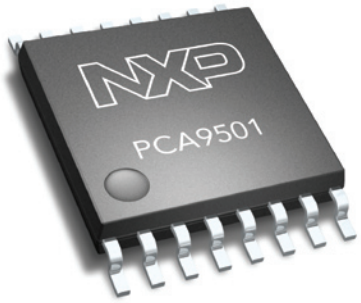

NXP 8-bit I²C/SMBus GPIO expanders with 2-K EEPROM PCA9500/01

Combination GPIO expanders and EEPROMs for smaller boards

For reduced board space and lower overall cost, these I²C/SMBus-compatible devices combine an 8-bit GPIO expander with a 2-Kbit serial EEPROM in a single package.

Key features

- Compatible with I²C-bus and SMBus
- 8 programmable GPIO compatible with most processors
  - Input or output
  - Quasi-bidirectional outputs
- Outputs can drive LEDs directly
  - 25-mA (max) sink and 100-µA (max) source per bit
  - 100-mA (max) capacity per package
- Active-low, open-drain interrupt output activates when input changes state
- Low standby current (I_{DDQ}): 60 µA (max)
- Operating voltage: 2.5 to 3.6 V
- All I/O tolerant to 5.5 V
- Temperature range: -40 to +85 °C
- I²C-bus clock frequency: 0 to 400 kHz
- Internal 256 x 8-bit EEPROM with self-timed write cycle
- High-volume CMOS process
- Package options: SO Wide, TSSOP, HVQFN

Applications

- Multi-card systems in telecom, networking, basestation infrastructure equipment, and high-end computing servers
- Storage of board version and configuration
- Monitoring the health and reporting the status of a board
- Field recall and troubleshooting functions for installed boards
- Monitoring push-buttons and controlling LEDs
- Combining GPIO and memory functions in multi-board systems

By combining general-purpose I/O (GPIO) expansion with a 2-Kbit EEPROM, the NXP PCA9500 and PCA9501 let designers replace two components with a single IC.

The PCA9500 is a 16-pin device that is footprint and I²C-address compatible with the NXP 8-bit I/O expander PCF8574 and I²C-address compatible with the NXP 2-Kbit EEPROM PCF8582C, allowing direct replacement of both devices. Three hardware pins (A0, A1, A2) vary the I²C-bus address and allow up to eight devices to share the same I²C/SMBus. The PCF8574 interrupt output is used for the EEPROM write control ($\overline{WC}$).

The PCA9501 is a 20-pin device similar to the PCA9500, but with six hardware pins (A0, A1, A2, A3, A4, and A5), and with the MSB fixed at 0 for the GPIO address and at 1 for the EEPROM address. This allows up to 64 devices to reside on the same bus, with the GPIO and EEPROM in each package having a different I²C-bus address. This way, the two functions are

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seen by the bus master as two separate devices. An active-low, open-drain interrupt output is activated when any input state differs from its corresponding input port register state. The output notifies the system master that an input state has changed and the device needs to be interrogated.

By writing to the I/O configuration bits in the same way as for the PCF8574, the system master can enable the I/O on the PCA9500 or PCA9501 as inputs or outputs. The data for each input and output is kept in the corresponding input or output register. The system master can read all registers.

The system's central processor (typically located on the main board) can use the I²C-bus to poll the PCA9500/01 on each card for status, version control, and similar types of information.

In production, the PCA9500/01 can be programmed with information regarding board build, firmware version, manufacturer ID, configuration option data, and so forth.

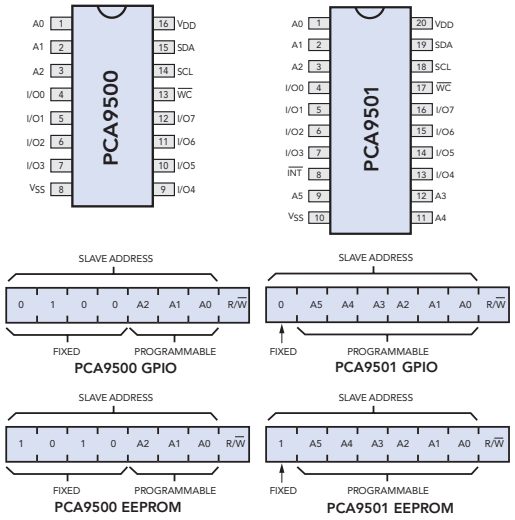
The devices can also be used to create a convenient, cost-effective intra-system system management bus, by using the I²C-bus as a board interface for ASIC configurations or to indicate LED status.

The PCA9500/01 GPIO functional diagram and I/O schematic are identical to those of the 8-bit PCF8574, so the devices can be used as direct replacements without software modifications. The quasi bidirectional outputs sink 25 mA and source 100 µA.

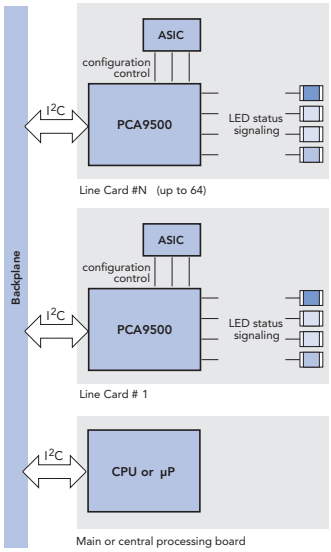
The PCA9500/01 EEPROM functional diagram is the same as that of the 256 x 8-bit PCF8582C-2 EEPROM, and can be used as a direct replacement. The PCA9500 has a 4-byte page write, while the PCA9501 has a 16-byte page operation. As indicated in the shaded area of the PCA9501 block diagram, the PCA9500 has three fewer address pins and no interrupt.

Ordering information

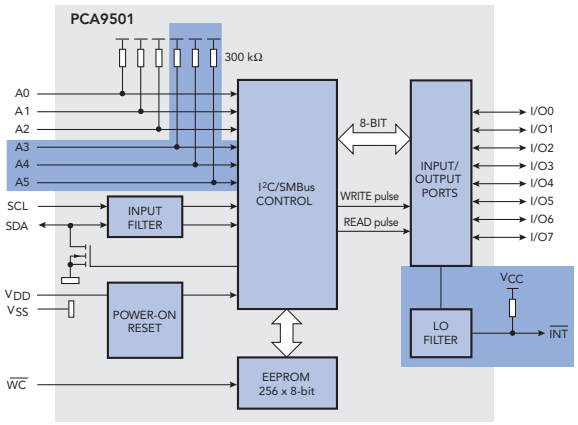
Package	Container	PCA9500	PCA9501
SO	Tube T & R	PCA9500D PCA9500D-T	PCA9501D PCA9501D-T
TSSOP	Tube T & R	PCA9500PW PCA9500PW-T	PCA9501PW PCA9501PW-T
HVQFN	Tube	PCA9500BS-T	PCA9501BS-T



Pin configuration



PCA9500 application diagram



PCA9501 application diagram

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