SPC-100

10.4” TFT LCD Smart Panel Computer with Intel® XScale® CPU and Windows® CE.NET

Users Manual

Version 2.00

Acknowledgements

For more information on this and other Advantech products, please visit our websites at:
http://www.advantech.com
For technical support and service, please visit our support website at:
http://eservice.advantech.com.tw/eservice/
This manual is for the SPC-100 series products.

1st. Edition: Dec 2004

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.*

Reversion List:

REV	DATE	Description
1.00	Dec 2004	Original version
1.01	Dec 2004	Modify Chapter 1
1.02	Dec 2004	Modify Chapter 2
1.03	Dec 2004	Modify Chapter 3
1.04	Dec 2004	Modify Chapter 4
2.00	Jan 2005	Release

Packing List

Before you begin to use SPC, please make sure that the following materials have been shipped.

- SPC-100 Smart Panel Computer
- Windows® CE.NET end user license agreement (for Windows® CE.NET version)
- Advantech Software Support CD (Windows® CE.NET)
  - Readme.txt
  - Datasheet
  - User manual
  - Windows® CE.NET 4.2 platforms SDK (for Windows® CE.NET)
  - Microsoft ActiveSync Version 3.7 installs files (for Windows® CE.NET).
- Power connector
- Plastic Stylus for touch-screen
- 1 x USB client ActiveSync cable
- Warranty card

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 **http://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

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. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over voltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. 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.
15. 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.
16. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70dB (A).
17. DISCLAIMER: This set of instructions is given according to IEC 704-1.

Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheishinweise

1. Bitte lesen sie Sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie Keine Flüssig-oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die NetzanschluBsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor überhitzung schützt. Sorgen Sie dafür, daB diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim. AnschluB an das Stromnetz die AnschluBwerte.
9. Verlegen Sie die NetzanschluBleitung so, daB niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
    a. Netzkabel oder Netzstecker sind beschädigt.
    b. Flüssigkeit ist in das Gerät eingedrungen.
    c. Das Gerät war Feuchtigkeit ausgesetzt.
    d. Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
    e. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
    f. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
15. Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70 dB(A) oder weiger.
16. DISCLAIMER: This set of instructions is given according to IEC704-1.
17. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

CHAPTER

1

General Information

This chapter gives background Information of the SPC-100 Sections includes:

• Introduction

• Specification

• LCD Specification

• Touchscreen Specification

• Power

• I/O ports

• Mounting

• Dimension and cutout

1.1 Introduction

Intel® XScale®, Ultra Low Power, Embedded Applications Anywhere!!

Advantech smart panel computers enable great embedded flexibility when powered by Intel® XScale® technology. Built with an Intel IXP-420 CPU, LCD display, touchscreen, and pre-installed with Microsoft® Windows CE .NET 4.2 and LAN, the SPC series provide the best cost-effective and stable solution to customers for a diverse range of embedded applications. The great features of SPC, ultra low power, compact size, IP65 front bezel, and Fanless

- **Removable back cover:** The back cover of the SPC series is easily removed to fit customer application needs. With the flexibility of a removable back cover, customers can better utilize the location and type of I/O by designing their own back for seamless integration.
- **Dust and spill resistant:** IP65 rated front bezel for protection from dust and water damage.
- **Fanless and ultra low power consumption**
- **Compact size:** Around 4cm thickness.
- **Rich connectivity for external accessories:** GPS modules, wireless LAN modules, GPRS modules are verified to work well with the SPC series.
- **SM bus for battery power:** SPC keep the SM bus interface inside, users can equip battery through SM bus to provide mobility on their own solution. The SM bus is made through I^2C
- **Versatile I/O:** RS-232, RS-485, USB host, LAN, PCMCIA slot, CF slot, audio jack etc.

- **Applications**
  - ✓ Factory automation in manufacturing and warehousing
  - ✓ Kiosks in public places – airports, information centers, railway stations and shopping malls
  - ✓ HMI: Human Machine Interface
  - ✓ Entertainment – Gaming, Casino
  - ✓ Hotel, Restaurant and public place
  - ✓ Medical and health care in Hospital
  - ✓ Portable/Mobile device
  - ✓ In-vehicle device

1.2 Specifications

SPC-100C

System kernel	
CPU	Intel IXP-420 533MHz on board
OS	Windows CE .NET 4.2 professional plus
SDRAM	64MB SDRAM on board (extendable to 256MB)
Flash	32MB on board for OS-preinstalled, M system as default.
RTC	HT1381, backup by internal backup battery
Display	
LCD	AUO 10.4" TFT LCD SVGA 800 x 600
Touch screen	10.4" 4-wire Touch Screen
VGA chip	SM501 with external 8MB SDRAM
I/O	
Mini PCI	Mini PCI slot x 1
RS-232	Full function transceiver level by DB9 x2, COM1 & COM2 4-wire transceiver level by DB9 x1, Max Baudrate is 57600, COM3 4-wire transceiver level by pin-header, Max Baudrate is 57600,COM4
RJ-45	10/100 base-T RJ-45 X 1
USB	USB 1.1 host X 4
PCMCIA	PCMCIA slot type II X 1
Video-in	Optional
Audio	Audio line out jack X 1; speaker out pin header inside case
Power	
V-in range	DC 10 ~ 28V
Protection	Over current protection, Electric pole reverse protection
Power switch	ON/OFF power switch
HW reset	HW reset right angle toggle switch
Mechanical	
Dimension	5.25” biscuit 146mm x 203mm`
Material	SPC-100C: SPCC SPC-100A: Front bezel is made from Aluminum
Certification	CE, FCC, UL, VCCI, IBSM
Environmental	
Operating temp	0 degree C ~ 50 degree C
Storage temp	-20 degree C ~ 60 degree C
Water/dust resistance	IP65 for front bezel

1.3 LCD Specifications

LCD model	AU G104SN03
Display type	TFT color LCD
Size (Diagonal)	10.4”
Resolution	800 x 600 (VGA)
Maximum colors	262k color
Pixel pitch (mm)	0.264(H) x 0.264(V)
Horizontal viewing angle	Right 60 degree, Left 60 degree
Vertical viewing angle	Up 35 degree, Down 65 degree
Luminance (cd/m^2)	180 cd/m^2
Contrast ratio	500:1
Response time	Rise 10 ms, Fall 25 ms
Lamp lifetime	20000 hours

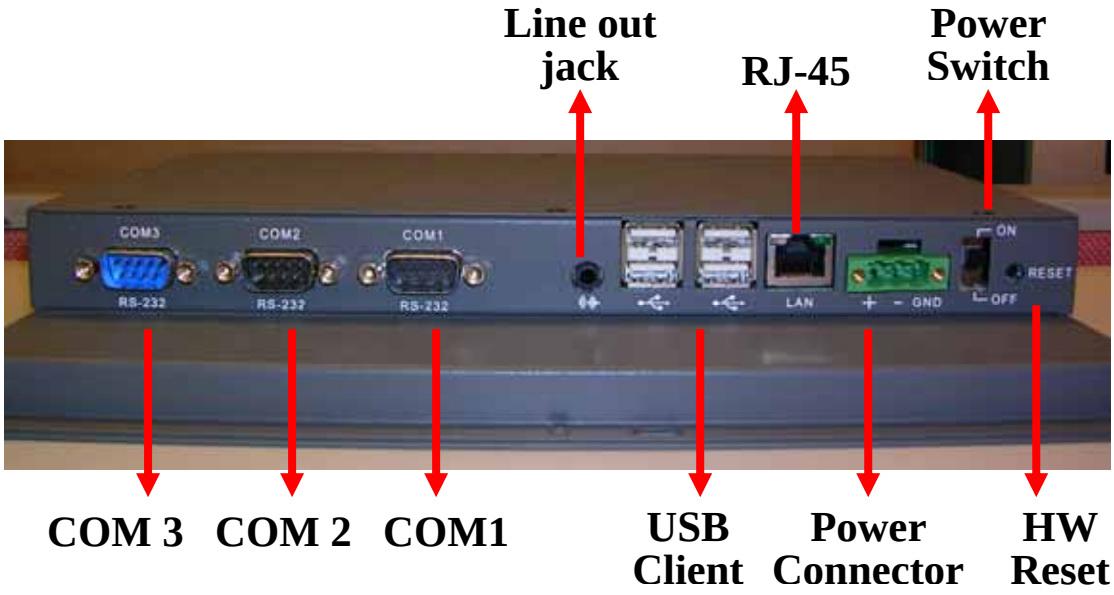
1.4 Touchscreen Specifications

Type	Resistive
Base glass construction	Tempered Glass
Resolution	Continuous
Light transmission	76% typical
Durability	10000000 activations for each single point

1.5 Power & Power Consumption

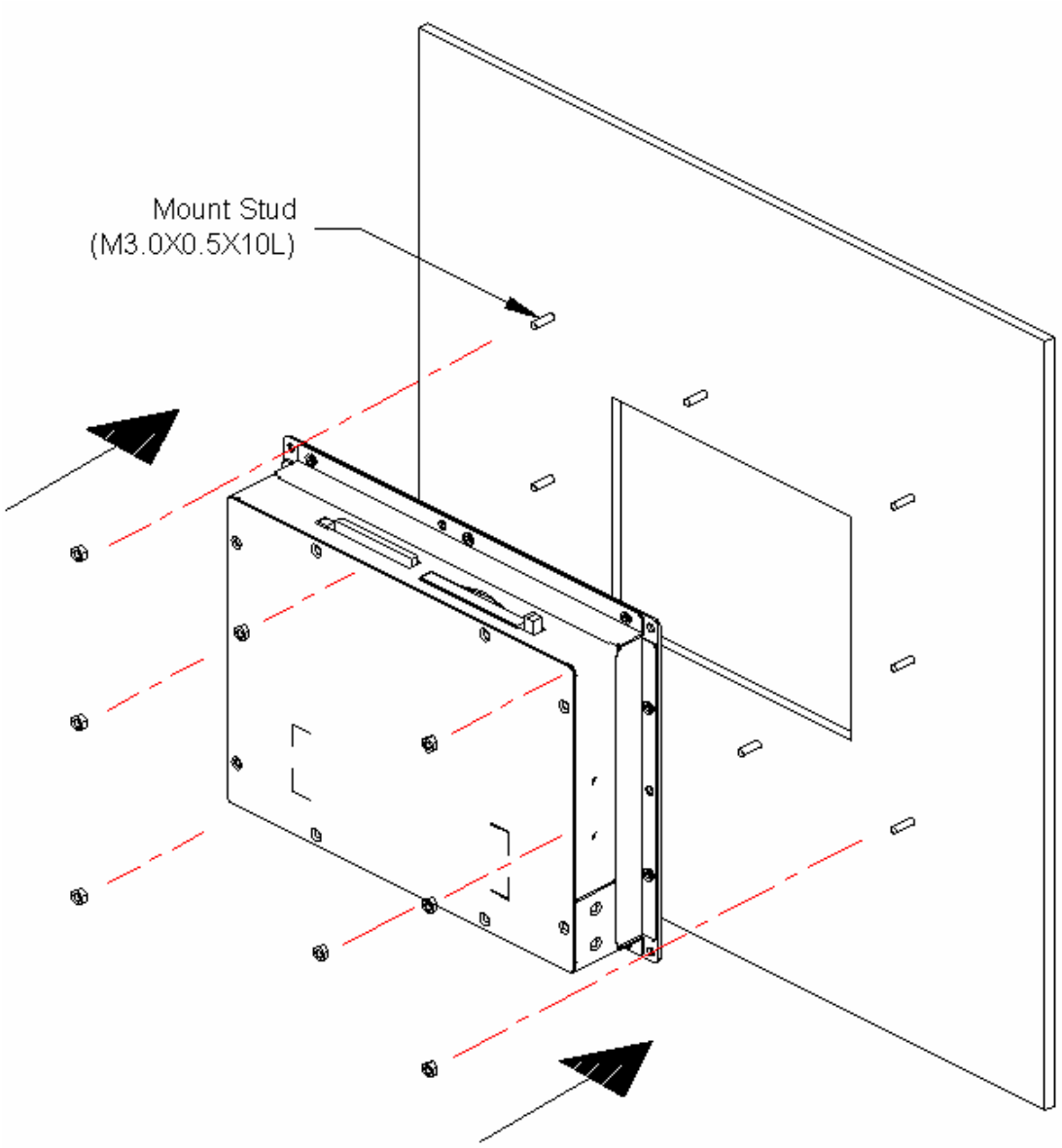
SPC-100 works by 10 ~ 28V DC power input. The maximum current is about 1.5A. The power consumption is 10.4 Watts in normal mode and 6.5 Watts in idle mode (LCD backlight off).

1.6 I/O Ports Arrangement



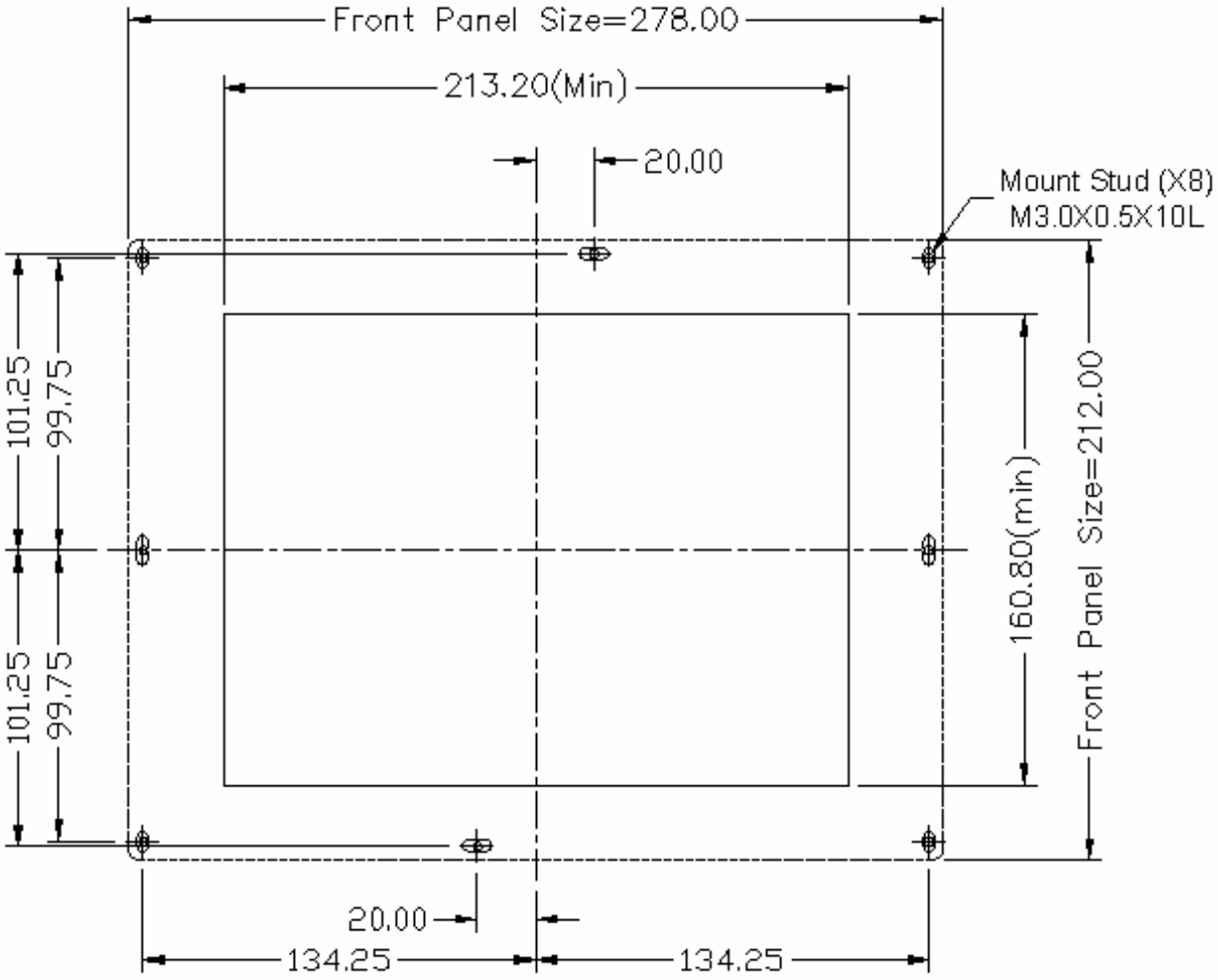
1.7 Mounting

SPC-100C



Rear View for Panel Mount (SPC-100C)

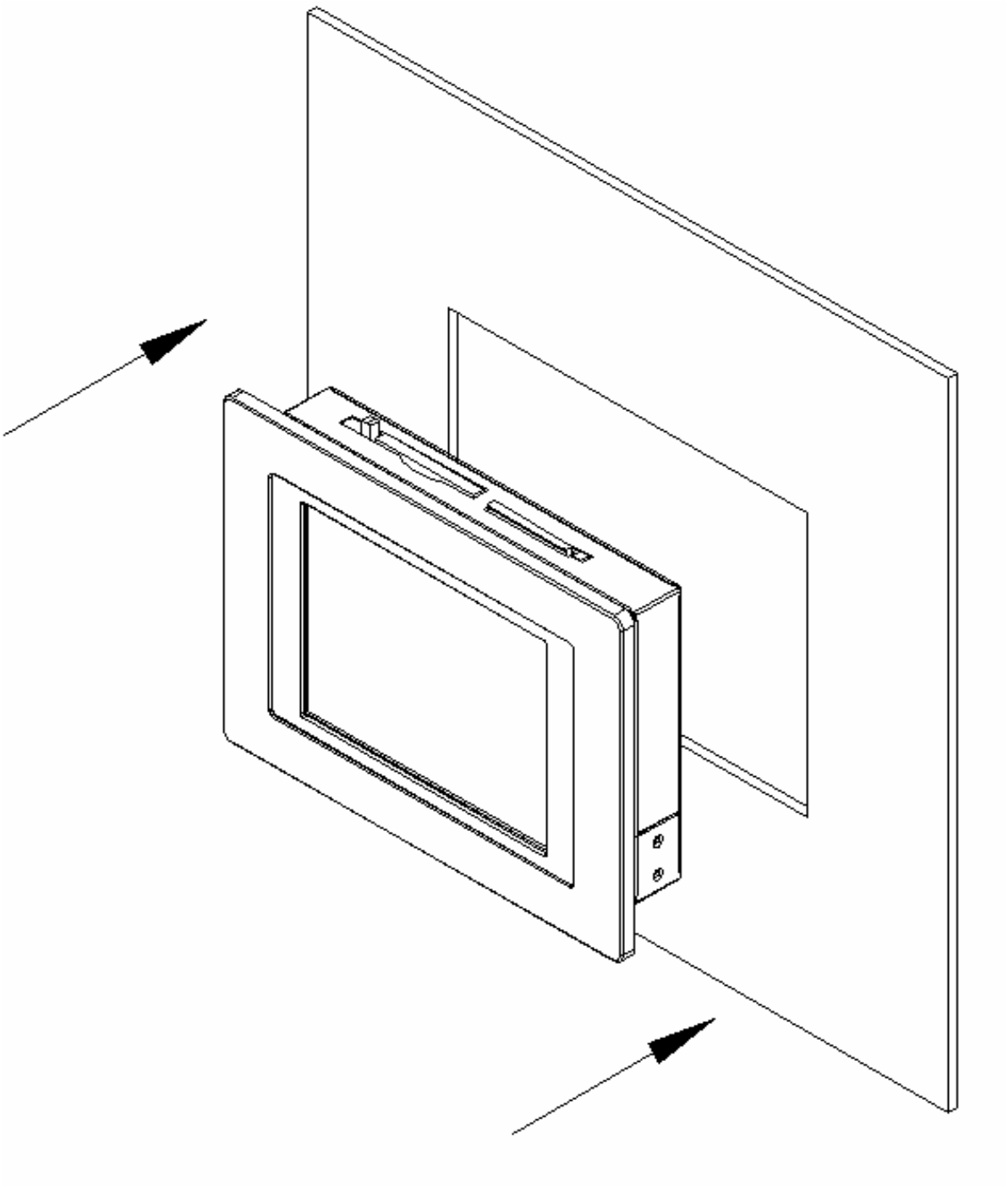
Unit: mm



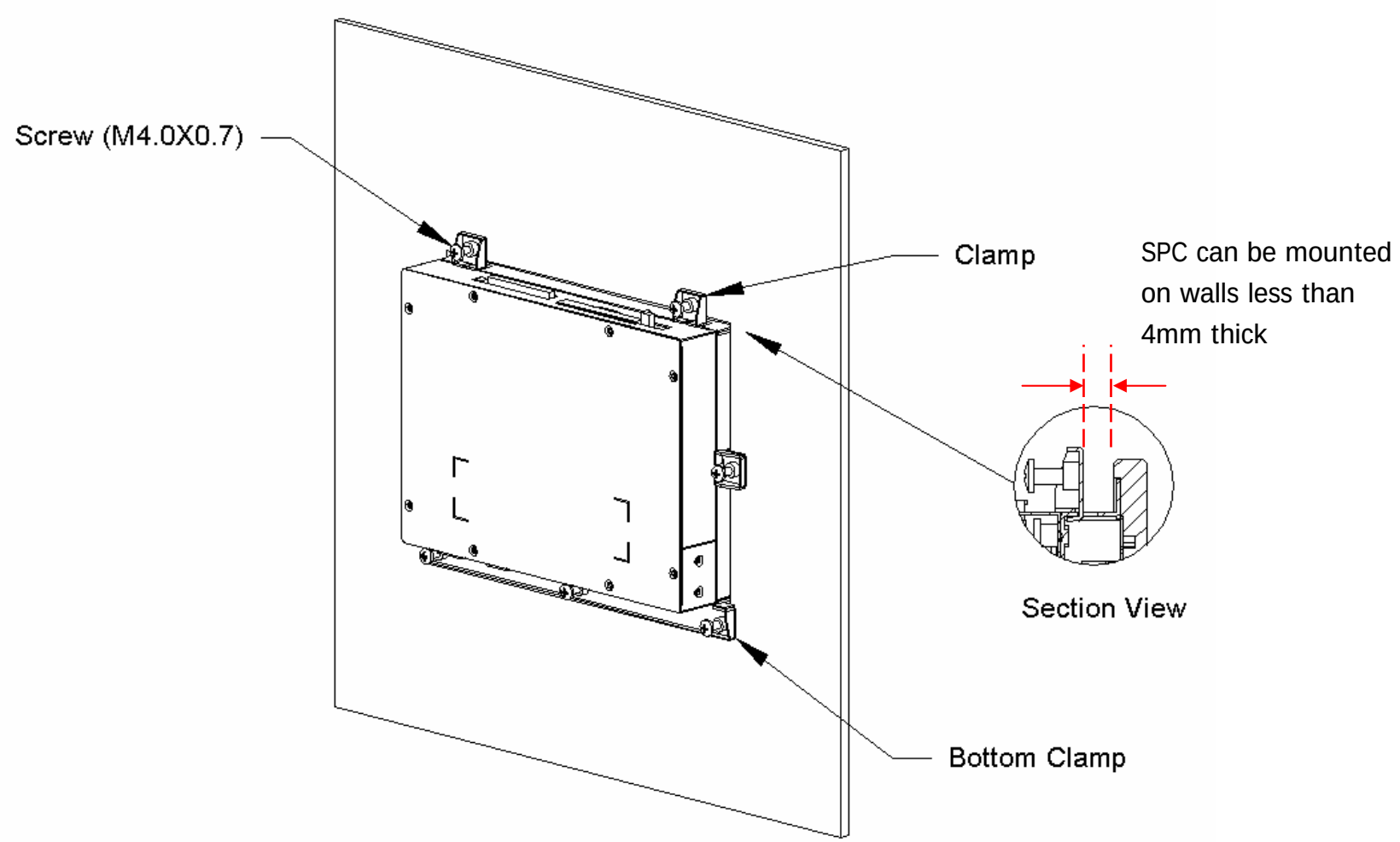
Front View for Panel Mount (SPC-100C)

Unit: mm

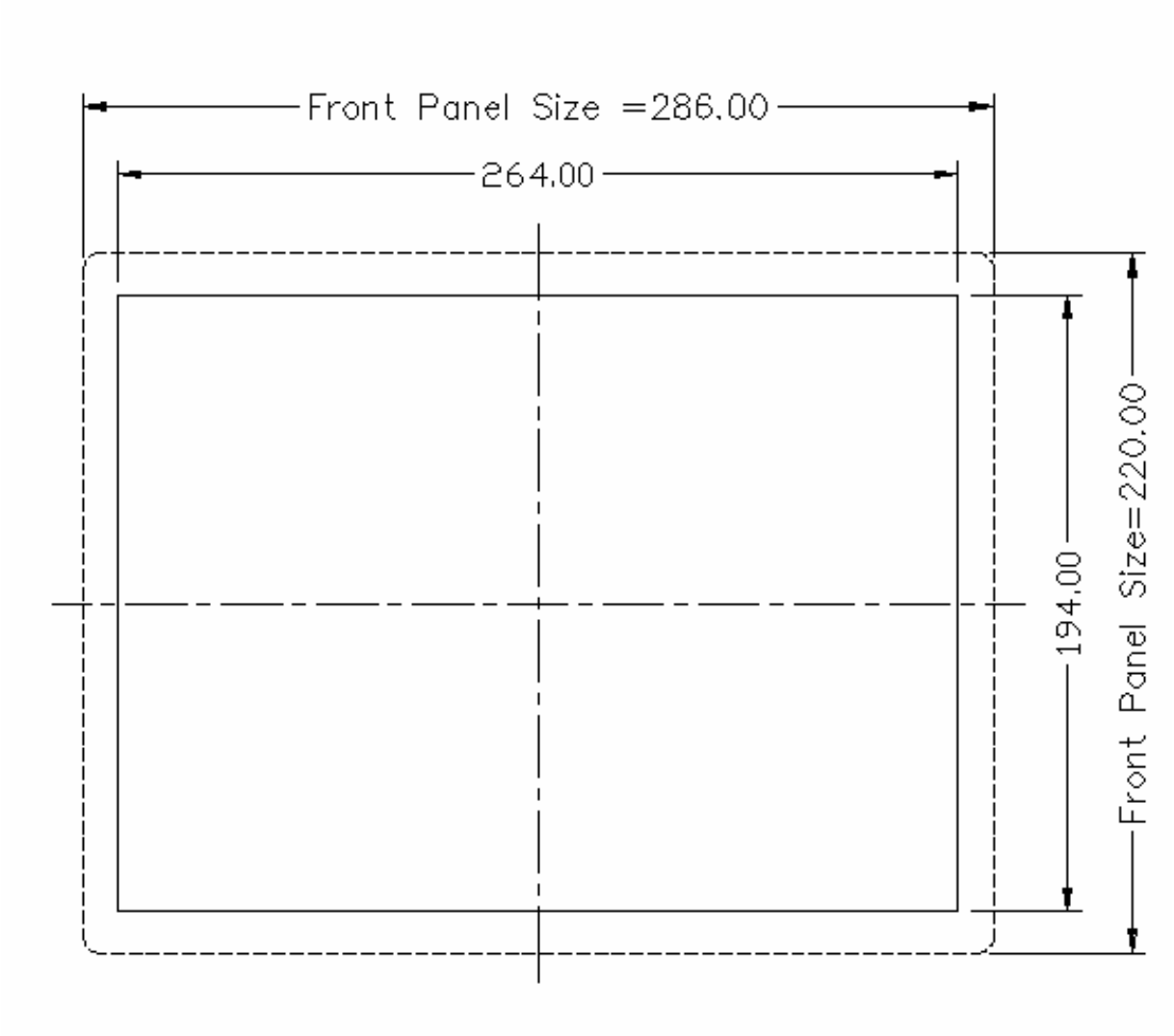
SPC-100A



Front View (SPC-100A)



Rear View (SPC-100A)

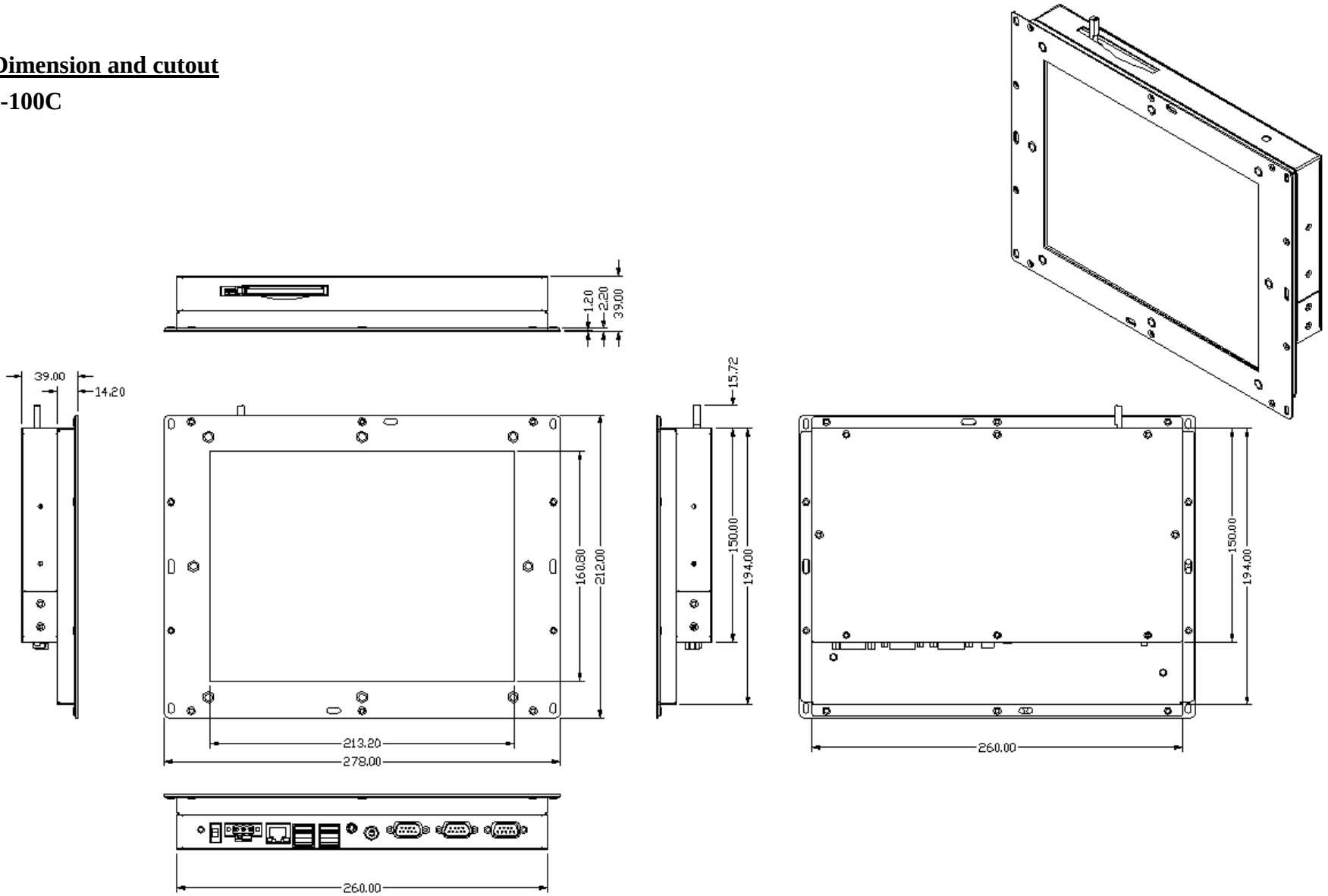


Front View for Panel Mount (SPC-100A)

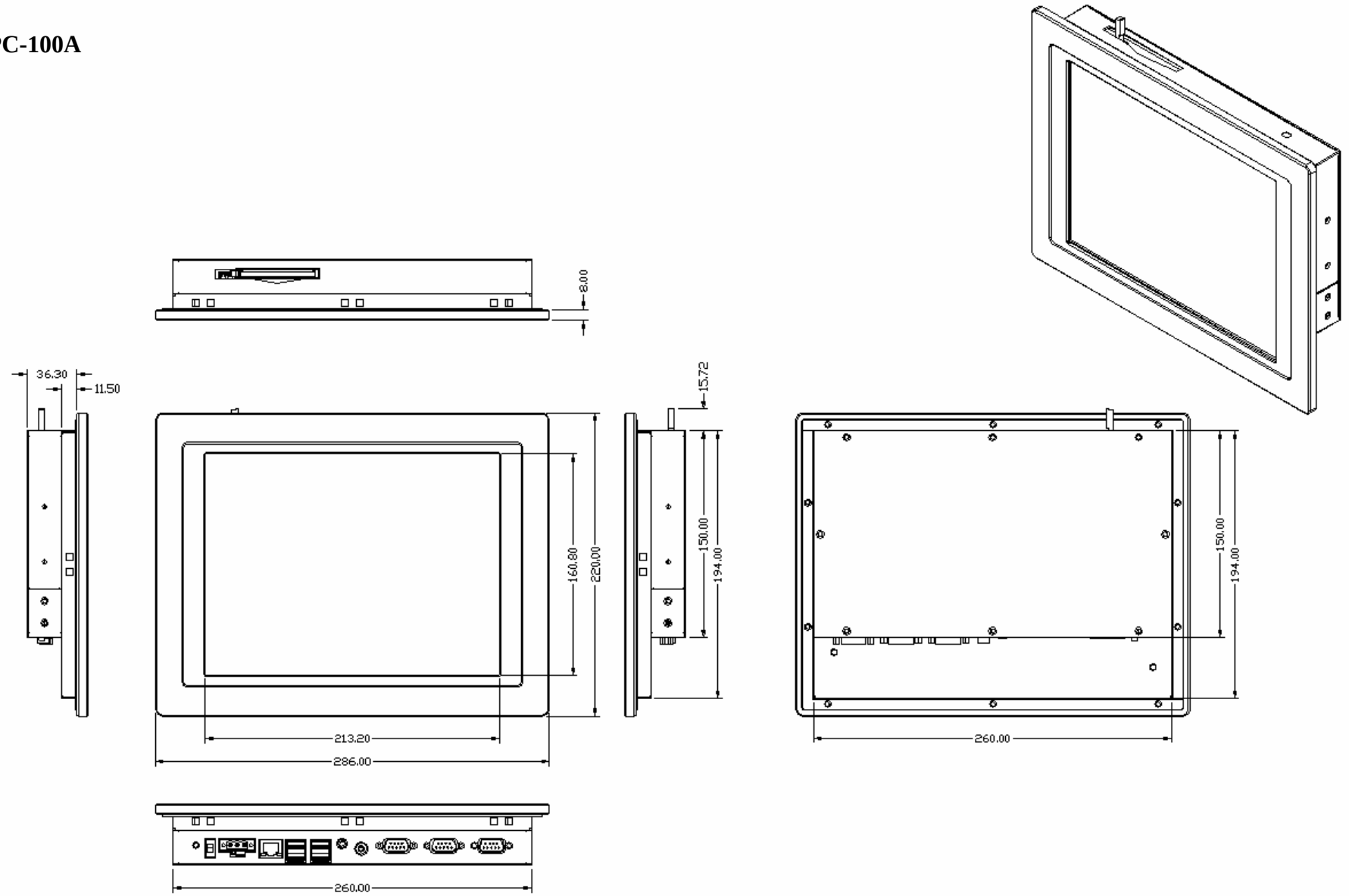
Unit: mm

1.8 Dimension and cutout

SPC-100C



SPC-100A


8.00
36.30
11.50
15.72
160.80
220.00
150.00
194.00
213.20
286.00
260.00
150.00
194.00
260.00

CHAPTER

2

Getting Start

This chapter provides brief instructions for operating the SPC-100

2.1 Quick Starting

Step1: Unpack the SPC-100 from its packing. Please check the packing list at the beginning of this manual.

Step2: Connect the power connector to 10 ~ 28V DC power source. The power source can either be from a power adapter or an in-house power source.

Step3: Connect the power source to the system power supply.

Step4: Plug in the power lines and turn on the system power switch, you will see the Welcome screen of Windows® CE.NET. Then you can start to use SPC-100.

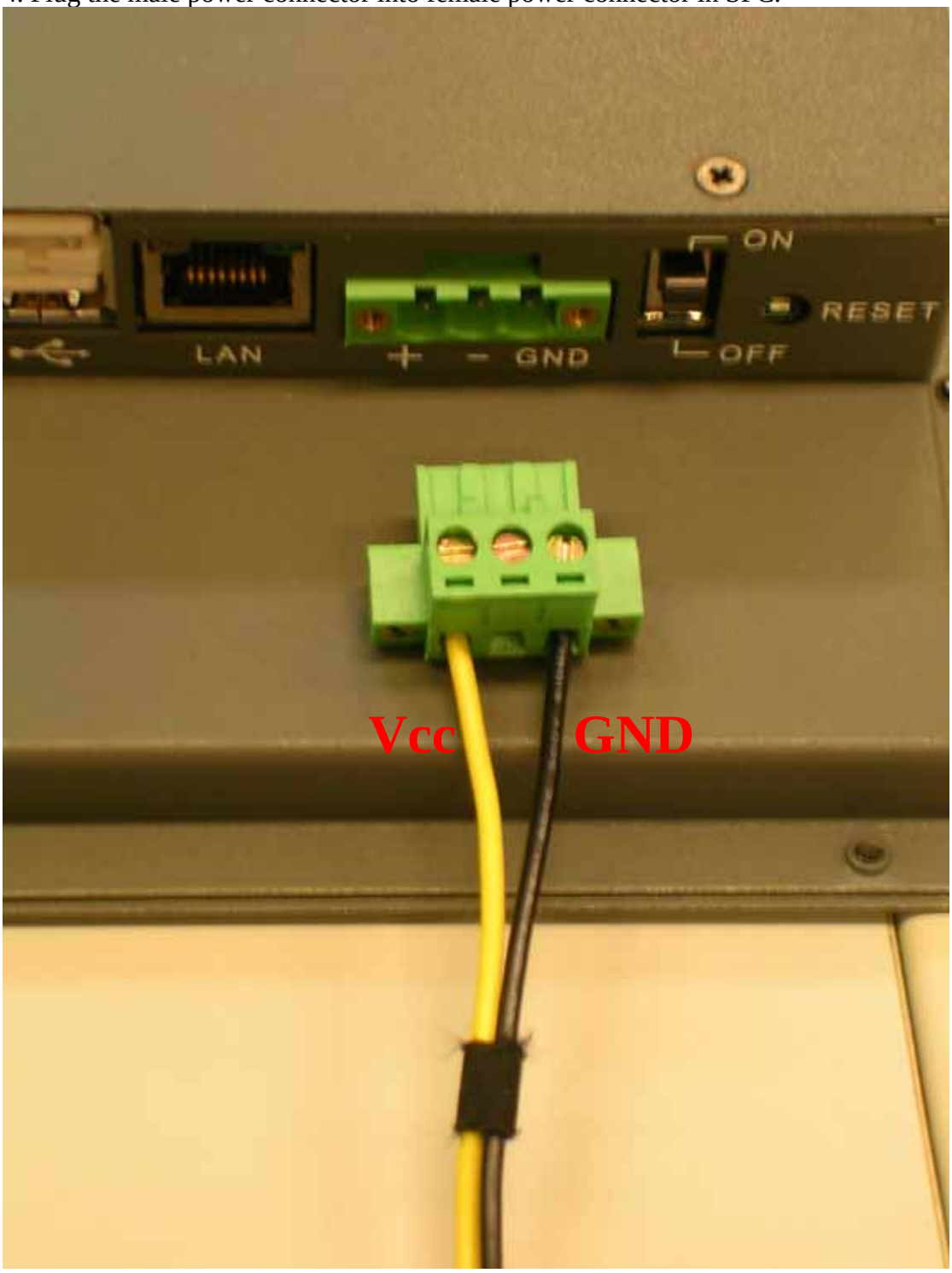
Step5: Turn on the power switch.

Step6: Calibrate the touchscreen.

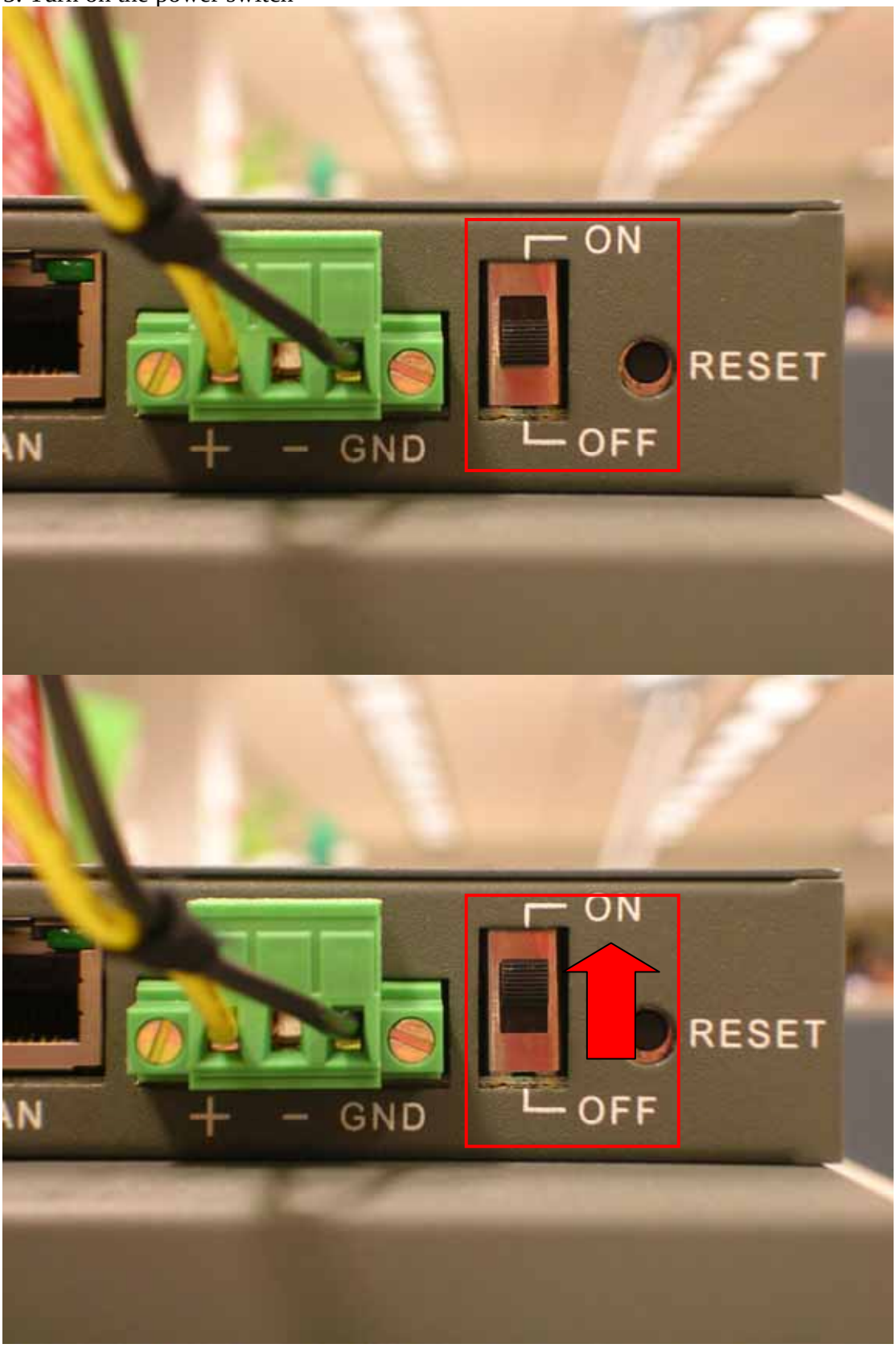
2.2 Supplying Power to SPC

1. SPC accepts only DC power, not AC power
2. The DC input range for SPC is 10V ~ 28V.
3. Install the Vcc cable and GND cable into the male power connector (male power connector is in the package of SPC)

4. Plug the male power connector into female power connector in SPC.



5. Turn on the power switch



CHAPTER

3

The Engine of the SPC-100

This chapter will descript hardware’s connectors of the SPC-100

This chapter will descript hardware connectors of the SPC-100, the pin definition and power system.

3.1.SPC-100 Connector Table

The following table is the information for SPC-100's connectors.

Table 3.1 Connector Table

Label	Function
CN 1	COM1 RS-232 Full transceiver level port
CN 3	Ethernet 10/100 base-T RJ-45 port
CN 6	Audio Line out jack
CN13	Video-in port (Reserve function)
CN 15	PCMCIA(CardBus) slot type II
CN 23	COM3 RS-232 4-wire TTL level port
CN 25	COM2 RS-232 Full 9 pin transceiver level port
CN 26	2 port USB Host 1.1
CN 27	2 port USB Host 1.1
CN 28	Power-in connector (5.08mm Phoenix conn.)

3.2.Connectors pin definition of the SPC-100

★ CN 1: RS-232 serial port

Pin	Signal
1	DCDR
2	RXDR
3	TXDR
4	DTRR
5	GND
6	DSRR
7	RTSR
8	CTSR
9	RIR

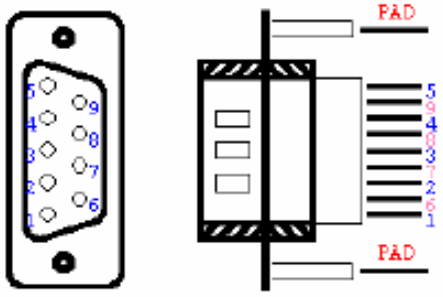


Figure 3.1 COM1 (RS-232) serial port

★ CN 25: RS-232 serial port

Pin	Signal
1	DCDR
2	RXDR
3	TXDR
4	DTRR
5	GND
6	DSRR
7	RTSR
8	CTSR
9	RIR

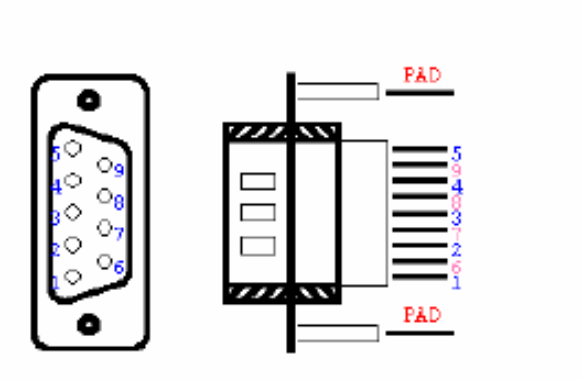


Figure 3.2 COM2 (RS-232) serial port

★ CN 6 : Audio (Line-out) port

Pin	Signal
1	Right channel
2	Left channel
3	GND

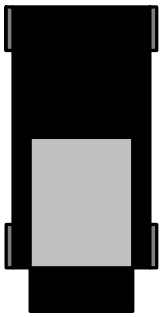


Figure 3.3 Audio(Line-out) port

★ CN 26 : 2 port 1.1USB Host port

Pin	Signal
1	USBV1
2	USB1_N
3	USB1_P
4	GND
5	USBV2
6	USB2_N
7	USB2_P
8	GND

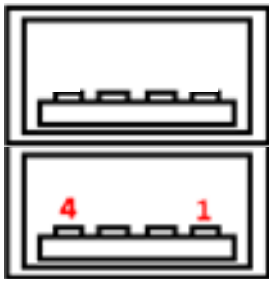


Figure 3.4 2 port USB Host port

★ CN 27 : 2 port 1.1USB Host port

Pin	Signal
1	USBV1
2	USB1_N
3	USB1_P
4	GND
5	USBV2
6	USB2_N
7	USB2_P
8	GND

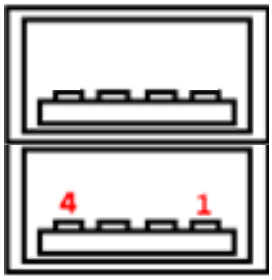


Figure 3.5 2 port USB Host port

★ CN 3 : RJ-45 for Ethernet port

Pin	Signal
1	TPTX100P
2	TPTX100N
3	TPRX100P
4	N/C
5	N/C
6	TPRX100N
7	N/C
8	N/C
9	GND
10	GND
11	LED1+
12	nENET0_LINK_LED
13	LED2+
14	nENET0_ nSPEED_LED

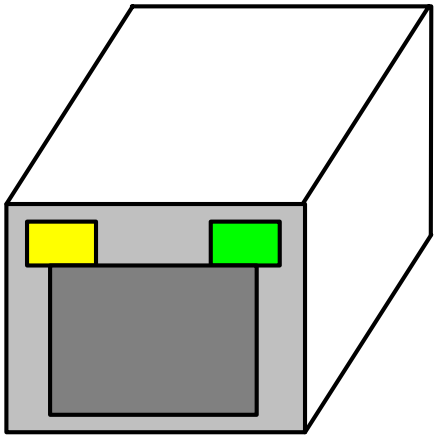


Figure 3.6 RJ-45 for Ethernet port

★ CN 28 : Power Connector

Pin	Signal
1	VDC (+)
2	VDC (-)
3	GND

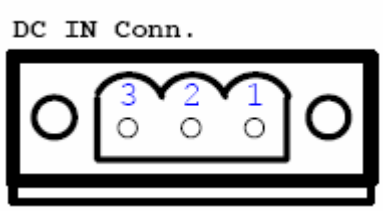


Figure 3.7 Power connector

3.2.Power System of the SPC-100

Users can only use a Terminal Block 5.08mm 3P MALE (Advantech PN: **1652000063**, the vendor : **DINKLE** ,The DINKLE PN : **2ESDVM-03P**) 19Vdc power adapter to be SPC-100's power input.SPC-100 Power input range is DC 10-28V.Power consumption is 11W in normal mode and 6.5W in idle mode There is one 3.0V, coin-type rechargeable backup battery on SPC-100. This coin battery is mainly for external RTC of the SPC-100. When the power switch is on, the external DC power will automatically charge this coin battery.

CHAPTER

4

Software Functionality

This chapter details the Windows®

CE.NET operating system on the

Sections include:

• Introduction

•Windows® CE Startup Procedure

• Upgrade Procedure

• Utilities

• Network

• M-system DOC Flash File System

• Application Program Development

• Windows® CE.NET 4.2 Require Components

4.1 Introduction

The SPC series is one embedded system with Windows® CE.NET OS. 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, but 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.

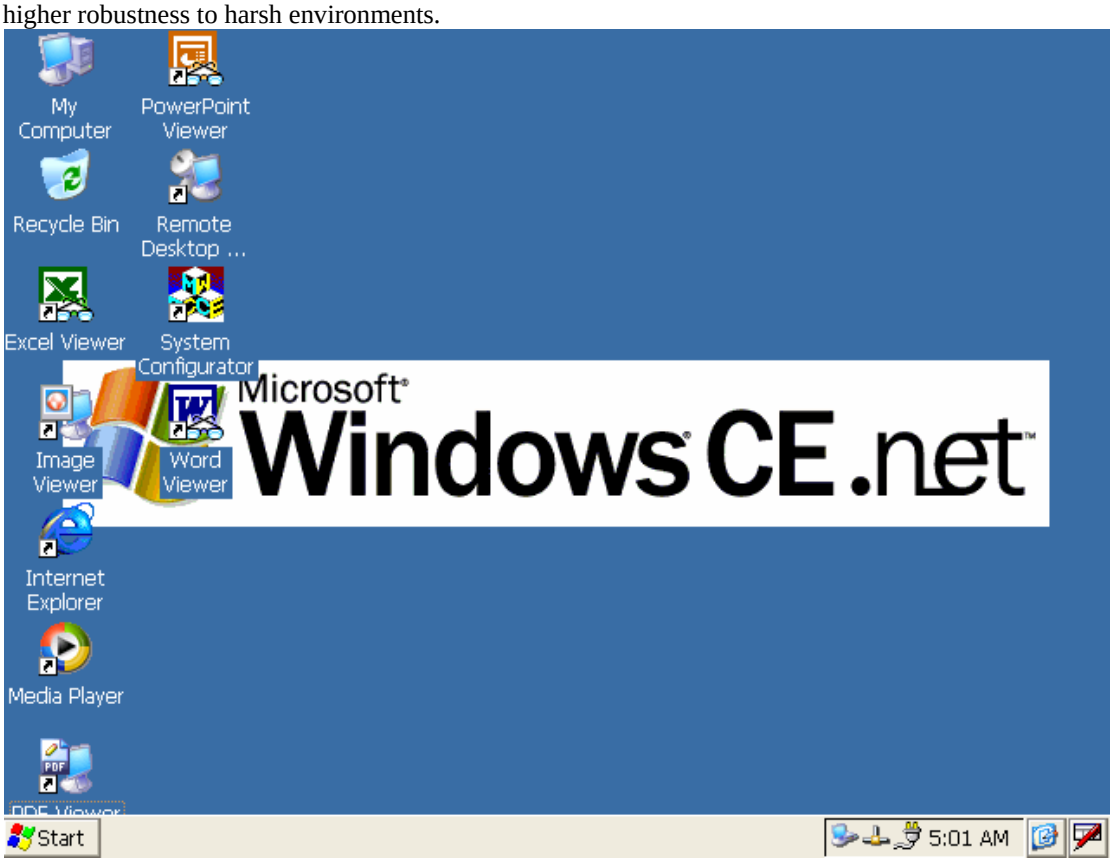


Figure 4.1 Windows® CE.NET on the SPC Series

4.2 Windows CE Startup Procedure

Windows CE can be loaded by two methods, one is through on-board flash(default), the other is through Ethernet. After setting HyperTerminal on PC side and connecting Null modem cable between PC Com port and SPC-100 COM1, user can get the boot-up message and configure the method to download Windows CE image.

4.2.1 Setup HyperTerminal on PC

Step1. Execute HyperTerminal

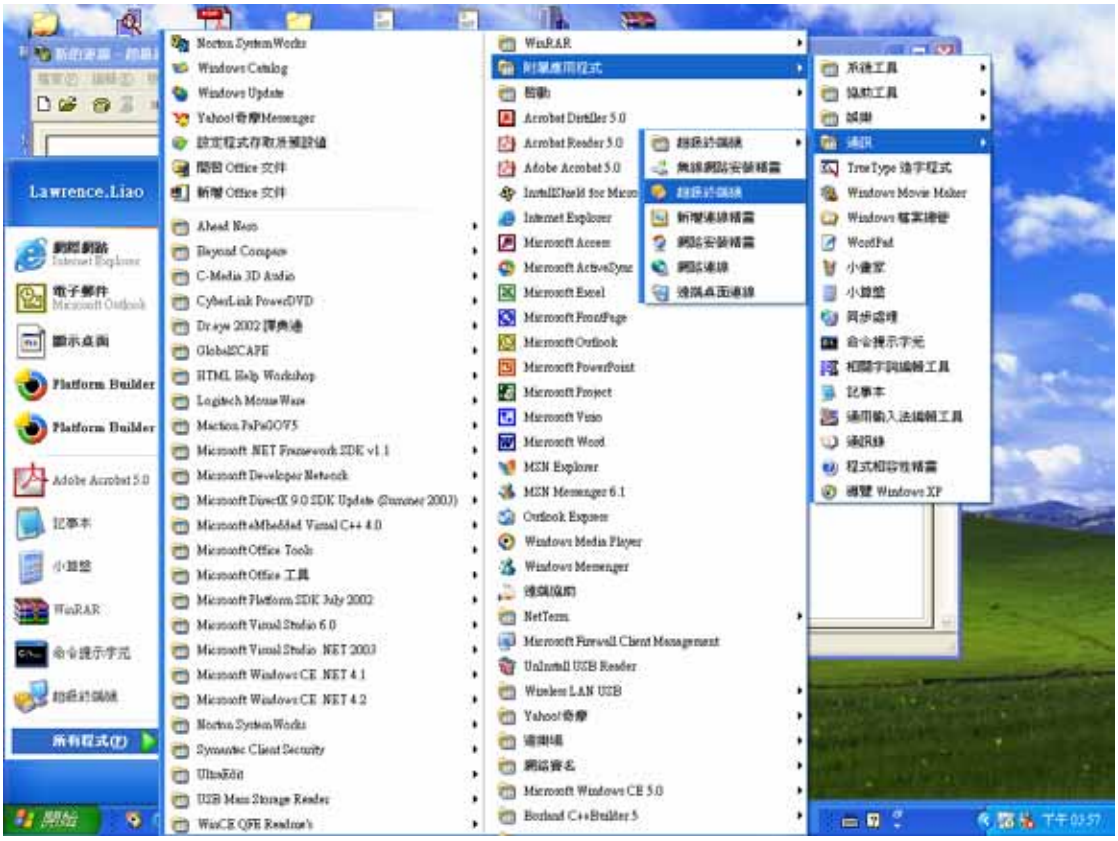


Figure 4.2 Execute HyperTerminal from Start menu

Step2. Name HyperTerminal, and then press “OK”

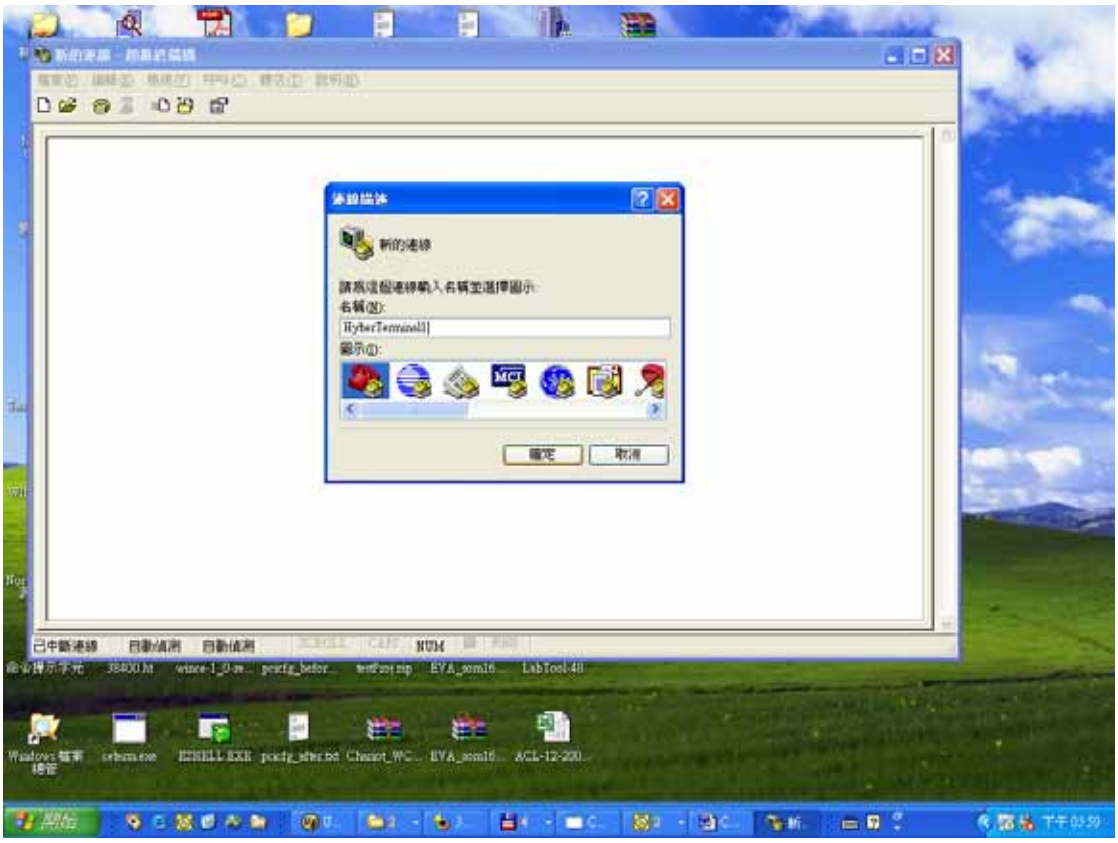


Figure 4.3 Naming HyperTerminal

Step3. Choose used COM port on PC, and then press “OK”

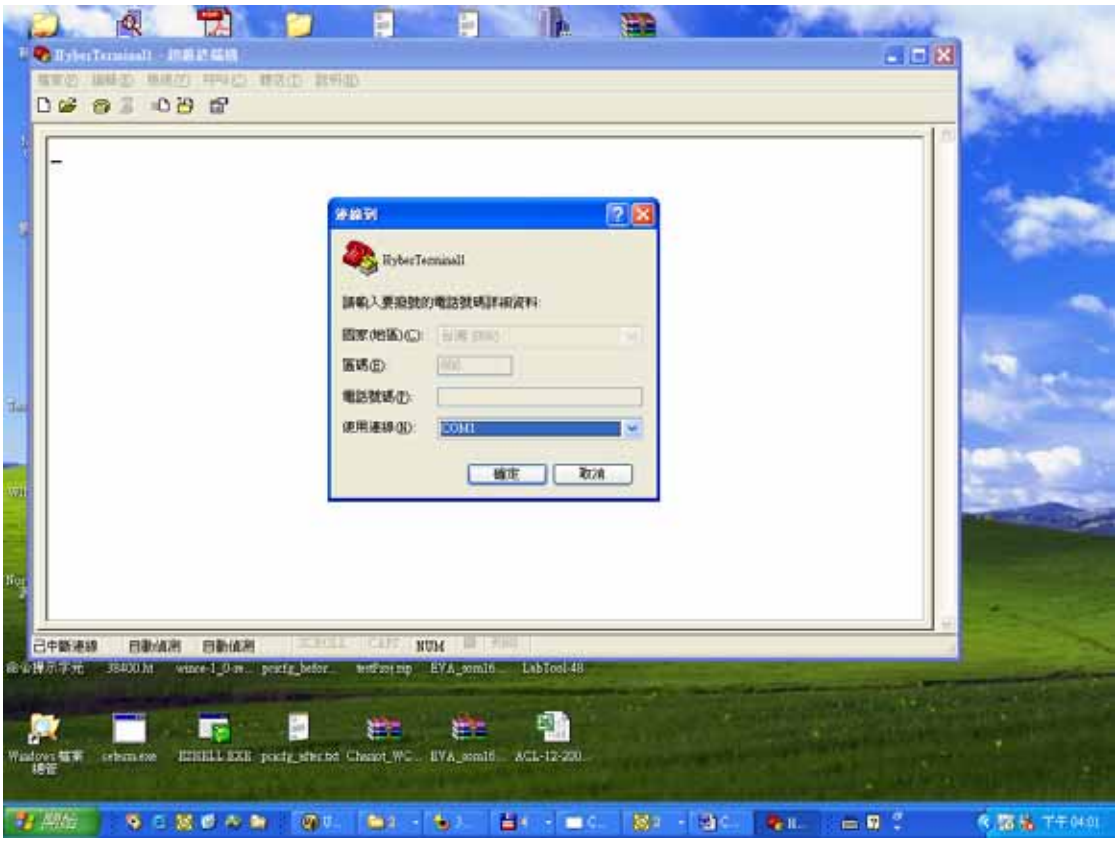


Figure 4.4 Choose HyperTerminal COM port

Step4. Setup HyperTerminal contents. Baud Rate = 38400, Data Bits = 8, Parity = None, Stop Bits = 1, Flow Control = None. And then press “OK”.

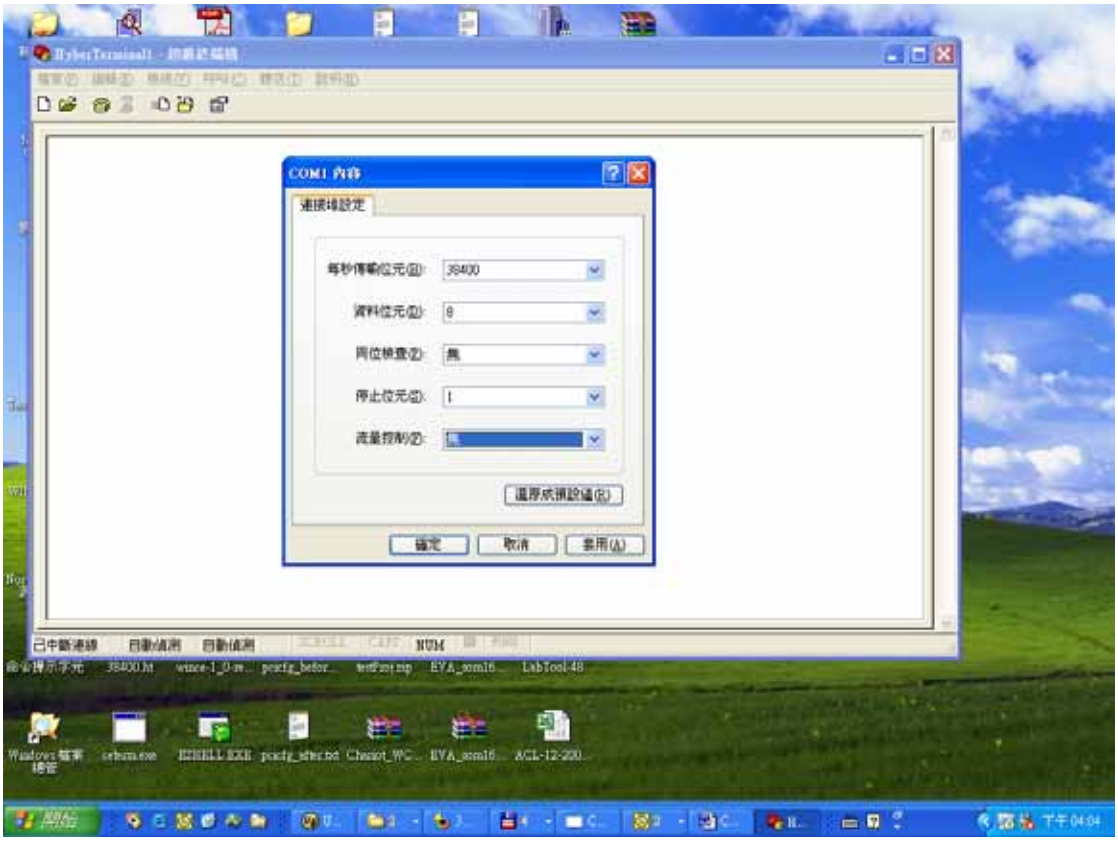


Figure 4.5 Configure COM port parameters

Now, HyperTerminal is working.

4.2.2 Use Null modem cable to link HyperTerminal COM port and SPC-100 COM1

User can get the SPC-100 COM1 location from Chapter 3 in this manual.

4.2.3 Choose download image method from HyperTerminal

Step1. Power on SPC-100

Step2. Press “SPACE” to enter EBOOT Configuration Options window when the HyperTerminal shows the screen below.

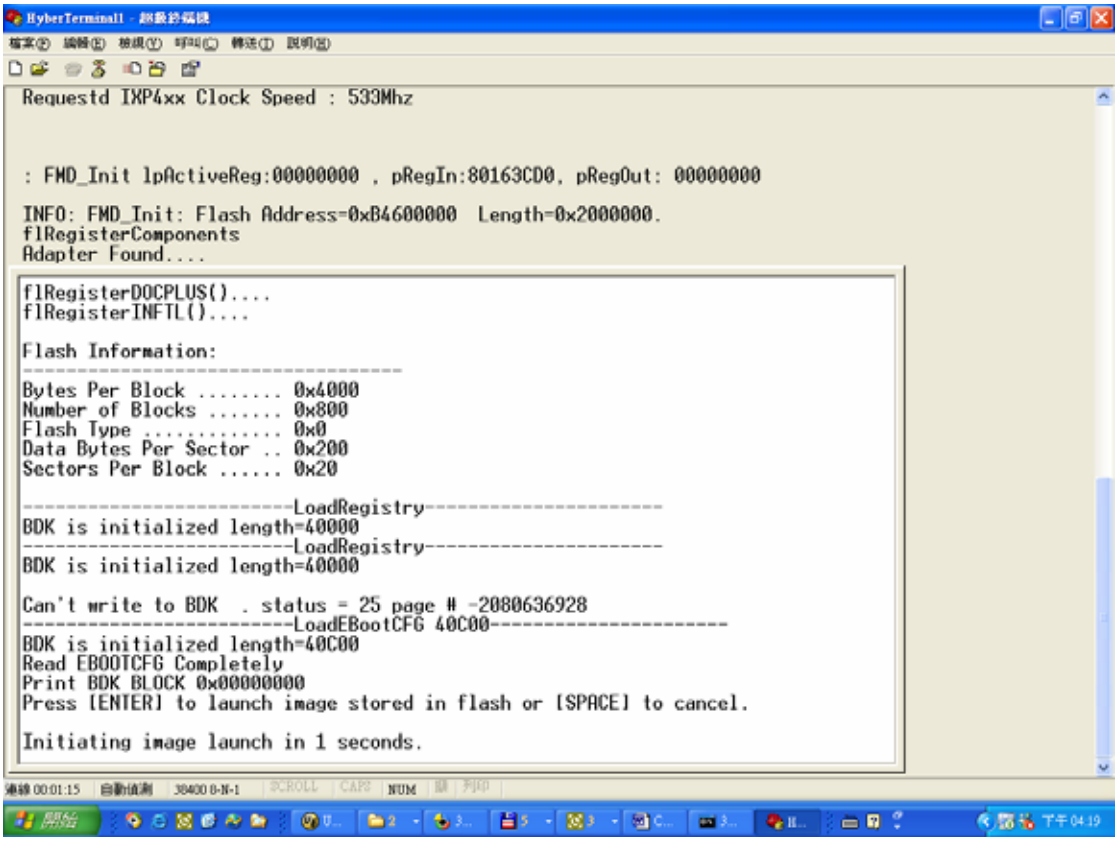


Figure 4.5 SPC-100 boot up window

Step3. Configure EBOOT Configuration Options

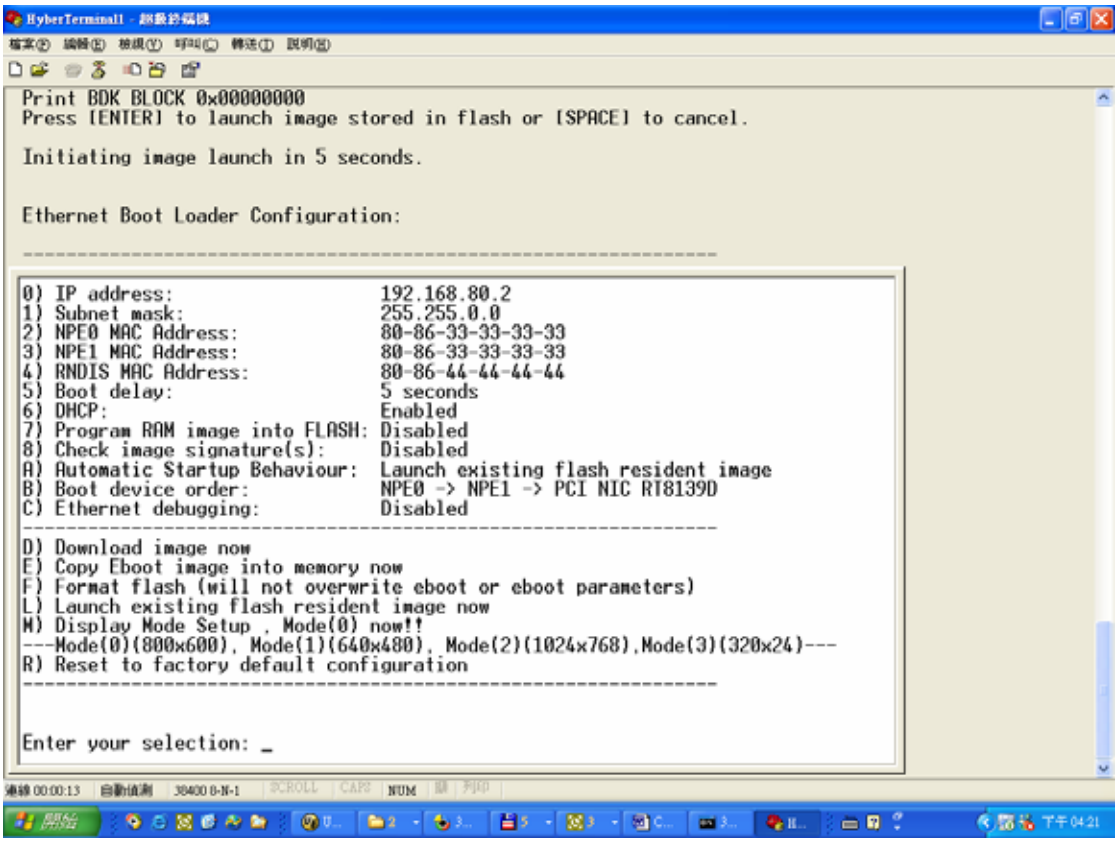


Figure 4.5 SPC-100 Eboot Configuration Options window

-- Option(0) IP address

Choosing this option allows the configuration of the static IP address that is used if DHCP is not enabled. This information is configured once and stored into flash for subsequent downloads.

The following prompt is displayed:

Enter new IP address:

You should enter a decimal representation of the IP address with each byte separated by a decimal point. If you enter no data at the prompt, the IP address is not changed. If you enter any numbers, they are used. Any numbers not entered are expanded to zeros. That is, entering 255.255 at the prompt resolves to 255.255.0.0.

-- Option (1) Subnet Mask

Choosing this option allows the configuration of the subnet mask that is used in combination with the static IP address. Just like the IP address, this information is configured once and stored into flash for subsequent downloads.

The following prompt is displayed:

Enter new subnet mask:

You should enter a decimal representation of the mask with each byte separated by a decimal point.

If you enter no data at the prompt, the mask is not changed. If you enter any numbers, they are used. Any numbers not entered are expanded to zeros. That is, entering 255.255 at the prompt resolves to 255.255.0.0.

-- Option (2) NPE0 MAC Address

Choosing this option allows the configuration of the static MAC address that is used for NPE0 Interface. This information is now configured once and stored into flash for subsequent downloads.

The following prompt is displayed:

Enter new MAC address:

You should enter a hexidecimal representation of the MAC address with each byte separated by a dash. If you enter no data at the prompt, the MAC address is not changed. If you enter any numbers, they are used. Any numbers not entered are expanded to zeros. That is, entering 80-86-AA at the prompt resolves to 80-86-AA-00-00-00.

-- Option (3) NPE1 MAC Address

This option is not used on SPC-100.

-- Option (4) RNDIS MAC Address

This option is not used on SPC-100.

-- Option (5) Boot Delay

Choosing this option allows the configuration of the number of seconds that the boot loader waits for user input before continuing with the image download or launch.

The following prompt is displayed:

Enter maximum number of seconds to delay [1-255]:

-- Option (6) DHCP

Choosing this option cycles between enabling and disabling the use of DHCP. When DHCP is enabled the static IP address is not used. When DHCP is disabled, the static IP address is used.

-- Option (7) Program RAM Image into Flash

Choosing this option instructs the boot loader to store a normal NK.BIN RAM image into flash memory. This image may be launched via option (L). When launched, the boot loader reads the entire image out of flash and stores it into the appropriate location within SDRAM. It then executes this image from SDRAM exactly the same way it would have had it downloaded the image into RAM and never stored it into flash. Because the image runs completely out of SDRAM, system performance is improved due to the faster access speeds associated with this memory type.

-- Option (8) Check Image Signature(s)

Choosing this option will check the signature of the downloaded binary image. Note that the released image is not signed so this is expected to fail.

-- Option (A) Automatic Startup Behavior

Choosing this option cycles the default boot behavior from downloading a new image at startup to launching the existing flash resident image. The existing flash image is the flash image that is programmed when an NK.BIN image is programmed into flash.

-- Option (B) Boot Device Order

This option is not used in SPC-100. The always boot device is NPE0.

-- Option (C) Ethernet Debugging

This option is not used in SPC-100. Must keep it DISABLE.

-- Option (D) Download Image Now

Choose this option to break out of the menu, save any applicable changes that were made and then continue with the image download process.

-- Option (F) Format Flash

Choose this option to format the flash. This will not overwrite EBOOT or EBOOT parameters.

-- Option (L) Launch Existing Flash Resident Image Now

Choose this option to break out of the menu, save any applicable changes that were made and then launch the previously programmed flashed image.

-- Option(M) Display Mode Setup , Mode(0) now!!

---Mode(0)(800x600), Mode(1)(640x480), Mode(2)(1024x768),Mode(3)(320x24)—

Choose this option to configure the display resolution. In default in SPC-100, this option is set as Mode(0) 800x600.

-- Option (R) Reset to Factory Default Configuration

Choosing this option resets the user-configurable settings to their factory defaults.

IP address:	192.168.80.2
Subnet mask:	255.255.0.0
NPE0 MAC Address:	80-86-22-22-22-22
NPE1 MAC Address:	80-86-33-33-33-33
RNDIS MAC Address:	80-86-44-44-44-44
Boot delay:	5 seconds
DHCP:	Enabled
Program RAM image into FLASH:	Disabled
Check image signature(s):	Disabled
Automatic Startup Behavior:	Download new image via Ethernet
Boot device order:	PCI NIC RT8139D -> NPE0 -> NPE1
Ethernet debugging:	Enabled

Note: When you reset the user-configurable settings, you must change option(C) Ethernet debugging setting from Enable to Disable for boot-up Windows CE successfully.

Configure EBOOT configuration examples:

Ex1: Launch on-board flash image

Do not enter EBOOT Configuration menu, or in EBOOT Configuration menu choose option(L) to launch on-board flash image

Ex2: Download Windows CE image from Ethernet without programming image into Flash

1. Configure option(7) as DISABLE
2. Choose option(D) to start downloading image

Ex2: Download Windows CE image from Ethernet with programming image into Flash

1. Configure option(7) as ENABLE
2. Choose option(D) to start downloading image

4.3 Upgrade Procedure

After the OS image was built, we may want to burn it to the on-board flash ROM. Advantech provides the upgrade utility "UpgradeIXP_1.01.05.exe" to upgrade Bootloader image, WinCE image or boot logo to onboard flash ROM. The upgrade procedure is described as following :

Step1. Copy "UpgradeIXP_1.01.05.exe" utility and image files you want (for example, NK.NB0, EBOOT.NB0, and WINDOWSCE.BMP) to CF storage card.
Note **:** NK.NB0 is WinCE image.
EBOOT.NB0 is Bootloader image.
WINDOWSCE.BMP is boot bitmap.
Step2. Insert CF storage card to platform, and then launch UpgradeIXP_1.01.05.exe.

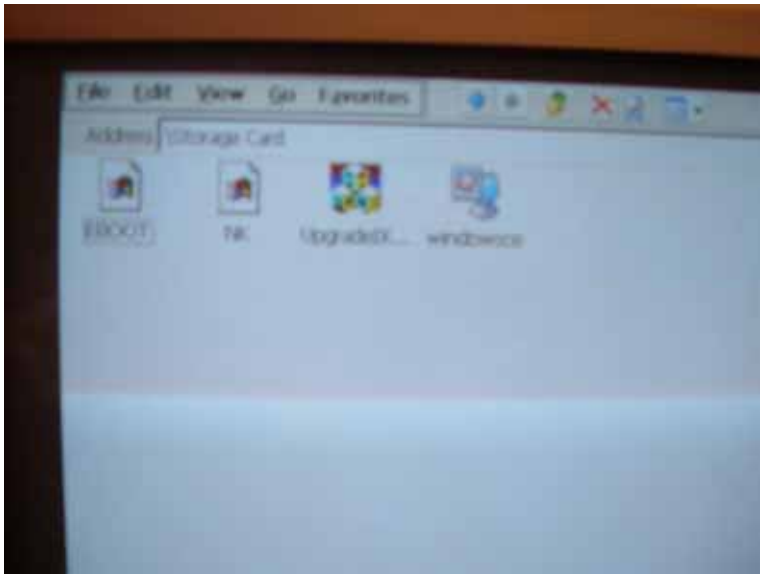


Figure 4.6 Image files and upgrade utility in CF storage card

Step3. Check the items you want to upgrade as the figure shown in Figure 4.7. If you want to upgrade boot logo, you can input the path of the bitmap file in the edit box or click 'Browse' button to select the file.

Note: The difference between NK.NB0 (Compressed) and NK.NB0 (Normal, XIP) **:** The option "NK.NB0 (Normal, XIP)" means that the nk.nb0 will be upgraded directly to the flash ROM, and "NK.NB0 (Compressed)" means that we compress nk.nb0 first, and then write the compressed data to the flash ROM. :
(1) Boot time : compressed image take more time in system bootup.
(2) Flash file system size : compressed OS image would result in larger flash file system size.

Step4. Press 'Apply' button on the dialog. Then the items you select will be upgraded to the flash ROM. See Figure 4-7.

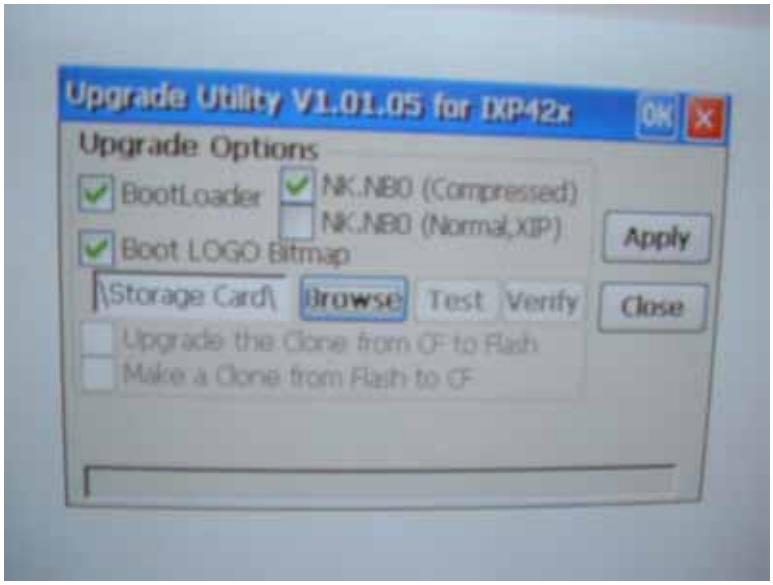


Figure 4.7 Press Apply button in order to upgrade onboard flash ROM

After the upgrade process done, reboot system..

4.4 Utilities

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

4.4.1 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. Following sections illustrate the functions of System Configurator.

4.4.1.1 General

The memory information including DRAM, and FLASH file system are displayed in the General page. And the versions of each part of the installed embedded OS, including Windows® CE.NET, Bootloader and System Configurator respectively.

Figure 4.8 General information

4.4.1.2 Calibration

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, user needs to save the registry to store the calibration data manually. About registry save, please see section 4.4.1.5 for detail description.

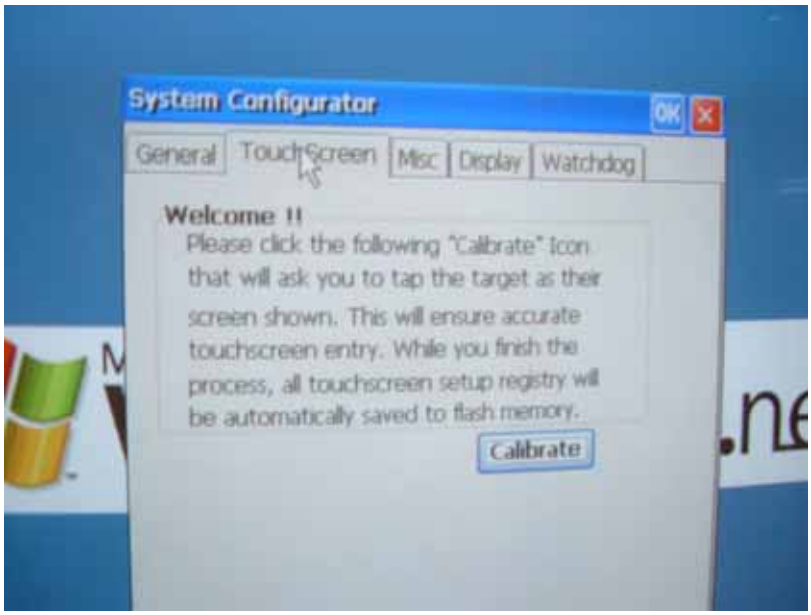


Figure 4.9 Touch-screen calibration

4.4.1.3 Display

From time to time it is unnecessary to turn on the display attached to the SPC all the day. The Display page provides two frequently used functions, one is the display resolution and the other is brightness adjusting. .

Figure 4.10 Display configuration

NOTE: User can set the idle time to turn off backlight automatically from the backlight page of Display Properties of Control Panel. When backlight is off, there were three inputs to turn it on: (1) mouse; (2) keyboard; (3) touch-screen.

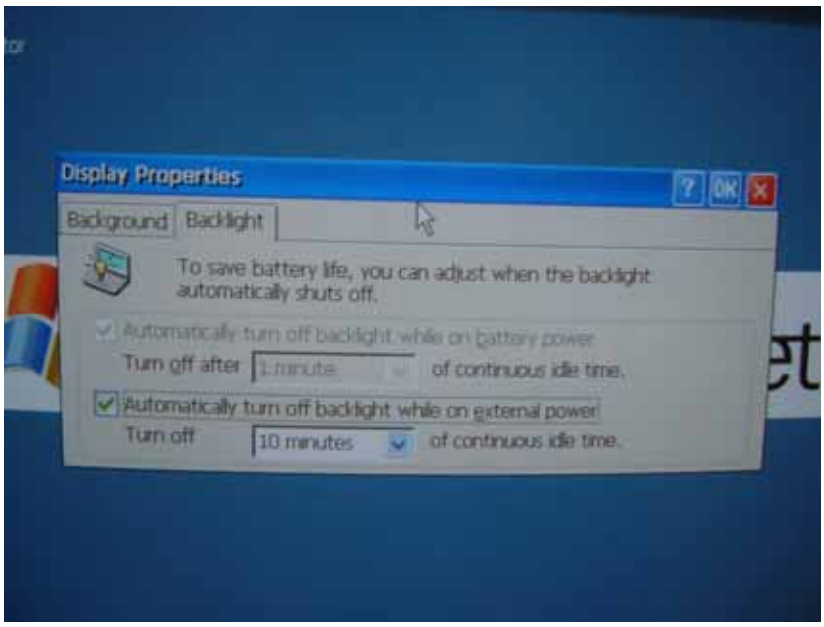


Figure 4.11 Display Properties setting window

4.4.1.4 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 SPC. 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 SPC provides eight different time intervals: 2 seconds, 5 seconds, 10 seconds, 30 seconds, 60 seconds, 2 minutes, 5 minutes and 10 minutes. The "Test" button is used to start the Watchdog count down function, and the "Enable Trigger" button is used to trigger the Watchdog periodically.

Figure 4.12 Watchdog timer

4.4.1.5 Miscellaneous

The Misc page provides several functions as described below. The "Registry" block provides registry save , clear and registry view function. The "MAC ID" block shows the network MAC address. The "COMM" block provides the communication function – IPConfig. The "Reset" Block provides "Cold Boot" and "Start Upgrade" functions. "Cold Boot" is used to reboot system. "Start Upgrade" is used to automatically download image from Ethernet and program image into flash after system reboot.

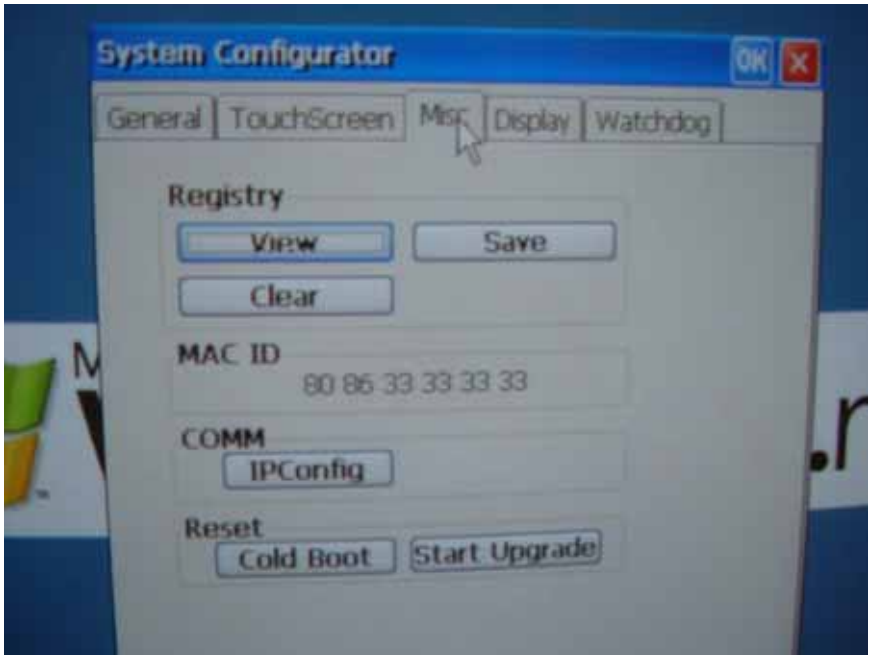


Figure 4.13 Miscellaneous settings

4.4.2 Startup execution

The SPC has one 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 SPC, there is one way to perform "Starup" function.

Method:

Step1: Create "startup" directory in CF storage card or in folder "\Mounted Volume\".

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

Example:

We copy the executable files "tty.exe" in "\Mounted Volume\Startup", and then reboot the system. After the system boot up, "tty.exe" would be automatically executed.

4.5 Network

4.5.1 Networking via Ethernet

SPC build in one 100Base-T Ethernet controller. It appears at “Control Panel/Network and Dial-up Connections” via “IXP425ETHNPE1”. 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 SPC is a node of the LAN with DHCP servers, it is now available.

5. If the SPC 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 “System Configurator\Misc\Registry\Save” on the desktop to save this changed registry. Reboot the system, the Ethernet functions would be available as previous configuration.

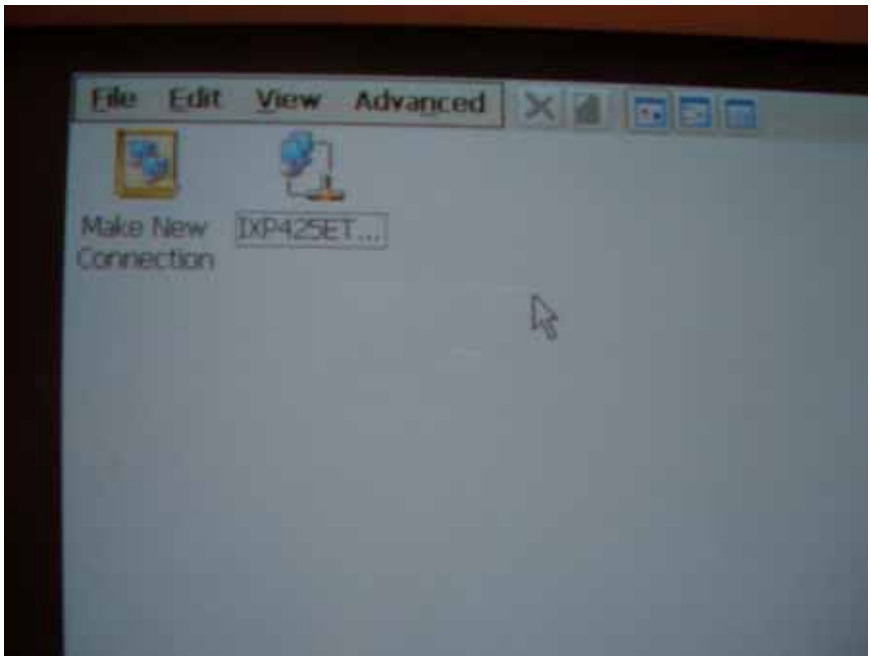


Figure 4.14 Networking via Ethernet

4.5.2 Networking via PPP

The SPC 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 SPC series.

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".

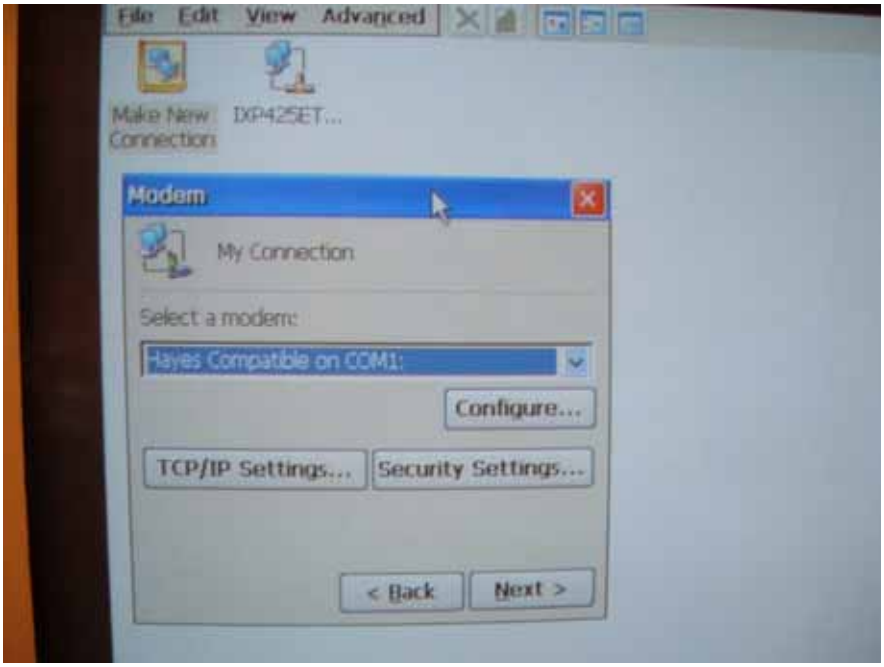


Figure 4.15 Networking via PPP

4.5.3 Web browser

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

4.6 M-system DOC Flash File System

4.6.1 Introduction to M-system DOC Flash File System

M-system DOC Flash File System was designed and developed specifically as an enhancement to Microsoft Windows CE operating systems and eliminates extra disk-like storage such as storage cards, redundant RAM and ROM.

4.6.2 Mounted Volume folder in SPC-100

SPC uses M-system DOC Flash to utilize the free space of flash ROM for persistent storage. The M-system DOC Flash file system region in the system is located in "\Mounted Volume" directory. Any file or directory stored in "\Mounted Volume" directory would be keep persistently, even if the power of SPC were turned off. The user can store software or data in “\Mounted Volume” rather in CF card to avoid inconvenience.

4.7 Application Program Development

The SPC is bundled with built-in Windows® CE.NET operating system. In real application user need to execute various application programs on it. However, unlike its other CPU 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.

4.7.1 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 SPC

• 64MB DRAM

• CD-ROM drive

• Monitor with VGA resolution at least

• Mouse

• 200MB free hard disk space at least

• SPC series platform

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

• USB cable (bundled in the standard SPC series)

4.7.2 Building Windows CE program

By the platform SDK bundled with the standard SPC, users can build the Windows CE runtime application program by the eMbedded Visual Tools.

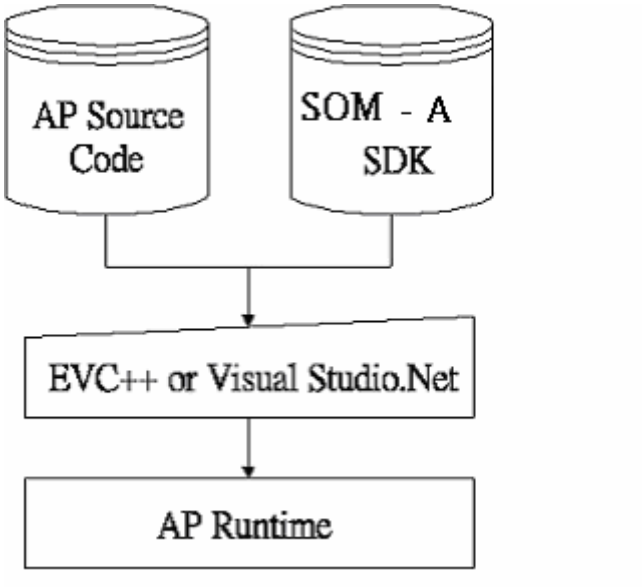


Figure 4.16 Flow-chart of Building Windows® CE.NET runtime

4.7.3 How to install SDK

Copy SPC SDK file “ADV_IXP_SDK.msi” to your PC, and launch it. You can install SDK by steps.

Step 1, Launch SPC SDK file, and then tap Next button.

Figure 4.17

Step 2, Accept License Agreement and go next.

Figure 4.18

Step 3, Key in your information and go next.

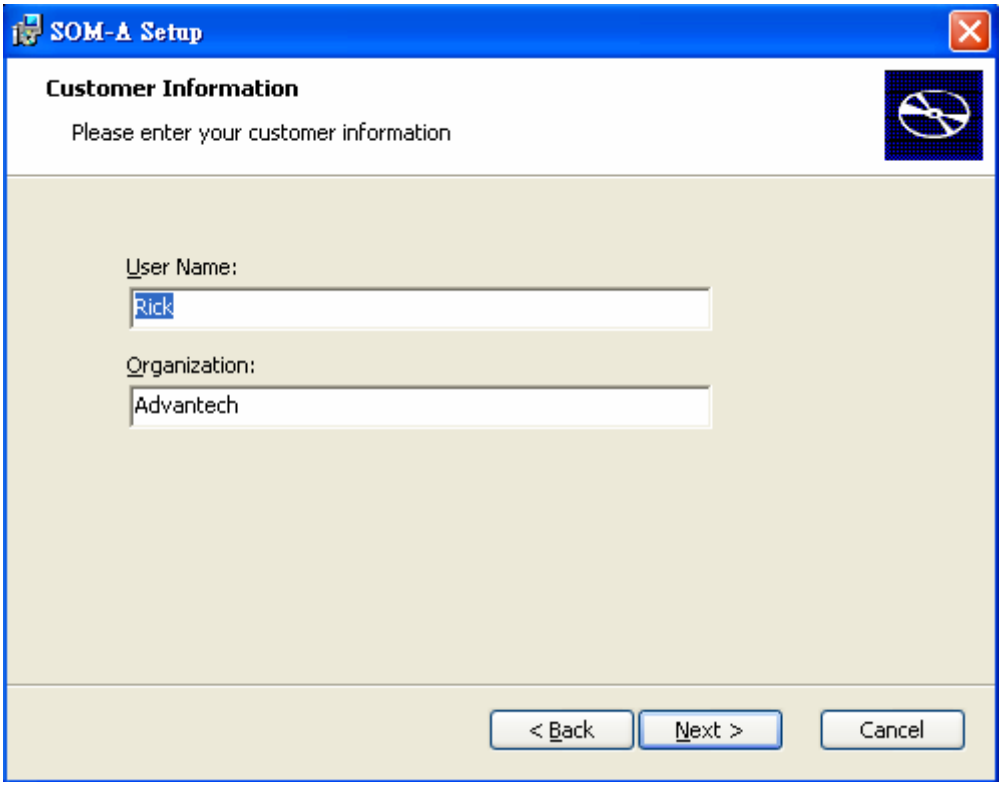


Figure 4.19

Step 4, Choose setup type.

There are 3 options “Embedded Visual C++”, “Microsoft .NET Compact Framework”, and “Documentation” in Custom Setup.

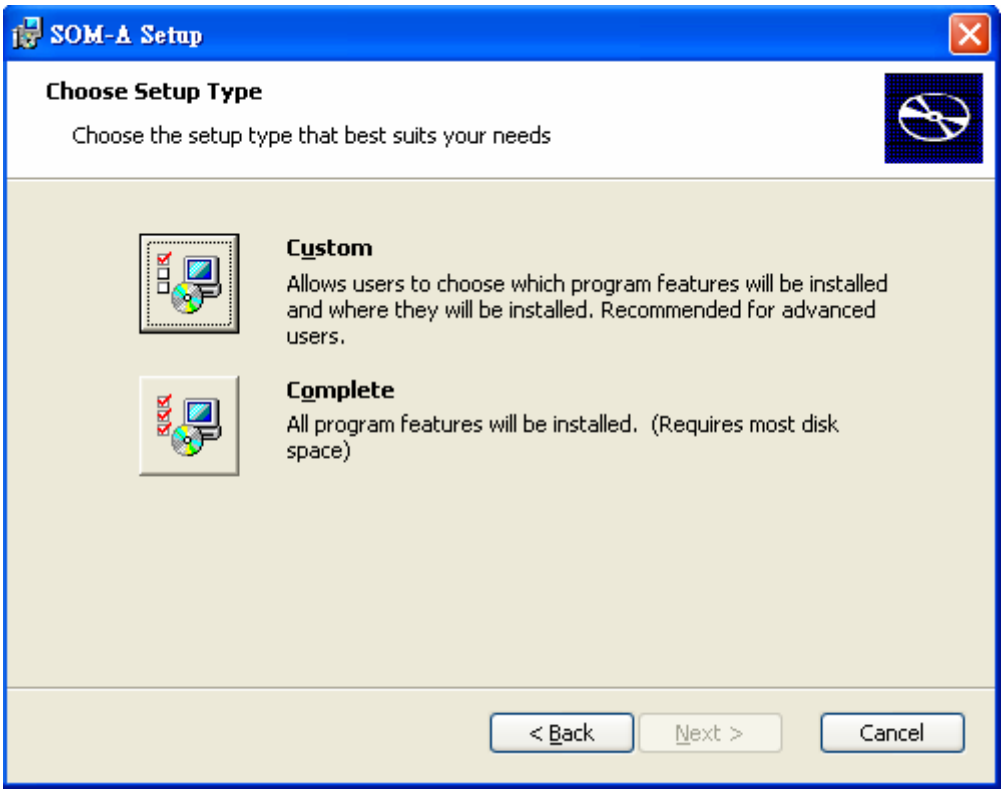


Figure 4.20

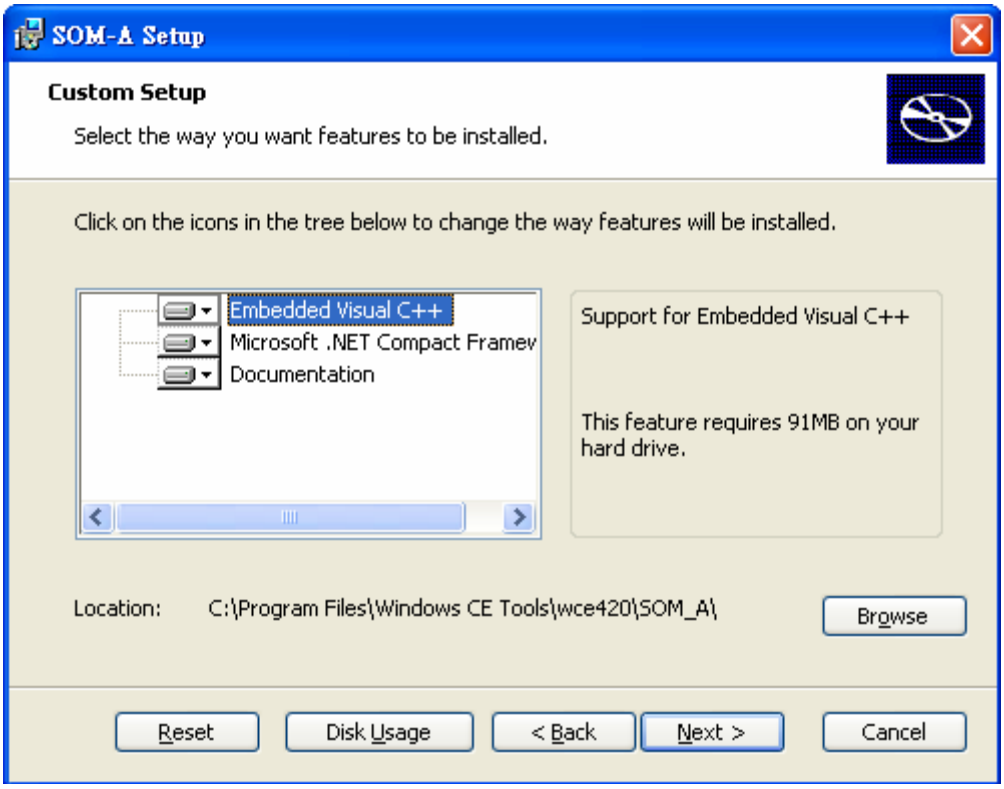


Figure 4.21

Step 5, Tap “Install” button to install SDK.

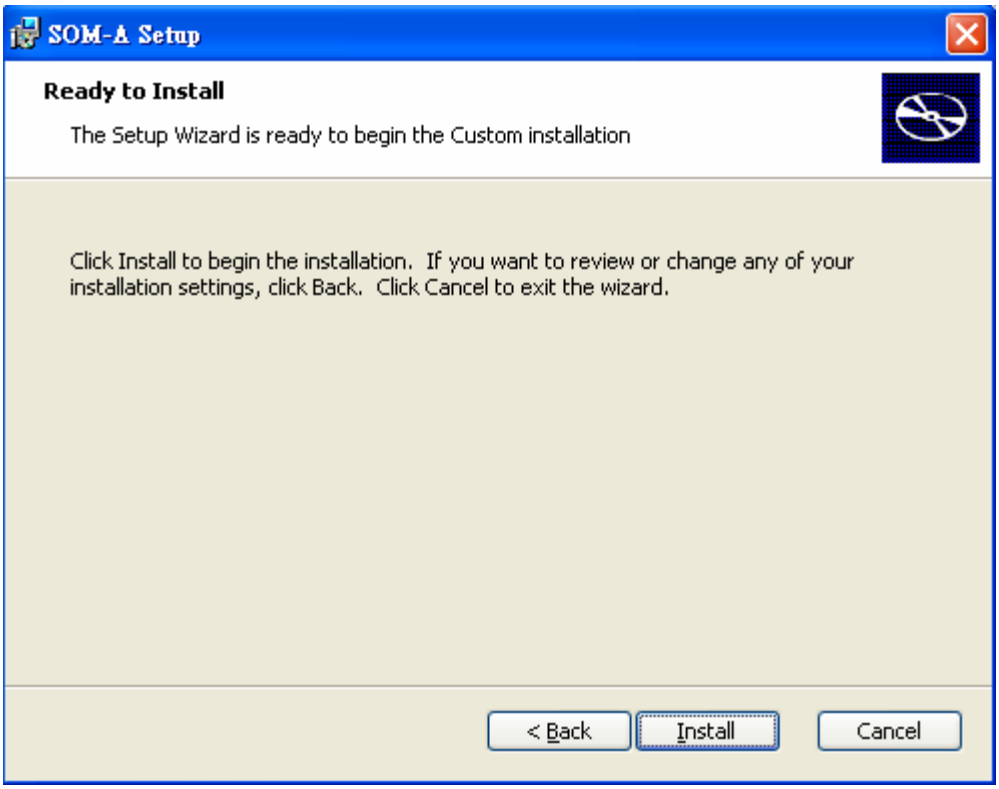


Figure 4.22

Install SDK…….

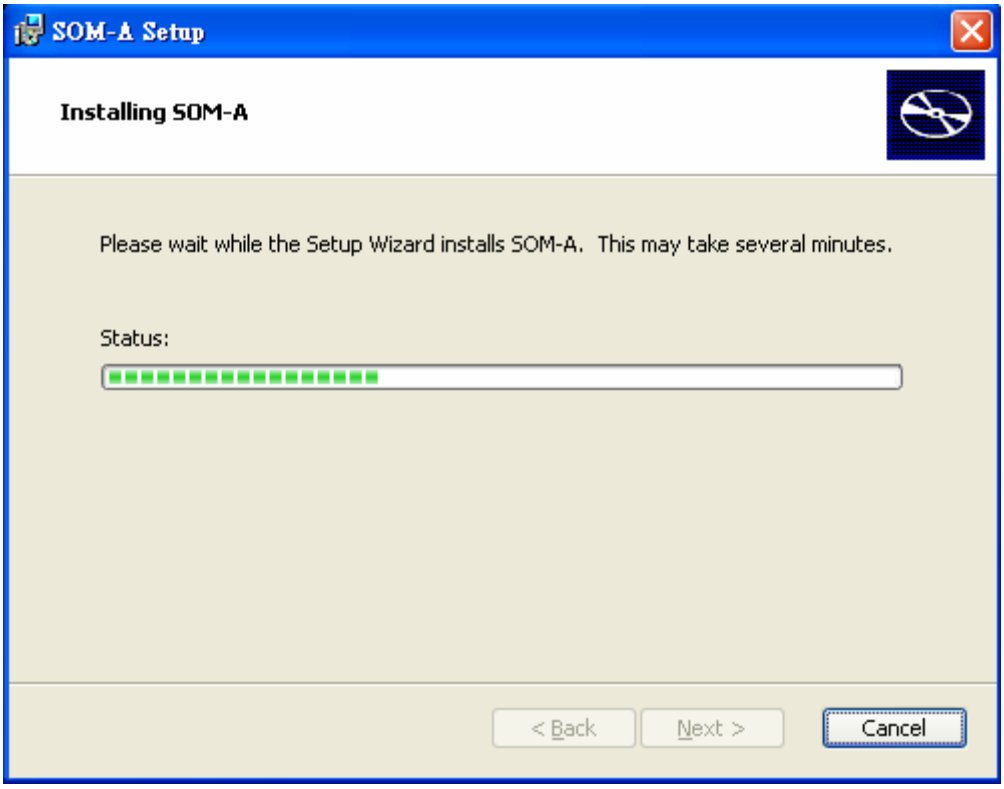


Figure 4.23

Step6, Finish installing.

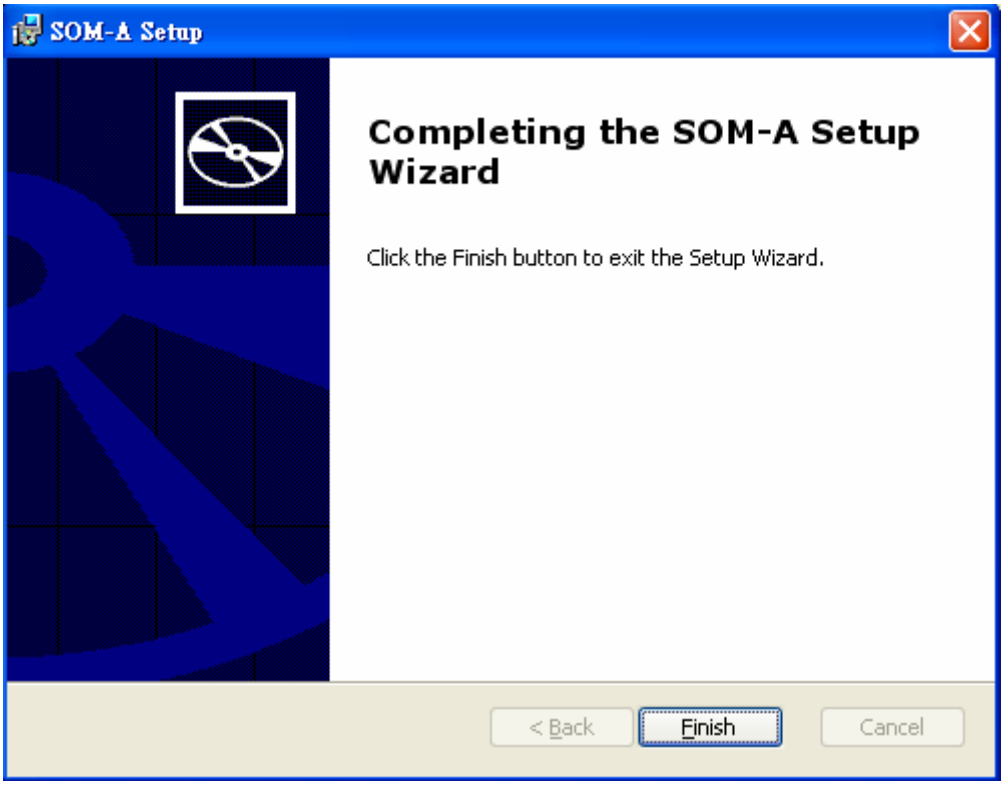

SOM-A Setup
Completing the SOM-A Setup Wizard
Click the Finish button to exit the Setup Wizard.
< Back
Finish
Cancel

Figure 4.24

4.7.4 Running your application programs

ActiveSync would automatically transfer the built application program to platform. Choose SDK type as SOM_A once compile your application program.

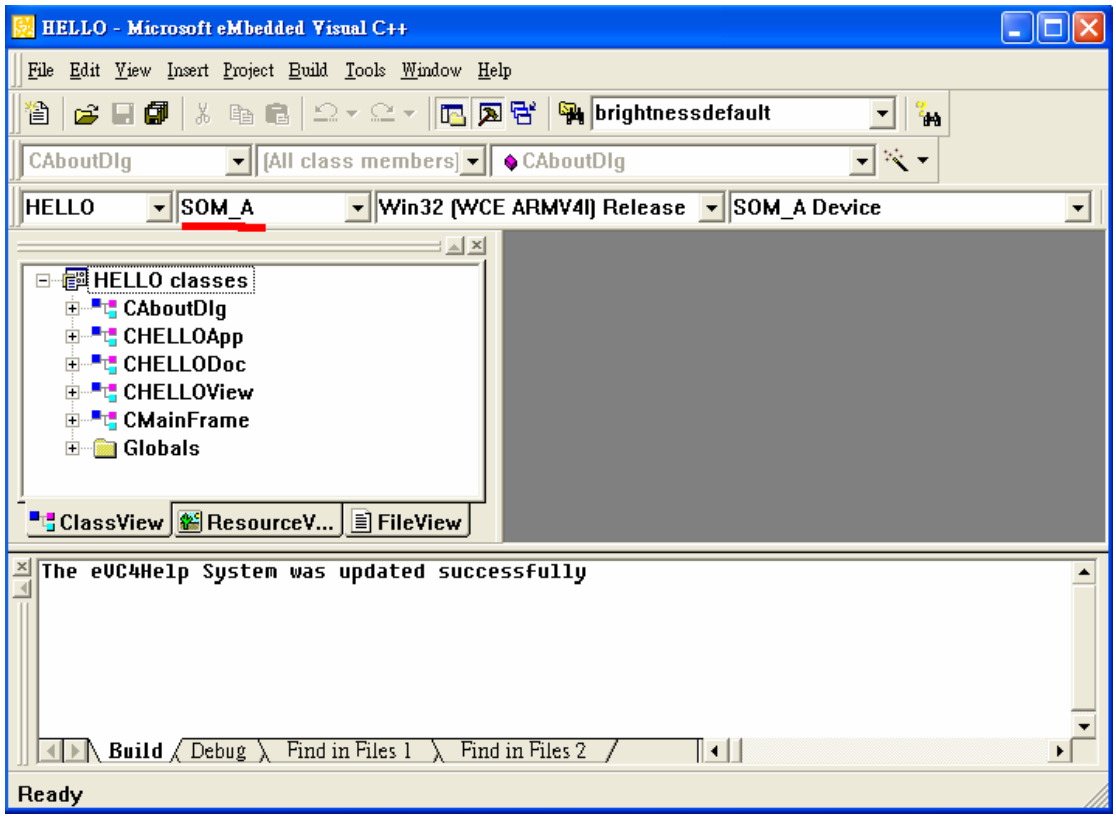


Figure 4.25

4.8 Windows® CE.NET 4.2 Require Components

(Advantech Recommend)

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	■