Mini Reflector (Plastic mold type)

NJL5161K NJL5162K NJL5175K NJL5191K NJL5198K	NJL5161K-F10 NJL5162K-F10 NJL5175K-F10 NJL5191K-F10 NJL5198K-F10 NJL5181K-F10 NJL5196K-F10	NJL5161K-F1 NJL5162K-F1 NJL5175K-F1 NJL5191K-F1 NJL5198K-F1
NJL5163K NJL5164K NJL5177K NJL5193K NJL5199K	NJL5163K-F10 NJL5164K-F10 NJL5177K-F10 NJL5193K-F10 NJL5199K-F10 NJL5183K-F10 NJL5194K-F10 NJL5197K-F10	NJL5163K-F1 NJL5164K-F1 NJL5177K-F1 NJL5193K-F1 NJL5199K-F1
NJL5181K-F20 NJL5196K-F20		NJL5196K-F25
NJL5183K-F20 NJL5194K-F20 NJL5197K-F20		NJL5197K-F25
NJL5165K NJL5166K		NJL5167K NJL5168K
NJL5171K NJL5172K		NJL5171K-F NJL5172K-F
NJL5801K NJL5802K NJL5803K NJL5804K NJL5805K NJL5809K		NJL5801K-F1 NJL5802K-F1 NJL5803K-F1 NJL5804K-F1 NJL5805K-F1 NJL5809K-F1

Figure 1 Outline and Lead Arrangement

PRODUCT EXPLANATION

1. Structure

The photo reflector with infrared light emitting diode and light detecting element in a package is the sensor that detects the reflective object by sensing the light reflected by the object (Figure 2). Light emitting diode is the liquid phase epitaxial GaAs which offers high power and long life as the feature and light detecting element is Si NPN photo transistor in which offer high sensitivity as the feature. Since the IR transparent epoxy resin used in the package has the dyes as the ingredient which cut visible light, the reflector receives no impact of visible light. The resin selected by the consideration of reliability against moisture and temperature stress offers high reliability as the device.

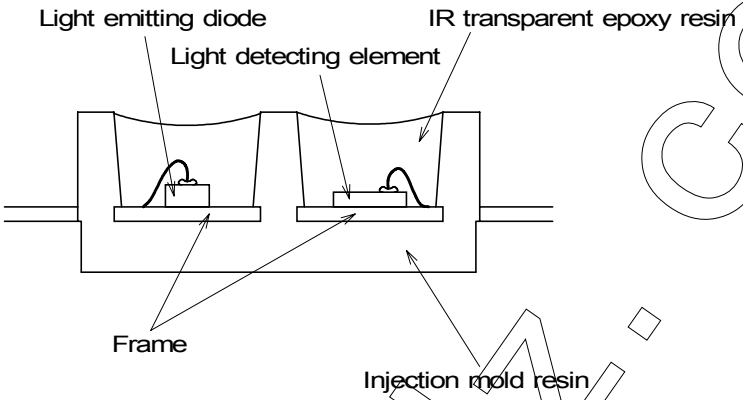

Figure 2 NJL5191K Internal structure

2. Fundamental Characteristics

2-1. Output current characteristics

The output current is shown by the photo transistor collector current as the function of the light emitting diode current. Since this characteristics is changed by reflective factor of the object and distance to the object. The characteristics is measured as specified below by manufacture. For instance, the object current of photo reflector is classified into 3 ranks and stated individual specification.

2-2. Distance characteristics

The characteristics is the output current as the function of the distance between the photo reflector and reflective object (Fig. 3). The Figure 3 shows the change of the output current by the distance to the object, the focal distance (most proper distance to the object) and the focal depth (distance width at 50% relative output current). The photo reflectors with various focal distance are provided for your application convenience.

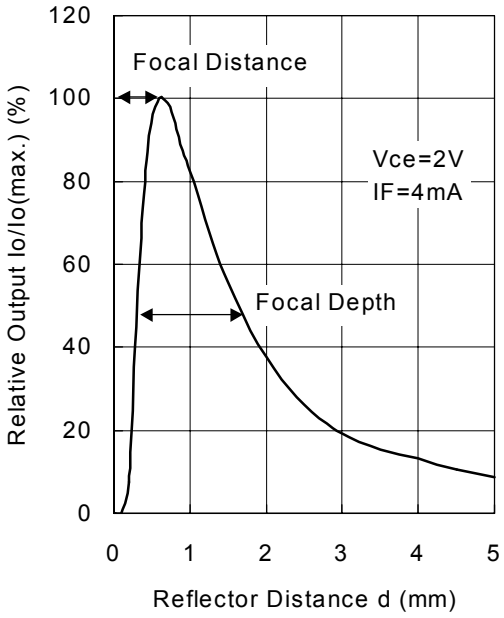

Figure 3 Output current vs. Distance (Ta=25°C)

2-3. Resolution

The Figure 4 shows the change of the relative output current in case that the object edge is moved in parallel to the sensing surface of the photo reflector. The resolution is provided by the moving distance of the object edge when the relative output current between 10% and 90% (Figure 5).

Since the resolution depends on reflective factor of the object surface and distance to the object, special care is recommended in designing the device into the application (In general, the resolution on the paper is less than that on the mirror).

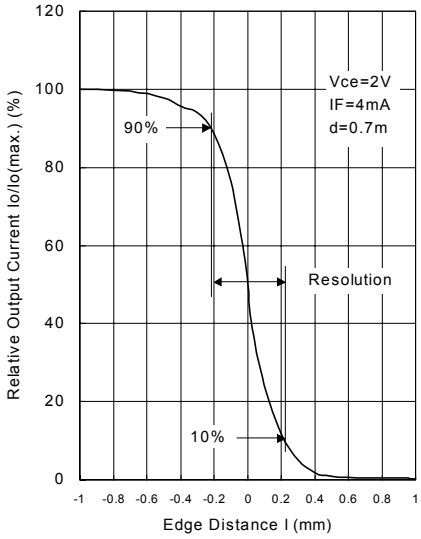

Figure5 Output current vs. Edge Distance (Ta=25°C)

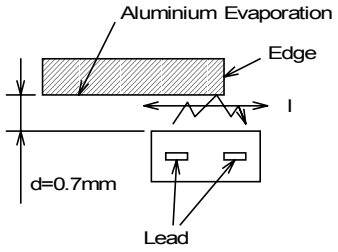

Figure4 Measuring Specification for Edge Response

3. General care

Since the light path is built outside of elements from light emitter to light detector, the following cares are recommended to take.

3-1. Reflective characteristics of the object

Since the output current characteristics of the photo reflector depends on reflective factor of the object surface, recommendation is made in selecting the mirror type surface with large reflective factor to get large output current.

3-2. Interference of ambient light

The photo reflector which has visible light cut off filter in it is not interfered by the ambient light. However, it is interfered by infrared except the light from light emitting diode, so it is required to take care to reduce it depending your application.

4. Special care required in designing the circuit

In designing the circuit using the photo reflector, the care is recommended to take on the following 4-1 and 4-2 because of it's own output characteristics.

4-1. Relative output current as function of ambient temperature

The output current of the photo reflector changes by the temperature. Figure 6 shows the temperature characteristics of the relative output current efficiency (Output current / Output current at 25°C X 100). The light emitting of the LED has negative temperature coefficient while the hFE of the transistor has positive one. Accordingly, the photo reflector which is combination of both works like offsetting the temperature variation. It is, therefore, recommended to consider to set up the relative output current to be 80% at the worst of the output current at 25°C.

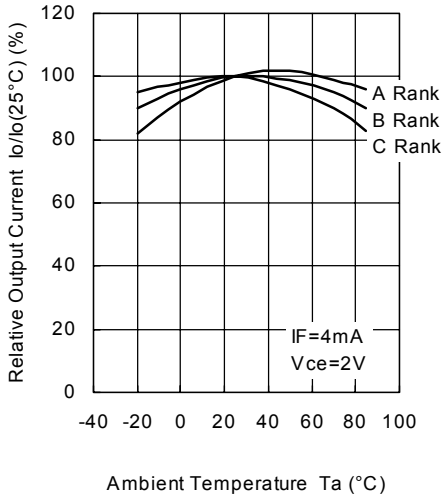

Figure 6 Output current vs. Ambient Temperature

4-2. Output current as function of the forward current

The output current of the photo reflector changes by forward current of the light emitting diode as shown in Figure 7. At the forward current of the LED to be 4mA and above, the changes are proportional, but the care should be taken at less than 4mA, because the changes are not proportional and it is unlikely to get the current as desired.

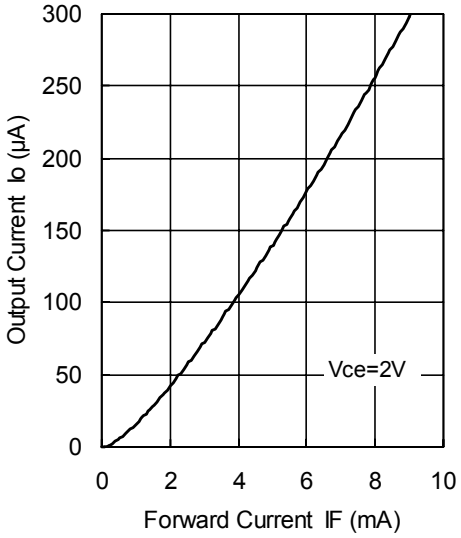

Figure 7 Output Current vs. Forward Current (Ta=25°C)

5. Special type of the photo reflectors also available

In order to improve the optical characteristics of the photo reflector, the other products with specially designed lens are also available. They are suitable for the application in which the object is remote (detection of facsimile paper or barcode reader). The followings show the outline of the characteristics.

	NJL5165KL
Output Current	1mA ~ 5mA
Focal Distance	≈ 4.0mm

For more details, refer to individual specification. NJRC will honor for the photo reflector with specially designed lens.

6. Marking

NJRC applies ink mark or laser mark, or both to photo reflector products.