

**Digital Color
Progressive Scan Camera**

 System: **IEEE1394a**
Baumer FWX20c

 Art. No: **OD106710**

- IEEE1394a (FireWire™) progressive scan CCD camera
- 1624 x 1236 pixel
- 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 synchronization via asynchronous trigger and flash sync function
- Integrated 8 MByte RAM for temporarily image data buffering
- Compact robust aluminum housing
- Industrial IEEE1394a connector
- Camera parameter in real-time programmable
- Powerful Baumer FCAM1394 driver (OHCI standard compliant) / Software Development Kit for Windows / Linux
- IEEE1394a interface
- User-friendly Baumer TWAIN compatible image capture and camera control software



shown lens needs to be ordered separately

1. Overview

Sensor	1/1.8" interline progressive scan CCD
Shutter / readout mode	global shutter / progressive scan readout
Number of pixel	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
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 , 1024 steps
Offset (black level)	0 .. 255 LSB (12 bit)
Image data buffer	8 MByte
Image acquisition	
Data format	raw image data from camera

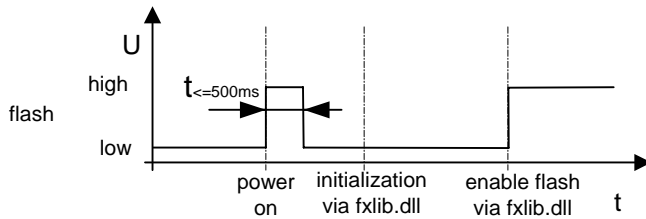
Camera image format modes (see item 3)	Format (pixel)	Bit per pixel	Pixel clock MHz	Frames per sec. *)	t _{readout}
Full frame	slow	1624 x 1236	14.75	6	164 msec
	fast		29.5	12	82 msec
Binning 2x2	slow	812 x 618	14.75	12	82 msec
	fast		29.5	24	41 msec
Subsample	slow	812 x 618	14.75	12	82 msec
	fast		29.5	24	41 msec
Partial scan function	yes, format freely programmable (binning on partial scan ok)				
Brightness correction function	optional in binning mode				
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	$\sigma < 0.5$ LSB (8 bit) typical				
Dynamic range	typ. > 54 dB				
Optical interface	C-Mount				
Optical filter	Hoya CM500S option: dust protection or no filter				
Process interface functions					
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	delay up to 22 msec		
		fast	11 msec		
	Binning 2x2	slow	delay up to 11 msec		
		fast	6 msec		
Subsample	slow	delay up to 11 msec			
	fast	6 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, 3 V .. 14 V / 20 mA trailing edge **) min. trigger impulse length (t _{min}): 1 µsec max. trigger delay (t _{delay}): 4 µsec				
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				
Environmental					
Storage temperature	-10 °C .. +70 °C				
Operating temperature	+5 °C .. +50 °C				
Humidity	10 % .. 90 % non condensing				
Housing	aluminum				
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 / Linux Kernel 2.4.>22, 2.6.xx Baumer TWAIN image capture and camera control software				

*) 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	
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 *)

*) Electrical interface: flash sync signal



3. SDK Supported Image Formats

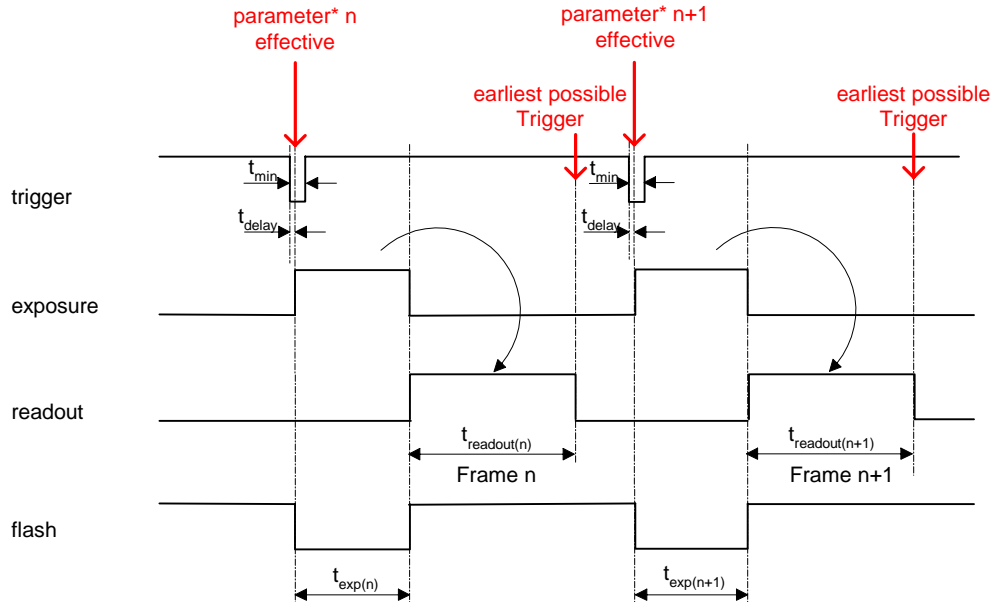
Camera name	FWX20c				
Camera mode	SDK image mode				
	Mode ID	Description	Image format	Color coding	Functions / State
Full Frame slow	0	Full Frame HQ	1624 x 1236	RawBayer8, Mono8, Color3x8	PS, T, F, Color
Full Frame fast	1	Full Frame	1624 x 1236	RawBayer8, Mono8, Color3x8	PS, T, F, Color
Binning 2x2 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

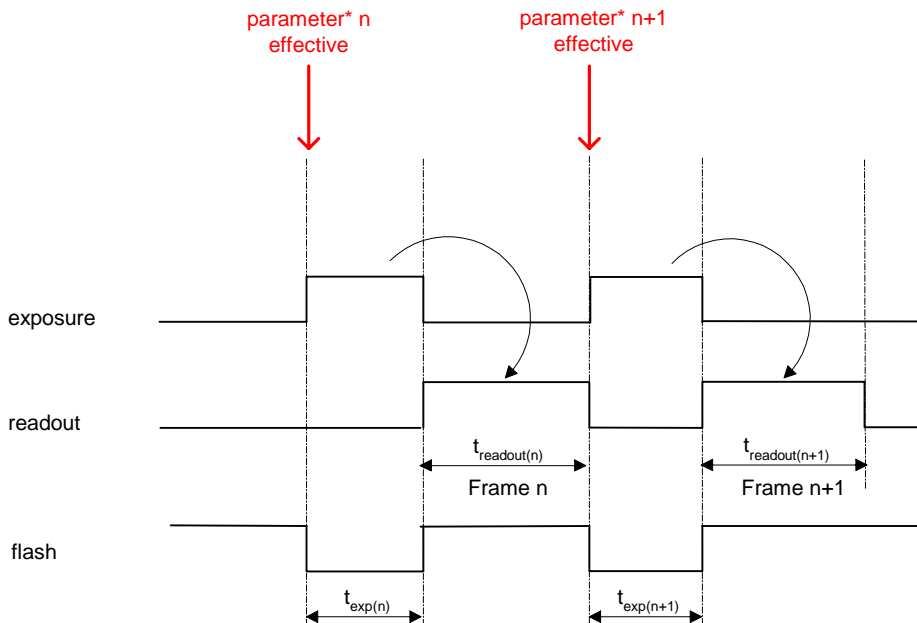
RawBayer8 - unmanipulated pixel data in Bayer filter pattern in 8 bit
 RawMono8 - unmanipulated pixel data for monochrome camera modes in 8 bit
 Color3x8 - software corrected image data for color camera modes in the color data arrangement RGB...RGB in 8 bit
 Mono8 - software corrected image data for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

4. Timing Operation Modes

Trigger Mode: sequential operation

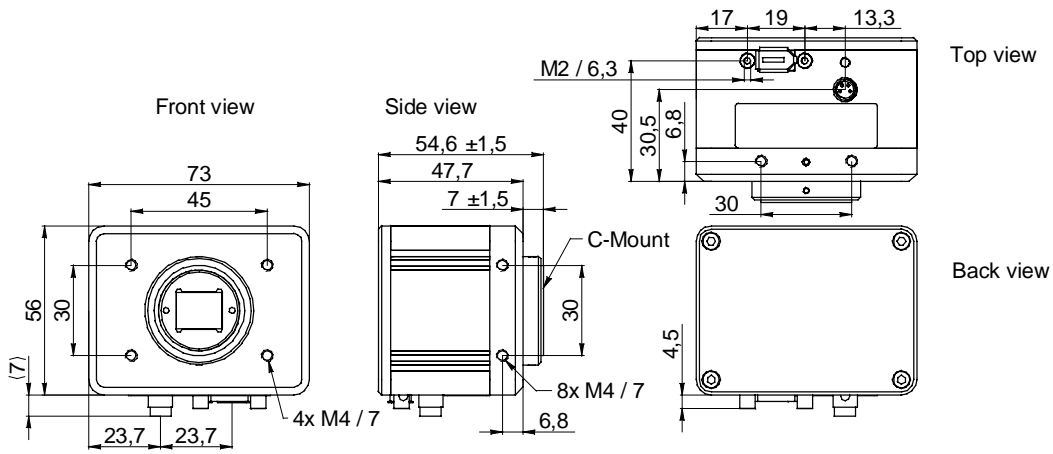


Free Running Mode: sequential operation



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

5. Housing



6. Connectors / Electrical Interfaces

IEEE1394a	Pin
	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	

*) shielded trigger / flash cable needs to be used and ordered separately

End of Document