

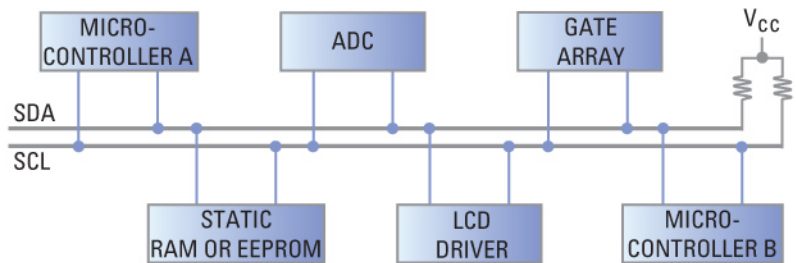
Application Clip

Standard Linear and Logic

I²C and Serial Bus Devices

I²C and Serial Bus Background

A complete I²C system usually has at least one microcontroller, peripheral memory, hard disk, graphic chip, and other I/O subsystems. The I²C bus is popular in computing, consumer electronics, and communications since it allows easy communication between two systems through two signal lines called SDA (Serial Data line) and SCL (Serial CLock line). The I²C bus has 3 modes of operation: Standard mode (0 to 100 kbps), Enhanced mode (0 to 400 kbps), and High-Speed mode (0 to 3.4 Mbps). Because all successive enhancements to the specification are backward compatible, mixed-mode communication is possible with the speed of the bus being controlled by the Bus Master chip.



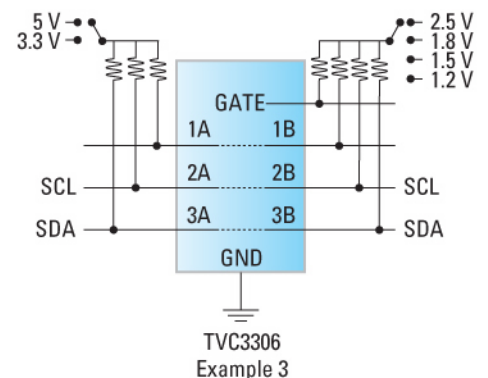
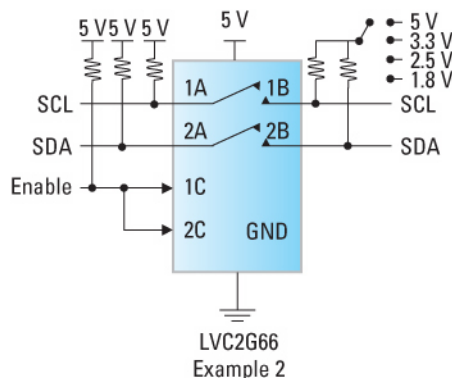
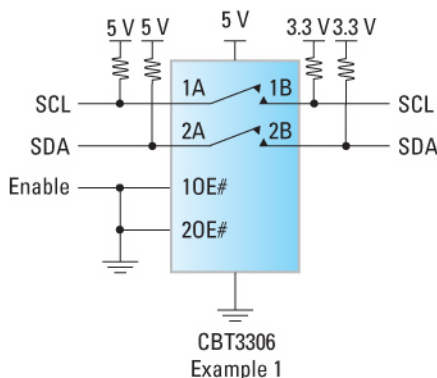
Common I²C Application Problems

Mixed voltage levels:

I²C-bus devices currently in the market range in supply voltage from 1.5 V to 5 V with commensurate I/O and threshold levels. Operating mixed threshold-level devices on the same bus requires level translation.

I²C Bus Translation Solutions for mixed voltage levels:

The dual-channel signal switches shown below can be used to translate I²C signals (SDA and SCL) between mixed voltage levels as required by the IC's and system.

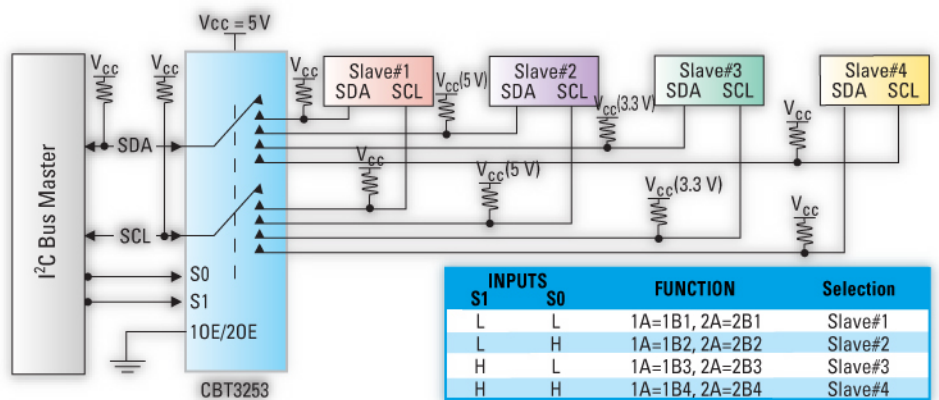


Address conflict/bus contention:

I²C addresses for two different functions, such as LCD controller or temperature sensor, are intentionally unique to prevent bus contention. However, a problem arises when identical components are used more than once on a system. In this case, the designer may be forced to connect two devices with the same address to the bus. Addressing conflicts arise because there is no way to isolate one device from the others.

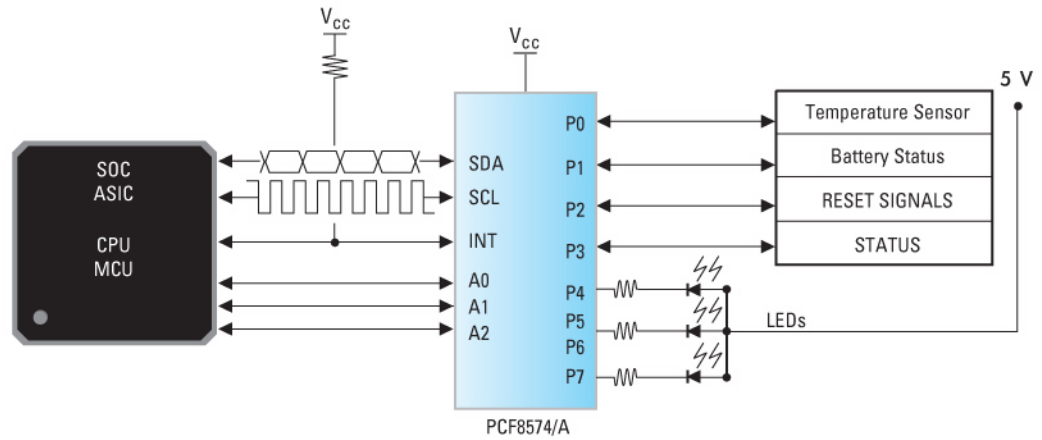
I²C/SM Bus Multiplexer Solution for address conflict:

The CBT3253 is a near-zero delay, bi-directional, dual 1:4 multiplexer signal switch that operates at 5 V and is available in a tiny 16-pin QFN package. Data paths are selected through the use of control input select pins (S0 and S1). Using this device, the SDA and SCL signal pair can be fanned out to up to 4 downstream channels.



PCF8574/A (8-BIT I/O Expander for I²C-Bus)

The PCF8574 and PCF8574A, which comply with Philips I²C protocol, provide an 8-bit, general-purpose, remote I/O expander for the I²C bus. These I/O expander devices have low current consumption and include latched outputs with high-current drive capability for directly driving LEDs.



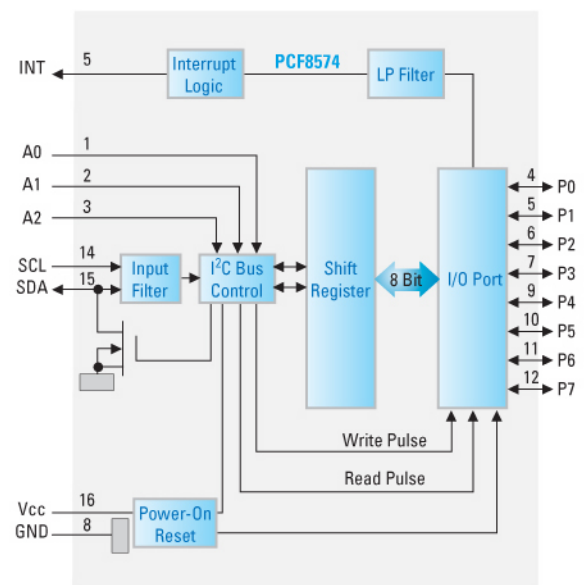
Features

- Operating supply voltage **2.5 to 6 V**
- Low standby current consumption of **10 uA** maximum
- I²C-bus to parallel port expander
- **Open-drain** interrupt output
- 8-bit remote I/O port for the I²C-bus
- Compatible with most microcontrollers
- Latched outputs with high current drive capability for directly driving **LEDs**
- Address by 3 hardware address pins for use of up to 8 devices (up to 16 with PCF8574A)
- Drop-In replacement to Philips PCF8574/8574A

Pins Descriptions

Symbol	Pin	Description
A0	1	Address input 0
A1	2	Address input 1
A2	3	Address input 2
P0	4	Bi-direction I/O 0
P1	5	Bi-direction I/O 1
P2	6	Bi-direction I/O 2
P3	7	Bi-direction I/O 3
GND	8	
P4	9	Bi-direction I/O 4
P5	10	Bi-direction I/O 5
P6	11	Bi-direction I/O 6
P7	12	Bi-direction I/O 7
INT	13	Interrupt Output (active low)
SCL	14	Serial Clock line
SDA	15	Serial data line
V _{CC}	16	Supply Voltage

PCF8574/A Functional Block Diagram



For More Information visit: www.ti.com.tw/I2C
www.ti.com/sc/device/partnumber
 Replace partnumber in URL with **sn74cbit3306**,
sn74lvc2G66, **sn74tvc3306**, **sn74cbit3253** or **pcf8574**

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