



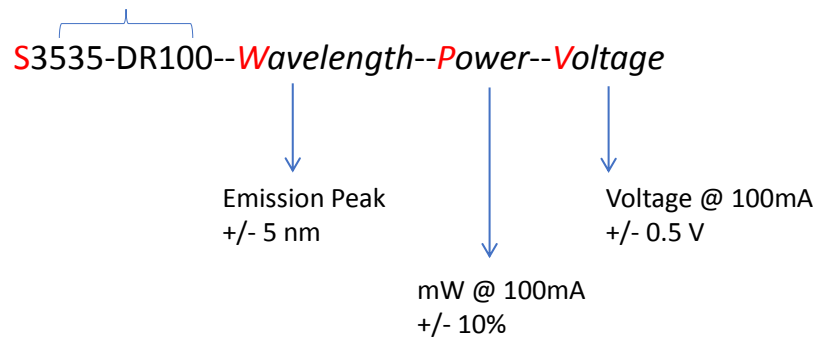
## UV-C LED

Product Specifications  
SMD 3535 Packaged LED

V4.0 March 2021

## 3535 Packaged LED Identification Convention

### SMD type package and drive current (mA)



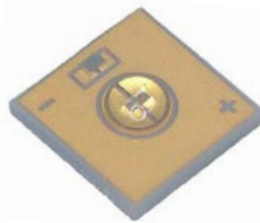
### Example:

S3535- DR100-W275-P40-V6.5

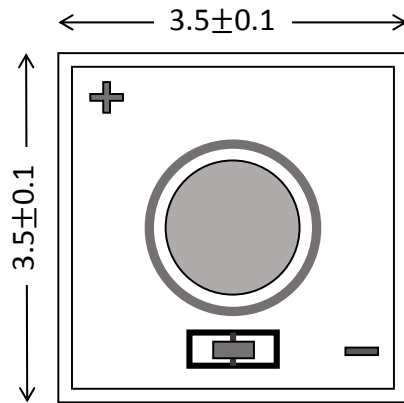
### Interpretation:

Surface Mount type 3.5x3.5mm packaged LED  
 Nominal drive current 100mA  
 Peak wavelength = 275 +/- 5nm  
 Power output @ 100mA = 40 mW (+/-10%)  
 Forward voltage @100mA = 6.5V (+/- 0.5V)

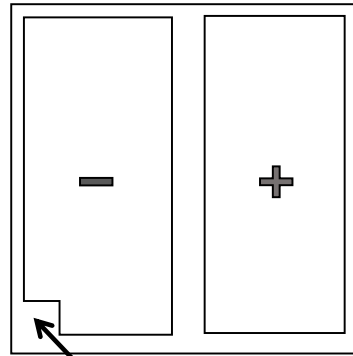
3535 Packaged LED Diagram



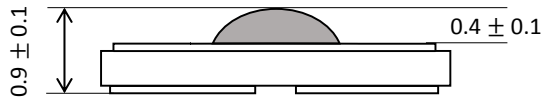
Top view



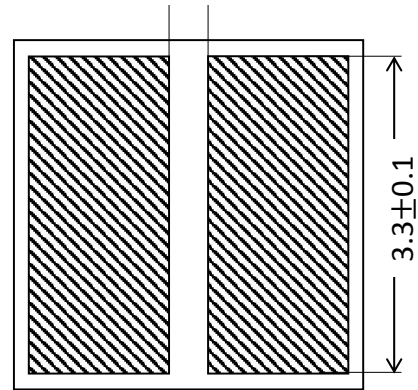
Bottom view



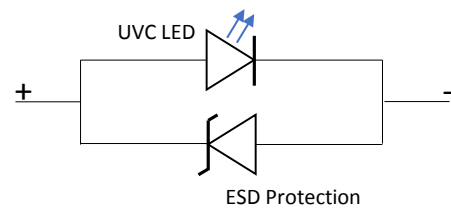
Cathode Mark (-)



0.30±0.05



Recommended Solder Pattern on PCB



All Units = mm

Specifications may subject to change without notice

UVC LED: Electro-optical parameters

TABLE 1. Performance SMD 3535 (25°C ambient, packaged)

Parameter	Symbol	Unit	Min.	Typ.	Max
Peak Wavelength	$\lambda_p$	nm	265	275	278
Radiant Flux	$\phi_e$	mW	21@60 mA	25@60 mA	28@60 mA
			35@100 mA	40@100 mA	42@100mA
Forward Voltage	VF	V	5.8	6.5	7.0
			-	-	-
Spectrum Half Width	$\Delta\lambda$	nm		9.5	
View Angle	2 $\theta_{\frac{1}{2}}$	°		150	
Thermal Resistance	RJ-b	°C/W		<10 (TBD)	

FIG 1. Forward Current vs. Forward Voltage

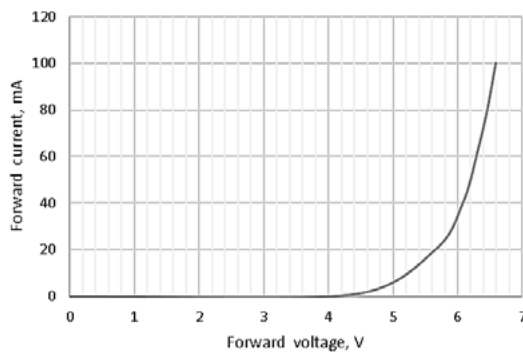
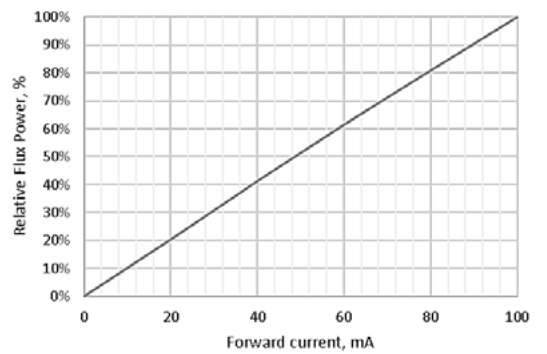


FIG 2. Relative Radiant Flux vs. Forward Current



Specifications may subject to change without notice

UVC LED: Electro-optical parameters (continued)

FIG 3. Peak Wavelength vs. Forward Current

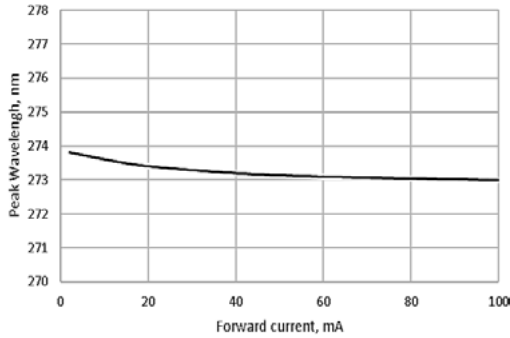


FIG 4. Spectrum

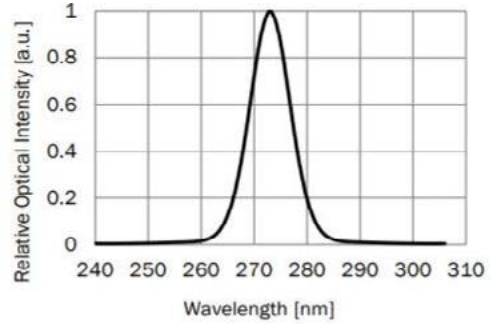


Fig 5. Forward Voltage vs. Ambient Temperature

[ $I_f$  100mA]

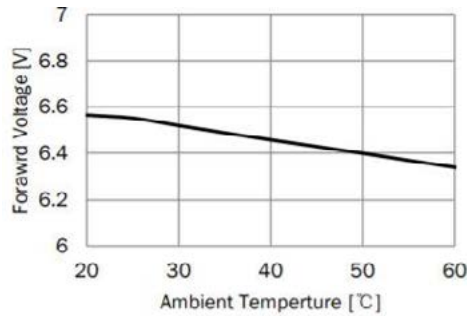


Fig 6. Relative Radiant Flux vs. Ambient Temperature

[ $I_f$  = 100mA]

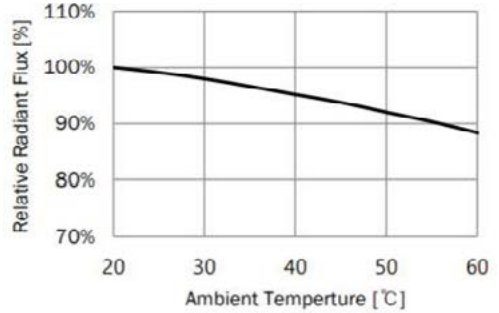
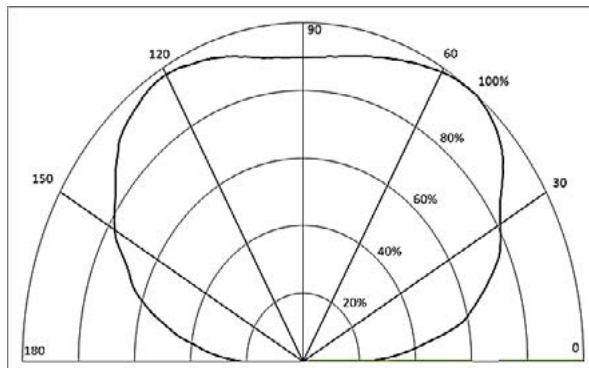


Fig 7. Far-field Emission Pattern

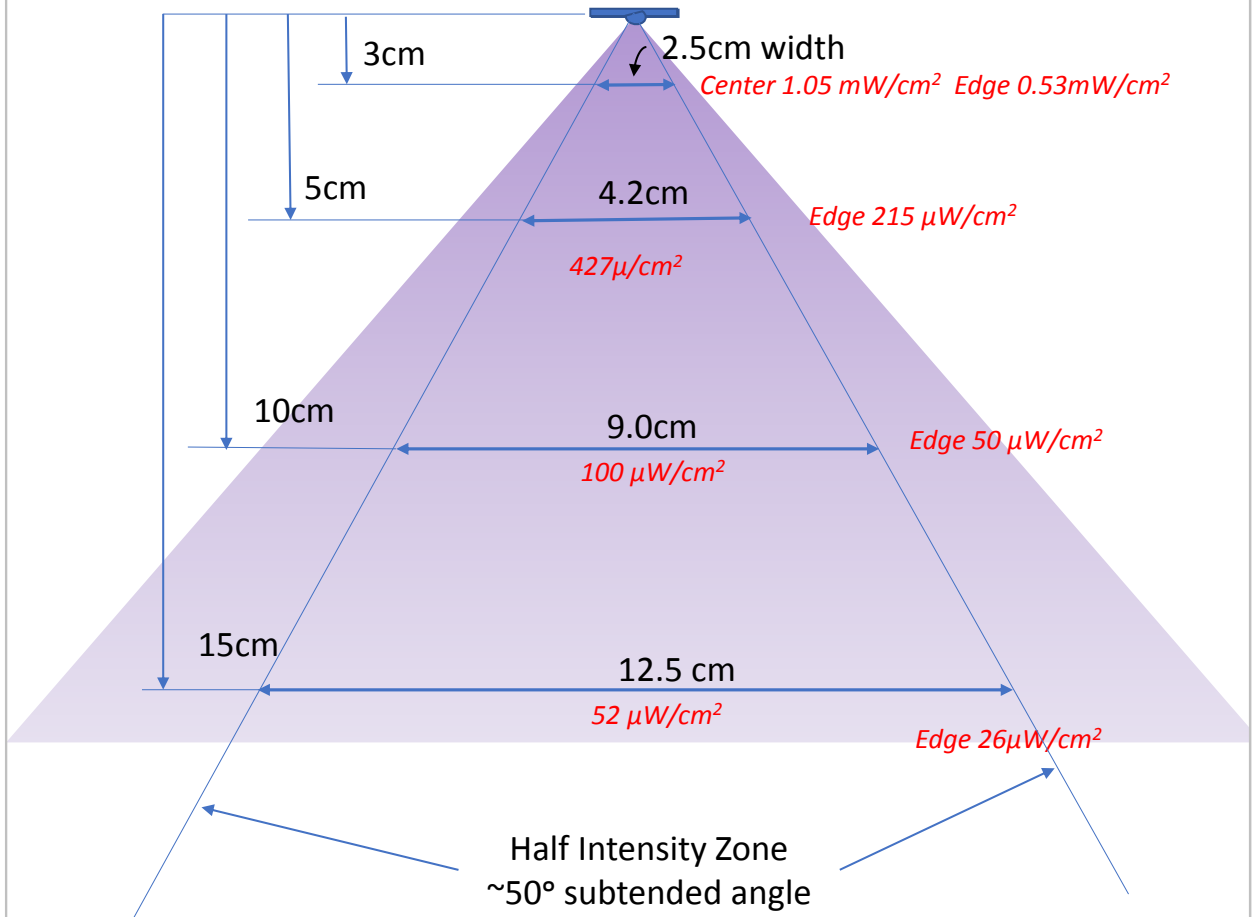


Typical Intensity Distribution of SMD3535 with Hemispherical Lens

40 mW UVC SMD3535

Short Distance Intensity Data

Distance (cm)	0.5	1	1.5	2
Intensity (mW/cm <sup>2</sup> )	16.5	8.1	3.8	2.3



04/21 / V3 / OSIF / balb/smd3535-uvc-led-mid-power

Intensity Distribution of SMD3535 long distance

Long Distance SMD3535 Intensity Distribution  
Intensity Linearly Scales with LED Output Power

Intensity ( $\mu\text{W}/\text{cm}^2$ )		lateral distance (cm)		
	vertical distance (cm)	0	20	50
SMD3535 40mW	20	27.5	13.2	2.4
	40	7.6	5.9	2.3
	60	3.2	3.1	1.7
	80	1.9	1.7	1.3
	100	1.24	1.17	0.9

**UVC LED: Electro-optical parameters (continued)**

**TABLE 2. Device lifetime (forward current =100mA, T = 25°C)**

Parameter	Symbol	Unit	Min.	Typ.	Max
70% Power Lifetime	L70	hours	2000	3000	5000
50% Power Lifetime	L50	hours	4000	6000	10000

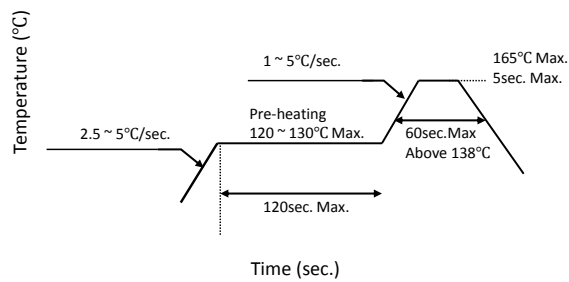




Soldering conditions of UVC LED

FIG 8. Solder reflow temperature profile

■ SnBiAg alloy for **lensed** SMD6060



Reflow Soldering Instructions	
	SnBiAg alloy (Melting Temperature=138°C)
Pre-Heating	120 ~ 130°C
Pre-Heat Time	120sec. Max.
Peak Temperature	165°C Max.
Soldering Time	5sec. Max.

- Recommended solder composition: SnBiAg alloy or T3 soldering paste)
- Recommended stencil thickness is 60~80um
- Recommended stencil solder paste area is 60~80%
- Forming gas (5%-7% $H_2$  in  $N_2$ ) ambient recommended for best results
- After reflow soldering, Rapid cooling should be avoided
- When soldering, do not use a none calibrated hot plate. A convection type reflow oven is preferred. (Fig 9.)

Must not use heat gun (blower) for soldering

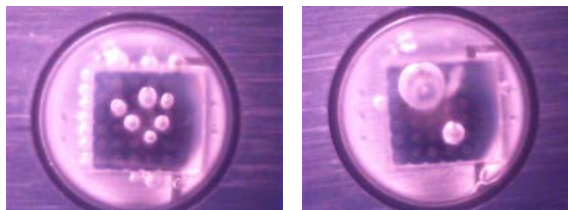


FIG 9. Examples of bubble formation due to failure to follow the above instructions.

## Handling Precautions

### ESD Protection

Workplace setup should follow the recommendations given in JEDEC standard document JESD625B "Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices" or IEC 61340-5-1,2 and 3. The operators should be properly trained to handle UVC flipchips according to the guidelines listed below:

- Always wear conductive wrist straps that is continuously monitored when working or handling assembled boards containing unprotected chips.
- Use an ion blower to neutralize the static discharge that may build up on the surface of the UVC flipchips during storage and handling.
- Always keep unused UVC flipchips in the protective ESD storage bag. Depending on the final application, it may be necessary to include additional ESD protection, such as a TVS protection diode on the substrate on which UVC flip chip is reflowed. Bolb Inc. includes a TVS chip inside each LED package.
- Use tweezers to pick up UVC LEDs, Teflon coated tweezers would be recommended to avoid scratching UVC LEDs.
- Recommend holding the sidewalls of the LEDs (See Fig 10.)

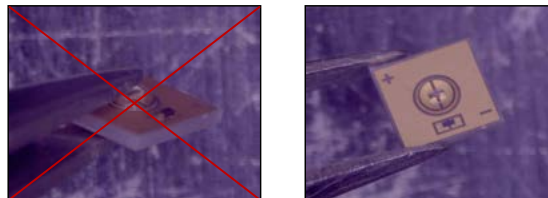


Fig 10. incorrect handling (left) and correct handling (right) of UVC LED Package

## General Precautions and UVC Safety



UVC flipchip emits deep ultraviolet radiation, with extremely high intensity near its surface. This allows rapid disinfection but safety precautions must be observed during assembly and testing.

By purchasing the UVC LEDs from the manufacturer, the customer hereby agrees to absolve the manufacturer's responsibility of any bodily harm as a result of failure to observe the precautions, warnings and guidelines contained within this Specifications.

All assembly workers, observers and bystanders must wear eye and skin protection when the UVC LEDs are energized. Bare eye observation (including through microscopes) and bare-hand handling of a UVC LED in operation is **PROHIBITED**.

UVC light can be easily absorbed, so any oil or other absorbent liquid or solid substance must **NOT** be allowed to touch the sapphire side of the UVC chip, or the dome lens on a packaged LED.

Do not apply pressure to the dome lens on packaged LED.