TriGem All-in-one Motherboard (**CALGARY**)

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I. Introduction

The ***Calgary*** motherboard is designed only for TriGem' s all-in-one PC to support a special monitor made by KDS. For information regarding the system, please refer to the system documents (Manual). This board is designed to support Intel Celeron PPGA processors and to provide the high performance targeted 3D graphical display –AGP based solution. Also, PCI based audio function with AC-link 97 interface provides a complete high quality audio solution. To expand system integration on the user side, the PCMCIA function supports two independent card sockets - 16-bit PC card specification and 32-bit PC card (CardBus) specification. The NTSC decoding function is provided to connect the game machine/VCR into one composite input port. Also, this board support Audio CD controls in system power off state (Soft-off State). There is a unique connector, which is supporting PCI modem device and Ethernet LAN with HomePNA device. This sub-board is designed to support ACPI specification fully.

1. General description

Motherboard
- Optimized PCB size in mini form factor: 215.0mm(8.5") * 190.0mm(7.6") * 1.6t (6 Layers)
- Both side soldering (Top and bottom)

Processor
- Intel Socket-370 (370pin PPGA Socket)
- Intel Celeron 300A/333/366/400/433MHz processor support

Main Chipset
- AGPsets PCI/AGP Controller: ***Intel 440LX***
- PCI bus mastering controller, and Power management interface: ***Intel PIIX4E***
- Graphics system : ***ATi RAGE-XL*** with 4(32 bit) or 8 MB (64 bit) SDRAM
- Audio system : ***Crystal CS4280*** with AC97 Codec ***(CS4297)***
- Super I/O controller : ***ITE IT8673F***
- PCMCIA controller : ***TI PCI1225***
- NTSC decoder : ***ATi Rage-Theater***
- DC-DC Converter : ***Semtech SC1164***
- Clock Generator : ***ICS9148BF-08*** (66MHz host clock support)

Memory Configuration
- System Memory
  - Built-in 64MB consists of 8 device – 64Mbit 3.3V SDRAM component
  - One 144pin SDRAM SO-DIMM connector is up to 128MB
  - Total Memory Size is up to 192MB
- Flash Memory (BIOS): Programmable 2MB Flash memory

I/O Feature
- Integrated standard I/O functions in the right side
  - One FIFO serial port (COM1)
  - PS/2 styles keyboard and mouse port
  - One vertical USB port
  - One audio jack for Speaker output
- Integrated standard I/O functions in the rear side
  - One multi-mode parallel port by header type
  - One joystick port by header type
- Integrated standard I/O functions in the Mother board
  - One E-IDE connector: for HDD
  - One FDD connector by FFPC type: for slim type 3.5" FDD
  - One CD-ROM connector: for slim type CD-ROM control interface
- Integrated special I/O functions in the Mother board ***for Front Panel interface***
  - Audio CD control interface between MiCOM (in Audio CD control B/D) and CD-ROM
  - Two audio jacks for Headphone & MIC and One USB port
  - Power ON/OFF Button and system state indicator LED (two colors)
  - Three RCA jacks for NTSC-In and Audio In(Left / Right)

Expandability
- Supports PCMCIA Card Type II*2, PCMCIA card Type III*1

- Supports two PCI devices (Soft Modem and Ethernet LAN) by the 80pin connector
  - *-Refer to the **"Ethernet LAN and Soft Modem subsystem**"*

Audio Subsystem
- Crystal CS4280 PCI audio controller with fully DOS Games compatibility
- 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
- PC97 and PC98 compliance
- Audio CD control Features
  - Although computer is in the off state, this system can control Audio CD using the control buttons
  - (located on the front panel)
  - Supports both Power Off mode and Power On mode
  - ***Power Off Mode***: *Controlled between buttons (in the front panel) and CD-ROM*
  - ***Power On Mode (in the Windows 98***): *Controlled between buttons and manager program*

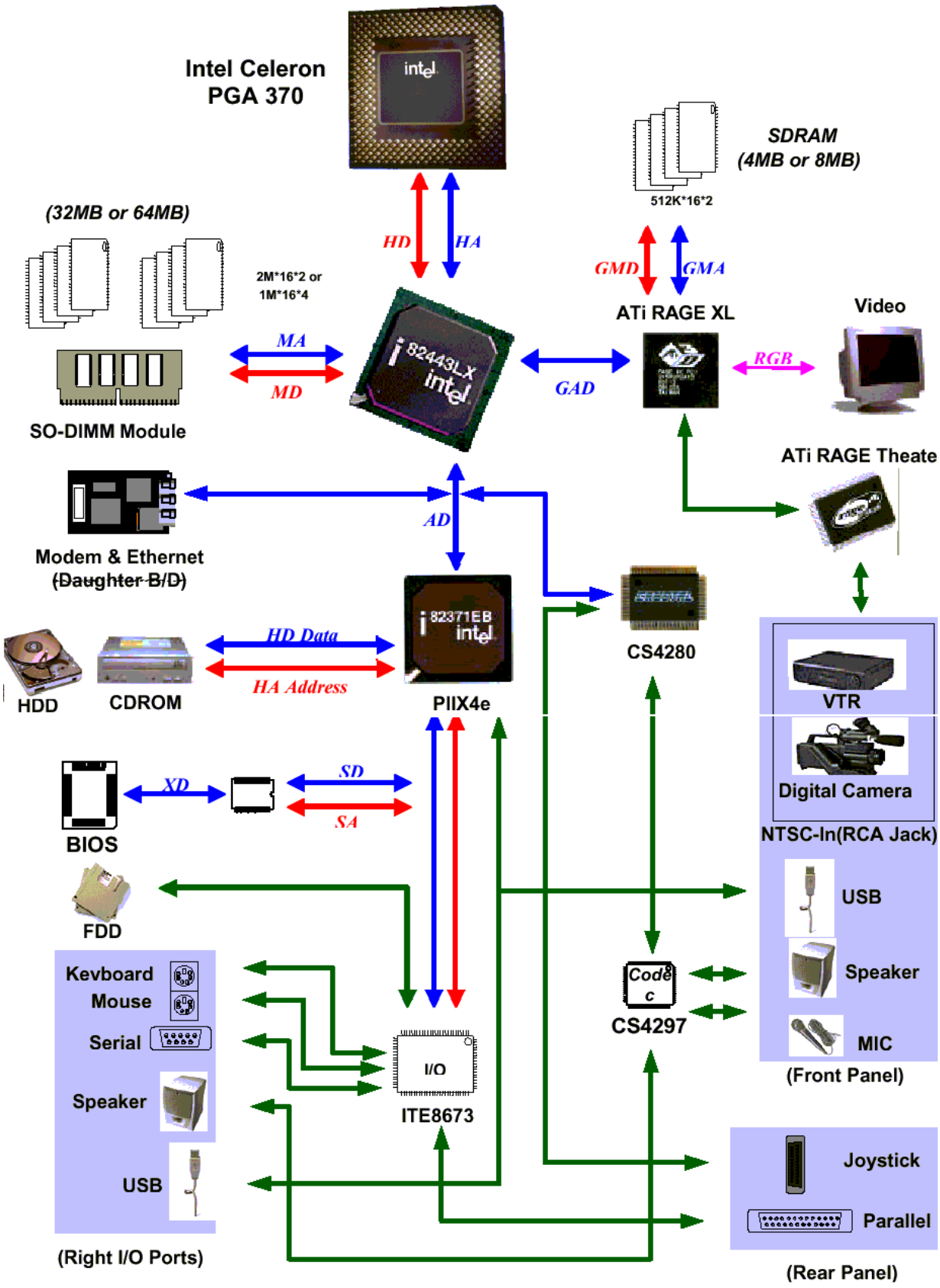
Graphics Subsystem (ATi RAGE XL + ATi Rage Theater)
- General Features
  - Comprehensive AGP support, including 2X mode, side-band addressing and AGP texturing
  - Fully PC98 compliant
  - Triple 8-bit palette DAC with gamma correction for true WYSIWYG color
  - Pixel rates up to 230MHz
  - Flexible graphics memory configuration: 4MB(32-bit) or 8MB(64-bit) SDRAM (Manufacture option)
    Superior 3D acceleration and comprehensive 3D support including a triangle set-up engine, Single-pass tri-linear filtering, six perspectively correct texturing mode, video texturing, Gouraud and specular shading, a host of 3D special effects video enhancements.
- NTSC decoding Features
  - Supports NTSC North America and Japan
  - One Composite input format support
  - Advanced adaptive comb filter for better picture quality
  - Integrated high-quality horizontal and vertical downscalers

PCMCIA Subsystem
- 1997 PC Card standard complaint
- High performance PCI-to-PCI Card controller that supports two independent card sockets
- Two PC Card or CardBus slots with hot insertion and removal
- Any combination of 16-bit and CardBus PC cards in the two socket, powered at 5V or 3.3V
- Not support ZV port protocol

Ethernet LAN with Home PNA Subsystem
- Main Chipset : ***Intel 21145***
- HomePNA Features
- Compliant with the ***HomePNA(****Home Phoneline Networking Alliance)* Specification effort
- Integrates a HomePNA PHY for 1 Mb/s Ethernet-like home networking on telephone lines
- Provides automatic support for dual HomePNA data transfer rates
- Network Side Features
- Supports two network port: 10BASE-T(10 Mb/s) and HomePNA (1 Mb/s)
- Supports autodetection between 10BASE-T and HomePNA
- Provides internal and external loopback capability on all network ports
- Supports IEEE 802.3 and ANSI 8802-3 Ethernet standards

Soft MODEM Subsystem
- Main Chipset : ***PC Tel PCT789T-A***
- Data Modem Features
- Max. Speed : 56Kbps(Down Stream)
- Protocol : K56Flex, V.90, V.34+, V.34, V.32bis, V.32, V.22bis, V.22A/B, V.23, Bell212A, 103
- Fax Modem Features
- Max. Speed : 14.4Kbps
- Protocol : ITU-T V.17, V.29, V.27ter, V.21 ch2

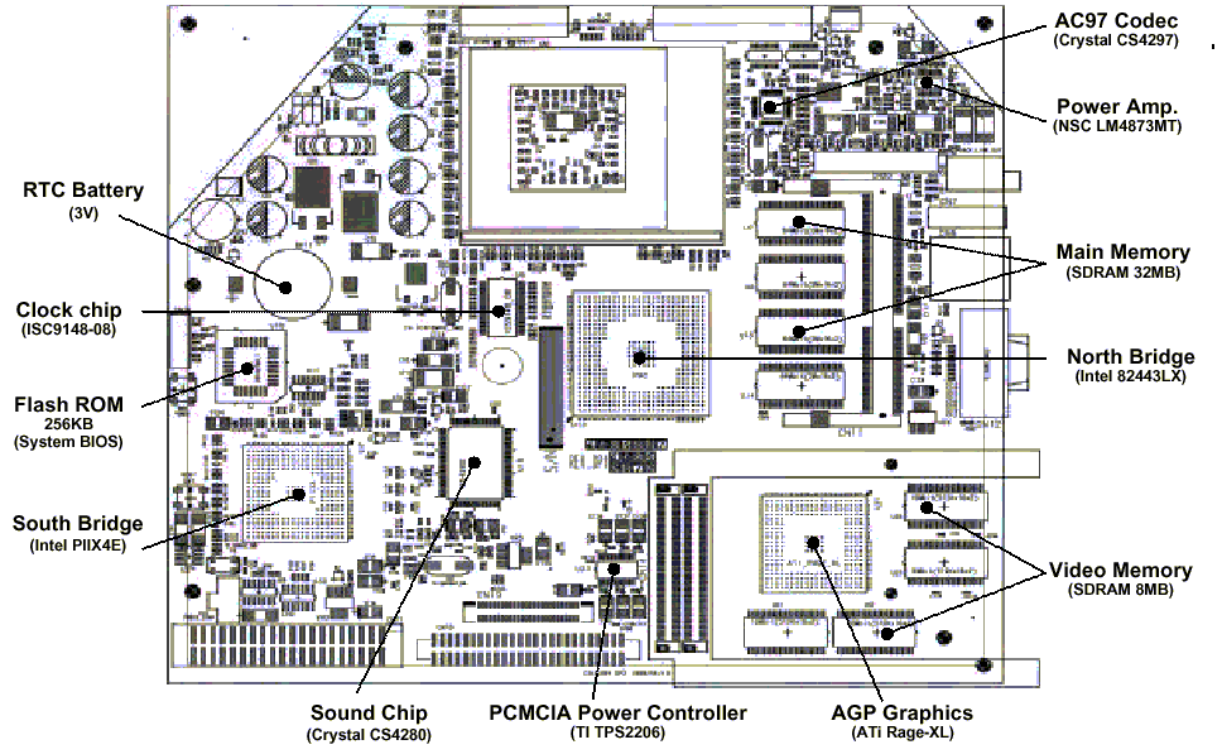
2. Function Block Diagram



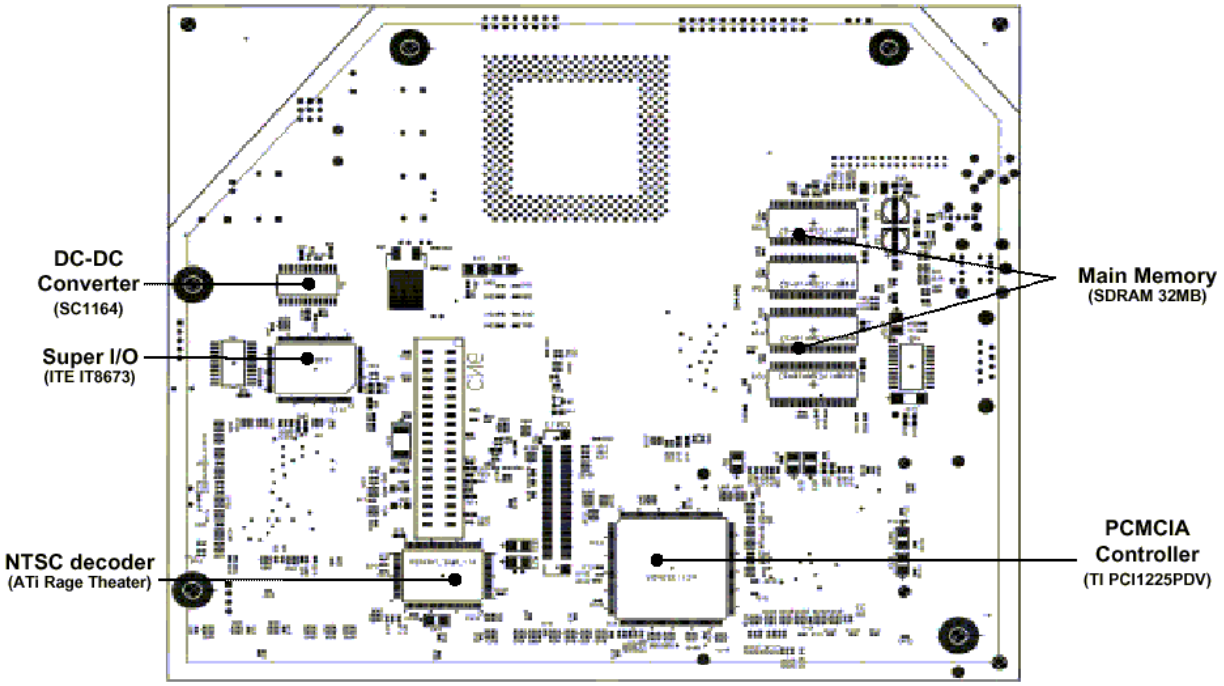
II. System Overview

1. Major Units

1-1. Component (Top) side



1-2. Solder (Bottom) side



2. Upgradeability

2-1. Processor

CALGARY motherboard provides the 370pin PGA370 socket that is not backward compatible with ZIF socket-7 processors The Processor' s VID pin automatically program the voltage regulator on the motherboard to the required processor voltage. The motherboard supports processors that run internally at 300A/333/366/400/433MHz.

Supported Intel Celeron Processors (PPGA Socket Type)
- Intel : Celeron 300AMHz
- : Celeron 333MHz
- : Celeron 366MHz
- : Celeron 400MHz
- : Celeron 433MHz

2-2. Memory

The motherboard has 64MB SDRAM on board and only one dual inline memory module (DIMM). So, minimum 64MB to maximum 192MB-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

- Default 64MB SDRAM on Board
- 3.3V and unbuffered 144-pin SO-DIMM
- Only 66MHz unbuffered SDRAM
- Non-ECC memory support
- Single or double-sided DIMM with the following types

Total size	On Board memory	DIMM memory size	Remarks
32 MB **64MB** **96MB** **160MB**	**1Mbit * 16bit * 4 banks * 4ea** or **2Mbit * 16bit * 2 banks * 4ea**	**None** **32MB** **64MB** **128MB**	**On B/D 32MB** **(Factory Option)**
64MB **96MB** **128MB** **192MB**	**1Mbit * 16bit * 4 banks * 8ea** or **2Mbit * 16bit * 2 banks * 8 ea**	**None** **32MB** **64MB** **128MB**	**On B/D 64MB**

2-3 BIOS

The motherboard uses a TriGem-Phoenix 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
FFFFC000-FFFFFFFF	16KB	Book block
FFFFA000-FFFFBFFF	8KB	ESCD (NVRAM area)
FFFC0000-FFF9FFFF	232KB	Main BIOS block -Video -DMI configuration, PnP Code -ACPI, PM Code

On-board device management

The BIOS can manage the devices on the motherboard over the CMOS setup menu.

Device	Description	CMOS setup menu	Default value
Internal Cache	Celeron PPGA Processor	Enable / Disable	Enabled
PS/2 Mouse	Intel 8237 1EB (PIIX4E)	Enable / Disable / Auto	Auto
USB Function	Intel 8237 1EB (PIIX4E)	Enable / Disable	Enabled
On board LAN	Intel 21145 with HomePNA	Enable / Disable	Enabled
On board FDC	Super I/O (ITE 8673)	Auto / Enable / Disable	Auto
On board serial	Super I/O (ITE 8673)	Auto / Enable / Disable	Auto
On board parallel	Super I/O (ITE 8673)	Auto / Enable / Disable	Auto
On board IDE	Intel 8237 1EB (PIIX4E)	Disable / Enable / Disable / Both	Both

2-4. Expansion Function

The motherboard support ISA, PCI and AGP function. The PCI functions are extended to the additional connector in solder side of PCB with two PCI devices, 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	North Bridge (Intel 82443LX)
00	01	00	South Bridge (PIIX4E)
00	07	00	PCI / ISA bridge (PIIX4E)
00	07	01	IDE / bus master (PIIX4E)
00	07	02	USB (PIIX4E)
00	07	03	Power management (PIIX4E)
01	00	00	Ati Rage XL graphics controller (AGP)
00	13	00	Ethernet with HomePNA (Intel21145)
00	12	00	Software MODEM (PCTEL?)
00	0D	00	PCMCIA Socket-1 (PCI1225)
00	0D	01	PCMCIA Socket-2 (PCI1225)
00	0B	00	PCI Audio (CS4280)

PCI interrupt & master number routing map

Intel 82371EB (PIIX4E) 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.

South Bridge INT signals	Ethernet with HPNA	Software MODEM	AGP graphics	PCMCIA Device	Audio Device	PIIX4E USB Device
PIRQA			INTA		INTA	
PIRQB	INTA					
PIRQC		INTA		INTA		
PIRQD						INTA
Master	REQ1	REQ2		REQ3	REQ0	
IDSEL	AD30	AD29	AD16	AD24	AD22	

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 (Green), standby mode (Amber), and suspend mode (Amber).

But, this logic located in the Monitor MCU part(LED is absent in the motherboard)

Wakeup devices and events

Wakeup device	Wakeup events and functionality
Power switch (ON/OFF mode)	Wakeup from Power-off status and power-off function
Power switch (Suspend / Resume mode)	Wakeup from Power-on status and go to suspend mode
LAN	Wakeup from Power-off status
Modem	Wakeup from Power-off status
Keyboard & Mouse	Wakeup from Power-on status
USB	Wakeup from Power-on status

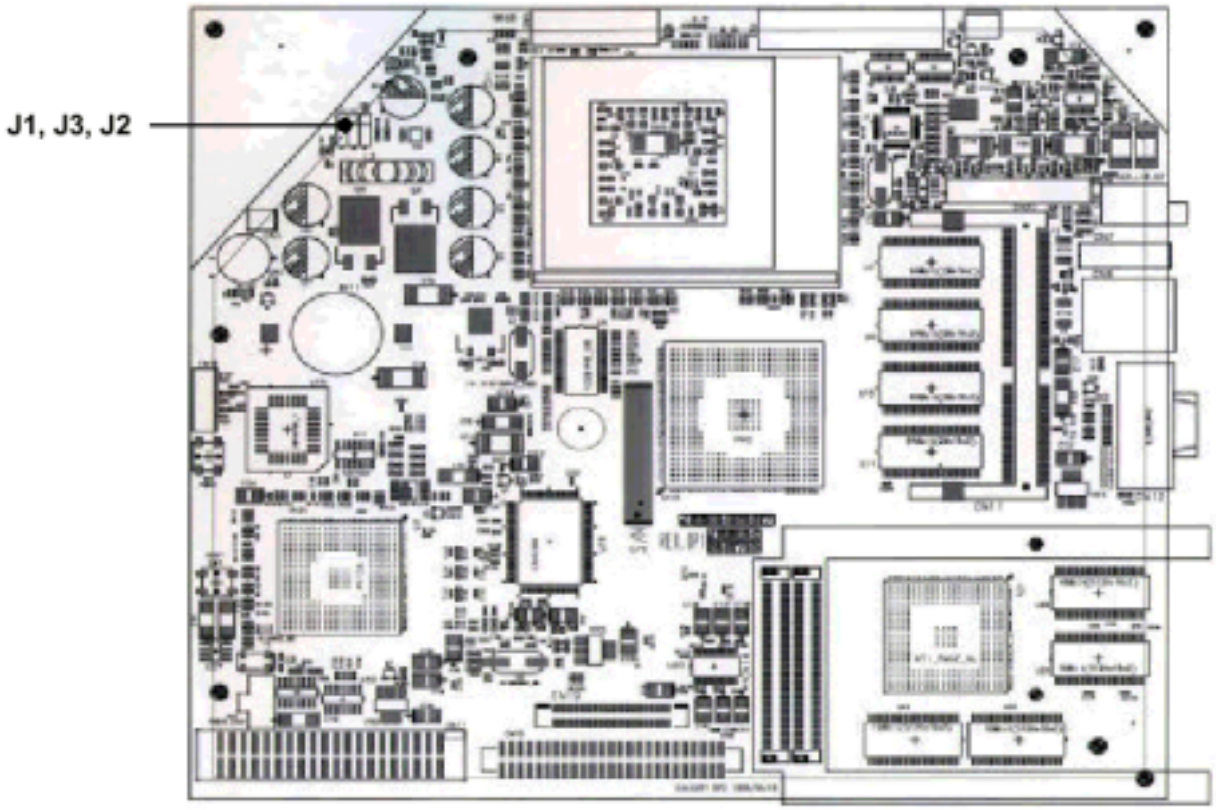
2-6. Manufacturing Options

The motherboard has several manufacturing options according to ***CUSTOMER*** 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
Super I / O	ITE8673 / ITE8693	Include LM79 (for HW Monitoring)
Main memory	32MB / 64MB	Four / eight SDRAM configuration
Graphics memory	4MB / 8MB	Two / four SDRAM configuration

III. Jumper & Connector Description

1. Motherboard Jumper Setting



1-1. Selection for Processor CPU Clock

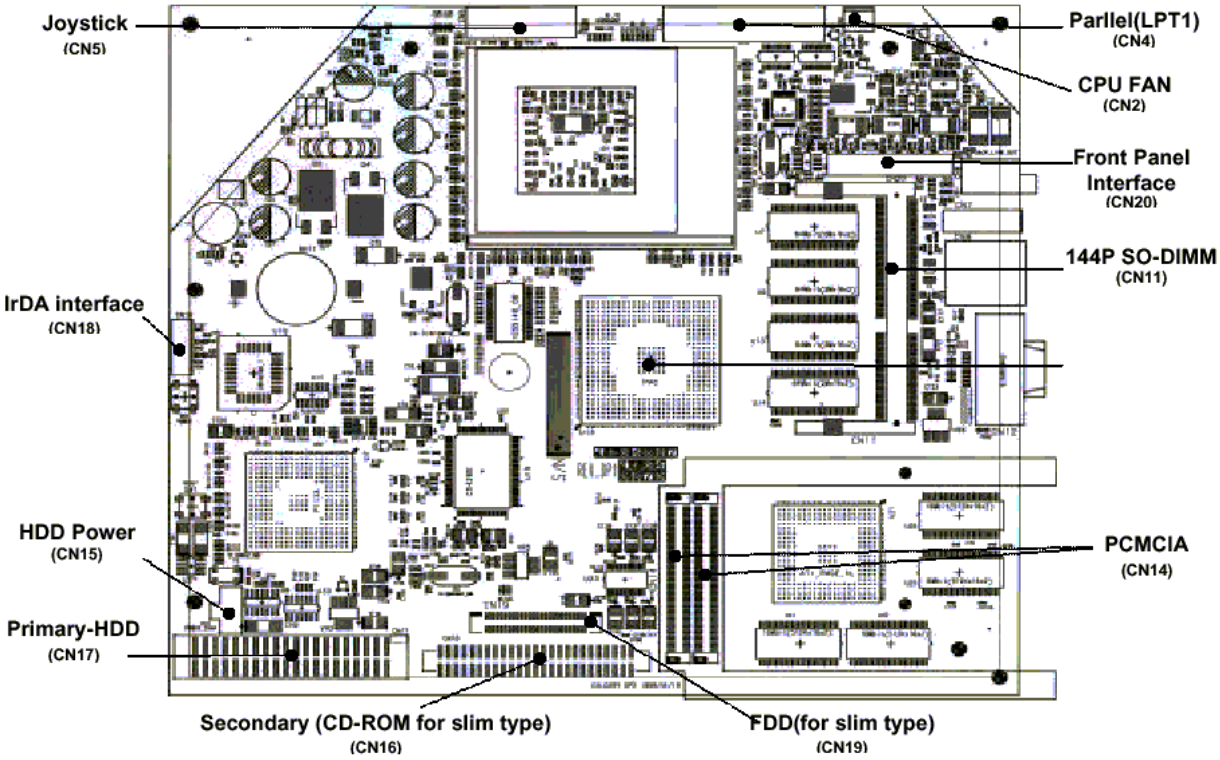
*& **Intel Celeron PPGA Processor is auto set the core to bus frequency ratio.***

Jumper	Function	2-3	1-2 (Default)
J1	Mode select function	Test for Q-spec. Intel CPU only	Normal mode
J2	Password function	Clear password	Enable password
J3	CMOS RAM function	Clear CMOS RAM	Enable write/slave

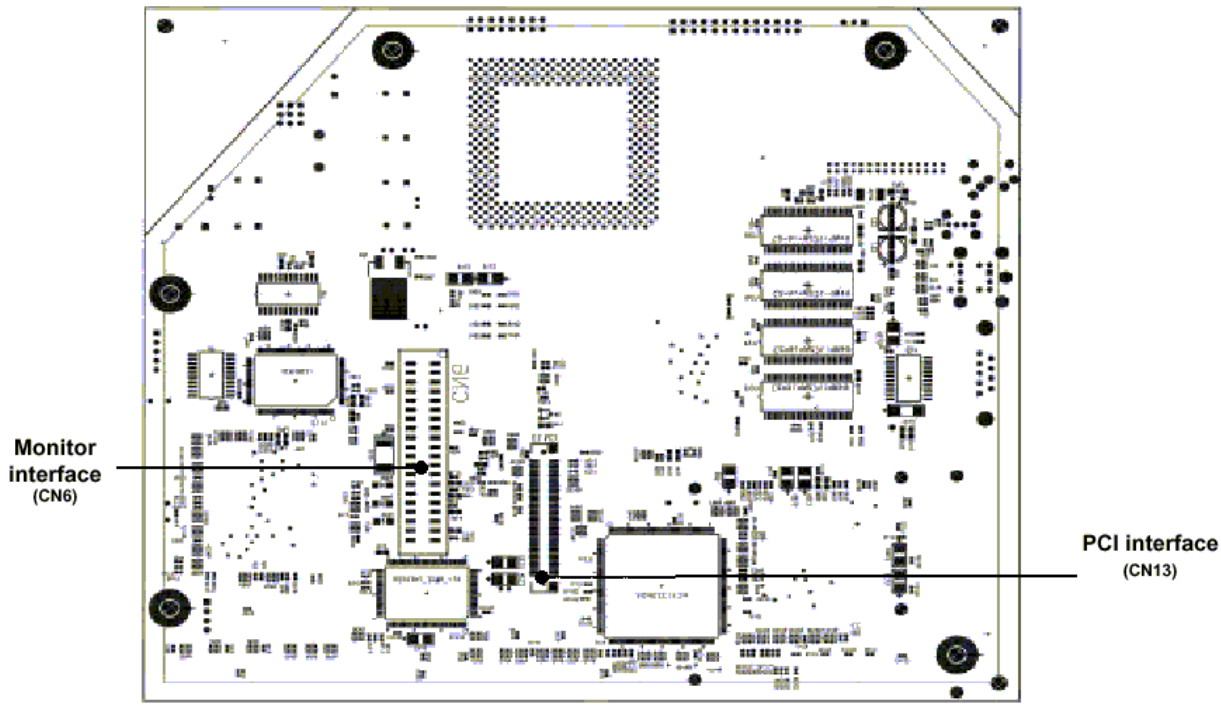
2. I/O Header Connector Description

2-1. Motherboard Internal Connector

2-1-1. Component (Top) side



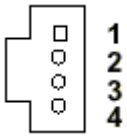
2-1-2. Solder (Bottom) side



CPU Fan connector (CN2)

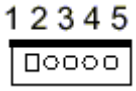
Pin number	Signal description
1	GND
2	Fan power
3	Tachometer (speed)

HDD Power (CN15)



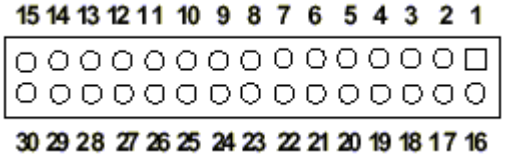
Pin number	Signal description
1	VCC
2	GND
3	GND
4	+12 V

IrDA interface (CN18)



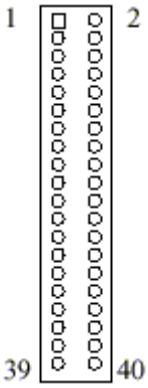
Pin number	Signal description
1	IRRX
2	GND
3	IRTX
4	VCC
5	IR _SEL

Front Panel interface (CN20)



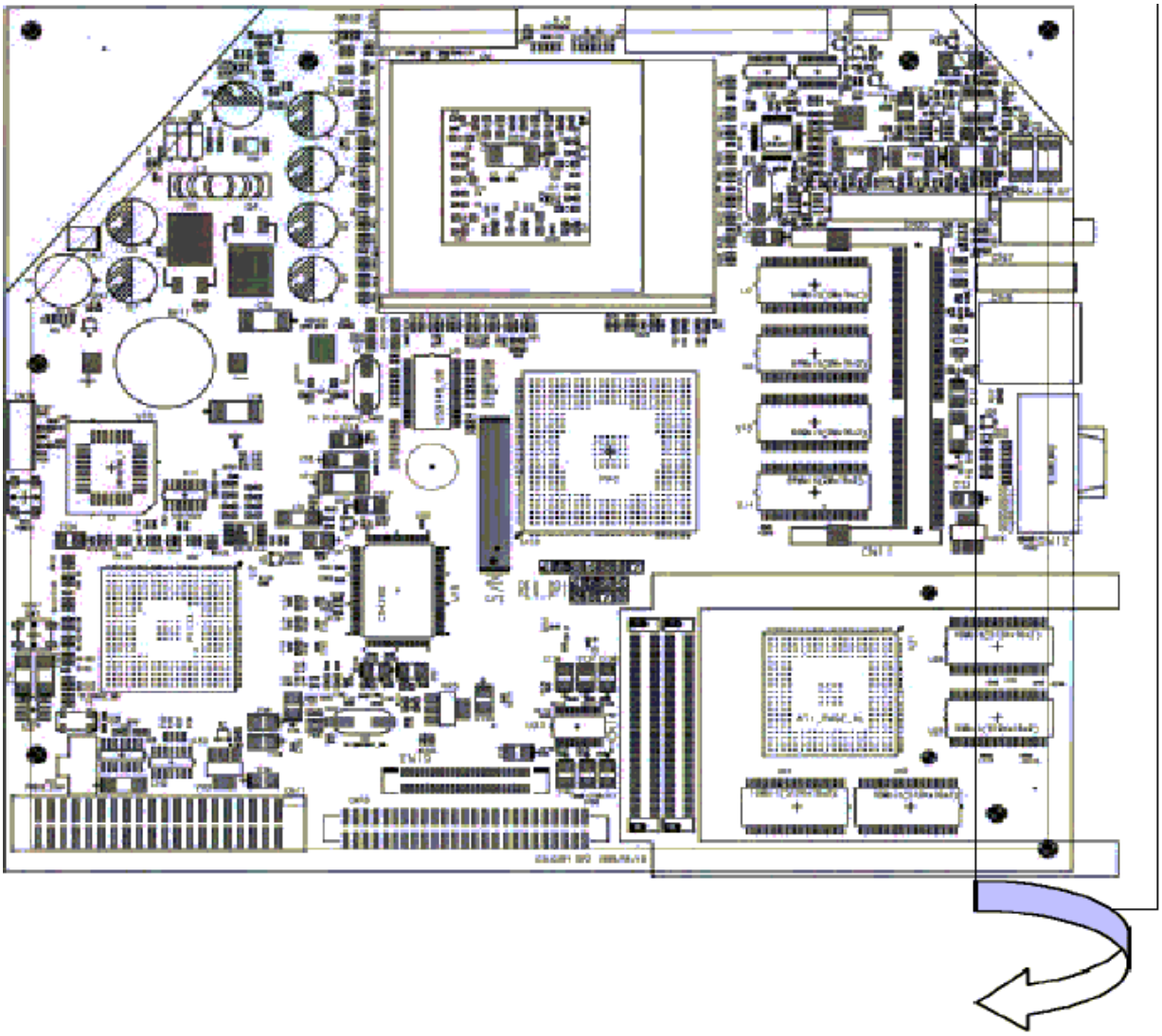
Pin number	Signal description	Pin number	Signal description
1	+5 VSB	16	M_KBCLK
2	GND	17	M_KBDATA
3	CD_TX	18	KBCLK
4	CD_RX	19	KBDATA
5	-SHUTDOWN	20	-PS_ON
6	SPK_L+	21	SPK_R+
7	SPK_L-	22	SPK_R-
8	HEADPHONE-L	23	HEADPHONE-R
9	AGROUND	24	-OC_1
10	HP_IN	25	USB_P1+
11	AGROUND	26	USB_P1+
12	MIC_JACK	27	GND
13	AGROUND	28	PWR_BUTTON
14	RIGHT_RCA_IN	29	AGROUND
15	LEFT_RCA_IN	30	NTSC_IN

Monitor interface (CN6)

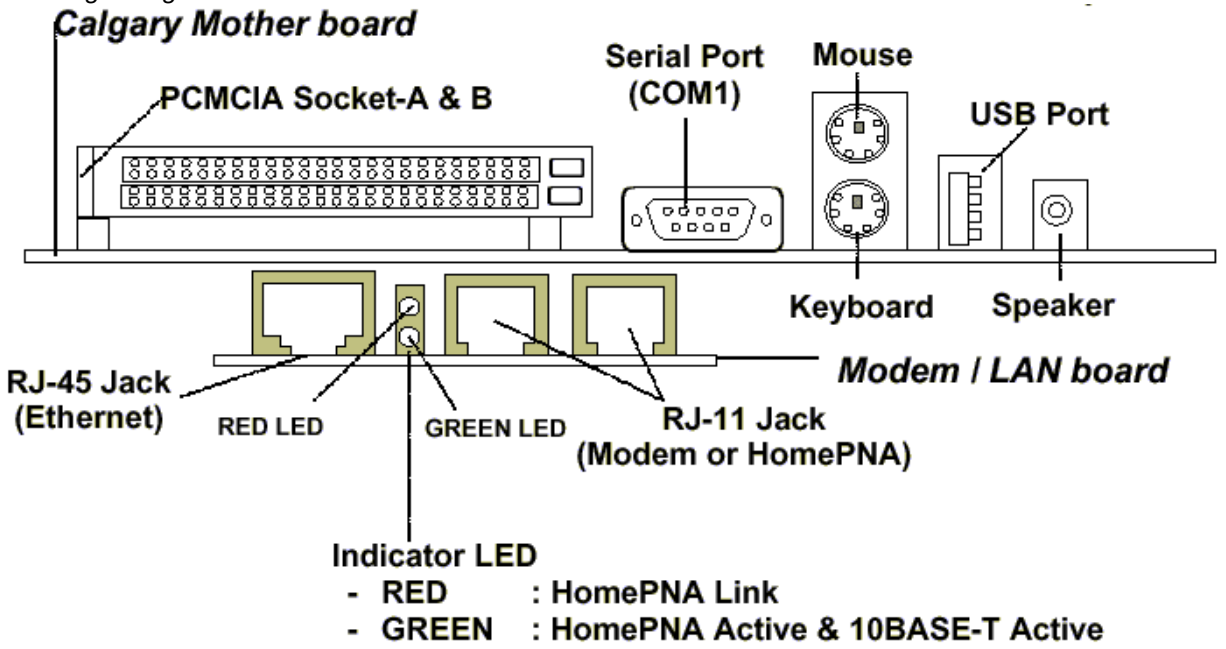


Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	VCC	11	VCC3	21	GND	31	GND
2	VCC	12	VCC3	22	GND	32	V_G
3	VCC	13	VCC3	23	GND	33	-V_HSYNC
4	VCC	14	VCC3	24	GND	34	GND
5	GND	15	GND	25	GND	35	GND
6	GND	16	GND	26	GND	36	V_B
7	-12V	17	-PS_ON	27	DDCDAT	37	-V_VSTNC
8	VCC	18	+5VSB	28	V_R	38	GND
9	GND	19	GND	29	DDCCLK	39	GND
10	GND	20	+12V	30	GND	40	GND

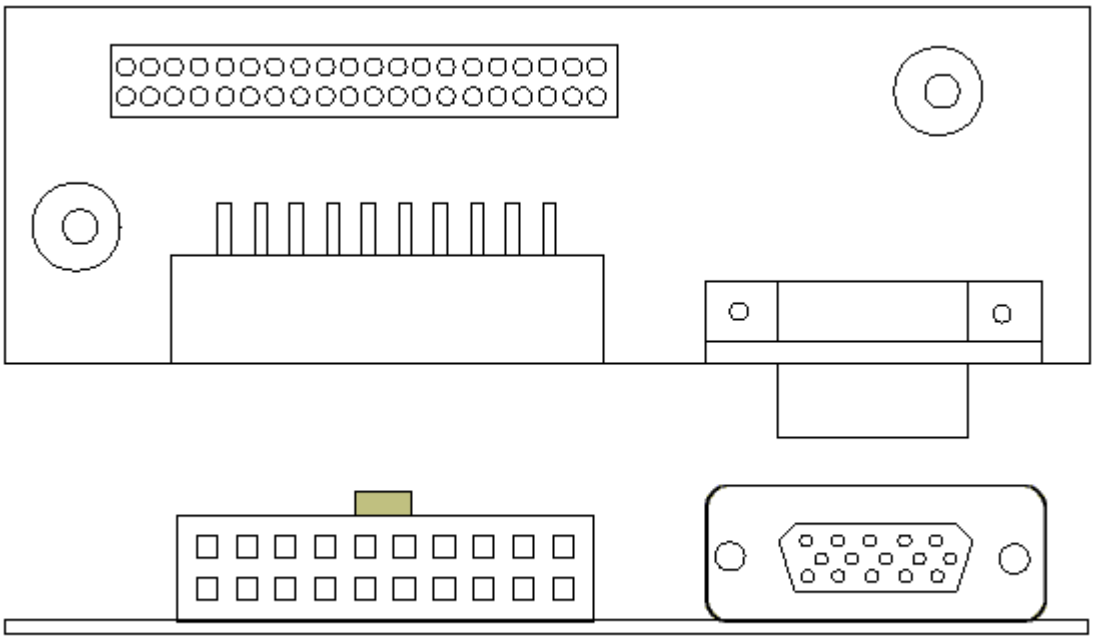
2-2. Motherboard External I/O Port



Drawing of Right-side View



3. Monitor interface daughter board


Power Port
VGA Port