

**HAMAMATSU**

PHOTON IS OUR BUSINESS

# DEUTERIUM LAMPS (D<sub>2</sub> LAMPS)



HAMAMATSU PHOTONICS K.K.

# D<sub>2</sub> LAMPS

FOR HIGH PERFORMANCE DEVICES

Hamamatsu deuterium lamps (D<sub>2</sub> lamps) deliver a long lifetime, excellent stability, and high output to the highest levels to allow users to obtain the maximum performance characteristics from their equipment.

## Hamamatsu deuterium lamps key features and the reasons

### Long lifetime

#### ① UV-transmitting glass

##### ○Problems with prior lamps using quartz glass

Premature deterioration in transmittance cause by UV light

Quality variations due to production process and material inclusions

Troublesome ozone generation

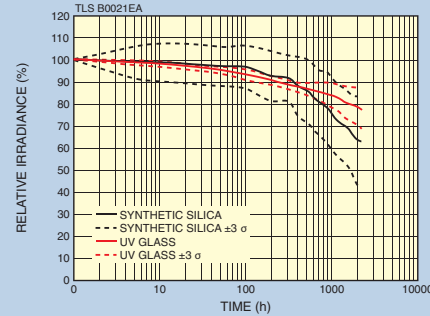
○We solved these problems by using UV-transmitting glass superior to quartz glass!!

High resistance to UV light

High quality with less variations

No ozone generation

##### Life characteristics

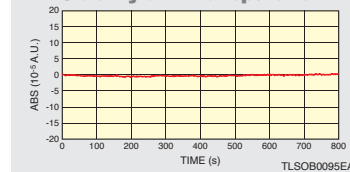


### High stability

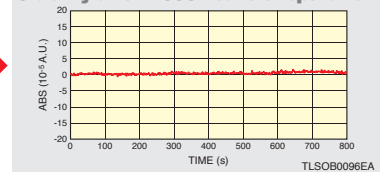
#### Light output stability

Maintains high stability until product lifetime end

##### Stability at initial operation



##### Stability after 2000 hours of operation



#### ② Ceramic electrode

##### ○Problems with prior lamps using (Metal electrode)

Low stability due to being susceptible to ambient conditions

Large variation in light output because electrode spacing is not uniform

○We solved these problems by using ceramic electrodes with excellent temperature characteristics!!

Excellent temperature characteristics ensure high stability

Uniform electrode spacing minimizes variations in characteristics

#### ③ Cathode (Super quiet type)

##### ○Problems with conventional directly-heated type

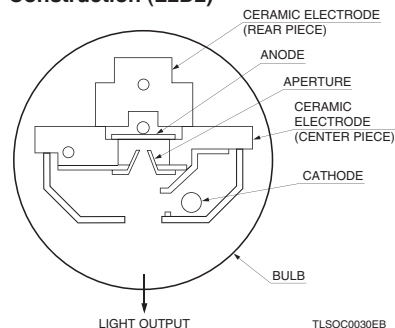
Concentrated radiated heat damage applies a large load to the cathode

Vibration and operating time directly affect cathode deterioration

○We solved these problems of the directly-heated type by using a super quiet cathode!!

Electron emission capability with minimal fluctuations

#### Construction (L2D2)



### Lighting performance

#### ④ Capacitor

##### ○Problems with D<sub>2</sub> lamp without auxiliary ignition

Fails to light up due to electrode deterioration during long-term operation

Fails to light up due to decrease of internal gas during long-term operation

Fails to light up when the lamp is hot and in case of re-igniting right after turning off

○We solved these problems with the conventional lighting method by using auxiliary lighting method!!

Secured lighting even if the lamp is hot or at the end of lifetime

Deuterium lamps are light source lamps that utilize an arc discharge in deuterium (D<sub>2</sub>) gas. They emit an intense spectrum in the UV region and have feature of unrivaled stability compared to other UV light sources.

## PRODUCT LINE-UP / APPLICATION LIST

**33 W**  
**X2D2<sup>®</sup>**  
**LAMPS**  
**High brightness deuterium lamps**  
 High-end light sources that offer the world's highest luminance among the 30 W class \* (twice that of L2D2 lamps)  
**P3**

**30 W**  
**L2D2<sup>®</sup>**  
**LAMPS**  
**Long lifetime deuterium lamps**  
 Best-selling light sources that deliver the high quality and high performance required by chemical analysis instruments while keeping costs low  
**P5**

**5 W to 7 W**  
**S2D2<sup>®</sup>**  
**LAMPS**  
**Compact deuterium lamps**  
 Compact yet high-performance light sources that were impossible to create up till now with conventional deuterium lamps  
**P11**

**110 W**  
**H2D2<sup>®</sup>**  
**LAMPS**  
**Ultra-high luminance deuterium lamps**  
 Next-generation light sources that have achieved the highest luminance in the history of deuterium lamps  
**P14**

\*As of Feb. 2016 according to our research

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Applications	Window material	UV glass	Synthetic silica	MgF <sub>2</sub>
HPLC (High Performance Liquid Chromatography)		⊙	○	×
UV-VIS Spectrophotometer		⊙	○	○
CE (Capillary Electrophoresis)		⊙	○	×
Atomic Absorption Spectrophotometer		⊙	○	×
Thin Layer Chromatography		⊙	○	×
Water Quality, Air Pollution and Other Environmental Analyzer		⊙	○	×
Film Thickness Gauge		⊙	⊙	○
Semiconductor Testing Equipment		○	⊙	⊙
UV Resistance Evaluation of Materials		⊙	⊙	⊙
Photoionization Light Source		×	×	⊙
Static Electricity Removal by Vacuum UV Light		×	×	⊙

⊙: Optimum ○: Usable according to application ×: Not generally suitable

## Peripheral devices that support high performance

### Total support for extracting maximum lamp performance

To enable lamps to exhibit their maximum performance, it is important to design an optimum housing and power supply. We do not only sell deuterium lamps but also provide power supplies and housings specifically designed for deuterium lamps.

Besides selling our own products, we provide technical support to help users design their own lamp housings and power supplies. We are also glad to offer advice on optimal electrical ratings and lamp shapes that meet user specifications.

Please consult with us for specifications that are not listed in our product catalog.



# X2D2<sup>®</sup> LAMPS

The X2D2<sup>®</sup> lamps (high brightness & long lifetime deuterium lamps) deliver unparalleled brightness twice that of L2D2 lamps (see page 5) while still maintaining the high stability and long lifetime offered by the conventional deuterium lamps. These characteristics will enhance sensitivity and throughput in various photometric instruments.

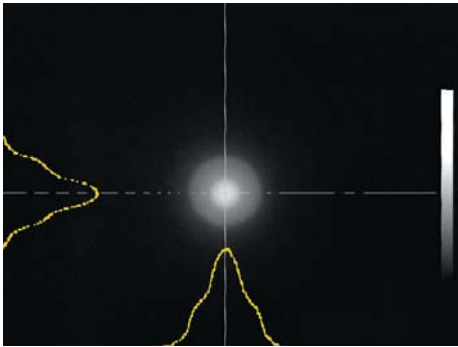


## Features

- Long life: 2000 h
- High stability: 0.005 % (p-p) typ.
- High brightness: 2 times higher than L2D2 lamps

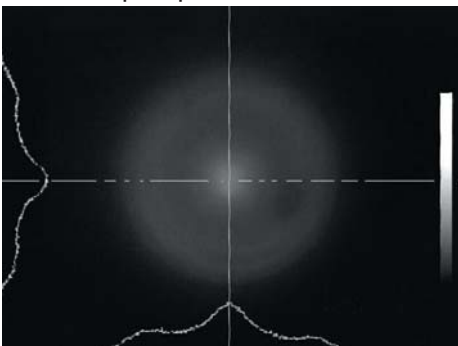
### Arc distribution

- X2D2 lamp Aperture size: 0.5 mm



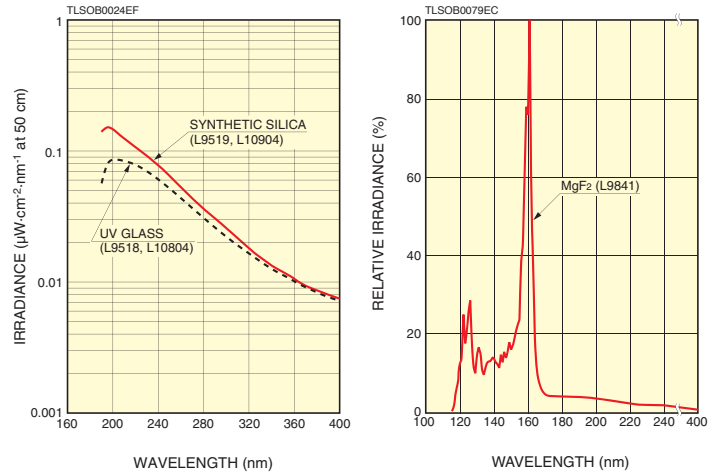
**2 times**  
higher than  
conventional type

- L2D2 lamp Aperture size: 0.5 mm

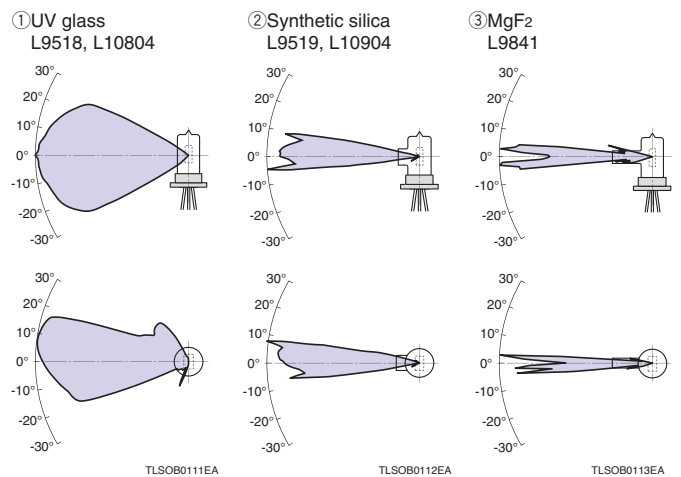


## Characteristics

### Spectral distribution

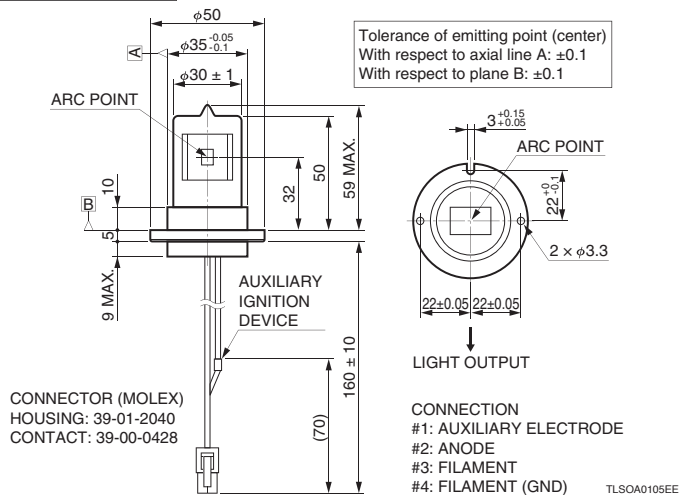


### Directivity (Light distribution)

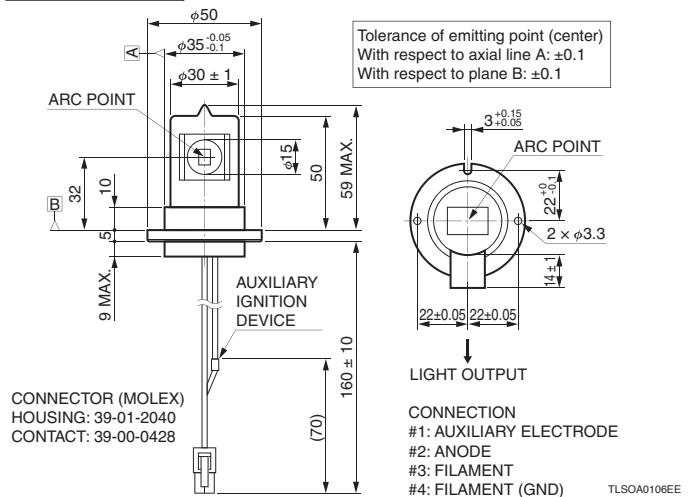


## Dimensional outline (Unit: mm)

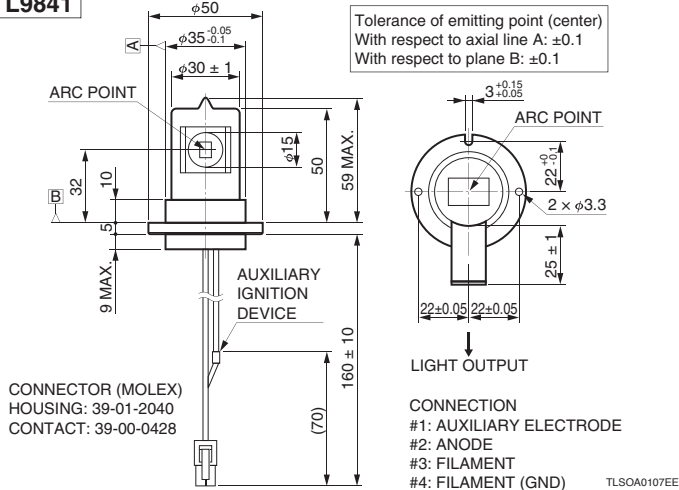
### L9518, L10804



### L9519, L10904

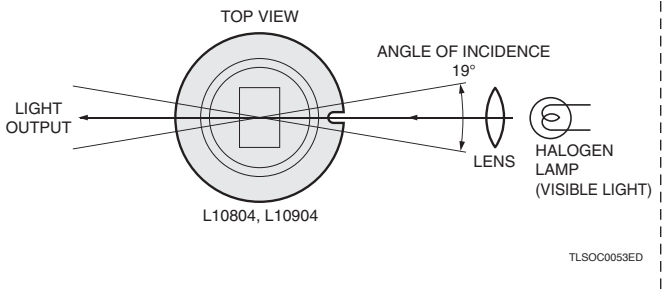


### L9841



### Example of optical system layout for visible light (X2D2 lamp)

The see-through structure allows easy use in combination with a visible light source.



## Specifications

Type No.	L9518	L10804	L9519	L10904	L9841	Unit
Type	Standard	See-through	Standard	See-through	Standard	—
Window material	UVglass		Synthetic silica		MgF <sub>2</sub>	—
Spectral distribution	185 to 400		160 to 400		115 to 400 <sup>⑤</sup>	nm
Aperture diameter	0.5					mm
Output stability at 230 nm	Drift (Max.)		±0.3			%/h
	Fluctuation (p-p) Typ.		0.005			%
Guaranteed life at 230 nm <sup>④</sup>	2000					h
Discharge starting voltage (Max.) <sup>⑥</sup>	400					V dc
Anode current	300 ± 30					mA dc
Tube voltage (Typ.)	90		85			V dc
Filament ratings	Warm-up	Voltage	2.5 ± 0.25			V dc
		Current (Typ.)	4			A dc
	Operating	Voltage	1.7 ± 0.2			V dc
		Current (Typ.)	3.3			A dc
Filament warm-up time (Min.)	20					s
Power supply <sup>③</sup>	C9559, M9521					—
Bulb wall temperature <sup>⑦</sup>	245 to 290					°C

④ Lamp life end is defined as the point when light output at 230 nm falls to 50 % of its initial value or when output fluctuations exceed 0.05 % (p-p).

⑤ A trigger voltage must be applied to the anode and auxiliary electrode. ⑥ The power supply for the L2D2 cannot be used to operate X2D2 lamps.

⑦ Recommended temperature for operating a lamp in the lamp housing. Consult us on how to measure the temperature.

⑧ Does not support vacuum evacuation and so should be used in nitrogen atmosphere.

\* Custom lamps not listed above will be available on request. Please feel free to contact us.

# L2D2<sup>®</sup> LAMPS

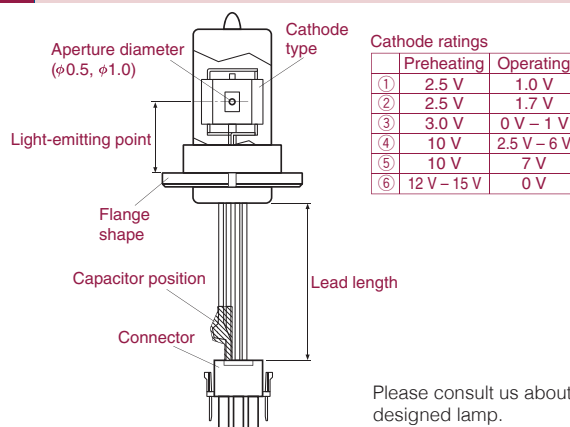
The L2D2<sup>®</sup> lamps are UV light sources with a long service lifetime and high stability. These L2D2 lamps have characteristics essential for light sources used in chemical analysis instruments and provide high measurement accuracy.



## Features

- Long life: 4000 h (L6565)
- High stability: 0.005 % (p-p) typ.
- Small intensity variations
- Low cost
- Error-free lighting

## Example of custom-designed lamp



Please consult us about custom designed lamp.

## Specifications

Type No.	Type	① Dimensional outline	Window material	Spectral distribution (nm)	Aperture diameter (mm)	Output stability at 230 nm		② Guaranteed life at 230 nm (h)	③ Required discharge starting voltage Max. (V dc)	Anode current (mA dc)	Tube voltage Typ. (V dc)
						Drift Max. (%/h)	Fluctuation (p-p) Typ. (%)				
L6565	Standard	①	UV glass	185 to 400	1.0	±0.3	0.005	4000	350	300 ± 30	80
L6301		⑧									
L6301-50		①									
L6303		③									
L12313		⑦									
L12313-50		②									
L6307		④	Synthetic silica	160 to 400							
L6309		⑥									
L7296		②	UV glass	185 to 400							
L7296-50		⑤	MgF <sub>2</sub>	115 to 400							
L12307		⑨									
L7293		①									
L7293-50		⑧	UV glass	185 to 400							
L6999		④			1.0	—	—	2000 <sup>④</sup>	350		
L6999-50	⑥										
L9030	②										
L9030-50	⑦										
	See-through	①	Synthetic silica	160 to 400	0.5	±0.3	0.005	2000	400		
		⑧									
		④									
		⑥									

① See pages 7 and 8.

② Lamp life end is defined as the point when light output at 230 nm falls to 50 % of its initial value or when output fluctuations exceed 0.05 % (p-p).

③ A pulse voltage higher than this value must be supplied to start reliable lamp discharge.

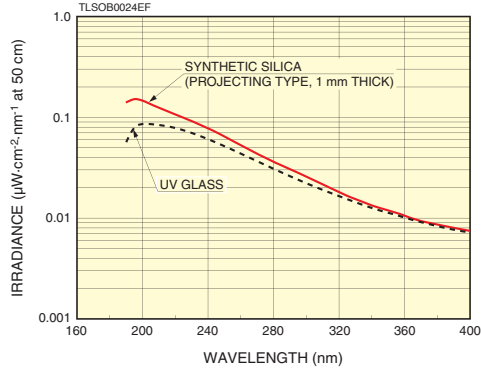
④ Operating life may vary depending on operating environmental conditions (vacuum atmosphere).

# Characteristics

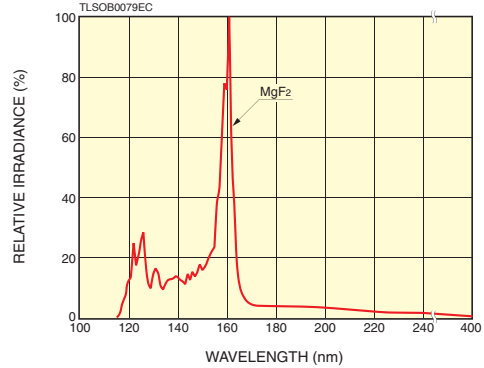
## ●Spectral distribution

Deuterium lamps emit high intensity light in the UV range at wavelengths shorter than 400 nm. Light intensity on the short wavelength side is determined by the window material used.

### ■UV glass, Synthetic silica

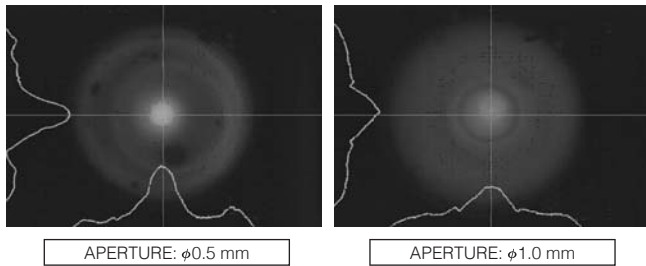


### ■MgF<sub>2</sub>

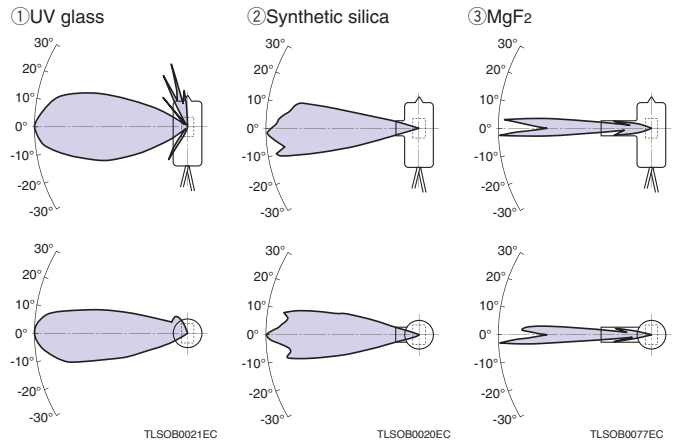


## ●Arc distribution

Arc distribution of deuterium lamps is determined by the aperture (light exit) size. At the same input current and voltage, lamps with a 0.5 mm aperture provide 1.4 times higher intensity than lamps with a 1.0 mm diameter aperture.



## ●Directivity (Light distribution)



Filament ratings				Filament warm-up time Min. (s)	Applicable power supply <sup>(H)</sup>		Bulb wall temperature (Recommended) <sup>(I)</sup>	Type No.
Warm-up		Operating			AC input type	DC input time		
Voltage <sup>(E)</sup> (V dc, ac)	Current Typ. (A dc, ac)	Voltage (V dc)	Current Typ. (A dc)					
2.5 ± 0.25	4	1.0 ± 0.1	1.8	20	C9598-2510	M9596-2510	245 to 290	L6565
		1.7 ± 0.2	3.3		C9598-2517	M9596-2517		L6301
3	5	0 to 1	0 to 1.8		C9598-3000	M9596-3000		L6301-50
		0.8	2.5 to 6.0 <sup>(F)</sup>		0.3 to 0.6	C9598-1035		M9596-1035
10 ± 1	1.2	7.0 ± 0.5	1		C9598-1070	M9596-1070		L12313
		0 <sup>(G)</sup>	0 <sup>(G)</sup>		C9598-1555	M9596-1555		L12313-50
2.5 ± 0.25	4	1.0 ± 0.1	1.8		C9598-2510	M9596-2510		L6307
					L6309			
					L7296			
					L7296-50			
				L12307				
				L7293				
				L7293-50				
L6999								
L6999-50								
L9030								
L9030-50								

<sup>(E)</sup> If the cable between the lamp and power supply is too long, a large filament voltage drop occurs in the cable that might make the lamp filament voltage too low. The filament power supply should be designed to supply the specified voltage at the lamp input terminal.

<sup>(F)</sup> Recommended operating voltage is 3.5 V ± 0.5 V.

<sup>(G)</sup> During lamp operation a discharge current flows into the filament so no external power supply is needed to maintain the filament temperature.

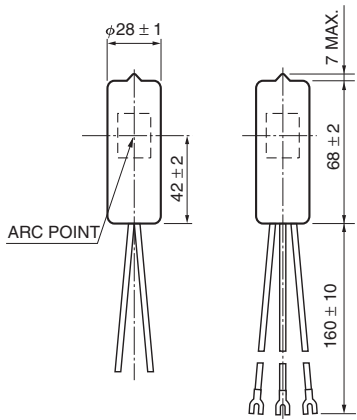
<sup>(H)</sup> To extract full performance from our deuterium lamps we recommend using our dedicated power supplies.

<sup>(I)</sup> Recommended temperature for operating a lamp in the lamp housing. Consult us on how to measure the temperature.

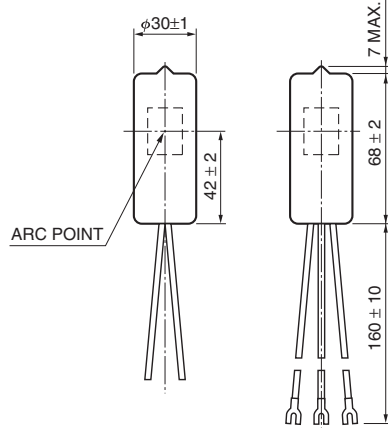
\* Custom lamps not listed above will be available on request. Please feel free to contact us.

# Dimensional outline (Unit: mm)

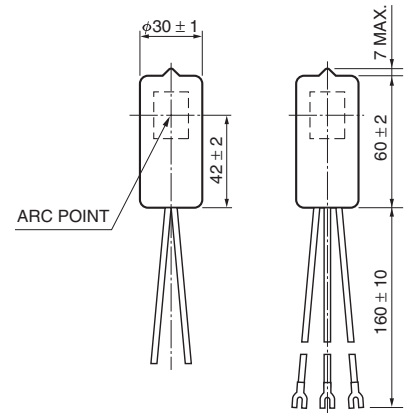
① L6301, L6565, L6303, L6999 See-through type



② L6307, L6309, L12307



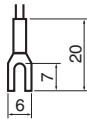
③ L12313



CONNECTION

L6303	
FILAMENT	: BLUE
FILAMENT · GND	: BLACK
ANODE	: RED

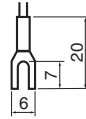
L6301, L6565, L6999	
FILAMENT	: BLUE
FILAMENT	: BLUE
ANODE	: RED



TL50A0040ED

CONNECTION

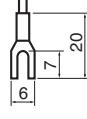
FILAMENT	: BLUE
FILAMENT · GND	: BLACK
ANODE	: RED



TL50A0018EF

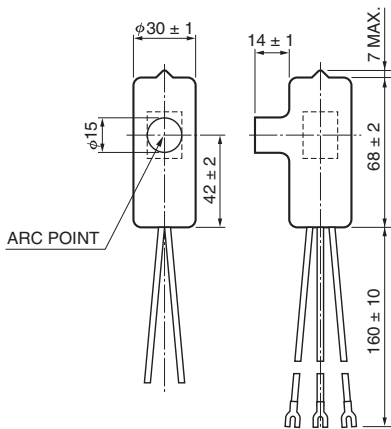
CONNECTION

FILAMENT	: BLUE
FILAMENT · GND	: BLUE
ANODE	: RED



TL50A0039EF

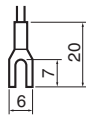
④ L7296, L9030 See-through type



CONNECTION

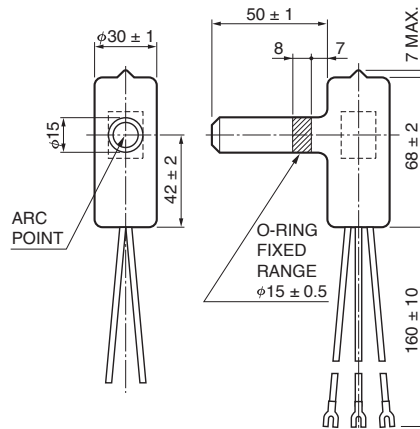
L7296	
FILAMENT	: BLUE
FILAMENT · GND	: BLACK
ANODE	: RED

L9030	
FILAMENT	: BLUE
FILAMENT	: BLUE
ANODE	: RED



TL50A0017EG

⑤ L7293



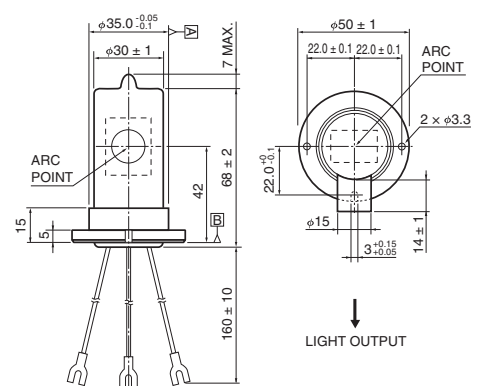
CONNECTION

L7293	
FILAMENT	: BLUE
FILAMENT	: BLUE
ANODE	: RED



TL50A0011EF

⑥ L7296-50, L9030-50 See-through type



CONNECTION

L7296-50	
FILAMENT	: BLUE
FILAMENT · GND	: BLACK
ANODE	: RED

L9030-50	
FILAMENT	: BLUE
FILAMENT	: BLUE
ANODE	: RED

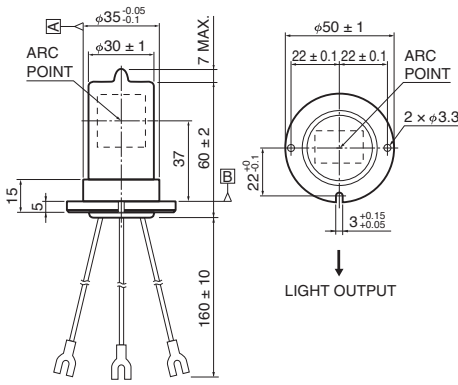


Tolerance of emitting point (center)  
With respect to axial line A: ±0.1  
With respect to plane B: ±0.1

TL50A0075EE



**7 L12313 -50**



**CONNECTION**

FILAMENT: BLUE  
FILAMENT: BLUE  
ANODE : RED

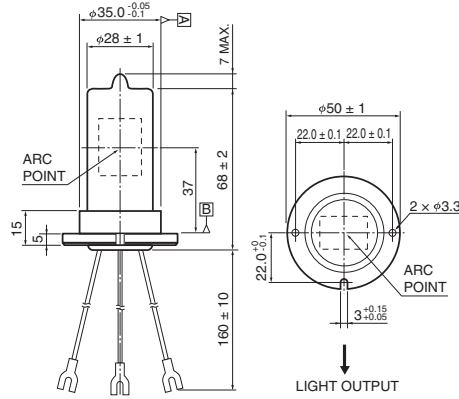


Tolerance of emitting point (center)  
With respect to axial line A:  $\pm 0.1$   
With respect to plane B:  $\pm 0.1$

TLSOA0050EA

**8 L6301-50, L6999-50**

See-through type



**CONNECTION**

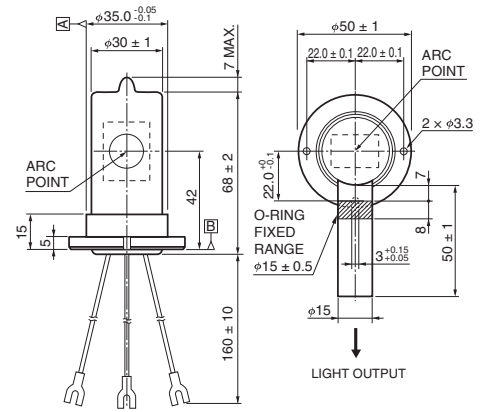
FILAMENT: BLUE  
FILAMENT: BLUE  
ANODE : RED



Tolerance of emitting point (center)  
With respect to axial line A:  $\pm 0.1$   
With respect to plane B:  $\pm 0.1$

TLSOA0051ED

**9 L7293-50**



**CONNECTION**

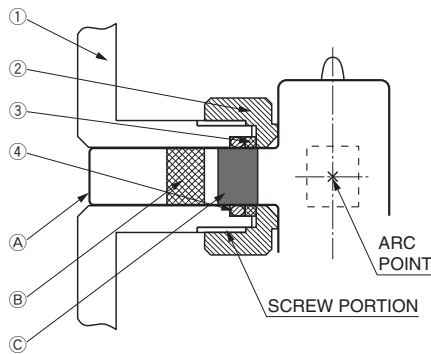
FILAMENT: BLUE  
FILAMENT: BLUE  
ANODE : RED



Tolerance of emitting point (center)  
With respect to axial line A:  $\pm 0.1$   
With respect to plane B:  $\pm 0.1$

TLSOA0088EC

**Mounting example on the vacuum system (L7293, L7293-50)**



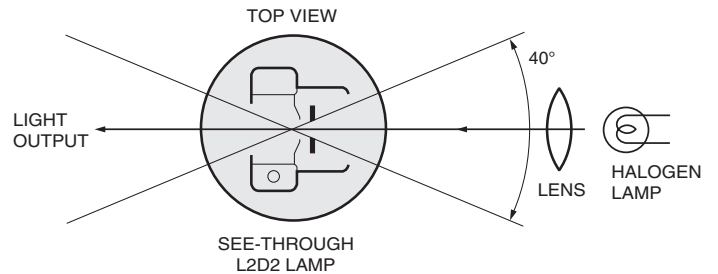
- ① VACUUM FLANGE
- ② TIGHTENING SCREW
- ③ O-RING JIS B2401  
CALL No. V15
- ④ SPACER
- A MgF<sub>2</sub> WINDOW
- B GRADED SEAL
- C O-RING FIXED RANGE

TLSO 0053EA

**See-through type**

The see-through type electrode structure enables straight-line arrangement of the halogen lamp, deuterium lamp, optical system and optical path. This simplifies optical design of UV-VIS spectrophotometer etc., and eliminates loss of light amount caused by the half mirror.

**An example for optics of See-through type**



TLSOC0011EF

**▼Type No.**

L6999, L6999-50, L9030, L9030-50

**X2D2<sup>®</sup>**  
LAMPS

**L2D2<sup>®</sup>**  
LAMPS

# POWER SUPPLY FOR D<sub>2</sub> LAMPS LAMP HOUSE

Applications using deuterium lamps require very high stability of light output, so using a Hamamatsu dedicated power supply and lamp house is recommended to operate these lamps. When users are designing their own power supply and lamp housing, we provide technical support and follow-up to ensure an optimal optical design so please consult us when needed.

E9522-50: for L9518 E9558-50: for L9519  
E9522: for L6301-50 E9558: for L7296-50

\* We welcome requests for custom products for see-through types (L10804, L6999-50, L6999-50 and L9030-50).

## Power supply for X2D2<sup>®</sup> lamps / Lamp housing



▲Power supply Left: C9559, Right: M9521



▲Lamp housing Left: E9522-50, Right: E9558-50

## Power supply for L2D2<sup>®</sup> lamps / Lamp housing



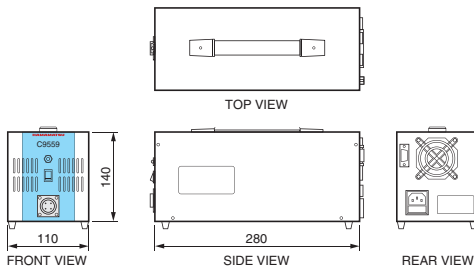
▲Power supply Left: C9598, Right: M9596



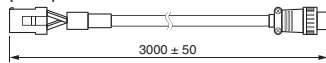
▲Lamp housing Left: E9522, Right: E9558

## Dimensional outline (Unit: mm)

### ●C9559

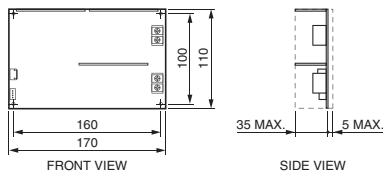


### ●Supplied lamp output cable



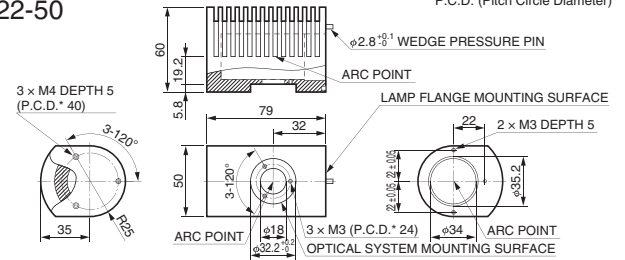
TLSOA0112EA

### ●M9521



TLSOA0113EA

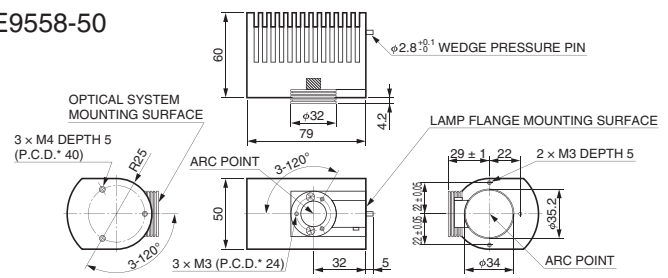
### ●E9522-50



\* P.C.D. (Pitch Circle Diameter)

TLSOA0114EA

### ●E9558-50



TLSOA0115EA

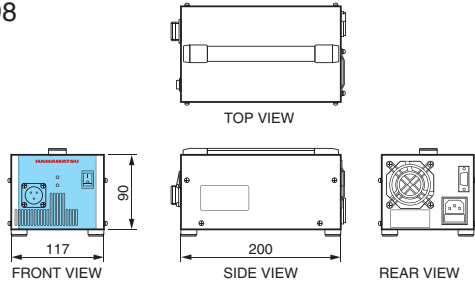
## Power supply for X2D2 lamp specifications

Parameter		C9559	M9521	Unit	
Input	Input voltage	AC 100 V to AC 240 V (100 V/200 V Auto switching) Single phase 50 Hz / 60 Hz	DC 24 V ± 2.4 V	—	
	Input current (Max.)	1.4	3	A	
Output	Output voltage (DC)	With load (Typ.)	85 / 90	V dc	
		Without load (Min.)	200	V dc	
	Output current (DC)	300 ± 30		mA dc	
	Current fluctuation (p-p) (Typ.)	0.005		%	
	Current drift at 25 °C (Typ.)	±0.02		%/h	
	Filament ratings	Warm-up	Voltage	2.5 ± 0.2	V dc
			Current (Typ.)	4	A dc
		Operation	Voltage	1.7 ± 0.2	V dc
			Current (Typ.)	3.3	A dc
	Filament warm-up time		Approx. 20	s	
Trigger voltage	Anode	600		V peak	
	Auxiliary electrode	600		V peak	
Cooling method	—	Forced air cooling (0.3 m <sup>3</sup> /min)	—		
Operation ambient temperature		0 to +40	°C		
Storage temperature		-10 to +60	°C		
Operating and storage humidity		Below 80 (No condensation)	%		
External control (Lamp ON/OFF, Lamp irradiation signal)		Yes	Yes	—	
Conformance standards	CE	Yes	Yes	—	
	UL (File No. E249677)	—	Yes	—	

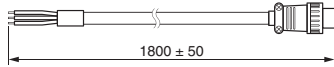
## Dimensional outline (Unit: mm)

ⓘ The power supply for the L2D2 cannot be used to operate X2D2 lamps. \* P.C.D. (Pitch Circle Diameter)

### ●C9598

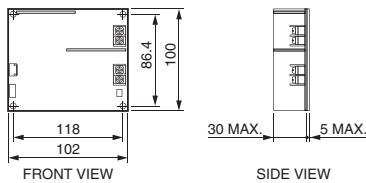


#### ●Supplied lamp output cable



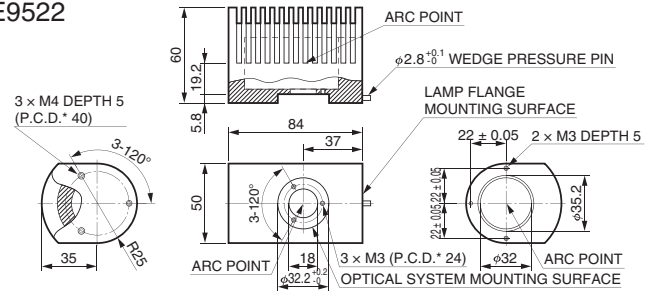
TLSOA0116EA

### ●M9596



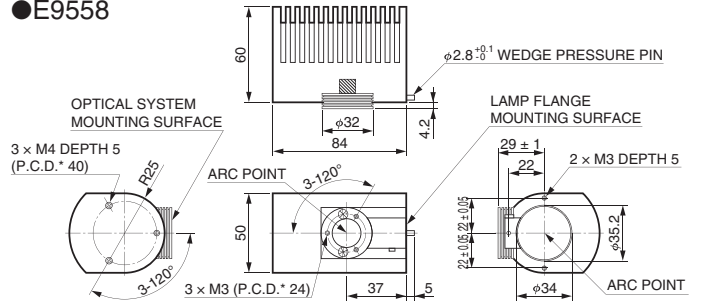
TLSOA0117EA

### ●E9522



TLSOA0118EA

### ●E9558



TLSOA0119EA

## Power supply for L2D2 lamp specifications

Parameter		C9598	M9596	Unit
Input	Input voltage	AC 100 V to AC 240 V (100 V/200 V Auto switching) Single phase 50 Hz / 60 Hz	DC 24 V ± 2.4 V	—
	Input current (Max.)	0.9	2	A
Output	Output voltage (DC)	With load (Typ.)	80	V
		Without load (Min.)	200	V
	Output current (DC)	300 ± 30		mA
	Current Fluctuation (p-p) (Typ.)	0.005		%
	Current drift at +25 °C (Typ.)	±0.02		%/h
	Warm-up time	Approx. 20		s
	Trigger voltage	Approx. 600		V peak
Cooling method		—	Forced air cooling (0.3 m <sup>3</sup> /min)	—
Operation ambient temperature		0 to +40		°C
Storage temperature		-10 to +60		°C
Operating and storage humidity		Below 80 (No condensation)		%
External control (Lamp ON/OFF, Lamp irradiation signal)		Yes	Yes	—
Conformance standards	EN (CE marking)	Yes	Yes	—
	UL (File No. E249677)	—	Yes	—

## Filament ratings

Type No.	Warm-up		Operation		Applicable lamp
	Voltage (V dc)	Current (A dc)(Typ.)	Voltage (V dc)	Current (A dc)(Typ.)	
C9598/M9596-2510	2.5 ± 0.2	4	1.0 ± 0.1	1.8	L6565, L7293, L6999, L6999-50, L7293-50 L6301, L6301-50, L9030, L9030-50
C9598/M9596-2517	2.5 ± 0.2	4	1.7 ± 0.2	3.3	L6303
C9598/M9596-3000	3 ± 0.2	5	0	0	L12313
C9598/M9596-1035	10 ± 0.5	0.8	3.5 ± 0.2	0.3	L6307
C9598/M9596-1070	10 ± 0.5	1.2	7 ± 0.4	1	L7296, L6309, L7296-50
C9598/M9596-1555	13.5 ± 0.7	0.5	5.25 ± 0.25	0.3	L12307

# S2D2<sup>®</sup> LAMPS

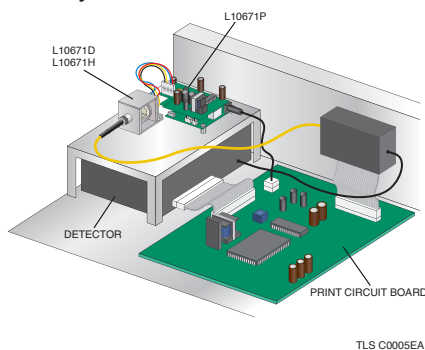
The S2D2<sup>®</sup> lamps are compact deuterium lamps with a drastically reduced size compared to ordinary deuterium lamps. Despite their compact body, the S2D2 lamps have the same high stability as conventional deuterium lamps and a unique electrode structure that delivers high brightness.



▲Left: L13301  
Right: L10671D

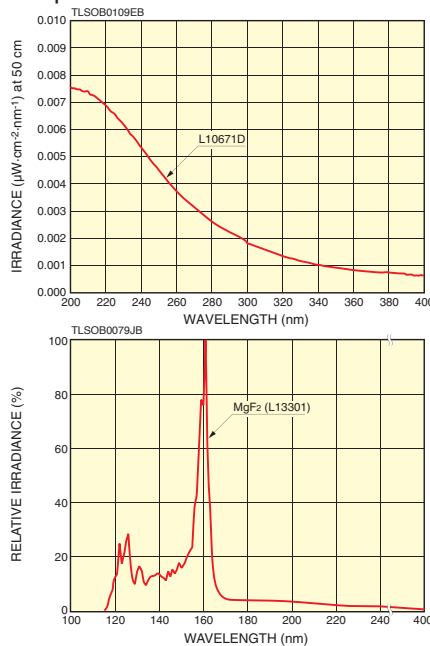
## Features

- Long life: 1500 h (L10671D)
- Compact
- High stability: 0.005 % (p-p) typ.
- High output UV continuous spectrum
- Low power consumption
- Easy to use

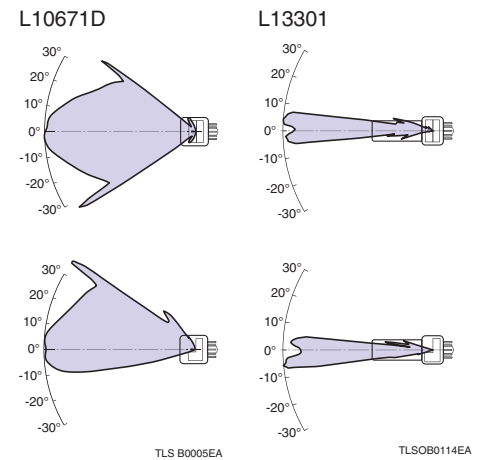


## Characteristics

### ● Spectral distribution



### ● Directivity (Light distribution)



## Specifications

Parameter		Description / Value		Unit
Type No.		L10671D	L13301	—
Window material		UV glass	MgF <sub>2</sub>	—
Spectral distribution		185 to 400	115 to 400	nm
Aperture diameter		1.0		mm
Output stability at 230 nm	Drift (Max.)	±0.25		%/h
	Fluctuation (p-p) (Typ.)	0.005		%
Guaranteed life at 230 nm <sup>(A)</sup>		1500	1000 <sup>(B)</sup>	h
Output current		30	50	mA
Output voltage (Typ.)		Approx. 135		V
Filament ratings	Warm-up	Voltage	4.2	V
		Current (Typ.)	0.55	A dc
	Operating	Voltage	3.5	V
		Current (Typ.)	0.5	A dc
Filament warm-up time (Min.)		Approx. 25		s
Bulb wall temperature <sup>(B)</sup> (Max.)		185	240	°C
Storage temperature		-10 to +60		°C
Storage humidity		Below 85 % (No condensation)		—

<sup>(A)</sup>Lamp life end is defined as the point when light output at 230 nm falls to 50 % of its initial value or when output fluctuations exceed 0.05 % (p-p).

<sup>(B)</sup> Position "a" in dimensional outline      <sup>(C)</sup>Operating life may vary depending on operating environmental conditions (vacuum atmosphere).



# RELATED PRODUCTS

## Fiber light source

### APPLICATIONS

- Spectrophotometry
- Environmental measurement
- Absorption spectrum measurement
- Microtiter plate reader
- Pharmaceutical testing
- High-performance liquid chromatography
- Biological measurement
- Semiconductor inspection
- Optical component inspection

### Compact UV-VIS S2D2 fiber light source L12515

The L12515 is the world's smallest UV-visible fiber light source containing an S2D2® compact deuterium lamp. Despite its small size, the L12515 delivers high output and high stability. Its compact, easy-to-carry size and low voltage operation make it useful for various types of portable devices.

#### Features

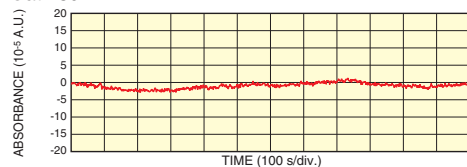
- Compact: 72 mm × 40 mm × 90 mm
- High stability: Fluctuation 0.004 % p-p (Typ.) (equivalent  $2 \times 10^{-5}$  A.U.)
- External control
- Shutter function



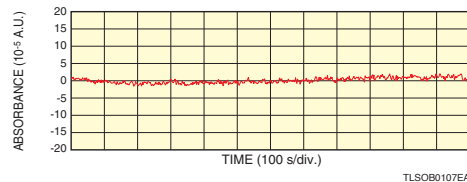
▲L12515

#### Light output stability

● at 230 nm



● at 600 nm

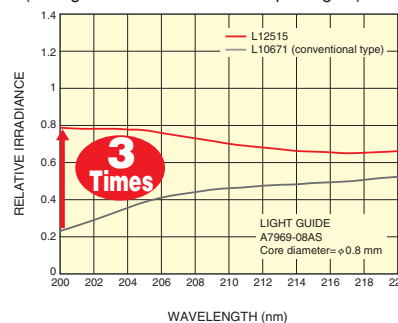


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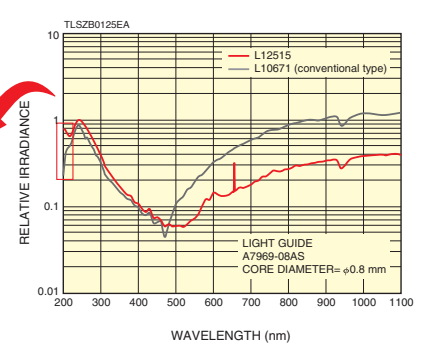
#### Characteristics

● Spectral distribution (Typical data)

● 200 nm to 220 nm (enlarged view of enhanced output region)



● 200 nm to 1100 nm

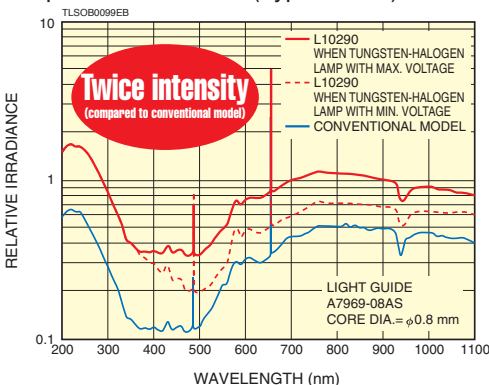


### High power UV-VIS fiber light source L10290

The L10290 is a high power UV-visible fiber light source that outputs 200 nm to 1600 nm light through a light guide (sold separately). The L10290 utilizes a high brightness deuterium lamp (X2D2 lamp) to provide radiant intensity that is about twice that of our conventional products. These features make it easier to use a UV-visible light source with high power and high stability.

#### Characteristics

● Spectral distribution (Typical data)



#### Features

- High output: Twice intensity (Compared to conventional model)
- High stability: Fluctuation 0.004 % p-p (Typ.) (equivalent to  $2 \times 10^{-5}$  A.U.)
- Long life lamp: 2000 hours
- External control
- Shutter function
- Filter holder (Sold separately)



▲L10290

# VUV light source

## APPLICATIONS

- Electrostatic remover
- Semiconductor inspection
- Dechucking of electrostatic chucks
- Film thickness measurement
- Material resistance evaluation
- LCD manufacturing equipment
- Spectrophotometry
- Photoionization source

## H2D2 light source unit L11798, L11799

The H2D2 light source unit contains a high-brightness, high-end deuterium lamp (H2D2 lamp) that emits light at a brightness 6 times higher than our current deuterium lamps (L2D2 lamps). Despite its high brightness, the H2D2 is highly stable, has a long service life, and allows air-cooled operation by a specially designed housing. This feature makes it much more convenient and easy to use than ordinary water-cooled lamps. The H2D2 can be used in various applications and enhances equipment sensitivity and throughput.



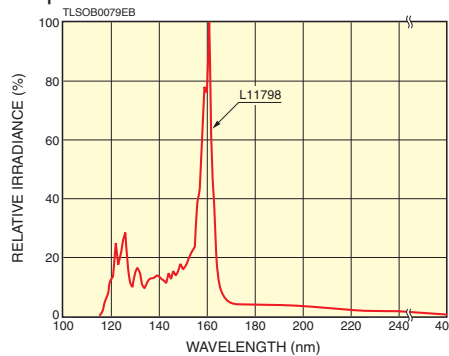
▲L11798, L11799  
Left: Light source, Right: Power supply

### Features

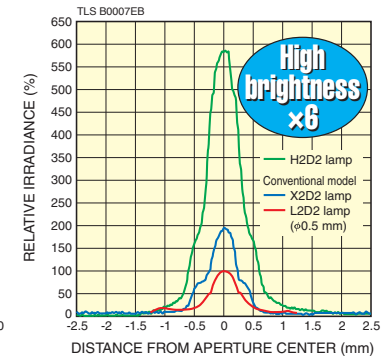
- High brightness: 6 times (Compared to L2D2 lamp)
- High stability: Fluctuation 0.05 % p-p (Max.)  
Drift  $\pm 0.3$  %h (Max.)
- Long life: Warranty of 1000 hours
- Air cooling (needs no cooling water)
- External control

### Characteristics

#### ● Spectral distribution



#### ● Arc distribution



## Electrostatic remover VUV ionizer L12542



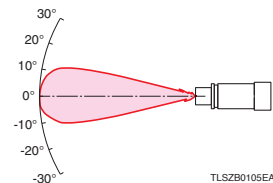
Due to its wide irradiation angle about 3 times larger than our current VUV light source, the L12542 efficiently removes electrostatic charges over large areas in depressurized or vacuum environments. Up until now two or more VUV light sources were needed to neutralize electrostatic charges in large areas due to their limited irradiation angle. The L12542 solves this problem and efficiently neutralizes large areas in a vacuum.



▲L12542  
Left: Light source, Right: Power supply

### Characteristics

#### ● Directivity (Light distribution)



## S2D2 VUV light source unit L10706 series

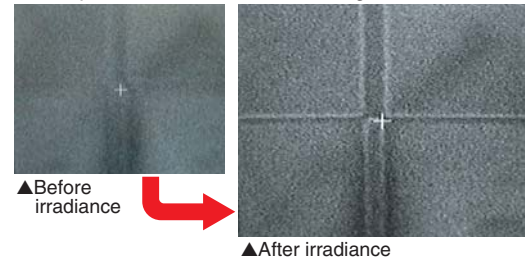
The S2D2 VUV light source unit is a vacuum ultraviolet light source unit that incorporates a compact deuterium lamp with an MgF<sub>2</sub> window. Equipped with a SUS flexible tube with a vacuum flange and a unique cooling mechanism, this light source unit allows irradiating objects or samples at a very close distance, and can be installed and operated under depressurized conditions. The compact lamp unit and SUS flexible tube offer greater flexibility in attaching the light source unit to various types of equipment.



▲L10706  
Left: Light source, Right: Power supply

### SEM image

#### ● Comparison of electrostatic charge removal effect



\* It is also possible to remove electrostatic charges by other D<sub>2</sub> lamps with MgF<sub>2</sub> window.



## ■ HANDLING PRECAUTION

1. Deuterium lamps emit ultraviolet rays which can be harmful to eyes and skin. Do not look directly at the emitted light or allow direct exposure to skin. Always wear protective glasses or goggles and clothing when operating the lamps. (Refer to JIS T 8141 or equivalent safety standards).
2. Since the bulb wall temperature reaches a high temperature (over 200 °C) during lamp operation, do not touch it with bare hands or bring inflammable objects near it.
3. Do not apply vibrations or mechanical shocks to the lamp. These might cause light output stability to deteriorate.
4. Graded sealing of synthetic silica and MgF<sub>2</sub> window:  
On bulbs using synthetic silica or MgF<sub>2</sub> window, the window is formed by so-called "graded sealing" which connects different glasses with slightly different expansion rates. Since the mechanical strength of the seams of this graded sealing is low, use caution when securing the lamp so that no force is exerted on those seams during use.
5. Before turning on the lamp, wipe the bulb and window gently using alcohol or acetone. Do not handle the lamp with bare hands. Dirt or smears on the window will cause a significant drop in ultraviolet transmittance.
6. High voltage is used to operate these lamps. Use extreme caution to prevent electrical shock.
7. Be sure to avoid to store the lamp under high humidity and high temperature. Also, in case the lamp is not used for a long time, it with package in the place where shock or vibration is not applied.
8. Handling MgF<sub>2</sub> and synthetic quartz windows:  
UV light generates ozone when it irradiates an atmosphere containing oxygen. The amount of the generated ozone is low and so does not affect the human body but does produce an ozone smell. So ventilate the room from time to time when using a lamp with an MgF<sub>2</sub> or synthetic quartz window in a closed room.

## ■ WARRANTY

Lamps are warranted for a period of one year from the date of shipment. If a lamp is found to be defective within this warranty period, Hamamatsu will replace the defective lamp without charge. (This warranty is limited to replacement of the defective lamp.) Even if within the warranty period (one year), the warranty shall not apply to cases where the lamp operation time has exceeded the guaranteed life, or the trouble was caused by incorrect operation or natural or man-made disasters.

## ■ DISPOSAL OF LAMPS

When disposing of the used lamp, take appropriate measures in compliance with applicable regulations regarding waste disposal and correctly dispose of it yourself, or entrust disposal to a licensed industrial waste disposal company.

In any case, be sure to comply with the regulations in your country, state, region or province to ensure the used lamp is disposed of legally and correctly.

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### HAMAMATSU PHOTONICS K.K., Electron Tube Division

314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218 E-mail: [usa@hamamatsu.com](mailto:usa@hamamatsu.com)

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: [info@hamamatsu.de](mailto:info@hamamatsu.de)

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: [infos@hamamatsu.fr](mailto:infos@hamamatsu.fr)

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: [info@hamamatsu.co.uk](mailto:info@hamamatsu.co.uk)

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01 E-mail: [info@hamamatsu.se](mailto:info@hamamatsu.se)

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: [info@hamamatsu.it](mailto:info@hamamatsu.it)

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: [hpc@hamamatsu.com.cn](mailto:hpc@hamamatsu.com.cn)

Taiwan: Hamamatsu Photonics Taiwan Co., Ltd.: 8F-3, No.158, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)03-659-0080, Fax: (886)03-659-0081 E-mail: [info@hamamatsu.com.tw](mailto:info@hamamatsu.com.tw)

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