艾笛森光電股份有限公司
Edison Opto Corporation

UVC LED
Product Portfolio

Lighting
Design
Manufacturing
Service

UVC Outline

- Minamata Convention on Mercury
- UVC LED Advantages
- UVC Device Applications
- EDISON UVC Product Road Map
- EDISON UVC Package Series
- EDISON UVC Module Series
- UVC Measurement

Minamata Convention on Mercury

2013
October

BAT

Best Available Techniques

UN environment programme

BEP

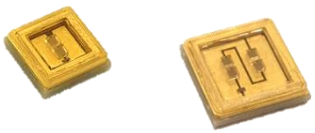
Best Environmental Practices

UN environment programme

MINAMATA CONVENTION ON MERCURY

TODAY | 123 PARTIES

UV Lamp



UV LED

2020

Deadline for phasing out manufacture, import and export of listed **mercury-added products** (including certain lamps, batteries, cosmetics, pesticides).

The Convention also includes measures to phase down **mercury dental amalgam** and to reduce mercury by half when used in vinyl chloride monomer production processes (used for plastic products).

2021

COP-4 to focus on indicators for effectiveness evaluation of the Minamata Convention after years of multilateral work.

Review of the annexes and **second reporting deadline** for parties.

2025

Deadline for phasing out **mercury-cell chlor-alkali production** (an outmoded process for chlorine production).

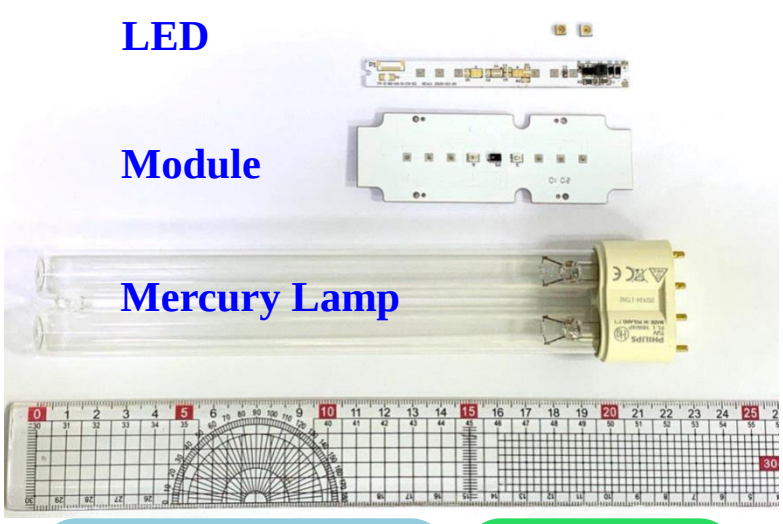
2032

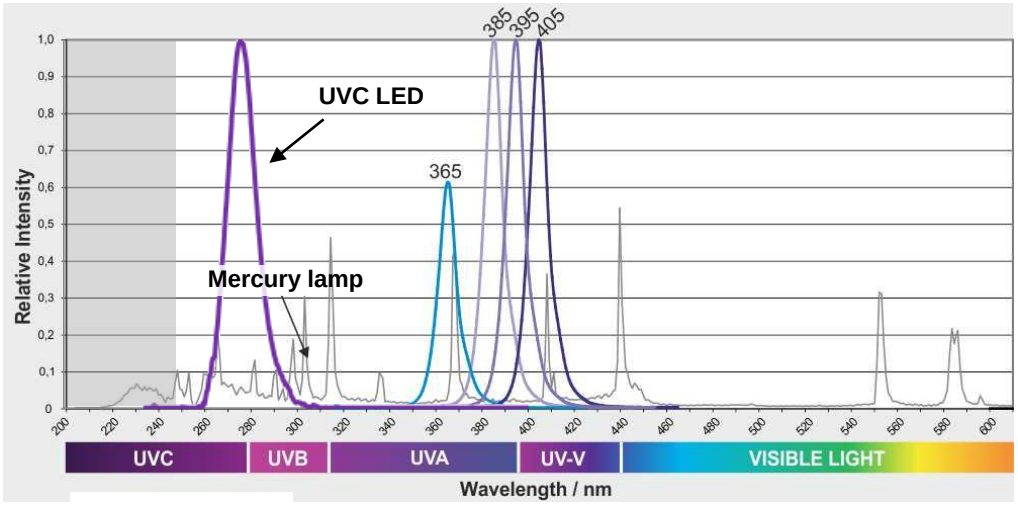
Deadline for ending **primary mercury mining** in known producing parties.

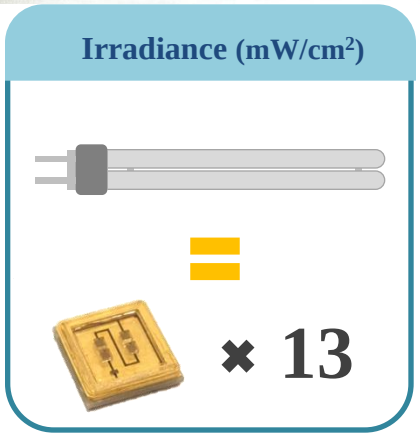
MULTILATERALISM MAKES MERCURY HISTORY

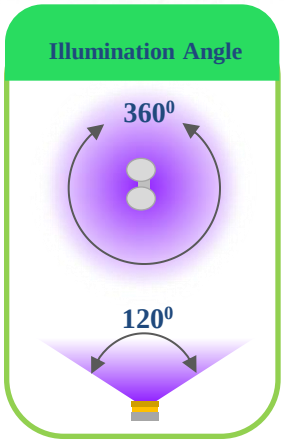
September 2020

UVC LED Advantages







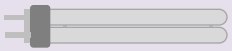


UVC Mercury Lamp

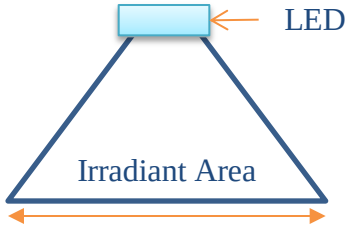
High Power
Inexpensive
Long Range
Mercury pollution

UVC LED

Compact
Design Flexibility
Long Life
Eco-friendly

Item	Picture	Efficiency (%)	Power (W)	Radiant Flux (mW)	Irradiance (mW/cm²) @60mm	Volume (mm)	Weight (g)
UVC Lamp		30	18	5400	7.13	230*45*25	30
UVC LED		1.6	5	80	0.55	7.0*7.0*1.7	0.34

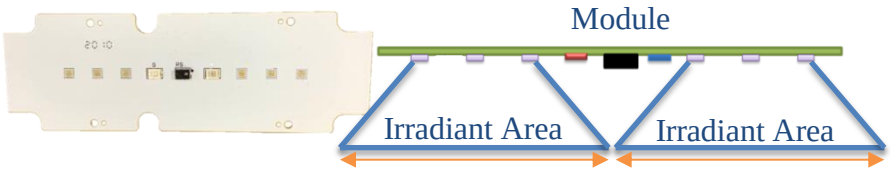
UVC LED Sterilization Assessment



Sterilization distance	10 mm	20 mm	30 mm	40 mm
Irradiant area (mm)	34.6	69.2	103.9	138.5
Irradiance mW/cm^2	1.63	0.52	0.253	0.16

Scientific name	Kind	Disease	Standard UV Lethal dose mJ/cm^2	Expected Sterilization time(s)			
◦ Bacillus subtlis spores	Bacteria	◦ -------	22	13.5	42.3	87.0	137.5
◦ Bacteriophage	Virus	◦ -------	6.6	4.0	12.7	26.1	41.3
◦ Coxsackie vinus	Virus	◦ Intestinal infection	6.3	3.9	12.1	24.9	39.4
◦ Shigella spores	Bacteria	◦ Bacterial dysentery	4.2	2.6	8.1	16.6	26.3
◦ Escherichia coli	Bacteria	◦ Food poisoning	6.6	4.0	12.7	26.1	41.3
◦ Fecal coliform	Bacteria	◦ Intestinal infection	6.6	4.0	12.7	26.1	41.3
◦ Hepatitis A virus	Virus	◦ Hepatitis	8	4.9	15.4	31.6	50.0
◦ Influenza virus	Virus	◦ Flu	6.6	4.0	12.7	26.1	41.3
◦ Legionella pneumopila	Bacteria	◦ Legionellosis	12.3	7.5	23.7	48.6	76.9
◦ Salmonella typhi	Bacteria	◦ Typhoid	7	4.3	13.5	27.7	43.8
◦ Staphylococcus aureus	Bacteria	◦ Food poisoning, toxic shock syndrome, etc.	6.6	4.0	12.7	26.1	41.3
◦ Streptococcus spores	Bacteria	◦ Throat infection	3.8	2.3	7.3	15.0	23.8

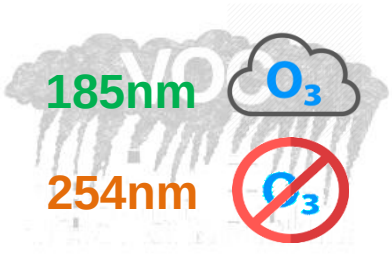
UVC Module Sterilization Assessment



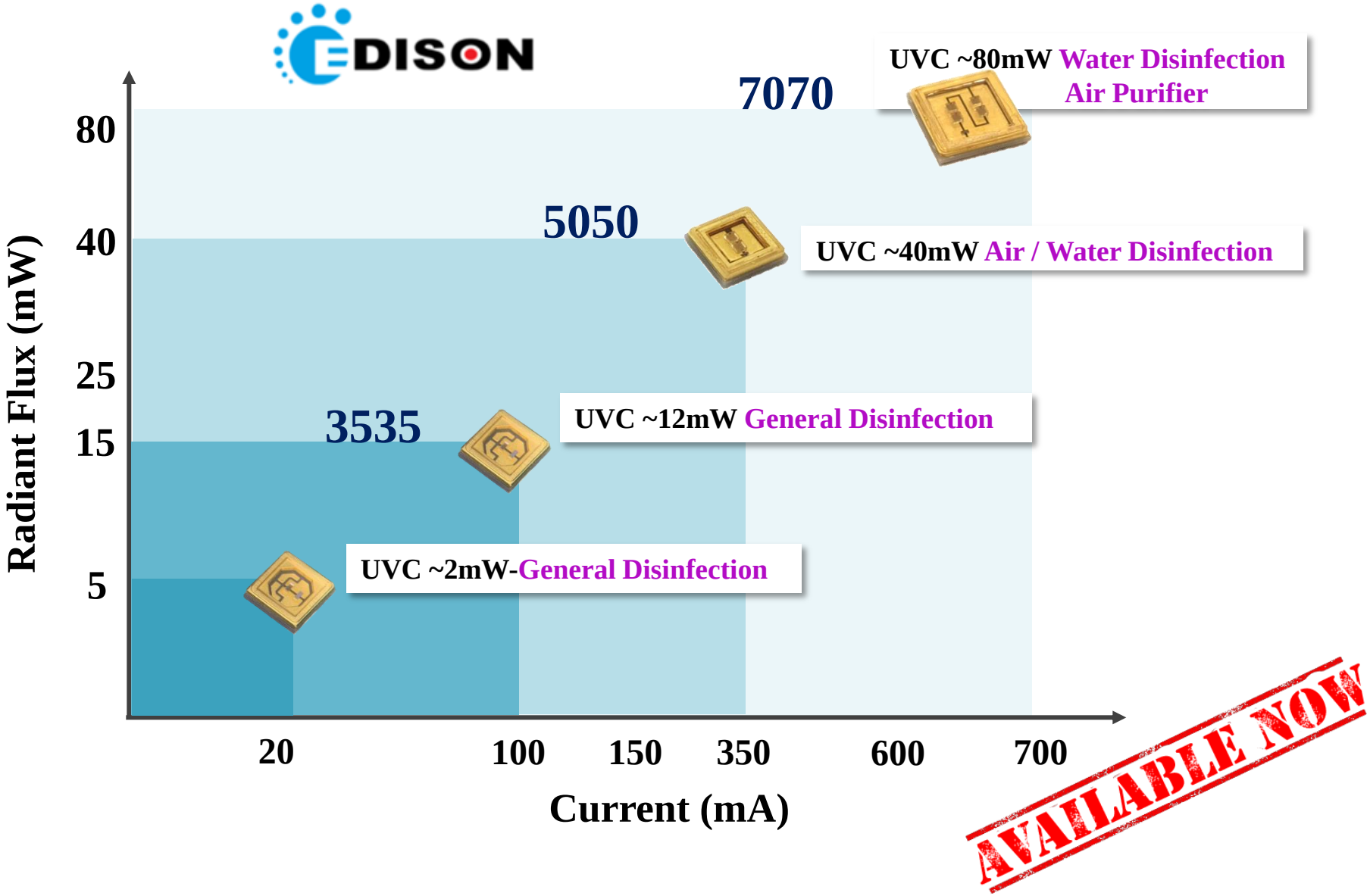
Sterilization distance	10 mm	20 mm	30 mm	40 mm
Irradiant area (mm)	58.6	93.3	127.9	162.5
Irradiance mW/cm^2	0.56	0.42	0.28	0.08

Scientific name	Kind	Disease	Standard UV Lethal dose mJ/cm^2	Expected Sterilization time(s)			
Bacillus subtlis spores	Bacteria	-------	22	39.3	52.4	78.6	275.0
Bacteriophage	Virus	-------	6.6	11.8	15.7	23.6	82.5
Coxsackie vinus	Virus	Intestinal infection	6.3	11.3	15.0	22.5	78.8
Shigella spores	Bacteria	Bacterial dysentery	4.2	7.5	10.0	15.0	52.5
Escherichia coli	Bacteria	Food poisoning	6.6	11.8	15.7	23.6	82.5
Fecal coliform	Bacteria	Intestinal infection	6.6	11.8	15.7	23.6	82.5
Hepatitis A virus	Virus	Hepatitis	8	14.3	19.0	28.6	100.0
Influenza virus	Virus	Flu	6.6	11.8	15.7	23.6	82.5
Legionella pneumopila	Bacteria	Legionellosis	12.3	22.0	29.3	43.9	153.8
Salmonella typhi	Bacteria	Typhoid	7	12.5	16.7	25.0	87.5
Staphylococcus aureus	Bacteria	Food poisoning, toxic shock syndrome, etc.	6.6	11.8	15.7	23.6	82.5
Streptococcus spores	Bacteria	Throat infection	3.8	6.8	9.0	13.6	47.5

UVC Device Applications

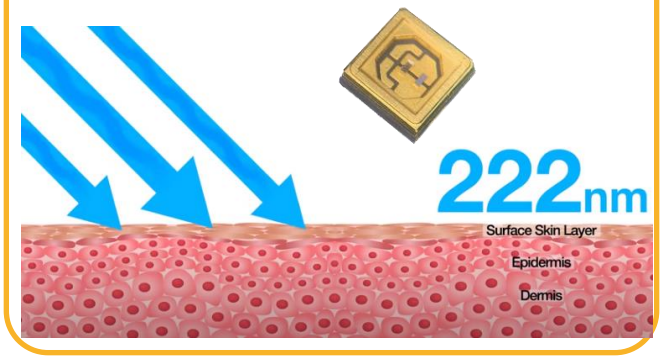


UVC Product Road Map



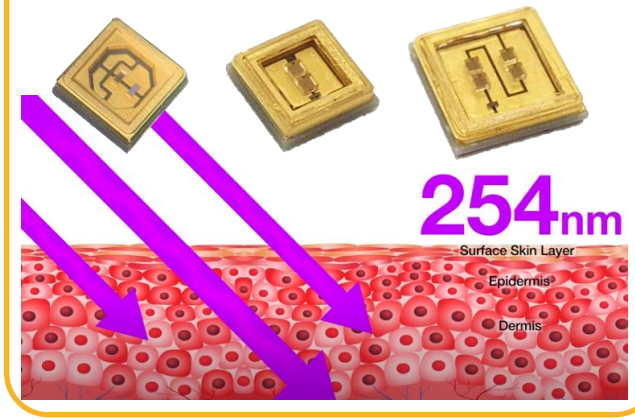
Deep UV Product Road Map

UVC 222nm
(Under Development)

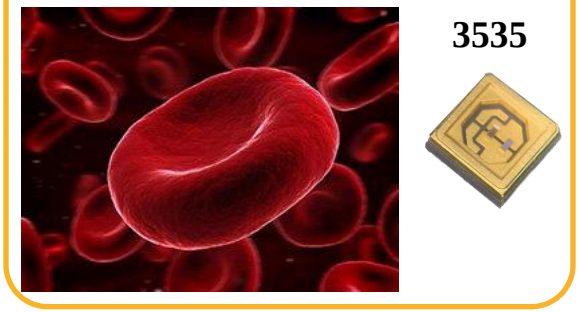


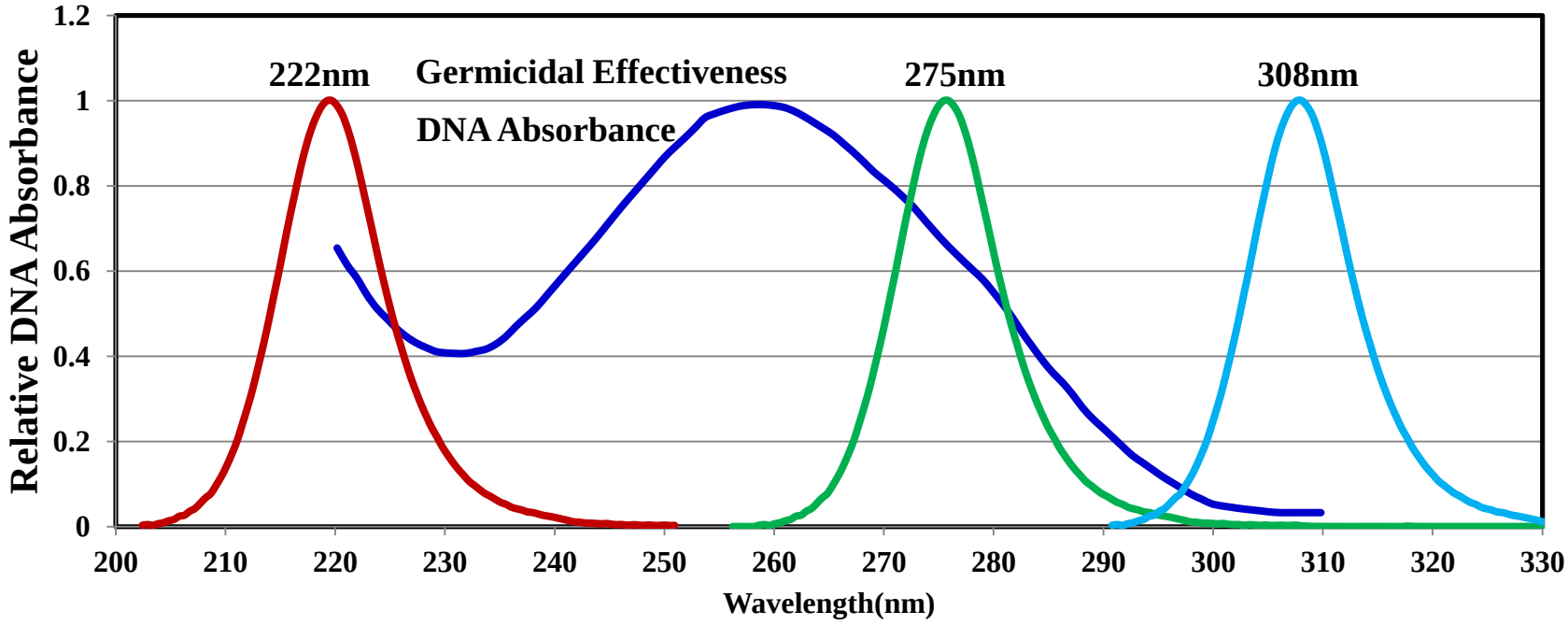
UVC 275nm

3535 **5050** **7070**

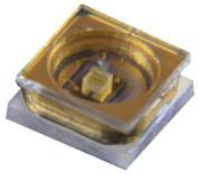
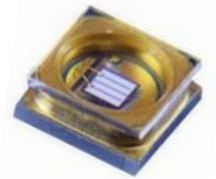


UVB 285nm
UVB 308nm

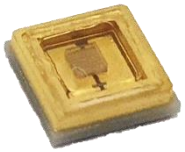
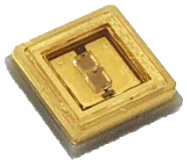
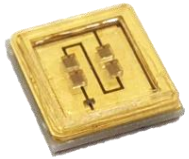




Edison UV LED Mid Low Power Series (3535)

Ordering Code	UAIC0102F3C0C097	UAIC0104F3C0C097	UAIC0205F3C0C093	UAIC020DVCC0C093
Wavelength (nm)	275	275	275	365
Radiant Flux (mW)	Typ.	Typ.	Typ.	Typ.
	2	12	12	480
Appearance				
Package Size (mm)	3.5*3.5*1.6	3.5*3.5*1.6	3.7*3.7*1.52	3.7*3.7*1.52
Forward Voltage (V)	5 ~ 8	5 ~ 8	6 ~ 10	2 ~ 4
Forward Current (mA)	20	100	100	350
Viewing Angle (degree)	120	120	120	120

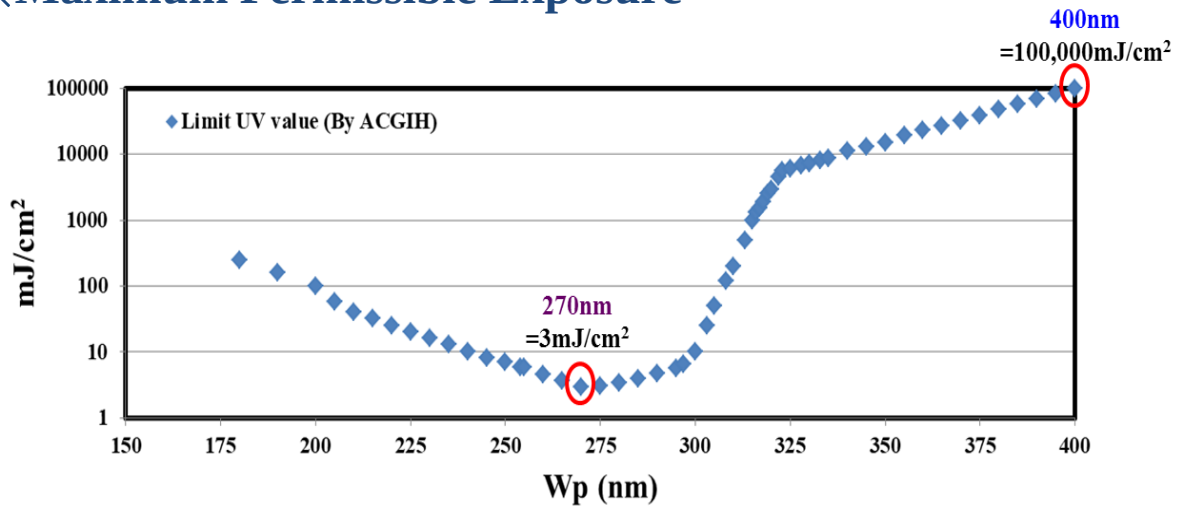
Edison UV LED High Power Series

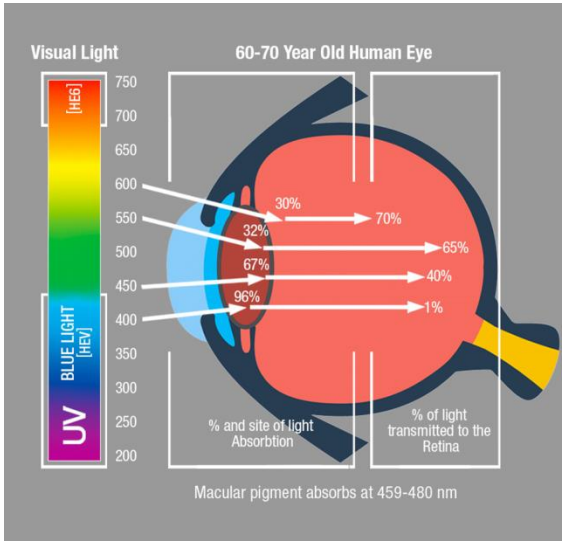
Ordering Code	UAIC050CF3C0C009	UAIC0507F3C0C009	UAIC070CF3C0C009	UAIC0707F3C0C009
Wavelength (nm)	275	275	275	275
Radiant Flux (mW)	Typ.	Typ.	Typ.	Typ.
	40	40	80	80
		mW/$ ↑		mW/$ ↑
Appearance				
Package Size (mm)	5.0*5.0*1.7	5.0*5.0*1.7	7.0*7.0*1.7	7.0*7.0*1.7
Forward Voltage (V)	5 ~ 8	5 ~ 8	5 ~ 8	5 ~ 8
Forward Current (mA)	350	350	700	700
Viewing Angle (degree)	120	120	120	120

UV Exposure Safety

Health Risk vs. UV bands					
Band	**Wavelength (nm)**	**MPE※**	**Primary Visual Hazard**	**Other Visual Hazard**	**Other Hazards**
UVA (Near)	315-400	1mW/cm^2 8hr	Cataracts of Lens		Skin Cancer Retinal Burns
UVB (Mid)	280-315	500μW/cm^2 1min	Corneal injuries	Cataracts of Lens Photokeratitis	Erythema Skin Cancer
UVC (Far)	100-280	100μW/cm^2 1min	Corneal injuries	Photokeratitis	Erythema Skin Cancer

※Maximum Permissible Exposure

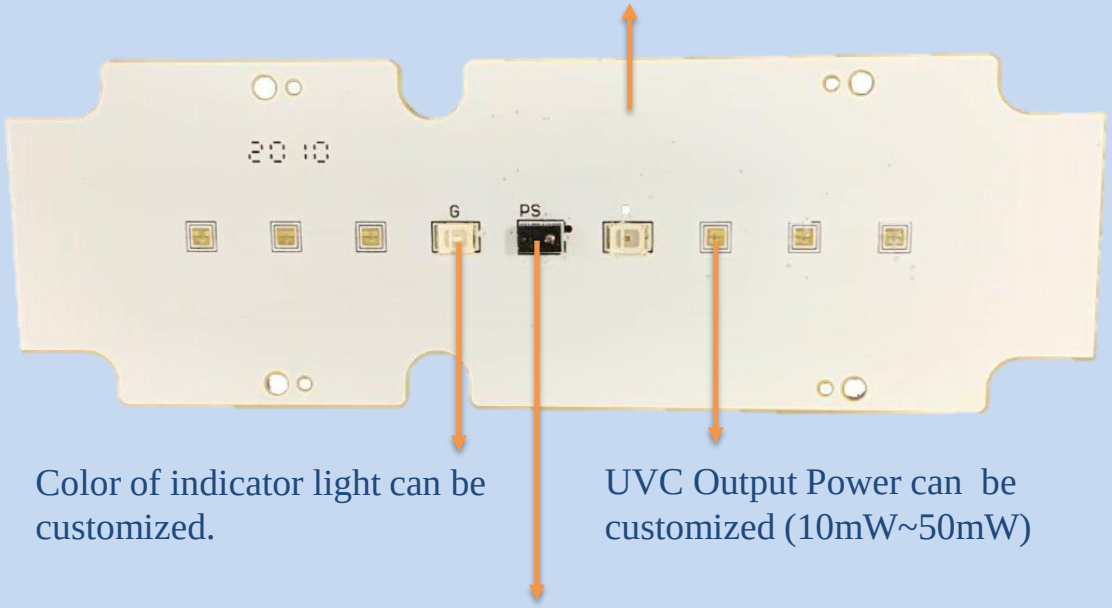




American Conference of Governmental Industrial Hygienists（ACGIH，美國工業衛生師協會)

UVC Customized Module

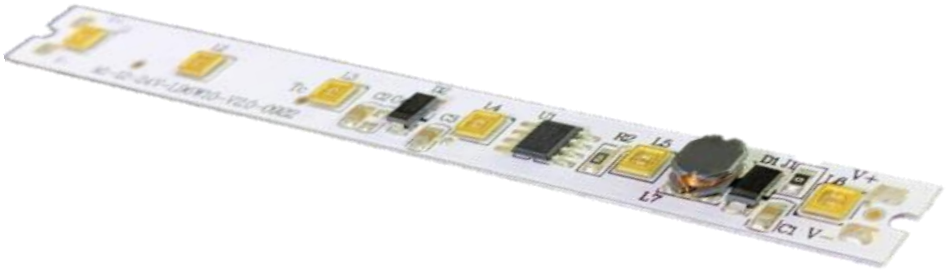
The size of the circuit board can be customized.

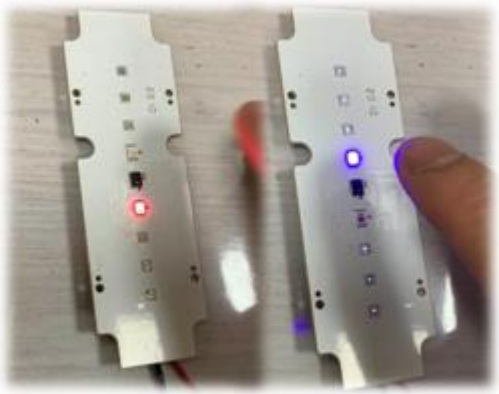


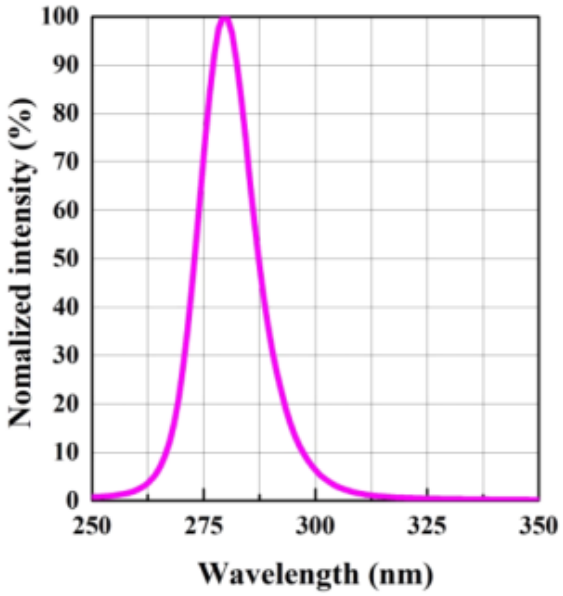
Color of indicator light can be customized.

UVC Output Power can be customized (10mW~50mW)

- Distance detection can be customized to fit different applications.
- Ambient light Sensor can be activated.

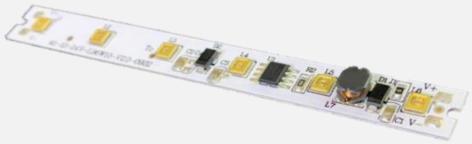






Edison UVC Module Series

UVC Linear M1

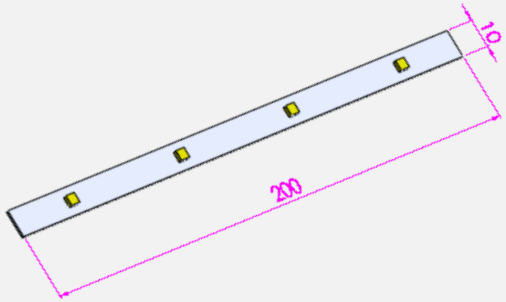


Dimension (mm)

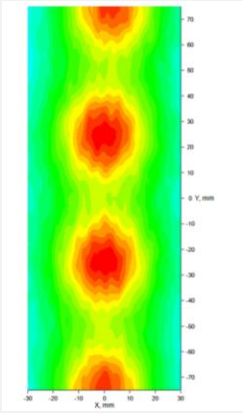
96 x 10 x 6

Item number	Power (W)	Radiant Flux (mW)
UAMDLM01UCC0C091	0.96	12
UAMDLM04UCC0C091	4.7	72
UAMDLM06UCC0C091	6.6	110

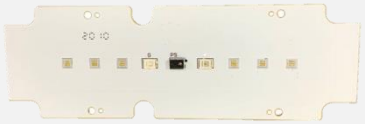
Customized Module



Simulation



UVC Linear M2

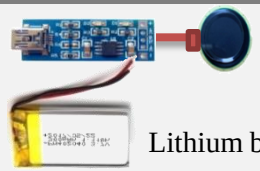


Dimension (mm)

100 x 32.8

Customized Module	Power (W)	Radiant Flux (mW)	Protect Function
UAMDUM01UCC0C091	3	12	Distance

UVC Linear M2+



Lithium battery

Dimension (mm)

100 x 32.8

Customized Module	Power (W)	Radiant Flux (mW)	Protect Function
Module 2	~3	12	Distance Fingerprint

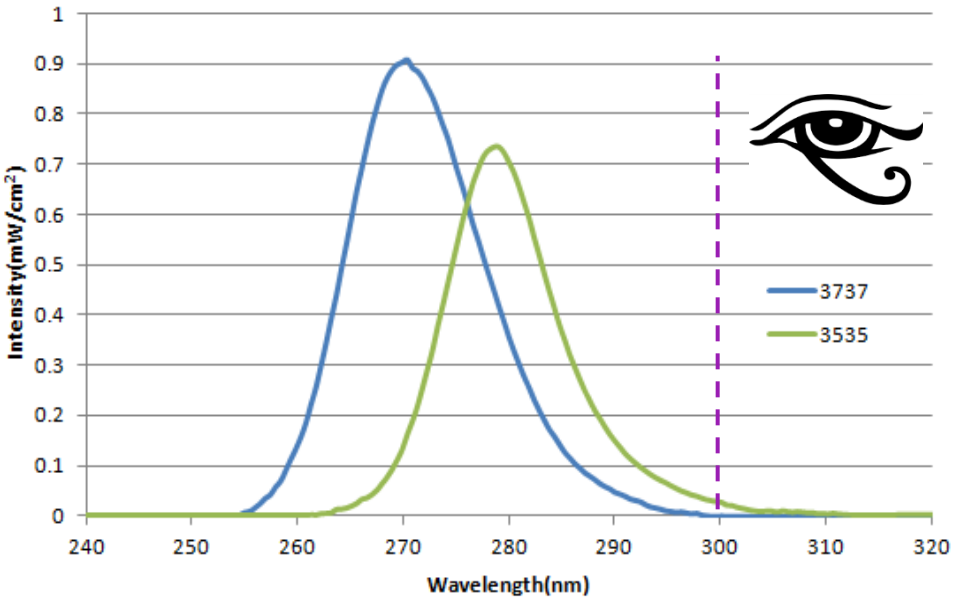
UVC Power Measurement

Measuring Instrument

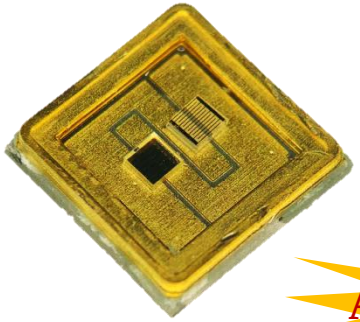
UV Radiometer

Integrating Spheres
UV

Comparison between 3535 & 3737



UV Photodiode in Package



- High Responsively
- Low dark current
- Good Solar Blind

Active Detect UVC

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Responsivity	R_{230}	λ=230nm,V_r = -5V	20	-	-	A/W
Responsivity	R_{280}	λ=280nm,V_r = -5V	2	-	-	A/W
Spectral detection range	λ	R*0.1	200	-	285	nm
Dark current	I_d	Vr= -5V		-	2	nA
Photo current	I_{ph}	DUV lamp*1 , 20μW/cm²	15	-	-	uA
Reverse Breakdown Voltage	V_{BR}	I_R =1μA	600	-	-	V
Capacitance	C	F=1MHz,V_R= 5V	-	-	0.5	pF

EDISON UVC Services

EDISON

Level 1 Emitter

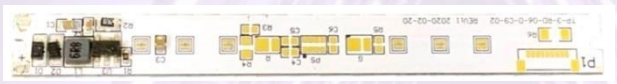
Level 2 PCB

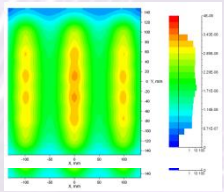
Level 3 Optical

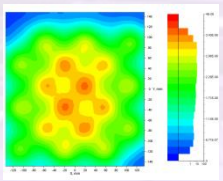
Level 4 Heat sink

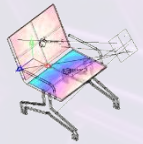
Level 5 Circuit

Level 6 Solution









UVC Disinfection Total Solution Provider

艾笛森光電股份有限公司
Edison Opto Corporation

Thank you!