

## APG0603VBC-A1-5MAV

0.65 x 0.35 x 0.2 mm SMD Chip LED Lamp

### DESCRIPTIONS

- The Blue source color devices are made with InGaN on Sapphire substrate Light Emitting Diode
- Electrostatic discharge and power surge could damage the LEDs
- It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs
- All devices, equipments and machineries must be electrically grounded

### FEATURES

- 0.65 mm x 0.35 mm SMD LED, 0.2 mm thickness
- Low power consumption
- Wide viewing angle
- Compatible with automatic placement equipment
- Package: 4000 pcs / reel
- Moisture sensitivity level: 2
- Halogen-free
- RoHS compliant

### APPLICATIONS

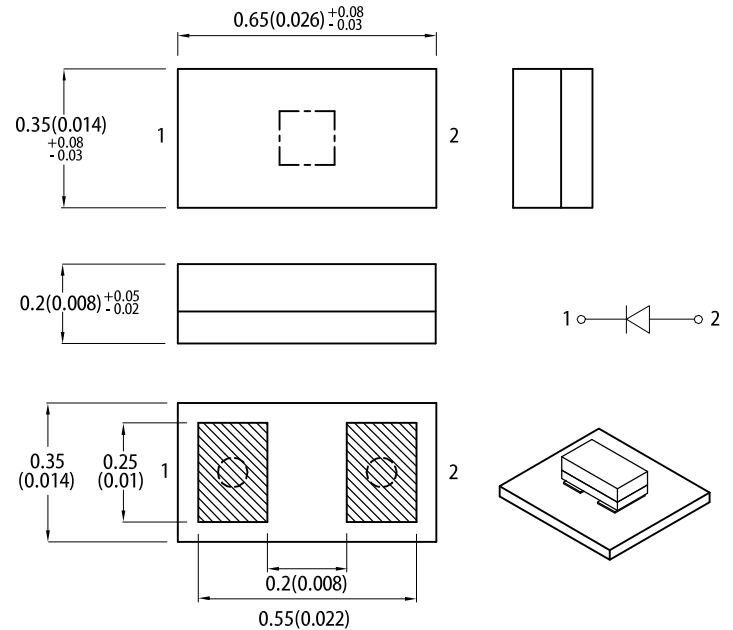
- Backlight
- Status indicator
- Home and smart appliances
- Wearable and portable devices
- Healthcare applications

### ATTENTION

Observe precautions for handling electrostatic discharge sensitive devices

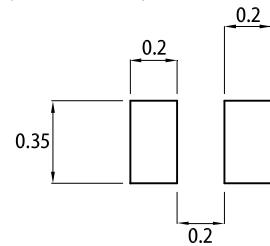


### PACKAGE DIMENSIONS



### RECOMMENDED SOLDERING PATTERN

(units : mm; tolerance : ± 0.1)



Mask open area ratio:80%  
Mask thickness:80~100um

#### Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.1(0.004") unless otherwise noted.
3. The specifications, characteristics and technical data described in the datasheet are subject to change without prior notice.
4. The device has a single mounting surface. The device must be mounted according to the specifications.

### SELECTION GUIDE

Part Number	Emitting Color (Material)	Lens Type	Iv (mcd) @ 5mA <sup>[2]</sup>		Viewing Angle <sup>[1]</sup>
			Min.	Typ.	2θ1/2
APG0603VBC-A1-5MAV	■ Blue (InGaN)	Water Clear	30	60	140°

Notes:  
 1. θ1/2 is the angle from optical centerline where the luminous intensity is 1/2 of the optical peak value.  
 2. Luminous intensity / luminous flux: +/-15%.  
 3. Luminous intensity value is traceable to CIE127-2007 standards.

ELECTRICAL / OPTICAL CHARACTERISTICS at  $T_A=25^\circ\text{C}$ 

Parameter	Symbol	Emitting Color	Value		Unit
			Typ.	Max.	
Wavelength at Peak Emission $I_F = 5\text{mA}$	$\lambda_{\text{peak}}$	Blue	463	-	nm
Dominant Wavelength $I_F = 5\text{mA}$	$\lambda_{\text{dom}}^{[1]}$	Blue	468	-	nm
Spectral Bandwidth at 50% $\Phi$ REL MAX $I_F = 5\text{mA}$	$\Delta\lambda$	Blue	25	-	nm
Forward Voltage $I_F = 5\text{mA}$	$V_F^{[2]}$	Blue	2.9	3.2	V
Reverse Current ( $V_R = 5\text{V}$ )	$I_R$	Blue	-	50	$\mu\text{A}$
Temperature Coefficient of $\lambda_{\text{peak}}$ $I_F = 5\text{mA}$ , $-10^\circ\text{C} \leq T \leq 85^\circ\text{C}$	$\text{TC}_{\lambda_{\text{peak}}}$	Blue	0.04	-	$\text{nm}/^\circ\text{C}$
Temperature Coefficient of $\lambda_{\text{dom}}$ $I_F = 5\text{mA}$ , $-10^\circ\text{C} \leq T \leq 85^\circ\text{C}$	$\text{TC}_{\lambda_{\text{dom}}}$	Blue	0.03	-	$\text{nm}/^\circ\text{C}$
Temperature Coefficient of $V_F$ $I_F = 5\text{mA}$ , $-10^\circ\text{C} \leq T \leq 85^\circ\text{C}$	$\text{TC}_V$	Blue	-3	-	$\text{mV}/^\circ\text{C}$

## Notes:

- The dominant wavelength ( $\lambda_d$ ) above is the setup value of the sorting machine. (Tolerance  $\lambda_d : \pm 1\text{nm}$ .)
- Forward voltage:  $\pm 0.1\text{V}$ .
- Wavelength value is traceable to CIE127-2007 standards.
- Excess driving current and / or operating temperature higher than recommended conditions may result in severe light degradation or premature failure.

ABSOLUTE MAXIMUM RATINGS at  $T_A=25^\circ\text{C}$ 

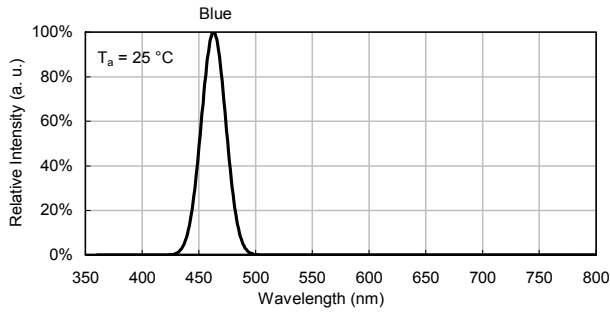
Parameter	Symbol	Value	Unit
Power Dissipation	$P_D$	16	mW
Reverse Voltage	$V_R$	5	V
Junction Temperature	$T_j$	115	$^\circ\text{C}$
Operating Temperature	$T_{\text{op}}$	-40 to +85	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to +85	$^\circ\text{C}$
DC Forward Current	$I_F$	5	mA
Peak Forward Current	$I_{\text{FM}}^{[1]}$	25	mA
Electrostatic Discharge Threshold (HBM)	-	250	V
Thermal Resistance (Junction / Ambient)	$R_{\text{th JA}}^{[2]}$	760	$^\circ\text{C}/\text{W}$
Thermal Resistance (Junction / Solder point)	$R_{\text{th JS}}^{[2]}$	640	$^\circ\text{C}/\text{W}$

## Notes:

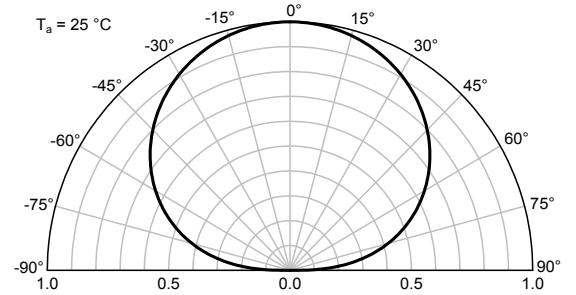
- 1/10 Duty Cycle, 0.1ms Pulse Width.
- $R_{\text{th JA}}$ ,  $R_{\text{th JS}}$  Results from mounting on PC board FR4 (pad size  $\geq 16\text{mm}^2$  per pad).
- Relative humidity levels maintained between 40% and 60% in production area are recommended to avoid the build-up of static electricity – Ref JEDEC/JESD625-A and JEDEC/J-STD-033.

### TECHNICAL DATA

#### RELATIVE INTENSITY vs. WAVELENGTH

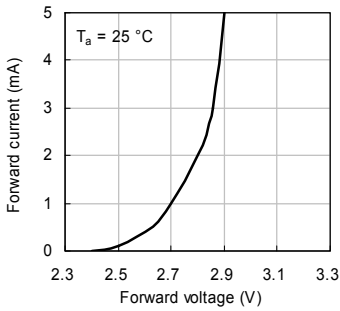


#### SPATIAL DISTRIBUTION

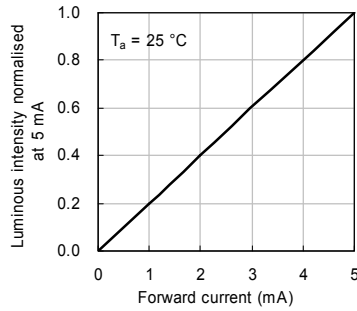


### BLUE

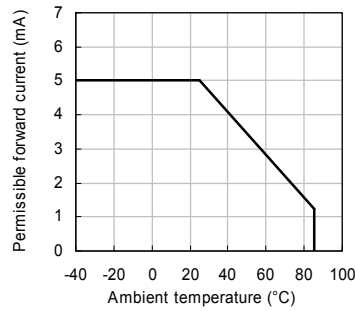
Forward Current vs. Forward Voltage



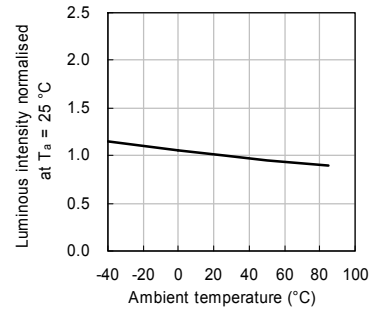
Luminous Intensity vs. Forward Current



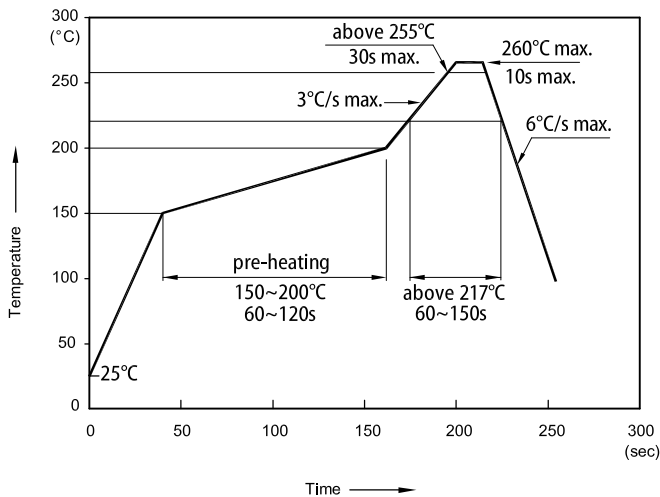
Forward Current Derating Curve



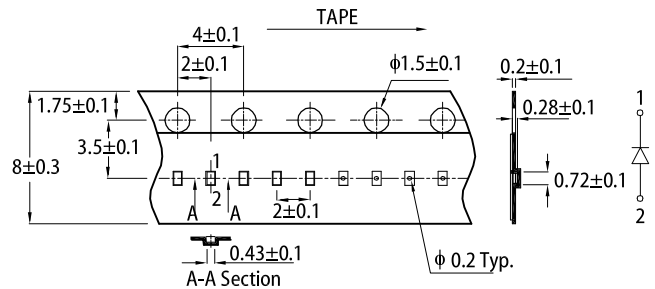
Luminous Intensity vs. Ambient Temperature



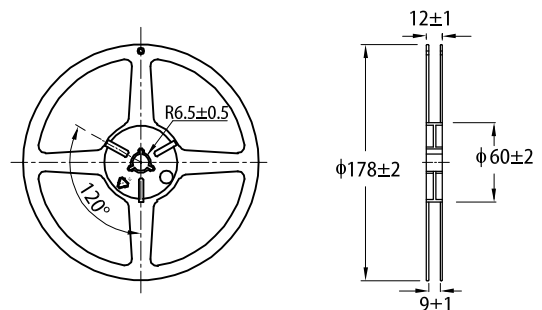
#### REFLOW SOLDERING PROFILE for LEAD-FREE SMD PROCESS



#### TAPE SPECIFICATIONS (units : mm)

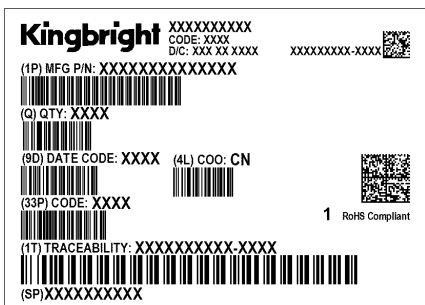
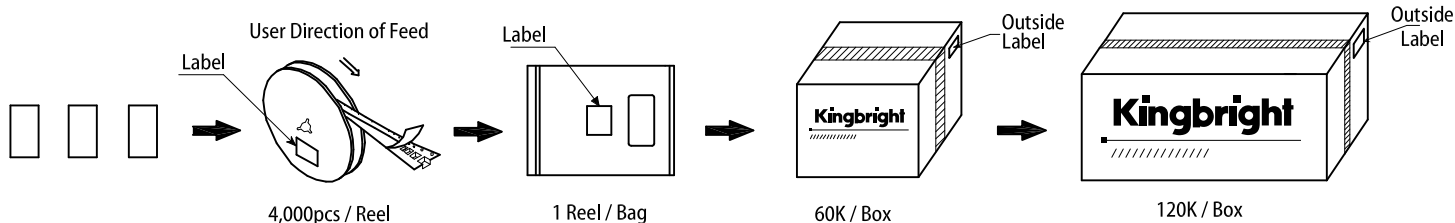


#### REEL DIMENSION (units : mm)



- Notes:
1. Don't cause stress to the LEDs while it is exposed to high temperature.
  2. The maximum number of reflow soldering passes is 2 times.
  3. Reflow soldering is recommended. Other soldering methods are not recommended as they might cause damage to the product.

### PACKING & LABEL SPECIFICATIONS



### RELIABILITY TEST ITEMS AND CONDITIONS

The reliability of products shall be satisfied with items listed below

**Lot Tolerance Percent Defective (LTPD) : 10%**

No.	Test Item	Standard	Test Conditions	Test Times / Cycles	Number of Damaged
1	Continuous operating test	EIAJ ED-4701/100 (101)	$T_a = 25^{\circ}\text{C}, \text{RH} < 75\%$ $I_F = \text{maximum rated current} *$	1,000 h	0 / 22
2	High temp. & humidity storage test	EIAJ ED-4701/100 (103)	$T_a = 60^{\circ}\text{C}, \text{RH} = 90\%$	1,000 h	0 / 22
3	Resistance to Soldering Heat (Reflow Soldering)	EIAJ ED-4701/300 (301)	$T_{\text{sld}} = 260^{\circ}\text{C}, 5 \text{ sec}$	2 times	0 / 22
4	Solderability (Reflow Soldering)	EIAJ ED-4701/300 (303)	$T_{\text{sld}} = 245^{\circ}\text{C}, 5 \text{ sec}$	1 time over 95%	0 / 22
5	Thermal shock test	EIAJ ED-4701/300 (307)	$T_a = -40^{\circ}\text{C}(15\text{min}) \sim 100^{\circ}\text{C}(15\text{min})$	100 cycles	0 / 22
6	Vibration test	EIAJ ED-4701/400 (403)	100 ~ 2000 ~ 100HZ Sweep 4 times. 200m/s <sup>2</sup> 3directions, 4cycles	48 min.	0 / 22
7	Drop	JIS C0044	H= 100 cm	3 cycles	0 / 22

Note: Refer to forward current vs. derating curve diagram.

**Criteria for Judging Damage**

Item	Symbol	Test Conditions	Failure Criteria
luminous Intensity	$I_V$	$I_F = 5\text{mA}$	Testing Min. Value < Spec. Min. Value x 0.5
Forward Voltage	$V_F$	$I_F = 5\text{mA}$	Testing Max. Value $\geq$ Spec. Max. Value x 1.2
Reverse Current	$I_R$	$V_R = \text{Maximum Rated Reverse Voltage}$	Testing Max. Value $\geq$ Spec. Max. Value x 2.5
High temp. storage test	-	-	Occurrence of notable decoloration, deformation and cracking

**PRECAUTIONARY NOTES**

1. The information included in this document reflects representative usage scenarios and is intended for technical reference only.
2. The part number, type, and specifications mentioned in this document are subject to future change and improvement without notice. Before production usage customer should refer to the latest datasheet for the updated specifications.
3. The customer should verify the product's performance and lifetime are suitable for the customer's specific operating conditions and requirements.
4. When using the products referenced in this document, please make sure the product is being operated within the environmental and electrical limits specified in the datasheet. If customer usage exceeds the specified limits, Kingbright will not be responsible for any subsequent issues.
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