

**Pb-free  
HEAT**



# MU13 Series

Bi-Color / Light Bar Module

## Features

Light emitting surface (Outer size)	9 x 9 mm (10.1 x 10.1 mm) (L x W)
Product features	<ul style="list-style-type: none"> <li>▪ Bi-Color</li> <li>▪ Lead-free soldering compatible</li> <li>▪ RoHS compliant</li> </ul>
Peak wavelength	Green : 555 nm Yellow Green : 570 nm Red : 660 nm
Die materials	Green, Yellow Green : GaP Red : GaAlAs
Soldering methods	TTW (Through The Wave) soldering and manual soldering
Soldering methods	More than 2kV(HBM)
Packing	Plastic bag

## Recommended Applications

Electric Household Appliances, OA/FA, Other General Applications

## Color and Luminous Intensity

Part No.	Material	Emitted Color	Resin Color	Intensity <sup>※1</sup> I <sub>v</sub> (mcd)			Number of Chips
				MIN.	TYP.	I <sub>F</sub>	
MU13-9101	GaP	Green	Milky White	7	14	20	5
	GaAlAs	Red		6	12	20	1
MU13-9102	GaP	Yellow Green	Milky White	20	40	20	5
	GaAlAs	Red		6	12	20	1

※1 Luminous Intensity : 5 chips (Green・Yellow Green), 1 chip (Red)

## Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Absolute Maximum Ratings			Unit
		Green	Yellow Green	Red	
Power Dissipation <sup>※2</sup>	P <sub>d</sub>	310	375	60	mW
Forward Current	I <sub>F</sub>	25	30	30	mA
Pulse Forward Current <sup>※3</sup>	I <sub>FRM</sub>	60	60	60	mA
Derating (Ta=25°C or higher)	ΔI <sub>F</sub>	0.33	0.40	0.40	mA/°C
	ΔI <sub>FRM</sub>	0.80	0.80	0.80	mA/°C
Reverse Voltage	V <sub>R</sub>	4	4	4	V
Operating Temperature	T <sub>opr</sub>	-40~+85			°C
Storage Temperature	T <sub>stg</sub>	-40~+85			°C

※2 Power Dissipation : 5 chips (Green・Yellow Green), 1 chip (Red)

The other Items : 1 chip

※3 I<sub>FRM</sub> Measurement condition : Pulse Width ≤ 2ms, Duty ≤ 1/5

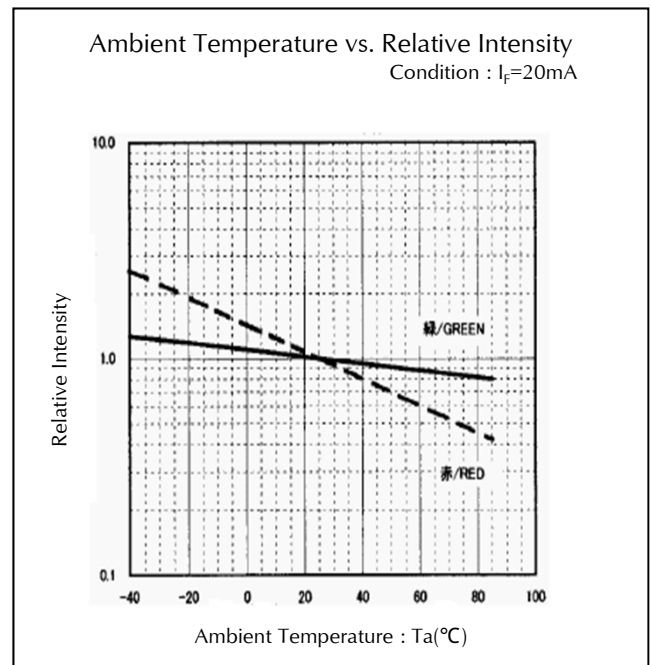
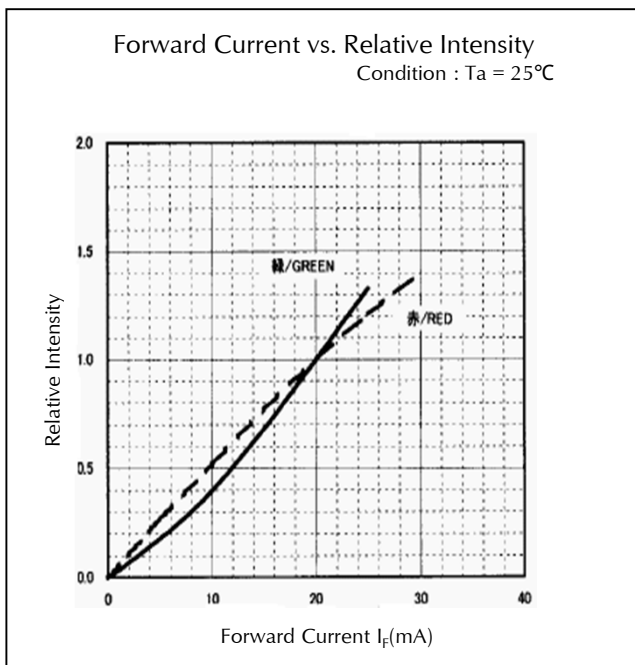
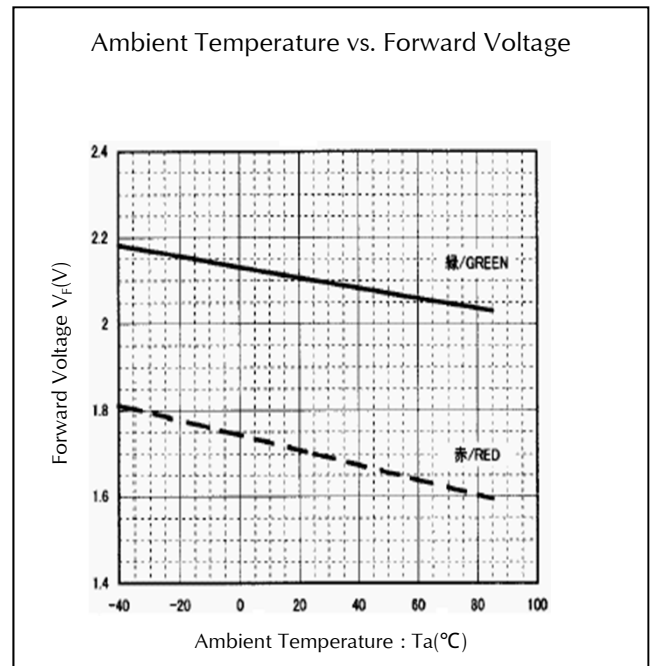
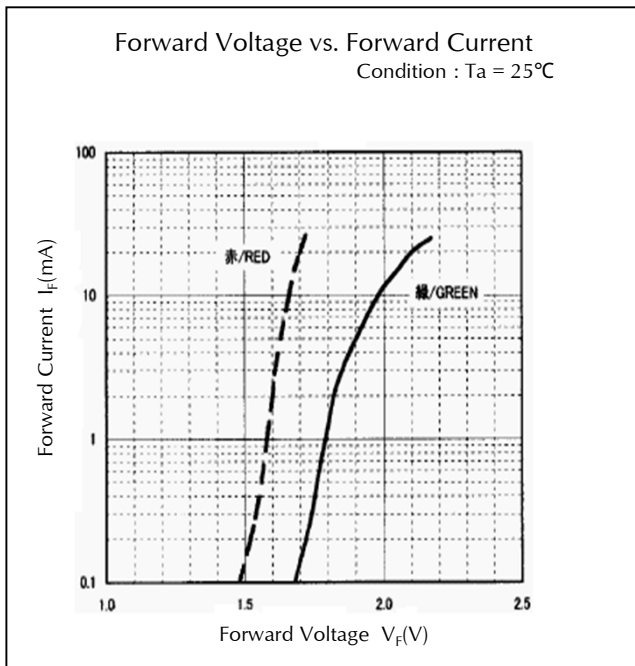
## Electro-Optical Characteristics

(Ta=25°C)

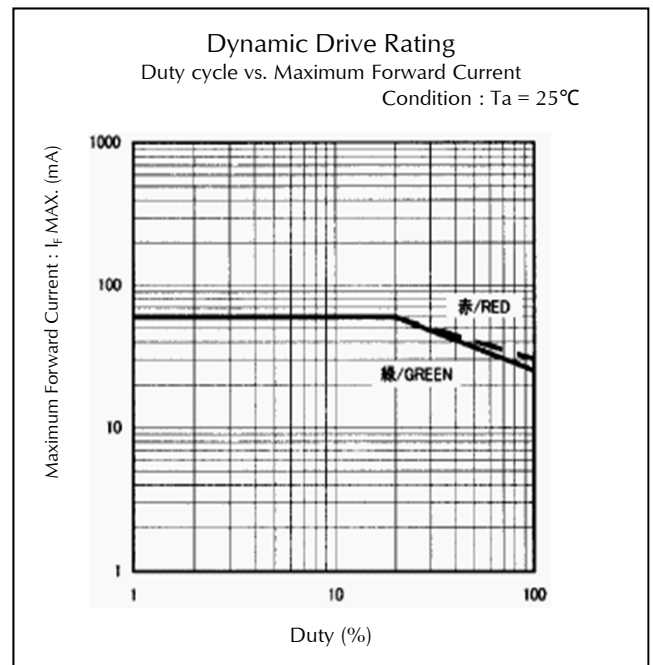
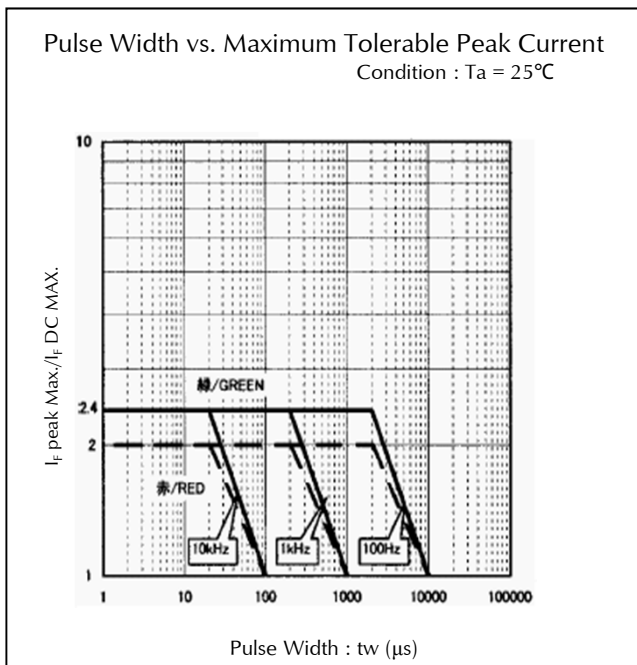
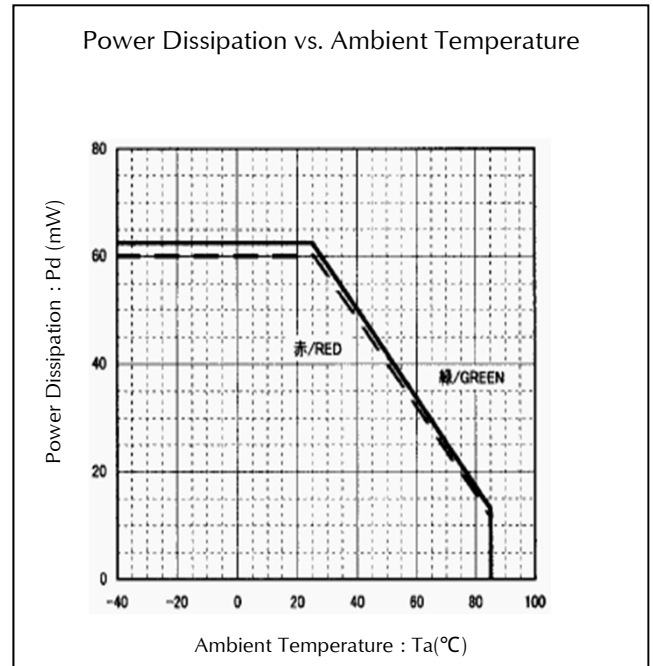
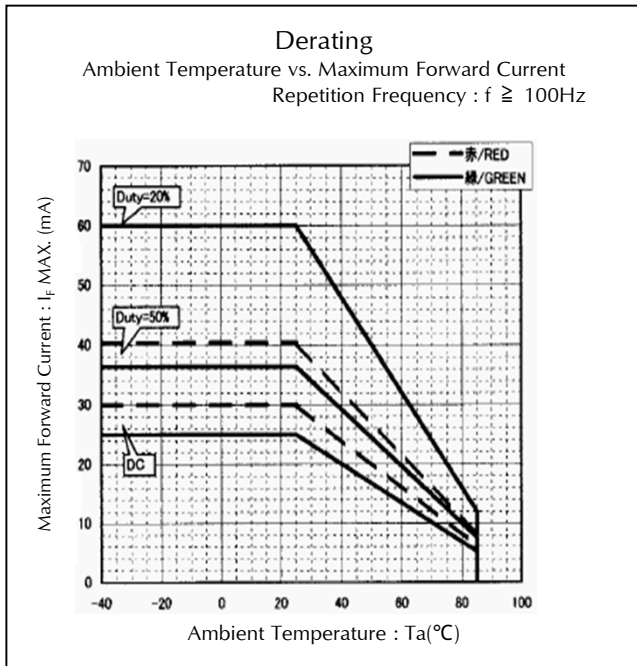
Item	Conditions	Symbol		Characteristics			Unit
				Green	Yellow Green	Red	
Forward Voltage	I <sub>F</sub> =20mA	V <sub>F</sub>	TYP.	2.2	2.1	1.7	V
			MAX.	2.5	2.5	2.0	
Reverse Current	V <sub>R</sub> =4V	I <sub>R</sub>	MAX.	100	100	100	μA
Peak Wavelength	I <sub>F</sub> =20mA	λ <sub>p</sub>	TYP.	555	570	660	nm
Spectral Line Half Width	I <sub>F</sub> =20mA	Δλ	TYP.	30	30	30	nm

※ The above Items : 1 chip

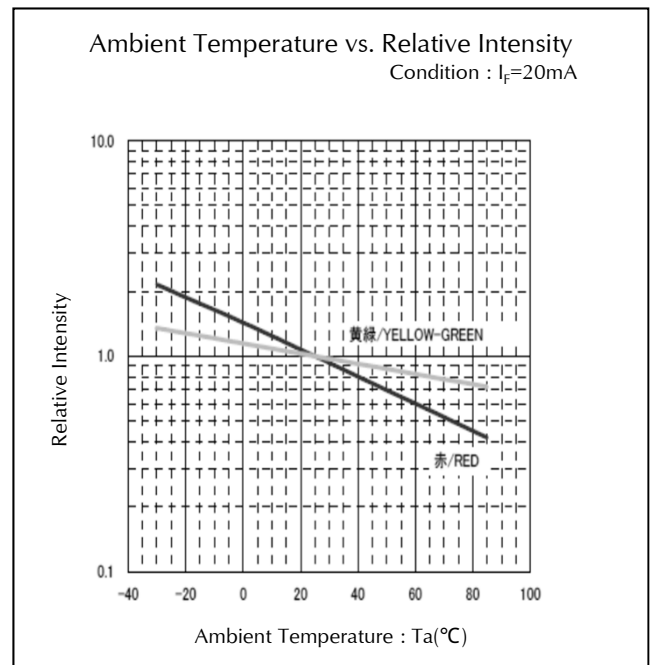
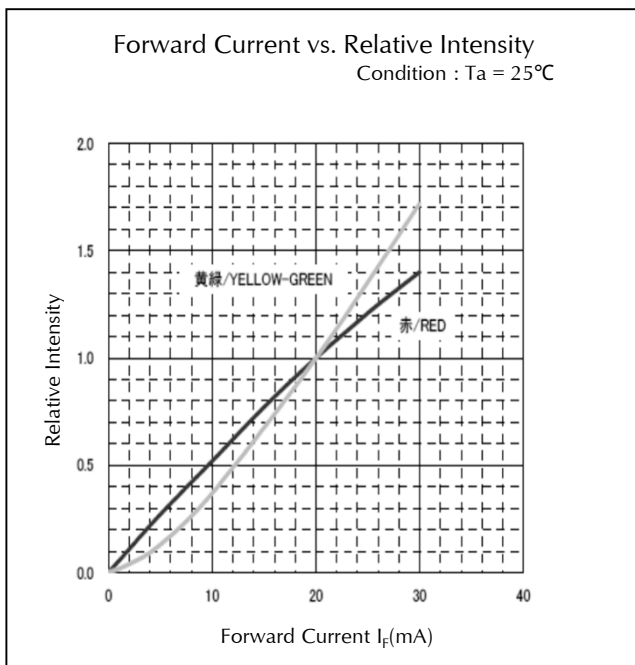
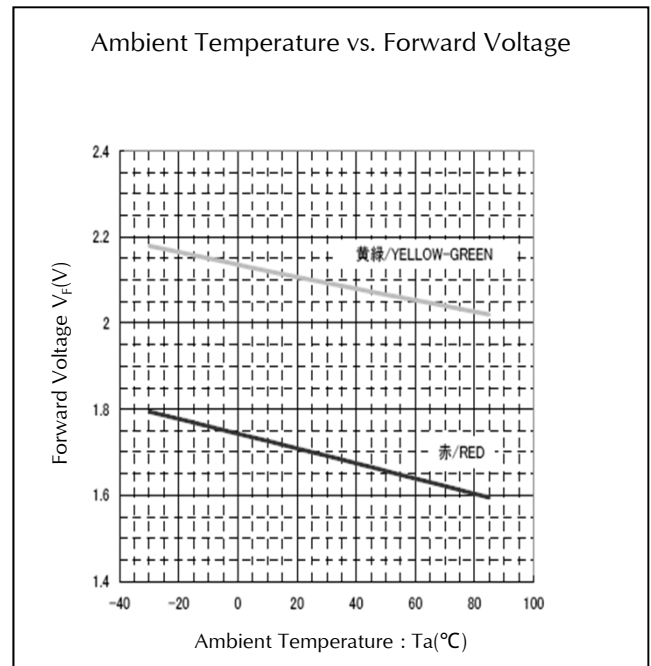
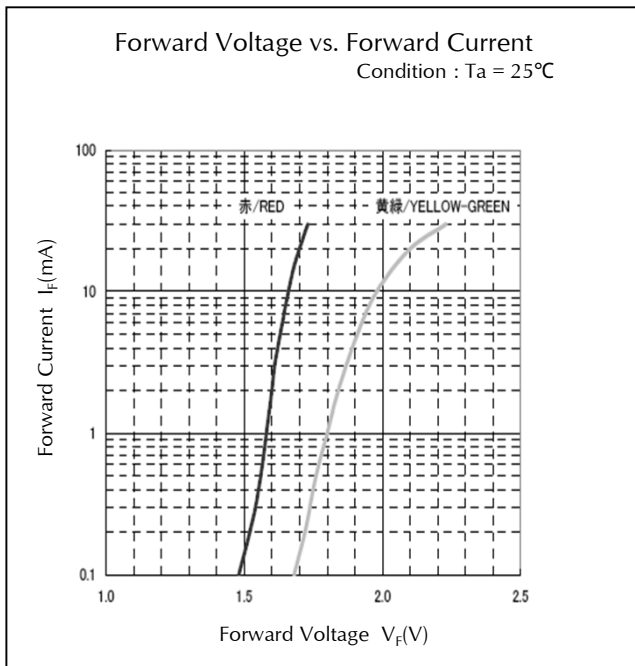
## Technical Data(9101)



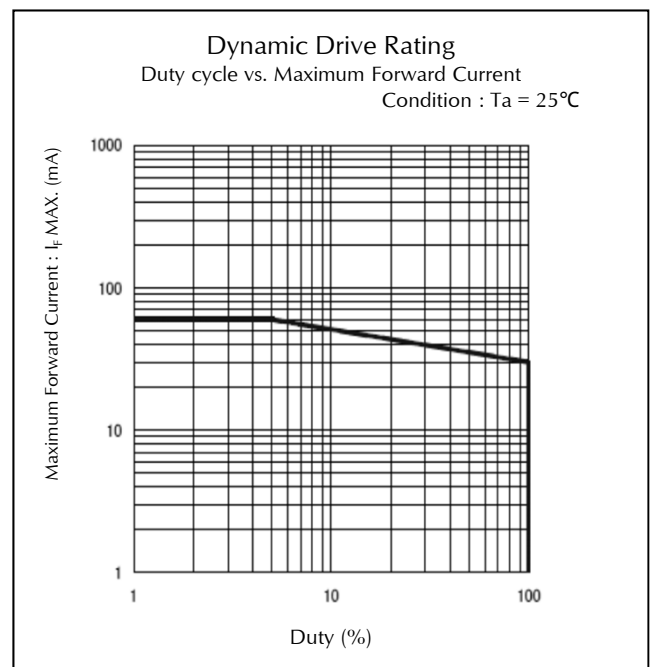
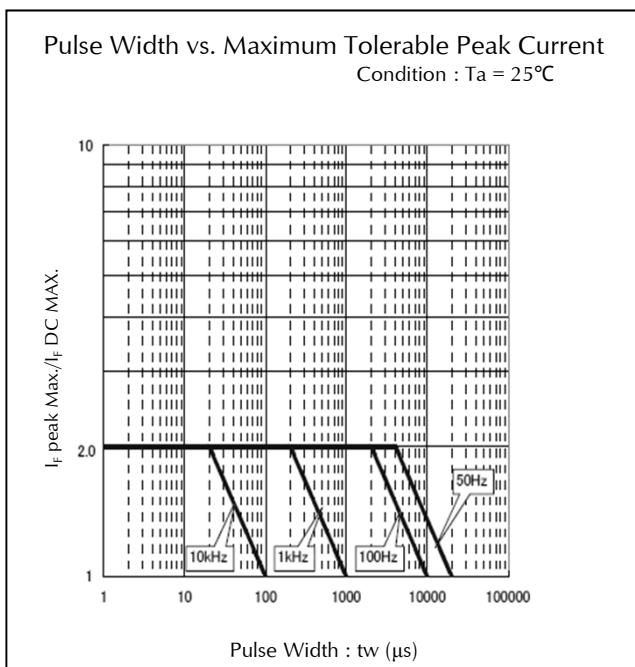
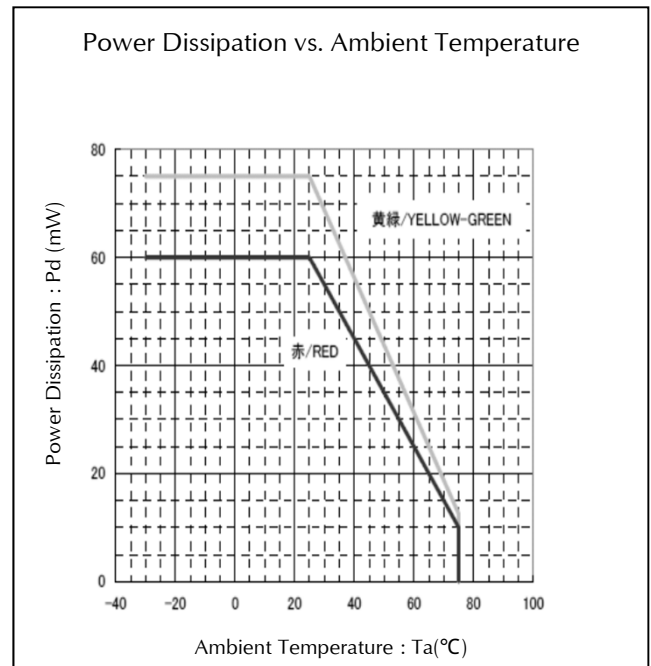
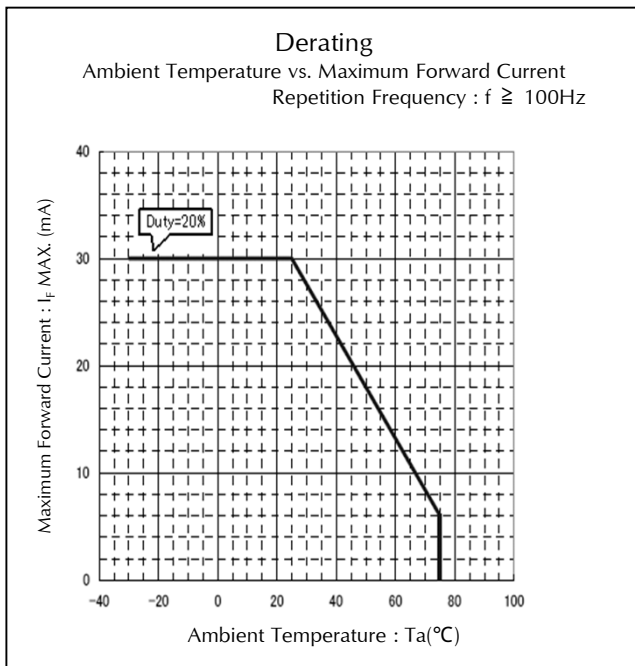
## Technical Data(9101)



## Technical Data(9102)



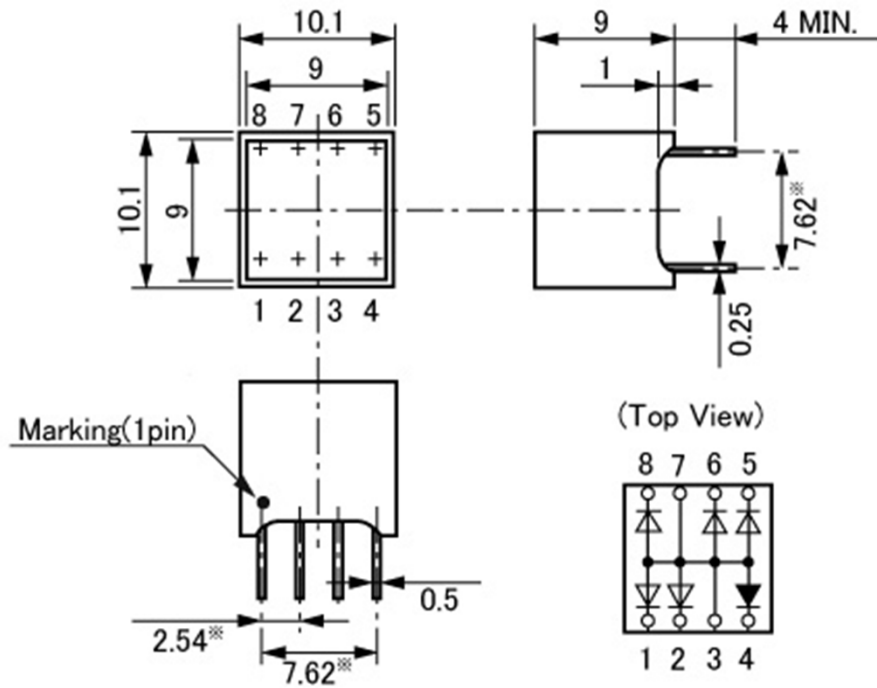
## Technical Data(9102)



## Package Dimensions

(Unit: mm)

(Tolerance :  $\pm 0.25$  mm)



● ※ mark : The measure of lead root



## TTW (Through The Wave) soldering Conditions

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Pre-heating	100 °C 60 s	(MAX.) Resin surface temperature (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 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	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 <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	Iv	If=20mA	Testing Min. Value < Spec. Min. Value x 0.5
Forward Voltage	V <sub>F</sub>	If=20mA	Testing Max. Value ≥ Spec. Max. Value x 1.2
Reverse Current	I <sub>R</sub>	V <sub>R</sub> =4V	Testing Max. Value ≥ Spec. Max. Value x 2.5
Cosmetic Appearance	-	-	Occurrence of notable decoloration, deformation and cracking

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