

GENERAL PURPOSE PHOTO REFLECTOR

■ GENERAL DESCRIPTION

The NJL5194K is super miniature and super thin general purpose photo reflector, which can be soldering by reflow method. This device attains high durability after reflow same as NJL5181K/5183K, and consists of high output infrared emitting and high sensitive Si photo darlington transistor, and attains high cost performance. In order to prevent from degradation of this device in moisturing at reflow method, so that keep the precaution for handling.

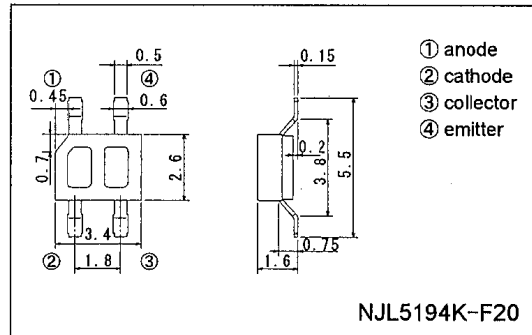
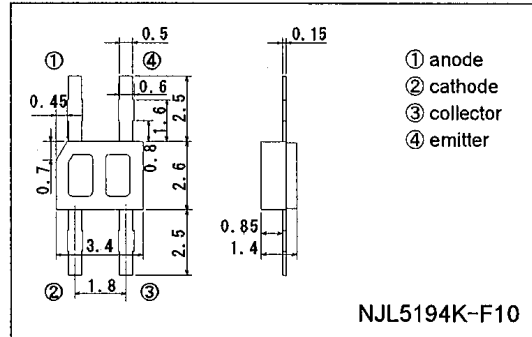
■ FEATURES

- Super miniature, super thin type
- Built-in visible light cut-off filter.
- High output, high S/N ratio.

■ APPLICATIONS

- End detector of video, audio tape.
- Rotation detection and control of various motors, audio turntables.
- Paper edge detection and mechanism timing detection of facsimile printer, X-Y recorder.
- Reading film information and mechanism timing detection of camera.
- Reading out the characters of bar code reader, encoder and the automatic vending machine.
- Various detection of industrial system, such as FDD, Robot.

■ OUTLINE (typ.) Unit:mm



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■ ABSOLUTE MAXIMUM RATINGS (Ta=25 °C)

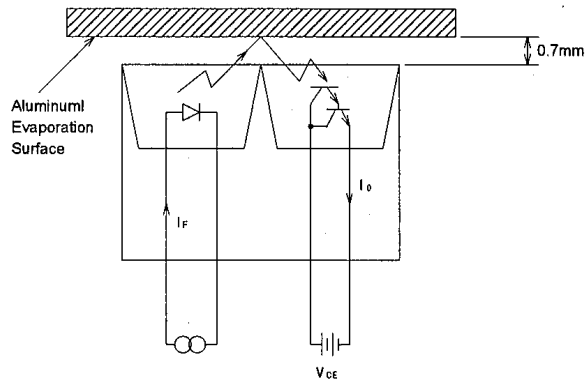
| PARAMETER | SYMBOL | RATINGS | UNIT |
|------------------------------|-----------|------------------------------|------|
| Emitter | | | |
| Forward Current (Continuous) | I_F | 30 | mA |
| Reverse Voltage (Continuous) | V_R | 6 | V |
| Power Dissipation | P_D | 45 | mW |
| Detector | | | |
| Collector-Emitter Voltage | V_{CEO} | 16 | V |
| Emitter-Collector Voltage | V_{ECO} | 6 | V |
| Collector Current | I_C | 20 | mA |
| Collector Power Dissipation | P_C | 50 | mW |
| Coupled | | | |
| Total Power Dissipation | P_{tot} | 80 | mW |
| Operating Temperature | T_{opr} | -20~+85 | °C |
| Storage Temperature | T_{stg} | -30~+85 | °C |
| Soldering Temperature | T_{sol} | 260 (10sec. 1.5mm from body) | °C |

■ ELECTRO-OPTICAL CHARACTERISTICS (Ta=25 °C)

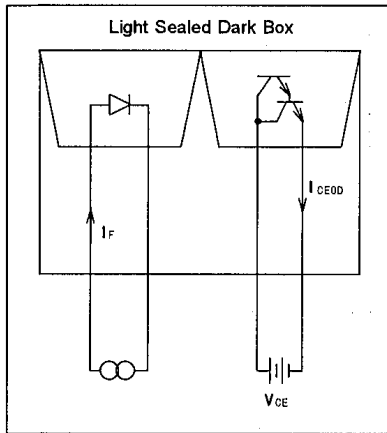
| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---------------------------|-------------|---|------|------|------|---------|
| Emitter | | | | | | |
| Forward Voltage | V_F | $I_F=4mA$ | — | — | 1.4 | V |
| Reverse Current | I_R | $V_R=6V$ | — | — | 10 | μA |
| Capacitance | C_t | $V_R=0V, f=1MHz$ | — | 25 | — | pF |
| Detector | | | | | | |
| Dark Current | I_{CEO} | $V_{CE}=10V$ | — | — | 1 | μA |
| Collector-Emitter Voltage | V_{CEO} | $I_C=100\mu A$ | 16 | — | — | V |
| Coupled | | | | | | |
| Output Current | I_o | $I_F=4mA, V_{CE}=2V, d=0.7mm$ | 1.6 | — | — | mA |
| Operating Dark Current | $I_{CEO D}$ | $I_F=4mA, V_{CE}=2V$ | — | — | 1 | μA |
| Rise Time | t_r | $I_o=10mA, V_{CE}=2V, R_L=100\Omega, d=0.7mm$ | — | 100 | — | μS |
| Fall Time | t_f | $I_o=10mA, V_{CE}=2V, R_L=100\Omega, d=0.7mm$ | — | 70 | — | μS |

MEASURING SPECIFICATION FOR OUTPUT CURRENT

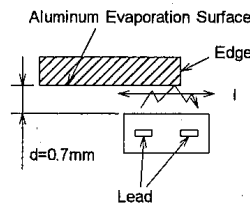
The output current can be measured when reflected at the aluminum



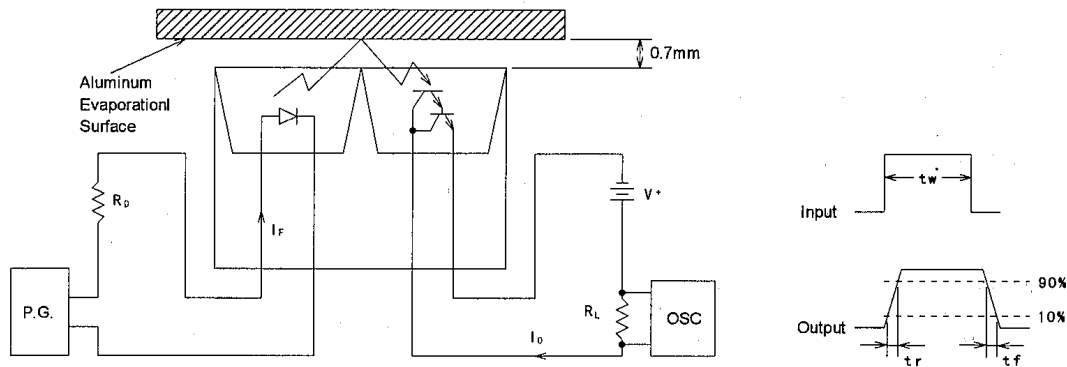
MEASURING CIRCUIT FOR OPERATING DARK CURRENT



MEASURING SPECIFICATION FOR EDGE RESPONSE

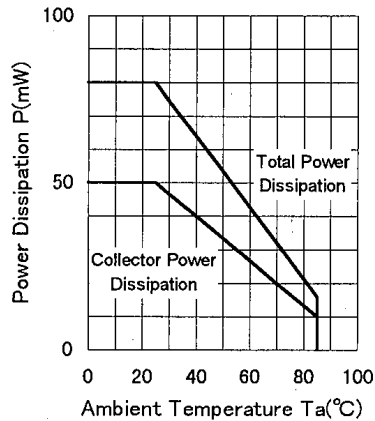


MEASURING CIRCUIT FOR RESPONSE TIME

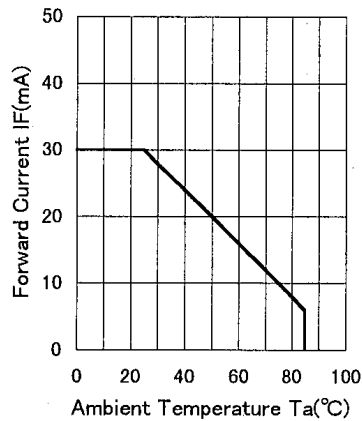


MAXIMUM RATING CURVES

Power Dissipation vs. Temperature



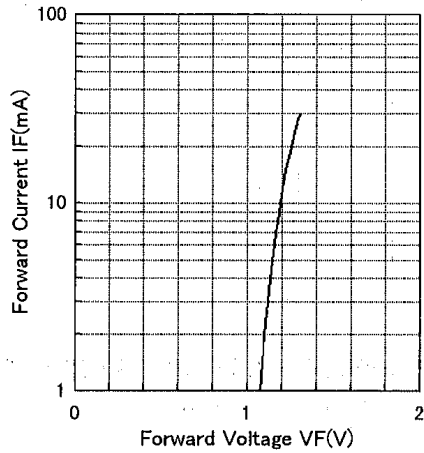
Forward Current vs. Temperature



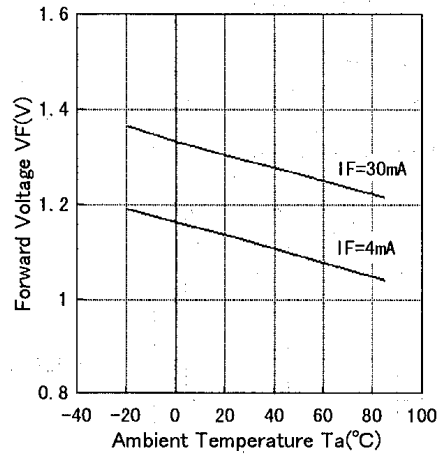
TYPICAL CHARACTERISTICS

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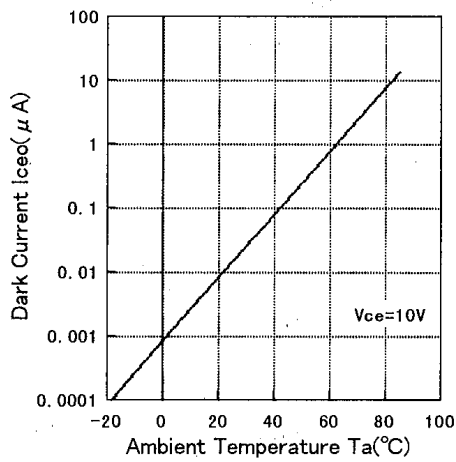
Forward Current vs. Forward Voltage



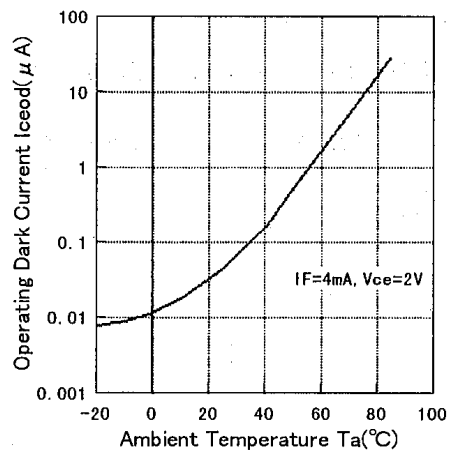
Forward Voltage vs. Temperature



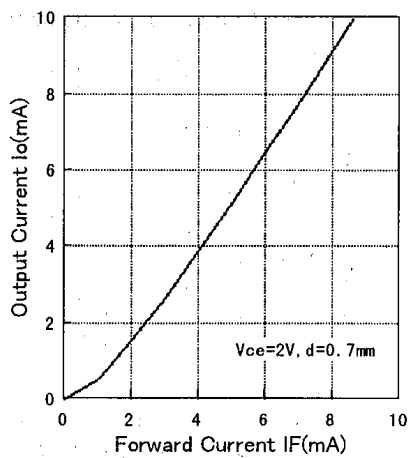
Dark Current vs. Temperature



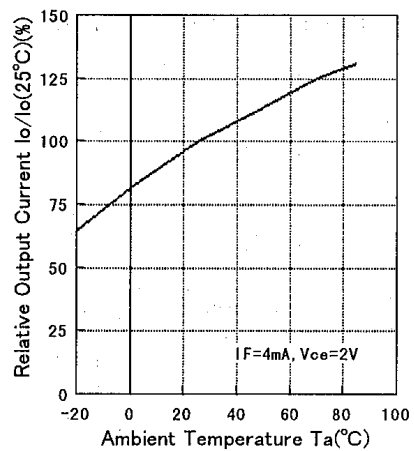
Operating Dark Current vs. Temperature



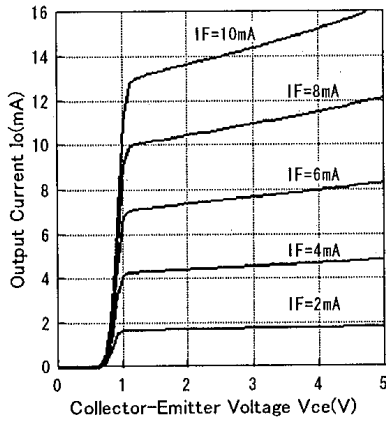
Output Current vs. Forward Current ($T_a = 25^\circ\text{C}$)



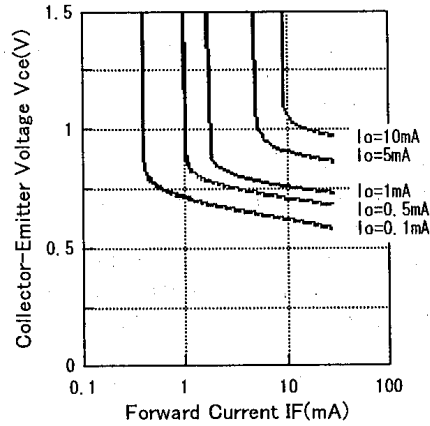
Output Current vs. Temperature



Output Characteristics (Ta=25 °C)

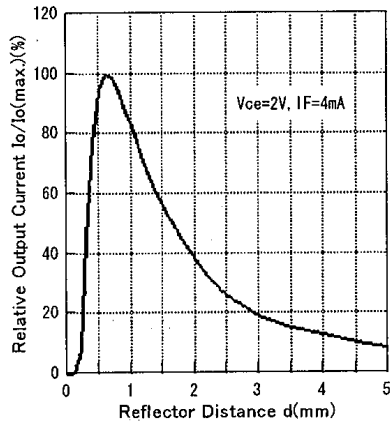


Vce Saturation (Ta=25 °C)

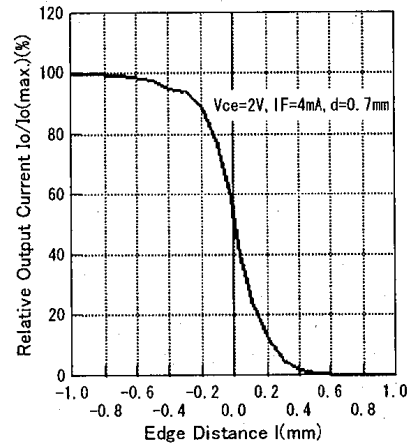


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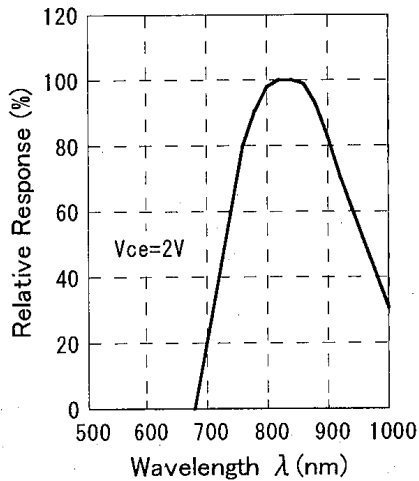
Output Current vs. Distance (Ta=25 °C)



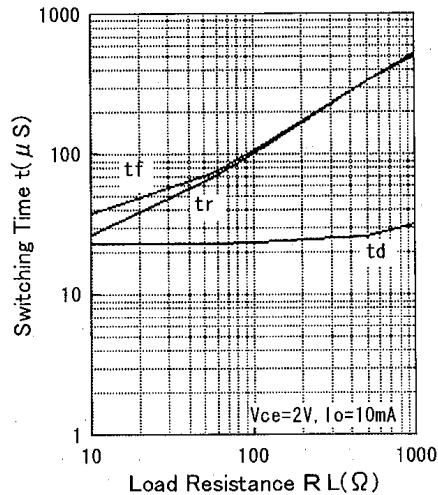
Output Current vs. Edge Distance (Ta=25 °C)



Spectral Response (Ta=25 °C)



Switching Time vs. Load Resistance (Ta=25 °C)



PRECAUTION FOR HANDLING

1. Soldering to actual circuit board

Soldering condition

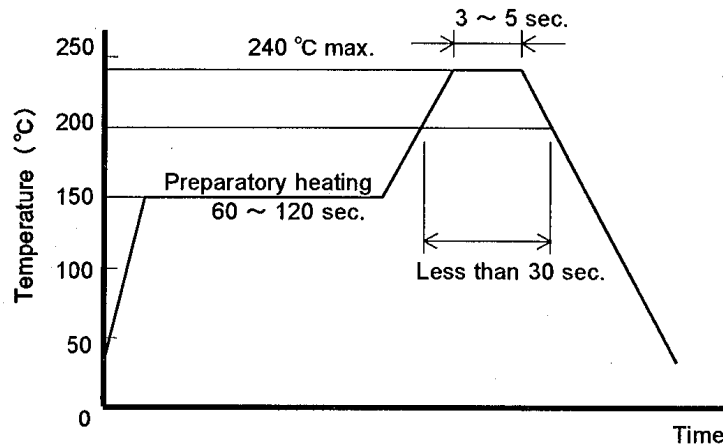
- Lead's of soldering temperature and heating time.
260 °C maximum, less than 10 seconds, at least 1.5mm from body.
- Heated condition of plastic package.
Lower than 240 °C of maximum surface temperature, less than 30 seconds of time kept higher than 200 °C.

Soldering Method

1) Reflow Method

Recommended temperature profile of its method.

- ① Preparatory heating condition : 120 ~ 150 °C about 60 sec.
- ② Recommended soldering temperature : 230 ~ 240 °C about 3 ~ 5 sec.
- ③ Slowly cool down right after soldering.
- ④ Soldering to be done within twice under this condition.



2) Reflow Method (In case of infrared heating)

- Temperature profile : Same to the above
- Avoid direct irradiation to the plastic package because it is black colored, absorbs the Infrared Radiation and its surface temperature will be higher than lead itself.

3) The other method

Avoid rapid heating up like dipping the devices directly into the melting solder or vapor phase method.

(VPS)

If the device is heated to high temperature and kept in its condition for longer time, it would affect to its reliability. It is necessary to solder in short time as soon as possible.

2. Cleaning

Avoid washing of the device after soldering by reflow method.

3. Attention in handling

- 1) Treat not to touch the lens surface.
- 2) Avoid dust and any other foreign materials (paint, bonding material, etc.) on the lens surface.
- 3) Never to apply reverse voltage (V_{EC}) of more than 6V on the photo transistor when measuring the characteristics or adjusting the system. If applied, it causes to lower the sensitivity.
- 4) When mounting, special care has to be taken on the mounting position and tilting of the device because it is very important to place the device to the optimum position to the object.

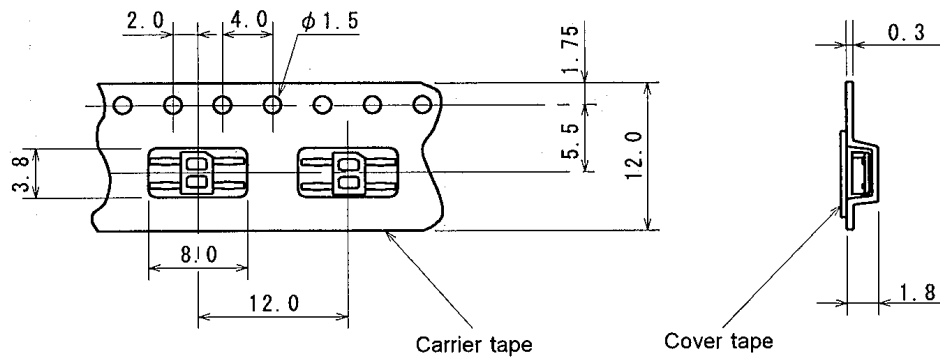
4. Storage

In order to prevent from degradation of this device in moisturing at reflow method, so that this device is contained in dampproof packaging. And the leads are silver plated and they are discolored if the device is left open to the air for long after taken out of the envelope. It causes deterioration of soldering characteristics. So that mount the device as short as possible after opening the envelope.

1. Taping Size

- 1) Carrier tape is used with Styrene type Carbonated Plastic.
- 2) Cover tape is used with electro statistically prevention treated Polyester type tape.
- 3) Product taping direction is to place the index mark against the pull out direction of the tape as in the drawing.

Pull out direction of tape →



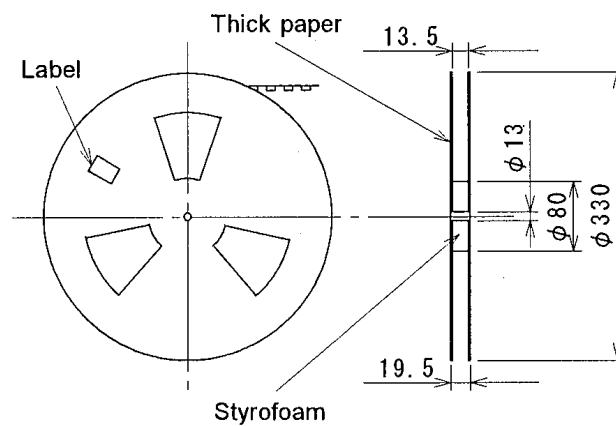
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2. Taping Strength

Pullup the cover tape from the carrier tape, and when the opening angle comes around 10 ~ 15°, and the peeling-off strength is to be within the power of 20 ~ 70g.

3. Packaging

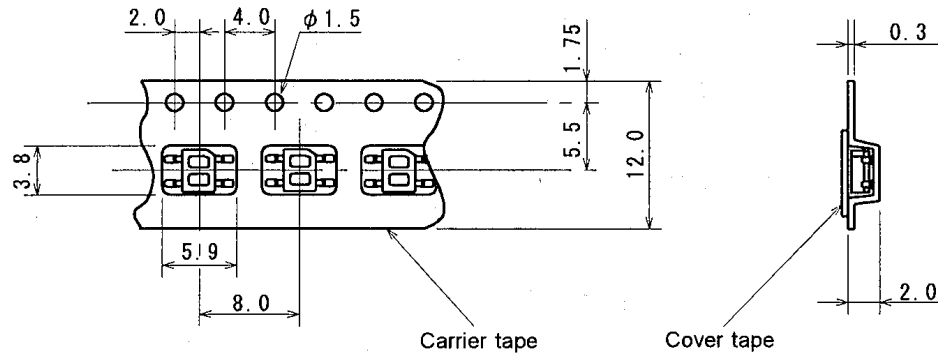
- 1) The taped products are to be rolled up on the taping reel as on the drawing.
- 2) Rolling up specification
 - ① Start Rolling : Carrier tape open space more than 20 Pieces.
 - ② End of Rolling : Carrier tape open space more than 20 Pieces, and 2 round of reel space at the cover tape only.
- 3) Taping quantity : 3,000 Pieces
- 4) Seal off after putting each reels in a vinyl bag with silica gel (3 bags).



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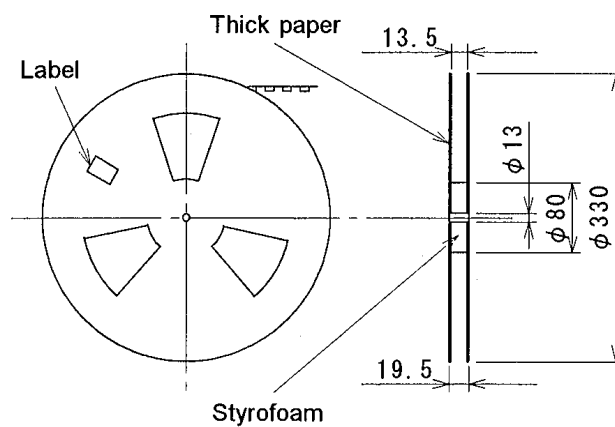
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- 3) Taping quantity : 4,000 Pieces
- 4) Seal off after putting each reels in a vinyl bag with silica gel (3 bags).



NJL5194K

MEMO

[CAUTION]

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New Japan Radio Co., Ltd.