

**Digital Color  
Progressive Scan Camera**

 System: **Gigabit Ethernet**
**Baumer TXG13c**

 Art. No: **OD108073**

- Gigabit Ethernet progressive scan CCD camera
- 1384 x 1032 pixel
- Up to 20 full frames per second
- GigE Vision™ standard compliant
- On board integrated color processor for high quality color calculation
- Outstanding image quality
- High sensitivity and dynamic range
- High quality slow scan mode for lowest readout noise
- True partial scan function (ROI) for increased frame rates
- External synchronization via industrial compliant process interface (trigger / flash)
- Supported jumbo frames
- Integrated 32 MByte RAM for temporarily image data buffering
- Camera parameter programmable in real-time
- Ultra compact and lightweight aluminum housing
- Standard RJ45 connector
- Screw-lock type industrial connector
- Baumer-GAPI: Flexible, generic software interface for Windows / Linux



shown lens needs to be ordered separately

**1. Overview**

<b>Sensor</b>	1/2" interline progressive scan CCD
Shutter / readout mode	global shutter / progressive scan readout
Number of pixel	1392 x 1040
Scan area	6.4 mm x 4.8 mm
Pixel size	4.65 µm x 4.65 µm
Color filter	RGB Bayer mosaic
<b>Operation modes</b>	
Trigger mode	yes, overlapped operation
Free running mode	yes, overlapped operation
<b>Signal processing</b>	real-time software programmable
Pixel clock	40 MHz fast scan / 20 MHz high quality (HQ) scan
A/D converter	12 bit
Exposure control (t <sub>exp</sub> )	total: 4 µsec .. 60 sec step 1 µsec
Gain control	0 .. 20 dB
Offset (black level)	0 .. 255 LSB (12 bit)
Image data buffer	32 MByte

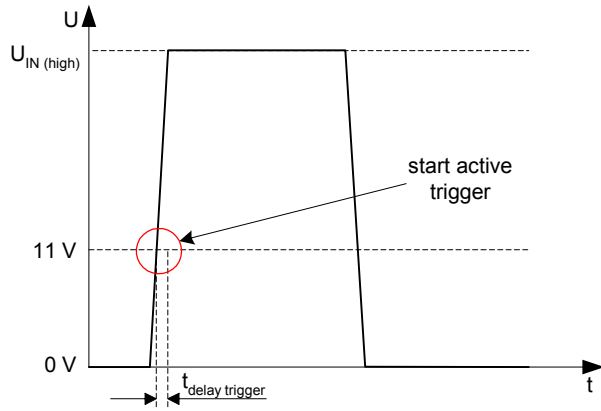
Technical specifications subject to change

Image acquisition									
Data format	YUV , RGB , BGR , Mono8 or Raw image data from camera								
Camera image format modes	Format (pixel)	Gen-Cam standard	Format ID	Pixel format	Pixel clock MHz	Frames per sec. *)	t <sub>readout</sub>		
Full frame HQ Raw	slow	1392 x 1040	Vendor specific	00	BayerRG8 **) BayerRG12	20	10	100 msec	
Full frame Raw	fast	1392 x 1040	yes	01	BayerRG8 **) BayerRG12	40	20	50 msec	
Full frame HQ	slow	1384 x 1032	Vendor specific	02	Mono8 YUV411 Packed YUV422 Packed **) YUV444 Packed RGB8 Packed BGR8 Packed	20	10	100 msec	
Full frame	fast	1384 x 1032	yes	03	Mono8 YUV411 Packed YUV422 Packed **)	40	20	50 msec	
Stream channel packet size	576 Byte .. 16 kByte jumbo frames supported								
Partial scan function	yes, format freely programmable in all modes								
Look up table function	on request: user programmable (input 12 bit, output 12 bit / 8 bit) or Gamma								
Test pattern function	yes, in all modes								
Advanced features									
Time stamp function	yes								
Resend function	yes								
Asynchronous message channel	on request								
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	typical > 54 dB								
Optical interface	C-Mount on request: CS-Mount								
Optical filter	Hoya E-CM500S on request: super polished, dust protection, daylight filter or no filter								
Process interface functions									
Ethernet IP configuration	static IP / DHCP / LLA								
Async. Trigger	yes, trigger mode operation, software trigger and external trigger separately selectable external trigger in trigger mode 0 (overtriggered signals and trigger signals during the readout time will be notified in the received image header)								
External flash sync	yes, delay_value $\leq 4$ $\mu$ sec, duration_value (t <sub>duration</sub> ) : slow mode = t <sub>exp</sub> + 94 $\mu$ sec fast mode = t <sub>exp</sub> + 47 $\mu$ sec								
Software reset	yes, delay up to 102 msec								
Asynchronous reset	Full frame	slow	delay up to 21.3 msec						
		fast	10.7 msec						
Image info header	yes								
User defined identifier	on request : user programmable permanent identifier								
Electrical interface									
Data / control	standard single cable 1000 Base-T, Cat6 option: screw lock type connector								
Power	VCC: 8 VDC .. 30 VDC I: 450 mA .. 135 mA								
Power consumption	approx. 4.5 Watt								

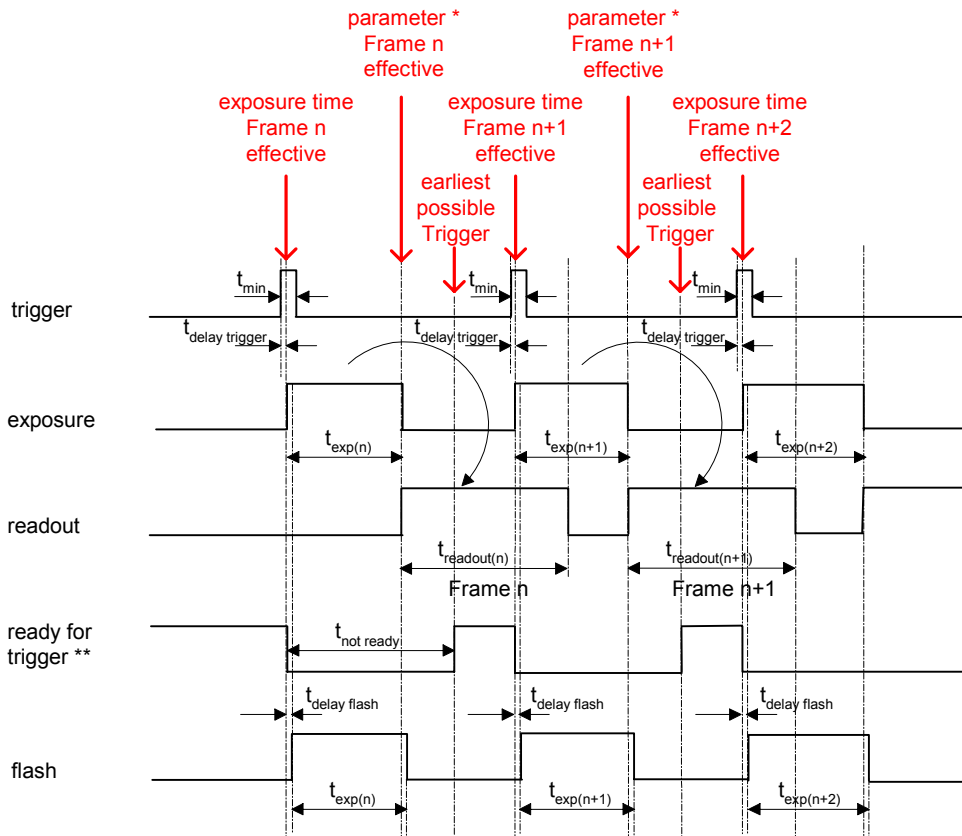


### 3. Timing Operation Modes

Trigger Mode: start up time



Trigger Mode: trigger mode 0, overlapped trigger



$$t_{exp} < t_{readout}: t_{\text{earliest possible trigger (n+1)}} = t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout}: t_{\text{earliest possible trigger (n+1)}} = t_{exp(n)}$$

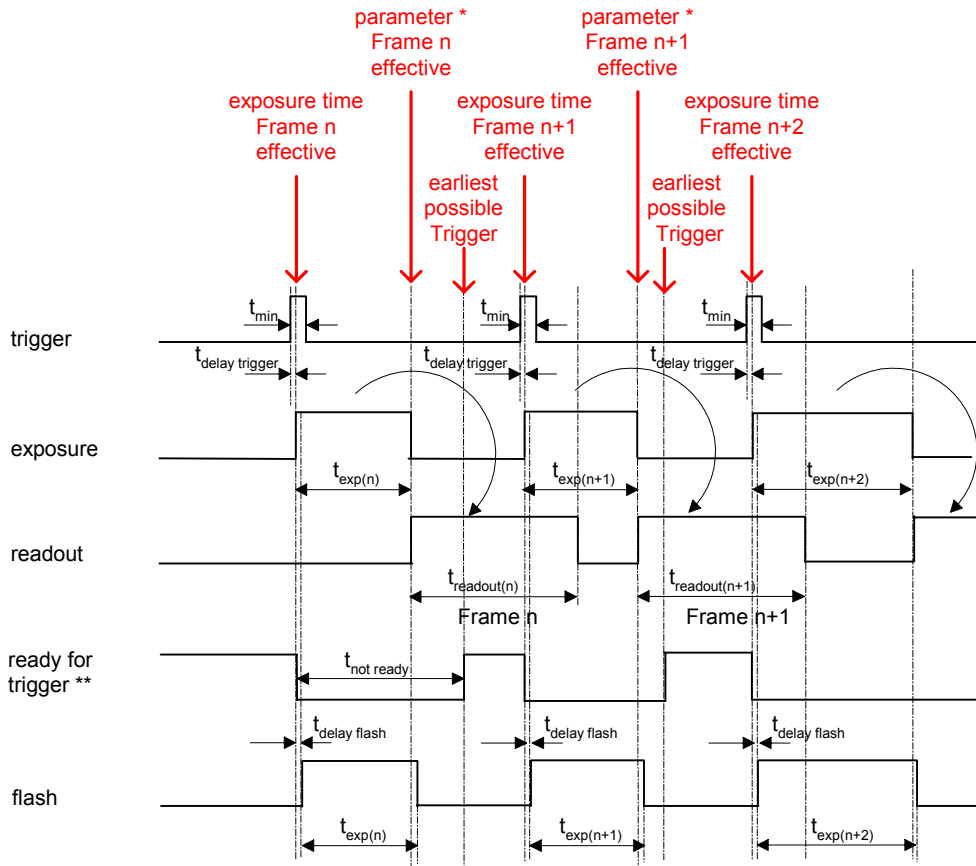
$$t_{exp} < t_{readout}: t_{\text{not ready (n+1)}} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout}: t_{\text{not ready (n+1)}} = t_{exp(n)}$$

\* image parameter:    offset  
                               global gain  
                               mode  
                               partial scan

\*\* signal is not available as digital output

Trigger Mode: trigger mode 0, overlapped trigger , when  $t_{exp(n+2)} > t_{exp(n+1)}$



$$t_{exp} < t_{readout}: t_{earliest\ possible\ trigger\ (n+1)} = t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout}: t_{earliest\ possible\ trigger\ (n+1)} = t_{exp(n)}$$

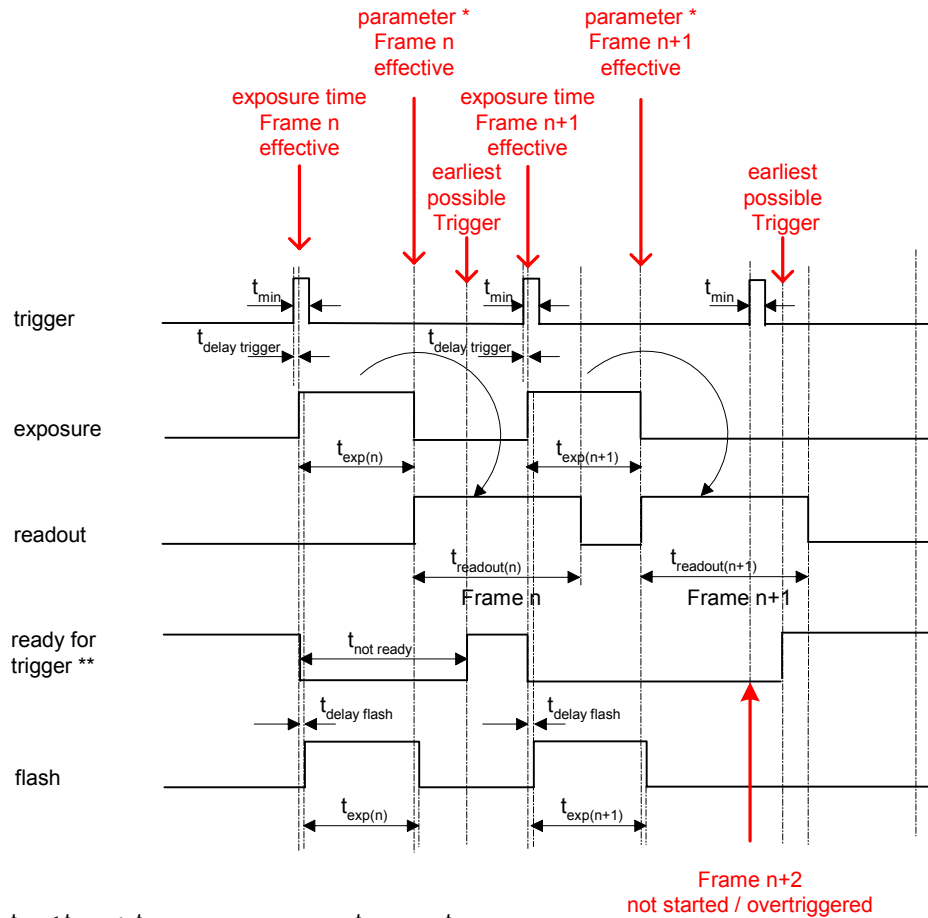
$$t_{exp} < t_{readout}: t_{not\ ready\ (n+1)} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout}: t_{not\ ready\ (n+1)} = t_{exp(n)}$$

\* image parameter:    offset  
                               global gain  
                               mode  
                               partial scan

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Trigger Mode: trigger mode 0, overlapped trigger , when  $t_{exp(n+2)} < t_{exp(n+1)}$



$$t_{exp} < t_{readout} : t_{earliest\ possible\ trigger\ (n+1)} = t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout} : t_{earliest\ possible\ trigger\ (n+1)} = t_{exp(n)}$$

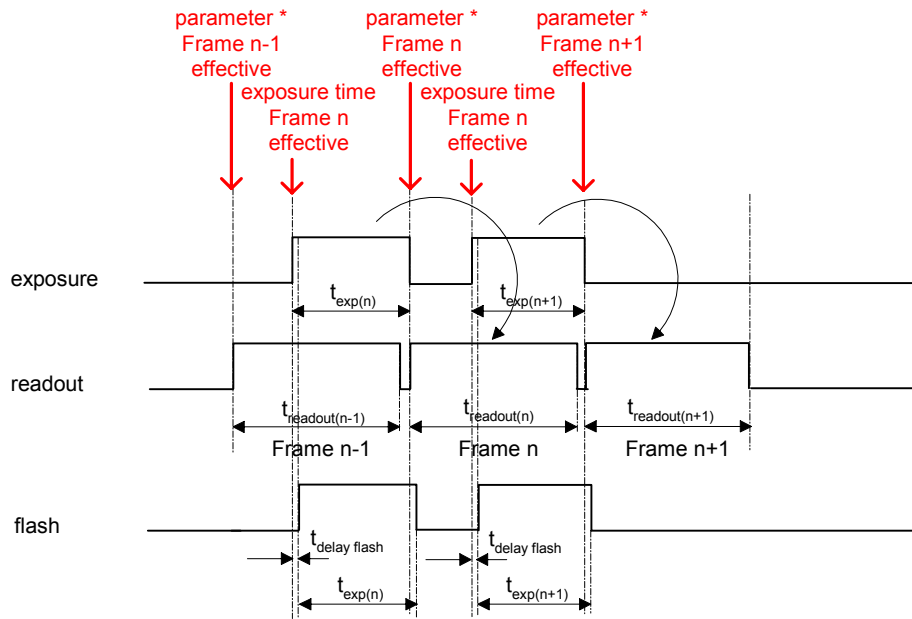
$$t_{exp} < t_{readout} : t_{not\ ready\ (n+1)} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

$$t_{exp} > t_{readout} : t_{not\ ready\ (n+1)} = t_{exp(n)}$$

\* image parameter: offset  
global gain  
mode  
partial scan

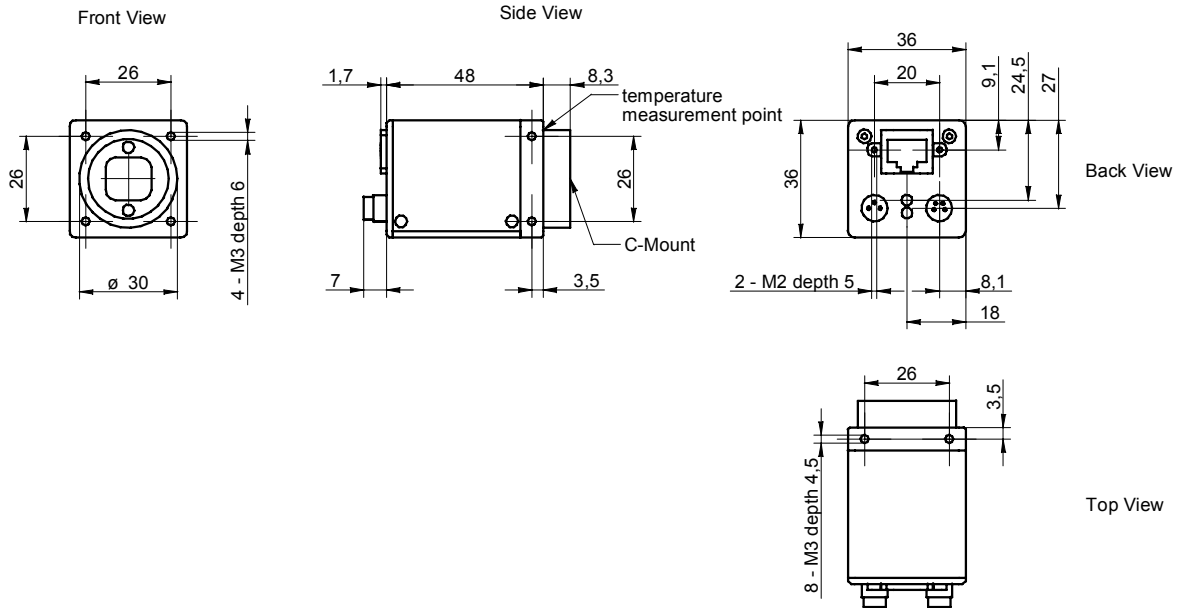
\*\* signal is not available as digital output

Free Running Mode: overlapped operation



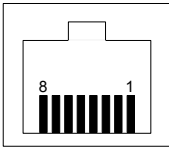
\* image parameter: offset  
global gain  
mode  
partial scan


### 4. Housing


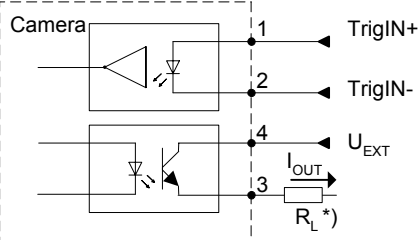


### 5. Connectors / Electrical Interfaces

#### 5.1 Pin assignment:

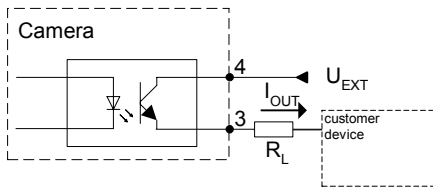
<b>Data / Control 1000 Base-T</b>	Type: RJ45 8P8S mod jack
	<ul style="list-style-type: none"> <li>1: MX1+</li> <li>2: MX1-</li> <li>3: MX2+</li> <li>4: MX3+</li> <li>5: MX3-</li> <li>6: MX2-</li> <li>7: MX4+</li> <li>8: MX4-</li> </ul>

<b>Power</b>	Type: Lumberg RSME3D / 3 pin
	<ul style="list-style-type: none"> <li>1: Power VCC+</li> <li>3: GND</li> <li>4: not used</li> </ul>
	Power cable wires color: 1 = brown 3 = blue 4 = black

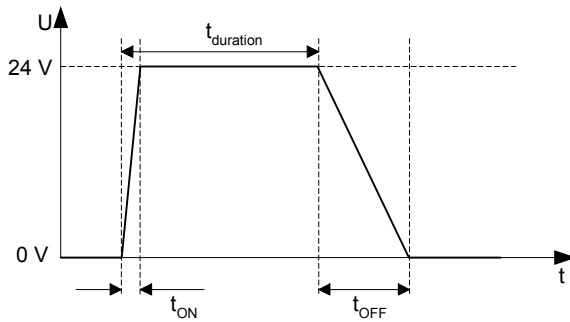
<b>Trigger Flash</b>	Type: Lumberg RSME3D 4pin.
	
	*) resistor must be used, $I_{OUT} = 16 \text{ mA}$ by $U_{EXT} = 24 \text{ VDC}$ recommended, drawing shown above example for using high active signal
	Trigger / Flash cable wires color *): 1 = brown 2 = white 3 = blue 4 = black

\*) shielded trigger / flash cable should be used and ordered separately

5.2 Flash sync sample  $U_{EXT} = 24\text{ VDC}$  high active:

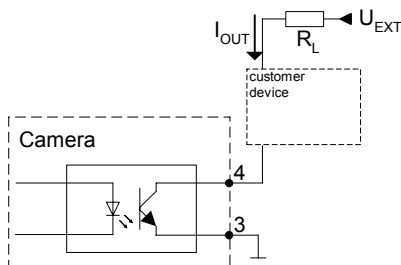


Timing example:  
 measurement condition  $U_{EXT} = 24\text{ VDC} / I_{OUT} = 16\text{ mA}$

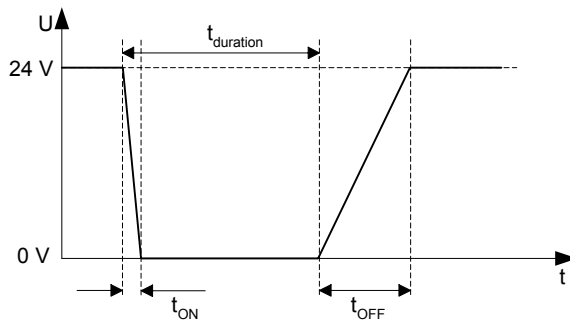


$t_{ON}$  time = typ. 2  $\mu\text{sec}$   
 $t_{OFF}$  time = typ. 40  $\mu\text{sec}$

5.3 Flash sync sample  $U_{EXT} = 24\text{ VDC}$  low active:



Timing example:  
 measurement condition  $U_{EXT} = 24\text{ VDC} / I_{OUT} = 16\text{ mA}$



$t_{ON}$  time = typ. 2  $\mu\text{sec}$   
 $t_{OFF}$  time = typ. 40  $\mu\text{sec}$

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