Op-Amp Non-Idealities

Electrical Engineering

What the datasheet is warning about, sorted into DC errors and frequency limits.

The ideal op-amp fails in two distinct directions.

DC errors

- Input offset voltage shifts the output
- Bias current across high-value resistors
- Offset drift as the part warms up
- Finite CMRR lets common mode leak through
- Output cannot reach either supply rail

AC limits

- Gain-bandwidth product caps usable gain
- Slew rate limits large fast signals
- Capacitive loads eat the phase margin
- Input noise density sets the noise floor
- Settling time outlasts the rise time

Two limits look alike on a scope: slew rate flattens the edges of a big signal, bandwidth merely rounds a small one.