



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"><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 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 °C)

Item	Symbol	Absolute Maximum Ratings			Unit
		Green	Orange	Red	
Power Dissipation	Pd	48	48	40	mW/seg
Forward Current	I <sub>F</sub>	20	20	20	mA/seg
Pulse Forward Current <sup>1</sup>	I <sub>FRM</sub>	80	80	80	mA/seg
Derating (Ta=25 °C or higher)	I <sub>F</sub>	0.33	0.33	0.33	mA/
	I <sub>FRM</sub>	1.33	1.33	1.33	mA/
Reverse Voltage	V <sub>R</sub>	4	4	4	V
Operating Temperature	T <sub>opr</sub>	-30 ~ +85	-30 ~ +85	-30 ~ +85	
Storage Temperature	T <sub>stg</sub>	-30 ~ +85	-30 ~ +85	-30 ~ +85	

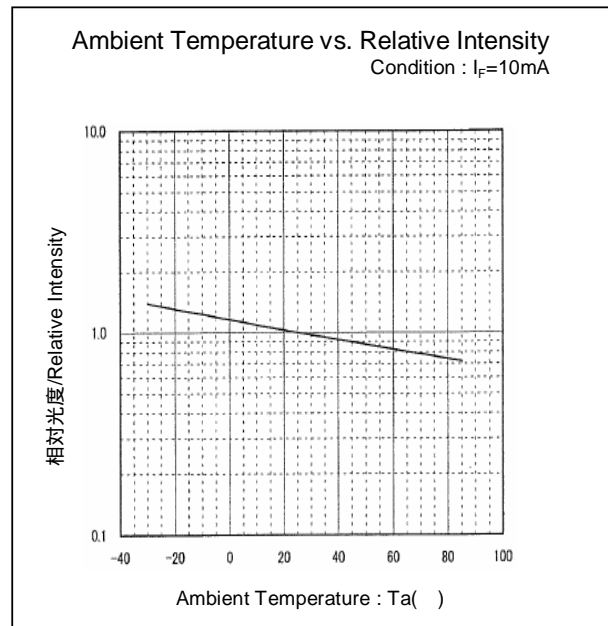
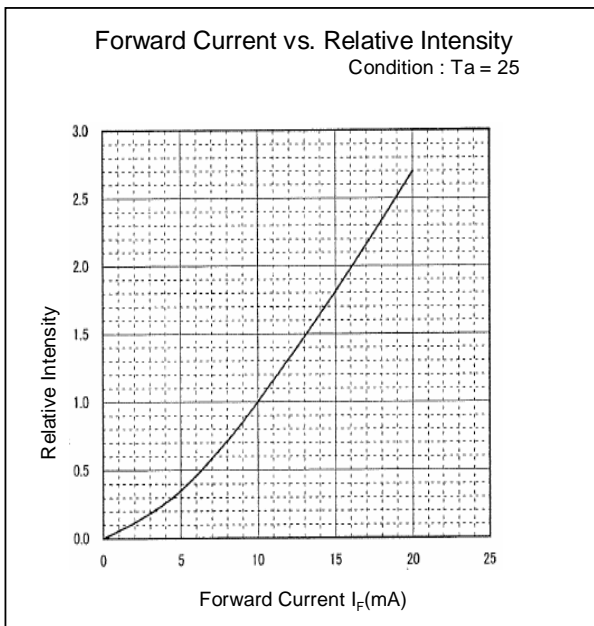
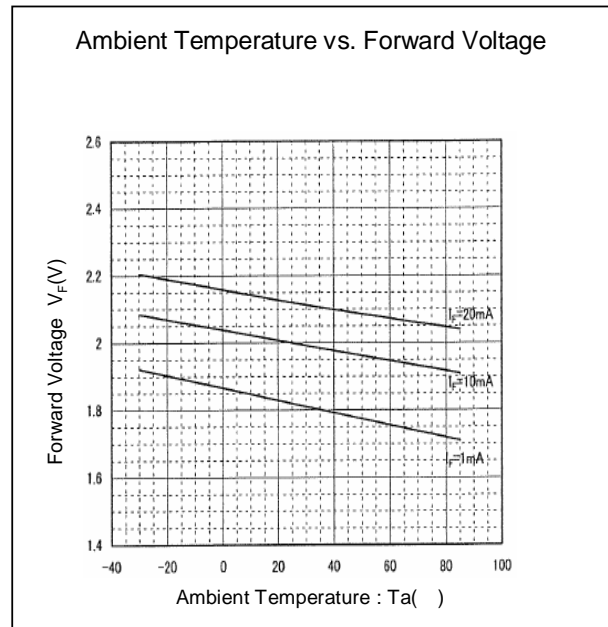
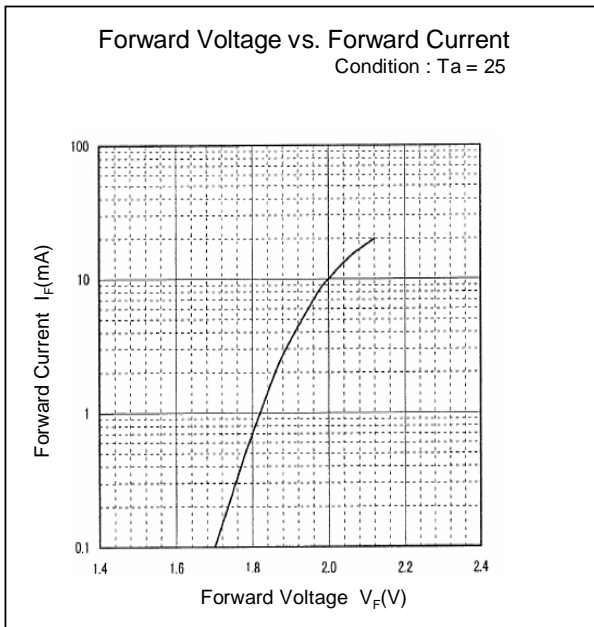
<sup>1</sup> I<sub>FRM</sub> Measurement condition : Duty 1/5, f = 1kHz

## Electro-Optical Characteristics

(Ta=25 °C)

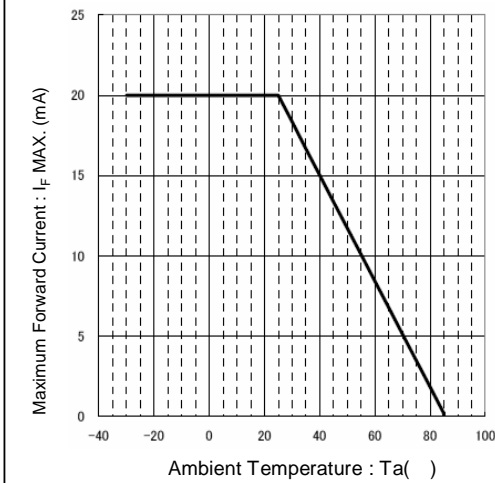
Item	Conditions	Symbol		Characteristics			Unit
				Green	Orange	Red	
Luminous Intensity (-B Product)	I <sub>F</sub> =10mA	I <sub>v</sub>	MIN.	1	0.6	1.4	mcd/seg
			TYP.	2	1.2	2.8	
Luminous Intensity (-C Product)	I <sub>F</sub> =10mA	I <sub>v</sub>	MIN.	-	-	2.8	mcd/seg
			TYP.	-	-	5.6	
Forward Voltage	I <sub>F</sub> =10mA	V <sub>F</sub>	TYP.	2.0	2.0	1.7	V/seg
			MAX.	2.4	2.4	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> =10mA	λ <sub>p</sub>	TYP.	565	605	660	nm
Spectral Line Half Width	I <sub>F</sub> =10mA		TYP.	30	30	30	nm

## Technical Data(Green)

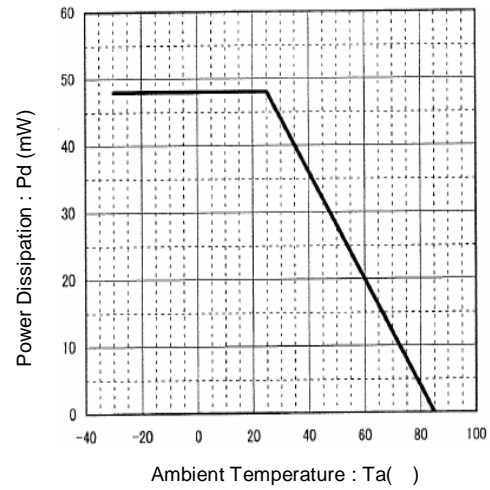


## Technical Data(Green)

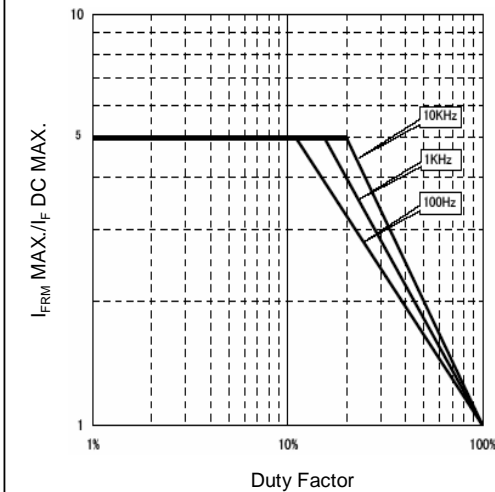
Ambient Temperature vs. Maximum Forward Current



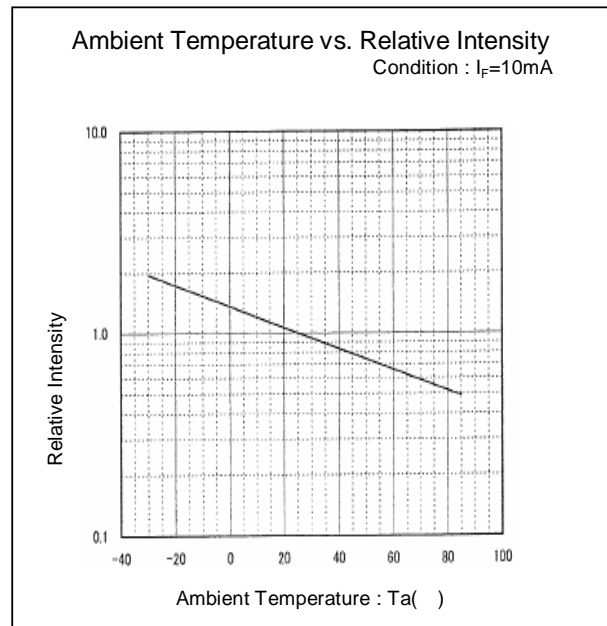
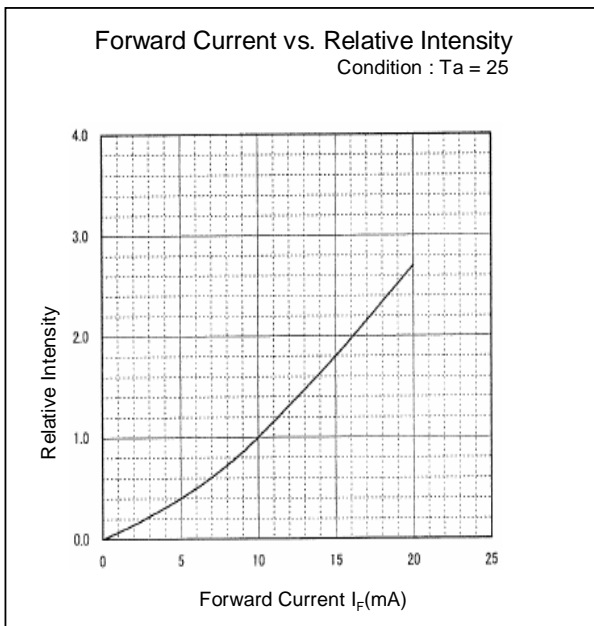
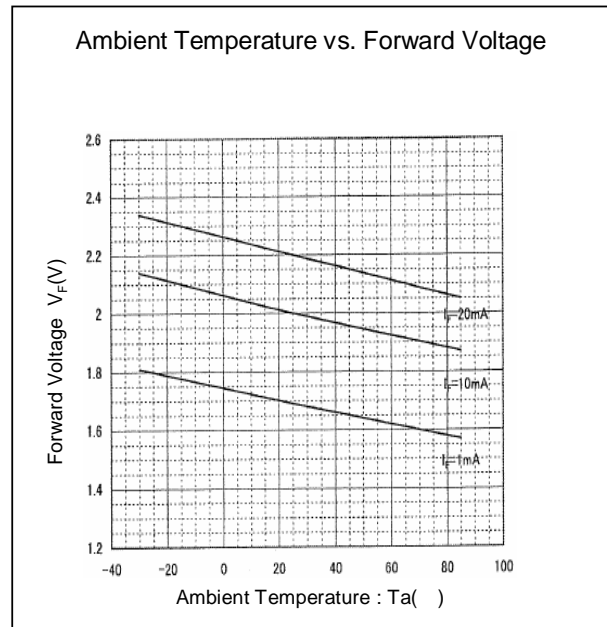
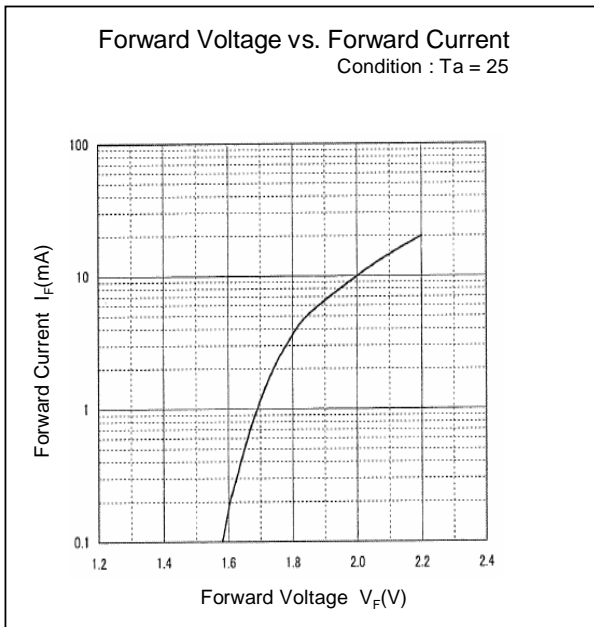
Ambient Temperature vs. Power Dissipation



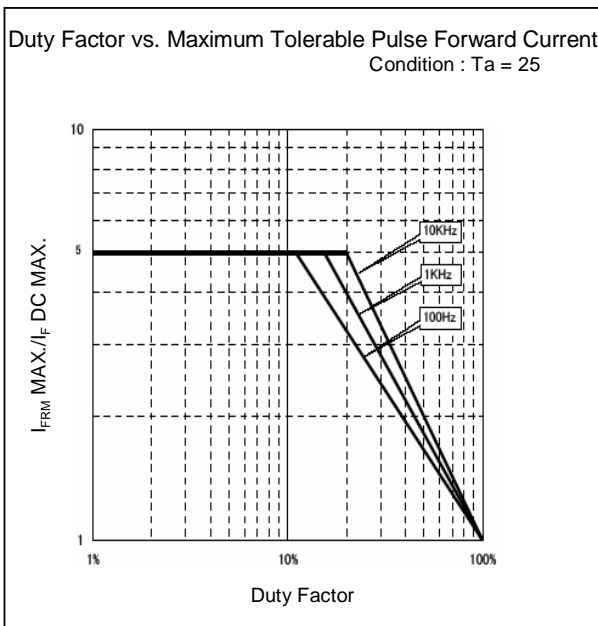
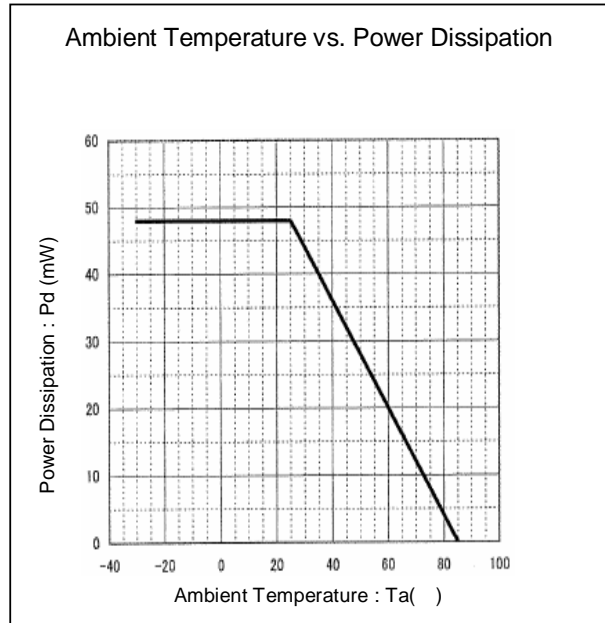
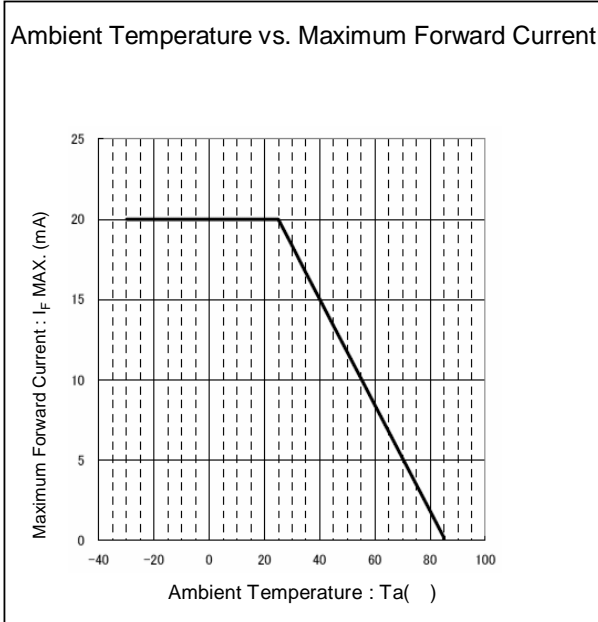
Duty Factor vs. Maximum Tolerable Pulse Forward Current  
Condition : Ta = 25



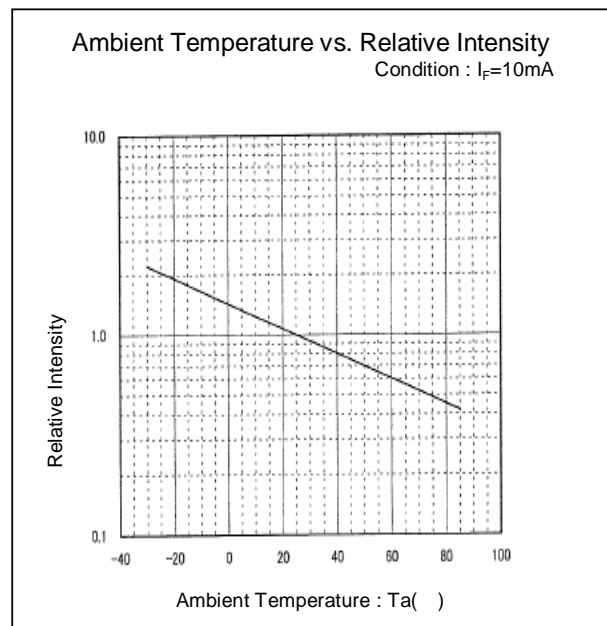
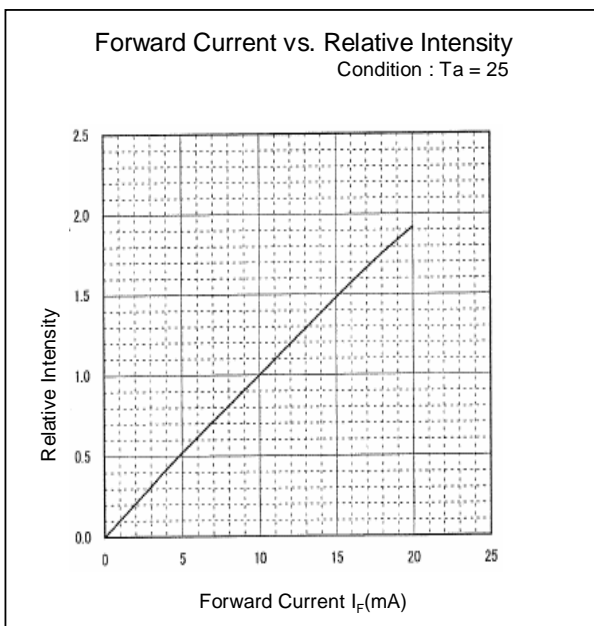
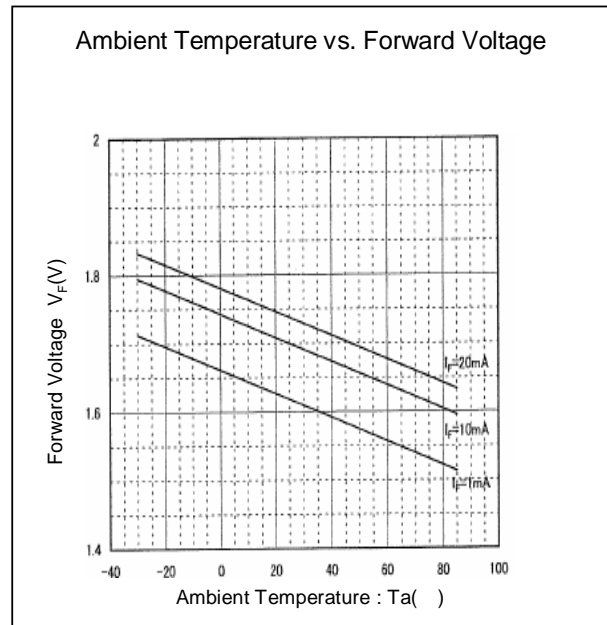
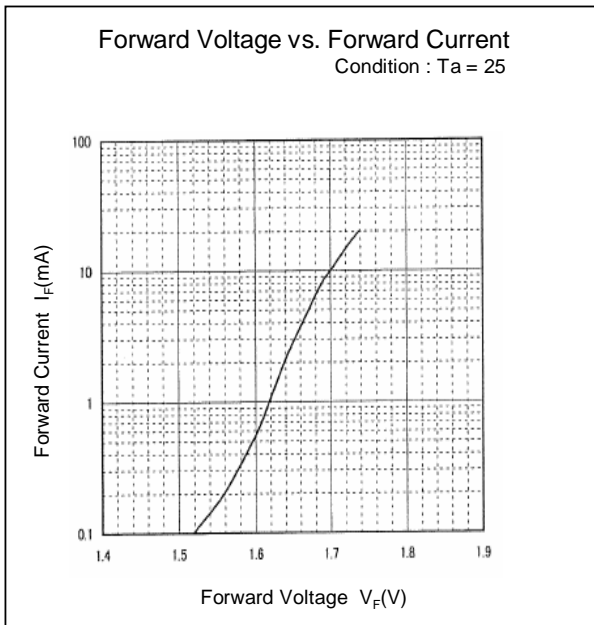
## Technical Data(Orange)



## Technical Data(Orange)

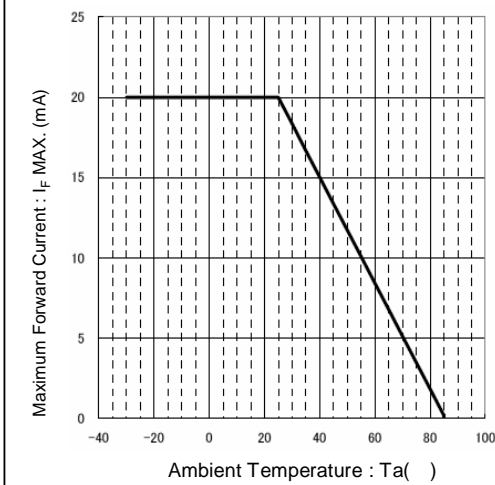


## Technical Data(Red)

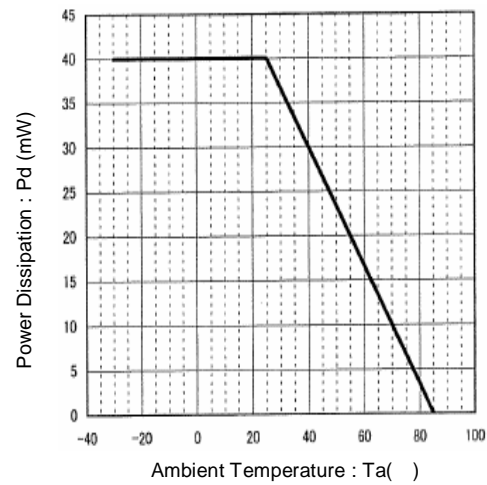


## Technical Data(RED)

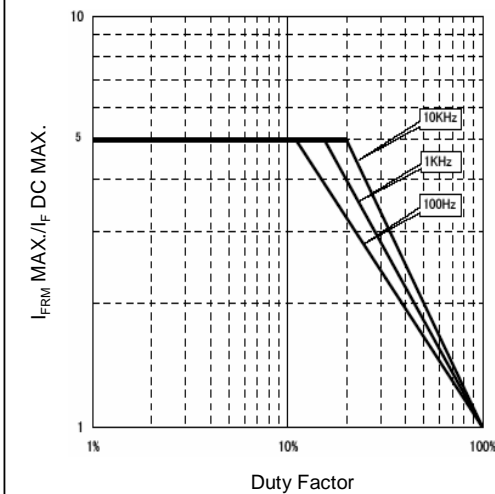
Ambient Temperature vs. Maximum Forward Current



Ambient Temperature vs. Power Dissipation



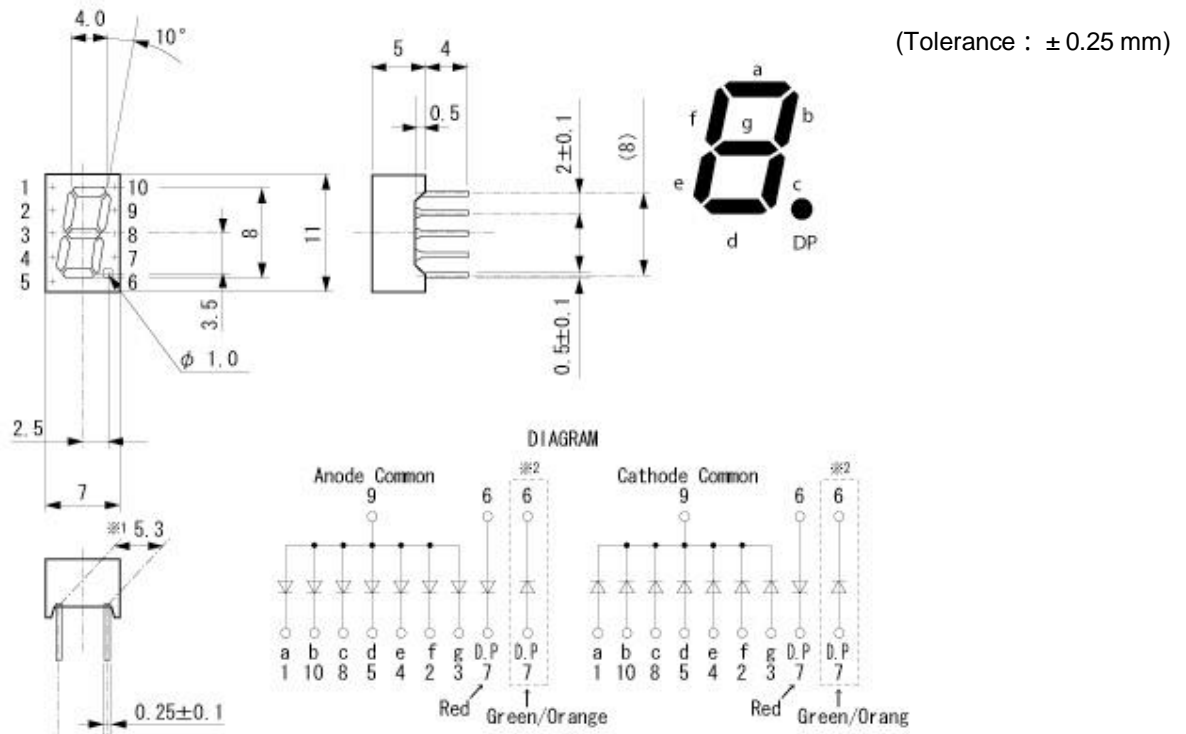
Duty Factor vs. Maximum Tolerable Pulse Forward Current  
 Condition :  $T_a = 25$





## Package Dimensions

(Unit: mm)



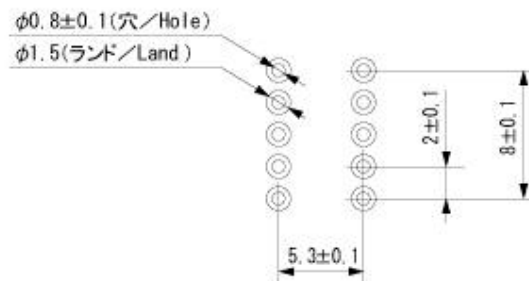
1 : The length of lead base.

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

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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

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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 = Maxium 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 <sup>2</sup> (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	Vf	If Value of each product Forward Voltage	Testing Max. Value Spec. Max. Value x 1.2
Reverse Current	Ir	Vr = 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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