



# User's Manual

# PPC-090T

DMP Vortex86 DX2 / DX3 Processor

Compact Panel PC with 9" Touchscreen

PPC-090T-D2 Series with DX2 processor

PPC-090T-D3 Series with DX3 processor

(Revision 1.12A)

## REVISION

| DATE       | VERSION      | DESCRIPTION  |
|------------|--------------|--|
| 2014/1/22  | Version 1.0A | New Release  |
| 2014/3/11  | Version 1.1A | Add <a href="#">4.3 Serial Ports Setting (RS232/422/485)</a>   |
| 2015/9/15  | Version 1.2A | Change <a href="#">the SPEC of Section 3.1</a>   |
| 2016/1/6   | Version 1.3A | <ol style="list-style-type: none"> <li>1. Add the type with 2GB DRAM solution</li> <li>2. Correct LED backlight lifetime</li> <li>3. Doesn't support DOS Touch Driver</li> </ol>   |
| 2016/4/28  | Version 1.4A | <ol style="list-style-type: none"> <li>1. Change J33~J36 connectors as optional<br/>(They are for I/O Extension board.)</li> <li>2. Add the information of DX3 &amp; extension board.</li> <li>3. Correct the weight of whole system.</li> </ol>   |
| 2016/10/19 | Version 1.5A | <ol style="list-style-type: none"> <li>1. Add USB WLAN solution as optional.</li> <li>2. Add the ordering information of SATA SLIM storage.</li> </ol>   |
| 2016/11/05 | Version 1.6A | Correct 16bit GPIO port on section 5.1.  |
| 2016/11/30 | Version 1.7A | Correct 16bit GPIO port on section 5.2.  |
| 2016/12/19 | Version 1.8A | Specification correction   |
| 2017/04/13 | Version 1.9A | <ol style="list-style-type: none"> <li>1. Panel mounting: M3 screws maximum torque 0.44Nm (4.5 kgf-cm).</li> <li>2. Add serial number code on section 1.6.</li> <li>3. Add pin assignment for PoE on RJ45.</li> <li>4. Add IEE 802.3at standard PoE+ pinout on section 5.2</li> <li>5. Specification correction</li> </ol> |

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| <b>DATE</b> | <b>VERSION</b> | <b>DESCRIPTION</b>                            |
|-------------|----------------|---|
| 2018/06/08  | Version 1.10A  | Correct the <b>PoE+ pinout</b> on section 5.2 |
| 2019/07/30  | Version 1.11A  | Add section 1.3 [Note 5] instruction          |
| 2021/08/31  | Version 1.12A  | Add Projected Capacitive Touch Solution       |

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This Manual is for the PPC-090T.

## SAFETY INFORMATION

- Read these Safety instructions carefully.
- Please carry the unit with both hands, handle carefully.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Do not expose your Panel PC to rain or moisture in order to prevent shock and fire hazard.
- Input voltage rated +12 ~ 24 VDC
- Operating temperature between 0~+50°C (+32~+122°F).
- Keep PPC-090T away from humidity.
- When a Compact Flash Card or a SATA Slim is the main operating system storage, please turn off power before inserting or removing. Do not open the cabinet to avoid electrical shock. Refer to your nearest dealer for qualified personnel servicing.
- Never touch un-insulated terminals or wire unless your power adaptor is disconnected.
- Locate your Panel PC as close as possible to the socket outline for easy access and to avoid force caused by entangling of your arms with surrounding cables from the Panel PC.
- USB connectors are not supplied with Limited Power Sources.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

### **WARNING!**



*DO NOT ATTEMPT TO OPEN OR TO DISASSEMBLE THE CHASSIS (ENCASING) OF THIS PRODUCT. PLEASE CONTACT YOUR DEALER FOR SERVICING FROM QUALIFIED TECHNICIAN.*

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# Ch. 1

## General Information

[1.1 Product Description](#)

[1.2 Product Specifications](#)

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[1.4 Product Dimensions](#)

[1.5 Mounting Instruction](#)

[1.6 Ordering Information](#)

# 1.1 Product Description

ICOP Technology Inc. is proudly going to release a brand new Panel PC, which offers fanless design, low power consumption, and IP65 front panel. The PPC-090T is powered by DMP's Vortex86DX2 and DX3 SoCs, the 3<sup>rd</sup> generation SoCs of Vortex86 family, and dual-channel 1GB / 2GB DDRII (DDDRIII) chipset that handles processing more efficiently and provides faster performance. The resistive touch panel with LED backlight TFT LCD increases operation convenience and visibility in outdoor environments. The ultra-compact and thin exterior design is perfect for the present demanding embedded and productive applications.

The new PPC-090T inherited PDX/PMX-series' smooth appearance and ultra-texture aluminum exterior design to make your industrial applications look more stylish. The versatile I/O ports, IP65 front panel, 10/100Mbps Ethernet, GIGA high-speed Ethernet, WLAN, etc. can fulfill fundamental functions. Our consistent advantages feature stable performance, extended working temperature support, low power consumption and fanless design. The expandable customize I/O ports can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs.

The PPC-090T supports Windows Embedded CE 6.0, Windows Embedded Compact 7, Windows Embedded Standard 2009, Windows Embedded Standard 7 and Linux to meet ready-to-market demand and provide competitive advantages for customers.



## 1.2 Product Specifications

### CPU BOARD SPECIFICATIONS

|                       |   |
|-----------------------|---|
| CPU                   | DM&P Vortex86DX2- 933MHz / DX3-1GHz   |
| Cache                 | DX2: L1:16KB I-Cache, 16KB D-Cache<br>L2: 256KB Cache<br>DX3: L1:32KB I-Cache, 32KB D-Cache<br>L2: 512KB Cache              |
| BIOS                  | AMI BIOS  |
| Memory                | 512MB/1GB/2GB DDR2(DDR3) onboard  |
| Watchdog Timer        | Software Programmable from<br>30.5u to 512 seconds x 2 sets   |
| LAN                   | Integrated 10/100M Ethernet X1<br>Giga Ethernet (Optional) X1   |
| PoE <b>(Optional)</b> | Optional upon 10/100Mbps Ethernet x 1<br>Support IEEE 802.3AT   |
| Audio                 | HD Audio-Realtek ALC262 CODEC   |
| Internal Drives       | Compact Flash Type I / II Slot<br>SATA SLIM, SD Slot (Optional)   |
| I/O                   | RS-232/422/485 x 2<br>USB Ports (Ver2.0) x 3<br>PS/2 KB<br>Audio-Out<br>RJ-45 Port x 1<br>GIGA Ethernet Port X 1 (Optional) |

### MECHANICAL & ENVIRONMENT

|                       |                        |
|-----------------------|------------------------|
| Power Requirement     | +12 ~ 24VDC            |
| Power Consumption     | +24VDC@ 1A             |
| Operating Temperature | 0~+50°C (+32~+122°F) / |

|                     |  |
|---------------------|--|
|                     | -20~+60°C (-4~+140°F; <b>DX2 with 800MHz</b> ) |
| Storage Temperature | -30~+70°C (-22~ +158°F)                        |
| Operating Humidity  | 0% ~ 90% Relative Humidity, Non-Condensing     |
| Dimensions          | 242x156.5x44mm (9.68"x6.26"x1.76")             |
| Weight              | 1.36 Kg  |
| Protection          | IP65 Front Panel                               |
| Certification       | CE / FCC / VCCI / Vibration / Shock            |

## LCD SPECIFICATIONS

|                                 |                                |
|---------------------------------|--------------------------------|
| Display Type                    | 9" WSVGA TFT LCD               |
| Backlight Unit                  | LED                            |
| Display Resolution              | 1024(W) x 600(H)               |
| Brightness (cd/m <sup>2</sup> ) | 300 nits                       |
| Contrast Ratio                  | 500 : 1                        |
| Display Color                   | 262,144                        |
| Pixel Pitch (mm)                | 190.5 (H) x 189 (V)            |
| Viewing Angle                   | Vertical 120°, Horizontal 140° |
| Backlight Lifetime              | 18,000 hrs                     |

## TOUCHSCREEN

|                 |  |
|-----------------|--|
| <b>Type1</b>    | Analog Resistive   |
| Resolution      | Continuous   |
| Transmittance   | 80%  |
| Controller      | PS/2 interface   |
| Software Driver | Linux, Win CE, Win XP, Win 7,<br>Windows Embedded Standard |
| Durability      | 1 million  |

|                  |   |
|------------------|---|
| <b>Type2</b>     | Projected Capacitive Touch Screen <b>(Optional)</b> |
| Resolution       | 25ppi (Min.)  |
| Transparency     | 86% ± 2%  |
| Accuracy         | Within 2.5mm each target                            |
| Surface Hardness | ≥ 7H (Pressure: 0.5N/45°)                           |

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# 1.3 Inspection standard for TFT-LCD Panel

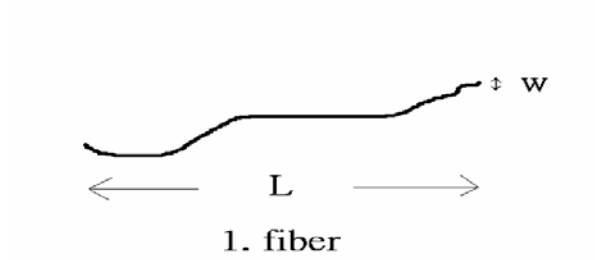
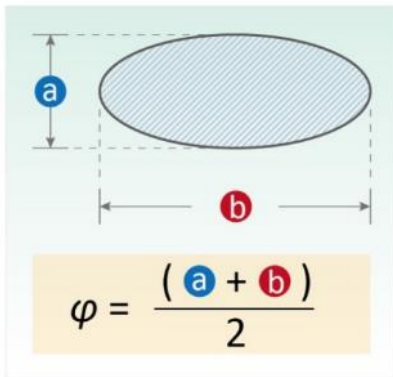
| DEFECT TYPE                |             |                   | LIMIT  |                 |                 |                 | Note            |       |
|----------------------------|-------------|-------------------|--|-----------------|-----------------|-----------------|-----------------|-------|
| VISUAL DEFECT              | INTERNAL    | SPOT              | $\varphi < 0.15\text{mm}$                                |                 | Ignore          |                 | Note1           |       |
|                            |             |                   | $0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$           |                 | $N \leq 4$      |                 |                 |       |
|                            |             |                   | $0.5\text{mm} < \varphi$                                 |                 | $N=0$           |                 |                 |       |
|                            |             | FIBER             | $0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$ |                 | $N \leq 3$      |                 | Note1           |       |
|                            |             |                   | $1.0\text{mm} < W, 1.5\text{mm} < L$                     |                 | $N=0$           |                 |                 |       |
|                            |             | POLARIZER BUBBLE  | $\varphi < 0.15\text{mm}$                                |                 | Ignore          |                 | Note1           |       |
|                            |             |                   | $0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$           |                 | $N \leq 2$      |                 |                 |       |
|                            |             |                   | $0.5\text{mm} < \varphi$                                 |                 | $N=0$           |                 |                 |       |
|                            |             | Mura              | It' OK if mura is slight visible through 6%ND filter     |                 |                 |                 |                 |       |
|                            |             | ELECTRICAL DEFECT | BRIGHT DOT   | A Grade         |                 |                 | B Grade         |       |
| C Area                     | O Area      |                   |  | Total           | C Area          | O Area          | Total           | Note3 |
| $N \leq 0$                 | $N \leq 2$  |                   |  | $N \leq 2$      | $N \leq 2$      | $N \leq 3$      | $N \leq 5$      | Note2 |
| DARK DOT                   | $N \leq 2$  |                   | $N \leq 3$   | $N \leq 3$      | $N \leq 3$      | $N \leq 5$      | $N \leq 8$      |       |
| TOTAL DOT                  | $N \leq 4$  |                   |  | $N \leq 5$      | $N \leq 6$      | $N \leq 8$      | Note2           |       |
| TWO ADJACENT DOT           | $N \leq 0$  |                   | $N \leq 1$ pair  | $N \leq 1$ pair | $N \leq 1$ pair | $N \leq 1$ pair | $N \leq 1$ pair | Note4 |
| THREE OR MORE ADJACENT DOT | NOT ALLOWED |                   |  |                 |                 |                 |                 |       |
| LINE DEFECT                | NOT ALLOWED |                   |  |                 |                 |                 |                 |       |

(1) One pixel consists of 3 sub-pixels, including R, G, and B dot. (Sub-pixel = Dot)

(2) Little bright Dot acceptable under 6% ND-Filter.

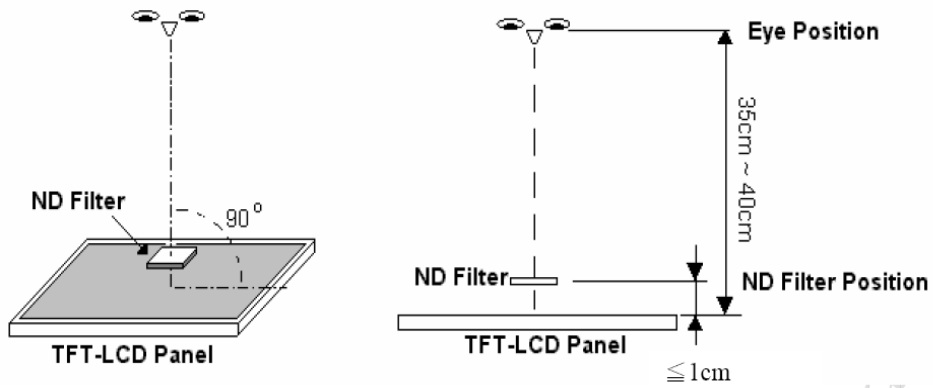
**(3) If require G0 grand (Total dot  $N \leq 0$ ), please contact region sales.**

[ Note 1 ] W: Width[mm]; L: Length[mm]; N: Number;  $\varphi$ : Average Diameter.

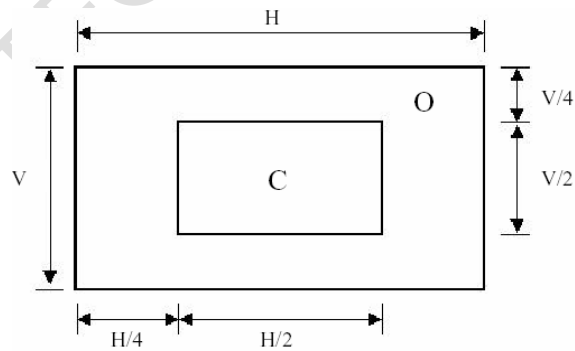


(a) White / Black Spot    (b) Polarizer Bubble

[ Note 2 ] Bright dot is defined through 6% transmission ND Filter as following.

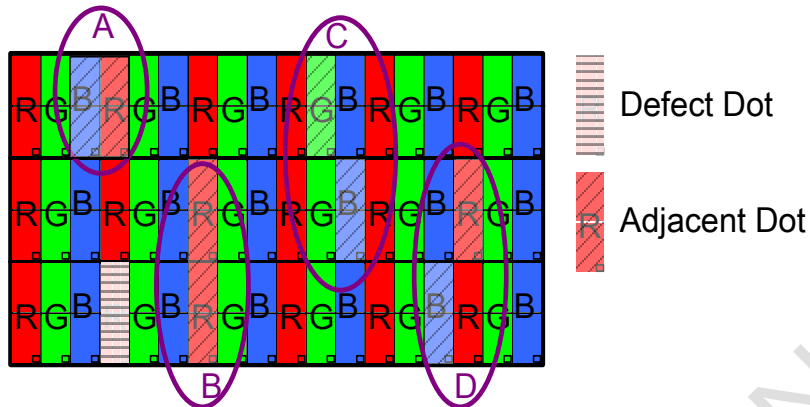


[ Note 3 ] Display area



**C Area:** Center of display area    **O Area:** Outer of display area

**[ Note 4 ]** Judge the defect dot and the adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

**[Note 5]**

According to the technical information from LCD manufacturer, the image retention may happen on LCD display if the static image is kept for a period of time without any change. ICOP will suggest customers not to have static image on LCD for over 4 hours without any image movement and also enable screensaver to avoid image sticking issue if LCD displays need to be kept on for a long time.

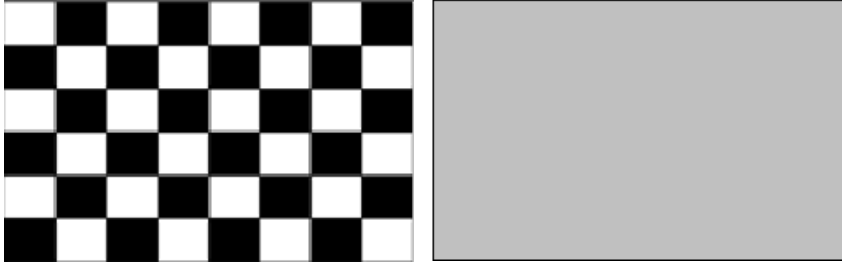
Some Image retention issue will disappear when LCD display is turned off for a period of time, but some image retention may be not reversible when LCD encounters screen burn.

The following is LCD manufacturer's test result for customers' reference.

| TEST ITEMS                               | CONDITIONS                                | NOTE                          |
|--|---|-------------------------------|
| High Temperature Operation               | 70°C ;240hrs                              |                               |
| High Temperature Storage                 | 80°C ; 240hrs                             |                               |
| High Temperature High Humidity Operation | 60°C ; 90%RH ;240hrs                      | No condensation               |
| Low Temperature Operation                | -20°C ; 240hrs                            | Backlight unit always turn on |
| Low Temperature Storage                  | -30°C ; 240hrs                            |                               |
| Thermal Shock                            | -30°C (0.5hr) ~ 80°C (0.5hr) ; 200 Cycles |                               |
| Image Sticking                           | 25°C ; 4hrs                               | <b>Note 5-1</b>               |
| MTBF                                     | 20,000Hrs                                 |                               |

**Note 5-1**

1. Condition of Image Sticking test :  $25\text{ }^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$ .
2. Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.
3. After 5 mins, the mura must be disappeared completely.

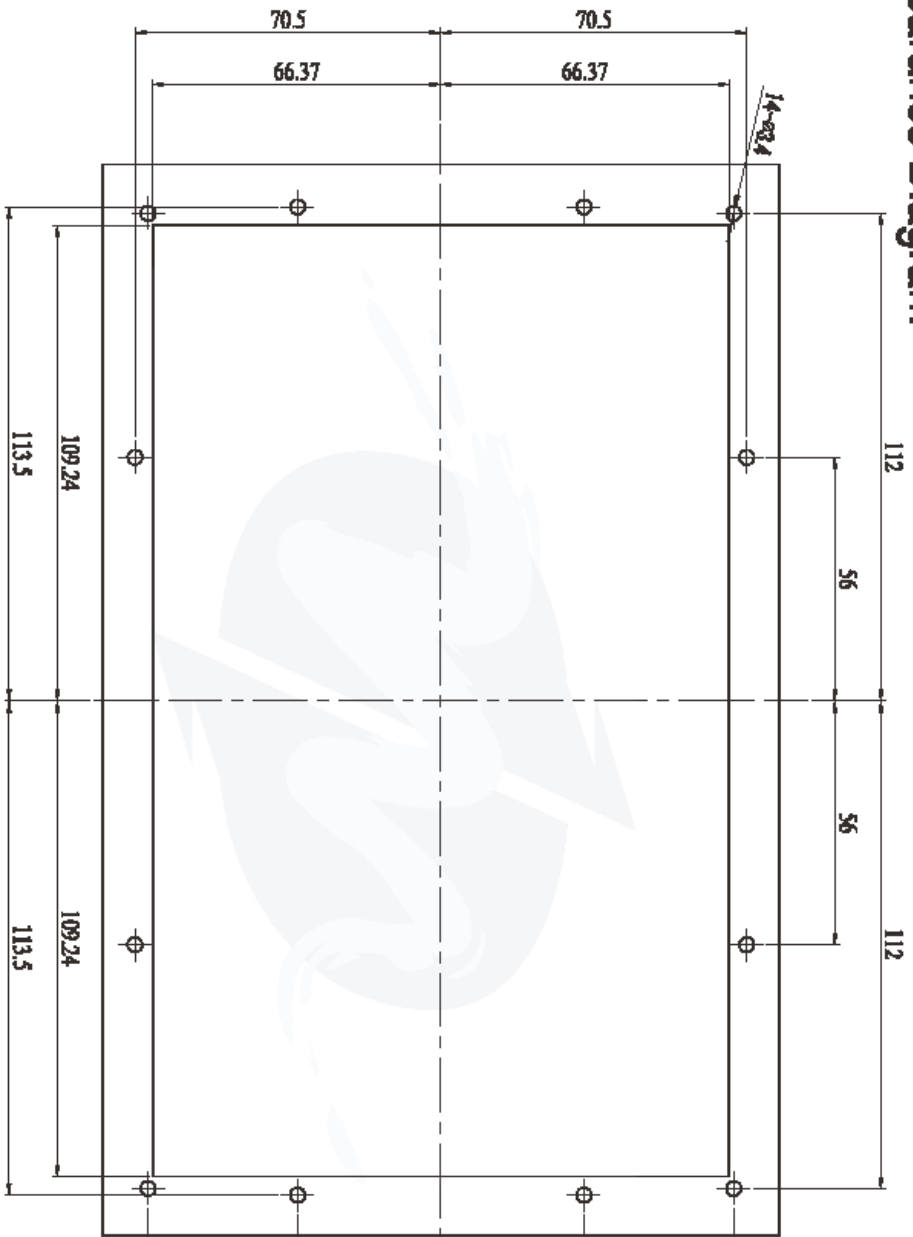


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# Appearance Diagram



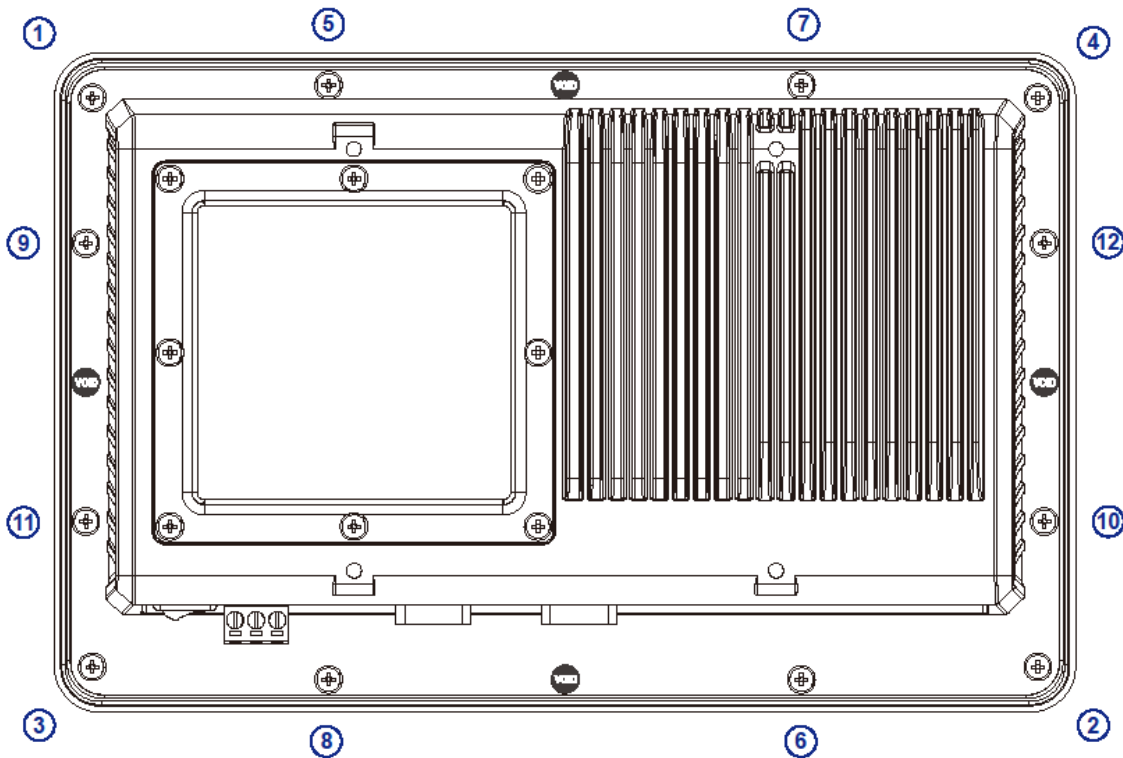
|     |      |             |          |
|-----|------|-------------|----------|
| REV | DATE | DESCRIPTION | APPROVED |
|     |      |             |          |

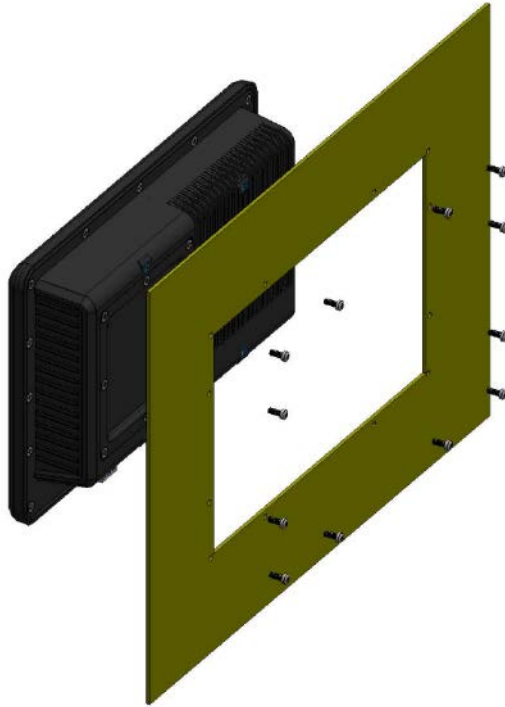
|      |    |         |          |                    |          |
|------|----|---------|----------|--------------------|----------|
| DATE | BY | CHKD BY | APP'D BY | PART NAME          | UNIT     |
|      |    |         |          | Explosion_Draining | PPC-090T |
|      |    |         |          |                    |          |

2019-02-08 Rev.02

## 1.5 Panel Mounting Instruction

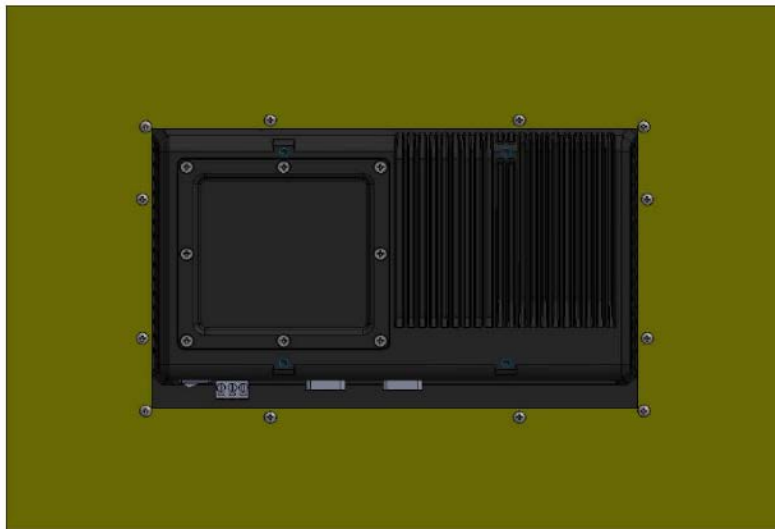
1. Cut a mounting hole in the panel. (Refer to [PPC-090T Dimensions](#) on page 11~12.) (Note 1)
2. Check and remove the twelve M3 screws in a diagonal pattern as image below if necessary.
3. Place PPC-090T face-down on a clean, flat surface.
4. Slide the panel cutout around the back of PPC-090T, until the panel rests directly on the gasket. Make sure the screw holes align with the screw holes on PPC-090T.
5. The screw size is M3\*L (L=wall thickness + 6.0mm) (Note 2)
6. Insert all twelve M3 screws into the screw holes. (Note 2)
7. Finger-tighten the M3 screws. Finish tightening the M3 screws in a diagonal pattern using an M3 screw driver (see the image as below); maximum torque 0.44Nm (4.5 kgf-cm).





**Note 1:**

It is strongly recommended that a professional machine shop cut the mounting hole in the panel.



**Note 2:**

The length for all twelve M3 screws will be according to the thickness of mounting panel. For example: The length of standard M3 screws for PPC-090T is 6mm. If the thickness of your mounting panel is 3mm and washer thickness is 1mm, you have to use 10mm M3 screw.

# 1.6 Ordering Information

| Product Code | LCD Size | CPU Type   | CPU Clock  | RAM                            | Flash onboard   | I/O  |
|--------------|----------|--|--|--------------------------------|---|--|
| PPC          | 090T     | D2 (DX2)<br>D3 (DX3)<br><b>PD2 (DX2 + 9" PCAP)</b><br><b>PD3 (DX3 + 9" PCAP)</b> | W(800MH)<br>N(933MHz)<br>G (1GHz)<br><b>D (1GHz with wide temp.)</b> | 3 (512B)<br>4 (1GB)<br>5 (2GB) | N (No Flash)<br>A (256MB)<br>B (512MB)<br>C (1GB)<br>D (2GB)<br>E (4GB) | GE (GigaLAN)<br>G7C (GigaLAN + 7 COMs)<br>G7CP (GigaLAN + 7 COMs + PoE)<br>G5CG (GigaLAN + 5 COMs + 16bit GPIO)<br>G5CGP (GigaLAN + 5 COMs + 16bit GPIO + PoE)<br>7C (7 COMs)<br>7CP (7 COMs + PoE)<br>5CG (5 COMs + 16bit GPIO)<br>5CGP (5 COMs + 16bit GPIO + PoE) |

1. Product Code :

PPC : Panel PC Series ◦

2. LCD Size :

090T : 9" LCD Panel ◦

3. CPU Type :

D2 : Vortex86DX2 CPU with Resistive Touch ◦

D3 : Vortex86DX3 CPU with Resistive Touch ◦

**PD2** : Vortex86DX2 CPU with **PCAP** Touch ◦

**PD3** : Vortex86DX3 CPU with **PCAP** Touch ◦

4. CPU Clock :

3 : 300MHz ◦      8 : 800MHz ◦      W : 800MHz ◦      N : 933M

G : 1GHz ◦      D : 1GHz with wide temp -20~60°C ◦ (DX3 only)

5. RAM :

3 : 512MB ◦      4 : 1GB ◦      5 : 2GB ◦

6. Flash Onboard :

N : No Flash ◦      A : 256MB ◦      B : 512MB ◦      C : 1GB ◦      D : 2GB ◦

E : 4GB ◦

7. I/O Code :

GE or G : Giga Ethernet (GbE) ◦

5C : Total 5 COM ports ◦ (Standard 2 COMs + Extension board -> 3 COMs)

7C : Total 7 COM ports ◦ (Standard 2 COMs + Extension board -> 5 COMs)

G : 16bit of GPIO port ◦ (Extension board -> 16bit of GPIO)

P : PoE Function ◦ (Extension board -> PoE)

| PART NUMBER  | DESCRIPTION  |
|--|--|
| PPC-090T-D2N4N   | 9" Panel PC w/DX2/1GB Memory<br>3USB/AUDIO/LAN/2COM/RTP/DC12~24V   |
| PPC-090T-D2N4N-GE  | 9" Panel PC w/DX2/1GB Memory<br>3USB/AUDIO/LAN/GbE/2COM/RTP/DC12~24V                                       |
| PPC-090T-D2N4N-G7CP  | 9" Panel PC w/DX2/1GB Memory<br>3USB/AUDIO/LAN/GbE/7COM/RTP/PoE  |
| PPC-090T-D2W4N-GE  | 9" Panel PC w/DX2- <b>800MHz</b> /1GB<br>Memory/3USB/AUDIO/LAN/GbE/2COM/RTP/<br>DC12~24V/ <b>Wide Temp</b> |
| PPC-090T-D3G4N   | 9" Panel PC w/DX3/1GB Memory<br>3USB/AUDIO/LAN/2COM/RTP/DC12~24V   |
| PPC-090T-D3G4N-GE  | 9" Panel PC w/DX3/1GB Memory<br>3USB/AUDIO/LAN/GbE/2COM/RTP/DC12~24V                                       |
| PPC-090T- <b>PD</b> 3G5N   | 9" Panel PC w/DX3/2GB Memory<br>3USB/AUDIO/LAN/2COM/ <b>PCAP</b> /DC12~24V                                 |
| PPC-090T-D3G5N-GE  | 9" Panel PC w/DX3/2GB Memory<br>3USB/AUDIO/LAN/GbE/2COM/RTP/DC12~24V                                       |
| PPC-090T- <b>PD</b> 3G5N-GE  | 9" Panel PC w/DX3/2GB Memory<br>3USB/AUDIO/LAN/GbE/2COM/ <b>PCAP</b> /DC12~24V                             |
| PPC-090T-D3G5N-G7C   | 9" Panel PC w/DX3/2GB Memory<br>3USB/AUDIO/LAN/GbE/7COM/RTP/DC12~24V                                       |
| <b>WLAN KIT (Optional)</b><br><br>(Can't be used for PCAP version) | USB-WLAN-IPEX-KIT<br>WIRELESS-ANTENNA-157MM<br>WIRELESS-CABLE-150MM  |
| ★ Please contact your region sales for more ordering part numbers. |  |

# Ch. 2

## System Installation

[2.1 CPU Board Outline](#)

[2.2 Connector Summary](#)

[2.3 Connector Pin Assignments](#)

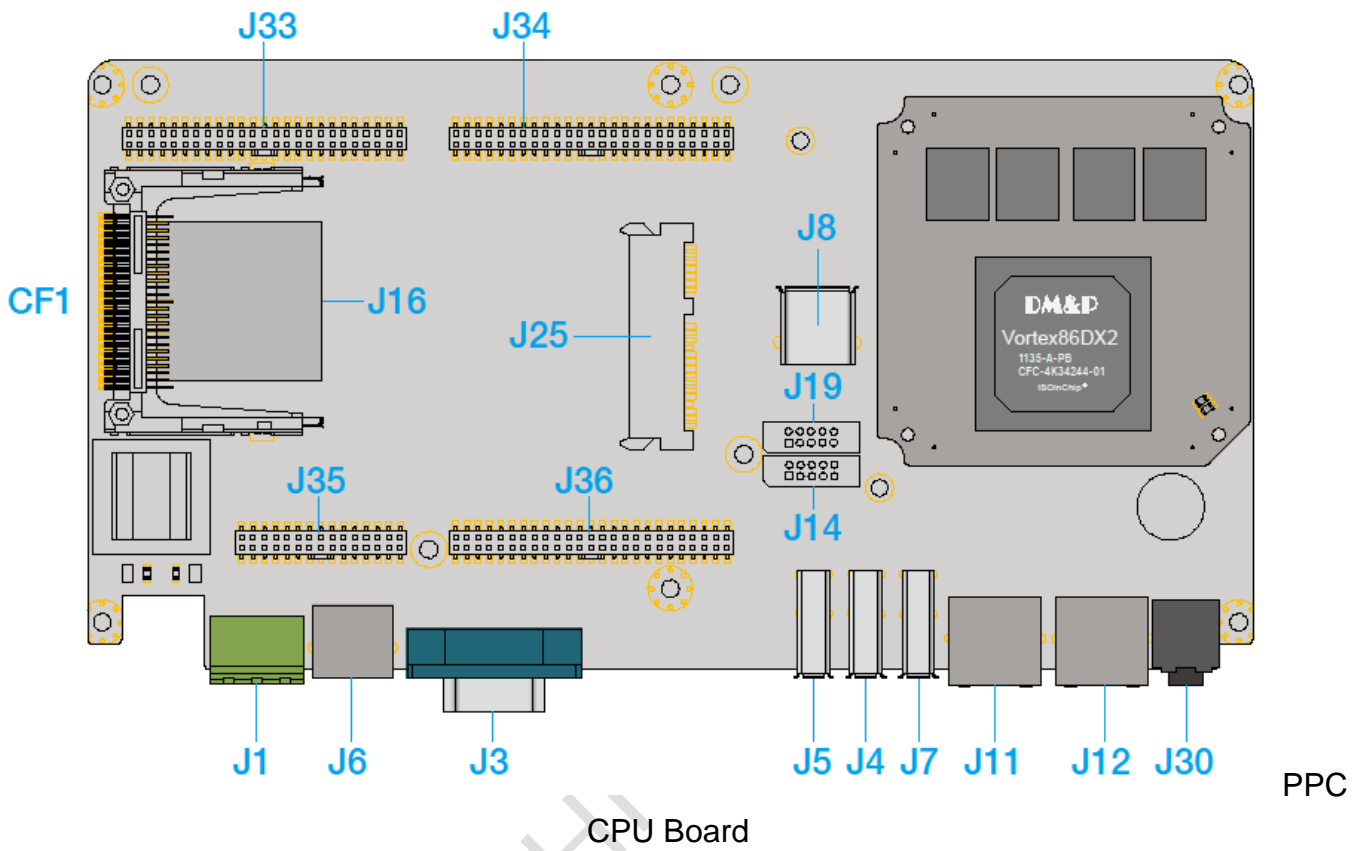
[2.4 External I/O Overview](#)

[2.5 External I/O Pin Assignment](#)

[2.6 Watchdog Timer](#)

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## 2.1 CPU Board Outline



## 2.2 Connector Summary

| No. | Description                    | Type of Connections           | Pin #  |
|-----|--------------------------------|-------------------------------|--------|
| J1  | Power Terminal Connector       | External Power Plug           | 3-pin  |
| J3  | <b>COM1</b> (RS232/422/485)    | External D-Sub Male Connector | 9-pin  |
| J4  | USB                            | External USB Connector        | 6-pin  |
| J5  | USB                            | External USB Connector        | 6-pin  |
| J6  | PS/2Keyboard                   | External Mini DIN Socket      | 6-pin  |
| J7  | USB                            | External USB Connector        | 6-pin  |
| J8  | USB <b>(For WLAN Optional)</b> | Internal USB Connector        | 5-pin  |
| J11 | Ethernet                       | External RJ45 Connector       | 8-pin  |
| J12 | GIGA Ethernet                  | External RJ45 Connector       | 8-pin  |
| J14 | <b>COM2</b> (RS-232/422/485)   | 2.0mm 10-pin box header       | 10-pin |
| J16 | SD Card Slot <b>(Optional)</b> | Internal SD Card Socket       |        |
| J19 | VGA <b>(Reserved)</b>          | 2.0mm 10-pin box header       | 10-pin |
| J25 | SATA Slim Slot                 | Internal SATA Slim Socket     |        |
| J30 | Audio Line-Out                 | 1.25mm Phone Jack             | 2-pin  |
| J33 | GPIO-X3 <b>(Optional)</b>      | PH2*25F(2.0)-7.5mm/P2N71-2XX  | 50-pin |
| J34 | GPIO-X1 <b>(Optional)</b>      | PH2*25F(2.0)-7.5mm/P2N71-2XX  | 50-pin |
| J35 | GPIO-X4 <b>(Optional)</b>      | PH2*15F(2.0)-7.5mm/P2N71-2XX  | 30-pin |
| J36 | GPIO-X2 <b>(Optional)</b>      | PH2*25F(2.0)-7.5mm/P2N71-2XX  | 50-pin |
| CF1 | CF Card Socket                 | CF Type I/II Socket           |        |

**(J8 is for WLAN optional, but can't be used for PCAP version.)**



## 2.3 Connector Pin Assignments

### J1: Power Terminal Connector

| Pin # | Signal Name |
|-------|-------------|
| 1     | +12~24V     |
| 2     | GND         |
| 3     | FG          |

### J3 & J14: COM1 & 2 (RS232/422/485)

| Pin # | Signal Name            | Pin # | Signal Name            |
|-------|------------------------|-------|------------------------|
| 1     | DCD1/422TX-/<br>RS485- | 2     | RXD1/422TX+<br>/RS485+ |
| 3     | TXD1/422RX+            | 4     | DTR1/422RX-            |
| 5     | GND                    | 6     | DSR1                   |
| 7     | RTS1                   | 8     | CTS1                   |
| 9     | RI1                    |       |                        |

### J4: USB

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | VCC         | 2     | USBD2-      |
| 3     | USBD2+      | 4     | GND         |
| 5     | GND         | 6     | GND         |

### J5: USB

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | VCC         | 2     | USBD3-      |
| 3     | USBD3+      | 4     | GND         |
| 5     | GND         | 6     | GND         |

### J7: USB

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | VCC         | 2     | USBD4-      |
| 3     | USBD4+      | 4     | GND         |
| 5     | GND         | 6     | GND         |

### J8: USB (WLAN Optional)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | VCC         | 2     | USBD1-      |
| 3     | USBD1+      | 4     | GND         |
| 5     | GND         |       |             |

### J6 : PS/2Keyboard

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | KBCLK       | 2     | MSCLK       |
| 3     | GND         | 4     | KBDATA      |
| 5     | MSDATA      | 6     | VCC         |
| 7     | GND         | 8     | GND         |
| 9     | GND         |       |             |

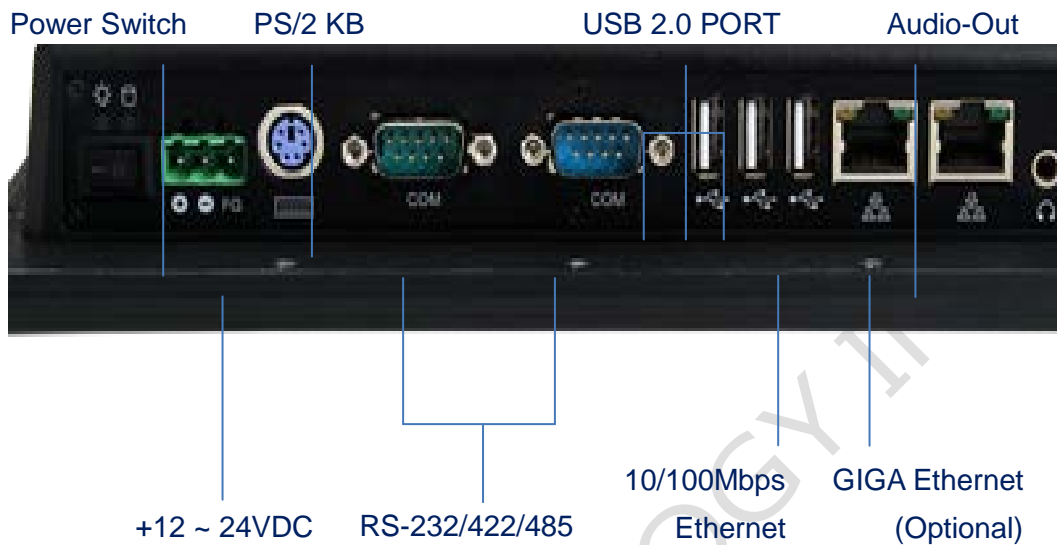
### J19: VGA (Reserved)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1     | R OUT       | 2     | GND         |
| 3     | G OUT       | 4     | GND         |
| 5     | B OUT       | 6     | GND         |
| 7     | HSYNC       | 8     | GND         |
| 9     | VSYNCD      | 10    | GND         |

### J33/J34/J35/J36: GPIO 180-pin (Optional for I/O extension board on Ch.5)

| J33  |             |      |             | J34  |             |      |             | J35  |             |      |             | J36  |             |      |             |
|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|
| Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name | Pin# | Signal Name |
| 1    | GND         | 2    | GND         | 1    | GND         | 2    | SBHE        | 1    | VCC         | 2    | VCC         | 1    | SA7         | 2    | SA6         |
| 3    | GP34        | 4    | GP35        | 3    | RSTDRV      | 4    | SD7         | 3    | GND         | 4    | GND         | 3    | IRQ3        | 4    | SA5         |
| 5    | GP36        | 6    | GP37        | 5    | VCC         | 6    | SD6         | 5    | GP90        | 6    | GP91        | 5    | IRQ10       | 6    | SA4         |
| 7    | GP40        | 8    | GP41        | 7    | SD8         | 8    | SD5         | 7    | GP92        | 8    | GP93        | 7    | IRQ11       | 8    | SA3         |
| 9    | GP42        | 10   | GP43        | 9    | SD9         | 10   | SD4         | 9    | GP94        | 10   | GP95        | 9    | IRQ12       | 10   | SA2         |
| 11   | GP44        | 12   | GP45        | 11   | SD10        | 12   | SD3         | 11   | GP96        | 12   | GP97        | 11   | BALE        | 12   | SA1         |
| 13   | GP46        | 14   | GP47        | 13   | SD11        | 14   | SD2         | 13   | GPCS0       | 14   | GPCS1       | 13   | OSC         | 14   | SA0         |
| 15   | GP50        | 16   | GP51        | 15   | SD12        | 16   | SD1         | 15   | GP00        | 16   | GP01        | 15   | GND         | 16   | IQ14        |
| 17   | GP52        | 18   | GP53        | 17   | SD13        | 18   | SD0         | 17   | GP02        | 18   | GP03        | 17   | GP10        | 18   | GND         |
| 19   | GP54        | 20   | GP55        | 19   | GND         | 20   | GND         | 19   | GP04        | 20   | GP05        | 19   | GP12        | 20   | GP11        |
| 21   | GP56        | 22   | GP57        | 21   | SMEMW       | 22   | IOCHRDY     | 21   | GP06        | 22   | GP07        | 21   | GP14        | 22   | GP13        |
| 23   | GND         | 24   | GND         | 23   | SMEMR       | 24   | AEN         | 23   | RS485+1     | 24   | RS485-1     | 23   | GP16        | 24   | GP15        |
| 25   | GP60        | 26   | GP61        | 25   | IOW         | 26   | SA19        | 25   | VBATT       | 26   | FGND        | 25   | GP20        | 26   | GP17        |
| 27   | GP62        | 28   | GP63        | 27   | IOR         | 28   | SA18        | 27   | VIN         | 28   | VIN-        | 27   | GP22        | 28   | GP21        |
| 29   | GP64        | 30   | GP65        | 29   | SD14        | 30   | SA17        | 29   | VIN         | 30   | VIN-        | 29   | GP24        | 30   | GP23        |
| 31   | GP66        | 32   | GP67        | 31   | SD15        | 32   | SA16        |      |             |      |             | 31   | GP26        | 32   | GP25        |
| 33   | GP70        | 34   | GP71        | 33   | MEMCS16     | 34   | SA15        |      |             |      |             | 33   | GP30        | 34   | GP27        |
| 35   | GP72        | 36   | GP73        | 35   | IOCS16      | 36   | SA14        |      |             |      |             | 35   | GP32        | 36   | GP31        |
| 37   | GP74        | 38   | GP75        | 37   | REFRESH     | 38   | SA13        |      |             |      |             | 37   | XPCIRST-    | 38   | GP33        |
| 39   | GP76        | 40   | GP77        | 39   | GND         | 40   | SA12        |      |             |      |             | 39   | GND         | 40   | GND         |
| 41   | GP80        | 42   | GP81        | 41   | SYSCLK      | 42   | SA11        |      |             |      |             | 41   | XPE0_RX-    | 42   | XPE0_TX-    |
| 43   | GP82        | 44   | GP83        | 43   | IRQ7        | 44   | SA10        |      |             |      |             | 43   | XPE0_RX+    | 44   | XPE0_TX+    |
| 45   | GP84        | 46   | GP85        | 45   | IRQ6        | 46   | SA9         |      |             |      |             | 45   | GND         | 46   | GND         |
| 47   | GP86        | 48   | GP87        | 47   | IRQ5        | 48   | SA8         |      |             |      |             | 47   | XYPE0_CLK-  | 48   | XUSB03-     |
| 49   | GND         | 50   | GND         | 49   | IRQ4        | 50   | GND         |      |             |      |             | 49   | XYPE0_CLK+  | 50   | XUSB03+     |

## 2.4 External I/O Overview

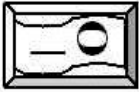


### NOTE

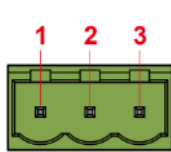
1. GIGA LAN is optional
2. **WLAN is optional for RTP type, but not support for PCAP type.**
3. RS232/422/485 is selected by BIOS setting
4. MicroSD socket is optional (Either one for CF or MicroSD)

## 2.5 External I/O Pin Assignment

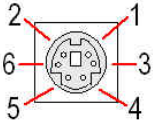
### Power Switch

|  | Pin # | Status |
|---|-------|--------|
|   |       | ON     |
|   | O     | OFF    |

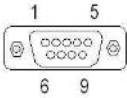
### Power Connector DC-IN +12~24V

|  | Pin # | Signal Name |
|---|-------|-------------|
|   | 1     | +12~24V     |
|   | 2     | GND         |
|   | 3     | FG          |

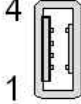
### PS/2 Keyboard

|  | Pin # | Signal Name |
|---|-------|-------------|
|   | 1     | KBCLK       |
|   | 2     | PMCLK       |
|   | 3     | GND         |
|   | 4     | KBDAT       |
|   | 5     | PMDAT       |
|   | 6     | SB5V        |

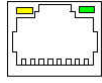
### J3 & J14: COM1 & 2 -RS232/422/485 (Change mode by BIOS Setup)

|  | Pin # | Signal Name        | Pin # | Signal Name        |
|---|-------|--------------------|-------|--------------------|
|   | 1     | /422TX-<br>/RS485- | 2     | /422TX+<br>/RS485+ |
|   | 3     | TXD1 /<br>422RX+   | 4     | DTR1 /<br>422RX-   |
|   | 5     | GND                | 6     | DSR1               |
|   | 7     | RTS1               | 8     | CTS1               |
|   | 9     | RI1                |       |                    |


### J4/J5/J7: USB

|  | Pin # | Signal Name |
|---|-------|-------------|
|   | 1     | VCC         |
|   | 2     | USB0-       |
|   | 3     | USB0+       |
|   | 4     | GND         |
|   | 5     | GGND        |
|   | 6     | GGND        |

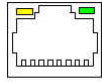
### RJ45

|  | Pin # | Signal Name | Pin # | Signal Name |
|---|-------|-------------|-------|-------------|
|   | 1     | FTXD+       | 2     | FTXD-       |
|   | 3     | FRXIN+      | 4     | NC          |
|   | 5     | NC          | 6     | FRXIN-      |
|   | 7     | NC          | 8     | NC          |


### RJ45 (Option for PoE)

|  | Pin # | Signal Name | Pin # | Signal Name |
|---|-------|-------------|-------|-------------|
|   | 1     | FTXD+       | 2     | FTXD-       |
|   | 3     | FRXIN+      | 4     | SP2         |
|   | 5     | SP2         | 6     | FRXIN-      |
|   | 7     | SP1         | 8     | SP1         |

### GIGA Ethernet (Optional)

|  | Pin # | Signal Name | Pin # | Signal Name |
|---|-------|-------------|-------|-------------|
|   | 1     | GTX+        | 2     | GTX-        |
|   | 3     | GRX+        | 4     | GRX-        |
|   | 5     | GTXC+       | 6     | GTXC-       |
|   | 7     | GRXD+       | 8     | GRXD-       |

### Audio Line-Out

|  | Pin # | Signal Name |
|---|-------|-------------|
|   | 1     | GND         |
|   | 2     | LOUTL       |
|   | 3     | Open Touch  |
|   | 4     | Open Touch  |
|   | 5     | VREFOUT     |

## 2.6 Watchdog Timer

There are two watchdog timers in PPC-090T, we also provide DOS, Linux and WinCE example for your reference.

For more technical support, please visit: <http://tech.icop.com.tw> or download the PDF file: [dmp.com.tw/tech](http://dmp.com.tw/tech)

ICOP TECHNOLOGY INC.

# Ch. 3

## Hardware Installation

PPC-090T supports various kinds of storages for industrial application, divided into SATA Slim, CompactFlash or SD card (optional).

[3.1 Installing the SATA Slim](#)

[3.2 Installing the Compact Flash](#)

### 3.1 Installing the SATA Slim

**[SPEC]**

JEDEC SFF-8156 standard form factor  
x 4.0 mm



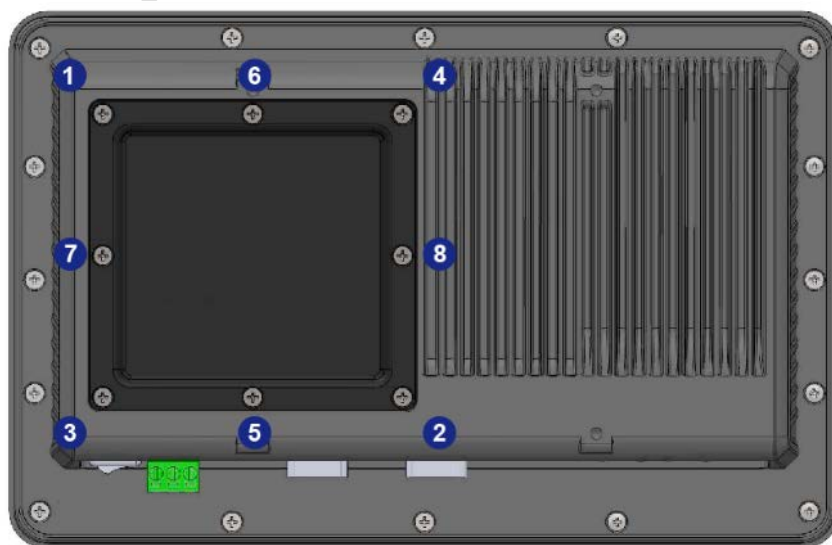
53 x 32

**[SATA SLIM MLC LIST]**

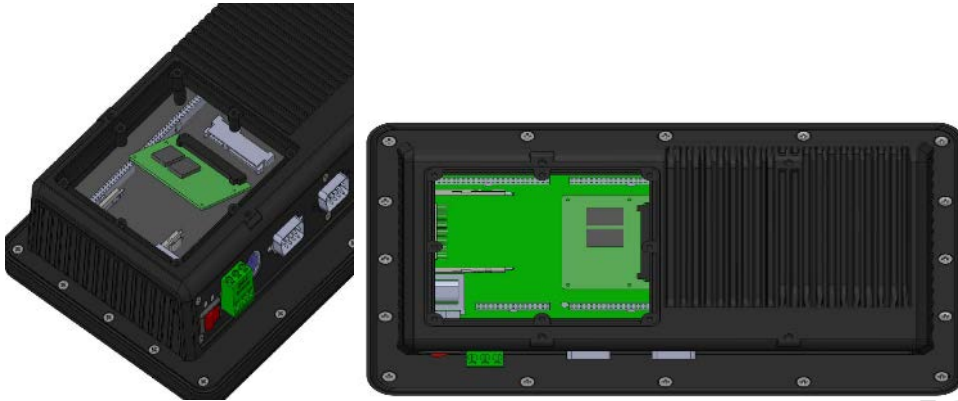
| P/N                 | MLC | SLC | Operating Temperature |
|---------------------|-----|-----|-----------------------|
| SDM-SST-SLIM(M)-4G  | V   |     | 0°C ~ +70°C           |
| SDM-SST-SLIM(M)-8G  | V   |     | 0°C ~ +70°C           |
| SDM-SST-SLIM(M)-16G | V   |     | 0°C ~ +70°C           |
| SDM-SST-SLIM(M)-32G | V   |     | 0°C ~ +70°C           |
| ISATA-SLIM(M)-8G    | V   |     | 0°C ~ +70°C           |
| ISATA-SLIM(M)-16G   | V   |     | 0°C ~ +70°C           |
| ISATA-SLIM(M)-32G   | V   |     | 0°C ~ +70°C           |
| ISATA-SLIM(M)-8G-X  | V   |     | -40°C ~ +85°C         |
| ISATA-SLIM(M)-16G-X | V   |     | -40°C ~ +85°C         |
| ISATA-SLIM(M)-32G-X | V   |     | -40°C ~ +85°C         |

**[STEP]**

1. Remove the nine screws in a diagonal pattern as the image below.



2. Place the SATA slim horizontally aligned and gently put into the socket until you feel a click.



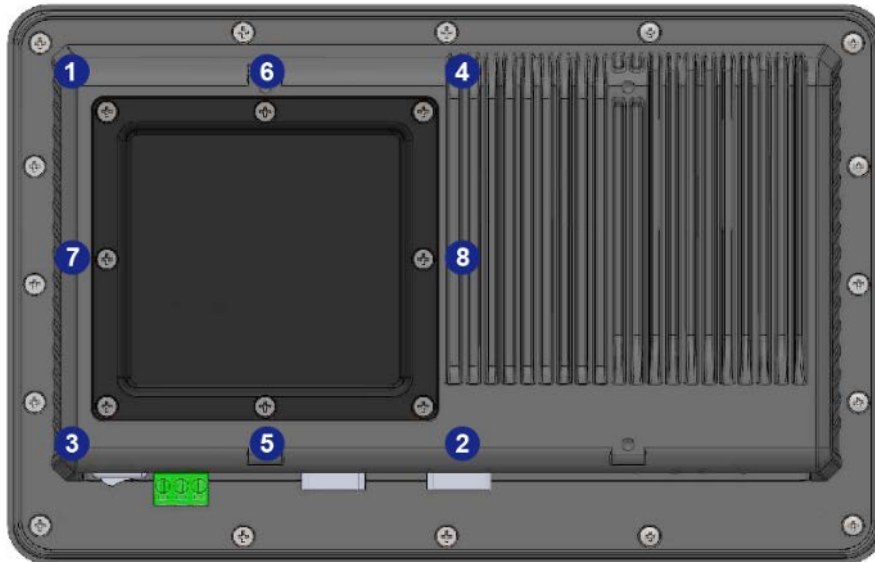
3. Insert all eight screws into the screw holes.



## 3.2 Installing the Compact Flash

### [STEP]

1. Remove the nine screws in a diagonal pattern as the image below.



2. Gently insert the CF card along the track. Caution: Please watch out for the direction which the CF card has to be face up.



3. Insert all nine screws into the screw holes.

# Ch. 4

## Driver Installation

[4.1 PPC-090T Development Note](#)

[4.2 BIOS Default Setting](#)

[4.3 Serial Ports Setting \(RS232/RS422/RS485\)](#)

## VGA

The Vortex86DX2 / DX3 processor is integrated RDC Display chip which is an ultra-low powered graphics chipset with total power consumption at around 1-1.5 W.

## LAN

The Vortex86DX2 / DX3 processor is integrated 10/100Mbps Ethernet controller that supports both 10/100BASE-T and allows direct connection to your 10/100Mbps Ethernet based Local Area Network for full interaction with local servers, wide area networks such as the Internet.

I/O and IRQ settings can be done by software with the supplied utility software, or it can be set for Plug and Play compatibility. The controller supports: Half / Full-Duplex Ethernet function to double channel bandwidth, auto media detection.

## AUDIO

The ALC262 series are 4-Channel High Definition Audio Codecs with UAA (Universal Audio Architecture) featuring two 24-bit stereo DACs and three 20-bit stereo ADCs, they are designed for high performance multimedia desktop and laptop systems. The ALC262 series incorporates proprietary converter technology to achieve over 100dB Signal-to-Noise ratio playback quality; easily meeting PC2001 requirements and also bringing PC sound quality closer to consumer electronic devices.

## OPERATING SYSTEM SUPPORT

The PPC-090T provides the VGA and LAN drivers for Linux, Windows CE, Windows XP Professional, Win 7, and Windows Embedded standard (WES2009 / WES7).

Please get the drivers from ICOP technical support URL: [tech.icop.com.tw](http://tech.icop.com.tw)

PPC-090T also supports most of the popular Linux distributions, for more detail information, please visit DMP official website: [vortex86dx2](http://vortex86dx2)

## 4.1 PPC-090T Development Note

### < WINDOWS DEVELOPMENT GUIDE >

Windows Embedded CE 6.0 BSP, Windows Embedded Compact 7 BSP, and Windows Embedded Standard 2009 trial image with development notes, please visit technical website to get more information at <http://tech.icop.com.tw/>.

### < LINUX INSTALLATION NOTE>

Please visit Linux technical website to get more information at [ftp://ftp.dmp.com.tw/Linux\\_DEMO/Vortex86\\_Linux\\_Support\\_List.htm](ftp://ftp.dmp.com.tw/Linux_DEMO/Vortex86_Linux_Support_List.htm).

## 4.2 BIOS Default Setting

If the system cannot be booted after BIOS changes are made, Please follow below procedures in order to restore the CMOS as default setting.



Press < **End** > Key, when the power on



Press < **Del** > to enter the AMI BIOS setup



Press < **F9** > to Load Optimized defaults



Press < **F10** > to Save configuration changes and exit setup

---













```

Advanced
*****
* TXDEN1 Support [232 Type] * Options *
* TXDEN2 Support [232 Type] *
* SB Serial Port 1 [3F8] * Disabled *
* Serial Port IRQ 1 [IRQ4] * Enabled *
* Serial Port Boud Rate [115200 BPS] * 232 Type *
* SB Serial Port 2 [2F8] * 422 Type *
* Serial Port IRQ 2 [IRQ3] * 485 Type *
* Serial Port Boud Rate [115200 BPS] *
*
*
*
*
*
* * Select Screen *
* ** Select Item *
* +- Change Option *
* F1 General Help *
* F10 Save and Exit *
* ESC Exit *
*
*****
v02.67 (C)Copyright 1985-2009, American Megatrends, Inc.

```

**[Step 3]** Press <Esc> twice to get back to the Top Menu. Use the arrow key to the category “Exit”, and select the option “Save Changes and Exit”.

```

Main Advanced PCIPnP Boot Security Exit
*****
* Exit Options * Exit system setup *
* * after saving the *
* Save Changes and Exit * changes. *
* Discard Changes and Exit *
* Discard Changes * F10 key can be used *
* * for this operation. *
* Load Optimal Defaults *
* Load Failsafe Defaults *
*
*
*
*
* * Select Screen *
* ** Select Item *
* Enter Go to Sub Screen *
* F1 General Help *
* F10 Save and Exit *
* ESC Exit *
*
*****
v02.67 (C)Copyright 1985-2009, American Megatrends, Inc.

```

Press <Enter> and choose [OK] to keep your changes, then the device will



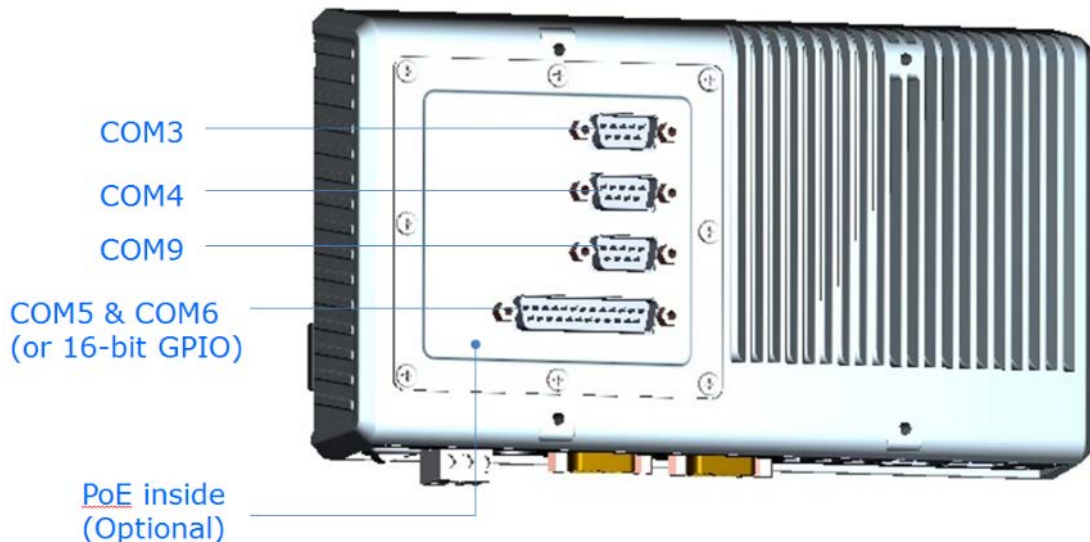
# Ch. 5

## Extension I/O (*Optional*)

[5.1 Extension I/O Overview](#)

[5.2 External I/O Pin Assignment](#)

## 5.1 Extension I/O Overview (*Optional*)

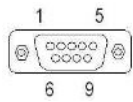


### NOTE:

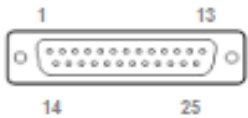
1. Those COM ports are only for RS232 signals.
2. DSub-25pin only can be set to be either one of **COM5 & COM6** or **16-bit GPIO** by hardware settings, and user can't change hardware setting there. Thus, please contact your region sales person to order correct part number in advance.
3. **This model with more COM ports only supports SATA SLIM storage, but won't support CF card because the same pins of CF are used for more COM ports already.**
4. **Please order a SATA SLIM before assembling and shipping because SATA interface is located on the bottom of extension I/O board and user can not assemble.**
5. For **PoE+** function (IEEE 802.3at), highly recommend that user uses the max. **25.5watt** of **PoE+** switch/router/adapter on PPC series.

## 5.2 Extension I/O Pin Assignment *(Optional)*

### COM3, 4 and 9 (RS232) (Change setting by BIOS)

|  | Pin # | Signal Name | Pin # | Signal Name |
|---|-------|-------------|-------|-------------|
|   | 1     | DCD1        | 2     | RXD1        |
|   | 3     | TXD1        | 4     | DTR1        |
|   | 5     | GND         | 6     | DSR1        |
|   | 7     | RTS1        | 8     | CTS1        |
|   | 9     | RI1         |       |             |

### COM5 & 6 (RS232) / 16-bit GPIO

|  | Pin # | Signal Name      | Pin # | Signal Name    |
|---|-------|------------------|-------|----------------|
|   | 1     | VCC (+5V_Output) | 2     | GND            |
|   | 3     | DCD5 / GPIO_00   | 4     | TXD5 / GPIO_01 |
|   | 5     | RTS5 / GPIO_02   | 6     | RI5 / GPIO_03  |
|   | 7     | GND              | 8     | RXD5 / GPIO_04 |
|   | 9     | DTR5 / GPIO_05   | 10    | DSR5 / GPIO_06 |
|   | 11    | CTS5 / GPIO_07   | 12    | GND            |
|   | 13    | VCC (+5V_Output) | 14    | GND            |
|   | 15    | DCD6 / GPIO_10   | 16    | TXD6 / GPIO_11 |
|   | 17    | RTS6 / GPIO_12   | 18    | RI6 / GPIO_13  |
|   | 19    | GND              | 20    | RXD6 / GPIO_14 |
|   | 21    | DTR6 / GPIO_15   | 22    | DSR6 / GPIO_16 |
|   | 23    | CTS6 / GPIO_17   | 24    | GND            |
|   | 25    | GND              |       |                |

### IEEE 802.3at standard PoE+ pin out on RJ45 10/100Mbps Ethernet:

| Pin | Alternative B  | Pin | Alternative B  |
|-----|----------------|-----|----------------|
| 1   | FTXD+          | 2   | FTXD-          |
| 3   | FRXIN+         | 4   | Vport Positive |
| 5   | Vport Positive | 6   | FRXIN-         |
| 7   | Vport Negative | 8   | Vport Negative |

If you want to know more about PoE function, please refer the pin assignment on 2-5.

**Note:** The pin of "VCC" is for the pull up of GPIO pins if it is necessary for user. If GPIO pin is set to be output high, the maximum current of GPIO pin is 8mA only.

# Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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