GPUpartner

VALIDATION REPORT · TEXT GENERATION

Gemma 4 31B

on M5 Ultra 512 GB · 8-bit (Q8_0) · Ollama / LM Studio · Chat

STATUS · OCT 22, 2026

Validated

5 of 5 checks pass

Gemma 4 31B at 8-bit runs on the M5 Ultra 512 GB with 256K of context at about 21 tokens a second.

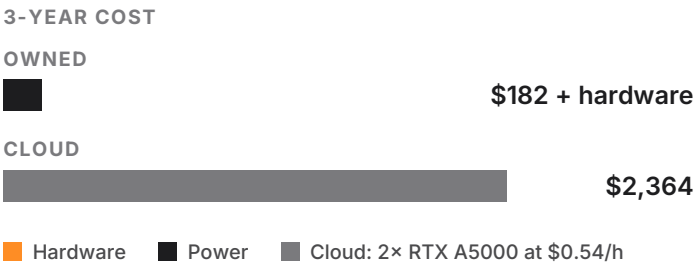
VALIDATION

CHECK	TARGET	RESULT	STATUS
Fits in GPU memory	384 GB usable	42.6 GB needed	PASS
Headroom	5% free	341 GB free (89%)	PASS
Context for chat	16K or more	256K	PASS
Writing speed	15 tok/s or more	21 tok/s	PASS
First reply	under 3 s, 2K prompt	1.8 s	PASS

Targets: a reply you can read along with, a first reply the use case tolerates, and 5% of memory left free. Calculated from published specs, not benchmarked.

BUDGET

HARDWARE, ONE-TIME	MSRP not entered
POWER, PER YEAR	$61 · 231 W at the wall
CLOUD INSTEAD, PER YEAR	$788
3-YEAR TOTAL, OWNED	Hardware + $182 power
3-YEAR TOTAL, CLOUD	$2,364
BREAK-EVEN	Needs the hardware MSRP



Budget basis: 4 h a day, power at $0.18 per kWh, cloud at RunPod on-demand prices as of Oct 22, 2026. Hardware at the MSRP entered in the calculator, not a GPU Partner quote. A 3-year view; resale value, staff time and taxes aren't counted.

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TECHNICAL DETAIL · TEXT GENERATION

Gemma 4 31B

on M5 Ultra 512 GB · 8-bit (Q8_0) · Ollama / LM Studio · Chat

SETUP

PARAMETERS	31.3B
PRECISION	8-bit (Q8_0)
CONTEXT	256K, auto
CHATS AT ONCE	1
USE	Chat
RUNS IN	Ollama / LM Studio
HARDWARE	M5 Ultra 512 GB
GPU CAN USE	384 GB of 512 GB

SAME MODEL, OTHER MACHINES

RTX 4090	4-bit · 35 tok/s
RTX 5090	6-bit · 45 tok/s
RTX PRO 6000 BLACKWELL	8-bit · 35 tok/s
M5 MAX 128 GB	8-bit · 13 tok/s
M3 ULTRA 256 GB	8-bit · 15 tok/s
DGX SPARK 128 GB	8-bit · 5.7 tok/s
RYZEN AI MAX+ 395 128 GB	8-bit · 4.6 tok/s

MEMORY

WEIGHTS	30.9 GB
CONTEXT	10.8 GB
RUNTIME	936 MB
SYSTEM	128 GB
FREE	341 GB

HOW TO RUN IT

OLLAMA	`ollama run gemma4:31b`
LLAMA.CPP	`llama-server -hf unsloth/gemma-4-31B-it-GGUF`
VLLM	`vllm serve google/gemma-4-31B-it`
MLX (MAC)	`mlx_lm.chat --model mlx-community/gemma-4-31b-it-4bit`
MODEL CARD	huggingface.co/google/gemma-4-31B-it

METHOD AND ASSUMPTIONS

Memory is the weights (parameters times bits per weight, read from each model's config.json), the context cache for every chat, and the runtime, against the memory this GPU can use after the OS and display take theirs. Writing speed is memory bandwidth over the bytes read per token, plus a per-layer latency, calibrated against llama.cpp benchmarks. First reply is the prompt's FLOPs over the chip's dense 16-bit TFLOPS at the runtime's measured efficiency. Running cost is power at the wall at your rate and hours; the cloud figure is the cheapest RunPod on-demand GPU that runs the same job. Accuracy: memory lands within about a gigabyte; speeds and times are rough, about ±25%. Model data and hardware specs checked Oct 2026; cloud prices are RunPod's on-demand list as of Oct 22, 2026. Report VR-1GDIFPA, generated October 22, 2026.