# CES-470

## **COM Express** Module

### **User's Manual**

Edition 1.0
2006/4/30

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# Packing List:

Please check the package content before you starting using the board.

## Hardware:

CES-470 COM Express module x 1

## Cable Kit:

**CES-470 heat sink x 1**

## Printed Matters:

**User's Manual x 1**

**Driver CD x 1**

# Index

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# Chapter 1 <Introduction>

## 1.1 <Product Overview>

**CES-470** is the new generation of the COM express module, with supporting last Intel Pentium M processors for 533MHz front side bus, Intel 915GM and ICH6-M chipset, integrated GMA900 graphics, DDR2 memory, support High Definition Audio, Serial ATA, PCI Express x16, x1 interface and one 10/100M base LAN.

### New Intel Pentium M Processor

The module supports last Intel Pentium M processors with 400/533MHz front side bus, 2MB L2 cache, to provide more powerful performance than before.

### New features for Intel 915GM chipset

The module integrates Intel 915GM and ICH6-M chipset, to provide new generation of the mobile solution, supports Intel GMA900 graphics, DDR2 400/533 memory, built-in high speed mass storage interface of serial ATA, High Definition Audio interface.

### All in One multimedia solution

Based on Intel 915GM and ICH6-M chipset, the module provides high performance onboard graphics, 18-bit dual channel LVDS interface, to meet the very requirement of the multimedia application.

### Flexible Extension Interface

The module support one PCI-Express x16 slot, four PCI-Express x1, it also support four PCI slots.

# 1.2 <Product Specification>

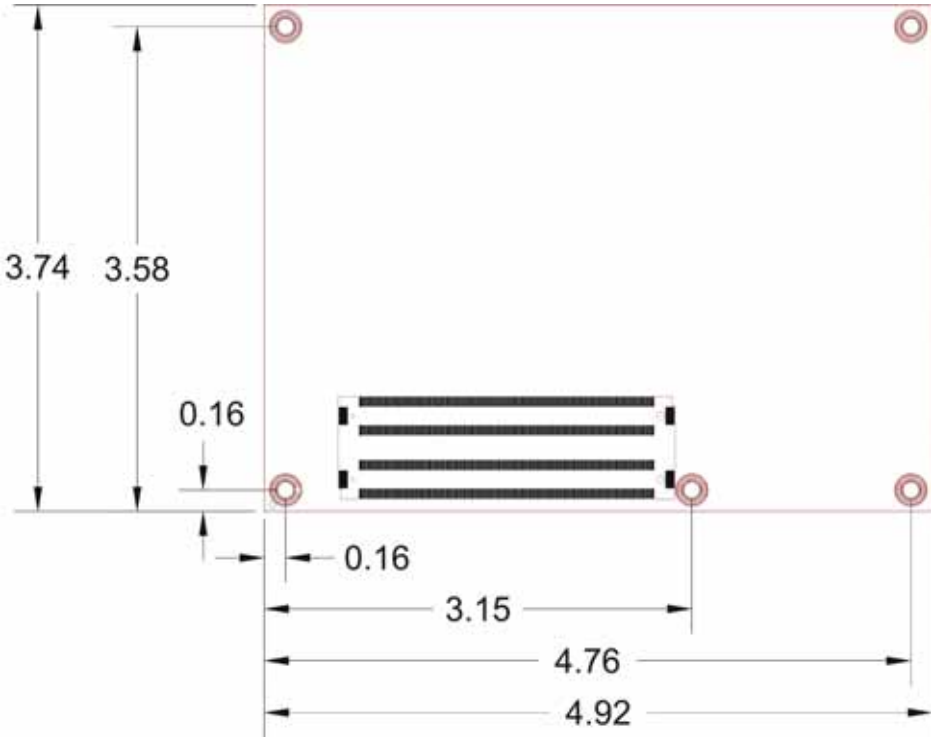
| General Specification | |
|---|---|
| Form Factor | COM Express module |
| CPU | Intel® **Pentium M** / **Celeron M** processors<br>Package type: FC-PGA478<br>L2 Cache: 512KB/1MB/2MB<br>Front side bus: 400/533MHz |
| Memory | 1 x 200-pin DDR2 SoDIMM 400/533MHz SDRAM up to 1GB<br>Up to 4GB/s of bandwidth.<br>Unbufferred, none-ECC memory supported only |
| Chipset | Intel® 915GM (Northbridge) and ICH6-M (Southbridge) |
| BIOS | Phoenix-Award v6.00PG 4Mb PnP flash BIOS |
| Green Function | Power saving mode includes doze, standby and suspend modes.<br>ACPI version 1.0 and APM version 1.2 compliant |
| Watchdog Timer | System reset programmable watchdog timer. |
| Real Time Clock | Intel® ICH6-M built-in RTC with lithium battery |
| Enhanced IDE | Support UltraDMA100 IDE interface supports up to 2 ATAPI devices |
| Serial ATA | Intel® ICH6-M integrates support 2 Serial ATA interfaces<br>Up to 150MB/s of transfer rate |
| **VGA Display Interface** | |
| Chipset | Intel® 915GM GMCH (Graphic Memory Controller Hub) |
| Frame Buffer | Up to 128MB shared with system memory |
| Display Type | Support CRT, LCD monitor with analog display<br>Support 18-bit dual channel LVDS interface<br>Support HDTV interface |

| | |
|---|---|
| **Ethernet Interface** | |
| Controller | Intel 82562ET PHY |
| Type | 10/100Base-T<br>auto-switching Fast Ethernet<br>Full duplex, IEEE802.3U compliant |
| **Expansive Interface** | |
| PCI-Express | Support x16 PCI-Express slot (***compatible with x1 slot***) and four x1 slots<br>PCI-Express x16 Up to 8GB/s of transfer bandwidth<br>PCI-Express x1 up to 5Gb/s of transfer bandwidth<br>Power supply: +3.3V, +12V |
| PCI | Support four PCI slots<br>Power supply: +3.3V, +5V |
| LPC | Support LPC interface |
| Audio | Support HD audio or AC97 Codec |
| **Power and Environment** | |
| Dimension | 125(L) x 95 (H) mm |
| Temperature | Operating within 0 ~ 60°C (32 ~ 140°F)<br>Storage within -20 ~ 85°C (-4 ~ 185°F) |
| **Ordering Code** | |
| **CES-470** | COM Express module for Pentium M Processor |

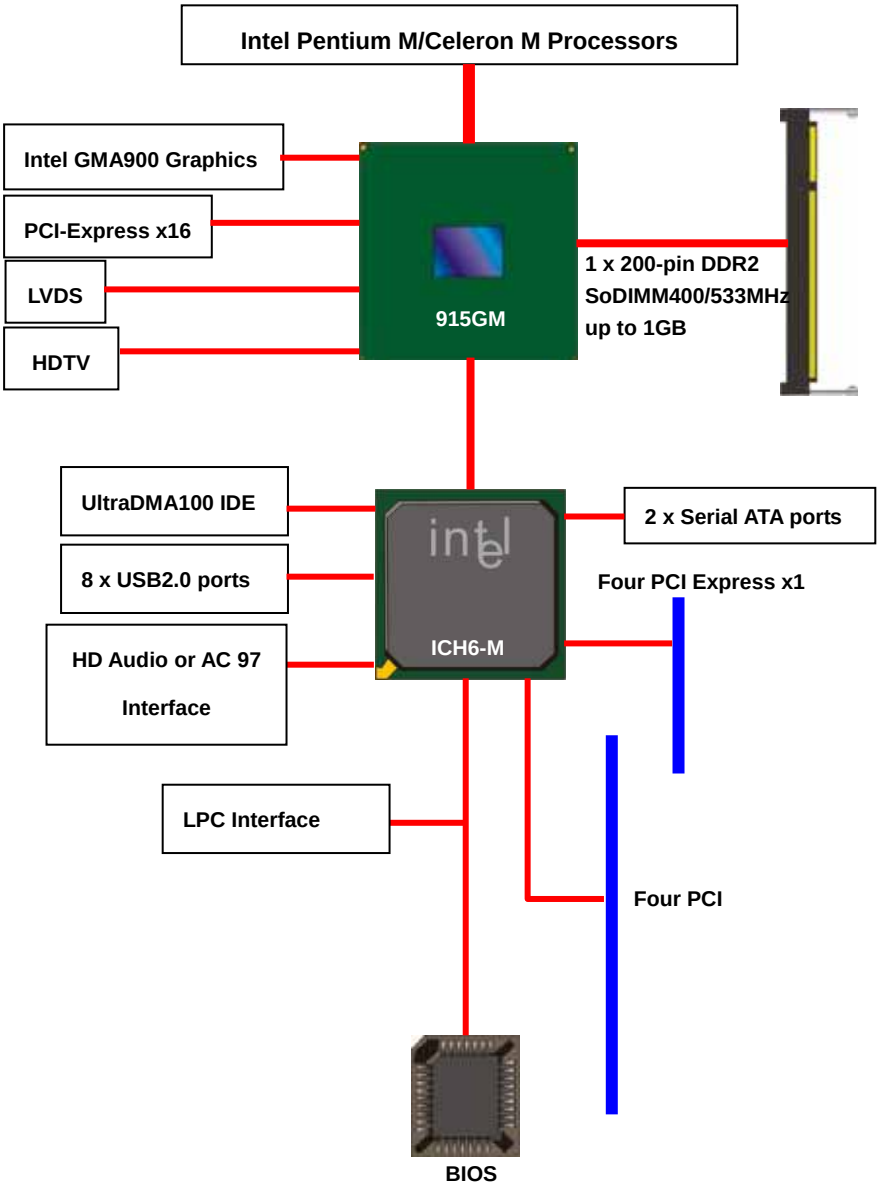
The specifications may be different as the actual production.

For further product information please visit the website at http://www.commell.com.tw

## 1.3 <Mechanical Drawing>



## 1.4 <Block Diagram>



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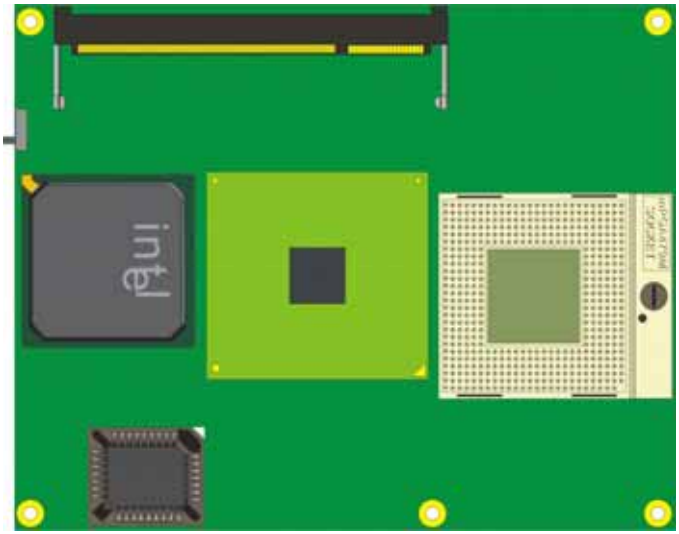
# Chapter 2 <Hardware Setup>

## 2.1 <Connector Location>

DDRII SoDIMM



CPU

## 2.2 <Connector Reference>

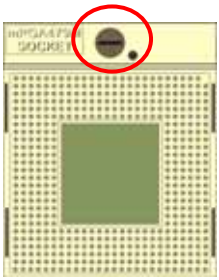
### 2.2.1 <Internal Connectors>

| Connector | Function | Remark |
|---|---|---|
| CPU | Socket479 for CPU | Standard |
| DDRII | 200 -pin DDR2 SoDIMM slot | Standard |

## 2.3 <CPU and Memory Setup>

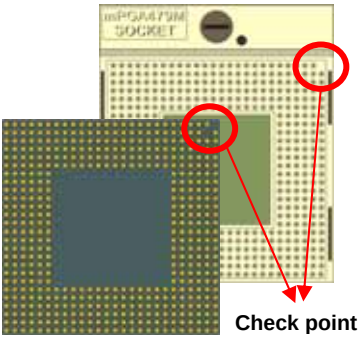
### 2.3.1 <CPU Setup>

The module comes with the socket479 for Intel Pentium M/Celeron M processors, it supports new generation of Intel Pentium M processors with 533MHz of front side bus and 2MB L2 cache. Please follow the instruction to install the CPU properly.



**1. Use the flat-type screw drive to unlock the CPU socket**

**Unlock way**



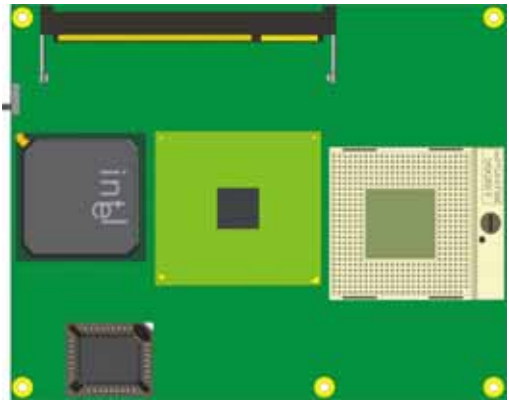
**Check point**

**2. Follow the pin direction to install the processor on the socket**

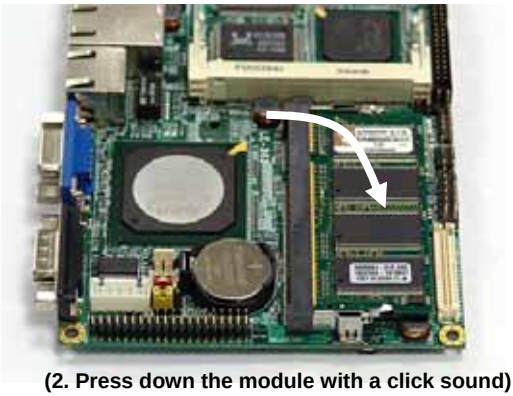
**3. Lock the socket**

### 2.3.2 <Memory Setup>

The module provides one 200-Pin DDRII SoDIMM slot 400/533 memory modules up to 1GB of capacity. Non-ECC, unbuffered memory is supported only.



**(1. Insert the DDR So-DIMM module into the socket at 45 degree)**



**(2. Press down the module with a click sound)**

## 2.4 <CMOS Setup>

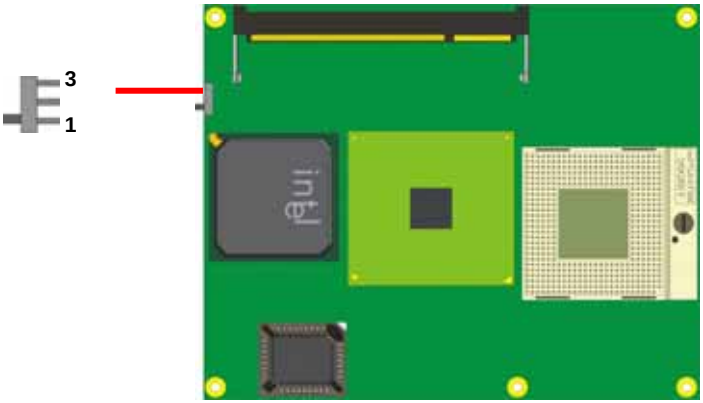
The board's data of CMOS can be setting in BIOS. If the board refuses to boot due to inappropriate CMOS settings, here is how to proceed to clear (reset) the CMOS to its default values.

**Jumper: JRTC**

**Type: Onboard 3-pin jumper**

| JRTC | Mode |
|---|---|
| 2-3 | Clear CMOS |
| 1-2 | Normal Operation |

Default setting




## 2.5 <Ethernet Interface>

The module integrates with one Intel 82562ET Ethernet PHY. The Intel 82562ET supports triple speed of 10/100base-T, with IEEE802.3 compliance and Wake-On-LAN supported.

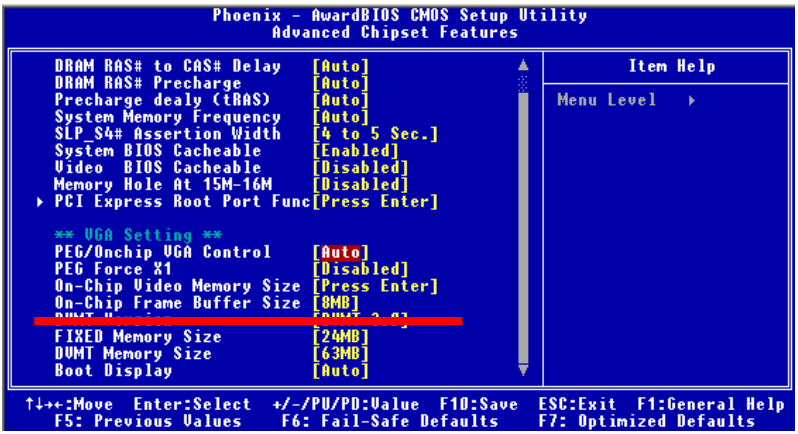
# Chapter 3 <System Setup>

## 3.1 <Video Memory Setup>

Based on Intel® 915GM chipset with GMA (Graphic Media Accelerator) 900, the board supports Intel® DVMT (Dynamic Video Memory Technology) 3.0, which would allow the video memory to be allocated up to 128MB.

To support DVMT, you need to install the Intel GMA 900 Driver with supported OS.

**BIOS Setup:**




**On-Chip Video Memory Size:** This option combines three items below for setup.

**On-Chip Frame Buffer Size:**

This item can let you select video memory which been allocated for legacy VGA and SVGA graphics support and compatibility. The available option is **1MB** and **8MB**.

**Fixed Memory Size:**

This item can let you select a static amount of page-locked graphics memory which will be allocated during driver initialization. Once you select the memory amount, it will be no longer available for system memory.

**DVMT Memory Size:**

This item can let you select a maximum size of dynamic amount usage of video memory, the system would configure the video memory depends on your application, this item is strongly recommend to be selected as **MAX DVMT**.

**Fixed + DVMT Memory Size:**

You can select the fixed amount and the DVMT amount at the same time for a guaranteed video memory and additional dynamic video memory, please check the table below for available setting.

| System Memory | On-Chip Frame Buffer Size | Fixed Memory Size | DVMT Memory Size | Total Graphic Memory |
|---|---|---|---|---|
| 128MB~255MB | 1MB | 32MB | 0MB | 32MB |
| | 1MB | 0MB | 32MB | 32MB |
| | 8MB | 32MB | 0MB | 32MB |
| | 8MB | 0 | 32MB | 32MB |
| 256MB~511MB | 1MB | 64MB | 0MB | 64MB |
| | 1MB | 0 | 64MB | 64MB |
| | 1MB | 128MB | 0MB | 128MB |
| | 1MB | 0 | 128MB | 128MB |
| | 1MB | 64MB | 64MB | 128MB |
| | 8MB | 64MB | 0MB | 64MB |
| | 8MB | 0 | 64MB | 64MB |
| | 8MB | 128MB | 0MB | 128MB |
| | 8MB | 0 | 128MB | 128MB |
| | 8MB | 64MB | 64MB | 128MB |
| 512MB upper | 1MB | 64MB | 0 | 64MB |
| | 1MB | 0 | 64MB | 64MB |
| | 1MB | 128MB | 0 | 128MB |
| | 1MB | 0 | 128MB | 128MB |
| | 1MB | 64MB | 64MB | 128MB |
| | 8MB | 64MB | 0 | 64MB |
| | 8MB | 0 | 64MB | 64MB |
| | 8MB | 128MB | 0 | 128MB |
| | 8MB | 0 | 128MB | 128MB |
| | 8MB | 64MB | 64MB | 128MB |

Notice:

1. The On-Chip Frame Buffer Size would be included in the Fixed Memory.

Please select the memory size according to this table.

# Chapter 4 <BIOS Setup>

The motherboard uses the Award BIOS for the system configuration. The Award BIOS in the single board computer is a customized version of the industrial standard BIOS for IBM PC AT-compatible computers. It supports Intel x86 and compatible CPU architecture based processors and computers. The BIOS provides critical low-level support for the system central processing, memory and I/O sub-systems.

The BIOS setup program of the single board computer let the customers modify the basic configuration setting. The settings are stored in a dedicated battery-backed memory, NVRAM, retains the information when the power is turned off. If the battery runs out of the power, then the settings of BIOS will come back to the default setting.

The BIOS section of the manual is subject to change without notice and is provided here for reference purpose only. The settings and configurations of the BIOS are current at the time of print, and therefore they may not be exactly the same as that displayed on your screen.

To activate CMOS Setup program, press ＜DEL＞ key immediately after you turn on the system. The following message "Press DEL to enter SETUP" should appear in the lower left hand corner of your screen. When you enter the CMOS Setup Utility, the Main Menu will be displayed as **Figure 4-1**. You can use arrow keys to select your function, press ＜Enter＞ key to accept the selection and enter the sub-menu.

**Figure 4-1** CMOS Setup Utility Main Screen

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# Appendix A <Flash BIOS>

## A.1 <Flash Tool>

The board is based on Award BIOS and can be updated easily by the BIOS auto flash tool. You can download the tool online at the address below:

**http://www.phoenix.com/en/home/**
**http://www.commell.com.tw/Support/Support_SBC.htm**

File name of the tool is "awdflash.exe", it's the utility that can write the data into the BIOS flash ship and update the BIOS.

## A.2 <Flash BIOS Procedure>

1. Please make a bootable floppy disk.
2. Get the last .bin files you want to update and copy it into the disk.
3. Copy awardflash.exe to the disk.
4. Power on the system and flash the BIOS. (Example: C:/ awardflash XXX.bin)
5. Restart the system.

Any question about the BIOS re-flash please contact your distributors or visit the web-site at below:

**http://www.commell.com.tw/support/support.htm**

# Appendix B <COM Express Pin assignment>

| | | | | | |
|---|---|---|---|---|---|
| A1 | GND | A38 | -USBOC6 | A75 | ATX2+ |
| A2 | N/C | A39 | USBP4- | A76 | ATX2- |
| A3 | N/C | A40 | USBP4+ | A77 | LVDD EN |
| A4 | ETH_SPD- | A41 | GND | A78 | N/C |
| A5 | 3VSB | A42 | USBP2- | A79 | N/C |
| A6 | N/C | A43 | USBP2+ | A80 | GND |
| A7 | N/C | A44 | -USBOC2 | A81 | ACLK+ |
| A8 | ETH_LINK- | A45 | USBP0- | A82 | ACLK- |
| A9 | ETH_RX0- | A46 | USBP0+ | A83 | LVDDCLK |
| A10 | ETH_RX0- | A47 | RTCVCC | A84 | LVDDDAT |
| A11 | GND | A48 | N/C | A85 | N/C |
| A12 | ETH_TX0- | A49 | N/C | A86 | -RCIN |
| A13 | ETH_TX0- | A50 | SERIRQ | A87 | A20GATE |
| A14 | ETH CTREF | A51 | GND | A88 | PCIECLK |
| A15 | -SLPS3 | A52 | N/C | A89 | -PCIECLK |
| A16 | SATA0TXP | A53 | N/C | A90 | GND |
| A17 | SATA0TXN | A54 | N/C | A91 | N/C |
| A18 | -SLPS4 | A55 | N/C | A92 | N/C |
| A19 | SATA0RXP | A56 | N/C | A93 | N/C |
| A20 | SATA0RXN | A57 | GND | A94 | N/C |
| A21 | GND | A58 | PCIE_TXP4 | A95 | N/C |
| A22 | SATA2TXP | A59 | PCIE_TXN4 | A96 | GND |
| A23 | SATA2TXN | A60 | GND | A97 | +12V |
| A24 | -SLPS5 | A61 | PCIE_TXP3 | A98 | +12V |
| A25 | SATA2RXP | A62 | PCIE_TXN3 | A99 | +12V |
| A26 | SATA2RXN | A63 | N/C | A100 | GND |
| A27 | -BATLOW | A64 | PCIE_TXP2 | A101 | +12V |
| A28 | -SATALED | A65 | PCIE_TXN2 | A102 | +12V |
| A29 | AC SYSNC | A66 | GND | A103 | +12V |
| A30 | -AC RST | A67 | N/C | A104 | +12V |
| A31 | GND | A68 | PCIE_TXP1 | A105 | +12V |
| A32 | AC BCLK | A69 | PCIE_TXN1 | A106 | +12V |
| A33 | AC SDOUT | A70 | GND | A107 | +12V |
| A34 | N/C | A71 | ATX0+ | A108 | +12V |
| A35 | -THERMTRIP | A72 | ATX0- | A109 | +12V |
| A36 | USBP6- | A73 | ATX1+ | A110 | GND |
| A37 | USBP+ | A74 | ATX1- | | |

| | | | | | |
|---|---|---|---|---|---|
| B1 | GND | B38 | -USBOC4 | B75 | BTX2+ |
| B2 | ETH ACT- | B39 | USBP5- | B76 | BTX2- |
| B3 | -LFRAME | B40 | USBP5+ | B77 | N/C |
| B4 | LAD0 | B41 | GND | B78 | N/C |
| B5 | LAD1 | B42 | USBP3- | B79 | BKL EN |
| B6 | LAD2 | B43 | USBP3+ | B80 | GND |
| B7 | LAD3 | B44 | -USBOC0 | B81 | BCLK+ |
| B8 | -LDRQ0 | B45 | USBP1- | B82 | BCLK- |
| B9 | -LDRQ1 | B46 | USBP1+ | B83 | BKL CRTL |
| B10 | LPC33CLK | B47 | N/C | B84 | 5VDU |
| B11 | GND | B48 | N/C | B85 | 5VDU |
| B12 | -ICHBTN | B49 | -SYSRST | B86 | 5VDU |
| B13 | SMBCLK | B50 | -CBRST | B87 | 5VDU |
| B14 | SMBDATA | B51 | GND | B88 | N/C |
| B15 | GPI11 | B52 | N/C | B89 | CRT R |
| B16 | SATA1TXP | B53 | N/C | B90 | GND |
| B17 | SATA1TXN | B54 | N/C | B91 | CRT G |
| B18 | -SUSTAT | B55 | N/C | B92 | CRT B |
| B19 | SATA1RXP | B56 | N/C | B93 | CRT HS |
| B20 | SATA1RXN | B57 | N/C | B94 | CRT VS |
| B21 | GND | B58 | PCIE_RXP4 | B95 | CRTDCLK |
| B22 | SATA3TXP | B59 | PCIE_RXN4 | B96 | CRTDDAT |
| B23 | SATA3TXN | B60 | GND | B97 | TVA PB |
| B24 | PWR_GD | B61 | PCIE_RXP3 | B98 | TVB Y |
| B25 | SATA3RXP | B62 | PCIE_RXN3 | B99 | TVC PR |
| B26 | SATA3RXN | B63 | N/C | B100 | GND |
| B27 | WDT | B64 | PCIE_RXP2 | B101 | +12V |
| B28 | AC SDIN2 | B65 | PCIE_RXN2 | B102 | +12V |
| B29 | AC SDIN1 | B66 | -PCIEWK | B103 | +12V |
| B30 | AC SDIN0 | B67 | -LPCME | B104 | +12V |
| B31 | GND | B68 | PCIE RXP1 | B105 | +12V |
| B32 | ICHSPKR | B69 | PCIE RXN1 | B106 | +12V |
| B33 | SMLINK0 | B70 | GND | B107 | +12V |
| B34 | SMLINK1 | B71 | BTX0+ | B108 | +12V |
| B35 | -THERM | B72 | BTX0- | B109 | +12V |
| B36 | USBP7- | B73 | BTX1+ | B110 | GND |
| B37 | USBP7+ | B74 | BTX1- | | |

| | | | | | |
|---|---|---|---|---|---|
| C1 | GND | C38 | -CBE2 | C75 | PEG RXN7 |
| C2 | PDD7 | C39 | AD17 | C76 | GND |
| C3 | PDD6 | C40 | AD19 | C77 | N/C |
| C4 | PDD3 | C41 | GND | C78 | PEG RXP8 |
| C5 | PDD15 | C42 | AD21 | C79 | PEG RXN8 |
| C6 | PDD8 | C43 | AD23 | C80 | GND |
| C7 | PDD9 | C44 | -CBE3 | C81 | PEG RXP9 |
| C8 | PDD2 | C45 | AD25 | C82 | PEG RXN9 |
| C9 | PDD13 | C46 | AD27 | C83 | N/C |
| C10 | PDD1 | C47 | AD29 | C84 | GND |
| C11 | GND | C48 | AD31 | C85 | PEG RXP10 |
| C12 | PDD14 | C49 | -PIRQA | C86 | PEG RXN10 |
| C13 | PIORDY | C50 | -PIRQB | C87 | GND |
| C14 | -PDIOR | C51 | GND | C88 | PEG RXP11 |
| C15 | -PME | C52 | PEG RXP0 | C89 | PEG RXN11 |
| C16 | -GNT2 | C53 | PEG RXN0 | C90 | GND |
| C17 | -REQ2 | C54 | N/C | C91 | PEG RXP12 |
| C18 | -GNT1 | C55 | PEG RXP1 | C92 | PEG RXN12 |
| C19 | -REQ1 | C56 | PEG RXN2 | C93 | GND |
| C20 | -GNT0 | C57 | N/C | C94 | PEG RXP13 |
| C21 | GND | C58 | PEG RXP2 | C95 | PEG RXN13 |
| C22 | -REQ0 | C59 | PEG RXN2 | C96 | GND |
| C23 | -PCIRST | C60 | GND | C97 | N/C |
| C24 | AD0 | C61 | PEG RXP3 | C98 | PEG RXP14 |
| C25 | AD2 | C62 | PEG RXN3 | C99 | PEG RXN14 |
| C26 | AD4 | C63 | N/C | C100 | GND |
| C27 | AD6 | C64 | N/C | C101 | PEG RXP15 |
| C28 | AD8 | C65 | PEG RXP4 | C102 | PEG RXN16 |
| C29 | AD10 | C66 | PEG RXN4 | C103 | GND |
| C30 | AD12 | C67 | N/C | C104 | +12V |
| C31 | GND | C68 | PEG RXP5 | C105 | +12V |
| C32 | AD14 | C69 | PEG RXN5 | C106 | +12V |
| C33 | -CBE1 | C70 | GND | C107 | +12V |
| C34 | -PERR | C71 | PEG RXP6 | C108 | +12V |
| C35 | -PLOCK | C72 | PEG RXN6 | C109 | +12V |
| C36 | -DEVSEL | C73 | SDVODAT | C110 | GND |
| C37 | -IRDY | C74 | PEG RXP7 | | |

| | | | | | |
|---|---|---|---|---|---|
| D1 | GND | D38 | AD18 | D75 | PEG TXN7 |
| D2 | PDD5 | D39 | AD20 | D76 | GND |
| D3 | PDD10 | D40 | AD22 | D77 | P66DET |
| D4 | PDD11 | D41 | GND | D78 | PEG TXP8 |
| D5 | PDD12 | D42 | AD24 | D79 | PEG TXN8 |
| D6 | PDD4 | D43 | AD26 | D80 | GND |
| D7 | PDD0 | D44 | AD28 | D81 | PEG TXP9 |
| D8 | PDDREQ | D45 | AD30 | D82 | PEG TXN9 |
| D9 | -PDIOW | D46 | -PIRQC | D83 | N/C |
| D10 | -PDDACK | D47 | -PIRQD | D84 | GND |
| D11 | GND | D48 | N/C | D85 | PEG TXP10 |
| D12 | IDEIRQ | D49 | N/C | D86 | PEG TXN10 |
| D13 | PAD0 | D50 | PCISCLK | D87 | GND |
| D14 | PAD1 | D51 | GND | D88 | PEG TXP11 |
| D15 | PAD2 | D52 | PEG TXP0 | D89 | PEG TXN11 |
| D16 | -PCS1 | D53 | PEG TXN0 | D90 | GND |
| D17 | -PCS3 | D54 | CFG9 | D91 | PEG TXP12 |
| D18 | IDESET | D55 | PEG TXP1 | D92 | PEG TXN12 |
| D19 | -GNT3 | D56 | PEG TXN1 | D93 | GND |
| D20 | -REQ3 | D57 | N/C | D94 | PEG TXP13 |
| D21 | GND | D58 | PEG TXP2 | D95 | PEG TXN13 |
| D22 | AD1 | D59 | PEG TXN2 | D96 | GND |
| D23 | AD3 | D60 | GND | D97 | N/C |
| D24 | AD5 | D61 | PEG TXP3 | D98 | PEG TXP14 |
| D25 | AD7 | D62 | PEG TXN3 | D99 | PEG TXN14 |
| D26 | -CBE0 | D63 | N/C | D100 | GND |
| D27 | AD9 | D64 | N/C | D101 | PEG TXP15 |
| D28 | AD11 | D65 | PEG TXP4 | D102 | PEG TXN15 |
| D29 | AD13 | D66 | PEG TXN4 | D103 | GND |
| D30 | AD15 | D67 | GND | D104 | +12V |
| D31 | GND | D68 | PEG TXP5 | D105 | +12V |
| D32 | PAR | D69 | PEG TXN5 | D106 | +12V |
| D33 | -SERR | D70 | GND | D107 | +12V |
| D34 | -STOP | D71 | PEG TXP6 | D108 | +12V |
| D35 | -TRDY | D72 | PEG TXN6 | D109 | +12V |
| D36 | -FRAME | D73 | SDVOCLK | D110 | GND |
| D37 | AD16 | D74 | PEG TXP7 | | |

# Contact Information

Any advice or comment about our products and service, or anything we can help you please don't hesitate to contact with us. We will do our best to support you for your products, projects a business.


## Taiwan Commate Computer Inc.

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