System board D2020 for Econel 200

Technical manual

Edition December 2004

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Certified documentation according to DIN EN ISO 9001:2000

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Contents

1 Introduction

This technical manual describes the system board D2020, which can be equipped with one or two Intel® processors.

Further information about drivers is provided in the readme files on the hard disk, on the supplied "ServerSupport" or "ServerStart" CDs.

You will find further information in the BIOS description.

Notational conventions

The meanings of the symbols and fonts used in this manual are as follows:

italics	indicates commands, menu items, file and path names or software programs
`fixed font`	indicate system output on the monitor
`semi-bold fixed font`	indicates values to be entered through the keyboard
[Key symbol]	indicates keys according to their representation on the keyboard If capital letters are to be entered explicitly, then the Shift key is shown, e.g. [SHIFT] - [A] for A. If two keys need to be pressed at the same time, then this is shown by placing a hyphen between the two key symbols.
“quotation marks”	indicates names and terms that are being emphasized.
►	indicates an operation that to be performed
CAUTION!	indicates warnings, which, if ignored, will endanger your health, destroy the system or lead to the loss of data.
	indicates additional information, notes and tips

Table 1: Notational conventions

2 Important notes

In this chapter you will find essential information regarding safety when working with your server.

CAUTION!

With the system board installed you must open the system to access the system board. How to dismantle and reassemble the system is described in the service manual accompanying your system.

When installing the system board, refer to the specific installation information in the operating and/or service manual for the receiving server.

2.1 Notes on safety

CAUTION!

- The actions described in these instructions should only be performed by authorized, qualified personnel. Equipment repairs should only be performed by qualified staff. Any failure to observe the guidelines in this manual, and any unauthorized openings and improper repairs could expose the user to risks (electric shock, fire hazards) and could also damage the equipment. Please note that any unauthorized openings of the device will result in the invalidation of the warranty and exclusion from all liability.
- Transport the device only in the antistatic original packaging or in packaging that protects it from knocks and jolts.
- Only install expansions that are allowed for the system board. If you install other expansions, you may damage the requirements and rules governing safety and electromagnetic compatibility or your system. Information on which system expansions are suitable can be obtained from the customer service centre or your sales outlet.
- The warranty expires if the device is damaged during the installation or replacement of system expansions.

- Components can become very hot during operation. Ensure you do not touch components when making extensions to the system board. There is a danger of burns!
- Transmisson lines to peripheral devices must be adequately shielded.
- To the LAN wiring the requirements apply in accordance with the standards EN 50173 and EN 50174-1/2. As minimum requirement the use of a protected LAN line of category 5 for 10/100 MBps Ethernet, and/or of category 5e for Gigabit Ethernet is considered. The requirements of the specification ISO/IEC 11801 are to be considered.
- Never connect or disconnect data transmission lines during a storm (lightning hazard).

Batteries

CAUTION!

- Incorrect replacement of lithium battery may lead to a risk of explosion. The batteries may only be replaced with identical batteries or with a type recommended by the manufacturer.

  It is essential to observe the instructions on page 21.
- Do not throw batteries into the trash can. They must be disposed of in accordance with local regulations concerning special waste.
- The battery must be disposed of in accordance with local regulations concerning special waste.
- All batteries containing pollutants are marked with a symbol (a crossed-out garbage can). In addition, the marking is provided with the chemical symbol of the heavy metal decisive for the classification as a pollutant:

  Cd Cadmium
  Hg Mercury
  Pb Lead

Modules with electrostatic-sensitive components

Systems and components that might be damaged by electrostatic discharge (ESD) are marked with the following label:

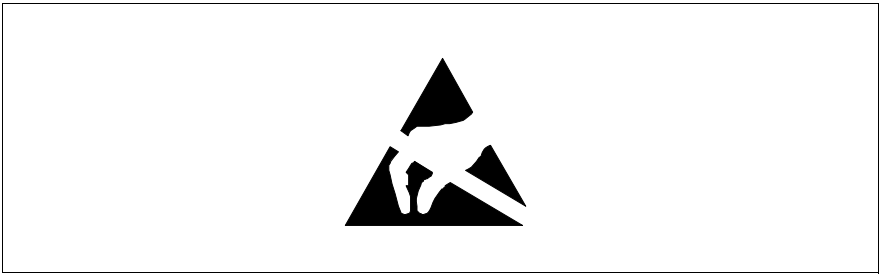

Figure 1: ESD label

When you handle components fitted with ESDs, you must observe the following points under all circumstances:

- You must always discharge yourself of static charges (e.g. by touching a grounded object) before working.
- The equipment and tools you use must be free of static charges.
- Remove the power plug from the power socket before inserting or removing boards containing ESDs.
- Always hold boards with ESDs by their edges.
- Never touch pins or conductors on boards fitted with ESDs.
- Use a grounding cable designed for this purpose to connect yourself to the system unit as you install/deinstall the board.
- Place all components on a static-safe base.

i You will find a detailed description for handling ESD components in the relevant European or international standards (EN 61340-5-1, ANSI/ESD S20.20).

Notes about boards

- During installation/deinstallation of the system board, observe the specific instructions described in the service manual for the server.
- Remove the plug from the mains outlet so that system and system board are totally disconnected from the mains voltage.
- To prevent damage to the system board, the components and conductors on it, please take great care when you insert or remove boards. Take great care to ensure that extension boards are slotted in straight, without damaging components or conductors on the system board, or any other components, for example EMI spring contacts
- Be careful with the locking mechanisms (catches, centring pins etc.) when you replace the system board or components on it, for example memory modules or processors.
- Never use sharp objects (screwdrivers) for leverage.

2.2 CE Certificate

CE

The shipped version of this board complies with the requirements of the EEC directive 89/336/EEC "Electromagnetic compatibility".

Compliance was tested in a typical PRIMERGY configuration.

2.3 Environmental Protection

Notes on packaging

Please do not throw away the packaging. We recommend that you do not throw away the original packaging in case you need it later for transporting.

Notes on dealing with consumables

Please dispose batteries in accordance with local government regulations.

Do not throw lithium batteries into the household waste. They must be disposed of in accordance with local regulations concerning special waste.

Take-back, recycling and disposal

For details on take-back and reuse of devices and consumables within Europe, contact your Fujitsu Siemens Computers branch office/subsidiary or our recycling centre in Paderborn:

Fujitsu Siemens Computers
Recycling Center
D-33106 Paderborn
Germany

Tel. +49 5251 8 18010

Fax +49 5251 8 18015

3 Features

3.1 Overview

Processors

- 2 x Intel® Xeon™ processors
- 2 prozessor sockets mPGA604 for Intel® Xeon™ Prozessor with 800 MHz front side bus
- Support of SMP, MPS 1.4 compliant
- VRM 10.1 onboard (EVRD)

Main Memory

- 4 slot for main memory PC2700 DDRI/333 MHz (registered), SDRAM memory modules with 512 MB and 1Gbyte
- maximum 4 Gbyte of memory
- minimum 512 MB
- ECC multiple bit error detection and single bit error correction
- memory scrubbing function
- Single Device Data Correction (SDDC) function (Chipkill™)

Chips on the system board

- Intel® E7320 Chipset
- Intel® 6300ESB PCI-X Hub
- 1 x GBit LAN controller (Broadcom BCM5705E)
- VGA controller (ATI Rage XL) onboard with 8 MB SDRAM memory
- Super I/O controller (Winbond W83627THF-A)
- Flash EPROM for:
  - BIOS
  - LAN
- thermal and system management controller (W83792D)

internal connectors

– floppy disk
– 1 IDE primary
– 1 IDE secondary
– main power connector (12V, -12V, 5V, 3.3V and 5V auxiliary)
– 12V (CPU) power connector
– 2 CPU fans
– 1 front fan
– 1 rear fan
– PC98 connector
– IPMB connector (ID Prom)
– SATA-HDD Access (HDLED1)
– front panel
– battery holder
– 2 SATA RAID connectors

external connectors

– 1 serial port (COM1)
– 2 PS/2 interfaces for keyboard and mouse
– 2 USB 2.0 ports with 480 Mbits/s (rear)
– 1 VGA port
– 1 RJ45 LAN port

PCI slots

Standard:
– 2 x PCI-X (64 Bit / 66 MHz)
– 2 x PCI (32 Bit / 33 MHz)
– 1 x PCI-Express x8 slot

BIOS features

- American Megatrend BIOS
- MultiProcessor Specification 1.4
- Server Hardware Design Guide 3.0
- WfM 2.0
- IPMI V1.5
- ACPI 1.0b support
- LSI SATA RAID BIOS
- USB keyboard/mouse
- boot possible from:
  - 120 MB floppy disk drive
  - CD-ROM
  - USB drive
  - LAN
- console redirection support
- OEM logo
- CPU, Memory disable
- memory mirroring support

Environmental protection

Battery in holder

Form factor

12“ x 10.5“

3.2 Main memory

The system board supports up to 16 Gbyte main memory. 4 slots (2 banks with 2 modules) are available for the main memory. Each memory bank can be populated with 512 Mbyte or 1 Gbyte registered PC2700 DDR I memory modules.

ECC with memory scrubbing and with the Single Device Data Correction (SDDC) function is supported.

Module population

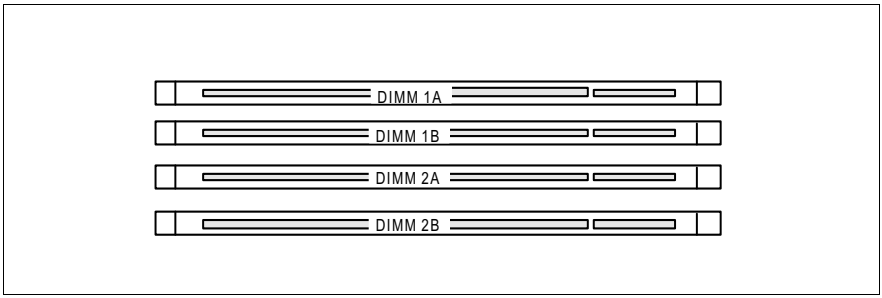

Figure 2: Main memory

– The memory modules have to be based on x4 organized SDRAMs.

– If the memory modules are populated in pairs, each pair must consist of identical memory modules (2-way interleaved mode)

– The module capacity between pairs can differ: pair 2A/2B can be populated with two 512 Mbyte modules and pair 1A/1B with two 1 Gbyte modules.

– Only single rank modules are permitted.

Following table shows the mandatory population order:

	DIMM 1A	**DIMM 2A**	**DIMM 1B**	**DIMM 2B**
single channel	populated	empty	empty	empty
dual channel	populated	empty	populated	empty
	populated	populated	populated	populated

3.3 PCI bus

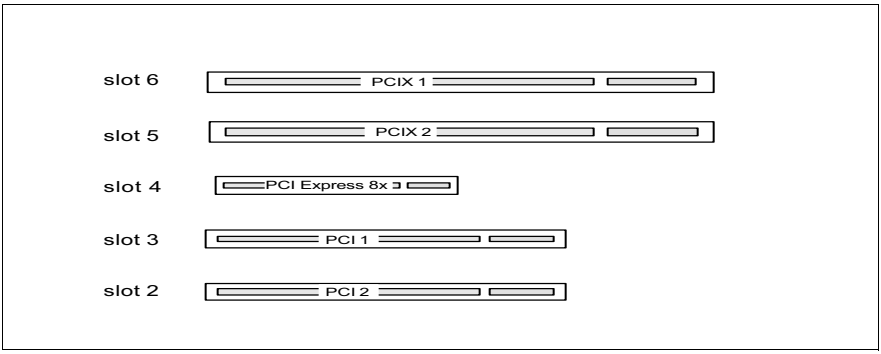

Figure 3: PCI slots

PCI slots

The following table shows an overview of the PCI slots:

PCI slot	64Bit/ 32Bit	Frequency in MHz	Description
2	32 Bit	33	32 bit PCI bus slot
3	32 Bit	33	32bit PCI bus slot
4			PCI-Express x8 slot
5	64 Bit	66	64 bit PCI-X bus slot
6	64 Bit	66	64 bit PCI-X bus slot

PCI IRQ Line x - Assignment of the PCI interrupts

PCI IRQ Line x defines which ISA interrupts are used for the separate PCI slots.

If you select *Auto* in the BIOS setup, the interrupts are assigned automatically and no further settings are required.

Multifunctional PCI boards or boards with an integrated PCI-to-PCI bridge can use several PCI interrupts (INTA#, INTB#, INTC#, INTD#). Monofunctional PCI boards (default) only use one PCI interrupt (INTA#) per PCI slot.

The PCI interrupts INTA#, INTB#, INTC# and INTD# are available for each PCI slot.

The same interrupt can be assigned simultaneously to several PCI boards. You should avoid this condition due to reduced performance.

If you use a setting other than *Auto*, the Plug&Play functionality of the system BIOS for the corresponding PCI boards is deactivated.

Auto The PCI interrupts are assigned automatically in accordance with the Plug&Play guidelines.

Disabled No ISA interrupt is assigned to the PCI interrupt.

3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15

The selected ISA interrupt is assigned to the PCI interrupt. You may not select an ISA interrupt that is used by a component on the system board (e.g. controller) or an ISA board.

	IDsel	**INTA**	**INTB**	**INTC**	**INTD**
slot 2	17	PIRQE#	PIRQF#	PIRQG#	PIRQH#
slot 3	18	PIRQG#	PIRQH#	PIRQE#	PIRQF#
slot 4					
slot 5	18	PXIRQ3	PXIRQ1	PXIRQ0	PXIRQ2
slot 6	17	PXIRQ0	PXIRQ1	PXIRQ2	PXIRQ3
VGA	19	PIRQB#			
LAN	20	PIRQF#			
USB		PIRQH#			

3.4 Screen resolution

Depending on the operating system used the screen resolutions in the following table refer to the screen controller on the system board. If you are using an external screen controller, you will find details of supported screen resolutions in the operating manual or technical manual supplied with the controller.

Screen resolution	Refresh rate (Hz)	Max. number of colours
640x480	200	16,7 Mio.
800x600	200	16,7 Mio.
1024x768	150	16,7 Mio.
1152x864	120	16,7 Mio.
1280x1024	100	16,7 Mio.

3.5 Temperature / system monitoring

Temperature and system monitoring aim to reliably protect the computer hardware against damage caused by overheating. In addition, any unnecessary noise is also prevented by reducing the fan speed, and information is provided about the system status.

The temperature and system monitoring are controlled by an onboard controller.

The following functions are supported:

Temperature monitoring

Measurement of the processor temperature, measurement of the ambient temperature by a temperature sensor on the LED board.

Fan monitoring

Fans that are no longer available, blocked or sticky fans are detected.

Fan control

The fans are regulated according to temperature.

Sensor monitoring

The removal of, or a fault in, a temperature sensor is detected. Should this happen all fans monitored by this sensor run at maximum speed, to achieve the greatest possible protection of the hardware.

Voltage monitoring

When voltage exceeds warning level high or falls below warning level low an alert will be generated.

Cover monitoring

Unauthorised opening of the cover is detected, even when the system is switched off. However, this will only be indicated when the system is switched on again

System Event Log (SEL)

All monitored events of the system board are recorded in the System Event Log. They could be retrieved after a system reboot via ServerView.

3.6 Connectors and Jumpers

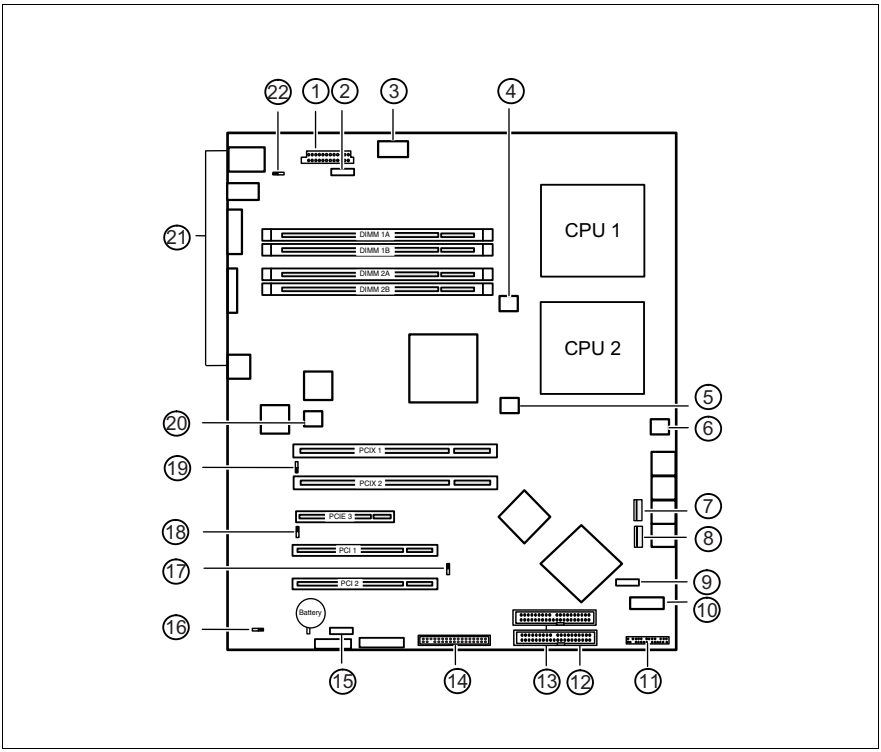

Figure 4: Schematic overview of the system board D2020

1 = PSU ATX connector
2 = PC98
3 = PSU 12V connector (CPU)
4 = CPU1 fan
5 = CPU2 fan
6 = front fan
7 = SATA 2
8 = SATA 1
9 = HDLED1
10 = Intrusion
11 = front panel
12 = IDE primary
13 = IDE secondary
14 = floppy disk drive
15 = IPMB
16 = CLRTC (jumper)
17 = BIOSREC (jumper)
18 = VGA EN1 (jumper)
19 = LAN EN2 (jumper)
20 = rear fan
21 = external connector
22 = KBPWR1 (jumper)

Settings with jumpers

The system board is supplied with all jumpers set on default position (pin 1-2).

CLRTC (16)

1-2 CMOS/RTC settings are not cleared (default)
2-3 clear CMOS/RTC settings

BIOSREC (17)

1-2 system BIOS (default)
2-3 recover system BIOS

VGA EN1 (18)

1-2 onboard VGA enabled (default)
2-3 onboard VGA disabled (PCI VGA grafics controller)

LAN EN2 (19)

1-2 onboard LAN enabled (default)
2-3 onboard LAN disabled (PCI LAN controller)

KBPWR1 (22)

1-2 wake from standby via keyboard disabled (default)
2-3 wake from standby via keyboard enabled

3.6.1 External connectors

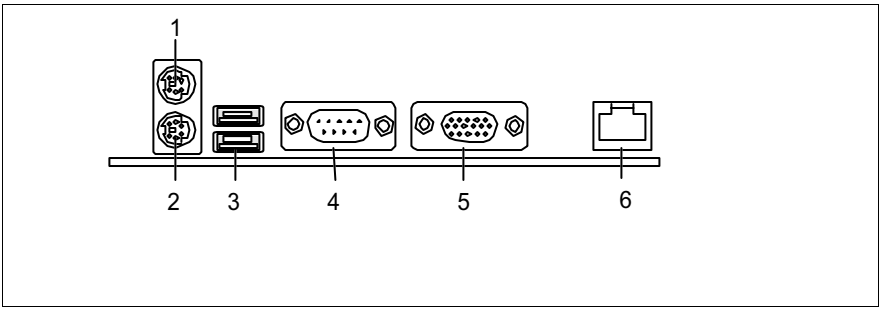

Figure 5: External connectors of the system board D2020

1 = PS/2 mouse port

2 = PS/2 keyboard port

3 = USB port 1/2

4 = Serial port COM1

5 = VGA port

6 = LAN port1

LAN connectors

On this system board you will find one GbE Broadcom LAN controller BCM5705E. This LAN controller supports the transfer rates of 10 Mbit/s, 100 Mbit/s and 1 Gbit/s. The LAN controller supports WOL function through Magic Packet™.

It is also possible to boot a device without its own boot hard disk via LAN. Here Intel PXE is supported.

The LAN port serves as management interface and is prepared for Remote-View.

The LAN controller connectors are equipped with two LEDs (light emitting diode) indicating the transfer rate and the activity.

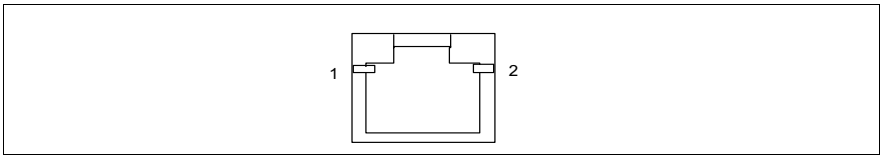

Figure 6: LAN connectors

1	LAN link/aktivity	green	on	LAN connection
			off	no LAN connection
			flashing	LAN transfer
2	LAN transfer rate	green + orange	off	transfer rate 10 Mbit/s (or no connection)
		green	on	transfer rate 100 Mbit/s
		orange	on	transfer rate 1000 Mbit/s

4 Replacing the lithium battery

In order to save the system information permanently, a lithium battery is installed to provide the CMOS-memory with a current. When the charge is too low or the battery is empty, a corresponding error message is provided. The lithium battery must then be replaced.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer (CR2032).

Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.

Make sure that you insert the battery the right way round. The plus pole must be on the top!

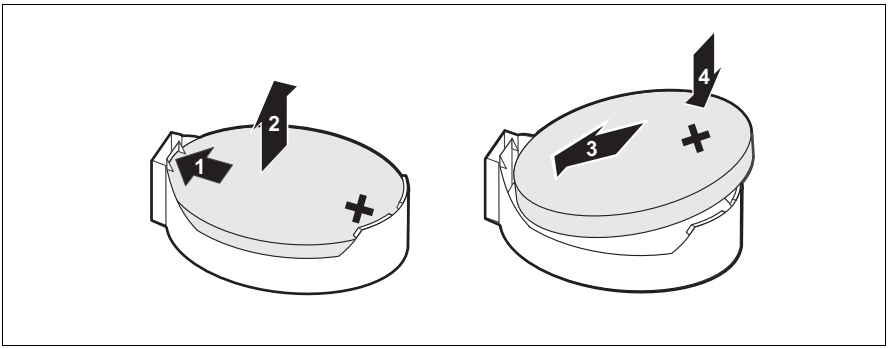

Figure 7: Replacing the lithium battery

- Press the locking spring into direction of of the arrow (1), so that the lithium-battery jumps out of its socket.
- Remove the battery (2).
- Insert a new lithium battery of the same type into the socket (3) and (4).

Abbreviations

The technical terms and abbreviations given below represent only a selection of the full list of common technical terms and abbreviations.

Not all technical terms and abbreviations listed here are valid for the described system board.

ACPI
Advanced Configuration and Power management Interface

ASSR
Automatic Server Recovery and Restart

ATA
Advanced Technology Attachment

BBU
Battery Backup Unit

BIOS
Basic Input Output System

BMC
Baseboard Management Controller

CMOS
Complementary Metal Oxide Semiconductor

COM
COMmunication port

CPU
Central Processing Unit

DDR
Double Data Rate

DIMM
Dual In-line Memory Module

DIP
Dual In-line Package

DMI
Desktop Management Interface

DRAM
Dynamic Random Access Memory

ECC
Error Correction Code

EEPROM
Electrical Erasable Programmable Read Only Memory

EPROM
Erasable Programmable Read Only Memory

EMRL
Embedded RAID Logic

EVRD
Enterprise VRD

HPC
Hotplug Controller

ICE
In Circuit Emulation

IDE
Integrated (intelligent) Drive Electronics

IME
Integrated Mirror Enhanced

IOOP
Intelligent Organisation Of PCI

IPMB
Intelligent Platform Management Bus

IPMI
Intelligent Platform Management Interface

LAN
Local Area Network

LED
Light Emitting Diode

MPS
Multi Processor Specification

NMI
Non Maskable Interrupt

OEM
Original Equipment Manufacturer

OHCI
Open Host Controller Interfache

OS
Operating System

PCI
Peripheral Components Interconnect

PDA
Prefailure Detection and Analyzing

PIO
Programmed Input Output

PLD
Programmable Logic Device

PS(U)
Power Supply (Unit)

PWM
Puls Wide Modulation

PXE
Preboot eXecution Environment

RAID
Redundant Array if Inexpensive Disks

RSB
Remote Service Board

RST
ReSeT

RTC
Real Time Clock

SCSI
Small Computer Systems Interfache

SDDC
Single Device Data Correction

SDRAM
Synchronous Dynamic Random Access Memory

SHDG
Server Hardware Design Guide

SMB
System Management Bus

SMM
Server Management Mode

SMP
Symmetrically Multi Processing

UHCI
Unified Host Controller Interface

USB
Universal Serial Bus

VGA
Video Graphics Adapter

VRD
Voltage Regulator Down

VRM
Voltage Regulator Module

WfM
Wired for Management

WOL
Wake up On LAN

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