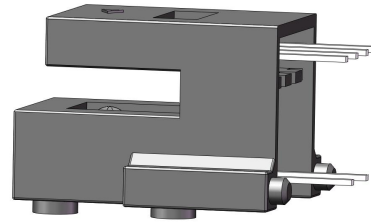




## RK Series

### Optical Encoder

### Data Sheet



#### Description

RK series is a high performance , low cost , two-channel optical incremental encoder module. It consists of a highly collimated light source and a detector IC enclosed in a small C-shaped plastic package, matched with a codewheel or codestrip, it provides information of rotary or linear position.

RK series also has linear (LPI) options: 20, 45, 90,150,180, 300,3 60.

RK series have lots of CPR options based on optical radius(ROP)=11mm, standard CPRs : 100, 200, 360, 600.

#### Features

- Photodetector Array
- -20° C— +85° C Operating Temperature
- Resolution Up to 600 CP
- C-Shape Structure , Easy to Mount
- TTL Compatible
- Single 5V Supply

#### Applications

Typical applications include printers, plotters, copiers, office automation and industrial automation equipment.

*Note: Not recommended for use in safety critical application. Eg. ABS braking system.*

#### Absolute Maximum Ratings

| Parameter                             | Symbol | Range               |
|---------------------------------------|--------|---------------------|
| Storage Temperature                   | Ts     | -40 ° C --- +85 ° C |
| Operating Temperature                 | TA     | -20 ° C --- +85 ° C |
| Supply Voltage                        | Vcc    | -0.5V --- 7V        |
| Soldering Temperature                 |        | ≤260° C (t≤ 5s)     |
| Response Frequency                    | f      | 500KHz              |
| Reverse Voltage                       | Vr     | 10V                 |
| Forward Current (650nm Light Source ) | If     | 30mA                |
| Forward Current (850nm Light Source)  | If     | 70mA                |



## Recommended Operating Conditions

|                       |     |                      |                 |
|-----------------------|-----|----------------------|-----------------|
| Operating Temperature | T   |                      | -20° C -- 85° C |
| Supply Voltage        | Vcc | Ripple voltage<100mV | 4.5V ---- 5.5V  |

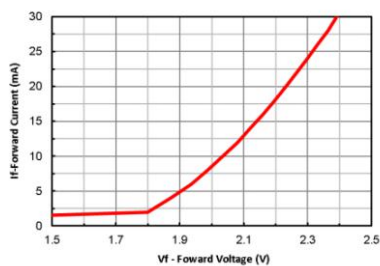
## Electrical Characteristics

### Electrical Characteristics over Recommended Operating Range, Typical at 25 ° C

| Parameter                               | Symbol          | Min. | Typ. | Max. | Units | Condition                             |
|---|-----------------|------|------|------|-------|---------------------------------------|
| Light Source (650nm)<br>Forward Current | Vf              | 1.8  | 2    | 2.3  | V     | If=20mA                               |
| Light Source (850nm)<br>Forward Current | Vf              | 1.4  |      | 1.9  | V     | If=20mA                               |
| Light Source(650nm)<br>Wavelength       | $\lambda_p$     | 650  |      | 660  | nm    | If=20mA                               |
| Light Source(850nm)<br>Wavelength       | $\lambda_p$     | 845  |      | 855  | nm    | If=20mA                               |
| Supply Current                          | I <sub>cc</sub> |      | 10   | 15   | mA    | If=20mA                               |
| Low Level Output Voltage                | V <sub>OL</sub> |      | 0.2  | 0.4  | V     | 2k $\Omega$ Pull-up inside            |
| High Level Output Voltage               | V <sub>OH</sub> | 2.4  | 4.5  |      | V     | 2k $\Omega$ Pull-up inside            |
| A/B Rise Time                           | t <sub>r</sub>  |      | 160  |      | ns    | 2k $\Omega$ Pull-up<br>inside, CL=8PF |
| A/B Fall Time                           | t <sub>f</sub>  |      | 20   |      | ns    | 2k $\Omega$ Pull-up<br>inside, CL=8PF |
| AB Duty Ration                          | Dt              | 40   | 50   | 60   | %     |                                       |
| A/B Phase Difference                    | $\theta$        | 60   | 90   | 120  | °e    |                                       |
| Response Frequency                      | f               |      |      | 200  | KHz   |                                       |

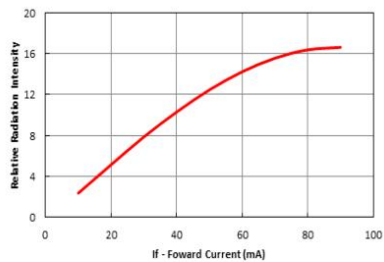


## Light source characteristic curve



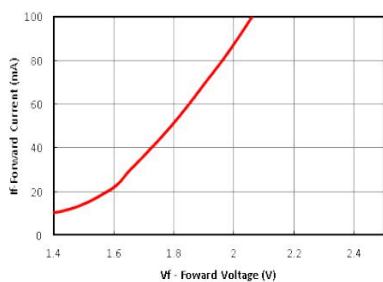
I-V 曲线

Fig.1 650nm Forward voltage and Forward current



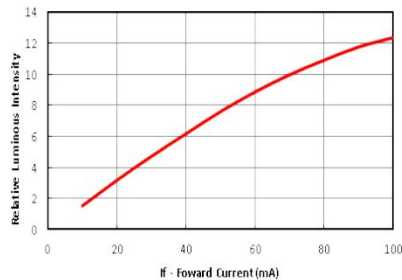
L-I 曲线

Fig.2 650nm Forward Current and Relative Luminescence Intensity



I-V 曲线

Fig.3 850nm Forward voltage and Forward current



L-I 曲线

Fig.4 850nm Forward Current and Relative Luminescence Intensity

## A/B Output Waveform Diagram

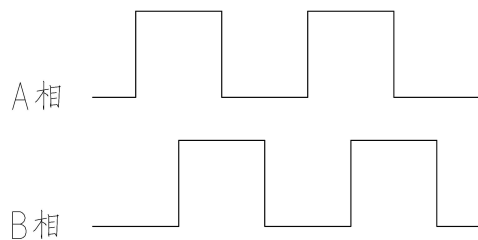


Fig.5 A/B Output Waveform ---Clockwise



## Straight Lead Dimensions (Unit: mm)

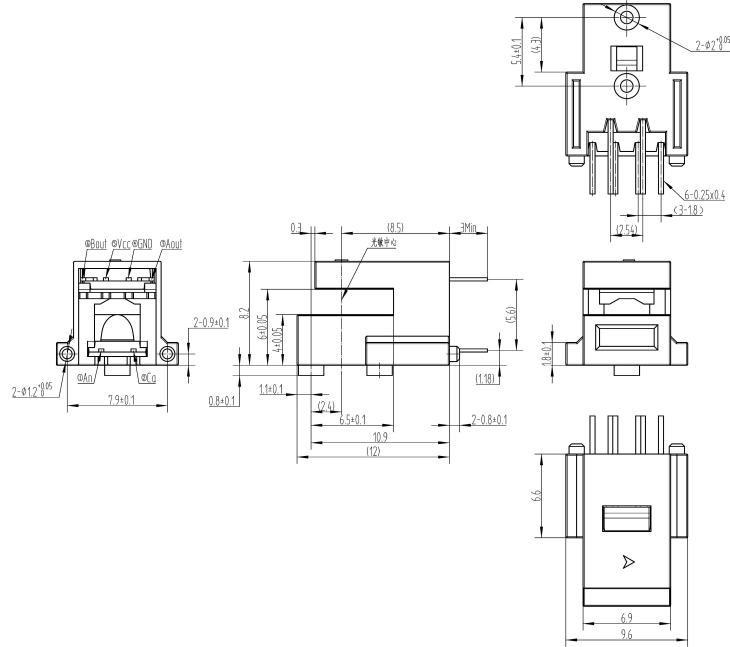


Fig.6. Straight Lead Dimensions

## Bent Lead Dimensions (Unit:mm)

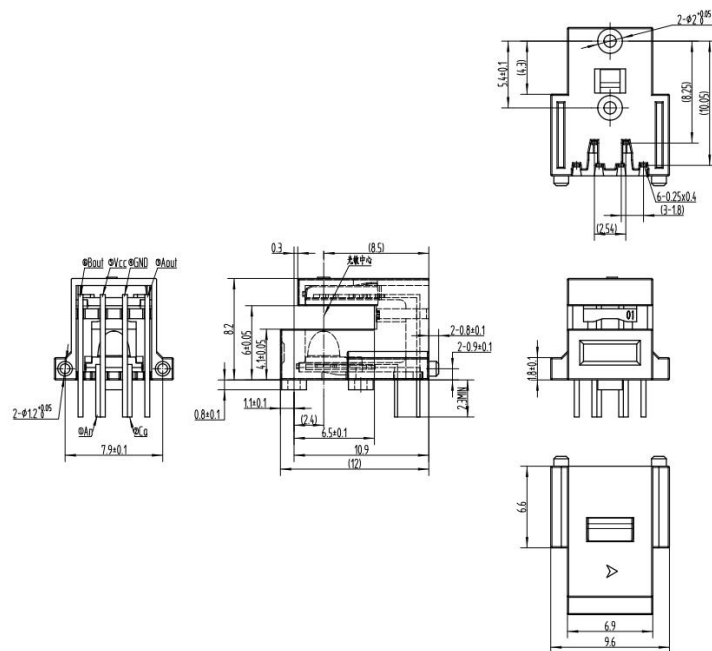


Fig. 7. Bent Lead Dimension



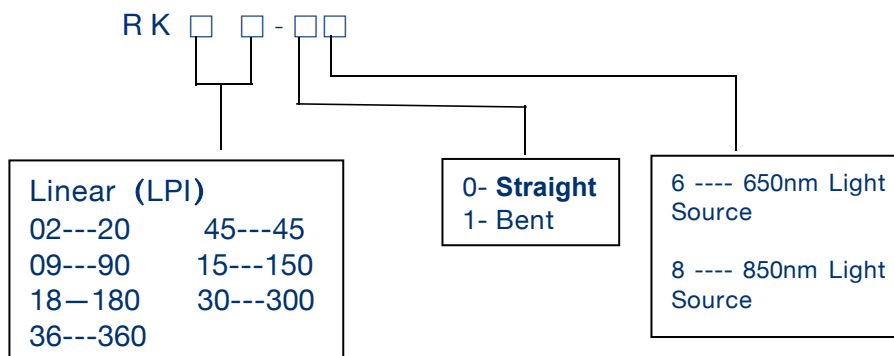
## Pin Definition

| Pin Name  | Function   | Input/Output |
|-----------|--|--------------|
| <b>An</b> | Positive pole of light source (240 ohm current limiting resistor is recommended, VCC=5V) |              |
| <b>Ca</b> | Negative pole of light source  |              |
| Vcc       | Power Supply+, 5V  | Power Supply |
| Aout      | A Channel output, 2kΩ Pull-up inside   | Output       |
| Bout      | B Channel output, 2kΩ Pull-up inside   | Output       |
| Gnd       | Ground   | Ground       |

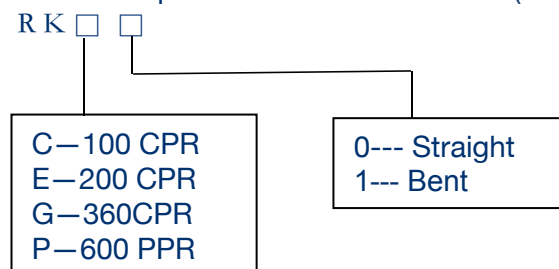
## Ordering Information

RK series has multiple options, including linear and optical radius (ROP)=11mm, as shown in the following table

### Linear Option(s) - LPI



### Module option with optical radius ROP=11mm (650nm light source)



Option examples:

If 90 LPI infrared elbow module is the option, the model is: RK09-18-18

If the red light straight lens module with ROP=11 of 600 pulses is the option, the model is RKPO