High Sensitive
Digital Monochrome (b/w)
Progressive Scan Camera

System: **IEEE1394a**

Baumer FWX14
NeuroCheck Edition

Art. No: OD106129

- IEEE1394a (FireWire™) Progressive Scan CCD Camera
- 1392 x 1040 Pixels
- Outstanding Image Quality
- Ultra High Sensitivity (EXview CCD Technology)
- High Quality Slow Scan Mode for Lowest Readout Noise
- Up to 15 Full Frames per Second
- Binning and True Partial Scan Function (ROI) for Increased Frame Rates
- External Synchronisation via Asynchronous Trigger and Flash Sync Function
- Integrated 8 MByte RAM for Temporarily Image Data Buffering
- Compact Robust Aluminium Housing
- Industrial IEEE1394 Connector
- Camera Parameter in Real Time programmable
- Powerful Baumer FCAM1394 Driver / Software Development Kit for Windows
- IEEE1394a Interface compliant to OHCI Standard
- User Friendly Baumer TWAIN compatible Image Capture and Camera Control Software

shown lens and cable need to be ordered separately

1. Overview

Sensor		2/3“ interline progressive scan CCD EXview-technology				
Shutter / readout mode		global shutter / progressive scan readout				
Number of pixels		1392 x 1040				
Scan area		9.0 mm x 6.7 mm				
Pixel size		6.45 µm x 6.45 µm				
Color filter		-				
Operation modes						
Trigger mode		yes				
Free running mode		yes, sequential shutter operation				
Signal processing		real time software programmable				
Pixel clock		29.5 MHz fast scan / 14.75 MHz high quality (HQ) scan				
A/D converter		12 Bit				
Exposure control (t_{exp})		total: 4 µsec .. 2 sec 4 µsec .. 65 msec: step 1 µsec 70 msec .. 2 sec: step 10 msec				
Gain control		0 .. 20 dB				
Offset (black level)		0 .. 255 LSB (12 Bit)				
Image data buffer		8 MByte				
Image acquisition						
Data format		raw image data from camera				
Camera image format modes (see item 3)		**Format (pixel)**	**Bit per pixel**	**Pixel clock MHz**	**Frames per sec. *)**	**$t_{readout}$**
Full frame	slow	1392 x 1040	8	14.75	7.5	133 msec
	fast			29.5	15	66 msec
Binning 2x2	slow	696 x 520	8	14.75	15	66 msec
	fast			29.5	30	33 msec
Binning 4x4	slow	348 x 260	8	14.75	30	33 msec
	fast			29.5	60	17 msec

Partial scan function	yes, format freely programmable in all modes (binning on partial scan ok)
Brightness correction function	optional in all binning modes
Test pattern function	yes, in all modes
Data quality	at 20 °C, gain = 1, exposure time = 32 msec, full frame mode, slow scan
Readout noise	σ < 0.5 LSB (8 Bit) typical
Dynamic range	typ. > 54 dB
Optical interface	C-Mount
Optical filter	dust protection option: super polished, IR-cut filter or no filter
Process interface func.	
Async. trigger	yes, trigger mode operation, software trigger and external trigger signal
External flash sync	yes
Software reset	yes, in free running mode, delay up to 133 msec
Image data header	yes
Electrical interface	
Data / control / power	standard single cable IEEE1394a / 6 pins option: screw lock type connector
Digital input	1: trigger signal, opto decoupled, 2.4 V .. 14 V / 20 mA min. trigger impuls length (t_{min}): 1 µsec max. trigger delay (t_{delay}): 4 µsec
Digital output	1: flash sync signal, 12 V / 20 mA
LED	green: power on / yellow: data transmission active
Power consumption	app. 3 Watt
Environmental	
Storage temperature	-10 °C .. +70 °C
Operating temperature	+5 °C .. +50 °C
Humidity	10 % .. 90 % non condensing
Housing	Aluminium
Dimensions	73 x 56 x 55 mm^3
Weight	340 g
IEEE1394a interface	OHCI standard compliant
Software	Baumer FCAM1394 Driver / SDK for Windows 2000 / Windows XP

*) maximum frame rate in free running mode, effective frame rate depending on SDK image mode settings and set exposure time

2. Camera Factory Settings after Camera Start-Up

	camera factory settings after camera start up
Operation modes	free running mode
Signal processing	
Exposure control	32 msec
Gain control	factor 1 = 0 dB
Offset (black level)	0
Image acquisition	
Camera image format mode	mode ID = 0: full frame HQ (see item 3)
Partial scan function	not active
Electrical interface	
Flash sync signal	disabled, digital output set to low status

3. SDK Supported Image Formats

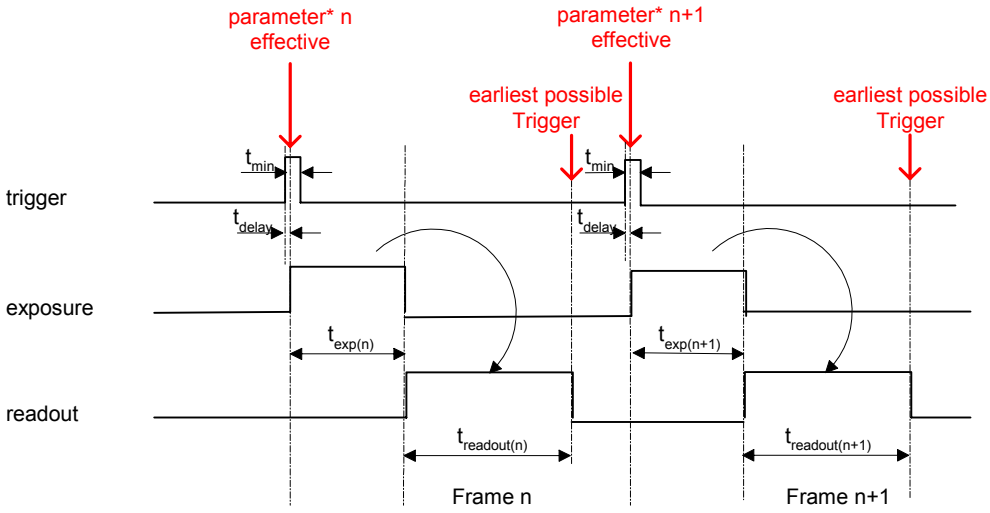
Camera Mode	SDK Image Mode				
	Mode ID	Description	Image Format	Color Coding	Functions / State
Full Frame slow	0	Full Frame HQ	1392 x 1040	RawMono8, Mono8	PS, T, F, Mono
Full Frame fast	1	Full Frame	1392 x 1040	RawMono8, Mono8	PS, T, F, Mono
Binning 2x2 slow	2	Binning 2x2 HQ	696 x 520	RawMono8, Mono8	PS, T, F, BRC, Mono
Binning 2x2 fast	3	Binning 2x2	696 x 520	RawMono8, Mono8	PS, T, F, BRC, Mono
Binning 4x4 slow	4	Binning 4x4 HQ	348 x 260	RawMono8, Mono8	PS, T, F, BRC, Mono
Binning 4x4 fast	5	Binning 4x4	348 x 260	RawMono8, Mono8	PS, T, F, BRC, Mono

SDK - software development kit
HQ - high quality
BRC - brightness correction
PS - partial scan
T - trigger
F - flash
Mono - monochrome mode

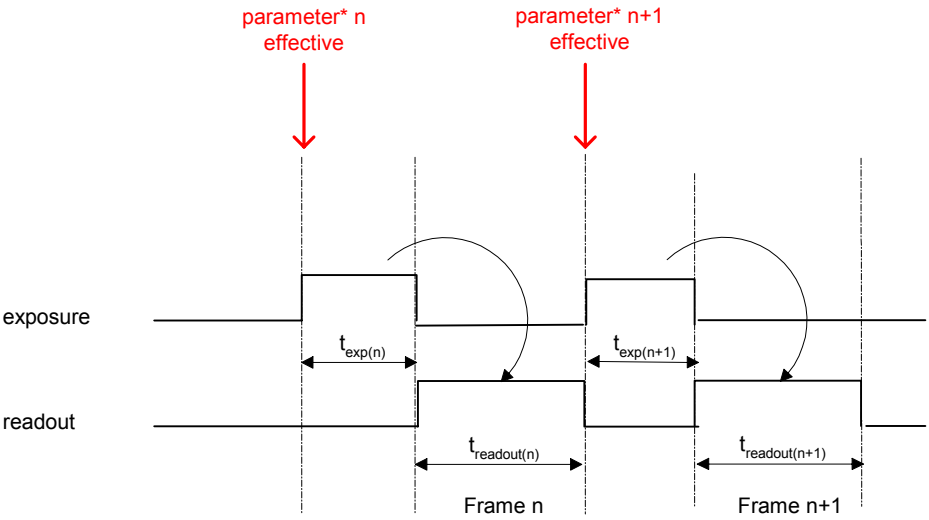
RawMono8 - unmanipulated pixel data for monochrome camera modes in 8 bit
Mono8 - software corrected image data for monochrome camera modes in 8 bit

4. Timing Operation Modes

Trigger Mode: sequential operation

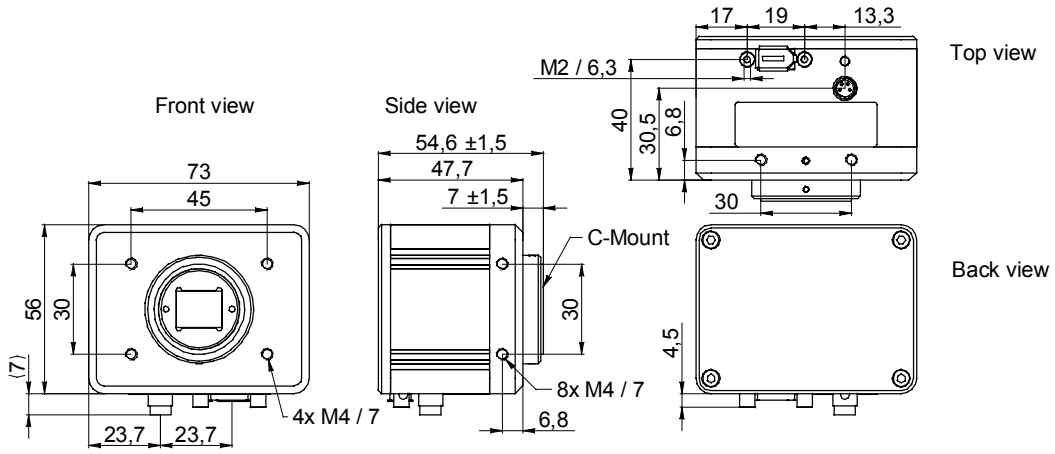


Free Running Mode: sequential operation



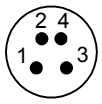
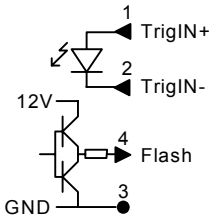
* image parameter: exposure time
offset
global gain
mode
partial scan

5. Housing



6. Connectors / Electrical Interfaces

	Pin
IEEE 1394a	1: Power 2: GND 3: TPB- 4: TPB+ 5: TPA- 6: TPA+

Trigger / Flash	Typ: Lumberg RSMESD 4pin.
	

End of Document

History of TDS FWX14 NC Edition

Date	Version	Name	Pages/ Chapter	Change
10.06.2003	1.0	lsc	all	creation document
20.06.2003	1.1	lsc	1+2/1	items added: image data buffer, IEEE1394a adapter, software
07.07.2003	1.1	lsc	2/2 1+2/1	item 2 added: camera factory settings after camera start-up product name changed: Baumer FCAM1394 Driver / SDK
21.07.2003	1.2	lsc	5/5	drawing revised
27.09.2003	1.2	lsc	all	revision as follows: sales arguments; gain; optical filter; dynamic range; IEEE1394 interface
09.01.2004	1.2	dni	1	sales argument added