

# LIGHT SOURCE

# 5 W XENON FLASH LAMP MODULES



## OVERVIEW

Hamamatsu offers xenon flash lamp modules containing a 5 W xenon flash lamp along with its power supply and trigger socket. Up to 5 W of energy can be input, which is the maximum among lamp modules of this size. These xenon flash lamp modules also deliver high stability and long service life, making them ideal as a light source for water quality and atmospheric analyzers.

## APPLICATIONS

- Blood analyzers
- Laboratory testing
- Air pollution analysis
- Water quality and pollution analysis
- Microplate readers
- Fluorescence spectrophotometers
- Semiconductor inspection
- Light sources for image processing

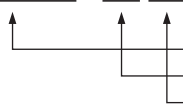
## FEATURES

- High stability... 1.5 % CV or less
- Long life...  $1 \times 10^9$  flashes or more
- Compact size
- Repetitive emission frequency  
... 530 Hz Max.
- Broad emission spectrum  
... Covers from UV to near IR
- Compatible with SMA fibers  
... No lens design required
- Silent type  
... Audible noise reduced to 1/10 or less
- High precision type  
...  $\pm 0.05$  mm precision
- Internal EMC noise filter  
... Electromagnetic noise reduced to  
CISPR 11 Class B

# HIGHLY STABLE TYPE FOR ANALYTICAL INSTRUMENTS

## TYPE NUMBER GUIDE

L O O O O - A B



### ●Type No.

Type No.	Arc size	Type	Maximum input
L9455	1.5 mm	Side-on	50 mJ
L9456	3.0 mm		

### A: Module type

Suffix	Module type
0	Standard
1	SMA fiber adapter
2 *	Silent
4 *	High precision

\* Make to order

\* The L9456 is not available as a module with an SMA fiber adapter.

### B: Main discharge capacitance

Suffix	Capacitance
1	0.22 $\mu$ F
2	0.11 $\mu$ F
3	0.047 $\mu$ F
4	0.28 $\mu$ F

Window material change, built-in EMC noise filter and lamp electrode angle change are available as options. please feel free to consult us.

## SPECIFICATIONS

Parameter	L9455 series	L9456 series	Unit
Arc size	1.5	3.0	mm
Window material	UV glass		—
Emission wavelength range	185 to 2000		nm
Main discharge voltage variable range ①	400 to 600		V
Main discharge capacitor ②	0.22 / 0.11 / 0.047 / 0.28		$\mu$ F
Maximum input energy (per flash) ③	See operating conditions.		—
Maximum average input (continuous) ④	5		W
Light output stability (Max.) ⑤	2.0	1.5	% CV
Guaranteed life ⑥	$1 \times 10^9$		flashes
Input voltage range	11 to 28		V
Input current	1		A
Inrush current	4		A
Trigger input	Rectangular wave 5 V to 10 V; pulse width must be 10 $\mu$ s or more. ⑦		—
Trigger input impedance	330		$\Omega$
Cooling method	Not required ⑧		—
Weight (standard type: L9455-01)	Approx. 155		g
Operating temperature range	0 to +40		$^{\circ}$ C
Storage temperature range	-40 to +90		$^{\circ}$ C
Storage humidity range	Below 95 (no condensation)		% RH
EMC standards	Without EMC noise filter	IEC61326-1: 2005 Group1, ClassA	
	With EMC noise filter	IEC61326-1: 2005 Group1, ClassB	
Safety standards	IEC62471: 2006 Risk Group3		—

### NOTE:

- ① Internal: Adjustable with variable trimmer.  
External: Variable with control voltage from 3.2 V to 4.8 V.
- ② Installed at time of shipment (refer to the above lineups).
- ③ Maximum lamp input energy (per flash)  
 $E=1/2 CV^2$   
E: Maximum lamp input energy (J)  
V: Main discharge voltage (V)  
C: Main discharge capacitance (F)
- ④ Maximum average lamp input (continuous)  
 $W=E \times f$   
f: Lamp emission repetition frequency (Hz)
- ⑤ Light output stability is given by:  
Light output stability (% CV) =  
light output standard deviation /  
average light output  $\times 100$
- ⑥ At 5 W operation
- ⑦ Only for external control;  
synchronized with rising edge.
- ⑧ Cooling is required when the  
package temperature exceeds  
50  $^{\circ}$ C during operation.

## VIBRATION AND SHOCK RESISTANCE

Resistance to vibration: 5 Hz to 200 Hz, 15 m/s<sup>2</sup>

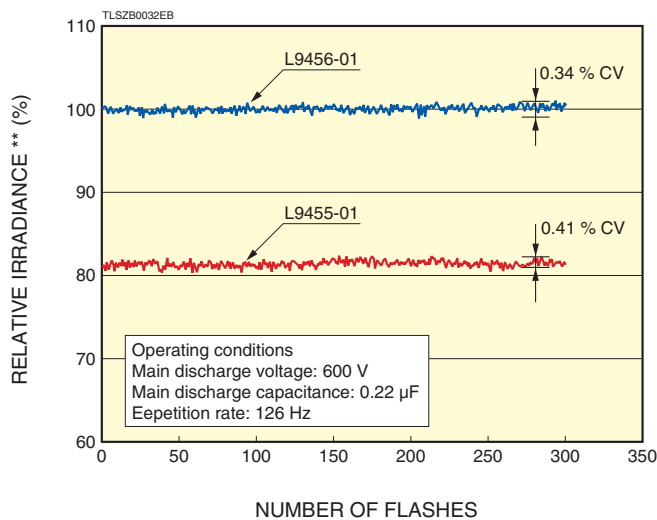
Resistance to shock: 500 m/s<sup>2</sup>

# OPERATING CONDITIONS

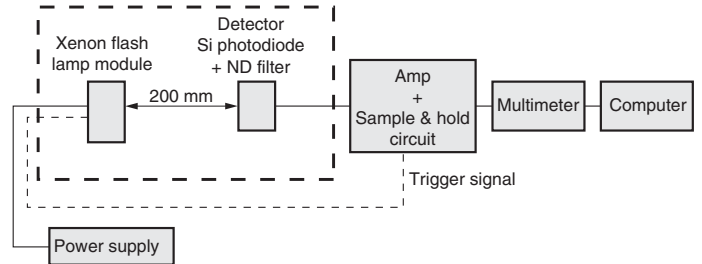
Type No.	Main discharge capacitor (μF)	Main discharge voltage (V)	Maximum input energy [per flash] (mJ)	Maximum repetition rate (Hz)	Maximum input (W)
L9455 / L9456-○1	0.22	400	17.6	284	5.0
		500	27.5	182	5.0
		600	39.6	126	5.0
L9455 / L9456-○2	0.11	400	8.8	530	4.7
		500	13.8	362	5.0
		600	19.8	252	5.0
L9455 / L9456-○3	0.047	400	3.8	530	2.0
		500	5.9	530	3.1
		600	8.5	530	4.5
L9455 / L9456-○4	0.28	400	22.4	223	5.0
		500	35.0	142	5.0
		600	50.4	100	5.0

# CHARACTERISTICS

## ●LIGHT OUTPUT STABILITY \* (Typ.)



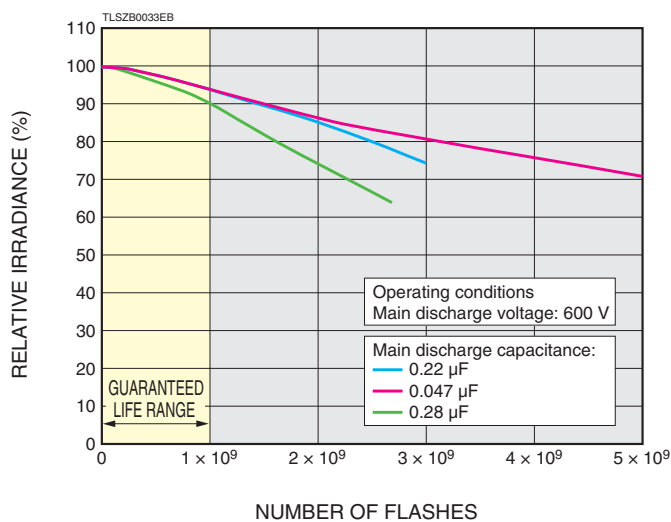
## Measurement block diagram



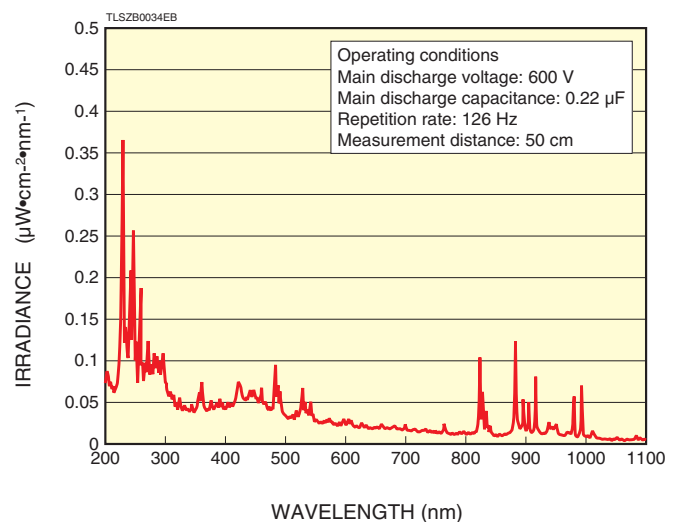
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\* Light output stability (% CV) = light output standard deviation / average light output × 100  
\*\* Output value with average light output of L9456-01 set to 100 %.

## ●LIFE CHARACTERISTICS



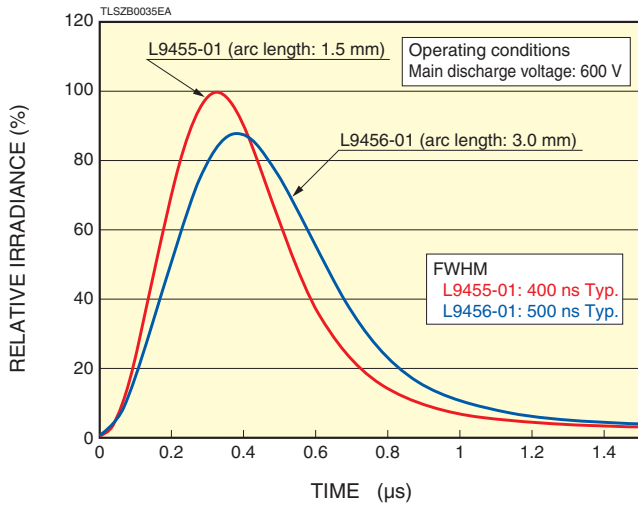
## ●SPECTRAL DISTRIBUTION (Typ.)



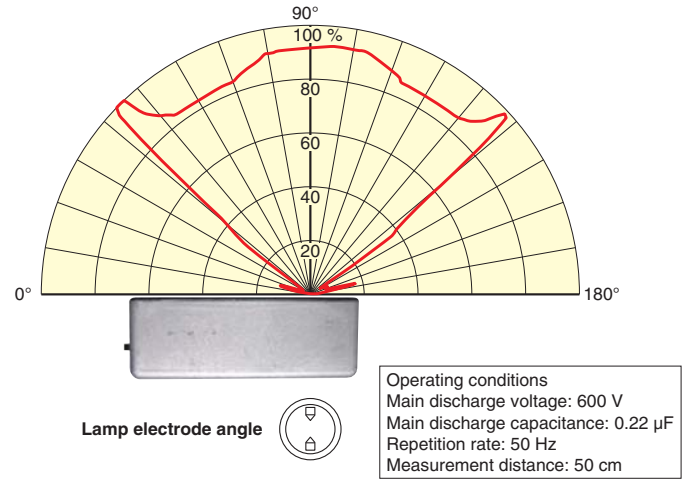
# CHARACTERISTICS

## ●EMISSION PULSE WAVEFORM (Typ.)

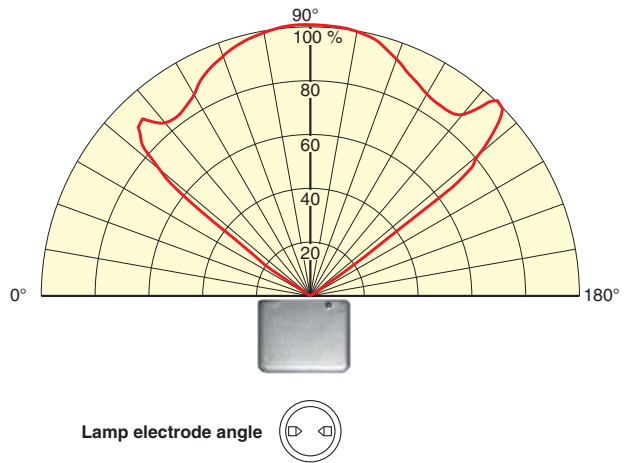
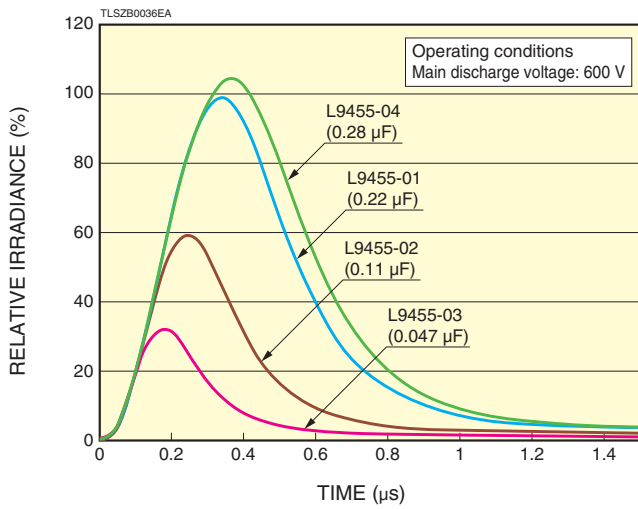
### Waveform difference by arc length



## ●DIRECTIVITY (LIGHT DISTRIBUTION) (Typ.)



### Waveform difference by main discharge capacitance

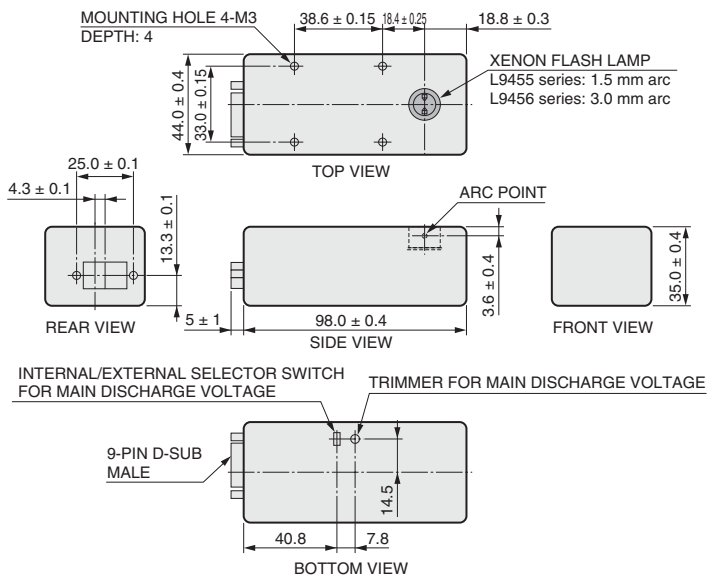


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# DIMENSIONAL OUTLINES (unit: mm)

## STANDARD TYPE

### ●L9455-0○, L9456-0○



### 9-pin D-sub connection

Pin No.	Signal
1	+ input voltage (11 V to 28 V) <sup>Ⓐ</sup>
2	+ input voltage (11 V to 28 V) <sup>Ⓐ</sup>
3	+ main discharge voltage control (3.2 V to 4.8 V)
4	Trigger RTN <sup>Ⓑ</sup>
5	+ trigger input <sup>Ⓑ</sup>
6	Input voltage RTN
7	Input voltage RTN
8	Main discharge voltage control RTN
9	No connection

<sup>Ⓐ</sup> Input current: 1 A, Inrush current: 4 A

<sup>Ⓑ</sup> Trigger input: 5 V to 10 V rectangular waveform (pulse width: 10  $\mu$ s or more)

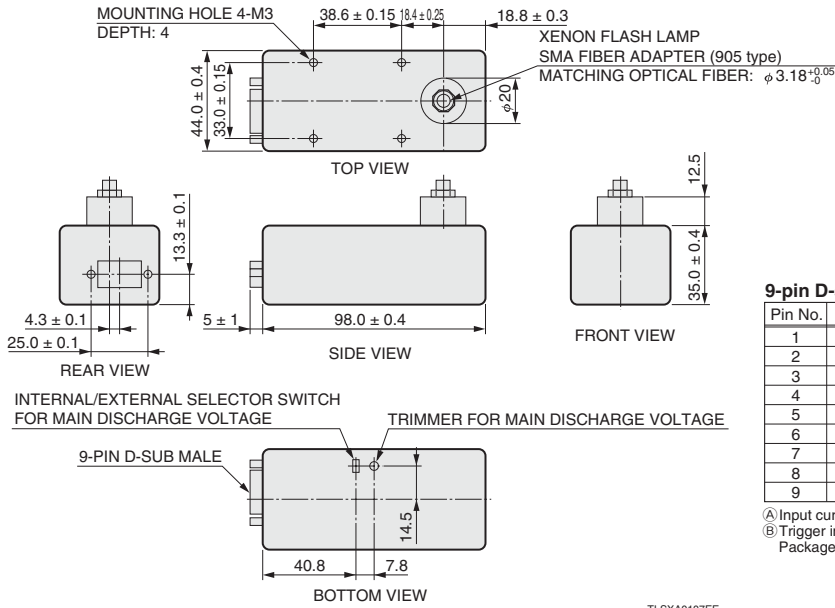
Package must be grounded, for example, by using an M3 screw for mounting holes.

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# DIMENSIONAL OUTLINES (Unit: mm)

## SMA FIBER ADAPTER TYPE

### ●L9455-1○



### 9-pin D-sub connection

Pin No.	Signal
1	+ input voltage (11 V to 28 V) <sup>(A)</sup>
2	+ input voltage (11 V to 28 V) <sup>(A)</sup>
3	+ main discharge voltage control (3.2 V to 4.8 V)
4	Trigger RTN <sup>(B)</sup>
5	+ trigger input <sup>(B)</sup>
6	Input voltage RTN
7	Input voltage RTN
8	Main discharge voltage control RTN
9	No connection

<sup>(A)</sup> Input current: 1 A, Inrush current: 4 A

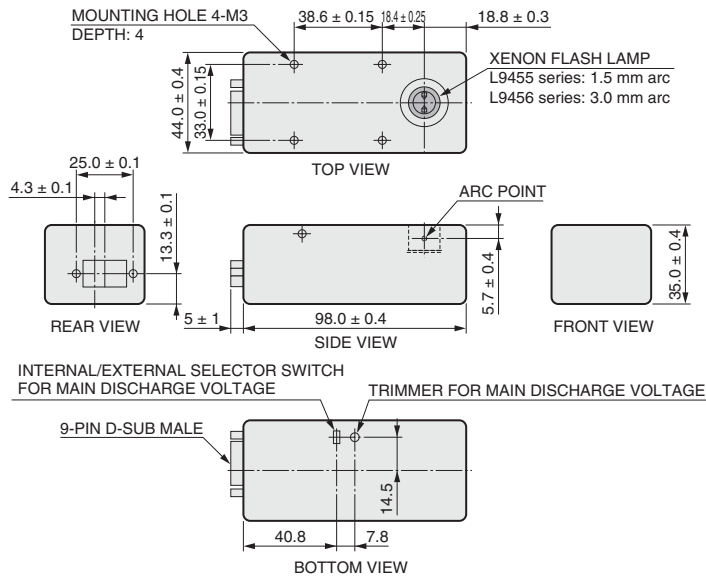
<sup>(B)</sup> Trigger input: 5 V to 10 V rectangular waveform (pulse width: 10  $\mu$ s or more)

Package must be grounded, for example, by using an M3 screw for mounting holes.

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## SILENT TYPE Emitting points are different.

### ●L9455-2○, L9456-2○



### 9-pin D-sub connection

Pin No.	Signal
1	+ input voltage (11 V to 28 V) <sup>(A)</sup>
2	+ input voltage (11 V to 28 V) <sup>(A)</sup>
3	+ main discharge voltage control (3.2 V to 4.8 V)
4	Trigger RTN <sup>(B)</sup>
5	+ trigger input <sup>(B)</sup>
6	Input voltage RTN
7	Input voltage RTN
8	Main discharge voltage control RTN
9	No connection

<sup>(A)</sup> Input current: 1 A, Inrush current: 4 A

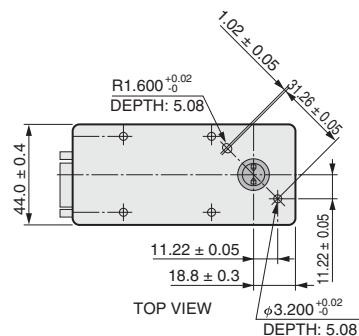
<sup>(B)</sup> Trigger input: 5 V to 10 V rectangular waveform (pulse width: 10  $\mu$ s or more)

Package must be grounded, for example, by using an M3 screw for mounting holes.

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## HIGH PRECISION TYPE Positioning pins are provided in the lamp position.

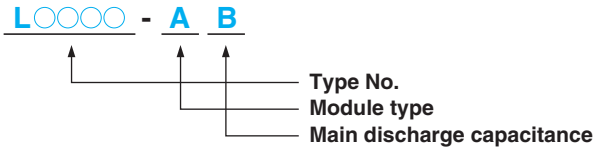
### ●L9455-4○, L9456-4○



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# HIGH OUTPUT TYPE

## TYPE NUMBER GUIDE



### ●Type No.

Type No.	Arc size	Type	Maximum input
L11316	1.5 mm	Side-on	100 mJ
L11317	3.0 mm		

### A: Module type

Suffix	Module type
0	Standard
1	SMA fiber adapter
2 *	Silent
4 *	High precision

\* Make to order

\*The L11317 is not available as a module with an SMA fiber adapter.

### B: Main discharge capacitance

Suffix	Capacitance
1	0.2 $\mu$ F
2	0.1 $\mu$ F

Window material selection, built-in EMC noise filter and lamp electrode angle change are available as options. please feel free to consult us.

## SPECIFICATIONS

Parameter	L11316 series	L11317 series	Unit
Arc size	1.5	3.0	mm
Window material	UV glass		—
Emission wavelength range	185 to 2000		nm
Main discharge voltage	Internal	650 to 1000	V
Main discharge voltage variable range ①	External	500 to 1000	
Main discharge capacitance ②	0.2 / 0.1		$\mu$ F
Maximum input energy (per flash) ③	See operating conditions.		J
Maximum average input (continuous) ④	5		W
Light output stability (Max.) ⑤	3.0	2.5	% CV
Guaranteed life ⑥	$5 \times 10^8$		flashes
Input voltage range	21.6 to 26.4		V
Input current	0.75		A
Inrush current	3		A
Trigger input	Rectangular waveform 5 V to 10 V; pulse width must be 10 $\mu$ s or more ⑦		—
Trigger input impedance	330		$\Omega$
Cooling method	Not required ⑧		—
Weight (standard type: L11316-01)	Approx. 328		g
Operating temperature range	0 to +40		$^{\circ}$ C
Storage temperature range	-40 to +90		$^{\circ}$ C
Storage humidity range	Below 95 (no condensation)		% RH
EMC standards	Without EMC noise filter	IEC61326-1: 2005 Group1, ClassA	—
	With EMC noise filter	IEC61326-1: 2005 Group1, ClassB	
Safety standards	IEC61010-1: 2010		—
	IEC62471: 2006 Risk Group3		

### NOTE:

- ① Internal: Adjustable with variable trimmer.  
External: Variable with control voltage from 2.44 V to 4.88 V.
- ② Installed at time of shipment (refer to the above lineups).
- ③ Maximum lamp input energy (per flash)  
 $E = 1/2 CV^2$   
E: Maximum lamp input energy (J)  
V: Main discharge voltage (V)  
C: Main discharge capacitance (F)
- ④ Maximum average lamp input (continuous)  
 $W = E \times f$   
f: Lamp emission repetition frequency (Hz)
- ⑤ Light output stability is given by:  
Light output stability (% CV) = light output standard deviation / average light output  $\times$  100
- ⑥ At 5 W operation
- ⑦ Only for external control; synchronized with rising edge.
- ⑧ Cooling is required when the package temperature exceeds 50  $^{\circ}$ C during operation.

## VIBRATION AND SHOCK RESISTANCE

Resistance to vibration: 5 Hz to 200 Hz, 15 m/s<sup>2</sup>

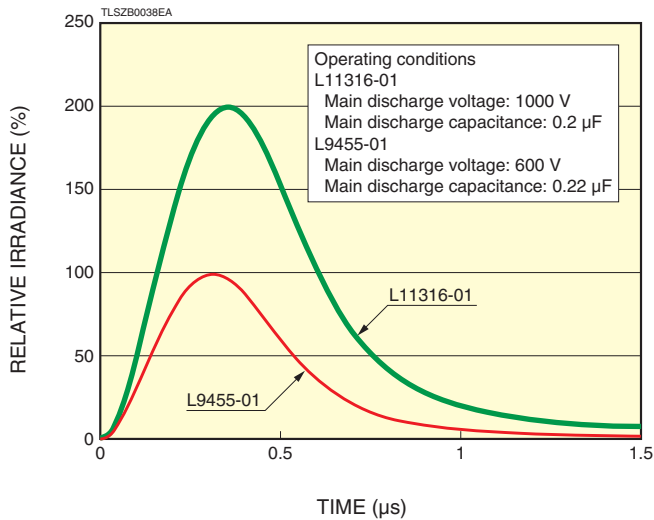
Resistance to shock: 500 m/s<sup>2</sup>

# OPERATING CONDITIONS

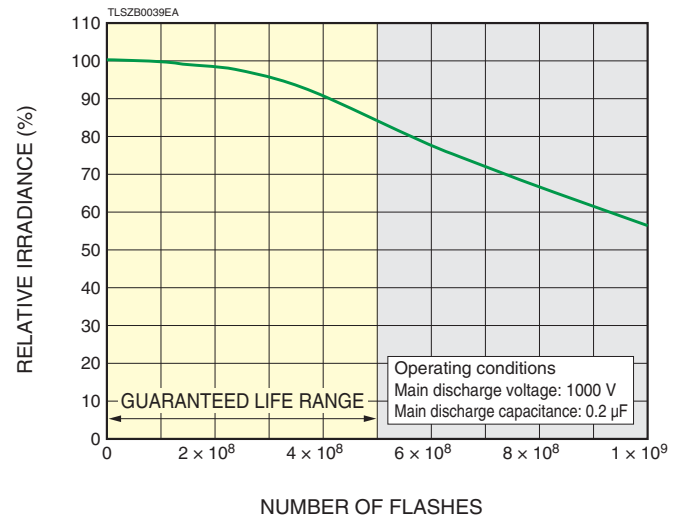
Type No.	Main discharge capacitor (μF)	Main discharge voltage (V)	Maximum input energy [per flash] (mJ)	Maximum repetition rate (Hz)	Maximum input (W)
L11316-○1 L11317-○1	0.2	500	25.0	200	5.0
		700	49.0	102	5.0
		1000	100.0	50	5.0
L11316-○2 L11317-○2	0.1	500	12.5	400	5.0
		700	24.5	204	5.0
		1000	50.0	100	5.0

# CHARACTERISTICS

## ●EMISSION PULSE WAVEFORM (Typ.)



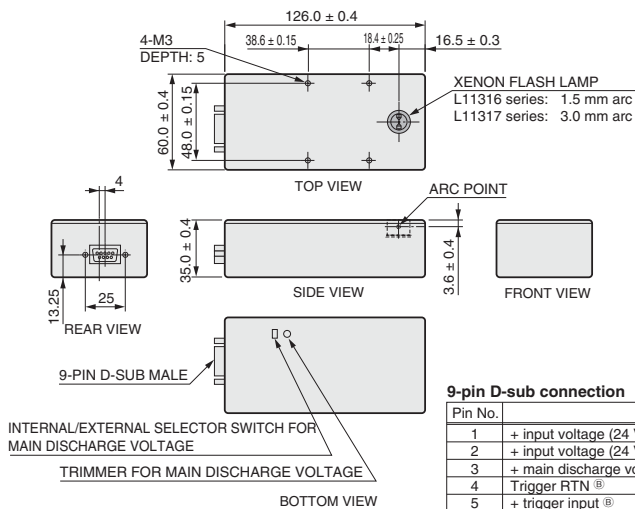
## ●LIFE CHARACTERISTICS (Typ.)



# DIMENSIONAL OUTLINES (unit: mm)

## STANDARD TYPE

### ●L11316-0○, L11317-0○



### 9-pin D-sub connection

Pin No.	Signal
1	+ input voltage (24 V ± 2.4 V) <sup>Ⓐ</sup>
2	+ input voltage (24 V ± 2.4 V) <sup>Ⓐ</sup>
3	+ main discharge voltage control (2.44 V to 4.88 V)
4	Trigger RTN <sup>Ⓑ</sup>
5	+ trigger input <sup>Ⓑ</sup>
6	Input voltage RTN
7	Input voltage RTN
8	Main discharge voltage control RTN
9	No connection

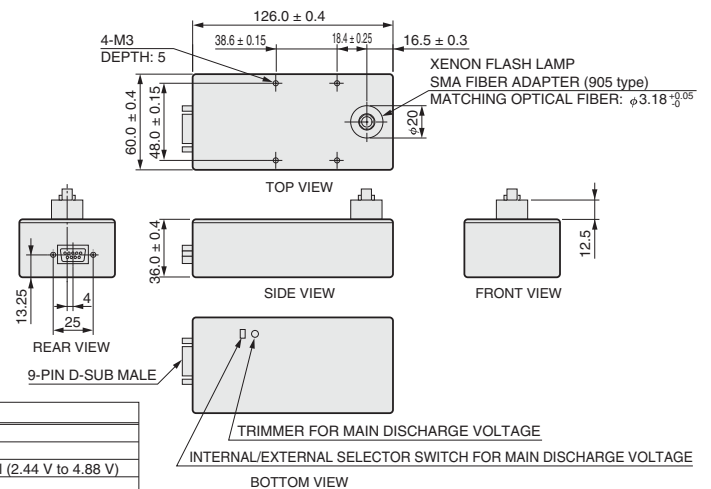
<sup>Ⓐ</sup> Input current: 0.75 A, Inrush current: 3 A

<sup>Ⓑ</sup> Trigger input: 5 V to 10 V rectangular waveform (pulse width: 10 μs or more)

Package must be grounded, for example, by using an M3 screw for mounting holes.

## SMA FIBER ADAPTER TYPE

### ●L11316-1○

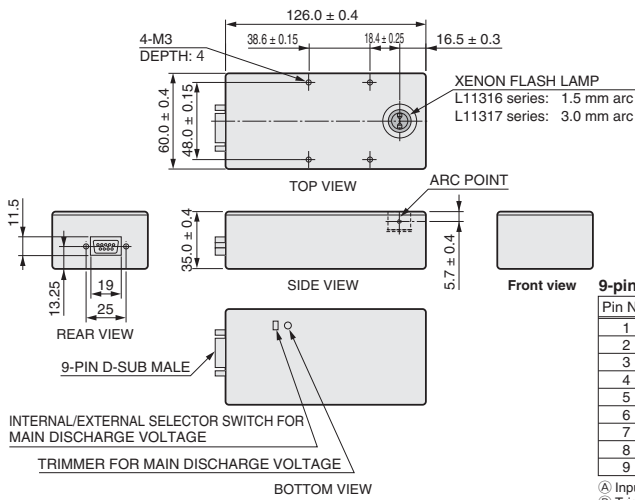


# DIMENSIONAL OUTLINES (Unit: mm)

## SILENT TYPE

Emitting points are different.

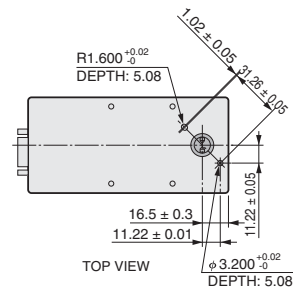
●L11316-2○, L11317-2○



## HIGH PRECISION TYPE

Positioning guides are provided in the lamp position.

●L11316-4○, L11317-4○



### 9-pin D-sub connection

Pin No.	Signal
1	+ input voltage (24 V ± 2.4 V) <sup>(A)</sup>
2	+ input voltage (24 V ± 2.4 V) <sup>(A)</sup>
3	+ main discharge voltage control (2.44 V to 4.88 V)
4	Trigger RTN <sup>(B)</sup>
5	+ trigger input <sup>(B)</sup>
6	Input voltage RTN
7	Input voltage RTN
8	Main-discharge-voltage control RTN
9	No connection

<sup>(A)</sup> Input current: 0.75 A, Inrush current: 3 A

<sup>(B)</sup> Trigger input: 5 V to 10 V rectangular waveform (pulse width: 10 μs or more)

Package must be grounded, for example, by using an M3 screw for mounting holes.

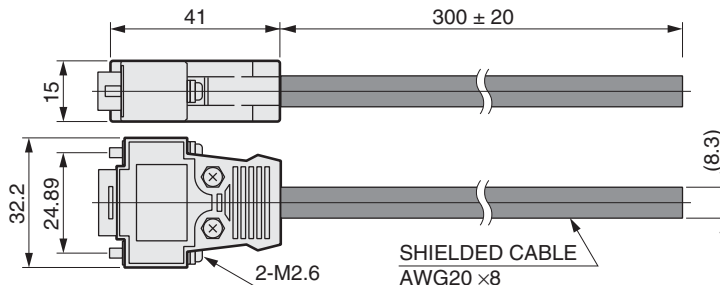
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## RELATED PRODUCTS

### SHIELD CABLE WITH D-SUB INPUT CONNECTOR A11690 (Sold separately)

Besides grounding the module case, properly shielding the cable is important to reduce noise in xenon flash lamp modules. The A11690 is a shielded cable with a D-sub input connector that is extremely effective in reducing noise. Standard cable length is 300 mm but other lengths are available on request. Please consult our sales office if needed.

### DIMENSIONAL OUTLINE (Unit: mm)



1. Brown : + input voltage
2. Red : + input voltage
3. Blue : + main discharge voltage control
4. Yellow : Trigger RTN.
5. Green : + trigger input
6. White : Input voltage RTN
7. Black : Input voltage RTN
8. Gray : Main-discharge-voltage control RTN

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\* Patent pending: 2 patents

Subject to local technical requirements and regulations, availability of products included in this promotional material may vary. Please consult with our sales office.

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