

APPROVAL SHEET

AOT MODEL NAME	2020
AOT PART NUMBER	2020C-D501
CUSTOMER NAME	General
DATE	2021 / May
Version	01

MAKER			CUSTOMER			
Prepared	Checked	Approved				
<i>Dimitri</i>						

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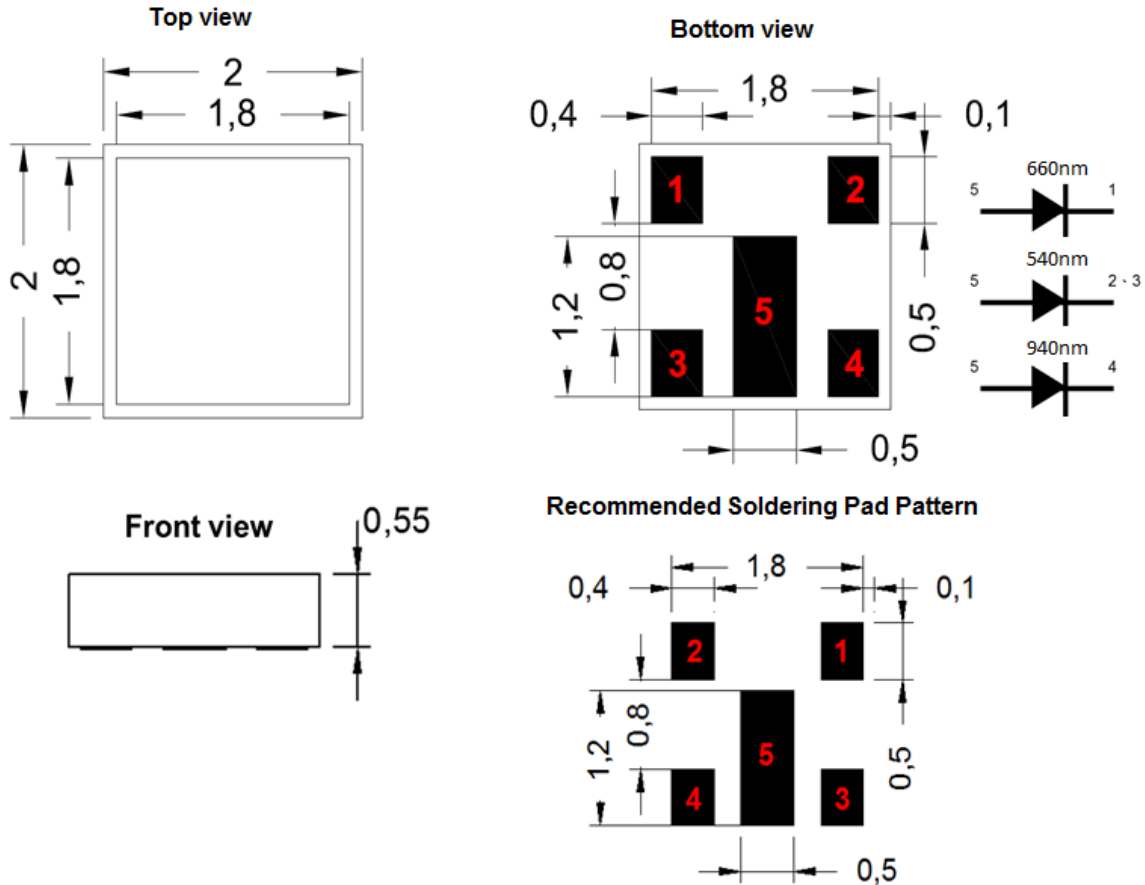
Package Outline

Model name: 2020C-D501

Package Tolerance: ± 0.1 mm

Pad Tolerance: ± 0.05 mm

Unit: mm



Cathode: 1、2、3、4

Anode: 5

Item	Materials
Package	Heat-Resistant Polymer
Encapsulating	Silicone Resin(with BN)
Electrode	Ag Plating Copper Alloy

- High density Infrared Red/Green/Red emitter.
- High brightness SMD.
- Compact package outline (LxWxH) of 2.0 mm x 2.0 mm x 0.6mm.
- Compatible with reflow soldering.
- Complies with RoHS Directive.

Optical/Electronic Characteristics (Ts=25°C)

(660nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$	--	1.6	2.4	V
Luminous Intensity	ϕ_i	$I_F = 20\text{mA}$	3.8	--	6	mW/sr
Wavelength	W_p	$I_F = 20\text{mA}$	650	--	665	nm
View Angle	Θ	$I_F = 20\text{mA}$	--	120	--	deg
Thermal Resistance	$R_{\text{ths-j}}$	$I_F = 20\text{mA}$	--	60	--	°C/W

Notes:

*Optical and electrical testing condition is based on 50ms pulse.

* Tolerance of measurements of the Forward Voltage is ± 0.1 V.

* Tolerance of measurements of the Radiant Intensity is $\pm 10\%$.

(540nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$	--	2.3	2.7	V
Luminous Intensity	ϕ_v	$I_F = 20\text{mA}$	3000	--	--	mcd
Wavelength	W_d	$I_F = 20\text{mA}$	530	--	550	nm
View Angle	Θ	$I_F = 20\text{mA}$	--	120	--	deg
Thermal Resistance	$R_{\text{ths-j}}$	$I_F = 20\text{mA}$	--	60	--	°C/W

Notes:

*Optical and electrical testing condition is based on 50ms pulse.

*Single G chip current at 10mA

(940nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$	--	1.4	1.8	V
Radiant Intensity	I_e	$I_F = 20\text{mA}$	2.5	--	5	mW/sr
Wavelength	λ_p	$I_F = 20\text{mA}$	935	--	950	nm
View Angle	θ	$I_F = 20\text{mA}$	--	120	--	deg
Thermal Resistance	$R_{\text{th-s-j}}$	$I_F = 20\text{mA}$	--	60	--	°C/W

(940nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 5\text{mA}$	--	1.2	--	V
Radiant Intensity	I_e	$I_F = 5\text{mA}$	0.7	--	--	mW/sr
Wavelength	λ_p	$I_F = 5\text{mA}$	--	940	--	nm
View Angle	θ	$I_F = 5\text{mA}$	--	120	--	deg

Notes:

- *Optical and electrical testing condition is based on 50ms pulse.
- * Tolerance of measurements of the Forward Voltage is ± 0.1 V.
- * Tolerance of measurements of the Radiant Intensity is $\pm 10\%$.

Absolute Maximum Ratings (Ts=25°C)

Item	Symbol	Color	Absolute Maximum Rating	Unit
Forward Current	I _F	R(660nm)	60	mA
		G(540nm)	150	
		IR(940nm)	120	
*Pulse Forward Current	I _{FP}	R(660nm)	120	mA
		G(540nm)	300	
		IR(940nm)	200	
Power Dissipation	P _D	R(660nm)	0.6	W
		G(540nm)	0.6	
		IR(940nm)	1.1	
Operating Temperature	T _{opr}		-40~+85	°C
Storage Temperature	T _{stg}		-40~+100	°C
Soldering Temperature	T _{sld}		Reflow Soldering : 260°C for 5sec	
Junction Temperature	T _j		115	°C

* I_{FP} Conditions : Pulse Width ≤50msec, and duty ≤1/10

* Max condition is not guarantee for life time

* Reliability tests are based on MCPCB

* Operating temperature has to be controlled under junction temperature limitation

Group Definition of Forward Voltage

Rank	Condition	660nm	540nm	940nm	Unit
A0	Ta = 25°C If = 20mA	1.6-2.4	2.1-2.3	1.2-1.8	V
A1			2.3-2.5		
A2			2.5-2.7		
A3			2.7-2.9		

Notes: Forward Voltage tolerance is $\pm 0.1V$.

Group Definition of Brightness

Rank	Condition	660nm	540nm	940nm	Unit
A	Ta = 25°C If = 20mA	3.8-6.0	3000-3200	2.5-5.0	mW/sr
B			3200-3400		mcd
C			3400-3600		(for 540nm)

Notes: Radiant Intensity tolerance is $\pm 10\%$.

*G chip brightness is 2 chips.

Group Wavelength Rank

Rank	Condition	660nm	540nm	940nm	Unit
W1	Ta = 25°C If = 20mA	650-665	530-535	935-950	nm
W2			535-540		
W3			540-545		
W4			545-550		

Notes: Wavelength measurement tolerance is $\pm 1nm$.

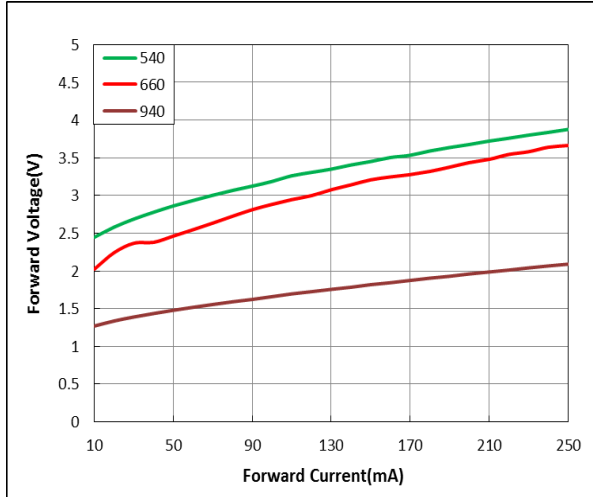
*A shipment shall consist of LEDs in a combination of above ranks.

The percentage of each rank in the shipment shall be determined by AOT.

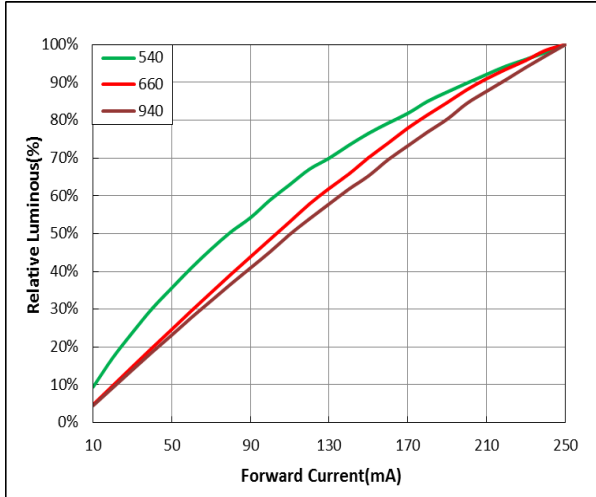
*The ranking information of LEDs can be found on the reel label.

Optical and electrical characteristics

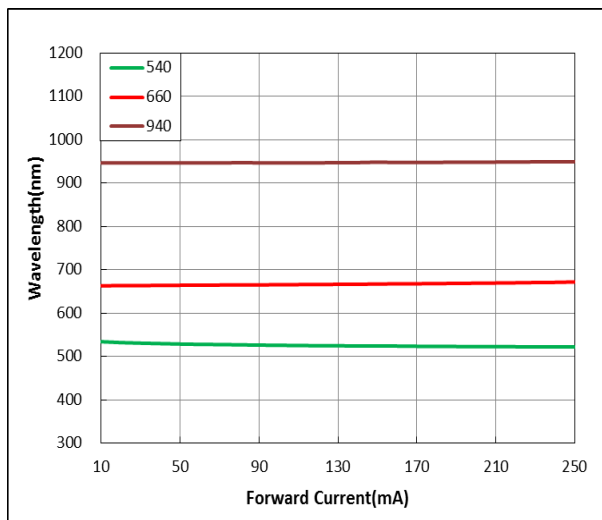
Forward Current vs. Forward Voltage



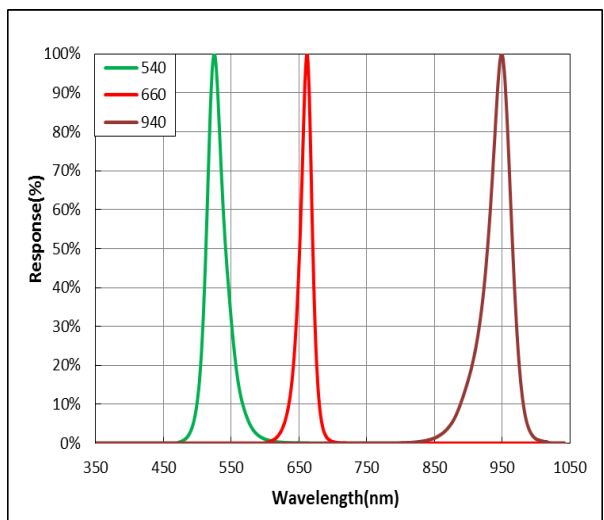
Forward Current vs. Relative Luminous



Forward Current vs. Wavelength



Wavelength vs. Response



Recommended Reflow Soldering Conditions

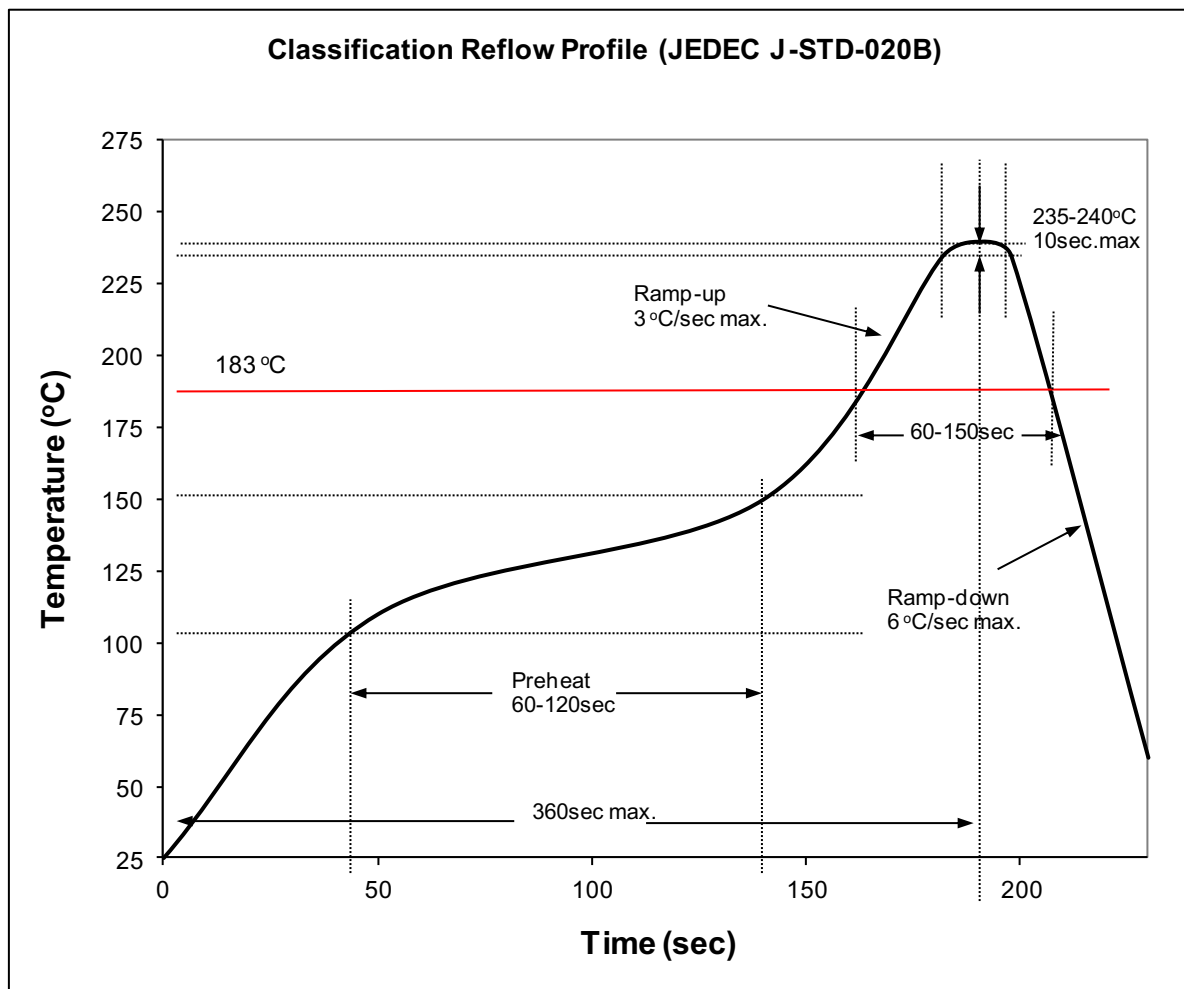
Surface Mounting Condition

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.

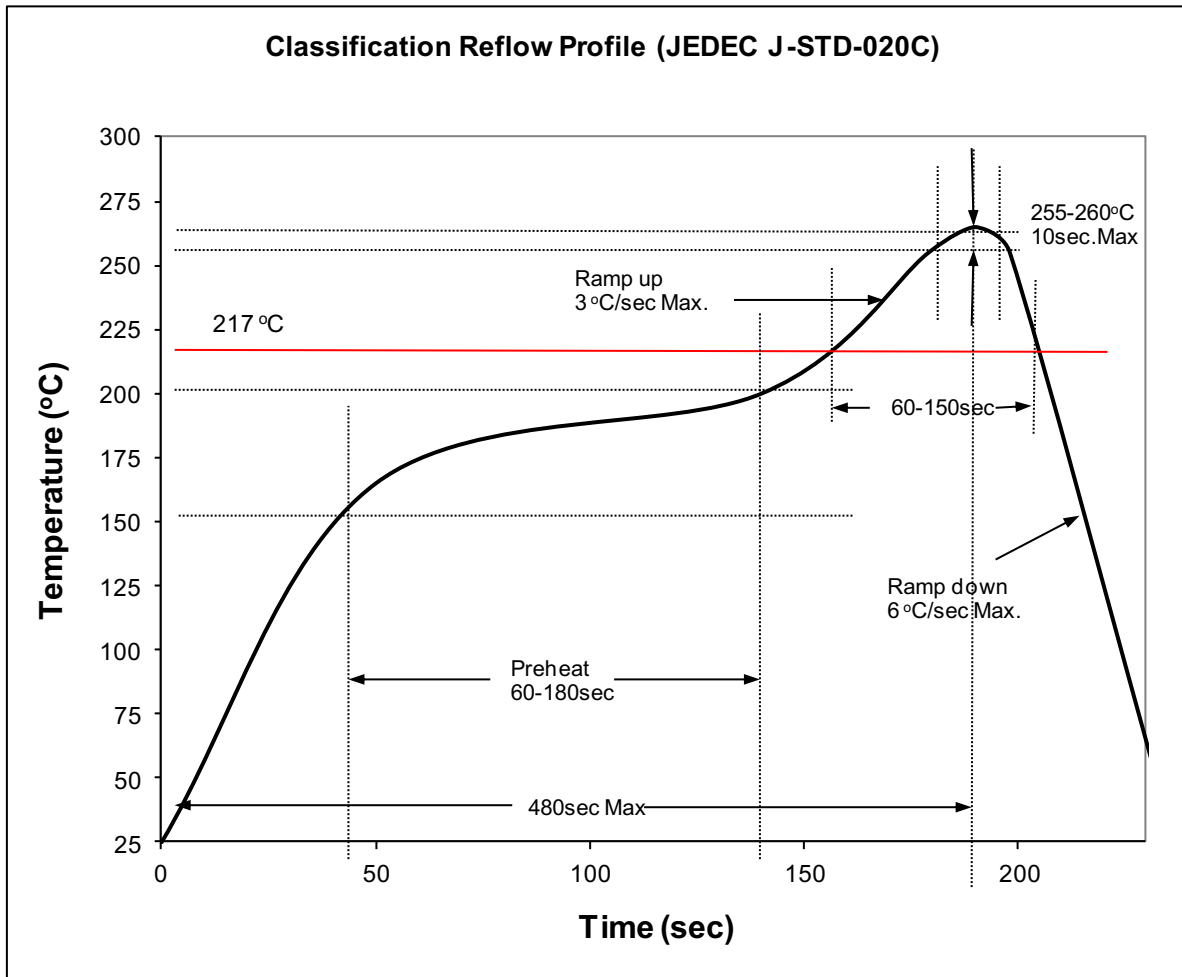
Soldering Reflow

- 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



(2) Lead-Free Solder



(3) Manual Soldering Conditions

- Lead Solder

Max. 300 °C for Max. 3sec, and only one time.

- Lead-free Solder

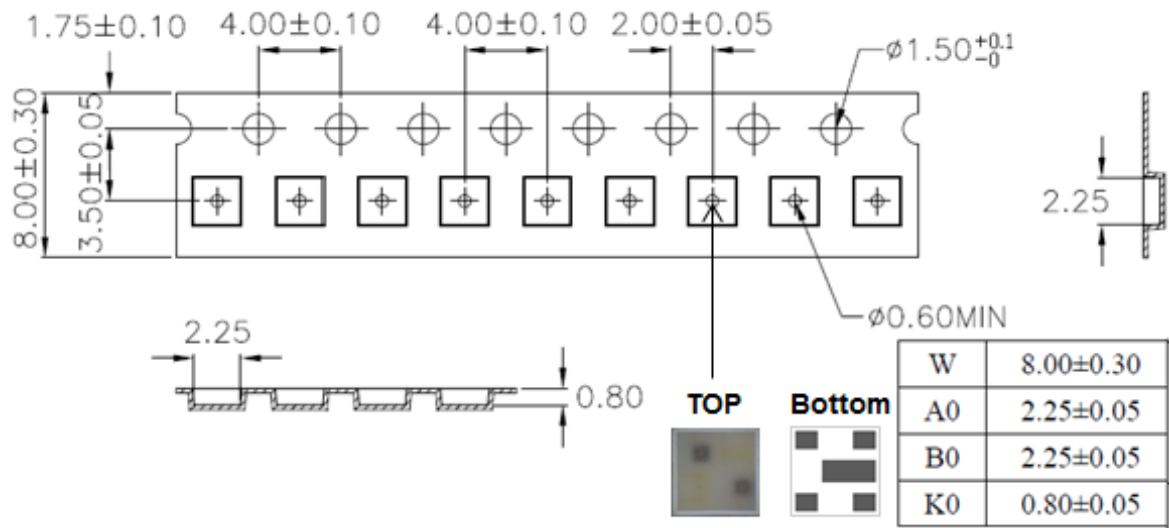
Max. 350 °C for Max. 3sec, and only one time.

- 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.

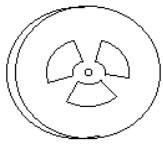
- Reflow soldering should not be done more than two times

Dimensions (Unit :mm)

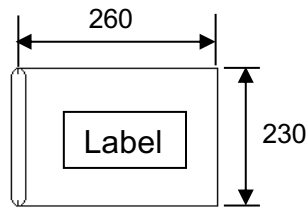
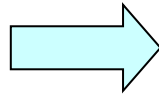


Item	Spec.	Tolerance(mm)	Item	Spec.	Tolerance(mm)
W	8.00	± 0.30	P1	4.00	± 0.1
E	1.75	± 0.10	P2	2.00	± 0.1
F	3.50	± 0.05	T	0.20	± 0.05
D0	1.50	$+0.10, -0$	A0	2.25	± 0.05
D1	0.60	± 0.10	B0	2.25	± 0.05
P0	4.00	± 0.1	K0	0.80	± 0.05

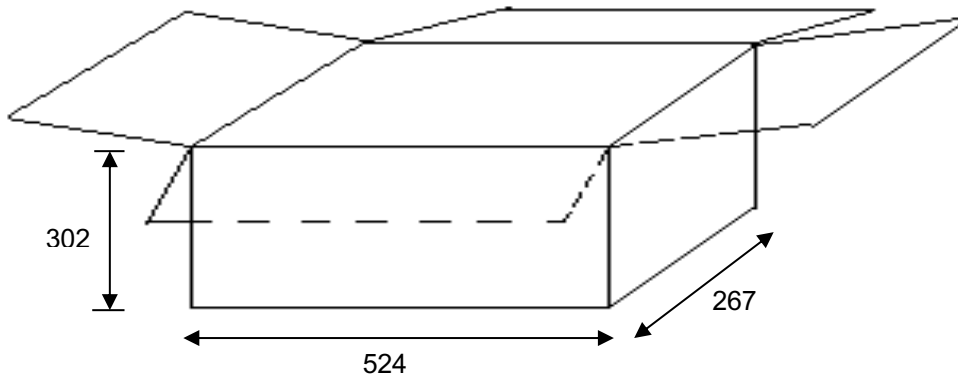
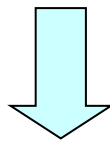
Packing Formation



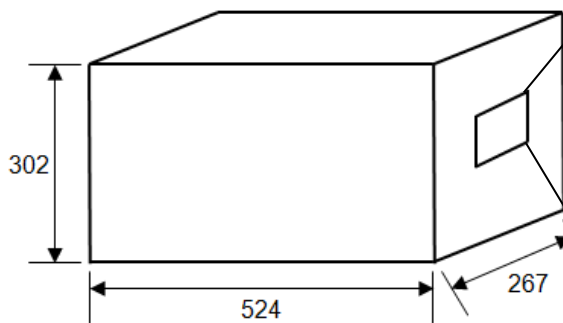
Diameter : 178 mm
 Width : 8 mm
 2,000 pcs/Reel
 Antistatic Reel



MBB Bag
 +5g drying agent
 +Humidity card
 1 Reel / Bag



Package Outlook



 Solid-State Light. Done Right. Advanced Optoelectronic Technology Inc.	
Customer	
PO No.	
Part No.	
Quantity	
Packing Date	
Carton No.	
Ship No.	
QC Check	 
備註	

Moisture Level(MSL Level)

MSL label is attached on the Aluminum bag and Reel



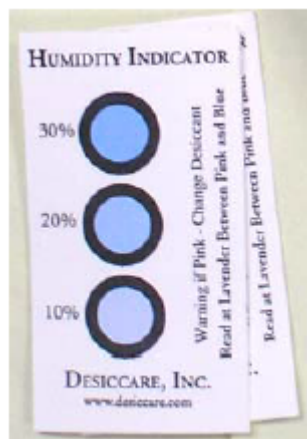
Moisture Level(MSL Level)

Silica gel is enclosed in the Aluminum bag. (Size : 8 cm x 5 cm / Weight : 8 gr.)



Moisture Level(MSL Level)

Humidity indicator is enclosed in the Aluminum bag. (Size : 8 cm x 9 cm)



Reel Label Definition

SMD LED, Top View Pure White Model
Model Name : 2020C-D501
Part Number : CKKWD5000-BZ00
Brightness : A
Wd : B
Vf : C
Quantity : nn ea
Serial No : SHyymmddxxx



A : Iv value noted, (A,B,C,)
B : Wd value noted,(W1,W2,W3,W4)
C : Vf value noted, (A0,A1,A2,A3)
nn : Quantity of LED

SHyymmddxxx : yy : year, mm : month, dd : day, xxx : reel no

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

Reliability Test

No.	Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
1	LTO_-40°C	JESD22-A108	I _F =20mA Ta=25°C	1000 hr	0/20
2	HTHHO(60°C/90%RH)	JESD22-A119	60°C, 90%RH, I _F =20mA	1000 hr	0/20
3	HTO_65°C	JESD22-A108	Ta=65°C, I _F =20mA	1000 hr	0/20
4	HTO_85°C	JESD22-A108	Ta=85°C, I _F =20mA	1000 hr	0/20
5	HTS_100°C	JESD22-A103	Ta=100°C	1000 hr	0/20
6	LIFE	NA	I _F =20mA Ta=25°C	1000 hr	0/20
7	TST-(-40°C~100°C)	JESD22-A106	-40°C~100°C	300 cycles	0/50

Criteria for Judging Damage

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V _F	I _F =20mA	-	*U.S.L×1.1
Radiant Intensity	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, 60%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 handling 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: $V_F > 1.9V$ at $I_F = 1\mu A$

(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



Solid-State Light. Done Right.

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

When performing the characteristics inspection of the LEDs in your application, customer is advised to check on the LEDs whether or not they are damaged by ESD, Such damage can be detected during forward voltage measurement or light up test at low current. (The recommended current is 1mA or lower)

ESD-damaged LEDs may have a current flow at low voltage, or no longer light up at low current, Failure Criteria: $V_F < 1.9V$ at $I_F = 1\mu A$

(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.

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