USHIO

Lighting—Edge Technologies

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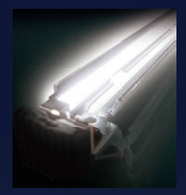
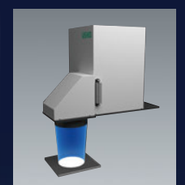
1403G①-500G①

Industrial LED

General Catalog

LED for Industry





USHIO Lighting—Edge Technologies

Introduction

USHIO INC. began in 1964 as a manufacturer of industrial light sources, and has since evolved technology development and applications of optical systems, equipment and light-source-related systems to reach newly created light markets using ultraviolet light sources for photochemical energy and infrared light for thermal energy, as well as light for illumination.
Our light technology has created many “world’s no. 1” products, primarily in leading-edge electronics, imaging and video, OA, and lighting fields, as a “light-innovating company" providing light solutions. As a light source manufacturer of a broad lineup of lamps, LEDs and lasers, from vacuum ultraviolet to extreme infrared, we are developing for new business fields in biotechnology, agriculture, medicine and the environment.

USHIO Industrial LEDs

USHIO’s industrial LED light sources are optimally designed and developed according to custom specifications to satisfy the demands and purposes of our customers, providing reasonably priced products with reference standards using the long-term know-how and experience in light source development evident from the actual results of our many worldwide market-leading products.
USHIO has also developed and manufactures devices for irradiation modules and maintains supply chains to installed device and systems from within the group, so the ability to provide turn-key LED light solutions is an USHIO specialty.
USHIO industrial LEDs utilize optimized light as a light-specialist manufacturer responding to broad customer demands.

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USHIO Industrial LED Product Line

USHIO LED Selection by Application

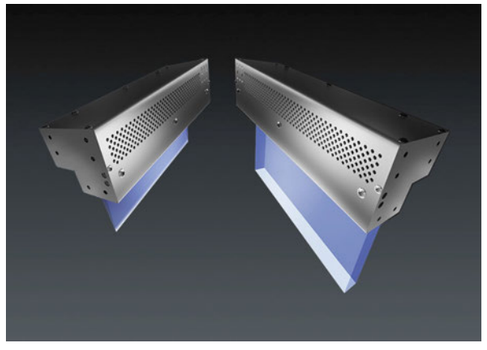
Industry	Applications	Products	Page
Semiconductors	·Various wafer surface coat curing ·Curing in various wafer handling procedures ·UV nano-imprinting ·Lithography	UV-LED Units for Wafer Processing	8
		UV-LED Light Source Units for Contact/Proximity Exposure	9
	·Photoresist hardening	Step-wise Irradiation Zone Controlled Light Source Units	10
Liquid crystal	·Binding (side-face) and sealing displays and touch panels	Side-Facing Irradiation Units for Touch Panel Bonding	6
	·Various curing and lighting for tests	Spot UV Irradiation Systems	11
	·Roll-in rint ·Roll film surface coat curing	Line Light Sources for Roll-In Print and Inkjet Printers	12
Printing	·UV inkjet printers ·UV ink drying	Line Light Sources for Roll-In Print and Inkjet Printers	12
Image processing	·Lighting for tests	Line Light Sources for Light-Guide Type Image Processing	14
Optical/Precision equipment	·Electronic assembly ·Coating curved lens surfaces	Step-Wise Irradiation Zone Controlled Light Source Units	10
		Spot UV Irradiation Systems	11
Lighting	·Interior lighting	Line Light Sources for Light-Guide Type Image Processing	14
Medical	·Assembly of medical equipment such as syringes	Spot UV Irradiation Systems	11
Iluminance management	·UV irradiance meters and Spectroradiometers	Optical Measurement Instruments	18

USHIO Industrial LED Product Line

Side-Facing Irradiation Units for Touch Panel Bonding

Main Applications

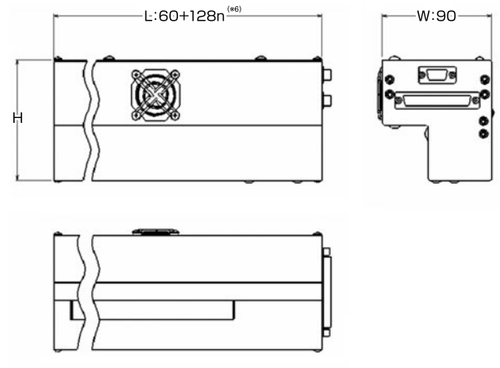
UV line lighting for testing and for side-face sealing and
UV curing of display devices (such as touch panels and LCDs),
and for UV curing of resins and adhesives



Features

- ●Industry's first irradiation work distance (WD) of up to 150 mm (parallel light type)
- ●Industry's smallest UV-LED line light source & lighting power supply
  - · Can be installed in confined spaces
- ●High-uniformity UV irradiation
- ●Rich, diverse product lineup
  - · Selectable wavelength, irradiation distance, and UV intensity to match the application.
  - · The 128 mm standard irradiation length is customizable up to 1024 mm in 32 mm steps.
  - · Selectable cooling methods

■ Air-cooled SEN-HC external view (※4)(※5)



(mm)

type \ Dimensions	L	W	H
P-type	60+128n	90	90
C1-type			80
C2-type			83
C3-type			139
C4-type			136

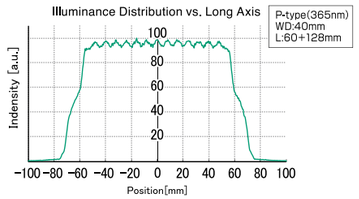
(※4): External dimensions may be changed according to specification.
(※5): External views of water-cooled LED line light source available upon request.
(※6): Supported irradiation lengths range from the standard 128 mm up to 1024 mm.
Please inquire about irradiation distances other than the above.

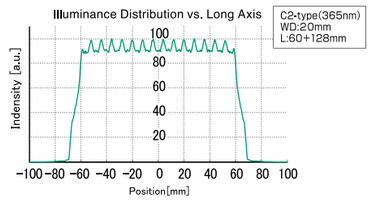
■ Parallel Light Type

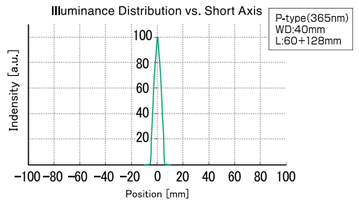
Model	Irradiation work distance (WD) mm	UV illuminance (※1) mW/cm²	Uniformity (※1) (※2) %	Wavelength (※3) nm
P-type	30	900	± 5	365 (385)
	40	950		
	100	550		
	150	400		

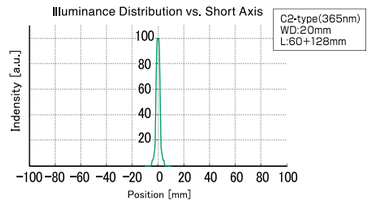
■ Focused Light Type

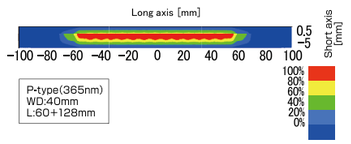
Model	Irradiation work distance (WD) mm	UV illuminance (※1) mW/cm²	Uniformity (※1) (※2) %	Wavelength (※3) nm
C1-type	10	2300	± 10	365 (385)
C2-type	20	1800	± 6	
C3-type	30	1500		
C4-type	40	1200		

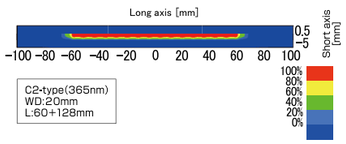












(※1): Typical values (not guaranteed) (※2): Uniformity [%] = (Max-Min)/(Max+Min)×100 (※3): Please inquire for 385 nm wavelength information.

■ Compatible Power Supply

Model	UVDB
Input voltage	AC100V～240V
Input current	6.7A/3.2A
Control method	Constant current control
Brightness control	Knob or 0 to 5 V DC external input Command input by RS-485 communications
Light on/off control	Panel switch or external on/off control Command input by RS-485 communications
Interlock	On/off by terminal short/open
Error output	Open-collector output by photocoupler Confirm by RS-485 communications command Load short/open, power supply overheating
External dimensions (mm)	W135 × D300 × H140

USHIO Industrial LED Product Line

UV-LED Light Source Units for Contact/Proximity Exposure

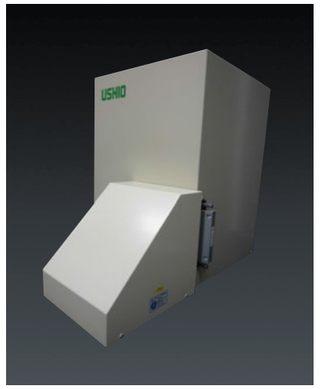
Main Applications

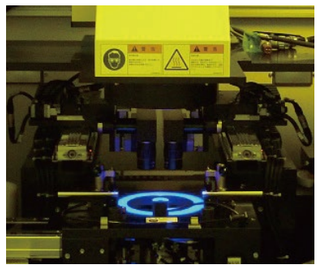
Mask aligner, light source for MEMS exposure

Features

The world's first capability to simultaneously and uniformly irradiate multiple wavelengths on the same area.
Materializes high quality parallel light within ±3° viewing angle and available for contact and proximity exposure methods.
Capable of complex programmed irradiation at each wavelength while supporting a variety of general-purpose resists.

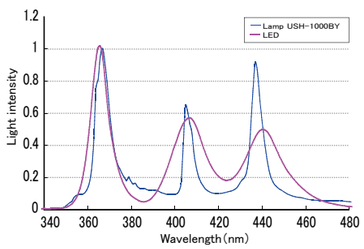
- ●Independent output regulation and exposure timing control at i-, h-, and g-line wavelengths
  →Bandpass filters and ND filters not required
- ●750 W lamp equivalent irradiance
- ●Absence of heat means low irradiation temperature
- ●Long life minimizes downtime
- ●Shutterless



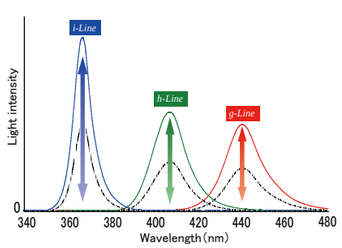


■ Spectral Data

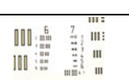
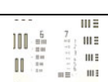
〈UV Lamp Comparison Example〉



〈Independent output regulation at i-, h-, and g-line wavelengths〉



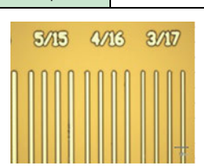
■ Exposure Data

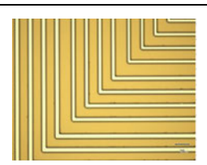
Light source	Lamp	LED
Viewing angle	4.4 deg.	4.4 deg.
Gap	15μm	
Illuminance(mW/cm²)	37.4	44.8
Irradiation time (sec)	32.1	26.8
Irradiation area (mm)	φ150	
Patterns		
Visual separation resolution (chart)	3.9μmL/S (7-1)	3.9μmL/S (7-1)

Conditions Exposure system:USHIO UX-3200SC
Lamp:USHIO USH-1000BY
Resist:LA900(t =15μm)

■ Exposure Pattern Examples

Light source	LED (i+h+g)
Viewing angle	4.4°
Gap	Contact (soft)
Exposure value	400mJ/cm²
Observation pattern	4μms spaces (20μm pitch)





・Exposure system: USHIO UX-3100SC
・Resist:OFPR-800LB(t =4μm)

UV-LED Units for Wafer Processing

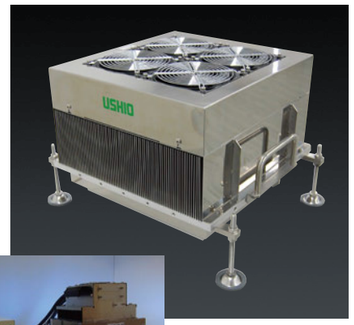
Main Applications

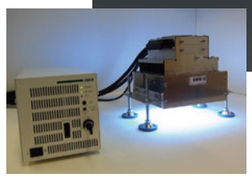
Curing various wafer surface coatings, curing in various wafer processes, UV nano-imprinting, bonding and sealing displays and touch panels, etc.

Features

USHIO's unique lens design miniaturizes systems by 56% while increasing energy efficiency over standard devices (in the 200 mm type case).
Because there is almost no illuminance reduction, no fine adjustment is needed for work at varying thickness when the irradiation distance deviates slightly from 50 mm.

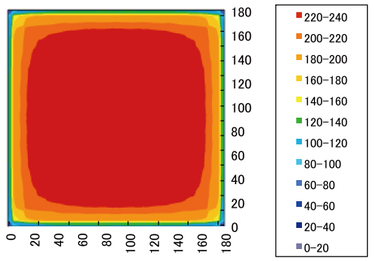
■ Air-Cooling Systems 150mm(FC-155)





FC-105 and
UVDB Compatible
Power Supply

■ Illuminance distribution (at 50 mm irradiation distance)



■ Specifications

Model	FC-105	FC-155	FC-205
Irradiation area(mm)	□100	□150	□200
Corresponding wavelength(nm)	365 / 385 (395, 405)		
Illuminance(mW/cm²)	150 (365nm)		
Illuminance distribution(%)	±10		
Irradiation distance(mm)	50		
External dimensions(outline mm)	W180×D180×H150	W230×D230×H150	W280×D280×H150

■ Compatible Power Supply

Model	UVDB
Input voltage	100 to 240 V AC
Input current	6.7A/3.2A
Control method	Constant current control
Brightness control	Knob or 0 to 5 V DC external input Command input by RS-485 communications
Light on/off control	Panel switch or external on/off control Command input by RS-485 communications
Interlock	On/off by terminal short/open
Error output	Open-collector output by photocoupler Confirm by RS-485 communications command Load short/open, power supply overheating
External dimensions(mm)	W135 □ D300 □ H140

USHIO Industrial LED Product Line

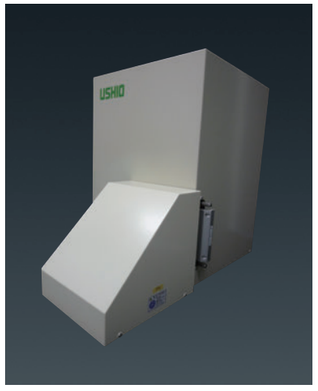
Step-Wise Irradiation Zone Controlled Light Source Units

Main Applications

Hardening photoresist and coating curved lens surfaces

Features

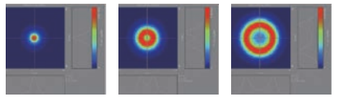
- Our telecentric optical system and unique electrical control of our optical manufacturing enable high-intensity parallel light and individual output controls for each irradiation area.
- Illuminance control suitable for concave and curved lenses, prevents uneven illuminance due to height differences, contributing to higher quality product finish.

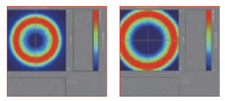


■ 60 mm five-ring zone control

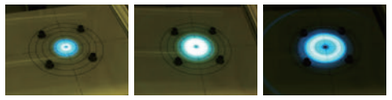
Irradiation can be applied to a desired area with the desired output. Also supports curved shapes.

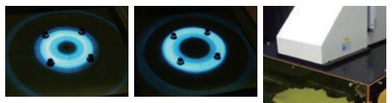
Simulation Data

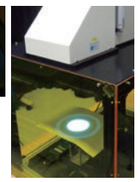




Demo Data







■ Example Specifications

Control of the irradiation surface	The 60 mm irradiation surface is irradiated in five individually controlled concentric zones
Wavelength	Selectable from 365, 385, 396 and 405 nm
Maximum irradiation area	Φ60mm
Maximum illuminance	At least 100mW/cm²
Design focal length (irradiation distance)	250mm
Irradiation area uniformity	±5%
Collimation angle	±10°
Maximum illuminance	From 10 to at least 100mW/cm² (at 405 nm) per zone

Spot UV Irradiation Systems

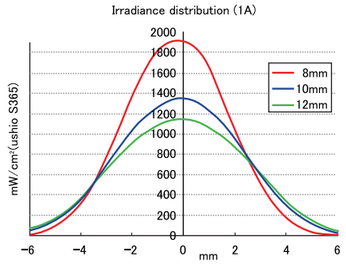
Main Aplications

Used for bonding various optical components such as pickup lenses, assembly of various image sensors and medical equipment such as syringes, laminating of displays and touch panels.

Features

- LED light source utilizes the technology of lamps.
- Stable irradiance by the sufficient cooling mechanism incorporated in the main LED unit.
- With no LED element at the tip, no heat-dissipation jig is required, greatly improving user serviceability in limited space.

■ Irradiance distribution



■ Main Specifications

Model	SPL-2
Wavelength (nm)	365nm/385nm
Irradiance (mW/cm²)	1900 (365nm)
Irradiation distance (mm)	8
Fiber length (m)	1
External dimensions (outline,mm)	W150×D205×H175
Mass (Kg)	3.8

USHIO Industrial LED Product Line

Line Light Sources for Roll-In Print and Inkjet Printers

Main Applications

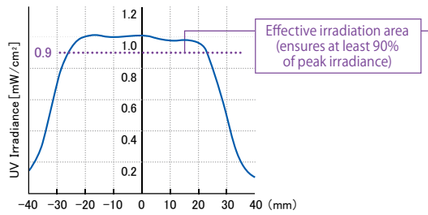
Roll-in print, UV inkjet printers, UV ink drying

Features

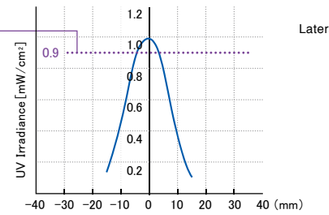
- High irradiance and stability using USHIO patented cooling technology
- Supported wavelengths: 365, 385, 395 and 405 nm
- Selectable water-cooled systems
- Light weight and compact
- Dimming function is ideal for pin curing

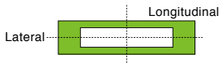
Irradiance distribution

■ Longitudinal light distribution location

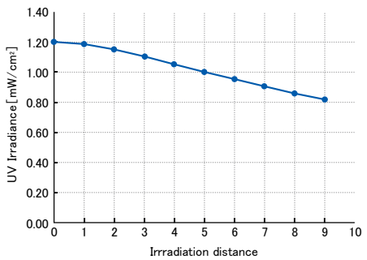


■ Lateral light distribution location



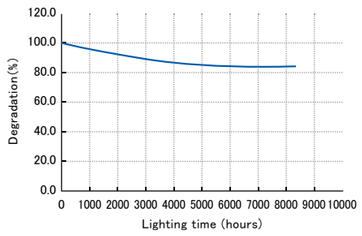


Distance from emitting glass surface vs. UV irradiance

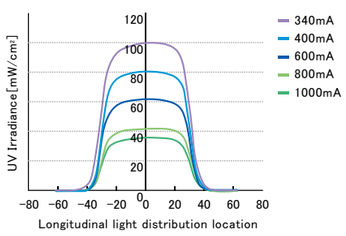


High stability and reliability from Ushio's technology

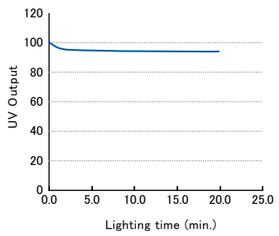
■ Irradiance degradation characteristics



■ Current vs. Irradiance Distribution
(Achieved stability of in-plane irradiance distribution)

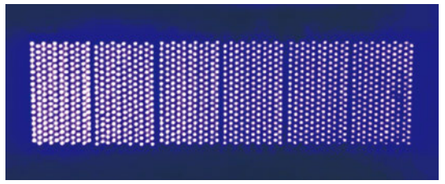


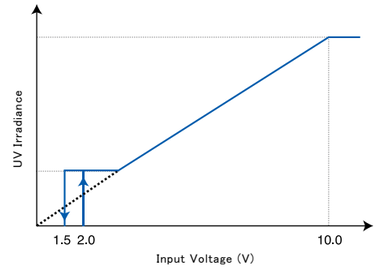
■ Irradiance stability immediately after turn-on
(Irradiance reduction stays within 10% immediately after turn-on)



Brightness Control

Accurate and stable brightness control achieved (from 10 to 100%)





■ Specifications

		type1	type2	type3	type4	type5	type6
Cooling method		Air cooling					
Light source size	Light source width (mm)	15					
	Light source length (mm)	62	124	186	248	310	372
Basic optical characteristics (※1)	Wavelength (nm)	385、395、405					
	UV output (W/cm²)	6.0、8.0 (※3)					
	Irradiation width (※2) (mm)	7					
	Irradiation length (※2) (mm)	46	108	170	232	294	356
	Output stability	After 3 minutes continuous operation, maintains at least 95% of initial value					
Additional functions	Brightness Control	On/off function, and 35 to 100% brightness adjustment range					
	Light Distribution Control	Turn off light source in 20 mm segments or set brightness from 35 to 100%					
Dimensions	Vertical (mm)	68	90				
	Horizontal (mm)	110	168	230	292	354	416
	Height (mm)	160					
	Mass (kg)	0.88	1.84	2.67	3.49	4.32	5.12

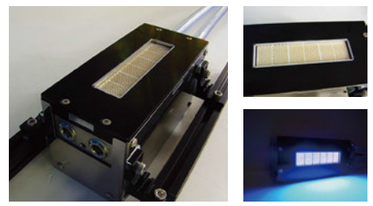
(※1) Three minutes after turn-on, at 5 mm irradiation distance (※2) 90% flat length (※3) Samples start shipping in June, 2014.

■ Power Supply Specifications

Input power	DC 24V±10%
Size (mm)	W135×L75×H70
Interface	Light on/off, brightness (dimming), fan operating signal, error output (no turn-on, overheating)
Environmental safety standard compliance	IEC 60950 2nd Edition and RoHS Directive

Water-Cooled Ultra-High-Output Type

Ultra-high-density LED mounting provides world's best peak irradiance.
Available for roll-in print with fast line speed and coating process applications.



■ Main Specifications

Wavelength (nm)	365	385	395	405
Peak irradiance t (W/cm²)	10	16	18	20
Irradiance distance (mm)	5			

USHIO Industrial LED Product Line

Line Light Sources for Light-Guide Type Image Processing

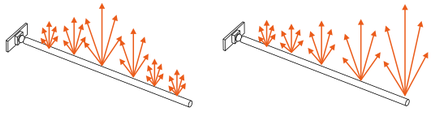
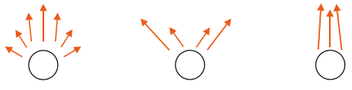
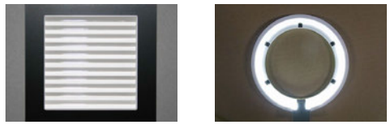
Main Applications

Image processing lighting, special lighting for testing, fluorescence excitation and observation, and interior lighting

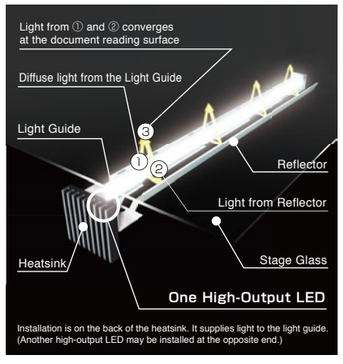
Features

- An ideal light source for image processing scanners incorporated in copy machines, and for special lighting applications
- We provide light distribution to suit demands by applying light to the guide through special prism processing
- Flexible support for almost any shape to suit your application,and size requirements
- Our totally in-house manufacturing enables us to flexibly support prototyping and custom specifications
- Besides visible light, specific-wavelength LEDs are available for invisible near-infrared and ultraviolet irradiation

■ Line Light Sources for Light-Guide Type Image Processing
(optional unlimited emission length and light distribution configurations)

Unlimited guide length	
Unlimited light distribution design (axial aspect)	
Unlimited light distribution design (radial aspect)	
Unlimited light source designs	

■ Copier-Scanner Structure and Features

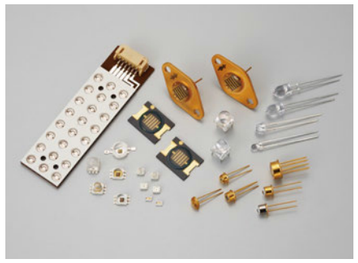


■ Example of fluorescence observation with ultraviolet rays

Custom LED Devices

Features

- Select any desired wavelength
- Select packaging to suit your purpose
- Inquire about our custom (wavelength and packaging) products
- Light intensity feedback function with built-in PD is available for analysis and measurement
- Inquire ask about our modularity support



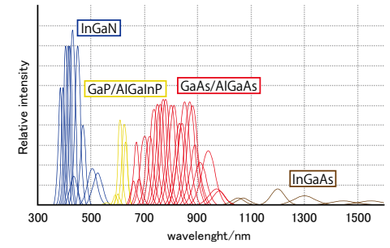
■ Choose from over 40 emission spectra types

365	395	435	545	645	700	760	870	1050
	405	450	570	660	720	780	890	1070
375	415	470	590	670	735	810	910	1200
	420	505	620	680	740	830	940	1450
385	430	525	630	690	750	850	970	1550

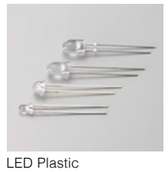
Ultraviolet light — Visible light — Near-infrared light

(nm)

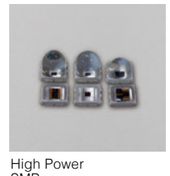
※Simulated spectral radiation power traces indicate the typical spectral performance of each part number.
※This is not actual measurement data.

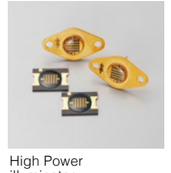


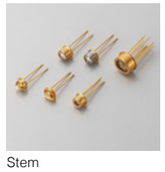
■ Package lineup

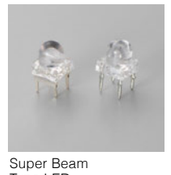

LED Plastic Mold

Surface Mount (PKG)


High Power SMB


High Power illuminator


Stem Type LED

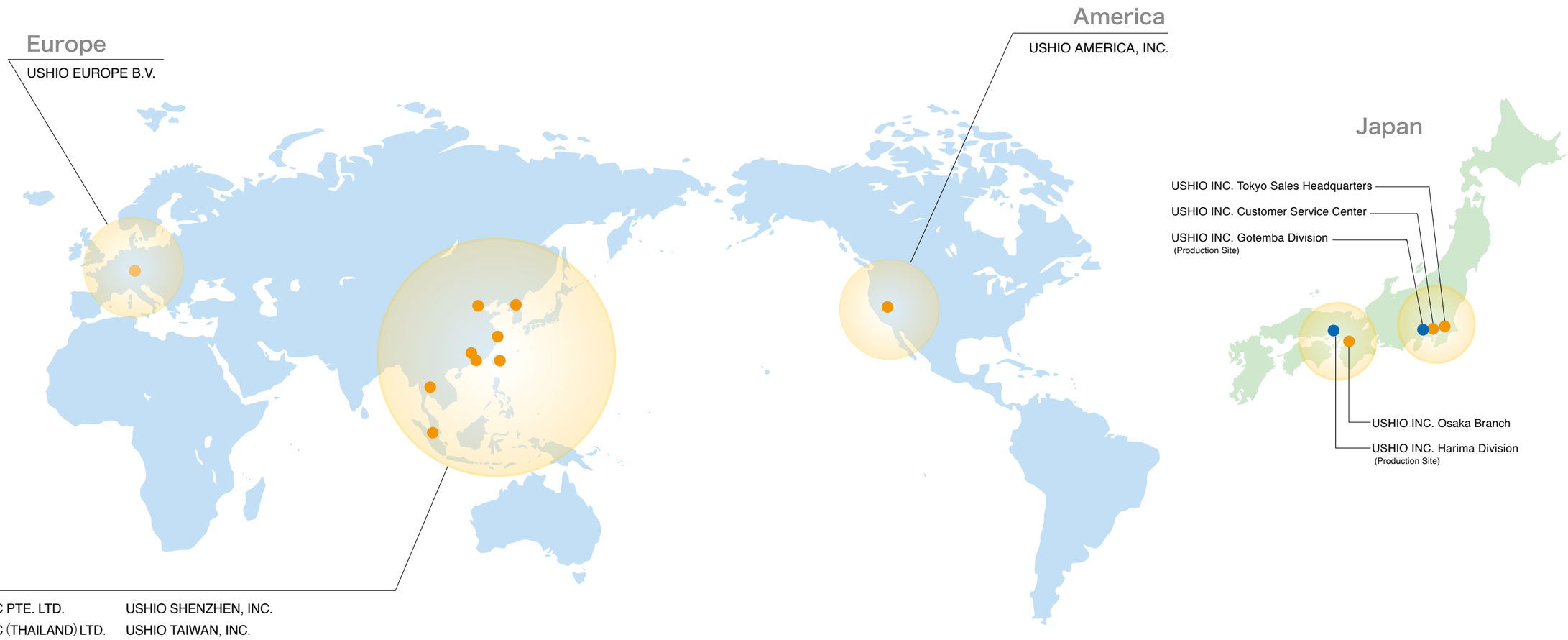

Super Beam Type LED

SMB with outer lens

For Horticulture lighting

Ushio Support System

We have built a worldwide sales organization to provide quick support in close touch with local subsidiaries.
Please contact us.



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www.ushio.com.hk

Options (Optical Measurement Instruments)

Accumulated UV Meter UIT-250

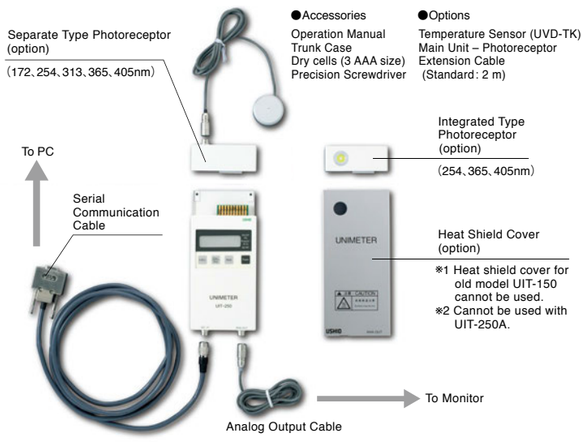
Features

- Measure five wavelength regions (centered on 172, 254, 313, 365, and 405 nm) and temperature by simply replacing the detector unit
- Battery/external power supply switching function (AC adapter optional)
- Compatible with extension cables (main unit to photoreceptor: 2 m as standard option)
- Measures irradiance, peak irradiance, exposure, irradiance distribution, irradiance of spot light sources, and temperature distribution
- Internal memory allows measurement of irradiance distribution for up to four minutes
- Auto power-off function can be enabled or disabled
- PC serial communications functions

Irradiance Distribution Data Reading	Measurement Range Switching
Samples-per-Second Confirmation	Irradiance (Temperature) Measurement

System Configuration

The UIT-250A includes the switchable battery/external power supply (AC adapter) function.



●Accessories
Operation Manual
Trunk Case
Dry cells (3 AAA size)
Precision Screwdriver

●Options
Temperature Sensor (UVD-TK)
Main Unit – Photoreceptor Extension Cable (Standard: 2 m)

※1 Heat shield cover for old model UIT-150 cannot be used.
※2 Cannot be used with UIT-250A.

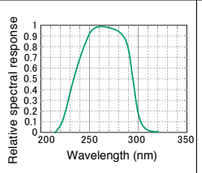
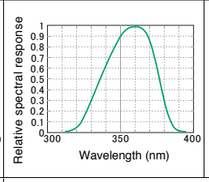
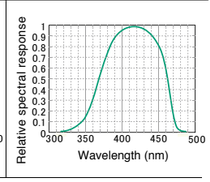
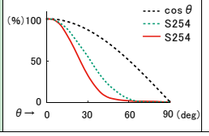
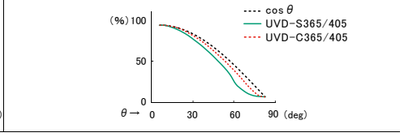
■ Specifications

Model	UIT-250
Display	Digital LCD display on main unit, 4 irradiance digits, 5 exposure digits
Functions	Real-time display, peak irradiance, exposure, irradiance distribution, temperature, 3-step range switching, auto-power-off (5 minutes or disable)
Irradiance distribution output	Analog 0 to 1 V output; maximum recording time of 2 min., or 4 min. (with recorder connected)
Sampling rate	16 or 32 samples/s
Communication specifications	Communication format: half duplex Synchronization format: Start-stop synchronization (asynchronous) Baud rate: 4,800 bps (fixed) Transmission code: ASCII, Data length: 8 bits (fixed) Stop bits: 1, Parity: none, Delimiter: CR
Power	3 AAA dry cell batteries
Size (mm)	W75×D160×H15
Mass (g)	Approx. 250g

■ Temperature Sensor Specifications

Model	UVD-TK
Temperature measurement range(℃)	0～350
Thermocouple wire	Chromel/Alumel wire (K thermocouple)

■ Detector Specifications

Model		UVD-C254	UVD-S254	UVD-C365	UVD-S365	UVD-C405	UVD-S405
Type		Integrated	Separate	Integrated	Separate	Integrated	Separate
Sensitivity wavelength region (nm)		220～310		310～390		320～470	
Wavelength for calibrating absolute value (nm)		254		365		405	
Calibration accuracy (%)		±10	±10	±5	±5	±5	±5
Detector diameter (mm)		φ10	φ3	φ10	φ1	φ10	φ1
Non-linearity (%)		Within ±1	Within ±1	Within ±1	Within ±1	Within ±1	Within ±1
Operating temperature range (°C) (The temperature of detector)		0～50	0～50	0～50	0～50	0～50	0～50
Temperature dependency (typical value)		-0.2%/°C	-0.2%/°C	-0.2%/°C	-0.2%/°C	-0.2%/°C	-0.2%/°C
Irradiance measurement range	Range H	0～9999		0～9999		0.0～999.9	
	Range M	0.0～999.9		0.0～999.9		0.00～99.99	
	Range L	0.00～99.99		0.00～99.99		0.000～9.999	
Accumulated light amount measurement range	Range H	0～99999		0～99999		0～9999.9	
	Range M	0.0～9999.9		0.0～9999.9		0.0～999.99	
	Range L	0.00～999.99		0.00～999.99		0.00～99.999	
Spectroscopic sensitivity (typical value)							
Angular dependence characteristics (typical value)							

※Values in the graphs and figures should be considered typical values for reference, and not guaranteed for all products.

Super-Thin Palm-Top UV Irradiance Meter UIT-θ365

This wireless type irradiance meter is just 4.9 mm thick. It is useful for measuring even in environments where the light source and irradiated object are very close, such as in UV coating of optical film, bonding precious components and lenses, and in UV printing processes.

Spectro-Radiometer USR-45VA/DA

Wide Dynamic Range Types

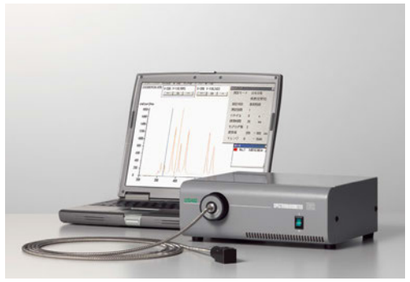
This standard-type equipment provides dispersive continuous light measurement and high-irradiance measurement functions. A greater range of light sources may now be measured, including sunlight and LED.

※Wavelength Ranges VA type: 300 to 1000 nm, DA type: 220 to 800 nm

Features

- **Measurement of Absolute Values /** This enables absolute values of spectrum energy to be displayed.
- **Minimal Scattering Light /** Minimizes amount of scattering light to achieve highly accurate measurement.
- **Wide Light Range:Flash Light /** Flash light can be measured, not only ambient light and AC light.
- **Wide Dynamic Range /** Supports wide range of measurements from weak to intense light.
- **Measurement of Dispersive Continuous Light is Possible /** Angular properties have been significantly improved with the unique optical system. Oblique incident light is captured without requiring an integrating sphere.
- **Measurement of High-Irradiance LED is Possible /** Highly accurate dispersion board enables measurement of high-intensity light.

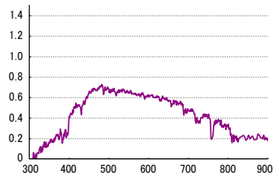
※365 nm reference value



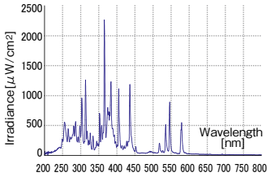
Measurement Examples

■ Sunlight

Measurement of dispersive continuous spectral light, including sunlight and long arc metal halide lamps



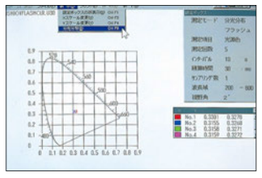
Optical Spectrum of Sunlight



Optical Spectrum of Long Arc Metal Halide Lamp

■ LED

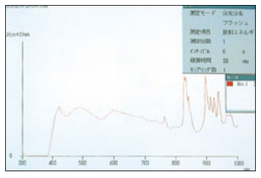
Measurement of high-intensity light, including that of LEDs and long arc light sources



Chromaticity Coordinates

■ Pulse

Measurement of flash light (brief light emissions) such as from LEDs and xenon lamps



Spectral Radiation Energy of Xenon Flash Lamp