A Product Line of
Diodes Incorporated

PRODUCT BRIEF

PI4IOE5V6416RQ

Low-Voltage Translating 16-Bit I²C-Bus I/O Expander

Features

- Operation power supply voltage from 1.65V to 5.5V
- Allows bidirectional voltage-level translation and GPIO expansion between:
  - 1.8/2.5/3.3/5V SCL/SDA and 1.8/2.5/3.3/5V Port
- Low standby current consumption:
  - 1.5μA typical at 5V V_{DD}
  - 1μA typical at 3.3V V_{DD}
- 400kHz I²C-bus interface
- Compliant with the I²C-bus fast and standard modes
- Programmable push-pull/open-drain output stages
- Programmable output drive strength and pull-up/down resistor
- Power-on reset all register contents to default
- Active LOW open-drain interrupt output
- Active LOW reset input to reset I²C bus only while register contents remain unchanged
- Latch-up tested (exceeds 100mA)
- Support AEC-Q100 (Grade 2)
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- The DIODES™ PI4IOE5V6416RQ is suitable for automotive applications requiring specific change control; the part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949certified facilities.
  https://www.diodes.com/quality/product-definitions/
- Packaging (Pb-free & Green):
  - 24-Pin TSSOP (L)

Description

The PI4IOE5V6416RQ is a 16-bit general-purpose I/O expander that provides remote I/O expansion for most microcontroller families via the I²C-bus interface.

The device provides a simple solution when additional I/Os are needed while keeping interconnections to a minimum; such as in sensors, push buttons, keypads, and battery-powered mobile applications for interfacing.

The PI4IOE5V6416RQ can operate from 1.65V to 5.5V on the GPIO-port side and 1.65V to 5.5V on the SDA/SCL side. This allows the PI4IOE5V6416RQ to interface with next-generation microprocessors and microcontrollers on the SDA/SCL side, where supply levels are dropping down to conserve power.

The bidirectional voltage-level translation in the PI4IOE5V6416RQ is provided through $V_{DD(I2C_bus)}$. $V_{DD(I2C_bus)}$ should be connected to the V_{DD} of the external SCL/SDA lines. The voltage level on the GPIO-port of the PI4IOE5V6416RQ is determined by $V_{DD(P)}$.

At power on, the I/Os are configured as inputs; however, the system master can enable the I/Os as either inputs or outputs by writing to the I/O direction bits. The data for each input or output is kept in the corresponding Input or Output register. All registers can be read by the system master.

The PI4IOE5V6416RQ has an open-drain interrupt $\overline{INT}$ output pin that goes LOW when the input state of a GPIO-port changes from the input-state default register value. The device also has an interrupt masking feature by which the user can mask the interrupt from an individual GPIO-port.

The power-on reset sets the registers to their default values and initializes the device state machine. In the PI4IOE5V6416RQ however, only the device state machine is initialized by the $\overline{RESET}$ pin and the internal general-purpose registers remain unchanged. Using $\overline{RESET}$ pin will only reset the I²C-bus interface for the master to regain access the I²C-bus when the bus is getting struck with SDA pin staying LOW. This allows the I/O pins to retain their last configured state so that they can keep any lines in their previously defined state and not cause system errors while the I²C-bus is being restored. The $\overline{INT}$ state will not be clear by the $\overline{RESET}$ pin.

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

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