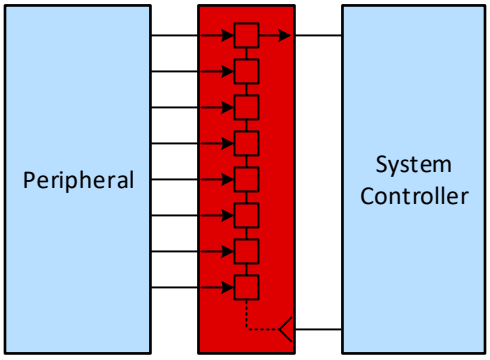
Product Overview

Increase the Number of Inputs on a Microcontroller

Microcontrollers often have a very limited number of GPIO pins. Parallel-in serial-out shift registers can be used to read in a large number of input signals 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 Inputs on a Microcontroller*.

Design Considerations

- The clock input controls the rate at which data is read out of the shift register
- The clock (F_{clk}) must be faster than the parallel input data (BR_{in}) based on the number of input bits (N) by this equation: F_{clk} (MHz) = BR_{in} (Mbps) × N
- For more inputs, shift registers can be daisy-chained together
- *[FAQ] What is the default output of a latched device? (Flip-Flop, latch, register)*
- *[FAQ] Where do I find maximum power dissipation for a device?*
- Ask a question on our *Engineer-to-Engineer (E2E™) forum*

Recommended Parts

Part Number	Automotive Qualified	V_{CC} Range	Bits	Features
SN74HCS165		2 V to 6 V	8	Schmitt-trigger inputs Inverted and standard serial outputs
SN74HCS165-Q1	✓			
SN74HCS166		2 V to 6 V	8	Schmitt-trigger inputs Asynchronous clear input Standard serial output
SN74HCS166-Q1	✓			
CD4014B		3 V to 18 V	8	Synchronous parallel input Outputs from Q6, Q7, and Q8
CD4021B		3 V to 18 V	8	Asynchronous parallel input Outputs from Q6, Q7, and Q8

For more devices, browse through the *online parametric tool* where you can sort by desired voltage, channel numbers, and other features.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265