

# **EBM-PNV (B.2)**

**Intel® Atom™ Dual-Core 5.25" Mini Module with Intel® ICH8-M Chipset**

## **Quick Installation Guide**



**3<sup>rd</sup> Ed – 20 December 2011**

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# 1. Getting Started

## 1.1 Safety Precautions

### Warning!



Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

### Caution!



Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

## 1.2 Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

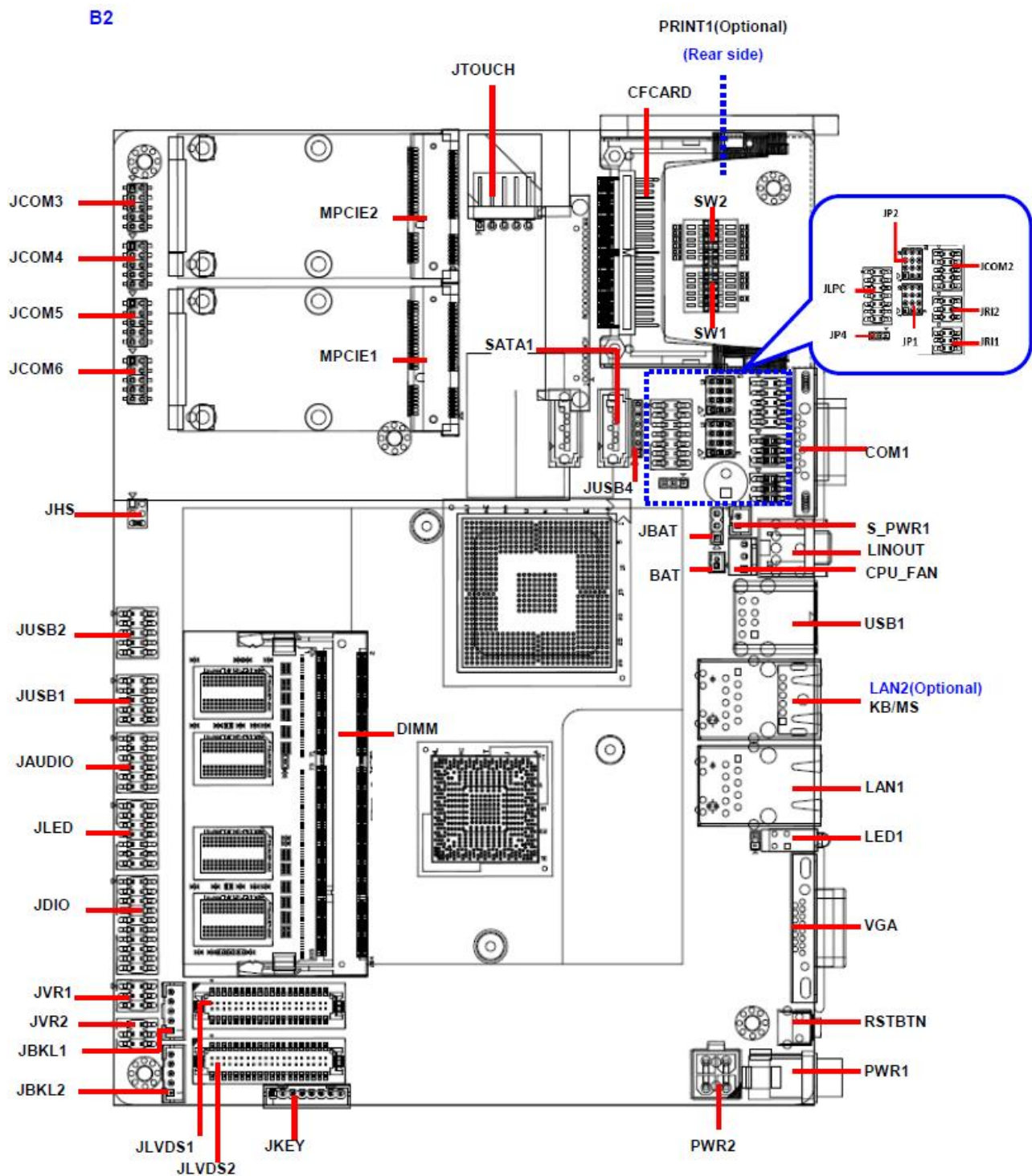
- 1 x EBM-PNV (B.2) with Intel® Atom™ Dual Core & DDR3 SDRAM Mini Module.
- Heatsink
- 1 x Quick Installation Guide
- 1 x DVD-ROM or CD-ROM contains the followings:
  - User's Manual (this manual in PDF file)
  - Ethernet driver and utilities
  - VGA drivers and utilities
  - Audio drivers and utilities



If any of the above items is damaged or missing, contact your retailer.

## 2. Hardware Configuration

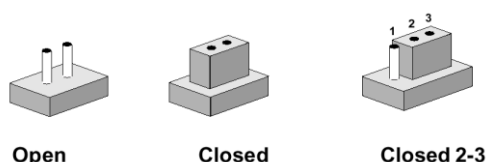
### 2.1 Product Overview



## 2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip. To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board’s jumpers and connectors.

### Jumpers

| Label       | Function                                       | Note                       |
|-------------|------------------------------------------------|----------------------------|
| <b>JBAT</b> | Clear CMOS                                     | 3 x 1 header, pitch 2.54mm |
| <b>JP1</b>  | Serial port 1 – RS232/ 422/ 485 mode select    | 4 x 3 header, pitch 2.0mm  |
| <b>JP2</b>  | Serial port 2 – RS232/ 422/ 485 mode select    | 4 x 3 header, pitch 2.0mm  |
| <b>JP4</b>  | SATA DOM Pin 7 Power mode selector             | 3 x 1 header, pitch 2.0mm  |
| <b>JRI1</b> | Serial port 1 pin9 signal select               | 3 x 2 header, pitch 2.0mm  |
| <b>JRI2</b> | Serial port 2 pin9 signal select               | 3 x 2 header, pitch 2.0mm  |
| <b>JVR1</b> | LCD backlight brightness adjustment            | 3 x 2 header, pitch 2.0mm  |
| <b>JVR2</b> | LCD backlight brightness adjustment            | 3 x 2 header, pitch 2.0mm  |
| <b>SW1</b>  | Multi-function select                          | DIP switch 6pin            |
| <b>SW2</b>  | Serial port 1/ 2 – RS232/ 422/ 485 mode select | DIP switch 6pin            |

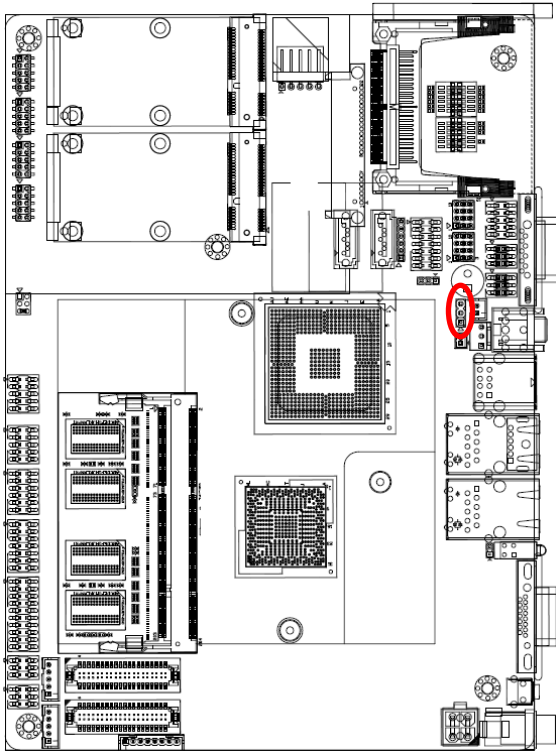
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### Connectors

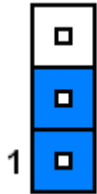
| Label   | Function                                         | Note                           |
|---------|--------------------------------------------------|--------------------------------|
| BAT     | Battery connector                                | 2 x 1 wafer, pitch 1.25mm      |
| CFCARD  | Compact Flash card connector                     |                                |
| COM1    | Serial Port 1 connector                          | D-sub 9 pin, male              |
| CPU_FAN | CPU fan connector                                | 3 x 1 wafer, pitch 2.54mm      |
| DIMM    | 204-pin DDR3 SODIMM socket                       |                                |
| JAUDIO  | Audio connector                                  | 6 x 2 header, pitch 2.0mm      |
| JBKL1   | LCD Inverter connector                           | 5 x 1 wafer, pitch 2.0mm       |
| JBKL2   | LCD Inverter connector                           | 5 x 1 wafer, pitch 2.0mm       |
| JCOM2   | Serial Port 2 connector                          | 5 x 2 header, pitch 2.0mm      |
| JCOM3   | Serial Port 3 connector                          | 5 x 2 header, pitch 2.0mm      |
| JCOM4   | Serial Port 4 connector                          | 5 x 2 header, pitch 2.0mm      |
| JCOM5   | Serial Port 5 connector                          | 5 x 2 header, pitch 2.0mm      |
| JCOM6   | Serial Port 6 connector                          | 5 x 2 header, pitch 2.0mm      |
| JDIO    | General purpose I/O connector                    | 10 x 2 header, pitch 2.0mm     |
| JHS     | Handset speaker Mode selector                    | 3 x 2 header, pitch 2.0mm      |
| JLED    | LED indicator connector                          | 7 x 2 header, pitch 2.0mm      |
| JLVDS1  | LVDS Connector                                   | DIN 40-pin wafer, pitch 1.25mm |
| JLVDS2  | LVDS Connector                                   | DIN 40-pin wafer, pitch 1.25mm |
| JTOUCH  | Touch panel connector                            | 5 x 1 header, pitch 2.54mm     |
| JUSB1   | USB connector 4&5                                | 5 x 2 header, pitch 2.0mm      |
| JUSB2   | USB connector 2&3                                | 5 x 2 header, pitch 2.0mm      |
| JUSB4   | USB connector 9                                  | 6 x 1 header, pitch 2.0mm      |
| JKEY    | OSD for front panel key                          | 8 x 1 wafer, pitch 2.0mm       |
| LAN1    | RJ-45 Ethernet 1                                 |                                |
| KBMS    | Keyboard & Mouse <a href="#">(LAN2-Optional)</a> |                                |
| LED     | LED indicator connector                          |                                |
| LINOUT  | Audio line-out connector                         |                                |
| MPCIE1  | Mini-PCI connector 1                             |                                |
| MPCIE2  | Mini-PCI connector 2                             |                                |
| PRINT   | Optional LPT Connector                           |                                |
| PWR1    | Power connector                                  |                                |
| PWR2    | Power connector                                  | 2 x 2 wafer, pitch 2.0mm       |
| RSBTN   | Reset button                                     |                                |
| S_PWR1  | Serial ATA power connector                       | 2 x 1 wafer, pitch 2.0mm       |
| SATA1   | Serial ATA connector 1                           |                                |
| SATA2   | Serial ATA connector 2                           |                                |
| USB1    | USB connector 0&1                                |                                |
| VGA     | VGA connector                                    | D-sub 15-pin, female           |

2.3 Setting Jumpers & Connectors

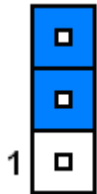
2.3.1 Clear CMOS (JBAT)



Protect\*

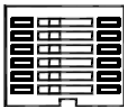
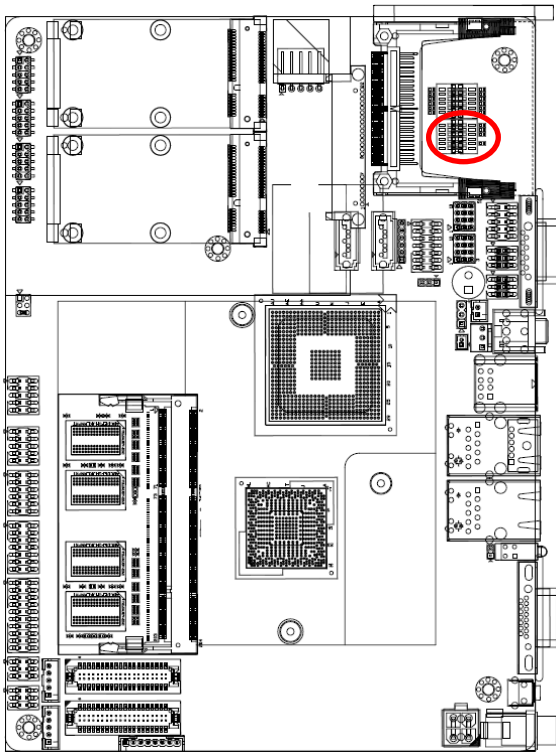


Clear CMOS



\* Default

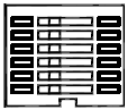
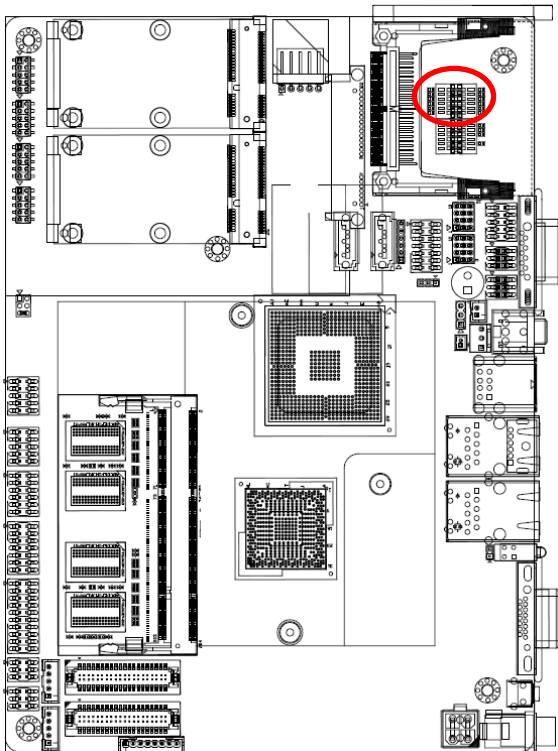
2.3.2 Multi-function select (SW1)



|   | ON        | OFF       |
|---|-----------|-----------|
| 1 | AT SEL    | ATX SEL   |
| 2 | CF Master | CF Slave  |
| 3 | Touch Off | Touch On  |
| 4 | Touch: 4W | Touch: 5W |
| 5 | GPIO32:L  | GPIO32:H  |
| 6 | GPIO33:L  | GPIO33:H  |

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2.3.3 Serial port 1/ 2 - RS-232/ 422/ 485 mode select (SW2)



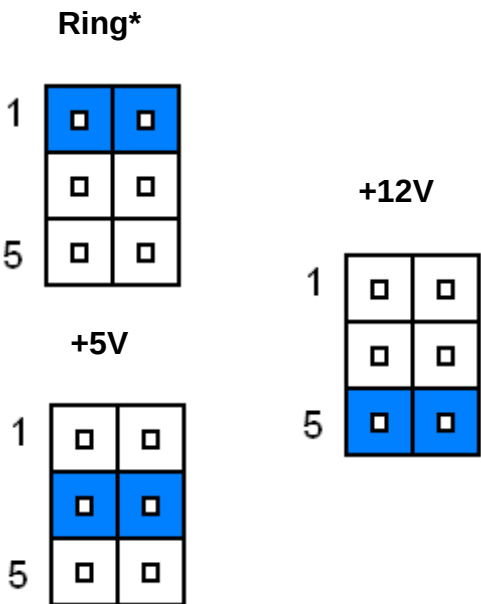
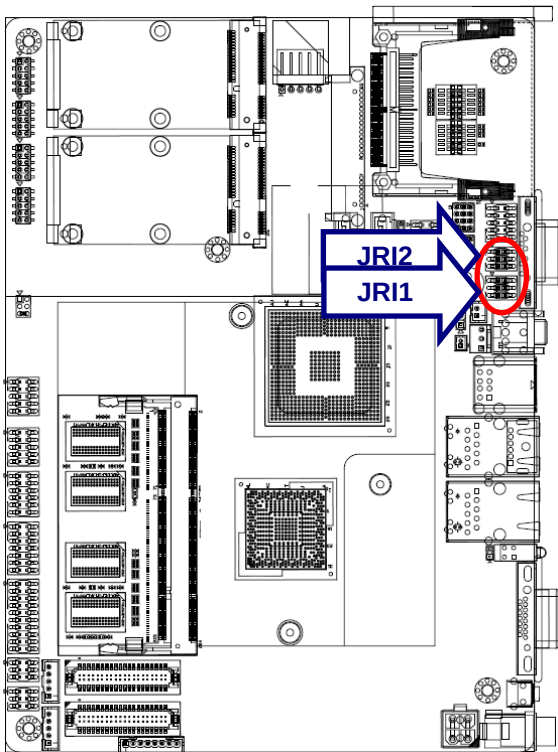
In Serial Port 1 mode

|   | RS-232 | RS-422 | RS-485 |
|---|--------|--------|--------|
| 1 | ON     | OFF    | OFF    |
| 2 | OFF    | ON     | OFF    |
| 3 | OFF    | OFF    | ON     |

In Serial Port 2 mode

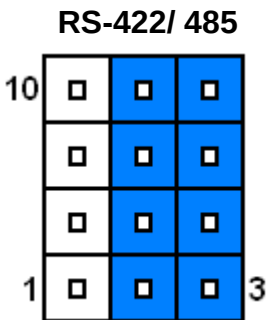
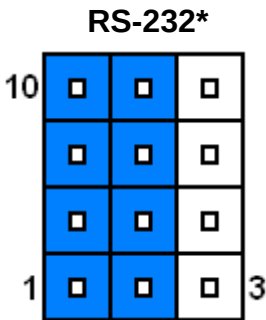
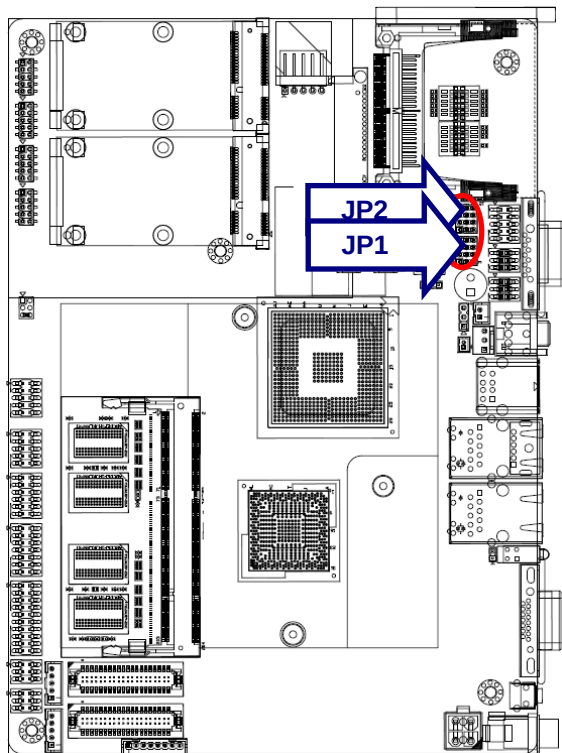
|   | RS-232 | RS-422 | RS-485 |
|---|--------|--------|--------|
| 4 | ON     | OFF    | OFF    |
| 5 | OFF    | ON     | OFF    |
| 6 | OFF    | OFF    | ON     |

2.3.4 Serial port 1/ 2 pin9 signal select (JRI1/ JRI2)



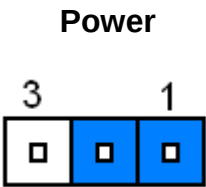
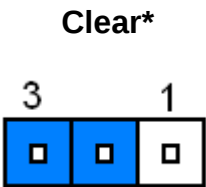
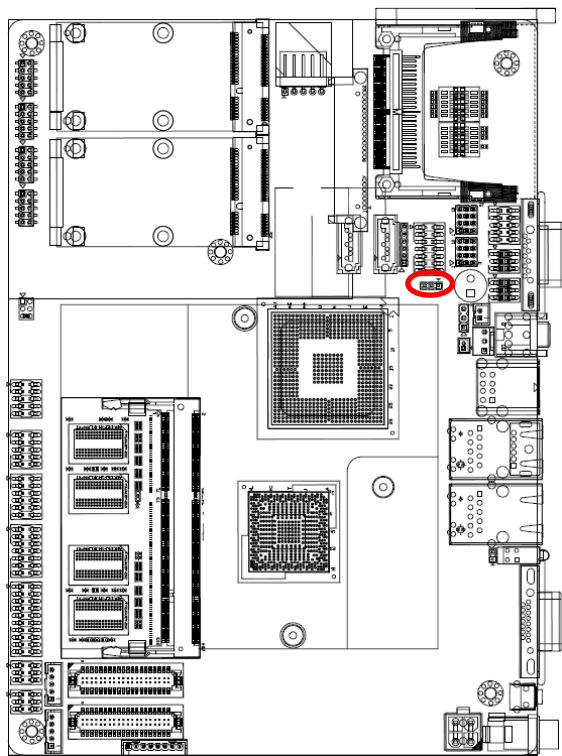
\* Default

2.3.5 Serial port 1/ 2 RS-232/ 422/ 485 mode select (JP1/ JP2)



\* Default

2.3.6 SATA DOM Pin 7 Power mode selector (JP4)

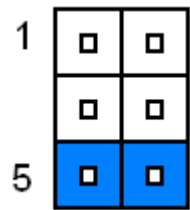
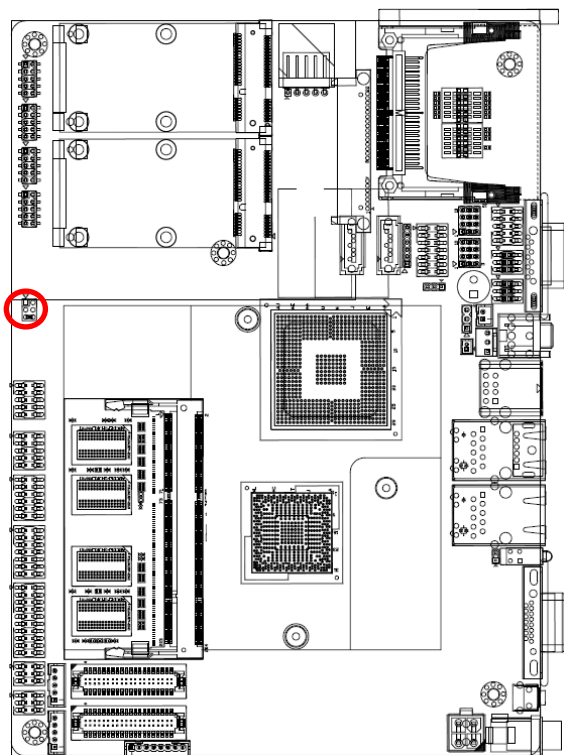


| Signal   | PIN |
|----------|-----|
| SATA_PWR | 1   |
| GND#7_1  | 2   |
| GND      | 3   |

\* Default

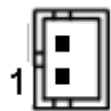
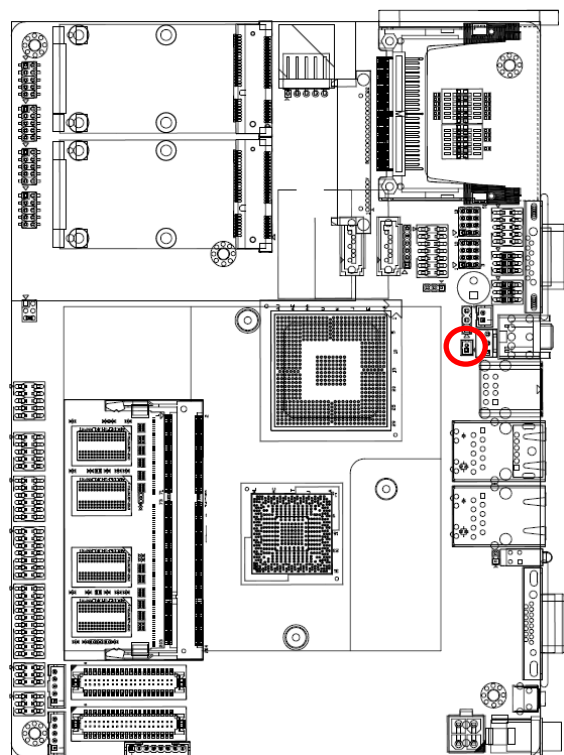
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2.3.7 Handset speaker Mode selector (JHS)



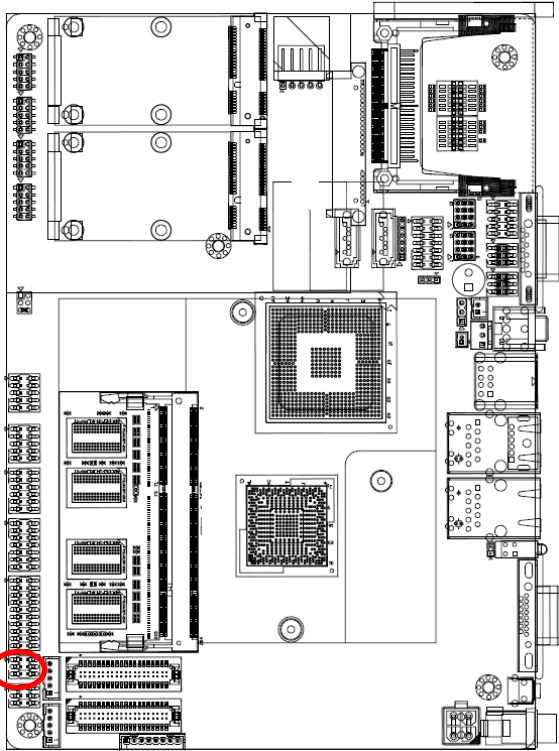
| Signal  | PIN | PIN | Signal  |
|---------|-----|-----|---------|
| HS_MIC+ | 1   | 2   | HS_MIC- |
| HS_OUT+ | 3   | 4   | GND     |
| HOOK    | 5   | 6   | GND     |

2.3.8 Battery connector (BAT)



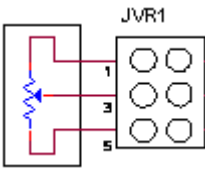
| Signal | PIN |
|--------|-----|
| GND    | 2   |
| BAT    | 1   |

2.3.9 LCD backlight brightness adjustment (JVR1)



\* Default

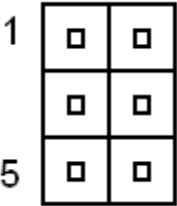
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| +5V    | 1   | 2   | DC     |
| VR     | 3   | 4   | VR     |
| GND    | 5   | 6   | PWM    |



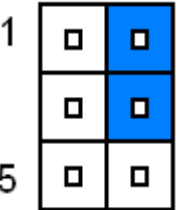
Variation Resistor

(Recommended: 4.7KΩ, >1/16W)

Mode1: VR type

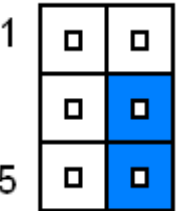


Mode 2: DC type\*



Note: DC: 0V ~5V

Mode 3: Pulse-Width Modulated type

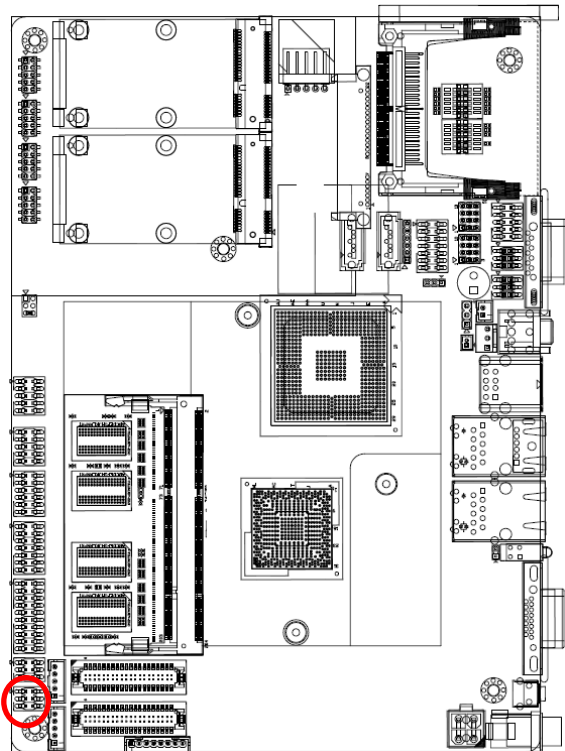


Note:

For inverters with adjustable Backlight function, it is possible to control the LCD brightness through the VR signal controlled by JBLK1. Please see the JBLK1 section for detailed circuitry information.

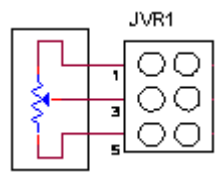
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2.3.10 LCD backlight brightness adjustment (JVR2)



\* Default

| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| +5V    | 1   | 2   | DC2    |
| VR     | 3   | 4   | VR     |
| GND    | 5   | 6   | PWM2   |



Variation Resistor

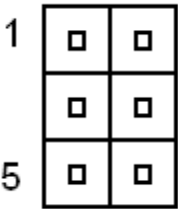
(Recommended: 4.7KΩ, >1/16W)



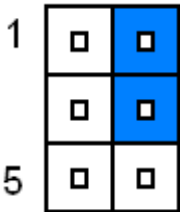
**Note:**

For inverters with adjustable Backlight function, it is possible to control the LCD brightness through the VR signal controlled by JBKL2. Please see the JBKL2 section for detailed circuitry information.

**Mode1: VR type**

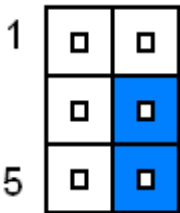


**Mode 2: DC type\***

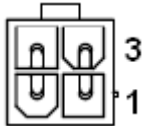
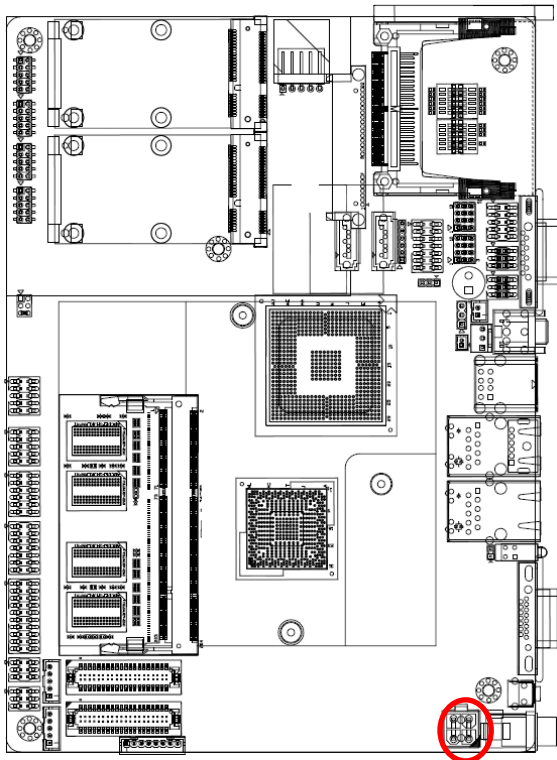


**Note:** DC: 0V ~5V

**Mode 3: Pulse-Width Modulated type**

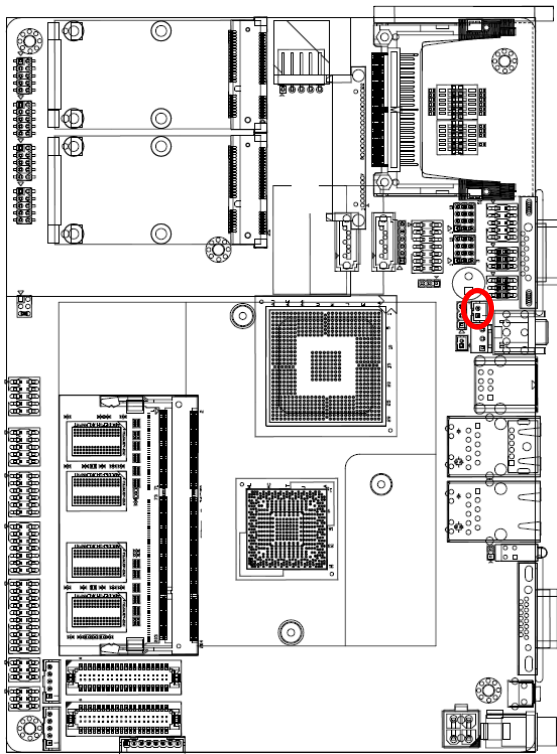


2.3.11 Power connector (PWR2)



| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| VIN    | 4   | 3   | VIN    |
| GND    | 2   | 1   | GND    |

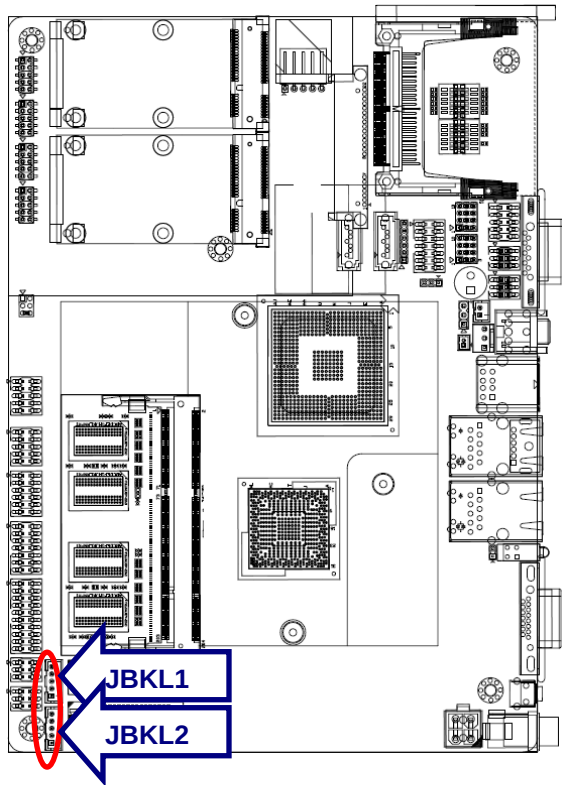
2.3.12 Serial ATA power connector (S\_PWR1)



| Signal   | PIN |
|----------|-----|
| SATA_PWR | 2   |
| GND      | 1   |

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2.3.13 LCD Inverter connector (JBKL1/ JBKL2)



| Signal | PIN |
|--------|-----|
| +5V    | 5   |
| BRIGHT | 4   |
| BLK_ON | 3   |
| GND    | 2   |
| +12V   | 1   |

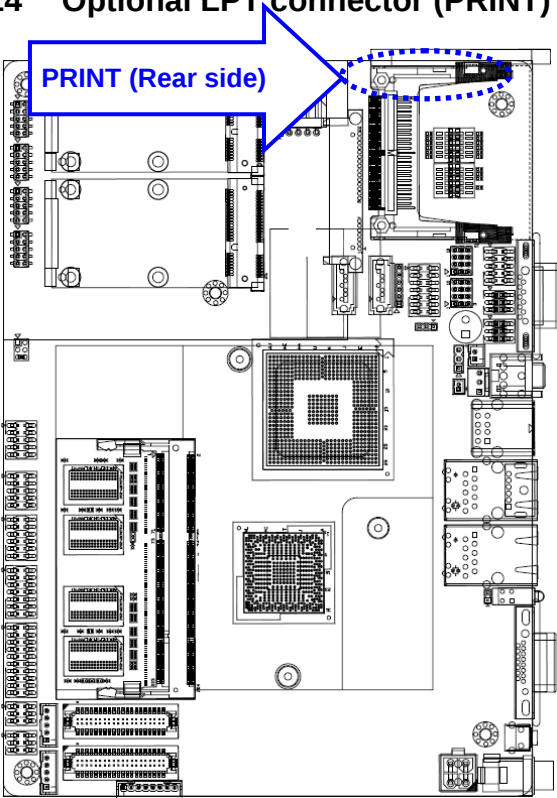


**Note:**  
For inverters with adjustable Backlight function, it is possible to control the LCD brightness through the VR signal controlled by **JVR1/ JVR2**. Please see the **JVR1/ JVR2** section for detailed circuitry information.

2.3.13.1 Signal Description – LCD Inverter Connector (JBKL1/ JBKL2)

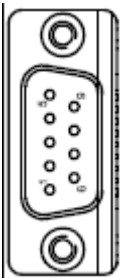
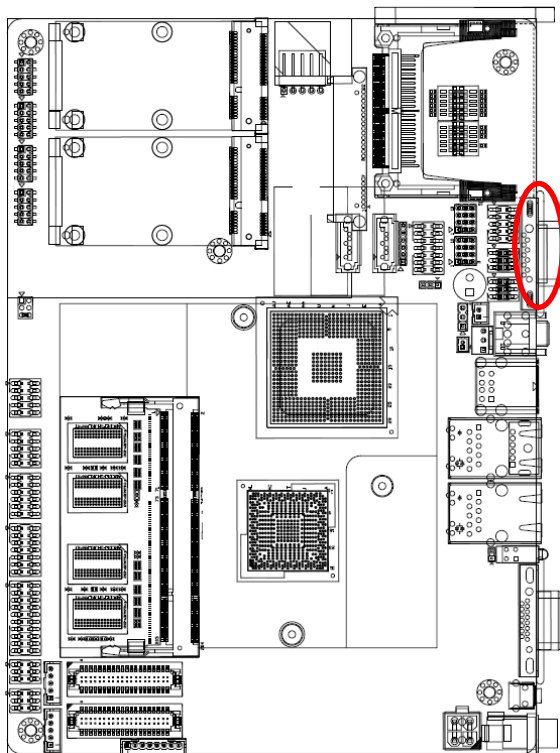
| Signal | Signal Description                                |
|--------|---------------------------------------------------|
| BRIGHT | Vadj = 0.75V ~ 4.25V (Recommended: 4.7KΩ, >1/16W) |
| BKL_ON | LCD backlight ON/OFF control signal               |

2.3.14 Optional LPT connector (PRINT)



| Signal    | PIN |
|-----------|-----|
| GND       | 20  |
| GND       | 19  |
| GND       | 18  |
| SLIN#     | 17  |
| PAR_INIT# | 16  |
| ERR#      | 15  |
| AFD#      | 14  |
| SLCT      | 13  |
| PE        | 12  |
| BUSY      | 11  |
| ACK#      | 10  |
| PTD7      | 9   |
| PTD6      | 8   |
| PTD5      | 7   |
| PTD4      | 6   |
| PTD3      | 5   |
| PTD2      | 4   |
| PTD1      | 3   |
| PTD0      | 2   |
| STB-      | 1   |

2.3.15 Serial port 1 connector (COM1)



In RS-232 Mode

| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DCD1   | 1   | 2   | RxD1   |
| TxD1   | 3   | 4   | DTR1   |
| GND    | 5   | 6   | DSR1   |
| RTS1   | 7   | 8   | CTS1   |
| RI1    | 9   |     | NC     |

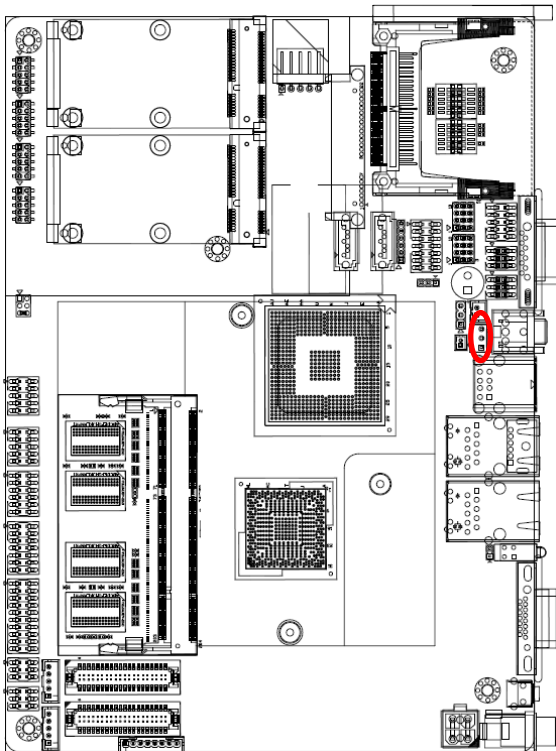
In RS-422 Mode

| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| TxD1-  | 1   | 2   | RxD1+  |
| TxD1+  | 3   | 4   | RxD1-  |
| GND    | 5   | 6   | NC     |
| NC     | 7   | 8   | NC     |
| NC     | 9   |     | NC     |

In RS-485 Mode

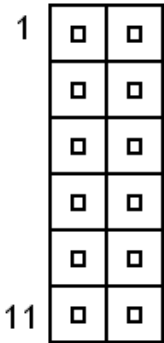
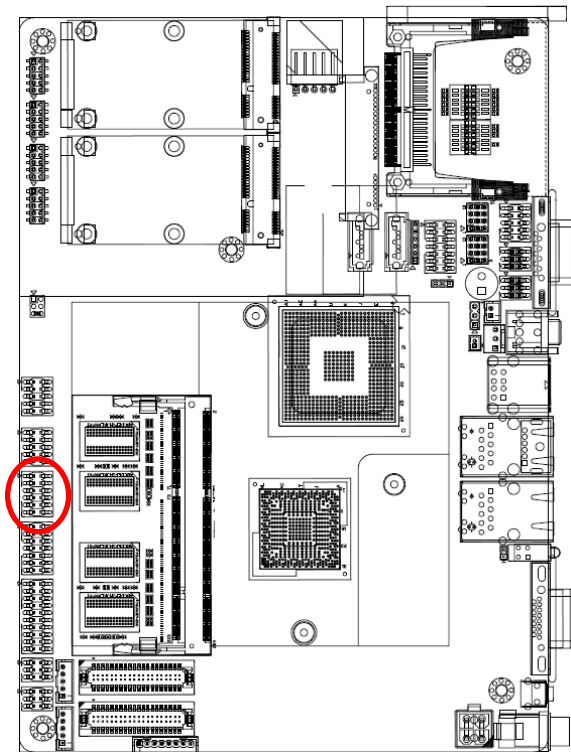
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DATA1- | 1   | 2   | NC     |
| DATA1+ | 3   | 4   | NC     |
| GND    | 5   | 6   | NC     |
| NC     | 7   | 8   | NC     |
| NC     | 9   |     | NC     |

2.3.16 CPU fan connector (CPU\_FAN)



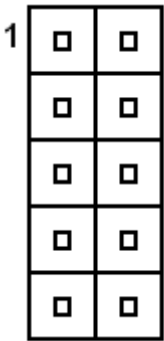
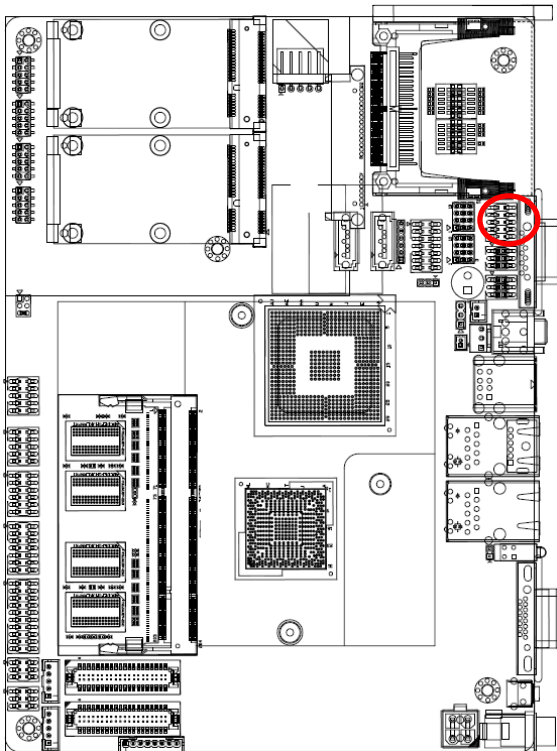
| Signal   | PIN |
|----------|-----|
| FAN_TAC1 | 3   |
| +12V     | 2   |
| GND      | 1   |

2.3.17 Audio connector (JAUDIO)



| Signal     | PIN | PIN | Signal     |
|------------|-----|-----|------------|
| APM_LOUT_R | 1   | 2   | APM_LOUT_L |
| GND        | 3   | 4   | GND        |
| LINEIN_R   | 5   | 6   | LINEIN_L   |
| MIC-R      | 7   | 8   | MIC-L      |
| FRONT-JD   | 9   | 10  | LINE1-JD   |
| MIC1-JD    | 11  | 12  | GND        |

2.3.18 Serial port 2 connector (JCOM2)



In RS-232 Mode

| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DCD2   | 1   | 2   | RxD2   |
| TxD2   | 3   | 4   | DTR2   |
| GND    | 5   | 6   | DSR2   |
| RTS2   | 7   | 8   | CTS2   |
| RI2    | 9   | 10  | NC     |

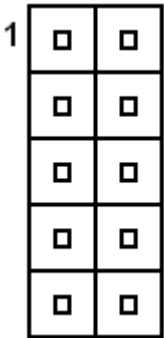
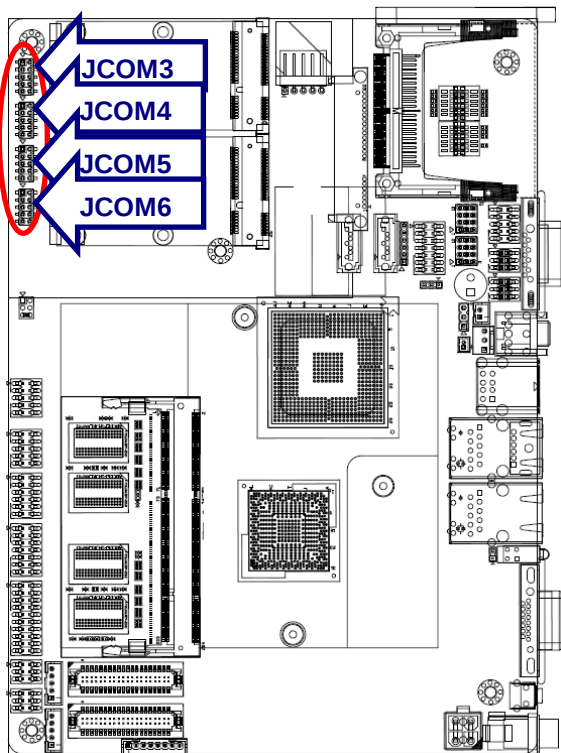
In RS-422 Mode

| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| TxD2-  | 1   | 2   | RxD2+  |
| TxD2+  | 3   | 4   | RxD2-  |
| GND    | 5   | 6   | NC     |
| NC     | 7   | 8   | NC     |
| NC     | 9   | 10  | NC     |

In RS-485 Mode

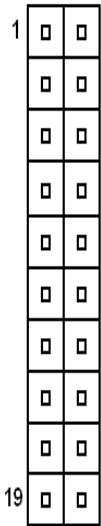
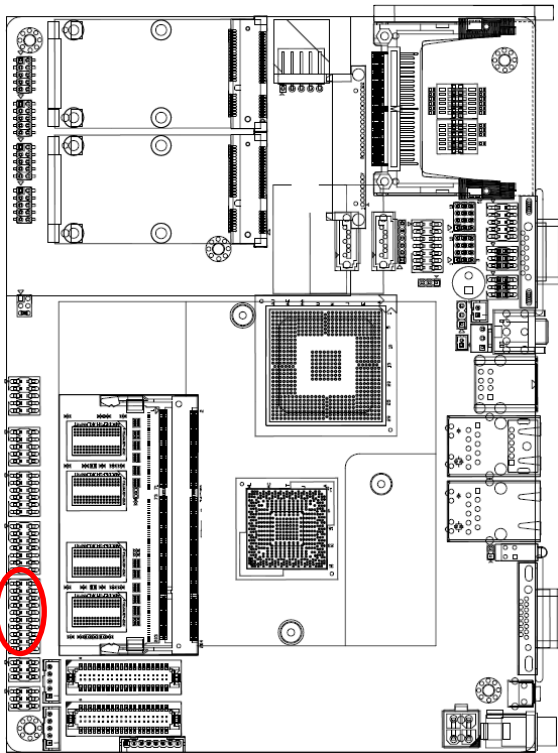
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DATA2- | 1   | 2   | NC     |
| DATA2+ | 3   | 4   | NC     |
| GND    | 5   | 6   | NC     |
| NC     | 7   | 8   | NC     |
| NC     | 9   | 10  | NC     |

2.3.19 Serial port 3/ 4/ 5/ 6 connector (JCOM3/ JCOM4/ JCOM5/ JCOM6)



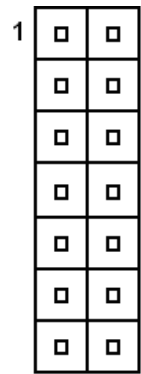
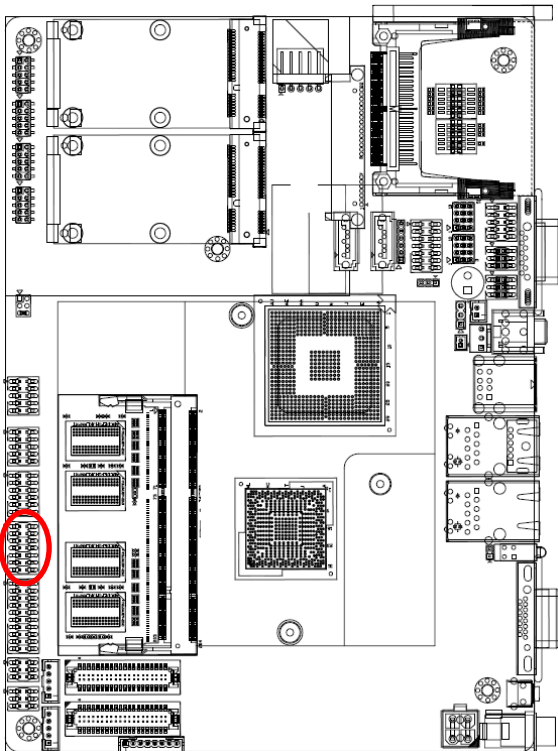
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DCD    | 1   | 2   | RxD    |
| TxD    | 3   | 4   | DTR    |
| GND    | 5   | 6   | DSR    |
| RTS    | 7   | 8   | CTS    |
| RI     | 9   | 10  | NC     |

2.3.20 General purpose I/O connector (JDIO)



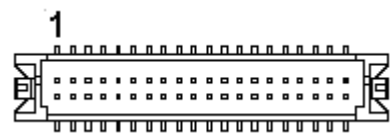
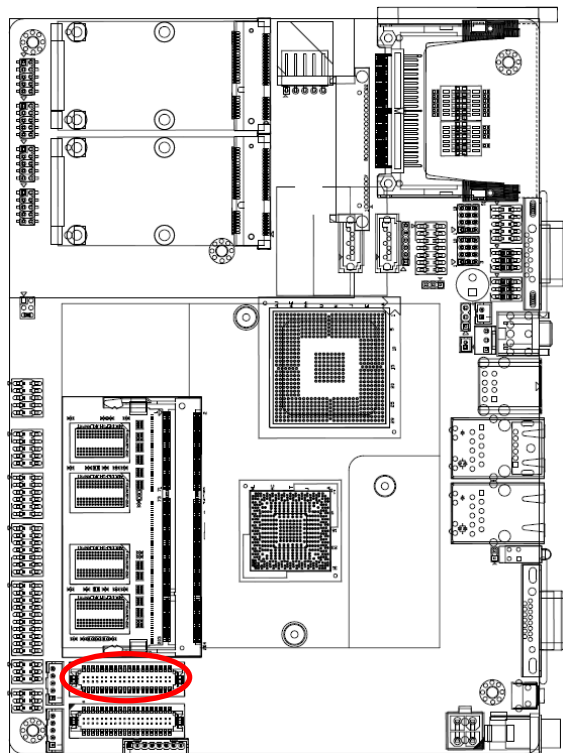
| Signal    | PIN | PIN | Signal     |
|-----------|-----|-----|------------|
| DIO0      | 1   | 2   | DIO10      |
| DIO1      | 3   | 4   | DIO11      |
| DIO2      | 5   | 6   | DIO12      |
| DIO3      | 7   | 8   | DIO13      |
| DIO4      | 9   | 10  | DIO14      |
| DIO5      | 11  | 12  | DIO15      |
| DIO6      | 13  | 14  | DIO16      |
| DIO7      | 15  | 16  | DIO17      |
| SMB_CLK_S | 17  | 18  | SMB_DATA_S |
| GND       | 19  | 20  | +5V        |

2.3.21 LED indicator connector (JLED)



| Signal   | PIN | PIN | Signal  |
|----------|-----|-----|---------|
| GND      | 1   | 2   | +3.3V   |
| HD_ACT#  | 3   | 4   | +3.3V   |
| LAN1_ACT | 5   | 6   | 3.3V_SB |
| LAN2_ACT | 7   | 8   | 3.3V_SB |
| ROUT-    | 9   | 10  | ROUT+   |
| LOUT-    | 11  | 12  | LOUT+   |
| PWRBTN#  | 13  | 14  | GND     |

2.3.22 LVDS connector (JLVDS1)



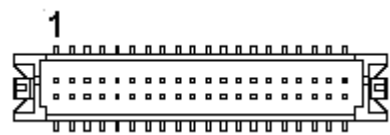
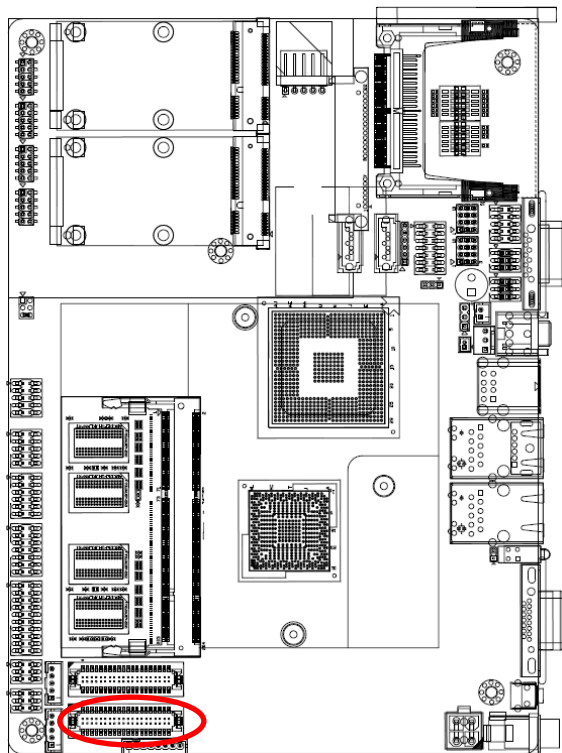
| Signal               | PIN | PIN | Signal               |
|----------------------|-----|-----|----------------------|
| +5V                  | 2   | 1   | +3.3V                |
| +5V                  | 4   | 3   | +3.3V                |
| I <sup>2</sup> C_DAT | 6   | 5   | I <sup>2</sup> C_CLK |
| GND                  | 8   | 7   | GND                  |
| Txout0               | 10  | 9   | Txout1               |
| Txout0#              | 12  | 11  | Txout1#              |
| GND                  | 14  | 13  | GND                  |
| Txout2               | 16  | 15  | NC                   |
| Txout2#              | 18  | 17  | NC                   |
| GND                  | 20  | 19  | GND                  |
| NC                   | 22  | 21  | NC                   |
| NC                   | 24  | 23  | NC                   |
| GND                  | 26  | 25  | GND                  |
| NC                   | 28  | 27  | NC                   |
| NC                   | 30  | 29  | NC                   |
| GND                  | 32  | 31  | GND                  |
| Txclk                | 34  | 33  | NC                   |
| Txclk#               | 36  | 35  | NC                   |
| GND                  | 38  | 37  | GND                  |
| +12V                 | 40  | 39  | +12V                 |

2.3.22.1 Signal Description – LVDS Connector (JLVDS)

| Signal                                     | Description                                                                                                                                                                                                                  |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I <sup>2</sup> C_DAT, I <sup>2</sup> C_CLK | I <sup>2</sup> C interface for panel parameter EEPROM. This EERPOM is mounted on the LVDS receiver. The data in the EEPROM allows the EXT module to automatically set the proper timing parameters for a specific LCD panel. |

EBM-PNV (B.2) Quick Installation Guide

2.3.23 LVDS connector (JLVDS2)



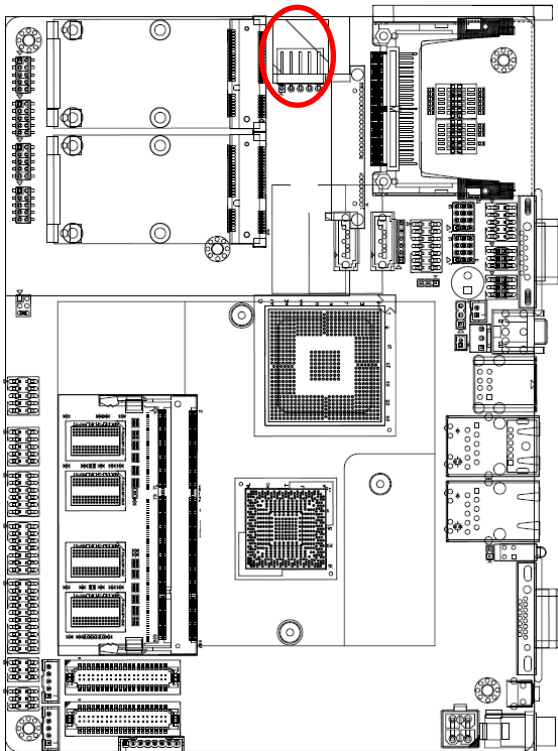
| Signal  | PIN | PIN | Signal  |
|---------|-----|-----|---------|
| +5V     | 2   | 1   | +3.3V   |
| +5V     | 4   | 3   | +3.3V   |
| NC      | 6   | 5   | NC      |
| GND     | 8   | 7   | GND     |
| Txout0  | 10  | 9   | Txout1  |
| Txout0# | 12  | 11  | Txout1# |
| GND     | 14  | 13  | GND     |
| Txout2  | 16  | 15  | Txout3  |
| Txout2# | 18  | 17  | Txout3# |
| GND     | 20  | 19  | GND     |
| Txout4  | 22  | 21  | Txout5  |
| Txout4# | 24  | 23  | Txout5# |
| GND     | 26  | 25  | GND     |
| Txout6  | 28  | 27  | Txout7  |
| Txout6# | 30  | 29  | Txout7# |
| GND     | 32  | 31  | GND     |
| Txclk1  | 34  | 33  | Txclk2  |
| Txclk1# | 36  | 35  | Txclk2# |
| GND     | 38  | 37  | GND     |
| +12V    | 40  | 39  | +12V    |



**Note:** Single/Dual 24-bit LVDS

1. CRT's resolution < LCD's resolution.  
If we boot from CRT & LCD, the resolution is fixed by CRT's resolution.  
If we boot from LCD only and plug the CRT in the OS, LCD works well but the CRT will have wrong resolution.
2. CRT's resolution > LCD's resolution.  
Everything is fine.

2.3.24 Touch panel connector (JTOUCH)

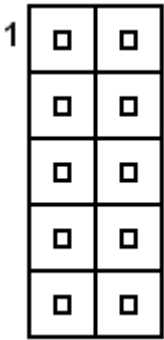
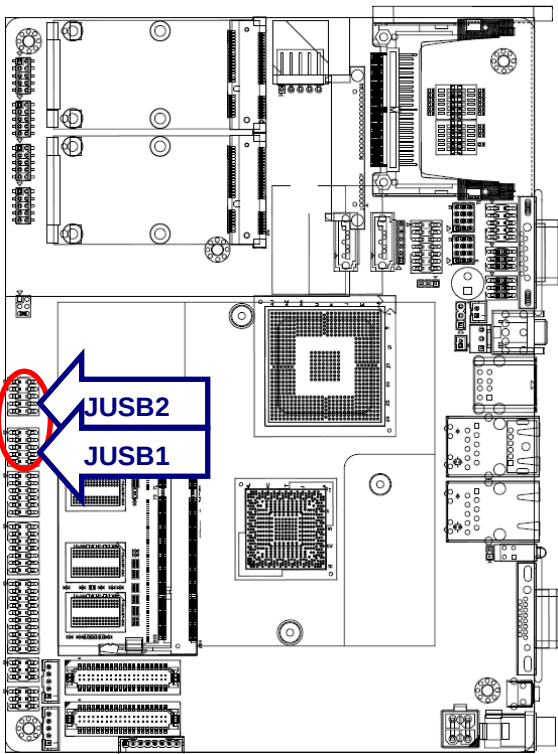


| Signal | PIN |
|--------|-----|
| UL     | 1   |
| UR     | 2   |
| PROBE  | 3   |
| LR     | 4   |
| LL     | 5   |



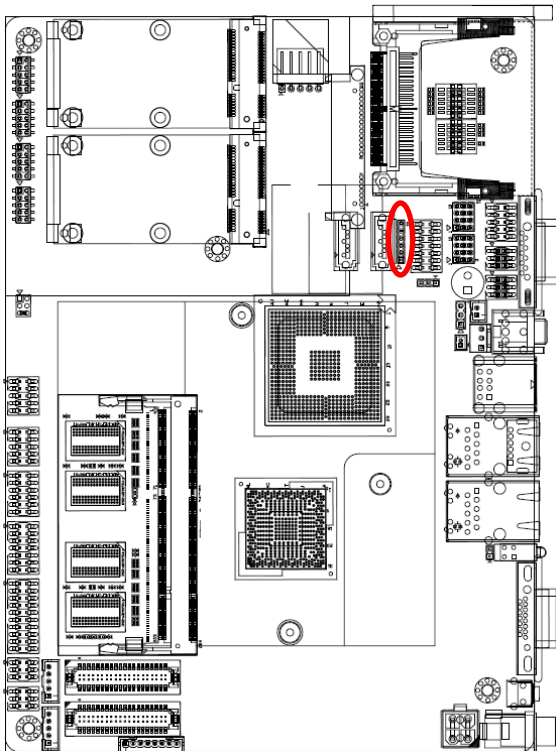
**NOTE:** Under 4W situation  
UL=X+, UR=Y+, LR=Y-, LL=X-

2.3.25 USB connector 4&5, 2&3 (JUSB1/ JUSB2)



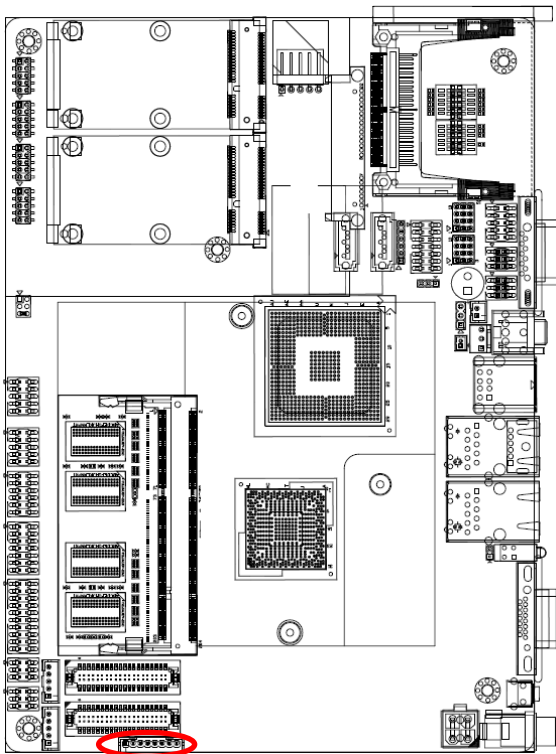
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| +5V    | 1   | 2   | GND    |
| D-     | 3   | 4   | GND    |
| D+     | 5   | 6   | D+     |
| GND    | 7   | 8   | D-     |
| GND    | 9   | 10  | +5V    |

2.3.26 USB connector 9 (JUSB4)



| Signal | PIN |
|--------|-----|
| +5V    | 1   |
| D-     | 2   |
| D+     | 3   |
| GND    | 4   |
| GND    | 5   |
| +3.3V  | 6   |

2.3.27 OSD for front panel key (JKEY)



| Signal      | PIN |
|-------------|-----|
| GND         | 1   |
| K-LED_GREEN | 2   |
| K-LED_RED   | 3   |
| K-POWER     | 4   |
| K-AUTO      | 5   |
| K-MENU      | 6   |
| K-RIGHT     | 7   |
| K-LEFT      | 8   |

