Intel® 852GM Small Form Factor Proof-of-Concept Board

User's Manual

March 2006

Order Number: 309239-002

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Revision History

Date	Revision	Description
March 2006	002	Updated with branding changes.
September 2005	001	Initial release

Product Overview 1

1.1 Introduction

The POC board utilizes the Ultra Low Voltage Intel® Celeron® M or Mobile Intel® Celeron® processor, Intel® 852GM chipset and the Intel® FW82801DB I/O Controller Hub. It is a fanless design which provides higher processing capability with excellent power consumption control. It offers a stable and efficient solution for customer who is seeking a trade-off between high performance and low power consumption. The POC board supports multiple display modes including CRT, LCD, DVI and TV-out. With the dimension of 146 mm X 102 mm, SFF also has the expansion capability through on-board Mini-PCI slot.

1.2 Related Documents

For more information, please contact your Intel local representative.

Table 1. Related Documents

Intel Order Number	Document	Location
251308	Mobile Intel® Celeron® Processor Datasheet	www.intel.com/design/mobile/datashts/251308.htm
300302	Intel® Celeron® M Processor Datasheet	www.intel.com/design/mobile/datashts/300302.htm
252407	Intel® 852GM Chipset (GMCH) Datasheet	www.intel.com/design/mobile/datashts/252407.htm
290744	Intel® 82801DB I/O Controller Hub 4 (ICH4) Datasheet	www.intel.com/design/chipsets/datashts/290744.htm
290745	Intel® 82801DB I/O Controller Hub 4 (ICH4) Specification Update	http://developer.intel.com/design/chipsets/specupdt/290745.htm
252338	Intel® 852GM Chipset Platform Design Guide	www.intel.com/design/mobile/desguide/252338.htm

1.3 Product Contents

The SFF POC board is shipped with the following peripherals and features:

- One SFF POC Board with heat sink
- One IDE cable
- One Keyboard/Mouse cable
- Two USB cables
- One Audio cable
- One COM port cable
- One TV-out and S-terminal cable
- One DVI cable
- One Parallel port cable
- One Jumper cap

1.4 Proof-of-Concept Board Features

The proof-of-concept board features are summarized as below:

System:

- CPU: Onboard Intel® Celeron® M Processor Ultra Low Voltage 600 MHz 512K L2 Cache or Mobile Intel Celeron Processor at 600MHz Processor
- Memory: 200-pin DDR 266MHz SODIMM x 1, Max. 1GB
- Chipset: Intel 852GM chipset + Intel® 82801DB I/O Controller Hub 4 (ICH4)
- I/O Chipset: ITE IT8712F
- Ethernet: Intel® 82562 Fast Ethernet Controller, 10/100Base-TX RJ-45
- BIOS: AWARD 512KB FLASH ROM
- Watchdog Timer: Generate a Time-out System Reset
- SSD: Type II CompactFlash* slot x 1
- Expansion Interface: Type III Mini PCI Socket x 1
- Battery: Lithium battery
- Power Supply Voltage: +5V. AT/ATX
- Board Size: 5.75”(L) x 4”(W) (146mm x 102mm)
- Gross Weight: 0.55lb(0.4kg)
- Operating Temperature: 32ºF~140ºF (0ºC~60ºC)

Display:

- Chip: Intel 852GM chipset + Chrontel 7009
- Memory: Shared System Memory Up to 64 MB with DVMT
- Resolutions: Up to 1280 x 1024 @ 32bpp Colors for CRT and Up to 1280 x 1024 @ 24 bpp Colors for LCD
- TV-Out: Supports NTSC and PAL standard;

I/O:

- Miscellaneous: EIDE x 1(UDMA33 x 1), KB + Mouse x 1, RS-232 x 1, RS-232/422/485 x 1, Parallel x 1
- IrDA: IrDA Tx/Rx Header x 1
- Audio: MIC in, Line in, Line out 5.1 Output
- USB: Two 5 x 2 Pin Headers Support 4 USB 2.0 Ports

1.5 SFF POC Board Block Diagram

Figure 1. SFF POC Board Block Diagram

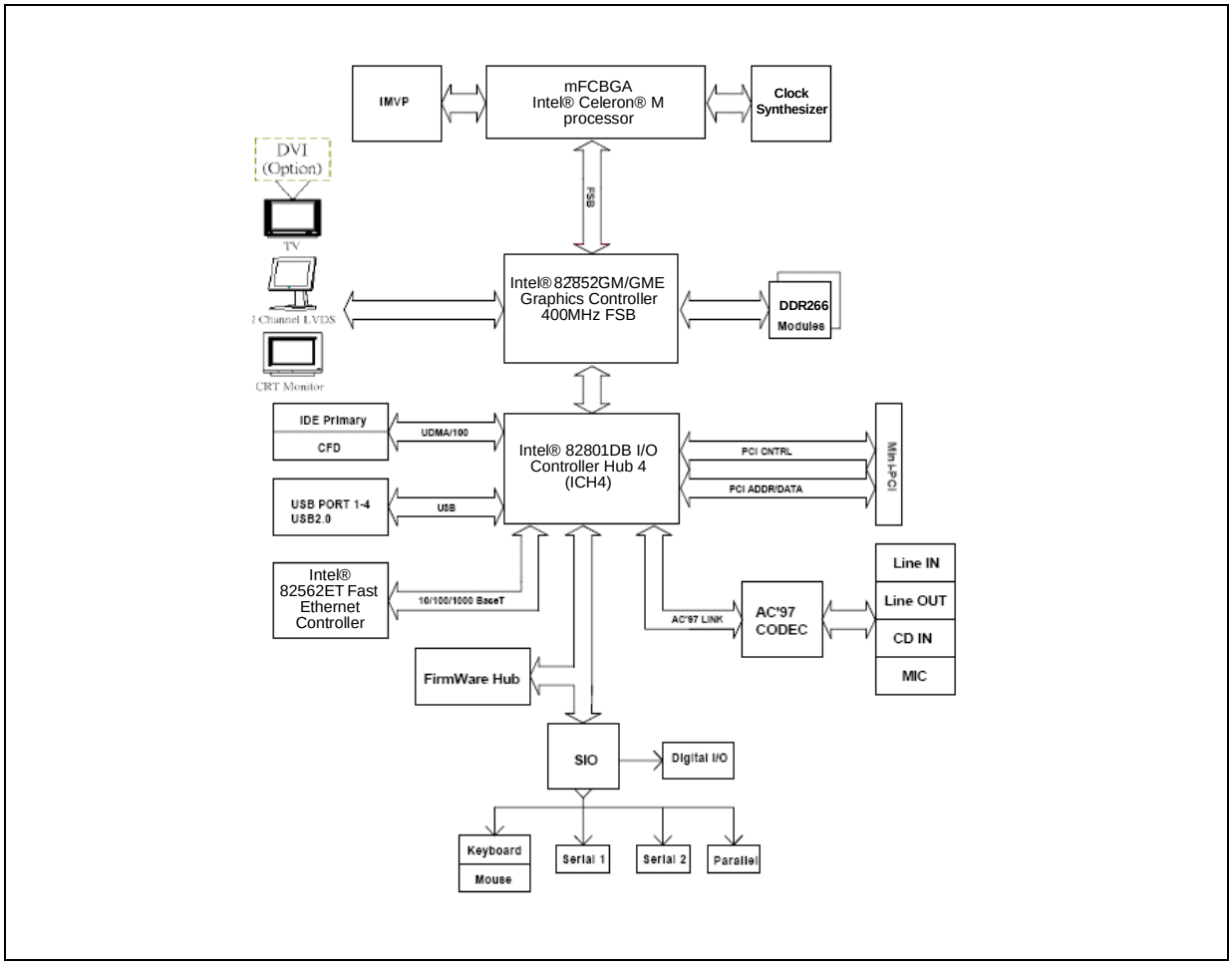
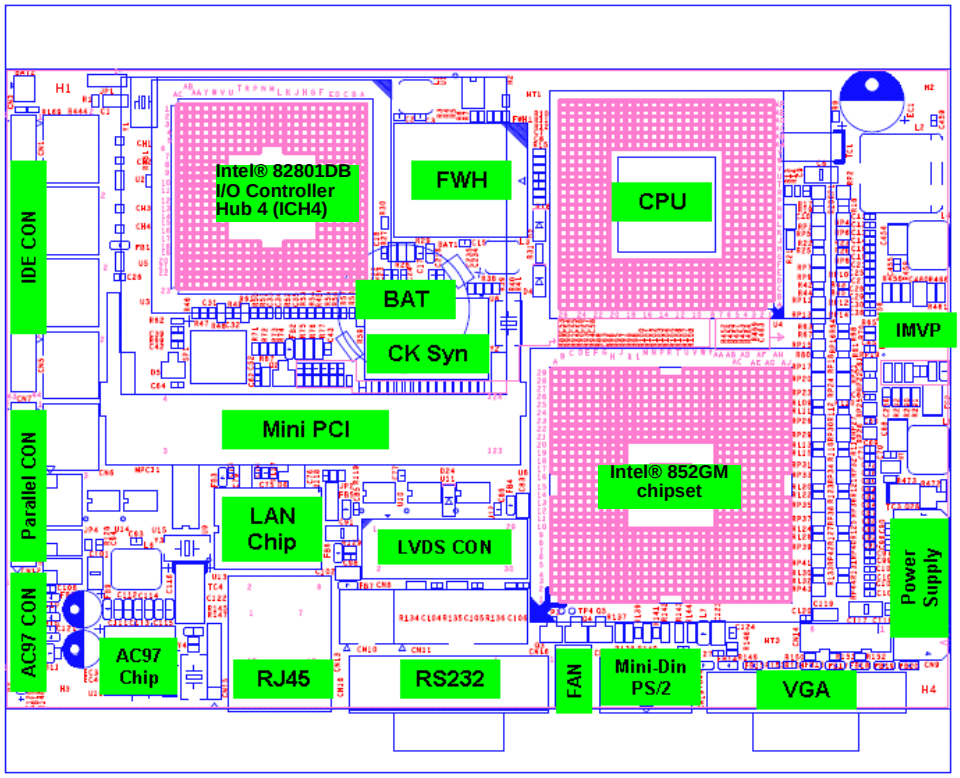


Figure 2. SFF Placement - Top View



For more details information on connectors' placement, please refer to Chapter 3, "Connectors and Jumpers".

Installation Guide for POC Board 2

2.1 Before You Begin

Table 2 represents the additional hardware you may require to set up the board.

Table 2. Additional Hardware

Component	Description
VGA Monitor	Standard VGA or greater resolution monitor
Keyboard	Keyboard with a PS/2 connector or adapter
Mouse	Mouse with a PS/2 connector or adapter
IDE Devices	Up to two IDE devices can be connected to the POC board. One cable is included in this kit. The cable accommodates the included hard drive and one other IDE device, such as a CD-ROM drive or another hard drive.
Network Adapter	An Intel® 82562ET Ethernet Controller is included in the development kit. A CAT-5 cable with an RJ-45 connector is required to connect this Ethernet adapter to local area network.
AT Power Supply	Require an AT power supply to power the board. If you are using ATX power supply, some minor work is required.
Memory	Require one module of 200-pin DDR266 SODIMM (max 1 GB)
Other Devices and Adapters	Many PC compatible peripherals can be attached and configured to work with the POC board. For example, to install an additional network adapter into the mini PCI slot. Procuring and installing any drivers required for additional devices will need to be done by user.

2.2 Setting up the SFF POC Board

Gather the hardware described in Table 2 and follow the steps below to set up the POC board. This manual assumes you are familiar with basic concepts of installing and configuring hardware for an x86 architecture platform.

1. **Ensure a static-free work environment.** Static-free procedures must be completed before removing any components from various anti-static packaging. The POC board is susceptible to electrostatic discharge (ESD), which may cause product failure or unpredictable operation.

Warning: Connecting the wrong cable or reversing a cable may damage the POC board and the device being connected. Since the board is not in a protective chassis, use caution when connecting cables to this product.

2. **Verify contents.** Inspect the contents of your kit and make sure that everything listed in Section 2.1 is included. Check for damage that may have occurred during shipment.
3. **Check jumper settings.** Verify that the following jumpers are set in their default state (see Table 3).

Table 3. Jumper Settings

Jumper	Function	Default Setting
J1	Clear CMOS	1-2 Normal
J2	LCD Voltage Selection	1-2 +5 V
J3	COM2 RS-232/422/485 Mode Selection - 1	1-2 RS232
J4	COM2 RS-232/422/485 Mode Selection - 1	1-2 RS232
J5	COM2 RI/+5V/+12V Selection	5-6 RI

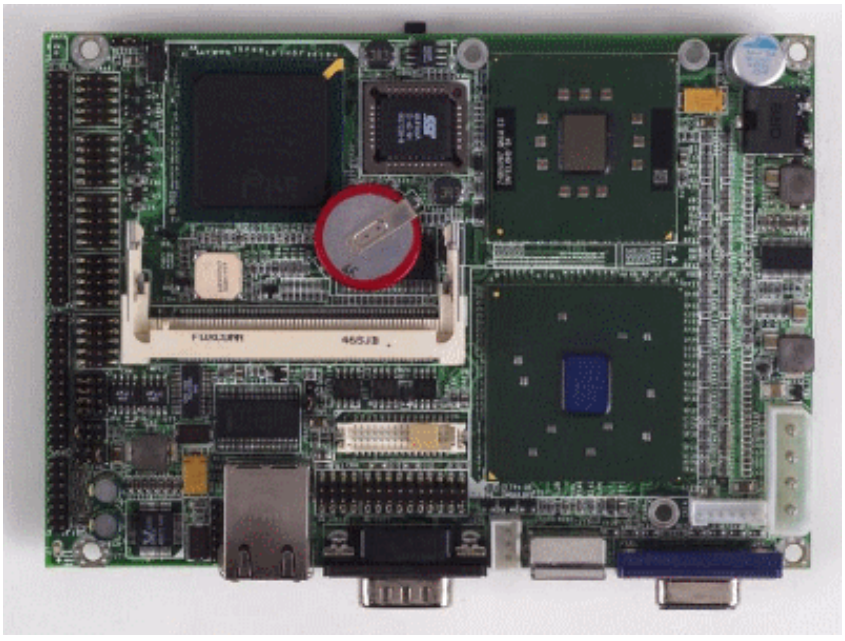
4. **Verify installed hardware.** Make sure the following hardware is populated on your POC board:

- One Onboard Intel® Celeron® M processor 1.3 GHz, mFCBGA479 package
- BIOS FWH
- Battery
- Heatsink

Note: If the above hardware is not installed correctly, DO NOT apply power to the board. Correctly re-install the components before proceeding.

5. **Install memory.** Install the SO-DIMM in memory slot DIMM1. Insert the SO-DIMM above the slot (the DIMM is keyed so that it only fits in the slot in one orientation). Firmly, but carefully, insert the SO-DIMM into the slot until the tabs close.

Figure 3. Assembled Board, Front View



6. **Install storage devices.** There is one IDE connector on the POC board that supports two IDE devices—a master and a slave. Attach the unconnected pin 41-43 header to the board. For a correct boot-up of the system, the included hard drive must be installed as the primary master.

Note: Master/slave settings are determined by a jumper on each IDE device. Consult the device label/ documentation to verify that the jumper is set correctly for your configuration.

7. A CD-ROM drive or additional hard drive may be installed as a primary slave device. To install the included hard drive on the POC board:
   a. Verify that the jumper on the hard drive is set correctly for single or master, depending on your configuration.
   b. Connect the end of the IDE cable (pin 41-43) to the IDE connector CN3 on the board. Ensure that the tracer on the cable is aligned with pin 1 of the connector.
   c. Connect the middle connector of the cable to the hard drive. Again, ensure that the cable tracer is aligned with pin 1 of the connector.

Warning: Failure to properly align the IDE cable may damage the POC board and/or the hard drive.

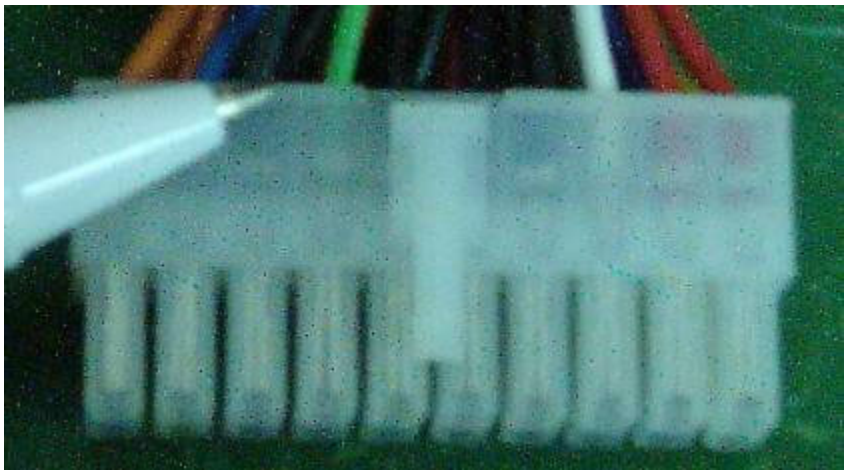
   d. Connect the four-pin power connector from the power supply to the hard drive.
8. Install the CD-ROM drive (optional). A CD-ROM drive is not included in the kit and is not required, but it may be useful in loading additional software. To install it on the POC board:
   a. Verify that the jumper on the CD-ROM drive is set for slave.
   b. Connect the unused end of the IDE cable you already attached to the POC board to the CD-ROM drive. Ensure that the cable tracer is aligned with pin 1 of the CD-ROM drive connector.
   c. Connect a large four-pin power connector from the power supply to the CD-ROM drive.
9. **Connect the monitor.** Connect the monitor cable to the VGA port.
10. **Connect the keyboard and mouse.** Connect the KB/Mouse cable to the Mini-Din PS/2 connector CN17 on the POC board. Then connect a PS/2 mouse and keyboard to the KB/ Mouse cable. Alternatively, USB keyboard and a USB mouse maybe plug into one or both of the USB connectors on the POC board. Note that a legacy (PS/2) keyboard may be required for BIOS setup.

Note: Prior to connect the USB keyboard and USB mouse, you must first have the USB cable connect to the connector CN1 or CN2 on the POC board.

11. **Connect the power supply.** Make sure the power supply is turned off and unplugged. Connect the AT 4P power supply cables to connector CN9 on the POC board. Next, plug the power cord into the power supply and the wall.
12. **Power up the system.** Turn on the monitor and follow by the power supply. If you are using the ATX power supply, then you will need to short the pin15 (black) and pin14 (green) of the 20pin power supply connector in order to power up the system.

Warning: Loose jumper wire could lead to intermittent power which could eventually damage the POC board or cause electrical short to the user.

Figure 4. 20-pin Power Supply Connector



Warning: Powering up without all components installed correctly can lead to a failure that can damage the board. Do not apply power to the board until any loose components are fixed.

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Connectors and Jumpers 3

This section describes the placement of the connectors as well as setting jumpers setting on the board.

Figure 5. SFF POC Board Connectors and Jumpers

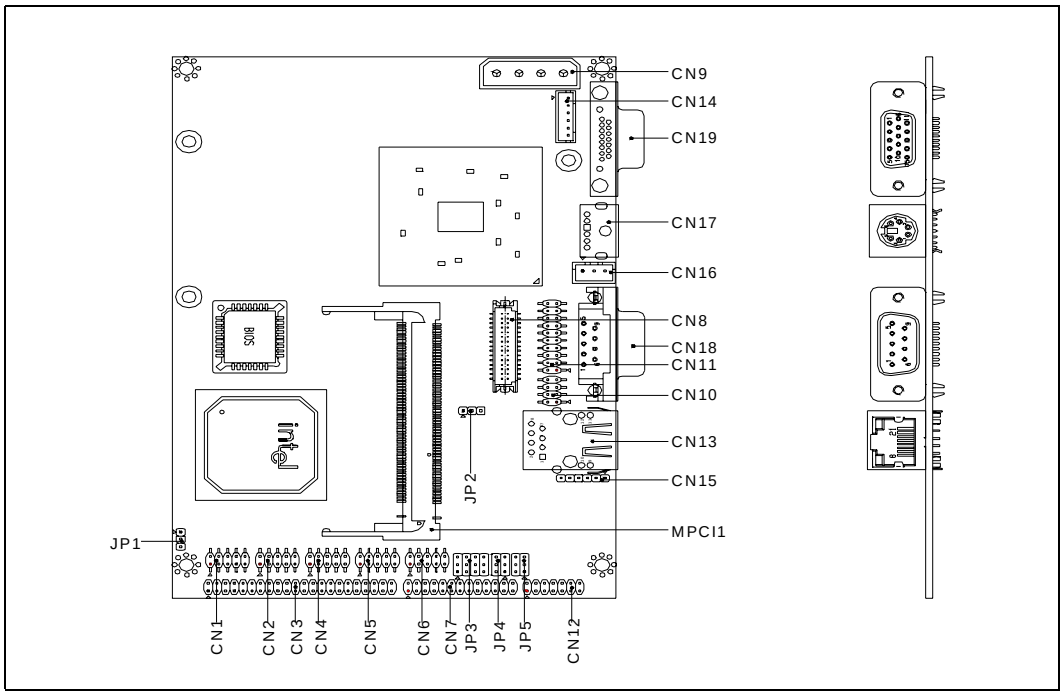
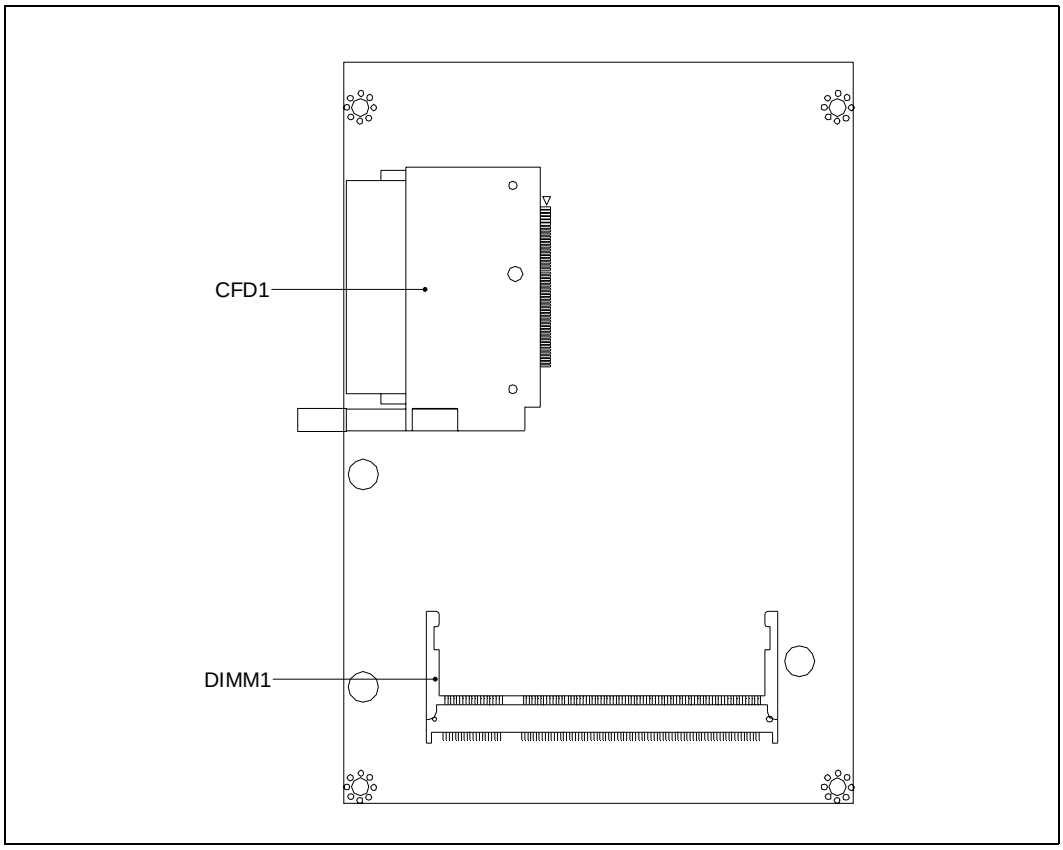


Figure 6. SFF POC Board Solder Side



3.1 List of Jumpers

Table 4 must be used in setting the jumpers on the POC board. These tables give details about the jumpers shown in Figure 5and Figure 6. The jumpers allow configuring the system to user's application. The table below shows the function of each of the board's jumpers:

Table 4. Jumpers

Label	Function
JP1	Clear CMOS
JP2	LCD Voltage Selection
JP3	COM2 RS-232/422/485 Mode Selection – 1
JP4	COM2 RS-232/422/485 Mode Selection – 2
JP5	COM2 RI /+5 V /+12 V Selection

Table 5. Clear CMOS (JP1)

JP1	Function
1-2	Normal (Default)
2-3	Clear CMOS

Table 6. LCD Voltage Selection (JP2)

JP2	Function
1-2	+5 V
2-3	+3.3 V (Default)

Table 7. COM2 RS-232/422/485 Selection (JP3)

JP3	Function
1-2, 4-5, 7-8, 10-11	RS-232 (Default)
2-3, 5-6, 8-9, 11-12	RS-422
2-3, 8-9	RS-485

Table 8. COM2 RS-232/422/485 Selection (JP4)

JP4	Function
1-2	RS-232(Default)
3-4	RS-422
5-6	RS-485

Table 9. RI/+5V/+12V Selection (JP5)

JP5	Function
5-6	RI(Default)
3-4	+5 V
1-2	+12 V

3.2 List of Connectors

The POC board has a number of connectors configuring the system to user's application. The table below shows the function of each board's connectors:

Table 10. Connectors

Label	Function
CN1	USB 2.0 Port 1 Connector
CN2	USB 2.0 Port 2 Connector
CN3	Primary IDE Hard Drive Connector
CN4	Digital I/O Connector
CN5	Front Panel
CN6	Serial Port COM2 Connector
CN7	Parallel Port 1 Connector
CN8	Dual Channel LVDS Connector
CN9	4P Power Connector
CN10	TV-Out Connector
CN11	DVI Connector
CN12	Audio Input/Output Connector
CN13	Ethernet 10/100BaseT RJ-45 Phone Jack
CN14	External 5VSB/PWRGD Connector
CN15	IrDA Connector
CN16	Fan Connector
CN17	Mini-Din PS/2 Connector
CN18	Serial Port COM1 Connector
CN19	CRT Display Connector
MPCI1	Mini-PCI Slot
CFD1	CompactFlash* Disk Slot

Table 11. USB Connector (CN1)

Pin	Signal	Pin	Signal
1	USBVDD0-1	2	GND
3	USBD0-	4	GND
5	USBD0+	6	UDBD1+
7	GND	8	USBD1-
9	GND	10	USBVDD0-1

Table 12. USB Connector (CN2)

Pin	Signal	Pin	Signal
1	USBVDD2-3	2	GND
3	USBD2-	4	GND
5	USBD2+	6	UDBD3+
7	GND	8	USBD3-
9	GND	10	USBVDD2-3

Table 13. Primary IDE Hard Drive Connector (CN3)

Pin	Signal	Pin	Signal
1	PRI_IDERST#	2	GND
3	PDD7	4	PDD8
5	PDD6	6	PDD9
7	PDD5	8	PDD10
9	PDD4	10	PDD11
11	PDD3	12	PDD12
13	PDD2	14	PDD13
15	PDD1	16	PDD14
17	PDD0	18	PDD15
19	GND	20	N.C.
21	PDREQ	22	GND
23	PDIOW#	24	GND
25	PDIOR#	26	GND
27	PIORDY	28	GND
29	PDDACK#	30	GND
31	IRQ14	32	N.C.
33	PDA1	34	P66DET
35	PDA0	36	PDA2
37	PDCS#1	38	PDCS#3
39	IDEACTP#	40	GND
41	+5V	42	+5V
43	GND	44	N.C.

Table 14. Digital IO Connector (CN4)

Pin	Signal	Pin	Signal
1	DIN_IN0	2	DIN_IN1
3	DIN_IN2	4	DIN_IN3
5	DIO_OUT0	6	DIO_OUT1
7	DIO_OUT2	8	DIO_OUT3
9	+5V	10	GND

Table 15. Front Panel (CN5)

Pin	Signal
1-2	ATX Power-On Button
3-4	HDD Active LED
5-6	External Speaker
7-8	Power LED
9-10	System Reset Button

Table 16. Serial Port COM2 Connector (CN6) RS-232 Mode

Pin	Signal	Pin	Signal
1	DCDB	2	RXB
3	TXB	4	DTRB
5	GND	6	DSRB
7	RTSB	8	CTSB
9	RIB	10	N. C.

Table 17. Serial Port COM2 Connector (CN6) RS-422 Mode

Pin	Signal	Pin	Signal
1	TXD-	2	RXD+
3	TXD+	4	RXD-
5	N. C.	6	N. C.
7	N. C.	8	N. C.
9	GND	10	N. C.

Table 18. Serial Port COM2 Connector (CN6) RS-485 Mode

Pin	Signal	Pin	Signal
1	TXD-	2	N.C.
3	TXD+	4	N. C.
5	N. C.	6	N. C.
7	N. C.	8	N. C.
9	GND	10	N. C.

Table 19. Parallel Port Connector (CN7)

Pin	Signal	Pin	Signal
1	STBX	2	AFD#
3	PTD0	4	ERR#
5	PTD1	6	PINIT#
7	PTD2	8	SLIN#
9	PTD3	10	GND
11	PTD4	12	GND
13	PTD5	14	GND
15	PTD6	16	GND
17	PTD7	18	GND
19	ACK#	20	GND
21	BUSY	21	GND
23	PE	23	GND
25	SLCT	26	N. C.

Table 20. Dual Channel LVDS Connector (CN8) (Sheet 1 of 2)

Pin	Signal	Pin	Signal
1	Back-Light Enable	2	Back-Light Control
3	LCD Volt.	4	GND
5	TXLCLK#	6	TXLCLK
7	LCD Volts	8	GND
9	TXL0#	10	TXL0
11	TXL1#	12	TXL1
13	TXL2#	14	TXL2
15	TXL3#	16	TXL3
17	LVDS_DATA	18	LVDS_CLK

Table 20. Dual Channel LVDS Connector (CN8) (Sheet 2 of 2)

19	TXU0#	20	TXU0
21	TXU1#	22	TXU1
23	TXU2#	24	TXU2
25	TXU3#	26	TXU3
27	LCD Volt.	28	GND
29	TXUCLK#	30	TXUCLK

Table 21. 4P Power Connector (CN9)

Pin	Signal
1	+5 V
2	GND
3	GND
4	+12 V

Table 22. TV-out Connector (CN10)

Pin	Signal	Pin	Signal
1	Y	2	CVBS
3	GND	4	GND
5	C	6	N. C.
7	GND	8	N. C.

Table 23. DVI Connector (CN11)

Pin	Signal	Pin	Signal
1	TD1	2	TD1#
3	GND	4	GND
5	TDC	6	TDC#
7	GND	8	+5 V
9	HPDET	10	+5 V
11	TD2	12	TD2#
13	GND	14	GND
15	TD0	16	TD0#
17	N.C.	18	N.C.
19	DVI_DATA	20	DVI_CLK

Table 24. Audio Input/Output Connector (CN12)

Pin	Signal	Pin	Signal
1	MIC_IN	2	MIC_Vcc
3	Audio GND	4	CD_GND
5	LINE_IN L	6	CD_L
7	LINE_IN R	8	CD_GND
9	Audio GND	10	CD_R
11	LINE_OUT L	12	LINE_OUT R
13	Audio GND	14	Audio GND

Table 25. Ethernet 10/100BaseT RJ-45 Phone Jack Connector (CN13)

Pin	Signal	Pin	Signal
1	TX+	2	TX-
3	TCT	4	N.C.
5	N.C.	6	RCT
7	RX+	8	RX-
9	LINK_LED	10	ACT_LED
11	SPD_LED	12	+3.3V

Table 26. External 5VSB/PWRGD Connector (CN14)

Pin	Signal
1	N. C.
2	GND
3	N, C,
4	GND
5	PS_ON
6	+5 V (Standby)

Table 27. IrDA Connector (CN15)

Pin	Signal
1	+5 V
2	N. C. (CIR_Tx_Option)
3	Rx

Table 27. IrDA Connector (CN15)

4	GND
5	Tx
6	N. C. (CIR_Tx_Option)

Table 28. Fan Connector (CN16)

Pin	Signal
1	Fan Sense
2	+5 V
3	GND

Table 29. Mini-DIN PS/2 Connector (CN17)

Pin	Signal	Pin	Signal
1	Keyboard Data	2	Mouse Data
3	GND	4	Shield
5	+5 V	6	Keyboard Clock
7	Shield	8	Mouse Clock

Table 30. Serial Port COM1 Connector (CN18)

Pin	Signal	Pin	Signal
1	DCDA	2	RXA
3	TXA	4	DTRA
5	GND	6	DSRA
7	RSTA	8	CTSA
9	RIA	10	N. C.

Table 31. CRT Display Connector (CN19)

Pin	Signal	Pin	Signal
1	CRT_RED	9	5 V
2	CRT_GREEN	10	VGA GND
3	CRT_BLUE	11	N.C.
4	N.C.	12	CRT_SDA
5	VGA GND	13	CRT_HSYNC
6	VGA GND	14	CRT_VSYNC
7	VGA GND	15	CRT_SCL
8	VGA GND		

Table 32. External Battery (VBA T2)

Pin	Signal
1	VBAT (+3.3 V)
2	GND

Table 33. Compact Flash Disk Slot (CFD) (Sheet 1 of 2)

Pin	Signal	Pin	Signal
1	GND	26	GND
2	SDD3	27	SDD11
3	SDD4	28	SDD12
4	SDD5	29	SDD13
5	SDD6	30	SDD14
6	SDD7	31	SDD15
7	SDCS#1	32	SDCS#3
8	GND	33	GND
9	GND	34	SDIOR#
10	GND	35	SDIOW#
11	GND	36	+5 V
12	GND	37	IRQ15
13	+5 V	38	+5V
14	GND	39	CSEL#
15	GND	40	N.C.
16	GND	41	IDERST#
17	GND	42	SIORDY

Table 33. Compact Flash Disk Slot (CFD) (Sheet 2 of 2)

Pin	Signal	Pin	Signal
18	SDA2	43	DMAREQ
19	SDA1	44	DMAACK
20	SDA0	45	DASP#
21	SDD0	46	PDIAG#
22	SDD1	47	SDD8
23	SDD2	48	SDD9
24	N.C.	49	SDD10
25	GND	50	GND