



## INFINITY DIGITAL MICROSCOPY CAMERAS

Produce crystal clear, vibrant images with Lumenera's INFINITY microscopy cameras. Our user friendly USB 2.0 cameras range in resolution from 1.4 to 32 megapixel and feature CMOS, CCD, low light CCD, large format and pixel shifting technologies. As one of the most respected digital camera manufacturers in the scientific market, we install thousands of INFINITY cameras each year into life science, clinical and industrial applications. Trust Lumenera to provide a complete imaging solution, consisting of high-end scientific cameras and feature rich software packages to fit any application.

**Contact us to determine how you can benefit from Lumenera's high-quality reliable products.**





# Why Lumenera

# Why INFINITY

## Extensive Product Line

Life science researchers, clinical pathologists and industrial technicians address imaging and budgetary requirements with Lumenera's wide range of USB 2.0 INFINITY cameras. Satisfy your most critical imaging needs with resolutions ranging from 1.4 to 32 megapixel and a wide variety of high quality sensors. Choose from Lumenera's cost-effective CMOS cameras with extremely fast frame rates or our CCD solutions with high dynamic range and outstanding color reproduction.

### Centralized Research, Development & Manufacturing

Research, development and manufacturing are tightly controlled in one location ensuring the highest standard of quality from design to delivery. As a testament to our commitment we have dedicated more engineers to customization than many direct competitors have employees, thus enabling the company to sustain a rapid rate of new product introductions and development. To ensure a timely product supply Lumenera has established close, collaborative relationships with vendors and provides its own in-house manufacturing inspection and quality controls. We continue to invest in research and development in order to maintain our reputation as a leading provider of high-performance digital imaging solutions. As a Lumenera customer you will benefit from our ongoing success and solid growth for years to come.

### Industry Leading Technical Assistance Center

Realize your vision needs through our Technical Assistance Center (TAC). Our core competencies include microscopy, software development, color algorithms, opto-electronics, laser physics, remote sensing, sensor architecture and optics. Receive timely, accurate information from our skilled team. With our focus on complete satisfaction, we draw on a large pool of expertise found throughout the company to help provide solutions to your toughest application or design challenges. Lumenera's TAC team is customer focused and prides itself on delivering timely responses to your questions. Additional information is available through our tutorials and FAQs on the Lumenera website at [www.lumenera.com](http://www.lumenera.com).

### Intuitive Software Package

Included with your USB 2.0 camera purchase is INFINITY ANALYZE and INFINITY CAPTURE software. Together, the camera and software create a complete imaging solution for your application. Take advantage of features ranging from full camera control to advanced capabilities such as measurement, video recording, annotation and the pseudo-coloring of fluorescent images. INFINITY ANALYZE is translated into eight languages (Latin Spanish, Castilian Spanish, Italian, Russian, Japanese, Chinese, Korean and French), providing life science, clinical and industrial researchers native language support. Also included is a Mac camera driver and ImageJ plug-in for select INFINITY cameras.

### 3rd Party Software Integration

Lumenera is integrated with leading software technology partners:

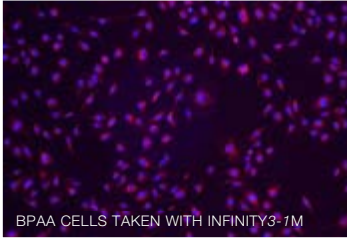
- Image Pro
- LanSchool
- LabVIEW
- MATLAB
- MetaMorph
- Mideo Systems
- Pomicra
- Streampix
- Visiopharm
- ZView

Contact us for additional software packages.



# Life Science & Clinical Applications

## Genetics/Biology/Pathology



BPAA CELLS TAKEN WITH INFINITY3-1M



PARAMECIUM TAKEN WITH INFINITY1-2C

### Fluorescence

Producing clear, well-contrasted fluorescent images is a challenge due to the extremely low light signals produced by the sample. Typically, images tend to be noisy and preview frame rates are reduced to a point where noticeable lag occurs. Lumenera's INFINITY cameras offer a higher dynamic range and optional thermoelectric cooling to address these challenges, resulting in smooth clear images and fast preview speeds.

### Stained Samples

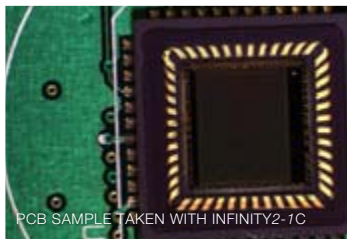
To ensure proper identification and diagnosis of stained samples, precise color is required. Benefit from years of INFINITY software development to produce excellent color in your biological samples. Difficult transition colors such as pinks, purples and browns that are improperly reproduced by many other cameras on the market today are easily achieved by Lumenera's advanced algorithms.

### Live Imaging

Combine INFINITY software with our high-speed USB 2.0 cameras to create smooth clear videos of live events. Reach frame rates of up to 90 fps, produce videos in a variety of formats including AVI and take advantage of time-lapse imaging.

## Material Science—Quality Control

### Metrology/Mineralogy/Metallurgy



PCB SAMPLE TAKEN WITH INFINITY2-7C



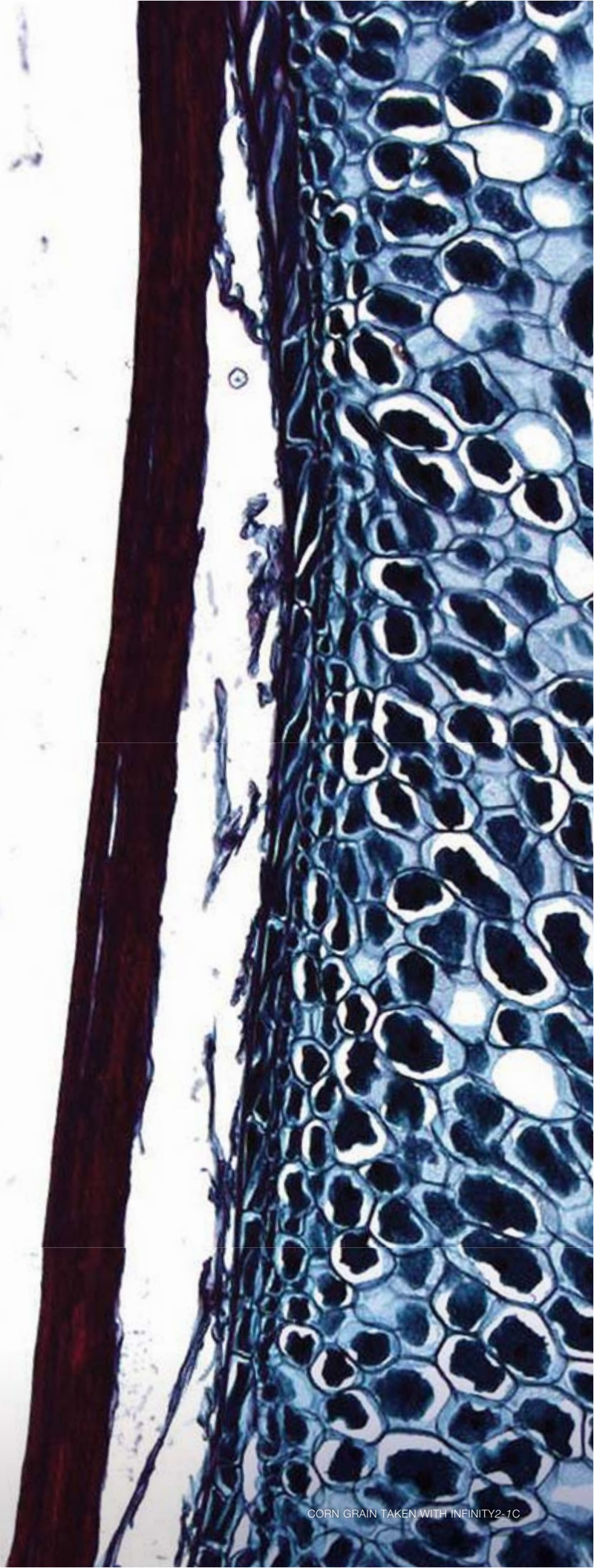
METALIC SAMPLE TAKEN WITH INFINITY1-3C

### Defect Analysis

Measurement and annotation are an important part of any quality control process. Obtain precise reproducible results through a variety of features found in INFINITY software such as simple calibration as well as extensive measurement options.

### Stereo and Macro Imaging

Samples with reflection, shadowing and low-light conditions commonly found in the QC environment can be quite difficult to image. Effectively deal with washed out or dark areas, bright spots or poorly lit samples with our high dynamic range INFINITY CCD cameras, whose high sensitivity allows for proper imaging. Perform depth of focus and spherical aberration correction with the Advanced Features Module (available as an accessory).



CORN GRAIN TAKEN WITH INFINITY2-7C



# INFINITY Camera Selection

High to Moderate Illumination  
10-bit Quantitative Analysis

Brightfield/Darkfield  
DIC  
Live Cell Imaging  
Histology/Pathology/Cytology  
Semiconductor Inspection  
Metrology  
Documentation and Archiving

**INFINITY1**  
INFINITY1-2  
INFINITY1-3  
INFINITY1-5



## INFINITY1

CMOS Cameras for Photo Documentation and High-Speed Imaging

Highlights:

- 2, 3 and 5 megapixel resolutions
- Extremely high frame rates
- High quality, cost-effective solution
- 8 or 10-bit output

The INFINITY1 series of CMOS USB 2.0 digital microscopy cameras, with resolutions as high as 5 megapixel, is specifically designed to be a cost-effective, versatile solution for a wide variety of microscopy photo documentation applications including life science, pathology, industrial inspection and geology.

Benefit from outstanding color, clarity and image detail. Extremely fast frame rates are achieved through the plug-and-play, low noise USB 2.0 data interface, maximizing your workflow. Combine our powerful feature-rich software package, together with the INFINITY1 series of cameras to produce accurate, reproducible results.

Models:

- INFINITY1-2C 2.0 MP CMOS Color Camera
- INFINITY1-3C 3.1 MP CMOS Color Camera
- INFINITY1-5C 5.0 MP CMOS Color Camera
- INFINITY1-5M 5.0 MP CMOS Mono Camera

## INFINITY2

CCD Cameras for Photo Documentation with Challenging Lighting and Color Conditions, as well as Quantitative Analysis

Highlights:

- 1, 2, 3 and 5 megapixel resolutions
- Excellent light sensitivity
- Superior color reproduction
- 12-bit output for quantitative applications

Effortlessly capture challenging images of samples in complex lighting situations with the INFINITY2 CCD high dynamic range digital microscopy cameras. If precise color reproduction is critical, the exceptional quality of the INFINITY2's Sony sensor meets the requirements of the most demanding applications. The INFINITY2 series of cameras offer consistent results with resolutions as high as 5 megapixel, positioning them as an ideal solution for challenging photo documentation and quantitative analysis applications in high-end scientific, medical, ophthalmic and life science applications.

Models:

- INFINITY2-1C 1.4 MP CCD Color Camera
- INFINITY2-1M 1.4 MP CCD Mono Camera
- INFINITY2-2C 2.0 MP CCD Color Camera
- INFINITY2-2M 2.0 MP CCD Mono Camera
- INFINITY2-3C 3.3 MP CCD Color Camera
- INFINITY2-5C 5.0 MP CCD Color Camera
- INFINITY2-5M 5.0 MP CCD Mono Camera

Moderate to Low Illumination  
12-bit Quantitative Analysis

Brightfield/Darkfield  
DIC  
Live Cell Imaging  
Histology/Pathology/Cytology  
Semiconductor Inspection  
Metrology  
Documentation and Archiving

**INFINITY2**  
INFINITY2-1  
INFINITY2-2  
INFINITY2-3  
INFINITY2-5

Moderate Light Fluorescence  
Gel Documentation

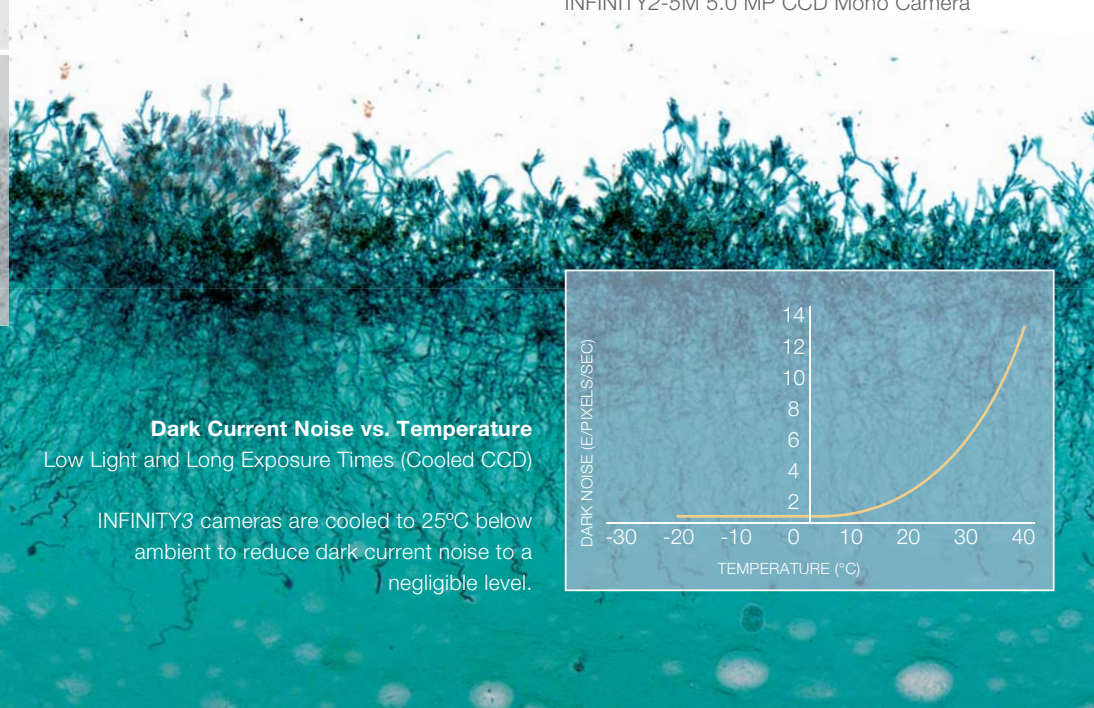
**INFINITY4**  
INFINITY4-11

High Sensitivity  
12-bit Quantitative Analysis

Brightfield/Darkfield  
DIC  
Live Cell Imaging  
Histology/Pathology/Cytology  
Semiconductor Inspection  
Metrology  
Documentation and Archiving  
Gel Documentation

**INFINITY3**  
INFINITY3-1  
INFINITY3-7U

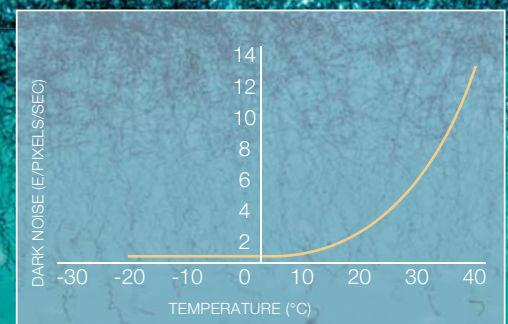
Low Light Fluorescence  
Chemiluminescence  
Bioluminescence  
Flow Analysis  
GFP  
FISH  
NIR  
FRET



### Dark Current Noise vs. Temperature

Low Light and Long Exposure Times (Cooled CCD)

INFINITY3 cameras are cooled to 25°C below ambient to reduce dark current noise to a negligible level.





## INFINITY3

CCD Cameras for Low Light Conditions and Quantitative Analysis

### Highlights:

- Ultra-sensitive Sony ICX285 1.4 megapixel sensor
- Thermoelectric cooled and uncooled camera models
- Fast frame rates
- 12-bit output for quantitative applications
- GPI/O provided standard on cooled models

For complicated low-light applications the INFINITY3 series employs the ultra-sensitive Sony ICX285 CCD sensor. Two high dynamic range camera models are available:

- The INFINITY3-1 is thermoelectrically cooled to 25°C below ambient and features a high signal to noise ratio, positioning it as an ideal solution for applications with extremely long integration times where dark noise must be eliminated.
- The uncooled INFINITY3-1U is a cost-effective solution for general low light applications including fluorescence. Highlights include high dynamic range, outstanding color reproduction and extremely high frame rates of 15 fps.

### Models:

INFINITY3-1C 1.4 MP Cooled CCD Color Camera  
 INFINITY3-1M 1.4 MP Cooled CCD Mono Camera  
 INFINITY3-1UC 1.4 MP CCD Color Camera  
 INFINITY3-1UM 1.4 MP CCD Mono Camera

### Progressive Scan CMOS and CCD Sensors

INFINITY cameras include a progressive scan sensor, ideal for imaging moving or changing objects. Progressive scan provides consistent live previews when focussing or imaging moving samples, without the tearing or color blurring normally found in interlaced cameras. This is due to the sensor array being read in its entirety versus field by field. Additionally, no settle time is required before image capture.

Please note: The INFINITY2-3 is not progressive scan.



## INFINITY4

Large Format CCD Cameras with a Large Field of View and High Resolution

### Highlights:

- 11 megapixel resolution
- Large format sensor
- 12-bit output for quantitative applications

The INFINITY4 camera series offers a large format megapixel Kodak sensor for a wide field of view. The perfect choice for demanding high resolution imaging requiring excellent color rendition. Features include a 12-bit digital output, binning, progressive scan electronic shutter, full exposure control, programmable gain, sub-windowing and region of interest. Ideal for high-end ophthalmic, medical, clinical and life science applications. GPI/O for control of peripheral devices is available upon request.

### Models:

INFINITY4-11C 10.7 MP CCD Color Camera  
 INFINITY4-11M 10.7 MP CCD Mono Camera



## INFINITYX

Extremely High Resolution Pixel Shifting Cameras

### Highlights:

- 32 megapixel resolution for viewing fine detail
- CCD sensors provide application versatility
- INFINITYX-32 has 12-bit output for quantitative applications

The INFINITYX-32 digital camera's sub-pixel shifting technology provides variable resolution capture at 2, 8, 16 and 32 megapixel. High resolution, combined with the excellent sensitivity of a CCD, make this an excellent general camera for virtually any application. In addition to high resolution, pixel-shifting cameras have the added advantage of acquiring all three color channels for each pixel, ensuring the highest possible quality of color reproduction.

### Models:

INFINITYX-32C 32 MP CMOS Color Camera  
 INFINITYX-32M 32 MP CMOS Mono Camera

## INFINITY ANALYZE Software

All Lumenera INFINITY cameras include INFINITY ANALYZE software, allowing complete camera control and advanced image acquisition and analysis.

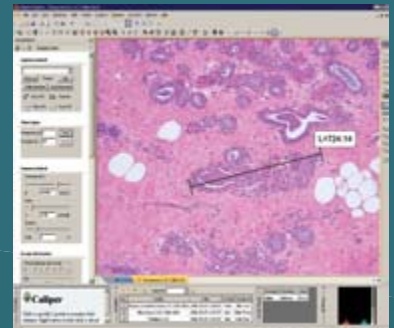
Also included is INFINITY CAPTURE, an intuitive user interface that contains all of the basic features needed to control the camera and capture images.

Easily integrate your INFINITY camera with 3rd party software applications through our TWAIN and DirectX/WDM interface (included) as well as 3rd party drivers for most image analysis packages.

An Advanced Features Model is available as an accessory to perform depth of focus and spherical aberration correction.

### Features include:

- Real time video preview
- Measurement and annotation
- Archiving with search for date, author, description
- Fluorescent image composition including RGB Look-Up Tables (LUT)
- Single capture and time lapse
- Image stitching
- Automatic/manual exposure and white balance
- Hue, saturation, gain, contrast, brightness and gamma controls
- Advanced image processing
- Customize interface for specific applications
- Thumbnail worksheet
- Drag and drop measurement data to Microsoft Excel for analysis
- Save and restore camera settings
- Context sensitive help for all functions
- Optional focus enhancement
- Interactive color composition
- Available in 9 languages: English, Latin Spanish, Castilian Spanish, Italian, Russian, Japanese, Chinese, Korean and French





Cat. # (Color/Mono)	Megapixel	Resolution	Sensor	C-Mount Coupler	Pixel Pitch	Frame Rate	Bit Depth	Read Noise	Binning/ Sub Sampling	Region of Interest
<b>INFINITY1</b>										
INFINITY1-2C	2.0	1600x1200	1/2" CMOS	0.5X	4.20	15	8 or 10	20 e-	N/Y	Y
INFINITY1-3C	3.1	2048x1536	1/2" CMOS	0.5X	3.20	12	8 or 10	20 e-	N/Y	Y
INFINITY1-5C or M	5.0	2592x1944	1/2.5" CMOS	0.5X	2.20	5	8 or 10	20 e-	N/Y	Y
<b>INFINITY2</b>										
INFINITY2-1C or M	1.4	1392x1040	1/2" CCD	0.5X	4.65	15	8 or 12	12 e-	Y/Y	Y
INFINITY2-2C or M	2.0	1616x1216	1/1.8" CCD	0.5X	4.40	12	8 or 12	12 e-	Y/Y	Y
INFINITY2-3C	3.3	2080x1536	1/1.8" CCD	0.5X	3.45	5	8 or 12	12 e-	Y/Y	Y
INFINITY2-5C or M	5.0	2448x2048	2/3" CCD	0.63X	3.45	9	8 or 12	12 e-	Y/Y	Y
<b>INFINITY3</b>										
INFINITY3-1C or M	1.4	1392x1040	2/3" Cooled CCD	0.67X	6.45	15	8 or 12	8 e-	Y/Y	Y
INFINITY3-1UC or M	1.4	1392x1040	2/3" CCD	0.67X	6.45	15	8 or 12	8 e-	Y/Y	Y
<b>INFINITY4</b>										
INFINITY4-11C or M	10.7	4008x2672	35mm Format CCD (43.3mm)	Custom F-Mount	9.00	3.5	8 or 12	12 e-	Y/Y	Y
<b>INFINITYX</b>										
INFINITYX-32C or M	2.0, 8.0, 16, 32	1616x1216 to 6464x4864	1/1.8" CCD	0.5X	4.40	12	8 or 12	12 e-	Y/Y	Y

### INFINITY Camera Specifications

- Auto/Manual Exposure
- Manual White Balance
- 1 to 10X programmable gain
- USB 2.0 High-Speed Interface (480 MB/s)
- *Power:*  
INFINITY1, 2 & 3U: USB Bus Power  
INFINITY3 Cooled/INFINITYX: External 5VDC-1A  
INFINITY4: External 12VDC-1A
- *Operating Temp:* 0°C to +50°C
- *Operating Humidity:* 5%–95%, Non-condensing
- *Operating Systems:*  
PC: Windows XP, Windows Vista and Windows 7, 32 and 64-bit  
Mac: 32 and 64-bit (10.6 or higher)


### OEM Custom Camera Design


As a Lumenera OEM customer you can now leverage the success of the INFINITY camera line through our custom camera development. Our unique options for OEM custom software features and hardware camera design offer the following advantages:

- Improve Time-to-Market
- Reduce Development Costs
- Differentiate from the Competition

### Comparing USB 2.0 to FireWire

Video performance in digital cameras is defined by the maximum frame rate at a given resolution and is measured in frames per second (fps). Both FireWire and high-speed USB 2.0 digital cameras exhibit almost identical frame rates by resolution. These frame rates are usually limited by the sensor read-out rate — not the physical interface. As an example, a 1 megapixel CCD sensor using a FireWire or USB 2.0 interface is limited to 15 or 30 fps depending on the camera model. As resolution increases, frame rates decrease.

 **USB 2.0:** 480 Mbit/s, 15 fps, plug-and-play. 99% of computers have USB 2.0 ports.

 **FireWire:** 400 Mbit/s, 15 fps. Most computers need a FireWire card installed — some laptops may not have the space required.

USB 2.0 is an ideal interface for scientific cameras, offering plug-and-play with all computers, while providing more than enough throughput for its selected image sensors.

### INFINITY Mac Software

A Mac Camera Driver and ImageJ Plug-In are available for the following INFINITY cameras:

- INFINITY1-2
- INFINITY1-5
- INFINITY2-2
- INFINITY3-1
- INFINITY4-11
- INFINITY1-3
- INFINITY2-1
- INFINITY2-5
- INFINITY3-1U

Visit [www.lumenera.com/support/downloads/microscopy-downloads.php](http://www.lumenera.com/support/downloads/microscopy-downloads.php) to download the latest version.

\* Mac Software is not available for the INFINITY2-3 or INFINITYX cameras.

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