

**Full 16-bit ISA Bus
VDX-6324**

DM&P Vortex86DX 800MHz

Half-Size CPU Module

with 4S/4USB/VGA/LCD/LAN/GPIO/PWMx16

256MB DDR2 Onboard

User's Manual

(Revision 1.1A)

<http://www.microcomputersystems.com>

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Chapter 1

Introduction

1.1 Packing List

| Product Name | Package |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VDX-6324 | <ul style="list-style-type: none">● Embedded Vortex86DX CPU All-in-One Board● Manual & Drivers CD x 1● RS232 cable x 3● PRINT cable x1● IDE cable x 1● USB cable x 2 (USB port x 2)● GPIO cable x 1● YKB for PS/2 Keyboard & Mouse x 1 |

1.2 Product Description

The VDX-6324 family of low-power x86 embedded controller is designed to meet Half-Size specification with full 16-bit ISA Bus, and integrated with the following features.

- 800MHz Vortex86DX System-On-Chip
- VGA, TFT/LVDS LCD support up to 1280x1024 resolution
- 256 / 512MB DDR2 system memory
- Enhanced IDE (UltraDMA-100/66/33)
- 10/100Mbps Ethernet
- 4 USB 2.0 (host)
- Up to 4 serial ports
- Parallel port
- 16-bit GPIOs
- Onboard 4MB SPI Flash
- PC/104-Plus expansion bus
- Meet PC/104 stacking spec.
- 2 watchdog timer
- 16~24 PWM channels
- JTAG interface
- AMI BIOS
- Single voltage +5V DC
- Support extended operating temperature range of -20°C to +70°C

The VDX-6324 Half-Size family of embedded controller is designed with backward compatibility in mind, to provide migration path for projects facing end-of-life challenges with their existing x86 based Half-Size controller. The VDX-6324 family of controller is designed as a plug in replacement, with backward compatibility to support legacy software to help extend existing product life cycle without heavy re-engineering.

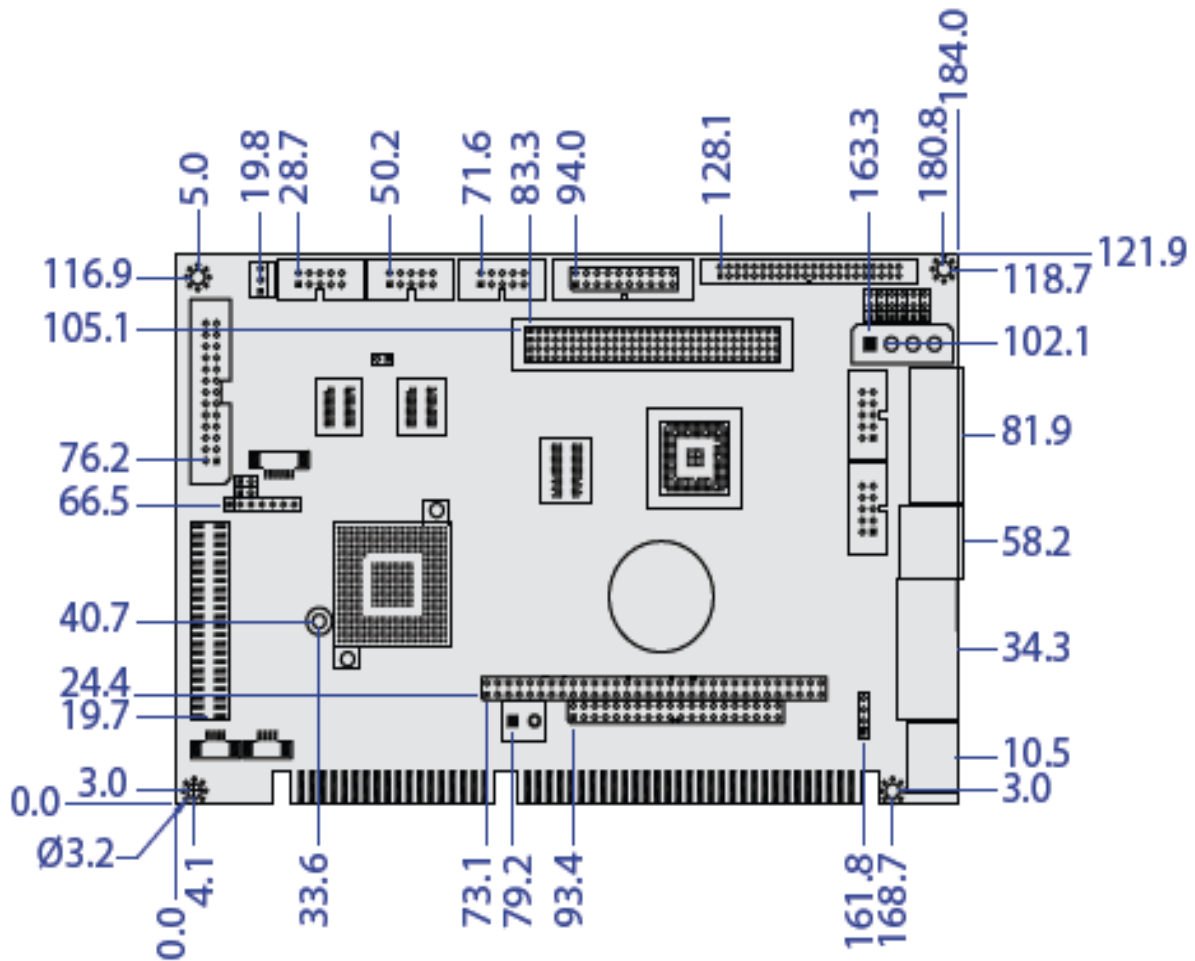
VDX-6324 is suitable for broad range of data-acquisition, Industrial automation, Process control, Automotive controller, AVL, Intelligent Vehicle management device, Medical device, Human machine interface, Robotics, machinery control And more... application that required small footprint, low-power and low-cost hardware with open industry standard such as Half-Size.

1.3 Specifications

| Features | VDX-6324 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU | DM&P SoC CPU Vortex86DX- 800MHz Real Time Clock with Lithium Battery Backup |
| Cache | L1:16K I-Cache, 16K D-Cache, L2 Cache 128KB |
| BIOS | AMI BIOS |
| Bus Interface | PC/104 Standard Compliant (Optional: PCI-104) |
| System Memory | 256 /512MB DDR2 onboard |
| Watchdog Timer | Software programmable from 30.5 us to 512 seconds x2 sets(Watchdog 1 fully compatible with M6117D) |
| VGA | XGI Volari Z9s Chipset VGA and TFT Flat Panel Interface Support LVDS Flat Panel Interface Support (Optional) Onboard 32MB VGA Memory Support resolution up to 1280 x 1024 |
| LAN | Integrated 10/100M Ethernet |
| Audio | CM119 USB Audio Controller (Optional) |
| I /O Interface | <ul style="list-style-type: none"> ● Enhanced IDE port (UltraDMA-100/66/33) x1 ● RS-232 port x3 ● RS-232/422/485 port x1 (RS485 Auto Direction) ● Parallel port x1 ● USB port (2.0) x4 ● 16-bit GPIO port x1 ● 10/100Mbps Ethernet port x1 |

| | |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectors | <ul style="list-style-type: none"> ● 2.54mm Ø 26-pin box header for Print x1 ● 2.54mm Ø 10-pin box header for RS-232 x3 ● 2.54mm Ø 10-pin box header for USB x2 ● 2.54mm Ø 20-pin box header for 16-bit GPIO x1 ● 2.54mm Ø 3-pin header for RS-485 x1 ● 2.54mm Ø 2-pin header for Reset x1 ● 2.54mm 4-pin header for DC-in x1 ● 2.54mm 7-pin header for Redundancy Signal x1(O) ● 2.54mm 2-pin header for SYS-SW-IN x1 (Opt) ● 2.0mm Ø 44-pin box header for IDE x1 ● 2.0mm Ø 44-pin box header for LCD x1 ● 1.25mm Ø 6-pin Wafer for JTAG x1 ● 1.25mm Ø 4-pin Wafer for Line-out/MIC-in x2 (O) ● External RJ-45 connector for Ethernet x1 ● External Mini DIN connector for KBD/Mouse x1 ● External D-Sub 15 pin female connector for VGA x1 ● External D-Sub 9 pin male connector for RS232 x1 ● Type I/II Compact Flash Slot x1 ● 4-pin Male Power Connector x1 |
| Flash Disk Support | <ul style="list-style-type: none"> ● On board 4MB SPI Flash Disk (Driver: A) ● 44-pin IDE Flash Disk(EmbedDisk 16MB or above) ● Compact Flash Type I/II ● 44-pin IDE to Micro SD (Optional) |
| PWM | 16~24 Channels |
| SRAM support | 512KB (Optional) |
| Power Requirement | Single Voltage +5V @760mA |
| Dimension | 184mm X 122mm (7.24 x4.80 inches) |
| Weight | 180g |
| Operating Temperature | -20°C ~ +70°C -40°C ~ +85°C (Optional) |

1.4 Board Dimension

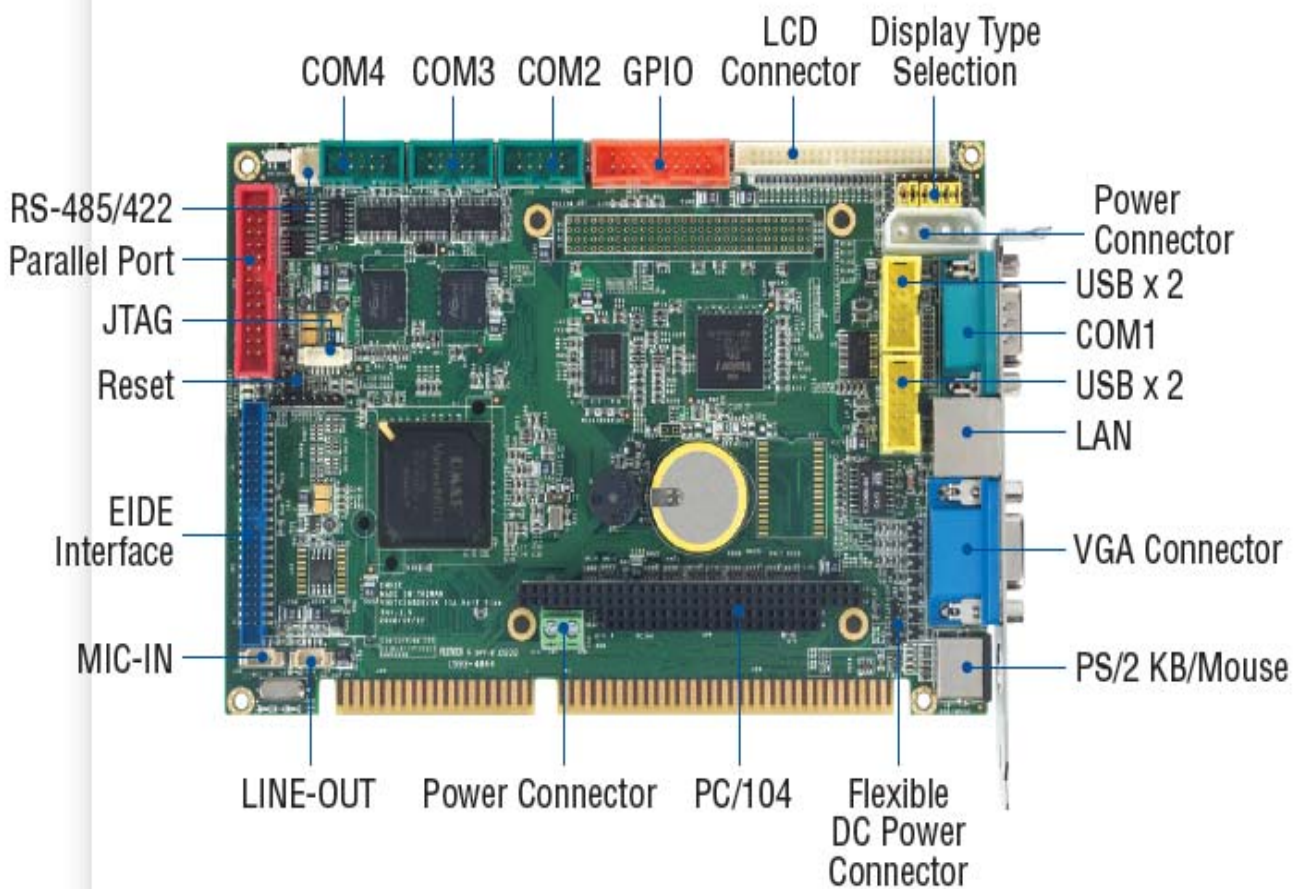


Unit: mm

Chapter 2

Installation

2.1 Board Outline



(Note1: COM2 RS232/422/485 is selected by BIOS setting)

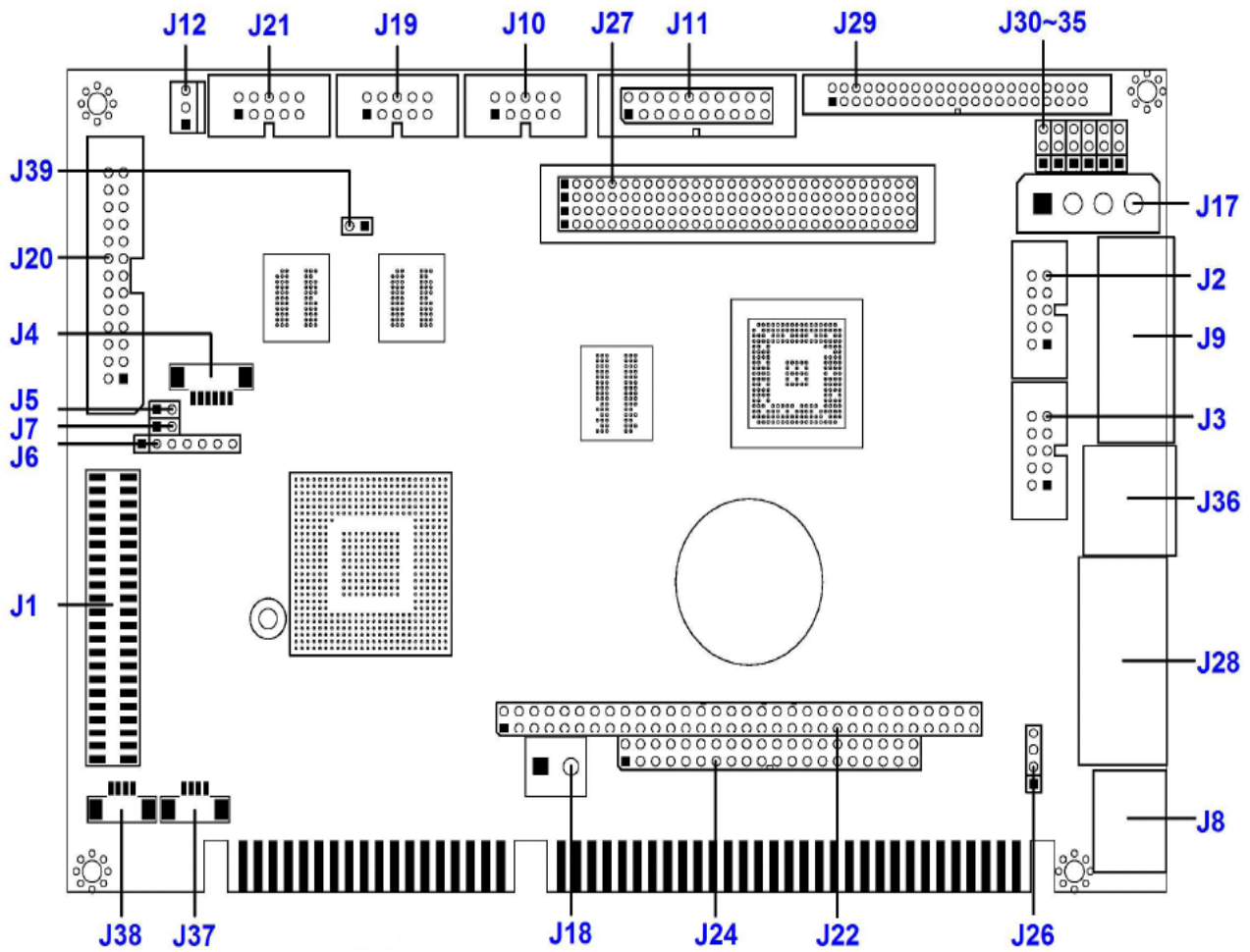
(Note2: J39 Default setting of JTAG Has to be Disable: Pin 1 & Pin 2 short)

(Note3: PCI-104 connector is optional: VI/O setting: +5V only)

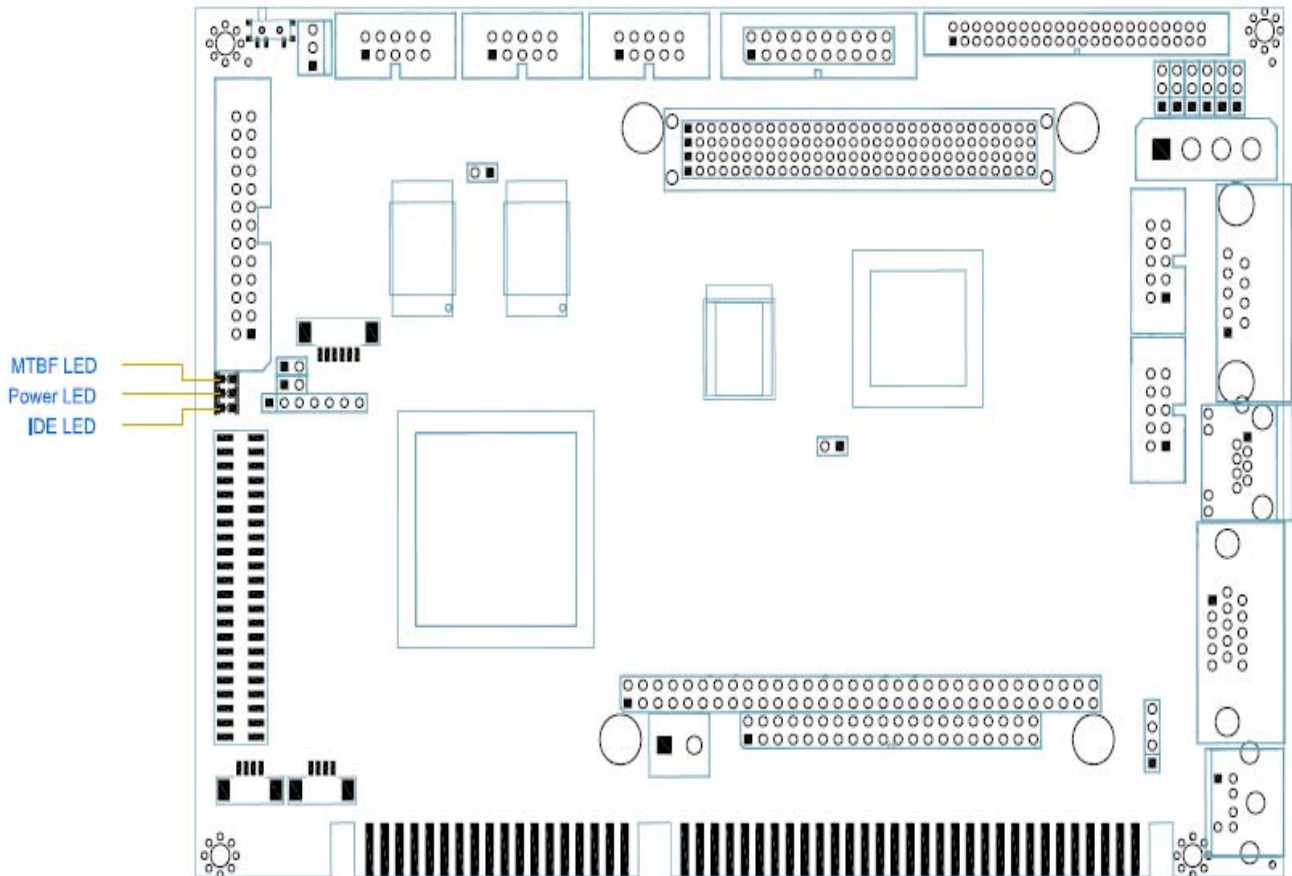
(Note4: Redundancy Signal and System-Fail-SW are optional)

2.2 Connectors & Jumpers Location

Connectors



Jumpers & LEDs



2.3 Connectors & Jumpers Summary

Summary Table

| Nbr | Description | Type of Connections | Pin nbrs. |
|-----|------------------------------------------------|--------------------------|-----------|
| J1 | IDE | Box Header, 2.0Ø , 22x2 | 44-pin |
| J2 | USB1 | Box Header, 2.54Ø , 5x2 | 10-pin |
| J3 | USB2 | Box Header, 2.54Ø , 5x2 | 10-pin |
| J4 | JTAG | Wafer, 1.25Ø , 6x1 | 6-pin |
| J5 | Reset | Pin Header, 2,54Ø,1x2 | 2-pin |
| J6 | Redundancy (Optional) | Pin Header, 2.54Ø, 7x1 | 7-pin |
| J7 | System –Fail-Switch (Optional) | Pin Header, 2.54Ø , 2x1 | 2-pin |
| J8 | PS/2 Keyboard & Mouse | Mini-Din Connector | 6-pin |
| J9 | COM1(TTL/GPIO-P4 / PWMx8) | D-Sub Connector | 9-pin |
| J10 | COM2(RS232/422/485) | Box Header, 2.54Ø 5x2 | 10-pin |
| J11 | GPIO (Port 0 / 1 /PWMx16) | Box Header, 2.54Ø ,10x2 | 20-pin |
| J12 | RS-485 | Molex Header,2.54Ø , 3x1 | 3-pin |
| J17 | Power Connector | Box Header, 5.0Ø Molex | 4-pin |
| J18 | Power Connector | Terminal Block 5.0Ø,2x1 | 2-pin |
| J19 | COM3 | Box Header, 2.54Ø, 5x2 | 10-pin |
| J20 | PRINT | Box Header, 2.54Ø ,13x2 | 26-pin |
| J21 | COM4 | Box Header, 2.54Ø, 5x2 | 10-pin |
| J22 | PC104 Connector – 64 pin | Box Header, 2.54Ø 32x2 | 64-pin |
| J24 | PC104 Connector – 40 pin | Box Header, 2.54Ø ,20x2 | 40-pin |
| J26 | 4P Power Source (Interconnect to PC/104 – J22) | Pin Header, 2.54Ø , 4x1 | 4-pin |
| J27 | PC/104 + (Optional) | Box Header, 2.0Ø , 30x4 | 120-pin |
| J28 | VGA | D-Sub female connector | 15-pin |
| J29 | LCD | Box Header,2.0Ø ,22x2 | 44-pin |
| J30 | Display type Setup | Pin Header, 2.54Ø , 3x1 | 3-pin |
| J35 | | | |
| J36 | 10/100Base-T Ethernet LAN | RJ45 Connector | 8-pin |
| J37 | LINE-OUT (Optional) | Wafer, 1.25Ø , 4x1 | 4-pin |
| J38 | MIC-IN (Optional) | Wafer, 1.25Ø , 4x1 | 4-pin |
| J39 | JTAG Disable (Default setting) | Pin Header, 2,54Ø,1x2 | 2-pin |
| J40 | Master/Slave for IDE & CF | Slide Switch | 3-pin |

| | | | |
|----------|--------------------------------|------------------------|--------|
| J41 | Console Redirection (Optional) | Pin Header, 2,54Ø,1x2 | 2-pin |
| PWR-LED | Power Active LED (Red) | LED-SMD | |
| IDE-LED | IDE Active LED (Green) | LED-SMD | |
| MTBF-LED | MTBF-Out (Orange) | LED-SMD | |
| CF1 | Compact Flash | Type I/II CF Connector | 50-pin |
| SP1 | BUZZER | | |

2.4 Pin Assignments & Jumper Settings

J1: IDE (44 Pins)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | IDERST | 2 | GND |
| 3 | IDED7 | 4 | IDED8 |
| 5 | IDED6 | 6 | IDED9 |
| 7 | IDED5 | 8 | IDED10 |
| 9 | IDED4 | 10 | IDED11 |
| 11 | IDED3 | 12 | IDED12 |
| 13 | IDED2 | 14 | IDED13 |
| 15 | IDED1 | 16 | IDED14 |
| 17 | IDED0 | 18 | IDED15 |
| 19 | GND | 20 | NC |
| 21 | IDEREQ | 22 | GND |
| 23 | IDEIOW | 24 | GND |
| 25 | IDEIOR | 26 | GND |
| 27 | ICHRDY | 28 | GND |
| 29 | IDEACK | 30 | GND |
| 31 | IDEINT | 32 | NC |
| 33 | IDESA1 | 34 | IDECBLID |
| 35 | IDESA0 | 36 | IDESA2 |
| 37 | IDECS-0 | 38 | IDECS1 |
| 39 | IDELED | 40 | GND |
| 41 | VCC | 42 | VCC |
| 43 | GND | 44 | NC |

J2: USB 1

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | VCC | 2 | VCC |
| 3 | LUSBD0- | 4 | LUSBD1- |
| 5 | LUSBD0+ | 6 | LUSBD1+ |
| 7 | GND | 8 | GND |
| 9 | GGND | 10 | GGND |

J3: USB 2

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | VCC | 2 | VCC |
| 3 | LUSBD2- | 4 | LUSBD3- |
| 5 | LUSBD2+ | 6 | LUSBD3+ |
| 7 | GND | 8 | GND |
| 9 | GGND | 10 | GGND |

J4: JTAG

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | VCC | 2 | GND |
| 3 | TCK | 4 | TDO |
| 5 | TDI | 6 | TMS |

J5: RESET

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | Reset | 2 | GND |

J6: Redundancy (Optional)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|--------------|
| 1 | GND | 2 | SYS-FAIL-OUT |
| 3 | SYS-FAIL-IN | 4 | GPCS0 |
| 5 | SYS-GPCS-IN | 6 | TXD9\ |
| 7 | RXD9\ | | |

J7: System-Fail-Switch (Optional)

| Pin # | Signal Name |
|-------|-------------|
| 1 | SYS-SW-IN |
| 2 | GND |

J8: PS/2 KBD / Mouse

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

J9: COM 1 (Optional: TTL/ GPIO-P4 / PWMx8)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | DCD1 | 2 | RXD1 |
| 3 | TXD1 | 4 | DTR1 |
| 5 | GND | 6 | DSR1 |
| 7 | RTS1 | 8 | CTS1 |
| 9 | RI1 | 10 | GND |
| 11 | GND | | |

J10: COM2 RS232 / RS422 / RS485 (Optional: TTL)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-----------------------|-------|------------------------|
| 1 | DCD2/ 422TX- / RS485- | 2 | RXD2 / 422TX+ / RS485+ |
| 3 | TXD2 / 422RX+ | 4 | DTR2 / 422RX- |
| 5 | GND | 6 | DSR2 |
| 7 | RTS2 | 8 | CTS2 |
| 9 | RI2 | 10 | NC |

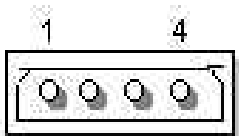
J11: GPIO (Port 0 / Port 1/PWMx16)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | GND | 2 | VCC |
| 3 | GP00 | 4 | GP10 |
| 5 | GP01 | 6 | GP11 |
| 7 | GP02 | 8 | GP12 |
| 9 | GP03 | 10 | GP13 |
| 11 | GP04 | 12 | GP14 |
| 13 | GP05 | 14 | GP15 |
| 15 | GP06 | 16 | GP16 |
| 17 | GP07 | 18 | GP17 |
| 19 | VCC | 20 | GND |

J12: RS485 (Auto direction)

| Pin # | Signal Name |
|-------|-------------|
| 1 | RS485 + |
| 2 | RS485 — |
| 3 | GND |

J17: Power Connector – 4-pin Header (P4 Molex 5mm)

|  | Pin # | Signal Name |
|-------------------------------------------------------------------------------------|-------|-------------|
| | 1 | +5V |
| | 2 | GND |
| | 3 | GND |
| 4 | +12V | |

J18: Power Connector (Terminal Block 5.0mm)

| Pin # | Signal Name |
|-------|-------------|
| 1 | +5V |
| 2 | GND |

J19: COM3 (Optional: TTL)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | DCD3 | 2 | RXD3 |
| 3 | TXD3 | 4 | DTR3 |
| 5 | GND | 6 | DSR3 |
| 7 | RTS3 | 8 | CTS3 |
| 9 | RI3 | 10 | NC |

J20: PRINT

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | STB- | 14 | AFD- |
| 2 | PD0 | 15 | ERR- |
| 3 | PD1 | 16 | INIT- |
| 4 | PD2 | 17 | SLIN- |
| 5 | PD3 | 18 | GND |
| 6 | PD4 | 19 | GND |
| 7 | PD5 | 20 | GND |
| 8 | PD6 | 21 | GND |
| 9 | PD7 | 22 | GND |
| 10 | ACK- | 23 | GND |
| 11 | BUSY | 24 | GND |
| 12 | PE | 25 | GND |
| 13 | SLCT | 26 | NC |

J21: COM4 (Optional: TTL)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | DCD4 | 2 | RXD4 |
| 3 | TXD4 | 4 | DTR4 |
| 5 | GND | 6 | DSR4 |
| 7 | RTS4 | 8 | CTS4 |
| 9 | RI4 | 10 | NC |

J22: PC104 Connector – 64pin

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | IOCHCHK * | 2 | GND |
| 3 | SD7 | 4 | RESETDRV |
| 5 | SD6 | 6 | VCC |
| 7 | SD5 | 8 | IRQ9 |
| 9 | SD4 | 10 | -5V |
| 11 | SD3 | 12 | DRQ2 |
| 13 | SD2 | 14 | -12V |
| 15 | SD1 | 16 | OWS |
| 17 | SD0 | 18 | +12V |
| 19 | IOCHRDY | 20 | GND |
| 21 | AEN | 22 | SMEMW * |
| 23 | SA19 | 24 | SMEMR * |
| 25 | SA18 | 26 | IOW * |
| 27 | SA17 | 28 | IOR * |
| 29 | SA16 | 30 | DACK3 * |
| 31 | SA15 | 32 | DRQ3 |
| 33 | SA14 | 34 | DACK1 * |
| 35 | SA13 | 36 | DRQ1 |
| 37 | SA12 | 38 | REFRESH * |
| 39 | SA11 | 40 | SYSCLK |
| 41 | SA10 | 42 | IRQ7 |
| 43 | SA9 | 44 | IRQ6 |
| 45 | SA8 | 46 | IRQ5 |
| 47 | SA7 | 48 | IRQ4 |
| 49 | SA6 | 50 | IRQ3 |
| 51 | SA5 | 52 | DACK2 * |
| 53 | SA4 | 54 | TC |
| 55 | SA3 | 56 | BALE |
| 57 | SA2 | 58 | VCC |
| 59 | SA1 | 60 | OSC |
| 61 | SA0 | 62 | GND |
| 63 | GND | 64 | GND |

J24: PC104 Connector – 40pin

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | GND | 2 | GND |
| 3 | MEMCS16 * | 4 | SBHE * |
| 5 | IOCS16 * | 6 | SA23 |
| 7 | IRQ10 | 8 | SA22 |
| 9 | IRQ11 | 10 | SA21 |
| 11 | IRQ12 | 12 | SA20 |
| 13 | IRQ15 | 14 | SA19 |
| 15 | IRQ14 | 16 | SA18 |
| 17 | DACK0 * | 18 | SA17 |
| 19 | DRQ0 | 20 | MEMR * |
| 21 | DACK5 * | 22 | MEMW * |
| 23 | DRQ5 | 24 | SD8 |
| 25 | DACK6 * | 26 | SD9 |
| 27 | DRQ6 | 28 | SD10 |
| 29 | DACK7 * | 30 | SD11 |
| 31 | DRQ7 | 32 | SD12 |
| 33 | VCC | 34 | SD13 |
| 35 | MASTER * | 36 | SD14 |
| 37 | GND | 38 | SD15 |
| 39 | GND | 40 | NC |

J26: 4P Power Source (Interconnect to PC/104 – J22)

| Pin # | Signal Name |
|-------|-------------|
| 1 | -5V |
| 2 | -12V |
| 3 | +12V |
| 4 | GND |

J27: PC/104 + (Optional)

VI/O setting: +5V only

If you need to use VI/O as +3.3V, please use VDX-6324-FD-Plus

| Pin # | A | B | C | D |
|-------|-----------|-----------|-----------|-----------|
| 1 | GND | NC | +5V | AD00 |
| 2 | VI/O(+5V) | AD02 | AD01 | +5V |
| 3 | AD05 | GND | AD04 | AD03 |
| 4 | C/BE0# | AD07 | GND | AD06 |
| 5 | GND | AD09 | AD08 | GND |
| 6 | AD11 | VI/O(+5V) | AD10 | GND |
| 7 | AD14 | AD13 | GND | AD12 |
| 8 | +3.3V | C/BE1# | AD15 | +3.3V |
| 9 | SERR# | GND | NC | PAR |
| 10 | GND | PERR# | +3.3V | NC |
| 11 | STOP# | +3.3V | LOCK# | GND |
| 12 | +3.3V | TRDY# | GND | DEVSEL# |
| 13 | FRAME# | GND | IRDY# | +3.3V |
| 14 | GND | AD16 | +3.3V | C/BE2# |
| 15 | AD18 | +3.3V | AD17 | GND |
| 16 | AD21 | AD20 | GND | AD19 |
| 17 | +3.3V | AD23 | AD22 | +3.3V |
| 18 | IDSEL0 | GND | IDSEL1 | IDSEL2 |
| 19 | AD24 | C/BE3# | VI/O(+5V) | IDSEL3 |
| 20 | GND | AD26 | AD25 | GND |
| 21 | AD29 | +5V | AD28 | AD27 |
| 22 | +5V | AD30 | GND | AD31 |
| 23 | REQ0# | GND | REQ1# | VI/O(+5V) |
| 24 | GND | REQ2# | +5V | GNT0# |
| 25 | GNT1# | VI/O(+5V) | GNT2# | GND |
| 26 | +5V | CLK0 | GND | CLK1 |
| 27 | CLK2 | +5V | CLK3 | GND |
| 28 | GND | INTD# | +5V | RST# |
| 29 | +12V | INTA# | INTB# | INTC# |
| 30 | -12V | NC | NC | GND |

J28: VGA (D-Sub connector)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | R OUT | 2 | G OUT |
| 3 | B OUT | 4 | NC |
| 5 | GND | 6 | GND |
| 7 | GND | 8 | GND |
| 9 | VCC | 10 | GND |
| 11 | NC | 12 | DDCDAT |
| 13 | HSYNC | 14 | VSYNC |
| 15 | DDCCLK | | |

J29: LCD Connector

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | +3.3V | 2 | +3.3V |
| 3 | LG2 | 4 | LG3 |
| 5 | LG4 | 6 | LG5 |
| 7 | NC | 8 | NC |
| 9 | LR0 | 10 | LR1 |
| 11 | LR2 | 12 | LR3 |
| 13 | LR4 | 14 | LR5 |
| 15 | GND | 16 | NC |
| 17 | NC | 18 | NC |
| 19 | NC | 20 | GND |
| 21 | NC | 22 | NC |
| 23 | LB0 | 24 | LB1 |
| 25 | LB2 | 26 | LB3 |
| 27 | LB4 | 28 | LB5 |
| 29 | NC | 30 | NC |
| 31 | LG0 | 32 | LG1 |
| 33 | GND | 34 | GND |
| 35 | NC | 36 | LCLK |
| 37 | NC | 38 | LDE |
| 39 | NC | 40 | LHSYNC |
| 41 | NC | 42 | LVSYNC |
| 43 | LBACKL | 44 | LVDDEN |

(Please refer to Appendix A, for TFT Flat Panel Data Output)

J30~J35: Display type setup (CRT /LCD)

| Connector | Pin # | Signal Name |
|-----------|-------|-------------|
| J30 | 1 | VCC |
| | 2 | GPIOA |
| | 3 | GND |
| J31 | 1 | VCC |
| | 2 | GPIOB |
| | 3 | GND |
| J32 | 1 | VCC |
| | 2 | GPIOC |
| | 3 | GND |
| J33 | 1 | VCC |
| | 2 | GPIOD |
| | 3 | GND |
| J34 | 1 | VCC |
| | 2 | GPIOE |
| | 3 | GND |
| J35 | 1 | VCC |
| | 2 | GPIOF |
| | 3 | GND |

[\(Please refer to Appendix D, for Display type setup\)](#)

J36: LAN

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

J37: LINE OUT (Optional)

| Pin # | Signal Name |
|-------|-------------|
| 1 | LOUTR |
| 2 | GND |
| 3 | GND |
| 4 | LOUTL |

J38: MIC-IN (Optional)

| Pin # | Signal Name |
|-------|-------------|
| 1 | MICVREF |
| 2 | GND |
| 3 | GND |
| 4 | MIC-IN |

J39: JTAG Disable (Default setting Pin 1 & Pin 2 short)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|--------------|
| 1 | GND | 2 | JTAG Disable |

J41: Console Redirection (Optional: Pin 1 & Pin 2 short)

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | Console_Red | 2 | GND |

2.5 System Mapping

System Mapping

Memory Mapping

| Address | Description | Usage |
|---------------------|----------------------------------------|-------|
| 0000:0000-9000:FFFF | System RAM | * |
| A000:0000-A000:FFFF | EGA/VGA Video Memory | * |
| B000:0000-B000:7FFF | MDA RAM, Hercules graphics display RAM | * |
| B000:8000-B000:FFFF | CGA display RAM | * |
| C000:0000-C000:7FFF | EGA/VGA BIOS ROM | * |
| C000:8000-C000:FFFF | Boot ROM enable. | * |
| D000:0000-D000:FFFF | Expansion ROM space. | |
| E000:0000-E000:FFFF | USB Legacy SCSI ROM space. | * |
| F000:0000-F000:FFFF | Motherboard BIOS | * |

I/O Mapping

| I/O Address | Owner | Usage |
|---------------|----------------------------------|-------|
| 0000h - 000Fh | DMA 8237-1 | * |
| 0010h - 0017h | COM 9 | * |
| 0018h - 001Fh | Empty | |
| 0020h - 0021h | PIC 8259-1 | * |
| 0022h - 0023h | 6117D configuration port | * |
| 0024h - 002Dh | Empty | |
| 002Eh - 002Fh | Forward to LPC BUS | * |
| 0030h - 003Fh | Empty | |
| 0040h - 0043h | Timer counter 8254 | * |
| 0044h - 0047h | Empty | |
| 0048h - 004Bh | PWM counter 8254 | * |
| 004Ch - 004Dh | Empty | |
| 004Eh - 004Fh | Forward to LPC BUS | * |
| 0050h - 005Fh | Empty | |
| 0060h | Keyboard data port | * |
| 0061h | Port B + NMI control port | * |
| 0062h - 0063h | 8051 download 4K address counter | * |
| 0064h | Keyboard status port | * |
| 0065h | WatchDog0 reload counter | * |

| | | |
|---------------|--------------------------------------------------------------------------|---|
| 0066h | 8051 download 8bit data port | * |
| 0067h | WatchDog1 reload counter | * |
| 0068h - 006Dh | WatchDog1 control register | * |
| 006Eh - 006Fh | Empty | |
| 0070h - 0071h | CMOS RAM port | * |
| 0072h - 0075h | MTBF counter | * |
| 0076h - 0077h | Empty | |
| 0078h - 007Ch | GPIO port 0,1,2,3,4 default setup | * |
| 007Dh - 007Fh | Empty | |
| 0080h - 008Fh | DMA page register | * |
| 0090h - 0091h | Empty | |
| 0092h | System control register | * |
| 0093h - 0097h | Empty | |
| 0098h - 009Ch | GPIO direction control | * |
| 00A0h - 00A1h | PIC 8259-2 | * |
| 00A2h - 00BFh | Empty | |
| 00C0h - 00DFh | DMA 8237-2 | * |
| 00E0h - 00FFh | Empty | |
| 0100h - 0101h | GPCS1 default setting address | * |
| 0170h - 0177h | IDE1 (IRQ 15) | |
| 01F0h - 01F7h | IDE0 (IRQ 14) | * |
| 0220h - 0227h | COM8 Forward to LPC BUS | |
| 0228h - 022Fh | COM7 Forward to LPC BUS | |
| 0238h - 023Fh | COM6 Forward to LPC BUS | |
| 0278h - 027Fh | Printer port (IRQ 7, DMA 0) | * |
| 02E8h - 02EFh | COM4 (IRQ 11) | * |
| 02F8h - 02FFh | COM2 (IRQ 3) | * |
| 0338h - 033Fh | COM5 Forward to LPC BUS | |
| 0376h | IDE1 ATAPI device control write only register | * |
| 03E8h - 03Efh | COM3 (IRQ 10) | * |
| 03F0h - 03F7h | Floppy Disk (IRQ 6, DMA 2) | |
| 03F6h | IDE0 ATAPI device control write only register | * |
| 03F8h - 03FFh | COM1 (IRQ 4) | * |
| 0480h - 048Fh | DMA High page register | * |
| 0490h - 0499h | Instruction counter register | * |
| 04D0h - 04D1h | 8259 Edge,/ level control register | * |
| 0CF8h - 0CFFh | PCI configuration port | * |
| D400h - D4FFh | on board LAN | * |
| FC00h - FC05h | SPI Flash BIOS control register | * |
| FC08h - FC0Dh | External SPI BUS control register (output pin configurable GPIO3[0-3]) | * |

| IRQ Mapping | | |
|--------------------|----------------------------|--------------|
| IRQ# | Description | Usage |
| IRQ0 | System Timer | * |
| IRQ1 | Keyboard Controller | * |
| IRQ2 | Cascade for IRQ8 - 15 | |
| IRQ3 | Serial Port 2 | * |
| IRQ4 | Serial Port 1 | * |
| IRQ5 | USB / Ethernet 10/100M LAN | * |
| IRQ6 | USB | * |
| IRQ7 | Parallel Port | * |
| IRQ8 | Real Time Clock | * |
| IRQ9 | Serial Port 9 | * |
| IRQ10 | Serial Port 3 | * |
| IRQ11 | Serial Port 4 | * |
| IRQ12 | Mouse | * |
| IRQ13 | Math Coprocessor | * |
| IRQ14 | Hard Disk Controller#1 | * |
| IRQ15 | USB | * |

| DMA Mapping | | |
|--------------------|------------------------|--------------|
| DMA# | Description | Usage |
| DMA0 | | |
| DMA1 | | |
| DMA2 | Floppy Disk Controller | |
| DMA3 | | |
| DMA5 | | |
| DMA6 | | |
| DMA7 | | |

2.6 Watchdog Timer

There are two watchdog timers in Vortex86SX/DX CPU. One is compatible with M6117D watchdog timer and the other is new. The M6117D compatible watchdog timer is called WDT0 and new one is called WDT1.

We also provide DOS, Linux and WinCE example for your reference. For more technical support, please visit: <http://www.dmp.com.tw/tech> or download the PDF file:

<http://www.dmp.com.tw/tech/vortex86dx/>

2.7 GPIO (General Purpose Input / Output)

40 GPIO pins are provided by the Vortex86SX/DX for general usage in the system. All GPIO pins are independent and can be configured as inputs or outputs, with or without pull-up/pull-down resistors.

We also offer DOS, Linux and WinCE example for your reference. For more technical support, please visit: <http://www.dmp.com.tw/tech> or download the PDF file: <http://www.dmp.com.tw/tech/vortex86dx/>

2.8 SPI flash (Serial Peripheral Interface)

As SPI Flash (Serial Peripheral Interface) offers many benefits including: reduced controller pin count, smaller and simpler PCBs, reduced switching noise, less power consumption, and lower system cost

Many of users may consider using a formatted SPI flash to boot for the system or emulate SPI flash as Floppy (A: Driver or B: Driver). Then you must know how to set for this condition in CMOS Setup and boot up under DOS 6.22, X-DOS, DR-DOS and Free DOS.

For more technical support, please visit: <http://www.dmp.com.tw/tech> or download the PDF file: <http://www.dmp.com.tw/tech/vortex86dx/>

2.9 PWM (Pulse-width modulation)

Pulse-width modulation (PWM) of a signal or power source involves the modulation of its duty cycle, to either convey information over a communications channel or control the amount of power sent to a load.

The popular applications of pulse width modulation are in speed control of electric motors, volume control of Class D audio amplifiers or brightness control of light sources and many other power electronics applications.

The Vortex86DX SoC integrated 32 channels of PWM interface enabling the Automation, robotic industry to a New Age x86 SoC platform and we also offer the sample code of PWM which will guide the engineer to control the PWM functionality smoothly.

For more inquire of this sample code that please contact our sales team or mail to:

info@icop.com.tw

3.0 IDE to SD (Micro-SD)

Vortex86DX SoC also built-in simulation circuit to adapt SD to IDE in order to allow your system to recognize Micro-SD card as C: or D: Driver

SD-1917: 44 pins IDE to SD Adapter is an ideal solution for industrial PC or embedded system and 44 pins IDE to SD Adapter can be easily installed on all Vortex86DX-63xx CPU boards. You or your customers just do the BIOS setting and use SD-1917 to connect IDE connector of Vortex86DX-63xx directly.

For further inquiries of SD-1917, please contact ICOP sales team or mail to: info@icop.com.tw for your request.

<BIOS setting>

- Get into the BIOS setup Utility
- Choose Primary IDE Pin Select: SD card
- Press "F10" to Save configuration changes and exit setup

SD-1917



SD-1917: <http://www.icop.com.tw/pddetail.aspx?id=125&pid=4>

Chapter 3

Driver Installation

VGA

The Vortex86DX processor also use external Display chip “Volari™ Z9s” which is an ultra low powered graphics chipset with total power consumption at around 1-1.5 W. It is capable in providing VGA display output upto 1600x1200. With DVO interface, developers could easily connect flat Panel to support TFT and LVDS output.

LAN

The Vortex86DX processor also 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.

The controller supports: Half / Full-Duplex Ethernet function to double channel bandwidth, auto media detection.

Operating system support

The Vortex86DX-6324 ISA CPU board supports Embedded software: Free DOS, DOS 6.22, PC DOS 7.1, DR-DOS, x-DOS, OS/2, Windows CE 6.0, Windows 98, Windows XP Professional, Windows Embedded standard (XPE) and Windows 2000 (SP4).

Please get the drivers from the Driver CD which attached with the standard packing of Vortex86DX-6324 board or please get it from DMP official website:

<http://www.dmp.com.tw/tech/vortex86dx/>

Vortex86DX-6324 also supports most of the popular Linux distributions, for more detail information, please visit DMP official website: <http://www.dmp.com.tw/tech/vortex86dx/>

Appendix

A. TFT Flat Panel Data Output

| Vortex86 SX/DX Pin Name | | TFT LCD 18 / 24 Bits |
|----------------------------|-------------|-------------------------|
| 1 | VCC3 (3.3V) | VDD |
| 2 | VCC3 (3.3V) | VDD |
| 3 | LG2 | G2 |
| 4 | LG3 | G3 |
| 5 | LG4 | G4 |
| 6 | LG5 | G5 |
| 7 | NC | / |
| 8 | NC | / |
| 9 | LR0 | R0 |
| 10 | LR1 | R1 |
| 11 | LR2 | R2 |
| 12 | LR3 | R3 |
| 13 | LR4 | R4 |
| 14 | LR5 | R5 |
| 15 | GND | VSS |
| 16 | NC | / |
| 17 | NC | / |
| 18 | NC | / |
| 19 | NC | / |
| 20 | GND | VSS |
| 21 | NC | / |
| 22 | NC | / |
| 23 | LB0 | B0 |
| 24 | LB1 | B1 |
| 25 | LB2 | B2 |
| 26 | LB3 | B3 |
| 27 | LB4 | B4 |
| 28 | LB5 | B5 |
| 29 | NC | / |
| 30 | NC | / |
| 31 | LG0 | G0 |
| 32 | LG1 | G1 |
| 33 | GND | VSS |
| 34 | GND | VSS |
| 35 | NC | / |
| 36 | LCLK | XCLK |
| 37 | NC | / |
| 38 | LDE | DEN |
| 39 | NC | / |
| 40 | LHSYNC | HSYNC |
| 41 | NC | / |
| 42 | LVSYNC | VSYNC |
| 43 | LBACKL | / |
| 44 | LVDDEN | VDDEN |

B. TFT Flat Panel Support List

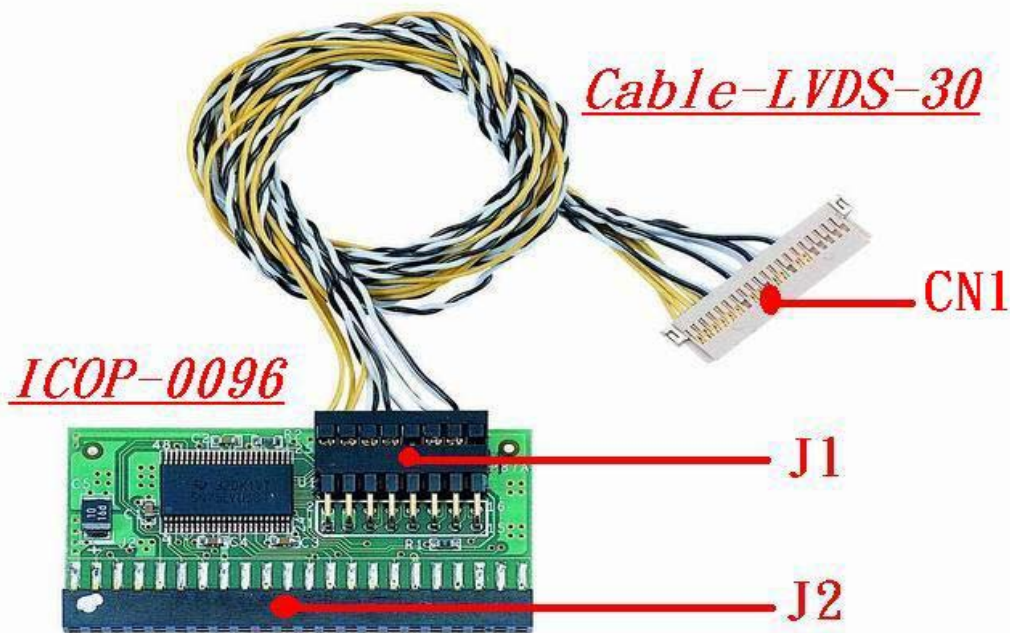
| Size | Brand | Resolution | Model No. |
|------|------------|-----------------------|-----------------------|
| 5.7" | Data image | 320x240 | FG050701DSSWBG01 |
| 5.7" | Optrex | 320x240 | 55264GD057J-FW-ABN |
| 5.7" | TOSHIBA | 320x240 | LTA057A343F |
| 5.7" | Sharp | 320x240 (QVGA / VGA) | LQ057Q3DC02 |
| 5.7" | Kyocera | 320x240 (QVGA / VGA) | TCG057QV1AC-G10 |
| 5.7" | PVI | 320x240 (QVGA / VGA) | PD057VU4 /U5 |
| 5.7" | Data image | 640x480 | FG050710DSSWJG01/DG01 |
| 5.7" | Ampire | 640x480 | AM-640480GTMQW-T00H |
| 5.7" | URT | 640x480 | UMSH-8004MD-T |
| 5.7" | Sharp | 640x480 | LQ057V3DG01 |
| 5.7" | CPT | 640x480 | CLAA057VA01 |
| 6.4" | PVI | 640x480 | V16C6448AC |
| 6.4" | LG-PHILIPS | 640x480 | LB064V02 |
| 6.4" | PVI | 640x480 | PD064VT2 /VT4 /VT5 |
| 6.4" | Sharp | 640x480 | LQ064V3DG01 |
| 7" | AUO | 800x480 | C070VW02V0 |
| 7" | Data image | 800x480 | FG0700A0DSSWBG01 |
| 7" | LG-PHILIPS | 800x480 (TFT 24 bits) | LB070WV1 |
| 7" | HITACHI | 800x480 | TX18D57VM2BAA |
| 7" | Samsung | 800x480 | LMS700KF05 |
| 7" | PVI | 800x480 | PM070WL4 |
| 7" | URT | 800x480 | UMSH-8173MD-1T |
| 8" | Sharp | 640x480 | LQ080V3DG01 |
| 8" | AUO | 800x600 (TFT 24bits) | A080SN01 V0 |

C. LVDS Flat Panel Support List

If you would like to use LVDS Flat Panel with Vortex86SX / Vortex86DX series, please contact our regional sales to get ICOP-0096 information or visit ICOP website:

<http://www.icop.com.tw/pddetail.aspx?id=65&pid=4>

ICOP-0096: 18-bit TFT to LVDS converter and Cable-LVDS-30: LVDS Cable 30cm



Approved LVDS Flat Panel List

| Size | Brand | Resolution | Model No. |
|-------|-------|------------|---------------|
| 3.5" | PVI | 640x480 | PD035VL1 |
| 5" | PVI | 640x480 | PD050VL1 |
| 6.5" | AUO | 640x480 | G065VN01 |
| 8.4" | AUO | 800x600 | G084SN03 |
| 8.9" | AUO | 1024x600 | A089SW01 |
| 8.9" | CPT | 1024x600 | CLAA089NA0ACW |
| 10.4" | AUO | 800x600 | G104SN02 |
| 12.1" | AUO | 800x600 | G121SN01 |
| 15" | AUO | 1024x768 | G150XG01 |

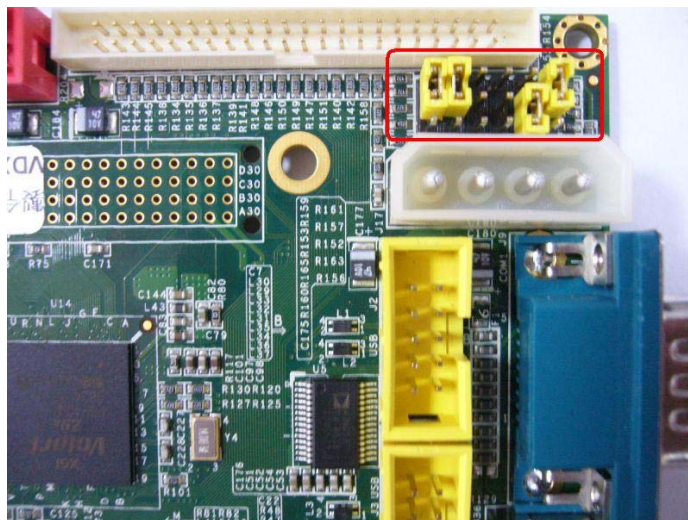
D. Flat Panel Hardware Setting:

The Vortex86DX-6324 offers the Hardware setting for the various TFT LCD Flat Panels support and please make sure the jumper setting (J30~J35) before you connect the LCD.

Display type setup

| Connector | LCD | |
|-----------|-----|-----|
| | 1-2 | 2-3 |
| J30 | | C |
| J31 | | C |
| J32 | X | X |
| J33 | X | X |
| J34 | C | |
| J35 | | C |

Note: "C" means close; "X" means open



E. Flat Panel Wiring and Lighting

■ Hardware

Before you connect the TFT LCD Flat Panel with Vortex86DX-6324, please make sure that the input Voltage of LCD is +3.3V or Not

■ BIOS

Please contact or e-mail our regional sales to get the special BIOS for any TFT LCD Flat Panels.

■ Wiring LCD Cable

Please refer to [Page 19 \(J29: LCD connector\)](#) and [Page 31~36](#). Or for more LCD lighting and integration service, please contact our regional sales or mail to info@icop.com.tw, if you have any questions.

F. TCP/IP library for DOS real mode

DSock is a TCP/IP library for DOS real mode, which is used by RSIP. It provides simple C functions for programmer to write Internet applications. ICOP also provide Internet examples using DSock: BOOTP/DHCP, FTP server, SMTP client/server, HTTP server, TELNET server, Talk client/server, etc.

DSock provides a lot of example source code. Programmer can add Internet functions to their project easily and save development time. With a utility "MakeROM", programmer also can make a ROM image to fit their application, those examples can be seen in the following Application systems: Mity-Mite Serial Server, Web Camera Tiny Server and RSIP Serial Server.

DSock is free for All ICOP products using M6117D/Vortex86/Vortex86SX/Vortex86DX CPU and ICOP also provide the business version of DSock for those customers who are using other x86 CPUs.

If you would like to use DSock or business version of DSock, Please mail to info@icop.com.tw or contact your regional sales.

Please download the trial DSock software and Utilities from our website:

<http://www.dmp.com.tw/tech/dmp-lib/dsock/>

G. 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 to enter the AMI BIOS setup
- Press "F9" to Load Optimized Defaults
- Press "F10" to Save configuration changes and exit setup

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.