

**Digital Color
Progressive Scan Camera**

 System: **Gigabit Ethernet**
Baumer TXG03c

 Art. No: **OD108079**

- Gigabit Ethernet progressive scan CCD camera
- 640 x 480 pixel
- Up to 90 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

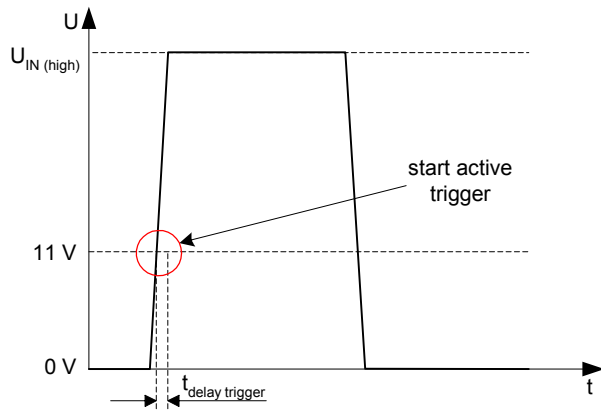
| | |
|--------------------------------|---|
| Sensor | 1/3" interline progressive scan CCD HAD technology |
| Shutter / readout mode | global shutter / progressive scan readout |
| Number of pixel | 656 x 494 |
| Scan area | 4.85 mm x 3.65 mm |
| Pixel size | 7.4 µm x 7.4 µm |
| Color filter | RGB Bayer mosaic |
| Operation modes | |
| Trigger mode | yes, overlapped operation |
| Free running mode | yes, overlapped operation |
| Signal processing | real-time software programmable |
| Pixel clock | 40 MHz fast scan / 20 MHz high quality (HQ) scan |
| A/D converter | 12 bit |
| Exposure control (t_{exp}) | 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

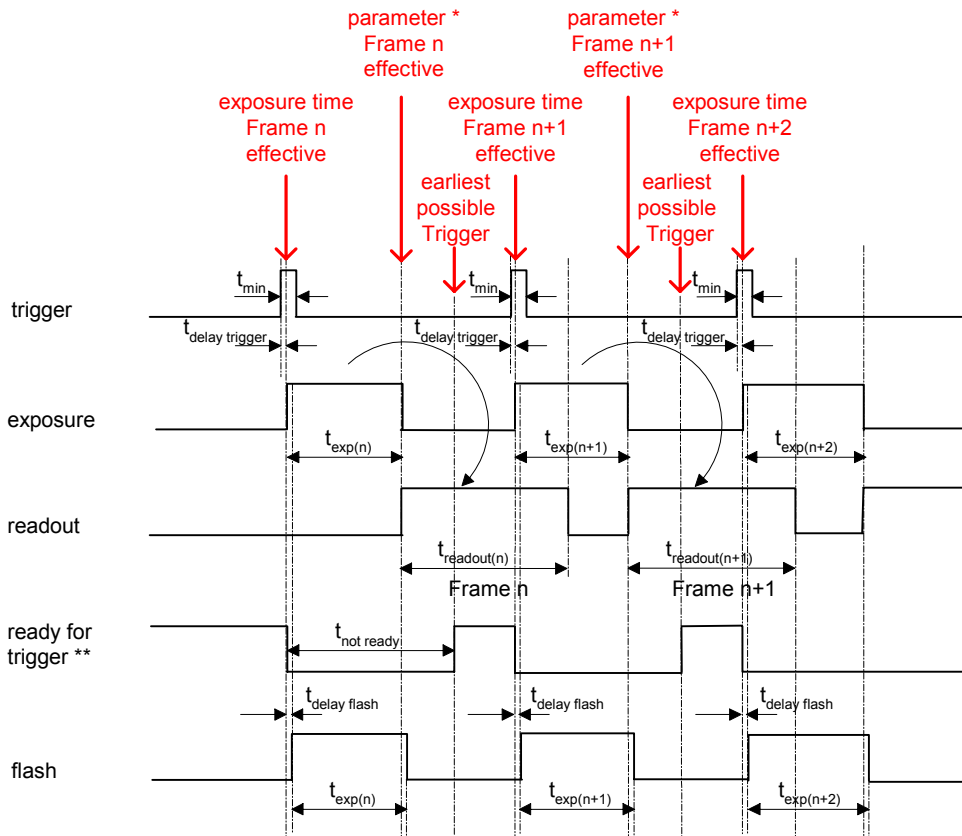
| Image acquisition | | | | | | | | | |
|------------------------------|--|------------------|----------------------|--------------|-------------------|--------------------|----------------------|---------|--|
| Data format | YUV , RGB , BGR , Mono8 or Raw image data from camera | | | | | | | | |
| Camera image format modes | Format (pixel) | Gen-Cam standard | Format ID | Pixel format | Pixel clock MHz | Frames per sec. *) | t _{readout} | | |
| Full frame HQ Raw | slow | 656 x 494 | Vendor specific | 00 | BayerRG8 **) | 20 | 46 | 22 msec | |
| | | | | | BayerRG12 | | | | |
| Full frame Raw | fast | 656 x 494 | yes | 01 | BayerRG8 **) | 40 | 90 | 11 msec | |
| | | | | | BayerRG12 | | | | |
| Full frame HQ | slow | 640 x 480 | Vendor specific | 02 | Mono8 | 20 | 46 | 22 msec | |
| | | | | | YUV411 Packed | | | | |
| | | | | | YUV422 Packed **) | | | | |
| | | | | | YUV444 Packed | | | | |
| | | | | | RGB8 Packed | | | | |
| | | | | | BGR8 Packed | | | | |
| Full frame | fast | 640 x 480 | yes | 03 | Mono8 | 40 | 90 | 11 msec | |
| | | | | | YUV411 Packed | | | | |
| | | | | | YUV422 Packed **) | | | | |
| 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 ≤ 4 μ sec, duration_value (t _{duration}) : slow mode = t _{exp} + 41 μ sec fast mode = t _{exp} + 21 μ sec | | | | | | | | |
| Software reset | yes, delay up to 102 msec | | | | | | | | |
| Asynchronous reset | Full frame | slow | delay up to 4.9 msec | | | | | | |
| | | fast | 2.5 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: 370 mA .. 120 mA | | | | | | | | |
| Power consumption | approx. 3.5 Watt | | | | | | | | |

3. Timing Operation Modes

Trigger Mode: start up time



Trigger Mode: trigger mode 0, overlapped trigger



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

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

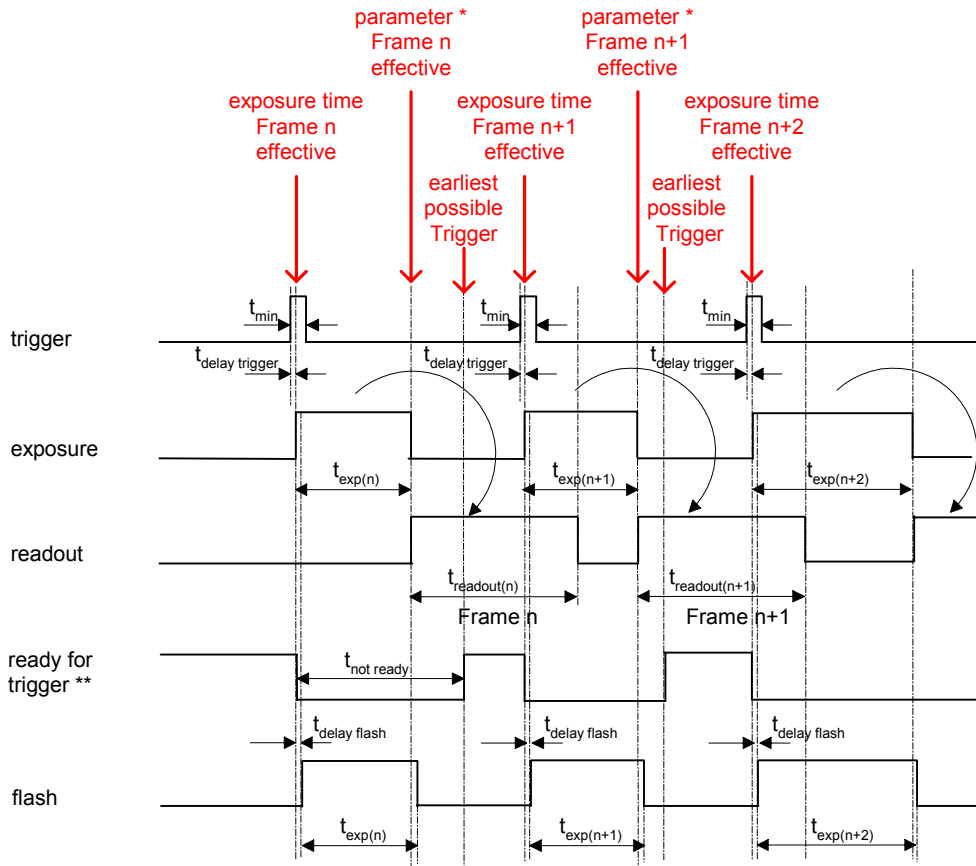
$$t_{exp} < t_{readout}: t_{\text{not ready (n+1)}} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

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

* image parameter: offset
 global gain
 mode
 partial scan

** signal is not available as digital output

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



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

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

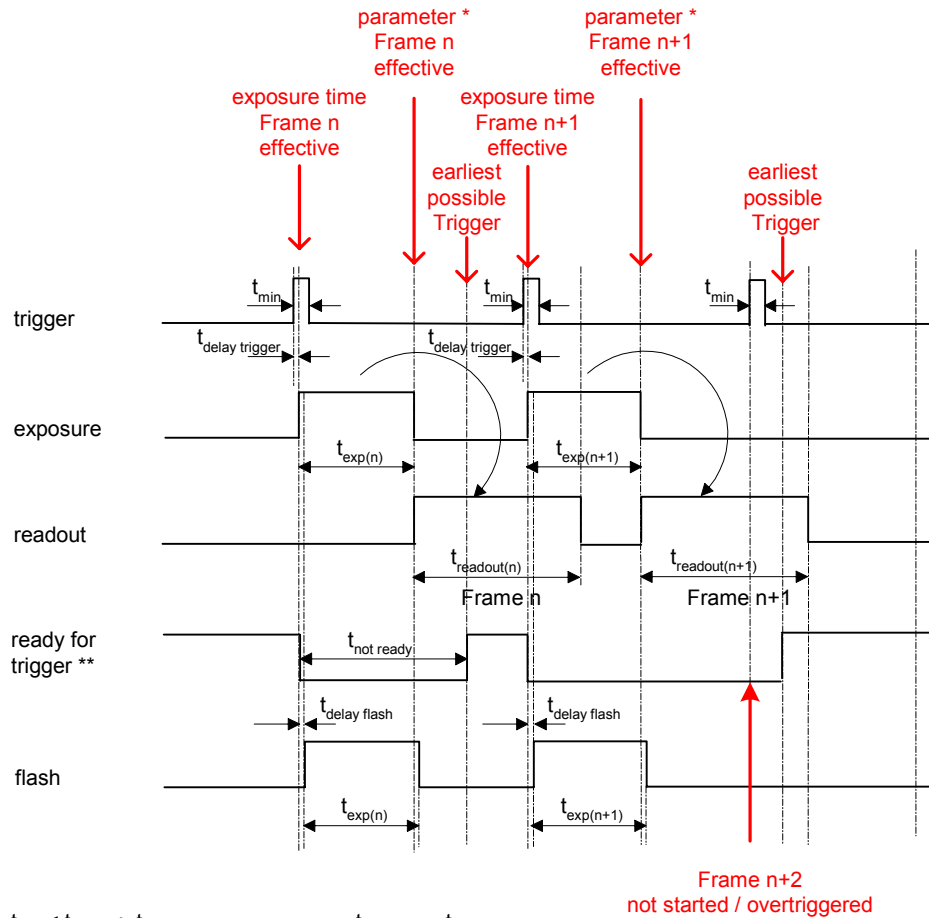
$$t_{exp} < t_{readout}: t_{not\ ready\ (n+1)} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

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

* image parameter: offset
 global gain
 mode
 partial scan

** signal is not available as digital output

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



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

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

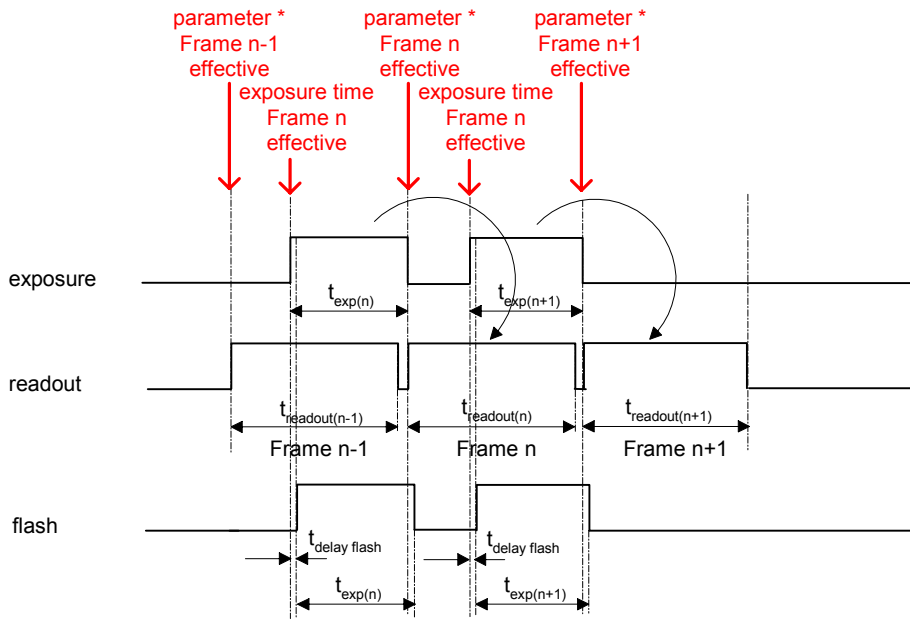
$$t_{exp} < t_{readout} : t_{not\ ready\ (n+1)} = t_{exp(n)} + t_{readout(n)} - t_{exp(n+1)}$$

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

* image parameter: offset
global gain
mode
partial scan

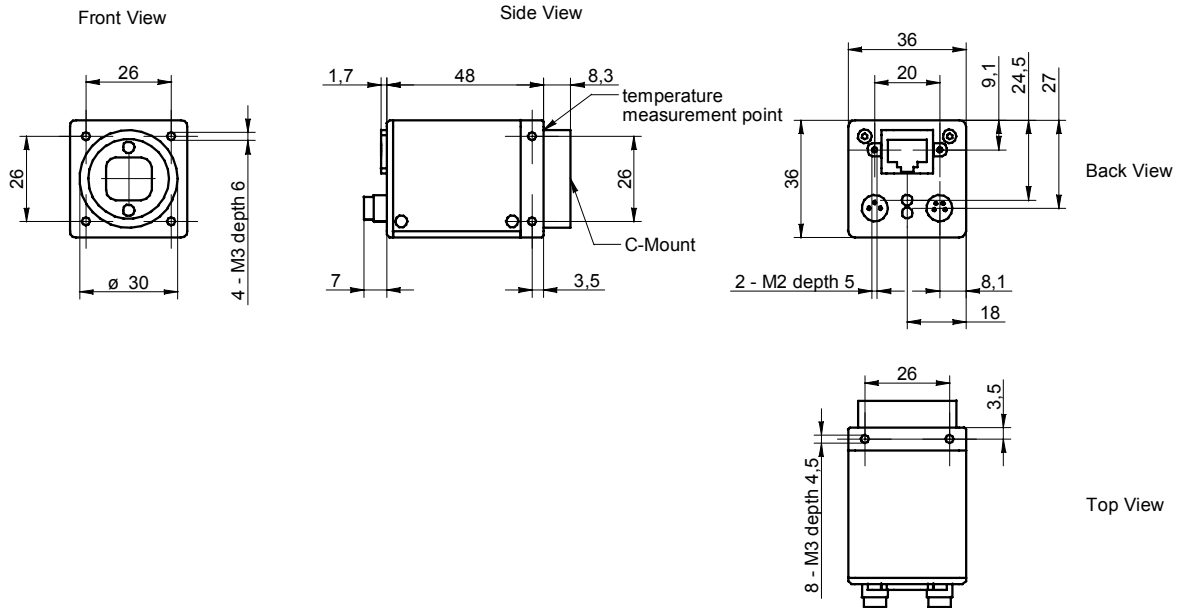
** signal is not available as digital output

Free Running Mode: overlapped operation



* image parameter: offset
 global gain
 mode
 partial scan

4. Housing



5. Connectors / Electrical Interfaces

5.1 Pin assignment:

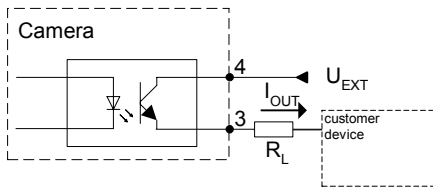
| | |
|---------------------------------------|--|
| Data / Control 1000 Base-T | Type: RJ45 8P8S mod jack |
| | <ul style="list-style-type: none"> 1: MX1+ 2: MX1- 3: MX2+ 4: MX3+ 5: MX3- 6: MX2- 7: MX4+ 8: MX4- |

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

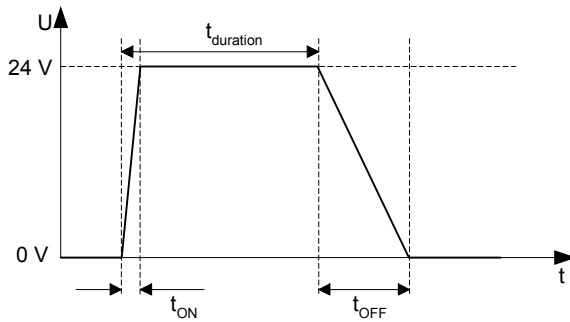
| | |
|--------------------------|---|
| Trigger Flash | Type: Lumberg RSMEED 4pin. |
| | |
| | *) resistor must be used, $I_{OUT} = 16 \text{ mA}$ by $U_{EXT} = 24 \text{ VDC}$ recommended, drawing shown above example for using high active signal |
| | Trigger / Flash cable wires color *): 1 = brown 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:

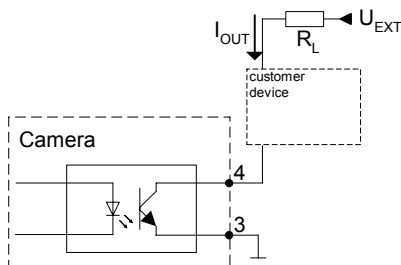


Timing example:
 measurement condition $U_{EXT} = 24\text{ VDC} / I_{OUT} = 16\text{ mA}$

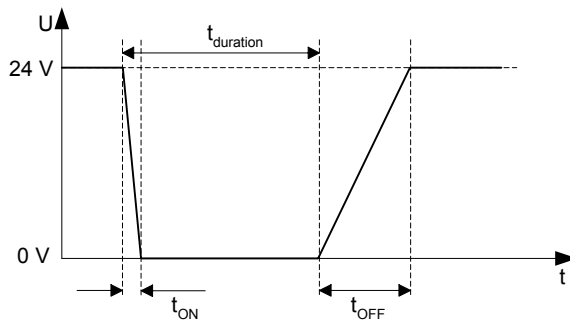


t_{ON} time = typ. 2 μsec
 t_{OFF} time = typ. 40 μsec

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 μsec
 t_{OFF} time = typ. 40 μsec

End of Document