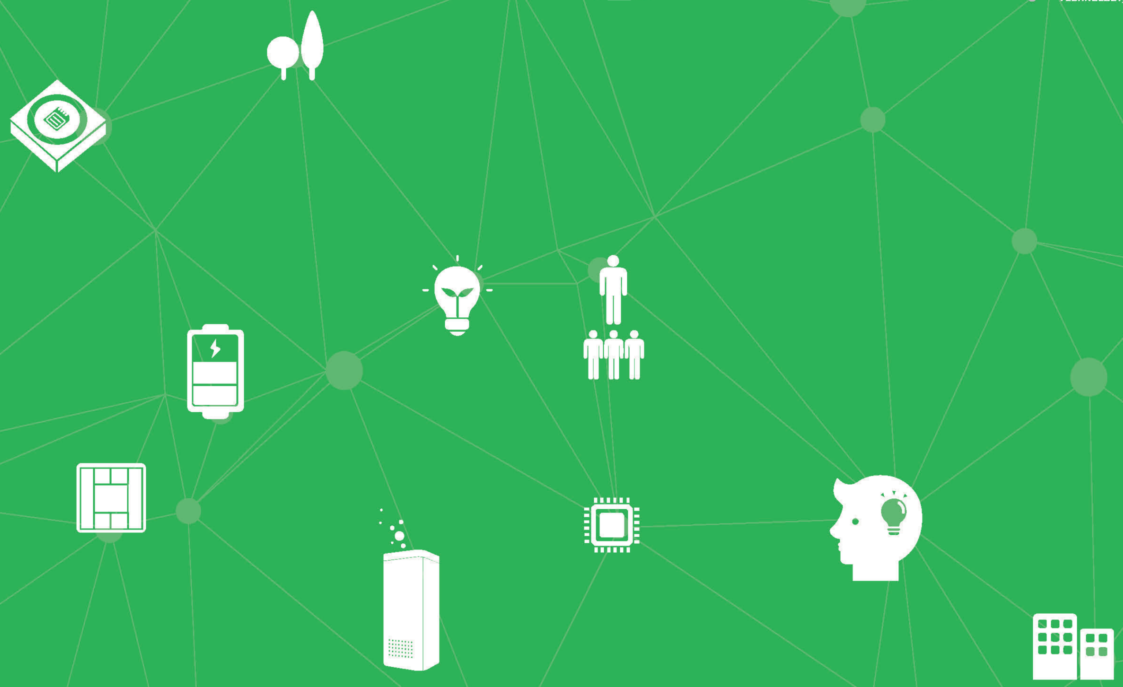
TOTAL UV SOLUTION PROVIDER

SEOUL VIOSYS SETi

www.seoulviosys.com

www.s-et.com



"Expansion from Visible & UV Chip Maker to **Total UV Solutions Provider**"

Overview of SEOUL VIOSYS

Seoul Viosys is a leading UV LED company that provides the widest range of UV wavelength devices in the world.
As a pioneer in both Near and Deep UV LED technology, SEOUL VIOSYS is currently supplying its competitive solutions to many global customers. Its technology leadership is supported by 12,000 related patents sustained through investing 15% of its revenue into R&D.

Overview of SETi

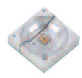
Sensor Electronic Technology, inc. (SETi) is proud to be part of Seoul Semiconductor and Seoul Viosys. Sensor Electronic Technology, Inc. (SETi) is the world's leading supplier of deep UV LEDs; LEDs with emission wavelengths shorter than 365nm. Using our proprietary and patented technology, we develop, manufacture and sell standard LED products, Certified to ISO9001:2008 and AS9100, we are committed to meeting and exceeding the needs of our customers and stakeholders through the highest levels of quality management. We develop, manufacture and offer a broad portfolio of UV-A, UV-B and UV-C LED products and application solutions.

SEOUL VIOSYS **Business Milestone**

2002
Seoul Optodevice
Seoul Optodevice founded in 2002

2003
Developed EPI, FAB, UV LED

2005
World's first mass production of UVC



SETi Investment & Joint Development

2008
Establishment Nitek

2009
Volume production of blilions of Visible & UV LED Chips

2013
SEOUL VIOSYS Renamed
High power new UVA (365~420nm)

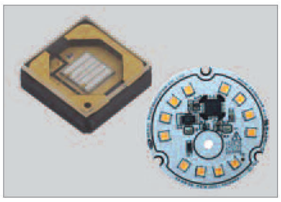
2014
violeds
Launched violeds technology for UV LED

2015
SETi acquisition is approved by the US Department of Defense

2016
MOSCLEAN
Launched MOSCLEAN Finished product

Core **Competency**

01



World First and Best UV LED

- Unique world 1st technology - Wicop, violeds
- New generation UV LED using differentiated technology

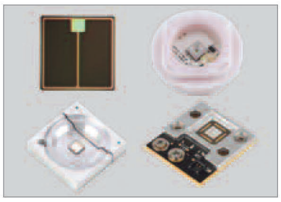
02

12,000 Patents Registered
IEEE
(Institute of Electrical and Electronics Engineers)

No.1 IP Power

- World No. 1 IP Power by IEEE - Total 12,000 Patents
  - UV 4,000 Patents
- All product protected against copy cat companies

03



α to Ω UV LED

- Epi, Chip PKG, COB, Module, F/P, covering whole UV wavelength
- Customized product available
- Total UV LED Solution provider

04

Research Capability

- Application Lab - In-House, Entomology, Sterilization, Deodorization Laboratory
  - All Test available by applications
- Analysis Lab beyond industrial standard

05

Manufacturing Capacity

- World's Largest Capacity - PKG 2.0 B/month
  - Chip 2.4 B/month
  - Able to be converted to UV LED production

06

Global Sales Network

- 4 Production platforms
- 6 R&D Labs
- 40 Sales Offices

Why **UV LED**?

Compare UV LED with Conventional UV Lamp

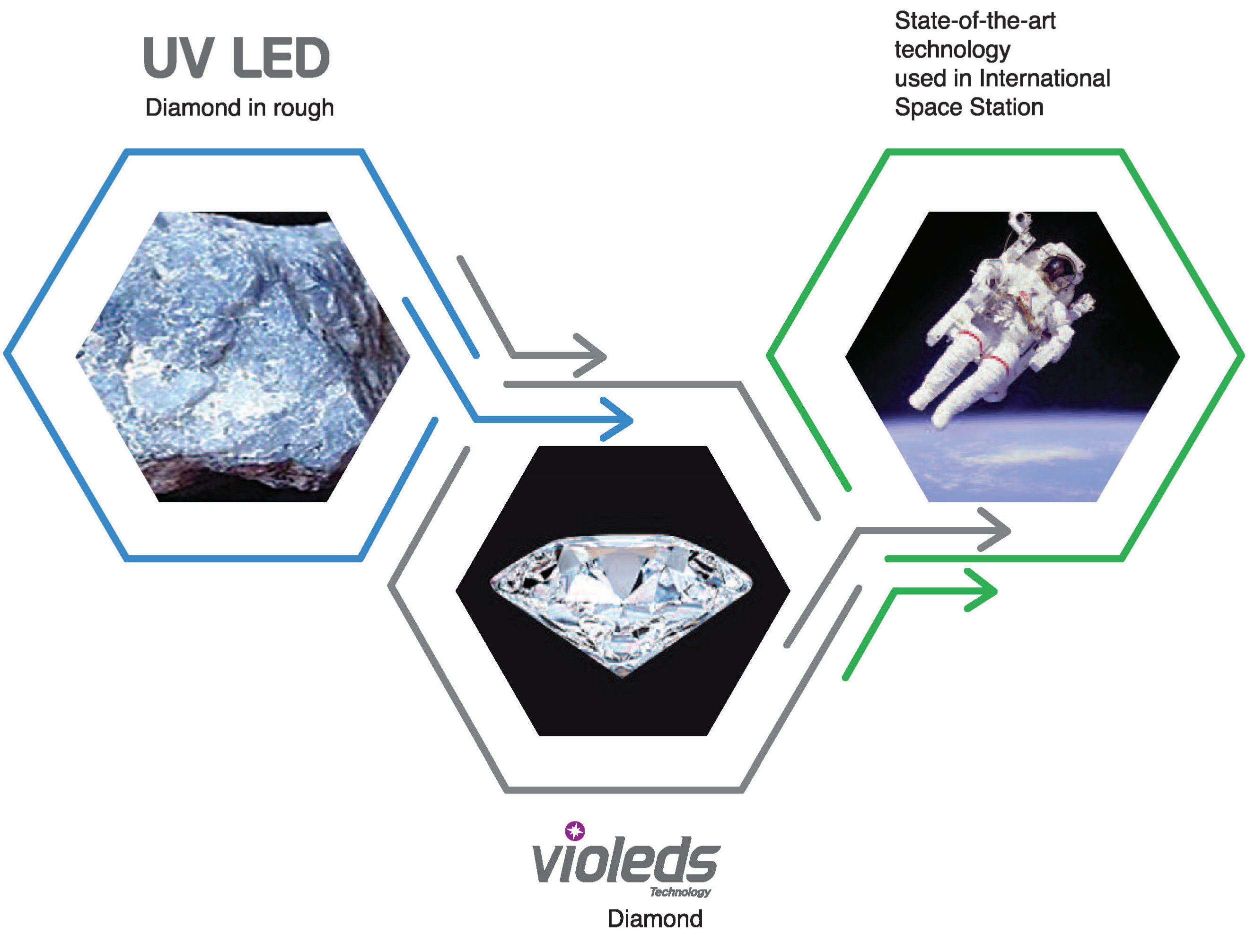
UV LED has advantages of a long lifespan, an energy saving, and a low heat as known as Eco-friendly not using mercury.

UV LED		UV Lamp
New, Light, Simple, Compact	Technology	Old, Bulky, Heavy, Complex
None	Heavy Metals	Mercury (20-200mg)
10,000-50,000 Hour	Life Time	2,000-10,000 Hour
Non Toxic	Environmental Friendliness	Toxic(Hg, O_3)
Low	Energy Consumption	High
Single UV Band, Customizable	Emission Wavelength	Multiple Peaks
Low	Heat generation	High
Instant	Warm-up time	Long

violeds technology

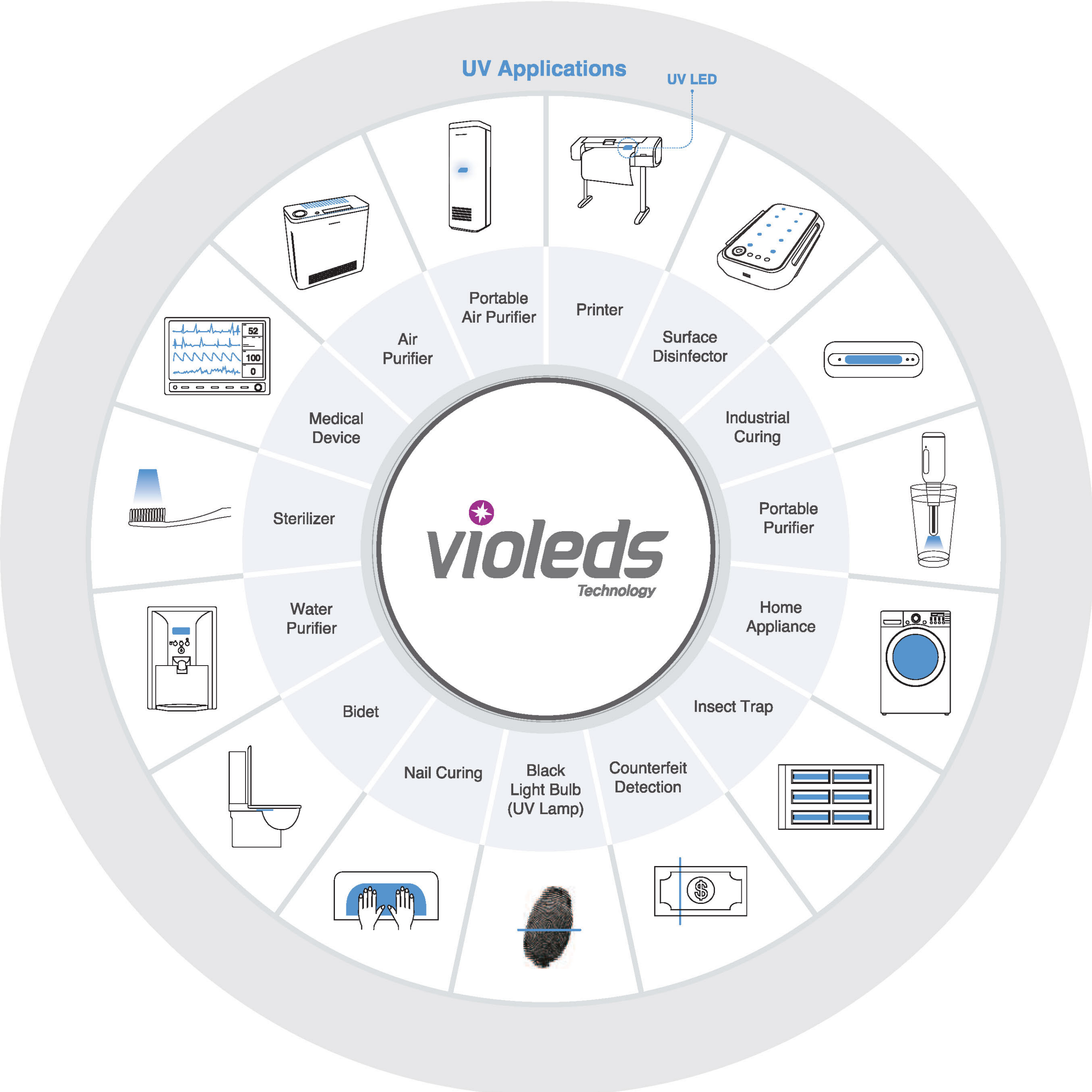
What is violeds technology?

- violeds technology eliminates the drawbacks of UV and is a technology optimized for clean environment and health.
- violeds is a clean technology that can be used for disinfection, deodorization, phototherapy and curing, realized by the collaboration of SEOUL VIOSYS and SETi.
- violeds uses special LEDs that emit in the ultraviolet spectrum.
- The collaboration of SEOUL VIOSYS and SETi offers the highest performance, most cost effective UV LEDs covering the entire UV LED spectrum from UVA, UVB and UVC.
- violeds is a patented technology that includes UV LEDs, UV LED modules and UV LED solutions.



Application of **violeds technology**

"Able to meet customer needs in various applications"



UV LED Package Line-up

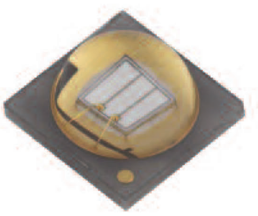
Wave length	Product	Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (V)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Thermal Resistance (°C/W)	Remark
UV-A PKG	Z5	CUN66A1B	365	Dome Wide	3.6	900	500	120	3.5×3.5×2.0	3.8	1chip
		CUN86A1B	385		3.4	1,160				3.5	
		CUN96A1B	395		3.4	1,100				3.5	
		CUN06A1B	405		3.3	1,160				3.5	
		CUN26A1B	420		3.4	970				3.9	
		CUN66A1F	365		3.6	420	250			9.28	
		CUN66A1E	365		3.6	920	500			6.4	
	nZ5	CUN66B1B	365	Dome Narrow	3.6	1,000	500	45	3.5×3.5×2.83	3.8	1chip
		CUN86B1B	385		3.4	1,200				3.5	
		CUN96B1B	395		3.4	1,270				3.5	
		CUN06B1B	405		3.4	1,200				3.5	
		CUN26B1B	420		3.4	1,040				3.9	
	CA3535 Dome	CUN6GB1A	365	Dome	3.7	1,400	1,000	62	3.5X3.5X2.5	5	1chip
		CUN8GB1A	385		3.6	1,600		62.5		3.8	
		CUN9GB1A	395		3.4	1,600		62.5		3.9	
		CUN0GB1A	405		3.4	1,600		62.5		3.9	
	CA3535 Flat	CUN6GF1A	365	Flat	3.7	1,400	1,000	115	3.5X3.5X1.1	5	1chip
		CUN8GF1A	385		3.5	1,600		112		3.8	
		CUN9GF1A	395		3.4	1,600		115		3.9	
		CUN0GF1A	405		3.4	1,600		115		3.9	
	AAP 1Chip	CUN6AF1B	365	Flat	3.8	820	500	110	6.35×6.35×1.4	3.5	1chip
		CUN8AF1B	385		3.6	950				2.7	
		CUN9AF1B	395		3.6	900				2.7	
		CUN0AF1B	405		3.6	850				2.7	
	AAP 4Chip	CUN6AF4A	365	Flat	7.5	2,750	1,000	116	6.3×6.3×1.4	1.3	4chip
		CUN8AF4A	385		7.3	3,750				1.1	
		CUN9AF4A	395		7.2	3,750				1.1	
	CA6868	CUN6HF4A(U)	365	Flat	3.7	3,800	3,000	115	6.8X6.8X1.0	-	4chip
		CUN8HF4A(U)	385		3.5	5,300					
		CUN9HF4A(U)	395		3.4	5,300					
		CUN0HF4A(U)	405		3.4	5,300					
	5050C	CUN0CF1	400	Flat	3.2	61	50	120	5.0×5.0×1.0	17	1chip
		CUN0CF2	400		3.4	150	150			-	2chip
	CA3528	CUN6LF1C	365	Flat	3.6	40	50	120	3.5x2.8x0.7	18	1chip
		CUN8LF1C(U)	385		3.3	50	50			15	
UV-B/C PKG	CA3535	CUD5GF1A(U)	255	Flat	6.5	0.5	30	120	3.5×3.5×1.1	21.5	1chip
		CUD7GF1A	275		6.0	1.8	20				
		CUD8GF1A	285		6.0	2.0	30				
		CUD9GF1A	295		6.0	2.0	30				
		CUD1GF1A	310		5.5	1.2	20				
		CUD7GF1B	275		6.0	11.5	150	125		31	
		CUD8GF1B	285		6.0	10.0	200				
	AAP	CUD8AF1C	275	Flat	6.5	3.3	30	115	6.35×6.35×1.4	22	1chip
		CUD1AF1C(U)	310		5.5	1.8	30	115		22	
		CUD8AF1D(U)	275		6.0	19	200	120		24.2	
		CUD4AF1B(U)	340		4.3	55	500	110		-	
		CUD8AF4C(U)	275		6.5	13	120	116		19.7	4chip
		CUD1AF4C(U)	310		5.5	6.8	120	116		19.7	
		CUD8AF4D	275		6.5	50	600	118		15.1	

※ (U) : Under development

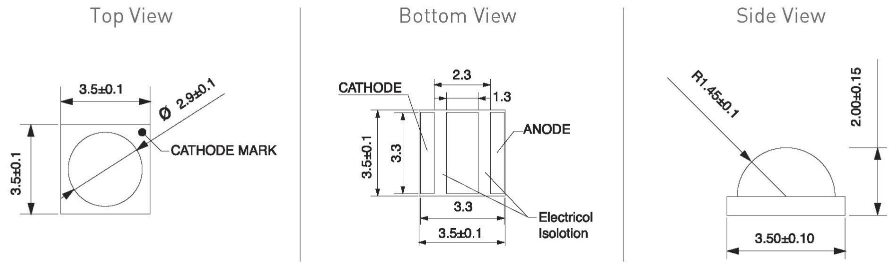
UV LED Package

UV-A : Z5

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN66A1B	365		3.6	900				3.8	
CUN86A1B	385		3.4	1,160				3.5	
CUN96A1B	395	Dome Wide	3.4	1,100	500	120		3.5	
CUN06A1B	405		3.3	1,160			3.5×3.5×2.0	3.5	1chip
CUN26A1B	420		3.4	970				3.9	
CUN66A1F	365		3.6	420	250	120		9.28	
CUN66A1E	365		3.6	920	500	120		6.4	



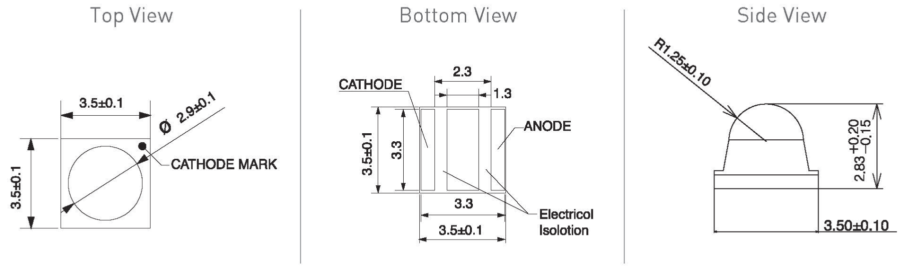
Outline Dimensions



UV-A : nZ5

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN66B1B	365		3.6	1,000				3.8	
CUN86B1B	385		3.4	1,200				3.5	
CUN96B1B	395	Dome Narrow	3.4	1,270	500	45	3.5×3.5×2.83	3.5	1chip
CUN06B1B	405		3.4	1,200				3.5	
CUN26B1B	420		3.4	1,040				3.9	

Outline Dimensions

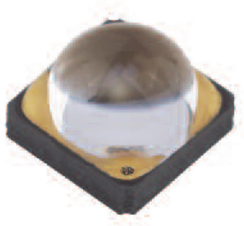


UV LED Package

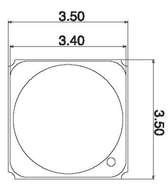
UV-A : CA3535 Dome

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6GB1A	365	Dome	3.7	1,400	1,000	62	3.5×3.5×2.5	5	1chip
CUN8GB1A	385		3.6	1,600		62.5		3.8	
CUN9GB1A	395		3.4	1,600		62.5		3.9	
CUN0GB1A	405		3.4	1,600		62.5		3.9	

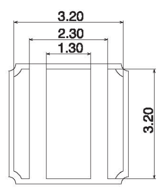
Outline Dimensions



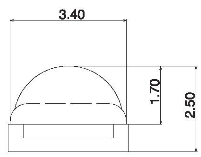
Top View



Bottom View



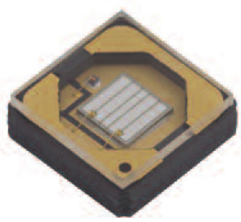
Side View



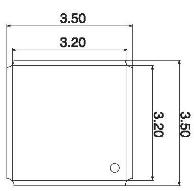
UV-A : CA3535 Flat

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6GF1A	365	Flat	3.7	1,400	1,000	115	3.5×3.5×1.1	5.0	1chip
CUN8GF1A	385		3.5	1,600		112		3.8	
CUN9GF1A	395		3.4	1,600		115		3.9	
CUN0GF1A	405		3.4	1,600		115		3.9	

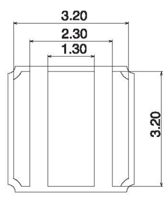
Outline Dimensions



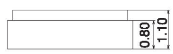
Top View



Bottom View



Side View

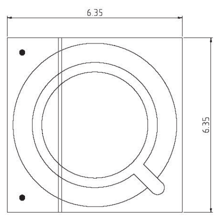


UV-A : AAP 1 Chip

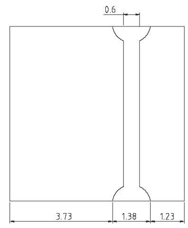
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6AF1B	365	Flat	3.8	820	500	110	6.35×6.35×1.4	3.5	1chip
CUN8AF1B	385		3.6	950				2.7	
CUN9AF1B	395		3.6	900				2.7	
CUN0AF1B	405		3.6	850				2.7	

Outline Dimensions

Top View



Bottom View



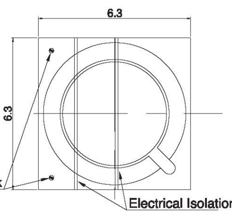
Side View

UV-A : AAP 4 Chip

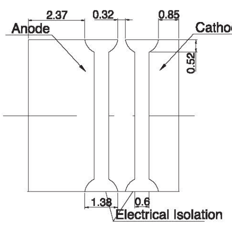
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6AF4A	365	Flat	7.5	2,750	1,000	116	6.3×6.3×1.4	1.3	4chip
CUN8AF4A	385		7.3	3,750				1.1	
CUN9AF4A	395		7.2	3,750				1.1	

Outline Dimensions

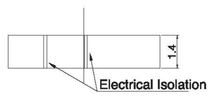
Top View



Bottom View



Side View

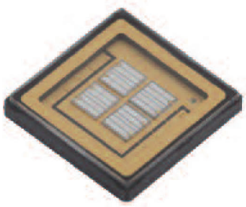


UV LED Package

UV-A : CA6868

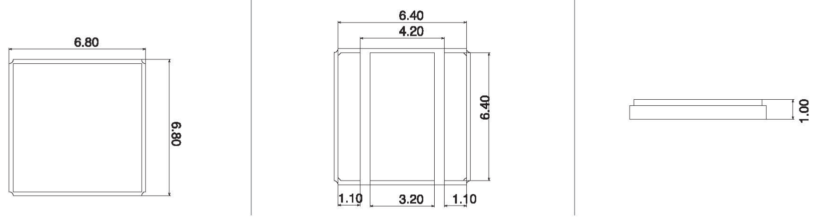
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6HF4A(U)	365	Flat	3.7	3,800	3,000	115	6.8×6.8×1.0	-	4chip
CUN8HF4A(U)	385		3.5	5,300					
CUN9HF4A(U)	395		3.4	5,300					
CUN0HF4A(U)	405		3.4	5,300					

※ (U) : Under development



Outline Dimensions

Top View Bottom View Side View

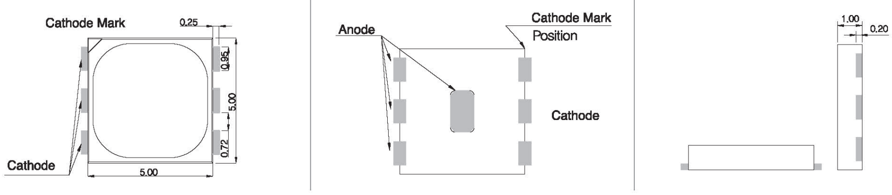


UV-A : 5050c

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN0CF1	400	Flat	3.2	61	50	120	5.0×5.0×1.0	17	1chip
CUN0CF2	400		3.4	150	150			-	2chip

Outline Dimensions

Top View Bottom View Side View



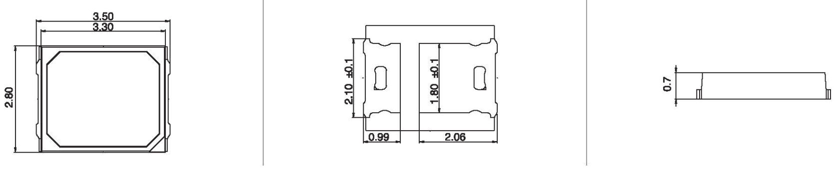
UV-A : CA3528

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6LF1C	365	Flat	3.6	40	50	120	3.5x2.8x0.7	18	1chip
CUN8LF1C(U)	365		3.3	50	50			15	

※ (U) : Under development

Outline Dimensions

Top View Bottom View Side View

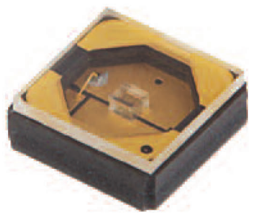


UV-B/C : CA3535

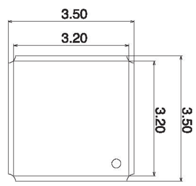
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUD5GF1A(U)	255		6.5	0.5	30				
CUD7GF1A	275		6.0	1.8	20				
CUD8GF1A	285		6.0	2.0	30	120		21.5	
CUD9GF1A	295	Flat	6.0	2.0	30		3.5×3.5×1.1		1chip
CUD1GF1A	310		5.5	1.2	20				
CUD7GF1B	275		6.0	11.5	150	125		31	
CUD8GF1B	285		6.0	10.0	200				

※ (U) : Under development

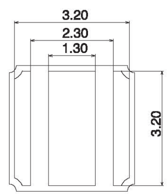
Outline Dimensions



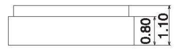
Top View



Bottom View



Side View



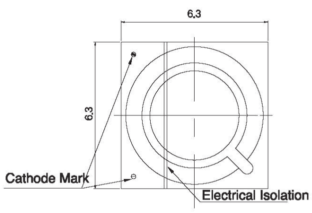
UV-B/C : AAP

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUD8AF1C	275		6.5	3.3	30	115		22	
CUD1AF1C(U)	310		5.5	1.8	30	115		22	1chip
CUD8AF1D(U)	275		6.0	19	200	120		24.2	
CUD4AF1B(U)	340	Flat	4.3	55	500	110	6.35×6.35×1.4	-	
CUD8AF4C(U)	275		6.5	13	120	116		19.7	
CUD1AF4C(U)	310		5.5	6.8	120	116		19.7	4chip
CUD8AF4D(U)	275		6.5	50	600	118		15.1	

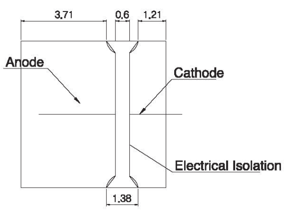
※ (U) : Under development

Outline Dimensions

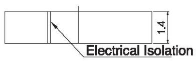
Top View



Bottom View



Side View



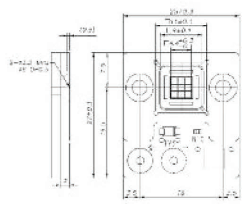
UV COB

UV-A : NCOB

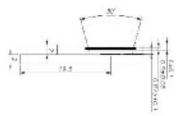
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUN6MF9A	365	Flat	3.85	12,500	2~12	120	25×27×4	0.43	9chip
CUN8MF9A	385		3.62	16,500		115		0.42	
CUN9MF9A	395		3.55	16,500		125		0.45	
CUN0MF9A	405		3.55	16,500		115.5		0.49	

Outline Dimensions

Top View



Side View

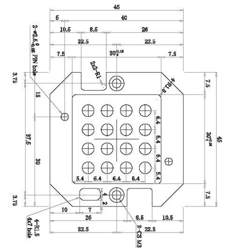


UV-B/C : DCOB 64chip

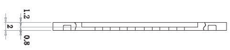
Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUD1KFMA(U)	310	Flat	44	80	-	-	45×45×4	-	64chip

Outline Dimensions

Top View

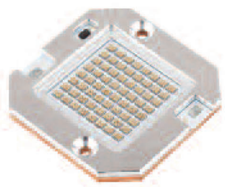


Side View



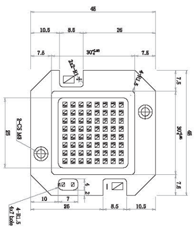
UV-B/C : DCOB 256chip

Part No.	Peak Wavelength (nm)	Dome Type	Forward Voltage (v)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Termal Resistance (°C/W)	Remark
CUD1TFMA(U)	310	Flat	50	470	-	-	45×45×4	-	256chip



Outline Dimensions

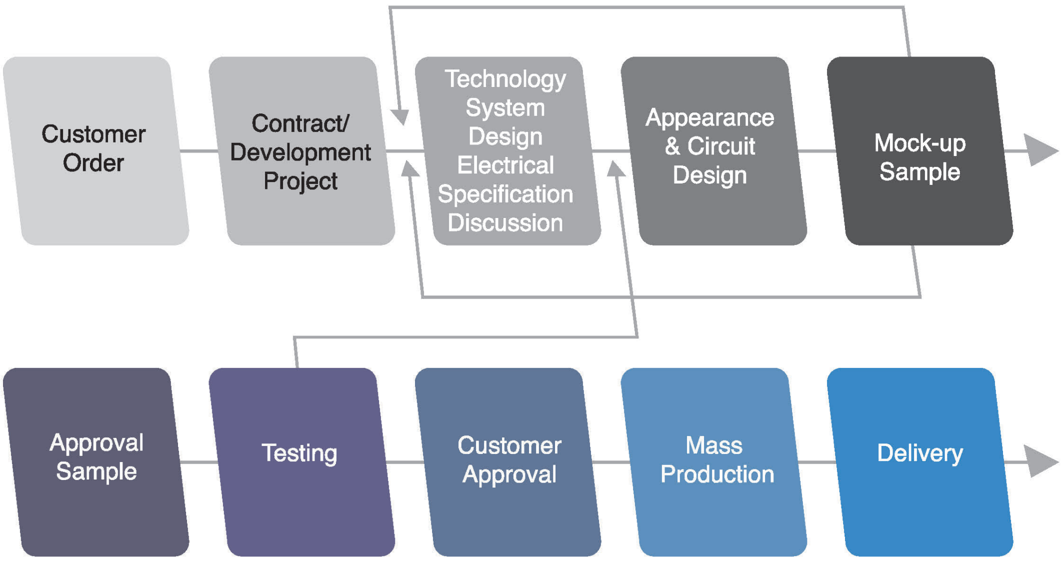
Top View



Side View

Customized
UV Chip-On-Board(COB) Module

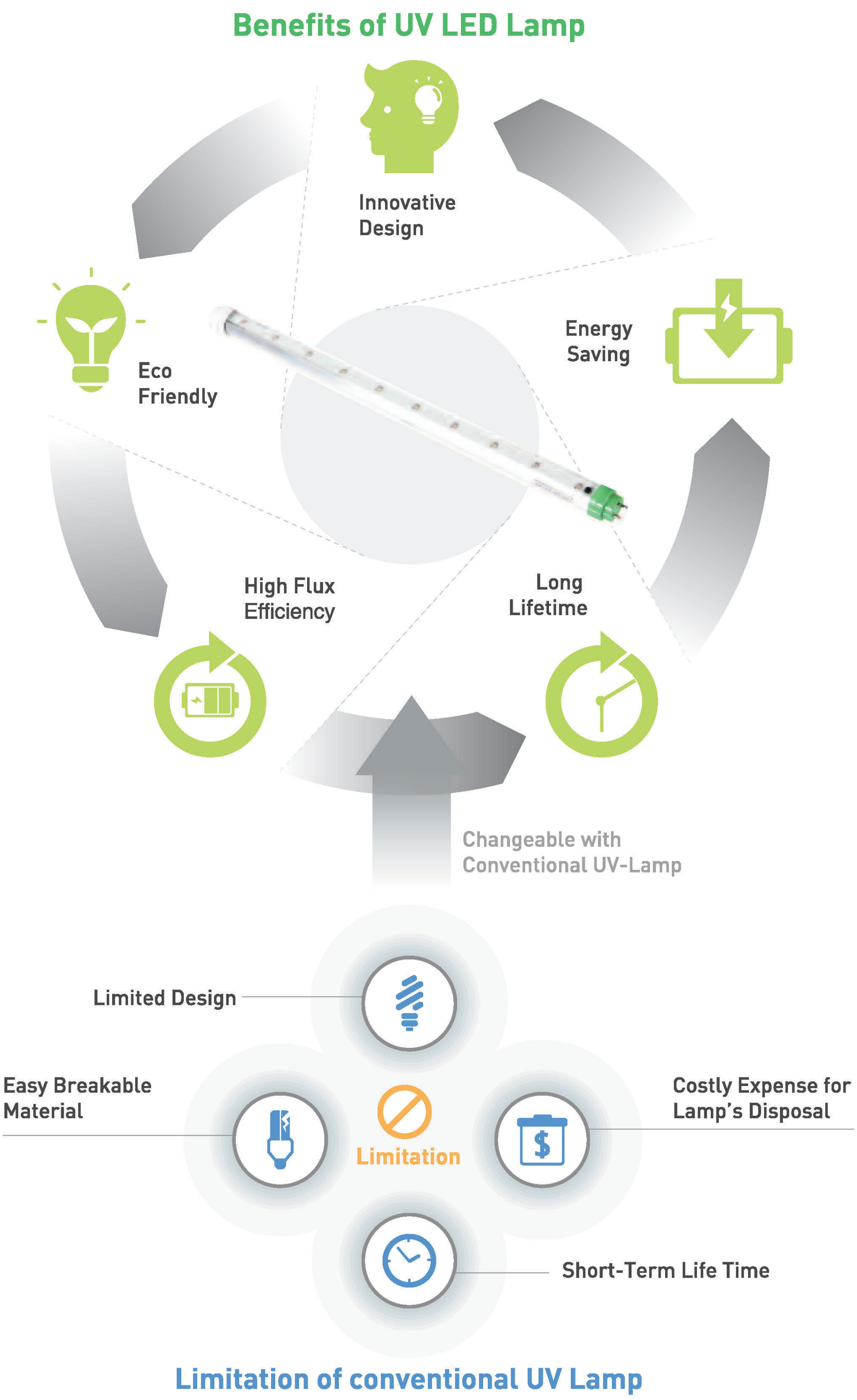
Chip-On-Board(COB) is an array of individual UV LED chips placed in a high performance package to maximize light intensity and improve reliability over discrete solutions. The chips are electrically connected to operate at high voltages compatible with standard power supplies.



Flow Chart
for Customer Order COB/Module

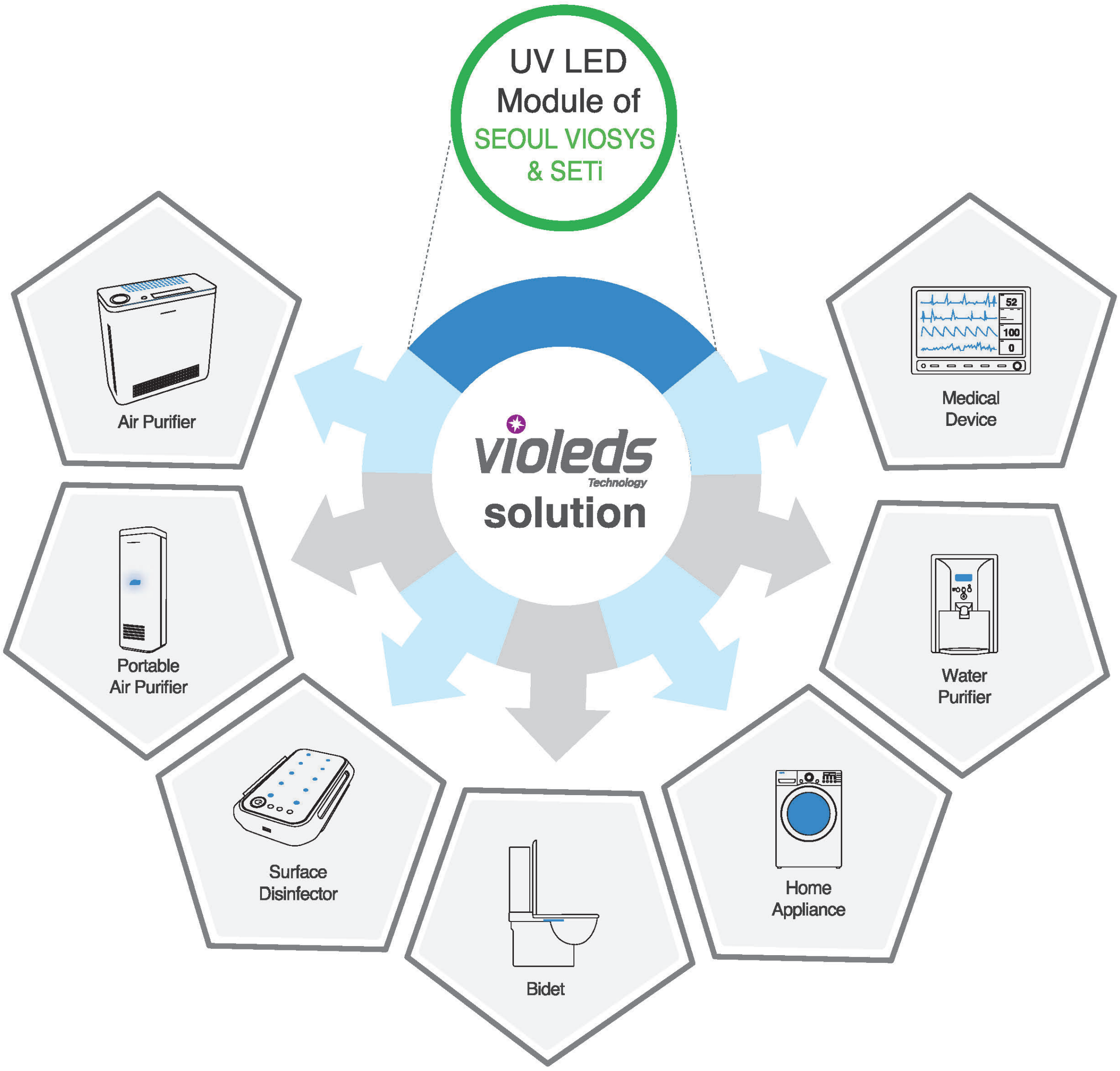
Enable to assemble the desired shape of a high performance UV Chip-On-Board(COB) module.

UV LED Lamp


Benefits of UV LED Lamp
Innovative Design
Energy Saving
Eco Friendly
High Flux Efficiency
Long Lifetime
Changeable with Conventional UV-Lamp
Limited Design
Easy Breakable Material
Limitation
Costly Expense for Lamp's Disposal
Short-Term Life Time
Limitation of conventional UV Lamp

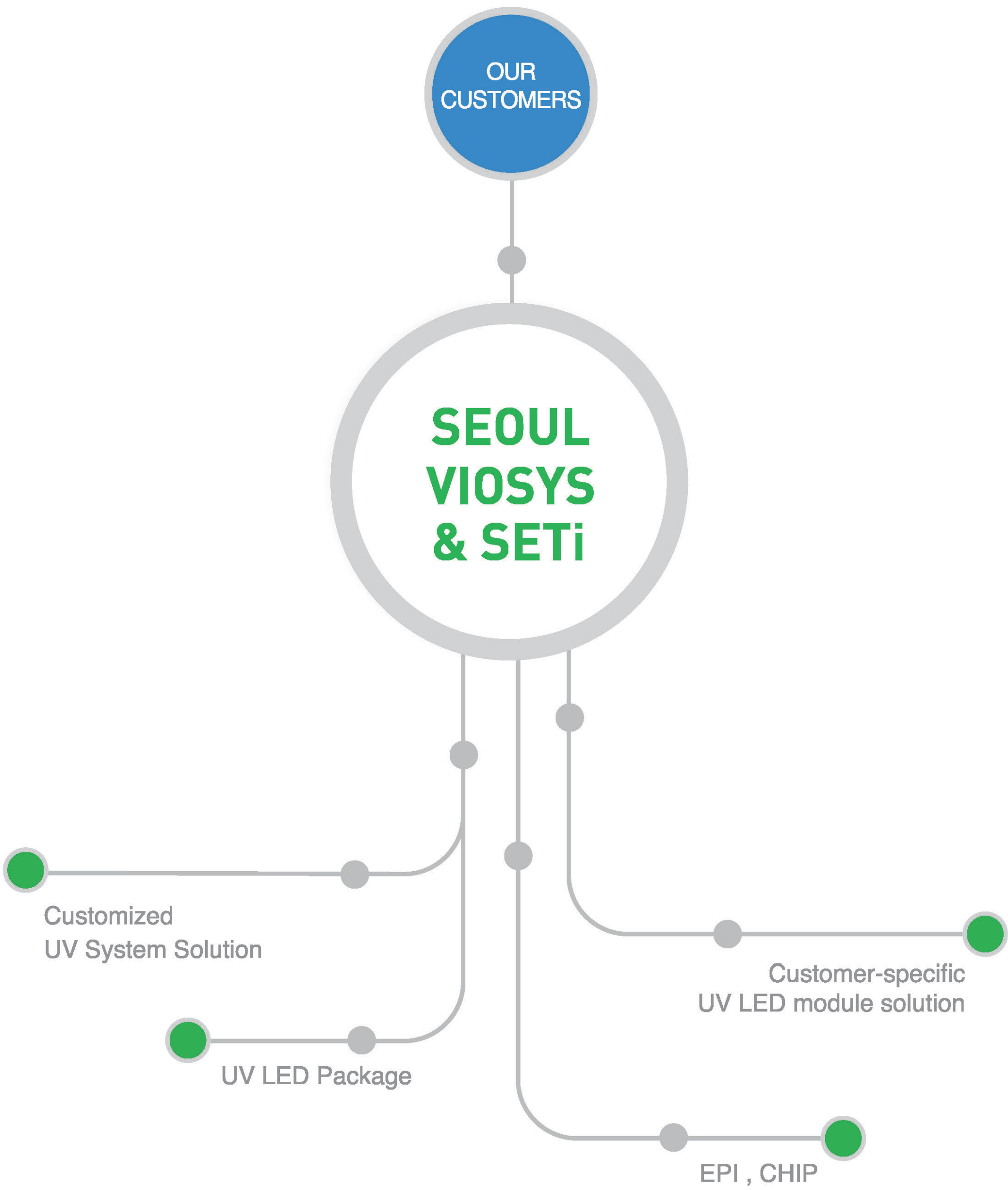
UV LED Module for SYSTEM Application

The UV LED Module of SEOUL VIOSYS & SETi can be applied to various product families. Below are some of the products that UV sterilization is applied to in our everyday surroundings.



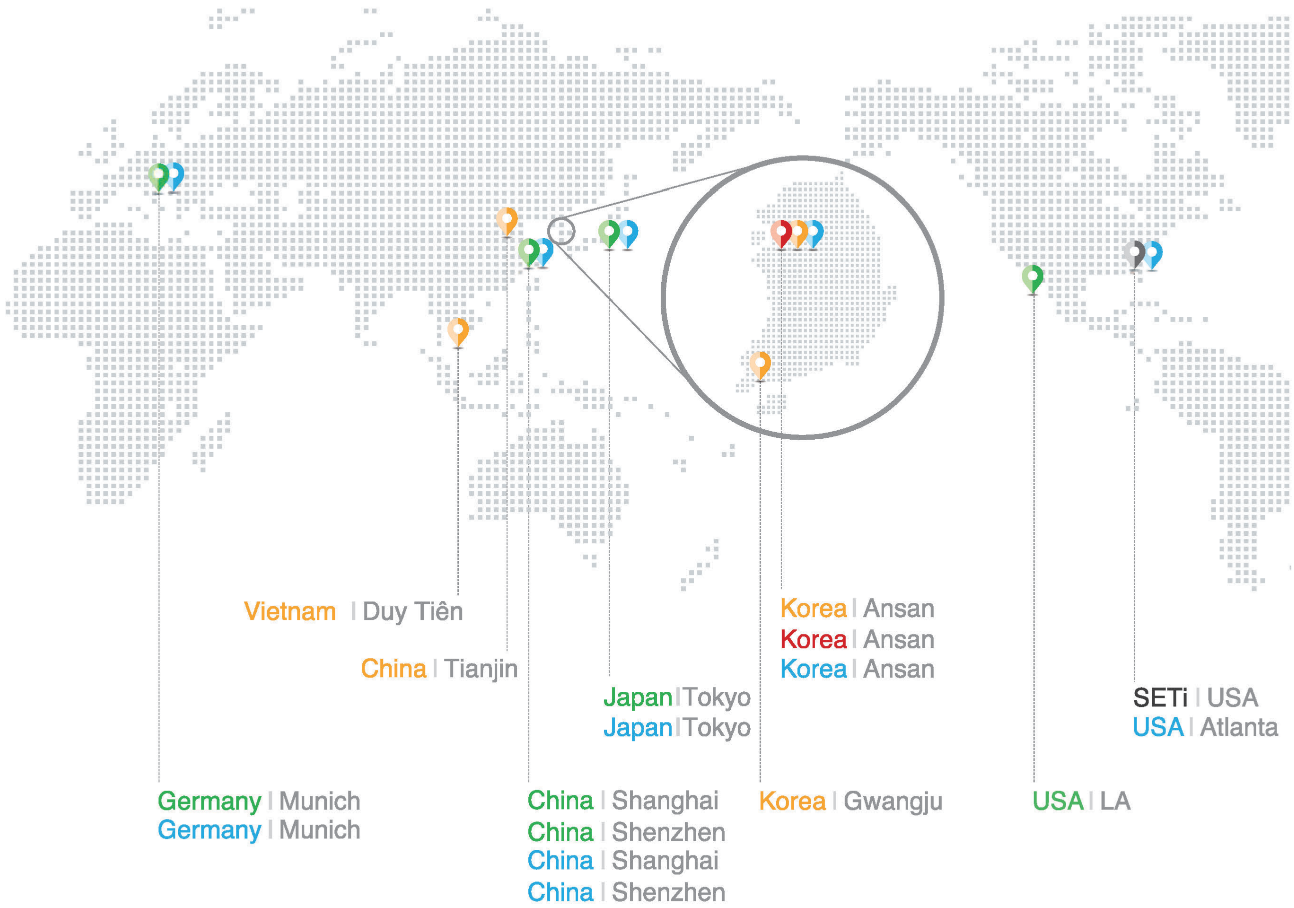
We create innovations
for innovations

“WE DO NOT COMPETE WITH OUR CUSTOMERS”



Global Networks

SEOUL VIOSYS offers one-stop complete UV LED solutions to our business partners



SEOUL VIOSYS and SEOUL SEMICONDUCTOR(Parent company)

- **Headquarters** Korea(Ansan)
- **Production Sites** Korea(Ansan, Gwangju), China(Tianjin), Vietnam(Duy Tiên)
- **Corporate Offices** USA(LA), Germany(Munich), China(Shanghai, Shenzhen), Japan(Tokyo)
- **R&D Labs** Korea(Ansan), Japan(Tokyo), USA(Atlanta), China(Shenzhen, Shanghai), Germany(Munich)
- **Partner Company** SETi(USA)

40 Sales Offices / 150distributors

TOTAL UV SOLUTION PROVIDER

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