PCF8574 and PCF8574A I/O Expanders

Texas Instruments’ (TI) PCF8574 and PCF8574A are two-wire I2C-bus to 8-bit parallel bus I/O expanders from TI’s I2C logic portfolio. They are designed to provide a simple and cost-effective method to monitor and control several peripheral signals. The difference between the PCF8574 and PCF8574A is the I2C address:

- PCF8574 has addresses ranging from 0x20 to 0x27 (up to eight PCF8574 devices may be used on the same I2C bus).
- The PCF8574 and PCF8574A have addresses ranging from 0x38 to 0x3F (up to eight PCF8574A devices may be used on the same I2C bus).
- A total of 16 PCF8574 and PCF8574A devices may be used on the same I2C bus.

The PCF8574 and PCF8574A use the serial clock (SCL) and serial data (SDA) I2C lines to communicate with the bus controller.

Key Features

- Pin-to-pin compatible and functionally equivalent with Philips PCF8574 and PCF8574A (PDIP, SOIC and TSSOP)
- In addition, TI has package offerings that are smaller than Philips package options:
  - 20-pin TVSOP (23% smaller than 20-pin TSSOP)
  - 20-pin QFN package (62% smaller than 20-pin TSSOP; industry’s smallest PCF8574 and PCF8574A package)
- Two-wire I2C-bus to 8-bit bidirectional parallel-bus expander
- Operating supply voltage from 2.5-V to 6-V VCC
- Low standby current consumption of 10 mA maximum (IPSL = 0Hz)
- Open-drain interrupt output to signal a change on an I/O pin
- Latched outputs with high-current drive capability for driving LEDs
- Addressed by three hardware-address pins
- Top applications:
  - Fan control
  - LED driver
  - System monitoring
  - Temperature sensor monitoring
  - Push button monitoring
  - 8-bit bidirectional expansion

![PCF8574/A Functional Block Diagram*](image)
Applications With Multiple PCF8574 and PCF8574A Devices

The expanders can be configured to have a unique 7-bit address. The first four bits of the PCF8574’s 7-bit address are 0100, and those for the PCF8574A are 0111. The lower three bits are the settings on the device pins A2, A1, and A0. This ability to set unique addresses for the expanders makes it possible to have up to eight PCF8574 and eight PCF8574A devices on the same I2C bus.

**PCF8574 and PCF8574A I2C-Bus Slave Address Map**

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>PCF8574 I2C-Bus Slave Address</th>
<th>PCF8574A I2C-Bus Slave Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 A1 A0</td>
<td>20 (hexadecimal) 38 (hexadecimal)</td>
<td>21 (hexadecimal) 39 (hexadecimal)</td>
</tr>
<tr>
<td>L L L</td>
<td>22 (hexadecimal) 3A (hexadecimal)</td>
<td>23 (hexadecimal) 3B (hexadecimal)</td>
</tr>
<tr>
<td>H L L</td>
<td>24 (hexadecimal) 3C (hexadecimal)</td>
<td>25 (hexadecimal) 3D (hexadecimal)</td>
</tr>
<tr>
<td>H H L</td>
<td>26 (hexadecimal) 3E (hexadecimal)</td>
<td>27 (hexadecimal) 3F (hexadecimal)</td>
</tr>
<tr>
<td>H H H</td>
<td>24 (hexadecimal) 3C (hexadecimal)</td>
<td>25 (hexadecimal) 3D (hexadecimal)</td>
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</table>

**Bi-Directional I/O Expander Applications**

In the I/O expander application shown here, the PCF8574 or PCF8574A is used with P0 and P1 as inputs and P2 to P7 as outputs. When used in this configuration, during a write, the inputs (P0 and P1) must be written as high so the external devices fully control the input ports. The desired high or low logic levels may be written to the I/Os used as outputs (P2 to P7). During a read, the logic levels of the external devices driving the input ports (P0 and P1) and the previous written logic levels to the output ports (P2 to P7) will be read.

The TI PCF8574 and PCF8574A also have an interrupt line (INT) that can be connected to the interrupt logic of the microprocessor. By sending an interrupt signal on this line, the remote I/O informs the microprocessor that there is incoming data or a change of data on its ports without having to communicate via the I2C communication bus.

**High Current-Drive Load Applications**

The PCF8574 and PCF8574A have a maximum sinking current of 25 mA. In applications requiring additional drive, two port pins may be connected together to sink up to 50-mA current.

**For More Information:** [www.ti.com/i2c](http://www.ti.com/i2c)

Product Folders: [www.ti.com/sc/device/PCF8574](http://www.ti.com/sc/device/PCF8574)  •  [www.ti.com/sc/device/PCF8574A](http://www.ti.com/sc/device/PCF8574A)

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