

**Digital Color  
Progressive Scan Camera**

System: **IEEE1394a**

## Baumer FWX20c NeuroCheck Edition

Art. No: **OD106833**

- IEEE1394a (FireWire™) Progressive Scan CCD Camera
- 1624 x 1236 Pixels
- Outstanding Color Fidelity
- High Speed up to 12 Full Frames per Second
- High Sensitivity and Dynamic Range
- High Quality Slow Scan Mode for Lowest Readout Noise
- Binning, Subsample for up to 24 Frames per Second
- Binning, Subsample 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 needs to be ordered separately

### 1. Overview

<b>Sensor</b>	1/1.8 " interline progressive scan CCD					
Shutter / readout mode	global shutter / progressive scan readout					
Number of pixels	1624 x 1236					
Scan area	7.15 mm x 5.44 mm					
Pixel size	4.4 µm x 4.4 µm					
Color filter	RGB Bayer mosaic					
<b>Operation modes</b>						
Trigger mode	yes					
Free running mode	yes, sequential shutter operation					
<b>Signal processing</b>						
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 <sub>exp</sub> )	total: 4 µsec .. 2 sec 4 µsec .. 65 msec: step 1 µsec 70 msec .. 2 sec: step 10 msec					
Gain control	0 .. 20 dB , 1024 steps					
Offset (black level)	0 .. 255 LSB (12 Bit)					
Image data buffer	8 MByte					
<b>Image acquisition</b>						
Data format	raw image data from camera					
<b>Camera image format modes (see item 3)</b>	<b>Format (pixel)</b>	<b>Bit per pixel</b>	<b>Pixel clock MHz</b>	<b>Frames per sec. *)</b>	<b>t<sub>readout</sub></b>	
<b>Full frame</b>	slow	1624 x 1236	8	14.75	6	164 msec
	fast					
<b>Binning 2x2</b>	slow	812 x 618	8	14.75	12	82 msec
	fast					

<b>Subsample</b>	slow fast	812 x 618	8	14.75 29.5	12 24	82 msec 41 msec
<b>Partial scan function</b>	yes, format freely programmable (binning on partial scan ok)					
<b>Brightness correction function</b>	optional in binning mode					
<b>Test pattern function</b>	yes, in all modes					
<b>Data quality</b>	at 20 °C, gain = 1, exposure time = 32 msec, full frame mode, slow scan					
Readout noise	$\sigma < 0.5$ LSB (8 Bit) typical					
Dynamic range	typ. > 54 dB					
<b>Optical interface</b>	C-Mount					
Optical filter	Hoya CM500S option: dust protection or no filter					
<b>Process interface func.</b>						
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 164 msec					
Asynchronous reset	Full frame	slow fast	delay up to 22 msec 11 msec			
	Binning 2x2	slow fast	delay up to 11 msec 6 msec			
Image data header	yes					
<b>Electrical interface</b>						
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 falling edge **) min. trigger impulse length ( $t_{min}$ ): 1 $\mu$ sec max. trigger delay ( $t_{delay}$ ): 4 $\mu$ sec					
Digital output	1: flash sync signal, 12 V / 20 mA low active **)					
LED	green: power on / yellow: data transmission active					
Power consumption	app. 3 Watt					
<b>Environmental</b>						
Storage temperature	-10 °C .. +70 °C					
Operating temperature	+5 °C .. +50 °C					
Humidity	10 % .. 90 % non condensing					
<b>Housing</b>	Aluminium					
Dimensions	73 x 56 x 55 mm <sup>3</sup>					
Weight	340 g					
<b>IEEE1394a interface</b>	OHCI standard compliant					
<b>Software</b>	Baumer FCAM1394 Driver / SDK for Windows 2000 / Windows XP					

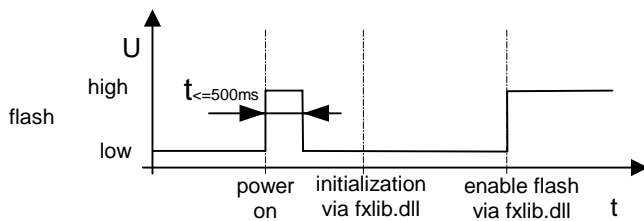
\*) maximum frame rate in free running mode, effective frame rate depending on SDK image mode settings and set exposure time

\*\*) can be inverted via software

## 2. Camera Factory Settings after Camera Start-Up

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

\*) Electrical Interface: flash sync signal



## 3. SDK Supported Image Formats

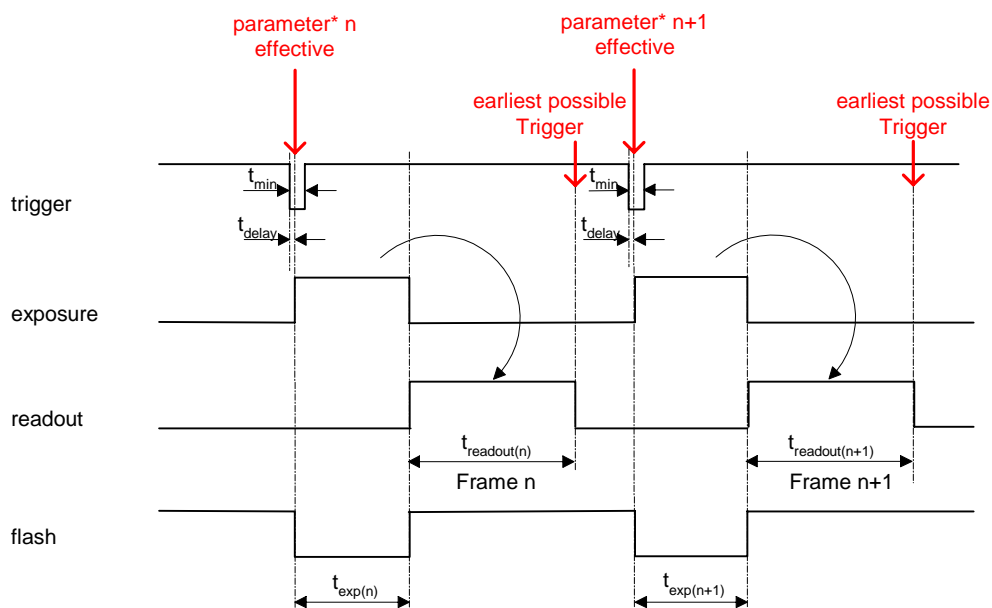
Camera Name	FWX20c NC Edition				
Camera Mode	SDK Image Mode				
	Mode ID	Description	Image Format	Color Coding	Functions / State
Full Frame slow	0	Full Frame HQ	1624 x 1236	RawBayer8, Mono8, Color3x8	PS, T, F, Color
Full Frame fast	1	Full Frame	1624 x 1236	RawBayer8, Mono8, Color3x8	PS, T, F, Color
Binning 2x2 slow	2	Binning 2x2 HQ	812 x 618	RawMono8, Mono8	PS, T, F, BRC, Mono
Binning 2x2 fast	3	Binning 2x2	812 x 618	RawMono8, Mono8	PS, T, F, BRC, Mono
Subsample slow	6	Subsample HQ	812 x 618	RawBayer8, Mono8, Color3x8	T, F, Color
Subsample fast	7	Subsample	812 x 618	RawBayer8, Mono8, Color3x8	T, F, Color

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

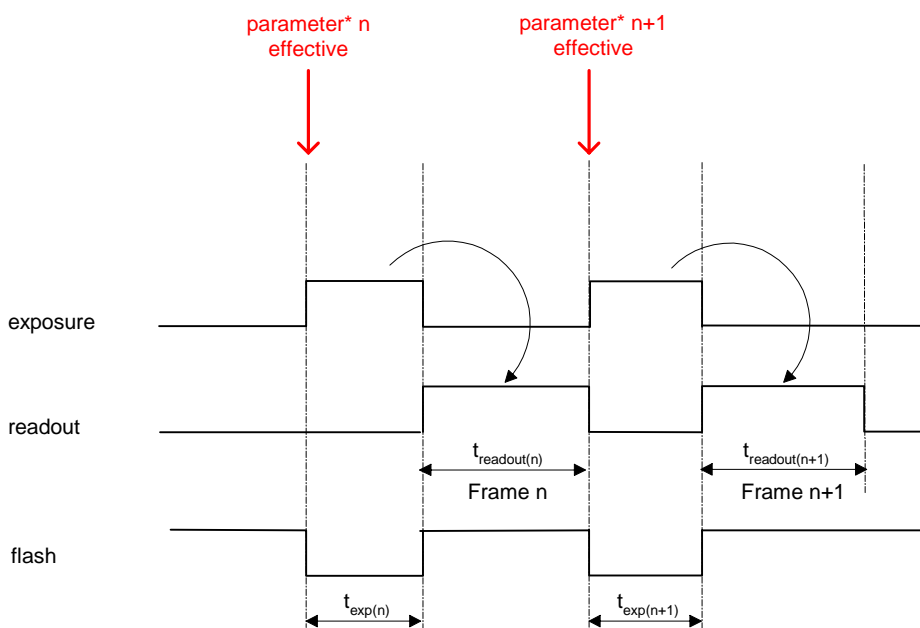
RawBayer8 - unmanipulated pixel data in Bayer filter pattern in 8 bit  
 RawMono8 - unmanipulated pixel data for monochrome camera modes in 8 bit  
 Color3x8 - software corrected image data for color camera modes in the color data arrangement RGB...RGB in 8 bit  
 Mono8 - software corrected image data for monochrome camera modes in 8 bit

## 4. Timing Operation Modes

Trigger Mode: sequential operation

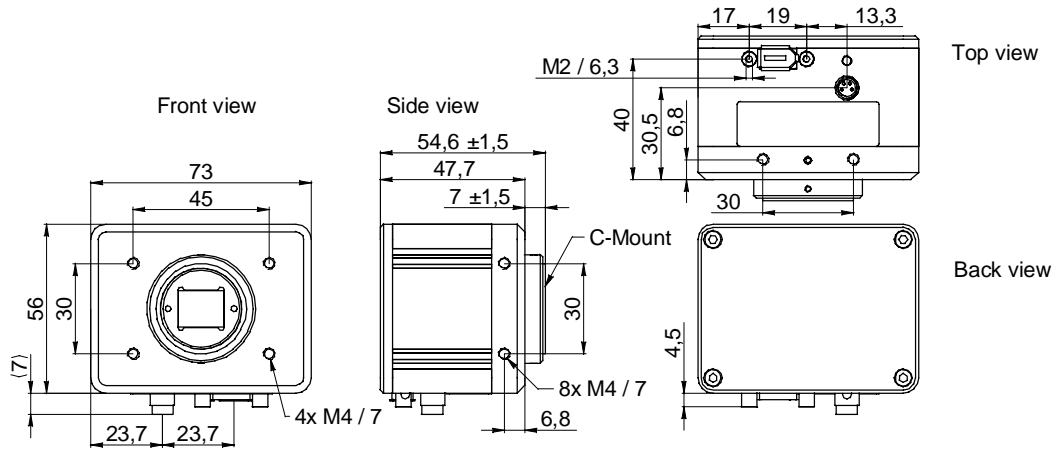


Free Running Mode: sequential operation



\* 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	Type: Lumberg RSMESD 4pin.
Trigger / Flash cable wires color *): 1 = brown 2 = white 3 = blue 4 = black	

\*) Trigger / Flash cable needs to be ordered separately

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