A205E Mini PC User Guide

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1.1 Notice

Please read manual carefully before install, operate, or transport device.

- Ensure that the correct power range is being used before powering the device.

- Avoid hot plugging.

- To properly turn off the power, please shut down the Ubuntu system first, and then cut off the power. Due to the particularity of the Ubuntu system, on the Nvidia developer kit, if the power is turned off when the startup is not completed, there will be a 0.03% probability of abnormality, which will cause the device to fail to start. Due to the use of the Ubuntu system, the same problem also exists on the device.

- Do not use cables or connectors other than described in this manual.

- Do not use device near strong magnetic fields.

- Backup your data before transportation or device is idle.

- Recommend to transport device in its original packaging.

1.2 Packing List

A205E mini PCx 1

Antenna x2

Power adapter （Without Power cord） x 1

1.3 A205E mini PC introduction

1.3.1 Brief

A205E mini PC is an embedded artificial intelligence computer capable of empowering many end devices with up to 21TOPS of computing power. A205E mini PC offers a fast passive thermal design that can meet industrial standards such as anti-vibration and anti-static. Meanwhile, A205E mini PC X is rich in interfaces and cost-effective.

1.3.2 Specifications

Processor

Processor	NVIDIA Jetson Xavier NX
AI Performance	21 TOPS (INT8)
GPU	384-core NVIDIA Volta™ GPU with 48 Tensor Cores
GPU Max Freq	1100 MHz
CPU	6-core NVIDIA Carmel ARM®v8.2 64-bit CPU 6MB L2 + 4MB L3

Processor	**NVIDIA Jetson Xavier NX**
CPU Max Freq	2-core @ 1900MHz 4/6-core @ 1400Mhz
Memory	8 GB 128-bit LPDDR4x @ 1866MHz 59.7GB/s
Storage	16 GB eMMC 5.1
Power	10W|15W|20W
PCIe	1 x1 + 1x4 (PCIe Gen3, Root Port & Endpoint)
CSI Camera	Up to 6 cameras (24 via virtual channels) 14 lanes MIPI CSI-2 D-PHY 1.2 (up to 30 Gbps)
Video Encode	2x 4K60 | 4x 4K30 | 10x 1080p60 | 22x 1080p30 (H.265) 2x 4K60 | 4x 4K30 | 10x 1080p60 | 20x 108p30 (H.264)
Video Decode	2x 8K30 | 6x 4K60 | 12x 4K30 | 22x 1080p60 | 44x 1080p30 (H.265) 2x 4K60 | 6x 4K30 | 10x 1080p60 | 22x 1080p30 (H.264)
Display	2 multi-mode DP 1.4/eDP 1.4/HDMI 2.0
DL Accelerator	2x NVDLA v1.0
Vision Accelerator	7-Way VLIW Vision Processor

Processor	NVIDIA Jetson Xavier NX
Networking	10/100/1000 BASE-T Ethernet

I/O

Feature	A205 E Carrier for NVIDIA Jetson NX
Module Compatibility	NVIDIA Jetson NX
PCB Size / Overall Size	115mm x 105mm
Display	2x HDMI
Ethernet	2x Gigabit Ethernet (10/100/1000)
USB	4x USB 3.0 Type A (Integrated USB 2.0) 1x USB 2.0 Type C
M.2 KEY M	1x M.2 KEY M Interface
Camera	120P Camera Connector
TF_CARD	1x TF_CARD
USB 2.0	ZIF 20P 0.5mm pitch
FAN	1 x FAN(5V PWM)
CAN	1x CAN, 1CAN transceiver
RS485	1 x RS485
RS232	1 x RS232
Misc.	2x I2C Link （+3.3V I/O） 1X SPI Bus(+3.3V Level) 2x LED STATE
Power Requirements	+9---+36V DC Input @ 8A
Operating Temperature	-25 o C to +80 o C
Warranty and Support Accessories	1 Year Warranty and Free Support

Power Supply

Power Supply	Specification
Input Type	DC
Input Voltage	+9---+36V DC Input @ 8A
Typical consumption	30W

Mechanical

Mechanical	Specification

Mechanical	Specification
Dimensions (W x H x D)	209.0mm x 68.3mm x 130.0mm
Weight	1.6kg

Environmental

Environmental	Specification
Operating Temperature	-20℃-60℃, 0.2~0.3m/s air flow
Storage Temperature	-25℃ ~ +80℃
Storage Humidity	10%-90% non-condensing

1.4 Install Dimension

Dimensions as below:
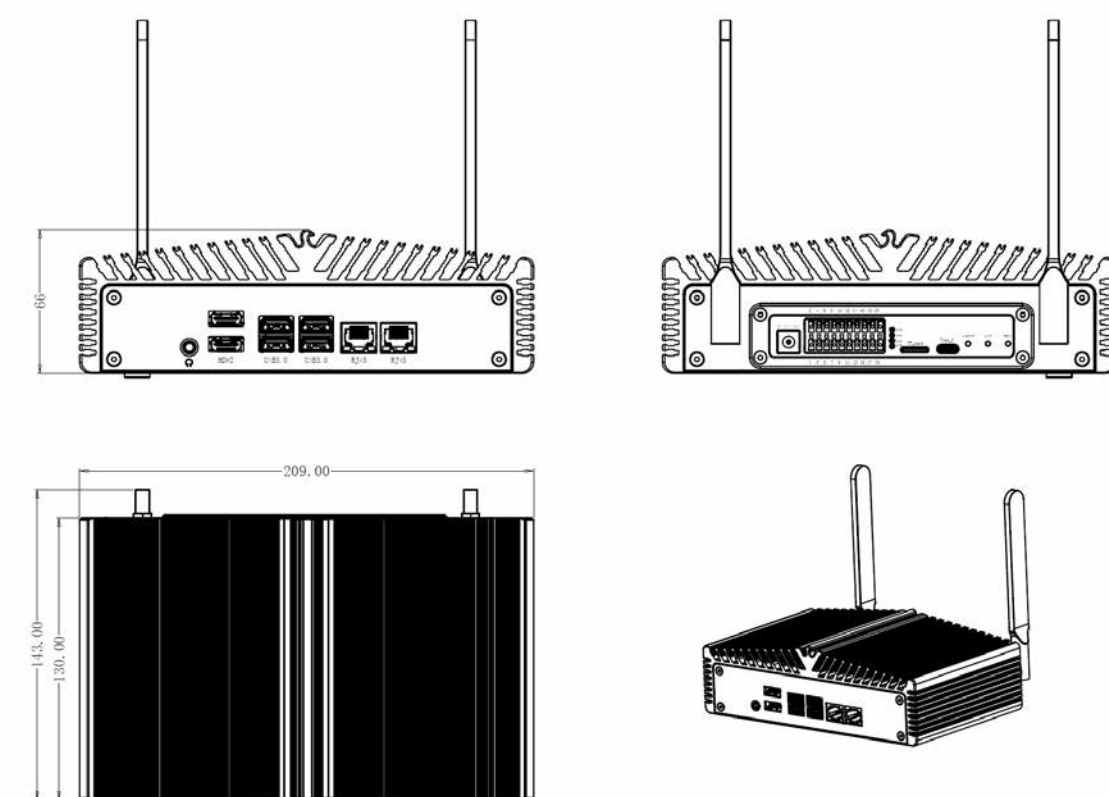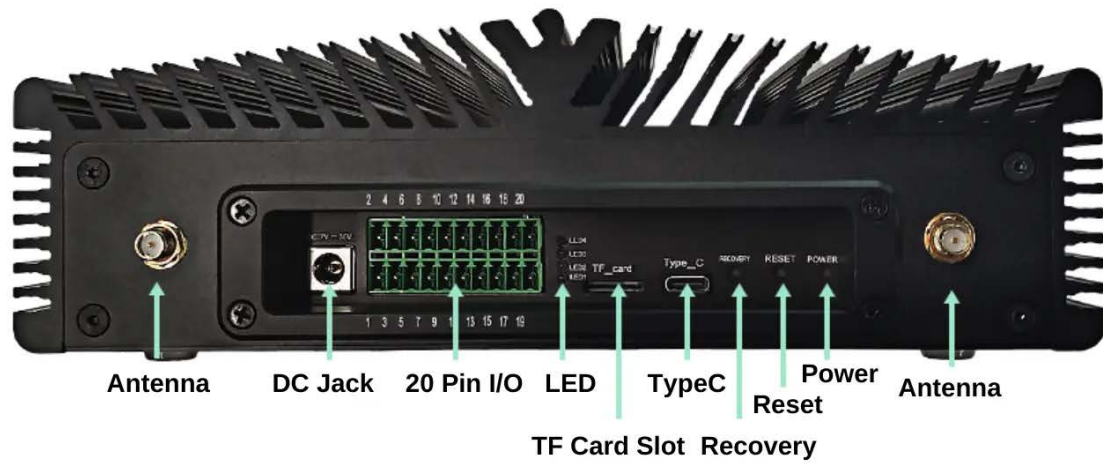
1.5 Interfaces

1.5.0.1

Front

Interfaces	Interface description
HDMI	HDMI x2
USB 3.0	USB3.0 Type-A x4（USB2.0 compatible）
RJ45	2x Gigabit Ethernet (10/100/1000)
Audio	3.5mm connetor

Back

Antenna   DC Jack   20 Pin I/O   LED   TypeC   Reset   Power   Antenna

TF Card Slot   Recovery

Interfaces	Name	Interface description
DC	DC power supply interface	+13V(8A)~+20V(5A)
LNB	Antenna HF head	Antenna HF head
20 Pin I/O	1xRS232, 1xRS485, 1xCAN, 2x I2C, 1xSPI,	
TF Card	TF slot	for Micro SDcard
RESET	Resetting switch	Resetting switch
REC	Recovery Boutton	Enter Recovery Mode
LED		

Note: This product is self-starting when on power.

1.6.1 Jetpack KEY FEATURES IN JETPACK

1.6.1.1 JetPack

NVIDIA JetPack SDK is the most comprehensive solution for building AI applications. It bundles Jetson platform software including TensorRT, cuDNN, CUDA Toolkit, VisionWorks, GStreamer, and OpenCV, all built on top of L4T with LTS Linux kernel.

JetPack includes NVIDIA container runtime, enabling cloud-native technologies and workflows at the edge.

JetPack SDK   Cloud-Native on Jetson

1.6.1.2 L4T

NVIDIA L4T provides the Linux kernel, bootloader, NVIDIA drivers, flashing utilities, sample filesystem, and more for the Jetson platform.

You can customize L4T software to fit the needs of your project. By following the platform adaptation and bring-up guide, you can optimize your use of the complete Jetson product feature set. Follow the links below for details about the latest software libraries, frameworks, and source packages.

1.6.1.3 DeepStream SDK on Jetson

NVIDIA's DeepStream SDK delivers a complete streaming analytics toolkit for AI-based multi-sensor processing, video and image understanding. DeepStream is an integral part of NVIDIA Metropolis, the platform for building end-to-end services and solutions that transform pixel and sensor data to actionable insights. Learn about the latest 5.0 developer preview features in our developer news article.

1.6.1.4 Isaac SDK

The NVIDIA Isaac SDK makes it easy for developers to create and deploy AI-powered robotics. The SDK includes the Isaac Engine (application framework), Isaac GEMs (packages with high-performance robotics algorithms), Isaac Apps (reference applications) and Isaac Sim for Navigation (a powerful simulation platform). These tools and APIs accelerate robot development by making it easier to add artificial intelligence (AI) for perception and navigation into robots.

1.6.2 KEY FEATURES IN JETPACK

OS	NVIDIA L4T provides the bootloader, Linux kernel 4.9, necessary firmwares, NVIDIA drivers, sample filesystem based on Ubuntu 18.04, and more. JetPack 4.6.1 includes L4T 32.7.1 with these highlights: Support for Jetson AGX Xavier 64GB and Jetson Xavier NX 16GB
TensorRT	TensorRT is a high performance deep learning inference runtime for image classification, segmentation, and object detection neural networks. TensorRT is built on CUDA, NVIDIA's parallel programming model, and enables you to optimize inference for all deep learning frameworks. It includes a deep learning inference optimizer and runtime that delivers low latency and high-throughput for deep learning inference applications.
cuDNN	CUDA Deep Neural Network library provides high-performance primitives for deep learning frameworks. It provides highly tuned implementations for standard routines suchas forward and backward convolution, pooling, normalization, and activation layers.
CUDA	CUDA Toolkit provides a comprehensive development environment for C and C++ developers building GPU-accelerated applications. The toolkit includes a compiler for NVIDIA GPUs, math libraries, and tools for debugging and optimizing the performance of your applications.
Multimedia API	The Jetson Multimedia API package provides low level APIs for flexible application development. Camera application API: libargus offers a low-level frame-synchronous API for camera applications, with per frame camera parameter control, multiple (including synchronized) camera support, and EGL stream outputs. RAW output CSI cameras needing ISP can be used with either libargus or GStreamer plugin. In either case, the V4L2 media-controller sensor driver API is used.
Computer Vision	VPI (Vision Programing Interface) is a software library that provides Computer Vision / Image Processing algorithms implemented on PVA1 (Programmable Vision Accelerator), GPU and CPU OpenCV is a leading open source library for computer vision, image processing and machine learning. VisionWorks2 is a software development package for Computer Vision (CV) and image processing. JetPack 4.6.1 includes VPI 1.2

Developer Tools	CUDA Toolkit provides a comprehensive development environment for C and C++ developers building high-performance GPU-accelerated applications with CUDA libraries. The toolkit includes Nsight Eclipse Edition, debugging and profiling tools including Nsight Compute, and a toolchain for cross-compiling applications. NVIDIA Nsight Systems is a low overhead system-wide profiling tool, providing the insights developers need to analyze and optimize software performance.
Supported SDKs and Tools	NVIDIA DeepStream SDK is a complete analytics toolkit for AI-based multi-sensor processing and video and audio understanding. DeepStream SDK 6.0 supports JetPack 4.6.1 NVIDIA Triton™ Inference Server simplifies deployment of AI models at scale. Triton Inference Server is open source and supports deployment of trained AI models from NVIDIA TensorRT, TensorFlow and ONNX Runtime on Jetson. On Jetson, Triton Inference Server is provided as a shared library for direct integration with C API.
Cloud Native	Jetson brings Cloud-Native to the edge and enables technologies like containers and container orchestration. NVIDIA JetPack includes NVIDIA Container Runtime with Docker integration, enabling GPU accelerated containerized applications on Jetson platform. NVIDIA hosts several container images for Jetson on NVIDIA NGC. Some are suitable for software development with samples and documentation and others are suitable for production software deployment, containing only runtime components. Find more information and a list of all container images at the Cloud-Native on Jetson page.

1.7 Sample Applications

JetPack includes several samples which demonstrate the use of JetPack components. These are stored in the reference filesystem and can be compiled on the developer kit.

JetPack component	Sample locations on reference filesystem
TensorRT	/usr/src/tensorrt/samples/
cuDNN	/usr/src/cudnn_samples_/
CUDA	/usr/local/cuda-/samples/
Multimedia API	/usr/src/tegra_multimedia_api/
VisionWorks	/usr/share/visionworks/sources/samples/ /usr/share/visionworks-tracking/sources/samples/ /usr/share/visionworks-sfm/sources/samples/
OpenCV	/usr/share/OpenCV/samples/
VPI	/opt/nvidia/vpi/vpi-/samples

1.8 Developer Tools

JetPack includes the following developer tools. Some are used directly on a Jetson system, and others run on a Linux host computer connected to a Jetson system.

- Tools for application development and debugging:
    - NSight Eclipse Edition for development of GPU accelerated applications: Runs on Linux host computer. Supports all Jetson products.
    - CUDA-GDB for application debugging: Runs on the Jetson system or the Linux host computer. Supports all Jetson products.
    - CUDA-MEMCHECK for debugging application memory errors: Runs on the Jetson system. Supports all Jetson products.
- Tools for application profiling and optimization:
    - NSight Systems for application multi-core CPU profiling: Runs on the Linux host computer. Helps you improve application performance by identifying slow parts of code. Supports all Jetson products.
    - NVIDIA® Nsight™ Compute kernel profiler: An interactive profiling tool for CUDA applications. It provides detailed performance metrics and API debugging via a user interface and command line tool.
    - NSight Graphics for graphics application debugging and profiling: A console-grade tool for debugging and optimizing OpenGL and OpenGL ES programs. Runs on the Linux host computer. Supports all Jetson products.