



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	• 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	<table><tr><td>Green</td><td>: 565nm</td></tr><tr><td>Orange</td><td>: 605nm</td></tr><tr><td>Red</td><td>: 660nm</td></tr></table>	Green	: 565nm	Orange	: 605nm	Red	: 660nm
Green	: 565nm						
Orange	: 605nm						
Red	: 660nm						
Number of Digit	1 Digit						
Segment Shape	Arrow Feather Type						
Character Height	8.0 mm						
Die materials	<table><tr><td>Green</td><td>: GaP</td></tr><tr><td>Orange</td><td>: GaAsP</td></tr><tr><td>Red</td><td>: GaAlAs</td></tr></table>	Green	: GaP	Orange	: GaAsP	Red	: GaAlAs
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 °C)

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)	I _F	0.33	0.33	0.33	mA/
	I _{FRM}	1.33	1.33	1.33	mA/
Reverse Voltage	V _R	4	4	4	V
Operating Temperature	T _{opr}	-30 ~ +85	-30 ~ +85	-30 ~ +85	
Storage Temperature	T _{stg}	-30 ~ +85	-30 ~ +85	-30 ~ +85	

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

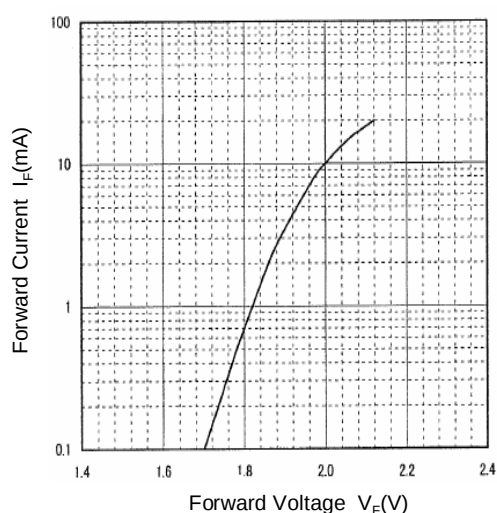
Electro-Optical Characteristics

(Ta=25 °C)

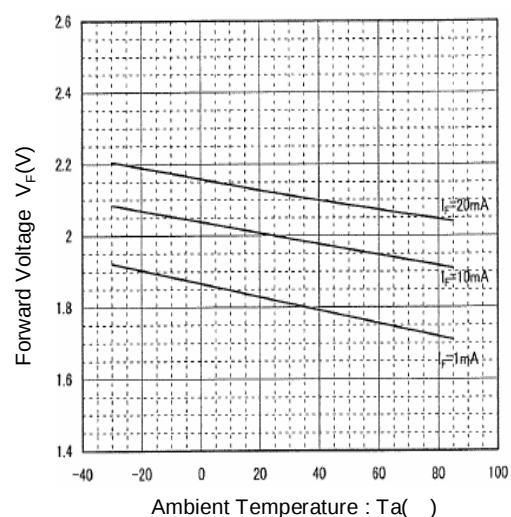
Item	Conditions	Symbol		Characteristics			Unit
				Green	Orange	Red	
Luminous Intensity (-B Product)	I _F =10mA	I _V	MIN.	1	0.6	1.4	mcd/seg
			TYP.	2	1.2	2.8	
Luminous Intensity (-C Product)	I _F =10mA	I _V	MIN.	-	-	2.8	mcd/seg
			TYP.	-	-	5.6	
Forward Voltage	I _F =10mA	V _F	TYP.	2.0	2.0	1.7	V/seg
			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	λ	TYP.	30	30	30	nm

Technical Data(Green)

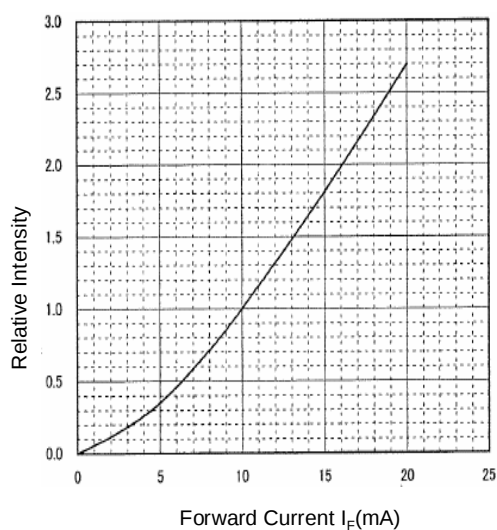
Forward Voltage vs. Forward Current
Condition : $T_a = 25$



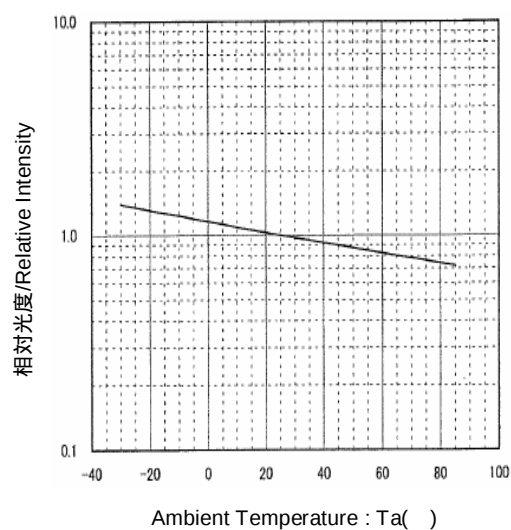
Ambient Temperature vs. Forward Voltage



Forward Current vs. Relative Intensity
Condition : $T_a = 25$

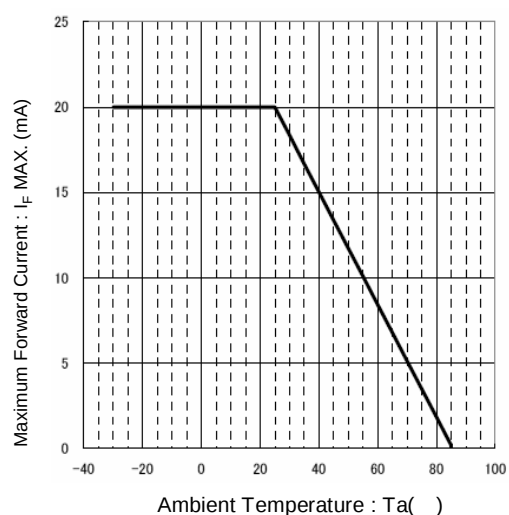


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 10mA$

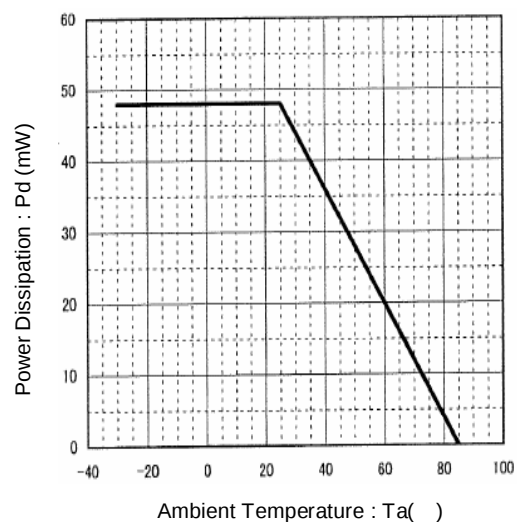


Technical Data(Green)

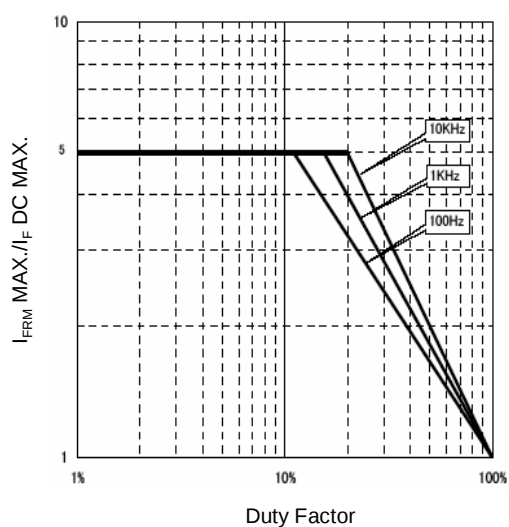
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation

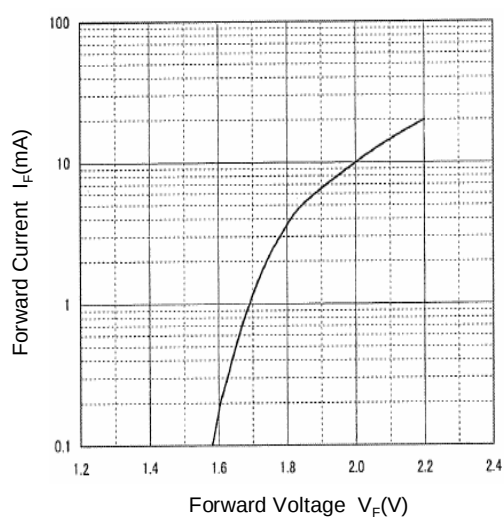


Duty Factor vs. Maximum Tolerable Pulse Forward Current
Condition: $T_a = 25$

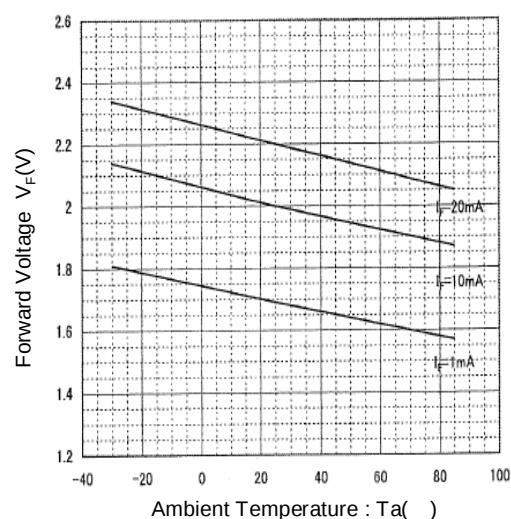


Technical Data(Orange)

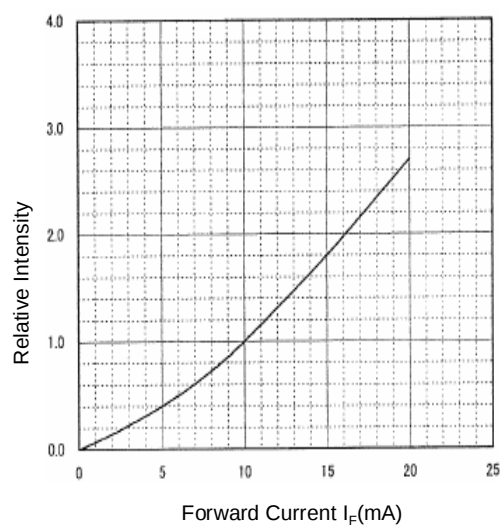
Forward Voltage vs. Forward Current
Condition : $T_a = 25$



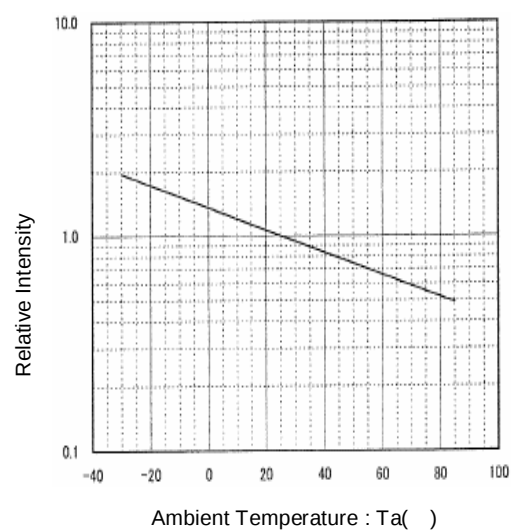
Ambient Temperature vs. Forward Voltage



Forward Current vs. Relative Intensity
Condition : $T_a = 25$

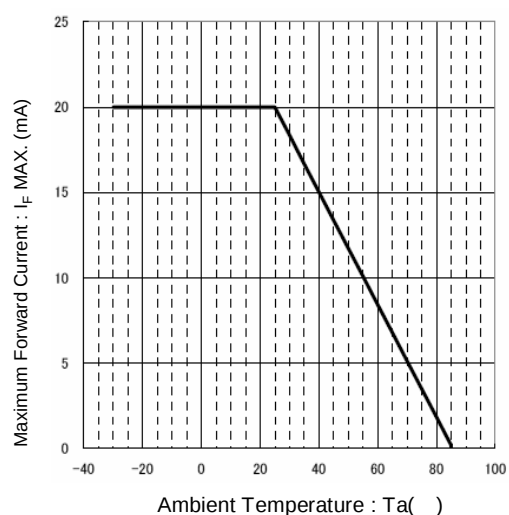


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 10\text{mA}$

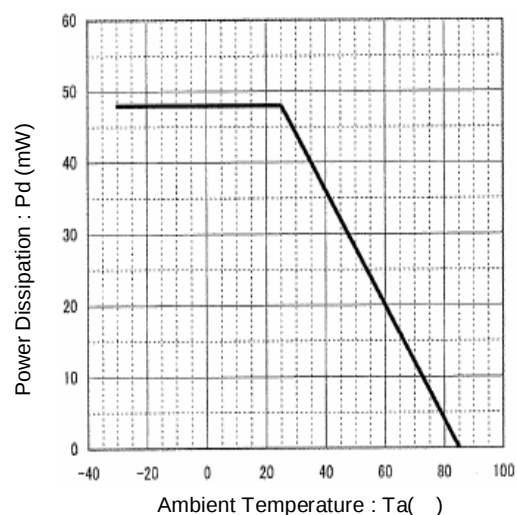


Technical Data(Orange)

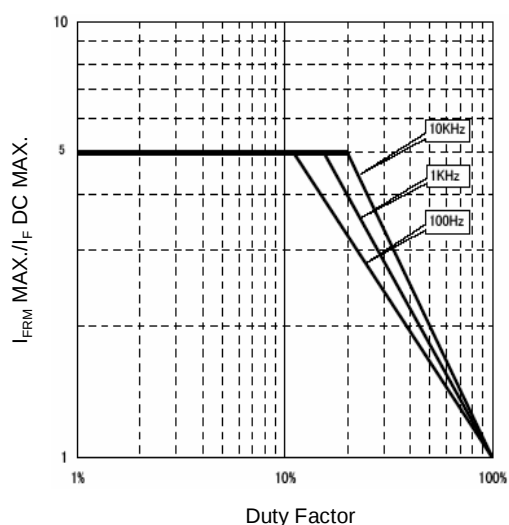
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation

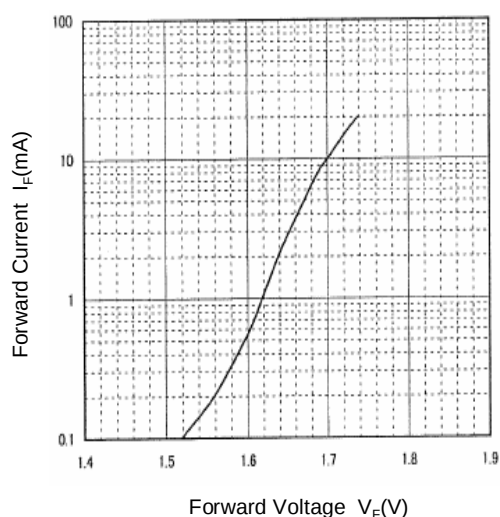


Duty Factor vs. Maximum Tolerable Pulse Forward Current
Condition: $T_a = 25$

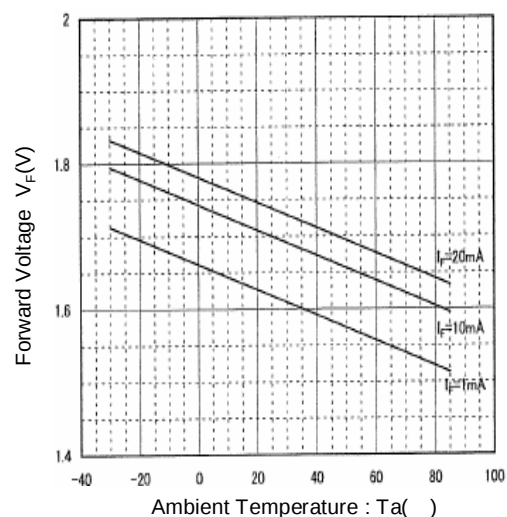


Technical Data(RED)

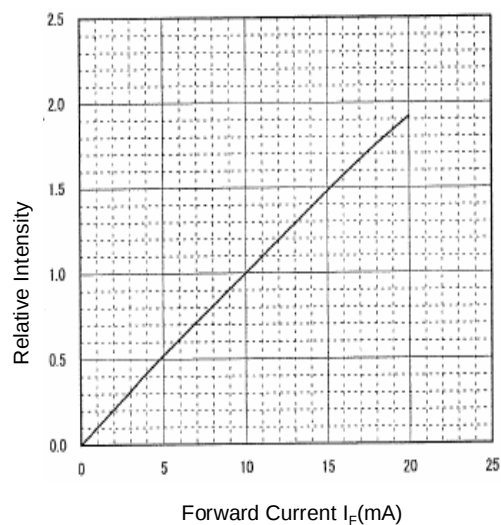
Forward Voltage vs. Forward Current
Condition : $T_a = 25$



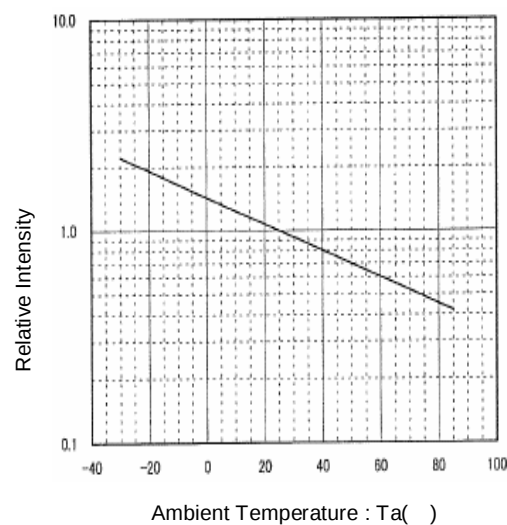
Ambient Temperature vs. Forward Voltage



Forward Current vs. Relative Intensity
Condition : $T_a = 25$

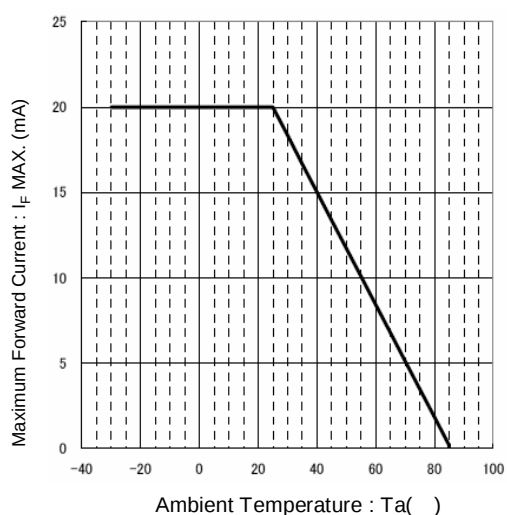


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 10\text{mA}$

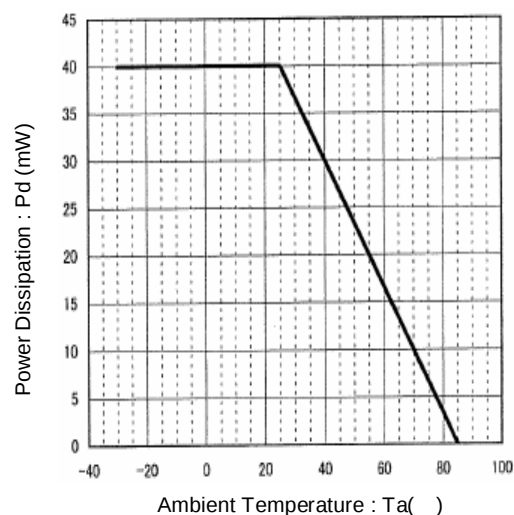


Technical Data(RED)

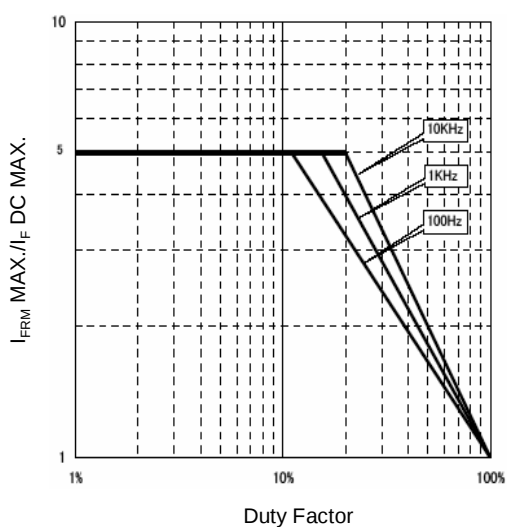
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation

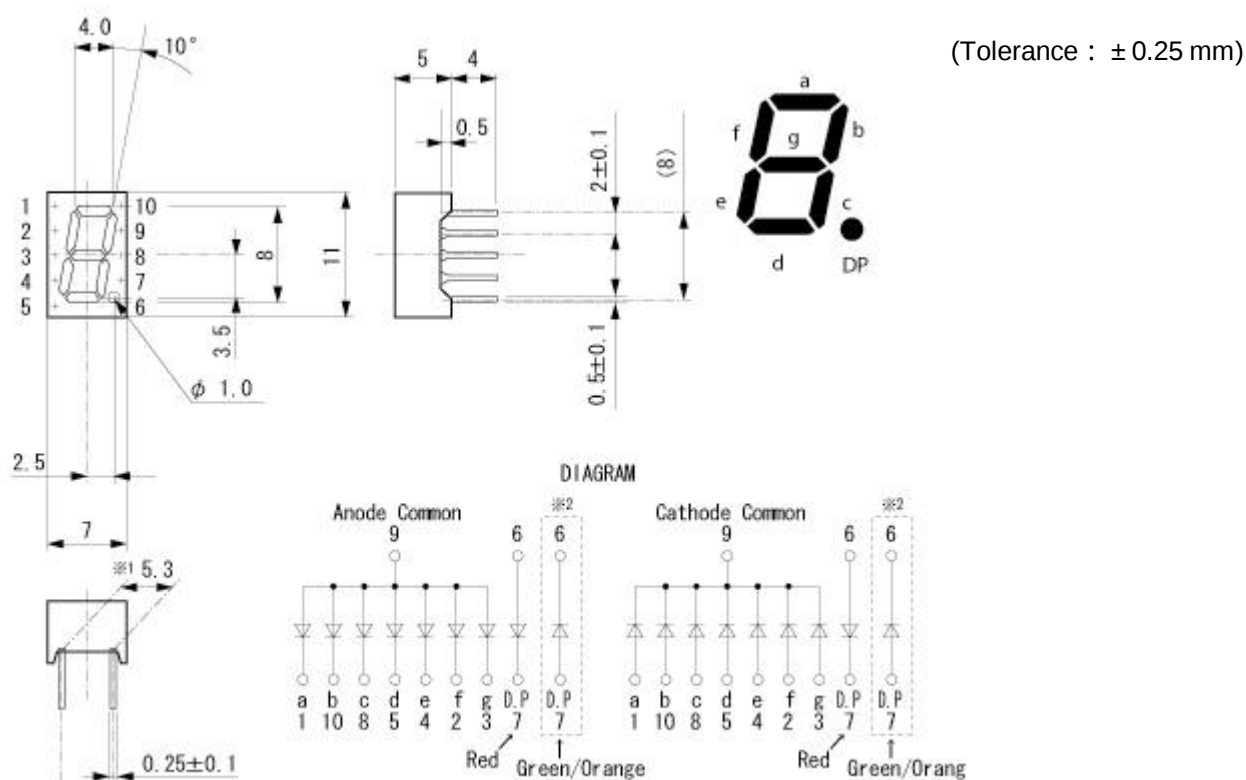


Duty Factor vs. Maximum Tolerable Pulse Forward Current
Condition: $T_a = 25$



Package Dimensions

(Unit: mm)



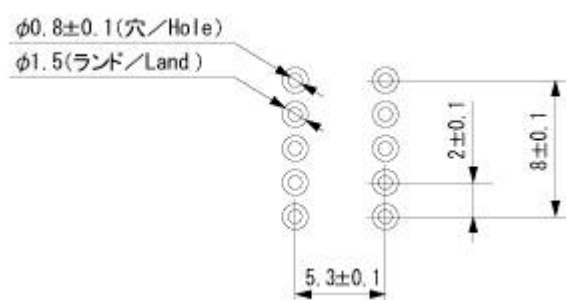
1 : The length of lead base.

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.	400	(MAX.) (30 W 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	BAJED-4701/100(101)	Ta = 25 , If = Maximum Rated Current/seg	1,000 h	0/10
Resistance to Soldering Heat	BAJED-4701/300(302)	260 ± 5 , 3mm from package base	10s	0/10
Temperature Cycling	BAJED-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	BAJED-4701/100(103)	Ta = 60 ± 2 , RH = 90 ± 5%	1,000 h	0/10
High Temp. Storage Life	BAJED-4701/200(201)	Ta = Maximum Rated Storage Temperature	1,000 h	0/10
Low Temp. Storage Life	BAJED-4701/200(202)	Ta = Minimum Rated Storage Temperature	1,000 h	0/10
Lead Tension	BAJED-4701/400(401)	5N, 1time	10s	0/10
Vibration, Variable Frequency	BAJED-4701/400(403)	98.1m/s ² (10G), 100 ~ 2KHz sweep for 20min., XYZ each direction	2 h	0/10
Lead Bend	BAJED-4701/400(401)	2.5N, 0 ° ↔ 90 °	Twice	0/10
Shock	JSC 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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