

TriGem MVP3 Micro-ATX Motherboard (Delhi-III)

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I. Introduction

The *Delhi-III* Micro ATX motherboard offers a time to market consumer and corporate desktop solution featuring the Pentium(R) processor with 60/66/75/83/95/100MHz front side bus and the MVP3 AGPsets in a Micro ATX low profile motherboards. In addition, the integrated graphics components have been upgraded with the AGP graphics controller and 4 or 8MB of SDRAM.

The Delhi-III motherboard was designed to be highly-minimized system cost . In this effort a smaller form factor, Micro-ATX, gives the greater space economy and more affordable systems. Integrating AGP graphics controller and SDRAM, as well as ISA audio solution onto the motherboard eliminates the need for more expensive graphic and audio add-in cards. The end result is a system platform with a primary component level of integration with translates into affordable solution for entry level users.

1. General description

❑ Motherboard

- Small PCB size in the Micro ATX form factor (ATX V1.2 form factor)
- 227mm * 244mm * 1.6t (4 Layers)

❑ Processor

- Socket 7 (321pin ZIF Socket)
- Intel / AMD / Cyrix / IDT / IBM Pentium compatible processor support
 - Intel P54C (75/90/100/133/166/200) and P55C with MMX (166/200/233)
 - AMD K5 (75/90/100/120/133), K6 (166/200/233/266/300), and K6-2(3D) (233/266/300/333/350)
 - Cyrix 6x86 (120/133/150/166), 6x86MX (166/200/233/266), and M-II(300/333/350)
 - IDT C6 (180/200/225/240/266/300/333)

❑ Main Chipset

- AGPsets PCI/AGP Controller : VIA Apollo MVP3 VT82C598MVP
- PCI bus mastering controller, and Power management interface : VIA VT82C596 or VT82C596A
- Graphics : ATi RAGE-3D IIc with 4 or 8MB SDRAM
- Audio : Crystal CS4235
- Super I/O : Winbond W83877TF
- DC-DC Converter : SC1152
- Clock : IMI SG745BYB (60/66/75/83/90/100MHz host clock support)

❑ Memory Configuration

- System Memory
 - Two banks of 3.3V EDO/SDRAM (168pin unbuffered DIMM) with max 256MB
 - EDO/SDRAM operation in 66MHz front side bus and 100MHz SDRAM with 100MHz FSB.
- Flash Memory : Programmable 2MB Flash memory

❑ I/O Feature

- Integrated standard I/O functions in the rear side
 - One multi-mode parallel port
 - One FIFO serial ports and optional port by header type
 - PS/2 style keyboard and mouse port
 - One USB port
 - Three audio jack for Line input, Speaker output and MIC input
- Integrated standard I/O functions in the front side
 - One Joystick port
 - One USB port

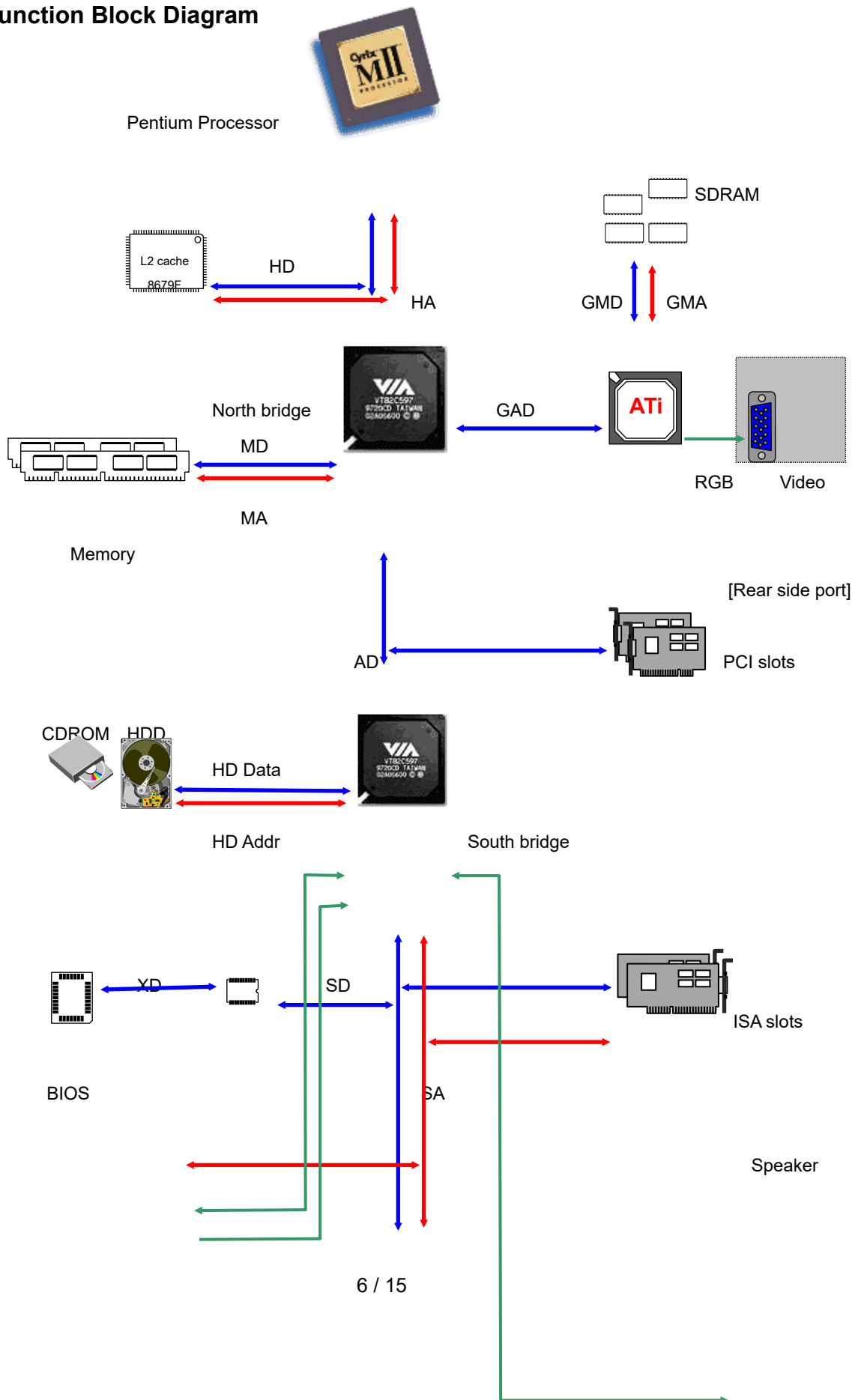
❑ Audio Subsystem

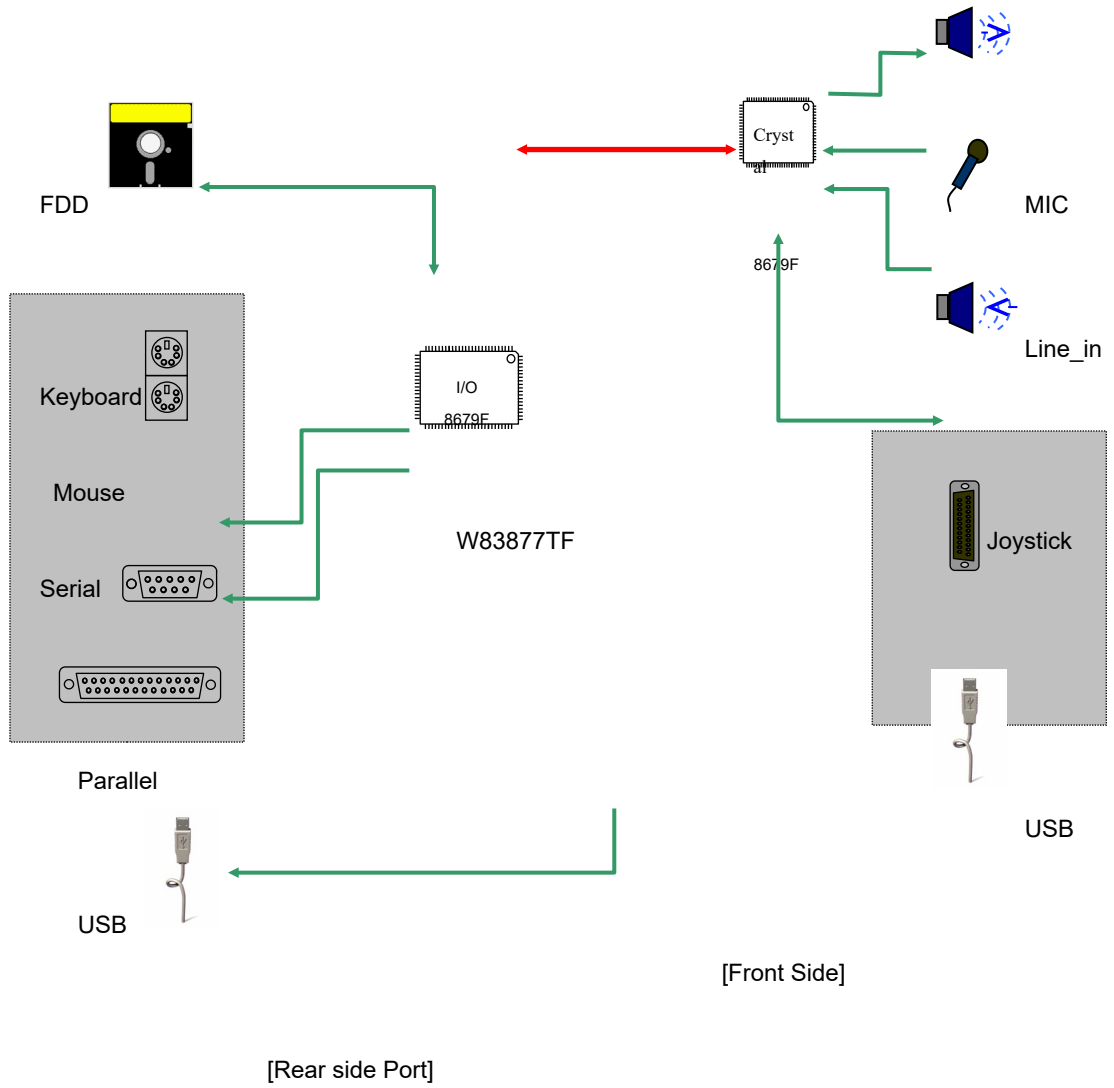
- Crystal CS4235 audio controller with fully plug and play ISA compatible function
- Compatible with sound blaster, sound blaster pro, and window sound system
- Enhanced Stereo full duplex operation
- Advanced MPC3-compatible input and output mixer
- Joystick port and MPU-401 compatible MIDI interface

❑ Graphics Subsystem

- General features
 - Fully PC98 compliant
 - Triple 8-bit palette DAC with gamma correction for true WYSIWYG color
 - DDC1 and DDC2B+ for plug and play monitors
 - Flexible graphics memory configuration : 4MB or 8MB SDRAM
- 2D Acceleration
 - Hardware acceleration of BitBlt, Line Draw, Polygon / Rectangle Fill Masking, Monochrome Expansion, Panning/Scrolling, Scissoring, full ROP support and hardware cursor
 - Acceleration in 8/16/24/32bpp modes.
 - Increased display FIFO from 24 to 32 DWORDS
- 3D Acceleration
 - Hidden surface removal using 16-bit z-buffering
 - Full support for Direct3D texture lighting
 - Dithering support in 16bpp for near 24bpp quality in less memory

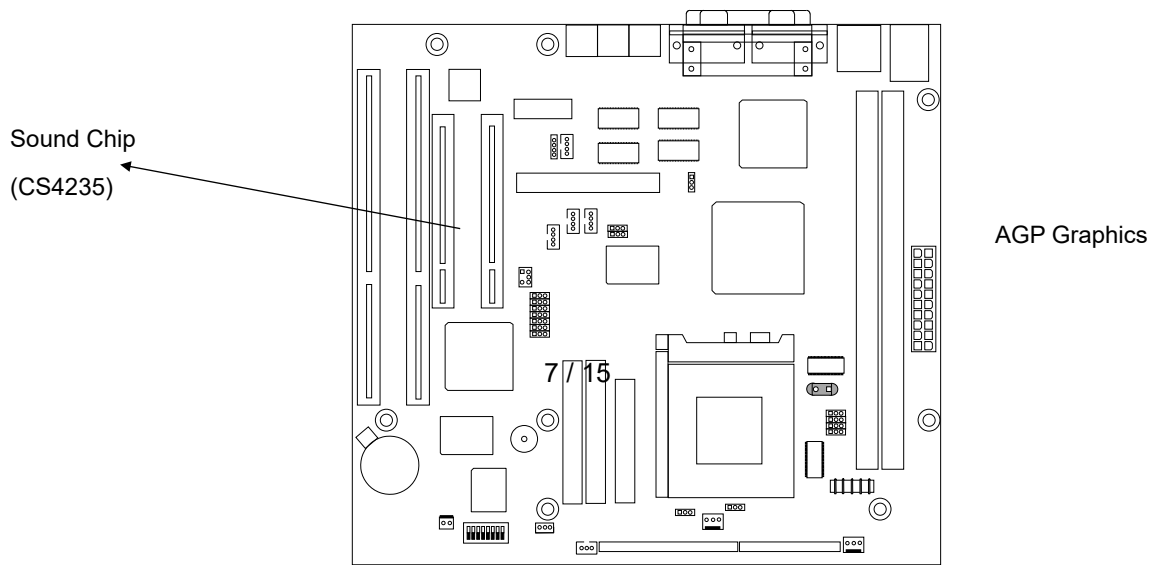
2. Function Block Diagram

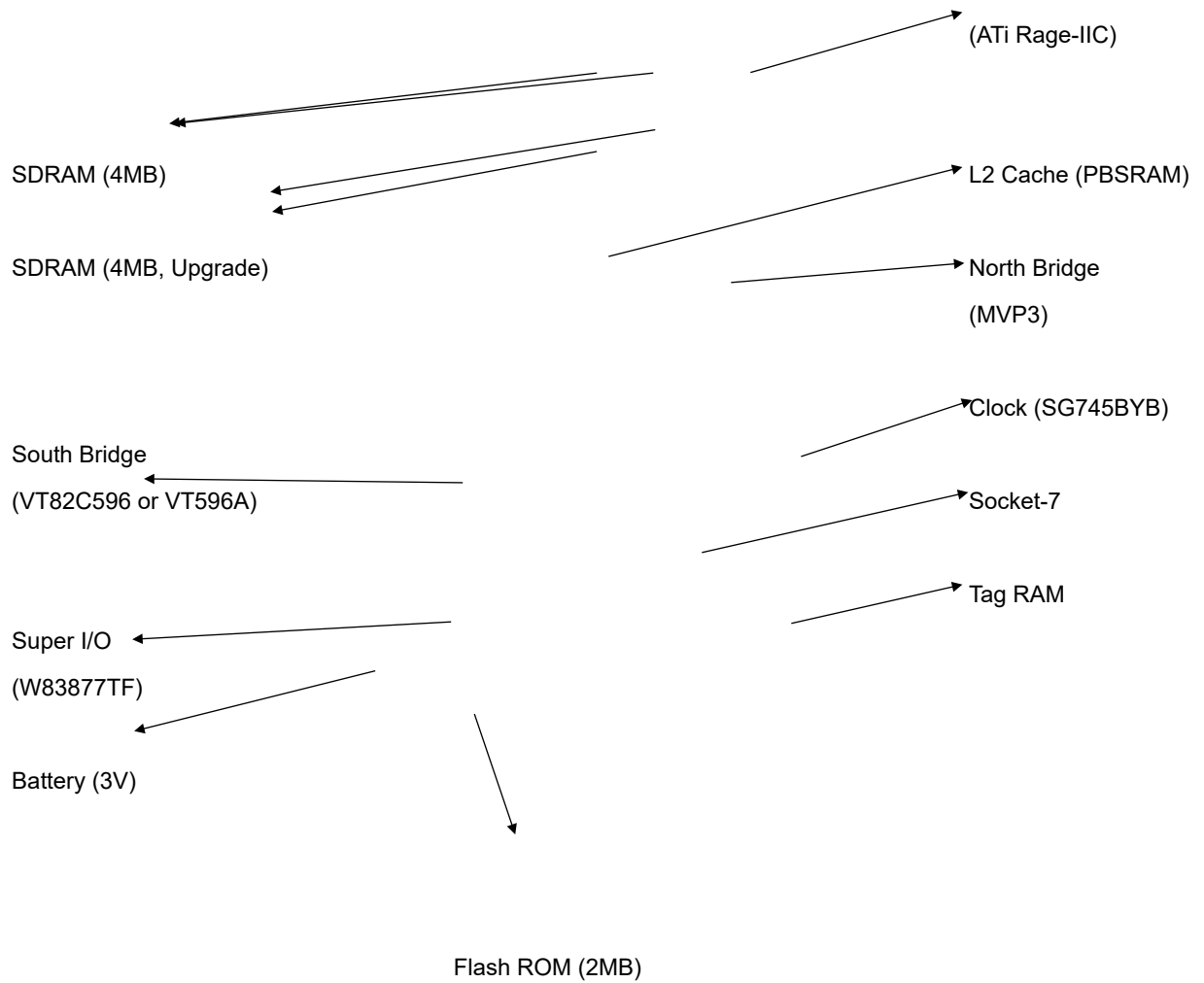




II. System Overview

1. Major Units





2. Upgradeability

2-1. Processor

Delhi-III motherboard provides the 321pin ZIF socket-7 that is backward compatible with ZIF socket-5 processors. The Pentium processor have the variable CoreVCC voltage according to the model and vendor, so the voltage regulator should be designed in the motherboard. SC1152 switching regulator offers the higher efficiency and programmability of output voltage from 2.0V to 3.5V in 100mV increments with the VID pins.

Voltage selection

SC1152 DC-DC converter operates at a fixed frequency of 100KHz, providing an optimum compromise between size, efficiency and cost in the intended application areas. The output voltage can be adjusted in 100mV increment or decrement according to the VID pin status.

Output voltage = minimum 2.0V, 2.1V, 2.2V, 3.2V, 3.3V, 3.4V, maximum 3.5V

Especially the old Pentium processors have to operate in the single power source, so must be carefully adjusted or set within the recommended specification.

Supported Pentium processor group

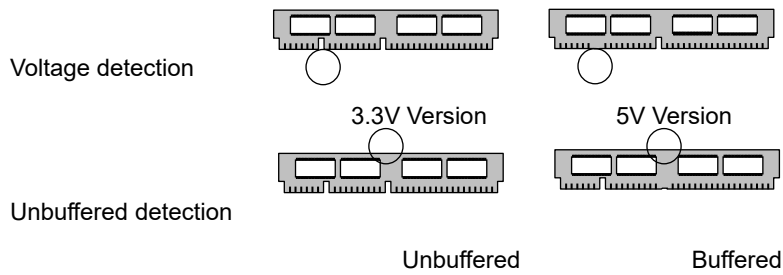
- Intel : P54C and P55C with MMX
- AMD : K5, K6, and K6-2 with 3D Technology
- IBM/Cyrix : 6x86, 6x86MX, and M-II
- IDT : WinChip C6 Processor

2-2. Memory

The motherboard has two, dual inline memory module (DIMM), minimum 16MB to maximum 256MB memory size. The BIOS can automatically detect the memory type, size, and speed through SMBUS interface between the core chipset and DIMM module.

The motherboard supports the following memory features

- 3.3V and unbuffered 168-pin DIMM



- 66MHz and 100MHz unbuffered SDRAM, and also EDO DRAM
- Non-ECC memory and ECC memory support
- Single or double-sided DIMM with the following types

DIMM size	Non-ECC memory	ECC memory
16MB	2Mbit * 64bit	2Mbit * 72bit
32MB	4Mbit * 64bit	4Mbit * 72bit
64MB	8Mbit * 64bit	8Mbit * 72bit
128MB	16Mbit * 64bit	16Mbit * 72bit

2-3 BIOS

The motherboard uses a TriGem-AMI BIOS, which is stored in flash memory and can be upgraded using a disk-based program. A new version of the BIOS can be upgraded from a diskette using the Flash Memory Update utility.

□ Flash memory organization

Address (Hex)	Size	Functional description
FFFF0000 - FFFFFFFF	64KB	Boot block
FFFA0000 - FFFEFFFF	256KB	Main BIOS block
FF9F0000 - FFF9FFFF	8KB	Used by BIOS (Event logging)
FFF9E000 - FFF9EFFF	8KB	OEM logo or can flash area
FFF9C000 - FFF9DFFF	16KB	DMI configuration data, PnP,
FFF90000 - FFF9BFFF	96KB	Fault tolerant storage
FFF80000 - FFF8FFFF	64KB	Fault tolerant backup block

□ On-board device management

The BIOS can manage the devices on the motherboard over the CMOS setup menu. However the built-in AGP graphics controller can be disabled by the corresponding jumper as described Jumper Setting section later.

Device	Description	CMOS setup menu	Default value
Internal Cache	Pentium Processor	Enable / Disable	Enabled
External Cache	64K*64 PBSRAM	Enable / Disable	Enabled
PS/2 Mouse	South Bridge (VT82C596x)	Enable / Disable	Enabled
USB Function	South Bridge (VT82C596x)	Enable / Disable	Enabled
On board Sound	CS4235	Enable / Disable	Enabled
On board FDC	Super I/O (W83877TF)	Auto / Enable / Disable	Auto
On board serial	Super I/O (W83877TF)	Auto / 3F8 / 2F8 / 3E8 / 2E8	Auto
On board parallel	Super I/O (W83877TF)	Auto / Disable / 378 / 278 / 3BC	Auto
On board IDE	South Bridge (VT82C596x)	Disable / Primary / Secondary / Both	Both

2-4. Expansion Slot

The motherboard support ISA, PCI and AGP function. ISA and PCI functions are extended to the additional slot with two ISA and two PCI, and AGP function is designed in the motherboard with AGP graphics controller.

□ PCI configuration space map

Bus number	Device number	Function number	Device
00	00	00	VIA VT82C598MVP (North bridge)
00	01	00	VIA VT82C596x (South bridge)
00	07	00	PCI/ISA bridge (South bridge)
00	07	01	IDE bus master (South bridge)
00	07	02	USB (South bridge)
00	07	03	Power management (South bridge)
01	00	00	ATi Rage IIC graphics controller (AGP)
00	13	00	PCI slot1
00	12	00	PCI slot2

□ PCI interrupt & master number routing map

The VT82C596 PCI/ISA bridge has four programmable interrupt request input signals. Any PCI interrupt source connects to one of these interrupts signals and assigned to the free proper interrupt number by PnP BIOS.

SB INT signals	First PCI slot	Second PCI slot	AGP * graphics	PIIX4e USB device
PIRQA	INTA	INTB	INTA	INTA
PIRQB	INTB	INTC		
PIRQC	INTC	INTD		
PIRQD	INTD	INTA		
Master	REQ0	REQ1		
IDSEL	AD30	AD29	AD18	

❖ Note

Also AGP graphics controller does not use any PCI interrupt in the Delhi-III motherboard, because the interrupt function of AGP graphics controller was designed to disabled status. For more information, please contact the technical support team.

2-5. Advanced Configuration and Power Interface (ACPI)

The motherboard and system BIOS support the ACPI that requires an ACPI-aware operating system such as Windows-NT 5.0 or Windows 98. ACPI feature include

- Plug and play and APM functionality normally contained in the BIOS
- Power management control of individual devices : add-in cards, hard disk drives, USB devices, and Video
- A soft-off feature that enables operating system to power off the computer
- Support for multiple wakeup events
- Indication LED for normal mode (Amber), standby mode (Blinking Amber), and suspend mode (Green) but this function is dependent on the LED logic.

❑ Wakeup devices and events

Wakeup device	Wakeup events and functionality
Power switch	Wakeup from Power-off status and power-off function
LAN	Wakeup from power-off status
Modem	Wakeup from power-off status
Thermal event	Wakeup from power-off status
Sleep button	Wakeup from power-off status and go to suspend mode (option)

2-6. Manufacturing Options

The motherboard has several manufacturing option according to OEM/ODM requirement. Make sure that these options can be applied in the assembly stage, and it's impossible to upgrade or change in the customer field.

Option items	Selectable functionality	Feature changes
Joystick port	Front side / Rear side	Use additional board or not

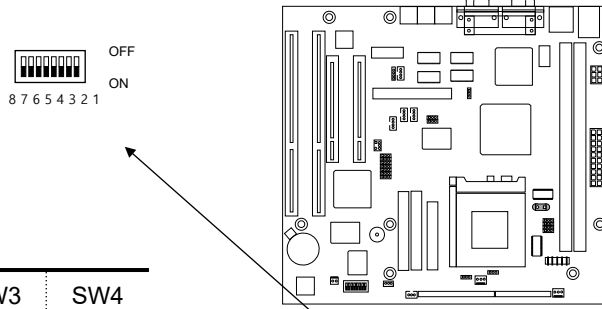
USB port	Front side / Rear side	Use additional board or not
LM78	Installation / No device built-in	H/W sensor on LDCM
Graphics controller	Rage-Ilc / Rage pro	AGP mode (1x or 2x)
Graphics memory	4MB / 8MB	Two / four SDRAM configuration

III. Jumper & Connector Description

1. Motherboard Jumper Setting

1-1. DIP Switch Setting Method

□ CPU CoreVCC set



CoreVCC	SW1	SW2	SW3	SW4
2.2V	OFF	ON	OFF	OFF
2.5V	ON	OFF	ON	OFF
2.7V	ON	ON	ON	OFF
2.8V	OFF	OFF	OFF	ON
2.9V	ON	OFF	OFF	ON
3.2V	OFF	OFF	ON	ON
3.3V	ON	OFF	ON	ON
3.4V	OFF	ON	ON	ON
3.5V	ON	ON	ON	ON

☞ To set the CoreVCC correctly, please refer the CPU specification sheet and set J15 together.

CPU Vendor	CPU Model	CoreVCC	IOVCC	Remarks
Intel	P54C/P54CS	3.5V (VRE)	IOVCC	IOVCC = CoreVCC
		3.4V (STD)	IOVCC	IOVCC = CoreVCC
	P55C-MMX	2.8V	3.3V	
AMD	K5	3.5V (VRE)	IOVCC	IOVCC = CoreVCC
		3.4V (STD)	IOVCC	IOVCC = CoreVCC
	K6-PR233 (0.35um)	3.2V	3.3V	
	K6-166/200 (0.35um)	2.9V	3.3V	
	K6-233/266/300 (0.25um)	2.2V	3.3V	

	K6-2-300/333/350 (0.25um)	2.2V	3.3V	
IBM/Cyrix	6x86	3.5V (VRE)	IOVCC	IOVCC = CoreVCC
	6x86MX	2.9V	3.3V	
	M-II	2.9V	3.3V	
IDT	WinChip C6 (0.35um)	3.5V	IOVCC	IOVCC = CoreVCC
		3.3V	IOVCC	IOVCC = CoreVCC
	WinChip 2-3D (0.25um)	2.8V	3.3V	

Other functionality

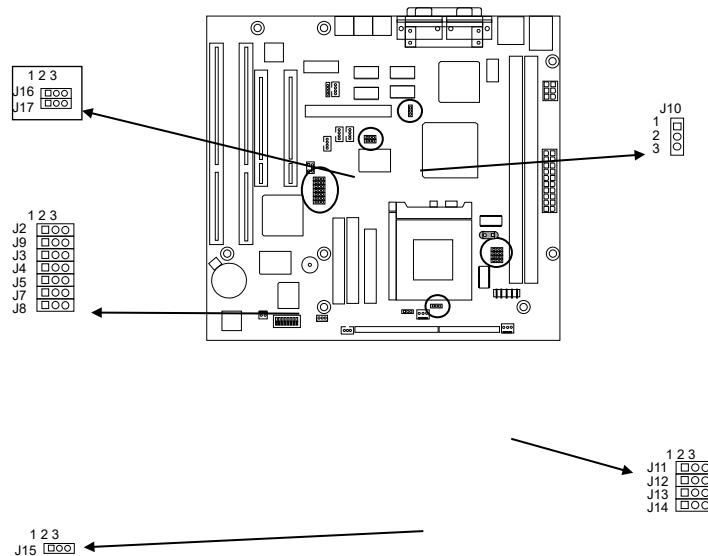
DIP Switch	Function	ON	OFF
SW5	CMOS RAM function	Clear CMOS RAM	Enable write/save
SW6	Password function	Clear password	Enable password
SW7	CMOS setup function	Disable to edit CMOS contents	Enable to edit CMOS contents
SW8	FDD write protect	Disable to write data to Floppy disk	Enable to write data to Floppy disk

1-2. Jumper Setting Method

□ IOVCC set

This jumper is used for set of the CPU voltage like as the CoreVCC set. Mostly the Pentium processor uses two kind of power source - CoreVCC and IOVCC, and the corresponding voltage level should be adjusted as recommended in the CPU specification.

J15	CPU Type
1-2	IOVCC = CoreVCC (single CPU power source)
2-3 (default)	IOVCC = 3.3V (dual CPU power source)



□ AGP graphics device function

This jumper does set the functionality of the built-in AGP graphics controller

J10	AGP device functionality
1-2	Disable AGP graphics controller built in the motherboard
2-3 (default)	Enable AGP graphics controller built in the motherboard

L2 cache functionality

This jumper does set the functionality of L2 cache

J14	L2 cache functionality
1-2 (default)	Interleave mode
2-3	Linear mode

OEM/ODM selector

These jumpers (J7 & J8) will be optional parts for the OEM/ODM logo message selector.

Memory Clock Selector

These jumpers can set the frequency of the DIMM memory (66, 75, 83, 90, and 100MHz)

For the proper operation, these jumpers should be set together.

J16	J17	DIMM Module Frequency Selector	Memory Type
2-3	1-2	66MHz Only	66MHz & 100MHz SDRAM, EDO
1-2	2-3	Depend on CPU clock (66/75/83/90/100MHz)	100MHz SDRAM only

□ CPU frequency set

To set the CPU frequency correctly, the proper combination should be selected in the CPU vendor, type, and the internal speed.

BF0/BF1/BF2 : Set the bus speed ratio of CPU =====> (J11,J12,J13)

FS0/FS1/FS2 : Set the host clock frequency of the clock generator => (J3,J4,J5)

HA26/HA27 : Set the ratio between PCI clock and the host clock => (J2,J9)

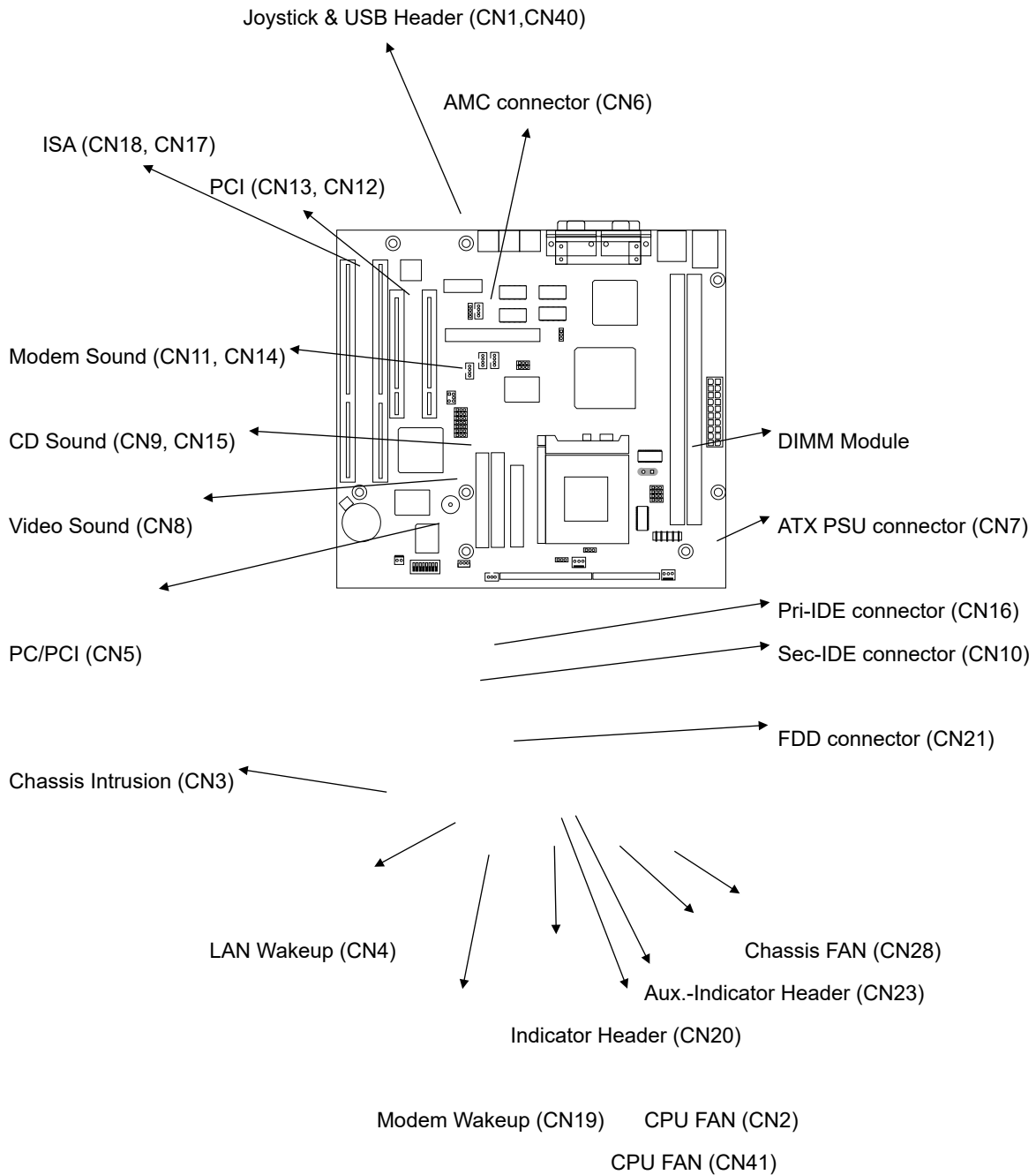
☞ BF0/BF1/BF2 functionality are different with the CPU vendor.

CPU Vendor & Type	Freq.	Bus	Ratio	J3	J4	J5	J2	J9	J11	J12	J13
Intel P54C 90MHz	90	60	1.5x	2-3	2-3	2-3	2-3	2-3	1-2	1-2	1-2
Intel P54C 100MHz	100	66	1.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
Intel P54C 120MHz	120	60	2.0x	2-3	2-3	2-3	2-3	2-3	2-3	1-2	1-2
Intel P54C 133MHz	133	66	2.0x	1-2	2-3	2-3	2-3	2-3	2-3	1-2	1-2
Intel P54C 150MHz	150	60	2.5x	2-3	2-3	2-3	2-3	2-3	2-3	2-3	1-2
Intel P54C 166MHz	166	66	2.5x	1-2	2-3	2-3	2-3	2-3	2-3	2-3	1-2
Intel P55C 166MHz	166	66	2.5x	1-2	2-3	2-3	2-3	2-3	2-3	2-3	1-2
Intel P55C 200MHz	200	66	3.0x	1-2	2-3	2-3	2-3	2-3	1-2	2-3	1-2
Intel P55C 233MHz	233	66	3.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K5 PR90	90	60	1.5x	2-3	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K5 PR100	100	66	1.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K5 PR120	90	60	1.5x	2-3	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K5 PR133	100	66	1.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K6 PR166	166	66	2.5x	1-2	2-3	2-3	2-3	2-3	2-3	2-3	1-2
AMD K6 PR200	200	66	3.0x	1-2	2-3	2-3	2-3	2-3	1-2	2-3	1-2
AMD K6 PR233	233	66	3.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
AMD K6 PR266	266	66	4.0x	1-2	2-3	2-3	2-3	2-3	2-3	1-2	2-3
AMD K6 PR300	300	66	4.5x	1-2	2-3	2-3	2-3	2-3	2-3	2-3	2-3
AMD K6-2 3D PR266	266	66	4.0x	1-2	2-3	2-3	2-3	2-3	2-3	1-2	2-3
AMD K6-2 300-66	300	66	4.5x	1-2	1-2	1-2	1-2	2-3	2-3	2-3	2-3

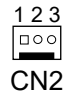
AMD K6-2 333-66	333	66	5.0x	1-2	1-2	1-2	1-2	2-3	1-2	2-3	2-3
AMD K6-2 3D PR300	300	100	3.0x	1-2	1-2	1-2	1-2	2-3	1-2	2-3	1-2
AMD K6-2 3D PR350	350	100	3.5x	1-2	1-2	1-2	1-2	2-3	1-2	1-2	1-2
IBM/Cyrix 6x86 PR150+	120	60	2.0x	2-3	2-3	2-3	2-3	2-3	2-3	1-2	1-2
IBM/Cyrix 6x86 PR166+	133	66	2.0x	1-2	2-3	2-3	2-3	2-3	2-3	1-2	1-2
IBM/Cyrix 6x86MX PR166	150	60	2.5x	2-3	2-3	2-3	2-3	2-3	2-3	2-3	1-2
IBM/Cyrix 6x86MX PR200	166	66	2.5x	1-2	2-3	2-3	2-3	2-3	2-3	2-3	1-2
IBM/Cyrix 6x86MX PR233	200	66	3.0x	1-2	2-3	2-3	2-3	2-3	1-2	2-3	1-2
IBM/Cyrix 6x86MX PR266	210	60	3.5x	2-3	2-3	2-3	2-3	2-3	1-2	1-2	1-2
IBM/Cyrix M-II PR300	233	66	3.5x	1-2	2-3	2-3	2-3	2-3	1-2	1-2	1-2
IBM/Cyrix M-II PR333	250	83	3.0x	1-2	2-3	1-2	1-2	1-2	1-2	2-3	1-2
IBM/Cyrix M-II PR350	270	90	3.0x	1-2	2-3	2-3	1-2	2-3	1-2	2-3	1-2
IBM/Cyrix M-II PR366	262	75	3.5x	2-3	2-3	1-2	1-2	1-2	1-2	1-2	1-2
IDT WinChip C6 180	180	60	3.0x	2-3	2-3	2-3	2-3	2-3	1-2	2-3	1-2
IDT WinChip C6 200	200	66	3.0x	1-2	2-3	2-3	2-3	2-3	1-2	2-3	1-2
IDT WinChip C6 225	225	75	3.0x	2-3	2-3	1-2	1-2	1-2	1-2	2-3	1-2
IDT WinChip C6 240	240	60	4.0x	2-3	2-3	2-3	2-3	2-3	2-3	1-2	2-3
IDT WinChip C6 266	266	66	4.0x	1-2	2-3	2-3	2-3	2-3	2-3	1-2	2-3

2. I/O Header Connector Description

2-1. Motherboard Internal Connector



❑ CPU FAN connector (CN2,CN41)



<i>Pin number</i>	<i>Signal description</i>
1	GND
2	FAN power
3	Tachometer (speed)



<i>Pin number</i>	<i>Signal description</i>
1	GND
2	+12V
3	GND

❑ Chassis FAN connector (CN28)



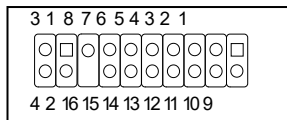
<i>Pin number</i>	<i>Signal description</i>
1	GND
2	FAN control
3	Tachometer (Speed)

- PC/PCI connector (CN5)



<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	/PCGNTA	4	/PCREQA
2	GND	5	N.C
3	Key	6	SER_IRQ

- Joystick connector (CN1,CN40)



<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	VCC	9	VCC
2	GD(4)	10	GD(6)
3	GD(0)	11	GD(2)
4	GND	12	MIDI OUT
5	GND	13	GD(3)
6	GD(1)	14	GD(7)
7	GD(5)	15	MIDI IN
8	VCC	16	Key
1	GND	3	Positive DATA
2	Negative DATA	4	VCC

- Video Sound (CN8)



<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	Left Sound	3	GND
2	GND	4	Right Sound

- Modem Sound (CN11, CN14)



<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	MIC	4	GND
2	GND	5	MONO IN

3	MONO OUT		
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1 2 3 4

 CN11


<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	MONO IN	3	GND
2	GND	4	MIC

□ CD Sound (CN9, CN15)

1 2 3 4

 ATAPI CD (CN9)

<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	Left Sound	3	GND
2	GND	4	Right Sound

1 2 3 4

 Mitsumi CD (CN15)

<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	GND	3	GND
2	Left Sound	4	Right Sound

- LAN Wakeup (CN4)



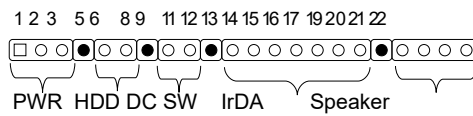
<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	+5VSB	3	LANWK
2	GND		

- Modem Wakeup (CN19)



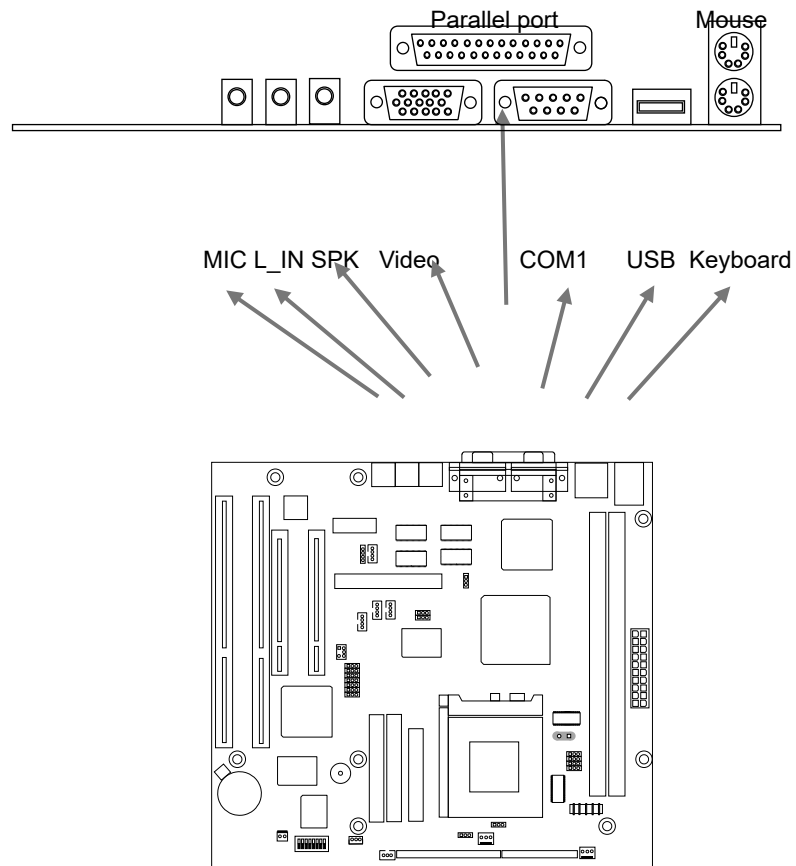
<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	Modem Ring	3	+5VSB
2	GND		

□ Indicator Header (CN20)



<i>Pin</i>	<i>Signal description</i>	<i>Pin</i>	<i>Signal description</i>
1	VCC	12	GND
2	PM indicator signal	13	IRTX
3	GND	14	VCC
4	Key	15	IRSEL
5	VCC	16	N.C
6	HDD access signal	17	GND
7	Key	18	Key
8	Power-ON switch signal	19	VCC
9	GND	20	GND
10	Key	21	N.C
11	IRRX	22	Speaker signal

2-2. Motherboard External I/O Port

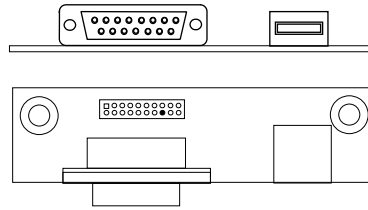


3. Joystick & USB daughter board

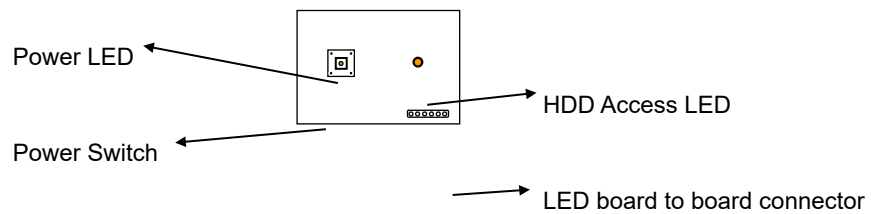
Joystick

USB

20pin Flat Cable



4. LED & Power S/W board



- Power LED color : Green (normal working)
 Blinking Green (power management mode)
- HDD LED color : Green light on (HDD access)
 Light off (no access to HDD device)