

PI-MAX®

4

ICCD Cameras

The Ultimate in
Precision & Intelligence



Intensified CCD Cameras



TELEDYNE
PRINCETON INSTRUMENTS
Everywhere you look™

Introducing the New PI-MAX[®] 4



*The Ultimate in
Precision &
Intelligence*

The PI-MAX[®] 4 is the culmination of years of research and development by Princeton Instruments to create an intensified CCD (ICCD) camera that not only meets, but anticipates, users' continually evolving requirements for sensitivity, speed, and control in time-resolved imaging and spectroscopy applications. The PI-MAX4 offers precision gating capabilities to <500 picoseconds, the ability to perform frequency domain measurements utilizing RF modulation, and unsurpassed control of all experiments via Princeton Instruments' intelligent LightField[®] software.

Readout of the PI-MAX4 ranges from video rates to thousands of frames per second in order to capture dynamics, while a sustained gating repetition rate of 1 MHz (2x better than most research-grade ICCD cameras available on the market today) allows the camera to keep up with the ever increasing repetition rates of pulsed and modulated lasers.

Before our engineers could begin designing the next generation of Princeton Instruments ICCD cameras, one deceptively simple question had to be answered: "How can we improve upon something already considered the industry's gold standard?"

For guidance, we decided to turn to the people who stood to benefit the most from our furthering of ICCD camera performance. Thus, we solicited plenty of input from our customers. After all, researchers worldwide who strive to break new ground via cutting-edge, time-resolved, optical diagnostic techniques rely on Princeton Instruments PI-MAX ICCD cameras every day. Our instrumentation helps them understand fundamental mechanisms and solve difficult problems in life and physical sciences, enabling research that ranges from improving internal combustion engine efficiency to uncovering new drug-cell interactions.

If you are embarking on new research or trying to elevate your current research to the next level, we invite you to take a look at how the PI-MAX4 can help.

An Impressive Lineage



• PI-MAX4

2012 New ICCD cameras offer picosecond gating capabilities, RF modulation capabilities, and complete control via LightField software

~1978 1990 1997 1998 2000 2005 2007 2009



First
intensified
photodiode
array

First
scientific-grade
gated ICCD
camera for
imaging and
spectroscopy

I-PentaMAX
camera:
revolutionized
low-light-level,
single-molecule
fluorescence
applications

PI-MAX: the
first ICCD
camera
to have a
built-in delay
generator for
precise timing

MCP gating:
combined fast
gating with
the high QE of
slow-gate
Gen II
intensifiers;
ideal for PLIF
imaging in
combustion

PI-MAX2:
readout speed
5x faster than
original PI-MAX,
plus unique
Double Image
Feature (DIF)

UNIGEN II:
exclusive
Gen III
intensifier
with UV-to-red
sensitivity

PI-MAX3: fully
integrated
ICCD camera
provided
the best
combination
of frame rate,
gating, and
low-noise
capabilities
available

Key Features & Benefits

Ultimate in Precision

Video and higher frame rates:

Camera achieves near-video frame rates (even at full 1k x 1k resolution); thousands of spectra per second can be acquired while in spectroscopy mode; provides ability to capture a gated image or spectrum for every pulse of a high-repetition-rate laser.

SuperHV:

More powerful, built-in, high-voltage gating technology precisely turns on and off Gen II and Gen III image intensifiers in response to programmed delays and widths; standard implementation capable of achieving sustained 1 MHz repetition rate; optional implementation delivers picosecond gating capabilities with sustained 100 kHz repetition rate.

PIPs (Princeton Instruments Picosecond) gating technology:

Without sacrificing the quantum efficiency of a standard Gen II or Gen III image intensifier, new PIPs technology allows image capture with precision gating to <500 psec.

DIF (Double Image Feature):

Optional feature quickly transfers a full-resolution image under the interline CCD array's mask in the PI-MAX4:1024i, enabling the camera to take a second frame in as little as 450 nsec (limit imposed by P46 or P47 phosphor decay times).

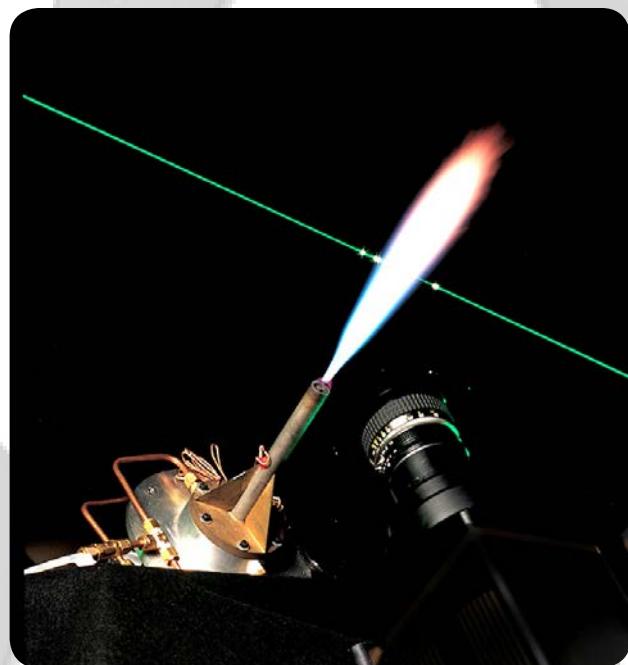


Image courtesy of Drs. Adela Ben-Yakar and Ronald K. Hanson (Stanford HTGU).



PRECISION