

NXP expandable 5-channel I²C-bus hub PCA9518A

Accommodate more I²C-bus devices on a single bus

For systems that need capacitance loads greater than the 400 pF specified by the I²C-bus protocol, this easy-to-use, expandable hub divides the I²C-bus or SMBus into four, eight, or even twelve 400-pF spokes, so designs can accommodate more ICs on a single bus.

Key features

- ▶ Accommodates more I²C-bus devices or a longer bus length (up to 400 pF per segment)
- ▶ Bi-directional I²C-bus drivers isolate the I²C-bus capacitance of each segment without the need for a direction pin
- ▶ Powered-off high impedance I²C-bus pins support hot insertion
- ▶ Open drain outputs and fail-safe operation on loss of power
- ▶ Compatible with I²C-bus and SMBus
- ▶ Supports 100- and 400-kHz devices and multiple masters
- ▶ Lock-up free operation
- ▶ Multi-master capable repeaters for bus arbitration and clock stretching, with only one repeater delay between segments
- ▶ Individual segment active HIGH Enable input signals let segments be individually isolated
- ▶ ESD protection exceeds 2000 V HBM per JESD22-A114, 200 V MM per JESD22-A115, and 1000 V CDM per JESD22-C101
- ▶ Latch-up testing conforms to JEDEC Standard JESD78 (exceeds 100 mA)
- ▶ 20-pin SO wide (D) and TSSOP (PW) packages

Applications

- ▶ Mixed 100/400-kHz operation
- ▶ Expanding PCI slots
- ▶ Bus isolation for hot-plugging PCI slots
- ▶ Using the main bus to drive multiple system boards
- ▶ Voltage translation to combine 2.5, 3.3- and 5.0-V devices

The PCA9518A separates the I²C-bus into multiple groups of five 400-pF segments. As a result, capacitance of the I²C-bus or SMBus is limited only by the number of PCA9518A hubs that can communicate with each other over the four-wire, inter-hub expansion bus.

Each repeater segment has an enable/disable feature that electrically isolates the segment from the I²C-bus. This makes it easy to isolate a 100-kHz segment from the rest of a 400-kHz system, to allow mixed 100/400-kHz operation. The feature can also be used to support the PCI management bus with eight PCI slots, isolate the SMBus when hot-plugging PCI slots, or allow the main SMBus to drive multiple system boards.

The PCA9518A can also be used to translate voltages between 2.5-V or 5.0-V I²C-bus and 3.3-V I²C-bus or SMBus segments, thus extending the life of older 5.0-V circuit blocks while using newer 3.3-V or 2.5-V devices for improved system performance.

The PCA9518A is designed to work with clock frequencies up to 400 kHz and is suitable for use in multi-master I²C-bus or SMBus environments.

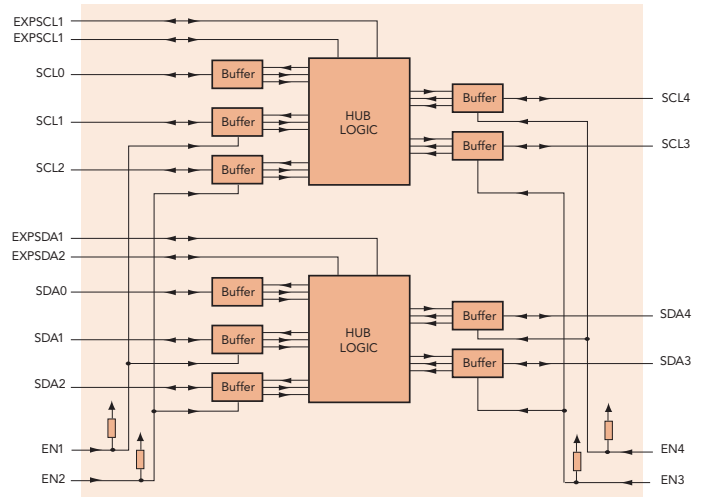
The system's microprocessor or microcontroller can use the 400-kHz I²C-bus or SMBus to poll devices on different system cards for status or version-control information.

The PCA9518A segment-hardware disable can isolate a specific system card socket before the card is removed or inserted. The segment should be isolated and restored only after a stop command or when the bus is idle.

In systems that have a limited number of device addresses, the PCA9518A can also be used as a multiplexer, isolating different segments to support more I²C-bus devices on the bus at once. In this situation, since the SCL0/SDA0 port can't be isolated, use a pull-up resistor to hold the lines high when the port is not in use.

The operating voltage range is 2.3 to 3.6 V and the operating temperature range is -40 to +85 °C. The I²C-bus pins are tolerant to 5.5 V.

The Application Note AN255 covers the use of this device and explains pull-up resistor sizing in detail.

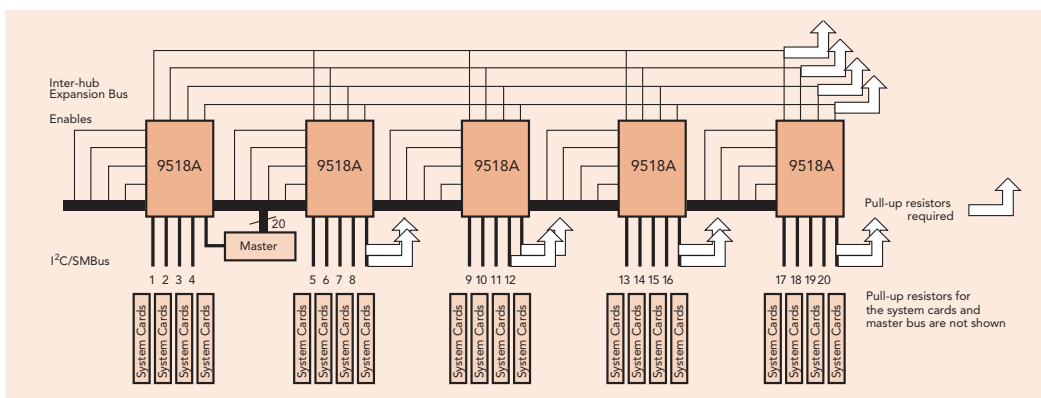


PCA9518A Block diagram

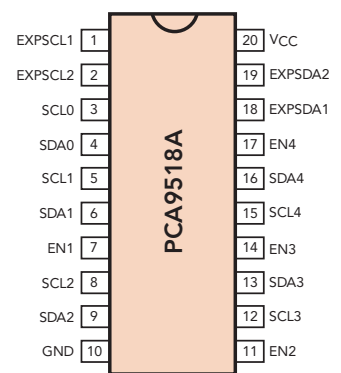
The PCA9518A is a wider voltage range (2.3 V to 3.6 V) version of the PCA9518 and also improves partial power-down performance, keeping I²C-bus I/O pins in high-impedance state when V_{DD} is below 2.0 V. The PCA9518 is no longer recommended for new designs but will be supported until existing users ramp down.

Ordering information

Package	Container	PCA9518A
SO	Tube	PCA9518AD
	Tape & Reel	PCA9518AD-T
TSSOP	Tube	PCA9518APW
	Tape & Reel	PCA9518APW-T



Typical expansion application (showing 20 slots that can be disabled)



Pin configuration