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User Manual

PCM-3343

DM&P Vortex86DX-1GHz SOC
PC/104 SBC, LVDS ,TTL, dual
LAN, CFC,and On board memory

Trusted ePlatform Services

ADVANTECH

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- Product updates/upgrades and tests upon the request of customers who are without warranty.

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FCC

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

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For more information about this and other Advantech products, please visit our website at:

http://www.advantech.com/

http://www.advantech.com/ePlatform/

For technical support and service, please visit our support website at:

http://support.advantech.com.tw/support/

Additional Information and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   – Product name and serial number
   – Description of your peripheral attachments
   – Description of your software (operating system, version, application software, etc.)
   – A complete description of the problem
   – The exact wording of any error messages

Packing List

Before installation, please ensure the following items have been shipped: Item Part Number:

- ■ 1 PCM-3343 SBC
- ■ 1 Startup manual
- ■ 1 Utility CD
- ■ Cables

Part Number	Description
1700060202	1 x CABLE 6P-6P-6P PS/2 KB & MOUSE 20cm
1703060053	1 x PS2 Cable 6P (MINI-DIN)-6P (Wafer 2.0 mm) 6 cm
1703100260	1 x USB cable 2port 2.0mm pitch w/ bracket 26cm
1701200220	1 x RS232 x2 ports 2.0mm pitch 22CM
1703040157	1 x RS-422/485 W/D-SUB COM 4P 15 cm
1700000898	1 x VGA cable D-SUB 15P(F)/12P-1.25MM 15CM
1700017863	1 x LAN cable RJ45/2*5P-2.0 15cm
9660104000	1 x PC/104 screw and copper post package

Optional Accessories

Model Number	Description
1701440350	1 IDE cable 44P/44P/44P 35 cm

Ordering Information

Model Number Description

PCM-3343F-256A1E PC104 DM&P Vortex86DX-1GHz, 265 MB Memory On board , VGA, LVDS,TTL,2 LAN,4COM,4USB,PC/104

PCM-3343L-256A1E PC104 DM&P Vortex86DX-1GHz, 265 MB Memory On board, 1 LAN,2COM,2USB,PC/104

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Chapter 1

General Introduction

This chapter gives background information on the PCM-3343.

Sections include:

■ Introduction

■ Specifications

1.1 Introduction

The PCM-3343 is a fanless, cost-effective, small size (96 x 90mm) PC/104 SBC (Single Board Computer) geared to satisfy the needs for various industrial computing equipment. PCM-3343 is ideal for data-acquisition, environment monitoring systems, Intelligent Vehicle management, factory automation, and medical applications that require basic X86 computing power for various low-power, and cost-effective embedded applications.

PCM-3343 is designed with DM&P Vortex86DX System-On-Chip. The Vortex86DX is a high performance and fully static 32-bit X86 processor with the compatibility of Windows based, Linux and most popular 32-bit RTOS. It also integrates floating-point Unit, 32KB write through 4-way L1 cache, 4-way 256KB L2 cache, PCI rev. 2.1 32-bit bus interface at 33 MHz, DDR2, ROM controller, IPC (Internal Peripheral Controllers with DMA and interrupt timer/counter included), Fast Ethernet, FIFO UART, USB2.0 Host and IDE controller within a single 581-pin BGA package to form a system-on-a-chip (SOC).

PCM-3343 offers convenient connector layout, easy assembly with right angle connectors, and multiple I/O including dual 10/100Mbps Ethernet, four USB (Universal Serial Bus) 2.0, VGA port, 24-bit LVDS and TTL outputs, four RS-232 serial ports (one of them can be configured to RS-422/485 serial port,) I2C connector, 16-bit GPIO, and one PC/104 expansion slot. PCM-3343 supports DDR2 333 SRAM 256MB on board to endure high vibration environments.

1.2 Features

- Ultra low power, fanless DM&P Vortex86DX- 1 GHz
- Integrated Floating-point Unit
- Supports 256MB on-board DDR2 SDRAM memory
- Supports CRT+LCD dual independent display
- Supports 24-bit LVDS/TTL
- Supports 2 LAN ports in standard PC/104 96x90mm dimension
- Supports Embedded Software API, Watchdog,GPIO,Brightness control, I2C,and backlight on/off
- Supports Embedded Software Utility, BIOS flash, eSOS, Embedded Security ID, and Flash Lock

1.3 Product Specifications

1.3.1 Standard PC/104 SBC Functions

- **Processor:** DM&P Vortex86DX SOC 1GHz
    - **x86 Compatible Processor Core**
      6 stage pipeline
    - **Floating point unit support**
    - **Embedded I / D Separated L1 Cache**
      16K I-Cache, 16K D-Cache
    - **DMA Controller**
    - **Package Type**
      27x27, 581 Ball BGA

Note! *For wide temperature version, CPU speed would be downgraded.*

- **System Memory:** Supports On board DDR2 333 SDRAM Memory 256 MB. Maximum up to 512 MB for optional
- **2nd Cache Memory:** 256 KB on the processor
- BIOS: Award integrated 16 Mbit ROM in SOC
- **Watchdog timer:** System reset; Software programmable from 30.5μ sec.to 512 sec. x 2 sets
- **Expansion Interface:** PC/104 (ISA)
- **Battery:** Lithium 3V/210 mAh
- **Enhanced IDE interface:** One channel supports up to two EIDE devices . Supports UDMA 33 mode

Note! *When you use the CF socket , the IDE connector can only be attached to one IDE device.*

- **CFC:** Solid State Disk (SSD) supports one 50-pin socket for CFC type I (type II optional) shared with primary IDE
- **External SPI onboard Flash:** Optional onboard 4MByte SPI Flash Disk (Support by request for boot device or storage on DOS OS)
- **Serial ports:** Four serial RS-232 ports, one of them can be configured to RS-422/485 ports by jumper J2
1. CN7 provides two RS-232 serial ports (COM3/4).
2. CN12 provides two RS-232 serial ports (COM1/2).
3. CN6 provides one RS-422/485 serial port adjusted by J2, and you just can select either COM2 (RS-232) on CN12 or RS-422/485 on CN6.

Note! 1. *When RS-422/485 on CN6 is enable, COM2(RS-232) on CN12 will be disable.*

2. *When using PWM Brightness control, COM2 will be configured as PWM function using. You can select either COM2 or PWM Brightness control function.*

- **Keyboard/mouse connector:** Supports one standard PC/AT keyboard and a PS/2 mouse
- **USB:** Four USB 2.0 ports compliant universal serial bus ports
- **GPIO:** 16 bit general purpose Input/Output
- **I2C:** Compliant w/t V2.1, Some master code (general call, START and CBUS) not support

1.3.2 VGA/LVDS Interface

- **Controller:** SMI SM712 2D graphic Chip
- **VRAM:** 4 MB internal memory
- **Graphic Engine:**
  – 62.5MHz single clock/cycle engine (EM+)
  – 86MHz single clock/cycle engine (EM4+)
  – Designed to accelerate DirectDraw
- **Output Interfaces:**
  – VGA: Supports up to 1024 x 768 @85Hz
  – LVDS: Supports up to 1024 x 768 @ 24-bit LVDS LCD Panel
  – TTL: Supports up to 1024 x 768 @ 24-bit TTL LCD Panel
  – Dual Display: CRT + LVDS and CRT+TTL, support extended mode and clone mode

Note! *TTL and LVDS interface are not recommended to use together at the same time.*

1.3.3 Ethernet Interface

- Supports Dual 10/100 Mbps Ethernet networking
- LAN1 Controller: Integrated Vortex86DX SOC 10/100 Mbps Ethernet
- LAN2 Controller: Realtek RTL 8100CL 10/100 Mbps Ethernet

1.3.4 OS and SW API support

This board supports Win XP, Window WP Embedded, Win CE and Linux.

Supports Embedded Software API: Watchdog, GPIO, Brightness control, I2C,and backlight on/off.

Supports Embedded Software Utility: BIOS flash, eSOS, Embedded Security ID, and Flash Lock.

Software Ordering Information:
2070009536: CE 6.0 Pro PCM-3343 V1.3 ENG
2070009528: XPE WES2009 Vortex86DX V4.0 ENG
2070009529: XPE WES2009 Vortex86DX V4.0 MUI24"
205E343000: SUSI 3.0 SW API for PCM-3343 Window XP/XPE

For further information about OS support in your PCM-3343, visit the following Advantech web resource: www.advantech.com or please contact your technical support center.

1.3.5 Mechanical and Environmental

- **Dimensions:** 96 x 90 mm (3.8" x 3.5") Mechanical Drawing (dxf file) is available.
- **Power Supply Type:** AT
- **Power Requirement:** +5 V ± 5%, +12 V ± 5% (Optional), (5 V only,12 V optional for PC104 add on card and LCD inverter)
- **Power Consumption:** (Vortex86DX 1GHz, 256 MB DDRII 667)
  - **Power on Load:** +5 V @ 0.63 A, +12 V @ 0.01 A
  - **Max load:** +5 V @ 0.85 A, +12 V @ 0.01 A
  - **Idle mode:** +5 V @ 0.55 A, +12 V @ 0.01 A
- **Power Consumption Conditions:**
  - **Test software:** Passmark Burnin Test Pro6.0
  - **Power on - Boot:** Measure the maximum current value of between system power on and boot-up to O.S.
  - **Max. load:** Measure the maximum current value which system under maximum load on running Passmark Burnin Test (CPU: Top speed, RAM &Graphic: Full loading)
  - **Idle mode:** Measure the current value when system in DOS mode and without running any program
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F) (operation humidity: 40° C @ 85% RH Non-Condensing)
- **Weight:** 0.097 kg (0.214lb) (reference weight of total package)

1.4 Board layout: Dimensions

Figure 1.1 PCM-3343 Dimension (Top)

Figure 1.2 PCM-3343 Dimension (Bottom)

Chapter 2

H/W Installation

This chapter explains the setup procedures of the PCM-3343 hardware, including instructions on setting jumpers and connecting peripherals, switches, indicators and mechanical drawings. Be sure to read all safety precautions before you begin the installation procedure.

2.1 Jumpers

The PCM-3343 has a number of jumpers that allow you to configure your system to suit your application. The table below lists the functions of the various jumpers.

Table 2.1: Jumpers	
Label	Function
J1	LVDS Panel Power Select
J2	COM2 RS-232/RS422/RS485 Select

2.2 Connectors

Onboard connectors link the PCM-3343 to external devices such as hard disk drives, a keyboard, USB,or COM The table below lists the function of each of the board's connectors.

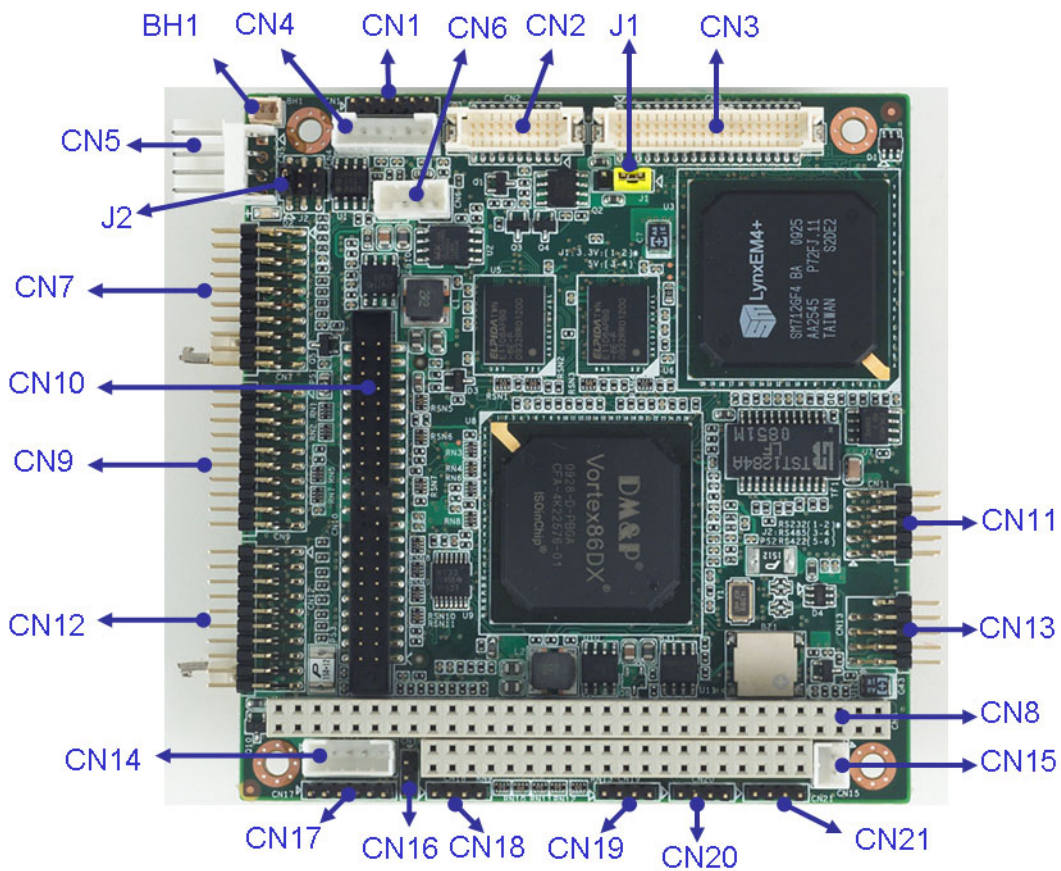| Table 2.2: Connectors	
Label	Function
CN1	SPI Connecter
CN2	LVDS Panel Connecter
CN3	LCD Panel Connecter
CN4	PS2 Keyboard/Mouse Connecter
CN5	Power In Connecter
CN6	RS422/RS485 Connecter
CN7	COM3/4 Connecter
CN8	PC104 Connecter
CN9	GPIO Connecter
CN10	IDE Connecter
CN11	LAN2 Connecter
CN12	COM1/2 Connecter
CN13	USB1/2 Connector
CN14	Inverter Connector
CN15	System Reset Connector
CN16	-12V / -5V Power In Connector
CN17	JTAG Connector
CN18	PWR / HDD LED Connector
CN19	LAN1 LED Connecter
CN20	I2C Connecter
CN21	LAN2 LED Connecter
CN22	VGA Connector
CN23	CF Socket
CN24	LAN1 Connector
CN25	USB3/4 Connecter

2.3   Locating Connectors & Block Diagram
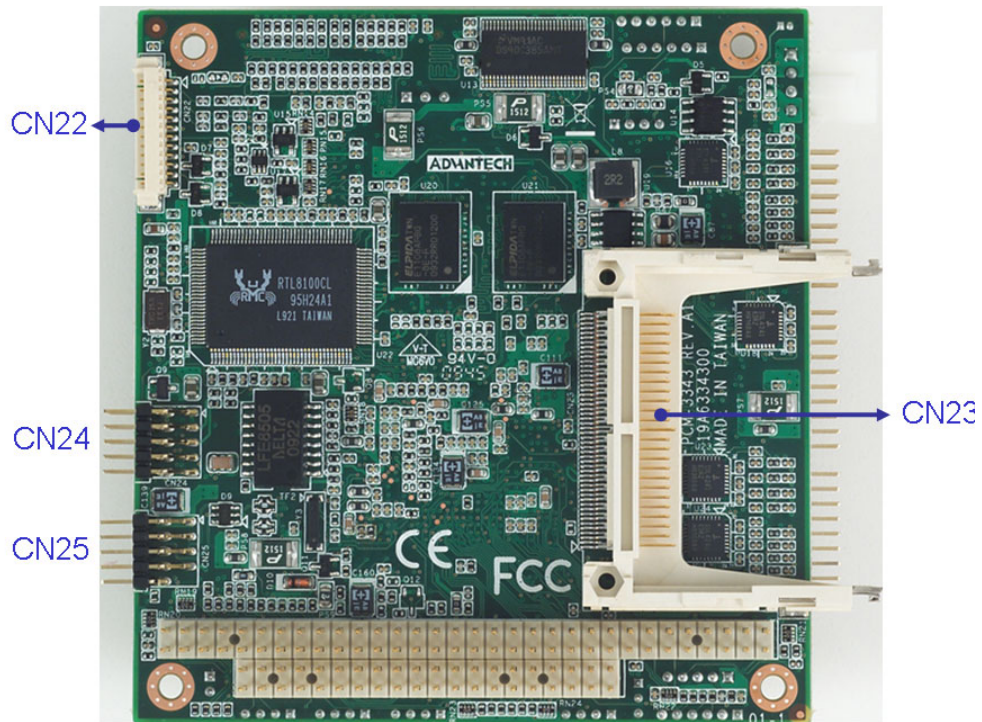

Figure 2.1 Connectors (Component Side)

Figure 2.2 Connectors (Solder Side)
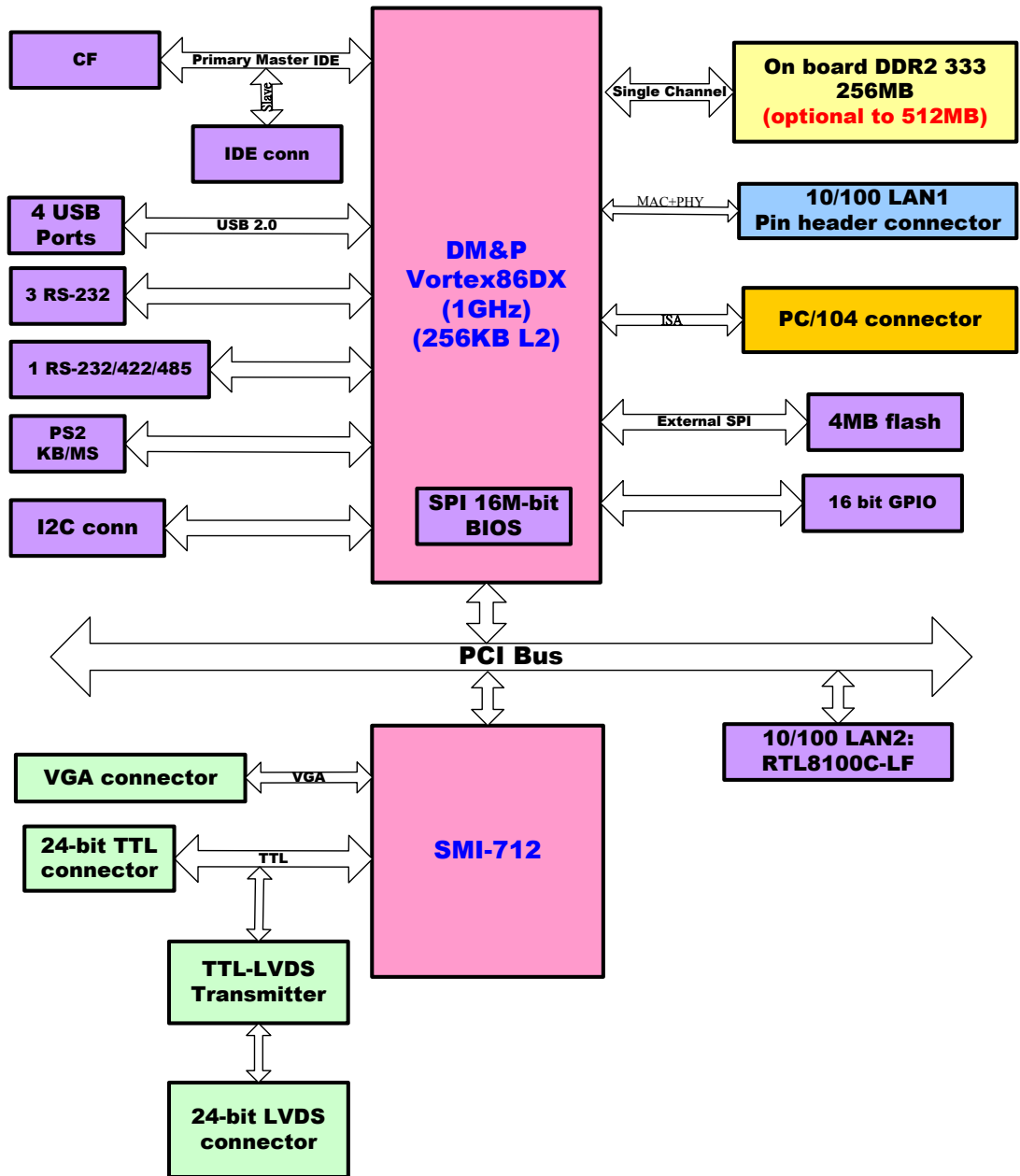
Figure 2.3 Block Diagram

2.3.1 Jumper Description

You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.
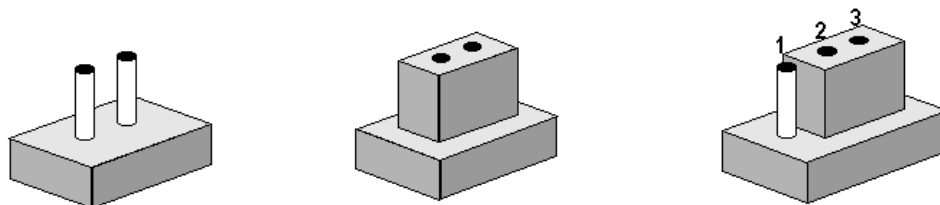
The jumper settings are schematically depicted in this manual as follows.
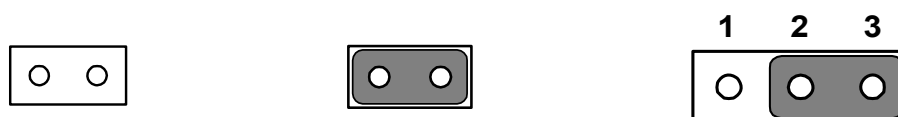
A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

2.4 Setting Jumper

2.4.1 LVDS Panel Power Select (J1)

Table 2.3: LVDS Panel Power Select (J1)

Setting	Function
1-2	3.3V (default)
2-3	5V

2.4.2 COM2 RS232/RS422/RS485 Select (J2)
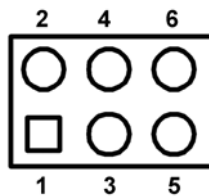
Table 2.4: COM2 RS232/RS422/RS485 Select (J2)

Setting	Function
1-2	RS-232 (Default)
3-4	RS-485
5-6	RS-422

2.5   External SPI Flash

The board provides optional onboard external SPI flash up to 4MB for bootable devices using DOS Operating System. If required, please contact with Advantech's sales rep to support onboard external SPI flash by request, and follows below steps to enable external SPI flash.

1. If you want to use the external SPI flash as storage for read/ write in DOS OS, please adjust the BIOS SETUP \Advanced Chipset Features\Virtual Disk to "Enabled". and then use "SPITOOL.exe" on the Drive CD to format it, so that you can read/write external SPI flash.

2. If you want to utilize the external SPI flash as a bootable device in DOS OS, please make a DOS bootable disk on a CF card or IDE hard drive, boot from the DOS bootable disk and then perform format A: /s pointing towards the external flash.Next, set the BIOS SETUP\ Boot Device to "FLOPPY", so that you can boot from the external SPI DOS OS.

2.6   SPI Connector (CN1)

The board provides 6-pin external SPI connector for external SPI device and peripheral usage.

CN1	SPI Connecter		
Part Number	1653006101		
Footprint	PH_6x1V_2.00mm		
Description	PIN HEADER 6*1P 180D(M) 2.0mm DIP W/O Pb		
Pin	Pin Name	Signal Type	Signal Level
1	+V3.3_SPI	PWR	
2	GND	GND	
3	SPI_CLK	Out	+3.3 V
4	SPI_DO	Out	+3.3 V
5	SPI_DI	IN	+3.3 V
6	SPI_CS#	Out	+3.3 V

2.7   VGA/LVDS/TTL interface connections

The PCM-3343's VGA interface can drive conventional CRT displays and is capable of driving LVDS and TTL flat panel displays. The board has three connectors to support these displays: one for standard CRT VGA monitors, one for LVDS type LCD panels, another one for LVDS type LCD panels.

PCM-3343 uses SMI SM712 2D graphic Chip offering enhanced capabilities for dual view and for handling dual applications, CRT+TTL, and CRT +LVDS. Each display can support independent full screen full motion video, as well as independent graphics refresh rates, resolutions, and color depths.

LVDS and TTL can support resolutions of 640 x 480,800 x 480,800 x 600, and 1024 x 768.

> *Note!*   *1.   TTL and LVDS interfaces are not recommended to be used together at the same time.*
>
> *2.   In DOS mode, PCM-3343 can't display full screen on 1024 x 768 resolutions.*

2.7.1 CRT display connector (CN22)

CN22 is a 12-pin, dual-inline header used for conventional CRT displays. A simple one-to-one adapter can be used to match CN22 to a standard 15-pin D-SUB connector commonly used for VGA. Users can drive a standard progressive scan analog monitor with pixel resolution up to 1024 x 768 @85Hz. Pin assignments for CRT display connector CN22 are detailed in Appendix A.

2.7.2 TTL connector (CN3)

The PCM-3343 uses SMI SM712 2D graphic Chip that supports single channel 24-bit TTL panel up to 1024X768 panel resolution.

2.7.3 LVDS connector (CN2)

Four PCM-3343 series, the board supports 1 channel 24-bit LVDS LCD panel displays up to 1024X768 panel resolution.

2.7.4 Panel Inverter Power (CN14)

The LCD inverter is connected to CN14 via a 5-pin connector to provide +5 V/+12 V power to the LCD display. J1 provides inverter voltage selection function, closing Pin 1, 2 is for 3.3V power input inverter; closing Pin 2, 3 is for 5V power input inverter.

2.8 Keyboard and PS/2 mouse connector (CN4)

The board provides a keyboard connector that supports both a keyboard and a PS/2 style mouse. In most cases, especially in embedded applications, a keyboard is not used. If the keyboard is not present, the standard PC/AT BIOS will report an error or fail during power-on self-test (POST) after a reset. The PCM 3343's BIOS standard setup menu allows you to select "All, But Keyboard" under the "Halt On" selection. This allows no-keyboard operation in embedded system applications, without the system halting under POST.

2.9 Power Connectors (CN5)

Supplies main power +5 V to the PCM-3343, and to devices that require +12 V.

2.10 COM port connector (CN7 & CN12 & CN6)

The board provides four RS-232 serial ports, and CN6 can be configured to RS-422/485

1. CN7 provides two RS-232 serial ports (COM3/4).
2. CN12 provides two RS-232 serial ports (COM1/2).
3. CN6 provides one RS-422/485 serial port adjusted by J2, and you just can select either COM2 (RS-232) on CN12 or RS-422/485 on CN6.

Note!

1. *When RS-422/485 on CN6 is enabled, COM2(RS-232) on CN12 will be disabled.*
2. *When using PWM Brightness control, COM2 will be configured for PWM function use. You can select either COM2 or PWM Brightness control function.*

Four serial RS-232 ports in two 20 pin connector (CN7&CN12), and one serial port RS422/485 in 4 pin connector (CN6).

They provide connections for serial devices or a communication network. You can find the pin assignments for the COM port connector in Appendix.

2.10.1 Serial Port RS-422/485 (CN6)

CN6 can be configured to operate in RS-422 or RS-485 mode by J2.

2.11 GPIO Connector (CN9)

The board supports 16-bit GPIO through GPIO connector. The 16 digital inputs and outputs can be programmed to read or control devices, with each input or output defined. Refer to Appendix for detailed information on the pin assignments and pro-gramming guide.

> *Note!*   *The Input power from external device cannot exceed 3.3 V.*

2.12 IDE Connector (CN10)

The board provides 1 IDE channel which you can attach up to two enhanced Inte-grated Drive Electronics hard disk drives or CDROM to the board's internal controller. This advanced IDE controller supports faster data transfer up to UDMA 33.

> *Note!*   *When you using CF socket , the IDE connector only be attached to one IDE device.*

2.12.1 Connecting hard drives

Connecting drives is done in a daisy-chain fashion. If you want to use IDE Hard Drives, please purchase an additional 44 PIN IDE cable (Advantech's p/n: 1701440350) that can connect to 1.8" and 2.5" drives.

1. Connect one end of the cable to the Hard Drive connector. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).
2. Plug the other end of the cable into the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive.

(See your hard drive's documentation for the location of the connector.)

If desired, connect a second drive as described above. Unlike floppy drives, IDE hard drives can connect to either end of the cable. If you install two drives, you will need to set one as the master and one as the slave by using jumpers on the drives. If you install only one drive, set it as the master.

2.13 LAN Connector (CN24 & CN11)

Ethernet configuration

The board is equipped with two high performance 32-bit PCI-bus Ethernet interface which are fully compliant with IEEE 802.3 10/100Mbps, and supported by all major network operating systems.