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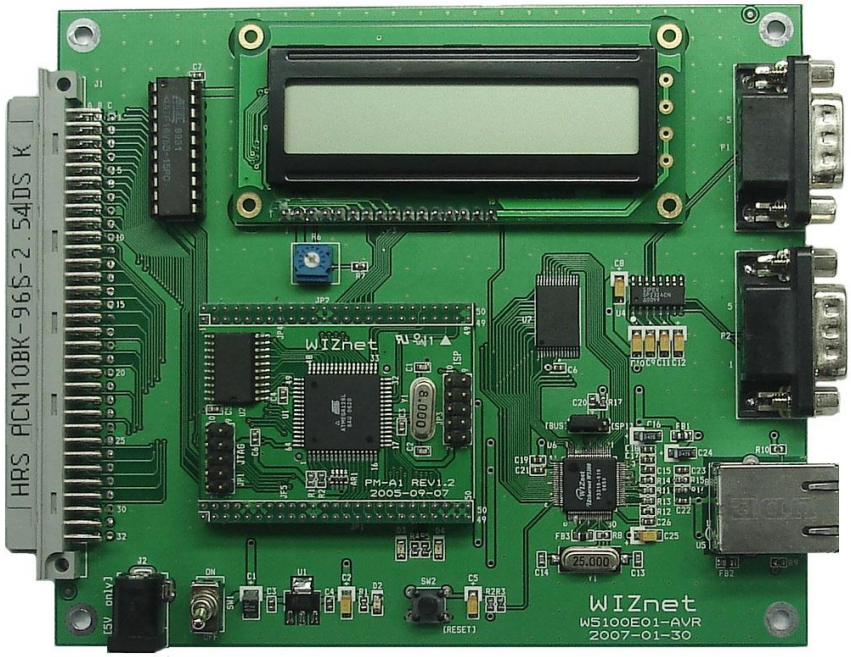
W5100E01-AVR User's Manual

(Version 1.1.0)



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Ver. 1.0.0	Febrary 1, 2007	Original Document
Ver. 1.1.0	June 17, 2013	The software CD is not provide anymore. For more software contents, please visit our website. (www.wiznet.co.kr) modified the comment about S/W CD. (CH 1.1, 4.3.1, 4.3.2, 4.4.4, 4.5.1, 4.5.2)

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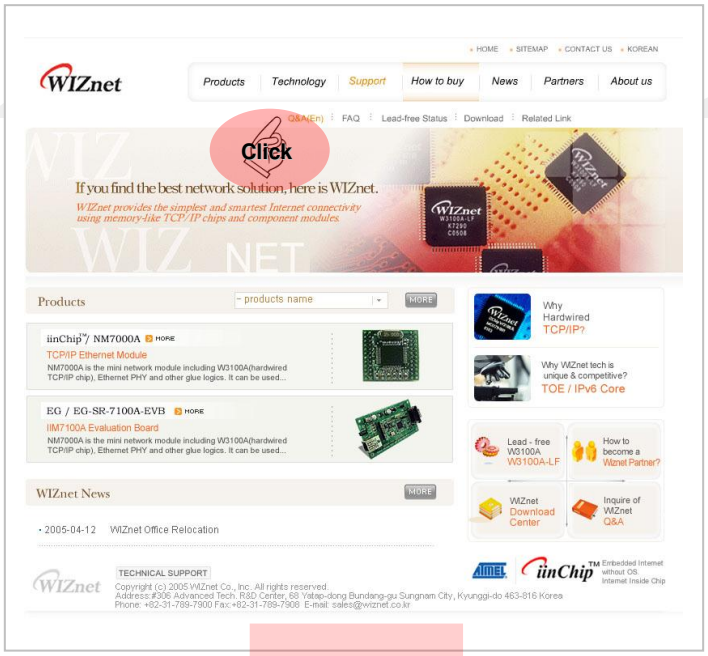

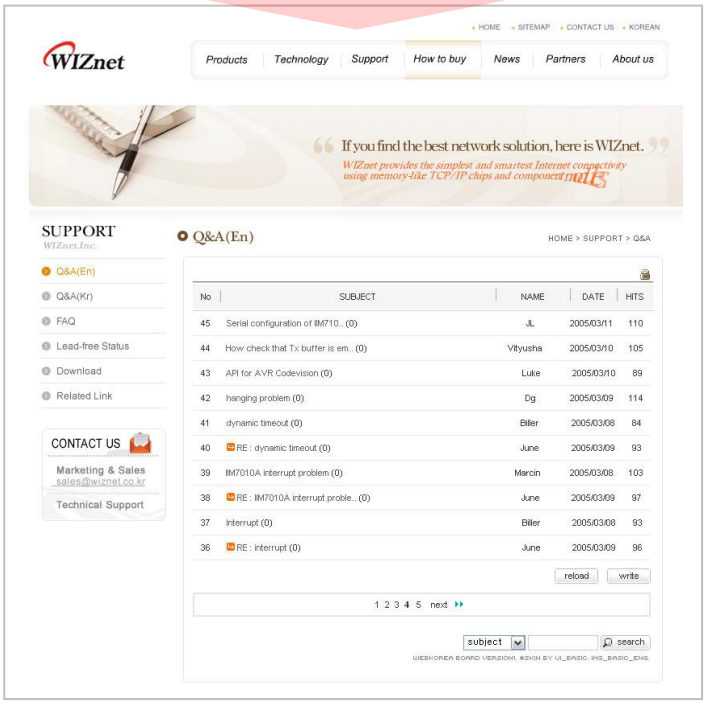

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1. Overview

W5100E01-AVR is W5100 Evaluation B/D for AVR developers.

1.1. Package

When purchasing W5100E01-AVR B/D, please make sure you have all the following contents.

<Table 1-1: List of Items Contained in the EVB B/D>

	Item	Quantity
EVB B/D	W5100E01-AVR Main Board	1
	PM-A1 MCU Module (Plugged In W5100E01-AVR)	1
	Power Adaptor (DC5V / 2A)	1
Accessory	**AVR ISP Internal Flash Programming Tool**	**Option**
	UTP Cable	1
	Serial Cable	1
	ISP Gender Type I	**Option**

<Table 1-2 : Contents of Software>

Directory			Contents
W5100E01-AVR	DOCs	Manual	User's Manual
		Datasheet	All sorts of Datasheet
		Application Note	AVR Tool Gudie ISP Gender Guide
	HW	Schematics	All sorts of schematics
		Part List	All sorts of Part List
		PAL	Logic Source & JED File
	SW	Firmware	EVB B/D Firmware
		PC Utility	All sorts of Tool Program
W5100			

- The contents of Software could be changed by version. Please check the official website of WIZnet.

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1.2. Feature

1.2.1. H/W Features

W5100E01-AVR B/D is composed of 2 type B/Ds

- PM-A1
  - MCU : ATmega128, 8MHz
  - RAM : 32KB SRAM (External)
  - ROM : 128KB Flash (Atmega128 Internal Flash)
  - ICE I/F : JTAG, ISP Support
- W5100E01-AVR
  - Power : DC5V, 2A Adaptor
  - UART : Two 232 Serial Port, (default 57600 Baud Rate)
  - LCD Display : 16 X 2 Text LCD
  - PAL : Address Decoder
  - W5100 : Hardwired TCP/IP Chip(embedded PHY chip)
  - MagJack : RD1-125BAG1A (UDE) , Integrated Transformer(1:1)
    Link & ACT & FDX LEDs

1.2.2. F/W Feature

The F/W of EVB B/D is made up of two parts.

- Manager mode
  - Network Config : MAC, Source IP, G/W IP, S/N, DNS IP Setup
  - Channel Config : W5100 Test Application Setup for each channel
  - Ping Test : Ping Request Test with DNS
- Application mode
  - Loopback TCP Server : TCP Server Mode Test Application
  - Loopback TCP Client : TCP Client Mode Test Application
  - Loopback UDP : UDP Test Application
  - Web Server : Web Server Test Application
  - DHCP Client : Dynamic Network Config using DHCP Server

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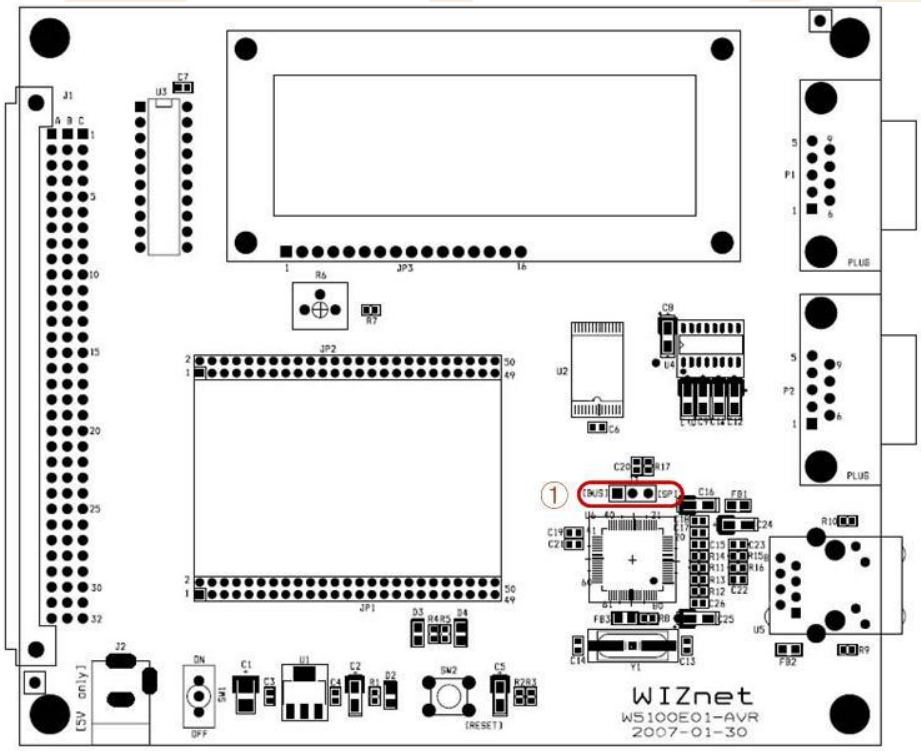
2. Getting Started

2.1. System Configuration

2.1.1. EVB B/D Layout & Configuration

For testing the functions of the EVB B/D and developing applications, the EVB B/D should be configured as shown below. First, the EVB B/D is connected to the PC using the crossed UTP Cable (for data transmission) and the Serial Cable (for monitoring). Second, the dip switch and jumper should be set as below;



<Fig 2.1 : EVB B/D Jumper Setting>

① SPI Enable : J3

For interfacing W5100 with MCU through SPI mode, the pin of 2 and 3 of JP3 should go short. In case that SPI mode is not used, the pin of 1 and 2 should be shorted.

<Fig 2.2 : JP3 Jumper Setting >

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2.2. PC Programs Install

2.2.1. Development Program Install

Please refer to "**AVR Tool Guide Vx.x.pdf**" for more information.

2.2.1.1. Compile Tool Chain

For installation and usage of WinAVR, refer to the related manual.

Firmware of EVB B/D is currently using AVR GCC Version 3.4.6 Compiler and can be changed with compiler version upgrade.

2.2.1.2. ICE Programs

EVB B/D supports JTAG & ISP ICE for development and debugging. For ISP Program, "AVRStudio" program is used. Please refer to "**AVR Tool Guide Vx.x.pdf**" for installation and usage of "AVR Studio" and **"ISP GENDER User's Guide Vx.x.pdf"** for usage of 'ISP GENDER'.

2.2.1.3. ROM File Maker Program

ROM File Maker Program is a utility program that provides convenience in using simple 'ROM File System' for EVB B/D. The reason that ROM File Maker Program is used in EVB B/D is to access Web Pages for Web Server Test Application as 'ROM File System'. Refer to "**ROM File Maker Manual Vx.x.pdf**" for further instruction on installation and ROM File Maker Program

2.2.2. EVB B/D Test PC Program Install

2.2.2.1. Loopback Test Program (AX1) Install

Loopback Test Program (referred to as "AX1" from here on) is a program to evaluate the performance of W5100 and does the Loopback the file and packet data in connection with EVB B/D channel applications such as Loopback TCP Server/Client and Loopback UDP. Please refer to "**AX1 Manual Vx.x.pdf**" for installation and usage.

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2.3. Quick Start

After the confirming the Package of EVB B/D, test EVB B/D in the order shown below.

① Confirm the testing environment. Refer to Chapter 2.1

Connect test PC to EVB B/D using UTP cable directly.

Connect test PC to EVB B/D using serial cable directly.

Connect 5V power adaptor to EVB B/D

② Confirm the network information of Test PC as the following

Source IP Address : 192.168.0.3

Gateway IP Address : 192.168.0.1

Subnet Mask : 255.255.255.0

③ Install AX1 on Test PC. Refer to Chapter 2.2.2.1

④ After the execution of serial terminal program (like Hyperterminal), set up the properties as the following.

<Table 2-1 : Terminal Properties Setting>

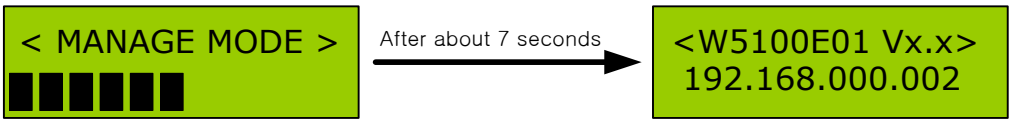
Properties	Setting Value
Bits Per second(Baud Rate)	57600 bps
Data Bits	8 Bits
Stop Bits	1 Bit
Parity	No
Flow Control	None

After the completion of terminal setup, connect to EVB B/D and wait.

⑤ Turn on the power switch(SW1) of EVB B/D

Following items should be checked upon power on

- Check lighting on power LED(D2) of EVB B/D when powering on
- Check if LEDs of D3 and D4 blink three times by turns.
- Check if Text LCD display of EVB B/D outputs in the way shown in <Fig 2.3> and shown in <Fig 2.4> on the Terminal Program



<Fig 2.3 : EVB B/D Text LCD Display >

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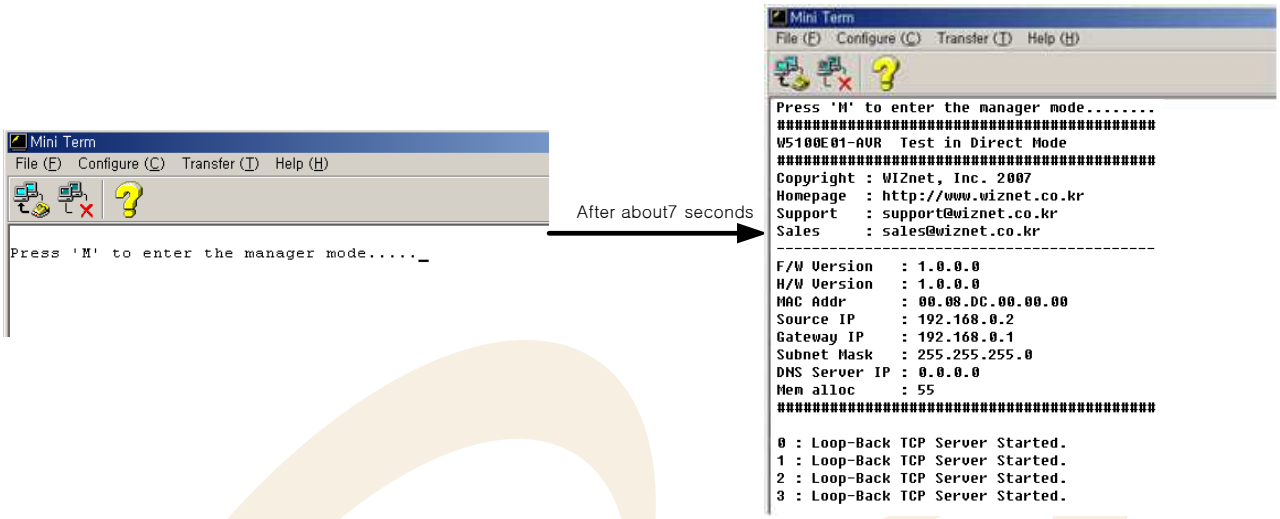
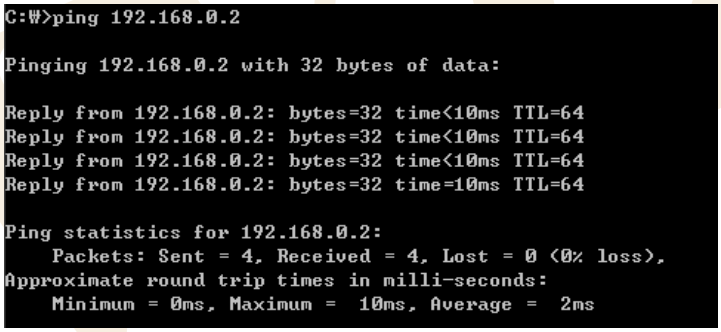


<Fig 2.4 : Output of Terminal Program>

⑥ Execute Ping test with EVB B/D



<Fig 2.5 : EVB B/D Ping Reply Test >

⑦ Execute “AX1” program. Refer to “**AX1 Manaul Vx.x.pdf**”

⑧ Test the operation of “AX1” program with TCP Client. Refer to “**AX1 Manaul Vx.x.pdf**”

After setting the Server IP Address as “192.168.0.2” and port Number as “5000” by clicking [TCP>>Connect] Menu, then click,[TCP>>Send] Menu or [Ts],[Tr],[∞] Icons.

⑨ Test the loopback with any file or packet between “AX1” Program and EVB B/D.

2.4. EVB B/D Test

The firmware of EVB B/D can be divided into Manage Program and EVB B/D Test Application.

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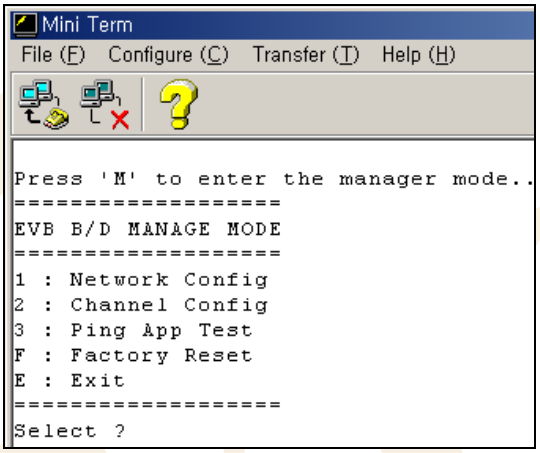
Manage Program performs system configuration to run EVB B/D, and EVB B/D Test Application is Network Application Program for W5100 Test.

2.4.1. Manage Program

Manage Program is a program that is executed upon receiving character 'M' or 'm' from the terminal program within 7 seconds when doing the manual reset of EVB B/D and EVB B/D power on. This program sets up the channel application of W5100 to be tested, and perform certain ping request test with DNS server.



<Fig 2.6 : Manage Program Execution >

2.4.1.1. Network Configuration

It selects Network Information that is used in EVB B/D. When choosing '1' at terminal Program of <Fig 2.6>, Network Information of EVB B/D can be set as desired. The default Network Information of EVB B/D is shown in <Table 2-2>.

<Table 2-2 : EVB B/D Default Network Information>

Network Information	Default Value
MAC Address	00.08.DC.00.00.00
Source IP Address	192.168.0.2
Gateway IP Address	192.168.0.1
Subnet Mask	255.255.255.0
DNS Server IP Address	0.0.0.0

If "Network Config" menu is selected on Manage Program, menu shown in <Fig 2.7> can be displayed and each function is described in <Table 2-3>.

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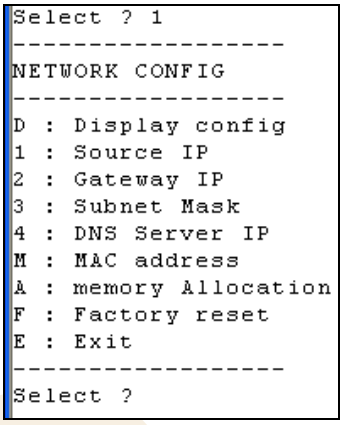

<Fig 2.7 : Network Config >

<Table 2-3 : Menu of Network Config>

Menu	Description
D : Display Config	Display current Network Information
1 : Source IP Address	Sets up Source IP Address
2 : Gateway IP Address	Sets up Gateway IP Address
3 : Subnet Mask	Sets up Subnet Mask
4 : DNS Server IP	Sets up DNS Server IP Address <Warning> DNS Server is information needed for "Ping Request" test and transformation of Domain Name into IP address. Therefore, it must be set up as Static IP Address.
'A' or 'a'	Sets up Memory Allocation – W5100 Memory Size Register.(RMSR,TMSR) Refer to "W5100 Datasheet.pdf".
F : Factory Reset	Initialization of the system with the default value. Refer to <Table 2-2>
'M' or 'm'	Sets up MAC Address. <Warning> This value is not changed when Factory Reset.
E : Exit	Exit "Net Config"

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<Fig 2.8> is an example of setting the Source IP of EVB B/D in Network Config

```
------------------
NETWORK CONFIG
------------------
D : Display config
1 : Source IP
2 : Gateway IP
3 : Subnet Mask
4 : DNS Server IP
M : MAC address
A : memory Allocation
F : Factory reset
E : Exit
------------------
Select ? 1
Source IP ? 192.168.0.100
```

<Fig 2.8 : Source IP Address Setup Example>

<Fig 2.9> is an example of setting the MAC address of EVB B/D in Network Config

```
------------------
NETWORK CONFIG
------------------
D : Display config
1 : Source IP
2 : Gateway IP
3 : Subnet Mask
4 : DNS Server IP
M : MAC address
A : memory Allocation
F : Factory reset
E : Exit
------------------
Select ? m
MAC Address ? 00.08.dc.00.00.20
```

<Fig 2.9 : MAC address Setup Example>

2.4.1.2. Channel Config

It sets up an application that can be operated in 4 channels of W5100. By selecting '2 : Channel Config', each channel can be set up. The default W5100 channel information is shown in <Table 2-4>.

<Table 2-4 : EVB B/D Default Channel Information>

W5100 Channel	Test Application
1st	Loopback TCP Server (Port 5000)
2nd	Loopback TCP Server (Port 5000)
3rd	Loopback TCP Server (Port 5000)
4th	Loopback TCP Server (Port 5000)

If "Channel Config" menu is selected in manage program, <Fig 2.10> is displayed and the functionality of each menu is described in <Table 2-5>.

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```
Select ? 2
------------------
CHANNEL CONFIG
------------------
0 : Display Config
1 : 1st Channel
2 : 2nd Channel
3 : 3rd Channel
4 : 4th Channel
F : Factory Reset
E : Exit
------------------
Select ?
```

<Fig 2.10 : Menu of Channel Config>

<Table 2-5 : Menu of Channel Config>

Menu	Description
D : Display Config	Displays current set up Test Application type of each W5100 channel
0 : 1st Channel	Sets up test application type at W5100 No. "0" channel <Warning> As developing EVB B/D, DHCP Client application setup is possible only at no. "0" channel.
1 : 2nd Channel	Sets up test application type at W5100 no. "1" channel
2 : 3rd Channel	Sets up test application type at W5100 no. "2" channel
3 : 4th Channel	Sets up test application type at W5100 no. "3" channel
F : Factory Reset	Initialize into original setup status. Refer to <Table 2-4>
E : Exit	Exits "Channel Config"

Available test application of each W5100 channel is shown as <Table 2-6>

<Table 2-6 : W5100 Channel Application Type>

Application Type	Description
No Use	Not used
DHCP Client	Receiving Network Information of EVB B/D from DHCP Server dynamically <Warning> If DHCP Server does not exist in LAN, it sets back to default value after certain amount of time
TCP Loopback Server	TCP Server Test Program <Warning> EVB B/D : TCP Server, AX1 : TCP Client
TCP Loopback Client	TCP Client Test Program <Warning> EVB B/D : TCP Client, AX1 : TCP Server
Loopback UDP	UDP Test Program
Web Server	Web Server Test Program

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Other application types except for “DHCP Client” can be repeatedly set up regardless of channel.
<Fig 2.11> shows an example of 2nd channel setting of W5100 as “TCP Loopback Client”

When inputting simply [ENTER] without IP address or port number, the default value is applied. <Table 2-7> shows default values required for each application.

```
Select ? 2
Select the followed APPs type for 1 channel.
        0 : No Use
        2 : Loop-Back TCP Server
        3 : Loop-Back TCP Client
        4 : Loop-Back UDP
        5 : Web Server
Select ? 3
Server IP Address ?
Default Applied. 192.168.0.3
Server Port Num (1~65535) ?
Default Applied. 3000
```

<Fig 2.11 : Loopback TCP Client Application Setting Example>

< Table 2-7 Application Default Value >

Application Type	Default Value
DHCP Client	None
TCP Loopback Server	Listen Port Number : 5000
TCP Loopback Client	Server IP Address : 192.168.0.3 Server Port Number : 3000
Loopback UDP	Source Port Number : 3000
Web Server	HTTP Port Number : 80

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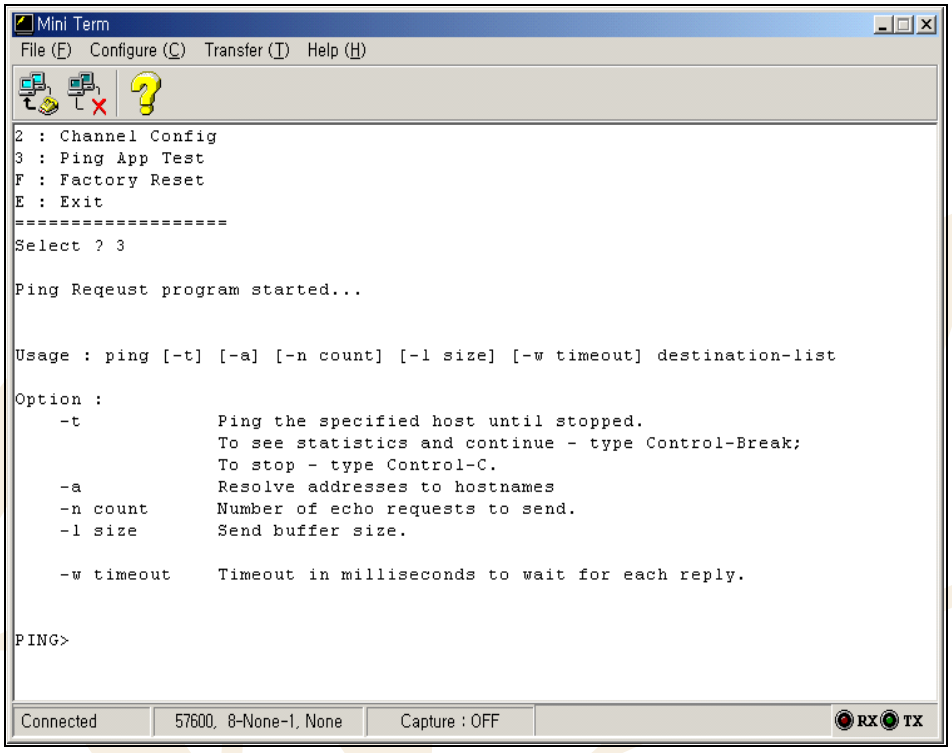
2.4.1.3. Ping Application Test

Ping Application Test is a program created for IP RAW channel evaluation of W5100 and sends Ping request to certain peer and receives Ping Reply. This program is set up identically with the ping command in the DOS prompt. It's executed when '3' is chosen <Fig 2.6 : Manage Program Execution>.



<Fig 2.12 : Usage of Ping Application >

<Fig 2.12> displays the execution screen of Ping Application and shows how to use the Ping Application.

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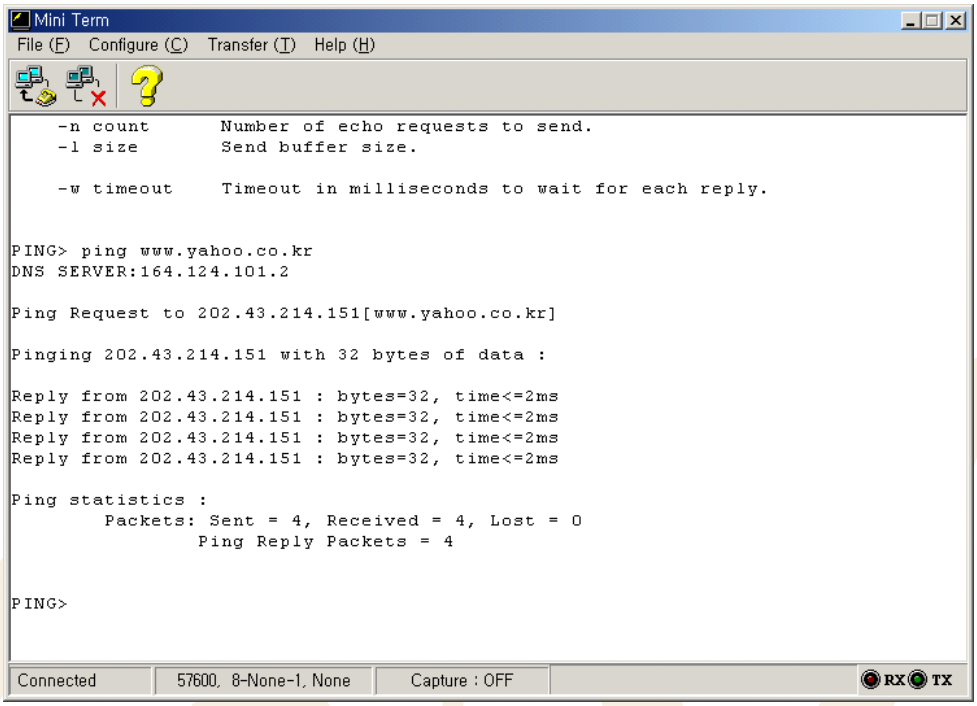
<Fig 2.13> shows the real example of sending the Ping Request to the destination and receiving the Ping Reply.



<Fig 2.13 : Ping Application Test>

To terminate the Ping Application type, type “exit” at the “PING>” prompt.

2.4.2. EVB B/D Test Applications

2.4.2.1. DHCP Client

DHCP Client Application is an application that dynamically assigns network information for EVB B/D from DHCP Server. To test DHCP Client, first of all, W5100 1st channel application type must be set up as “DHCP Client” using [Manager>>Channel Config>>0th Channel] Menu.

Refer to Chapter 2.4.1.2

<Fig 2.14> is the screen that DHCP Client successfully obtains network information. Note that DHCP Client will be set with default network information if DHCP Server does not exist or is not able to obtain network information from DHCP Server.

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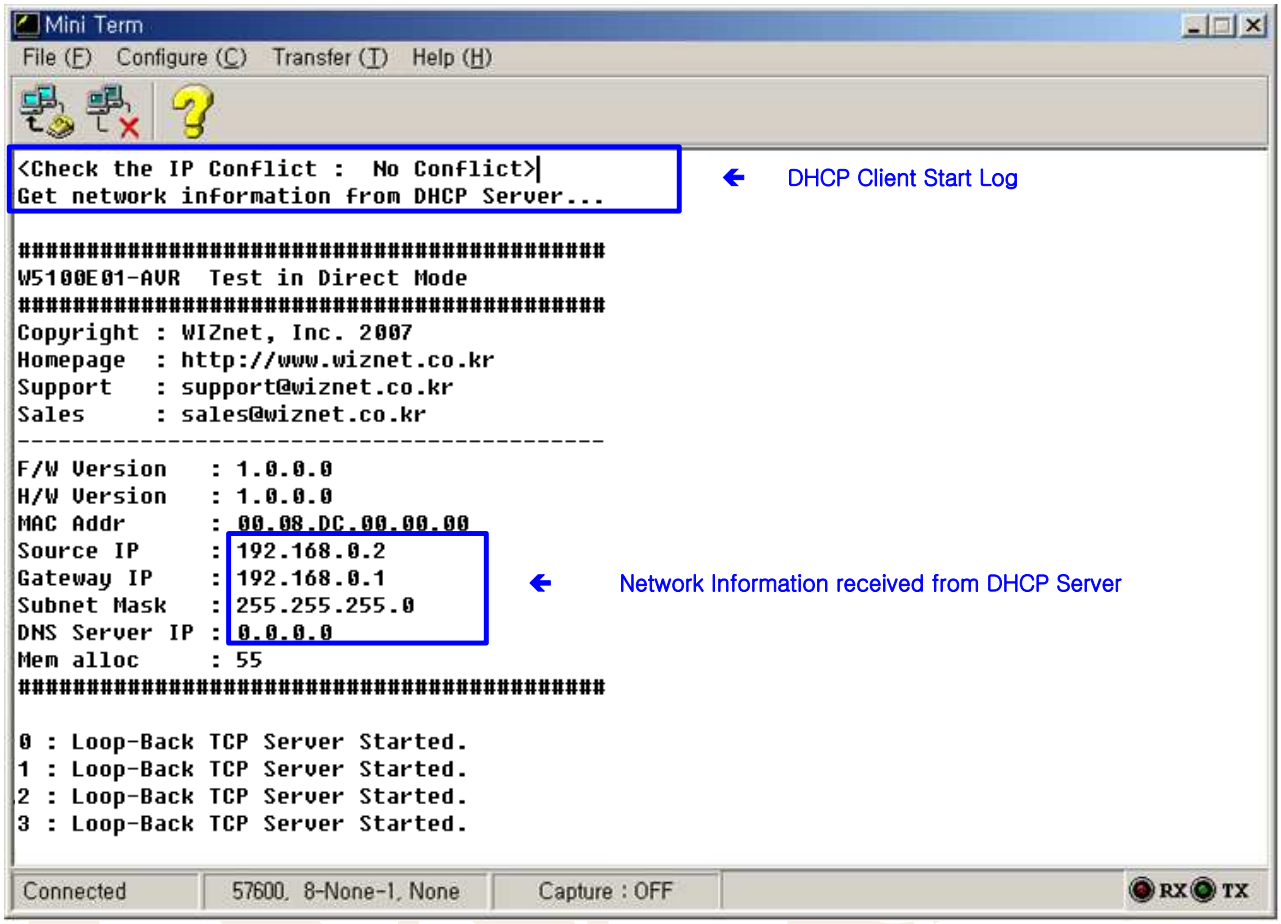

<Fig 2.14 : DHCP Client Test>

2.4.2.2. Loopback TCP Server

Loopback TCP Server Application is an application that loops back any file or packet data through TCP channel connected with "AX1" Program of Test PC. First of all, set any channel as "Loopback TCP Server" application type using [Manager>>Channel Config] menu of EVB B/D to test Loopback TCP Server.

When setting up "Loopback TCP Server" application type of EVB B/D, you can set listen port to any value. Here, it's set as the default value, 5000. Refer to Chapter 2.4.1.2

After the setup of EVB B/D is complete, run "AX1" at Test PC then try the connection to the IP Address. When the connection between EVB B/D and "AX1" is successful, loop back the data. Refer to "**AX1 Manual Vx.x.pdf**"

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```
Source IP      : 192.168.0.2
Gateway IP     : 192.168.0.1
Subnet Mask    : 255.255.255.0
DNS Server IP  : 0.0.0.0
MAC Addr  : 0x00.0x08.0xDC.0x00.0x00.0x35
#############################################

0 : Loop-Back TCP Server Started.
1 : Loop-Back TCP Server Started.
2 : Loop-Back TCP Server Started.
3 : Loop-Back TCP Server Started.
0 : Connected by 192.168.0.30(2313)
```

Peer Connection Information in 0 channel of W5100

<Fig 2.15 : Loopback TCP Server Test>

2.4.2.3. Loopback TCP Client

Loopback TCP Client Application is an application that loops back any file and packet data through TCP channel connected with "AX1" Program of Test PC

After running the "AX1" on the server, set any channel of W5100 as "Loopback TCP Client" application type using [Manager>>Channel Config] menu of EVB B/D.

When setting up the "Loopback TCP Client" Application type of EVB B/D, set the Server IP as the IP Address of the Test PC and set Server Port as the waiting Server Port Number(3000). Refer to Chapter 2.4.1.2.

After setting up EVB B/D is complete, exit from the manager program and run EVB Test Application. If EVB B/D is connected to "AX1" successfully, loop back the desired data. Refer to "**AX1 Manual Vx.x.pdf**"

```
Source IP      : 192.168.0.2
Gateway IP     : 192.168.0.1
Subnet Mask    : 255.255.255.0
DNS Server IP  : 0.0.0.0
MAC Addr  : 0x00.0x08.0xDC.0x00.0x00.0x35
#############################################

0 : Loop-Back TCP Server Started.
1 : Loop-Back TCP Client Started.
2 : Loop-Back TCP Server Started.
3 : Loop-Back TCP Server Started.
1 : Connected by 192.168.0.30(2827)
```

← Peer Connection Information in 1 channel of W5100

<Fig 2.16 : Loopback TCP Client>

2.4.2.4. Loopback UDP

Loopback UDP Application is an application that loops back any file and packet data through UDP Channel connected with "AX1" Program of Test PC. First of all, to test Loopback UDP, set up any channel of W5100 as "Loopback UDP" Application Type using [Manager>>Channel Config] Menu of EVB B/D.

In setting up "Loopback UDP" Application type, set Source Port as any value. Here, it's set with 3000. Refer to Chapter 2.4.1.2

After EVB B/D setup is over, loop back desired data with IP Address and UDP Source Port of EVB B/D using menu or Icon related to UDP.

Refer to "AX1 Manual Vx.x.pdf".

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