



ULTRAVIOLET INFRARED

IR HEATER LAMPS
UV LED MODULES
UV LED EQUIPMENT
VUV-UVA LAMPS
GRAPHIC ART LAMPS
UV & IR LEDs
LASER DIODES

Our Products

About 130 years have passed since Edison invented the incandescent light bulb. The world has seen many advancements in lighting, but there are still many more possibilities for the application of light in areas where it is not presently used. Unraveling the mysteries of light one step at a time, USHIO implements its new discoveries to provide solutions in a wide variety of cutting edge applications, such as semiconductors, liquid crystal displays, cinema, medicine and biotechnology.

Today, USHIO is drawing attention as a potential means of resolving issues via cutting edge technologies that will form an essential part of our future. These technologies will contribute to improvements in the environment, food production, space exploration and the development of new energy sources.

Our feelings with regard to light are also reflected in our corporate USHIO green logo. Green is one of the colors in the trichromatic primary color set, and falls midway in the spectrum between infrared and ultraviolet. This reflects our aim of exerting a constant presence “in the center of the light.” Marking 50 years since our inception as a maker of industrial light sources and lighting equipment, our business is providing total light solutions and exploring other possibilities of light.

USHIO contributes to the development of people and society from a unique perspective by opening up the possibilities of light for potential application in the future of energy, and not just as a source of illumination.

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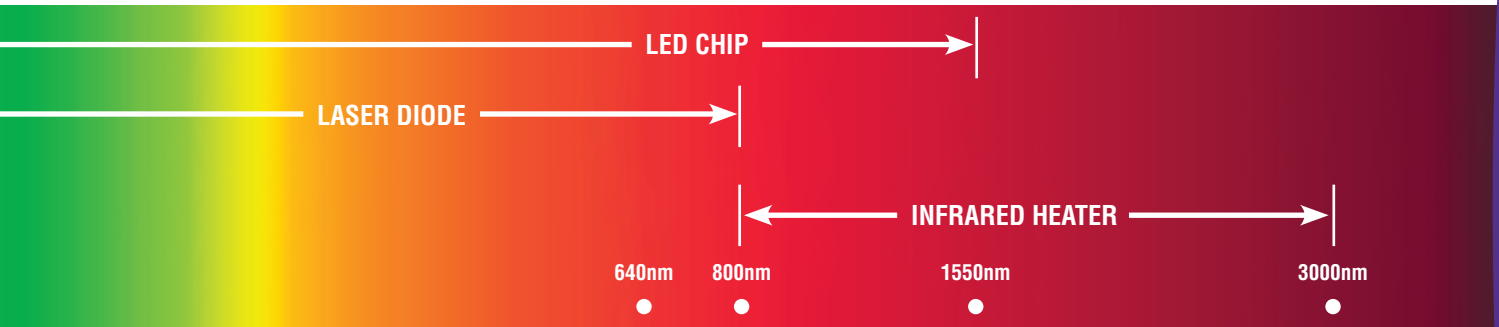
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SPECTRAL DISTRIBUTION CHART



Spectral distribution chart is not to scale.

- **172nm**
Excimer: Mercury Free Ozone Generation, Air Purification
VUV Equipment: Hydrophilic Treatment, Organic Matter Decomposition, Low Temperature Process, Direct Bonding
mUVi Lab Equipment: Testing of Water, Air and Surface Disinfection, Material Curing, Surface Modification, TOC Analysis, Ultraviolet Testing, Ozone Generation
- **185nm**
Amalgam: Ozone Producing Mercury Lamp, TOC Reduction in Water
- **190nm**
mUVi Lab Equipment: Testing of Water, Air and Surface Disinfection, Material Curing, Surface Modification, TOC Analysis, Ultraviolet Testing, Ozone Generation
- **222nm**
mUVi Lab Equipment: Testing of Water, Air and Surface Disinfection, Material Curing
- **230nm**
XeFl: Mercury Free Surface Disinfection, Air Purification, Material Curing, Odor Removal, Pesticide Dissolution
mUVi Lab Equipment: Testing of Water, Air and Surface Disinfection, Material Curing, Ultraviolet Testing
- **254nm**
Low Pressure UV lamps: Water Treatment, Air Purification, Material Curing
Amalgam: Air Disinfection, Industrial and Commercial Water Treatment, Cooling Tower Water Conditioning, Sewage Treatment
mUVi Lab Equipment: Testing of Water, Air and Surface Disinfection, Material Curing



Spectral distribution chart is not to scale.

- **254-430nm**
Medium Pressure UV: Waste Water Treatment, Ink Print Drying, Photoresist Hardening, Label Printing, Spot Curing
- **270-405nm**
UV LED Module/UV LED Chip: Inkjet Print Curing, 3-D Printing, Label Printing, Lithography, Photoresist Hardening, Sheet & Web Printing
Industrial LED Equipment: Wafer Curing, Nano Imprinting, Lithography, Photo Resist Hardening, Bind and Sealing of LCD Displays, Roll Film Surface Coat Curing, UV Ink Print
- **352nm**
Blacklight: UV Curing, Fluorescence, Photochemistry, Phototherapy, Dermatology, Inspection, Insect Luring
- **368nm**
Blacklight Blue: UV Curing, Fluorescence, Photochemistry, Phototherapy, Insect Luring
- **375-800nm:**
Laser Diodes: Digital Projection, Entertainment Lighting, Remote Source Lighting Through Fibers for Commercial and Medical Use
- **405-800nm:**
Visible LED Chip: Interior and Exterior Lighting, Flashlights, Automotive Lighting, Medical Applications
- **800-1550nm**
IR LED Chip: Security Camera, Hair Growth, Solar Simulation, Material Heating, Drying
- **1000-3000nm**
IR Heater Lamps: Baking, Drying, Material Heating, 3-D Printing, Food Warming, Area Heating, Dehydrating



Quartz Infrared Heater Lamps

The quartz infrared heater (QIH) lamps provide clean, instantaneous and precision controlled heat for use in applications such as baking, drying, curing, dehydrating, warming of foods and general area warming.

Infrared heater lamps are available in a variety of base configurations and a variety of design alternatives. Including segmented lamps for uniform heating, coated lamps for better directional efficiency and special filament designs for medium wave lamps. We also offer a wide array of twin tube, circular and other bent type lamps to meet your specific heating requirements.

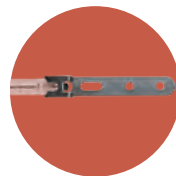


**Flat Ceramic Base
w/Lead Wire**

(Shown: Spade Tongue Terminal)



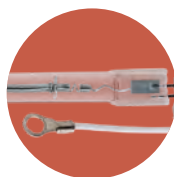
**R7s Base
(Contact Type)**



Metal Clip Base



**Round Ceramic Base
w/Lead Wire**

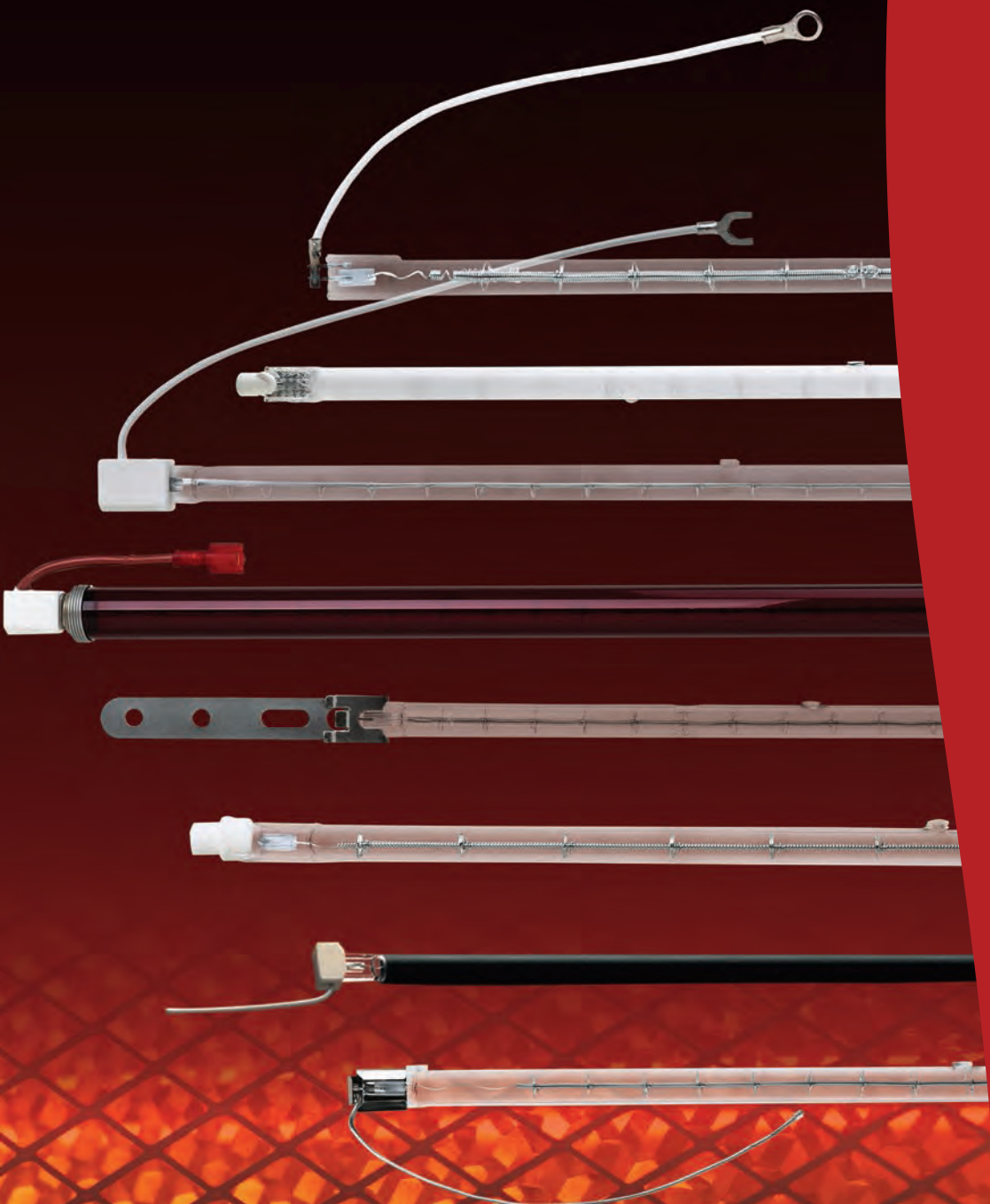


**Lead Wire;
No Metal Sleeve**
(Shown: Ring Tongue Terminal)



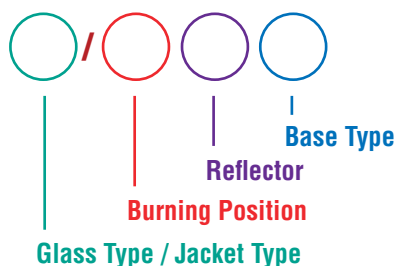
**Metal Sleeve
w/Lead Wire**

QIH/QUARTZ INFRARED LIGHTING



USHIO QIH PART NUMBER REFERENCE GUIDE

Q I H 240-1000



Glass Type

T Translucent Quartz
No Indication; Clear Quartz

Jacket Type

C Clear
R Ruby

Burning Position

V Vertical Burning
No Indication; Horizontal Burning

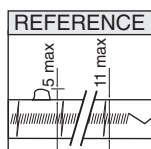
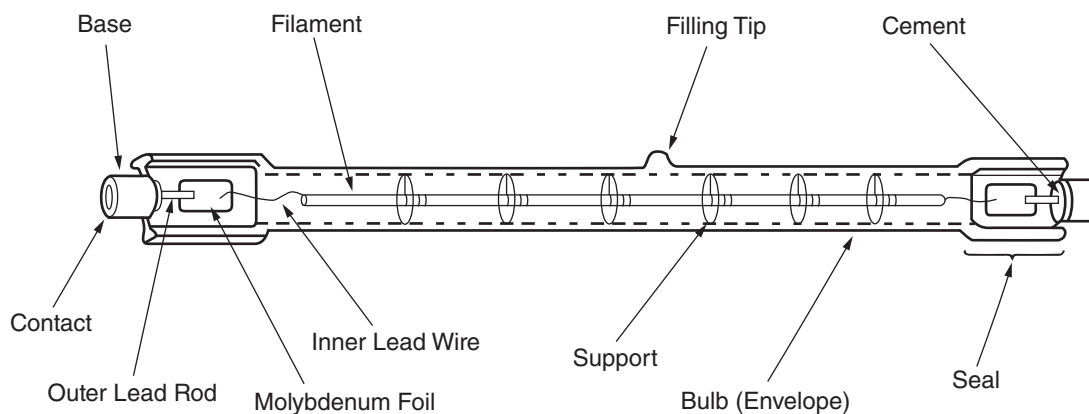
Reflector

Z White Coated Reflector
No Indication; No Reflector

Base Type

B Metal Clip Base
E R7s (Contact Type)
S Metal Sleeve w/Lead Wire
C Lead Wire; No Metal Sleeve
L Round Ceramic Base w/Lead Wire
D Flat Ceramic Base w/Lead Wire
H Flat Ceramic Base w/Lead Wire (no adhesive)

GENERAL PROPERTIES OF A QIH LAMP



Dimensions

MOL = Maximum Overall Length
LL = Lighted Length (Filament Length) (Avg.)
L1 = Contact to Contact Length

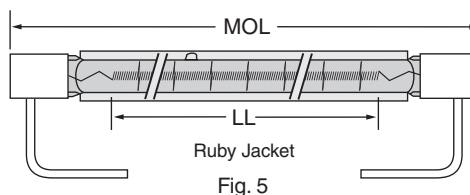
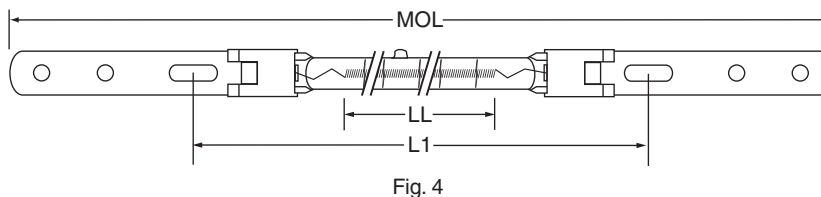
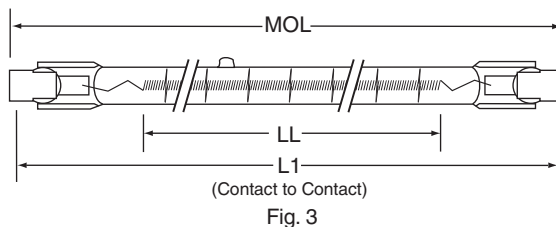
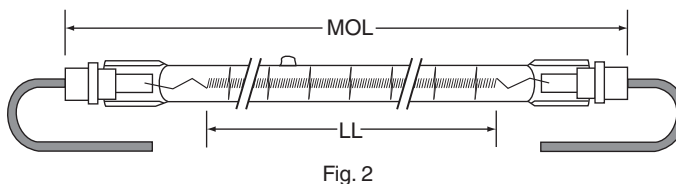
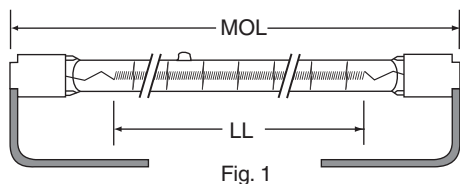
Lamp Notes

F = Faston Terminal
FR = Faston Receptacle
FT = Faston Tab
IW = Insulated Wire
R = Ring Tongue Terminal
S = Spade Tongue Terminal / Standard Lead Wire Length: 145mm

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the USA

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
104 Volts										
600	1001285	QIH104-600/S	303.0	152	—	2500	6000	1	600T3/CL/12	
115 Volts										
1350	1001287	QIH115-1350/L	317.0	256	—	2750	3000	2	13381/99	IW
120 Volts										
300	1001288	QIH120-300T/S	214.0	106	—	2450	6000	1	QH300T3	
375	1001289	QIH120-375T/E	219.0	128	215	2500	6000	3	QH375T3/7	
375	1001290	QIH120-375T/S	223.0	128	—	2500	6000	1	QH375T3	
500	1001293	QIH120-500/L	223.0	127	—	2500	5000	2	QH500T3/CL	
500	1001294	QIH120-500/S	223.0	127	—	2500	6000	1	QH500T3/CL	
500	1001295	QIH120-500/S2	221.0	142	—	2500	5000	1	13169Y	
500	1001296	QIH120-500/ZB	356.0	142	241	2500	5000	4	13169X/98	
500	1001297	QIH120-500T/E	220.0	127	216	2500	6000	3	QH500T3/7	
500	1001298	QIH120-500T/S	223.0	127	—	2500	6000	1	QH500T3	
500	1003201	QIH120-500T/S3	223.0	127	—	2500	5000	1	—	R
800	1001299	QIH120-800T/S	303.0	203	—	2500	6000	1	QH800T3	
850	1003565	QIH120-850R/VD	198.0	115	—	—	5000	5	13833Z/876	FT, IW w/Silicon Sleeve



QUARTZ INFRARED HEATER LAMPS • 144V - 230V

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
144 Volts										
1200	1001300	QIH144-1200/S	224.0	155	—	2500	5000	1	QH1200T3/CL	
1200	1001301	QIH144-1200/S2	228.0	155	—	2500	5000	1	13561Y/00	IW, R
1200	1003792	QIH144-1200/ZS2	225.0	155	—	2500	5000	1	—	
1600	1001302	QIH144-1600/S	229.0	150	—	2650	3000	1	13568Y/00	IW, R
1600	1003793	QIH144-1600/ZS	225.0	155	—	2500	5000	1	—	
200 Volts										
1000	1003075	QIH200-1000/ZB	485.0	272	370	2500	5000	2	—	
1600	1003037	QIH200-1600/S	223.5	158	—	3000	1000	1	—	
208 Volts										
1600	1001305	QIH208-1600/L	502.0	407	—	2500	5000	3	—	
1600	1001306	QIH208-1600T/E	499.0	407	495	2400	6000	2	QH1600T3/7	
1600	1001307	QIH208-1600T/S	503.0	407	—	2400	6000	1	QH1600T3	
220 Volts										
1350	1001311	QIH220-1350/L	317.0	256	—	2750	3000	3	13381/99	IW
230 Volts										
1200	1003142	QIH230-1200/ZH	225.0	155	—	2700	3000	4	14134Z/98	IW, S
1300	1003236	QIH230-1300/ZL	453.0	358	—	2500	5000	3	—	IW, F
1500	1003235	QIH230-1500/ZL	453.0	360	—	2500	5000	3	—	IW, FR
1600	1003143	QIH230-1600/ZH	225.0	155	—	2700	3000	4	14135Z/98	IW, S
3000	1003768	QIH230-3000/ZH	787.0	700	—	2450	5000	4	—	

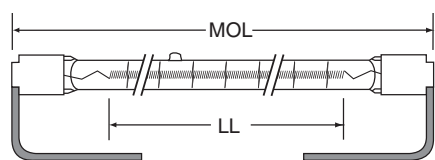


Fig. 1

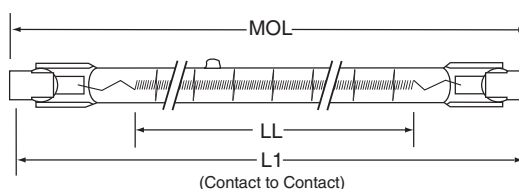


Fig. 2

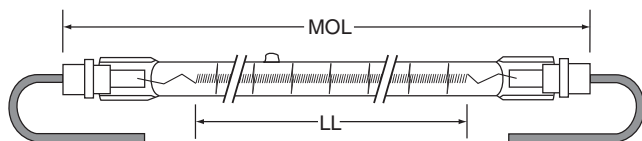


Fig. 3

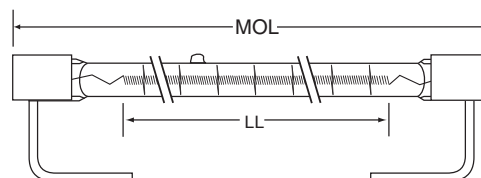


Fig. 4

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
240 Volts										
500	1001352	QIH240-500/D	227.5	165	—	2600	4000	1	13169Z	IW, S
500	1001353	QIH240-500/ZD	227.5	165	—	2600	4000	1	13169Z/98	IW, S
500	1001409	QIH240-500C/D	227.0	162	—	2500	5000	2	—	IW, S
1000	1001317	QIH240-1000/S	351.0	254	—	2500	5000	3	QH1000T3/2CL/HT	
1000	1001318	QIH240-1000/S2	303.0	254	—	2500	5000	3	QH1000T3/CL	
1000	1001319	QIH240-1000/S3	351.0	272	—	2500	5000	3	13195Y	
1000	1001320	QIH240-1000/VB	485.0	272	370	2500	5000	4	13713X	
1000	1001321	QIH240-1000/VD	357.5	272	—	2500	5000	1	13713Z	IW, S
1000	1001322	QIH240-1000/VZD	357.5	272	—	2500	5000	1	13713Z/98	IW, S
1000	1001323	QIH240-1000/ZB	485.0	272	370	2500	5000	4	13195X/98	
1000	1001324	QIH240-1000/ZD	357.5	272	—	2500	5000	1	13195Z/98	IW, S
1000	1002250	QIH240-1000/VZH	357.5	272	—	2500	5000	1	13713Z/98	IW, S
1000	1003244	QIH240-1000/ZH3	357.0	272	—	2500	5000	1	—	IW
1000	1003550	QIH240-1000R/VD4	531.0	440	—	—	5000	2	13836Z/876	FT, IW w/Silicon Sleeve
1000	1001325	QIH240-1000T/S	351.0	254	—	2500	5000	3	QH1000T3	
1500	1003235	QIH230-1500/ZL	453.0	360	—	2500	5000	5	—	IW, FR
1500	1001327	QIH240-1500/S	303.0	235	—	2500	5000	3	1500T3/CL/HT	
1500	1003566	QIH240-1500R/VD	787.0	700	—	—	5000	2	13250Z/876	FT, IW w/Silicon Sleeve

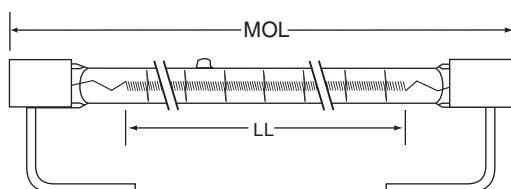


Fig. 1

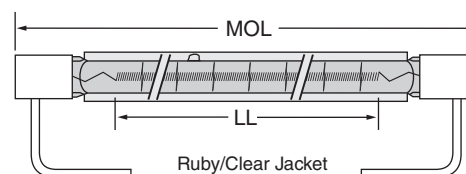


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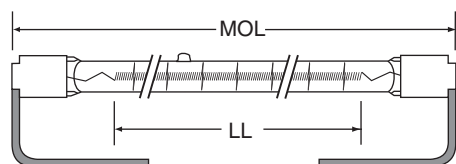


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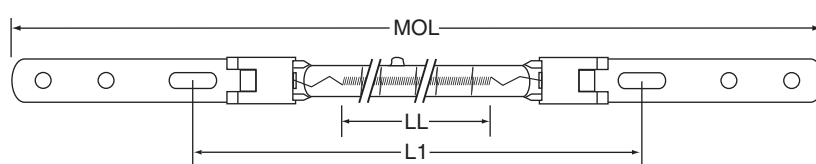


Fig. 4

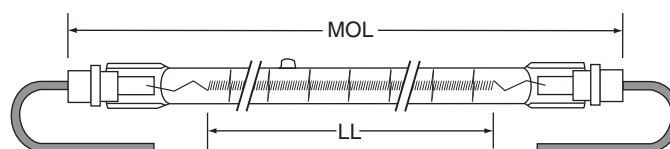


Fig. 5

QUARTZ INFRARED HEATER LAMPS • 240V

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
240 Volts										
1600	1001328	QIH240-1600/E	499.0	407	495	2500	5000	1	—	
1600	1001329	QIH240-1600/L2	502.0	407	—	2500	5000	2	—	
1600	1001330	QIH240-1600/S	503.0	407	—	2500	5000	3	QH1600T3/CL	
1600	1001331	QIH240-1600/S2	455.5	407	—	2500	3000	3	1600T3/1CL/HT	
1600	1001332	QIH240-1600/VL2	502.0	407	—	2500	5000	2	—	
1600	1002198	QIH240-1600/VS	503.0	407	—	2500	5000	3	—	
1600	1001333	QIH240-1600T/E	499.0	407	495	2500	5000	1	QH1600T3/7	
1600	1001334	QIH240-1600T/L	502.0	407	—	2500	5000	2	1600T3/5	
1600	1001335	QIH240-1600T/S	503.0	407	—	2500	5000	3	QH1600T3	
2000	1003851	QIH240-2000/E2	604.5	540	598.5	2450	5000	1	—	
2000	1001339	QIH240-2000/S	303.0	248	—	2500	5000	3	QH2M/T3/1CL/HT	
2000	1001340	QIH240-2000/S2	351.0	254	—	2500	5000	3	QH2M/T3/CL/HT	
2000	1001341	QIH240-2000/VB	485.0	280	370	2500	5000	4	13168X	
2000	1003595	QIH240-2000/VC2	349.0	280	—	2500	5000	5	—	R
2000	1001343	QIH240-2000/VS	303.0	248	—	2500	5000	3	QH2M/T3/1CL/HT/VB	

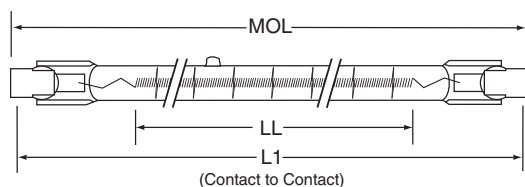


Fig. 1

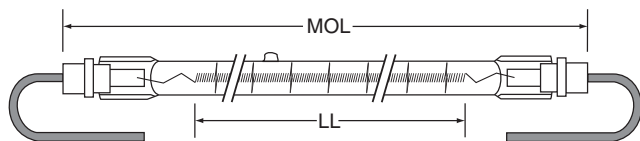


Fig. 2

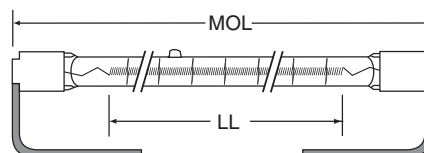


Fig. 3

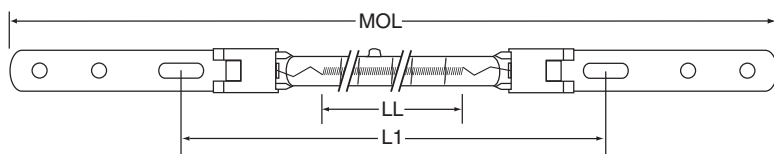


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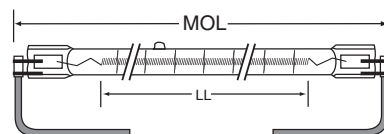


Fig. 5

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
240 Volts										
2000	1001344	QIH240-2000/VZD	357.0	280	—	2500	5000	1	13168Z/98	IW, S
2000	1002251	QIH240-2000/VZH	357.0	280	—	2500	5000	1	13168Z/98	IW
2000	1003405	QIH240-2000/ZD4	354.0	290	—	2500	5000	1	—	IW
2000	1003243	QIH240-2000/ZH3	357.0	280	—	2500	5000	1	—	IW
2000	1003404	QIH240-2000/ZH5	354.0	290	—	2400	5000	1	—	IW
2000	1001350	QIH240-2000T/S	603.0	508	—	2500	5000	2	2000T3/524	
2600	1001408	QIH240-2600R/D	583.0	500	—	—	5000	3	—	IW, S w/Silicon Sleeve
3000	1001351	QIH240-3000/S	503.0	410	—	2500	5000	2	3000T3/CL	
250 Volts										
2200	1001354	QIH250-2200/C	303.0	248	—	2500	3000	4	2200T3/CL/H	R
277 Volts										
1600	1001355	QIH277-1600/L	502.0	407	—	2500	5000	5	—	
1600	1001356	QIH277-1600T/E	499.0	407	495	2500	5000	6	QH1600T3/7	
1600	1001357	QIH277-1600T/S	503.0	407	—	2500	5000	2	QH1600T3	

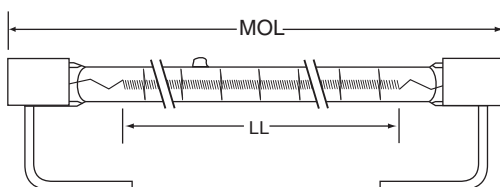


Fig. 1

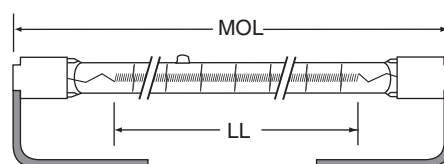


Fig. 2

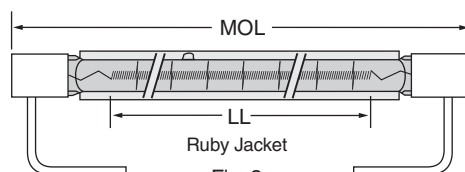


Fig. 3

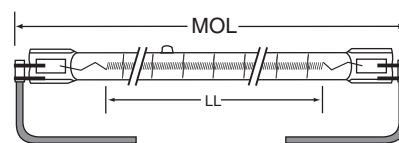


Fig. 4

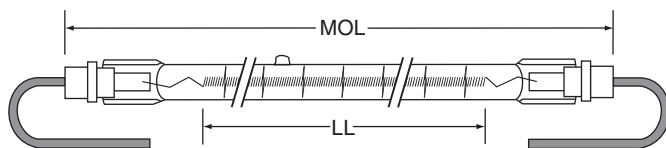


Fig. 5

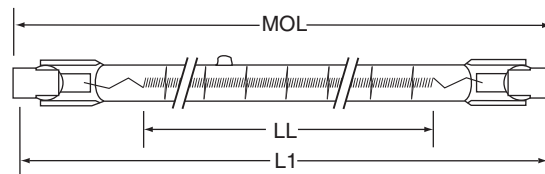


Fig. 6

QUARTZ INFRARED HEATER LAMPS • 384V - 480V

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
384 Volts										
3200	1001360	QIH384-3200/S	456.0	406	—	2500	3000	1	3200T3/CL/HT	
400 Volts										
2000	1001345	QIH400-2000/VB	623.0	410	508	2500	5000	2	13765X	
2000	1001362	QIH400-2000/ZB	623.0	410	508	2500	5000	2	13245X/98	
2500	1003570	QIH400-2500/ZD	381.0	310	—	2500	5000	3	—	IW
2500	1003329	QIH400-2500/ZH2	357.0	280	—	2700	3000	3	—	IW, S
3000	1003571	QIH400-3000/ZD	381.0	310	—	2500	5000	3	—	IW
3000	1003330	QIH400-3000/ZH2	357.0	280	—	2700	3000	3	—	IW, S
420 Volts										
3800	1003046	QIH420-3800/VS	1062.0	965	—	2500	5000	1	—	
3800	1001369	QIH420-3800T/S	1062.0	965	—	2500	5000	1	3800T3/HT	
480 Volts										
2500	1001372	QIH480-2500/L	731.0	635	—	2500	5000	4	—	
2500	1001373	QIH480-2500/S	732.0	635	—	2500	5000	1	QH2500T3/CL	
2500	1001375	QIH480-2500/VL	731.0	635	—	2500	5000	4	—	
2500	1001376	QIH480-2500/VS	732.0	635	—	2500	5000	1	2500T3/CL/VB	
2500	1003164	QIH480-2500/ZH	737.0	635	—	2500	5000	3	—	IW
2500	1001380	QIH480-2500T/L	729.0	635	—	2500	5000	4	—	
2500	1001381	QIH480-2500T/S	732.0	635	—	2500	5000	1	QH2500T3	

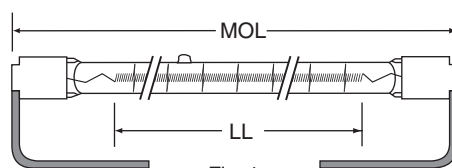


Fig. 1

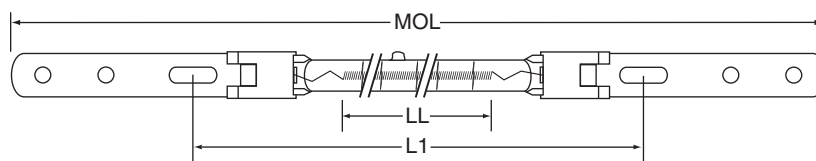


Fig. 2

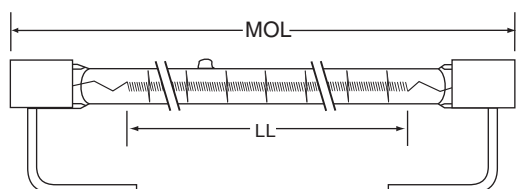


Fig. 3

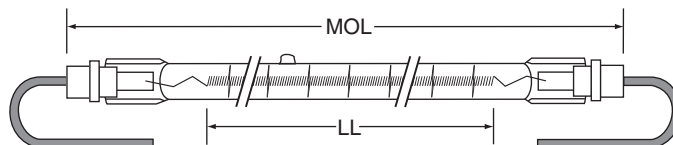


Fig. 4

QIH

- Short, Medium & Long Wavelengths Available
- ISO 9001 Certified
- Custom Designs
- Manufactured in the U.S.A.

Watts (W)	Ordering Code	Lamp Description	Dimensions			Color Temp (K)	Avg Life (h)	Fig No	Alternate Designation	Lamp Notes
			MOL (mm)	LL (mm)	L1 (mm)					
480 Volts										
3650	1001385	QIH480-3650/L	1062.0	965	—	2500	5000	1	—	
3650	1001386	QIH480-3650/S	1059.0	965	—	2500	5000	2	3650T3/CL	
3650	1003258	QIH480-3650/VS	1059.0	965	—	2500	5000	2	—	
3650	1001387	QIH480-3650T/L	1060.0	965	—	2500	5000	1	QH3650T3/5	
6000	1003753	QIH480-6000/C3	300.0	248	—	3150	—	3	—	
6000	1001391	QIH480-6000/RI	300.0	248	—	3150	1500	3	—	
570 Volts										
3800	1001392	QIH570-3800/L	1062.0	965	—	2500	5000	1	—	
3800	1001393	QIH570-3800/S	1062.0	965	—	2450	5000	2	QH3800T3/CL	
3800	1001395	QIH570-3800/VS	1062.0	965	—	2450	5000	2	3800T3/CL/VB	
3800	1001398	QIH570-3800T/VS	1062.0	965	—	2450	5000	2	QH3800T3/VB	
575 Volts										
2500	1001399	QIH575-2500/S	732.0	635	—	2500	5000	2	2500T3/HT	
600 Volts										
5000	1001402	QIH600-5000/S	732.0	638	—	2500	5000	2	QH5M/T3/1CL/HT	

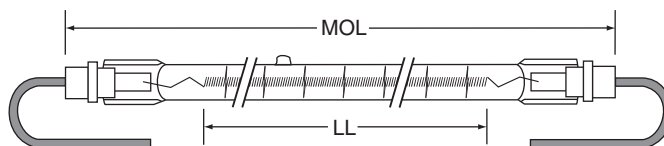


Fig. 1

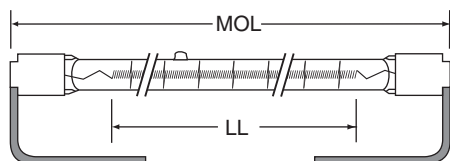


Fig. 2

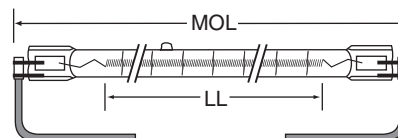


Fig. 3

UNIJET UV LED SERIES

Module Lineup for Inkjet & 3-D Printers

USHIO's expertise in manufacturing has resulted in specialized UV products. Looking to create a unique design that provides a light rich in the ultraviolet spectral regions, USHIO created the Unijet UV LED Series. The Unijet Series is the ideal choice for UV curing and printing industries.



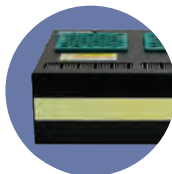
A Series



M Series



L Series

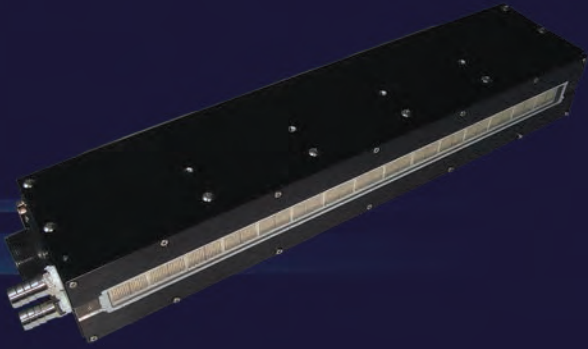


i Series



E Series

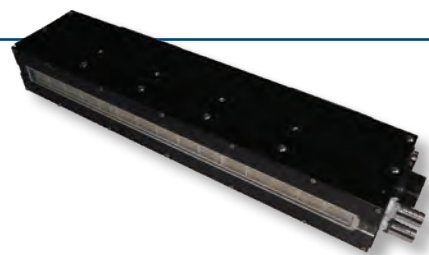
UNIJET UV LED SERIES



UNIJET UV LED SERIES

A SERIES

- Custom Lengths Up to 1070mm
- Water Cooled
- High Power 24W/cm²
- Dimming from 10%-100%



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Power W/cm²@ 5mm	Dimensions		
					Length (mm)	Width (mm)	Height (mm)
A Series							
1000712459	Unijet A90	365	16.0	12.0	80	140	120
1000712455	Unijet A90	385	24.0	18.0	80	140	120
1000712457	Unijet A90	395	24.0	18.0	80	140	120
1000712458	Unijet A90	405	24.0	18.0	80	140	120
TBD-Call for More Info.	Unijet A180	365	16.0	12.0	80	230	120
1000743571	Unijet A180	385	24.0	18.0	80	230	120
TBD-Call for More Info.	Unijet A180	395	24.0	18.0	80	230	120
TBD-Call for More Info.	Unijet A180	405	24.0	18.0	80	230	120
TBD-Call for More Info.	Unijet A270	365	16.0	12.0	80	320	120
1000743572	Unijet A270	385	24.0	18.0	80	320	120
TBD-Call for More Info.	Unijet A270	395	24.0	18.0	80	320	120
TBD-Call for More Info.	Unijet A270	405	24.0	18.0	80	320	120
TBD-Call for More Info.	Unijet A360	365	16.0	12.0	80	410	120
1000743573	Unijet A360	385	24.0	18.0	80	410	120
TBD-Call for More Info.	Unijet A360	395	24.0	18.0	80	410	120
TBD-Call for More Info.	Unijet A360	405	24.0	18.0	80	410	120
TBD-Call for More Info.	Unijet A450	365	16.0	12.0	80	500	120
1000743574	Unijet A450	385	24.0	18.0	80	500	120
TBD-Call for More Info.	Unijet A450	395	24.0	18.0	80	500	120
TBD-Call for More Info.	Unijet A450	405	24.0	18.0	80	500	120
TBD-Call for More Info.	Unijet A540	365	16.0	12.0	80	590	120
1000743575	Unijet A540	385	24.0	18.0	80	590	120
TBD-Call for More Info.	Unijet A540	395	24.0	18.0	80	590	120
TBD-Call for More Info.	Unijet A540	405	24.0	18.0	80	590	120
Accessories - A Series					Notes		
1000712043	A-Power Cable	Power cable from power supply to module					
1000712456	A-PS PRK200-8	Input: 190-250VAC Output: 2000W power supply					

M & M II SERIES

- Small Area Spot Curing
- Separate Driver
- Lightweight
- Dimming from 30%-100%
- U-VIT (USHIO Variable Illumination Technology)*



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Dimensions		
				Length (mm)	Width (mm)	Height (mm)
M Series						
1000712372	Unijet M30	365	5.3	48	77	90
1000710434	Unijet M30	385	7.0	48	77	90
1000710435	Unijet M30	395	7.0	48	77	90
1000710436	Unijet M30	405	7.0	48	77	90
M II Series						
1000712372	Unijet M30 II	365	—	48	77	90
1000710434	Unijet M30 II	385	9.0	48	77	90
1000710435	Unijet M30 II	395	9.0	48	77	90
1000710436	Unijet M30 II	405	9.0	48	77	90
Accessories - M & M II Series				Notes		
1000712375	M-Driver			LED driver		
1000712513	M-PS PLA-150F-24			Input: 100-240VAC 50/60Hz Output: 150W 24VDC power supply		
1000710440	M-Power Cable 1			Cable for driver connection 5m length		
1000710441	M-Power Cable 2			Cable from power supply to control box 5m length		

*U-VIT: Allows for segmented dimming and On/Off function to optimize light distribution which can contribute to energy savings and fine tuning of the curing process.

UNIJET UV LED SERIES

L & L II SERIES

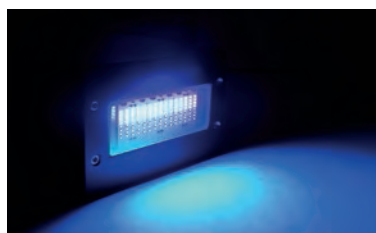
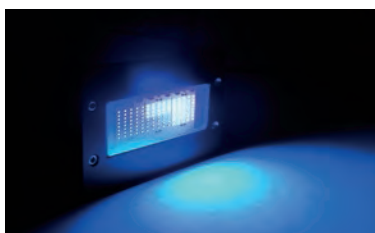
- High Power Density of Up to 12W/cm²
- Air Cooled
- Lightweight
- Dimming from 30%-100%
- U-VIT (USHIO Variable Illumination Technology)*

- Separate Driver



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Dimensions		
				Length (mm)	Width (mm)	Height (mm)
L Series						
1000712373	Unijet L60	365	6.0	68	110	160
1000707070	Unijet L60	385	8.0	68	110	160
1000692049	Unijet L60	395	8.0	68	110	160
1000707071	Unijet L60	405	8.0	68	110	160
1000712374	Unijet L125	365	6.0	90	168	160
1000707072	Unijet L125	385	8.0	90	168	160
1000695334	Unijet L125	395	8.0	90	168	160
1000707073	Unijet L125	405	8.0	90	168	160
L II Series						
1000712257	Unijet L60 II	385	12.0	68	110	160
1000707509	Unijet L60 II	395	12.0	68	110	160
1000712258	Unijet L60 II	405	12.0	68	110	160
1000712259	Unijet L125 II	385	12.0	90	168	160
1000707517	Unijet L125 II	395	12.0	90	168	160
1000712260	Unijet L125 II	405	12.0	90	168	160
Accessories - L & L II Series				Notes		
1000710444	L-Power Supply Box			Power supply, control box & driver Also good to use for M Series		
1000711244	L-Driver			LED driver also good to use for M Series		
1000712515	L-PS PLA-600F-24			Input: 100-240VAC 50/60hz Output: 600W 24VDC power supply		
1000711249	L-Power Cable 1			Cable for driver 5m length		
1000715675	L-Power Cable 4			Cable for driver and power supply		
1000713079	L-Power Cable 3			Cable from power supply to control box 0.7m length		
1000711242	L-Analog Control Cable 1			0.5m length		
1000711243	L-Interface Cable 1			0.5m length		

*U-VIT: Allows for segmented dimming and On/Off function to optimize light distribution which can contribute to energy savings and fine tuning of the curing process.



i SERIES

- Daisy Chainable
- Air Cooled
- Edgeless Module
- Dimming from 10%-100%
- U-VIT (USHIO Variable Illumination Technology)*



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Dimensions		
				Length (mm)	Width (mm)	Height (mm)
i Series						
1000724470	Unijet i80	365	6.0	89	127.6	250
1000724472	Unijet i80	385	8.0	89	127.6	250
1000724473	Unijet i80	395	8.0	89	127.6	250
1000724474	Unijet i80	405	8.0	89	127.6	250
1000724475	Unijet i185	365	6.0	89	187.4	250
1000724477	Unijet i185	385	8.0	89	187.4	250
1000724478	Unijet i185	395	8.0	89	187.4	250
1000724479	Unijet i185	405	8.0	89	187.4	250
1000712382	Unijet i245	365	6.0	89	249.2	250
1000703250	Unijet i245	385	8.0	89	249.2	250
1000692089	Unijet i245	395	8.0	89	249.2	250
1000703251	Unijet i245	405	8.0	89	249.2	250
1000724480	Unijet i310	365	6.0	89	311.0	250
1000724483	Unijet i310	385	8.0	89	311.0	250
1000724484	Unijet i310	395	8.0	89	311.0	250
1000724486	Unijet i310	405	8.0	89	311.0	250
1000724487	Unijet i370	365	6.0	89	372.8	250
1000724488	Unijet i370	385	8.0	89	372.8	250
1000724489	Unijet i370	395	8.0	89	372.8	250
1000724490	Unijet i370	405	8.0	89	372.8	250
1000724491	Unijet i430	365	6.0	89	434.6	250
1000724492	Unijet i430	385	8.0	89	434.6	250
1000724493	Unijet i430	395	8.0	89	434.6	250
1000724495	Unijet i430	405	8.0	89	434.6	250
1000724496	Unijet i495	365	6.0	89	496.4	250
1000724497	Unijet i495	385	8.0	89	496.4	250
1000724498	Unijet i495	395	8.0	89	496.4	250
1000724499	Unijet i495	405	8.0	89	496.4	250

*U-VIT: Allows for segmented dimming and On/Off function to optimize light distribution which can contribute to energy savings and fine tuning of the curing process.

For Accessories See page 20.



UNIJET UV LED SERIES

i II SERIES

- High Power Density of up to 12W/cm²
- Air Cooled
- Dimming from 10%-100%
- Scalable End-to-End with Edgeless Module
- U-VIT (USHIO Variable Illumination Technology)*
- Integrated Driver



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Dimensions		
				Length (mm)	Width (mm)	Height (mm)
i II Series						
1000724500	Unijet i80 II	385	12.0	89	127.6	250
1000724501	Unijet i80 II	395	12.0	89	127.6	250
1000724502	Unijet i80 II	405	12.0	89	127.6	250
1000724503	Unijet i185 II	385	12.0	89	187.4	250
1000724504	Unijet i185 II	395	12.0	89	187.4	250
1000724508	Unijet i185 II	405	12.0	89	187.4	250
1000712246	Unijet i245 II	385	12.0	89	249.2	250
1000707518	Unijet i245 II	395	12.0	89	249.2	250
1000712251	Unijet i245 II	405	12.0	89	249.2	250
1000724509	Unijet i310 II	385	12.0	89	311.0	250
1000724510	Unijet i310 II	395	12.0	89	311.0	250
1000724511	Unijet i310 II	405	12.0	89	311.0	250
1000724512	Unijet i370 II	385	12.0	89	372.8	250
1000724513	Unijet i370 II	395	12.0	89	372.8	250
1000724514	Unijet i370 II	405	12.0	89	372.8	250
1000724515	Unijet i430 II	385	12.0	89	434.6	250
1000724516	Unijet i430 II	395	12.0	89	434.6	250
1000724517	Unijet i430 II	405	12.0	89	434.6	250
1000724518	Unijet i495 II	385	12.0	89	496.4	250
1000724519	Unijet i495 II	395	12.0	89	496.4	250
1000724520	Unijet i495 II	405	12.0	89	496.4	250
Accessories - i & i II Series				Notes		
1000712052	i-PS FETA2500B-48			Input: 190-240VAC 50/60Hz Output: 2500W 48VDC power supply (1 unit of power supply up to i310)		
1000712496	i-PS H-PA-13			Cable for 2 units of power supply connection		
1000727283	i-Power Cable 2 (5P)			Cable for i80 (5m)		
1000711246	i-Power Cable (3P)			Cable for i245 (3m length)		
1000712466	i-Power Cable (7P)			Cable for i310 and > (5m length)		
1000711247	i-Control Box			—		
1000727281	i-Analog Control Cable 3			for i180		
1000727109	PS P4K18-2 (100V Cable 1)			Control box for i80		
1000727108	i-PS PBA-1000F-48			ACDC power supply for i80		
1000712387	i-Power Supply Box 2			Input: 190-240VAC 50/60Hz Output: 2500W 48VDC power supply 2.5kW power supply and control box (1 unit of power supply up to i310)		
1000712388	i-Power Cable 2 (3P)			Cable 5m for i-power supply box 2		
1000712389	i-Analog Control Cable 2			5m length		
1000712390	i-Power Supply Box 3			Input: 190-240VAC 50/60Hz 5.0kW power supply and control box Output: 5000W 48VDC power supply > i310		
1000712391	i-Power Cable 3 (7P)			5m length		

*U-VIT: Allows for segmented dimming and On/Off function to optimize light distribution which can contribute to energy savings and fine tuning of the curing process.

i SLIM 1 & 2 SERIES

- Smaller Footprint Than Standard “I” Series
- 10W/cm² Power Output
- Scalable End-to-End with Edgeless Module
- Integrated Driver
- U-VIT (USHIO Variable Illumination Technology)*
- Adjustable Directional Airflow

Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Dimensions		
				Length (mm)	Width (mm)	Height (mm)
i Slim 1 Series						
TBD-Call for More Info.	Unijet i245 Slim 1	365	—	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 1	385	10.0	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 1	395	10.0	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 1	405	10.0	69	245	298
i Slim 2 Series						
TBD-Call for More Info.	Unijet i245 Slim 2	365	—	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 2	385	10.0	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 2	395	10.0	69	245	298
TBD-Call for More Info.	Unijet i245 Slim 2	405	10.0	69	245	298

*U-VIT: Allows for segmented dimming and On/Off function to optimize light distribution which can contribute to energy savings and fine tuning of the curing process.



Slim 1



Slim 2

UNIJET UV LED SERIES

E & E II SERIES

- Lightweight
- Air Cooled
- Dimming from 10%-100%
- Scalable End-to-End with Edgeless Module
- Integrated Driver



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Power W/cm²@ 5mm	Power W/cm²@ 10mm	Dimensions		
						Length (mm)	Width (mm)	Height (mm)
E Series								
1000729644	Unijet E110 HC	365	—	—	1.4	23	110	123
1000723174	Unijet E110 HC	385	—	—	3	23	110	123
1000723173	Unijet E110 HC	395	—	—	3	23	110	123
1000723175	Unijet E110 HC	405	—	—	3	23	110	123
1000723169	Unijet E110 HD	365	1.8	—	—	23	110	115
1000723171	Unijet E110 HD	385	3.0	—	—	23	110	115
1000723172	Unijet E110 HD	395	3.0	—	—	23	110	115
1000723170	Unijet E110 HD	405	3.0	—	—	23	110	115
1000723168	Unijet E110 U-DOS	385	—	1.5	—	23	110	120
1000723166	Unijet E110 U-DOS	395	—	1.5	—	23	110	120
1000723167	Unijet E110 U-DOS	405	—	1.5	—	23	110	120
E II Series								
1000729645	Unijet E075 II HC	365	—	—	1.8	28	76	150
1000723458	Unijet E075 II HC	385	—	—	4	28	76	150
1000723459	Unijet E075 II HC	395	—	—	4	28	76	150
1000723460	Unijet E075 II HC	405	—	—	4	28	76	150
1000723454	Unijet E075 II HD	365	4.2	—	—	28	76	135
1000723455	Unijet E075 II HD	385	7.0	—	—	28	76	135
1000723456	Unijet E075 II HD	395	7.0	—	—	28	76	135
1000723457	Unijet E075 II HD	405	7.0	—	—	28	76	135
1000723461	Unijet E075 II U-DOS	385	—	—	3	28	76	150
1000723462	Unijet E075 II U-DOS	395	—	—	3	28	76	150
1000723463	Unijet E075 II U-DOS	405	—	—	3	28	76	150
1000729646	Unijet E110 II HC	365	—	—	1.8	28	110	135
1000723155	Unijet E110 II HC	385	—	—	4	28	110	135
1000723154	Unijet E110 II HC	395	—	—	4	28	110	135
1000721930	Unijet E110 II HC	405	—	—	4	28	110	135
1000721941	Unijet E110 II HD	365	4.2	—	—	28	110	135
1000723153	Unijet E110 II HD	385	7.0	—	—	28	110	135
1000721938	Unijet E110 II HD	395	7.0	—	—	28	110	135
1000721940	Unijet E110 II HD	405	7.0	—	—	28	110	135
1000721933	Unijet E110 II U-DOS	385	—	—	3	28	110	135
1000723152	Unijet E110 II U-DOS	95	—	—	3	28	110	135
1000721934	Unijet E110 II U-DOS	405	—	—	3	28	110	135

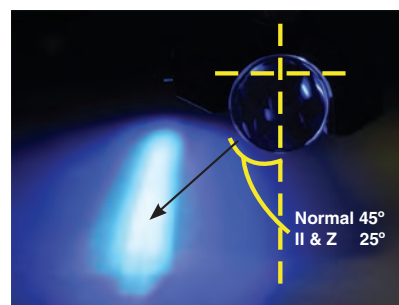
For accessories see page 23.



HC = High Condensing



HD = High Dose



U-DOS = Directional Optical System

E Z SERIES

- Lightweight
- Air Cooled
- Dimming from 10%-100%
- Scalable End-to-End with Edgeless Module
- Integrated Driver



Part Number	Product Description	Wavelength (nm)	Power W/cm²@ Window	Power W/cm²@ 5mm	Dimensions		
					Length (mm)	Width (mm)	Height (mm)
EZ Series							
1000729648	Unijet E075Z HC	365	—	2.4	33	76	149
1000723468	Unijet E075Z HC	385	—	5.5	33	76	149
1000723469	Unijet E075Z HC	395	—	5.5	33	76	149
1000723470	Unijet E075Z HC	405	—	5.5	33	76	149
1000723464	Unijet E075Z HD	365	4.2	—	33	76	135
1000723465	Unijet E075Z HD	385	7.0	—	33	76	135
1000723466	Unijet E075Z HD	395	7.0	—	33	76	135
1000723467	Unijet E075Z HD	405	7.0	—	33	76	135
1000723471	Unijet E075Z U-DOS	385	—	4.5	33	76	150
1000723473	Unijet E075Z U-DOS	395	—	4.5	33	76	150
1000723479	Unijet E075Z U-DOS	405	—	4.5	33	76	150
1000729649	Unijet E110Z HC	365	—	2.4	33	113.5	149
1000723165	Unijet E110Z HC	385	—	5.5	33	113.5	149
1000723164	Unijet E110Z HC	395	—	5.5	33	113.5	149
1000723163	Unijet E110Z HC	405	—	5.5	33	113.5	149
1000723162	Unijet E110Z HD	365	4.2	—	33	113.5	135
1000723161	Unijet E110Z HD	385	7.0	—	33	113.5	135
1000723160	Unijet E110Z HD	395	7.0	—	33	113.5	135
1000723159	Unijet E110Z HD	405	7.0	—	33	113.5	135
1000723158	Unijet E110Z U-DOS	385	—	4.5	33	113.5	150
1000723157	Unijet E110Z U-DOS	395	—	4.5	33	113.5	150
1000723156	Unijet E110Z U-DOS	405	—	4.5	33	113.5	150
Accessories - E Series					Notes		
1000711272	E-PS SP-200-24				Input: 100-240VAC 50/60Hz Output: 200W 24VDC power supply		
1000711273	E-PS SP-320-24				Input: 100-240VAC 50/60Hz Output: 320W 24VDC power supply		
1000711252	E-Power Cable				2m length		
1000711269	E-Daisy Chain Cable				150mm length		
1000711270	E-Control Box				—		
1000711271	E-Analog Control Cable				2m length		
Accessories - E II Series					Notes		
1000712460	E II-PS SP-200-48				Input: 100-240VAC 50/60Hz Output: 200W 48VDC power supply Power supply for 1 unit		
1000712461	E II-PS SP-320-48				Input: 100-240VAC 50/60Hz Output: 320W 48VDC power supply (for 2 units E110 II)		
1000712462	E II-PS PSP-600-48				Input: 100-240VAC 50/60Hz Output: 600W 48VDC power supply (for 2 units E110 Z)		
1000712408	E II-Power Cable				2m length		
1000712409	E II - Daisy Chain Cable				150mm length		
1000714554	E II - Data Daisy Chain Cable				150mm length		
1000712410	E II - Control Box				—		
1000712411	E II - Analog Control Cable				2m length		

MEDIUM PRESSURE CURING

for Graphic Arts Applications

Quality is always a top priority for USHIO, which is why all medium pressure graphic art lamps are manufactured in an ISO 9001 certified facility. With wattages ranging from 250W to over 20kW, lamp lengths from under 100cm to over 2m, and an assortment of base types, these versatile lamps can be customized for a variety of applications. By using a mixture of additives during manufacturing, USHIO is able to shift the wavelength of the light to more accurately and efficiently meet output needs for curing applications across a wide array of materials. USHIO's graphic art lamps are repeatedly chosen for their quality and customizable features.



**Metal Halide
MHL**



**Double-Ended
Halogen Quartz**



**Xenon
UXL**



**Flash Lamp
UPX**

MEDIUM PRESSURE CURING



METAL HALIDE & MERCURY LAMPS

MHL



Watts (W)	Ordering Code	Lamp Description	Dimensions (mm)			Spectral Range (nm)	Lead Wire Length (mm)	Base Type	Contact	Process	Fig
			Dia (A)	MOL (B)	LCL (C)						
1000	5000061	MHL-1000	25	130	24	400-450	90	Ceramic	AMP Connector	Diazo	1
1200	5000062	MHL-1000/1	23	147	68	350-370	—	RSC	RX7s	Photo-Polymer	2
1000	5000064	MHL-1000S	25	134	24	400-450	80	Ceramic/THS	AMP Connector	Diazo	3
1000	5000065	MHL-1007	25	130	24	300-450	90	Ceramic	AMP Connector	Multi-Spectrum	1
450	5000068	MHL-12	16	110	31	400-450	300	Ceramic	Wire Insulated	Diazo	4
3000	5000071	MHL-121HT	25	181	86	400-450	—	Metal 14.3mm	Metal	Diazo	5
1000	5000072	MHL-13	28	159	75	400-450	300	Ceramic	Wire Insulated	Diazo	4
2000	5000073	MHL-1403	25	180	86	300-450	—	Metal 9.5mm	Metal	Multi-Spectrum	5
1500	5000078	MHL-1507S	25	134	24	300-450	80	Ceramic/THS	AMP Connector	Multi-Spectrum	3
6000	5000079	MHL-153LY	28	240	127	300-450	60	Ceramic	AMP Connector	Multi-Spectrum	6
2000	5000081	MHL-17	28	189	102	400-450	—	Ceramic	Wire Insulated	Diazo	4

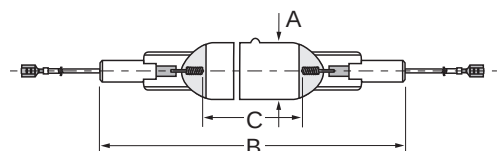


Fig. 1

Base: Ceramic
Contact: AMP Connector
Wire: Insulated

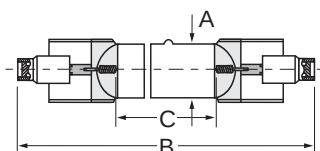


Fig. 2

Base: RSC
Contact: RX7s

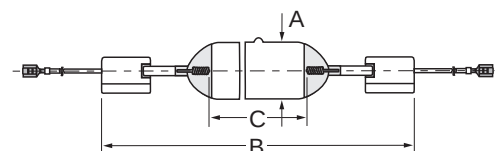


Fig. 3

Base: Ceramic/THS
Contact: AMP Connector
Wire: Insulated

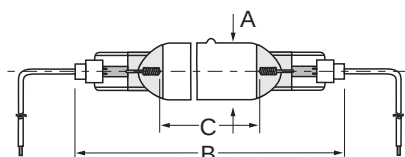


Fig. 4

Base: Ceramic
Contact: Wire Insulated

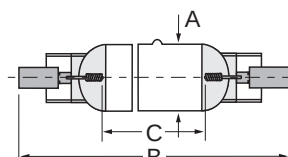


Fig. 5

Base: Metal
Contact: Metal

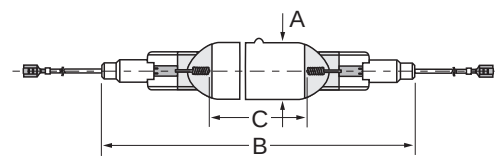


Fig. 6

Base: Ceramic
Contact: AMP Connector
Wire: Not Insulated

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www.lamprecycle.org or call 800.895.8842.

MHL



Watts (W)	Ordering Code	Lamp Description	Dimensions (mm)			Spectral Range (nm)	Lead Wire Length (mm)	Base Type	Contact	Process	Fig
			Dia (A)	MOL (B)	LCL (C)						
5000	5000082	MHL-170L	28	189	102	400-450	56	Ceramic	Spade Tongue	Diazo	1
2000	5000084	MHL-2000/1	25	172	75	400-450	—	Metal 14.3mm	Metal	Diazo	2
2000	5000085	MHL-2000/2	25	180	86	350-370	—	Metal 9.5mm	Metal	Photo-Polymer	3
2000	5000086	MHL-2000/3	25	180	86	400-450	—	Metal 9.5mm	Metal	Diazo	3
250	5000089	MHL-250	15.5	68	18	300-450	—	RCS	R7s	Multi-Spectrum	4
2000	5000788	MHL-252L	28	189	102	300-450	56	Ceramic	Spade Tongue	Multi-Spectrum	1
5000	5000090	MHL-261L	28	189	102	350-370	56	Ceramic	Spade Tongue	Photo-Polymer	1
8000	5000091	MHL-280L	28	250	154	400-450	95	Ceramic	Spade Tongue	Diazo	5
8000	5000092	MHL-281L	28	247	127	300-450	60	Ceramic	Spade Tongue	Multi-Spectrum	6
8000	5000093	MHL-282L	28	247	127	400-450	60	Ceramic	Spade Tongue	Diazo	6

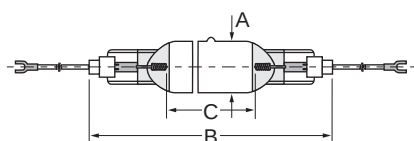


Fig. 1

Base: Ceramic
Contact: Spade Tongue
Wire: Insulated

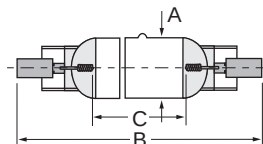


Fig. 2

Base: Metal
Contact: Metal

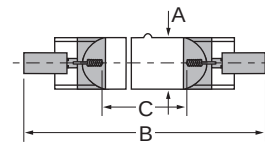


Fig. 3

Base: Metal
Contact: Metal

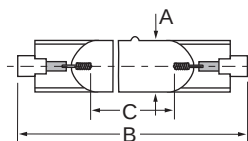


Fig. 4

Base: RSC
Contact: R7s

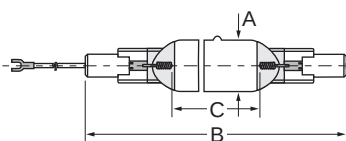


Fig. 5

Base: Ceramic
Contact: Spade Tongue
Wire: Insulated

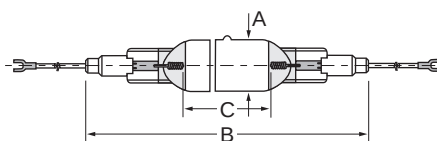


Fig. 6

Base: Ceramic
Contact: Spade Tongue
Wire: Insulated

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METAL HALIDE & MERCURY LAMPS

MHL



Watts (W)	Ordering Code	Lamp Description	Dimensions (mm)			Spectral Range (nm)	Lead Wire Length (mm)	Base Type	Contact	Process	Fig
			Dia (A)	MOL (B)	LCL (C)						
3000	5000098	MHL-3001S	28	133	47	400-450	90	Ceramic/THS	AMP Connector	Diazo	1
3000	5000102	MHL-3007S	28	133	47	300-450	90	Ceramic/THS	AMP Connector	Multi-Spectrum	1
3000	5000104	MHL-3027S	25	190	102	300-450	90	Ceramic/THS	AMP Connector	Multi-Spectrum	1
6000	5000106	MHL-33LY	24.4	240	127	300-450	60	Ceramic	AMP Connector	Multi-Spectrum	2
6000	5000107	MHL-38KT	28	222	120	400-450	—	Metal 12.7mm	Metal	Diazo	3
3500	5000112	MHL-4007	28	230	102	300-450	—	Metal/Wing	Metal	Multi-Spectrum	4
450	5000114	MHL-450	16.3	106	31	300-450	—	RSC	R7s	Multi-Spectrum	5
450	5000115	MHL-460	16.3	106	31	400-450	—	RSC	R7s	Diazo	5
5000	5000116	MHL-5000	28	190	102	400-450	100	Ceramic	AMP Connector	Diazo	6
5000	5000118	MHL-5000/4	25	281	175	400-450	—	Metal 14.3mm	Metal	Diazo	3
5000	5000120	MHL-5000/7	25	281	175	300-450	—	Metal 14.3mm	Metal	Multi-Spectrum	3
5000	5000124	MHL-5007S	28	190	102	300-450	90	Ceramic/THS	AMP Connector	Multi-Spectrum	1
5000	5000126	MHL-5020	28	240	154	400-450	150	Ceramic	AMP Connector	Diazo	6
5000	5000127	MHL-5020S	28	240	154	300-450	150	Ceramic/THS	AMP Connector	Multi-Spectrum	1
5000	5000128	MHL-5027	28	240	154	300-450	150	Ceramic	AMP Connector	Multi-Spectrum	6
5000	5000129	MHL-5027S	28	240	154	300-450	150	Ceramic/THS	AMP Connector	Multi-Spectrum	1
6000	5000132	MHL-6027S	28	215	127	300-450	160	Ceramic/THS	AMP Connector	Multi-Spectrum	1
7500	5000135	MHL-8027S	28	215	127	300-450	160	Ceramic/THS	AMP Connector	Multi-Spectrum	1

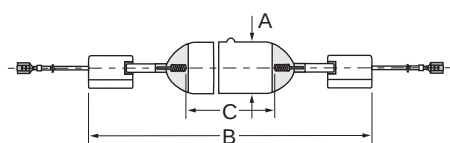


Fig. 1

Base: Ceramic/THS
Contact: AMP Connector
Wire: Insulated

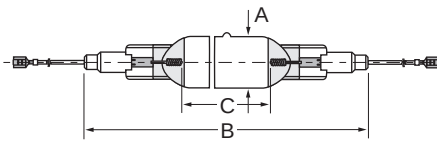


Fig. 2

Base: Ceramic
Contact: AMP Connector
Wire: Not Insulated

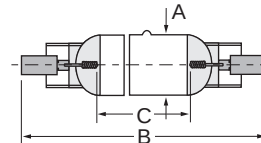


Fig. 3

Base: Metal
Contact: Metal

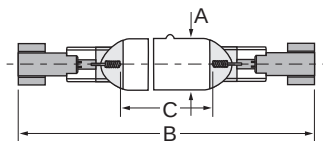


Fig. 4

Base: Metal Wing
Contact: Metal

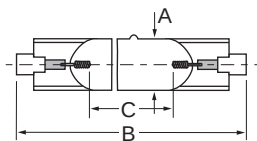


Fig. 5

Base: RSC
Contact: R7s

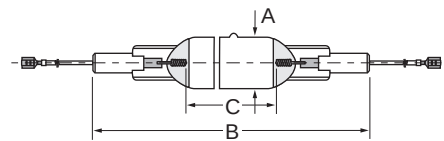


Fig. 6

Base: Ceramic
Contact: AMP Connector
Wire: Insulated

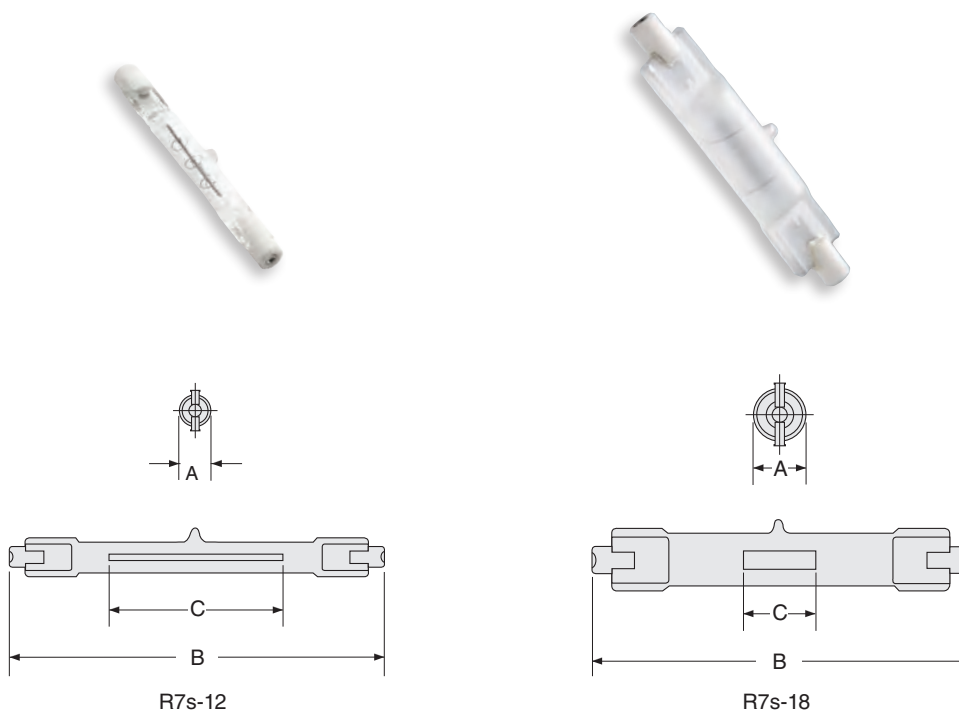
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J, JP & JPD

- Only for Use in Approved Enclosed Halogen Fixtures
- Recessed Single Contact Base - R7s-12, R7s-18
- C-8 & CC-8 Linear Filaments

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm)			Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Burn Position
			Dia (A)	MOL (B)	LCL (C)						
R7s-12 Base											
500	1000736	J220V-500WE	12.0	119.6	65.0	C-8	9500	3000	2000	Clear	Univ
750	1000738	J220V-750WB1	12.0	119.6	69.0	C-8	16100	3050	1500	Clear	Univ
500	1001084	JP220V-500WC	12.0	119.6	62.0	C-8	12500	3200	200	Clear	Univ
1250	1001086	JP225V-1250WC1	12.0	191.1	135.0	C-8	33500	3200	200	Clear	Univ
R7s-18 Base											
420	1000518	FFM, JPD120V-420WC1	15.0	80.3	13.0	CC-8	11000	3200	75	Clear	Univ
650	1000485	FCA, JPD120V-650WSF	15.0	80.3	16.0	CC-8	19000	3400	35	Frost	Univ

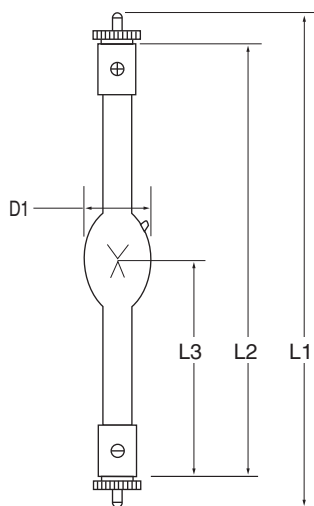


XENON

UXL

- Horizontal & Vertical Burn Position
- Standard Life & Long Life Version
- Xenon Filled

Watts (W)	Ordering Code	Lamp Description	Lamp Current (A)	Volts (V)	Approx Lumens (lm)	Luminous Intensity (cd)	Avg Life (h)	Dimensions (mm)			
								Dia (D1)	Length (L1)	Length (L2)	Length (L3)
150	5000323	UXL-150M-O	8.5	17.5	2900	290	1500	19	150	125	58
150	5000375	UXL-S150M-O	8.5	17.5	2900	290	3000	19	150	125	58



UPX

- Universal Burn Position
- Insulated Wire
- Flash Lamp

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Pulse Frequency (pps)	Approx Lumens (lm)	Color Temp (K)	Avg Life (h)	Max Seal Temp	Lead Wire Length (mm)	Base Type	Fig
600	5000262	UPX-44	52	100	18000	5400	150	200°C	188	Ceramic	1
4000	5000268	UPX-50	210	100	125000	5400	200	370°C	190	Ceramic	2
8000	5000271	UPX-80	420	100	240000	5400	200	370°C	177.8	Ceramic	3

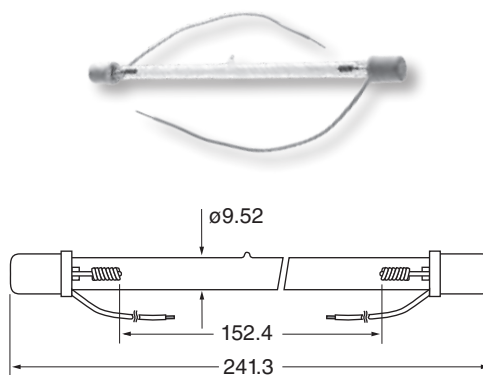


Fig. 1

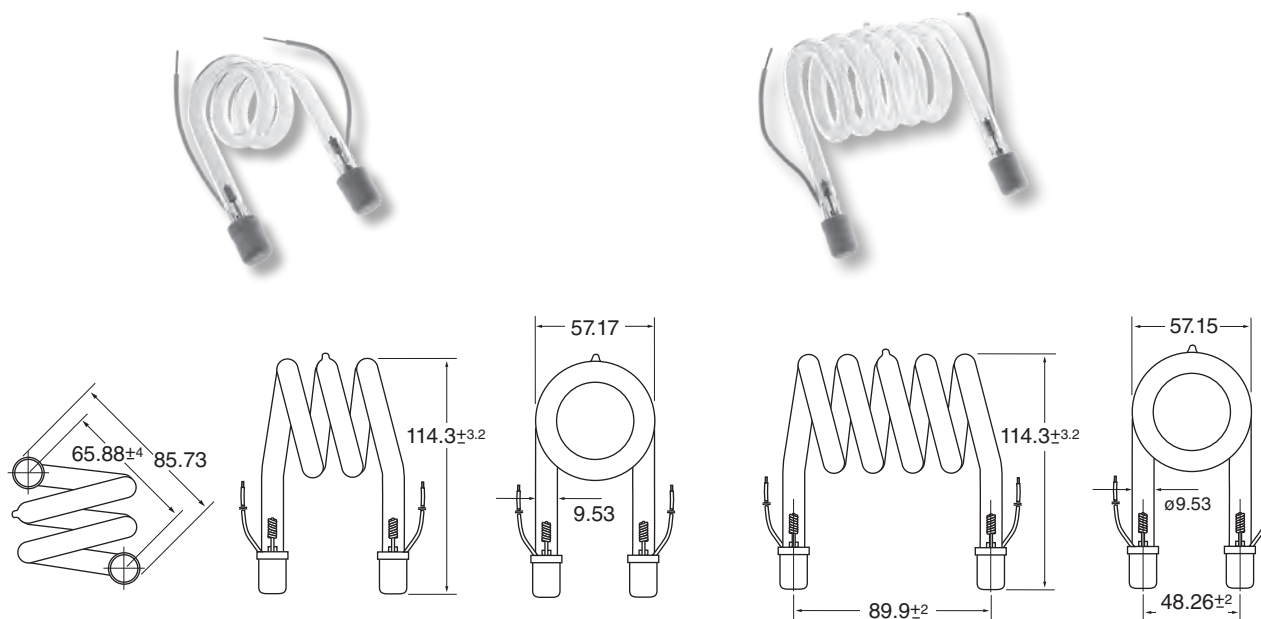


Fig. 2

Fig. 3

LOW PRESSURE UV

Ultraviolet Lamps

USHIO ultraviolet lamps are low pressure UV lamps that emit radiation peaking at 253.7nm (UV-C).

Designed by experienced engineers, and by using quality material in combination with a tightly controlled manufacturing process, we provide high quality lamps free of impurities to maintain strong and stable output throughout the life of the lamp.

Our ultraviolet lamps are manufactured at an ISO 9001 certified facility. Emphasis on quality control and our large production capacity makes us an ideal OEM partner for providing consistent quality lamps with reliable delivery.

These lamps are components which may be used by customers to manufacture a variety of finished products.

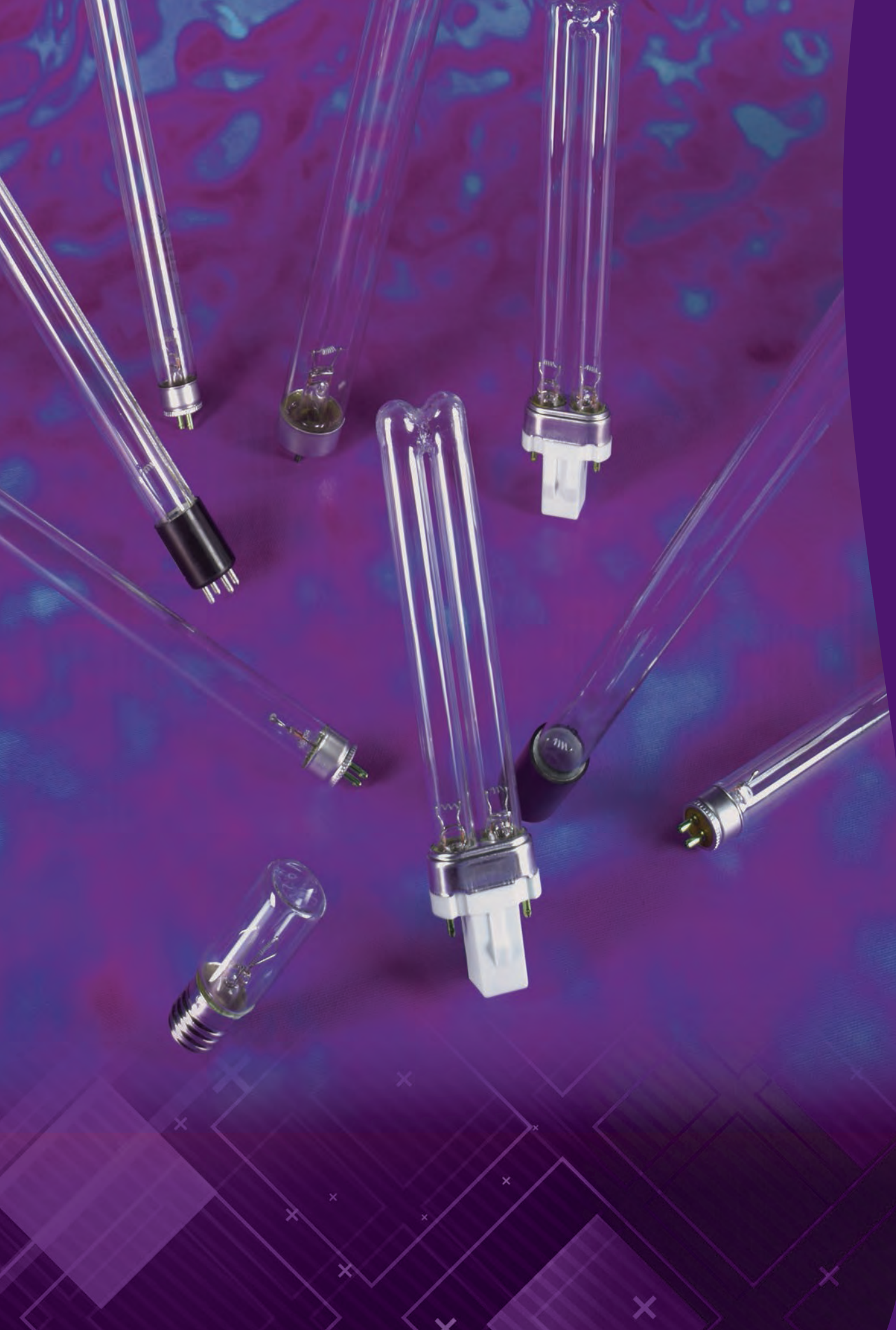


Linear Tube



Double Tube

LOW PRESSURE UV



LOW PRESSURE UV LAMPS

LINEAR

- Low Mercury Dose to Meet Environmental Demands
- High Purity Lamp Construction
- Stabilized UV Output < 25% Depreciation
- Flexible Design Capabilities

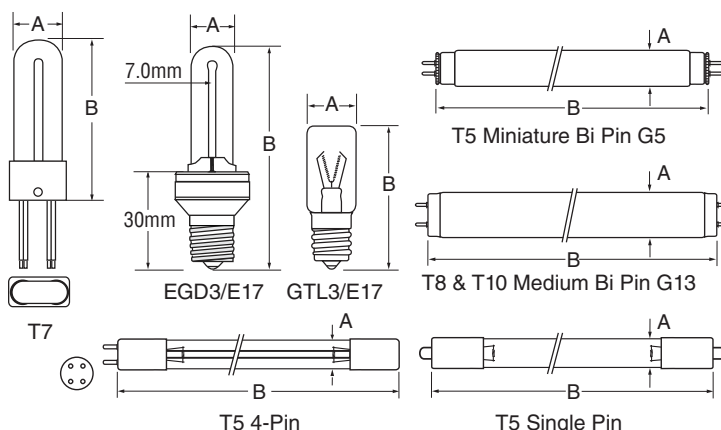
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Lamp Current (A)	Dimensions				Spectral Peak (nm)	UV Output (W)	Avg Life (h)
					Dia (A)		Length (B)				
					(mm)	(in)	(mm)	(in)			
T7											
2.3	3000667	GUL3	28	0.085	19.0	0.75	61.5	2.42	253.7	0.54	3000
GTL3 Replacement with Ballast E17 Base											
3.4	3000666	EGD3	115	0.050	17.7	0.70	90.0	3.54	253.7	0.5	6000
Mini Bowl Intermediate Screw E17 Base											
3.0	3000022	GTL3	10.5	0.300	20.0	0.79	63.0	2.48	253.7	0.2	3000
T5 - Miniature Bi Pin G5 Base											
4.5	3000013	G4T5	29	0.170	15.5	0.61	134.5	5.30	253.7	0.8	6000
6.0	3000015	G6T5	42	0.160	15.5	0.61	210.5	8.29	253.7	1.8	8000
7.2	3000016	G8T5	57	0.145	15.5	0.61	287.0	11.30	253.7	2.2	8000
16.0	3000311	G16T5	50	0.350	15.5	0.61	287.0	11.30	253.7	3.2	8000
T8 - Medium Bi Pin G13 Base											
9.5	3000006	G10T8	46	0.230	25.5	1.00	330.0	12.99	253.7	2.7	8000
15.0	3000007	G15T8	55	0.305	25.5	1.00	436.0	17.17	253.7	4.9	8000
25.0	3000008	G25T8	46	0.600	25.5	1.00	436.0	17.17	253.7	6.9	8000
30.5	3000009	G30T8	99	0.355	25.5	1.00	893.0	35.16	253.7	13.9	8000
T10 - Medium Bi Pin G13 Base											
19.0	3000314	G20T10	58	0.360	32.5	1.28	588.5	23.17	253.7	7.5	8000
39.5	3000315	G40T10	106	0.420	32.5	1.28	1198.0	47.17	253.7	19.8	8000
T5 - Single Pin											
16.0	3000338	G10T5L	55	0.425	15.5	0.61	357.0	14.06	253.7	5.3	9000
39.0	3000312	G36T5L	115	0.425	15.5	0.61	846.0	33.31	253.7	13.0	9000
65.0	3000313	G64T5L	250	0.425	15.5	0.61	1553.6	61.17	253.7	27.0	9000
T5 - Single Pin - Quartz											
39.0	3000010	G36T5L	120	0.425	15.0	0.59	846.0	33.31	253.7	—	9000
65.0	3000014	G64T5L	220	0.425	15.0	0.59	1572.0	61.89	253.7	—	7500
T5 - Single Pin - Ozone											
39.0	3000011	G36T5VH	120	0.425	15.0	0.59	860.0	33.86	253.7	—	7500
65.0	3000242	G64T5VH	220	0.425	15.0	0.59	1554.0	61.18	253.7	25.0	9000
T5 - 4-Pin Base											
14.0	3000348	G14T5L/4P (GPH287)	40	0.400	15.5	0.61	287.0	11.30	253.7	3.0	8000
22.0	3000350	G22T5L/4P (GPH436)	62	0.420	15.5	0.61	436.0	17.16	253.7	7.0	8000
39.0	3000343	G36T5L/4P	115	0.425	15.5	0.61	846.0	33.31	253.7	13.0	9000
T5 - 4-Pin Base - Quartz											
16.0	3000425	G10T5L/4P	55	0.425	15.0	0.59	357.0	14.06	253.7	5.7	9000
65.0	3000423	G64T5L/4P	220	0.425	15.0	0.59	1554.0	61.18	253.7	25.0	9000

Average lamp life and output measurements taken under laboratory conditions in open air.

Lamps are cycled for 2hrs 45minutes on / 15minutes off when testing life and output.

Lamp data is for reference only. Actual lamp performance depends on system design and operating conditions.

WARNING! Dangerous ultraviolet radiation! Protect your eyes and skin when operating Ultraviolet lamps. Equipment should be designed to completely screen or filter UV-C radiation from direct human or animal exposure.



Hg - LAMP CONTAINS MERCURY

Manage in Accord with Disposal Laws. Visit www.lamprecycle.org or call 800.895.8842.

DOUBLE TUBE

- Air Purification
- High Power Compact Design

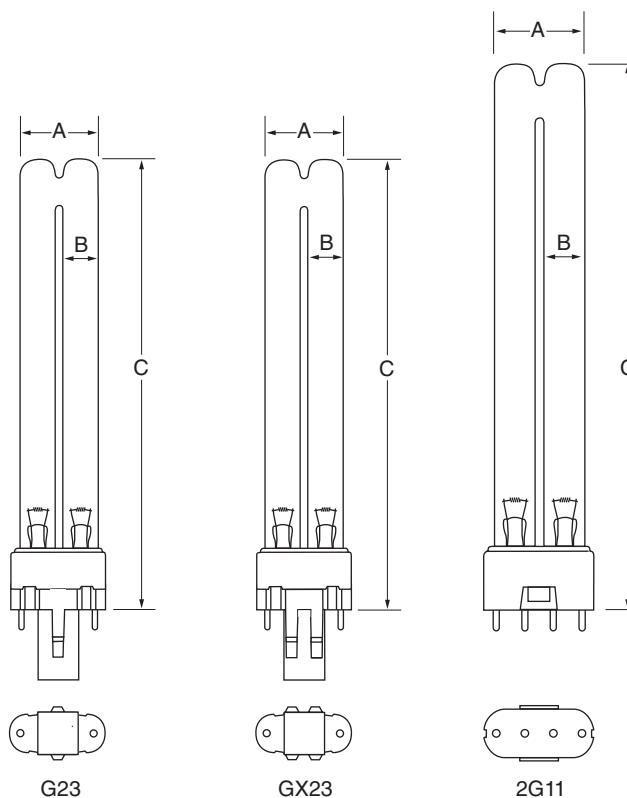
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Lamp Current (A)	Dimensions						Spectral Peak (nm)	UV Output (W)	Avg Life (h)	Base Type
					Dia (A)		Dia (B)		Length (C)					
G23 & GX23 Base														
5.5	3000321	GPX5	35	0.180	28.0	1.10	13.0	0.51	85.0	3.35	253.7	1.2	8000	G23
9.0	3000304	GPX9	59	0.180	28.0	1.10	13.0	0.51	145.0	5.71	253.7	2.4	8000	G23
13.4	3000323	GPX13	59	0.285	28.0	1.10	13.0	0.51	170.0	6.69	253.7	3.6	8000	GX23
2G11 Base														
18.0	3000324	GPL18K	58	0.375	40.0	1.57	20.0	0.79	225.0	8.86	253.7	5.5	8000	2G11
36.0	3000339	GPL36K	106	0.435	40.0	1.57	20.0	0.79	415.0	16.33	253.7	12.0	8000	2G11

Average lamp life and output measurements taken under laboratory conditions in open air.

Lamps are cycled for 2 hours 45 minutes on / 15 minutes off when testing life and output.

Lamp data is for reference only. Actual lamp performance depends on system design and operating conditions.

WARNING! Dangerous ultraviolet radiation! Protect your eyes and skin when operating Ultraviolet lamps. Equipment should be designed to completely screen or filter UV-C radiation from direct human or animal exposure. For professional use only: UV-C can degrade or cause photochemical effects on inorganic and organic materials including plastics, wire insulation, and rubber.



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UV-B, BLACKLIGHT & BLACKLIGHT BLUE

Special Coated Low Pressure Lamps

USHIO offers three types of special coated low pressure lamps: UV-B, BL and BLB. These lamps are each coated with special blended phosphor to emit radiation peaking at 306nm (UV-B), 352nm (BL) or 368nm (BLB).

The UV radiation emitted at specific wavelengths are used to create UV reaction and effects for various applications such as in laboratory/research, industrial, sanitation, criminology, cosmetics and entertainment.



Linear Tube



Double Tube

UV-B, BL & BLB



UV-B, BL & BLB

SPECIAL COATED LOW PRESSURE LAMPS

- 3 Wavelength Variations: 306nm (UV-B), 352nm (UV-A) or 368nm (UV-A)
- Special Blended Phosphor Coating for Maximum UV Effect & Output
- Low Mercury Dose to Meet Environmental Demands
- Flexible Custom Lamp Design Capability



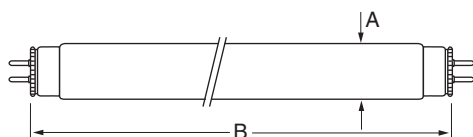
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Lamp Current (A)	Dimensions				Spectral Peak (nm)	UV Output (W)	Avg Life (h)	Base Type
					Dia (A)		Length (B)					
					(mm)	(in)	(mm)	(in)				
UV-B (306nm) Midrange Lamp												
7.2	3000318	G8T5E	57	0.145	15.5	0.61	287.0	11.30	306	1.4	3000	G5
14.7	3000319	G15T8E	55	0.300	25.5	1.00	436.0	17.17	306	3.0	4000	G13
25.0	3000335	G25T8E	52	0.600	25.5	1.00	436.0	17.17	306	3.9	3000	G13
Half Coat (254nm/352nm)												
4.5	3000333	G4T5/HC	29	0.170	15.5	0.61	134.5	5.30	254 / 352	0.4 / 0.2	3000	G5
Blacklight T5 Diameter												
4.5	3000105	F4T5BL	29	0.170	15.5	0.61	134.5	5.30	352**	0.5	3000	G5
6.0	3000110	F6T5BL	42	0.160	15.5	0.61	210.5	8.29	352**	1.0	3000	G5
7.2	3000115	F8T5BL	57	0.145	15.5	0.61	287.0	11.30	352**	1.2	3000	G5
Blacklight T8 Diameter												
15.0	3000077	F15T8BL	55	0.305	25.5	1.00	436.0	17.17	352**	2.6	4000	G13
Blacklight Blue T5 Diameter												
4.5	3000106	F4T5BLB	29	0.170	15.5	0.61	134.5	5.30	368	0.5	3000	G5
6.0	3000111	F6T5BLB	42	0.160	15.5	0.61	210.5	8.29	368	1.0	3000	G5
7.2	3000116	F8T5BLB	57	0.145	15.5	0.61	287.0	11.30	368	1.2	3000	G5
Blacklight Blue T8 Diameter												
9.5	3000305	F10T8BLB	46	0.230	25.5	1.00	330.0	12.99	368	1.5	4000	G13
15.0	3000078	F15T8BLB	55	0.305	25.5	1.00	436.0	17.17	368	2.6	4000	G13
30.5	3000148	F30T8BLB	99	0.355	25.5	1.00	893.0	35.16	368	6.3	4000	G13
Blacklight Blue T10 Diameter												
19.0	3000306	F20T10BLB	58	0.360	32.5	1.28	588.5	23.17	368	3.7	4000	G13

Average lamp life and output measurements taken under laboratory conditions in open air.

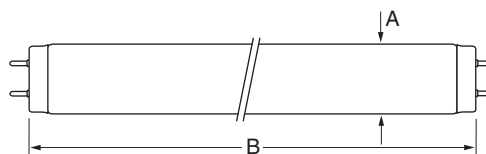
Lamps are cycled for 2hrs 45minutes on / 15minutes off when testing life and output.

Lamp data is for reference only. Actual lamp performance depends on system design and operating conditions.

** 368nm available upon request



Miniature Bi Pin G5 Base
T5



Medium Bi-Pin G13 Base
T8 & T10

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SPECIAL COATED LOW PRESSURE LAMPS

- 3 Wavelength Variations: 306nm (UV-B), 352nm (UV-A) or 368nm (UV-A)
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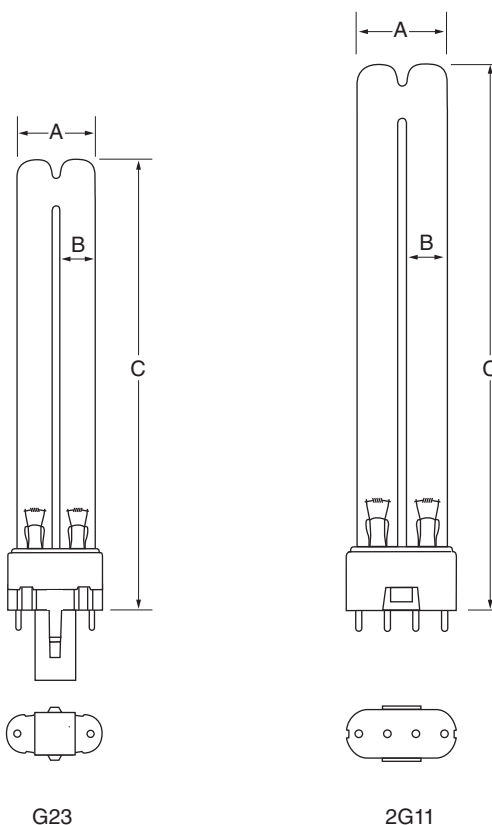


Watts (W)	Ordering Code	Lamp Description	Volts (V)	Lamp Current (A)	Dimensions						Spectral Peak (nm)	UV Output (W)	Avg Life (h)	Base Type
					Dia (A)		Dia (B)		Length (C)					
					(mm)	(in)	(mm)	(in)	(mm)	(in)				
Blacklight Blue, Compact														
9.0	3000325	FPX9BLB	59	0.180	28.0	1.10	13.0	0.51	145.0	5.71	368	1.4	4000	G23
18.0	3000327	FPX18KBLB	58	0.375	40.0	1.57	20.0	0.79	225.0	8.86	368	3.3	4000	2G11

Average lamp life and output measurements taken under laboratory conditions in open air.

Lamps are cycled for 2hrs 45minutes on / 15minutes off when testing life and output.

Lamp data is for reference only. Actual lamp performance depends on system design and operating conditions.



G23

2G11

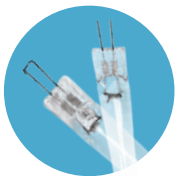
(Hg) - LAMP CONTAINS MERCURY

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UV AMALGAM

Low Pressure UV Amalgam Lamps

USHIO's low pressure Amalgam lamps are designed with a special coating for longer life. Amalgam lamps are able to achieve ten times the UV power density of standard low pressure lamps and five times more ozone production while operating at a higher temperature than conventional low pressure mercury lamps. The higher efficiency of these Amalgam lamps also allows for less lamps per system or lower wattage lamps in the system while achieving the same results as standard low pressure mercury lamps. Thanks to these dynamic features, USHIO's UV Amalgam lamps are able to thrive in water treatment and conditioning and disinfection applications.



**UV Amalgam
Single & 4-Pin Base**



**UV Amalgam
Ballast**

UV AMALGAM



UV AMALGAM LAMPS

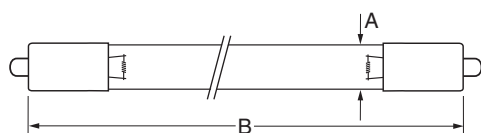
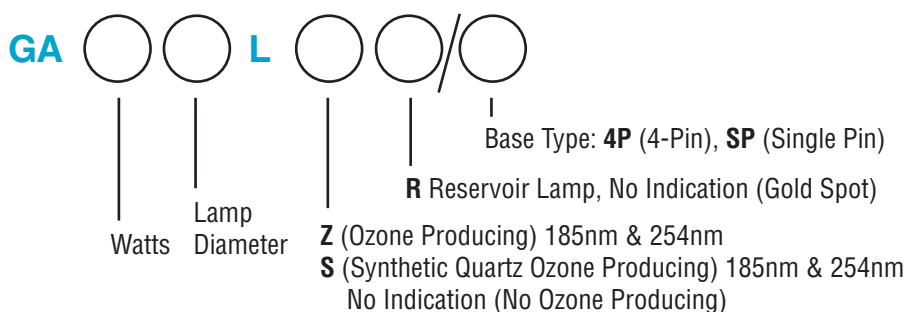
T5, T6, T8 & T10

- Low Mercury Dose for RoHS Compliance
- Increased Operating Temperature Range
- High Lamp Efficiency
- Offered with Different Base Configurations
- Ozone Producing or Ozone Free

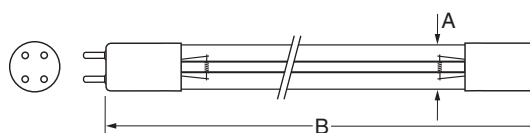
Watts (W)	Lamp Description	Lamp Current (A)	Dimensions		UV Output Total Watt @ 254nm	Avg* Life (h)
			Dia (A) (mm)	Length (B) (mm)		
T5						
80	GA80T5L	1.50	15	559	24	16000
100	GA100T5L	1.50	15	711	30	16000
120	GA120T5L	1.50	15	860	35	16000
130	GA130T5L	1.50	15	965	38	16000
200	GA200T5L	1.50	15	1553	72	16000
215	GA215T5L	1.55	15	1524	61	16000
260	GA250T5L	1.55	15	1829	70	16000
T6						
170	GA170T6L	2.00	19	1120	60	16000
320	GA320T6L	2.00	19	1554	108	16000
T8						
350	GA350T8L	2.90	25	1554	132	16000
T10						
400	GA400T10L	3.50	28	1539	140	16000

*Lamp lifetime based on 1 start per day using UV Technik pre-heat ballast.

AMALGAM PART# REFERENCE GUIDE



Single Pin



4-Pin

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www.lamprecycle.org or call 800.895.8842.

BALLASTS



	BALLASTS			
	Wattage (W)	Ballast Type	Lamp Type	Lamp Current (A)
UV TECHNIK	FEATURES: Adjustable Output, Preheat			
	40-150	EVG UVT*	T5	0.8-1.5
	40-200	DVG200	T5 / T6	1.5-2
	80-200	EVG UVT*	T5	1.2-2.1
	100-200	EVG UVT2X*	T5	1.2-2.1
	150-320	DVG500-2	T8	2.9
	230-500	DVG500-1	T10	3.8
FULHAM	FEATURES: Instant Start			
	200-400	Sunhorse	T5	1.5

*Dimming

UV EXCIMER & XEFL LAMPS

Mercury Free VUV & UVC

Designed by experienced engineers, USHIO's 172nm Excimer lamps and 230nm XeFl lamps boast quality materials with a tightly controlled manufacturing process for lamps, free of impurities that maintain a strong and stable output throughout the life of the lamp. These lamps are engineered with TOC monitoring and ultraviolet applications in mind and are custom built with available customizable power supplies. With options to have the power, length and diameter of the lamp modified to fit present equipment or designed to fit new equipment. Other wavelengths are available by design for the XeFl lamps allowing the end user to pick a wavelength that is most efficient for their applications.

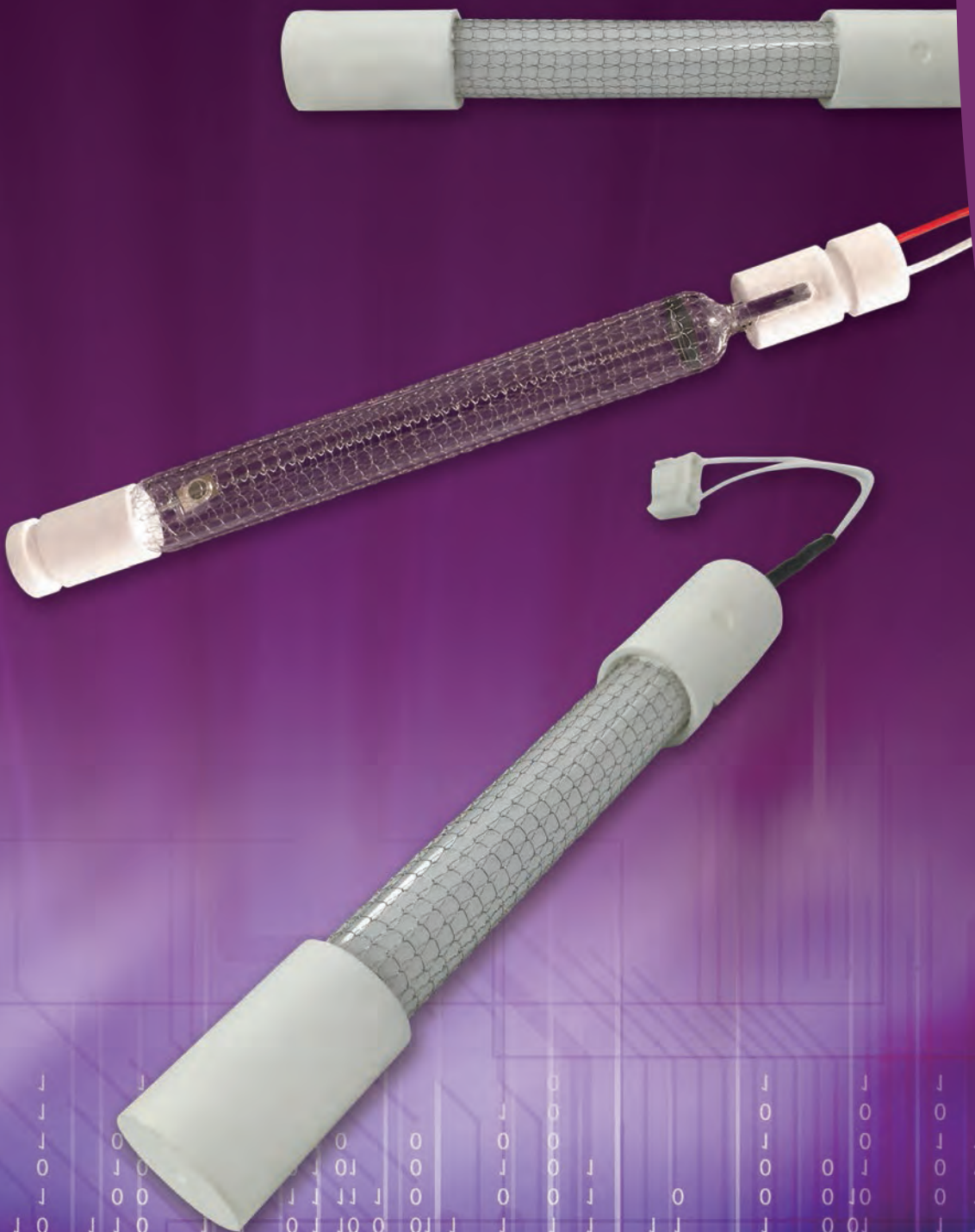


**Excimer
Special Clear Quartz**



**XeFl
Phosphor Coated**

UV EXCIMER & XeFI LAMPS



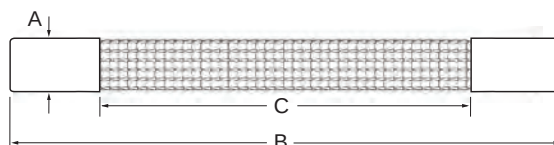
172NM EXCIMER LAMPS

EXCIMER

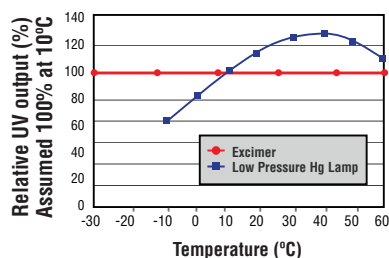
- Mercury Free
- Extremely Energetic Photon Forming Hydroxyl Radicals
- Flexible Design Capability for Custom Lamp Development
- Instant On/Off



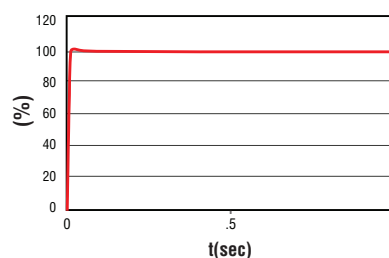
Watts (W)	Lamp Description	Wavelength (nm)	Volts (V)	Lamp Current (A)	Dimensions			Power Supply Dimensions		
					Dia (A) (mm)	MOL (B) (mm)	LCL (C) (mm)	Length (mm)	Width (mm)	Height (mm)
9	UXFL-UST10L70-01A	172	15	—	10	80	70	—	—	—
16	UXFL-UST16L100-01A	172	24	—	16	135	100	—	—	—
25	UXFL-UST16L160-01A	172	24	—	16	195	160	—	—	—
Power Supply										
12	PXZ100E3-A	—	14.6	0.6	—	—	—	108	38	27.6 max.
25	PXZ380J7-A	—	24	0.7	—	—	—	135	40	29.5 max.



Excimer is not affected by the ambient temperature.



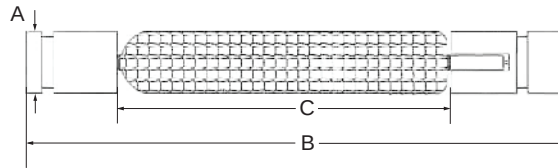
Takes effect as soon as the power is turned on. Can be used only when desired.



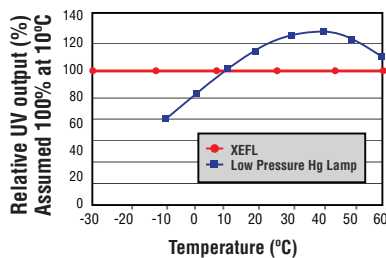
XEFL

- Effective Ultraviolet UV Wavelength
- Mercury Free
- Instant ON/OFF
- Compact Size
- Easy to Install
- Functions in Hot or Cold Temperatures

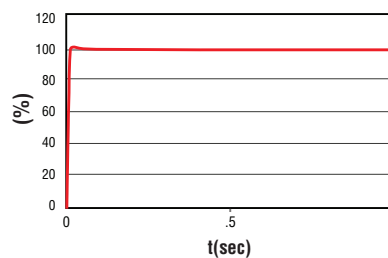
Watts (W)	Lamp Description	Wavelength (nm)	Volts (V)	Lamp Current (A)	Dimensions			Power Supply Dimensions		
					Dia (A) (mm)	MOL (B) (mm)	LCL (C) (mm)	Length (mm)	Width (mm)	Height (mm)
9	UXFL-UST10L70-13A	230	15	—	10	80	70	—	—	—
Power Supply										
12	PXZ100E3-A	—	14.6	0.6	—	—	—	108	38	27.6 max.



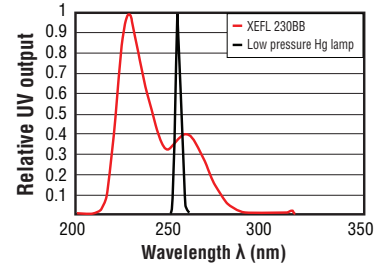
XeFl is not affected by the ambient temperature.



Takes effect as soon as the power is turned on. Can be used only when desired.



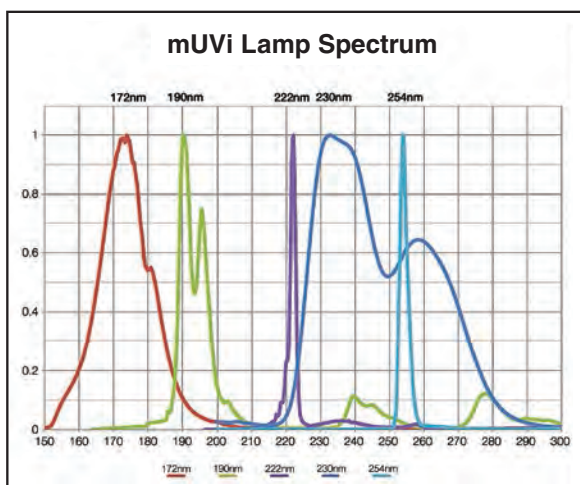
Two wavelength types available. Selectable to suit organism. Sterilizing capability equivalent to or better than conventional low-pressure mercury lamps.



MUVI

Multiple Ultraviolet Irradiation System

USHIO's mUVi system is a desktop unit with the capabilities of a refrigerator sized unit. The unit offers controlled exposure of 172nm, 190nm (VUV) as well as 222nm, 230nm and 254nm (UV) light. This unique system contains five separate lamps. The 172nm, 190nm and 222nm lamps are mercury free Excimer lamps and the 230nm lamp is a mercury free XeFl lamp. The 254nm lamp is a low pressure mercury lamp.



FEATURES

- 5 Separate Selectable VUV and UV Wavelengths
- Compact Size
- Programmable Exposure Time
- Individual Timing of Each Lamp Duty Cycle
- Any Combination of These 5 Wavelengths Can Be Used Simultaneously

APPLICATIONS

- Disinfection, Testing of Water, Air and Surfaces
- Surface Modification for Wettability and Adhesion Improvement
- Direct Bonding
- Molecular Level Cleaning of Substrates
- TOC Analysis
- Ultraviolet Testing
- Ink Curing
- Ozone Generation

mUVi SYSTEM



VUV

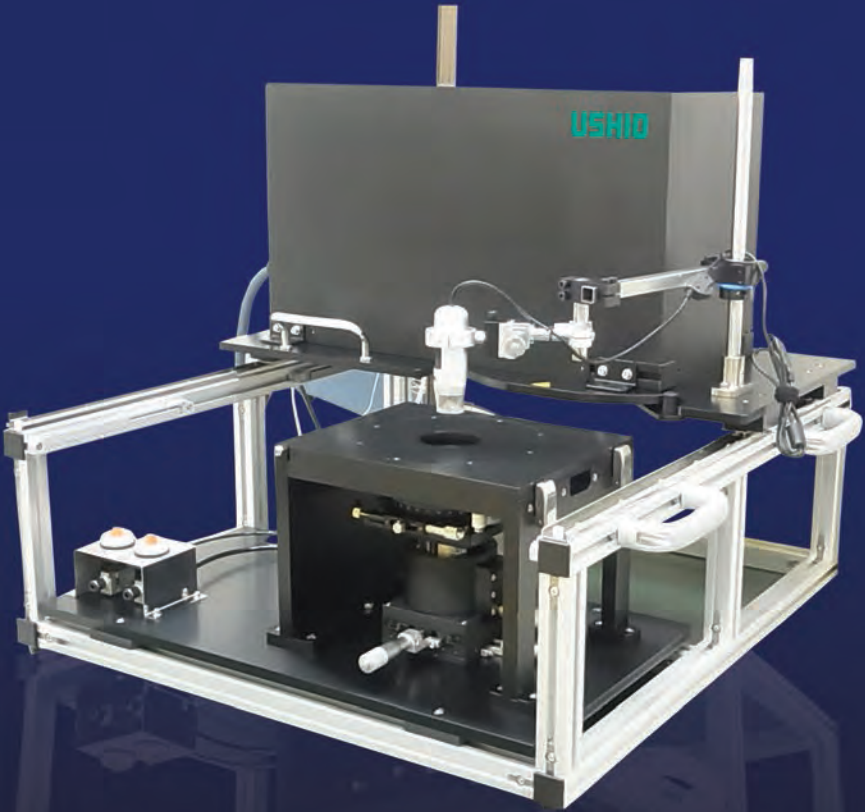
Collimated Light Source

USHIO's VUV collimated light equipment uses a pulsed xenon light source to irradiate many sensitive substrates. A hydrophilic process is used to form a self-assembled monolayer or collimated VUV light can be used to etch a selective organic layer. This process along with the highly collimated 172nm light, allows for the fabrication of detailed miniature circuits with line resolution down to 5 by 5 microns. Low levels of heat generated by the light source allows for design flexibility as the user can incorporate a variety of substrates into their work including plastic.

The small scale, highly selective and detailed abilities of this tool make it ideal for prototype manufacturing in a laboratory setting. USHIO also has the capability to manufacture larger scale automated machines with multiple heads intended for industrial use and mass production. For more information on custom orders, please contact your local sales manager.



VUV COLLIMATED LIGHT

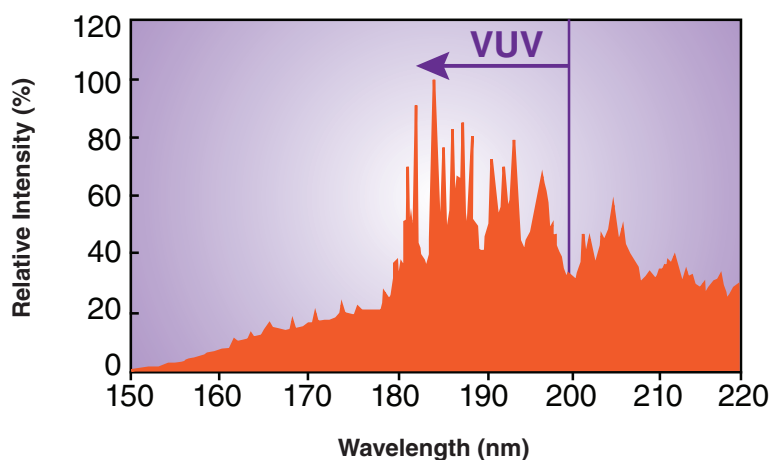


VUV COLLIMATED LIGHT EQUIPMENT

SELECTIVE VUV/O₃ TREATMENT

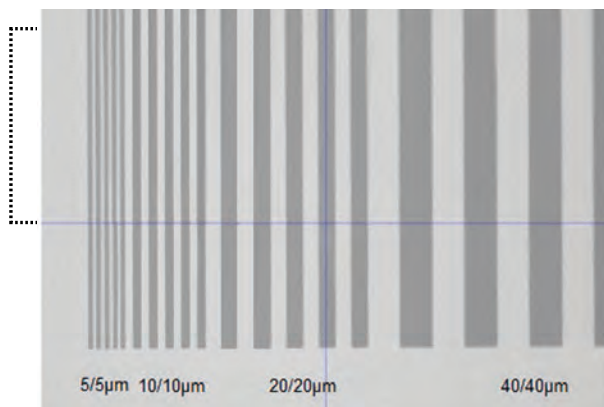
- Collimated Broad Spectrum with Exceptional 172nm Output
- Low Temperature Process
- Selective Hydrophilic Treatment
- Selective Organic Matter Decomposition
- Can Be Applied to Flexible & Stretchable Materials

Lamp Description	Mask Type	Sample Size	Wavelength (nm)	Optical System	Alignment	Gap	Utilities
SUS740	4"	Ø30mm	150 to 200	Collimated Light Source	Manual	Adjustable by Spacer	AC 100V, N2: 10L/min



Selectable Surface Modification Using Collimated VUV Light Equipment

Coating Ag Nano Ink



Ag Nano Ink: Sigma Alto Rich 719048

Achieved 5/5µ Resolution

Exposure Parameter(s)

Gap µm: Working distance between mask and samples
Coater: 3mm/sec moving

Materials adhere only to exposed hydrophilic area

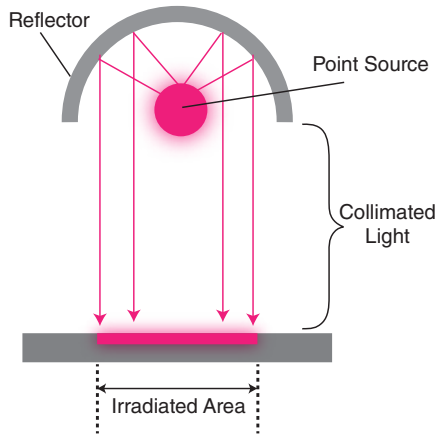


1 hour baking at 200°C

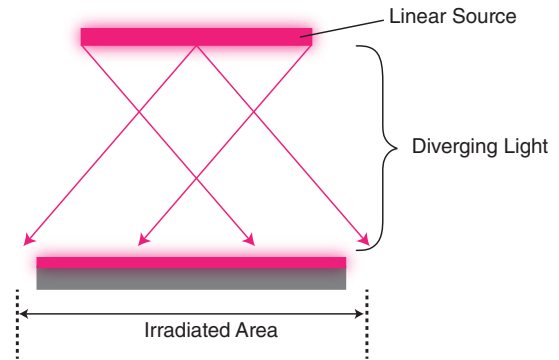
SELECTIVE VUV/O₃ TREATMENT

Principle of Collimated Light Source and Selective Treatment

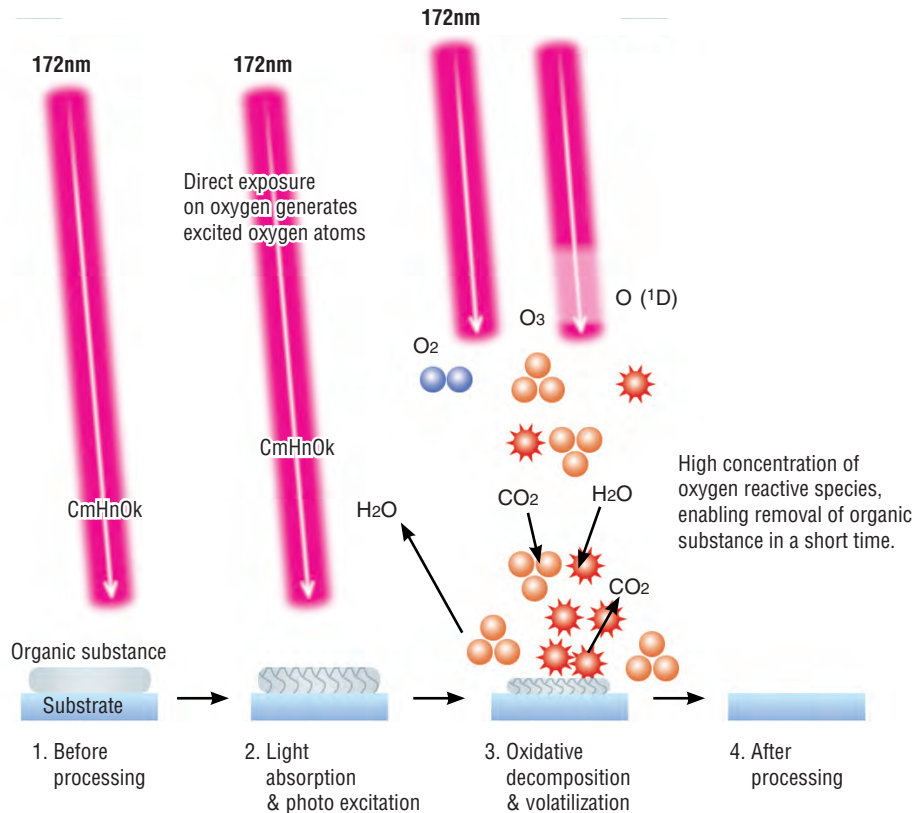
New Principle of Collimated Light Sources



Conventional VUV Light Source



Principle of Hydrophilic Treatment and Organic Materials Decomposition by VUV



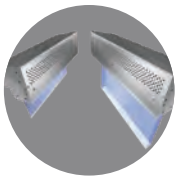
INDUSTRIAL LED

LED for Industry

USHIO's Industrial LED light sources are optimally designed and developed to custom specifications to satisfy the demands and purposes of our customers. USHIO provides products with reference standards using long-term know-how and experience in light source development.

USHIO develops and manufactures devices for irradiation systems and maintains supply chains to installed devices and systems from within the group. The ability to provide turn-key LED light solutions is an USHIO specialty.

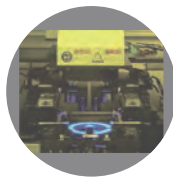
USHIO industrial LEDs utilize optimized light to respond to broad customer demands.



Irradiation Units



**UVDB
Power Supply**



**UV LED
Exposure Unit**



**UV LED
Wafer Processing Unit**



**Stepwise
Irradiation Unit**



**UIT-250
Accumulated Meter**

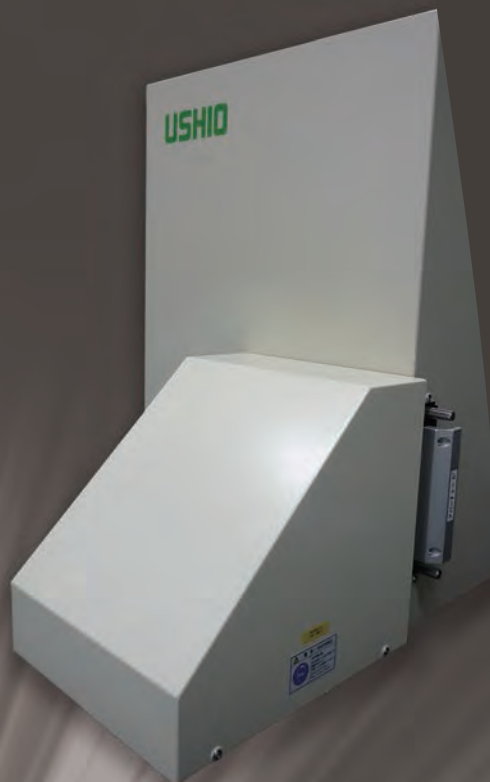
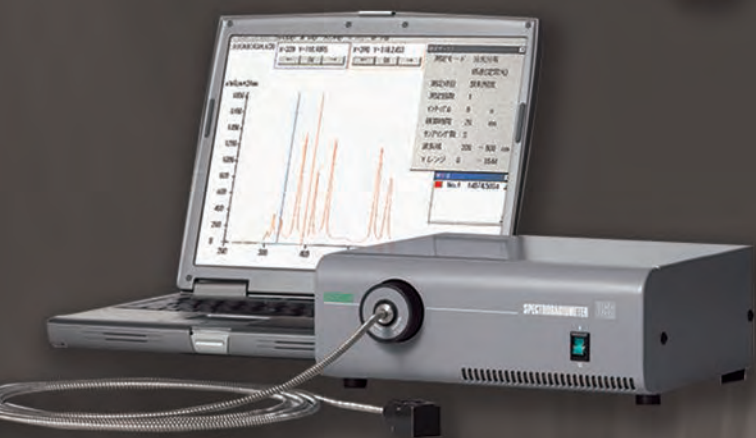
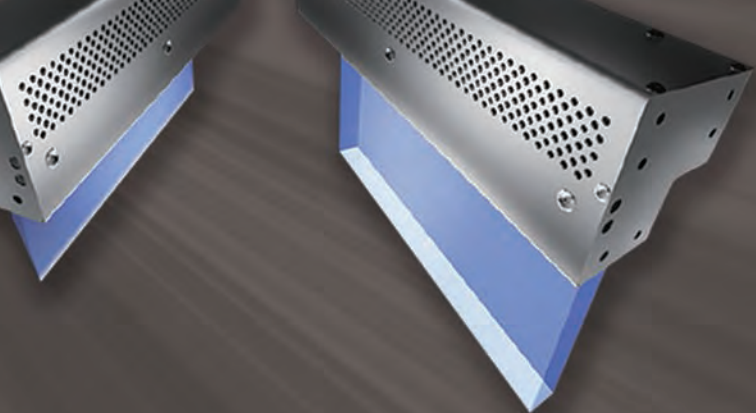


**Palm-Top
Irradiance Meter**



**USR-45VA/DA
Spectroradiometer**

INDUSTRIAL LED



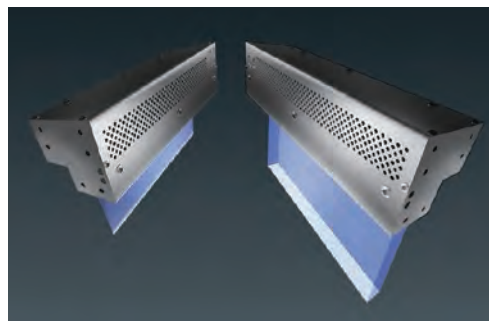
SIDE FACING IRRADIATION UNITS FOR TOUCH PANEL BONDING

Features

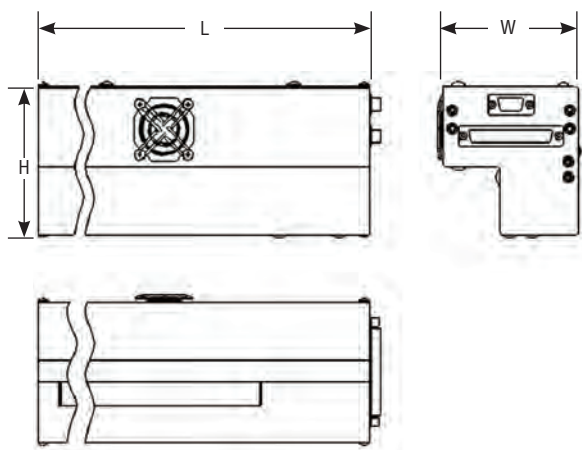
- Working Distance of Up to 150mm (Parallel Light Type)
- Smallest UV LED Line Light Sources
- High Uniformity UV Irradiation
- Rich, Diverse Product Lineup
- Water Cooled Available

Applications

- UV Line Lighting for Side Face Sealing
- UV Curing of Display Devices (Touch Panels & LCDs)
- UV Curing for Resins & Adhesives



■ Air-Cooled External View



Dimensions	L (mm)	W (mm)	H (mm)
P-type	128 ~ 1024	90	90
C1-type			80
C2-type			83
C3-type			139
C4-type			136

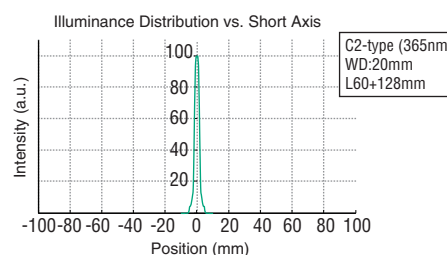
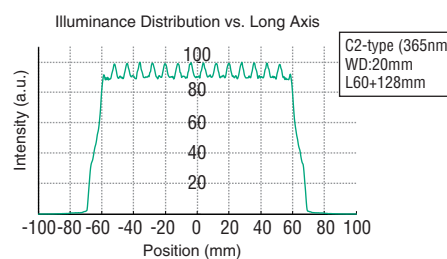
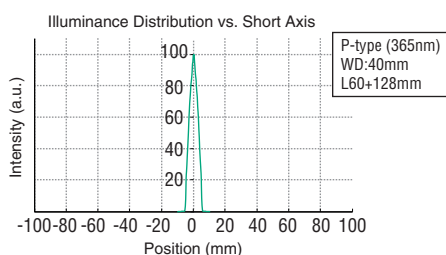
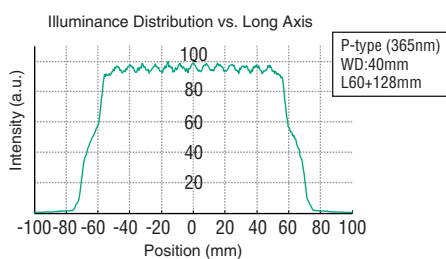
■ Parallel Light Type

Model	Irradiation Working Distance mm	UV Illuminance (*1) mW/cm ²	Uniformity (*1) (*2) %	Wavelength (*3) nm
P-type	30	900	±5	365 (385)
	40	950		
	100	550		
	150	400		

■ Focused Light Type

Model	Irradiation Working Distance mm	UV Illuminance (*1) mW/cm ²	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.) x 100 (*3) Please inquire for 385nm wavelength information.



UVDB POWER SUPPLY

■ Compatible Power Supply



Model	UVDB
Input Voltage	100 ~ 240VAC
Input Current	6.7A/3.2A
Control Method	Constant Current Control
Brightness Control	Knob or 0 to 5VDC 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)	W135xD300xH140

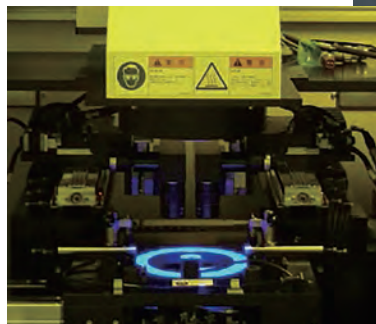
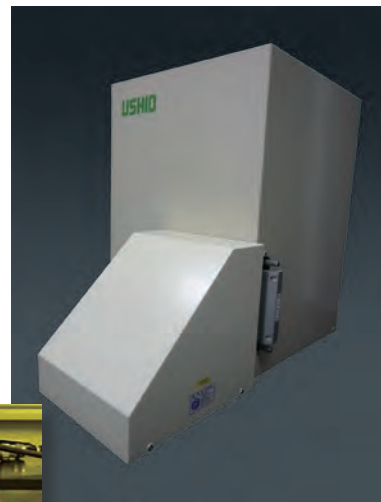
UV LED LIGHT SOURCE UNITS FOR CONTACT/PROXIMITY EXPOSURE

Features

- Simultaneously & Uniformly Irradiating Multiple Wavelengths on the Same Area
- High Quality Parallel Light
- Complex Programmable Irradiation at Each Wavelength
- Independent Output Regulation of i-, h- & g-, Line Wavelengths
- Low Irradiation Temperature
- Shutterless

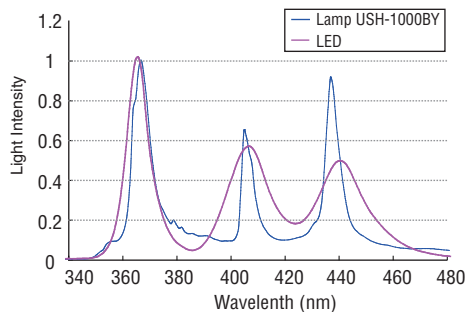
Applications

- Mask Aligner
- Light Source for MEMS Exposure

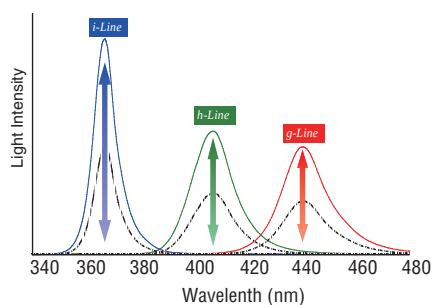


■ Spectral Data

(UV Lamp Comparison Example)



(Independent Output Regulation at i-, h- and g-Line Wavelengths)



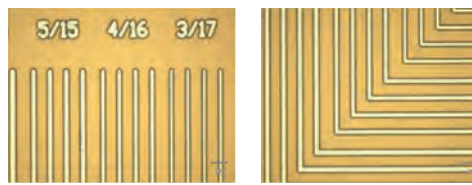
■ Exposure Data

Light Source	Lamp	LED
Viewing Angle	4.4°	4.4°
Gap	15μm	
Illuminance (mW/cm ²)	37.4	44.8
Irradiation Time (sec)	32.1	26.8
Irradiation Diameter (mm)	ø150	
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/cm ²
Observation Pattern	4μm Spaces (20μm Pitch)



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

UV LED UNITS FOR WAFER PROCESSING

Features

- Uniform Area Irradiation
- 100x100mm ~ 200x 200mm Area Irradiation
- $\pm 10\%$ Uniformity
- No Fine Adjustment Needed When the Irradiation Distance Deviates
- System Miniaturized Through Unique Lens Design

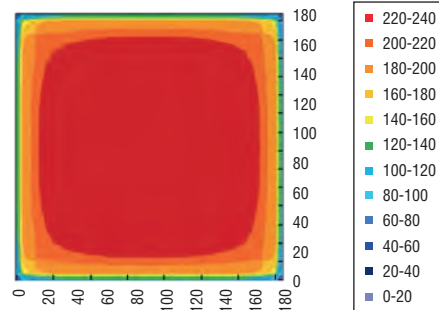
Applications

- Curing Various Wafer Surface Coatings
- UV Nano Imprinting
- Bonding & Sealing Displays & Touch Panels



FC-105 and
UVDB Compatible
Power Supply

■ Illumination Distribution @ 50mm



■ Power Supply



Model	FC-105	FC-155	FC-205
Irradiation Area (mm)	100x100	150x150	200x200
Corresponding Wavelength (nm)	365, 385, 395, 405		
Illuminance (mW/cm ²)	150 @ 365nm		
Illuminance Distribution (%)	± 10		
Irradiation Distance (mm)	50		
External Dimensions (Outline mm)	W180xD180xH150	W230xD230xH150	W280xD280xH150

Model	UVDB
Input Voltage	100 ~ 240VAC
Input Current	6.7A/3.2A
Control Method	Constant Current Control
Brightness Control	Knob or 0 to 5VDC 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)	W135xD300xH140

STEPWISE IRRADIATION ZONE CONTROLLED LIGHT SOURCE UNIT

Features

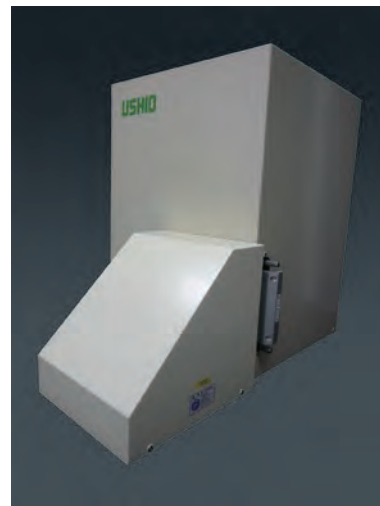
- High Intensity Parallel Light
- Individual Output Control for Each Irradiation Area
- Illuminance Control for Uneven Surfaces

Applications

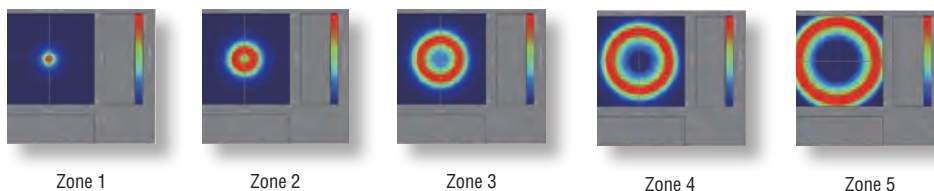
- Hardening Photoresist
- Curing Coating on Curved Lens Surfaces

■ 60mm Five Ring Zone Control

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



Simulation Data



Demo Data



■ Specifications

Control of the Irradiation Surface	The 60mm Irradiation Surface is Irradiated in Five Individually Controlled Concentric Zones
Wavelength (nm)	Selectable from 365, 385, 395 and 405
Maximum Irradiation Diameter (mm)	Ø60
Maximum Illuminance (mW/cm ²)	At least 100
Design Focal Length (Irradiation Distance in mm)	250
Irradiation Area Uniformity	±5%
Collimation Angle	±10°
Maximum Illuminance	From 10-100mW/cm ² @ 405nm per Zone

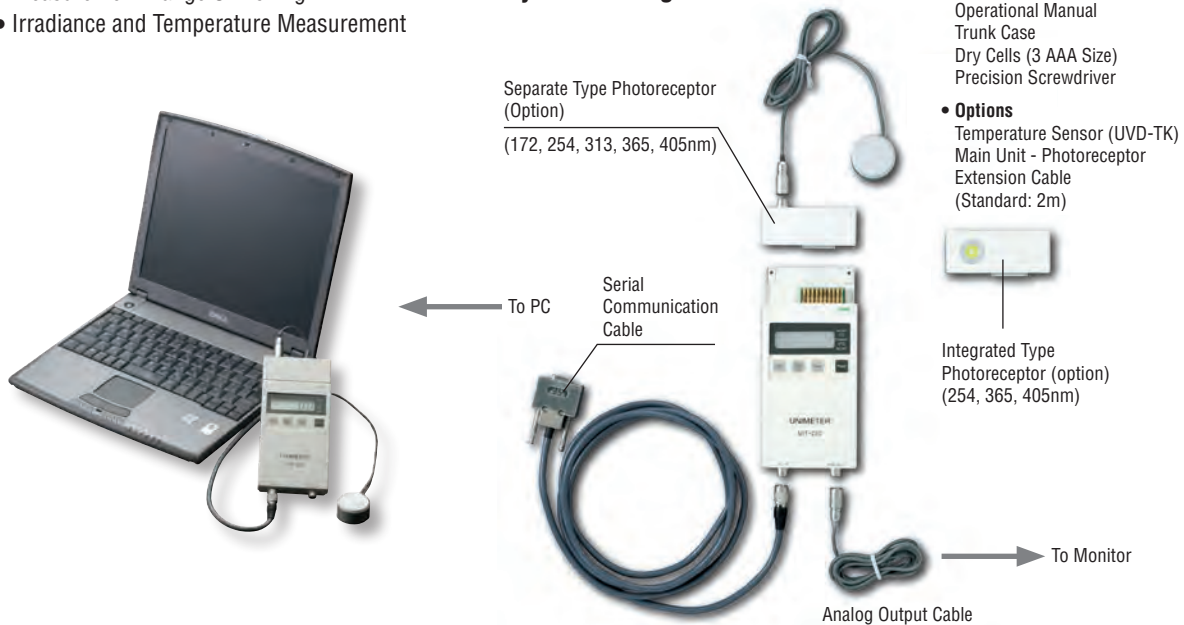
UIT-250 ACCUMULATED UV METER

Features

- Measure Five Wavelength Regions (Centered on 172, 254, 313, 365 & 405nm) by Simply Replacing the Detector Unit
- Battery/External Power Supply Switching Function (AC Adapter Optional)
- Compatible with Extension Cables (Main Unit to Photoreceptor: 2m as Standard Option)
- Measures Irradiance, Peak Irradiance, Exposure, Irradiance Distribution, Irradiance of Spot Sources & Temperature Distribution
- Internal Memory Allows Measurement of Irradiance Distribution of Up to Four Minutes
- Auto Power-Off Function Can be Enabled or Disabled
- PC Serial Communication Functions
- Irradiance Distribution Data Reading
- Samples per Second Confirmation
- Measurement Range Switching
- Irradiance and Temperature Measurement



System Configuration



Accessories

Operational Manual
Trunk Case
Dry Cells (3 AAA Size)
Precision Screwdriver

Options

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

Specifications

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

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 min. or Disable)
Irradiance Distribution Output	Analog 0 to 1V Output; Maximum Recording Time of 2 or 4 Minute (with Recorder Connected).
Sampling Rate	16 or 32 Samples per Second
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)	W75xD160xH15
Mass (g)	Approximately 250

Temperature Sensor Specifications

Model	UVD-TK
Temperature Measurement Range °C	0-350
Thermocouple Wire	Chromel/Alumel Wire (K Thermocouple)

PALM-TOP IRRADIANCE METER

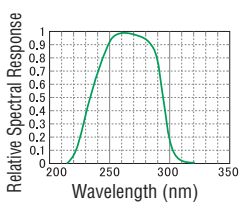
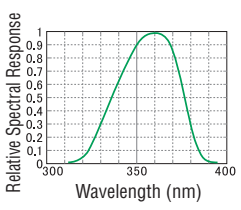
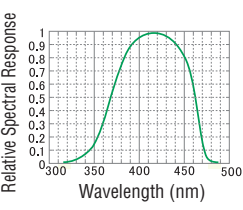
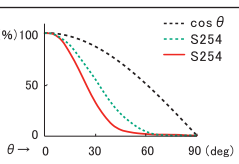
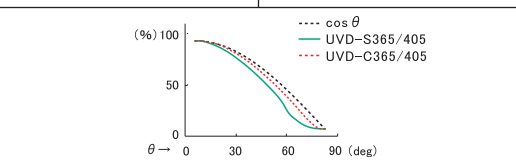
This wireless irradiance meter is just 4.9mm thick. It is useful for measuring in environments where the light source and irradiated objects are very close, such as UV coating of optical film, bonding of precision components (such as lenses) and UV printing processes.

Features

- Available with an Integrated or Separate Detector
- Calibrated Wavelengths of 254, 365 and 405nm Available
- Compact 90x25x4.9mm
- Wide Angular Detection Head
- Accumulated and Instantaneous Irradiance Measurement



■ 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)		ø10	ø3	ø10	ø1	ø10	ø1
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 graph and figures should be considered typical values for reference and not guaranteed for all products.

USR-45VA/DA SPECTRORADIOMETER

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: USR-45 VA Type: 300 ~ 1000nm
USR-45 DA Type: 220 ~ 800nm

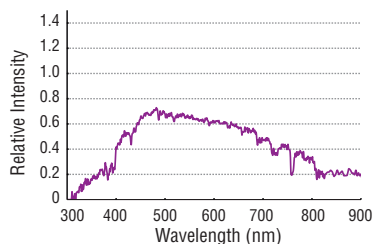


Features

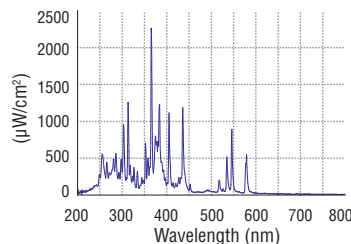
- Enables Absolute Values of Spectrum Energy to be Displayed
- Minimizes Amount of Scattered Light to Achieve Highly Accurate Measurement
- Flash Light, Ambient Light and AC Light Measurement
- Supports a Wide Range of Measurements from Weak to Intense Light
- Angular Properties Have Been Significantly Improved
- Highly Accurate Dispersion Board Enables Measurement of High-Intensity Light

■ Sunlight

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



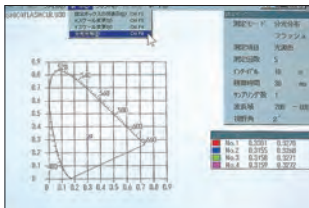
Optical Spectrum of Sunlight



Optical Spectrum of Long Arc Metal Halide Lamp

■ LED

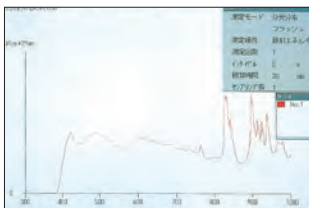
Measurement of high-intensity light, including that of LEDs and long arc light sources.



Chromaticity Coordinates

■ Pulse

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



Spectral Radiation Energy
of Xenon Flash Lamp

LED CHIP

UV/VIS/IR LEDs Solution Provider

USHIO is a high quality solutions provider in the field of industrial LED's and photo sensors. As a solutions provider, USHIO offers all wavelengths from UVC to visible and even into the infrared spectrum with available wavelengths between 270 and 1550nm.

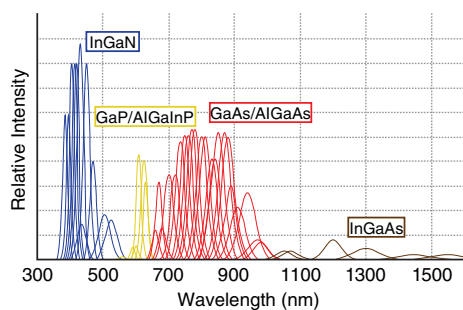
An extensive range of package styles are also available including SMD, high power TOP, super beam, ultra high power arrays, stem, SMBB and photodiodes and phototransistors. With this wide array of available LED wavelengths and package styles, USHIO products are able to meet the needs of many market segments. These markets include automotive ITS, visual imaging, UV curing, lithographic exposure, bio-medical applications, night vision, sorting and material curing. Speed, agility and flexibility define USHIO's LED solutions.

LED CHIP



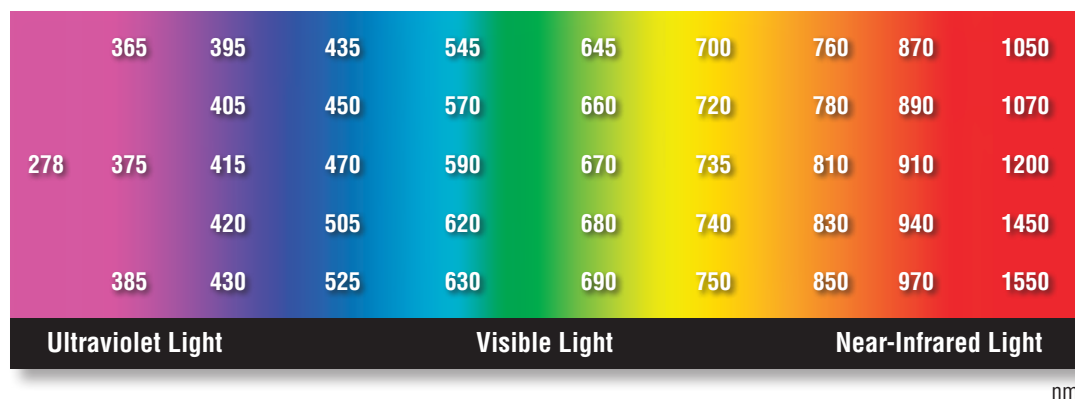
CUSTOM LED DEVICES

- Medical
- 3-D Curing
- Print Curing
- Lithography
- Water Purification
- Skin Treatment
- Material Curing
- Biometric Finger
- Solar Simulation



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

■ Choose from Over 40 Emission Spectra Types



■ Package Lineup



LED Plastic Mold



Surface Mount Package



High Power SMB



High Power Illuminator



Stem Type LED



Super Beam Type LED



SMB with Outer Lens



For Horticulture Lighting

CUSTOM LED DEVICES

IR Illumination:

IR LED arrays are available between 780 and 1550nm. Their customizable sizes and wavelengths allow for IR security monitoring as well as specific material and area heating and curing. Other custom wavelengths are available upon request.

Multi Wavelength:

With a multi wavelength, the user is given the option to use a combination of a variety of available wavelengths in a single package. These combination wavelengths are available between 270 and 1550nm and can also combine UV and IR wavelengths. Standard multi wavelength packages available.

High Density Array:

In a high density array, up to 60 chips can be used in less than an 8mm square array. These arrays are available for most wavelengths between 270 and 1550nm..

High Power Array:

High power output arrays feature uniform light emission using water cooling systems. These UV wavelengths are available between 365 and 405nm. Other custom wavelengths are available upon request.



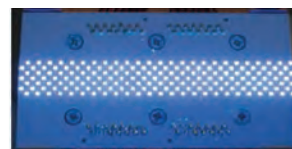
IR Illumination



Multi Wavelength



High Density Array



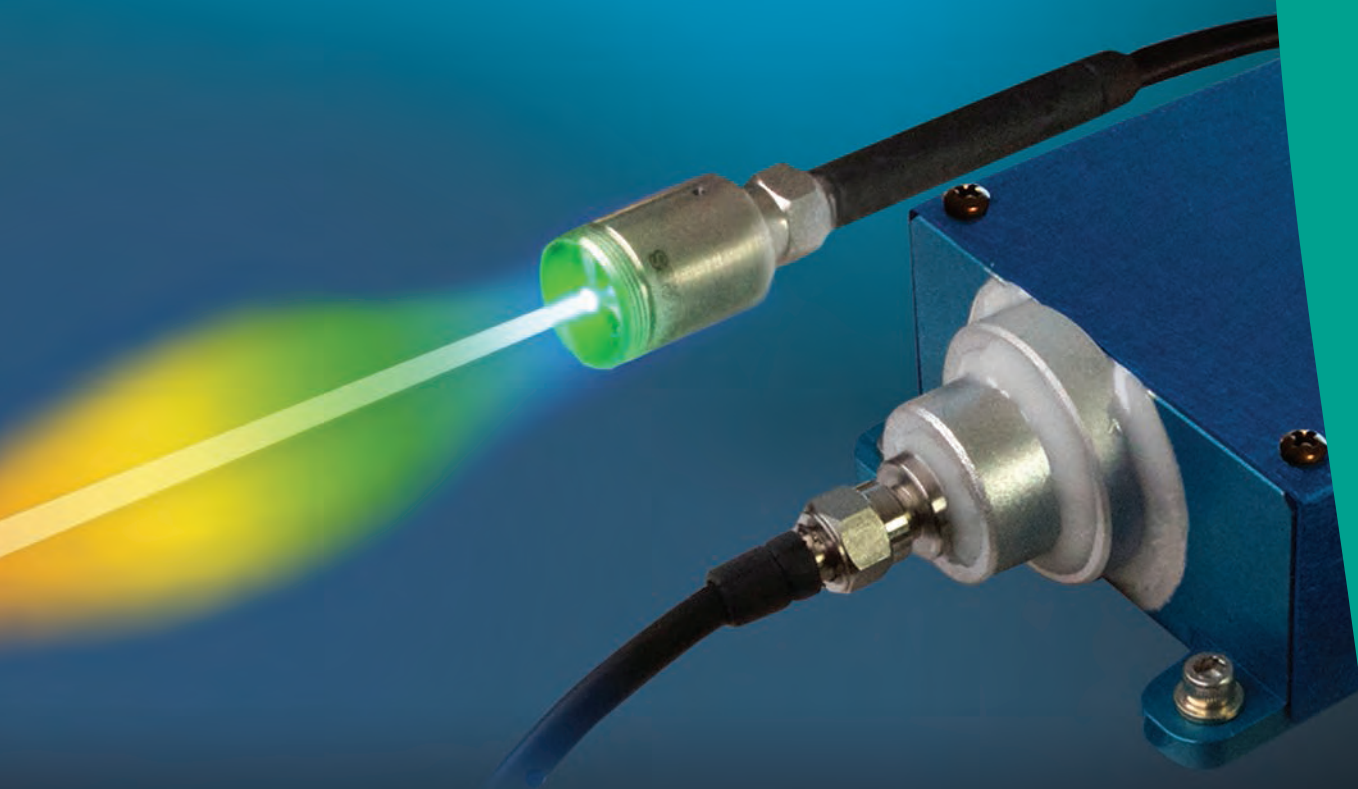
High Power Array

NECSEL

Laser Diodes

Necsel is an award winning global organization headquartered in Silicon Valley that designs and manufactures high powered visible lasers. With the support of Ushio Inc., one of the world's largest specialty light source manufacturers, Necsel has become the leader in visible laser system solutions. Their unique patented technology and wide array of wavelengths, from 375 to 800nm, have allowed Necsel to transform cinema projection and specialty lighting markets. Development kits are available to allow you to design your own solution.





LASER DIODES

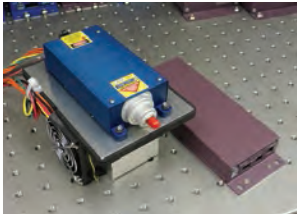
- Digital Projection
 - Remote Source Lighting
 - Hazardous Lighting
 - Theme Park Attractions
 - Forensic Lighting
- Therapeutic
 - Spot Curing



Wavelength nm	Power Available in NovaLum					
	100mW	500mW	1W	5W	10W	>10W
375	●	●	●			
405	●	●	●	●		
445	●	●	●	●	●	●
465	●	●	●	●	●	●
490	●	●				
525	●	●	●	●		
635	●	●	●	●		
730	●					
>800	●	●	●	●	●	●



Laser Developer Kit



Thermal Platform Developer Kit

Laser Developer Kits (Optional)

Laser Developer Kit Includes: laser controller, power supply, GUI interface and cables.
Thermal Platform Developer Kit Includes: Controller TEC based cooling system, power supply, GUI interface and cables.

LASER MODULES AND ACCESSORIES

Multi-Color IR-RGB-V NovaLum

The IR-RGB-V NovaLum allows customers to create a custom eight laser module by selecting from various wavelengths. This laser has a 400 micron connector and can be easily integrated into an OEM system when combined with the Necsel Intelligent Controller.

RGB NovaLum 1200

The Necsel RGB NovaLum 1200 offers 1200 lumen brightness levels at D65 and combines red, green, and blue lasers into a 400 μm fiber-coupling. Each laser can be individually modulated and mixed to generate white light or any color in the full color spectrum. Combined with the Necsel Intelligent Controller, this laser gives temperature feedback, modulates at high speed and is easily integrated into any OEM system.

RGB NovaLum 700

The Necsel NovaLum contains red, green and blue lasers to produce a combined output of over 700 white balanced lumens into an extremely small 400 micron core fiber. Combined with the Necsel Intelligent Controller, this laser can be easily integrated into an OEM system.

RGB NovaLum 250

The Necsel NovaLum contains red, green and blue lasers to produce a combined output of over 250 white balanced lumens into an extremely small 400 micron core fiber. Combined with the Necsel Intelligent Controller, this laser can be easily integrated into an OEM system.

NovaLum Developer Kit

This kit includes the controller, connection cables, USB cable, Windows GUI, and a power supply. The functionality of the NovaLum Intelligent Controller offers direct modulation of each individual color as well as temperature feedback and ESD protection.

Laser Neon

The Necsel Laser Neon is a turnkey system that offers the benefits of remote source lighting. Each red, green and blue laser in the box offers a lifetime of over 10 years without failure or color shift. Laser Neon can channel single primary, dual primaries, mixed color gamut, or white light and offers 10 watts of power.



Accessories:



Transport Fiber (1mm)
Transport Fiber (400 μm)



Combiner Fiber (3-to-1)



Homogenizing Rod



Mating Barrel



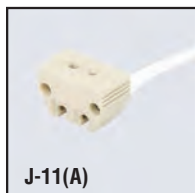
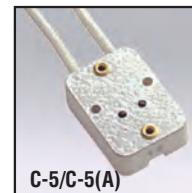
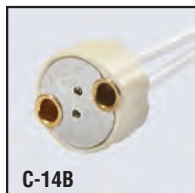
Collimation Lens

CERAMIC & STEATITE SOCKETS

Order Code	Description	Wire Length (mm)	Wire Type	Watts (W)	Volts (V)	Lamp Type
4.0mm Pin Spacing						
G4, GU4, GY4, GZ4 Base						
1000109*	C-14B	255	UL1659, PTFE (Teflon), AWG 18	300	24	JC, MR8, MR11
5.33mm Flat Pin Spacing						
GY5.3 Base						
1000111‡	C-21	—	—	750	125	Flat Pin MR16
5.33mm Pin Spacing						
GU5.3 & GX5.3 Base						
1002142	C-33U	250	UL 3068, Silicone Rubber, AWG 18	210	30	MR16
1000114	C-5	160	UL 3068, Silicone Rubber, AWG 18	1875	125	JCD (G5.3), MR16
1000115	C-5(A)	300	UL 3068, Silicone Rubber, AWG 18	1875	125	JCD (G5.3), MR16
6.35mm Pin Spacing						
G6.35, GX6.35, GZ6.35 Base						
1000681‡	J-11(A)	—	—	1500	250	JC, JCR, MR16
9.53mm Pin Spacing						
G9.5 Base						
1000113*	C-3	914.4	UL 1815, PTFE (Teflon), AWG 18	1000	250	JCD, JCV
1000679	J-10	304.8	UL 3068, Silicone Rubber, AWG 16	1250	125	JCD, JCV
Recessed Single Contact Base						
R7s & RX7s Base						
1000117	C-8	152.4	UL 3068, Silicone Rubber, AWG 16	2500	250	J, JP, JPD, QIH, QIR

‡ Special Order Item.

*UL Recognized Component



TECHNICAL LAMP REFERENCES

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GLOSSARY OF TERMS

AlGaAs: One of the material systems for manufacturing LEDs that produce light in the red and amber portions of the visible light spectrum.

AlInGaP: The Light-Emitting Diode (LED) chip technology containing Aluminum, Indium, Gallium and Phosphorous to produce red, orange and amber-colors.

Alternating Current (AC): Electrical current in which the direction is reversed at regular intervals or cycles; in the U.S. the standard is 120 reversals or 60 cycles per second. (See Direct Current).

Ambient Temperature (Ta): The air temperature surrounding the device.

Ampere (Amps): The SI unit measuring the intensity of electrical current flow.

American National Standards Institute (ANSI): The organization that coordinates voluntary guidelines and standards for the electrical and other industries.

Arc Gap: The distance measured between the electrodes of an arc discharge lamp (HID lamp).

Ballast: A device used to provide the starting voltage and regulate the current to discharge lamps, including Fluorescent, Metal Halide, and High Pressure Sodium.

Ballast Types for Fluorescent Lamps:

Instant Start: A type of Fluorescent lamp ballast that applies high voltage across the lamp with no preheating of the cathode.

Preheat: A Fluorescent lamp type that requires a starter, which enables the electrodes to be properly heated before allowing the ballast to supply the correct current flow.

Rapid Start: A type of Fluorescent ballast that applies a low filament voltage to preheat the cathodes. Simultaneously, a starting voltage (lower than that used in instant start ballasts) is also applied to strike the arc. When the cathodes are hot enough the lamp will strike.

Ballast Factor: The percentage of rated lumens from the same lamp using a commercial ballast as compared to an ANSI reference ballast. A ballast factor of .94 means the commercial ballast produces 94% of light produced by an ANSI reference ballast operating same lamp. The ballast factor can be referred to in the catalogs from Fluorescent ballast manufacturers.

Base: The physical end of the lamp that inserts into the lamp socket or holder.

Black Body / Black Body Radiator: An object that absorbs all electromagnetic radiation falling on it. Because it reflects no light, a black body appears black. As a black body is heated to incandescence, it radiates light in a sequence of colors, from red to orange to yellow to white to blue, depending on its temperature. This color sequence describes a curve within a color space, known as the black-body curve.

Black Body Curve: A curve within a color space describing the sequence of colors emitted by a black-body radiator at different temperatures.

Burn Position: The position in which lamps are designed to be operated. Often designated by the position of the lamp base. BU = Base Up, Horiz = Horizontal.

CSA (Canadian Standards Association): The CSA International certification mark, recognized in Canada, the U.S. and around the world, provides increased assurance of quality and safety.



Candela (cd): The measuring unit of luminous intensity of a light source in a given direction. A light source may have different intensities depending upon the given direction which the measurement is taken. The old measurement equated to the amount of light produced by a standard candle.

Candlepower (cp): Luminous intensity expressed in candelas. Typically used in measuring the luminous intensity distribution of a reflector lamp or lighting fixture.

Case Temperature: The temperature measured at the LED package or case.

CE Mark: Formerly known as the EC mark, the CE mark signifies that a product meets the conformity standards for products sold in the European Economic Area (EEA). The CE stands for "Conformité Européene," which is French for "European Conformity."



Chromaticity of a Color: The quality of color that includes its dominant or complementary wavelength, purity, hue, and saturation. Independent of luminance or brightness.

Color Rendering Index (CRI): An index from 0-100 measuring a light source's ability to render color accurately. Sodium lamps can have a CRI as low as 22, while tungsten Halogen lamps can have a CRI as high as 100. Any lamps rated above 80 CRI tend to be of good color rendering.

Correlated Color Temperature (CCT) or Color Temperature: A scientific measurement of the balance of wavelengths making up any "white" light. The unit of measurement is in Kelvin(K) which determines the warm or cool appearance of a light source. The lower the color temperature, the warmer or more yellow is the appearance. The higher the color temperature, the cooler or bluer is the appearance. Typical color temperatures are 2800K for Incandescent, 3000K for Halogen, 4200K Cool White Fluorescent, and 5000K daylight Fluorescent and Metal Halide.

Current: A measure of the rate of flow of electricity, expressed in amperes.

Daylight: Generally defined as having a correlated color temperature of 6000K or higher.

Direct Current (DC): A type of electrical current and distribution by which electricity flows in one direction through the conductor. Battery operated systems are typical DC applications. (See Alternating Current).

Dichroic: "Two Color"; Often referred to in lighting as the dichroic coating applied to glass filters and glass reflectors to change or control the color of light passing through the lighting fixture or lamp.

Die: Also known as Chip: the active light emitting semiconductor compound.

Dimmable: A lamp that has varying lumen output controlled by dimming device.

Directional Light Source: A light source that emits light only in the direction it is pointed or oriented.

Discharge Lamps: See High Intensity Discharge Lamp (HID).

Efficacy: The measured effectiveness at which lamps convert power (measured in watts) into light (measured in lumens). Also see Lumens Per Watt.

Ellipsoidal Reflector: A reflector designed to converge light so that the beam is focused to a single point. This often results in the reduction of light trapped within a lighting fixture.

ETL Listed Mark: See Intertek Testing Services (ETL).

Federal Communications Commission (FCC): The FCC mark ensures the product complies with the necessary requirement to avoid interference with radio frequencies.



Filament: A tungsten wire that when heated electrically generates radiation in the visible, infrared and ultraviolet ranges.

Fluorescent Lamp: A low-pressure mercury discharge lamp in which an electric discharge of ultraviolet energy excites a coating of phosphor on the lamp glass and transforms some of that energy to visible light. Fluorescent lamps are manufactured in many different forms including linear four foot T8 lamps, U-shaped and Coiled Compact Fluorescent lamps with integrated ballasts. Fluorescent lamps typically require a matching ballast to operate the lamp properly.

Footcandle (fc): A unit of illuminance. One footcandle is equal to one lumen per square foot (lmft²); see Lux. A lighting designer would use a measure of footcandles at the work surface to determine the proper illumination level for office lighting.

Forward voltage: LEDs are current driven devices. If an external current is passed through the device, a forward voltage will be developed across the diode.

Frequency: The number of times per second that an alternating current system reverses from positive to negative and back to positive, expressed in hertz (Hz).

Goniophotometer: A photometric device for testing the luminous intensity distribution, efficiency, and luminous flux of luminaires.

Halogen Lamp: A higher pressure, high temperature incandescent lamp containing Halogen gas that recycles tungsten back onto the filament surface. The Halogen cycle allows for higher efficacy, higher color temperature, and longer life cycles than incandescent lamps.

Heat Sink: A part of the thermal system that conducts or disperses heat away from sensitive components, such as LEDs and electronics.

Hertz (Hz): A unit of frequency equal to one cycle per second (see Frequency). The U.S. standard is 60 Hz.

High Power LED: A high power LED, sometimes referred to as a power LED, is one that is driven at a current of 350 mA or higher.

High Intensity Discharge Lamp (HID): A high pressure lamp in which high intensity light is produced by an electrical arc source. General terminology for Mercury lamps, Metal Halide lamps, High Pressure Sodium lamps, High Pressure Xenon lamps, or any other high intensity arc discharge source.

Ignitor: A ballast component that produces enough voltage to cause the initial arc to form across electrodes in HID lamps.

Illuminance: The concentration of luminous flux on a surface. Measured in Lux (lx) or Footcandles (fc).

InGaN LED: LED (Light-Emitting Diode) semiconductor material system containing Indium, Gallium, and Nitrogen to produce green, blue and white-colored LED light sources.

Initial Lumens: The luminous output of a new light source. Quantity of light output measured after 100 hours of operation using controlled system characteristics.

Integrating Sphere: A device used for a variety of optical, photometric, or radiometric measurements.

Inrush Current: The current generated during the initial start up of a lamp system. Inrush current can be several times higher than the operating current of a lamp.

Instant Start: See Ballast.

Intertek Testing Services (ETL): Originally a mark of Electrical Testing Services, the ETL Listed Mark now signifies that the lamp has been tested to meet North American safety standards by Intertek Testing Services.



Instant Start: A type of Fluorescent lamp ballast that applies high voltage across the lamp with no preheating of the cathode.

Junction Temperature: Junction temperature, noted as T_j, is the temperature of the LED's active region.

Kelvin: A unit of color temperature measurement. (See Correlated Color Temperature).

Kilowatt (kW): A measure of electrical power equal to 1000 watts.

Kilowatt Hour (kW/hr): 1000 watts of electricity used for one hour. A unit of measure that utility companies utilize for billing purposes.

LCL: (See Light Center Length).

LED: A solid state lighting device. (See Light-Emitting Diode).

LED Array: An assembly of LED packages or dies on a printed circuit board or substrate, possibly with optical elements and additional thermal, mechanical, and electrical interfaces that are intended to connect to the load side of an LED driver.

LED Chip (Chip): The light producing semiconductor device that may or may not be incorporated into an LED.

LED Driver: An electronic circuit that converts input power into a current source — a source in which current remains constant despite fluctuations in voltage. An LED driver protects LEDs from normal voltage fluctuations, over voltages, and voltage spikes.

LED Light Engine: An integrated assembly comprised of LEDs or LED arrays, LED driver, and other optical, thermal, mechanical, and electrical components.

LED Luminaire: A complete lighting unit consisting of LED-based light emitting elements and a matched driver together with parts to distribute light, to position and protect the light emitting elements, and to connect the unit to a branch circuit. The LED based light emitting elements may take the form of LED packages, (components), LED arrays (modules) LED Light Engine, or LED lamps. The LED luminaire is intended to connect directly to a branch circuit.

GLOSSARY OF TERMS

Life, Average Rated: Average life is a value for life expectancy based on laboratory tests using controlled system characteristics measured in hours where 50% are still operating.

Light Center Length (LCL): The distance between the center of the filament or arc tube and the reference plane (usually the bottom of the lamp base).

Light-Emitting Diode (LED): A Light Emitting Diode (LED) is a solid-state semiconductor device that converts electrical energy directly into light. On its most basic level, the semiconductor is comprised of two regions. The p-region contains positive electrical charges while the n-region contains negative electrical charges. When voltage is applied and current begins to flow, the electrons move across the n-region into the p-region. The process of an electron moving through the p-n junction releases energy. The dispersion of this energy produces photons with visible wavelengths.

Lumens: The international unit of measurement for light. A measurement of total quantity of light output from an electric lamp in all directions for a given unit of time. (See Initial Lumens and Mean Lumens)

Lumens Per Watt (LPW, Lm/W): Efficacy; Lumen output divided by lamp watts consumed.

Lumen Depreciation: The decrease in lumen output of a light source over time, until failure.

Luminance: Photometric brightness, luminance is a measure of the flux emitted from, or reflected by, a relatively flat and uniform surface. Luminance may be thought of as luminous intensity per unit area. Candelas per square meter (cd/m^2).

Luminous Intensity: (See Candela) (cd).

Lux (lx): An international metric unit of luminance. One lux is equal to 1 lumen per square meter (see footcandle). $1 \text{ lx} = 1 \text{ lumen per square meter (lm}/\text{m}^2)$.

Material System: The material, such as aluminum indium gallium phosphide (AlInGaP) and indium gallium nitride (InGaN), used within an LED to produce light of a specific color.

Maximum Overall Length (MOL): The end-to-end measurement of a lamp.

Metal Halide Lamp: A member of the high intensity discharge light source family. The light from this source is produced by the radiation from mercury, together with halides of metals such as sodium, scandium, indium and dysprosium. Metal Halide light sources typically require a matching ballast to operate the lamp properly. Metal Halide lamps are available in single-ended and double-ended varieties. Lamp design varies from tubular to elliptical shapes.

MOL: (See Maximum Overall Length).

Nanometer (nm): A unit of length equal to 10^{-9} meter. It is the preferred unit of measure for light in the visible and ultraviolet regions of the energy spectrum.

NTSC Color Space: The range of colors within the CIE Chromaticity Diagram included when combining phosphor based RGB sources in CRTs such as televisions and computer monitors.

Neodymium: A rare earth metal used in reflector and glass coatings to help reduce the yellow light emitted by the lamp.

Ohms Law: Volts x Amps = Watts

Operating Current: Steady state current consumed by a lamp at rated watts.

Operating Position: (See burn position).

Organic Light-emitting Diodes (OLED): Organic Light-Emitting Diodes (OLEDs) are based on organic (carbon based) materials. In contrast to LEDs, which are small point sources, OLEDs are made in sheets which provide a diffuse area light source. OLED technology is used in display applications such as cell phones and PDA screens.

P-N Junction: An area on an LED chip where the positively and negatively charged regions meet. When current is applied, the electrons move across the n region into the p region. The process of an electron moving through the p-n junction releases energy. The dispersion of this energy produces photons with visible wavelengths. In short, the area on a chip where light is produced.

Parabolic Reflector: A smooth surfaced, curved reflector formed in the shape of a parabola which focuses all the light at the focal point to create a parallel beam.

Phosphor: An inorganic chemical compound processed into a powder and deposited on the inner glass surface of certain discharge lamps. Phosphors absorb short wavelength ultraviolet radiation, transforms it and emits it as visible light.

Phosphor Conversion: This is the process by which photons from an LED chip are converted to a different color. White LEDs and some colored LEDs are made using phosphor conversion.

Picograms Per Lumen-Hour (pg/lu-hr): A measure of the amount of mercury in a lamp per unit of light delivered over the life of the lamp.

Planckian Black Body Locus: The line on the CIE Chromaticity Diagram that describes the color temperature of an object when heated from approximately 1,000K to more than 10,000K.

Preheat: (See Ballast).

Rapid Start: (See Ballast).

REACH: Reach stands for Registration, Evaluation, Authorization and Restriction of Chemicals. This is a directive of the European Union created for the purpose of regulating chemicals that can cause harm to one's health and the environment. The REACH Compliance mark signifies that the product meets the standards of this regulation.



Remote Phosphor: A phosphor conversion technique in which photons from a royal blue LED pass through a phosphor material that is not attached to the LED chip.

RGB Color Model: An additive color model in which red, green, and blue light are added together in different proportions to produce a broad range of colors, including white.

RGB White: A method of producing white light by combining the output from red, green, and blue LEDs.

RoHS (Restriction of Hazardous Substances) (Directive 2002/95/EC): Also known as Lead-Free, this initiative originated in the European Union. A product is considered compliant and receives the RoHS Compliant mark when the proper standards are met for restricted materials.



SMDs: Surface-mount LEDs.

Solid-State lighting: A description of the devices that do not contain moving parts or parts that can break, rupture, shatter, leak or contaminate the environment.

Spectral Distribution: The distribution and intensity of spectral energy of a lamp. Concerning the lighting industry, the UV, visible and IR regions are most important. Visible and UV light are most often measured in nanometers while IR light is most often measured in micrometers.

Thermal management: Controlling the operating temperature of the product through design, examples includes heat sinks and improved airflow.

Thermal Resistance (K/W): The property of a material's ability to conduct heat.

Trigger Start: A circuit used to eliminate the starter and start the preheat lamp almost instantly. In this circuit each electrode is connected to a separate winding in the ballast so the electrode is continuously heated.

Tungsten: A heavy metal used in wire filaments and electrodes. Also known as Wolfram.

UL (Underwriters Laboratories): An organization that tests equipment for electrical and fire safety. Qualified products display the UL Mark.



Ultraviolet (UV): The portion of the electromagnetic spectrum in which the longest wavelength is just below the visible spectrum, extending from approximately 4nm to approximately 400nm.

Voltage: The force or the pressure of electricity. For incandescent and Halogen lamps, voltage generally refers to the line voltage of which the lamp should be connected. For HID, Fluorescent, and Low-Voltage lamps, the voltage generally refers to the operating voltage which the lamp is connected to a power supply (ballast or transformer) after it has warmed up.

Watt: A unit of electrical power used to indicate power consumption.

Wavelength: Distance between two successive points of a periodic wave. The wavelengths of light are typically expressed in nanometers (nm), or billionths of a meter.

Xenon, High Pressure: A short-arc discharge lamp which Xenon gas is contained in a hard glass or special quartz capsule with a high pressure atmosphere. This includes lamps used for searchlight, followspots, and medical applications. Xenon is a heavy, colorless, chemically inactive, monatomic gaseous element.

SAFETY & HANDLING

TUNGSTEN HALOGEN & INCANDESCENT LAMPS

- DANGER! Halogen lamps operate at extremely high temperatures that can cause serious physical injuries and property damage.
- Only use Halogen lamps in Halogen-approved fixtures. Fixtures should fully contain any parts of the Halogen lamp upon the event of a lamp burst.
- Do not use Halogen lamps in close proximity of paper, cloth or other combustible materials that can cause a fire hazard.
- Lamps are very fragile. Do not drop, crush, bend or shake them. Vibration or impact will cause filament breakage and short lamp life.
- Do not touch the Halogen bulb surface or inside reflectors with your bare hands. Oils from skin can lead to breakage or shorten the life of the lamp. Use clean gloves or lint-free cloth for installation and removal.
- Clean any dirt, oil, or lint away from the lamp with alcohol and a lint-free cloth or tissue. Any foreign particles or materials on the bulb surface can cause hot spots on the bulb and result in lamp failure.
- Never touch the lamp when it is on, or soon after it has been turned off, as it is hot and may cause serious burns.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.
- Always turn off the electrical power before inserting, removing, or cleaning the lamp.
- Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to lamp and socket. Replace lamp holders and sockets when necessary.
- Keep the temperature of the Halogen lamp seal below 350° C.
- Keep the temperature of the Halogen bulb wall above 250° C.
- Keep the temperature of the Halogen lamp bulb wall below 800° C.
- Make sure lamps of specified wattage and voltage are only used in appropriately rated fixtures. Unspecified use will lead to short lamp life, breakage and overheating of fixture.
- Lamps should not be operated beyond the total rated voltage. Avoid the use of dimmers that may drive your lamp over its rated voltage.
- Operate the lamp only in the indicated burn position. Failure to do so will lead to overheating and shortened lamp life.
- Use an external fuse when required.
- Do not allow one lamp to directly expose another. This may lead to overheating and shortened lamp life.

FLUORESCENT LAMPS

- Fluorescent lamps operate at high surface temperatures that can cause serious physical injuries. Turn power off and allow adequate time (approximately 10 minutes) for the lamp to cool before attempting replacement.
- In order to avoid the risk of electrical shock, make sure the power to the fixture is turned off when replacing a lamp. Hold compact fluorescent lamps by the lamp base.
- Lamps are very fragile. Do not drop, crush, bend or shake them. Fluorescent tubes may shatter with considerable force when broken.
- To ensure that the lamps remain in the sockets for the duration of the operation, make sure that the fixture's sockets are not worn prior to installation of the lamps. If the lamps are installed in worn sockets, the lamps could fall out of the fixture during operation.
- Never operate a lamp above or below its rated current voltage.
- Electrical connections should be clean and in good condition. Replace lamp holders and sockets when needed. Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to the lamp and socket.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.
- Fluorescent lamp use is not recommended in extreme weather conditions. Excessive cold/warm temperatures dramatically affect starting, lamp life and lumen maintenance.

METAL HALIDE & HIGH PRESSURE SODIUM DISCHARGE LAMPS

- ANSI Type **E** = Enclosed Fixture Required
Lamps that are enclosed fixture rated should only be operated in an enclosed fixture that safely contains all lamp parts in the event of a lamp burst or rupture. These lamps operate at a high internal pressure and at high temperatures which can emit harmful ultraviolet light if the outer glass bulb is broken. A lamp may burst causing physical injury and property damage unless protective safety glass is used with the fixture. Use fixture that meets requirements per UL standard #1572.
- ANSI Type **O** = Open Fixture Rated
Lamps that are open fixture rated are suitable for operation in open fixture designs. These types of lamps typically feature UV protective quartz and a secondary shroud surrounding the arc tube to prevent the scatter of glass in the event of a burst.
- Metal Halide discharge lamps can emit ultraviolet radiation that may be harmful to eyes and skin. Metal Halide discharge lamps that are not open fixture rated, should only be used in enclosed fixtures with ultraviolet absorbing filter glass. Do not operate these lamps if the ultraviolet absorbing filter glass is broken or not installed.
- Metal Halide discharge lamps should only be operated with the compatible ballast, rated fixture (open/closed, wattage), and socket. (See lamp specification page for ballast information).
- Only operate the lamp in its designated operating position. (See lamp specification page for lamp operation position)

METAL HALIDE & HIGH PRESSURE SODIUM DISCHARGE LAMPS (Continue)

- Metal Halide lamps should be turned off for a minimum of 15 minutes per week.
- Lamps should never be operated beyond their rated useful life. The risk of a lamp burst increases with lamp age, temperature, improper operation and improper handling. Replace the lamp at or before the end of its rated life. Group relamping is always recommended.
- Never bump, drop, apply excessive stress, or scratch the lamp. This could cause the lamp to burst! Do not operate any lamps with any traces of scratches, cracks, or physical damage.
- Never operate a lamp above or below its rated current or voltage. This may cause the lamp to leak or burst.
- Always turn off the electrical power before inserting, removing, or cleaning the lamp.
- Clean any dirt, oil, or lint away from the lamp with alcohol and a lint-free cloth or tissue. Dirt or other contaminants will affect light output and may cause the lamp to overheat and decrease lamp life.
- Electrical connections should be clean and in good condition. Replace lamp holders and sockets when needed. Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to lamp and socket.
- Never touch the lamp when it is on, or soon after it has been turned off, as it is hot and will cause serious burns. Lamps should be allowed to cool for a minimum of ten (10) minutes after the lamp is turned off.
- Do not use lamp in close proximity of paper, cloth or other combustible material that can cause a fire hazard.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.

(Hg) - CONTAINS MERCURY. Manage in Accord with Disposal Laws

Metal Halide, Fluorescent and High Pressure Sodium discharge lamps contain Mercury. USHIO realizes the importance of lamp recycling and we encourage all lamps to be properly disposed of in order to help preserve the environment and our Earth's precious natural resources. Please refer to your local environmental laws regarding disposal and recycling of Mercury containing lamps. To learn more about lamp recycling requirements in your area, you can contact your state environmental authorities or visit www.lamprecycle.org.

R - NON SELF-EXTINGUISHING LAMP

WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Complies with the USA Federal Standard 21 CFR 1040.30 and Canada Standard SOR/80-381.

SOLID-STATE LIGHTING / LED LAMPS

- In order to avoid the risk of electrical shock, disconnect or turn off power to the fixture prior to lamp installation or servicing.
- Allow lamp to cool before handling.
- Do not open lamp. No user serviceable parts inside.
- Fully enclosed or recessed fixtures must contain proper ventilation for those lamps that are not approved for fully enclosed fixtures.
- Reliable Operating temperature is -4° F to 113° F.
- USHIO LED devices comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.
- Any modifications to the product will void the warranty.

General Lighting



Entertainment



Scientific-Medical



Audio/Visual & Photographic



Horticulture



Cinema



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