

Here's a high-side current sense circuit I designed and use:

Sensed current passes thru The sense resistor. The MPS92 is a 350V PNP transistor that level shifts and amplifies the voltage across the sense resistor. The diode connected MPS92 serves to cancel V_{be} and also temperature compensates the main MPS92. It's fwd biased by the 330K to gnd. The collector current passes thru the 10K resistor whose function is limit collector current (or fuse open) in case of a catastrophic failure of the PNP. The diodes clamp the sensed voltage to the logic supply rails. The LED is used as a 1.5V zener. It protects the PNP should the sense resistor burn open. R develops the sensed voltage. Scale it to whatever sense voltage you want the I-limit comparator to trip at.

The circuit works well, is remarkably linear and response time is under 500nS. The protection features guarantee no harm can be caused to the downstream circuitry no matter the failure mode of the level shifter.

