



## Getting Started

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Allied Vision Technologies GmbH  
Taschenweg 2a  
D-07646 Stadtroda / Germany



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**10.11.2003: 1.0a: Exchanged spectral data of MF-033C**

## **Before operation**

We place the highest demands for quality on our cameras.

This Getting Started manual should help you with the installation and setting up the camera for use.

Please read through the manual carefully before operating the camera.

We also refer to the technical manuals, available on CD or as download for every camera type.

## **Legal notice**

For customers in the U.S.A.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment. The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart J of Part 15 of FCC Rules.

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour utilisateurs au Canada

Cet appareil est conforme aux normes classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

Life support Applications

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Allied customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Allied for any damages resulting from such improper use or sale.

**Allied Vision Technologies GmbH 11/2003**

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Version: 1.0a

Managing Director: Mr. Frank Grube

Tax-ID: DE 184383113

Support:

Taschenweg 2A

D-07646 Stadtroda, Germany

Tel.: +49/36428/6770

Fax: +49/36428/677-28

email: [info@alliedvisiontec.com](mailto:info@alliedvisiontec.com)

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## Conventions used in this manual

In order to give this manual in an easily understood layout and to emphasize important information, the following typographical styles and symbols are used:

### Styles

Style	Function	Example
Courier	Programs, inputs, etc.	"Input"
upper case	Register	REGISTER
italics	Modes, fields	<i>Mode</i>
parentheses and/or blue	Links	( <a href="#">Link</a> )
	Write register	
	Read register	

### Symbols:

 This symbol highlights important instructions that you should make sure to follow if you want to avoid malfunctions.

## 1 Safety instructions

ⓘ There are no switches or parts inside of the camera that require adjustment. The guarantee becomes invalid upon opening the camera casing.

ⓘ If the product is disassembled, reworked or repaired by other than a recommended service person, AVT or its suppliers will not take any responsibility on the subsequent performance or quality of the camera.

ⓘ The camera does NOT generate dangerous voltages inside. Nevertheless because of the fact, that the IEEE-1394a standard permits cable power distribution at voltages higher than 24V, various international safety standards apply. Reference documents applicable in the United States include:

- Information Processing and Business Equipment, UL 478
  - National Electric Code, ANSI/NFPA 70
  - Standard for the Protection of Electronic Computer/Data-Processing Equipment, ANSI/NFPA 75
- Reference documents applicable in Europe include materials to secure the European Union CE marking as follows:

- Telecommunications Terminal Equipment (91/263/EEC)
- EMC Directive (89/339/EEC)
- CE Marking Directive (93/68/EEC)
- LOW Voltage Directive (73/23/EEC) as amended by the CE Marking

Reference documents applicable in Japan include:



- Electronic Equipment Technology Criteria by the Ministry of Trading and Industry (Similar to NFPA 70)
- Wired Electric Communication Detailed Law 17 by the Ministry of Posts and Telecom Law for Electric Equipment
- Dentori law made by the Ministry of Trading and Industry
- Fire law made by the Ministry of Construction

❗ Make sure NOT to touch the shield of the camera cable connected to a computer and the ground terminal of the lines at the same time.

❗ Use only DC-power supplies with insulated cases, which can be identified by having only TWO power connectors.

## **1.1 Environmental conditions**

Ambient temperature:

when camera in use: - 5° C ... +45° C

when being stored : - 10° C ... + 60° C

Relative humidity: 20% ... 80% no condensed water

Protection: IP 30

## **2 Marlin types and highlights**

Entry into the world of digital image processing has never been as simple and cost-effective before. With the new MARLIN, Allied Vision Technologies presents a whole series of attractive digital camera entry-level models of the FireWire™ category.

In this price class, the Marlin is practically without an equal and offers sound arguments for anyone wishing to switch from analog to digital technology.

The AVT Marlin family consists of five very compact IEEE 1394 C-mount cameras, which are equipped with highly sensitive high-quality sensors (CCD,CMOS). Each of these cameras is available in black/white as well as in color.

A large selection of different sensor sizes (1/2 ", 1/3 ", 2/3") and resolutions (VGA, SVGA, XGA, SXGA) leaves almost no wish unfulfilled and provides the right camera for all individual applications.

The MARLIN family consists of the following models:

### **MARLIN F-033B/C**

1/2 "Sony Progressive Scan CCD imager;(VGA)656 (h)x 494 (v); up to 74 fps at full resolution.

### **MARLIN F-046B/C**

1/2 "Sony Progressive Scan CCD imager;(SVGA) 780 (h)x 582 (v); up to 53 fps.

**MARLIN F-080B/C**

1/3 "Sony Progressive Scan CCD imager;(XGA) 1032 (h)x 778 (v); up to 30 fps.

**MARLIN F-131B/C**

2/3 "Global Shutter CMOS imager;(SXGA)1280 (h)x 1024 (v); up to 25 fps.

**MARLIN F-145B2/C2**

1/2 "Sony Progressive Scan CCD;(SXGA) 1392 (h)x 1040 (v); up to 15 fps at full resolution.

The cameras, operating in 8-bit mode, impress in almost any situation by their ability to produce high quality images. The MARLIN is equipped with an asynchronous trigger shutter as well as true partial scan and integrates numerous useful and intelligent Smart Features for image processing.

### 3 System Components

The following system components are included with delivery:



AVT Marlin



4.5m 1394 standard cable

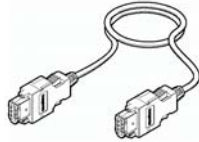


BG39 IR cut filter (650 nm, built in)

Optional:



Tripod Adapter



4.5m latching cable



Driver and documentation

Of course the camera also works with all IIDC (formerly DCAM) compatible IEEE 1394 program and image processing libraries.

To demonstrate the properties of the camera, all examples in this manual are based on the "FirePackage" OHCI API software and the "FireView" application. This can be obtained from Allied Vision Technologies. A free demo version of "FireView" is available for download at [www.alliedvisiontec.com](http://www.alliedvisiontec.com).

AVT offers different lenses from a variety of manufacturers. The following table lists selected image formats depending on camera type, distance and the focal width of the lens.

Focal Width MF-131	Distance = 0.5m	Distance = 1m
4.8 mm	0.7 m x 0.93 m	1.4 m x 1.86 m
8 mm	0.4 m x 0.53 m	0.8 m x 1.06 m
12 mm	0.27 m x 0.36 m	0.54 m x 0.72 m
16 mm	0.2 m x 0.27 m	0.4 m x 0.54 m
25 mm	12.5 cm x 16.625 cm	25 cm x 33.25 cm
35 mm	8.8 cm x 11.7c m	17.6 cm x 23.4 cm
50 mm	6 cm x 7.98 cm	12 cm x 15.96 cm

Focal Width MF-033/04	Distance = 0,5m	Distance = 1m
4.8mm	0,5m x 0,67m	1,0m x 1,33m
8mm	0,3m x 0,4m	0,6m x 0,8m
12mm	0,195m x 0,39m	0,39m x 0,78m
16mm	0,145m x 0,19m	0,29m x 0,38m
25mm	9,1cm x 12,1cm	18,2cm x 24,2cm
35mm	6,4cm x 8,51cm	12,8cm x 17,02cm
50mm	4,4cm x 5,85cm	8,8cm x 11,7cm

Focal Width MF-080	Distance = 0,5m	Distance = 1m
4.8mm	0,375m x 0,5m	0,75m x 1m
8mm	0,22m x 0,29m	0,44m x 0,58m
12mm	0,145m x 0,19m	0,29m x 0,38m
16mm	11cm x 14,7cm	22cm x 29,4cm
25mm	6,9cm x 9,2cm	13,8cm x 18,4cm
35mm	4,8cm x 6,4cm	9,6cm x 12,8cm
50mm	3,3cm x 4,4cm	6,6cm x 8,8cm

## 4 Specifications

### 4.1 MF-033B

Specification	
Image device	1/2 "(Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	656 (H) x 494 (V)
Lens Mount	C-Mount
Picture Sizes	640 x 480 pixels (Format_0; Mode_5) 656 x 494 (Format_7; Mode_0)
Cell Size	9,9 $\mu\text{m}$ x 9,9 $\mu\text{m}$
ADC	10 Bit
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; 30Hz; 60Hz; up to 74Hz in Format_7
Gain Control	Manual: 0-20 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 13 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, Sequencing

Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022,EN61000,EN 55024,FCC Class A, DIN ISO 9022
Options	Removable IR-Cut-Filter, Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.



## 4.2 MF-033C

Specification	
Image device	1/2 " (Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	656 (H) x 494 (V)@Raw8; 656 (H) x 492 (V)@YUV
Lens Mount	C-Mount
Picture Sizes	640 x 480 pixels (Format_0; Mode_5) 656 x 494 (Format_7; Mode_0)
Cell Size	9,9 $\mu\text{m}$ x 9,9 $\mu\text{m}$
ADC	10 Bit
Color Modes	Raw8, YUV4:2:2, YUV4:1:1
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; 30Hz; up to 74Hz in Format_7 (RAW); 66Hz (YUV 4:1:1); up to 51Hz in YUV 4:2:2
Gain Control	Manual: 0-19 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 13 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two

	configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022, EN61000, EN 55024, FCC Class A, DIN ISO 9022
Options	Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.

### 4.3 MF-046B

Specification	
Image device	1/2 "(Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	780 (H) x 582 (V)
Lens Mount	C-Mount
Picture Sizes	640 x 480 pixel (Format_0); 780 x 582 (Format_7)
Cell Size	8,3 $\mu\text{m}$ x 8,3 $\mu\text{m}$
ADC	10 Bit
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; 30Hz; up to 53Hz in Format_7
Gain Control	Manual: 0-20 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 13 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3

Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022,EN61000,EN 55024,FCC Class A, DIN ISO 9022
Options	Removable IR-Cut-Filter, Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.

#### 4.4 MF-046C

Specification	
Image device	1/2 " (Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	780 (H) x 582 (V)@Raw8; 780 (H) x 580 (V)@YUV
Lens Mount	C-Mount
Picture Sizes	640 x 480 pixel (Format_0); 780 (H) x 582 (V)@Raw8; 780 (H) x 580 (V)@YUV
Cell Size	8,3 $\mu\text{m}$ x 8,3 $\mu\text{m}$
ADC	10 Bit
Color Modes	Raw8, YUV4:2:2, YUV4:1:1
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; 30Hz; up to 53Hz in Format_7 (Raw8) (37Hz YUV4:2:2; 53Hz YUV4:1:1)
Gain Control	Manual: 0-17 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 13 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two

	configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022, EN61000, EN 55024, FCC Class A, DIN ISO 9022
Options	Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.

#### 4.5 MF-080B

Specification	
Image device	1/3 "(Diag 6 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	1032 (H) x 778 (V)
Lens Mount	C-Mount, CS-Mount
Picture Sizes	1024 x 768 pixel (Format_1 ) supporting all smaller fixed formats; up to 1032 x 778 (Format_7)
Cell Size	4,65 $\mu$ m x 4,65 $\mu$ m
ADC	10 Bit
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; up to 23Hz in Format_7
Gain Control	Manual: 0-20 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu$ s (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 7 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s

Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022,EN61000,EN 55024,FCC Class A, DIN ISO 9022
Options	Removable IR-Cut-Filter, Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.



#### 4.6 MF-080C

Specification	
Image device	1/3 "(Diag 6 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	1032 (H) x 778 (V)@Raw8; 1032 (H) x 776 (V)@YUV
Lens Mount	C-Mount, CS-Mount
Picture Sizes	1024 x 768 pixel (Format_1 ) supporting all smaller fixed formats; up to 1032 x 778 (Format_7)
Cell Size	4,65 $\mu\text{m}$ x 4,65 $\mu\text{m}$
ADC	10 Bit
Color Modes	Raw8,YUV4:2:2,YUV4:1:1
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; up to 23Hz in Format_7 Raw8 (20Hz at YUV4:1:1 /18Hz YUV4:2:2)
Gain Control	Manual: 0-17 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger_Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 7 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two

	configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022, EN61000, EN 55024, FCC Class A, DIN ISO 9022
Options	Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.

#### 4.7 MF-145B2

Specification	
Image device	1/2 "(Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	1392 (H) x 1040 (V)
Lens Mount	C-Mount
Picture Sizes	Up to 1280 x 960 pixel (Format_2 ), supporting all smaller fixed formats; 1392 x 1040 (Format_7)
Cell Size	4,65 $\mu$ m x 4,65 $\mu$ m
ADC	10 Bit
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; up to 10Hz in Format_7
Gain Control	Manual: 0-20 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu$ s (~67s); Auto Shutter
External Trigger Shutter	Trigger Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 3 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, Sequencing
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s

Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022,EN61000,EN 55024,FCC Class A, DIN ISO 9022
Options	Removable IR-Cut-Filter, Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA)- and WDM Stream driver

The design and specifications for the products described may change without notice.

#### 4.8 MF-145C2

Specification	
Image device	1/2 " (Diag 8 mm) Type progressive scan SONY IT CCD
Effective Picture Elements	1392 (H) x 1040 (V)@Raw8; 1392 (H) x 1038 (V)@YUV
Lens Mount	C-Mount
Picture Sizes	Up to 1280 x 960 pixel (Format_2 )supporting all smaller fixed formats; 1392 x 1040 (Format_7 Mode_0)
Cell Size	4,65 $\mu\text{m}$ x 4,65 $\mu\text{m}$
ADC	10 Bit
Color Modes	Raw8, YUV4:2:2, YUV4:1:1
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; up to 10Hz in Format_7
Gain Control	Manual: 0-17 dB (0.035 dB/step); Auto Gain
Shutter Speed	20 ...67.108.864 $\mu\text{s}$ (~67s); Auto Shutter
External Trigger Shutter	Trigger Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 3 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, Sequencing

Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022, EN61000, EN 55024, FCC Class A, DIN ISO 9022
Options	Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA) -and WDM Stream driver

The design and specifications for the products described may change without notice

#### 4.9 F-131B

Specification	
Image device	2/3" (Diag 11 mm) Type Global Shutter CMOS Sensor
Effective Picture Elements	1280 (H) x 1024 (V)
Lens Mount	C-Mount
Picture Sizes	Up to 1280 x 960 pixel (Format_2 ), supporting all smaller fixed formats; 1280 x 1024 (Format_7)
Cell Size	6.7 $\mu\text{m}$ x 6.7 $\mu\text{m}$
ADC	10 Bit
Data Path	8 Bit
Frame rates	3,75Hz; 7,5Hz; 15Hz; up to 25Hz in Format_7; 30Hz @ SVGA and smaller
Gain Control	Manual: 0-20 dB; Auto Gain
Shutter Speed	20 $\mu\text{s}$ ...tbd; Auto Shutter
External Trigger Shutter	Trigger Mode_0, Trigger_Mode_1 Advanced feature: Image Transfer by command
Internal FIFO-Memory	Up to 4 frames
# Look Up Tables	One, user programmable (10 Bit -> 8 Bit); Gamma (0.45)
Smart Functions	Real Time Shading correction; Image Sequencing, Two configurable inputs, two configurable outputs, High Dynamic

	Range Mode
Transfer Rate	100Mb/s, 200 Mb/s, 400 Mb/s
Digital Interface	IEEE 1394 IIDC v. 1.3
Power Requirements	DC 8V – 36V via IEEE 1394 cable or 12-pin HIROSE
Power Consumption	Less than 3 Watt (@ 12V DC)
Dimensions	58 mm x 44 mm x 29 mm (L x W x H); w/o tripod and lens
Mass	<120 gr (without lens)
Operating Temperature	+5 - 45 ° Celsius
Storage Temperature	-10 – 60 ° Celsius
Regulations	EN 55022, EN61000, EN 55024, FCC Class A, DIN ISO 9022
Options	Host Adapter Card, Locking IEEE-1394 cable, API (FirePackage), TWAIN (VIA) -and WDM Stream driver

The design and specifications for the products described may change without notice



**4.10 Spectral sensitivity**

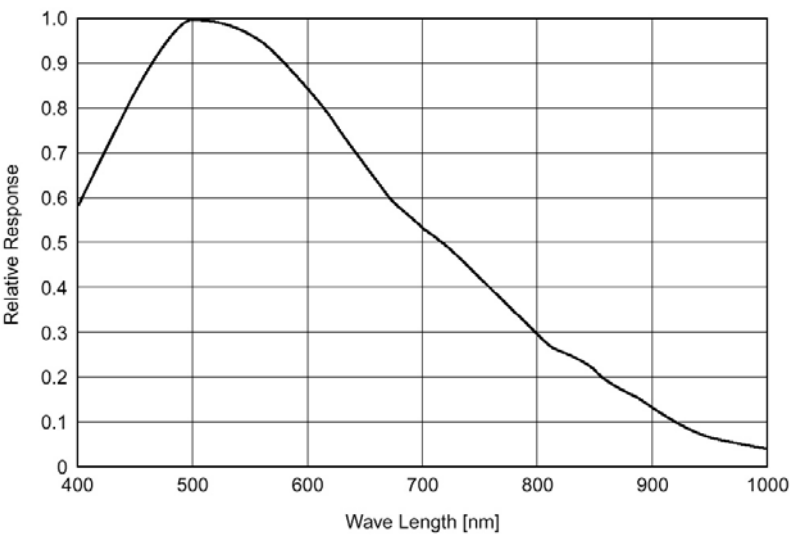


Figure 1 Spectral sensitivity of MF-033B without cut filter and without optics.

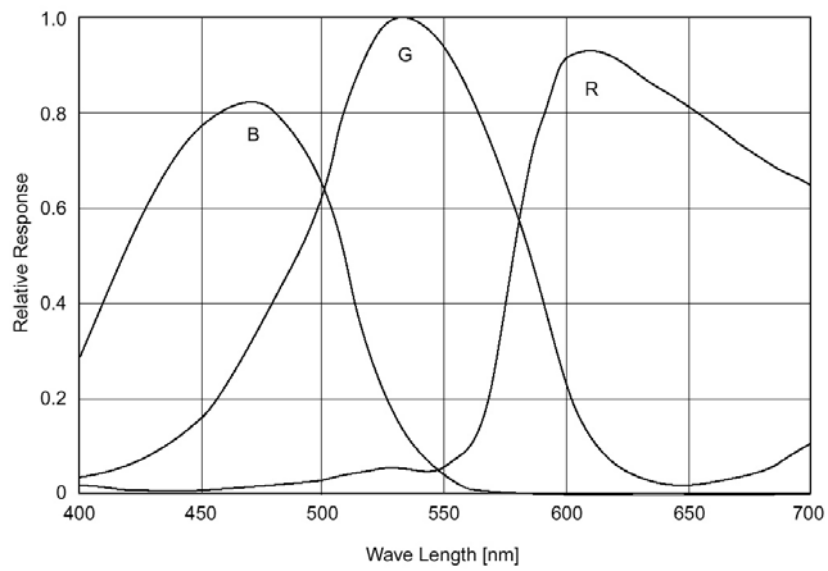


Figure 2 Spectral sensitivity of MF-033C without cut filter and without optics

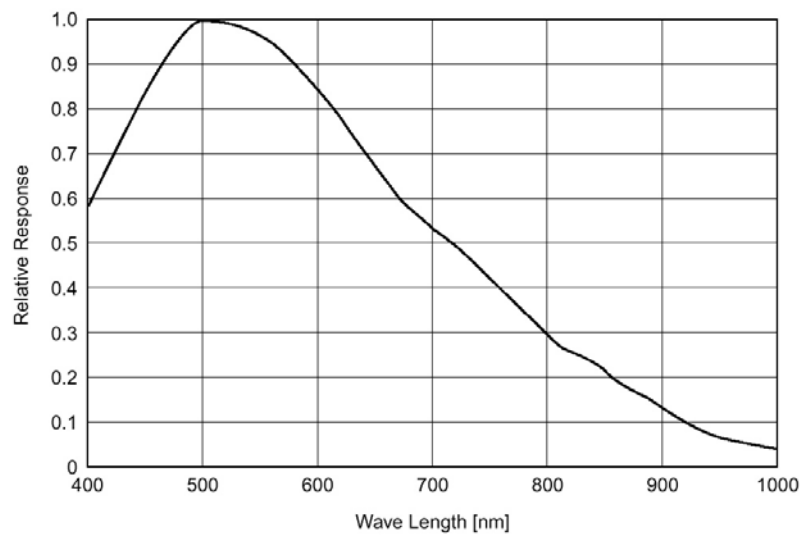


Figure 3 Spectral sensitivity of MF-046B without cut filter and without optics.

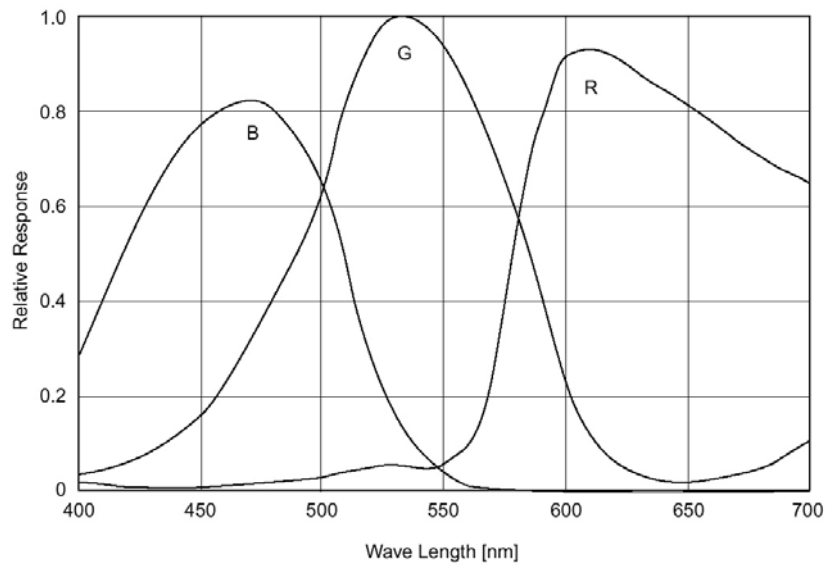


Figure 4 Spectral sensitivity of MF-046C without cut filter and without optics.

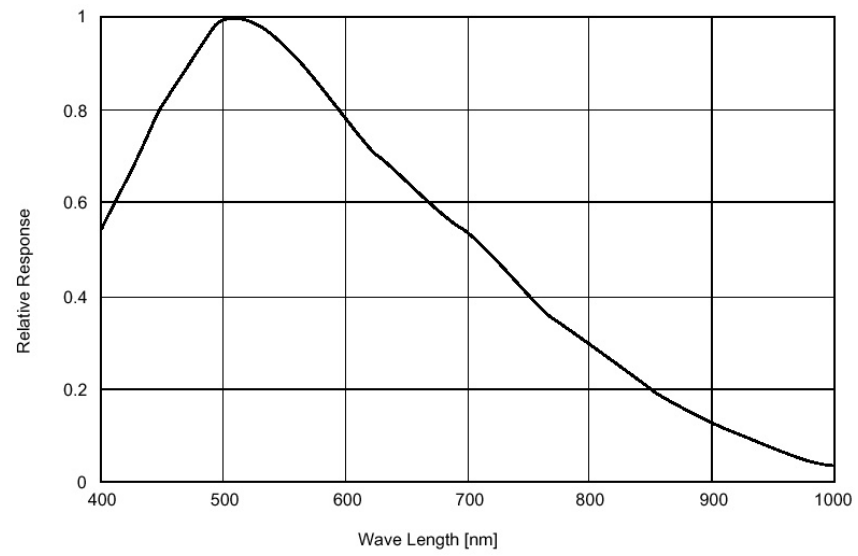


Figure 5 Spectral sensitivity of MF-080B without cut filter and without optics

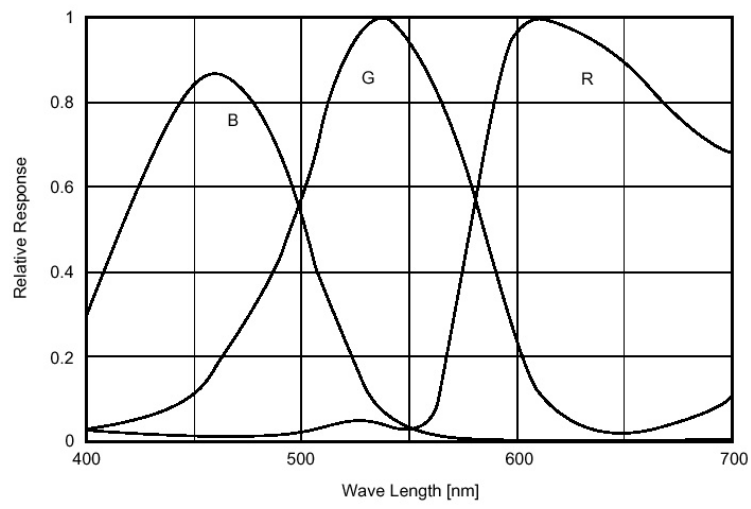


Figure 2 Spectral sensitivity of MF-080C without cut filter and without optics.

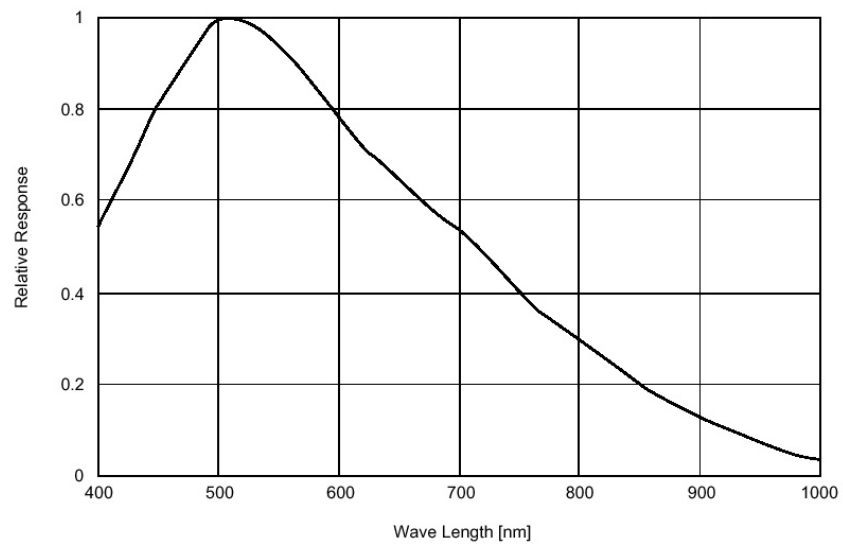


Figure 7 Spectral sensitivity of MF-145B2 without cut filter and without optics

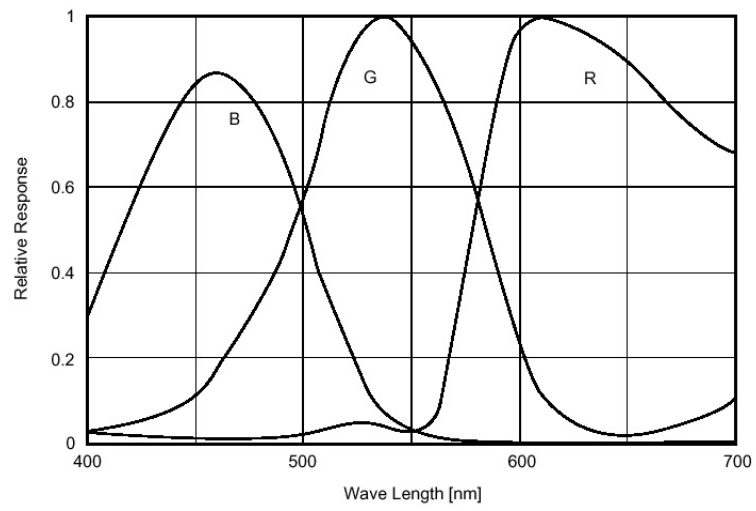


Figure 8 Spectral sensitivity of MF-145C2 without cut filter and without optics



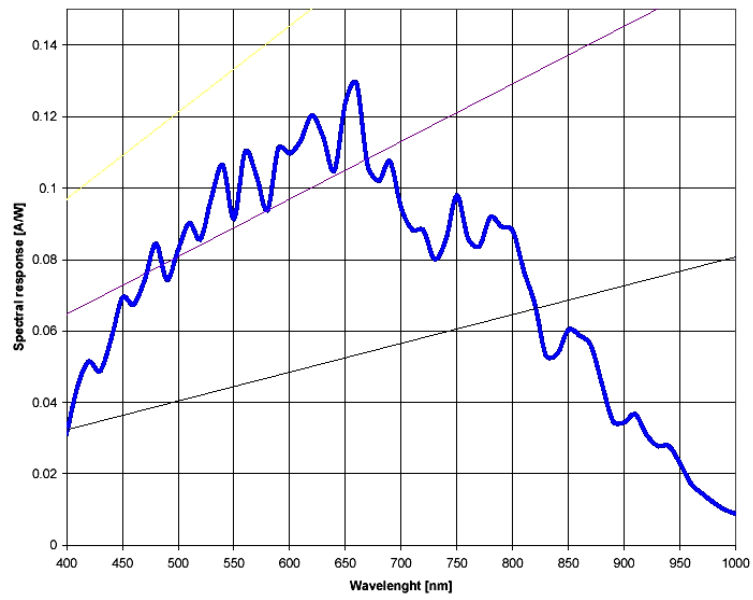


Figure 9 Spectral sensitivity of MF-131B without cut filter and without optics

## 5 Quick start

To hook up an IEEE-1394 camera you need a PC with an IEEE-1394 port and appropriate software. The port is already present in many PCs and laptops. Should this not be the case, you can upgrade by installing one or more IEEE-1394 ports in the form of a card for the PCI slot or as a PC card (PCMCIA) for the PC card slot. AVT offers a range of adaptors for different requirements.

After starting the operating system the plug and play mechanism on the PC should recognize the new hardware and prompts you to install the IEEE-1394 driver from Microsoft.

AVT supplies additional TWAIN (VIA) drivers and WDM Stream software to integrate the images into third party software, having these interfaces.

Alternatively you may use The FirePackage API SDK, which replaces the MS-IEEE-1394 driver by one from Intek.

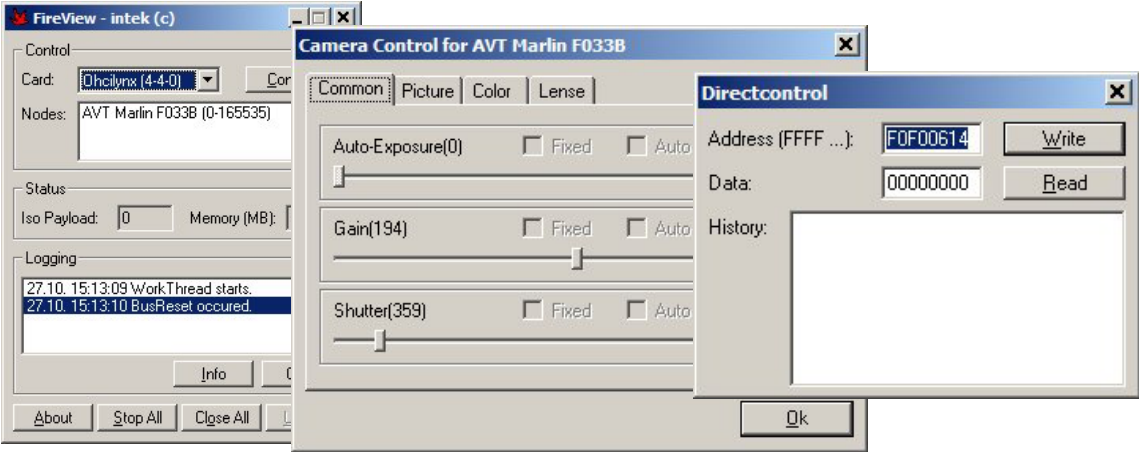
The exact description for installation routines can be found in the "FireView" software manual.

The latter driver works in conjunction with the "Viewer" program. This enables quick and easy access to all integrated IEEE-1394 ports and all attached IEEE-1394 cameras.

After using the drop down list to choose a matching card, all available cameras for this card are displayed in the list below.

Select a camera and connect to this camera by clicking on the *Connect button*. The subsequent dialog offers the option of setting all available video formats and displays the frame in a corresponding window.

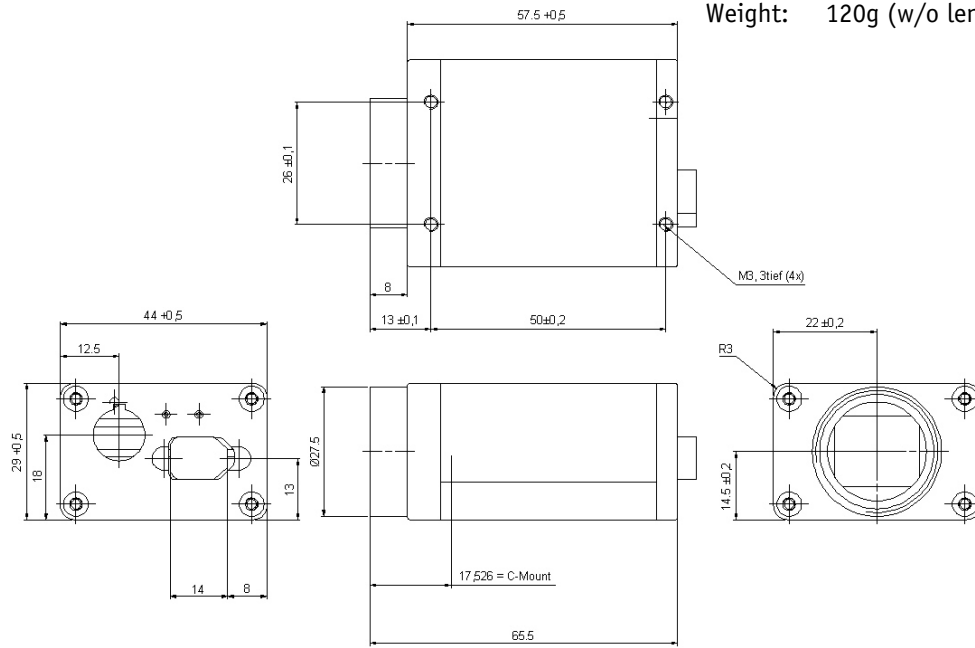
In the *Live Control* dialog box you can make the settings for the standard registers according to the IIDC specification, e.g. exposure time or gain.  
Direct access to the register level, e.g. to activate the advanced features of the camera, is done via the *Directcontrol* dialog box.



## 6 Camera dimensions

Body size: 58mm x 44mm x 29mm (l<sub>x</sub>w<sub>x</sub>h)

Weight: 120g (w/o lens)



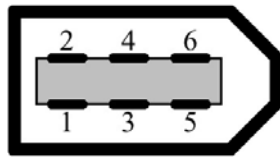
## 7 Camera interfaces

In addition to the two status LEDs, two jacks are located on the back of the camera. The 12-pin HiRose plug provides different control inputs and outputs. The IEEE-1394 connector with lock mechanism provides access to the IEEE-1394 bus and thus makes it possible to control the camera and output frames.



## 7.1 IEEE-1394 port pin assignment

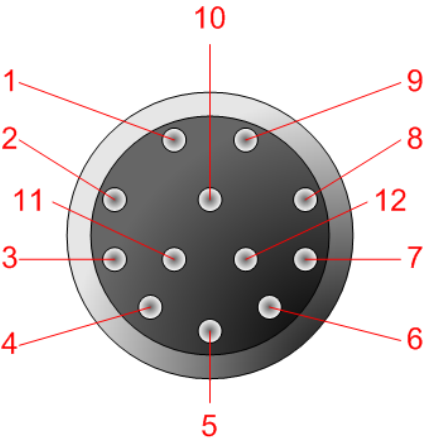
The IEEE-1394 plug is suitable for industrial use and has the following pin assignment as per specification:



Pin	Signal	Pin	Signal
1	Cable Power	4	TPB+
2	Cable GND	5	TPA-
3	TPB-	6	TPA+

7.2 HiRose jack pin assignment

The HiRose plug is also suitable for industrial use and in addition to providing access to the inputs and outputs on the camera, connects the camera to a power supply.



Pin	Signal	Use	Pin	Signal	Use
1	External GND		7	GPInput GND	
2			8	RS232 RxD	
3			9	RS232 TxD	
4	GPInput 1 (default Trigger)	TTL, Edge, progr.	10	OutVCC	
5			11	GPInput 2	TTL
6	GP Output 1 (default IntEna)	Open emitter	12	GPOutput 2	Open emitter

### 7.3 Status LEDs

#### On LED

The green power LED indicates that the camera is being supplied with sufficient voltage and is generally ready for operation.

#### Status LED (Yellow)

The following states are displayed via the LED:

Com	asynchronous and isochronous data transmission active (indicated asynchronously to transmission over the 1394 bus)
Trg	LED off – waiting for external trigger LED on – receiving external trigger



Blink codes are used to signal warnings or error states:

Class S1 Error code S2	Warning 1 blink	DCAM 2 blinks	MISC 3 blinks	FPGA 4 blinks	Stack 5 blinks
FPGA Boot error				1-5 blinks	
Stack setup					1 blink
Stack start					2 blinks
No FLASH object			1 blink		
No DCAM object		1 blink			
Register mapping		2 blinks			
VMode_ERROR_STATUS	1 blink				
FORMAT_7_ERROR_1	2 blinks				
FORMAT_7_ERROR_2	3 blinks				

The longer OFF-Time signalizes the begin of a new Class period. The error codes follow after a shorter OFF-Time.


## **8 Operating the camera**

Power for the camera is supplied only via the FireWire™ bus.

The input voltage must lie within the following range:

Vcc min.: + 8V

Vcc max.: +36V

 Input voltage of 12V is recommended to make most efficient use of the camera.

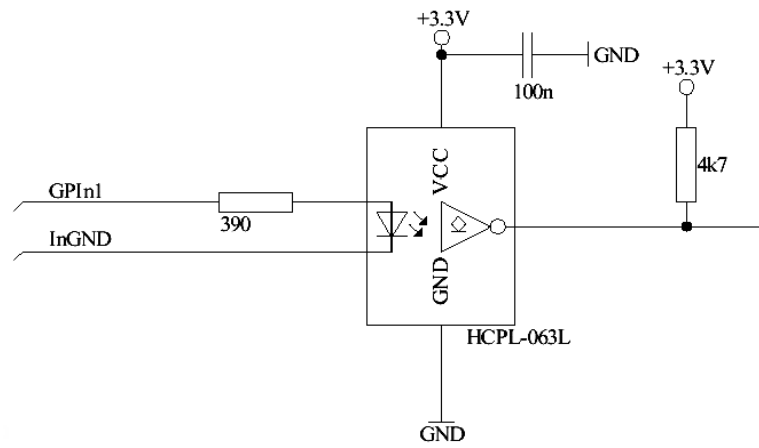
### **8.1 Control and video data signals**

The camera has 2 inputs and 2 outputs. These can be configured by software. The different modes are described below.

### 8.1.1 Inputs

All inputs have been implemented as shown on the diagram below.

#### Inputs

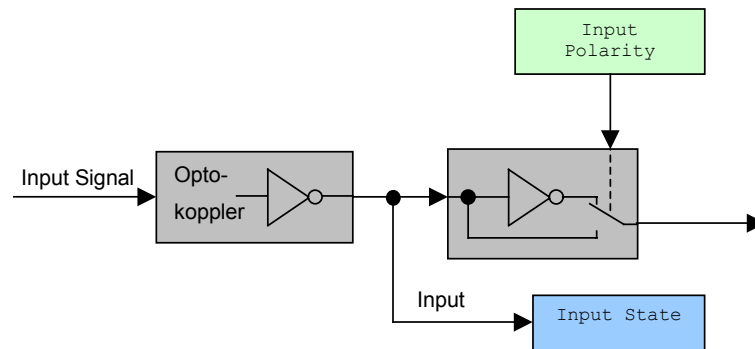


Flux voltage from LED type 1.5V at 10 mA		Cycle delay of the optical coupler	
min. on-current:	5 mA		
max. off-current:	0,25 mA		
max. input current:	15 mA		
min. pulse width @high speed:	0,67 $\mu$ s	tpdHL: tpdLH:	745 ns 760 ns
min. pulse width @normal speed:	2.2 $\mu$ s	tpdHL: tpdLH:	2275 ns 2290 ns

The inputs can be connected directly to +5V. If higher voltage is used an external resistor will have to be placed in series. Use @+12V a 470  $\Omega$  and @+24V a 1.2 k $\Omega$  resistor.

- ❗ Voltage above +45V may damage the optical coupler
- ❗ Setting inputs to high speed mode requires very clean input signals. Use of normal speed mode (default) is recommended.

All input signals are inverted by the optical coupler. Polarity is controlled via the IO\_INP\_CTRL1..2 register.



### Triggers

All inputs configured as triggers are linked by AND. If several inputs are being used as triggers, a high signal must be present on all inputs in order to generate a trigger signal. The polarity for each signal can be set separately via the inverting inputs.

The camera must be set to „external triggering“ to trigger image capture by the trigger signal.

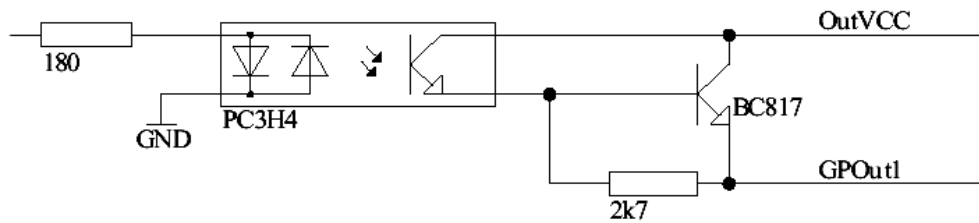
### 8.1.2 Outputs

The camera has 2 noninverting outputs with open emitters. These are shown in the following diagram:

Max. emitter current 500 mA

Max. collector emitter voltage 45 V

- ❗ Voltage above +45V may damage the optical coupler
- ❗ Depending on the voltage applied at OutVCC, a resistor may have to be switched in series between Gpoutl and Ground.



Output features are configured by software. Any signal can be placed on any output.  
The main features of output signals are described below:

#### IntEna Signal

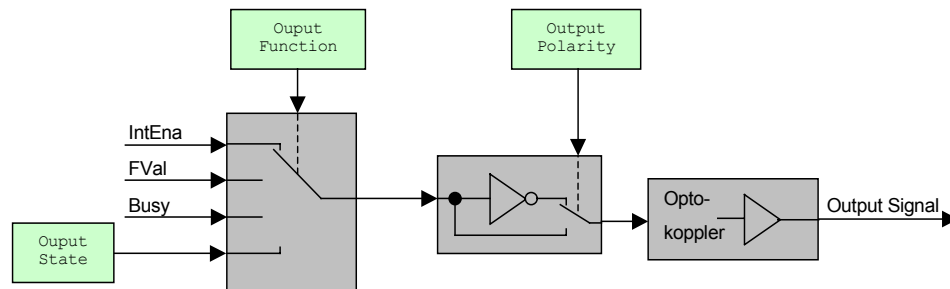
This signal displays the time the exposure was made. By using a register this output can be delayed by up to 1.05 seconds.

#### Fval Signal

This feature signals readout from the sensor. This signal Fval follows IntEna.

#### Busy Signal

This indicator appears when the exposure is being made, the sensor is being read from or data transmission is active. The camera is busy.



## **9     Firmware- Update**

- Firmware Updates are possible without open the camera casing. You need:
- Programming cable E 1000666
- Software "Bootprog"
- PC or Laptop with serial Interface (RS 232)
- Documentation for Firmware Update

Please contact your local dealer for further informations.

Check out the website [www.alliedvisiontec.com](http://www.alliedvisiontec.com) for availability and description of new firmware.



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