

SMD ■ Side View LEDs

99-216UMC/XXXXXXXX/TR8



Features

- . Side view white LED.
- . White SMT package.
- . Lead frame package with individual 2 pins.
- . Wide viewing angle
- . Soldering methods: IR reflow soldering
- . Pb-free
- . The product itself will remain within RoHS compliant version.
- . Compliance with EU REACH.
- . Compliance Halogen Free .(Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm).

Description

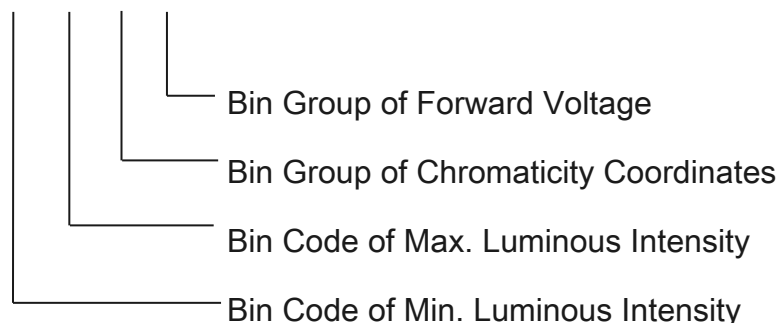
Due to the package design, 99-216 has wide viewing angle, low power consumption and white LEDs are devices which are materialized by combining blue chips and special phosphor. This feature makes the LED ideal for light guide application.

Applications

- . LCD back light.
- . Mobile phones.
- . Indicators.
- . Illuminations.
- . Switch lights.

Coding:

99-216UMC/XX XX XX X/TR8



Device Selection Guide

Chip Materials	Emitted Color	Resin Color
InGaN	Pure White	Water Clear

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Reverse Voltage	V_R	5	V
Forward Current	I_F	30	mA
Peak Forward Current (Duty 1/10 @10ms)	I_{FP}	60	mA
Power Dissipation	P_d	110	mW
Electrostatic Discharge(HBM) *1	ESD	2000	V
Operating Temperature	T_{opr}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +90	°C
Soldering Temperature	T_{sol}	Reflow Soldering : 260 °C for 10 sec. Hand Soldering : 350 °C for 3 sec.	

Notes: *1The products are sensitive to static electricity and must be carefully taken when handling products.

Electro-Optical Characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Luminous Intensity	Φ	1200	-----	2400	mcd	IF=20mA
Luminous Intensity	Φ	3.36	-----	2400	lm	
Viewing Angle	2 θ 1/2	-----	110	-----	deg	
Forward Voltage	V _F	2.90	-----	3.50	V	
Reverse Current	IR	-----	-----	1	μ A	V _R =5V

Notes:

1. Tolerance of Luminous Intensity、Luminous Flux: ± 7%
2. Tolerance of Forward Voltage: ± 0.05V

Bin Range of Luminous Intensity

Bin Code	mcd (Min.)	mcd (Max.)	Unit	Condition	Im(Min.)	Im (Max.)	Unit
22	1200	1250			3.36	3.50	
23	1250	1300			3.50	3.64	
24	1300	1350			3.64	3.78	
25	1350	1400			3.78	3.92	
26	1400	1450			3.92	4.06	
27	1450	1500			4.06	4.20	
28	1500	1550			4.20	4.34	
29	1550	1600			4.34	4.48	
30	1600	1650			4.48	4.62	
31	1650	1700			4.62	4.76	
32	1700	1750			4.76	4.90	
33	1750	1800	mcd	I _F =20mA	4.90	5.04	Im
34	1800	1850			5.04	5.18	
35	1850	1900			5.18	5.32	
36	1900	1950			5.32	5.46	
37	1950	2000			5.46	5.60	
38	2000	2050			5.60	5.74	
39	2050	2100			5.74	5.88	
40	2100	2150			5.88	6.02	
41	2150	2200			6.02	6.16	
42	2200	2300			6.16	6.44	
43	2300	2400			6.44	6.72	

Notes: Tolerance of Luminous Intensity、Luminous Flux: $\pm 7\%$.

The spec. for intensity is quantified in Im, mcd is for reference only.

Bin Range of Forward Voltage

Group								Bin	Min.	Max.	Unit	Condition
0	1	2	3	4	5	6	7	6-1	2.95	3.05	V	I _F =20mA
								6-2	3.05	3.15		
	8	9	10	11	12	13	14	7-1	3.15	3.25		
								7-2	3.25	3.35		
	15	16	17	18	19	20	21	8-1	3.35	3.45		
								8-2	3.45	3.55		
	22	23	24	25	26	27	28	9-1	3.55	3.65		
								9-2	3.65	3.75		

Bin Range of Forward Voltage

Group	Bin Code	Min.	Max.	Unit	Condition
9	6-11	3.00	3.05	V	I _F =20mA
	6-2	3.05	3.15		
	7-1	3.15	3.25		
	7-2	3.25	3.35		
	8-1	3.35	3.45		
	8-11	3.45	3.50		

Note: Tolerance of Forward Voltage: ±0.05V

Bin Range of Forward Voltage

Group		Bin Code	Min.	Max.	Unit	Condition
A	G	6-1-1	2.95	3.00	V	$I_F=20\text{mA}$
		6-1-2	3.00	3.05		
		6-2-1	3.05	3.10		
		6-2-2	3.10	3.15		
		7-1-1	3.15	3.20		
		7-1-2	3.20	3.25		
		7-2-1	3.25	3.30		
		7-2-2	3.30	3.35		
		8-1-1	3.35	3.40		
		8-1-2	3.40	3.45		

Group					Bin Code	Min.	Max.	Unit	Condition	
B	C	E	F	K	H	5-2-3	2.90	3.00	V	I _F =20mA
						6-1-3	3.00	3.10		
						6-2-3	3.10	3.20		
						7-1-3	3.20	3.30		
						7-2-3	3.30	3.40		
						8-1-3	3.40	3.50		

Note: Tolerance of Forward Voltage: $\pm 0.05\text{V}$

Bin Range of Chromaticity Coordinates Block (I_F=20mA)

Group	Range	I _v Rank*	Group	Range	I _v Rank*
01	B5-1,B5-2,B5-3,B5-4	37	27	A0-2, A0-1, A0-3	35
02	B5-1~B5-4,A0-2,A0-4	37	28	A0-2, A0-4, A0-3	35
07	B5-1,B5-3,A0-4	36	29	A0-2, B5-1, B5-3	36
08	A0-2,A0-3,A0-4	35	30	A0-2, A0-4, B5-3	36
09	A0-1,A0-3,A0+4	34	31	B5-1, A0-2, A0-4	36
10	A0+1, A0+2, A0-1	34	32	B5-1, B5-3, A0-4	36
11	A0+2, A0-1, A0-2	35	33	B5-1, B5-2, B5-4	37
12	A0-1, A0-2, B5-1	36	34	B5-1, B5-3, B5-4	37
13	A0-2, B5-1, B5-2	37	35	B5-2, B5-1, B5-3	37
14	A0+3, A0+4, A0-3	34	36	B5-2, B5-4, B5-3	37
15	A0+4, A0-3, A0-4	36	37	B5-1, B5-2	37
16	A0-3, A0-4, B5-3	36	38	A0-1, A0-3	34
17	A0-4, B5-3, B5-4	37	39	A0-2,A0-4,B5-1,B5-3	36
18	A0+1, A0+2, A0+4	33	40	A0-3,A0-4	35
19	A0+1, A0+3, A0+4	33	41	A0-4,B5-1,B5-3,B5-4	37
20	A0+2, A0+1, A0+3	33	42	A0-4, B5-3	36
21	A0+2, A0-1, A0-3	34	43	B5-2,B5-4	37
22	A0+2, A0+4, A0-3	34	44	A0-1,A0-2,A-4,B5-3	36
23	A0-1, A0+2, A0+4	34	45	B5-1, B5-3	36
24	A0-1, A0-3, A0+4	34	46	A0+1, A0+2	33
25	A0-1, A0-2, A0-4	35	47	B6-1, B6-2, B6-3, B6-4	39
26	A0-1, A0-3, A0-4	35	48	B6-2,B6-4	39

Note: The I_v rank is the highest one for relative bin range of chromaticity coordinates.

Bin Range of Chromaticity Coordinates Block

(If=20mA)

Group	Range	Iv Rank*	Group	Range	Iv Rank*
49	A0-2, B5-1, B5-3, B5-4	37	69	B5-1,B5-2,B5-3,B5-4 sub-division	36
50	A0-1~A0-4, B5-1~B5-4	37	70	A0+4-2, A0+4-4, A0-3 (sub-division), A0-4-1, A0-4-3	34
51	A0-1, A0-3, A0-4-1,A0-4-3	35	71	A0-3, A0-4 sub-division	35
52	A0+3, A0+4	33	72	A0+1 ~ +4, A0-1 ~ -4, B5-1 ~ -4, B6-1 ~ -4	39
53	B6-1, B6-2, B6-3	39	73	A0-4, B5-1, B5-3 sub-division	36
54	B6-1, B6-3	39	74	A0-4	35
55	B5-2, B5-4, B6-1, B6-3	38	75	B5-2	37
56	B5-2, B6-1	38	76	A0-1~A0-4;B5-1~B5- 4	37
57	A0-2, B5-1	36	77	B5-3, B5-4 sub-division	37
58	A0-1, A0-2	35	78	A0-3,A0+4	34
59	A0-1, A0-2, A0-3, A0-4, B5-1	36	79	B5-1,2,3,4 & B6-3 sub-division	39

Group	Range	I _v Rank*	Group	Range	I _v Rank*
60	A0+2, A0+4, A0-1, A0-3	34	80	A0-3, A0-4, B5-3 sub-division	37
61	B5-2-1~B5-2-4, 6-1-1~B6-1-4	38	81	A0-3,A0-4,B5-3	37
62	B5-3, B5-4	38	82	A0-1~A0-4,A0+2,A0+ 4	34
63	A0-1~A0-4, B5-1, B5-3	37	83	B5-4,B6-3	39
64	A0-2, A0-4	36	84	B6-1,B6-2	39
65	A0-2, A0-3, A0-4, B5-3*3	35	85	A0-4, B5-2, B5-3, B5-4	37
66	A0-3-1~A0-3-4, A0-4-1~A0-4-4	35	86	B5-1~5-4 & B6-1~ B6-4 sub-division	39
67	A0-1, A0-3,A0-4,A0+2	35	87	B5-3	37
68	A0+4-R, A0-3, A0-4-L	34	88	B5-2-3, B5-2-4, B6-4-1, B6-1-2, B5-4(sub-division), B6-1-3, B6-3(sub-division), B6-1-4,	39

Note: The I_v rank is the highest one for relative bin range of chromaticity coordinates.

Bin Range of Chromaticity Coordinates Block (IF=20mA)

Group	Range	IV Rank*	Group	Range	IV Rank*
89	A0-4, B5-3 sub-division	37	A3	B5-2, B5-4, B6-3	39
90	A0-4-R, B5-3 sub-division	37	A4	A0-1,A0-2,A0-4 subdivision	35
91	A0-3-2, A0-3-4, A0-4(sub-division), B5-3-1,B5-3-3	37	A5	A0-2,A0-4,B5-3 subdivision	36
92	B5-2 , B6-1-1, B6-4-1, B5-3-2, B6-1-3, B6-4-3, B6-1-4, B6-4-4, B5-4, B6-3	39	A6	A0-4-R, B5-3, B5-4-L	37
93	A0+4, A0-3(sub-division)	34	A7	B6-2 , B6-4, C0-1, C0-3	40
94	A0-4-R, B5-3, B5-4 subdivision	37	A8	B5-1,B5-3,B5-4 subdivision	37
95	B5-4, B6-3 subdivision	39	A9	A0-1, A0-2, A0-3, A0-4 subdivision	35
96	A0-4, B5-3, B5-4 subdivision	37	B2	A0-4, B5-3, B5-4-L	37
97	B6-1,B6-3,B6-4	39	C0	C0-1,C0-2,C0-3,C0-4	40
98	A0+1~A0+4;A0-1~A0-4;B5-1~B 5-4;B6-1~B6-4; NA0-3~NB6-3(Entire district)	38	A	A0+1, A0+2, A0+3, A0+4	34
99	B5-2,B5-4,B6-1,B6-3 subdivision	39	B	A0+4, A-3, A0-4	34
A1	A0+1,A0+2 subdivision	33	C	A0-1, A0-2, A0-3, A0-4	35
A2	B6-2,B6-3,B6-4	40			

Note: The I_v rank is the highest one for relative bin range of chromaticity coordinates.

Bin Range of Chromaticity Coordinates Block

(IF=20mA)

Group	Range	I _v Rank*
S1	NA0-3,NA0-4,NB5-3,NB5-4,NB6-3,A0-3a,A0-3b,A0-4a,A0-4b,B5-3a,B5-3b, B5-4a,B5-4b,B6-3a,B6-3b	39
S2	NA0-3,NA0-4, A0-3a,A0-3b,A0-4a,A0-4b	35
S3	NB5-3,NB5-4, B5-3a,B5-3b,B5-4a,B5-4b	37
S4	NB5-4, B5-4b, NB6-3, B6-3b subdivision	38
S5	NB5-3,NB5-4	37
S6	NA0-4,B5-3b,NB5-3	37
S7	NA0-3,NA0-4 subdivision	36
S8	NA0-4,NB5-3,NB5-4 subdivision	37
S9	NB5-3,NB5-4 subdivision	37
SA	NA0-3,NA0-4,NB5-3,NB5-4 subdivision	37
SB	NA0-3,NA0-4,NB5-3,NB5-4, NB6-3 subdivision	38
SC	NA0-4, NB5-3	37
SD	NA0-4-R, NB5-3, NB5-4-L subdivision	37

Note: The I_v rank is the highest one for relative bin range of chromaticity coordinates.

Bin Code of Chromaticity Coordinates

Bin Code	CIE_x	CIE_y	Bin Code	CIE_x	CIE_y
A0+1	0.2569	0.2528	A0+3	0.2652	0.2429
	0.2498	0.2385		0.2584	0.2283
	0.2584	0.2283		0.2666	0.2185
	0.2652	0.2429		0.2733	0.2333
A0+2	0.2640	0.2670	A0+4	0.2720	0.2575
	0.2569	0.2528		0.2652	0.2429
	0.2652	0.2429		0.2733	0.2333
	0.2720	0.2575		0.2800	0.2480
A0-1	0.2720	0.2575	A0-3	0.2800	0.2480
	0.2640	0.2670		0.2720	0.2575
	0.2755	0.2810		0.2818	0.2715
	0.2818	0.2715		0.2879	0.2619
A0-2	0.2818	0.2715	A0-4	0.2879	0.2619
	0.2755	0.2810		0.2818	0.2715
	0.2870	0.2950		0.2915	0.2855
	0.2915	0.2855		0.2960	0.2760

Note: Tolerance of Chromaticity Coordinates: ± 0.01

Bin Code of Chromaticity Coordinates

Bin Code	CIE_x	CIE_y	Bin Code	CIE_x	CIE_y
B5-1	0.2915	0.2855	B5-3	0.2960	0.2760
	0.2870	0.2950		0.2915	0.2855
	0.2970	0.3050		0.3003	0.2950
	0.3003	0.2950		0.3035	0.2850
B5-2	0.3003	0.2950	B5-4	0.3035	0.2850
	0.2970	0.3050		0.3003	0.2950
	0.3070	0.3150		0.3090	0.3045
	0.3090	0.3045		0.3110	0.2940
B6-1	0.3090	0.3045	B6-3	0.3110	0.2940
	0.3070	0.3150		0.3090	0.3045
	0.3185	0.3270		0.3195	0.3165
	0.3195	0.3165		0.3205	0.3060
B6-2	0.3195	0.3165	B6-4	0.3205	0.3060
	0.3185	0.3270		0.3195	0.3165
	0.3300	0.3390		0.3300	0.3285
	0.3300	0.3285		0.3300	0.3180

Note: Tolerance of Chromaticity Coordinates: ± 0.01

Bin Code of Chromaticity Coordinates

Bin Code	CIE_x	CIE_y	Bin Code	CIE_x	CIE_y
NA0-3	0.2800	0.2480	NB5-3	0.2960	0.2760
	0.2720	0.2580		0.2910	0.2870
	0.2820	0.2720		0.2990	0.3010
	0.2880	0.2620		0.3040	0.2900
NA0-4	0.2880	0.2620	NB5-4	0.3040	0.2900
	0.2820	0.2720		0.2990	0.3010
	0.2910	0.2870		0.3070	0.3150
	0.2960	0.2760		0.3120	0.3040
NB6-3	0.3120	0.3040			
	0.3070	0.3150			
	0.3150	0.3290			
	0.3200	0.3180			

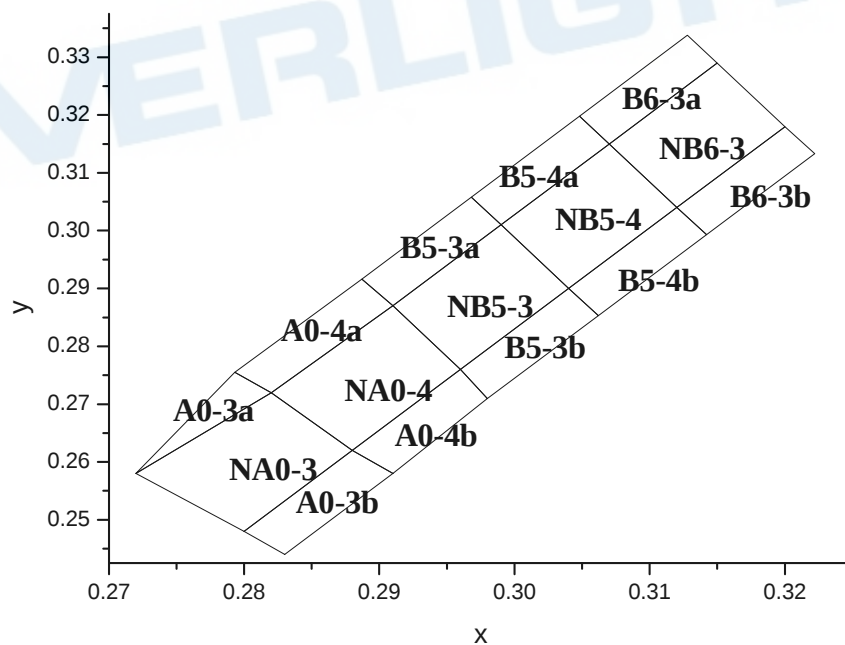
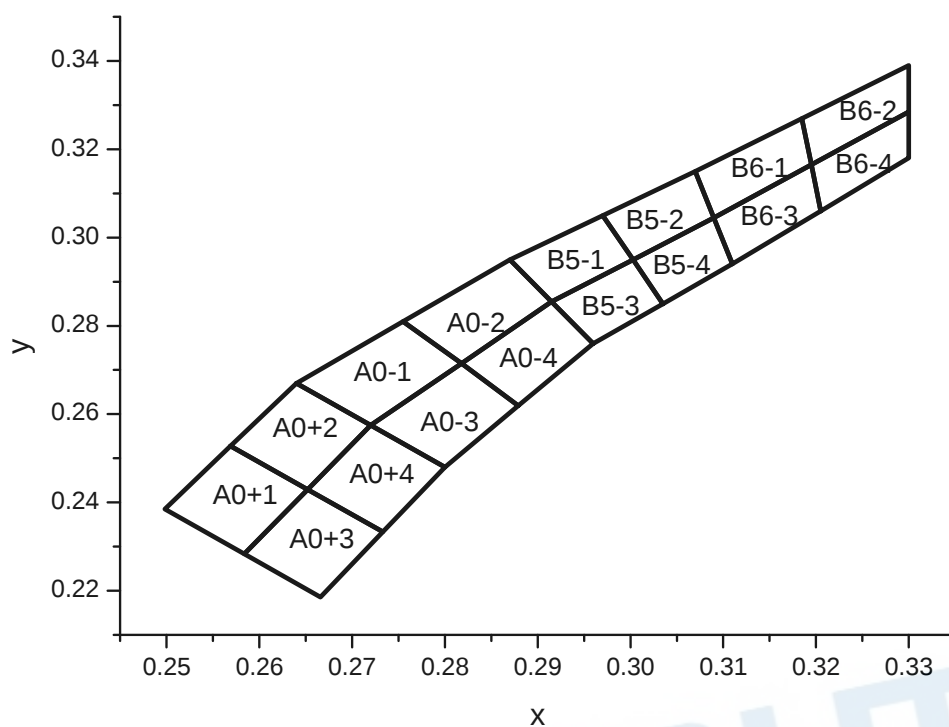
Note: Tolerance of Chromaticity Coordinates: ± 0.01

Bin Code of Chromaticity Coordinates

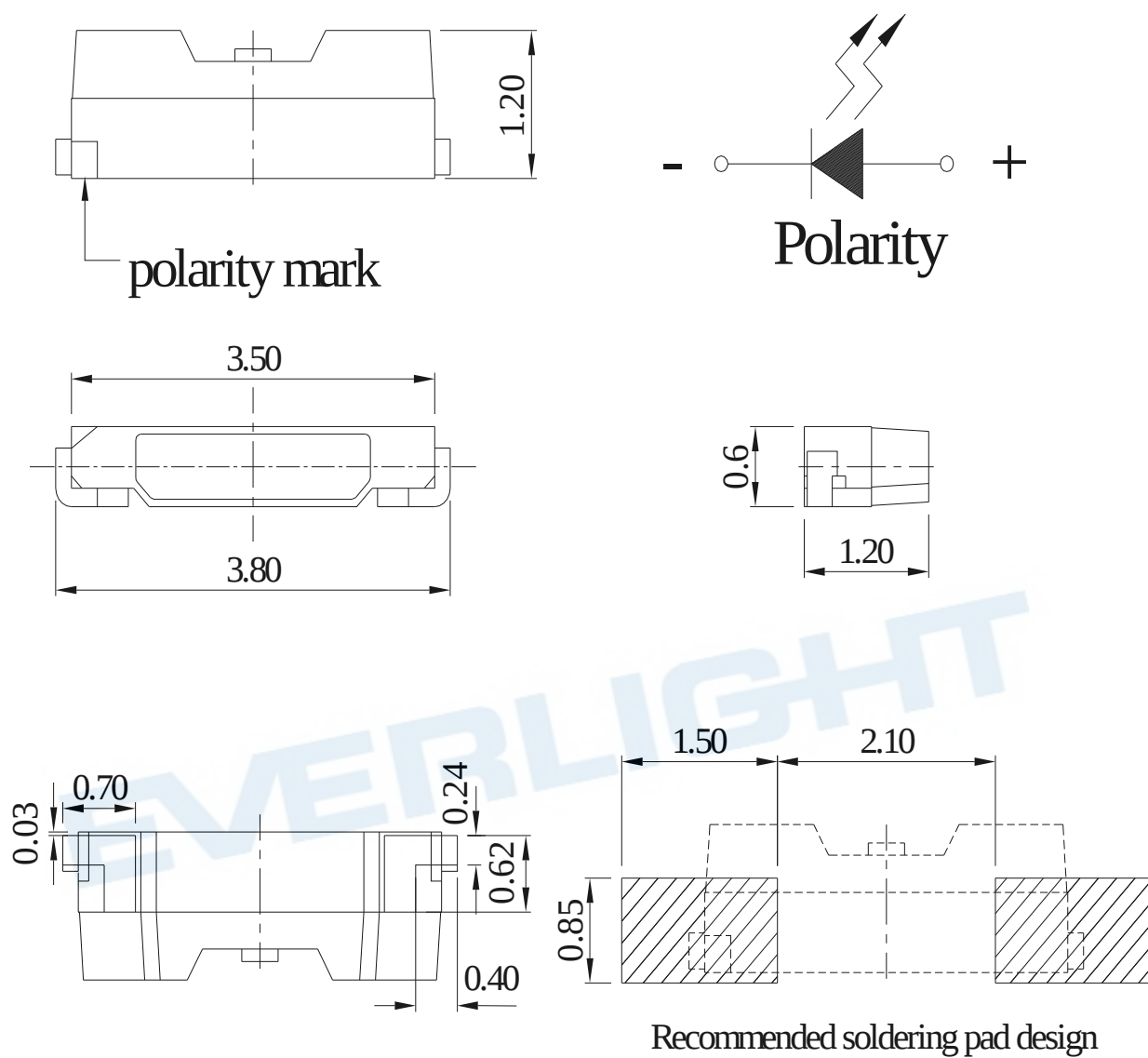
Bin Code	CIE_x	CIE_y	Bin Code	CIE_x	CIE_y
A0-3a	0.2720	0.2580	B5-3b	0.2980	0.2710
	0.2793	0.2755		0.2960	0.2760
	0.2820	0.2720		0.3040	0.2900
	0.2720	0.2580		0.3062	0.2853
A0-3b	0.2830	0.2440	B5-4a	0.2990	0.3010
	0.2800	0.2480		0.2968	0.3058
	0.2880	0.2620		0.3048	0.3198
	0.2910	0.2580		0.3070	0.3150
A0-4a	0.2820	0.2720	B5-4b	0.3062	0.2853
	0.2793	0.2755		0.3040	0.2900
	0.2887	0.2916		0.3120	0.3040
	0.2910	0.2870		0.3142	0.2993
A0-4b	0.2910	0.2580	B6-3a	0.3070	0.3150
	0.2880	0.2620		0.3048	0.3198
	0.2960	0.2760		0.3128	0.3338
	0.2980	0.2710		0.3150	0.3290
B5-3a	0.2910	0.2870	B6-3b	0.3142	0.2993
	0.2887	0.2916		0.3120	0.3040
	0.2968	0.3058		0.3200	0.3180
	0.2990	0.3010		0.3222	0.3133

Note: Tolerance of Chromaticity Coordinates: ± 0.01

The C.I.E. 1931 Chromaticity Diagram



Package Outline Dimensions

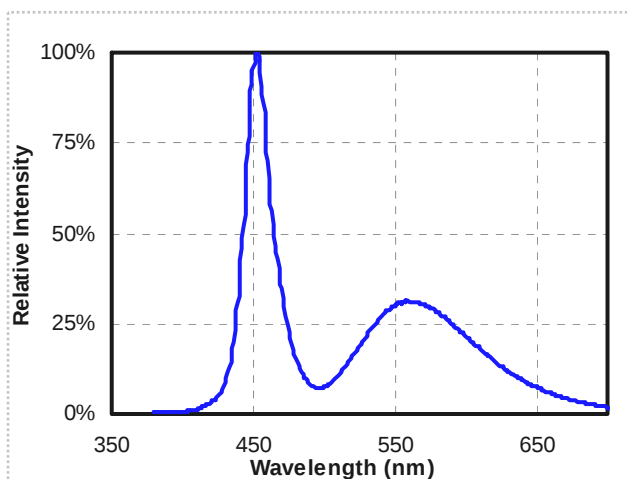


Note: The tolerances unless dimensions are $\pm 0.1\text{mm}$.

1. Spectrum Distribution

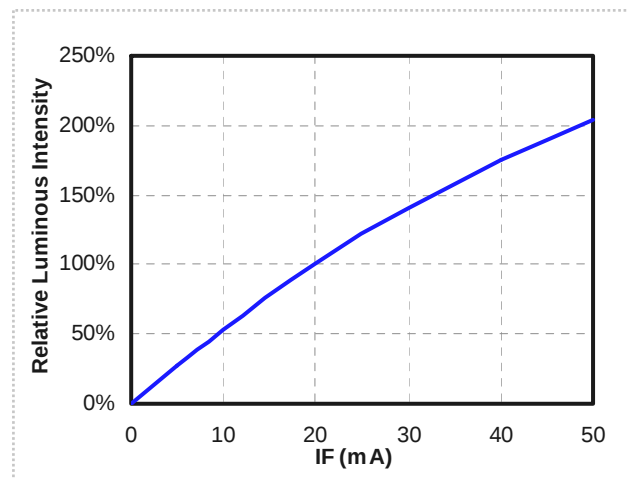
Current

($T_A=25^{\circ}\text{C}$, $I_F=20\text{mA}$)



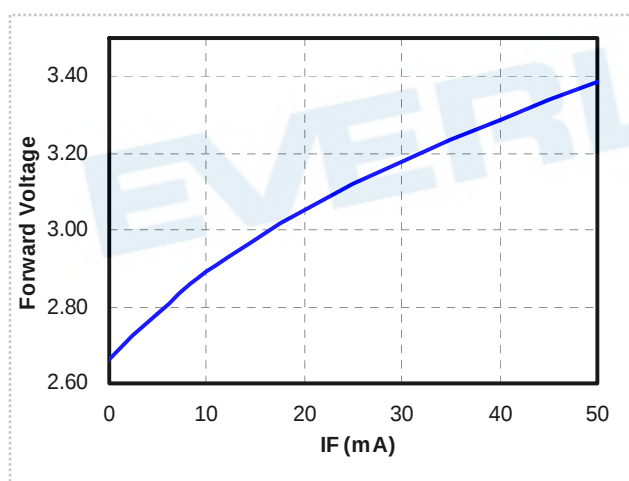
2. Relative Luminous Intensity vs. Forward

($T_A=25^{\circ}\text{C}$)



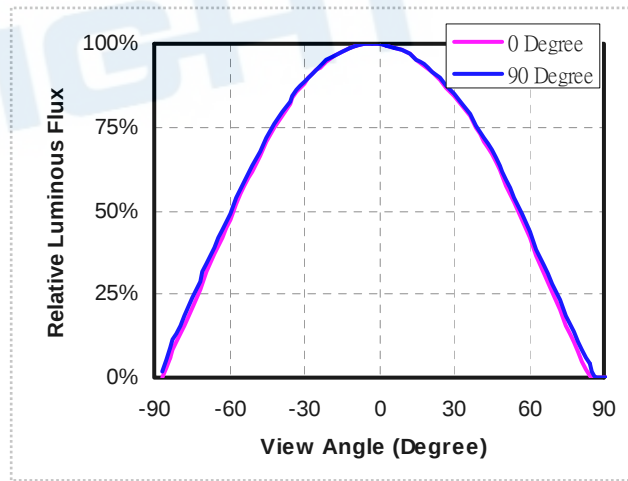
3. Relative Forward Voltage vs. Forward Current

($T_A=25^{\circ}\text{C}$)



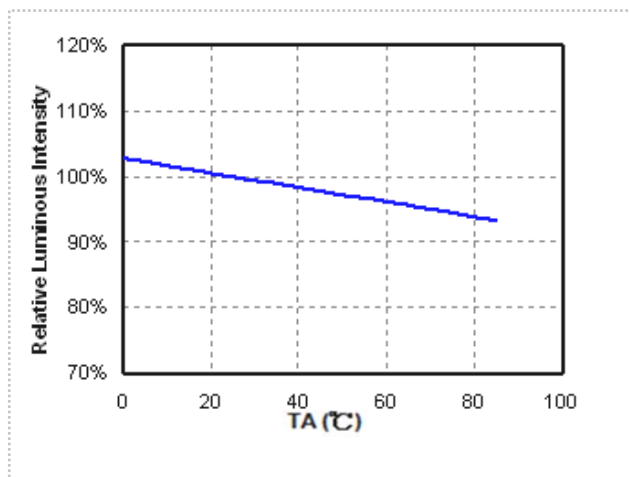
4. Radiation Diagram

($T_A=25^{\circ}\text{C}$, $I_F=20\text{mA}$)

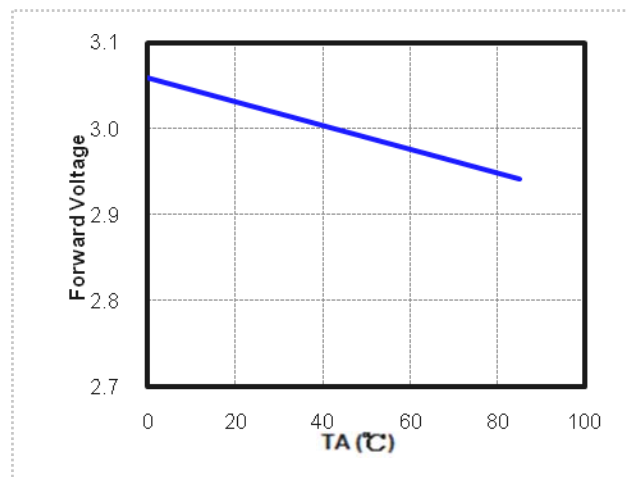


Typical Electro-Optical-Thermal Characteristics Curves

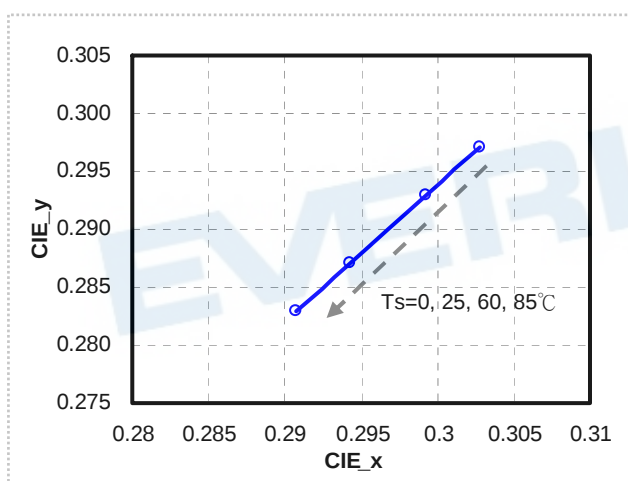
5. Relative Luminous Intensity vs. Solder Temperature
($I_F=20\text{mA}$)



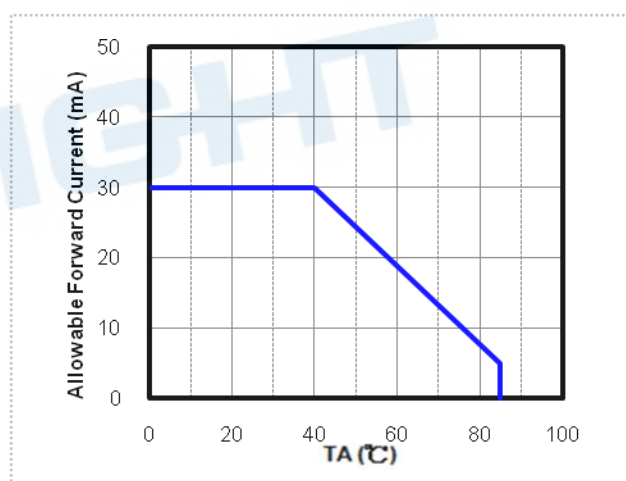
6. Forward Voltage vs. Solder Temperature
($I_F=20\text{mA}$)



7. Chromaticity Coordinates vs. Solder Temperature
($I_F=20\text{mA}$)



8. Forward Current De-rating Curve

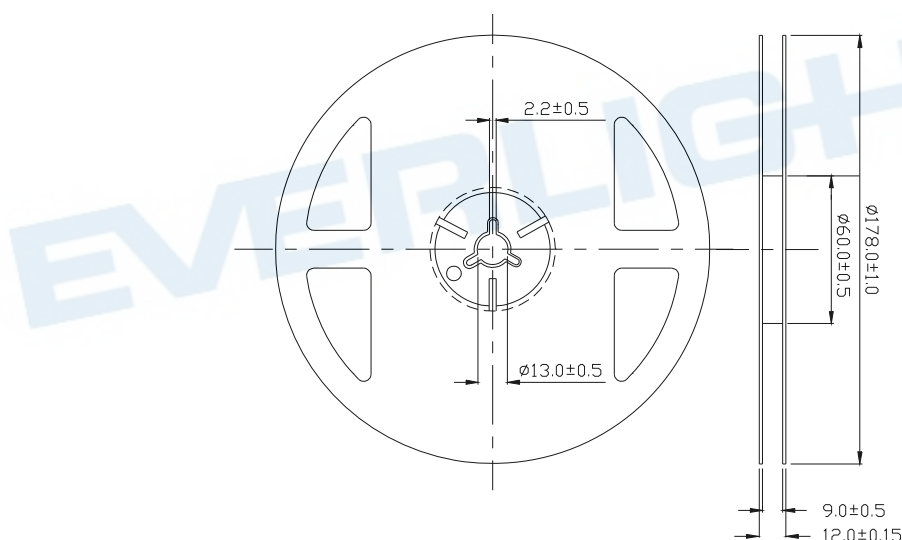


Label Explanation

CAT: Luminous Intensity Rank
HUE: Chromaticity Coordinates
REF: Forward Voltage Rank

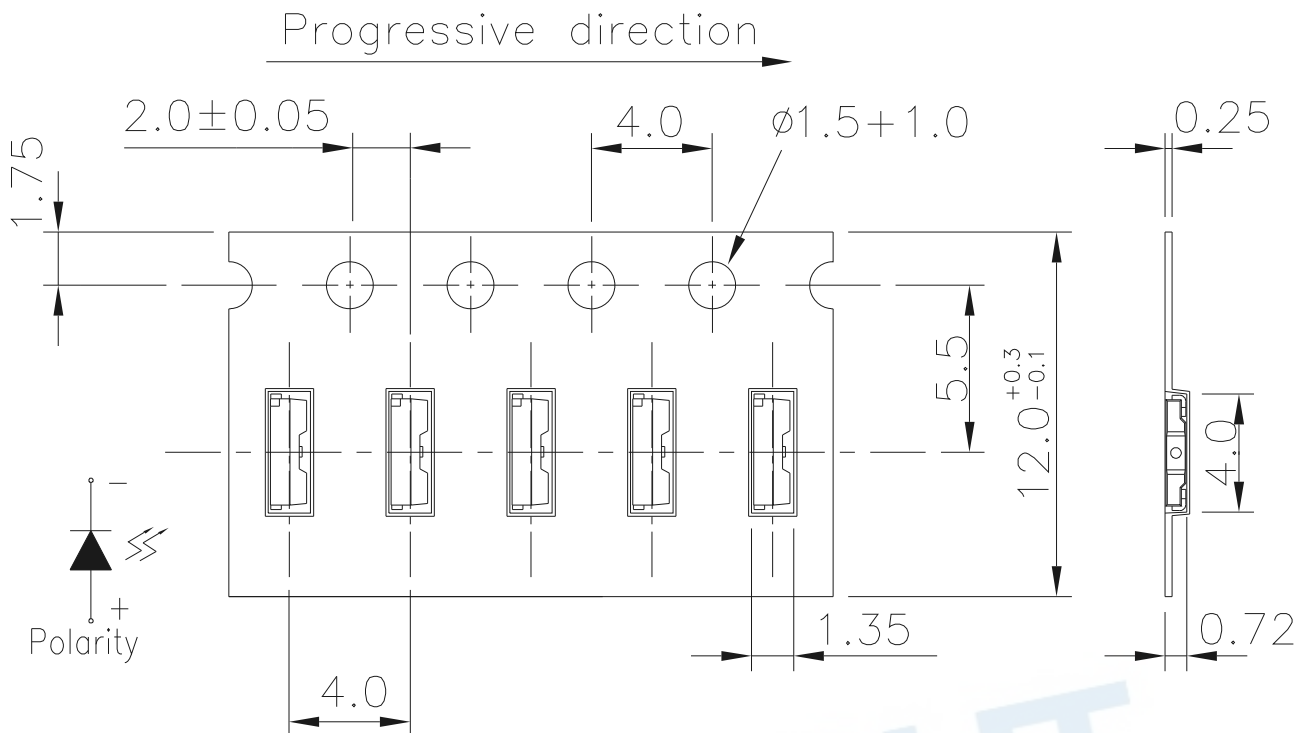


Reel Dimensions



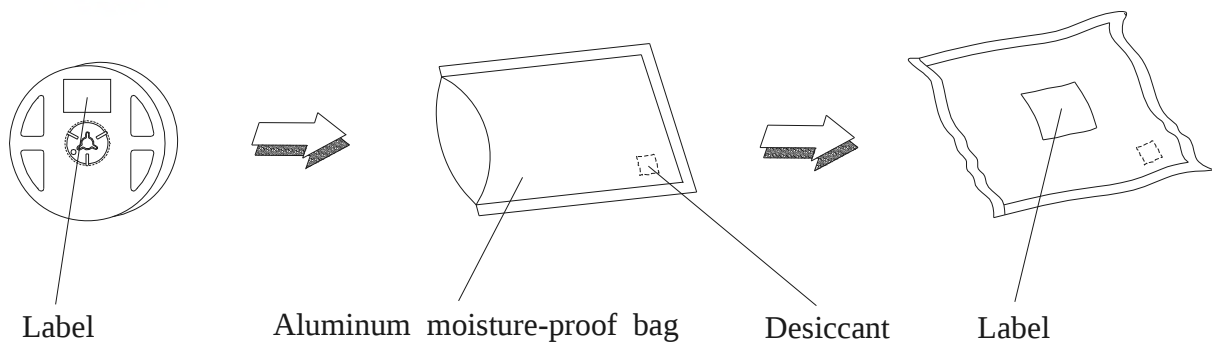
Note: The tolerances unless dimension are $\pm 0.1\text{mm}$.

Carrier Tape Dimensions: Loaded Quantity 1000/2000 pcs. Per Reel



Note: The tolerances unless mentioned is ± 0.1 mm, Unit = mm.

Moisture Resistant Packaging



Note: Actual photo of standard packing bag

Reliability Test Items and Conditions

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 10%

NO	Item	Test Condition		Test Hours / Times	Criteria	
		Temp./ Humidity	I _F (mA)		I _v @ 20mA	V _F @ 20mA
1	Reflow Soldering	TSld = 260°C, Max. 10sec.		2 times	<±5%	<±5%
2	Temperature Cycle	-40°C ~ 100°C 30min. (5min.) 30min.		200 cycles	I _v > 70%, V _F < 110%,	
3	Thermal Shock	-10°C ~ 100°C 20min. (<15sec.) 20min.		200 cycles		
4	Low Temp. Storage	Ta= -40°C	--	1000 hrs		
5	High Temp. Storage	Ta= 100°C	--	1000 hrs		
6	Temp. Humidity Storage	Ta= 60°C/ 90%RH	--	1000 hrs		
7	Steady State Operating Life of Low Temp.	Ta= -40°C	20	1000 hrs		
8	Steady State Operating Life Condition 1	Ta= 25°C/ Room Humidity	20	1000 hrs		
9	Steady State Operating Life Condition 2	Ta= 60°C	20	1000 hrs		
10	Steady State Operating Life of High Temp.	Ta= 85°C	5	1000 hrs		
11	Steady State Operating Life of High Humidity Heat	Ta= 60°C/ 90%RH	20	1000 hrs		

Notes:

1. Sampling for each test item: 22 (pcs.)
2. Test board: PCB board thickness=1.0mm, copper layer thickness=0.07mm, R_{th j-a}= 380°C/W.
3. Measurements are performed after allowing the LEDs to return to room temperature.

Precautions for Use

1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (Burn out will happen).

2. Storage

2.1 Do not open moisture proof bag before the products are ready to use.

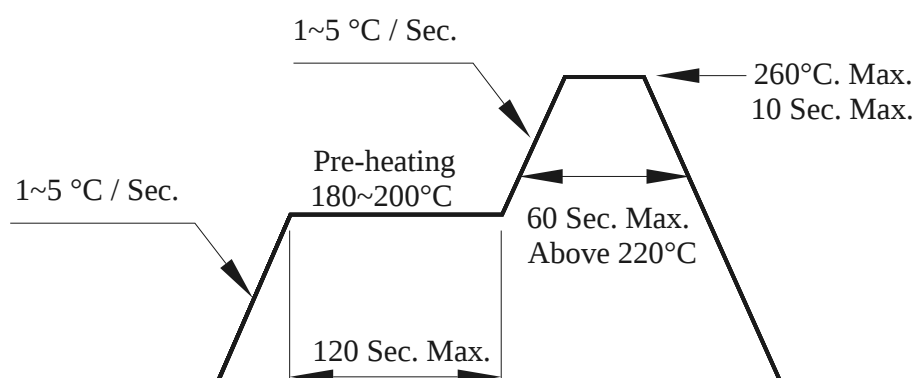
2.2 Before opening the package: The LEDs should be used within one year and kept at 30°C or less and 70%RH or less.

2.3 After opening the package: We recommend that the LED should be soldered quickly (**within 7 days**). The soldering condition is 30°C or less and 60%RH or less. If unused LEDs remain, it should be stored in moisture proof packages.

2.4 If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 60±5°C for 24 hours. (One time only)

3. Soldering Condition

3.1 Pb-free solder temperature profile



3.2 Reflow soldering should not be done more than two times.

3.3 When soldering, do not put stress on the LEDs during heating.

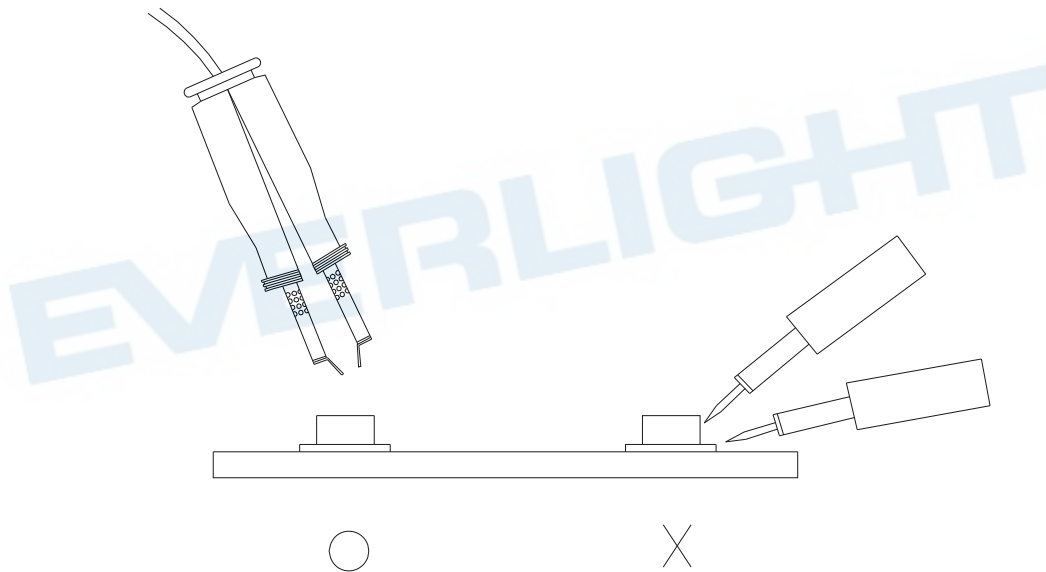
3.4 After soldering, do not warp the circuit board.

4. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than 350°C for 3 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals, and do soldering of each terminal. Be careful because the damage of the product is often started at the time of the hand solder.

5. Repairing

Repair should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.



6. Handling Indications

During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.