
Chapter 1

Hardware Overview

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1.1 Features

The Portege M200 is an ultra thin and lightweight PC realizing cable-less environment on a table by wireless function with a Pentium-M processor realizing high performance.

Microprocessor

A 1.4/1.5/1.6/1.7GHz Mobile Pentium-M (Banias) processor with a 1.4/1.5/1.6/1.7GHz internal clock, 400MHz bus and 1.48/0.96V core operation, supporting SpeedStep III.

Chipset

The computer is equipped with Intel Odem+, Intel ICH4-M and YEBISU-SS.

Cache memory

A Banias has 32KB primary cache and 1MB secondary cache (in CPU.)

GPU Controller

The computer has an nVIDIA MAP34-232 controller. The internal VRAM is 32MB.

Memory

Two DDR SO-DIMM slots support DDR333 (standard)/DDR226. Memory modules can be installed to a maximum of 2GB (2,048MB). Memory modules in 128MB (only for expansion), 256MB, 512MB and 1GB sizes are available.

HDD

Single 40/60/80GB internal drive. 2.5-inch x 9.5mm height

USB FDD

Three-mode 3.5 inch USB FDD supports 720KB, 1.2MB and 1.44MB formats.

Display

Display swivels automatically 0/90/180/270 degrees by display driver. LCD and CRT can be displayed at the same time.

LCD

Built-in 12.1 inch, 16M colors, SXGA+ (1,400×1,050 dots), thin type low temperature poly-silicon TFT color display.

- CRT

Supported via an RGB connector
- Digitizer

Digitizer is installed at the rear of LCD. The supplied Tablet pen enables pen computing.
- Keyboard

Keyboard has 84(US)/85(UK)-key and supports Windows key and Hot key.
- Touch pad

Touch pad is installed as a pointing device.
- Tablet pen (Tablet PC pen)

Tablet pen can be used as a mouse by touching the display softly with the pen tip. Tablet button on the side of the pen corresponds to the right click of the mouse. Erase button on the pen tail can be used as an eraser depending on the application.
- Reserve pen

Reserve pen can be used instead of the tablet pen at the time of loss or breakage. Some computers in the series are equipped with a Reserve pen.
- Batteries

The computer has two batteries: a rechargeable Lithium-Ion main battery pack and an RTC battery (that backs up the Real Time Clock and CMOS memory).
- USB (Universal Serial Bus)

The adopted chip for this computer equips six USB ports supporting USB 2.0. Three of them are occupied by the internal system, one is not used and others are usable as external ports.
- PC card slot

A PC card Type II is acceptable. Supports ToPIC-100 (3.3V/CardBus).
- SD card slot

One SD card slot. Supports only memory card.

Sound system

Incorporates an internal speaker, three internal microphones, an external monaural microphone connector and a stereo headphone connector.

 One touch buttons

Windows Security tablet button (Ctrl+Alt+Del), ESC/Rotation button and Cross Function button (Enter, Menu, scroll) are installed.

 Internal Modem

The internal modem is equipped as a modem daughter card (MDC).

The computer contains a MDC, enabling data and fax communication. It supports ITU-TV.90. The transfer rates are 56 Kbps for data reception, 33.6 Kbps for data transmission, and 14,400 bps for fax transmission. However, the actual speed depends on the line quality. The RJ11 modem jack is used to accommodate a telephone line. In U.S., Canada and Australia, the MDC supports V.90 and V.92.

 LAN

The internal LAN supports 10/100Mbit Ethernet.

 Wireless LAN

The internal wireless LAN supports Mini PCI Type III. The 802.11b/g (Atheros) mini PCI card is supported.

 FIR(Fast Serial InfraRed) communication port

Fast Serial InfraRed (FIR) communication port supports IrDA1.1. and realizes 115Kbps or 1.15Mbps wireless communication.

 Bluetooth

The computer is equipped with Bluetooth communication standards supporting Host interface and USB v1.1. It enables the communication between devices supporting Bluetooth version 1.1. The switch on the computer can switch on/off the communication function.

Figure 1-1 shows the front of the computer and Figure 1-2 shows the system units configuration.



Figure 1-1 Front of the computer

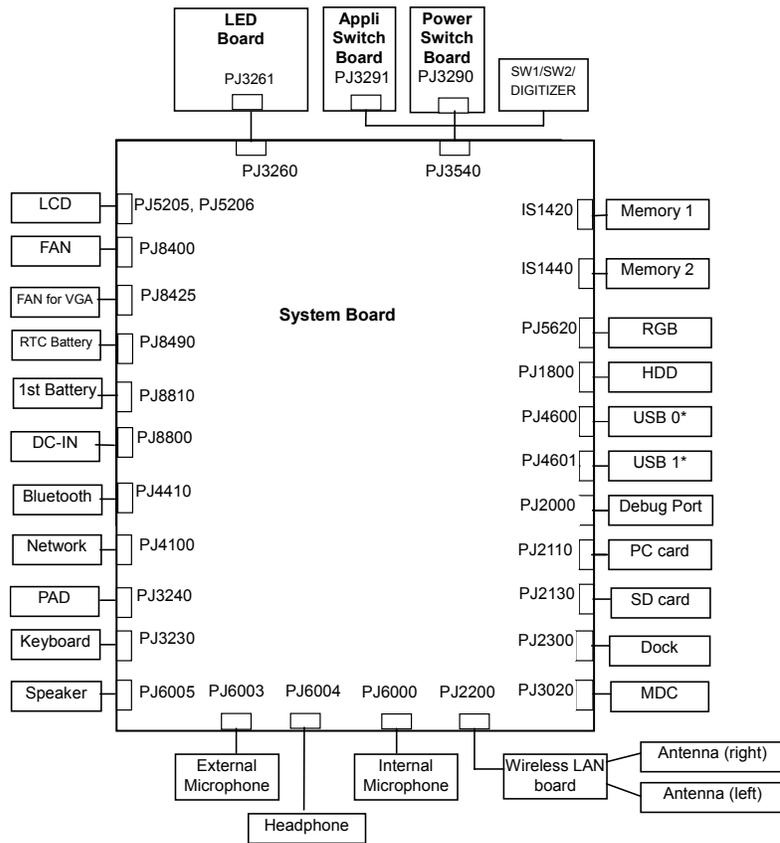


Figure 1-2 System units configuration

* The drawing above shows the physical configuration of USB ports. In the logical configuration, the connector PJ4600 is assigned to USB 1 and PJ4601 is assigned to USB0.

The PC contains the following components.

❑ CPU

Mobile Pentium-M (Banias)

- A 1.4/1.5/1.6/1.7GHz Pentium-M (Banias) processor with a 1.4/1.5/1.6/1.7GHz internal clock, 400MHz bus and 1.48/0.96V core operation voltage (built-in NDP), supporting SpeedStep III.
- Internal cache memory: 32KB Data and 32KB Instruction, Write-Back
- Secondary cache memory: 1MB (in CPU)

❑ Memory

Two DDR SO-DIMM slots support DDR333 (standard)/DDR226. Memory modules in 256MB, 512 MB and 1GB can be installed to a maximum of 2GB (2,048MB).

- 3.3V operation
- 200 pin, SO Dual In-line Memory Modules (SO-DIMM)
- Supports PC2700
- Access time : 6ns

❑ BIOS ROM (Flash memory)

- 4Mbit (256K×16-bit chip)
 - 64KB used for logo
 - 64KB used for setup and checksum
 - 128KB used for system BIOS
 - 64KB used for VGA-BIOS
 - 64KB used for ACPI
 - 8KB used for PnP
 - 8KB used for password security
 - 16KB used for booting
 - 64KB used for LAN
 - 32KB are reserved
- 5.0V operation
- Access time : 120 ns or 90 ns
- Data transfer: 8-bit

❑ PCI chipset

This gate array incorporates the following elements and functions

- Intel Odem+(855PM Bstep) (North Bridge)
 - Baniyas/Dothan Processor System Bus Support
 - DRAM Controller supporting DDR333/DDR266, 2GB max
 - Accelerated Graphics Port Interface: adheres to AGP2.0, AGP×4 mode
 - Hub Link Interface
 - 593-ball 37.5×37.5 mm FC-BGA package

- Intel ICH4-M (South Bridge)
 - Hub Link Interface
 - PCI Rev2.2 Interface (6 PCI REQ/GNT Pairs)
 - BusMaster IDE Controller (Ultra ATA 100/66/33)
 - USB 1.1/2.0 Controller 6 Ports (EHCI: Enhanced Host Controller)
 - I/O APIC (ACPI 1.06)
 - SMBus2.0 Controller
 - FWH Interface (BIOS)
 - LPC Interface (EC/KBC, Super I/O)
 - IRQ Controller
 - Serial Interrupt Controller
 - Power Management Controller
 - Deeper Sleep (C4) Support
 - Suspend/Resume Control
 - AC'97 2.2 Interface
 - Internal RTC
 - Internal LAN Controller (WfM2.0)
 - 421-ball 31×31mm BGA Package

❑ PC Card Controller Gate Array (YEBISU-SS)

- PCI interface (PCI Revision2.2)
- CardBus/PC Card controller (Yenta2 Version2.2)
- SD memory card controller (SDHC Ver.1.2)
- SD IO card controller (Ver.1.0)
- SmartMedia controller (SMHC Ver.01/SMIL1.0)
- SIO (UART) controller (MS Debug Port Specification Ver.1.0)
- Docking station interface
- Q switch control, reset control
- External device interface

GPU Controller (nVIDIA MAP34-232)

- VRAM 32MB (4M × 32 × 2) DDR200MHz
- AGP bus R2.0 x 4
- LCD Interface LVDS 2ch

 Batteries

The main battery is a detachable lithium ion main battery (10.8V-4,400mAh) and the RTC battery is a lithium ion battery (2.4V-17mAh).
The RTC battery is mounted inside computer.

 Other main system chips

- EC/KBC (Mitsubishi-made LPC microcontroller M306K5F8LRP x 1)
- PSC (Toshiba-made TMP87PM48U x 1)
- Temperature sensor (AND-made ADM1032 x 1)
- Temperature switch(for forcible CPU stop)(Maxim-made MAX6501UKP x 1)
- Super I/O (SMsC-made LPC47N217-JN x 1)
- SOUND CODEC (AND-made AD1981B x 1)
- CLK Generator (ICS-made ICS950812CGT x 1)
- FWH (Intel-made E82802AB8 x 1)

 Modem controller

Supported by MDC. Using of the secondary AC97 Line

 LAN controller (ICH4-M + Kinnerth)

Controls LAN and supports 10/100Base-T.

1.2 2.5-inch Hard Disk Drive

A compact, high-capacity HDD with a height of 9.5mm. Contains a 2.5-inch magnetic disk and magnetic heads.

Figure 1-4 shows a view of the 2.5-inch HDD and Tables 1-1 and 1-2 list the specifications.

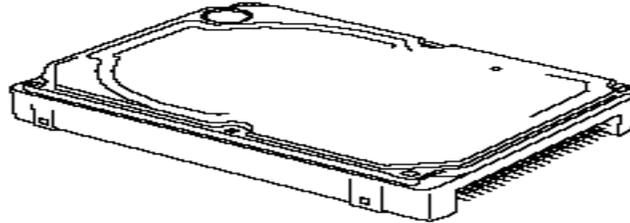


Figure 1-4 2.5-inch HDD

Table 1-1 2.5-inch HDD dimensions

Parameter		Standard value			
		TOSHIBA HDD2193B	TOSHIBA HDD2171B	TOSHIBA HDD2184B	TOSHIBA HDD2194B
Outline dimensions	Width (mm)	69.85			
	Height (mm)	9.5			
	Depth (mm)	100.0			
	Weight (g)	95.5 (MAX)	102 (MAX)		

Parameter		Standard value			
		HITACHI GST G8BC00014410	HITACHI GST G8BC00014610	HITACHI GST G8BC00015610	HITACHI GST G8BC00014810
Outline dimensions	Width (mm)	69.85			
	Height (mm)	9.5			
	Depth (mm)	100.2			
	Weight (g)	95	102 (MAX)	115 (MAX)	102 (MAX)

Table 1-2 2.5-inch HDD Specifications

Parameter	Specification			
	TOSHIBA HDD2193B	TOSHIBA HDD2171B	TOSHIBA HDD2184B	TOSHIBA HDD2194B
Storage size (formatted)	40GB	40GB	60GB	60GB
Speed (RPM)	5,400			
Data transfer speed (Mbits/s)	154.3- 298.0	200.8- 333.2	202.9- 373.3	258-394
Interface transfer rate (MB/s)	100			
Storage density(Kbpi)	618	607	632	652
Track density (Ktpi)	78.9	57.1	78.9	88.8
Average seek time (Read) (ms)	12			
Average seek time (Write) (ms)	-			
Start time (sec)	4			

Parameter	Specification			
	HITACHI GST G8BC00014410	HITACHI GST G8BC00014610	HITACHI GST G8BC00015610	HITACHI GST G8BC00014810
Storage size (formatted)	40GB	60GB	60GB	80GB
Speed (RPM)	5,400	5,400	7,200	5,400
Data transfer speed	450 (Mbps)	450 (Mbps)	507 (Mbps)	450 (Mbps)
Interface transfer rate (MB/s)	100			
Storage density(Kbpi)	712	712	624	712
Track density (Ktpi)	96.0	96.0	88.2	96.0
Average seek time (Read) (ms)	12	12	10	12
Average seek time (Write) (ms)	14	14	11	14
Start time (sec)	3.5	3.5	4	3.5

1.3 Keyboard

The keyboard is mounted 84(US)/85(UK) keys that consist of character key and control key, and in conformity with JIS. The keyboard is connected to membrane connector on the system board and controlled by the keyboard controller.

Figure1-5 is a view of the keyboard.

See Appendix E about a layout of the keyboard.

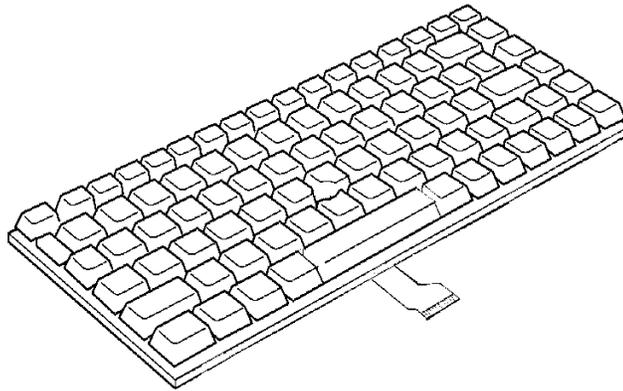


Figure 1-5 Keyboard

1.4 TFT Color Display

The TFT color display consists of a LCD module and FL inverter board.

1.4.1 LCD Module

The LCD module used for the TFT color display uses a backlight as the light source and can display images and characters of 16M colors with 1400×1050 resolution.

Table 1-5 shows list the specifications.

Table 1-3 LCD module specifications (12.1 TFT)

Item	Specifications
	G33C00019110
Number of Dots	1,400 (W) x 1,050 (H)
Dot spacing (mm)	0.176 (H) x 0.176 (V)
Display range (mm)	245.76 (H) x 184.32 (V)
Outline dimensions	269 (w) x 199 (H) x 6.7 Max (D)

1.4.2 FL Inverter Board

The FL inverter board supplies a high frequency current to illuminate the LCD module FL.

Table 1-4 lists the FL inverter board specifications.

Table 1-4 FL inverter board specifications

Item	Specifications	
	G71C00011110	
Input	Voltage (V)	DC 5
	Power (W)	7
Output	Voltage (V)	750
	Current (mA)	6.00
	Power	5W/7VA

1.5 Power Supply

The power supply supplies 26 different voltages to the system board.

The power supply microcontroller has the following functions.

1. Judges that the DC power supply (AC adapter) is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the battery icon, and DC IN icon.
4. Turns the battery charging system on and off and detects a fully charged battery.
5. Turns the power supply on and off.
6. Provides more accurate detection of a low battery.
7. Calculates the remaining battery capacity.
8. Controls the transmission of the status signal of the main battery.

Table 1-5 lists the power supply output specifications.

Table 1-5 Power supply output specifications

Name	Voltage [V]	Name/Use
PPV	1.000 - 0.748	CPU
MCH1R2-P1V	1.2	MCH-M
PTV	1.075	CPU, MCH-M, ICH4-M
2R5-P2V	2.5	GPU
2R5-B2V	2.5	MCH-M, SDRAM
1R25-P1V	1.25	MCH-M, SDRAM
PGV	1.2-1.5	GPU
LAN-E3V	3.3	ICH4-M, KINNERETH
S3V	3.3	ICH4-M, EC/KBC
B3V	3.3	YEBISUSS, PC Card, MDC
P3V	3.3	Clock Generator, ADM1032, ICH4-M, FWH, Mini PCI, GPU, LCD, AD1981B, Super I/O
SD-B3V	3.3	SD
E5V	5	USB
B5V	5	PC card
P5V	5	ICH4-M, KB, LED, FL INVERTER, HDD
IF-P5V	5	DOCK
A4R7-P4V	4.7	AD1981B, Headphone, Int-Mic, Ext-Mic
1R8-P1V	1.8	CPU, MCH-M, ICH4-M
1R5-P1V	1.5	MCH-M, ICH4-M, GPU
1R5-S1V	1.5	ICH4-M
LAN1R5-E1V	1.5	ICH4-M
M5V	5	LM26CIM5, LED
S5V	5	ICH4-M, DOCK
MCV	5	PSC
A4R7-P4V	4.7	AD1981B, MIC
R3V	2.0-3.3	ICH4-M

1.6 Batteries

The PC has the following two batteries.

- Main battery
- Real time clock (RTC) battery

Table 1-6 lists the specifications for these two batteries.

Table 1-6 Battery specifications

Battery Name		Battery Element	Output Voltage	Capacity
Main battery	G71C0003D110	Lithium ion	10.8 V	4,400 mAh
	G71C0003D210			
Real time clock (RTC) battery	GDM710000003	Lithium ion	2.4 V	17 mAh

1.6.1 Main Battery

The main battery is the primary power supply for the computer when the AC adapter is not connected. In resume (instant recovery) mode, the main battery maintains the current status of the computer.

1.6.2 Battery Charging Control

Battery charging is controlled by a power supply microprocessor. The power supply microprocessor controls power supply and detects a full charge when the AC adapter and battery are connected to the computer. The system charges the battery using quick charge or trickle charge.

Quick Battery Charge

When the AC adapter is connected, normal charging is used while the system is turned on and quick charge is used while the system is turned off or in suspend mode. (See Table 1-7)

Table 1-7 Time required for charges of main battery

	Charging Time
Normal charge	About 3 to 10 hours or longer
Quick charge	About 2.5 hours

Quick battery charge is stopped in the following cases.

1. The main battery is fully charged
2. The main battery is removed
3. Main battery or AC adapter voltage is abnormal
4. Charging current is abnormal

Trickle charge

When the main battery is fully charged and the AC adapter is plugged in, the power supply microcontroller automatically switches from quick charge to trickle charge.

1.6.3 RTC Battery

The RTC battery provides the power supply to maintain the date, time, and other system information in memory. Table 1-8 lists the battery charging time and data preservation times.

Table 1-8 RTC battery charging/data preservation time

		Time
Charging time	AC adapter or main battery in use (Power ON)	8 hours (approx.)
Data preservation time (when fully charged)		1 month

1.7 AC Adapter

The AC adapter is also used to charge the battery.

Table 1-9 lists the AC adapter specifications.

Table 1-9 AC adapter specifications

Parameter	Specification
	G71C0002S310
Input rated voltage	100V/240V
Input voltage range	AC 90 to 264V
Input frequency range	50Hz to 60Hz
Input current	1.5A or less (100VAC, 240VAC/4A load)
Output rated voltage	DC 15V
Output current	0A to 4A