



## APHB1608G2R2C-AMT

1.6 x 0.8 x 0.5 mm Bi-Color Surface Mount LED

### DESCRIPTIONS

- The Green source color devices are made with AlGaInP on GaAs substrate Light Emitting Diode
- The Hyper Red source color devices are made with AlGaInP on GaAs 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

- 1.6 x 0.8 mm SMD LED, 0.5 mm thickness
- Compatible with reflow soldering
- Available in various color combination
- Package: 2000 pcs / reel
- Moisture sensitivity level: 3
- Tinned pads for improved solderability
- Halogen-free
- RoHS compliant

### APPLICATIONS

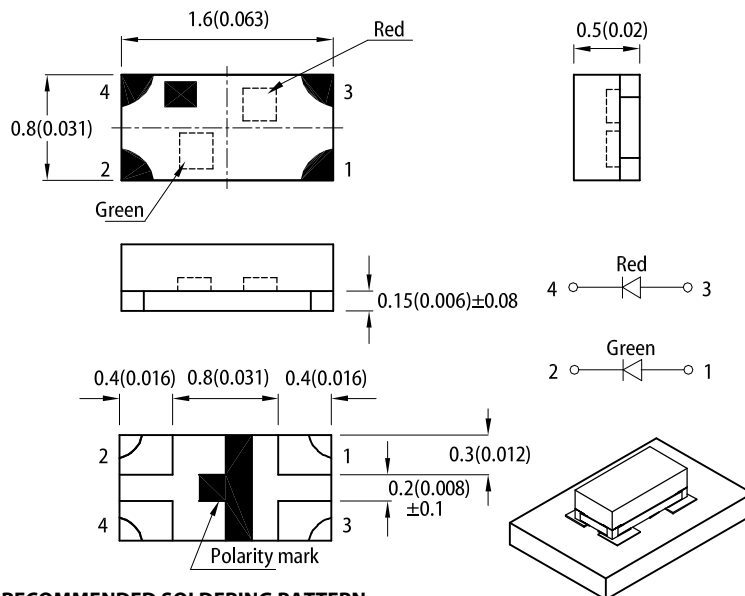
- Traffic signaling
- Backlighting (illuminated advertising , general lighting)
- Interior and exterior automotive lighting
- Substitution of micro incandescent lamps
- Reading lamps
- Signal and symbol luminaire for orientation
- Marker lights (e.g. Steps, exit ways, etc)
- Decorative and entertainment lighting
- Indoor and outdoor commercial and residential architectural lighting

### ATTENTION

Observe precautions for handling electrostatic discharge sensitive devices

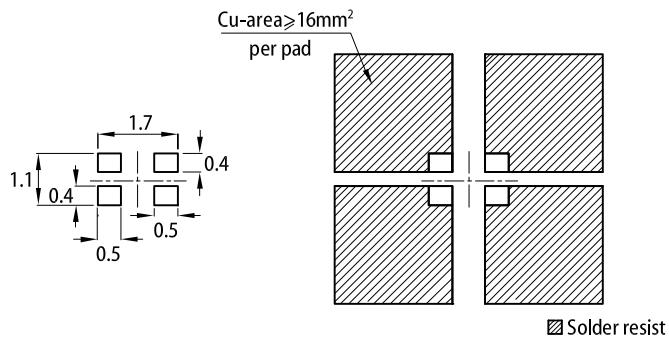


### PACKAGE DIMENSIONS



### RECOMMENDED SOLDERING PATTERN

(units : mm; tolerance : ± 0.1)



#### Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.15(0.006)$  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)	Iv (mcd) @ 20mA <sup>[2]</sup>			Lens Type	Viewing Angle <sup>[1]</sup>
		Code.	Min.	Max.		2θ1/2
APHB1608G2R2C-AMT	■ Green (AlGaInP)	F	20	40	Water Clear	130°
		G	40	55		
		H	55	80		
		*F	*20	*40		
		*G	*40	*55		
		*H	*55	*80		
	■ Hyper Red (AlGaInP)	N	120	200		
		P	200	300		
		Q	300	400		
		*G	*40	*55		
		*H	*55	*80		
		*M	*80	*120		

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%.  
 \* Luminous intensity value is traceable to CIE127-2007 standards.  
 3. LEDs will be provided from the listed bin codes. The bins delivered to the customer will be at Kingbright's discretion.

**ABSOLUTE MAXIMUM RATINGS at T<sub>A</sub>=25°C**

Parameter	Symbol	Value		Unit
		Green	Hyper Red	
Power Dissipation	P <sub>D</sub>	75	75	mW
Reverse Voltage	V <sub>R</sub>	5	5	V
Junction Temperature	T <sub>J</sub>	115	115	°C
Operating Temperature	T <sub>op</sub>	-40 to +100		°C
Storage Temperature	T <sub>stg</sub>	-40 to +115		°C
DC Forward Current	I <sub>F</sub>	30	30	mA
Peak Forward Current	I <sub>FM</sub> <sup>[1]</sup>	150	185	mA
Electrostatic Discharge Threshold (HBM)	-	3000	3000	V
Thermal Resistance (Junction / Ambient)	R <sub>th JA</sub> <sup>[2]</sup>	480	640	°C/W
Thermal Resistance (Junction / Solder point)	R <sub>th JS</sub> <sup>[2]</sup>	350	490	°C/W

Notes:  
 1. 1/10 Duty Cycle, 0.1ms Pulse Width.  
 2. R<sub>th JA</sub>, R<sub>th JS</sub> Results from mounting on PC board FR4 (pad size ≥ 16 mm<sup>2</sup> per pad).  
 3. 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.

### ELECTRICAL / OPTICAL CHARACTERISTICS at T<sub>A</sub>=25°C

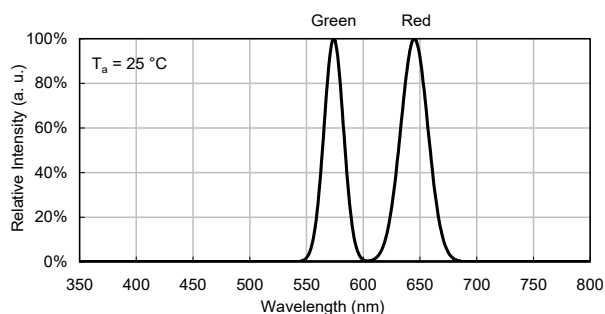
Parameter	Symbol	Emitting Color	Value				Unit
			Code.	Min.	Typ.	Max.	
Wavelength at Peak Emission I <sub>F</sub> = 20mA	λ <sub>peak</sub>	Green Hyper Red	-	-	574 645	-	nm
Dominant Wavelength I <sub>F</sub> = 20mA	λ <sub>dom</sub> [1]	Green	4	565	-	567	nm
			5	567	-	569	
			6	569	-	571	
			7	571	-	573	
		Hyper Red	-	620	-	640	
Spectral Bandwidth at 50% Φ REL MAX I <sub>F</sub> = 20mA	Δλ	Green Hyper Red	-	-	20 28	-	nm
Capacitance	C	Green Hyper Red	-	-	15 35	-	pF
Forward Voltage I <sub>F</sub> = 20mA	V <sub>F</sub> [2]	Green Hyper Red	-	-	2.1 1.95	2.5 2.5	V
Reverse Current (V <sub>R</sub> = 5V)	I <sub>R</sub>	Green Hyper Red	-	-	-	10 10	μA
Temperature Coefficient of λ <sub>peak</sub> I <sub>F</sub> = 20mA, -10°C ≤ T ≤ 100°C	TC <sub>λ<sub>peak</sub></sub>	Green Hyper Red	-	-	0.12 0.14	-	nm/°C
Temperature Coefficient of λ <sub>dom</sub> I <sub>F</sub> = 20mA, -10°C ≤ T ≤ 100°C	TC <sub>λ<sub>dom</sub></sub>	Green Hyper Red	-	-	0.08 0.05	-	nm/°C
Temperature Coefficient of V <sub>F</sub> I <sub>F</sub> = 20mA, -10°C ≤ T ≤ 100°C	TC <sub>V</sub>	Green Hyper Red	-	-	-1.9 -1.9	-	mV/°C

**Notes:**

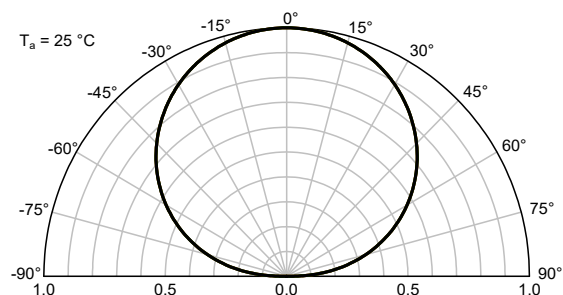
1. The dominant wavelength (λ<sub>d</sub>) above is the setup value of the sorting machine. (Tolerance λ<sub>d</sub> : ±1nm.)
2. Forward voltage: ±0.1V.
3. Wavelength value is traceable to CIE127-2007 standards.
4. Excess driving current and / or operating temperature higher than recommended conditions may result in severe light degradation or premature failure.
5. LEDs will be provided from the listed bin codes. The bins delivered to the customer will be at Kingbright's discretion.

## TECHNICAL DATA

### RELATIVE INTENSITY vs. WAVELENGTH

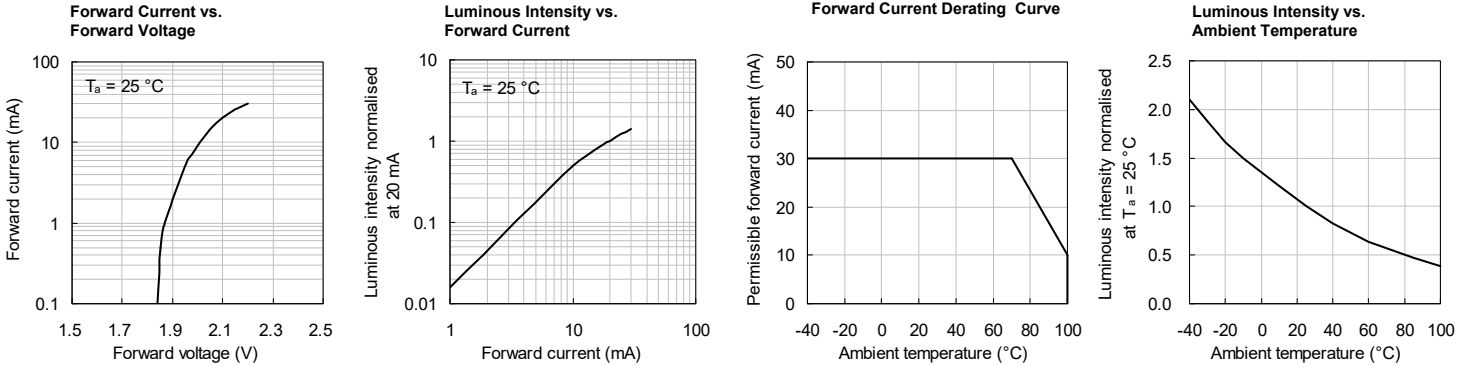


### SPATIAL DISTRIBUTION

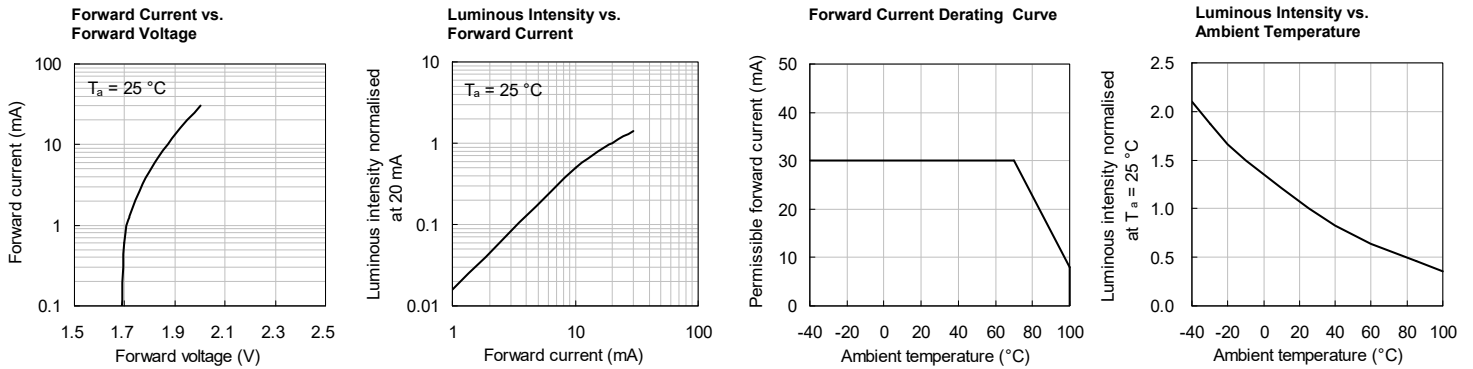


### TECHNICAL DATA

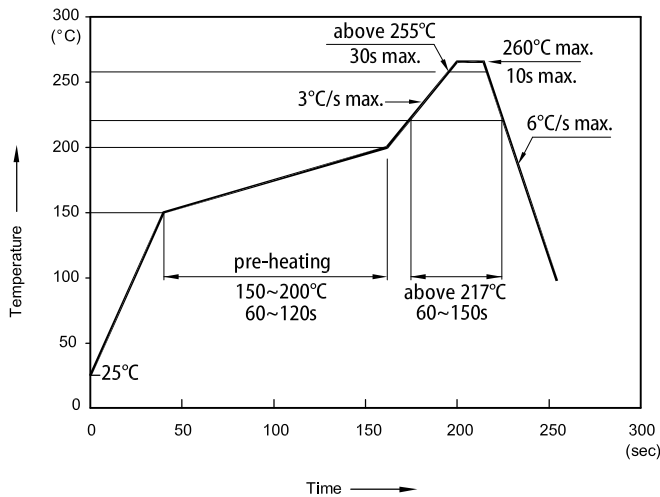
#### GREEN



#### HYPER RED

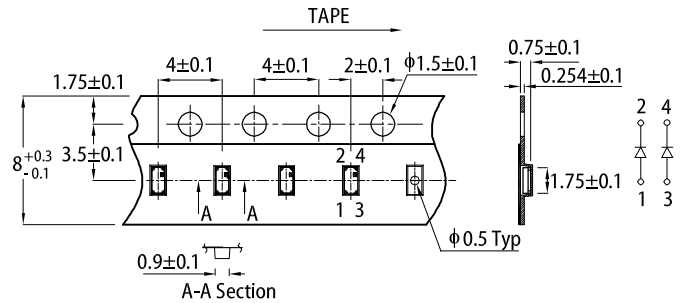


#### REFLOW SOLDERING PROFILE for LEAD-FREE SMD PROCESS

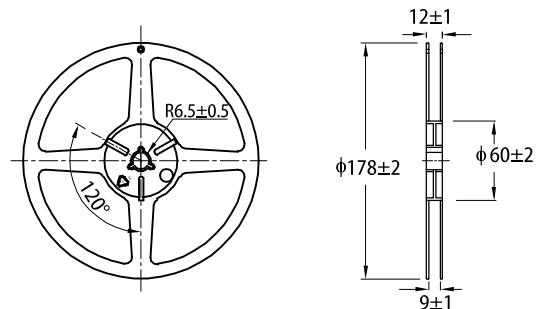


- Notes:
1. Don't cause stress to the LEDs while it is exposed to high temperature.
  2. The maximum number of reflow soldering passes is 2 times.
  3. Reflow soldering is recommended. Other soldering methods are not recommended as they might cause damage to the product.

#### TAPE SPECIFICATIONS (units : mm)



#### REEL DIMENSION (units : mm)



**RELIABILITY TEST ITEMS AND CONDITIONS**

The reliability of products shall be satisfied with items listed below

**LOT TOLERANCE PERCENT DEFECTIVE (LTPD) : 10%**

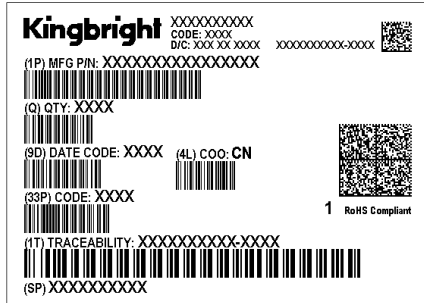
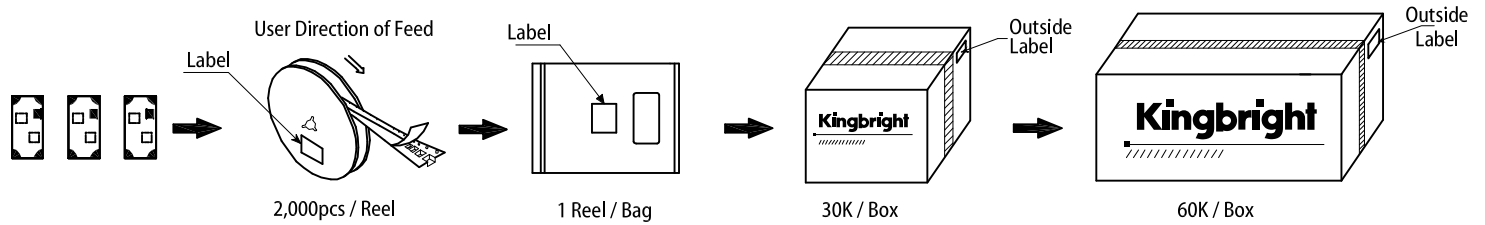
No.	Test Item	Standards	Test Condition	Test Times / Cycles	Number of Damaged
1	Continuous operating test	-	$T_a = 25^{\circ}\text{C}$ , $I_F =$ maximum rated current *	1,000 h	0 / 22
2	High Temp. operating test	EIAJ ED-4701/100(101)	$T_a = 100^{\circ}\text{C}$ , $I_F =$ maximum rated current *	1,000 h	0 / 22
3	Low Temp. operating test	-	$T_a = -40^{\circ}\text{C}$ , $I_F =$ maximum rated current *	1,000 h	0 / 22
4	High temp. storage test	EIAJ ED-4701/100(201)	$T_a =$ maximum rated storage temperature	1,000 h	0 / 22
5	Low temp. storage test	EIAJ ED-4701/100(202)	$T_a = -40^{\circ}\text{C}$	1,000 h	0 / 22
6	High temp. & humidity storage test	EIAJ ED-4701/100(103)	$T_a = 60^{\circ}\text{C}$ , RH = 90%	1,000 h	0 / 22
7	High temp. & humidity operating test	EIAJ ED-4701/100(102)	$T_a = 60^{\circ}\text{C}$ , RH = 90% $I_F =$ maximum rated current *	1,000 h	0 / 22
8	Soldering reliability test	EIAJ ED-4701/100(301)	Moisture soak: $30^{\circ}\text{C}$ , 70% RH, 72h Preheat: $150\sim 180^{\circ}\text{C}$ (120s max.) Soldering temp: $260^{\circ}\text{C}$ (10s)	2 times	0 / 18
9	Thermal shock operating test	-	$T_a = -40^{\circ}\text{C}$ (15min) ~ $100^{\circ}\text{C}$ (15min) $I_F =$ derated current at $100^{\circ}\text{C}$	1,000 cycles	0 / 22
10	Thermal shock test	-	$T_a = -40^{\circ}\text{C}$ (15min) ~ maximum rated Storage temperature(15min)	1,000 cycles	0 / 22
11	Electric Static Discharge (ESD)	EIAJ ED-4701/100(304)	$C = 100\text{pF}$ , $R_2 = 1.5\text{K}\Omega$ $V = 3000\text{V}$ (Green) $V = 3000\text{V}$ (Red)	Once each Polarity	0 / 22
12	Vibration test	-	$a = 196\text{m/s}^2$ , $f = 100\sim 2\text{KHz}$ , $t = 48\text{min}$ for all xyz axes	4 times	0 / 22

\*: Refer to forward current vs. derating curve diagram

**CRITERIA FOR JUDGING DAMAGE**

Items	Symbols	Conditions	Failure Criteria
luminous Intensity	$I_V$	$I_F = 20\text{mA}$	Testing Min. Value < Spec. Min. Value x 0.5
Forward Voltage	$V_F$	$I_F = 20\text{mA}$	Testing Max. Value $\geq$ Spec. Max. Value x 1.2
Reverse Current	$I_R$	$V_R =$ 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

### PACKING & LABEL SPECIFICATIONS



#### 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. 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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