



**Quick - smart - perfect:
1394b goes Pike.**

Pike F-032 B/C Pike F-032 B/C fiber

Pike F-100 B/C Pike F-100 B/C fiber

Pike F-145 B/C Pike F-145 B/C fiber

Image device	Type 1/3 (diag. 5.92mm) progressive scan, KODAK CCD	Type 2/3 (diag.10.5mm) progressive scan, KODAK CCD	Type 2/3(diag. 11.2mm) progressive scan, SONY IT CCD
Picture size	640 (H) x 480 (V) (all modes and color formats)	1000 (H) x 1000 (V) (all modes and color formats)	1388 (H) x 1038 (V) (all modes and color formats)
Cell size	7.4 µm x 7.4 µm	7.4 µm x 7.4 µm	6.45 µm x 6.45 µm
Resolution depth	8 bit /10 bit /12 bit /14 bit /16 bit (High SNR mode)	8 bit /10 bit /12 bit /14 bit /16 bit (High SNR mode)	8 bit /10 bit /12 bit /14 bit /16 bit (High SNR mode)
Lens mount	C-Mount / CS-Mount	C-Mount	C-Mount
Digital interface	IEEE1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 xopt. fiber on LCLC)	IEEE1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 xopt. fiber on LCLC)	IEEE1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 xopt. fiber on LCLC)
Transfer rate	100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s	100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s	100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s
Frame rates	Up to 208 fps (Mono8, Raw8), 139 fps (YUV 4:1:1), 105 fps (YUV 4:2:2, Raw16) 70 fps (RGB8)	Up to 60 fps (Mono8, Raw8), 43 fps (YUV 4:1:1), 33 fps (YUV 4:2:2, Raw16) 21 fps (RGB8)	30 fps (Mono8,Raw8), 30 fps (YUV 4:1:1); optional 15 fps, 23 fps (YUV 4:2:2, Raw16), 15 fps (RGB8)
Gain control	mono: Manual 0-22 dB, auto gain color: Manual 0-20 dB, auto gain	mono: Manual 0-22 dB, auto gain color: Manual 0-20 dB, auto gain	mono: Manual 0-32 dB, auto gain color: Manual 0-32 dB, auto gain
Shutter speed	18 µs ... ~ 67 s, auto shutter (select. AOI)	43 µs ... ~ 67 s, auto shutter (select. AOI)	39 µs ... ~ 67 s, auto shutter (select. AOI)
Smart features	AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode	AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode	AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode
External trigger shutter	Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay	Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay	Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay
Power requirements	DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)	DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)	DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)
Power consumption	Typ. 5 watt(@12 V DC) fiber: Typ.5.75 watt(@12V DC)	Typ. 5 watt(@12 V DC) fiber: Typ.5.75 watt(@12V DC)	Typ. 5 watt(@ 12 V DC)fiber: Typ.5.75 watt (@12VDC)
Dimensions	96.8mm x 44mm x 44mm (LxWxH); w/o tripod/lens	96.8mm x 44mm x 44mm (LxWxH); w/o tripod/lens	96.8mm x 44mm x 44mm (LxWxH); w/o tripod/lens
Mass	250 g (without lens)	250 g (without lens)	250 g (without lens)
Operating temperature	+5... +50°Celsius housing temperature	+5... +50°Celsius housing temperature	+5... +50° Celsius housing temperature
Storage temperature	-10... +60° Celsius ambient temperature	-10... +60° Celsius ambient temperature	-10... +60° Celsius ambient temperature
Regulations	CE, FCC Class B, RoHS (2002/95/EC)	CE, FCC Class B, RoHS (2002/95/EC)	CE, FCC Class B, RoHS (2002/95/EC)
Options	IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux	IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux	IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux

Go digital! Now it's easier than ever!

Getting started with digital image processing has never been so simple or cost-effective as it is now. With Pike, Allied Vision Technologies can supply a range of cameras that is currently the widest on the market with IEEE 1394b interfaces. Moreover, with daisy chain as well as direct fiber technology they gain the highest level of acceptance for demanding areas of use in manufacturing industry. Allied Vision Technologies can provide users with a range of products that meet almost all the requirements of a very wide range of image applications, a range that must surely be the most significant pioneer worldwide of FireWire camera technology in industrial and scientific image processing.

FireWire – the new standard in image processing

The digital connection technology presented to the computer industry by Apple as long ago as 1994 is now marching triumphantly forward through industrial image processing. The industry standard designated as IEEE 1394 (FireWire™ or i.Link™) facilitates the simplest computer compatibility and bi-directional data transfer using the

plug & play process. Further development of the IEEE 1394 standard has already made 800 Mbit/second possible – and the FireWire roadmap is already envisaging 1600 Mbit/second, with 3.2 Gbit/second as the next step. Investment in this standard is therefore secure for the future; each further development takes into account compatibility with the preceding standard, and vice versa, meaning that IEEE 1394b is reverse-compatible with IEEE 1394a. Your applications will grow as technical progress advances.

The Pike family at a glance

The AVT Pike family is equipped with an IEEE 1394b-(S800) interface and high-quality CCD sensors, and offers a surprising variety of different versions for the most demanding applications. The Pike offers a choice of six different high-quality sensors (b/w and color) with high sensitivity and faithful color reproduction. In order to be able to meet even the most stringent requirements of manufacturing industry the Pike is also available in a version with a copper daisy chain or 1 x copper combined with 1 x GOF connector. This not only enables system costs to be saved in multiple-camera operation but also

permits longer cable runs, even up to 500 meters. The direct fiber technology in the GOF version of Pike, moreover, provides a potential reconciliation and independence from electromagnetic compatibility. The high data rates of Pike, which go all the way up to 62.5 MByte/second, and a large number of useful "smart" features ensure extraordinarily good performance in PC-supported image processing. The image pre-processing that is already integrated into the Pike not only takes some of the load off the PC output but also reduces system costs by dispensing with the now redundant frame grabbers.

Pike highlights

- Pike F-032B/C; Pike F-032B/C fiber
Type 1/3 KODAK progressive scan CCD;
(VGA) 640 (h) x 480 (v); up to 208 fps *)
- Pike F-100B/C; Pike F-100B/C fiber
Type 2/3 KODAK progressive scan CCD;
(1 megapixel)1000 (h) x 1000 (v); up to 60 fps*)
- Pike F-145B/C; Pike F-145B/C fiber
Type 2/3 SONY progressive scan CCD;
(1.45 megapixel) 1388 (h) x 1038 (v); up to 30 / 16 fps *)

Pike F-210 B/C
Pike F-210 B/C fiber

Type 1 (diag. 16.3 mm) progressive scan, KODAK CCD
1920 (H) x 1080 (V) (all modes and color formats)
7.4 µm x 7.4 µm
8 bit / 10 bit / 12 bit / 14 bit / 16 bit (High SNR mode)
C-Mount / M39-Mount
IEEE 1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 x optical fiber on LCLC)
100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s
Up to 31 fps (Mono8, Raw8), 21 fps (YUV 4:1:1), 16 fps (YUV 4:2:2, Raw16), 11 fps (RGB8)
mono: Manual 0-22 dB, auto gain color: Manual 0-20 dB, auto gain
43 µs ... ~ 67 s, auto shutter (select. AOI); optional 71 µs
AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode
Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay
DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)
Typ. 5 watt (@ 12V DC) fiber: Typ. 5.75 watt (@ 12V DC)
96.8mm x 44mm x 44mm (LxWxH); incl.connectors, w/o tripod/lens
250 g (without lens)
+5... +50° Celsius housing temperature
-10... +60° Celsius ambient temperature
CE, FCC Class B, RoHS (2002/95/EC)
IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux

Pike F-421 B/C
Pike F-421 B/C fiber

Type 1.2 (diag. 21.4 mm) progressive scan, KODAK CCD
2048 (H) x 2048 (V) (all modes and color formats)
7.4 µm x 7.4 µm
8 bit / 10 bit / 12 bit / 14 bit / 16 bit (High SNR mode)
C-Mount / M39-Mount
IEEE 1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 x optical fiber on LCLC)
100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s
Up to 16 fps (Mono8, Raw8), 10 fps (YUV 4:1:1), 8 fps (YUV 4:2:2, Raw16), 5 fps (RGB8)
mono: Manual 0-22 dB, auto gain color: Manual 0-20 dB, auto gain
70 µs ... ~ 67 s, auto shutter (select. AOI)
AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode
Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay
DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)
Typ. 5.5 watt (@ 12V DC) fiber: Typ. 6.25 watt (@ 12V DC)
96.8mm x 44mm x 44mm (LxWxH); incl.connectors, w/o tripod/lens
250 g (without lens)
+5... +50° Celsius housing temperature
-10... +60° Celsius ambient temperature
CE, FCC Class B, RoHS (2002/95/EC)
IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux

Pike F-505 B/C
Pike F-505 B/C fiber

Type 2/3 (diag. 11.016 mm) progressive scan, SONY CCD
2452 (H) x 2054 (V) (all modes and color formats)
3.45 µm x 3.45 µm
8 bit / 10 bit / 12 bit / 14 bit / 16 bit (High SNR mode)
C-Mount / M39-Mount
IEEE 1394b, 2x bilingual (daisy chain); fiber: IEEE 1394b 1 x bilingual, 1 x GOF connector (2 x optical fiber on LCLC)
100 Mbit/s, 200 Mbit/s, 400 Mbit/s, 800 Mbit/s
Up to 15* fps (Mono8, Raw8), 12* fps (YUV 4:1:1), 9* fps (YUV 4:2:2, Raw16), 6* fps (RGB8)
mono: Manual 0-24 dB, auto gain color: Manual 0-24 dB, auto gain
27 µs ... ~ 67 s, auto shutter (select. AOI)
AGC/ AEC/AWB with autofunction AOI; only color: AWB/color correction/hue/saturation; real-time shading correction, LUT, 64 MB image memory, mirror, binning (only b/w), sub-sampling, High SNR, storable user sets, 2 progr. inputs / 4 progr. outputs, RS-232 port, SIS [secure image signature], sequence mode, anti-smear mode, 4x/8x binning, 12-bit speed increase mode
Programmable, trigger level control, single trigger, bulk trigger, programmable trigger delay
DC 8 V – 36 V (via IEEE1394 cable or 12-pin HIROSE)
Typ. 5.75 watt (@ 12V DC) fiber: Typ. 6.50 watt (@ 12V DC)
96.8mm x 44mm x 44mm (LxWxH); incl.connectors, w/o tripod/lens
250 g (without lens)
+5... +50° Celsius housing temperature
-10... +60° Celsius ambient temperature
CE, FCC Class B, RoHS (2002/95/EC)
IR cut/pass filter (mono), protection glass (color), host adapter card, angled head, power out (HIROSE); AVT FirePackage/Active FirePackage/Fire4Linux

** at 11000 bytes per packet

- Pike F-210B/C; Pike F-201B/C fiber
Type 1 KODAK progressive scan CCD;
(2.07 megapixel) 1920 (h) x 1080 (v);
up to 31 fps *)
- Pike F-421B/C; Pike F-421B/C fiber
Type 1.2 KODAK progressive scan CCD;
(4 megapixel) 2048 (h) x 2048 (v);
up to 15 fps *)
- Pike F-505B/C; Pike F-505B/C fiber
Type 2/3 SONY progressive scan CCD;
(5 megapixel) 2452 (h) x 2054 (v);
up to 15 fps **)

*) at full resolution
**) at 11000 bytes per packet

IEEE 1394b

Pike has an IEEE 1394b interface with a data rate of 800 Mbit/s, which permits not only faster and larger data transmissions from the camera to the system but also makes multiple-camera operation vastly more effective. At the same time the standard always remains reverse-

compatible, so that even the mixed operation of a 1394a camera in a 1394b environment is supported, as well as the reverse: a 1394b camera in a 1394a environment. The IEEE 1394b standard thus not only protects past investment but also contributes to reducing the total cost of ownership.

**The architecture of the Pike:
the maximum range of individual possibilities**

The separation from sensor and main boards enables the Pike series to meet the requirements for a "camera on demand." There are thus virtually no limits to the "design-in" and the scope for adaptation to each application. The highly efficient micro-controller and the FPGA (field-programmable gate array) ensure the swift execution of all camera commands and thus permit an outstanding performance of all functions such as auto white balance or LUT. The Pike is always up-to-date. If the application so requires, it can be retrofitted with even larger and more efficient FPGAs, which opens up plenty of scope for additional special functions.

The sensor

The Pike camera series can provide six different sensors, all of them highly sensitive. They cover virtually all areas of use and individual requirements for an extremely wide range of resolutions and the highest possible image quality. All variants are available in b/w and color versions.

The progressive scan CCD sensors have a convincingly high sensitivity and perfect color reproduction. The sensors are designed for particularly high data rates and are thus especially suitable for the IEEE 1394b standard.

Daisy chain

On the rear side of Pike there are two FireWire connectors that can be used for a daisy chain. In multiple-camera operation this arrangement enables cable lengths to be reduced and, moreover, costs to be saved on expensive accessories such as hubs or repeaters.

Few components and shorter cables also increase the reliability of the whole image processing system.

Direct fiber

Pike is also available in a fiber variant in which the FireWire port is arranged as a glass fiber output (GOF = glass optical fiber).

GOF offers a number of useful advantages:

- Cable lengths of up to 500 meters can be achieved. GOF easily bridges the distance between the camera and the PC.
- GOF is invulnerable to electromagnetic noise. It does not issue any electromagnetic waves and is not affected by any either, so the data transmission is perfectly secure.
- GOF has the same effect as perfect electrical insulation, because it consists of glass fiber and does not conduct electricity. There is no need for any complicated potential reconciliation.
- A wide diverse and inexpensive range of industrialized GOF accessories is available such as tow-chain compatible cable and 1394 GOF interface cards.

Asynchronous image trigger

Like all other AVT cameras, the Pike models can be triggered asynchronously. This also enables accidentally occurring events to be recorded precisely and processed. Under IEEE 1394 every camera connected to the bus can be controlled optionally by hardware or software triggers for image recording. So all the cameras can both start recording images with different signals and independently of one another, and be started absolutely synchronously from the one trigger signal or software trigger command (as a "broadcast trigger") to light up the sensor.

True partial scan

If the whole of the image from the sensor is not needed, Pike can provide a "true partial scan" function with which a freely selected part of the sensor image can be taken and sent to the PC. This not only reduces the quantity of data that the PC has to analyze and transport, it even enables higher frame rates to be achieved. The true partial scan function can therefore greatly increase the throughput of the installation and at the same time minimize the computing output required from the PC.

Optocoupled asynchronous image trigger

The AVT Pike has 2 input and 4 output ports providing electrical insulation from the connected devices via an optocoupler. This creates flexibility in wiring the camera

with the units that are to be controlled and also raises the reliability of the system. All the ports can be used freely and can also respond to inquiries at any time from a software command on their current status. The output ports are programmable, which enables individual control signals to be forwarded to external devices. The Pike, however, can also supply automatic signals such as "strobe triggers" or "camera busy", which can be sent to each port as required. With the two input ports, it is possible to trigger the cameras asynchronously and to send an inquiry to another external control signal from the PC.

Flexible AOI / flexible speed (full Format_7 support)

In addition to a number of different standard formats taken from video technology, the Pike can also handle "free-style" formats in which the AOI and the frame rate (such as free run, software trigger, and hardware trigger) can be set at will and altered online.

Powerful with smart features

Despite its small construction the Pike is equipped with a large number of intelligent features such as real-time shading correction, LUT, white balance, color correction, auto features, hue and saturation that can optically enhance the image content and optimize it for later image processing, but without increasing the PC workload. The optimization that takes place in the camera actually enables the examination to be made simpler, quicker, and more reliable, thus saving processor load in many different ways.

The frame grabber features emulate the frame grabber, which becomes redundant with FireWire. The functions usually found in grabbers are integrated into Pike, which makes a grabber superfluous.

Angled head system (optional)

Despite its many smart functions Pike is very compact in construction. If, however, the camera still does not fit into the system, one solution may be the Pike angled head system, with which it can be adjusted to fit almost any space requirements. A modular housing concept allows the user to choose between various different angled head models and to shorten the effective camera length by up to 9 centimeters.

Software

Image processing with the Pike uses the plug & play principle. The software from Allied Vision Technologies supports both still images (WIA/TWAIN) and video stream (video capture and preview), as well as the integration of the camera via its own API. Digital cameras can be used nowadays just as easily for image processing procedures as, by way of comparison, analog cameras and frame

grabbers – plus, of course, the images are better and the speed is higher. AVT software creates the right conditions for the simplest possible integration, and is available from AVT as a comfortable download. AVT can also supply a suitable software development kit (SDK) together with a "viewer" that gives you access to all the tools needed for customer-specific applications.

AVT can currently supply three different software packages for a wide variety of requirements. They are available as a free download from the AVT website:

www.alliedvisiontec.com

AVT FirePackage

This enables you to gain 100-percent control over the 1394 bus

AVT Active FirePackage

For full compatibility with WDM and DirectX

AVT Fire4Linux

The package for the Linux world

The Pike family is compatible with all image-processing systems in general use such as National Instruments Labview, MVTec Halcon, MVTec Active Vision Tools, Stemmer Imaging Common Vision Blox, Neurocheck, Scorpion, and Matrox Inspector, which support the FireWire standard.



© Copyright Allied Vision Technologies GmbH - Germany.

FireWire is a trademark of Apple Computer, Inc.

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable, and may be changed at any time without notice. No liability will be accepted by the publisher for any consequences of its use. Publication thereof does not convey or imply any licence under patent or other industrial or intellectual property rights.

Printed in Germany - 10/2008

