

## R-8PE/R-8PD

### 4-Bit Momentary Remote Control Encoder / Decoder IC's

---

#### **Description**

The R-8P series 4-bit encoder/decoder IC's offer an easy to use, low-cost solution for simple remote control applications in a convenient industry standard 8-pin PDIP package.

#### **Encoder Operation**

On power-up the encoder enters low power sleep mode. When a data input pin is pulled high, the encoder will wake up and begin the transmit process.

First, the encoder will record the state of the data lines, encode for error correction and assemble the packet.

It will then sample the BAUD select pin to set the data rate, and then output the encoded data packet on DOUT.

The encode/transmit process will continue for as long as any data input pin is high, and return to low power sleep mode when all data input pins return low.

It will update the state of the data lines before sending each packet, and finish the current transmission even if all data inputs are returned to ground.

#### **Encoded Data Packet**

Each data packet consists of five bytes of information to be transmitted.

- A one byte preamble
- One synchronization byte
- The data byte
- A 2<sup>nd</sup> copy of the data byte for verification.
- A packet checksum

A 10mS guard time is inserted between each encoded packet transmission to allow the decoder time to receive, decode, verify, and process each packet. The encoder returns to low power sleep mode for power conservation immediately once all data input pins return to logic 0, and the packet transmission is complete.

#### **Features**

- Momentary decoder outputs
- No programming necessary
- Very easy to use
- Very low component count
- Low current consumption
- Up to 25mA per decoder output
- Selectable baud rates (2400/4800)
- High noise immunity
- Standard 8-pin PDIP package

#### **Applications**

- Simple remote control
- Wire elimination
- Remote status monitoring
- Remote lighting control

#### **Decoder Operation**

The decoder enters a timed loop waiting for the synchronization byte. An internal 16-bit timer is used to force an exit from the receive loop, and reset the output pins every 65.5mS if no valid synch byte is received during this time period.

Note that 65.5mS is the maximum time the decoder will hold an output high unless a continuous valid data stream is being received.

Once a valid synch byte is received, the timer is disabled, and the remainder of the data packet is received and stored for the verification process.

Immediately after receiving a valid data packet the decoder begins the process of verifying the data, and checking for errors.

Once data has been verified, the decoded data will be placed on the output pins, and the decoder re-enters the timed loop waiting for the next valid packet.

Holding encoder data inputs at logic 1 will cause decoder outputs to remain at logic 1.

Any break or interruption during the data verification process will cause the decoder to reset all outputs to ground.

### **Pin Descriptions**

The BAUD input is the data rate selection pin. With BAUD connected to ground, the serial transmission data rate is 2400bps.

With this pin at Vcc, the serial transmission data rate is 4800bps. This option allows support for low-end RF modules that require the lower data rates, while providing the faster data rate option for higher end RF modules such as the excellent Linx Technologies® LR series, and others.

### **Encoder & Decoder Data Pins D0-D3**

On the encoder, pins D0-D3 are the data input pins. A logic 1 present on any of these inputs will cause the encoder to wake up and send the 4-bit data to the corresponding D0-D3 data output pins on the decoder.

### **Connect All Pins**

All data pins on the encoder must be pulled to ground through pull-down resistors as shown in the encoder schematic. Leaving any data input pins floating (not connected) will cause erratic operation of the encoder.

When prototyping circuits on a breadboard, it may be desirable to test logic levels on all encoder pins with a logic probe or meter before operation.

### **Encoder DOUT**

The encoder DOUT pin transmits serial data to the RF transmitter or other transmission device.

### **Decoder DIN**

The decoder DIN pin is the serial data input from the RF receiver or other receiving device.

### **Decoder Operation**

The decoder offers four momentary digital outputs capable of sinking or sourcing up to 25mA per output.

The decoder outputs will maintain the 4-bit data value being received for the duration of valid data reception.

If any part of the verification process fails, or reception is interrupted for longer than 65.5mS, the decoder will timeout, and discard the packet, reset the timer, force all decoder data outputs back to ground, and re-enter the timed loop waiting for the next valid packet.

When receiving a continuous stream of valid data, the timer is disabled, and the decoder will respond rapidly to changing data values, and hold the received binary pattern on the outputs.

### **VCC And Ground**

VCC is the positive power supply. GND is ground.

<b>Ordering Information</b>	
Part #	Description
R-8PD	4-Bit Decoder IC
R-8PE	4-Bit Encoder IC

### **Encoder Decoder Markings**

The R-8PE encoder IC is marked with a gold ink dot. The R-8PD decoder IC is marked with a silver ink dot.

**R-8PE/R-8PD**  
**4-Bit Momentary Remote Control Encoder / Decoder IC's**

**Electrical Characteristics**

Parameter	Designation	Min.	Typ.	Max.	Units	Notes
Supply Voltage	Vcc	3.0	--	5.5	VDC	
Supply Current	IDD					
@ 3.0V VCC		---	500	TBD	µA	1
@ 5.0V VCC		---	800	TBD	µA	1
Sleep Current						
@ 3.0V VCC		---	0.1	0.85	µA	
@ 5.0V VCC		---	0.2	0.95	µA	
Input Low Voltage	VIL	GND	---	0.2 VCC	V	2
Input High Voltage	VIH	0.8 VCC	---	VCC	V	3
Output Low Voltage	VOL	---	---	0.6	V	
Output High Voltage	VOH	VCC - 0.7	---	---	V	

**Notes**

1. Current consumption with no active loads
2. For 3V supply, (0.2 x 3.0) = 0.6V max.
3. For 3V supply, (0.8 x 3.0) = 2.4V min.

**Absolute Maximum Ratings**

Ambient temperature under bias.....	-40° to +125°C
Storage temperature .....	-65°C to +150°C
Voltage on VDD with respect to Vss .....	-0.3V to +6.5V
Voltage on MCLR with respect to Vss .....	-0.3V to +13.5V
Voltage on all other pins with respect to Vss .....	-0.3V to (VDD + 0.3V)
Total power dissipation .....	800 mW
Maximum current out of Vss pin .....	300 mA
Maximum current into VDD pin .....	250 mA
Input clamp current, I <sub>IK</sub> (V <sub>I</sub> < 0 or V <sub>I</sub> > V <sub>DD</sub> ).....	± 20 mA
Output clamp current, I <sub>OK</sub> (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>DD</sub> ).....	± 20 mA
Maximum output current sunk by any I/O pin.....	25 mA
Maximum output current sourced by any I/O pin .....	25 mA
Maximum current sunk or sourced by all pins combined .....	200 mA

**Disclaimer**

These devices are not intended for use in applications of a critical nature where safety, life, or property is at risk. The user of this product assumes full liability for the use of this product in all applications. Under no conditions will Reynolds Electronics be responsible for losses arising from the use or failure of the device in any application, other than the repair, replacement, or refund limited to the original product purchase price.

Technical support: Email: [tech@rentron.com](mailto:tech@rentron.com)  
 Sales: [sales@rentron.com](mailto:sales@rentron.com)  
 Distributor inquiries: [sales@rentron.com](mailto:sales@rentron.com)

Copyright © 2006 Reynolds Electronics  
 3101 Eastridge Lane  
 Canon City, CO. 81212  
 Phone: (719) 269-3469  
 Fax: (719) 276-2853  
 Web Site: <http://www.rentron.com>

The R-8P series encoder/decoder IC's are available for purchase online at: <http://www.rentron.com>

