ACCEL-JS500

NVIDIA®Jetson AGX Xavier™

Medical AI Imaging processing platform

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Packing List

Before you begin installing your Medical Station, please make sure that the following items have been shipped:

- ACCEL-JS500
- Medical Adapter, 84W 12VDC
- Vertical Mount Bracket or Wall Moun Bracket (Optional)

If any of these items are missing or damaged, you should contact your distributor or sales representative immediately.

* Use power cord should follow then specification below:

Listed, Detachable, Type SJT or above. 125/250 V minimum, 18 AWG/3C mini-mum, 3.0 m long maximum.   One end terminates in 125 V, 10 A, with NEMA 5-15P or 250 V, 10 A with NEMA 6-15P, grounding type, the other end with an appliance coupler. Hospital grade.

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Safety & Warranty

1. Read these safety instructions carefully.

2. Keep this user's manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.

4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.

7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. **Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.**

9. **WARNING: To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth (Avertissement: Pour éviter tout risque de choc électrique, cet appareil doit être connecté à une alimentation secteur avec une prise de terre)**

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⚠ Warning	Indicates a situation that could result in death or serious injury if not avoided. Indique une situation qui pourrait entraîner la mort ou des blessures graves si elle n'est pas évitée
⚠ Caution	Indicates a potentially hazardous situation that could result in minor or moderate injury or damage to equipment if not avoided. Indique une situation potentiellement dangereuse qui pourrait entraîner des blessures mineures ou modérées ou des dommages à l'équipement si elle n'est pas évitée
▤ Note	Indicates supplementary or useful information regarding use.

10. Position the power cord so that people cannot step on it. Do not place anything over the power cord.

11. All cautions and warnings on the equipment should be noted.

12. If the equipment is not used for a long time, unplug the power cord to disconnect it from the power source to avoid damage by transient over-voltage.

13. Never pour any liquid into an opening. This could cause fire or electrical shock.

14. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.

15. **Warning: Do not modify this equipment without authorization of the manufacturer.**

    (AVERTISSEMENT: ne modifiez pas cet équipement sans l'autorisation du fabricant.)

16. **If any of the following situations arises, get the equipment checked by service personnel:**

    a. The power cord or plug is damaged.

    b. Liquid has penetrated into the equipment.

    c. The equipment has been exposed to moisture.

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d. The equipment does not work well, or you cannot get it to work according to the users manual.

e. The equipment has been dropped and damaged.

f. The equipment has obvious signs of breakage.

17. **DO NOT LEAVE THIS EQUIPMENT IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4°F) OR ABOVE 60° C (140° F). IT MAY DAMAGE THE EQUIPMENT.**

18. **External equipment intended for connection to signal input/output or other connectors, shall comply with relevant UL / IEC standard   (e.g. UL 60950-1 for IT equipment and ANSI/AAMI ES 60601-1: 2005 AND CAN/CSA-C22.2 No. 60601-1:08)   Any person who connects external equipment to signal input, signal output, or other connectors has formed a system and is therefore responsible for the system to comply with the standard IEC 60601-1, safety requirements for medical electrical systems.**

19. **Warning : The device intends to be used in the highly sensitive medical environments and these environments are prevented from access by general hospital staff, and the device should be installed in a suitable and safe location to avoid unauthorized contact. The top cover of device is allowed to be opened by authorized personnel for professional service purpose only.**

Avertissement : L'appareil est destiné à être utilisé dans des environnements médicaux hautement sensibles et ces environnements sont interdits d'accès au personnel hospitalier général, et l'appareil doit être installé dans un endroit approprié et sûr pour éviter tout contact non autorisé. Le capot supérieur de l'appareil ne peut être ouvert que par le personnel autorisé à des fins de service professionnel uniquement.

20 ACCEL-JS500 is applying for the medical instruments main system but without the medication analysis, disease detection, and medical diagnosis function.

21. Do not touch the device and Patient at the same times.

Classification

1. Degree of production against electric shock: not classified

2. Mode of operation: Continuous

3. Type of protection against electric shock: Class I equipment

4. No Applied Part, No AP/APG

FCC

Warning!

This device complies with Part 18 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must

accept any interference received including interference that may cause undesired operation.

UL Module Description

CLASSIFIED c (UL) US	*ACCEL-JS500 modules are developed to suitable for the Classification Mark requirement*

Safety Symbol Description

The following safety symbols are the further explanations for your reference.

CLASSIFIED c (UL) US	*Medical equipment with respect to electric shock, fire and mechanical hazards only in accordance with* ***ANSI/AAMI ES 60601-1 (2005) + AMD (2012) AND CAN/CSA-C22.2 No. 60601-1:14***
[i]	*Follow operating instructions.*
(⏚)	*Ground wire* *Protective Ground wire.*

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∼	*Alternating current*
	Equipotentiality To identify the terminals, when connected together, bring the various parts of an equipment or of a system to the same potential.
⏻	Stand-by switch (PC power button)

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Chapter

1

General

Information

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1.1 Introduction

ACCEL-JS500 fully supports NVIDIA® Jetson AGX Xavier™ which aims it at Medical imaging application for edge computing such Endoscopy.

ACCEL-JS500 equips 512-core Volta GPU with 64 Tensor Cores, octal-core NVIDIA Carmel ARMv8.2 CPU at 2.26GHz, and dual Deep Learning Accelerator (DLA) engines. By using GPU and DLA, Xavier provides 16 TFLOP for deep learning network model, and only consumes maximum 30W power.

This device supports 2 built in speaker in order to set up alerts and alarms for doctor or operator during surgery, allowing surgeon to better care for their patients or to be cautious for device status

More importantly, ACCEL-JS500 provides SDI video input including 3G and 12G SDI, since SDI interface is the most common use in all kind of medical device in operating room. the video input interface can be used to capture image or video to do AI computing and analysis

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1.2 Feature

- Nvidia Jetson AGX Xaiver Platoform for Medical AI usage.
- 512-core Volta GPU with Tensor Cores
- Support optional 3G or 12G SDI input for image capture
- Support Dual 4K display output (HDMI and Display port)
- Support internal build in speaker
- Medical Certification
- Palm size dimension with powerful AI computing

1.3 Specification

System Specifications

AI Accelerator	Nvidia Jetson AGX Xavier
CPU	8-core ARM v8.2 64bit CPU, 8MB L2 + 4MB L3
GPU	NVIDIA Volta architecture with 512 NVIDIA CUDA cores and 64 Tensor cores
System Memory	32 GB 256-Bit LPDDR4 x 1 137 GB/s
Storage	32GB eMMC MicroSD Slot M.2 Key M 2280 x 1 (PCIe[x4 & SATA])
Speaker	2 x Build-in Speaker

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Rear I/O	2 x USB 3.1 Type C (5V/0.9A)
	1 x USB 3.0 Type A
	1 x USB 2.0 Type A
	1 x RJ-45 Gigabit LAN
	1 x HDMI 2.0
	1. x DP 1.4
	1 x COM
	1 x AC 12V input
	1 x MicroSD Slot
	1 x Grounding Pin
	Sound:
	1 x Line-out
	1 x Mic-in
	Function Port
	1 x Recovery Button
	1 x Reset Button
	Video Input (either one)
	1. 3G SDI or (Max 1920×1080p@60/50fps)
	2. 12G SDI(Max 4096×2160p@60/50fps)
Front I/O	1 x Power Button
Power LED	1 x Power LED Standby Power (Blue) Power On(Green)
Expansion Slot	1. M.2 E Key 2230 x 1 for WiFi + BT
	2. MiniCard x 1 for Capture card
	3. M.2 B+ M Key 2280 NVMe SSD x 1 (PCIE by 4 + SATA)

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Power Supply	Medical 84W Adapter 100~240VAC.12VDC, ATM090T-P120
OS Support	Jetpack OS, Compliant with Ubuntu 18.04
Wireless communication (Optional)	Support IEEE.802.11a/b/g/n/ac.w/BT5.0

Mechanical Specifications

Construction	Metal chassis
Dimension	184(W) x 145(L) x 66(H)(73 with rubber) mm
Carton Dimension	280(W) x 215(L) x 180(H(mm
Mounting Kit (Optional)	Wall Mount Vertical Mount
Net Weight	1.7KG
Gross Weight	2.3KG
Packing Filler	PE foam

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Environment Specifications

Operating Environment	0˚C to 35˚C (32 ˚F ~95˚F) 30% ~ 75% @ 40°C, Non-Condensing 700~1060 hPa
Storage / Transport Environment	-20˚C to 60˚C (-4˚F ~140˚F) 10% ~ 90% @ 35°C, Non-Condensing 700~1060 hPa
EMI / Safety	CE: EN 60601-1-2:2015(V4.0), EN 60601-1:2006/A1:2013/A12:2014 (V3.1) FCC: Part 18 Class B, Part 15 Class B, UL: ANSI/AAMI ES60601-1:2012 (V3.1) cUL: CAN/CSA-C22.2 No. 60601-1:2014 (V3.1)

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1.4 Dimension
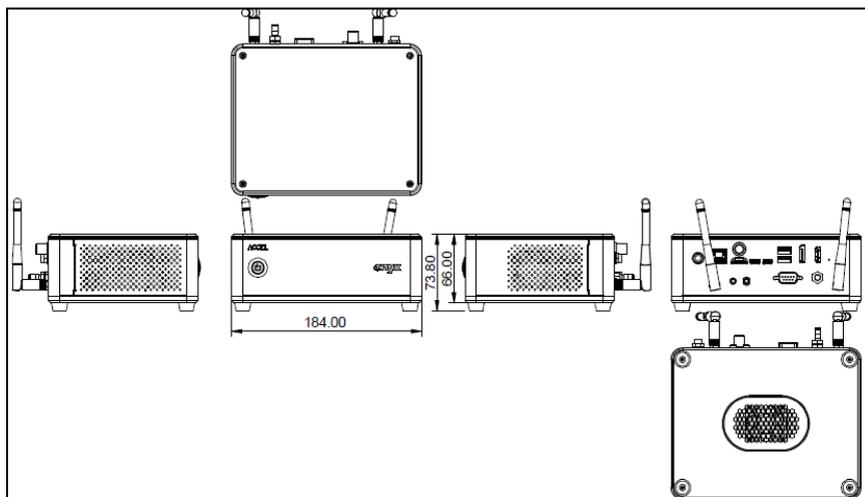
Chapter

2

Hardware
Introduction

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2.1 Safety Precautions

Warning! *Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.*

Caution! *Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis*

2.2 A Quick Tour of the ACCEL-JS500

Before you start to set up the ACCEL-JS500, take a moment to become familiar with the locations and purposes of the controls, drives, connections and ports, which are illustrated in the figures below.

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Please place the ACCEL-JS500 upright on the desktop, its front side appears as shown in Picture 1.1.

Picture 1.1: Front View of the ACCEL-JS500

When you turn the ACCEL-JS500 around and look at its rear side, as shown in Picture 1.2.

Picture 1.2: Rear view of the ACCEL-JS500

2.3 Turn On and Boot up into Jetpack OS

This section is for Jetpack OS operating system only. If you are installing a different operating system, please contact your vendor for installation details.

Your ACCEL-JS500 will begin loading Jetpack OS once you push the power button to turn power on. Initial Login for Jetpack OS is :

Account : Onyx
Password: Onyx

2.4 Turn off

Turning off ACCEL-JS500 properly is important for system reliability.

1. On the menu, click "shut down" and select "OK"
2. And then the system will shut down automatically

2.5 Rear Panel Connectors

Power button

HDMI 2.0

Optional 3G SDI or 12G SDI USB 3.2 x1 USB 2.0 x1

GigaLAN

DP 1.4

Recovery Button x1

Reset Button x1

Optional Antenna Hole.

Line out, Mic in

USB 3.2 Type C x2

Power input

Micro SD card

COM x1

Grounding Pin x1

Optional Antenna Hole.
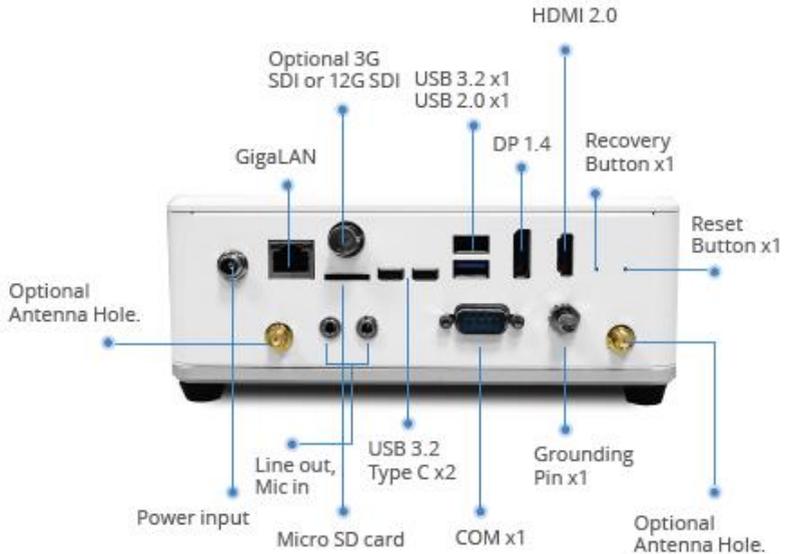
2.6 Mounting Installation

1. Vertical Mount
1. Remove the rubber and original screw
2. screw up the bracket with original screw

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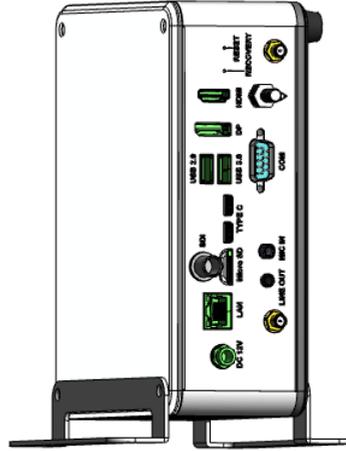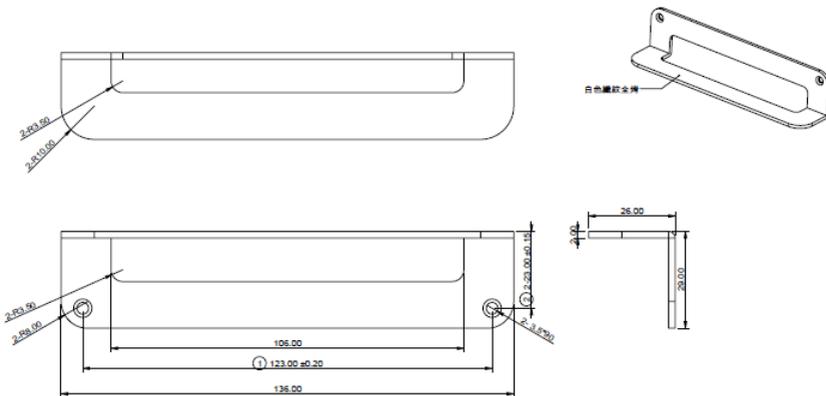
Bracket Drawing

2. Wall Mount

1. Remove the rubber and original screw
2. screw up the bracket with original screw

Remark: the suggestion of the screw is M4.

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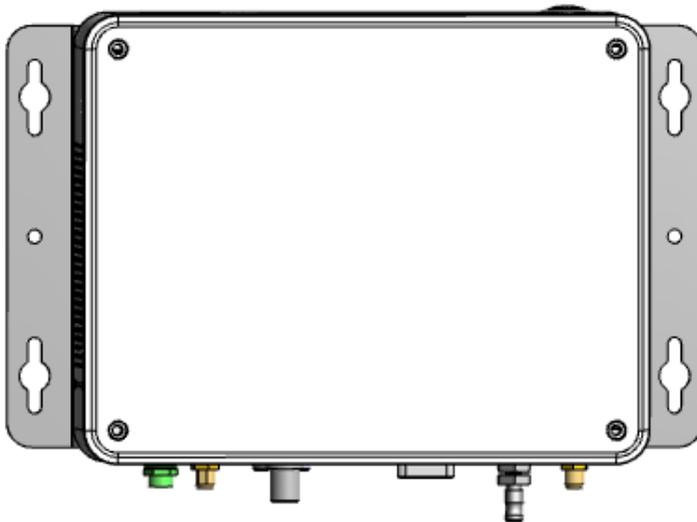
Bracket Drawing
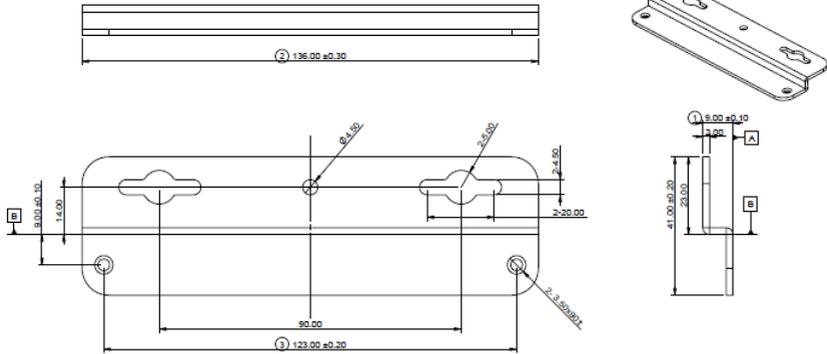
Remark: the suggestion of the screw is M4, the wall should be RC wall

Chapter

3

OS Flash
Guide

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3.1 Before installation

Before starting the process make sure your ACCEL-JS500 system is turned off and the power in is disconnected. You will need a host PC running Ubuntu 16.04 or 18.04.

Download the compressed OS image file. The file name will follow the format of:

Product name}.{Jetpack version}.{Release info}.tar.gz

For example:

ACCEL-JS500.Jetpack_R32.4.4.Rev-01.tar.gz

3.2 Connecting to PC/Force Recovery Mode

On Host Computer, open Linux terminal and enter the following command to extract compressed OS image files (*file name may vary*):

```
$ tar -zxvf ACCEL-JS500.Jetpack_R32.4.4.Rev-01.tar.gz
```

Next, perform the following steps to force the system to start in USB Recovery Mode:

I. Connect the USB Type C plug on the USB cable to the Recovery Port on the ACCEL-JS500 and the other end to an available USB port on the host PC.

II. Connect the ACCEL-JS500 power supply.

III. Press and hold the recovery button, then power on the system. While continuing to hold the recovery button. Release the recovery button after 2 seconds.

IV. When device is in recovery mode, lsusb command on host PC will list a line of "0955:7019 Nvidia Corp"
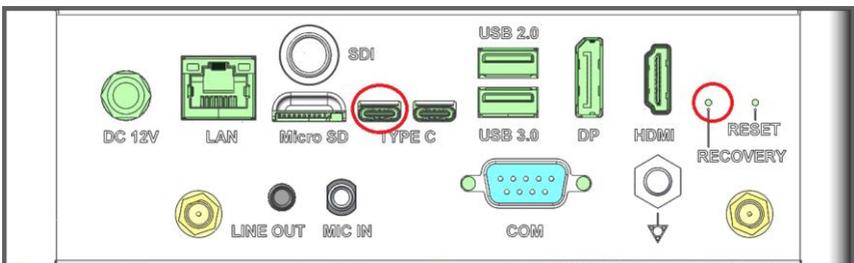
3.3 Flash Image to the unit

Use the following steps to flash the OS to the ACCEL-JS500.

I.   Open terminal on Ubuntu host PC, then access the bootloader folder you extracted in the previous section.

II.   Enter the following command in terminal to flash the image:
      $ sudo ./flashall.

III. Wait as the image is installed. Once finished you should see the following:

Chapter

4

Power Mode

Selection

Guide

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4.1 Power Mode Control

The NVIDIA Jetson AGX Xavier supports multiple power modes to give users a range of performance options to best suit their application's needs.To change power mode, look up the Mode ID of the corresponding power mode according to the chart below. Default Mode ID is 0 (max CPU freq. 2165 MHz).

NVPModel clock configuration for Jetson AGX Xavier 16GB and 32GB								
Property	Mode							
	MAXN	10W	15W	30W	30W	30W	30W	15W *
Power budget	n/a	10W	15W	30W	30W	30W	30W	15W
Mode ID	0	1	2	3	4	5	6	7
Online CPU	8	2	4	8	6	4	2	4
CPU maximal frequency (MHz)	2265.6	1200	1200	1200	1450	1780	2100	2188
GPU TPC	4	2	4	4	4	4	4	4
GPU maximal frequency (MHz)	1377	520	670	900	900	900	900	670
DLA cores	2	2	2	2	2	2	2	0
DLA maximal frequency (MHz)	1395.2	550	750	1050	1050	1050	1050	0
PVA cores	2	0	1	1	1	1	1	0
PVA maximal frequency (MHz)	1088	0	550	760	760	760	760	0
Memory maximal frequency (MHz)	2133	1066	1333	1600	1600	1600	1600	1333
SOC clocks maximal frequency (MHz) *All modes*	adsp 300 ape 150 axi_cbb 408 bpmp 896 bpmp_apb 408 display 800 display_hub 400		csi 400 host1x 408 isp 1190.4 nvdec 1190.4 nvenc 1075.2 nvjpg 716.8 pex 500			rce 819.2 sce 729.6 se 1036.8 tsec 1036.8 vi 998.4 vic 1036.8		

* The default mode is 15W (mode ID 7). Default mode is intended to improve desktop application performance. PVA and DLA are excluded from the 15W power budget.

Image Source NVIDIA Xavier [Online Power Management Guide](#)

Please refer to the below picture , please click below red mark button to select the power mode you need.
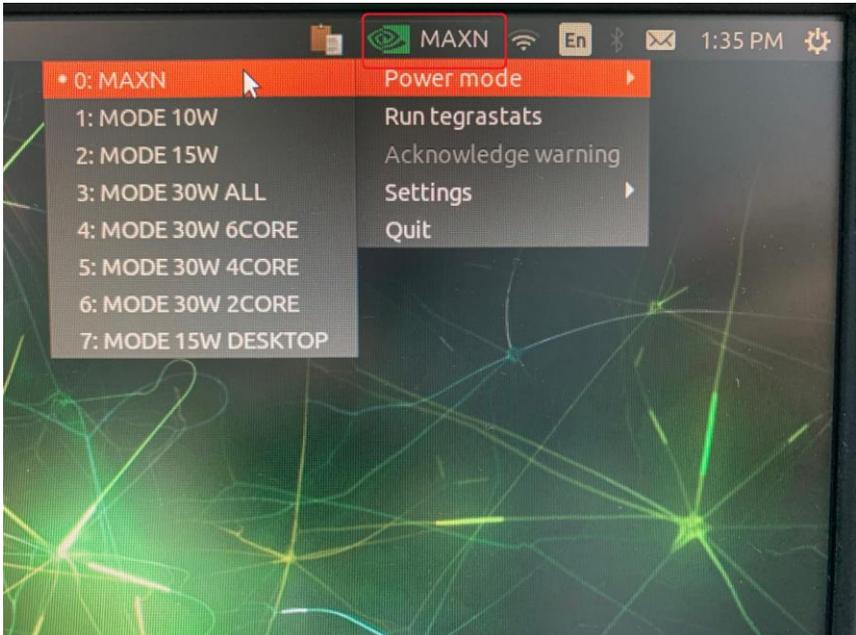
Appendix

A

Miscellanea

A.1 General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

1. Never spray or squirt the liquids directly onto any computer component. If you need to clean the device, please rub it with a piece of cloth or the material that mentioned in the A.2 Cleaning tools

2. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.

3. Turn the system off before you start to clean up the component or computer.

4. Never drop the components inside the computer or get circuit board damp or wet.

5. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.

6. Try not to put any food, drink or cigarette around the computer.

A.2 Cleaning tools

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a

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listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning tips.

- **Cloth** - A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.
- **Vacuum cleaner** - Absorb the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.
- **Cotton swabs** - Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and computer.
- **Foam swabs** - Whenever possible it is better to use lint free swabs such as foam swabs.

Note:

We strongly recommended that you should shut down the system before you start to clean any single components.

Please follow the steps below.

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1. Close all application programs.

2. Close operating software.

3. Turn off power switch

4. Remove all device

5. Pull out power cable

A.3 Scrap Computer Recycling

If the computer equipments need the maintenance or are beyond repair, we strongly recommended that you should inform us as soon as possible for the suitable solution. For the computers that are no longer useful or work well, please contact with worldwide distributors for recycling

.

The worldwide distributors show on the following website:

http://www.onyx-healthcare.com.tw/Contact.php

Note:

Follow the national requirement to dispose unit