Jetson PowerEstimator User Guide

Revision History

Version	Date	Summary
V 1.0	July 7th 2020	1. PowerEstimator tool's power knob setting details and the usage information.
V 1.1	July 29th 2021	1. Add 20W power modes support for Jetson-Xavier-NX platform. 2. Add Support for selecting the Jetpack version.
V 2.1	Aug 12th 2022	1. Add Jetson-AGX-Orin-32GB (40W) and Jetson-AGX-Orin-64GB/Jetson-AGX-Orin-devkit (60W) power estimation support.
V 2.2	Apr 10th 2023	1. Add Jetson-Orin-NX-16GB and Jetson-Orin-NX-8GB power estimation support.
V 2.3	Apr 24th 2023	1. Add Jetson-Orin-Nano-8GB power estimation support.
V 2.4	July 4th 2023	1. Add Jetson-AGX-Orin-Industrial power estimation support.
V 2.5	Dec 18th 2024	1. Add Jetson-Orin-Nano-8GB-Super mode configuration power estimation support.
V 2.6	Jan 7th 2025	1. Add Jetson-Orin-NX-16GB-Super and Jetson-Orin-NX-8GB-Super mode configuration power estimation support.
V 3.0	Sep 3rd 2025	1. Add Jetson-AGX-Thor (T5000) power estimation support.
V 3.1	Oct 9th, 2025	1. Add 70C, 80C and 90C temperature support
V 3.2	Dec 5th, 2025	1. Add Jetson-AGX-Thor (T4000) power estimation support.

Introduction

The NVIDIA® Jetson™ modules support nvpmodel power modes. To check the details about the different power modes supported by various platforms; visit the Jetson Software Documentation page and open the Developer Guide for the latest Jetpack release. Navigate through the platform series from the left pane and go to the "Platform Power and Performance > Supported Modes and Power Efficiency" section for the details. The Jetson PowerEstimator tool supports the platforms listed below:

- Jetson AGX Thor (T4000)
- Jetson AGX Thor (T5000)
- Jetson AGX Orin 32GB
- Jetson AGX Orin devkit
- Jetson AGX Orin 64GB
- Jetson AGX Orin Industrial
- Jetson Orin NX 16GB / Jetson Orin NX 16GB Super
- Jetson Orin NX 8GB / Jetson Orin NX 8GB Super
- Jetson Orin Nano 8GB / Jetson Orin Nano 8GB Super
- Jetson Xavier NX

Note: *Jetson Orin Nano 8GB and Jetson Nano 8GB Super mode configuration platform does not support DLA, PVA and NVENC engines. For video encoding; software encoder is used.*

You can set up a platform using an nvpmodel that contains all of the clock information for these default modes, but embedded applications are so diverse that it is a common practice to adjust the clocks, study the trade-offs, and optimize the power. Optimization may include reallocating power to different blocks: CPU, GPU, etc.

PowerEstimator is a power estimation tool for Jetson systems-on-module (SOMs). It estimates average SOM power consumption and generates an nvpmodel configuration file for the system configuration and target workload being modeled. The tool provides a set of input knobs, such as clock frequency, number of active cores, load level, and device operating state, for defining

target workload and getting power estimates before applying a configuration to the target device.

You can use PowerEstimator to:

1) Obtain SOM power estimates before application development
2) Tune system resources and parameters, and see how they affect total SOM power consumption
3) Obtain preliminary analyses of thermal cooling requirements, based on SOM power estimation
4) Generate and download an nvpmodel configuration file for a custom power mode

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Note: The power estimates provided by PowerEstimator are based on measured and simulated data. The SoC junction average temperature (Tj_avg) is considered fixed at 70 °C for Jetson Orin series and Xavier series platforms. However, for the Jetson AGX Thor, the temperature can be selected from three options: 70°C, 80°C, or 90°C. The estimated power can be 15% lower or higher than actual measured power. it depends on electrical parameters, silicon processes, environmental conditions, and processes running on the system.

The tool estimates SOM average power consumption while the system is running target workload at steady state. The Module power supply and thermal cooling design should consider all worst-case conditions related to power and thermal. See the Module Datasheet and Thermal Design Guide for your Jetson module's electrical characteristics, maximum power ratings, and thermal specifications.

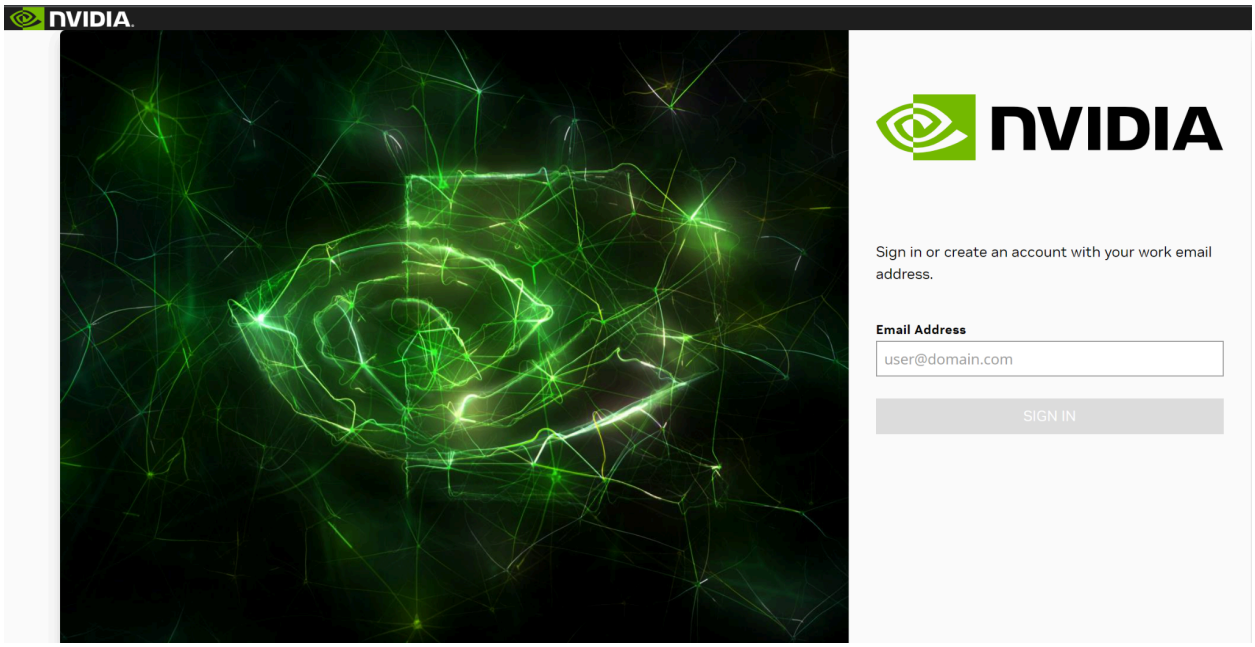
Jetson AGX Orin 64GB can be emulated using the Jetson AGX Orin Developer Kit. The production module with 64GB of memory will be available in Q4 2022. The Jetson AGX Orin 64GB and Jetson AGX Orin Developer Kit module support up to 60W in MAXN mode. The Jetson AGX Orin 64GB case is supported by the jetson-agx-orin-devkit.conf flash config. The Jetson AGX Orin 32GB production module supports up to 40W, and is supported by jetson-agx-orin-devkit-as-jao-32gb.conf flash config.

Using PowerEstimator:

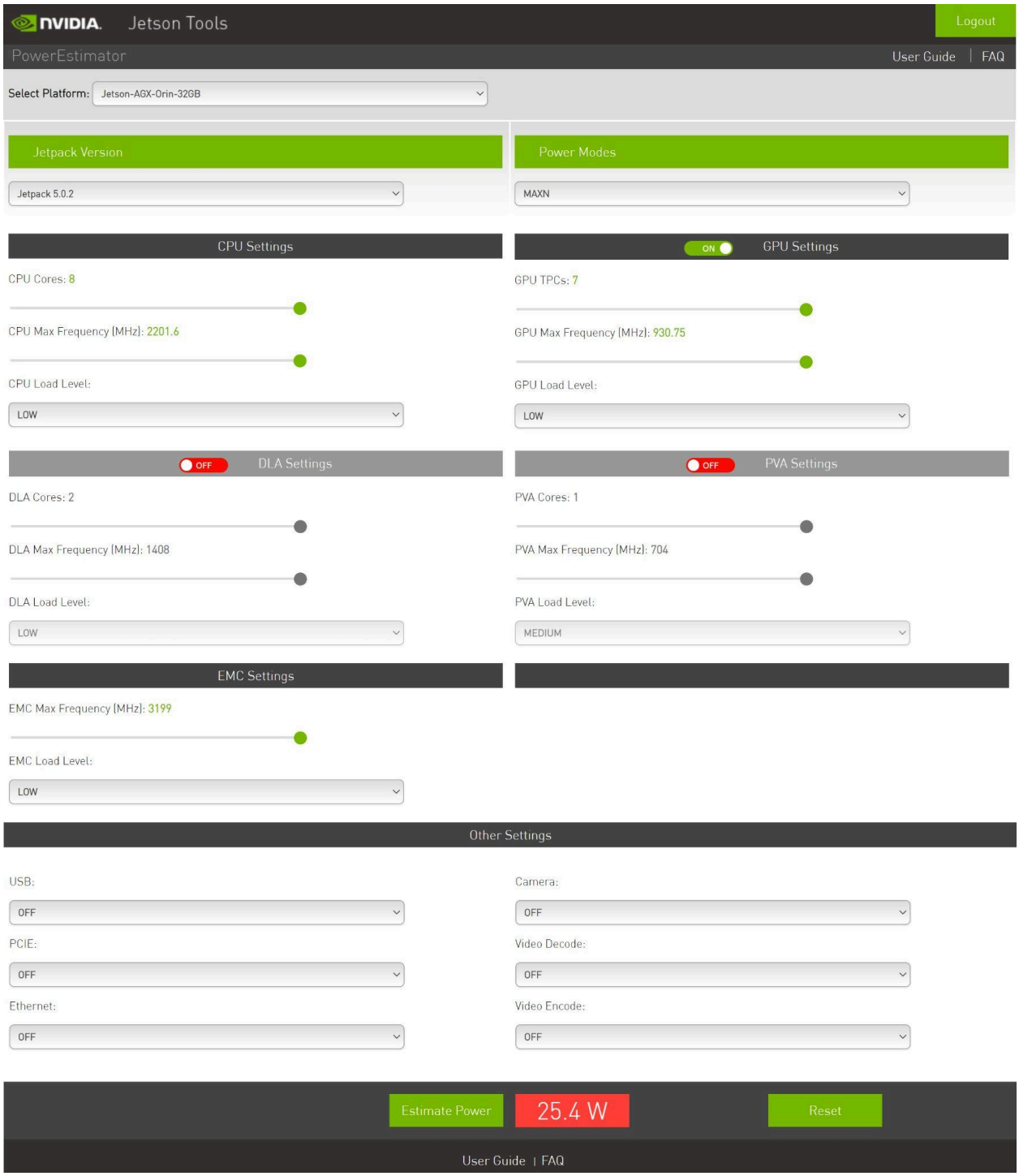
PowerEstimator is a web app, available in the NVIDIA Developer Zone in the NVIDIA Embedded Developer Zone at https://jetson-tools.nvidia.com/powerestimator/.

Login

1. If you are not already logged into NVIDIA Embedded Developer Zone, the web site displays the developer login page:



2. Enter your NVIDIA developer login credentials to log in. The browser displays the PowerEstimator page.



Estimate Power

1. Enter the power knob setting details. The following table describes the available settings.

Category	Power knob setting	Description
Platform Settings	Platform	Module selection list.
	Jetpack Version	The nvpmodel configuration varies between the Jetpack versions and thus users can select the correct Jetpack version as per their target platform setup.
	Power Modes	Supported power modes on the selected platforms. Select any supported power mode as a starting point to create a custom power profile.
	Temperature (Tj_avg)	The SOC Junction average temperature. This configuration is available only for the Jetson-AGX-Thor platform.
CPU Settings	CPU Cores	Number of active CPU cores.
	CPU Max Frequency (MHz)	Maximum CPU operating frequency.
	CPU Load Level	CPU utilization level. ● LOW - Less than 30% CPU utilization ● MEDIUM - 30% to 60% CPU utilization ● HIGH - More than 60% CPU utilization The CPU utilization can be profiled using tegrastats utility. See the L4T online Documentation for tegrastats User guide.
GPU Settings	GPU State	GPU state: Specifies whether GPU is ON or OFF. ● ON - GPU is enabled and configured for use. ● OFF - GPU is unused and stays in low-power state.

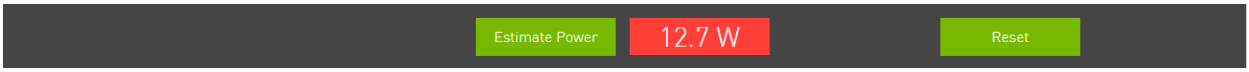
	GPU TPCs	Number of active GPU TPCs.
	GPU Max Frequency (MHz)	Maximum GPU operating frequency.
	GPU Load Level	GPU utilization level. ● LOW - Less than 30% GPU utilization ● MEDIUM - 30% to 60% GPU utilization ● HIGH - More than 60% GPU utilization The GPU utilization level can be theoretically calculated from the achieved percentage of TOPs with respect to the theoretical maximum.
DLA Settings	DLA State	DLA state: Specifies whether DLA is ON or OFF. ● ON - DLA is enabled and configured for use. ● OFF - DLA is unused and stays at a low-power state.
	DLA Cores	Number of active DLA cores.
	DLA Max Frequency (MHz)	Maximum DLA operating frequency.
	DLA Load Level	DLA utilization level. ● LOW - Less than 40% DLA utilization ● MEDIUM - 40% to 60% DLA utilization ● HIGH - More than 60% DLA utilization The DLA utilization level can be theoretically calculated from the achieved percentage of TOPs with respect to the theoretical maximum. **Note:** *Changing DLA Load levels are supported only for Jetson-AGX-Orin.*

PVA Settings	PVA State	PVA state: Specifies whether PVA is ON or OFF. ● ON - PVA is enabled and configured for use. ● OFF - PVA is unused and at a low-power state.
	PVA Cores	Number of active PVA cores.
	PVA Max Frequency (MHz)	Maximum PVA operating frequency.
	PVA Load Level	● MEDIUM - 40% to 60% PVA utilization
EMC Settings	EMC Max Frequency (MHz)	Maximum EMC operating frequency
	EMC Load Level	Memory utilization level ● LOW - Less than 25% memory bandwidth utilization ● MEDIUM - 25% to 50% memory bandwidth utilization ● HIGH - 50% to 75% memory bandwidth utilization The Memory bandwidth utilization can be profiled using tegrastats utility. See the L4T online Documentation for tegrastats User guide.
Fan Settings	Fan Mode	Fan mode configuration (This setting is available only for Jetson-Xavier-NX jetpack version 4.6 and earlier)
Other Settings	USB	USB operating state
	PCIE	PCIE operating state
	Camera	Camera operating state
	Ethernet	Ethernet operating state

	Video Decode	Video decode operating state
	Video Encode	Video encode operating state

Note: Default power knob setting value depends on chosen platform and power mode.

2. Click the Estimate Power button to get estimated power for the selected settings.



3. You may modify the power knob settings and press Estimate Power again to get estimated power for the modified settings.

4. Click the Download button to download a sample `nvpmodel.conf` file that you can use to configure the selected power mode settings:

   The Download button is visible after you press the Estimate Power button to get the estimated module power.

5. This sample “nvpmodel.conf” can be used to configure the target platform for this target power.

Download nvpmodel configuration file

Configure the target system with the downloaded `nvpmodel.conf` file.

- Copy the downloaded nvpmodel.conf file to the target platform.
- Set nvpmodel mode to 0:
  ```
  # nvpmodel -m 0
  ```
- Stop the nvpmodel service:
  ```
  # systemctl stop nvpmodel
  ```
- Apply the `nvpmodel.conf` file by one of the following methods:
  1. Method 1:
     ```
     # cp <downloaded_nvpmodel_conf_path>/nvpmodel.conf
     /etc/nvpmodel.conf
     ```

2. Method 2:
   ```
   # ln -sf <downloaded_nvpmodel_conf_path>/nvpmodel.conf
   /etc/nvpmodel.conf
   ```

- Restart the nvpmodel service:
  ```
  # systemctl start nvpmodel
  ```

  Note: Do not overwrite the nvpmodel.conf file before nvpmodel service is stopped.

Logout

Click the Logout button to log out from the current session.

Reset Settings

Click the Reset button to reset all power knob settings to the default state for the power mode selected from the dropdown list.

Troubleshooting

Browser incompatibility with Internet Explorer:

Internet Explorer displays web pages in the Intranet zone in a compatibility view. To change this:

1. Press Alt to display the IE menu.
2. Choose Tools | Compatibility View settings
3. Remove the checkmark next to Display intranet sites in Compatibility View.
4. Choose Close.