

DATA SHEET

CITILED COB Series
HP Type

CLU550-3626C1

CITILED[®]
The Light Engine

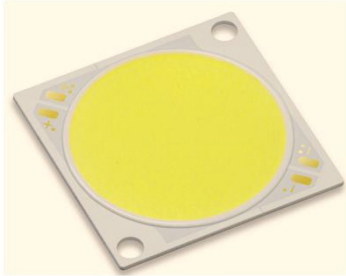
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CITIZEN ELECTRONICS CO., LTD.

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Product Nomenclature



CLU550 - 36 26 C1 - 27 3 M2 G2 - B24
[1] [2] [3] [4] [5]

[1]	Product shape	CLU550
[2]	Die count in series	36
[3]	Die count in parallel	26 (13 in parallel × 2channels)
[4]	Nominal CCT	2700K
[5]	CRI (Ra)	Min.80

1. Introduction

1-1. Product Description

CITIZEN ELECTRONICS is the first COB manufacture. Our advanced knowledge and packaging technology for many years has excellent reliability and high quality of our products. CITILED COB Series covers a wide range of luminous flux from a 10W incandescent bulb to a 500W sodium lamp in general lighting sources. The element arrangement of LED package is capable of utilizing light more effectively and higher performance.

The new version of CITILED COB series increase the performance significantly from previous version. New version creates more options to match luminaire's products design (ex. High performance , Cost effective , Small Light Emitting Surface(LES), Increased allowable max. If). Emitted light density of the LED package is improved higher for suitable use of light-condensing products. The outline and LES size is the same as for previous version. Thus existing parts of 3rd parties are compatible in mechanical characteristics. All of specs are at hot binning (Tj=85°C).

1-2. Features

- Mechanical Dimensions : 38.0×38.0×1.4 (mm)
- Package Structure : AluminumBase Chip on Board
- Reference Assembly : M3 screw , Connector
- CRI (Ra) : 80Min., 70Min.
- Nominal CCT : 2,700K, 3,000K, 3,500K, 4,000K, 5,000K ,5700K ,6,500K (CRI(Ra) 80Min.)
3,000K, 4,000K, 5,000K, 6,500K (CRI(Ra) 70Min.)
- Chromaticity Range : 3-step MacAdam Ellipse, the center refers to ANSI C78.377:2011. (CRI(Ra) 80Min.)
ANSI C78.377:2011. compliant (CRI(Ra) 70Min.)
- Thermal Resistance : 0.10C/W
- Maximum drive current : **4680mA (2340mA Max per channel)**
- RoHS compliant
- Better die arrangement for optics
- Wide range of luminous flux and high efficacy
- Improved lumen density compared with previous version
- UL recognized component (E358566)



2. Performance Characteristics

2-1. Electro Optical Characteristics (per Package)

(Tj=85C)

Product code	Nominal CCT	CRI		Luminous flux (lm)			Efficacy (lm/W)	Forward Current (mA)**	Voltage (V)			Thermal Resistance Rj-c (C/W)
		Ra	R9	Tj=85C		Tc=25C*			Min.	Typ.	Max.	
		Min.	Min.	Min.	Typ.	Typ.	Typ.					
CLU550-3626C1-273M2G2-B24	2700K	80	0	26,620	30,250	32,338	124	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-303M2G2-B24	3000K	80	0	27,896	31,700	33,888	130	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-353M2G2-B24	3500K	80	0	28,600	32,500	34,744	134	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-403M2G2-B24	4000K	80	0	29,172	33,150	35,439	136	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-503M2G2-B24	5000K	80	0	29,744	33,800	36,133	139	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-573M2G2-B24	5700K	80	0	30,008	34,100	36,454	140	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-653M2G2-B24	6500K	80	0	30,272	34,400	36,775	141	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-30AL7G4-B24	3000K	70	-	29,832	33,900	36,240	139	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-40AL7G4-B24	4000K	70	-	31,240	35,500	37,951	146	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-50AL7G4-B24	5000K	70	-	31,680	36,000	38,485	148	2,340	95.5	103.9	112.3	0.10
CLU550-3626C1-65AL7G4-B24	6500K	70	-	32,252	36,650	39,180	151	2,340	95.5	103.9	112.3	0.10

Notes :

1. Citizen Electronics maintains forward voltage +/-3%, luminous flux +/-10%, Ra and R9 +/-1.

*Values of Luminous flux at Tc=25C are provided as reference only.

** 1170mA per channel

2-2. Absolute Maximum Ratings

Absolute Maximum Ratings

Parameter	Symbol	Rating			
		Channel 1	Channel 2	Package	
Input Power (W)	Pi	298	298	595	*1*2
Forward Current (mA)	If	2340	2340	4680	*1*2
Reverse Current (mA)	Ir	1	1	1	*2
Operating Temperature (C)	Top	-40 ~ +100			
Storage Temperature (C)	Tst	-40 ~ +100			
Case Temperature (C)	Tc	105			*3
Junction Temperature (C)	Tj	140			*4

*1. Input power and forward current are the values per LED package when the LED is used within the range of the derating curve in this data sheet and the same amount of current is applied to each channel

*2. At the time of power input to two channels

*3. Refer to 4. Outline drawing for Tc measurement point.

*4. D.C. Current : $T_j = T_c + R_{j-c} \times P_i$

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2-3. Chromaticity Characteristics

(Rated current, Tj=85C)

Color Region	Nominal CCT	Center Point (x, y)	Oval parameter		
			Major Axis a	Minor Axis b	Ellipse Rotation Angle θ
3-step MacAdam ellipse	2700K	(0.4577, 0.4098)	0.00774	0.00411	57.28
	3000K	(0.4339, 0.4032)	0.00834	0.00408	53.17
	3500K	(0.4078, 0.3929)	0.00951	0.00417	52.97
	4000K	(0.3818, 0.3796)	0.00939	0.00402	54.00
	5000K	(0.3446, 0.3551)	0.00822	0.00354	59.62
	5700K	(0.3287, 0.3417)	0.00760	0.00296	59.46
	6500K	(0.3123, 0.3283)	0.00669	0.00285	58.38

Color Region	Nominal CCT	Center Point (x, y)	ANSI parameter							
			a (x, y)		b (x, y)		c (x, y)		d (x, y)	
ANSI C78. 377:2011	3000K	(0.4339, 0.4032)	0.4561	0.4259	0.4302	0.4171	0.4149	0.3820	0.4373	0.3892
	4000K	(0.3818, 0.3796)	0.4003	0.4034	0.3737	0.3879	0.3671	0.3583	0.3895	0.3708
	5000K	(0.3446, 0.3551)	0.3550	0.3752	0.3375	0.3619	0.3366	0.3372	0.3514	0.3480
	6500K	(0.3123, 0.3283)	0.3205	0.3375	0.3027	0.3205	0.3067	0.3221	0.3221	0.3366

* Color region stay within MacAdam 3-step ellipse from the chromaticity center.

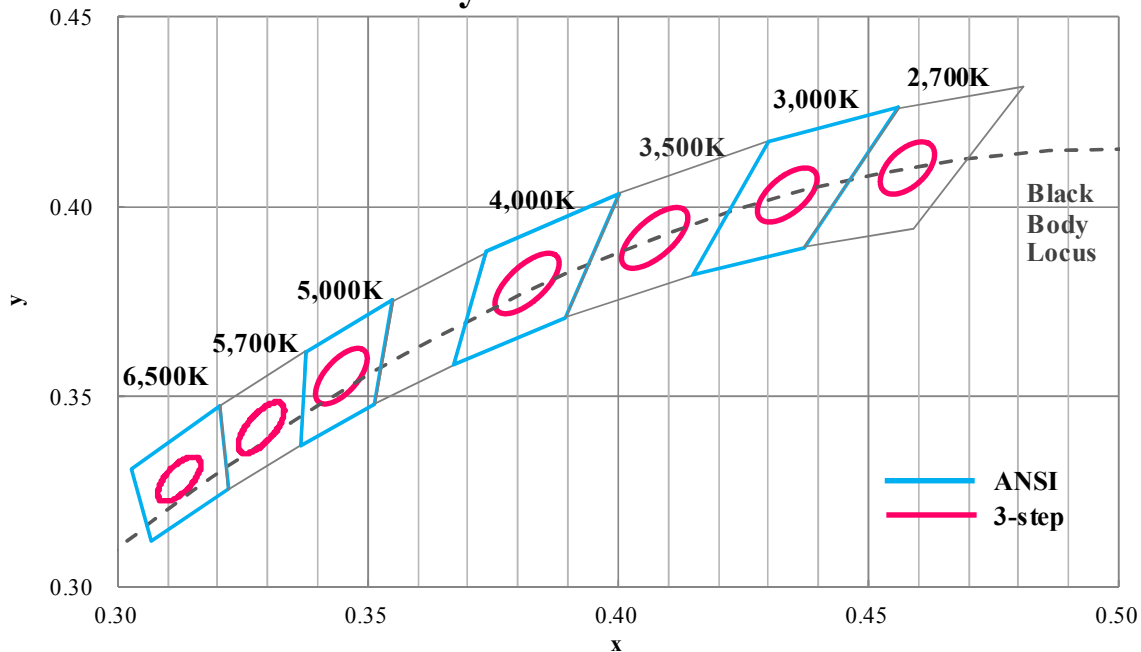
* The chromaticity center refers to ANSI C78.377:2011.

Please refer to ANSI C78. 377 for the chromaticity center.

* θ is the angle between the major axis of the ellipse and the x-axis, and a and b are the major and minor semi-axes of an ellipse.

(Ref. IEC 60081:1997 AnnexD)

x-y chart CIE1931



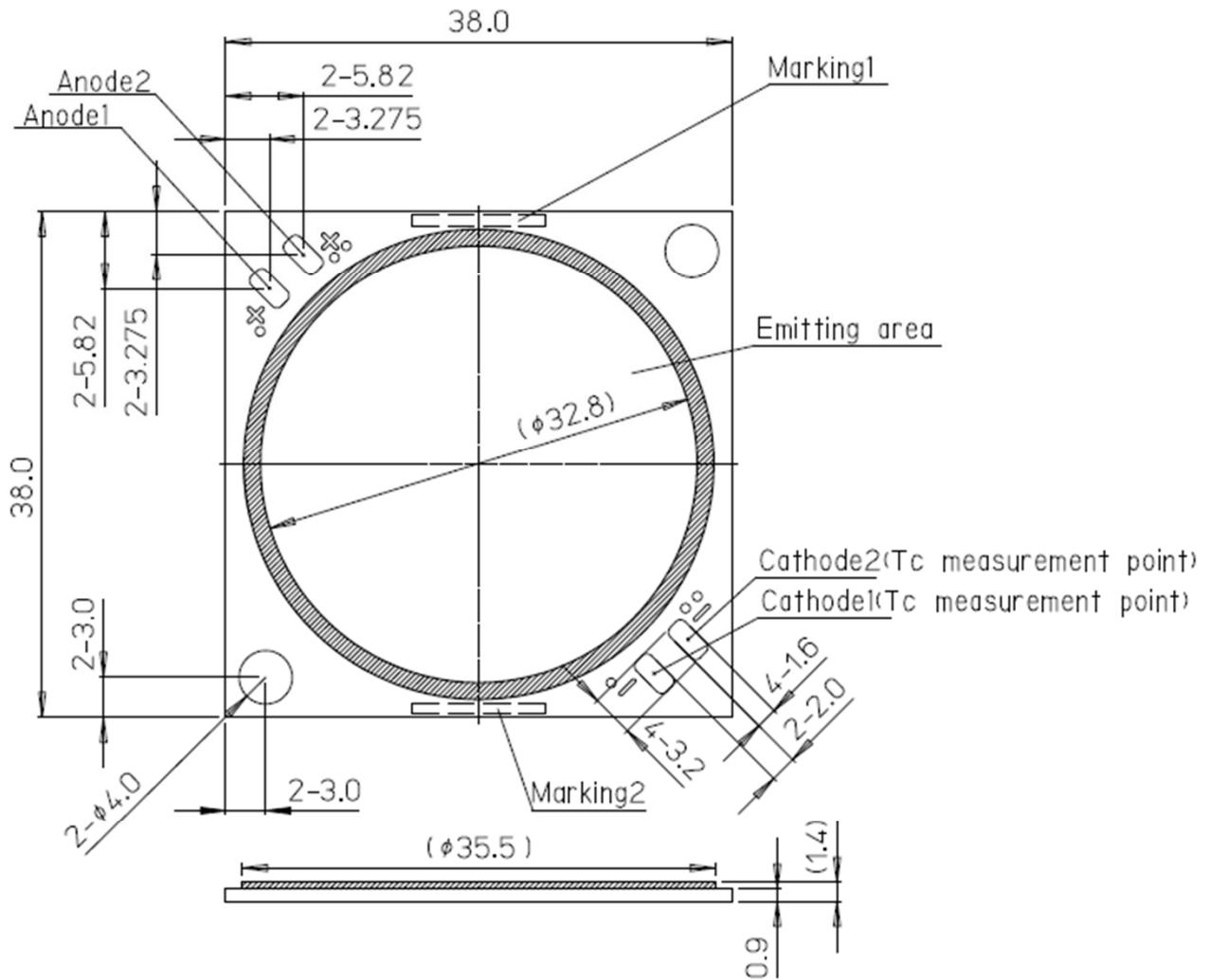
Note : Citizen Electronics maintains chromaticity (x, y) +/-0.005

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3. Mechanical Dimensions

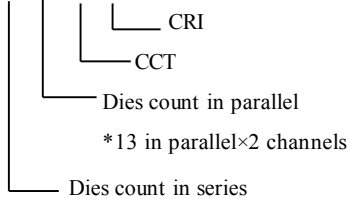
Unit : mm

Tolerances unless otherwise specified : +/-0.3

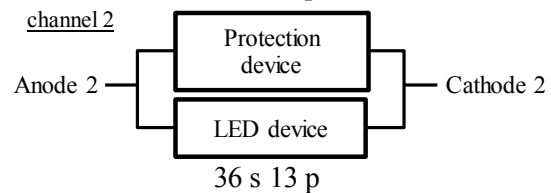
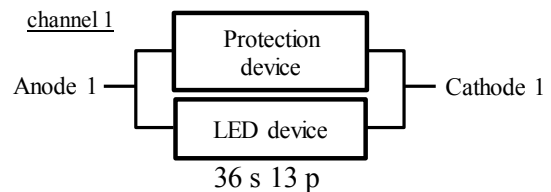


Marking 1 : Serial No.

Marking 2 : C 36 26 ** **



• Internal Circuit
channel 1

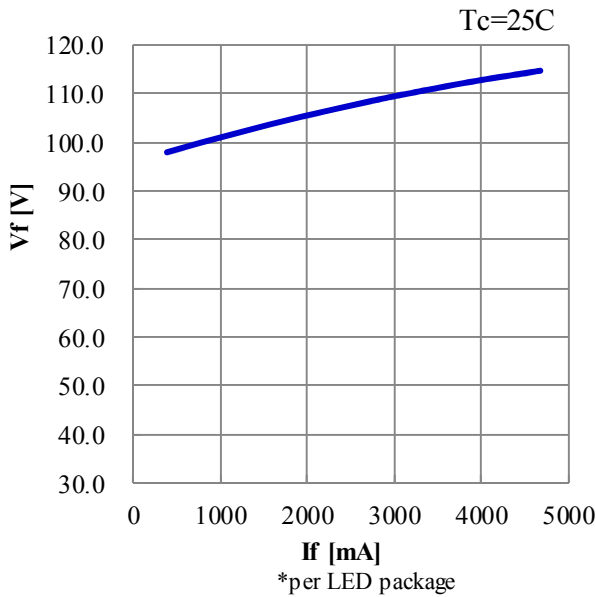


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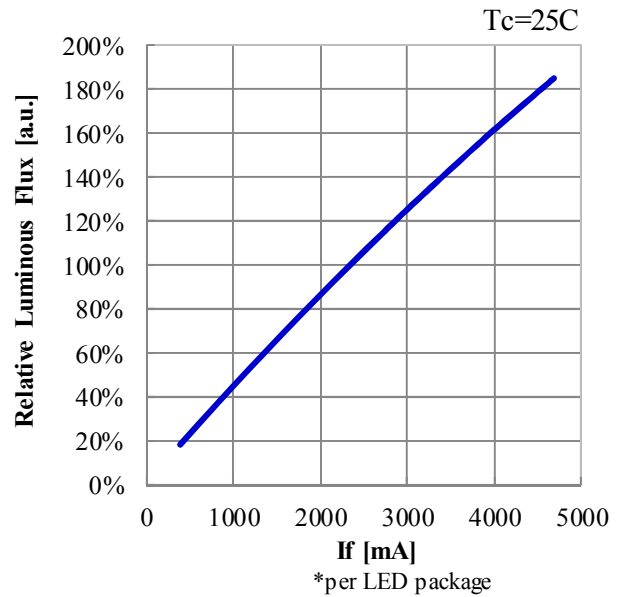
4. Characteristic Curves

4-1. Forward Current Characteristics / Temperature Characteristics

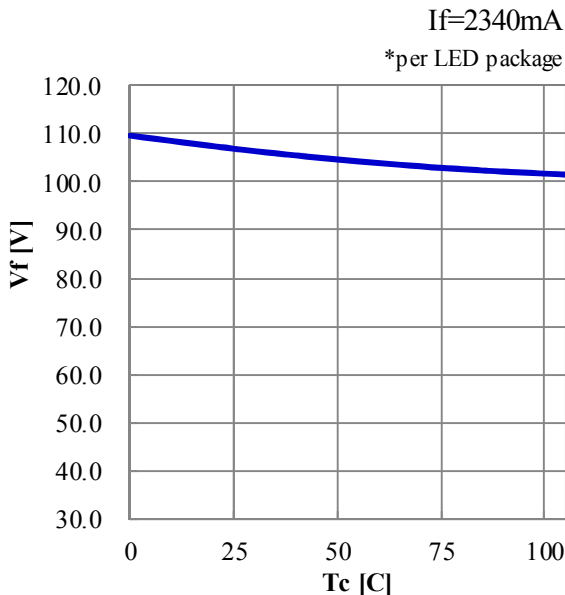
Forward Current vs. Forward Voltage



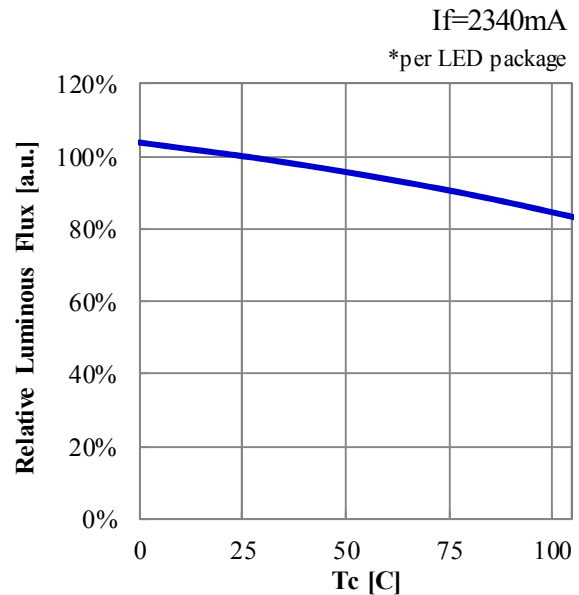
Forward Current vs. Relative Luminous Flux



Case Temperature vs. Forward Voltage



Case Temperature vs. Relative Luminous Flux

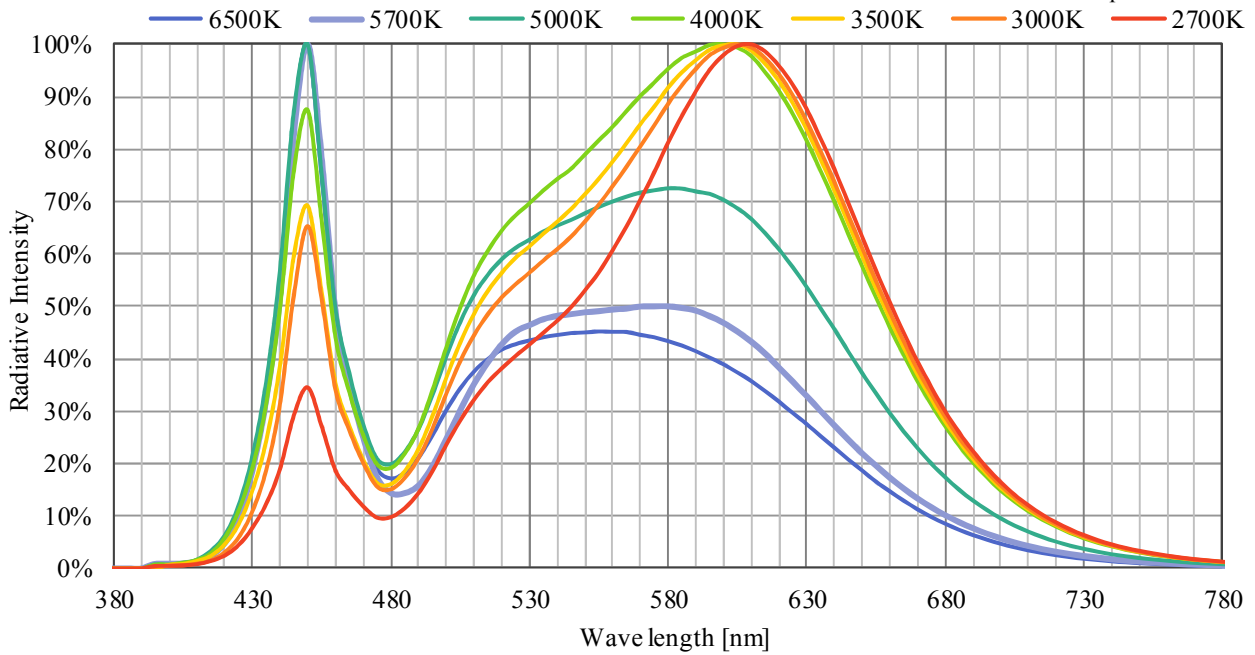


4-2. Optical Characteristics

Spectrum : CRI(Ra) 80Min.

$T_j=85^\circ\text{C}$ $I_f=2340\text{mA}$

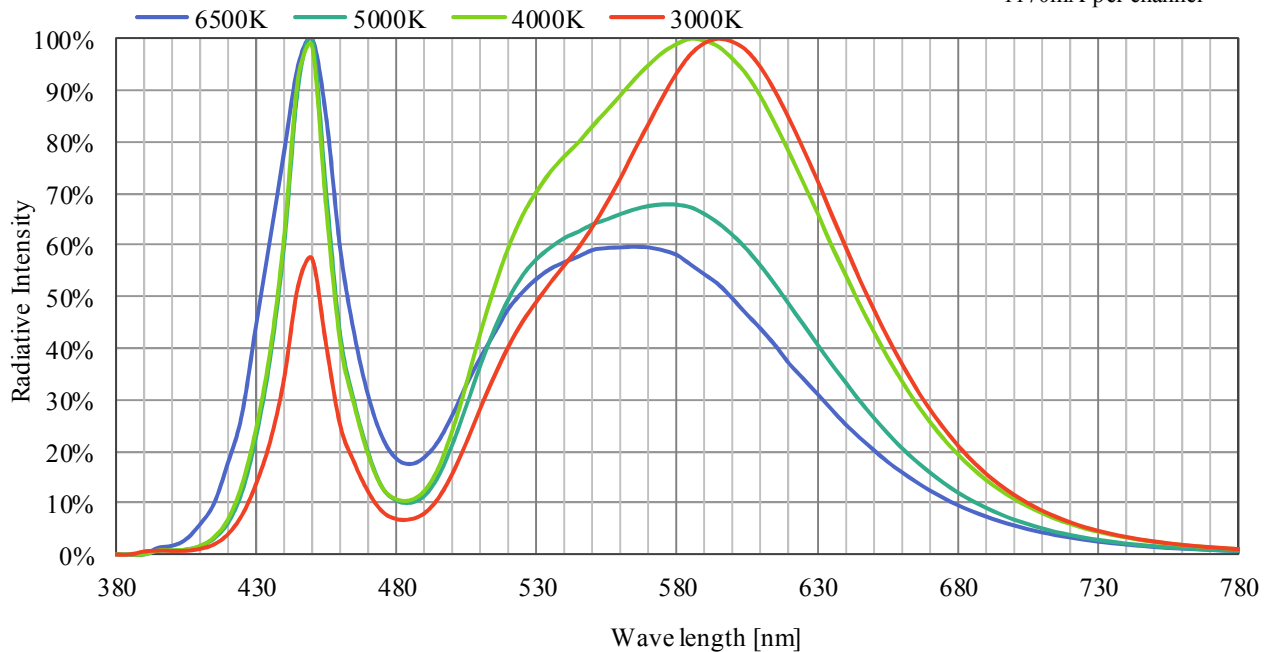
*1170mA per channel



Spectrum : CRI(Ra) 70Min.

$T_j=85^\circ\text{C}$ $I_f=2340\text{mA}$

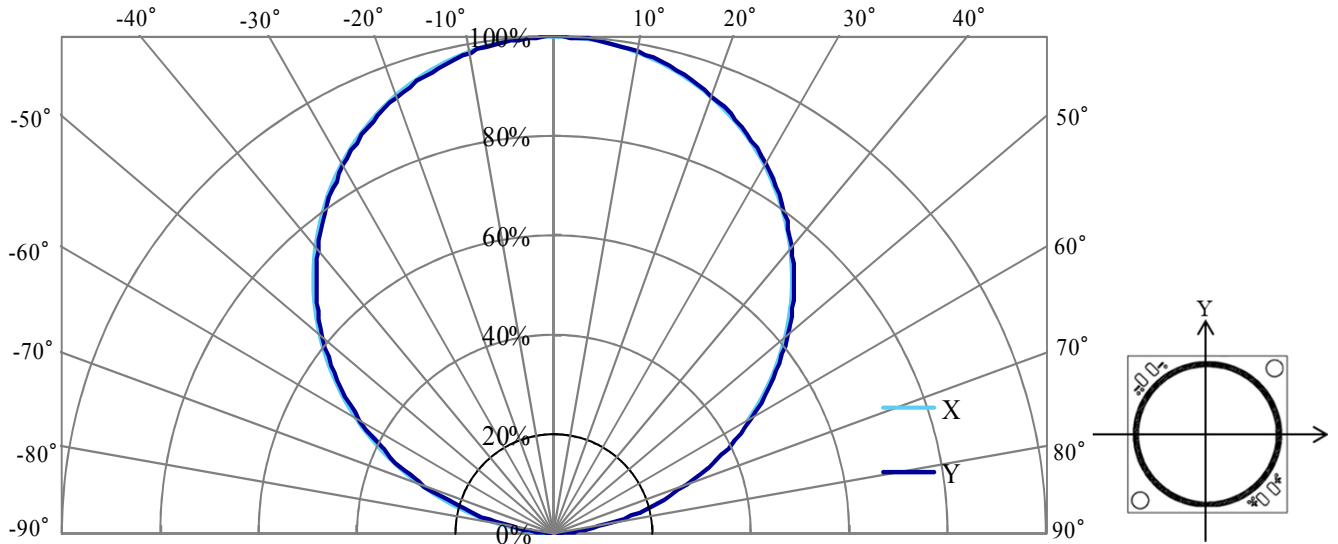
*1170mA per channel



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4-2. Optical Characteristics (continued)

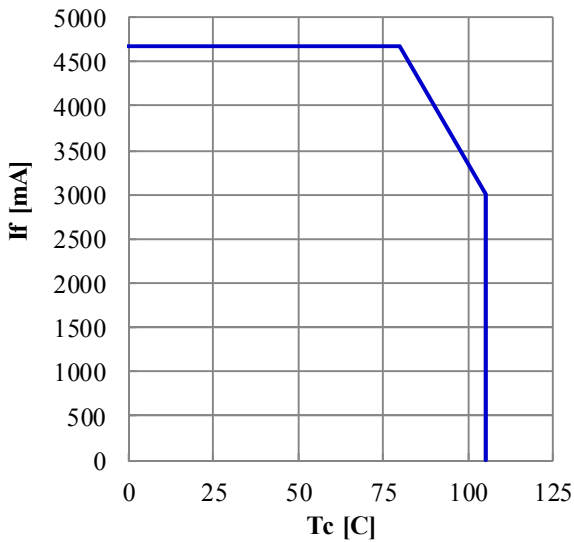
Radiation Characteristic



4-3. Derating Characteristics

Case Temperature

vs. Allowable Forward Current



5. Reliability

5-1. Reliability Test

Test Item	Test Condition
Continuous Operation Test	IF=2340mA* Tc=25C (with Al-fin) ×1000hrs
	IF=2340mA* Tj=140C (with Al-fin) ×1000hrs
Low Temperature Storage Test	-40 C × 1000 hours
High Temperature Storage Test	100 C × 1000 hours
Moisture-proof Test	85 C, 85 %RH for 500 hours
Thermal Shock Test	-40 C × 30 minutes – 100 C × 30 minutes, 100 cycle

※1170mA per channel

5-2. Failure Criteria

(Tc=25C)

Measuring Item	Symbol	Measuring Condition	Failure Criteria
Forward Voltage	Vf	If=2340mA*	>U × 1.1
Total Luminous Flux	Φv	If=2340mA*	<S × 0.85

※1170mA per channel

U defines the upper limit of the specified characteristics. S defines the initial value.

Note : Measurement shall be taken between 2 hours and 24 hours, and the test pieces should be return to the normal ambient conditions after the completion of each test.

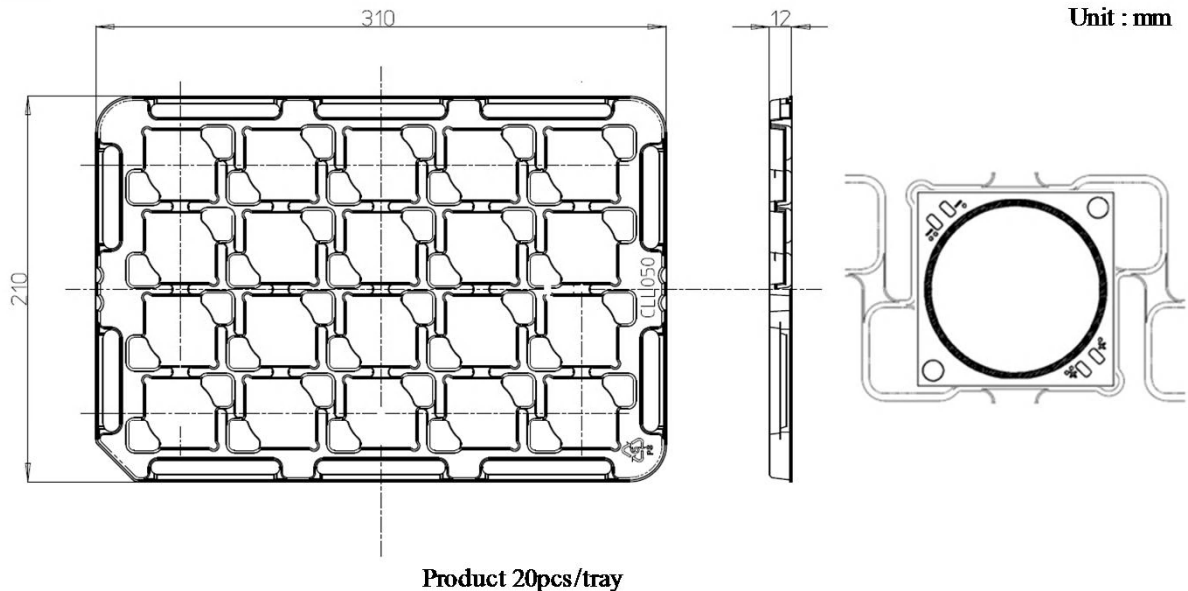
6. Packing Specification

6-1. Packing




An empty tray is placed on top of a 2-tier tray which contain 20 pieces each.
(Smallest packing unit: 40 pieces)

A label with product name, quantity and lot number is placed on the upper empty tray.

Tray (Dimensions: 310 x 210 x 12 mm / Materials: Electrically conductive PS)



Example of indication label

CUSTOMER	
TYPE	: CLU***_*****_***** --- (1)
P.NO	: ***** --- (2)
Lot No	: ***** --- (3)
Q'ty	: *** --- (4)
  	

1. TYPE e.g. CLU550-3626C1

2. P.No. (Customer's P/N)

3. Lot No.

e.g. 1 5 5 5 0 0 1
(1) (2) (3)

(1) Last two digit of the year 15 : year 2015

(2) Production month 5 : May

Note: October, November and December are designated X,Y and Z.

(3) CE's control number

4. Quantity

7. Precaution

7-1. Handling with care for this product

- Both the light emitting area and white rim around the light emitting area is composed of resin materials. Please avoid the resin area from being pressed, stressed, rubbed, come into contact with sharp metal nail (e.g. edge of reflector part) because the function, performance and reliability of this product are negatively impacted.
- Please be aware that this product should not come into contact with any other parts while incorporating in your lighting apparatus or your other products.
- Please be aware that careful handling is required after the attachment of lead wires to prevent the application of any load to the connections.
- For more information, please refer to application note "Instruction Manual(COB LED Package)".

7-2. Countermeasure against static electricity

- Handling of this product needs countermeasures against static electricity because this is a semiconductor product.
- Please take adequate measures to prevent any static electricity being produced such as the wearing of a wristband or anti-static gloves when handling this product.
- Every manufacturing facility in regard to the product (plant, equipment, machine, carrier machine and conveyance unit) should be connected to ground and please avoid the product to be electric-charged.
- ESD sensitivity of this product is over 1000V (HBM, based on JEITA ED-4701/304).
- After assembling the LEDs into your final product(s), it is recommended to check whether the assembled LEDs are damaged by static electricity (electrical leak phenomenon) or not.
- It is easy to find static damaged LED dies by a light-on test with the minimum current value.

7-3. Caution of product assembly

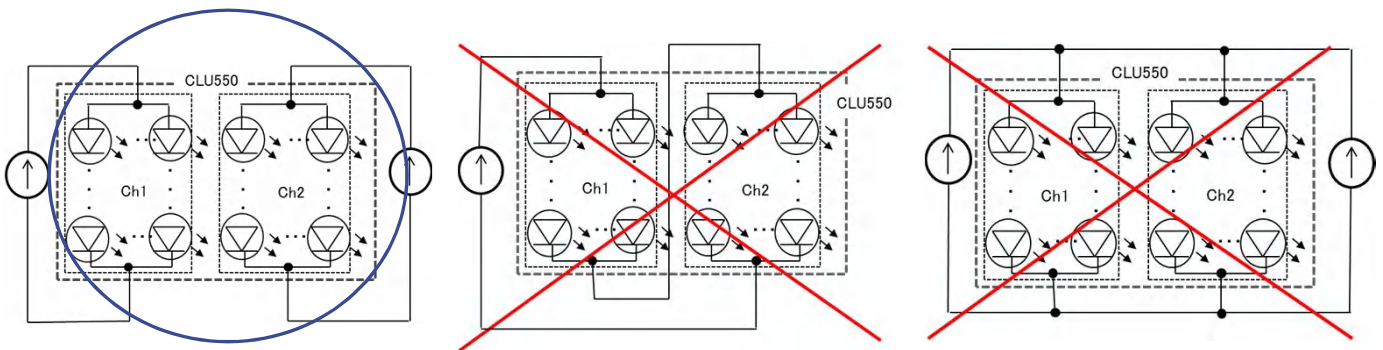
- Regarding this product assembling on the heat sink, it is recommended to use a connector. In cases where M3 screw is used, it might be good for screw tightening on the heat sink to do temporary tightening and final tightening with tightening torque of 0.4N·m. In addition, please don't press with excess stress on the product.
- The condition of the product assembling on the heat sink and the control of screw tightening torque needs to be optimized according to the specification of the heat sink.
- Roughness, unevenness and burr of surface negatively impact thermal bonding between the product and heat sink and increase heat thermal resistance between them. Confidence of thermally and mechanical coupling between the product and heat sink are confirmed by checking the mounting surface and measuring the case temperature of the product.
- In order to reduce the thermal resistance at assembly, it might be good to use grease as TIM (Thermal Interface Material) on the whole contact surface of the product. In case of using thermal grease for the TIM, it might be good to apply uniformly on the contact surface of the product. In case of using thermal sheet for the TIM, it might be good to make sure that the product is NOT strained by stress when the screws are tightened for assembly.
- For more information, please refer to application note "Instruction Manual(COB LED Package)".

7-4. Thermal Design

- The thermal design to draw heat away from the LED junction is most critical parameter for an LED illumination system. High operating temperatures at the LED junction adversely affect the performance of LED's light output and lifetime. Therefore the LED junction temperature should not exceed the absolute maximum rating in LED illumination system.
- Please be aware that this product should be used not to exceed the Tc limit.
- The LED junction temperature while operation of LED illumination system depends upon thermal resistance of internal LED package (Rj-c), outer thermal resistances of LED package, power loss and ambient temperature. Please take both of the thermal design specifications and ambient temperature conditions into consideration for the setting of driving conditions.
- For more information, please refer to application note "Thermal Management", "Instruction Manual(COB LED Package)".

7-5. Driving Current

- A constant current is recommended as an applying driving current to this product.
In the case of constant voltage driving, please connect current-limiting resistor to each products in series and control the driving current to keep under the absolute maximum rating forward current value.
- This package shall be allowed for use only when each channel independently operates with one power source for one channel. Neither series nor parallel connection that connects the two channels is allowed in the package.
- When different amount of current is applied to each channel, it is recommended that such difference is kept 10% or smaller. However, some brightness variation can be produced between two channels even if the difference in current between channels is 10% or smaller. For this reason, please conduct a sufficient verification using an apparatus.
- Electrical transient might apply excess voltage, excess current and reverse voltage to the product(s). They also affect negative impact on the product(s) therefore please make sure that no excess voltage, no excess current and no reverse voltage is applied to the product(s) when the LED driver is turn-on and/or turn-off.
- If you desire to connect a driver in the series connection, it is required to contact a driver manufacturer beforehand to check whether such a usage is acceptable. Also, please conduct a sufficient verification using an apparatus. Please be aware that this product can be in excess of the working voltage range specified in the UL standard.
- For more information, please refer to application note "Driving", "Instruction Manual(COB LED Package)".



7-6. Lighting at a minimum current value

- In a case where the minimum current(IF min) is applied to the product, some of LED dice in the product might look different in their brightness due to the individual difference of the LED dice, and they are not failed.

7-7. Electrical Safety

- This product is designed and produced according to IEC 62031:2008 (IEC 62031:2008 LED modules for general lighting. Safety specification)
- Dielectric voltage withstand test has been conducted on this product to see any failure after applying voltage between active pads and aluminum section of the product, and to pass at least 500V.
- Considering conformity assessment for IEC62031:2008, almost all items of the specification depend upon your final product of LED illumination system.
Therefore, please confirm with your final product for electrical safety of your product.
As well, the products comply with the criteria of IEC62031:2008 as single LED package.

7-8. Recommended soldering Condition (This product is not adaptable to reflow process.)

- For manual soldering
Please use lead-free soldering.
Soldering shall be implemented using a soldering bit at a temperature lower than 350C, and shall be finished within 3.5 seconds for one land.
No external force shall be applied to resin part while soldering is implemented.
Next process of soldering should be carried out after the product has return to ambient temperature.
Contacts number of soldering bit should be within twice for each terminal.
- Care should be taken to prevent solder from being spread across the electrodes of two channels.
* Citizen Electronics cannot guarantee if usage exceeds these recommended conditions.
Please use it after sufficient verification is carried out on your own risk if absolutely necessary.
- For more information, please refer to application note "Instruction Manual(COB LED Package)".

7-9. Eye Safety

- The International Electrical Commission (IEC) published in 2006 IEC 62471 "2006 Photobiological safety of lamps and lamp systems" which includes LEDs within its scope.
When sorting single LEDs according to IEC 62471, almost all white LEDs can be classified as belonging to either Exempt Group (no hazard) or Risk Group 1 (low risk).
- However, Optical characteristics of LEDs such as radiant flux, spectrum and light distribution are factors that affect the risk group determination of the LED, and especially a high-power LED, that emits light containing blue wavelengths,
might have properties equivalent to those of Risk Group 2 (moderate risk).
- Great care should be taken when directly viewing an LED that is driven at high current, has multiple uses as a module or when focusing the light with optical instruments, as these actions might greatly increase the hazard to your eyes.
- It is recommended to regard the evaluation of stand-alone LED packages as a reference and to evaluate your final product.

7-10. This product is not designed for usage under the following conditions.

If the product might be used under the following conditions, you shall evaluate its effect and appropriate them. In places where the product might:

- directly and indirectly get wet due to rain and/or at place with the fear.
- be damage by seawater and/or at place with the fear
- be exposed to corrosive gas (such as Cl₂, H₂S, NH₃, SO_x, NO_x and so on) and/or at place with the fear.
- be exposed to dust, fluid or oil and/or at place with the fear.

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