

Customer : Standard  
Date : 2018.02.07  
Rev. : 1.0

## SPECIFICATIONS FOR APPROVAL






UV LED Module

$\lambda$ p	Model P/N	Customer P/N
278nm	LLHMA32-00JB02B	-



APPROVAL	REMARK	APPENDIX
<del> </del>		

DESIGNED	CHECKED	APPROVED
'18.02.07	'18.02.07	'18.02.07
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### 1. Features

- These specifications are the description related to all electrical and structural specifications and reliable for Water Purifier 2mW UVC module .
- LED Module Type : SMD Ass'y
- Lighting Color(Peak Wavelength) : 278nm
- Model Name : LLHMA32-00JB02B

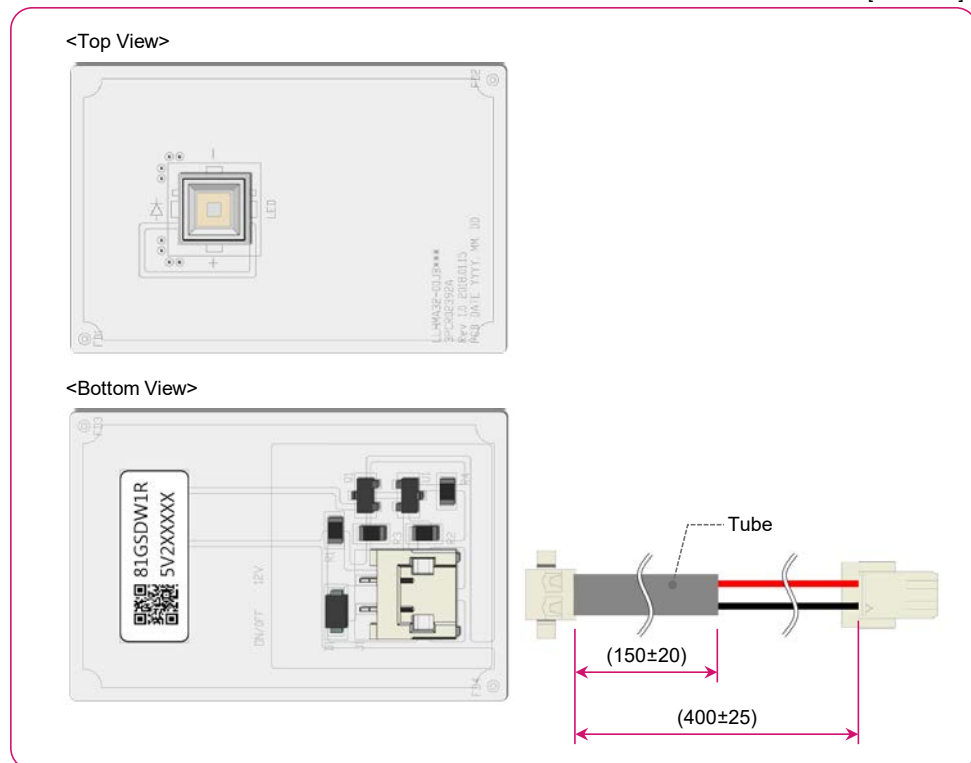
### 2. Application

- Water Purifier UV Sterilization

### 3. Outline Dimensions and Part List

#### 3-1. Exterior of Product

[Unit : mm]



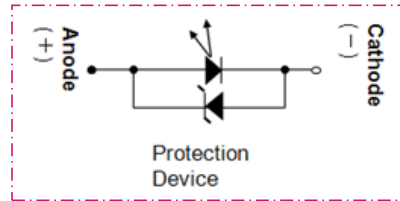
Items	Condition	Min.	Typ.	Max.	Unit	Remarks
UVC Module	L x W	37.7x24.7	38.0x25.0	38.5x25.3	mm	PCB Dimension
	Thickness	1.50	1.65	1.80	mm	

- ※ The visual inspection of the Product complies the internal standards of LG Innotek.  
 -. When measuring the PCB Dimension, Burr is excluded.

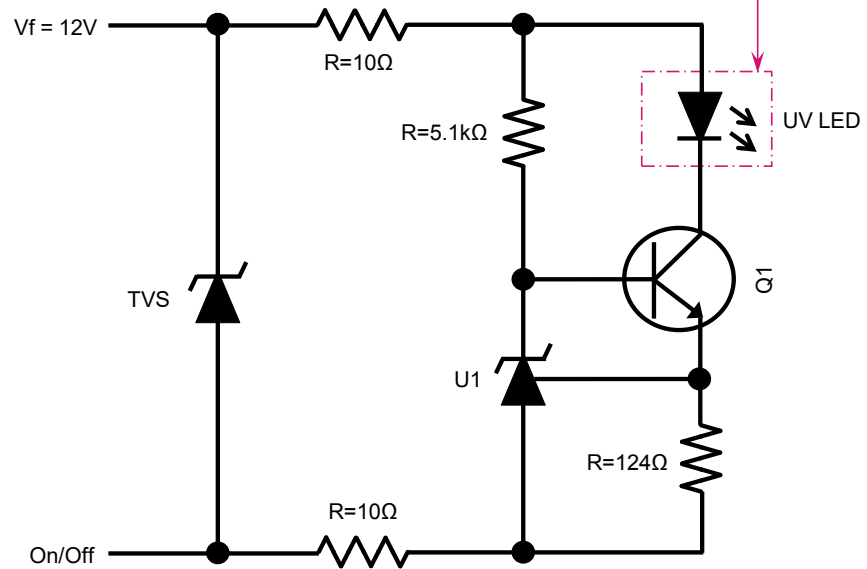
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4. Schematic Diagram

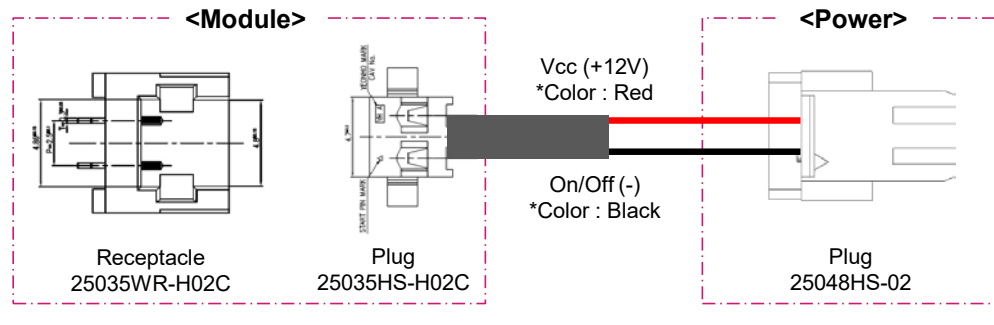
1) LED



2) Module



3) Connector and Harness Assembly



07/18 / V02 / IF / Iq/llhms32-00fb02b\_standard\_uvc\_led\_module\_278nm\_3mW\_iip7

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### 5. LED PKG Rank Information

[Ta=25°C, If=20mA]

Items	Rank	Min.	Typ.	Max.	Unit
Peak Wavelength	DW1	265	278	285	nm
Radiant Flux	R8	3.4	-	3.8	mW
	R7	3.1	-	3.4	
	R6	2.8	-	3.1	
	R5	2.5	-	2.8	
Forward Voltage	V3	6.75	-	7.30	V
	V2	6.25	-	6.75	
	V1	5.70	-	6.25	

### 6. Electro-Optical Characteristics

[Ta=25°C]

Items	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Forward Current	If	Vf = 12V	18.0	21.6	25.0	mA
Radiant Flux	$\Phi_e$	Vf = 12V	2.5	2.8	3.8	mW
Irradiance	-	Vf = 12V	0.45	0.59	0.83	mW/cm <sup>2</sup>
Peak Wavelength	$\lambda_p$	Vf = 12V	265	278	285	nm
IP	-	-	X7	-	-	-

※ The UVC module measures only Irradiance and Current during production.

※ These values measured by optical spectrum analyzer(for Irradiance) and integrating sphere(for Radiant Flux) in the LG Innotek measuring systems.

And Tolerances are followings as below.

- Forward Current (mA) : ±5%
- Radiant Flux ( $\Phi_e$ ) : ±10%
- Irradiance : ±10%
- Peak Wavelength ( $\lambda_p$ ) : ±3.0nm

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### 7. Reliability Test Items and Conditions

#### 7-1. Failure Criteria

Items	Symbol	Test Condition	Criteria	
			Min.	Max.
Forward Current	$I_F$	DC 12V	Initial Value $\times$ 0.75	Initial Value $\times$ 1.15
Radiant Flux	$\Phi_e$	DC 12V	Initial Value $\times$ 0.5	-

#### 7-2. Reliability Test

No	Items	Test Conditions	Test Hours /Cycles	Sample Size	Ac/Re
1	Room Temp. Operating Life (RTOL)	Ta = 25°C, DC 12V (If = 20mA/LED)	500 Hours	10ea	0/1
2	Room Temp. Operating Life 2 (RTOL)	Ta = 25°C, DC 12V (If = 30mA/LED)	500 Hours	5ea	0/1
3	Wet High Temp. Operating Life (WHTOL)	Ta = 40°C, RH = 90%, DC 12V (If = 20mA/LED)	500 Hours	5ea	0/1
4	Wet High Temp. on/off test	Ta = 40°C, RH = 90%, DC 12V On 5Sec./Off 5Sec.(If = 20mA/LED)	500 Hours	5ea	0/1
5	High Temp. Operating Life (HTOL)	Ta = 60°C, DC 12V (If = 10mA/LED)	500 Hours	5ea	0/1
6	Low Temp. Operating Life (LTOL)	Ta = -40°C, DC 12V (If = 20mA/LED)	500 Hours	5ea	0/1
7	High Temp. Storage Life (HTSL)	Ta = 100°C	500 Hours	5ea	0/1
8	Low Temp. Storage Life (LTSL)	Ta = -40°C	500 Hours	5ea	0/1
9	Wet High Temp. Storage Life (WHTSL)	Ta = 60°C, RH = 90%	500 Hours	5ea	0/1
10	Temp. Cycle (TC)	-40°C(30min) ~ 25°C(5min) ~ 100°C(30min) ~ 25°C(5min)	100 Cycles	5ea	0/1
11	Electrostatic Discharge (ESD_Air) * Measuring Parts : Terminal	R = 1.5kΩ, C = 100pF @15kV : Operate Normally @20kV : No Defect	10 Times	3ea	0/1
12	Vibration	1.3G, 5~55hz, 3 directions, 1hr/axis	3hr	3ea	0/1
13	Thermal Shock	Ta = 125°C, 15min Ta = -45°C, 15min.	300 Cycles	5ea	0/1

\* All samples must pass each test item and all test items must be satisfied.

\* If model is applied same LED compare with base model, reliability test can be skip.

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### 8. Standard Test Conditions

#### 8-1. Standard Test Environments

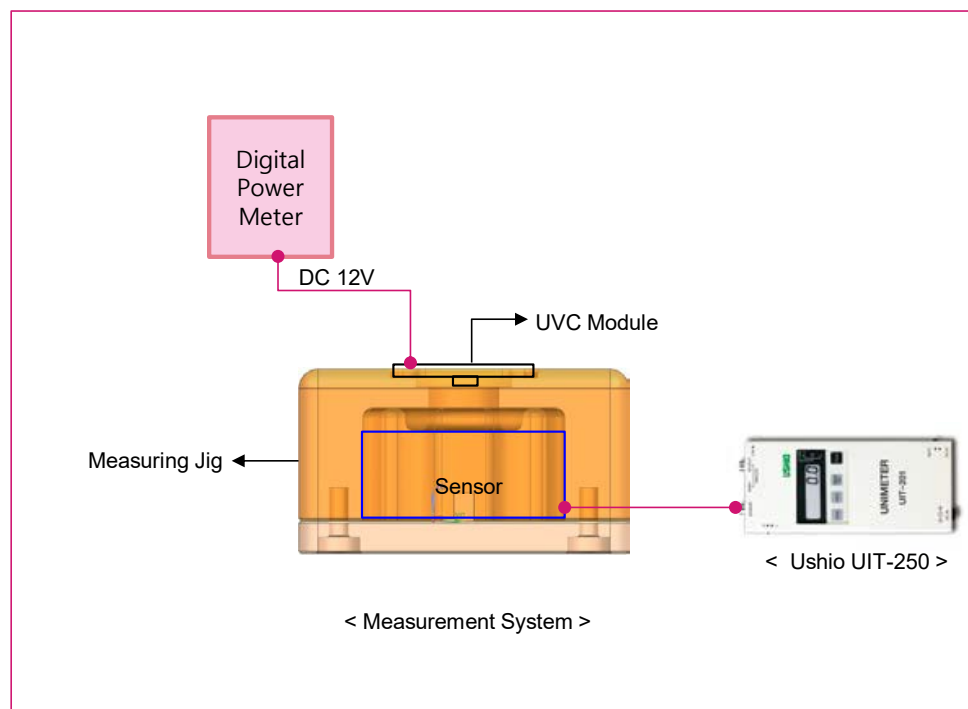
- Temperature & Humidity : 20~30 °C , 65% (RH)

#### 8-2. Standard Test Methods

- Equipment : Digital Power Meter, Accumulated UV Meter
- Operating Condition : DC Power

#### 8-3. Measurement System

- Aging : Lighting test starts under 3 sec.



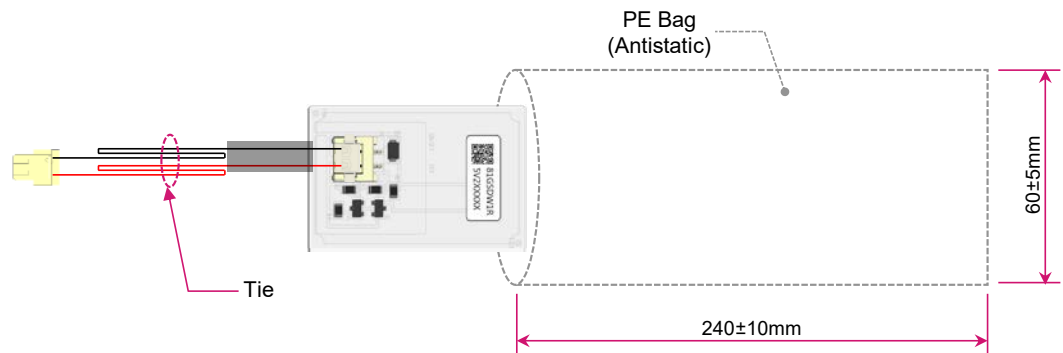
※ Measurement tolerance : Forward Current (mA) :  $\pm 5\%$  , Irradiance :  $\pm 10\%$

※ Measurement system can be changed by LG Innotek without prior notice.

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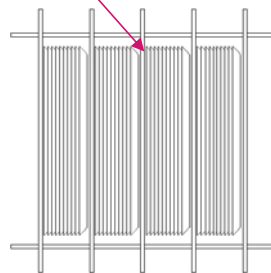
### 9. Packing and Labeling of Products

#### 9-1. Packing Specifications

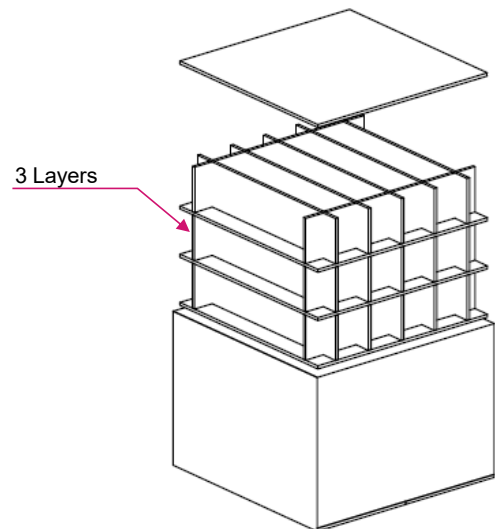


Box Specification	
Size (mm)	356 x 356 x 282 (L x W x H)
Module / Box	120 EA

10 EA / Partition



<TOP VIEW>



<SIDE VIEW>

※ Packing Specifications can be changed by LG Innotek without prior notice.



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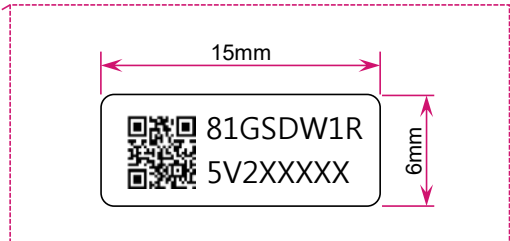
### 9-2. Labeling (Module)

▪ Position of Label



<Example>

▪ Size of Label



▪ Traceability Code Table

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Manufacture Year / Month / Date			Manufacturer	$\lambda_p$ Peak Wavelength			Radiant Flux		PKG Vf		Serial No.				
Year : 2018 → 8 Month : 1 → 1 Date : 16 → G			S(Sung-ji)	D	W	1	R	5	V	2	00001~99999				

**SMT Year/Month Code.**

Code	Year	Code	1	2	3	4	5	6	7	8	9	X
8	2018	Month	1	2	3	4	5	6	7	8	9	10
9	2019	Code	Y	Z								
0	2020	Month	11	12								

**SMT Date Code.**

Code	1	2	3	4	5	6	7	8	9	A	B	C
Date	1	2	3	4	5	6	7	8	9	10	11	12
Code	D	E	F	G	H	J	K	L	M	N	P	Q
Date	13	14	15	16	17	18	19	20	21	22	23	24
Code	R	S	T	U	V	W	X					
Date	25	26	27	28	29	30	31					

**Peak Wavelength Code**

Code	Bin
DW1	DW1

**Flux Code.**

Code	Bin
R5	R5
R6	R6
R7	R7
R8	R8

**Vf Code.**

Code	Rank
V1	V1
V2	V2
V3	V3

※ The size and contents of Label can be changed by LG Innotek without prior notice

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### 9-3. Labeling (Box)

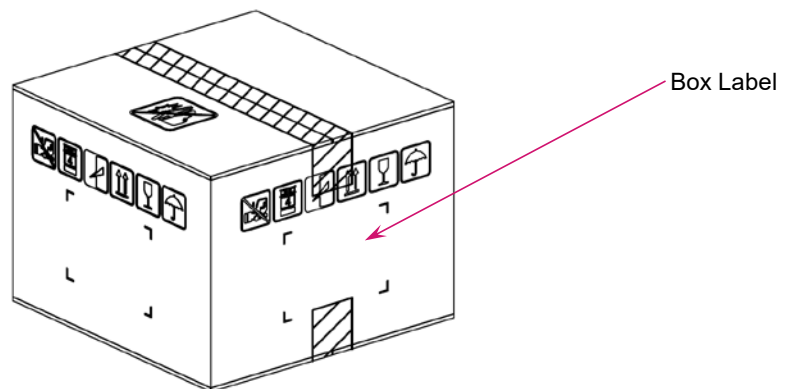
▪ Out Box Label

Customer		-
Customer P/N		-
Supplier P/N		LLHMA32-00JB02B
Desc		LED Assembly
Supplier Name		LG INNOTEK
Packing Qty	Lot	C/T No
120		
Made in Korea		YYYY.MM.DD

} 80mm

} 105mm

▪ Position of Label

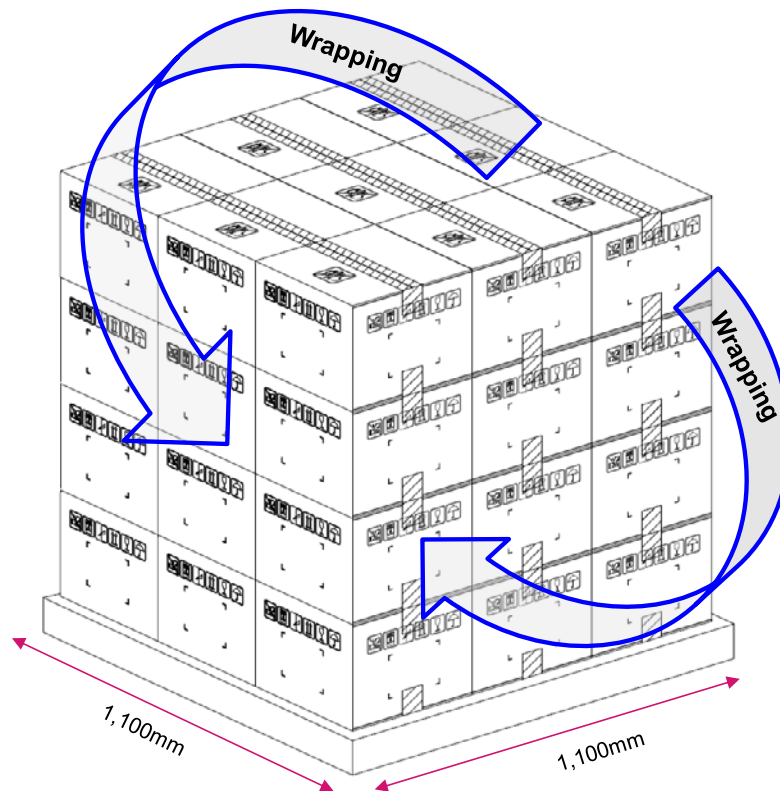


※ The size and contents of Label can be changed by LG Innotek without prior notice

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### 9-4. Pallet Packing

- Boxes are stacked with 4 layers on a pallet (Each layer contains 9 boxes)



※ The Pallet Packing can be changed by LG Innotek without prior notice

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### 10. Cautions on Use

#### 10-1. Moisture-Proof Package

- The moisture in the SMD package may vaporize and expand during soldering.
- The moisture can damage the optical characteristics of the LEDs due to the encapsulation.

#### 10-2. During Storage

When storing this products for a long time (over one week).

- Store the products in a dark place. Do not expose these product to sunlight.
- Store the products in the following conditions 5 °C ~ 30 °C, < RH 60%, and < 672 hrs.
- Do not keep it in environment exposed to Sulfur gas or Sulfur-contained material.
- Do not open box before this products are ready to use.

#### 10-3. During Usage

- The LED should be avoided direct contact with hazardous materials such as sulfur, chlorine, phthalate, acid, solvent, etc. These materials(S, Cl, VOCs, etc) may cause sulfurization of lead-frame or encapsulant silicone discoloration in LED.
- VOCs(Volatile Organic Compounds) can be generated from adhesives glue, cleaning flux, molding hardener or organic additive which used in luminaires fixtures and they(VOCs) may cause a significant Radiant Flux & Irradiance degradation of LED in Products when they exposed to heat or light. To prevent this phenomenon, materials used in Products must be carefully selected by users.
- The metal parts on the LED can rust when exposed to corrosive gases. Therefore, exposure to corrosive gases must be avoided during operation and storage.
- The metal parts also can be affected not only by the corrosive gases emitted inside of the end-products but by the gases penetrated from outside environment.
- Extreme environments such as sudden ambient temperature changes or high humidity that can cause condensation must be avoided.

#### 10-4. Cleaning

- Do not use brushes for cleaning or organic solvents (i.e. Acetone, TCE, etc..) for washing as they may damage the resin of the LEDs.
- IPA is the recommendable solvent for cleaning the LEDs under the following conditions.  
Clearing Condition : IPA, 25°C max. × 60 sec max.
- Ultrasonic cleaning is not recommended.
- Pretests must be followed by the actual cleaning processes to avoid any possible damages to the LEDs.

#### 10-5. Safety for Human Eyes

- Do not view directly in to the deep UV(UVC) light of UV LED driven at low current or the LED with optical instruments for measuring such as radiant flux, light distribution and spectrum, etc.
- Do not expose to the human body and eyes during the LED light emitting.
- Do not directly look at the light when the LEDs are on.
- Proceed with caution to avoid the risk of damage to the eyes when examining the LEDs with optical instruments.

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### 10-6. Electro Static Discharge(ESD)

- The LEDs are sensitive to static electricity or surge voltage and current.  
The Electrostatic Discharge can damage a LED Chip.  
Also, It can be affect a reliability belong to the life time of LED package.  
When handling LEDs, the following measures against ESD are actively recommended :
  - 1) Please wear a wrist strap, anti-static clothes, foot wear and gloves.
  - 2) Please set up a grounded or anti-static paint floors, a grounded or the ability to surge protection  
- workstation equipment or power supply, pulse generator, current/voltage driver circuit, etc. and tools.
  - 3) ESD protection- worktable/bench, mat made of a conductive materials.
- An appropriate grounding is required for all devices, equipment, and machinery used in product assembly.  
Please apply surge protection after review when designing of commercial products.
- If tools or equipment contain insulating materials such as glass or plastics,  
the following measures against ESD are strongly recommended :
  - 1) Dissipating static charge with conductive materials
  - 2) Preventing charge generation with moisture
  - 3) Plug in the ionizing blowers(ionizer) for neutralizing the charge
- The customer is advised to check if the LEDs are damaged by ESD when performing  
the characteristics inspection of the LEDs in the application.  
Damage of LED can be detected with a forward voltage checking(measuring) at low current( $\leq 1.0\text{mA}$ ).
- ESD damaged LEDs may have a current flow at a low voltage.  
\* Failure Criteria :  $V_f < 4.0\text{V}$  at  $I_f = 0.5\text{mA}$ .

### 10-7. Thermal Management

- The thermal management is the most important thing of the hear dissipation(cooling) performance  
for the deep UV(UVC) LED Package.
- The thermal design of the product must be seriously considered even from the beginning stage.
- The co-efficiency between the heat generation and the input power is affected by the thermal resistance of  
the circuit boards and the density of the LED placements together with other components.
- The deep UV(UVC) LED soldered on a metal PCB with a high thermal conductivity.  
Or Please combine the deep UV(UVC) LED with a metal PCB and a large volume-Heat Sink(Heat Block),  
a mini(compact / slim)-air or water cooler, etc.
- Please design the LED module or system in customer that the temperature of the LED Package  
does not exceed the maximum junction temperature( $T_j$ ).

### 10-8. Loading and Unloading

- When the boxes are loaded into a container, be sure the boxes fill the container completely.
- If the boxes are not able to fill a container, fill the container fully with supporting materials.
- Handle with care, when the boxes are loaded into a container also unloaded.
- Prevent the packings from drop, throwing, rolling, upside-down and every harmful method when  
handing a box.

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### 11. Disclaimers

- LG Innotek is not responsible for any damages or accidents caused if the operating or storage conditions exceed the absolute maximum ratings recommended in this document.
- The LEDs described in this document are intended to be operated by ordinary electronic equipment.
- Consult LG Innotek, sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs, may directly jeopardize life or health.
- It is recommended to consult with LG Innotek when the environment or the LED operation is non-standard in order to avoid any possible malfunctions or damage to product or risk of life or health.
- Disassembly of the LED products for the purpose of reverse engineering is prohibited without prior written consent from LG Innotek. All defected LEDs must be reported to LG Innotek and are not to be disassembled or analyzed.
- The product information can be modified and upgraded without prior notice.

