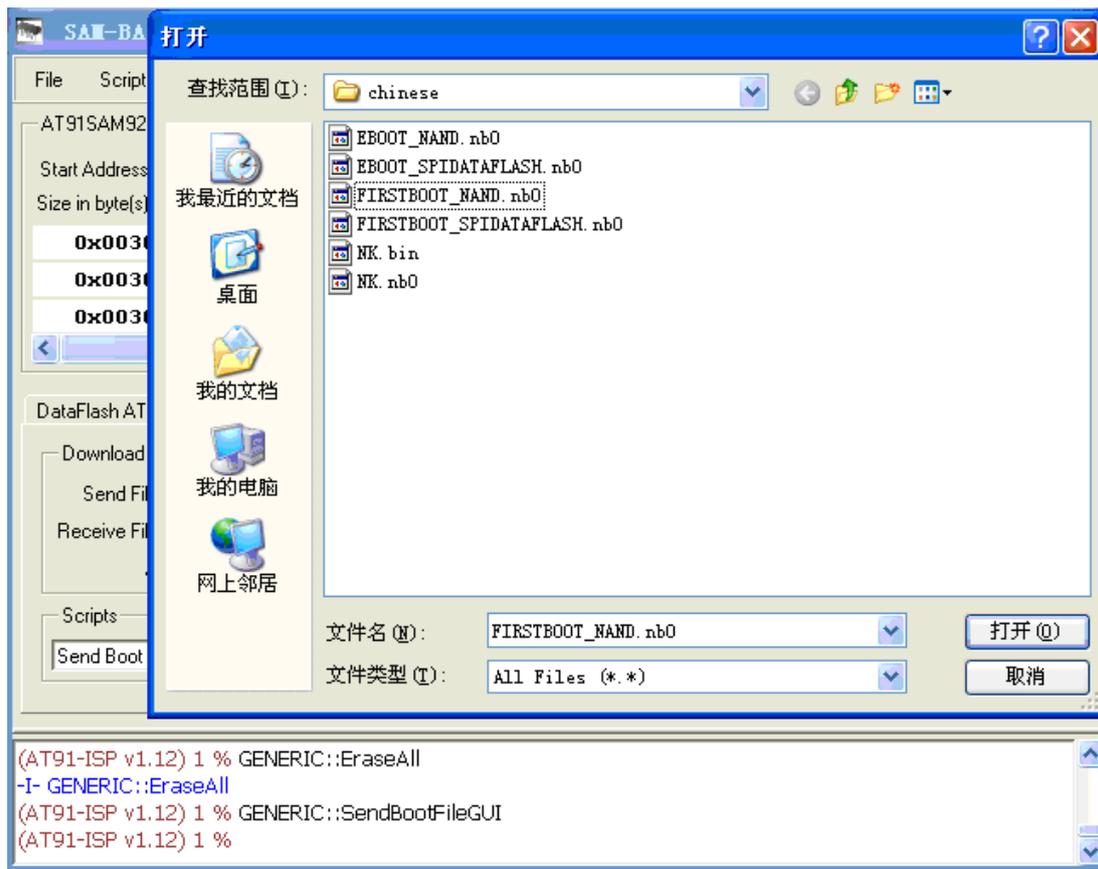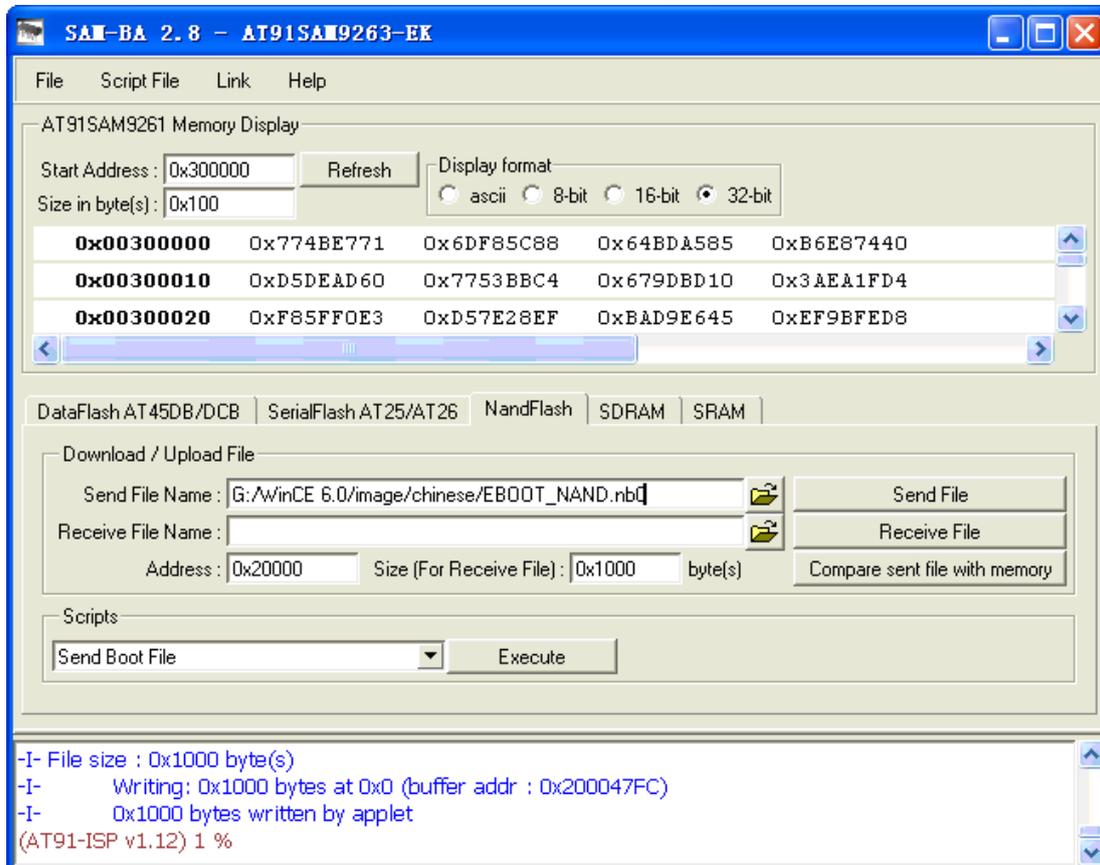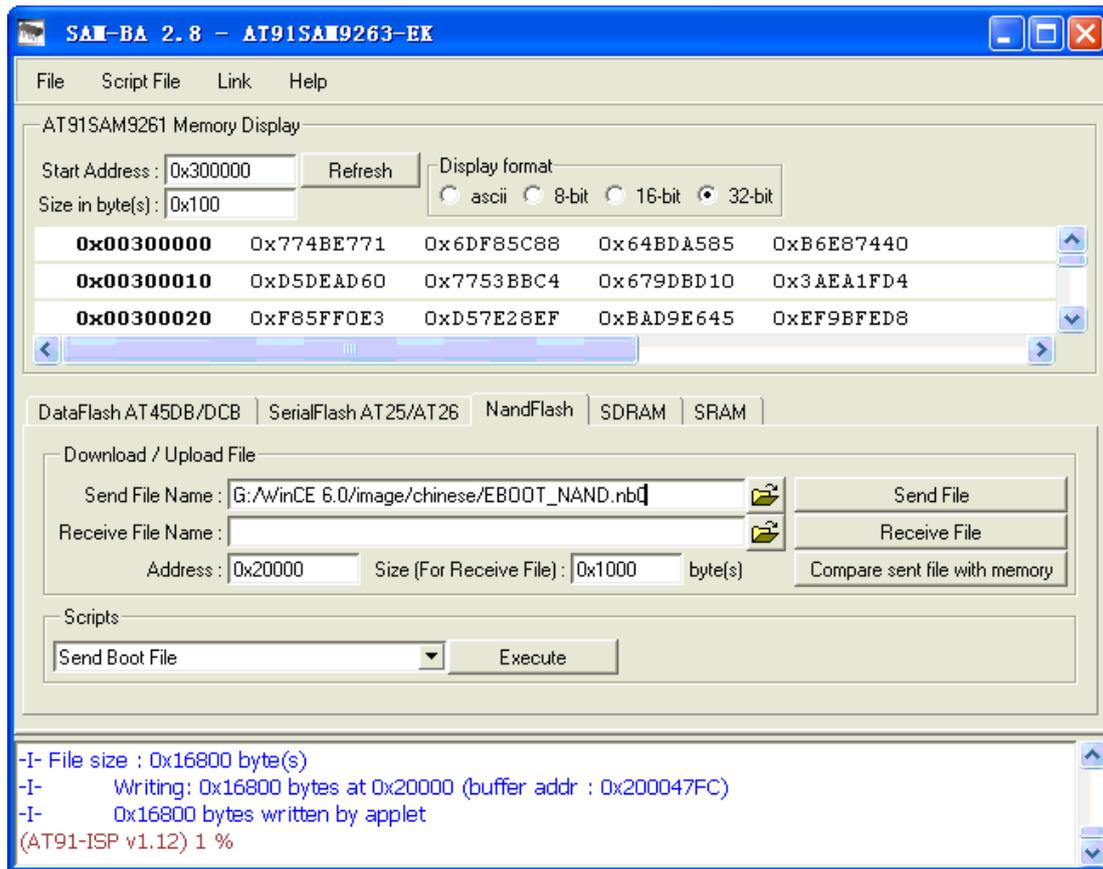
Figure 3.21
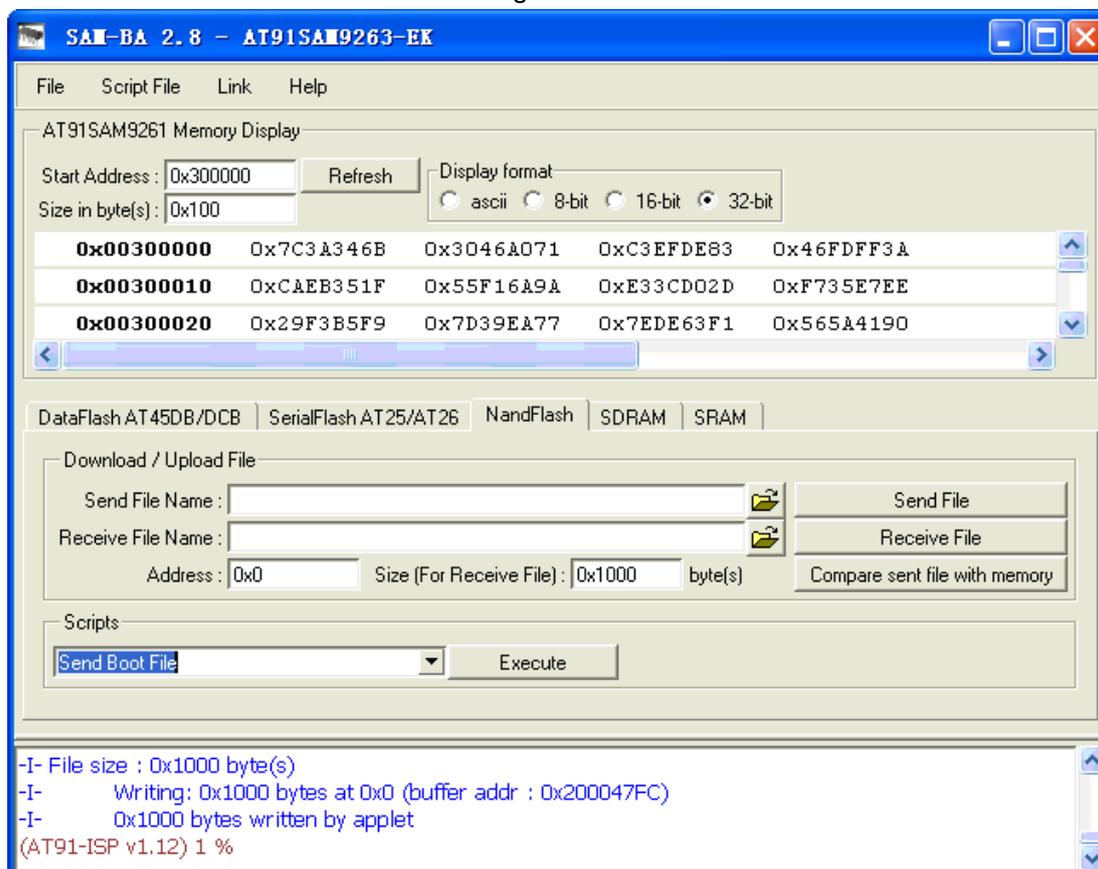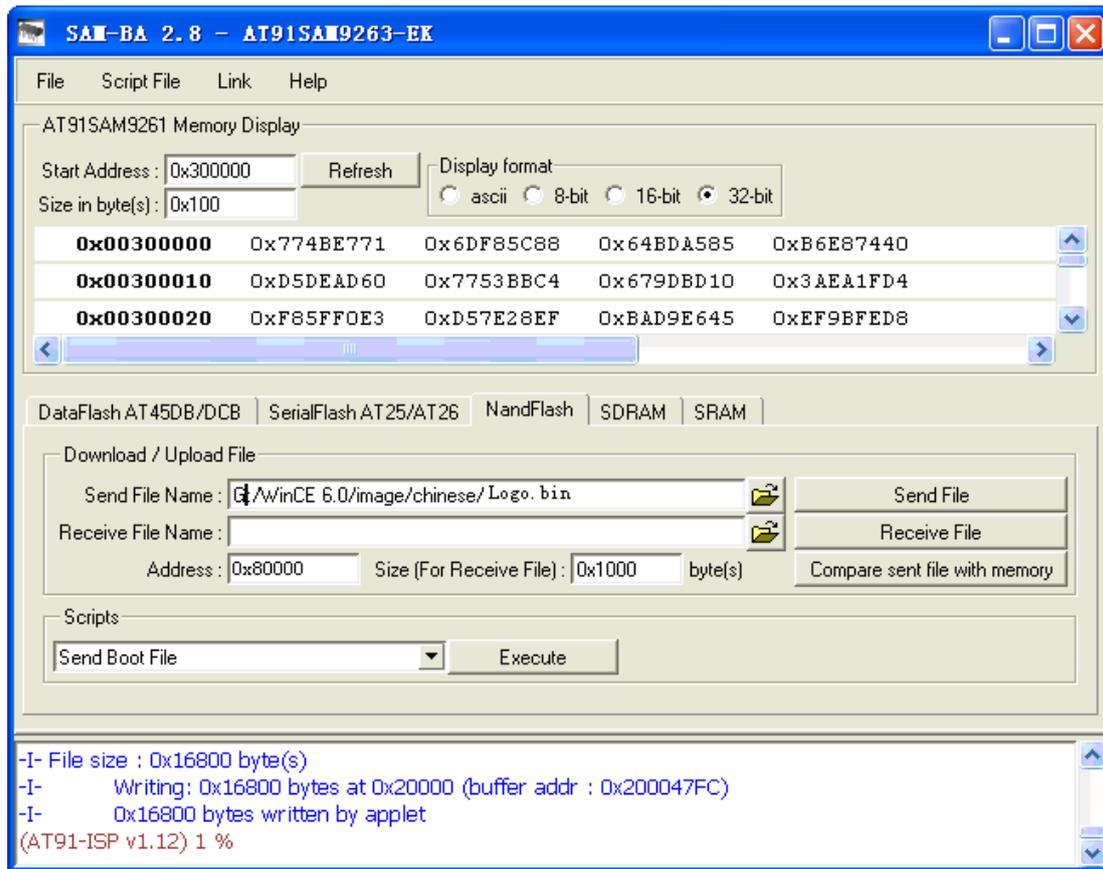

Figure 3.22

6. As shown in Figure 3.23, enter address <u>0x20000 </u>in the <u>Address: </u>field in <u>Download/Upload</u>

File of SAM-BA v2.8. Select SBC6300X CD \03 WinCE 6.0 Kit\00 Image \EBOOT_NAND.nb0 file in the text box Send File Name:, then click Send File button in Download/Upload File of SAM-BA v2.8, SAM-BA v2.8 will start burning EBOOT_NAND.nb0 file to the beginning of 0x20000 address of NAND flash on SBC6300X main board, After the burning is successful, the interface as shown in Figure 3.24 will appear.

Figure 3.23

Figure 24

7. As shown in Figure 3.25, enter address 0x80000 in the Address: field in Download/Upload File of SAM-BA v2.8. Select SBC6300X CD \03 WinCE 6.0 Kit\00 Image \Logo.bin file in the text box Send File Name:, then click Send File button in Download/Upload File of SAM-BA v2.8, SAM-BA v2.8 will start burning Logo.bin file to the beginning of 0x80000 address of NAND flash on SBC6300X main board.

Figure 25

8. As shown in Figure 3.26, enter the address <u>0x00200000</u> in the <u>Address:</u> field in <u>Download/Upload File</u> of SAM-BA v2.8, select SBC6300X CD <u>\03 WinCE 6.0 Kit\00 Image</u> <u>\NK.nb0</u> file in the text box <u>Send File Name:</u>, then click <u>Send File</u> button in <u>Download/Upload File</u> of <u>SAM-BA v2.8</u>, <u>SAM-BA v2.8</u> will start burning <u>NK.nb0</u> file to the beginning of <u>0x00200000</u> address of NAND flash on SBC6300X main board. After the burning is successful, the interface as shown in Figure 3.27 will appear<u>.</u>: (it takes 3-10 minutes to burn NK.nb0 file.) .
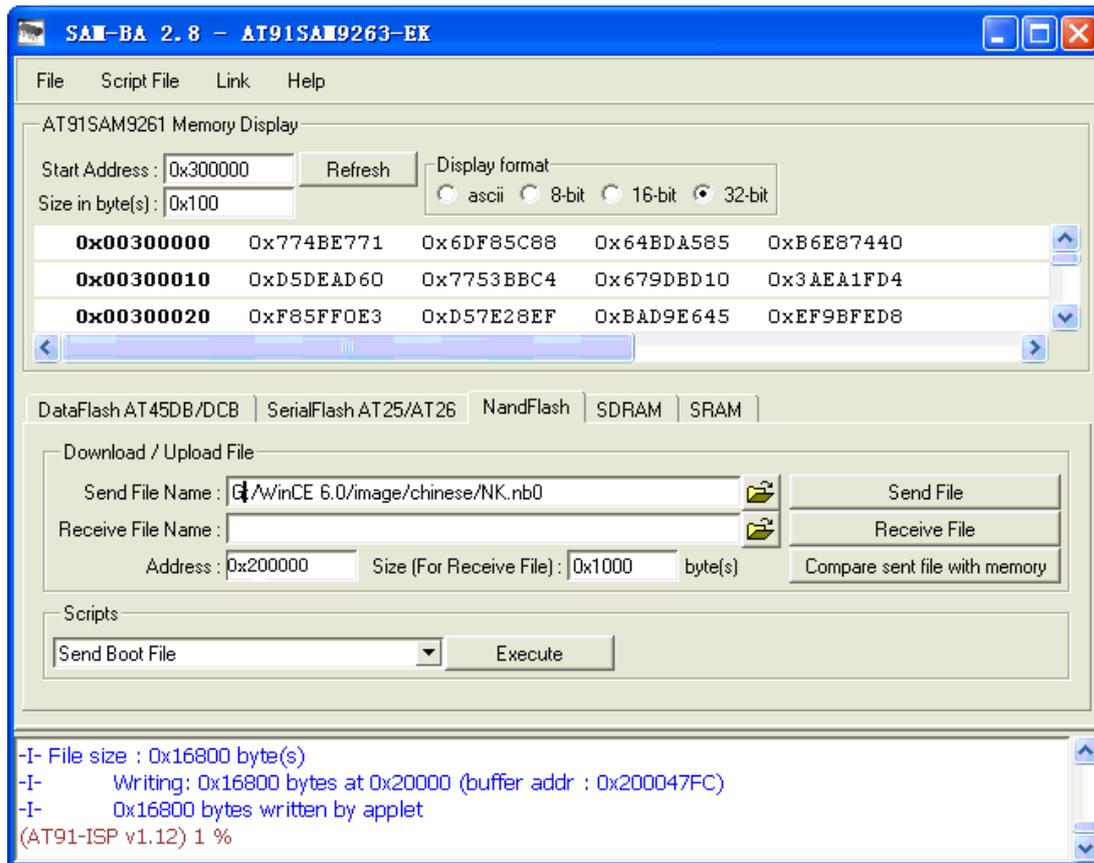
Figure 3.26
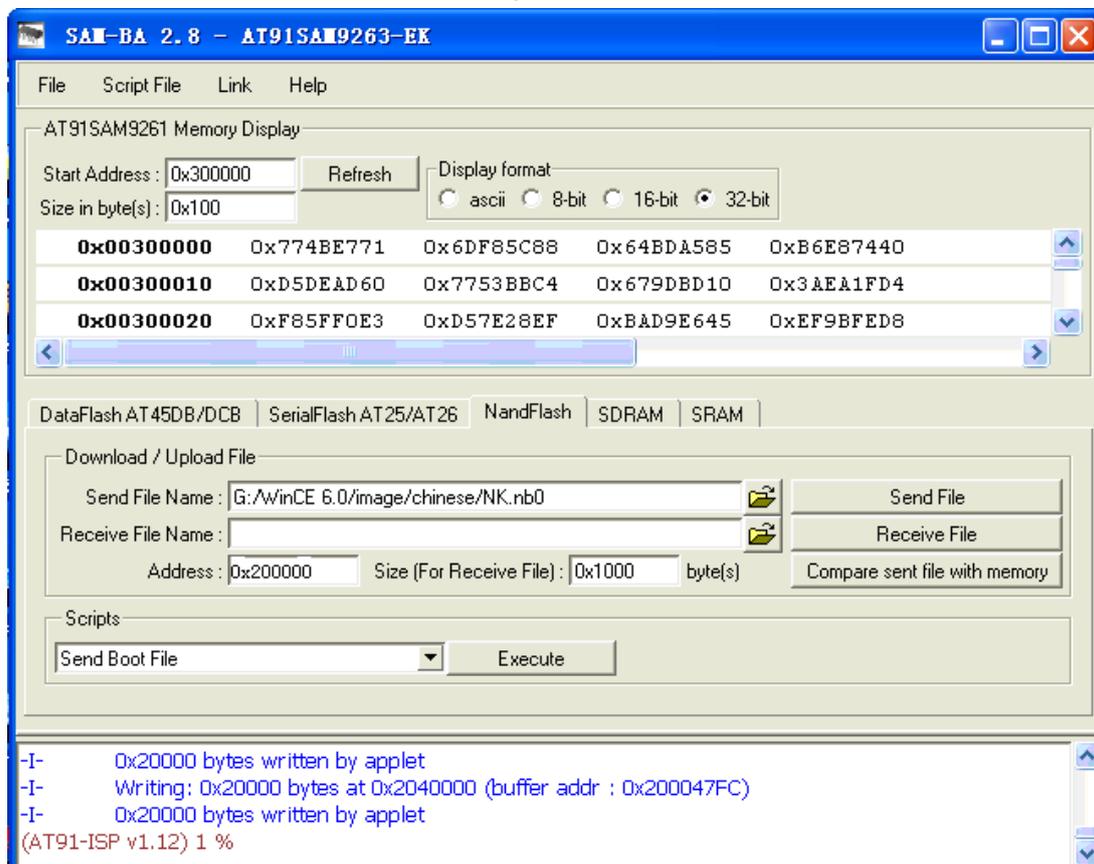
Figure 3.27

Chapter IV. Boot WinCE 6.0 system

4.1 Boot WinCE system

1. select to boot from NAND flash then burn WinCE 6.0 system image files.
2. Make the power SWITCH be ON state, WinCE system will be booted. Enter WinCE 6.0 system, TFTLCD will first display <u>calibration touch screen</u> as shown in Figure 4.1.
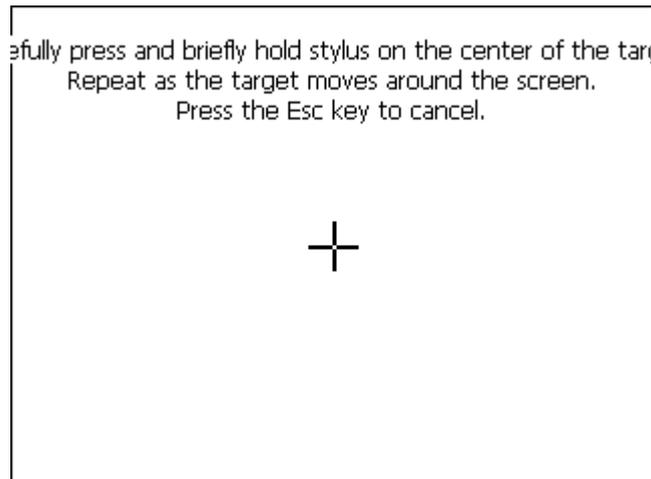
Figure 4.1

Chapter V. Customization of WinCE system based on SBC6300X WinCE 6.0 BSP

Notes:

To develop Windows Embedded CE 6.0 operating system using SBC6300X BSP, you need setup Windows Embedded CE 6.0development workstation.

This Manual specifies that Windows Embedded CE 6.0 development workstation software is to be installed in Driver F, that is to say, the installation path for Windows Embedded CE 6.0 is [F:\WINCE600].

5.1 Installation of SBC6300X WinCE 6.0 BSP

Unzip SBC6300X CD \03 WinCE 6.0 Kit\01 BSP \SBC6300X.rar to F:\WINCE600\PLATFORM of development workstation. Unzip SBC6300X CD \03 WinCE 6.0 Kit\01 BSP \ATMEL.rar to F:\WINCE600\PLATFORM\COMMON\SRC\SOC of development workstation, then the installation of SBC6300X WinCE 6.0BSP is finished.

5.2 The compilation of WinCE system based on SBC6300X WinCE 6.0 BSP

Here we will not describe how to customize a WinCE project based a BSP in VS2005 WinCE 6.0 development environment, user can directly copy SBC6300X CD \03 WinCE 6.0 Kit\02 Project \SBC6300X.rar file to the directory F:\WINCE600\OSDesigns\ of development workstation, and unzip this file under the same directory. User can directly open the project file SBC6300X.sln [under F:\WINCE600\OSDesigns\SBC6300X folder], then you can select [Build-> Build Solution] in VS2005 to start compiling the customized WinCE system.

5.3 The compilation of WinCE system based on SBC6300X WinCE 6.0 BSP

This section will describe the steps on how to customize WinCE 6.0 in SBC6300X BSP:

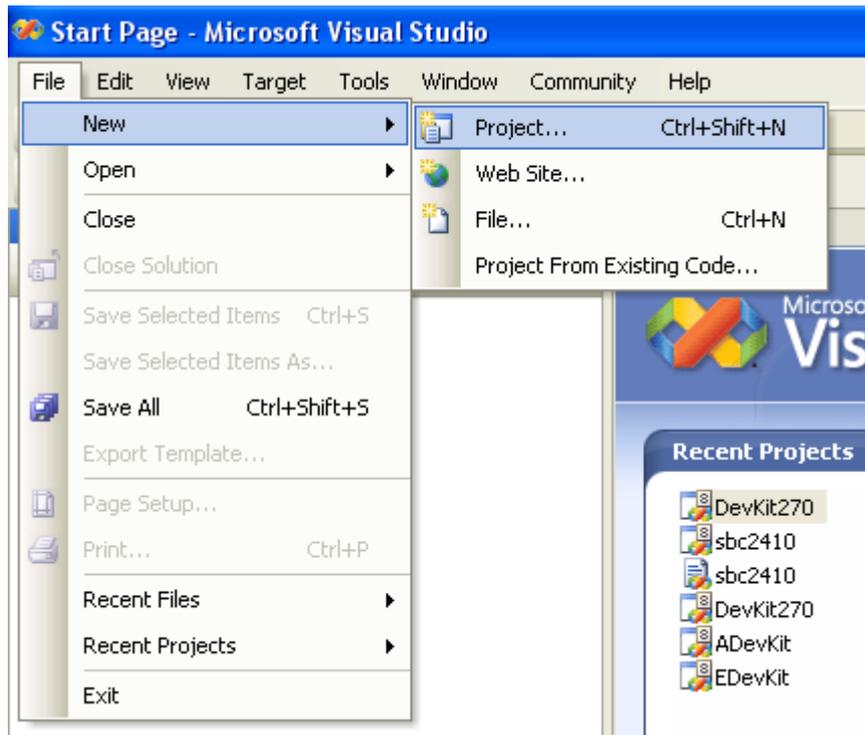1. Open Visual Studio 2005, click File->New->Project, see Figure 6.1 below:

Figure 6.1

2. Select Platform Builder for CE 6.0 from Other project types in New Project wizard, enter SBC6300X in name:, see Figure 6.2:
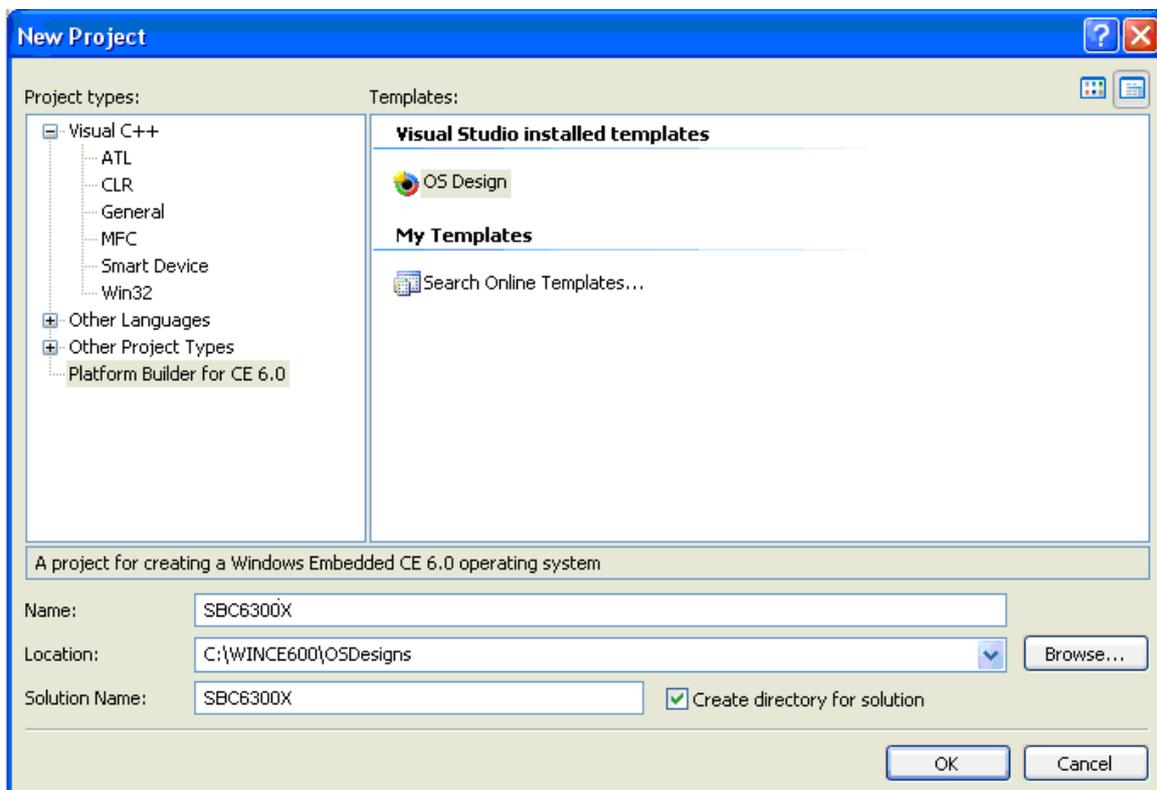

Figure 6.2

3. Click OK button as shown in Figure 6.2, the system will next step of Windows Embedded CE 6.0 OS Design Wizard, see Figure 6.3:
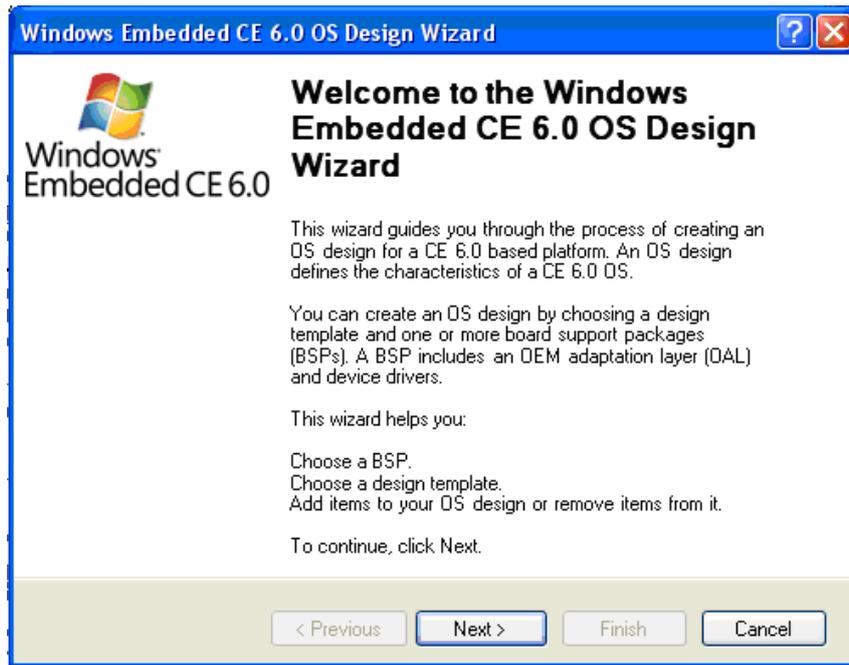
Figure 6.3

4.   Click <u>Next</u> button in <u>Windows Embedded CE 6.0 OS Design Wizard</u> as shown in Figure 6.3, select <u>SBC6300X:ARMV4I</u> in <u>Board Support Packages (BSPs)</u> as shown in Figure 6.4:
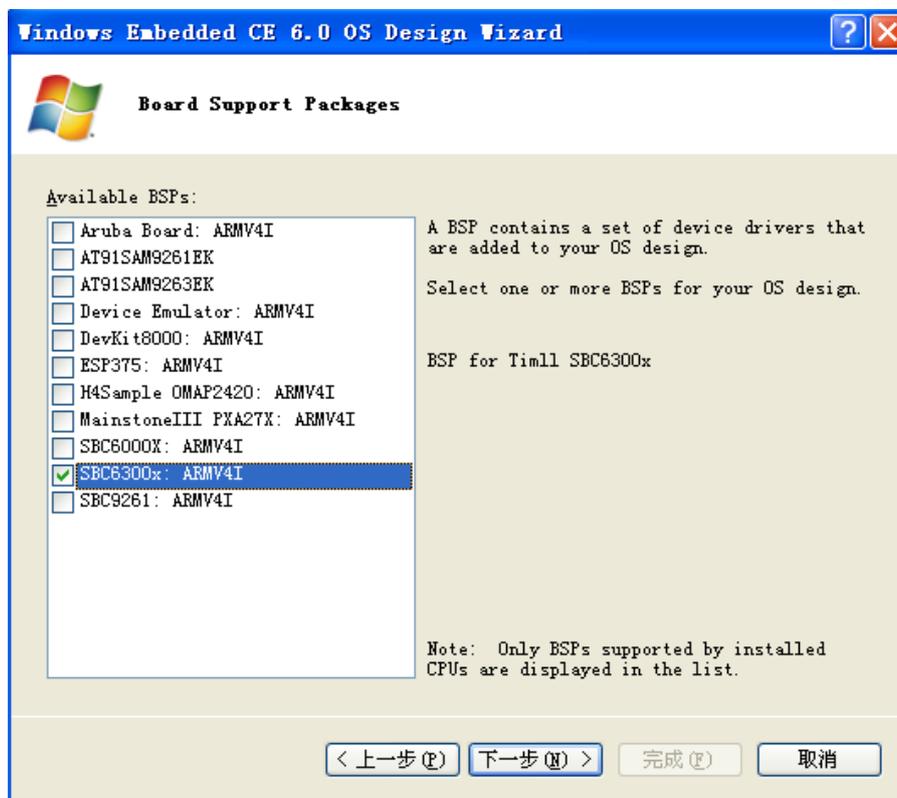

Figure 6.4

5.   Click <u>Next</u> button as shown in Figure 6.4, select <u>PDA Device</u> in newly opened <u>Design Templates->Available design templates</u>, see Figure 6.5:
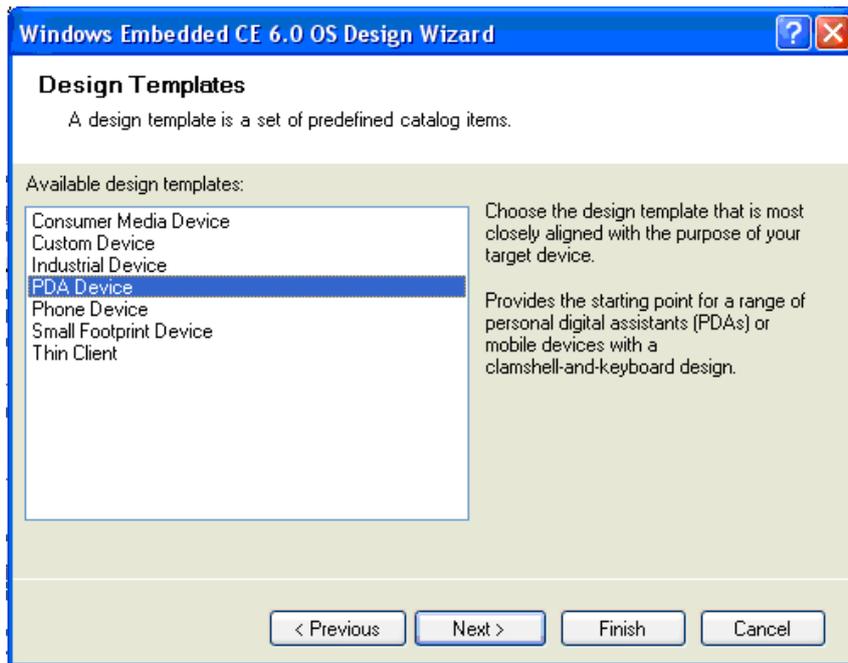
Figure 6.5

6. Click <u>Next</u> as shown in Figure 6.5, select <u>Mobile Handled</u> in newly opened <u>Design Template Variants->Variants</u>, see Figure 6.6:
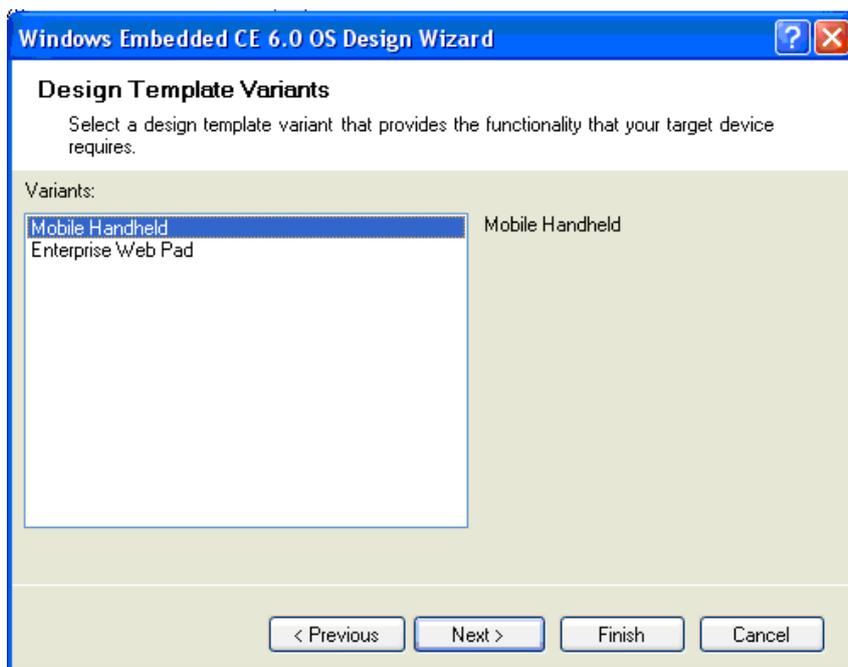
Figure 6.6

7. Click <u>Next</u> button as shown in Figure 6.6 to open <u>Applications & Media</u> window, add <u>Internet Browser->Internet Explorer 6.0</u> and <u>WordPad</u> in existing default options, see Figure 6.7:
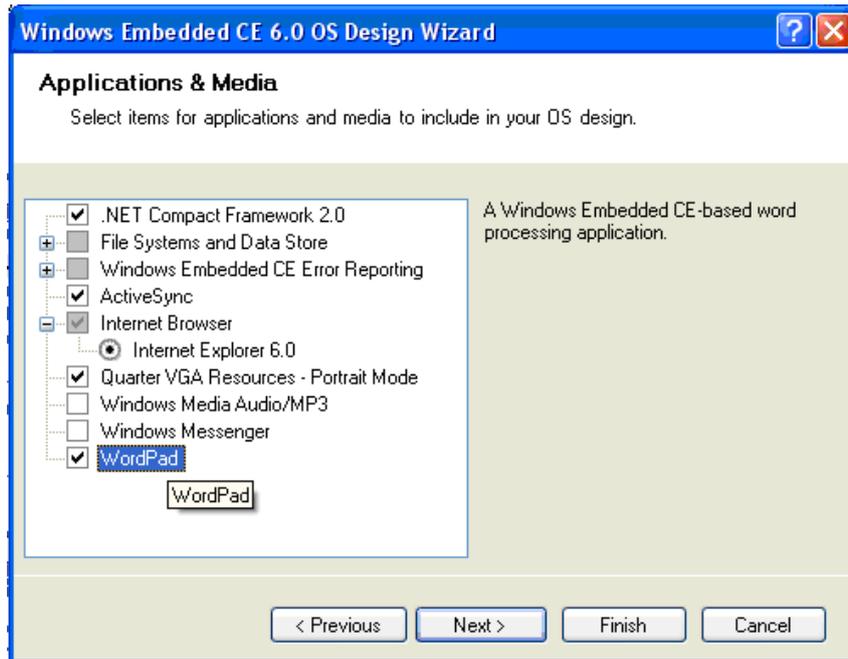
Figure 6.7

8. Click <u>Next</u> button as shown in Figure 6.7 to open <u>Networking & Communications</u>, remove <u>Personal Area Network(PAN)->Bluetooth</u> and <u>Personal Area Network(PAN)->IraDA</u> from in existing default options, see Figure 6.8:

Figure 6.8

9. Click <u>Next</u> button as shown in Figure 6.8, Click <u>finish</u> in newly opened <u>OS Design Project Wizard Complete</u>, see Figure 6.9:
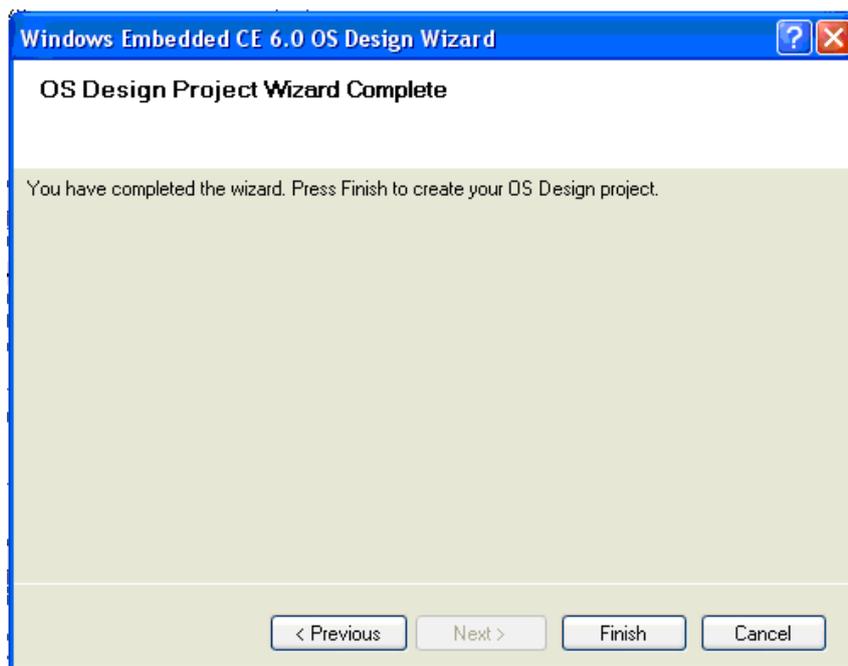
Figure 6.9

10. Click Acknowledge in the interface as shown in Figure 6.10 to finish the initial customization of WinCE 6.0 OS.
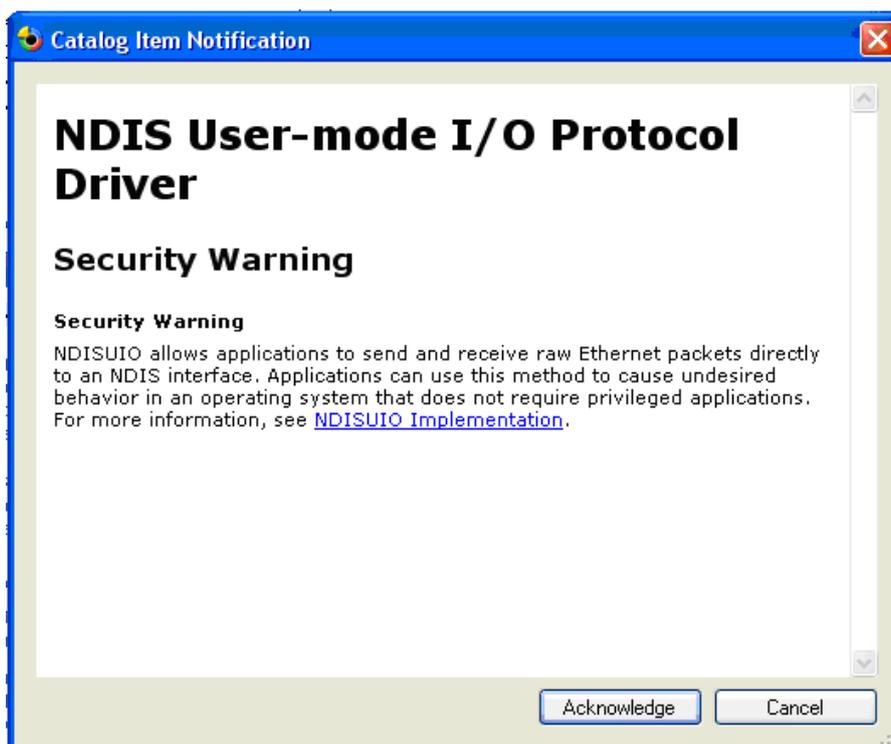
Figure 6.10

11. Tick the following options under View->other windows->Catalog Items View->SBC6300X->Core OS->CEBASE->Core OS Services->USB HOST Support in Catalog Items View of VS2005.

USB Function Driver
USB Host Support
USB Human Input Device (HID) Class Driver->USB HID Keyborad and Mouse
USB Storage Class Driver

See Figure 6.11.
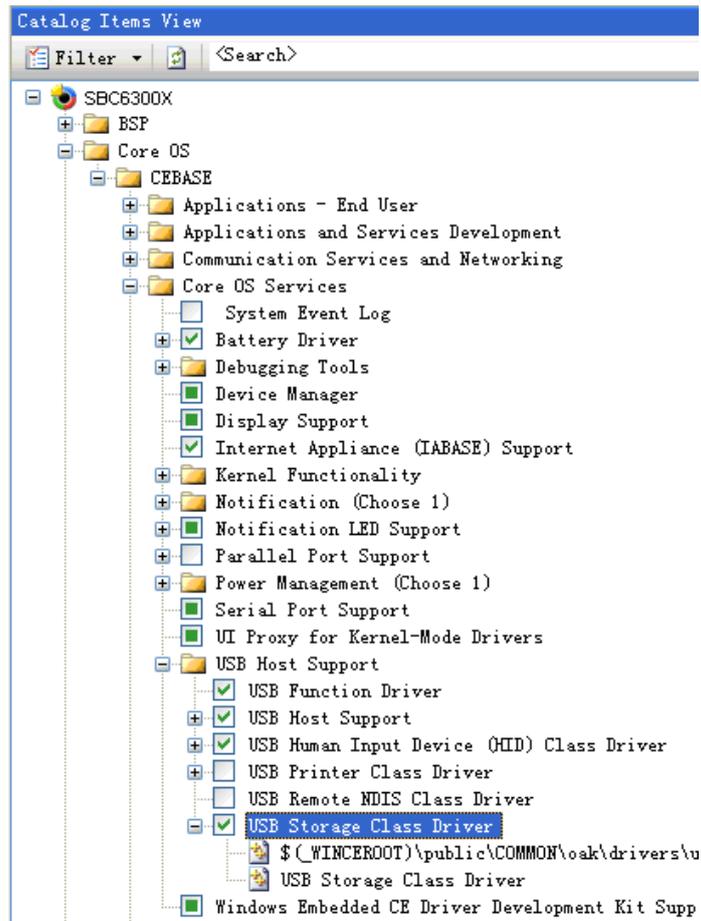
Figure 6.11

12. Add the following options following the steps of <u>add USB relevant modules</u> as described above:

> Core OS->CEBASE -> Communication Services and Networking->Networking-General->Domain Discovery
>
> Core OS->CEBASE -> Communication Services and Networking->Networking-General->Extended DNS Querying and Update(DNSAPI)

Here we remove the remove the existing default option below:

> Core OS->CEBASE -> Communication Services and Networking ->Networking-General->TCP/IPv6 Support

Continue to add the following options:

> Core OS->CEBASE->File Systems and Data Store->Storage Manager->Storage Manager Control Panel Applet
>
> Core OS->CEBASE->International->Locale Specific Support-> Chinese   (Simplified)->Fonts->SimSun&NsimSun(Choose 1)->SimSun&NsimSun
>
> Core OS->CEBASE->International->Locale Specific Support-> Chinese   (Simplified)->GB1803030 Data Converter-
>
> Core OS->CEBASE->International->Locale Specific Support-> Chinese   (Simplified) -> Monotype Imaging AC3 Font Compression
>
> Device Drivers->SDIO->SDIO Host->SDIO Standard Host Controller
>
> Device Drivers->SDIO->SDIO Memory->SD   Memory

Device Drivers->USB Function->USB Function Clients->Mass Storage
Device Drivers->USB Function->USB Function Clients->serial

13. Set compilation type as <u>SBC6300X ARMV4I Release</u>, see Figure 6.12:
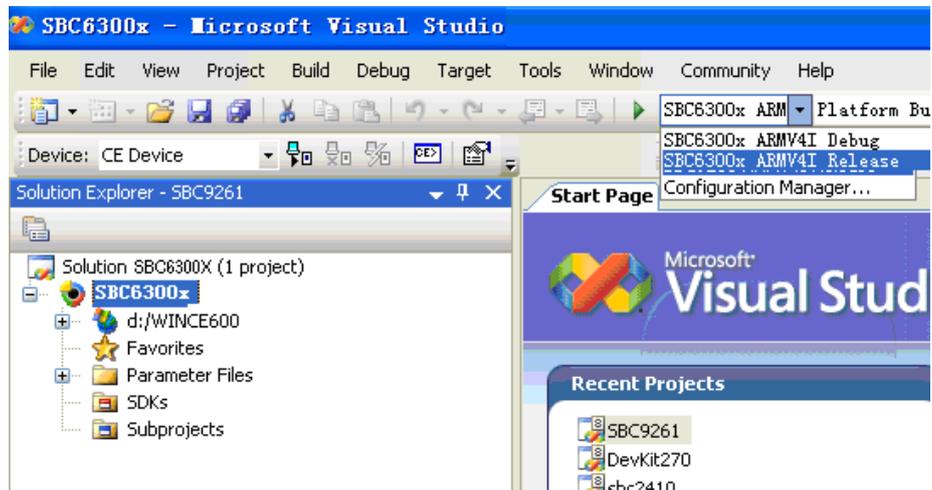

Figure 6.12

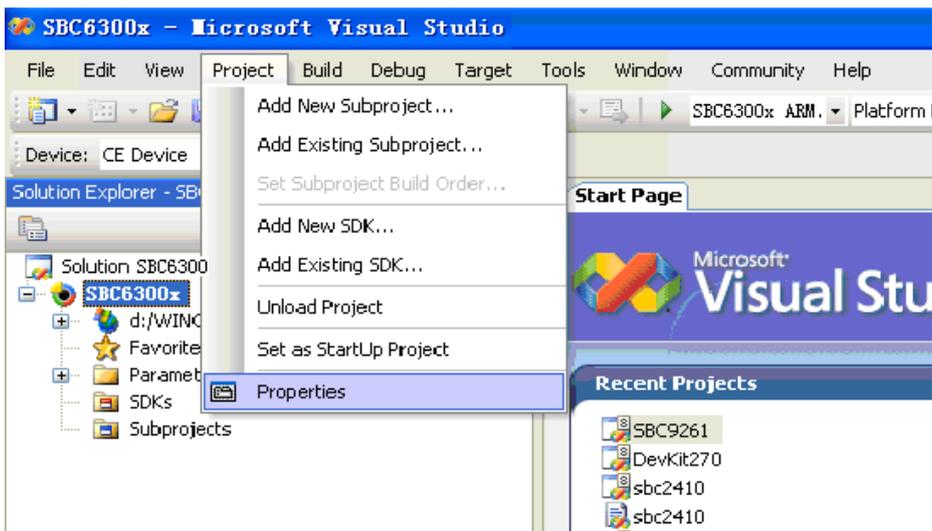14. Click <u>Project</u>-><u>properties</u> in VS2005 , see Figure 6.13:

Figure 6.13

15. Tick <u>Enable eboot space in memory(IMAGE=1)</u> in Build Options, as shown in Figure 6.14, click <u>OK</u> to finish the settings of compilation.
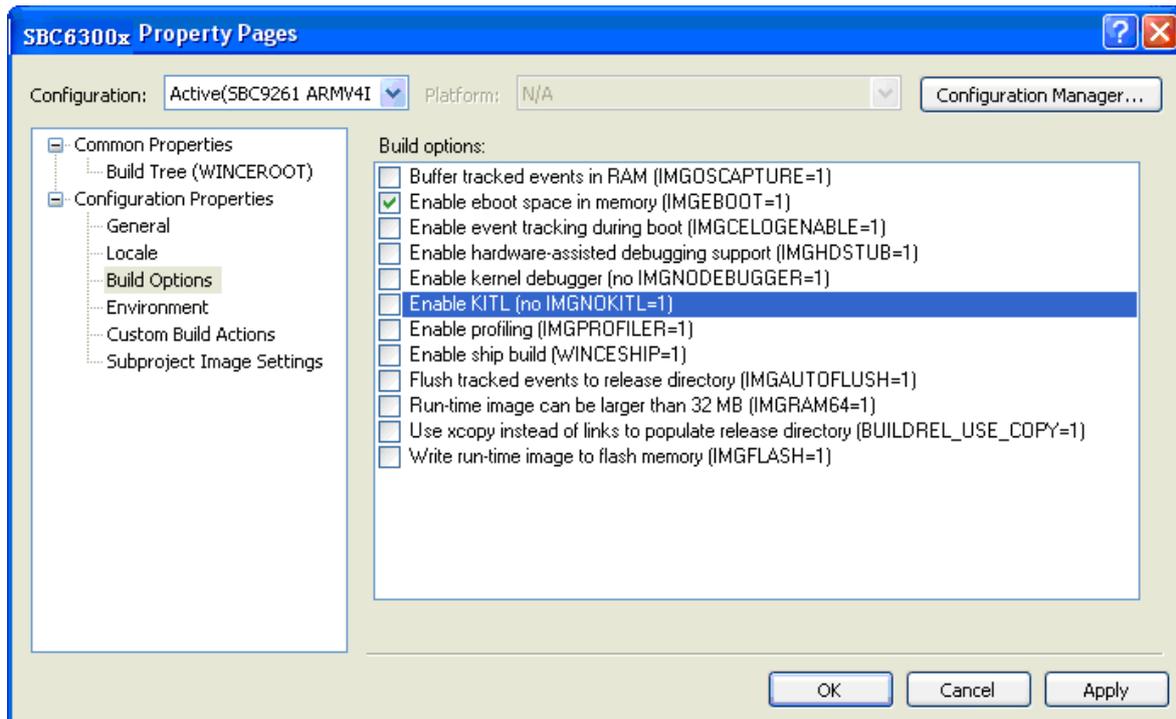
Figure 6.14

16. As shown in Figure 6.15, tick the driver of the module you need SBC6300X main board, in View->Other window->Catalog Items View->SBC6300X->Third Party->SBC6300X:ARMV4I in VS2005. (For details of each driver module please refer to Section 6.5) .
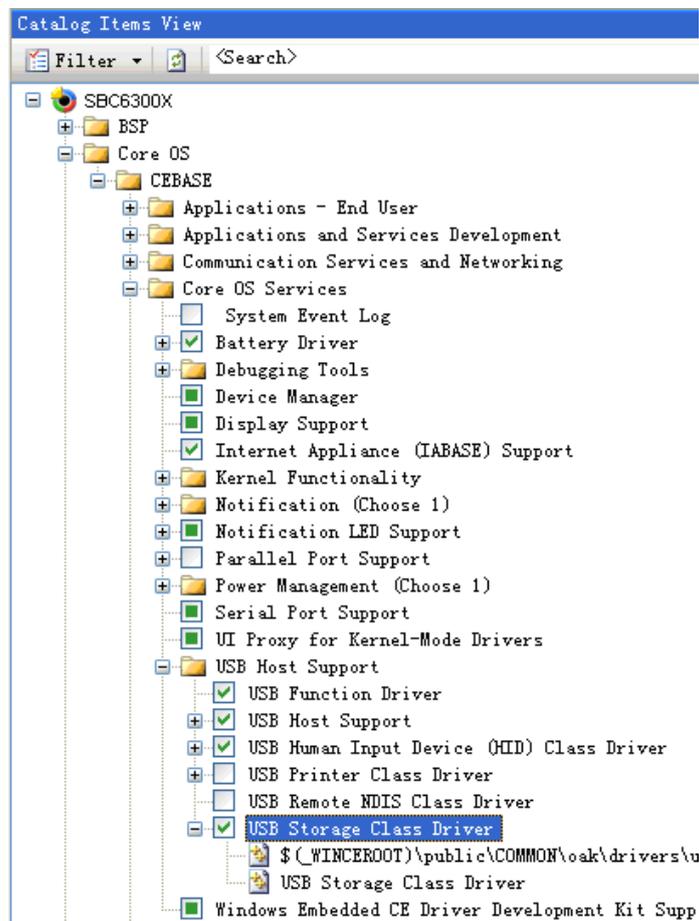
Figure 6.15

17. As shown in Figure 6.16, click Build->Advanced Build Commands->Sysgen of VS2005 to start compiling:
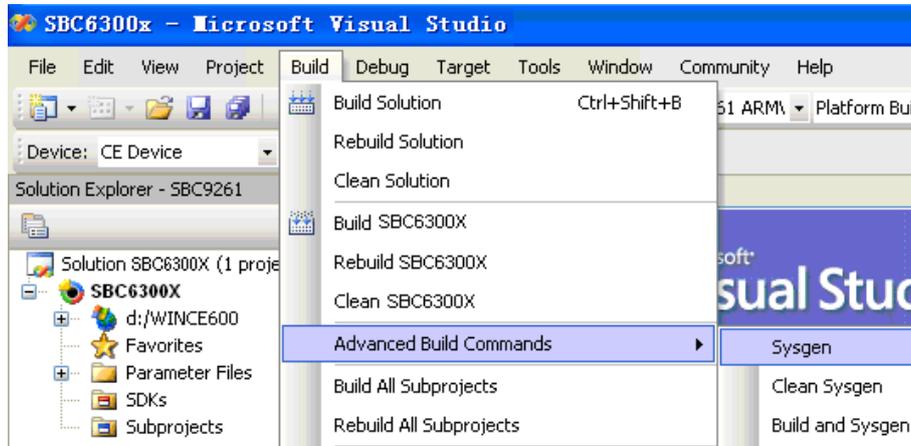
Figure 6.16

18. As the compilation may take a long time (depends on the hardware configurations of development workstation), please wait. After the system compilation is successful, VS2005 will export the following information as shown in Figure 6.17:
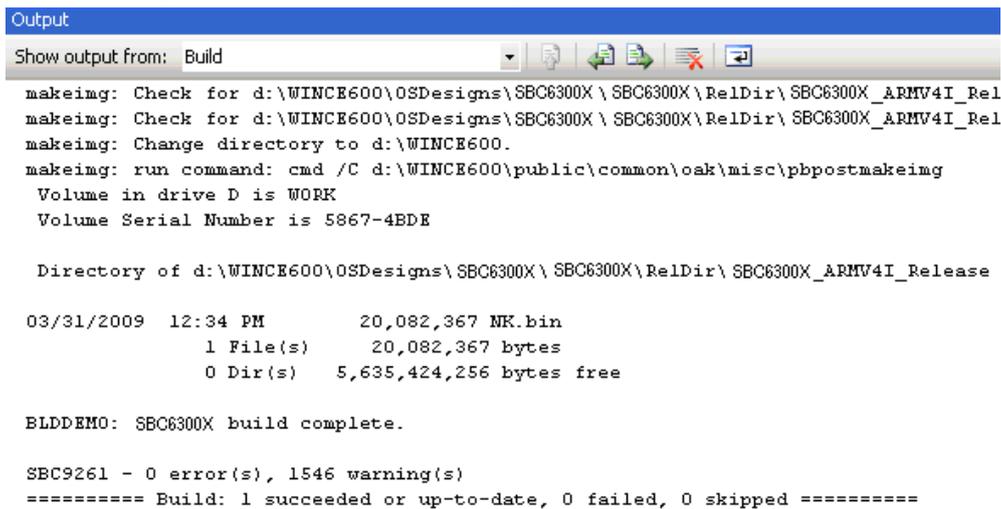
Figure 6.17

19. The moment 6 WinCE 6.0 image files, i.e.: FIRSTBOOT.nb0, EBOOT.nb0, NK.nb0, FIRSTBOOT.bin, EBOOT.bin, NK.bin, will be generated under F:\WINCE600\OSDesigns\SBC6300X\SBC6300X\RelDir\SBC6300X_ARMV4I_Releas\folder.

5.4 Modules of SBC6300X WinCE 6.0 BSP driver

After SBC6300X WinCE 6.0 BSP is installed and the project based on the BSP is initially customized following the instructions of Section 6.4, click View->Other window->Catalog Items View->SBC6300X->Third Party->SBC6300X:ARMV4I in VS2005, you will see the modules of each driver module of SBC6300X WinCE 6.0 BSP, you can choose them on your demand. The table below will describe the functions of each module in details.

Module	Functions	Remarks

ADC ☑ ADC	ADC driver	ADC driver.
Audio ☑ Audio Driver	AC97 driver	AC97 driver.
BSP_EXTUART ☑ BSP_EXTUART	SC16C554 serial chip driver	SC16C554 serial chip driver..
buzzer ☑ buzzer	Buzzer driver	Buzzer driver.
Display ▣ LCDC	Display driver	Display driver.
Ethernet ☑❗ Ethernet Driver	Emacb driver	Emacb driver.
GPIO ☑ GPIO driver	GPIO driver	GPIO driver.
I2C ☑ I2C (TWI) Driver	I2C driver	I2C driver.
I2C_EEPROM ☑ I2C EEPROM Driver	I2C EEPROM driver	I2C EEPROM driver.
IO ☑ IO	IO driver	IO driver.
Keypad ☐ Keypad	IO key driver	IO key driver.
Local Area Networking (LAN) devices ☐ Ethernet Driver	DM9000 driver	DM9000 driver
matrixkey ☑ matrixkey	6X6 matrix keyboard driver	6X6 matrix keyboard driver
PWM ☑ PWM Driver	PWM driver	PWM driver.
SDHC ☑ SD Host Controller Driver (Bottom Slot) ☑ SD Host Controller Driver (Top Slot)	SD card SDIO driver	SD card SDIO driver.
Serial ☑ Serial Driver	AT91SAM9263 serial driver	AT91SAM9263 serial driver
TFTLCD ◉ TFTLCD 320X240 ○ TFTLCD 480X272 ○ TFTLCD 640X480 ○ TFTLCD 800X480	TFTLCD driver	TFTLCD driver
Touchscreen ☑ Touchscreen	Touch screen driver	Touch screen driver.
USB Function USB Function Bus Drivers ☑ USB Function Driver	USB device driver	USB device driver.
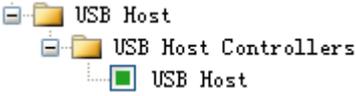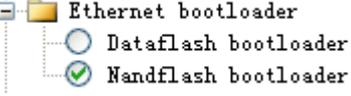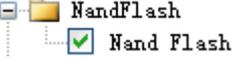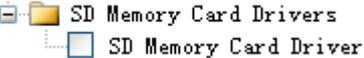
	USB host driver	USB host driver.
USB Host → USB Host Controllers → USB Host		
Ethernet bootloader → Dataflash bootloader → Nandflash bootloader	Bootloader	Bootloader
Saved Registry → Registry saved in NAND Flash (Hive)	Hive registry	Hive registry.
NandFlash → Nand Flash	NAND flash driver	NAND flash driver.
SD Memory Card Drivers → SD Memory Card Driver	SD card 4 cables SPI driver	SD card 4 cables SPI driver.Note: SD card SDIO driver and SD card 4 cables SPI driver can only be selected one.