Kentech Instruments Ltd.
Gated Optical Imager

The GOI is a microchannel plate intensified, gated single frame camera with a minimum gate open time of less than 100ps fwhm over a full 18mm diameter cathode aperture. It is easily interfaced to a CCD readout system. The small size allows several images to be packed together to provide a multi–framing capability.

The camera uses an entirely solid state electronic pulser to give super fast gating speeds. This technology gives low jitter, less than 20ps RMS, combined with a small trigger delay, typically 18 ns. The modular form of the electronics allows easy change of the gate times.

The camera has three modes of operation: DC on, slow gate (~10µs to 1ms) and fast gate (100 ps to 5ns). It may be used as a fast camera or as an image intensifier. The DC mode allows easy focusing and set up.

The fast gate durations are either set by the use of a switched network giving several widths or as a special option set by a system offering small steps in possible gate lengths over the same range.

The proximity focused wafer tube design gives a large number of pixels across the cathode. The resolution is typically better than 10 line pairs per mm.

The input window to the wafer tube may be either fibre optic or, for extended blue response, quartz. The cathode is processed to respond to 850nm light permitting easy characterisation with a laser diode (not included in the package).

The camera head is 50mm square by 65mm. The camera is available in a four frame version in which four detector heads are close packed on a 52mm square (52mm between adjacent optical axes).

Typical Tube Specification

•Type	**18mm microchannel plate intensified wafer tube.**
•Gating method	**Cathode to microchannel plate voltage switched.**
•Cathode	**S20 or S1 to special order**
•Output window	**Fibre optic**
•Dimensions	**50 mm x 50mm x 60mm**
•Resolution	**~10 lpmm-1**
•Shortest gate	**<100ps FWHM (less to special order)**
•Gate modes	**100ps to 5ns, 10µs to 1ms and DC**
•Triggering	**Whole system requires single trigger ~18ns before event. >10 volts into 50Ω with rise time <5ns.**

Options

1 Film output.

2 UV optics.
With UV optics a lens or mirror must be used to form the image on the cathode plane at the rear, inner side, of the quartz window. With the normal fibre optic input window the image must be on the front, outer, face of the detector. This allows images to be transported with fibre bundles to the detector head.

3 Clear aperture.
The normal version of this system uses a gating mesh over the input; we can also offer a mesh free system to special order for imaging of highly coherent sources.

4 Repetition rates.
The normal repetition rate is 200Hz. Recently we are also able to offer repetition rates up to 10kHz. If a longer gate time is acceptable (sub ns) then the user should consider an HRI device instead

5 Larger Aperture.
With larger aperture tubes somewhat reduce temporal response is achieved, 25mm will gate down to 150ps and 40mm down to 200ps.

6 Infrared response.
Standard systems have S20 cathodes. We can produce systems with S1 cathodes to special order. Typical response curves are available.

7 Multiframe systems.
Multiframe systems are available. The standard is a four frame. These can have separate or combined electronics and or mechanics. Trigger sequencers are available to set up interframe timing. Customers are usually responsible for arranging the optical imaging with as there is no standard application.

8 High dynamic range, high resolution readout.
Kentech generally recommends that customers needing this option purchase the Pico star system from LA Vision*. This includes our gated detector which is integrated into a system with a high fidelity readout and image processing software.

9 Flexible gate width adjustment.
The standard unit comes with typically 6 gate widths over the range 100ps to 2ns. We can offer continuous gate width adjustment in small increments over the same range.
A further option under development will offer similar gate width adjustment over an extended range with fast turn off and turn on and a computer interface for gain, mode, gate width and delay control.

10 Shorter gate widths.
With a 12mm diameter tube we are able to achieve around 50ps gate widths.

Unit 9, Hall Farm Workshops, South Moreton, Didcot, Oxfordshire OX11 9AG, U.K.
International Tel: +44 1235 510 748 International Fax: +44 1235 510 722
email info@kentech.co.uk Web: http://www.kentech.co.uk

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High Rate Imager

The High Rate Imager is a very high trigger rate gated intensifier intended for applications such as fluorescence lifetime imaging, lidar and time resolved spectroscopy. Its gate pulse driver has a bandwidth of 800MHz and it has internal pulse forming circuitry to provide gate widths to less than 500ps at trigger rates from single shot to greater than 100MHz. It features an internal microcontroller with a front panel LCD display and keypad for all functions (except analogue input attenuation level). In addition it has an RS232 interface to allow remote operation. It is able to provide RF modulation of the intensifier gain at frequencies up to 800MHz.

The intensifier is supplied in a remote housing with a flexible connection to the power supply. The input and output faces have mounting holes for the user to attach various optical accessories. The output format is a flat fibre optic faceplate. We are able to provide CCD readout options or users may make their own readout arrangements. We are able to offer certain standard lens mounts at the input face as an option.

The power supply is self contained and includes trigger input conditioning circuitry, intensifier high voltage supplies and protection, gain control, bias circuitry and remote computer control.

HRI Specifications

Features:

110MHz maximum trigger rate from logic input
<0.5ns to 1ms optical gate width (5% duty cycle limit)
800MHz maximum RF modulation from analogue input
Internal 0.5ns comb generator
Ideal for use with mode locked lasers
Single power supply with RS232 remote control facility

Intensifier:

18mm diameter
S25 on glass or S20 on quartz cathode
P20, P43 or equivalent phosphor
Fibre optic output

Operating modes:

Slave, Slave (high duty cycle), Comb, RF, DC

Controls:

Gate mode	Keypad/remote
Gain	Keypad/remote
Trigger source	Keypad/remote
Analogue gain	Front panel
Help	Button
Reset overload	Keypad/remote
Enable DC	Keypad/remote

Indicators:

LCD Control status
LED Trigger indicator, Overload, DC mode active, AC power

Connectors:

BNC Trigger input (logic), Analogue input, Monitor output (logic), Monitor output (analogue)
15 way D RS232 interface,

A full specification is available on request.

Unit 9, Hall Farm Workshops, South Moreton, Didcot, Oxfordshire OX11 9AG, U.K.
International Tel: +44 1235 510 748 International Fax: +44 1235 510 722
email info@kentech.co.uk Web: http://www.kentech.co.uk