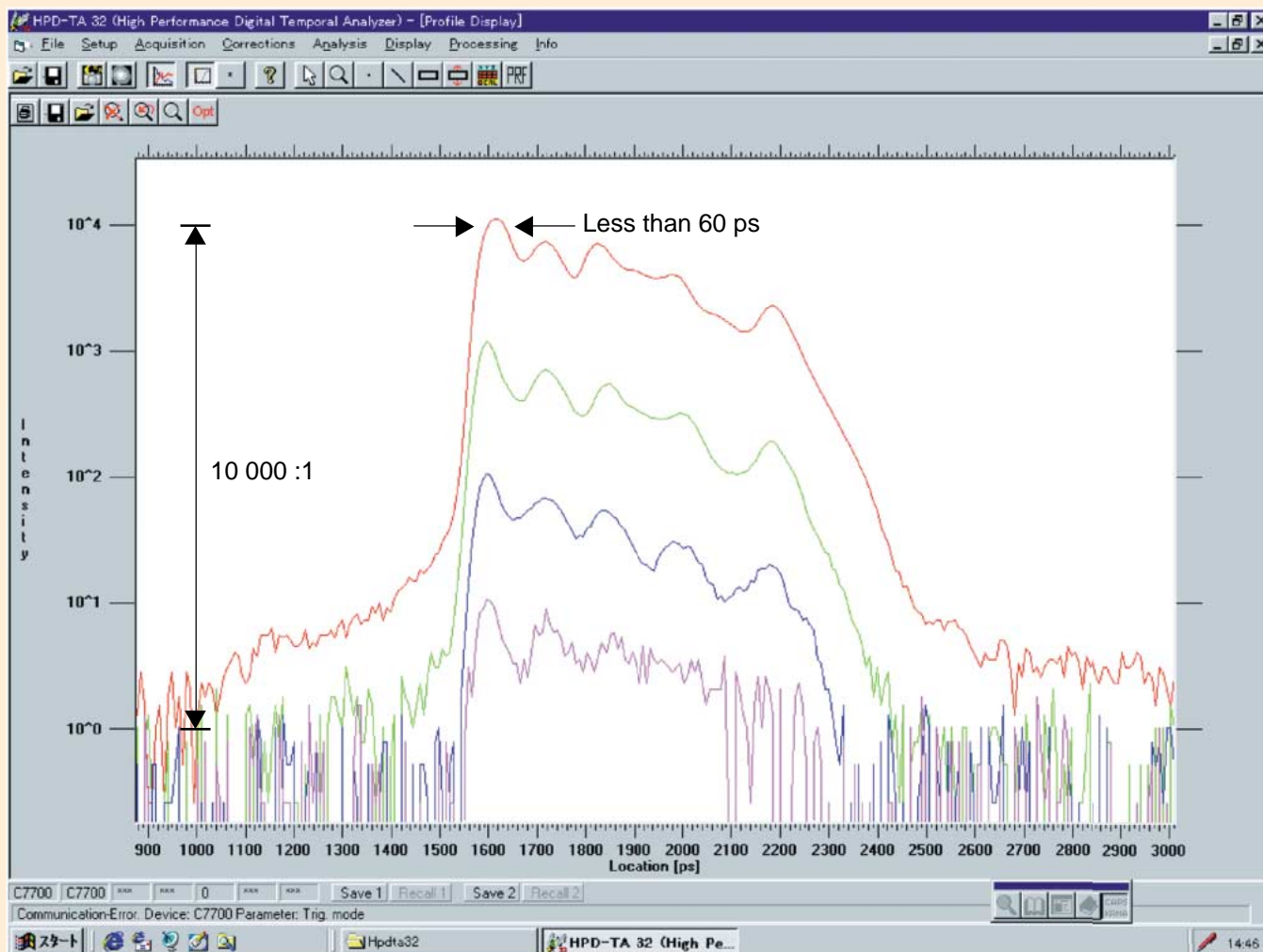


# High Dynamic Range Streak Camera C7700



▲ The relaxation oscillation of a laser diode can be measured with the C7700 under single shot operation.  
(The data was captured with a C4880-21 readout CCD camera.)

The C7700 is a newly developed high dynamic range streak camera that can handle a large number of photoelectrons. This feature enables single-shot measurements of ultrafast phenomena with a D-range as high as 10 000 : 1.

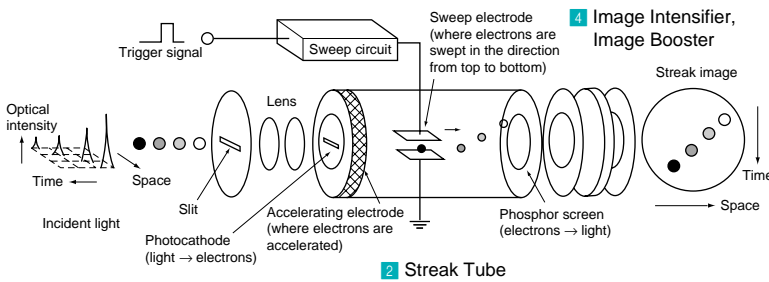
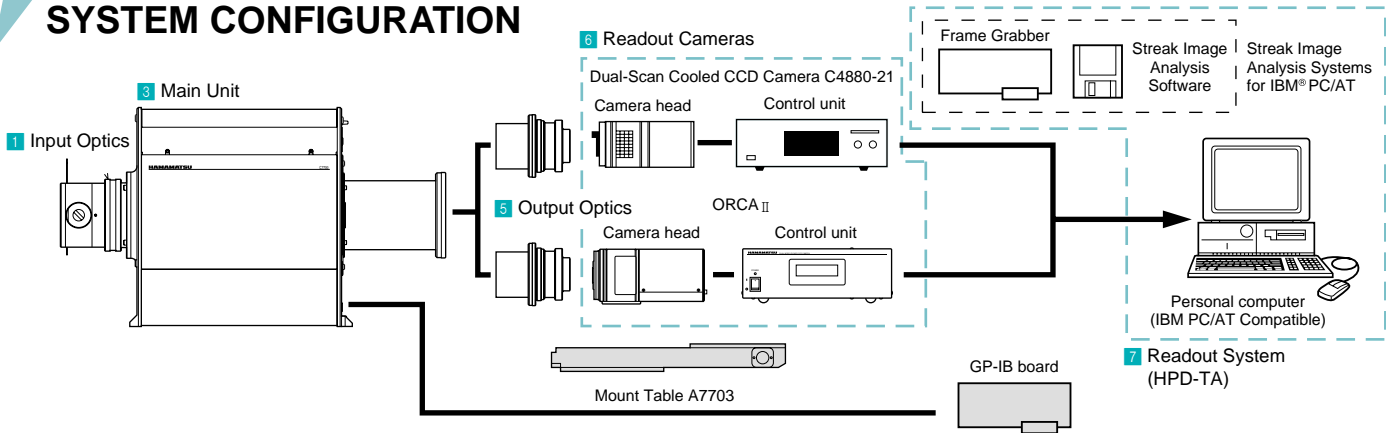
This system is suitable for high-precision simultaneous measurement of high-intensity and weak intensity pulse light.



# HAMAMATSU

# High Dynamic Range Measure

## SYSTEM CONFIGURATION



### [Operating Principle]

The light pulse to be measured is focused onto the photocathode of the streak tube through the slit, where the photons are converted into a number of electrons proportional to the intensity of the incident light. These electrons are accelerated and conducted towards the phosphor screen, and a high-speed voltage which is synchronized to the incident light is applied. The electrons are swept at high speed from top to bottom, after which they are bombarded against the phosphor screen of the streak tube and converted to an optical image.

When the light intensity of the streak image is very weak, an image intensifier or an image booster amplifies the low light level streak image.

## D-range of 10 000:1 of ultrafast phenomena under single-shot operation

### FEATURES

- High dynamic range of 10 000:1\*
- Temporal resolution of 5 ps\*
- Effective photocathode size: 17 mm
- Simultaneous measurement of light intensity on temporal and spatial (wavelength) axis
- IEEE 488 (GP-IB) control

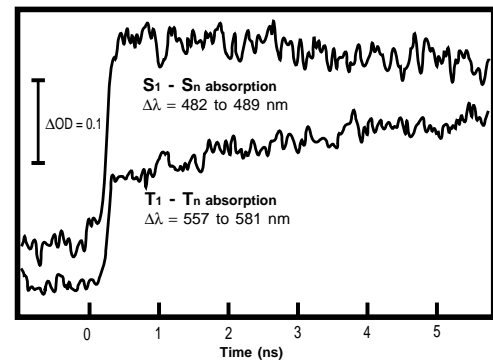
#### \*[About a Dynamic Range]

The maximum dynamic range of the streak camera essence is set to 1000:1 by the measurement condition of temporal resolution 5ps, and is set to 10 000:1 by the measurement condition of temporal-resolution 100ps. With a light intensity, the image intensifier tube, such as an image intensifier or an image booster, is combined with a streak camera. In this case, the image intensifier tube may restrict the dynamic range of the measurement system. Furthermore, a read-out camera may also restrict the dynamic range of the measurement system.

Readout Camera	Image Intensifier Tube	Temporal Resolution	
		5 ps	100 ps
C4880-21	Image Intensifier	1000:1	2000:1
	Image Booster	-	10 000:1
ORCA II	Image Intensifier	1000:1	2000:1
	Image Booster	-	3000:1

### APPLICATIONS

- Research involving laser fusion lasers, free electron lasers and various other types of pulsed lasers
- Plasma light emission, radiation, laser ablation, combustion and explosion
- Picosecond transient absorption measurement (Time dependence of absorption is shown below.)



▲ The 266 nm excitation (25 ps, 0.2 mJ,  $\phi 2$  mm focused, single shot) of Chrysenes in THF (0.5 mmol/l)

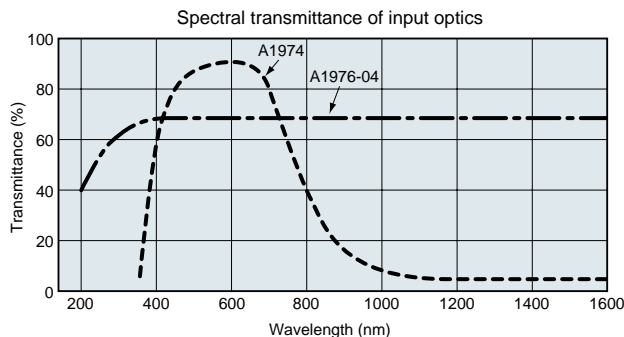
- LIDAR, Thomson scattering, time-of-flight laser ranging
- Fluorescence lifetime measurement, time-resolved Raman spectroscopy

# ment Possible up to 10 000:1

## SPECIFICATIONS

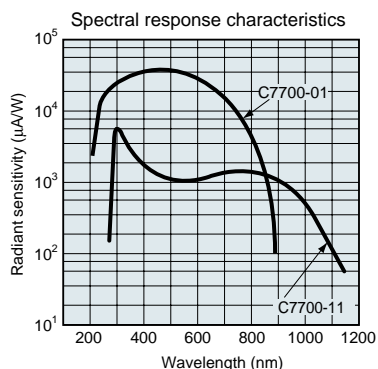
### 1 Input Optics

Type No.	Spectral Transmission	Effective F Value	Image Multiplication Ratio	Slit Width	Slit Width Reading Precision	Overall Length
A1974	400 nm to 900 nm	1.2	1 : 1	0 to 5 mm	5 $\mu$ m	159 mm
A1976-04	200 nm to 1060 nm	3.5	1 : 1			98.2 mm



### 2 Streak Tube

Type No.	Streak Tube	Spectral Response Characteristic	Effective Photocathode Size	Phosphor Screen	Spatial Resolution
C7700-01	N8059	200 nm to 850 nm	7 mm $\times$ 17 mm	<ul style="list-style-type: none"> <li>Phosphor screen characteristic P-43</li> <li>Fiber-optic output</li> <li>Effective Phosphor screen size: <math>\phi</math> 25 mm</li> </ul>	18 lp/mm or more centered on photocathode (Note) readout camera ORCA II
C7700-11	N8059-02	300 nm to 1060 nm			



### 3 Main Unit

#### • Streak Unit

- Temporal resolution: better than 5 ps (at the fastest sweep range)
- Sweep time/full screen: 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 ns  
1, 2, 5, 10, 20, 50, 100, 200, 500  $\mu$ s, 1 ms
- Trigger jitter: less than  $\pm$ 20 ps (at the fastest sweep range)
- Trigger delay: about 25 ns (at the fastest sweep range)
- Maximum sweep repetition frequency: 1 kHz (at the fastest sweep range)
- Operating mode: Focus/Streak
- Trigger input: Maximum input voltage  $\pm$ 5 V/50  $\Omega$   
Trigger level  $\pm$ 4 V Adjustable
- Gating mode: NORMAL, Gate, Open Fixed
- Gating method: Photocathode Gating
- Gate trigger input: 3.5 V to 5.0 V/50  $\Omega$
- Gate repetition frequency: 100 Hz
- Gate delay time: 1  $\mu$ s

### 4 Image Intensifier (I.I.), Image Booster (I.B.)

Type No.	Photocathode	Effective Photocathode Size	Phosphor Screen	Luminous Gain
V3346U-04 (I.I.)	S-20	25 mm	P-43	3000
V3346U-24 (I.B.)				15 (typ.)

### 5 Output Optics

Type No.	Magnification	Effective F-number	Readout Camera
A7702-02	1 : 0.7	F = 2.0	C4880-21
A2098	2 : 1	F = 2.5	ORCA II

### 6 Readout Cameras

Type No.	Imaging Device	Effective No. of Pixels	Pixel Size
C4880-21	Full frame transfer CCD	512(H) $\times$ 512 (V)	24 $\mu$ m $\times$ 24 $\mu$ m
ORCA II	Progressive-scan interline CCD	1280(H) $\times$ 1024(V)	6.7 $\mu$ m $\times$ 6.7 $\mu$ m

### 7 Readout System

#### • HPD-TA

The HPD-TA (Temporal Analyzer) is a high-performance digital data acquisition and control system specifically designed to readout images from the phosphor screen of the HAMAMATSU streak camera. It enables precise, quantitative acquisition and preanalysis of two dimensional streak data that includes photon counting plus a full range of data correction and calibration possibilities. The HPD-TA allows the remote control of the C7700 via GPIB interface. The entire system is controlled through a powerful and user-friendly application software that runs on a Microsoft Windows platform

## UTILITY

- Line voltage: VA100 V to 120/220 V to 240 V
- Power consumption: Approx. 180 V $\cdot$ A
- Operating temperature: +10  $^{\circ}$ C to +30  $^{\circ}$ C
- Operating humidity: Less than 70 % (with no condensation)

## OPTIONAL

### ● Delay Unit C1097-01

This passive delay unit provides convenient timing adjustment with zero jitter. Optional remote GPIB control (C1097-04).

Variable Delay Range	0 to 31.96 ns
Delay Setting Range	30, 60, 120, 250, 500 ps, 1, 2, 4, 8, 16 ns
Minimum Delay Time	Approx. 12 ns
Maximum Input Voltage	30 V
Power Supply	AC100 V to 240 V
Dimensional Outline	215 (W) × 350 (D) × 102 (H) mm/3.4 kg

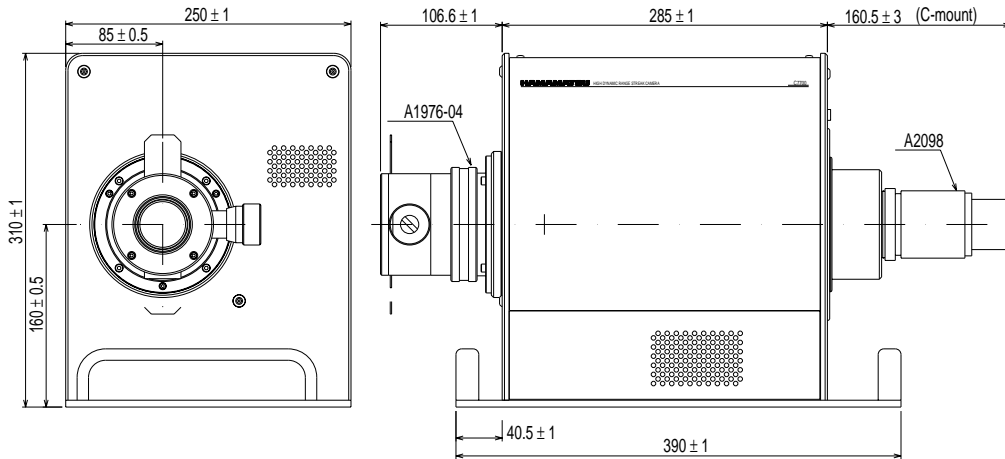
### ● PIN Photodiode C1083-01

Converts low-repetition light pulses to an electronic trigger for streak sweep.

Spectral response	400 to 1100 nm
Rise time	0.8 ns
Power supply	+22.5 V (battery)
Dimensional Outline	Head: 100 (W) × 160 to 235 (H) × 50 (D) mm/400 g Power supply unit: 100 (W) × 83(H) × 100 (D) mm/400 g

## DIMENSIONAL OUTLINES (Unit: mm)

### ● Main Unit (approx. 24.0 kg)



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# HAMAMATSU

Home page Address <http://www.hamamatsu.com>

HAMAMATSU PHOTONICS K.K., Systems Division

812 Joko-cho, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-435-1574, E-mail: export@sys.hpk.co.jp

U.S.A. and Canada: Hamamatsu Photonic Systems: 360 Foothill Road, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-1116, Fax: (1)908-231-0852, E-mail: usa@hamamatsu.com

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658, E-mail: info@hamamatsu.de

France: Hamamatsu Photonics France S.A.R.L.: 8, 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

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

North Europe: Hamamatsu Photonics Norden AB: Smidesvägen 12, SE-171-41 Solna, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01, E-mail: info@hamamatsu.se

Italy: Hamamatsu Photonics Italia S.R.L.: Strada della Moia, 1/E 20020 Arese (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741, E-mail: info@hamamatsu.it

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