



BOOST™

emccd BT 2100



The SPOT™ BOOST™ BT 2100 EMCCD has single photon detection capability without an image intensifier. Containing a 1004 x 1002 Impactron™ Frame Transfer CCD sensor from Texas Instruments, it enables charge to be multiplied on the sensor before it is read out, while utilizing the full QE performance of the CCD sensor. The EMCCD gain of the camera can be varied from unity up to a thousand times directly through the software. The system offers up to 35MHz pixel readout rate and benefits from minimized dark current with unequalled thermoelectric cooling down to -100°C

CAMERA SPECS

- **EMCCD Technology**
- **True Linear gain**
- **One window design with double sided AR-coated window**
- **Fastest vertical clock speeds**
- **1004 x 1002 Frame Transfer sensor**
- **Readout rates up to 35MHz**
- **Fan control**
- **Vacuum sealed cooling**
- **Thermoelectric cooling to -100°C possible**
- **Built-in C-mount compatible shutter**
- **EM protect**

Ultimate in sensitivity from EMCCD gain – even single photon signals are amplified above the noise floor.

Control EMCCD gain with a linear, quantified scale – ask for a gain value and get it corrected to the CCD temperature.

Highest possible throughput of photons to sensor. Can be used with C-mount magnifying lens without image curvature.

Maximum frame rate. Shorter exposures without smear.

Small pixel size ($8 \times 8 \mu\text{m}$) delivering high resolution, large field of view and fast, shutterless imaging.

Quantitative accuracy at all speeds - ~ 31.5 full frames/sec possible.

Set fan speed or turn off completely for no vibration!

Critical for sustained vacuum integrity to maintain unequalled cooling and QE performance

Critical for elimination of dark current detection limit – an EMCCD must!

Easy means to record control dark images – excellent for optimization of experimental set-up

EM gain register is protected from accidental damage using built-in algorithms. Also limits long-term gain aging.

CAMERA OVERVIEW

Active Pixels	1004 x 1002
Pixel Size (WxH; μm)	8 x 8
Image Area (mm)	8 x 8
Active Area pixel well depth (e-, typical)	40,000
Gain Register pixel well depth (e-, typical)	80,000
Max Readout Rate (MHz)	35
Frame Rate (frames per sec)	31.5
Read Noise (e-)	< 25 @ 35MHz

SYSTEM CHARACTERISTICS

Peak QE	65%
Pixel Readout Rate (MHz)	35, 27, 13
Non-Linearity²	<1%
Vertical Clock Speed (μs)	0.5 to 1.9 (variable)
Electron Multiplier Gain (software controlled)	1 – 1000 times
Digitization @ 35, 27 & 13 MHz readout rate	14-bit
Camera window type	Single window with double-sided AR coating

NOISE

System Readout Noise (typical; e ⁻) ⁴	Typical	with Electron Multiplication
35MHz through EMCCD amplifier	25	<1
13MHz through EMCCD amplifier	12	<1
Dark Current	0.05 e/p/s @ -85°C	

OPERATING & STORAGE CONDITIONS

Operating Temperature	0° C to 30° C ambient
Relative Humidity	< 70% (non-condensing)
Storage Temperature	-25° C to 55° C

COMPUTER REQUIREMENTS

Minimum:
Windows 2000 or XP operating system

Recommended:
3.2 GHz Pentium (or better) + 1 GB RAM
SCSI or SATA RAID 0 hard disc
– Seagate Barracuda, WD Caviar
RE WD Raftor

In all cases the operating system should be on a separate harddrive and the hardware controller should be on a separate PCI bus.

Power Requirements⁸:
1A @ +12V | 0.3A @ -12V | 3.0A @ +5V

ALSO:

- PCI 2.2 or PCI-X 1.0 compatible computer
- PCI slot must have bus master capability
- Available auxiliary internal power connector
- 25 Mbytes free hard disc

Need more information?

Contact us at:

Phone: 586.731.6000

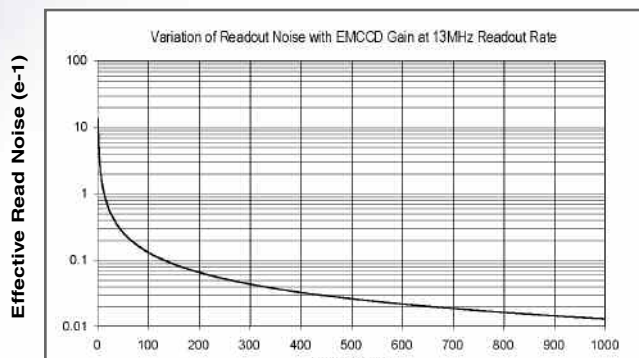
Fax: 586.731.6469

e-mail: info@diaginc.com

website: www.diaginc.com

For footnote review: www.diaginc.com/boostnotes

NOISE & EMCCD GAIN



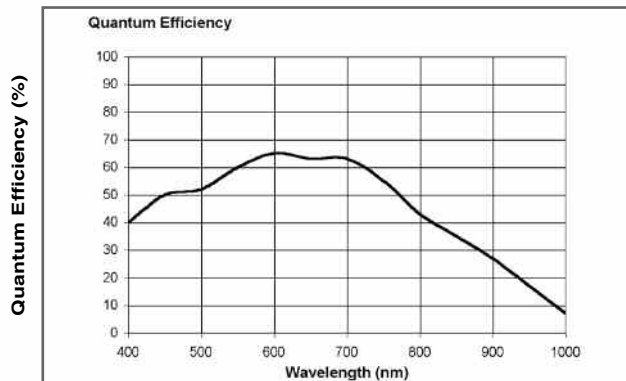
Minimum Temperature (°C)

Air-cooled (ambient air @ 20° C) -85° C

Re-circulator (RC180) (ambient air @ 20° C) -90° C

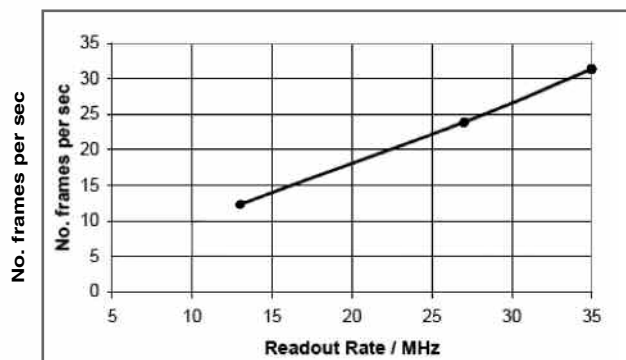
Water-cooled (@ 10° C, 0.75 l / min) -100° C

QUANTUM EFFICIENCY



Quantum Efficiency at 600nm and room temperature⁵

FULL FRAME RATE⁶



MAX FRAMES PER SEC⁷

Array size	1004 x 1002	502 x 501	251 x 250	125 x 125
Binning (full frame)				
1x1	31.5	60.5	113	199.2
2x2	58.7	109.9	194.5	318.5
4x4	104	185.2	304.9	446.4

BOOST™ Model:BT 2100
1004 x 1002 REV 7.10.06



BOOST™

dimensions

