

**Pb-free
HEAT**



131S/133S Series

Numeric Display/Case Size 7.0 x 11.0 mm

Features

| | |
|-------------------|---|
| Case Size | 7.0 x 11.0 mm (W x H) |
| Product features | <ul style="list-style-type: none"> ▪ Each color has anode common and cathode common respectively. ▪ A black case and a gray case are available. ▪ Lead-free soldering compatible ▪ RoHS compliant |
| Peak wavelength | Green : 565nm Orange : 605nm Red : 660nm |
| Number of Digit | 1 Digit |
| Segment Shape | Arrow Feather Type |
| Character Height | 8.0 mm |
| Die materials | Green : GaP Orange : GaAsP 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/ Segment |
|---------------------|--------------------|---------------------|--------------------|----------|---------------|------------------|
| Anode Common | | Cathode Common | | | | |
| Case Color Black | Case Color Gray | Case Color Black | Case Color Gray | | | |
| NAG131SP-B | NAG133SP-B | NKG131SP-B | NKG133SP-B | GaP | Green | 1 |
| NAA131S-B | NAA133S-B | NKA131S-B | NKA133S-B | GaAsP | Orange | 1 |
| NAR131S-B | NAR133S-B | NKR131S-B | NKR133S-B | GaAlAs | Red | 1 |
| NAR131S-C | - | NKR131S-C | NKR133S-C | GaAlAs | Red | 1 |

Absolute Maximum Ratings

(Ta=25)

| Item | Symbol | Absolute Maximum Ratings | | | Unit |
|---------------------------------|-------------------|--------------------------|---------|---------|--------|
| | | Green | Orange | Red | |
| Power Dissipation | Pd | 48 | 48 | 40 | mW/seg |
| Forward Current | I _F | 20 | 20 | 20 | mA/seg |
| Pulse Forward Current ※1 | I _{FRM} | 80 | 80 | 80 | mA/seg |
| Derating (Ta=25°C or higher) | ΔI _F | 0.33 | 0.33 | 0.33 | mA/°C |
| | ΔI _{FRM} | 1.33 | 1.33 | 1.33 | mA/°C |
| Reverse Voltage | V _R | 4 | 4 | 4 | V |
| Operating Temperature | T _{opr} | -30~+85 | -30~+85 | -30~+85 | °C |
| Storage Temperature | T _{stg} | -30~+85 | -30~+85 | -30~+85 | °C |

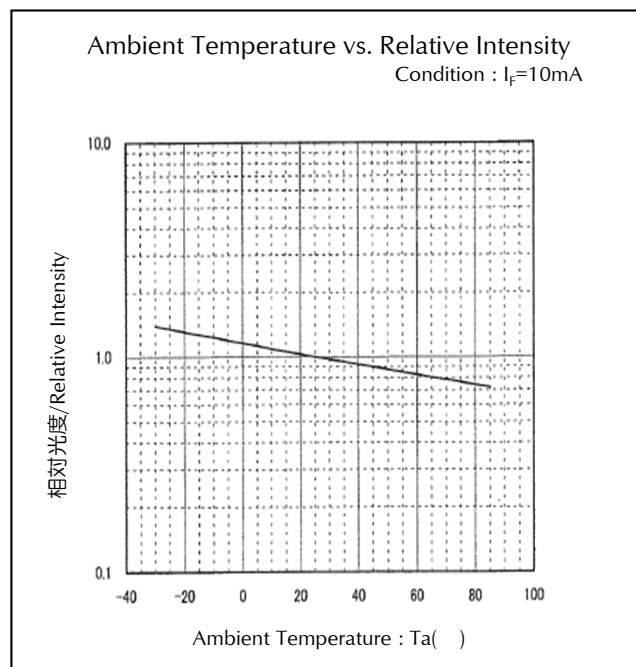
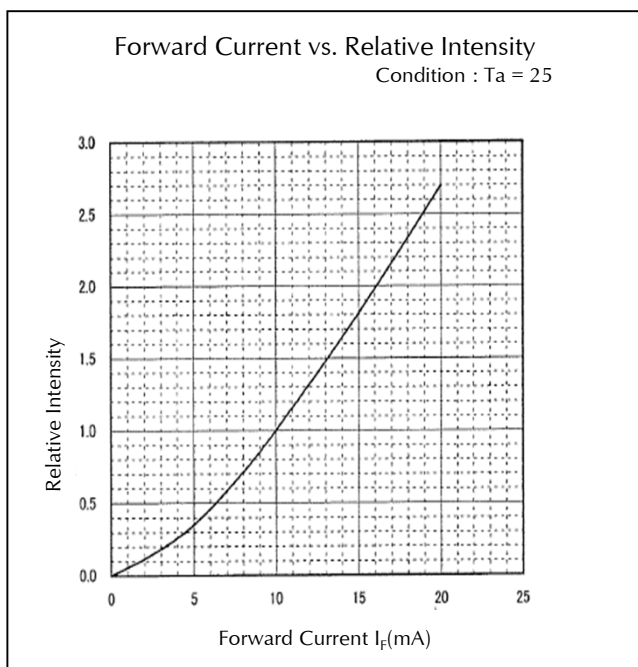
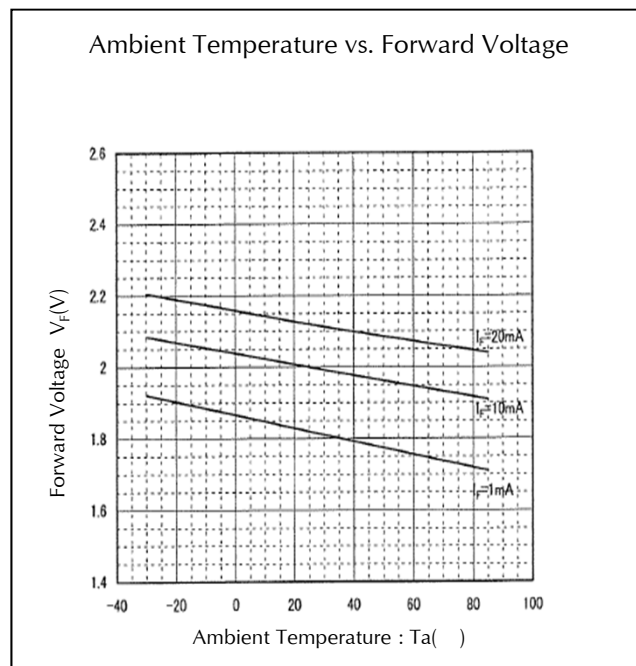
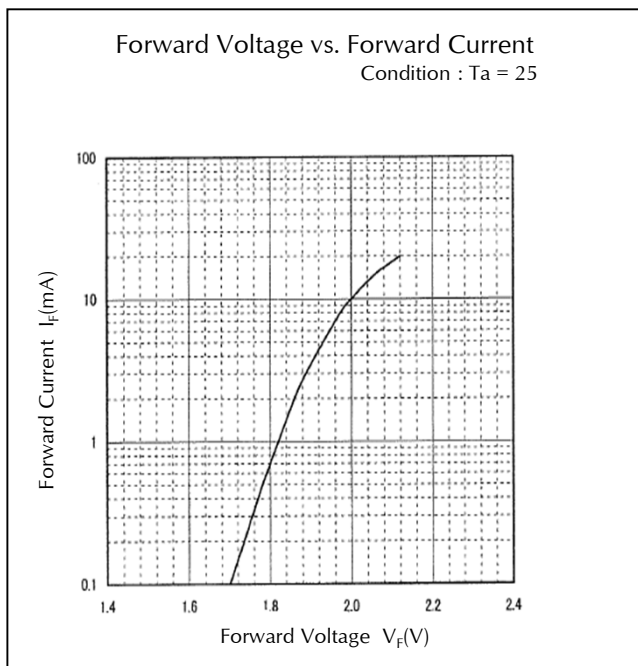
 ※1 I_{FRM} Measurement condition : Duty 1/5, f = 1kHz

Electro-Optical Characteristics

(Ta=25)

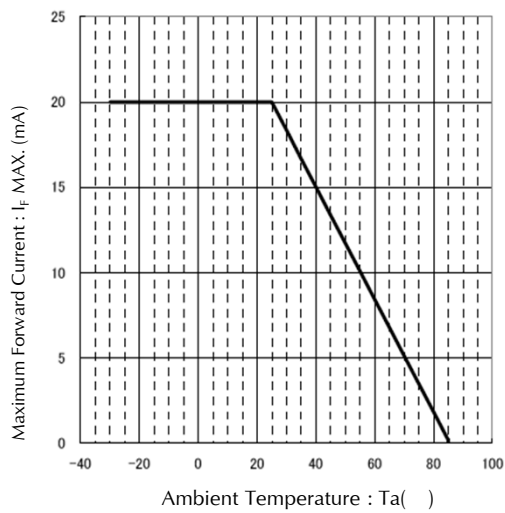
| Item | Conditions | Symbol | | Characteristics | | | Unit |
|------------------------------------|----------------------|----------------|------|-----------------|--------|-----|---------|
| | | | | Green | Orange | Red | |
| Luminous Intensity (-B Product) | I _F =10mA | I _V | MIN. | 1 | 0.6 | 1.4 | mcd/seg |
| | | | TYP. | 2 | 1.2 | 2.8 | |
| Luminous Intensity (-C Product) | I _F =10mA | I _V | MIN. | - | - | 2.8 | mcd/seg |
| | | | TYP. | - | - | 5.6 | |
| Forward Voltage | I _F =10mA | V _F | TYP. | 2.0 | 2.0 | 1.7 | V/seg |
| | | | MAX. | 2.4 | 2.4 | 2.0 | |
| Reverse Current | V _R =4V | I _R | MAX. | 100 | 100 | 100 | μA/seg |
| Peak Wavelength | I _F =10mA | λ _p | TYP. | 565 | 605 | 660 | nm |
| Spectral Line Half Width | I _F =10mA | Δλ | TYP. | 30 | 30 | 30 | nm |

Technical Data(Green)

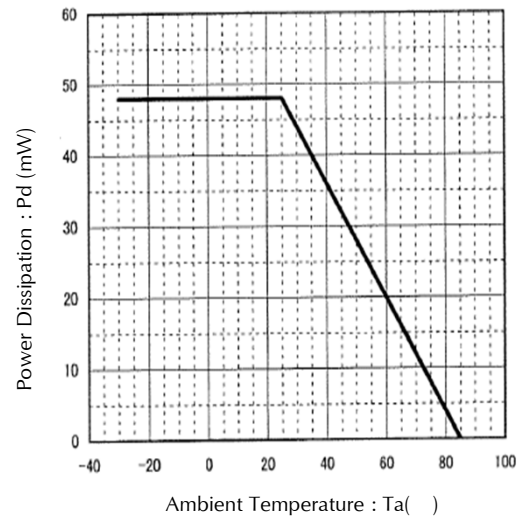


Technical Data(Green)

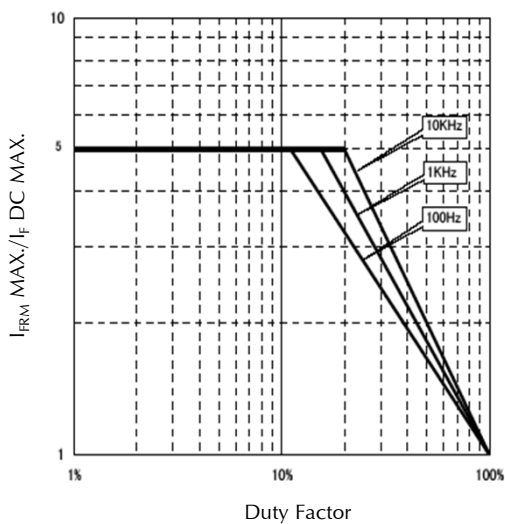
Ambient Temperature vs. Maximum Forward Current



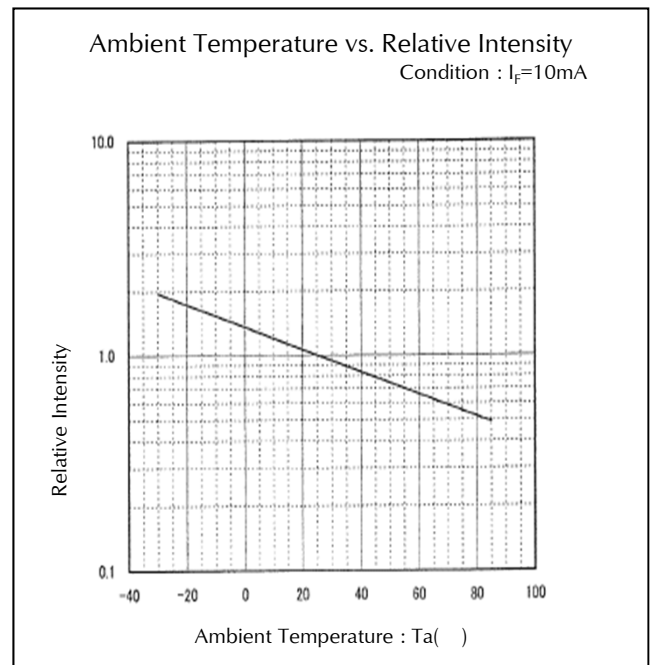
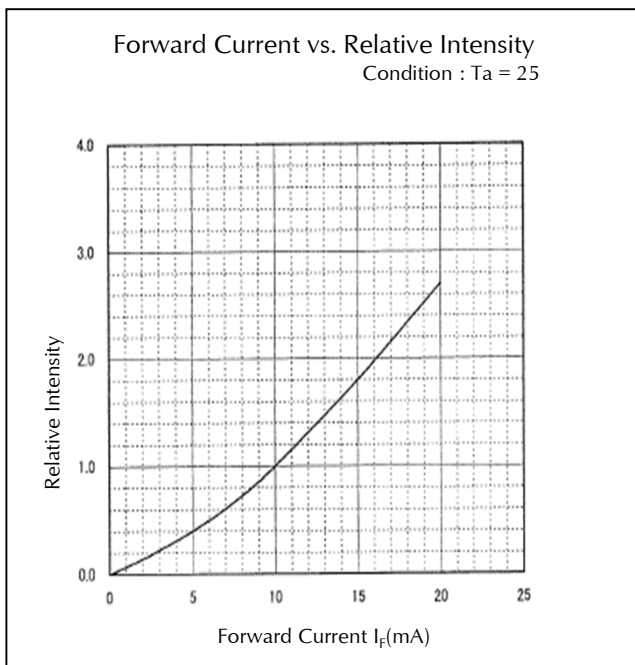
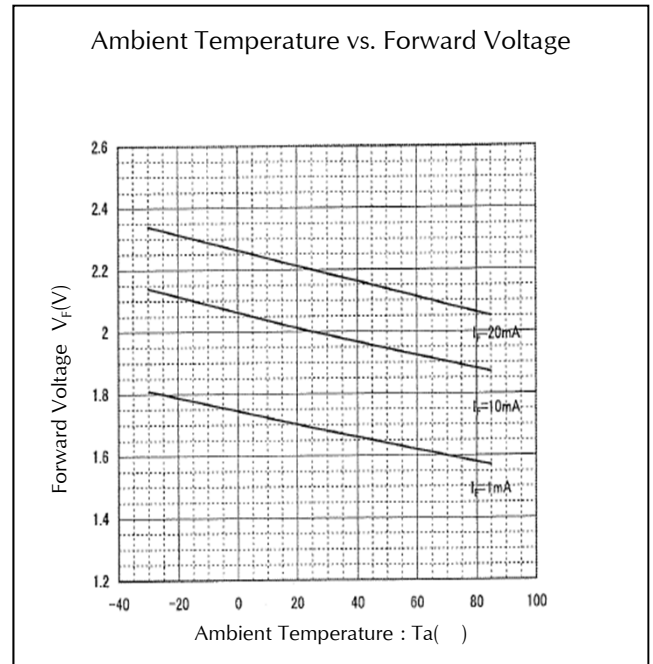
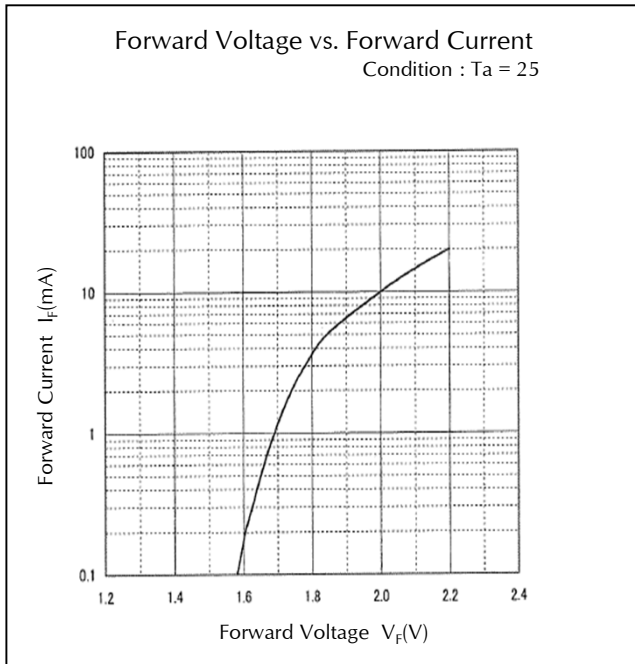
Ambient Temperature vs. Power Dissipation



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

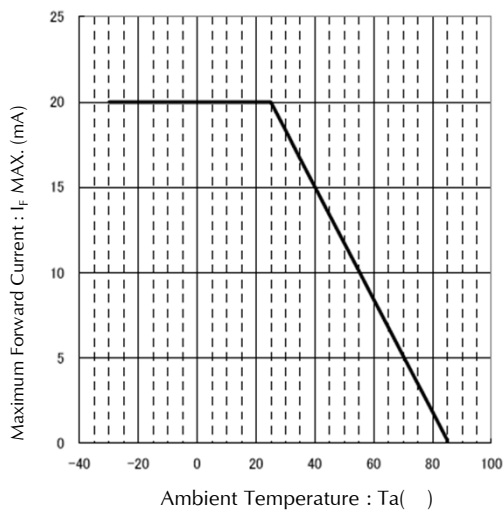


Technical Data(Orange)

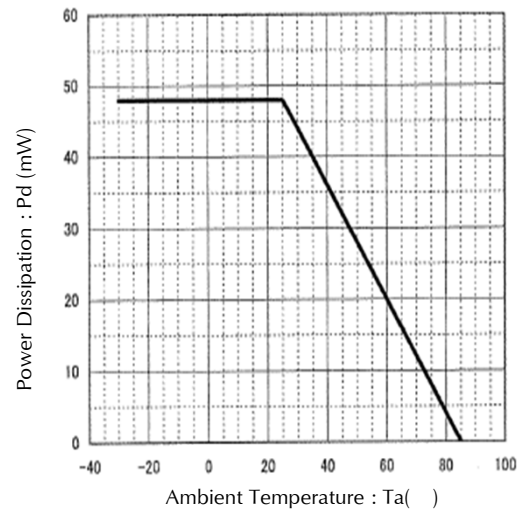


Technical Data(Orange)

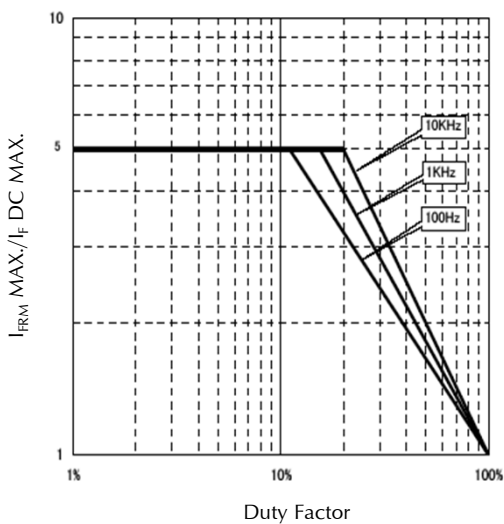
Ambient Temperature vs. Maximum Forward Current



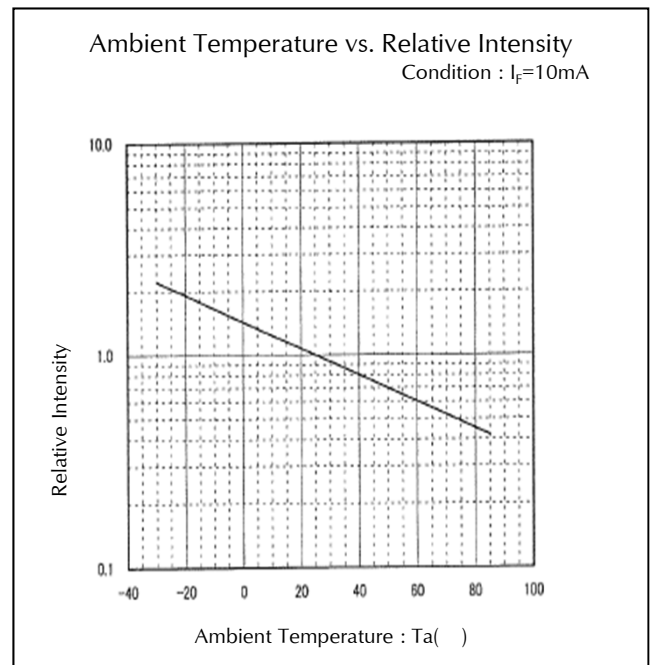
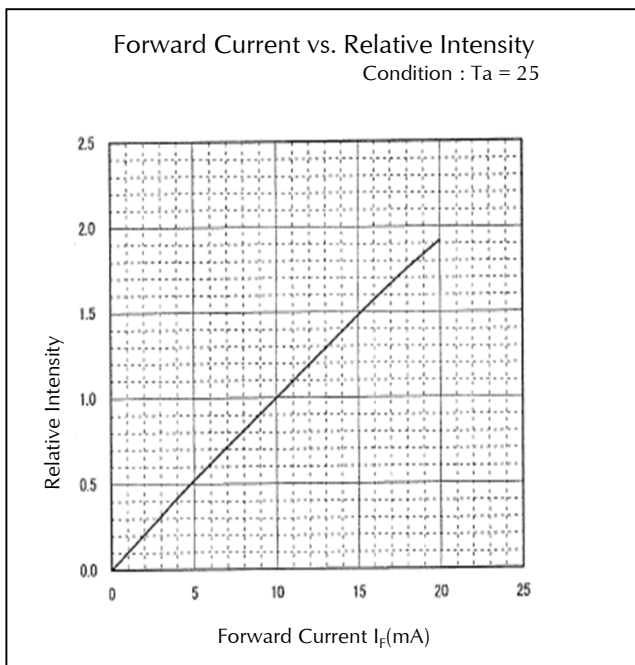
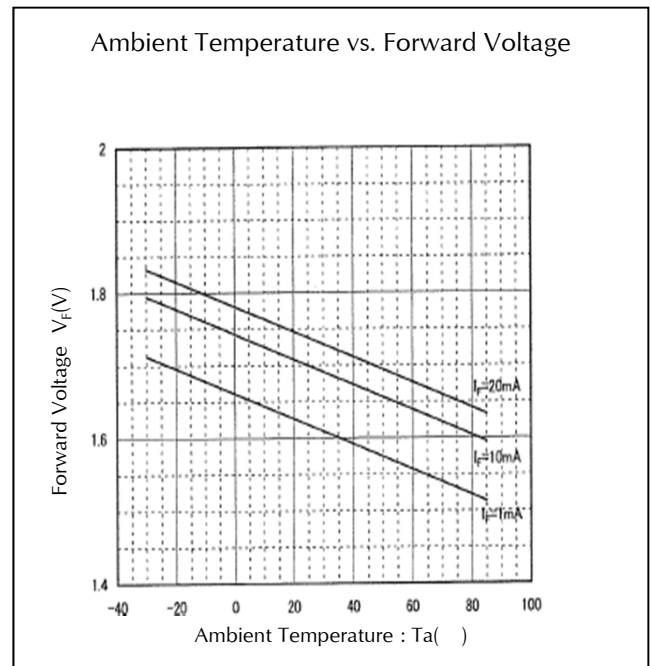
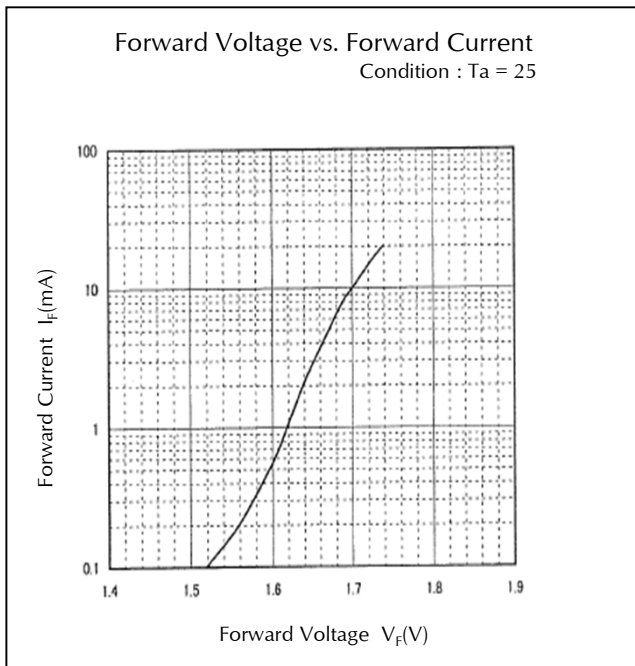
Ambient Temperature vs. Power Dissipation



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

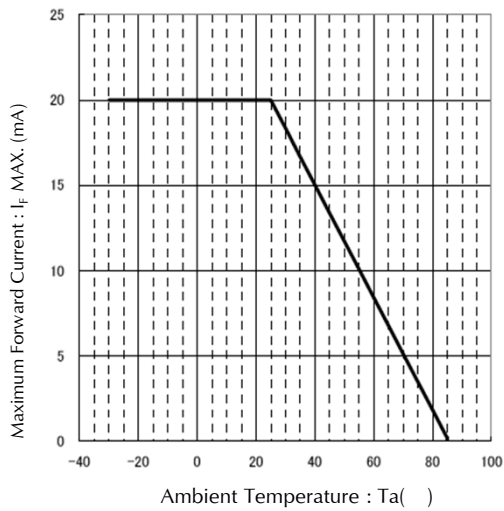


Technical Data(Red)

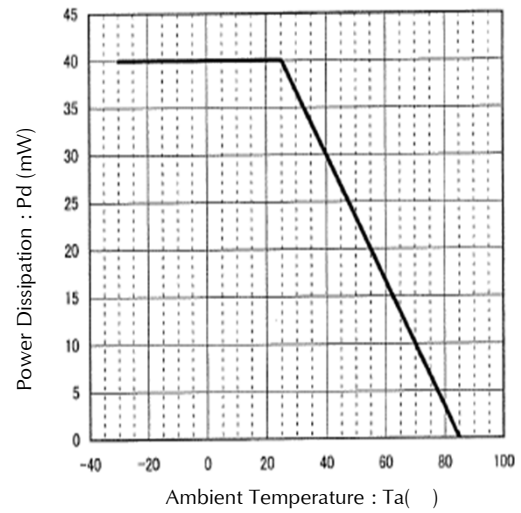


Technical Data(Red)

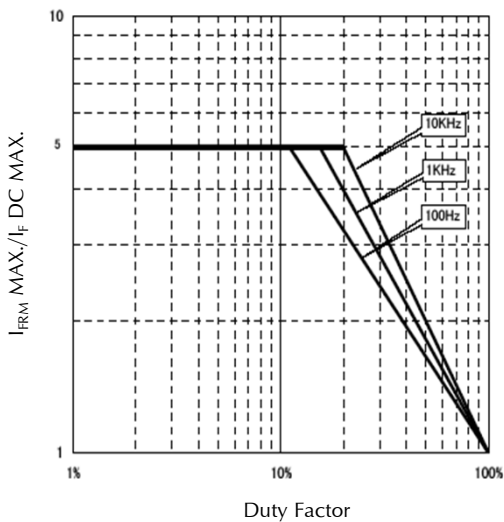
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation

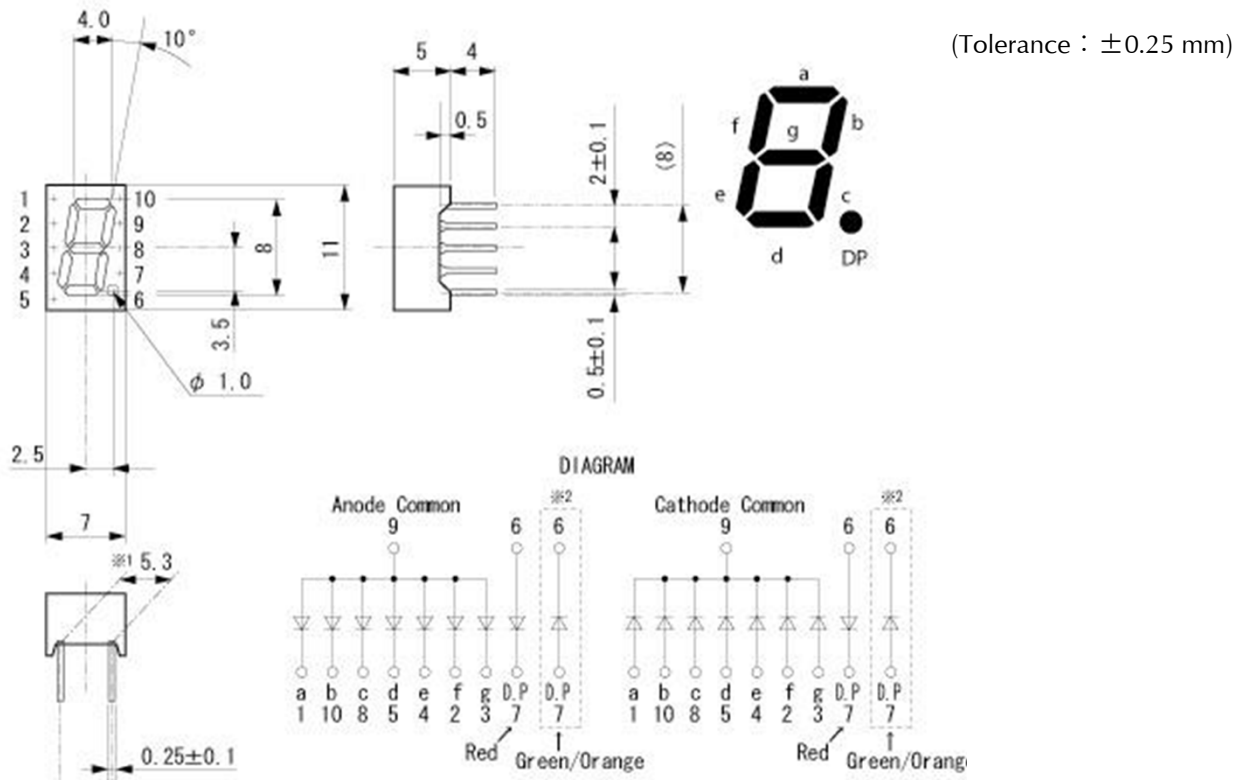


Duty Factor vs. Maximum Tolerable Pulse Forward Current
Condition : Ta = 25



Package Dimensions

(Unit: mm)



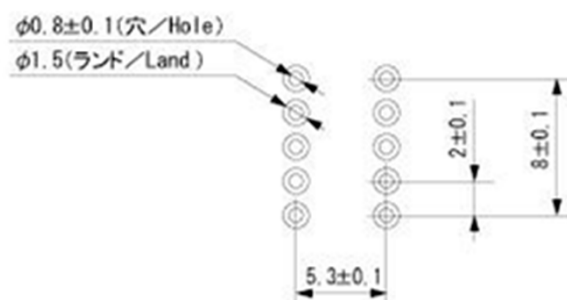
1 : The length of lead base.

2 : When the emitted color is red, the polarity of DP No.6 pin is an anode, and DP No.7 pin is a cathode.

But when the emitted color is green or orange, the polarity reverses.

Recommended Soldering Pattern

(Unit: mm)



TTW (Through The Wave) soldering Conditions

| | | |
|-------------------|--|--|
| Pre-heating | 100 60 s | (MAX.) Resin surface temperature (MAX.) |
| Solder Bath Temp. | 265 | (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

| | | |
|------------------------------|--|------------------|
| Iron tip temp. | 360 | (MAX.) |
| Soldering time and frequency | 3 s 2 times | (MAX.) (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) ~Normal Temperature(15min) ~Maximum Rated Storage Temperature(30min) ~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 ² (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 | Iv | If Value of each product Luminous Intensity | Testing Min. Value < Spec. Min. Value x 0.5 |
| Forward Voltage | V _F | If Value of each product Forward Voltage | Testing Max. Value ≥ Spec. Max. Value x 1.2 |
| Reverse Current | I _R | V _R = 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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