
AT91SAM9G45-EVK MDK User Manual

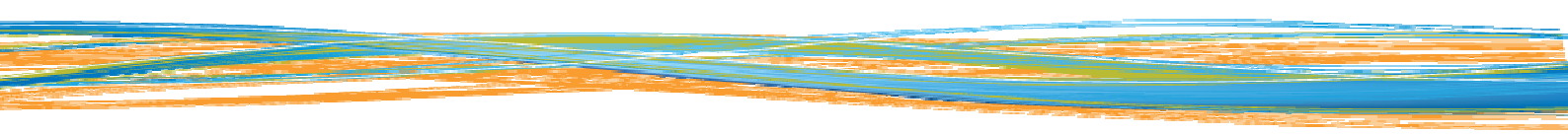


Revision History

| Rev | Date | Description |
|-----|------------|-----------------|
| 1.0 | 2011-05-24 | Initial version |

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Chapter 1 Configuring and compilation in MDK project

Initially install the keil RealView MDK (in 04-tools\Realview MDK 4.01 directory). Then open 04-MDK_Source\MDK4.01_Examples\01_audio directory, double click Audio.uvproj. You can set the project (NOTE: the project is set to OK in default, you can compile and download it directly. If you can't compile this project, you can check these settings.)

1) Choose Project/Options for Target Audio, open the dialog :

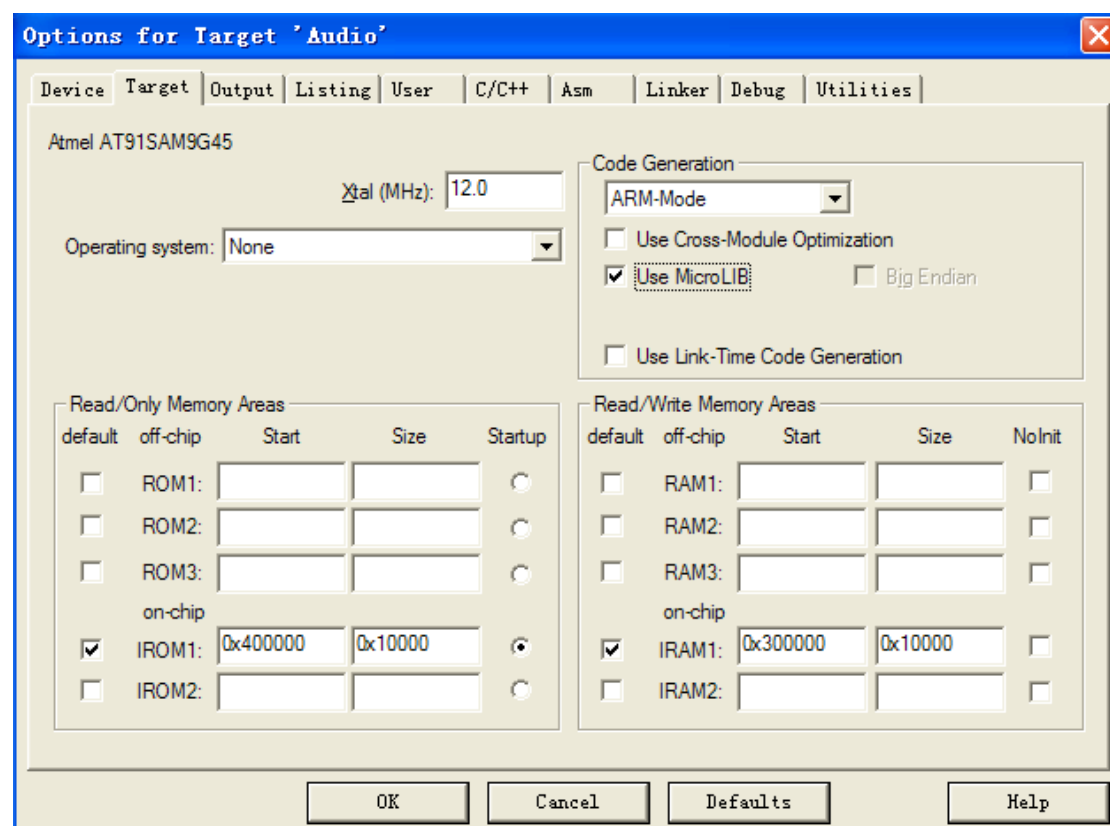


Figure 1-1 Target Tab

2) Click User tab in Figure 1-1, it is used to build .bin file, as follows:

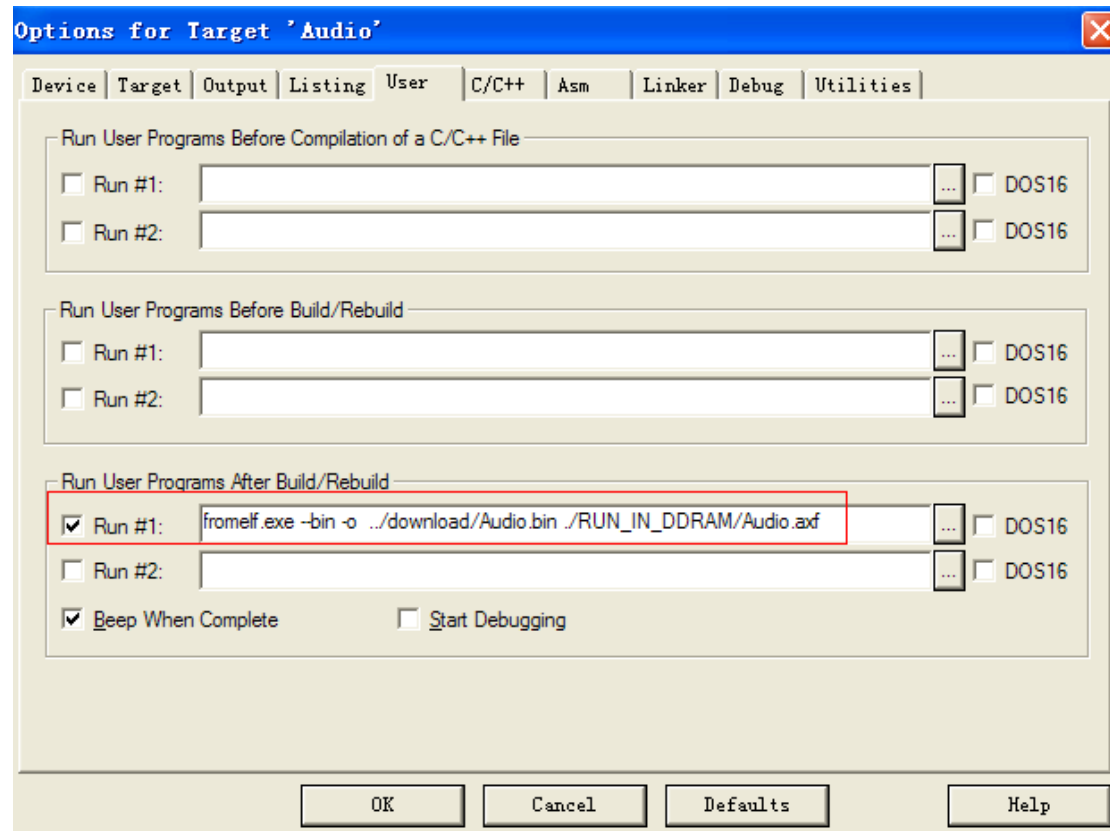


Figure 1-2 User Tab

3) Then click C/C++ tab as follows:

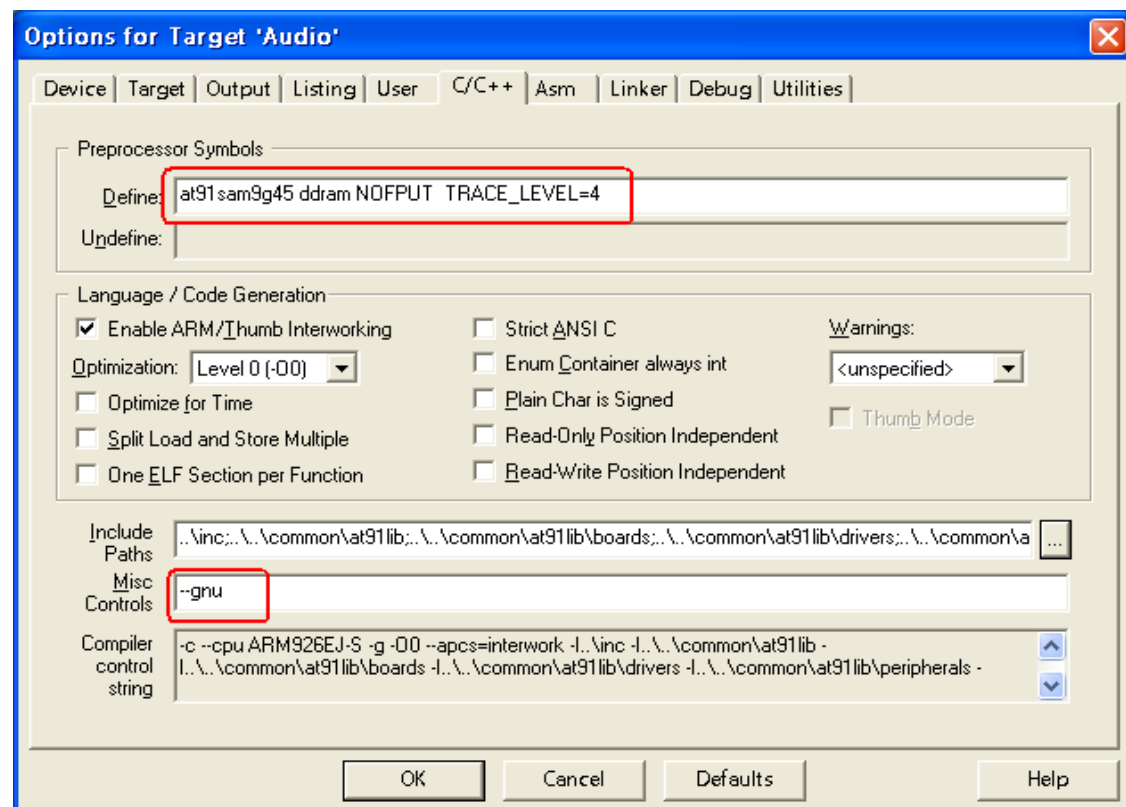


Figure 1-3 C/C++ Tab

4) Set Linker tab as follows:

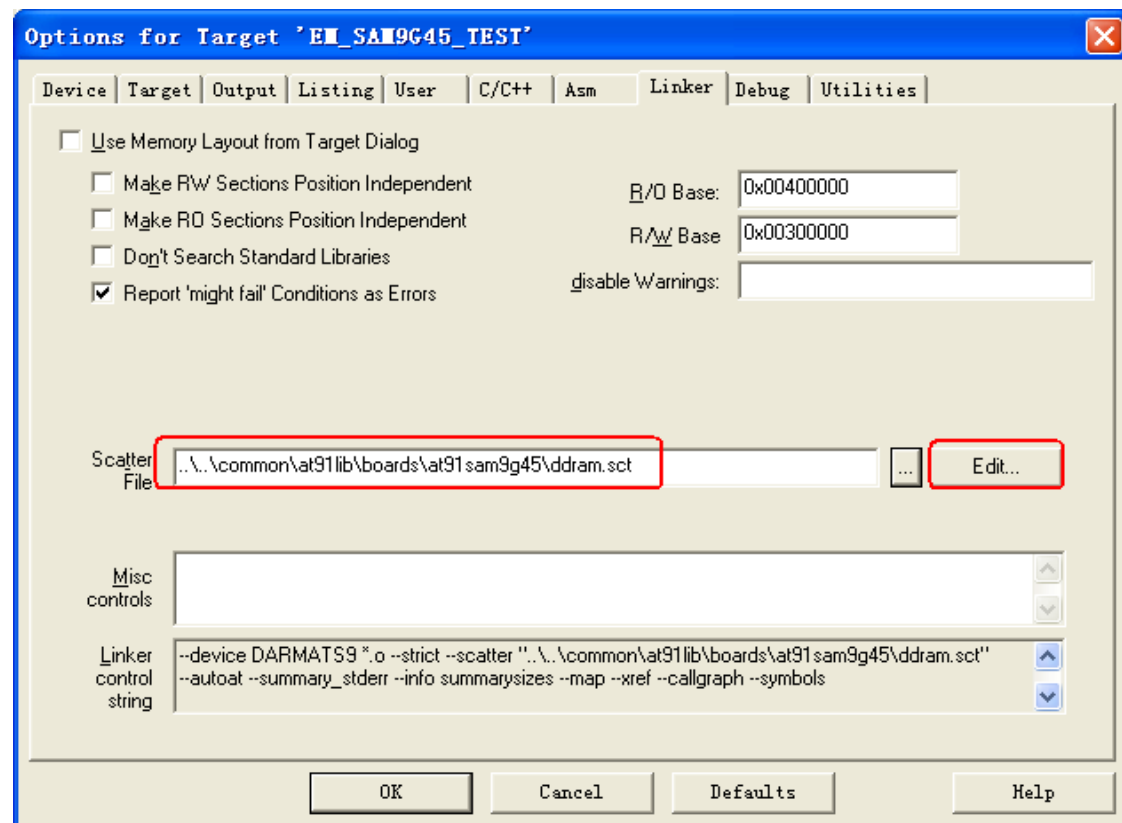
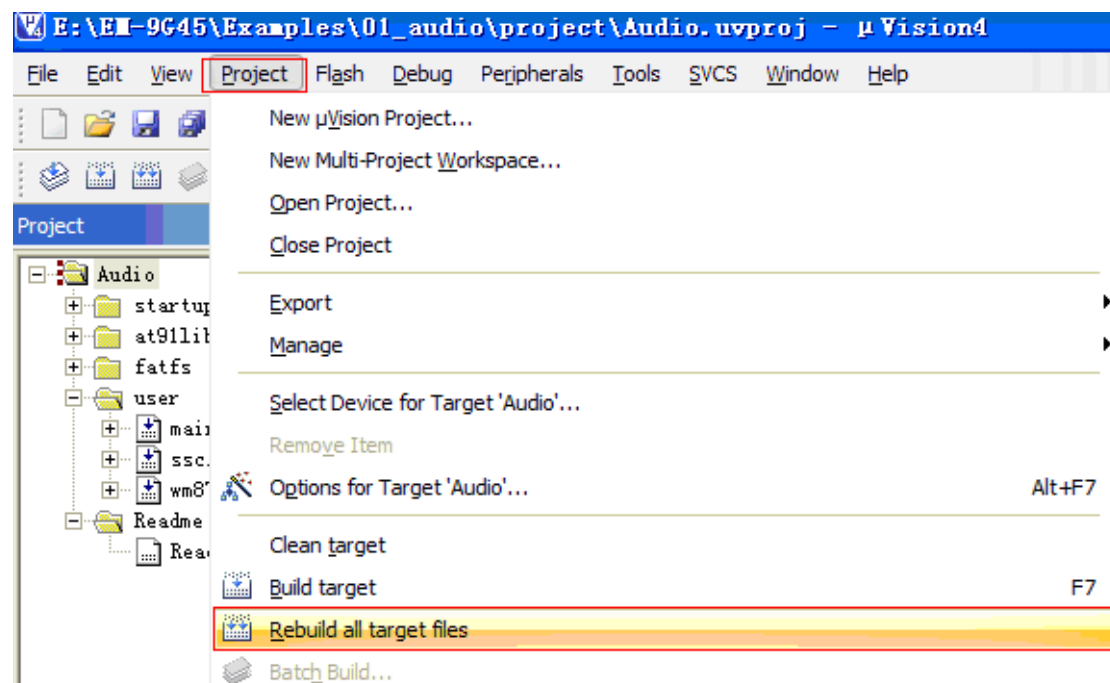


Figure 1-4 User Tab

5) Select project → rebuild all target files to compile the MDK project

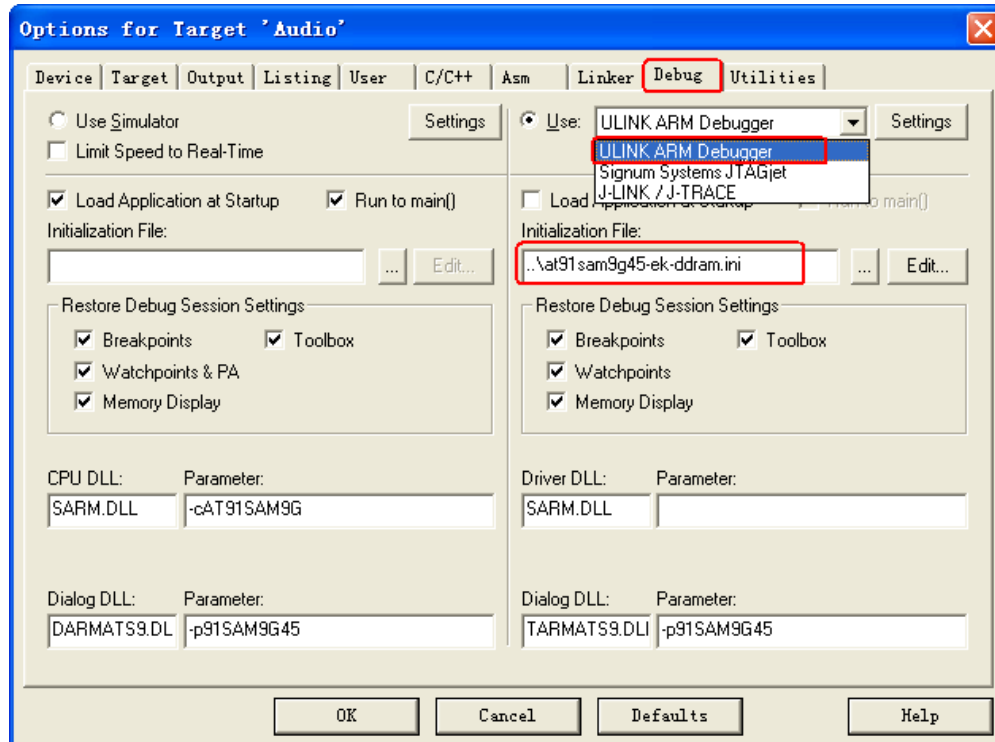


Chapter 2 Downloading of MDK project

2.1 Debug the routine using ULINK2

The precondition for the next step is that you already have bought or owned a corresponding hardware Emulator.

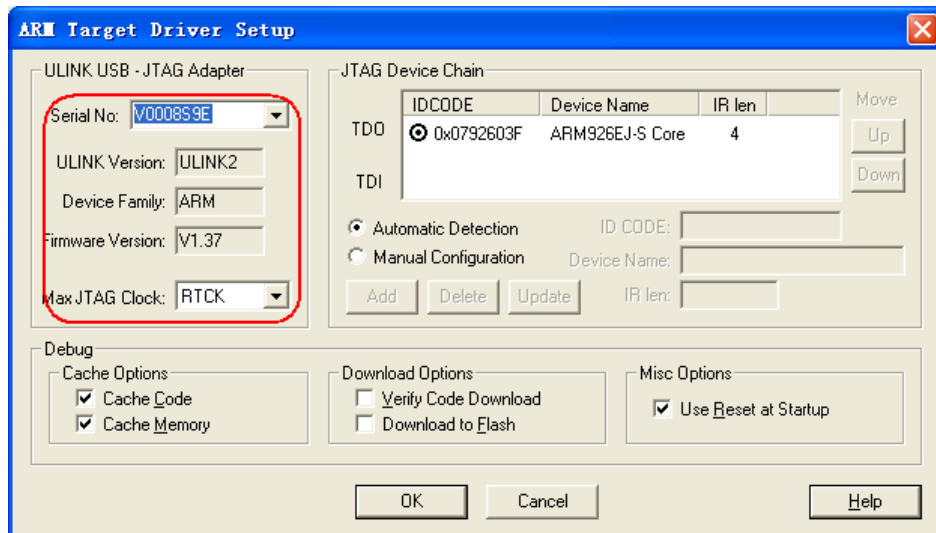
1) Choose Emulator and the initialization script.



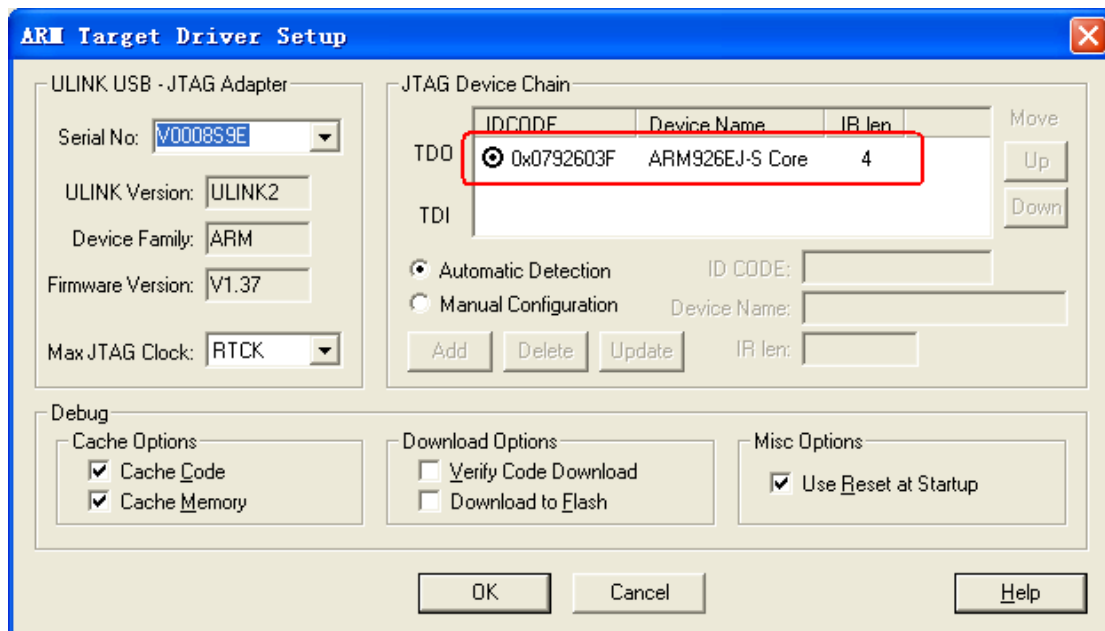
2) Check the ULINK2, optional.


When ULINK2 connects to the development board and if the RUN and COM indicator lights first change to blue and then go out with the USB indicator light has always been red, this indicates that ULINK2 has no problem.

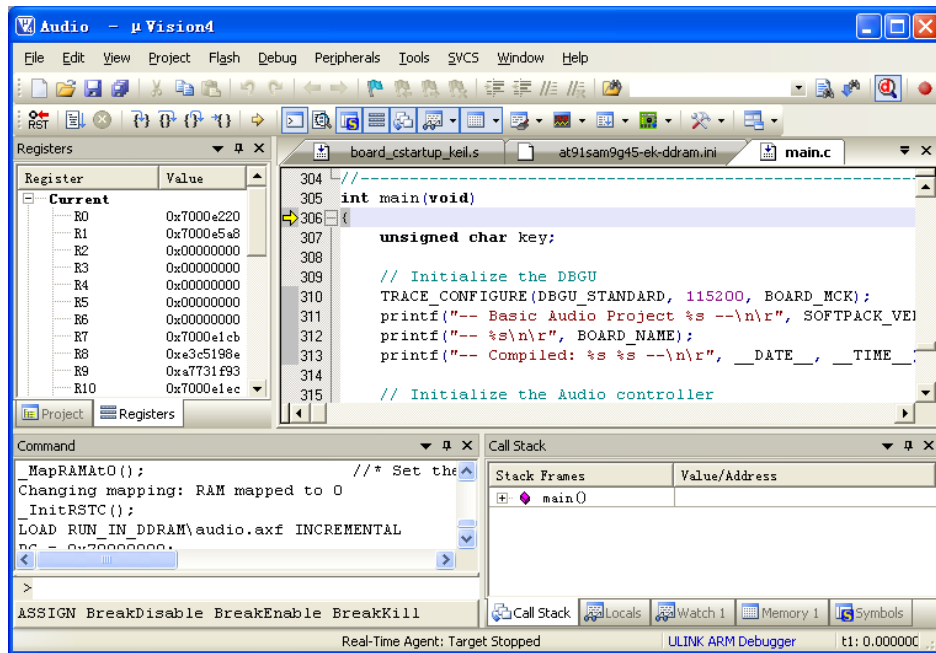
In addition, there is another way to check ULINK2. Click the Settings button in the Debug tab, if the red marked part appears, it signs that ULINK2 has no problem.



3) Check that whether ULINK2 can detect the development board or not which is optional. Click the Settings button in the Debug tab, if the red marked part appears, it proves that ULINK2 has detected the development board.



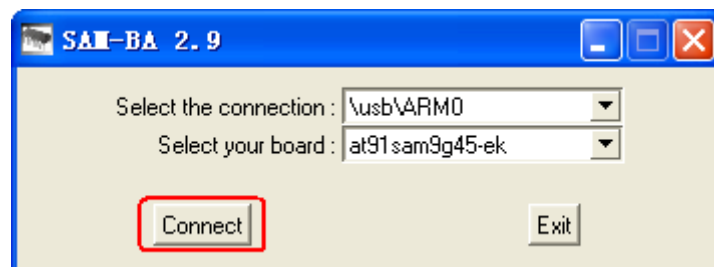
4) Start to Debug the routine by clicking shortcut button  or clicking Debug->Start/Stop Debug Session, the status of the debug as follows:



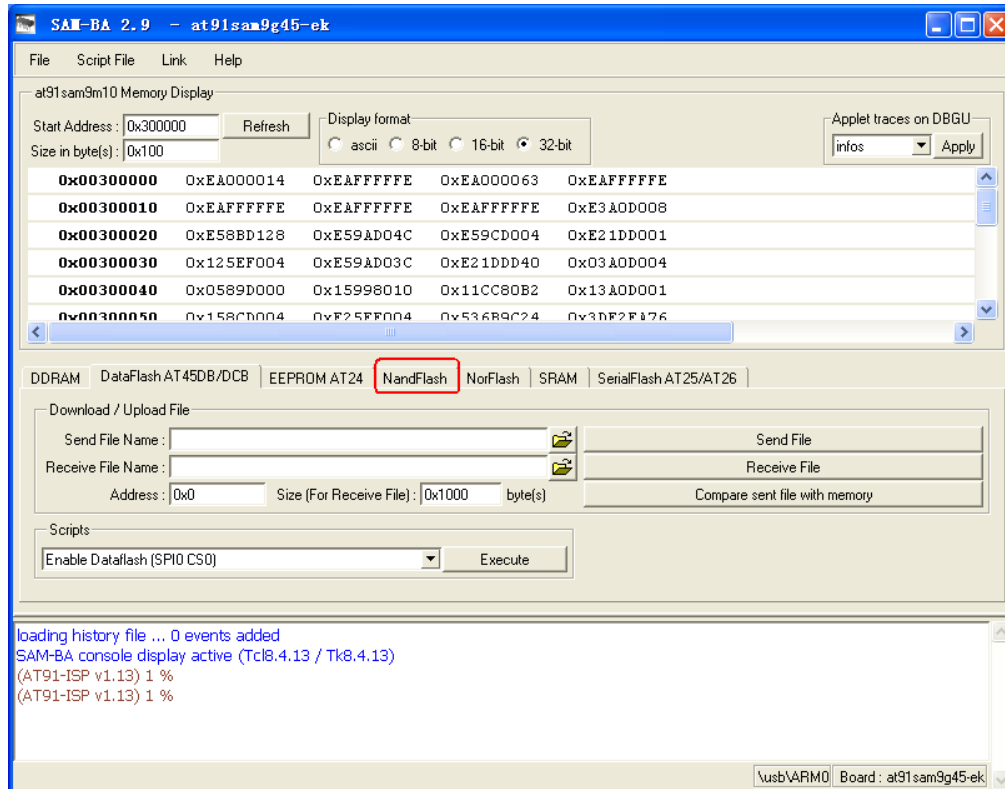
2.2 Downloading of the project

2.2.1 Manual Download

- 1) Install the sam-ba (in details to 03-tools\SAM-BA\sam-ba install)
- 2) Disable the JP2, and reset the board
- 3) Click "Start" -> "All programs" -> ATMEL Corporation -> AT91-ISP V1.13 -> SAM-BA v2.9, then open the SAM-BA, with the below pop-up dialog:



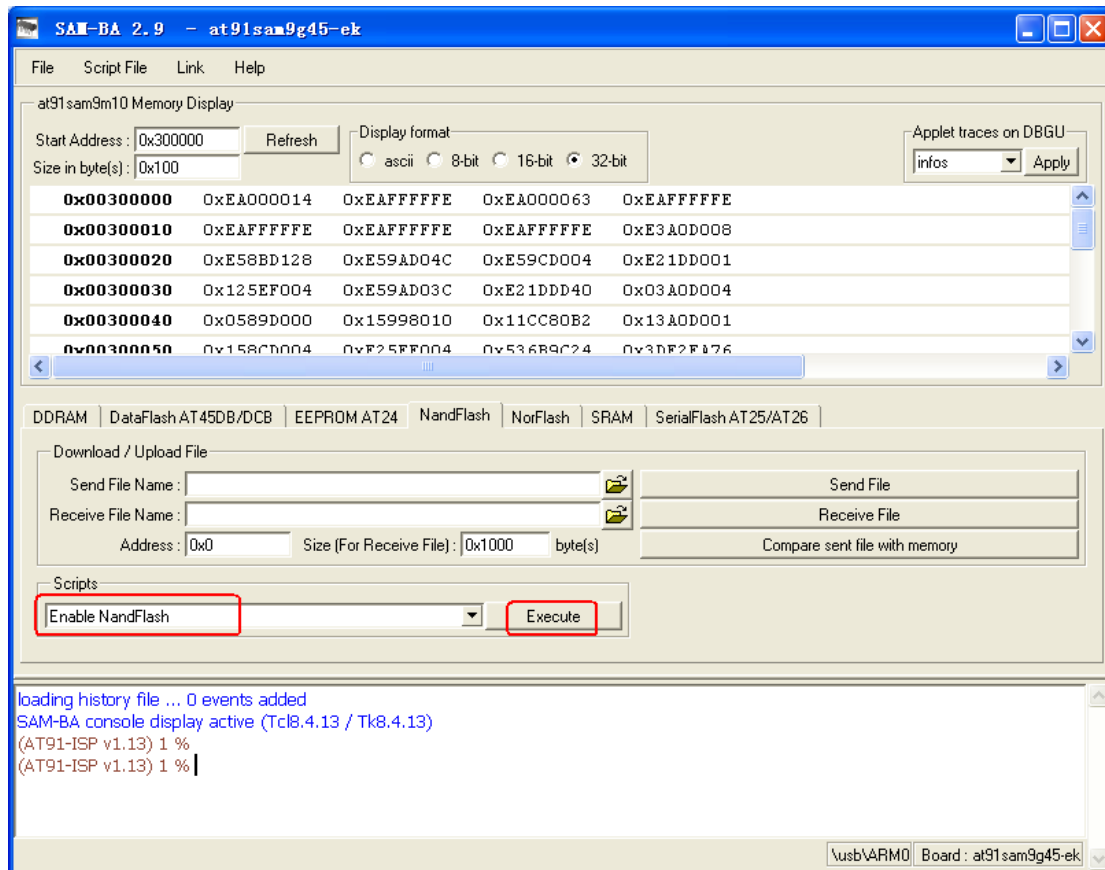
Then click 'Connect', it will display the below screen:



Now to download the application using SAM-BA.

① Enable the NandFlash

Close the JP2 wire, click the NandFlash tab in the last figure, it will display the below screen as follows:

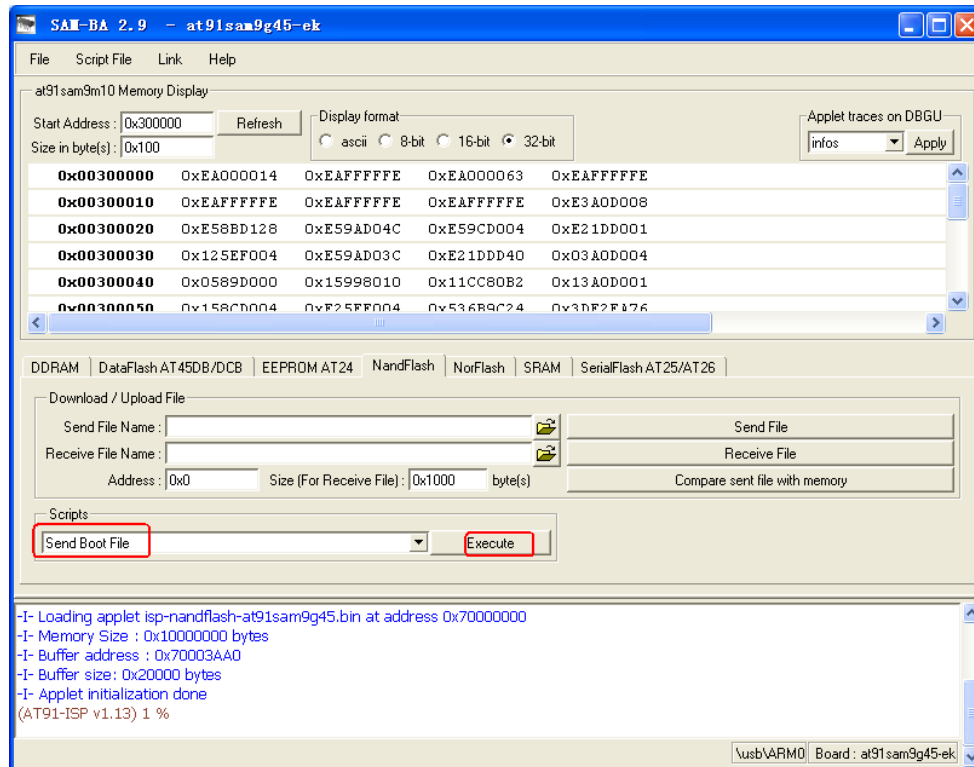


Choose “Enable NandFlash” from the Scripts lists, then Press ‘execute’ to enable NandFlash.

② Download nandflash_at91sam9g45ekes.bin boot file in the 02-Images\MDK\SAM-BA directory.

NOTE: Download nandflash_at91sam9g45ekes.bin in order to boot the application. System will cope nandflash_at91sam9g45ekes.bin from NandFlash to DDRAM, then nandflash_at91sam9g45ekes.bin will copy 258KB content from 0x20000 address to DDRAM.

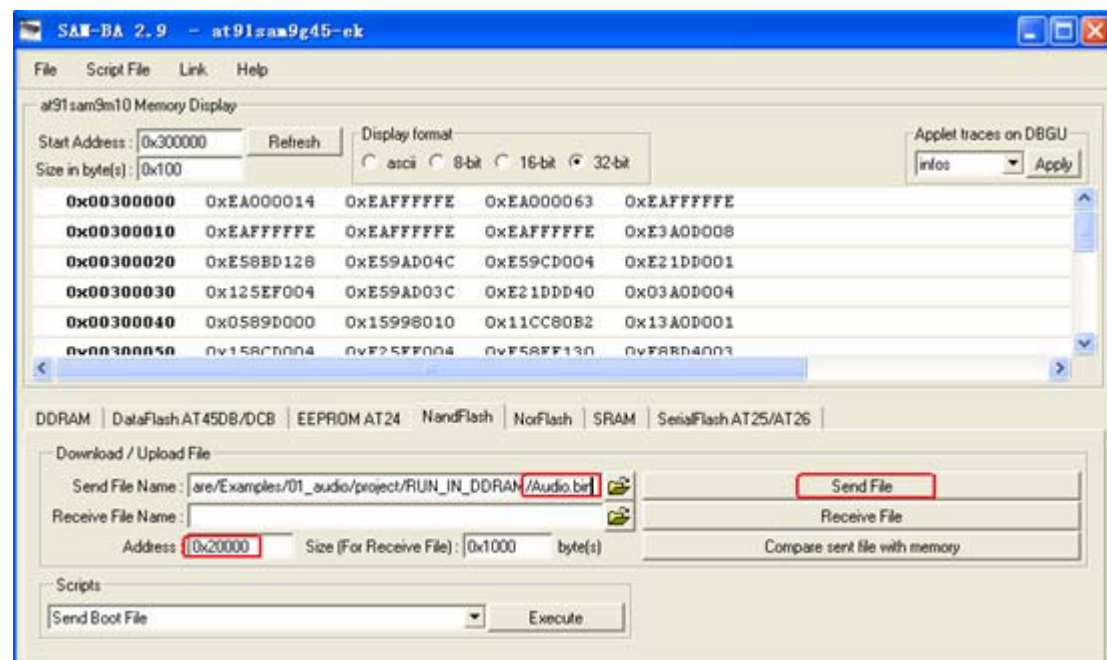
Choose ‘Send Boot File’ in the Scripts lists, as follow:



Click “execute” button, choose nandflash_at91sam9g45ekes.bin from the open dialog.

③ Download your application, take file Audio.bin for example.

Choose Audio.bin in the Send File Name, fill in 0x20000 in the Address textbox, as follow:



Then click “Send File” to download the Audio.bin.

5) After resetting the board, the application will run.

NOTE: If you want to download the application to NandFlash again, you need first clean up the data in the NandFlash, otherwise SAM-BA will not start up. In order to clean up the NandFlash, press the “USER2” button in the board, at the same time, press NRST button repeatedly until there is nothing display in the Serial Port.

2.2.2 Auto download

- 1) Install the sam-ba(in details to 03-tools\SAM-BA\sam-ba install)
- 2) Disable the JP2, and reset the board, you can see the flag as follows:



- 3) Connect the JP2
- 4) Open the package 01_audio\download. And click the file SAM9G45_MDK_nandflash.bat. Wait till it is downloaded.
- 5) Resetting the board, you can see the output on the board

Chapter 3 Peripherals Testing

3.1 Audio test

- Source code location: 04-MDK_Source\MDK4.01_Examples\01_audio
- Test description: This routine describes how to read the wav file from a Micro SD Card, and then output it through PHONE. NOTE: before testing you should copy the sample.wav in the 01_audio directory to the root directory of a Micro SD Card, and then insert this Micro SD Card to the board. And you also should insert an earphone to the PHONE interface.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and press NRST button, you will see the below operation as per below screen shot:

```
-- Basic Audio Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 18 2010 17:14:14 --
-I- Please connect a SD card ...
-I- SD card connection detected
-I- Init media Sdcard
-I- MEDSdcard init
-I- DMAD_Initialize channel 0
-I- Card Type 1, CSD_STRUCTURE 0
-I- SD/MMC TRANS SPEED 25000 KBit/s
-I- SD 4-BITS BUS
-I- SD/MMC TRANS SPEED 25000 KBit/s
-I- SD/MMC card initialization successful
-I- Card size: 121 MB
-I- Mount disk 0
-I- File Found!
    Wave file header information
-----
- Chunk ID           = 0x46464952
- Chunk Size         = 6801444
- Format              = 0x45564157
- SubChunk ID        = 0x20746D66
- Subchunk1 Size     = 16
- Audio Format        = 0x0001
- Num. Channels       = 2
- Sample Rate        = 24000
- Byte Rate          = 96000
```

- Block Align = 4
- Bits Per Sample = 16
- Subchunk2 ID = 0x61746164
- Subchunk2 Size = 6801408

Press a key to return to the menu ...

Then, you press any keys, HyperTerminal will display:

-I- PCM Load to 70100100, size 6801408

Menu :

P: Play the WAV file

D: Display the information of the WAV file

Then, you press 'P, you will listen to a music from the earphone.

- Reference manual: XWM8731EDS.pdf, AT91SAM9G45 Reference Manual.pdf

3.2 LCD Test

- Source code location: 04-MDK_Source\MDK4.01_Examples\02_lcd
- Test description: This routine will display the two pre-loaded pictures on the LCD. Before testing you need to download the files image1_rgb.raw and image2_rgb.raw in the 02_lcd directory to the address 0x70100000 and 0x70200000 of the DDRAM with SAM-BA.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and push NRST button. The application displays two preloaded images on the board LCD, alternating between each image every other second.
- Reference manual: AT91SAM9G45 Reference Manual.pdf (LCDC part)

3.3 Touchscreen test

- Source code location: 04-MDK_Source\MDK4.01_Examples\03_touchscreen
- Test description: This routine displays how to calibrate touch screen.
- Test phenomenon: Download the program to target board. Press the NRST button, the LCD will display as follows:

LCD calibration

Touch the dots to calibrate the screen

Then in the LCD will appear five red dots, press the red dot on touch-screens to calibrate touch screen, if the calibration is successful, LCD will display:

-I- Calibration successful !

Otherwise, LCD need calibrate again ,and LCD will display:

-E- Error too big ! Retry...

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.4 NandFlash test

- Source code location: 04-MDK_Source\MDK4.01_Examples\04_nandflash
- Test description: This routine display some information about the NandFlash in the board, then read, writes, and erases to test NandFlash.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and press NRST button. First it will display the NandFlash's ID, Bus width, block numbers, and block size. Then read, write, erase to test NandFlash. The HyperTerminal will display as per below screen shot:

```
-- Basic NandFlash Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: Jan 11 2010 11:29:19--  
-I- Nandflash ID is 0x9510DAEC  
-I-      Nandflash driver initialized  
-I- Size of the whole device in bytes: 0x10000000  
-I- Size in bytes of one single block of a device: 0x20000  
-I- Number of blocks in the entire device: 0x800  
-I- Size of the data area of a page in bytes: 0x800  
-I- Number of pages in the entire device: 0x40  
-I- Bus width: 0x8  
-I- SkipBlockNandFlash_EraseBlock: Block is BAD  
-I- Skip bad block      44:  
-I- Test in progress on block:      95  
-I- Test passed
```

- Reference manual: AT91SAM9G45 Reference Manual. PDF (SMC part)

3.5 NorFlash test

- Source code location: 04-MDK_Source\MDK4.01_Examples\05_Norflash
- Test description: The routine display some information about the NorFlash in the board, then read, writes, and erases to test NorFlash.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and press NRST button. Firstly it will display the NorFlash's ID, and Device ID. Then read, write, erase to test NorFlash. HyperTerminal displays as per below screen shot::

```
-- Basic NorFlash Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: May 23 2011 20:51:04 --  
NorFlash Manu ID = 0x1, Device ID = 0x225b  
Nor Flash is erasing...  
Nor Flash is writing...  
Nor Flash is reading...  
Nor Flash operation success!
```


- Reference manual: AT91SAM9G45 Reference Manual. PDF (SMC part)

3.6 FatFS test

- Source code location: 04-MDK_Source\MDK4.01_Examples\06_FatFS
- Test description: The routine display some information about the FatFS in the board, then read and write to test filesystem.
- Test phenomenon: First it initializes the FatFS, then read and write the file, the results are as follows:

```
-- Basic FatFS Full Version with External RAM Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: May 23 2011 20:58:27 --  
-I- MEDDdram init  
-I- DDRAM initialized  
-I- Mount disk 0  
-I- Format disk 0  
-I- Please wait a moment during formatting...  
-I- Format disk finished !  
-I- Create a file : "0:Basic.bin"  
-I- Write file  
-I- ByteWritten=512  
-I- f_write ok: ByteWritten=512  
-I- Close file  
-I- Open file : 0:Basic.bin  
-I- Read file  
-I- Close file  
-I- File data Ok !  
-I- Test passed !
```

- Reference manual: AT91SAM9G45 Reference Manual. PDF

3.7 filesystem test

- Source code location: 04-MDK_Source\MDK4.01_Examples\07_filesystem
- Test description: Make the 10MB DDRAM into a RAM, mount to the PC, access it through the USB, In addition, program can test RAM disc and formatting through the FAT file system, and also can test RAM disc and format through the EFSL file system .
- Test phenomenon: Before running the program, we should connect the development board to PC by USB cable. After the operation, we can see there appears a 10MB disk in the "my computer", and operate it as a ordinary disk. Beside this we can format the disk through the FAT or EFSL file system in the process. Input "F" in serial to switch file system, input "R" to test the file system. you will see the operation as per below screen shot::

```
-- Basic File System Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 11 2010 17:05:06—
*** Using EFSL ***

--- File System Test (EFSL) ---
1. FS Mount : PASS
2. Create file test.bin : OK
3. Write 4194304 bytes: Done, Speed 5363 KB/s
4. Copy file test.bin to copy.bin: Done, Speed 2728 KB/s
5. Verify file copy.bin: OK, Speed 1518 KB/s
6. Read file test.bin: OK, Speed 5577 KB/s

-----
F to change File System Type
R to run the test again
-----
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf (External Memories)

3.8 Dataflash test

- Source code location: 04-MDK_Source\MDK4.01_Examples\08_dataflash
- Test description: The demonstration program tests the dataflash present on the evaluation kit by erasing and writing each one of its pages.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and press RESET button, you will see the phenomenon below.

```
-- Basic Dataflash Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 19 2010 21:13:58 --
-I- Initializing the SPI and AT45 drivers
-I- At45 enabled
-I- SPI interrupt enabled
-I- Waiting for a dataflash to be connected ...
-I- AT45DB321D detected
-I- Device identifier: 0x0001271F
-I- Test in progress on page:    219
-I- Test passed.
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.9 Twi eeprom test

- Source code location: 04-MDK_Source\MDK4.01_Examples\09_twi_eeprom
- Test description: This software performs simple tests on the first and second page of the EEPROM.

- Test phenomenon: Connect TWD (SDA) for the 2 boards: pin 8 of connector J9, Connect TWCK(SCL) for the 2 boards: pin 7 of connector J9, Connect GND for the 2 boards: pin 30 of connector J9, Add a pull up of 2,2KOhms on TWD and TWCK (pin 1 of J9 is 3,3V).

Download the program to target board. initialize PC HyperTerminal and press the RESET button, you will see the phenomenon below.

```
-- Basic TWI EEPROM Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 12 2010 20:50:27 --
-I- Filling page #0 with zeroes ...
-I- Filling page #1 with zeroes ...
-I- Read/write on page #0 (polling mode)
-I- 0 comparison error(s) found
-I- Read/write on page #1 (IRQ mode)
-I- Callback fired !
-I- Callback fired !
-I- 0 comparison error(s) found
-I- Callback fired !
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf, SAM9G45 Board Schematic.pdf

3.10 RTT test

- Source code location: 04-MDK_Source\MDK4.01_Examples\10_rtt
- Test description: This example enables the user to set an alarm and watch it being triggered when the timer reaches the corresponding value.
- Test phenomenon: This program displays a timer count and a menu on the DBGU, enabling the user to choose between several options. Download the program to target board. Open PC HyperTerminal and press the RESET button, you will see the phenomenon below.

```
Start AT91Bootstrap...
-- Basic RTT Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 9 2010 17:47:26 --
Time: 2
Menu:
r - Reset timer
s - Set alarm
Choice?
```

You can choose 'r' to reset or choose 's' to set alarm. If you choose 's' and enter 8, it may display "!!! ALARM !!!" when time gets to 8. Phenomenon is as follows.

```
Time: 8
!!! ALARM !!!
Menu:
```

```
r - Reset timer  
s - Set alarm  
c - Clear alarm notification  
Choice?
```

You may choose 'c' to clear message "!!! ALARM !!!".

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.11 RTC test

- Source code location: 04-MDK_Source\MDK4.01_Examples\11_rtc
- Test description: This basic example shows how to use the Real-Time Clock (RTC) peripheral available on the newest Atmel AT91 microcontrollers.
- Test phenomenon: Download the program to target board. Initialize PC HyperTerminal and press the RESET button, you will see the phenomenon below.

```
-- Basic RTC Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: Jan 11 2010 15:58:15 --
```

Menu:

```
t - Set time  
d - Set date  
i - Set time alarm  
m - Set date alarm  
q - Quit!
```

```
[Time/Date: 00:08:35, 01/14/2010 Thu ][Alarm status:]
```

Setting the time, date and time alarm is done by using Menu option "t", "d", the display is updated accordingly.

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.12 TWI test

- Source code location: 04-MDK_Source\MDK4.01_Examples\12_twi
- Test description: This routine displays the state when the TWI is in slave mode.
- Test phenomenon: Build the program and download it to the evaluation board. Initialize the PC HyperTerminal and press the RESET button. If HyperTerminal display shows as per below screen, it means the test is successful follows prove test success.

```
-- Basic TWI Slave Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: Jan 11 2010 15:58:15 --  
-I- Configuring the TWI in slave mode
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.13 DMA_screen test

- Source code : 04-MDK_Source\MDK4.01_Examples\13_dma_screensaver
- Test description: Use the DMA controller to transfer the picture
- Test phenomenon: If you use the 320x240 LCD screen, you should download Image320x240.bmp into the DDRAM. The offset is 0x100000, the absolute address is 0x70100000; If you use the 480x272 LCD screen, you should download Image480x272.bmp into the DDRAM with the offset 0x100000 and the absolute address is 0x70100000; Build the program and download it to the evaluation board. Initialize the PC HyperTerminal and press the RESET button. If terminal display shows as follows, it means the test is successful.

```
-- Basic DMA Screensaver Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: May 24 2011 09:20:55 --  
-I- DMAD_Initialize channel 1  
-I- Callback fired !  
-I- DMAD_Initialize channel 0  
-I- Callback fired !  
-I- DMAD_Initialize channel 1  
-I- Callback fired !  
-I- DMAD_Initialize channel 0  
-I- Callback fired !  
-I- DMAD_Initialize channel 1  
-I- Callback fired !  
-I- DMAD_Initialize channel 0  
-I- Callback fired !  
-I- DMAD_Initialize channel 1  
.....
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf

3.14 EMAC test

- Source code location: 04-MDK_Source\MDK4.01_Examples\14_emac
- Test description: This project uses the Ethernet MAC (EMAC) and the on-board Ethernet transceiver available on the evaluation board. It enables the device to respond to a ping command sent by a host computer. Upon startup, the program will configure the EMAC with a default IP and MAC addresses and then ask the transceiver to auto-negotiate the best mode of operation. Once this is done, it will start monitoring incoming packets and processing them whenever appropriate. The basic will only answer to two kinds of packets: the ARP requests with its MAC address and ICMP ECHO request. To test that the board responds

correctly to ping requests, type “ping 192.168.2.19” command-line on a computer connected to the same network as the board..

- Test phenomenon: Build the program and download it inside the evaluation board. Connect an Ethernet cable between the evaluation board and the network. The board may be connected directly to a computer; in this case, make sure to use a cross/twisted wired cable such as the one provided with the evaluation kit. Open PC HyperTerminal and push RESET button. The program will then auto-negotiate the mode of operation and start receiving packets, displaying feedback on the DBGU. To display additional information, press any key in the terminal application. The below screen shot shows the operation:

```
Start AT91Bootstrap...
-- Basic EMAC Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 13 2010 09:54:58 --
-- MAC 0:45:56:78:9a:ac
-- IP 192.168.2.19
-I- ** Valid PHY Found: 3
-I- MACB_ResetPhy
-I- AutoNegotiate complete
P: Link detected
Press a key for statistics
=== EMAC Statistics ===
.tx_packets = 3
.tx_comp = 3
.....
```

To test that the board responds to ICMP ECHO requests, type the command “ping 192.168.2.19” in a shell.

- Reference manual: AT91SAM9G45 Reference Manual.pdf,DM9161AEP.pdf

3.15 EMAC Uip Helloworld test

- Source code : 04-MDK_Source\MDK4.01_Examples\15_emac_uip_helloworld
- Test description: This basic example shows that development board can respond to Telnet connection of default port 1000.
- Test phenomenon: Build the program and download it inside the evaluation board. Connect an Ethernet cable between the evaluation board and the network. The board can be connected directly to a computer, Open PC HyperTerminal and push RESET button. Phenomenon is as follows:

```
Start AT91Bootstrap...
-- Basic EMAC uIP Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 13 2010 11:07:43 --
- MAC 0:45:56:78:9a:ac
- Host IP 192.168.2.19
```

```
- Router IP 192.168.2.1
- Net Mask 255.255.255.0
-I- ** Valid PHY Found: 3
-I- MACB_ResetPhy
-I- AutoNegotiate complete
P: Link detected
P: clock time initialize - TC0
P: APP Init ... hello-world
```

Open the PC command-line, input "Telnet", press enter key, input " open 192.168.2.19 1000".

If connect success, then in the command line will display a message: "Hello. Getting your name?"

- Reference manual: AT91SAM9G45 Reference Manual.pdf, DM9161AEP.pdf

3.16 EMAC Uip Telnet test

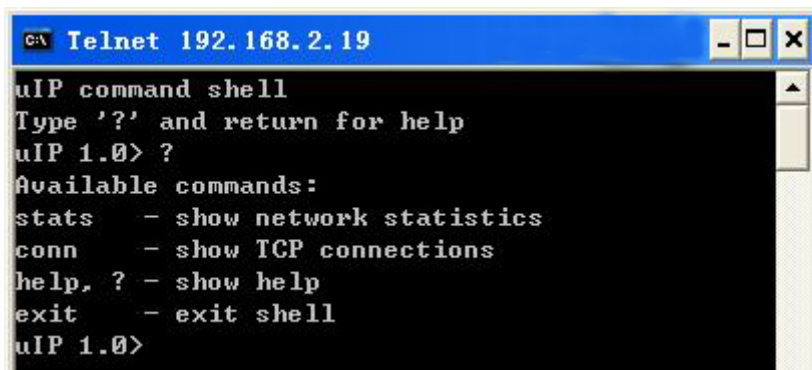
- Source code location: 04-MDK_Source\MDK4.01_Examples\16_emac_uip_telnet
- Test description: This routine code displays a telnet application of development board. In the program we can customize shell commands. The routine just accepts four command format: Stats, conn, help/? and exit. It shows network statistics , show TCP connections , show help , exit shell. Among the corresponding function only last exit command realized change shell' status and help command realized that show available command menu function. The function of other command is the same as help command's function.
- Test phenomenon: Build the program and download it to the evaluation board. Connect an Ethernet cable between the evaluation board and the network, The board can be connected directly to a computer, Open PC HyperTerminal and press the RESET button. You Can press any key display EMAC statistical information .The phenomenon is as follows:

```
Start AT91Bootstrap...
-- Basic EMAC uIP Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 13 2010 11:45:22 --
- MAC 0:45:56:78:9a:ac
- Host IP 192.168.2.19
- Router IP 192.168.2.1
- Net Mask 255.255.255.0
-I- ** Valid PHY Found: 3
-I- MACB_ResetPhy
-I- AutoNegotiate complete
P: Link detected
P: clock time initialize - TC0
P: APP Init ... telnet
```

```
=== EMAC Statistics ===  
.tx_packets = 0  
.tx_comp = 0  
.tx_errors = 0  
.collisions = 0  
.tx_exhausts = 0  
.....
```

Open the command-line, input "Telnet", press enter key, input "open 192.168.2.19 1000", default in port 23 to connect .

If the connection is successful, the window will display Corresponding message ,input "?" according to relevant information , there will returns all available commands of help information. As below:



```
C:\> Telnet 192.168.2.19  
uIP command shell  
Type '?' and return for help  
uIP 1.0> ?  
Available commands:  
stats - show network statistics  
conn - show TCP connections  
help, ? - show help  
exit - exit shell  
uIP 1.0>
```

- Input "stats", "conn." or "am /?", the command-line display help menu. don't show any information when input 'exit', just set shell state is close .
- Reference manual: AT91SAM9G45 Reference Manual.pdf, DM9161AEP.pdf

3.17 EMAC Uip Web Server test

- Source code : 04-MDK_Source\MDK4.01_Examples\17_emac_uip_webserver
- Test description: The demonstration program is a web server application for the development board. In the process have set uip, including IP address, routers IP and subnet mask, when the program is running, the evaluation board can be used as a Web server, you can access it by typing ip in the pc's browser.
- Test phenomenon: Build the program and download it to the evaluation board. Connect an Ethernet cable between the evaluation board and the network, The board can be connected directly to a computer, Open PC HyperTerminal and press the RESET button. You Can press any key display EMAC statistical information .The phenomenon is as follows:

```
Start AT91Bootstrap...  
-- Basic EMAC uIP Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: Jan 13 2010 17:00:36 --  
- MAC 0:45:56:78:9a:ac  
- Host IP 192.168.2.19  
- Router IP 192.168.2.1
```



```
- Net Mask 255.255.255.0
-I- ** Valid PHY Found: 3
-I- MACB_ResetPhy
-I- AutoNegotiate complete
P: Link detected
P: clock time initialize - TC0
P: APP Init ... web server
=== EMAC Statistics ===
.tx_packets = 0
.tx_comp = 0
.tx_errors = 0
.collisions = 0
.....
```

If display “Link detected”, proved that link success, open the browser in PC, input <http://192.168.219>. press “enter” key, open a web page, as follows:



If the phenomenon is the same of the above, it proved test success.

- Reference manual: AT91SAM9G45 Reference Manual.pdf, DM9161AEP.pdf

3.18 SDMMC test

- Source code location: 04-MDK_Source\MDK4.01_Examples\18_sdmmc
- Test description: This basic example shows how to read or write the SD/MMC Card. Before testing, you should insert a SD into the board.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and push NRST button, you will see the phenomenon below.

```
-- Basic SD/MMC MCI Mode Project xxx --
-- AT91SAM9G45-EK
-- Compiled: Jan 11 2010 15:58:15 --
-I- Cannot check if SD card is write-protected
-I- DMAD_Initialize channel 0
TC Start ... OK

=====
-I- Card Type 1, CSD_STRUCTURE 0
-I- SD 4-BITS BUS
-I- CMD6(1) arg 0x80FFFF01
-I- SD HS Not Supported
-I- SD/MMC TRANS SPEED 25000 KBit/s
```

```
-I- SD/MMC card initialization successful
-I- Card size: 483 MB, 990976 * 512B
...
```

Press Enter key, it will display help menu:

```
=====
# 0,1,2 : Block read test
# w,W   : Write block test(With data or 0)
# b,B   : eMMC boot mode or access boot partition change
# i,I   : Re-initialize card
# t     : Disk R/W/Verify test
# T     : Disk performance test
# p     : Change number of blocks in one access for test
# s     : Change MCI Clock for general test
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf, SAM9G45 Board Schematic.pdf

3.19 SD Card Device Core test

- Source code location: 04-MDK_Source\MDK4.01_Examples\19_sdcard
- Test description: The program tests the speed of read/write SD card.
- Test phenomenon: Download the program to target board. Open PC HyperTerminal and press the NRST button, you will see the phenomenon below.

```
-- Basic FatFS Full Version with SDCard Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 15 2010 14:22:48 --
-I- Please connect a SD card ...
-I- SD card connection detected
-I- Init media Sdcard
-I- MEDSdcard init
-I- DMAD_Initialize channel 0
-I- Card Type 1, CSD_STRUCTURE 0
-I- SD/MMC TRANS SPEED 25000 KBit/s
-I- SD 4-BITS BUS
-I- CMD6(1) arg 0x80FFFF01
-I- SD HS Enable
-I- SD/MMC TRANS SPEED 50000 KBit/s
-I- SD/MMC card initialization successful
-I- Card size: 972 MB
-I- Mount disk 0
auto_mount_test-I- The disk is already formatted.
-I- Display files contained on the SDcard :
auto_mount_test0:/BASIC.bin
-I- Do you want to erase the sdcard to re-format disk ? (y/n)!
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf, EM_AT91SAM9G45

Board
Schematic.pdf

3.20 FATFS SD Card test

- Source code location: 04-MDK_Source\MDK4.01_Examples\20_fatfs_sdcard
- Test description: This basic example shows how to use SD card through FAT file system.
- Test phenomenon: Download the program to target board. Initialize the PC HyperTerminal and press the NRST button, you will see the phenomenon below.

```
-- Basic FatFS Full Version with SDCard Project 1.7 --  
-- AT91SAM9G45-EK  
-- Compiled: Jan 15 2010 14:22:48 --  
-I- Please connect a SD card ...  
-I- SD card connection detected  
-I- Init media Sdcard  
-I- MEDSdcard init  
-I- DMAD_Initialize channel 0  
-I- Card Type 1, CSD_STRUCTURE 0  
-I- SD/MMC TRANS SPEED 25000 KBit/s  
-I- SD 4-BITS BUS  
-I- CMD6(1) arg 0x80FFFF01  
-I- SD HS Enable  
-I- SD/MMC TRANS SPEED 50000 KBit/s  
-I- SD/MMC card initialization successful  
-I- Card size: 972 MB  
-I- Mount disk 0  
auto_mount_test-I- Format disk 0  
-I- Please wait a moment during formatting...  
-I- Format disk finished !  
-I- Create a file : "0:Basic.bin"  
-I- Write file  
-I- ByteWritten=2064
```

- Reference manual: AT91SAM9G45 Reference Manual.pdf, EM_AT91SAM9G45 Board Schematic.pdf

3.21 USB Device Core test

- Source code : 04-MDK_Source\MDK4.01_Examples\21_usb_device_core
- Test description: This project helps you to be familiar with the USB Framework that is used for rapid development of USB-compliant class drivers such as USB Communication Device class (CDC). You can find the information about Sample usage of USB Device Framework, USB enumerate sequence, the standard and

class-specific descriptors and requests handling and the initialize sequence and usage of UDP interface.

- Test phenomenon: Download the program to target board. Connect board to PC using USB cable. Open PC HyperTerminal and press the RESET button, you will see the phenomenon below.

```
Start AT91Bootstrap...
-- USB Device Core Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 11 2010 10:51:06 --
```

When connect USB cable to PC, the LED blinks, and the host reports a new USB device attachment.

- Reference manual: AT91SAM9G45 Reference Manual.pdf, SP2526A-2EN.pdf

3.22 USB Device Hid Transfer test

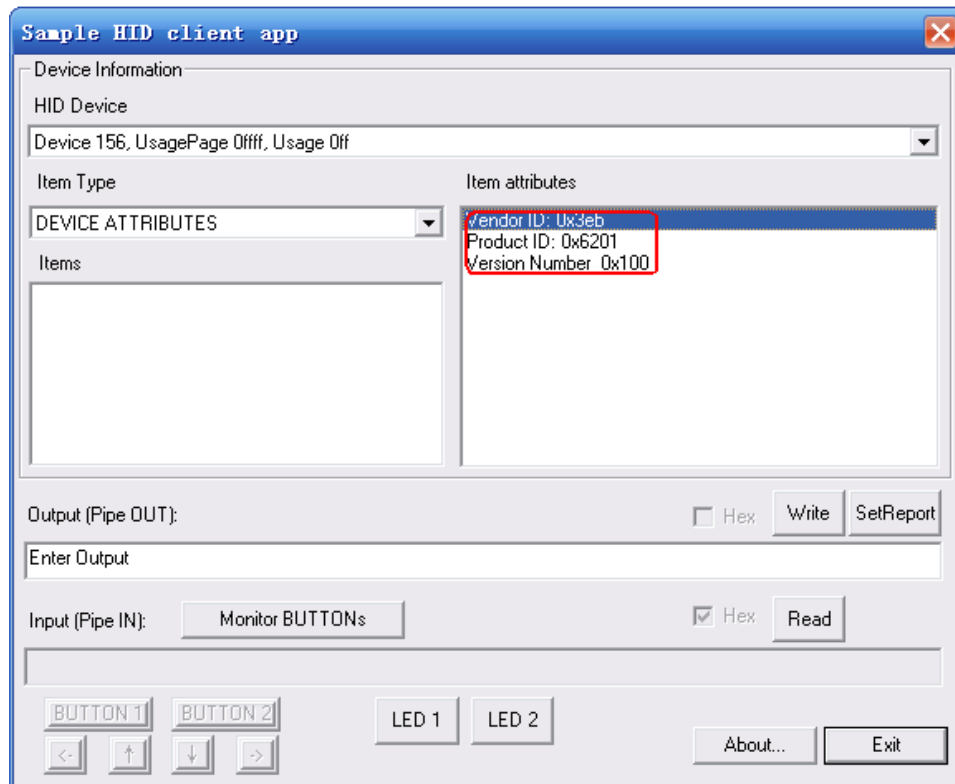
- Source
code :04-MDK_Source\MDK4.01_Examples\22_usb_device_hid_transfer
- Test description: This process realizes a USB device HID transmission example. The program includes USB HID drive and corresponding PIO configuration. and can test USB device through hidTest.exe
- Test phenomenon: Download the program to target board. Connect board to PC using USB cable. Open PC HyperTerminal and press the RESET button, you will see the phenomenon as below.

```
Start AT91Bootstrap...
-- USB Device HID Transfer Project 1.7 --
-- AT91SAM9G45-EK
-- Compiled: Jan 12 2010 17:30:14 --
-W- HIDDTransferDriver_RequestHandler: request 0x0A
-W- Sta 0x8085F400 [0] -W- _
```

At the same time, the PC prompt find the USB devices, and the USB devices can be find in PC equipment management.

Insert or pull the USB attachment, the led in board will flash.

open project directory, test USB HID device.



Choice DEVICE ATTRIBUTES in Item Type, in the right flank we can see the VID of device is 0x03EB, PID is 0x6201. In the Output edit box input the message you want to send. Click the right buttons, you can Write and send the message and check this information by super terminal. For example, sending information "ABCDEFGH", click button "Write", super terminal will show information as follows.

```
-W- Sta 0x8085F400 [0] -W- _ Data In(32):  
41 42 43 44 45 46 47 00  
00 00 00 .....
```

We can also click Monitor BUTTON on the Input edit box to monitor Equipment data. Then press the key BP3 and BP4 on the Development board. BUTTON1 and BUTTON2 gray button will have a corresponding change. If you press the LED button on the interface, the LED will brighten or off.

- Reference manual: AT91SAM9G45 Reference Manual.pdf, SP2526A-2EN.pdf

3.23 USB Device CDC Serial test

- Source code location:
04-MDK_Source\MDK4.01_Examples\23_usb_device_cdc_serial
- Test description: The project displays a USB virtual serial function applications.
- Test phenomenon: Download the program to target board. Connect board to PC using USB cable. push RESET button, PC will prompt to install driver, don't automatically search installation. But designated driver locations as the following directory : 03-software\Examples\23_usb_device_cdc_serial\drive. After install driver ,open "computer management" -> "Equipment management", there will appear a "AT91 USB to Serial Converter (COM11)" item in the "com and LPT" of

the right side interface.

At the same time, open serial port 11 and port1 on tool SSCOM3.2.select the serial port used and set the following parameters (to set status: Baud rate (115200), data bits (8 bits), stop bits (1 bit), parity bit (no), data flow control (no)).then serial port 1 can send string to serial port 11,and Serial port 11 can receive it normal. By doing this, you can virtual the communication between serial port 1 and port 11.

- Reference manual: AT91SAM9G45 Reference Manual.pdf, SP2526A-2EN.pdf

3.24 USB Device Hid Keyboard

- Source code location: 04-MDK_Source\MDK4.01_Examples\24_usb_device_hid_keyboard
- Test description: This routine realized a USB HID keyboard example. The Program has provide USB HID drive, corresponding PIO configuration process and UDB interface initialization, etc. you can input character through this keyboard, control Num Lock lamp, etc..
- Test phenomenon: Download the program to target board. Connect board to PC using USB cable. Open PC HyperTerminal and push RESET button, PC will prompt have find a "USB HID Keyboard Device", the corresponding USB Device can be opened in the PC device manager. When connect USB cable to PC, the LED blinks
At the same time, create a new file in the PC desktop, you can sent 'a' character to the file by press BP4 button on the development board, Press BP3 button, can control the Num Lock LED and LED3 will flash.
- Reference manual: AT91SAM9G45 Reference Manual.pdf, SP2526A-2EN.pdf

3.25 Buzzer test

- Source code location: 04-MDK_Source\MDK4.01_Examples\25_buzzer
- Test description: This routine is used to test buzzer.
- Test phenomenon: Download the program to target board. After press RESET button, you will listen to the beep from the buzzer.
- Reference manual: AT91SAM9G45 Reference Manual.pdf.

3.26 USART0 test

- Source code location: 04-MDK_Source\MDK4.01_Examples\26_USART0
- Test description: This routine is used to test the serial port of USART0
- Test phenomenon: Download the program to target board. Use the wire to connect the PC com to the J16 interface;the process is :use PC com port 2(RXD) to connect the 2(R1out) pin of J16, use PC com port 3(TXD) to connect the

1(R1in) pin of J16, then press RESET button, you can see the phenomenon in the terminal:

```
TEST USART0...
```

Please input:

Then you can use the keyboard to input the characters that is successful.

- Reference manual: AT91SAM9G45 Reference Manual.pdf.

3.27 USART1 test

- Source code location: 04-MDK_Source\MDK4.01_Examples\27_USART1
- Test description: This routine is used to test the serial port of USART1
- Test phenomenon: Download the program to target board. Use the wire to connect the PC com to the J13 interface; the process is: use PC com port 2(RXD) to connect the 3(R1out) pin of J13, use PC com port 3(TXD) to connect the 1(R1in) pin of J13, use PC com port 7(RTS) to connect the 2(R2out) pin of J13, use PC com port 8(CTS) to connect the 4(R2in) pin of J13 (Notice: you must enable the RXD1 and CTS1 pin of sw1), then press RESET button, you can see the phenomenon in the terminal:

```
Test USART1(don't use hardware handshaking)...
```

Please input:

Then you can use the keyboard to input the characters, that is successful.

- Reference manual: AT91SAM9G45 Reference Manual.pdf.

3.28 USART2 test

- Source code location: 04-MDK_Source\MDK4.01_Examples\28_USART2
- Test description: This routine is used to test the serial port of USART2
- Test phenomenon: Download the program to target board. Use the wire to connect the PC com to the J15 interface; the process is: use PC com port 2(RXD) to connect the 3(R1out) pin of J15, use PC com port 3(TXD) to connect the 1(R1in) pin of J15, use PC com port 7(RTS) to connect the 2(R2out) pin of J15, use PC com port 8(CTS) to connect the 4(R2in) pin of J15 (Notice: you must enable the RXD2 and CTS1 pin of sw1), then press RESET button, you can see the phenomenon in the terminal:

```
Test USART2(don't use hardware handshaking)...
```

Please input:

Then you can use the keyboard to input the characters, that is successful.

- Reference manual: AT91SAM9G45 Reference Manual.pdf.

Chapter 4 List of programs

| | |
|----------------------------|--|
| 01-Audio | The audio test |
| 02-LCD | Use LCD to appear the picture |
| 03_touchscreen | The touchscreen calibrate |
| 04_nandflash | Read、write、erase the Nandflash |
| 05_norflash | Read、write、erase the Norflash |
| 06_fatfs | display some information about the FatFS in the board |
| 07_filesystem | test RAM disc and formatting through the FAT file system |
| 08_dataflash | tests the dataflash present on the evaluation kit by erasing and writing |
| 09_twi_eeprom | simple tests on the first and second page of the EEPROM |
| 10_rtt | The application of RTT |
| 11_rtc | The application of RTC |
| 12_twi | the state when the TWI is in slave mode |
| 13_dma_screensaver | Use the DMA controller to transfer the picture |
| 14_emac | EMAC test |
| 15_emac_uip_helloworld | Telnet connection of default port 1000 |
| 16_emac_uip_telnetd | a telnet application of development board |
| 17_emac_uip_webserver | a development board's web server application |
| 18_sdmmc | how to read or write the SD/MMC Card |
| 19_sdcard | test the speed of read/write SD card |
| 20_fatfs_sdcard | how to use SD card through FAT file system |
| 21_usb_device_core | the initialize sequence and usage of UDP interface |
| 22_usb_device_hid_transfer | USB device HID transmission |
| 23_usb_device_cdc_serial | USB virtual serial function applications |
| 24_usb_device_hid_keyboard | USB HID keyboard example |
| 25_buzzer | is used to test buzzer |
| 26_usart0 | test the serial port of USART0 |
| 27_usart1 | test the serial port of USART1 |
| 28_usart2 | test the serial port of USART2 |

Appendix A: After-sales Service

Customer Service

Please contact Premier Farnell local sales and customer services staffs for the help.

Website: <http://www.farnell.com/>

Technical Support

Please contact Premier Farnell local technical support team for any technical issues through the telephone, live chat & mail, or post your questions on the below micro site, we will reply to you as soon as possible.

Centralized technical support mail box: knode_tech@element14.com

Community: http://www.element14.com/community/community/knode/dev_platforms_kits

Please visit the below micro site to download the latest documents and resources code:

http://www.element14.com/community/community/new_technology/at91sam9g45-evk

Notes

This board was designed by element14's design partner- Embest, you can contact them to get the technical support as well.

Marketing Department:

Tel: +86-755-25635656 / 25638952

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E-mail: market@embedinfo.com

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