EVERLIGHT AUTOMOTIVE

DATASHEET

# *EL ALFS series*

## ALFS1E-PA7001H-AM



### Features

- Package：SMD ceramic package
- Typ. Luminous Flux：140 lm @ 700mA
- Viewing angle：120º
- ESD：up to 8KV
- MSL：2
- Sulfur robustness：Class A0
- The product itself will remain within RoHS compliant version.
- Compliance with EU REACH.
- Compliance Halogen Free .(Br <900 ppm ,CI <900 ppm , Br+Cl < 1500 ppm).

### Applications

- Automotive Exterior Lighting
- Turn signal

# Contents

1.Characteristics ..... 3
2.Absolute Maximum Ratings ..... 4
3.Characteristics Graph ..... 5
4.Binning Information ..... 10
5.Part Number ..... 12
6.Ordering Information ..... 13
7.Mechanical Dimension ..... 14
8.Recommended Soldering Pad ..... 15
9.Reflow Soldering Profile ..... 16
10.Packaging Information ..... 17
11.Precaution for Use ..... 19
12.Sulfur Test Criteria ..... 20


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# 1. Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Forward current[1] | $I_F$ | 50 | 700 | 800 | mA | |
| Luminous Flux[2][3] | $\Phi_v$ | 120 | 140 | 180 | lm | $I_F$=700mA |
| Forward Voltage[4] | $V_F$ | 2.90 | 3.20 | 3.80 | V | $I_F$=700mA |
| Viewing Angle | $\phi$ | --- | 120 | --- | deg | $I_F$=700mA |
| Color | CIE X | --- | 0.565 | --- | --- | $I_F$=700mA |
| | CIE Y | --- | 0.417 | --- | | |
| Thermal Resistance (Junction to Solder) | $R_{th\ JS\ real}$ | --- | 10 | 12 | K/W | $I_F$=700mA |
| | $R_{th\ JS\ el}$ | --- | 7.2 | 10.1 | | |

**Notes:**

1. Current pulse time: 25ms
2. Luminous flux measurement tolerance: ±8%.
3. The data of luminous flux measured at thermal pad=25°C
4. Forward voltage measurement tolerance: ±0.05V
5. The measurement tolerance of Chromaticity Coordinates: ±0.005


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# 2. Absolute Maximum Ratings

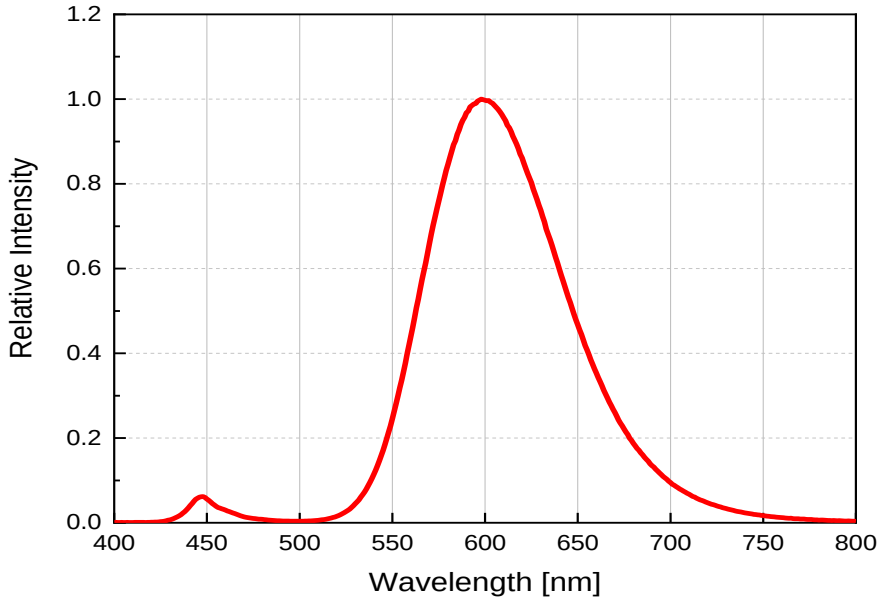
| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Reverse Voltage | $V_R$ | Not designed for reverse operation | V |
| Power Dissipation | $P_d$ | 3040 | mW |
| Surge current (t<=10 μs; D=0.005; $T_s$=25 ℃) | $I_{FM}$ | 2000 | mA |
| Forward Current | $I_F$ | 800 | mA |
| Junction Temperature | $T_J$ | 150 | °C |
| Operating Temperature | $T_{opr}$ | -40 ~ +125 | °C |
| Storage Temperature | $T_{stg}$ | -40 ~ +125 | °C |
| ESD Sensitivity (R=1.5kΩ, C= 100pF) | $ESD_{HBM}$ | 8 | KV |
| Soldering Temperature | Reflow | 260 | °C |


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# 3. Characteristics Graph

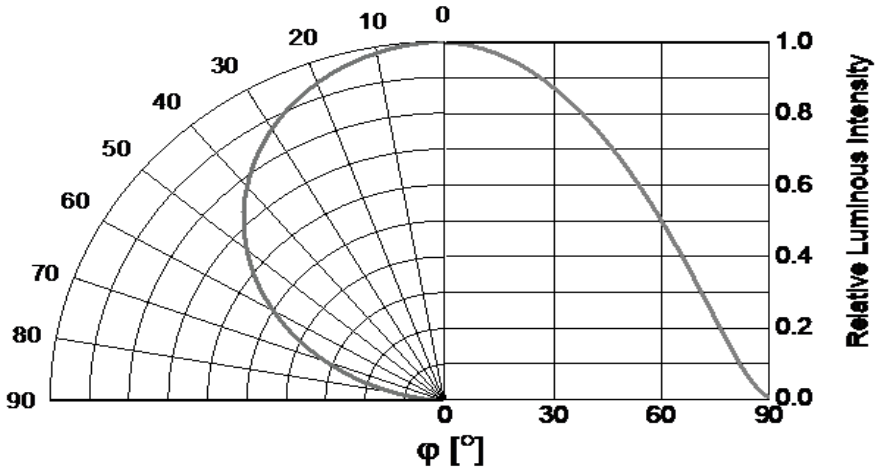
## Wavelength Characteristics Relative Spectral Distribution @ $T_S$ = 25°C 、$I_F$ = 700mA

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




## Typical Diagram Characteristics of Radiation

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



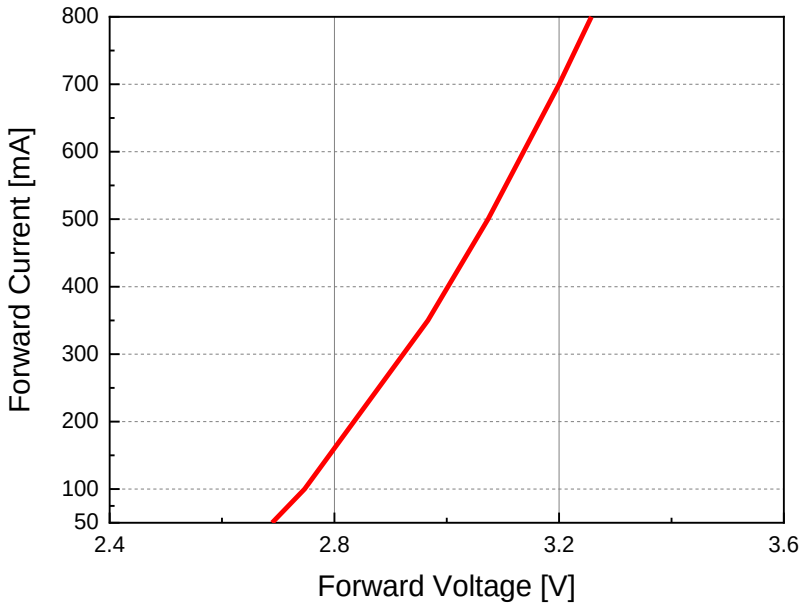

**Notes:**

1. φ is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is ± 5°


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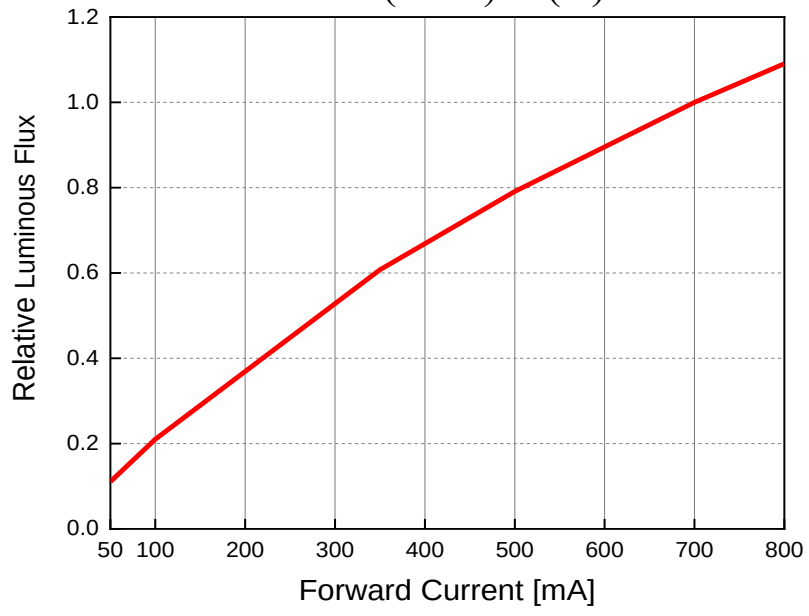
## Forward Current vs. Forward Voltage @ $T_S$ = 25°C

$$I_F = f(V_F)$$




## Relative Luminous Flux vs. Forward Current @ $T_S$ = 25°C

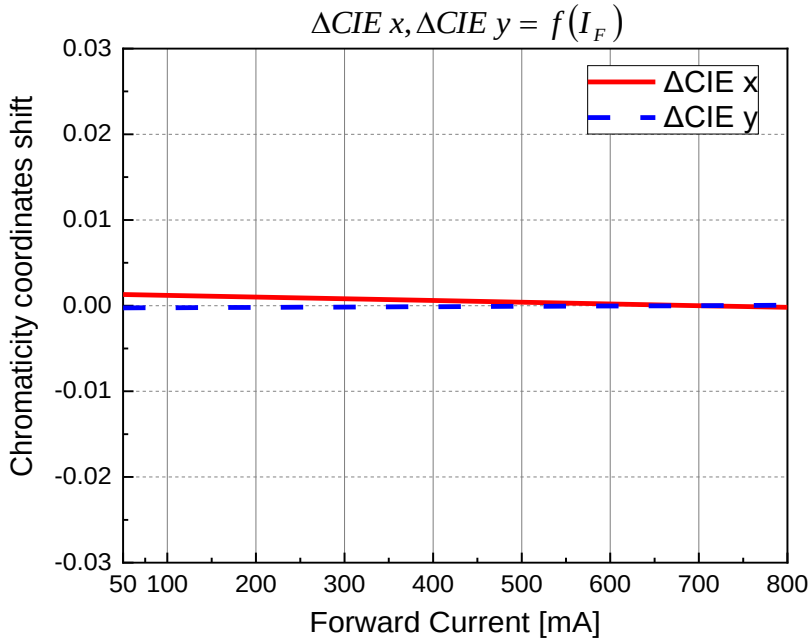
$$\Phi_V / \Phi_V(700mA) = f(I_F)$$



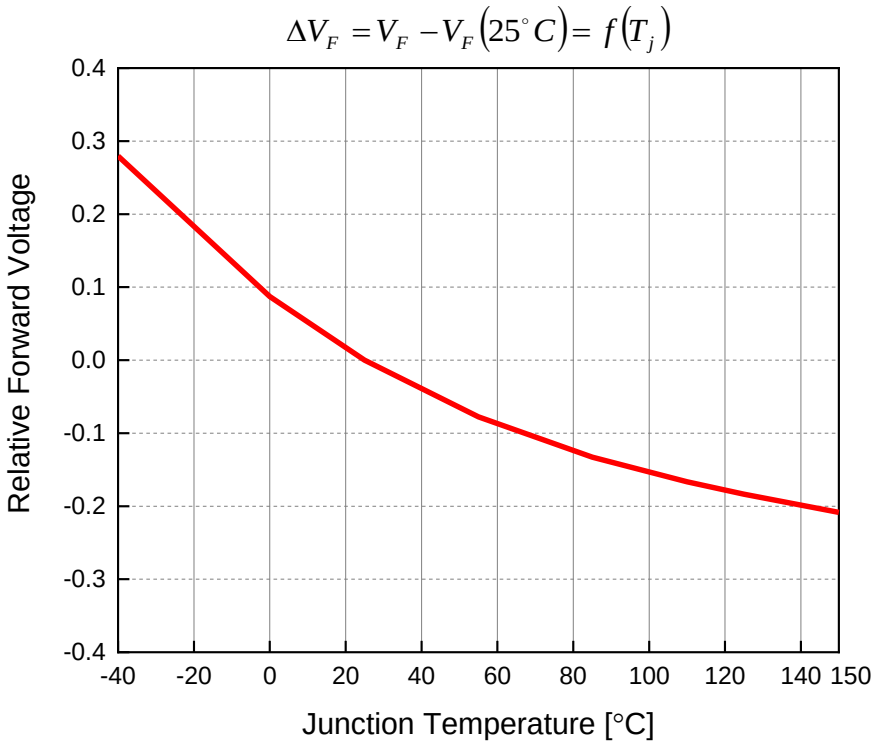


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## Chromaticity Coordinates Shift vs. Forward Current @ $T_S$ = 25°C




## Relative Forward Voltage vs. Junction Temperature @ $I_F$ = 700mA

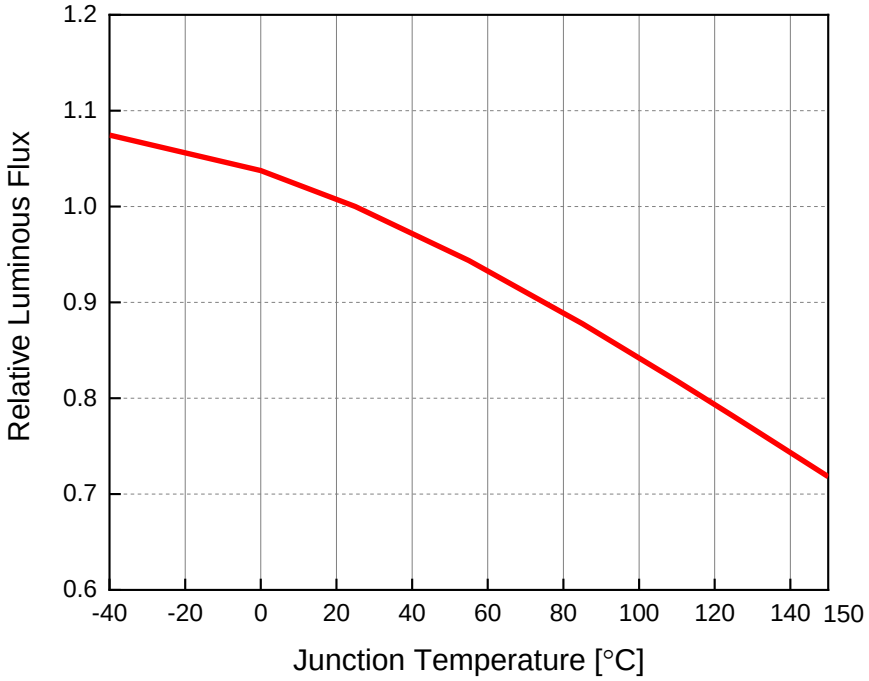




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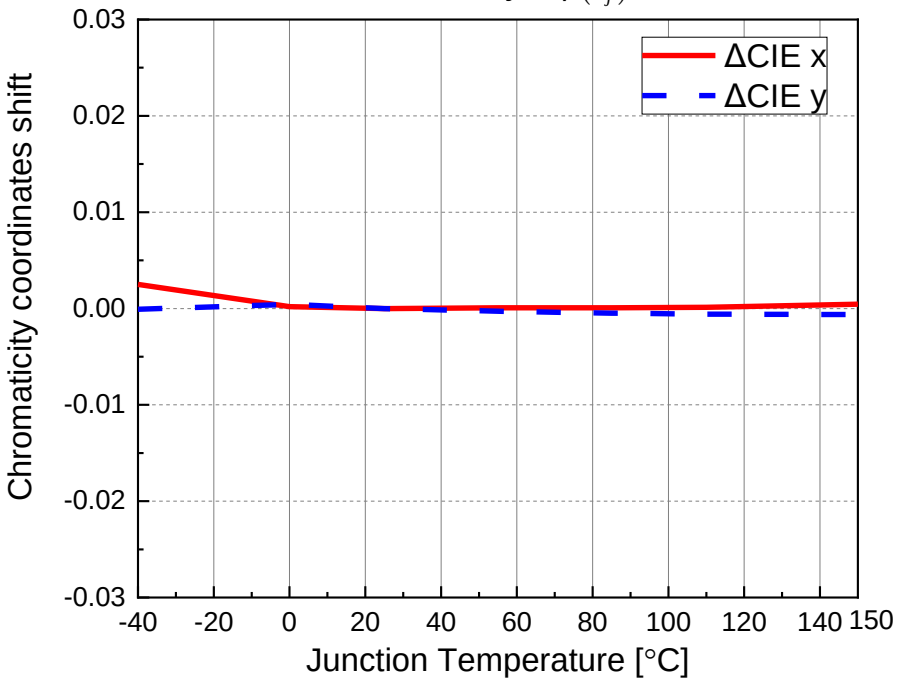
## Relative Luminous Flux vs. Junction Temperature @ $I_F$ = 700mA

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




## Chromaticity Coordinates Shift vs. Junction Temperature @ $I_F$ = 700mA

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

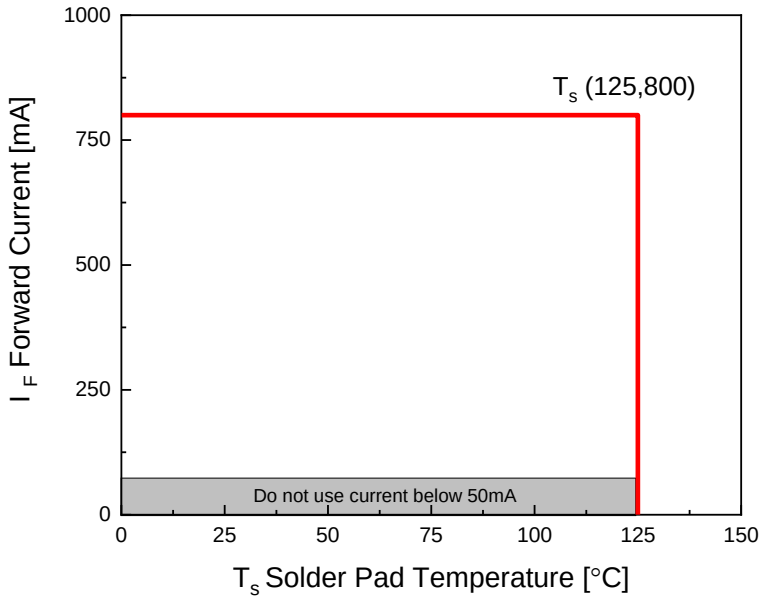




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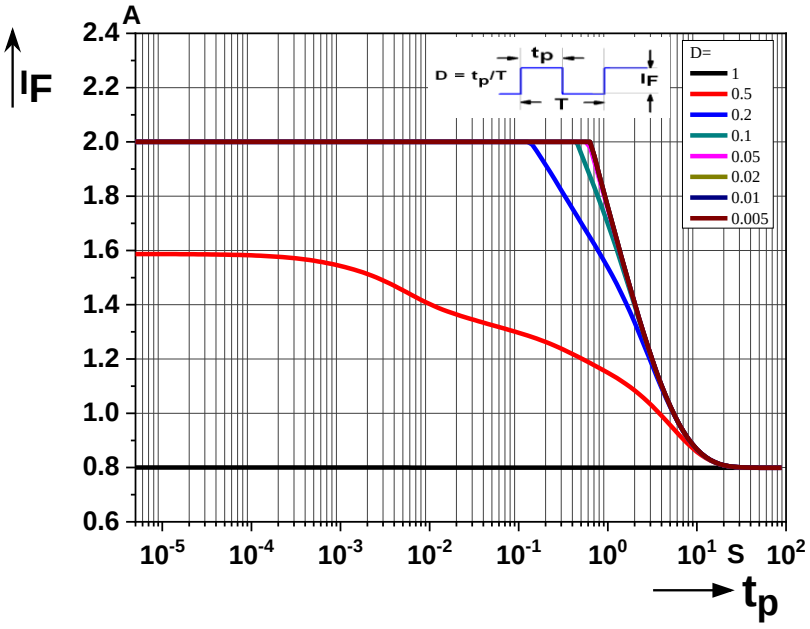
## Forward Current Derating Curve

$$I_F = f(T_S)$$




## Permissible Pulse Handling Capability

D=Duty cycle , $T_s$ = 25℃





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# 4. Binning Information

## Luminous Intensity Bins

| [ PC Amber ] | | | |
|---|---|---|---|
| Group | Bin | Minimum Luminous Flux (lm) | Maximum Luminous Flux (lm) |
| B | 2 | 120 | 140 |
| | 3 | 140 | 160 |
| | 4 | 160 | 180 |

**Notes:**

1. Luminous flux measurement tolerance: ±8%.
2. Highlighted Black Box is available bins.

## Forward Voltage Bins

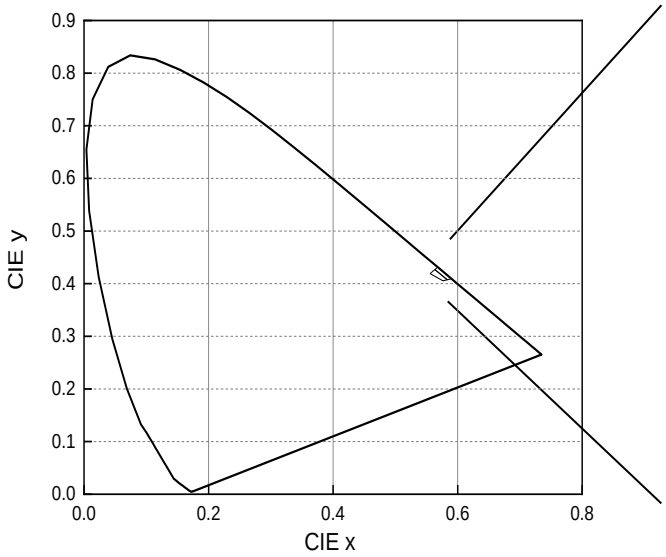
| Bin code | Minimum Forward Voltage(V) | Maximum Forward Voltage(V) |
|---|---|---|
| 1A | 2.90 | 3.20 |
| 1B | 3.20 | 3.50 |
| 1C | 3.50 | 3.80 |

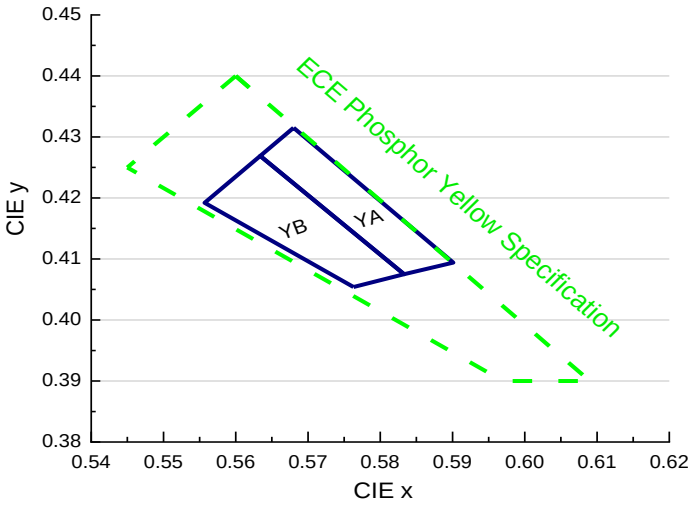
**Notes:**

1. Forward Voltage measurement tolerance: ±0.05V.


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## Color Bin Structure
## ECE Bin Structure




## PC Amber Bin Coordinates

| Bin | CIE x | CIE y |
|---|---|---|
| YA | 0.5680 | 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 |

**Notes:**

1. Color coordinates measurement tolerance: ±0.005
2. Test current: Typical forward current
3. Current pulse time: 25ms


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# 5. Part Number

## ALFS1E-PA7001H-AM

Part number is designated with below details.

ALFS = product family name.

1 = chip number

E = Product type

PA = Color [1]

700 = 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 |


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# 6. Ordering Information

## ALFS1E-PA7001H- ABCDEFGHIJKLMN-OP -AM

| Part Number of the ALFS | Order Code |
|---|---|
| ALFS1E-PA7001H-AM | ALFS1E-PA7001H- ABCDEFGHIJKLMN-OP -AM |

Order code contains information with below details：

ABCDEF= min/max wavelength or CCT

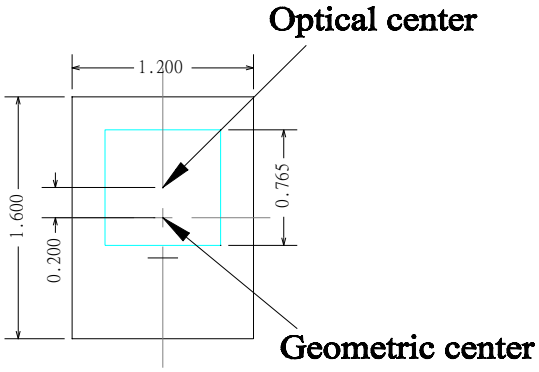
GHIJ= min./max. luminous flux in [lm] or luminous intensity in [mcd]

KLMN = min./max. Forward Voltage

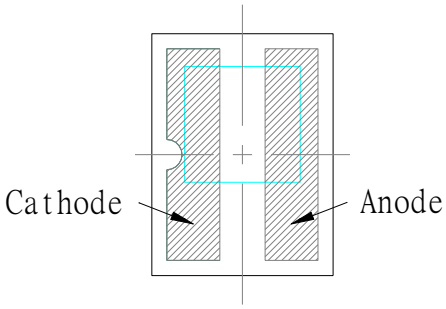
OP = Packing quantity (Minimum package)


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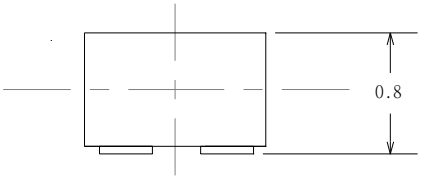
# 7. Mechanical Dimension



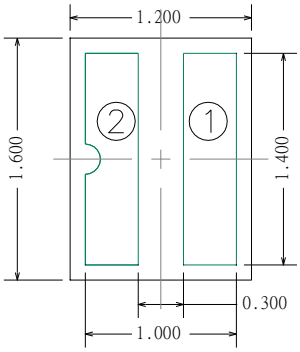

Top view



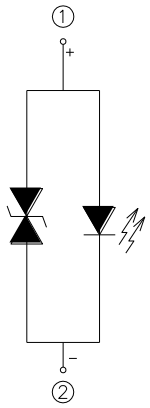

X-ray view




Side view




Bottom view




Polarity

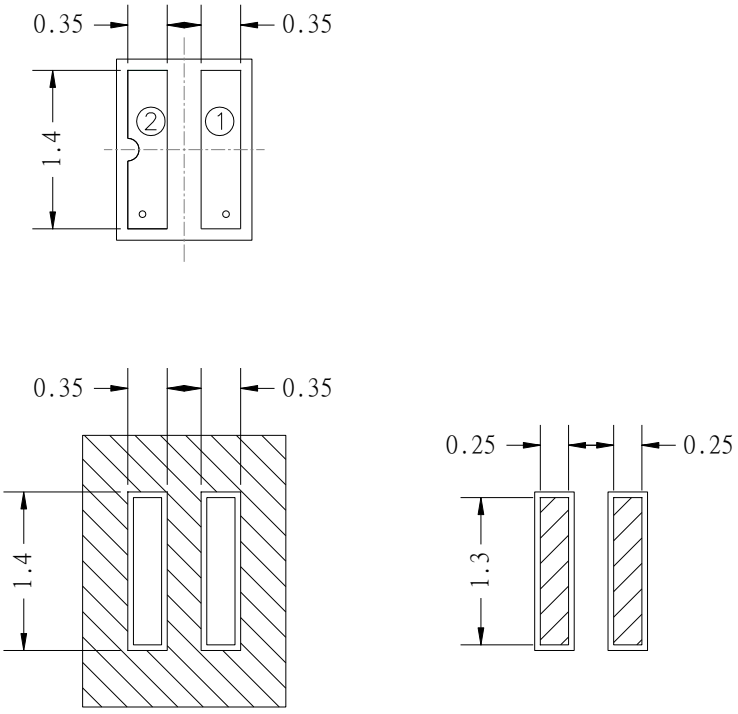
| | |
|---|---|
| 1 | Anode |
| 2 | Cathode |

**Notes:**

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are ± 0.1mm.


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# 8. Recommended Soldering Pad

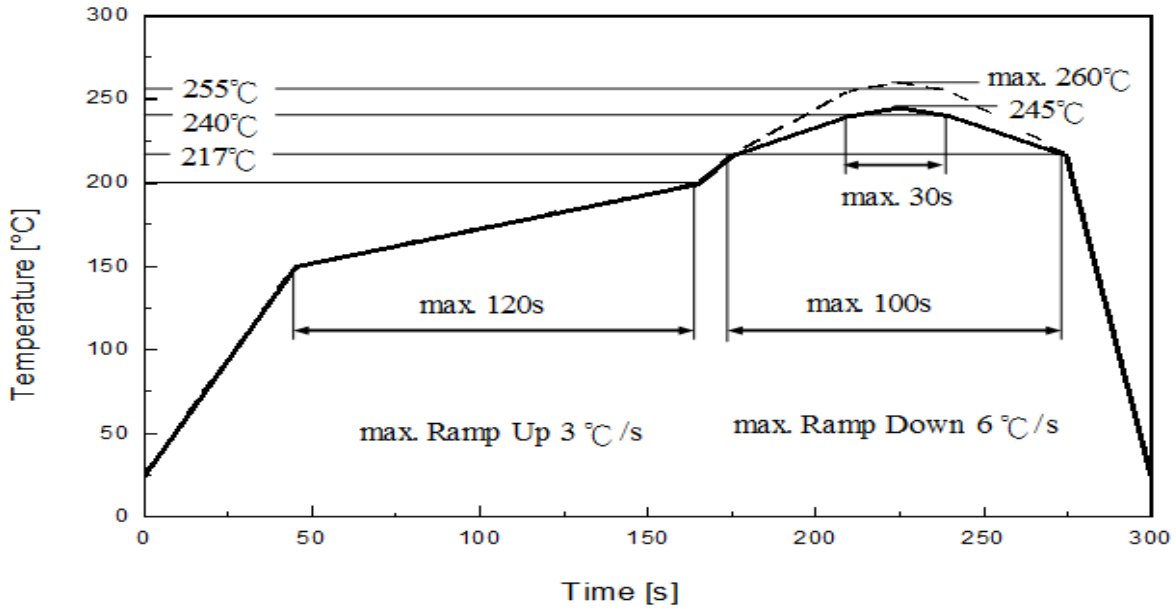



solder resist  solder stencil  (Unit : ㎜)


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# 9. Reflow Soldering Profile

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

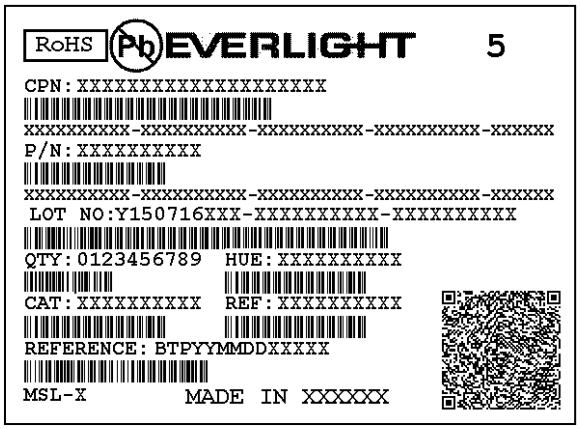



| Profile Feature | Pb-Free Assembly | Unit Einheit |
|---|---|---|
| Ramp-up rate to preheat25 °C to 150 °C | 3 | °C /sec |
| Time of soaking zone150 °C to 200 °C | 120 | sec |
| Ramp-up rate to peak | 3 | °C /sec |
| Liquidus temperature | 217 | °C |
| Time above liquidus temperature | 100 | sec |
| Peak temperature (max.) | 260 | °C |
| Time within 5°C of the specified peak temperature | 30 | sec |
| Ramp-down Rate (max.) | 6 | °C /sec |


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# 10. Packaging Information

## • Product Labeling




□CPN：Customer's Product Number

□P/N：Everlight Part Number

□LOT NO：Lot Number

□QTY：Packing Quantity

□HUE：Color Bin

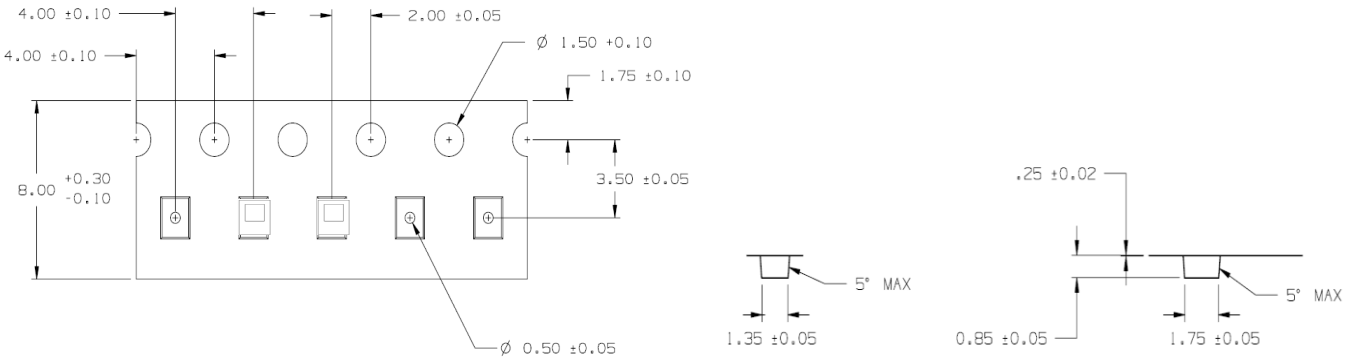
□CAT：Luminous Flux (Brightness) Bin

□REF：Forward Voltage Bin

## • Carrier Tape Dimensions as the following

**Reel: 1000pcs, MOQ≥ 100pcs (has to be a multiple of 100pcs)**

**Feed Direction**

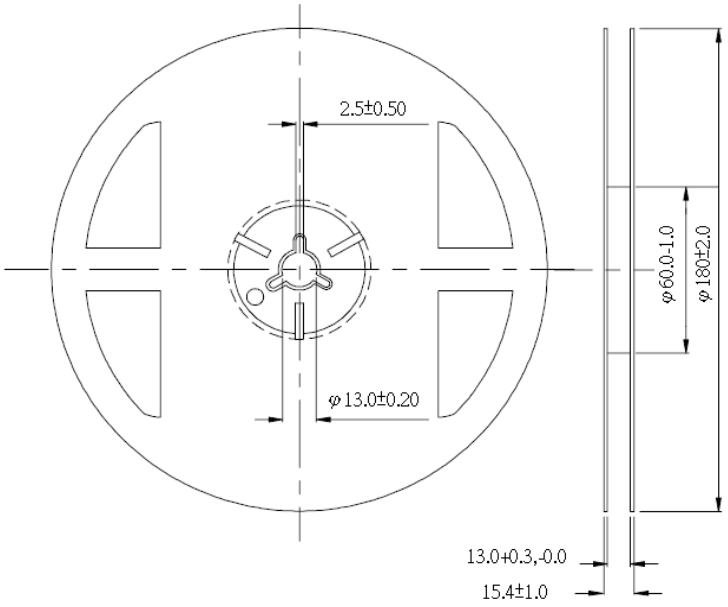



**Notes:**

1. Dimensions are in millimeters.


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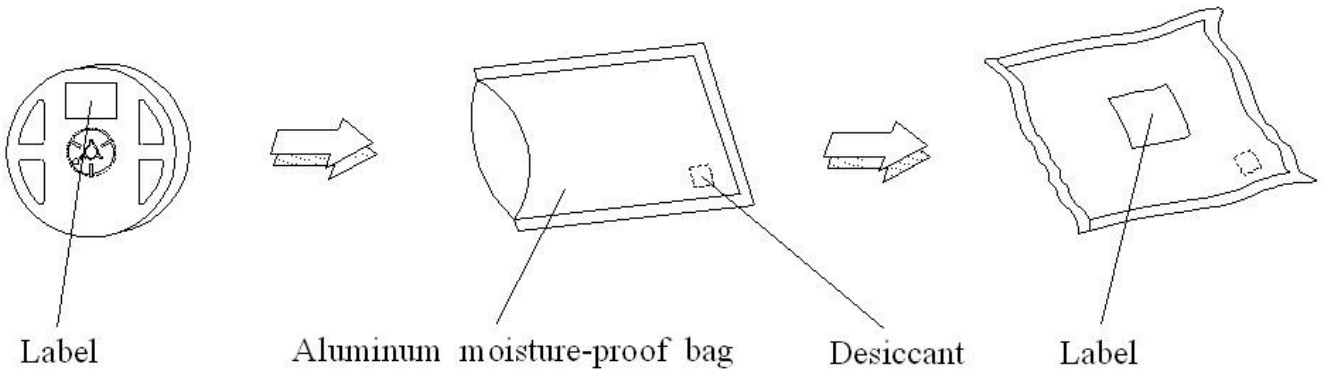
- **Reel Dimensions**




**Notes:**

Dimensions are in millimeters.

## Moisture Resistant Packing Process





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# 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℃ 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.


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# 12. Sulfur Test Criteria

| Products | Failure Criteria |
|---|---|
| Exterior Lighting products | Luminous Flux +/-20%, forward voltage +/-10%, color coordinates x,y +/-0.01, color wavelength +/- 2 nm<br>Visual defect issue following Everlight's inspection criteria |
| Interior lighting products | Luminous Flux +/-30% or +/-50% for some application, forward voltage +/-10%, color coordinates x,y +/-0.02, color wavelength +/- 2 nm<br>Visual defect issue following Everlight's inspection criteria |
| Grade of H2S and FMG test | Please refer to the table as below. As for discolor, please refer to the Frame blackening after Grade of H2S and FMG test defect under Everlight's inspection criteria |

| H2S test | Grade A0 | Grade A1 | Grade B0 | Grade B1 |
|---|---|---|---|---|
| Class A | Pass ΔIV, ΔColor, ΔVF criteria<br>No discoloration | Pass ΔIV, ΔColor, ΔVF criteria<br>Discoloration | | |
| Class B | | | Pass ΔIV, ΔColor, ΔVF criteria<br>No discoloration | Pass ΔIV, ΔColor, ΔVF criteria<br>Discoloration |

| Class for H2S Test & FMG | Description | |
|---|---|---|
| | H2S | FMG |
| Class A | 15 ppm with duration 336 h at 40 °C and 90% RH. | Duration 500 h at 25 °C and 75% RH.<br>H2S concentration: 10ppb<br>SO2 concentration: 200ppb<br>NO2 concentration: 200ppb<br>Cl2 concentration: 10ppb |
| Class B | 10 ppm with duration 500 h at 25 °C and 75% RH. | |

| Grade for H2S Test | Description |
|---|---|
| 0 | No discoloration |
| 1 | Discoloration |


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