

CUSTOMER : LGE

DATE : 2014.09.03

REV : 2.0

SPECIFICATIONS FOR APPROVAL

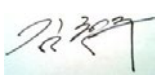




Air Washer Sterilization UV LED Module

λ p	Model Name	Customer P/N
278nm	LLHML32-03JA01A	-

RoHS
Compliant

APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED
'14.09.03	'14.09.03	'14.09.03
C. J. KIM	T. Y. CHOI	S. H. LEE
		

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1. Features

- These specifications are the description related to all electrical and structural specifications and reliable for LGE Air-Washer sterilizing UV LED module .
- LED Module Type : SMD Assy
- Lighting Color(Peak Wavelength) : 278nm
- Model Name
LLHML32-03JA01A

2. Application

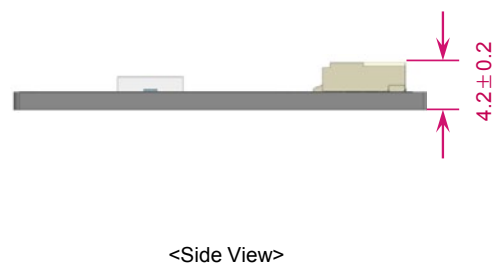
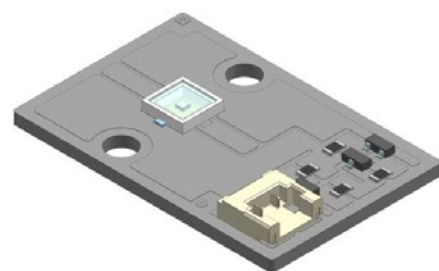
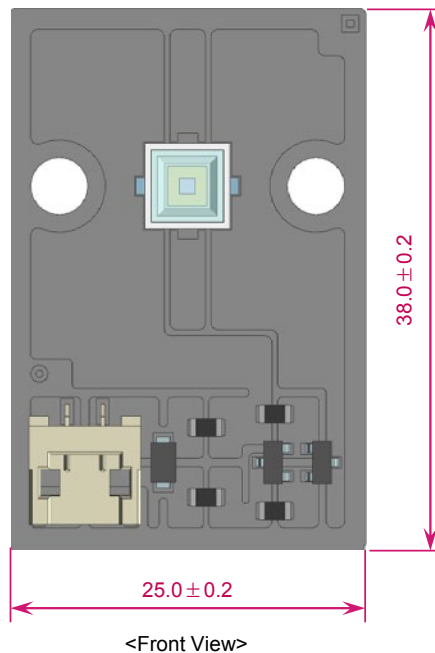
- Air-Washer UV Sterilization

3. Outline Dimensions and Part List

3-1. Exterior of Product

[Unit : mm]

[Module]

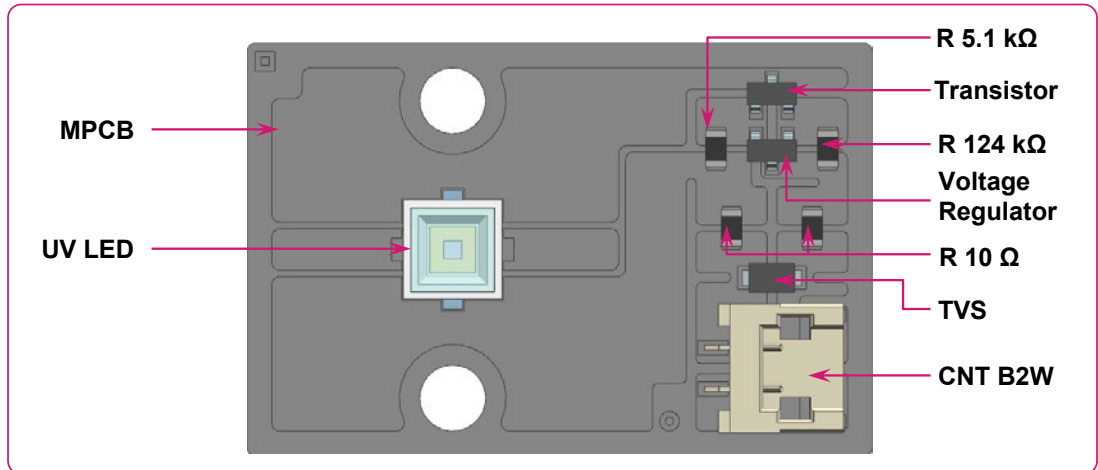


Items	Condition	Min.	Typ.	Max.	Unit	Remarks
Air Washer	L x W	37.8x24.8	38.0x25.0	38.2x25.2	mm	
	Total Height	4.0	4.2	4.4	mm	

※ The visual inspection of the Product complies the internal standards of LG Innotek

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3-2-1. Product Composition



3-2-2. Parts List

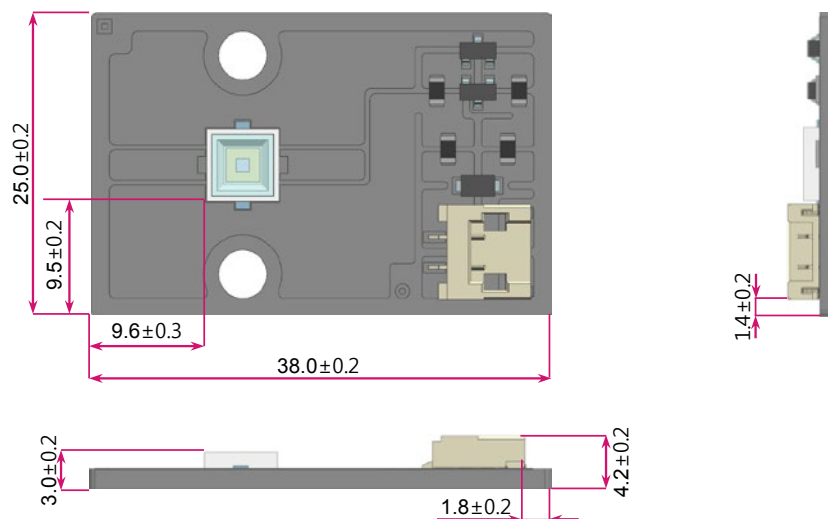
Part Number (LGIT)	Item	Spec.	Unit	Qty.
3PCM00173A	Metal PCB	38 mm x 25 mm, 1.6T, Al, 1oz, BK	EA	1
LEUVA66B00HF00	UV LED	6060 UV-C LED 278nm	EA	1
3CCS2S0022A-H	CNTB2W	25035WR-H02C, 2pin	EA	1
2RF512FE40T-F	R 5.1k	5.1 kΩ, 1%(F), 2012	EA	1
2RSC00423A	R 124	124 Ω, 1%(F), 2012	EA	1
2RF100JE40T-F	R 10	10 Ω, 5%(J), 2012	EA	2
2IP4310AATC-R	Voltage Regulator	AS431ANTR-E1, SOT-23-3, BCD	EA	1
2TS2222CATB-R	Transistor	SMMBT2222ALT1G, SOT-23-3	EA	1
2DIT00028A	TVS Diode	SMF16A, SOD-123F	EA	1
5000KC0117A-H	Solder Paste	Sn96.5 Ag3 Cu0.5	KG	-
5PKC00242A	Carton Box	375*315*180*8mm(W*L*H*T)	EA	0.002
3330KG0001A	Silicagel	FABRIC, 45*50mm(W*L), 5g	EA	0.01
5PKQ00562A	Tray Lower	PET, 355*295*16, 0.8 mm (W*L*H*T)	EA	0.01
5PKQ00562B	Tray Upper	PET, 355*295*29, 0.8 mm (W*L*H*T)	EA	0.01
5PKB00055A	PE Bag	PE, 450*350mm, GREY, ANTI-STATIC	EA	0.01
3TAT00288A	PCB Label	PAPER, 6×15mm, WHITE	EA	1
5PKG00400A	Box Label	PAPER, 117×61mm, WHITE	EA	0.002

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3-3-1. Module Dimension

[Unit : mm]

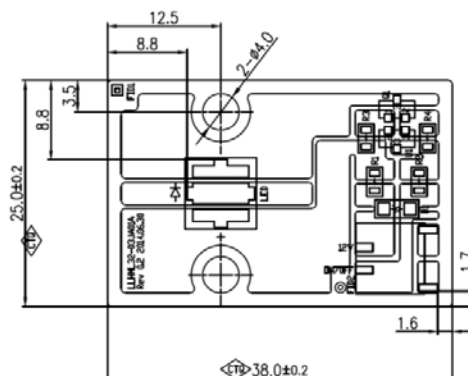
[Module]



3-3-2. LED PCB Dimension

[Unit : mm]

[PCB]



※ PCB Thickness : 1.6 ± 0.15 mm(Including the copper of the PCB)

※ PCB Tolerances unless otherwise specified : ± 0.2 mm

Items	Condition	Min.	Typ.	Max.	Unit	Remarks
Engine	Length	37.8	38.0	38.2	mm	Module height is the height of CNT
	Width	24.8	25.0	25.2	mm	
	Height	4.0	4.2	4.4	mm	
PCB	Length	37.8	38.0	38.2	mm	Al Cu : 1oz
	Width	24.8	25.0	25.2	mm	
	Thickness	1.55	1.6	1.75	mm	

4. Schematic Diagram

STAR Plug
25035WR-H02C-S

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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	R4	2.20	-	2.8	mW
	R3	1.90	-	2.20	
	R2	1.60	-	1.90	
	R1	1.28	-	1.60	
Forward Voltage	V3	7.0	-	7.5	V
	V2	6.5	-	7.0	
	V1	5.9	-	6.5	

※ R1 Rank is not available to apply in the Module.

6. Electro-Optical Characteristics

[Ta=25°C]

Items	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Forward Voltage	Vf	Vf = 12V	-	12	-	V
Forward Current	If	Vf = 12V	18.3	21.6	24.9	mA
Radiant Flux	Φe	Vf = 12V	1.6	2.0	2.8	mW
Peak Wavelength	λp	Vf = 12V	265	278	285	nm

※ These values measured by Optical Spectrum Analyzer and Integrating Sphere Measuring System.
And Tolerances are followings as below

- Forward Voltage (Vf) : ±2%
- Radiant Flux (Φe) : ±10%
- Peak Wavelength (λp) : ±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

7-2. Reliability Test

No	Items	Test Conditions	Test Hours /Cycles
1	Room Temperature Operating Life (RTOL)	Ta = 25°C, If = 20mA	500 Hours
2	Room Temperature Operating Life 2 (RTOL)	Ta = 25°C, If = 30mA	500 Hours
3	Wet High Temperature Operating Life (WHTOL)	Ta = 60°C, RH = 90%, If = 7mA	500 Hours
4	Wet High Temperature Operating Life 2 (WHTOL)	Ta = 40°C, RH = 90%, If = 20mA	500 Hours
5	High Temperature Operating Life (HTOL)	Ta = 60°C, If = 10mA	500 Hours
6	Low Temperature Operating Life (LTOL)	Ta = -40°C, If = 20mA	500 Hours
7	High Temperature Storage Life (HTSL)	Ta = 100°C	500 Hours
8	Low Temperature Storage Life (LTSL)	Ta = -40°C	500 Hours
9	Wet High Temperature Storage Life (WHTSL)	Ta = 60°C, RH = 90%	500 Hours
10	Moisture Sensitivity Level (MSL)	Tsld = 260°C (Pre treatment 60°C, 60%, 168 hours)	3 Times
11	Temperature Cycle (TC)	-40°C (30min) ~ 25°C (5min) ~ 100°C (30min) ~ 25°C (5min)	100 Cycles
12	Electrostatic Discharge (ESD)	R = 1.5kΩ, C = 100pF @15kV : Operate Normally @20kV : No Defect	10 Times
13	Vibration	100~2000~100Hz Sweep 4min. 200m/s², 3 directions	48 Minutes
14	Thermal Shock	Ta = 125°C, 15min Ta = -45°C, 15min.	300 Cycles

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

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8. Standard Test Conditions

8-1. Standard Test Environments

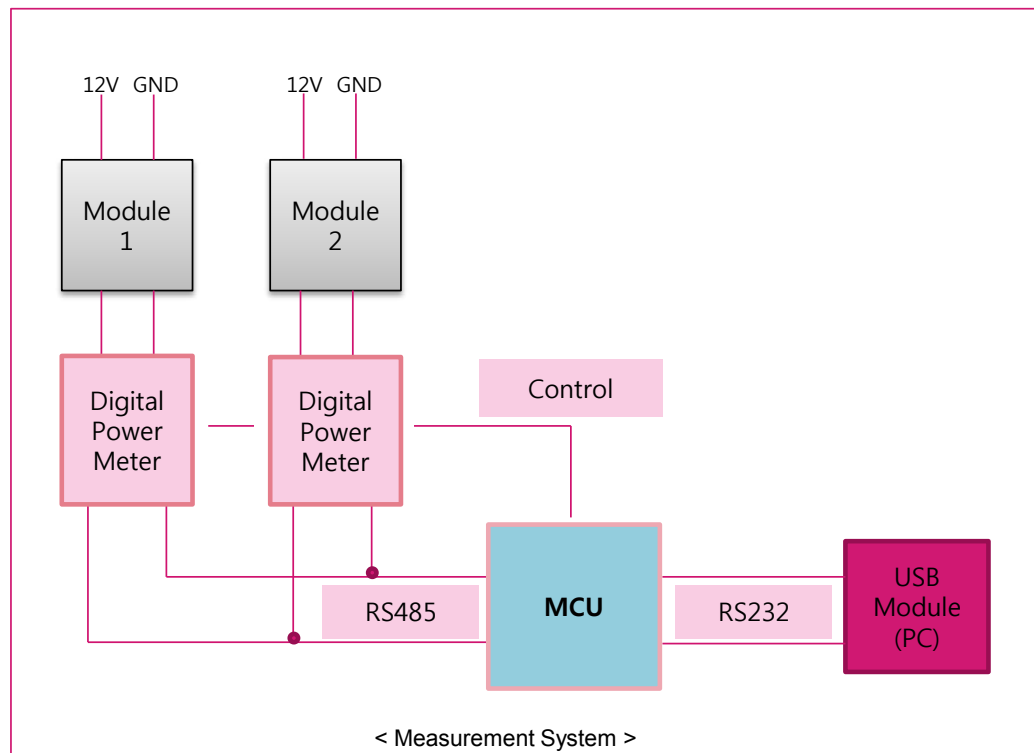
- Temperature & Humidity : 20~30 °C, 65% (RH)
- Darkroom Ambient (below 10lux)

8-2. Standard Test Methods

- Equipment : Digital Power Meter
- Operating Condition : DC Power

8-3. Measurement System

- Aging : Lighting test starts under 3 sec



※ Measurement tolerance : If = ± 5%

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

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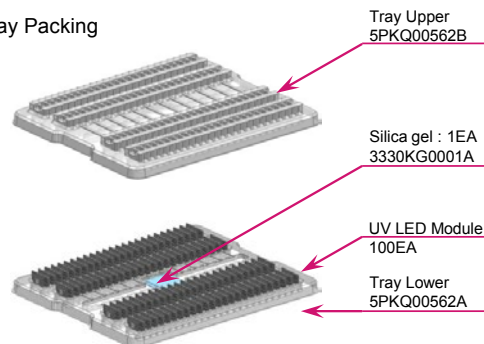
9. Packing and Labeling of Products

[Unit : mm]

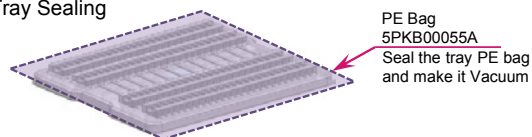
Parameter	Value / Example
Out Box	5PKC00242A, 375 x 315 x 180
Tray Lower	5PKQ00562A, 355 x 295 x 16
Tray Upper	5PKQ00562B, 355 x 295 x 29
PE Bag	5PKB00055A, 450 x 350
Silica gel	3330KG0001A, 45 x 50, 5g
Label(PCB)	3TAT00288A, 15 x 6
Label(Box)	5PKG00400A, 117 x 61

9-1. Packing Specifications

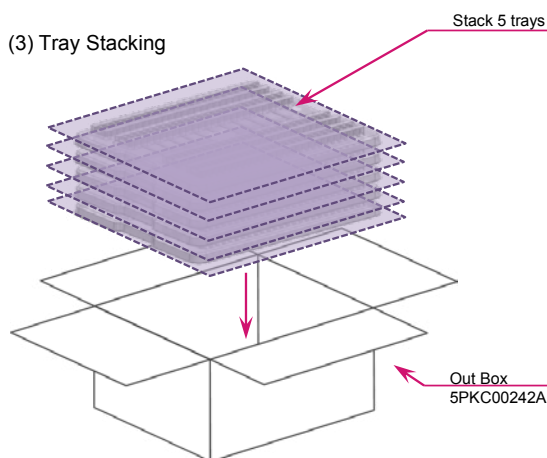
(1) Tray Packing



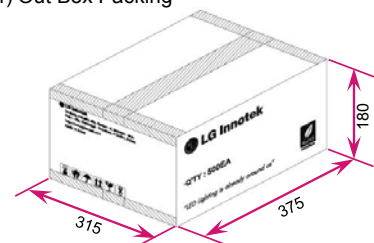
(2) Tray Sealing



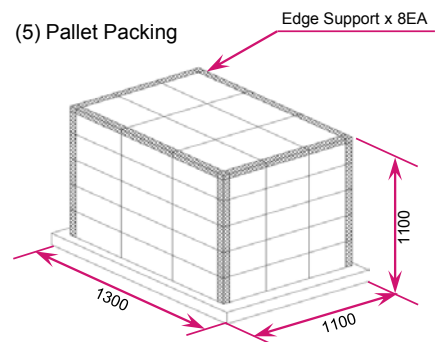
(3) Tray Stacking



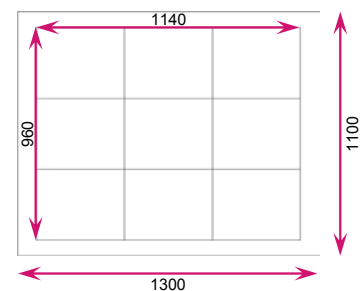
(4) Out Box Packing



(5) Pallet Packing



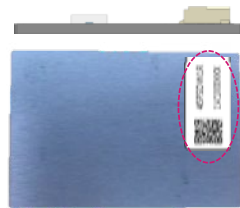
(6) Pallet Layout



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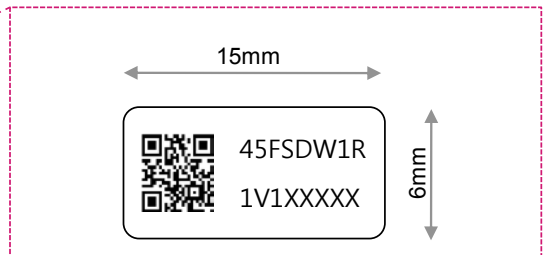
9-2. Labeling (Module)

▪ Position of Label



< On the Bottom of PCB , Apposite of CNT >

▪ 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	λ_p Peak Wavelength			Radiant Flux		PKG Vf		Serial No.				
Year : 2013 → 3 Month : 4 → 4 Date : 16 → G			S(Sungji) B(Borim)	D	W	1	R	2	V	1	00001~99999				

SMT Year/Month Code.

Code	Year	Code	1	2	3	4	5	6	7	8	9	X
4	2014	Month	1	2	3	4	5	6	7	8	9	10
5	2015	Code	Y	Z								
6	2016	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					

λ_p Code

Code	Type
DW1	DW1

Flux Code.

Code	Type
R2	R2
R3	R3
R4	R4

Vf Code.

Code	Type
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)

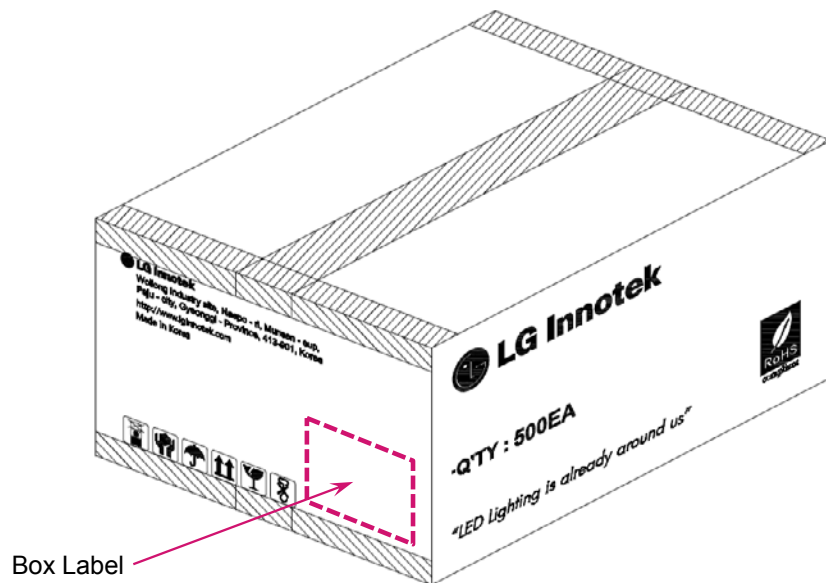
▪ Out Box Label

LG Innotek			Manufacture (협력사명)	LGIT INSPECTION (LGIT 검사판정)
PRODUCT NAME (제품명)		Q'TY (수량)		
SERIAL NUMBER (제품번호)		INPUT VOLTAGE (입력전압)		
CUSTOMER P/N (고객 P/N)		CCT (색온도)		
DATE (생산일자)		Design (디자인)		
INSPECTION (협력사 검사확인)	REMARK (특이사항)			

117mm

61mm

▪ Position of Label



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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

- LED should avoid the direct contact with exposure to hazardous materials such as sulfur, chlorine, phthalate, etc..
- The silver-plated metal parts on LEDs can be rusted when exposed to corrosive gases.
- The silver-plated 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.
- The corrosive atmosphere must be avoided during the use and storage.
- 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 heat 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.

SPECIFICATION

MODEL	LLHML32-03JA01A	DOCUMENT No.	14-ETC-1511
REG. DATE	2014.05.16	REV. No.	2.0
REV. DATE	2014.09.03	PAGE	14/14

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