

Reduce Size and Cost with Integrated Industrial Interface Digital Isolators

Survival in industrial markets is getting tougher with low cost competition and an increasing need to differentiate products. At the same time, safety standards are not getting any more lenient, requiring an increasing number of industrial applications to adopt galvanic isolation, with the associated penalties of optocouplers. These penalties include increased size, power consumption, board space, component count, and cost.

How does a design engineer balance the competing requirements for protection against nefarious bursts and surges, design complexity, and cost, all while getting to market as quickly as possible to remain competitive? One could simply tack on a set of optocouplers to an existing transceiver, but that means increasing cost, design complexity, component count, and board space. A simple search for “isolated RS-485,” “isolated RS-232,” “isolated CAN,” “isolated I²C,” or “isolated USB” reveals a number of fully integrated solutions based on digital isolation

technology—isolation and transceiver in a single package. Some even include isolated power in the same package, which further reduces the size and cost of the system. Only digital isolators can offer such a full breadth of these solutions, which means that they won’t suffer from too much power consumption, so they should fit right into an existing power budget without requiring further redesign. One has to be careful, however, because not every solution listed as “isolated” meets the stringent requirements for basic and/or reinforced isolation per UL, CSA, and VDE.

The designer who offers these fully integrated solutions will be treated as a hero by the purchasing manager. After all, what purchasing manager would say, “Just use the same stuff we already buy. I don’t care if it increases the cost”?

Figure 1 shows different approaches to isolating an I²C bus. Figure 1A shows how to do this with an I²C buffer and four optocouplers. Figure 1B shows how to do this with a single IC. Figure 2 shows similar examples for isolating RS-485, with the single IC approach clearly a purchasing manager’s dream: one part less expensive than two. We won’t even show the dramatic comparison between trying to isolate USB using discrete components compared to a single, isolated USB IC—there’s not enough room on the page!

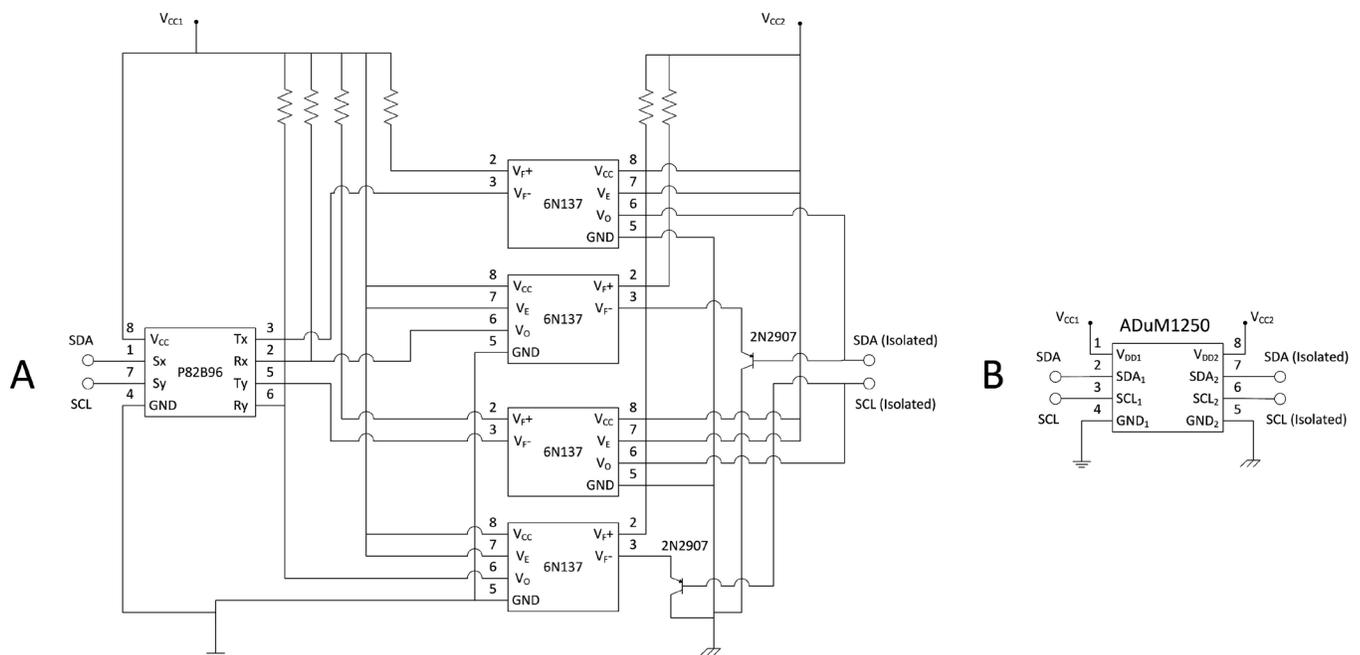


Figure 1. I²C Buffer and Four Optocouplers vs. Single IC (Note: Pull-Up Resistors Have Been Omitted for Simplicity)

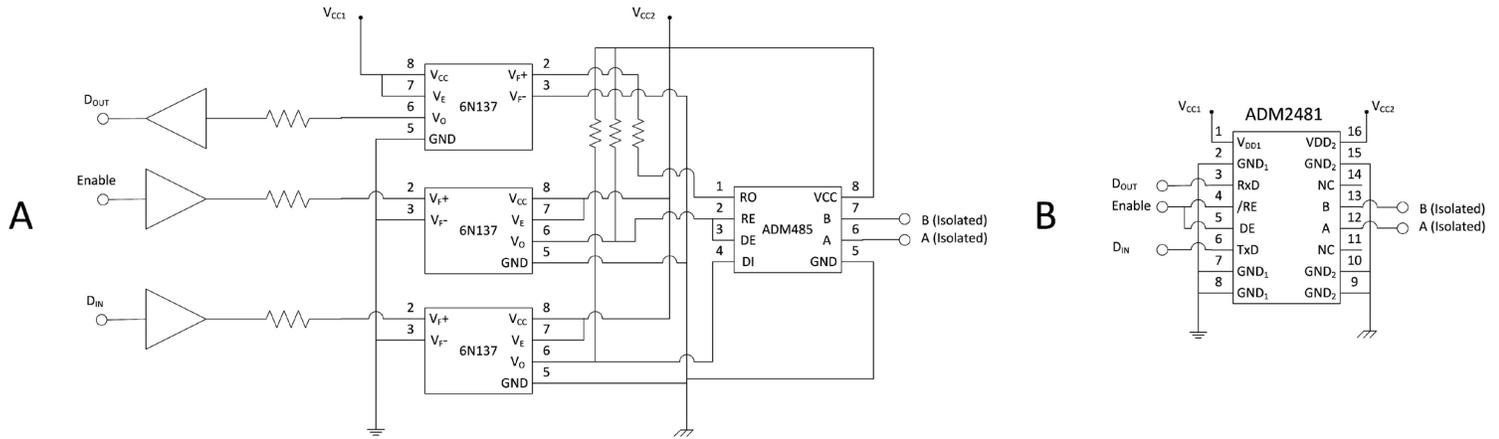


Figure 2. RS-485 Transceiver and Three Optocouplers vs. Single IC

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