TARGET APPLICATIONS

- I₂C multiplexing: split a single I₂C address without conflicts
- Voltage level shifting: translate between 1.65 and 5.5 V
- Capacitive load sharing: reduce system load by isolating idle devices

PCA954x multiplexers and switches fan the input I₂C/SMBus signals to two, four, or eight downstream channels of SDx/SCx pairs. Control is performed directly through the I₂C/SMBus, so there’s no need for an additional control pin. The muxes select one downstream channel at a time; the switches can select one or more. Some devices have an external active-low hardware reset pin (RESET). If the bus locks up or communication with the master is interrupted, the RESET pin can be used to reset the downstream channels to their default values ("not selected").

KEY FEATURES

- Multi-channel multiplexers and switches for use in I₂C/SMBus systems
- Muxes (PCA9540B, PCA9542A, PCA9544A, PCA9547)
- Switches (PCA9543A, PCA9545A, PCA9546A, PCA9548A)
- Arbiter (PCA9541A and PCA9641)
- Bi-directional translation directs upstream pairs to 2, 4, or 8 downstream channels
- Interrupt pins enable AND function
- Hardware address pins allow up to 8 devices to share I₂C bus
- External pull-up resistors set channel voltage
- All I/O tolerant to 6.0 V (except PCA9641 which is 3.6 V)
- TSSOP, and HVQFN package options
- Operating voltage range of 2.3 to 6.0 V (except PCA9641 which is 3.6 V)
- Operating temperature range of -40 to 85 °C
- Maximum operating frequency of 400 kHz (except PCA9641 which is 1 MHz)
**I2C MULTIPLEXING**

PCA954x devices split a single I2C-bus into several sub-branches so the I2C master can select and address devices with identical addresses one at a time without raising address conflict issues.

**VOLTAGE LEVEL SHIFTING**

The PCA954x family can be used to translate voltages between 1.65 and 5.5V. The channel pass gates let the VDD pin limit the maximum voltage to be passed by a device, so different bus voltages can be used on each pair. That way, 5-V devices can coexist with devices of 1.8, 2.5, or 3.3 V without any additional protection or external voltage translators. External pull-up resistors on the upstream and downstream channels are used to set the desired voltage levels for each channel, and all I/O pins are tolerant up to 6.0 V. PCA954x switches can have multiple downstream channels active simultaneously, so they're an excellent choice for this application, as well as for broadcast applications.

**CAPACITIVE LOAD SHARING**

When the number of I2C/SMBus devices risks exceeding the 400-pF limit for system loading, PCA954x devices can be used to isolate idle devices and reduce the overall load. Active channels function as wires, so the cumulative capacitive loading of the upstream channel, along with all the active downstream channels, needs to be taken into account.

**2-TO-1 I2C MASTER SELECTOR WITH INTERRUPT LOGIC AND RESET PCA9541A**

The PCA9541A is designed for use in high-reliability, dual-master I2C applications that require continuous operation even if one master fails or if its controller card is removed for maintenance. I2C commands are sent via the primary or back-up master and either master can, at any time, gain control of the downstream slave devices. If a master fails, it’s isolated from the system and doesn’t impact communication between the on-line master and the downstream slave devices. Two versions, /01 and /03, are available:

- PCA9541A/01 – Master Channel 0 is selected after power-up/reset
- PCA9541A/03 – No master channel (off) is selected after power-up/reset and either master can take control of the bus

**PCA9541 2-CHANNEL I2C-BUS MASTER ARBITER**

Similar to the PCA9541A but intelligently selects one winning master if two try to gain access to the shared resource at the same time. Operating range 2.3 - 3.6V up to 1 MHz.

### MULTIPLEXER AND SWITCH FUNCTIONS

![Multiplexer and Switch Functions Diagram](image-url)