

●Features

- High brightness
- 20/50mA guaranteed specifications
- PLCC2 package

●Size

Actual size

3528 (1411)

3.5 × 2.8mm (t=1.9mm)

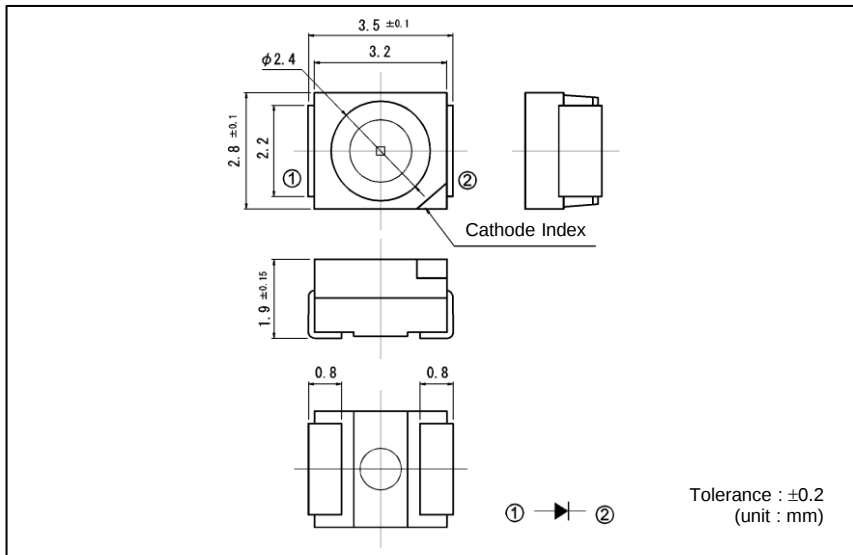
Color
Type



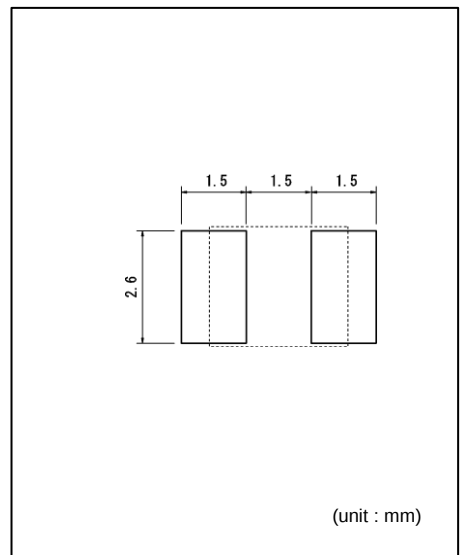
●Outline



●Dimensions



●Recommended Solder Pattern



●Specifications

Part No.	Chip Structure	Emitting Color	Absolute Maximum Ratings (Ta=25°C)						Electrical and Optical Characteristics (Ta=25°C)													
			Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} (mA)	Reverse Voltage V _R (V)	Operating Temp. Topr(°C)	Storage Temp. Tstg(°C)	Forward Voltage V _F		Reverse Current I _R		Dominant Wavelength λ _D				Luminous Intensity I _v					
									Typ. (V)	I _F (mA)	Max. (μA)	V _R (V)	Min.*2 (nm)	Typ. (nm)	Max.*2 (nm)	I _F (mA)	Min. (mcd)	Typ. (mcd)	I _F (mA)			
SML-Z14VT(A)	AlGaInP	Red	168	70	200* ¹	12	-40 to +100	-40 to +100	1.9	20	10	12	625	630	635	20	56	112	20			
SML-Z14UT(A)		Orange											615	620	625		112	224				
SML-Z14DT(A)													602	605	608		140	280				
SML-Z14YT(A)		Yellow	175	70	200* ¹	12	-40 to +100	-40 to +100	2.0	20	10	12	586	589	592	20	45	90	20			
SML-Z14MT(A)		Yellowish Green											568	571	574		22.4	45				
SML-Z14FT(A)		Green											561.5	564	566.5		11.2	22.4				
SML-Z14PT(A)		Red	189	70	200* ¹	12	-40 to +100	-40 to +100	2.0	50	100	12	557	560	563	50	11.2	22.4	50			
SML-Z14V4T													Orange	625	630		635	140		280		
SML-Z14U4T														615	620		625	280		560		
SML-Z14D4T														602	605		608	355		710		
SML-Z14Y4T									Yellow	2.1	50	100	12	587	590	593	50	112	224	50		
SML-Z14M4T									Yellowish Green					569	572	575		56	120			
SML-Z14F4T									Green					562	565	568		22.4	56			
SML-Z14P4T									Green	120	30	100* ¹	5	-40 to +100	-40 to +100	3.4	20	10	5	519	528	536
SMLZ14EGT(A)		Bluish Green	114	0.9	-40 to +85	3.3	464	470								476				220	300	
SMLZN4BGT(A)	Blue	(x, y) (0.30, 0.28)						1800								2400						
SMLZN4WBGUW(A)	White																					

*1:Duty1/10, 1kHz *2:Reference

●Electrical Characteristics Curves

Fig.1 Forward Current - Forward Voltages

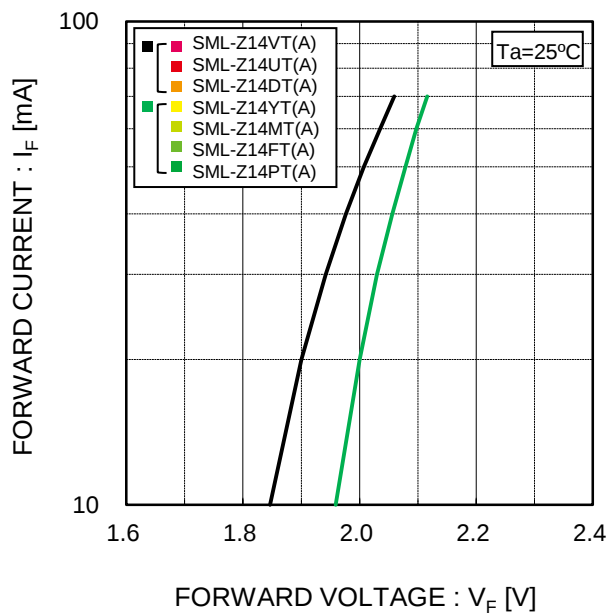


Fig.2 Luminous Intensity - Atmosphere Temperature

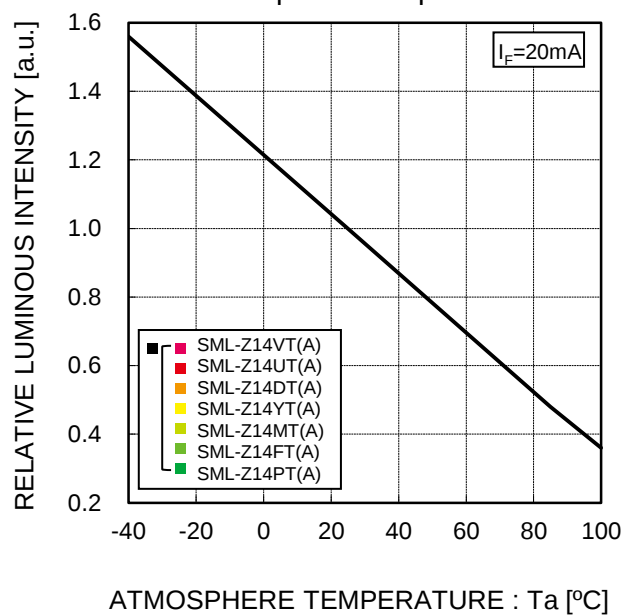


Fig.3 Luminous Intensity - Forward Current

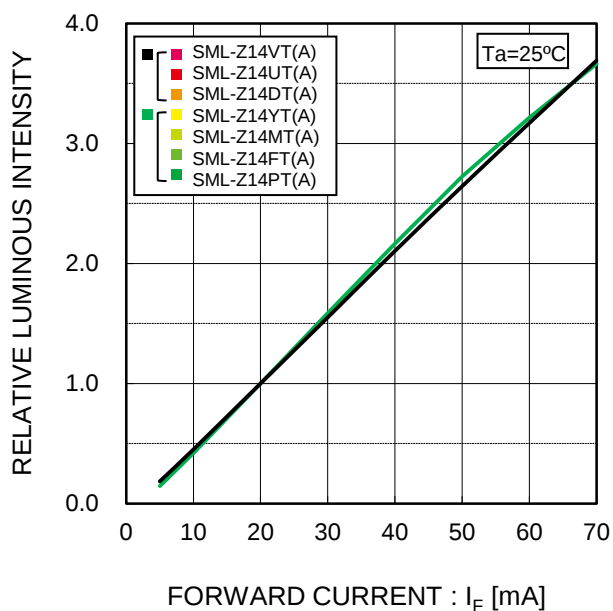
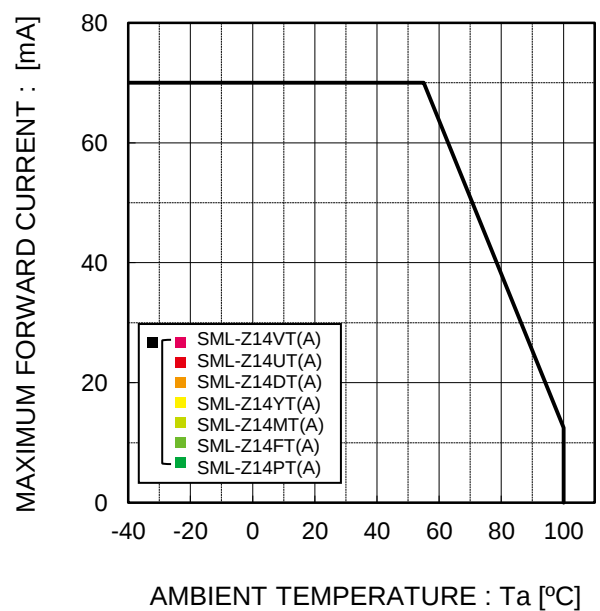


Fig.4 Derating



●Electrical Characteristics Curves

Fig.1 Forward Current - Forward Voltages

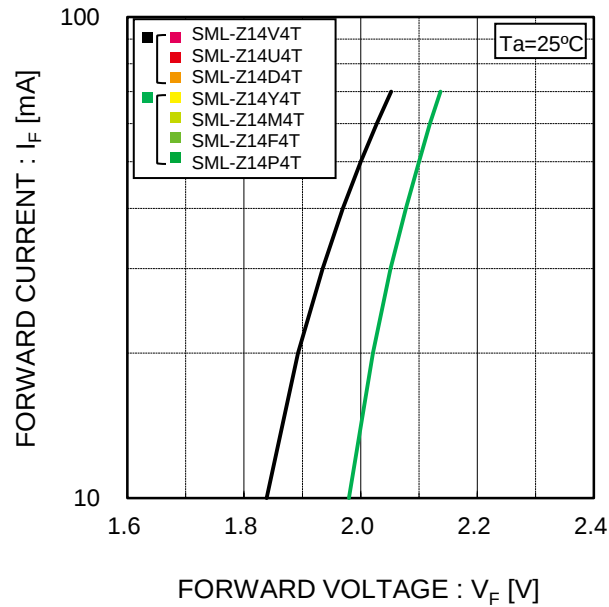


Fig.2 Luminous Intensity - Atmosphere Temperature

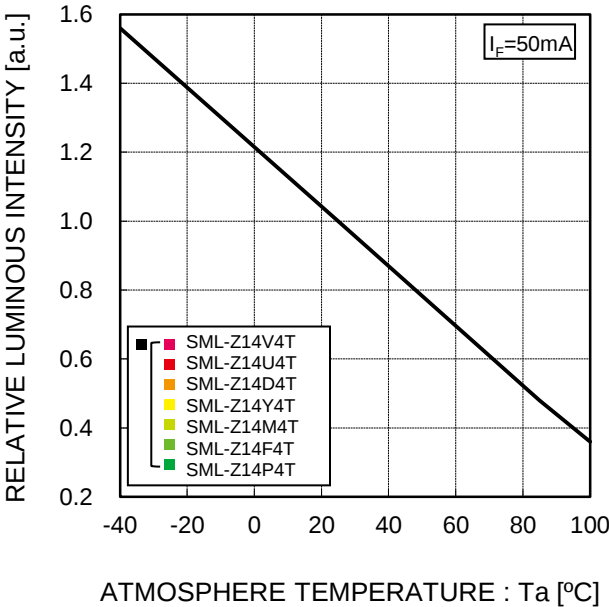


Fig.3 Luminous Intensity - Forward Current

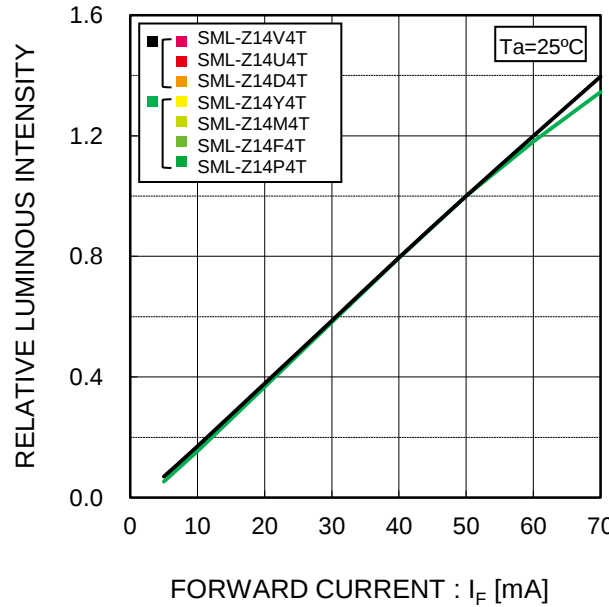
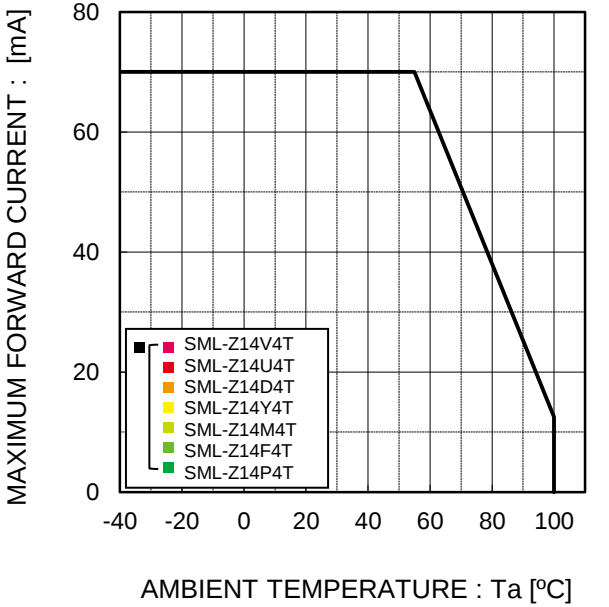


Fig.4 Derating



●Electrical Characteristics Curves

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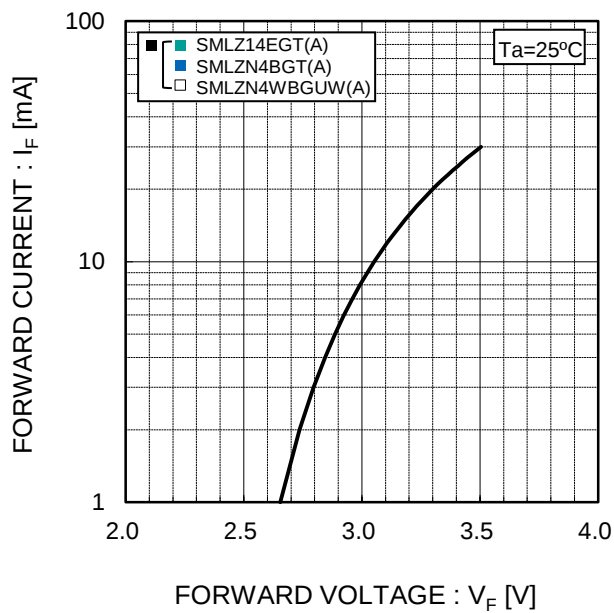


Fig.2 Luminous Intensity - Atmosphere Temperature

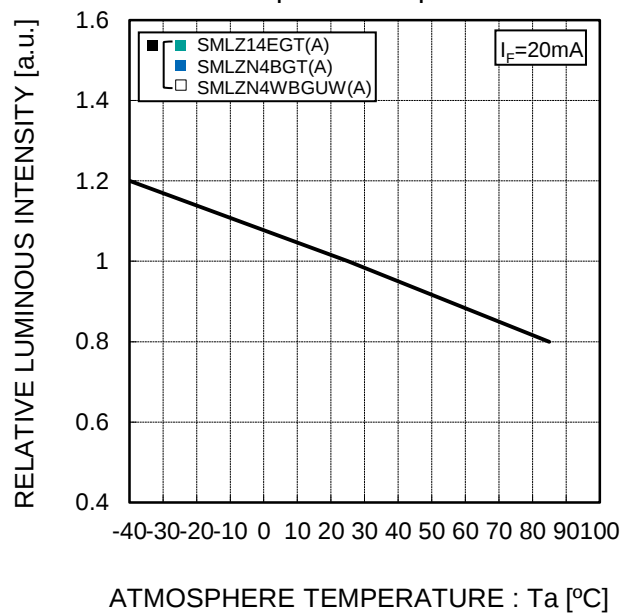


Fig.3 Luminous Intensity - Forward Current

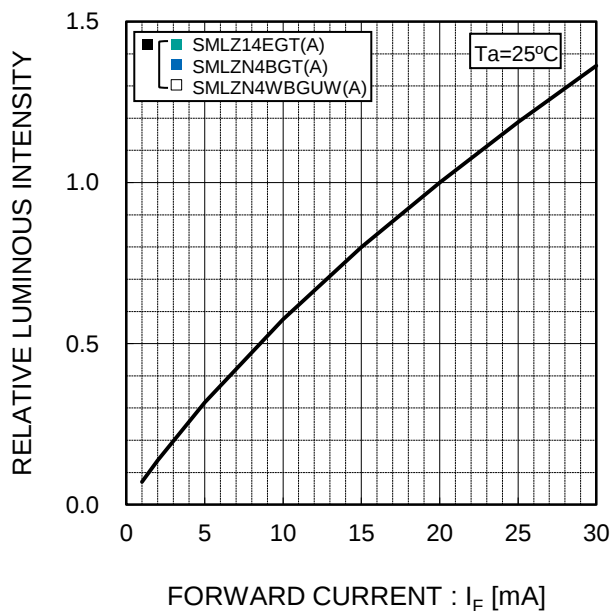
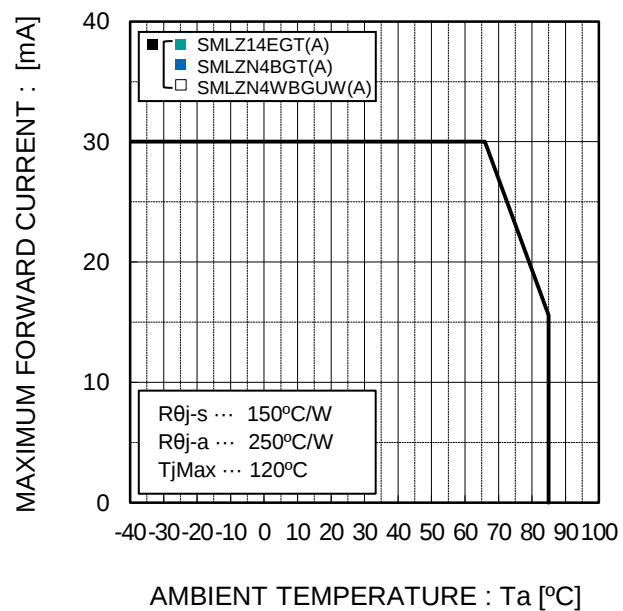
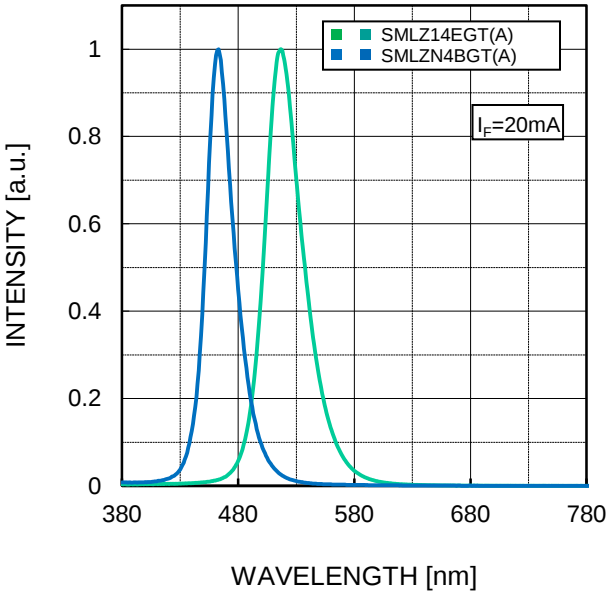
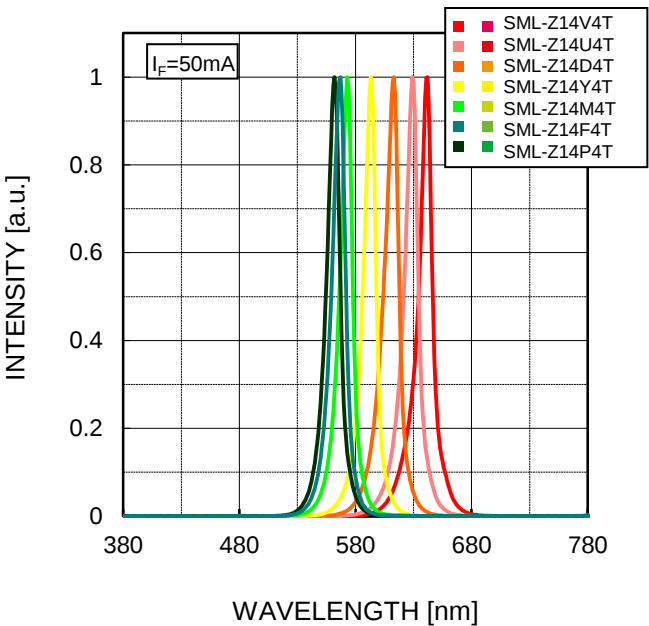
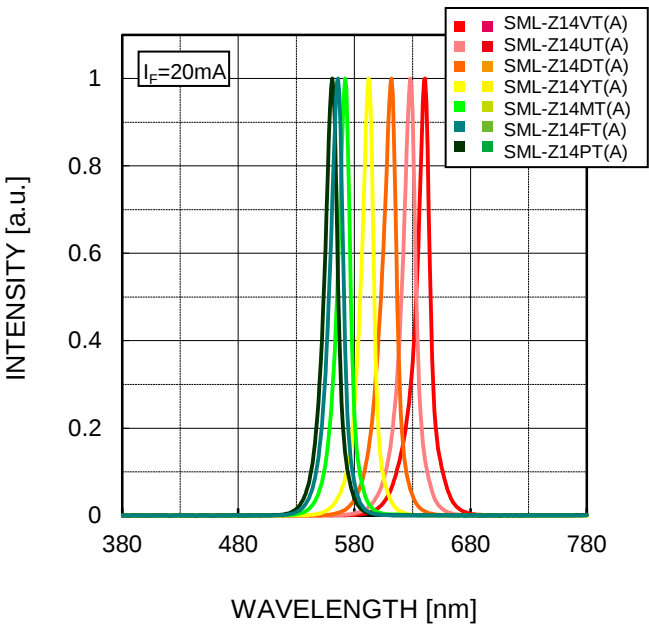


Fig.4 Derating

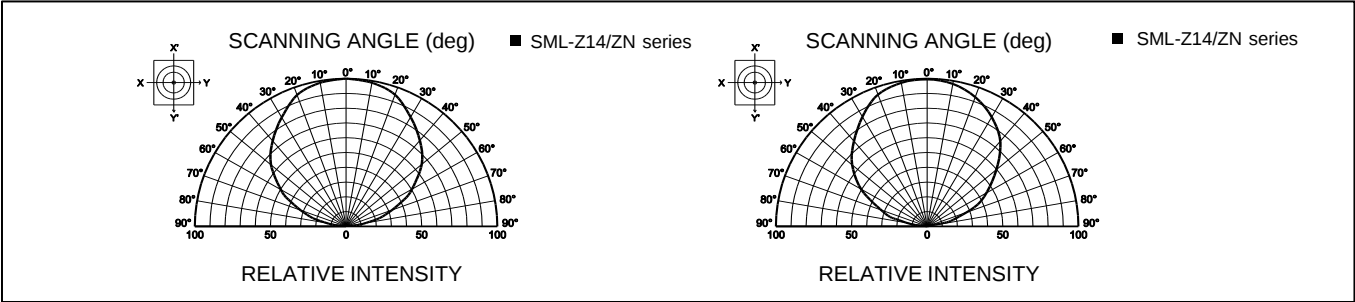


●Spectrum Data



* Please take this data as a reference data for the samples are measured randomly.
* The data is relativized for each color. It is NOT to show the spectrum peaks are equal.

●Viewing Angle



●Rank Reference of Brightness

Red(V,U)

(Ta=25°C, I_F=20mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14VT(A)																		
SML-Z14UT(A)																		

(Ta=25°C, I_F=50mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14V4T																		
SML-Z14U4T																		

Orange(D)

(Ta=25°C, I_F=20mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14DT(A)																		

(Ta=25°C, I_F=50mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14D4T																		

Yellow(Y)

(Ta=25°C, I_F=20mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14YT(A)																		

(Ta=25°C, I_F=50mA)

Rank	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
I _v (mcd)	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560	560 to 710	710 to 900	900 to 1120	1120 to 1400	1400 to 1800
SML-Z14Y4T																		

Green(M,P)

(Ta=25°C, I_F=20mA)

Rank	AG	AH	AJ	AK	AL	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
I _v (mcd)	9 to 11.2	11.2 to 14	14 to 18	18 to 22.4	22.4 to 28	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560
SML-Z14MT(A)																		
SML-Z14PT(A)																		
SML-Z14FT(A)																		

(Ta=25°C, I_F=50mA)

Rank	AG	AH	AJ	AK	AL	AM	AN	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
I _v (mcd)	9 to 11.2	11.2 to 14	14 to 18	18 to 22.4	22.4 to 28	28 to 35.5	35.5 to 45	45 to 56	56 to 71	71 to 90	90 to 112	112 to 140	140 to 180	180 to 224	224 to 280	280 to 355	355 to 450	450 to 560
SML-Z14M4T																		
SML-Z14P4T																		
SML-Z14F4T																		

Bluish Green(E)

(Ta=25°C, I_F=20mA)

Rank	S1	S2	T1	T2	U1	U2	V1	V2	W1	W2	X1	X2	Y1	Y2	Z1	Z2
I _v (mcd)	90 to 110	110 to 140	140 to 180	180 to 220	220 to 280	280 to 360	360 to 450	450 to 560	560 to 710	710 to 900	900 to 1100	1100 to 1400	1400 to 1800	1800 to 2200	2200 to 2800	2800 to 3600
SMLZ14EGT(A)																

Blue(B)

(Ta=25°C, I_F=20mA)

Rank	S1	S2	T1	T2	U1	U2	V1	V2	W1	W2	X1	X2	Y1	Y2	Z1	Z2
I _v (mcd)	90 to 110	110 to 140	140 to 180	180 to 220	220 to 280	280 to 360	360 to 450	450 to 560	560 to 710	710 to 900	900 to 1100	1100 to 1400	1400 to 1800	1800 to 2200	2200 to 2800	2800 to 3600
SMLZN4BGT(A)																

White(WB)

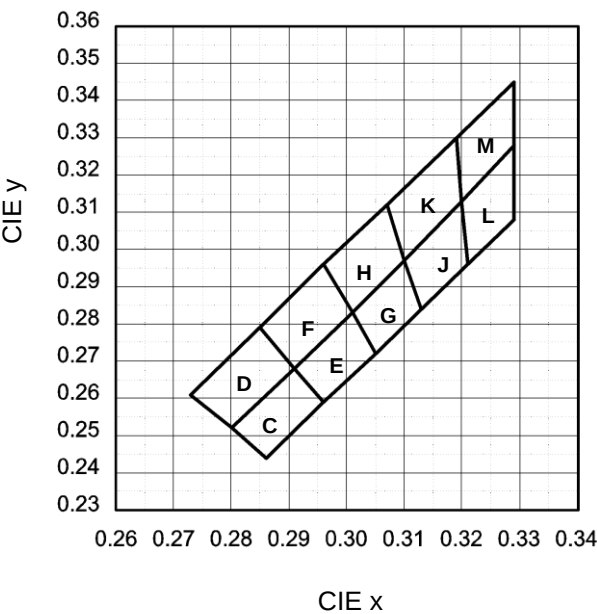
(Ta=25°C, I_F=20mA) I_F=20mA

Rank	S1	S2	T1	T2	U1	U2	V1	V2	W1	W2	X1	X2	Y1	Y2	Z1	Z2	Z3
I _v (mcd)	90 to 110	110 to 140	140 to 180	180 to 220	220 to 280	280 to 360	360 to 450	450 to 560	560 to 710	710 to 900	900 to 1100	1100 to 1400	1400 to 1800	1800 to 2200	2200 to 2800	2800 to 3600	3600 to 4500
SMLZN4WBGUW(A)																	

*Please note that the brightness of some products may fall between ranks (half rank).

●Chromaticity Diagram

SMLZN4WBGUW1(A)



[Chromaticity Coordinates] (Ta=25°C, I_F=20mA)

C		D		E		F		G	
x	y	x	y	x	y	x	y	x	y
0.296	0.259	0.291	0.268	0.296	0.259	0.291	0.268	0.305	0.272
0.291	0.268	0.285	0.279	0.291	0.268	0.285	0.279	0.301	0.283
0.280	0.252	0.273	0.261	0.301	0.283	0.296	0.296	0.310	0.297
0.286	0.244	0.280	0.252	0.305	0.272	0.301	0.283	0.313	0.284

H		J		K		L		M	
x	y	x	y	x	y	x	y	x	y
0.301	0.283	0.310	0.297	0.307	0.312	0.320	0.313	0.319	0.330
0.296	0.296	0.320	0.313	0.319	0.330	0.329	0.328	0.329	0.345
0.307	0.312	0.321	0.296	0.320	0.313	0.329	0.308	0.329	0.328
0.310	0.297	0.313	0.284	0.310	0.297	0.321	0.296	0.320	0.313

Measurement tolerance : ±0.01

Technical drawing of a reel of tape, showing dimensions and labels.

Top View Dimensions:

- Overall width: 4 ± 0.1
- Distance between centers of first two holes: 2 ± 0.05
- Distance between centers of last two holes: 3.05 ± 0.1
- Distance from center to edge: 3.7 ± 0.05
- Distance from edge to center: 5.5
- Distance from edge to center: 3.5 ± 0.05
- Overall height: 8.0
- Distance from edge to center: $0 \sim 0.5$

Side View Dimensions:

- Overall height: 11.4 ± 0.1
- Distance from edge to center: $\phi 13$
- Distance from edge to center: $\phi 60 \pm 0.1$
- Distance from edge to center: $\phi 180 \pm 0.3$

Labels:

- Cathode mark
- $\phi 1.5 \pm 0.1$
- Packing quantity 2000pcs/reel
- Pull direction
- (Note) Tolerances

(Note) Tolerance is $\pm 0.2\text{mm}$, unless otherwise specified.

* "-" will be taken out for emitting color W/B/E series.

Dice classification code

Rank sign (Chromaticity Rank)*
 (for white LED and pastel color)

Series name: S M L - Z 1 4 Y 4 T T 8 6 [] P

Package name: Z1 ZN

Chip Type: V Red:630nm, U Red:620nm, D Orange:605nm, Y Yellow:590(589)nm, M Yellowish-Green:572(571)nm, F Green:565(564)nm, P Green:561(560)nm, E Bluish-Green:528nm, B Blue:470nm, WB White

Emitting Color: V Red:630nm, U Red:620nm, D Orange:605nm, Y Yellow:590(589)nm, M Yellowish-Green:572(571)nm, F Green:565(564)nm, P Green:561(560)nm, E Bluish-Green:528nm, B Blue:470nm, WB White

Resin Color: T Transparent Colorless, W MilkyWhite

Taping Specifications: T Transparent Colorless, W MilkyWhite

Rank sign (Brightness Rank)*: T86 Cathode at sprocket hole side, T87 Anode at sprocket hole side, 1 For white LED and pastel color cathode at sprocket hole side

* Concerning the rank sign.

- Concerning the rank sign.
- Please refer to the rank chart above for luminous intensity classification.
- Please refer to specification sheet for color classification.
- Part name is individual for each rank.
- When shipped as sample, the part name will be a representative part name.

General products are free of ranks. Please contact sales if rank appointment is needed.

ROHM LED products are being shipped with desiccant (silica gel) concluded in moisture-proof bags.

Pasting the moisture sensitive label on the outer surface of the moisture-proof bags or enclosing the humidity indication card inside the bag is available upon request.

Please contact the nearest sales office or distributor if necessary.

●Precaution (Surface Mount Device)

1.Storage

If the product is heated during the reflow under the condition of hygroscopic state, it may vaporize and expand which will influence the performance of the product. Therefore, the package is waterproof. Please use the product following the conditions:

• Using Conditions

Classification	Temperature	Humidity	Expiration Date	Remark
①Before using	5 to 30°C	30 to 70%RH	Within 1 year from Receiving	Storage with waterproof package
②After opening package	5 to 30°C	Below 70%RH	Within 72h	Please storing in the airtight container with our desiccant (silica gel)

• Baking

Bake the product in case of below:

- ①The expiration date is passed.
- ②The color of indicator (silica gel) turned from blue to colorless or from green to pink.
(Even if the product is within the expiration date.)

• Baking Conditions

Temperature	Time	Humidity
60±3°C	40 to 48h	Below 20%RH
Remark	• Bake products in reel. • Reel and embossed tape are easy to be deformed when baking, so please try not to apply stress on it. • Recommend bake once.	

2.Application Methods

2-1. Precaution for Drive System and Off Mode

Design the circuit without the electric load exceeding the ABSOLUTE MAXIMUM RATING that applies on the products. If drive by constant voltage, it may cause current deviation of the LED and result in deviation of luminous intensity, so we recommend to drive by constant current. (Deviation of VF Value will cause deviation of current in LED.) Furthermore, for off mode, please do not apply voltage neither forward nor reverse. Especially, for the products with the Ag-paste used in the die bonding, there's high possibility to cause electro migration and result in function failure.

2-2. Operation Life Span

There's possibility for intensity of light drop according to working conditions and environments (applied current, surrounding temperature and humidity, corrosive gases), please call our Sales staffs for inquiries about the concerned application below.

- ①Longtime intensity of light life
- ②On mode all the time

2-3.Applied Stress on Product

The top of the LED is very soft, which the silicon resin is used as sealing resin. Therefore, please pay attention to the overstress on it which may influence its reliability.

2-4.Usage

The Product is LED. We are not responsible for the usage as the diode such as Protection Chip, Rectifier, Switching and so on.

3. Others

3-1. Surrounding Gas

Notice that if it is stored under the condition of acid gas (chlorine gas, sulfured gas) or alkali gas (ammonia), it may result in low soldering ability (caused by the change in quality of the plating surface) or optical characteristics changes (light intensity, chrominance) and change in quality of die bonding (Ag-paste) materials. All of the above will cause function failure of the products.

Therefore, please pay attention to the storage environment for mounted product (concern the generated gas of the surrounding parts of the products and the atmospheric environment).

3-2. Electrostatic Damage

The product is part of semiconductor and electrostatic sensitive, there's high possibility to be damaged by the electrostatic discharge. Please take appropriate measures to avoid the static electricity from human body and earthing of production equipment. The resistance values of electrostatic discharge (actual values) vary with products, therefore, please call our Sales staffs for inquiries.

3-3. Electromagnetic Wave

Please concern the influence on LED in case of application with strong electromagnetic wave such as IH (Induction heating).

4. Mounting

4-1. Soldering

- No resin hardening agent such as filler is used in the sealing resin of the product. Therefore, resin expansion and moisture absorption at humidity will cause heat stress during soldering process and finally has bad influence on the product's reliability.
- The product is not for flow soldering.
- Do not expose the product in the environment of high temperature (over 100°C) or rapid temperature shift (within 3°C of temperature gradient) during the flow soldering of surrounding parts.
- Please set appropriate reflow temperature based on our product usage conditions and specification.
- The max for reflowing is 2 times, please finish the second flow soldering and flow soldering with other parts within the usage limitation after open the moistureproof package.
- Compare with N2 reflow, during air reflow, because of the heat and surrounding conditions, it may cause the discoloration of the resin.

4-2. Automatic Mounting

4-2-1. Silicon Resin Sealing Product

The sealing resin of LED is very soft, so please select adsorption nozzle that would not apply stress directly on the sealing section.

4-2-2. Mini Package (Smaller than 1608 size)

Vibration may result in low mounting rate since it will cause the static electricity of product and adhere to top cover tape. We recommend to

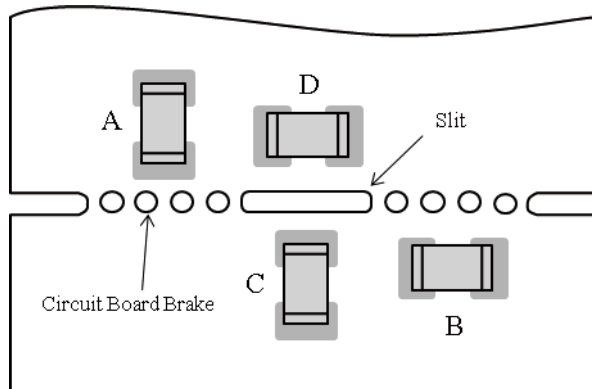
- set magnet on parts feeder cassette of the mounter to control the product stabilization
- set ionizer to prevent electrostatic charge

4-3. Mounting Location

The stress like bending stress of circuit board dividing after mounting, may cause LED package crack or damage of LED internal junction, therefore, please concern the mounting direction and position to avoid bending or screwing with great stress of the circuit board.

4-4. Mechanical Stress after Mounting

The mechanical stress may damage the LED after Circuit Mounting, so please pay attention to the touch on product.

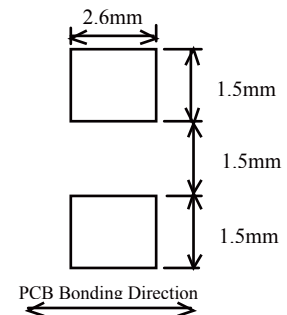


Stress strength according to the mounting position:
A>B>C>D

4-5. Soldering Pattern for Recommendation

We recommend the soldering pattern that shows on the right. It will be different according to mounting situation of circuit board, therefore, please concern before designing.

*The product has adopted the electrode structure that it should solder with back electrode of the product.

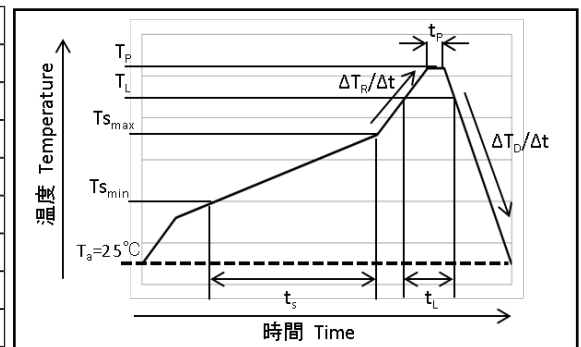


4-6. Reflow Profile

For reflow profile, please refer to the conditions below: (*)

• Meaning of marks, Conditions

Mark	Meanings	Conditions
$T_{s_{max}}$	Maximum of pre-heating temperature	180°C
$T_{s_{min}}$	Minimum of pre-heating temperature	140°C
T_s	Time from $T_{s_{min}}$ to $T_{s_{max}}$	Over 60sec.
T_L	Reference temperature	230 to 250°C
t_L	Retention time for T_L	Within 40sec.
T_P	Peak temperature	250°C(Max)
t_P	Time for peak temperature	Within 10sec.
$\Delta T_R/\Delta t$	Temperature rising rate	Under 3°C/sec.
$\Delta T_D/\Delta t$	Temperature decreasing rate	Over -3°C/sec.



*Above conditions are for reference. Therefore, evaluate by customer's own circuit boards and reflow furnaces before using, because stress from circuit boards and temperature variations of reflow furnaces vary by customer's own conditions.

4-7. Cleaning after Soldering

Please follow the conditions below if the cleaning is necessary after soldering.

Solvent	We recommend to use alcohols solvent such as, isopropyl alcohols
Temperature	Under 30°C within 3 minutes
Ultrasonic Cleaning	15W / Below 1 liter (capacity of tank)
Drying	Under 100°C within 3 minutes

Notes

- 1) The information contained herein is subject to change without notice.
- 2) Before you use our Products, please contact our sales representative and verify the latest specifications :
- 3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Products beyond the rating specified by ROHM.
- 4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.
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- 8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.
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