APPROVAL SHEET

AOT MODEL NAME	3528
AOT PART NUMBER	3528C-U3C1
CUSTOMER NAME	Toshiba
DATE	2021 / JUL
VERSION	10

MAKER			CUSTOMER			
Prepared	Checked	Approved				
Joy Wu	***Chris Huang***	***Bin Chen***				

AOT Headquarters
No. 13, Gongye 5th. Road, Hsinchu Industrial Park, Hukou Shiang,
Hsinchu Hsien 303, Taiwan, R.O.C.
TEL: +886-3-597-6988 / FAX: +886-3-598-7392

DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Solid-State Light. Done Right.

Revision Note

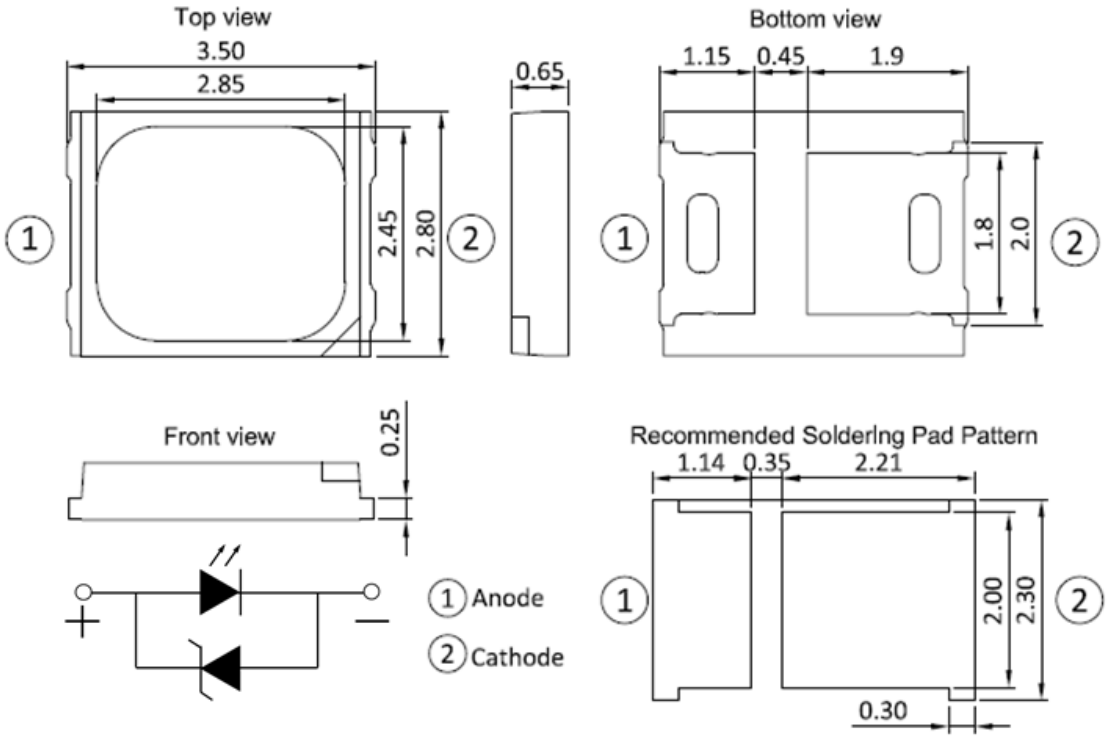
Date	Revision	Page	Version
2016-06-13	Initiate Document	16	01
2016-07-26	1.add ESD item 2.modify forward current of absolute maximum ratings 3. modify package quantity of reel	4&12	02
2016-08-09	1. modify operating temperature 2. add derating characteristics	4&7	03
2017-01-12	1.add circuit diagram 2.remove reverse current of optical and electronic characteristics 3.add thermal resistance of optical and electronic characteristics	3&4	04
2017-02-21	1. modify peak emission wavelength of optical and electronic characteristics 2. remove UC &UD bin of group definition of wavelength 3. add reflow item of reliability test	4&5&14	05
2017-04-05	1. add reverse voltage of optical and electronic characteristics 2. modify bin code of group definition of wavelength	4&5	06
2018-08-20	1. modify bin code of group definition of wavelength	4&5&14	07
2018-10-26	1. add supplier chip size 2. modify Optical / Electronic Characteristics graphs	3&6	08
2019-01-30	1. modify supplier chip size	3	09
2021-07-15	1. change lead frame type	16	10

DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Package Outline

Type Number:3258C-U3C1

Unit: mm, Tolerance: ± 0.2 mm



Item	Materials
Package	Heat-Resistant Polymer
Encapsulating Material	Silicone Resin
Electrode	Ag Plating Copper Alloy

- One UV chip ⇒ EPISTAR ES-EEUVF08P 8mil×15mil
- High brightness SMD.
- Compact package outline (L x W x H) of 3.5 mm x 2.8 mm x 0.65 mm.
- Compatible with reflow soldering.

Optical/Electronic Characteristics (Ts=25°C)

Item	Symbol	Condition	Value	Unit
Forward Voltage	V_{F2}	I_{FP} = 20 mA	3.1 ~ 3.5	V
Reverse Voltage	V_Z	I_{RP}=10uA	0.5 ~ 0.8	V
Peak Emission Wavelength	λ_P	I_{FP} = 20 mA	395 ~ 400	nm
Viewing Angle	$2_{\theta 1/2}$	I_{FP} = 20 mA	120	deg
Radiant Flux	φ_e	I_{FP} = 20 mA	17.4 ~ 24	mW
Thermal Resistance	R_{ths-j}	I_{FP} = 20 mA	20	°C/W

* Tolerance of measurement of the Forward voltage is ±0.05v
* Tolerance of measurement of the Radiant Flux is ±10%
* Tolerance of measurement of the wavelength is ±1nm

Absolute Maximum Ratings (Ts=25°C)

Item	Symbol	Maximum Value	Unit
Forward Current	I_{FP}	30	mA
***Reverse Current**	I_R	<20	mA
Operating Temperature.	T_{opr}	-40 ~ +80	°C
Storage Temperature.	T_{stg}	-40 ~ +100	°C
Power Dissipation	P_D	105	mW
Soldering Temperature	T_{sld}	Reflow Soldering 260℃,10sec	
LED Junction Temperature.	T_j	115	°C
Electrostatic Discharge Classification	ESD	Class 3	

***** Max condition is not guarantee for life time
* Reverse current is for zener use

DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Group Definition of Forward Voltage

Rank	Condition	V_F(V)
V1	T_s=25°C I_F=20mA	3.1 ~ 3.2
V2		3.2 ~ 3.3
V3		3.3 ~ 3.4
V4		3.4 ~ 3.5

Group Definition of Brightness

Rank	Condition	φ_e (mW)
P17	T_s=25°C I_F=20mA	17.4 ~ 19
P18		19 ~ 20.6
P19		20.6 ~ 22.4
P20		22.4 ~ 24

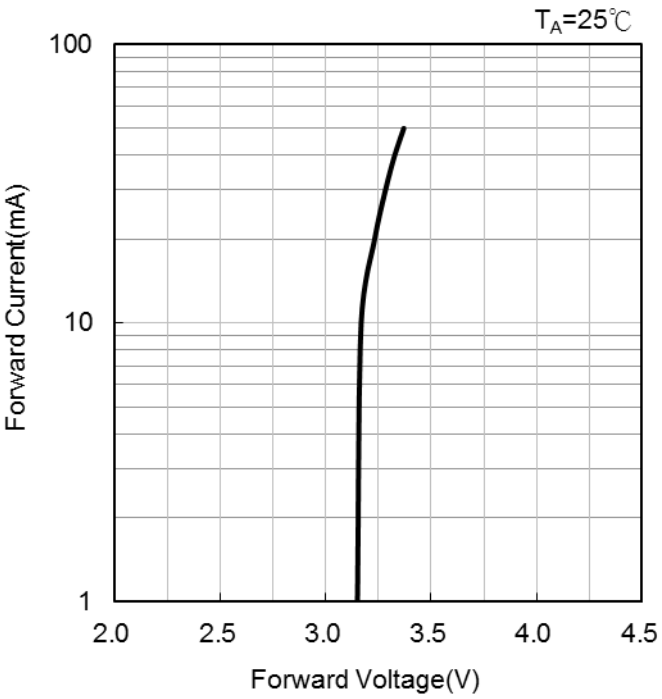
Group Definition of Wavelength

Rank	Condition	λ_P (nm)
UA	T_s=25°C I_F=20mA	395 ~ 400

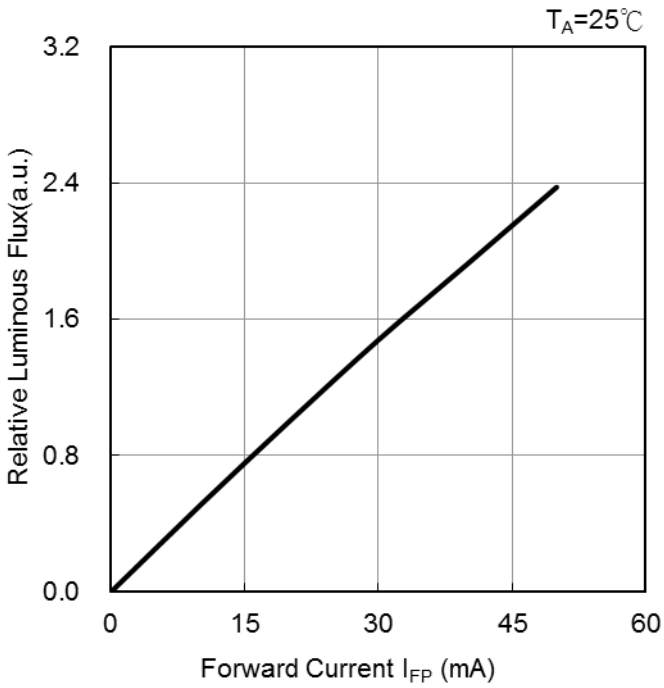
*A shipment shall consist of LEDs in a combination of above ranks.
*The percentage of each rank in the shipment shall be determined by AOT.
*The ranking information of LEDs can be found on the reel label.

Optical and electrical characteristics

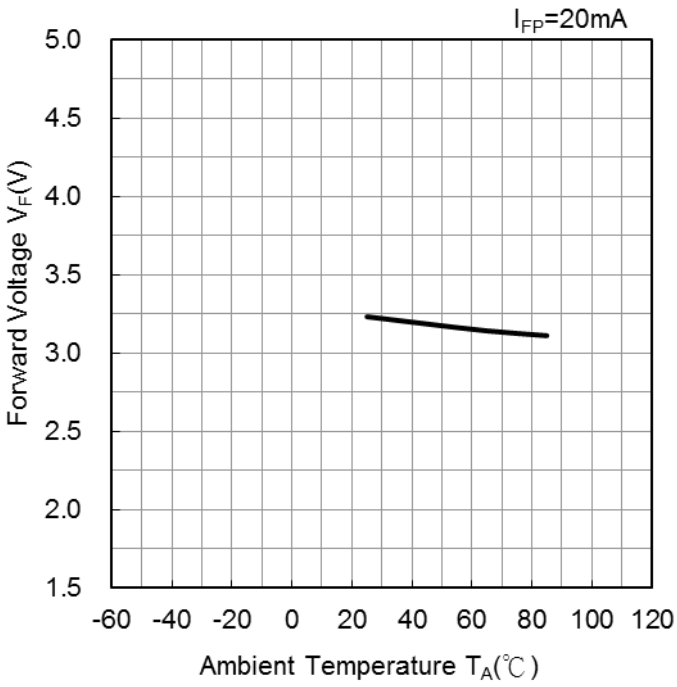
Forward Voltage vs. Forward Current



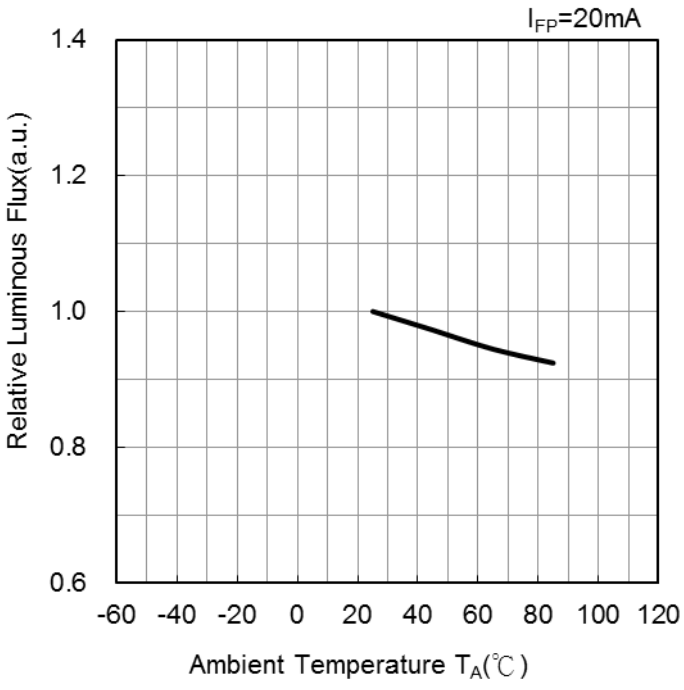
Forward Current vs. Relative Luminous Flux



Ambient Temperature vs. Forward Voltage



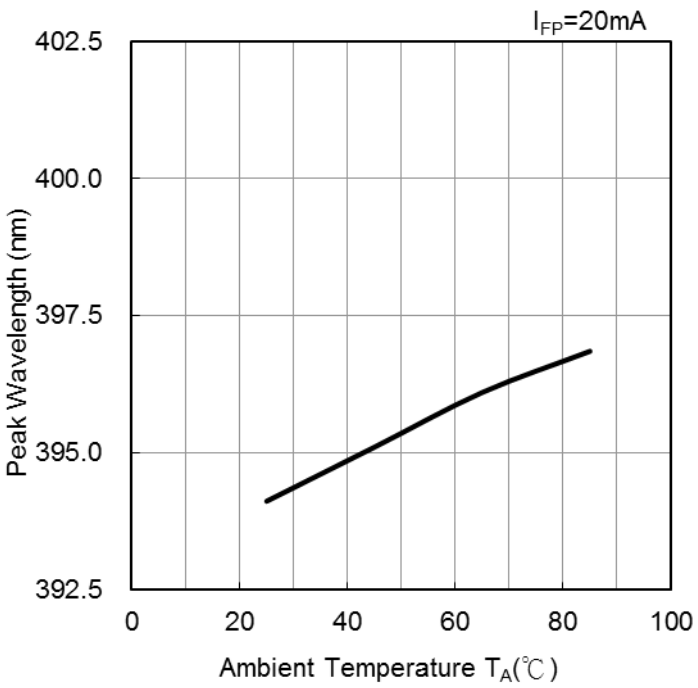
Ambient Temperature vs. Relative Luminous



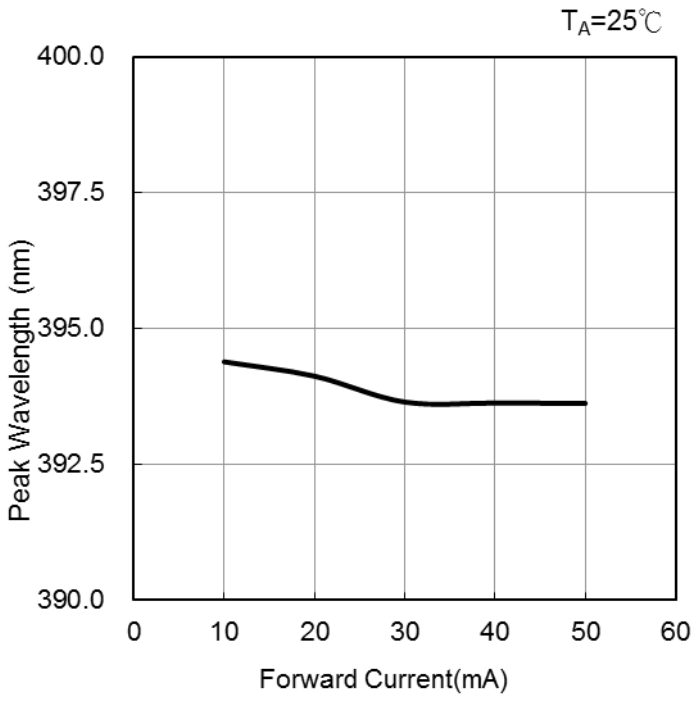
DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Optical and electrical characteristics

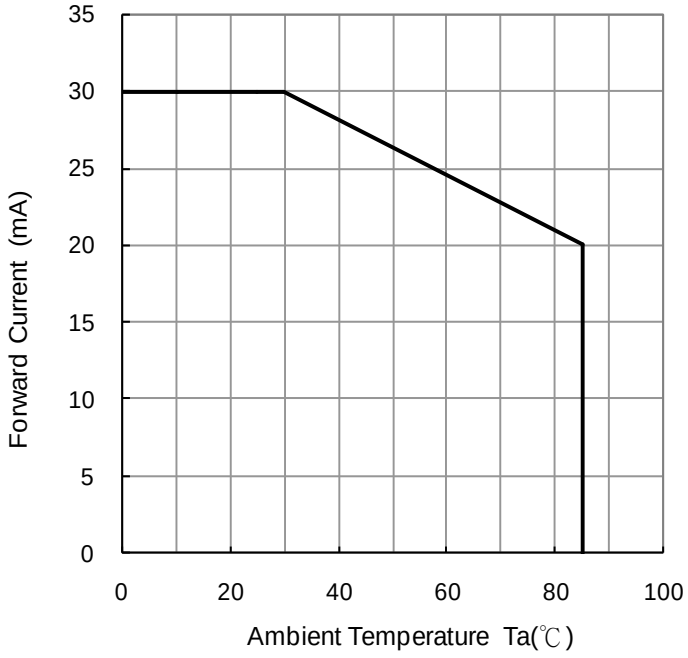
Ambient Temperature vs. Peak Wavelength



Forward Current vs. Peak Wavelength

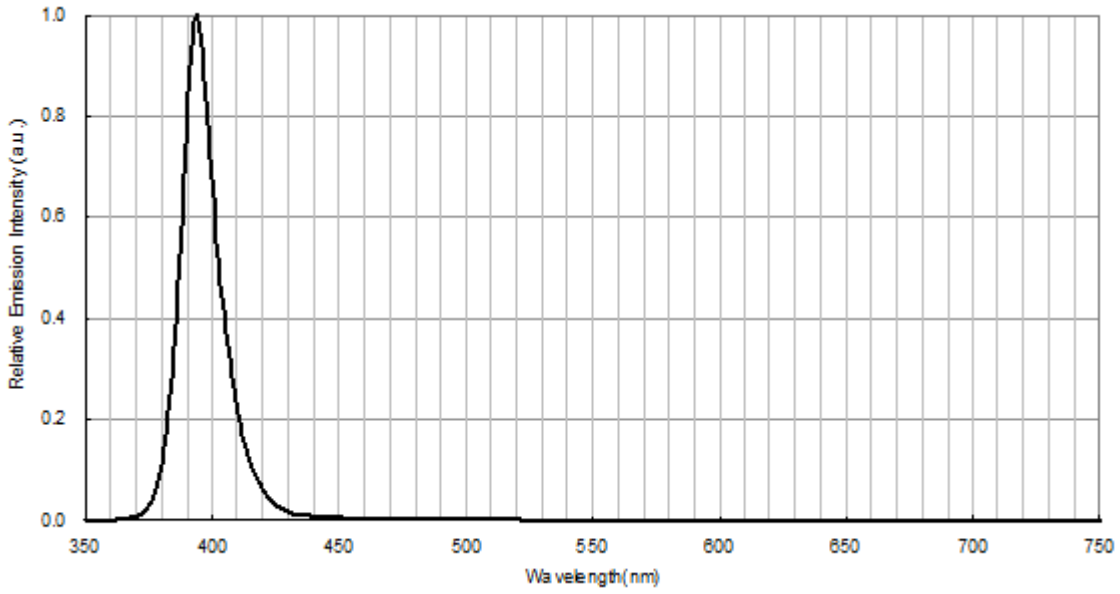


Derating Curve

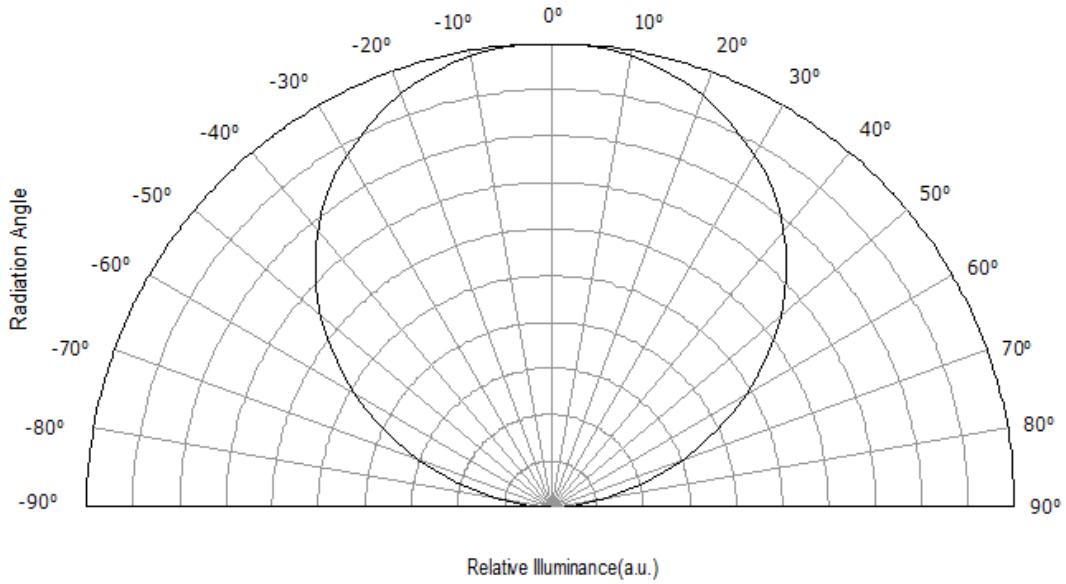


DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Spectrum(T_A=25°C,I_{FP}=20mA)



Radiation Pattern(T_A=25°C,I_{FP}=20mA)



DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Recommended Reflow Soldering Conditions

Surface Mounting Condition

In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs should be kept min. to prevent them from electrical failures and mechanical damages of the devices.

Soldering Reflow

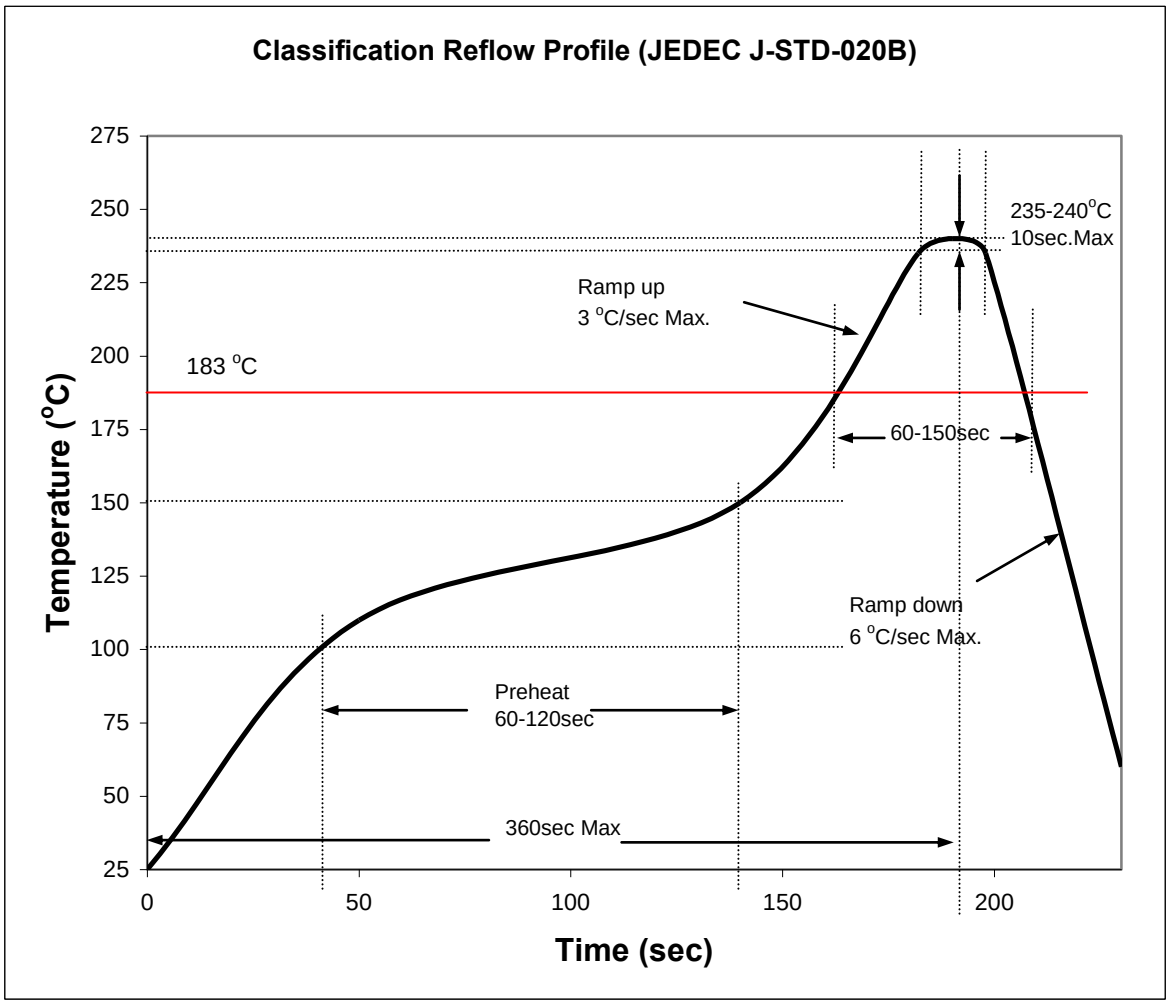
-Soldering of the SMD LEDs should conform to the soldering condition in the individual specifications.

-SMD LEDs are designed for Reflow Soldering.

-In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating/cooling may cause electrical & optical failures and damages of the devices.

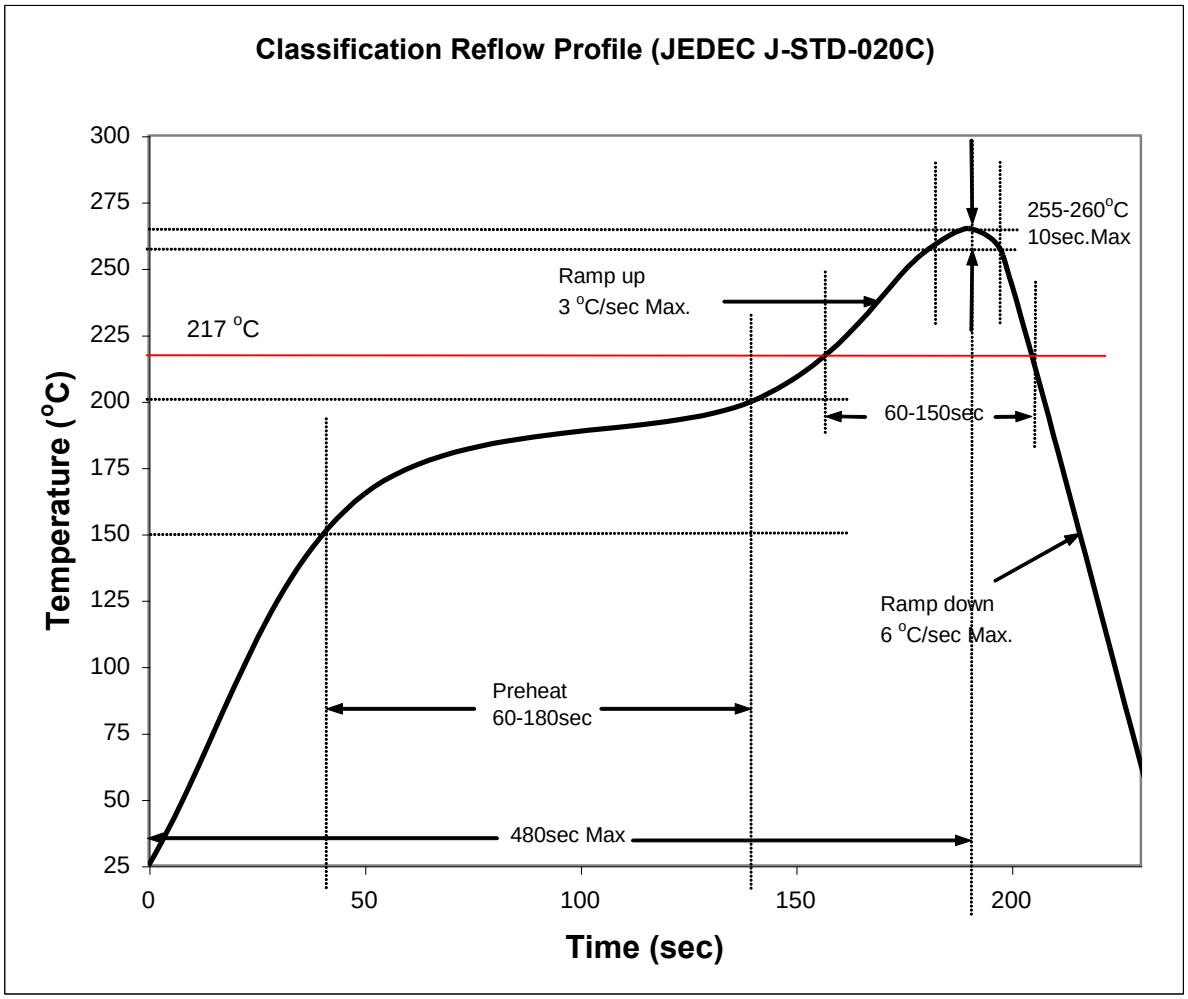
-AOT cannot guarantee the LEDs after they have been assembled using the solder dipping method.

1) Lead Solder



DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

2) Lead-free Solder

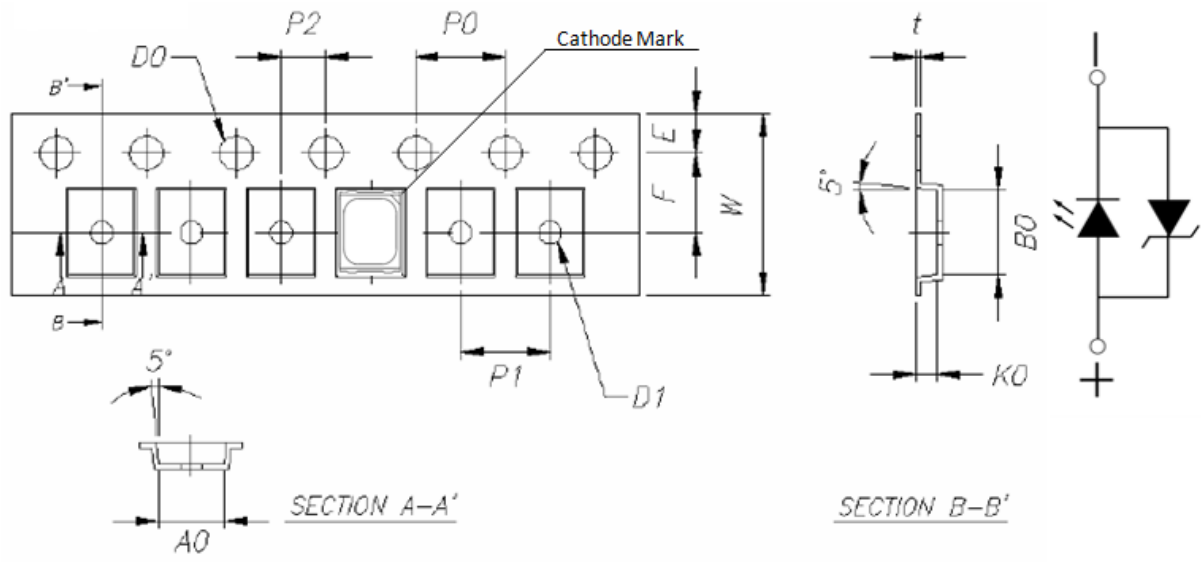


3) Manual Soldering Conditions

- Lead Solder
  Max. 300 °C for Max. 3sec, and only one time.
- Lead-free Solder
  Max. 350 °C for Max. 3sec, and only one time.

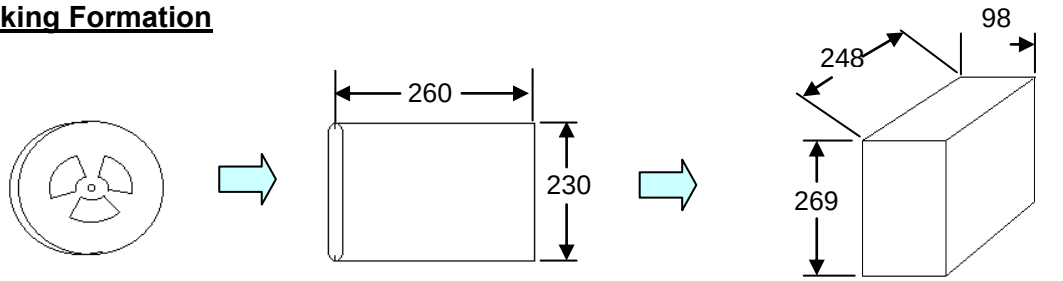
- There is possibility that the brightness of LEDs is decreased, which is influenced by heat or ambient atmosphere during reflow. It is recommended to use the nitrogen reflow method.
- After LEDs have been soldered, repair should not be done. As repair is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will be damaged by repairing or not.
- Reflow soldering should not be done more than two times.

Taping and Orientation



Item	Spec.	Tolerance(mm)	Item	Spec.	Tolerance(mm)
W	8.00	±0.20	P1	4.00	±0.05
E	1.75	±0.10	P2	2.00	±0.05
F	3.50	±0.05	t	0.23	±0.05
D0	1.50	+0.10, -0	A0	2.95	±0.10
D1	1.00	±0.10	B0	3.75	±0.10
P0	4.00	±0.05	K0	0.95	±0.10

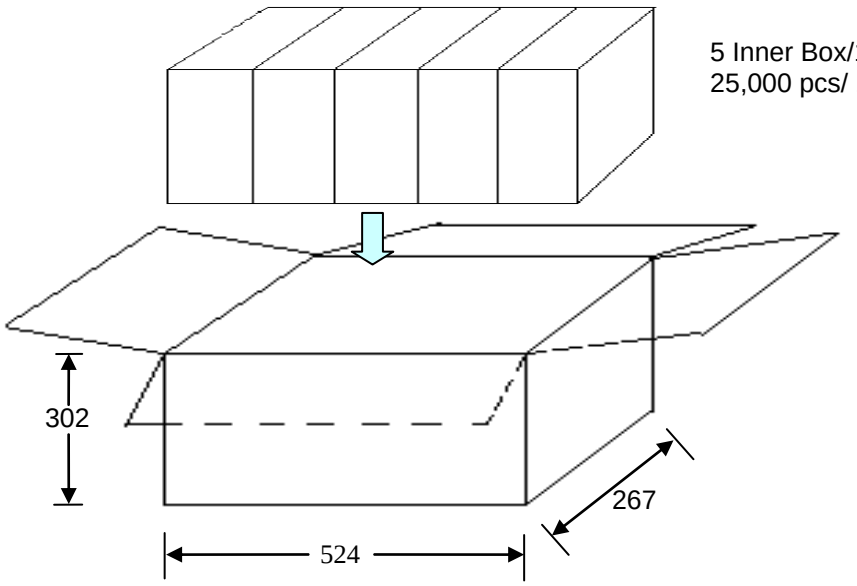
Packing Formation



Diameter : 178 mm
Width : 8mm
1,000 pcs/Reel
Antistatic Black Reel

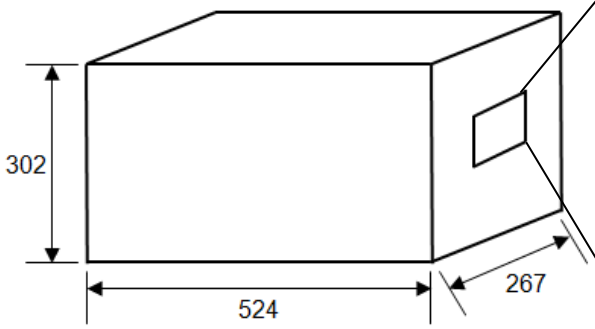
Antistatic Shielding Aluminum Bag
1 Reel / Bag

5 Bags / 1Inner Box
5,000 pcs/ 1 Inner Box



5 Inner Box/1 Carton
25,000 pcs/ 1Carton

Package Outlook



Advanced Optoelectronic Technology Inc.	
Customer	
PO No.	
Part No.	
Quantity	
Packing Date	
Carton No.	
Ship No.	
QC Check	
備註	

2021/07/21

Solid-State Light. Done Right.

Reel Label Definition

SAP. No.

SMD LED .

Part Number : 3528C-U3C1

Brightness : A

WP : B

VF : C

Quantity : nn ea

Serial No : SM0yymmddxxxx

Cust. PN. : XXXXX-XXXX

A : Radiant Flux value noted, (P17-P20)
B : Wavelength value noted, (UA)
C : Voltage value noted, (V1~ V4)
nn : Quantity of LED

SM0yymmddxxx : yy : year, mm : month, dd : day, xxxx : reel no.

*Reel Label to fill in practice data of all LED characteristic

DCC ISSUED
AOT
Solid-State Light. Done Right.
2021/07/21

Reliability Test

No.	Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
1	Room Temp. Life Test	Internal Ref.	T_a=25°C ,I_F = 20 mA	1000 hr	0/20
2	High Temp. Operation	JESD22-A108	T_a=85°C, I_F = 20 mA	1000 hr	0/20
3	Low Temp. Operation	JESD22-A108	T_a=-40°C, I_F = 20mA	1000 hr	0/20
4	Thermal Shock Test	JESD22-A106	-40°C ~ 100°C (30min~30min)	300 cycles	0/20
5	Low Temp. Storage Test	JESD22-A103	T_a= -40 °C	1000 hr	0/20
6	High Temp. and High Humidity Operation	JESD22-A119	60℃ 90%RH,I_F=20mA	1000 hr	0/20
7	Reflow Test	Internal Ref.	Reflow 260°C → HTOL 140°C 2min	2 cycles	0/500

Criteria for Judging Damage

Item	Symbol	Test Conditions	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V_F	I_F=20mA	-	*U.S.L×1.1
Luminous Flux	Φ_V	I_F=20mA	*L.S.L×0.7	-

* U.S.L: Upper Standard Level
* L.S.L: Lower Standard Level

CAUTIONS

(1) Moisture Proof Package

The moisture proof package should be used to prevent moisture in the package as the moisture may Cause damage to optical characteristics of the LEDs.
The aluminum bag with zipper is used for moisture proof package. And, the moisture absorbent Material, Silica gel, is inserted into aluminum bag.

(2) Storage:

Storage Conditions
Before opening the package:
The LEDs should be kept at 30˚C or less than 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material is recommended.
After opening the package:
After open the package, the LED should be kept at 30˚C, 70%RH or less. The LED should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, it should be stored in moisture proof condition.

(3) Heat Generation

Thermal design of the end products is of paramount importance. The heat generation must be taken into design consideration when using the LED. The coefficient of the temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components.

(4) Static Electricity

Static electricity or surge voltage damages the LEDs. All equipment and machinery must be properly grounded. It is recommended to use a wristband or anti-electrostatic glove when handing 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 or a Vf test at a lower current. (Below 1mA is recommended).
Criteria: Vf >1.6 V at If=0.01mA

(5) Cleaning

Use isopropyl alcohol as a solvent for cleaning the LEDs. The other solvent may dissolve the LEDs package and the epoxy.
Ultrasonic cleaning should not be done.

(6) Electrostatic Discharge (ESD)

The products are sensitive to static electricity or surge voltage, An ESD event may damage its die or reduce its reliability performance. When handling the products, measures against electro static discharge, including the followings, are strongly recommended.

Eliminating the charge;

Wrist strap, ESD footwear and garments, ESD floors

Grounding the equipment and tools at workstation

ESD table / shelf mat (conductive materials)

Proper grounding techniques are required for all devices, equipment and machinery used in the assembly of the products, Also note that surge protection should be considered in the design of customer products.
If tools or equipment contain insulating materials, such as glass or plastic, proper measures against electro static discharge, including the followings are strongly recommended.

Dissipating the charge with conductive materials

Preventing the charge generation with moisture

Neutralizing the charge with ionizer

(7) Others

When using the LEDs, it must care that the reverse voltage will not exceed the absolute maximum rating.
The LED light is enough to injure human eyes, so it should avoid looking at LED light directly.

NOTE.

All the information published is considered to be reliable. However, AOT does not assume any liability arising out of the application or use of any product described herein.

AOT reserves the right to make changes at any time without notice to any products in order to improve reliability, function or design.

AOT products are not authorized for use as critical components in life support devices or systems without the express written approval from the managing director of AOT.

- This UV LED during operation radiates intense UV light.
- Do not look directly into the UV light during operation of device. This can be harmful to the eyes even for brief period due to the intense UV light.
- If viewing the UV light is necessary, please use UV filtered glasses to avoid damage by the UV light.
- Please affix a caution label to your product to that effect, if the UV LED in your product might be viewed directly,
- Avoid direct eye exposure to UV light.
- Keep out of reach of children.