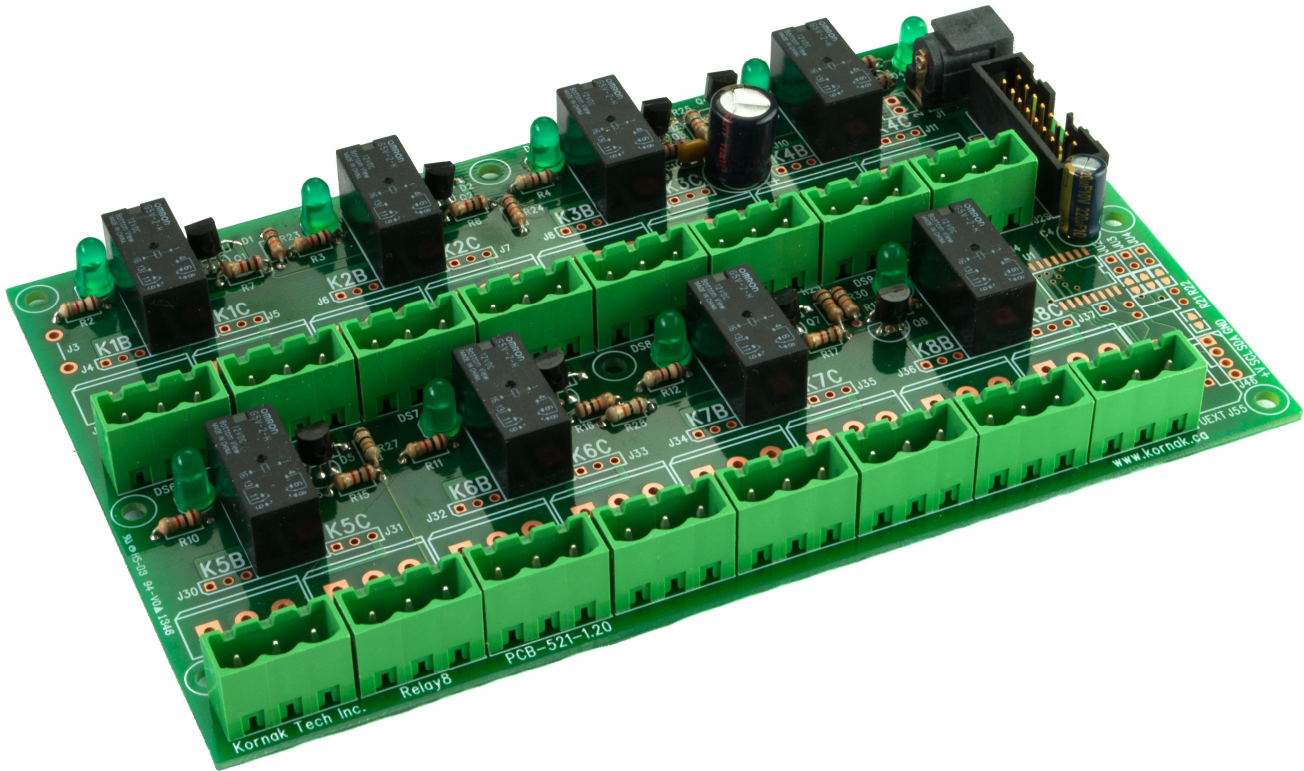


## *Octal Relay Output Board for Microcontroller Projects*



**Part Number:** PCB-RELAY8 (unpopulated PCB, no parts)

### Features

- A bare PCB to build a relay board with 8 DPDT relays. Each relay has up to four 3-pin terminal blocks to connect to the relay contacts.
- Can be controlled via an I2C interface or 8 logic lines. UEXT connector used for I2C connection.
- Can be used with 5V, 9V or 12V Omron G5V series relays with 2 Amp contacts. The supply voltage must match the relay voltage. Separate logic supply required for I2C.
- Bare PCB only (unpopulated, no parts provided). BOM and schematic available for download.
- Mostly thru-hole construction allows for easy assembly (I2C output port is SMT).

### Details

The RELAY8 is an output board providing 8 DPDT relays for microcontroller projects. Each relay has two switches with NO and NC contacts (Normally Open and Normally Closed).

Removable 5.08mm (0.2 inch) terminal blocks are used to connect circuitry to the relays. Each relay has two switches, and each switch has two 3-pin terminal blocks that can be installed to provide an easy way to connect multiple wires to each contact.

The RELAY8 board can be built to be controlled by 8 logic signals or an I2C interface. A 2x8 header is used to connect to the inputs with a 16-pin ribbon cable for the logic level version. An Olimex style UEXT 2x5 header is used for the I2C option. UEXT is an open standard developed by Olimex providing 3 Volt I2C, SPI, and USART expansion on one connector. A 10-pin ribbon cable is used to connect to dev boards with UEXT connectors.

The power input connector can be a coaxial barrel connector, a 2-pin terminal block, or a 2-pin MTA-100 connector, or 0.1" spacing header.

This is an unpopulated board and no parts are included. The BOM (bill of materials) and schematic diagram are available at <http://www.busboard.us/products/PCB-RELAY8/> to construct the circuit. Soldering is required and prior experience with electronic assembly is recommended. A PCB soldermask helps prevent solder bridges on tracks and a silkscreen legend provides part locations.

### **Construction**

The construction is completely thru-hole for the parallel port version, providing easy assembly, maintenance, and modification. The I2C version uses a SMT output port IC and a 0805 capacitor and resistors (it's still easy to solder).

When assembling the board, install the SMT components first (if any). Install the thru-hole components from shortest to tallest to make it easier to keep the parts inserted when soldering. Hint: Insert the thru-hole parts of a particular height, place a stiff piece of cardboard over the board, and turn it over using the cardboard to hold the parts in place. Then you can solder them.

### **GPIO Parallel Port Option**

The parallel port connector uses an 8 bit GPIO port from the microcontroller to control the 8 relays. The signals are carried on a 16 pin ribbon connector to the 2x8 shrouded connector J29.

The connector has the same pinout as the GPIO headers on BPS development boards and baseboards. The Vlogic power is separate from the Vrelay power to allow the relays to be driven at a different voltage, or to provide a higher current supply for the relays. Vlogic and Vrelay can be connected if needed using jumper JU1.

The GPIO 2x8 connector J29 pinout is as follows:

<b>Signal Function</b>	<b>Pin</b>	<b>Pin</b>	<b>Signal Function</b>
Relay 1	1	2	+5V
Relay 2	3	4	+3V3 (not connected)
Relay 3	5	6	Uncommitted Pin
Relay 4	7	8	Uncommitted Pin
Relay 5	9	10	Uncommitted Pin
Relay 6	11	12	Uncommitted Pin
Relay 7	13	14	Uncommitted Pin
Relay 8	15	16	Ground

## **I2C Driver Option**

An I2C driver can be installed to control the relays instead of using 8 GPIO lines. This uses fewer microcontroller pins. Two connector options are provided, a 4-pin connector J46, or a 2x5 UEXT header J55.

The I2C driver IC is PCF8574T which is available from NXP and Texas Instruments.

The I2C address can be selected using jumpers JU2, JU3, and JU4.

### **4-pin I2C Connector J45**

J46 provides a 4 pin connection for the I2C interface.

A Tyco MTA-100 type polarized connector is typically used, but the 0.1” pin spacing allows other connector types to be fitted as well.

The SMT pull-up resistors must be installed on the baseboard or on a peripheral board for the I2C to function. Typically they are on the microcontroller board, allowing multiple peripheral boards to be connected. The pull-up resistors R21 and R22 are not fitted in this case

The 4-pin I2C connector signals are as follows:

<b>Pin</b>	<b>Name</b>	<b>Description</b>	<b>Signal Direction</b>
1	GND	Ground	
2	SDA	I2C Data	Bi-directional
3	SCL	I2C Clock	Output
4	+5V (or +3.3V)	Power to I2C Driver	Power to Relay8

### **UEXT Connector J55**

The Universal-EXTension-Connector (UEXT) is an expansion connector standard created by Olimex Ltd. ([www.Olimex.com](http://www.Olimex.com)). It provides an asynchronous serial port (USART), SPI and I2C all on the same connector. Peripheral modules for UEXT are available from Olimex (and stocked at [www.Mouser.com](http://www.Mouser.com)) as well as from other suppliers.

The Relay8 uses only the I2C signals and power and ground to power Vlogic for the Driver IC (pins 1,2,5,6).

The UEXT interface standard uses a 2x5 polarized header with 0.1” spacing. Modules connect to the UEXT connector with a 10-pin ribbon cable.

The UEXT pinout is as follows:

<b>Direction</b>	<b>Signal Function</b>	<b>Pin</b>	<b>Pin</b>	<b>Signal Function</b>	<b>Direction</b>
Output	+3.3 Volts	1	2	GND	-
Output from MCU	USART-TX	3	4	USART-RX	Input to MCU
Output	I2C-SCL	5	6	I2C-SDA	Bi-directional
Master In Slave Out	SPI-MISO	7	8	SPI-MOSI	Master Out Slave In
Master Out Slave In	SPI-SCK	9	10	SPI-SSN	Master Out Slave In

Most UEXT modules are designed for 3.3V operation only. Therefore, no +5V power option is provided on most UEXT headers.