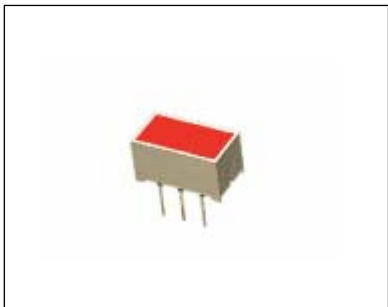




Ph-free
HEAT



MU11 Series

Single Color / Light Bar Module

Features

Light emitting surface (Outer size)	4.6 x 9.5 mm (5.6 x 10.5 mm) (L x W)								
Product features	▪ Single Color (Green, Yellow, Orange or Red) ▪ Lead-free soldering compatible ▪ RoHS compliant								
Peak wavelength	<table><tr><td>Green</td><td>: 555 nm</td></tr><tr><td>Yellow</td><td>: 570 nm</td></tr><tr><td>Orange</td><td>: 605 nm</td></tr><tr><td>Red</td><td>: 660 nm</td></tr></table>	Green	: 555 nm	Yellow	: 570 nm	Orange	: 605 nm	Red	: 660 nm
Green	: 555 nm								
Yellow	: 570 nm								
Orange	: 605 nm								
Red	: 660 nm								
Die materials	<table><tr><td>Green, Yellow</td><td>: GaP</td></tr><tr><td>Orange</td><td>: GaAsP</td></tr><tr><td>Red</td><td>: GaAlAs</td></tr></table>	Green, Yellow	: GaP	Orange	: GaAsP	Red	: GaAlAs		
Green, Yellow	: GaP								
Orange	: GaAsP								
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	Luminous Intensity※ ¹			Number of Chips
				I _v (mcd)			
				MIN.	TYP.	I _F	
MU11-5201	GaP	Green	Green	5	10	20	2
MU11-4201	GaP	Yellow	Yellow	10	20	20	2
MU11-3201	GaAsP	Orange	Orange	5	10	20	2
MU11-2201	GaAlAs	Red	Red	10	20	20	2

※1 Luminous Intensity : 2 chips

Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Absolute Maximum Ratings				Unit
		5201	4201	3201	2201	
Power Dissipation ^{※2}	P _d	125	150	125	120	mW
Forward Current	I _F	25	30	25	30	mA
Pulse Forward Current ^{※3}	I _{FRM}	60	60	60	60	mA
Derating (Ta=25°C or higher)	ΔI _F	0.33	0.40	0.33	0.40	mA/°C
	ΔI _{FRM}	0.80	0.80	0.80	0.80	mA/°C
Reverse Voltage	V _R	4	4	4	4	V
Operating Temperature	T _{opr}	-40~+85				°C
Storage Temperature	T _{stg}	-40~+85				°C

※2 Power Dissipation : 2 chips, The other Items : 1 chip

※3 I_{FRM} Measurement condition : Pulse Width ≤ 2ms, Duty ≤ 1/5

Electro-Optical Characteristics

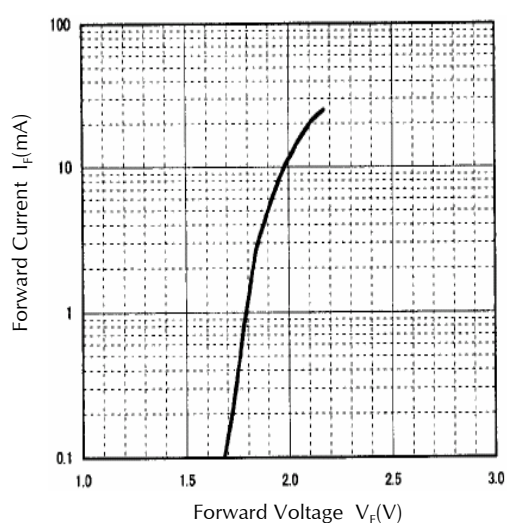
(Ta=25°C)

Item		Symbol	Characteristics					Unit
	Conditions			5201	4201	3201	2201	
Forward Voltage	I _F =20mA	V _F	TYP.	2.2	2.1	2.2	1.7	V
			MAX.	2.5	2.5	2.5	2.0	
Reverse Current	V _R =4V	I _R	MAX.	100	100	100	100	μ A
Peak Wavelength	I _F =20mA	λ _p	TYP.	555	570	605	660	nm
Spectral Line Half Width	I _F =20mA	Δ λ	TYP.	30	30	30	30	nm

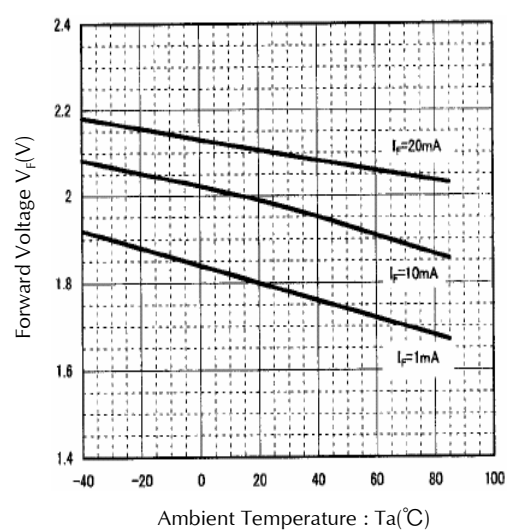
※ The above Items : 1 chip

Technical Data(5201)

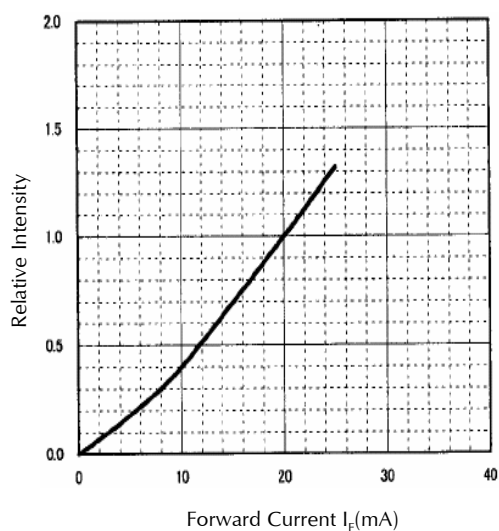
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



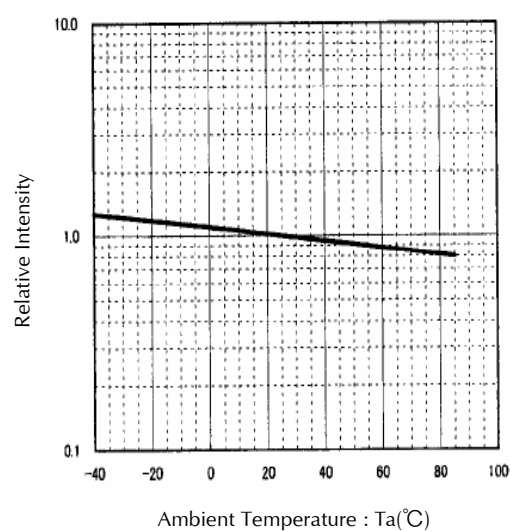
Ambient Temperature vs. Forward Voltage



Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$

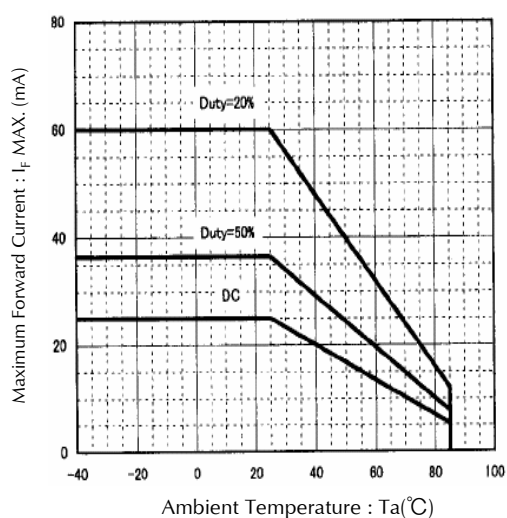


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$

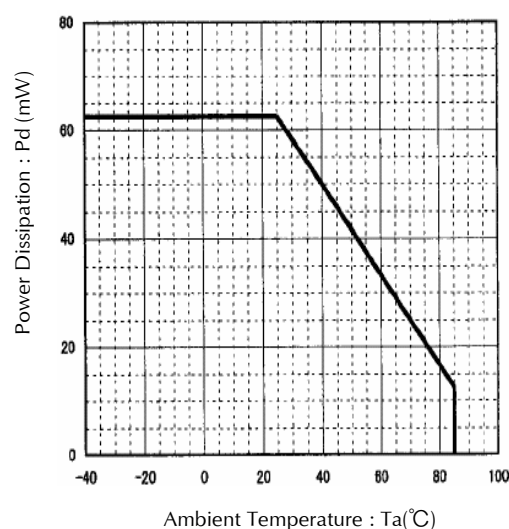


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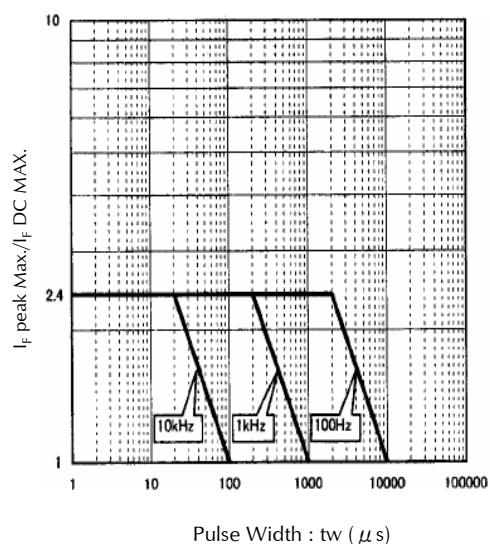
Derating
Ambient Temperature vs. Maximum Forward Current
Repetition Frequency : $f \geq 100\text{Hz}$



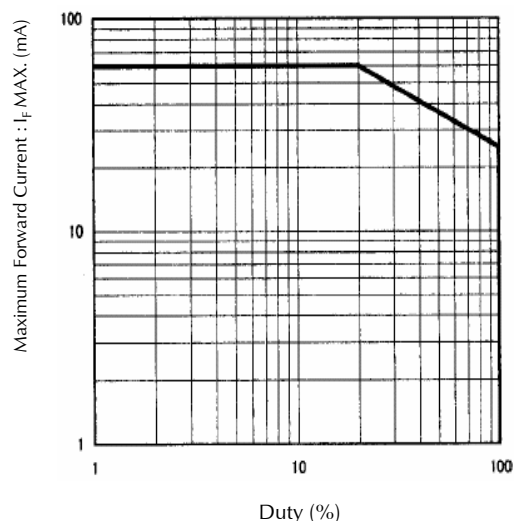
Power Dissipation vs. Ambient Temperature



Pulse Width vs. Maximum Tolerable Peak Current
Condition : $T_a = 25^\circ\text{C}$

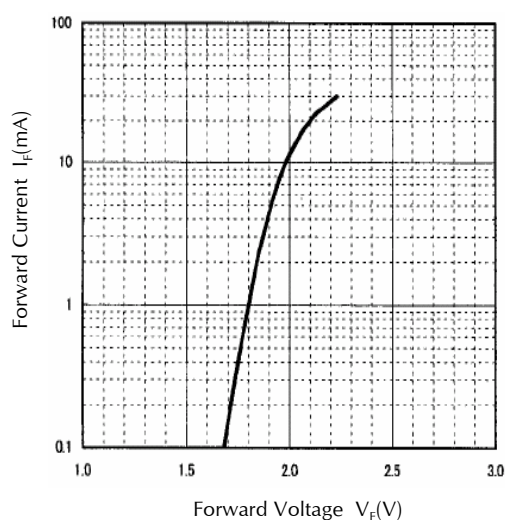


Dynamic Drive Rating
Duty cycle vs. Maximum Forward Current
Condition : $T_a = 25^\circ\text{C}$

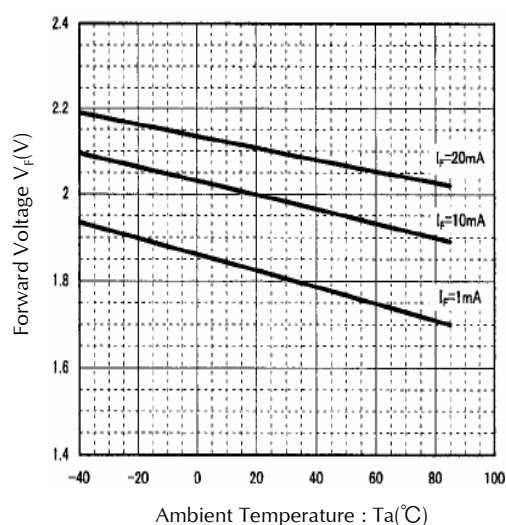


Technical Data(4201)

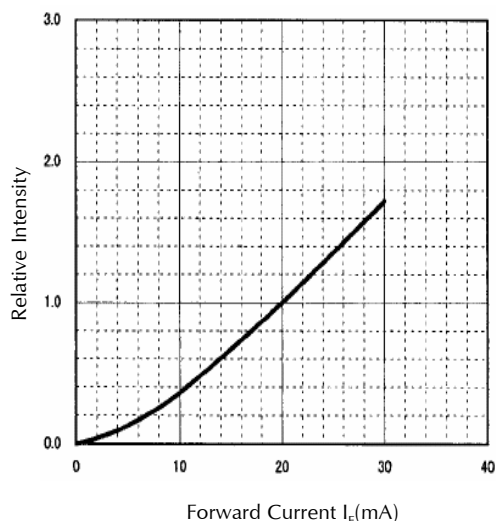
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



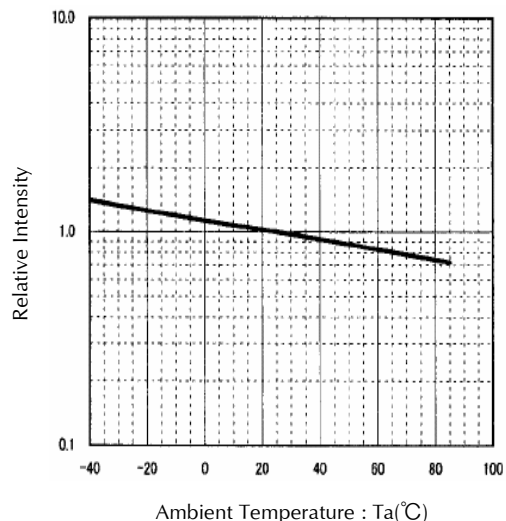
Ambient Temperature vs. Forward Voltage



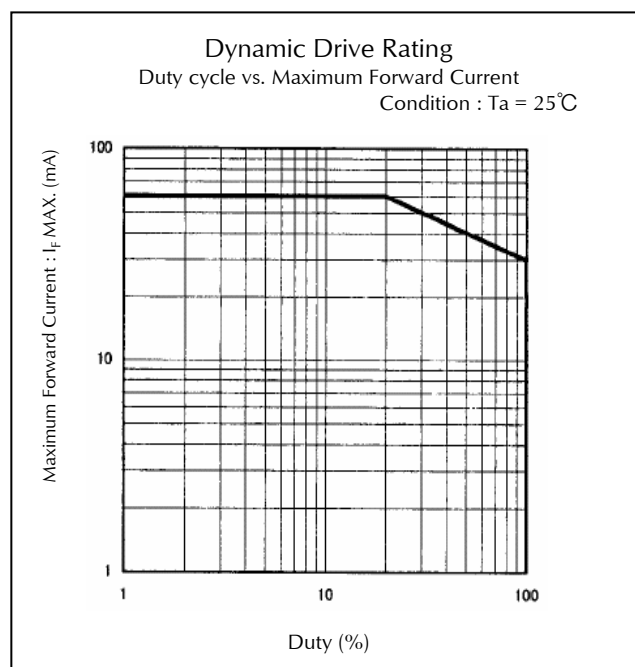
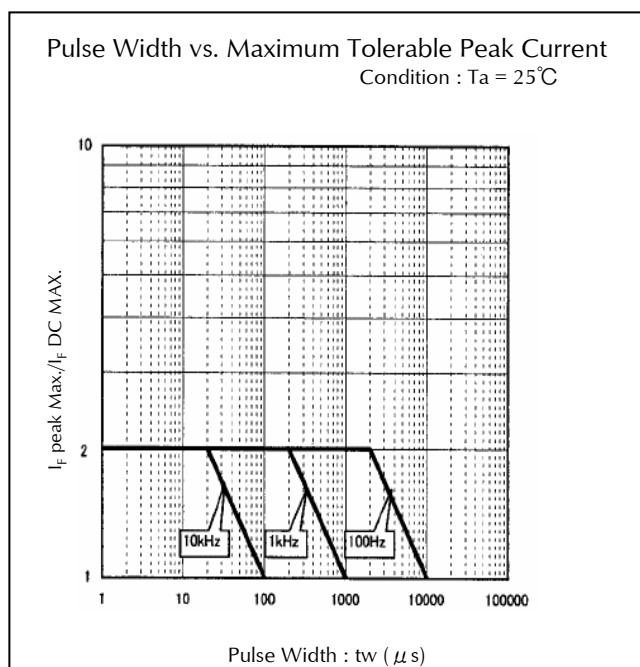
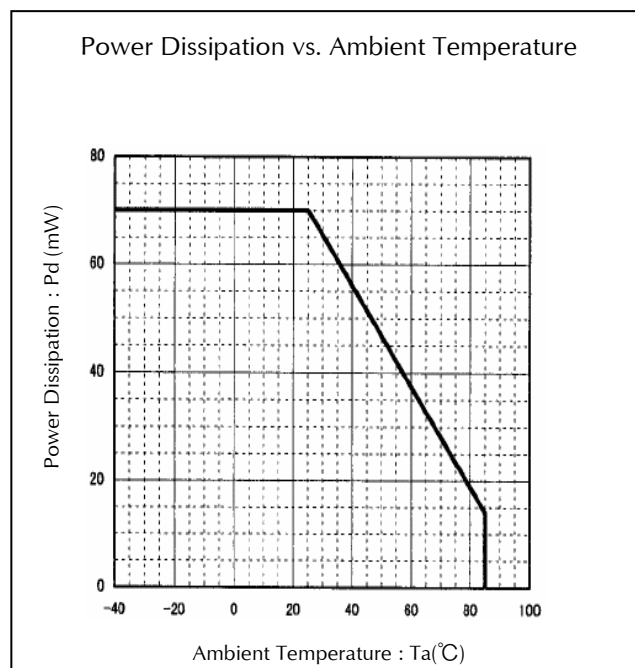
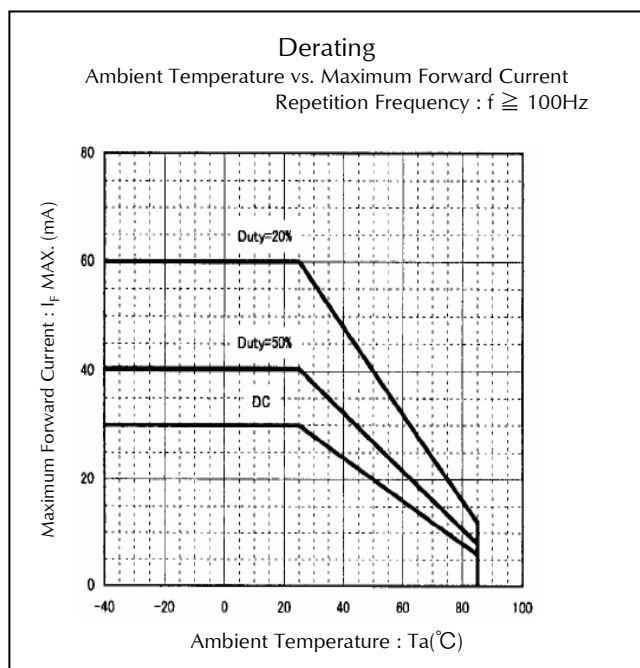
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$

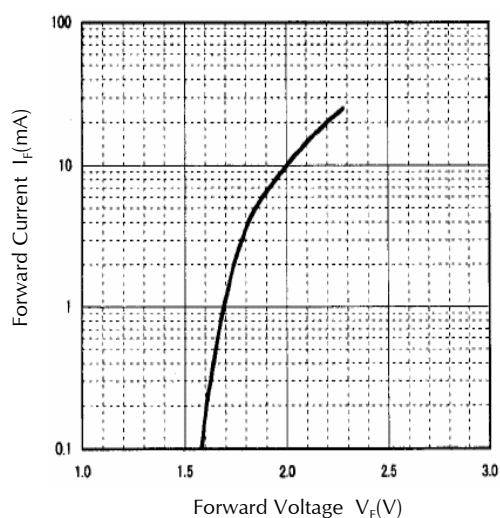


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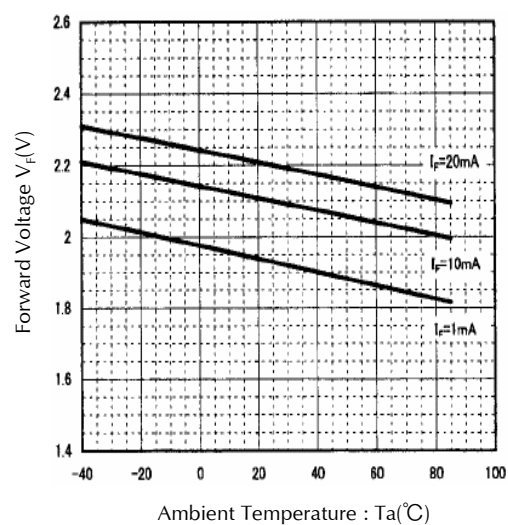


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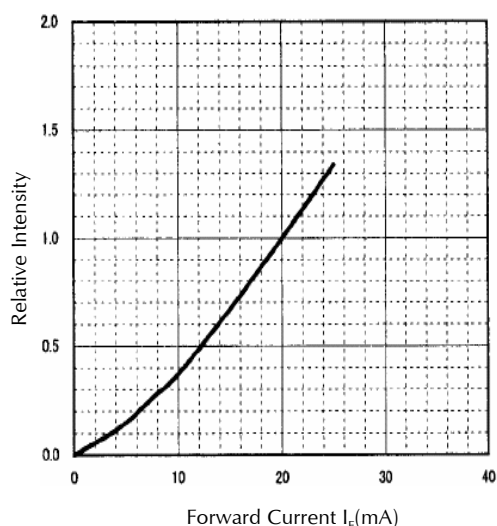
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



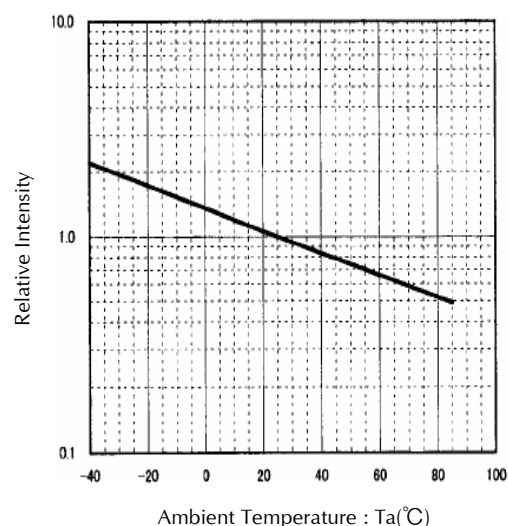
Ambient Temperature vs. Forward Voltage



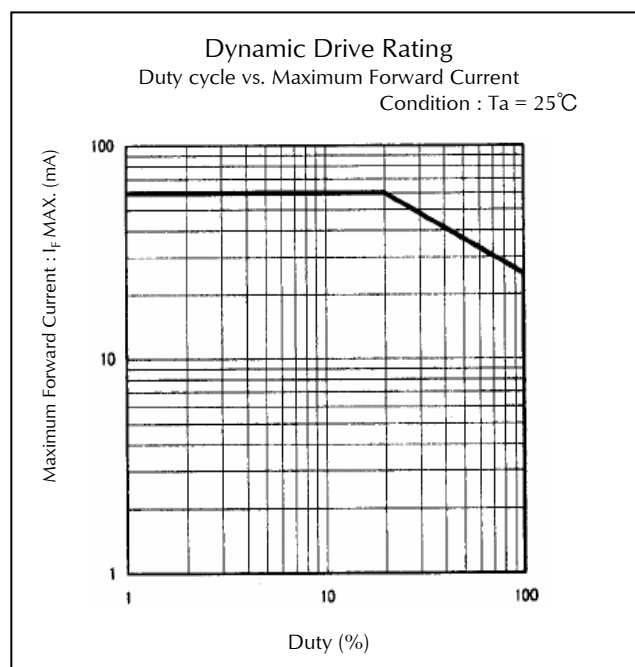
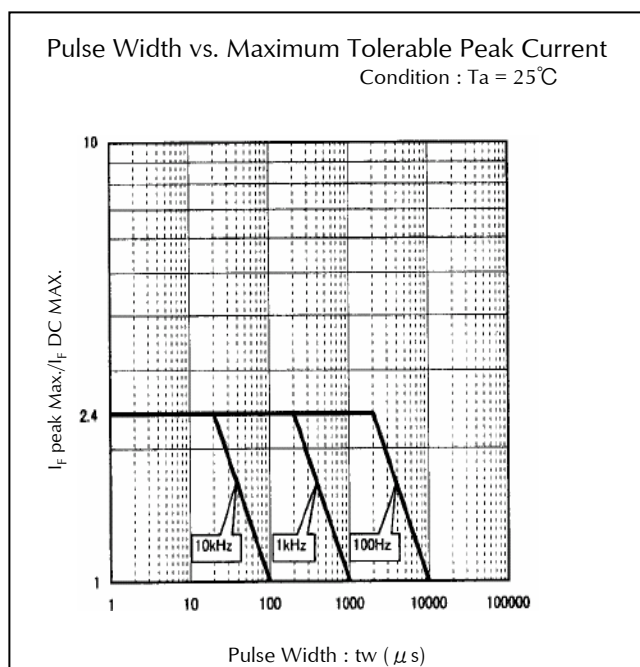
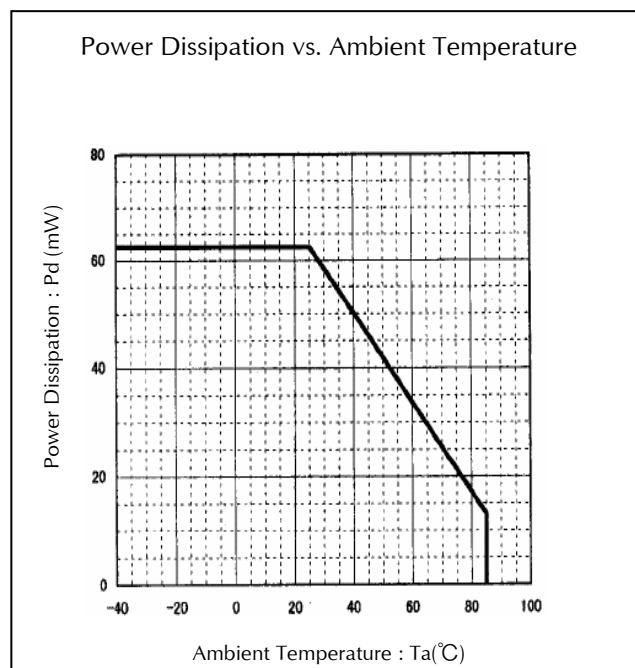
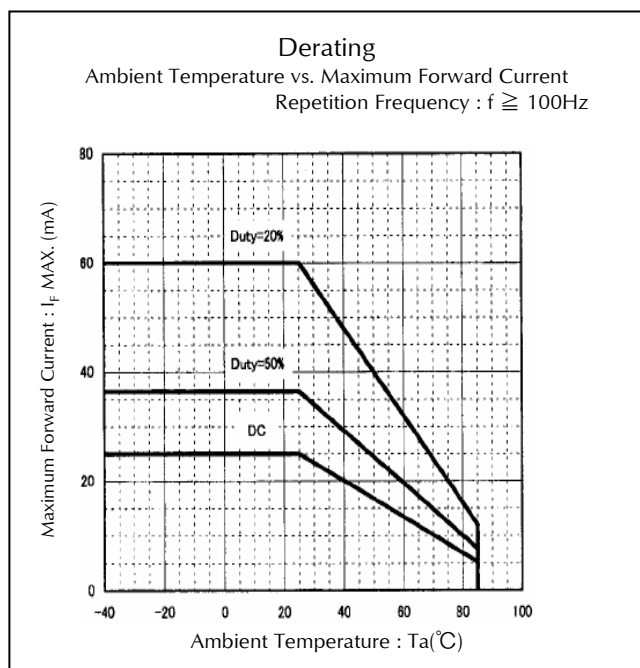
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$

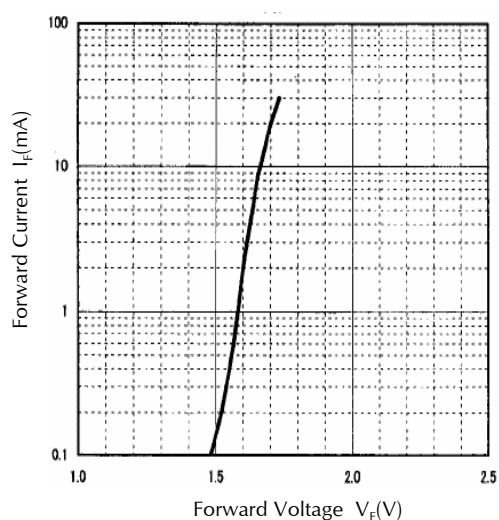


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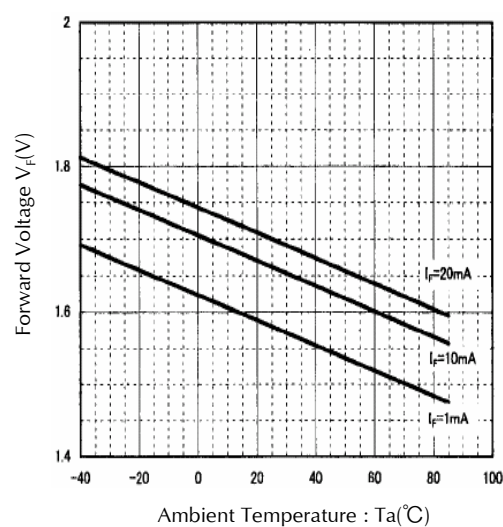


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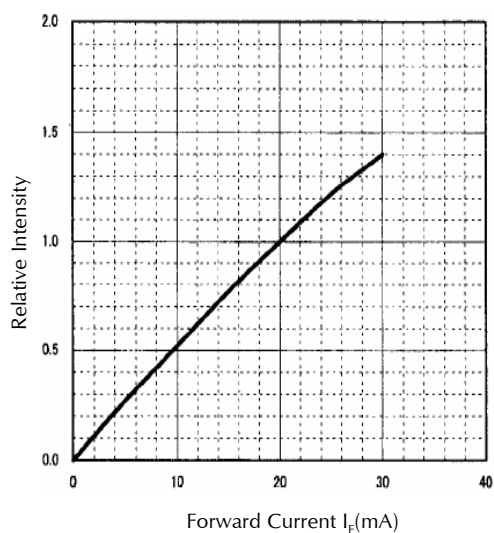
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



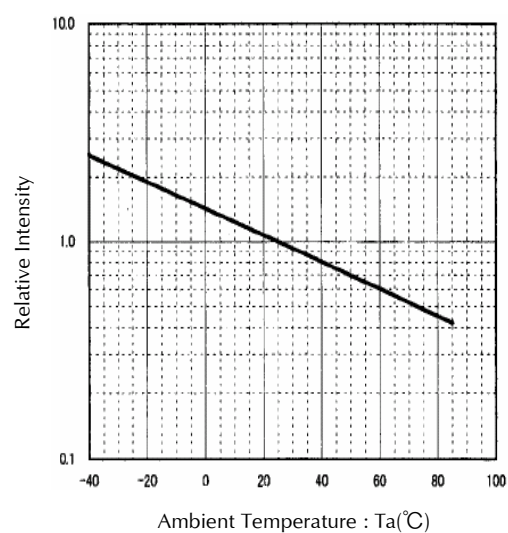
Ambient Temperature vs. Forward Voltage



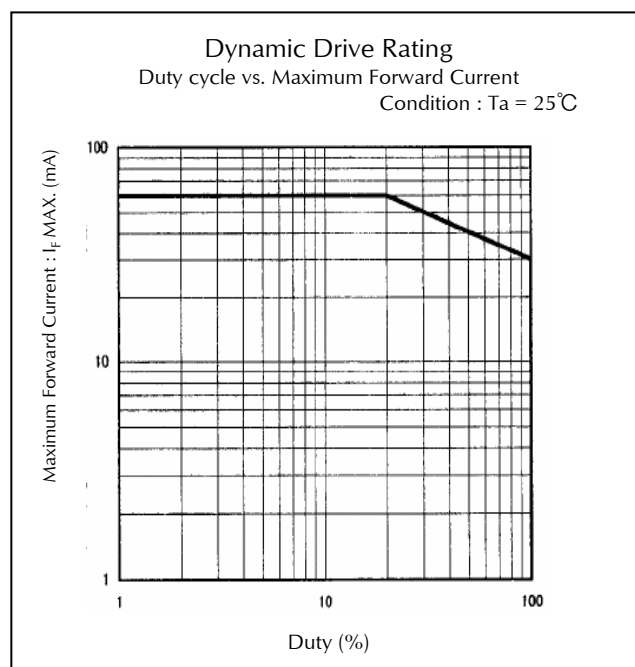
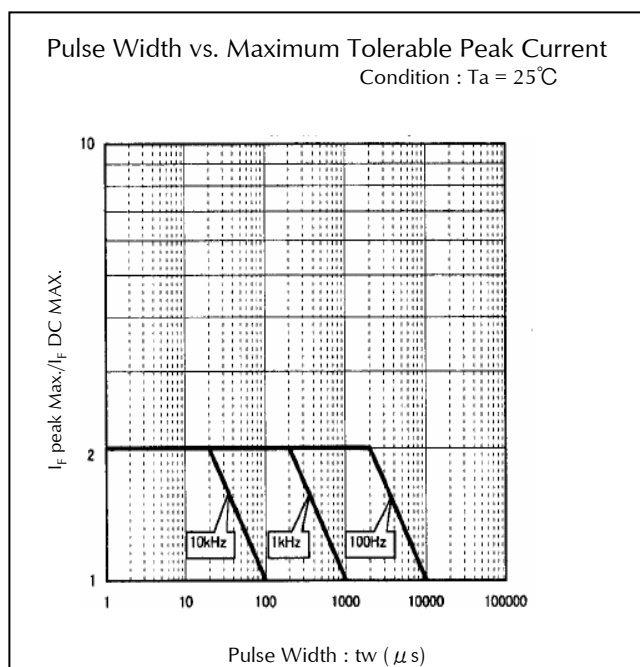
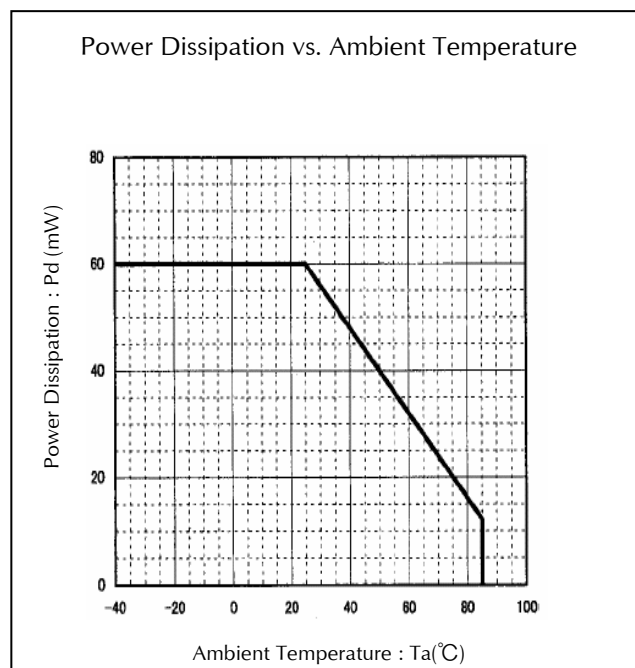
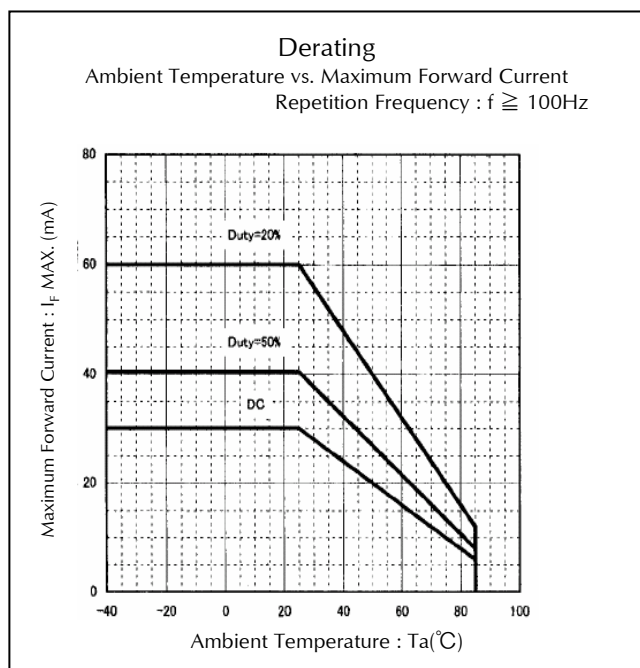
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$



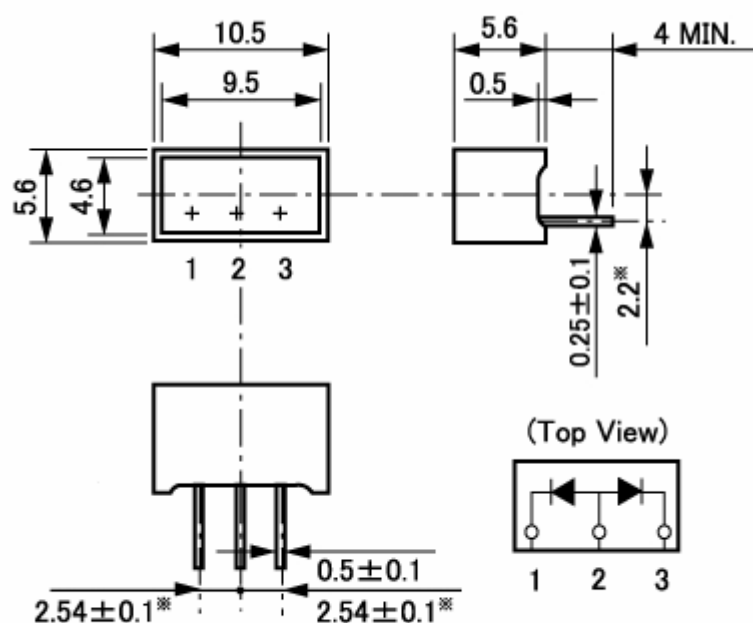
Technical Data(2201)



Package Dimensions

(Unit: mm)

(Tolerance : ± 0.25 mm)



● ※ mark : The measure of resin root

TTW (Through The Wave) soldering Conditions

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 resin body	

- 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 °C	(MAX.) (30 W Max.)
Soldering time and frequency	3 s 2 times	(MAX.) (MAX.)
Position	At least 2.0 mm away from resin body	

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	10sec	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	10sec	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°	2 times	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 _F	If=20mA	Testing Max. Value ≥ Spec. Max. Value x 1.2
Reverse Current	I _R	V _R =4V	Testing Max. Value ≥ Spec. Max. Value x 2.5
Cosmetic Appearance	-	-	No notable, decoloration, deformation and cracking

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