

High power UVC module for disinfection

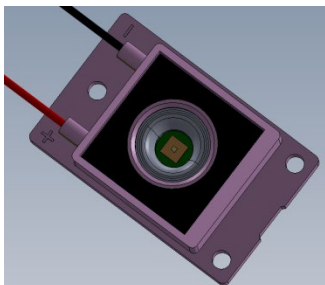
2021.10.29
Business planning division
PPA21-0218-09

- High output 265nm UVC LED with the highest disinfection efficacy
- UVC LED module for compact equipment and replacing germicidal lamps
- Shorter disinfection time by efficient irradiation for disinfection area

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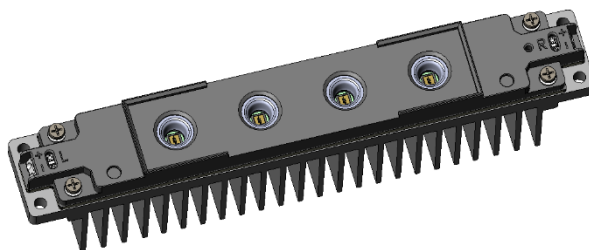
Lineup of High power UVC module for disinfection

Single module



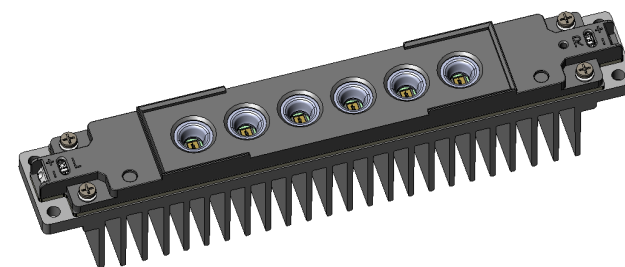
- UVM001-0101U1 -

4 LED Linear module



- UVM002A-0401U1 -

6 LED Linear module



- UVM003A-0302U1 -

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Product features

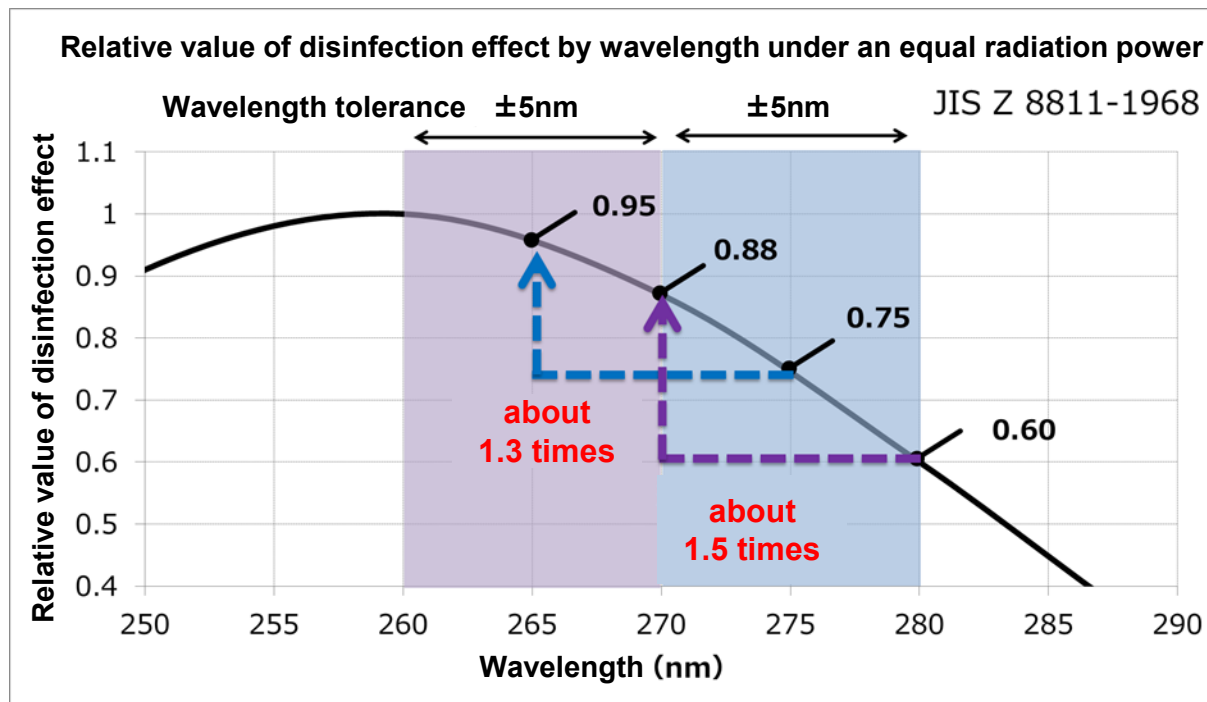
1. [Homogeneous irradiation](#) to the disinfection area by a highly reflective optics developed in-house
2. [Narrow, Middle, Wide](#) light distribution lineup of reflectors
3. [High output 265nm UVC LED](#) with the highest disinfection efficacy
4. [Scheduled demonstration experiment for new coronavirus \(Dec 2021 \)](#) * using UVM001-0101U1
5. [Dustproof and waterproof\(IP54\)](#) that can be used in high humidity environments such as air purifiers
* Only UVM001-0101U1
6. [Replacement module for germicidal lamps](#) such as GL-15 etc. * UVM002A-0401U1/UVM003A-0302U1

		UVM001-0101U1	UVM002A-0401U1	UVM003A-0302U1
Appearance				
Light distribution	Narrow		✓	✓
	Middle	✓	✓	✓
	Wide	✓		

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Disinfection efficacy by 265nm



* Referring to JIS Z 8811-1968 Relative value of disinfection effect by wavelength under an equal radiation power

- ✓ 265nm has **about 1.3 times sterilization effect** than 275nm
- ✓ Considering the wavelength tolerance +5nm,
270nm has **about 1.5 times sterilization effect** than 280nm

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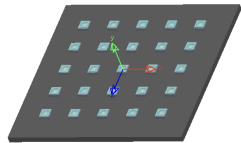
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Disinfection effect comparison with other company's LED by optical simulation

REFERENCE

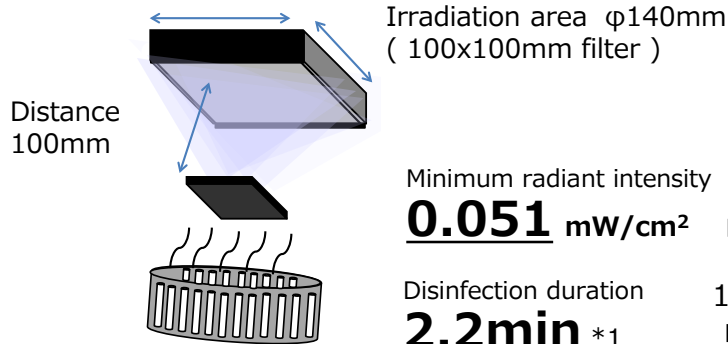
1. $\phi 140\text{mm}$ (100x100mm filter) area disinfection at irradiation distance 100mm

Other company SMD LED (275nm) 25pcs **A**



Input power : 1.87W/25pcs
Output power : 45mW/25pcs

PWB size : W60×L60mm



Minimum radiant intensity

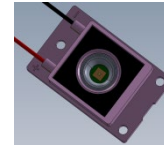
0.051 mW/cm²

Disinfection duration

2.2min *1

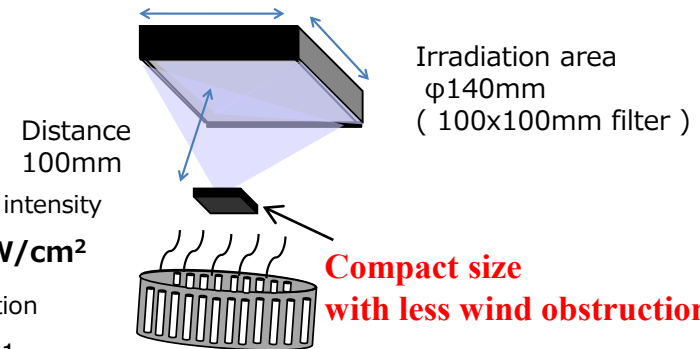
About
1.3times

UVM001-0101U1-RM1(265nm) 1pcs **B**



Input power : 1.75W/1pcs
Output power : 29.9mW/1pcs

PWB size : W42×L27×H 10mm



Minimum radiant intensity

0.069 mW/cm²

Disinfection duration

1.3min *1

**Compact size
with less wind obstruction**

Reduced by 1min
due to increased intensity and wavelength effect

*1 Cumulative light amount 5mJ/cm² (Equivalent to 99.9% disinfection of new coronavirus)

The above is the comparison between 275nm UVC SMD LED array and our UVC module. Even under the conditions where the input power and output power of UVM001 (above B) is much lower than SMD LED array (above A),

✓ UVM001 **radiant intensity is about 1.3 times** that of other's product (25pcs).

✓ Disinfection duration of new coronavirus is estimated **to be 1.3 min, reduced by 1min.**

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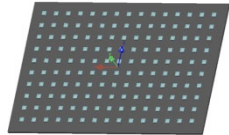
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Disinfection effect comparison with other company's LED by optical simulation

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2. $\phi 2.8\text{m}$ area disinfection at irradiation distance 2m from ceiling

Other company SMD LED (275nm) 150pcs **A**



Input power : 14.0W/150pcs
Output power : 270mW/150pcs

PWB size : W160×L110mm

UVM003A-0302U1-RM1(265nm) 1 module **B**



Input power : 10.5W/1module(6LED)
Output power : 204mW/1module (6LED)

PWB size : W200×L30×H 43.5mm

About 1.37 times

Minimum radiant intensity

0.0008 mW/cm²

Minimum radiant intensity

0.0011 mW/cm²

Disinfection duration

143min *1

Disinfection duration

78min *1

Reduced by 65min
due to increased intensity and wavelength effect

Irradiation area
 $\phi 2.8\text{m}$

Irradiation area
 $\phi 2.8\text{m}$

*1 Cumulative light amount 5mJ/cm² (Equivalent to 99.9% disinfection of new coronavirus)

The above is the comparison between 275nm UVC SMD LED array and our UVC module. Even under the conditions where the input power and output power of UVM003A (above B) is much lower than SMD LED array (above A),

- ✓ UVM003 **radiant intensity is about 1.37 times** that of other's product (150pcs).
- ✓ Disinfection duration of new coronavirus is **estimated to be 78min, reduced by 65min.**

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E. coli disinfection effect test result by our module

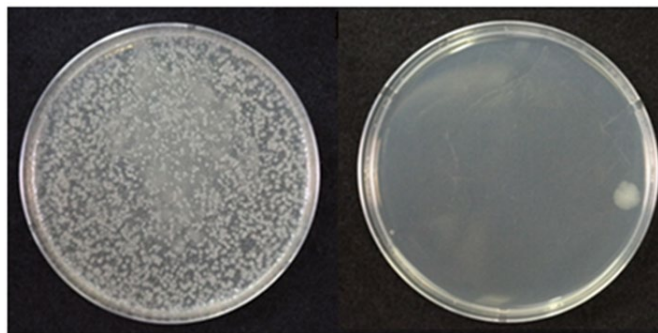
Disinfection effect test directly under irradiation distance 2.4m

Conducted tests in collaboration with a domestic third-party testing institute (Kitasato Environmental Science Research Center)

Parameters		GL-15(15W)	UVM003(Narrow×4pcs)
Central radiant intensity		0.006 mW/cm ²	0.008 mW/cm ²
Approximate duration to disinfect E. coli	99.9%	17min	15min
	99.99%	20min	17min
	99.999%	28min	20min

Before test

After test (after 15min irradiation)

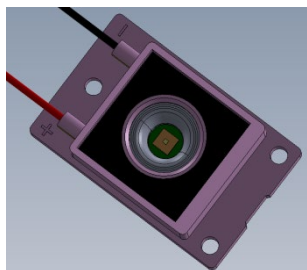


- ✓ Our module **achieves the same central radiant intensity** as that of GL-15.
- ✓ Confirmed that **disinfection duration of both our module and mercury lamp is same.**

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UVM001-0101U1 specifications



- Dimensions 42×27×10mm
- Distribution lineup Middle, Wide
- Sample request November 2021
- Mass production March 2022

T_c=25℃

Item	Conditions	Min	Ave	Max	Unit	Remarks
Forward voltage	IF=250mA	(4.3)	-	(7.7)	V	*1
Center radiant intensity	IF=250mA (Middle angle)	(0.090)	(0.115)	-	mW/cm ²	*1,2
Peak wavelength	IF=500mA	(260)	-	(270)	nm	*3

*1 The measurement distance is 10cm (from UVC LED to the optical sensor of the measuring device)

*2 Measurement tolerances are forward voltage ±3%, Radiant intensity ±10%, Wavelength ±2nm.

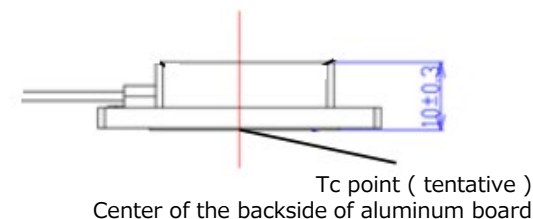
*3 This the wavelength range of the mounted LED.

Item	Symbol	Absolute maximum	Unit	Remarks
Input power	Pi	5.3	W	*4
Forward current	IF	500	mA	*4
Operating temperature	Top	-10~ +45	degC	*5
Storage temperature	Tst	-25~ +75	degC	*5
Case temperature	Tc	70	℃	*6

*4 There is a limit on the driving range.

*5 No condensation.

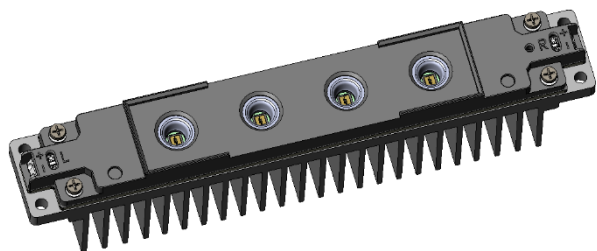
*6 Please refer below image.



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UVM002A-0401U1 specifications



- Dimensions 200×30×43.5mm
- Distribution lineup Narrow, Middle
- Sample request Under preparation
- Mass production Under preparation

T_c=25℃

Item	Conditions	Min	Ave	Max	Unit	Remarks
Forward voltage	IF=250mA	(17.2)	-	(30.8)	V	*1
Center radiant intensity	IF=250mA (Middle angle)	(0.010)	(0.018)	-	mW/cm ²	*1,2
Peak wavelength	IF=500mA	(260)	-	(270)	nm	*3

*1 The measurement distance is 50cm (from UVC LED to the optical sensor of the measuring device)

*2 Measurement tolerances are forward voltage ±3%, Radiant intensity ±10%, Wavelength ±2nm.

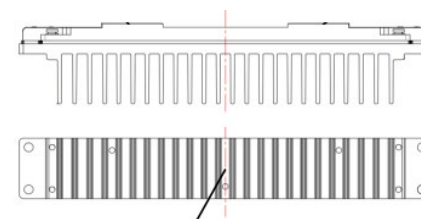
*3 This the wavelength range of the mounted LED.

Item	Symbol	Absolute maximum	Unit	Remarks
Input power	Pi	21.1	W	*4
Forward current	IF	500	mA	*4
Operating temperature	Top	-10~ +40	degC	*5
Storage temperature	Tst	-25~ +60	degC	*5
Case temperature	Tc	70	℃	*6

*4 There is a limit on the driving range.

*5 No condensation.

*6 Please refer below image.

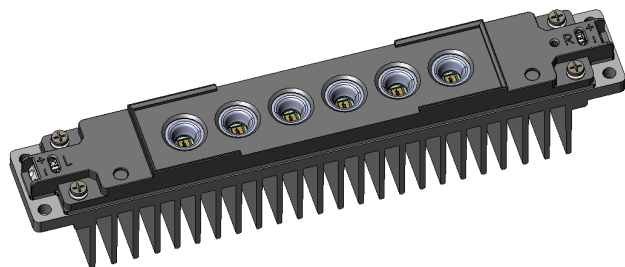


T_c point (tentative)
Center of the backside of heatsink

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UVM003A-0302U1 specifications



- Dimensions 200×30×43.5mm
- Distribution lineup Narrow, Middle
- Sample request November 2021
- Mass production March 2022

T_c=25℃

Item	Conditions	Min	Ave	Max	Unit	Remarks
Forward voltage	IF=500mA	(12.9)	-	(23.1)	V	*1
Center radiant intensity	IF=500mA (Middle angle)	(0.020)	(0.027)	-	mW/cm ²	*1,2
Peak wavelength	IF=500mA	(260)	-	(270)	nm	*3

*1 The measurement distance is 50cm (from UVC LED to the optical sensor of the measuring device)

*2 Measurement tolerances are forward voltage $\pm 3\%$, Radiant intensity $\pm 10\%$, Wavelength $\pm 2\text{nm}$.

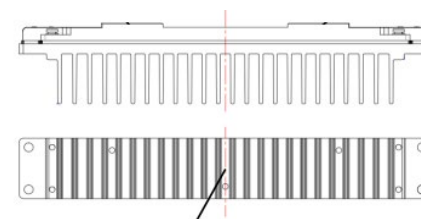
*3 This the wavelength range of the mounted LED.

Item	Symbol	Absolute maximum	Unit	Remarks
Input power	Pi	31.6	W	*4
Forward current	IF	1,000	mA	*4
Operating temperature	Top	-10~ +40	degC	*5
Storage temperature	Tst	-25~ +60	degC	*5
Case temperature	Tc	70	℃	*6

*4 There is a limit on the driving range.

*5 No condensation.

*6 Please refer below image.



T_c point (tentative)
Center of the backside of heatsink

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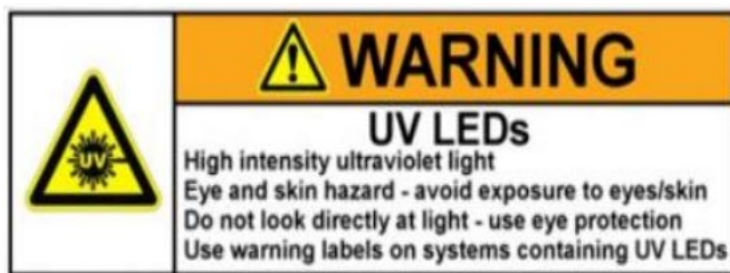
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Handling precautions for UVC LED module

- This product is a product that emits deep ultraviolet rays (UVC).
UVC has a strong influence on cells, so direct exposure to the body is dangerous.
- JISZ8812 defines the allowable amount of ultraviolet rays, which is 4.6mJ/cm² (8 hours a day) for 260 nm and 6mJ/cm² (8 hours a day) for 270 nm.
As it may affect the human body even from long distances, please take measures such as using protective glasses or gloves to prevent directly exposure of ultraviolet rays to the human body when looking directly at UVC light or lighting the reflected light.
Do not look at UVC lighting source directly because there is a risk of eye pain or visual impairment.
Also, pay attention not only to the direct light itself but also to reflected light.
Irradiating the skin directly with UVC light may cause skin irritation.
- Disassembling or modifying the product may cause a part to drop off, fire, electric shock, or injury.
- If you connect or disconnect the power supply line or operate the product with wet hands, you may receive an electric shock.
- If you notice a strange odor or smoke, cease operation it immediately. It may cause a fire or electric shock.
- Covering or sealing the product may cause heat to build up inside and it may cause a fire or malfunction.
- Do not use for any purpose other than sterilization.
- Do not add excessive shock by a dropping and so on. It may cause a malfunction or an unexpected accident.
- Do not touch the irradiation window or place anything on it. It may cause a malfunction or an unexpected accident.
- Plants are sensitive to UV light. Depending on the type of plant, the leaves may wilt or die.
- Ensure the power supply system of this product is separate from lighting equipment and other equipment.
- Ultraviolet rays deteriorate wallpaper or resin products, etc. Also, if you irradiate at a short distance, the color of such may change rapidly. Please be careful regarding deterioration and discoloration of the object exposed to light.
- Do not touch the area near the irradiation window with your bare hands during or immediately after irradiation.
The irradiation window and its surroundings may be hot during or immediately after irradiation.
Therefore, please do not touch the irradiation window or its surroundings.
- We are not liable for any personal or property damage caused to you or a third party due to UV exposure.

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