PCM-7230 series

**PCM-7230 SBC and
Evaluation Kit
with Windows® CE.NET**

Users Manual

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http://eservice.advantech.com.tw/eservice/

This manual is for the PCM-7230 series products.

Packing List

Before you begin installing your card, please make sure that the following materials have been shipped.

For PCM-7230 SBC series

• PCM-7230 SBC

  • Advantech Software Support CD (Windows® CE.NET)

  • Windows® CE.NET end user license agreement (for Windows® CE.NET version)

• PCM-7230 series Cable kit (Optional. Advantech PN: PCM-7230-CK001)

  • 1 x Audio cable (Mic-in jack, line-in jack, line-out jack and two 2W speakers)

  • 2 x composite connector cables. One for video-in function and the other for Video-out function.

  • 4 x DB-9 RS-232 cables

  • 1 x DB-9 RS-485 cable

  • 1 x DB-15 CRT cable

  • 1 x two ports USB host & one port USB client cable

  • 1 x RJ45 Ethernet cable

  • 1 x DB-25 cable for DIO & hotkey function

  • 1 x 3 Push button cables for S/W reset, H/W reset & sleep/wakeup function.

• 1 x power in cable with big 4-pin connector

• 1 x Power switch cable

• 1 x JTAG cable

• 1 x Null modem cable

• 1 x USB client ActiveSync cable

For PCM-7230 Evaluation Kit

• PCM-7230 KIT (Base on SBC PCM-7230S-230CE)

• Plastic Stylus for touch-screen

• 19V DC/60W adaptor and power cord

•Windows® CE.NET end user license agreement (for Windows® CE.NET version)

• Advantech Software Support CD for Windows® CE.NET

    • readme.txt

    • Datasheet

    • User manual

    •Windows® CE.NET 4.1 platforms SDK for PCM-7230 (for Windows® CE.NET)

    • Microsoft ActiveSync Version 3.7 install files (for Windows® CE.NET).

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Additional Information and Assistance

Step 1: Visit the Advantech web site at **www.advantech.com/risc** where you can find the latest information about the product.

Step 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 problems

- The exact wording of any error messages

FCC Class A

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 residential environment. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this user's manual, it may cause harmful interference to radio communications. Note that even when this equipment is installed and used in accordance with this user's manual, there is still no guarantee that interference will not occur. If this equipment is believed to be causing harmful interference to radio or television reception, this can be determined by turning the equipment on and off. If interference is occurring, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna

• Increase the separation between the equipment and the receiver

• Connect the equipment to a power outlet on a circuit different from that to which the receiver is connected

• Consult the dealer or an experienced radio/TV technician for help

Warning!   HIGH VOLTAGE!!!

Please do NOT touch the inverter between main board and LCD panel with your hands or any other electric conductors.

Warning! Any changes or modifications made to the equipment which are not expressly approved by the relevant standards authority could void your authority to operate the equipment.

Warning!   Input voltage rated 8V~28V DC for PCM-7230 series SBC.

Packing: please carry the unit with both hands, handle with care Our European representative:

Advantech Europe GmbH

      Kolberger Straße 7

      D-40599 Düsseldorf, Germany

      Tel: 49-211-97477350

      Fax: 49-211-97477300

      Maintenance: to properly maintain and clean

      the surfaces, use only approved products or

      clean with a dry applicator

Safety Instructions

1. Read these safety instructions carefully.

2. Keep this User's Manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.

7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

8. Position the power cord so that people cannot step on it. Do not place anything over the power cord.

9. All cautions and warnings on the equipment should be noted.

10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

11. Never pour any liquid into an opening. This may cause fire or electrical shock.

12. If one of the following situations arises, get the equipment checked by service personnel:

   a. The power cord or plug is damaged.

   b. Liquid has penetrated into the equipment.

   c. The equipment has been exposed to moisture.

   d. The equipment does not work well, or you cannot get it to work according to the user's manual.

e. The equipment has been dropped and damaged.

f. The equipment has obvious signs of breakage.

13. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW **-20° C (-4° F)** OR ABOVE **60° C (140° F)**. THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT. BUT SPECIAL TEMPERATURE PRODUCTS COULD BE EXCLUDED.

14. *CAUTION*: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED.REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

15. *Caution: HIGH VOLTAGE!!!* **DO NOT** touch the inverter board between main board and LCD panel.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

CHAPTER

1

General Information

This chapter gives background

Information of the 3.5" Biscuit

PCM-7230 Evaluation Kit.

Sections include:

• Introduction

• Specification

• Safety Precautions

• PCM-7230 Series

1.1 Introduction

Functionalities-certified, Fast, and Flexible Solution Platform Based On Intel® XScale^TM Technology

The PCM-7230 is designed as a solution board, using Intel® PXA255 processor based on Intel® XScale^TM technology, which is a complete 32-bit, up to 400 MHz speed SoC engine. It provides customers a high performance board subsystem based on Intel® XScale^TM technology with characters of ready-to-run, compact, and easy-to-expansion in order to meet customers' versatile needs. With the flexible I/O interfaces and complete hardware and software solutions, the PCM-7230 is a fast time-to-market platform for customers to develop their applications and products easily without considering system integration.

The PCM-7230 Evaluation Kit is a complete system designed for customers to evaluate the PCM-7230. It integrates all solutions developers need, based on the PCM-7230 board, into a package that provides customers an effortless system platform for project evaluation, application development, and solution feasibility testing that decreases lead-time and lowers initial expense. The PCM-7230 Evaluation Kit has already integrated complete certified functional peripherals in a battery-powered pack under Windows® CE.NET SDK, making project development and implementation becomes an easy and risk-free way at the starting point.

Including all necessary cables, power core, and Support CD, the Evaluation Kit also contains one 800*600 LCD panel, 2000 mAh (4S1P) Li- ion battery pack and one 4-COM AMI-120 (ARM Module Interface) module. All bundled parts/components including the PCM-7230 main board arrive fully tested and certified in production-ready condition. All functionalities have been certified completely and can be leveraged to customized needs for different hardware configurations and system optimization based on the customer's request.

Customizes and expands your versatile needs easily -- AMI-120 interface

Through the Advantech's unique open expansion interface AMI-120, ARM Module Interface, customers could expand functionality easily with a custom-made way similar to PC/104 in x86 platforms. With this AMI-120 interface, customers can not only expand products' functionalities easily, but develop various products based on the PCM-7230 via AMI-120 modules with

different functionalities. Users using the PCM-7230 can design their own AMI-120 module after receiving license agreement from Advantech or cooperate with Advantech for a customized AMI-120 module based on an ODM project.

1.2 The PCM-7230 Evaluation Kit Specifications

The PCM-7230 Evaluation Kit is consisted of

(1) The PCM-7230 main board integrated with Windows$^®$ CE.NET: Intel$^®$ PXA255 processor running at 400 MHz, 64 MB SDRAM on board, and a 32 MB flash on Memory Module;

(2) LCD panel, touch-screen, and inverter;

(3) Power system and adapter;

(4) AMI-120 solution module: 4-COM AMI-120 module;

(5) Cable kit(Optional for PCM-7230 series SBC. Advantech PN : PCM-7230-CK001);

(6) Advantech Software Support CD for Windows$^®$ CE.NET;

(7) Windows$^®$ CE.NET end user license agreement (for Windows$^®$ CE.NET version only).

(8) Misc IO Board

(9) Peripheral IO Board
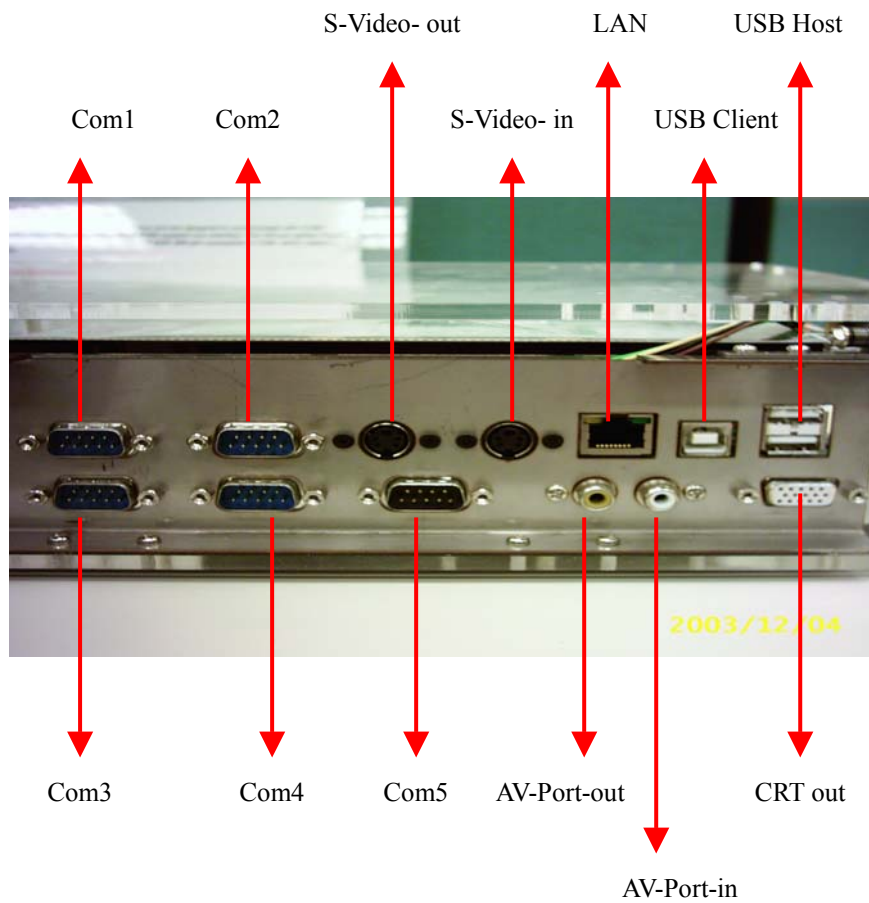
Figure 1.1 PCM-7230 Evaluation Kit

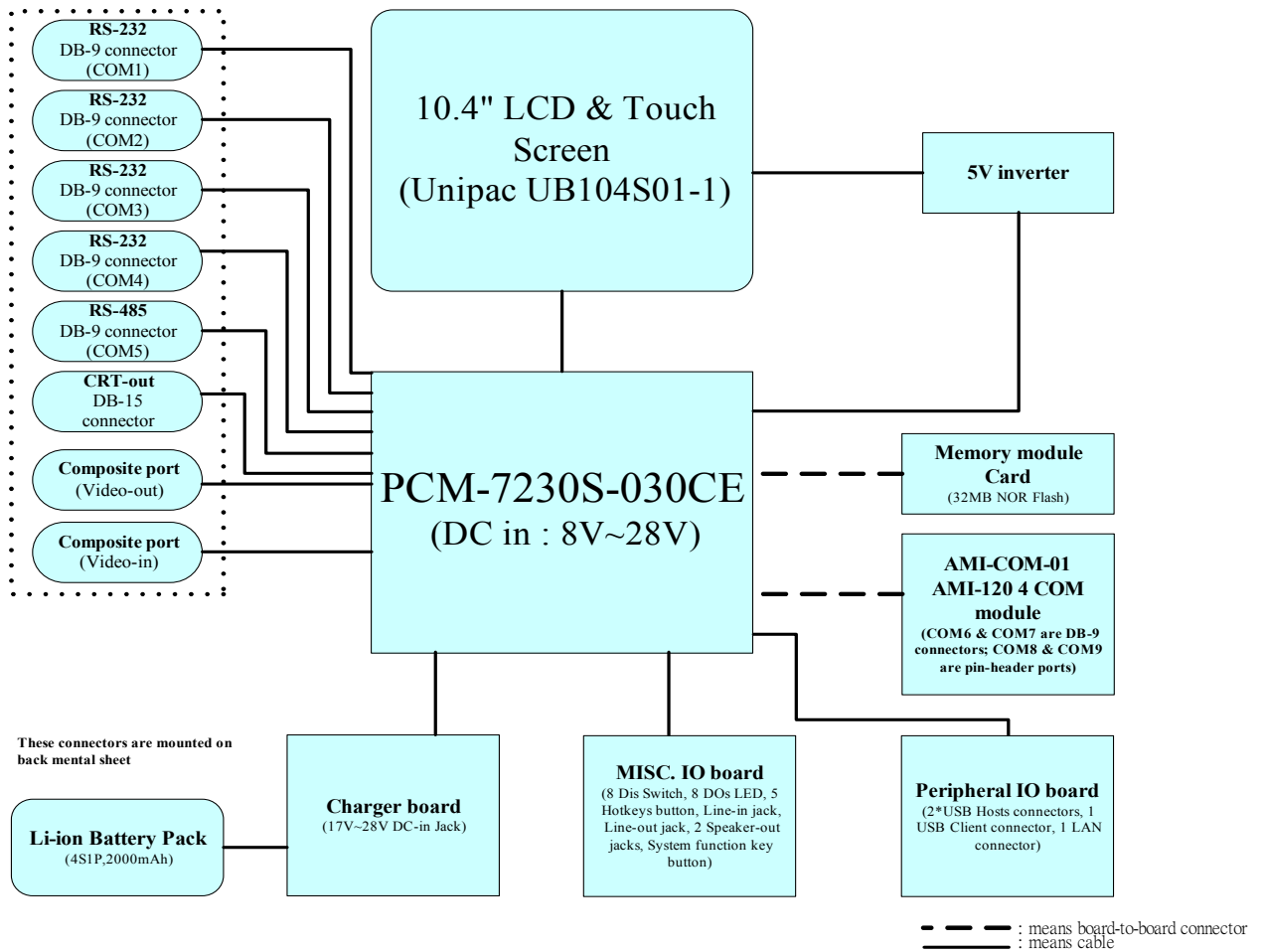Figure 1.2 PCM-7230 Evaluation Kit back place I/O connector placement

Figure 1.3 PCM-7230 Evaluation Kit block diagram

1.2.1 The PCM-7230 SBC (PCM-7230S-230CE)

- CPU: Intel® PXA255 processor at 400 MHz

- System Memory: 1MB flash on board for bootloader and 64 MB SDRAM on board

- Memory Module: 32 MB flash on Memory Module w/o SDRAM

- RTC: External RTC w/ rechargeable coin battery

- Watchdog timer: Intel® PXA255 processor internal Watchdog timer

- Coin battery: Rechargeable Lithium 3V 65 mAH for RTC and system

backup

• PCMCIA slot: 1 type-II PCMCIA slot

• CF slot: 1 type-II CF slot

• Expansion Slot: AMI-120, thru system bus

• Operating System: Microsoft® Windows® CE.NET stored in the flash memory

• Power supply: DC 8V ~ 28V in 4-pin housing header

• Power consumption: Typical: 2.8W (only SBC) ; Sleep mode: small than 50mW.

1.2.2 LCD, touch-screen, and inverter

• LCD panel: 10.4", 800(H) X 600(V) resolution, TFT 1 channel LVDS 18-bit LCD (Unipac UB104S01)

(Advantech keeps adding new LCDs into the compatibility list. Please visit Advantech website or contact local representatives for newest documents.)

• Touch-screen: 4-wire resistant touch-screen thru SPI (Serial Peripheral Interface) bus

• Inverter: 4-pin inverter interface for 5V inverter

1.2.3 Power system

• Battery: 4S1P, 2000 mAH Li-ion battery packs

• Charger board: 2.5φ 19 Vdc power input, supports 4S1P Li-ion battery pack and 12Vdc output to PCM-7230 SBC. 1A fuse on board.

• Power adapter: 2.5φ 19 Vdc/60W power adaptor.

1.2.4 4-COM AMI-120 module

• ARM Module Interface 120-pin (AMI-120) for Advantech/user-defined

module

• 4x 9-pin full-function transceiver level RS-232

1.2.5 Cable kit (Optional for PCM-7230 series SBC)

• 1 x Audio cable (Mic-in jack, line-in jack, line-out jack and two 2W
   speakers)

• 2 x compositive connector cables. One for video-in function and the
   other for Video-out function.

• 4 x DB-9 RS-232 cables

• 1 x DB-9 RS-485 cable

• 1 x DB-15 CRT cable

•1 x two ports USB host & one port USB client cable

• 1 x RJ45 Ethernet cable

• 1 x DB-25 cable for DIO & hotkey function

• 3 x Push button cables for S/W reset, H/W reset & sleep/wakeup
   function.

• 1 x power in cable with big 4-pin connector

• 1 x Power switch cable

• 1 x JTAG cable

• 1 x Null modem cable

• 1 x USB client ActiveSync cable (for users link PCM-7230 with PC by
    USB client port)

1.2.6 Advantech Software Support CD

• ActiveSync Install Program

• Windows® CE.NET 4.1 platforms SDK for PCM-7230 (for Windows® CE.NET)

• PCM-7230 User Manual

• PCM-7230 datasheet

• PCM-7230 Evaluation Kit datasheet

• Readme.txt

1.2.7 Environmental

• Operating temperature: 0 ~ 60° C (32 ~ 140° F) fanless operation

• Storage temperature: -20 ~ 70° C (4 ~ 158°F)

• Operating humidity: 0 ~ 90 % relative humidity, non-condensing

1.2.8 Dimensions for PCM-7230 Evaluation Kit

• PCM-7230 SBC Dimensions (L x W x H): 145 mm x 102 mm x 21.1 mm

• PCM-7230 Evaluation Kit Dimensions (L x W x H): 291mm x 209mm x 84mm

1.2.9 Windows® CE.NET license agreement (for Windows® CE.NET version only)

1.3 Safety Precautions

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable. All of the connector pin assignments are shown in Appendix A.

Caution! Always ground yourself to remove any static electric charge before touching the PCM-7230-0K0CE. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.

Caution!!! HIGH VOLTAGE!!!

Do NOT touch the inverter between main board and LCD panel with your hand or any electric conductors.

1.4 PCM-7230 Series

PCM-7230S-030CE: Intel$^®$ PXA255 processor at 400 MHz, 64 MB SDRAM on board, W/O Memory Module and Windows$^®$ CE.NET.

PCM-7230S-230CE: Intel$^®$ PXA255 processor at 400 MHz, 64 MB SDRAM on board, with Memory Module (32 MB Flash/ 0 MB SDRAM) and Windows$^®$ CE.NET.

PCM-7230-0K0CE: PCM-7230 Evaluation Kit system based on PCM-7230S-230CE.

Advantech welcomes ODM projects for depopulated, configurable and customized specifications. You can serf to www.advantech.com/risc for more detail about ODM project and related forms download.

2

Getting Start

This chapter provides brief

instructions for operating the

PCM-7230 Evaluation Kit.

Sections include:

• Quick Starting

2.1 Quick Starting

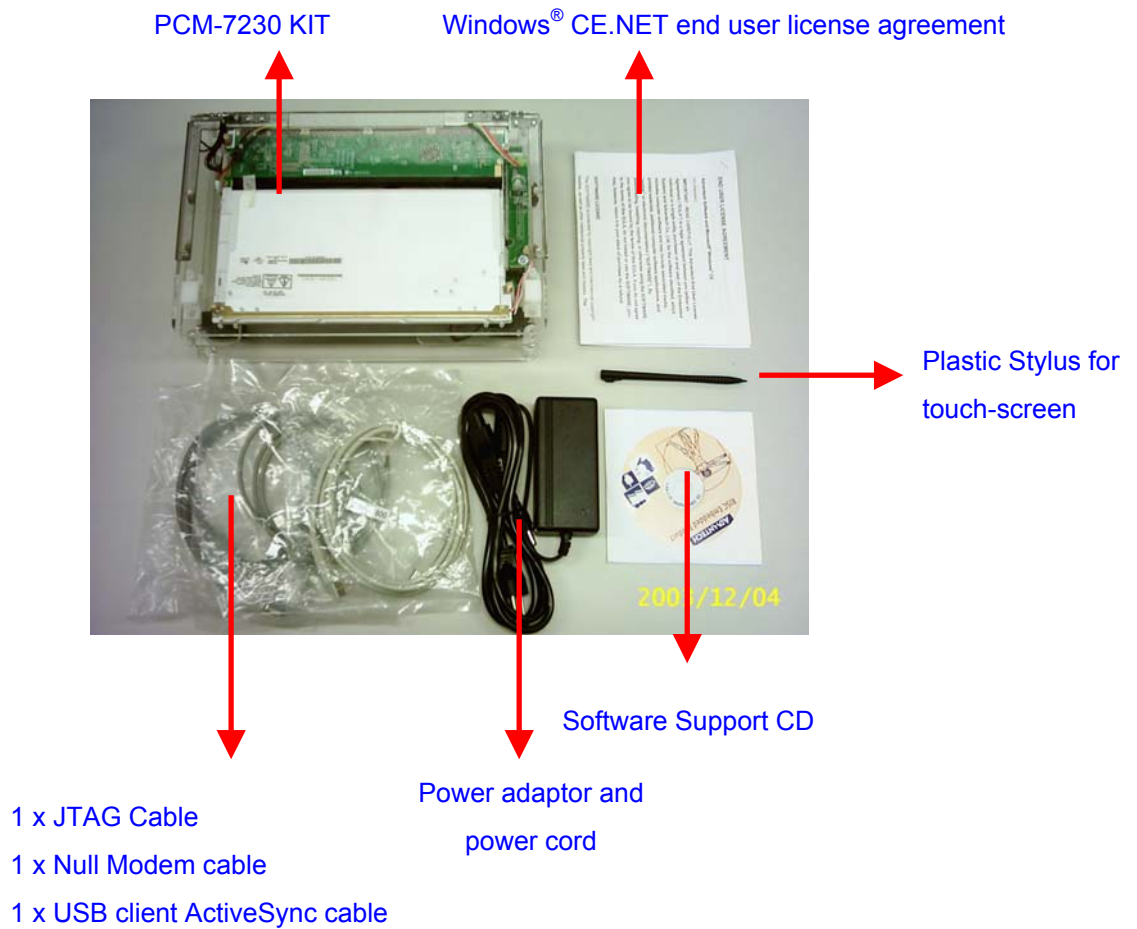**Step1**: Unpack the PCM-7230 Evaluation Kit from its packing.

PCM-7230 KIT   Windows® CE.NET end user license agreement

Plastic Stylus for
touch-screen

200 /12/04

Software Support CD

Power adaptor and
power cord

1 x JTAG Cable
1 x Null Modem cable
1 x USB client ActiveSync cable

Figure 2.1 Unpack the PCM-7230 Evaluation Kit

Step2: Check you get everything in the packing list at the beginning of this manual.

Step3: Connect the power cord with the adapter.

Figure 2.2 Connect the power cord with the adapter

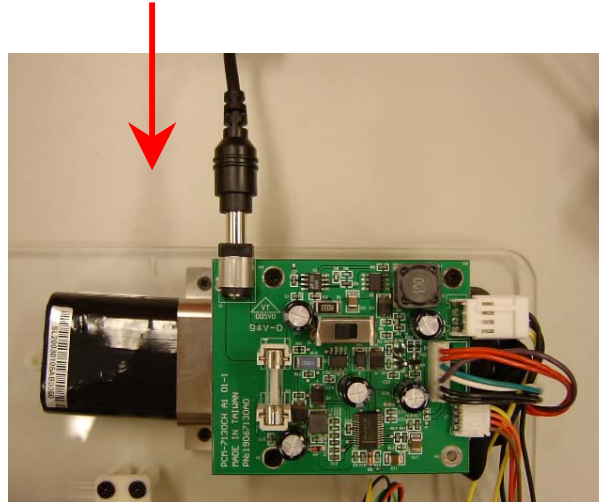**Step4**: Plug in the power line to both a power source and PCM-7230 Evaluation Kit.

Figure 2.3 Plug in the power line

Step5: Turn on the power switch. After the Buzzer beeps, you will see the Welcome screen of Windows® CE.NET. Then you can start to try on the PCM-7230 Evaluation Kit.
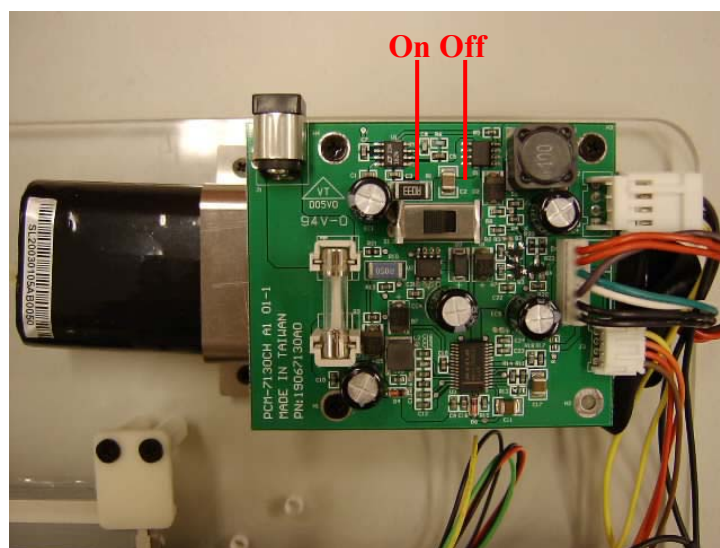

Figure 2.4 Turn on the power switch

Figure 2.5 Welcome

NOTE: The Li-ion battery is charged when you connect the PCM-7230 Evaluation Kit to a power source. The Li-ion battery can last about 2 hours without being charged.

3

Hardware Functionality

This chapter details hardware's

setting and functionality in the

PCM-7230 Evaluation Kit.

Sections include:

• The PCM-7230 SBC

• 4-COM AMI-120 module

• LCD and touch-screen

• Power system

This chapter will detail hardware setting and functionality in the PCM-7230 Evaluation Kit. Following will introduce (1) PCM-7230 SBC; (2) 4-COM AMI-120 module; (3) LCD and touch-screen; (4) Power system.

3.1 PCM-7230 SBC

The PCM-7230 SBC is a 3.5" (145mm x 102 mm x 21.1mm) single board computer with the Intel® PXA255 processor running at 400 MHz. The milli-watt power consumption by its kernel makes the PCM-7230 suitable for power conscious applications. With the expandable Memory Module and abundant I/O ports and interfaces, the PCM-7230 SBC is cost-effective and flexible solution for customers. The AMI-120 expansion bus, a unique standard interface for ARM-based processor defined by Advantech, lets customers expand the functionality of PCM-7230 easily by Advantech's or user-defined module according to their needs. Besides, the PCM-7230 series offer customers variety optional specifications and solutions, providing a RISC hardware platform and fast time-to-market benefit to customers.

There are two type standard PCM-7230 SBCs, the PCM-7230S-030CE and the PCM-7230S-230CE. The PCM-7230S-230CE, the same SBC installed in the PCM-7230 Evaluation Kit, is a full-function version SBC for PCM-7230. The PCM-7230S-030CE takes off the Memory Module from the PCM-7230S-230CE. Therefore there is only 1MB on-board Flash for bootloader in the PCM-7230S-030CE. Customers who boot their application from CF card thru CF or PCMCIA slot may order this PCM-7230S-030CE because they don't need Memory Module. Besides these two type SBCs, Advantech also offers customers another solution for customized specifications thru ODM projects. Customers can have their own PCM-7230 SBCs with specific specifications in order to achieve best performance-to-cost ratio.

3.1.1 Specification

Model   **PCM-7230S-030CE**

Model		PCM-7230S-230CE (PCM-7230S-030CE)	Scalable Specifications
Kernel part	CPU	Intel® PXA255 processor at 400 MHz	200/300 MHz
	System memory	1MB NOR flash for bootloader and 64MB SDRAM on board	16/32/64 MB SDRAM on-board, up to 128MB thru Memory Module
	Memory Module	100-pin B2B interface for 32MB flash (PCM-7230S-030CE interface reserved)	16/32 MB flash and/or 32/64 MB SDRAM
	WDT	PXA-255 Internal (2, 5, 10 Sec as default)	√
	RTC	HT-1381 with rechargeable coin battery	√
	Power Input	DC 8V~28V, with power protect(protect for over voltage, over current & short). Power consumption is 2.8W in SBC typical run mode and small than 50mW in sleep mode.	√
	OS	Microsoft® Windows® CE.NET 4.1 or Embedded Linux ready for project reference (Linux kernel 2.4.19)	√

I/O ports	Serial Ports	Four full-function RS-232 ports and one RS-485 w/ AFC -COM1 full-function transceiver level RS-232 -COM2 full-function transceiver level RS-232 -COM3 full-function transceiver level RS-232 -COM4 full-function transceiver level RS-232 -COM5 RS-485 w/ AFC	- COM1~COM4: Full 9-pin transceiver Level RS232 -COM5: Full function transceiver Level RS-232 or RS-485 w/ AFC
	Ethernet	10/100 BASE-T Ethernet Port	Optional
	USB host port	two USB 1.1 host ports	Optional
	USB Client Port	USB Client Port for ActiveSync function	√
	PCMCIA/CF	One type-II hot-swappable PCMCIA slot	√
	AMI-120 Expansion Bus	Connector for expansion function	Optional
	DI & DO	8 digital input pins & 8 digital output pins. All are TTL level.	√
	Hotkey	8 hotkey pins. All are TTL level.	√

Display	LCD	Tvia 5202G.support 640x480 & 800x600(default) (320x240 & 1024x768 is by project), up to 24 bit, Support STN/DSTN/ TFT Thru Advantech 40-pin connector Image default with LCD: AU, model: 1331010408 10.4" SVGA, TFT,18bit Optional support LCD type: 1) PVI, 6.4" TFT, VGA, 16bit model: 1331006000 2) Nan-Ya 5.7" STN, QVGA, 8 bit model:1339057040 SW LCD type selection utility support	Reserve both PXA-255 LCD controller I/F and Tvia LCD I/F (default)
	LVDS	one channel LVDS signal, thru Advantech standard 20-pins connector.	Optional
	CRT	SVGA at default to align with LCD setting, Pin header output	√
	Video-out	Output NTSC (Default) /PAL(Reserved) S-Video out (Reserved): 2x2 2.00mm pin header Composite video out : 2x1 2.00mm pin header Up to VGA (640X480) resolution support	√

	Video-in	S-Video in (Reserved): 2x2 2.00mm pin header Composite video in: 2x1 2.00mm pin header	Optional
System Part	JTAG	7x1 pin header for upgrade the bootloader in AMD flash.	√
	Inverter	4-pin inverter interface for 5V inverter	√
	touch-screen	4-wire resistive T/S interface. 2x2 2.00mm pin header.	Optional
	Buzzer	For system alarm function. 2.00mm 2x1 pin header	√
	Audio	AC'97 Stereo Audio w/ 2W Amp. - Line-In, Line-Out, Speaker-out and Mic-In	Optional
	SM Bus	For sensing DC power and battery status. 2x2 2.00mm pin header	√
	Backup Battery	For data backup function while main battery is exchanged. Rechargeable coin battery 3.0V, 65mAh.	√

	LED Indicator	On board : IO_VCC3P3 indicator(beside CN12), CF interface busy indicator(beside CN20). Pin header: SYS_VCC3P3, CF card busy indicator, PCMCIA card busy indicator, battery status indicator, LAN link, LAN speed 10/100 indicator.	√
	Headers for system	HW Reset, SW Reset and Sleep/Wakeup 2.00 mm 3*2 pin headers	√
Environ-ment	Operating Temperature	0~60°C (32°~140°F)	-20/-40°~80/90° C
	Operating Humidity	0%~90% Relative Humidity	√
Form factor/ Weight	Form factor	145 mm x 102 mm 3.5" Biscuit Size	√
	Weight	0.1 kg (0.22 lb)	√
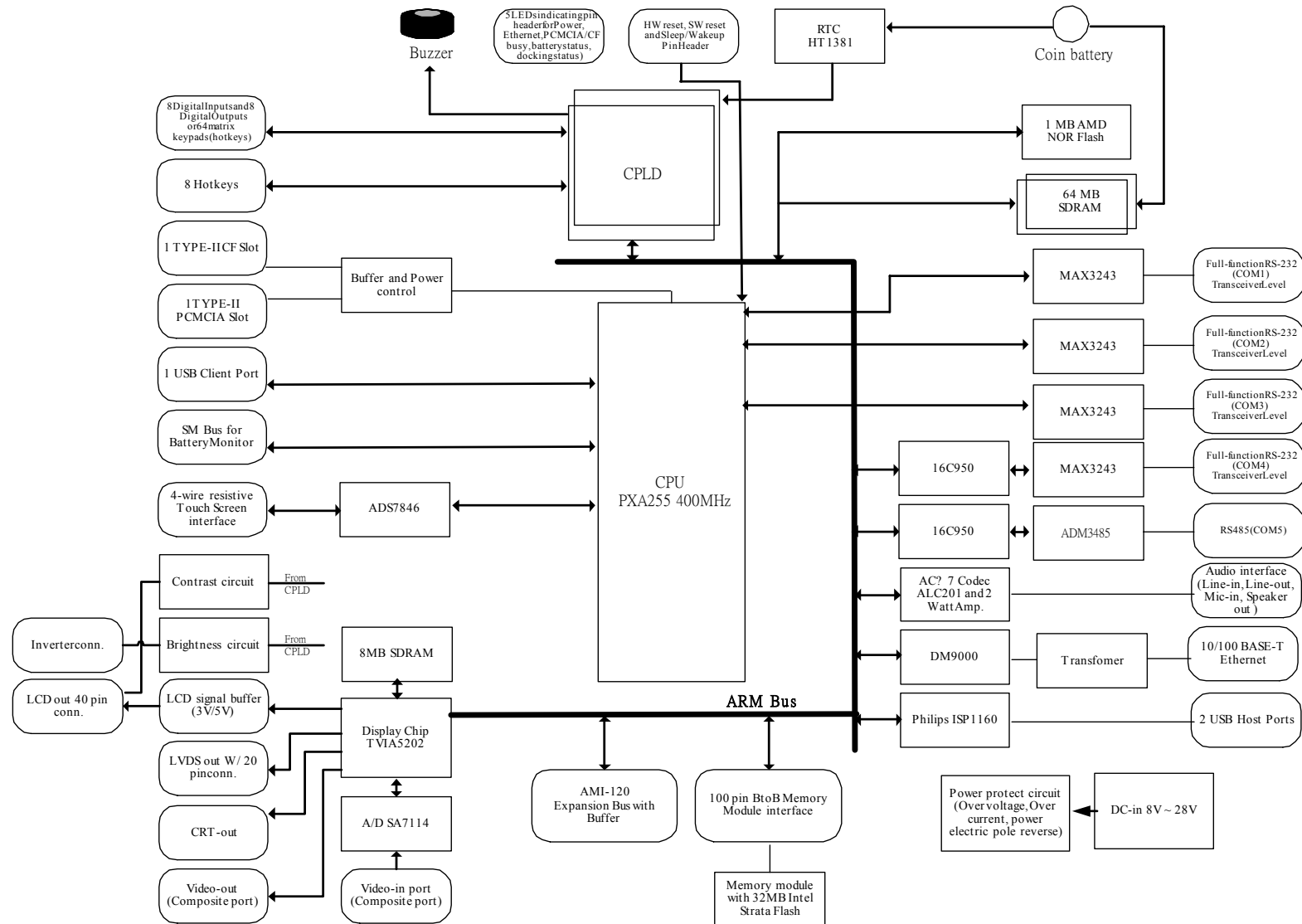
Figure 3.1 The PCM-7230 series Block Diagram

3.1.2 Headers and connectors

This section locates headers and connectors of PCM-7230 and describes their functionality.
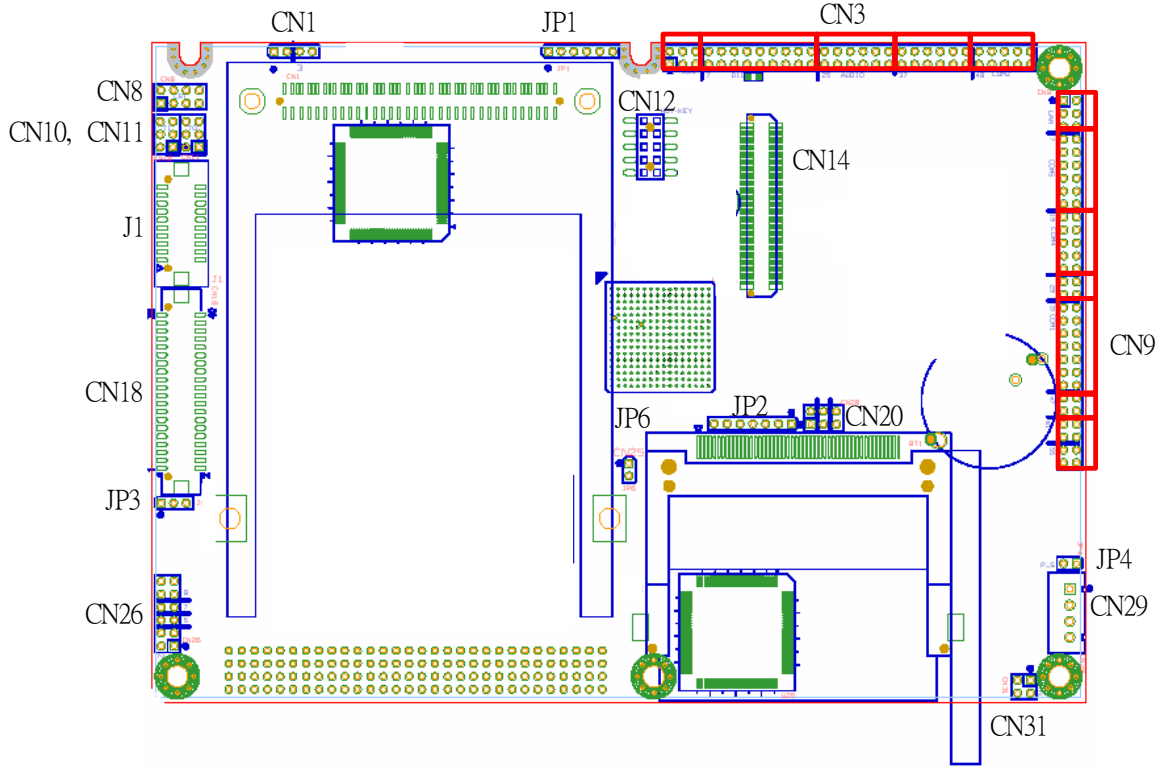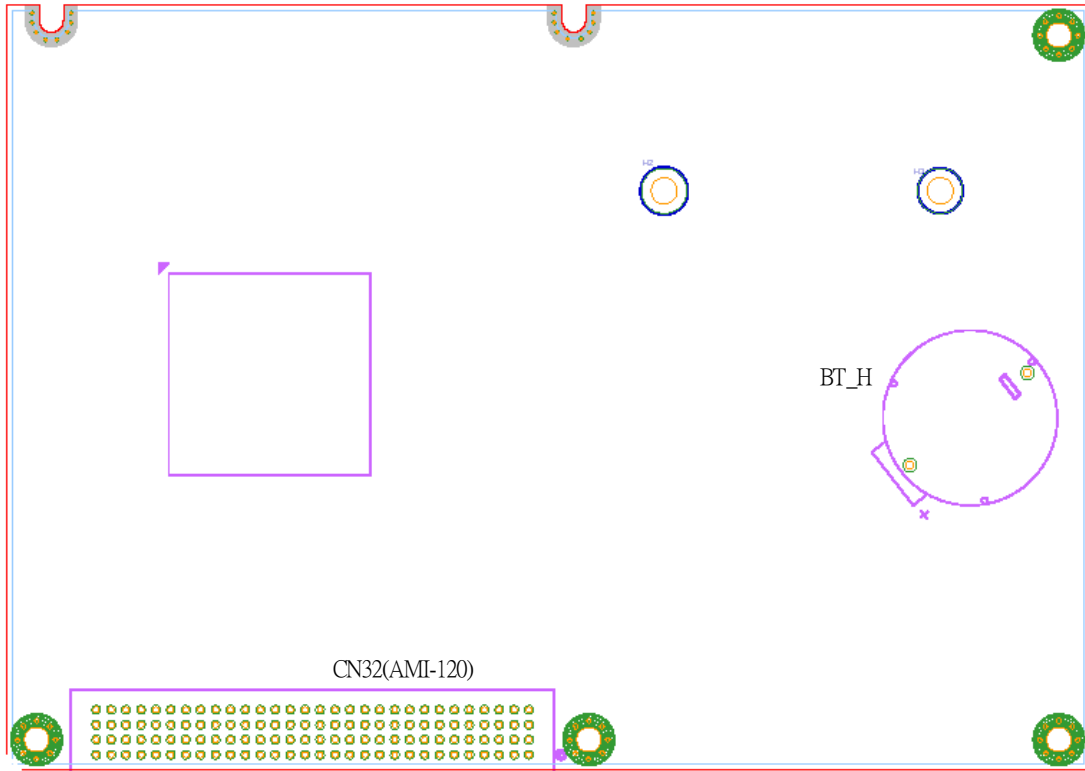
Figure 3.2: Component side of the PCM-7230

Figure 3.3: Solder side of the PCM-7230

Table 3.1 Header Description

Label	Function
JP 1	CPLD JTAG port
JP 2	CPU PXA255 JTAG port
JP 3	LCD signal voltage level select
JP 4	Power switch header
JP 6	Buzzer header
J 1	LCD LVDS connector
CN 1	PCMCIA accessing status port
CN 3	multi-function I/O header(I)
CN 8	CRT-out header
CN 9	multi-function I/O header(II)
CN 10	Video-in port
CN 11	TV-out function port
CN 12	HotKey function header
CN 14	memory module 100-pin board-to-board connector
CN 18	TTL level LCD signal connector
CN 20	LAN status LED header

CN 25	type II CF slot
CN 26	Inverter signals header
CN 29	Power-in connector
CN 31	SM bus port
CN 32	AMI-120 expansion bus connector*

*about AMI-120 bus pin define, please check the Appendix.

3.1.3 Headers and connectors pin definition

Because the board size limitation & wants to keep the flexible of I/O connector placement,

The following lists are I/O pin definitions of PCM-7230 SBC. All the pin headers' pin order is the same as the figure. As you see, the first pin has a white mark on PCB. Except the pin headers, all the other connectors have white mark at 1st pin.
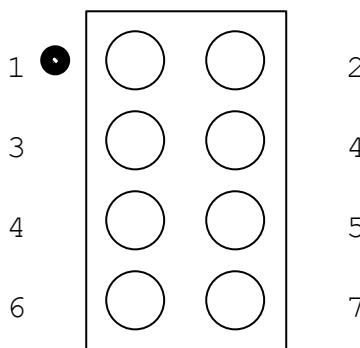
The following tables are the pin definition of all the connectors on PCM-7230 SBC.

★JP 1 : CPLD JTAG port
there are two CPLDs on PCM-7230. Advantech doesn't suggest users to modify the CPLD code. If users have to do it, please contact your distributor or sales representative.

★ JP 2 : CPU PXA255 JTAG port

Pin Number	Pin function	Ps.
1	TCK	
2	TDI	
3	TDO	
4	TMS	
5	nJTAG_TRST	

6	nRESET	

Note: Users can use this port to modify the bootloader.

★JP 3 : LCD signal voltage level select

Pin Number	Pin function	Ps.
1	SYS_VCC	+5V
2	LCD_VCC	power of LCD-signal buffers
3	VCC3P3	+3.3V. VCC3P3 will change to 0V when system enter sleep mode.

Note: when User wants to use CN18 (40 pin TTL level LCD signal) to drive LCD panel, user needs to setup this pin header. If the LCD panel signal is 3.3V then set the 2.00mm jumper at 1-2 pin of JP3; if the LCD panel signal is 5V then set the jumper at 2-3 pin.

★JP 4 : Power switch header

Pin Number	Pin function	Ps.
1	POW_SW_P	connect to power switch positive pole
2	POW_SW_N	connect to power switch negative pole

Note: Only pin 1 is shorted with pin 2 of JP4, the system power is on.

★JP 6 : Buzzer header

Pin Number	Pin function	Ps.
1	SYS_VCC	+5V
2	BUZZER_OUT*	Default is floating. Changed to GND for 500ms when image downloaded well.

Note: Connect Buzzer positive pole at 1st pin & negative pole to 2nd pin of JP6. At default setting, when image is downloaded well, the 2nd pin will change from float status to GND for 500 ms.   If users want to control the buzzer, users can check the memory map of PCM-7230 to do it.

★J 1 : LCD LVDS connector

Pin Number	Pin function	Ps.
1	VCC3P3	
2	VCC3P3	
3	GND	
4	GND	
5	LVDS_TxOUT0-	
6	LVDS_TxOUT0+	

7	GND	
8	LVDS_TxOUT1-	
9	LVDS_TxOUT1+	
10	GND	
11	LVDS_TxOUT2-	
12	LVDS_TxOUT2+	
13	GND	
14	LVDS_TxOUT3-	
15	LVDS_TxOUT3+	
16	GND	
17	LVDS_TxCLKOUT-	
18	LVDS_TxCLKOUT+	
19	GND	
20	GND	

Note: PCM-7230 only supports one channel LVDS signals.

★ CN 1 : PCMCIA accessing status port

Pin Number	Pin Function	Ps.
1	Resv.	
2	Resv.	
3	PCM_RDY	
4	PCM_VR	

Note: If user wants to know the accessing status of PCMCIA slot, user can directly connect the LED positive pole to 4th pin and negative pole to 3rd pin.

★ CN 3 : multi-function I/O header (I)

Pin Number	Pin Function	Ps.
1	SLEEP/WAKEUP	
2	GND	
3	nSW_RESET	Software reset function pin. System software reset is low active & edge trigger.
4	GND	
5	nHW_RESET	Hardware rest. System hardware reset is low active & edge trigger.
6	GND	
7	DI 0*	Digital input bit 0.
8	DO 0*	Digital output bit 0.
9	DI 1*	Digital input bit 1.
10	DO1*	Digital output bit 1.
11	DI 2*	Digital input bit 2.
12	DO2*	Digital output bit 2.
13	DI 3*	Digital input bit 3.
14	DO3*	Digital output bit 3.

15	DI 4*	Digital input bit 4.
16	DO 4*	Digital output bit 4.
17	DI 5*	Digital input bit 5.
18	DO 5*	Digital output bit 5.
19	DI 6*	Digital input bit 6.
20	DO 6*	Digital output bit 6.
21	DI 7*	Digital input bit 7.
22	DO 7*	Digital output bit 7.
23	GND	
24	VCC3P3	
25	SPK_OUT_RP	positive port of right channel speaker-out function
26	SPK_OUT_RN	negative port of right channel speaker-out function
27	SPK_OUT_LP	positive port of left channel speaker-out function
28	SPK_OUT_LN	negative port of left channel speaker-out function
29	LINE_OUT_RP	
30	LINE_OUT_LP	
31	AC97_AGND	
32	AC97_AGND	
33	LINE_IN_L	left channel of audio line-in port
34	LINE_IN_R	right channel of audio line-in port
35	MIC_IN	audio microphone-in port
36	AC97_AGND	
37	nUART3_DCD	
38	UART3_RXD	
39	UART3_TXD	
40	nUART3_DTR	
41	GND	
42	nUART3_DSR	
43	nUART3_RTS	
44	nUART3_CTS	
45	nUART3_RI	
46	VCC_UART3	+5V
47	nRESET_OUT	
48	MODE	reserved for future use. pull-high by 100K resistor.
49	nUART2_DCD	
50	UART2_RXD	
51	UART2_TXD	
52	nUART2_DTR	
53	GND	
54	nUART2_DSR	

55	nUART2_RTS	
56	nUART2_CTS	
57	nUART2_RI	
58	VCC_UART2	+5V

Warning! Be careful when these DI/DO are used. Surge or over voltage may damage the circuits.

★ CN 8 : CRT-out header

Pin Number	Pin function	Ps.
1	Reserv.	reserve for the future
2	CRT _Vsync	
3	Reserv.	reserve for the future
4	CRT _Hsync	
5	CRT_B	CRT blue signal
6	GND	
7	CRT _G	CRT green signal
8	CRT _R	CRT red signal

★ CN 9 : multi-function I/O header(II)

Pin Number	Pin function	Ps.
1	TPTX100P	Lan TX signal
2	TPTX100N	Lan TX signal
3	TPRX100P	Lan RX signal
4	TPRX100N	Lan RX signal
5	RJ45_P4_P5	LAN connector P4 & P5. in order to avoid noise
6	RJ45_P7_P8	LAN connector P7 & P8. in order to avoid noise
7	nUART5_DCD	Reserved. No function right now.
8	UART5_RXD	Reserved. No function right now.
9	UART5_TXD	Reserved. No function right now.
10	nUART5_DTR	Reserved. No function right now.
11	GND	
12	nUART5_DSR	Reserved. No function right now.
13	nUART5_RTS	Reserved. No function

		right now.
14	nUART5_CTS	Reserved. No function right now.
15	nUART5_RI	Reserved. No function right now.
16	VCC_UART5	+5V
17	UART5_485_TXN	Negative signal of RS485 function.
18	UART5_485_TXP	Positive signal of RS485 function.
19	nUART4_DCD	
20	UART4_RXD	
21	UART4_TXD	
22	nUART4_DTR	
23	GND	
24	nUART4_DSR	
25	nUART4_RTS	
26	nUART4_CTS	
27	nUART4_RI	
28	VCC_UART4	+5V
29	XP	X axis positive signal of touch screen function
30	YP	touch screen signal
31	XN	touch screen signal
32	YN	touch screen signal
33	nUART1_DCD	
34	UART1_RXD	
35	UART1_TXD	
36	nUART1_DTR	
37	GND	
38	nUART1_DSR	
39	nUART1_RTS	
40	nUART1_CTS	
41	nUART1_RI	
42	VCC_UART1	+5V
43	GND	
44	VCC_UART1	
45	N.C.	No function
46	N.C.	No function
47	USB_VCC5	
48	GND	
49	SA_BUSB_DPR	
50	SA_BUSB_DNR	
51	USB1_V	USB 1st host power +5V

52	GND	
53	USB1_P	USB 1st host signal
54	USB1_N	USB 1st host signal
55	USB2_V	USB 2ed host power +5V
56	GND	
57	USB2_P	USB 2ed host signal
58	USB2_N	USB 2ed host signal

note: UART5 can be configured as full function RS232 or 2-wire RS485, but Users can't do this change to UART5.

★ CN 10 : Video-in port

Pin Number	Pin function	Ps.
1	TV_IN_AV	Composite video in port
2	GND	Composite video in port
3	TV_IN_S_C	S-Video in port
4	GND	S-Video in port
5	TV_IN_S_Y	S-Video in port
6	GND	S-Video in port
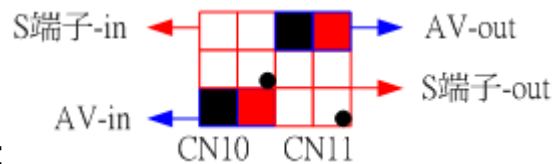
★ CN 11 : TV-out function port

Pin Number	Pin function	Ps.
1	TV_OUT_ LUMA	S-Video out port
2	GND	S-Video out port
3	TV_OUT_ CHROMA	S-Video out port
4	GND	S-Video out port
5	TV_OUT_AV	Composite video out port
6	GND	Composite video out port

★ CN 12 : HotKey function header

Pin Number	Pin function	Ps.
1	HK 1	1st pin of hotkey function
2	HK 5	5th pin of hotkey function
3	HK 2	2nd pin of hotkey function
4	HK 6	6th pin of hotkey function
5	HK 3	3rd pin of hotkey function
6	HK 7	7th pin of hotkey function
7	HK 4	4th pin of hotkey function

Pin Number	Pin function	Ps.
8	HK 8	8th pin of hotkey function
9	GND	
10	SYS_VCC3P3	

note : when HKx connects to SYS_VCC3P3, then hotkey function works. HKx
signals are triggered by rising edge.

★CN 18 : TTL level LCD signal connector

Pin Number	Pin function	Ps.
1	VCC	+5V
2	VCC	+5V
3	GND	
4	GND	
5	VCC3P3	+3.3V
6	VCC3P3	+3.3V
7	LCD_VEE	
8	GND	
9	LCD_D0	
10	LCD_D1	
11	LCD_D2	
12	LCD_D3	
13	LCD_D4	
14	LCD_D5	
15	LCD_D6	
16	LCD_D7	
17	LCD_D8	
18	LCD_D9	
19	LCD_D10	
20	LCD_D11	
21	LCD_D12	
22	LCD_D13	
23	LCD_D14	
24	LCD_D15	
25	LCD_D16	
26	LCD_D17	
27	LCD_D18	
28	LCD_D19	
29	LCD_D20	
30	LCD_D21	
31	LCD_D22	
32	LCD_D23	
33	GND	
34	GND	
35	SHCLK	
36	FLM_VSYNC	
37	M_DE	

38	LP_HSYNC	
39	N.C.	no function
40	ENVEE	

note : User can use JP3 to change the LCD signals level.

★ CN 20 : LAN status LED header

Pin Number	Pin function	Ps.
1	CF_VR	compact flash slot LED indicator, positive pole
2	CF_RDY	compact flash slot LED indicator, negative pole
3	LED_LINK_P	positive pole of LAN link status LED
4	LED_LINK_N	negative pole of LAN link status LED
5	LED_SPEED_P	negative pole of LAN 10/100 speed status LED
6	LED_SPEED_N	negative pole of LAN 10/100 speed status LED

Note: If user wants to know the accessing status of CF slot, he can connect the LED positive pole to pin 1 and negative pole to pin 2.

★ CN 26 : Inverter signals header

Pin Number	Pin function	Ps.
1	SYS_VCC	+5V
2	GND	
3	ENVBK5V	inverter enable signal
4	BLCTRL_SW	backlight strength switch
5	Resev.	reserve pin for future
6	GND	
7	Power_LED	System power LED indicator. +3.3V
8	GND	
9	Resev.	reserve pin for future
10	Resev.	reserve pin for future
11	Resev.	reserve pin for future
12	Resev.	reserve pin for future

Note: If user wants to know the system power status by self-connected LED, he can connect the LED positive pole to pin 7 and negative pole to pin 8.

★CN 29 : Power-in connector

Pin Number	Pin function	Ps.
1	GND	negative pole of power input
2	GND	negative pole of power input
3	DC_IN	positive pole of power

		input
4	DC_IN	positive pole of power input

Note: CN29 is the main power input port. The DC_IN range is 8V ~ 28V.

★CN 31 : SM bus port

Pin Number	Pin function	Ps.
1	I2CSCL	clock pin of SM bus for smart battery
2	GND	
3	I2CSDA	data pin of SM bus for smart battery
4	nDC_IN	This pin is pulled low on PCM-7230 by 2M ohm.

3.1.4 COM1~COM5 serial ports

The PCM-7230 offers four full-functions RS-232 (COM1, COM2, COM3 and COM4) and one RS-485 w/ AFC (COM5) serial communication interface ports. Please refer to Appendix A for their pin assignments.

➢ Automatic Data Flow Control Function for RS-485

The RS-485 in PCM-7230 will automatically sense the direction of incoming data and switch its transmission direction accordingly. Therefore no handshaking signal (e.g. RTS signal) is necessary. This feature lets users build an RS-485 network simply and quickly with just two wires. More importantly, application software previously written for half duplex RS-232 environments can be maintained without need for modification.

➢ Optional Choice

All COM ports are configurable by Advantech. COM1~COM4 are selectable as full 9-pin TTL or transceiver Level RS232. COM5 port might be modified to one 2-wire TTL Level RS-232 serial communication interface ports (default is RS-485 w/ AFC) by Advantech according to customers' need.

3.1.5 LAN: Ethernet Connector(CN9,Pin1~Pin6)

The PCM-7230 is equipped with one Davicom DM9000 10/100 Base-T Ethernet LAN controller. The second and third LED indicators (approach AMI-120 Interface) on board show the Link and Active (Green LED) status of this Ethernet port.

3.1.6 USB client connector(CN9,Pin47~Pin50)

This USB client connector is used to communicate with PC for ActiveSync. Users may connect the PCM-7230 with PC to develop their own applications and download files to PCM-7230.

3.1.7 DC power connector(CN29)

The DC power connector carries 12 VDC external power input and features reversed wiring protection. Therefore, it will not cause any damage to the system by reversed wiring of ground line and power line.

3.1.8 LCD display connector(TTL level:CN18 ; LVDS:J1)

This 40-pin LCD display connector is for LCD connectivity. The PCM-7230 supports both active and passive LCD displays, default is 18-bit 800*600 TFT color panel. The PCM-7230 provides a bias control signal which can be used to control the LCD bias voltage. It is recommended that the LCD bias voltage not be applied to the panel until the logic supply voltage (+5 V or +3.3 V) and panel video signals are stable. Under normal operation the control signal is active high. When the PCM-7230 board's power is applied, the control signal is low until just after the relevant flat panel signals are present. The PCM-7230 supports 5 V and 3.3 V LCD displays. By setting the JP3, users can select the panel video signal level to be 5V or 3.3V according to the LCD panel you used.

3.1.9 LCD inverter connector for 5V inverter(CN26, Pin1~Pin4)

Connect the PCM-7230 with the 5V inverter for adjusting LCD panel's brightness. The voltage range of this signal is from 0 to 5V. When enable backlight is on, the voltage of this signal is 5V; otherwise is 0V. Brightness voltage is adjustable by Advantech SW utility.

3.1.10 Audio connector(CN3,P25~P36)

The PCM-7230 provides audio signals on pin25 ~ pin36 of CN3. These audio signals include Microphone in (mono), Line in/out (stereo) and two speaker-out function.

3.1.11 Battery and DC power status monitor connector(CN31)

With this connector, the PCM-7230 can monitor and report the battery and DC power status thru I2C bus.

3.1.12 4-wire touch-screen connector(CN9,Pin29~Pin32)

Connect the PCM-7230 with the 4-wire touch-screen. The PCM-7230 supports

4-wire resistive touch-screen. Figure 3.7 shows the cable connected to this connector.

3.1.13 8 DI,8 DO pin header (CN3,Pin7~Pin24)　 & HotKey pin header(CN12)

This connector connects the PCM-7230 with the 8 DI & 8 DO. The PCM-7230 has 8-channel digital inputs,8-channel digital outputs and 8 HotKey pins. HotKey function is configurable by Advantech System configurator.

3.1.14 AMI-120 connector (CN32)

The PCM-7230 provides a unique and unified interface, AMI-120-120 (ARM Module Interface) interface, to expand its functionality. The 120-pin AMI-120-120 interface uses PC-104 connector, a 15mm high profile Board-to-Board connector, with different pins definition. Users can use Advantech's standard AMI-120 solution modules or develop your own AMI-120 module for functionality expansion in an easy, flexible, low cost and fast way. The AMI-120 interface is also opened to customized solution modules. For detail information about pin assignment, please refer to Appendix B.

3.1.16 PCMCIA slot (U10)

The PCM-7230 default provides one type II hot-swappable PCMCIA slots in the solder side for CompactFlash card, wireless LAN card, etc.

3.1.17 100-pin board-to-board connector for Memory Module (CN14)

The PCM-7230 can flexible expand its memory size thru this 100-pin B2B connector. It default equips one Memory Module with 32MB Flash (without SDRAM). Users can optional select the Memory Module with 16/32 MB Flash and/or 32/64 MB SDRAM according to their application's size.

Another issue related to the Memory Module is boot priority. Users may put your image files into flash on the Memory Module by Advantech upgrade utility. Users may also put your image files in the CompactFlash card as another choices and boot from PCMCIA or CF slots. In this case user can select not to use Memory Module or use a Memory Module with 64MB SDRAM, totally 128MB SDRAM supported by the PCM-7230 series. *The CompactFlash card always comes the first priority when system is booting*.
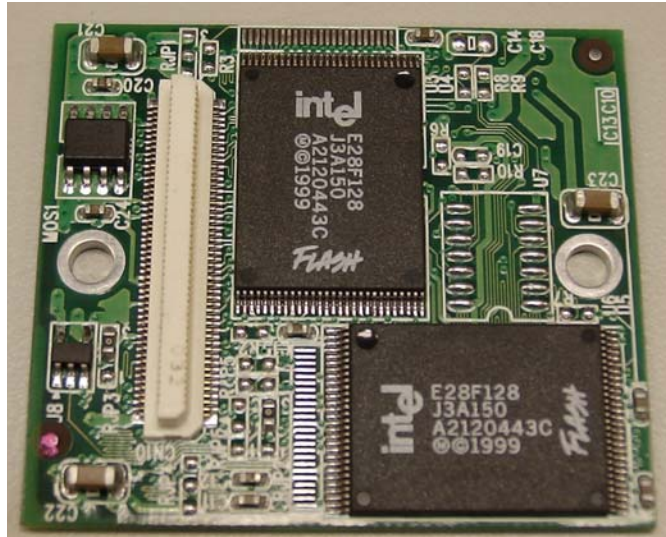
Figure 3.8: Component Side of Memory Module
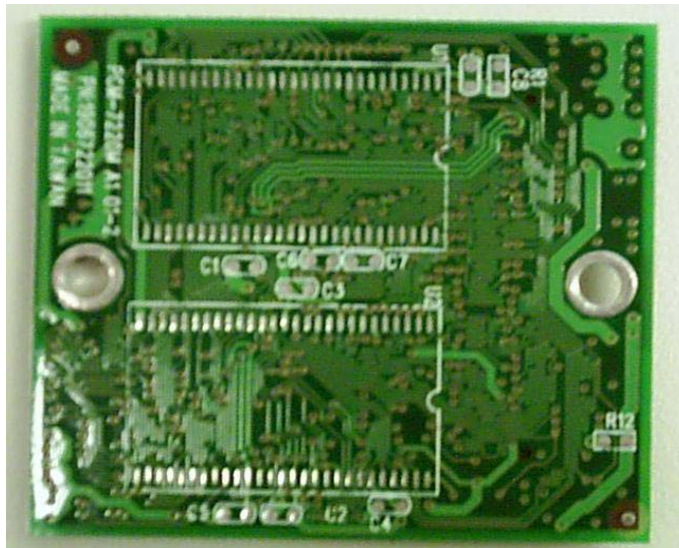
Figure 3.9 Solder side of Memory Module

NOTE: PCM-7230-230CE has one Memory Module w/ 32MB flash, and PCM-7230-030CE has no Memory Module but interface reserved.

3.1.18 Reset Buttons

The PCM-7230 series provide three reset modes, hardware reset, software reset, and sleep/wakeup mode. For hardware reset mode, system will load image file from Flash or CF card to SDRAM and execute the image file again. For software reset mode, system will execute the image file in SDRAM directly without load image file again. For Sleep/Wakeup mode, system will stay at the moment that users press sleep/wakeup button and keep the data users execute, and then

wake up with the same utility/application when system sleep. Figure 3.10 demonstrates the reset modes and boot sequence for PCM-7230 series.

With this sleep mode, users may change system battery and wake up without reboot system. The PCM-7230 Evaluation Kit will default enter sleep mode when system is idled for 2 minutes. Users may change the sleep time in System Configuration. Please refer to Chapter 4 for detail information and operation.

H/W Reset

Load image file to SDRAM

S/W Reset

Run image file in SDRAM

Sleep/Wakeup

Execute utility/application
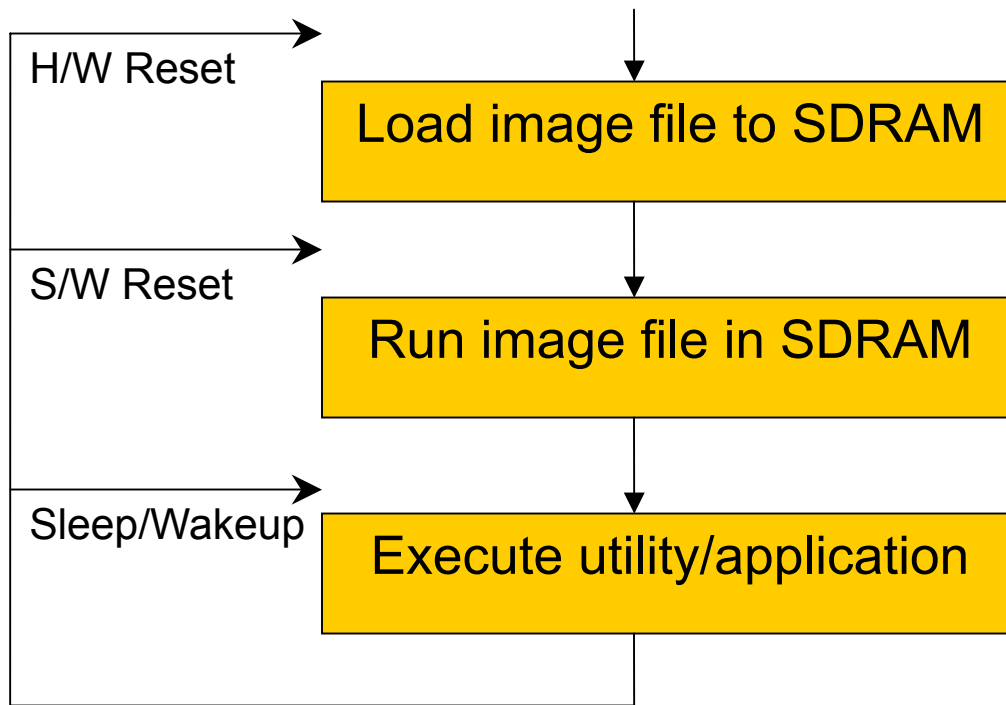
Figure 3.10 Boot sequence and reset mode

3.1.19 Backup Battery (BT_H)

The PCM-7230 series build in one 3.0V, coin-type rechargeable backup battery for external RTC. This backup battery is charging when system power is on. Therefore, users have about 10 minutes to replace main battery without losing data. In order to keep the data in SDRAM when main battery is going empty, Advantech suggests users follow the steps to change main battery:

1. Make sure the backup battery exists.
2. Press the Sleep/Wakeup button. Put system into sleep mode.
3. Replace the main battery with a full-charged one within 1 minutes.
4. Press the Sleep/Wakeup button again to wake up the system.

NOTE: In order to charge this backup battery, users HAVE TO turn on the system periodical. Otherwise the backup battery will go empty and system will lose time/date information.

3.1.21 Form factor

Figure 3.11 shows the form factor of the PCM-7230.
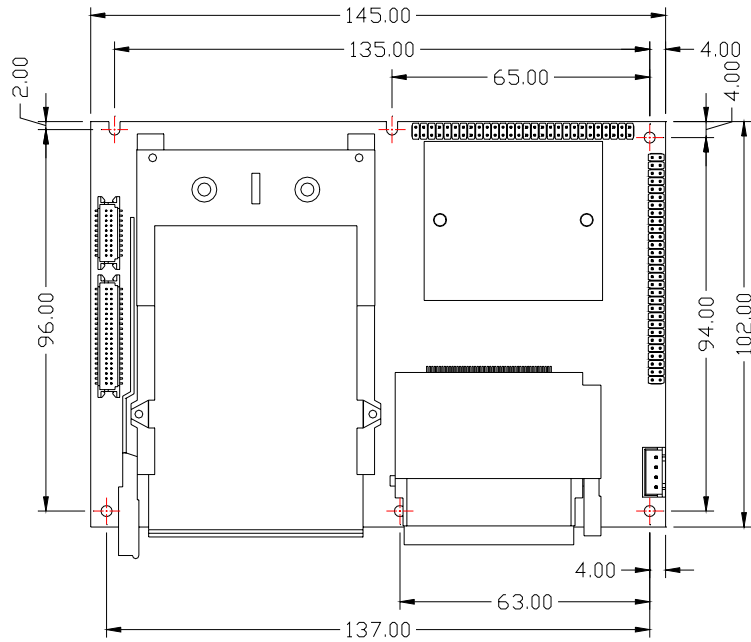
Figure 3.11 Form factor of the PCM-7230

3.1.22 Cable kit

Users may optional purchase cable kit when ordering the PCM-7230 series SBC. (Advantech PN: PCM-7230-CK001), please refer to the Appendix A.

3.2 4-COM AMI-120 module

3.2.1 Function Description

The PCM-7230 Evaluation Kit includes a 4-COM AMI-120 module for RS-232 functionality expansion. The 4-COM AMI-120 Module provides 4 9-pin full-function Transceiver RS-232, expanding the PCM-7230's functionality easily thru the AMI-120 interface. Users may install this 4-COM AMI-120 module to expand RS-232 ports or evaluate the AMI-120 interface for other customized function expansions. Customers may also change these full-function Transceiver RS-232 ports in the 4-COM AMI-120 module to TTL Level RS-232 ports based on ODM projects. Figure 3.13 shows the block diagram of the 4-COM AMI-120 module.
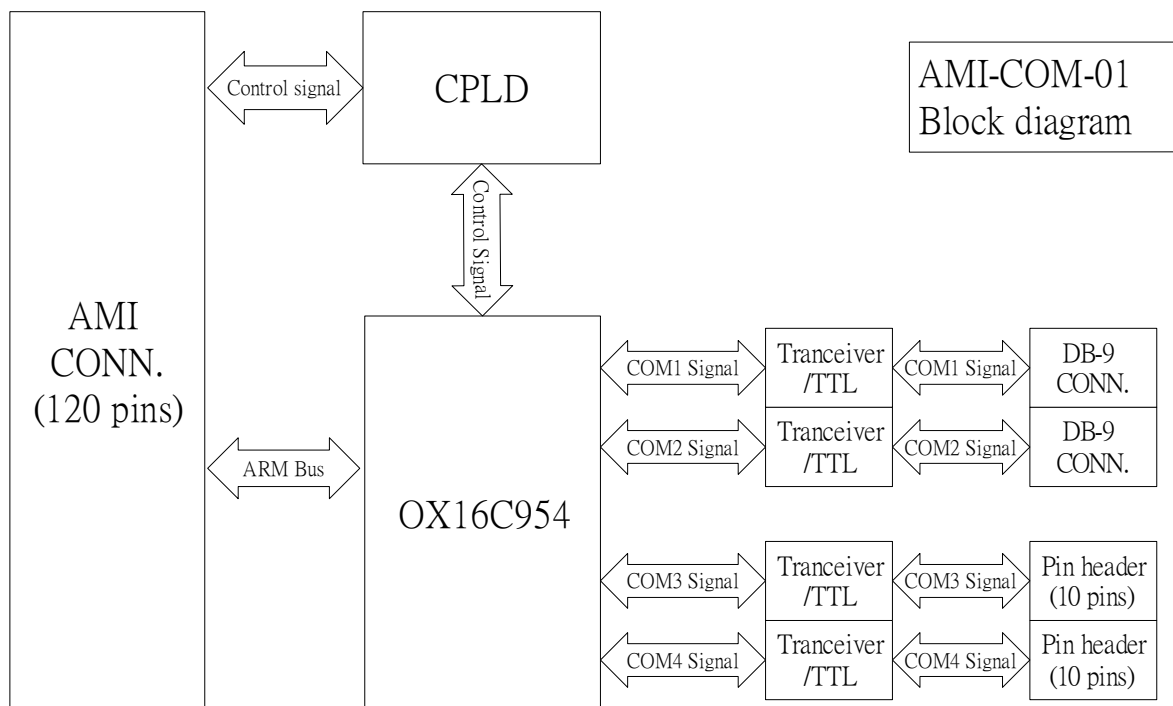
Figure 3.13 Block Diagram of 4-COM AMI-120 module

3.4 LCD and touch-screen

The PCM-7230 supports both active and passive LCD displays thru 40-pin TTL level LCD connector(CN18) and 20-pin one channel LVDS connector(J1) from TVIA display chip. 24-bit VGA/QVGA active/passive color panel is suggested. By setting the JP3, users can also select the CN18 panel video signal level to be 5V or 3.3V according to the LCD panel you used.

The LCD panel in the PCM-7230 Evaluation Kit is a 10.4'', 800(H) X 600(V), 18-bit one channel LVDS SVGA TFT panel (Unipac UB104S01). With the 5V inverter, the PCM-7230 Evaluation Kit is able to adjust LCD's brightness by Advantech's software utility. The voltage range of this signal is from 0 to 5V. When enable backlight is on, the voltage of this signal is 5V; otherwise is 0V. Users may refer to Chapter 4 for detail information. The touch screen in the PCM-7230 Evaluation Kit is a 4-wire touch screen. The PCM-7230 supports only 4-wire touch-screen.

Nevertheless, the specifications of various LCD diversify substantially. The newest supporting list will be included in a progressive technical reference by Advantech. Please contact with local Advantech representatives or surf the website of Advantech: http://support.advantech.com.

3.5 Power system

The power system of the PCM-7230 Evaluation Kit includes charger board, 4S1P, 2000mAH Li-ion battery, adapter and power cord.

Users can only use a 2.5φ19Vdc power adapter to be the PCM-7230 Evaluation Kit's power input. The 4S1P, 2000mAH, rechargeable Li-Ion battery pack can also provide the PCM-7230 power input through the charger board. Thru the smart battery interface (SM Bus), users can get the battery information such as battery capacity, charging status and so on by Advantech's software utility. When the battery capacity is not full, the charger board will automatically charge the battery pack if the 19Vdc power adapter plugged, no matter the power switch turns on or off.

There is one 3.0V, coin-type rechargeable backup battery on the PCM-7230 SBCs. This coin battery is mainly for external RTC of the PCM-7230. When the power switch is on, the external DC power will automatically charge this coin battery. When system is closed or in sleep mode, this backup battery will provide power for RTC to keep time/date information. However, *users should periodically turn on the power switch and plug the adapter in order to charge both the coin battery and Li-Ion battery.* Otherwise you will lose all time/date information. The coin battery can also help users to replace empty Li-Ion battery. Please refer to 3.1.20 for detail steps.

4

Software Functionality

This chapter details the Windows®

CE.NET operating system on the

PCM-7230 series products.

Sections include:

• Introduction

• Windows® CE.NET utility on the

 PCM-7230 Evaluation Kit

• PCM-7230 Networking Utilities

• Intel® Persistent Storage Manger (IPSM)

• Application Program Development

• Windows® CE.NET Components

4.1 Introduction

The PCM-7230 is a single board platform that integrates complete I/O and Windows® CE.NET operating system. The Windows® CE.NET is a compact OS that occupies less storage space or system resources compared with other operating systems such as Windows® NT or Windows® XP. By its modular nature, it is possible to choose those functions that are useful for specific application. Not only reducing the system resources required, it also reduces start-up time. In the field of embedded applications, this is an appealing feature because the impact of downtime would be minimized.

Furthermore, the small storage space it needs makes OS on solid-state disk possible, which implies higher robustness to harsh environments.
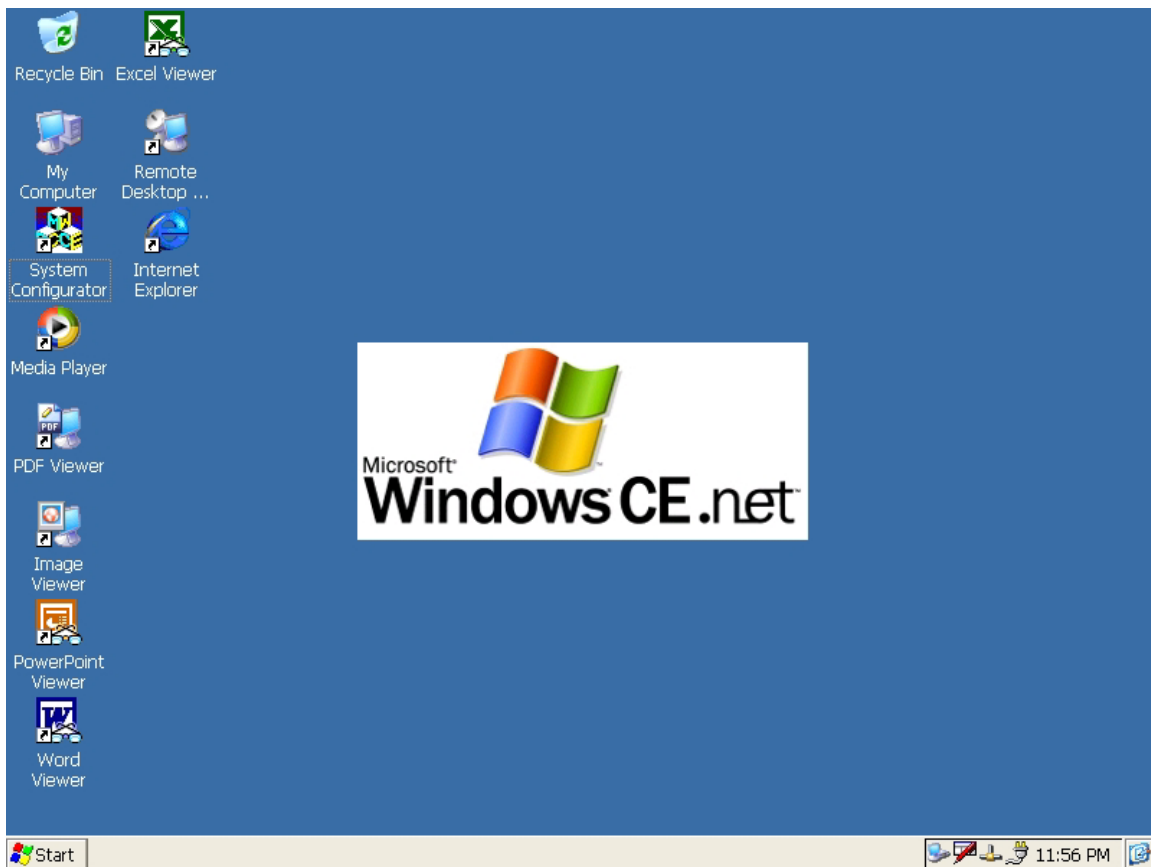
Figure 4.1 Windows® CE.NET on the PCM-7230

4.2 PCM-7230 Utilities

There are several useful utilities added in the standard Windows® CE.NET OS of the PCM-7230:

4.2.1 Notepad

Although reading, writing or editing a text file is supposed a trivial function, there is not a useful text file editor in the standard Microsoft® Windows® CE.NET OS. The utility "Notepad" is an east-to-use text file editor. It can smartly handle the difference between Unicode text and ASCII-code text then seamlessly save as file of their original formats. From the Windows® CE.NET status bar, tap "Start/Run". Use the soft-keyboard to type "notepad" command in the command text box and press "OK" then the text file editor pops up.

Figure 4.2 Notepad

4.2.2 Regflash

The utility "Regflash" is a convenient tool to save, overwrite or delete registry data, as well as erase the content of IPSM folder. From the Windows® CE.NET status bar, tap "Start/Run". Use the soft-keyboard to type "regflash" command in the

command text box and press "OK". There are four selections here:

Save to Flash, Delete from Flash, Save to CF Disk, Erase IPSM.

Choose the options you want and press "Save" button to proceed. "Save to Flash" option was used to save the registry setting to on board flash ROM. In contrast, "Delete from Flash" option was intended to erase the on board registry data. "Save to CF Disk" option would save the registry data to CompactFlash card as a file "wince.reg". "Erase IPSM" option erase the IPSM region of the on board flash.

Note: Please be careful using this utility "Regflash". This utility is able to overwrite all registry data.
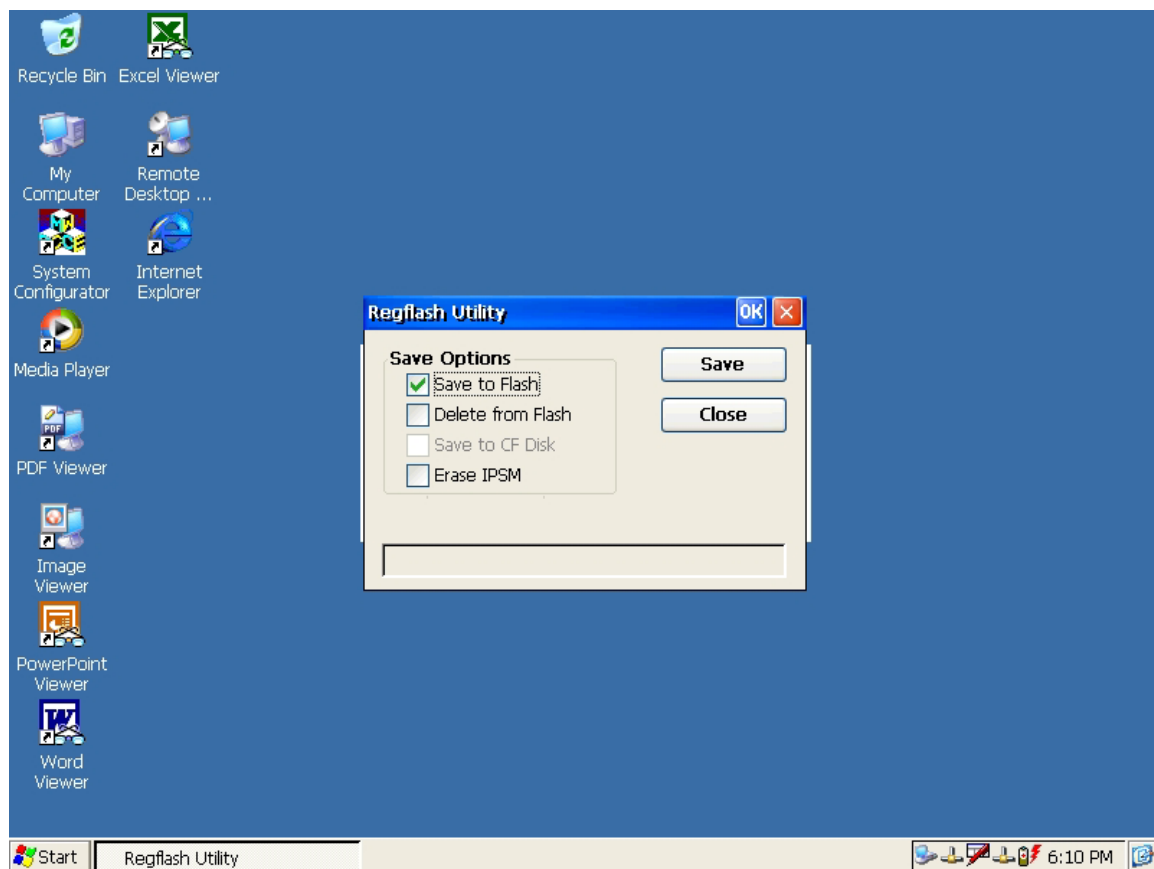
Figure 4.3 Regflash

It is important to keep the power normal during "Save to Flash" process. If the power were broken down during the registry saving process, then the registry would be lost and corrupted. On the next time you turn on PCM-7230, the system would load the default registry setting rather than the previously customized registry setting.

4.2.3 Reboot

The utility "Reboot" is a convenient tool to reset the system. From the Windows$^{®}$ CE.NET status bar, tap "Start/Run". Use the soft-keyboard to type "reboot" command in the command text box and press "OK". The other ways to reboot are clicking the "Reboot" button on the Watchdog page of the built-in utility System Configurator and hardware reboot button.
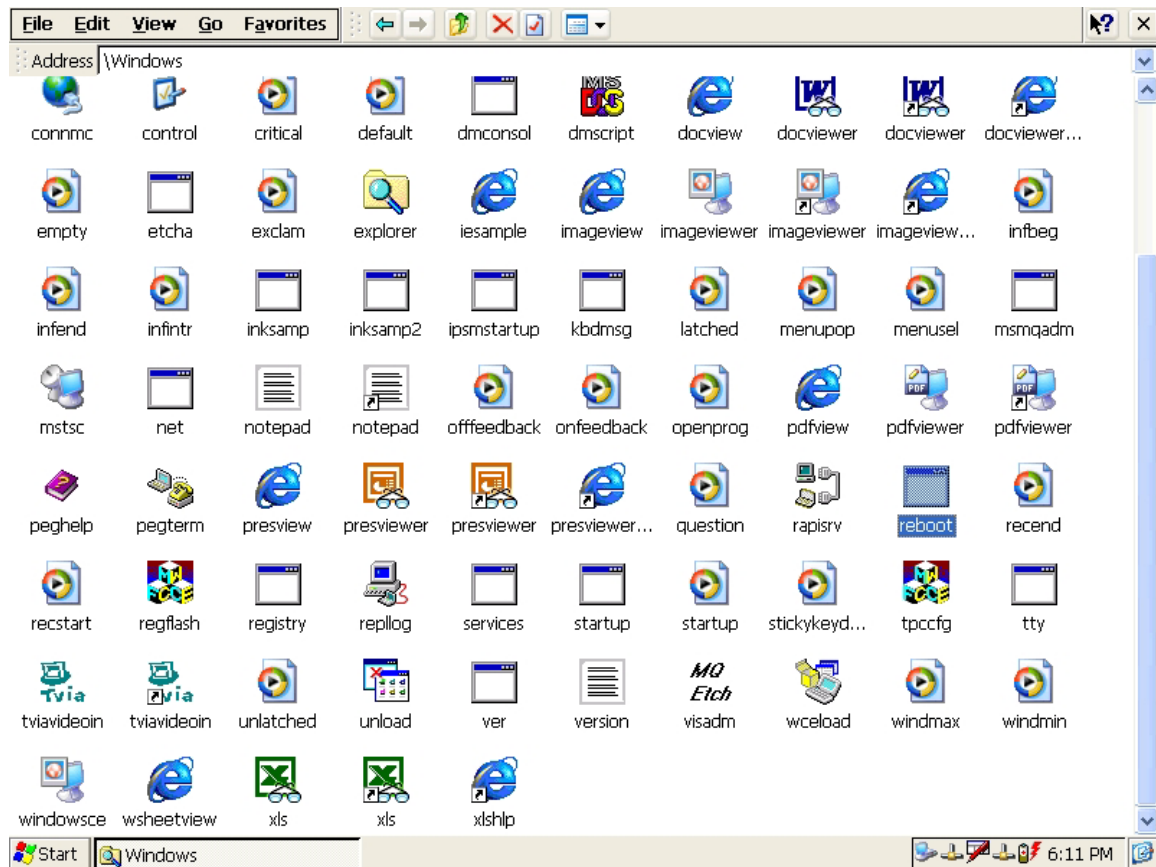
Figure 4.4 Reboot the system

4.2.4 Startup execution

The PCM-7230 has a useful function call "Startup execution". After the system boot up, the startup execution function would automatically perform. This function is useful for control system to do the initialization processes or some other procedures. In PCM-7230, there are two ways to perform "Starup" function.

Method 1:

Step1: Create "startup" directory in CompactFlash card or in "\IPSM\".

Step2: Copy executable files to "startup" directory that is created in Step 1.

Example:

We copy two executable files "REGFLASH.exe" and "Notepad.exe" in "\IPSM\Startup", and then reboot the system. After the system boot up, the two executable file would automatically execute.

Method 2:

Step1: The same as Step1 in Method 1.

Step2: Create a file called "startup.ini" in "startup" directory. Type in the commands you want to execute after boot up in that file.

Example:

Create "Startup.ini" in "\IPSM\Startup" directory and reboot the system. The content of startup.ini was listed below:

\windows\tty.exe

\windows\registry.exe

After the system reboot, "\windows\ tty.exe" and "\windows\ registry.exe" would automatically execute. Be sure that the two methods are independent. It means they can be used simultaneously.

4.2.5 Safemode

PCM-7230 utilities allow user to alter registry setting, and save it by either "regflash.exe" or the registry frame of the "Misc" page of the System Configurator. But sometimes user may make some non-appropriate registry setting, and cause PCM-7230 fail to boot. In the circumstance, the easiest way to boot up PCM-7230 is to use the default registry setting from the Windows® CE.NET image. When the PCM-7230 is booted up with the default registry setting, we say that it is working in "safemode". To enter "safemode", user must perform several steps as described below:

Step 1: Create a file whose filename is "safemode" or a directory whose name is "safemode" in the CompactFlash card.

Step 2: Insert the CompactFlash card into the PCM-7230.

Step 3: Turn on the power switch of PCM-7230.

4.2.6 System Configurator

System Configurator is an outstanding utility designed by Advantech Windows®
CE.NET software team. It is an integrated environment where user can get useful
system information as well as configure favorite system settings and apply system
control function on demand. Double click the icon of System Configurator on the
desktop to open the PCM-7230 utility. Following sections illustrate the functions of
System Configurator.

4.2.6.1 General

The memory information including DRAM, CF Disk and IPSM FLASH are
displayed in the General page. And the versions of each part of the installed
embedded OS, including Windows® CE.NET, Registry, Bootloader and System
Configurator respectively.
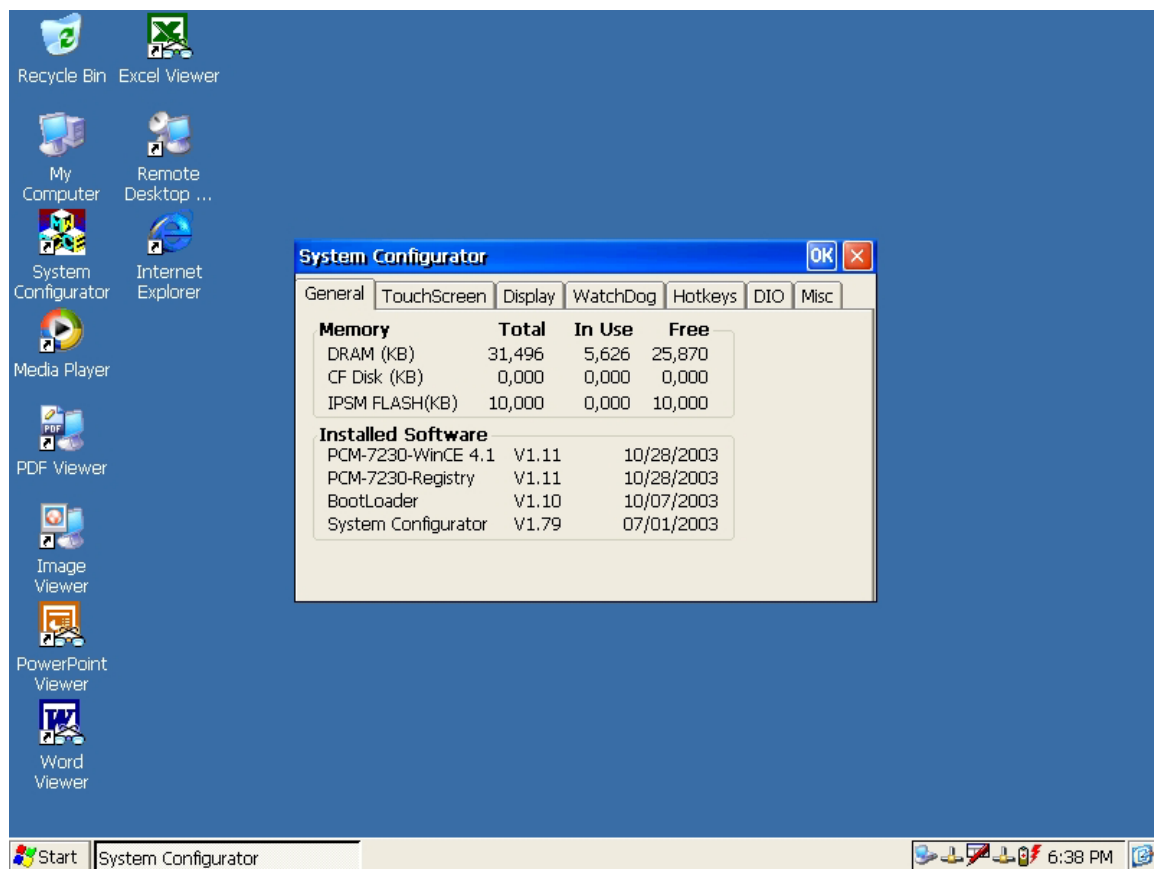
Figure 4.5 General information

4.2.6.2 Touch-screen

The Touch-screen page provides the calibration function. Click the "calibration"
button, the "Stylus Properties" windows would appear. Then click "calibrate"
button in the Stylus Properties window to enter calibration process. In the
calibration process, user taps on the center of the target on the screen then the

target will move to the next position. After calibration, press "OK" to leave Stylus Properties window, and then the Regflash utility process would automatically start to save the registry setting.
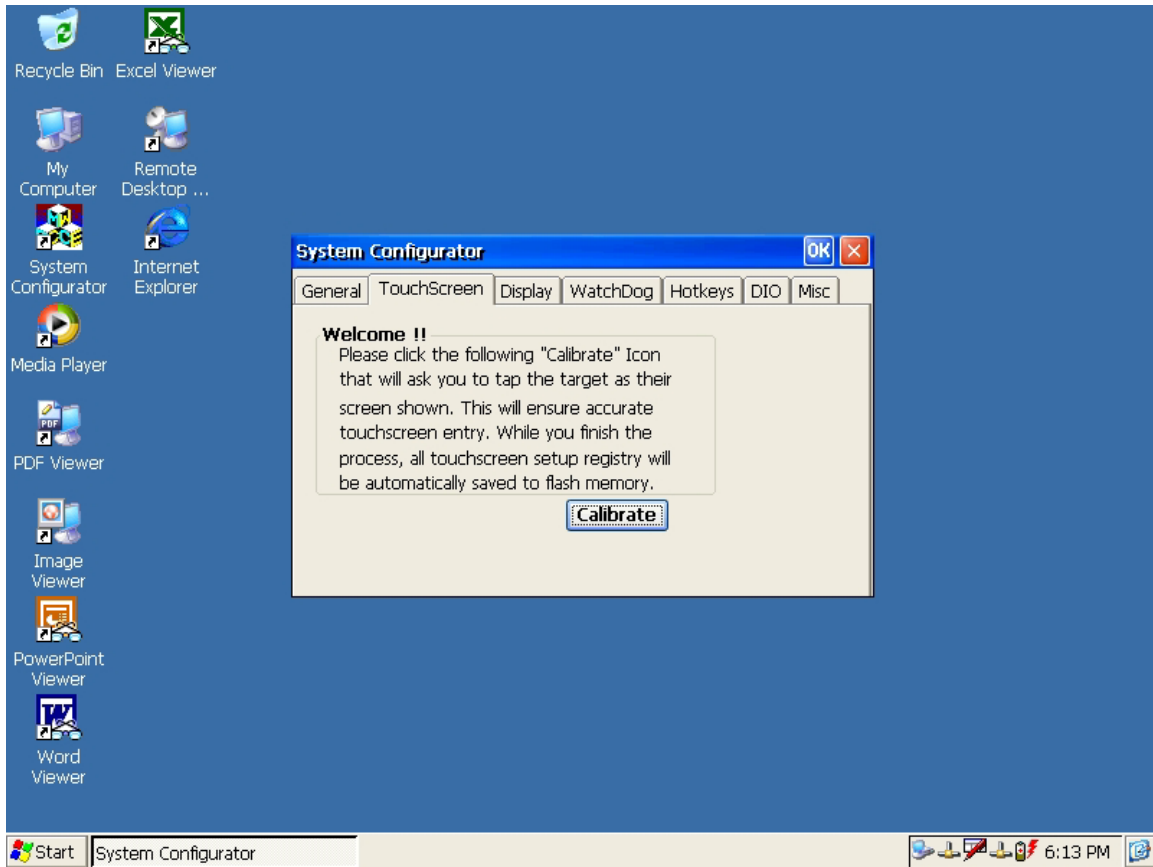
Figure 4.6 Touch-screen calibration

4.2.6.3 Display

From time to time it is unnecessary to turn on the display attached to the PCM-7230 all the day. The Display page provides several frequently used functions such as turning off the LCD and backlight to elongate the display repair period, adjusting brightness or contrast. For example, if user wants the backlight turn-off setting function, he can press "setting" button. Then the backlight page of Display Properties of Control Panel will appear on the screen. Besides, user can click the "Off Now" button to turn off the backlight of the display panel immediately without waiting. Once the backlight was turned off, there were three inputs to turn it on: (1) mouse; (2) keyboard; (3) touch-screen; user can use any one of them to turn on the display. The lower "Brightness" and "Contrast" blocks have scroll bars by which users can tune brightness level of TFT LCD or the contrast level of passive matrix LCD.
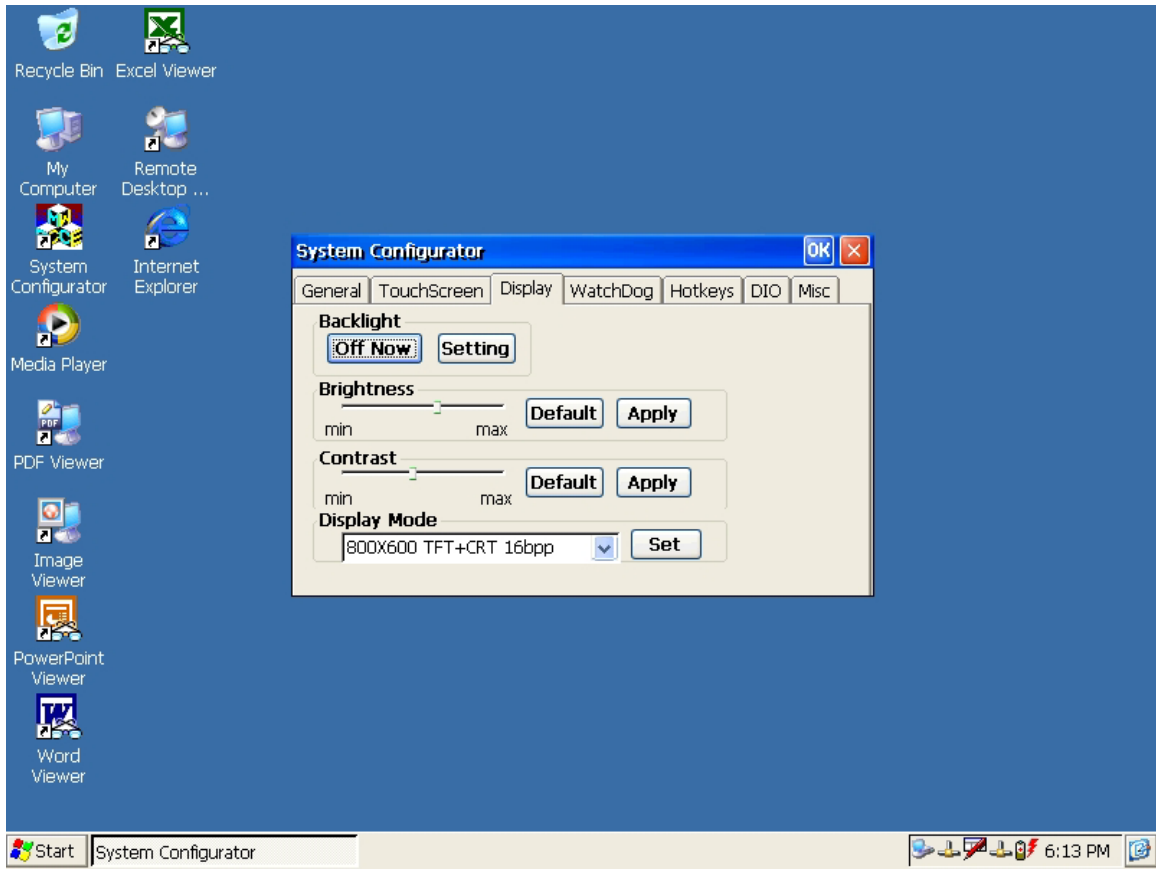
Figure 4.7 Display controls

The lowest block is "Display Mode". The PCM-7230 supports 2 display modes including:

• 800x600 TFT+CRT 16bpp (Default)
• 640X480 TFT+CRT+TV (NTSC)

As new display mode is set, we must take H/W reset or S/W reset to reboot to activate new display mode setting.
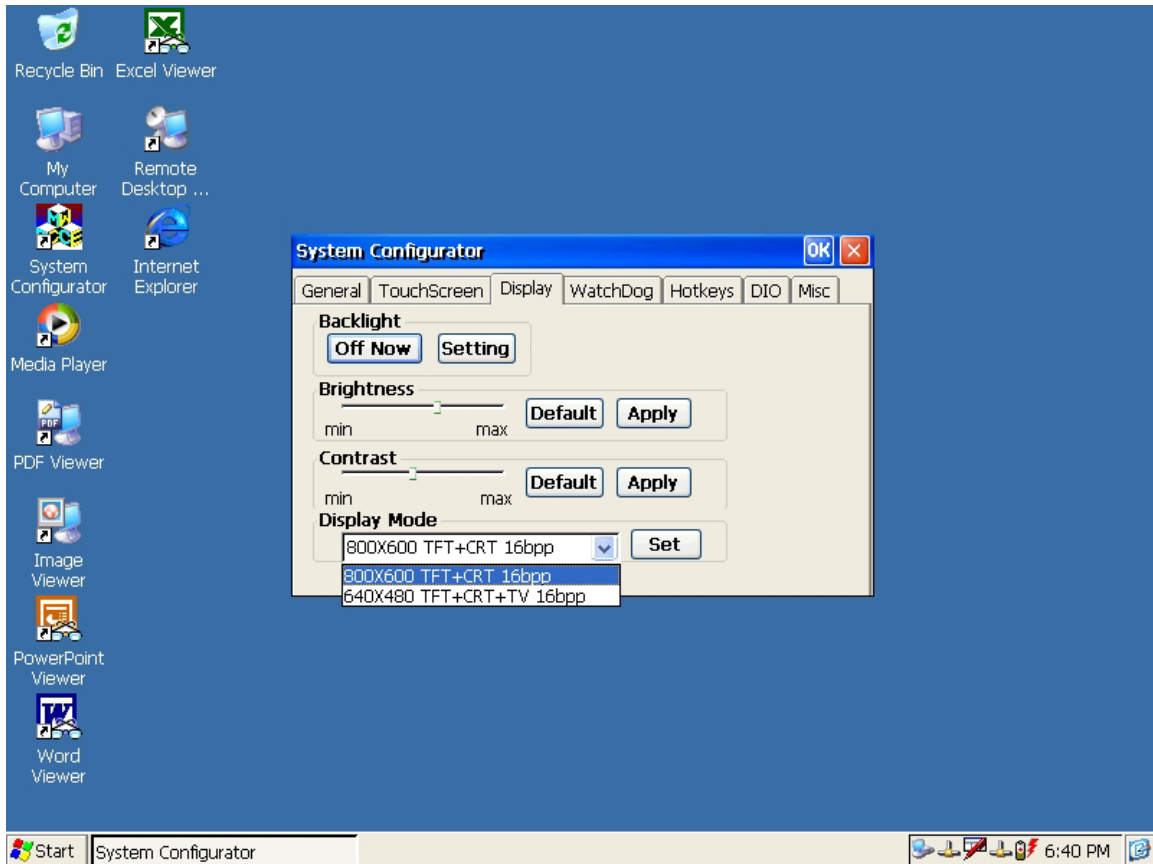
Figure 4.8 Display mode setting

4.2.6.4 WatchDog timer

It is important in industrial applications that the control systems are rarely crashed, or are capable of self-reset if they are halted somehow. Watchdog function of automatic resetting system is therefore provided in PCM-7230. There is a timer inside the watchdog function. User's AP could invoke the associated APIs in Watchdog function to start the timer, then Watchdog function would repeat the countdown of the specified period of time to reboot the system if the user's AP does not clear the timer in time periodically. The Watchdog function in the PCM-7230 provides eight different time intervals: 2 seconds, 5 seconds, 10 seconds, 30 seconds, 60 seconds, 2 minutes, 5 minutes and 10 minutes. The "Enable" button is used to simulate the Watchdog function. Detail programming guide is illustrated at section 4.5.4. The "Sleep" button could make the system enter suspend mode as "Suspend" of "Start" could. Press the "SoftReset" button will cause system warm boot that clears DRAM, reloads all drivers and refresh the newest registry settings. Press the "REBOOT" button will cause the system cold boot.
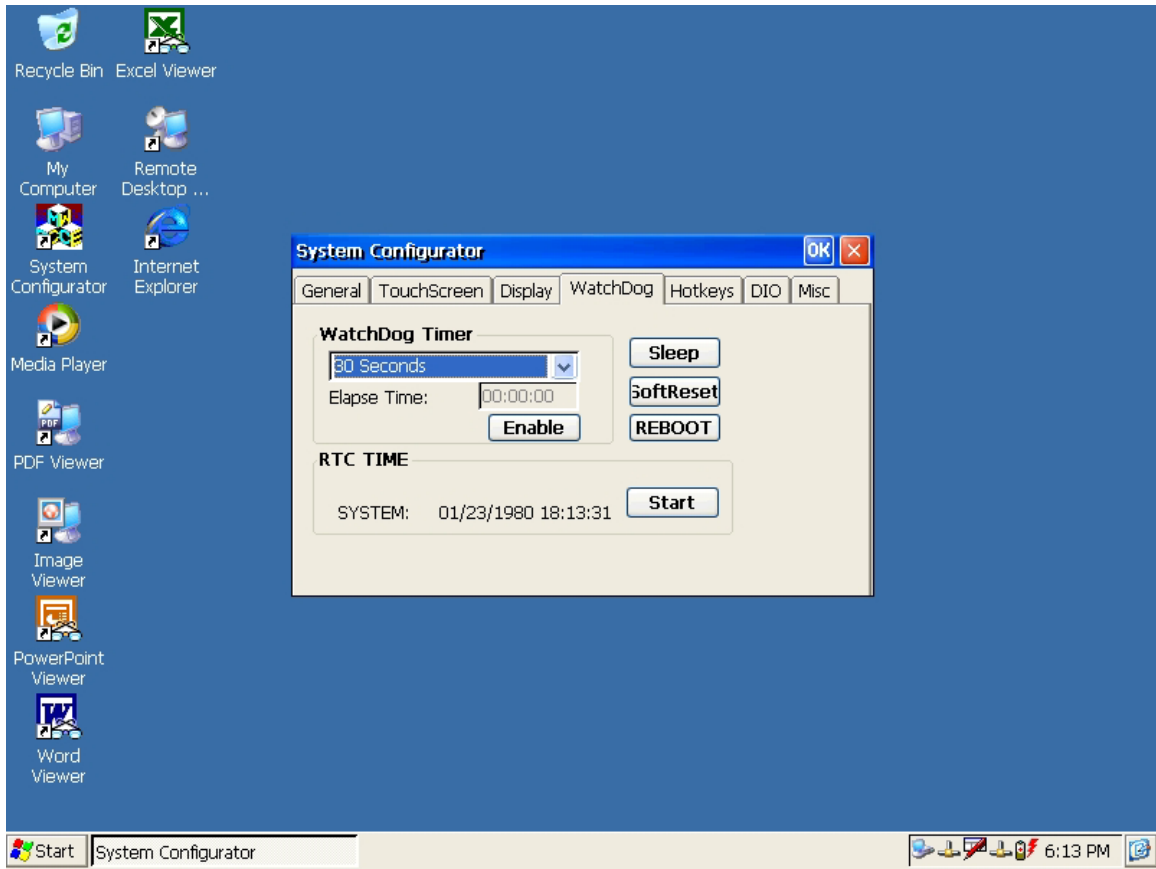
Figure 4.9 Watchdog timer

4.2.6.5 Hotkey

There are 8 Hotkeys reserved for users on the PCM-7230. These Hotkeys are assigned to invoke different application programs as defaults:
Hot key 1: invokes Windows Explorer
Hot key 2: invokes Advantech homepage
Hot key 3: invokes System Configurator
Hot key 4: invokes Windows Media Player
Hot key 5: invokes Control Panel
Hot key 6: invokes Command prompt
Hot key 7: invokes Calibration dialog
Hot key 8: invokes repllog.exe
These settings can be freely revised by keying in new paths in the edit boxes.
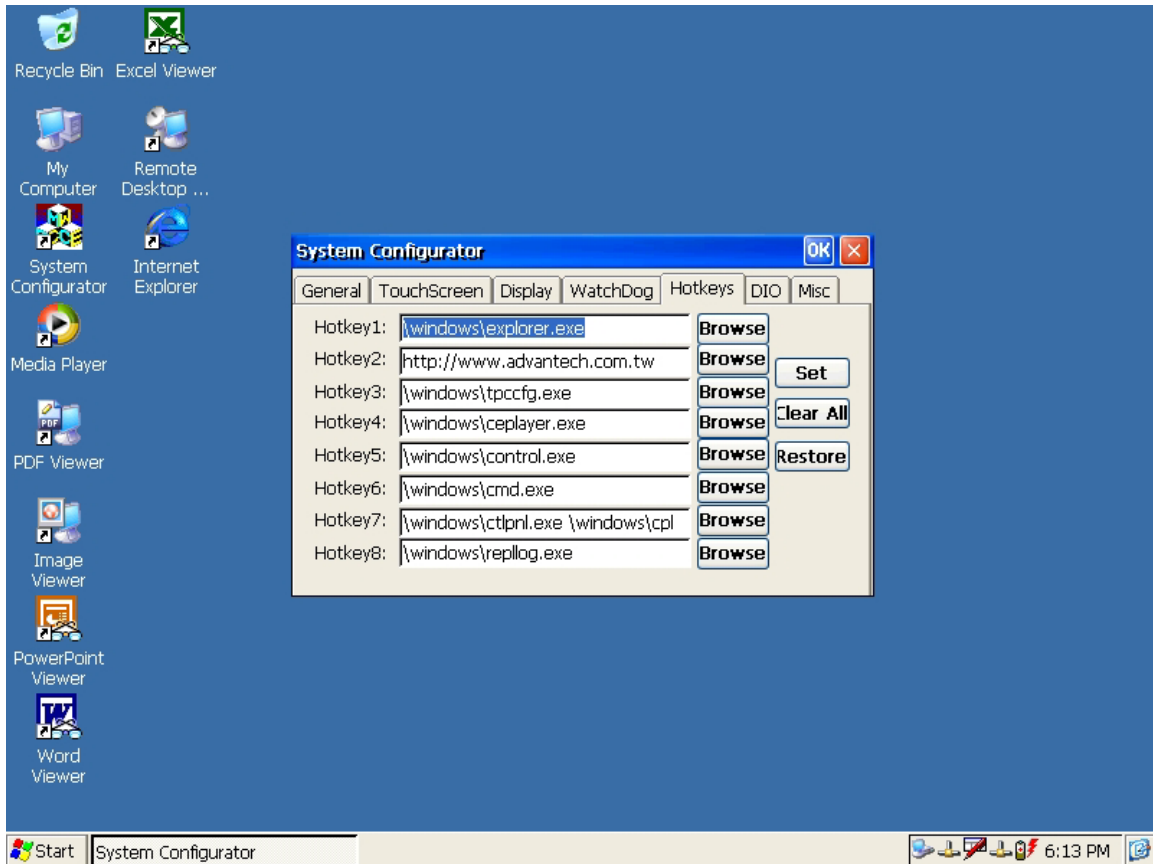
Figure 4.10 Default function key settings

4.2.6.6 DIO

There are 8 digital inputs and 8 digital outputs. This DIO page of the System Configurator can show their status. When the "Start" button is pressed, the 8 DI will try to retrieve external inputs, then those pins having positive inputs will mark respective radial buttons inside the "Digital Input Status" block, others will make their radial buttons empty. On the other hand, when users use mouse, finger or stylus to check some of the 8 check boxes, the level of the related DO pins will be changed to positive level. The DO pin status will sustain until users change them again.
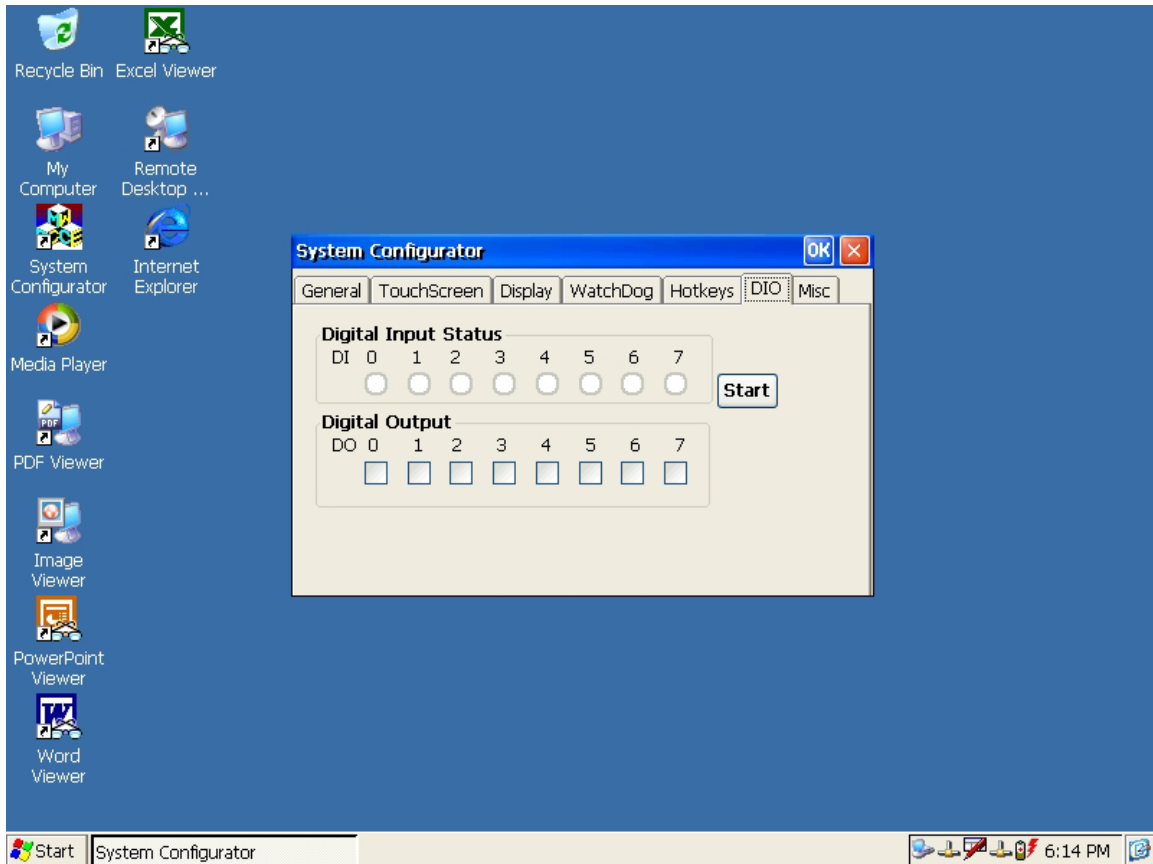
Figure 4.11 DI/DO verification

4.2.6.7 Miscellaneous

The Misc page provides several functions as described below. The "Registry" block provides registry save and registry view function. The "A. Sync" button invokes ActiveSync to the host computer. The "USB Host" block provides USB port power reset function. "The "HTTP Server Root" block was used to specify the root directory of http server. The default directory is "\windows\www\wwwpub", user can specify another directory by type the directory in the edit box and press "Set" button. The new setting would become effective after the system reboot. The "CF Disk Folder Name" block specifies the folder name of the storage card inserted. The default name is "Storage Card". User can specify another directory by type the directory in the edit box and press "Set" button. The new setting would become effective after the system reboot. The "MAC ID" block shows the network MAC address. The "COMM" block provides the communication functions, including IPConfig and Pinging Yahoo.
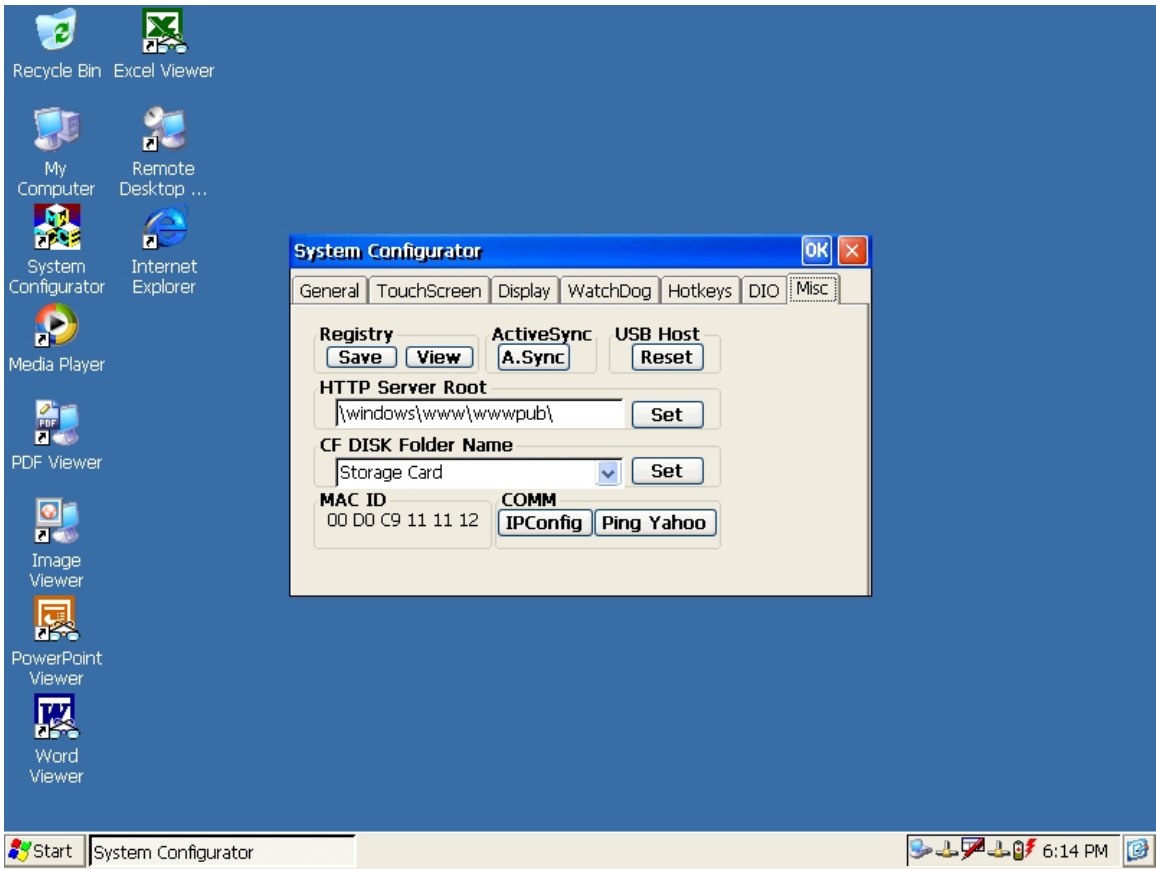
Figure 4.12 Miscellaneous settings

4.3 PCM-7230 Networking

4.3.1 Networking via Ethernet

The PCM-7230 builds in one 100Base-T Ethernet controller. It appears at "Control Panel/Network and Dial-up Connections" via "DM9CE1". User can configure its Ethernet support as follows:

1. Click "Start/Settings/Control Panel"

2. Double click "Network and Dial-up Connections"

3. This window will display all available connections. Pressing the connection icon, its pop-up menu appears and users could disable, rename or modify properties from there.

4. If the PCM-7230 is a node of the LAN with DHCP servers, it is now available.

5. If the PCM-7230 is a node of the LAN with fixed IP, the user has to consult with MIS to get specific IP addresses. Then fill them into the associated fields of the Properties Dialog that could be popped up by the properties item of the step 3 above. Then use the "Regflash" utility to save this changed registry. Reboot the system, the Ethernet functions would be available as previous configuration.
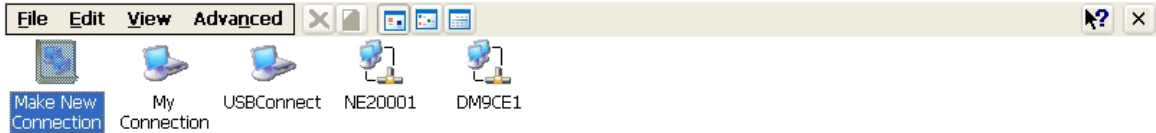
Figure 4.13 Networking via Ethernet

4.3.2 Networking via USB port

The PCM-7230 supports USB port direct-connections to host computer. The host computer must install the Microsoft ActiveSync service offered by Microsoft. Use the USB cable to connect the USB ports of them. Then activate ActiveSync service on the host computer. The host will automatically scan the USB ports to make a connection.

1. Make sure the Microsoft ActiveSync service and the Microsoft embedded Visual Tools are properly installed in the host PC.

2. Connect the USB ports of the host PC and the PCM-7230 by a USB ActiveSync cable and USB cable.

3. If users are using the Microsoft eMbedded Visual Tools to develop Windows® CE.NET application runtimes, make sure the PCM-7230 SDK provided in the PCM-7230 support CD is also properly installed in the host PC.

4. Click "Start/Settings/Network and Dial-up Connections"

5. Make a new connection. As the dialogue box pops out, choose the default "Direct Connection" radial button. Click "Next".

6. Select "USB Cable" from the combo box and click "Finish" to complete making new connection. It is recommended to keep the default settings of the ports connection.

7. Click "PC Connection" icon in the Control Panel. As the "PC Connection Properties" dialogue box pops up, change the connection to the newly made connection by clicking the "Change..." button.

8. If the ActiveSync service on the host PC has been activated, the above seven steps will make the PCM-7230 automatically try to connect the host, ;otherwise you can invoke "\windows\reglog.exe" to do the activesync connection.

NOTE: Users should properly install the associated USB driver on the host computer while plugging in the PCM-7230 as a USB client device at the first time.

NOTE: The USB driver--wceusbsh.inf and wceusbsh.sys--are included in PCM-7230 support CD.

NOTE: Users may also use COM ports to do ActiveSync function thru RS-232 cable but may not be fully supported.

Figure 4.14 Networking via USB port

4.3.3 Networking via PPP

The PCM-7230 supports PPP protocol. To setup and utilize it, follow the steps below:

1. Click "Start/Settings/Network and Dial-up Connections"

2. Make a new connection. As the dialogue box pops out, choose the "Dial-Up Connection". Click "Next".

3. Click "Configure" to setup the device according to the specification of your modem, and then click "OK" on the top-right corner of the window.

4. Click "Next". Input the telephone number in the "Phone Number" window. Press "Finish" to complete the setup process.

5. Turn on your modem and use RS-232 cable to connect modem and COM1 of PCM-7230.

6. Double click the connection you have made in Step 4. Key in the user name,

password and domain for the dial-up connection and press "Connect".
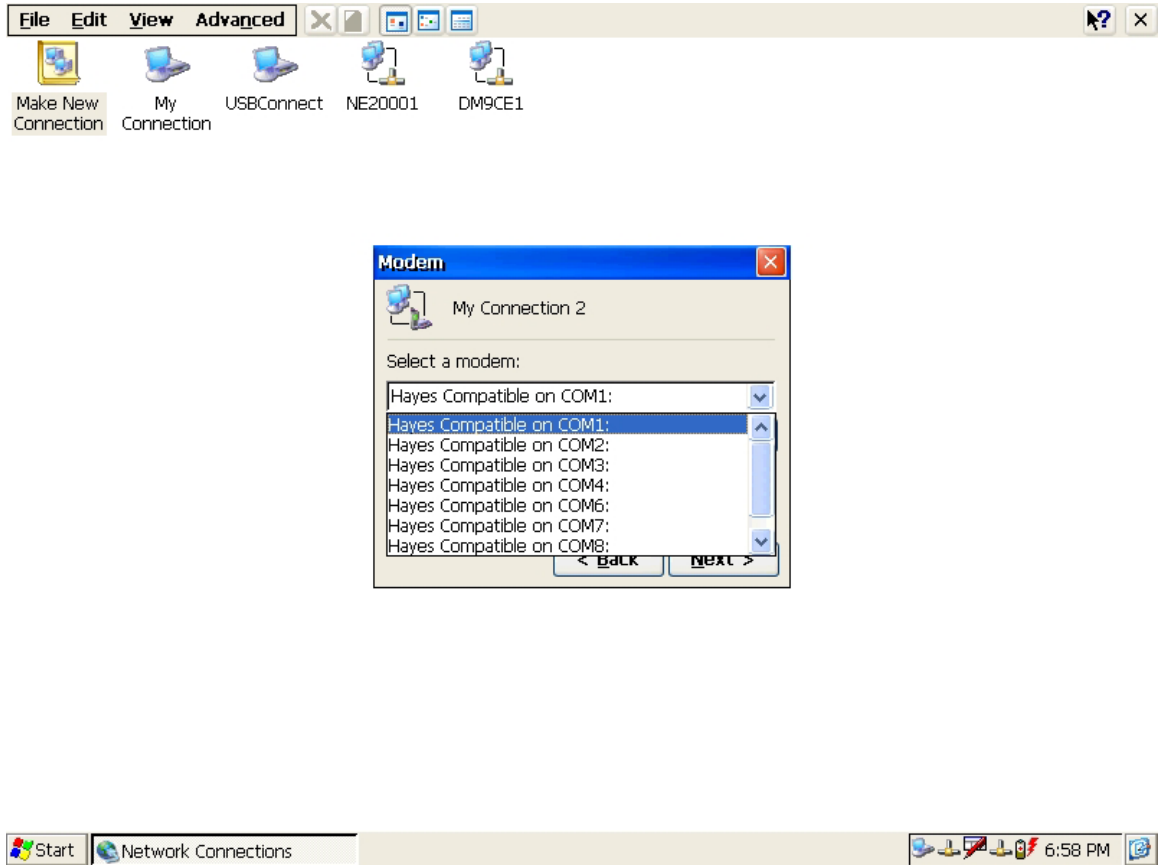
Figure 4.15 Networking via PPP

4.3.4 Web browser

The PCM-7230 builds-in Windows CE OS includes IESample. It can be used to browse web pages on World Wide Web via LAN or PPP.

4.4 Intel Persistent Storage Manger (IPSM)

4.4.1 Introduction to Intel Persistent Storage Manger

Intel Persistent Storage Manager was designed and developed specifically as an enhancement to Microsoft Windows CE operating systems. IPSM eliminates extra disk-like storage such as storage cards, redundant RAM and ROM.

4.4.2 IPSM in PCM-7230

PCM-7230 uses Intel Persistent Storage Manger to utilize the free space of flash rom for persistent storage. The IPSM region in the system is located in "\IPSM" directory. Any file or directory stored in "\IPSM" directory would be keep persistently, even if the power of PCM-7230 were turned off. The user can store software or data in \IPSM rather in CompactFlash card to avoid inconvenience.

4.5 Application Program Development

The PCM-7230 is bundled with built-in Windows® CE.NET operating system. In real applications users need to execute various application programs on it. However, unlike its other family, the Windows® CE.NET is a hardware-dependent operating system. That is to say, Windows® CE.NET application programs are only portable in the source code level. Users must rebuild the runtime file for a different Windows® CE.NET platform even though the source code may not be changed at all.

4.5.1 System requirements

• Intel® Pentium-90 CPU or more advanced

• Microsoft® Windows® 2000 Professional or Windows® XP

• Microsoft® eMbedded Visual Tools 4.0

• Platform SDK for PCM-7230 (bundled in the standard PCM-7230)

• 64MB DRAM

• CD-ROM drive

• Monitor with VGA resolution at least

• Mouse

• 200MB free hard disk space at least

• PCM-7230

• Let the host PC and PCM-7230 connect on the same LAN to do kernel debugging if necessary

• USB cable (bundled in the standard PCM-7230)

4.5.2 Building Windows CE runtime

By the platform SDK bundled with the standard PCM-7230, users can build the Windows CE runtime by the eMbedded Visual Tools.
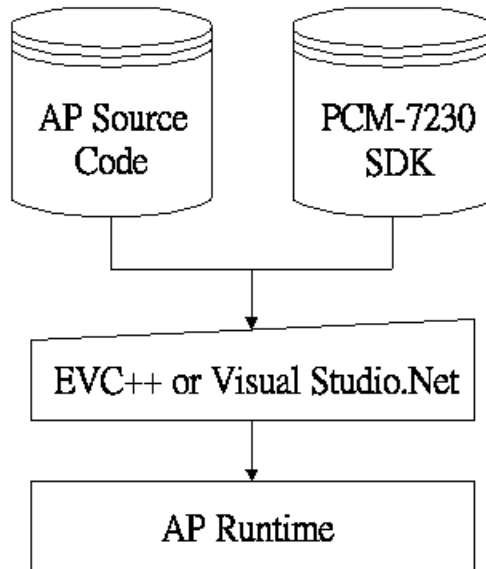
Figure 4.16 Flow-chart of Building Windows® CE.NET runtime

4.5.3 Running your application programs

Activesync would automatically transfer the built application program to PCM-7230 to test (reference 4.3.2). After completely building and testing, users can merge the application into the PCM-7230 Windows® CE.NET OS via "Startup execution"(reference 4.2.4).

4.5.4 WDT Modules

PCM-7230 is targeted to be the embedded device for web-enabled and data-acquisition systems. It is built-in with a useful dynamic link library, WATCHDOG.DLL, which has been designed to help AP developer easily implement his requirements of handling the system resources such as Watchdog timer and LCD brightness control etc. Programmers who are familiar with WIN32 API programming would feel very easy to use this DLL to create his functions. The DLL make its device services look as a file whose name is "WDT1:". The programmer could use this file name in "CreateFile()" to open it and get the file handler. Then the following controls of user required device services would be achieved by way of the file handler in one function call of "DeviceIOControl()". At most 5 applications can access watchdog timer simultaneously. The DeviceIOControl function is following:

- DeviceIoControl

This function sends a control code directly to a specified device driver, causing the corresponding device to perform the specified operation.

BOOL DeviceIoControl(

HANDLE *hDevice*,

DWORD *dwIoControlCode*,

LPVOID *lpInBuffer*,

DWORD *nInBufferSize*,

LPVOID *lpOutBuffer*,

DWORD *nOutBufferSize*,

LPDWORD *lpBytesReturned*,

LPOVERLAPPED *lpOverlapped*);

- Parameters

hDevice

[in] Handle to the device that is to perform the operation. Call the Create- File function to obtain a device handle.

dwIoControlCode

[in] Specifies the control code for the operation. This value identifies the specific operation to be performed and the type of device on which the operation is to be performed. No specific values are defined for the dwIo- ControlCode parameter. However, the writer of a custom device driver can define IOCTL_XXXX control codes, per the CTL_CODE macro.

These control codes can then be advertised, and an application can use these control codes with DeviceIoControl to perform the driver-specific functions.

lpInBuffer

[in] Long pointer to a buffer that contains the data required to perform the operation.

This parameter can be NULL if the dwIoControlCode parameter specifies an operation that does not require input data.

nInBufferSize

[in] Size, in bytes, of the buffer pointed to by lpInBuffer.

lpOutBuffer

[out] Long pointer to a buffer that receives the operation's output data.

This parameter can be NULL if the dwIoControlCode parameter specifies an operation that does not produce output data.

nOutBufferSize

[in] Size, in bytes, of the buffer pointed to by lpOutBuffer.

lpBytesReturned

 [out] Long pointer to a variable that receives the size, in bytes, of the data stored into the buffer pointed to by lpOutBuffer.

The lpBytesReturned parameter cannot be NULL. Even when an operation produces no output data, and lpOutBuffer can be NULL, the Device-IoControl function makes use of the variable pointed to by lpBytesReturned. After such an operation, the value of the variable is without meaning.

lpOverlapped

[in] Ignored; set to NULL.

- Return Values

Nonzero indicates success. Zero indicates failure. To get extended error information, call GetLastError.

WDT Control Codes

There are 8 control codes for the operation codes in the WDT1 driver:

1. IOCTL_ENABLE_WDT (0x1001):

Enables the Watchdog timer on your application. Your application must trigger to Watchdog timer by IOCTL_ACCESS_WDT interface during specified period, otherwise the device will reboot automatically

lpInBuffer : unsed.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

2. IOCTL_DISABLE_WDT (0x1002):

Disable the Watchdog time on your application.

lpInBuffer : unsed.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

3. IOCTL_GET_WDTPERIOD (0x1003):

lpInBuffer :unused.

nInBufferSize: unused.

lpOutBuffer: the DWORD pointer to your Watchdog time setting. The unit is mini-second. Its value should be greater 1000. The default setting is 5000 mini-seconds.

nOutBufferSize: unused.

4. IOCTL_SET_WDTPERIOD (0x1004):

lpInBuffer : the DWORD pointer to your Watchdog time setting. Its value should be greater 1000. The unit is mini-second. If your application opens the WDT driver, the default Watchdog timer is set to 5000 mini-seconds.

nInBufferSize:.unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

5. IOCTL_ACCESS_WDT (0x1005):

Your application must trigger the Watchdog once during your Watchdog timer period. If your application has not trigger at the specified period, the device will reboot automatically.

lpInBuffer :unused.

nInBufferSize:.unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

6. IOCTL_GET_SCREENOFFTIME (0x1006):

lpInBuffer :unused.

nInBufferSize: unused.

lpOutBuffer: the DWORD pointer to your screen off time if user-interface idled. The unit is mini-second. If the value is 0, screen-off function is disabled.

nOutBufferSize: unused.

7. IOCTL_SET_SCREENOFFTIME (0x1007):

lpInBuffer : the DWORD pointer to your screen off time if user-interface idled. The unit is mini-second. If the value is 0, screen-off function is disabled.

nInBufferSize:unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

8. IOCTL_SET_SCREENOFF (0x1010):

Set the LCD power off immediately.

lpInBuffer : unused.

nInBufferSize:.unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

Examples:

#define   IOCTL_ENABLE_WDT   0x1001

#define   IOCTL_DISABLE_WDT   0x1002

#define   IOCTL_GET_WDTPERIOD   0x1003

```
#define   IOCTL_SET_WDTPERIOD        0x1004

#define   IOCTL_ACCESS_WDT          0x1005

#define   IOCTL_GET_SCREENOFFTIME    0x1006

#define   IOCTL_SET_SCREENOFFTIME    0x1007

#define   IOCTL_SET_SCREENON        0x100F

#define   IOCTL_SET_SCREENOFF       0x1010




HANDLE m_hWDT=NULL;

TCHAR szClassName[60];

...

// assign the WDT driver name

wsprintf(szClassName, TEXT("WDT1:"));

// Open the WDT driver

m_hWDT = CreateFile(szClassName, GENERIC_READ | GENERIC_WRITE, 0,

          NULL, OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, NULL);

if ( m_hWDT == INVALID_HANDLE_VALUE )

{

      DebugMsg(CString("WDT driver fail"));

      return;

}

...

DWORD dwTemp;

DWORD nPeriod=10000;

// Set the Watchdog Timer as 10 seconds (10000 mini-seconds)

DeviceIoControl(m_hWDT, IOCTL_SET_WDTPERIOD, &nPeriod, 4, NULL, 0, &dwTemp, NULL);

// Enable the Watchdog timer

DeviceIoControl(m_hWDT, IOCTL_ENABLE_WDT, NULL, NULL, NULL, 0, &dwTemp, NULL);
```

```
While (1)

{

        // do your job here...

        Sleep(8000);

        DeviceIoControl(m_hWDT, IOCTL_ACCESS_WDT, NULL, NULL, NULL, 0, &dwTemp, NULL);

}

DeviceIoControl(m_hWDT, IOCTL_DISABLE_WDT, NULL, NULL, NULL, 0, NULL, NULL);

CloseHandle(m_hWDT);
```

4.5.5 DIO Modules

PCM-7230 has 8 DI(Digital Input), 8 DO(Digital Output). Users can access these resources by writing windows programs with WIN32 API. PCM-7230 is built-in the DIO driver to allow users accessing DI and DO values. Users should use WIN32 APIs to access them. The driver name is "DIO1:". The programmers must open this driver before using the resources. Then programmers could use DeviceIOControl functions to access DO and DI values. The function description of DeviceIOControl is illustrated in section 4.5.4. There are 3 control codes for the operation codes in the DIO driver:

1. IOCTL_GET_DI (0x1002):

lpInBuffer : the pointer to the DI index. Its range is from 0 to 7.

nInBufferSize: unused.

lpOutBuffer: the pointer to the current DI value. Its value should be 0 or 1.

nOutBufferSize: unused.

2. IOCTL_GET_DO (0x1003):

lpInBuffer : the pointer to the DO index. Its range is from 0 to 7.

nInBufferSize: unused.

lpOutBuffer: the pointer to the current DI value. Its value should be 0 or 1.

nOutBufferSize: unused.

3. IOCTL_SET_DO (0x1005):

lpInBuffer : the pointer to the DO index. Its range is from 0 to 7.

nInBufferSize: the setting value. It must be 0 or 1.

lpOutBuffer: unused.

nOutBufferSize: unused.

Examples:

```
#define IOCTL_GET_DI 0x1002

#define IOCTL_GET_DO 0x1003

#define IOCTL_SET_DO 0x1005

HANDLE g_hDIO=NULL;

TCHAR szClassName[60];

...

// assign the DIO driver name

wsprintf(szClassName, TEXT("DIO1:"));

// Open the DIO driver

g_hDIO = CreateFile(szClassName, GENERIC_READ | GENERIC_WRITE, 0, NULL,

        OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, NULL);



if ( g_hDIO == INVALID_HANDLE_VALUE )

{

        DebugMsg(CString("DIO driver fail"));

        return;

}
```

...

// Get the DO 2 value into nV

DWORD dwTemp;

DWORD nDO = 2;

int nV;

DeviceIoControl(g_hDIO, IOCTL_GET_DO, (LPVOID)&nDO, 4, (LPVOID)&nV, 4, &dwTemp, NULL);

CloseHandle(g_hDIO);

4.6 Windows® CE.NET 4.1 Components

Applications and Services Development (■: with; □: without)

Feature	Default Selection
Active Template Library (ATL)	■
C Libraries & Runtimes	■
Component Services (COM)	■
Device Management	■
Lightweight Directory Access Protocol (LDAP)	■
Message Queuing (MSMQ)	■
Microsoft Foundation Classes (MFC)	■
Object Exchange Protocol (OBEX)	■
Pocket Outlook Object Model (POOM) API	□
Simple Object Access Protocol (SOAP) Toolkit	■
Standard SDK for Windows CE .NET	■
.NET Compact Framework	■
XML	■

Applications – End User

Feature	Default Selection
ActiveSync	■
File Viewers	■
Help	■
Inbox	□
Remote Desktop Connection	■
Terminal Emulator	■
Windows Messenger	□
WordPad	□

Core OS Services

Feature	Default Selection
Serial Port Support	■
Parallel Port Support	■
USB Host Support	■
Debugging Tools	■

Power Management	■
Kernel Features	■

Communication Services and Networking

Feature	Default Selection
Networking Features	■
Networking - Local Area Network (LAN)	■
Networking - Personal Area Network (PAN)	☐
Networking - Wide Area Network (WAN)	■
Servers (HTTPD)	■

File Systems and Data Store

Feature	Default Selection
Storage Manager	■
File & Database Replication (Bit-based)	■
File System – Internal (RAM & ROM File System)	■
Registry Storage (RAM-based Registry)	■

Fonts

Feature	Default Selection
Arial	☐
Comic Sans MS	☐
Courier New	☐
Georgia	☐
Impact	☐
Kino	☐
MSLogo	☐
Symbol	☐
Tahoma	☐
Times New Roman	☐
Trebuchet MS	☐
Verdana	☐
Webdings	☐
Wingding	☐

International

Feature	Default Selection
Locale Services	■
Locale Specific Support (Input Method Selector Sample Application)	■
Multilingual User Interface (MUI)	■

Internet Client Services

Feature	Default Selection
Browser Application (Internet Explorer 5.5 for Windows CE - Standard Components)	■
Internet Explorer 5.5 for Windows CE Components	
- Internet Explorer Browser Control Host	■
- Internet Explorer HTML/DHTML API	■
- Internet Explorer Multiple-Language API	■
- Internet Explorer TV-Style Navigation	☐
- URL Moniker Services	■
- Windows Internet Services	■
Pocket Internet Explorer HTML View (WEBVIEW)	■
Sample IE 5.5 Internet Options Control Panel	■
Scripting	■

Multimedia Technologies

Feature	Default Selection
Basic Multimedia	■
Multimedia Components	
- Audio	■
- DirectMusic	■
- Digital Rights Management	☐
- Direct3D	☐
- DirectDraw	■
- DirectShow	■
- DVD-Video	☐
- Windows Media Player	■
- Windows Media Technologies	■

Security

Feature	Default Selection
Authentication Services (SSPI)	☐
Cryptography Services (CryptoAPI 1.0) with High Encryption Provider	☐

Shell and User Interface

Feature	Default Selection
Shell	■
User Interface	■
- Accessibility	■
- Customizable UI	■
- Mouse	■
- Touch Display (Stylus)	■
- Network User Interface	■
- Overlapping Menus	■
- Software Input Panel	■
- Speech Interface	■

Appendix A-1 Boot & Registry Searching Sequence

The following diagram demonstrates the boot sequence and registry searching sequence when PCM-7230 boot-up.
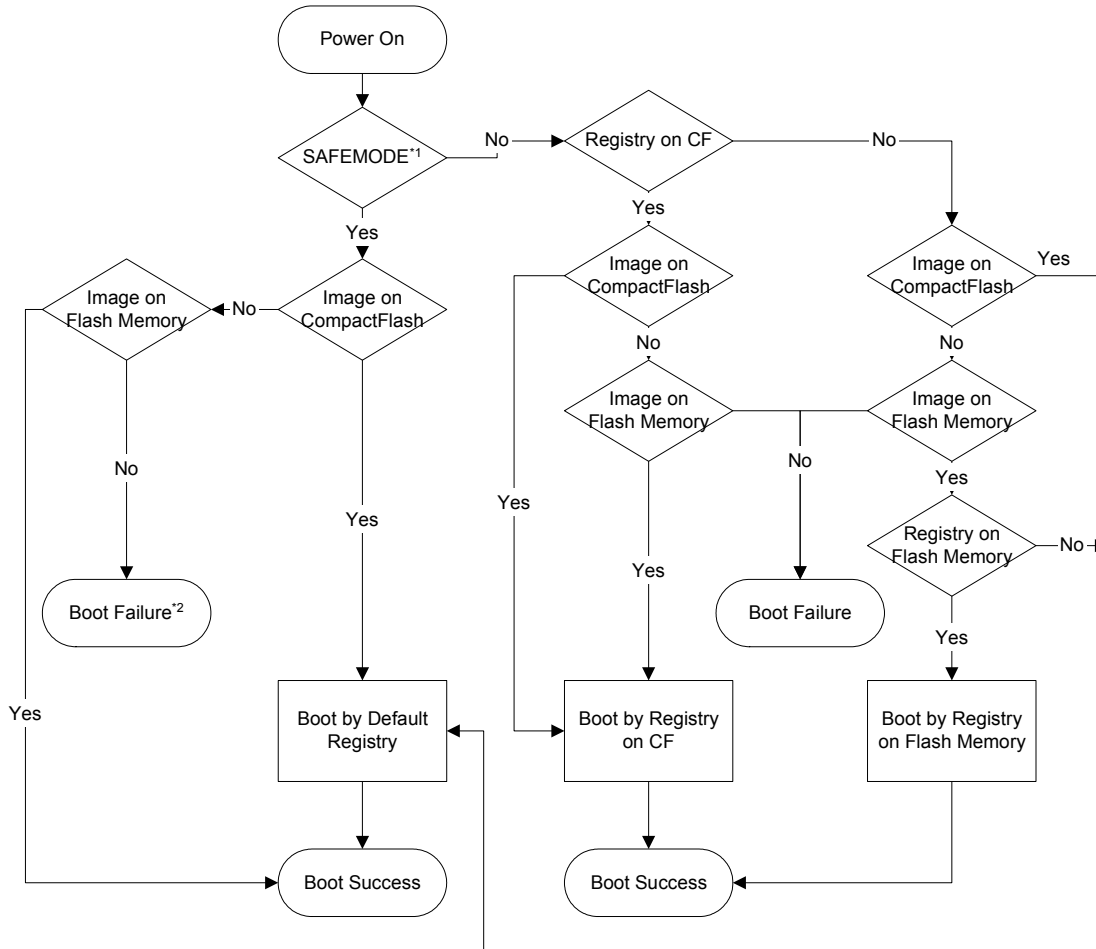

Figure A: Boot & Registry Searching Sequence
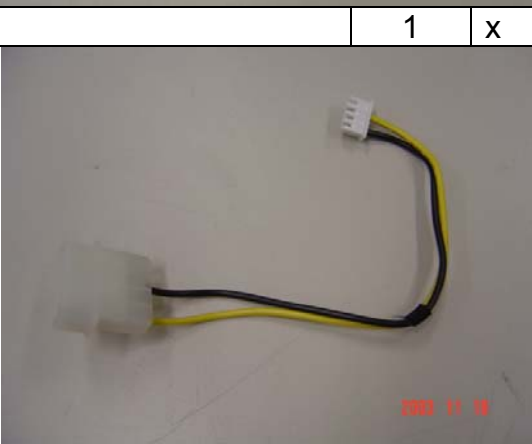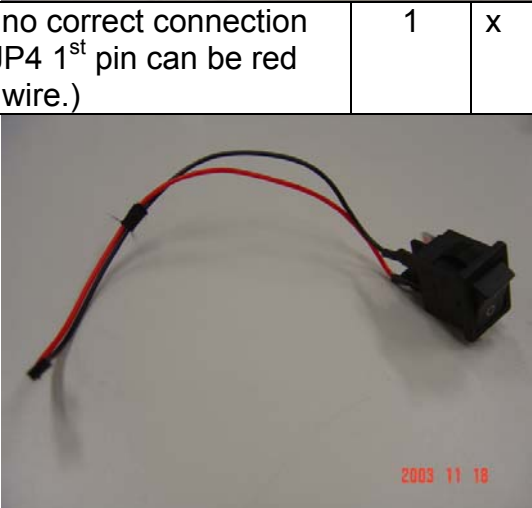
Appendix-A PCM-7230 series Cable kit

(Advantech PN: PCM-7230-CK001)

There are many 2.00mm pin headers on PCM-7230-SBC. In order to let users feel friendlier when plug cables, almost all the pin-header type cables have label on it. The label describes the cable's correct connector on PCM-7230-SBC.

Function Description	Location on PCM-7230-SBC	Quantity	Cable Pin define
Audio cable	CN3, Pin25~Pin36.(cable 1st pin connected to CN3-Pin25)	1	1st pin has white mark
compositive connector cables (one for Video-in; the other for Video-out)	Video-in: CN10, Pin1~Pin2.(cable 1st pin connects to CN10-Pin1) Video-out : CN11, Pin5~Pin6.(Cable 1st pin connects to CN11-Pin5)	2	1st is red.

DB-9 RS-232 cables	COM1:CN9,Pin33~Pin42(cable 1st pin connect to CN9-Pin33) COM2:CN3,Pin49~Pin58(cable 1st pin connect to CN3-Pin49) COM3:CN3,Pin37~Pin46(cable 1st pin connect to CN3-Pin37) COM4:CN9,Pin19~Pin28(cable 1st pin connect to CN9-Pin19)	4	cable 1st pin has white mark
standard DB-9 cable for RS-485 function	COM5:CN9,Pin7~Pin18(cable 1st pin connect to CN9-Pin7)	1	cable 1st pin has white mark
2 ports USB host & 1 USB	CN9,Pin47~Pin58.(connect 1st pin to CN9-Pin47)	1	cable 1st pin has white mark

host & 1 USB client port cable			
DB-15 CRT cable	CN8.(connect 1st pin to CN8-Pin1)	1	cable 1st pin has white mark
RJ45 Ethernet cable	CN9,Pin1~Pin4.(connect 1st pin to CN9-Pin1)	1	cable 1st pin has white mark
3 Push buttons cable	CN3,Pin1~Pin6(connect 1st pin to CN3-Pin1)	1	cable 1st pin has white mark

buttons cable for S/W reset, H/W reset &sleep/wakeup			
	CN29	1	x
power in cable with big 4-pin connector			
	JP4 (there is no correct connection way of JP4. JP4 1st pin can be red wire or black wire.)	1	x
Power switch cable			
JTAG cable	JP2(connect cable 1st pin to JP2 1st pin)	1	cable 5th pin is empty

	Connect the female DB-9 connector to one of the PCM-7230 COM signal port.	1	x
Null modem cable			
	Connect the female USB host connector to PCM-7230 USB client port.	1	X
USB client ActiveSync cable			

	9x2 header connects to CN3,Pin7~Pin24.(connect cable's 1st pin to CN3-Pin7) 5x2 header connects to CN12.(connect cable's 1st pin to CN12-Pin1) Please check the following table for DB-25 pin definition.	1	cable 1st pin has white mark
standard DB-25 connector for DI/DO (9x2 header)& HotKey(5x2 header) function cable			

The followings are the standard DB-25 connector for DI/DO (9x2 header) & HotKey (5x2 header) function cable pin definition.

pin number	function
1	DI 0
2	DI 1
3	DI 2
4	DI 3
5	DI 4
6	DI 5
7	DI 6
8	DI 7
9	DO 0
10	DO 1
11	DO 2
12	DO 3
13	DO 4
14	DO 5
15	DO 6
16	DO 7
17	HK 1
18	HK 2
19	HK 3

20	HK 4
21	HK 5
22	HK 6
23	HK 7
24	HK 8
25	GND

Note 1 : DI means digital input; DO means digital output; HK means hotkey.
Note 2 : When HKx connects to SYS_VCC3P3, the hot key will works.

Appendix-B AMI-120 Interface

Pin	Signals	Pin	Signals	Pin	Signals	Pin	Signals
A1	SDRAM_CLK1	B1	GND	C1	SDRAM_CKE1	D1	PWR_EN
A2	GND	B2	3.6864MHz	C2	SYS_VCC3P3*	D2	SYS_VCC3P3*
A3	PXA_GPIO27	B3	Reserved	C3	PXA_GPIO3	D3	PXA_GPIO9
A4	Reserved	B4	PXA_GPIO7	C4	GND	D4	SYS_VCC3P3*
A5	PXA_A0	B5	PXA_A1	C5	PXA_A15	D5	PXA_A14
A6	PXA_A2	B6	PXA_A3	C6	PXA_A13	D6	PXA_A12
A7	PXA_A4	B7	PXA_A5	C7	PXA_A11	D7	PXA_A10
A8	PXA_A6	B8	PXA_A7	C8	PXA_A9	D8	PXA_A8
A9	PXA_A16	B9	PXA_A17	C9	PXA_A24	D9	PXA_A25
A10	PXA_A18	B10	PXA_A19	C10	NC	D10	nPXA_OE
A11	PXA_A20	B11	PXA_A21	C11	nPXA_WE	D11	GND
A12	PXA_A22	B12	PXA_A23	C12	PXA_RD_nWR	D12	RDY
A13	SYS_VCC3P3*	B13	nPXA_CS3	C13	nPXA_CS4	D13	nPXA_CS5
A14	PXA_D0	B14	PXA_D1	C14	PXA_D15	D14	PXA_D14
A15	PXA_D2	B15	PXA_D3	C15	PXA_D13	D15	PXA_D12
A16	PXA_D4	B16	PXA_D5	C16	PXA_D11	D16	PXA_D10
A17	PXA_D6	B17	PXA_D7	C17	PXA_D9	D17	PXA_D8
A18	PXA_D16	B18	PXA_D17	C18	PXA_D31	D18	PXA_D30
A19	PXA_D18	B19	PXA_D19	C19	PXA_D29	D19	PXA_D28
A20	PXA_D20	B20	PXA_D21	C20	PXA_D27	D20	PXA_D26
A21	PXA_D22	B21	PXA_D23	C21	PXA_D25	D21	PXA_D24
A22	nSDRAM_RAS	B22	nSDRAM_CAS	C22	nPXA_RESET	D22	GND
A23	nSDRAM_CS0	B23	nSDRAM_CS1	C23	nRESET_OUT	D23	GND
A24	DQM0	B24	DQM1	C24	nBATT_FALT	D24	SYS_VCC3P3*
A25	DQM2	B25	DQM3	C25	nVDD_FALT	D25	SYS_VCC3P3*
A26	Reserved	B26	Reserved	C26	Reserved	D26	Reserved
A27	Reserved	B27	Reserved	C27	SYS_VCC**	D27	SYS_VCC**
A28	Reserved	B28	Reserved	C28	Reserved	D28	PXA_GPIO20
A29	Reserved	B29	Reserved	C29	PXA_GPIO22	D29	PXA_GPIO19
A30	MBREQ	B30	MBGNT	C30	GND	D30	SDRAM_CLK2

*SYS_VCC3P3 is +3.3V, no matter system is in run mode or sleep mode.

**SYS_VCC is 5V and will be 0V while system is in sleep mode.