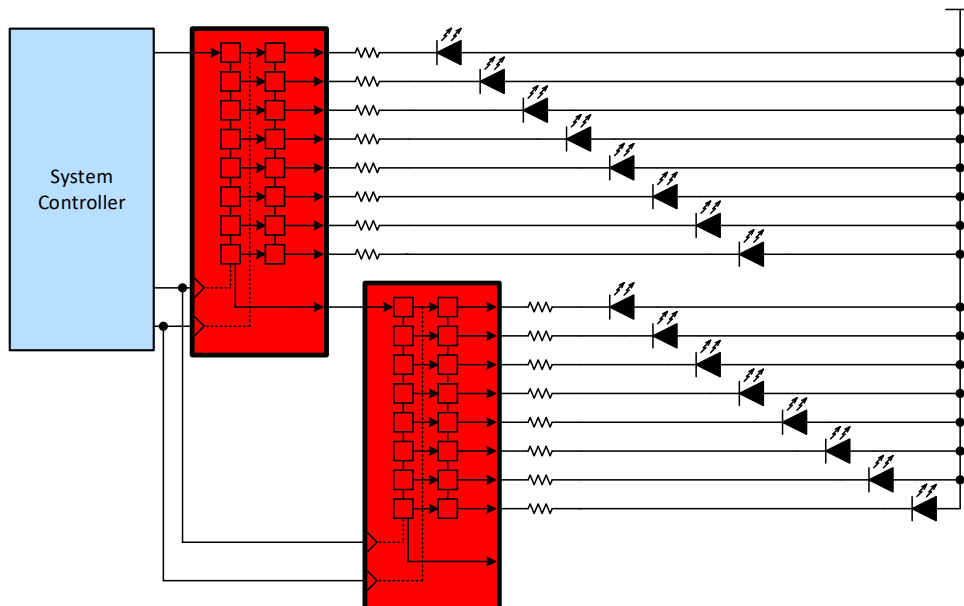


Increase the Number of Outputs on a Microcontroller



Microcontrollers often have a very limited number of GPIO pins. Serial-in parallel-out shift registers can be used to output to a large number of devices while only utilizing a few GPIO pins from the controller.



See more about this use case in the *Logic Minute* video [Increase the Number of Outputs on a Microcontroller](#).

Design Considerations

- Serial input data (BR_{in}) must be faster than the desired output data rate (BR_{out}) based on the number of output bits (N) by this equation: $BR_{in} \text{ (Mbps)} = BR_{out} \text{ (Mbps)} \times N$
- The clock input controls the rate at which data is loaded into the shift register, $F_{clk} \text{ (MHz)} = BR_{in} \text{ (Mbps)}$
- For more outputs, shift registers can be daisy-chained together
- [\[FAQ\] What is the default output of a latched device? \(Flip-Flop, latch, register\)](#)
- Ask a question on our [Engineer-to-Engineer \(E2E™\) forum](#)

Recommended Parts

Part Number	Automotive Qualified	V _{CC} Range	Bits	Features
SN74HCS595		2 V to 6 V	8	Schmitt-trigger inputs, 3-State outputs Asynchronous clear input for internal registers
SN74HCS595-Q1	✓			
SN74HC595B		2 V to 6 V	8	X1QFN package (2.50 mm × 2.50 mm)

For more devices, browse through the [online parametric tool](#) where you can sort by desired voltage, channel numbers, and other features.

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