Elegant Imaging Systems from Opteon

Powerful, Reliable, Incredibly Fast and Accurate
And You Simply Plug Them In

Highly Reliable Imaging Systems You Can Deploy in Minutes

The world's most powerful imaging systems are so advanced that they are also simple to use.

The Opteon system was designed from the ground up to tap the hidden potential for cameras, networks, and modern computers to solve challenging real world problems quickly and easily. Six facets of the Opteon Architecture deliver this potential for a wide range of industries:

- **Direct-to-Host Technology**
- **Work-Cell Clusters**
- **Distributed Imaging**
- **Image Precision**
- **Simple/Powerful API and Code-Free Interfaces**
- **Open Architecture**

Direct-to-Host Technology

No More Frame Grabbers

Over 800 camera types, spanning the categories of monochrome, color, 3-chip color, and line-scan can be easily connected, in any combination, via all of the evolving standard data pathways in conventional PCs (USB2, Ethernet, PCI, and 64/66 PCI).

Opteon systems provide extremely high throughput (460 to 920 Megabytes/second, sustained, per computer and 110 Megabytes/second per camera) with little, or no utilization of the host processor, even for asynchronous data from multiple, disparate camera channels.

This is achieved in a system with guaranteed data integrity, long, inexpensive standard cables (300' without repeaters, multiple kilometers with one repeater), no requirement for external power supplies, and at greatly diminished cost.

Quick to Implement

Through ingenious use of new open computer standards for peripheral connections, Opteon systems supersede both conventional and proprietary methods of interfacing cameras to computers, storage devices, and displays. They eliminate the lengthy integration delays and loss of fidelity that plague deployments with conventional equipment. Gone are the days of multiple vendors, each of whose products have specific requirements that must be reconciled in hardware and patched together in software before even rudimentary functionality can be demonstrated.

Snap Together

Opteon components snap together and immediately function flawlessly.

Data from almost any camera you could imagine is delivered with perfect fidelity, directly (no intermediate copies and without using the host processor) to the user-mode virtual memory of modern, inexpensive, high-speed PCs and Servers.

Vastly superior single-camera solutions can be implemented for half the cost of today's "smart cameras" with even greater savings for multiple camera systems.

Systems of over 1000 cameras can be deployed from a single 19" equipment rack.

Work-Cell Clusters

Often clusters of cameras and light sources need to be located in close proximity to a work cell and must be synchronized with each other and with the operations of a machine.

Lights Slaved to Cameras

Specific light sources may be needed for each camera to properly record its particular view. Lighting often must be synchronized with each camera in a way that prevents stray light intended for one camera from disturbing the data generated by another camera in the work cell (sometimes called "light pollution"). The Opteon StrobeMaster IV light source driver is an innovative snap-on device that provides control for up to 4 independent light sources and automatically synchronizes them with each camera's exposure.

Cameras Synchronized with Machines

Two other snap-on accessories to Opteon cameras facilitate very high-speed (less than 1 microsecond) coordination of machines and imaging systems. The Machine Interface Device (MID) provides an opto-isolated interface with physical equipment in the neighborhood of the cameras and incorporates a Programmable Logic Controller (PLC) that can automate control of high-speed machinery, or communicate in real time with other such controllers.

The Motion Control Device (MCD) automates control of up to six axes of motion and can track their motion, or the motion of other devices, to automatically generate axis control signals and image triggers.

Powerful and Accurate Systems You Can Control, From Anywhere

These devices operate via the same code-free interfaces or software API that are used to control the cameras themselves.

Distributed Imaging

Separating the computer from the camera saves money, increases flexibility, accelerates throughput, and simplifies deployment.

Completely Scalable
With Opteon Systems, you can precisely tailor the amount of processor each deployment requires; to save money on applications requiring low computational resources or manage extremely demanding compute-intensive algorithms. Opteon systems are inherently scalable for use at extremely high speeds or to manage large numbers of multiple simultaneous image sources.

Imaging applications benefit from the freedom to place cameras where they need to be to properly record the relevant action while the compute platform resides wherever is most convenient for maintenance and communication.

Realtime Distributed Decision Making
Often data from various sensors in one or more work cell clusters may need to be combined before a conclusion can be drawn that will dictate the next action of the work cells. This is facilitated in Opteon systems since data can be effortlessly delivered in real time to standard PCs where such global decisions can easily be made.

In the Opteon system, not only can image data be delivered seamlessly to one or more computers on a network, but digital data to and from the machinery can be communicated rapidly (maximum round-trip latencies of much less than 1 mS) between the machinery and the host(s), to facilitate complete decision making and control of the work cell's response to the decisions.

Network-wide Controllability
Any combination of analyzed data, detailed or compressed images, and statistical process control information can be forwarded in real time to computers elsewhere in the network as needed for product documentation, updating control charts, or process management.

Engineers, managers, or safety personnel can initiate any or all of these data streams from their offices, or remotely from off-site.

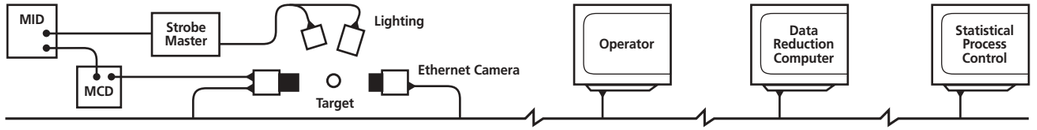
Image Precision

The datum for each Opteon pixel is completely independent of the values on neighboring pixels so the spatial response of Opteon cameras is up to 5 times higher than conventional cameras. The relationship between light level and reported gray scale for each pixel of an Opteon camera is also much more linear than that of other imaging systems.

Razor-sharp Accuracy
Taken together these factors improve the accuracy of algorithms using Opteon imagery by 3 to 5 fold over their performance with standard cameras. Greater accuracy means that difficult applications often become robust, or you may be able to use a standard resolution Opteon to replace a conventional megapixel camera.

Opteon cameras can also correct in real time the gray scale returned for each pixel for both the sensor's inherent biases as well as for illumination and lensing aberrations in the viewing environment, further improving system accuracy.

More precise imagery means more accurate and repeatable answers.



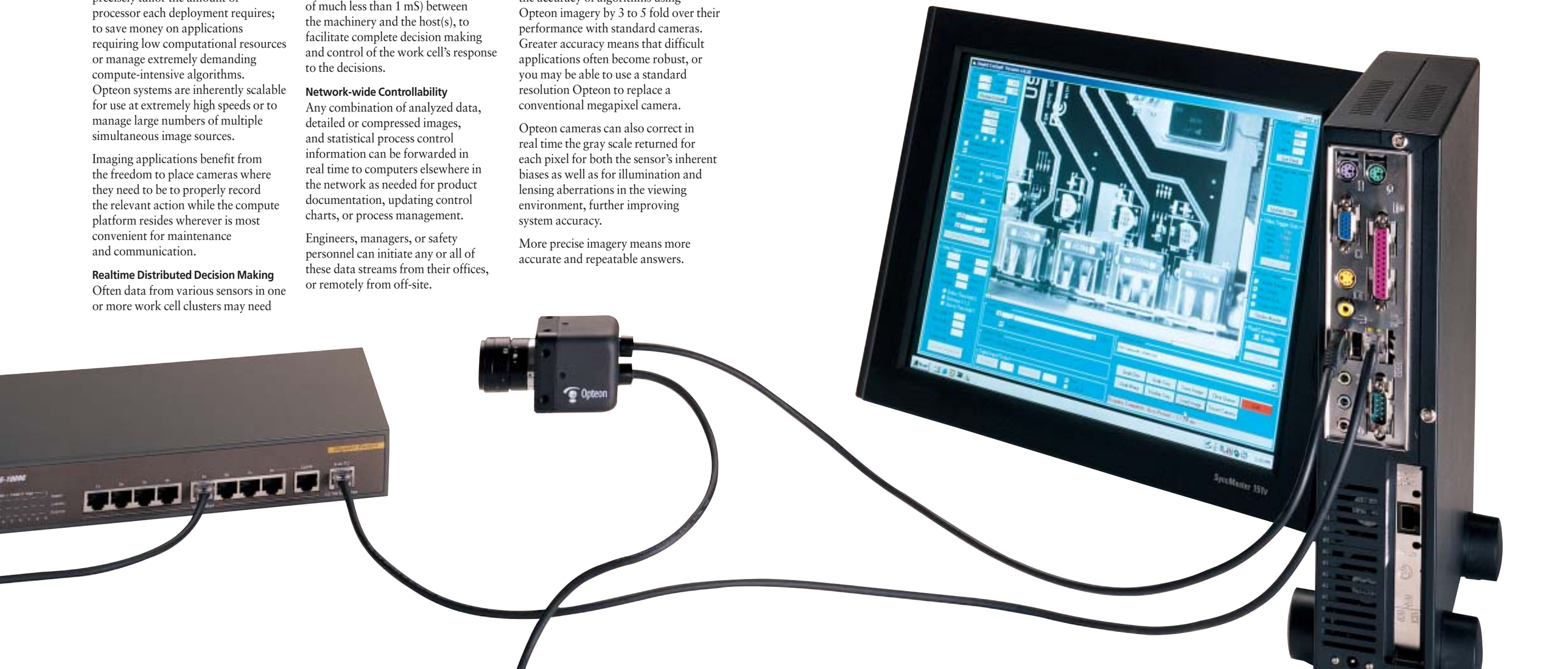
Ask Us About Distributed Imaging

Our competitors say that getting imagery from a camera through the network fast enough for modern tasks violates the laws of physics. What physics?

Opteon Cameras can deliver images over standard Ethernet at 330 uncompressed images per second – an image every 3 milliseconds. As soon as an exposure is in a camera, it can be anywhere in the world.

A millisecond later, the world's answer can be back to the camera and the machinery associated with it.

Our snap-together imaging components make this sort of Distributed Imaging so easy to achieve that you don't have to write a line of code to install them.



A User Interface as Elegant as the System Itself

Simple/Powerful API and Code-Free Interfaces

All of the Opteon capabilities, even when supporting multi-threaded, multi-processor applications are accomplished through code-free tools like Cockpit™ or Chassis™ or a very simple though powerful Application Programming Interface. The Opteon Depict API enables you to create an imaging application of unprecedented power with two simple calls that direct asynchronous acquisition from any camera to any location in user-mode virtual memory:

1. DepictOpenCameraBySerialNumber ("Serial Number")

2. DepictSingleAcquireEx (Camera, Destination, Trigger Source, Transmission Complete Event)

Auto-Configuration
When your computer boots, the Opteon system identifies all of the imaging sources that are currently available to your computer anywhere in your enterprise. A graphic camera setup screen will tell you what imaging resources are available, let you view the default settings, and observe the images they produce as well as store and retrieve them from disk and CDROM.

Over 40 parameters can be set for each Opteon camera on-the-fly, at full frame rates. Examples of changes that can be made on any particular shot include:

- **exposure, 1 µsec. – 4 seconds**
- **gain, 1.0 – 32.0**
- **offset,**
- **area of interest, i.e. which pixels to send,**
- **how pixels should be binned,**
- **trigger source**
- **whether pixel corrections should be applied**

Other parameters concern in what format the data should be sent, what condition, input, or other camera should trigger the acquisition, and where the resulting data should go.

Deterministic Controllability
The cameras can be completely configured, either from the screen, or programmatically. All image system changes can be made from your user-mode executable code and are applied to the precise, queued acquisition you expect them to affect – no guessing about which acquisition will reflect your latest command. All camera settings can be different for each successive frame, even when a camera is delivering over 300 images per second.

Unlimited Agility
The agility of the Opteon cameras means that it is easy to intersperse images from several different types of cameras, using different light sources, and from different perspectives in a precise order and synchronized with real world operations as diverse as parts moving through high speed manufacturing environments, people moving through crowds, or cars moving through intersections. It is even possible to specify how many exposures you would like to take of an object at fixed intervals for time/motion studies.

Self-Targeting
Opteon cameras can even find their own targets, sending data and instigating control signals only in the presence of particular objects at specific locations in the field of view. In manufacturing environments this often eliminates the need for part-in-place sensors to trigger the cameras.

A Complete Family of Imaging Products

By using the standard docking ports that every modern operating system now implements for data flow (Pointers to user-mode virtual memory) and interrupt-driven real time communications (Events) the data from any combination of Opteon sources is available in real time to any combination of third-party and/or custom imaging algorithms and machine control software.


652 x 494 pixel
3-Chip Color,
60 fps


1004 x 1004 pixel
3-Chip Color,
40 fps


652 x 494 pixel
Single Chip Color/
B&W, 60 fps


656 x 494 pixel
B&W, 120 fps


652 x 494 pixel
Single Chip Color/
B&W Remote Head,
60 fps


1392 x 1040 pixel
Single Chip Color/
B&W, 23 fps

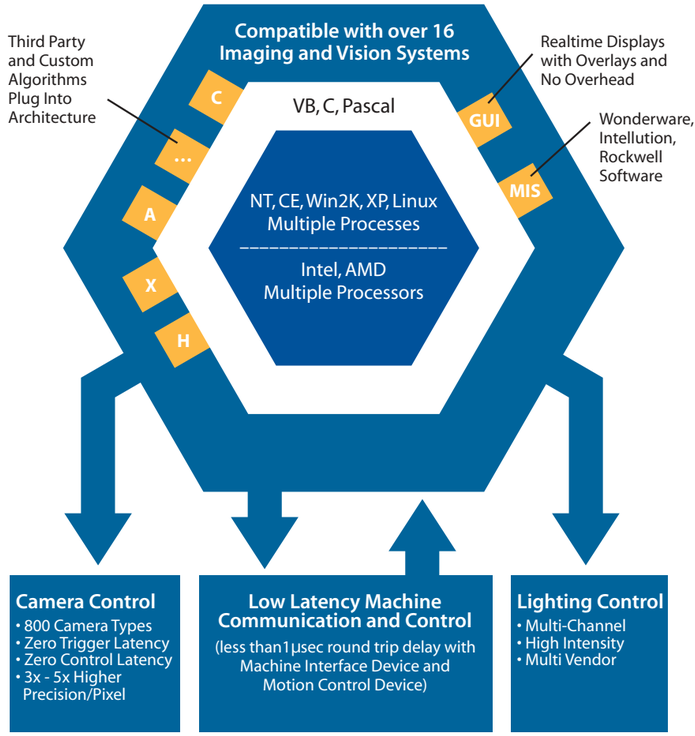

1024 x 768 pixel
Single Chip Color/
B&W, 30 fps


1024 x 1024 pixel
Single Chip B&W,
100 fps


2048 pixel
Line Scan B&W,
50 Mhz


1004 x 1004 pixel
Single Chip Color/
B&W, 48 fps

Open Architecture Unlocks Modern PCs



Open Architecture

The Opteon system was architected from first principles to interact with modern computers and operating systems in their most efficient and natural modes so that data will arrive where people (on-screen or around the network) and algorithms (user-mode virtual memory) need it to be without bottlenecks, lost data, or use of the host processor.

Transactions take place on standard computers and operating systems asynchronously, in real time, and with no latencies.

Graphical representations of algorithm results and decisions are overlaid seamlessly on real time imagery.

All of the Opteon components and drivers, used in any combination, are completely multi-thread and multi-processor safe.

Opteon

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Opteon Ordering Information

X	Camera Interface Type
S	Standard
U	USB 2.0
E	10/100 Base T Ethernet
O	Optical
F	1394 Firewire
M	USB & Fireware

C	Performance Bundles
0	Base Configuration
1	Agility: ROI, Binning, Simultaneous Transfer
2	Trigger: Through the Lens, Simultaneous, Delayed, Timebase
3	Fidelity: Pixel Corrections, Expanded Pixel Depth
4	Combined Agility & Trigger Bundles
5	Combined Agility & Fidelity
6	Combined Trigger & Fidelity Bundles
7	Combined Trigger, Fidelity, & Agility Bundles

BBB	Imager Type	Sensor Size	Fps	Case Options
B1A	652 x 494 Progressive Scan, B&W	1/3"	30-60	0-3,6
C1A	652 x 494 Progressive Scan, Mosaic Color	1/3"	30-60	0-3,6
C3A	652 x 494 Progressive Scan, 3-CCD Color	1/3"	30-60	4
B2D	652 x 494 Progressive Scan, Dual Tap, B&W	1/3"	60-120	0-3
B1E	1296 x 1024 Progressive Scan, B&W	2/3"	8-23	0-3
C1E	1296 x 1024 Progressive Scan, Mosaic Color	2/3"	8-23	0-3
B2F	1004 x 1004 Progressive Scan, B&W	2/3"	10-48	0-3
C2F	1004 x 1004 Progressive Scan, Mosaic Color	2/3"	10-48	0-3
C3F	1004 x 1004 Progressive Scan, 3-CCD Color	2/3"	10-40	5
B4G	1024 x 1024 Frame Transfer	2/3"	30-100	7
B2H	2048 pixel line scan	21mm	5Mhz	2-3
BAI	1280 x 1024 Progressive Scan, B&W	2/3"	30-110	8
CAI	1280 x 1024 Progressive Scan, Mosaic Color	2/3"	30-110	8
B1J	1024 x 768 Progressive Scan, B&W	1/3"	30	0-3
B1J	1024 x 768 Progressive Scan, Mosaic Color	1/3"	30	0-3
B1J	1024 x 768 Progressive Scan, 3-CCD Color	1/3"	30	4

D	Special Functions
0	No special functions
M	Data Compression
C	Color Processing

EEE	Frames Per Sec.
Use 3 digits ex: 008, 012, 016, 018, 022, 023, 030, 045, 048, 060, 090, 100, 120, 330	

F	Pixel Depth
8	8 Bits
A	10 Bits
C	12 Bits

G	Orientation
0	Normal Orientation
3	Image Vertical "UP" oriented towards 3 o'clock (camera's right side) as viewed from behind
6	Image Inverted
9	Image Vertical "UP" oriented towards 9 o'clock (camera's left side) as viewed from behind

H	Lens
C	C - Mount
S	CS - Mount
M	1" - 32 THD
R	5/8 - 40 Male THD
T	42 mm x 0.75
O	O - Mount, 29.5 x 0.5 mm

I	Case	
0	CS-Mount 3B Quad	1.77" (H) x 1.77" (W) x 1.78" (D)
1	CS-Mount 4B Quad	1.77" (H) x 1.77" (W) x 2.16" (D)
2	C-Mount 3B Quad	1.77" (H) x 1.77" (W) x 1.98" (D)
3	C-Mount 4B Quad	1.77" (H) x 1.77" (W) x 2.35" (D)
4	C-Mount 3S Quad	1.77" (H) x 1.77" (W) x 2.24" (D)
5	M-Mount 3S	2.0" (H) x 2.5" (W) x 3.25" (D)
6	Remote Head	0.88" (H) x 0.88" (W) x 1.18" (D)
7	O-Mount	1.77" (H) x 2.4" (W) x 2.20" (D)
8	C-Mount 2B	2.00" (H) x 2.00" (W) x 1.54" (D)

J	Filter
0	None
1	IR

KK	Data Cable Length
0P	Short pigtail
xx	Length in meters

L	I/O Cable Termination
0	None
1	Hirose
2	Modular
3	Tinned
4	Hirose w/pwr
5	Mod. w/pwr
6	Tinned w/pwr
A	Hirose w/Optiport
B	Modular w/Optiport
C	Tinned w/Optiport
D	Hirose w/pwr + Optiport
E	Mod. w/pwr + Optiport
F	Tinned w/pwr + Optiport

M	I/O Cable Length
P	Short pigtail
x	Length in meters

Fill out this form to determine your Opteon part number.

CA- ☐ ☐☐☐ ☐ ☐ ☐☐☐ ☐ ☐ ☐ ☐ ☐ ☐☐ ☐ ☐

CA- X BBB C D EEE F G H I J KK L M

CA- ☐ ☐☐☐ ☐ ☐ ☐☐☐ ☐ ☐ ☐ ☐ ☐ ☐☐ ☐ ☐

CA- X BBB C D EEE F G H I J KK L M

Example: CA-UB1A1003080C20052P is a Depict USB2.0 B&W Camera with 652x494 pixels, Agility Bundle, no special functions, 030 frames/sec, 8 bits/pixel, Normal Orientation, C-Mount, Quad Case, 1.8" deep, no filter, 05 meter integrated data cable, and modular Optiport pigtail cable.