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Pb-free  
HEAT



## 161/163 Series

Numeric Display/Case Size 12.5 x 19.0 mm

### Features

|                   |  |
|-------------------|--|
| Case Size         | 12.5 x 19.0 mm (W x H)   |
| Product features  | <ul style="list-style-type: none"><li>• Each color has anode common and cathode common respectively.</li><li>• A black case and a gray case are available.</li><li>• Lead-free soldering compatible</li><li>• RoHS compliant</li></ul> |
| Peak wavelength   | Green : 565nm<br>Orange : 605nm<br>Red : 660nm   |
| Number of Digit   | 1 Digit  |
| Segment Shape     | Arrow Feather Type   |
| Character Height  | 15.24 mm   |
| Die materials     | Green : GaP<br>Orange : GaAsP<br>Red : GaAlAs  |
| Soldering methods | TTW (Through The Wave) soldering and manual soldering  |
| ESD               | More than 2kV(HBM)   |
| Packing           | Tray   |

### Recommended Applications

Amusement Equipment, Electric Household Appliances, Other General Applications

## Emitted Color

| Part No.            |                    |                     |                    | Material | Emitted Color | Chip/<br>Segment |
|---------------------|--------------------|---------------------|--------------------|----------|---------------|------------------|
| Anode Common        |                    | Cathode Common      |                    |          |               |                  |
| Case Color<br>Black | Case Color<br>Gray | Case Color<br>Black | Case Color<br>Gray |          |               |                  |
| NAG161P-B           | NAG163P-B          | NKG161P-B           | NKG163P-B          | GaP      | Green         | 1                |
| NAA161-B            | NAA163-B           | NKA161-B            | NKA163-B           | GaAsP    | Orange        | 1                |
| NAR161-B            | NAR163-B           | NKR161-B            | NKR163-B           | GaAlAs   | Red           | 1                |
| NAR161-C            | NAR163-C           | NKR161-C            | NKR163-C           | GaAlAs   | Red           | 1                |

## Absolute Maximum Ratings

(Ta=25°C)

| Item                            | Symbol            | Absolute Maximum Ratings |         |         | Unit   |
|---------------------------------|-------------------|--------------------------|---------|---------|--------|
|                                 |                   | Green                    | Orange  | Red     |        |
| Power Dissipation               | Pd                | 63                       | 63      | 60      | mW/seg |
| Forward Current                 | I <sub>F</sub>    | 25                       | 25      | 30      | mA/seg |
| Pulse Forward Current ※1        | I <sub>FRM</sub>  | 100                      | 100     | 120     | mA/seg |
| Derating<br>(Ta=25°C or higher) | ΔI <sub>F</sub>   | 0.34                     | 0.34    | 0.41    | mA/°C  |
|                                 | ΔI <sub>FRM</sub> | 1.35                     | 1.35    | 1.64    | mA/°C  |
| Reverse Voltage                 | V <sub>R</sub>    | 4                        | 4       | 4       | V      |
| Operating Temperature           | T <sub>opr</sub>  | -40~+85                  | -40~+85 | -40~+85 | °C     |
| Storage Temperature             | T <sub>stg</sub>  | -40~+85                  | -40~+85 | -40~+85 | °C     |

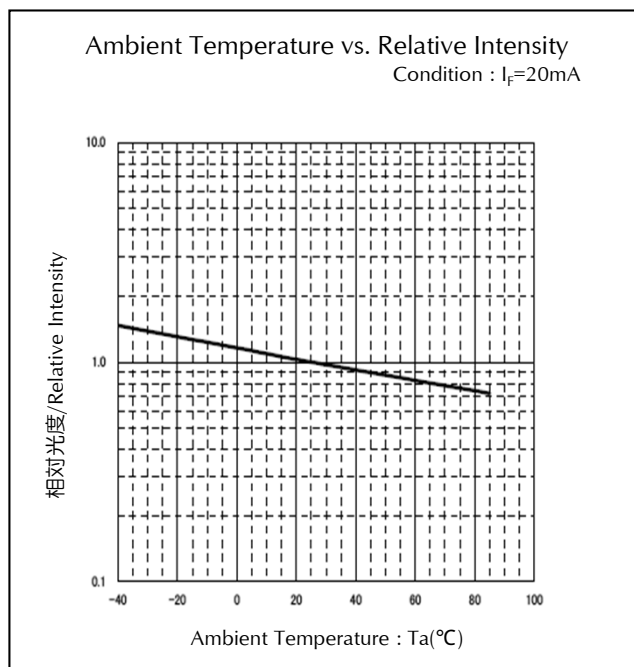
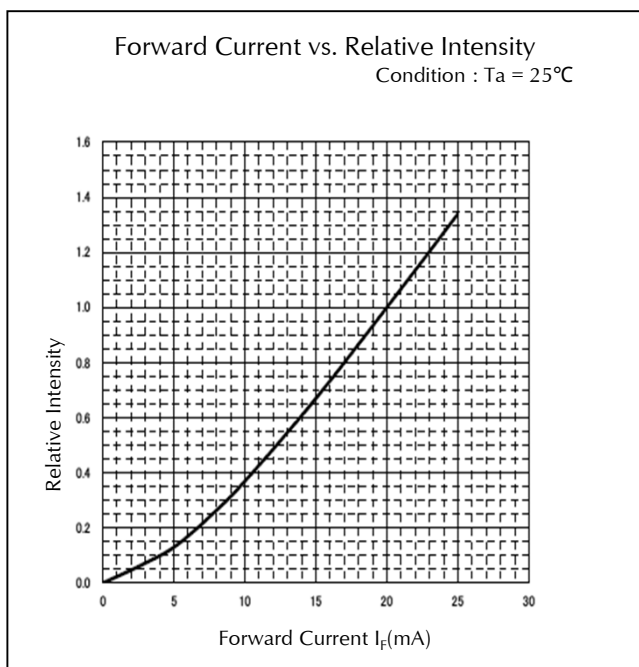
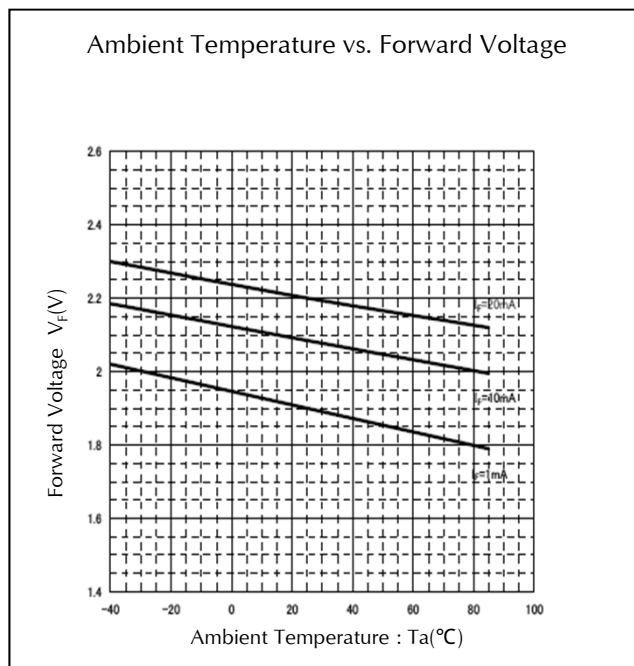
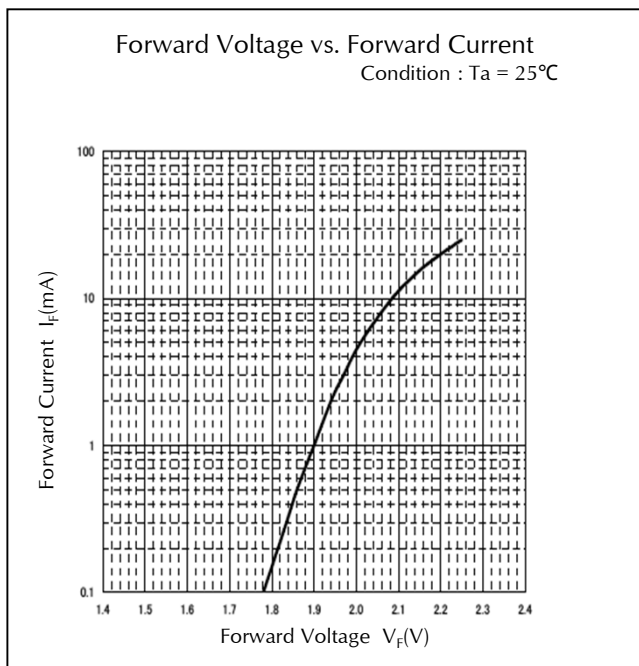
 ※1 I<sub>FRM</sub> Measurement condition : Duty 1/5, f = 1kHz

## Electro-Optical Characteristics

(Ta=25°C)

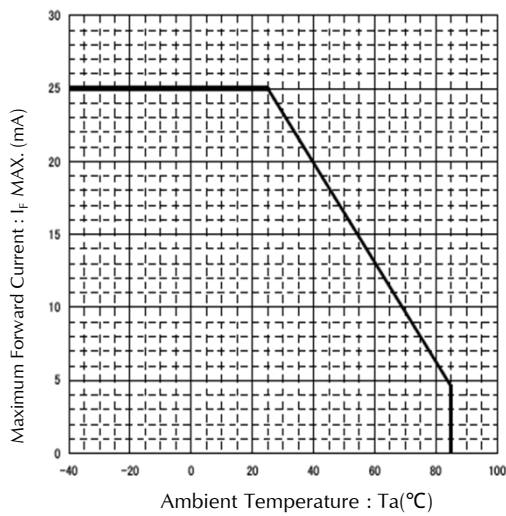
| Item                               | Conditions           | Symbol         |      | Characteristics |        |     | Unit    |
|------------------------------------|----------------------|----------------|------|-----------------|--------|-----|---------|
|                                    |                      |                |      | Green           | Orange | Red |         |
| Luminous Intensity<br>(-B Product) | I <sub>F</sub> =20mA | I <sub>V</sub> | MIN. | 2               | 4      | 6   | mcd/seg |
|                                    |                      |                | TYP. | 4               | 8      | 12  |         |
| Luminous Intensity<br>(-C Product) | I <sub>F</sub> =20mA | I <sub>V</sub> | MIN. | -               | -      | 12  | mcd/seg |
|                                    |                      |                | TYP. | -               | -      | 15  |         |
| Forward Voltage                    | I <sub>F</sub> =20mA | V <sub>F</sub> | TYP. | 2.2             | 2.2    | 1.7 | V/seg   |
|                                    |                      |                | MAX. | 2.5             | 2.5    | 2.0 |         |
| Reverse Current                    | V <sub>R</sub> =4V   | I <sub>R</sub> | MAX. | 100             | 100    | 100 | μA/seg  |
| Peak Wavelength                    | I <sub>F</sub> =20mA | λ <sub>p</sub> | TYP. | 565             | 605    | 660 | nm      |
| Spectral Line Half Width           | I <sub>F</sub> =20mA | Δλ             | TYP. | 30              | 30     | 30  | nm      |

## Technical Data(Green)

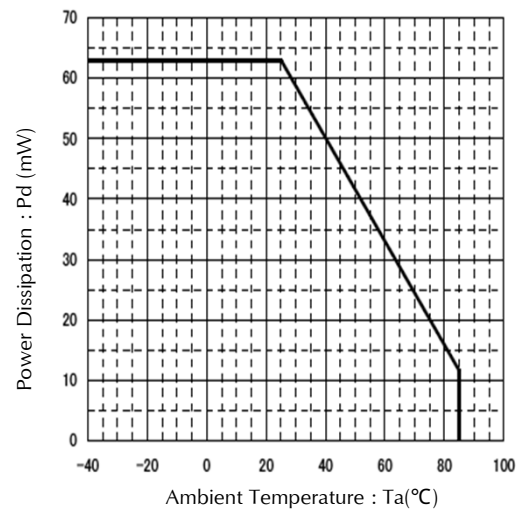


## Technical Data(Green)

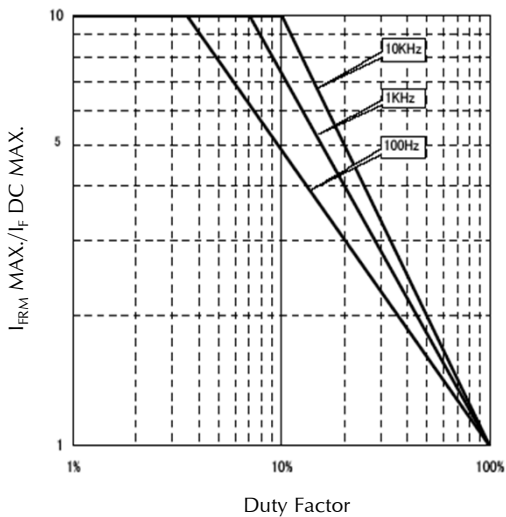
Ambient Temperature vs. Maximum Forward Current



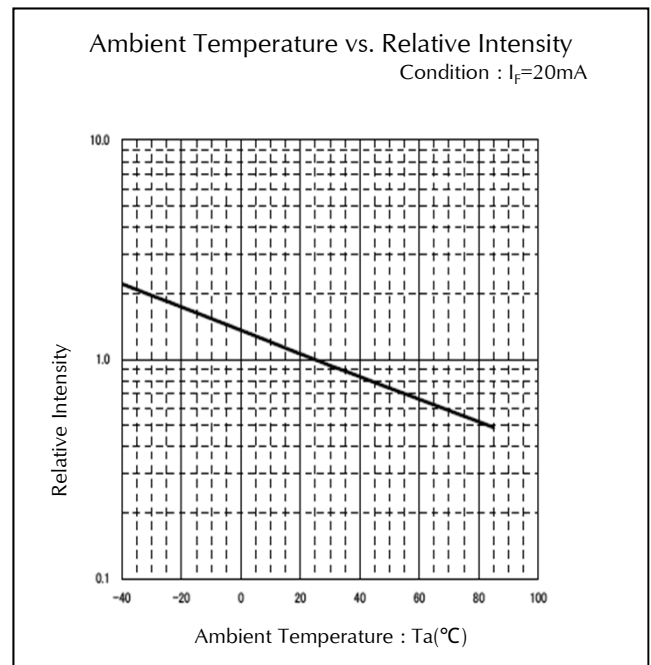
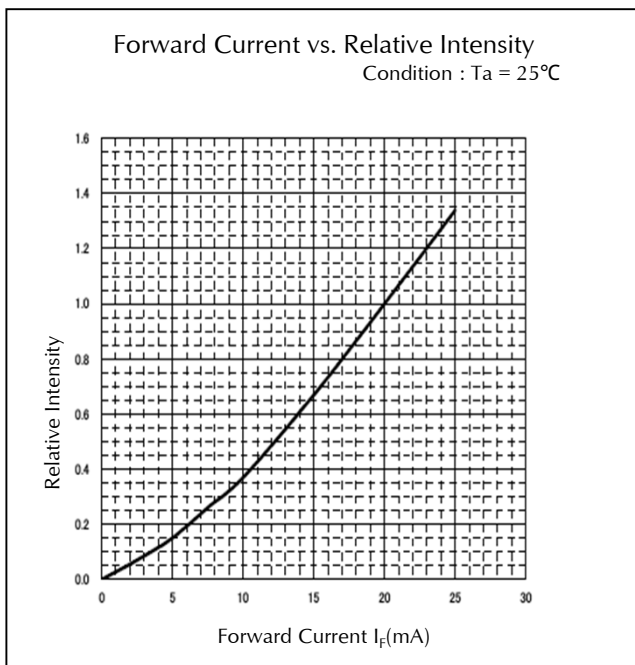
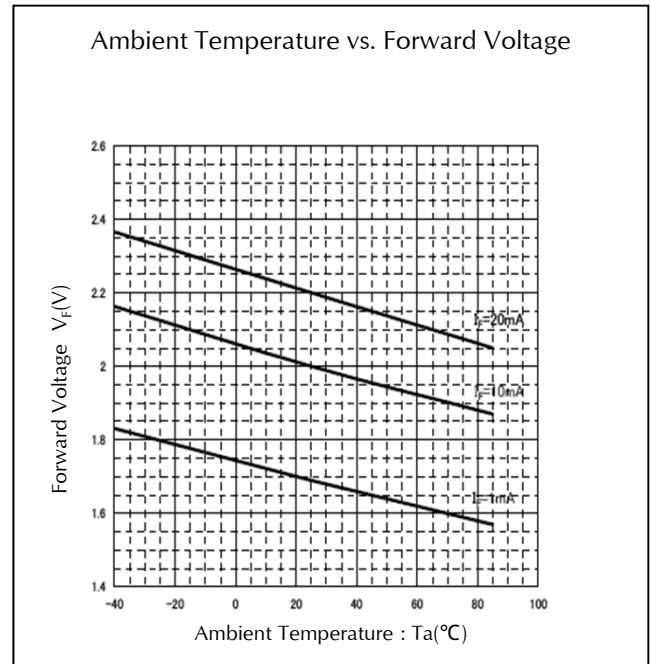
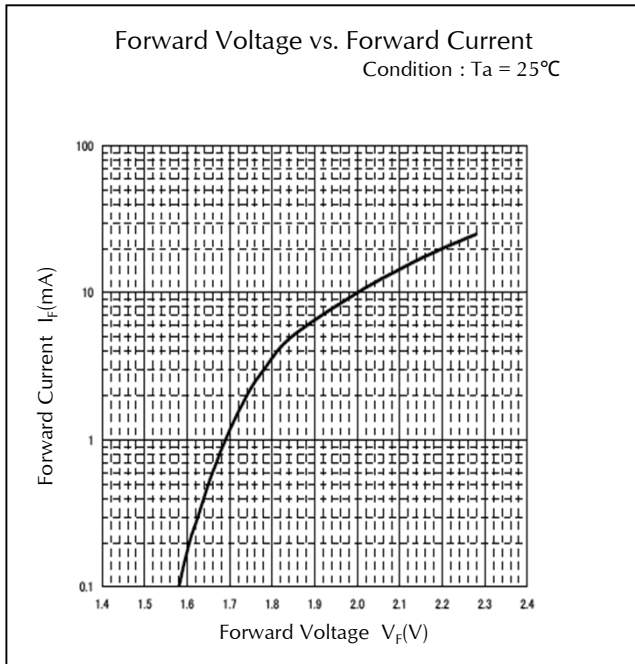
Ambient Temperature vs. Power Dissipation



Duty Factor vs. Maximum Tolerable Pulse Forward Current  
Condition : Ta = 25°C

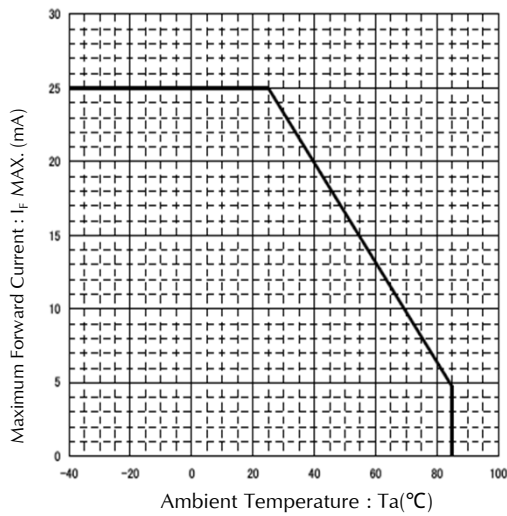


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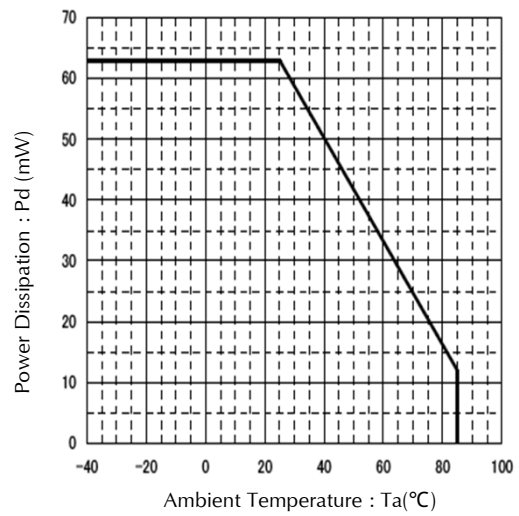


## Technical Data(Orange)

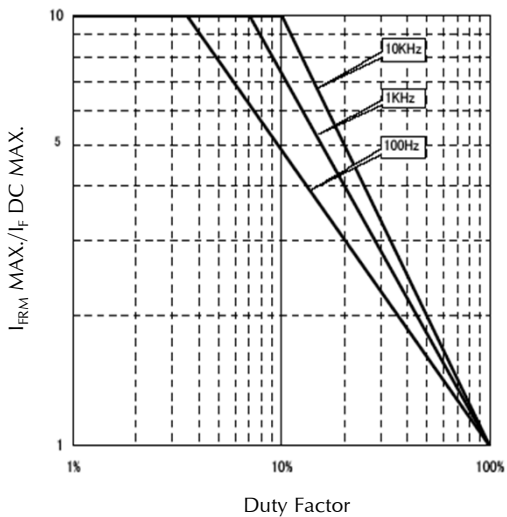
Ambient Temperature vs. Maximum Forward Current



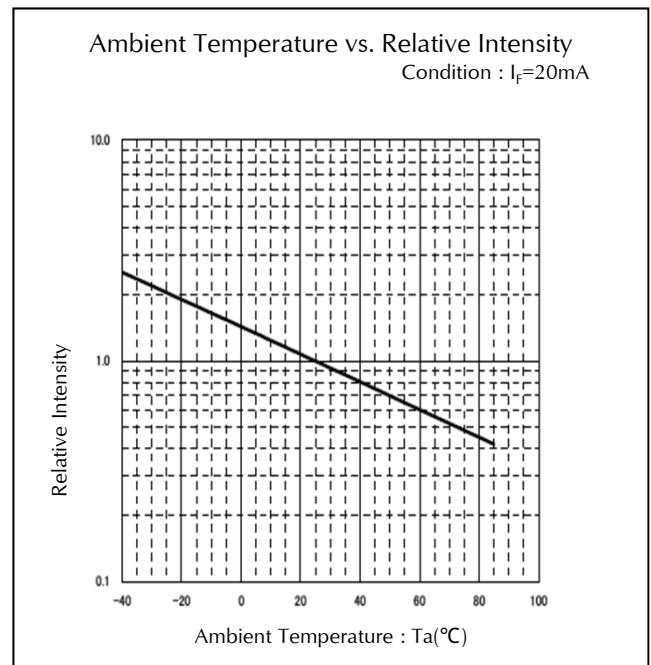
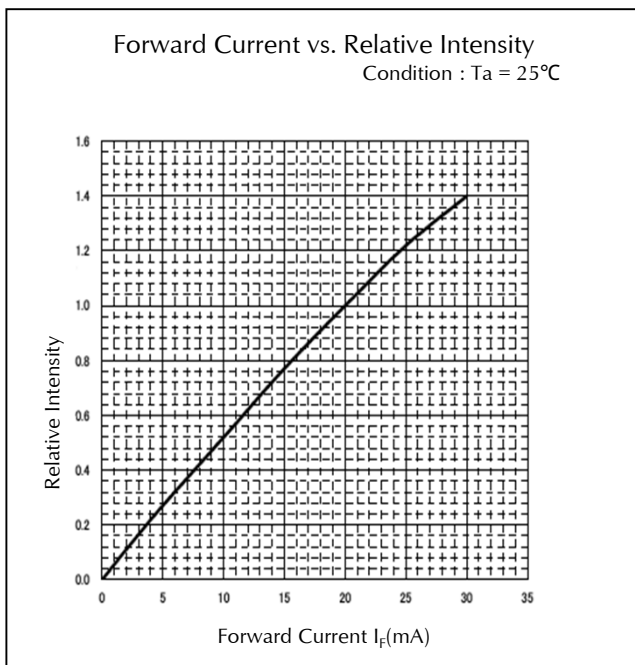
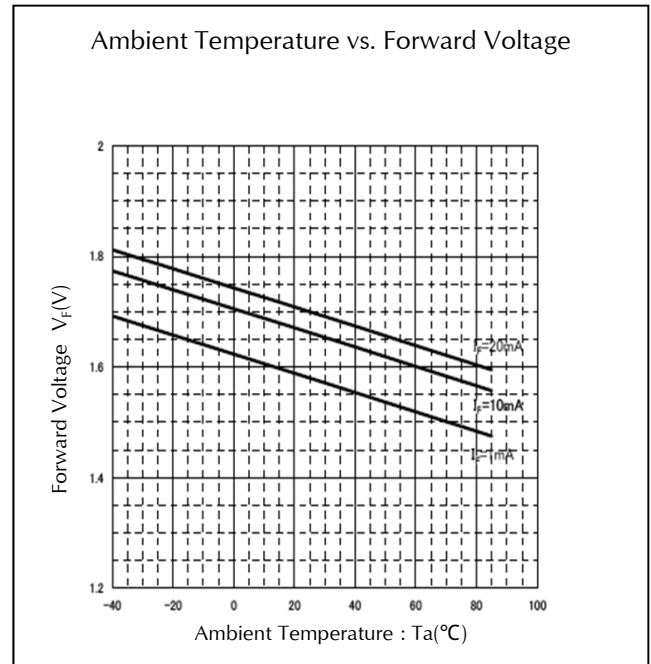
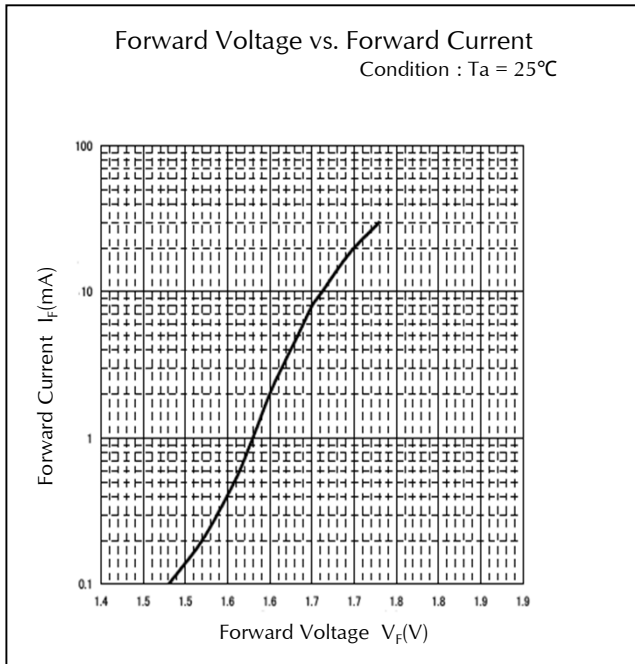
Ambient Temperature vs. Power Dissipation



Duty Factor vs. Maximum Tolerable Pulse Forward Current  
Condition : Ta = 25°C



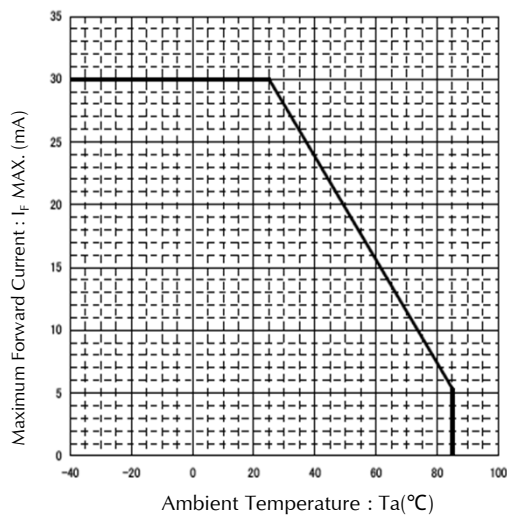
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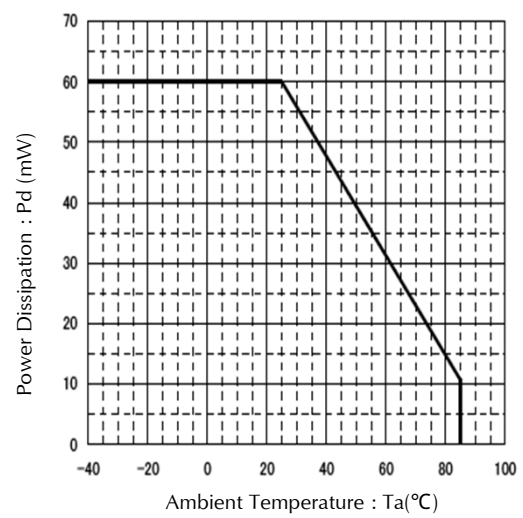


## Technical Data(Red)

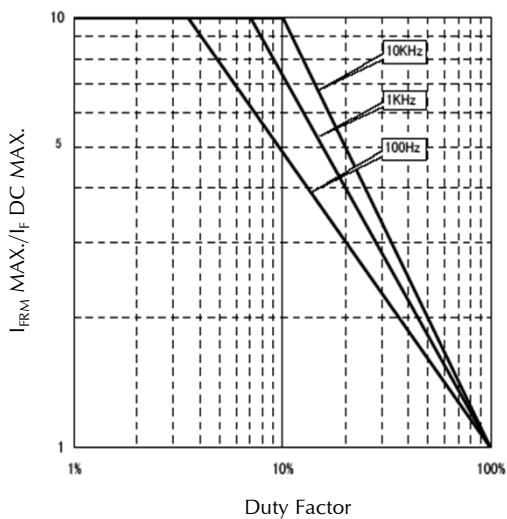
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation

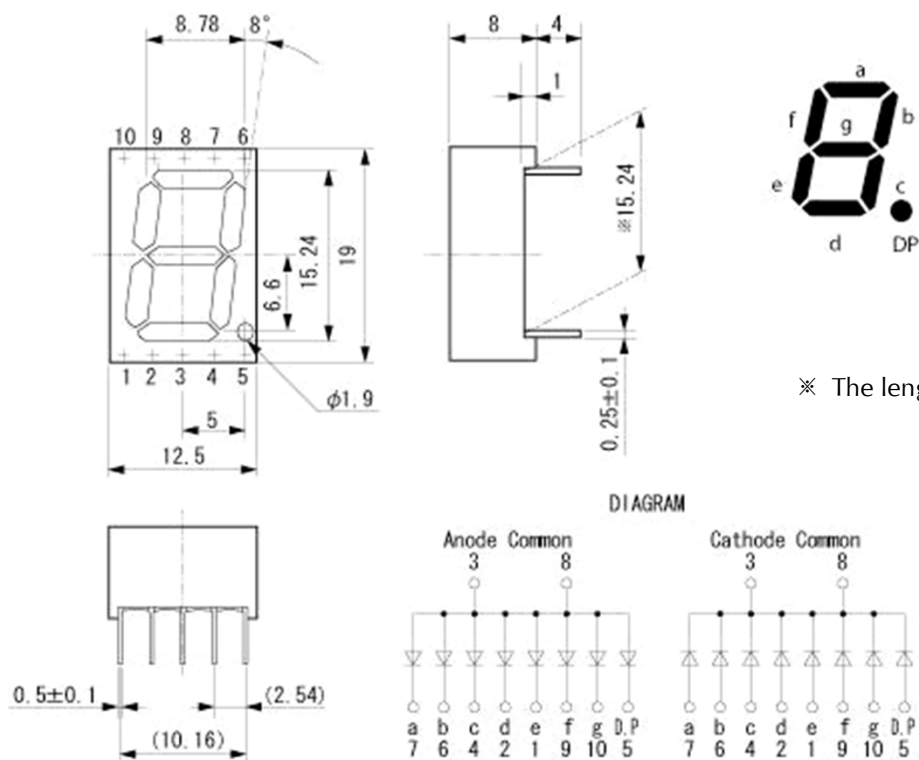


Duty Factor vs. Maximum Tolerable Pulse Forward Current  
Condition : Ta = 25°C



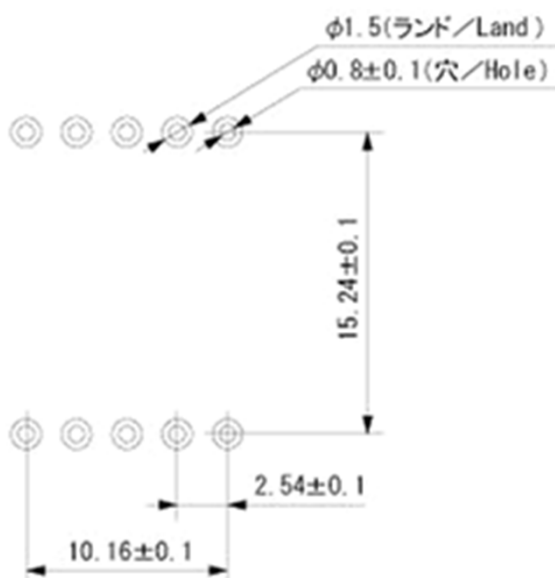
## Package Dimensions

(Unit: mm)



## Recommended Soldering Pattern

(Unit: mm)



## TTW (Through The Wave) soldering Conditions

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|                   |  |  |
|-------------------|--|--|
| Pre-heating       | 100 °C<br>60 s                             | (MAX.) Resin surface temperature<br>(MAX.) |
| Solder Bath Temp. | 265 °C                                     | (MAX.)                                     |
| Dipping Time      | 5 s  | (MAX.)                                     |
| Position          | At least 2.0 mm away from the root of lead |  |

- 1) The dip soldering process shall be 2 times maximum.
- 2) The product shall be cooled to normal temperature before the second dipping process.

## Manual Soldering Conditions

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|                              |  |                  |
|------------------------------|--|------------------|
| Iron tip temp.               | 360 °C                                     | (MAX.)           |
| Soldering time and frequency | 3 s<br>2 times                             | (MAX.)<br>(MAX.) |
| Position                     | At least 2.0 mm away from the root of lead |                  |

## Reliability Testing Result

| Reliability Testing Result    | Applicable Standard   | Testing Conditions  | Duration | Failure |
|-------------------------------|-----------------------|---|----------|---------|
| Room Temp. Operating Life     | EIAJ ED-4701/100(101) | Ta = 25°C, If = Maximum Rated Current/seg   | 1,000 h  | 0/10    |
| Resistance to Soldering Heat  | EIAJ ED-4701/300(302) | 260±5°C, 3mm from package base  | 10s      | 0/10    |
| Temperature Cycling           | EIAJ ED-4701/100(105) | Minimum Rated Storage Temperature(30min)<br>~Normal Temperature(15min)<br>~Maximum Rated Storage Temperature(30min)<br>~Normal Temperature(15min) | 5 cycles | 0/10    |
| Wet High Temp. Storage Life   | EIAJ ED-4701/100(103) | Ta = 60±2°C, RH = 90±5%   | 1,000 h  | 0/10    |
| High Temp. Storage Life       | EIAJ ED-4701/200(201) | Ta = Maximum Rated Storage Temperature  | 1,000 h  | 0/10    |
| Low Temp. Storage Life        | EIAJ ED-4701/200(202) | Ta = Minimum Rated Storage Temperature  | 1,000 h  | 0/10    |
| Lead Tension                  | EIAJ ED-4701/400(401) | 5N, 1time   | 10s      | 0/10    |
| Vibration, Variable Frequency | EIAJ ED-4701/400(403) | 98.1m/s <sup>2</sup> (10G), 100 ~ 2KHz sweep for 20min., XYZ each direction   | 2 h      | 0/10    |
| Lead Bend                     | EIAJ ED-4701/400(401) | 2.5N, 0° ↔ 90°  | Twice    | 0/10    |
| Shock                         | JIS C 7201 A-8        | It falls on wood engraving from height of 75cm.   | 3 times  | 0/10    |

## Failure Criteria

| Items               | Symbols        | Conditions                                       | Failure criteria   |
|---------------------|----------------|--|--|
| Luminous Intensity  | I <sub>v</sub> | If Value of each product Luminous Intensity      | Testing Min. Value < Spec. Min. Value x 0.5                  |
| Forward Voltage     | V <sub>F</sub> | If Value of each product Forward Voltage         | Testing Max. Value ≥ Spec. Max. Value x 1.2                  |
| Reverse Current     | I <sub>R</sub> | V <sub>R</sub> = Maximum Rated Reverse Voltage V | Testing Max. Value ≥ Spec. Max. Value x 2.5                  |
| Cosmetic Appearance | -              | -  | Occurrence of notable decoloration, deformation and cracking |

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