1. Scope of Application
This data sheet is applied to the LED package, model CL-L400-MC1N1-A.

2. Part code

$$\underbrace{\text{CL - L400}}_{[1]} \text{ - } \underbrace{\text{M}}_{[2]}\ \underbrace{\text{C1}}_{[3]}\ \underbrace{\text{N1}}_{[4]} \text{ - A - } \underbrace{\text{T}}_{[5]}$$

[1] Part Code

[2] Special feature M : General color rendering index Ra 80 minimum.

[3] Watt class C1 : 1 watt class package

[4] Chromaticity range N1 : Corrirated color temperature 5000K

[5] Shipping specification T : Taping

■ Features ■

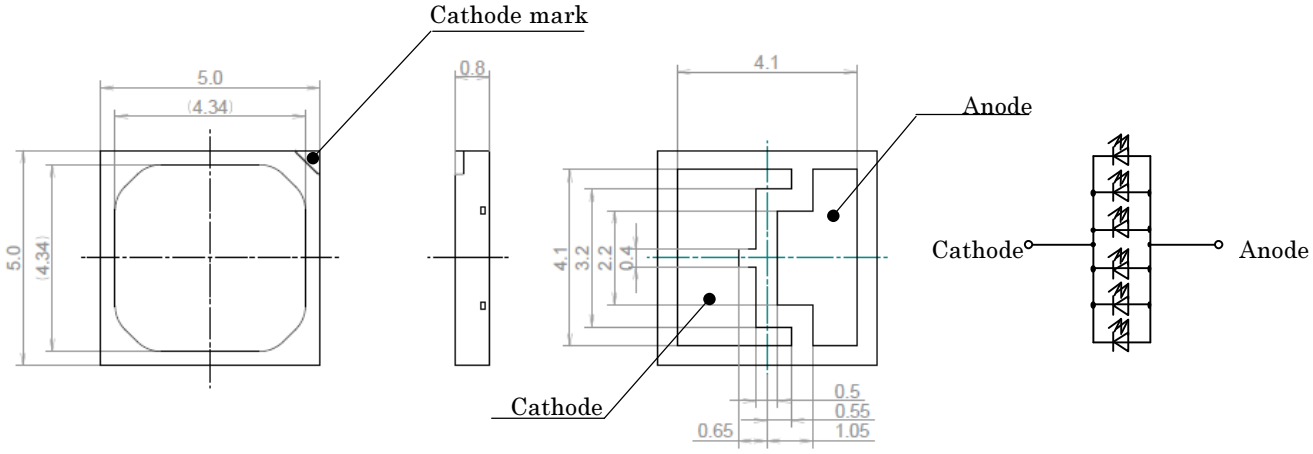
- ☞ External Dimensions: 5.0×5.0×0.8 mm
- ☞ Internal Structure: Lead frame

- ☞ Luminous Flux: 118 lm @ 350 mA
- ☞ CCT: 5000 K (ANSI C78.377 Compliant)
- ☞ CRI: Ra 80 min.
- ☞ Thermal Resistance: 9 C/W

- ☞ RoHS Compliant

3. Outline drawing

Unit: mm
Tolerance : ±0.1



4. Performance

(1) Absolute Maximum Rating

Parameter	Symbol	Rating Value	Unit	
Input Power	Pi	2.0	W	*1
Forward Current	I_F	600	mA	*1
Reverse Voltage	V_R	5	V	
Operating Temperature	T_{op}	-30 ~ +85	C	
Storage Temperature	T_{st}	-40 ~ +100	C	
Solder Terminal Temperature	Ts	85	C	*2
Junction Temperature	Tj	120	C	*3

*1 Input power and forward current are the values when the LED is used within the range of the derating curve in this data sheet.

*2 Ts : Anode solder terminal.

*3 D.C. Current : Tj = Ts + Rj-s x Pi

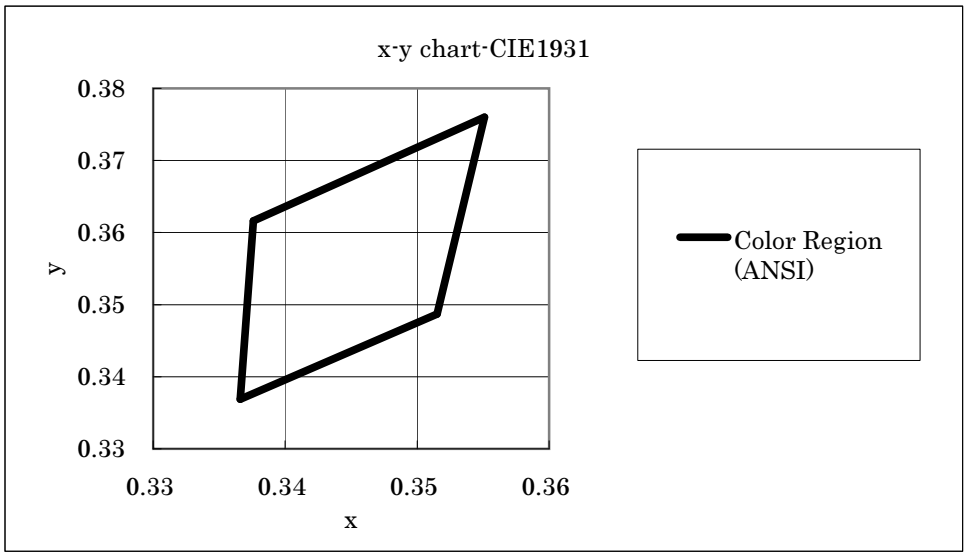
(2) Electro-optical Characteristics Ts=25C

Parameter	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Voltage	V_F	I_F=350mA	2.8	3.1	3.4	V
Luminous Flux	ϕ v	I_F=350mA	89	118	-	lm
CRI	Ra	I_F=350mA	80	-	-	–
Thermal Resistance	Rj-c	Junction-Case	-	9	-	C/W

Chromaticity coordinates (Condition : IF=350mA, Ts = 25C)

		x	y
5000K	Center	0.3447	0.3553
	a	0.3551	0.3760
	b	0.3376	0.3616
	c	0.3366	0.3369
	d	0.3515	0.3487

*The chromaticity center refers to ANSI C78.377:2008.



Note: The tolerance of measurement at our tester is V_F+/-3% , Φv+/-10% , Chromaticity(x,y)+/-0.005 and Ra+/-1.

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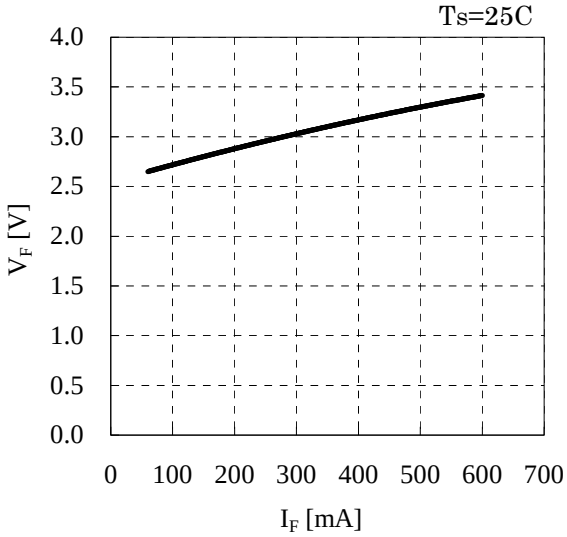
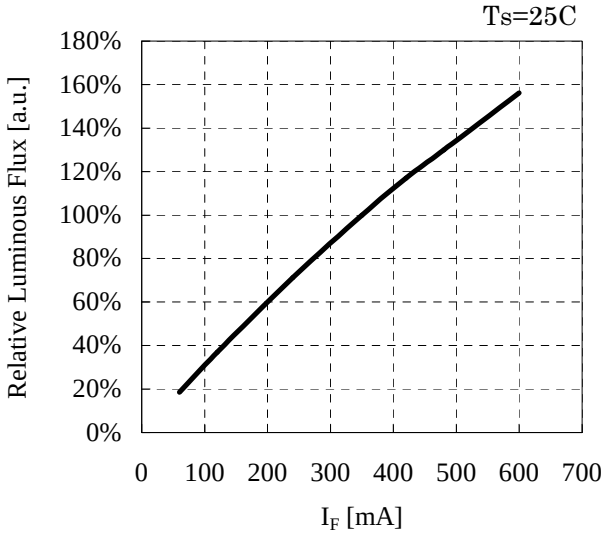
5. Characteristics

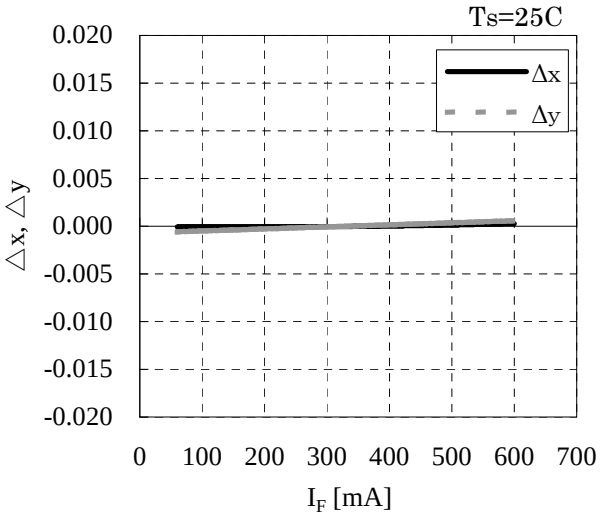
・Forward Current vs. Forward Voltage



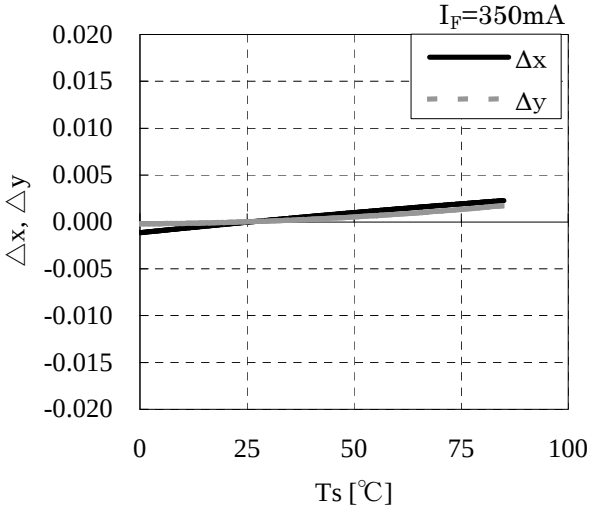
・Forward Current vs. Relative Luminous Flux



・Forward Current vs. Chromaticity Coordinate



・Case Temperature vs. Chromaticity Coordinate



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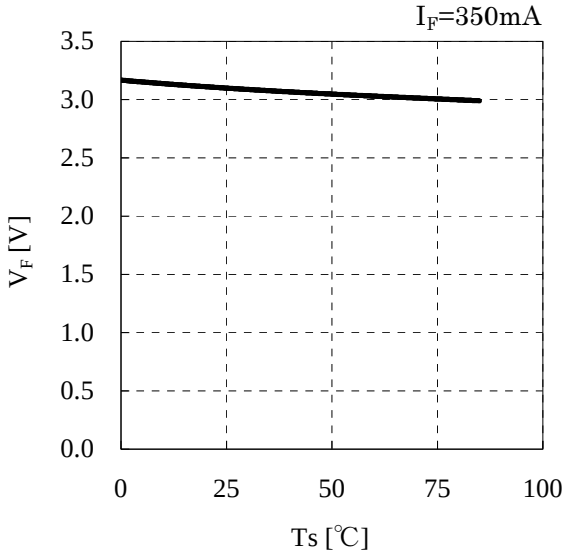
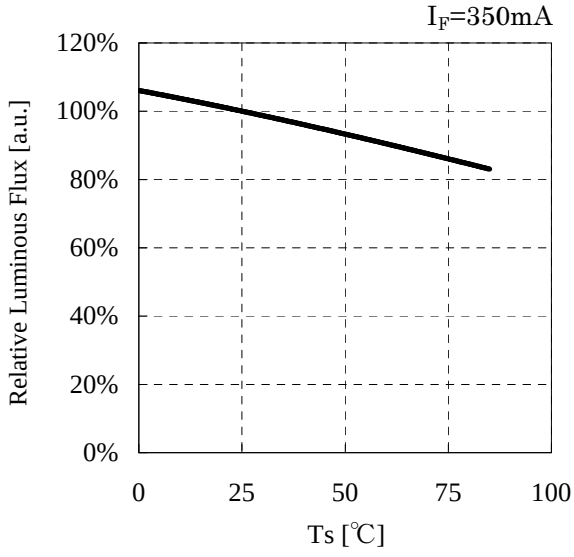
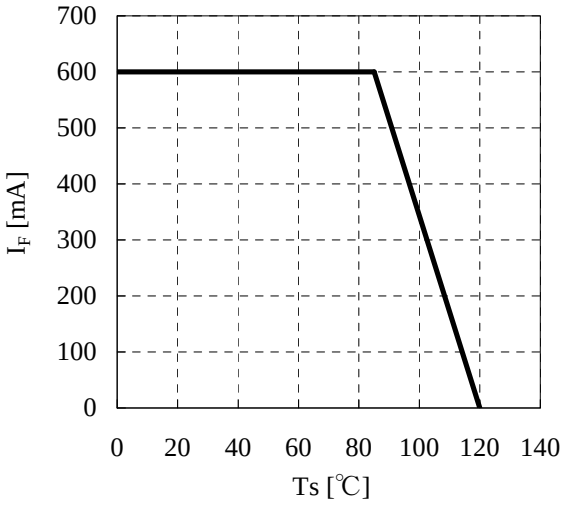
・Case Temperature vs. Forward Voltage



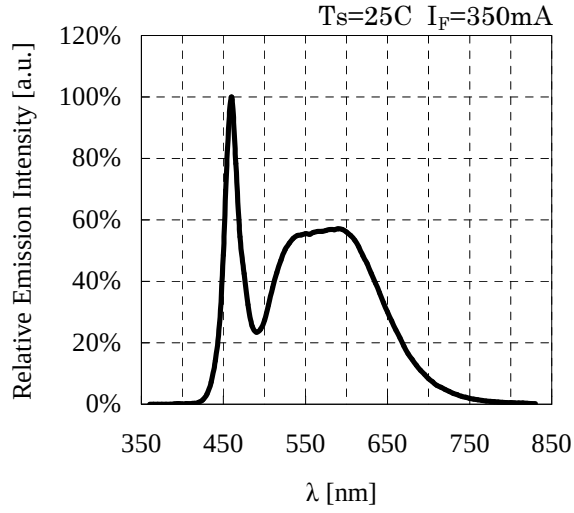
・Case Temperature vs. Relative Luminous Flux



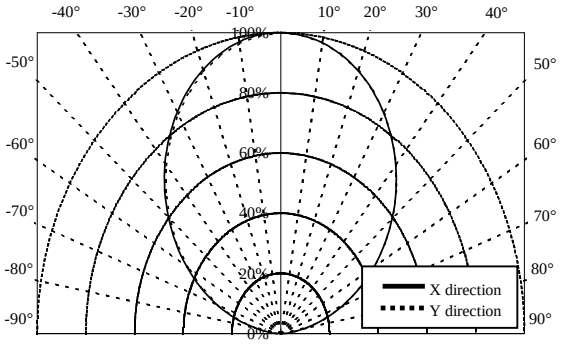
・Case Temperature vs. Allowable Forward Current

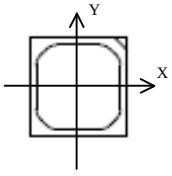


・Spectrum



・Directive Characteristic





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6. Reliability

(1) Datails of the tests

Test Item	Test Condition
Continuous Operation Test	Ta=25 C, I_F=350mA× 1000 hours
Low Temperature Storage Test	-40 C × 1000 hours
High Temperature Storage Test	100 C × 1000 hours
Moisture-proof Test	60 C, 90 %RH for 500 hours
Thermal Shock Test	-40 C × 30 minutes – 100 C × 30 minutes, 100 cycle
Solder heat resistance test	Recommended temperature profile (reflow soldering)× 2, (2nd test must be started after the samples are stabilized thermally.)

(2)Judgement Criteria of Failure for Reliability Test (Ta=25℃)

Measuring Item	Symbol	Measuring Condition	Judgement Criteria for Failure
Forward Voltage	VF	I_F=350mA	>U X 1.1
Total Luminous Flux	φv	I_F=350mA	<S X 0.70

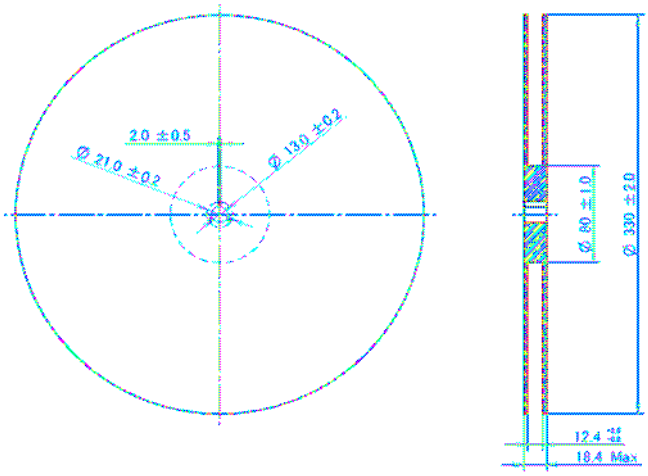
U defines the upper limit of the specified characteristics. S defines the initial value.

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.

7. Taping Specifications

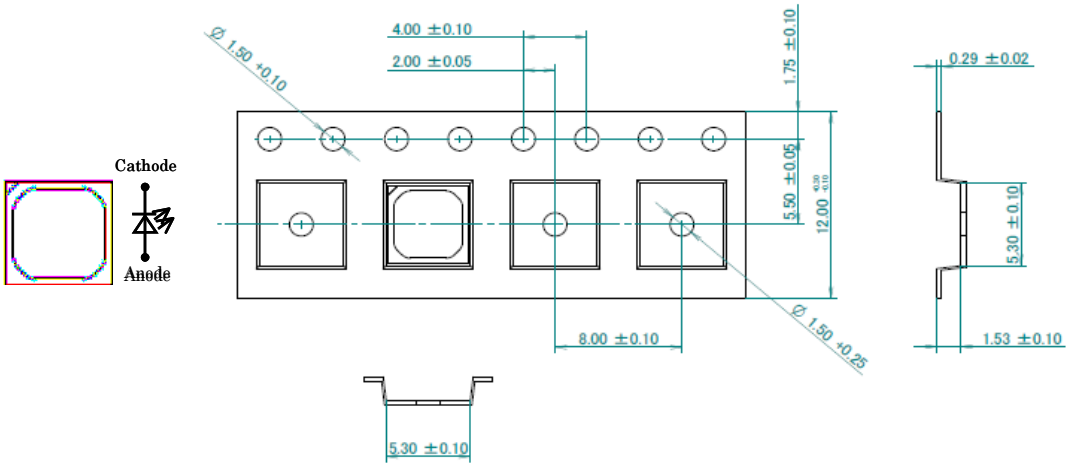
(1) Dimensions of Reel

Unit : mm

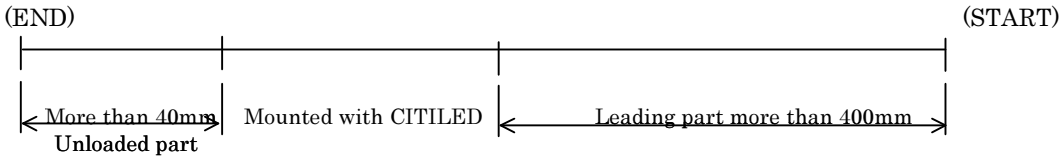


(2) Dimensions of Career tape

Unit : mm



(3) Configration of Tape



(4) Quantity 4000pcs/reel

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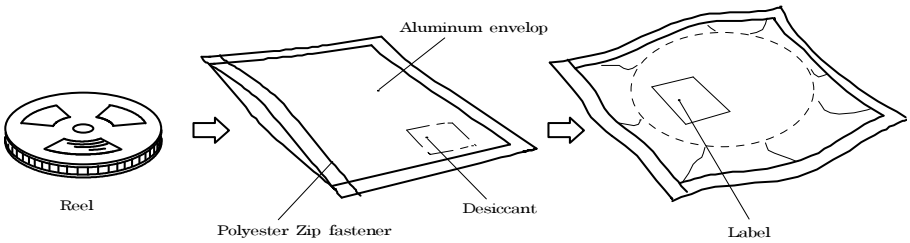
8. Packing Specification

(1) Moisuture-Proof Packing

To prevent moisture absorption during transportation and strage, reels are packed in aluminium envelpoed which contain a desicant with a humidity indicator.



(2) Storage

To prevent moisture absorption, it is strongly recommended that reels (in bulk ore taped) should be stored in the dry box(or the desicator) with a desiccant as the appropriate strage place. If not, the following condition is recommended.

Temperature : 5~30C
Humidity : 60%RH max

The devices should be mounted within 168H(7days) after unpacking.

If you store the unpacked reels, please store them in the dry box or seal them into the envelop again.

(3) Using condition

This devices contain silver plated elctrode. So, when being exposed to environment which contains corrosive gases, the silver plating becomes tarnished.

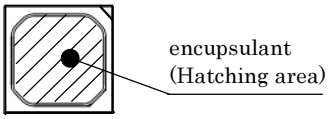
Tarnished plating may lead to poor solderability and degradation of optical characteristics.

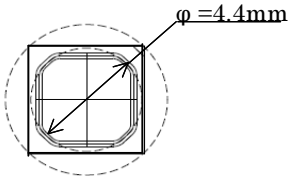
Please DO NOT exposed this debvice to corrosive atomosphere anytime (during storage, or after mounted). Please take care above when designing your product.

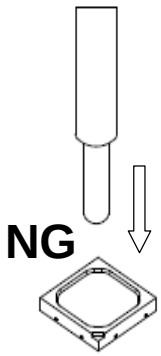
9. Precautions

1. Handling precaution

(1) Avoid the application of any stress to the encupsulant.
(2) Avoid any contact by a sharp metal nail or other materials with the encupsulant.







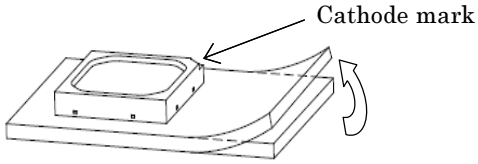
(3) Pick and Place

Recommend condition： nozzle inner radius ≧φ4.4mm
Avoid direct contact to the encapsulant with the nozzle.

Bad ex：narrow nozzle

(4). PCB handling

Bending the circuit board with soldered LEDs may cause breakage of LEDs.
Please take care to bow, twist, and warpage of fthe PCB.



2. Lighting at low current

A minimum current value of lighting of all dice is 6mA.
When a minimal current is applied, LED dice may look different in their brightness due to the individual difference of the LED element, and it is not a failed product.

3. Handling of static electricity

These products are sensitive to static electricity charge.
Please take measure to prevent any static electricity being produced as the wearing of a wristband or anti-static gloves when handling this product.

All devices, equipment, and machinary must be properly grounded. It is recommended that precautions be taken against surge voltage to the equipment that mounts the LEDs.

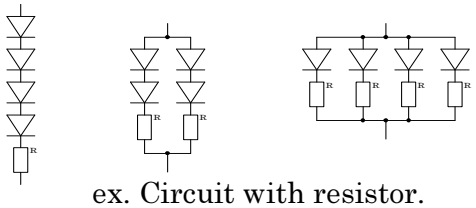
When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not.

It is easy to find static-damaged LEDs by a light-on test.

9. Precautions (continued)

4. Designing precaution

A constant current circuit is recommended as a drive circuit.
When using two or more LED packages, connect current limiting resistor in series on each path is recommended.



ex. Circuit with resistor.

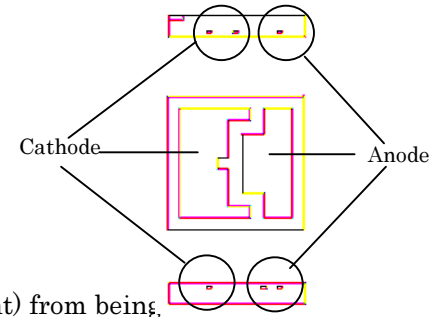


fig : small electrode

CL-L400 has small electrode at the side of package.
Please take care about shortage with conductive rubbish.

Please design a circuit that prevents any reverse voltage (excess current) from being applied to this product instantaneously when the circuit is ON or OFF.

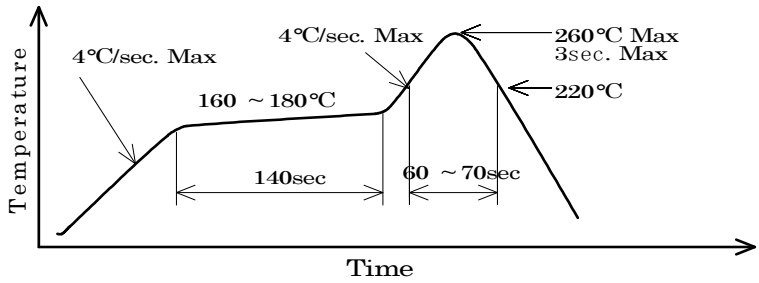
Please be aware that this product should not come into contact with any other parts in assembled status.

5. Soldering

(1) Lead free soldering

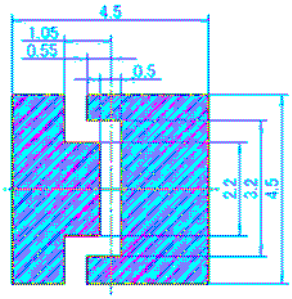
1) Melting temperature : 216~220C.
Composition : Sn 3.5 Ag 0.75 Cu

2) The temperature profile at the top surface of the parts is recommended as below.



3) It is requested that products shuld be handled after their temperature has dropped down to the normal room temperature.

(2) Recommended soldering pattern



Mountability and solderability need to be optimized with actual conditions such as amount of solder, reflow temperature applied in the process.

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9. Precautions (continued)

6. Heat generation

As this product is designed with consideration of the heat release property of module,
a heat release design is required to use this product effficiently.
please ensure that heat generation is not in excess of the absolute maximum rating.

Factors responsible for an increase in temperature include heat generation attributed to
ambient temperature conditions or power dissipation. Thus, drive condition should be
taken into consideration, depending on ambient temperature(Ta).

*Citizen Electoronics cannnot guarantee if usage exeeds this recommended conditions.
Please use it after sufficient verification is carried out on your own risk if necessary.

7. Eye Safety

- The International Electrical Commission (IEC) published in 2006 IEC 62471
"2006 Photobiological safety oflamps and lamp systems" which includes LEDs within its scope.
When sorting single LEDs according to IEC 62471, most white LEDs can be classified as belonging to either Exempt Group or Risk Group 1.
- 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, may have properties equivalent to those of Risk Group 2.
- 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 may 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 the customer's final product.

8. The use of Class 2 power supply is assumed for this product.

9. If the product might to be used under the following conditions, the customer must evaluate its approproateness them. This product is not designed for use under the following conditions.
in places where the product might:

- get wet due to rain
- suffer from damage caused by salt.
- be exposed to corrosive gas such as Cl, H2S, NH3, SO2, Nox and so on.
- be exposed to dust, fluid or oil.

10. Precautions with regard to product use

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