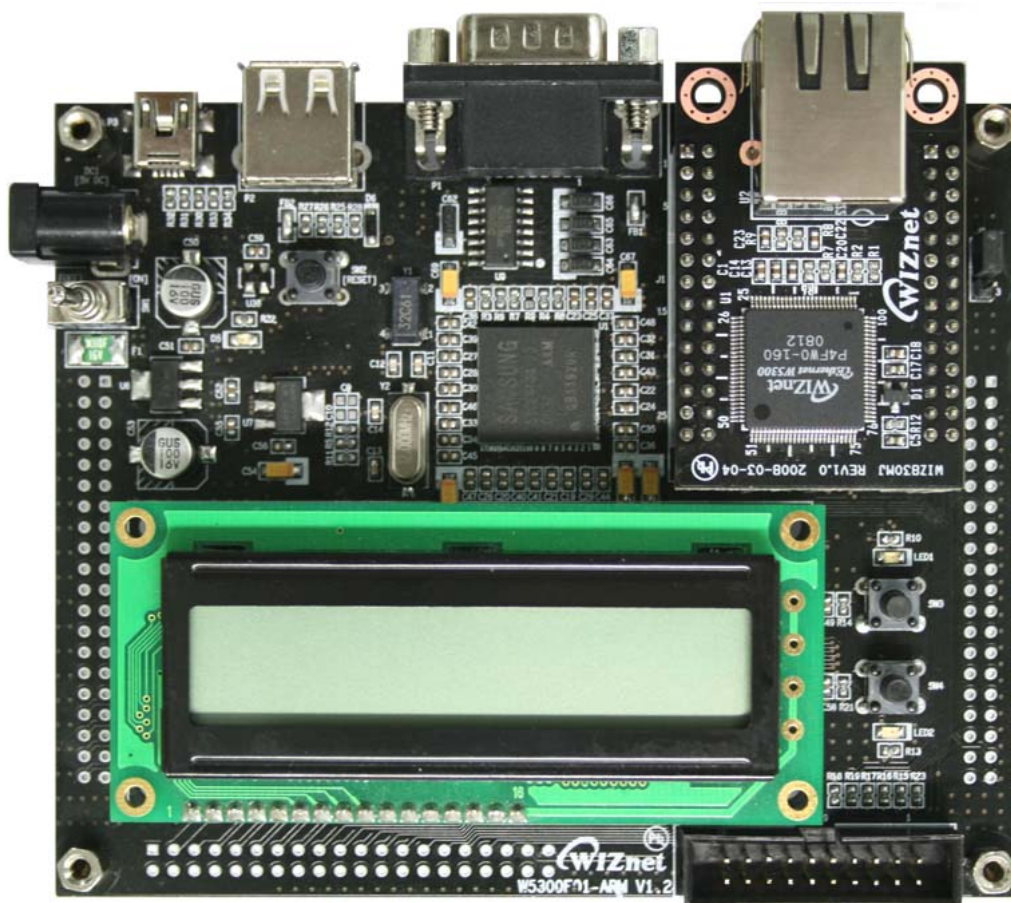


W5300E01-ARM User's Manual

(Version 1.0)



©2008 WIZnet Co., Ltd. All Rights Reserved.

For more information, visit our website at <http://www.wiznet.co.kr>

Document History Information

| Revision | Date | Description |
|----------|---------------|-------------------------|
| Ver. 1.0 | July 15, 2008 | 1 st Release |
| | | |
| | | |



WIZnet's Online Technical Support

If you have something to ask about WIZnet Products, Write down your question on Q&A Board in WIZnet website (www.wiznet.co.kr). WIZnet Engineer will give an answer as soon as possible.

The screenshot shows the WIZnet website's Q&A board. At the top, there is a navigation bar with links for HOME, LOGIN, JOIN, CONTACT US, and language options (ENGLISH, CHINESE, JAPANESE, KOREAN). Below this is a sidebar with a 'PRODUCTS' menu and a 'PRODUCT LINE' list. The main content area features a 'NEW PRODUCT' section for the W5300 chip, highlighting its 'Stable 70Mbps Guaranteed (in DMA!)' performance. A 'WHAT'S UPDATED' section lists recent news items. Below these are sections for 'COMPANY OVERVIEW', 'DISTRIBUTOR', and 'WHAT'S UPDATED'. A red circle highlights a 'Click' button next to the 'Download Center' link. The bottom section of the page is the 'Q&A' board, which includes a search bar, an RSS feed, and a list of questions and answers.

Q&A

If you want to know about WIZnet we will inform you.

| Total : 2315 (1/116) | | | | | |
|----------------------|--|-----------------------|------------|-----|--|
| NO | SUBJECT | NAME | DATE | HIT | |
| 2315 | How to initialization TX_WR Pointer | Andria Ginting | 2008-05-19 | 30 | |
| 2314 | ASRB-USB W3150A* | DOUG KHAN | 2008-05-17 | 23 | |
| 2313 | re:ASRB-USB W3150A* | WIZnet | 2008-05-21 | 3 | |
| 2312 | W5300 - Driver (Send function) | Ari Mendes dos Santos | 2008-05-16 | 36 | |
| 2311 | why RX_WR_POINTER not return to zero | harry | 2008-05-14 | 34 | |
| 2310 | UDP: Sn_RX_WR bug in W3150 | Alex | 2008-05-13 | 46 | |
| 2309 | UPDATE!!! UDP ERROR | Alex | 2008-05-14 | 50 | |
| 2308 | recv size register does not return to .. | HARRY | 2008-05-13 | 30 | |
| 2307 | re:recv size register does not return .. | WIZnet | 2008-05-21 | 4 | |

COPYRIGHT NOTICE



Copyright 2008 WIZnet, Co., Ltd. All Rights Reserved.

Technical Support: support@wiznet.co.kr

Sales & Distribution: sales@wiznet.co.kr

For more information, visit our website at <http://www.wiznet.co.kr>

Table of Contents

| | |
|--|----|
| 1. Overview | 1 |
| 1.1. Products Introduction | 1 |
| 1.2. Products Specification | 2 |
| 1.2.1. Base Board Specification | 2 |
| 1.2.2. WIZ830MJ Module Specification | 2 |
| 2. Products Description | 3 |
| 2.1. Board Layout | 3 |
| 2.1.1. Base Board Layout | 3 |
| 2.1.2. WIZ830MJ Module Layout | 3 |
| 2.1.3. Parts Description | 4 |
| 2.2. Package and Contents | 5 |
| 3. Hardware Designer's Guide | 6 |
| 3.1. Block Diagram | 6 |
| 3.1.1. System Block Diagram | 6 |
| 3.1.2. Power Block Diagram | 7 |
| 3.2. Block Description | 8 |
| 3.2.1. S3C2410A System Block | 8 |
| 3.2.2. SDRAM | 8 |
| 3.2.3. NAND Flash ROM | 8 |
| 3.2.4. WIZ830MJ Module | 9 |
| 3.2.5. RS-232C Serial Port | 10 |
| 3.2.6. USB Host / Device Port | 10 |
| 3.2.7. JTAG Interface | 10 |
| 3.2.8. LED & Tact Switch for Debugging | 10 |
| 3.2.9. Character LCD | 10 |
| 3.2.10. Power Block | 11 |
| 3.2.11. Expansion Port Interface | 12 |
| 3.3. Schematic | 14 |
| 3.3.1. W5300E01-ARM Base Board Schematic | 14 |
| 3.3.2. WIZ830MJ Module Schematic | 14 |
| 3.4. Parts List | 14 |
| 3.4.1. W5300E01-ARM Parts List | 14 |
| 3.4.2. WIZ830MJ Module Parts List | 14 |
| 3.5. Physical Specification | 15 |

| | | |
|-----------|---|-----------|
| 3.5.1. | Board Dimension | 15 |
| 4. | Board Operation | 16 |
| 4.1. | Booting Check | 16 |
| 4.1.1. | Booting Check for Windows | 16 |
| 4.1.2. | Booting Check for Linux | 18 |
| 4.2. | Testing Network Operation | 20 |
| 4.2.1. | Testing FTP Server | 20 |
| 4.2.2. | Testing HTTP Server | 21 |
| 4.2.3. | Testing TELNET Server | 22 |
| 4.2.4. | Testing Loopback | 22 |
| 5. | Configuring Development Environment | 24 |
| 5.1. | Cable Connection | 24 |
| 5.2. | Toolchain Installation | 25 |
| 5.3. | Network Configuration of Host PC | 25 |
| 5.3.1. | TFTP(Trivial File Transfer Protocol) Server Configuration | 25 |
| 5.3.2. | NFS(Network FileSystem) Server Configuration | 27 |
| 5.4. | File Transmission | 28 |
| 5.4.1. | File Transmission by using Serial (ZModem) | 28 |
| 5.4.2. | File Transmission by using NFS | 32 |
| 5.4.3. | Others | 32 |
| 6. | Linux Kernel Patch & Compile | 33 |
| 6.1. | Linux Kernel Patch | 33 |
| 6.2. | Linux Kernel Compile | 34 |
| 7. | Root File System | 36 |
| 7.1. | Ramdisk | 36 |
| 7.1.1. | Modifying Ramdisk | 36 |
| 7.1.2. | Ramdisk Directory Structure | 38 |
| 7.2. | JFFS2 | 39 |
| 7.2.1. | JFFS2 File System Mount | 39 |
| 8. | Bootloader | 40 |
| 9. | Appendix | 41 |
| 9.1. | Hardware Schematic of W5300E01-ARM Base Board | 41 |
| 9.2. | W5300E01-ARM Base Board Parts List | 43 |

Figures

| | |
|---|----|
| FIGURE 1-1 : W5300E01-ARM BOARD | 1 |
| FIGURE 2-1 : W5300E01-ARM BASE BOARD LAYOUT..... | 3 |
| FIGURE 2-2 : WIZ830MJ MODULE LAYOUT..... | 3 |
| FIGURE 3-1 : W5300E01-ARM SYSTEM BLOCK DIAGRAM..... | 6 |
| FIGURE 3-2 : W5300E01-ARM POWER BLOCK DIAGRAM..... | 7 |
| FIGURE 3-3 : WIZ830MJ MODULE INTERFACE PIN MAP..... | 9 |
| FIGURE 3-4 : W5300 DATA BUS WIDTH SETTING PORT..... | 9 |
| FIGURE 3-5 : JTAG INTERFACE PART SCHEMATIC..... | 10 |
| FIGURE 3-6 : W5300E01-ARM BOARD DIMENSION..... | 15 |
| FIGURE 4-1 : HYPER TERMINAL PORT CONFIGURATION..... | 16 |
| FIGURE 4-2 : BOOTING CHECK AT THE HYPER TERMINAL..... | 17 |
| FIGURE 4-3 : MINICOM PORT CONFIGURATION..... | 18 |
| FIGURE 4-4 : BOOTING CHECK AT THE MINICOM..... | 19 |
| FIGURE 4-5 : FTP SERVER TEST..... | 20 |
| FIGURE 4-6 : HTTP SERVER TEST..... | 21 |
| FIGURE 4-7 : TELNET SERVER TEST..... | 22 |
| FIGURE 4-8 : LOOPBACK CONNECTION CHECK..... | 23 |
| FIGURE 4-9 : LOOPBACK TEST..... | 23 |
| FIGURE 5-1 : CABLE CONNECTION EXAMPLE 1..... | 24 |
| FIGURE 5-2 : CABLE CONNECTION EXAMPLE 2..... | 24 |
| FIGURE 5-3 : ZMODEM SELECTION AT THE MINICOM..... | 29 |
| FIGURE 5-4 : ZMODEM AT THE MINICOM..... | 30 |
| FIGURE 5-5 : EXECUTING TEST FILE AT THE MINICOM..... | 30 |
| FIGURE 5-6 : SELECTING ZMODEM AT THE HYPER TERMINAL..... | 31 |
| FIGURE 6-1 : LINUX KERNEL IMAGE DOWNLOAD..... | 34 |
| FIGURE 6-2 : LINUX KERNEL BOOTING..... | 35 |
| FIGURE 7-1 : RAMDISK DOWNLOAD..... | 37 |
| FIGURE 7-2 : RAMDISK MODIFICATION CHECK..... | 37 |
| FIGURE 7-3 : RAMDISK DIRECTORY STRUCTURE..... | 38 |
| FIGURE 9-1 : HARDWARE SCHEMATIC OF W5300E01-ARM BASE BOARD..... | 42 |

Tables

| | |
|--|----|
| TABLE 1-1 : W5300E01-ARM BASE BOARD SPECIFICATION | 2 |
| TABLE 1-2 : WIZ830MJ MODULE SPECIFICATION | 2 |
| TABLE 2-1 : PARTS DESCRIPTION OF W5300E01-ARM | 4 |
| TABLE 2-2 : W5300E01-ARM CONTENTS | 5 |
| TABLE 2-3 : CONTENTS OF DATA CD | 5 |
| TABLE 3-1 : LCD PIN DESCRIPTION | 11 |
| TABLE 3-2 : EXPANDED BOARD INTERFACE PIN DESCRIPTION | 14 |
| TABLE 4-1 : LOOPBACK OPTION | 22 |
| TABLE 8-1 : BOOTLOADER COMMANDS | 40 |
| TABLE 9-1 : W5300E01-ARM BASE BOARD PART LIST | 44 |

1. Overview

W5300E01-ARM is the test board to evaluate the function of W5300 based on ARM920T.

1.1. Products Introduction

W5300E01-ARM is composed of the base board and WZ830MJ module. In the base board, ARM920T based Samsung S3C2410A-200MHz processor is built in, and W5300, the hardware TCP/IP chip is used.

By using serial port of base board and Ethernet port of WIZ830MJ, the communication environment can be easily set up. You can also test external devices having USB interface through USB Host and Device port.

W5300E01-ARM operates on Linux OS. By installing 64MB SDRAM, various applications can operate without any problem.

Samsung S3C2410A processor supports NAND Flash Booting. By installing 64MB NAND Flash memory, enough space is provided for bootloader, OS and user application.

By using extension connector (40pin * 3, total 120pin), the easy extension is supported for the functions that the base board does not support.

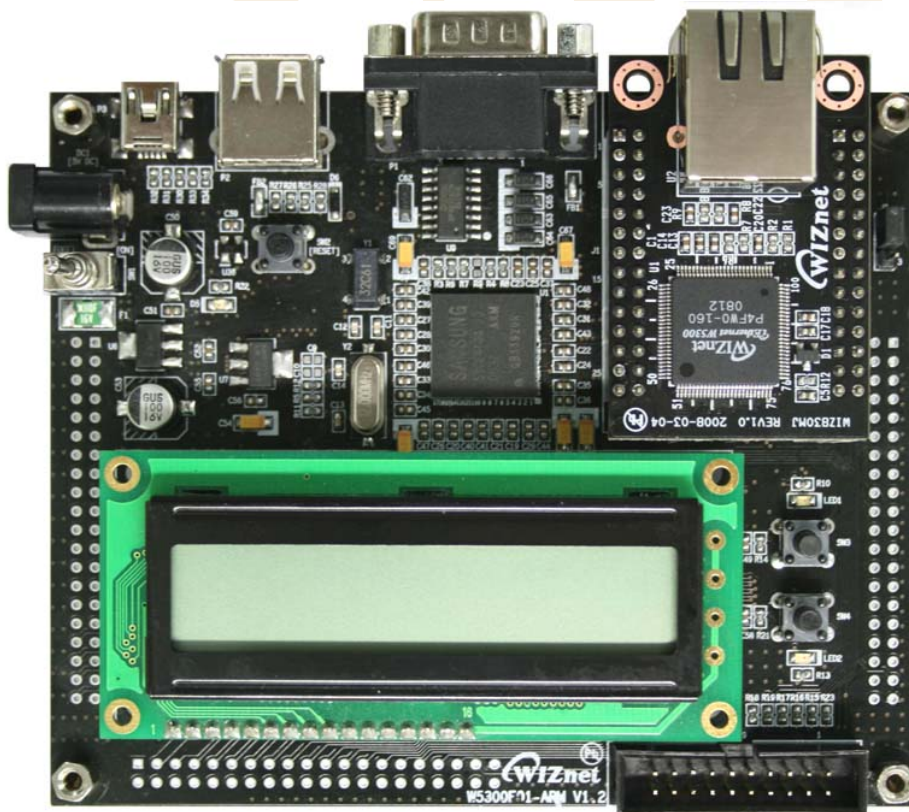


Figure 1-1 : W5300E01-ARM Board

1.2. Products Specification

1.2.1. Base Board Specification

| ITEM | Description | ETC |
|---------------------------|--|------------|
| MCU | 200MHz Samsung S3C2410A ARM RISC Processor | ARM920T |
| RAM | SDRAM 64MB | |
| ROM | NAND Flash ROM 64MB | |
| Serial | RS-232C 1Port | |
| USB Host | USB Host 1Port | |
| USB Device | USB Device 1Port | |
| Ethernet | Supported by WIZ830MJ Module | Basic ITEM |
| LCD | 16Character * 2Line Character LCD Port | Basic ITEM |
| LED | LED 2Ea for Debugging | |
| Button | Tact Switch 2Ea for Debugging | |
| JTAG | On board JTAG Socket | |
| WIZ830MJ Module Connector | 56Pin (28Pin * 2) 2.54mm Pitch Pin-Header Socket | |
| Expansion Port | 120Pin (40pin * 3) 2.54mm Pitch Pin-Header | |
| Power | DC 5V / 2A Adapter | Basic ITEM |
| PCB | 118mm * 97mm Size | |

Table 1-1 : W5300E01-ARM Base Board Specification

1.2.2. WIZ830MJ Module Specification

| ITEM | Description | ETC |
|----------------------|---|-----|
| Ethernet Chip | WIZnet W5300 TCP/IP Chip | |
| RJ-45 | RJ-45 1Port (integrated Transformer) | |
| Base board Interface | 56Pin (28pin * 2) 2.54mm Pitch Pin-Header | |
| PCB | 50mm * 34mm Size | |

Table 1-2 : WIZ830MJ Module Specification

2. Products Description

2.1. Board Layout

2.1.1. Base Board Layout

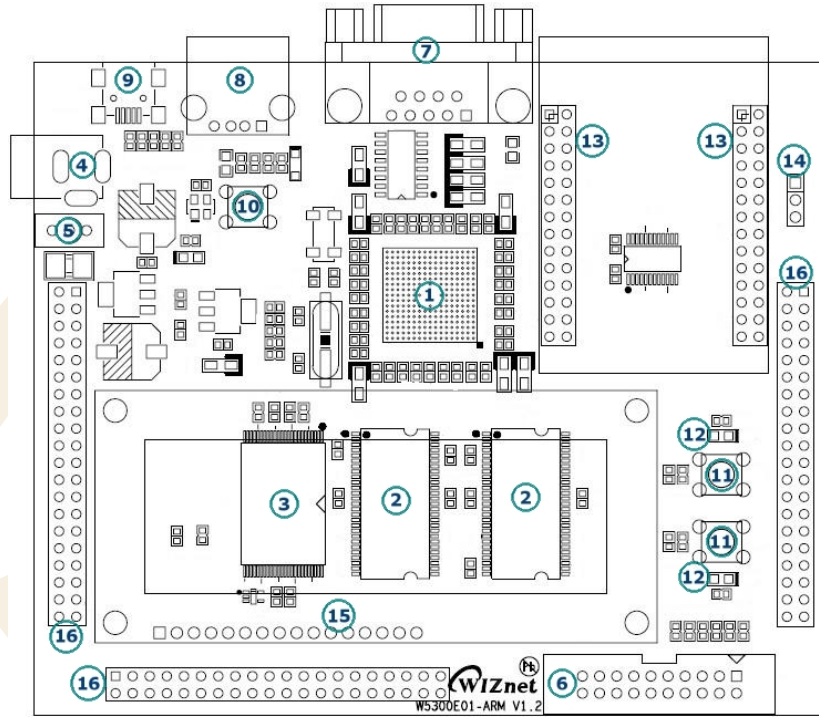


Figure 2-1 : W5300E01-ARM Base Board Layout

2.1.2. WIZ830MJ Module Layout

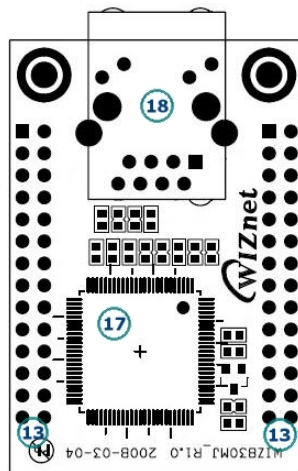


Figure 2-2 : WIZ830MJ Module Layout

2.1.3. Parts Description

The description of each part shown in <Figure 2-1 : W5300E01-ARM Base Board Layout> and <Figure 2-2 : WIZ830MJ Module Layout> is as below.

| No | Description | No | Description |
|----|-------------------------------|----|---|
| 1 | Samsung S3C2410A Processor | 10 | Reset Switch |
| 2 | 32MB SDRAM * 2Ea (Total 64MB) | 11 | Tact Switch for Debugging * 2Ea |
| 3 | 64MB NAND Flash ROM (K9F1208) | 12 | Green LED for Debugging * 2Ea |
| 4 | DC 5V / 2A Adapter Jack | 13 | WIZ830MJ Module Interface Connector |
| 5 | Power Switch | 14 | WIZ830MJ Module Bus width select Jumper |
| 6 | JTAG Connector | 15 | Character LCD Interface Connector |
| 7 | RS-232C Serial Connector | 16 | Expansion Connector (40Pin * 3Ea) |
| 8 | USB Host Connector | 17 | WIZnet W5300 TCP/IP Chip |
| 9 | USB Device(Slave) Connector | 18 | RJ-45 Jack (integrated Transformer) |

Table 2-1 : Parts Description of W5300E01-ARM

- For more detail, refer to 3. Hardware Designer's Guide.

2.2. Package and Contents

The contents of W5300E01-ARM are as below.

| | Item | Quantity |
|------------------|---|----------|
| Board | W5300E01-ARM Base Board | 1 |
| | WIZ830MJ Module (plugged in the base board of W5300E01-ARM) | 1 |
| | Character LCD (installed in the base board of W5300E01-ARM) | 1 |
| Accessory | Data CD | 1 |
| | Power adapter (DC 5V / 2A) | 1 |
| | UTP Cable | 1 |
| | Serial Cable | 1 |
| | USB Host / Device Cable | Option |

Table 2-2 : W5300E01-ARM Contents

| Directory | | Contents | | |
|--------------|-----------------------------|----------------------|---------------------------------|--------------------------|
| W5300E01-ARM | Documents | Manual | User's Manual | |
| | | Datasheet | Datasheet of Main Parts | |
| | Hardware | Schematics | W5300E01-ARM Hardware Schematic | |
| | | Parts List | W5300E01-ARM Parts List | |
| | Software | Bootloader | wiz-u-boot Source | |
| | | LinuxKernel | Linux kernel Source | Linux kernel Source |
| | | | Linux Kernel Patch file | Linux Kernel Patch file |
| | | | Linux Kernel Config file | Linux Kernel Config file |
| | | Image | Bootloader Image | Kernel Image |
| | | | Ramdisk Image | |
| Tools | Toolchain(compiler, etc...) | | | |
| Drivers | W5300 Driver | W5300 Driver | | |
| | Character LCD Driver | Character LCD Driver | | |
| Examples | Loopback test | | | |

Table 2-3 : Contents of Data CD

3. Hardware Designer's Guide

3.1. Block Diagram

3.1.1. System Block Diagram

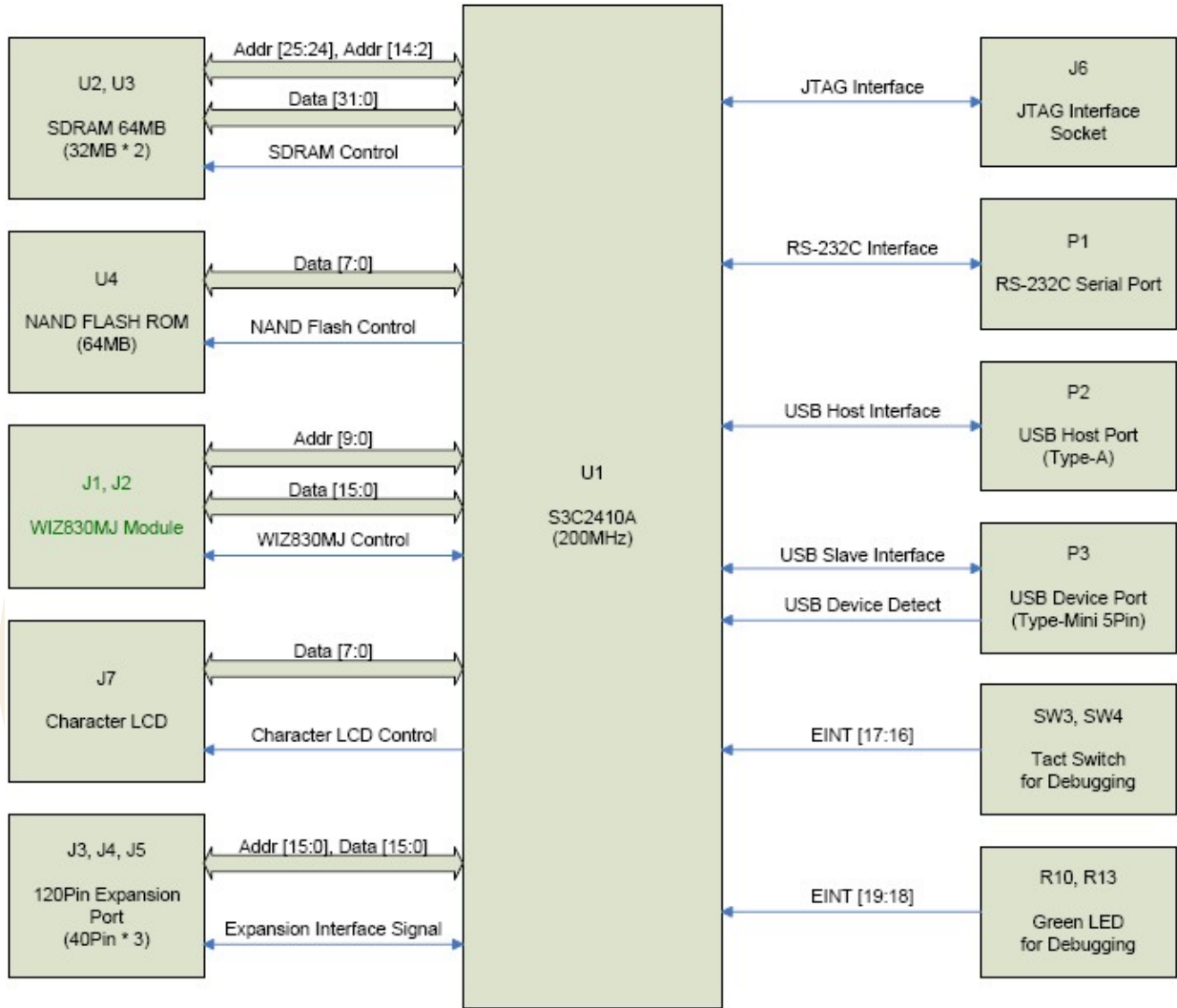


Figure 3-1 : W5300E01-ARM System Block Diagram

3.1.2. Power Block Diagram

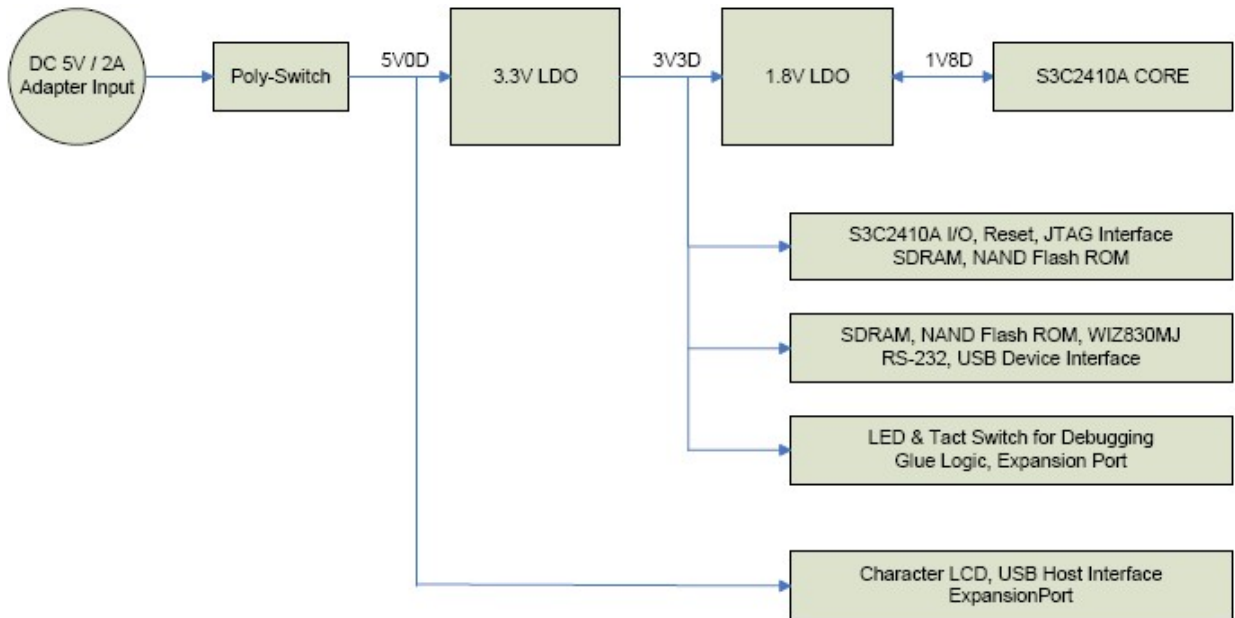


Figure 3-2 : W5300E01-ARM Power Block Diagram

3.2. Block Description

W5300E01-ARM can be divided into below blocks.

- S3C2410A System Block
- SDRAM
- NAND Flash ROM
- WIZ830MJ Module
- Character LCD
- RS-232C Serial Port
- USB Host / Device Port
- JTAG Interface
- LED & Tact Switch for Debugging
- Expansion Port Interface
- Power Block

3.2.1. S3C2410A System Block

In order to support NAND Flash boot loader, Samsung S3C2410A processor contains SRAM buffer called as Steppingstone.

W5300E01-ARM Platform uses NAND Flash ROM for Booting memory. It is designed to be initialized with NAND Flash booting by pull-down OM0 and OM1 pins of S3C2410A to GND.

As power-on reset IC is installed for user manual reset, it is possible to manually reset the board by using tact switch during board operation.

3.2.2. SDRAM

64MByte SDRAM is used for external memory of S3C2410A processor, and provides enough space for operation of O/S and User application.

3.2.3. NAND Flash ROM

64MByte NAND Flash ROM is used for external programming memory of S3C2410A and non-volatile storage device. Basically, Linux bootloader, Kernel, and File System are programmed in this Flash ROM. Additionally, embedded web server (utilizing W5300 TCP/IP) is also saved in NAND Flash ROM. Extra space can be used for user data field.

3.2.4. WIZ830MJ Module

WIZ830MJ is the Ethernet module having W5300 TCP/IP chip and RJ-45 connector (having Transformer). The connection of WIZ830MJ and base board is supported through 2.54mm Pitch Pin Header typed connector as shown in < Fig 3>

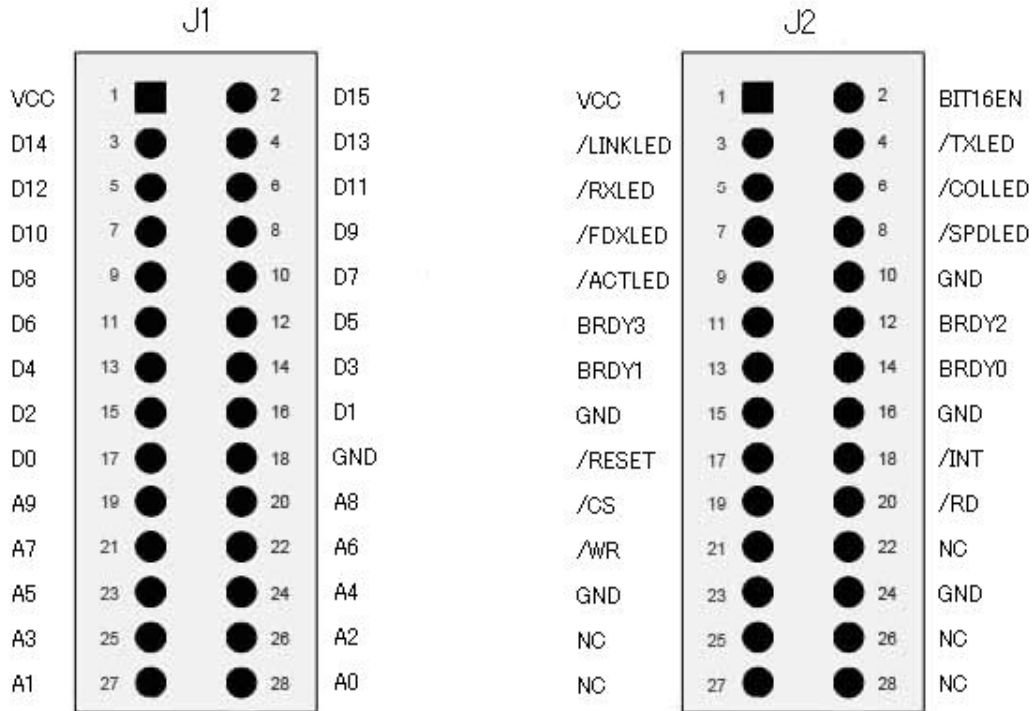


Figure 3-3 : WIZ830MJ Module Interface PIN Map

For more detail, refer to WIZ830MJ Module Datasheet.

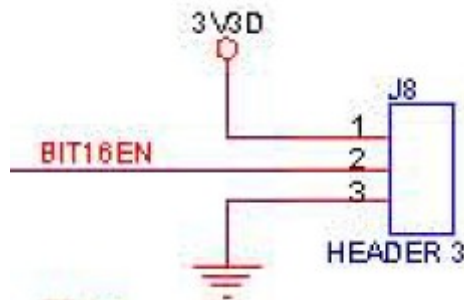


Figure 3-4 : W5300 Data Bus Width Setting Port

By using J8 3Pin header, it is possible to configure data bus width(8bit or 16bit) of W5300 in WIZ830MJ. By connecting pin 1 and 2 of J8 by using 2 pin jumper, 16 bit data bus width is configured. By connecting pin 2 and 3, 8 bit bus width is configured.

3.2.5. RS-232C Serial Port

It is the interface for UART 0, one of 3 channel UARTs that S3C2410A processor is supporting. The rest of 2 channels are used for extension through expansion port. W5300E01-ARM platform basically uses 9 pin DSUB male typed connector.

3.2.6. USB Host / Device Port

A-Type Host Connector and Mini-Type Device Connector are provided for testing USB Host interface and USB Device (Slave) interface that S3C2410 supports.

As USB Host driver is basically supported by Linux, it is possible to test various USB devices by connecting to W5300E01-ARM platform. Through USB device driver, the connection with PC is supported.

3.2.7. JTAG Interface

Through JTAG Interface, it is possible to write the Bootloader to the NAND Flash ROM. Debugging is available through JTAG debugging equipment. As 20 pin JTAG connector is installed, general JTAG equipments can be connected without any problem.

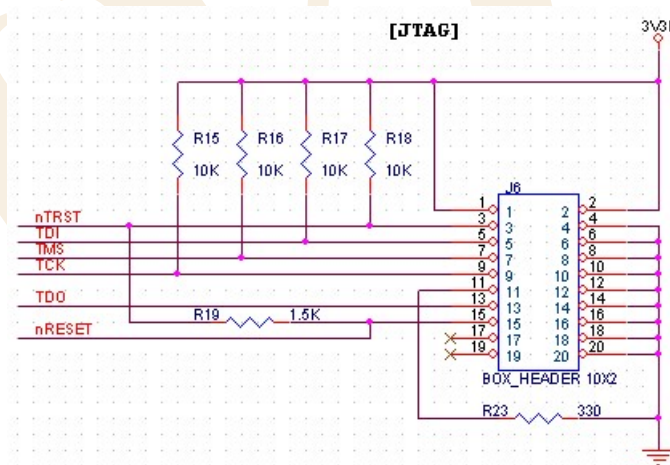


Figure 3-5 : JTAG Interface Part Schematic

3.2.8. LED & Tact Switch for Debugging

By using 2 LEDs and 2 Tact Switches connected to EINT/GPIO, simple debugging is supported.

3.2.9. Character LCD

Character LCD is used for displaying debugging and system status.

The pin description of character LCD interface (J7) is as below.

| PIN# | W5300E01-ARM B/D PIN NAME / LCD PIN NAME | DIR. | Description |
|--------|---|------|---------------------------------------|
| 1 | GND / VSS | | Signal Ground |
| 2 | 5V / VDD | I | LCD Power Supply |
| 3 | V0 / V0 | I | Voltage for LCD drive |
| 4 | A1 / RS | I | Data / Instruction register select |
| 5 | A2 / RW | I | Read / Write |
| 6 | LCD_E / E | I | Enable signal,start data read / write |
| 7 ~ 14 | D0 / DB0 ~ D7 / DB7 | I/O | Data Bus Line |
| 15 | 5V / LED A | O | LED Anode, power supply+ |
| 16 | GND / LED K | O | LED Cathode,ground 0V |

Table 3-1 : LCD PIN Description

74LBC4245 Bidirectional Level shifter is installed between I/O interface voltage level, 3.3V and LCD operational voltage level, 5V, for stable operation. More reliable operation is available by checking LCD Busy Flag through bi-directional buffer.

Low active chip select signal of S3C2410A is passed through inverter and changed to High active. And it is used for LCD Enable signal.

For more detail related to LCD operation, refer to LCD datasheet. (**LC1624(R2).pdf**).

3.2.10. Power Block

The power of W5300E01-ARM is supplied by 5V/2A adaptor. The internal power is 5V, 3.3V and 1.8V. For the detail of each power, refer to reference schematic or '3.1.2 Power Block Diagram'.

The input of 5V adaptor can be controlled by power switch (SW1). In order to prevent the damage by over-power when the switch is on, Poly-Fuse(F1) is applied.

Low Drop Out Regulator (5V -> 3.3V, 3.3V -> 1.8V) is applied for power efficiency and heat minimization.

3.2.11. Expansion Port Interface

Expansion port interface is designed for user to add the functions that S3C2410A provides (but W5300E01-ARM does not).

| Function | Pin # | Pin Name | Dir. | Description |
|-----------------------|--|----------|------|-----------------------------------|
| J3 Port | | | | |
| Power | 1 | 3V3D | | 3.3V System power |
| | 3 | 5V0D | | 5V System power |
| | 39 | GND | | System ground |
| System Data Bus | 2,4,6,8,10,12, 14,16,18,20,22, 24,26,28,30,32 | D0 ~ D15 | IO | Data bus |
| System Address Bus | 5,7,9,11,13,15, 17,19,21,23,25, 27,29,31,33,35 | A0 ~ A15 | O | Address bus |
| System Control Signal | 34 | nGCS0 | O | General chip select 0 |
| | 36 | nOE | O | Output enable |
| | 37 | nRESET | I | System reset input |
| | 38 | nWE | O | Write enable |
| | 40 | EINT0 | IO | External interrupt request / GPIO |
| J4 Port | | | | |
| Power | 1 | 3V3D | | 3.3V System power |
| | 3 | 5V0D | | 5V System power |
| | 39 | GND | | System ground |
| | 38 | VDDA_ADC | | 3.3V ADC power |
| | 40 | VSSA_ADC | | ADC ground |
| DMA | 2 | nXDACK0 | O | External DMA acknowledge |
| | 4 | nXDREQ0 | I | External DMA request |
| I2S Interface | 5 | I2SLRCK | IO | I2S bus channel select clock |
| | 7 | I2SSCLK | IO | I2S bus serial clock |
| | 9 | CDCLK | O | CODEC system clock |
| | 11 | I2SSDI | I | I2S bus serial data input |
| | 13 | I2SSDO | O | I2S bus serial data output |
| UART Interface | 10 | TXD1 | O | UART1 transmit data output |
| | 12 | RXD1 | I | UART1 receive data input |
| | 14 | TXD2 | O | UART2 transmit data output |

| | | | | |
|-----------------------|--|-----------------|----|---------------------------------------|
| | 16 | RXD2 | I | UART2 receive data input |
| SD Card Interface | 15 | SDCLK | O | SD clock |
| | 17 | SDCMD | IO | SD command |
| | 19,21,23,25 | SDDAT0 ~ SDDAT3 | IO | SD receive / transmit data |
| SPI Interface | 24 | SPICKL0 | IO | SPI clock |
| | 26 | SPIMOSI0 | IO | SPI master data output line |
| | 28 | SPIMISO0 | IO | SPI master data input line |
| | 30 | EINT10 / nSS0 | I | SPI chip select (for slave mode) |
| I2C Interface | 27 | IICSDA | IO | I2C bus data |
| | 29 | IIC_SCL | IO | I2C bus clock |
| ADC | 32 | AIN1 | AI | ADC analog input 1 |
| | 34 | AIN0 | AI | ADC analog input 0 |
| | 36 | Vref | AI | ADC voltage reference |
| GPIO / Interrupt | 18 | EINT6 | IO | External interrupt request / GPIO |
| | 37 | EINT1 | IO | External interrupt request / GPIO |
| System Control Signal | 6 | nXBREQ | I | Bus hold request |
| | 8 | nXBACK | O | Bus hold acknowledge |
| | 20 | PWREN | | |
| | 22 | nRSTOUT | | |
| | 31 | nWAIT | | |
| | 33 | nGCS4 | | General chip select 4 |
| | 35 | nGCS5 | | General chip select 5 |
| J5 Port | | | | |
| Power | 1 | 3V3D | | |
| | 3 | 5V0D | | |
| | 39 | GND | | |
| LCD Data Bus | 5,7,9,11,13,15, 17,19,21,23,25, 27,29,31,33,35, 37,2,4,6,8,10, 12,14 | VD0 ~ VD23 | | STN / TFT / SEC TFT LCD data bus |
| LCD Control Signal | 16 | LEND | | Line end signal |
| | 18 | VCLK | | LCD clock signal |
| | 20 | VLINE | | LCD line signal |
| | 22 | VM | | VM alternates the polarity of the row |

| | | | | |
|--------------------------|----------|------------------|----|--|
| | | | | and column voltage |
| | 24 | VFRAME | | LCD frame signal |
| | 26,28,30 | LCDVF0 LCDVF2 | ~ | Timing control signal for specific TFT LCD (OE/REV/REVB) |
| GPIO Port / Interrupt | 32 | EINT12 | IO | External Interrupt request / GPIO |
| | 34 | EINT23 | IO | External Interrupt request / GPIO |
| | 36 | EINT22 | IO | External Interrupt request / GPIO |
| | 38 | EINT21 | IO | External Interrupt request / GPIO |
| | 40 | EINT20 | IO | External Interrupt request / GPIO |

Table 3-2 : Expanded Board Interface Pin Description

3.3. Schematic

3.3.1. W5300E01-ARM Base Board Schematic

- Refer to 'W5300E01-ARM_V1.0.DSN' file included in CD.

3.3.2. WIZ830MJ Module Schematic

- Refer to 'WIZ830MJ_R10.DSN' file included in CD.

3.4. Parts List

3.4.1. W5300E01-ARM Parts List

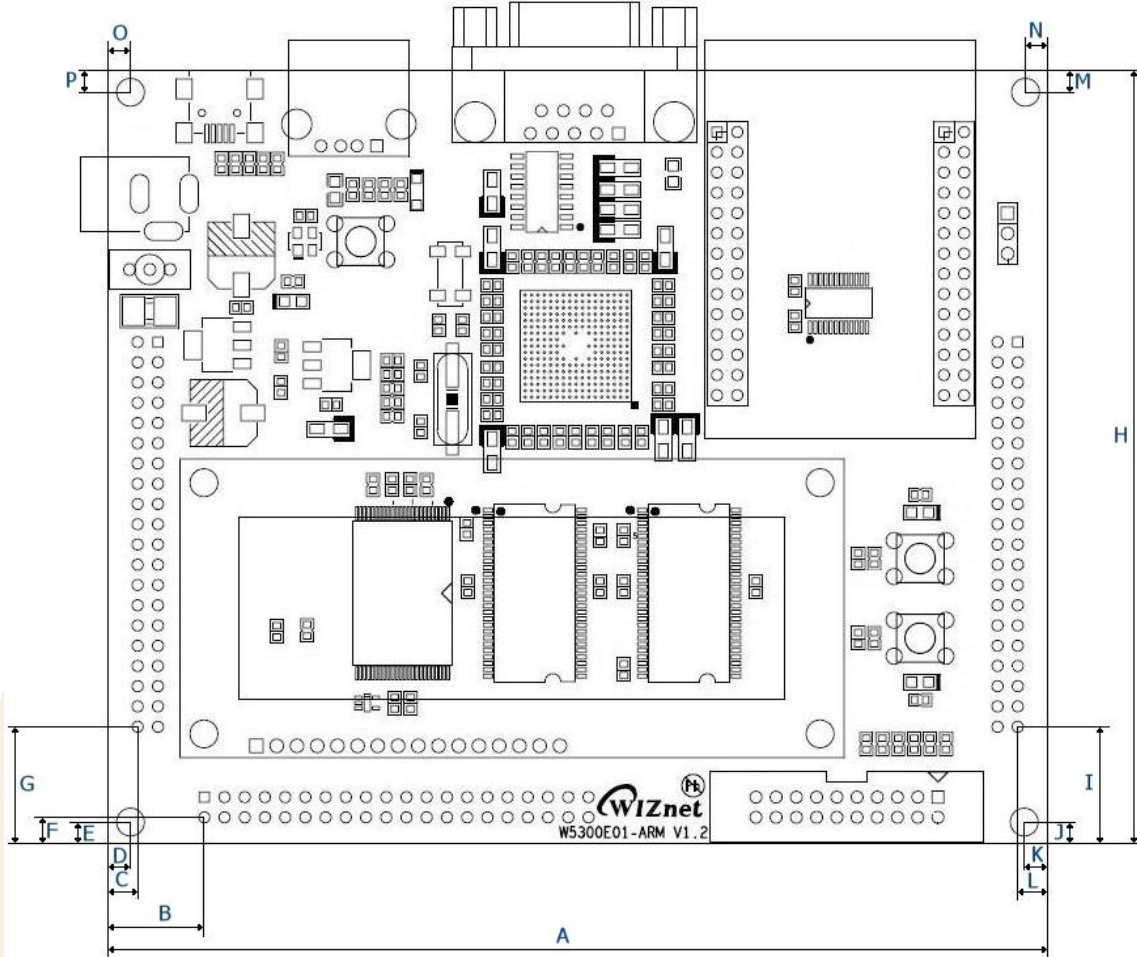
- Refer to 'W5300E01-ARM V1.0 PART LIST.PDF' file included in CD.

3.4.2. WIZ830MJ Module Parts List

- Refer to 'WIZ830MJ V1.0 PART LIST.PDF' file included in CD.

3.5. Physical Specification

3.5.1. Board Dimension



| Symbols | Dimensions (mm) | Symbols | Dimensions (mm) |
|---------|-----------------|---------|-----------------|
| A | 118.00 | I | 14.65 |
| B | 12.10 | J | 4.00 |
| C | 3.70 | K | 4.00 |
| D | 4.00 | L | 3.70 |
| E | 4.00 | M | 4.00 |
| F | 3.30 | N | 4.00 |
| G | 14.65 | O | 4.00 |
| H | 97.00 | P | 4.00 |

Figure 3-6 : W5300E01-ARM Board Dimension

- For the board dimension of WIZ830MJ, refer to WIZ830MJ datasheet.

4. Board Operation

4.1. Booting Check

4.1.1. Booting Check for Windows

Execute the Hyper Terminal of Windows and configure the port as below.

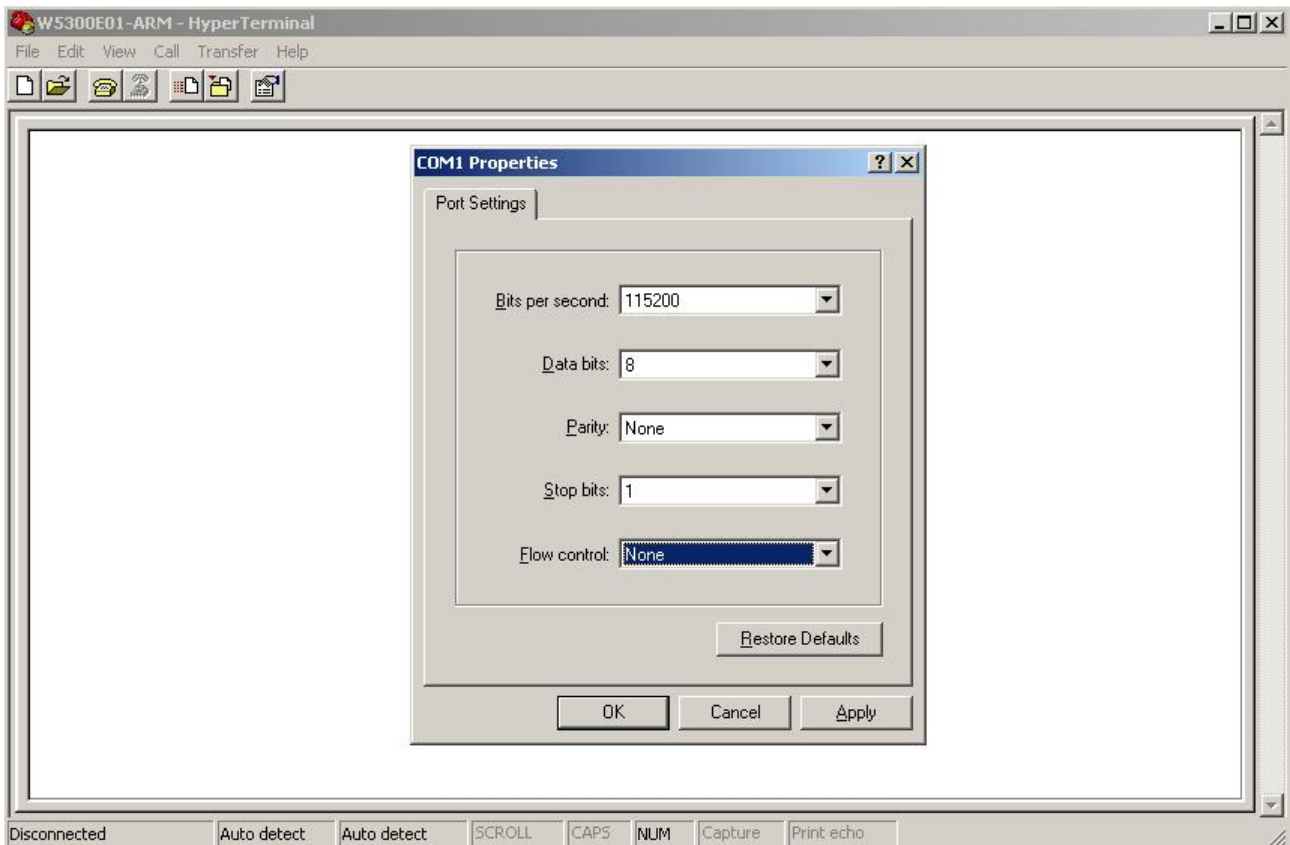


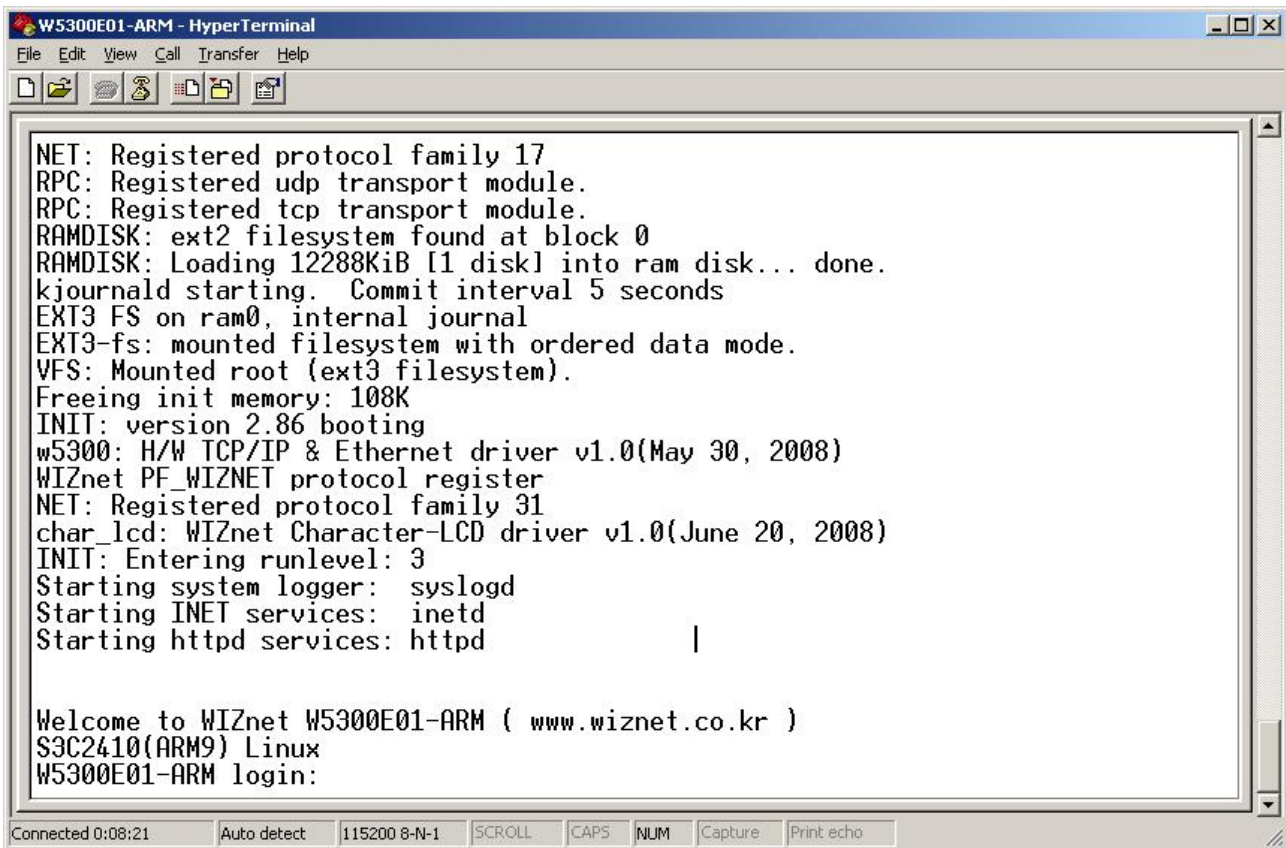
Figure 4-1 : Hyper Terminal Port Configuration

Configure the port as above.

In order to check the operation of the board, turn on the power after connecting the serial cable and executing Hyper Terminal program.

Below booting message means normal operation of the board. Below screen means that the booting is processed to Bootloader and Linux Kernel, and user can use the Linux.

- If below booting message is not displayed, check if power adaptor or serial cable is normally connected.



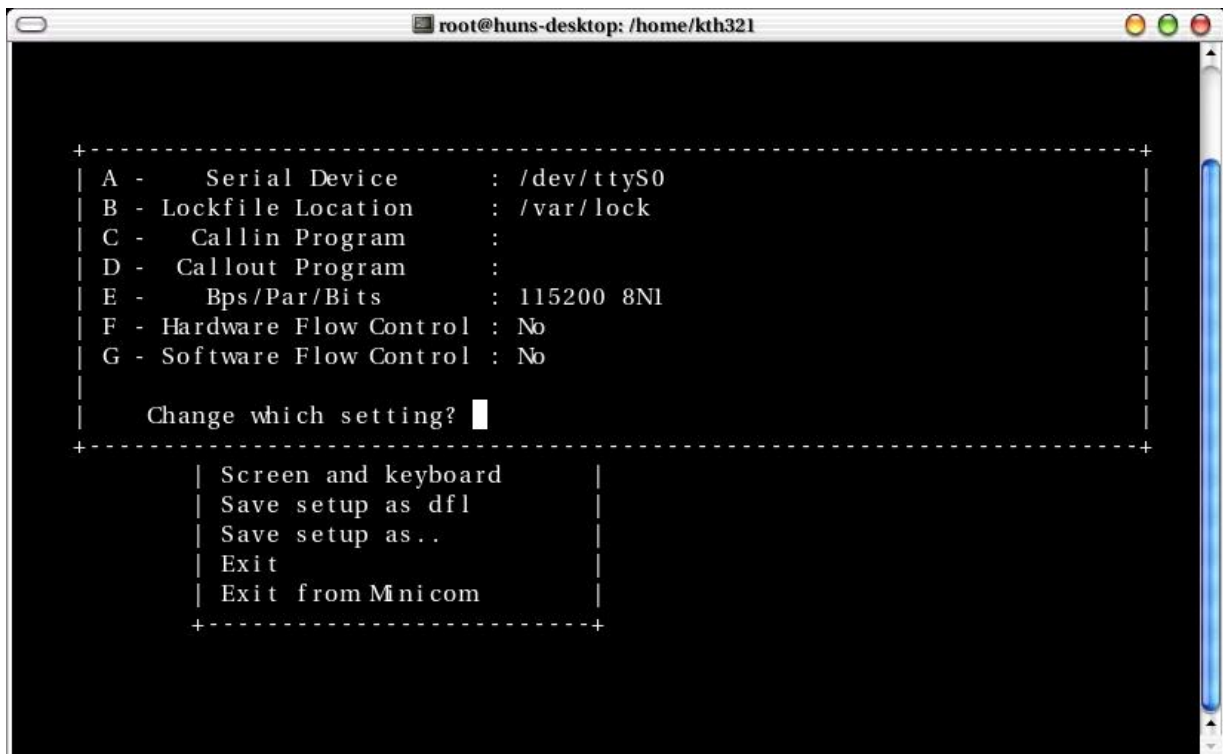
```
W5300E01-ARM - HyperTerminal
File Edit View Call Transfer Help
[Icons]
NET: Registered protocol family 17
RPC: Registered udp transport module.
RPC: Registered tcp transport module.
RAMDISK: ext2 filesystem found at block 0
RAMDISK: Loading 12288KiB [1 disk] into ram disk... done.
kjournald starting. Commit interval 5 seconds
EXT3 FS on ram0, internal journal
EXT3-fs: mounted filesystem with ordered data mode.
VFS: Mounted root (ext3 filesystem).
Freeing init memory: 108K
INIT: version 2.86 booting
w5300: H/W TCP/IP & Ethernet driver v1.0(May 30, 2008)
WIZnet PF_WIZNET protocol register
NET: Registered protocol family 31
char_lcd: WIZnet Character-LCD driver v1.0(June 20, 2008)
INIT: Entering runlevel: 3
Starting system logger: syslogd
Starting INET services: inetd
Starting httpd services: httpd

Welcome to WIZnet W5300E01-ARM ( www.wiznet.co.kr )
S3C2410(ARM9) Linux
W5300E01-ARM login:
Connected 0:08:21 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

Figure 4-2 : Booting Check at the Hyper Terminal

4.1.2. Booting Check for Linux

At the Linux, the booting can be checked by using minicom.



```

root@huns-desktop: /home/kth321
+-----+
| A -   Serial Device       : /dev/ttyS0
| B - Lockfile Location    : /var/lock
| C -   Callin Program     :
| D -   Callout Program    :
| E -   Bps/Par/Bits       : 115200 8N1
| F - Hardware Flow Control : No
| G - Software Flow Control : No
+-----+
|
| Change which setting? █
|
+-----+
| Screen and keyboard
| Save setup as dfl
| Save setup as..
| Exit
| Exit from Minicom
+-----+
    
```

Figure 4-3 : Minicom Port Configuration

Execute 'minicom -s' and select 'Serial port setup' menu, and configure the port as above.

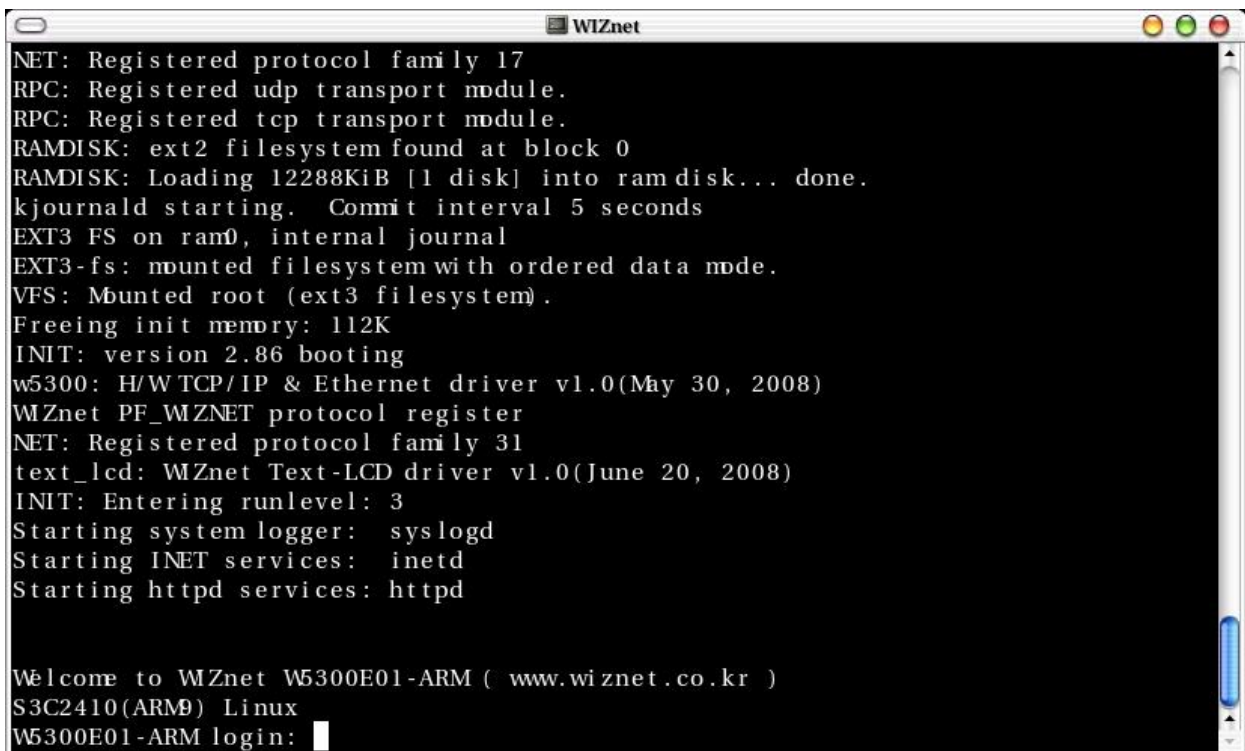
Select 'Save setup as dfl' menu to save serial configuration. By selecting 'Exit' menu, exit the configuration menu.

- The device file of 'Serial Device' can be different according to the Linux version.

Turn on the board after connecting the board to PC by using serial cable, and executing the Hyper Terminal program. If below booting message is displayed on the Terminal screen, the board normally operates.

Below screen means that the booting is processed to Bootloader and Linux Kernel, and user can use the Linux.

- If below booting message is not displayed, check if power adaptor or serial cable is normally connected.



```
WIZnet
NET: Registered protocol family 17
RPC: Registered udp transport module.
RPC: Registered tcp transport module.
RAMDISK: ext2 filesystem found at block 0
RAMDISK: Loading 12288KiB [1 disk] into ramdisk... done.
kjournald starting. Commit interval 5 seconds
EXT3 FS on ram0, internal journal
EXT3-fs: mounted filesystem with ordered data mode.
VFS: Mounted root (ext3 filesystem).
Freeing init memory: 112K
INIT: version 2.86 booting
w5300: H/W TCP/IP & Ethernet driver v1.0(May 30, 2008)
WIZnet PF_WIZNET protocol register
NET: Registered protocol family 31
text_lcd: WIZnet Text-LCD driver v1.0(June 20, 2008)
INIT: Entering runlevel: 3
Starting system logger: syslogd
Starting INET services: inetd
Starting httpd services: httpd

Welcome to WIZnet W5300E01-ARM ( www.wiznet.co.kr )
S3C2410(ARM9) Linux
W5300E01-ARM login: █
```

Figure 4-4 : Booting Check at the minicom

4.2. Testing Network Operation

W5300E01-ARM board supports Hybrid mode of W5300 linux driver – simultaneous use of S/W & H/W TCP/IP stack. By configuring channel 0 as MAC_RAW mode, it is possible to utilize Hybrid mode for compatibility with existing network program. Channel 1 is configured for testing looback test through H/W TCP/IP stack.

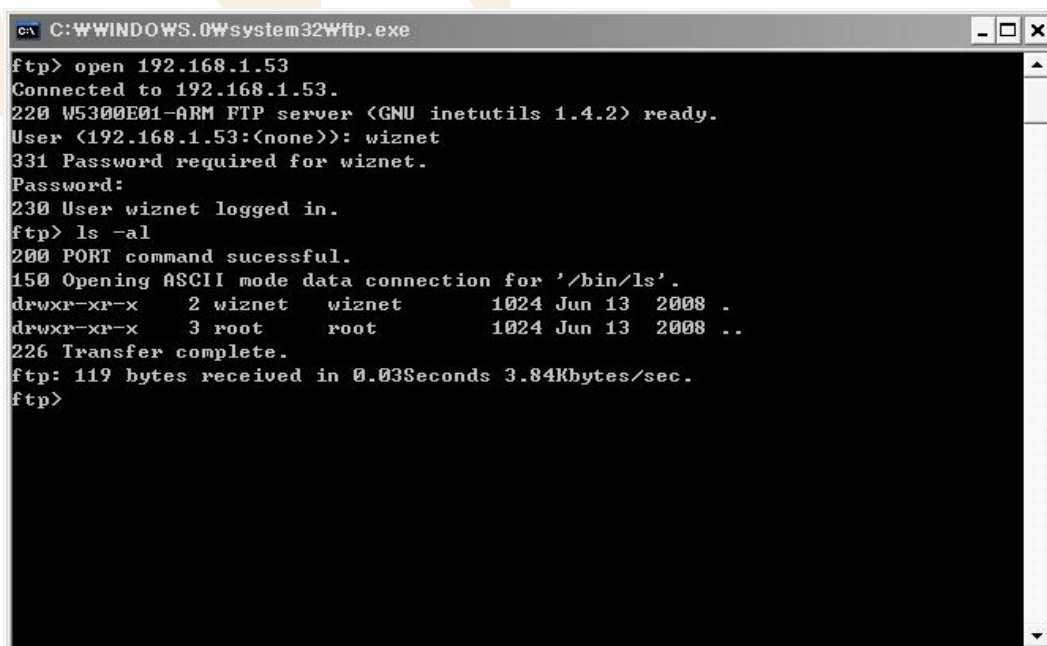
By configuring channel 0 as MAC_RAW mode, existing network program can be supported without any change. And, if there is any network application requiring higher performance, you can use other H/W TCP/IP channels.

According to the requirement of your products, Hybrid mode can be useful. For more detail, refer to 'W5300 Datasheet'.

When W5300E01-ARM board is booted, FTP server, HTTP server and Telnet server are automatically loaded.

4.2.1. Testing FTP Server

1. Supply the power to W5300E01-ARM and check booting is normally processed.
2. Execute FTP Client program.
 - Windows : Start -> 'Run' -> input 'ftp'
 - Linux : Input 'ftp' at the terminal
3. Input 'open 192.168.1.53' and connect to FTP server of W5300E01-ARM.
4. Log in with 'id > wiznet, password > wiznet'.



```

C:\WINDOWS.0\system32\Wftp.exe
ftp> open 192.168.1.53
Connected to 192.168.1.53.
220 W5300E01-ARM FTP server (GNU inetutils 1.4.2) ready.
User (192.168.1.53:(none)): wiznet
331 Password required for wiznet.
Password:
230 User wiznet logged in.
ftp> ls -al
200 PORT command successful.
150 Opening ASCII mode data connection for '/bin/ls'.
drwxr-xr-x  2 wiznet  wiznet    1024 Jun 13  2008 .
drwxr-xr-x  3 root   root      1024 Jun 13  2008 ..
226 Transfer complete.
ftp: 119 bytes received in 0.033Seconds 3.84Kbytes/sec.
ftp>
    
```

Figure 4-5 : FTP Server Test

4.2.2. Testing HTTP Server

1. Supply the power to W5300E01-ARM board and check booting.
2. Execute Web Browser.
3. Input 'http://192.168.1.53' for address.

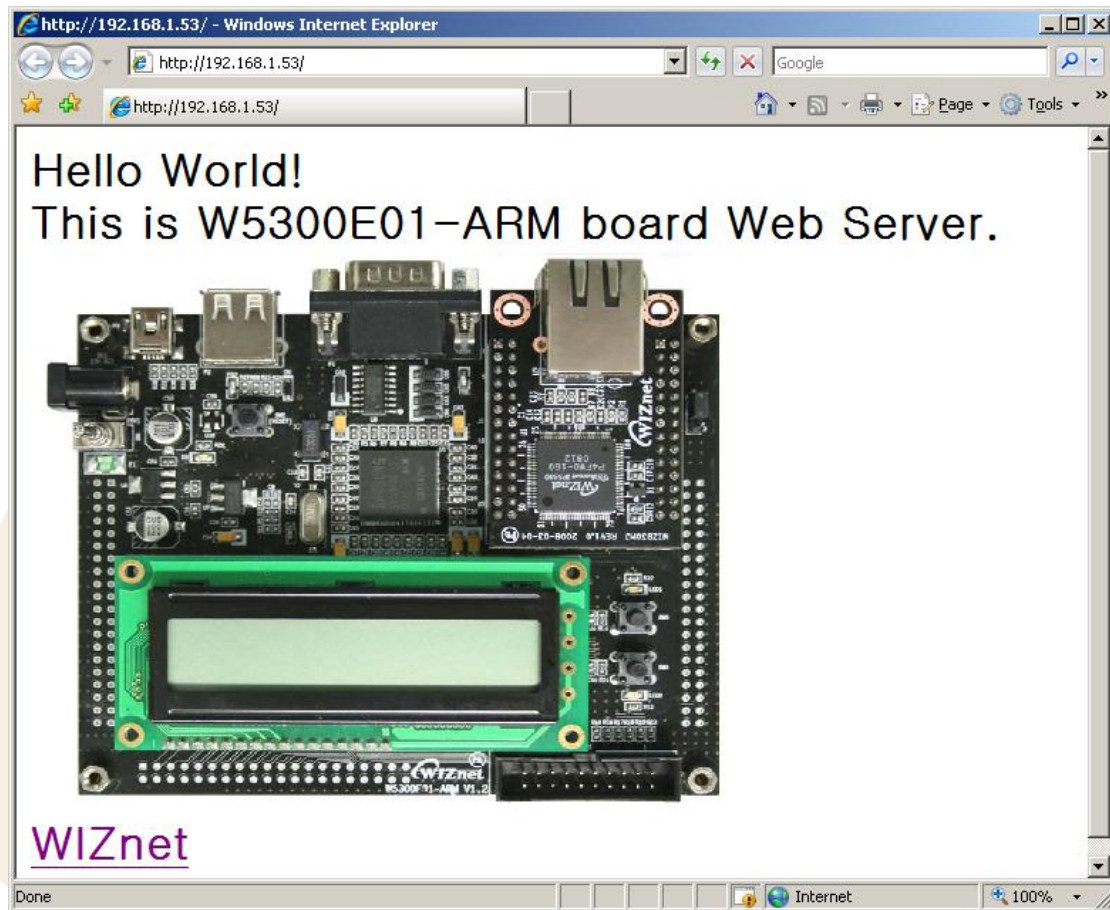
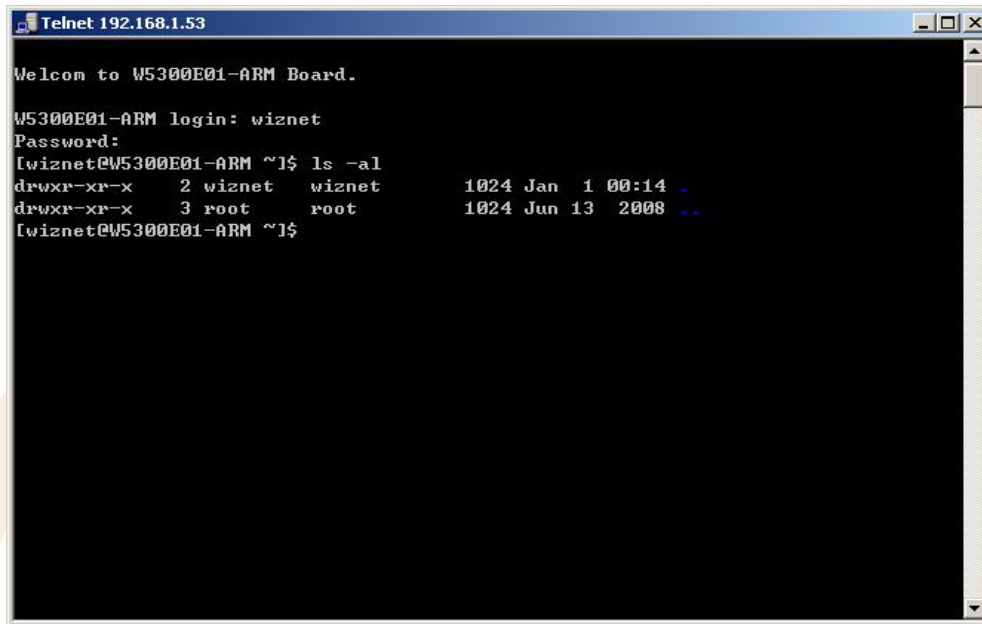


Figure 4-6 : HTTP Server Test

4.2.3. Testing TELNET Server

1. Supply the power to W5300E01-ARM board and check booting.
2. Execute TELNET Client program.
 - Windows : Start -> 'Run' -> Input 'telnet'
 - Linux : Input 'telnet' at the terminal
3. Log in with 'id > wiznet, password > wiznet'.



```

Telnet 192.168.1.53
Welcom to W5300E01-ARM Board.
W5300E01-ARM login: wiznet
Password:
[wiznet@W5300E01-ARM ~]# ls -al
drwxr-xr-x  2 wiznet  wiznet    1024 Jan  1  00:14 .
drwxr-xr-x  3 root   root      1024 Jun 13  2008 ..
[wiznet@W5300E01-ARM ~]#
    
```

Figure 4-7 : TELNET Server Test

4.2.4. Testing Loopback

With the loopback program in W5300E01-ARM, it is possible to test both of SW & HW TCP/IP stack. Loopback program is installed in '/root' directory of 5300E01-ARM board.

1. Install AX1 provided by CD. (**Software/Tools/AXInstallV3.1.exe**)
For the detail of AX1, refer to '**Documents/Manual/AX1 Manual V3.1**' provided by CD.
2. Supply the power to W5300E01-ARM and check booting.
3. Log in with 'root'.
4. Execute the Loopback server with './loopback -t -w' command. The option of Loopback is as below.

| | |
|-----------|--|
| -h | Looback help |
| -u | UDP loopback mode |
| -t | TCP loopback mode |
| -w | PF_WIZNET(H/W TCP/IP) loopback mode(Default 'PF_INET') |
| -b <size> | Buffer size(Default 4096) |
| -p <port> | Port number(Default 5001) |

Table 4-1 : Loopback Option

5. Execute AX1 at the PC.
6. For the exact testing, calculate CPU Tick by selecting 'CPUTICK' -> 'CPUTICK' of AX1.
7. Select 'TCP' -> 'Connect' of AX1.
8. Input 'IP > 192.168.1.53' and 'PORT > 5001' and click 'OK' button.
The IP address of PC in which AX1 is installed, should be set as 192.168.1.xxx (Ex> 192.168.1.2).
9. Check if 'Connected' message is shown. If PC and W5300E01-ARM board is connected, 'loopback start!' message is displayed at the loopback program of W5300E01-ARM. If connection is not normal, check below.
 - Is UTP cable correctly connected?
 - Is IP address correctly configured as 192.168.1.xxx?
 - Is loopback program normally executed at the W5300E01-ARM?

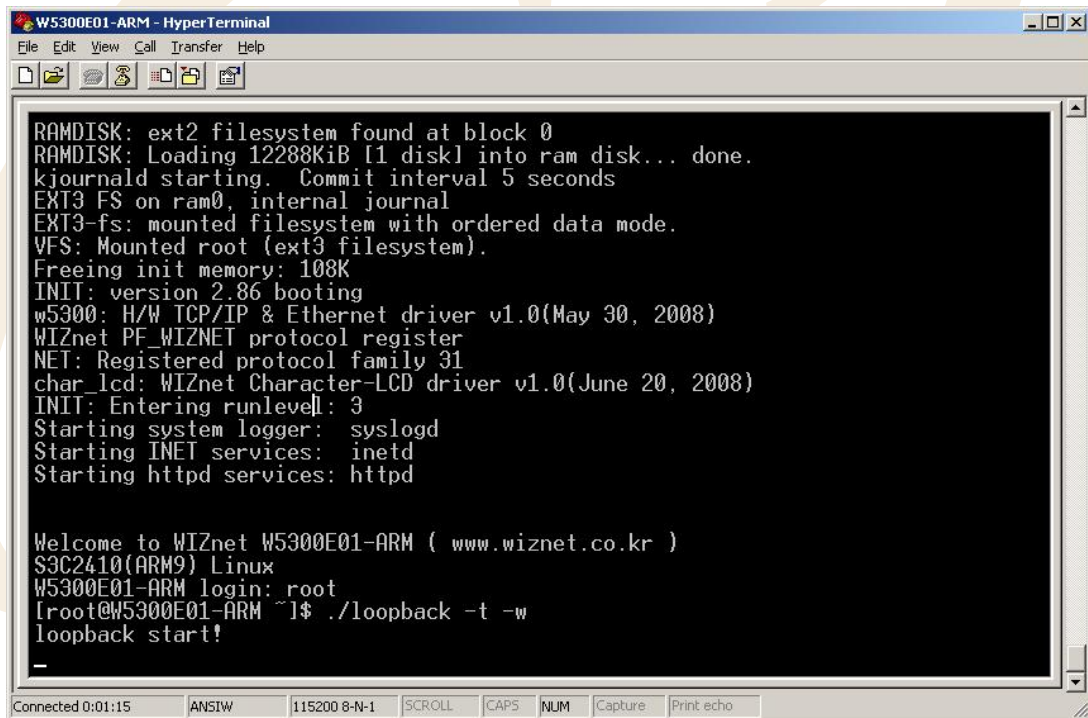


Figure 4-8 : Loopback Connection Check

10. Select '∞' Toolbar of AX1, and select any image file. (Size : 10~50Mb)

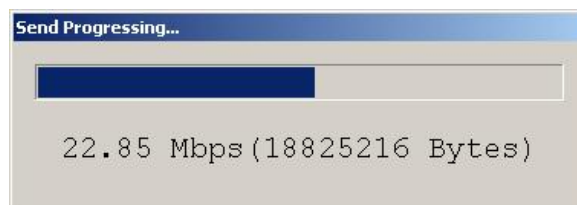


Figure 4-9 : Loopback Test

5. Configuring Development Environment

Development environment is same as one which is generally used. Programming is done at the Host PC. Execution file for target board is created by using cross compiler. The file is sent to target board for execution.

5.1. Cable Connection

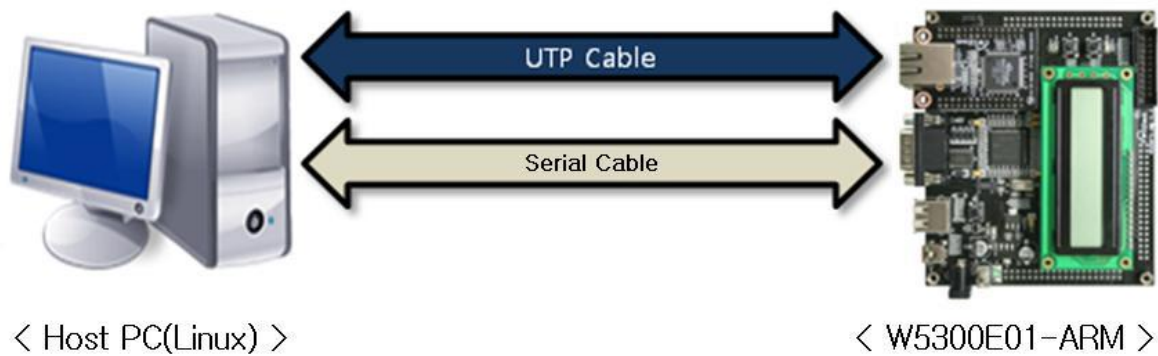


Figure 5-1 : Cable Connection Example 1

As shown in <Figure 5-1>, connect the Host PC and W5300E01-ARM board. The Linux should be installed in the Host PC. Serial cable is used for system console, debugging and data transmission. UTP cable is for data transmission. The data communication through UTP cable is faster than serial cable. In order to transfer big-sized file, use UTP cable for more efficiency.

If you are not familiar with Linux, it is possible to develop at the Windows, and compile the source code by sending to Host PC as shown in <Figure 5-2>.

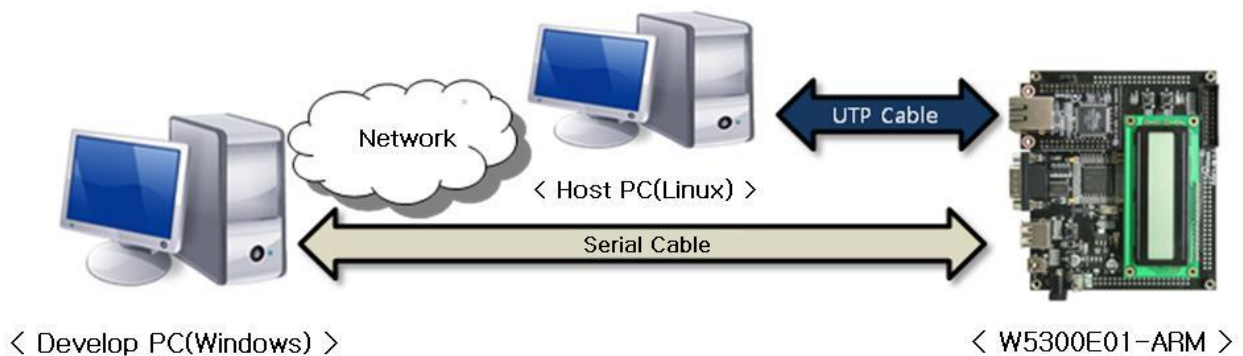


Figure 5-2 : Cable Connection Example 2

5.2. Toolchain Installation

Toolchain is included in CD. Log in with 'root' at the Host PC, and install as below steps.

1. Mount the CD on the CD-ROM.
2. Copy the compressed Toolchain file into '/'.
3. Extract the Toolchain compressed file.

After mounting CD, input below commands in the terminal window.

```
# mount /dev/cdrom /media/cdrom
# cp /media/cdrom/Software/Tools/arm-toolchain-3.4.3.tar.gz /
# cd /
# tar zxvf arm-toolchain-3.4.3.tar.gz
```

As the CD contents are automatically mounted in the latest Linux version, you don't need to input 'mount' command in the most cases. When you mount the CD manually, check device file and mounting directory.

5.3. Network Configuration of Host PC

In order to transfer files between Host PC and target board by using UTP cable, server programs should be installed in the Host PC. Virtual IP address can be used for this networking. As server program installation is processed by package management system, the board should be conneted to the WAN. In order to use LAN and WAN together, add the virtual IP with below command.

```
# ifconfig eth0 add 192.168.1.2
```

5.3.1. TFTP(Trivial File Transfer Protocol) Server Configuration

In order to transmit Linux Kernel image, Ramdisk image or other files, tftp server should be installed in Host PC. In here, we will install the tftp server of Red Hat and Debian.

If Host PC is using Debian Linux, install tftpd-hpa package by using apt-get package management system.

```
# apt-get install tftpd-hpa
```

At the Red Hat Linux, install tftpd-server package by using yum package management system.

```
# yum install tftp-server
```

Make the directory to be used for tftp server, and execute tftp server.

```
# mkdir /tftpboot
# in.tftpd -l -s /tftpboot
```

Now, it is possible to download the files in '/tftpboot' of Host PC into the target board by using tftp.

When executing tftp server by using xinetd, open '/etc/xinetd.d/tftp' file at the editor, and change the 'disable = yes' into 'disable = no'. If you don't have '/etc/xinetd.d/tftp' file, create the file and include below.

```
service tftp
{
    disable          = no
    socket_type      = dgram
    protocol         = udp
    wait            = yes
    user             = root
    server           = /usr/sbin/in.tftpd
    server_args      = -c -s /tftpboot
    per_source       = 11
    cps              = 100 2
    flags            = IPv4
}
```

Re-start the 'xinetd'

```
# /etc/init.d/xinetd stop
# /etc/init.d/xinetd start
```

When using 'xinetd', 'xinetd' package should be installed. If 'xinetd' package is not installed, install it by using apt-get or yum package management system.

5.3.2. NFS(Network FileSystem) Server Configuration

When transmitting big-sized file from Host to target board, serial is not efficient. For this case, NFS (Network File System) can be used. Binary image is created after programming and compiling at the Host PC. If you install the the binary image at the directory configured by NFS, you can execute it at the target board.

If nfs server is not installed in the Host PC, install the nfs server. If you are using Debian Linux, install the nfs-kernel-server package with apt-get package management system.

```
# apt-get install nfs-kernel-server
```

In case of Red Hat, install nfs-utils package with yum package management system.

```
# yum install nfs-utils
```

Create a directory to share NFS between Host PC and Target board.

```
# mkdir /nfs
```

Open '/etc/exports' file and add below.

```
/nfs 192.168.1.0(rw, insecure)
```

Re-start the NFS. (In case of using Debian, input '/etc/init.d/nfs-kernel-server' instead of '/etc/init.d/nfs'.)

```
# /etc/init.d/nfs stop  
# /etc/init.d/nfs start
```

5.4. File Transmission

5.4.1. File Transmission by using Serial (ZModem)

It is possible to transmit a file by using Zmodem of terminal program.

Serial transmission is simple and easy, but slow in speed. It is appropriate to transmit small-sized files.

For the testing, program 'Hello World' in the 'test.c' source file.

```
#include <stdio.h>

int main(void)
{
    printf("Hello World!\n");
    return 0;
}
```

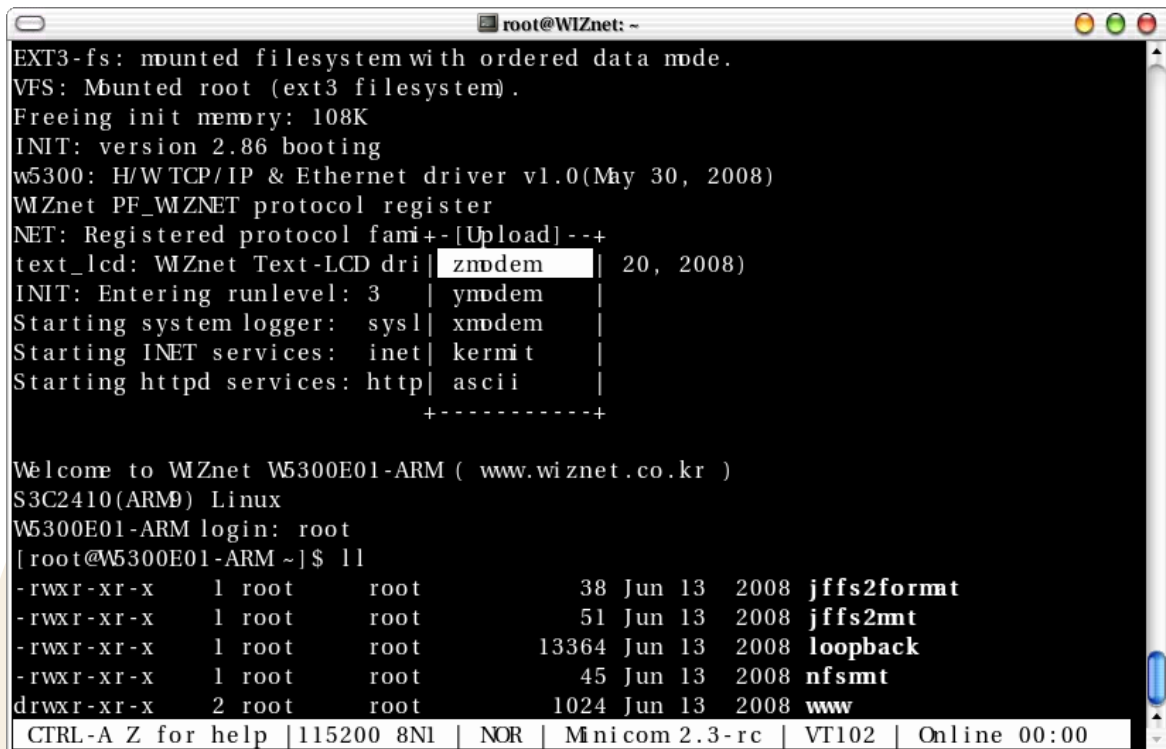
Compile the source code into execute file for ARM.

```
# arm-linux-gcc -o test test.c
```

5.4.1.1. Serial File Transmission at the Minicom

It is possible to transmit serial data to Minicom by using serial console at the Linux Host PC as below.

1. Execute minicom, and log in with 'root' after W5300E01-ARM is booted.
2. Press 'Ctrl + A' and 'Ctrl + S', and select ZModem as transmission protocol.

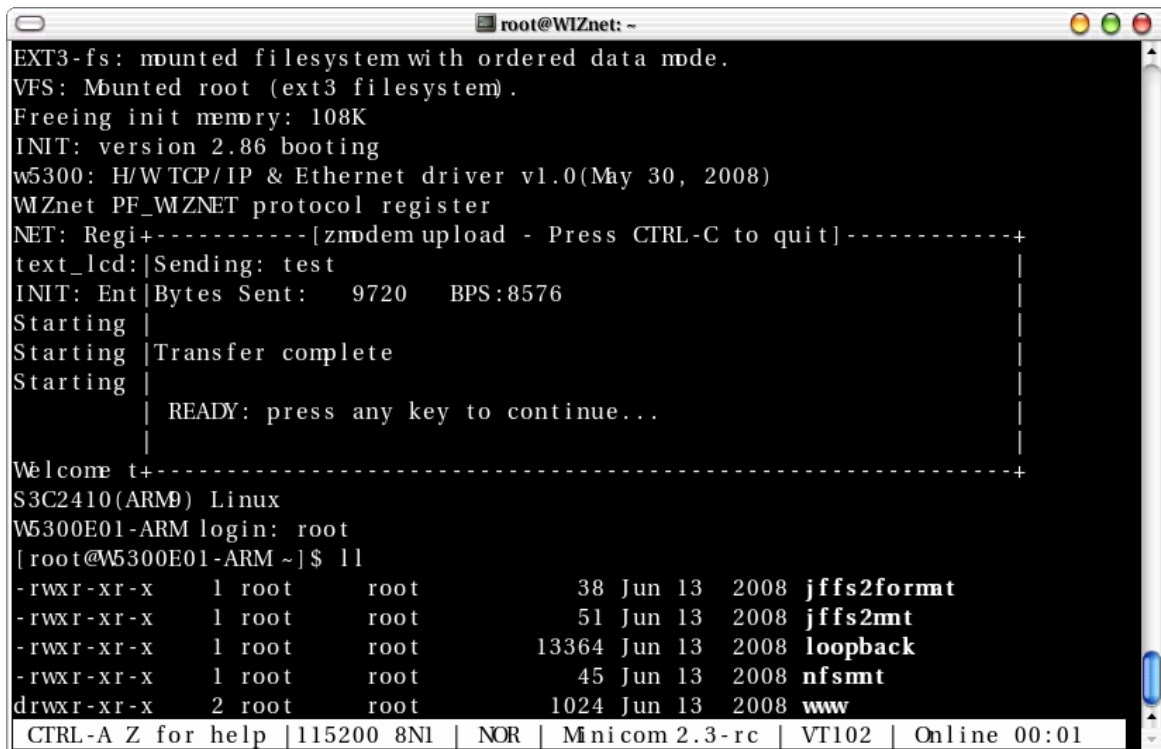


```

root@WIZnet: ~
EXT3-fs: mounted filesystem with ordered data mode.
VFS: Mounted root (ext3 filesystem).
Freeing init memory: 108K
INIT: version 2.86 booting
w5300: H/W TCP/IP & Ethernet driver v1.0(May 30, 2008)
WIZnet PF_WZNET protocol register
NET: Registered protocol family 17
text_lcd: WIZnet Text-LCD driver v1.0(May 30, 2008)
INIT: Entering runlevel: 3
Starting system logger: syslog
Starting INET services: inetd
Starting httpd services: httpd
+-----+
Welcome to WIZnet W5300E01-ARM ( www.wiznet.co.kr )
S3C2410(ARM) Linux
W5300E01-ARM login: root
[root@W5300E01-ARM ~]# ll
-rwxr-xr-x  1 root   root      38 Jun 13  2008 jffs2format
-rwxr-xr-x  1 root   root      51 Jun 13  2008 jffs2mt
-rwxr-xr-x  1 root   root    13364 Jun 13  2008 loopback
-rwxr-xr-x  1 root   root      45 Jun 13  2008 nfsmt
drwxr-xr-x  2 root   root     1024 Jun 13  2008 www
CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.3-rc | VT102 | Online 00:00
    
```

Figure 5-3 : Zmodem Selection at the minicom

3. Move the cursor to the file to be transmitted. If you press the 'Space Bar', the file is highlighted. Now, if you input 'Enter', the file is transmitted. The 'test' file is transmitted.
4. When transmission is completed, below message is displayed.

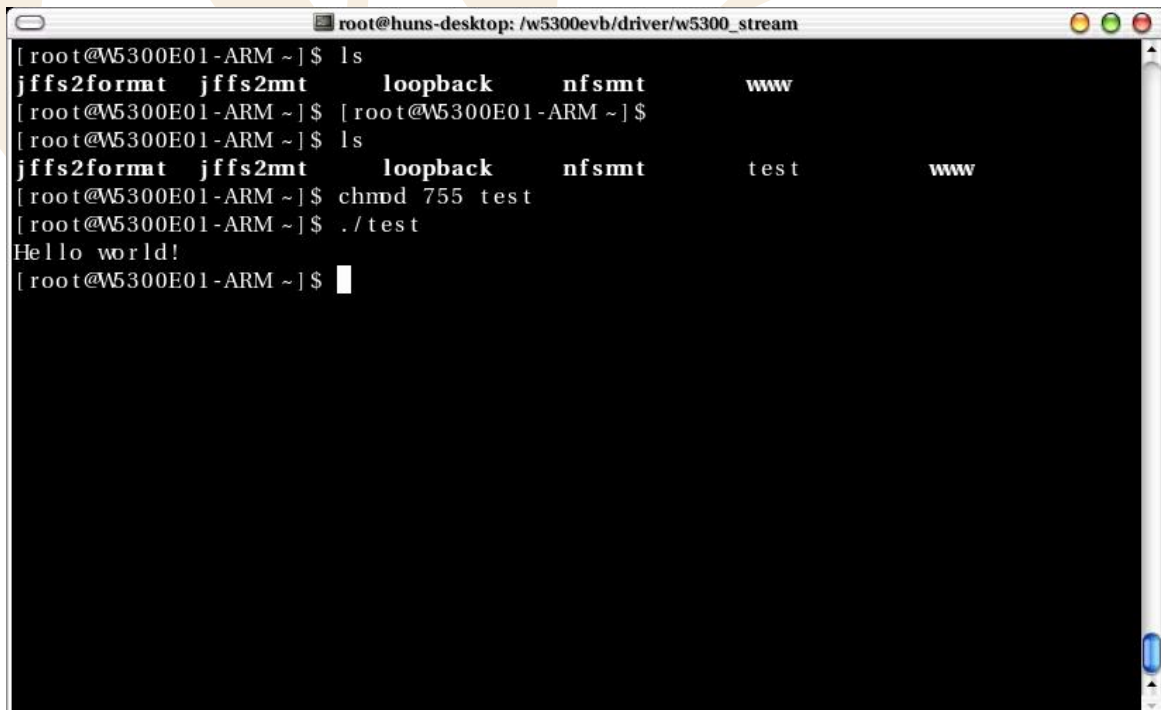


```

root@WIZnet: ~
EXT3-fs: mounted filesystem with ordered data mode.
VFS: Mounted root (ext3 filesystem).
Freeing init memory: 108K
INIT: version 2.86 booting
w5300: H/W TCP/IP & Ethernet driver v1.0(May 30, 2008)
WIZnet PF_WZNET protocol register
NET: Regi+-----[zmodem upload - Press CTRL-C to quit]-----+
text_lcd:|Sending: test
INIT: Ent|Bytes Sent: 9720 BPS:8576
Starting |
Starting |Transfer complete
Starting |
        |READY: press any key to continue...
Welcome t+-----+
S3C2410(ARM) Linux
W5300E01-ARM login: root
[root@W5300E01-ARM ~]$ ll
-rwxr-xr-x 1 root root 38 Jun 13 2008 jffs2format
-rwxr-xr-x 1 root root 51 Jun 13 2008 jffs2mt
-rwxr-xr-x 1 root root 13364 Jun 13 2008 loopback
-rwxr-xr-x 1 root root 45 Jun 13 2008 nfsmt
drwxr-xr-x 2 root root 1024 Jun 13 2008 www
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.3-rc | VT102 | Online 00:01
    
```

Figure 5-4 : Zmodem at the minicom

5. Check if the file is correctly transmitted with 'ls' command.
6. Configure file authority with 'chmod 755 test' and execute 'test' program.



```

root@huns-desktop: /w5300evb/driver/w5300_stream
[root@W5300E01-ARM ~]$ ls
jffs2format jffs2mt loopback nfsmt www
[root@W5300E01-ARM ~]$ [root@W5300E01-ARM ~]$
[root@W5300E01-ARM ~]$ ls
jffs2format jffs2mt loopback nfsmt test www
[root@W5300E01-ARM ~]$ chmod 755 test
[root@W5300E01-ARM ~]$ ./test
Hello world!
[root@W5300E01-ARM ~]$
    
```

Figure 5-5 : Executing Test File at the minicom

5.4.1.2. Serial File Transmission at the Hyper Terminal

If PC is operating on Windows, the Hyper Terminal can be used as below.

The serial file transmission can be processed at the Hyper Terminal.

1. Execute Hyper Terminal, and log in with 'root' after W5300E01-ARM is booted.
2. Select 'Transfer' -> 'Send File...' at the menu bar.
3. When 'Send File' dialogue window appears, select 'Zmodem with Crash Recovery' or 'Zmodem' for Protocol.

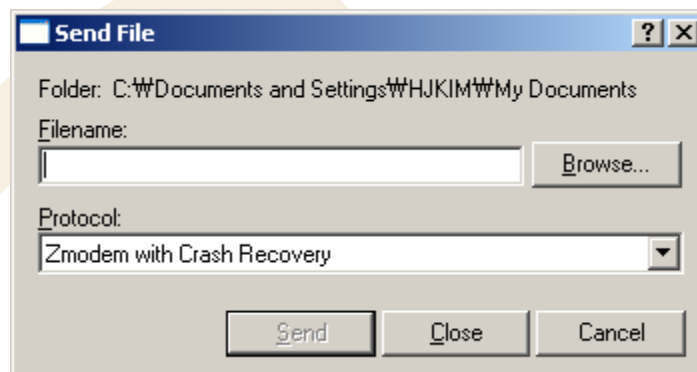


Figure 5-6 : Selecting Zmodem at the Hyper Terminal

4. Click 'Browse...' button for selecting file to be transmitted.
5. If transmission is completed, check if the file is correctly transmitted with 'ls' command.

5.4.2. File Transmission by using NFS

In order to use NFS, NFS Server should be installed in the Host PC. For the detail of NFS server installation, refer to '5.3.2 NFS Server Configuration'.

W5300E01-ARM supports NFS Client. In order to use the directory of NFS at the Host PC, input below command at the target board.

```
# mount -t nfs -o nolock 192.168.1.2:/nfs /mnt/nfs
# ls /mnt/nfs
```

In the '/root' directory, the script to mount NFS is included. By using this script, NFS directory can be simply mounted.

```
#!/nfsmnt 192.168.1.2:/nfs
# ls /mnt/nfs
```

5.4.3. Others

In the W5300E01-ARM, FTP server and client are built in. By using FTP, file transmission is available.

6. Linux Kernel Patch & Compile

- The official Linux kernel can't be used in W5300E01-ARM.
- The kernel code should be modified in accordance with W5300E01-ARM platform.
- In the CD, the modified kernel source is included.
- The file to patch Linux official kernel is also included in the CD.

6.1. Linux Kernel Patch

You can use official Linux kernel source (downloadable from <http://kernel.org>) and patch it.

Download the Linux kernel version 2.6.24.4.

Download the Linux kernel source file and extract it in the directory '/usr/src/'

```
# mv linux-2.6.24.4.tar.gz /usr/src/  
# cd /usr/src  
# tar zxvf linux-2.6.24.4.tar.gz
```

Copy the patch file (provided by CD) and paste it in the directory '/usr/src/' for applying the patch.

```
# cd /media/cdrom/Software/LinuxKernel  
# cp patch-w5300e01-v01 /usr/src  
# cd /usr/src  
# patch -p0 < patch-w5300e01-v01
```

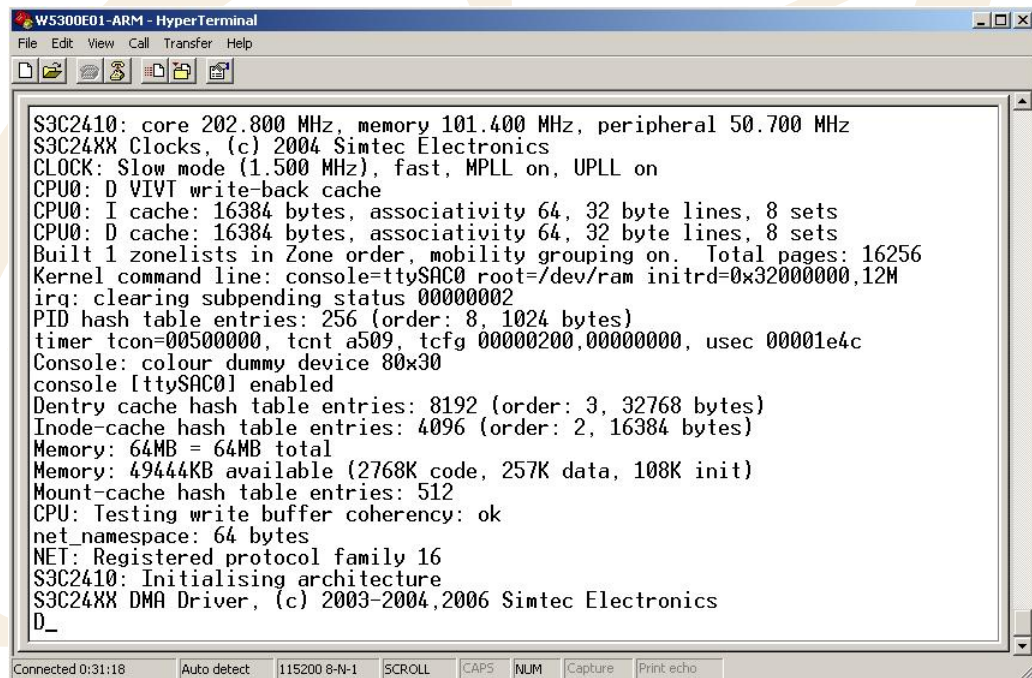
Now, the official Linux kernel is patched to W5300E01-ARM.

If you open the 'patch-w5300e01-v01' by using Editor program, you can check changed parts.

5. Input 'nand erase 40000 3c0000' to remove NAND Flash kernel area.
6. Input 'nand write 31000000 40000 2eb958' to write the kernel image of RAM into the NAND Flash kernel area. In here, '2eb958' is size of kernel image downloaded from tftp.
7. By inputting 'printenv', check bootcmd.
8. When kernel image size is changed, re-configure environment variable 'bootcmd'
Ex > If changed kernel image size is **300000**.

```
WIZnet # setenv bootcmd 'nand read 30400000 40000 c00000;nand read 32000000 40000
300000;bootm 32000000'
```

9. Input 'reset' or check Linux kernel booting by pushing reset button.



```
W5300E01-ARM - HyperTerminal
File Edit View Call Transfer Help
S3C2410: core 202.800 MHz, memory 101.400 MHz, peripheral 50.700 MHz
S3C24XX Clocks, (c) 2004 Simtec Electronics
CLOCK: Slow mode (1.500 MHz), fast, MPLL on, UPLL on
CPU0: D VIVT write-back cache
CPU0: I cache: 16384 bytes, associativity 64, 32 byte lines, 8 sets
CPU0: D cache: 16384 bytes, associativity 64, 32 byte lines, 8 sets
Built 1 zonelists in Zone order, mobility grouping on. Total pages: 16256
Kernel command line: console=ttySAC0 root=/dev/ram initrd=0x32000000,12M
irq: clearing subpending status 00000002
PID hash table entries: 256 (order: 8, 1024 bytes)
timer tcon=00500000, tcnt a509, tcfg 00000200,00000000, usec 00001e4c
Console: colour dummy device 80x30
console [ttySAC0] enabled
Dentry cache hash table entries: 8192 (order: 3, 32768 bytes)
Inode-cache hash table entries: 4096 (order: 2, 16384 bytes)
Memory: 64MB = 64MB total
Memory: 49444KB available (2768K code, 257K data, 108K init)
Mount-cache hash table entries: 512
CPU: Testing write buffer coherency: ok
net_namespace: 64 bytes
NET: Registered protocol family 16
S3C2410: Initialising architecture
S3C24XX DMA Driver, (c) 2003-2004,2006 Simtec Electronics
D_
Connected 0:31:18 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

Figure 6-2 : Linux Kernel Booting

7. Root File System

Root File system is the file system mounted in '/'.

Root File system should include dynamic library, device file, and indispensable utilities basically used for system operation.

W5300E01-ARM uses Ramdisk for Root File system. NAND Flash area is used by mounting JFFS2 file system at the Ramdisk

7.1. Ramdisk

Ramdisk uses a part of memory as like disk drive. Ramdisk is volatile because the file system exists on RAM. If power is off, the saved data disappears.

If data should be preserved, the data should be written in NAND Flash area.

(For the detail, refer to '7.2 JFFS2'.)

You can change the Ramdisk composition. However, the size of Ramdisk cant' be over 12M (the maximum size of Ramdisk)

7.1.1. Modifying Ramdisk

1. Copy Ramdisk Image from CD.

```
# cp /media/cdrom/Software/Image/ramdisk_w5300e01 /tftpboot
```

2. Create the directory in which Ramdisk is mounted, and mount it.

```
# mkdir /mnt/ramdisk
# mount -t ext3 -o loop /tftpboot/ramdisk_w5300e01 /mnt/ramdisk
# cd /mnt/ramdisk
# ls
```

3. Modify the file system mounted '/mnt/ramdisk' directory.
4. Unmount it.

```
# cd /
# umount /mnt/ramdisk
```

5. Input 'tftp 31000000 ramdisk_w5300e01' at the bootloader of the target board for downloading Ramdisk image.

(For the detail of bootloader, refer to '8. Bootloader')

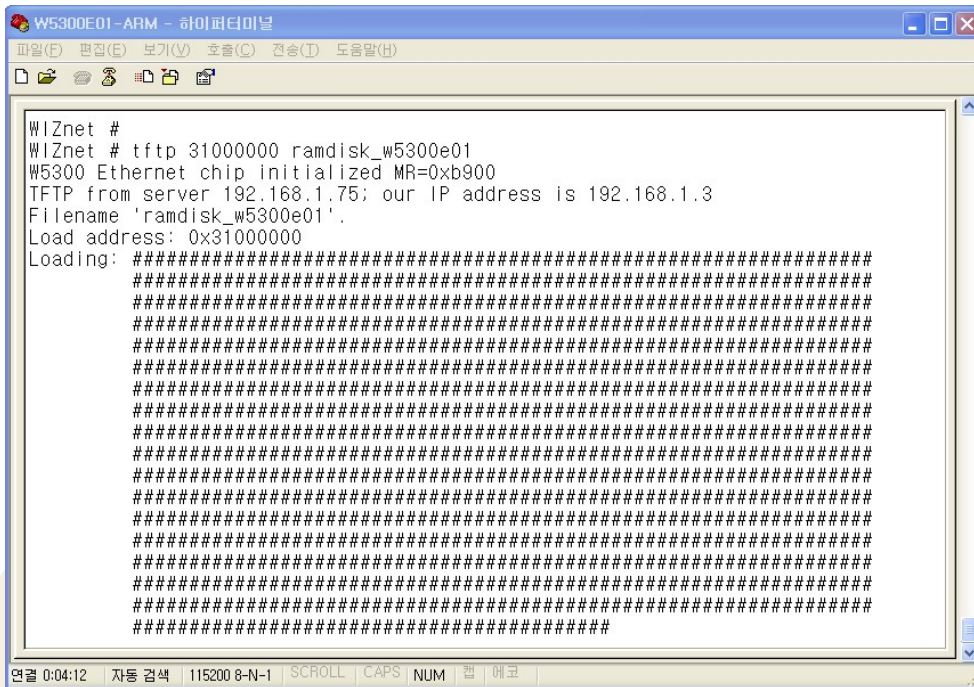


Figure 7-1 : RAMDISK Download

6. Input 'nand erase 400000 1000000' for erasing Ramdisk area of NAND Flash.
7. Input 'nand write 31000000 400000 c00000' for writing Ramdisk image of RAM into Ramdisk area of NAND Flash.
8. Input 'reset' or check if Ramdisk is correctly modified by pushing RESET button.

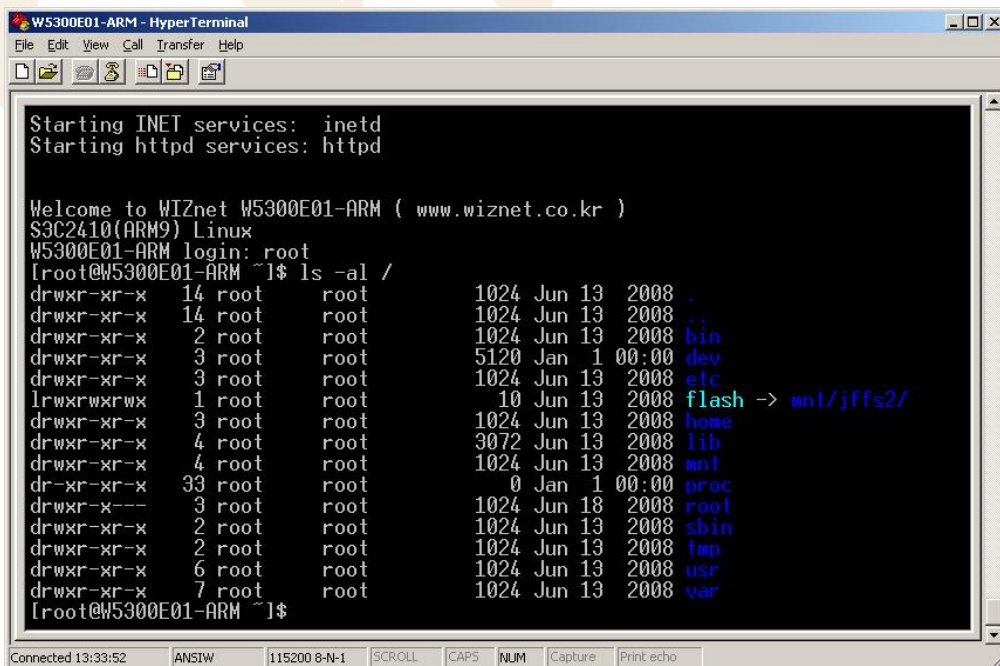


Figure 7-2 : RAMDISK Modification Check

7.1.2. Ramdisk Directory Structure

```

/
|-- bin
|-- dev -- pts
|-- etc -- rc.d
|   |-- init.d
|   |-- rc0.d
|   |-- rc1.d
|   |-- rc2.d
|   |-- rc3.d
|   |-- rc4.d
|   |-- rc5.d
|   `-- rc6.d
|-- flash -> mnt/jffs2/
|-- home -- wiznet
|-- lib
|   |-- ldscripts
|   `-- modules
|-- mnt
|   |-- jffs2
|   `-- nfs
|-- proc
|-- root -- www
|-- sbin
|-- tmp
|-- usr
|   |-- arm-linux – lib -> /lib
|   `-- bin -- include -- sbin
`-- var
    |-- lib
    |-- lock -- subsystems
    |-- log
    |-- run
    `-- spool – cron -- crontabs
    
```

Figure 7-3 : Ramdisk Directory Structure

7.2. JFFS2

NAND Flash is non-volatile storage device. For storing data, use NAND Flash area. JFFS2 is the file system only for Flash. When W5300E01-ARM accesses NAND Flash area, mount and use the JFFS2 file system.

NAND Flash area can be divided as below

- 0x00000000 – 0x00020000 : Bootloader
- 0x00020000 – 0x00040000 : Boot Param
- 0x00040000 – 0x00400000 : Kernel
- 0x00400000 – 0x01400000 : Ramdisk
- 0x01400000 – 0x04000000 : JFFS2 File System

Bootloader field has bootloader firstly operating when power is supplied to the system.

The Boot Param field is the space where boot parameter value is saved when kernel is booted at the bootloader. Linux kernel field includes kernel images. At the bootloader, the kernel image of this field is loaded to RAM and booted to kernel.

In the Ramdisk area, the Ramdisk used for current root file system is included.

JFFS2 File System area does not have any image. This area can be used after formatting as JFFS2.

7.2.1. JFFS2 File System Mount

1. After completing the boot, log in with 'root'.
2. In case of using JFFS2 area for the first time, it should be formatted in JFFS2 type.

```
# flash_eraseall -j /dev/mtd4
```

3. Mount JFFS2 file system.

```
# mount -t jffs2 /dev/mtdblock4 /mnt/jffs2
```

4. If data is written in the directory - '/mnt/jffs2', the data is saved in NAND Flash.

Now, JFFS2 file system can be automatically mounted.

8. Bootloader

In the W5300E01-ARM, the bootloader that u-boot is modified, is included. The usage of u-boot is almost same as existing one.

For the detail of each command, refer to <http://www.denx.de/wiki/DULG/Manual>. You can also see the information of each command through 'help [command]'

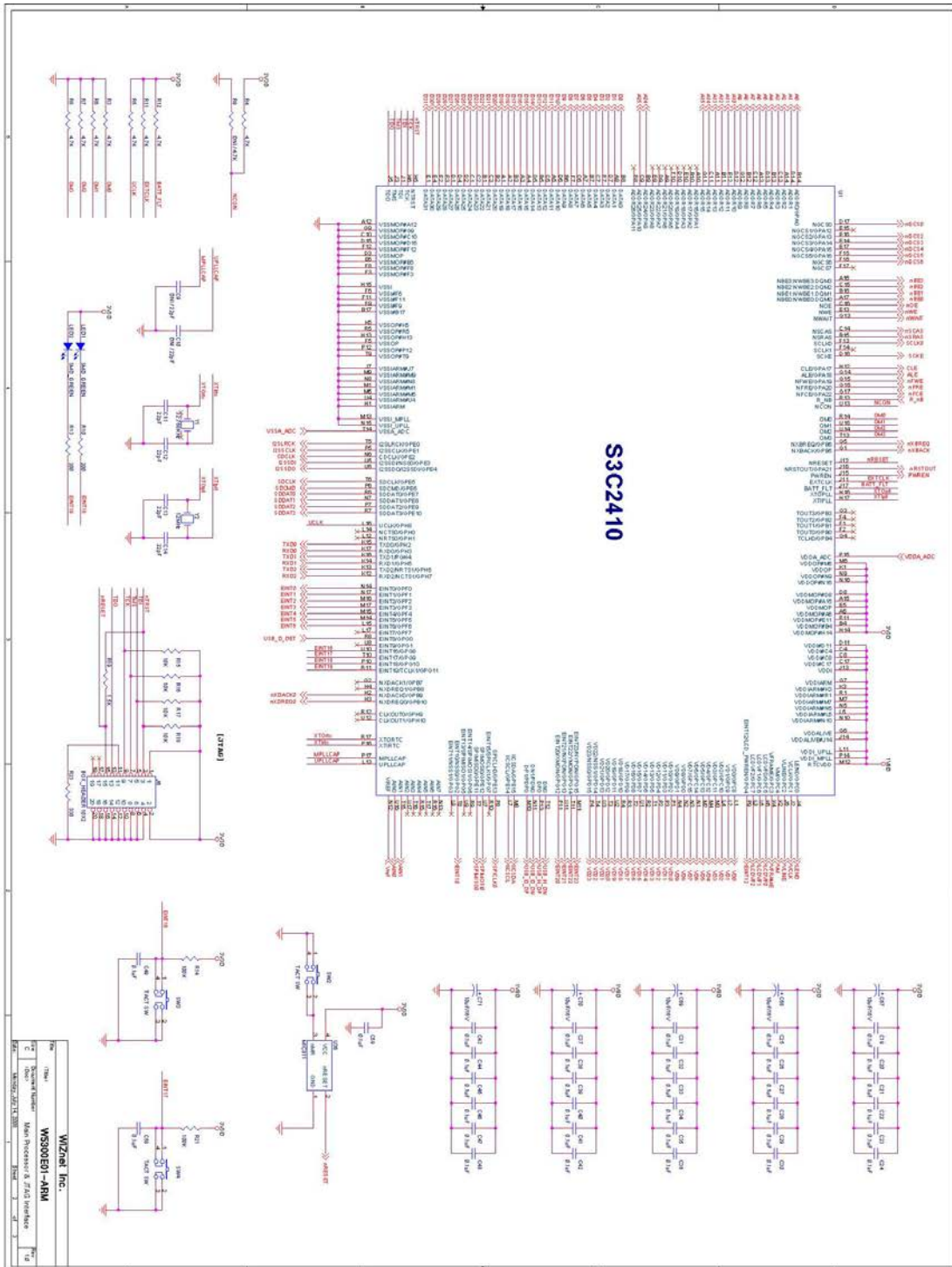
Below is the description of frequently used commands.

| | |
|-----------------------------------|---|
| printenv | It shows environment variables currently set. |
| setenv <name> <value> | It configures <name> environment variables as <value>. Some important variables should be configured in accordance with system. <ul style="list-style-type: none"> ● ipaddr : It shows IP address of the target board during current bootloader operates. Default value is '192.168.1.3'. ● serverip : It is the IP address of Host PC. The default value is '192.168.1.2'. ● gatewayip : It is the Gateway IP address. The default value is '192.168.1.1'. ● netmask : It is the Network mask value. The default value is '255.255.255.0'. ● bootcmd : It is the environment variables automatically executed when booting at the bootloader. |
| tftpboot <address> <bootfilename> | Download the <bootfilename> image file of Host PC of which IP address is set as 'serverip' into <address> of the target board. At this time, tftp server should be installed in the Host PC. For the configuration method of tftp server, refer to '5.3.1. tftp server configuration'. If download is not normally processed, check environment variable 'ipaddr' and 'serverip'. |
| bootm <address> | Boot with application image saved in <address>. |
| nand erase [clean] [off size] | Erase Nand Flash as much as [size] at the [off] address. Be careful that all value of NAND Flash can be removed if 'nand erase clean' is used. |
| nand read <addr> <off> <size> | Read the data of <off> address of NAND Flash as much as <size> to <addr> address. |
| nand write <addr> <off> <size> | Write the data of <addr> of RAM as much as <size> into <off> of NAND Flash. It is used when writing new bootloader, kernel and Ramdisk into NAND Flash. |

Table 8-1 : Bootloader Commands

9. Appendix

9.1. Hardware Schematic of W5300E01-ARM Base Board



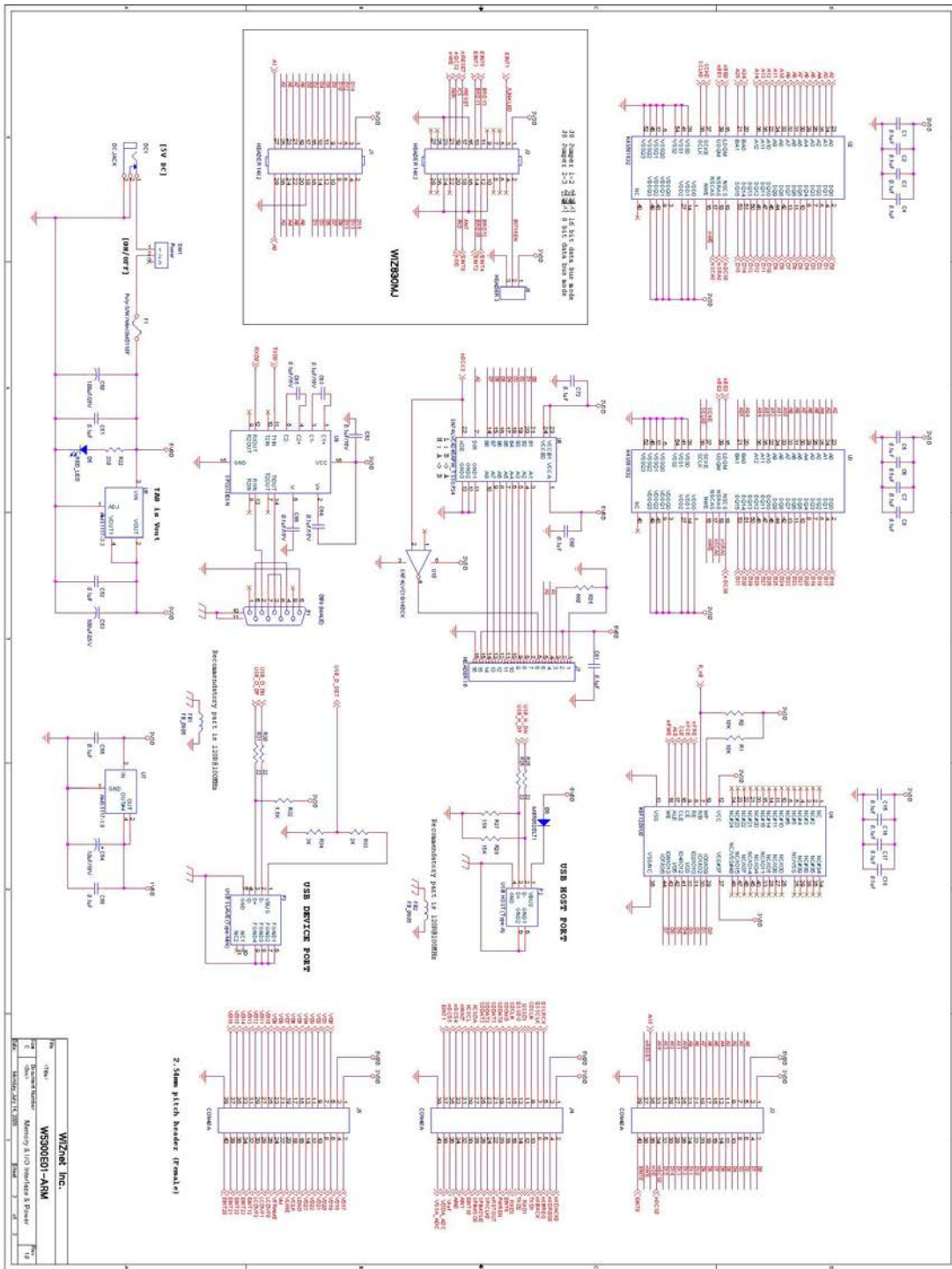


Figure 9-1 : Hardware Schematic of W5300E01-ARM Base Board

- For the schematic of WIZ830MJ Module, refer to **WIZ830MJ_R10.DSN** file included in the CD..

9.2. W5300E01-ARM Base Board Parts List

| Item | Q.ty | Reference | Part | Tech. Characteristics | Package |
|------|------|--|---------------------------|-------------------------|----------------|
| 1 | 52 | C1,C2,C3,C4,C5 C6,C7,C8,C15,C16,C17,C18,C19,C20, C21,C22,C23,C24, C25,C26,C27,C28, C29,C30,C31,C32, C33,C34,C35,C36, C37,C38,C39,C40, C41,C42,C43,C44, C45,C46,C47,C48, C49,C51,C52,C55, C56,C58,C59,C60, C61,C72 | 0.1uF | 50V-20% Ceramin | CASE 0603 |
| 2 | 4 | C11,C12,C13,C14 | 22pF | 50V-20% Ceramin | CASE 0603 |
| 3 | 2 | C50,C53 | 100uF/25V | Aluminum 25Vmin 20% | |
| 4 | 6 | C54,C67,C68,C69, C70,C71 | 10uF/16V | Tantal 16Vmin 10% | EIA/IECQ 3216 |
| 5 | 5 | C62,C63,C64,C65, C66 | 0.1uF/16V | Tantal 16Vmin 10% | EIA/IECQ 3216 |
| 6 | 1 | DC1 | DC-Jack | Ø3.5 | DIP |
| 7 | 1 | D6 | MBR0520LT1 | SBR DIODE | SOD-123 |
| 8 | 2 | FB1,FB2 | 120 ohm Chip Ferrite Bead | 120 ohm @ 100MHz | CASE 0805 |
| 9 | 1 | F1 | MiniSMD110F/16 | Poly-Fuse | SMD4532 |
| 10 | 2 | J1,J2 | 14x2 Pin Header (F) | 2.54mm pitch | 2.54pitch, DIP |
| 11 | 1 | J6 | 10x2 Box Socket | 2.54mm pitch | 2.54pitch, DIP |
| 12 | 1 | J7 | 16x1 Pin Header (F) | 2.54mm pitch | 2.54pitch, DIP |
| 13 | 1 | J8 | 3x1 Pin Header (M) | 2.54mm pitch | 2.54pitch, DIP |
| 14 | 2 | LED1,LED2 | Chip LED, Green | | CASE 0805 |
| 15 | 1 | D5 | Chip LED, RED | | CASE 0805 |
| 16 | 1 | P1 | DSUB 9Pin Male, R/A | RS-232 Serial Connector | DIP |
| 17 | 1 | P2 | USB A-Type Connector | USB Host Connector | DIP |

| Item | Q.ty | Reference | Part | Tech. Characteristics | Package |
|------|------|------------------------------|--|-------------------------------------|-----------|
| 18 | 1 | P3 | USB Mini-Type Connector | USB Device(Slave) Connector | SMD |
| 19 | 6 | R1,R2,R15,R16, R17,R18 | 10K ohm | 1/10W-5% SMD | CASE 0603 |
| 20 | 8 | R3,R4,R5,R6,R7, R8R11,R12 | 4.7K ohm | 1/10W-5% SMD | CASE 0603 |
| 21 | 2 | R10,R13 | 200 ohm | 1/10W-5% SMD | CASE 0603 |
| 22 | 2 | R22,R23 | 330 ohm | 1/10W-5% SMD | CASE 0603 |
| 23 | 2 | R14,R21 | 100K ohm | 1/10W-5% SMD | CASE 0603 |
| 24 | 2 | R19,R32 | 1.5K ohm | 1/10W-5% SMD | CASE 0603 |
| 25 | 4 | R25,R26,R30,R31 | 22 ohm | 1/10W-5% SMD | CASE 0603 |
| 26 | 2 | R27,R28 | 15K ohm | 1/10W-5% SMD | CASE 0603 |
| 27 | 1 | R33 | 2K ohm | 1/10W-5% SMD | CASE 0603 |
| 28 | 1 | R34 | 3K ohm | 1/10W-5% SMD | CASE 0603 |
| 29 | 1 | R35 | 680 ohm | 1/10W-5% SMD | CASE 0603 |
| 30 | 1 | SW1 | 3Pin Power Toggle S/W | Power Switch | DIP |
| 31 | 3 | SW2,SW3,SW4 | STS-110B | 4Pin Tact Switch | DIP |
| 32 | 1 | U1 | S3C2410A | SAMSUNG ARM920T Processor | 272-FBGA |
| 33 | 2 | U2,U3 | K4S561632H | SDRAM 32MB | TSOP(II) |
| 34 | 1 | U4 | K9F1208U | NAND Flash ROM 64MB | TSOP(I) |
| 35 | 1 | U6 | AMS1117-3.3 | LDO 3.3V Output | SOT-223 |
| 36 | 1 | U7 | AMS1117-1.8 | LDO 1.8V Output | SOT-223 |
| 37 | 1 | U8 | SN74LVC4245APW | Bidirectional Buffer(Level Shifter) | TSSOP24 |
| 38 | 1 | U9 | SP3232ESN | 2-CH RS-232 Transceiver | NSOIC |
| 39 | 1 | U10 | SN74LVC1G14DCK | Schmitt Trigger Inverter | SC-70 |
| 40 | 1 | U36 | MIC811RU | Reset IC (Active Low Output) | SOT-143 |
| 41 | 1 | Y1 | 32.768KHz | Crystal | SMD |
| 42 | 1 | Y2 | 12MHz | Crystal | SMD |
| 43 | 1 | Character LCD | LC1624 | 16character * 2line | |
| 44 | 1 | PCB | W5300E01-ARM Rev1.2 / 1.6T, 6-Layer | | |

Table 9-1 : W5300E01-ARM Base Board Part List

- For the part list of WIZ830MJ Module, refer to 'WIZ830MJ V1.0 PART LIST.PDF' file included in CD.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.