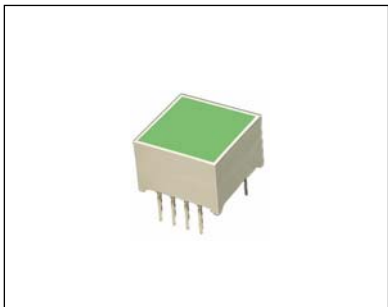




**Pb-free
HEAT**



MU02 Series

Single Color / Light Bar Module

Features

Light emitting surface (Outer size)	14 x 14 mm (15 x 15 mm) (L x W)										
Product features	• Single Color (Green, Yellow Green, Orange or Red) • Lead-free soldering compatible • RoHS compliant										
Peak wavelength	<table><tr><td>Green</td><td>: 555 nm (5201,5205)</td></tr><tr><td></td><td>: 560 nm (5202)</td></tr><tr><td>Yellow Green</td><td>: 570 nm (4201,4205)</td></tr><tr><td>Orange</td><td>: 605 nm (3201,3205)</td></tr><tr><td>Red</td><td>: 660 nm (2201,2205)</td></tr></table>	Green	: 555 nm (5201,5205)		: 560 nm (5202)	Yellow Green	: 570 nm (4201,4205)	Orange	: 605 nm (3201,3205)	Red	: 660 nm (2201,2205)
Green	: 555 nm (5201,5205)										
	: 560 nm (5202)										
Yellow Green	: 570 nm (4201,4205)										
Orange	: 605 nm (3201,3205)										
Red	: 660 nm (2201,2205)										
Die materials	<table><tr><td>Green, Yellow Green</td><td>: GaP</td></tr><tr><td>Orange</td><td>: GaAsP</td></tr><tr><td>Red</td><td>: GaAlAs</td></tr></table>	Green, Yellow Green	: GaP	Orange	: GaAsP	Red	: GaAlAs				
Green, Yellow Green	: GaP										
Orange	: GaAsP										
Red	: GaAlAs										
Soldering methods	TTW (Through The Wave) soldering and manual soldering										
Soldering methods	More than 2kV(HBM)										
Packing	Tray										

Recommended Applications

Electric Household Appliances, OA/FA, Other General Applications

Color and Luminous Intensity

Part No.	Material	Emitted Color	Resin Color	Intensity ^{※1} I _v (mcd)			Number of Chips
				MIN.	TYP.	I _F	
MU02-5201	GaP	Green	Green	10	20	20	4
MU02-5205	GaP		Milky White	10	20	20	4
MU02-5202	GaP		Green	15	32	20	4
MU02-4201	GaP	Yellow Green	Yellow	20	42	20	4
MU02-4205	GaP		Milky White	20	42	20	4
MU02-3201	GaAsP	Orange	Orange	10	20	20	4
MU02-3205	GaAsP		Milky White	10	20	20	4
MU02-2201	GaAlAs	Red	Red	20	42	20	4
MU02-2205	GaAlAs		Milky White	20	42	20	4

※1 Luminous Intensity : 4 chips

Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Absolute Maximum Ratings									Unit
		5201	5205	5202	4201	4205	3201	3205	2201	2205	
Power Dissipation※ ²	P _d	250	250	300	300	300	250	250	240	240	mW
Forward Current	I _F	25	25	30	30	30	25	25	30	30	mA
Pulse Forward Current ※ ³	I _{FRM}	60	60	60	60	60	60	60	60	60	mA
Derating (Ta=25℃ or higher)	Δ I _F	0.33	0.33	0.40	0.40	0.40	0.33	0.33	0.40	0.40	mA/℃
	Δ I _{FRM}	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	mA/℃
Reverse Voltage	V _R	4	4	4	4	4	4	4	4	4	V
Operating Temperature	T _{opr}	-40～+85									℃
Storage Temperature	T _{std}	-40～+85									℃

※2 Power Dissipation : 4 chips, The other Items : 1 chip

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

Electro-Optical Characteristics

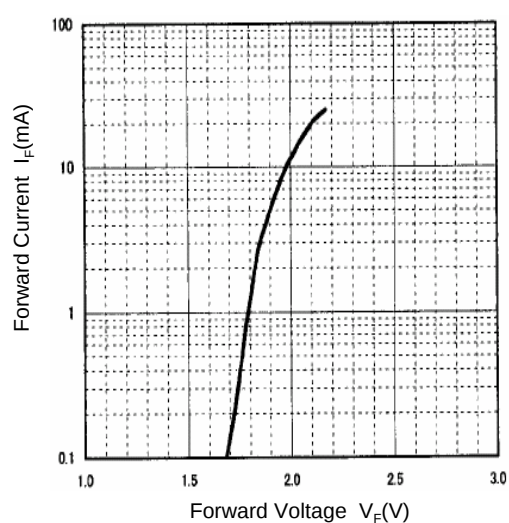
(Ta=25°C)

Item		Symbol	Characteristics										Unit
	Conditions			5201	5205	5202	4201	4205	3201	3205	2201	2205	
Forward Voltage	I _F =20mA	V _F	TYP.	2.2	2.2	2.1	2.1	2.1	2.2	2.2	1.7	1.7	V
			MAX.	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	
Reverse Current	V _R =4V	I _R	MAX.	100	100	100	100	100	100	100	100	100	μ A
Peak Wavelength	I _F =20mA	λ _p	TYP.	555	555	560	570	570	605	605	660	660	nm
Spectral Line Half Width	I _F =20mA	Δ λ	TYP.	30	30	30	30	30	30	30	30	30	nm

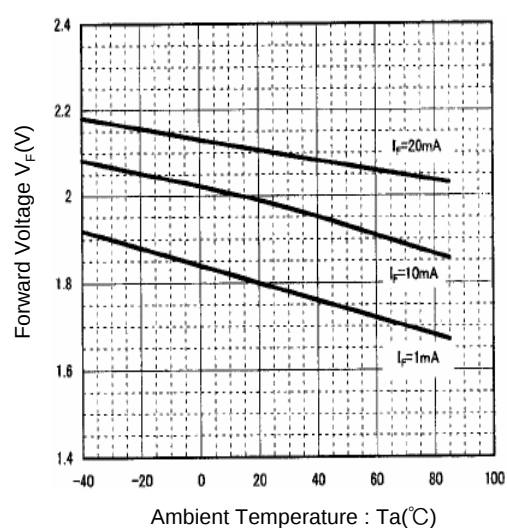
※ The above Items : 1 chip

Technical Data(5201/5205)

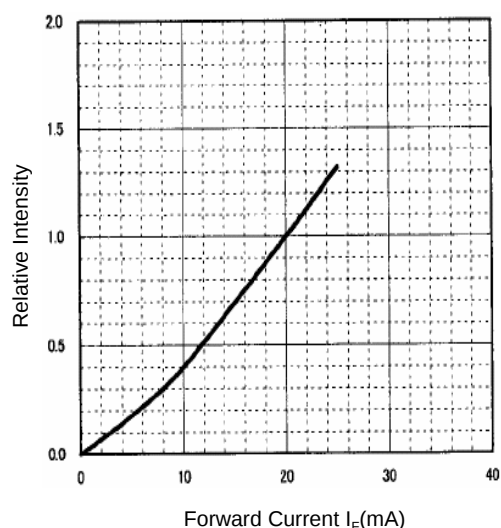
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



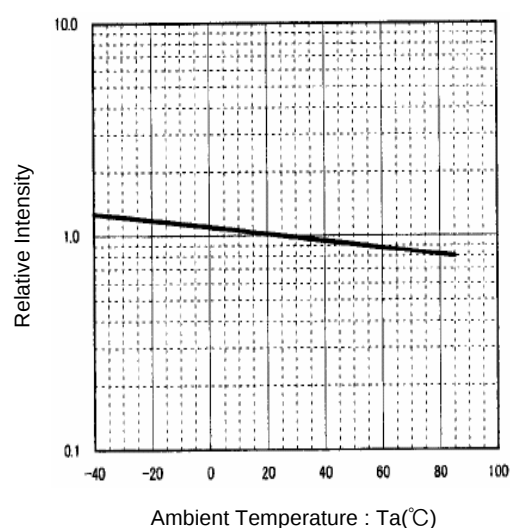
Ambient Temperature vs. Forward Voltage



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

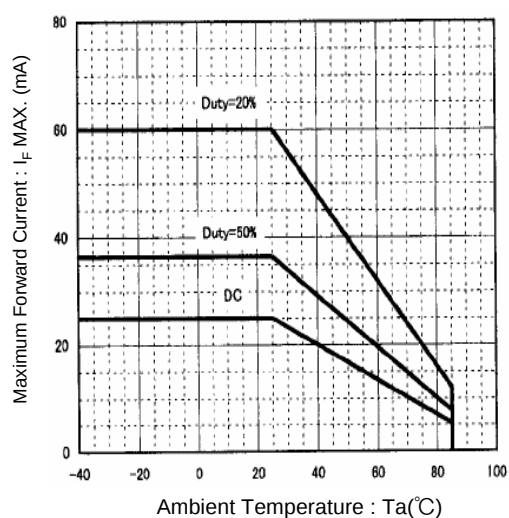


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$

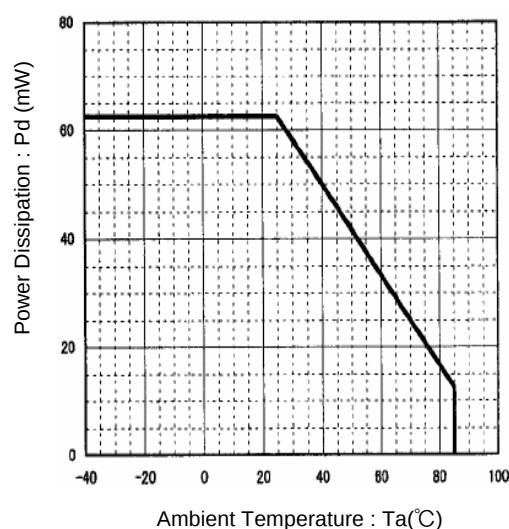


Technical Data(5201/5205)

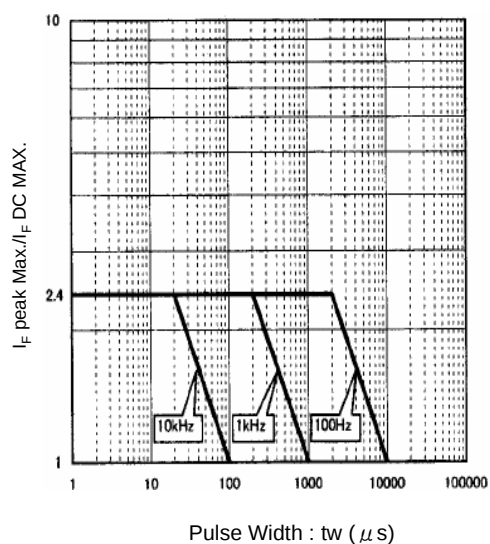
Derating
Ambient Temperature vs. Maximum Forward Current
Repetition Frequency : $f \geq 100\text{Hz}$



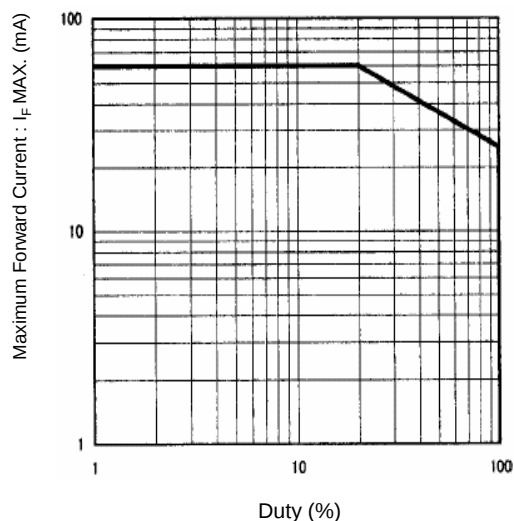
Power Dissipation vs. Ambient Temperature



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

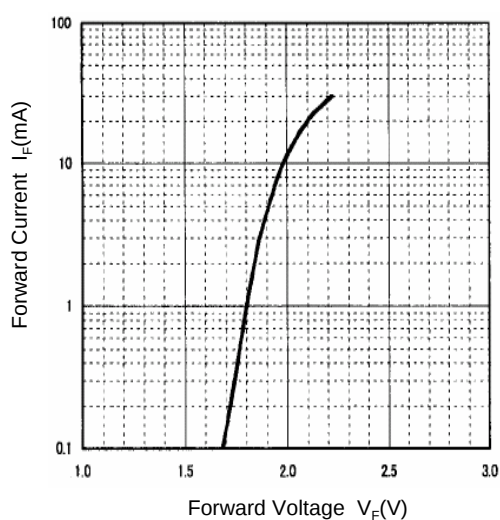


Dynamic Drive Rating
Duty cycle vs. Maximum Forward Current
Condition : $T_a = 25^\circ\text{C}$

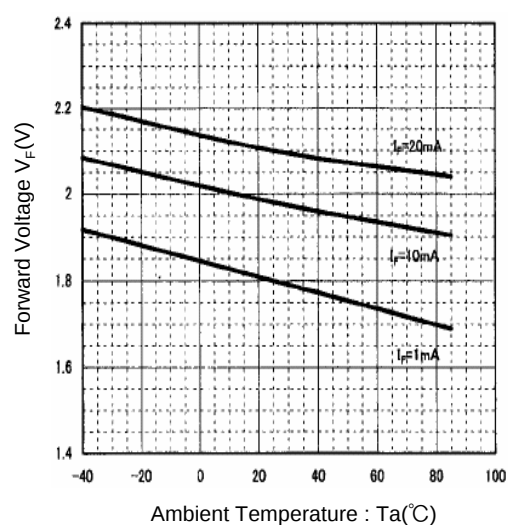


Technical Data(5202)

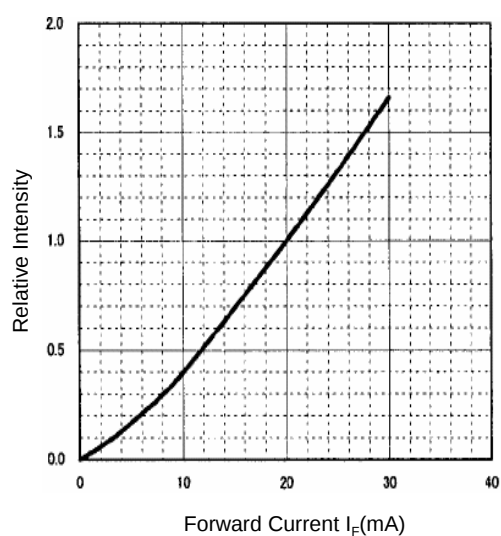
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



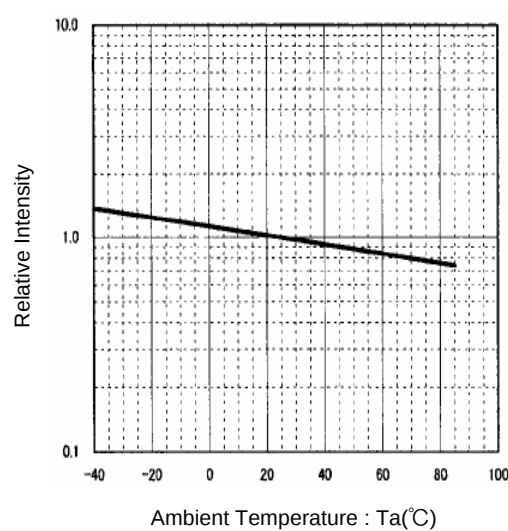
Ambient Temperature vs. Forward Voltage



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

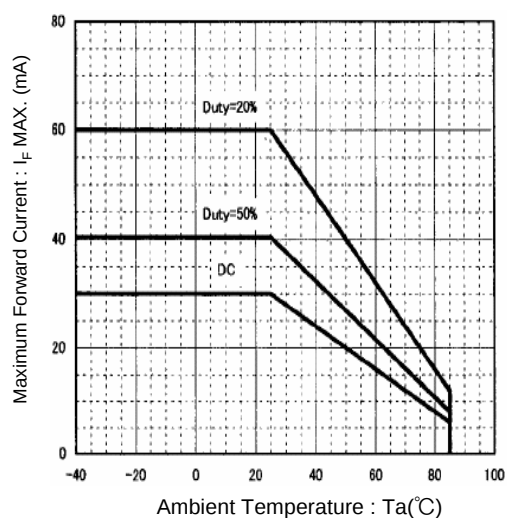


Ambient Temperature vs. Relative Intensity
Condition : $I_F = 20\text{mA}$

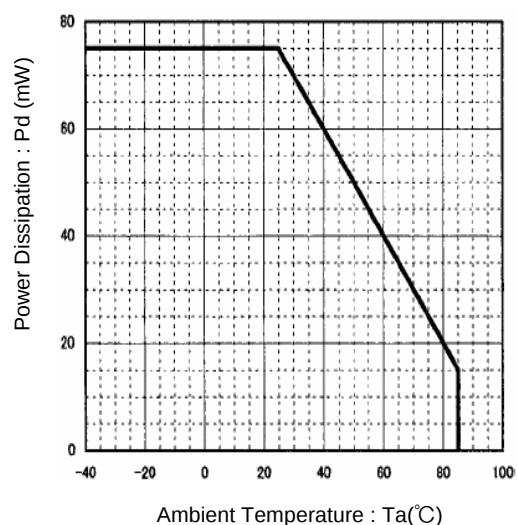


Technical Data(5202)

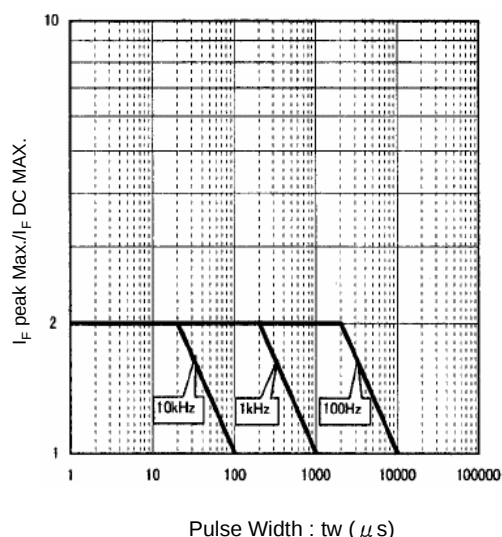
Derating
Ambient Temperature vs. Maximum Forward Current
Repetition Frequency : $f \geq 100\text{Hz}$



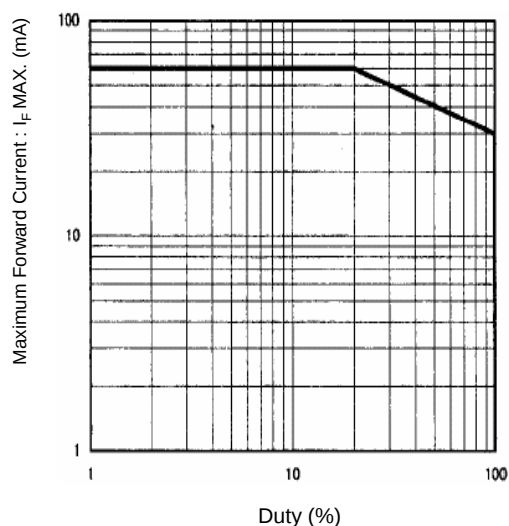
Power Dissipation vs. Ambient Temperature



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

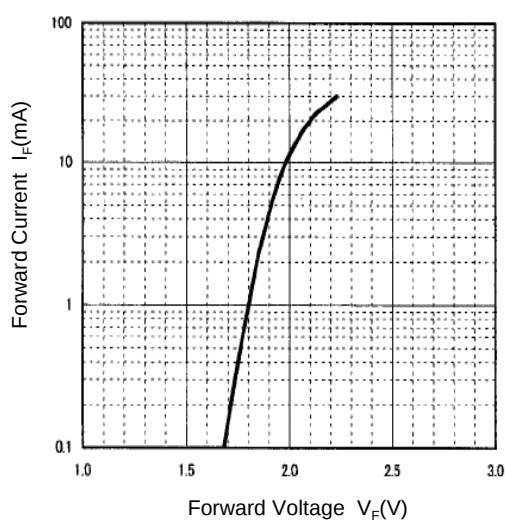


Dynamic Drive Rating
Duty cycle vs. Maximum Forward Current
Condition : $T_a = 25^\circ\text{C}$

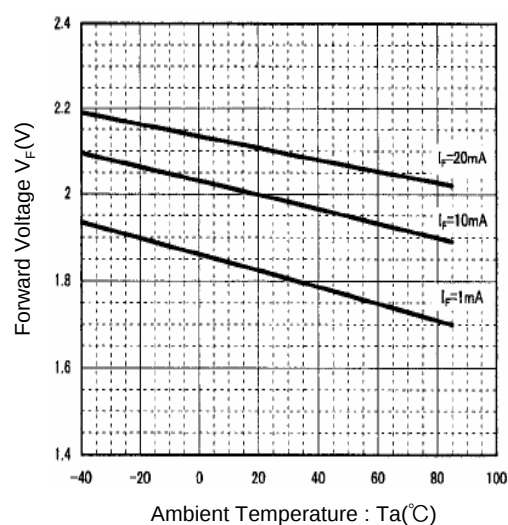


Technical Data(4201/4205)

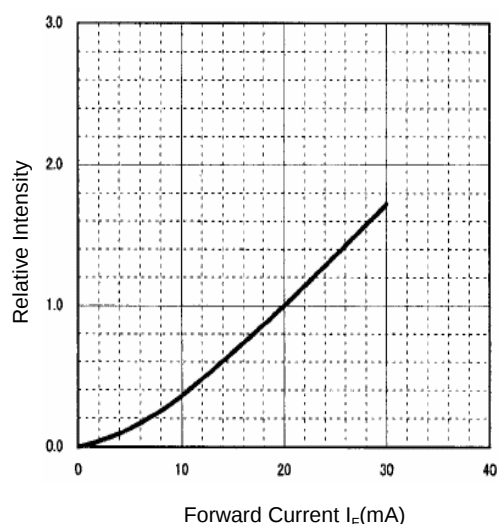
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



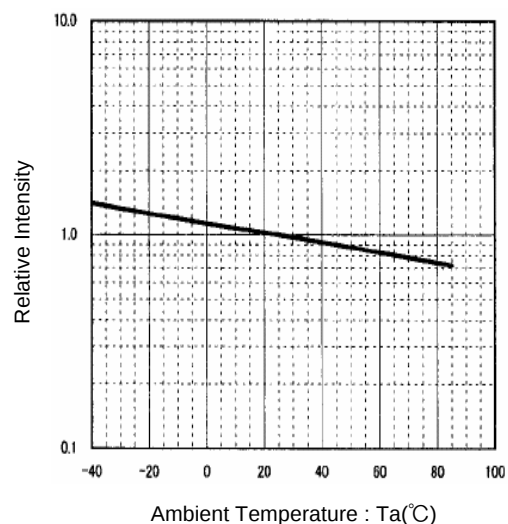
Ambient Temperature vs. Forward Voltage



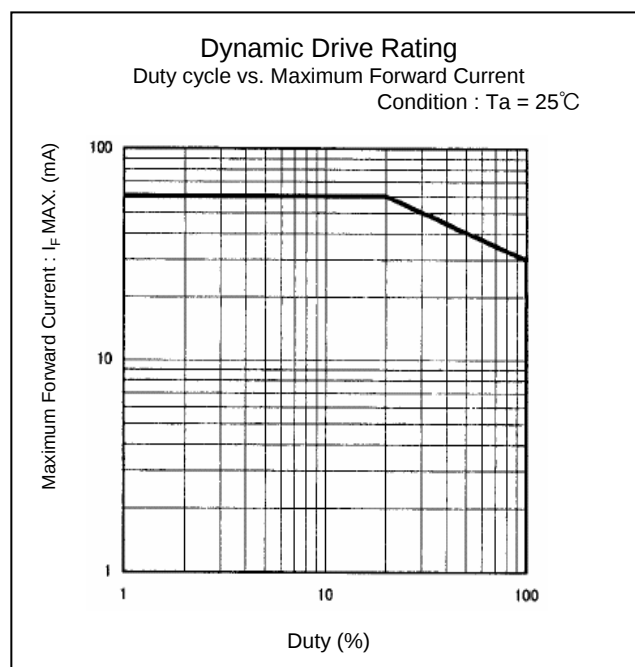
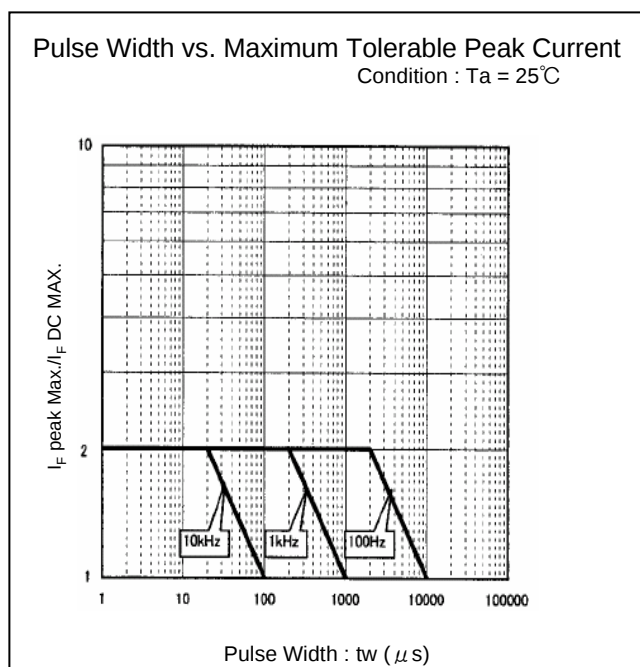
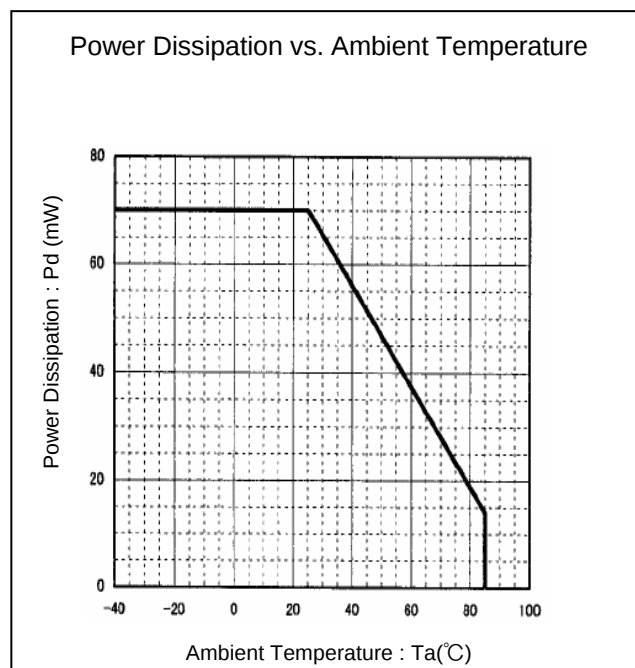
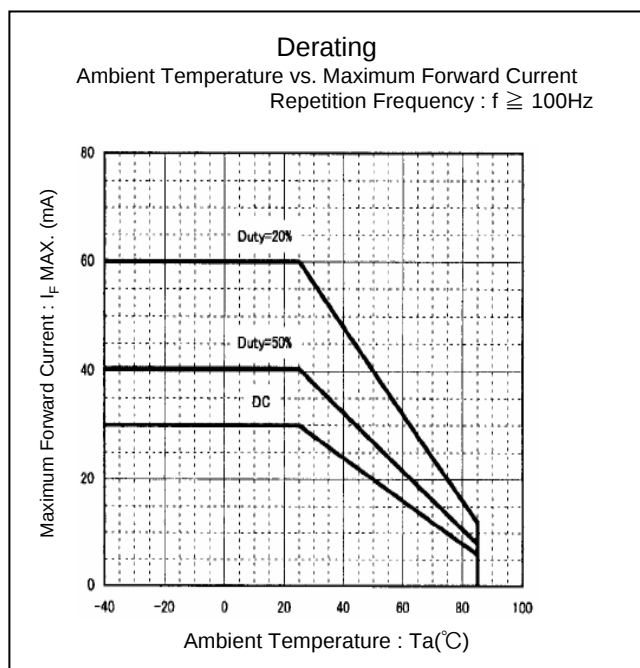
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



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

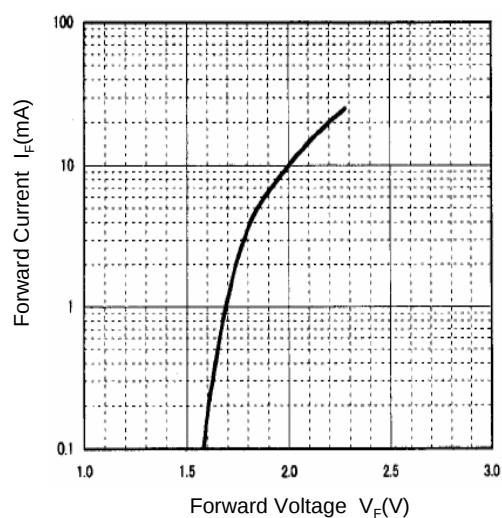


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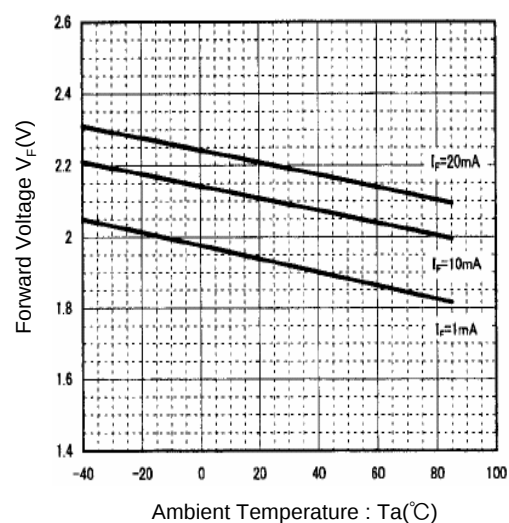


Technical Data(3201/3205)

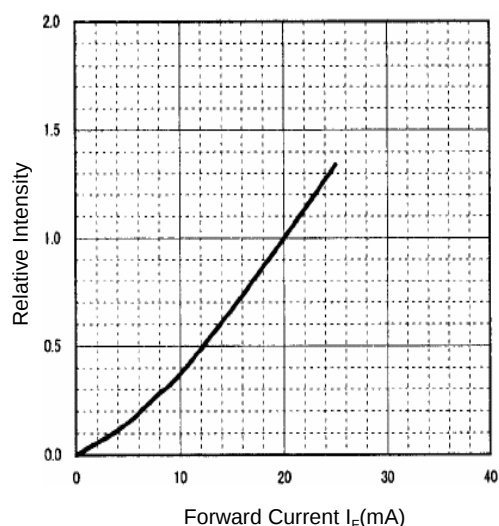
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



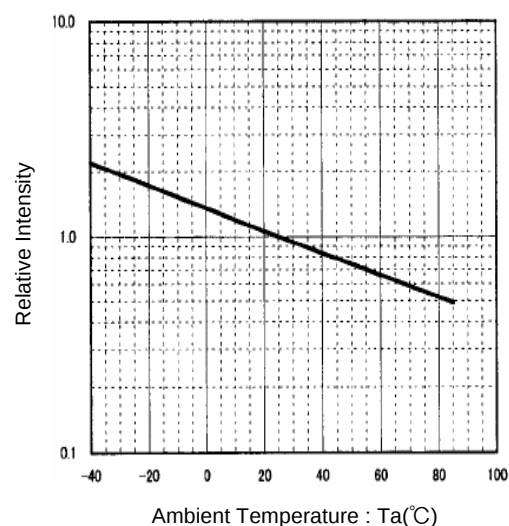
Ambient Temperature vs. Forward Voltage



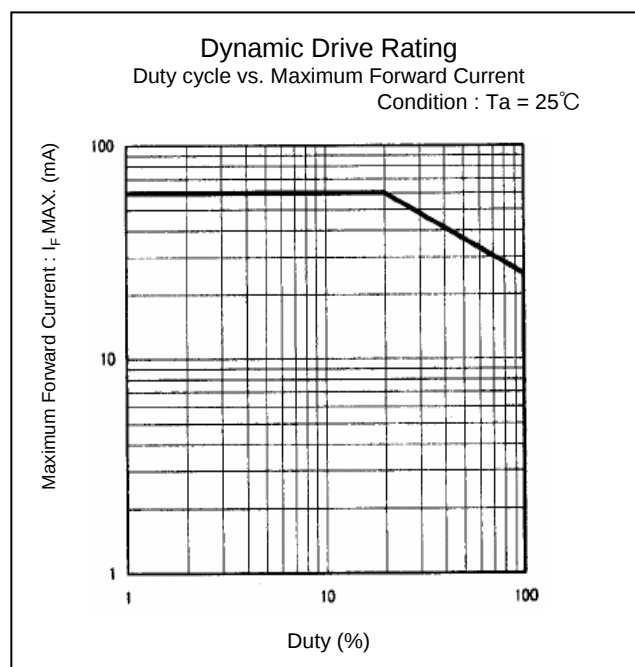
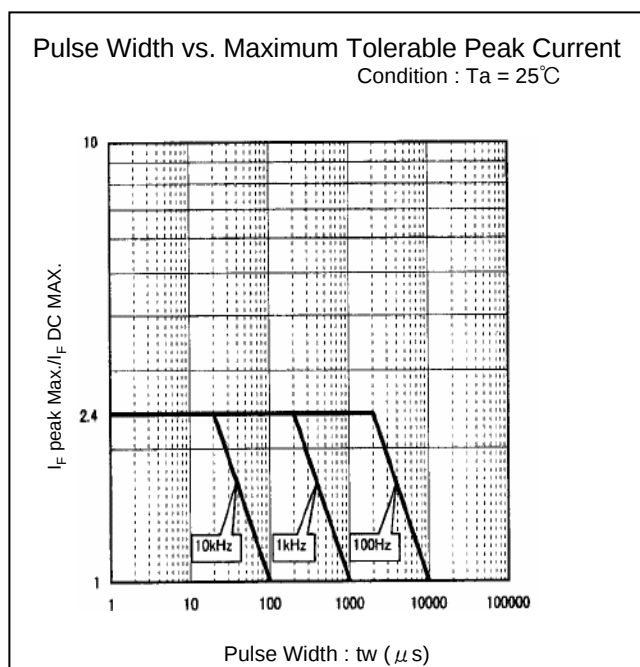
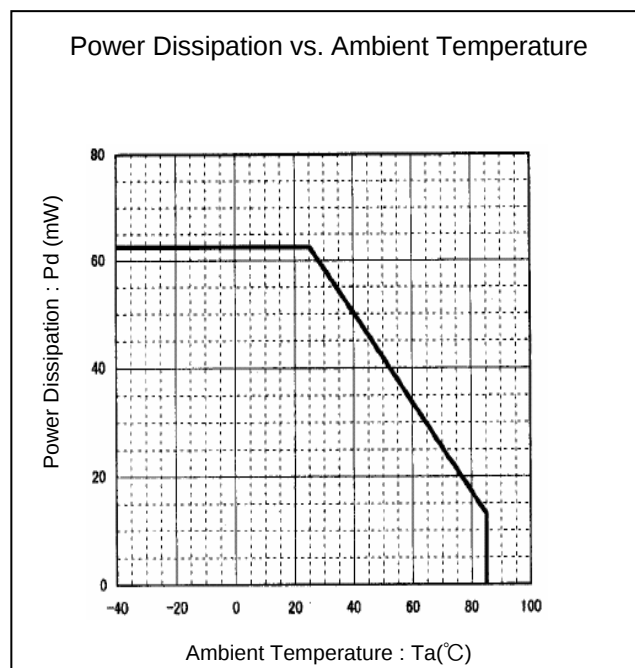
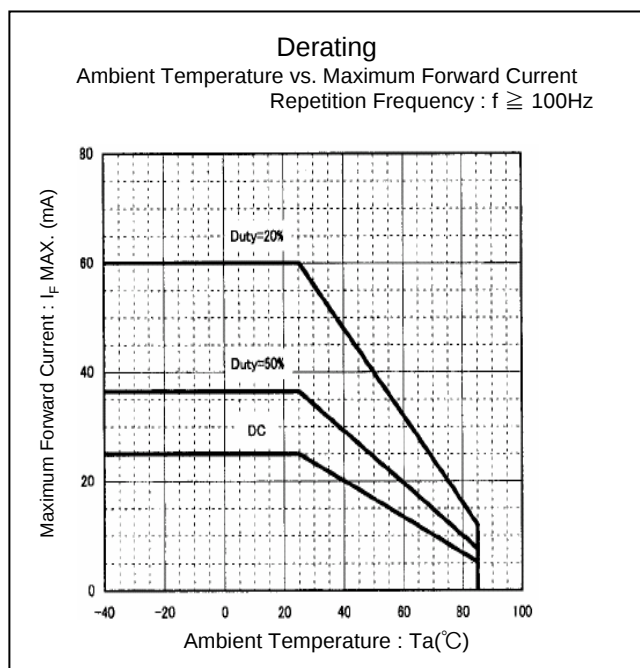
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



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

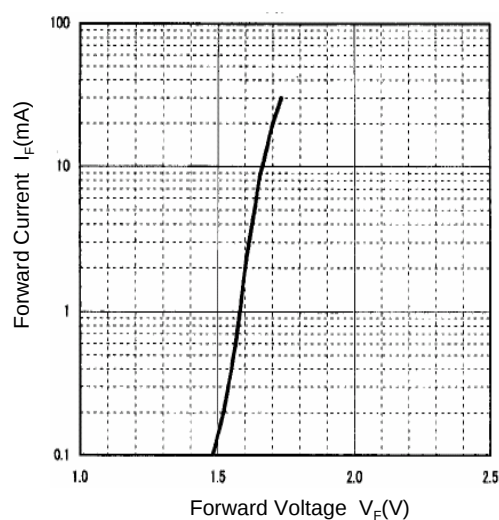


Technical Data(3201/3205)

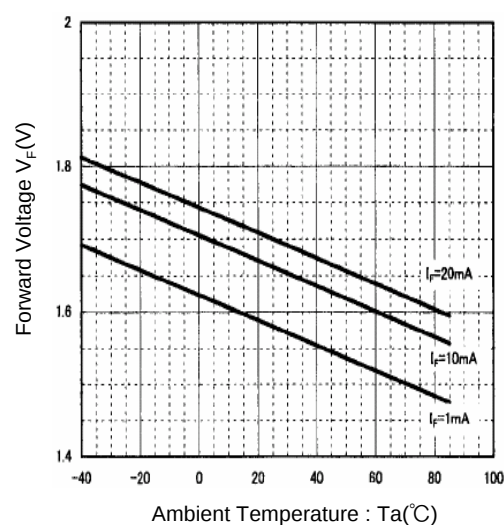


Technical Data(2201/2205)

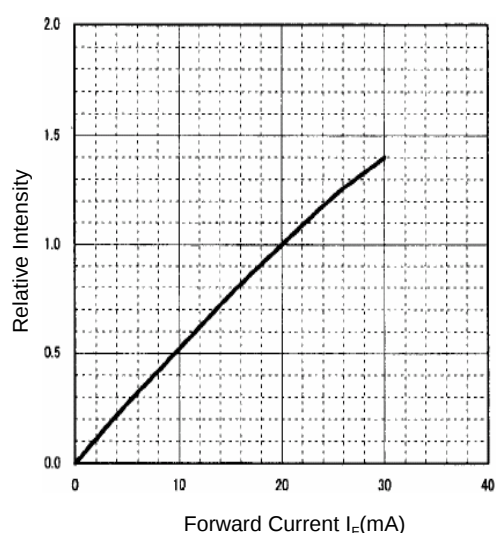
Forward Voltage vs. Forward Current
Condition : $T_a = 25^\circ\text{C}$



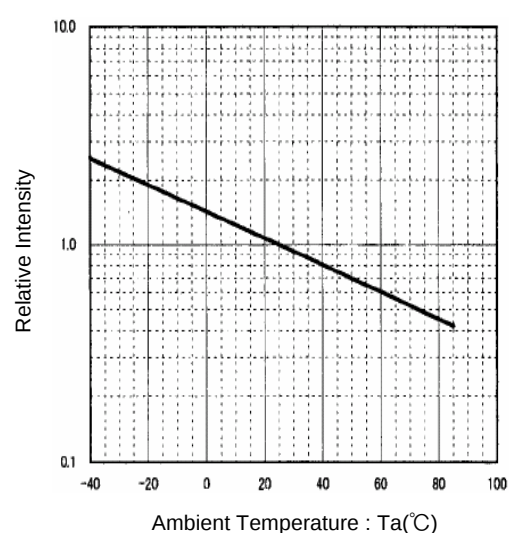
Ambient Temperature vs. Forward Voltage



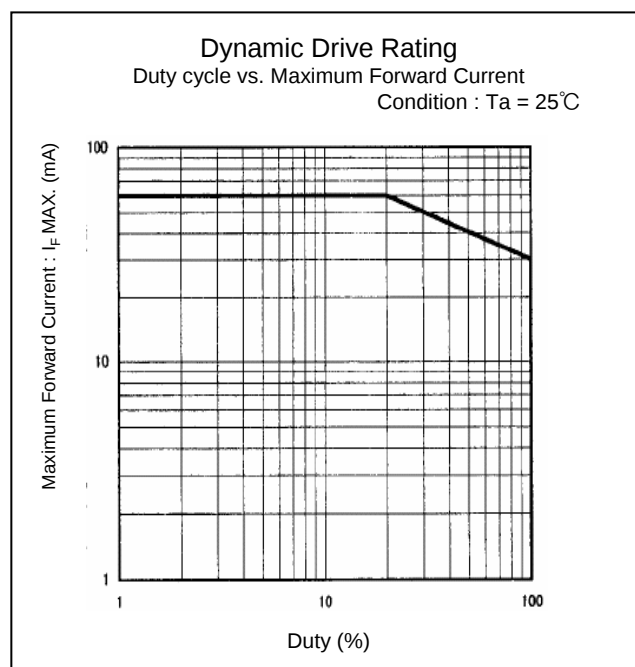
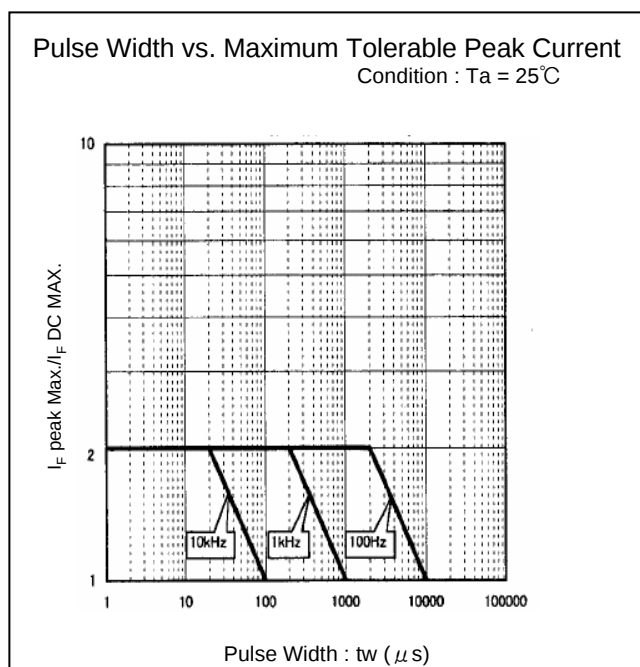
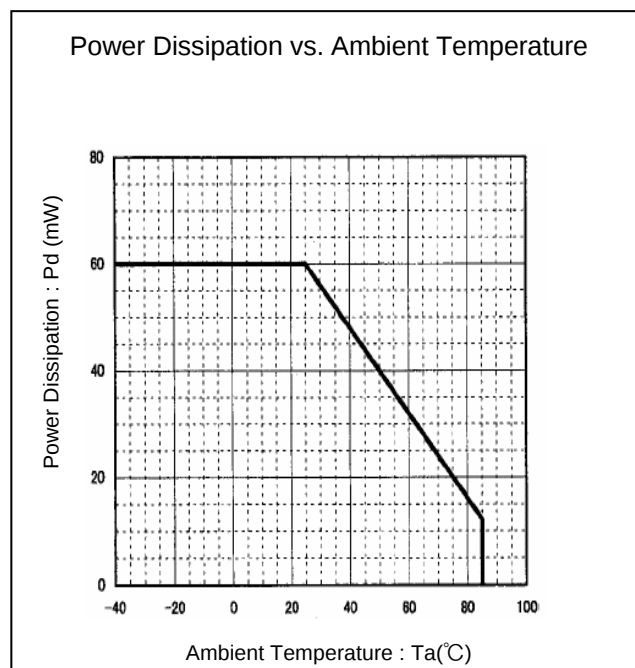
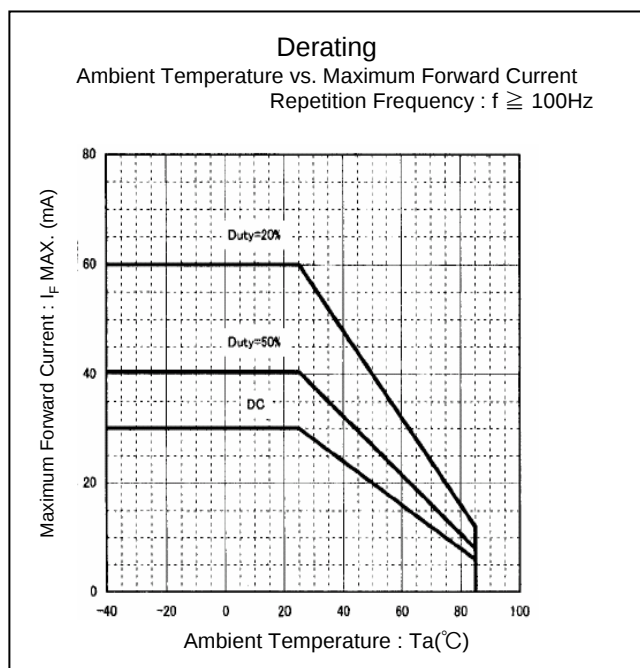
Forward Current vs. Relative Intensity
Condition : $T_a = 25^\circ\text{C}$



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



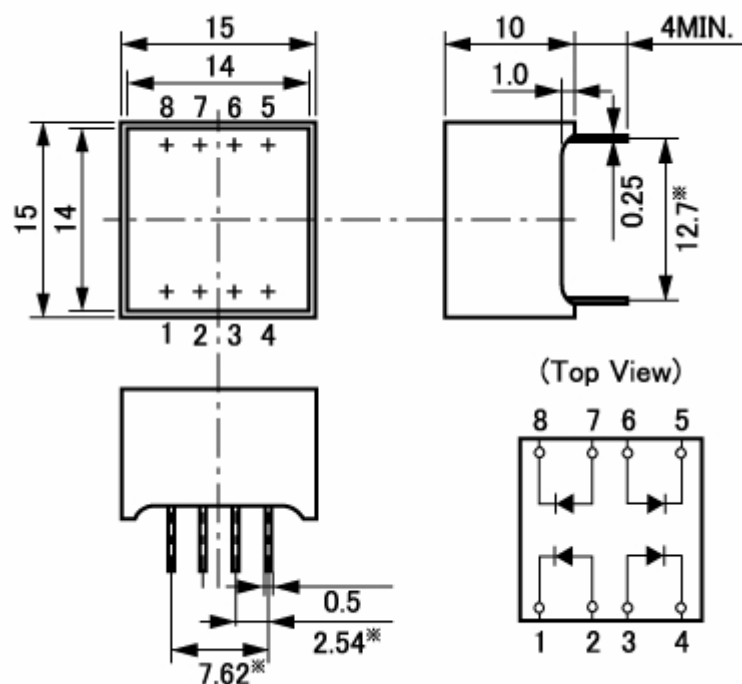
Technical Data(2201/2205)



Package Dimensions

(Unit: mm)

(Tolerance : ± 0.25 mm)



● ※ mark : The measure of lead 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 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 °C	(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°C, If = Maximum Rated Current	1,000 h	0/10
Resistance to Soldering Heat	BAJED-4701/300(302)	260±5°C, 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°C, 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=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	-	-	Occurrence of notable decoloration, deformation and cracking

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