

UV-accelerated weathering chamber for low-temperature material degradation: technical specifications

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October 15, 2024

Content

1 Introduction	3
2 Instructions for use	3
3 Physical characteristics	3
4 Electrical specifications	3
5 LED Panels	3
6 Electrical diagram	4
7 Materials	5
8 Surface power	5
9 References	5



Figure 1: Overall view of the UV chamber.

1 Introduction

This UV chamber is designed to irradiate materials to simulate their accelerated degradation using high surface power light (several hundred W/m²). A study conducted by a team from the University of Le Mans (IMMM Mixed research Unite, Le Mans, France) using an incandescent UV lamp served as the basis for defining its characteristics.

2 Notice d'utilisation

The typical use of this chamber is at half power continuously for 10 to 60 days.

Ultraviolet radiation is invisible to the eye but not without danger, so it is recommended to wear dedicated protective glasses. The surface of the chamber can reach a relatively high temperature, so be cautious of burn risk.

A safety feature prevents the UV lamps from operating with the door open. To turn on the UV lamps, close the door and press the "ON" button. In the event of a momentary power outage, the chamber does not restart automatically; it must be pressed.

The fans and electrical outlets inside the chamber operate without the door safety feature.

The chamber is relatively heavy; to move it, do not carry it by the electrical panel!

3 Physical characteristics

- Dimensions (LxWxH): $\sim 630 \times 530 \times 445$ mm
- Usable dimensions (LxPxH): $\sim 430 \times 400 \times 240$ mm
- Weight: ~ 21 kg

4 Electrical specifications

- Main power supply: 100 – 300V_{AC}, 47 – 63Hz, 1A
- Fuse: 5x20 mm, 4 amperes time-dela

5 LED Panels

The LED panels were custom-made by Agrotek with the following characteristics:

- Mix U.V.: ratio UVA :UVB = 79 : 21%
- UV-A, SMD 3030, [360nm-370nm], manufacturer LEDESTAR, 0.8W, quantity 100, Relative spectral distribution: 365nm Reference: LDR-3030TTAV365-V0VA0H0

- UV-B, SMD 3535, 350nm, manufacturer LEDESTAR, 1.2W, quantity 25, Relative spectral distribution: 310nm [290nm-330nm] Reference: LDR-3535CNZV310-M0
- Driver with power dimming in 20% increments, MeanWell XLG-150-H-AB

Measurements conducted on a driver-panel assembly at ambient temperature *:

Pos.	$R_{add}(k\Omega)$	$P_{line}(W)$	$V_{led}(V)$	$I_{led}(A)$	$P_{led}(W)$	$\eta_{elec}(\%)$	$T_{in}(^{\circ}C)$	$T_{rise}(^{\circ}C)$
0	0	0	4,1	0,000	0	-	20,8	0
20	47	13,4	37,6	0,325	12,22	91,19	23,9	3,1
40	138	45,0	39,1	1,060	41,45	92,10	30,2	9,4
60	220	74,4	39,9	1,713	68,35	91,87	35,3	14,5
80	280	96,1	40,4	2,197	88,76	92,36	38,6	17,8
100	infini	122,0	40,8	2,764	112,775	92,44	42,9	22,1

*: Electrical values are measured for one LED panel coupled with a driver. For powers corresponding to the chamber, multiply the values by two. Temperatures are measured while both panels operate simultaneously.

6 Electrical diagram

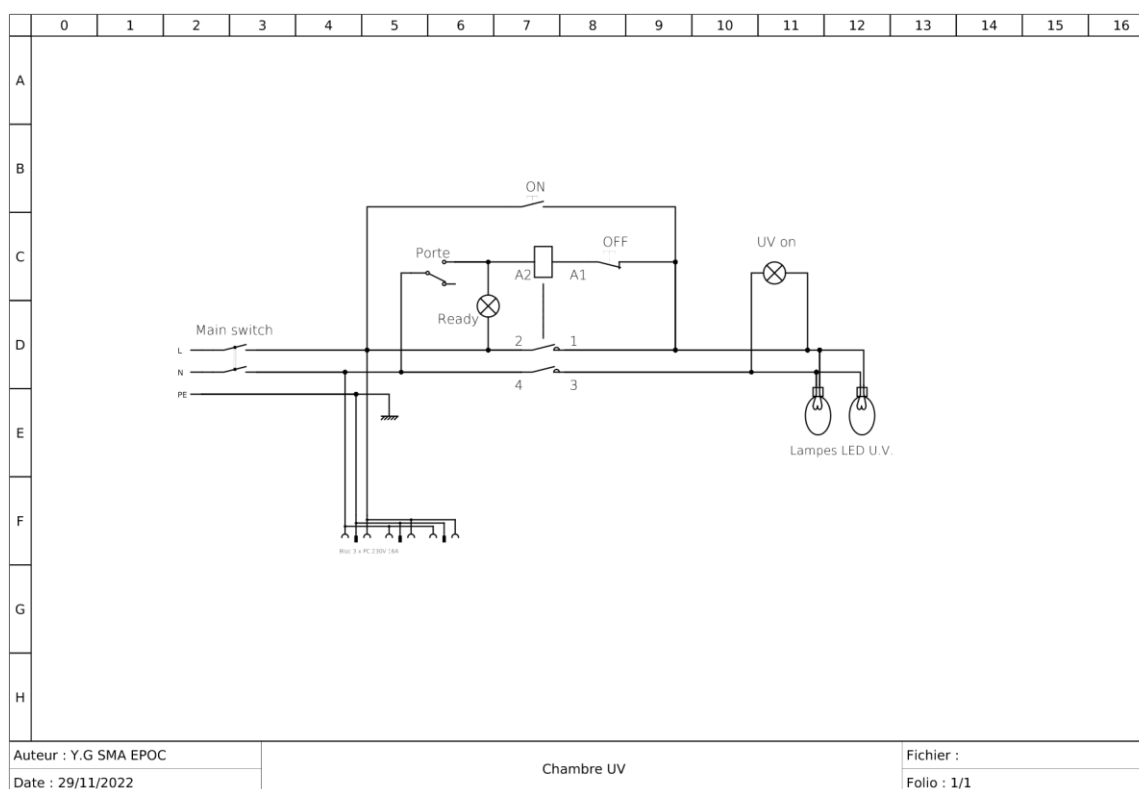


Figure 2: Electrical diagram of the UV chamber.

7 Materials

The chamber is primarily made from plywood panels painted on the exterior and covered with aluminum sheeting on the interior. The electrical enclosure is made of polycarbonate.

8 Surface power

When the LED panel intensity dimmer is set to 20%, the average surface power on the chamber platform is 309 ± 25 (SE) W/m² for the 365 nm wavelength (UV-A) and 106 ± 20 (SE) W/m² for the 310 nm wavelength (UV-B).

When the LED panel intensity dimmer is set to 40%, the average surface power on the chamber platform is 906 ± 60 (SE) W/m² for the 365 nm wavelength (UV-A) and 201 ± 37 (SE) W/m² for the 310 nm wavelength (UV-B).

9 References

This up-to-date notice can be downloaded at the following address:

https://github.com/EdgarDusacre/Plasfito_public/tree/2d29354daf9d6200ea9daaece1cb81ee23ea4562/UV_chamber

Agrotek SAS
25 rue General Ferrié
38100 Grenoble, FRANCE
<https://www.agrotek>.

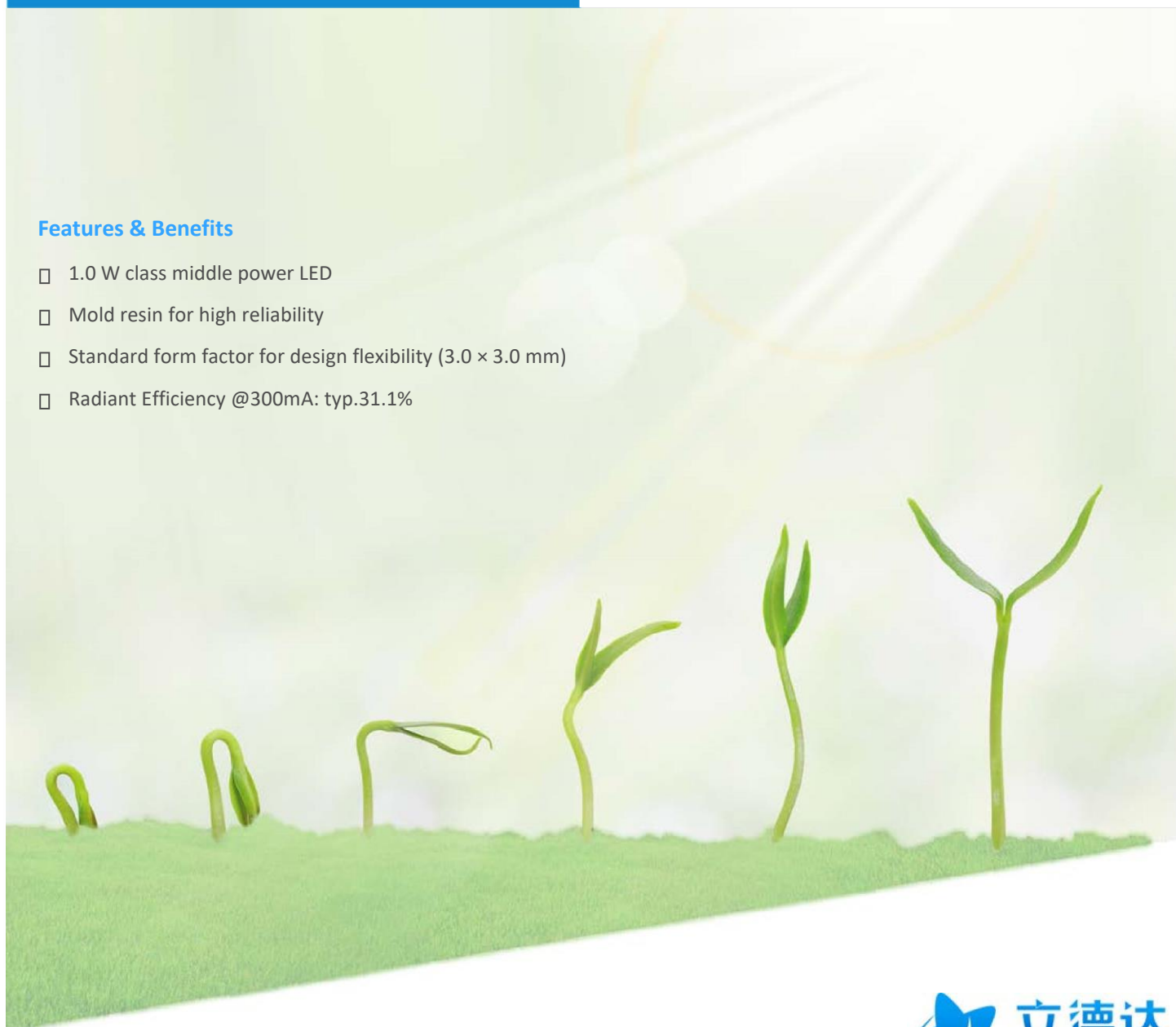
Middle PowerLED
3030

302G UVA Series
Purple



Features & Benefits

- ❑ 1.0 W class middle power LED
- ❑ Mold resin for high reliability
- ❑ Standard form factor for design flexibility (3.0 × 3.0 mm)
- ❑ Radiant Efficiency @300mA: typ.31.1%



1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +105	°C	-
Storage Temperature	T_{stg}	-40 ~ +105	°C	-
LED Junction Temperature	T_j	125	°C	-
Forward Current	I_F	300	mA	-
Pulse Forward Current	I_{FP}	600	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	0.5	kV	-

b) Electro-optical Characteristics ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Item	Unit	Rank	Min.	Typ.	Max.
Forward Voltage (V_F)	V	V0	3.2	3.4	3.6
Reverse Current(I_R) (@ $V_R=5V$)	uA		-	-	1
Peak wavelength (λ_p)	nm	VA0	365	-	375
Radiant Power	mW	H0	280	300	350
Electrical thermal resistance junction/ solderpoint with efficiency ($R_{thJS \text{ elec.}}$) $\eta_e=31.1\%$	°C/W		-	13	-
Beam Angle	°		-	120	-

Note:

Ledstar maintains measurement tolerance of: Radiant Power = $\pm 7\%$, forward voltage = $\pm 0.1 \text{ V}$, Wavelength = $\pm 2 \text{ nm}$

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
L	D	R	-3	0	3	0	T	T	A	V	3	6	5	-V	0	V	A	0	H	0	
Digit		PKG Information				Code		Specification													
1 2 3		Ledstar Package Middle Power				LDR															
4 5 6 7		Package Model and Size				3030		3.0 x 3.0 x 0.65mm													
8		Product Cat egory				T		Top View													
9		Bractek Type				T		PCT & Cu													
10		Version				A															
11		Color				V		Violet													
12 13 14		Wavelength Typical (nm)				365		365~375													
15 16		Forward Voltage (V)				V0		3.2~3.6 <div>Bin Code:</div> <div>H0 3.2~3.4 J0 3.4~3.6</div> <div>H1 3.2~3.3 J1 3.4~3.5</div> <div>H2 3.3~3.4 J2 3.5~3.6</div>													
17 18 19		Peak Wavelength (nm)				VA0 VA1 VA2		VA1 VA2 365~370 370~375													
20 21		Radiant Power (mW)				H0 HY HZ		HY HZ 280~300 300~350													

a) Voltage Bins ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
LDR-3030TTAV365-V0VA0H0	V0	H1	3.2 ~ 3.3
		H2	3.3 ~ 3.4
		J0 J1	3.4 ~ 3.5

J2

3.5 ~ 3.6

c) Wavelength Bins ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

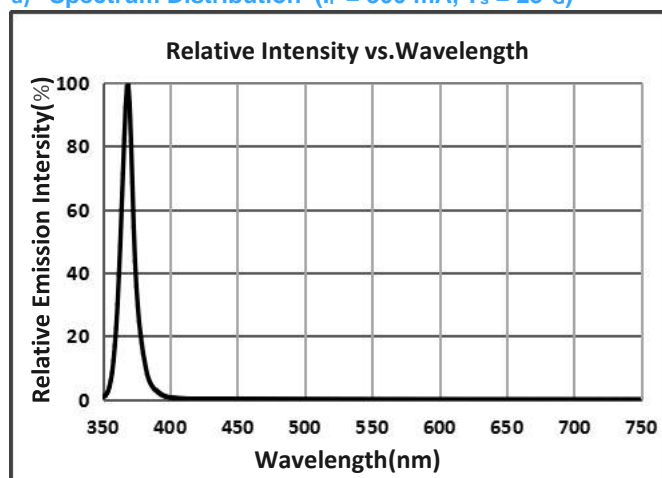
Product Code	Wavelength Rank	Wavelength Bin	Wavelength Range (nm)
LDR-3030TTAV365-V0VA0H0	VA0	VA1	365 ~ 370
		VA2	370 ~ 375

c) Radiant Power Bins ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

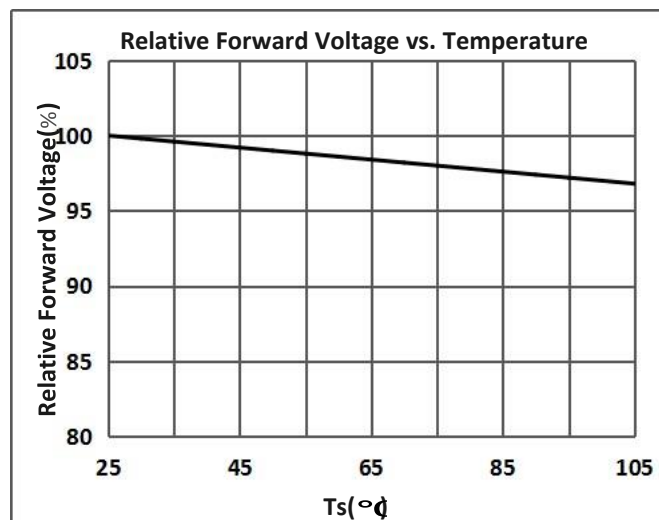
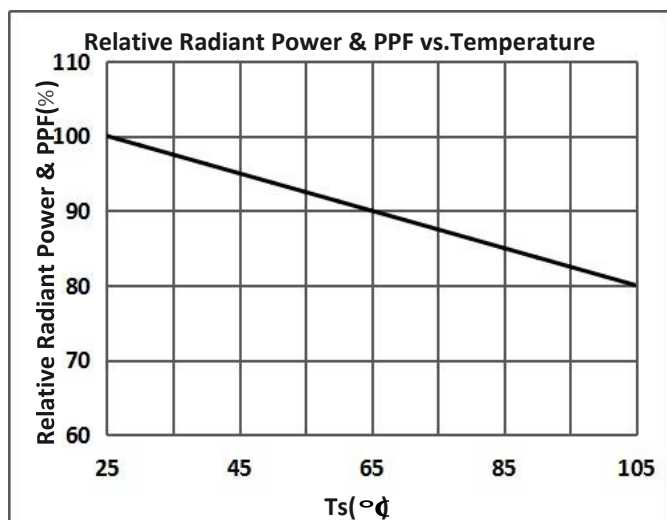
Product Code	Power Rank	Power Bin	Power Range (mW)
LDR-3030TTAV365-V0VA0H0	H0	HY	280 ~ 300
		HZ	300 ~ 350

3. Typical Characteristics Graphs

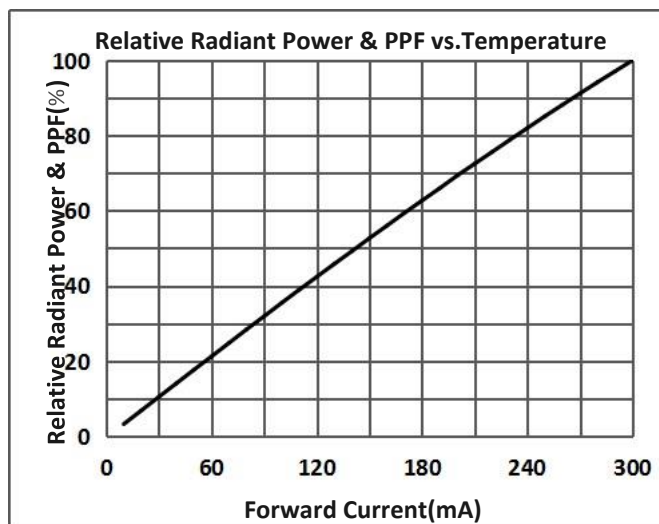
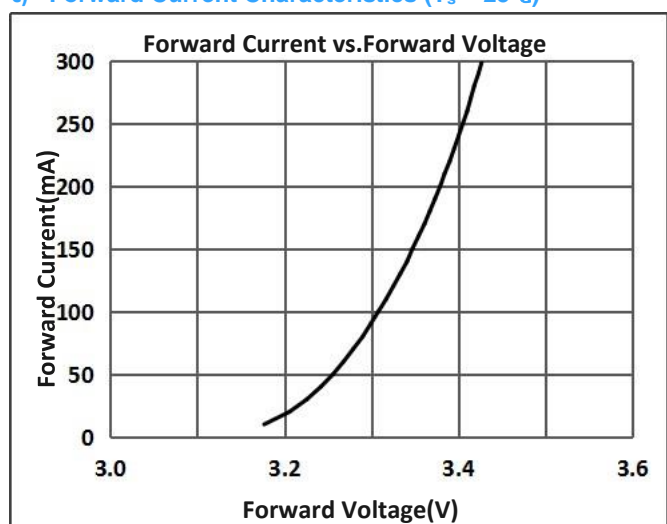
a) Spectrum Distribution ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)



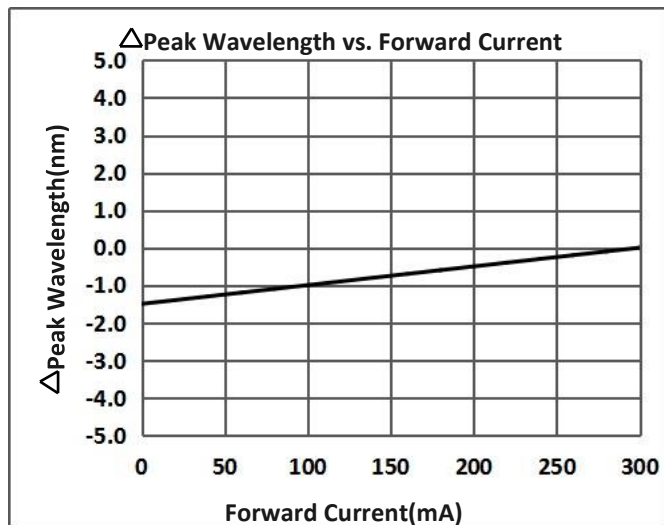
b) Temperature Characteristics ($I_F = 300 \text{ mA}$)



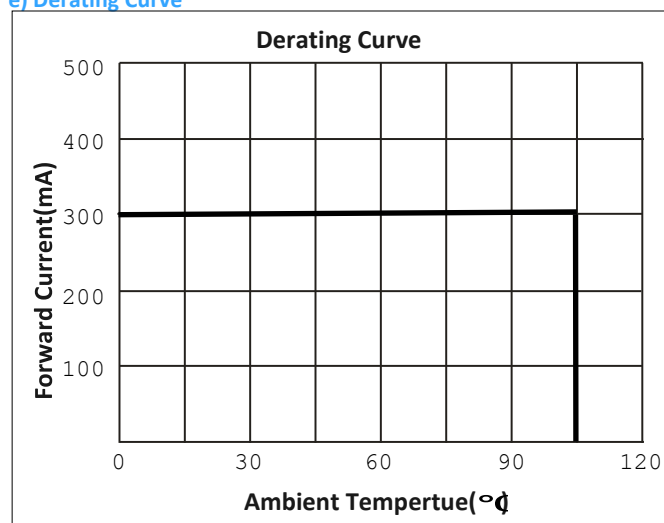
c) Forward Current Characteristics ($T_s = 25^{\circ}\text{C}$)



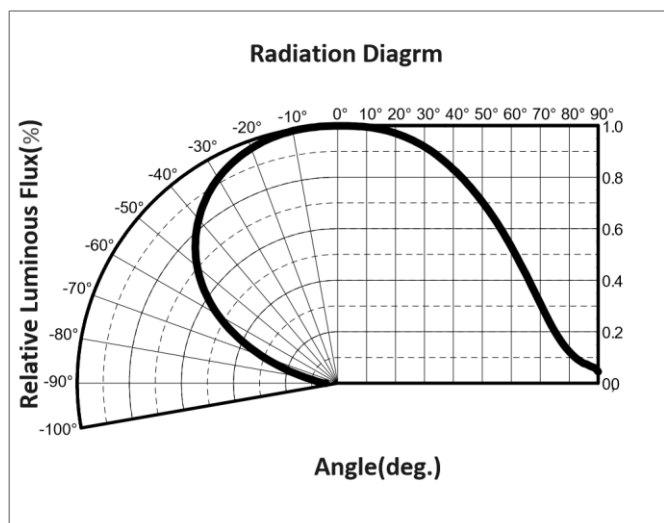
d) Color Shift Characteristics, $T_s = 25^\circ\text{C}$



e) Derating Curve



f) Beam Angle Characteristics ($T_s = 25^\circ\text{C}$, $I_F = 300\text{ mA}$)



Middle PowerLED
3535

351W UVB Series
Ultraviolet

For Disinfect Lighting



Features & Benefits

- 0.8 W class middle power LED
- Mold resin for high reliability
- Standard form factor for design flexibility (3.5 × 3.5 mm)

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +60	°C	-
Storage Temperature	T_{stg}	-40 ~ +60	°C	-
LED Junction Temperature	T_j	85	°C	-
Forward Current	I_F	100	mA	-
Pulse Forward Current	I_{FP}	200	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	220 <10	°C s	-
ESD (HBM)	-	6	kV	-

b) Electro-optical Characteristics ($I_F = 40$ mA, $T_s = 25$ °C)

Item	Unit	Rank	Min.	Typ.	Max.
Forward Voltage (V_F)	V	M0	5.0	-	7.0
Peak wavelength (λ_p)	nm	VB0	305	-	315
Radiant Power (Φ_e)	mW	L0	3	-	5
Thermal Resistance (junction to solder point)	°C/W		-	5	-
Beam Angle	°		-	120	-

Note:

Ledstar maintains measurement tolerance of: forward voltage = ± 0.1 V, Radiant Power = ± 5 %, Wavelength = ± 2 nm

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
L	D	R	- 3	5	3	5	C	N	Z	V	3	1	0	- M	0	V	B	0	L	0	
Digit		PKG Information					Code	Specification													
1 2 3		Ledstar Package Middle Power					LDR														
4 5 6 7		Package Model and Size					3535	3.5 x 3.5 x 1.47mm													
8		Product Cat egory					C	Ceramics													
9		Bractek Type					N	AlN													
10		Version					Z	With Zener													
11		Color					V	Violet													
12 13 14		Wavelength Typical (nm)					310	305~315													
15 16		Forward Voltage (V)					M0	5.0~7.0													
17 18 19		Peak Wavelength (nm)					VC0	VB1 VB2													
							VB1	305~310													
							VB2	310~315													
20 21		Radiant Power (mW)					LA LC LD	LC LD 3.0~4.0 4.0~5.0													

a) Voltage Bins ($I_F = 40 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Product Code	Voltage Rank	Voltage Range (V)
LDR-3535CNZ V310-M0VB0L0	M 0	5.0 ~ 5.5
		5.5 ~ 6.0
		6.0 ~ 6.5
		6.5 ~ 7.0

b) Wavelength Bins ($I_F = 40 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Product Code	Wavelength Rank	Wavelength Bin	Wavelength Range (nm)
LDR-3535CNZ V310-M0VB0L0	VB0	VB1	305 ~ 310

VB2

310 ~ 315

c) Radiant Power Bins ($I_F = 40 \text{ mA}$, $T_s = 25^\circ \text{C}$)

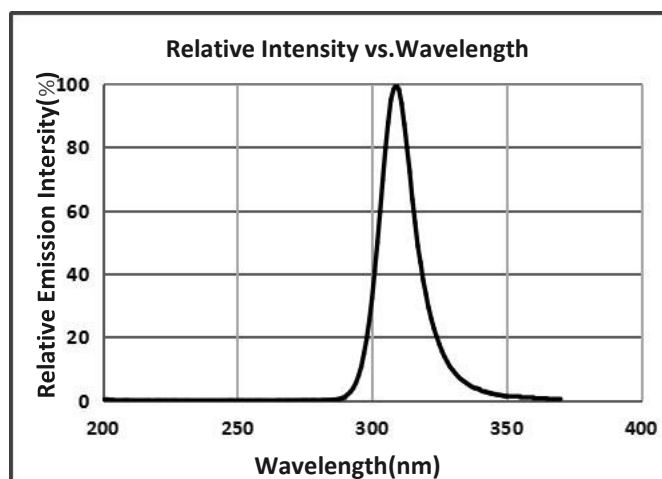
Product Code	Power Rank	Power Bin	Power Range (mW)
		LC	3 ~ 4
		LD	4 ~ 5

LDR-3535CNZ V310-M0VB0L0L0

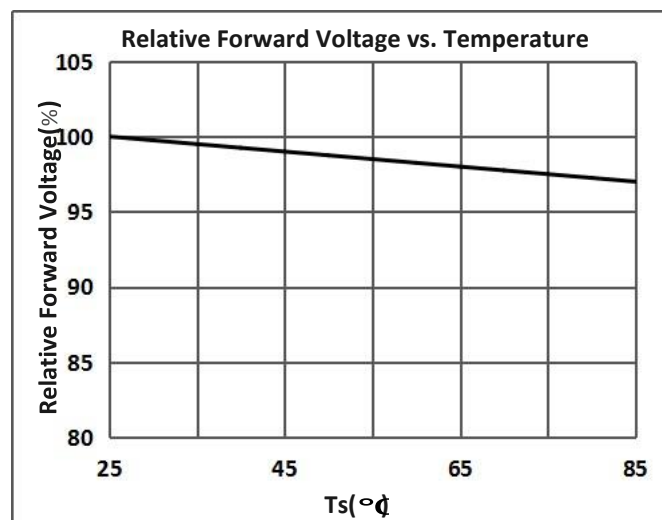
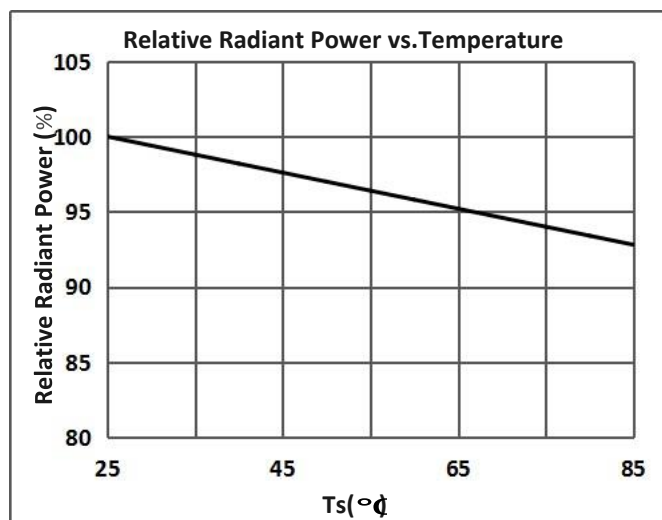
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_F = 40 \text{ mA}$, $T_s = 25^\circ \text{C}$)

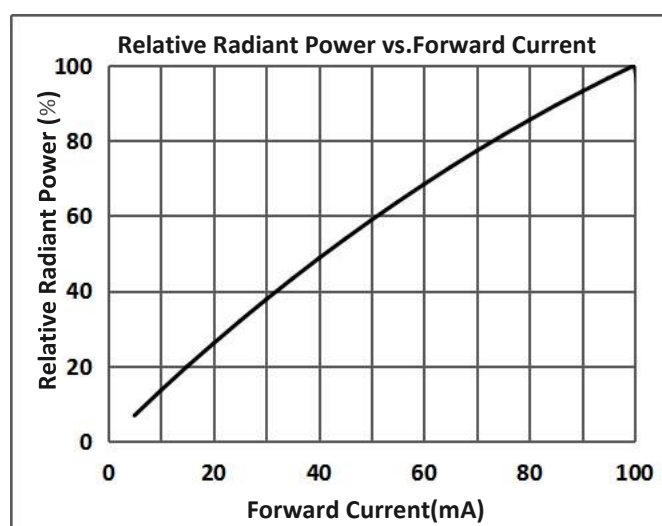
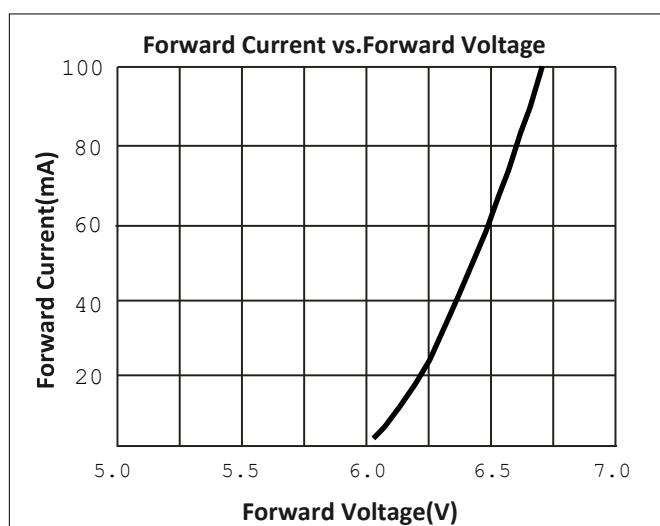
WLP:305-315nm



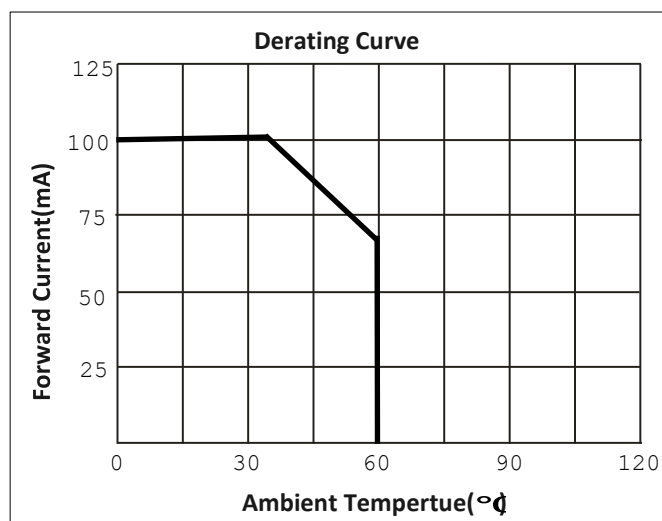
b) Temperature Characteristics ($I_F = 40 \text{ mA}$)



c) Forward Current Characteristics ($T_s = 25^{\circ}\text{C}$)



d) Derating Curve



e) Beam Angle Characteristics ($T_j = 25^{\circ}\text{C}$, $I_f = 40\text{ mA}$)

