Switching

The adverse effects to pulse shape when inhibited by diodes and photo-diodes with nano and micro-second rise and fall times that exponentially induce latency per pulse.

- H11D1 Opto-Coupler / Opto-Isolator
- Transistors
    - High Side vs. Low Side - Pros & Cons

H11D1 Opto-Coupler / Opto-Isolator

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Transistors

High Side vs. Low Side - Pros & Cons

Using an NPN transistor like the 2N3773 for high side or low side switching in circuits with voltages less than 120VDC has its advantages and disadvantages. Here's an analysis based on the setup you've mentioned, which includes a base resistor of 100R 10W and an H11D1 optocoupler:

High Side Switching with NPN:

Pros:

1. **Simplicity in Grounded Loads:** It can be simpler when you want the load to be grounded. This can be beneficial in certain applications where grounding is necessary for operational or safety reasons.
2. **Less Noise:** High side switching might offer less electrical noise in certain applications, as the load is connected directly to ground.

Cons:

1. **Complex Base Drive:** Requires a more complex base drive since the base must be driven higher than the positive supply voltage to turn on the transistor fully. This often requires an additional voltage source or charge pump.
2. **Lower Efficiency:** The voltage drop across the NPN when on (Vce(sat)) can be significant compared to a low side switch, leading to higher power dissipation and lower efficiency.
3. **Hard to Saturate Fully:** Getting the NPN fully saturated (fully on) is more difficult in high side configurations, which might result in higher heat dissipation and lower efficiency.

Low Side Switching with NPN:

Pros:

1. **Ease of Driving:** The base of an NPN transistor is easier to drive in a low-side configuration since it's referenced to ground. This means simpler and often more efficient driver circuits.
2. **Better Saturation:** NPN transistors can saturate more easily in a low-side configuration, reducing Vce(sat) and therefore reducing heat and increasing efficiency.

3. **Simplicity:** Generally, circuits are simpler and require fewer components in low-side switching.

Cons:

1. **Ground Disruption:** Low side switching interrupts the ground path to the load, which can cause issues in some circuits, especially those where the load needs a stable ground reference.
2. **Potential for Noise:** Disrupting the ground path can introduce electrical noise into the system, which can be problematic in sensitive applications.
3. **System Complexity:** If multiple loads need to be controlled, and they share a common ground, low-side switching can complicate the system design.

General Considerations for Your Setup:

- **2N3773 Characteristics:** Ensure that the 2N3773's specifications (like current handling, Vce, etc.) are suitable for your application. It's a robust transistor but has its limits.
- **Base Resistor & Optocoupler:** The 100R 10W base resistor and H11D1 optocoupler should provide a good interface for pulsing the transistor. Ensure that the optocoupler's properties are compatible with your control signal and that the resistor can handle the expected power dissipation.
- **Thermal Management:** Especially in high side configurations or when the transistor isn't fully saturating, it might dissipate significant heat. Ensure adequate cooling.