emergent

vision technologies

10 GigE Cameras

All About **10GigE**

What is **10GigE?**

10GigE (a.k.a. 10 Gigabit Ethernet) is the successor to 1GigE (1 Gigabit Ethernet) which is the leading interface for machine vision applications. 10GigE, as the successor, provides all the same benefits of 1GigE but with a ten- fold increase in data-rate which leads to a ten-fold increase in frame rate. 10GigE, as with 1GigE, is an industry standard which has been around for years and is managed/produced by the IEEE 802.3 working group. The standard is used in applications such as telecom, data communications, industrial, military, etc., and now we leverage the benefits of this globally accepted cross-industry technology for machine vision applications.

What is the bandwidth of **10GigE?**

The maximum bandwidth available for 10GigE is 10Gbps or 1,250 Mbytes/s. The usable bandwidth is around 9.5Gbps or 1,180 Mbytes/s.

What are the cable options & max cable length of **10GigE?**

The two main connector options are SFP+ and RJ45. RJ45 is a good option for shorter cable lengths since the power consumption of such a solution can add an additional 2W of power for running the full 100m which becomes a bit of a problem as we attempt to make cameras more compact. SFP+ is the most flexible option and is conscious of keeping power consumption to a minimum. Using the SFP+ interface provides primarily three options which cover the cable length requirements of all applications. The first and least expensive option is Direct Attach which is a copper based passive solution and the cable lengths for these single piece cables range from 1m to 10m. The second option utilizes SFP+ multi- mode fiber modules/transceivers and LC-LC multi-mode fiber cables and the cable lengths for this three-piece cable range from 1m to 300m. The third option utilizes SFP+ single-mode fiber modules/transceivers and LC-LC single-mode fiber cables and the cable lengths for this three-piece cable range from 1m to tens of Kilometres.

Why **10GigE** for my application?

-With 10 GigE you get ultra high data/frame rates.
-A large number of accessory & cabling options
-Network support & accurate multi-camera synchronization
-Low CPU overhead, low latency, low jitter using Myricom's MVA.
-Industry acceptance due to IEEE and AIA standardization.

Does GigE Vision work for **10GigE?**

Yes. GigEVision (the machine vision specific interface standard) regardless of its version supports Emergent 10GigE cameras. The later versions add some additional 10GigE specific elements which are not critical for the operation of Emergent 10GigE cameras with various GigE Vision compliant software such as NI Labview, MVTec Halcon, Norpix StreamPix, etc.

10GigE NIC Cards and MVA for **10GigE.**

Emergent and Myricom Inc. have partnered to provide an optimal solution for Machine Vision applications. Myricom supplies their NICs pre-programmed with MVA and are available direct from Emergent. We have 3 NIC options to chose from, Single NICs, Dual NIC (2 cameras per card), and Dual SYNC NICs (2 cameras per card that can be sync'd to sub 1 micro second). By using these cards in conjunction with the MVA license that comes with them, customers can expect to see:
-Extremely low CPU utilization
(2% single CPU core overhead for a 9Gbps video stream)
-Extremely low latency
-Extremely low jitter

How does **10GigE** compare with other interfaces?

Emergent 10GigE cameras, coupled with Myricom's MVA, equals or out-performs other interfaces in every technical category and its price performance is in line with the best. With MVA, all the shortcomings associated with 1GigE w.r.t. CPU utilization, latency and jitter are obliterated. Industry acceptance is very good and will only get better.

HS SERIES

2MP TO 20MP

The HS Series cameras are our legacy product line with camera options of 2MP, 4MP, 12MP, or 20MP. These cameras come equipped with SFP + Connections that can be used with our short length direct attached copper cables or long range fiber with transceivers. What makes this line so attractive, is if a customer needs to run those long cable lengths, there is no need for a Converter. With Fiber, the cable lengths can go up to 10KM.

HT SERIES

The HT Series cameras are our newest product family with camera options of 2MP, 4MP, 12MP, or 20MP. These cameras are smaller in physical size and come equipped with CAT6A 10GBaseT Connections. They have the more familiar ethernet connection similar to GigE but 10x the speed. Cable lengths can go up to 100M.

SOFTWARE
eCapture and eSDK

eCapture provides control of all camera functions for preview, capture and save. Advanced functions such as Area Of Interest (AOI), integration control, standard pre-processing such as brightness, gamma, frame rate control and many more. The eCapture also provides <3% CPU overhead for Windows and Linux when capturing a 9Gbps image stream from the cameras directly to application buffers.

eSDK is available with concise API commands to facilitate simple integration with custom software for Windows® and Linux® Based Systems. Access to eSDK is available at no charge with the purchase of an Emergent camera system. The eSDK software solution also provides <3% CPU overhead for Windows and Linux when capturing a 9Gbps image stream from the cameras directly to application buffers.

ACCESSORIES
10GIGE NIC CARDS

10G NICs are available direct from Emergent Vision Technologies and come with the MVA optimized driver for extremely low CPU utilization. All are fully supported by the Emergent eSDK and eCapture for seamless integration. We currently offer a Single NIC, Dual NIC or Dual SYNC NIC which allows for synchronization <1μs.

CABLES, POWER SUPPLIES, AND GPIO

SFP+ fiber and direct attach cables are available direct from Emergent Vision Technologies. Direct attach cables are available for most applications while fiber cables are available for longer distance applications. Power supplies and GPIO accessories are also available to our customers for easy setup and use with our cameras.

HS SERIES

HS-2000

Model	HS-2000M/C	HS-2000N	HS-2000M/C-RA	HS-2000N-RA
Sensor	CMV2000	CMV2000	CMV2000	CMV2000
Resolution	2048x1088	2048x1088	2048x1088	2048x1088
Megapixels	2MP	2MP	2MP	2MP
Sensor Type	2/3" CMOS	2/3" CMOS	2/3" CMOS	2/3" CMOS
Max Frame Rate	338fps	338fps	338fps	338fps
Cell Size	5.5μm	5.5μm	5.5μm	5.5μm
Standard Mount	C Mount	C Mount	C Mount	C Mount
Dimensions	138x58x40	138x58x40	138x58x40	138x58x40

HS-4000

Model	HS-4000M/C	HS-4000N	HS-4000M/C-RA	HS-4000N-RA
Sensor	CMV4000	CMV4000	CMV4000	CMV4000
Resolution	2048x2048	2048x2048	2048x2048	2048x2048
Megapixels	4MP	4MP	4MP	4MP
Sensor Type	1" CMOS	1" CMOS	1" CMOS	1" CMOS
Max Frame Rate	179fps	179fps	179fps	179fps
Cell Size	5.5μm	5.5μm	5.5μm	5.5μm
Standard Mount	C Mount	C Mount	C Mount	C Mount
Dimensions	138x58x40	138x58x40	138x58x40	138x58x40

HS-12000

Model	HS-12000M/C	HS-12000N
Sensor	CMV12000	CMV12000
Resolution	4096x3072	4096x3072
Megapixels	12MP	12MP
Sensor Type	28mm CMOS	28mm CMOS
Max Frame Rate	84fps	84fps
Cell Size	5.5μm	5.5μm
Standard Mount	F, M42	F, M42
Dimensions	138x58x50	138x58x50

HS-20000

Model	HS-20000M/C
Sensor	CMV20000
Resolution	5120x3840
Megapixels	20MP
Sensor Type	35mm CMOS
Max Frame Rate	32fps
Cell Size	6.4μm
Standard Mount	F, M52
Dimensions	138x58x60

HS FAMILY SPECIFIC

Shutter	Global
Bit Depth	8 or 10 Bit
GPIO	2 in, 4 out
Interface	SFP+ 10GigE

HT SERIES

HT-2000

Model	HT-2000M/C	HT-2000N
Sensor	CMV2000	CMV2000
Resolution	2048x1088	2048x1088
Megapixels	2MP	2MP
Sensor Type	2/3" CMOS	2/3" CMOS
Max Frame Rate	338fps	338fps
Cell Size	5.5µm	5.5µm
Standard Mount	C Mount	C Mount
Dimensions	95x58x40	95x58x40

HT-4000

Model	HT-4000M/C	HT-4000N
Sensor	CMV4000	CMV4000
Resolution	2048x2048	2048x2048
Megapixels	4MP	4MP
Sensor Type	1" CMOS	1" CMOS
Max Frame Rate	179fps	179fps
Cell Size	5.5µm	5.5µm
Standard Mount	C Mount	C Mount
Dimensions	95x58x40	95x58x40

For any of our of our cameras you can take advantage of the Birger Mount. These Canon EF lens mount adapters provide electronic iris and focus control.

The picture above shows the Birger module electrically connected via the 4 pin Hirose connector. The Birger mount screws into the M42, M52, or C-mount front of the applicable camera. Then you plug the 12 pin Hirose connector into the back of the camera as shown above. Contact us for more information.

HT-12000

Model	HT-12000M/C	HT-12000N
Sensor	CMV12000	CMV12000
Resolution	4096x3072	4096x3072
Megapixels	12MP	12MP
Sensor Type	28mm CMOS	28mm CMOS
Max Frame Rate	84fps	84fps
Cell Size	5.5µm	5.5µm
Standard Mount	F, M42	F, M42
Dimensions	95x58x50	95x58x50

HT-20000

Model	HT-20000M/C
Sensor	CMV20000
Resolution	5120x3840
Megapixels	20MP
Sensor Type	35mm CMOS
Max Frame Rate	32fps
Cell Size	6.4µm
Standard Mount	F, M52
Dimensions	95x58x60

HT FAMILY SPECIFIC

Shutter	Global
Bit Depth	8 or 10 Bit
GPIO	2 in, 4 out
Interface	CAT6A 10GBaseT