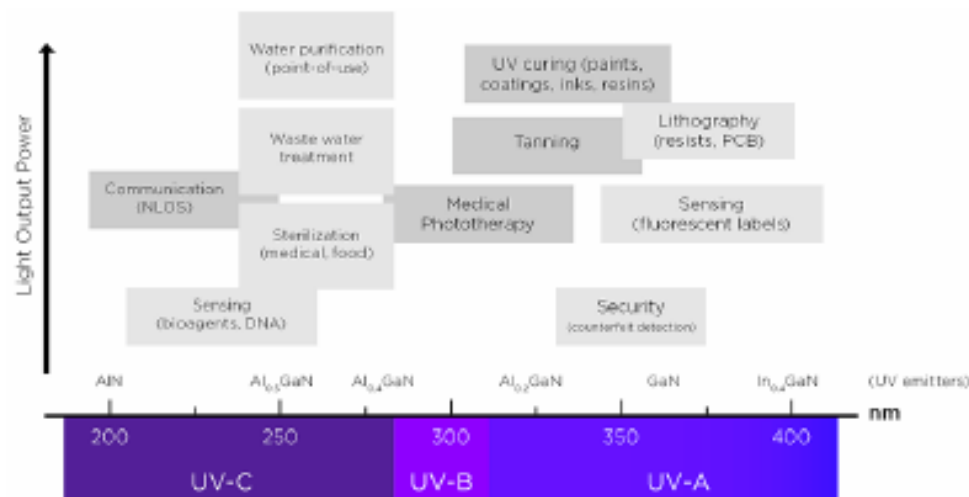


UVC LED

**Clean for Life
Change your Life**

UVC LED Function Introduction



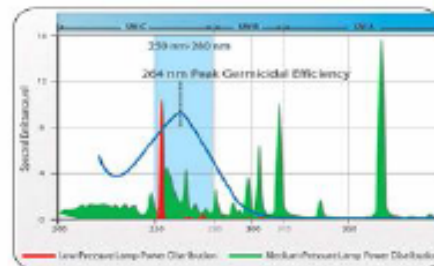
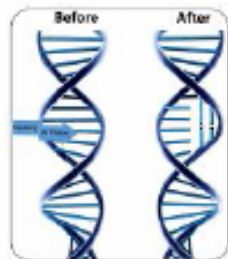
UVC (200-280nm) Applications include Disinfection & Medical Measurement:

-UVC Disinfect is a fast, effective and safe technique.

When microorganisms (ex: bacteria, virus, cyst and mycete) are exposed under UVC light, it will damage their DNA, and make them harmless. UVC can be used for Water Disinfection, Air Disinfection and Surface Disinfection.

-Using blocking-up UVC light to measure the existence and the quantity of matter. UVC light measurement can be used to measure air, impurity of matter, water quality, protein and DNA.

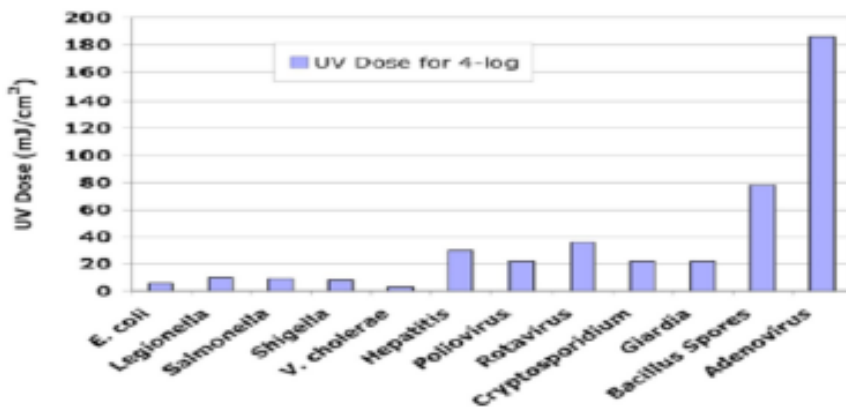
UVC LED Disinfection Principle



UVC Disinfection : microorganism such as bacteria, virus, cyst and mycete is using simple methods to maintain life cycle, such as sprout and spore. When they lose their growing function, they became harmless and can't induce illness.

UVC LED Disinfection Function : is applying different dose of UVC to microorganism.

Dose = UVC Radiant Flux x Time(mW/cm² x Sec= mJ/cm²), the higher Radiant Flux, the less Disinfection time.

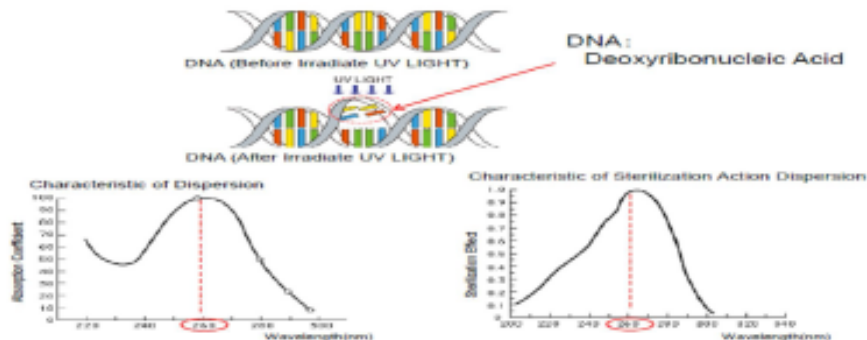


Different microorganism needs different dose of UVC to Disinfect

UVC LED Water, Air ,Surface Disinfection (265-275nm)

•265-270nm Air, Surface Disinfection

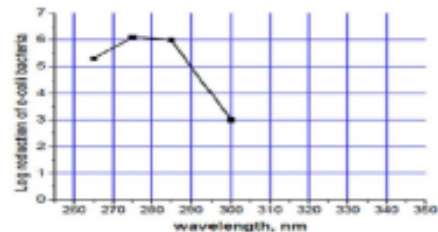
When microorganisms are exposed under UVC light, it will damage their DNA and make them harmless.



The best UVC LED wavelength for Air & Surface Disinfection is 265-270nm

•275nm Water Disinfection

UVC LED can be controlled at the best wavelength for operation: It have been proved that the best wavelength to disinfect the Escherichia coli in the water is 275nm. UVC LED design is not limited as tube anymore, it is almost unlimited.



The best UVC LED wavelength for Water Disinfection is 275nm



UVC LED Disinfection Test (wavelength)

UVC LED Wavelength: 265-275nm most efficiency

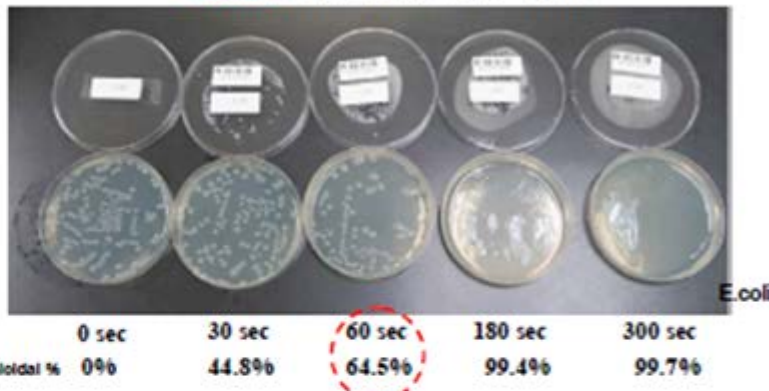
280nm / 10mW / 120° / WD=40mm

產品名稱: 260nm 120degree UVC LED
 產品狀態: 開發階段
 產品編號: --
 產品規格: --
 產品圖紙: --
 生產日期: --
 製造日期: --
 檢驗日期: 2016/10/28
 測試日期: 2016/11/01
 測試方法: 8.111 U.S. Pharmacopeia 28 NF 30 Microbiological Tests(3)
 Antimicrobial Effectiveness Testing 其中用菌種E.coli及S. aureus



測試結果:

照射時間 (sec)	菌落數 (cfu/plate)	滅菌率 (%)
0	300	---
0.5	100	44.8
1	100	64.5
3	2	99.4
5	1	99.7

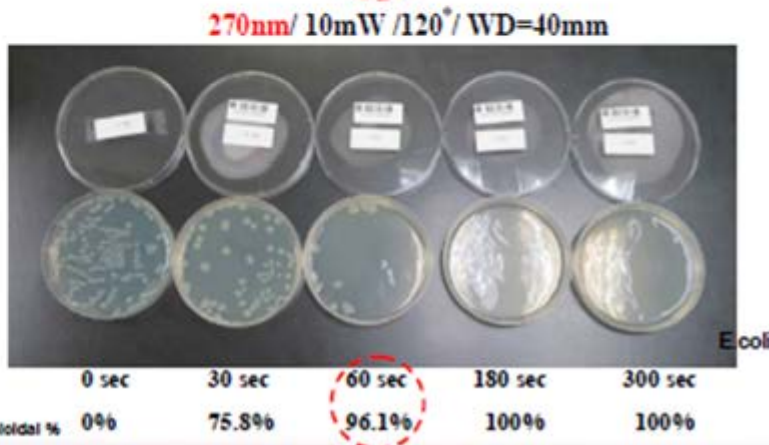


產品名稱: 270nm 120degree UVC LED
 產品狀態: 開發階段
 產品編號: --
 產品規格: --
 產品圖紙: --
 生產日期: --
 製造日期: --
 檢驗日期: 2016/10/28
 測試日期: 2016/11/01
 測試方法: 8.111 U.S. Pharmacopeia 28 NF 30 Microbiological Tests(3)
 Antimicrobial Effectiveness Testing 其中用菌種E.coli及S. aureus



測試結果:

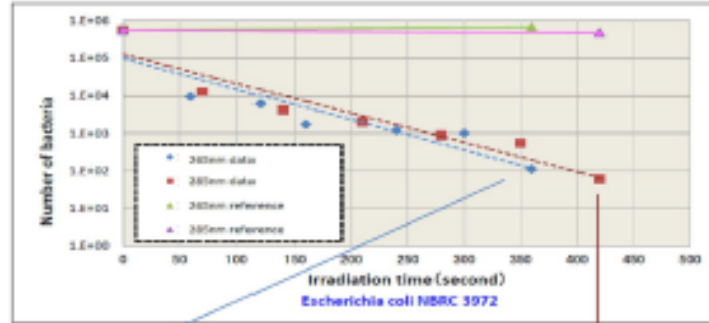
照射時間 (sec)	菌落數 (cfu/plate)	滅菌率 (%)
0	300	---
0.5	88	75.8
1	14	96.1
3	0	100
5	0	100



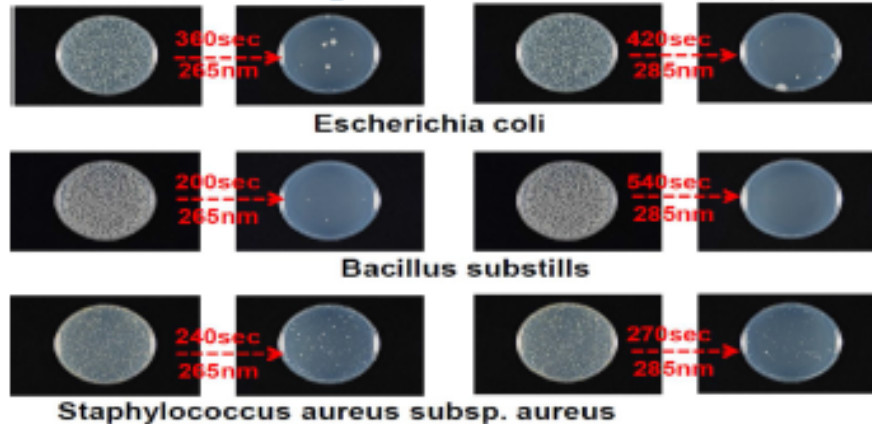


UVC LED Disinfection Test (wavelength vs Germs)

265nm : 1.3mW/cm²
 285nm: 2.4 mW/cm²
 WD: 10mm
 Dose = UVC Radiant Flux x Time
 (mW/cm² x Sec= mJ/cm²)



By Nikkiso 2016



UVC LED : < 275nm + High Irradiance(mW/cm²) → The best combination of Disinfection



UVC LED Applications

Medical Analyze Device



Water-cleaner



Air & Surface Disinfector



Surface Disinfector
Medical Disinfector



Air-cleaner



- Blood & Urine analyze device
- DNA purity measurement
- Protein & Drug research
- Water & Air quality measurement



UVC LED Advantages:

single wavelength, small size, easy to combine & operate, low voltage, high-speed switch on & off, environmental protection & mercury-free






White LED + UVC LED



UVC LED is not only replacing UVC lamp, but also creating more application

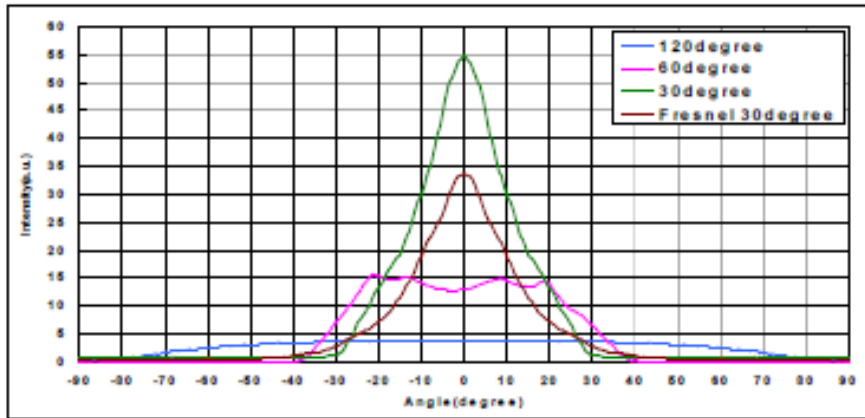


UVC LED Disinfection Package Specification

	High Purified Quartz Lens Al Reflector /Cu substrate				High Purified Quartz Lens Ceramic AlN Substrate				High Purified Quartz Lens Al Reflector /Cu substrate UVC COB		
	 120°	 30° / 60°		 Fresnel 30°							
Peak Wavelength λ_p (nm)	265-275nm 275-285nm				265-275nm 275-285nm				265-275nm 275-285nm		
Viewing Angle (θ) deg.	120° Flat quartz lens	60°	30°	30° Fresnel quartz lens	120° Flat quartz lens	60°	30°	30° Fresnel quartz lens	120° Flat quartz lens	60°	40°
Output power typ. (mW)	10mW				10mW				Customized Design		
Irradiance (mW/cm ²) typ. @10mm	2.8	12	25	15	2.8	12	25	15	Customized Design		
Forward voltage Vf (V)	6~10V				6~10V				Customized Design		
Forward Current If (mA)	150mA				150mA				Customized Design		
Spectra half-Width $\Delta \lambda$ nm	15				15				15		
Footprint (mm)	4.4 x 4.4 mm				3.5 x 3.5 mm				Customized Design		

UVC LED Disinfection Package Advantages

- UVC Disinfect Dose= mW/cm² ↑ x Sec ↓



Irradiance: mW/cm ² at WD (mm) (Based on output 10mW/LED)	120° Flat	60°	30°	30° Fresnel
mW/cm ² @10mm	2.8	12	25	15
mW/cm ² @30mm	0.33	1.4	4.2	2.4
mW/cm ² @50mm	0.12	0.5	1.55	0.9

UVC LED : < 275nm + High Irradiance(mW/cm²) → The best combination of Disinfection



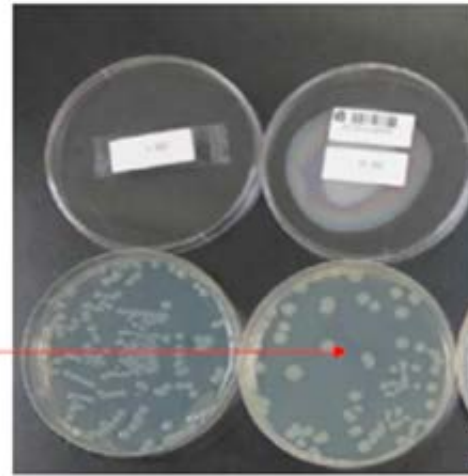
UVC LED Disinfection Viewing Angle

270nm/ 10mW / (3mW/cm²) / 30°
WD=40mm

270nm/ 10mW / (0.3mW/cm²) / 120°
WD=40mm



0 sec 30 sec
100%

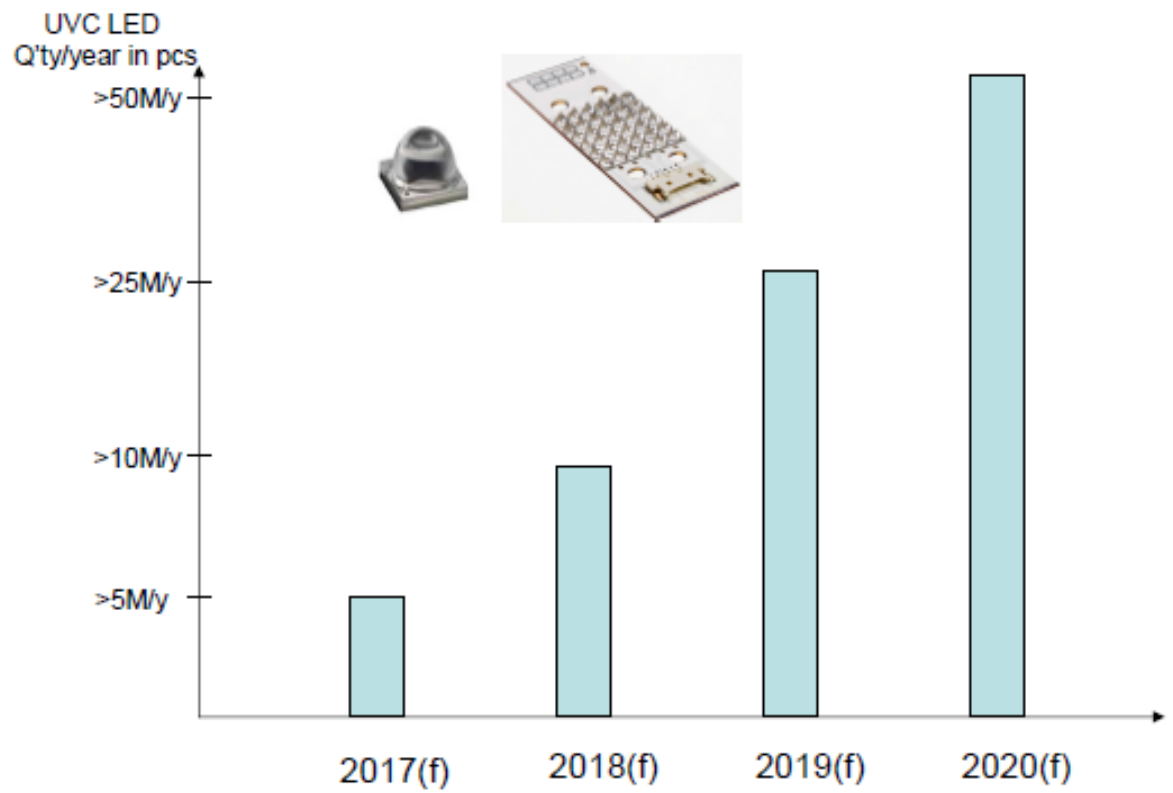


0 sec 30 sec
75.8%

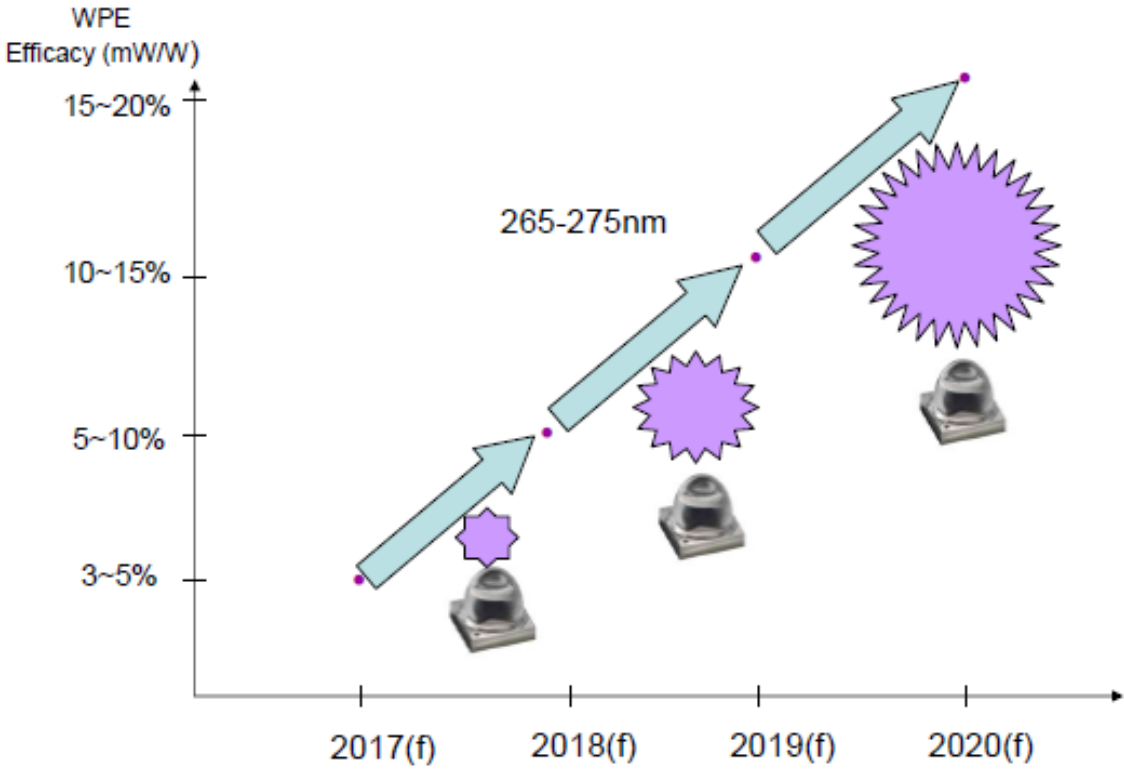
Luminous angle (30 °) vs (120 °) -8 times block sterilization efficiency, optimize the application of product design freedom



UVC LED Capacity (F)



UVC LED Technology (F)



SHARLIGHT ELECTRONICS CO., LTD.

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