

### EL TOP VIEW LED A09K-PA1501H-AM



#### Features

- Package : PLCC 6 package
- Color : Phosphor Converted Amber
- Typ. Luminance Intensity : 7100 mcd @ 150mA
- Viewing angle : 120°
- ESD : 8KV
- MSL : 2
- Typ.color coordinates : (0.57,0.42)
- Qualified AEC-Q102
- Sulfur robustness
- 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).

#### Applications

- Automotive exterior lighting
- Turning signal

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# 1. Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	
Forward Current	$I_F$	20	150	200	mA	---	
Luminous Intensity	$I_V$	5600	7100	11200	mcd	$I_F=150\text{mA}$	
Forward Voltage	$V_F$	2.50	3.15	3.75	V	$I_F=150\text{mA}$	
Viewing Angle	$\phi$	---	120	---	deg	$I_F=150\text{mA}$	
Color	CIE x	---	0.57	---		$I_F=150\text{mA}$	
Color	CIE y	---	0.42	---	---	$I_F=150\text{mA}$	
Thermal Resistance (Junction to Solder)	Real	$R_{th JS real}$	---	---	60	K/W	$I_F=150\text{mA}$
	Electrical	$R_{th JS el}$	---	---	45		

## Notes:

1. Luminous Flux measurement tolerance:  $\pm 8\%$ .
2. The data of Luminous Flux measured at thermal pad= $25^\circ\text{C}$
3. Forward voltage measurement tolerance:  $\pm 0.05\text{V}$
4. The  $V_F$  range shown in the table above indicates 99% output.
5. Tolerance of Chromaticity Coordinates  $x,y$  :  $\pm 0.005$

## 2. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Dissipation	$P_d$	750	mW
Forward Current	$I_F$	200	mA
Surge Current ( $t \leq 10 \mu\text{s}$ ; $D=0.005$ ; $T_s=25^\circ\text{C}$ )	$I_{FM}$	750	mA
Reverse Voltage	$V_R$	Not designed for reverse operation	V
Junction Temperature	$T_J$	125	$^\circ\text{C}$
Operating Temperature	$T_{opr}$	-40 ~ +110	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 ~ +110	$^\circ\text{C}$
ESD Sensitivity ( $R=1.5\text{k}\Omega$ , $C=100\text{pF}$ )	$ESD_{HBM}$	8	kV
Soldering Temperature	Reflow	260 $^\circ\text{C}$ for 30sec	$^\circ\text{C}$

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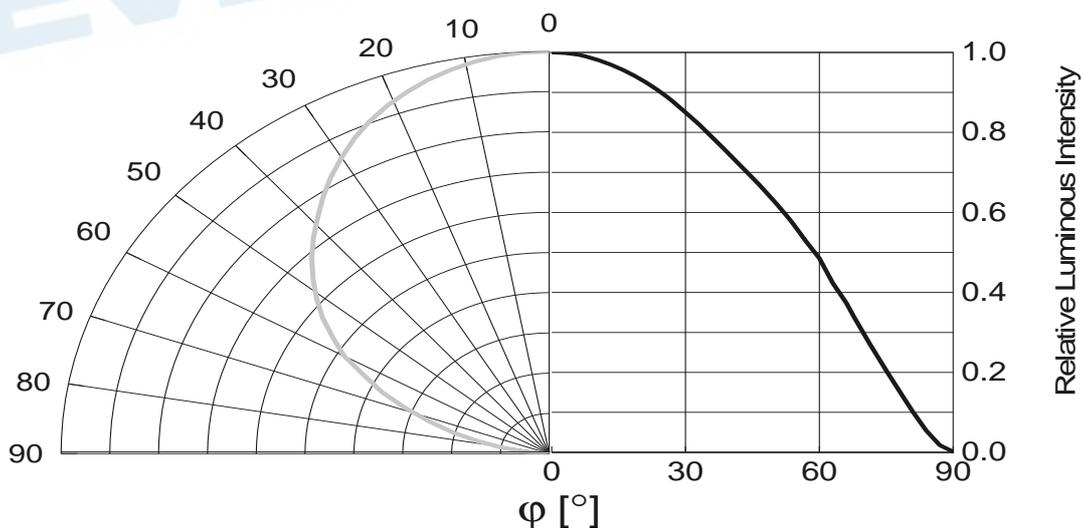
### 3. Characteristics Graph

#### Wavelength Characteristics Relative Spectral Distribution @ Ts = 25°C, If=150mA

$$\Phi_V / \Phi_V (Max.) = f(\lambda)$$

#### Typical Diagram Characteristics of Radiation

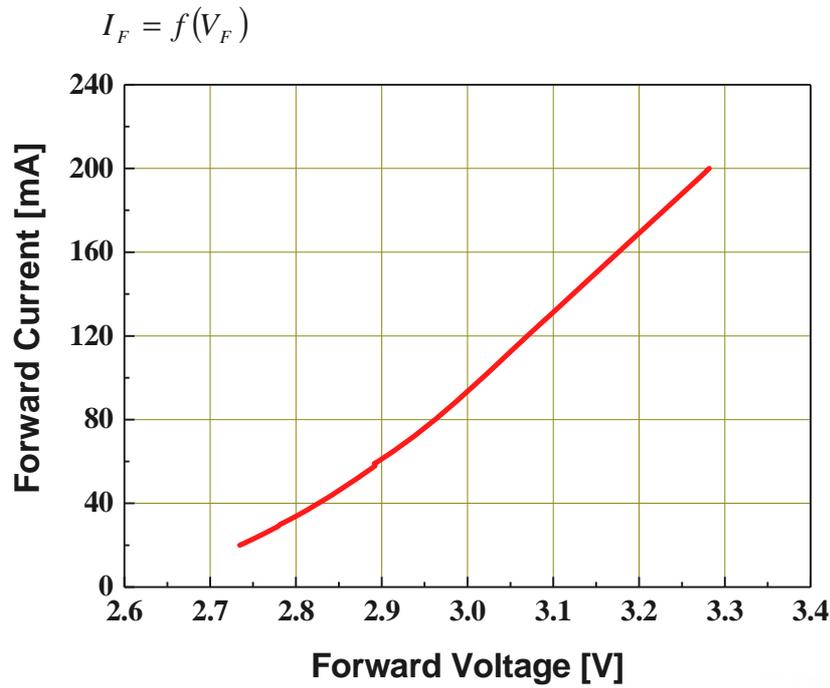
$$\Phi_V / \Phi_V (0^\circ) = f(\varphi)$$



#### Notes:

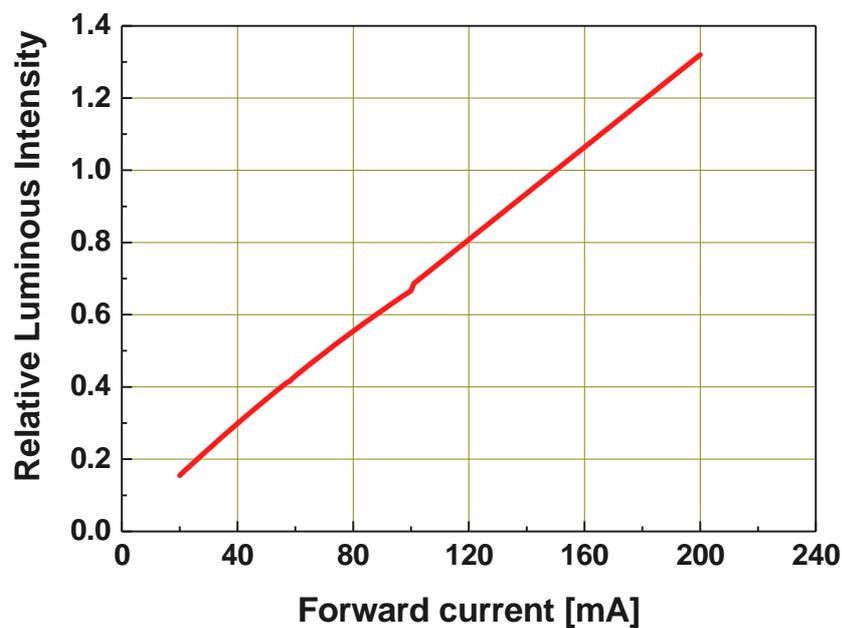
1.  $\varphi$  is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is  $\pm 5^\circ$ .

### Forward Current vs. Forward Voltage @ Ts = 25°C



### Relative Luminous Intensity vs. Forward Current @ Ts = 25°C

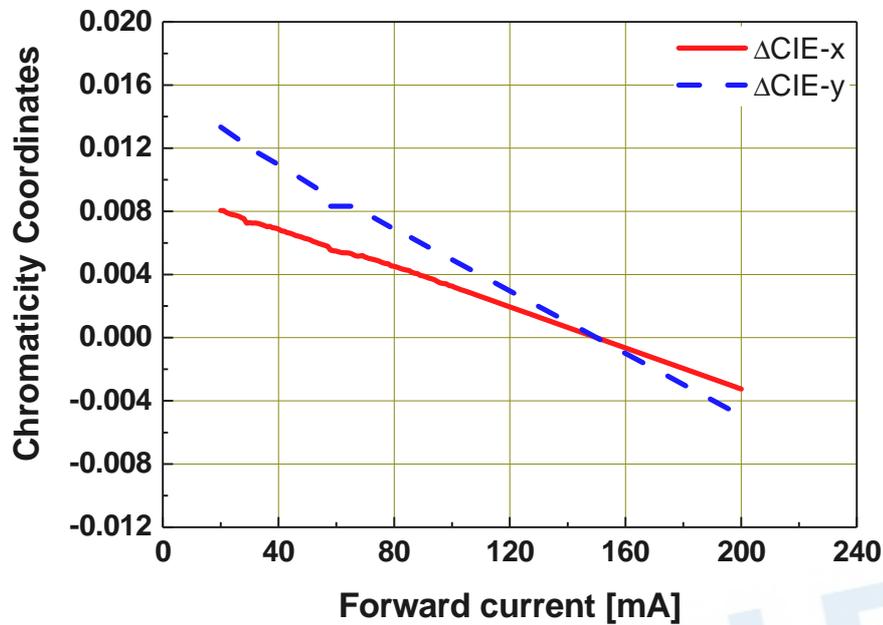
$\Phi_V / \Phi_V (150mA) = f(I_F)$



### Chromaticity Coordinates Shift vs. Forward Current

@  $T_s = 25^\circ\text{C}$

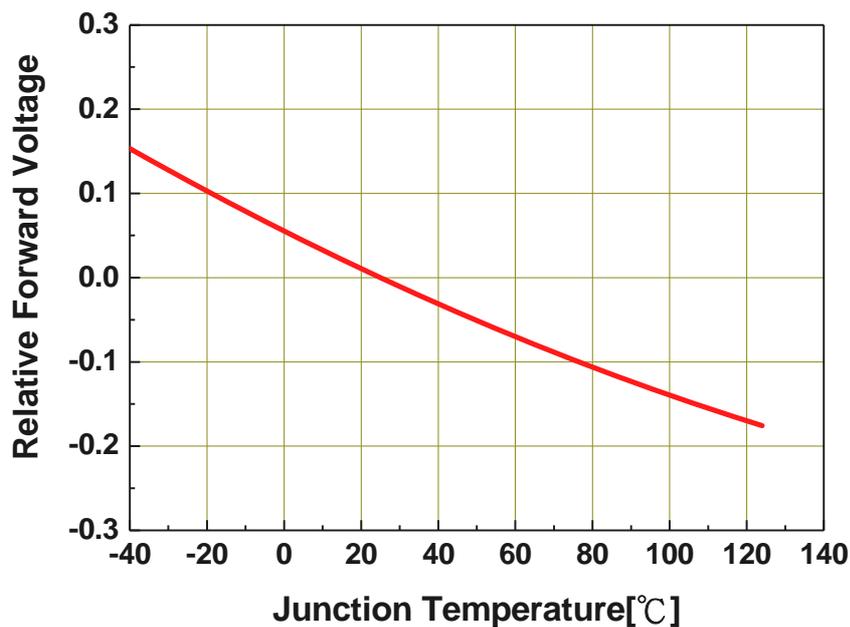
$$\Delta CIE\ x, \Delta CIE\ y = f(I_F)$$



### Relative Forward Voltage vs. Junction Temperature

@  $I_F = 150\text{mA}$

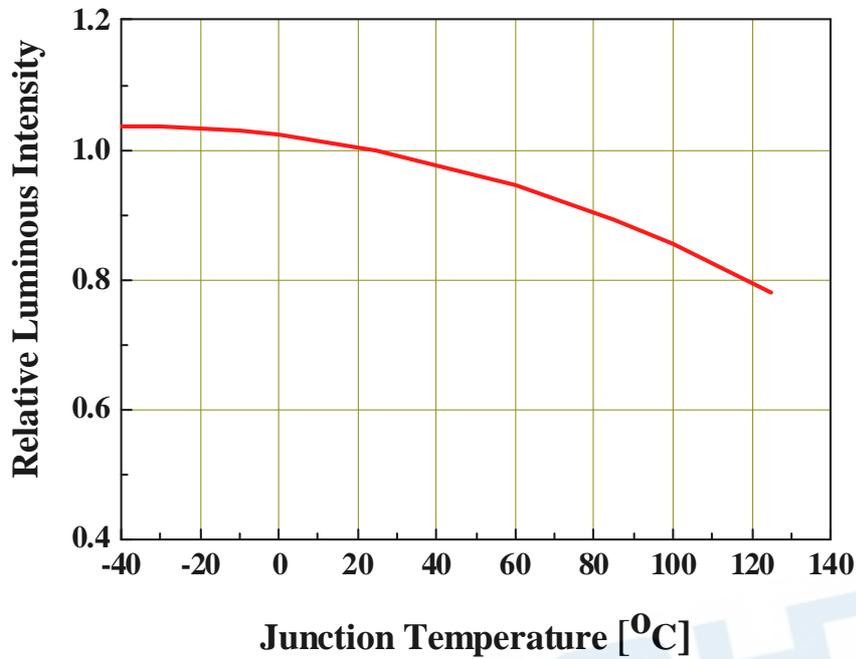
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j)$$



### Relative Luminous Intensity vs. Junction Temperature

@ I<sub>F</sub>=150mA

$$\Phi_v / \Phi_v(25^\circ C) = f(T_j)$$



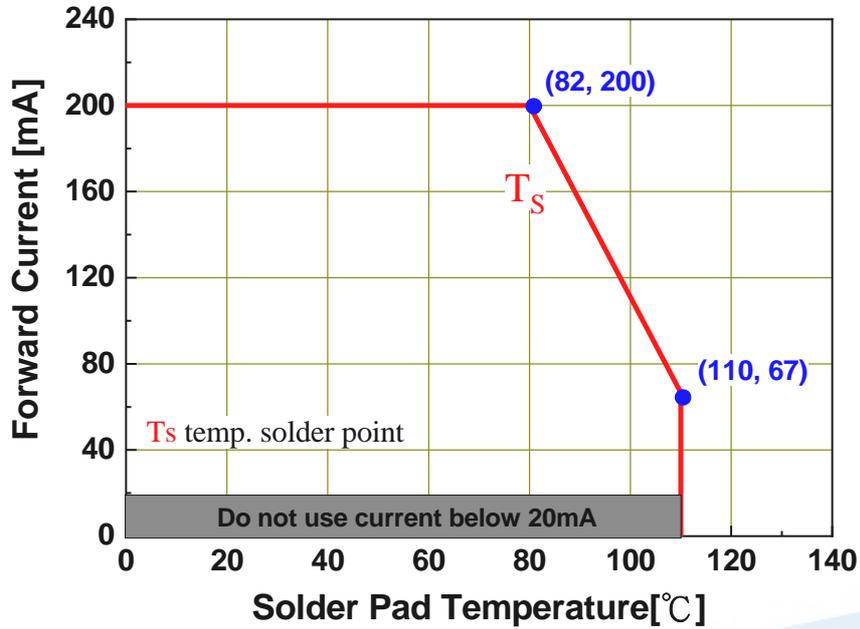
### Chromaticity Coordinates Shift vs. Junction Temperature

@ I<sub>F</sub>=150mA

$$\Delta CIE x, \Delta CIE y = f(T_j)$$

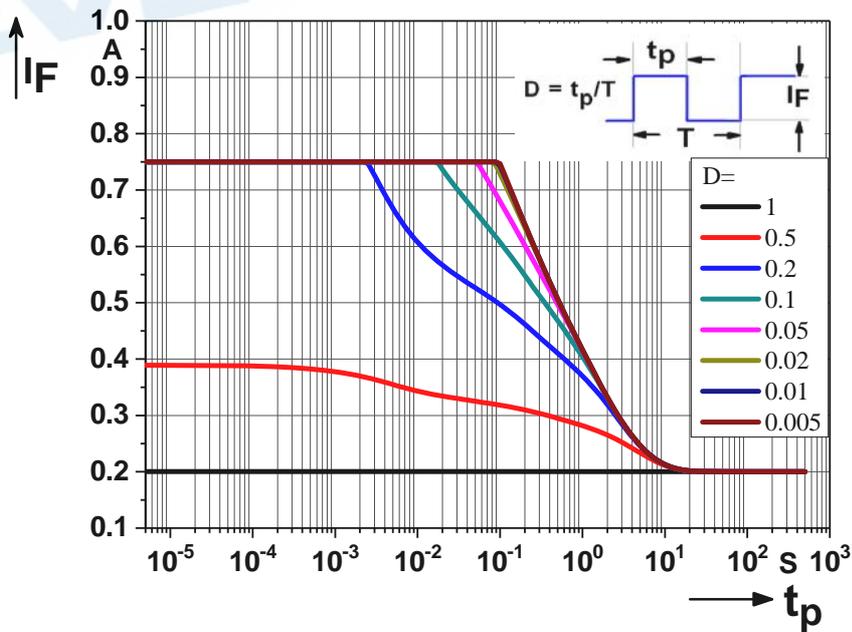
### Forward Current Derating Curve

$$I_F = f(T_S)$$



### Permissible Pulse Handling Capability

D=Duty cycle,  $T_s = 25^\circ\text{C}$



## 4. Binning Information

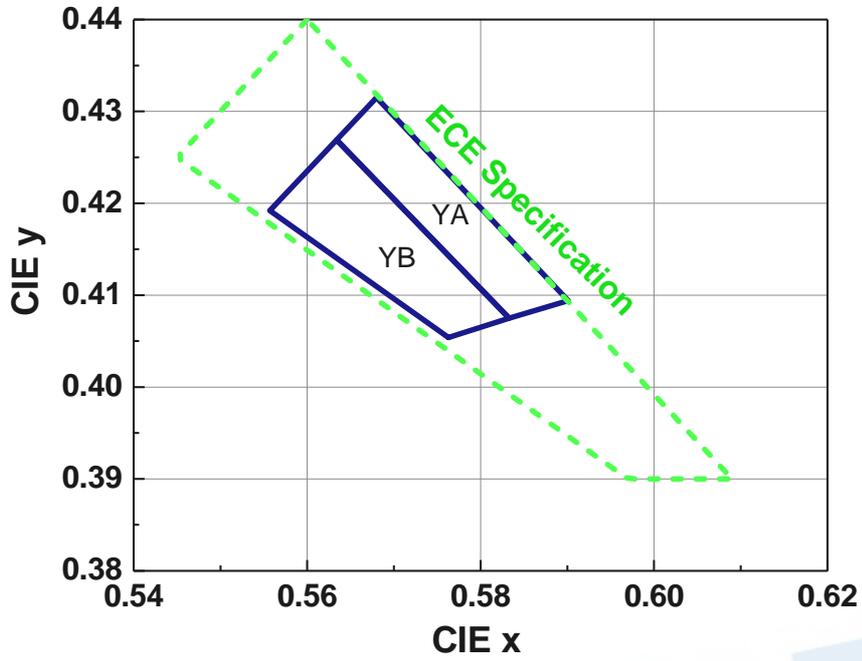
### Luminous Intensity Bins

Group Bin	Luminous Intensity (mcd)		Luminous flux (lm)(for reference)	
	Min.	Max.	Min.	Max.
L1	11.2	14	0.035	0.044
L2	14	18	0.044	0.057
M1	18	22.4	0.057	0.070
M2	22.4	28	0.070	0.088
N1	28	35.5	0.088	0.112
N2	35.5	45	0.112	0.142
P1	45	56	0.142	0.176
P2	56	71	0.176	0.223
Q1	71	90	0.223	0.283
Q2	90	112	0.283	0.352
R1	112	140	0.352	0.440
R2	140	180	0.440	0.566
S1	180	224	0.566	0.704
S2	224	280	0.704	0.881
T1	280	355	0.881	1.12
T2	355	450	1.12	1.42
U1	450	560	1.42	1.76
U2	560	710	1.76	2.23
V1	710	900	2.23	2.83
V2	900	1120	2.83	3.52
AA	1120	1400	3.52	4.40
AB	1400	1800	4.40	5.66
BA	1800	2240	5.66	7.04
BB	2240	2800	7.04	8.81
CA	2800	3550	8.81	11.2
CB	3550	4500	11.2	14.2
DA	4500	5600	14.2	17.6
DB	5600	7100	17.6	22.3
EA	7100	9000	22.3	28.3
EB	9000	11200	28.3	35.2
FA	11200	14000	35.2	44.0
FB	14000	18000	44.0	56.6
GA	18000	22400	56.6	70.4

**Notes:**

1. Luminous flux measurement tolerance:  $\pm 8\%$ .
2. Highlighted Black Box is possible output bins.

### Standard Phosphor Converted Amber Bin Structure



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### Phosphor Converted Amber Bin Coordinates

Bin	CIE x	CIE y
YA	0.568	0.4315
	0.5634	0.4269
	0.5833	0.4075
	0.5901	0.4094

Bin	CIE x	CIE y
YB	0.5763	0.4054
	0.5833	0.4075
	0.5634	0.4269
	0.5557	0.4192

Bin	CIE x	CIE y
YE	0.568	0.4315
	0.5596	0.4231
	0.5813	0.4069
	0.5901	0.4094

**Notes:**

1. Tolerance of Chromaticity Coordinates x,y :  $\pm 0.005$

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### Forward Voltage Bins

Bin code	Min Forward Voltage [V]	Max Forward Voltage [V]
1012	1.00	1.25
1215	1.25	1.50
1517	1.50	1.75
1720	1.75	2.00
2022	2.00	2.25
2225	2.25	2.50
2527	2.50	2.75
2730	2.75	3.00
3032	3.00	3.25
3235	3.25	3.50
3537	3.50	3.75
3740	3.75	4.00
4042	4.00	4.25
4245	4.25	4.50
4547	4.50	4.75
4750	4.75	5.00
5052	5.00	5.25
5255	5.25	5.50
5557	5.50	5.75
5760	5.75	6.00
6062	6.00	6.25
6265	6.25	6.50
6567	6.50	6.75
6770	6.75	7.00

**Notes:**

1. Forward voltage measurement tolerance:  $\pm 0.05V$ .
2. Forward voltage bins are defined at  $I_F = 150mA$  operation.
3. Highlighted Black Box is possible output bins.

## 5. Part Number

### A09K-PA1501H-AM

Part number is designated with below details.

A09K = Product family name.

PA = Color <sup>[1]</sup>

150 = Test current [mA]

1 = internal code

H = Brightness Level

AM = Automotive application

Note

[1] Color :

Symbol	Description
C	Cool White
N	Neutral White
W	Warm White
PA	Phosphor Converted Amber
PR	Phosphor Converted Red
UB	Blue
IB	Ice Blue
SB	Sky Blue
UP	Purple
UG	Green
UY	Yellow
UYG	Brilliant Yellow Green
UPG	Pale Green
UA	Amber
UR	Red
SR	Super Red
RGB	RGB-Color
PYG	Phosphor Converted Yellow Green

## 6. Ordering Information

### A09K- PA1501H-**ABCDEFGHIJKLM**-NO-AM

Part Number of the A09K	Order Code
A09K-PA1501H-AM	A09K- PA1501H-ABCDEFGHIJKLM-NO-AM

Order code contains information with below details :

ABCD = min/max wavelength or CCT

EFGH = min./max. luminous flux in [lm] or luminous intensity in [mcd]

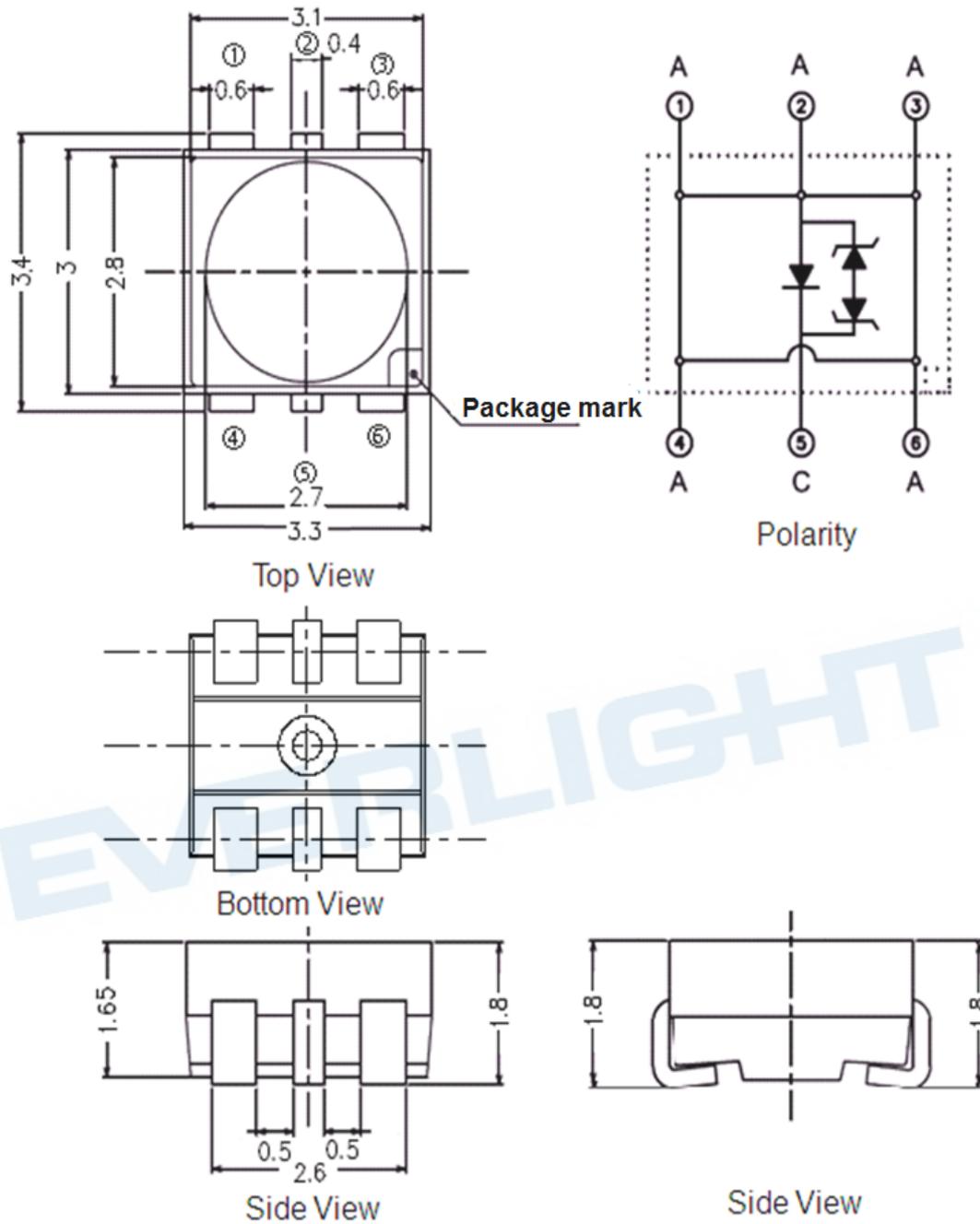
JKLM = min./max. forward voltage

NO = internal code

AM = Automotive Application



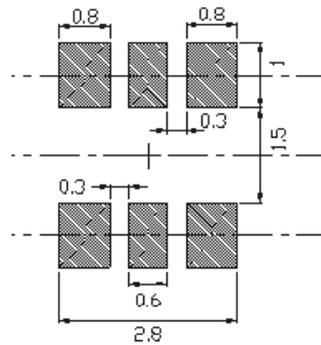
## 7. Mechanical Dimension



**Notes:**

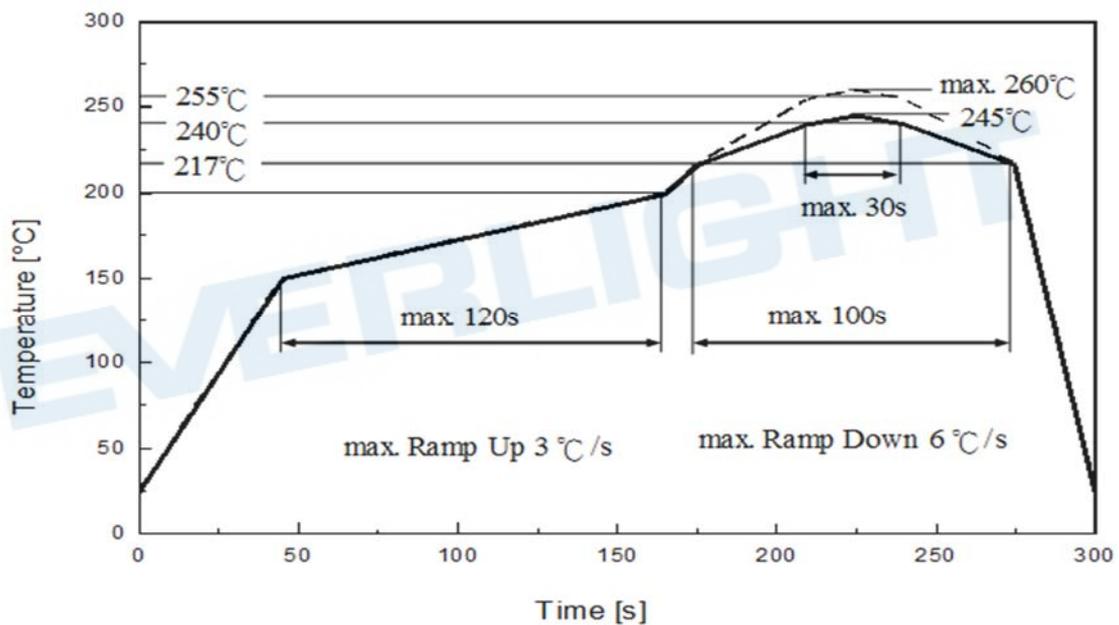
1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.1$ mm.

## 8. Recommended Soldering Pad



## 9. Reflow Soldering Profile

Soldering Condition (Reference: IPC/JEDEC J-STD-020D)



Profile Feature	Pb-Free Assembly	Unit
	Recommendation	
Ramp-up rate to preheat 25 °C to 150 °C	3	°C /sec
Time of soaking zone 150 °C to 200 °C	120	sec
Ramp-up rate to peak	3	°C /sec
Liquidus temperature	217	°C
Time above liquidus temperature	100	sec
Peak temperature (max.)	260	°C
Time within 5°C of the specified peak temperature	30	sec
Ramp-down Rate (max.)	6	°C /sec

## 10. Packaging Information

### • Product Labeling

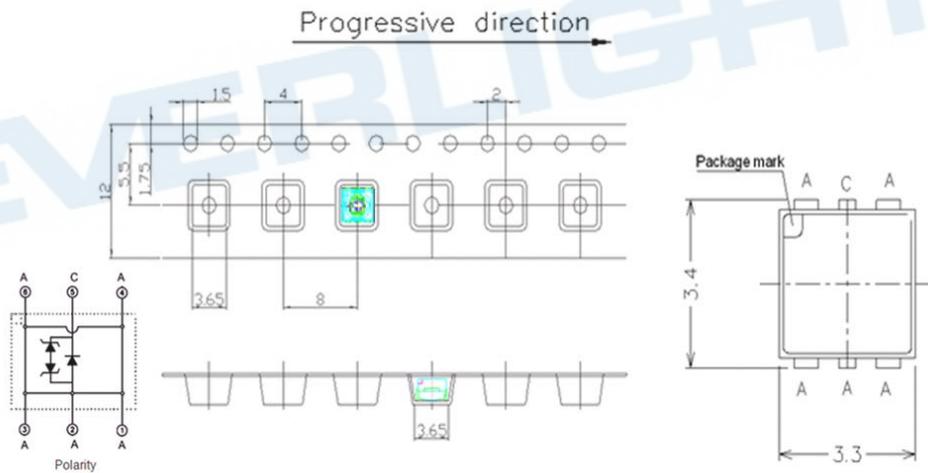
RoHS Pb **EVERLIGHT**      5

CPN : XXXXXXXXXXXXXXXXXXXX  
  
 XXXXXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXX  
 P/N : XXXXXXXXXXXX  
  
 XXXXXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXX  
 LOT NO: Y150716XXX-XXXXXXXX-XXXXXXXXXX  
  
 QTY: 0123456789    HUE: XXXXXXXXXXX  
  
 CAT: XXXXXXXXXXX    REF: XXXXXXXXXXX  
  
 REFERENCE: BTPYYMDDXXXXX  
  
 MSL-X                  MADE IN XXXXXX



- CPN : Customer's Product Number
- P/N : Everlight Part Number
- QTY : Packing Quantity
- CAT : Luminous Flux (Brightness) Bin
- HUE : Color Bin
- REF : Forward Voltage Bin
- LOT No : Lot Number

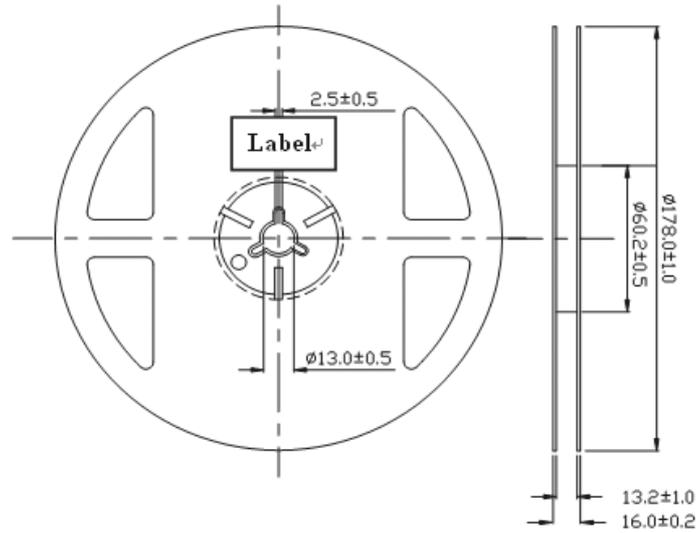
### • Packing: Loaded Quantity 1000 pcs Per Reel



#### Notes:

1. Dimensions are in millimeters.

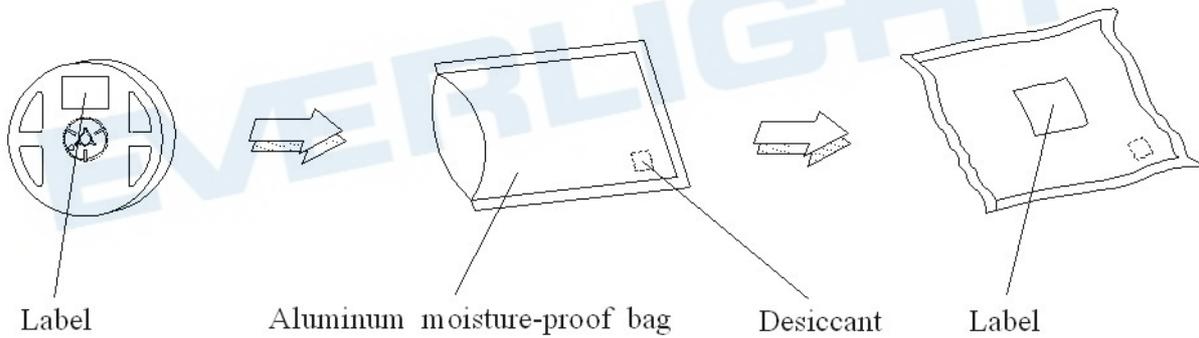
● **Reel Dimensions**



**Notes:**

1. Dimensions are in millimeters.

● **Moisture Resistant Packing Process**



## 11. Precaution 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. Assemblies

Do not stack assemblies containing LEDs to prevent damage to the optical surface of LEDs. Forces applied to the optical surface may result in the surface being damaged.

### 3. Soldering Condition

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

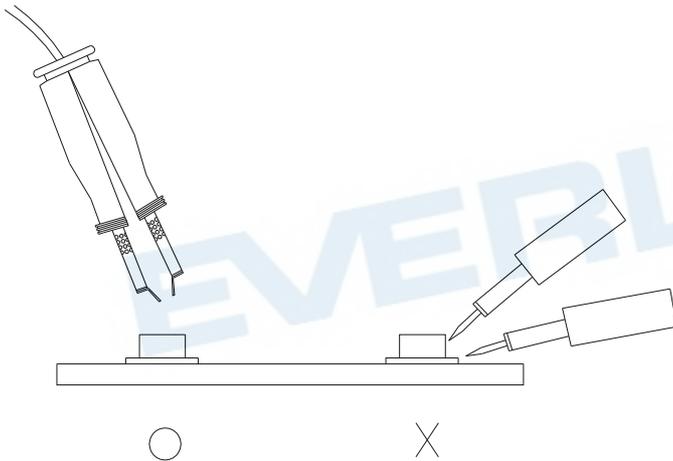
3.2 After soldering, do not warp the circuit board.

### 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.



## Revision History

Current version : 14.Aug.2023

Issue No: DHE-0003210

Version: 7.0

Rev.	Subjects (major change in previous version)	Modified date
1	Standard Datasheet	2016/09/07
2	Revised $R_{th JS real}$ & $R_{th JS el}$	2018/02/06
3	Revised Packaging Information	2018/09/14
4	Revised Relative Luminous intensity vs. Forward Current and Relative Luminous intensity vs. Junction T	2021/06/30
5	Revise Qualified AEC-Q102 level	2023/05/19
6	Add Luminous flux Bin	2023/08/14
7	Add YE color Bin	2024/10/1

