

# Stable Diffusion Image Generation Speed Comparison

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# Agenda

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- Stable Diffusion Web UI Setting
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# Purpose

- To understand “where we are” about Stable Diffusion **image generation speed** and **image quality** by testing with accelerating tools below
  - LCM or Turbo
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- The test items are basically what I do to generate images by using SD V1.5
- To understand if it's time to play SDXL, below items will be involved
  - LCM + SD V1.5
  - SD V1.5
  - LCM + Turbo + SDXL
  - SDXL
  - SDXL Turbo (model build in turbo)

# PC Key Component & Stable Diffusion Web UI Information

CPU	AMD 5600X
RAM	DDR4 80GB, 3200MHz
GPU	Nvidia 4060Ti 16gb
SSD	PCIe gen3*4 NVME SSD ADATA SX8200PNP
WebUI ver	V1.7.0
ControlNet ver	V1.1.430
Adetailer ver	V24.1.1

# Stable Diffusion Web UI Setting

- Detailed test parameter is shown in SD15\_vs\_SDXL.ods file, which can be opened by MS Office or LibreOffice



# SD V1.5 model Test Procedure

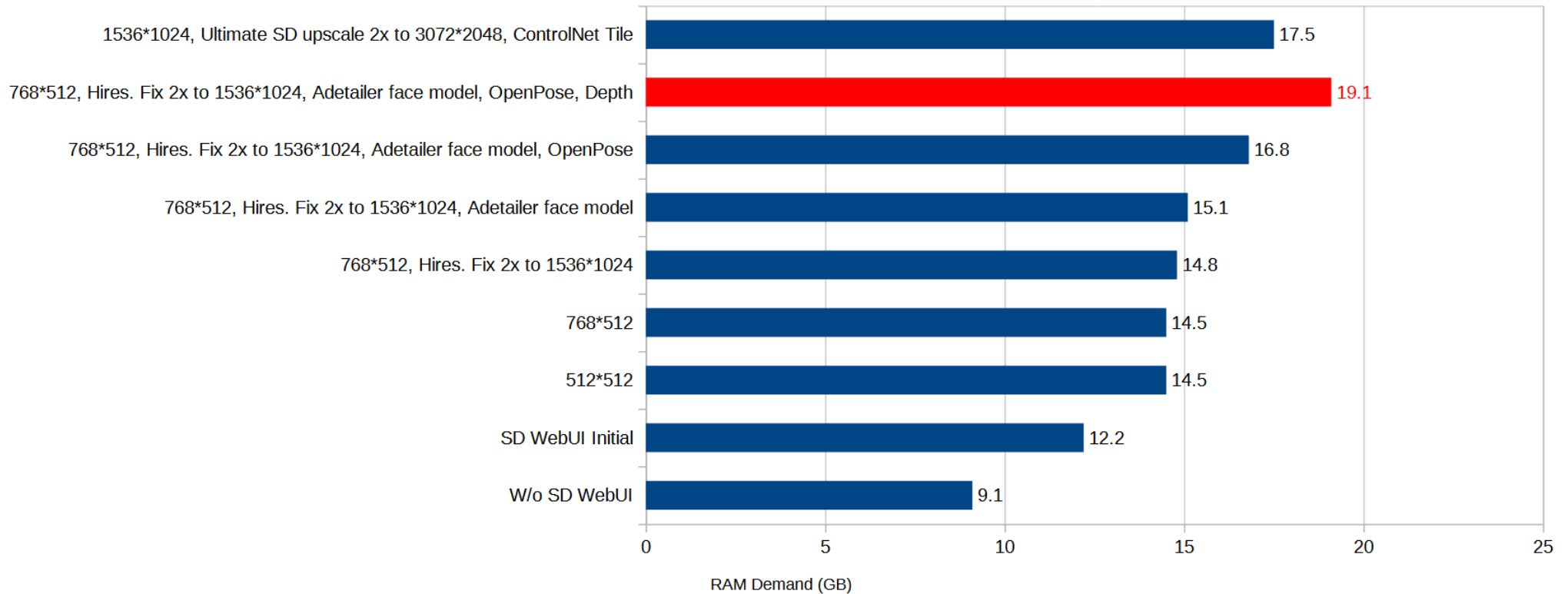
- Test Procedure
  1. Set testing parameters in Web UI, and generate 1 image in the condition “768\*512 upscale to 1536\*1024, and Adetailer for face”, and then turns Web UI off
  2. Run Web UI
  3. Load last parameters from PNG information 『 send to text to image 』 button
  4. 512\*512 image, 5 batches, twice
  5. 768\*512 image, 5 batches, twice
  6. 768\*512 upscale to 1536\*1024, 5 batches, twice
  7. 768\*512 upscale to 1536\*1024, and Adetailer for face, 5 batches, twice
  8. 768\*512 upscale to 1536\*1024, and Adetailer for face, and openpose, 5 batches, twice
  9. 768\*512 upscale to 1536\*1024, and Adetailer for face, and openpose, and depth, 5 batches, twice
  10. 1536\*1024 upscale to 3072\*2048, and Tile, and ultimate SD upscale, twice

# SDXL model Test Procedure

- Test Procedure
  1. Set testing parameters in Web UI, and generate 1 image in the condition “1200\*800 upscale to 1560\*1040, and Adetailer for face”, and then turns Web UI off
  2. Run Web UI
  3. Load last parameters from PNG information 『 send to text to image 』 button
  4. 1024\*1024 image, 5 batches, twice
  5. 1200\*800 image, 5 batches, twice
  6. 1200\*800 upscale to 1560\*1040, 5 batches, twice
  7. 1200\*800 upscale to 1560\*1040, and Adetailer for face, 5 batches, twice
  8. 1200\*800 upscale to 1560\*1040, and Adetailer for face, and openpose, 5 batches, twice
  9. 1200\*800 upscale to 1560\*1040, and Adetailer for face, and openpose, and depth, 5 batches, twice
  10. 1560\*1040 upscale to 3120\*2080, and Tile, and ultimate SD upscale, twice

# Test Result – SD v1.5 RAM Consumption

Stable Diffusion V1.5 RAM Demand

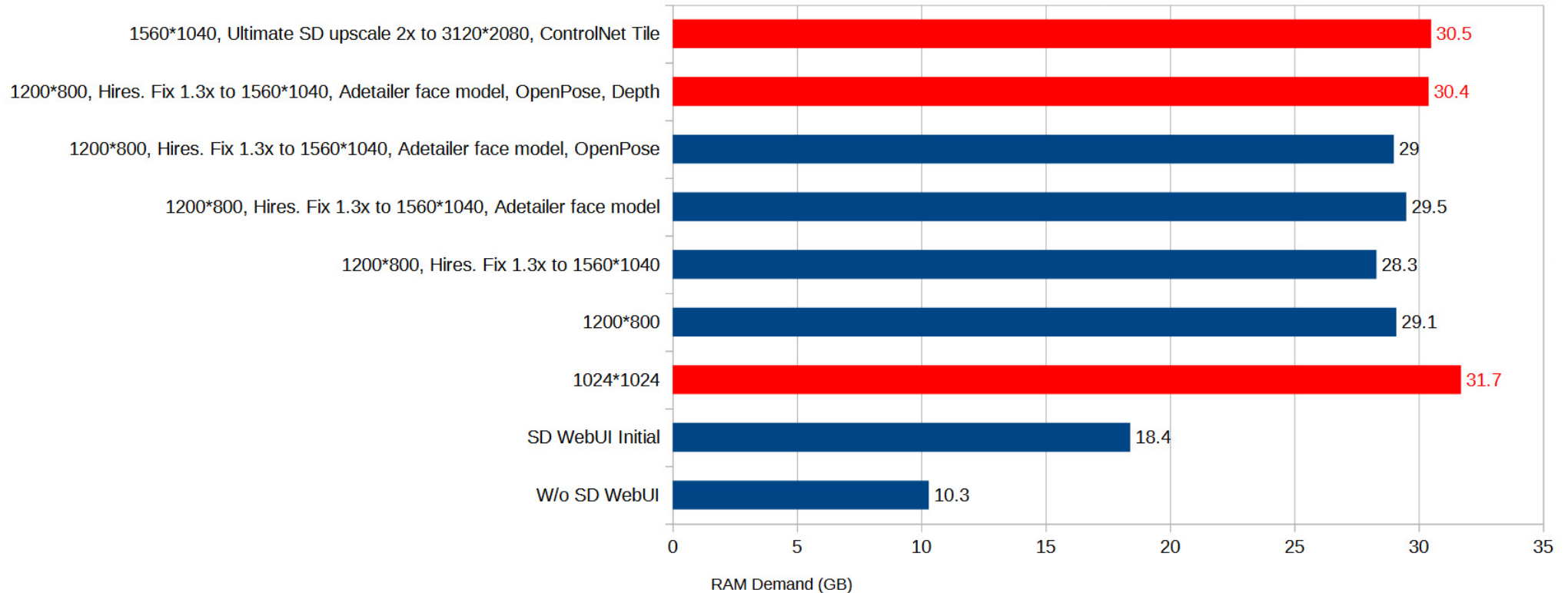


- It spends **10GB RAM** in **(768\*512 + Hires. Fix 2X + Adetailer 1 model + OpenPose + Depth)** condition
- Computer with **32GB RAM is recommended** for SD v1.5 application

# Test Result – SDXL RAM Consumption



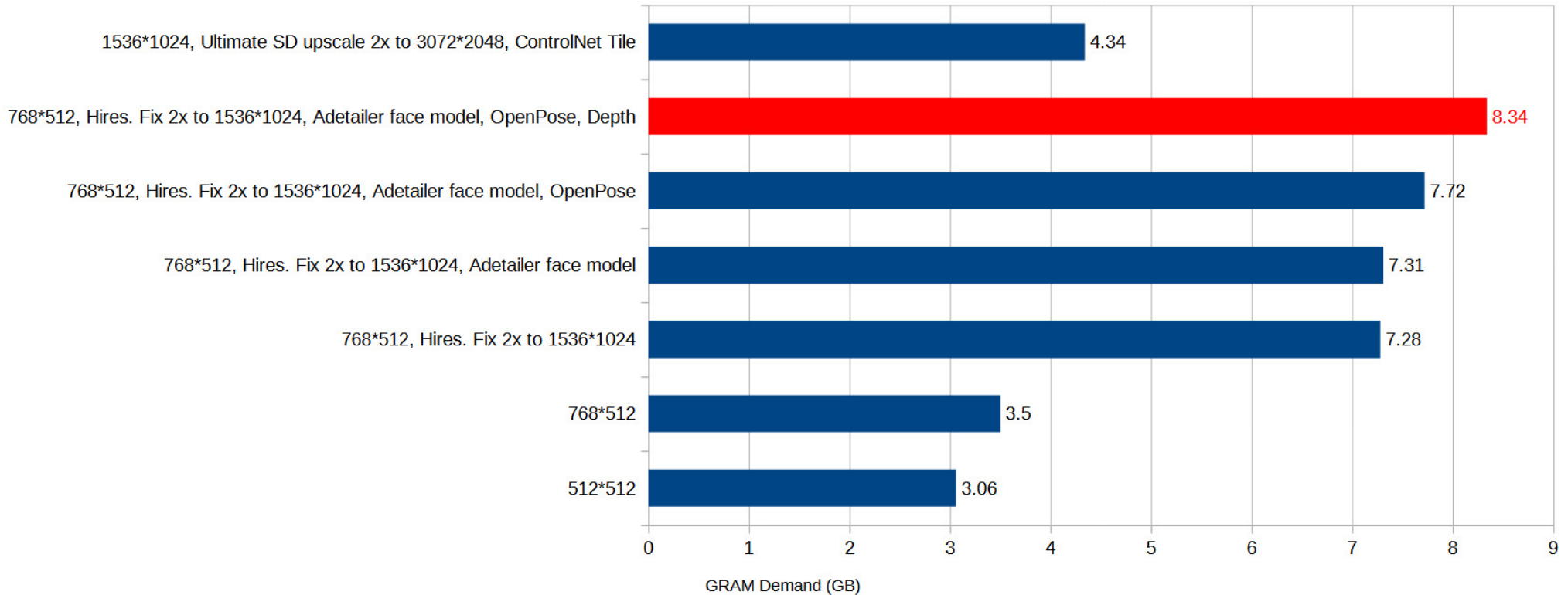
Stable Diffusion XL RAM Demand



- It spends **20GB RAM** in **(1200\*800 + Hires. Fix 1.3X + Adetailer 1 model + OpenPose + Depth)** condition
- Computer with **32GB RAM or higher is recommended** for SDXL application

# Test Result – SD v1.5 VRAM Consumption

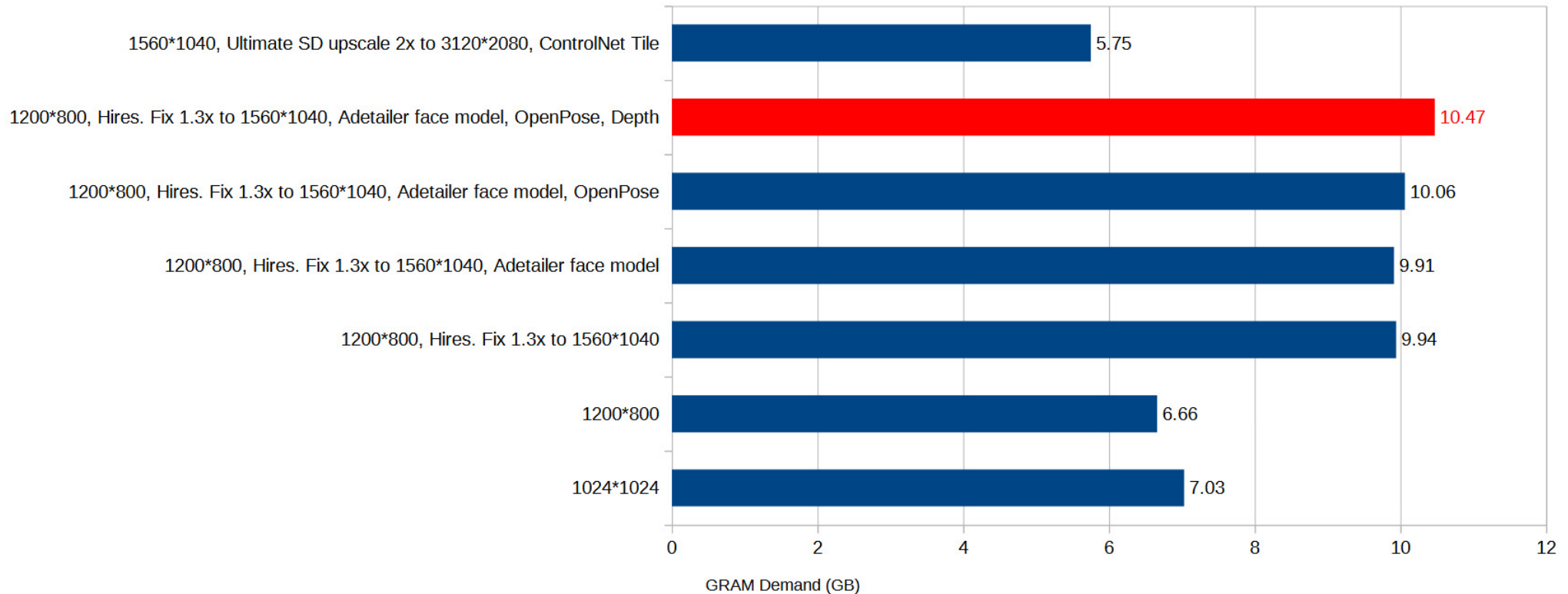
Stable Diffusion V1.5 GRAM Demand



- Test **w/o --medvram**
- It spends **8.34GB VRAM** in **(768\*512 + Hires. Fix 2X + Adetailer 1 model + OpenPose + Depth)** condition
- Graphic card with **12GB VRAM is recommended** for SD v1.5 application

# Test Result – SDXL VRAM Consumption

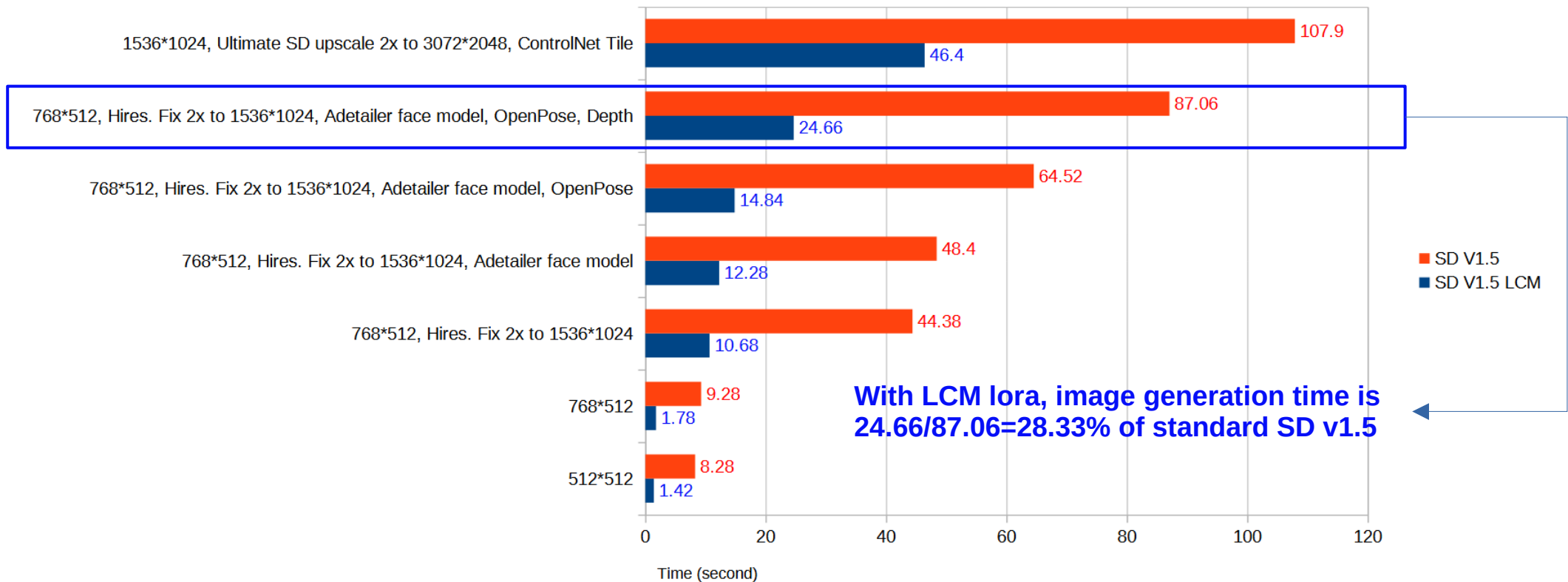
Stable Diffusion XL GRAM Demand



- Test with `--medvram-sd-xl`
- It spends **10.47GB VRAM** in **(1200\*800 + Hires. Fix 1.3X + Adetailer 1 model + OpenPose + Depth)** condition
- Graphic card with **12GB VRAM or higher is recommended** for SDXL application

# Test Result – SD v1.5/LCM Image Generation Time

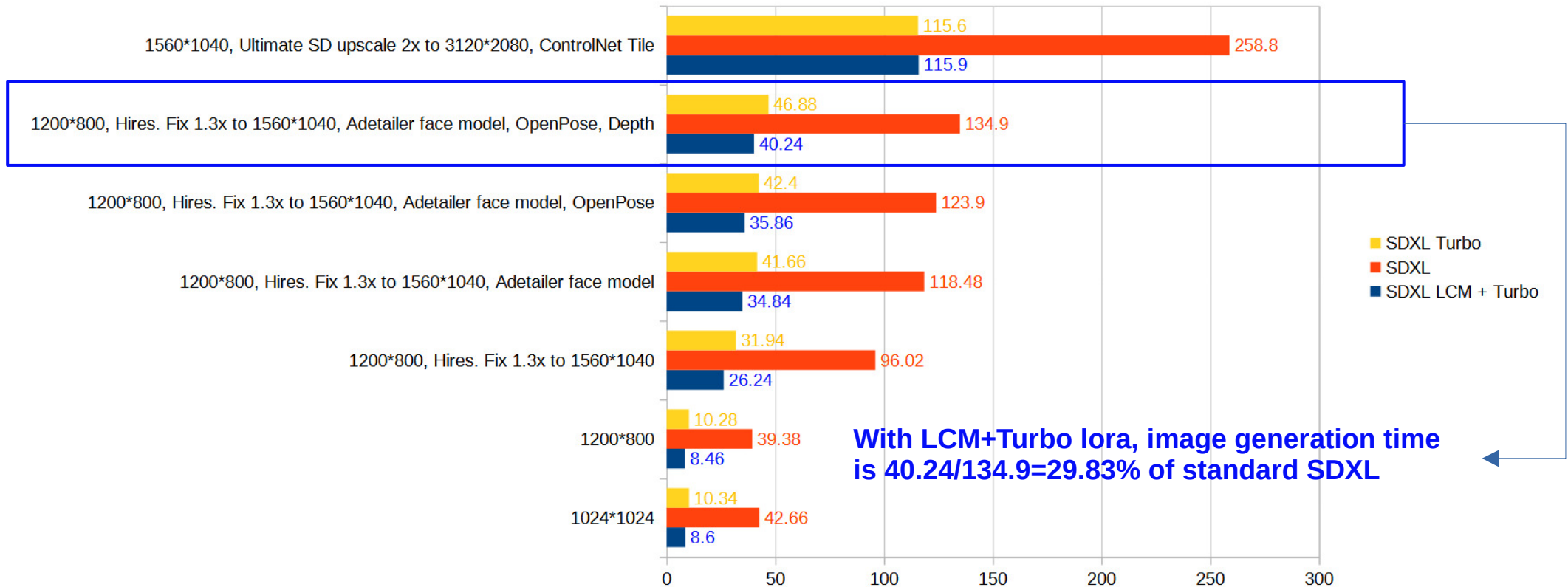
Stable Diffusion V1.5 Standard vs. LCM



- Test **w/o --medvram**
- LCM-LoRA Weights - Stable Diffusion Acceleration Module
  - <https://civitai.com/models/195519>
- **With LCM lora, image generation time is 17.15%~43% of standard SD v1.5**

# Test Result – SDXL/Turbo Image Generation Time

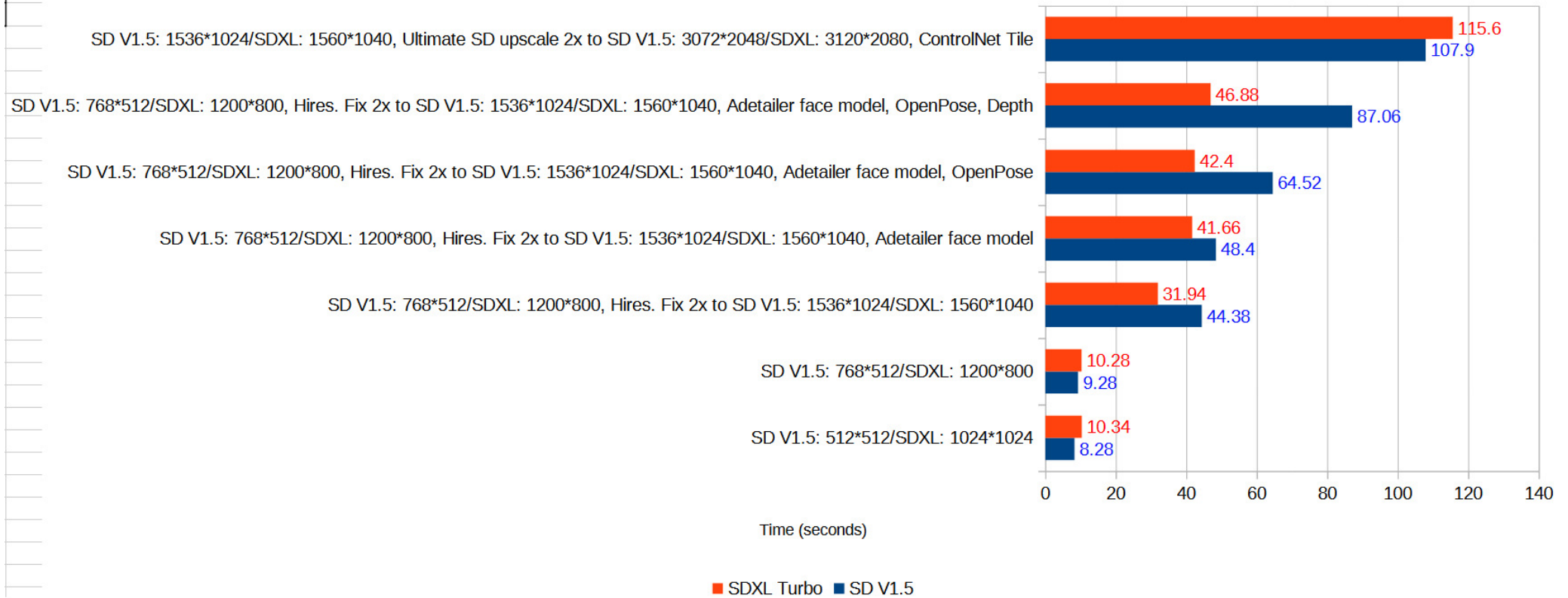
Stable Diffusion XL vs. Turbo vs. LCM + Turbo



- Test **with --medvram-sdxi**
- LCM+Turbo: PAseer-SDXL-LCM and Turbo Accelerator
- SDXL Turbo: RealVisXL V3.0 + Turbo
- **With LCM+Turbo lora or SDXL Turbo model, image generation time is 20.16%~44.78% of standard SDXL**

# Test Result – Image Generation Speed Comparison

Image Generation Speed of Stable Diffusion XL Turbo and V1.5 Standard Are In Similar Level



- Image generation time of SDXL Turbo model and SD v1.5 standard are in similar level
- SDXL Turbo is faster when image size is about 1536\*1024

# Image Quality Comparison SD v1.5 vs SD v1.5 + LCM

SD v1.5, AnalogMadness V7.0

SD v1.5, AnalogMadness V7.0 + LCM



- 768\*512 + Hires. Fix 2X to 1536\*1024 + Adetailer 1 model + OpenPose + Depth
- **Image quality, SD v1.5 standard is better**
- **For OpenPose model creation and verification, SD v1.5 + LCM is good enough**
  - **Spending 1/5 time**

# Image Quality Comparison SDXL vs SDXL Turbo

SDXL, realvisxIV30\_v30Bakedvae



SDXL Turbo, realvisxIV30\_v30TurboBakedvae



- 1200\*800 + Hires. Fix 1.3X to 1560\*1040 + Adetailer 1 model + OpenPose + Depth
- **Image quality, SDXL standard is better**
- **For OpenPose model creation and verification, SDXL Turbo is good enough**
  - **Spending 1/3 time**

# Conclusion

- Computer Hardware Suggestion for Stable Diffusion Web UI a1111
  - **32GB RAM** or higher, **12GB VRAM** or higher
  -
- With **Nvidia 4060Ti 16gb**, Stable Diffusion Image Generation Speed
  - **SD v1.5 condition**, 768\*512+Hires. Fix 2X to **1536\*1024**+OpenPose+Depth
  - **SDXL condition**,1200\*800+Hires. Fix 1.3X to **1560\*1040**+OpenPose+Depth
  - Test Result
    - Fastest, **SD v1.5 + LCM**, 24.66 seconds, **100% time**
    - Medium, **SDXL Turbo**, 46.88 seconds,**190% time**
    - Medium, **SD v1.5**, 87.06 seconds, **353% time**
    - Slowest, **SDXL**, 134.9 seconds, **547% time**
    -
- SD Operation Suggestion, **2024/01/12**
  - **For non image quality sensitive task**, like prompt test or openpose model creation
    - **SD v1.5 + LCM** or **SDXL Turbo**
  - **For best image quality**
    - **SD v1.5** or **SDXL**
    -
- Personal Feeling, 2024,01/12
  - With Nvidia 4060Ti 16gb, keep using SD v1.5
  - When SDXL Turbo image quality is close to SDXL, transfer to SDXL Turbo
  - **Could transfer to SDXL when graphic card is 2 times faster than 4060Ti (4080)**

The End