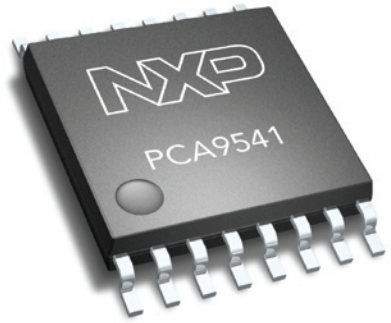


NXP 2-to-1 I²C-bus master selector PCA9541 with interrupt logic and reset

Easily isolate each master in dual-master I²C-bus applications

This versatile bus selector ensures continuous operation in dual-master configurations. When a master fails or a controller card is removed for maintenance, this device makes it easy to switch from the primary to the back-up master.

Key features

- I²C-bus interface logic
- Four address pins for up to 16 devices on the I²C-bus
- Up to 16 cards in multi-point or radial applications
- Channel selection via I²C-bus
- Downstream bus initialization/recovery function before changing channel
- Bus traffic sensor
- No glitch on power-up and support for hot insertion
- Identical software for both masters
- Voltage translation between 1.8-, 2.5-, 3.3-, and 5-V buses
- Operating power supply voltage range = 2.3 to 5.5 V
- I²C-bus clock frequency = 0 to 400 kHz
- Temperature range = -40 to +85 °C
- 16-pin SO (D), TSSOP (PW), or HVQFN (BS) package

Applications

- High-end servers, basestations, and mass storage systems that require frequent maintenance
- Systems that link two independent masters to a single I²C-bus slave device

The NXP PCA9541 is used to select a bus master in I²C-bus systems that use two masters. In a typical configuration, the primary and backup I²C-bus masters are on separate I²C-buses connected to the same downstream I²C-bus slave devices.

I²C-bus commands are sent via the primary or back-up master and either master can take command of the I²C-bus. Either master can, at any time, gain control of the downstream slave devices if the other master is disabled or removed from the system. The failed master is isolated from the system and doesn't affect communication between the on-line master and the slave devices on the downstream I²C-bus.

Interrupt logic input from the slave devices is multiplexed to provide a separate signal to each master. The interrupt output is also used to tell the masters which master is in control of the bus.

During emergency changeovers, the PCA9541 bus initialization/recovery function sends nine clock pulses/stop condition to reset the downstream devices. The function, which can be disabled, sends SCL clock pulses/stop condition and leaves the SDA line high before switching the master channel.

NXP founded by Philips

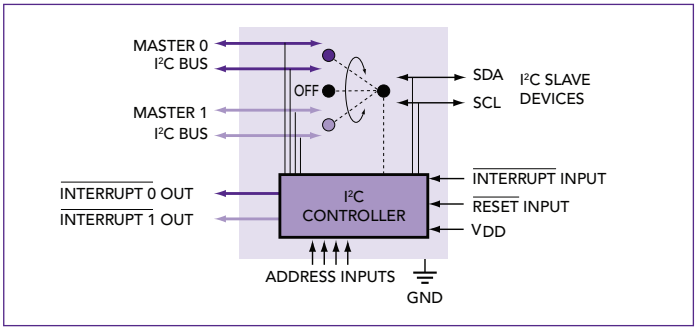
An internal and permanent bus sensor function senses the I²C-bus traffic and generates an interrupt if a channel switch occurs during a non-idle situation. This function is enabled when the PCA9541 recovery/initialization function is bypassed.

An active-low RESET input initializes the PCA9541. Pulling the RESET pin low resets the I²C-bus state machine and configures the device to its default state. The internal power-on-reset function also returns the device to its default state.

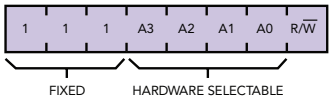
Alternative uses

The PCA9541/03 version can be used as a device multiplexer in applications that use multiple I²C-bus devices with the same fixed address and connected, in a multi-point arrangement, to the same I²C-bus. Up to 16 hot-swappable cards/devices can be multiplexed to the bus master, using one PCA9541/03 per card to connect it to the bus (Master 0 position) and isolate the rest of the cards/devices (off position).

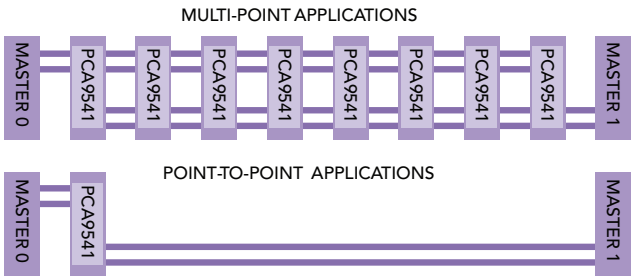
The PCA95401/03 version can also be used for bus initialization and recovery in systems that use I²C-bus devices without a hardware reset pin. If the I²C-bus is hung, resetting the PCA95401/03 via its hardware reset pin isolates the downstream slave bus from the master, thereby restoring the master's control of the bus. The bus master can then command the PCA95401/03 version to send nine clock pulses/stop condition to reset the I²C-bus devices and reconnect them to the master bus.

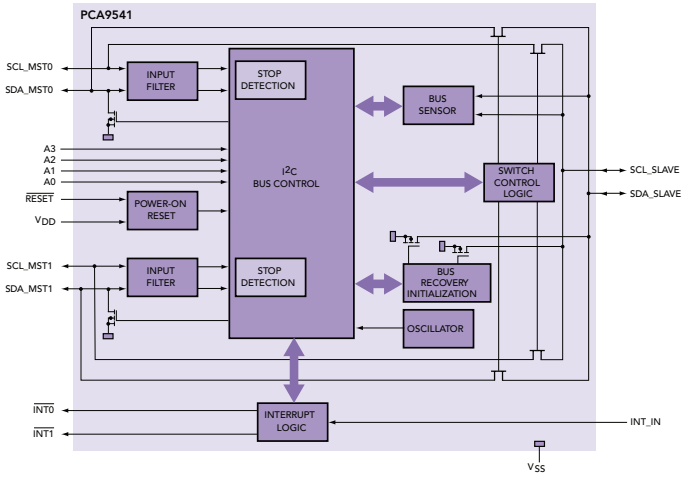


PCA9541 application diagram

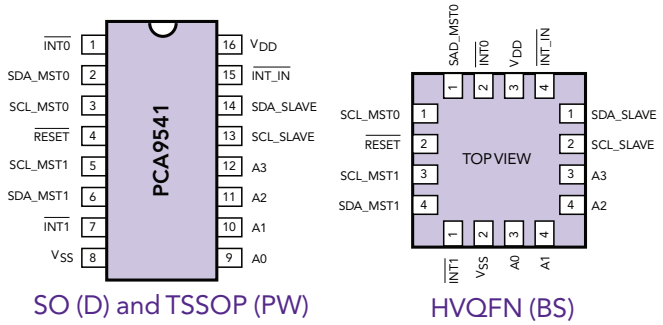


PCA9541 I²C-bus slave address





PCA9541 block diagram



Ordering information

Package	Container	PCA9541/01	PCA9541/03
SO	Tube	PCA9541D/01	PCA9541D/03
	T & R	PCA9541D/01-T	PCA9541D/03-T
TSSOP	Tube	PCA9541PW/01	PCA9541PW/03
	T & R	PCA9541PW/01-T	PCA9541PW/03-T
HVQFN	T & R	PCA9541BS/01-T	PCA9541BS/03-T

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