

EddyTM means
real-time

Eddy Serial

User Guide

Ver 2.5.3.1

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Revision History

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Nov-11-2009	2.1.0.3	2,3,5	Eddy-S4M added
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Sep-15-2010	2.5.1.1	2,5	Eddy-CPU v2.5 added
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Chapter 1. Introduction

Eddy, SystemBase Embedded Device Server Module, is an optimized minimal CPU module for developing an industrial embedded device. This manual introduces general functions for the Eddy.

1.1 About this manual

This manual guides users to develop Eddy for a device server including the function that transfers from serial data to LAN. Setting Eddy's configurations, status monitoring, firmware update, and other administration work are also included, H/W level integration and S/W setting information can also be found.

1.2 Who should read this manual

This guide is designed for Eddy users and administrators. It is strongly recommended that anyone trying to apply, use, and maintain Eddy read this document. It will be a great starting point for any administrator who wants to easily monitor and control Eddy and its connected devices.

1.3 Contents

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

[Chapter 2. Getting Started](#) gives a brief introduction to Eddy series, including features and applications.

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

[Chapter 4. Configuration via Web](#) provides ways to configure and to connect Eddy via web browser.

[Chapter 5. Configuration via Telnet](#) provides commands and its explanation to configure and to connect Eddy via web Telnet.

[Chapter 6. Appendix](#) provides firmware update guides and detailed technical specifications.

1.4 Eddy Documents

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

Document	Description
Eddy Serial User Guide	Eddy's Configuration, and Management Information
Eddy DK Guide	Programmer's application development guide, including in-depth approach to compiling, linking, creating and uploading firmware API reference is included with a list of available functions for customized application programming
LemonIDE User Guide	User manual about Eddy integrated development environment of Window/Linux based on Eclipse
PortView User Manual	Guide for SystemBase device server management application PortView
COM Port Redirector User Manual	Guide for COM Port Redirector by SystemBase
TestView User Manual	Guide for test program, TestView, by SystemBase

Other relevant documents are as follows:

Document	Description
Eddy-CPU Spec Sheet	Eddy-CPU spec description
Eddy-S4M Spec Sheet	Eddy-S4M spec description
Eddy-WiFi Spec Sheet	Eddy-WiFi spec description
Eddy-BT Spec Sheet	Eddy-BT spec description
LemonIDE Spec Sheet	integrated development environment description
Eddy White Paper	An introductory reading for anyone new to embedded device server, which focuses on background, history, market environment, and technology

General information related to Eddy or embedded device servers can be obtained at Eddy Community at <http://www.embeddedmodule.com/>. Latest documents, software and firmware are available.

All documents are updated promptly, so check for the recent document updates. The contents in these documents are subject to change without a prior notice.

1.5 Technical Support

You can reach our tech support by following 3 ways;

1. Visit the Eddy official community site at <http://www.embeddedmodule.com> and go to 'Technical Support' m

enu. FAQ and questions can be reviewed and submitted.

2. Post your inquiries at our technical support website at <http://www.solvline.com/> or e-mail our technical support team at tech@sysbas.com. Any kind of inquiries, requests, and comments are welcomed.

3. Call us at our customer center at +82-2-855-0501 for immediate support. Available from Monday to Friday, 09:00 to 18:00 KST (Korean Standard Time)

Our technical support team will kindly help you get over with the problem.

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Homepage: <http://www.sysbas.com/>

Tel: +82-2-855-0501

Fax: +82-2-855-0580

16F Daerung Post Tower-1, 212-8, Guro-dong, Guro-gu, Seoul, Republic of Korea

Postal code: 152-790

Chapter 2. Getting Started

This chapter includes Eddy series overview, main and distinctive features, package contents for each product, and application fields.

2.1 Overview

There are two categories in Eddy; Eddy-CPU module, Eddy Development Kit (DK).

Eddy-CPU modules include category of socket type Eddy-CPU and Mini PCI type Eddy-S4M.

Eddy-DK includes DK board for Eddy-CPU exclusive, JIG and DK board for Eddy-S4M exclusive.

The Eddy-CPU module includes default applications for serial and LAN communication, and supports plug-and-play features. By switching to the custom mode, users can program any application and upload it on to the module. This application then is executed on the module. In order to write and compile programmer's source code, Software Development Kit (SDK) LemonIDE™ is required.

SDK is included in the DK package. Please refer to Programming Guide and LemonIDE™ user's manual included in the Development Kit for detailed information on the SDK.

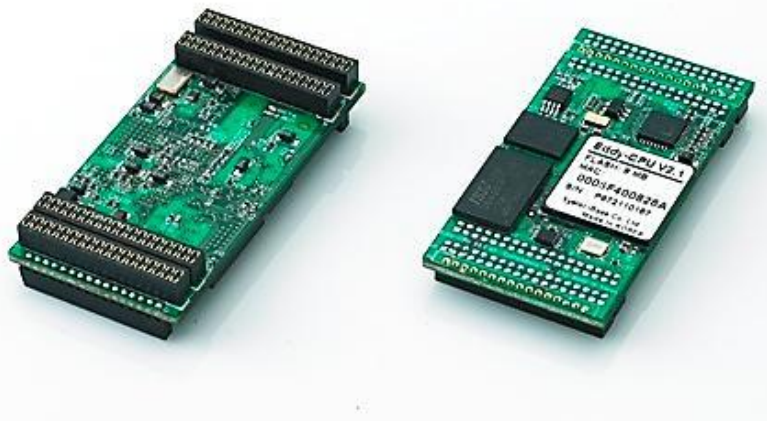
SDK is not necessary for users using Eddy in default presetting.

2.2 Eddy-CPU v2.5

Eddy-CPU is an embedded module based on ARM9 processor with 32MB SDRAM, 4MB or 8MB Flash Memory, 1 Ethernet port with 10/100Mbps, 16 bit address / 8 bit data bus interface supporting external device connection, and maximum 17 programmable IO pins. Programmers can easily implement any device drivers with referring to library type example codes and evaluation kit circuit diagrams.

User can design their own customized device using example sources and Evaluation Kit circuit.

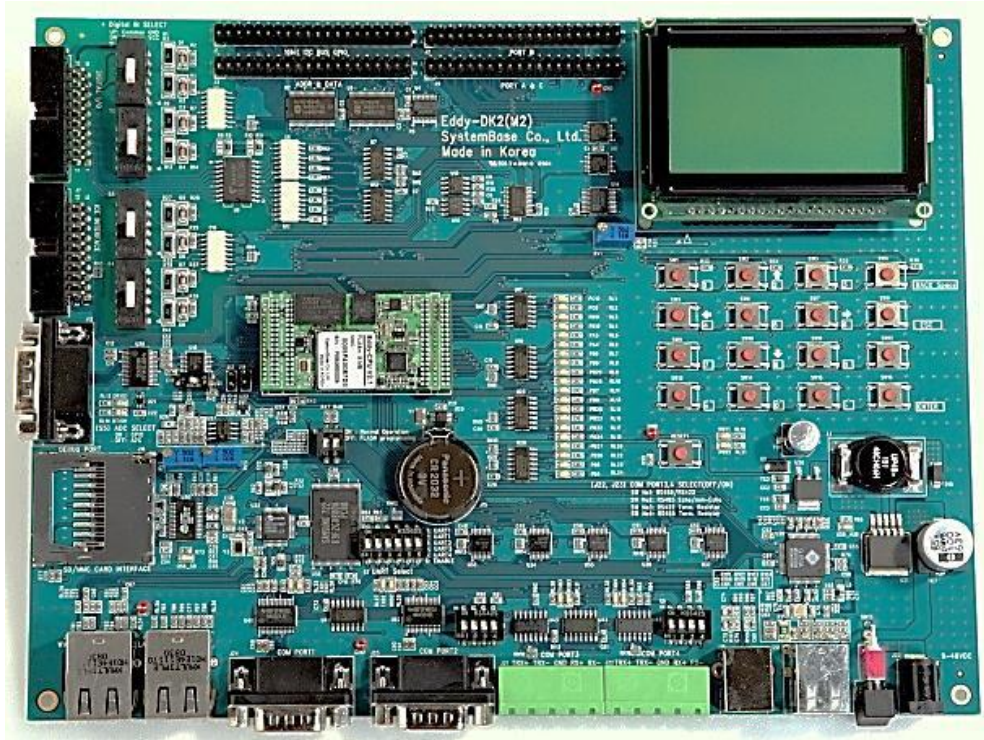
Eddy-CPU is implemented on a small form factor (42 * 25mm) with on-board memory and integrated 10/100 Mbps network interface. Developers can minimize time and cost spent on developing application products.



	Feature	Type
		Eddy-CPU v 2.5
Hardware	CPU	AT91SAM9G20 (400MHz)
	Memory	8MB Data Flash, 32 MB SDRAM
	External I/F	19 Bit / 16 Bit Data Bus
	Ethernet I/F	10/100 Base-T Auto MDI/MDIX
	UARTs	4 Port, Support up to 921.6 Kbps (1 : Full Signal, 2,3,4, : RxD, TxD, RTS, CTS only)
	USB 2.0 FS	2 Host / 1 Device Port, 2.0 FS (12Mbps)
	ADC	4-Channel 10 Bit ADC
	TWI(I2C)	Master, Multi-Master and Slave Mode
	SPI	8- to 16-bit Programmable Data Length Four External Peripheral Chip Selects
	GPIO	Max. 56 Programmable I/O Pins
	Power Input	3.3 V (Max. 200 mA)
	Dimensions	25 x 48.5 x 6.2 mm
	Weight	8.3 g
Network	Protocol	TCP, UDP, Telnet, ICMP, DHCP, TFTP, HTTP, SNMP 1&2, SSH, SSL
	Ethernet	10/100Mbps MAC / PHY
	Network Connection	Static IP, DHCP
Software	O/S	Linux Kernel 2.6.21
	Mgt Tools	SNMP, Web, PortView
	Uploads	TFTP, FTP, Web
	Dev Tools	LemonIDE & SDK
Environmental	Operating Temp	-40 ~ 85 °C
	Storage Temp	-60 ~ 150 °C
	Humidity	5 ~ 95% Non-Condensing
Approvals	CE Class A, FCC Class A, RoHS compliant	

2.3 Eddy-DK v2.1/v2.5 (Development Kit)

Eddy Development Kit (Eddy DK) helps programmers to test and customize their own Eddy applications easily. The kit includes evaluation board, all necessary connectors, and programming environment with documentation and guidelines. Please refer to Eddy DK Manual included in the Development Kit for detailed information on the DK.



Feature	Type
NAND Flash	256MB, 8bit I/F
SD Card Connector	Push Type, up to 16 GB MMC / SD Card / MC supported
USB Connector	1 x Device 2 x HOST, Dual-Port
LCD Module	128 x 64 Dots Matrix Structure
KEY	4 x 4 Matrix
Battery Holder	3V Lithium Battery, 235 mAh
LED	Power, Ready, 20 Programmable IO, Console and Serial Tx/D, Rx/D
I2C Interface	16bit I2C BUS GPIO
SPI Interface	2Kbit EEPROM
MCI Interface	SD Card, MMC Socket
ADC Interface	Temp / Light Sensor
Digital I/O	8 Port Input, 8 Port Output

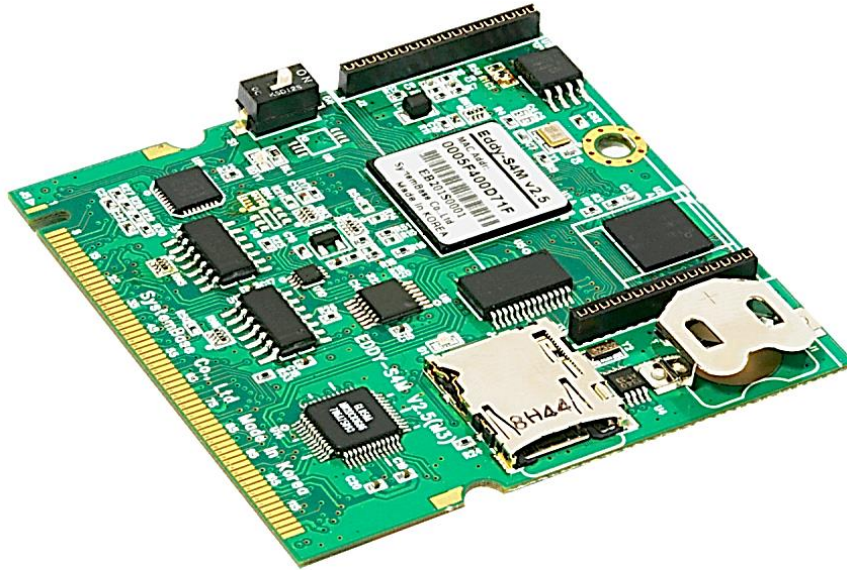
Feature	Type
Switch	Serial or GPIO Select RS422/485 Select DIO : Common VCC or GND Select Programming
Jumper Switch	Boot Mode Select, JTAG Select
Serial Port	2 x RS232 DB9 Male 2 x RS422/485 Terminal Block (RS422 or RS485 selected with S/W)
Console Port	DB9 Male
LAN Port	2 x RJ45
ICE Port	Used for Flash Programming
Reset Button	Factory Default & Warm Boot
Input Power	9-48VDC
Dimensions	240 x 180 mm

2.4 Eddy-S4M v2.5

Eddy-S4M is a high-performance mini PCI type embedded module which include ARM9 processor 32MB SD RAM, 8MB DataFlash, 10/100Base-T Ethernet port, Serial 4 Channel, RTC with Battery, MicroSD, 4ch ADC, temperature sensor, max 34 programmable GPIO pins.


Eddy-S4M is 59.75 x 61.8mm size. If using Eddy-S4M-JIG board, user could develop their customized device without other H/W development, which minimizing time and cost to develop.

Referring Example code and Evaluation Kit circuit allow developer to design device they want.



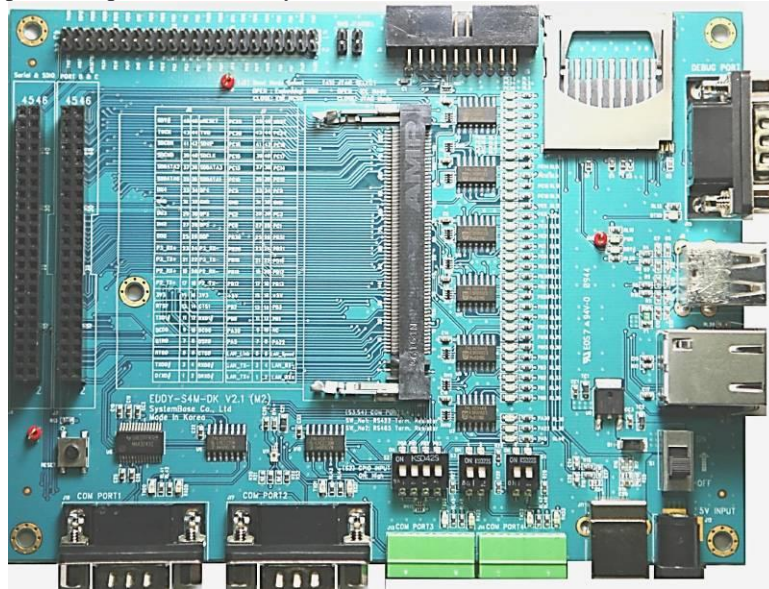
Eddy-S4M v2.5 is compatible with Eddy-S4M v2.1. The specification is as follows.

	Classification	Type
		Eddy-S4M v2.5
Hardware	CPU	AT91SAM9G20 (400MHz)
	Memory	AT45DB642D, 8MB Data Flash IS42S16160B, 32 MB SDRAM
	Ethernet MC/PHY	10/100 Base-T MAC KSZ8041NLI PHYceiver Auto MDI/MDIX
	Serials	Port 0,1 : RS232 (DB9 male) Port 0 : Full Signal Port 1 : TxD, RxD, RTS, CTS only Port 2,3 : COMBO (Terminal Block 5pin) * COMBO : RS422/RS485 is S/W selectable
	USB 2.0 FS	3 Host /1 Device Port, 2.0 FS (12Mbps) Use to GL850A USB Hub chip
	RTC	Real Time Clock, RTC DS1340U-33+ Connect to I2C I/F
	Battery Holder	CR1220(38mAh) 3V Lithium Battery
	ADC	4-Channel 10 Bit ADC
	TWI(I2C)	Master, Multi-Master and Slave Mode
	SPI	8 to 16-bit Programmable Data Length Four External Peripheral Chip Selects
	MCI	SD Spec V2.0 [SDHC], MMC Spec V4.2 support USB to SD Controller, 16GB, 12Mbits/s
	GPIO	Max. 34 Programmable I/O Pins

	Classification	Type
		Eddy-S4M v2.5
	LED	Ready LED
Software	Protocol	TCP, UDP, Telnet, ICMP, DHCP, TFTP, HTTP, SNMP1&2, SSH, SSL
	Network Connection	Static IP, DHCP
	O/S	Linux Kernel 2.6.21
	Mgt Tools	SNMP, Web, PortView
	Uploads	TFTP, FTP, Web
	Dev Tools	LemonIDE & SDK
Physical characteristics	Power Input	3.3 V (200mA Max)
	Dimensions	59.75 x 61.80 x 4 mm
	Weight	15 g
Environment	Operating Temp	-40 ~ 85°C
	Storage Temp	-66 ~ 150°C
	Humidity	5 ~ 95% Non-Condensing
CE Class A, FCC Class A, RoHS compliant		

2.5 Eddy-S4M-DK v2.1 (Development Kit)

Eddy-S4M DK is Development Kit supporting programmer can easily materialize and test their application. DK includes Test Board, various connectors, programming environment and document. Please refer to Eddy-DK manual for more specific explanation of Eddy-S4M

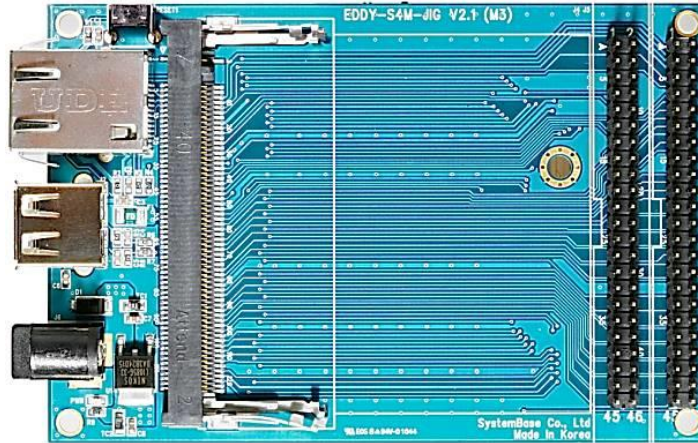


Classification	Specification
Serial Port	2 x RS232 DB9 Male 2 x RS422/485 5pin Terminal Block (S/W Selectable & with Auto toggle)
SD Card Connector	Push Type, Up to 16 GB MMC / SD Card / MC supported
MCI Interface	SD Card, MMC Socket
ADC Interface	Light Sensor
USB Connector	1 x Device, 2 x HOST, Dual-Port
LAN Port	RJ45 with transformer
Console Port	DB9 Male
Switch	Power ON/Off switch Serial RS422/485 Termination resistor configuration switch GPIO input test switch(Off : Low, ON : High)
LED	RDY, Power, 34 Programmable IO, Console & Serial Tx/D, Rx/D LED
JTAG Port	Used for downloading code and single-stepping through programs
Reset Button	Factory Default & Warm Boot (If pushing over 5sec, operate in Factory default)
JIG Connection Socket	2 2x23pin socket, which connect to JIG board to check any problems
Expansion Header	2x22pin Header, used to test GPIO of Eddy-S4M
Input Power	5 VDC
Dimensions	160 x 120 mm

2.6 Eddy-S4M-JIG v2.1 (Testing Board)

Eddy-S4M JIG board is test board which enable of user to integrate and test their application with Eddy-S4M. JIG board include mini connector for joining Eddy-S4M, Ethernet RJ45, USB Host, Power, Reset Switch, and

providing connectors to all Eddy-S4M functions.
For more information, please refer to Eddy-DK manual in DK product.

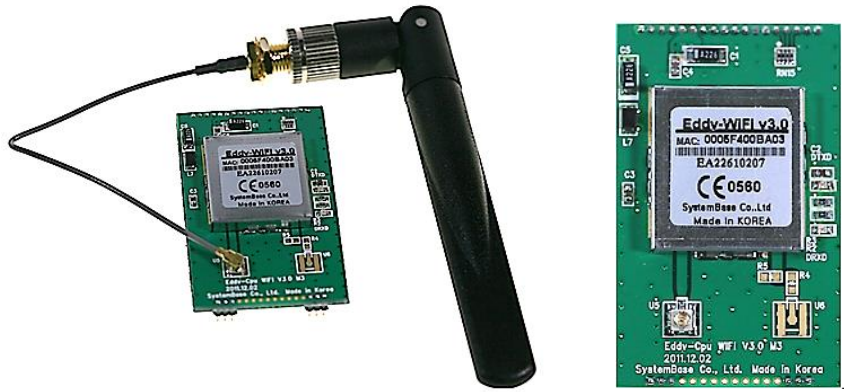


Classification	Specification
USB Connector	USB HOST
LAN Port	RJ45 with Transformer
Reset Button	Factory Default & Warm Boot
Expansion Header	Used to connect external devices with most functions of S4M
Input Power	5 VDC
Dimensions	70 x 105 mm

2.7 Eddy-WiFi v 3.0

(* Eddy-WiFi v2.1 is not compatible. please check the previous manual.)

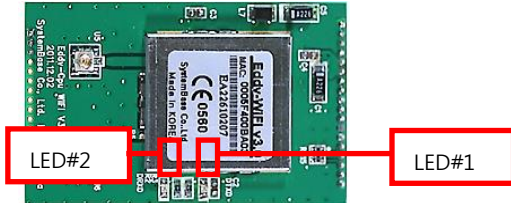
Eddy WiFi joined with Eddy-CPU v2.1/v2.5, Eddy-S4M v2.1 enables various serial devices (secure device, communication device, modem, print data device, industrial measuring instrument) to connect wireless LAN. Eddy-WiFi module supports IEEE 802.11 b/g/n wireless specification.



Classification	Specification
Standard	802.11b, 802.11g, 802.11n
Modulation	802.11b:CCK, DQPSK, DBPSK 802.11g:64 QAM, 16 QAM, QPSK, BPSK 802.11n:BPSK, QPSK, 16-QAM, 64-QAM
Frequency Band	ISM band 2.4GHz ~ 2.4884GHz
Output Power	802.11b:16 dBm (11Mbps) 802.11g:14 dBm (54Mbps) 802.11n:14 dBm (20MHz BW,MCS7) 13 dBm (40MHz BW,MCS7)
RX sensitivity	802.11b:-84dBm@11MHz 802.11g:-73dbm@54MHz 802.11n:-71dBm(MCS 7_HT20) -68dBm(MCS 15_HT20) -68dBm(MCS 7_HT40) -65dBm(MCS 15_HT40)
Security	WPA, WPA-PSK, WPA2, WPA2-PSK , WEP 64bit & 128bit , IEEE 802.11x, IEEE 802.11i
Working distance	60 - 120m, depending on surrounding environment
Data Rate	802.11b: 11, 5.5, 2, 1 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 802.11n: 20 MHz BW: 130, 1117, 104, 78, 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 40 MHz BW: 270, 243, 216, 162, 150, 135, 121.5, 108, 81, 54, 40.5, 27, 13.5 (unit: Mbps)
Antenna	2.4Ghz 2dB, 1 x U.FL
Dimension	28.2 x 45.4 x 9.6 mm

Operating Temp	-10 ~ 70°C
Operating Voltages	3.3V±5% I/O supply voltage
Weight	10g
Approvals	KC, RoHS Compliant

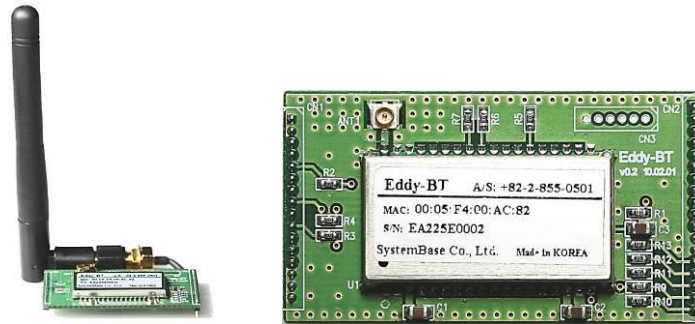
LED Specification



Classification	Specification
LED#1(TTXD)	When WiFi is connected, LED blinks.
LED#2(TRXD)	When WiFi is connected with other AP or device, LED blinks every seconds. When it is transmitting or receiving data, it will blink every 0.5 seconds.

2.8 Eddy-BT v2.1

Linking to Eddy-CPU v2.1/v2.5 and Eddy-S4M v2.1, Eddy-BT module enables communication with various types of Bluetooth device in Bluetooth method. Eddy-BT is based on Bluetooth 2.0 and supports communication distance of up to 100m.

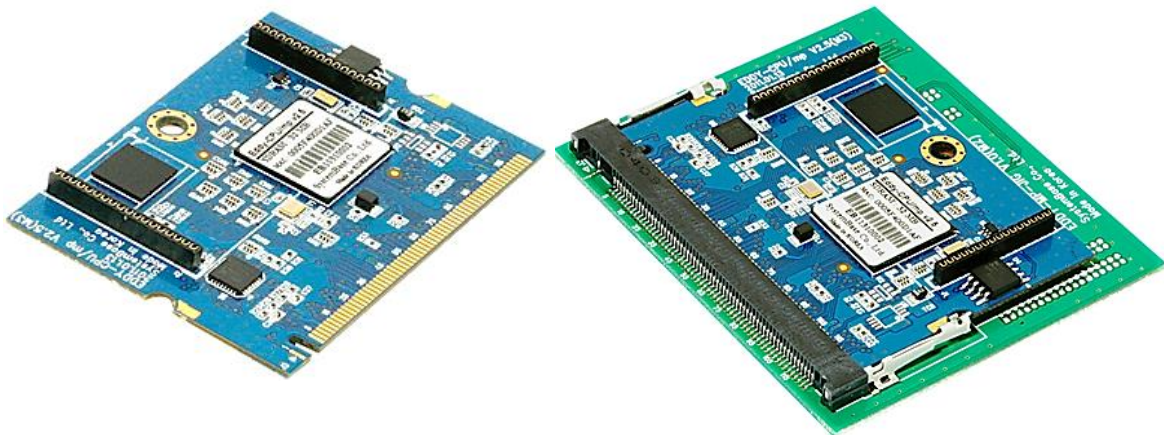


Classification	Specification																
Interface	Bluetooth v2.0+ EDR Class 1																
Profile	SPP (Serial Port Profile)																
Max, TX Power	+18dBm																
RX sensitivity	-88dBm																
Power	Supply voltage: 3.3V DC Supply current: 10mA – 60mA																
Operating Temp	Operating temperature: -30 ~ 80 °C																
Storage Temp	Storage temperature: -40 ~ 85 °C																
Humidity	Humidity : 90% (Non-condensing)																
Working distance	<table border="0"> <tr> <td>Stub Antenna (+1dBi) - Stub Antenna (+1dBi)</td> <td>100 meters</td> </tr> <tr> <td>Stub Antenna (+1dBi) - Dipole Antenna (+3dBi)</td> <td>150 meters</td> </tr> <tr> <td>Dipole Antenna (+3dBi) - Dipole Antenna (+3dBi)</td> <td>200 meters</td> </tr> <tr> <td>Dipole Antenna (+3dBi) - Dipole Antenna (+5dBi)</td> <td>300 meters</td> </tr> <tr> <td>Dipole Antenna (+3dBi) - Patch Antenna (+9dBi)</td> <td>500 meters</td> </tr> <tr> <td>Dipole Antenna (+5dBi) - Dipole Antenna (+5dBi)</td> <td>400 meters</td> </tr> <tr> <td>Dipole Antenna (+5dBi) - Patch Antenna (+9dBi)</td> <td>600 meters</td> </tr> <tr> <td>Patch Antenna (+9dBi) - Patch Antenna (+9dBi)</td> <td>1,000 meters</td> </tr> </table>	Stub Antenna (+1dBi) - Stub Antenna (+1dBi)	100 meters	Stub Antenna (+1dBi) - Dipole Antenna (+3dBi)	150 meters	Dipole Antenna (+3dBi) - Dipole Antenna (+3dBi)	200 meters	Dipole Antenna (+3dBi) - Dipole Antenna (+5dBi)	300 meters	Dipole Antenna (+3dBi) - Patch Antenna (+9dBi)	500 meters	Dipole Antenna (+5dBi) - Dipole Antenna (+5dBi)	400 meters	Dipole Antenna (+5dBi) - Patch Antenna (+9dBi)	600 meters	Patch Antenna (+9dBi) - Patch Antenna (+9dBi)	1,000 meters
Stub Antenna (+1dBi) - Stub Antenna (+1dBi)	100 meters																
Stub Antenna (+1dBi) - Dipole Antenna (+3dBi)	150 meters																
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Dipole Antenna (+5dBi) - Dipole Antenna (+5dBi)	400 meters																
Dipole Antenna (+5dBi) - Patch Antenna (+9dBi)	600 meters																
Patch Antenna (+9dBi) - Patch Antenna (+9dBi)	1,000 meters																
Approvals	CE Class A, FCC Class A, RoHS Compliant																


2.9 Eddy-CPU/mp v2.5 /32bit

Eddy-CPU is an embedded module based on ARM9 processor 4MB or 8MB Flash Memory, 1 Ethernet port with 10/100Mbps, 16 bit address / 8 bit data bus interface supporting external device connection, and maximum 17 programmable IO pins. Programmers can easily implement any device drivers with referring to library type example codes and evaluation kit circuit diagrams.

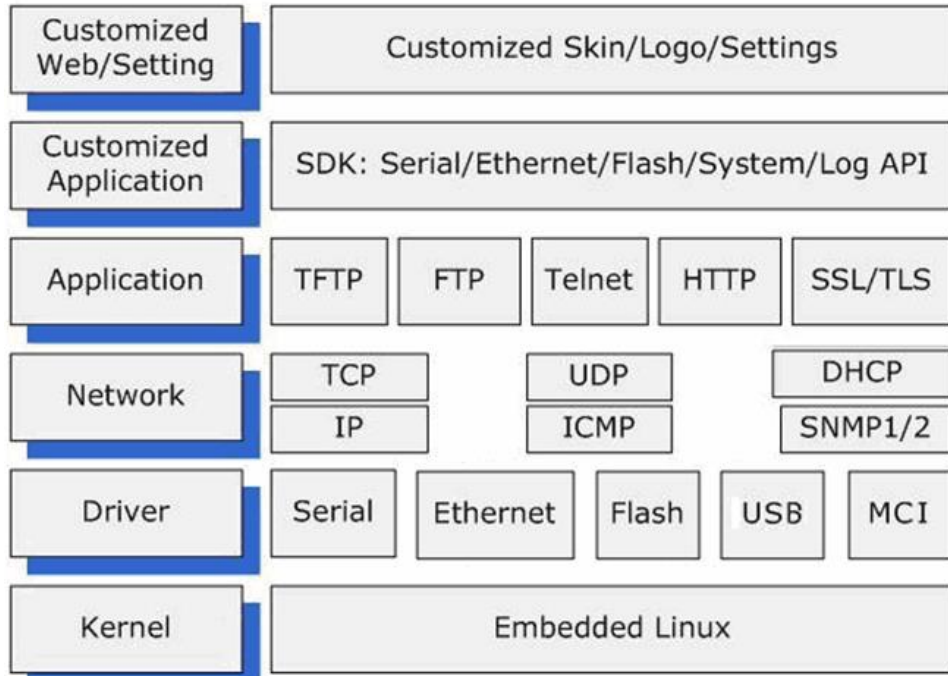
Eddy-CPU/mp v2.5 is a low-cost mini PCI type module which is compatible with Eddy-CPU v2.5. DK provide s 32MB SDRAM, 64MB SDRAM and it is also compatible with DK v2.1 using its exclusive JIG board.



	Classification	Specification
Hardware	CPU	AT91SAM9G20 (400 MHz)
	Memory	8MB Data Flash, 32MB SDRAM, 64MB SDRAM
	External I/F	16 Bit / 16 Bit Data Bus
	Ethernet I/F	10/100 Base-T Auto MDI/MDIX
	UARTs	4 Port, Support up to 921.6 Kbps (1 : Full Signal, 2,3,4, : RxD, TxD, RTS, CTS only)
	USB 2.0 FS	2 Host /1 Device Port, 2.0 FS (12Mbps)
	ADC	4-Channel 10 Bit ADC
	TWI(I2C)	Master, Multi-Master and Slave Mode
	SPI	8- to 16-bit Programmable Data Length Four External Peripheral Chip Selects
	GPIO	Max. 56 Programmable I/O Pins
	Power Input	3.3 V (200 mA Max)
	Dimensions	59.75 x 44.6 X 1.0 mm
	Weight	8.3 g
Network	Protocol	TCP, UDP, Telnet, ICMP, DHCP, TFTP, HTTP, SNMP 1&2, SSH, SSL
	Ethernet	10/100Mbps MAC / PHY
	Network Connection	Static IP, DHCP
Software	O/S	Linux Kernel 2.6.21

	Classification	Specification
	Mgt Tools	SNMP, Web, PortView
	Uploads	TFTP, FTP, Web
	Dev Tools	LemonIDE & SDK
Environmental	Operating Temp	-40 ~ 85 °C
	Storage Temp	-60 ~ 150 °C
	Humidity	5 ~ 95% Non-Condensing
Approvals	CE Class A, FCC Class A, RoHS compliant	

2.10 Eddy Software Architecture



2.11 Main Features

Features

Various features of Eddy make it a universal yet distinctive embedded solution.

Below lists main features of Eddy.

- Premium-level hardware with ARM9 210MHz CPU, 8MB Flash, and 32MB SDRAM, 64MB SDRAM
- Selectable: RS232 only or RS422/485 Combo interfaces
- USB host port (Max. 8Mbps USB Full speed)
- MCI (Multimedia Interface) feature supported (Max. 8Mbps speed)
- Max 921.6Kbps serial communication speed
- Able to upload/run the user customized program
- SystemBase SDK and API support for application programming (included in the CD)
- Small size to fit in any hardware
- 10/100Mbps Ethernet port (auto MDIX)
- SystemBase COM Port Redirector for better adaptability
- Extensive configuration and monitoring with PortView
- Firmware upload with Web, FTP, and TFTP
- Configuration with Web, Telnet, SNMP, and PortView
- Various customizing options
- Standard Linux environment for openness in executable applications
- Multiple Programmable IO pins for customized applications
- Watchdog timer supported for monitoring the system and reset when system error is occurred.

2.12 Applications

Eddy can be applied to many practical applications in various fields. Some are presented below.

◆ 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**

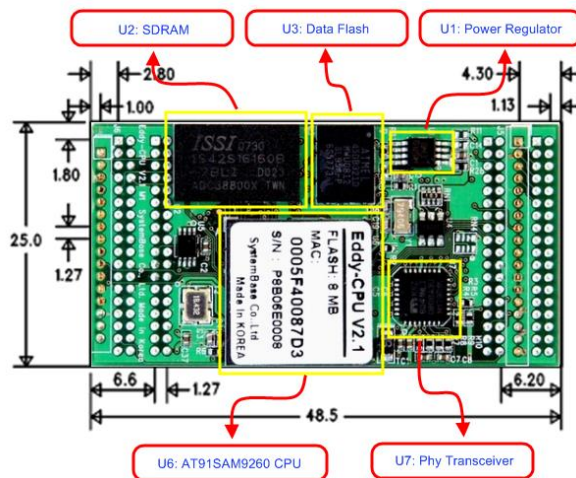
OEM device server with distributor's own case & brand
Ready-to-go device or customized application / setup mode can be inserted

Chapter 3. Hardware Description

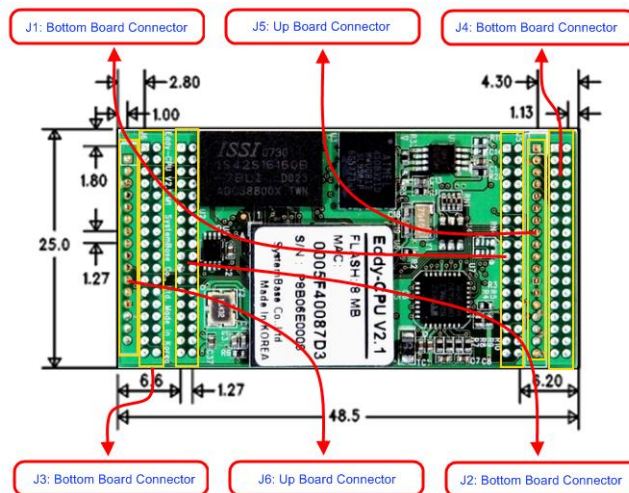
This chapter provides Eddy's hardware information, including block diagram, layout, pin specifications, dimensions and other hardware-related issues.

3.1 Eddy-CPU v2.1/v2.5

Ethernet port is provided as pin headers, and the transformer and RJ-45 connector should be manually implemented by users. (RJ-45 connector with embedded transformer, normally called LAN-Mate or MAG Jack, can be used as a simpler approach.



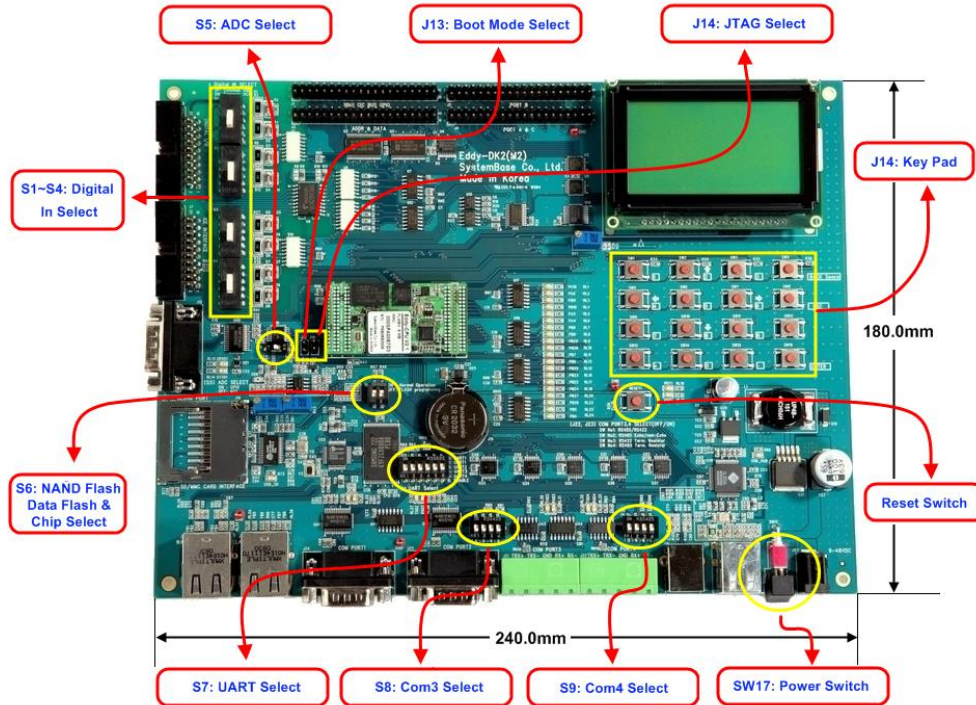
Eddy CPU V2.1/v2.5 Device description



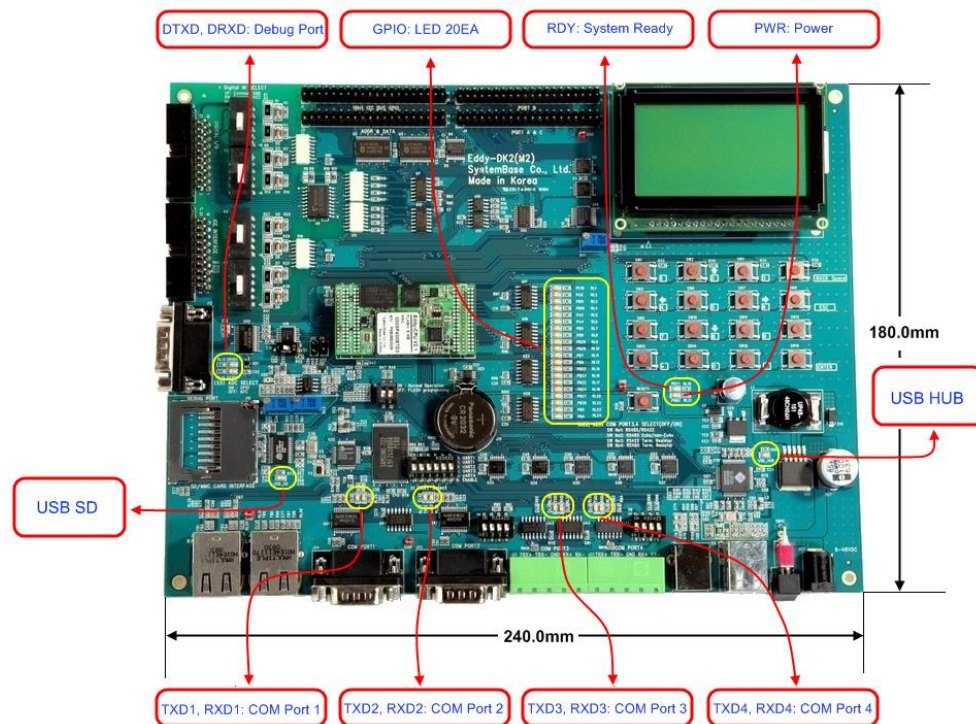
Eddy CPU V2.1/v2.5 Connector description

3.2 Eddy-DK v2.1

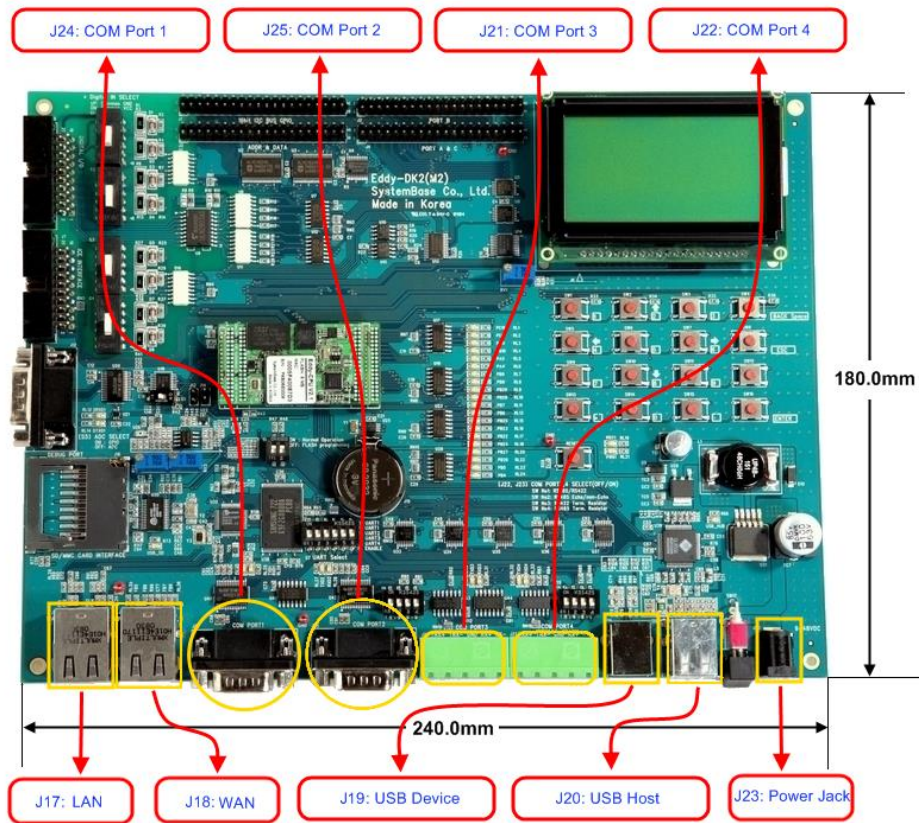
It is Development Kit Providing environment to test and develop. Below shows simple instruction on device, switch, pin, LED and so on.



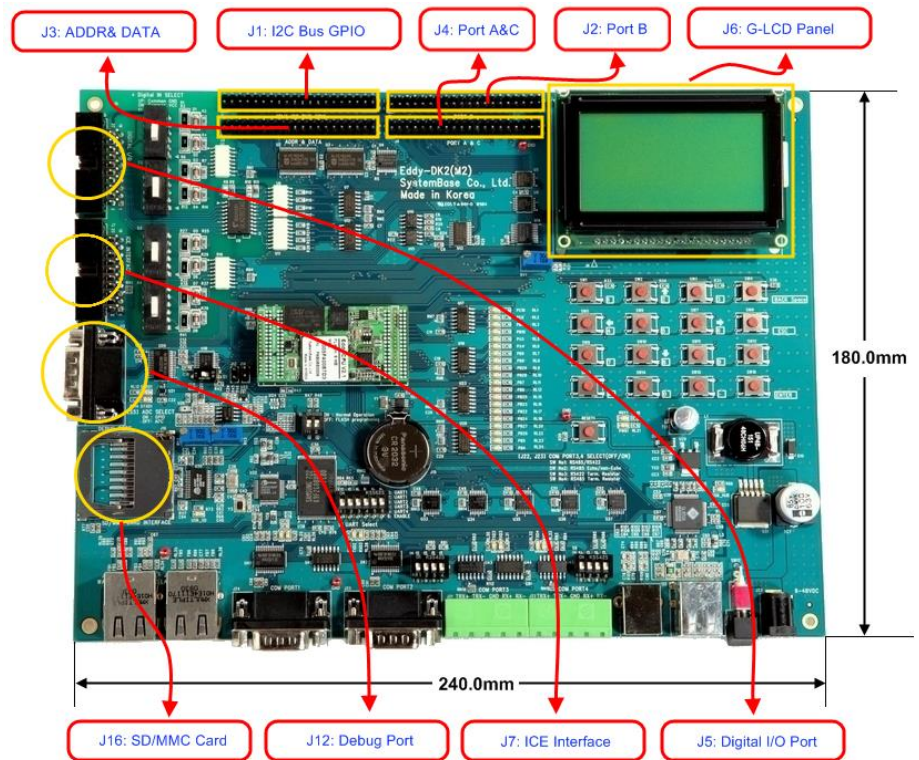
Switch Feature



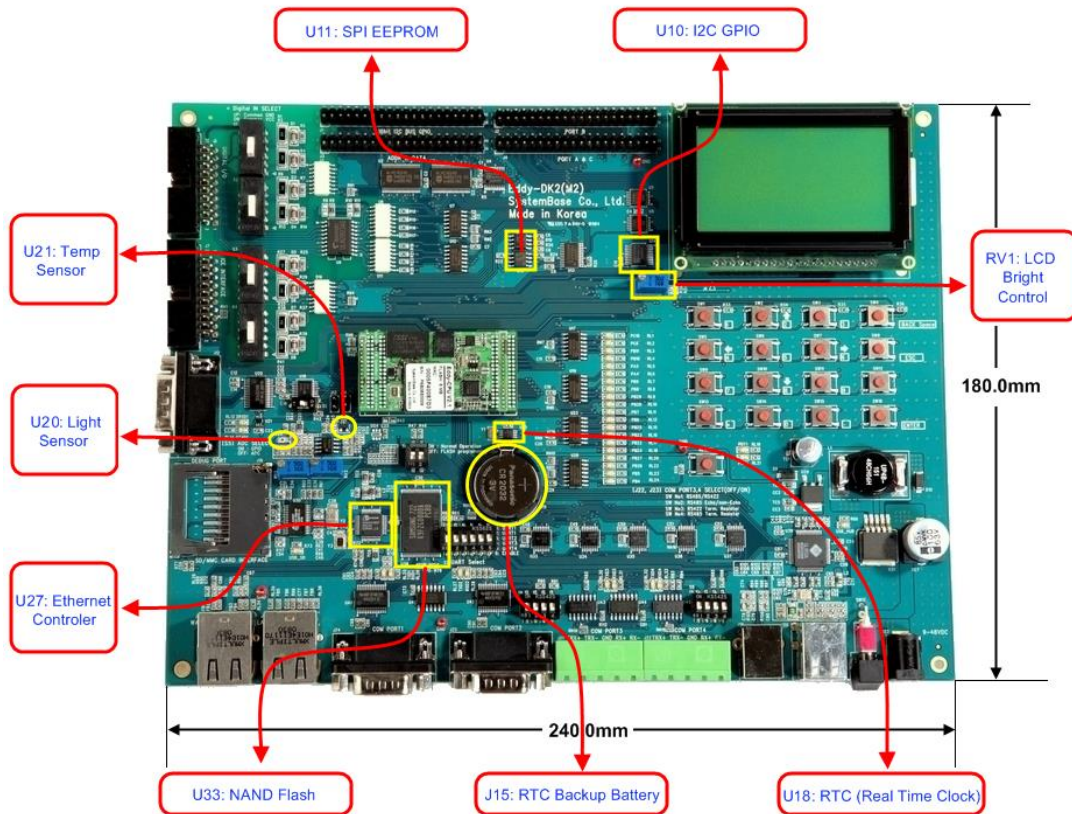
LED Feature



External Device Feature A



External Device Feature B

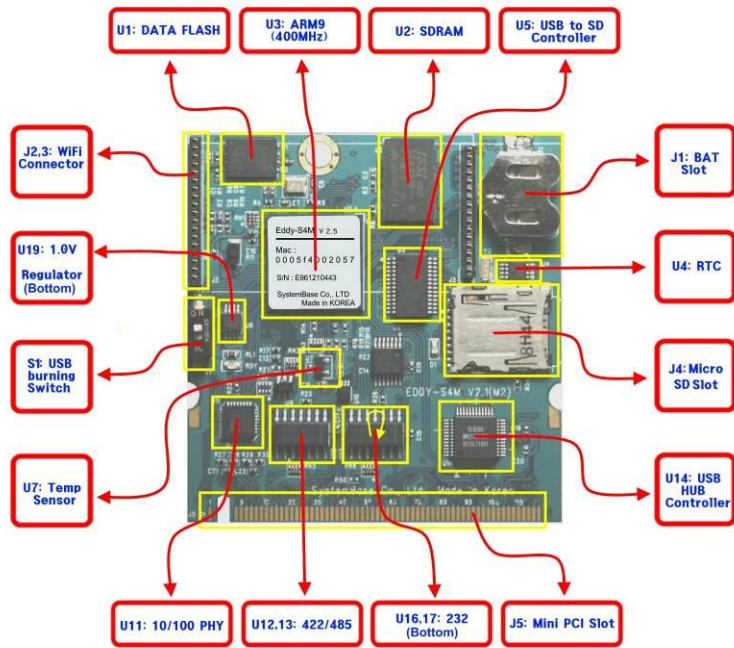


Internal Device Feature

3.3 Eddy-S4M v2.5

Mini PCI Type Slot.. Eddy-S4M v2.5 is compatible with Eddy-S4M v2.1.

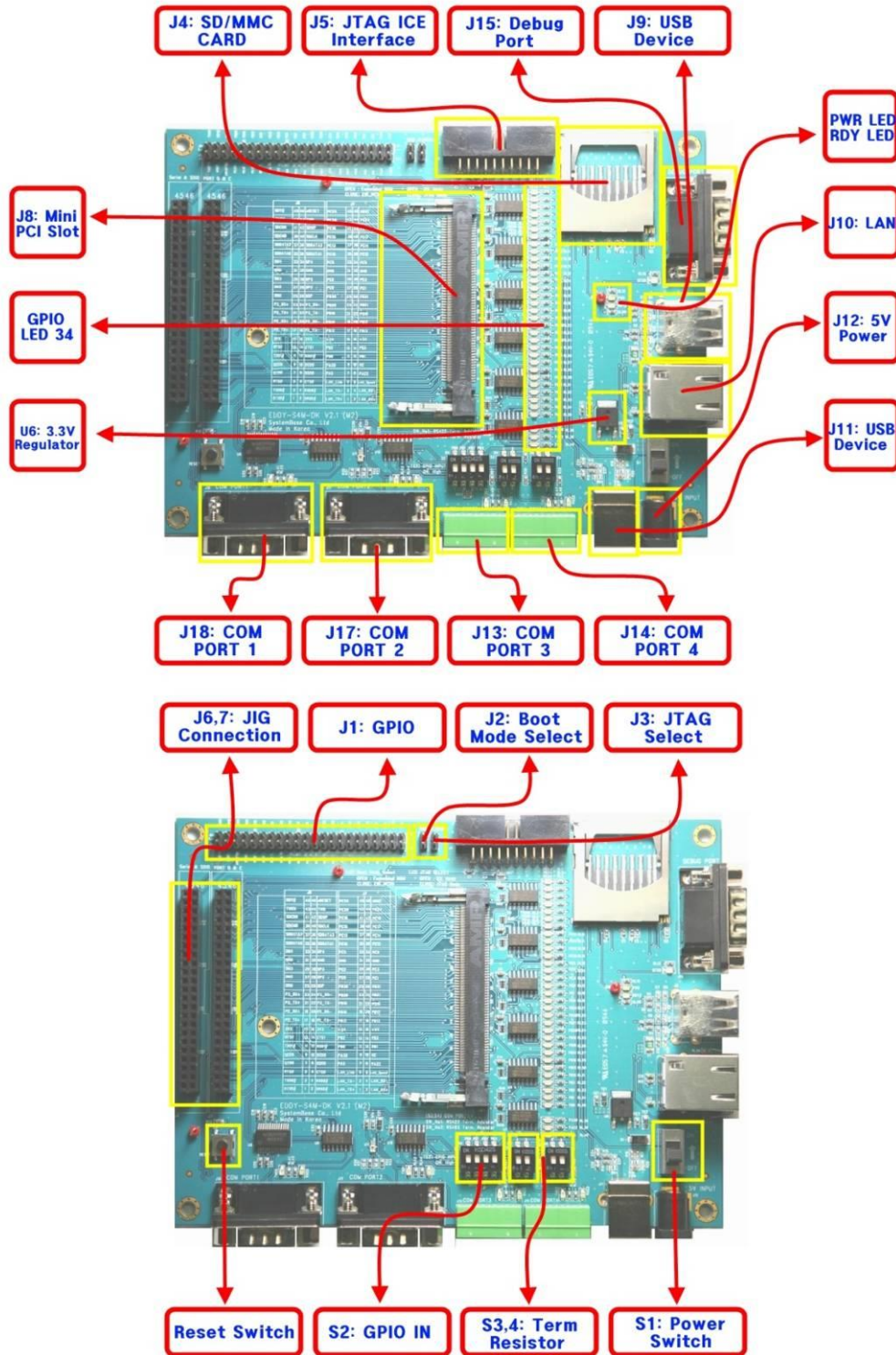
When developing main board, user must materialize transformer and RJ-45 connector (or RJ45 in which transformer is included (LAN-Mate or MAC Jack)). Since Driver IC is in Eddy-S4M, Serial port can be integrated easily only by attach connector.



Eddy-S4M v2.5

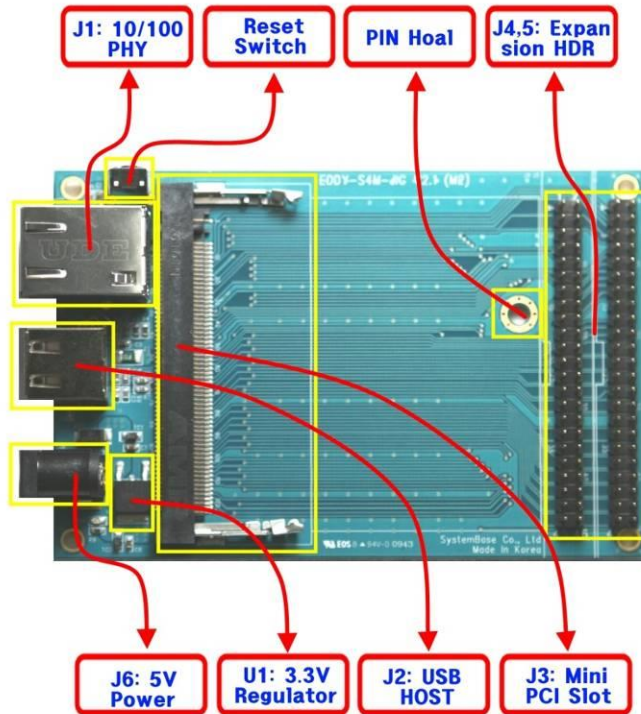
3.4 Eddy-S4M-DK v2.1

Development Kit provides environment for testing and configuration for Eddy-S4M v2.1



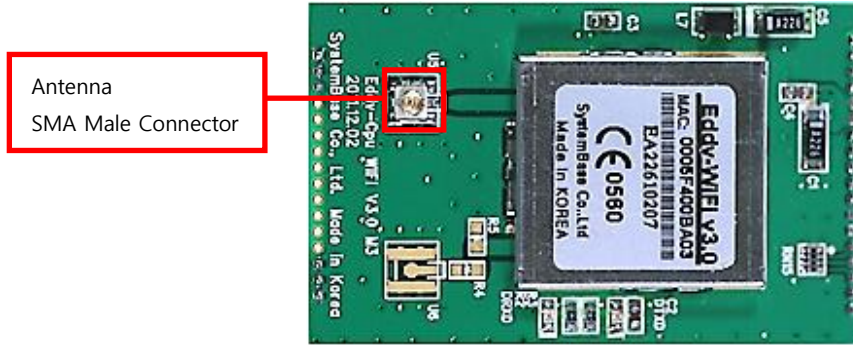
3.5 Eddy-S4M-JIG v2.1

This is a test board to develop with Eddy-S4M v2.1



3.6 Eddy WiFi v3.0

Pin out for Eddy-WiFi module is introduced in this section.

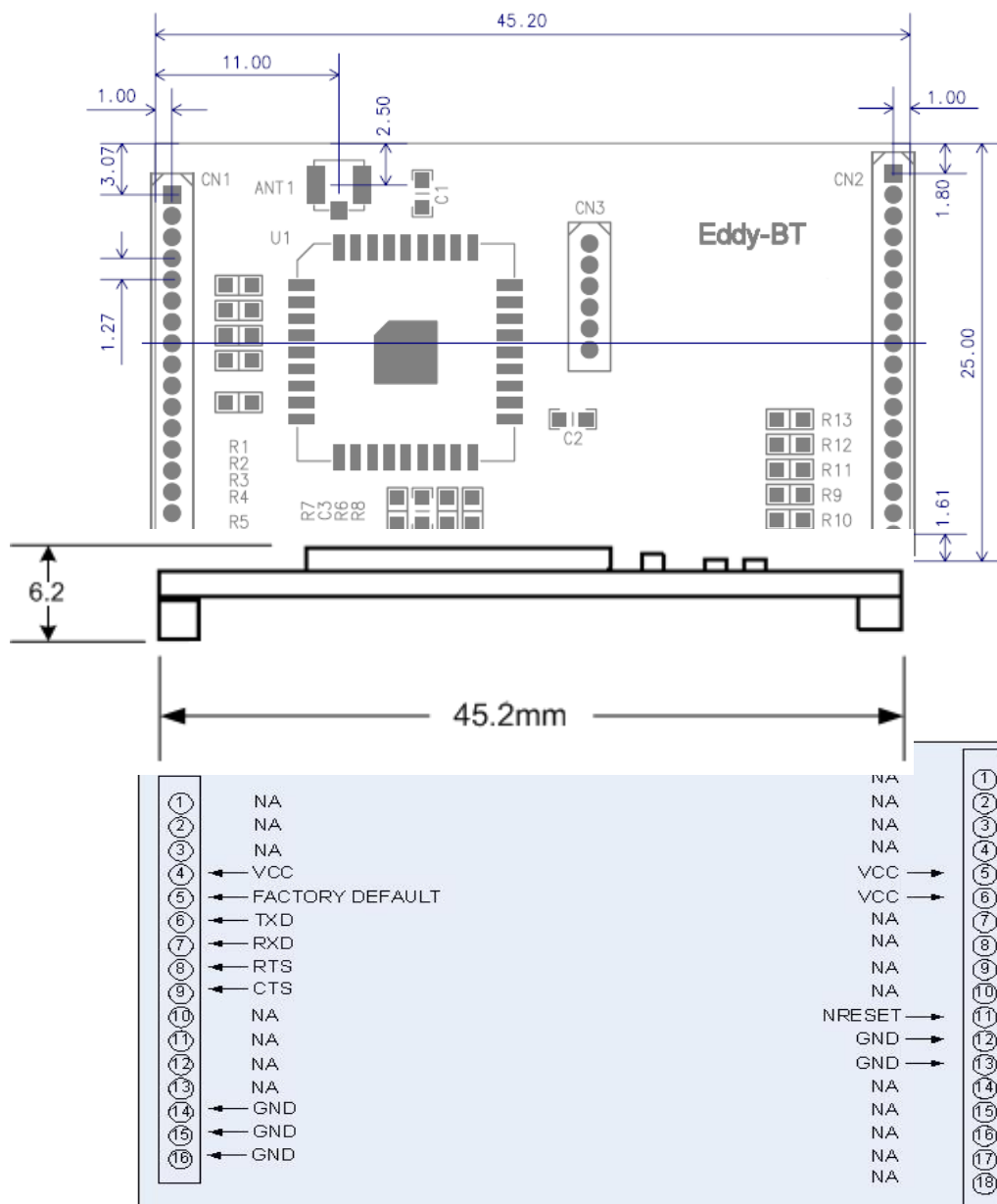
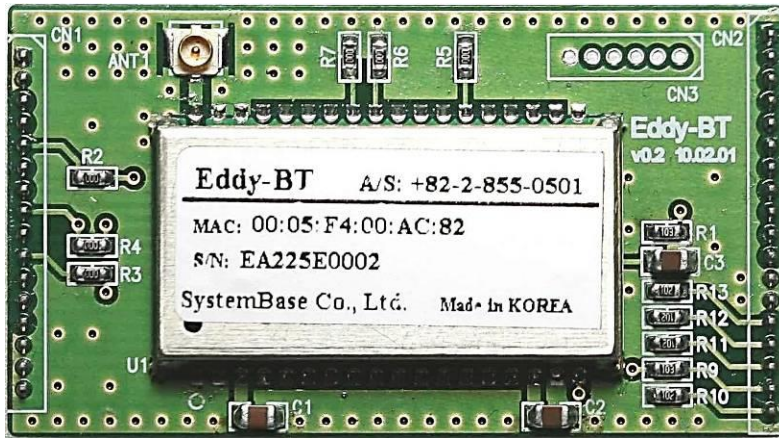


LEFT	Description
1	NA
2	NA
3	NA
4	NA

RIGHT	Description
1	NA
2	NA
3	NA
4	NA
5	VCC(3.3V)
6	VCC(3.3V)
7	USB Host Data(-)
8	USB Host Data(+)
9	NA
10	NA
11	H/W Reset
12	Ground
13	Ground
14	NA
15	NA
16	NA
17	NA
18	NA

3.7 Eddy BT v2.1

Bluetooth module is composed to connect 4th serial port of Eddy-CPU or Eddy-S4M in TTL method. It is possible to use Eddy-BT as 4th serial port, but it can lose data in case of using HW Flow Control. If you want to use HW Flow Control, please refer to Test_Bluetooth.c in SDK and revitalize HW Flow control of 4th serial port.

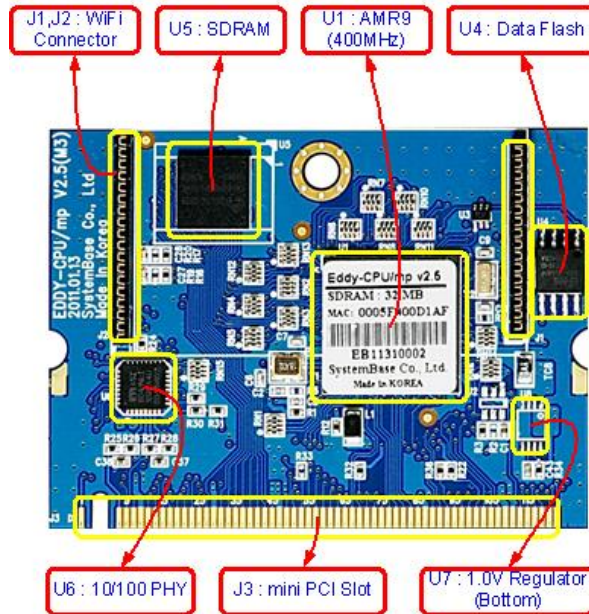


LEFT	Description
1	NA
2	NA
3	NA
4	VCC(3.3V)
5	Factory Reset
6	UART TXD
7	UART RXD
8	UART RTS
9	UART CTS
10	Pairing Signal
11	H/W Reset
12	NA
13	NA
14	Ground
15	Ground
16	Ground

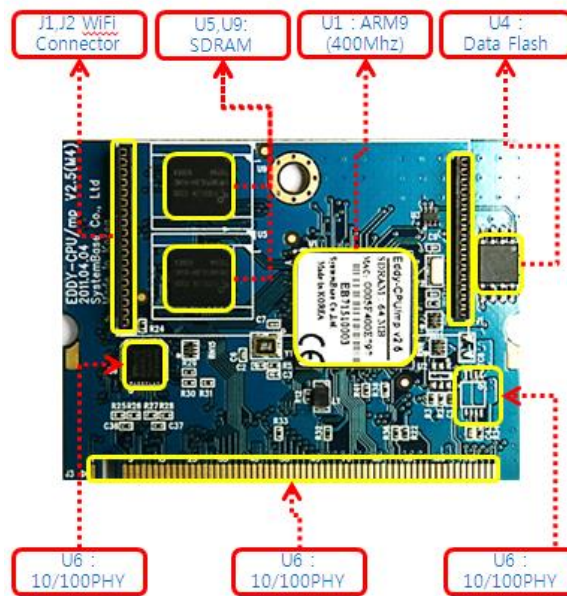
RIGHT	Description
1	NA
2	NA
3	NA
4	NA
5	VCC(3.3V)
6	VCC(3.3V)
7	NA
8	NA
9	NA
10	NA
11	H/W Reset
12	Ground
13	Ground
14	NA
15	NA
16	NA
17	NA
18	NA

3.8 Eddy-CPU/mp v2.5 / 32bit v2.5

Ethernet port is provided as pin headers, and the transformer and RJ-45 connector should be manually implemented by users. (RJ-45 connector with embedded transformer, normally called LAN-Mate or MAG Jack, can be used as a simpler approach.)



<Eddy-CPU/mp v2.5>



<Eddy-CPU/mp 32bit v2.5>

Chapter 4. Integration

This chapter explains how you can make Eddy to communicate. It deals with LAN and pin header connection guides for Eddy to operate together with the target serial device. Follow these steps to connect Eddy to the device and network.

4.1 Connection Guide

1) WAN/LAN

In order to connect Eddy to network, you need to use RJ45 Ethernet port. It supports both 10Mbps and 100Mbps Ethernet connection (auto-sensing). Since Eddy's LAN port supports MDIX function, you can either connect cross LAN cable or direct LAN cable. Plug one end of a LAN cable to Eddy and the other end to a hub, switch, or any other network device that can provide you with network access.

2) DB9

For the model included a DB9 serial port, you can simply connect Eddy to the destination serial device with a DB9 cable. For pin specifications, please refer to Chapter 3.

3) MCI slot

MMC and SD Cards excepting T-Flash, Micro SD, and SDHC can be used through MCI slot. It provides Maximum 2 GBytes. Please note that MCI and SD Card must be inserted before power is induced to Eddy module.

2) USB Host

An USB memory stick or USB hub can be attached to Eddy-S2M/PIN module's USB host port. For an USB Hub it should have own power.

4.2 First-time Booting up

First of all, please make sure the power input you supply to the module is corresponding with the Eddy model that you have. If an appropriate power input has been successfully supplied, Eddy will power on and start booting.

Although there is no power LED to check the status, you can check by LEDs on the RJ45 Ethernet port. LED status operation is described in [Chapter 3. Hardware Description](#).

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.

4.3 Connecting Eddy

In order to view current Eddy's settings or modify them, you need to make a Web or Telnet connection to Eddy. IP address is required information to make a connection.

There are two ways you can know the current IP address of Eddy.

First is to use a built-in, alias IP address of "10.10.1.1".

Second is to use "Detector" application provided in the Utility & Documents CD. This application allows searching for Eddy modules on the network.

◆ The factory default IP address: 192.168.0.223

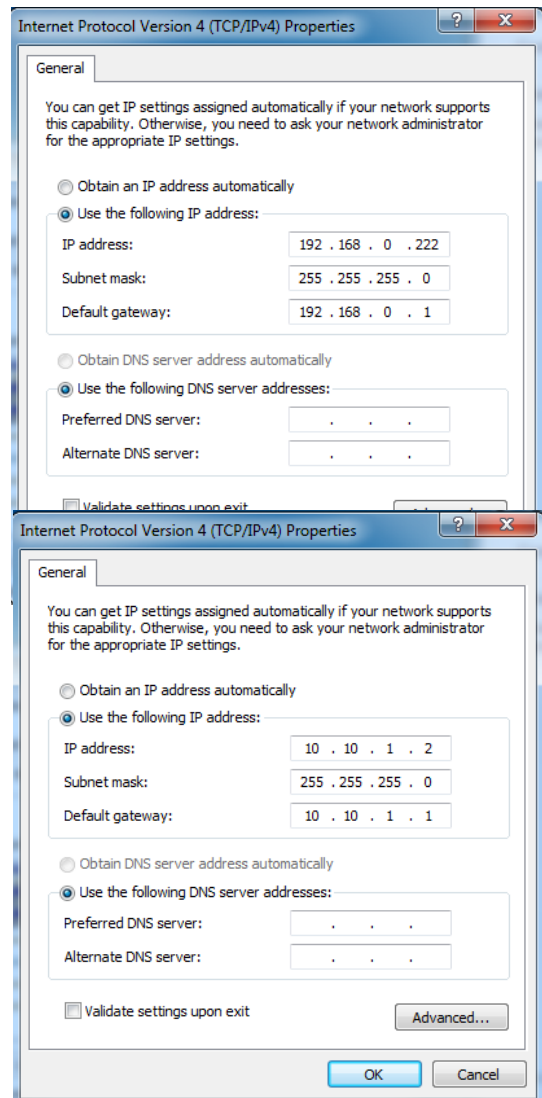
Eddy's default IP address is set to 192.168.0.223. In order to connect with this address, you need to change network configurations so that your PC can connect to the IP 192.168.0.223. Please refer to an example below, and note that values don't necessarily have to be identical to the example below.

◆ Factory default alias IP address: 10.10.1.1

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.

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 do not necessarily have to be identical to the example below.

☑ Since Eddy-S4M doesn't support LAN port so that doesn't include below.



Chapter 5. Configuration via Web

5.1 Connect to Web Manager

Open your favorite web browser and enter the IP address of Eddy to access the web manager.

The screenshot shows the Eddy web manager interface. At the top left is the Eddy logo with the tagline 'means real-time'. At the top right is the URL 'www.embeddedmodule.com'. Below the header is a blue navigation bar containing system information:

MODEL	Eddy v2.5	IP	192.168.0.219	MAC	00:05:f4:00:d7:9f
NAME	eddy	WIFI	no device	Firmware	2.5.3.1 rev 50

On the left side, there is a vertical menu with the following items: Overview, Network, Serial, User Filesystem, Update Firmware, and Reboot. The main content area is titled 'Overview' and contains the following sections:

- Network**
 - Link Type: static
 - IP Address: 192.168.0.219
 - Subnet Mask: 255.255.255.0
 - Gateway: 192.168.0.254
- Services**
 - Web: y
 - Telnet: y
 - FTP: y
- User Filesystem**
 - User Init: /flash/userinit
 - /flash/eddy_wif30.zip: unzip to /
 - /flash/dk_default.zip: unzip to /

At the bottom of the page, there is a copyright notice: 'Copyright 2013 Systembase Co., Ltd.'

5.2 Network Settings

You can manage the network environment settings in Network Settings. After changing values, you must click [Apply] button to apply the settings.

Main features for WAN Setting is as follows.

Menu	Default	Descriptions
Device Name	Eddy	Name of the current device
Line Type	Static IP	IP obtaining method for network connection.
IP Address	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	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	192.168.0.254	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.)..
DNS	168.126.63.1	Domain Name Service IP address

Main features for Network Service Setting is as follows.

Menu	Default	Descriptions
Telnet Service	Enable	Set whether to enable the Telnet Server (If disabled, connection to Eddy using telnet is not possible.)
FTP Service	Enable	Set whether to enable the FTP Server (If disabled, connection to Eddy using FTP is not possible.)
WEB Service	Enable	Set whether to enable the Web Server (If disabled, connection to Eddy using a web browser is not possible.)

5.3 Serial Settings

You can set the communication and operation environment for the serial port. After changing values, you must click [Apply] button. If you do not save and exit, modified values will be lost.

The screenshot shows the Eddy web interface. At the top left is the Eddy logo with the tagline 'means real-time'. At the top right is the website URL 'www.embeddedmodule.com'. Below this is a blue status bar containing the following information:

MODEL	Eddy v2.5	IP	192.168.0.219	MAC	00:05:f4:00:d7:9f
NAME	eddy	WIFI	no device	Firmware	2.5.3.1 rev 50

The main content area has a sidebar menu on the left with the following items: Overview, Network, Serial, User Filesystem, Update Firmware, and Reboot. The 'Network' section is active, displaying the following settings:

Network

Wan Port Setting

Device Name: eddy

Line Type: Static IP

IP Address: 192.168.0.219

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.254

DNS: 168.126.63.1

Network Service Setting

Telnet Service: Enable

FTP Service: Enable

Web Manager: Enable

At the bottom of the settings panel are 'Apply' and 'Cancel' buttons.

Copyright 2013 Systembase Co., Ltd.

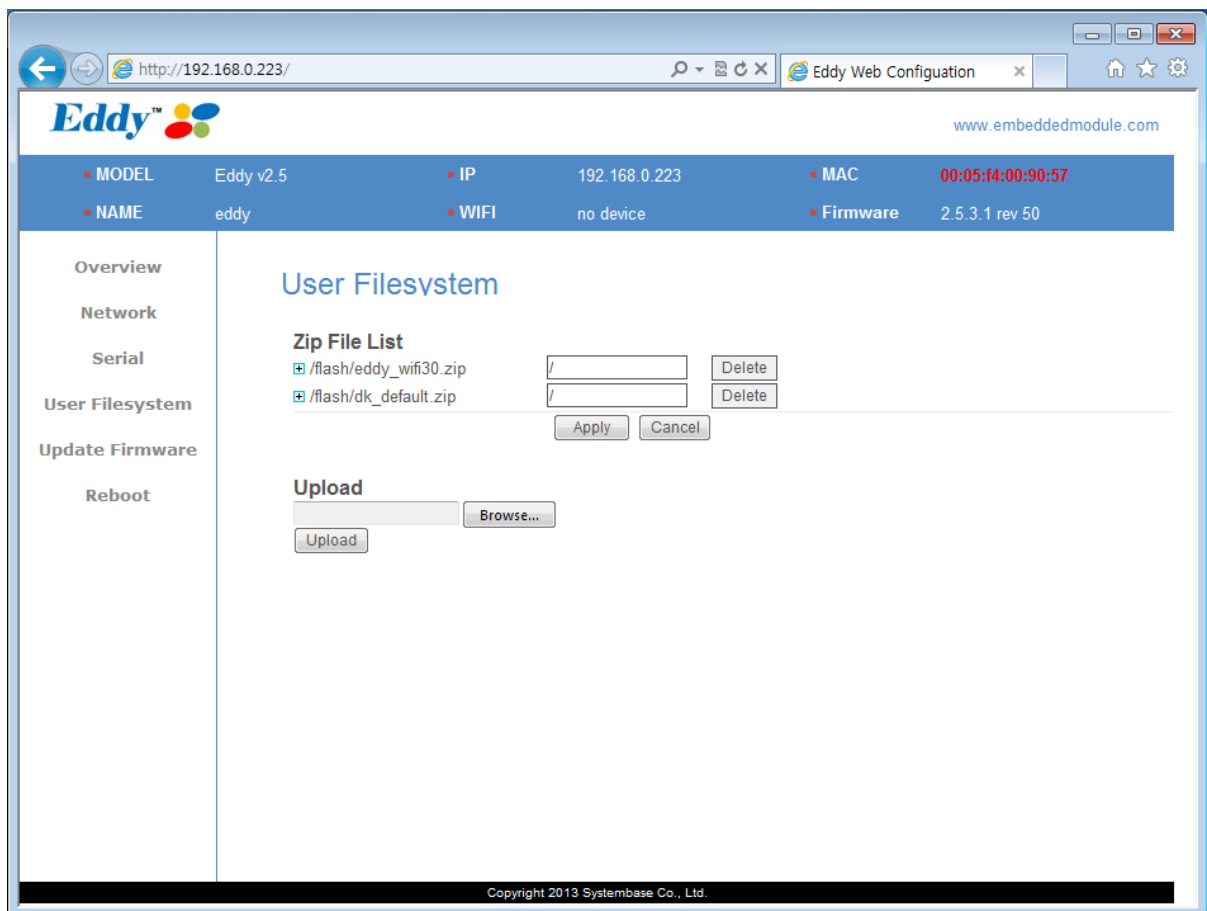
The serial settings for Eddy is as follows.

Menu	Default	Descriptions
Operation Mode	TCP Server	<p>Select the operation protocol, which the serial port would use.</p> <p>Disable Do not use this port.</p> <p>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.</p> <p>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.</p> <p>TCP Broadcast Eddy works as a server, accepting up to 5 simultaneous connections from socket clients. Data transmitted from Eddy is broadcast to each socket client.</p> <p>TCP Multiplex Eddy works as a server, accepting up to 5 simultaneous connections from socket clients. The difference between TCP Broadcast and TCP Multiplex is that Multiplex allows each socket to communicate exclusively. That is, serial data in response are only transferred to the sender socket.</p> <p>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.</p> <p>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. Server IP and port number can be set in [Remote IP/Port].</p> <p>User Application An executable file build by a user can be uploaded.</p>
Interface	RS232	<p>The serial port 1 and 2 are fixed to RS232 so these ports cannot be selected. By selecting RS422 or RS485 (Echo, Non-echo) serial port 3 and 4 can be used.</p> <p>In Eddy-CPU, this can be selected by the dip switch S8 and S9 on Eddy-DK board, therefore this category cannot be selected. (option: RS422, RS485(Echo), RS485(Non-echo))</p>
Local Socket Port	4001	Set the socket number for the port. TCP server and UDP server operation mode make use of this port for awaiting network socket connections.
Port Alias	Port1	Port alias name for convenience. (Max. 16 characters)

Menu	Default	Descriptions
Baud Rate	9600 bps	Set communication speed. (Options: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 bps)
Data Bits	8	Set the number of bits in each character size. (Options: 5, 6, 7, 8)
Stop Bits	1	Set the number of stop bits. (Options: 1, 2)
Parity	None	Set parity bit check scheme. (Options: None, Odd, Even)
Flow Control	None	Set the flow control scheme. (Options: None, Xon/Xoff, RTS/CTS)
Device Type	DataOnly	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. (Options: Data Only, Modem Signals)
Remote IP Address / Port	0.0.0.0 / 4000	While in TCP Client or UDP Client mode, set the target IP address and the port number.
Keepalive Check Time	0	<p>After a certain amount of time passes without any communication after the socket connection between the given serial port and the server are established, automatically disconnect the socket connection. (Valid from 0 to 32767 sec. When set to 0, it is disabled.)</p> <p>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.</p> <p>If the value is set to 0, this function is disabled. Once connected socket will be retained until explicitly disconnected.</p> <p>(Only applies to TCP Client, TCP Server, TCP Broadcast, and TCP Multiplex operation modes.)</p>
Latency Time	0	<p>This needs to be set when consecutive data from the given serial port needs to be transmitted to socket at once.</p> <p>For example, if 100 bytes of character string are to be transmitted from the serial device to a server through Eddy, bypass is set to 0 for the latency time. Although it provides immediate sending through Eddy, the server could be received a lot parts of divided packets.</p> <p>If the latency time is not 0, Eddy will wait for the time and check new data. If there is new data, Eddy repeatedly wait for the time. Otherwise, Eddy will transfer the buffered data, but it could not run in real time.</p>

5.4 User File System

When a user uploads a customized user file system, it will be automatically executed when Eddy boots. The user can add or remove and features for his/her needs. From the [Upload] shown in image below, use the [Browse] button to upload the file which then will be added to [Zip File List] with its path shown in the left. The text box to the right is where zipped file will be unzipped when Eddy boots. Zipped file system is usually set to unzip to /. If the delete button is clicked, the file in /flash will be removed and when Eddy boots again, removed file system will not be applied.



5.5 Update Firmware

Firmware is an application embedded in flash memory. Set the location of the firmware file to update, using the [Browse...] button. The selected firmware will be sent to Eddy when you click [Update] button. After the uploading is complete, it will take about 60 seconds to save the new firmware to the flash memory. Then, Eddy will automatically restart to run with the new firmware.

The screenshot shows the Eddy web interface. At the top left is the Eddy logo. At the top right is the URL www.embeddedmodule.com. Below the logo is a blue status bar with the following information:

MODEL	Eddy v2.5	IP	192.168.0.219	MAC	00:05:f4:00:d7:9f
NAME	eddy	WIFI	no device	Firmware	2.5.3.1 rev 50

On the left side, there is a navigation menu with the following items: Overview, Network, Serial, User Filesystem, Update Firmware (highlighted), and Reboot.

The main content area is titled "Update Firmware". It contains a warning icon (a yellow triangle with an exclamation mark) and the following text:

It will take about a minute for the upload to complete.
The time may vary according to your environment.
Note that wrong firmware file may cause damage to the device.

Below this text is a section titled "Update". It contains a label "Upload firmware file" followed by a text input field and a "Browse..." button. Below the input field are two buttons: "Update" and "Cancel".

At the bottom of the page, there is a black footer bar with the text "Copyright 2013 Systembase Co., Ltd."

5.6 Reboot

Reboot Eddy from the Reboot menu in the left.

The screenshot shows the Eddy web interface. At the top left is the Eddy logo with the tagline "means real-time". At the top right is the URL "www.embeddedmodule.com". Below the header is a blue bar containing system information:

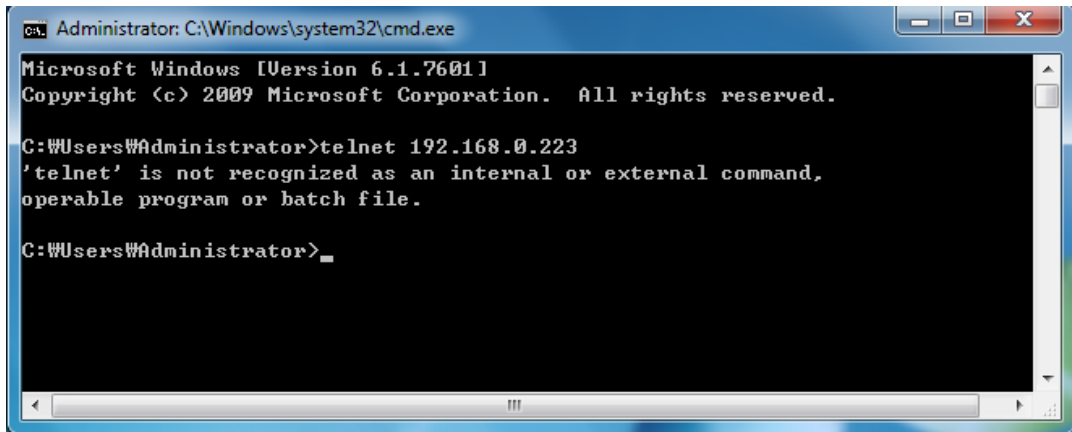
MODEL	Eddy v2.5	IP	192.168.0.219	MAC	00:05:f4:00:d7:9f
NAME	eddy	WIFI	no device	Firmware	2.5.3.1 rev 50

Below the blue bar is a sidebar menu with the following items: Overview, Network, Serial, User Filesystem, Update Firmware, and Reboot. The "Reboot" item is selected. The main content area displays the word "Reboot" in a large, light blue font. At the bottom of the page, there is a black footer bar with the text "Copyright 2013 Systembase Co., Ltd."

Chapter 6. Configuration via Telnet

6.1 Configure Telnet Client

In Windows XP, telnet is provided by default, but in Windows 7 and 8, as shown below, telnet is not available right away.

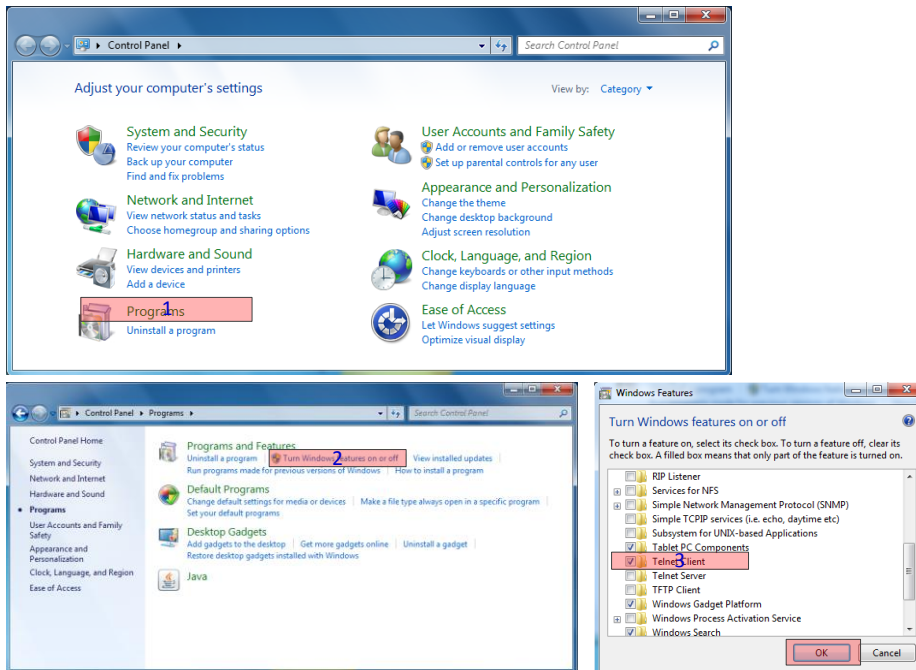


Please use the

following steps to install the telnet client.

Control Panel → Programs → Turn Windows features on or off → Telnet Client

Click and add a check mark next to the telnet client and click ok to install the telnet service.

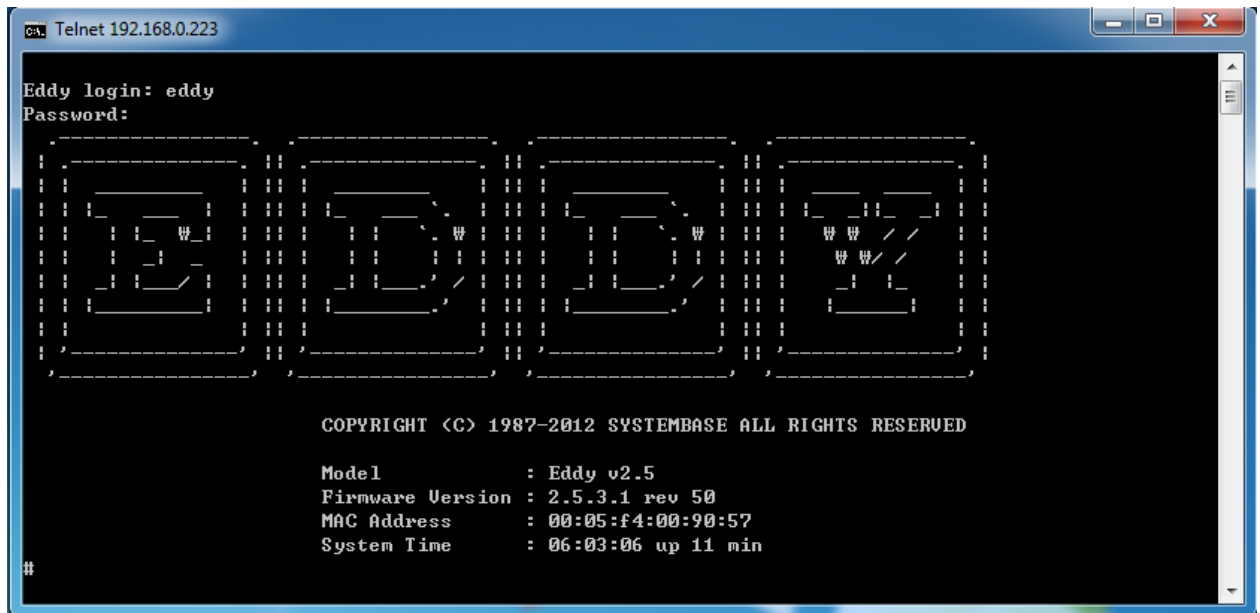


When the installation is complete, use telnet to connect to Eddy.

6.2 Connect

When you connect to Eddy, it will ask for the login ID and password. Use the information below to login. The login ID and password for the telnet are the same for the web connection.

- ◆ Factory Default user ID : eddy
- ◆ Factory Default password : 99999999



setenv command - Set the settings for Eddy

After the settings are modified, **printenv** command can be used to check the changed value. However, unless the **saveenv** command is used, the settings will valid until Eddy reboots.

6.3 Check Current Configuration

To check all the settings, use /usr/bin/printenv command.

Usage : printenv

To check an individual setting value use /usr/bin/getenv command.

Usage : getenv <variable>

Example : getenv ipaddr

Environmental Value	Description	Default Value
product	Product Name	Eddy v2.5
firmware	Firmware Version	2.5.2.0
ipaddr	IP Address	192.168.0.223
netmask	Network mask	255.255.255.0
serverip	TFTP Server IP Address	192.168.0.220
ethaddr	Network Hardware(MAC) Address	00:05:f4:00:20:57
gatewayip	Gateway IP Address	192.168.0.254
baudrate	Debug Serial Port Speed	115200
stdin	Standard Input (bootloader only)	serial
stdout	Standard Output (bootloader only)	serial
stderr	Standard Error (bootloader only)	serial
ethact	Ethernet Device Name (bootloader only)	macb0
httpd	Web Daemon Execution Status (y/n)	y
ftpd	FTP Daemon Execution Status (y/n)	y
telnetd	TELNET Daemon Execution Status (y/n)	y
userinit	User initialization command	/flash/userinit.sh
dhcpcd	DHCP Daemon Execution Status (y/n)	n
dhcpcstart	DHCP Service First Address	10.10.1.2
dhcpcend	DHCP Service Last Address	10.10.1.10
dhcplease	DHCP Service lease time (unit in seconds)	864000
lanip	LAN port IP Address	10.10.1.1
lansubmask	LAN port subnet mask	255.255.255.0
dnsip	DNS server Address	168.126.63.1
wifi	WIFI usage status (y/n)	n
wifimode	WIFI operation mode (normal/adhoc)	normal
wifissid	SSID of the wireless AP to connect	-
wifipassword	Password/Passkey of the wireless AP	-
wifichannel	Channel number (1~13) to be used to connect while in adhoc mode	-
wifiauthmode	WIFI adhoc authentication mode (open/shared)	-
serial01	Parameter of Serial 1	
serial02	Parameter of Serial 2	
serial03	Parameter of Serial 3	
serial04	Parameter of Serial 4	

6.4 Modify Configuration Values

To set the specific setting, use `/usr/bin/setenv` command.

Usage : `setenv <variable name> <value>`

Example : `setenv ipaddr 192.168.0.220`

6.5 Username/Password Commands

Configure username and password for Web/Telnet/FTP.

Commands	Default	Descriptions
<code>setenv username <username></code>	eddy	Set username to use in Web, Telnet, or FTP. (Max. 16 characters)
<code>setenv password <password></code>	99999999	Set password to use in Web, Telnet, or FTP. (Max. 16 characters)

6.6 System Commands

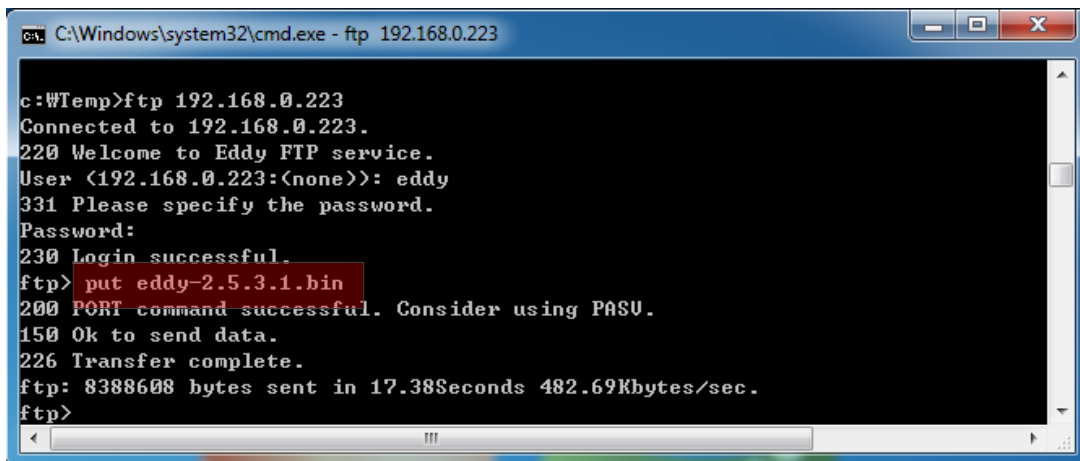
Commands	Descriptions
<code>setenv default</code>	Restore all settings to factory default. Requires reboot for changes to take an effect.
<code>saveenv</code>	Save current configuration settings. Requires reboot for changes to take effect.
<code>reboot</code>	Reboot Eddy.

Chapter 7. Appendix

7.1 Using FTP to upgrade the firmware

Firmware upgrade for Eddy can be done by the web manager or telnet using FTP. This section describes update method through FTP and Telnet. Web update is described in [Chapter 5. Configuration via Web](#).

- 1) Connect to Eddy with FTP, using correct username and password. (Default: eddy, 99999999)
- 2) To check the binary file transfer mode and transfer status, use 'bi' and 'hash' commands.
- 3) Use 'put' command to upload the firmware.
- 4) After getting 'Transfer complete' message, use 'quit' or 'bye' command to disconnect. Now we are ready to update the firmware.

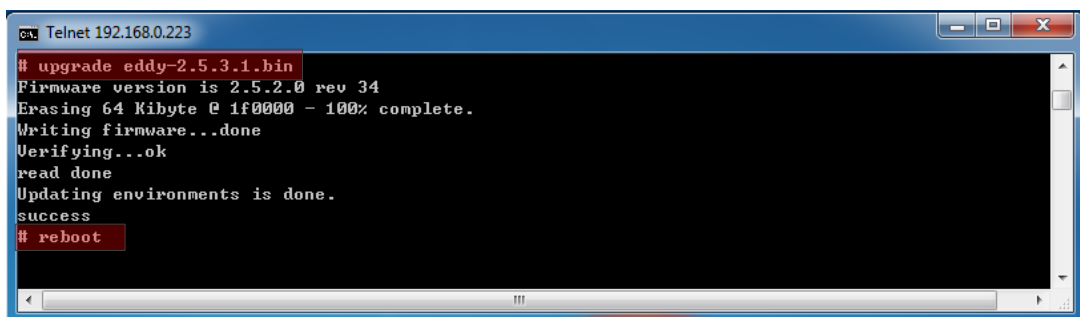


```
C:\Windows\system32\cmd.exe - ftp 192.168.0.223

c:#Temp>ftp 192.168.0.223
Connected to 192.168.0.223.
220 Welcome to Eddy FTP service.
User (192.168.0.223:(none)): eddy
331 Please specify the password.
Password:
230 Login successful.
ftp> put eddy-2.5.3.1.bin
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
ftp: 8388608 bytes sent in 17.38Seconds 482.69Kbytes/sec.
ftp>
```

Please follow the steps below to upgrade the firmware with the file uploaded with the steps above.

- 1) Connect to Eddy with telnet, using correct username and password. (Default: eddy, 99999999)
- 2) After logging in, you are in the default directory where the firmware is located. Update process can be started right away.
- 3) Use 'ls' command to check whether the firmware file is successfully uploaded.
- 4) Use 'upgrade' command to write this file into flash memory in Eddy. The Upgrade Application automatically detects whether the given firmware is a kernel or a file system.
- 5) Usage: upgrade <firmware filename> (Filename is case-sensitive.)
- 6) Make sure 'Flash Write OK' and 'Flash Verify OK' messages are displayed.
- 7) Enter 'reboot' to restart Eddy. Now Eddy will run with the updated firmware.



```
Telnet 192.168.0.223

# upgrade eddy-2.5.3.1.bin
Firmware version is 2.5.2.0 rev 34
Erasing 64 Kibyte @ 1f0000 - 100% complete.
Writing firmware...done
Verifying...ok
read done
Updating environments is done.
success
# reboot
```

7.2 Ordering Information

Product	Version	Description
Eddy-CPU	2.1	Embedded CPU Module
Eddy-CPU	2.5	Embedded CPU Module
Eddy-CPU	2.5B	Embedded CPU Module (64MB SDRAM)
Eddy-DK	2.1	Eddy Development Kit with Eddy-CPU v2.1
Eddy-DK	2.5	Eddy Development Kit with Eddy-CPU v2.5
Eddy-DK	2.5B	Eddy Development Kit with Eddy-CPU v2.5 (64MB SDRAM)
Eddy-S4M	2.1	Embedded CPU Module (Mini PCI Type)
Eddy-S4M	2.5	Embedded CPU Module (Mini PCI Type)
Eddy-S4M-DK	2.1	Eddy-S4M v2.1 Development Kit
Eddy-S4M-JIG	2.1	Eddy-S4M v2.1 JIG Board
Eddy-WiFi	3.0	802.11 b/g/n Wi-Fi Module
Eddy-BT	2.1	Bluetooth 2.0 Module
Eddy-CPU/mp	2.5	Embedded CPU Module (32MB SDRAM)
Eddy-CPU/mp 32bit	2.5B	Embedded CPU Module (64MB SDRAM)
Eddy-CPU/mp-JIG	2.5	Eddy-CPU/mp v2.5 JIG Board

7.3 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.
- 2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED.
- 3) 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.