AO3401A — P-channel MOSFET (reverse-polarity guard)

AOS / generic · SOT-23 · P-FET · ~$0.1

WHAT IT IS

A P-channel MOSFET wired as a "reverse-polarity protection" switch: in series with the 12 V input, it conducts normally but BLOCKS if you plug power in backwards — cheaper + lower-loss than a series diode.

KEY SPECS (what matters to us)

P-channel · ~30 V, ~4 A · low on-resistance
Pinout (this part): G=1, S=2, D=3

SIGNALS / PINS WE USE

Source = 12 V in · Drain = protected 12 V · Gate → GND via R + Zener clamp

ELECTRICAL · GOTCHAS

Gate-source voltage abs-max is ±12 V → a Zener clamps Vgs (review fix). Source faces the input, drain faces the load (verified).

WHY IT'S IN OUR SYSTEM

A backwards 12 V plug would destroy the board. A P-FET guard blocks it with almost no voltage loss (unlike a diode that'd drop ~0.5 V and get hot). One cheap part of insurance on every board's power input.