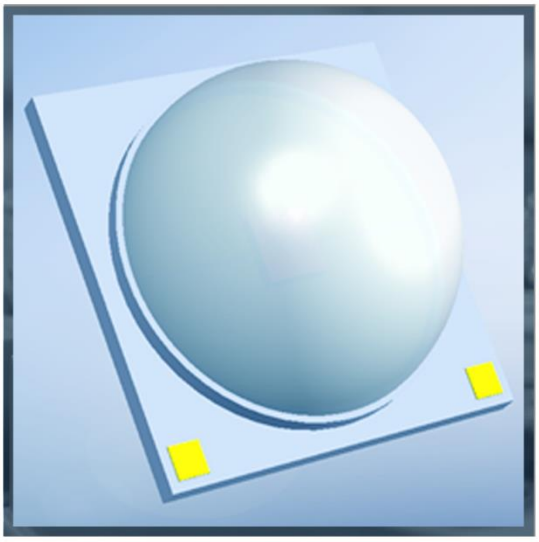
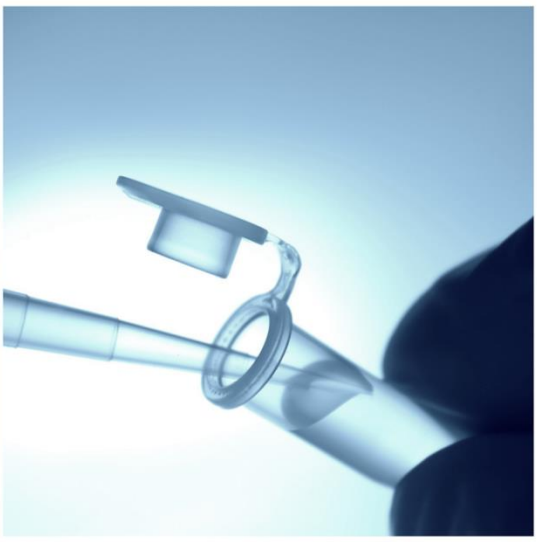
UV-C LED

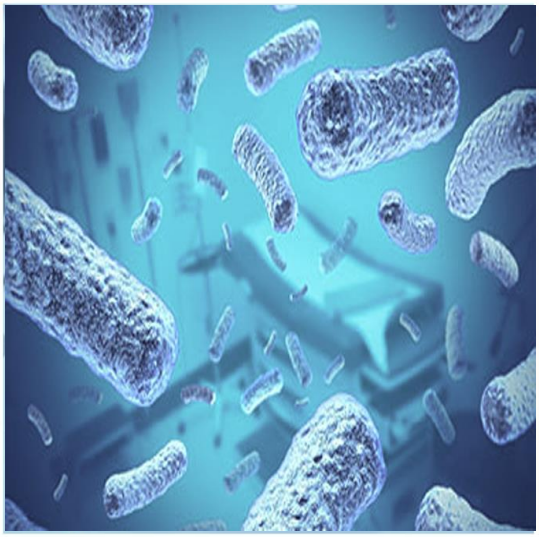
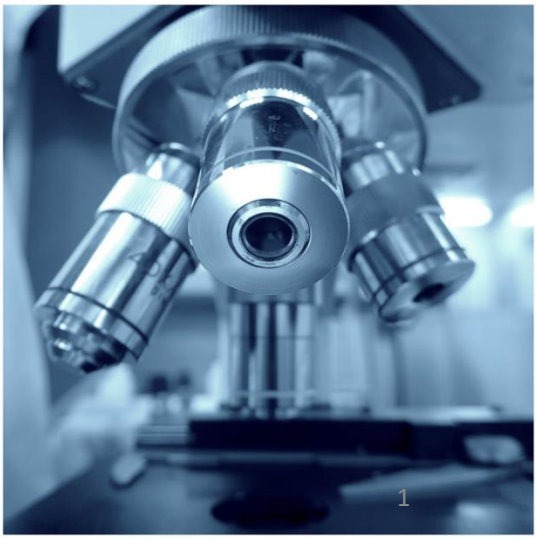
Product Specifications

265-275 nm 2020 Mil LED Chip

(Not for Open Sale)

BOLB Inc.
Livermore, California
V1.1 September 2023

UVC EMMITER RISK GROUP 3
WARNING UV EMITTED WITHIN THIS PRODUCT WHEN ENERGIZED FOR YOUR SAFETY DO NOT DISASSEMBLE THIS PRODUCT

AVERTISSEMENT UV ÉMIS DANS CE PRODUIT LORSQU'IL EST SOUS TENSION.
POUR VOTRE SÉCURITÉ NE PAS DÉMONTER CE PRODUIT

ADVERTENCIA EMISIÓN DE UV DENTRO DE ESTE PRODUCTO CUANDO ESTÁ ENERGIZADO. POR SU SEGURIDAD, NO DESMONTE ESTE PRODUCTO

警告 通電時に本製品内で紫外線が発生します。あなたの安全のためにこの製品を分解しないでください

UVC Emitter Certifications

2020 Mil LED Chip Identification Convention

Bare chip 20x20 Mil

C2020-DR100-*Wavelength*--*Power*—*Voltage*

Drive current (mA)

Wavelength Bin
L0=260-270 nm
L1=270-280nm

mW @ 100mA
+/- 5mW

Bare die performance parameters are measured on blue tape at 100mA.

Voltage @ 100mA
+/- 0.5 V

Example:

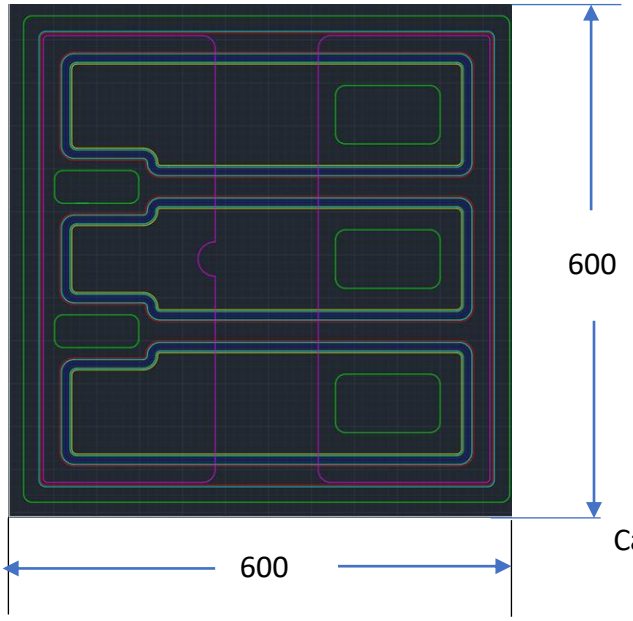
C2020-DR100-W265-P25-V6.5 or
C2020-DR100-L0-P25-V6.5

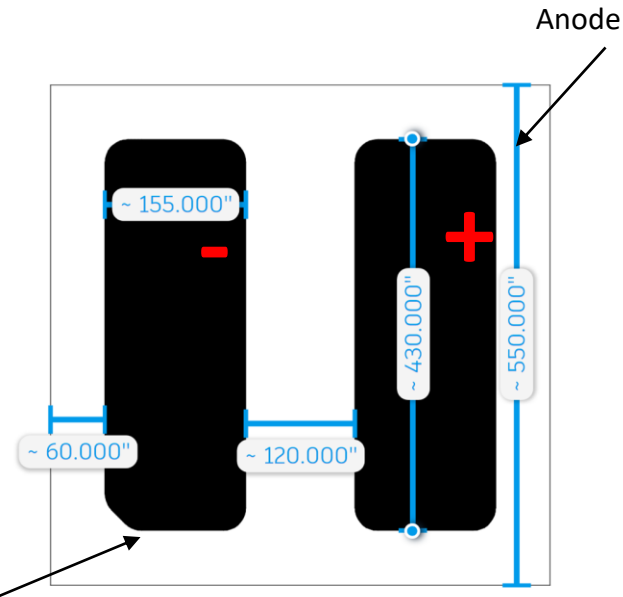
Interpretation:

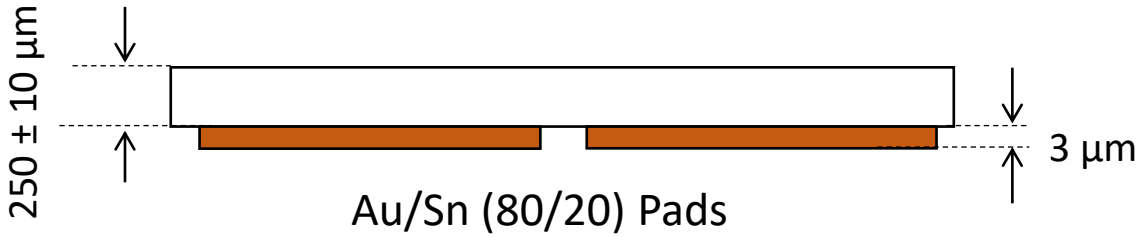
20x20 mils LED chip (bare dice)
The tested drive current is 100mA
Peak wavelength = 260-270 nm (L0)
Power output @ 100mA = 25 mW (+/-5mW)
Forward voltage @ 100mA = 6.5V (+/- 0.5V)
Chip design: Line
Bonding pad: Symmetric

Symmetric AuSn Bond Pad Configuration

All sizes in µm, tolerance: ±20 µm







Note: Drawings are not to scale.

2020 Mil UVC Chip: Electro-optical parameters

Table 1. Electrical Optical Characteristics

(Ta=25°C , flat quartz window packaged)

Parameter	Symbol	Conditions	Unit	Min.	Typ.	Max
Peak Wavelength	λp	100mA	nm	260	265	270
Radiant Flux (Packaging-dependent)	φe	100mA	mW	20	30	35
Forward Voltage	VF	100mA	V	5.8	7.0	7.5
Spectrum Half Width	Δλ	100mA	nm	9	10	11
View Angle	2θ½	, flat quartz window -	°		150	
Thermal Resistance	RJ-b		°C/W		<10 (TBD)	

Table 2. Absolute Maximum Rating

Parameter	Symbol	Unit	Conditions
Forward Current (Continuous)	I_F	mA	150mA
Storage Temperature	T_{STC}	°C	-40°C-100°C
Operating Temperature	T_{OPT}	°C	-30°C-60°C
Junction Temperature	Tj	°C	85°C
Electrostatic Discharge (with TVS diode)	ESD	V	HBM, 2KV,1.5kΩ,100pF 3 pulses, alternately positive or negative

2020 Mil UVC Chip: Electro-optical parameters (continued)

Figure 1. Forward Current vs. Forward Voltage

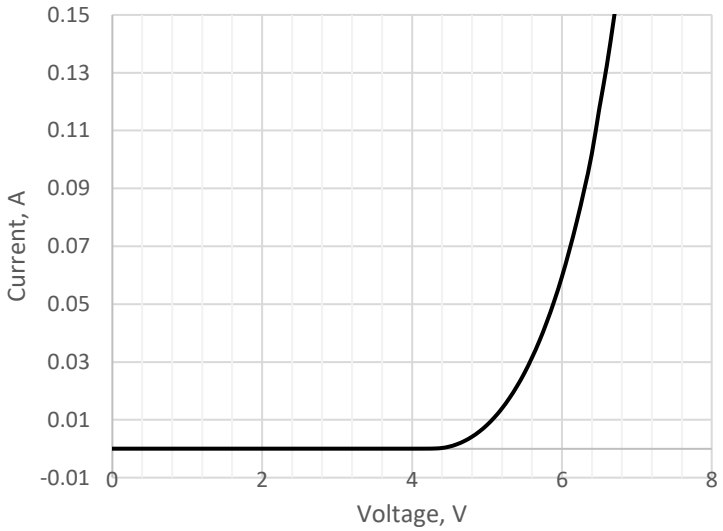


Figure 2. Relative Radiant Flux vs. Forward Current

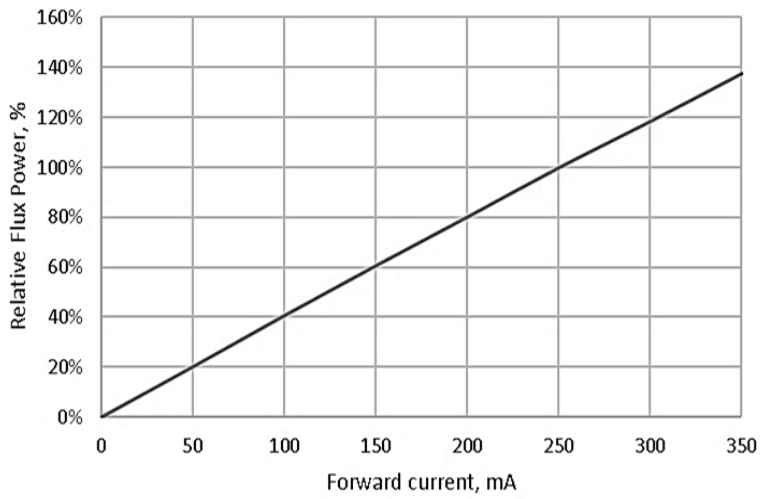


Figure 3. Emission Spectrum

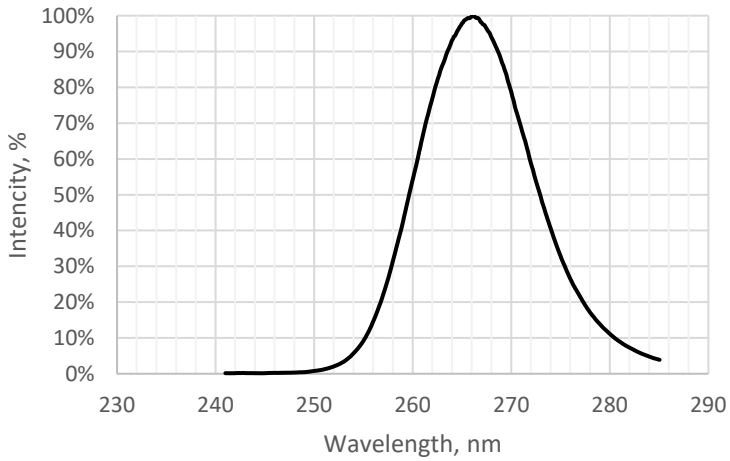


Figure 4. Forward Voltage vs Ambient Temperature

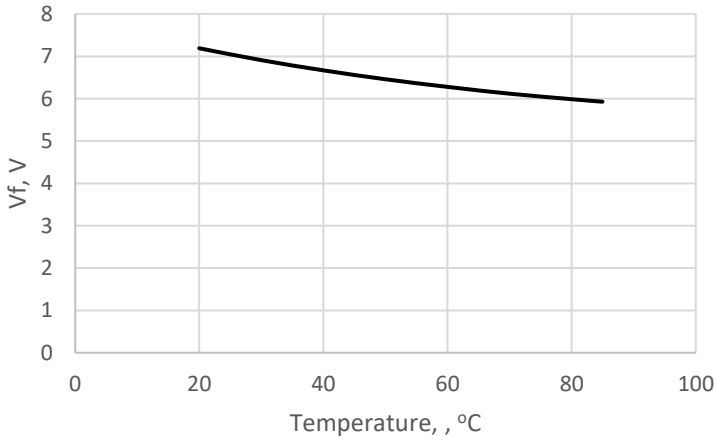


Figure 5. Relative Radiant Flux vs Ambient Temperature

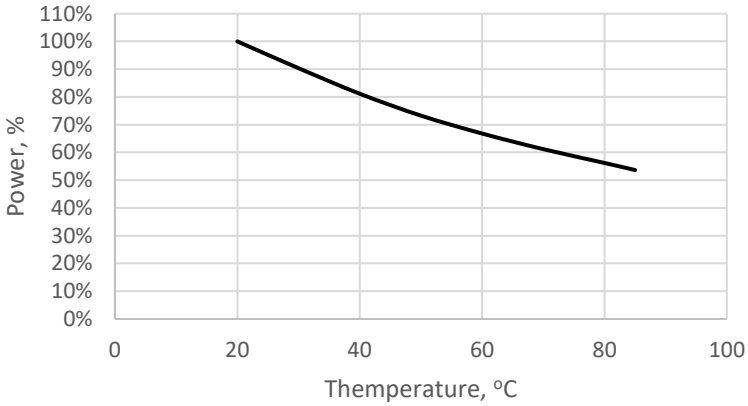
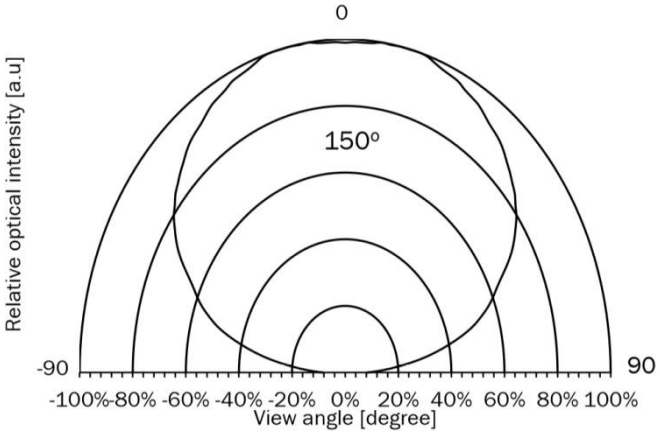


Figure 6. Far-field Emission Pattern



2020 Mil UVC Chip: Binning information

Table 3. Device lifetime (forward current =250mA, T = 25°C). Measured on SMD6060.

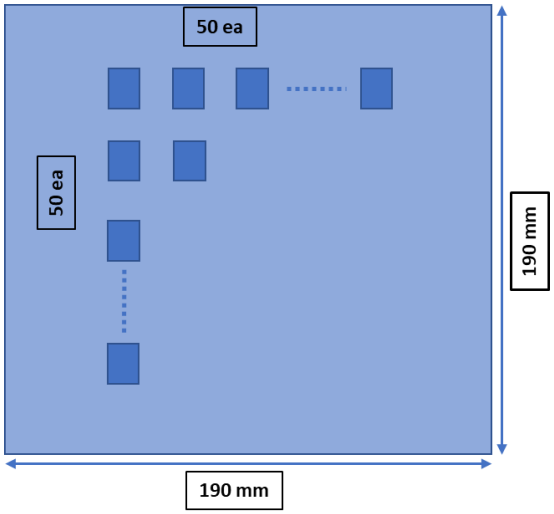
Parameter	Symbol	Unit	Min.	Typ.	Max
70% Power Lifetime	L70B50	hours	-	10000	-
50% Power Lifetime	L50B50	hours	-	20000	-

Table 4. Binning Table (I=100mA, Ta=25°C)

Designate	Information	Code	Minimums	Typical	Maximum
W	Peak wavelength (nm)	265 (L0)	260	265	270
		275 (L1)	270	275	280
P	Radiant Flux (mW)	U0	10	15	20
		U1	20	25	30
		U2	30	35	40
V	Voltage (V)	V1	5.0	5.5	6.0
		V2	6.0	6.5	7.0
		V3	7.0	7.5	8.0

2020Mil UVC Chip: Package for Shipping

All chips are mounted on standard UV curable semiconductor grade Blue tape, metal contacts up.
The Chip-on-Wafer (CoW) testing condition is 100mA



Use blue tape:
-Adhesive strength: N/20 mm
-Tape size: 190 mm x 190 mm

-Chip to chip: 350 µm
-Chip array: 50 ea x 50 ea
-Full bin: 2500 ea

Flipchip Die Attach Instructions (continued)

Figure 7. AuSn (80/20 wt%) reflow temperature profile

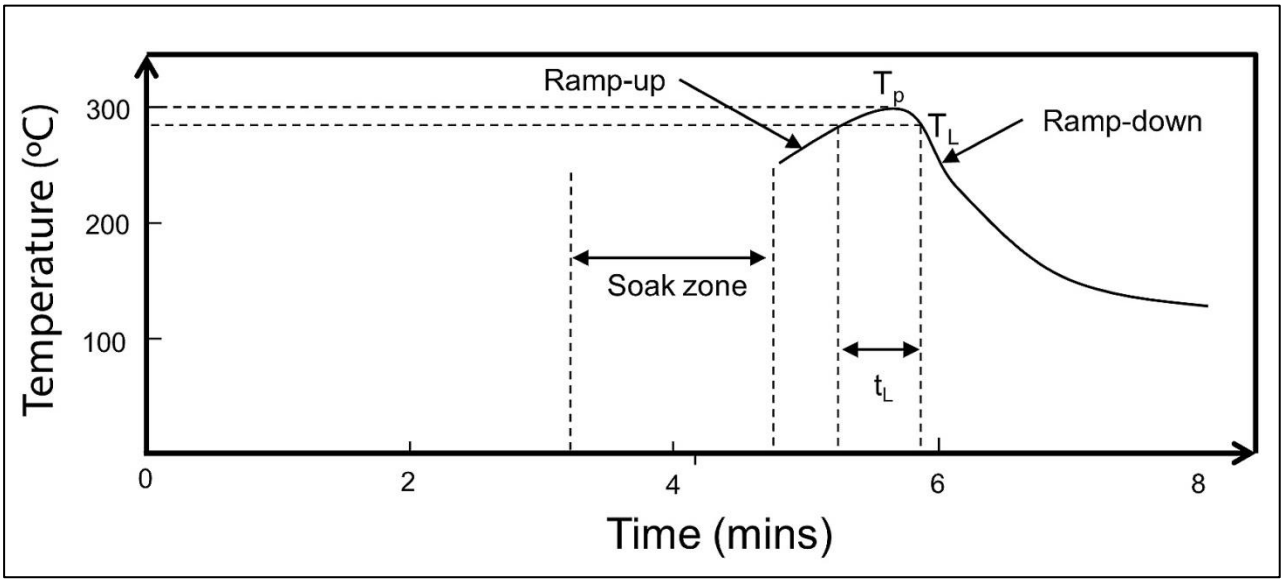


Table 5. AuSn (80/20 wt%) reflow temperature profile

Profile Feature	SPECIFICATIONS
Process Ambient	N_2 (O_2 < 500 ppm) or Forming gas (<7% H2)
Soak Zone Temperature	250˚C max
Soak Time	60-80 seconds
Liquidus Temperature T_L	280˚C
Ramp-up	~1˚C/second
Time above Liquidus Temperature t_L	30-40 seconds
Peak Temperature T_p	< 320˚C
Ramp-down	< 3.0 ˚C/second

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 flip chips according 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 flip chips during storage and handling.

• Always keep unused UVC flip chips 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.

• All delivered package (bag, reel, carrier tape) have ESD protection.

General Precautions and UVC Safety

UVC flipchips emit 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 chips (bare dice) or packaged LEDs from the manufacturer, the customer hereby agrees to indemnify the manufacturer for any bodily harm as a result of failure to observe the precautions, warnings and guidelines contained within this Specifications document.

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.