**High-Side Switching vs Low-Side Switching**

**What is High-side switching:**  
High-side switches are used to turn electrical loads ON and OFF by switching the positive (high-) side of the load supply. Additionally, smart high-side switches are designed with the ability to protect themselves and diagnose possible unintended system behavior.

**What is Low-side switching:**

Low-side power switches are used to turn electrical loads ON and OFF by switching the GND (low-) side of the load supply. MOSFET low-side switches allow more control for applications that use high-speed pulse-width modulations (PWM).

### **Key Differences:**

* **Position in Circuit**: High-side switches connect the load to the positive supply, while low-side switches connect the load to ground.
* **Control Requirements**: High-side switches often require additional circuitry to generate a control voltage higher than the supply voltage, whereas low-side switches can often be controlled directly by standard logic levels.
* **Application Considerations**: High-side switching is preferred in scenarios where the load needs to be connected to ground for safety or functional reasons, while low-side switching is simpler and easier to implement for direct control.

**When to choose High-Side switching:**

* **Sensitive Equipment**: When the load is sensitive and requires a constant ground connection for safety
* **Noise Immunity**: High-side switches prevent unintended activation of the load due to ground noise or potential differences that might occur in low-side configurations.
* **Application Examples:**
  + **Automotive Systems**: commonly used to control components like headlights, where the chassis is grounded.
  + **Power Distribution Units**: In systems where multiple devices share a common ground.

**When to choose Low-Side switching:**

* **Ease of Control**: Low-side switching is generally easier to control because it often requires simpler driving circuitry.
* **Cost and Complexity**: Low-side switching usually involves fewer components and less complexity, which can reduce cost and simplify the design.
* **Application Examples:**
  + **LED Drivers**: Low-side switching is often used in LED drivers and other applications where the control circuit needs to toggle the connection to ground.
  + **Motor Control**: For simple DC motor control circuits, low-side switching can be used to start and stop the motor by controlling the ground connection.