

Eddy-CPU User Guide

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Chapter 1. Introduction

This chapter is an introduction to SystemBase embedded CPU module Eddy-CPU.

1. About This Document

This guide is designed for users of Eddy-CPU, who are in charge of connecting to and communicating with Eddy, setting Eddy's configurations, status monitoring, firmware update, and other administration work.

2. Who Should Read This Document?

This guide is designed for Eddy-CPU users and administrators. It is strongly recommended that anyone trying to apply, use, and maintain Eddy read this document. This guide deals with the hardware-level integration issues and software-level configuration tips. It will be a great starting point for any administrators who want to easily monitor and control Eddy and its connected devices.



3. Document Structure

Introduction (Chapter 1) is a preface with general information and introductory notices.

Getting Started (Chapter 2) presents a brief introduction about Eddy-CPU, including features and applications.

Hardware Descriptions (Chapter 3) explains about the layout and pin specifications with block diagram and drawings.

Integration (Chapter 4) helps you to connect Eddy to serial and network environment. It ends up with first time boot-up and status check.

Configuration via Web (Chapter 5) provides menu-by-menu guide for setting up the operation environment for Eddy via web browser.

Configuration via Telnet (Chapter 6) provides a list of commands for setting up the operation environment for Eddy via Telnet.

Appendix (Chapter 7) provides firmware update guides and technical specifications for detailed information.

4. Eddy Documents

The following table summarizes documents included in the Eddy document set.

Document Name	Description
User Guide	Integration, configuration, and management of Eddy-CPU for the administrator
Programmer's Guide	Programmer's application development guide, including in-depth approach to compiling, linking, and creating firmware API reference is also included with a list of available functions for customized application programming
Portview User Manual	Guide for SystemBase device server management application Portview
COM Port Redirector User Manual	Guide for SystemBase COM Port Redirector

If you need more information on Eddy-CPU or embedded device servers in general, please visit our corporate website at <http://www.sysbas.com/>. You can view and/or download documents related to Eddy as well as latest software and firmware updates. Available resources are as follows:

Document Name	Description
Eddy-CPU Spec Sheet	Specifications for Eddy-CPU
Eddy-CPU White Paper	An introductory reading for anyone new to embedded device server. Deals with background, history, market environment, and technology
Eddy-CPU Application Notes	Various applications of Eddy presented in diagrams and images

All documents are updated promptly, so check for the recent document update. The contents in these documents are subject to change without any notice in advance.

5. Technical Supports

There are three ways you can get a technical support from SystemBase.

First, visit our website <http://www.sysbas.com/> and go to 'Technical Support' menu. There you can read FAQ and ask your own question as well.

Second, you can e-mail our technical support team. The mail address is tech@sysbas.com. Any kind of inquiries, requests, and comments are welcome.

Finally, you can call us at the customer center for immediate support. Our technical support team will kindly help you get over with the problem. The number to call is 82-2-855-0501.

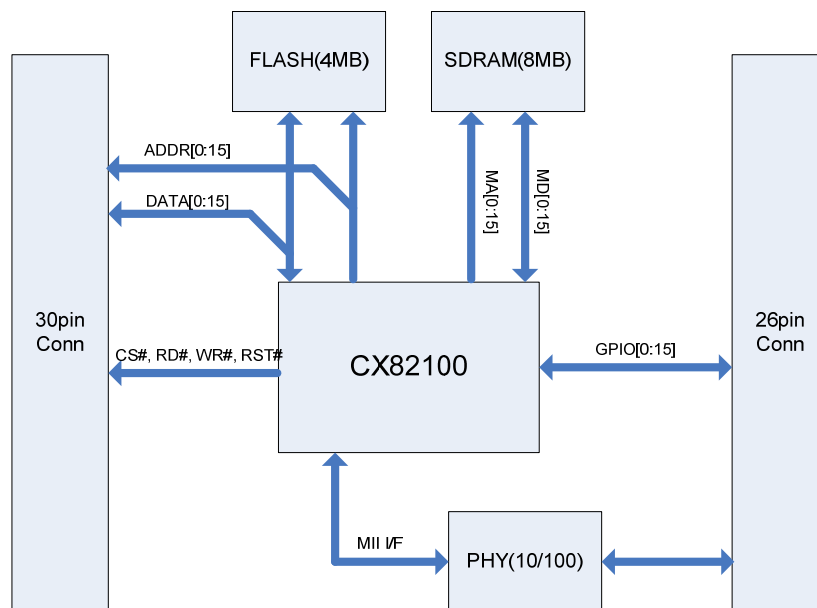
Chapter 2. Getting Started

Welcome to Eddy! This chapter includes Eddy-CPU overview, main and distinctive features, package contents for each product, and application fields.

1. Overview

Eddy-CPU is an Embedded Device Server module that comes with a Conexant CX82100-41Z processor, SDRAM, Flash memory, one 10/100Mbps Ethernet port, 8 bit address/8 bit data bus interface to support flexible connections to outer devices such as UART, and a maximum of 17 user programmable IOs. Users can easily implement UART & 232/422/485, I2C interface and much more using example codes and Evaluation Kit circuits.

Eddy-CPU comes in small form factor (38 x 22mm) but yet has an on board memory and integrated 10/100Mbps network interface which would enable minimized input of time and money for future application developments.



[Eddy-CPU module block diagram]

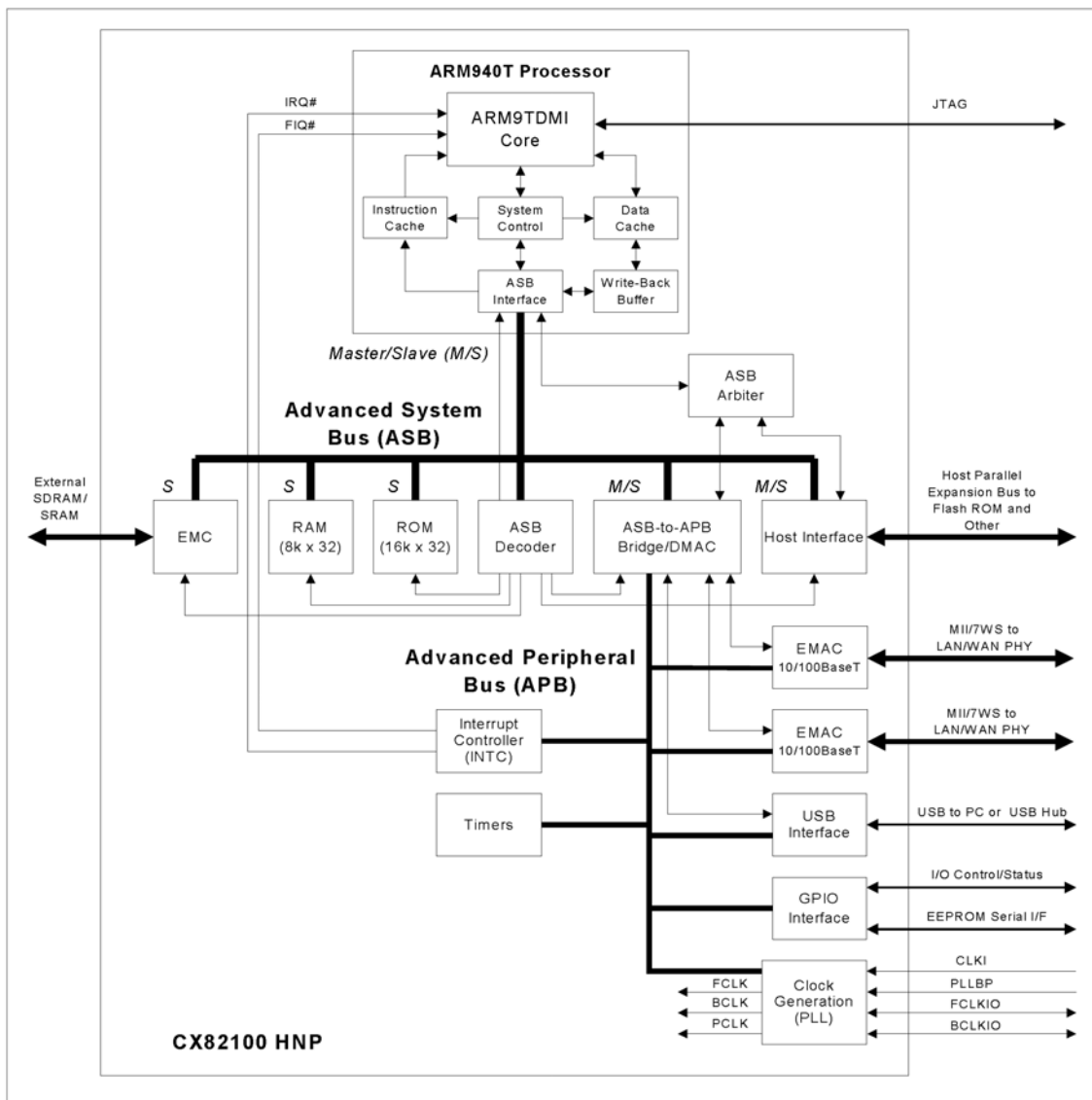
Eddy-CPU Development Kit

Eddy-CPU Development Kit provides an easy environment for the programmer to test their applications on Eddy-CPU. Eddy-CPU Development Kit includes test board, various connectors, programming environment and documents.

Refer to ‘Programming Guide’ included in the Eddy-CPU Development Kit for more detailed information.

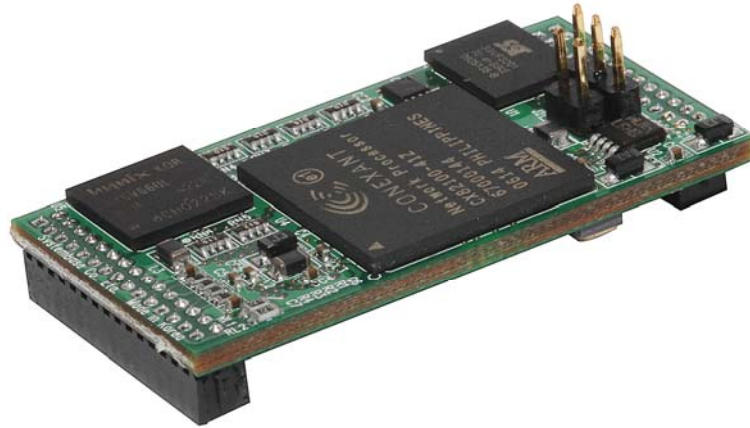
Conexant CX82100

The Conexant™ CX82100 Home Network Processor (HNP) is a single-chip, 185 MIPS high performance, ARM940T-based processor integrated with multiple network interface hardware functions and packaged into a 196-pin FPBGA.

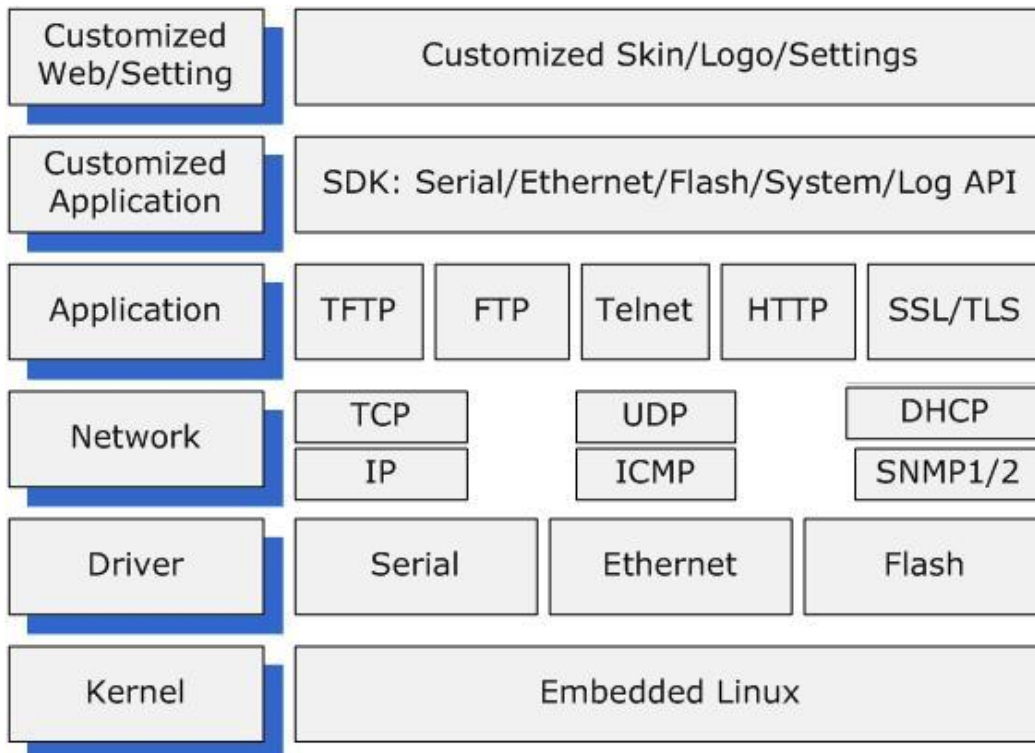


[Processor Block Diagram]

Product at a Glance



Software Architecture



2. Features

Various features of Eddy-CPU make it easy to apply Eddy-CPU to various application developments. Main features are presented below. Other minor features will be explicitly presented throughout this guide.

- Premium-level hardware with ARM940T 168MHz CPU, 4MB Flash, and 8MB SDRAM
- Program and execute your own application
- SystemBase SDK and API support for application programming (included in Development Kit)
- Small sized to be integrated in any hardware (38.0 x 20.8 mm)
- 10/100Mbps Ethernet port (Exterior Transformer & RJ45 needs to be implemented)
- SystemBase COM Port Redirector for better adaptability
- Extensive configuration and monitoring with Portview
- Firmware upload through Web, FTP, and TFTP
- Configuration through Web, Telnet, SNMP, and Portview
- Various customizing options
- Standard Linux environment for openness in executable applications
- Maximum 16 Programmable IO pins for customized applications
- 3.3V power input

3. Package Checklist

Eddy-CPU package is composed of following components. Make sure every component is included with your package.

Module

All module packages include a module and a CD with utilities and documents.

- One Eddy-CPU Module
- CD-ROM (utilities and documents)

Development Kit: Eddy-CPU DK

Eddy-CPU Evaluation Board

Eddy-CPU Module

Serial Cable 1pc (null modem cable)

LAN Cross Cable 1pc

USB Cable 1pc (for firmware download), jumper

Power Adaptor 1pc

Power Cable 1pc (Euro or US – selectable in order)

CD (SystemBase SDK, compile environment, documentations, etc.)

4. Applications

Eddy-CPU can be applied to many practical applications in various fields. Here we present some of them.

Factory / Industrial Automation

PLC, Robot arms, Human-Machine Interface, Warehouse rails

Medical instruments, Inspection equipment controllers

Alarming units

Home Appliances / Electronic Devices

Power controller, Gaming machines

Scales, Gas detection units, Water & pollution metering devices

Data collection and distribution units

Financial / Building Automation

Card readers, Barcode scanners, Kiosks, Point-Of-Sale related devices

Serial printers, Cash registers, Credit card authorization terminals

Biometric detection units, Security devices

OEM Device Server Distributors

OEM device server with distributor's own case & brand

Ready-to-go device or customized application / setup mode can be inserted

Chapter 3. Hardware Description

This chapter provides Eddy-CPU's hardware information including block diagram, layout, pin specifications, dimensions and other hardware-related issues.

1. Overview

Ethernet LAN port is provided as a pin-header. Transformers and RJ-45 connector must be implemented exteriorly by the user. (or RJ connectors with internal transformer -- LAN-Mate or MACJack -- may be use for implementations.)

8 bit address/8 bit data bus provides flexible connections to outer devices such as UART

8 bit address/8 bit data bus interface to support flexible connections to peripheral devices such as UART. Maximum of 16 user programmable IOs are available.

This chapter provides Eddy's hardware information, including block diagram, layout, pin specifications, dimensions and other hardware-related issues.

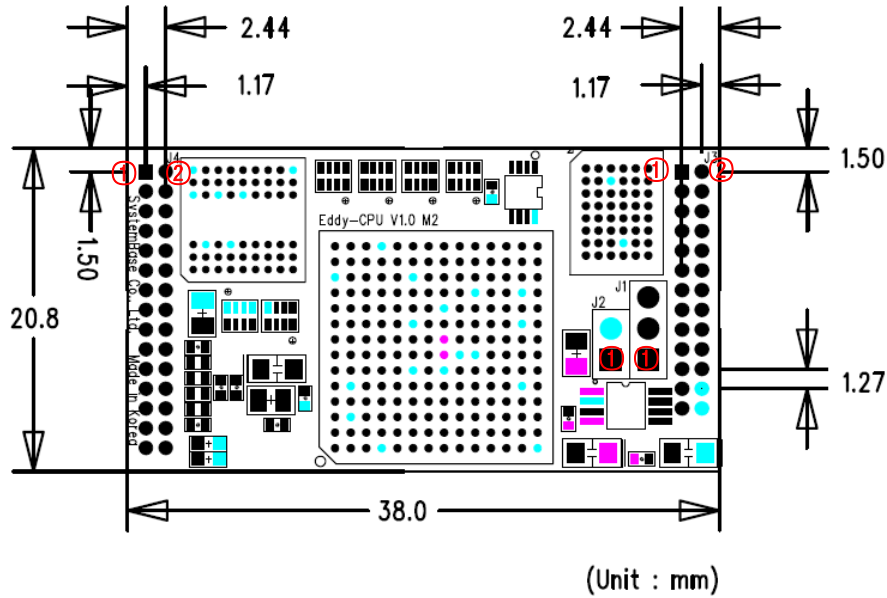
Chip Selects

Chip select signal	Typical Slave Device	Address Range	Size
CS0#	Flash ROM	0x00400000- 0x007FFFFFFF	4MB
IO_CS#	Application dependent	0x002C0000- 0x002CFFFF	64KB

Eddy-CPU Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Supply Voltage	V _{cc}	3.0	3.3	3.6	VDC
Supply Current	I _{cc}		400		mA
Operating ambient temperature	T _A	0		70	°C

Eddy-CPU Board Layout



Pin Descriptions

J1 Pin Description

Pin for Flash Programming. Insert pin jumper on J2 and connect J1 to USB cable. (Please refer to the Programmer Guide for more information on flash programming).

Pin No	Name	Description
1	USBN	USBP and USBN are differential data positive and negative signals for USB port. Connect USBP and USBN to USB +Data and USB - Data.
2	USBP	
3	GND	Connect to USBs GND

J2 Pin Description

Enables compiling, linking, creating and uploading of firmware to Eddy-CPU. Connect J1 to USB cable while J2 is connected to a jumper.

J2 Jumper	
ON	Internal Boot (USB Programming)
OFF	Flash Boot (Normal operation)

J3, J4 Pin Description
J3

Pin	Description	Pin	Description
1	HA7	2	HA6
3	HA5	4	HA4
5	HA3	5	HA2
7	HA1	8	HA0
9	IO_CS#	10	IO_WR#
11	GND	12	IO_RD#
13	HRST#	14	HRST
15	HD7	16	HD6
17	HD5	18	HD4
19	HD3	20	HD2
21	HD1	22	HD0
23	GND	24	33V
25	GND	26	33V

J4

Pin	Description	Pin	Description
1	GPIO8	2	GPIO9
3	GPIO10	4	GPIO3
5	GPIO4	5	GPIO1
7	GPIO6	8	GPIO7
9	GPIO5	10	GPIO11
11	GPIO12	12	GPIO2
13	IO_INT	14	GPIO13
15	GPIO14	16	GPIO15
17	GPIO16	18	GND
19	GND	20	NC
21	LAN_TX+	22	LAN_TX-
23	GND	24	GND
25	LAN_RX+	26	LAN_RX-
27	NC	28	NC
29	LED_100M	30	LED_10M

J3

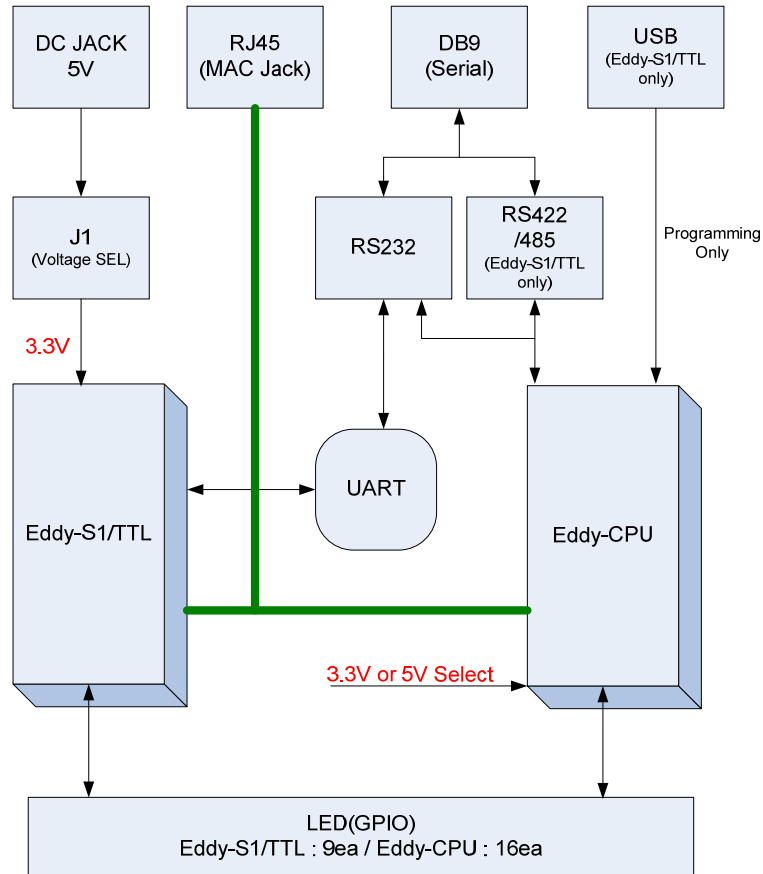
Pin No	Name	Description
1~8	HA[7:0]	Address Line 0~7
9	IO_CS#	Exterior Device Chip Select Signal, active low signal
10	IO_WR#	Exterior Device Write Enable Signal, active low signal
11	GND	Ground
12	IO_RD#	Exterior Device Read Enable Signal, active low signal
13	HRST#	Reset Output Signal, active low
14	HRST	Reset Output Signal, active high
15~22	HD[7:0]	Data Line 0~7

J4

Pin No	Name	Description
1~17	GPIO[15:0]	Programmable General purpose Input/output 16ea
13	IO_INT	Exterior Device Interrupt Signal, input polarity selectable
20	NC	No Connection, Must maintain Open status
21	LAN_TX+	Ethernet TX+, Ethernet Implementable by connecting to External Transformer
22	LAN_TX-	Ethernet TX-, Ethernet Implementable by connecting to External Transformer
25	LAN_RX+	Ethernet RX+, Ethernet Implementable by connecting to External Transformer
26	LAN_RX-	Ethernet RX-, Ethernet Implementable by connecting to External Transformer
29	LAN_100M	When linked to 100Base-T, LED ON lightens up and blinks during data transmission. (When linked to 10Base-T, this LED does not light up.)
30	LAN_10M	When linked to 10Base-T, LED ON lightens up and blinks during data transmission. (When linked to 100Base-T, this LED does not light up.)

2. Eddy-CPU Development Kit

Block Diagram



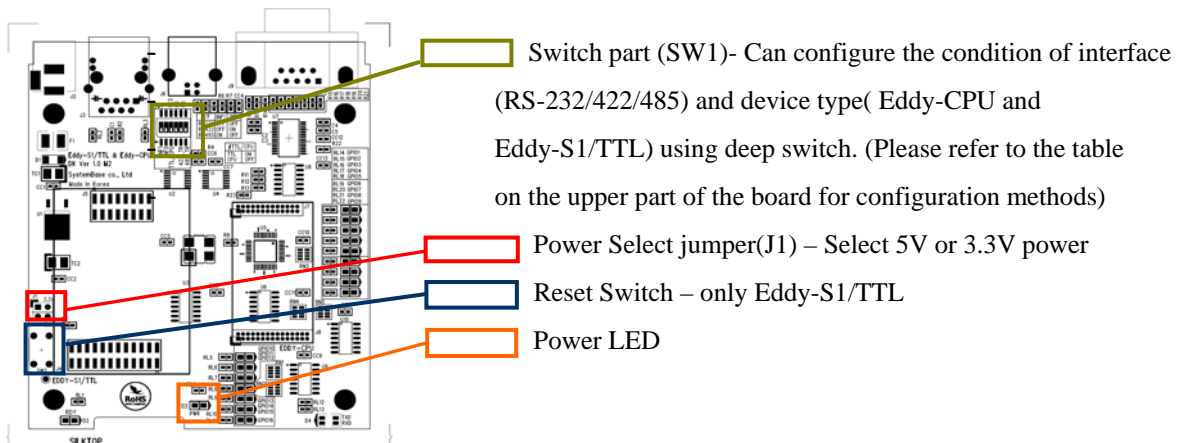
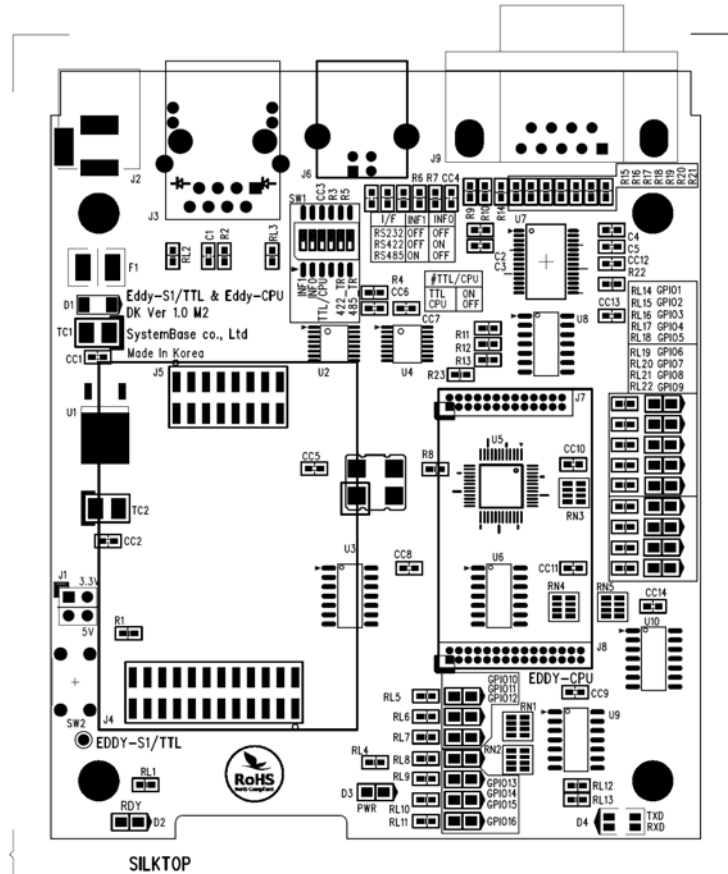
Eddy-CPU User Guide

Development Kit Board Setup

The table below explains configuration of straps and jumper setting required for utilizing Eddy-CPU Development Kit. For Eddy-S1/TTLs, be sure to check the input voltage label sticker on the board. J1 must be set to proper voltage shown on the label before power is supplied.

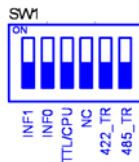
→ For more information , please refer to DK manual.

Eddy-CPU & Eddy-S1/TTL DK Layout-Top View

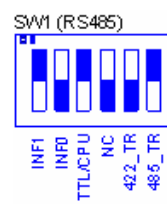
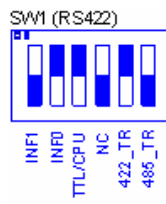
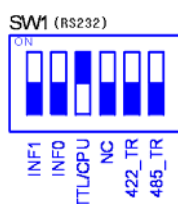


Configuration Straps and Jumper Settings

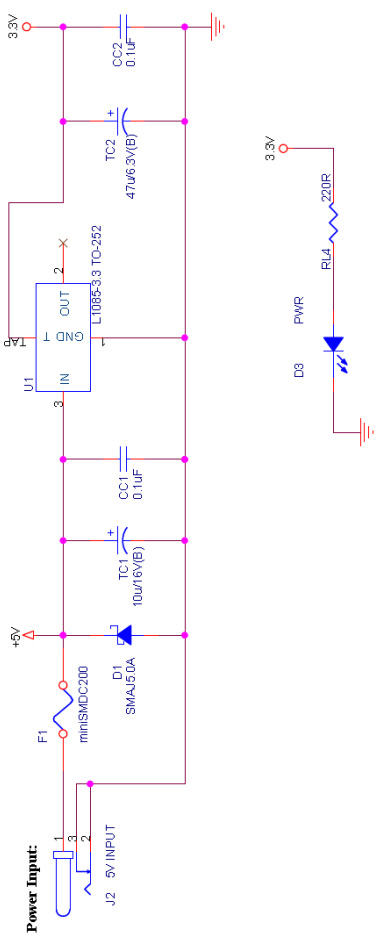
Designation	Setting	Feature
Power select Jumper(J1)	1-2	Eddy-S1/TTL input voltage is set to 3.3V Eddy-S1/TTL can take in either 3.3V or 5V. Be sure to check the input voltage label sticker on the board and set the jumper accordingly. (Eddy-CPU input voltage is set to 3.3v regardless of J1 settings.)
	3-4	Eddy-S1/TTL input voltage is set to 5V
Switch Part (SW1)	1	INF1
	2	INF0
	3	TTL/CPU
	4	NC
	5	422_TR
	6	485_TR
		Serial Interface Configuration INF[1:0] = '00' , RS232 INF[1:0] = '01' , RS422 INF[1:0] = '10' , RS485 Serial Interface Configuration applies only to Eddy-S1/TTL products. Default setting(OFF) is configured to Eddy-CPU DK.
		Determines output power of serial port. When testing Eddy-CPU DK , turn the switch OFF. When testing Eddy-S1/TTL , turn the switch ON.
		No Connection
		Termination Resistor can be installed when configuring RS422 mode. If operating under RS422 mode, 485_TR must be switched to "OFF". 422_TR may be switched to "ON" depending on the existence of termination resistors.
		Termination Resistor can be installed when configuring RS85_mode. If operating under RS485 mode, 422_TR must be switched to "OFF". 485_TR may be switched to "ON" depending on the existence of termination resistors.



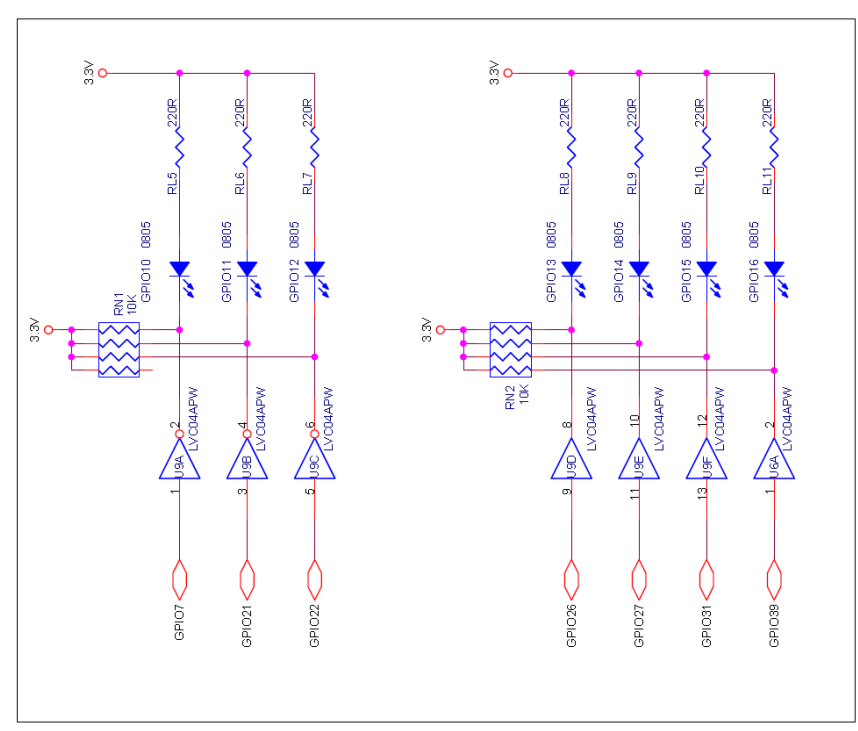
[Eddy-CPU Configuration(RS232 Only)]



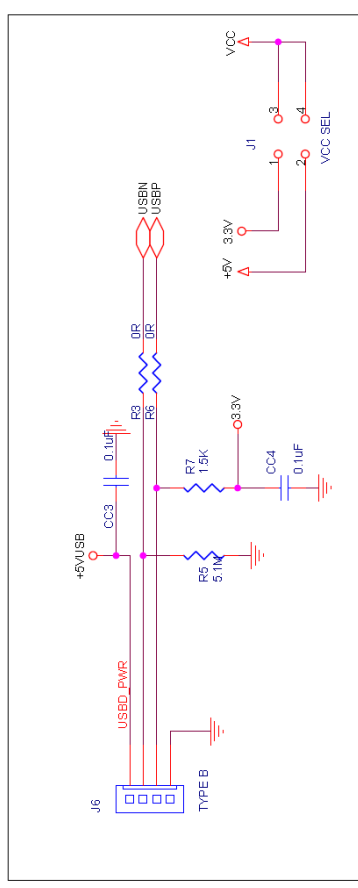
[Eddy-S1/TTL Configuration]



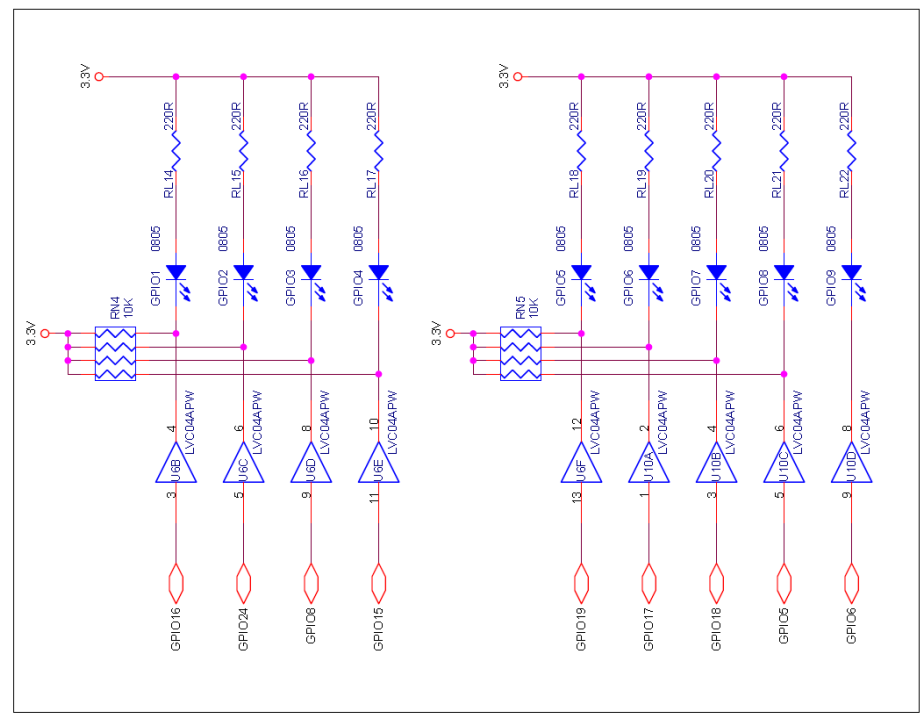
#2



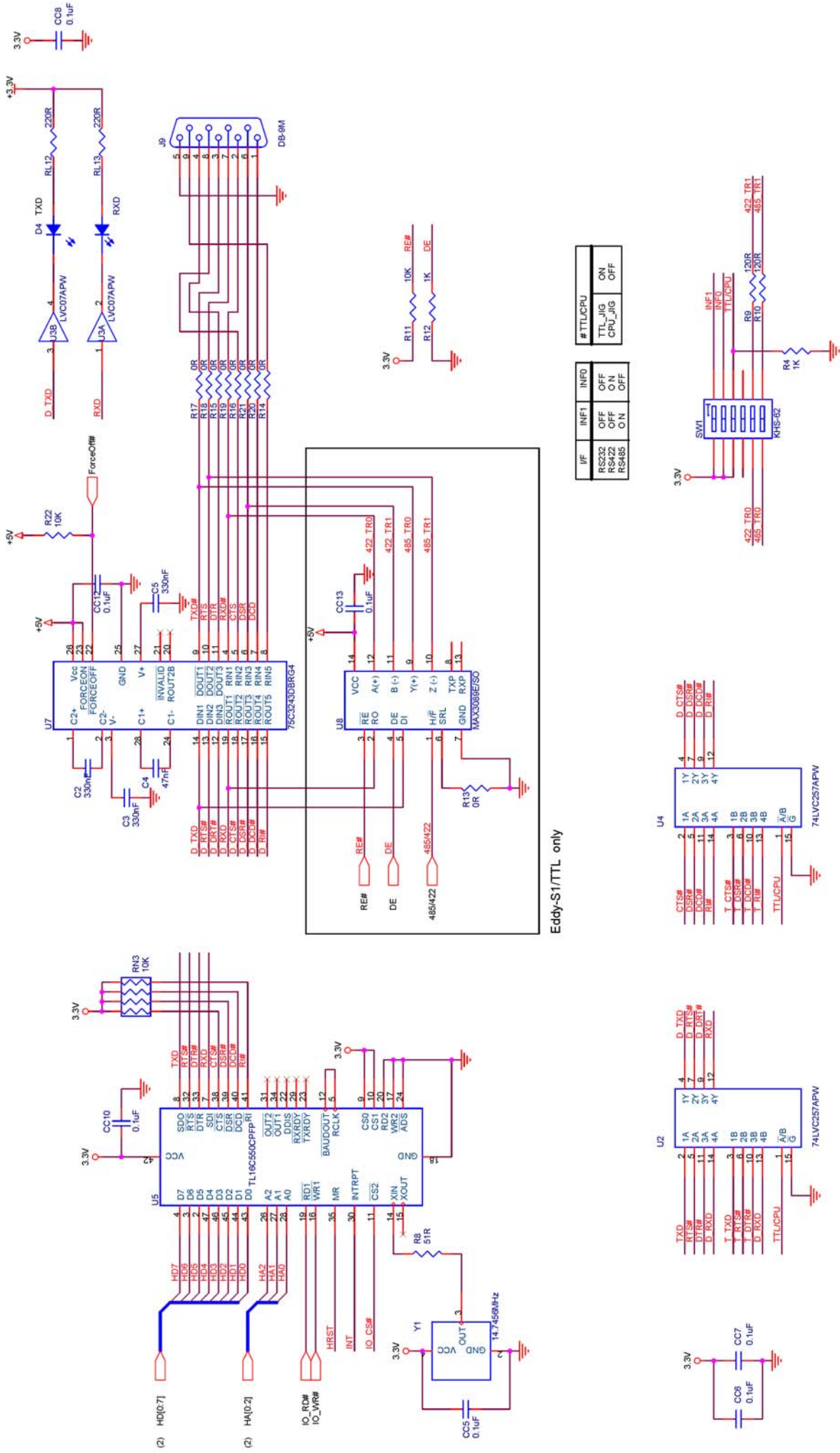
Eddy-CPU only



Eddy-S1/TTL only

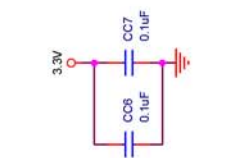
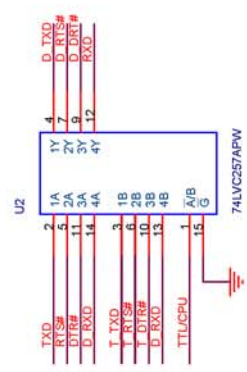
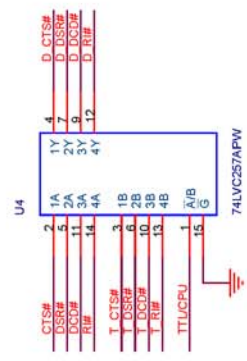
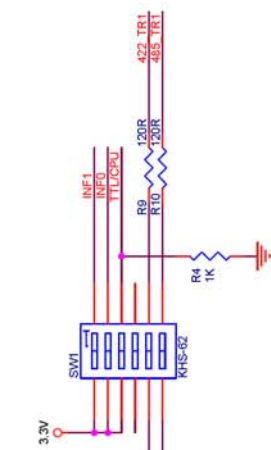


Eddy-S1/TTL & Eddy-CPU



Eddy-S1/TTL only

IF	INF1	INF2	# TTL/CPU
RS232	OFF	OFF	ON
RS422	OFF	OFF	ON
RS485	ON	ON	OFF



Chapter 4. Integration

This chapter explains how you can make Eddy-CPU to communicate. It deals with LAN and pin header connection guides for Eddy-CPU to operate together with the target serial device.

1. Connection Guide

Follow these steps to connect Eddy to the device and network.

In order to connect Eddy to network, you need to use RJ45 Ethernet port. It supports both 10Mbps and 100Mbps Ethernet connection (auto-sensing). If you would like to connect Eddy-CPU development board to PC directly, use a **cross LAN cable**. Otherwise, plug one end of a **direct LAN cable** to Eddy-CPU and the other end to a hub, switch, or any other network device that can provide you with network access.

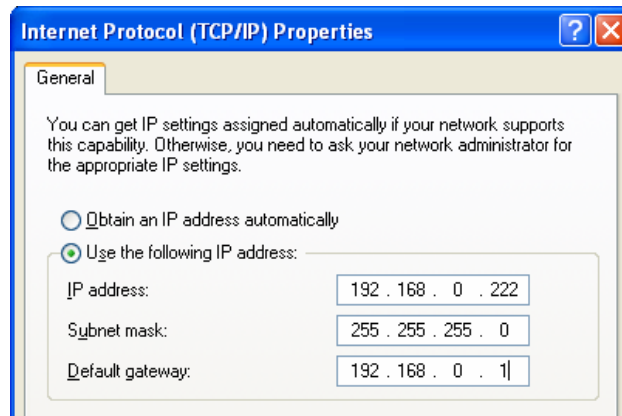
2. First-time Bootup

An IP address is required to access Eddy's web interface or telnet command-line configuration tool. By factory default, Eddy is assigned a static IP address. After the initial connection, you can either manually assign a different IP address or set Eddy to automatically get an IP address from a DHCP server. While this depends on your network environment and policy, **it is strongly recommended that you assign Eddy with a unique static IP.**

3. Connecting to Eddy with IP address

The factory default IP address: **192.168.0.223**

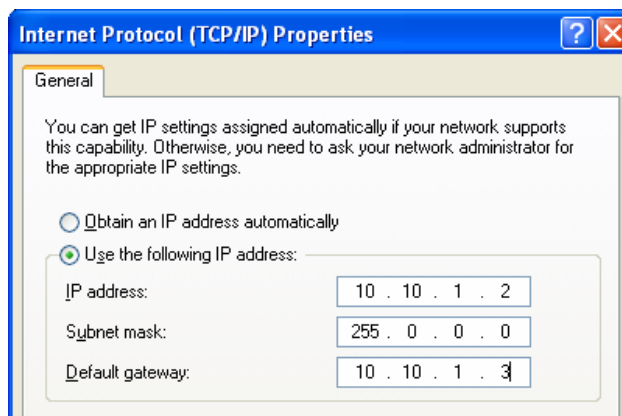
Eddy's default IP address is set to 192.168.0.223. In order to connect with this address, you need to change network configurations so that your PC can connect to the IP 192.168.0.223. Please refer to an example below, and note that values don't necessarily have to be identical to the example below.



In case you configure Eddy to use DHCP to obtain an IP address automatically, you might find it hard to know the IP address to connect to. To provide users with an easier way to know the current IP address, Eddy has a fixed alias IP that is always accessible. Use the address below whenever you cannot find out Eddy's IP address.

Factory default alias IP address: **10.10.1.1**

In order to connect with this address, you need to change network configurations so that your PC can connect to the IP 10.10.1.1. Please refer to an example below, and note that values don't necessarily have to be identical to the example below.



Now you are ready to connect to Eddy! There are three options to configure Eddy.

Web: You can easily configure Eddy with web interface, accessible from any web browser. For more information, please refer to Chapter 5. Configuration via Web.

Telnet: You can configure Eddy with commands after accessing Eddy through Telnet. For more

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information, please refer to Chapter 6. Configuration via Telnet.

Portview: You can use a Windows-based utility Portview from SystemBase to monitor Eddy. For more information on using the utility for your administration purpose, please refer to Portview User Guide.

Chapter 5. Configuration via Web

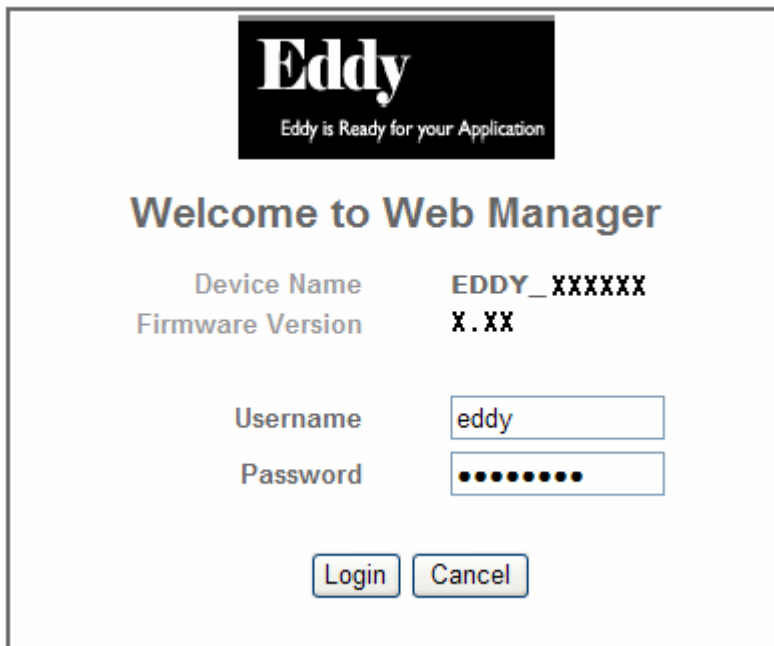
1. Connection

Open your favorite web browser and enter the IP address of Eddy to access Eddy's web manager. Once you are successfully connected, the following front page will show up. You need to enter appropriate username and password to login.

Please note that this username and password is used as authentication method for Telnet as well. This means if username or/and password has been modified from the web interface, modified values have to be entered to connect to Telnet, and vice versa.

Factory default username: **eddy**

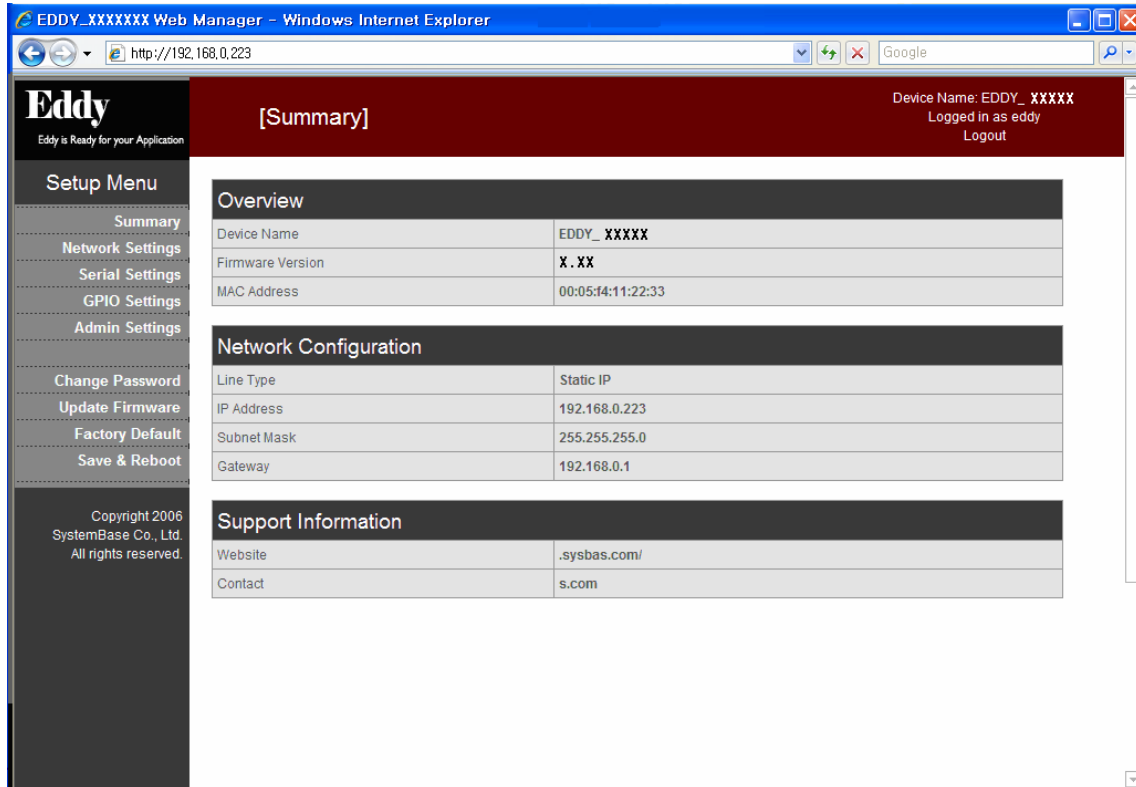
Factory default password: **99999999**



The screenshot shows the Eddy Web Manager interface. At the top, there is a black banner with the word "Eddy" in white, and below it, the text "Eddy is Ready for your Application". Below the banner, the text "Welcome to Web Manager" is displayed. Underneath, the device name is shown as "EDDY_XXXXXX" and the firmware version as "X.XX". There are two input fields: "Username" with the value "eddy" and "Password" with a masked password represented by ten dots. At the bottom, there are two buttons: "Login" and "Cancel".

2. Setup Menu

If login process is successful, you will see a web manager's main page, showing summary of your device. On the left, you will see a setup menu, and you can navigate through these options.

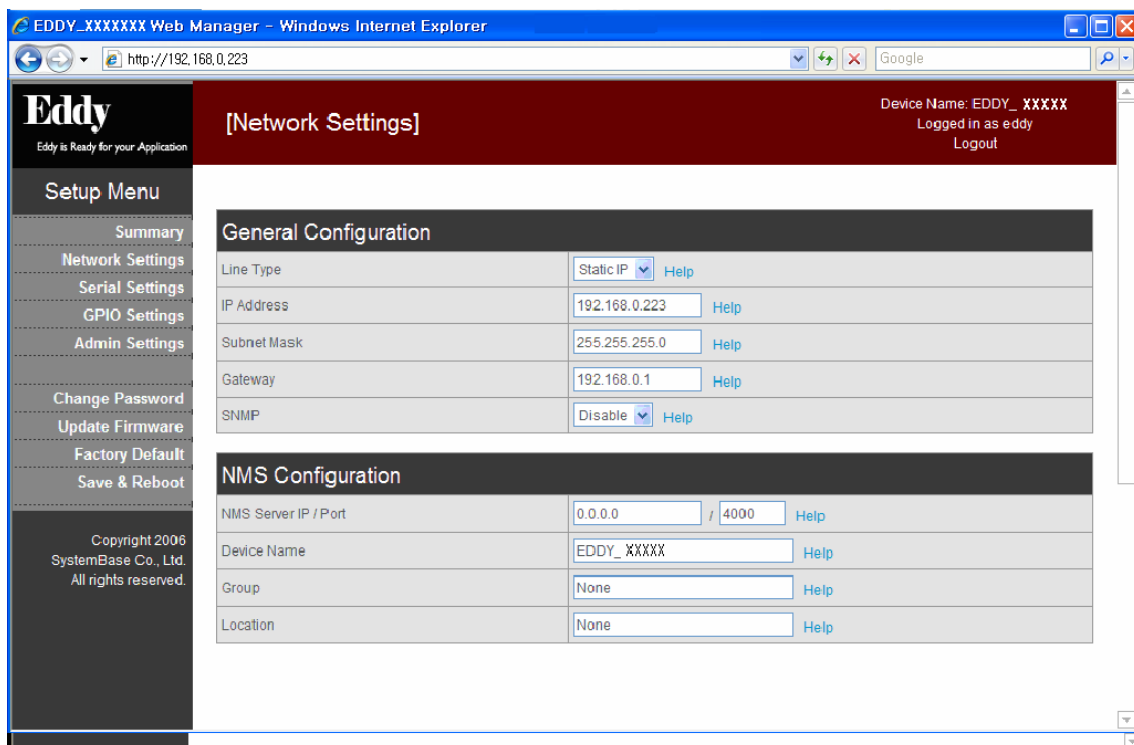


- Summary** : View a summary of Eddy.
- Network Settings** : Configure network connection settings.
- Serial Settings** : Configure detailed operation environment for serial communication.
(You need an external UART circuit for this)
- GPIO Settings** : Configure programmable I/O pins.
- Admin Settings** : View and change device information and support information.

- Change Password** : Change ID and password for both Web and Telnet interface.
- Update Firmware** : Update Eddy's firmware.
- Factory Default** : Restore all the factory default settings.
- Save & Reboot** : Save the configurations and reboot Eddy.

3. Network Settings

Configure general network environment and network management. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.



General Configuration

- **Line Type** (Default: Static IP)
Options: Static IP / DHCP
IP obtaining method for Eddy's network connection
- **IP Address** (Default: 192.168.0.223)
Current IP address Eddy is assigned to.
When line type is Static IP, manually enter an appropriate IP address.
When line type is DHCP, current IP is displayed, but it is not editable.
- **Subnet Mask** (Default: 255.255.255.0)

Current subnet mask Eddy is assigned to.

When line type is Static IP, manually enter an appropriate subnet mask.

When line type is DHCP, current subnet mask is displayed, but it is not editable.

- **Gateway** (Default: 192.168.0.1)

Current default gateway Eddy is assigned to.

When line type is Static IP, manually enter an appropriate default gateway.

When line type is DHCP, current default gateway is displayed, but it is not editable.

- **SNMP** (Default: Disable)

Options: Enable / Disable

Enable or disable SNMP(Simple Network Management Protocol) support.

MIB-II (RFC 1213): System, Interface, IP, ICMP, TCP, UDP

MIB-I (RFC 1317): Serial Interface

NMS Configuration

If multiple devices are installed and managed together, integration in management is necessary. In addition, it is often the case when the device reports an erroneous status, figuring out the reason for the failure becomes a time-consuming job. To solve this inefficiency and provide better solution, Eddy includes a Network Management System software, Portview.

- **NMS Server IP / Port** (Default: 0.0.0.0 / 4000)

Set the IP address and the port number of the PC where Portview is installed. For more information on Portview, please refer to the Portview User Manual.

If IP is set to 0.0.0.0, NMS feature is disabled.

- **Device Name** (Default: Eddy-1/Pin)

Set the device name for management. 32 Characters at maximum.

- **Group** (Default: None)

Set the group name for management. 32 Characters at maximum.

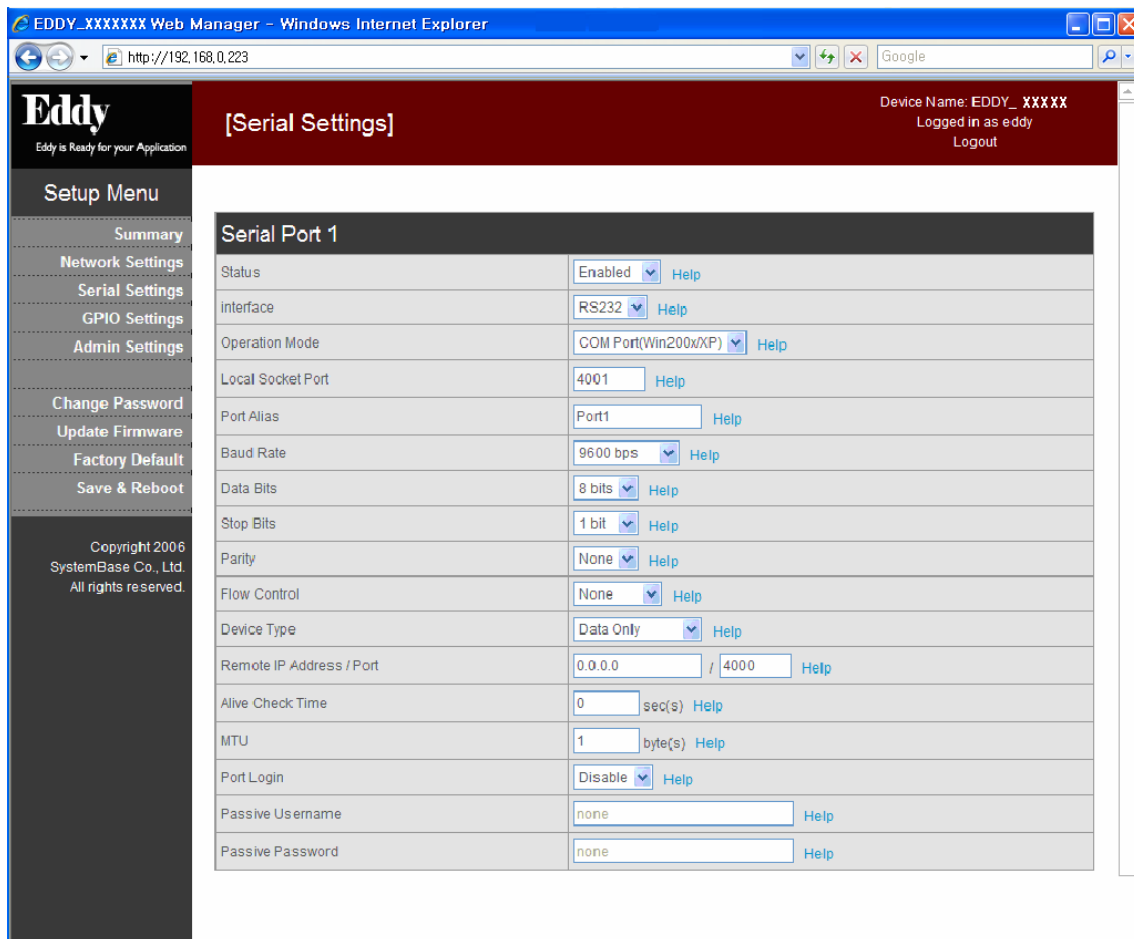
- **Location** (Default: None)

Set the location name for management. 32 Characters at maximum.

4. Serial Settings

This part will be used by user who wants to use serial port with external UART. If you don't want to use serial port, you don't need to see this part.

You can set the communication and operation environment for the serial port. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to '**Save & Reboot**' in order to see these changes in effect. Changes will be discarded if you do not save current settings.



The screenshot shows the 'Eddy' web manager interface in a Windows Internet Explorer browser. The page title is '[Serial Settings]'. The device name is 'EDDY_XXXXX' and the user is logged in as 'eddy'. The main content area is titled 'Serial Port 1' and contains the following settings:

Serial Port 1	
Status	Enabled Help
Interface	RS232 Help
Operation Mode	COM Port(Win200xXP) Help
Local Socket Port	4001 Help
Port Alias	Port1 Help
Baud Rate	9600 bps Help
Data Bits	8 bits Help
Stop Bits	1 bit Help
Parity	None Help
Flow Control	None Help
Device Type	Data Only Help
Remote IP Address / Port	0.0.0.0 / 4000 Help
Alive Check Time	0 sec(s) Help
MTU	1 byte(s) Help
Port Login	Disable Help
Passive Username	none Help
Passive Password	none Help

- **Status** (Default: Enabled)
Options: Enabled / Disabled
Choose to use or not use this port.

- **Interface** (Default: RS232)

Options: RS232 / RS422 / RS485

Current serial interface type is displayed. Refer to Chapter 3. Hardware for detailed information on changing serial interface type.

- **Operation Mode** (Default: COM(Win200x/XP))

Select the operation protocol, which the serial port would use.

- **COM(Win200x/XP)**

Use the serial port of Eddy as the COM ports of Windows 2000/XP/2003 operated PC. (Both the data and the signal line information of the serial port can be controlled.)

- **COM(Win98/ME)**

Use the serial ports of Eddy as the COM ports of Windows 98/ME operated PC. (Both the data and the signal line information of the serial port can be controlled.)

- **TCP Server**

Eddy works as a socket server, waiting for the client connection on the network.

Socket number for awaiting connections can be set in 'Local socket port' field.

All data between the socket and the serial port is transferred untouched after the socket connection is established.

- **TCP Client**

Eddy acts as a socket client in this mode. It tries to connect to the server IP address and the socket number assigned when a certain server waits for connection on the network.

All data between the socket and the serial port is transferred untouched after the socket connection is established.

- **TCP Multi-Server**

Eddy works as a server, accepting up to 5 simultaneous connections from socket clients.

Data transmitted from Eddy is broadcast to each socket client.

- **UDP Server**

Eddy works as a UDP server, waiting for UDP connection from the client on the network.

Socket number for awaiting connections can be set in 'Local socket port' field.

Once a UDP packet is received to the socket that waits for the connection, the data is transmitted to the serial port. The data input from the serial port is put into UDP packets, which eventually are sent to the client.

- **UDP Client**

When the data is input to the serial port, UDP packets are sent using the preset IP address and the socket number of the server.

- **Local Socket Port** (Default: 4001)
Set the socket number for the port. TCP server and UDP server operation mode makes use of this port for awaiting network socket connections.

- **Port Alias** (Default: Port1)
Port alias name for convenience. 16 Characters at maximum.

- **Baud Rate** (Default: 9600bps)
Options: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600bps
Set communication speed.

- **Data Bits** (Default: 8)
Options: 5, 6, 7, 8
Set the number of bits in each character size.

- **Stop Bits** (Default: 1)
Options: 1, 2
Set the number of stop bits.

- **Parity** (Default: None)
Options: None, Odd, Even
Set parity bit check scheme.

- **Flow Control** (Default: None)
Options: None, Xon/Xoff, RTS/CTS
Set the flow control scheme.

- **Device Type** (Default: DataOnly)
Options: Data Only, Modem Signals
Set the signal line checking method for the device to be connected to the given serial port.
If the mode is set to Data Only, only Txd, Rxd, and Gnd signal lines are used in inter-device communication. If the mode is set to Modem Signals, all modem signals except RI(Ring Indicator) are asserted, tested, and used in communication.

- **Remote IP Address / Port** (Default: 0.0.0.0 / 4000)

When the Operation Mode is either TCP Client or UDP Client, set the IP address and the socket number to connect to.

- **Alive Check Time** (Default: 0 sec)

After a certain amount of time passes without any communication after the socket connection between the given serial port and the server is established, automatically disconnect the socket connection. Valid from 0 to 32767.

For example, if the operation mode is set to TCP Server and Alive Check Time is configured to 10, TCP Server will listen for the client's connection and eventually establish a connection. Since the check time is 10 seconds, the server will wait for 10 seconds until the client connected to it sends any packet. If there is no data for 10 seconds, server will quit the connection and return to the listening state. This option is helpful in preventing communication obstacles that occur when either Eddy or the client quits unexpectedly (i.e. Sudden black out, reboot, LAN cable cut, etc.). In these cases, the other part of communication might not recognize the failure of its partner. Such misunderstanding can cause communication errors.

If the value is set to 0, this function is disabled. Once connected socket will be retained until explicitly disconnected.

(Only applies to TCP Client, TCP Server, TCP Multi-Server operation modes.)

- **MTU** (Default: 1 byte)

MTU stands for Maximum Transmission Unit, and this option needs to be set when consecutive data from the given serial port needs to be transmitted to socket at once. If 100 bytes of character string are to be transmitted from the serial device and MTU is set to '100', Eddy waits until the entire 100 bytes are received. After receiving 100 bytes, it transmits this data to the server as a single packet, using the socket. If 200 bytes of character string are to be transmitted from the serial device, Eddy breaks this data into 2 packets of 100 bytes. If data less than 100 bytes is received, Eddy will wait for a certain amount of time. While the duration is determined by the communication speed, it normally is around 20 msec. If there is no further data incoming during this time, Eddy will send what is stored until then, though not a

full 100-byte data it may be, as one packet.

If MTU is set to '1', however, each byte is transmitted right away in a packet, therefore multiple packets sent to the server. Valid from 1 to 1100.

- **Port Login** (Default: Disable)

Options: Enable, Disable

When the Operation Mode is set to TCP Server, ask for the username and password when the client tries to connect.

- **Passive Username** (Default: conuser)

When the Operation Mode is set to TCP Server, set the username to ask for. 32 Characters at maximum.

- **Passive Password** (Default: 99999999)

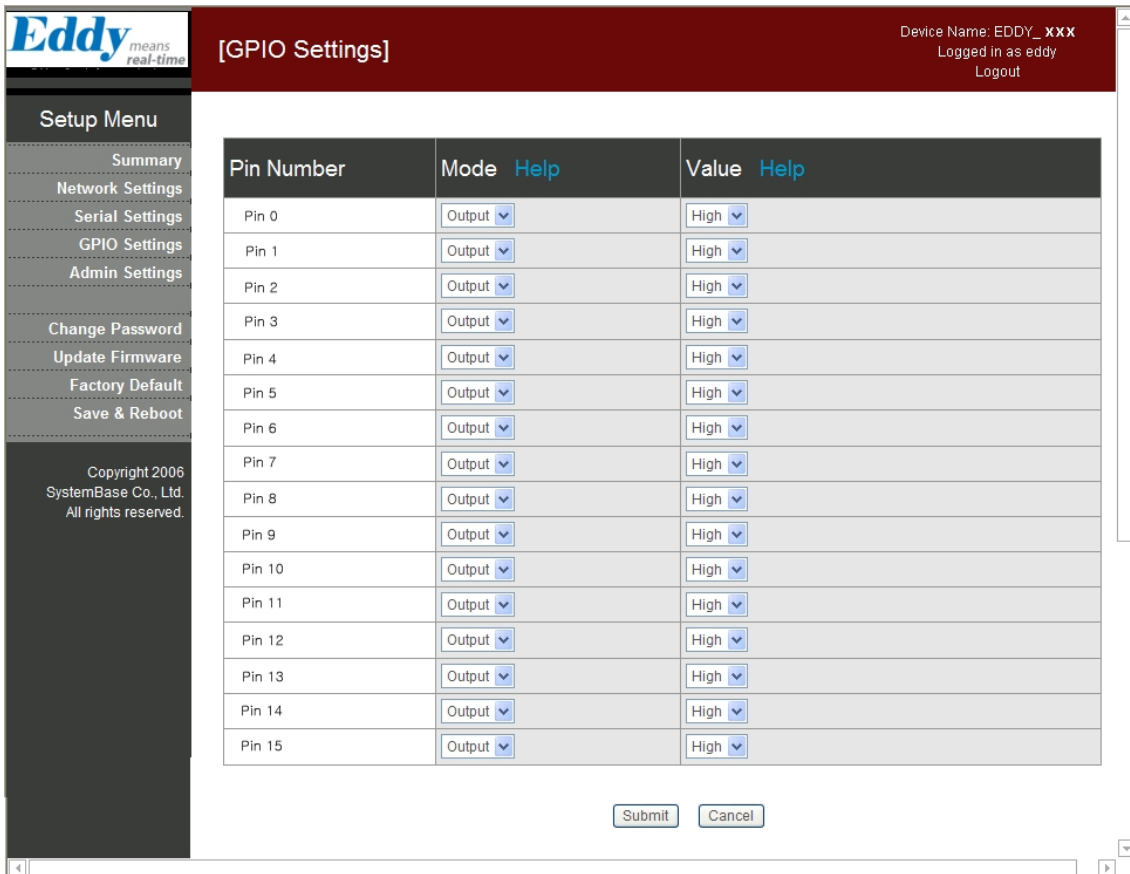
When the Operation Mode is set as TCP Server, set the password to ask for. 32 Characters at maximum.

5. GPIO Settings

Configure operation mode and value for each Programmable I/O pins.

Eddy includes 9 GPIO pins that output 3.3V or detect 3.3V signals. You can detect either any 3.3V signals from external device, or output 3.3V signal to the external device. You can also program a customized GPIO application, and you can implement it with the SDK included in the Eddy development kit.

After changing values, you need to click ‘Submit’ button. Then you will see the same page with modified values. Please note that you have to ‘**Save & Reboot**’ in order to see these changes in effect. Changes will be discarded if you do not save current settings.



Pin Number	Mode Help	Value Help
Pin 0	Output	High
Pin 1	Output	High
Pin 2	Output	High
Pin 3	Output	High
Pin 4	Output	High
Pin 5	Output	High
Pin 6	Output	High
Pin 7	Output	High
Pin 8	Output	High
Pin 9	Output	High
Pin 10	Output	High
Pin 11	Output	High
Pin 12	Output	High
Pin 13	Output	High
Pin 14	Output	High
Pin 15	Output	High

- **Mode** (Default: Output)

Options: Output, Input

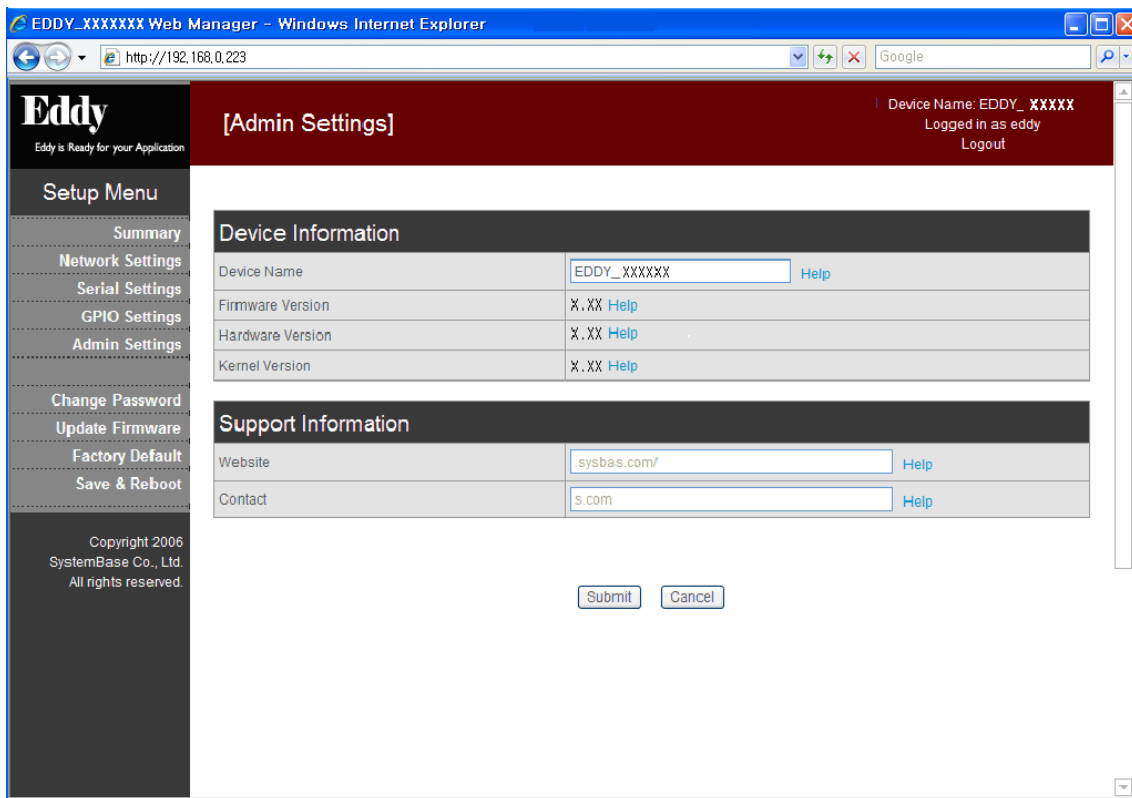
Set current pin’s I/O mode. When in output mode, 3.3V output can be controlled. When in input mode, any 3.3V from outside can be detected.

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- **Value** (Default: High)
Options: High / Low
Set current pin's output value. (This option only applies to output mode pins)
If the value is High, 3.3V is output through the port.

6. Admin Settings

Device information and support information settings. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.



Device Information

- **Device Name** (Default: Eddy-1/Pin)
Name of the current device.
- **Firmware Version**
Current firmware version.

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- **Hardware Version**
Current hardware version.

- **Kernel Version**
Current kernel version.

Support Information

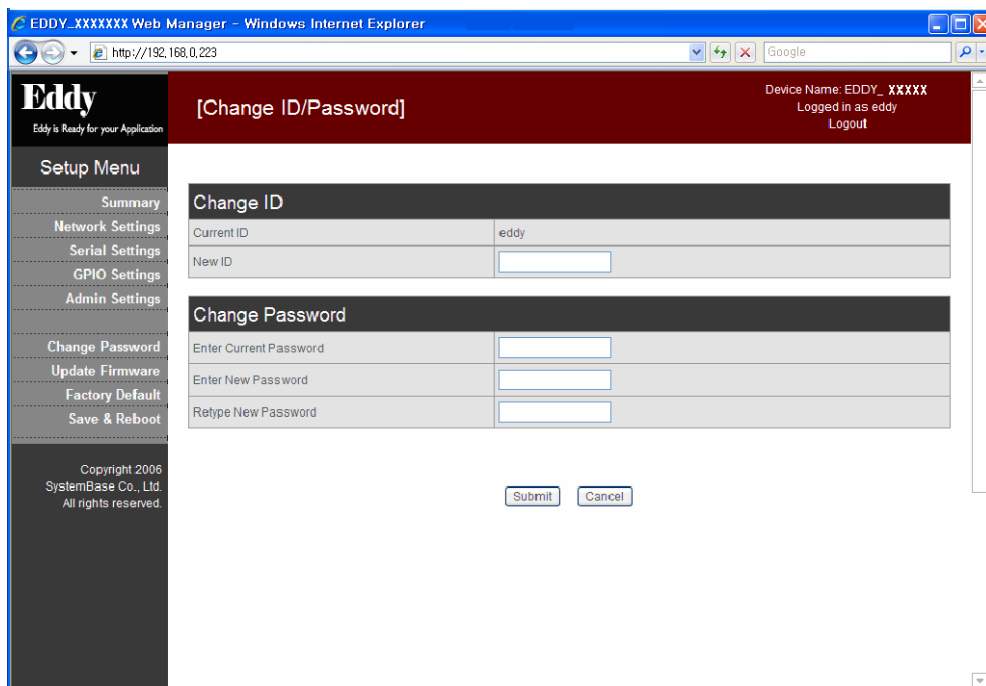
- **Website**
Website for help and support.

- **Contact**
Contact information for technical support.

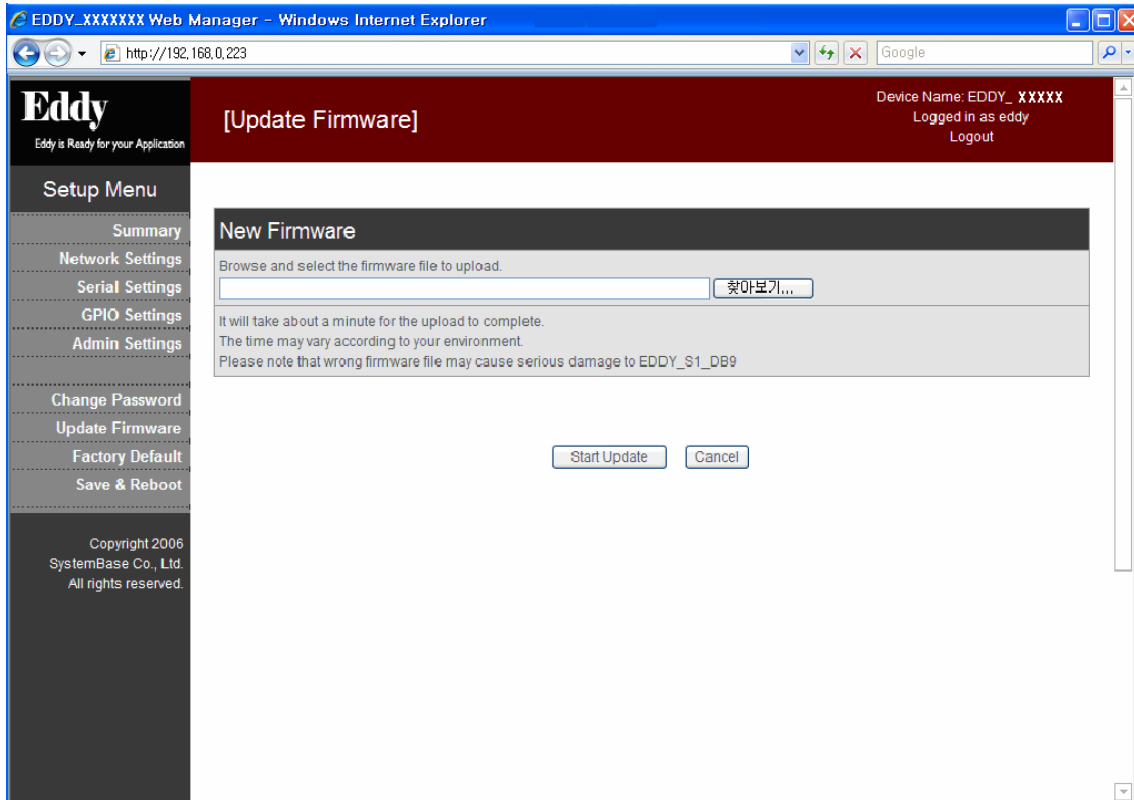
7. Change Password

Change Web/Telnet access username and password. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to '**Save & Reboot**' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

As stated before, default username and password are **eddy** and **99999999**, respectively.



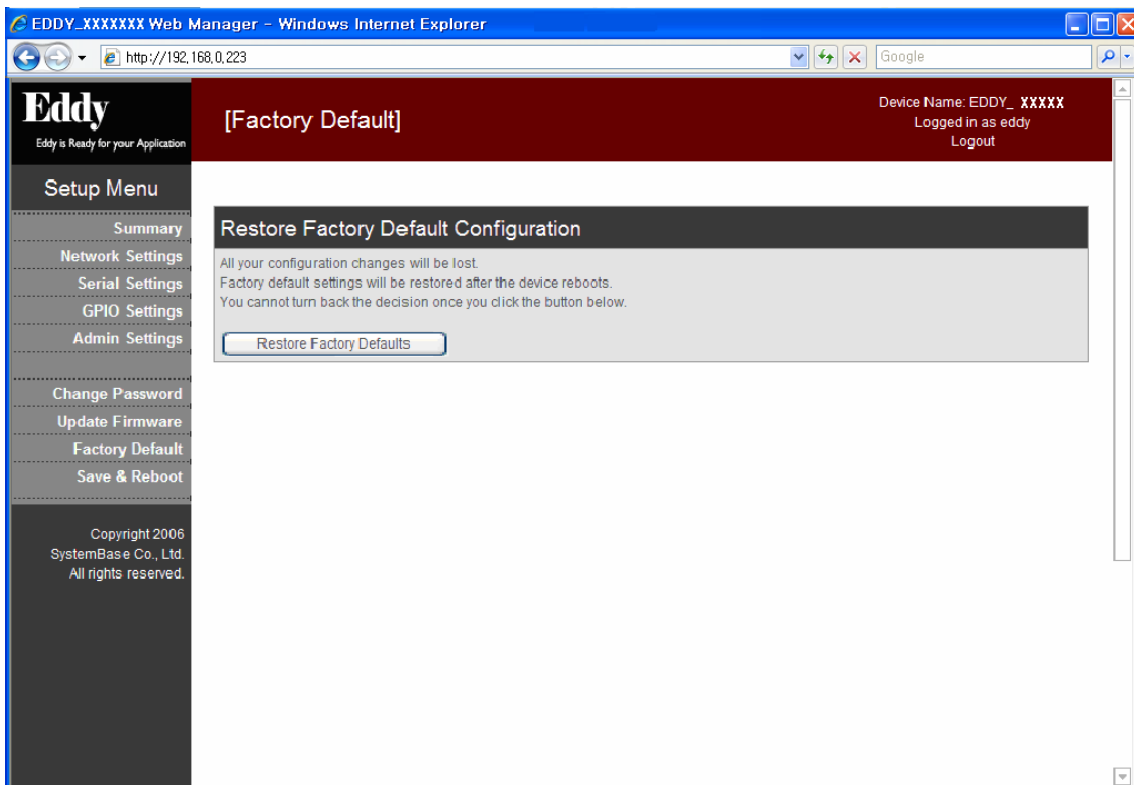
8. Update Firmware



Firmware is an application embedded in Flash memory of Eddy. Set the location of the firmware file to update, using the 'Browse...' button. The selected firmware will be transferred to Eddy when you click 'Start Update'. After the transmission is complete, Eddy will be automatically restarted to operate with the new firmware. Recent firmware can be downloaded at the SystemBase web site, <http://www.sysbas.com/>

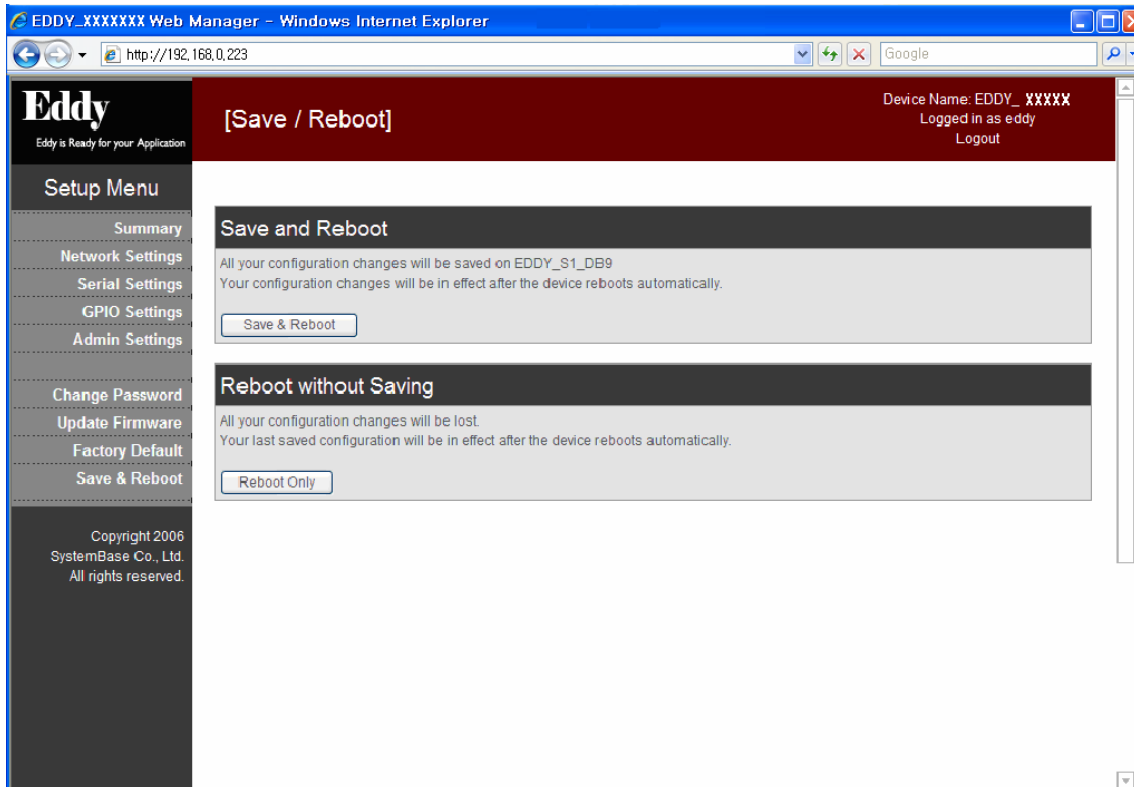
9. Factory Default

Restore all the configuration parameters to the factory default values. Clicking on 'Restore Factory Defaults' button will delete all current settings and restore settings to the initial status. Eddy will automatically reboot. You cannot turn back the decision once you select this option.



10. Save & Reboot

This option saves changes to the Flash memory and restarts the system to let the changes to take place in the operation.



- **Save and Reboot**

‘Save & Reboot’ reboots Eddy after saving changes to Flash memory.

- **Reboot without Saving**

‘Reboot Only’ option just reboots Eddy without saving changes. This option can be used to rollback the changes you have mistakenly made.

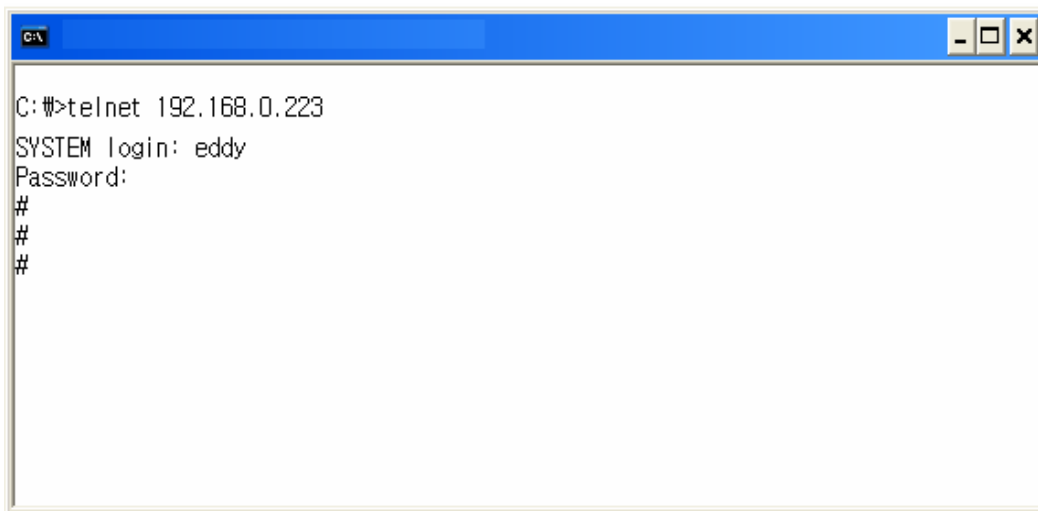
Chapter 6. Configuration via Telnet

1. Connection

Open your telnet client and enter Eddy's IP address to connect. You need to enter appropriate username and password to login. Please note that this username and password is used as authentication method for Web as well. This means if username or/and password has been modified from the telnet interface, modified values have to be entered to connect to web, and vice versa.

Factory default username: **eddy**

Factory default password: **99999999**



```
C:\#>telnet 192.168.0.223
SYSTEM login: eddy
Password:
#
#
#
```

With **'set'** commands, you can configure Eddy's settings.

With **'view'** commands, you can view current Eddy's settings.

After changing values, you can see modified values with **'view'** commands. But be careful because these values are not in effect unless you issue a **'set save'** command. Changes will be discarded if you do not save current settings.

Command notations:

- 1) set line [ip / dhcp]: Either enter **set line ip** or **set line dhcp**.
- 2) set ip <IP address>: Enter actual values such as **set ip 192.168.0.223**

2. View Commands

- **view**
Show summarized information about Eddy.
- **view all**
Show all available information about Eddy.
- **view server**
Show network and device server's settings.
- **view port**
Show serial port settings.
- **view gpio**
Show GPIO pin settings.
- **view version**
Show version and support information.
- **view command**
Show 'set' command list.
- **view help**
Show 'view' command list.

3. Network Commands

Configure general network environment and network management.

General Configuration

- **set line [ip / dhcp]** (Default: Static IP)
IP obtaining method for Eddy's network connection
- **set ip <IP Address>** (Default: 192.168.0.223)
Set the current IP address Eddy is assigned to.
When line type is Static IP, manually enter an appropriate IP address.
When line type is DHCP, it is not editable.

- **set mask <Subnet mask>** (Default: 255.255.255.0)
Set the subnet mask Eddy is assigned to.
When line type is Static IP, manually enter an appropriate subnet mask.
When line type is DHCP, it is not editable.
- **set gateway <Gateway address>** (Default: 192.168.0.1)
Set the default gateway Eddy is assigned to.
When line type is DHCP, it is not editable.
- **set snmp [Enable / Disable]** (Default: Disable)
Enable or disable SNMP(Simple Network Management Protocol) support.
MIB-II (RFC 1213): System, Interface, IP, ICMP, TCP, UDP
MIB-I (RFC 1317): Serial Interface

NMS Configuration

If multiple devices are installed and managed together, integration in management is necessary. In addition, it is often the case when the device reports an erroneous status, figuring out the reason for the failure becomes a time-consuming job. To solve this inefficiency and provide better solution, Eddy includes a Network Management System software, Portview.

- **set nms <IP address>** (Default: 0.0.0.0)
If IP is set to 0.0.0.0, NMS feature is disabled.
- **set nport <Port number>** (Default: 4000)
NMS socket number (if NMS is used)
- **set name** (Default: Eddy-1/Pin)
Set the device name for management. 32 Characters at maximum.
- **set group** (Default: None)
Set the group name for management. 32 Characters at maximum.
- **set location** (Default: None)
Set the location name for management. 32 Characters at maximum.

4. Serial Commands

You can set the communication and operation environment for the serial port. Chapter 5 describes each option in detail. Only a summary of each option is presented here.

- **set port 1 status [Enable / Disable]** (Default: Enable)
Choose to use or not use this port.

- **set port 1 protocol [com2kxp / com98 / tcp_server / tcp_client / tcp_mserver / udp_server / udp_client]** (Default: com2kxp)
Select the operation protocol, which the serial port would use.

- **set port 1 <port number>** (Default: 4001)
Set the socket number for the port. TCP server and UDP server operation mode makes use of this port for awaiting network socket connections.

- **set port 1 name <name>** (Default: Port1)
Port alias name for convenience. 16 Characters at maximum.

- **set port 1 speed [150 / 300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 / 230400 / 460800 / 921600]** (Default: 9600bps)
Set communication speed.

- **set port 1 data [5 / 6 / 7 / 8]** (Default: 8)
Set the number of bits in each character size.

- **set port 1 stop [1 / 2]** (Default: 1)
Set the number of stop bits.

- **set port 1 parity [none / odd / even]** (Default: none)
Set parity bit check scheme.

- **set port 1 flow [none / xon / rts]** (Default: none)
Set the flow control scheme.

- **set port 1 signal [data / modem]** (Default: data)
Set the signal line checking method for the device to be connected to the given serial port.
- **set port 1 remote <IP address>** (Default: 0.0.0.0)
When the Operation Mode is set to TCP Client, set the IP address to connect to.
- **set port 1 rport <socket number>** (Default: 4000)
When the Operation Mode is set to TCP Client, set the socket number to connect to.
- **set port 1 keepalive <0 ~ 32767>** (Default: 0 sec)
After a certain amount of time passes without any communication after the socket connection between the given serial port and the server is established, automatically disconnect the socket connection. If the value is set to 0, this function is disabled.
- **set port 1 mtu <1 ~ 1100>** (Default: 0)
MTU stands for Maximum Transmission Unit, and this option needs to be set when consecutive data from the given serial port needs to be transmitted to socket at once.
- **set port 1 uselogin [0 / 1]** (Default: 0-Disable)
When the Operation Mode is set to TCP Server, ask for the username and password when the client tries to connect. Set to 1 to enable.
- **set port 1 conusername <username>** (Default: conuser)
When the Operation Mode is set to TCP Server, set the username to ask for.
- **set port 1 conpassword <password>** (Default: 99999999)
When the Operation Mode is set as TCP Server, set the password to ask for.

5. GPIO Commands

Configure operation mode and value for each Programmable I/O pins.

- **set gpio <0~15> mode [in / out]** (Default: Output)
Set current pin's I/O mode.
- **set gpio <0~15> value [low / high]** (Default: High)
Set current pin's output value. (This option only applies to output mode pins)

6. Username/Password Commands

Configure username and password for Web/Telnet.

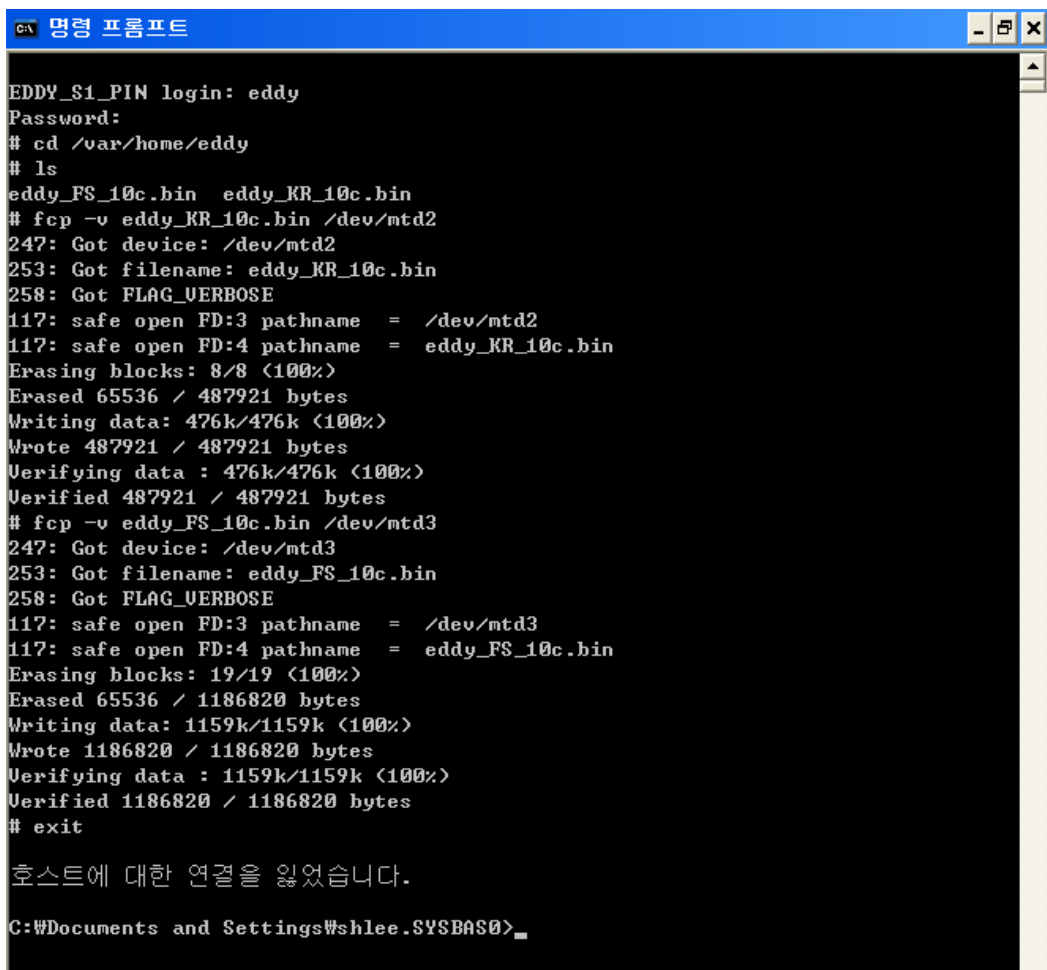
- **set user <username>** (Default: eddy)
Set username. 16 Characters at maximum.
- **set pass <password>** (Default: 99999999)
Set password. 16 Characters at maximum.

7. System Commands

- **set default**
Restore all settings to factory default. Requires reboot for changes to take effect.
- **set save**
Save current configuration settings. Requires reboot for changes to take effect.
- **reboot**
Reboot Eddy.

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1. First of all, connect to Eddy with Telnet. Enter eddy for the username and 99999999 for the password. (When using the default settings)
2. After the connection, activate the FTP service with 'set ftp on' command.
3. Make sure you have the right firmware of Eddy on your PC. In this example, firmware images are stored under C:\eddy_firmware. Here we use firmware files named Eddy_FS_10c.bin and Eddy_KR_10c.bin.
4. Connect to Eddy via ftp command. You can also use GUI-style FTP clients.
5. Enter **anonymous** for username. Password is not required, so just leave it blank.
6. Issue a command '**cd /var/home/eddy**' to move to the directory where firmware can be uploaded. Please note that write attempts to any other directories are restricted for security reasons.
7. Issue a command '**bin**' for binary file transfer mode. Optionally use '**hash**' to see the data transfer mark.
8. Issue both commands '**put Eddy_FS_10c.bin**' and '**put Eddy_KR_10c.bin**' to start upload. The image files must reside in the same directory with current directory where you are running the ftp command.
9. After getting a 'Transfer complete' message, issue a command '**quit**' or '**bye**' to disconnect.



```

c:\ 명령 프롬프트
EDDY_S1_PIN login: eddy
Password:
# cd /var/home/eddy
# ls
eddy_FS_10c.bin  eddy_KR_10c.bin
# fcp -v eddy_KR_10c.bin /dev/mtd2
247: Got device: /dev/mtd2
253: Got filename: eddy_KR_10c.bin
258: Got FLAG_VERBOSE
117: safe open FD:3 pathname = /dev/mtd2
117: safe open FD:4 pathname = eddy_KR_10c.bin
Erasing blocks: 8/8 (100%)
Erased 65536 / 487921 bytes
Writing data: 476k/476k (100%)
Wrote 487921 / 487921 bytes
Verifying data : 476k/476k (100%)
Verified 487921 / 487921 bytes
# fcp -v eddy_FS_10c.bin /dev/mtd3
247: Got device: /dev/mtd3
253: Got filename: eddy_FS_10c.bin
258: Got FLAG_VERBOSE
117: safe open FD:3 pathname = /dev/mtd3
117: safe open FD:4 pathname = eddy_FS_10c.bin
Erasing blocks: 19/19 (100%)
Erased 65536 / 1186820 bytes
Writing data: 1159k/1159k (100%)
Wrote 1186820 / 1186820 bytes
Verifying data : 1159k/1159k (100%)
Verified 1186820 / 1186820 bytes
# exit

호스트에 대한 연결을 잃었습니다.

C:\Documents and Settings\shlee.SYSBAS0>_

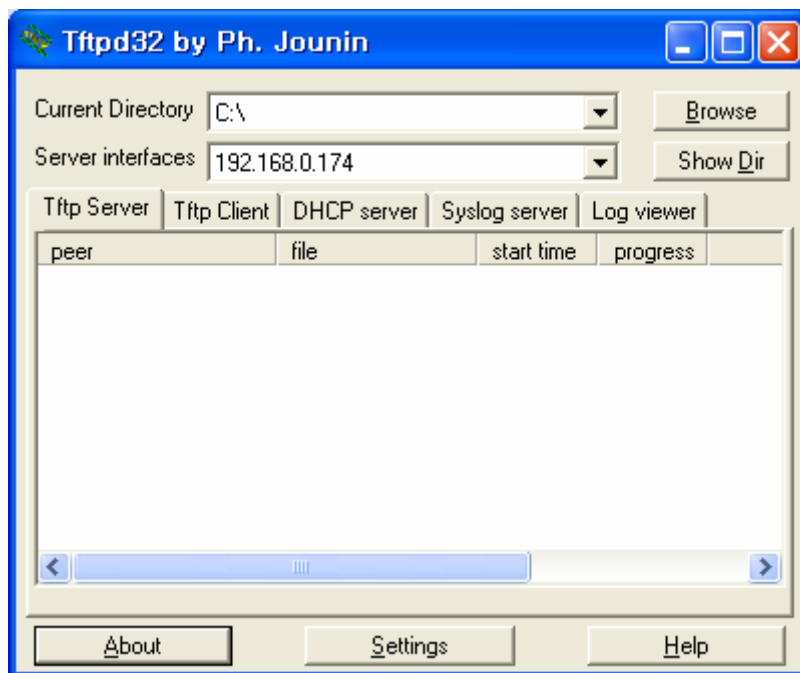
```

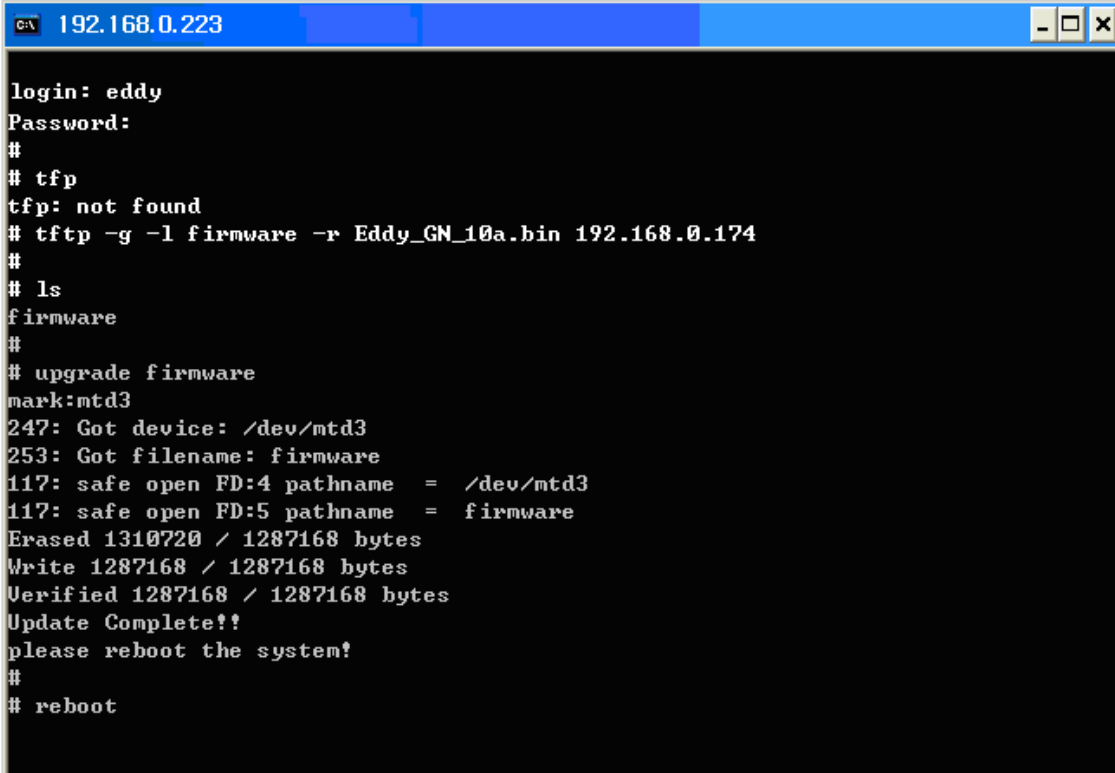
<You may not see the exact same output for all commands>

10. Now connect to Eddy with Telnet, if you are not connected.
11. Issue a command 'cd /var/home/eddy' to move to the upload directory.
12. Issue a command 'ls' to make sure firmware files are both successfully uploaded.
13. Issue a command '**fcpx -v Eddy_KR_10c.bin /dev/mtd2**' to write the new kernel image to the Flash memory of Eddy.
14. Issue a command '**fcpx -v Eddy_FS_10c.bin /dev/mtd3**' to write the new file system image to the Flash memory of Eddy.
15. Check if Erase / Write / Verify process is successful.
16. Issue a command '**exit**' to close the telnet window, and reset Eddy to start with new firmware.

Update via TFTP

1. You need a TFTP server on your PC. There are various freeware, so install any TFTP server software of your choice.
2. Make sure the firmware file is included in the current directory.





```

CA 192.168.0.223
login: eddy
Password:
#
# tftp
tftp: not found
# tftp -g -l firmware -r Eddy_GN_10a.bin 192.168.0.174
#
# ls
firmware
#
# upgrade firmware
mark:mtd3
247: Got device: /dev/mtd3
253: Got filename: firmware
117: safe open FD:4 pathname = /dev/mtd3
117: safe open FD:5 pathname = firmware
Erased 1310720 / 1287168 bytes
Write 1287168 / 1287168 bytes
Verified 1287168 / 1287168 bytes
Update Complete!!
please reboot the system!
#
# reboot

```

3. Now connect to Eddy with Telnet.
4. Enter your username and password.
5. After receiving a prompt, issue a command
'tftp -g -l firmware -r Eddy_GN_10a.bin 192.168.0.45' where **-l firmware** refers to the local firmware location (Eddy) and **-r Eddy_GN_10a.bin** refers to the firmware filename that is in TFTP Root directory at TFTP server (PC). The last argument is the TFTP server's IP address (PC).
6. You get no output if TFTP transmission is successful.
7. Move to the directory where the firmware is downloaded, and issue a command **'ls'** to make sure uploaded firmware file resides in this directory.
8. Issue a command **'upfirm firmware'** to start writing a new firmware to the memory.
9. Check if Erase / Write / Verify process is successful.
10. Issue a command **'reboot'** to reset Eddy with a new firmware.

1. Technical Specifications

Specifications

Network

Protocols	TCP, UDP, Telnet, SSH, SSL/TLS, DDNS, ICMP, DHCP, TFTP, HTTP, SNMP 1 & 2
LAN Port	10/100Mbps PHY * 1 (External transformer and RJ45 port required)
Connection Type	Static IP, DHCP

Hardware

Processor	32-bit ARM9 Processor with 168MHz
Flash Memory	4 MB
SDRAM	8 MB
GPIO (Programmable IO)	Max 16
LED	None
Power Input	3.3V
Power Consumption	1.3W
Dimensions	38.0 x 20.8mm
Weight	10g

Serial

only when you plan to implement a customized UART circuit for serial connectivity

Environmental

Operating Temp.	0 ~ 50°C
Storage Temp.	-20 ~ 80°C
Humidity	5 ~ 95% Non-Condensing

Software

O/S	Embedded Linux (Kernel 2.4.x)
Mgmt. Tools	SNMP, Portview, Web
Configuration	Telnet, Web, Portview
Security	Telnet, Web ID/Password, SSH, SSL/TLS

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Application Upload	TFTP, FTP, Web
Web Service	Embedded Web Server
COM Port Redirection	SystemBase COM Port Redirector for Windows 98/ME/2K/XP/2003

Approvals

CE Class A, FCC Class A, RoHS compliant



2. Ordering Information

Eddy-CPU

Embedded CPU module w/programmability & 3.3V power
(Pin Header interface)

3. FCC Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

FCC RF

INTERFERENCE STATEMENT

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.