Wired Communication in Optically Isolated System Gate Driving

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Research question

- The research team is working on "Series Input Parallel Output" power converters that require high isolation voltage between their inputs and outputs (20 kV+).
- Communication between each module remains an issue that has yet to be handled.
- This technology will improve control communication in solar strings and electric vehicles, depending on how well it transfers signals vs wireless networks.

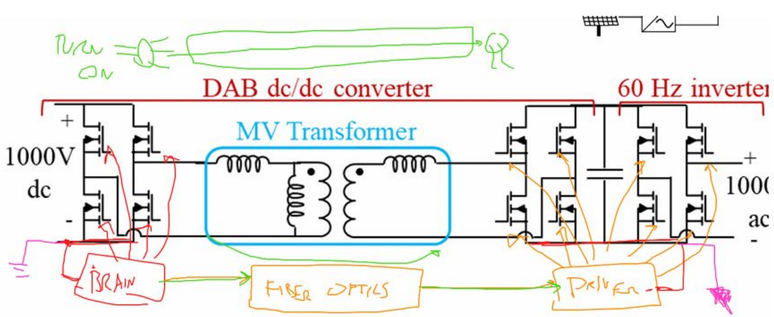


Diagram-1: Series Input Parallel Output converter

Method

Create a demo board to test our understanding of how to use fiber optic modules to establish isolated communication with the 8 switches on the secondary side of the power converters, assuming that control signals come from a central "brain."

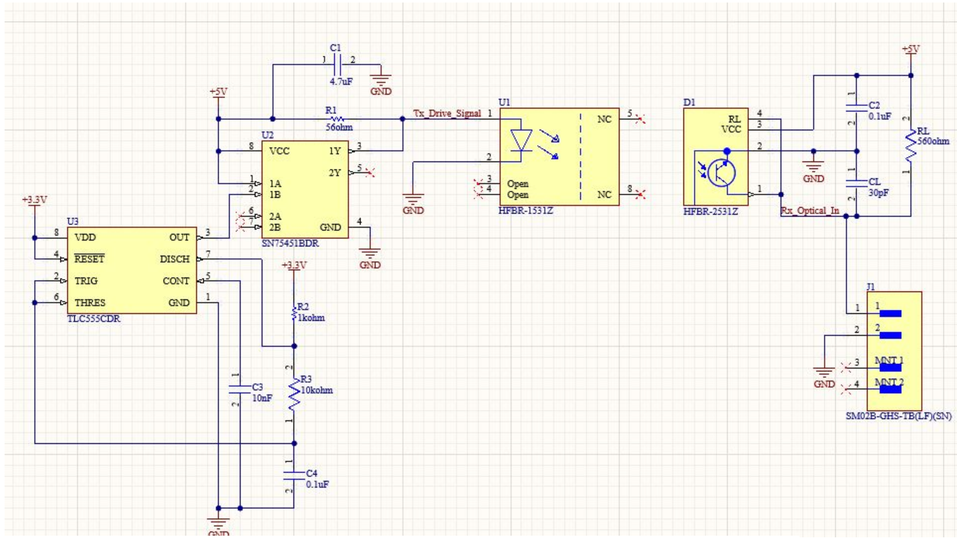
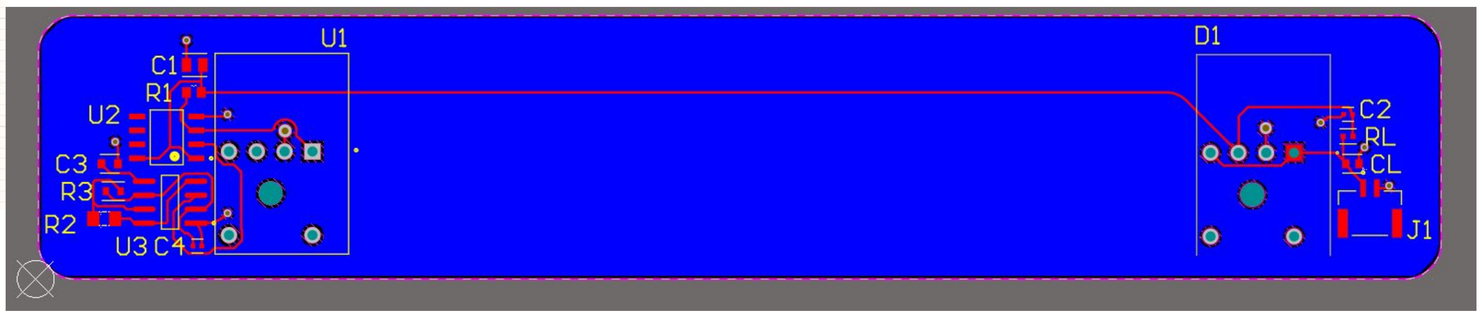


Diagram-2: Fiber Optic Module Schematic (**ONTOP**)

Diagram-3: Fiber Optic Module PCB Layout (**TO THE RIGHT**)

Requirements

- Transmitter and Receiver pair that transmits at least 1 Mbaud.
- Cable at least 10m.
- Small Pulse Width Distortion.
- Signal goes from 0 to 3V.



Acknowledgements/References

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❑ [1] K. Dennis, "Intro to Fiber-Optic Communication Systems," *EETech Group, LLC*, Feb. 2021, Accessed: Jan. 16, 2025. [Online]. Available: https://www.allaboutcircuits.com/technical-articles/transmitter-and-receiver-circuits-for-fiber-optic-communication-systems/

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