

APPROVAL SHEET

AOT MODEL NAME	4821
AOT PART NUMBER	4821C-D501
CUSTOMER NAME	General
DATE	2020 / March
Version	02

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

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



Solid-State Light. Done Right.

Revision Note

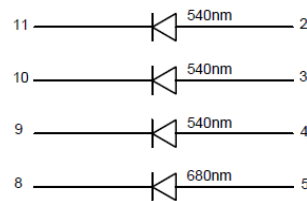
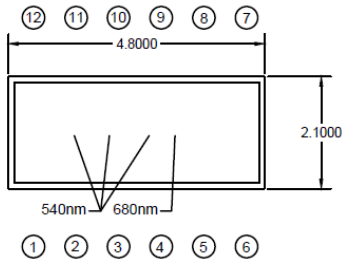
Date	Revision	Page	Version
2019-04-12	Initiate Document	15	01
2020-04-30	Add moisture card	15	02

Package Outline

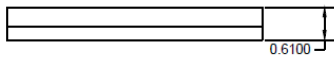
Model name: 4821C-D501

Unit: mm, Tolerance: ± 0.2 mm

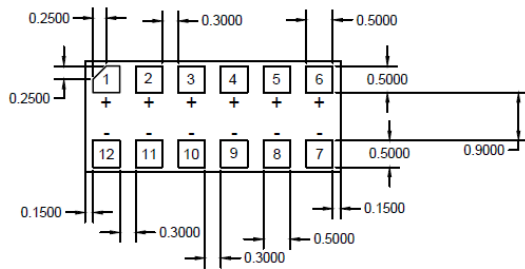
Top view



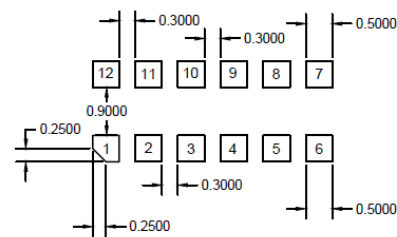
Front view



Bottom view



Recommended Soldering Pad Pattern



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

- High density Red/Green emitter.
- High brightness SMD.
- Compact package outline (LxWxH) of 4.8 mm x 2.1 mm x 0.61 mm.
- Compatible with reflow soldering.
- Complies with RoHS Directive.

Optical/Electronic Characteristics (Ts=25°C)

(675nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$	--	1.9	2.4	V
Luminous Flux	ϕ_v	$I_F = 20\text{mA}$	3.2	4		mW/sr
Wavelength	λ_p	$I_F = 20\text{mA}$	670	--	680	nm
View Angle	θ	$I_F = 20\text{mA}$	--	120	--	deg
Thermal Resistance	$R_{\text{th-s-j}}$	$I_F = 20\text{mA}$	--	80	-	°C/W

Notes: Optical and electronic testing condition is based on 50ms pulse.

(540nm)

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$	--	2.5	2.9	V
		$I_F = 120\text{mA}$	--	--	3	
Luminous Flux	ϕ_v	$I_F = 20\text{mA}$	2100	3000	--	mcd
Wavelength	λ_p	$I_F = 20\text{mA}$	530	--	550	nm
View Angle	θ	$I_F = 20\text{mA}$	--	120	--	deg
Thermal Resistance	$R_{\text{th-s-j}}$	$I_F = 20\text{mA}$	--	80	-	°C/W

Notes: Optical and electronic testing condition is based on 50ms pulse.

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

* Tolerance of measurements of the Luminous Flux is $\pm 10\%$.

Absolute Maximum Ratings (Ts=25°C)

Item	Symbol	Color	Absolute Maximum Rating	Unit
Forward Current	I _F	R(680nm)	60	mA
		G(540nm)	150	
*Pulse Forward Current	I _{FP}	R(680nm)	120	mA
		G(540nm)	300	
Power Dissipation	P _D	R(680nm)	0.6	W
		G(540nm)	0.6	
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	680nm	540nm	Unit
A0	Ta=25°C If=20mA	1.6-2.4	2.1-2.3	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	680nm	540nm	Unit
A	Ta =25°C If=20mA	3.2-6	2100-2500	mW/sr (for >660nm)
B			2500-2900	
C			2900-3300	
D			3300-3700	mcd (for 540nm)
E			3700-4300	
F			4300-4700	

Notes: Luminous flux tolerance is $\pm 10\%$.

Group Wavelength Rank

Rank	Condition	680nm	540nm	Unit
W1	Ta =25°C If=20mA	670-680	530-535	nm
W2			535-540	
W3			540-545	
W4			545-550	

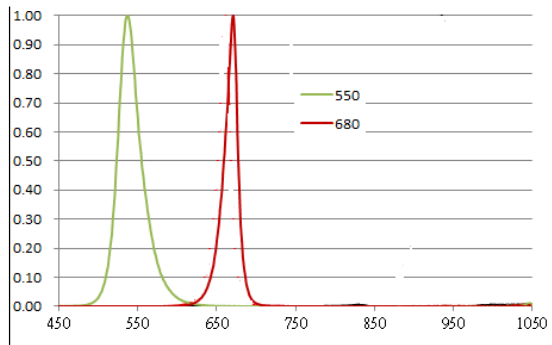
Notes: Wavelength measurement tolerance is $\pm 1nm$.

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

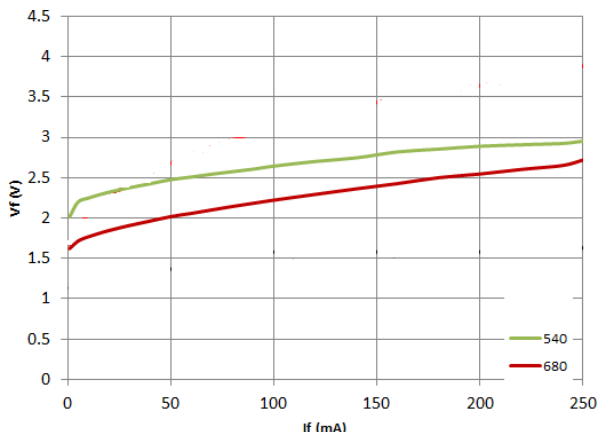
The percentage of each rank in the shipment shall be determined by AOT.

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

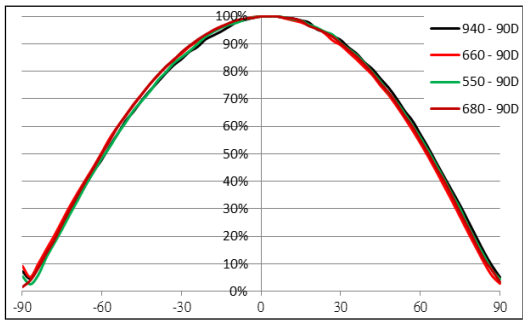
Color Rank



Forward Current vs. Forward Voltage

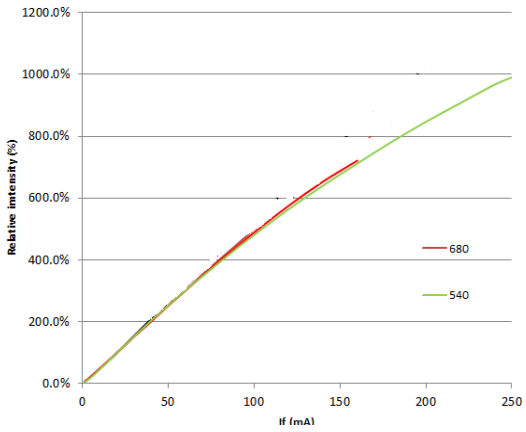


Radiation Pattern

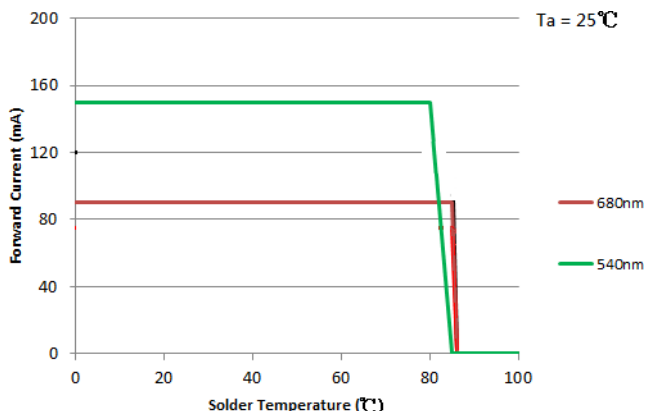


Forward Current vs. Relative Luminous Flux

Flux



Allowable Forward Current vs. Ambient Temperature



Note:

Chromaticity coordinate groups are measured with an accuracy of ± 0.005 .

Recommended Reflow Soldering Conditions

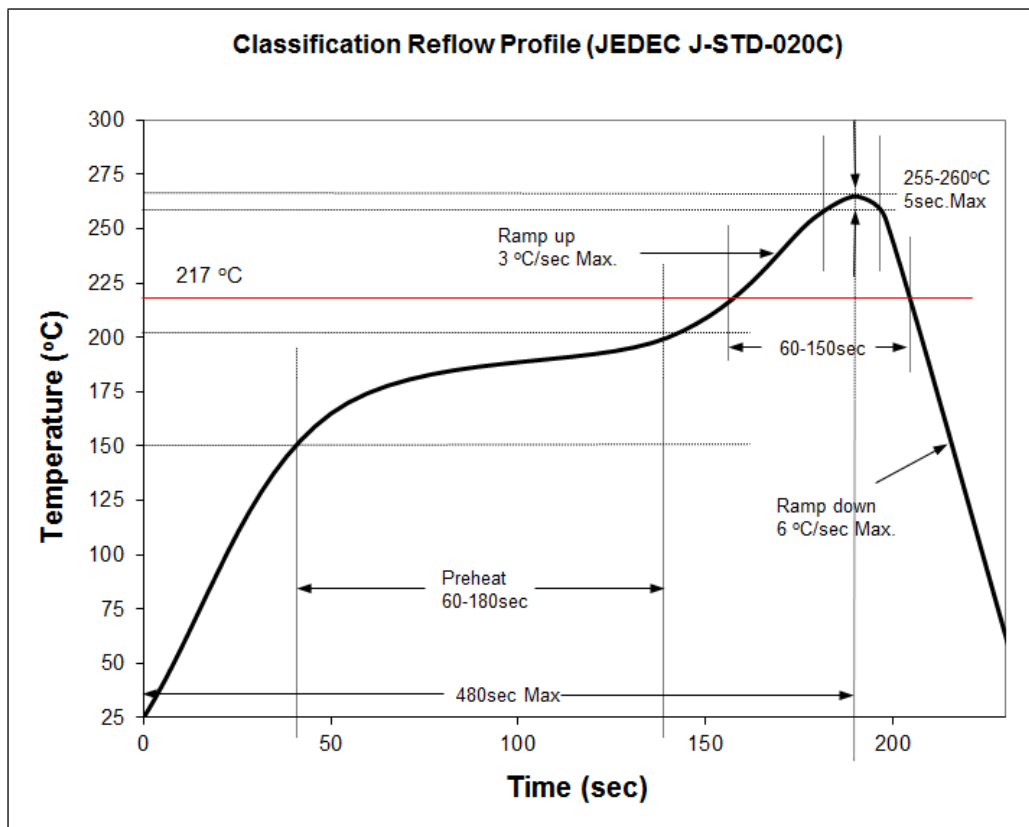
Surface Mounting Condition

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.

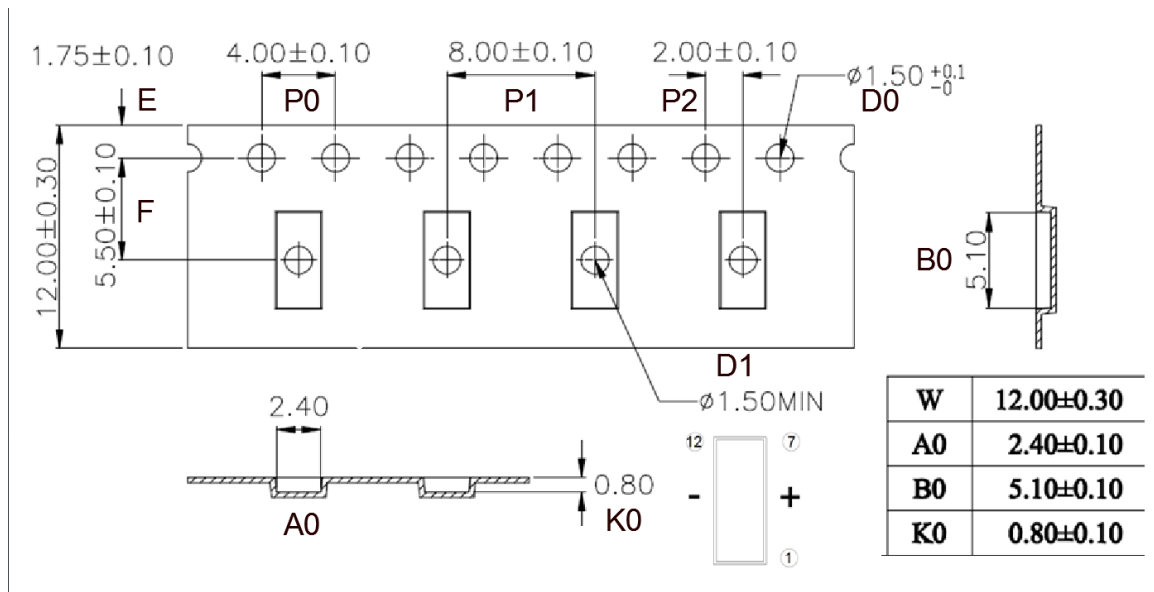
(1) Lead-Free Solder



(3) Manual Soldering Conditions

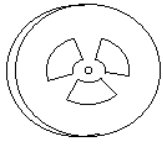
- Lead-free Solder
 - Max. 260 °C for Max. 5sec, and only one time.
- There is possibility that the brightness of LEDs is decreased, which is influenced by heat or ambient atmosphere during reflow. It is recommended to use the nitrogen reflow method.
- After LEDs have been soldered, repair should not 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)

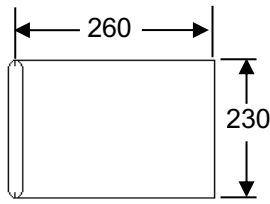


Item	Spec.	Tolerance(mm)	Item	Spec.	Tolerance(mm)
W	12.00	±0.30	P1	8.00	±0.1
E	1.75	±0.10	P2	2.00	±0.1
F	5.50	±0.1	T	0.30	±0.05
D0	1.50	+0.10, -0	A0	2.40	±0.1
D1	1.50	±0.10	B0	5.10	±0.01
P0	4.00	±0.1	K0	0.80	±0.1

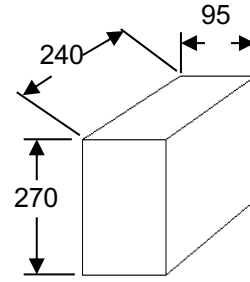
Packing Formation



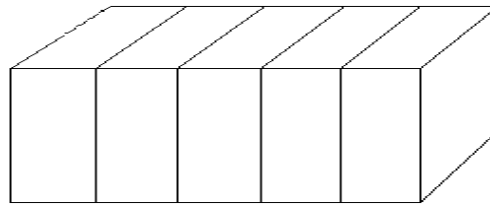
Diameter : 178 mm
 Width : 12mm
 1000 pcs/Reel
 Antistatic Black Reel



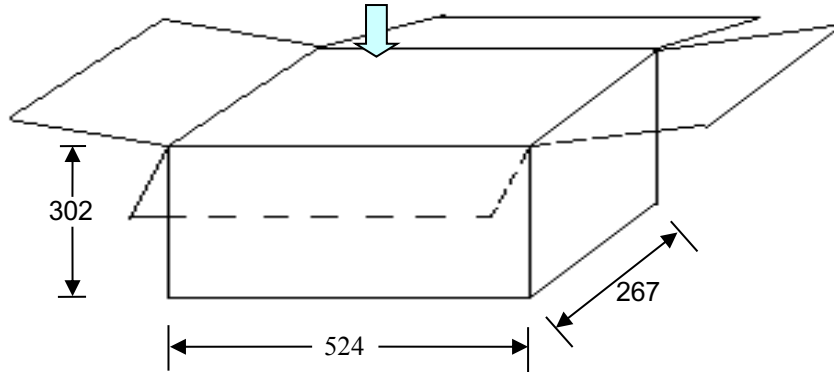
Antistatic Shielding Aluminum Bag
 1 Reel / Bag



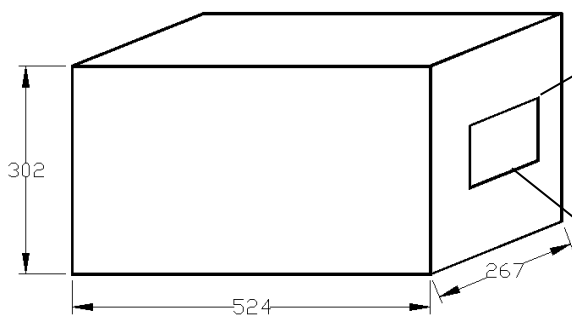
5 Bags / 1 Inner Box
 5000 pcs/ 1 Inner Box




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



Package Outlook



 Advanced Optoelectronic Technology Inc.	
Customer	
Part Number	
Quantity	
Date	
Remarks	

AOT

Solid-State Light. Done Right.

Moisture Level(MSL Level)

MSL label is attached on the Aluminum bag and Reel



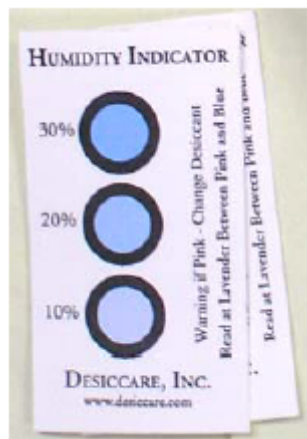
Moisture Level(MSL Level)

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 : 4821C-D501
Part Number : CDLWD5001-1Z00
Brightness : A
Wd : B
Vf : C
Quantity : nn ea
Serial No : SHyymmddxxx



A : Iv value noted, (A,B,C,D,E,F)
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 oC	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

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.



Solid-State Light. Done Right.

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.

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.