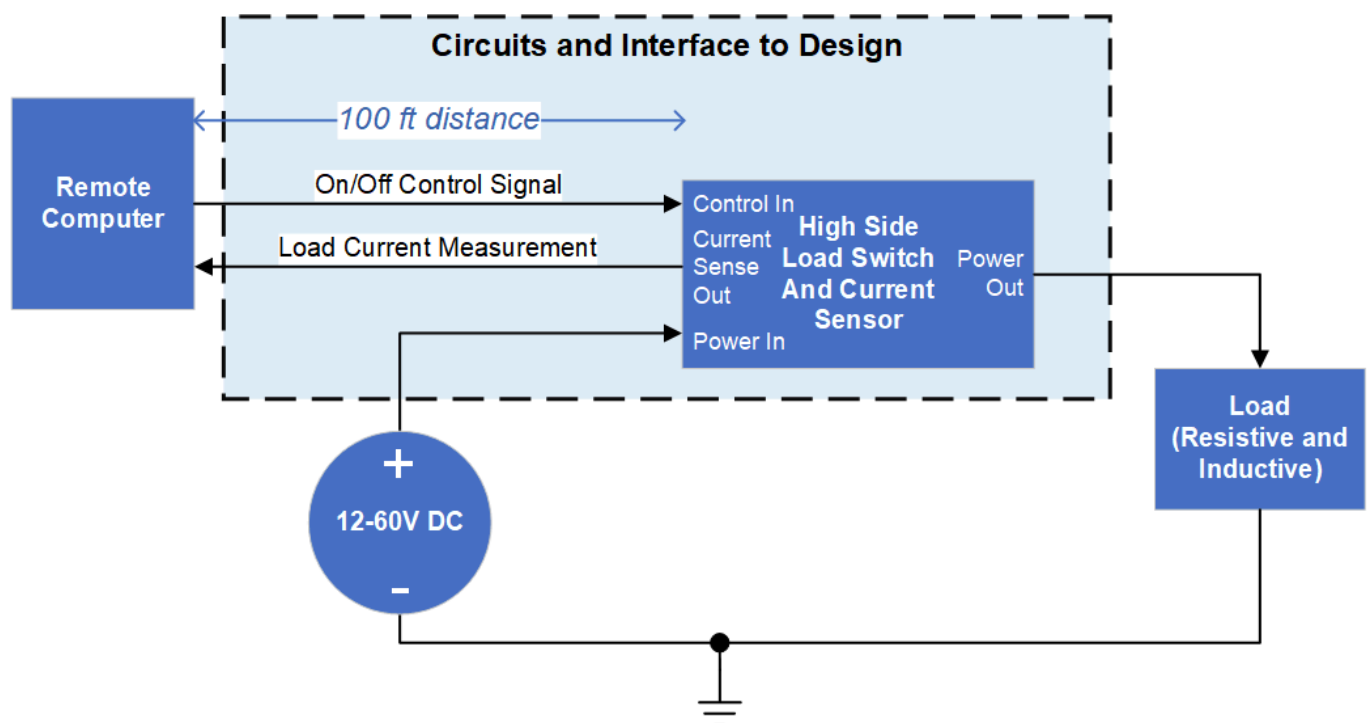


Electrical Take-Home Project - Remote Load Switch

For the following prompts, please create schematic-level designs that implement the requested circuits. You may specify any number of DC power sources that you need for the design without drawing the regulators supplying them.

For this project you are asked to create a high side load switch and current sensor circuit that can be controlled by a remote computer up to 100 feet away. This design should switch 12-60V DC power into a load, measure the load current, and report it back to the remote computer.



More detailed requirements for the load switch, current sensing, and remote interface are provided on the following page

Load Switch

Design a circuit for a high-side load switch capable of switching 12-60 VDC into an inductive load ($L < 5\text{mH}$) at currents of up to 10A. The switch shall be capable of operating continuously, but may be cycled on and off at a frequency lower than 1 Hz.

Load Current Measurement

The circuit shall measure and report the load current with a resolution of 10mA to the remote computer at a rate of 100Hz. Note that the load current may contain higher frequency content than DC. For purposes of this problem, only unidirectional current sensing is needed.

Remote Computer Interface

The load switch and current sensing circuits need to be interfaced to a remote computer that may be located up to 100 feet away from the circuits. Please design an interface using technologies of your choice to both send the on/off command to the switch circuit and report out the measured load current to the computer. These interfaces may be shared or separate.

General Environments

This circuit should be considered to be deployed into a vehicle environment (like an aircraft or road vehicle). These environments may include

- -40 to +70°C ambient temperatures
- Standard atmospheric pressure
- Some potential exposure to conducted and radiated electromagnetic interference
- Moderate mechanical shock and vibration

Deliverables

- Written document describing your design choices and any analysis that supports them.
 - Present your work such that another engineer can understand your design with the material provided.
- Schematics containing the requested load switch, current sensing, and interface circuits
 - Note: The schematics can be done either in CAD or by hand
- Bill of materials (BOM)
 - For critical components (i.e. IC's/transistors) specify part numbers
 - Passive components can be specified by value and other key characteristics that you think would be necessary to adequately describe the component