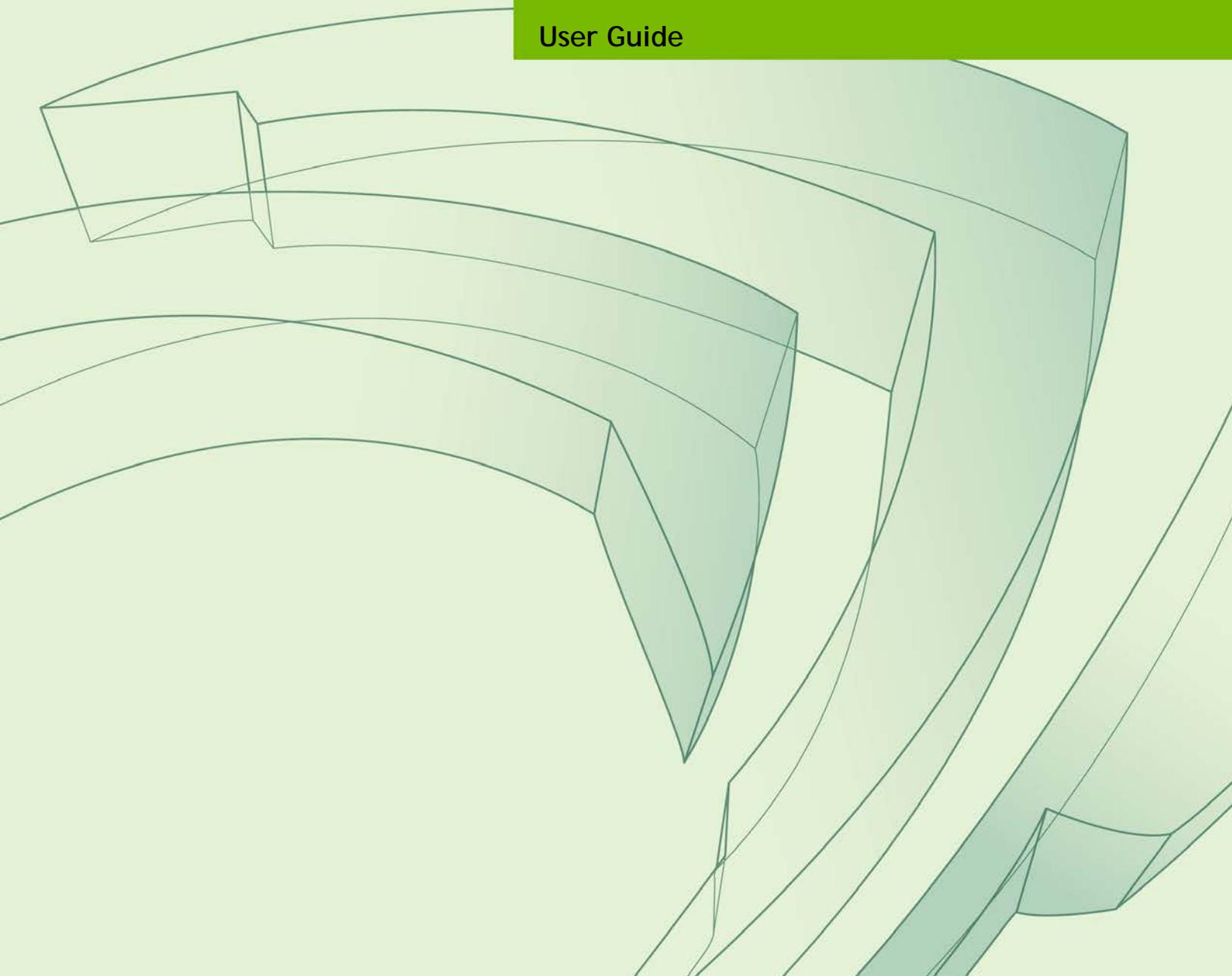




JETSON AGX XAVIER DEVELOPER KIT

DA_07976_001_01 | September 7, 2018

User Guide



DOCUMENT CHANGE HISTORY

DA_07976_001_01

Version	Date	Authors	Description of Change
1.0	September 7, 2018	plawrence	Initial release

NOTE

If you are new to the NVIDIA Jetson platform, welcome! There two key things you should do right away:

0. Sign up for the [NVIDIA Developer Program](#) – this enables you to ask questions and contribute on the [NVIDIA Jetson Forums](#), gives access to all documentation and collateral on the [Jetson Download Center](#), and more.
1. Read this User Guide. Especially don't miss:
 - The requirement for a Linux host computer, described in the "Getting Started" section. You'll need the host computer to flash your developer kit with the latest software.
 - The "Important Resources" list with links to support resources and helpful documentation

Thanks,
The NVIDIA Jetson team

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JETSON AGX XAVIER DEVELOPER KIT

The NVIDIA® Jetson AGX Xavier™ Developer Kit provides a full-featured development platform designed to get you up and running quickly. The included carrier board exposes many standard hardware interfaces, enabling a highly flexible and extensible platform for rapid prototyping. NVIDIA JetPack SDK supports both your developer kit and host development platform. It includes:

- ▶ Sample Linux filesystem with NVIDIA drivers
- ▶ AI and Computer Vision libraries and APIs
- ▶ Developer tools
- ▶ Supporting documentation
- ▶ Code samples to help you get started

GETTING STARTED

Before using your developer kit, you must install JetPack. A Linux host computer is required to run JetPack installer and flash the developer kit.

- ▶ Minimum system requirements for the host computer: Ubuntu Linux x64 v16.04 or v18.04, a valid Internet connection and at least 23GB of disk space.

See [How to Install JetPack](#), below, for details about these steps:

- ▶ Download JetPack installer to your Linux host computer.
- ▶ Connect your developer kit to the Linux host computer.
- ▶ Put your developer kit into Force Recovery Mode.
- ▶ Run JetPack installer to select and install desired components.

Important Resources

This User Guide has the information you need to setup and start using the Jetson AGX Xavier Developer Kit. However, you should also review these key items:

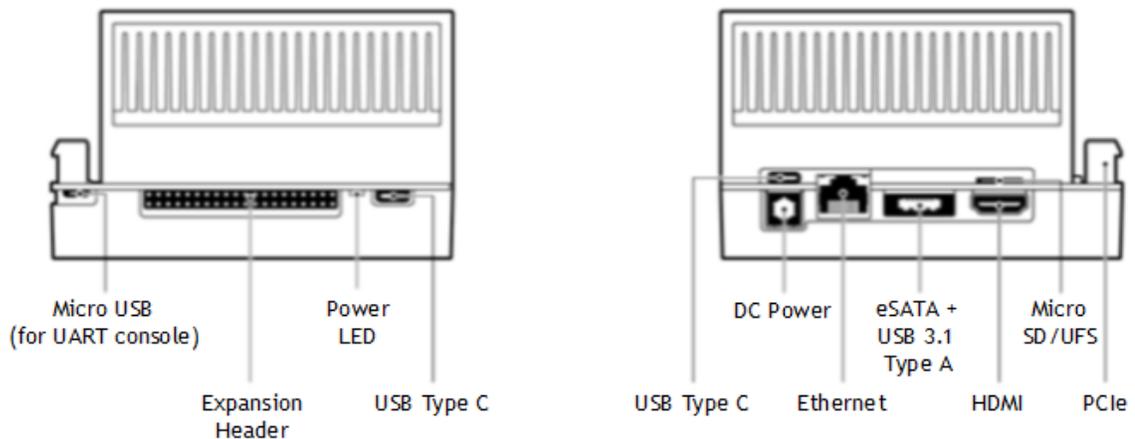
- ▶ [Jetson FAQ](#) – Please read the FAQ.
- ▶ [Support Resources](#) – this web page links to important resources, including the Jetson Forum and the Jetson Ecosystem page.
- ▶ [L4T Release Notes](#) – L4T is a key component of the Jetson platform, and provides the sample filesystem for your developer kit. Please read the latest release notes.
- ▶ [Jetson Download Center](#) – Documentation and other collateral is found here.

Included in the box

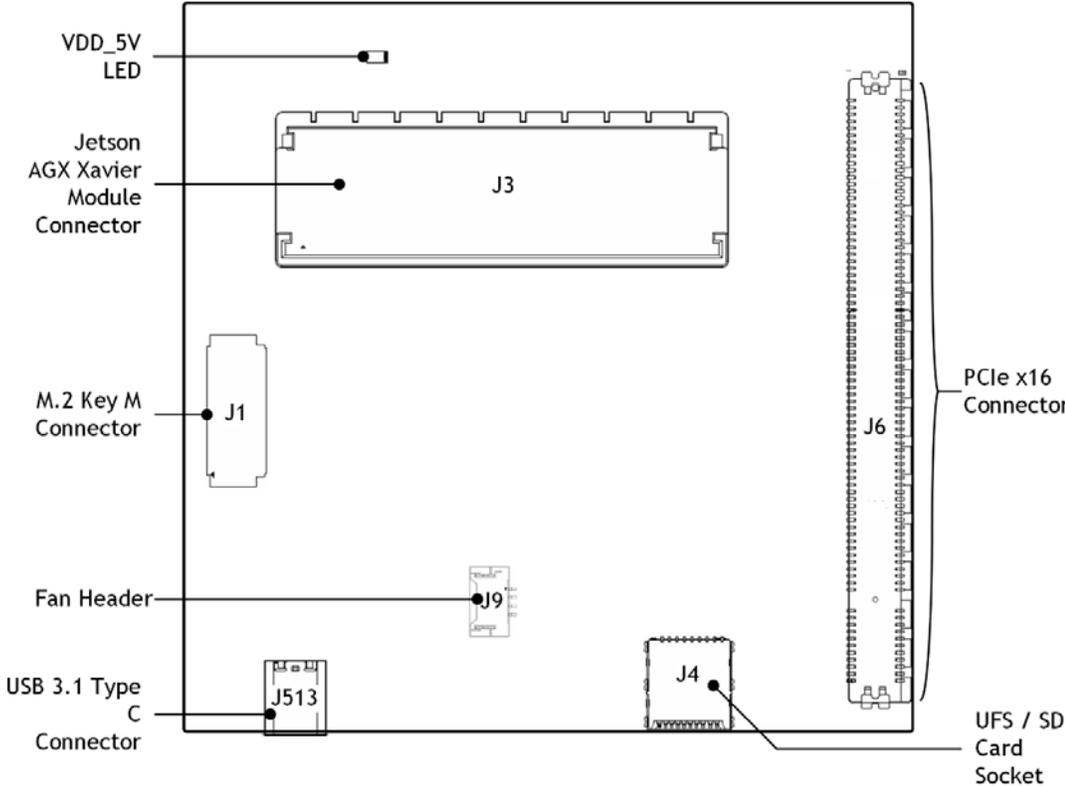
- ▶ Jetson AGX Xavier module with thermal solution
- ▶ Reference carrier board
- ▶ 65W power supply with AC cord
- ▶ Type C to Type A cable (USB 3.1 Gen2)
- ▶ Type C to Type A adapter (USB 3.1 Gen 1)

Developer Kit Interfaces

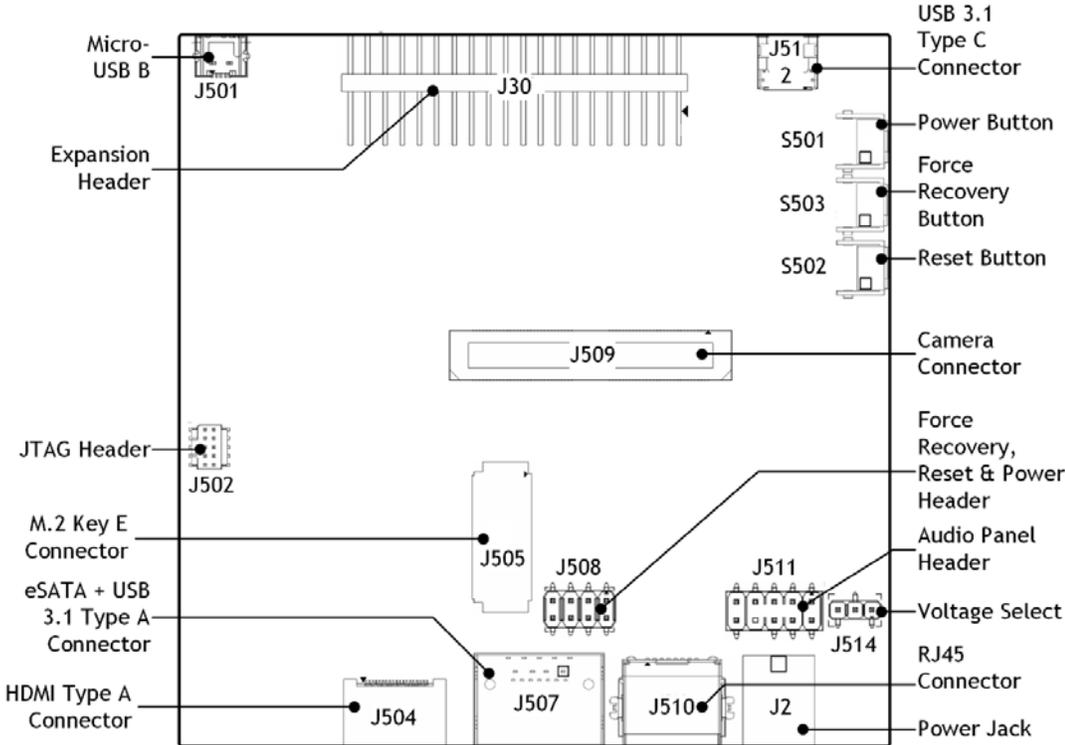
Front view (left) and rear view (right)



Top view of developer kit carrier board



Bottom view of developer kit carrier board



Interface Details

This list highlights some of the Jetson AGX Xavier Developer Kit carrier board interfaces. See the [Jetson AGX Xavier Developer Kit Carrier Board Specification](#) for comprehensive information:

- ▶ [J1] M.2 Key M connector for high speed NVMe storage.
 - To reach it, you must detach the combined module and thermal solution.
- ▶ [J2] Power available for peripherals is limited to power supply capability (65W from included power supply) minus developer kit system power usage (maximum of 30W in default configuration).
- ▶ [J4] Slot accepts either an SD Card or a UFS card.
- ▶ [J6] PCIe x16 connector routes to a x8 PCIe 4.0 controller.
- ▶ [J6] This connector is also where the lanes are connected for SLVS cameras.
- ▶ [J501] Micro-USB connector provides access to the UART console.
 - For example, you can access the serial console of the developer kit from a terminal emulator on a computer connected to this micro-USB port.
- ▶ [J504] HDMI 2.0.
- ▶ [J505] M.2 Key E connector can be used for wireless networking cards, and includes interfaces for PCIe (x1), USB 2.0, UART, I2S & I2C.
- ▶ [J507] Hybrid connector can be used for either eSATA or USB3 Type-A. The eSATA connector can supply 5V.
- ▶ [J509] Camera connector supports up to six directly connected cameras via CSI-2, or up to 16 cameras via the virtual channel feature of CSI-2.
- ▶ [J512, J513] USB Type-C connectors.
 - J512 can be used to flash the developer kit.
 - Either connector can be used to power the developer kit from USB Type-C power supplies listed in [Jetson AGX Xavier Supported Component List](#).
 - Both connectors support DisplayPort, so you can run three displays at once by using these plus the HDMI adapter.

Physical Configuration Instructions

To prepare your Jetson AGX Xavier Developer Kit for use, connect it as follows:

- ▶ Connect an external HDMI display to the carrier board's HDMI port.
- ▶ Connect a USB keyboard and mouse.
 - Connect directly to the hybrid USB Type-A/eSATA port and use the included USB Type-C to Type-A adapter to connect to the rear USB Type-C port. (Leave the front USB Type-C port available; it will be needed to flash the developer kit.)
- ▶ Connect the developer kit to your local network via Ethernet cable to the carrier board's Ethernet port.

- ▶ Connect the included AC adapter to the carrier board's power jack. Plug the AC adapter into an appropriately rated electrical outlet.
 - Use only the supplied AC adapter, as it is appropriately rated for your device.

Note that the Jetson AGX Xavier Developer Kit may be run upside down or resting on the non-vented side, allowing easy access to the camera connector and headers on the bottom of the carrier board. Any of these orientations are OK:



JETPACK

NVIDIA JetPack SDK is the most comprehensive solution for building AI applications. It includes the latest developer kit, OS image, libraries and APIs, developer tools, samples, and documentation.

Before using your developer kit, you will need to install JetPack.¹

JetPack Components

OS Image

JetPack includes a sample file system derived from Ubuntu.

Libraries

JetPack includes the following libraries:

- ▶ [TensorRT](#) and [cuDNN](#) for high performance deep learning applications
- ▶ [CUDA](#) for GPU accelerated applications across multiple domains
- ▶ [Multimedia API](#) package for camera applications and sensor driver development
- ▶ [VisionWorks](#) and [OpenCV](#) for visual computing applications

¹ The developer kit ships with only a reference filesystem that boots to a command line. The username and password required for log-in are both `nvidia`.

Developer Tools

JetPack includes the following developer tools:

- ▶ [CUDA tools](#): Nsight Eclipse Edition IDE, debugging and profiling tools, and toolchain for cross-compiling high performance GPU-accelerated applications are included in the CUDA Toolkit.
- ▶ [NVIDIA Nsight Systems](#): A system trace and multi-core CPU PC sampling profiler that provides an interactive view of captured profiling data, helping improve overall application performance.
- ▶ [NVIDIA Nsight Graphics](#): A console-grade tool that allows developers to debug and profile OpenGL, OpenGL ES, and Vulkan.

Samples

There are a number of samples available for the Jetson AGX Xavier Developer Kit. In some cases, JetPack installer compiles the samples and installs both source and compiled sample to the developer kit.

Link to Documentation	Location on filesystem
TensorRT	Source code: /usr/src/tensorrt/samples/
cuDNN	Source code and compiled: /usr/src/cudnn_samples_<version>/
CUDA	Source code and compiled: ~/NVIDIA_CUDA-<version>_Samples/
MM API	Source code: ~/tegra_multimedia_api/samples/
VisionWorks	Source code: /usr/share/visionworks/sources/samples/ /usr/share/visionworks-tracking/sources/samples/ /usr/share/visionworks-sfm/sources/samples/ Compiled: ~/VisionWorks-SFM-<version>-Samples/
OpenCV	Source code: /usr/share/OpenCV/samples/
NVIDIA GameWorks Vulkan and OpenGL	<i>Follow the documentation link for Git repository location</i>

Documentation

- ▶ [JetPack Documentation](#)
- ▶ [L4T Release Notes](#)
- ▶ [TensorRT Documentation](#)
- ▶ [cuDNN Documentation](#)
- ▶ [CUDA Toolkit](#)
- ▶ [Nsight Systems](#)
- ▶ [Nsight Graphics](#)
- ▶ [Multimedia API Reference](#)
- ▶ [VisionWorks documentation](#)
- ▶ [OpenCV Documentation](#)
- ▶ [NVIDIA Gameworks Documentation](#)

How to Install JetPack

Installing JetPack to your developer kit requires these steps, which are detailed in the sections below:

- ▶ Download JetPack installer to your Linux host computer.
- ▶ Connect your developer kit to the Linux host computer.
- ▶ Put your developer kit into Force Recovery Mode.
- ▶ Run JetPack installer to select and install desired components.

Download Installer to the Host Computer

You must have a Linux host computer to run JetPack installer and flash the developer kit. Supported host operating systems are:

- ▶ Ubuntu Linux x64 Version 18.04 or 16.04

Download the latest JetPack installer to the Linux host from the [JetPack](#) page on the Jetson Developer Site.

Note: The installer can flash and update software on a target Jetson device, but it cannot not run directly on that device. Whether or not a Jetson device is present, you can use JetPack installer to update software on the Linux host.

Connect Developer Kit to the Host Computer

- ▶ Use the included USB cable to connect the Linux host computer to the front USB Type-C connector on the developer kit.
- ▶ Connect a display, keyboard, and mouse to your Jetson AGX Xavier Developer Kit (see [Physical Configuration Instructions](#), above).
- ▶ Connect the developer kit and Linux host computer to the same network.
- ▶ Connect the included AC adapter to the developer kit's DC jack.

Put Developer Kit into Force Recovery Mode

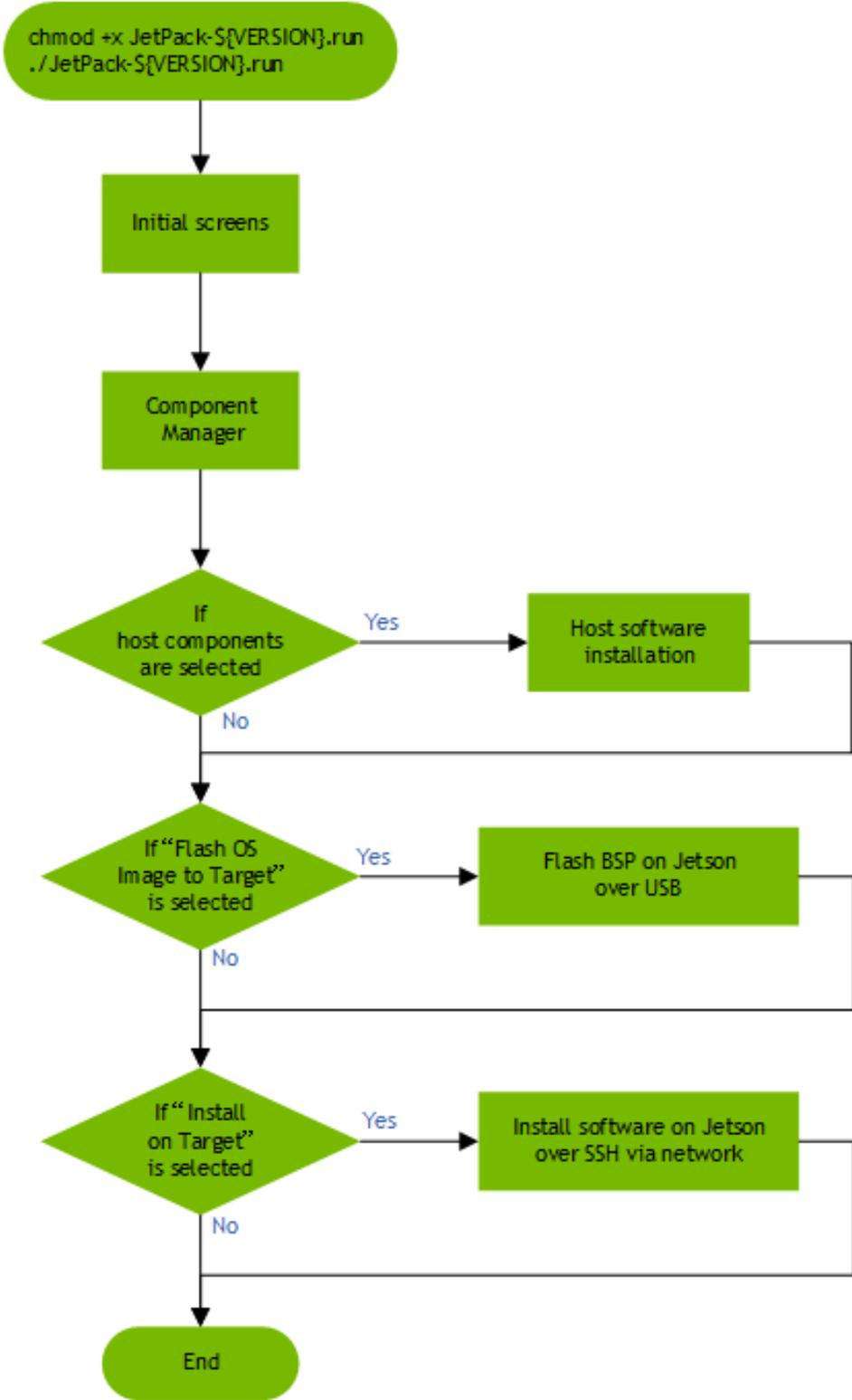
The developer kit must be in Force USB Recovery Mode (RCM) so the installer can transfer system software to the Jetson AGX Xavier module.

1. Connect the developer kit as described above. It should be powered off.
2. Press and hold down the Force Recovery button.
3. Press and hold down the Power button.
4. Release both buttons.

Run the Installer

JetPack installer includes a Component Manager, allowing you to choose what to install on the Linux host computer and/or the Jetson Developer Kit.

The following flowchart outlines the process of running the installer.



For detailed JetPack installation instructions, including screenshots, see the [JetPack Installation Guide](#).

WORKING WITH L4T

NVIDIA L4T provides the Linux kernel, bootloader, board support package (BSP), and sample filesystem for the Jetson AGX Xavier Developer Kit. JetPack installer installs the L4T sample file system to your developer kit to get you up and running quickly.

L4T is also available for download directly from the [main L4T page](#) on the Jetson Developer Site.

A command line flashing utility is included in the L4T driver package, and the [L4T documentation](#) describes how to flash your developer kit.

The L4T documentation also includes documents such as the [Platform Adaptation and Bring-Up Guide](#), which describes how to port the L4T BSP and bootloader from your developer kit to a new hardware platform incorporating the Jetson module. Porting L4T to a new device enables use of the other JetPack components on that device, along with the software you've created using the developer kit.

COMPLIANCE INFORMATION

The NVIDIA Jetson AGX Xavier Developer Kit is compliant with the regulations listed in this section.

UNITED STATES

Federal Communications Commission (FCC)



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.

FCC Warning: The FCC requires that you be notified that any changes or modifications to this device not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Underwriters Laboratories (UL)

UL listed Product Logo for Jetson Xavier Developer Kit, model name P2972.



UL Recognized Component Logo for Embedded System Module, model number P2888 for Jetson Xavier.



Canada

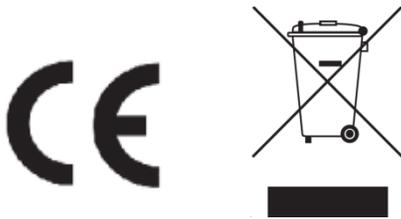
Industry Canada (IC)
CAN ICES-3(B)/NMB-3(B)

This device complies with Industry Canada license-exempt RSS standard(s). 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'Industrie 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 bears the CE mark accordance with following directives:

- Electromagnetic Compatibility Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- RoHS Directive 2011/65/EU

A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA GmbH (Floessergasse 2, 81369 Munich, Germany).

Japan

Voluntary Control Council for Interference (VCCI)



この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

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: Jetson Xavier 開発者コンポーネント

主な分類	特定化学物質記号					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
PCBボード	0	0	0	0	0	0
パッシブ電子部品	除外項目	0	0	0	0	0
アクティブ電子部品	除外項目	0	0	0	0	0
コネクタ / ケーブル	除外項目	0	0	0	0	0
プロセッサ	0	0	0	0	0	0
メモリ	0	0	0	0	0	0
機械部品	除外項目	0	0	0	0	0
カメラ (オプション)	除外項目	0	0	0	0	0
はんだ付け材料	0	0	0	0	0	0
フラックス、クリーム はんだ、ラベル、その他 消耗品	0	0	0	0	0	0

注:

- 「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。
- 「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不要であることを示します。
- 「0.1wt%超」または「0.01wt%超」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を超えていることを示します。

A Japanese regulatory requirement, defined by specification JIS C 0950: 2008, mandates that manufacturers provide Material Content Declarations for certain categories of electronic products offered for sale after July 1, 2006.

Product Model Number: Jetson Xavier Developer Kit

Major Classification	Symbols of Specified Chemical Substance					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
PCB	0	0	0	0	0	0
Passive components	Exempt	0	0	0	0	0
Active components	Exempt	0	0	0	0	0
Connectors/Cables	Exempt	0	0	0	0	0
Processor	0	0	0	0	0	0
Memory	0	0	0	0	0	0
Mechanicals	Exempt	0	0	0	0	0
Camera (optional)	Exempt	0	0	0	0	0
Soldering material	0	0	0	0	0	0
Flux, Solder Paste, label and other consumable materials	0	0	0	0	0	0

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.

South Korea

Radio Research Agency (RRA)



R-R-NVA-P2972

R-R-NVA-P2888

B급 기기	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.
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Korea RoHS Material Content Declaration

확인 및 평가 양식은 제품에 포함 된 유해 물질의 허용 기준의 준수에 관한				
문 준비	상호 :	앤비디아홍콩홀딩즈리미티드(영 업소)	법인등록번호	110181 - 003637 3
	대표자성명	카렌테레사번즈	사업자등록번호:	120- 84- 06711
	주소	서울특별시 강남구 영동대로 511, 2101호 (삼성동, 코엑스무역타워)		
제품 내용				
제품의 종류	해당없음	제품명(규격)	해당없음	
세부모델명(번호):	해당없음	제품출시일	해당없음	
제품의 중량	해당없음	제조, 수입업자	앤비디아	

엔비디아의 그래픽 카드제품은 전기 전자제품 및 자동차의 자원순환에 관한 법률 시행령 제 11조 제 1항에 의거한 법 시행규칙 제 3조에 따른 유해물질함유 기준을 확인 및 평가한 결과, 이를 준수하였음을 공표합니다.

구비서류 : 없음

작성방법

- ① 제품의 종류는 "전기.전자제품 및 자동차의 자원순환에 관한 법률 시행령" 제 8조 제 1항 및 제 2항에 따른 품목별로 구분하여 기재합니다.
- ② 전기 전자 제품의 경우 모델명 (번호), 자동차의 경우, 제원관리번호를 기재합니다.
- ③ 해당제품의 제조업자 또는 수입업자를 기재합니다.

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

Russia/Kazakhstan/Belarus

Customs Union Technical Regulations (CU TR)



This device complies with the technical regulations of the Customs Union (CU TR)

This device complies with the rules set forth by Federal Agency of Communications and the Ministry of Communications and Mass Media

Federal Security Service notification has been filed.

Taiwan

Bureau of Standards, Metrology & Inspection (BSMI)



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

Product Name: Jetson Xavier Developer Kit開發者組件

Taiwan RoHS Material Content Declaration

限用物質含有情況標示聲明書 Declaration of the presence condition of the Restricted Substances Marking						
設備名稱: Jetson Xavier Developer Kit Equipment Name: Jetson Xavier Developer Kit						
單元 Parts	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr(VI))	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
印刷電路板 PCB	0	0	0	0	0	0
處理器 Processor	0	0	0	0	0	0
主動電子零件 Active components	-	0	0	0	0	0
被動電子零件 Passive components	-	0	0	0	0	0
存儲設備 Memory	0	0	0	0	0	0
機械部件 Mechanicals	-	0	0	0	0	0
連接器/線材 Connectors/Cable	-	0	0	0	0	0
攝像頭 (選配) Camera (optional)	-	0	0	0	0	0
焊接金屬 Soldering material	0	0	0	0	0	0
助焊劑, 錫膏, 標籤及耗材 Flux, Solder Paste, label and other consumable materials	0	0	0	0	0	0

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.

注：環保使用期限的參考標識取決與產品正常工作的溫度和濕度等條件

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

China

China RoHS Material Content Declaration

 产品中有害物质的名称及含量 The Table of Hazardous Substances and their Content 根据中国《电器电子产品有害物质限制使用管理办法》 as required by Management Methods for Restricted Use of Hazardous Substances in Electrical and Electronic Products						
部件名称 Parts	有害物质 Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 PCB	O	O	O	O	O	O
处理器 Processor	O	O	O	O	O	O
主动电子零件 Active components	X	O	O	O	O	O
被动电子零件 Passive components	X	O	O	O	O	O
存储设备 Memory	O	O	O	O	O	O
机械部件 Mechanicals	X	O	O	O	O	O
连接器/线材 Connectors / Cable	X	O	O	O	O	O

摄像头 (选配) Camera (optional)	X	O	O	O	O	O
焊接金属 Soldering material	O	O	O	O	O	O
助焊剂, 锡膏, 标签及耗材 Flux, Solder Paste, label and other consumable materials	O	O	O	O	O	O
<p>本表格依据SJ/T 11364-2014 的规定编制 The table according to SJ/T 11364-2014</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>						

India

India RoHS Compliance Statement

This product, as well as its related consumables and spares, complies with the reduction in hazardous substances provisions of the “India E-waste (Management and Handling) Rule 2016”. It does not contain lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in concentrations exceeding 0.1 weight % and 0.01 weight % for cadmium, except for where allowed pursuant to the exemptions set in Schedule 2 of the Rule.

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