Dynabook Personal Computer

Satellite Pro L50-G

dynabook P*-C*

(PBS10x/PBS11x/PBS12x)

(PBS20x/PBS21x/PBS22x)

Maintenance Manual

DYNABOOK CORPORATION

S/ No

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Dynabook Satellite Pro L50-G / dynabook P*-C* Maintenance Manual

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Disclaimer

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Dynabook Personal Computer Satellite Pro L50-G /dynabook P*-C*, referred to as Satellite Pro L50-G /dynabook P*-C* in this manual.

The procedures described in this manual are intended to help service technicians isolate faulty Field Replaceable Units (FRUs) and replace them in the field.

SAFETY PRECAUTIONS

Four types of messages are used in this manual to bring important information to your attention. Each of these messages will be italicized and identified as shown below.

DANGER: "Danger" indicates the existence of a hazard that could result in death or serious bodily injury, if the safety instruction is not observed.

WARNING: "Warning" indicates the existence of a hazard that could result in bodily injury, if the safety instruction is not observed.

CAUTION: "Caution" indicates the existence of a hazard that could result in property damage, if the safety instruction is not observed.

NOTE: "Note" contains general information that relates to your safe maintenance service.

Improper repair of the computer may result in safety hazards. Dynabook requires service technicians and authorized dealers or service providers to ensure the following safety precautions are adhered to strictly.

- Be sure to fasten screws securely with the right screwdriver. If a screw is not fully fastened, it could come loose, creating a danger of a short circuit, which could cause overheating, smoke or fire.

- If you replace the battery pack or backup battery, be sure to use only the same model battery or an equivalent battery recommended by Dynabook. Installation of the wrong battery can cause the battery to explode.

The manual is divided into the following parts:

Chapter 1   Hardware Overview describes the Satellite Pro L50-G /dynabook P*-C* system units and each FRU.

Chapter 2   Troubleshooting Procedures explains how to diagnose and resolve FRU problems.

Chapter 3   Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.

Chapter 4   Replacement Procedures describes the removal and replacement of the FRUs.

Appendices   The appendices describe the following:

  ❑   Handling the LCD module
  ❑   Board layout
  ❑   Keyboard scan/character codes
  ❑   Key layout

Conventions

This manual uses the following formats to describe, identify, and highlight terms and operating procedures.

Acronyms

On the first appearance and whenever necessary for clarification acronyms are enclosed in parentheses following their definition. For example:

Read Only Memory (ROM)

Keys

Keys are used in the text to describe many operations. The key top symbol as it appears on the keyboard is printed in **boldface** type.

Key operation

Some operations require you to simultaneously use two or more keys. We identify such operations by the key top symbols separated by a plus (+) sign. For example, **Ctrl + Pause (Break)** means you must hold down **Ctrl** and at the same time press **Pause (Break)**. If three keys are used, hold down the first two and at the same time press the third.

User input

Text that you are instructed to type in is shown in the boldface type below:

DISKCOPY A: B:

The display

Text generated by the XXXXX that appears on its display is presented in the type face below:

```
Format complete
System transferred
```

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Hardware Overview

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1.1 Features

Dynabook Satellite Pro L50-G is a Slim and Light entry notebook PC based on the mobile Intel Comet lake series Processor, providing high-speed processing capabilities and advanced features. The computer employs a Lithium Ion battery that allows it to be battery-operated for a longer period of time. The display uses 15.6-inch FHD and HD LED panel, at a resolution of 1920x1080 and 1366x768. The CPU package is BGA type.

The computer has the following features:

 Processor

   CPU is mobile Intel Comet Lake Processor:

      Intel Comet Lake Celeron CPU

            Celeron 5205U (1.90G) Hz

      Intel Comet Lake Core i3 CPU

            Core i3-10110U (2.10G) Hz

      Intel Comet Lake Core i5 CPU

            Core i5-10210U (1.60G) Hz

      Intel Comet Lake Core i7 CPU

            Core i7-10510U (1.80G) Hz

            Core i7-10710U (1.10G) Hz

 Host Bridge System Controller

   System Controller: Intel integrated Host bridge system into CPU.

 Graphics

   Internal: Intel Comet Lake integrated.

   External: NVIDIA MX250 graphics.

 Memory

The computer has two SO-DIMM slots, which come standard with DDR memory module. DDR4 is driven at 1.2V. It accepts BTO for your memory requirements. It can incorporate up to 16GB of main memory.

Using the following sizes of memory modules:

4096 MB (512M64) / D D R 4 - 2 6 6 6 M H z

8192 MB (1024M64) / D D R 4 - 2 6 6 6 M H z

(The data transfer rate is varying by CPU, PC4-2666 on i3/i5/i7 but PC4-2400 on Celeron 5205U)

◻ Hard Disk Drive (HDD)

The computer accommodates 2.5-inch 7mm height SATA HDD with following storage capacities:

1 TB (7mm thick) SATA (5,400rpm)

◻ Solid State Drive (SSD)

The computer accommodates SSD with following types:

SATA SSD M.2 128GB/256GB

PCIe SSD M.2 256GB/512GB

Optane PCIe SSD M.2 512GB+32GB

Optane PCIe SSD M.2 16GB

◻ Display

LCD displays come in the following type at resolution 1920x1080 and 1366x768:

15.6" FHD 250nits eDP 1920x1080 In-Cell touch LED display

15.6" FHD 250nits eDP 1920x1080 LED display

15.6" HD 220nits eDP 1366x768 LED display

15.6" FHD 470nits eDP 1920x1080 LED display

◻ Touch Screen(Design capable only for FHD in-cell touch LED)

Support Capacitive type Touch ScreenFunction with 10 points Multi-finger.

 On-Board LAN

The internal LAN supports 10/100/1Gbit Ethernet, enabling connection to a LAN at up to 1Gbps. It supports Wake-up on LAN from S3/S4/S5 and PXE boot support. This internal LAN has RJ45 jack to directly accommodate a LAN cable.

 Wireless LAN

The internal Mini Card slot supports IEEE802.11ax+agn + Bluetooth5.0 and IEEE802.11ac+agn + Bluetooth4.2 combo Wireless LAN cards. The Antenna has two wires dual band.

 Sound System

REALTEK ALC255 integrated audio controller supports multimedia. The sound system contains the following:

Stereo speakers

Headphone jack

Integrated microphone (with Webcam)

External microphone jack

 Keyboard

26 kinds' countries keyboard, which is Non-backlight keyboard + 10 Keys black color for US/UK keyboard with 100keys layout and White color for JPN keyboard with 105 keys layout.

 Pointing Device

Click Pad and Secure Pad two pointing device support. Gesture support for precision function as Tapping/Tap and Drag/Pinch zoom/Up to 4 fingers.

 USB Port

The computer has four USB ports, two for USB3.0 type A and one of USB3.0 type A support Sleep & Charge Function. Another One is USB type C (USB3.1 Gen1/DP/PD). High-Speed USB3.0/3.1 allows data transfers up to 5Gbps,

 HDMI Out Port

A HDMI monitor can be connected to HDMI Out Port on the computer.

 Bridge Media Slot

This slot is for your memory card requirements like SD/Mini SD (need adaptor)/Micro SD (need adaptor)/SDHC/SDXC and MMC Cards to provide memory card read on your computer.

 Webcam with embedded internal microphone

The computer has an internal camera. It supports HD (0.92M) with Camera shutter and FHD(2M). It also supports Camera LED, LED is on when Camera working. The internal microphone is embedded in this camera module.

 Battery

The computer has a 4 Cell (2480mAh) Lithium Ion battery pack and integrated RTC battery function.

 Figures 1-1/1-2/1-3 and 1-4 show the computer and its system unit configuration, respectively.
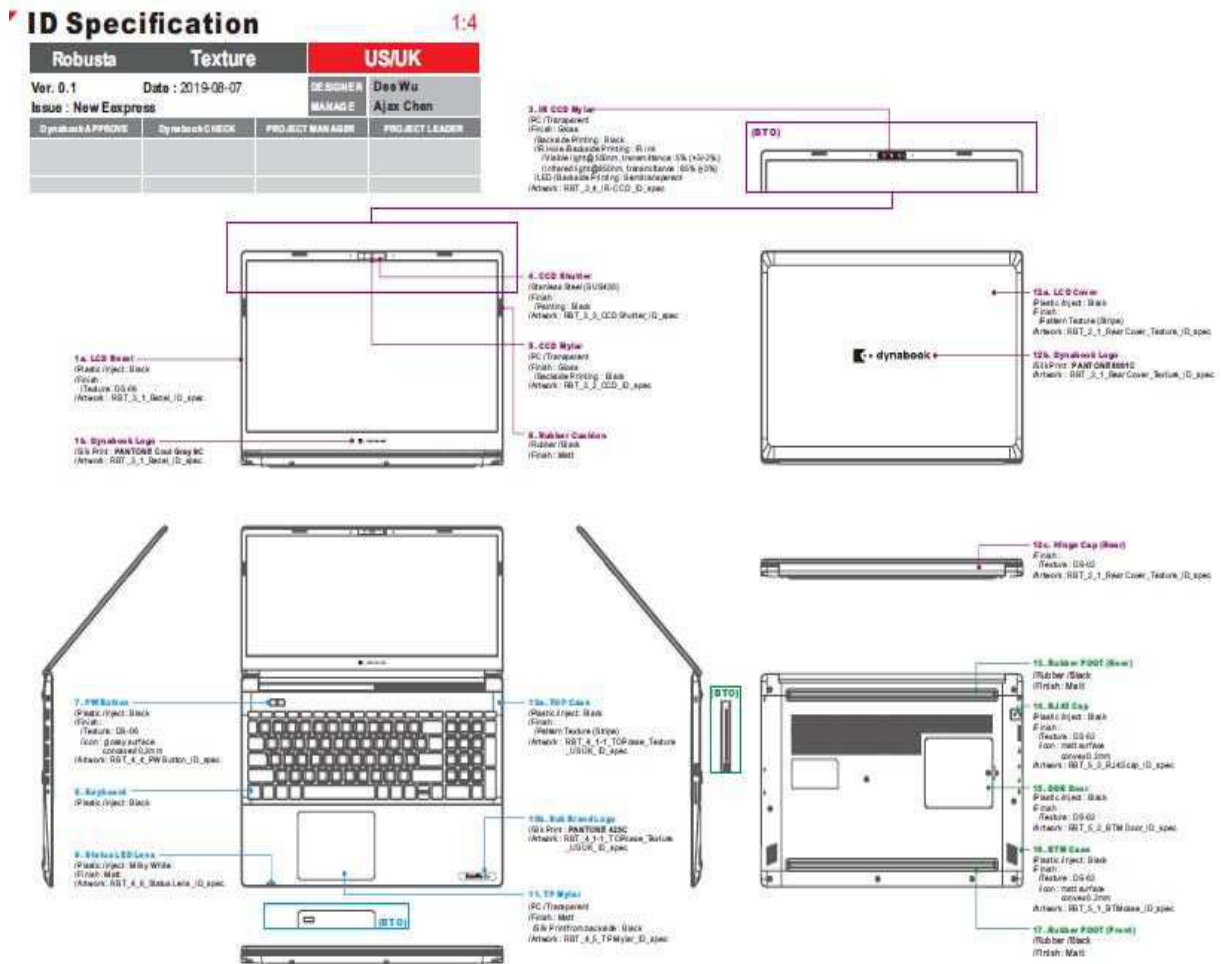
Figure 1-1 ID Parts Description Placement

Block Diagram_Intel CML U
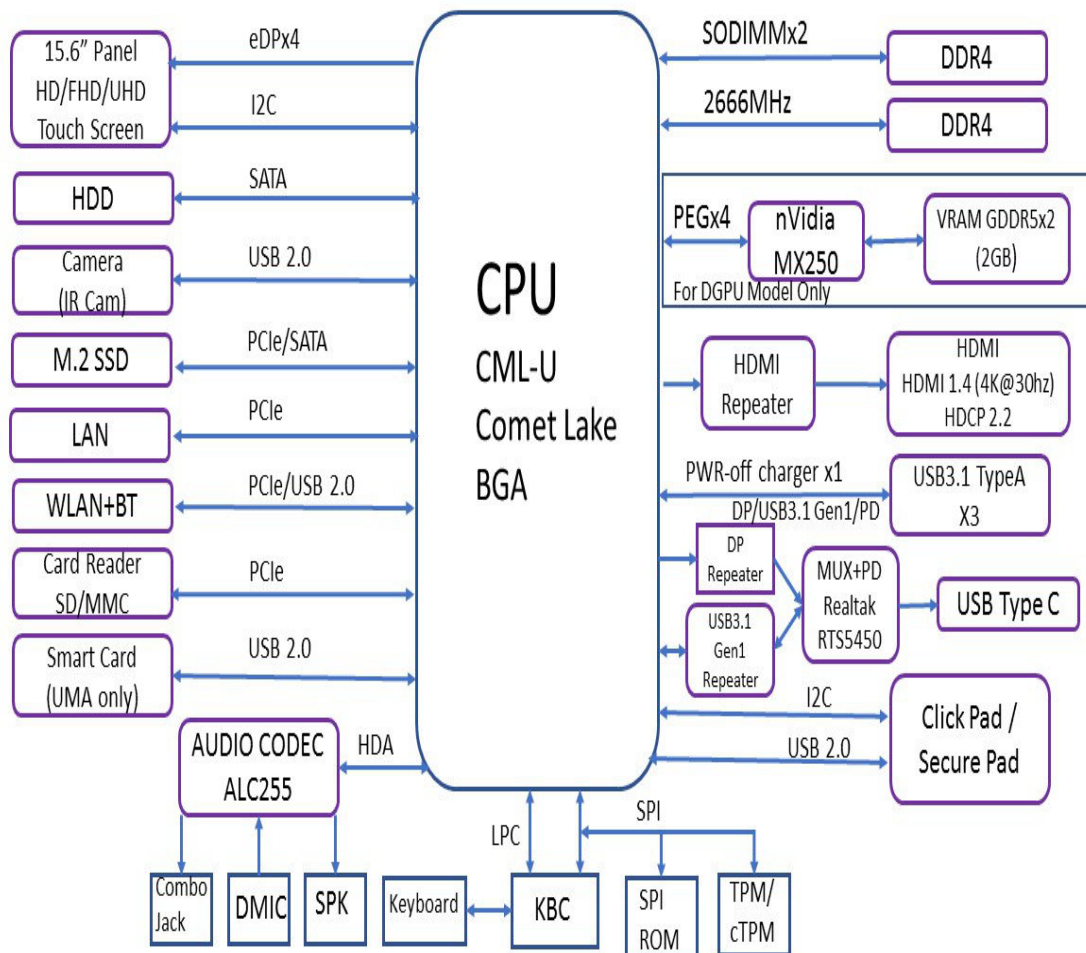
Figure 1-2 Computer Block Diagram

Port Location - UMA

Port Location - dGPU
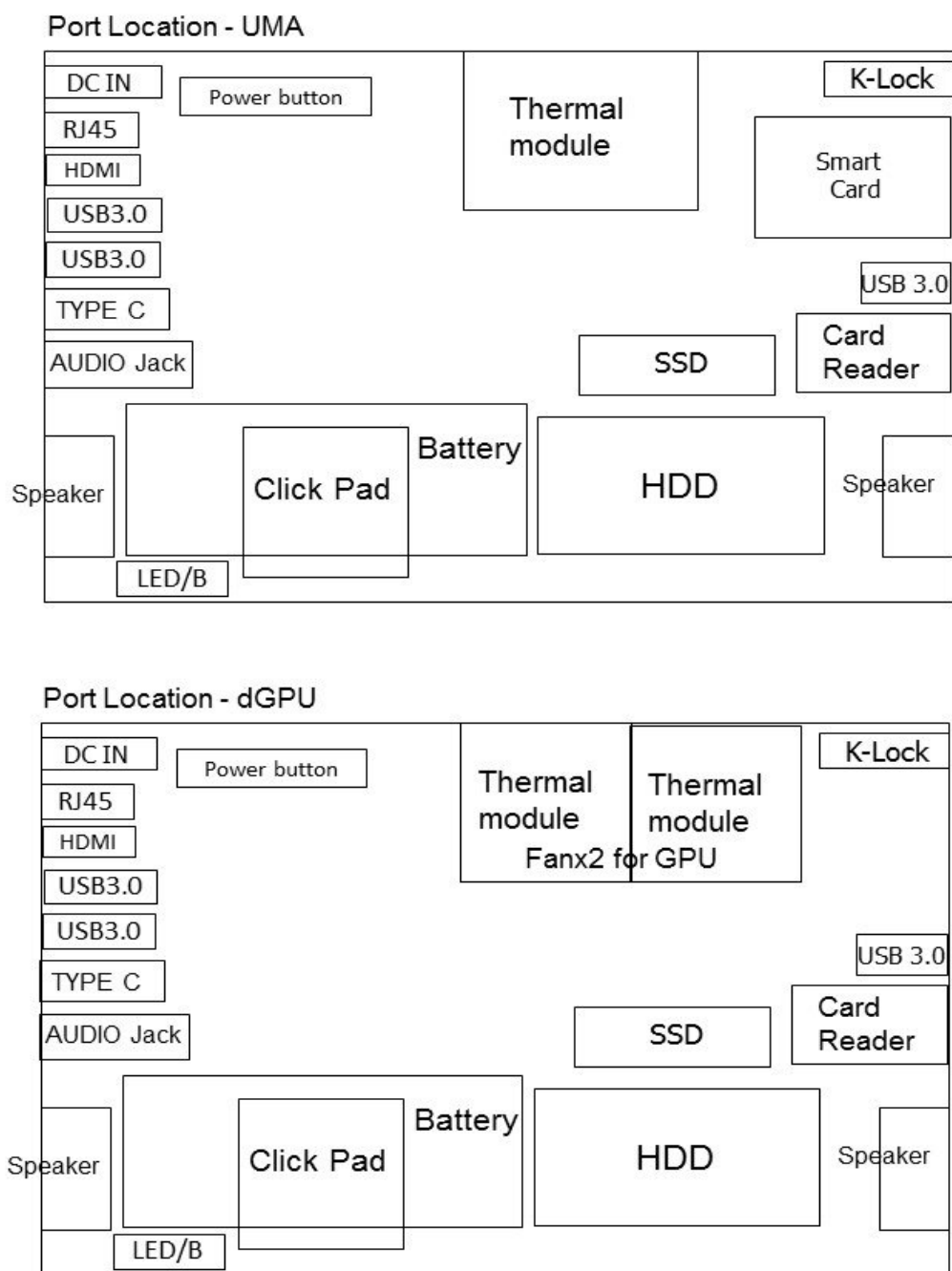
Figure 1-3 System Board Configurations

1.2 System Unit Components

Figure 1-4 is Block Diagram of the SystemUnit.
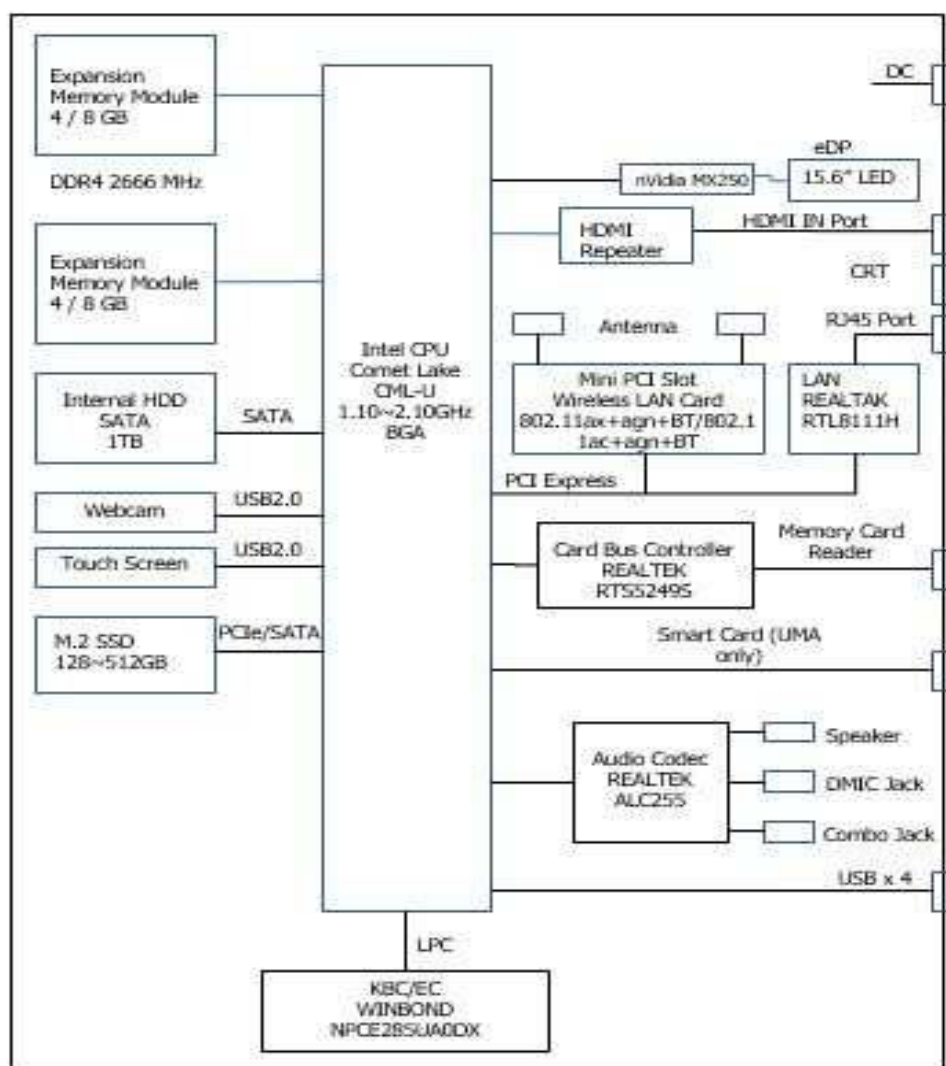
Figure 1-4 SystemUnit Block Diagram

The system unit of the computer consists of the following components:

☐ Processor: Mobile Intel Comet Lake Processor.

Intel Comet Lake Celeron 5205U Processor(TBD)

- Core Speed: 1.90 GHz
- CPU Core: Dual Cores
- Intel smart Cache: 2MB

Intel Comet Lake Core i3-10110U Processor

- Core Speed: 2.10 GHz
- CPU Core: Dual Cores
- Intel smart Cache: 4MB

Intel Comet Lake Core i5-10210U Processor

- Core Speed: 1.60 GHz
- CPU Core: Four Cores
- Intel smart Cache: 6MB

Intel Comet Lake Core i7-10510U Processor

- Core Speed: 1.80 GHz
- CPU Core: Four Cores
- Intel smart Cache: 8MB

Intel Comet Lake Core i7-10710U Processor

- Core Speed: 1.10 GHz
- CPU Core: Six Cores
- Intel smart Cache: 12MB

☐ Memory: Two expansion memory slots are provided. They can hold 4/8 GB memory modules available as options to grow up to 16GB.

PC4-2666(2666MHz) DDR4 SDRAM supported

4096/8192MB modules supported

- 4096 MB (512M x 64)
- 8192 MB (1024M x 64)

DDR4 1.2V operation

16 internal Banks (4 Bank Groups)

Data transfer rates: PC4-2666 on i3/i5/i7 CPU and PC4-2400 on CPU Celeron 5205U.

☐ BIOS ROM (Flash memory)

Storage Size

- FD Size: 16384K
- Nv Storage size: 400K
- Nv Storage Free Space: 387K
- FV00 Size: 4412K
- FV00 Free Space: 1925K
- FV01 Size: 192K
- FV01 Free Space: 4K
- FV02 Size: 384K
- FV02 Free Space: 383K
- FV03 Size: 212K
- FV03 Free Space: 17K
- FV04 Size: 512K
- FV04 Free Space: 375K
- FV05 Size: 1024K
- FV05 Free Space: 714K
- FV06 Size: 20K
- FV06 Free Space: 3K
- FV07 Size: 544K
- FV07 Free Space: 137 K
- FV08 Size: 252K
- FV08 Free Space: 181K

 System Controller

Mobile Intel integrated Comet Lake into CPU.

- System Memory Interface
- Technology Enhancements of Intel Fast Memory Access
- System Memory Frequency
- DRAM Clock Generation
- DRAM Reference Voltage Generation
- Processor Graphics Controller(GT)
- Digital Display Interface(DDI)
- Platform Environmental Control Interface(PECI)
- Advanced Configuration and Power Interface (ACPI) states supported
- Processor Core Power Management
- Integrated Memory Controller (IMC) Power Management
- Graphics Power Management
- Intel Turbo Boost Technology 2.0 Power Control
- Configurable TDP (cTDP) and Low Power Mode
- Adaptive Thermal Monitor
- Digital Thermal Sensor
- Intel Memory Thermal Management

− Scenario Design Power(SDP)

 Card Bus Controller

REALTEK RTS5249

− Memory Card ReaderController

 Audio Controller

REALTEK ALC255 integrated audio controller supports multimedia. The sound system features contain the following:

4-channel DAC supports 16/20/24-bit PCM format for independent two stereo channel or 2.1 audio playback. All DACs support 44.1k/48k/96k/192kHz sample rate.

4-channel ADC that supports 16/20/24-bit PCM format for independent two stereo channel audio inputs. All ADCs support 44.1K/48K/96/192KHz sample rates.

4 GPIOs for customized applications (pin-shared with digital microphone interface and SPDIF-OUT).

Supports three jack detection pins each designed to detect up to 2 jacks, and SPDIF-OUT jack detection.

Supports stereo digital Microphone input, and programmable boost gain and volume control.

Intel low power DCN(HDA015-B) compliant, supports power status control jack detection, and wake-up event in D3 mode.

 KBC/EC (Keyboard Controller/Embedded Controller)

A KBC WINBOND NPCE285UA0DX chip is used to serve as KBC/EC and Super IO:

KBC

− Scan controller function
− Interface controller function

EC

− Power supply sequence control
− Overheat shutdown support
− LED control
− Beep control
− Device ON/OFF
− Cooling fan speed control
− Universal I/O port
− Battery capacity check

        − Flash memory reprogramming function
        − EC accessinterface
        − I2C communication control

Clock Generator

Mobile Intel Comet Lake-U CPU integrated Clock Generator

        − Generating the clock signal required for the system

LAN Controller

REALTEK _ RTL8111H-10/100Mbit/1Gbit

        − Fully compliant with IEEE 802.3,IEEE 802.3u,IEEE 802.3ab,supportsFull duplex flow control(IEEE 802.3x)
        − Supports PCI Express 1.1
        − Transmit/Receive on-chip buffer support
        − Supports PCI MSI (MessageSignaled Interrupt) and MSI-X
        − Wake-On LAN and "RealWoW!" Technology (remote wake-up) support
        − Supports 32-set 128-byte Wake-Up Frame pattern exact matching
        − SupportsMicrosoft WPI (Wake Packet Indication)
        − Supports PCIe L1.Off and L1.Snooze

Wireless LAN Controller

Support following 2 kinds of mini PCI wireless LAN cards

        − IEEE 802.11ac+BT4.2
        − IEEE 802.11ax+BT5.0

Data Rate

        − IEEE 802.11a/g: Standard 54M bps
        − IEEE 802.11ac : Standard 433.3M bps
        − IEEE 802.11ax : Standard 1201M bps

Frequency Channel

        − IEEE802.11a/g: 2.4GHz
        − IEEE802.11ac : 5GHz

1.3 2.5-inch HDD

The computer contains an extremely low-profile, lightweight and high-performance HDD. The HDD incorporates 7mm height magnetic disk and mini-Winchester type magnetic heads. The HDD interface conforms to Serial ATA. Storage capacities supported is 1TB.

The HDD is shown in Figure 1-5 and some of its specifications are listed in Table 1-1.
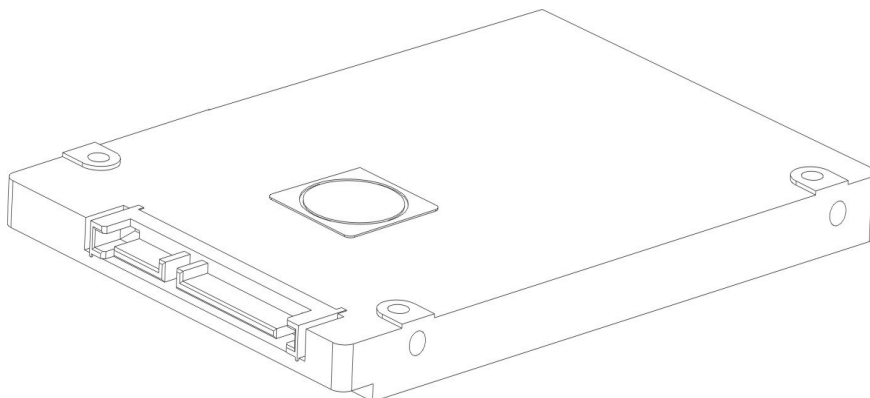
Figure 1-5 SATA HDD

Item	Specifications
Capacity (GB)	**1 TB**
Rotational Speed (RPM)	5400 rpm
Height	7 mm
User Data Sectors	1,953,525,168
Bytes / Sector	512

Table 1-1 HDD Specifications

1.4 Solid State Drive (SSD)

The M.2 PCIe SSD is fully consist of semiconductor device and using NAND flash Memory which has a high reliability   and a high technology in a small form factor for using a SSD and supporting Peripheral Component Interconnect Express (PCIe) 3.0 interface standard up to 4 lanes shows much faster performance than previous SATA SSDs.

The SSD is shown in Figure 1-6 and some of its specifications are listed in Table 1-2.
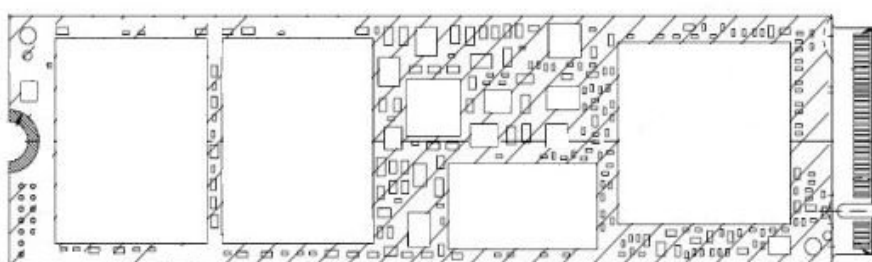
Figure 1-6 *Solid state driver*

Table 1-2 SSD Specifications

Item	Read	Write	Data transfer rate	LBA	Bytes per sector
M.2 PCIe 256G SSD	3,000MB/s	1,300MB/s	128KB	500118192	512Byte
M.2 PCIe 512G SSD	3,000MB/s	1,800MB/s	128KB	1000215216	512Byte
M.2 PCIe 512G SSD Optane	2,300MB/s	1,300MB/s	128KB	1000215216	512Byte
M.2 PCIe 16G SSD Optane	900MB/s	145MB/s	128KB	28131328	512Byte
M.2 PCIe 128G SSD(Value)	2,300MB/s	1,800MB/s	128KB	250069280	512Byte
M.2 PCIe 256G SSD(Value)	2,300MB/s	1,800MB/s	128KB	500118192	512Byte
M.2 PCIe 512G SSD(Value)	2,300MB/s	1,800MB/s	128KB	1000215216	512Byte

1.5 Power Supply

The power supply unit provides many different voltages for the system board and performs the following functions:

1. Power input monitor

   Checks whether the DC power supply (AC adapter) is connected to the computer.

   Checks whether the battery pack is connected to the computer.

   Monitors the DC power supply input voltage (AC Adapter output voltage).

2. Power supply's internal control

   Turns on and off the battery pack charging power supply.

   Issues a charging current instruction to the PWM control IC of the battery pack charging power supply.

   Controls the supply of DC power supply input (AC Adapter output) to the power supply unit.

   Controls the supply of power to the system block (load/logic circuit side).

   Controls forced shutdown if the power supply malfunctions.

3. Logic circuit control

   Instructs the gate array to enable/disable tuning the power on.

   Controls power-on/off operation.

4. Status display

   Turns on the Power.

   Battery indicator (in White or Amber or Amber Blink).

5. External interface

   Performs communication through the I2C bus (via the internal EC/KBC).

   Transfers the power supply operation mode.

6. Output monitor

   Monitors the voltage output to the system block (load/logic circuit side).

   Monitors the voltage, over voltage, input/output current of the battery pack.

   Monitors the internal temperature of the battery pack.

   Monitors the supply voltage from the AC adapter.

1.6 Batteries

The computer has the following type of battery:

 Main Battery Pack

Table 1-4 list the specifications of battery.

Table 1-3 Battery Specifications

Battery Type		Material	Output voltage	Capacity
Main Battery Pack	4 Cell	Lithium Ion	15.4 V	2480 mAh

1.61   Main Battery

The main battery pack serves as the computer's main power source when the AC adapter is not attached. The main battery maintains the state of the computer so that it   can resume it.

1.62   Battery Charging Control

Battery charging is controlled by TI BQ24780S. When AC adapter and battery pack are attached to the computer, BQ24780S controls the charge on/off state and detects a full charge.

 Battery Charge

When the AC adapter is attached, the battery is charged by off-state charge when the system is powered off or by on-state charge when it is powered on.

Table 1-4 Quick/Normal Charging Time

State	Charge Time	
Off-State Charge	4 Cell	Less than 4 hours
On-State Charge	4 Cell	over 4 hours

NOTE: The time required for normal charge depends on the power consumption by the system. Using the fluorescent lamp and frequently accessing the disk consume much power and lengthen the charge time.

Any of the following cases stops battery charge:

1. The battery becomes fully charged.

2. The AC adapter or battery pack is removed.

3. The battery or AC adapter voltage is abnormal.

 Detection of full charge

A full charge is detected only when the battery is being charged by quick or normal charge. A full charge is detected when either of the following conditions is met:

1. The current in the battery charging circuit drops below the predetermined value.

2. The charging time exceeds the fixed limit.

Chapter 2
Troubleshooting

Chapter 2   Contents

Figures

2.1 Outline

This chapter describes the fault diagnostic procedures for field replaceable units (FRUs) in the computer.

The FRUs covered here are as follows:

1. System Board	2. HDD	3. Keyboard
4. Display	5. Memory	6. SSD
7. Audio	8. Touchpad	9. USB Port
10. Headphone Port	11. Microphone Port	12. Smart Card Port
13. HDMI Port	14. SD Card Port	15. Camera
16. Wireless LAN	17. Battery Pack	18. Finger Print
19. Bluetooth	20. LAN	

This Model support two types platform, one is Intel Comet lake with UMA, other one is Intel Comet lake with dGPU. See Chapter 4 for the procedures to replace FRUs and Chapter 3 for the procedures to use test programs.

The following tools are required to perform the diagnostic procedures:
1. USB Memory
2. Screwdrivers (2.0mm, 2.5mm)
3. Multi-meter
4. External monitor with HDMI In Port
5. Headphone
6. Microphone
7. Smart Card
8. SD card

2.2 Basic Flowchart

The basic flowchart in Figure 2-1 serves as a guide for identifying a possibly faulty FRU.

Before going through the diagnostic flowchart steps, verify the following:

- Ask the user if a password has been registered and, if so, ask him or her to enter the password. If the user has forgotten the system password, please follow erase password process. To obtain necessary details about the process, please contact Tech Support team:

  ✉ EMEA Tech Support contact: tech-support_eu@dynabook.com

- Make sure Windows® 10 has been installed on the HDD. Any other operating system can cause the computer to malfunction.

Figure 2-1   Basic Flowchart (1/2)

①

Keyboard works well?? — **No** → Follow the keyboard diagnostic Procedure in Section 2.6

Insert Bootable USB Memory into USB Port.

Diagnostic Program is loaded? — **No** → Follow the USB port diagnostic Procedure in Section 2.12

Yes

Perform each test with the diagnostic program.

Any error is detected by the diagnostic program? — **Yes** → Identify the test resulting in the error And perform the appropriate Diagnostic procedures

No

Perform the continuous test to check if the error is intermittent

Any error is detected by the diagnostic program? — **Yes** → Identify the test resulting in the Error and perform the appropriate Diagnostic procedures

No

The system is normal.

END

Figure 2-1   Basic Flowchart (2/2)

If diagnostic program cannot detect an error, the error may be intermittent. Run continuous test program repeatedly to isolate problem. Check log utility function to confirm which diagnostic test detects error, and perform appropriate troubleshooting procedures as below:

1. If an error is detected by CPU Test, follow the system board troubleshooting procedures in Section 2.4.
2. If an error is detected by HDD Test, follow the HDD troubleshooting procedures in Section 2.5.
3. If an error is detected by Keyboard Test, follow the keyboard troubleshooting procedures in Section 2.6.
4. If an error is detected by Display Test, follow the display troubleshooting procedures in Section 2.7.
5. If an error is detected by Memory Test, follow the memory troubleshooting procedures in Section 2.8.
6. If an error is detected by SSD Test, follow the SSD troubleshooting procedures in section 2.9.
7. If Audio error is detected by Windows application, please follow the audio troubleshooting procedures in Section 2.10.
8. If Touchpad error is detected by Windows application, please follow the touchpad troubleshooting procedures in Section 2.11.
9. If USB error is detected by Windows application, please follow the USB port troubleshooting procedures in Section 2.12.
10. If Headphone error is detected by Windows application, please follow the headphone port troubleshooting procedures in Section 2.13.
11. If Microphone error is detected by Windows application, please follow the microphone troubleshooting procedures in Section 2.14.
12. If Smart Card error is detected by Windows application, please follow the Smart Card port troubleshooting procedures in Section 2.15.
13. If HDMI error is detected by Windows application, please follow the HDMI port troubleshooting procedures in Section 2.16.
14. If SD Card error is detected by Windows application, please follow the SD Card Port troubleshooting procedures in Section 2.17.
15. If Camera error is detected by Windows application, please follow the Camera troubleshooting procedures in Section 2.18.
16. If Wireless LAN error is detected by Windows application, please follow the Wireless LAN troubleshooting procedures in Section 2.19.
17. If Battery error is detected by Windows application, please follow the Battery troubleshooting procedures in Section 2.20.
18. If Finger Print error is detected by Windows application, please follow the Finger Print troubleshooting procedures in Section 2.21.
19. If Bluetooth error is detected by Windows application, please follow the Bluetooth troubleshooting procedures in section 2.22.
20. If LAN Port error is detected by Windows application, follow the LAN Port troubleshooting procedures in section 2.23

2.3 Power Supply

The power supply in the computer controls many functions and components. To check if the power supply is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1   Power Icon Check

Procedure 2   Connection Check

Procedure 3   Replacement Check

Procedure 1 Power Icon Check

The following power LED indicates the power supply status:

❑   DC IN/Battery ChargeLED

The power supply controller displays the power supply status through the DC IN/Battery Charge LED as in the table below.

❑   DC IN/Battery ChargeLED

DC IN/Battery Charge LED	Power Supply Status
On in White	Both DC Power is been supplying from AC Adapter and Battery is fully Charged.
On in Amber	Battery is been Charging from AC Adapter.
Blinking in Amber (at equal intervals)	Battery low while driving the computer. Battery low critical.
Off	Battery damage or Else.

If the DC IN/Battery Charge LED is off, follow the steps below:
1. Remove the battery pack and the AC adapter to shut off power supply to the computer. Shut down the computer. Next, remove the AC adapter. Then disassemble the computer and replace the battery. Next, assemble to check the battery.
2. Attach the battery and AC adapter back again.

If the DC IN/Battery Charge LED is still off, follows the steps below:

Check 1   Make sure the DC IN/Battery Charge LED goes on in White or Amber. If it does not, go to Procedure 2.

Check 2   Make sure the DC IN/Battery Charge LED goes on in White or Amber again. If it does not, go to Procedure 3.

Procedure 2 Connection Check

Power is supplied to the system board as illustrated below:

```
  ___                ┌──────────┐        ┌──────────────────────┐
 /   \──────────────│    AC    │────────│    System board      │
│     │              │ adaptor  │        │                      │
 \___/──┐         ┌──└──────────┘──┐     └──────────────────────┘
         \       /                  \                  │
  ┌───────────────┐  ┌─────────────────┐      ┌──────────────────┐
  │ AC power cord │  │ AC adaptor cord │      │   Battery pack   │───
  └───────────────┘  └─────────────────┘      └──────────────────┘
```
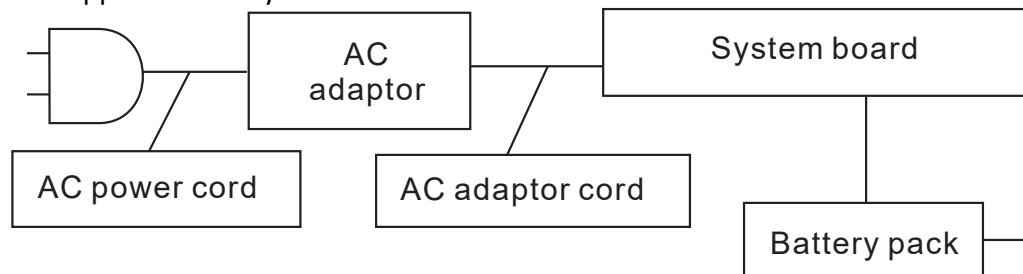
Follow the steps below to check whether each connector has been connected correctly:

Check1   **Make sure the AC adaptor and AC power cord have been firmly plugged into the DCIN socket and wall outlet, respectively. When they have been connected correctly, perform Check2.**

Check2   **Connect a new AC adaptor and AC power cord.**

Check3   **Make sure the battery pack has been correctly installed in the computer. If the LED does not go on while the battery pack has been installed correctly, go to Procedure 3.**

Procedure 3 Replacement Check

The system board may be faulty. Disassemble the computer according to Chapter 4 and follow the steps below:

Check1   **Replace the system board with a new one.**

2.4 System Board

To check if the system board is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Message Check

Procedure 2 Test Program Check

Procedure 3 Replacement Check

Procedure 1 Message Check

When the power is turned on, the system performs the self-diagnostic Power On Self Test (POST) embedded in the BIOS ROM. The POST tests and initializes each IC on the system board.

 If an error message appears on the display, perform Check 1.

 If there is no error message, go to Procedure 2.

 If Window 10 is loaded normally, go to Procedure 3.

Procedure 2 Test Program Check

The maintenance test program contains several programs for diagnosing the system board and CPU. Execute the following test programs using the procedures described in Chapter 3.

1. System Information Test
2. CPU Test
3. Memory Test
4. HDD Test
5. Video Test
6. Keyboard test
7. LED Test
8. FAN Test
9. DMI Read/Write Test
10. SSD Test

If an error is detected during these tests, go to Procedure 3.

Procedure 3 Replacement Check

The system board or memory may be defective. Disassemble the computer following the steps described in Chapter 4 and replace the system board, memory module with a new one.

2.5 HDD

To check if the 7.0mm HDD is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

CAUTION: The contents of the HDD will be erased when the HDD diagnostic test or formatting is executed. Save the required contents of the HDD to other storage drive in advance.

Procedure 1 Test Program Check

Run the HDD test program stored on the maintenance test program disk for all test items.
See Chapter 3 for details on how to use the test program.
If an error is detected during the HDD test, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The HDD or system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1   **Make sure the following connectors have been firmly connected to the HDD, system board.**
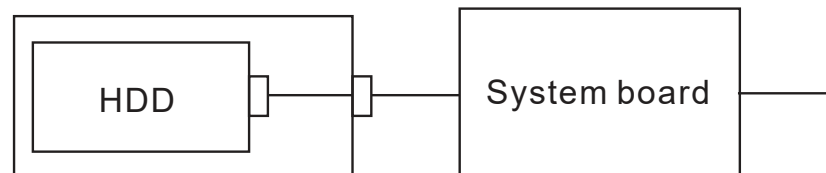
If any connector is loose or off, reconnect it firmly and return to Procedure 1.
If there is still an error, perform Check 2.

Check2   **The HDD may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 3.**

Check3   **The System board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4.**

2.6 Keyboard

To check if the computer's keyboard is defective or malfunctioning, follow troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

Execute the Keyboard test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test. Some Keyboard have support Illumination (Backlit) function, check this function during Keyboard test when press any key.
If an error is detected in the test, go to Procedure 2. If no error is detected, the keyboard itself is normal.

Procedure 2 Connector Check and Replacement Check

The keyboard or system board may be disconnected or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1　　**Make sure the keyboard cable has been firmly connected to the system board.**
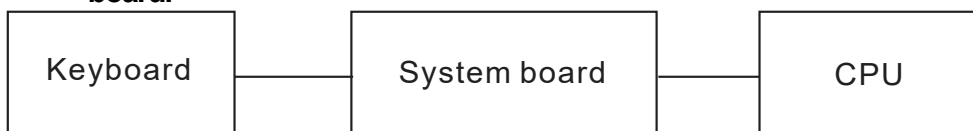
Keyboard	—	System board	—	CPU

If the cable is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check2　　**The keyboard may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 3.**

Check3　　**The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the keyboard is still not functioning properly, perform Check 4.**

Check4　　**The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4.**

2.7 Display

To check if the computer's display is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 External Monitor Check (Monitor with HDMI terminal)

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

Procedure 1 External Monitor Check

Connect an external monitor to the computer's external monitor port, then boot the computer. The computer automatically detects the external monitor even if resume mode is enabled.

If the external monitor works correctly, the internal LCD, or LCD cable may be faulty. Go to Procedure 3.

If the external monitor appears to have the same problem as the internal monitor, the system board may be faulty. Go to Procedure 2.

Procedure 2 Test Program Check

Insert the diagnostics USB Memory into the computer's USB Port, turn on the computer and run the test. See Chapter 3 for information on how to perform the test.

If an error is detected in the test, go to Procedure 3. If no error is detected, the display itself is normal.

Procedure 3 Connector Check and Replacement Check

The display unit has an LCD module, LED Backlight module, panel close switch. Any of the components or their connections may be defective. Disassemble the computer following steps described in Chapter 4, and then perform the following checks:

(1)   If the FL does not light, perform Check 1.
(2)   If characters or graphics are not displayed normally, perform Check 5.
(3)   If the FL remains lit when the display is closed, the panel close switch may be
      defective. Perform Check 8.

Check 1   Make sure the following cables have been firmly connected to the system board.

```
┌──────────┐                              ┌──────────────┐
│          │                              │              │
│   LCD    │──────────────        ───────│ System board │
│          │              ╲               │              │
└──────────┘               ╲              └──────────────┘
                            ╲LCD cable
```

If any of the cables is loose or off, reconnect it firmly and return to Procedure

     3. **If there is still an error, perform Check2.**

Check2   **The LCD cable may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check3.**

Check3   **Make sure the LCD cable has been firmly connected to the system board and LCD module, if the cable is loose or off, reconnect it firmly and return to Procedure 3. If there is still an error, perform Check4.**

Check4   **The LCD module may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check5.**

Check5   **The Systemboard may be faulty. Replace it with a new one. If there is still an error, perform Check6.**

Check6   **The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4.**

2.8   Memory

To check if the computer's Memory Module is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1   Test Program Check

Execute Memory Test Program available as part of the maintenance test program. This test program checks the memory module. Insert the diagnostics USB Memory into the computer's USB Port, turn on the computer and run the test. See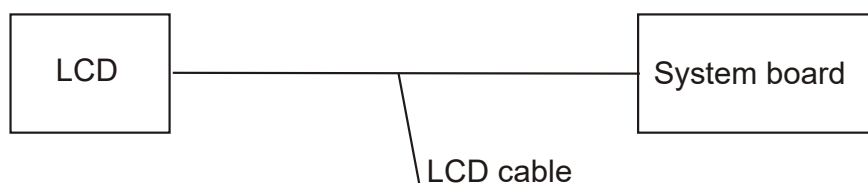 Chapter 3 for information on how to perform the test. If any error is detected by the test, go to Procedure 2. If no error is detected, Memory Module is functioning properly.

Procedure 2   Connector Check and Replacement Check

The memory module is connected to the system board. If the memory module malfunctions, there may be a bad connection between Memory Module and System Board, or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1   **Make sure Memory Module has been firmly connected to the connector on System Board. Also make sure the tape is not stuck to any part of Memory Module and Memory Module is free of foreign matters.**

```
+-------------------+        +---------------------+
|                   |        |                     |
|  Memory Module    |--------|    System Board     |
|                   |        |                     |
+-------------------+        +---------------------+
```

And if connector is disconnected, connect it firmly to system board & return to Procedure 1. If the tape is stuck to any part of memory, stick it back to the specified point and if a foreign matter is found on memory, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

Check2   **Memory Module may be faulty. Replace it with a new one following the steps described in Chapter 4. If Memory Module replaced is still not functioning properly, perform Check3.**

Check3   **System Board may be defective. Replace System Board with new one following steps described in Chapter 4.**

2.9 SSD (Solid-state Drive)

To check if the SSD is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

CAUTION: The contents of the SSD will be erased when the SSD diagnostic test or formatting is executed. Save the required contents of the SSD to other storage drive in advance.

Procedure 1 Test Program Check

Run the storage test program stored on the maintenance test program disk for all test items. See Chapter 3 for details on how to use the test program.

If an error is detected during the SSD test, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The SSD or system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks s:

Check 1   **Make sure the following connectors have been firmly connected to the SSD and system board.**
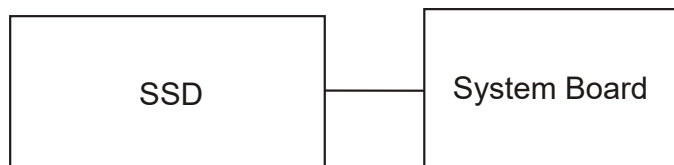
If any connector is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2   **The SSD may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 3.**

Check 3   **The System board may be faulty. Replace it with a new one following the instructions in Chapter 4.**

2.10 Audio Test

To check if the computer's Speaker is defective or malfunctioning, follow troubleshooting procedures below as instructed.

Procedure 1 Windows Application Test
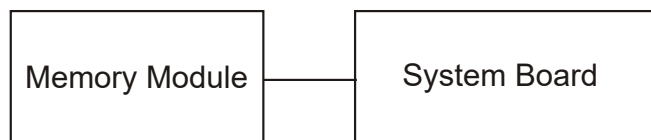
Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Speakers are connected to System Board through cable. Please power on the computer into Windows. The computer will automatically detect these speakers.
If an error is detected in the test, go to Procedure 2. If no error is detected, the Audio itself is normal.

Procedure 2 Connector Check and Replacement Check

The Audio or system board may be disconnected or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   Make sure the Speaker cable has been firmly connected to the system board.

```
┌──────────────┐          ┌──────────────────┐
│              │          │                  │
│   Speaker    │──────────│   System board   │
│              │          │                  │
└──────────────┘          └──────────────────┘
```

If the cable is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2   The Speaker may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 3.

Check 3   The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the Audio is still not functioning properly, perform Check 4.

Check 4   The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4.

2.11 Touchpad

This model has support two kind types Touch Pad. One is normal touch pad, another is secure pad. To check if the computer's Touchpad or Secure pad is defective or malfunctioning, follow troubleshooting procedures below as instructed.

Procedure 1 Windows Application Test

Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test
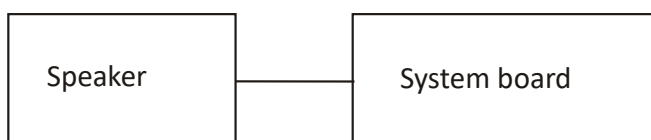
The Touchpad or Secure Pad module is connected to System Board through FFC cable. Please power on the computer into Windows. The computer will automatically detect this touchpad or Secure Pad device. If the touchpad or Secure Pad device appears to have a certain problem, go to Procedure 2. If an error is not located, Touchpad or Secure Pad itself is normal.

Procedure 2 Connector Check and Replacement Check

Touchpad or Secure Pad Module is connected to the system board through FFC Cable.

If Touchpad or Secure Pad Module malfunctions, there may be a bad connection between Module and System Board, or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1 **Make sure Touchpad or Secure Pad Module has been firmly connected to the connector on System Board. Also make sure the tape is not stuck to any part of Touchpad Module and Touchpad or Secure Pad Module is free of foreign matters.**
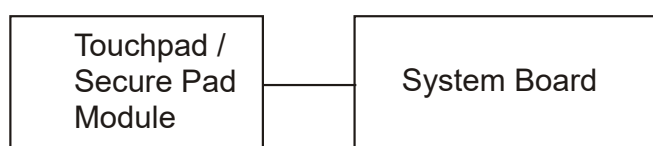
```
┌──────────────┐       ┌──────────────────┐
│ Touchpad /   │       │                  │
│ Secure Pad   │───────│  System Board    │
│ Module       │       │                  │
└──────────────┘       └──────────────────┘
```

And if connector is disconnected, connect it firmly to system board & return to Procedure 1. If the tape is stuck to any part of Touchpad or Secure pad, stick it back to the specified point and if a foreign matter is found on Touchpad or Secure pad, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

Check2 **Touchpad or Secure Pad Module may be faulty. Replace it with a new one following the steps described in Chapter 4. If Touchpad or Secure Pad Module replaced is still not functioning properly, perform Check3.**

Check3 **System Board may be defective. Replace System Board with new one following steps described in Chapter 4.**

2.12 USB Port

To determine if the computer's USB Port is functioning properly or malfunctions, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test

Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

The USB Port Connector is mounted on System Board. Connect a USB device with USB interface to the computer's USB port, then power on the computer into Windows. The computer will automatically detect this USB device through USB Port. Some SKU have support USB3.0 port with Sleep & Charge function. Check this function by USB device charge when system suspend mode. If the USB device appears to have a certain problem, go to Procedure 2. If an error is not located, USB Port is functioning properly.

Procedure 2 Connector Check and Replacement Check

If USB Port on System Board malfunctions, there may be a bad connection between USB device and System Board, or either of System Board might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure USB device cable has been firmly connected to USB Port of System Board. Also make sure USB Port on System Board is free of foreign matters.**

```
┌─────────────┐        ┌─────────────┐
│             │        │             │
│  USB Port   │────────│ System Board│
│             │        │             │
└─────────────┘        └─────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on USB Port of System Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2   **System Board may be faulty. Replace it with a new one following the steps described in Chapter 4.**

2.13 Headphone Port

To determine if the computer's Headphone Port is functioning properly or malfunctions, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test
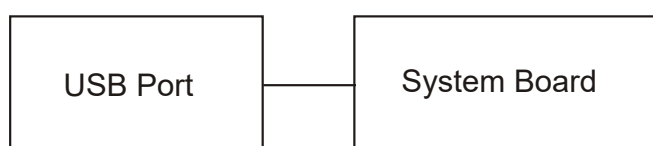
Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Headphone Port Connector is mounted on System Board. Connect external Headphone with Headphone Jack interface to the computer's Headphone Port, then power on the computer into Windows. The computer will automatically detect this Headphone device through Headphone Port. Execute Function Programs in Windows, if the Headphone device appears to have a certain problem, go to Procedure 2. If an error is not located, Headphone Port is functioning properly.

Procedure 2 Connector Check and Replacement Check

If Headphone Port on System Board malfunctions, there may be a bad connection between Headphone device and System Board, or either of System Board might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1   **Make sure Headphone device cable has been firmly connected to Headphone Port of System Board. Also make sure Headphone Port on System Board is free of foreign matters.**

```
┌──────────────┐        ┌──────────────────┐
│  Headphone   │        │                  │
│    Port      │────────│   System Board   │
│              │        │                  │
└──────────────┘        └──────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Headphone Port of System Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check2   **System Board may be faulty. Replace it with a new one following the steps described in Chapter 4.**

2.14 Microphone Port

To determine if the computer's Microphone Port is functioning properly or malfunctions, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test
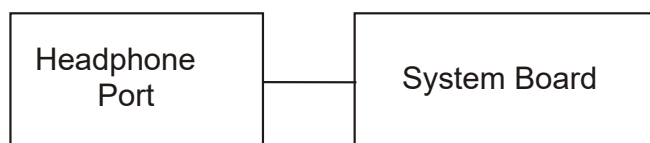
Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Microphone Port Connector is mounted on System Board. Connect external Microphone with Microphone Jack interface to the computer's Microphone Port, then power on the computer into Windows. The computer will automatically detect this Microphone device through Microphone Port. Execute Function Programs in Windows, if the Microphone device appears to have a certain problem, go to Procedure 2. If an error is not located, Microphone Port is functioning properly.

Procedure 2 Connector Check and Replacement Check

If Microphone Port on System Board malfunctions, there may be a bad connection between Microphone device and System Board, or either of System Board might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   Make sure Microphone device cable has been firmly connected to Microphone Port of System Board. Also make sure Microphone Port on System Board is free of foreign matters.
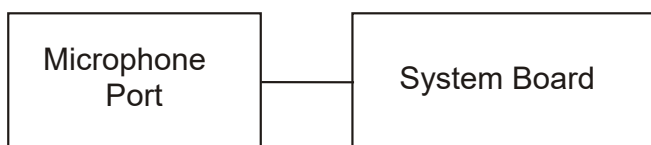
Microphone Port	System Board

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Microphone Port of System Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2   System Board may be faulty. Replace it with a new one following the steps described in Chapter 4.

2.15 Smart card Port

Smart card Board or System Board may be the reason of Smart card fault. Either of these two components may be damaged. To determine if the computer's Smart card Board is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

> Procedure 1 Windows Application Test
>
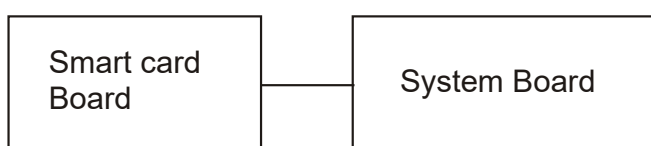> Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Put a Smart Card into Smart Card Slot, then power on the computer into Windows. The computer will automatically detect this Smart Card through Smart Card Slot. Execute Function Programs in Windows, if the Smart Card is not functioning properly, go to Procedure 2. If an error is not located, Smart Card system is functioning properly.

Procedure 2 Connector Check and Replacement Check

Smart Card Board is connected to System Board through FFC Cable. If Smart Card malfunctions, there may be a bad connection between Smart Card Board and System Board, or either of these two components might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure Smart Card Board FFC Cable has been firmly connected to the connector on System Board. Also make sure Smart Card Board is free of foreign matters.**

```
┌─────────────┐        ┌─────────────────┐
│ Smart card  │        │                 │
│ Board       │────────│  System Board   │
│             │        │                 │
└─────────────┘        └─────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Smart Card Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2   **Smart Card Board may be faulty. Replace it with a new one following the steps described in Chapter 4. If Smart Card Board replaced is still not functioning properly, perform Check 3.**

Check 3   **System Board may be defective. Replace System Board with a new one following steps described in Chapter 4.**

2.16 HDMI Port

To determine if the computer's HDMI Port is functioning properly or malfunctions, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test

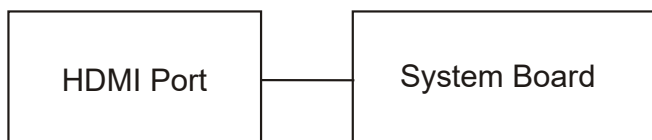Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

The HDMI Port Connector is mounted on System Board. Connect an external monitor with HDMI interface to the computer's HDMI port, then power on the computer into Windows. The computer will automatically detect this external monitor through HDMI Port. If the external monitor appears to have a certain problem, go to Procedure 2. If an error is not located, HDMI Port is functioning properly.

Procedure 2 Connector Check and Replacement Check

If HDMI Port on System Board malfunctions, there may be a bad connection between External Monitor and System Board. Or System Board might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure External Monitor HDMI Cable has been firmly connected to HDMI Port on System Board. Also make sure HDMI Port on System Board is free of foreign matters.**

```
┌──────────────┐        ┌──────────────┐
│              │        │              │
│  HDMI Port   │────────│ System Board │
│              │        │              │
└──────────────┘        └──────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on HDMI Port of System Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2   **System Board may be faulty. Replace it with a new one following the steps described in Chapter 4.**

2.17 SD card Port

IO Board or System Board may be the reason of SD fault. Either of these two components may be damaged. To determine if the computer's IO Board is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test

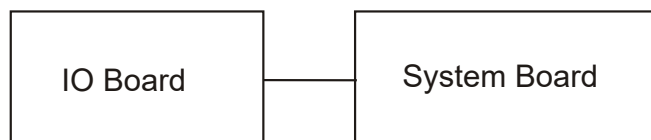Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Put a SD Card into SD Card Port, then power on the computer into Windows. The computer will automatically detect this SD Card through SD Port. Execute Function Programs in Windows, if the SD is not functioning properly, go to Procedure 2. If an error is not located, SD system is functioning properly.

Procedure 2 Connector Check and Replacement Check

IO Board is connected to System Board through FFC Cable. If SD Card malfunctions, there may be a bad connection between IO Board and System Board, or either of these two components might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 **Make sure IO Board FFC Cable has been firmly connected to the connector on System Board. Also make sure IO Board is free of foreign matters.**

```
┌──────────────┐          ┌──────────────────────┐
│              │          │                      │
│   IO Board   │──────────│    System Board      │
│              │          │                      │
└──────────────┘          └──────────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on IO Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2 **IO may be faulty. Replace it with a new one following the steps described in Chapter 4. If IO Board replaced is still not functioning properly, perform Check 3.**

Check 3 **System Board may be defective. Replace System Board with a new one following the steps described in Chapter 4.**

2.18 Camera

Camera Module or System Board may be the reason of Camera fault. Either of these two components may be damaged. To determine if the computer's Camera is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test

Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Execute Function Programs in Windows, LED of Camera Module should be turned on when Camera is working, if Camera Module is not functioning properly, go to Procedure 2. If an error is not located, Camera system is functioning properly.

Procedure 2 Connector Check and Replacement Check

Camera Module is connected to System Board through FPC Cable. If Camera malfunctions, there may be a bad connection between Camera Module and System Board, or either of these two components might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 **Make sure Camera Module FPC Cable has been firmly connected to the connector on System Board. Also make sure Camera Module is free of foreign matters.**
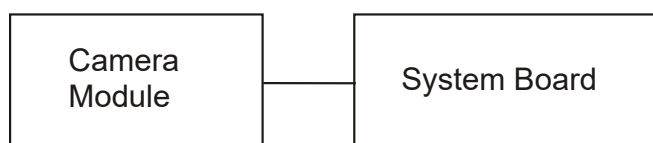
| Camera Module | —— | System Board |

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Camera Module, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2 **Camera Module may be faulty. Replace it with a new one following the steps described in Chapter 4. If Camera Module replaced is still not functioning properly, perform Check 3.**

Check 3 **System Board may be defective. Replace System Board with a new one following the steps described in Chapter 4.**

2.19 Wireless LAN

Wireless Module or system board may be the reason of Wireless LAN fault. Either of these two components may be damaged. To determine if the computer's Wireless LAN module is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedures as instruction below.

> Procedure 1 Windows Application Test
>
> Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Place unit to location near wifi hotspot. Execute wifi applications in Windows, then active wireless connection. Check whether unit can normally connect to wifi hotspot. If connection is fail, go to Procedure 2. If error is not located, Wireless LAN system is functioning properly.

Procedure 2 Connector Check and Replacement Check

Wireless LAN Module is connected to the system board. If Wireless LAN malfunctions, there may be a bad connection between Wireless LAN Module and the system board, or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure Wireless LAN module has been firmly connected to the connector on the system board. Also make sure Wireless LAN module is free of foreign matters.**
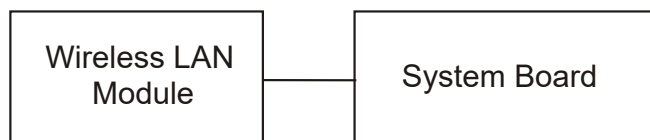
```
┌─────────────────┐         ┌─────────────────┐
│  Wireless LAN   │         │                 │
│     Module      │─────────│  System Board   │
│                 │         │                 │
└─────────────────┘         └─────────────────┘
```

> And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Wireless LAN Module, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

Check 2   **Wireless LAN Module may be faulty. Replace it with a new one following the steps described in Chapter 4. If Wireless LAN Module replaced is still not functioning properly, perform Check 3.**

Check 3   **System Board may be defective. Replace System Board with a new one following the steps described in Chapter 4.**

2.20 Battery Pack

Battery Pack or system board may be the reason of Battery fault. Either of these two components may be damaged. To determine if the computer's Battery Pack is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedures as instruction below.

>   Procedure 1 Windows Application Test
>
>   Procedure 2 Windows Application Test
>
>   Procedure 3 Connector Check and Replacement Check

Procedure 1 Windows Application discharge Test

Boot up unit from Battery only, make sure AC adaptor power cable doesn't connect to unit .

If unit can't boot up after pressing power button, connect AC adaptor power cable to unit to charge battery.

After 10 mins, remove AC adaptor power cable then press power button.

If unit can boot up after pressing power button, go to Procedure 2.

If it can not boot up, go to Procedure 3.

Procedure 2 Windows Application charge Test

Boot up unit from Battery only, make sure Battery is not full charged from system battery icon in window.

Record current Battery charged percentage value.

Connect AC adaptor power cable to unit to charge battery. After 10 mins, check system battery icon in window again.
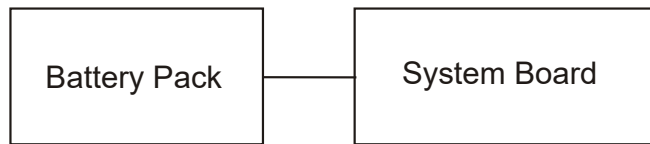
If Battery charged percentage is not increased, go to Procedure 3.

If Battery charged percentage is increased or is full charged, Battery Pack is functioning properly.

Procedure 3 Connector Check and Replacement Check

Battery Pack is connected to the system board. If Battery Pack malfunctions, there may be a bad connection between Battery Pack and the system board, or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure Battery Pack has been firmly connected to the connector on the system board. Also make sure Battery Pack is free of foreign matters.**

```
┌─────────────────────┐          ┌─────────────────────┐
│                     │          │                     │
│    Battery Pack     │──────────│    System Board     │
│                     │          │                     │
└─────────────────────┘          └─────────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1 or 2. If a foreign matter is found on Battery Pack, remove it and then return to Procedure 1 or 2. If there is still an error, perform Check 2.

Check2   **Battery Pack may be faulty. Replace it with a new one following the steps described in Chapter 4. If Battery Pack replaced is still not functioning properly, perform Check3.**

Check3   **System Board may be defective. Replace System Board with a new one following the steps described in Chapter 4.**

2.21 Finger Print

To check if the computer's Finger Print is defective or malfunctioning, follow the troubleshooting procedures below as instructed.
Procedure 1 Windows Application Test
Procedure 2 Connector Check

Procedure 1 Windows Application
Execute Applications in Windows, move finger above Finger Print Reader.
If it can detect finger print, Finger Print is functioning properly.
If it can not detect finger print, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check
Finger Print is on Secure Pad, and is connectd to System Board through FFC cable. If the Finger Print malfunctions, the system board or Secure Pad might be faulty.
Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1 The Secure Pad may be faulty. Replace it with a new one following the instructions in Chapter 4. Then go through procedure 1 again. If the Finger Print is still not functioning properly, perform Check2.
Check2 The system board may be defective. Replace the system board with a new one following the steps described in Chapter 4. Then go through procedure 1 again.

2.22 Bluetooth

Bluetooth is combo module with Wireless LAN on this model. Bluetooth Module or system board may be the reason of Bluetooth fault. Either of these two components may be damaged. To determine if the computer's Bluetooth module is functioning properly, perform following procedures. Start with Procedure 1 and continue with the other procedures as instruction below.

Procedure1 Windows Application Test

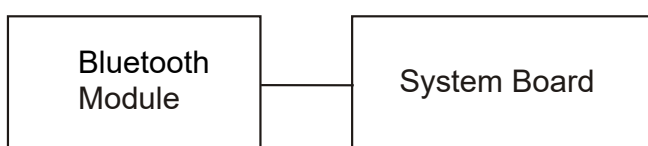Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

Place unit to location near Bluetooth device. Execute Bluetooth applications in Windows, then active Bluetooth connection. Check whether unit can normally connect to Bluetooth device. If connection is fail, go to Procedure 2. If error is not located, Bluetooth is functioning properly.

Procedure 2 Connector Check and Replacement Check

Bluetooth Module is connected to the system board. If Bluetooth malfunctions, there may be a bad connection between Bluetooth Module and the system board, or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check1   **Make sure Bluetooth module has been firmly connected to the connector on the system board. Also make sure Bluetooth module is free of foreign matters.**

```
┌──────────────┐        ┌──────────────────┐
│  Bluetooth   │        │                  │
│   Module     │────────│   System Board   │
│              │        │                  │
└──────────────┘        └──────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on Bluetooth Module, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

Check2   **Bluetooth Module may be faulty. Replace it with a new one following the steps described in Chapter 4. If Bluetooth Module replaced is still not functioning properly, perform Check3.**

Check3   **System Board may be defective. Replace System Board with a new one following the steps described in Chapter 4.**

2.23 LAN Port

To determine if the computer's LAN Port is functioning properly or malfunctions, perform following procedures. Start with Procedure 1 and continue with the other procedure as instruction below.

Procedure 1 Windows Application Test
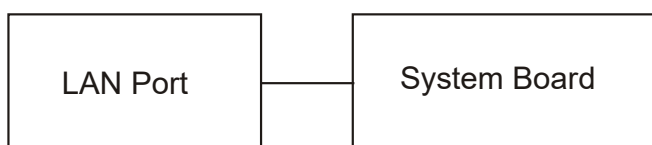
Procedure 2 Connector Check and Replacement Check

Procedure 1 Windows Application Test

The LAN Port Connector is mounted on System Board. Connect an LAN Cable with Internet interface to the computer's LAN port, then power on the computer into Windows. Execute Function Programs in Windows, which will display the LAN Test Result. If the test and diagnostics result is abnormal, go to Procedure 2. If an error is not located, LAN system is functioning properly.

Procedure 2 Connector Check and Replacement Check

If LAN Port on System Board malfunctions, there may be a bad connection between LAN Cable and System Board. Or System Board might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   **Make sure LAN Cable has been firmly connected to LAN Port on System Board. Also make sure LAN Port on System Board is free of foreign matters.**

```
┌─────────────────┐        ┌─────────────────────┐
│                 │        │                     │
│    LAN Port     │────────│    System Board     │
│                 │        │                     │
└─────────────────┘        └─────────────────────┘
```

And if the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If a foreign matter is found on LAN Port on System Board, remove it and then return to Procedure 1. If the problem persists, perform Check 2.

Check 2   **System Board may be faulty. Replace it with a new one following the steps described in Chapter 4.**

Chapter 3

Diagnostic Programs

Change History

Date	Revision	Contents	Remark
2019-11-19	A	Released	
2019-11-21	B	1.Add page of Change history 2.Replace Page.19 / 3.2.8 Fan Test figure	

Chapter 3   Contents

3.1   General

This chapter explains the diagnostic programs which tests and diagnoses the functions of the hardware components of this computer.

NOTE 1: *This Diagnostic supports* `Dynabook Satellite Pro L50-G`

NOTE 2: *Before test, one must set "Secure Boot" to "Disabled" in BIOS Security Page. When once finishes tests, make reduction of the setting.*

NOTE 3: *Need full shutdown (hold <Shift> key to click <Shutdown> button) before work the T&D, if the unit is in Windows.*

NOTE 4: *Don't Press <ESC> Key during Test, It can Cause T&D Malfunction.*

The DIAGNOSTIC TEST Devices include the following tests:

- System Information
- CPU Test
- Memory Test
- HDD Test
- Video Test
- Keyboard Layout Test
- LED Test
- FAN Test
- DMI Read/Write
- SSD Test

Before running the diagnostic programs, get the following tools prepared:

- A Service Diagnostic USB STICK

How to make:

1. Prepare a USB STICK and format it as FAT32.
2. Uncompress the Diagnostic Zip file.
3. Copy [efi] & [EFIDiag] folders to the USB STICK root directory.

3.2   Main Menu

How to boot by USB:

1. Insert the USB STICK into the Notebook USB Port.
2. Press Power button to boot the Notebook.
3. Hold the <F12> function key until Boot Option Menu show on screen.
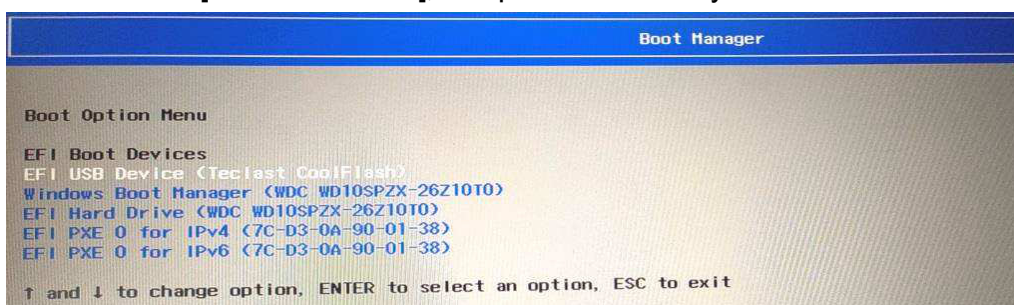4. Select the [EFI USB Device], and press <Enter> key.

Figure -1 USB Boot

When the system is booting from Service Diagnostic USB STICK, the following screen will be displayed:

Figure -2 Main Menu

Please select a test item or select **0** to exit to UEFI Shell Command.

3.2.1   System Information

This function is used to read the system information. When the test is completed, a file named Autocfg.log will be saved in the defined location.

This function can detect the following device information:

- CPU
- Video
- HDD
- Memory
- SSD

During the reading process, the following screen will be displayed to indicate that the progress is in detection:

```
run auto detect........
201911051
[SSD 1]
Vendor ID=SAMSUNG
Model=SAMSUNG
Firmware=MZVLB256HAHQ-00000
Total Capacity=250 GB

[CPU 1]
VendorID=GenuineIntel
ProcessorID=bfebfbff000a0660
FamilyLevel=6
ModelLevel=6
SteppingLevel=0
BrandString=Intel(R) Core(TM) i7-10710U CPU @ 1.10GHz
ExtClock=100MHz
Speed=1100MHz
CoreNum=8
L1InstructionCacheSize=32KB * 8
L1DataCacheSize=32KB * 8
L2CacheSize=256KB * 8
L3CacheSize=12288KB

[Video 1]
Vendor=Intel
BusNum=00
DevNum=02
FunNum=00
VendorID=8086
DeviceID=9BCA
RevisionID=04

[HDD 1]
Vendor ID=WDC
Serial Number=WD-WX51A79402FF
Model=WD10SPZX-26Z10T0
Firmware=04.01A04
Total Capacity=1000 GB

[Memory Total Size]
Size=8192 MB
Press (Enter) Key to Return Back to Main Menu
```

Figure -3 System Information Testing Process

3.2.2 CPU Test

This test module is to check whether CPU works normally.

This test include below sub items:

- CPU Basic Function Test
- CPU FPU Function Test

During the test process, the following screen will be displayed to indicate that the progress is in testing:

```
run cpu test........
CPU Basic Function Test:
        CPU General Test Start.
        CPU General Test Pass.
        CPU Arithmetic Test Start.
        CPU Arithmetic Test Pass.
        CPU Logic Test Start.
        CPU Logic Test Pass.
CPU FRU Function Test:
        CPU Float Calc Test Start.
        CPU Float Calc Test Pass.
        CPU Float Precision Test Start.
        CPU Float Precision Test Pass.
==========================CPU Test Pass==========================
Press (Enter) Key to Return Back to Main Menu
```

Figure -4 CPU Testing Process

1. CPU Basic Function Test

   This test item is to check whether the CPU works normally through math and logic calculation, which means verifying the general registers, math registers and logic registers.

2. CPU FPU Function Test

   This test item is to check whether the precision of the numeric processor in the float calculation is up to the IEEE standards.

3.2.3 Memory Test

This test module is to check whether the memory chip works normally.

This test include below sub items:

- ProceedAll Test Items
- Walking1 Test
- Walking0 Test
- Memory Address Test
- Random Data Test
- CheckerBoard Test
- Memory Copy Test
- Bus Noise Test
- Random Increment Test
- PatternBS High Test
- PatternBS Low Test
- PatternCAS Line Test

The following screenwill be displayed:

```
Select a item to test:
======================================================================
1. Proceed All Test Items
2. Walking 1 Test
3. Walking 0 Test
4. Memory Address Test
5. Random Data Test
6. Checker Board Test
7. Memory Copy Test
8. Bus Noise Test
9. Random Increment Test
10. Pattern BS High Test
11. Pattern BS Low Test
12. Pattern CAS Line Test
0. Exit to Main Menu
======================================================================
Enter Your Choice (0~12), then Press <Enter> Key to Continue..
```

Figure -5 Memory Test Item

Pleaseselect a test item or select **0** to exit to Main Menu:

During the test process,the following screenwill be displayed to indicate that the progressis in testing:

```
run memory test........
Walking1 Test begin
Total Availabel Memory Size 4096 MB
Walking1 Test end
Walking0 Test begin
Total Availabel Memory Size 4096 MB
Walking0 Test end
Memory Address Test begin
Total Availabel Memory Size 4096 MB
Memory Address Test end
Random Data Test begin
Total Availabel Memory Size 4096 MB
Random Data Test end
CheckerBoard Test begin
Total Availabel Memory Size 4096 MB
CheckerBoard Test end
MemoryCopy Test begin
Total Availabel Memory Size 4096 MB
MemoryCopy Test end
Busnoise Test begin
Total Availabel Memory Size 4096 MB
Busnoise Test end
RandMemRandIncr Test begin
Total Availabel Memory Size 4096 MB
RandMemRandIncr Test end
PatternBSHigh Test begin
Total Availabel Memory Size 4096 MB
PatternBSHigh Test end
PatternBSLow Test begin
Total Availabel Memory Size 4096 MB
PatternBSLow Test end
PatternCASLine Test begin
Total Availabel Memory Size 4096 MB
PatternCASLine Test end
========================Memory Test Pass========================
Press (Enter) Key to Return Back to Main Menu
```

Figure -6 Memory Testing Process

1. ProceedAll   Test Items

    The item is to run all memory test items one by one.

2. Walking 1 Test

    The test item is to ensure that there is no short circuitry issue in memory chip. It
    will wire each memory address one bit '1' (likes a data 1 working) and read from
    memory to check the write result.

3. Walking 0 Test

The test item is to ensure that there is no open circuitry issue in memory chip. It will wire each memory address one bit '0' (likes a data 0 working) and read from memory to check the write result.

4. Address Test

This test item is to check short and open issue on memory address lines. It will write the address to memory and check the write result by read.

5. Random Data Test

This test item is to check whether the memory could be correctly accessed with randomized data and randomized memory address.

6. Checker Board Test

This test item is to check whether the system memory that could be accessed correctly through writing and reading with a series of designed pattern data.

Parameter format:

Lo-byte and hi-byte are composed with 0101(0x5) and 1010 (0xA)

Parameter length: *Byte*

7. Memory Copy Test

This test item is to check whether the memory copy works normally.

Copy Size: *Byte*

8. Bus Noise Test

This test item is to check whether the bus noise works normally.

Parameter format:

0x00 and 0xff

9. Random Increment Test

This test item is to check whether the memory could be correctly accessed with randomized memory address and a series of incremental data.

10. Pattern BS High Test

This test item is to check whether the system memory that could be accessed correctly through writing and reading with a series of designed pattern data.

Parameter format:

Every bit is '1' (Each bit is high)

Parameter length: *Byte*

11.   Pattern BS Low Test

This test item is to check whether the system memory that could be accessed correctly through writing and reading with a series of designed pattern data.

Parameter format:

Every bit is '0'(Each bit is low)

Parameter length: *Byte*

12. Pattern CAS Line Test

This test item is to check whether the system memory that could be accessed correctly through writing and reading with a series of designed pattern data.

Parameter format:

Lo-byte and hi-byte are composed with 0000 (0x0) and 1111(0xF)

Parameter length: *Byte*

3.2.4 HDD Test

This test item runs on the hard disk. It checks the functions and performance of hard disk.

In order to protect user's HDD data, the password must be verified before the HDD test. The screen is as follows:

Figure -7 HDD Test Password

Password: hard disk

This test include below sub items:

- Proceed All Test Items
- Copy Test
- Random Read Write Test
- Positive Sequential Read Write Test
- Negative Sequential Read Write Test
- Funnel Sequential Read Write Test

The following screen will be displayed :


```
Select a item to test:
====================================================================
1. Proceed All Test Items (Long Time)
2. Copy Test (Short Time)
3. Random Read Write Test (Short Time)
4. Positive Sequential Read Write Test (Long Time)
5. Negative Sequential Read Write Test (Long Time)
6. Funnel Read Write Test (Long Time)
0. Exit to Main Menu
====================================================================
Enter Your Choice (0~6), then Press (Enter) Key to Continue..
```
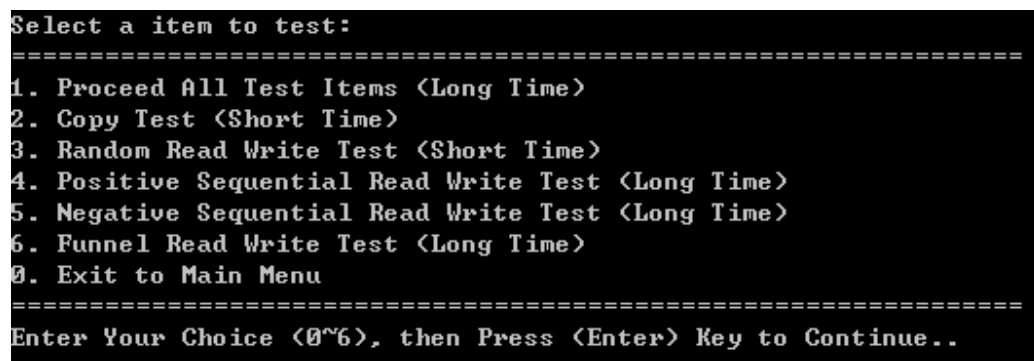
Figure -8 HDD Test Item

Please select a test item to run or select **0** to exit to Main Menu:

The following screenwill be displayed to indicate that the progressis in testing:

```
run hdd test........
Copy Test begin
Copy Test end
Random Read Write Test begin
Random Read Write Test end
Positive Sequential Read Write Test begin
Positive Sequential Read Write Test end
Negative Sequential Read Write Test begin
Negative Sequential Read Write Test end
Funnel Sequential Read Write Test begin
Funnel Sequential Read Write Test end
=========================HDD Test Pass=========================
Press (Enter) Key to Return Back to Main Menu
```

Figure -9 HDD Testing Process

1. ProceedAll Test Items

   The item is to run all HDD test items one by one.

2. Copy Test

   This test item is to check HDD's Read/Write function through data copying and
   reading to HDD.

3. Random Read Write Test

   This test item is to check HDD's Read/Write function through random data
   writing and reading to HDD.

4. Sequential Read Write Test

   The test item is to check HDD's Read/Write function through sequential data
   0xA5 write and reading to HDD.

   The test has three types sequential as below:

   Positive: From first Sector to the last Sector (0,1,2,……,N-1,N)

   Negative: From the last Sector to the first Sector (N,N-1,……,2,1,0)

   Funnel: From the first and last to middle Sector (0,N,1,N-1,2,N-2,……)

3.2.5 Video Test

User can confirm whether each video images work normally by judging whether the display is correct.

This test include below sub items:

- PureColor Test

1. Pure Color Test

This test is to check whether the system could display the purity 5 colors (Red, Green, Blue, White and Black) normally in full screen mode.

Before test system will give a message as below:

Figure -10 Video Test

User will confirm whether each video mode works normally by judging whether the display is correct.
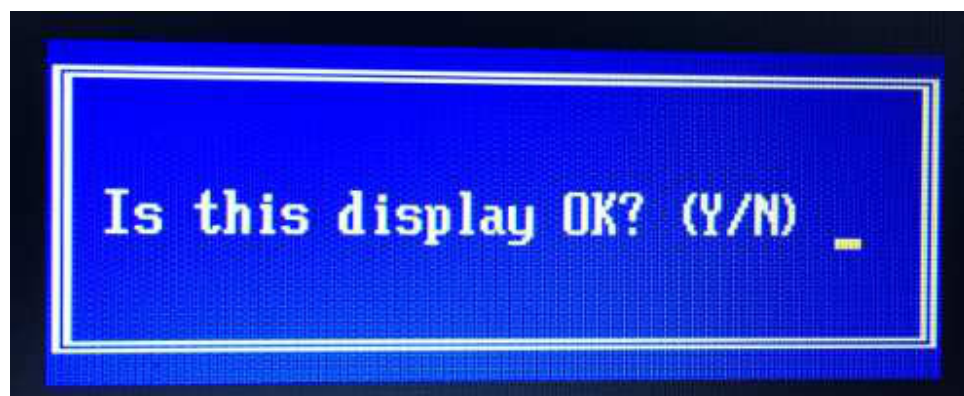
Figure -11 Video Test Confirmation

3.2.6 Keyboard Layout Test

The test purpose is to check whether keyboard run well during the test procedure. When users choose the item the program will test the key map of the keyboard.

> **NOTE:**
>
> *1. Due to UEFi Limitation, Separate **Satellite Pro L50-G** Keyboard Layout Test into 2 Steps.*
>
> *2. Small Pad Map Test will comeout after Main Pad Map Test is completed.*
>
> *3. Due to UEFi Limitation, Some Keys Show "Gray" Color, They can't be tested*

Please select a keyboard type before the keyboard test. The screen is as follows:
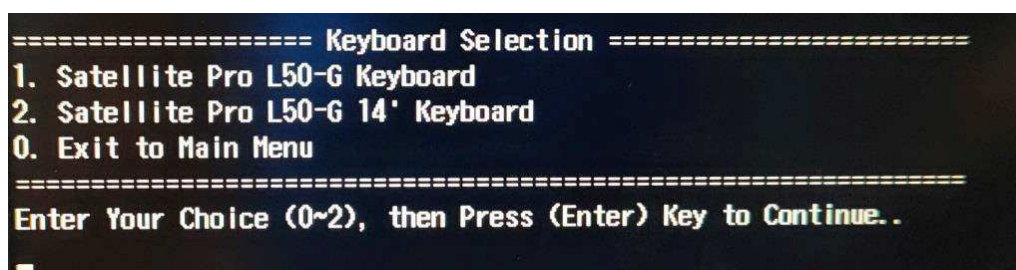
Figure -12 Keyboard Layout Test Item

The Main Pad Map would be shown as below (**Satellite Pro L50-G 14** only equips Main Pad):
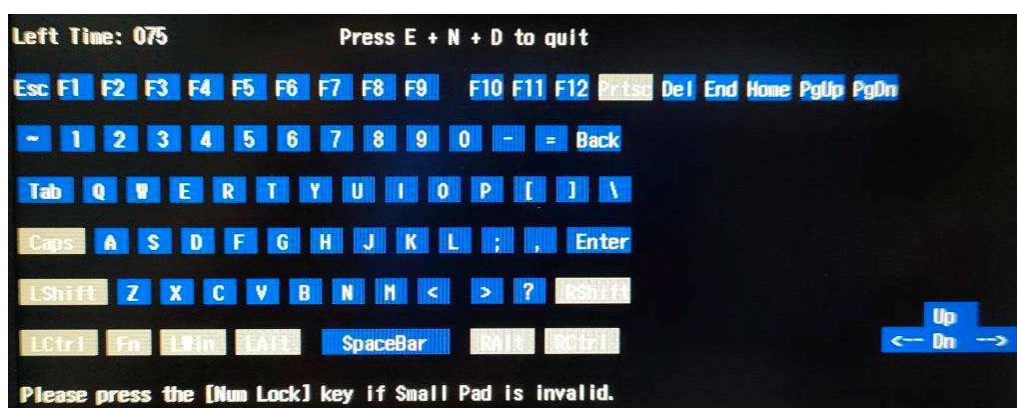
  Satellite Pro L50-G Main Keyboard

Figure -13 Keyboard Layout Test Main Keyboard

The Small Pad Map would be shown as below:

Note: Please press the [Num Lock] key if Small Pad is invalid!
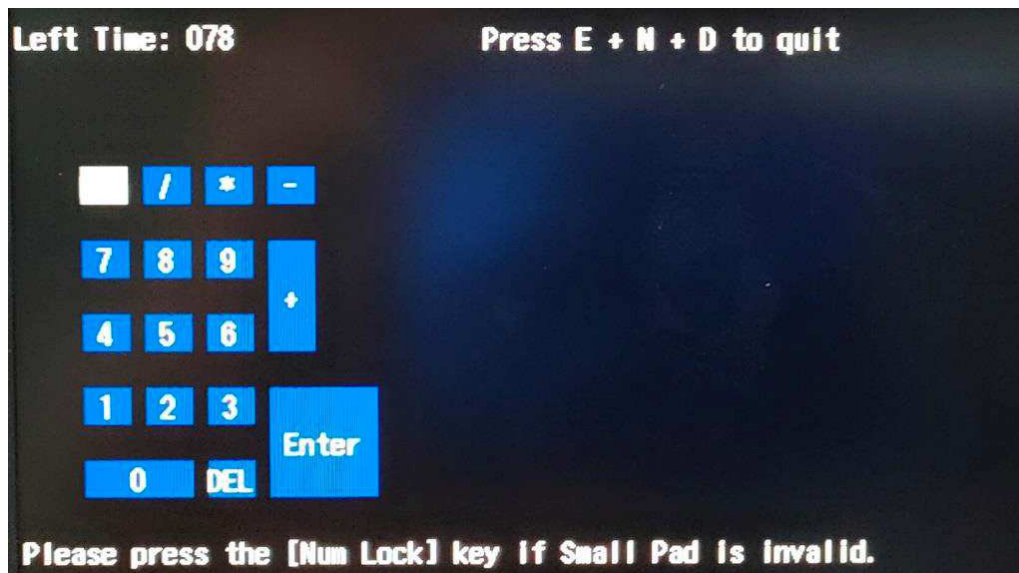

Figure -14 Keyboard Layout Test Small Pad

It requires user to press the key and check whether the key in the screen changes color or not. User can terminate test by typing '**END**'.

When the user has checked all the keys and all the keys in the screen have changed color, the diagnostics program would automatically end the test and report the pass Information.

If keyboard test fails, program will terminate the test and report the fail information when it is time to timeout.

The test will end when all keys are pressed or test time is out after 100 seconds.

3.2.7 LED Test

This test module is to check whether LEDs work normally.

1. Power White LED Test

    This test item is to check whether Power White LED work normally.
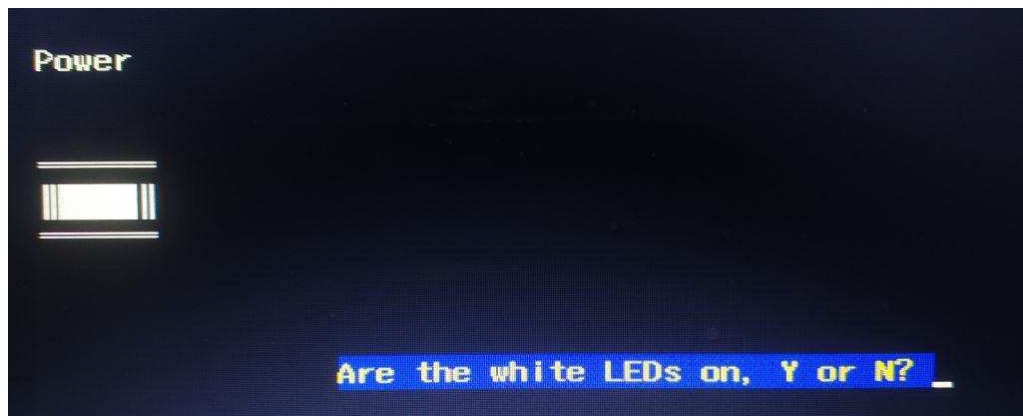

Figure -15 LED Test - Power White

2. Power Orange LED Test

    This test item is to check whether Power Orange LED work normally.
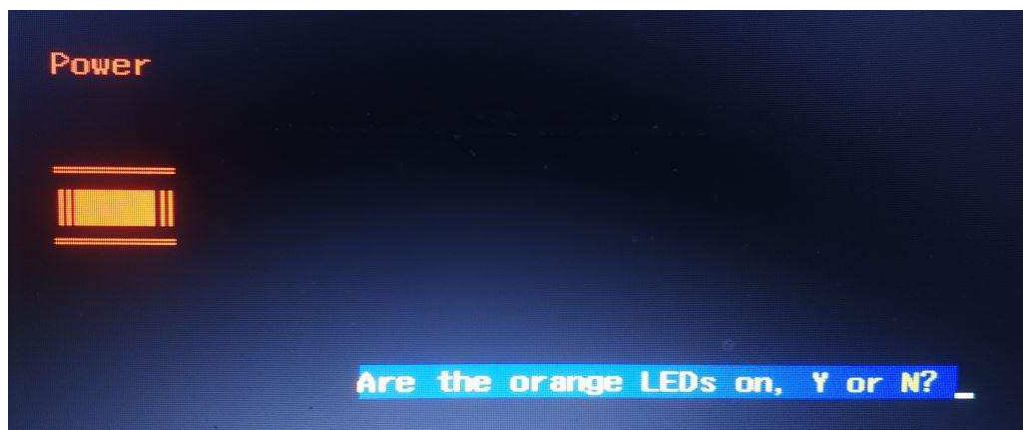

Figure -16 LED Test - Power Orange

3. DC-IN White LED Test

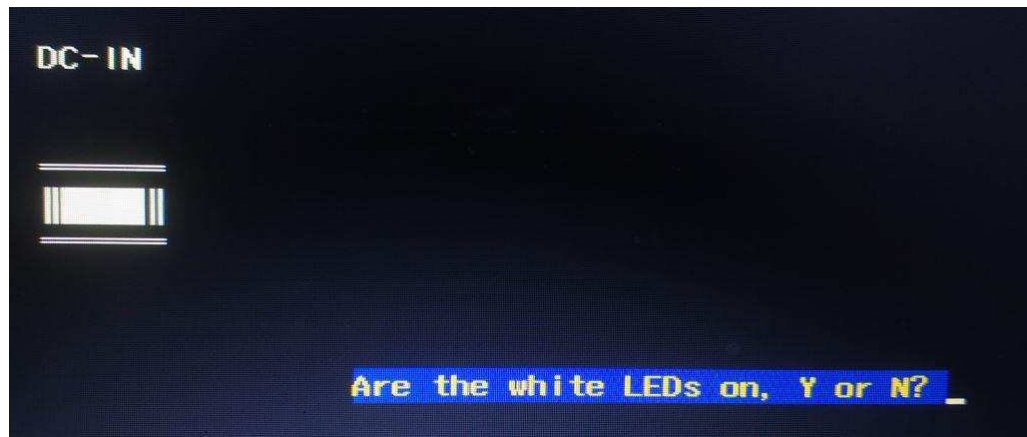   This test item is to check whether DC-IN White LED work normally.

Figure -17 LED Test - DC-IN White

4. DC-IN OrangeLED Test

    This test item is to check whether DC-IN OrangeLED work normally.
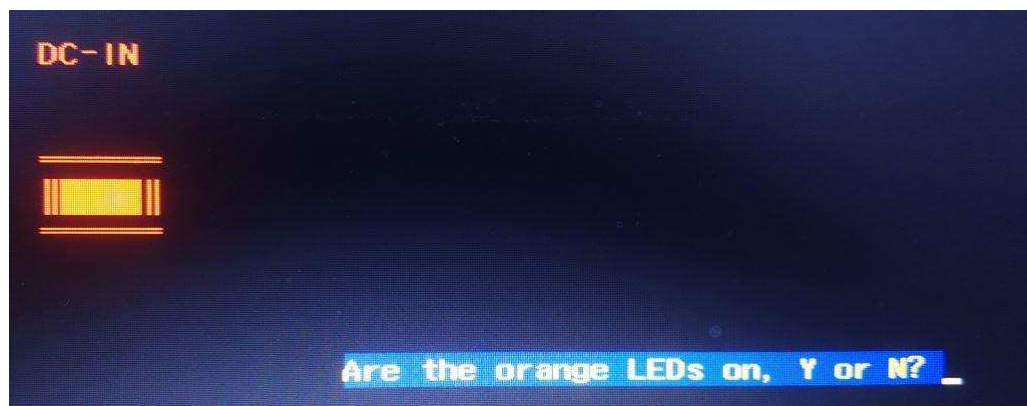

Figure -18 LED Test - DC-IN Orange

5. CapsWhite LED Test

    This test item is to check whether CapsWhite LED work normally.

Figure -19 LED Test - CapsWhite

3.2.8 FAN   Test

This test item tests if the two status of fan are normal: Stop and Fast Speed.

In auto-test mode, it judges if the actual fan speed correspond to the setting to confirm if the test result is PASS or FAIL.
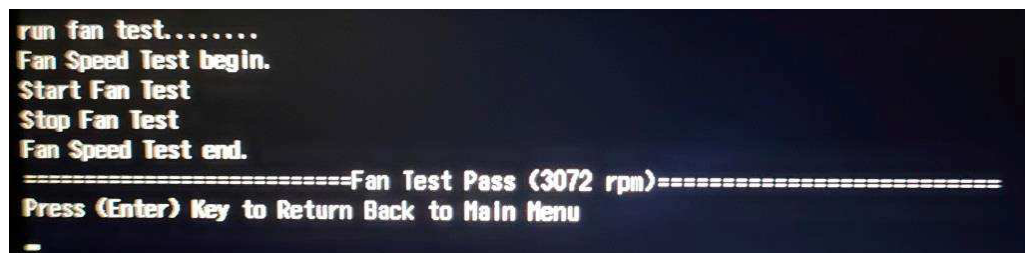
This test module is to check whether FAN work normally.

This test include below sub items:

- SpeedTest

1. SpeedTest

This test is to check whether two status of fan are normal: Stop and Fast Speed.

During the test process, the following screen will be displayed to indicate that the progress is in testing:

```
run fan test........
Fan Speed Test begin.
Start Fan Test
Stop Fan Test
Fan Speed Test end.
==========================Fan Test Pass (3072 rpm)==========================
Press (Enter) Key to Return Back to Main Menu
_
```

Figure -20 Fan Testing Process

3.2.9 DMI Read / Write

Read the information from the system's SMBIOS and display it on the screen as follows:


```
=======================================================
UEFI DMI Read / Write Function
Version 2.00
=======================================================
The DMI Tool Information as below:
=======================================================
== THIS TOOL ONLY APPLY FOR INVENTEC SERVICE DEPARTMENT! ==
== PLEASE CONTACT SERVICE TEAM IF YOU HAVE ANY QUESTION! ==
=======================================================
1.  Read Manufacture
2.  Read Product Name
3.  Write Product Name
4.  Read Version
5.  Write Version
6.  Read Serial Number
7.  Write Serial Number
8.  Read SKU Number
9.  Write SKU Number
10. Read OEM String (OEM Part Number, OEM SW Number)
11. Write OEM String (OEM Part Number, OEM SW Number)
0.  Return Back to Main Menu
=======================================================
Enter Your Choice (0~11), then Press (Enter) Key to Continue..
_
```
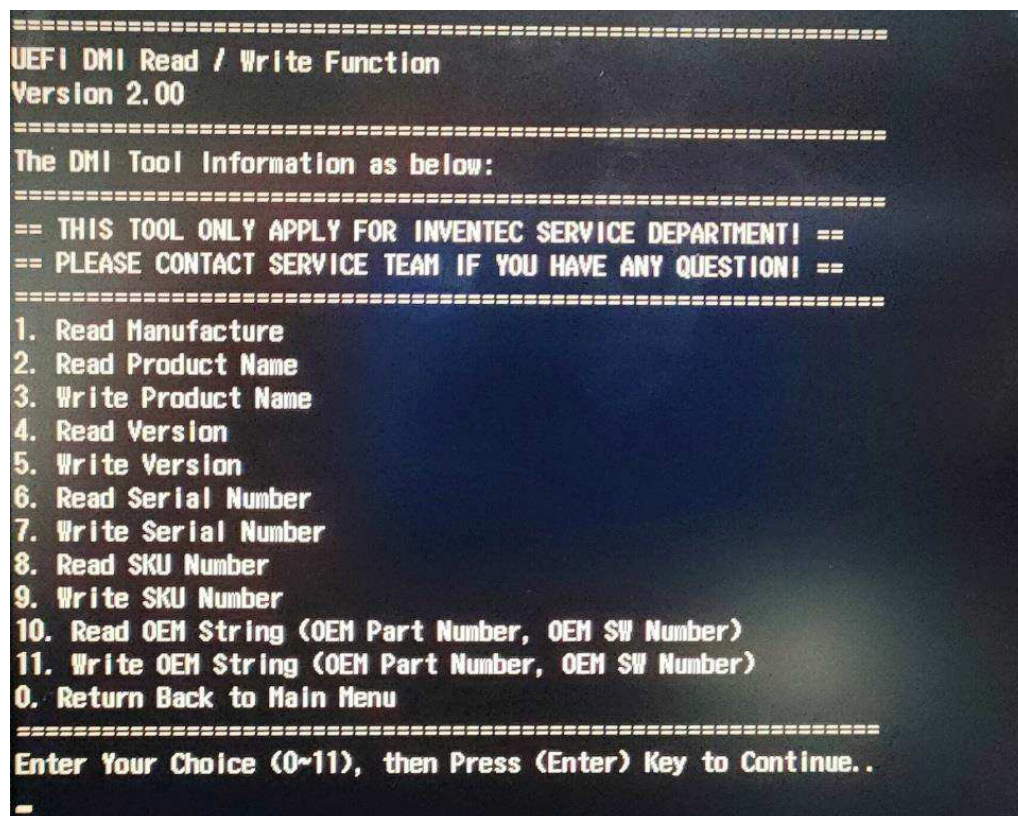
Figure -21 DMI Read / Write Item

A user can press **0** to return to the Main Menu.

In addition to reading the DMI information, it also permits attributes editing and updating: Manufacturer (Only Read), Product Name, Version, Serial Number, SKU Number, and OEM String.

Etc. You can select which item you would like to write, after selection, one can input a new value in the message dialog box, and press "Enter" when finished.
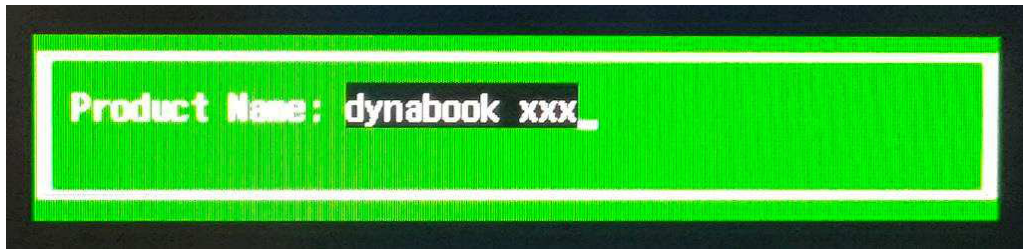
Figure -22 DMI Write Testing Process

Write the DMI and return "selection menu" for you to change another item value.

3.2.10 SSD Test

This test item runs on the ssd hard disk. It checks the functions and performance of ssd hard disk.

In order to protect user's SSD data, the password must be verified before the SSD test. The screen is as follows:
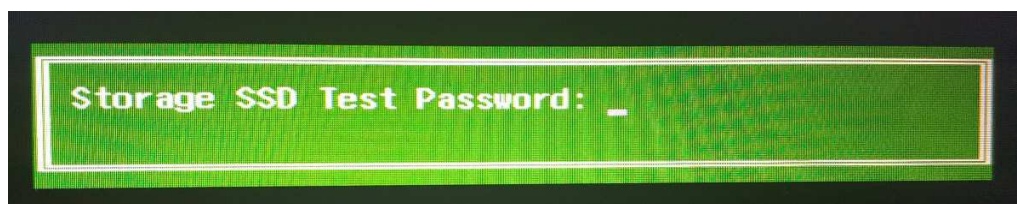

Figure -23 SSD Test Password

Password: 987654321

This test include below sub items:

- Proceed All Test Items
- Copy Test
- Random Read Write Test
- Positive Sequential Read Write Test
- Negative Sequential Read Write Test
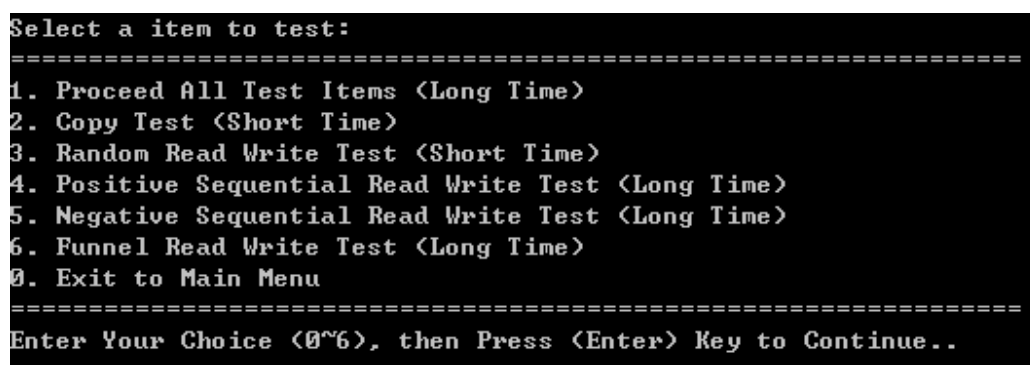- Funnel Sequential Read Write Test

The following screen will be displayed:


```
Select a item to test:
===============================================================
1. Proceed All Test Items <Long Time>
2. Copy Test <Short Time>
3. Random Read Write Test <Short Time>
4. Positive Sequential Read Write Test <Long Time>
5. Negative Sequential Read Write Test <Long Time>
6. Funnel Read Write Test <Long Time>
0. Exit to Main Menu
===============================================================
Enter Your Choice <0~6>, then Press <Enter> Key to Continue..
```

Figure -24 SSD Test Item

Please select a test item to run or select **0** to exit to Main Menu:

The following screen will be displayed to indicate that the progress is in testing:

```
run ssd test........
Copy Test begin
Copy Test end
Random Read Write Test begin
Random Read Write Test end
Positive Sequential Read Write Test begin
Positive Sequential Read Write Test end
Negative Sequential Read Write Test begin
Negative Sequential Read Write Test end
Funnel Sequential Read Write Test begin
Funnel Sequential Read Write Test end
=========================SSD Test Pass=========================
Press (Enter) Key to Return Back to Main Menu
```

Figure -25 SSD Testing Process

1. ProceedAll Test Items

   The item is to run all SSD test items one by one.

2. Copy Test

   This test item is to check SSD's Read/Write function through data copying and reading to SSD.

3. Random Read Write Test

   This test item is to check SSD's Read/Write function through random data writing and reading to SSD.

4. Sequential Read Write Test

   The test item is to check SSD's Read/Write function through sequential data 0xA5 write and reading to SSD.

   The test has three types sequential as below:

   Positive: From first Sector to the last Sector (0,1,2,……,N-1,N)

   Negative: From the last Sector to the first Sector (N,N-1,……,2,1,0)

   Funnel: From the first and last to middle Sector (0,N,1,N-1,2,N-2,……)

3.2.11 View Logs

User can enter one choice to view a log file on the screen as follows:

Figure -26 View Log Item

For Memory, HDD and SSD, sub log menu will be displayed on the screen as follows:

Figure -27 View Log - Memory Log

```
Select a HDD Log to view:
======================================================================
1. All Test Items
2. Copy Test
3. Random Read Write Test
4. Positive Sequential Read Write Test
5. Negative Sequential Read Write Test
6. Funnel Read Write Test
7. Full Coverage Read Test
0. Exit to View Log Menu
======================================================================
Enter Your Choice (0~7), then Press <Enter> Key to Continue..
```

Figure -28 View Log - HDD Log

The log will be display as below:

```
<system_cpu.0.BasicFunction>[2019-07-27 00:29:33]Pass
<system_cpu.0.FPUFunction>[2019-07-27 00:29:34]Pass
Press <Enter> Key to Return Back to View Log Menu

_
```

Figure -29 View Log – Log Detail

3.2.12 Exit to UEFI Shell

Select this item to exit to UEFI Shell Command Mode.

3.3   Subtests

Item ID	Test Item	Test ID	Sub Test items
01	System Information	01	CPU Information
		02	Video Information
		03	HDD Information
		04	Memory Information
		05	SSD
02	CPU Test	01	Basic Function Test
		02	FPU Function Test
03	Memory Test	01	ProceedAll Test Items
		02	Walking1 Test
		03	Walking0 Test
		04	Address Test
		05	Random Data Test
		06	Checker Board Test
		07	Copy Test
		08	Bus Noise Test
		09	Random Incremental Test
		10	Pattern BS High Test
		11	Pattern BS Low Test
		12	Pattern CAS Line Test
04	HDD Test	01	ProceedAll Test Items
		02	Copy Test
		03	Random Read Write Test
		04	Positive Sequential Read Write Test
		05	Negative Sequential Read Write Test
		06	Funnel Sequential Read Write Test
05	Video Test	01	Purity Color Test
06	Keyboard Layout	01	Main Pad Map Test
		02	Small Pad Map Test
07	LED Test	01	Green / White LED Test
		02	Orange LED Test
08	FAN Test	01	Speed Test
09	DMI Read / Write	01	Manufacturer
		02	Product Name

		03	Version
		04	Serial Number
		05	SKU Number
		06	OEM String
10	SSD Test	01	ProceedAll Test Items
		02	Copy Test
		03	Random Read Write Test
		04	Positive Sequential Read Write Test
		05	Negative Sequential Read Write Test
		06	Funnel Sequential Read Write Test

Chapter 4

Replacement Procedures

Chapter 4   Contents

Figures

4.1   General

This chapter explains how to disassemble the computer and replace Field Replaceable Units (FRUs). Some replacement procedures may not require you to remove all the surrounding FRUs to replace only one FRU. The chart below shows the FRUs in the order in which they should be removed in a top-down manner, irrespective of their physical locations. The FRUs shown in the top area of the chart should normally be removed before removing the FRUs shown in the bottom area. To replace the FRUs, first identify the suspect FRU for the system failure. Next, according to this chart, determine the FRUs that need to be removed before removing the suspect FRU. After you determine those FRUs, go to the appropriate sections according to the section numbers shown in the boxes. Then start removal and replacement.

4.2 Memory Cover	4.3 Memory Module	4.4 Base Enclosure	4.5 Battery Pack	4.10 LCD Module Assembly
	4.6 HDD	4.7 SSD	4.8 Wireless LAN Card	
4.9 Smart Card Board	4.11 DC IN harness	4.12 CPU Cooling Module and Fan		4.16 LCD Module Mask
4.13 System Board				4.17 LED Panel
4.14 LED board and IO board		4.15 Speaker and Touch pad(or Security pad)		4.18 CCD Module

How to use the chart (two examples):

• For removing the System Board:
First, remove Base Enclosure, Battery Pack and display assembly. Then, remove HDD, SSD, Smart Card Board, DC IN harness, and wireless LAN card, all of which are shown above the System Board.

• For removing the LCD Module: First, remove the display mask, both of which are shown above the LCD module.

4.2 Memory Cover	4.3 Memory Module	4.4 Base Enclosure	4.5 Battery Pack	4.10 LCD Module Assembly
	4.6 HDD	4.7 SSD	4.8 Wireless LAN Card	
4.9 Smart Card Board	4.11 DC IN harness	4.12 CPU Cooling Module and Fan		4.16 LCD Module Mask
4.13 System Board				4.17 LED Panel
4.14 LED board and IO board		4.15 Speaker and Touch pad(or Security pad)		4.18 CCD Module

Safety Precautions

  Before you begin to disassembly read the following safety precautions carefully. Be sure to follow them while you are working.

DANGER:

1.   ***Always use the genuine batteries or replacement batteries authorized by Toshiba.
         Batteries other than those differ in specifications and are incompatible with the
         computer. They may burst or explode. To avoid leakage of alkaline solutions,
         never heat or disassemble the battery packs. Never throw the battery packs into a
         fire. If this is violated, they will explode.***

2.   ***The components such as the power supply and FL inverter carry high voltages.
         When you partially disassemble the computer and turn on the components, use
         extreme care not to touch the connectors and components to avoid the risk of
         electrical shock. Do not disassemble individual components during first-level
         maintenance.***

WARNING:

1.   ***To avoid the risk of electrical shock, turn the computer off and remove the AC
         adapter from the electrical outlet.***

2.   ***Because the battery in the computer is left charged, the risk of electrical shock
         remains even after the AC adapter is removed from the electrical outlet. To avoid
         the risk of electrical shock, be sure to remove any metal jewelry or accessories
         such as necklaces, bracelets, and rings before starting work. Never work with
         damp or wet hands.***

3.   ***To avoid personal injury, use care to avoid the sharp edges or corners of the
         components.***

CAUTION:

1.   *Before replacing a component, make sure that the replacement component meets the required specifications. To avoid computer failures, never use components that do not meet the specifications.*

2.   *To avoid internal damage such as short circuits and fire, never drop metal objects such as screws, pins, paper clips, etc. into the components. When a screw is removed, be sure to replace a screw that is the same size as the original screw. Make sure that all the screws are fastened securely. Loose screws can cause short circuits, overheating, smoke, or fire.*

3.   *Before raising a FRU or other component, make sure that all the component cables have been disconnected to avoid the risk of electrical shock caused by accidental contact with the energized components.*

4.   *For AC input, be sure to use the AC adapter and AC power cable that come with your computer or Toshiba-recommended equivalents.*

5.   *To avoid the risk of electrical shock, make sure that all the replacement components meet the specifications of the computer and that all the cables and connectors are fastened securely.*

6.   *Inside the PC are components that become hot during operation (such as the CPU and cooling module). To avoid burns, let the hot components cool down before starting inspection or repair task.*

Before You Begin

Before you begin to disassembly the computer, keep in mind the precautions and advice in this section. Always begin disassembly by removing the AC adapter and battery pack. Remove the optional parts and accessories as well. The procedures for removing the batteries will be explained later.

Disassemble the computer only when an abnormality has occurred.

Use only the recommended tools.

To run and store the computer, be sure to prepare a working environment that is free from:

- Dust and contaminants
- Static electricity
- Extremely high or low temperatures and extremely high humidity

Run the diagnostic tests explained in Chapter 3 of this manual to identify the FRU that has probably caused the system failure.

Perform only the required machine operations. Use only the disassembly and reinstallation procedures described in this manual.

Place the removed components in a safe place away from the computer so that they are not damaged or get in the way of you doing your work.

Normally, a number of screws need to be removed or replaced during disassembling. Place the removed screws in a safe place so that you can easily find the right screws for the right components.

When assembling the computer, use the specified screws to fasten the parts to the specified locations. See the appropriate explanations and figures for screw sizes.

To avoid personal injury, use care to handle components that have sharp edges or corners.

After you have replaced a FRU, check that the FRU works correctly to ensure normal computer operation.

Disassembly Procedures

The cable connectors come in these two basic types:

 Pressure plate connectors
 Normal pin connectors

To remove a pressure plate connector, pull up the tabs on either side of the connector's plastic pressure plate and gently pull the cable out of the connector. To reconnect the cable to the pressure plate's connector, raise the pressure plate up to a satisfactory height and slide the cable into the connector. Secure the cable in the correct position by pressing down the sides of the pressure plate so that the plate is flush with the sides of the connector. Grasp and pull the cable gently to check that the cable is connected firmly. If the cable comes off the connector, reinsert the cable by raising the pressure plate up to a satisfactory height.

Normal pin connectors are used for all the other types of cables. These connectors can be installed or removed by simply inserting them or pulling them out.

Assembly Procedures

You have to reassemble the computer after you have disassembled the computer and fixed the component that caused the problem.

When reassembling the computer, keep the following general guidelines in mind:

 Take your time to carry out the suggested instructions completely. Hurried reassembly can often cause problems.
 Check that all the cable and connectors are fastened securely.
 Before securing the FRUs or other parts, check that the cables are not caught by the screws or FRUs.
 Check that all the latches are closed securely.
 Check that all the required screws are used to secure the FRUs. Using wrong screws can damage the threads or heads of the screws or does not ensure that the FRUs are secure.

After installing a FRU, make sure that the FRU and computer work normally.

Tools and Equipment

For your safety and that of other people in the working environment, it is strongly recommended that you use electrostatic discharge (ESD) equipment. The proper use of this equipment will ensure successful repair work and reduce the costs for repairing damaged components. The equipment and tools required for disassembly and reassembly are:

- One 2 mm Phillips screwdriver
- One 4 mm flat-blade screwdriver
- Torx screwdriver
- Tweezers (for pulling out screws)
- ESD mats (for the floor and work desks)
- An ESD wrist strap or heel grounder
- Anti-static carpets or flooring
- Air ionizers (for highly electrostatic sensitive areas)
- A plastic card (in credit card size)

Screw Tightening Torque

To secure screws, follow the torque values listed below. Over tightening can damage components and screws. Under tightening can loosen the screw or cause screws to come off, which may result in short circuits or other damage.

- M2 (2 mm)   0.22 N·m (1.5 kgf·cm)
- M2.5 (2.5 mm)   0.36 N·m (2.0 kgf·cm)
- M2.5 (2.5 mm) x 4.0   0.51 N·m (2.5 kgf·cm)
- M2.5 (2.5 mm) x 5.0   0.204 N·m (2.5 kgf·cm)

4.2   Memory cover

Removing Memory cover

Remove Memory cover according to the following   procedures and Figure 4-1.

1. Release (not remove) one M2.5x1.6 black Phillips head screw attached on it.

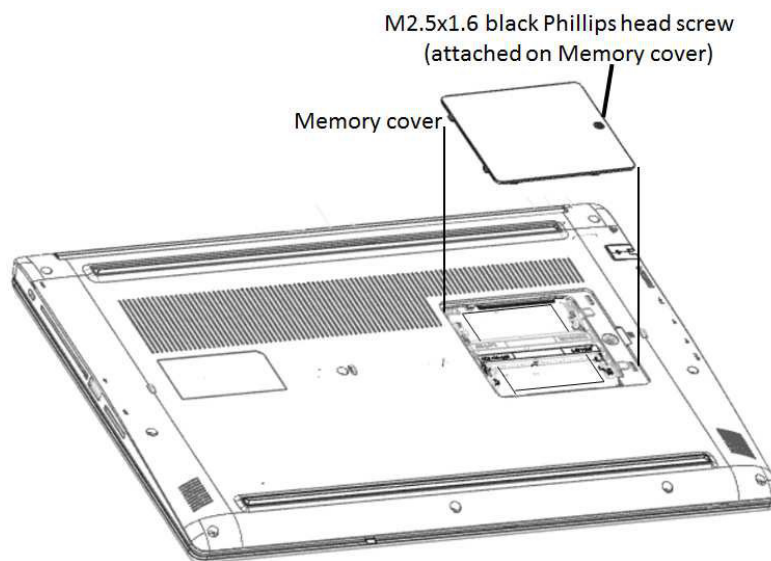2. Pull Memory Cover on screw side, then remove Memory cover.

Figure 4-1 Removing Memory cover

Installing Memory cover

Install Memory cover according to the following procedures and Figure 4-1.

1. Place Memory Cover in correct position.

2. Secure Memory Cover with one M2.5x1.6 black Phillips head screw attached.

4.3   Memory Module

Remove Memory Module

Remove Memory Module according to the following   procedures and Figure 4-2, after checking that the computer is turned off in boot mode.

CAUTION: Remove the optional memory after turning off the computer. If this is violated, the computer or memory can be damaged.

CAUTION: Do not touch the connectors on the Memory Modules or in the computer. Contaminated connectors can cause memory access problems.
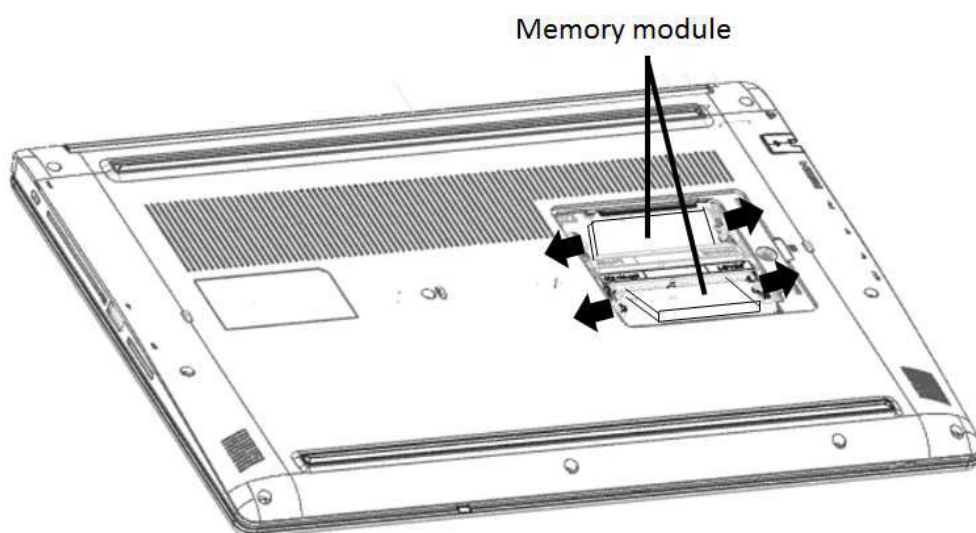

Figure 4-2 Removing Memory Module

1. Spread out the two memory lock latches so that the Memory Module pops up.

2. Pull the Memory Module up and out at an angle, using care to avoid touching the connectors.

Installing Memory Module

Install Memory Module according to the following procedures and Figure 4-2 after checking that the computer is turned off in boot mode.

CAUTION: Install the optional memory after turning off the computer. If this is violated, the computer or memory can be damaged.

---

1. Insert Memory Module into the connector at an angle of 45 degrees.

2. Press down Memory Module so that it is secured with both memory lock latches.

3. After the computer is turned on, check the hardware configuration in the Hardware Setup or TSETUP program to make sure that the installed Memory Module has been recognized by the system. If it has not been recognized yet, check the connections.

4. If the unit only contains one pcs of Memory Module, insert it into the connector which is near speaker.

4.4   Base Enclosure

Removing Base Enclosure

Remove Base Enclosure according to the following procedures and Figure 4-3.

1. Remove nine M2.5x5.0 black Phillips head screws securing Base Enclosure.
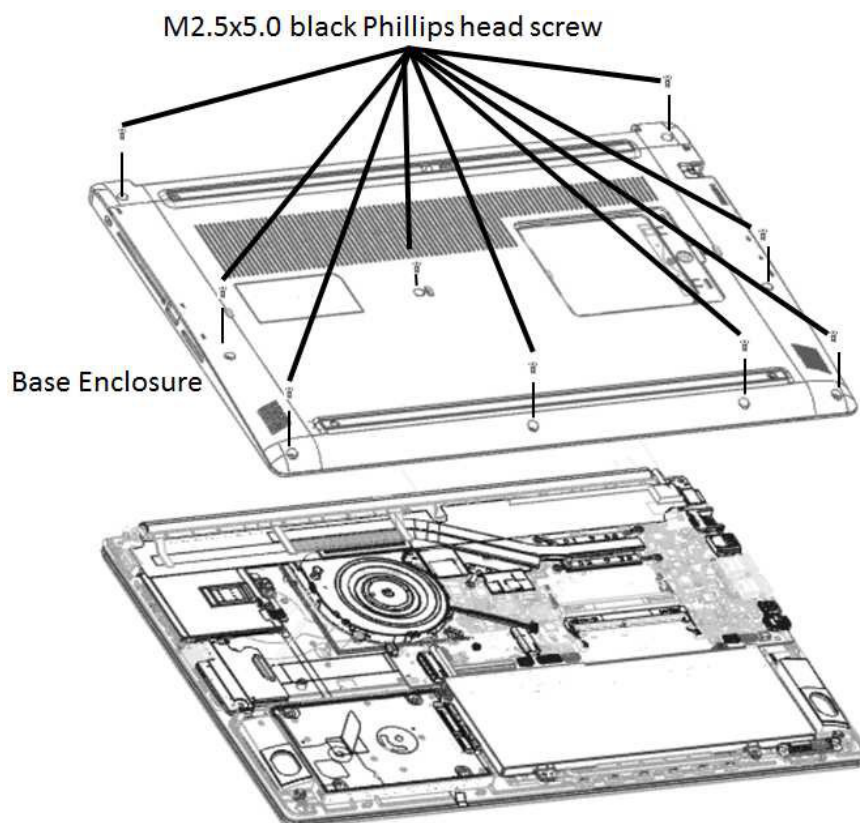
2. Remove Base Enclosure.

Figure 4-3 Removing Base Enclosure

Installing Base Enclosure

Install Base Enclosure according to the following procedures and Figure 4-3.

1. Place Base Enclosure in correct position.

2. Secure Base Enclosure with nine M2.5x5.0 black Phillips head screws.

4.5   Battery Pack

Removing Battery Pack

Remove battery pack according to the following procedures and Figure 4-4.

CAUTION: When handling the battery packs, use care not to short circuit the terminals. Do not drop, hit, twist, or bend the battery packs. Do not scratch or break up their casing.

---

1. Disconnect Battery cable from CN6050 on system board.

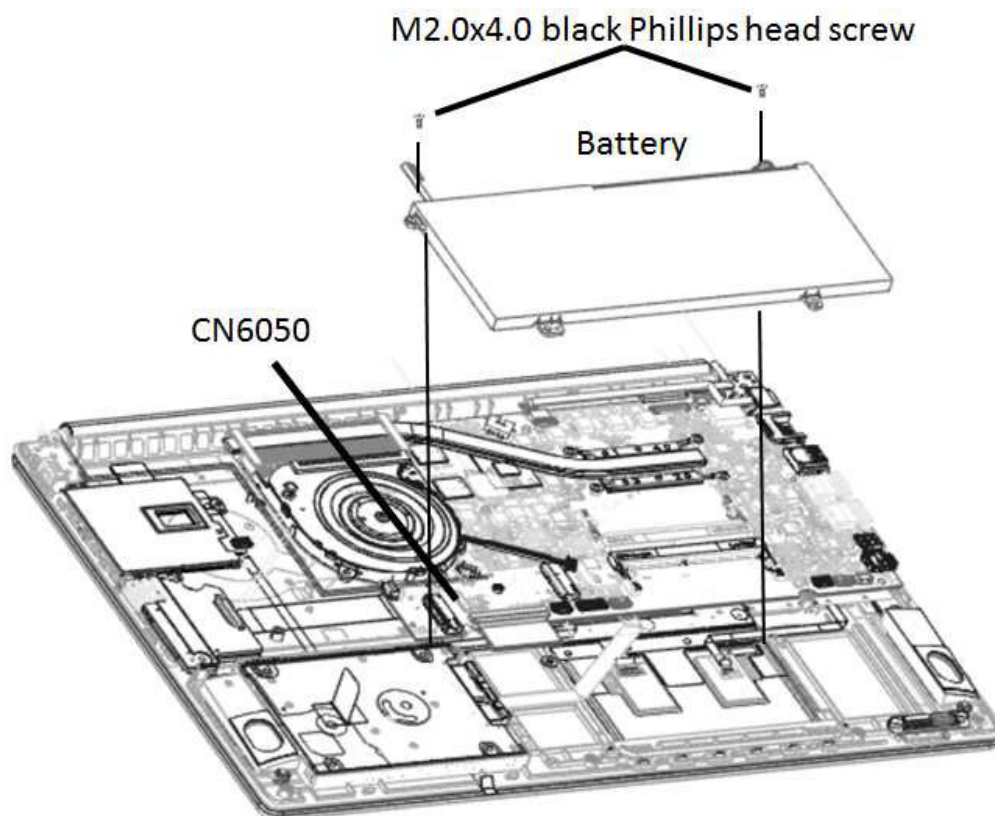2. Remove two M2.0x4.0 black Phillips head screws securing Battery.

3. Remove Battery.

Figure 4-4 Removing battery pack

NOTE: Dispose of the used battery packs as required by local ordinances or regulations.

Installing Battery Pack

Install battery pack according to the following procedures and Figure 4-4.

CAUTION: The battery packs contain a lithium ion battery, which can explode due to improper replacement, use, handling, or disposal. Always dispose of the battery packs as required by local ordinances or regulations.   Use only replacement batteries recommended by Toshiba.

NOTE: Visually check the battery's terminals. If they are dirty, clean them with a dry cloth.

1. Take a new or recharged Battery Pack.

2. Place Battery Pack in correct position.

3. Secure Battery with two M2.0x4.0 black Phillips headscrews.

4. Connect Battery cable to CN6050 on system board

4.6   HDD

Removing HDD

CAUTION: Do not press on the top or bottom of the drive.
Applying such pressure can either corrupt the data in the drive or
damage the drive.
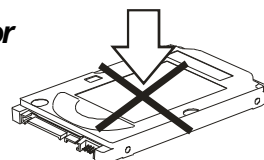
Remove HDD (hard disk drive) according to the following procedures and Figures 4-5 and 4-6.

1. Disconnect HDD cable from CN1700 on system board.

2. Remove HDD pack with cable together, by pulling the tape on HDD.
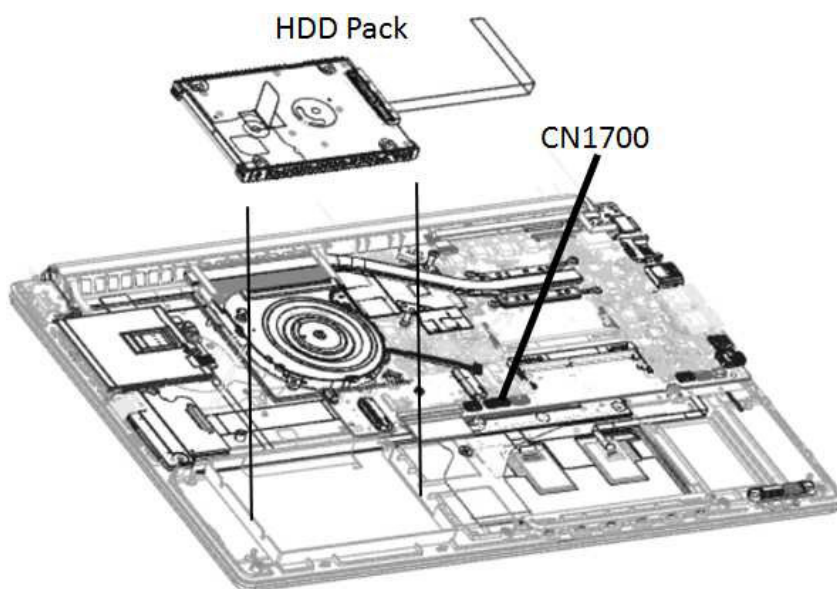

Figure 4-5 Removing HDD pack

NOTE: Do not disassemble the HDD pack when it is working normally.   Disassemble
or replace the HDD pack only if it fails.

---

3. Place HDD pack on flat surface (such as a desk), and release from two sides for removing the HDD Bumper.
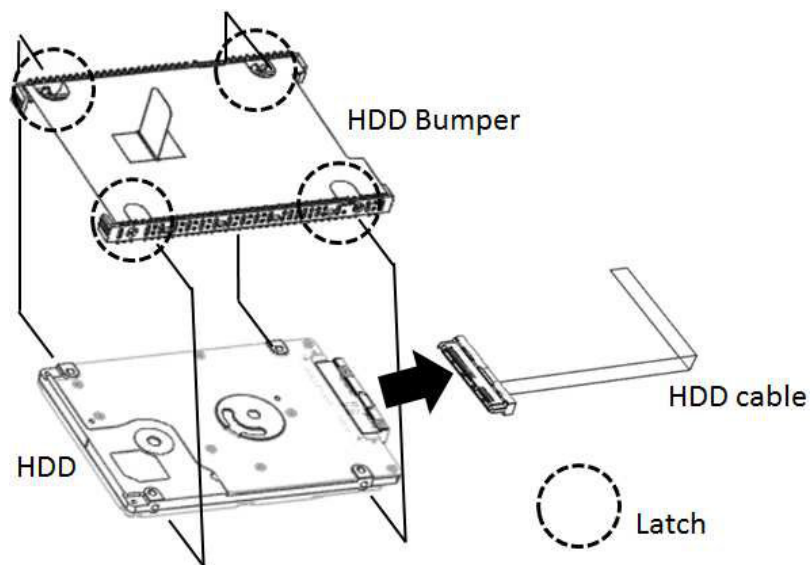
4. Disconnect HDD cable from HDD.

Figure 4-6 Removing HDD chassis and HDD cable

CAUTION: Do not apply pressure to the top or bottom of the drive.

Installing the HDD

Install HDD according to the following procedures and Figures 4-5 and 4-6.

CAUTION: To avoid damage, always hold the HDD only by its sides.

---

1. Insert four latches on HDD Bumper and HDD Cable to HDD pack.

CAUTION: To prevent the HDD bracket from being distorted when installing the HDD pack into the computer, do not press the center of the HDD pack. Always hold the HDD pack by its sides.

---

2. Place HDD pack into the correct position in the computer, holding the HDD pack by its sides.

3. Connect HDD cable to CN1700 on system board.

4.7   SSD

Removing SSD

Remove SSD according to the following   procedures and Figures 4-7.

CAUTION: Do not touch the connectors on SSD and in the computer with your bare hands. SSD can fail if they are contaminated with sweat, natural oils, etc. from your hands.

---

1.   Remove one M2.0x2.0 black Phillips head screw securing the SSD.

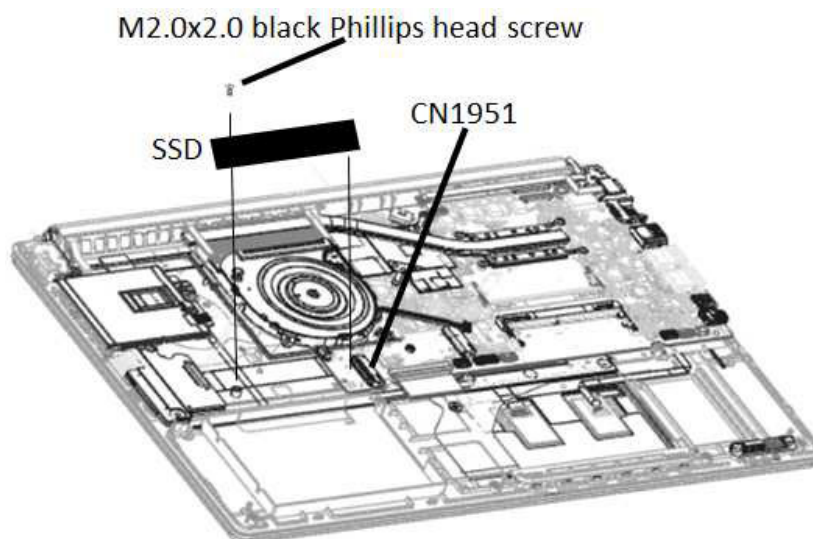2.   Pull SSD from CN1951 on system board.

Figure 4-7 Removing SSD

Installing SSD

Install SSD according to the following procedures and Figures 4-7.

1. Insert SSD into CN1951 on system board.

2. Secure it with one M2.0x2.0 black Phillips head screw.

CAUTION: Do not touch the connectors on SSD and in the computer with your bare hands. SSD can fail if they are contaminated with sweat, natural oils, etc. from your hands.

4.8   Wireless LAN Card

Removing Wireless LAN Card

Remove wireless LAN Card according to the following procedures and Figures 4-8.

CAUTION: Do not touch the connectors on the Wireless LAN Card and in the computer with your bare hands. Wireless LAN Cards can fail if they are contaminated with sweat, natural oils, etc. from your hands.

---

1. Remove tapes which fasten the antenna cable.

2. Disconnect two antenna cables with tweezers.

3. Remove one M2.0x2.0 black Phillips head screw securing Wireless LAN Card.

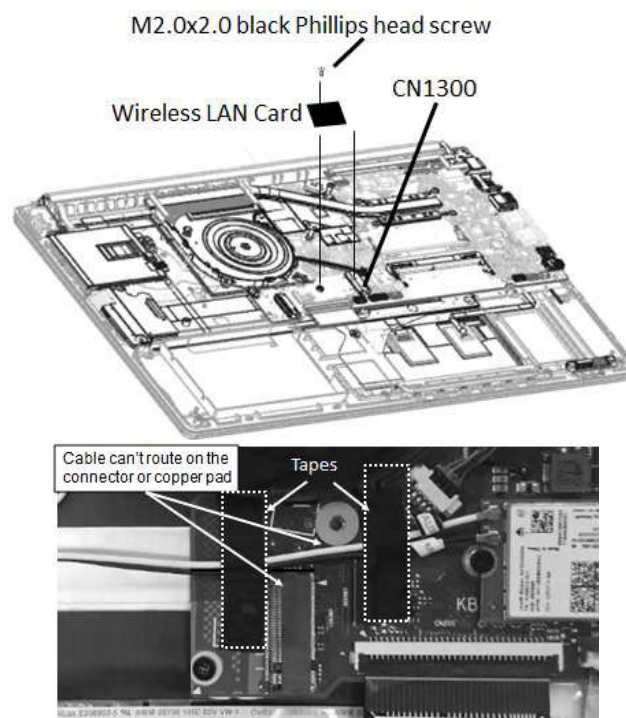4. Pull the Wireless LAN Card from CN1300 on system board.

Figure 4-8 Removing wireless LAN Card

Installing WirelessLAN Card

Install Wireless LAN Card according to the following procedures and Figures 4-8.

1. Insert Wireless LAN Card into CN1300 on system board.

2. Pressdown Wireless LAN Card to secure it with one M2.0x2.0 black Phillips head screw.

3. Connect two antenna cables by pressing them firmly into place.

4. Route antenna cables according to Figures 4-8, avoid to pinching the cables.

   Cable can't route on the connector or copper pad.

5. Stick tapes to fasten antenna cables according to Figures 4-8, avoid to stick on connector or copper pad.

CAUTION: Do not touch the connectors on the Wireless LAN Card and in the computer with your bare hands. Wireless LAN Cards can fail if they are contaminated with sweat, natural oils, etc. from your hands.

4.9   Smart Card Board

Removing Smart Card Board

Remove Smart Card Board according to the following procedures and Figure 4-9 and 4-10.

1. Remove three M2.5x5.0 black Phillips head screws securing Smart Card Board.

2. Disconnect Smart Card Board cable from CN201 on system board.
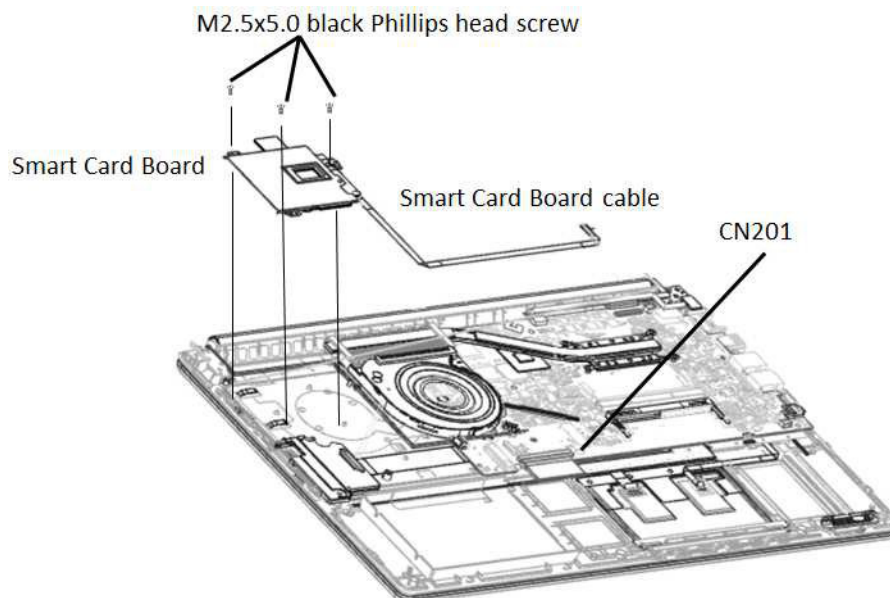
3. Remove Smart Card Board with cable.

Figure 4-9 Removing Smart Card Board

4. Disconnect Smart Card Board cable from CN9000 on Smart Card board.

5. Remove Rubber from Smart Card Board.

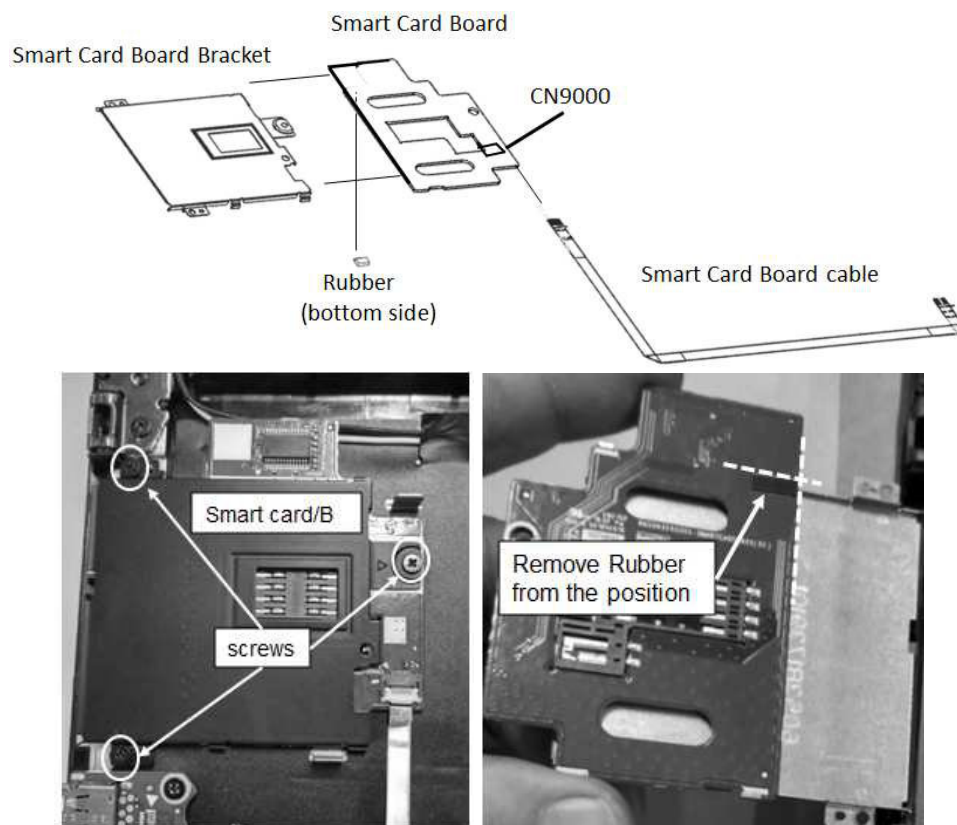6. Disassemble Smart Card Board Bracket from Smart Card Board.

Figure 4-10 Removing Smart Card Board Bracket and cable

Installing Smart Card Board

Install Smart Card Board according to the following   proceduresand Figure 4-9 and 4-10.

1. Assemble Smart Card Board Bracket with Smart Card Board.

2. Stick Rubber in the correct position.

3. Connect Smart Card Board cable to CN9000 on Smart Card board.

4. Place Smart Card Board in the correct position according to Figures 4-9 & 4-10.

5. Connect Smart Card Board cable to CN201 on the system board.

6. Secure Smart Card Board with three M2.5x5.0 black Phillips head screws.

4.10 LCD Module Assembly

> *NOTE: Touch SKU will provide the FRU parts as LCD Module Assembly.*

Removing LCD Module Assembly

Remove LCD Module Assembly according to the following procedures and Figure 4-11.

1. Remove tape for fasten LCD cable.

2. Disconnect LCD cable from CN3000 & CN3001(Only Touch SKU) on systemboard.

3. Tear three mylar on top cover to release Antenna cables.

4. Released wireless antenna cables from top cover.

5. Open LCD Module Assembly at an angle of 90 degrees.

6. Remove four M2.5x4.0 black Phillips head screws securing LCD Module Assembly with top cover.
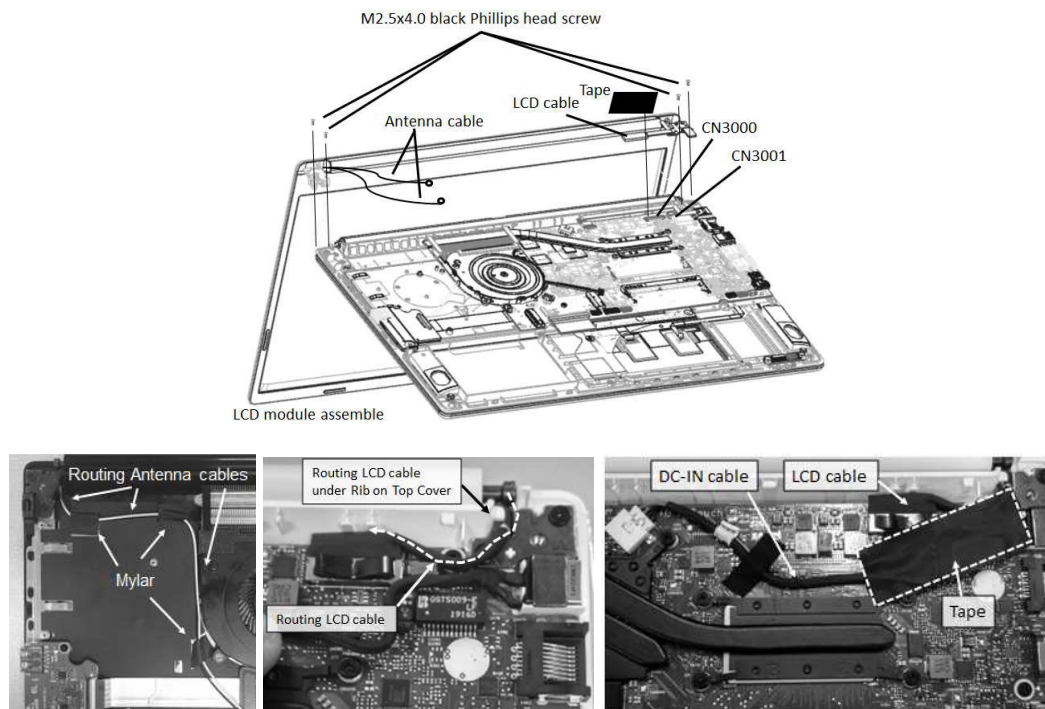
7. Remove LCD Module Assembly.

Figure 4-11 Removing the LCD Module assembly

Installing the LCD Module Assembly

Install the LCD Module Assembly according to the following procedures and Figure 4-11.

1. Place the LCD Module Assembly in the correct position.

2. Secure LCD Module Assembly with four M2.5x4.0 black Phillips head screws.

    (▲ mark portions)

3. Close LCD Module Assembly.

4. Connect LCD cable to CN3000 & CN3001 on system board.

5. Routing LCD cable according to Figure 4-11, need to under Rib on Top Cover.

6. Stick tape to fasten LCD cable.

7. Place antenna cables in correct position.

8. Stick three mylar on top cover to fasten antenna cables.

4.11 DC-IN harness

Removing DC-IN Harness

Remove DC-IN Harness according to the following procedures and Figure 4-12.

1. Remove tape for fasten DC-IN cable.

2. Disconnect DC-IN harness cable from CN6000 on system board.
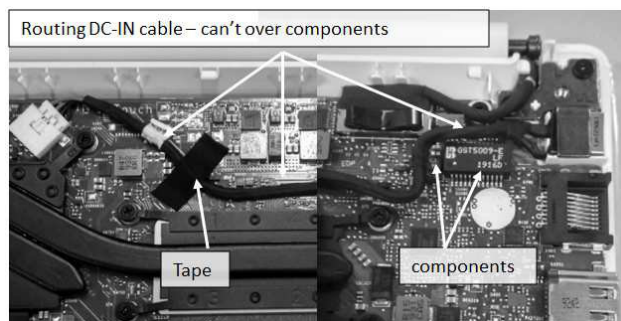
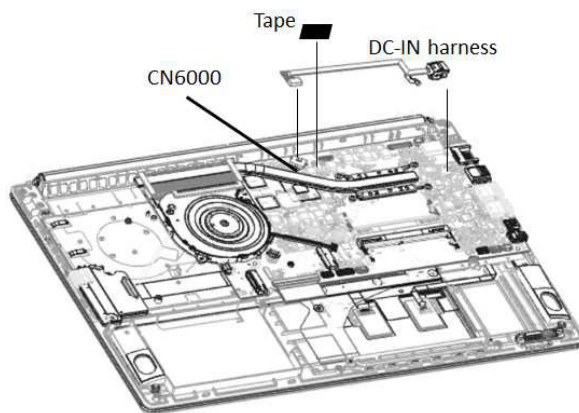3. Lift from DC-IN connector, then remove DC-IN harness.

Figure 4-12 Removing DC-IN Harness

Installing DC-IN Harness

Install DC-IN Harness according to the following procedures and Figure 4-12.

1. Place DC-IN harness in correct position on system board.

2. Connect DC-IN harness cable to CN6000 on system board.

3. Stick tape to fasten DC-IN cable.

4.12 CPU Cooling Module and Fan

CAUTION: When removing CPU Cooling Module and Fan, keep following in mind:

The CPU Cooling Module can become very hot during operation. Be sure to let it cool down before starting the repair work. Hold Fan on its outline, do not press on its center. Do not touch or cause damage to the fan in the CPU Cooling Module.

Remove CPU Cooling Module and Fan

Remove CPU Cooling Module and Fan according to the following procedures and Figures 4-13 and 4-14.

1. Remove four M2.0x2.5 black Phillips head screws securing CPU Cooling Module.

2. Remove CPU Cooling Module.

3. Remove tape to release Fan cable.

4. Disconnect Fan cable from CN4300 on system board.

5. Remove two M2.5x3.0 silver Phillips head screws securing Fan.
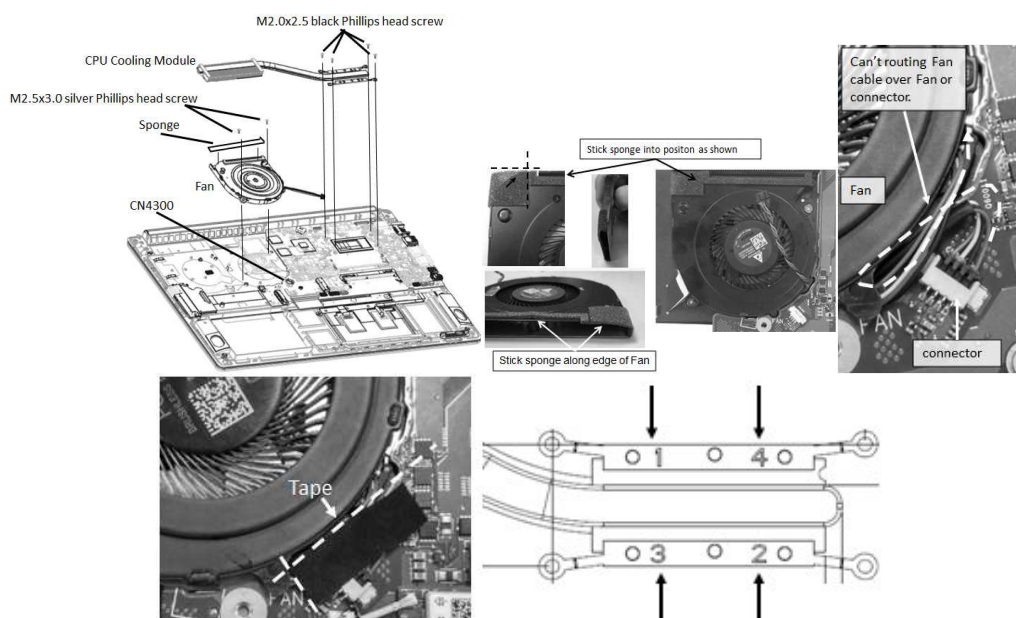
6. Remove Fan and peel off the sponge on Fan.

Figure 4-13 Removing the CPU Cooling Module and Fan

Figure 4-14 Applying silicon grease

Installing CPU Cooling Module and Fan

Install CPU Cooling Module and Fan according to the following procedures and Figures 4-13 and 4-14.

CAUTION: When installing the CPU Cooling Module, keep the following in mind:

1. Be sure to confirm the correct position for the module.

2. Secure the relevant screws on the main board according to the number sequence sealed on the heat sink module.

NOTE: Apply silicon grease with a special syringe to cover the surface of the CPU chip completely.

---

1. Stick one pcs of sponge in correct position on Fan.

2. Place Fan in correct position and secure it with two M2.5x3.0 silver flat head screws

3. Connect Fan cable to CN4300 on system board.

4. Routing Fan cable between Fan and CN4300, cable can't route on Fan or Connector.

5. Stick tape to fasten Fan cable.

6. Check silicon grease is on CPU or CPU Cooling Module,
   -If silicon grease is already applied to new CPU Cooling Module completely, check that grease on CPU needs to be wiped it off with a cloth.
   -If silicon grease is already applied to CPU and CPU Cooling Module but not enough for cover the surface,, wipe it off with a cloth.
   By using a special syringe, apply silicon grease G7762 to CPU chip center so that the entire CPU chip is covered with grease G7762.

7. Install CPU Cooling Module in correct position on system board.

8. Securing CPU Cooling Module with four M2.0x2.5 black Phillips head screws, as the order showed from 1-2-3-4 on module.

4.13 System Board

Removing System Board

Remove System Board according to the following procedures and Figures 4-15.

1. Disconnect the following cable from the connector on System Board:
    - Speaker cable from CN600.
    - LED board cable from CN102.
    - Secure Pad cable from CN281.
    - Touch Pad cable from CN280.
    - Keyboard cable from CN205.

2. Disconnect IO board cable from CN9502 on IO Board.

3. Remove four M2.0x2.5 black Phillips head screw securing System Board.

4. Remove System Board (attached with IO Board cable).

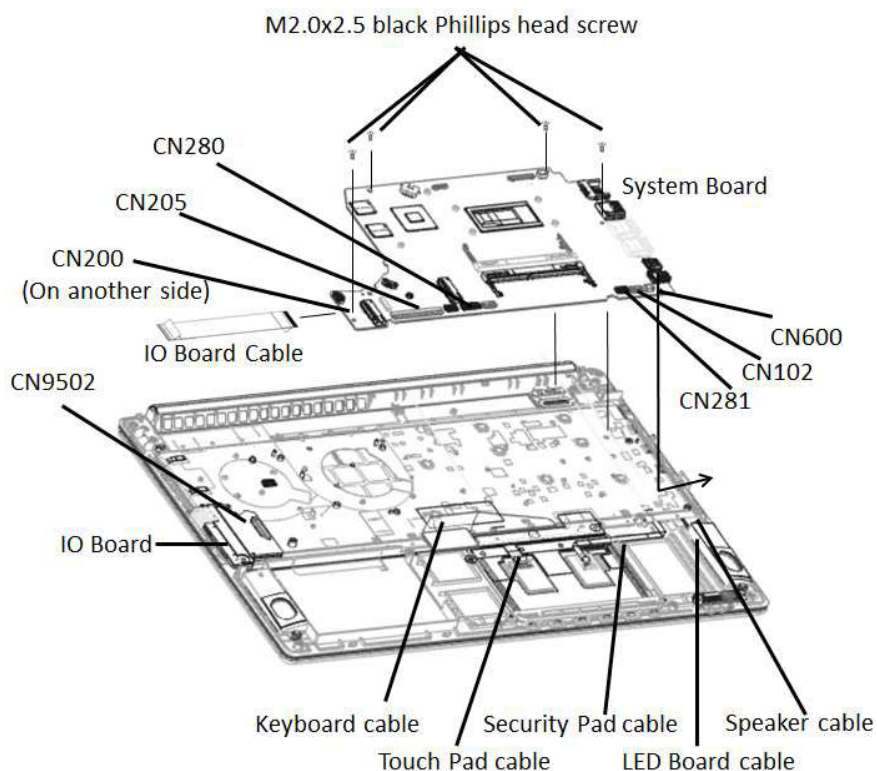5. Disconnect IO board cable from CN200 on another side of System Board.

Figure 4-15 Removing System Board

Install SystemBoard according to the following procedures and Figures 4-15.

1. Connect IO board cable to CN200 on another side of System Board.

2. Place System Board in correct position.

3. Securing System Board with four M2.0x2.5 black Phillips head screw.

    (▲ mark portions)

4. Connect IO board cable to CN9502 on IO Board, then attach the cable.

5. Connect following cable to the connector on System Board:
    - Speaker cable to CN600.
    - LED board cable to CN102.
    - Secure Pad cable to CN281.
    - Touch Pad cable to CN280.
    - Keyboard cable to CN205.

> *NOTE:*
>
> *Be sure to place all cables into the ditch to avoid the damage during assembling the bottom cover.*

> *NOTE:*
>
> *Be sure to align Type-C connector to Top Cover, when place systemboard on the unit..*

4.14 LED board and IO board

Removing LED board and IO board

Remove LED board and IO board according to the following procedures and Figure 4-16.

1. Remove two M2.0x2.5 black Phillips head screws securing LED board.

2. Remove LED board (with cable) from TOP Cover.

3. Disconnect LED board cable from CN100 on LED board.

4. Remove LED board cable.

5. Remove one M2.0x4.0 black Phillips head screws securing IO board.
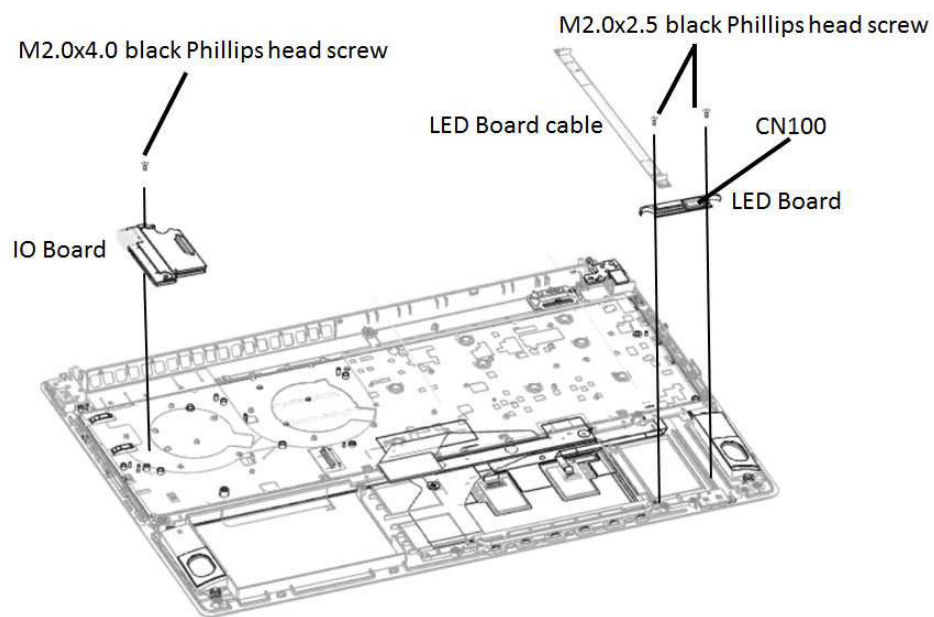
6. Remove IO board.

Figure 4-16 Removing LED board and IO board

Installing LED board and IO board

Install LED board and IO board according to the following procedures and Figure 4-16.

1. Place IO board in correct position.

2. Securing IO board with one M2.0x4.0 black Phillips headscrews.(▲ mark portions)

3. Connect LED board cable to CN100 on LED board.

4. Place LED board in correct position.

5. Securing LED board with two M2.0x2.5 black Phillips headscrews.

4.15 Speaker and Touch pad(or Secure pad)

Removing Speaker and Touch pad(or Secure pad)

Remove Speaker and Touch pad(or Secure pad) according to the following procedures and Figure 4-17.

1. Disconnect touch pad cable and Secure pad cable from Connectors on Touch pad(or Secure pad).

2. Remove Touch pad cable and Secure pad cable.

3. Remove three tapes which fasten Speaker cable.

4. Remove left and right Speaker.

5. Remove tape on upper left of Touch pad(or Secure pad).

6. Remove five M2.0x1.8 black Phillips head screws securing Touch pad(or Secure pad).

7. Remove gasket from Touch pad(or Secure pad).
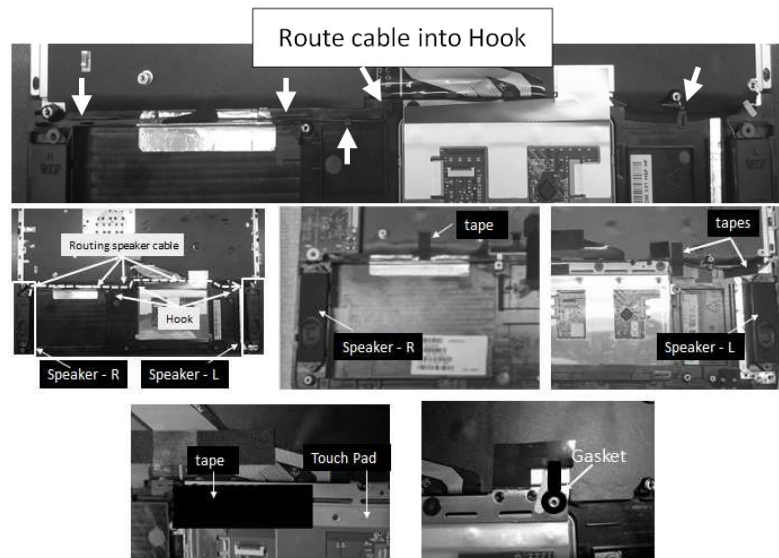
8. Remove Touch pad(or Secure pad).
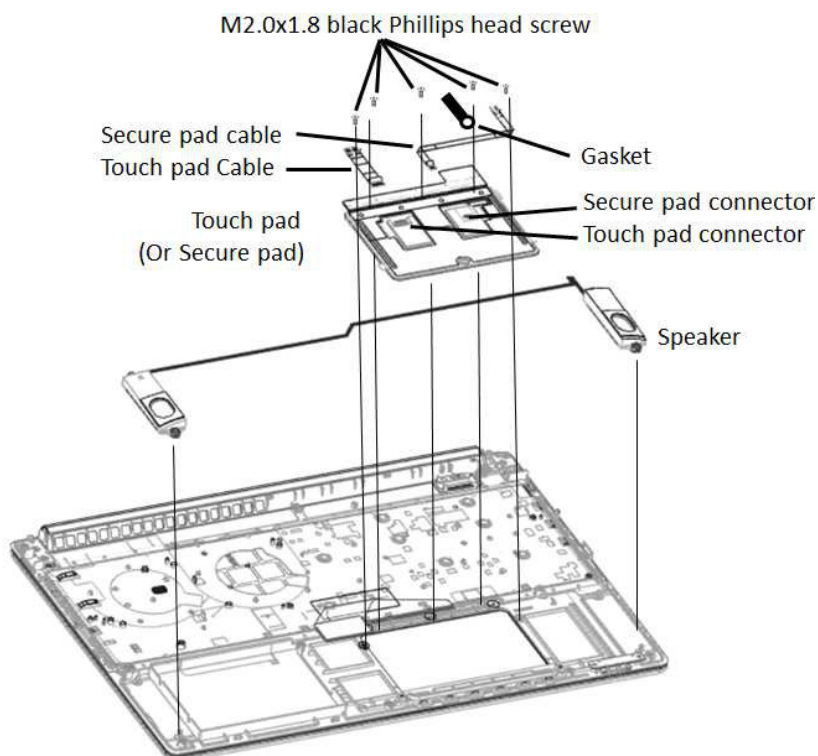
Figure 4-17 Removing Speaker and Touch pad(or Secure pad)

Installing Speaker and Touch pad(or Secure pad)

Install Speaker and Touch pad(or Secure pad) according to the following procedures and Figure 4-17.

1. Place Touch pad(or Secure pad) in correct position.

2. Stick Gasket in correct position.

3. Secure Touch pad(or Secure pad) with five M2.0x1.8 black Phillips head screws.

4. Stick tape on Touch pad(or Secure pad) in correct position

5. Place left and right Speakers in correct position

6. Route the speaker cable in the wire guide according to Figure 4-17. Place the cable into the ditch and correct position. Avoid to pinching the cables.

7. Stick three tapes for fasten speaker cable in correct position.

8. Connect touch pad cable and Secure pad cable to Connectors on Touch pad(or Secure pad).

4.16 LCD Module Mask

> **NOTE:** *This chapter is only for Non-Touch SKU. We provide Touch Panel Assembly for Touch SKU.*

Remove the LCD Module Mask

Removing the LCD Module Mask according to the following procedures and Figure 4-18

1. Insert your finger between the edge of LCD Module Mask and the LCD panel by twist in correct indication and follow step 1, 2 & 3 to release the latches.

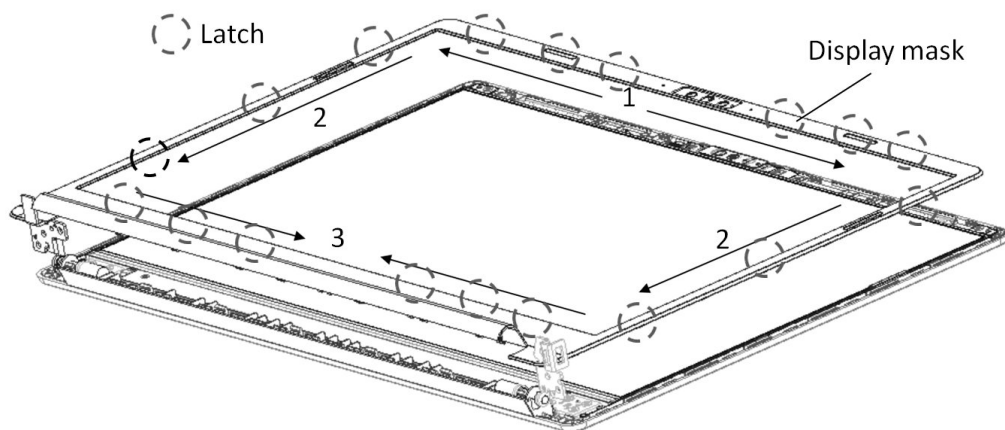2. Remove the LCD Module Mask while unlatching the LCD Module Mask.

Figure 4-18 Removing the LCD Module Mask

Installing the LCD Module Mask

Install the LCD Module Mask according to the following procedures and Figure 4-18.

1. Install the LCD Module Mask and follow step 3, 2 & 1 to press & lock the latches.

> **NOTE:** *When installing the LCD Module Mask, ensure there is no gap between the LCD Module Mask and the LCD module cover.*
>
> **NOTE:** *Do not lose the Camera Shutter.*

4.17 LCD Panel

NOTE: *Touch SKU will provide the FRU parts as LCD Module Assembly.*

 This chapter only for Non-Touch SKU.

NOTE: *ICs are fragile. Use extreme care not to apply pressure to the ICs along the edges of the LCD module.*

NOTE: *Dispose of used LCD Panel (fluorescent (FL) tubes) as required by local ordinances or regulations.*

NOTE: *The LCD cable must be carefully peeled away before disconnecting it from the module.*

Removing the LCD Panel

Remove the LCD Panel according to the following procedures and Figures 4-19 to 4-21.

1. Remove two Elastic tapes on the hinge, hold the Elastic tape and put it out parallel and then stretch it at about 45-degree angle until tape eliminated as Figure 4-19 show.

2. Follow the Figure 4-20 direction 1 to lift up LCD panel.

3. Carefully tilt the LCD module toward you.

4. Turn the LCD upside down. Be sure to place it on a cushioned surface such as a foam pad.

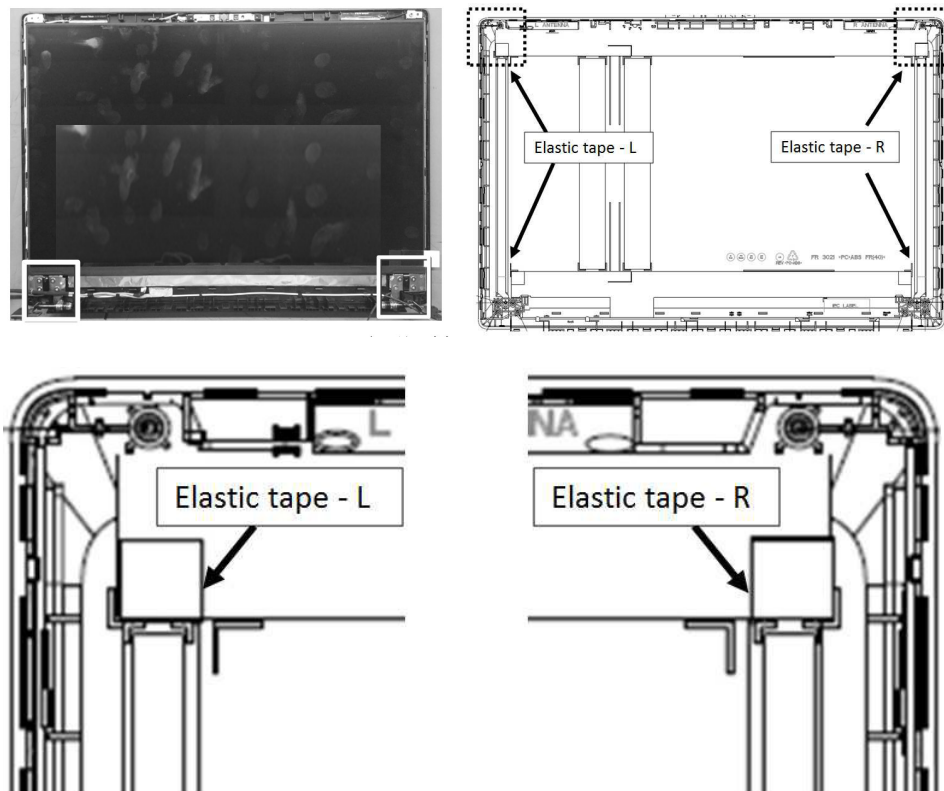5. Remove the tape and LCD cable connector. Then disconnect the LCD cable as Figure 4-21 shown.
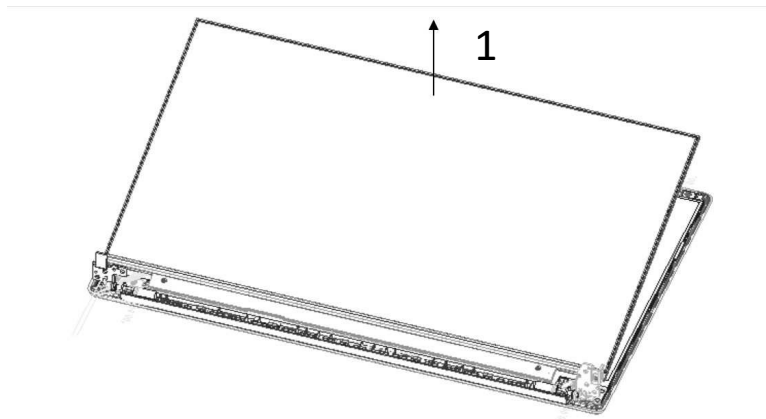
Figure 4-19 Removing two Elastic tapes

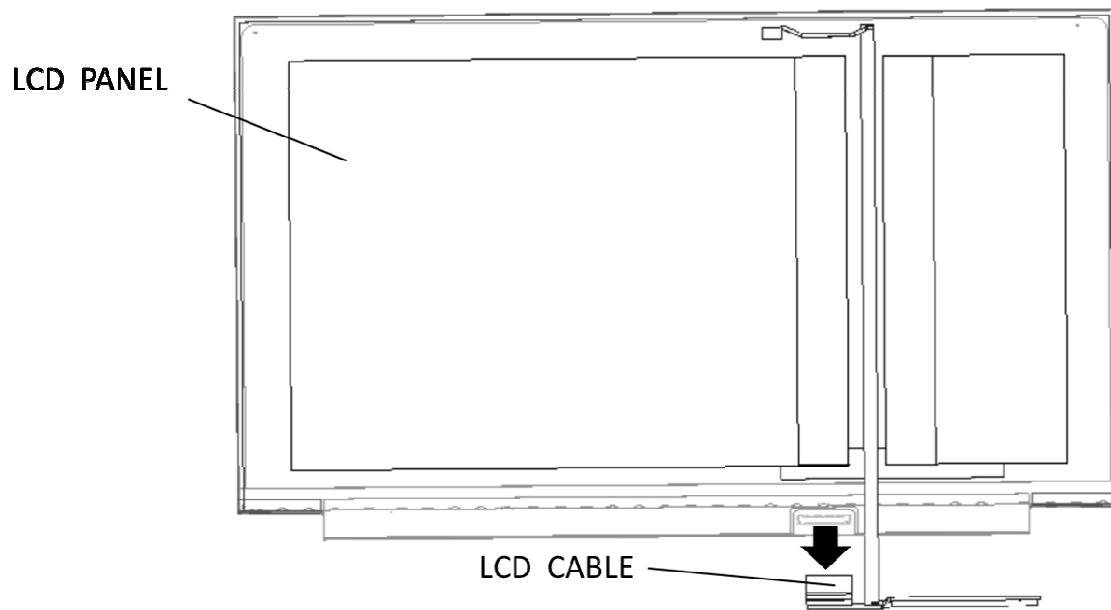*Figure 4-20 Removing LCD Panel follow direction 1.*

LCD PANEL

LCD CABLE

Figure 4-21 removing the LCD cable

Installing the LCD Panel

> **NOTE:** *LCD/FL cable must be carefully peeled away before disconnecting it from the module.*

Install the LCD Panel according to the following procedures and Figures 4-19 and 4-21.

Installing the LCD panel

Install the LCD Panel according to the following procedures.

1. Turn the LCD upside down.

2. Connect the LCD cable to the LCD module connector as Figure 4-21 shown.

3. Rip the Elastic tape on the LCD module cover.

4. Lift LCD panel top side up as Figure 4-20 shown, then place the LCD panel bottom side down on the LCD module cover.

5. Check LCD cable below the LCD module cover latch as Figure 4-22 shown.
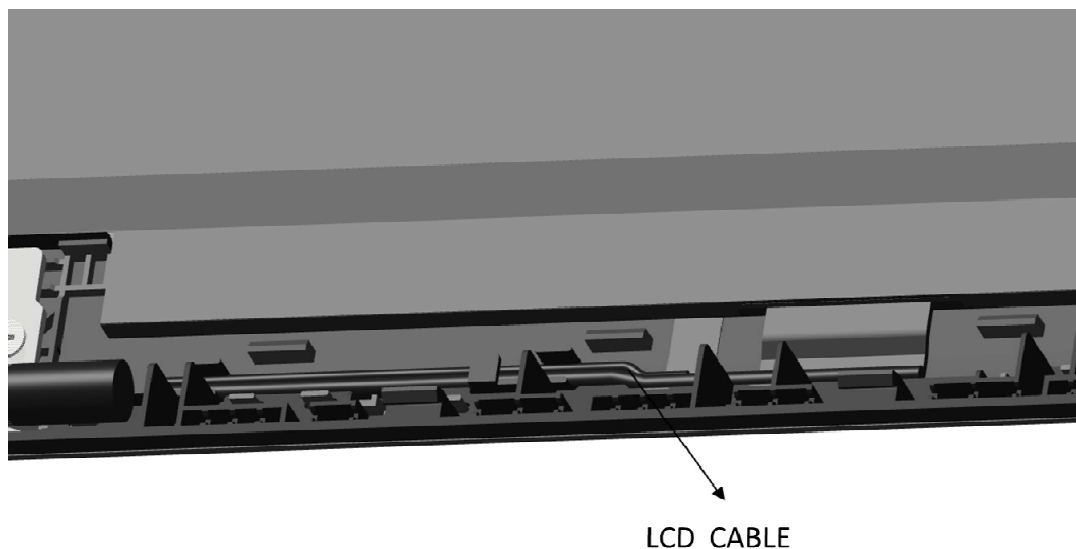

LCD CABLE

Figure 4-22 LCD cable below the LCD module cover latch

> **CAUTION:** *When installing the LCD module, please follow below instruction:*
> *When plug in LCD/FL cable into LCD panel connector, need to plug horizontally.*

4.18 CCD Module

> **NOTE:** *Touch SKU will provide the FRU parts as LCD Module Assembly. This chapter only for Non-Touch SKU.*

Removing the CCD Module

Remove the CCD Module according to the following procedures and Figure 4-23

1. Lift the CCD Module from the LCD module cover.

2. Tear the tape which on the CCD Module connector.

3. Disconnect LCD cable from CCD Module connector.
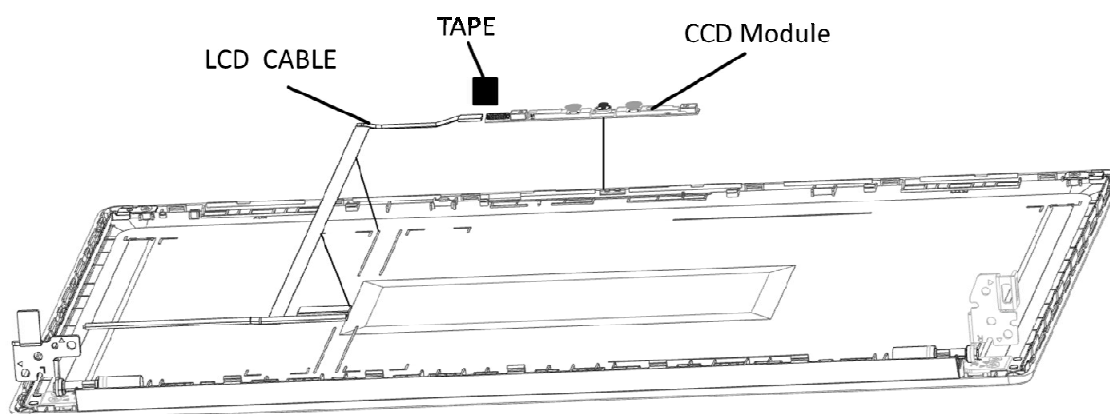
Figure 4-23 Removing the CCD Module

Installing the CCD Module

Install the CCD Module according to the following procedures and Figure 4-23.

1. Connect LCD cable to CCD module connector.

2. Place tape which on the CCD Module connector.

3. Seat the CCD Module in the correct position.

4. Route the LCD cables according to Figure 4-23, place the cable into the ditch and correct position. Avoid to pinching the cables.

Replacement Procedures

Appendices

Appendix   Contents

Appendix A　Handling the LCD Module

Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling the LCD module:

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.
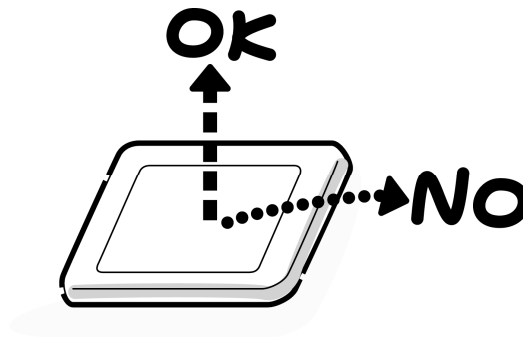
2. Be careful to align the four holes at the right side and left side of the LCD module with the corresponding holes in the LCD cover before securing the module with four screws. Do not force the module into place, because stress can affect its performance. Also, the panel's polarized surface is easily scarred, so be carefully when handling it.
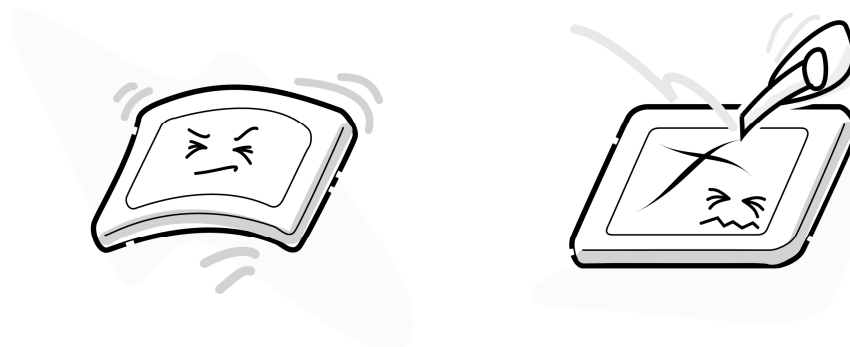
3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

    If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel. Also, never scratch the surface.
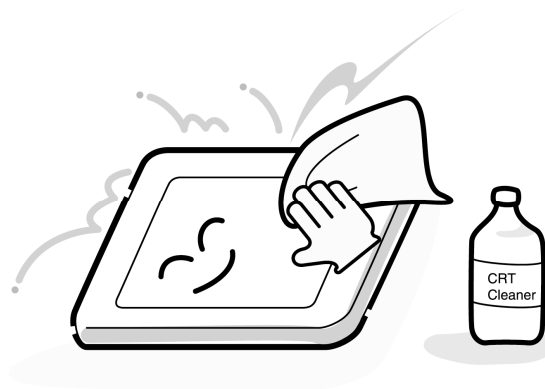
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.

5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
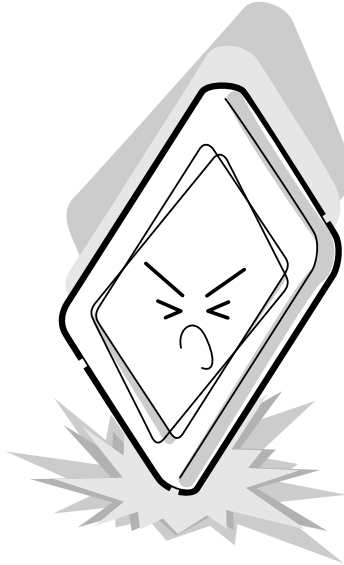
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.
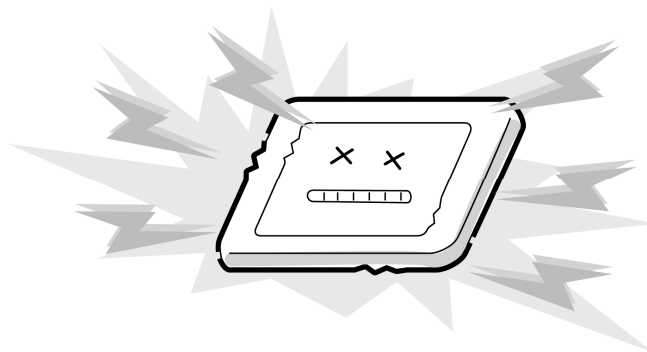
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
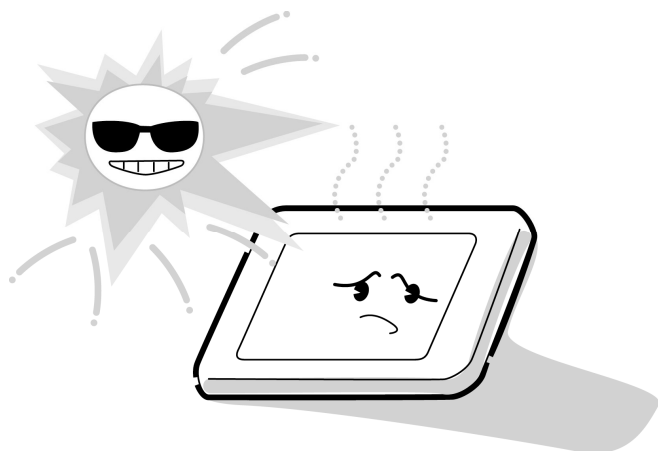
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
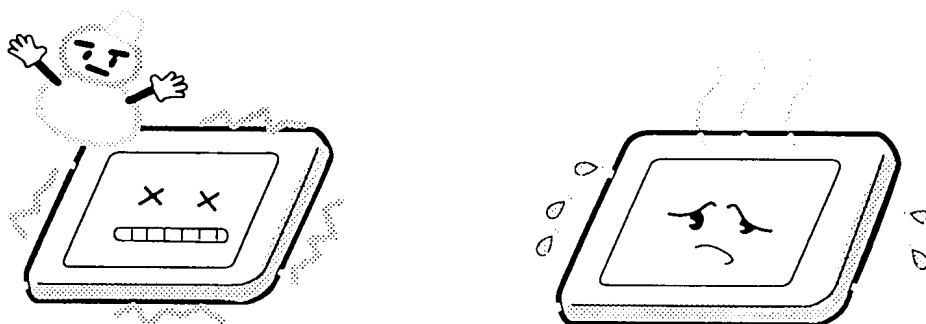
9.   Do not disassemble the LCD module. Disassembly can cause malfunctions.
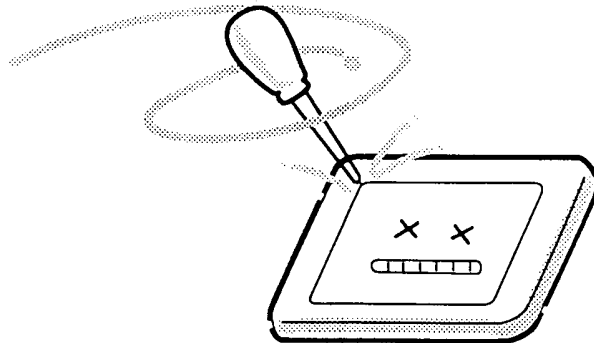
10. If you transport the module, do not use packing material that contains epoxy resin
(amine) or silicon glue (alcohol or oxide). These materials can release gas that can
damage the panel's polarization.
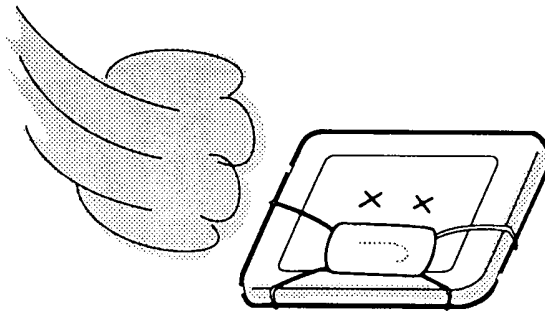
11. For the module with touch screen function, please be careful about the retro type
around the LCD bezel. If the retro is broken or dirty, the function of touch screen
will be effect.

Appendix B   Board Layout

B.1   System Board Front View
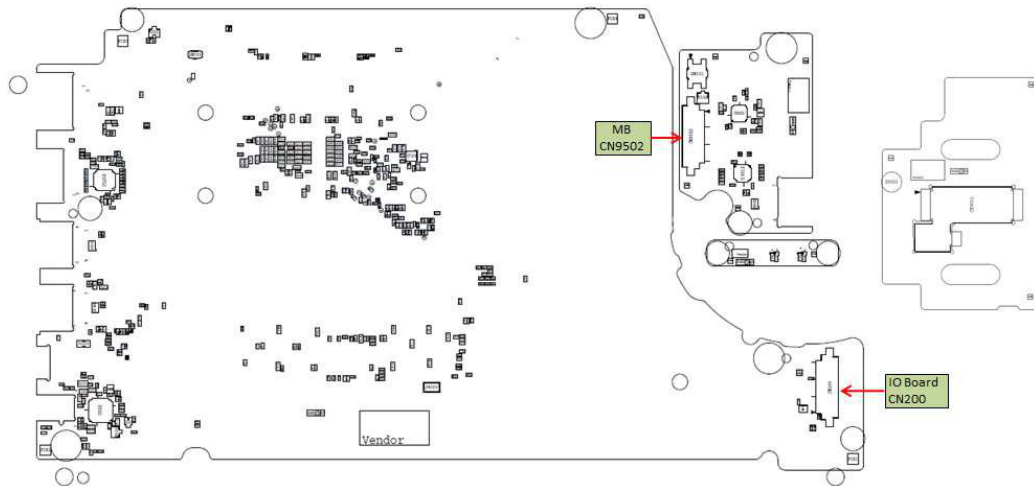
Figure B-1 Board Layout (Front)

B.2   System Board Back View
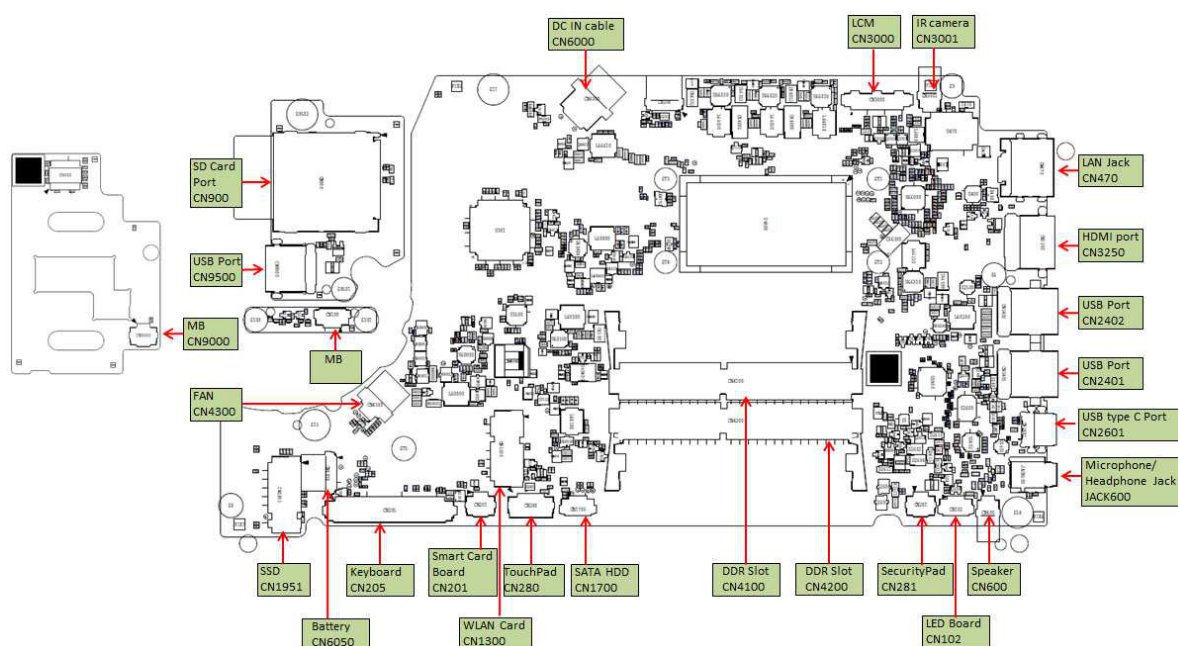
Figure B-2 Board Layout (Back)

Appendix C   Keyboard Scan/Character Codes

Table C-1 Scan Codes (set 1 and set 2) (1/4)

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break		Note
01	' ~	29	A9	0E	F0	0E	
02	1 !	02	82	16	F0	16	
03	2 @	03	83	1E	F0	1E	
04	3 #	04	84	26	F0	26	
05	4 $	05	85	25	F0	25	
06	5 %	06	86	2E	F0	2E	
07	6 ^	07	87	36	F0	36	
08	7 &	08	88	3D	F0	3D	*2
09	8 *	09	89	3E	F0	3E	*2
10	9 (	0A	8A	46	F0	46	*2
11	0)	0B	8B	45	F0	45	*2
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
14				7D	F0	7D	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	18	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[{	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	

Table C-1 Scan Codes (set 1 and set 2) (2/4)

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
29	\ |	2B	AB	5D	F0	5D	*5
30	Caps Lock	3A	BA	58	F0	58	
31	A	1E	9E	1C	F0	1C	
32	S	1F	9F	1B	F0	1B	
33	D	20	A0	23	F0	23	
34	F	21	A1	2B	F0	2B	
35	G	22	A2	34	F0	34	
36	H	23	A3	33	F0	33	
37	J	24	A4	3B	F0	3B	*2
38	K	25	A5	42	F0	42	*2
39	L	26	A6	4B	F0	4B	*2
40	; :	27	A7	4C	F0	4C	*2
41	' "	28	A8	52	F0	52	
43	Enter	1C	9C	5A	F0	5A	*3
44	Shift (L)	2A	AA	12	F0	12	
45	No.102 key	56	D6	61	F0	61	
46	Z	2C	AC	1A	F0	1A	
47	X	2D	AD	22	F0	22	
48	C	2E	AE	21	F0	21	
49	V	2F	AF	2A	F0	2A	
50	B	30	B0	32	F0	32	
51	N	31	B1	31	F0	31	
52	M	32	B2	3A	F0	3A	*2
53	, <	33	B3	41	F0	41	*2
54	. >	34	B4	49	F0	49	*2
55	/ ?	35	B5	4A	F0	4A	*2
56	_			73	F0	73	
57	Shift (R)	36	B6	59	F0	59	

Table C-1 Scan Codes (set 1 and set 2) (3/4)

Cap No.	Keytop	Code set 1 Make		Code set 1 Break		Code set 2 Make		Code set 2 Break			Note
58	Ctrl		1D		9D		14	F0		14	*3
60	Alt (L)		38		B8		11	F0		11	*3
61	Space		39		B9		29	F0		29	
62	ALT (R)	E0	38	E0	B8	E0	11	E0	F0	11	
75	Ins	E0	52	E0	D2	E0	70	E0	F0	70	*1
76	Del	E0	53	E0	D3	E0	71	E0	F0	71	*1
79	←	E0	4B	E0	CB	E0	6B	E0	F0	6B	*1
80	Home	E0	47	E0	C7	E0	6C	E0	F0	6C	*1
81	End	E0	4F	E0	CF	E0	69	E0	F0	69	*1
83	↑	E0	48	E0	C8	E0	75	E0	F0	75	*1
84	↓	E0	50	E0	D0	E0	72	E0	F0	72	*1
85	PgUp	E0	49	E0	C9	E0	7D	E0	F0	7D	*1
86	PgDn	E0	51	E0	D1	E0	7A	E0	F0	7A	*1
89	→	E0	4D	E0	CD	E0	74	E0	F0	74	*1
110	Esc		01		81		76	F0		76	
112	F1		3B		BB		05	F0		05	
113	F2		3C		BC		06	F0		06	
114	F3		3D		BD		04	F0		04	
115	F4		3E		BE		0C	F0		0C	
116	F5		3F		BF		03	F0		03	
117	F6		40		C0		0B	F0		0B	
118	F7		41		C1		83	F0		83	
119	F8		42		C2		0A	F0		0A	
120	F9		43		C3		01	F0		01	
121	F10		44		C4		09	F0		09	*3

Table C-1 Scan Codes (set 1 and set 2) (4/4)

Cap No.	Keytop	Code set 1				Code set 2					Note
		Make		Break		Make		Break			
122	F11	57		D7		78		F0		78	*3
123	F12	58		D8		7		F0		7	*3
124	PrintSc	*6		*6		*6		*6			*6
126	Pause	*7		*7		*7		*7			*7
202	Fn	—		—		—		—			*4
203	Win	E0	5B	E0	DB	E0	1F	E0	F0	1F	
204	App	E0	5D	E0	DD	E0	2F	E0	F0	2F	
205	Kat/Hir					70		F0	70		*8
206	Hen					79		F0	79		*8
207	Muh					7B		F0	7B		*8

Notes:

1. *   Scan codes differ by mode.
2. *   Scan codes differ by overlay function.
3. *   Combination with the **Fn** key makes different codes.
4. *   **Fn** key does not generate a code by itself.
5. *   This key corresponds to key No. 42 in a 102-key model.
6. *   Refer to Table C-6, No. 124 key scan code.
7. *   Refer to Table C-7, No. 126 key scan code.
8. *   205~207 are for JAPAN keyboard only

Table C-2 Scan Codes with left Shift key

Cap No.	Key top	Code set 1								Code set 2							
		Make				Break				Make				Break			
55	/	E0	AA	E0	35	E0	B5	E0	2A	E0	F0	12	E0	4A	E0	F0	4A	E0	12
75	INS	E0	AA	E0	52	E0	D2	E0	2A	E0	F0	12	E0	70	E0	F0	70	E0	12
76	DEL	E0	AA	E0	53	E0	D3	E0	2A	E0	F0	12	E0	71	E0	F0	71	E0	12
79	←	E0	AA	E0	4B	E0	CB	E0	2A	E0	F0	12	E0	6B	E0	F0	6B	E0	12
80	Home	E0	AA	E0	47	E0	C7	E0	2A	E0	F0	12	E0	6C	E0	F0	6C	E0	12
81	End	E0	AA	E0	4F	E0	CF	E0	2A	E0	F0	12	E0	69	E0	F0	69	E0	12
83	↑	E0	AA	E0	48	E0	C8	E0	2A	E0	F0	12	E0	75	E0	F0	75	E0	12
84	↓	E0	AA	E0	50	E0	D0	E0	2A	E0	F0	12	E0	72	E0	F0	72	E0	12
85	PgUp	E0	AA	E0	49	E0	C9	E0	2A	E0	F0	12	E0	7D	E0	F0	7D	E0	12
86	PgDn	E0	AA	E0	51	E0	D1	E0	2A	E0	F0	12	E0	7A	E0	F0	7A	E0	12
89	→	E0	AA	E0	4D	E0	CD	E0	2A	E0	F0	12	E0	74	E0	F0	74	E0	12
203	Win	E0	AA	E0	5B	E0	DB	E0	2A	E0	F0	12	E0	1F	E0	F0	1F	E0	12
204	App	E0	AA	E0	5D	E0	DD	E0	2A	E0	F0	12	E0	2F	E0	F0	2F	E0	12

Note : The table above shows scan codes with the left **Shift** key. In combination with the right **Shift** key, scan codes are changed as listed below:

	With left **Shift**	With right **Shift**
Set 1	E0 AA _____	E0 B6
	E0 2A _____	E0 36
Set 2	E0 F0 12_____	E0 F0 59
	E0 12_____	E0 59

Table C-3 Scan Codes in Numlock mode

Cap No.	Key top	Code set 1								Code set 2							
		Make				Break				Make				Break			
75	INS	E0	2A	E0	52	E0	D2	E0	AA	E0	12	E0	70	E0	F0	70	E0	F0	12
76	DEL	E0	2A	E0	53	E0	D3	E0	AA	E0	12	E0	71	E0	F0	71	E0	F0	12
79	←	E0	2A	E0	4B	E0	CB	E0	AA	E0	12	E0	6B	E0	F0	6B	E0	F0	12
80	Home	E0	2A	E0	47	E0	C7	E0	AA	E0	12	E0	6C	E0	F0	6C	E0	F0	12
81	End	E0	2A	E0	4F	E0	CF	E0	AA	E0	12	E0	69	E0	F0	69	E0	F0	12
83	↑	E0	2A	E0	48	E0	C8	E0	AA	E0	12	E0	75	E0	F0	75	E0	F0	12
84	↓	E0	2A	E0	50	E0	D0	E0	AA	E0	12	E0	72	E0	F0	72	E0	F0	12
85	PgUp	E0	2A	E0	49	E0	C9	E0	AA	E0	12	E0	7D	E0	F0	7D	E0	F0	12
86	PgDn	E0	2A	E0	51	E0	D1	E0	AA	E0	12	E0	7A	E0	F0	7A	E0	F0	12
89	→	E0	2A	E0	4D	E0	CD	E0	AA	E0	12	E0	74	E0	F0	74	E0	F0	12
203	Win	E0	2A	E0	5B	E0	DB	E0	AA	E0	12	E0	1F	E0	F0	1F	E0	F0	12
204	App	E0	2A	E0	5D	E0	DD	E0	AA	E0	12	E0	2F	E0	F0	2F	E0	F0	12

Table C-4 Scan Codes with Fn key

Cap No.	Keytop	Code set 1				Code set 2			
		Make		Break		Make		Break	
43	ENT	E0	1C	E0	9C	E0	5A	E0	F0	5A
58	CTRL	E0	1D	E0	9D	E0	14	E0	F0	14
60	LALT	E0	38	E0	B8	E0	11	E0	F0	11
121	ARROW	45		C5		77		F0	77
122	NUMERIC	45		C5		77		F0	77
123	Scrl	46		C5		7E		F0	7E

Table C-5 Scan Codes in overlay mode

Cap No.	Keytop		Code set 1		Code set 2		
			Make	**Break**	**Make**	**Break**	
08	7	(7)	47	C7	6C	F0	6C
09	8	(8)	48	C8	75	F0	75
10	9	(9)	49	C9	7D	F0	7D
11	0	(*)	37	B7	7C	F0	7C
23	U	(4)	4B	CB	6B	F0	6B
24	I	(5)	4C	CC	73	F0	73
25	O	(6)	4D	CD	74	F0	74
26	P	(−)	4A	CA	7B	F0	7B
37	J	(1)	4F	CF	69	F0	69
38	K	(2)	50	D0	72	F0	72
39	L	(3)	51	D1	7A	F0	7A
40	;	(+)	4E	CE	79	F0	79
52	M	(0)	52	D2	70	F0	70
54	.	(.)	53	D3	71	F0	71
55	/	(/)	E0 35	E0 B5	40 4A	E0 F0 4A	

Table C-6 No.124 key scan code

Key top	Shift	Code set 1				Code set 2				
		Make		**Break**		**Make**		**Break**		
Prt Sc	Common	E0 2A E0 37		E0 B7 E0 AA		E0 12 E0 7C		E0 F0 7C E0 F0 12		
	Ctrl+	E0 37		E0 B7		E0 7C		E0 F0 7C		
	Shift+	E0 37		E0 B7		E0 7C		E0 F0 7C		
	Alt+	54		D4		84		F0 B4		

Table C-7 No.126 key scan code

Key top	Shift	Code set 1						Code set 2						
		Make						Make						
Pause	Common*	E1	1D	45	E1	9D	C5	E1	14	77	E1	F0	14	F0 77
	Ctrl*	E0	46	E0	C6			E0	7E	E0	F0	7E		

*: This key generates only make codes.

Appendix D   Key Layout

D.1   USA (US) Keyboard
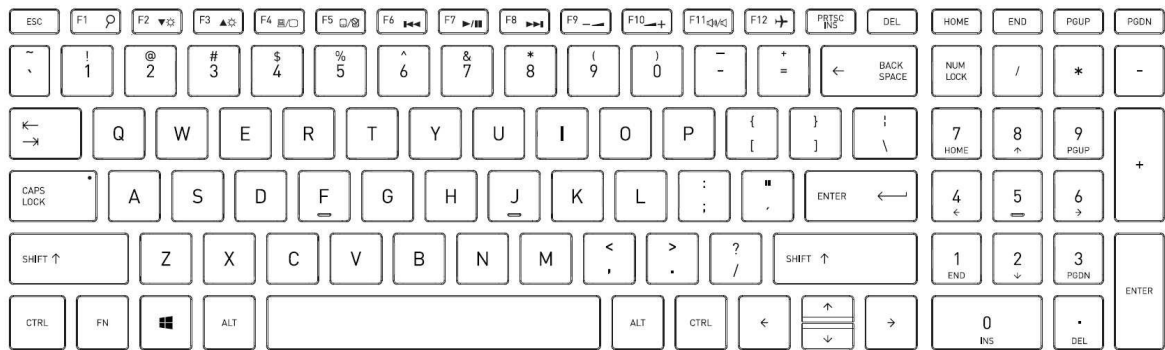
Figure D-1 US keyboard

D.2   Taiwanese (TW) Keyboard
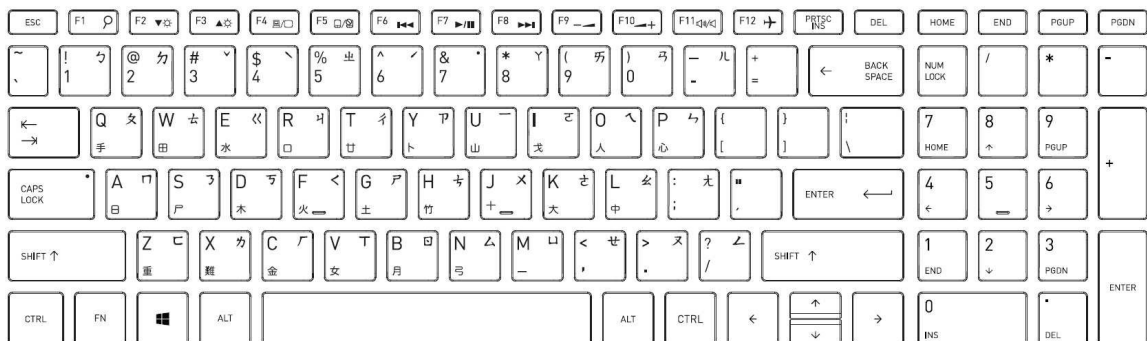
Figure D-2 TW keyboard

D.3   Thai (TH) Keyboard
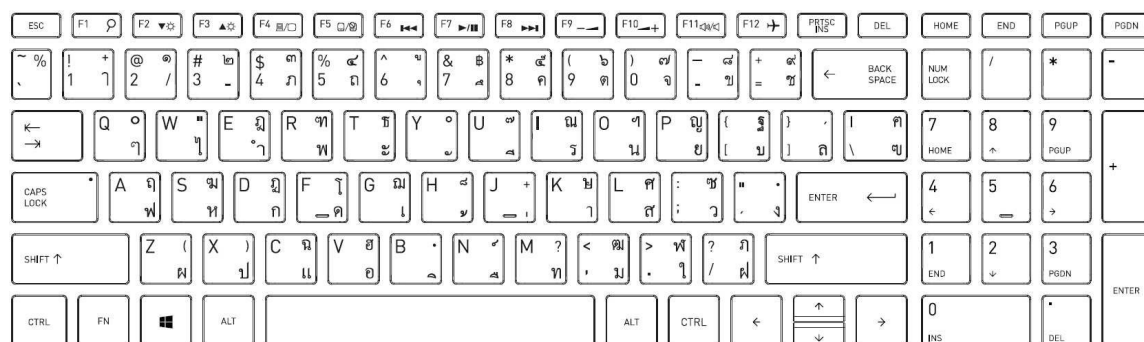
Figure D-3 TH keyboard

D.4   Japanese (JP) Keyboard

Figure D-4 JP keyboard

D.5 Hebrew (HE) Keyboard
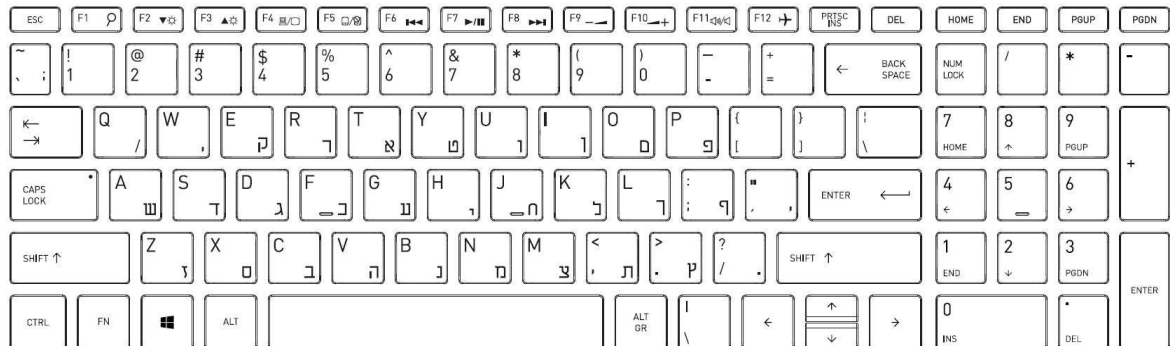
Figure D-5 HE keyboard

D.6 Korean (KR) Keyboard
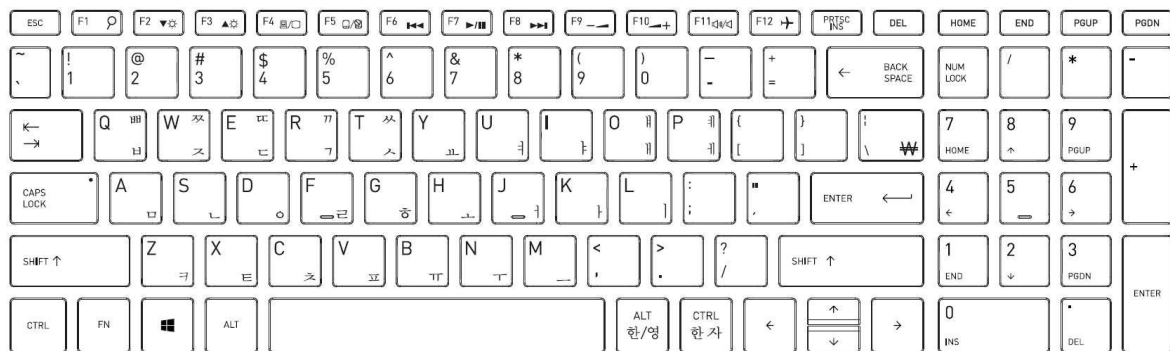
Figure D-6 KR keyboard

D.7 UK-English (EN) Keyboard
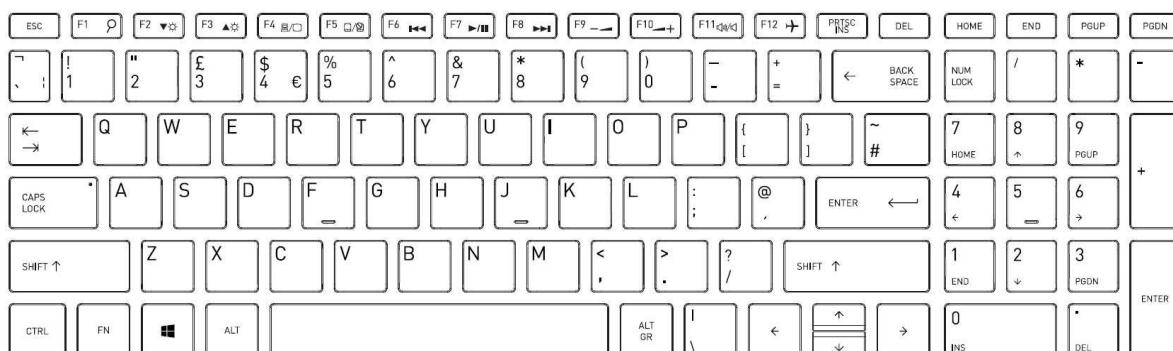
Figure D-7 EN keyboard

D.8 DU, UE, US International (USE) Keyboard
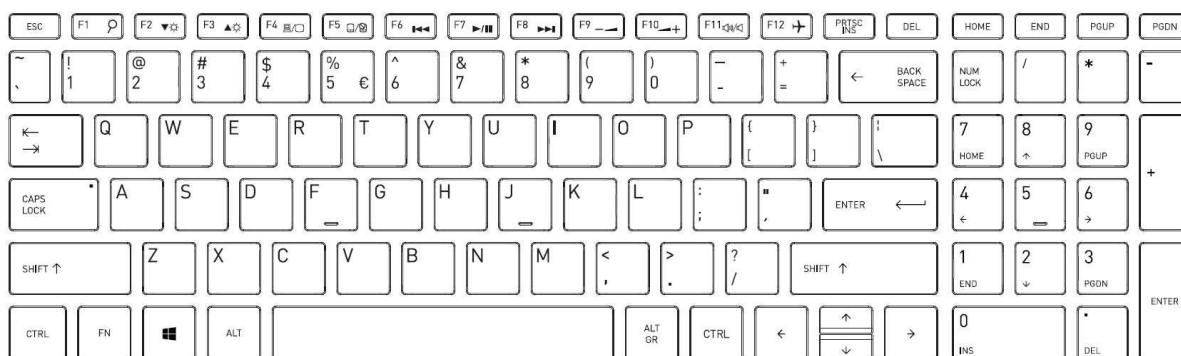
Figure D-8 USE keyboard

D.9 Scandinavian (N5) Keyboard
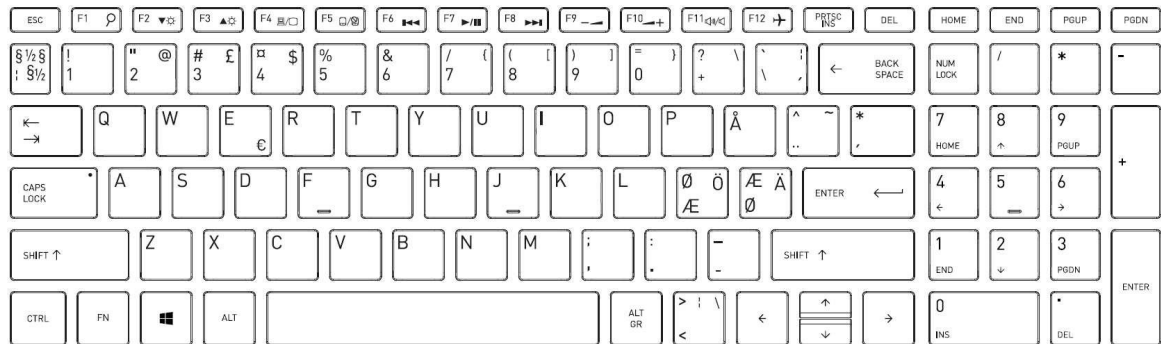
Figure D-9 N5 keyboard

D.10 Swiss (SL) Keyboard
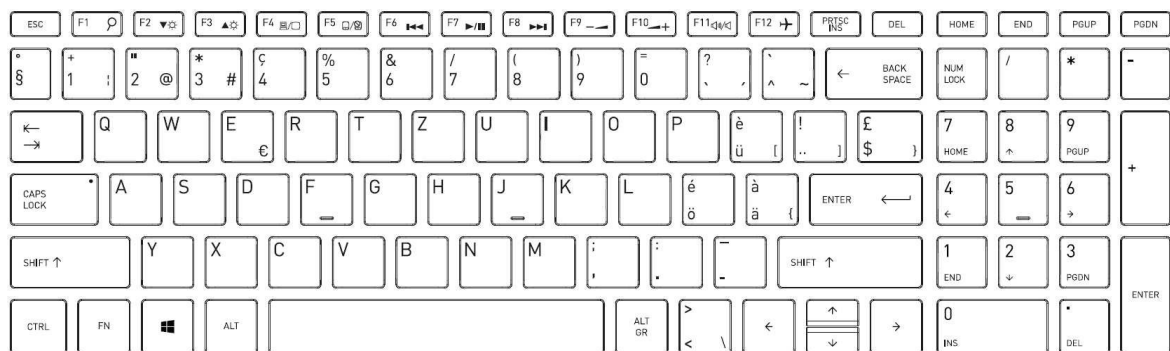
Figure D-10 SL keyboard

D.11 Arabic (AR) Keyboard
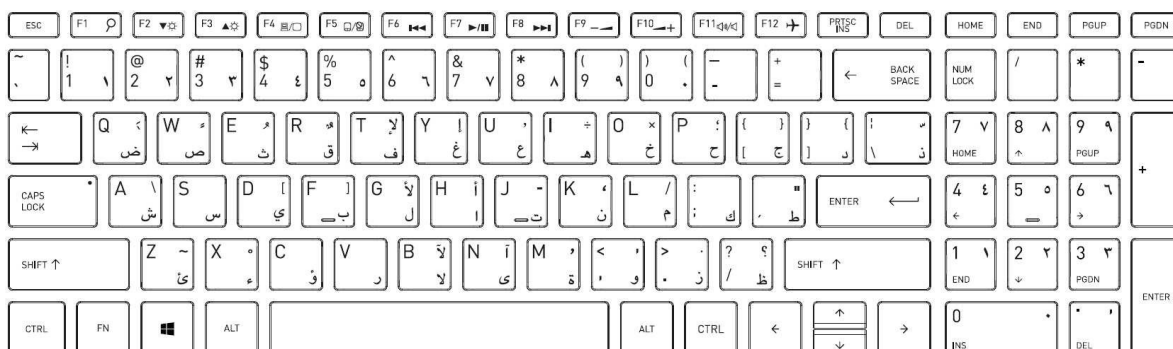
Figure D-11   AR keyboard

D.12 Czech (CZ) Keyboard
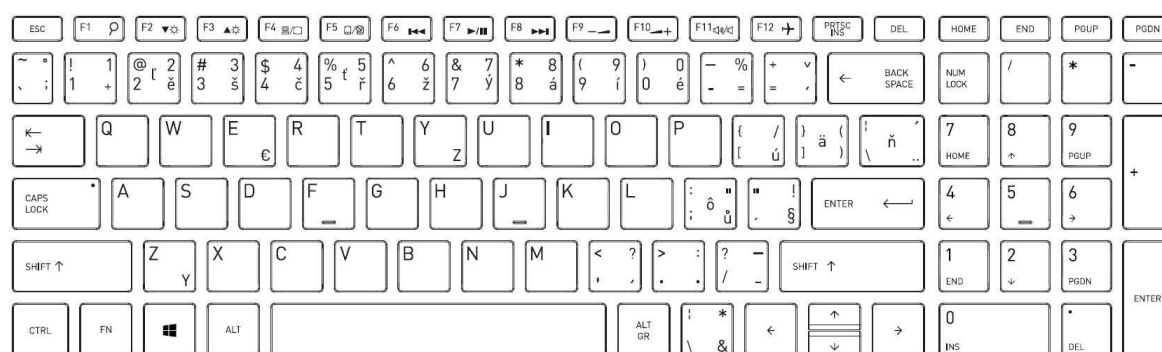
Figure D-12 CZ keyboard

D.13 Portuguese (PT) Keyboard
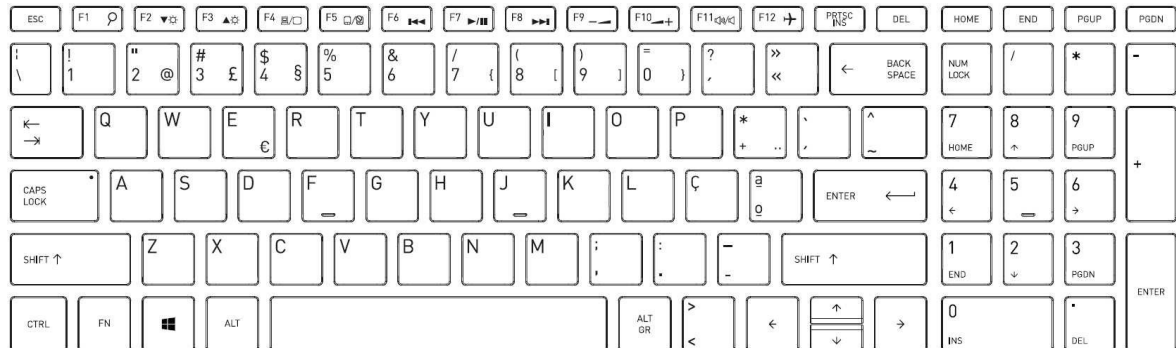
Figure D-13 PT keyboard

D.14 Latin American (LA) Keyboard
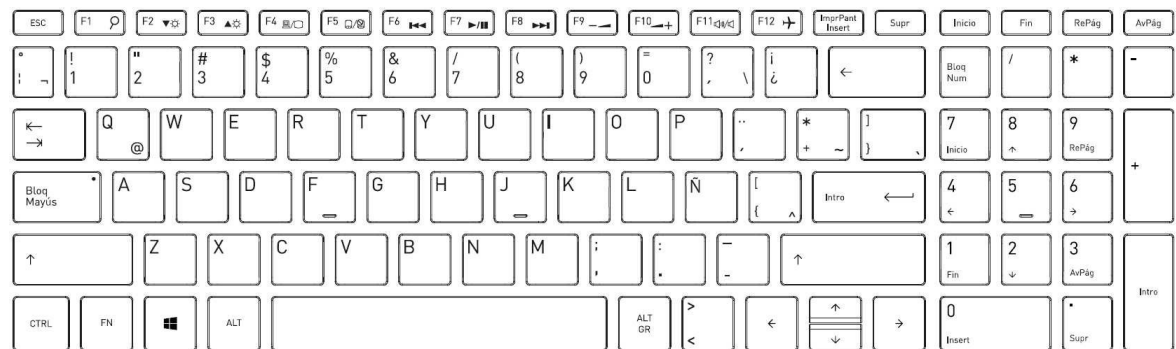
Figure D-14 LA keyboard

D.15 Italian (IT) Keyboard
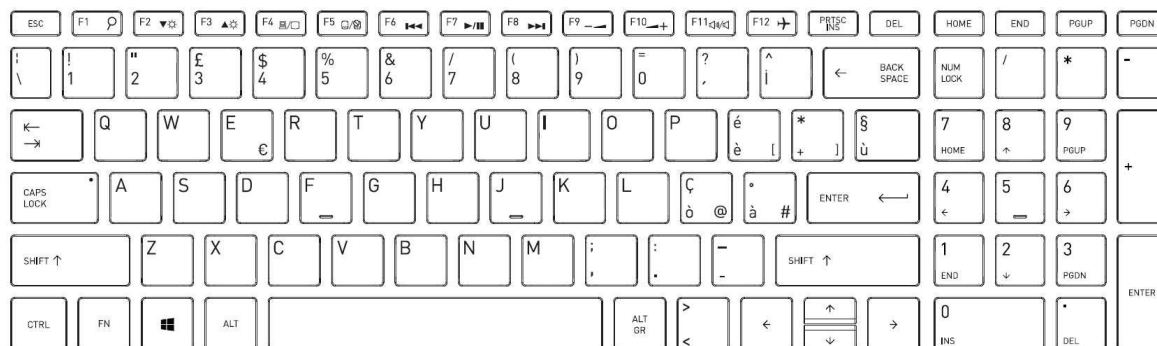
Figure D-15 IT keyboard

D.16 French (FR) Keyboard
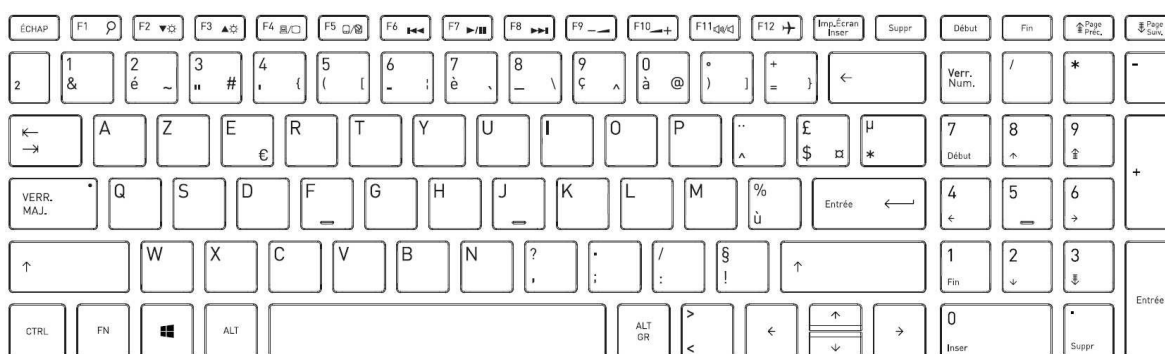
Figure D-16 FR keyboard

D.17 German (GR) Keyboard
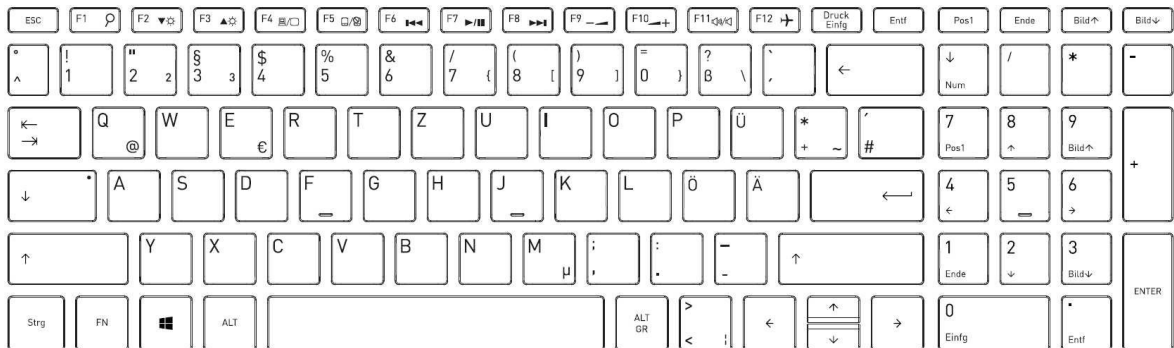
Figure D-17 GR keyboard

D.18 Greek (GK) Keyboard
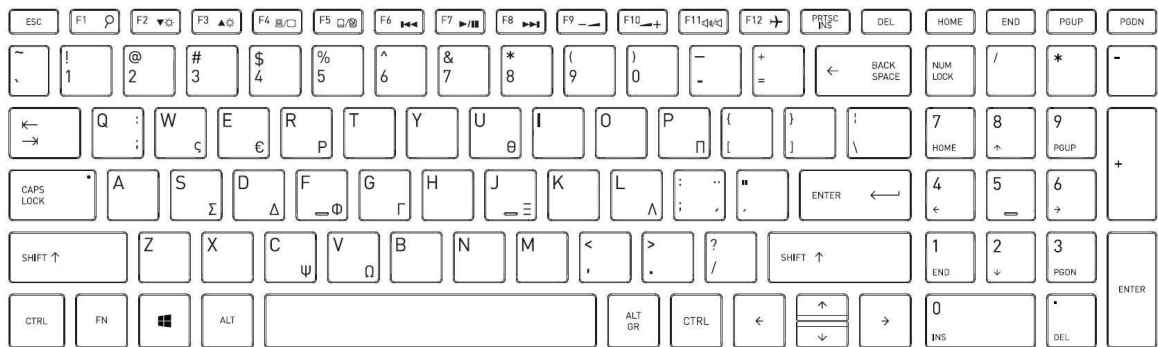
Figure D-18 GK keyboard

D.19 Hungarian (HU) Keyboard
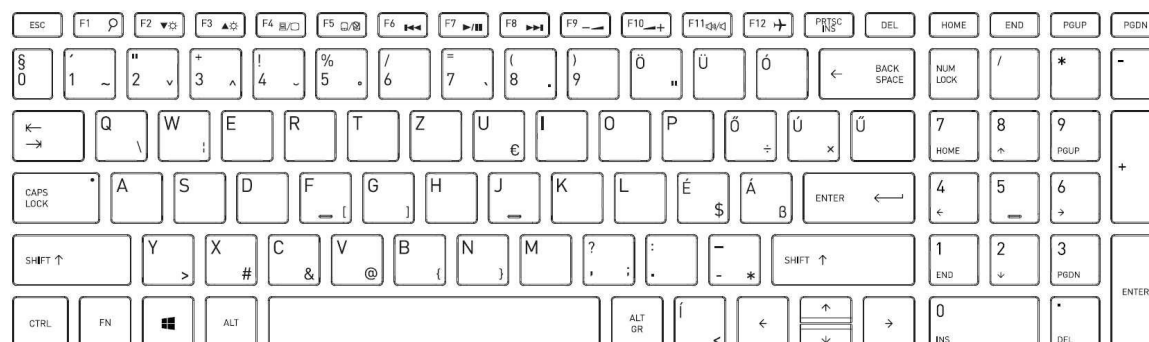
Figure D-19 HU keyboard

D.20 Spanish (SP) Keyboard
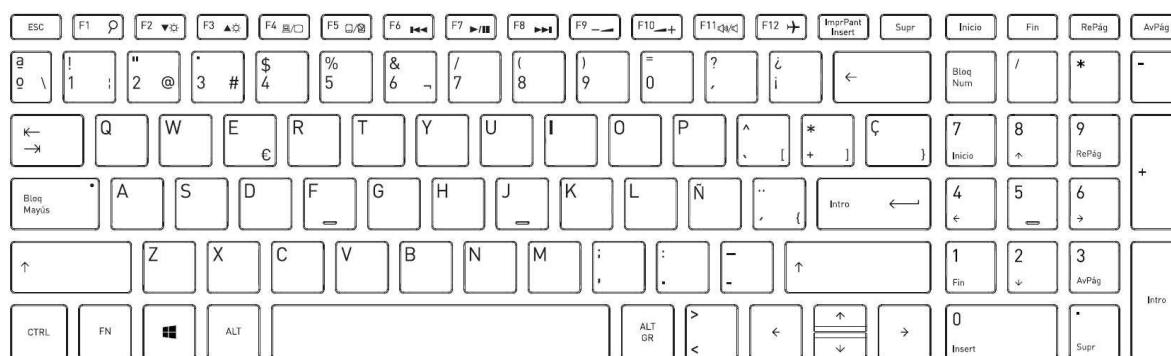
Figure D-20 SP keyboard

D.21 Turkish (TR) Keyboard
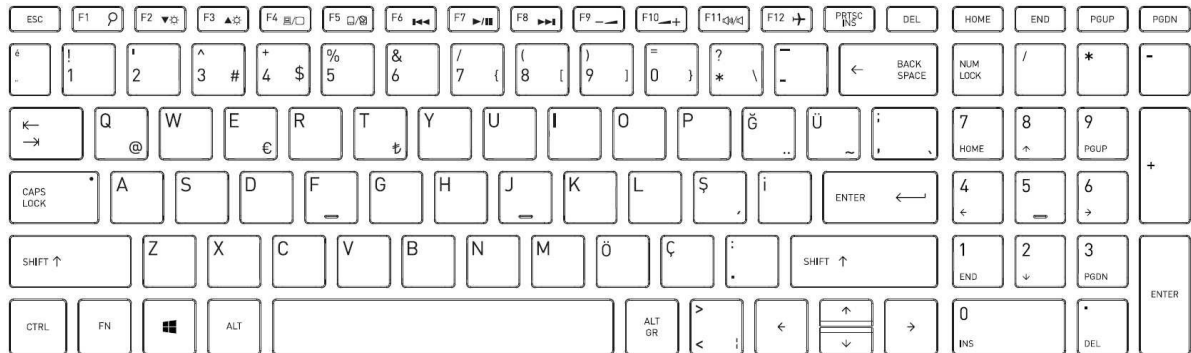
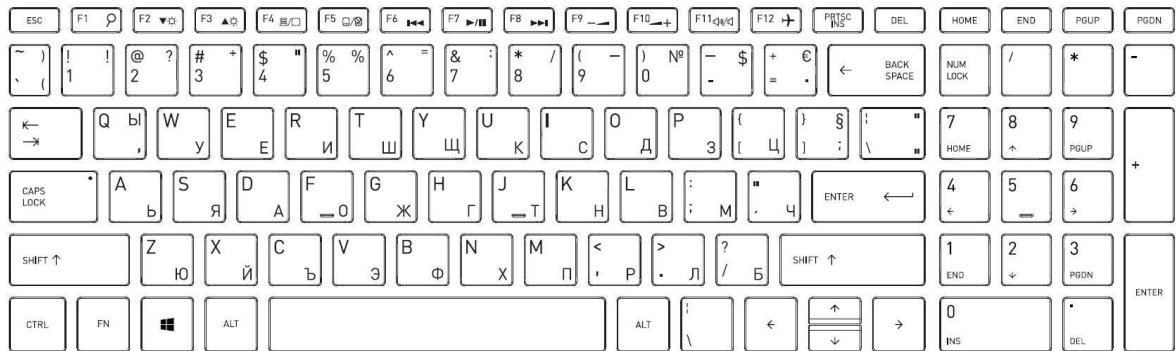*Figure D-21   TR keyboard*

D.22 Bulgarian (BU) Keyboard

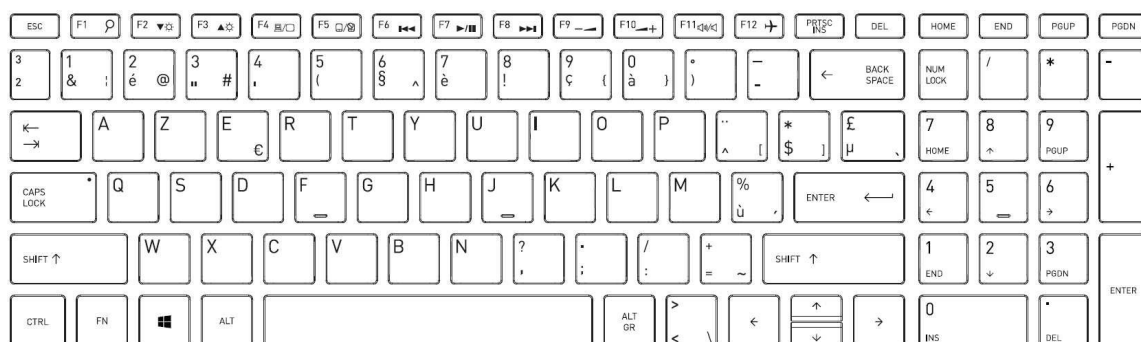*Figure D-22   BU keyboard*

D.23 Belgian (BE) Keyboard

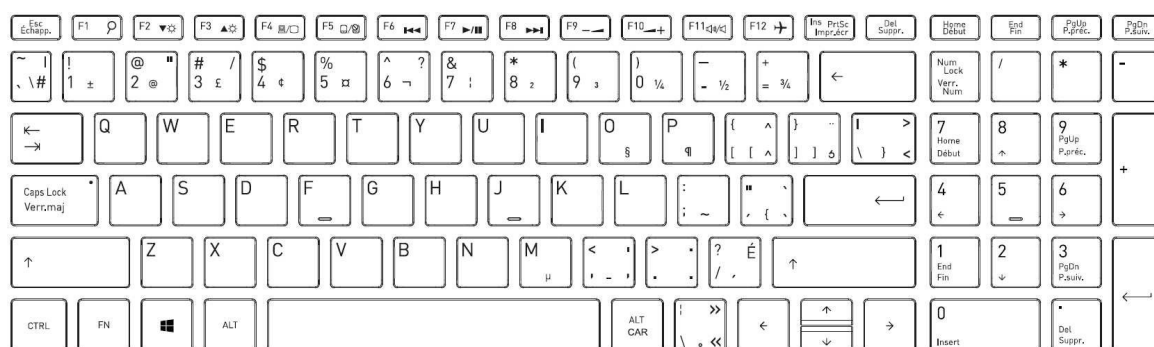*Figure D-23 BE keyboard*

D.24 Canadian Multilingual (CM) Keyboard

Figure D-24 CM keyboard