# V2400 Series Expansion Modules **User's Manual**

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# V2400 Series Expansion Modules User's Manual

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# **Technical Support Contact Information**

## www.moxa.com/support

## Moxa Americas

Toll-free:1-888-669-2872Tel:+1-714-528-6777Fax:+1-714-528-6778

#### Moxa Europe

Tel: +49-89-3 70 03 99-0 Fax: +49-89-3 70 03 99-99

## Moxa China (Shanghai office) Toll-free: 800-820-5036

 Tel:
 +86-21-5258-9955

 Fax:
 +86-21-5258-5505

## Moxa Asia-Pacific

Tel: +886-2-8919-1230 Fax: +886-2-8919-1231

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Moxa's EPM series modules, which include modules with serial ports, a wireless/GPS card, a digital input/output channel card, a CANbus card, a mini PCI/PCIe card, a VGA/DVI-I display card, and a 2-slot mini PCIe card, work with Moxa's V2422 and V2426 embedded computers, giving end-users the ability to set up and expand a variety of industrial applications.

The following topics are covered in this chapter:

- Overview
- Package Checklist
- Product Features

## EPM Module Specifications

- EPM-3032 Specifications
- EPM-3112 Specifications
- EPM-3337 Specifications
- EPM-3438 Specifications
- EPM-3552 Specifications
- EPM-DK01 Specifications
- EPM-DK02 Specifications

# **Overview**

Moxa's EPM series modules, which include modules with serial ports, a wireless/GPS card, a digital input/output channel card, a CANbus card, a mini PCI/PCIe card, a VGA/DVI-I display card, and a 2-slot mini PCIe card, work with Moxa's V2422 and V2426 embedded computers, giving end-users the ability to set up and expand a variety of industrial applications.

# Package Checklist

The EPM Series includes the following models:

- EPM-3032: Module with 2 isolated RS-232/422/485 ports with DB9 connectors
- EPM-3337: Module with HSDPA, GPS, WLAN (11n)
- EPM-3438: Module with 8 DIs and 8 DOs with 3 KV digital isolation protection, and a 2 KHz counter
- EPM-3112: Module with 2 isolated CAN ports with DB9 connectors
- EPM-3552: VGA and DVI-I display module
- EPM-DK01: Mini PCI and mini PCIe expansion module
- EPM-DK02: 2-slot mini PCIe expansion module

Each model is shipped with the following items:

1 EPM-3032, 3337,3438, 3112, 3552, DK01, or DK02 expansion module

NOTE: Please notify your sales representative if any of the above items are missing or damaged.

# **Product Features**

The EPM series expansion modules have the following features:

- PCI slots for interface expansion
- EPM-3032: 2 isolated RS-232/422/485 ports with DB9 connectors
- EPM-3112: 2 isolated CAN ports with DB9 connectors
- EPM-3337: HSDPA, GPs, WLAN (11a/b/g/n)
- EPM-3438: 8+8 DI/DO with 3 KV digital isolation protection, 2 KHz counter
- EPM-3552: VGA or DVI-I display module
- EPM-DK02: 2-slot Mini PCIe expansion module

# **EPM Module Specifications**

# EPM-3032 Specifications

### Serial Interface

Serial Standards: 2 RS-232/422/485 ports, software-selectable (DB9 male) Isolation: 2 KV digital isolation

### **Serial Communication Parameters**

Data Bits: 5, 6, 7, 8 Stop Bits: 1, 1.5, 2 Parity: None, Even, Odd, Space, Mark Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485 Baudrate: 50 bps to 921.6 Kbps (non-standard baudrates supported; see user's manual for details)

#### Serial Signals

RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

**RS-422:** TxD+, TxD-, RxD+, RxD-, GND **RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND **RS-485-2w:** Data+, Data-, GND

Physical Characteristics Weight: 137 g

**Dimensions:** 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

**Environmental Limits** 

Operating Temperature: -40 to 70°C (-40 to 158°F)

# **EPM-3112 Specifications**

## **CANbus Communication**

Interface: 2 optically isolated CAN2.0A/2.0B compliant ports CAN Controller: Phillips SJA1000T Signals: CAN-H, CAN-L Isolation: 2 KV digital isolation Speed: 1 Mbps Connector Type: DB9 male

## **Physical Characteristics**

Weight: 127 g Dimensions: 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

## **Environmental Limits**

Operating Temperature: -25 to 55°C (-13 to 131°F)

# **EPM-3337 Specifications**

### **Cellular Interface**

### Frequency Bands:

- UMTS/HSDPA: Triple band, 850/1900/1900 MHz
- GSM/GPRS/EDGE: Quad band, 850/900/1800/2100 MHz
- GSM Dass: Small MS

### Output Power:

- Class 4 (2 W) for GSM850/900
- Class 3 (0.25 W) for UMTS/HSDPA
- Class E2 (0.5 W) for EDGE850/900
- Class E2 (0.4 W) for EDGE1800/1900
- Class 1 (1 W) for GSM1800/1900

## **HSDPA Interface**

### 3GPP Release 5:

- 3.6 Mbps, UL 384 Kbps
- UE CAT. [1-6], 11, 12 supported
- Compressed mode (CM) supported according to 3GPP TS25.212

### GPS Interface

Tracking: Tracks up to 13 satellites, L1 1575.42 MHz

Accuracy Position: 2.5 m CEP; 5.0 m SEP

**Protocols:** NMEA-0183 V2.3, E911 AGPS Control plane, GPS dedicated AT commands, Date WGS-84 **Tracking sensitivity:** -158 dBm (with active antenna)

## Start-up Time:

- Hot start: <3s
- Cold start: 30s
- Warm start: 30s
- GPS active antenna supply: 3.3 V

### WLAN Interface

Supported Modes:

- IEEE 802.11a/b/g/n for client/bridge mode
- IEEE 802.11b/g/n for AP mode (Linux OS only)

Standards:

- IEEE 802.11a/b/g/n for Wireless LAN
- IEEE 802.11i for Wireless Security

## Operating Channels (central frequency):

- US: 2.412 to 2.462 GHz (11 channels), 5.18 to 5.24 GHz (4 channels)
- EU: 2.412 to 2.472 GHz (13 channels), 5.18 to 5.24 GHz (4 channels)
- USA: 1 to 11 (2400 to 2483.5 MHz)
- Europe: 1 to 13 (2400 to 2483.5 MHz)
- Japan: 1 to 14 (2400 to 2497 MHz)

802.11g:

- USA: 1 to 11 (2400 to 2483.5 MHz)
- Europe: 1 to 13 (2400 to 2483.5 MHz)
- Japan: 1 to 13 (2400 to 2497 MHz)

802.11a:

- USA: 36 to 165 (5180 to 5825 MHZ)
- Europe: 36 140 (5180 to 5700 MHz)
- Japan: 7 to 11 (5035 to 5055MHz),183 to 189 (4915 to 4945 MHz)

**Security:** 64-bit and 128-bit WEP encryption, WPA /WPA2-Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)

Transmission Rates:

- 802.11b: 1, 2, 5.5, 11 Mbps
- 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11n: 6 to 300 Mbps (multiple rates supported)

## TX Transmit Power:

• 802.11b: 1 to 11 Mbps: Typ. 18 dBm (± 1.5 dBm)

• 802.11g: 6 to 24 Mbps: Typ. 18 dBm (± 1.5 dBm); 36 to 48 Mbps: Typ. 17 dBm (± 1.5 dBm); 54 Mbps: Typ. 15 dBm (± 1.5 dBm)

• 802.11a: 6 to 24 Mbps: Typ. 17 dBm (± 1.5 dBm) 36 to 48 Mbps: Typ. 16 dBm (± 1.5 dBm); 54 Mbps: Typ. 14 dBm (± 1.5 dBm)

### TX Transmit Power MIMO:

• 802.11a/n (20/40 MHz): MCS15 20 MHz: Typ. 13 dBm (± 1.5 dBm); MCS15 40 MHz: Typ. 12 dBm (± 1.5 dBm)

• 802.11g/n (20/40 MHz): MCS15 20 MHz: Typ. 14 dBm (± 1.5 dBm); MCS15 40 MHz: Typ. 13 dBm (± -1.5 dBm)

### **RX Sensitivity:**

• 802.11b:

-92 dBm @ 1 Mbps, -90 dBm @ 2 Mbps, -88 dBm @ 5.5 Mbps, -84 dBm @ 11 Mbps

• 802.11g:

-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps, -80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps

• 802.11a:

-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps,

-80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps

## RX Sensitivity MIMO:

• 802.11a/n:

-68 dBm @ MCS15 40 MHz, -70 dBm @ MCS7 40 MHz, -69 dBm @ MCS15 20 MHz, -71 dBm @ MCS7 20 MHz • 802.11g/n:

-68 dBm @ MCS15 40 MHz, -70 dBm @ MCS7 40 MHz, -69 dBm @ MCS15 20 MHz,

-71 dBm @ MCS7 20 MHz

**AP-only Protocols:** ARP, BOOTP, DHCP, dynamic VLAN-Tags for 802.1X-Clients, STP/RSTP (IEEE 802.1D/w) **Default Antenna:** 2 dBi dual-band omni-directional antenna, RP-SMA (male) **Connector for External Antennas:** RP-SMA (female)

Physical Characteristics Weight: 220 g

**Dimensions:** 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

**Environmental Limits** 

Operating Temperature: -25 to 55°C (-13 to 131°F), EN 50155 Class T1

# **EPM-3438 Specifications**

## **Digital Input**

Input Channels: 8, source type Input Voltage: 0 to 30 VDC at 25 Hz Digital Input Levels for Dry Contacts: • Logic level 0: Close to GND • Logic level 1: Open Digital Input Levels for Wet Contacts:

• Logic level 0: +3 V max.

• Logic level 1: +10 V to +30 V (Source to DI)

Counter Frequency: 2 KHz (DIO only)

**Connector Type:** 10-pin screw terminal block (8 DI points, DI Source, GND) **Isolation:** 3 KV optical isolation

## **Digital Output**

Output Channels: 8, sink type, 0 to 30 VDC Output Current: Max. 200 mA per channel On-state Voltage: 24 VDC nominal, open collector to 30 VDC Connector Type: 9-pin screw terminal block (8 DO points, GND) Isolation: 3 KV optical isolation

### Physical Characteristics

Weight: 120 g Dimensions: 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

### **Environmental Limits**

Operating Temperature: -40 to 70°C (-40 to 158°F), EN 50155 Class TX

# **EPM-3552 Specifications**

### Display

Graphics Controller: DsiplayLink DL-195
VGA Interface: 15-pin D-sub connector (female)
DVI Interface: 24-pin DVI-I connector (female)
Resolution: Up to 1920x 1600 (2048 x 1152 for wide screen) resolution

## **Physical Characteristics**

Weight: 130 g Dimensions: 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

### **Environmental Limits**

Operating Temperature: -25 to 55°C (-13 to 131°F)

# **EPM-DK01 Specifications**

PCI Express Mini Slot Interface: PCIExpress V1.0 (one lane) USB 2.0 Bus SIM Card Holder: Reserved for Cellular applications

Mini PCI Slot Interface: PCI Bus Frequency: 32-bit, 33 MHz PCI

Physical Characteristics Weight: 117 g

Environmental Limits Operating Temperature: -40 to 70°C (-40 to 158°F), EN 50155 Class TX

# **EPM-DK02 Specifications**

PCI Express Mini Slot Interface: Slot 1: PCIExpress V1.0 (one lane) / USB 2.0 Slot 2: USB 2.0 USB 2.0 Bus SIM Card Holder: Reserved for cellular applications

Physical Characteristics Weight: 125 g

## **Environmental Limits**

Operating Temperature: -25 to 55°C (-13 to 131°F), EN 50155 Class T1

# Hardware Introduction

The EPM Series expansion modules are designed to work with Moxa's V2422 and V2426 embedded computers. By providing different modules with different connectors, the EPM series offers the greatest flexibility and convenience for users who would like to easily establish industrial applications that require different communication interfaces.

The following topics are covered in this chapter:

## □ Appearance

- ➢ EPM-3032
- ➢ EPM-3112
- ➢ EPM-3337
- ➢ EPM-3438
- ➢ EPM-3552
- ➢ EPM-DK01
- ➢ EPM-DK02
- Dimensions

# Appearance

# EPM-3032



# EPM-3112

CAN Port x 2 (DB9)

# EPM-3337



# EPM-3438



# EPM-3552



# EPM-DK01



# EPM-DK02



# **Dimensions**



# Hardware Connection Description

In this chapter, we show how to connect the embedded computers to the network and to various devices.

The following topics are covered in this chapter:

- Installing the EPM Expansion Modules
- Connecting Data Transmission Cables
  - > Connecting to the EPM-3032 Serial Port Module
  - > Connecting to the EPM-3337 Wireless/GPS Module
  - > Connecting to the EPM-3438 DI/DO Module
  - > Connecting to the EPM-3112 CANbus Port Module
  - Connecting to the EPM-DK01 Module
  - > Connecting to the EPM-3552 Display Module
  - > Connecting to the EPM-DK02 Module
  - > Configuring the Power On/Off Function Jumper for Socket 1

# **Installing the EPM Expansion Modules**

The EPM series expansion modules are designed to work with Moxa's V2422 and V2426 embedded computers. Below we describe how to insert the modules into the embedded computer slots.

1. Remove the module cover screws.



2. Remove the cover from the slot.



3. Gently insert the module into the slot.



4. When finished, tighten the screws to hold the module in place.

# **Connecting Data Transmission Cables**

In this section we explain how to connect the EPM modules to devices.

# Connecting to the EPM-3032 Serial Port Module

Use a serial cable to plug your serial device into the module's serial port. Serial ports 1 and 2 have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 communication by software. The pin assignments are shown in the following table:

DB9 Male Port	RS-232/422/485 Pinouts				
1 2 3 4 5	Pin	RS-232	RS-422	RS-485	RS-485
				(4-wire)	(2-wire)
$\left( \cdots \right) $	1	DCD	TxDA(-)	TxDA(-)	_
Viii	2	RxD	TxDB(+)	TxDB(+)	-
+ + + + + + + + + + + + + + + + + + +	3	TxD	RxDB(+)	RxDB(+)	DataB(+)
6789	4	DTR	RxDA(-)	RxDA(-)	DataA(-)
	5	GND	GND	GND	GND
	6	DSR	-	-	-
	7	RTS	-	-	-
	8	CTS	_	-	_

# Connecting to the EPM-3337 Wireless/GPS Module

The EPM-3337 module comes with 4 connectors that can be used to connect antennas, including 2 WiFi antennas, 1 cellular antenna, and 1 GPS antenna. Refer to the following figure for the location of the different antennas.



# Connecting to the EPM-3438 DI/DO Module

The EPM-3438 module comes with 8 digital input channels and 8 digital output channels. See the following figures for pin definitions and wiring methods.





# Connecting to the EPM-3112 CANbus Port Module

The EPM-3112 offers two CANbus ports with DB9 male connectors. Use a cable to plug your CAN device into the module's serial port. The pin assignments are shown in the following table:



CANbus Pinouts		
PIN	CAN	
1	_	
2	CAN-L	
3	-	
4	-	
5	-	
6	-	
7	CAN-H	
8	_	
9	_	

# Connecting to the EPM-DK01 Module

The EPM-DK01 offers a mini-PCI and a mini-PCIe sockets, allowing users to insert a mini-PCI or a mini-PCIe card. See the following figure for the specific locations when installing these cards. Meanwhile, if you need to connect the antenna, use the connectors on the exterior panel.





# Connecting to the EPM-3552 Display Module

The EPM-3552 display modules comes with a VGA connector and a DVI-I connector. Use a cable to connect the display to the connector on the module.



The pin assignments are shown in the following tables.

## **D-Sub 15 Connector Pin Assignments**



**DVI-I** Connector Pin Assignments



Pin No.	Signal Definition
1	T.M.D.S. Data2-
2	T.M.D.S. Data2+
3	T.M.D.S. Data2/4 Shield
4	T.M.D.S. Data4-
5	T.M.D.S. Data4-
6	DDC Clock
7	DDC Data
8	Analog Vertical Sync
9	T.M.D.S. Data1-
10	T.M.D.S. Data1+
11	T.M.D.S. Data1/3 Shield
12	T.M.D.S. Data3-
13	T.M.D.S. Data3+
14	+5V Power
15	Ground (return for +5V, HSync, and VSync)
16	Hot Plug Detect
17	T.M.D.S. Data0-
18	T.M.D.S. Data0+
19	T.M.D.S. Data0/5 Shield
20	T.M.D.S. Data5-
21	T.M.D.S. Data5+
22	T.M.D.S. Clock Shield
23	T.M.D.S. Clock+
24	T.M.D.S. Clock-
C1	Analog Red
C2	Analog Green
C3	Analog Blue
C4	Analog Horizontal Sync
C5	Analog Ground
	(analog R, G, B return)

# Connecting to the EPM-DK02 Module

The EPM-DK02 has 2 mini PCIe sockets that allow users to insert two mini PCIe cards for cellular communication. The figures below show the specific locations on the module to install these cards. Note that while both sockets provide a mini PCIe interface, socket 1 supports either mini PCIe or USB 2.0 signals, whereas socket 2 only supports USB 2.0 signals.

Connect the cellular module to the mini PCIe socket, and insert the SIM card into the SIM card holder. Be sure to tighten the screw in the screw holder so that the module will be firmly installed. Note that the second SIM card holder is located on the back of the module. If you need to connect the antenna, use the connectors on the exterior panel.



# Configuring the Power On/Off Function Jumper for Socket 1

Socket 1 of the EPM-DK02 module offers the power on/off function, which activated using the jumper setting shown in the following figure.



- 1. Place the jumper on pins 1 and 2 to enable the power on/off control function.
- 2. Place the jumper on pins 2 and 3 to disable the power on/off control function. In this case, the power will always be on.

**NOTE** This jumper configuration is for socket 1 only.

# Software Installation and Programming Guide

In this chapter we discuss software installation and programming guide for the EPM-3032, EPM-3337, and EPM-3438 expansion modules.

The following topics are covered in this chapter:

## Linux System

- EPM-3032 Driver Installation
- ► EPM-3032 Programming Guide
- EPM-3438 Driver Installation
- EPM-3438 Programming Guide
- EPM-3337 Driver Installation
- EPM-3112 Driver Installation
- EPM-3112 Programming Guide
- EPM-3552 Driver Installation
- ► EPM-3552 Chipset Configuration
- EPM-DK02 Driver Installation

#### Windows System

- EPM-3032 Driver Installation
- Configuring Serial Port Mode
- > Changing UART Mode Through Programming
- EPM-3438 Driver Installation
- EPM-3438 Programming Guide
- EPM-3337 Driver Installation
- Wireless Module Driver Installation
- > Configuring the GPRS/HSDPA Connection (without GPS)
- Enabling GPS Functionality
- > Configuring a Wireless Connection
- Getting Wireless Module Information
- EPM-3112 Driver Installation
- > EPM-3112 Programming Guide
- EPM-3552 Driver Installation
- EPM-3552 Configuration
- > Setting the Display to Extend Mode with the Windows Properties
- EPM-3552 Patch File Installation
- EPM-DK02 Driver Installation
- Controlling EPM-DK02 Power On/Off

# Linux System

# **EPM-3032** Driver Installation

The EPM-3032 supports Linux standard termios control. The normal tty device node is located at /dev/ttyM8, ttyM9. /dev/ttyM16 and ttyM17 are the second device files for the EPM-3032 module. The Moxa UART Device API allows you to configure ttyMx for RS-232, RS-422, 4-wire RS-485, or 2-wire RS-485.

The EPM-3032 driver has been pre-installed at the following location, and will be loaded automatically when the system boots up.

Moxa:~# /lib/modules/2.6.30-bpo.2-686/kernel/drivers/char/mxser.ko

# EPM-3032 Programming Guide

## Example to set the baud rate

```
#define MOXA
                            0x400
#define MOXA_SET_SPECIAL_BAUD_RATE
                                     (MOXA+100)
#define MOXA_GET_SPECIAL_BAUD_RATE
                                     (MOXA+101)
#include
          <termios.h>
   struct termios term;
              fd, speed;
   int
   fd = open("/dev/ttyM8", O_RDWR);
   tcgetattr(fd, &term);
   term.c_cflag &= ~(CBAUD | CBAUDEX);
   term.c_cflag |= B4000000;
   tcsetattr(fd, TCSANOW, &term);
   speed = 115200;
   ioctl(fd, MOXA_SET_SPECIAL_BAUD_RATE, &speed);
```

## Example to get the baud rate

```
#define MOXA
                            0x400
#define MOXA_SET_SPECIAL_BAUD_RATE
                                     (MOXA+100)
#define MOXA_GET_SPECIAL_BAUD_RATE
                                      (MOXA+101)
#include <termios.h>
   struct termios term;
   int
              fd, speed;
   fd = open("/dev/ttyM8", O_RDWR);
   tcgetattr(fd, &term);
   if ( (term.c_cflag & (CBAUD|CBAUDEX)) != B4000000 ) {
       // follow the standard termios baud rate define
   } else {
       ioctl(fd, MOXA_GET_SPECIAL_BAUD_RATE, &speed);
   }
```

## Baud rate inaccuracy

```
Divisor = 921600/Target Baud Rate. (Only Integer part)
ENUM = 8 * (921600/Targer - Divisor) ( Round up or down)
Inaccuracy = (Target Baud Rate - 921600/(Divisor + (ENUM/8))) * 100%
E.g.,
To calculate 500000 bps
Divisor = 1, ENUM = 7,
Inaccuracy = 1.7%
```

\*For reliable performance, inaccuracy should be under 2%

## Special Note

The embedded serial ports do not support special baud rates and the maximum baud rate is only 115200 bps. However, the expansion board can support special baud rates and maximum baud rates of up to 921600 bps.

If the target baud rate is not a special baud rate (e.g. 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600), the termios cflag will be set to the same flag.

If you use stty to get the serial information, you will get speed equal to 0.

## **Configure Serial Port Mode**

Use "setinterface" command to retrieve the parameters of the serial port configuration.

```
Moxa:~# setinterface
Usage: setinterface device-node [interface-no]
device-node - /dev/ttyMn; n = 0,1,2,...
interface-no - following:
none - to view now setting
0 - set to RS232 interface
1 - set to RS485-2WIRES interface
2 - set to RS485-2WIRES interface
3 - set to RS485-4WIRES interface
Moxa:~#
```

The different serial modes use specific parameters.

- 1 set to RS485-2WIRES interface
- 2 set to RS422 interface
- 3 set to RS485-4WIRES interface

To check the current interface setting:

```
Moxa: ~# setinterface /dev/ttyM8
Now setting is RS485-2WIRES interface.
```

In this case, Serial Port 1 is set as RS-485 2-wire. (M0 refers to port 1, and M1 refers to port 2, and so on)

To change the current interface setting:

```
Moxa: ~# setinterface /dev/ttyM8 2
Moxa: ~# setinterface /dev/ttyM8
Now setting is RS422 interface.
```

In this case, Serial Port 1 has been changed and is set as RS-422 mode.

To load the settings as the Default Value:

When OS boots up, the default interface mode of the EPM-3032 is RS232. If you want to change the default interface mode, please use the following steps:

First remount the read-only root file system in writable mode.

```
Moxa:~# mount -o remount,rw /dev/hdal /
Moxa:~#
```

Next, edit **/etc/udev/rules.d/96-moxa.rules**. Add the following description to **96-moxa.rules**. The VendorID of the EPM-3032 must be **0x1393** and the DeviceID must be **0x1022**. For example:

```
# Set the device, EPM-3032, 0x1393:0x1022 default as 232 mode interface
DRIVERS=="mxser", ATTRS{vendor}=="0x1393", ATTRS{device}=="0x1022",
RUN+="/bin/setinterface /dev/ttyM%n 0"
```

"96-moxa.rules"

```
Edit the command line RUN+="/bin/setinterface /dev/ttyM%n 0".
```

If you want to set the serial mode to RS-232, use the following parameter.

#### RUN+="/bin/setinterface /dev/ttyM%n 0"

If you want to set the serial mode to RS-485 2-wire, use the following parameter.

RUN+="/bin/setinterface /dev/ttyM%n 1"

If you want to set the serial mode to RS-422, use the following parameter.

#### RUN+="/bin/setinterface /dev/ttyM%n 2"

If you want to set the serial mode to RS-485 4-wire, use the following parameter.

#### RUN+="/bin/setinterface /dev/ttyM%n 3"

When finished, remember to umount the writable root file system.

```
Moxa:~# umount /
Moxa:~#
```

Reboot your computer.

Moxa:~# reboot Moxa:~#

Once the computer restarts, confirm that the setting has been loaded as the default value.



# **EPM-3438 Driver Installation**

Upload the package to embedded computer and to the tmpfs, /dev/shm.

```
root:~# scp epm3438-2.6.30-bpo.2-686.deb root@192.168.30.123:/dev/shm
root:~#
```

Install the package

```
Moxa:~# cd /dev/shm
Moxa:~# mount -o remount,rw /
Moxa:~# dpkg -i ./epm3438-2.6.30-bpo.2-686.de
Moxa:~# umount /
```

After the driver installs, you can use Ismod to check if the epm3438 module is loaded in the kernel.

Moxa:~#	Ismod more		
Module		Size	Used by
epm3438		4620	0

In /etc/init.d/moxainit.sh will add the `modprobe epm3438` and `modprobe -r epm3438` lines.





If you need to uninstall the driver, you can use this command:

Moxa:~# mount -o remount,rw / Moxa:~# dpkg -r epm3438 Moxa:~# umount /

# EPM-3438 Programming Guide

# Digital I/O

Digital input/output channels are featured in some models of Moxa embedded computers, including the UC-7408, UC-8410, IA240, IA260, W406 and EPM-3438. These channels can be accessed at run-time for control or monitoring using the functions in the following sections. Digital Output channels can be set to high or low via each port starting from 0. The Digital Input channels can be used to detect the state change of the digital input signal. The header file of digital I/O functions is *mxdgio.h*, which is located in the *digit\_input\_change* directory for Linux.

Function	HANDLE mxdgio_epm3438_open(int HWIndex);
Description	This function opens access to the DIO device.
Input	<hwindex> The first or second EPM-3438 board.</hwindex>
Output	None
Return	When successful, this function returns an access to the DIO device. Otherwise, there is an
	error.

#### Moxa functions for DI/DO

Function	void mxdgio_close(HANDLE fd);
Description	This function closes the access to the DIO device.
Input	<fd> The access to the device.</fd>
Output	None
Return	None

Function	int mxdgio_get_input_signal(HANDLE fd, int port);
Description	This function gets the signal state of a digital input channel.
Input	<fd> The access to the device.</fd>
	<port> port #</port>
Output	<state> DIO_HIGH (1) for high, DIO_LOW (0) for low</state>
Return	Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.

Function	int mxdgio_get_output_signal(HANDLE fd, int port);
Description	This function gets the signal state of a digital output channel.
Input	<fd> The access to the device.</fd>
	<port> Port number</port>
Output	None
Return	Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.

Function	int mxdgio_set_output_signal_high(HANDLE fd, int port);
Description	This function sets a high signal to a digital output channel.
Input	<fd> The access to the device.</fd>
	<port> Port number.</port>
Output	none.
Return	When successful, this function returns 0. When an error occurs, it returns -1.

Function	int mxdgio_set_output_signal_low(HANDLE fd, int port);
Description	This function sets a low signal to a digital output.
Input	<fd> The access to the device.</fd>
	<port> Port number.</port>
Output	none.
Return	When successful, this function returns 0. When an error occurs, it returns -1.

## Moxa I/O control definitions for COUNTER

#define	COUNTER_NODE1	"/dev/epm_3438_counter1"
#define	COUNTER_NODE2	"/dev/epm_3438_counter2"

Function	int mxdgio_epm3438_get_counter(int fd);
Description	get the counter value
Input	<fd> The access to the counter device.</fd>
	<port> Port number.</port>
Output	none.
Return	the counter value

Function	int mxdgio_epm3438_clear_counter(int fd);
Description	Clear the counter value
Input	<fd> The access to the counter device.</fd>
	<port> Port number.</port>
Output	none.
Return	0:clear success; -n: clear fail

## Special Note

- We have provided an example in CD digit\_input\_change. The mxdgio.h defines the convenient API for DIO and COUNTER programming.
- The DO initial status is HIGH. If you want the initial DO status to be LOW, you should add one line in /etc/modules to load epm\_3438.ko with epm3438\_DO2LOW=1;

Moxa: ~# mod	info /lib/modules/2.6.30-bpo.2-686/kernel/drivers/char/epm_3438.ko	
filename:	/lib/modules/2.6.30-bpo.2-686/kernel/drivers/char/epm_3438.ko	
description:	EPM-3438: DIO/Counter module	
author:	jared_wu@moxa.com	
license:	GPL	
depends:		
vermagic:	2.6.30-bpo.2-686 SMP mod_unload modversions 686	
parm: to LOW. (int	epm3438_DO2LOW:Reset DO to LOW. 0. Set DO to High (default). 1. Set DO )	
Moxa: ~# mou	nt -o remount,rw /	
Moxa: ~# vi /etc/init.d/moxainit.sh		
# Load the E	PM-3438 DIO driver.	
modprobe epm_3438 epm3438_DO2LOW=1		
Moxa: ~# umo	unt /	

This DIO sample program shows how users can develop a set of higher layer functions using preliminary DIO functions from the peripheral I/O library. These functions allow user applications to focus on event handling when events occur. A callback function is defined by the programmer to associate with an event. The source code files of the sample program are located in the *samples/mxphio/digit\_input\_change* directory for Linux Four higher layer functions, **digit\_io\_timer\_init**, **digit\_io\_timer\_dispatch**,

**digit\_io\_timer\_add\_callback**, and **digit\_io\_timer\_dispatch\_quit**, are provided. Four callback functions in the sample are added for four different events: **DGTIO\_GET\_INPUT\_STATE\_CHANGE**,

DGTIO\_GET\_INPUT, DGTIO\_GET\_OUTPUT, and DGTIO\_SET\_OUTPUT, via the

digit\_io\_timer\_add\_callback function.

mngr = digit\_io\_timer\_init();

•••

if (digit\_io\_timer\_add\_callback(mngr, HWIndex, port, DGTIO\_GET\_INPUT\_STATE\_CHANGE, interval, input\_chg\_cb, &port) < 0) {</pre>

•••

}

if (digit\_io\_timer\_add\_callback(mngr, HWIndex, port, DGTIO\_GET\_INPUT, interval, input\_get\_cb,
&port) < 0) {</pre>

•••

#### }

if (digit\_io\_timer\_add\_callback(mngr, HWIndex, port, DGTIO\_SET\_OUTPUT, interval, output\_set\_cb, &port) < 0) {</pre>

.... }

if (digit\_io\_timer\_add\_callback(mngr, HWIndex, port, DGTIO\_GET\_OUTPUT, interval, output\_get\_cb, &port) < 0) {</pre>

•••

}

digit\_io\_timer\_dispatch(mngr);

Examples

#### **DIO Program Source Code File Example**

File and Folder: digit\_input\_change/digit\_io\_timer.c

Description: Routines to operate timer functions on digital IO port.

```
#include <stdio.h>
#include <stdlib.h>
#if !defined(_WIN32_WCE) && !defined(WIN32)
#include <time.h>
#endif
#include "digit_io_timer.h"
/* callback function */
static void
dgio_input_change_exec(DGIOMNGR *mngr, DGIOITEM *item)
{
   int sig;
   HANDLE fd=mngr->fd[item->HWIndex];
   switch(item->mode)
   {
   case DGTIO_GET_INPUT:
        sig = mxdgio_get_input_signal(fd, item->port);
        item->cb(item->HWIndex, item->port, sig, item->arg);
        break;
   case DGTIO_GET_OUTPUT:
        sig = mxdgio_get_output_signal(fd, item->port);
        item->cb(item->HWIndex, item->port, sig, item->arg);
        break;
   case DGTIO_GET_INPUT_STATE_CHANGE:
        sig = mxdgio_get_input_signal(fd, item->port);
        if (item->last_signal!=sig)
        {
            item->cb(item->HWIndex, item->port, sig, item->arg);
        }
        break;
   case DGTIO_SET_OUTPUT:
        sig = item->cb(item->HWIndex, item->port, item->last_signal, item->arg);
        if (sig)
        {
            mxdgio_set_output_signal_high(fd, item->port);
        }
```

else

```
{
            mxdgio_set_output_signal_low(fd, item->port);
        }
        break;
   default:
       return;
   }
   item->last_signal = sig;
}
/* release the timer operation
*/
static void
dgio_input_change_release(DGIOMNGR *mngr)
{
   int i;
   DGIOITEM *item, *next;
   item=mngr->list;
   while(item)
    {
       next = item->next;
        free(item);
        item = next;
    }
    for ( i=0; i<HW_TOTAL; i++ )</pre>
        if (mngr->fd[i])
            mxdgio_close(mngr->fd[i]);
}
/* this function initilizes a timer manager
    Returns:
        Return a pointer to the manager.
*/
DGIOMNGR*
digit_io_timer_init(void)
{
   DGIOMNGR *mngr;
   mngr = (DGIOMNGR*) calloc(1, sizeof(DGIOMNGR));
   if (mngr)
   {
   mngr->fd[0] = mxdgio_open();
#if 1 // Jared, 08-10-2010, support the second EPM-3438
    mngr->fd[1] = mxdgio_epm3438_open(0); // The first EPM-3438
    mngr->fd[2] = mxdgio_epm3438_open(1); // The second EPM-3438
#endif
        if (mngr - fd[0] < 0)
        {
            free(mngr);
            mngr = NULL;
        }
   }
   return mngr;
}
/* add a digital io timer with a selected operation mode
    Inputs:
        <mngr> timer manager
```

```
<HWIndex> specify which hardware device;
           0: embedded DIO, 1: EPM-3438 #1, 2: EPM-3438 #2
        <port> specify which DIO pin
        <mode> the operation mode on the port
        <interval> the interval (in milliseconds) between 2 calls to a user-defined
function
        <cb> the user-defined callback function
        <arg> argument to the function
   Returns:
       0 on sucess, otherwise failure
* /
int
digit_io_timer_add_callback(DGIOMNGR *mngr, int HWIndex, int port, int mode, int
interval, digit_io_cb_t cb, void *arg)
{
   DGIOITEM *item;
   item = (DGIOITEM*) calloc (1, sizeof (DGIOITEM));
   if (!item)
      return -1;
   item->next = mngr->list;
   mngr->list = item;
   item->cb = cb;
   item->arg = arg;
   item->HWIndex = HWIndex; // Jared, 08-10-2010, HWIndex to support multiple boards
   item->port = port;
   item->mode = mode;
   item->interval = interval;
   item->next_time = interval;
   // Jared, 08-10-2010, HWIndex to support multiple boards
   item->last_signal = mxdgio_get_input_signal(mngr->fd[HWIndex], port);
   return 0;
}
void
digit_io_timer_dispatch_quit(DGIOMNGR *mngr)
{
   if (mngr) mngr->dispatch = 0;
#define MAX_TIME 0XFFFFFFF
/* start and dispatch the timer operations
   Inputs:
      <mngr> the manager
   Returns:
       none
*/
void
digit_io_timer_dispatch(DGIOMNGR *mngr)
{
   DGIOITEM *item;
   unsigned int ms_sleep, n;
#if !defined(_WIN32_WCE) && !defined(WIN32)
   struct timeval to;
#endif
   mngr->dispatch = 1;
   while(mngr->list && mngr->dispatch)
   {
```

```
for (item = mngr->list; item != NULL; item = item->next)
        {
            if (mngr->now_time < item->next_time) /* not yet */
                continue;
            n = mngr->now_time - item->next_time;
            /* over due, executable */
            item->next_time = mngr->now_time+item->interval-n; /* move to the next
time */
           dgio_input_change_exec(mngr, item);
        }
        ms_sleep = MAX_TIME;
        /* get the amount of time to sleep */
        for (item = mngr->list; item != NULL; item = item->next)
        {
            if (mngr->now_time < item->next_time) /* not yet */
            {
                n = item->next_time - mngr->now_time;
                if (n < ms_sleep) ms_sleep = n;</pre>
                continue;
            }
        }
        if (ms_sleep!=MAX_TIME)
#if !defined(_WIN32_WCE) && !defined(WIN32)
           to.tv_sec = ms_sleep/1000;
            to.tv_usec = (ms_sleep%1000)*1000;
            if (select (0, NULL, NULL, 0, &to) != 0) /* sleep */
                break;
#else
            Sleep(ms_sleep);
#endif
           mngr->now_time += ms_sleep;
        }
   }
   dgio_input_change_release(mngr);
}
File and Folder: digit_input_change/main.c
Description: This program is an example to operate timer functions on digital IO ports.
#include <stdio.h>
#include <stdlib.h>
#include "digit_io_timer.h"
static int
input_chg_cb(int HWIndex, int port, int sig, void *arg)
{
      printf("input_chg_cb() HWIndex %d port %d sig %d\n", HWIndex, port, sig);
      return 0;
}
static int
input_get_cb(int HWIndex, int port, int sig, void *arg)
{
      printf("input_get_cb() HWIndex %d port %d sig %d\n", HWIndex, port, sig);
      return 0;
}
static int
output_set_cb(int HWIndex, int port, int last_sig, void *arg)
```

```
{
      printf("output_set_cb() HWIndex %d port %d last sig %d\n", HWIndex, port,
last_sig);
      last_sig++;
      last_sig %= 2;
      printf("new sig=%d\n", last_sig);
      return last_sig;
}
static int
output_get_cb(int HWIndex, int port, int sig, void *arg)
{
      printf("output_get_cb() HWIndex %d port %d sig %d\n", HWIndex, port, sig);
      return 0;
}
#define INTERVAL
                       10000
int
#if defined(_WIN32_WCE)
WINAPT
WinMain( HINSTANCE hInstance, HINSTANCE hPrevInstance, LPTSTR lpCmdLine, int
nCmdShow )
#else
main(int argc, char *argv[])
#endif
{
      DGIOMNGR *mngr;
      int HWIndex;
      int port;
      int interval;
#if defined(_WIN32_WCE)
      int
              argc;
       char cmdline[256], *argv[32];
      WideCharToMultiByte(CP_ACP, 0, (LPCTSTR)lpCmdLine, 255, cmdline, 256, NULL,
NULL);
      argc = split_line(argv+1, 32, cmdline)+1;
#endif
      if (argc > 1) interval = atoi(argv[1]);
       else interval = INTERVAL;
      mngr = digit_io_timer_init();
      if (mngr == NULL) {
             printf("digit_io_timer_init() error\n");
             return -1;
       }
      HWIndex=0; // HWIndex=0 for embedded DIO
       for (port = 0; port < 1; port++) {
          if (digit_io_timer_add_callback(mngr, HWIndex, port,
DGTIO_GET_INPUT_STATE_CHANGE, interval, input_chg_cb, &port) < 0) {</pre>
                 printf("add %d input change callback error\n", port);
                    return -2;
          }
          if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_GET_INPUT,
interval, input_get_cb, &port) < 0) {</pre>
             printf("add %d input callback error\n", port);
             return -3;
          }
```

```
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_SET_OUTPUT, interval,
output_set_cb, &port) < 0) {</pre>
              printf("add %d set output callback error\n", port);
              return -4;
          }
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_GET_OUTPUT, interval,
output_get_cb, &port) < 0) {</pre>
             printf("add %d get output callback error\n", port);
              return -5;
          }
       }
       / / HWIndex=1 for EPM-3438 board #1; HWIndex=2, for EPM-3438 board #2
       for (HWIndex = 0; HWIndex < HW_TOTAL; HWIndex++ ) {</pre>
              for (port = 0; port < 8; port++) {</pre>
                     /* since list is LIFO last callbacks are added first */
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_GET_INPUT_STATE_CHANGE,
interval, input_chg_cb, &port) < 0) {</pre>
                           printf("add %d input change callback error\n", port);
                           return -2;
                     }
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_GET_INPUT, interval,
input_get_cb, &port) < 0) {</pre>
                           printf("add %d input callback error\n", port);
                           return -3;
                     }
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_SET_OUTPUT, interval,
output_set_cb, &port) < 0) {</pre>
                           printf("add %d set output callback error\n", port);
                           return -4;
                     }
if (digit_io_timer_add_callback(mngr, HWIndex, port, DGTIO_GET_OUTPUT, interval,
output_get_cb, &port) < 0) {</pre>
                           printf("add %d get output callback error\n", port);
                           return -5;
                    }
              }
       }
      digit_io_timer_dispatch(mngr);
      return 0;
}
Examples
Counter Program Source Code File Example
File and Folder: digit_input_change/tcounter.c
Description: This file is an example of the EPM-3438 couter programming.
read the counter value.
read the counter value and clear the counter.
#include
              <stdio.h>
              <stdlib.h>
#include
#include
               <sys/time.h>
               <fcntl.h>
#include
               <unistd.h>
#include
#include
               <signal.h>
#include
               "mxdgio.h" // For counter reading or clear
#define COUNTER_NODE1 "/dev/epm_3438_counter1" // The first EPM-3438
#define COUNTER_NODE2 "/dev/epm_3438_counter2" // The second EPM-3438
```
```
int main(int argc, char * argv[])
{
      int retval;
      int fd, fd2, len;
      unsigned int counter_value;
      fd=open(COUNTER_NODE1, O_RDONLY);
      while( 1 ) {
             printf("\nSelect a number of menu, other key to exit. \n\
      1. Get counter value
                                                   \n\
      2. Clear the counter
                                                    \n\
      Others. quit
                                                  \n\
Choose : ");
             scanf("%d", &retval);
             if ( retval == 1 ) {
                                   // Get counter without reset
                    counter_value = mxdgio_epm3438_get_counter(fd);
                    printf("EPM-3438 board #1 counter:%d\n", counter_value);
             }
             else if ( retval == 2 ) { // Get counter with reset
                    retval = mxdgio_epm3438_clear_counter(fd);
                    if (retval < 0)
                           printf("EPM-3438 board #1 counter reset fail\n");
             }
             else {
                    break;
             }
      }
      close(fd);
      return 0;
}
```

### **EPM-3337 Driver Installation**

Moxa's EPM-3337 module supports both 3G/GPS and wireless functionality. This section introduces how to configure these functions in the Linux platform.

1. Make root file system writable

Moxa:~# mount -o remount,rw /

2. Install the file epm3337.deb

Moxa:/home# dpkg -i epm3337.deb

3. Setup 3G module to Mdm mode

EPM-3337's 3G module supports multiple modes, issue Isusb to get information:

- 0681:0040 MdmNet mode (the default factory setting)
- 0681:0047 Mdm mode (for Linux)

Now convert EPM-3337 module with the moxa\_hc25\_setup\_mdm.sh script at /home

Moxa:/home# sh moxa\_hc25\_setup\_mdm.sh

Confirm that the conversion is completed

Moxa:/home# lsusb

Bus 001 Device 010: ID 0681:0047 Siemens Information and Communication

Note: You only need to do this conversion once.

4. Configure the driver to load at startup

The default run-level is 2 (setup in /etc/inittab). Issue the following command

Moxa:/etc/rc2.d# mv N98moxa hc25 load driver

Note: You need to reboot to load the driver or issue /etc/init.d/moxa\_hc25\_load\_driver

5. Install software from internet for wireless functionality

Moxa:/home# apt-get install wpasupplicant wireless-tools

6. Create the correct links for wpa\_supplicant



7. Mount root file system (/) as read-only

Moxa:~# umount /

8. Reboot your device to complete installation



#### ATTENTION

ppp 2.4.4 may get the incorrect DNS after connection; here are two workaround solutions:

```
1. Assign the DNS manually
```

Comment the option "**usepeerdns**" in /dev/pppt/chtgprs. Then assign a DNS /etc/resolv.conf manually.

#usepeerdns # use the DNS servers from the remote network

2. Remove ppp 2.4.4 and install ppp-2.4.5.deb

```
Moxa:~# apt-get remove ppp
Moxa:/home# dpkg -i ppp-2.4.5.deb
```

#### The EPM-3337's Two Operating Modes

The EPM-3337 module has two modes:

1. Normal Mode: Supports only GPRS/HSDPA functionality (without GPS).

The allocation of ports is:

- Modem port: /dev/ttyACMO
- Command port: /dev/ttyUSB0
- 2. Multiplexer Mode: Supports both GPRS/HSDPA and GPS functionality.

A multiplexer program must be run to put the module into multiplexer mode. The allocation of ports is:

- Modem port: /dev/pts/0
- Command port: /dev/pts/1
- GPS port: /dev/pts/2

Note: If you do not need the GPS functionality, use normal mode for better performance.

### Normal mode—GPRS/HSDPA functionality only

This section illustrates how to establish a connection with pppd configuration. The example files used are listed below:

- /etc/ppp/peers/chtgprs: a pppd additional option file
- /etc/chatscripts/chtgprs-connect: chat file for connection
- /etc/chatscripts/chtgprs-disconnect: chat file for disconnection

Take the following steps to set up your pppd:

- 1. Configure the file **/etc/ppp/peers/chtgprs**.
  - a. First, check if the name of the modem port is correct. It should be /dev/ttyACMO for the first module, /dev/ttyACM1 for the second one, and so on.
  - b. Make sure the "local" option is enabled. This option ignores the CD (Carries Detect) signal.
- 2. Configure /etc/chatscripts/chtgprs-connect.
  - a. First, check the packet data protocol type and Access point name of the ISP;
     a basic command is AT+CGDCONT=1,"<packet\_data\_protocal\_type>", "<APN>"
  - b. Check the ATD dialout number;
     a basic command is ATD<number>
- 3. Read configuration file to connect.
  - a. pppd call chtgprs
- 4. Finally, examine connection state.
  - a. If the connection is ok, a device ppp0 (or pppn) is established. Issue the command **ifconfig ppp0** to view its information.

### Multiplexer mode—GPS and GPRS/HSDPA dual functionality

GPS functionality is only enabled in the module's multiplexer mode. In multiplexer mode, the system uses a pseudo terminal slave (pts) instead of reading serial ports (/dev/ttyACMx) to communicate.

This section describes how to set up GPS functionality, work with the gpsd daemon, and change the pppd configuration file for modem port **/dev/pts/0**.

The following steps illustrate how to set up GPS and use gpsd:

1. Set the module to multiplexer mode at startup

Moxa:/etc/rc2.d# mv N99moxa\_hc25\_mux\_script S99moxa\_hc25\_mux\_script

Note: If you insert two EPM-3337 modules, you can set **module\_num=2** in **/etc/init.d/moxa\_hc25\_mux\_script** 

- 2. Reboot the embedded computer.
- 3. The multiplexer will now automatically start at bootup. It will occupy a modem port, /dev/ttyACMO, and generate three virtual terminal ports.

Moxa:~# ls /dev/pts/ 0 1 2 ptmx

/dev/pts/0: Modem port
/dev/pts/1: Command port
/dev/pts/2: GPS port

- NOTE 1. The command port in multiplexer mode only accepts AT commands with the suffix \r\n (i.e., carriage return and new line). You can see the echo example in "Enable GPS port by issuing command," or set the terminal output flag with command stty -F /dev/pts/1 opost onlcr. The option onlcr translates newline to carriage return+newline.
  - For the second EPM-3337 module, the allocation will be /dev/pts/3: Modem port /dev/pts/4: Command port /dev/pts/5: GPS port



#### ATTENTION

The number assigned to pts is affected by remote log in programs (e.g., ssh or telnet). Therefore, it is advisable to perform moxa\_hc25\_mux at startup to make sure the pts number is 0 to 2. If there is more than 1 EPM-3337 module, the number of pts increases to 3 to 5, and so on.

4. Enable the GPS port by issuing a command to the command port.

```
Moxa:~# cat < /dev/pts/1 &
Moxa:~# echo -e "AT^SGPSS=4\r"> /dev/pts/1
Moxa:~# killall cat
```

5. Check for NMEA data from the GPS port (/dev/pts/2)

```
Moxa:~# cat < /dev/pts/2
$GPGSV,1,1,04,24,28,123,37,21,09,054,31,19,52,213,,23,47,270,*74
$GPGGA,061824.0,2458.835139,N,12133.055835,E,1,05,19.7,-103.5,M,,,,*1
4
$GPRMC,061824.0,A,2458.835139,N,12133.055835,E,,290710,,A*68
$GPGSA,A,3,24,21,06,31,16,,,,,,,25.5,19.7,18.5*29
$GPVTG,,T,,M,0.0,N,0.0,K*4E</pre>
```

6. Install gpsd daemon.

Moxa:~# apt-get install gpsd

7. Start gpsd to read NMEA data from the GPS port (/dev/pts/2).

Moxa:~# gpsd /dev/pts/2

 On the remote computer, use ssh to connect to Moxa's embedded computer and issue the cgps command. You will see the following information:

Moxa:~# cgps

If cgps gets non-null data from gpsd, it will display the following message:

Time: 2 Latitude: 1 Altitude: 1 Speed: 1 Heading: 1 Climb: 6 Status: 3 GPS Type: 0 Horizontal Er Vertical Err: Course Err: Speed Err:	2010-07-29T06:46:38. 24.980836 N 121.552724 E 107.5 M n/a 3.0 M/Min 3D FIX (13 secs) Generic NMEA cr: +/- 131 M : +/- 78 M n/a +/- 973 kph	82	PRN: 11 7 13 24 21 19 3 23 6 31 16	Elev: 04 11 37 35 65 75 44 61 18 37	Azim: 201 319 288 045 227 350 250 026 127 042	SNR: 00 13 43 27 00 25 00 38 25 40	Used: N N Y N Y Y Y Y
0.000 0.000 ? 310. GPSD,O=RMC 1280385	.40 ? 3 5997.000 0.005 24.98	0836 121	. 552725	107.50	139.20	83.20	0.0000

0.000 0.000 ? 280.00 ? 3

**NOTE** You can issue AT^SGPSS=0 to the command port to stop GPS information.

```
Moxa:~# cat < /dev/pts/1 &
Moxa:~# echo -e "AT^SGPSS=0\r"> /dev/pts/1
Moxa:~# killall cat
```



#### ATTENTION

View the following reference for more information about gpsd.

- man gpsd
- man cgps
- http://gpsd.berlios.de/

As described in this section, in multiplex mode the modem port is **dev/pts/0** instead of /dev/ttyACMO. Check that the modem port is **/dev/pts/0** at /etc/ppp/peers/chtgprs.

```
# See /etc/ppp/option for detail
/dev/pts/0  # modem port used
115200  # speed
```

Now you can connect GPRS/HSDPA through pppd

Moxa:~# pppd call chtgprs

#### Troubleshooting for pppd

To troubleshoot pppd connection problems, open /etc/ppp/peers/chtgprs and then take the following steps:

- Enable the debug option and logfile /var/ppp.log option.
- Add the -V option in /usr/sbin/chat.

```
#Debug option---
#You call tail -f /var/ppp.log &
debug
logfile /var/ppp.log
connect "/usr/sbin/chat -v -V -f /etc/chatscripts/chtgprs-connect"
```

See /var/ppp.log for a more detailed message.

#### Setting up a Wireless Connection

In this section we introduce how to connect to an access point with WEP/WPA/WPA2(RSN) encryption. The connection program is **wpa\_supplicant**.

The basic command is **wpa\_supplicant** -i <interface> -c <configuration file> -B (the -B: option forces it to run in the background).

- 1. Example 1: Connect to AP (SSID: test\_wep) with WEP key 1234567890(hex)
  - a. Write a configure file test\_wep.conf as below



b. Connect with the following commands:
 wpa\_supplicant -i wlan0 -c test\_wep.conf -B

c. Use iwconfig to check the connection state



- 2. Example 2: Connect to AP (SSID: test\_wpa) with WPA key "1234567890" (ascii)
  - a. Write a configuration file test\_wpa\_wpa2.conf, as shown below:



b. Connect with the following command:

wpa\_supplicant -i wlan0 -c test\_wpa\_wpa2.conf -B

c. Use iwconfig to check the connection state:

wlan0 IEEE 802.11abgn ESSID:"test\_wpa" Mode:Managed Frequency:2.462 GHz Access Point: 00:1F:1F:8C:0F:64 Bit Rate=36 Mb/s Tx-Power=27 dBm Retry min limit:7 RTS thr:off Fragment thr:off Encryption key:157A-1DBD-B0C3-7CC8-0F9C-D059-2881-F815-E4DB-3705-6969-8253-865E-4DF0-FDB8-AEC1 [2] Security mode:open Power Management:off Link Quality=34/70 Signal level=-76 dBm Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:0 Tx excessive retries:0 Invalid misc:0 Missed beacon:0

- 3. Example 3: Connect to AP (SSID: test\_wpa2) with WPA2 key "1234567890" (ascii)
  - a. The configuration file **test\_wpa\_wpa2.conf** can also apply to a WPA2 connection. Follow the directions in example 2 to get the following results:





#### ATTENTION

View the following references for more information about wpa\_supplicant. Website: http://hostap.epitest.fi/wpa\_supplicant/ The configuration README: http://hostap.epitest.fi/gitweb/gitweb.cgi?p=hostap.git;a=blob\_plain;f=wpa\_supplicant/README

#### **Getting Wireless Card Information**

The program **iw** is a new nl80211 based CLI configuration utility. It can get more complete information than iwconfig for 802.11n. Although still under development, it contains some useful functionality.

To get the connection data, you can issue "iw dev <interface> station dump"

```
Moxa:~# iw dev wlan0 station dump

Station 00:1f:1f:8c:0f:64 (on wlan1)

inactive time: 35696 ms

rx bytes: 98054

rx packets: 364

tx bytes: 733

tx packets: 7

signal: -75 dBm

tx bitrate: MCS 42 40Mhz
```



#### ATTENTION

View the following reference for more information about iw. http://linuxwireless.org/en/users/Documentation/iw

# **EPM-3112 Driver Installation**

CAN is a broadcast serial bus standard for connecting electronic control units (ECUs). Each node is able to send and receive messages, but not simultaneously: a message (consisting primarily of an ID—usually chosen to identify the message-type/sender—and up to eight message bytes) is transmitted serially onto the bus, one bit after another. This signal-pattern codes the message (in NRZ) and is sensed by all nodes.

Moxa EPM-3112 module provides the CAN bus interface for industrial CAN communication. Users can use the library or file control interface (ioctl) to read, write or control the CAN interface as a file for easy CAN programming.

1. Make root file system writable

Moxa: ~ # mount -o remount,rw /

2. Install the file epm3112.deb

Moxa:/home# dpkg -i epm3112.deb

3. Mount root file system read-only

Moxa:~# umount /

4. Then modprobe moxa\_can or reboot your device to finish this installation

# EPM-3112 Programming Guide

### **CANBUS Library**

A simple library mxcanbus\_lx.c is offered; see the following sub-sections for details:

#### Moxa functions for CANbus

Function	unsigned int mxcan_get_bus_timing (unsigned int fd)
Description	Get the bus timing of an opened port.
Input	<fd> the opened port</fd>
Output	None
Return	0 on failure, otherwise the bus speed in KHz
Function	int mxcan_get_parameters (unsigned int fd, CANPRM *param)
Description	Get the parameter of an opened port.
Input	<fd> the opened port</fd>
Output	<pre><param/> pointer to a structure of CANPRM</pre>
Return	0 on success. Otherwise return a negative value

Function	int mxcan get registers (unsigned int fd. unsigned char *buffer int num)
Description	Get the register values of an opened port.
Input	<pre><fd> the opened port</fd></pre>
	<pre><num> number of register values. For module with sia1000 chipset, the value</num></pre>
	must be 32
Output	<pre><built a="" buffer="" for="" pre="" these="" to="" values<=""></built></pre>
Return	0 on success, otherwise failure
Function	int mxcan_get_stat (unsigned int fd, CANBST *stat)
Description	Get the statistics of an opened port.
Input	<fd> the opened port</fd>
Output	<stat> point to a contianer of statistics</stat>
Return	0 on success, otherwise failure
Function	int more in success (unside a fall)
	Cot the number of received bytes that are guoued in the driver of an encount next
Description	Get the number of received bytes that are queued in the driver of an opened port.
Input	<ra> the opened port</ra>
Output	None
Return	< 0 on failure, the number of bytes
Function	unsigned int mxcan_open (int port)
Description	Open a can port by the port number
Input	<pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>
Output	None
Return	0 on failure, otherwise return fd
Function	int mxcan_outqueue (unsigned int fd)
Description	Get the number of bytes waiting for being transmitted to a can port.
Input	<fd> the opened port</fd>
Output	None
Return	< 0 on failure, the number of bytes
<b>_</b>	
Function	int mxcan_purge_buffer (unsigned int fd, unsigned int purge)
Description	Purge the buffers of an opened port.
Input	<fd> the opened port</fd>
	<pre><purge> 1: receive data buffer, 2: transmit data buffer, otherwise: both</purge></pre>
Output	None
Return	0 on success, otherwise failure
Function	int mxcan_set_bus_timing (unsigned int fd, unsigned int speed)
Description	Set the bus timing of an opened port.
Input	<fd> the opened port</fd>
	<speed> bus timing in KHz. The available values are</speed>
	5/10/20/40/50/80/100/125/200/250/400/500/666/800/1000
Output	None
Return	0 on success, otherwise returns a negative value
Function	int mxcan_set_nonblocking (unsigned int fd)
Description	Set the opened fd to be non-blocking.
Input	<fd> the opened port</fd>
Output	None

Function	int mxcan_set_parameters (unsigned int fd, CANPRM *param)
Description	Set the parameter of an opened port.
Input	<fd> the opened port</fd>
	<param/> pointer to a structure of CANPRM
Output	None
Return	0 on success, otherwise return a negative value

#### Moxa definitions for CANbus

#define mxcan_close(fd)	close((int)fd)
#define mxcan_read(fd, buffer, size, hndl)	read((int)fd, buffer, size)
#define mxcan_write(fd, buffer, size, hndl)	write((int)fd, buffer, size)

### **Example Code**

You can download the library / example code from MOXA website. http://www.moxa.com/support/support\_home.aspx



#### ATTENTION

View the following reference for more information http://en.wikipedia.org/wiki/Controller\_area\_network

# **EPM-3552 Driver Installation**

The Moxa EPM-3552 module provides the capability of using the display on Moxa's V2422 and V2426 computers.

1. Make the root file system writable.

Moxa: ~# mount -o remount,rw /

2. Install the package epm3552.deb.

Moxa:/home# dpkg -i epm3552.deb

3. Install gconf-editor.

Moxa: ~ # apt-get install gconf-editor

4. Install grandr.

Moxa: ~ # apt-get install grandr

5. Start the GNOME desktop environment.

#### Moxa: ~ #/etc/init.d/gdm start

6. Disable the xrandr plug-in of gnome-settings-daemon due to its poor xrandr support. In gnome, launch Applications → System Tools → Configuration Editor, and then cancel the xrandr active options at the path /apps/gnome\_settings\_daemon/plugins/xrandr/.

🤷 Con	figuration Editor - xrandr 📃 🗖 🗙
<u>F</u> ile <u>E</u> dit <u>B</u> ookmarks <u>H</u> elp	
<ul> <li>▶ ☐ gnome-system log</li> <li>▶ ☐ gnome-system lools</li> <li>▶ ☐ gnome-terminal</li> <li>▶ ☐ gnome-volume-contrive</li> <li>▼ ☐ gnome_settings_date</li> </ul>	Name Value active pl priority 1
☐ keybindings ▼ ➢ plugins ☐ ally-keyboard	E Key Documentation
<ul> <li>background</li> <li>clipboard</li> <li>font</li> <li>keybindings</li> <li>keyboard</li> <li>media-keys</li> </ul>	Key name: /apps/gnome_settings_daemon/plug Key owner: gnome-settings-daemon Short description: Enable xrandr plugin Long description: Set to True to enable the plugin to m settings.
/apps/gnome_settings_daemon/p	lugins/xrandr/active

7. Mount the root file system as read-only.

Moxa: ~# umount /

### **EPM-3552** Chipset Configuration

As the V2422 and V2426 computers have already offered the VGA and DVI display outputs, this section illustrates how to configure EPM-3552 to display an independent desktop, so that users can use both displays simultaneously.

- 1. Connect a monitor to the EPM-3552 module before booting the computer.
- 2. Back up the original configuration file located at /etc/X11/xorg.conf.
- 3. Rename the new configuration file from **xorg.conf-epm3552-dual** to **xorg.conf**.

**Note:** For built-in Intel chipset, it is only necessary to setup the Virtual size at the Screen section. Please remove the "Right-of" option in monitor section if existed.

Section "Screen"			
Identifier	"Screen_Intel"		
Device	"Device_Intel"		
Monitor	"VGA"		
SubSection "D	isplay"		
Depth	24		
Virtual	3840 1080		
EndSubSection			

The value "3840 1080" is the maximum resolution of the desktop shared by the built-in VGA/DVI port, which is  $1920 \times 1080 \times 2$ .

- 4. Set up the initial mode of the built-in VGA/DVI ports. The default value is the maximum resolution of the monitor; you can adjust it in /etc/X11/Xsession.d/45xrandr.
  - a. Display an extended desktop.

#Resolution	
res=1920x1080	
#Extended mode	
xrandroutput TMDS-1mode \$resright-of VGAoutput VGAmode \$res	
#Clone mode	

b. Display a clone desktop

#Resolution
res=1920x1080
#Extended mode
#xrandroutput TMDS-1mode \$resright-of VGAoutput VGAmode \$res
#Clone mode
xrandroutput TMDS-1mode \$ressame as VGAoutput VGAmode \$res
xrandroutput TMDS-1mode \$ressame-as VGAoutput VGAmode \$res

The syntax is as follow:

- output: TMDS-1 (DVI) / VGA (VGA)
- right-of: the position in extended desktop
- same-as: for clone mode setting
- mode: resolution
- 5. Next start the X windows:

startx or /etc/init.d/gdm start

**NOTE** When you plug in 2 EPM3552 modules, uncomment the setting for Device\_DL2 / Monitor\_DL2/ Screen\_DL2 sections and the Screen 2 option in the Server Layout Section.

When finished, connect a monitor to the second EPM-3552 module and reboot your system to activate the settings.

#Setting	g for the secor	nd EPM3552 module
Section	"Device"	
	Identifier	"Device_DL2"
(	driver	"displaylink"
	Option	"fbdev" "/dev/fb1"
EndSect	tion	
Section	"Monitor"	
Section	Identifier	"Monitor DL2"
EndSect	tion	
2110.0001		
Section	"Screen"	
	Identifier	"Screen_DL2"
	Device	"Device_DL2"
	Monitor	"Monitor_DL2"
	SubSection "D	isplay"
	Depth	24
	EndSubSection	n
EndSect	tion	
Section	"ServerLayout	
	Identifier	"945G-Layout"
	Screen 0 "Scre	een_Intel" 0 0
	Screen 1 "Scre	een_DL1" LeftOf "Screen_Intel"

**NOTE** For Linux systems, the EPM-3552 display module cannot work with the V2422/2426 computers' built-in VGA/DVI-I display when in Extended Mode or Mirror Mode. Due to limitations of the Linux RandR design, the EPM-3552 display module can only work alone as an independent display.

### Configuration for Displaying only on the EPM-3552

Back up your **/etc/X11/xorg.conf** file and then rename **xorg.conf-epm3552-single** to **xorg.conf**. Next, start Xwindow to launch the display only on the EPM-3552 module.

### **Dynamically Changing the Display Resolution**

In this section we explain how to temporarily change the resolution and mode. To change the settings permanently, modify the file **/etc/X11/Xession.d/45xrandr**. For the EPM-3552 module, only the current driver can display the maximum resolution of a connected monitor. Therefore, even the "Modes" Option in **xorg.conf** cannot adjust its resolution. For the built-in VGA/DVI port driven by an Intel chipset, use **xrandr** or **grandr**, located in **System**  $\rightarrow$  **Administration**  $\rightarrow$  **Multiple Screens**, to change the layout and resolution.



**Note:** After testing, grandr will be reset to default layout (clone mode) when a setting is changed. When you adjust the resolution, choose the preferred layout before applying settings.



#### ATTENTION

- 1. Due to limitations of the driver, connect the monitor to the EPM-3552 module before booting up the computer.
- 2. The built-in VGA/DVI port only supports clone and extended mode; dual head mode is not supported.
- Click the following link for more information on XRandR and man xrandr: <u>http://www.x.org/wiki/Projects/XRandR</u>
- 4. Click the following link for more information on Xorg configuration: <u>https://wiki.ubuntu.com/X/Config/Resolution</u>

### **EPM-DK02** Driver Installation

Moxa's EPM-DK02 module supports 2 mini PCIe slots for connecting mini PCIe modules. The two slots support different feature as described below:

- Slot 1: Supports both mini PCI Express and USB 2.0.
- Slot 2: Supports USB 2.0 USB.

#### Installation

1. Make the root file system writable.

Moxa: ~# mount -o remount,rw /

2. Install the epmdk02.deb package at EPM-DK02\package.

Moxa:/home# dpkg -i epmdk02.deb

3. Mount the root file system (/) as read-only.

Moxa: ~# umount /

4. Load the Moxa EPM-DK02 driver.

You can manually load with following command:

Moxa: ~# modprobe moxa\_dk02

Or add the following lines in /etc/rc.local to loads driver at startup automatically.

modprobe moxa\_dk02

### **Configuring Power Control Tool**

After the installation is completed, use the command **mx-dk02-control** to power on or power off the USB connectivity of the Mini PCIE slot.

Here is its syntax:

mx-dk02-control slot\_num [1/0]

Fox example, if you want to power off the USB connectivity of slot 1, issue the following command:

Moxa: ~# mx-dk02-control 1 0

Note that the slot number depends on its position in the Moxa v242x embedded computer:





#### ATTENTION

The major aim of the **mx-dk02-control** command is to reset a USB GPRS/HSPDA module; it is not advisable to use the power on-off feature with a USB DOM module. This is because when a USB DOM module is powered on, the Linux system will automatically mount its partitions. Then, when it is powered off, the system cannot automatically umount its partitions.

Note that the power on/off control function is only suitable for devices that have a USB interface. If you are using a device with a PCIe interface, do not enable the power on/off control function, since doing so could damage the device.

# Windows System

### **EPM-3032** Driver Installation

Before using the EPM-3032 expansion module, you need to update the driver. Install the driver before inserting the expansion module in the slot.

Use the following steps to install the EPM-3032 module driver:

1. Execute EPM3032Setup.exe to install the driver and then click Next.

Welcome to the EPM3032Setup Setup Wizard The installer will guide you through the steps required to install EPM3032Setup on y	pur computer.
The installer will guide you through the steps required to install EPM3032Setup on y	our computer.
WARNING: This computer program is protected by copyright law and international L Unauthorized duplication or distribution of this program, or any portion of it, may resu or criminal penalties, and will be prosecuted to the maximum extent possible under th	reaties. It in severe civil ne law.

2. Click Next to install using default settings.



3. Click **Next** to start the installation.



4. Click Close to complete the installation.

FPM3032Setup			_ 🗆 🔼
Installation Complet	e		
EPM3032Setup has been succes	sfully installed.		
Click "Close" to exit.			
	Cancel	< <u>B</u> ack	

- 5. At this point, shut down the computer and insert the EPM-3032 expansion module into the embedded computer, and then reboot the computer.
- 6. The system will locate the new hardware; select No, not this time and then click Next.

Click Next to continue.	Found New Hardware Wizard	Welcome to the Found New Hardware Wizard         Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).         Read our privacy policy         Can Windows connect to Windows Update to search for software?         Yes, this time only         Yes, now and gyery time I connect a device
Click Next to continue.		Yes, now and every time I connect a device     No. not this time

7. Select Install the software automatically and then click Next.



8. The driver will be **installed** automatically. The module should be listed in the Device Manager window. At this point you can start using the module.



# **Configuring Serial Port Mode**

Take the following steps to configure the operation mode of each COM port:

- 1. Go to the Control Panel → Ports (COM & LPT) and select the COM port; e.g., MOXA Port 0 (COM1).
- 2. Right-click the COM port and then click Properties.
- 3. Click the Port Settings tab and then select the interface you would like to use.



4. Click **OK** to apply the settings.

	B 4 8 11	1	-		
General	Port Settings	Driver	Details		
			<u>I</u> nterface:	RS232	<b>_</b>
		B	aud Rate:	9600	•
			<u>D</u> ata bits:	8	
			Parity:	None	•
			<u>S</u> top bits:	1	•
		Elc	ow control:	None	•

In some situations, you may want to change the port name to match the name used by your program. Take the following steps to change port names:

1. Go to **Control Panel** → **Multi-port serial adapters** and select the adapter.

2. Right-click the adapter and select Properties.



3. Click the Port Configuration tab, select the port, and then click Port Setting.

Port	COM No.	Rx FIF0 Level	Tx FIF0 Level
2 3 4	COM 1 COM 2 COM 3 COM 4	COM 1 COM 2 COM 3 COM 4	COM 1 COM 2 COM 3 COM 4
		1	

4. To change the port name separately uncheck Auto Enumerating COM Number.

Port Number	COM1 (curre	ent)
Aut	to Enumerating	<u>C</u> OM Number
Rx FIFO Level		-
- I I Set	l the change to	all ports
<u>T</u> x FIFO Level		•
<mark></mark>	the change to	all ports

5. Select the new port name and then click **OK**.

Auto COM13 COM14 COM15 COM15 COM16 COM17 COM18 COM18 COM19		COMT (current)	
COM14 COM15 COM15 COM16 COM17 COM18 COM18 COM18 COM19	🔽 Auto	COM13	~
COM15 COM16 COM16 COM17 COM18 COM18 COM19	It Au	COM14	
ECOM16 COM17 COM17 COM18 I▼ Set COM19		COM15	
COM17 COM18 Set COM19		COM16	_
Set COM19	1X FIFU Level	CUM17	
IV Sec LUM19	ET Car		
LCOM20	IV Set	COM19	
COM20		ICOM20	
X FIFU Level (COM22	X FIFU Level		
Set the change to all ports	<b>▼</b> <u>S</u> et	the change to all po	orts

6. Make sure the port names are correct, and then click  ${\bf OK}$  to activate the settings.

Puri 1	COM 17	High	High
3	COM 18 COM 19 COM 20	Hiah Hiah Hiab	Hiah Hiah Hiab

7. Refer to Ports (COM & LPT) to verify that the port names have been changed.



**NOTE** Make sure each port name is unique; using duplicate names will result in some devices being inaccessible.

🔒 Device Manager	MOXA MU86	O UART CHIP (	PCI Bus) Properties		? ×	- 🗆 X
File Action View	General	<sup>o</sup> orts Configurat	tion Driver Details	Resources		
	Port	COM No.	Rx FIF0 Level	Tx FIF0 Level		<b>A</b>
<ul> <li>➡ Multi-port</li> <li>➡ MOXA</li> <li>➡ MOXA</li> <li>➡ MoxA</li> <li>➡ Motwork a</li> <li>➡ ♥ Ports (COI</li> <li>♥ Comm</li> </ul>	2 3 4	COM 5 COM 6 COM 7 COM 8	Hinh Hiah Hiah Hiah	Hiah Hiah Hiah Hiah		
MOXA SmartioAndust	tio Family Bo	ard Configura	tion Error			×
This COM ( to inaccess	name is being sible devices a	used by anothe nd changed se	er device (such as anol etting. Do you want to c Yes N	her com port or moder continue?	n). Using dupli	cate names can lead
MOXA MOXA MOXA MOXA	P	ort Setting	Port Info			
🖅 🐟 Processors			[	ок Са	ancel	×

### Changing UART Mode Through Programming

The code snippet is as follows:

```
int port=0,mode=0;
    int n=0;
    WCHAR sin;
    WCHAR wcs_port[3],wcs_mode[3];
    printf("UART Mode Test Program\n");
    printf("\t (0) Exit Program\n");
    printf("\t (1) Display UART Mode\n");
    printf("\t (2) Set UART Mode\n");
    sin=getwchar();
    n=_wtoi(&sin);
    do
   {
       switch (n)
       {
          // if char == '1', display the UART Mode
          case 1:
                printf("Input the Port Number (5 \sim 8) = \langle n \rangle;
                wscanf(L"%s",wcs_port);
                port=_wtoi(wcs_port);
                mode=uart_getmode(port);
                 if(mode = = (-1))
                 {
                     printf("Invalid value!!\n");
                     break;
                 }
                printf("COM%d=%s\n",port,mode_array[mode]);
              break;
          // if char == '2', Set the UART Mode
          case 2:
                 //Get Port Number
                printf("Input the Port Number (5 \sim 8) = \langle n \rangle;
                wscanf(L"%s",wcs_port);
                port=_wtoi(wcs_port);
                 //Get Mode Value
              printf("Input the Mode value (0 ~ 3) = ");
                wscanf(L"%s",wcs_mode);
                mode=_wtoi(wcs_mode);
                 //Set UART Mode
                 if(uart_setmode(port,mode)==-1)
                 {
                     printf("Invalid value!!\n");
                     printf("Set UART Mode Fail!!\n");
```

```
}
else
{
    printf("COM%d=%s\n",port,mode_array[mode]);
    }
    break;
}
getwchar();
sin = getwchar();
n = _wtoi(&sin);
} while (n != 0);
return 0;
```

### **EPM-3438 Driver Installation**

Before installing the EPM-3438, select counter mode or DI mode for the module.

If DIP switch 1 on the EPM-3438 is on, the DIO will work in digital input port mode. The DIO just reflects whether the input signal status is HIGH or LOW. If DIP switch 2 on the EPM-3438 is on, the DIO works as a 16-bit counter. The counter is increased when the input pulse is toggled from low to high. See the following figures for DIP switch settings.



Counter mode

DI mode

Before using the EPM-3438 expansion module, you need to update the driver. Be sure to install the driver before inserting the expansion module in the slot.

Take the following steps to install the  $\ensuremath{\mathsf{EPM}}\xspace{-3438}$  module driver:

1. Run EPM3438Setup.exe to begin installation and then click Next.

🙀 EPM-3438		_ 🗆 🔀
Welcome to the E	PM-3438 Setup Wizard	
The installer will guide you thro on your computer.	ugh the steps required to install EPM-3438 E	xpansion Module Driver
WARNING: This computer pro Unauthorized duplication or dis or criminal penalties, and will b	gram is protected by copyright law and inter tribution of this program, or any portion of it, e prosecuted to the maximum extent possible	national treaties. may result in severe civil e under the law.
	Cancel < Back	<u>N</u> ext>

2. Click **Next** to install using the default settings.

2 EPM-3438	
Select Installation Folder	
The installer will install EPM-3438 to the following folder.	
To install in this folder, click "Next". To install to a different	t folder, enter it below or click "Browse".
F.H.	
Folder:	
C:\Program Files\M0XA\EPM-3438\	Browse
Eolaer: C:\Program Files\M0XA\EPM-3438\	Browse Disk Cost
Eolaer: C:\Program Files\M0XA\EPM-3438\	B <u>r</u> owse Disk Cost
Loider: C:\Program Files\MDXA\EPM-3438\ Install EPM-3438 for yourself, or for anyone who uses th	Browse Disk Cost
C:\Program Files\MDXA\EPM-3438\ C:\Program Files\MDXA\EPM-3438\ Install EPM-3438 for yourself, or for anyone who uses th © Everyone	Browse Disk Cost

3. Click **Next** to begin the installation.

(₩ EPM-3438	_ 🗆 🔀
Confirm Installation	
The installer is ready to install EPM-3438 on your computer.	
Click "Next" to start the installation.	
Cancel < <u>B</u> ack	<u>N</u> ext >

4. Click **Close** to complete the installation.

🖥 EPM-3438				_ 0
Installation Complete				
EPM-3438 has been successfully installe	ed.			
Click "Close" to exit.				
	1 Constant	100	a an	

5. Shut down the computer, insert the EPM-3438 expansion module into the embedded computer, and then reboot the computer.

6. The system will find the new hardware and install the driver automatically. The module is now ready to use.



# EPM-3438 Programming Guide

Some operations can be configured through programming; the following "DIO" example can be found on the software DVD at  $\ensuremath{\camples\C++\lambda}$ .

### Moxa functions for DI/DO

Function	HANDLE mxdgio_epm3438_open(int HWIndex);
Description	This function opens access to the DIO device.
Input	<hwindex> The first or second EPM-3438 board.</hwindex>
Output	None
Return	When successful, this function returns an access to the DIO device. Otherwise, there is an
	error.

Function	void mxdgio_close(HANDLE fd);
Description	This function closes the access to the DIO device.
Input	<fd> The access to the device.</fd>
Output	None
Return	None

Function	int mxdgio_get_input_signal(HANDLE fd, int port);	
Description	This function gets the signal state of a digital input channel.	
Input	<fd> The access to the device.</fd>	
	<port> port #</port>	
Output	<state> DIO_HIGH (1) for high, DIO_LOW (0) for low</state>	
Return	Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.	

Function	int mxdgio_get_output_signal(HANDLE fd, int port);	
Description	This function gets the signal state of a digital output channel.	
Input	<fd> The access to the device.</fd>	
	<port> Port number</port>	
Output	None	
Return	Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.	

Function	int mxdgio_set_output_signal_high(HANDLE fd, int port);	
Description	This function sets a high signal to a digital output channel.	
Input	<fd> The access to the device.</fd>	
	<port> Port number.</port>	
Output	none.	
Return	When successful, this function returns 0. When an error occurs, it returns -1.	
Function	int mxdgio_set_output_signal_low(HANDLE fd, int port);	
Description	This function sets a low signal to a digital output	

Description	This function sets a low signal to a digital output.	
Input	<fd> The access to the device.</fd>	
	<port> Port number.</port>	
Output	none.	
Return	When successful, this function returns 0. When an error occurs, it returns -1.	

### Moxa I/O control definitions for COUNTER

#define	COUNTER_NODE1	"/dev/epm_3438_counter1"
#define	COUNTER_NODE2	"/dev/epm_3438_counter2"

Function	int mxdgio_epm3438_get_counter(int fd);	
Description	get the counter value	
Input	<fd> The access to the counter device.</fd>	
	<port> Port number.</port>	
Output	none.	
Return	the counter value	

Function	int mxdgio_epm3438_clear_counter(int fd);	
Description	lear the counter value	
Input	<fd> The access to the counter device.</fd>	
	<port> Port number.</port>	
Output	none.	
Return	0:clear success; -n: clear fail	

# **EPM-3337** Driver Installation

Take the following steps to install the 3G/GPS driver:

1. Open the directory HC25\HC25\_0205ussb\_ndis\_driver\install\program files\Siemens\HC25 Connection Manager and then double-click DPInst.exe.



2. Click Next.

Device Driver Installation Wiza	rd
	Welcome to the Device Driver Installation Wizard! This wizard helps you install the software drivers that some computers devices need in order to work.
	<u> </u>

3. Wait for the driver to install.

evice Driver Installation Wizard
The drivers are now installing
Please wait while the drivers install. This may take some time to complete.
<u>≺ B</u> ack Next > <b>Cance</b>

4. Click **Finish** to complete the driver installation.

Driver Name       Status         Siemens AG Siemens HC       Device Updated         Siemens AG Siemens HC       Device Updated         Siemens AG Siemens HC       Device Updated         Siemens AG Siemens HC       Device Updated		Completing the De Installation Wizard	vice Driver I
Driver Name     Status       ✓ Siemens AG Siemens HC     Device Updated       ✓ Siemens AG Siemens HC     Device Updated       ✓ Siemens AG HC25 USB     Device Updated	SIG	The drivers were successfully installed on this computer.	
<ul> <li>Siemens AG Siemens HC Device Updated</li> <li>Siemens AG Siemens HC Device Updated</li> <li>Siemens AG HC25 USB Device Updated</li> </ul>			
✓ Siemens AG Siemens HC Device Updated ✓ Siemens AG HC25 USB Device Updated		Driver Name	Status
Siemens AG HC25 USB Device Updated		Driver Name ✓ Siemens AG Siemens HC	Status Device Updated
		Driver Name ✔ Siemens AG Siemens HC ✔ Siemens AG Siemens HC	Status Device Updated Device Updated

 Navigate to the \HC25\HC25\_usb\_ndis\_driver\program files\ directory and double-click HC25 Connection Manager.msi.



6. Click Install.

😽 HC25 Connection Manager - InstallShield Wizard	
	Welcome to the InstallShield Wizard for HC25 Connection Manager
	The InstallShield(R) Wizard will install HC25 Connection Manager on your computer. To continue, click Install.
	WARNING: This program is protected by copyright law and international treaties.
	Install Cancel

7. During the installation process, if you encounter the following error message, just ignore it and click OK.



8. After the installation is completed, you should see **Siemens HC25 HSDPA USB Modem**, **Siemens HC25 Wireless Ethernet Adapter**, and **Siemens HC25 USB COM Port** in the Device Manager window.



9. Change to the Winmux2K directory and double-click wmux2k.exe.

🗁 Winmux2K	
Eile Edit <u>V</u> iew F <u>a</u> vorites <u>T</u> ools <u>H</u> elp	
🚱 Back 🔹 🕥 🕘 🏂 🔎 Search 陵 Folders 🚦	II
Address 🛅 C:\temp\Drivers\HC25\HC25\Winmux2K	
File and Folder Tasks       Istory.txt         Rename this file       Istory.txt         Move this file       Istory.txt         Copy this file       Istory.txt         Publish this file to the Web       Istory.txt         E-mail this file       Istory.txt         Delete this file       Minux2k.sys         Publish this file       Istory.txt         Publish this file       Istory.txt	it winmux2k.inf Setup Information 5 KB winmux2k_3102.zip 115 KB winmux2k_3102.zip 115 KB winmux2k_3102.zip 115 KB
Other Places       A         Image: Places       HC25         Image: Places       My Documents         Image: Places       My Computer         Image: Places       My Network Places	Description: Wireless Modules Multiplex Installation Utility Company: Siemens AG File Version: 3.1.0.2 Date Created: 2/18/2007 9:15 AM Size: 164 KB
Details	

10. Click Start Scan.

<u>S</u> tari	Scan	
odule Lis	t	
formation		
formation Vir	rtual Port 1 (data	
formation Vir Vir	rtual Port 1 (data rtual Port	<u>·</u>
formation Vir Vir Vir	rtual Port 1 (data rtual Port rtual Port 3:	

11. Click Install Driver once the scan is complete.

ican ioi n	Scan	i	сом 9
<u>S</u> to	p Scan		
Aodule Li	st		
Port	Module Type		
☑ СОМ	J SIEMENA HUZS REV		
СОМ	J JIEMENJ HUZD HEV		
СОМ	3 SIEMENS HUZS HEY		
<b>⊘</b> СОМ			
COM nformatio V	n irtual Port 1 (data	Сом 11	
nformatio V	n irtual Port 1 (data irtual Port	СОМ 11 СОМ 12	

12. Click Install Driver and then Continue Anyway once the scan is complete.



13. Click **OK** to complete the installation.

Scan for modules Start Scan	Scan		Finished
Module List			
Port Mo	dule Type		
	Use the property page to change the Settings	in the Device Manager !	
Informati Virtual Po	Use the property page to change the Settings OK ort 1 (data	in the Device Manager	7
Informati Virtual Po Virtual Po	Use the property page to change the Settings OK Ort 1 (data	in the Device Manager	-
Informati Virtual Po Virtual Po Virtual Po	Use the property page to change the Settings OK ort 1 (data ort 3:	In the Device Manager	

14. Serial Multiplexer should appear in you the Device Manager window.



15. Right-click on **Serial Multiplexer** and select **Properties**. You will see that 3 virtual serial modem ports have been generated; you can change the port numbers using the drop-down lists.

Serial Mut	tiplexer (COM	3) Properties		? 🔀
General	Port Settings	Driver Details		
Physi	cal Serial Mode	m Port		
	Modem Port Na	ame:	СОМЗ	•
	Baud Rate (	bps):	115200	•
Virtua	al Serial Modem	Ports		
			Virtual Por	rts
	Virtual Po	ort 1 (data channel):	COM11	•
	Virtual Po	ort 2:	COM12	•
	Virtual Po	rt 3:	COM13	•
				<u>R</u> estore
			OK	Cancel

**NOTE** Make sure each port name is unique; duplicate names will create glitches.

### Wireless Module Driver Installation

Take the following steps to install the wireless driver:

1. Click **Cancel** to stop searching for drivers when you first install the module.



2. Navigate to the Install\_CD directory and double-click setup.exe to install the driver.



3. Click Next.

Atheros Client Installation Program - InstallShield Wizard	_ 0 🔀
Choose Setup Language Select the language for the installation from the choice	s below.
Chinese (Simplified) Chinese (Traditional) Czech Danish Dutch English Finnish French (Standard) German Greek Hungarian Italian Japanese Korean	
InstallShield	ck <u>N</u> ext ≻ Cancel

4. Click Next.

Atheros Client Installation Program	×
	Atheros Client Installation Program
	This program installs the driver and client utilities for your Atheros Wireless LAN Client Adapter.
	< <u>B</u> ack <u>N</u> ext > Cancel

5. Select I accept the terms of the license agreement and then click Next.

Atheros Communications, Inc.	Software License Agreement	Ģ
PLEASE READ THIS SOFTWARE LICENS BEFORE USING THE ATHEROS SOFTWA YOU ARE AGREEING TO BE BOUND BY	SE AGREEMENT ("LICENSE") CAREFULLY ARE. BY USING THE ATHEROS SOFTWARE ' THE TERMS OF THIS LICENSE.	,
IF YOU DO NOT AGREE TO THE TERMS SOFTWARE. IF YOU DO NOT AGREE TO RETURN THE ATHEROS SOFTWARE TO REFUND. IF THE ATHEROS SOFTWARE "DISAGREE/DECLINE". FOR ATHEROS OF HARDWARE, YOU MUST RETURN T	OF THIS LICENSE, DO NOT USE THE D THE TERMS OF THE LICENSE, YOU MAY THE PLACE WHERE YOU OBTAINED IT FOI WAS ACCESSED ELECTRONICALLY, CLICK SOFTWARE INCLUDED WITH YOUR PURCH HE ENTIRE HARDWARE/SOFTWARE PACKA	R A ASE GE
③ I <u>a</u> ccept the terms of the license agree	ement P	rint
$\bigcirc$ I $\underline{d}$ o not accept the terms of the licens	e agreement	

6. Select Install Client Utilities and Driver and then click Next.

Atheros Client Installation Program	<b>X</b>
Setup Type Select the setup type that best suits your needs.	
Click the type of setup you prefer. Install Client Utilities and Driver Install Driver Only Make Driver Installation Diskette(s)	Description Choose this option to install the driver and client utilities. This is the recommended option.
InstallShield	jack <u>N</u> ext > Cancel

7. Click Next.

eros Client Installation Program		
Choose Destination Location Select the folder where the installati files.	on program will install the	
The installation program will install	the client utilities in the follow	ing location:
Destination Folder		
C:\Program Files\Atheros		B <u>r</u> owse
allShield		
	< <u>B</u> ack	Next > Cancel

8. Click Next.

Select Program Folder	- Andrew -
Select a program folder.	
The installation program will add pro may enter a new folder name or sele	ogram icons to the Program Folder listed below. You ect one from the Existing Folders list.
<u>P</u> rogram Folder:	
Atheros	
Evicting Folders:	
Accessories	
Administrative Tools	
Cinterion	
Startup	
illShield	
9. Click Next.

Atheros Client Installation Program	X
Atheros Client Installation Program	No.
IMPORTANT: Please Read!	
On Windows XP, you can configure your Atheros Wireless LAN Client Adapter thro Atheros Client Utility (ACU) or a third-party supplicant. Because third-party tools ma provide all of the functionality available in the ACU, Atheros recommends that you ACU. (Please note that a patch from Microsoft might be required to use the Microsoft with WPA security.)	ugh the ay not use the oft tool
configure your client adapter.	
NOTE: If you select a third-party tool, some of the ACU features will not be availabl activate those features, you must install the ACU.	le. To
InstallShield	
< <u>B</u> ack <u>N</u> ext >	Cancel

10. Select Atheros Client Utility (ACU) and Supplicant and then click Next.

Atheros Client Installation Program	× • • • • • • • • • • • • • • • • • • •
Choose Configuration Tool	
Which tool will you use to configure your clier	nt adapter?
Atheros Client Utility (ACU) and Supplicant.	
O Third-Party Supplicant	
InstallShield	< <u>B</u> ack <u>N</u> ext > Cancel

11. Click Yes.



12. Click OK.

Atheros	Client Installation Program
1	The installation program installs the driver automatically when the client adapter is inserted. Insert the adapter now if it is not yet inserted, cancel the Found New Hardware Wizard if it appears, and proceed with the installation. Click OK to continue.
	OK

13. Wait for the driver to be installed.

Atheros Client Installation Program
Setup Status
Atheros Client Installation Program is configuring your new software installation.
Installing the driver files
InstallShield Cancel

14. Select Yes, I want to restart my computer now and then click Finish.

Atheros Client Installation Program	
	InstallShield Wizard Complete The Installation Program has successfully performed the selected operations, but the system needs to be rebooted before all of the changes will take effect. Click OK/Yes to reboot the system. Yes, I want to restart my computer now.           Yes, I want to restart my computer now.           No, I will restart my computer later.           Remove any disks from their drives, and then click Finish to complete setup.
	< Back Finish Cancel

15. After the installation is complete, you should see **Siemens HC25 HSDPA USB Modem**, '**Siemens HC25 Wireless Ethernet Adapter**, and **Siemens HC25 USB COM Port** in the Device Manager window.



## Configuring the GPRS/HSDPA Connection (without GPS)

In this section we illustrate how to establish a connection using the **Siemens HC25 Connection Manager** utility.

Take the following steps to configure the 3G/GPS and wireless driver:

1. Go to Control Panel → System.



2. Click Hardware → Device Manager.



3. Right-click Serial Multiplexer → Properties → Port Settings.



ariat mut	uplexer (coms)	rropercies			1
General	Port Settings [	oriver Detai	ls		
Physi	cal Serial Modem	Port			
	Modem Port Nam	e:		COM3	•
	Baud Rate (bp	s):		115200	•
Virtua	al Serial Modem Po	orts			
				Virtual Ports	
	Virtual Port	1 (data chanr	nel):	COM11	•
	Virtual Port	2:		COM12	•
	Virtual Port 3	3:		COM13	•
					<u>R</u> estore
				Οκ	Cance

4. Open **Virtual Port 2** (e.g., COM12) and enter **at+cpin?**. Make sure the SIM card status is ready or the connection may fail.

PComm Terminal Emulator - COM20,115200,None,8,1,ANSI	_ 🗆 🔀
Profile Edit <u>P</u> ort Manager <u>W</u> indow <u>H</u> elp	
🛃 🖬 🛃 🚰 📚 Brk 🞎 2B	
🔀 COM20,115200,None,8,1,ANSI	
at OK at+cpin? +CPIN: READY OK	
State:OPEN CTS DSR RI DCD	



📲 Cinterion Connection Manager 📃 🗖 🔀
Connection Profiles SIM
PIN1 Status: Pin Enabled, Verified
Verify Retries Left: 3
Unblock Retries Left: 10
PIN2
Status: Pin Enabled, Not Verified
Verify Retries Left: 3
Unblock Retries Left: 10
Sim Actions
Action: Verify Pin  Pin ID: PIN1
Pin Value: 0000
Submit

5. Select the device from the drop-down list and then enter the APN Name.

elect Device: Siemens HC25 Wire	eless Ether	net Ada	apter					•
Override								
GRP Profile ID:								
Primary DNS:	0		0	10	0	+)(	0	
Secondary DNS:	0	(4) (4)	0	- 92 -	0	45	0	
Primary NBNS:	0		0	8	Ũ	÷.	Ũ	
🔲 Secondary NBNS:	0		0		0		0	
APN Name:	Internet							
IP Address:	0	(4) (4)	0	- 52	0	45	0	
Authentication Preference:	PAP							Ŧ
🔲 Username:	[							
Password:	[							
	-							

6. Click **Connect** to connect to the Internet and establish the wireless connection.

**NOTE** Do not close the program while the connection is being established, or the device driver may not work properly.

General	Support	
ି Conne	Address Type: J IP Address: Subnet Mask: Default Gateway: Details	Assigned by DHCP 111.82.89.227 255.255.255.248 111.82.89.225
Windov connec Repair.	vs did not detect problems wi tion. If you cannot connect,	th this Re <u>p</u> air

7. At this point you can access this wireless network connection.

C:\WINDOWS\system32\cmd.exe	- 🗆 🗙
Microsoft Windows XP [Version 5.1.2600] (C) Copyright 1985-2001 Microsoft Corp.	-
C:\Documents and Settings\Administrator>ping www.google.com.tw	
Pinging www.l.google.com [72.14.203.99] with 32 bytes of data:	
Reply from 72.14.203.99: bytes=32 time=200ms TTL=51 Reply from 72.14.203.99: bytes=32 time=181ms TTL=51 Reply from 72.14.203.99: bytes=32 time=203ms TTL=51 Reply from 72.14.203.99: bytes=32 time=142ms TTL=51	
Ping statistics for 72.14.203.99: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Mininum = 142ms, Maxinum = 203ms, Average = 181ms	
C:\Documents and Settings\Administrator>_	

## **Enabling GPS Functionality**

GPS functionality is only enabled when the module is in multiplexer mode. A **Winmux2K** driver is available for configuring the module in multiplexer mode. In multiplexer mode, the system will generate virtual COM ports to communicate, and the modem port will become one of the virtual COM ports.

Take the following steps below to enable GPS functionality:

1. Start the **Device Manager** and check the three virtual COM ports.

Serial Mul	tiplexer (COM	13) Prop	perties		? 🔀
General	Port Settings	Driver	Details		
Physi	cal Serial Mode	m Port			
	Modem Port Na	ame:		COM13	•
	Baud Rate (	bps):		115200	•
Virtua	al Serial Modem	Ports			
				Virtual Ports	
	Virtual Po	ort 1 (dat	a channel):	COM17	•
	Virtual Po	ort 2:		COM18	•
	Virtual Po	rt 3:		COM19	•
					Restore
L				ОК	Cancel

2. Start Terminal Emulator and then open the 2nd virtual COM port (COM18).

ommunication Paramet	er   Terminal	File I ranste	r   Capturing
COM Options			1
Ports :	COM18	-	
Baud Rate :	115200	-	
Data Bits :	8	-	
Parity :	None	•	
Stop Bits :	1	•	
- Flow Control	r Output Sta	te	
RTS/CTS	DTR 🔍 C	IN C OFF	
	RTS 🕫 C	IN C OFF	

3. Enter at ^ sgpss=4 to enable GPS functionality.

📸 PComm Terminal Emulator - COM18,115200,None,8,1,ANSI	_ 🗆 🔀
Profile <u>E</u> dit <u>P</u> ort Manager <u>Wi</u> ndow <u>H</u> elp	
COH19,115200,None,8,1,ANSI	
DTR         COM18,115200,None,8,1,ANSI	
at ^ sgpss=4	
State: OF	
State: OPEN CTS DSR RI DCD Ready	

4. Receive the **information** returned through GPS and verify that the position value is correct.

PComm Terminal Emulator - COM19,115200,None,8,1,ANSI	🛛 🔀
Profile <u>E</u> dit <u>P</u> ort Manager <u>W</u> indow <u>H</u> elp	
日	
COM18,115200,None,8,1,ANSI	
at^sgpss=4	_ 🗆 🔀
GPCSA,A,3,03,31,24,16,06,,,,,,,10.0,5.9,8.0*2D         \$GPCSA,A,3,03,31,24,16,06,,,,,,10.0,5.9,8.0*2D         \$GPVTC,,T,,M,0.0,N,0.0,K*4E         \$GPCSV,3,1,10,07,13,319,,11,07,199,,03,71,001,37,19,70,233,*7F         \$GPCSV,3,2,10,13,39,286,23,46,247,31,16,126,33,24,35,116,34*7E         \$GPCSV,3,3,10,16,33,045,42,06,55,028,41*71         \$GPCSA,A,3,03,31,24,16,06,,,,,,10.1,5.9,84.5,M,,,*32         \$GPCSV,3,3,10,16,33,045,42,06,55,028,41*71         \$GPCSA,A,3,03,31,24,16,06,,,,,,10.1,5.9,8.2*2E         \$GPCSV,3,1,10,07,13,319,,11,07,199,03,71,001,37,19,70,233,*7F         \$GPCSV,3,2,10,13,39,286,,23,46,247,17,31,16,126,33,24,35,116,34*78         \$GPCSV,3,2,10,13,39,286,,23,46,247,17,31,16,126,33,24,35,116,34*78         \$GPCSV,3,3,10,16,33,045,42,06,55,028,41*71         \$GPCSV,3,3,10,16,33,045,42,06,55,028,41*71         \$GPCSV,3,3,10,16,33,045,42,06,55,028,41*71         \$GPCSV,3,3,01,2,346,247,17,31,16,126,33,24,35,116,34*78         \$GPCSV,3,3,01,2,34,246,06,,247,17,31,16,126,33,24,35,116,34*78         \$GPCSV,3,3,03,1,24,16,06,,,,,,180810,,,A*65         \$GPCSA,A,3,03,31,24,16,06,,,,,,180810,,,A*65         \$GPCSA,A,3,03,31,24,16,06,,,,,,10.2,6.0,8.2*27         \$GPVTG,,T,M,0.0,N,0.0,K*4E	<b>3</b>
State:OPEN CTS DSR RI DCD Ready	11
State:OPEN CTS DSR RT DCD Ready	

## **Configuring a Wireless Connection**

The EPM-3337 module includes a wireless module. In this section we explain how to connect to an access point with WEP/WPA/WPA2(RSN) encryption.

Take the follow the steps to configure a wireless connection:

1. Double-click on the **Atheros client utility** shortcut on the desktop. Click on the **Profile Management** tab, and then click the **SCAN** button.

ent Status Profile Manager	nent Diagnostics	
Default		New
		<u> </u>
		Remove
		Acțivate
Details		
Network Type:	Infrastructure	Import
Security Mode:	Disabled	Export
Network Name 1 (SSID1):	<empty></empty>	
Network Name 2 (SSID2):	<empty></empty>	S <u>c</u> an
Network Name 3 (SSID3):	<empty></empty>	Order Profiles

2. Select the access point that you want to connect to and then click Activate.

Network Name (SSID)	¢9	11n	Super	XR	Si	gnal Strength	Channel	1
1	<b>w</b> 3				ull	21 dB	6	2
1 bioptic					all	14 dB	1	2
👗 суо	-				1]	3 dB	4	2
🗼 idctype	-	205			all)	15 dB	1	2
MIS-WAP-1	-				all	55 dB	6	2
I MOXASYS					1]	2 dB	9	2
🗼 WL-corega	5				ıll	6 dB	2	2
< ]								)

3. Enter the **Profile Name** and then select the **Security** tab.

rofile Management		? 🔀
General Security Advance	d	
Profile Settings		
Profile Name:	WirelessAP1	
Client Name:	OEM-VQ48XITXKOL	
Network Names		
SSID1:	MOXASYS	
SSID2:		
SSID3:		
		OK Cancel

4. Select the security option for your network and then click **Configure**.

al Security Advanced		
et Security Options		
⊃WPA/WPA2	WPA/WPA2 EAP Type: LEAP	~
WPA/WPA2 Passphrase		
🔵 802.1x	802.1x EAP Type: LEAP	~
Pre-Shared Key (Static WE	9	
🔵 None		
Configure	Allow Association to Mixed Cells	
Conngaro	Profile Locked	A sec
	Limit Time for Finding Domain Controller To: 0	<u> v </u> ****
Group Policy De	lay: 0 10 sec	

5. Enter the password.

Ley Entry					
Hexadecimal (0-9, A)	4-F)	O ASCII Text	(all keyboard charad	cters)	
ncryption Keys			,		e:
Transmit H	Key		E	меркеу 4 128	151ze:
WEP Key 1: 💿	1234567890		6	0	0
WEP Key 2: 🔘			(	0	0
WEP Key 3: 🔘			(	0	0
WEP Key 4: 🔿				0	0

6. The connection will now be established.

ort	
	Connected
	MOXASYS
	01:46:27
	54.0 Mbps
gth:	1000
Sent — 🛒	] — Received ()
254	3
<u>D</u> isable <u>V</u> iew	w Wireless Networks

## **Getting Wireless Module Information**

The Atheros Client Utility can be used to get wireless information and to manage wireless connections.

1. Double-click the Atheros client utility shortcut on the desktop and then select the Current Status tab.

$\Lambda$ Atheros Client Utility - Current	Profile: Defautt - Atheros Af	1922X Wireless Network Adapter <u>?</u> 🔀
Action Options Help		
Current Status Profile Managemer	t Diagnostics	
Total 802.11		
Profile Nam	e: Default	ATHEROS
ATHEROS Link Statu	s: Not Associated	Network Type: Infrastructure
Wireless Mod	e: 5 GHz 130 Mbps	Control Channel: Scanning Extension Channel:
Server Based Authentication	1:	Data Encryption:
IP Addres	s: fe80::203:7fff:febe:ef34%9	
Signal Strengt	n:	No Link
		Advanced

2. Click the **Advanced** button. You will see the status of the current wireless connection.

Advanced Status			? 🔀
Network Name (SSID):		Current Signal Strength:	-95 dBm
Server Based Authentication:		Current Noise Level:	-95 dBm
Data Encryption:		Up Time:	00:17:40
Authentication Type:		802.11b Preamble:	Short & Long
Message Integrity Check:		Current Receive Rate:	0 Kbps
QoS:	None	Current Transmit Rate:	0 Kbps
CCKM Authentication: Management Frame Protection:		Control Channel: Extension Channel:	Scanning
Associated AP Name:		Control Frequency:	Scanning
Associated AP IP Address:		Extension Frequency:	
Associated AP MAC Address:		Channel Set:	United States
		Channel Width:	20
Power Save Mode: Current Power Level:	Normal		
Available Power Levels (5 GHz):	50, 40, 25, 20, 13,	. 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 mW	
Available Power Levels (2.4 GHz):	100, 63, 50, 32, 20	0, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 mW	OK

## **EPM-3112 Driver Installation**

Take the following steps to install the CANBUS driver:

1. Double-click EPM-3112\_V1.0.msi to install the module driver and then click Next.



2. Click Next to continue.

🤯 EPM-3112	_ 🗆 🔀
Select Installation Folder	
The installer will install EPM-3112 to the following folder. To install in this folder, click "Next". To install to a different folder, enter it be	elow or click "Browse".
C:\Program Files\MOXA\EPM-3112\	Browse
	Disk Cost
Install EPM-3112 for yourself, or for anyone who uses this computer:	
Cancel < <u>B</u> ack	<u>N</u> ext>

3. Click **Next** to start the driver installation.



4. Click **Close** to complete the driver installation.

🙀 EPM-3112			🛛
Installation Complete			
EPM-3112 has been successfully instal Click "Close" to exit.	led.		
	Cancel	< <u>B</u> ack	Close

5. Click Action → Scan for hardware change to install the module driver automatically.



## **EPM-3112** Programming Guide

#### **CANBUS Library**

int mxcan_close (int fd)	
Description	Close an open port.
Input	<fd> the open port</fd>
Return Value	None

unsigned int mxcan_get_bus_timing (int fd)	
Description	Gets the bus timing of an open port.
Input	<fd> the open port</fd>
Return Value	0 on failure, otherwise the bus speed in KHz

int mxcan_get_parameters (int fd, CANPRM * param)	
Description	Gets the parameter of an open port.
Input	<fd> the open port</fd>
Output	< param> pointer to the CANPRM structure
Return Value	0 on failure, otherwise returns a negative value

int mxcan_get_registers (int fd, unsigned char * buffer, int num)		
Description	Gets the register values of an open port.	
Input	<fd> the open port</fd>	
Output	< buffer > pointer to a buffer for these values	
	<num> number of register values; for a module with sja1000 chipset, the value must be 32</num>	
Return Value	0 on success; other numbers indicate failure	

int mxcan_get_stat (int fd, CANBST * stat)	
Description	Gets the statistics of an open port.
Input	<fd> the open port</fd>
Output	< stat > pointer to a container of the statistics
Return Value	0 on success; other numbers indicate failure

int mxcan_inqueue (int fd)	
Description	Gets the number of received bytes that are queued in the driver of an open port.
Input	<fd> the open port</fd>
Return Value	0 on failure; otherwise the number of bytes

int mxcan_open (int port)	
Description	Open a can port given the port number.
Input	<port> port number starting from 1; in Linux, open port 1 will open /dev/can0</port>
Return Value	-1 on failure; otherwise returns fd

int mxcan_outqueue (int fd)	
Description	Gets the number of bytes waiting to be transmitted to a can port.
Input	<fd> the open port</fd>
Return Value	-1 on failure; otherwise the number of bytes

int mxcan_purge_buffer (int fd, unsigned int purge)	
Description	Purges the buffers of an open port.
Input	<fd> the open port</fd>
Output	< purge> 1: received data buffer; 2: transmit data buffer; otherwise: both
Return Value	0 on success; otherwise failure

int mxcan_read (int fd, char * buffer, int size)		
Description	Reads data into a buffer from an open port (the size should be a multiple of the CANMSG size)	
Input	<fd> the open port</fd>	
Output	<buffer> pointer to the buffer</buffer>	
Return Value	0 on failure (data not available); otherwise the number of bytes read	

int mxcan_set_bus_timing (int fd, unsigned int speed)		
Description	Sets the bus timing of an open port.	
Input	<fd> the open port</fd>	
Output	<speed> bus timing in Hz</speed>	
Return Value	0 on success; otherwise returns a negative number	

int mxcan_set_nonblocking (int fd)				
Description	Sets the open fd to be non-blocking.			
Input	<fd> the open port</fd>			
Return Value	0 on success; otherwise returns a negative number			

int mxcan_set_parameters (int fd, CANPRM * param)				
Description	Sets the parameters of an open port.			
Input	<fd> the open port</fd>			
	<pre><pre>conter to the CANPRM structure</pre></pre>			
Output	<speed> bus timing in Hz</speed>			
Return Value	eturn Value 0 on success; otherwise returns a negative number			

int mxcan_set	nt mxcan_set_read_timeout (int fd, unsigned int to)		
Description	Sets data reading timeout of an open port.		
Input	<fd> the open port</fd>		
	<to> timeout in milliseconds</to>		
Return Value	0 on success; otherwise failure		

int mxcan_set_write_timeout (int fd, unsigned int to)			
Description	Sets data writing timeout of an open port.		
Input	<fd> the open port</fd>		
	<to> timeout in milliseconds</to>		
Return Value	0 on success; otherwise failure		

int mxcan_wri	int mxcan_write (int fd, char * buffer, int size)		
Description	Writes data to the open port		
Input	<fd> the open port</fd>		
	 buffer> pointer to the data		
	<size> size of the data (should be a multiple of the CANMSG size)</size>		
Return Value	0 on failure; otherwise the number of bytes written		

## **EPM-3552** Driver Installation

Take the following steps to install the EPM-3552 module driver.



#### ATTENTION

The driver must be installed first. Do not install the EPM-3552 module in the computer before installing the driver.

 Double click DisplayLink-5.5.29194.exe in the Driver folder on the software CD-ROM, and then click I Accept to accept the software end user license agreement.

Install DisplayLink Software for DisplayLink Graphics
DisplayLink
English 5.5.29194.0
SOFTWARE END USER LICENCE AGREEMENT FOR
DISPLAYLINK MIRROR DRIVER and DISPLAYLINK GRAPHICS ADAPTER
(THE "PROGRAM")
This is a legal agreement between you, the end user, ( <b>"You"</b> ) and DisplayLink (UK) Limited ( <b>"DisplayLink"</b> ). BY INSTALLING THIS SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS AGREEMENT.
Some versions of this software, once installed, will check for updated system software at least once and then again at regular intervals unless you specifically disabled this feature when given this option. No personal information or information about your PC or the software installed on your PC is sent to our update servers during this process. Accepting the End-User License Agreement means that you accept this product feature.
Automatically check for updates I Accept Cancel





2. When finished, install the EPM-3552 module in your embedded computer. The following or similar message will appear on the toolbar.



3. Assign a specific path for the installation driver by clicking **Browse**, and then select the following path where the driver is located:

C:\Windows\system32\DRVStore\displaylin\_0C8028254229DB9\

Files Need	led 🛛 🔀
۲	The file 'DisplayLinkUsbPort.sys' on Installation Disk is OK
	Cancel Type the path where the file is located, and then click DK.
	<u>C</u> opy files from:
	c:\windows

4. Select DisplayLinkUsbPort and then click Open.

Locate File				? 🔀
Look jn:	🗀 displaylin_0(	C8028254229DB9A438BD6F822(	G 🕸 🖻 🖬	-
My Recent Documents	DisplayLinkUs	bPort		
Desktop				
My Documents				
My Computer				
	File <u>n</u> ame:	DisplayLinkUsbPort	~	<u>O</u> pen
My Network	Files of type:	DisplayLinkUsbPort.sys;DisplayLinkI	UsbPort.sy 🔽	Cancel

5. Click **OK** to complete the installation.



**NOTE** During the installation, the screen may flash or go black.

## **EPM-3552** Configuration

When the EPM-3552 module has been installed, an icon appears on the taskbar to give you access to the **DisplayLink manager menu**.

1. Click the **DisplayLink** icon on the taskbar **I**. The menu will appear as shown below.



2. Select an option from the menu. The following table lists which options are available.

Menu Options	Sub-menu Options	Descriptions
Screen Resolution		Displays a list of available resolutions. Some resolutions
		may be enclosed by square brackets ([]).
Screen Rotation	Normal	No rotation is applied to the display.
	Rotated Left	Rotates the extended or mirrored display by 270 degrees.
	Rotated Right	Rotates the extended or mirrored display by 90 degree.
	Upside-Down	Rotates the extended or mirrored display by 180 degrees.
Extend To Right Extends the dis		Extends the display to the right of the main display.
	Left	Extends the display to the left of the main display.
	Above	Extends the display above the main display.
	Below	Extends the display below the main display.
Extent		Extends your desktop onto the secondary display.
Set as Main		Sets the secondary display as the main display.
Monitor		

Notebook Monitor	Switches off the display of an attached notebook and
Off	makes the DisplayLink display primary.
Mirror	Copies what is on the main display and reproduces it on
	the secondary display.
Off	Switches off the secondary display
Fit to TV	Opens a GUI to change the size of the Windows desktop so
	it fits on a V screen.

## Setting the Display to Extend Mode with the Windows

## **Properties**

- 1. Right-click the display and select **Properties → Settings**.
- 2. Checkmark the Extend my windows desktop onto this computer option.
- 3. Adjust the screen resolution by dragging the  $\ensuremath{\textit{Screen resolution}}$  slide bar.
- 4. Select the Color quality from the drop-down list.
- 5. In the gray zone, select the monitor icons to match the physical arrangement of the monitors.
- 6. Click **OK** to save your settings.



For more detailed settings, including the refresh rate, click **Advanced Settings**  $\rightarrow$  **Adapter** tab  $\rightarrow$  **List All Modes**. All valid combinations of resolution, color quality, and refresh rate are listed. For CRT monitors, we suggest using a high refresh rate to avoid the discomfort caused by monitor flicker. Flat panel monitors do not flicker, so a lower refresh rate is adequate.

Display Attributes       Color Correction         General       Adapter       Monitor       Troubleshoot       Color Management         Adapter Type       Intel Corporation 945GME/945GSE Embedded Graphics Chipset Function 0       Properties         Adapter Information       Properties         Chip Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Intel 945GME/GSE Embedded Chipset         Badapter String:       Intel 945GME/GSE Embedded Chipset         Bios Information:       Intel Video BIOS	Driver Info		💽 D	splay Config		
General       Adapter       Monitor       Troubleshoot       Color Management         Adapter Type       Intel Corporation 945GME/945GSE Embedded Graphics Chipset Function 0       Properties         Adapter Information       Properties         Chip Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Integrated RAMDAC         Memory Size:       262148 KB         Adapter String:       Intel 945GME/GSE Embedded Chipset         Bios Information:       Intel Video BIOS	5	Display A	ttributes	🔄 💽 c	olor Correction	
Adapter Type         Intel Corporation 945GME/945GSE Embedded Graphics         Chipset Function 0         Properties    Adapter Information          Chip Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Integrated RAMDAC         Memory Size:       262148 KB         Adapter String:       Intel 945GME/GSE Embedded Chipset         Bios Information:       Intel Video BIOS	General	Adapter	Monitor	Troubleshoot	Color Management	
Adapter Information         Chip Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Integrated RAMDAC         Memory Size:       262148 KB         Adapter String:       Intel 945GME/GSE Embedded Chipset         Bios Information:       Intel Video BIOS		ntel Corpo Chipset Fui	ration 945GME. nction 0	/945GSE Embedde	d Graphics Properties	
Chip Type:       Intel 945GME/GSE Embedded Chipset         DAC Type:       Integrated RAMDAC         Memory Size:       262148 KB         Adapter String:       Intel 945GME/GSE Embedded Chipset         Bios Information:       Intel Video BIOS	- Adapter	Information				
DAC Type: Integrated RAMDAC Memory Size: 262148 KB Adapter String: Intel 945GME/GSE Embedded Chipset Bios Information: Intel Video BIOS	Chip Typ	be: li	ntel 945GME/G	SE Embedded Chip	iset	
Memory Size: 262148 KB Adapter String: Intel 945GME/GSE Embedded Chipset Bios Information: Intel Video BIOS	DAC Typ	be: li	Integrated RAMDAC			
Adapter String: Intel 945GME/GSE Embedded Chipset Bios Information: Intel Video BIOS	Memory Size:		262148 KB			
Bios Information: Intel Video BIOS	Adapter	String: li	ntel 945GME/G	SE Embedded Chip	oset	
List All Modes	Bios Info	rmation: I	ntel Video BIOS	i contra de la con		
	List Al	Modes				

List All Modes	? 🔀
List of valid modes	
1920 by 1080, 256 Colors, 60 Hertz 1920 by 1080, High Color (16 bit), 60 Hertz 1920 by 1080, True Color (32 bit), 60 Hertz 640 by 480, 256 Colors, 60 Hertz 640 by 480, High Color (16 bit), 60 Hertz 640 by 480, True Color (32 bit), 60 Hertz 640 by 480, 256 Colors, 70 Hertz 640 by 480, High Color (16 bit), 70 Hertz 640 by 480, True Color (32 bit), 70 Hertz	<
ОК	Iancel

## Setting the Display to Extend Mode with the DisplayLink Properties

- 1. From the taskbar, click the **DisplayLink** icon.
- 2. Select Extend.

#### Setting the Display to Mirror Mode with DisplayLink Properties

To use the Mirror Mode, you must use the DisplayLink Properties. To do this:

- 1. Right-click the display, and then select **Properties → Settings**.
- 2. Uncheck the **Extend the desktop onto this monitor** option.
- 3. Click Apply.



- 4. From the taskbar, click the **DisplayLink** icon.
- 5. Select Mirror.

**NOTE** The display resolution of the primary display and the display may be changed to a lower resolution. In mirror mode, both screens must output the same resolution, which may not be the maximum resolution of the display. This mode is NOT recommended if you are using the display as the primary laptop display, since it is unlikely to provide the optimum resolution for the display. See **Setting the Display as the Primary Display** section for details.

#### Setting the Display as the Primary Display with Windows Properties

Take the following steps to make the display the primary display.

- 1. Right-click the display and then select **Properties**  $\rightarrow$  **Settings**.
- 2. Checkmark the **This is my main monitor** option.
- 3. Click Apply.

**NOTE** On some PCs and laptops, it is necessary to disable the main display. This is because many primary graphics card drivers tend to make the laptop screen the primary screen if it is enabled. The only workaround for this is to disable the laptop screen to allow another screen to be the primary display.

To disable the main display, clear the Extend the desktop onto this monitor checkbox.

#### **Disabling the Laptop Screen**

- 1. Check the This is my main monitor option.
- 2. Select the primary display (Display 1).
- 3. Uncheck the Extend the desktop onto this monitor option.
- 4. Click Apply.

The display remains as the primary display if the PC enters hibernate or suspend mode or is rebooted. If the display is detached, the main display will once again become the primary display.

#### Setting the Display as the Primary Display with DisplayLink Properties

- 1. From the taskbar, click the **DisplayLink** icon.
- 2. Select Set as Main Monitor.



## **EPM-3552** Patch File Installation

#### **Known Technical Issues**

The following technical issues will be apparent if you do not install the EPM-3552 patch file.

- When powering off the V2422/2426 computer, the display connecting to an EPM-3552 module running Extended Mode also shows the shutdown screen. Normally, the display connecting to the EPM-3552 module should remain blank.
- When the EMP-3552 module has been mounted and the V2422/2426 computer has been powered on, no image shows on the display connected to the DVI-I connector of the V2422/2426 computer. Normally, the image should be visible.

#### **Installing the Patch File**

- 1. Download the patch file from <a href="http://www.moxa.com/support">http://www.moxa.com/support</a>.
- 2. Double click Setup.exe to start the Setup Wizard, and then click Next to continue.



3. Click Next to continue.

i EPM-3552_Patch	🖂
Select Installation Folder	
The installer will install EPM-3552_Patch to the following folder. To install in this folder, click "Next". To install to a different folder, enter it be <u>F</u> older:	elow or click "Browse".
C:\Program Files\M0XA\EPM-3552_Patch\	Browse
	Disk Cost
Install EPM-3552_Patch for yourself, or for anyone who uses this comput	ter:
O <u>E</u> veryone	
⊙ Just <u>m</u> e	
Cancel < <u>B</u> ack	<u>N</u> ext >

4. Click **Next** to install the patch file.

i EPM-3552_Patch			_ 🗆 🔀
Confirm Installation			
The installer is ready to install EPM-355 Click "Next" to start the installation.	52_Patch on your compu	uter.	
	Cancel	< <u>B</u> ack	Next >
ill FPM-3552 Patch			
Installing EPM-3552_P	atch		
EPM-3552_Patch is being installed.			
Please wait			

5. Click Close to complete the installation.



6. Restart the computer by clicking **Start → Turn Off Computer → Restart**.

Turn off con	nputer	<b>A</b>
Logoff	Turn Off	Restart
		Cancel

## **EPM-DK02** Driver Installation

The driver must be installed before using the power control function. Take the following steps to install the driver:

1. Click Add Hardware from the control panel.



2. Click Next.



3. Select Yes, I have already connected the hardware.

Is the hardware connected?		E Contraction
Have you already connected this h	ardware to your computer? ad the hardware rdware yet	

4. Select Add a new hardware device, and click Next.

Add Hardware Wizard	
The following hardware is already installed on your compo	iter
From the list below, select an installed hardware device, then clic properties or troubleshoot a problem you might be having.	k Next to check
To add hardware not shown in the list, click "Add a new hardwar	re device.''
Installed hardware:	
😋 Generic USB Hub	<b>^</b>
😴 USB Mass Storage Device	
😴 USB Mass Storage Device	
😪 USB Mass Storage Device	
Generic volume	
Add a new hardware device	M
< Back	Next > Cancel

5. Select Install the hardware that I manually select from a list (Advanced) and click Next.

ld Hardware Wizard	
The wizard can help you install othe	r hardware
The wizard can search for other hardwa know exactly which hardware model yo	are and automatically install it for you. Or, if you u want to install, you can select it from a list.
What do you want the wizard to do?	
O Search for and install the hardwa	re automatically (Recommended)
Install the hardware that I manual	ly select from a list (Advanced)
	< <u>B</u> ack <u>N</u> ext > Cancel

6. Select Show All Devices and click Next.



7. Click Have Disk.

Add Hardware Wizard Select the device driver you	want to install for this hardware.
Select the manufacturer an have a disk that contains th	d model of your hardware device and then click Next. If you he driver you want to install, click Have Disk.
Manufacturer	Model
(Standard Infrared Port) (Standard Modem Types) (Standard MTP-Compliant Dev (Standard MTP-compliant devi	Serial Cable using IrDA Protocol
This driver is digitally signed. <u>Tell me why driver signing is imp</u>	<u>H</u> ave Disk
	< <u>B</u> ack <u>N</u> ext > Cancel

8. Select the mxdk02.inf from the path EPM-DK02\driver in the CD-ROM, and click OK.

9. Select Model and click Next.

Add Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Model
This driver is digitally signed.       Have Disk         Iell me why driver signing is important
< <u>B</u> ack <u>N</u> ext > Cancel

10. Click Next.

Add Hardware Wizard		
The wizard is ready to install your hardw	<del>v</del> are	E.
Hardware to install:		
EPM-DK02 Driver		
To start installing your new hardware, click l	Next.	
	< <u>B</u> ack <u>N</u> ext>	Cancel

11. Click Finish to complete.



## Controlling EPM-DK02 Power On/Off

The EPM-DK02 module provides a power control function that lets you control the power of a USB device so that you can enable or disable the device. This section introduces how to configure this function to enable/disable a USB DOM.

Note that the power on/off control function is only suitable for devices that have a USB interface. If you are using a device with a PCIe interface, do not enable the power on/off control function, since doing so could damage the device.

#### Getting current power status

Take the following steps to get the current socket power status.

 Execute mx-dk02-control\_mfc.exe, located on the CD-ROM at EPM-DK02\examples\C++\EPM-DK02\_Example\_Build\_11060819\release.

odule1	Module2
Socket1 PCIe/USB	- Socket1 PCIe/USB
← Enable   ← Disable	• Enable C Disable
- Socket2 USB only	Socket2 USB only
🖲 Enable 🗌 C Disable	🖲 Enable 🖓 Disable

2. Check if current power status is enabled or disabled.

## **Disabling Socket Power**

Take the following steps to disable the USB power-on socket:

- 1. Execute mx-dk02-control\_mfc.exe.
- 2. Select the socket and change the status.
- 3. Clicks apply to take effect.
- 4. Check if the device is disabled.

🖳 Device Manager	
Eile <u>A</u> ction <u>Y</u> iew <u>H</u> elp	
<ul> <li>202.11n Wireless LAN Card</li> <li>202.11n Wireless LAN Controller</li> <li>202.11n Wireless LAN Controller</li> <li>202.11n Wireless LAN Controller</li> <li>202.11n Wireless LAN Card</li> <li>202.11n Wireless LAN Card</li></ul>	~
Sound, video and game controllers System devices Generic USB Hub Generic USB Hub Generic USB Hub Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C8 Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C9 Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C4 Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C8 Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CB Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CB USB Root Hub	

#### **Enabling Socket Power**

Take the following steps to enable the USB power-on socket:

- 1. Execute mx-dk02-control\_mfc.exe.
- 2. Select the socket and change the status.
- 3. Clicks apply to take effect.
- 4. Check if the device is enabled

🚇 Device Manager	🛛
<u>File Action View Help</u>	
<ul> <li>Big 802.11n Wireless LAN Card</li> <li>Realtek PCIe GBE Family Controller</li> <li>Realtek PCIe GBE Family Controller #2</li> <li>Ports (COM &amp; LPT)</li> <li>Processors</li> <li>Sound, video and game controllers</li> <li>System devices</li> </ul>	
Generic USB Hub     G	

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# Video Performance Table for the EPM-3552 Module

The EPM-3552 is a display module that provides a VGA and DVI output function for V2422 and V2426 computers. The module is used as the additional display option apart from the VGA/DVI provided by the V2422 and V2426 computers. Moxa provides the display performance tables so that users can optimize the EPM-3552 for specific applications.

This table was produced from an actual performance test with the following parameters: video codec, audio codec, film resolution, frame per second, and bit rates. We strongly suggest that you enable the **Hyper-Threading Technology** function in the BIOS to ensure better performance of the EPM-3552 display module.

Phoenix - AwardBIOS CMOS Setup Utility										
Advanced										
Advanced BIOS Features	Item Help									
PUL Forture Hyper-Threading Technology[Enabled] Quick Power Un Self Test [Enabled] Summary Screen Show [Disabled]	Menu Level ►									
↑↓→+:Move Enter:Select +/-/PU/PD:Value F10:Save   F5:Previous Values F6:Default Settings	ESC:Exit F1:General Help F7:Turbo Settings									

If you would like to use high resolution solutions for your applications, we suggest using the onboard VGA/DVI outputs on the V2422/2426 computers. The EPM-3552 display module is suitable for the applications that require lower resolution for displaying text and small-size figures.

## EPM-3552 Display Module Performance on Linux Systems

Player		mplayer 1.0rc2-4.3.2-DFSG-free			-		On-board VGA/DVI performance on		VGA/DVI performance on EPM-3552		
					V24XX		404 1 1				
					Model V2422/2426		2426-LX	EPM-3552-LX			
	Container	Video	Audio	Resolution	FPS	BitRate	System	Media	System	Media	Suggested
		Codec	Codec			(KDPS)	CPU	Player	CPU	Player/CPU	Configuration
							loading	/CPU	loading	loading	
		M(M) (2		1020 1000	20.07	15000	F1 4	loading	A	20.7	
WMV 3X		VVIVIV 3X	WIMA9	1920 x 1080	29.97	15000	51.4	47.5	46.6	30.7	
	WMV	WMV3x	WMA9	1680 x 1050	29.97	12000	50.7	46.8	48.8	33	
	WIMV	WMV3x	WMA9	1440 x 900	29.97	10000	50.1	46	49.9	33.5	
	WMV	WMV3x	WMA9	1280 x 720	29.97	8000	41	38.5	45.8	31.1	
	WMV	WMV3x	WMA9	1024 x 600	29.97	7000	29.8	28.4	48.3	33.9	
	WMV	WMV3x	WMA9	800 x 480	29.97	6000	20.9	20.1	33.9	23.8	
	WMV	WMV3x	WMA9	640 x 400	29.97	4000	14.4	13.7	22.7	16.2	
	WMV	WMV3x	WMA9	320 x 200	29.97	2000	6.5	6	8.1	6.5	*
WMV2X	WMV	WMV2x	WMA8	1920 x 1080	29.97	15000	49.1	45.5	46.7	32.4	
	WMV	WMV2x	WMA8	1680 x 1050	29.97	12000	48.8	44.9	48	33.4	
	WMV	WMV2x	WMA8	1440 x 900	29.97	10000	47	43.1	48.4	34	
	WMV	WMV2x	WMA8	1280 x 720	29.97	8000	42	38	46.4	32.5	
	WMV	WMV2x	WMA8	1024 x 600	29.97	7000	28.1	26.8	44.3	31.7	*
	WMV	WMV2x	WMA8	800 x 480	29.97	6000	18.9	18	29.9	21.2	*
	WMV	WMV2x	WMA8	640 x 400	29.97	4000	13	12.3	20	14.2	*
	WMV	WMV2x	WMA8	320 x 200	29.97	2000	6	5.4	7.1	5.6	*
MPEG-2	MPEG-PS	MPEG-2	ac3	1920 x 1080	29.97	15000	43.64	39.2	32	17.1	
	MPEG-PS	MPEG-2	ac3	1680 x 1050	29.97	12000	36.6	32.9	33.7	18.4	
	MPEG-PS	MPEG-2	ac3	1440 x 900	29.97	10000	27.9	25.4	34.4	18.8	
	MPEG-PS	MPEG-2	ac3	1280 x 720	29.97	8000	20.7	18.6	31.5	17.2	
	MPEG-PS	MPEG-2	ac3	1024 x 600	29.97	7000	15.2	13.6	32.2	17.8	*
	MPEG-PS	MPEG-2	ac3	800 x 480	29.97	6000	10.9	9.7	22.7	13	 ★
	MPEG-PS	MPEG-2	ac3	640 x 400	29.97	4000	7.6	6.5	16.1	9.1	<u>^</u>
	MPEG-PS	MPEG_2	ac3	320 x 200	20.07	2000	3	2.5	10.1	3.1	^ ★
L 264 /	MPEC /			1020 × 1090	29.97	15000	5	2.J	4.7	27.6	^
MPEG-4	WIF EG-4	4 AVC	WI4 AAC	1920 x 1080	27.71	15000	51.7	47.4	41.7	27.0	
	MPEG-4	H.264/M	M4 AAC	1680 x 1050	29.97	12000	51.5	47.3	44.6	29.7	
		4 AVC				10000					
	MPEG-4	H.264/M 4 AVC	M4 AAC	1440 x 900	29.97	10000	44./	42.1	45.6	30.2	
	MPEG-4	H.264/M	M4 AAC	1280 x 720	29.97	8000	33	31.6	42.4	28.9	
		4 AVC									
	MPEG-4	H.264/M	M4 AAC	1024 x 600	29.97	7000	24.5	23.4	42.4	29.1	*
		4 AVC									
	MPEG-4	H.264/M	M4 AAC	800 x 480	29.97	6000	18.2	17.6	30.3	21	*
		4 AVC									
	MPEG-4	H.264/M	M4 AAC	640 x 400	29.97	4000	12.9	11.9	20.8	14.6	*
		4 AVC									
	MPEG-4	H.264/M	M4 AAC	320 x 200	29.97	2000	5.9	5.5	7.4	5.8	*
		4 AVC									
AVI	AVI	MS/MPG	pcm	1920 x 1080	29.97	15000	48.8	42.7	35.2	19.9	
--------	-----	--------	-----	-------------	-------	-------	------	------	------	------	---
		4v2									
	AVI	MS/MPG	pcm	1680 x 1050	29.97	12000	38.3	34.2	36	21.1	
		4v2									
	AVI	MS/MPG	pcm	1440 x 900	29.97	10000	28.9	26	36.7	21.2	
		4v2									
	AVI	MS/MPG	pcm	1280 x 720	29.97	8000	21.4	19.2	34.2	19.4	
		4v2									
	AVI	MS/MPG	pcm	1024 x 600	29.97	7000	15.9	14.1	32.7	19.2	*
		4v2									
	AVI	MS/MPG	pcm	800 x 480	29.97	6000	10.6	9.4	22.6	13.2	*
		4v2									
	AVI	MS/MPG	pcm	640 x 400	29.97	4000	7.2	6.1	15.4	8.8	*
		4v2									
	AVI	MS/MPG	pcm	320 x 200	29.97	2000	2.74	2	4.4	2.6	*
		4v2									
AVI	AVI	DivX-5	mp3	1920 x 1080	29.97	15000	49.1	42.6	35.8	20.4	
(DivX)	AVI	DivX-5	mp3	1680 x 1050	29.97	12000	37.9	34.4	36.8	21.4	
	AVI	DivX-5	mp3	1440 x 900	29.97	10000	28.6	26.1	36.9	21.7	
	AVI	DivX-5	mp3	1280 x 720	29.97	8000	21.5	19.6	34	20	
	AVI	DivX-5	mp3	1024 x 600	29.97	7000	15.9	14.2	33.8	20	*
	AVI	DivX-5	mp3	800 x 480	29.97	6000	10.9	9.8	23	13.6	*
	AVI	DivX-5	mp3	640 x 400	29.97	4000	7.5	6.6	16	9.3	*
	AVI	DivX-5	mp3	320 x 200	29.97	2000	3.2	2.8	5	3.4	*

## EPM-3552 Display Module Performance on Windows Systems

Player		Media Play	er Classic - H	ome Cin	iema	On-board	VGA/DVI	VGA/DVI performance on		
		v1.4.1.283	4			performance on V24XX		EPM-3552		
Film Para	meters				V2422/V2426-XPE		EPM-3552			
Container	Video	Audio	Resolution	FPS	BitRate	System	Media Player	System	Media	Suggested
	Codec	Codec			(KBS/)	CPU	/CPU loading	CPU	Player/CPU	Configuration
						loading		loading	loading	
WMV	WMV3x	WMA9	1920 x 1080	29.97	15000	52.4	50.6	95.9	47.8	
WMV	WMV3x	WMA9	1680 x 1050	29.97	12000	52	50.1	96.7	48.5	
WMV	WMV3x	WMA9	1440 x 900	29.97	10000	50.1	48.4	92.7	47.9	
WMV	WMV3x	WMA9	1280 x 720	29.97	8000	37.7	35.7	90.4	46.6	
WMV	WMV3x	WMA9	1024 x 600	29.97	7000	29.2	27.7	74.9	35.8	
WMV	WMV3x	WMA9	800 x 480	29.97	6000	23.1	21.6	67	26.3	*
WMV	WMV3x	WMA9	640 x 400	29.97	4000	23.5	21.9	53.6	22	*
WMV	WMV3x	WMA9	320 x 200	29.97	2000	10.5	9	23.1	10.7	*
WMV	WMV2x	WMA8	1920 x 1080	29.97	15000	48.1	46.9	92.5	47.2	
WMV	WMV2x	WMA8	1680 x 1050	29.97	12000	46.1	44.8	91.8	46.4	
WMV	WMV2x	WMA8	1440 x 900	29.97	10000	38.1	36.4	86.1	44.8	
WMV	WMV2x	WMA8	1280 x 720	29.97	8000	29.4	28	75.7	36.4	
WMV	WMV2x	WMA8	1024 x 600	29.97	7000	21.2	19.7	63.9	25.3	*
WMV	WMV2x	WMA8	800 x 480	29.97	6000	19.3	17.9	57	19.2	*
WMV	WMV2x	WMA8	640 x 400	29.97	4000	17.6	16.2	47.4	19.6	*
WMV	WMV2x	WMA8	320 x 200	29.97	2000	8.1	6.7	19.5	8.3	*

MPEG-PS MPEG-PS MPEG-PS	MPEG-2 MPEG-2	ac3 ac3	1920 x 1080	29.97	15000	42.6	40.9	95.4	47.4	
MPEG-PS MPEG-PS	MPEG-2	ac3	1(00							
MPEG-PS	MPEG_2		1680 x 1050	29.97	12000	36.2	34.7	94.5	46.4	
		ac3	1440 x 900	29.97	10000	28.1	26.7	80.4	34	*
MPEG-PS	MPEG-2	ac3	1280 x 720	29.97	8000	21.7	20.1	68.8	24.9	*
MPEG-PS	MPEG-2	ac3	1024 x 600	29.97	7000	17	15.5	60.5	19.2	*
MPEG-PS	MPEG-2	ac3	800 x 480	29.97	6000	12.8	11.6	54.6	14.1	*
MPEG-PS	MPEG-2	ac3	640 x 400	29.97	4000	9.6	8.3	39.6	10.8	*
MPEG-PS	MPEG-2	ac3	320 x 200	29.97	2000	5.3	3.9	16.7	5.8	*
MPEG-4	H.264/M4 AVC	M4 AAC	1920 x 1080	29.97	15000	54.3	51.8	91.7	44.4	
MPEG-4	H.264/M4 AVC	M4 AAC	1680 x 1050	29.97	12000	43.9	43.1	93.1	45.2	
MPEG-4	H.264/M4 AVC	M4 AAC	1440 x 900	29.97	10000	36.6	35.1	85.4	41.4	
MPEG-4	H.264/M4 AVC	M4 AAC	1280 x 720	29.97	8000	28.5	26.8	77.6	34.2	*
MPEG-4	H.264/M4 AVC	M4 AAC	1024 x 600	29.97	7000	21.8	20.3	67	26.1	*
MPEG-4	H.264/M4 AVC	M4 AAC	800 x 480	29.97	6000	16.5	15	60.5	19.1	*
MPEG-4	H.264/M4 AVC	M4 AAC	640 x 400	29.97	4000	11.9	10.4	43.5	14.2	*
MPEG-4	H.264/M4 AVC	M4 AAC	320 x 200	29.97	2000	6.7	5.1	17.9	6.2	*
AVI	MS/MPG4v2	pcm	1920 x 1080	29.97	15000	51.8	50.1	94.2	48.3	
AVI	MS/MPG4v2	pcm	1680 x 1050	29.97	12000	51.4	49.9	92.7	48	
AVI	MS/MPG4v2	pcm	1440 x 900	29.97	10000	51.4	49.6	89.6	47.8	
AVI	MS/MPG4v2	pcm	1280 x 720	29.97	8000	50.6	49.1	88.2	47.8	
AVI	MS/MPG4v2	pcm	1024 x 600	29.97	7000	36.4	35	78.4	40.8	
AVI	MS/MPG4v2	pcm	800 x 480	29.97	6000	24.9	23.4	67.7	27.2	*
AVI	MS/MPG4v2	pcm	640 x 400	29.97	4000	17.1	15.5	48.9	18.2	*
AVI	MS/MPG4v2	pcm	320 x 200	29.97	2000	6.1	4.6	17	5.4	*
AVI	DivX-5	mp3	1920 x 1080	29.97	15000	47.9	46.3	78.5	34.4	
AVI	DivX-5	mp3	1680 x 1050	29.97	12000	41.8	39.9	81.3	36.6	
AVI	DivX-5	mp3	1440 x 900	29.97	10000	33.5	31.9	85.7	41.1	
AVI	DivX-5	mp3	1280 x 720	29.97	8000	27.1	25.4	74.6	32.2	*
AVI	DivX-5	mp3	1024 x 600	29.97	7000	19.7	18.2	64.6	23.3	*
AVI	DivX-5	mp3	800 x 480	29.97	6000	14.9	13.2	56.8	16.6	*
AVI	DivX-5	mp3	640 x 400	29.97	4000	10.9	9.4	39.8	12.5	*
AVI	DivX-5	mp3	320 x 200	29.97	2000	6.4	4.9	17.1	5.6	*