# Document History

## Document Version 1.9

<table>
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<tr>
<th>Version</th>
<th>Date</th>
<th>Authors</th>
<th>Description of Change</th>
</tr>
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<tr>
<td>1.1</td>
<td>July 7, 2021</td>
<td>Peter G.</td>
<td>Initial release</td>
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<tr>
<td>1.2</td>
<td>September 23, 2021</td>
<td>Peter G.</td>
<td>Add further Recovery mode instructions.</td>
</tr>
<tr>
<td>1.3</td>
<td>October 19, 2021</td>
<td>Peter G.</td>
<td>Add checklist and additional instructions.</td>
</tr>
<tr>
<td>1.4</td>
<td>November 8, 2021</td>
<td>Peter G.</td>
<td>Update to Holoscan, additional instructions.</td>
</tr>
<tr>
<td>1.5</td>
<td>March 16, 2022</td>
<td>Peter G.</td>
<td>Replace diagrams, add Compliance chapter, update links</td>
</tr>
<tr>
<td>1.5</td>
<td>June 16, 2022</td>
<td>Jin L.</td>
<td>Add sections Check Firmware Version and Manually Update if Needed, Install the Clara Holoscan SDK, and Known Issues, remove section Reinstalling Optional SDK Packages</td>
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<tr>
<td>1.6</td>
<td>Jun 28, 2022</td>
<td>Jin L.</td>
<td>Add back section Reinstalling Optional SDK Packages, changes to the Flashing steps, add two more Known Issues</td>
</tr>
<tr>
<td>1.7</td>
<td>July 22, 2022</td>
<td>Jin L.</td>
<td>Update to instructions for reset mode in Flashing, disclaimer the SDK is only tested in dGPU mode, add Manage Permission on SSD</td>
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<tr>
<td>1.8</td>
<td>August 4, 2022</td>
<td>Jin L.</td>
<td>Add section Enabling the HDMI Input</td>
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<tr>
<td>1.9</td>
<td>September 7, 2022</td>
<td>Peter G.</td>
<td>Simplify Docker storage setup section, highlight logging in with developer account in SDK Manager in Flashing</td>
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This user guide provides instructions to flash, setup, and start using a Clara AGX Developer Kit.

**Disclaimer:** The Clara AGX Developer Kit is not an approved medical device and is not intended for clinical use.
Checklist for Setting up the Developer Kit

After receiving the Clara AGX Developer Kit, ensure the following actions are taken before developing on the kit. Each action is described in its corresponding section of this user guide.

- Read through the **Hardware Setup** requirements and precautions.
- Familiarize yourself with the **System Overview**: the main components and system I/O.
- Power up the system.
- If you have previously flashed the Clara AGX Developer Kit, check the firmware version and manually update it if needed. If this is your first time flashing, return to this step after completing all other items on this checklist.
- Flash and update the Clara AGX Developer Kit with Holopack using SDK Manager.
- Switch from iGPU to dGPU mode.
- Set up the 250GB SSD storage.
- Set up Docker and Docker storage.
- Install the Clara Holoscan SDK from Github.
Hardware Setup

Requirements

- A Clara AGX Developer Kit
- A compatible power cable
  - The NVIDIA Clara AGX Developer Kit Developer Kit may not include a power cable compatible with your local electrical requirements.
  - A compatible cable should meet the following requirements:
    - Provides a certified local 3-prong AC power plug
    - Provides a C13 connector
    - Supports ratings of 100-120VAC/6A, 200-240VAC/3A, or higher with a minimum wire thickness of 18AWG and insulation rating of 300V or higher.
- An Ubuntu 18.04 / 20.04 host system (for use during flashing)
- A standard USB-A to USB-C or USB-C to USB-C cable with data enabled (for use during flashing)
- Connection to the Internet for the host system before and during flashing, and for the Clara AGX Developer Kit during flashing
- A keyboard, mouse, and monitor with HDMI for the Clara AGX Developer Kit

Precautions

- Only connect and disconnect a PCIe card (e.g. miniSAS or dGPU) when the system is powered down.
- Apply extra care when plugging and removing PCIe cards to avoid stress on the PCIe connectors (wearing, bending, breaking).
- The rightmost USB connector is USB 2.0 (even if the color is blue). The other two USB connectors are USB 3.0.
System Overview

Main Components

The Clara AGX Developer Kit contains the following major components:

- AGX Xavier 32 GB Module
- RTX 6000 discrete GPU
- ConnectX-6 IC
- 250GB Removeable SSD

Tech Specs

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<th>CPU</th>
<th>8-core Carmel ARM v8.2 64-bit CPU, 8MB L2 + 4MB L3</th>
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<td>Memory</td>
<td>32GB 256-Bit LPDDR4x</td>
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**GPU**
RTX6000 | 24 GB GDDR6 | 672 GB/s | 4,608 CUDA cores | 576 Tensor Cores

**Storage**
250GB SSD

**I/O**
USB2.0 | (2x) USB3.0 | USB-C | HDMI In/Out | (4x) DisplayPort | 1/10/100 GbE

**Expansion**
PCle x8 (single slot width) to Xavier | PCle x8 (single slot width) to RTX6000

**Power Supply**
750W | 100-240V

**Dimensions**
227mm W x 149mm H x 332mm L

---

**I/O and external interfaces**

1) Power cable connection
2) Power switch
3) PCIe slots for customer cards
4) dGPU outputs from RTX 6000, including four Display Ports and one mini HDMI port
   a) Reference the GPU section below to determine which display output to use.
5) 100 GbE QSFP28 Ethernet connector to NVIDIA ConnectX-6
6) 10 GbE RJ45 Ethernet connector to NVIDIA ConnectX-6
   a) The 10GbE connector only supports 10 GbE speeds.
7) 1 GbE RJ45 Ethernet connector to Xavier module
8) USB 3.0 ports (2x)
9) USB 2.0 port (1x)
10) HDMI out
   a) Reference the GPU section below to determine which display output to use.
11) HDMI in: Connect to instruments that output HDMI to the platform
12) Debug USB-C port: Connect to the Linux host system for flashing and serial port connections.
13) x8 PCIe slot (x16 physical) for customer card, to Xavier Module
14) x8 PCIe slot (x16 physical) for customer card, to RTX6000
   a) Used for cards supporting GPU Direct RDMA data transfer to RTX6000 GPU
15) SD card slot
16) Recovery button
17) Reset button
18) Main secondary compartment fan connector (there is an additional system fan inside the chassis)
19) Auxiliary fan connector for card fans
20) Power button

To access ports 13-19, remove the left-hand side cover. The process is illustrated below. Unscrew the two Phillips screws (21 and 22) that secure the cover at the back of the machine. Next, push and slide the cover in the direction towards the back of the machine without lifting (step 1). It should slide about 0.5 inch, or less than 1.5 cm. Finally, you should be able to lift the cover off once it has more than one degree of freedom and can be easily lifted upwards (step 2).
Getting Started

Powering up the System

1. Connect all peripherals to the system before powering up the system.
2. Connect the power cable to the system in the slot labeled (1) in the graphic above.
3. Once the power is connected, press the power button (20) for less than 1 second. It should light up.
4. If you have a display connected, you might already see the system booting on it. During flashing or re-flashing, use the HDMI output port (10) to connect to the display. Reference the GPU section below to determine how to choose between display outputs in different modes.

Note: The machine can be powered off by depressing the power button for approximately 10 seconds.

Check Firmware Version and Manually Update if Needed

If you are a current user of the Clara AGX Developer Kit and have flashed it before, check the firmware version. If needed, update the firmware on the devkit before moving on to the next step of flashing Holopack. Without the firmware update, you might experience Known Issue #1 once Holopack is installed.

If you are a new user of the Clara AGX Developer Kit and have not flashed it before, follow the rest of this document to set up your devkit, then come back to this section to check and update your firmware after switching to dGPU mode.

1. Install the tools for checking and updating the firmware version:

   $ sudo apt install mstflint

2. Check the device address for “Ethernet controller: Mellanox Technologies MT28908 Family [ConnectX-6]”. The old firmware uses the 0000:09:00.0 address, while the up-to-date firmware should use 0000:03:00.0.

   $ lspci | grep Mellanox
3. Run the following command using the device address obtained in step 2 to check the firmware version. If you see a version lower than 20.33.1048, then a firmware update is needed. Otherwise, there’s no need to update your firmware, and you can skip steps 4 - 7.

```bash
$ sudo mstflint -d 0000:09:00.0 q full
... FW Version: 20.27.4006 <- Update is needed
```

```bash
$ sudo mstflint -d 0000:03:00.0 q full
... FW Version: 20.33.1048 <- Firmware is already updated
```

4. Download the new firmware from [here](#) and unzip it.

5. Install the new firmware using the following command:

```bash
$ sudo mstflint -d 0000:09:00.0 -i fw-ConnectX6-rel-20_33_1048-Nvidia_McCoy_LOM_PCIE_switch_Ax.bin burn
```

6. Reboot the Clara AGX Developer Kit.

7. Check that the newly installed firmware has the correct version:

```bash
$ sudo mstflint -d 0000:03:00.0 q full
... FW Version: 20.33.1048
```

---

**Flashing and Updating Clara AGX Developer Kit using SDK Manager**

1. Register and activate an NVIDIA Developer Account [here](#) to access the latest version of Holopack in SDK Manager.

2. If you are running a VPN on your host system, log off before flashing the Clara AGX Developer Kit.

3. Using a VM as your host machine isn’t officially supported, but it is possible with certain VMs such as VMWare Workstation 16 running Ubuntu 18.04. If using a VM, ensure the USB port that connects to the USB-C port on the Clara AGX Developer Kit is always routed to the VM.

4. From the host system, download and install the latest version of NVIDIA SDK Manager. Instructions for downloading and setting up NVIDIA SDK Manager can be found [here](#). Make sure to log in with the same developer account in SDK Manager.

5. Connect the Clara AGX Developer Kit to the host system via USB-C (12).

6. From the NVIDIA SDK Manager, download and flash the Clara AGX Developer Kit. See the [step-by-step instructions](#) for more details.

   **Note:** We recommend setting the unit to reset mode for the flashing process and selecting “Manual Setup” mode in the prompt at Step 03 in the SDK Manager; it has been observed that flashing can get stuck in “Automatic Setup” mode.

   a) If you joined the Clara Holoscan SDK program after your initial SDK Manager login, you will need to log out and log in again on SDK Manager for the permissions to take effect.
b) Follow these steps to reset the Clara AGX Developer Kit:
   i) Remove the left-hand side cover to expose ports 13-19.
   ii) Make sure the unit is powered on.
   iii) Press and hold the Recovery button (16), then press and hold the Reset button (17), finally release both buttons.

c) If resetting the unit doesn’t work, try putting the unit into recovery mode:
   i) Power off the unit.
   ii) Remove the left-hand side cover to expose ports 13-19
   iii) Hold down the Recovery button (16) while pressing the Power button (20) to turn on the unit.
   iv) Release the Power Button, then the Recovery button.

7. We recommend putting the Clara AGX Developer Kit into reset mode during flashing, but if you need to know the default credentials when SDK Manager is preparing to flash the Clara AGX Developer Kit, they are shown below:
   a) Username: ubuntu
   b) Password: ubuntu

Switching between iGPU and dGPU

The Clara AGX Developer Kit can use either the Xavier AGX module GPU (iGPU, – integrated GPU) or the RTX6000 add-in card GPU (dGPU, – discrete GPU). You can only use one type of GPU at a time.

By default, the Clara AGX Developer Kit uses the iGPU. Switching between the iGPU and dGPU is performed using the nvgpuswitch.py script located in the /opt/nvidia/l4t-gputools/bin/ directory. To make the nvgpuswitch.py script accessible globally, copy it to a directory included in $PATH if it hasn’t been already:
$ sudo cp /opt/nvidia/l4t-gputools/bin/nvgpuswitch.py /usr/local/bin/

To switch from the iGPU to the dGPU, follow these steps:

1. Connect the Clara AGX Developer Kit to the Internet using one of the following methods:
   a) An Ethernet cable connected to a router or Wi-Fi extender
      i) Use the 1GbE connector to the Xavier module at port 7.
   b) A USB Wi-Fi receiver
      i) Not all USB Wi-Fi receivers will work out of the box on the Clara AGX Developer Kit.
      ii) The USB Wi-Fi receiver should have support for Ubuntu 20.04.
      iii) The TP-Link Archer T2U Nano USB Wi-Fi Adapter, which has previously worked with the Ubuntu 18.04 Holoscan SDK versions, will no longer work with Holoscan SDK v0.2, which based on Ubuntu 20.04.

2. To view the currently installed drivers and their version, use the query command:
$ nvgpuswitch.py query
gGPU (nvidia-l4t-cuda, 32.5.0-20201012161040)

3. To install the dGPU drivers, use the install command with the dGPU parameter (note that sudo must be used to install drivers):

$ sudo nvgpuswitch.py install dGPU

The install command prints out the list of commands that will be executed as part of the driver install and then continues to execute those commands. This aids with debugging if any of the commands fail to execute.

The following arguments may also be provided with the install command:

$ nvgpuswitch.py install -h

positional arguments:
  {iGPU,dGPU}           install iGPU or dGPU driver stack

optional arguments:
  -h, --help            show this help message and exit
  -f, --force           force reinstallation of the specified driver stack
  -d, --dry             do a dry run, showing the commands that would be executed but not actually executing them
  -i, --interactive     run commands interactively (asks before running each command)
  -v, --verbose         enable verbose output (used with --dry to describe the commands that would be run)
  -l LOG, --log LOG     writes a log of the install to the specified file
  -r [L4T_REPO], --l4t-repo [L4T_REPO]    specify the L4T apt repo (i.e. when using an apt mirror; default is repo.download.nvidia.com/jetson)

4. The dGPU driver install may be verified using the query command:

$ nvgpuswitch.py query
gGPU (cuda-drivers, 510.73.08-1)
Quadro RTX 6000, 24576 MiB

5. After the dGPU drivers have been installed, rebooting the system will complete the switch to the dGPU. At this point the Ubuntu desktop will be output via DisplayPort on the dGPU, so the display cable must be switched from the onboard HDMI (port 10) to DisplayPort (port 4) on the dGPU.

  Note: If the output connection isn’t switched before the Clara AGX Developer Kit finishes rebooting, the terminal screen will hang during booting.

6. Modify the PATH and LD_LIBRARY_PATH. CUDA installs its runtime binaries such as nvcc into its own versioned path, which is not included by the default $PATH environment variable. Because of this, attempts to run commands like nvcc will fail on dGPU unless the CUDA 11.6 path is added to the $PATH variable. To add the CUDA 11.6 path for the current user, add the following lines to $HOME/.bashrc after the switch to dGPU:

export PATH=/usr/local/cuda-11.6/bin:$PATH
export LD_LIBRARY_PATH=/usr/local/cuda-11.6/lib64:$LD_LIBRARY_PATH
At this time, the Clara Holoscan SDK is tested and supported only in dGPU mode. Switching back to iGPU mode after switching to dGPU mode is not recommended.

Note: The GPU settings will persist through reboots until it is changed again with nvgpuswitch.py.

### Reinstalling Optional SDK Packages

This section only applies if you have selected “Additional SDKs” in Step 01 of the SDK Manager installation process.

When switching between GPUs, CUDA is first uninstalled and then reinstalled by the script in order to provide the correct versions used by iGPU or dGPU (CUDA 11.4 and 11.6, respectively). Since some optionally installed packages via SDK Manager such as DeepStream depend on CUDA, this means that these packages are also uninstalled when the active GPU is switched.

To reinstall the packages after switching GPUs, the corresponding *.deb packages that were downloaded by SDK Manager during the initial installation can be copied to the Clara AGX Developer Kit and installed using apt. By default, SDK Manager downloads the *.deb packages to the following location on the host machine:

~/.Downloads/nvidia/sdkmanager

Note that the version numbers may differ—if this is the case, use the latest version of the arm64 package that exists in the download directory.

```bash
$ sudo apt install -y ./deepstream-6.1_6.1.0-1_arm64.deb
```

### Enabling the HDMI Input

The Clara AGX Developer Kit includes an HDMI input (port 11), which is connected internally to the Jetson CSI interface. Holopack does not configure this CSI interface by default to enable the HDMI input board, so this configuration must be done manually one time after Holopack is flashed onto the device. To do this, run the jetson-io.py script and select the following sequence of options to program the CSI connector pins to be compatible with the HDMI input board.

Note: If the options are not visible, resize the terminal window to make it taller.

1. Run the script

   ```bash
   $ sudo /opt/nvidia/jetson-io/jetson-io.py
   ```

2. Select “Configure Jetson AGX Xavier CSI Connector”.

   ============= Jetson Expansion Header Tool ==============
   |
   |
   Select one of the following:
   |
   |
   Configure Jetson 40pin Header
   |
   Configure Jetson AGX Xavier CSI Connector
   |
   Exit
   |
   ==============---------------------------------------------

---
3. Select “Configure for compatible hardware”.

Jetson AGX Xavier CSI Connector:
Configure for compatible hardware
Configure header pins manually
Back

4. Select “Jetson Camera HDMI CSI Bridge”.

Select one of the following options:

Camera Dual IMX274
Camera IMX274
Jetson Camera HDMI CSI Bridge
Back

5. Select “Save pin changes”.

Jetson AGX Xavier CSI Connector:
Save pin changes
Discard pin changes

6. Select “Save and reboot to reconfigure pins”.

Select one of the following:

Configure Jetson 40pin Header
Re-configure Jetson AGX Xavier CSI Connector
Save and reboot to reconfigure pins
Save and exit without rebooting
Discard all pin changes
Exit

7. Press any key to reboot.

Configuration saved to file
/boot/kernel_tegra194-p2888-0004-e3900-0000-user-custom.dtb.
Press any key to reboot the system now or Ctrl-C to abort

Once the system has rebooted, operation of the CSI input board can be verified using the v4l2ctl utility to check that the /dev/video0 device is visible and reports the supported formats:

$ sudo apt-get install -y v4l-utils
$ v4l2-ctl -d /dev/video0 --list-formats-ext
ioctl: VIDIOC_ENUM_FMT
Type: Video Capture
[0]: 'AR24' (32-bit BGRA 8-8-8-8)
  Size: Discrete 1920x1080
  Interval: Discrete 0.017s (60.000 fps)
  Size: Discrete 1280x720
  Interval: Discrete 0.017s (60.000 fps)

**Setting up SSD Storage**

Without setting up SSDK storage and moving docker storage to SSD, you might fill up the root directory with Docker image pull operations, since a complete installation of the Holopack leaves only about 10GB of storage remaining in the root 32GB.

**Note:** If the Clara AGX Developer Kit is reflashed with a new Holopack image, the partition table of the m2 drive will not be modified, and the contents of the partition will be retained. In this case, the Create Partition steps can be skipped; however, the Mount Partition steps should be followed again in order to remount the partition.

Any state, binaries, or Docker images that persist on the m2 drive after flashing the system may be made incompatible with new libraries or components that are flashed onto the system. You may need to recompile or rebuild these persistent objects to restore runtime compatibility with the system.

The Clara AGX Developer Kit includes a pre-installed 250GB m2 solid-state drive (SSD), but this drive is not partitioned or mounted by default. This section outlines the steps that you should follow after the initial SDK installation in order to partition and format the drive for use.

**Note:** The following steps assume that the m2 drive is identified by the Clara AGX Developer Kit as `/dev/sda`. This is the case if no additional drives have been attached, but if other drives have been attached (such as USB drives) then the disk identifier may change. This can be verified by looking at the symlink to the drive that is created for the m2 hardware address on the system. If the symlink below shows something other than `../../sda`, replace all instances of sda in the instruction below with the identifier that is being used by your system:

```
$ ls -l /dev/disk/by-path/platform-14100000.pcie-pci-0001\:01\:00.0-ata-1
lrwxrwxrwx 1 root root 9 Jan 28 12:24 /dev/disk/by-path/platform-14100000.pcie-pci-0001:01:00.0-ata-1 -> ../../sda
```

**Create a Partition**

1. Launch the fdisk utility:
   ```
   $ sudo fdisk /dev/sda
   ```

2. Create a new primary partition. Use the command ‘n’, then accept the defaults (press enter) for the next four questions to create a single partition that uses the entire drive:
   ```
   Command (m for help): n
   Partition type
   p  primary (0 primary, 0 extended, 4 free)
   e  extended (container for logical partitions)
   Select (default p):
   ```
Using default response p.
Partition number (1-4, default 1):
First sector (2048-488397167, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-488397167, default 488397167):

Created a new partition 1 of type 'Linux' and of size 232.9 GiB.

3. Write the new partition table and exit using the ‘w’ command:
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

4. Initialize the ext4 filesystem on the new partition:
$ sudo mkfs -t ext4 /dev/sda1
mke2fs 1.44.1 (24-Mar-2018)
Creating filesystem with 486400 4k blocks and 121680 inodes
Filesystem UUID: c3817b9c-eaa9-4423-ad5b-d6b8a8aa4ae
Superblock backups stored on blocks:
   32768, 98304, 163840, 229376, 294912
Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

Mount the Partition

1. Create a directory for the mount point. These instructions will use the path /media/m2, but any path may be used if preferred.
$ sudo mkdir /media/m2

2. Determine the UUID of the new partition. The UUID will be displayed as a symlink to the /dev/sdal partition within the /dev/disk/by-uuid directory. For example, the following output shows that the UUID of the /dev/sdal partition is 4b2bb292-a4d8-4b7e-a8cc-bb799dfeb925:
$ ls -l /dev/disk/by-uuid/ | grep sda1
lrwxrwxrwx 1 root root 10 Jan 28 10:05 4b2bb292-a4d8-4b7e-a8cc-bb799dfeb925 -> ../../sda1

3. Using the mount path and the UUID from the previous steps, add the following line to the end of /etc/fstab:
UUID=4b2bb292-a4d8-4b7e-a8cc-bb799dfeb925 /media/m2 ext4 defaults 0 2

4. Mount the partition. The /etc/fstab entry above will mount the partition automatically at boot time. To mount the partition immediately without rebooting instead, use the mount command (and df to verify the mount):
$ sudo mount -a
$ df -h /dev/sdal
Filesystem Size Used Avail Use% Mounted on
/dev/sdal 229G 5.6M 229G 0% /media/m2
5. Use the “chmod” command to manage file system access permissions:

   $ sudo chmod -R 777 /media/m2

### Setting up Docker and Docker Storage on SSD

1. Install Docker if it has not been installed on your system:

   $ sudo apt-get update
   $ sudo apt-get install -y docker.io

2. Create a Docker data directory on the new m.2 SSD partition. This is where Docker will store all of its data, including build cache and container images. These instructions use the path /media/m2/docker-data, but you can use another directory name if preferred.

   $ sudo mkdir /media/m2/docker-data

3. Configure Docker by writing the following to /etc/docker/daemon.json:

   ```json
   {
     "runtimes": {
       "nvidia": {
         "path": "/usr/bin/nvidia-container-runtime",
         "runtimeArgs": []
       }
     },
     "default-runtime": "nvidia",
     "data-root": "/media/m2/docker-data"
   }
   ```

4. Restart the Docker daemon:

   $ sudo systemctl daemon-reload
   $ sudo systemctl restart docker

5. Add the current user to the Docker group so Docker commands can run without sudo.

   # Create the docker group.
   $ sudo groupadd docker
   # Add your user to the docker group.
   $ sudo usermod -aG docker $USER
   # Activate the changes to groups. Alternatively, reboot or re-login.
   $ newgrp docker

6. Verify that you can run a “hello world” container.

   $ docker run hello-world

### Install the Clara Holoscan SDK

The Clara Holoscan SDK is hosted on Github starting from v0.2: [https://github.com/nvidia/clara-holoscan](https://github.com/nvidia/clara-holoscan). See [https://github.com/nvidia/clara-holoscan-embedded-sdk](https://github.com/nvidia/clara-holoscan-embedded-sdk) for information on installing the Clara Holoscan Embedded SDK.
Known Issues

1. **PCIE bridge doesn’t come up and dGPU cannot be detected**
   Note that upon flashing, the Clara AGX Developer Kit will be in iGPU mode. This known issue refers to a scenario where dGPU cannot be detected even after switching from iGPU to dGPU mode.
   - Environment: The intermittent issue can appear if Holopack (Clara Holoscan SDK v0.3) or Jetpack 5.0 (Clara Holoscan SDK v0.2) was installed on the Clara AGX Developer Kit and should not come up in Jetpack 4.x (Clara Holoscan v0.1).
   - Observed errors: The PCIE bridge doesn’t come up, hence dGPU cannot be detected, lspci does not show the VGA device or Mellanox PCIE brige, and nvidia-smi fails.
   - Frequency: This issue happens intermittently after each reboot.
   - Action: If after a reboot, the issue occurs, reboot the devkit multiple times until the PCIE bridge comes up in lspci. Then, update the firmware. See update instructions in Section “Check Firmware Version and Manually Update if Needed”.

2. **Automatic Setup during the flashing process gets stuck**
   When flashing the Clara AGX Developer Kit using SDK Manager, at the dialog prompt “SDK Manager is about to flash your Clara AGX Developer Kit module” in Step 03, it has been observed that if you choose Automatic Setup, even if the Clara AGX Developer Kit had been flashed before, the SDK Manager UI can hang.
   Action: Put the Clara AGX Developer Kit into recovery mode following the steps in the section “Flashing and Updating Clara AGX Developer Kit using SDK Manager” and choose “Manual Setup” in Step 03 of the SDK Manager flashing process.

3. **Attempting to switch to dGPU mode failed and the system is not in iGPU or dGPU mode**
   When running the nvqpuswitch.py script to install dGPU, if for any reason it fails, the system will not default back to the previous iGPU mode, therefore the system doesn’t have either of the GPU modes enabled.
   Action: When you are ready to try again, first check that the nvqpuswitch.py script is still in your $PATH, otherwise find the location of the script and copy it to a place in $PATH.
   ```bash
   $ sudo find / -name nvqpuswitch.py
   /opt/nvidia/l4t-gputools/bin/nvqpuswitch.py
   $ sudo cp /opt/nvidia/l4t-gputools/bin/nvqpuswitch.py /usr/local/bin/
   ```
   Then, use the -f option when running nvqpuswitch.py to force the reinstall of the dGPU stack.
   ```bash
   $ sudo nvqpuswitch.py install dGPU -f
   ```

Additional Resources

For other documentation and release notes, see the Clara Holoscan SDK page.

For further Jetson documentation, see the L4T documentation.
For feedback, discussion, and questions, please post to the Clara Holoscan SDK Developer Forum.
Compliance Information

United States
Federal Communications Commission (FCC)

FCC Marking (Class B)

This device complies with part 15 of the 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 any interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

**TUV Rheinland/cTUVus**

**Canada**

**Innovation, Science and Economic Development Canada (ISED)**

**CAN ICES-003(B)/NMB-003(B)**

This device complies with Industry Canada’s license-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

**European Union**

**European Conformity; Conformité Européenne (CE)**

This device complies with the following Directives:

• EMC Directive 2014/30/EU
• Low Voltage Directive 2014/35/EU
• RoHS Directive 2011/65/EU

The full text of EU declaration of conformity is available at the following internet address: www.nvidia.com/support
A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA GmbH (Bavaria Towers – Blue Tower, Einsteinstrasse 172, D-81677 Munich, Germany).

Great Britain (England, Wales and Scotland)

UK Conformity Assessed

This device complies with the following Regulations:

- SI 2016/1091: Electromagnetic Compatibility (EMC)
- SI 2016/1101: The Low Voltage Electrical Equipment (Safety)
- SI 2012/3032: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (As Amended)

A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA Ltd. (100 Brook Drive, 3rd Floor Green Park, Reading RG2 6UJ, United Kingdom).

Japan

Voluntary Control Council for Interference (VCCI)
Japan RoHS Material Content Declaration

日本工業規格 JIS C 0950:2008 により、2006年7月1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。

機器名称：NVIDIA Clara AGX Developer Kit

<table>
<thead>
<tr>
<th>主な分類</th>
<th>特定化学物質記号</th>
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<tr>
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<td>Pb</td>
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<tr>
<td>PCBボード</td>
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<tr>
<td>パッシブ電子部品</td>
<td>除外項目</td>
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<tr>
<td>アクティブ電子部品</td>
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<tr>
<td>メモリ</td>
<td>0</td>
</tr>
<tr>
<td>機械部品</td>
<td>0</td>
</tr>
<tr>
<td>ケーブル/コネクター</td>
<td>除外項目</td>
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<tr>
<td>はんだ付け材料</td>
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<tr>
<td>フラックス、クリームはんだ、ラベル、その他消耗品</td>
<td>0</td>
</tr>
</tbody>
</table>

注:
1. 「0」は、特定化学物質の含有率が日本工業規格 JIS C 0950:2008 に記載されている含有率基準値より低いことを示します。
2. 「除外項目」は、特定化学物質が含有マークの除外項目に該当するため、特定化学物質について、日本工業規格 JIS C 0950:2008 に基づく含有マークの表示が必要であることを示します。

Product Model Number: NVIDIA Clara AGX Developer Kit

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<th>Major Classification</th>
<th>Symbols of Specified Chemical Substance</th>
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<td>Passive components</td>
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<td>Active components</td>
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<td>Processor</td>
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<tr>
<td>Memory</td>
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<td>Mechanicals</td>
<td>0</td>
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<td>Cables/Connectors</td>
<td>Exempt</td>
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<tr>
<td>Soldering material</td>
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</tr>
<tr>
<td>Flux, Solder Paste, label and other consumable materials</td>
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Notes:

1. “0” indicates that the level of the specified chemical substance is less than the threshold level specified in the standard, JIS C 0950: 2008.

2. “Exempt” indicates that the specified chemical substance is exempt from marking and it is not required to display the marking for that specified chemical substance per the standard, JIS C 0950: 2008.

3. “Exceeding 0.1wt%” or “Exceeding 0.01wt%” is entered in the table if the level of the specified chemical substance exceeds the threshold level specified in the standard, JIS C 0950: 2008.
Australia and New Zealand

Australian Communications and Media Authority

This product meets the applicable EMC requirements for Class B, I.T.E equipment and applicable radio equipment requirements.

China

China Compulsory Certificate

China RoHS Material Content Declaration

<table>
<thead>
<tr>
<th>部件名称</th>
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<tr>
<td>Parts</td>
<td>Hazardous Substances</td>
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</tr>
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<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>PCB板 PCB</td>
<td>O</td>
</tr>
<tr>
<td>被动电子零件 Passive components</td>
<td>X</td>
</tr>
<tr>
<td>主动电子零件 Active components</td>
<td>X</td>
</tr>
<tr>
<td>处理器 Processor</td>
<td>O</td>
</tr>
<tr>
<td>内存 Memory</td>
<td>O</td>
</tr>
<tr>
<td>结构件以及风扇 Mechanical parts and Fan</td>
<td>O</td>
</tr>
<tr>
<td>线材/连接器 Cable/Connectors</td>
<td>X</td>
</tr>
<tr>
<td>焊接金属 Soldering material</td>
<td>O</td>
</tr>
<tr>
<td>助焊剂·锡膏·标签及耗材 Flux, Solder Paste, label and other consumable materials</td>
<td>O</td>
</tr>
</tbody>
</table>

本表格依据SJ/T 11364-2014 的规定编制
The table according to SJ/T 11364-2014

O：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572-2011 标准规定的限量要求以下。
O: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572-2011.
X：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572-2011 标准规定的限量要求。
X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572-2011.
此表中所有名称中含“X”的部件均符合欧盟RoHS立法。
All parts named in this table with an “X” are in compliance with the European Union’s RoHS Legislation.

注：环保使用期限的参考标识取决于产品正常工作的温度和湿度等条件
Note: The referenced Environmental Protection Use Period Marking was determined according to normal operating use conditions of the product such as temperature and humidity.

South Korea

Radio Research Agency (RRA)

Korean Agency for Technology and Standards (KATS)

R-R-NVA-E3904

<table>
<thead>
<tr>
<th>B급 기기</th>
<th>이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.</th>
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Korea RoHS Material Content Declaration

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<th>상호:</th>
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<th>주소</th>
<th>변인등록번호</th>
<th>사업자등록번호</th>
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<td>카렌테레사번즈</td>
<td>서울특별시 강남구 영동대로 511, 2101호 (삼성동, 코엑스무역타워)</td>
<td>110181-0036373</td>
<td>120-84-06711</td>
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제품 내용

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<th>제품의 종류</th>
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<th>제품명(규격)</th>
<th>해당없음</th>
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</thead>
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<td>해당없음</td>
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<tr>
<td>제품의 중량</td>
<td>해당없음</td>
<td>제조, 수입업자</td>
<td>앤비디아</td>
</tr>
</tbody>
</table>

엔비디아의 그래픽 카드 제품은 전기 전자 제품 및 자동차의 자원순환에 관한 법률 시행령 제 11조 제 1항에 의거한 법 시행규칙제 3조에에따른 유해물질함유 기준을 확인 및 평가한 결과, 이를 준수하였음을 공표합니다.

구비서류: 없음

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Confirmation and Evaluation Form Concerning the Adherence to Acceptable Standards of Hazardous Materials Contained in Products

<table>
<thead>
<tr>
<th>Statement Prepared by</th>
<th>Company Name: Nvidia Hong Kong Holding Ltd. Korea branch</th>
<th>Corporate Identification Number: 110181-0036373</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Company Representative: Karen Theresa Burns</td>
<td>Business Registration Number: 120-84-06711</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>2788 San Tomas Expressway, Santa Clara, CA 95051</td>
<td></td>
</tr>
</tbody>
</table>

Product Information

| Product Category: N/A | Name of Product: N/A |
**Clara AGX Developer Kit User Guide**

<table>
<thead>
<tr>
<th>Detailed Product Model Name (Number):</th>
<th>N/A</th>
<th>Date of first market release:</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Weight of Product:</td>
<td>N/A</td>
<td>Manufacturer and/or importer:</td>
<td>NVIDIA Corporation</td>
</tr>
</tbody>
</table>

This for is publicly certify That NVIDIA Company has undergone the confirmation and evaluation procedures for the acceptable amounts of hazardous materials contained in graphic card according to the regulations stipulated in Article 3 of the ‘Status on the Recycling of Electrical and Electronic Products, and Automobiles’ and that company has graphic card adhered to the Enforcement Regulations of Article 11, Item 1 of the statute.

Attachment: None

*Preparing the Form*

1. Please indicate the product category according to the categories listed in Article 8, Items 1 and 2 of the ‘Enforcement Ordinance of the Statute on the Recycling of Electrical, Electronic and Automobile Materials’

2. For electrical and electronic products, please indicate the Model Name (and number). For automobiles, please indicate the Vehicle Identification Number.

3. Please indicate the name of manufacturer and/or importer of the product.

---

**Taiwan**

**Bureau of Standards, Metrology & Inspection (BSMI)**

This device complies with CNS 13438 (2006) Class B.

**Taiwan RoHS Material Content Declaration**
<table>
<thead>
<tr>
<th>單元 Parts</th>
<th>限用物質及其化學符號 Restricted substances and its chemical symbols</th>
</tr>
</thead>
<tbody>
<tr>
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<td>鉛 (Pb)</td>
</tr>
<tr>
<td>PCB板 PCB</td>
<td>0</td>
</tr>
<tr>
<td>被動電子零件 Passive components</td>
<td>-</td>
</tr>
<tr>
<td>主動電子零件 Active components</td>
<td>-</td>
</tr>
<tr>
<td>處理器 Processor</td>
<td>0</td>
</tr>
<tr>
<td>內存 Memory</td>
<td>0</td>
</tr>
<tr>
<td>結構件以及風扇 Mechanical parts and Fan</td>
<td>0</td>
</tr>
<tr>
<td>線材/連接器 Cables/Connectors</td>
<td>-</td>
</tr>
<tr>
<td>焊接金屬 Soldering material</td>
<td>0</td>
</tr>
<tr>
<td>助焊劑，錫膏，標籤及耗材 Flux, Solder Paste, label and other consumable materials</td>
<td>0</td>
</tr>
</tbody>
</table>

備考1：O：系指該限用物質未超出百分比含量基準值。
Note 1：O：indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考2：-：系指該項限用物質為排外項目。
Note 2：-：indicates that the restricted substance corresponds to the exemption.

此表中所有名稱中含 “-” 的部件均符合歐盟 RoHS 立法。
All parts named in this table with an “-” are in compliance with the European Union’s RoHS Legislation.

Note: The referenced Environmental Protection Use Period Marking was determined according to normal operating use conditions of the product such as temperature and humidity.

<table>
<thead>
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