Stingray.
The Transformer
Camera

///ALLIED
Vision Technologies

	STINGRAY F-033B/C STINGRAY F-033B/C fiber	STINGRAY F-046B/C STINGRAY F-046B/C fiber	STINGRAY F-080B/C STINGRAY F-080B/C fiber
Image device	Type 1/2 (diag. 8 mm); progr. scan SONY CCD	Type 1/2 (diag. 8 mm); progr. scan SONY CCD	Type 1/3 (diag. 6 mm); progr. scan SONY CCD
Picture Size	656 (H) x 492 (V)	780 (H) x 580 (V)	1032 (H) x 776 (V)
Cell Size	9.9 µm x 9.9 µm	8.3 µm x 8.3 µm	4.65 µm x 4.65 µm
Resolution depth	8 bit / 14 bit (16 bit in High SNR mode)	8 bit / 14 bit (16 bit in High SNR mode)	8 bit / 14 bit (16 bit in High SNR mode)
Lens mount	C-Mount / optional: CS-Mount	C-Mount / optional: CS-Mount	C-Mount / optional: CS-Mount
Digital interface	IEEE 1394b, (S 800 daisy chain)	IEEE 1394b, (S 800 daisy chain)	IEEE 1394b, (S 800 daisy chain)
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 84 fps (full frames)	Up to 61 fps (full frames)	Up to 31 fps (full frames)
Gain control	Manual: 0…24 dB, auto gain	Manual: 0…24 dB, auto gain	Manual: 0…24 dB, auto gain
Shutter speed	30 µs…67 s, auto shutter	30 µs…67 s, auto shutter	48 µs…67 s, auto shutter
Image pre-processing	LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features	LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features	LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features
Grabber features	32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets	32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets	32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets
Power requirements	DC 8 V – 36 V; < 3.5 W @ 12 V	DC 8 V – 36 V; < 3.5 W @ 12 V	DC 8 V – 36 V; < 3.5 W @ 12 V
Dimensions	72.8 mm x 44 mm x 29 mm (L x W x H)	72.8 mm x 44 mm x 29 mm (L x W x H)	72.8 mm x 44 mm x 29 mm (L x W x H)
Mass	92 g (without lens)	92 g (without lens)	92 g (without lens)
Operating temperature	+ 5… + 45 °Celsius	+ 5… + 45 °Celsius	+ 5… + 45 °Celsius
Storage temperature	- 10… + 60 °Celsius	- 10… + 60 °Celsius	- 10… + 60 °Celsius
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	Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / FirePackage / Fire4Linux	Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / FirePackage / Fire4Linux	Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / 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. 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 standard in image processing.

The digital connection technology presented to the computer industry by Apple as long ago as 1994 is marching triumphantly forward through industrial image processing. The industry standard designated as IEEE1394 (FireWire™ or i.Link ™) facilitates the simplest computer compatibility and bi-directional data transfer using the plug & play process. Further development of the IEEE1394 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 IEEE1394b is reverse-compatible with IEEE1394a. Your applications will grow as technical progress advances.

STINGRAY: The Transformer Camera

The STINGRAY falls into the mid-range in terms of price, but offers a breadth of functions unrivaled in its class and an unbeatable price/performance ratio. The six different versions are equipped with a fast FireWire IEEE1394b interface and high-end CCD sensors in color and monochrome, with resolutions from VGA up to 2 megapixels. To meet the highest requirements in the industry, the STINGRAY comes optionally in a version with a copper daisy chain connection or 1 x copper combined with 1 x GOF connector (2 x optical fiber on LCLC). The camera is loaded with typical AVT intelligent

functions for image pre-processing, like look-up tables, shading corrections, white blance and 2 to 8x binning for enhanced photosensitivity. Grabber functions, including an internal memory and deferred transport mode, make the STINGRAY ideal for multi-camera operations, while the sequence mode enables lightning-fast parameter changes. The STINGRAY is designed to be modular and flexible, offering a wide selection of lens-mounts, sensors, case variations, interfaces and cable outputs, which can be flexibly configured using building-block principles.

Daisy Chain

On the rear side of STINGRAY 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.

STINGRAY F-145B/C STINGRAY F-145B/C fiber	STINGRAY F-146B/C STINGRAY F-146B/C fiber	STINGRAY F-201B/C STINGRAY F-201B/C fiber
Type 2/3 (diag. 11 mm); progressive scan SONY CCD	Type 1/2 (diag. 8 mm); progressive scan SONY CCD	Type 1/1.8 (diag. 9 mm); progressive scan SONY CCD
1388 (H) x 1038 (V)	1388 (H) x 1038 (V)	1624 (H) x 1234 (V)
6.45 μm x 6.45 μm	4.65 μm x 4.65 μm	4.4 μm x 4.4 μm
8 bit / 14 bit (16 bit in High SNR mode)	8 bit / 14 bit (16 bit in High SNR mode)	8 bit / 14 bit (16 bit in High SNR mode)
C-Mount / optional: CS-Mount	C-Mount / optional: CS-Mount	C-Mount / optional: CS-Mount
IEEE 1394b, (S 800 daisy chain)	IEEE 1394b, (S 800 daisy chain)	IEEE 1394b, (S 800 daisy chain)
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
Up to 16 fps (full frames)	Up to 15 fps (full frames)	Up to 14 fps (full frames)
Manual: 0...24 dB, auto gain	Manual: 0...24 dB, auto gain	Manual: 0...24 dB, auto gain
73 μs...67 s, auto shutter	38 μs...67 s, auto shutter	47 μs...67 s, auto shutter
LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features	LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features	LUT; shading correction; High SNR mode; white balance; color interpolation (debayering); local color anti aliasing; hue; saturation; sub-sampling; 2x - 8x binning or sub-sampling; separate reference AOI for auto features
32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets	32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets	32 MB on-board memory; deferred image transport; trigger delay; multi-shot; mirror image; several trigger modes; SIS (secure image signature); sequence mode; storable user sets
DC 8 V – 36 V; < 3.5 W @ 12 V	DC 8 V – 36 V; < 3.5 W @ 12 V	DC 8 V – 36 V; < 3.5 W @ 12 V
72.8 mm x 44 mm x 29 mm (L x W x H)	72.8 mm x 44 mm x 29 mm (L x W x H)	72.8 mm x 44 mm x 29 mm (L x W x H)
92 g (without lens)	92 g (without lens)	92 g (without lens)
+ 5... + 45 °Celsius	+ 5... + 45 °Celsius	+ 5... + 45 °Celsius
- 10... + 60 °Celsius	- 10... + 60 °Celsius	- 10... + 60 °Celsius
CE; FCC Class B; RoHS (2002/95/EC)	CE; FCC Class B; RoHS (2002/95/EC)	CE; FCC Class B; RoHS (2002/95/EC)
Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / FirePackage / Fire4Linux	Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / FirePackage / Fire4Linux	Angled head; board level version (on request); peltier cooling device (soon); optical filters; cable tails; medical design on request; AVT FirePackage / FirePackage / Fire4Linux

Highlights STINGRAY Camera Series

● **STINGRAY F-033B/C**

Type 1/2 Sony ICX 414; progressive scan CCD 656 (H) x 492 (V); up to 84 fps*.

● **STINGRAY F-046B/C**

Type 1/2 Sony ICX 415; progressive scan CCD 780 (H) x 580 (V); up to 61 fps*.

● **STINGRAY F-080B/C**

Type 1/3 Sony ICX 204; progressive scan CCD 1032 (H) x 776 (V); up to 31 fps*.

● **STINGRAY F-145B/C**

Type 2/3 Sony ICX 285; progressive scan CCD 1388 (H) x 1038 (V); up to 16 fps*.

● **STINGRAY F-146B/C**

Type 1/2 Sony ICX 267; progressive scan CCD 1388 (H) x 1038 (V); up to 15 fps*.

● **STINGRAY F-201B/C**

Type 1/1.8 Sony ICX 274; progressive scan CCD 1624 (H) x 1234 (V); up to 14 fps*.

* at full resolution

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.

With more functions to more performance

The STINGRAY offers additional "performance camera functions", which make it possible to achieve cost, time, and speed advantages for various applications.

Powerful by Smart Features

Despite its small construction the STINGRAY 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, quikker, 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 STINGRAY, which makes a grabber superfluous.

Speed increase modes (packed 12 bit): up to 33% faster

The FireWire standard (IEEE 1394) developed in 1995 was designed and optimized for image data of 8 and 16 bits per pixel. For images with 10, 12, or 14 bits per pixel, there are unused reserves in this standard, which unnecessarily limit the transfer rate. AVT utilizes these unused reserves and integrated a "packed 12-bit" mode into STINGRAY.

4x and 8x binning: lots of sensitivity

Binning is the name of the function in which the camera combines neighboring pixels. When two pixels are combined, the image's resolution is cut in half, but the sensitivity is increased by 6dB (+ 100%, meaning it is doubled) and the signal noise interval increases by 3dB (+ 41%).

Nearly every AVT camera is equipped with a similar binning function, which can combine pixels both vertically and horizontally. The STINGRAY has now been expanded to include 4x and 8x binning. That means that per axis 4 or 8 neighboring pixels are added together. In this way, startlingly high sensitivities and noise intervals can be reached, which cannot be achieved via a normal photographic mode.

SIS - "Secure Image Signatur": valuable assistance for system development

This function stamps the transferred image with various important data and camera settings, which were valid at the time of exposure, in a machine-readable form. On the PC side, answers to various questions are captured and engrained onto the image so that they are always available:

The SIS function simplifies the control and handling of the large volume of data, monitoring the trigger modules of the vision system, and opening up new possibilities in the development and debugging phase. With SIS, developers have the opportunity to get their system into an error-free mass production status faster and can reduce complexity and costs at the same time. This function has the potential to directly affect the return on investment!

Sequence mode: greater speed through prefabricated parameter lists

How can throughput be increased and optimized through automated inspection? What is the fastest way to get a camera to provide a sequence of images with different settings?

The sequence mode of STINGRAY will set new standards in this area: A list inside the camera enables STINGRAY to store over 30 different parameter sets in advance. In the automated inspection process, all that is then required is the trigger, in order to process the list in the camera; it is no longer necessary to reset the parameters. Since the processing of the list can be stopped via an input port of the camera, event-based camera control is still possible.

Quick format change modes: fast intuitive change of settings

In sequence mode it is possible to upload prefabricated parameter sets into the camera in order to work with them as quickly as possible. This is only possible when these records are known in advance – as in any typical automation process. However, there are also many applications in which the camera settings have to be adapted to situations intuitively – and from image to image!

For this kind of application, AVT has added the "quick format change modes" to STINGRAY, in which the new values, which have already been transferred to the camera, can always be activated for the next image.

Flexible AOI / flexible speed (full Format_7 support)

In addition to a number of different standard formats taken from video technology, the STINGRAY 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.

Angled head system (optional)

Despite its many smart functions STINGRAY is very compact in construction. If, however, the camera still does not fit into the system, one solution may be the STINGRAY 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 STINGRAY 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 framegrabbers – 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 STINGRAY 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.