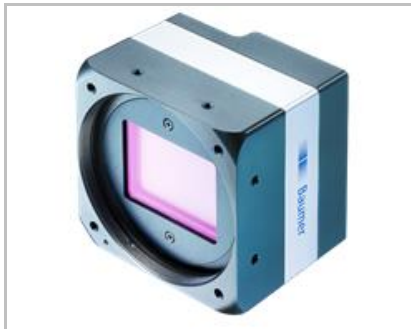


# LXG-120M.PS

## Technical Data

 Art. No.  
11174307


### Digital Monochrome Matrix Camera, Gigabit Ethernet, Visual Applets for FPGA Image Pre-processing

#### Sensor Information

|                   |                                       |
|-------------------|---------------------------------------|
| Model Name        | CMOSIS CMV-12000                      |
| Type              | APS-C progressive scan CMOS           |
| Shutter           | Global                                |
| Native Resolution | 4096 x 3072 pixels                    |
| Scan Area         | 22.528 mm x 16.896 mm                 |
| Pixel Size        | 5.5 $\mu\text{m}$ x 5.5 $\mu\text{m}$ |

#### Data Quality

@ 20 °C, gain = 1, exposure time = 4 msec

|                            |                           |
|----------------------------|---------------------------|
| Readout Noise ( $\sigma$ ) | 0.4 LSB @ 8 bit (typical) |
| Dynamic Range              | 54 dB (typical)           |

#### Acquisition Formats

| Image Formats | Format  | Resolution  | Sensor/GigE | $t_{\text{readout}}$ |
|---------------|---|-------------|-------------|----------------------|
|               | Full Frame  | 4096 x 3072 | 60/9 fps    | 16,6 msec            |
| Pixel Formats | Mono10 (Sensor), Mono8 / Mono10Packed (GigE)          |             |             |                      |
| Partial Scan  | True Partial Scan, Region of Interest (ROI) arbitrary |             |             |                      |

#### Image Pre-Processing

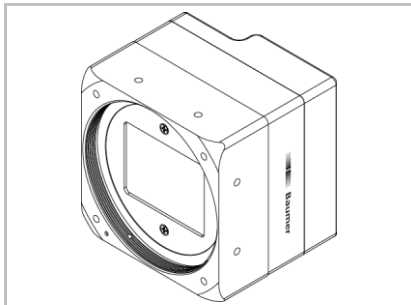
|                         |   |
|-------------------------|---|
| Analog Controls         | Exposure Time (17 $\mu\text{sec}$ ... 1 sec   Step Size 1 $\mu\text{sec}$ )<br>Gain (0 ... 12 dB), Offset (0 ... 63 LSB   10 bit) |
| Gamma Correction        | NA  |
| LUT                     | NA  |
| Color Models            | Mono  |
| Color Tolerance         | Only on Color Cameras   |
| Color Processing        | NA  |
| Color Adjustment        | NA  |
| Binning                 | NA  |
| Decimation              | NA  |
| Image Flipping          | Horizontal  |
| Defect Pixel Correction | via Defect Pixel List with up to 1000 Pixel Coordinates, 10 Lines, 10 Columns   |

#### Process Synchronization

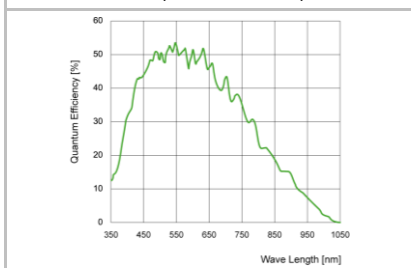
|                           |  |
|---------------------------|--|
| Modes                     | Free Running, Trigger  |
| Free Running              | Continuous or<br>Adjustable Acquisition Frame Rate (0.01 ... 13157 Hz)   |
| Trigger Sources           | line0, Software, ActionCommand, Timer1Start, eVAOutput1, All (except Timer1Start/eVAOutput1) or Off  |
| Trigger Delay             | 0 ... 2 sec, Tracking and buffering of up to 256 triggers  |
| Sequencer Characteristics | up to 128 sets of parameters, up to 65536 loop passes, up to 65536 repetitions of sets of parameters, up to 65536 images per trigger event |
| Sequencer Parameters      | Exposure Time, Gain Factor, ROI Offset x, ROI offset y   |
| External Flash Sync       | via Exposure Active<br>$t_{\text{delay flash}} \leq 3 \mu\text{sec}$ , $t_{\text{duration}} = t_{\text{exposure}} + 18 \mu\text{sec}$      |

#### Digital I/Os

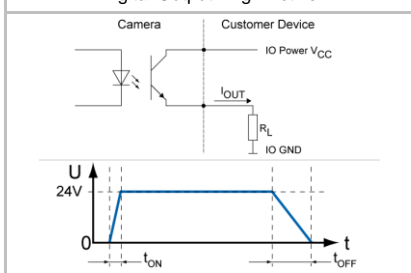
|                |   |
|----------------|---|
| Lines          | Input: Line 0, Output: Line1, Line 2, Line 3  |
| Circuit Times  | Output: $t_{\text{ON}} = \text{typ. } 2 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 30 \mu\text{sec}$   |
| Output Sources | Off, ExposureActive, ReadoutActive, FrameActive, TriggerReady, TriggerOverlapped, TriggerSkipped, Line 0, UserOutput{1,2,3}, Timer{1,2,3}Active, eVAOutput{1,2,3} |
| Line Debouncer | Low and high signal separately selectable<br>Debouncing Time 0 ... 5 msec, Step Size: 1 $\mu\text{sec}$   |



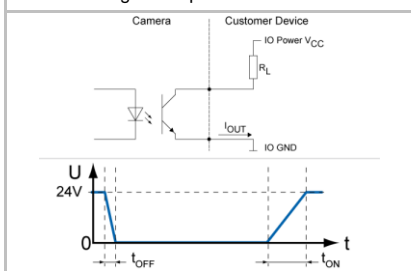
Sensor Graph: Relative Response

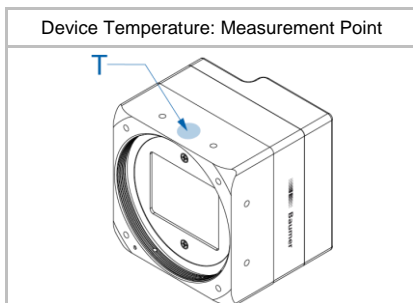
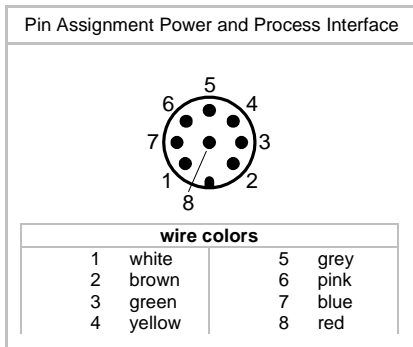
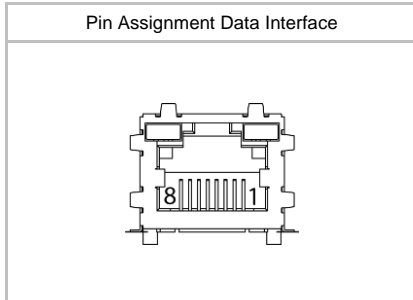
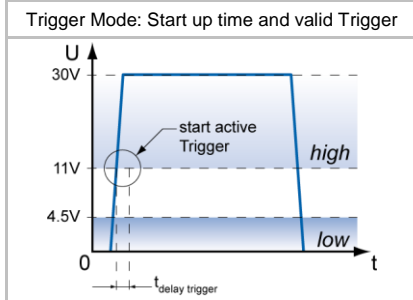
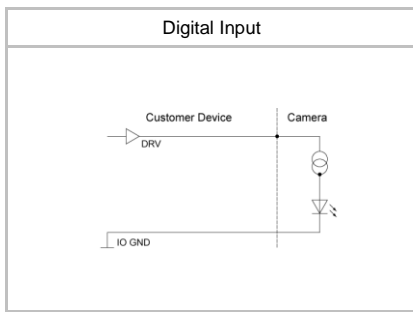


Digital Output: High Active



Digital Output: Low Active





## Interfaces and Connectors

|  |                  |                                      |                  |
|--|------------------|--------------------------------------|------------------|
| Data Interface<br>(lower GigE port not used) | Gigabit Ethernet | Transfer Rate                        | 1000 Mbits/sec   |
|  | Fast Ethernet    | Transfer Rate                        | 100 Mbits/sec    |
|  | Connector:       | 8P8C Modular Jack (RJ45), screw lock |                  |
|  | Pin Assignment:  | 1 – MX1+                             | 5 – MX3-         |
|  |                  | 2 – MX1-                             | 6 – MX2-         |
|  |                  | 3 – MX2+                             | 7 – MX4+         |
|  |                  | 4 – MX3+                             | 8 – MX4-         |
| Power and Process<br>Interface #1 (top)      | Connector:       | SACC-DSI-M8MS-8CON-M8-L180 SH        |                  |
|  | Assignment:      | 1 – OUT3 (line3)                     | 5 – IO Power VCC |
|  |                  | 2 – Power VCC                        | 6 – OUT1 (line1) |
|  |                  | 3 – IN1 (line0)                      | 7 – GND          |
|  |                  | 4 – IO GND                           | 8 – OUT2 (line2) |
| Power and Process<br>Interface #2 (bottom)   | Connector:       | SACC-DSI-M8FS-8CON-M10-L180 SH       |                  |
|  | Assignment:      | 1 – IN2_RS485+ (line4)               |                  |
|  |                  | 2 – IN2_RS485- (line4)               |                  |
|  |                  | 3 – IN3_RS485+ (line5)               |                  |
|  |                  | 4 – IN3_RS485- (line5)               |                  |
|  |                  | 5 – OUT4_RS485+ (line6)              |                  |
|  |                  | 6 – OUT4_RS485- (line6)              |                  |
|  |                  | 7 – External Power GND               |                  |
|  |                  | 8 – External Power 5 V/200 mA        |                  |

## Mechanical Data

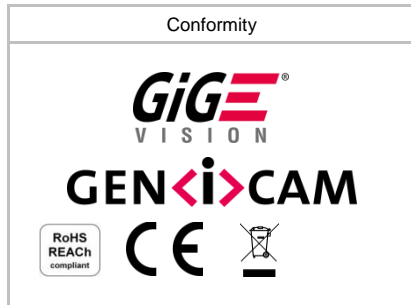
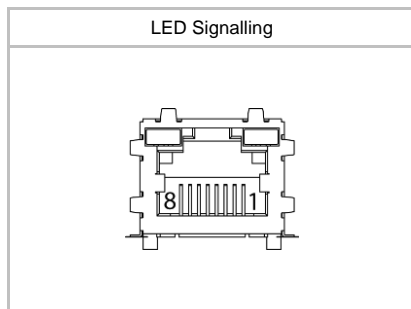
|            |                |
|------------|----------------|
| Housing    | Aluminum, IP40 |
| Dimensions |                |
| Weight     | 290 g          |

## Optical Data

|                |  |
|----------------|--|
| Lens Mount     | M58-Mount, via optional adapters F-/M42-/C-Mount |
| Optical Filter | None   |

## Electrical Data

|                     |                                     |                                 |
|---------------------|-------------------------------------|---------------------------------|
| Power Supply (ext.) | VCC:                                | 12 ... 24 V DC ± 20%            |
|                     | I:                                  | 305 ... 604 mA                  |
| Power over Ethernet | Class 0 device                      |                                 |
|                     | VCC:                                | 36 ... 57 V DC                  |
|                     | I:                                  | 174 mA @ 48 VDC                 |
| Power Consumption   | approx.                             | 7,3 W @ 24 VDC and 60 fps       |
|                     | approx.                             | 8,4 W @ 48 VDC (PoE) and 60 fps |
| Digital Input       | $U_{IN(low)}$ :                     | 0.0 ... 4.5 VDC                 |
|                     | $U_{IN(high)}$ :                    | 11.0 ... 30.0 VDC               |
|                     | $I_{IN}$ :                          | 6.0 ... 10 mA                   |
|                     | min. Impulse Length:                | 2.0 $\mu$ sec                   |
|                     | Trigger Delay out of treadout:      | 4.0 $\mu$ sec                   |
| Digital Output      | max. Trigger Delay during treadout: | 30.0 $\mu$ sec                  |
|                     | $U_{EXT}$ :                         | 5 ... 30 V DC                   |
|                     | $I_{OUT}$ :                         | max. 50 mA                      |



### LED Signalling

|            |                |                     |
|------------|----------------|---------------------|
| Camera LED | Green on       | Power on, link good |
|            | Green blinking | Power on, no link   |
|            | Red on         | Error               |
|            | Red blinking   | Warning             |
|            | Yellow         | Readout active      |
| RJ45 LEDs  | Green on       | Link on             |
|            | Green blinking | Link activity       |
|            | Amber on       | GigE speed          |
|            | Amber blinking | 100 Mb speed        |

### Environmental Data

|                         |   |
|-------------------------|---|
| Storage Temperature     | -10 °C ... +70 °C   |
| Operating Temperature   | +5 °C ... +50 °C @ T= Measurement Point<br>Ambient temperature above 50 °C requires cooling |
| Int. Temperature Sensor | 0 °C ... +85 °C accuracy: ±1 K  |
| Humidity                | 10 % ... 90 % non-condensing  |
| Conformity              | RoHS, REACH, CE   |

### Network Interface Data

|                           |  |            |                |
|---------------------------|--|------------|----------------|
| Network Interface         | Gigabit Ethernet                           | 1000BASE-T | 1000 Mbits/sec |
|                           | Fast Ethernet                              | 100 BASE-T | 100 Mbits/sec  |
| Link Aggregation          | According to 802.3ad, static configuration |            |                |
| Ethernet IP Configuration | Persistent IP, DHCP, LLA                   |            |                |
| Packet Size               | 576 .. 9000 Byte, Jumbo frames supported   |            |                |

### GigE Vision® Features (in compliance with GigE Vision® 1.2)

|   |  |
|---|--|
| Events<br>Transmission via Asynchronous Message Channel | GigEVisionError, HeartbeatTimeOut, EventLost, EventDiscarded, Line{0,1,2,3}RisingEdge, Line{0,1,2,3}FallingEdge, Action1, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerReady, TriggerOverlapped, TriggerSkipped, Timer{1,2,3}End |
| Frame Counter   | up to 2 <sup>32</sup>  |
| Lost Frame Counter                                      | up to 2 <sup>24</sup> - 1, counts discarded images when FIFO is full   |
| Payload Size  | 4 ... 58.720.468 Byte  |
| Transmission Delay                                      | 0 .. 2 <sup>32</sup> -1 Ticks (1 Tick = 8 nsec)  |
| Timestamp   | 64 bit   |
| Packet Delay  | 0 .. 2 <sup>32</sup> -1 Ticks (1 Tick = 8 nsec)  |
| Packet Resend   | Resend Buffer: 240 MB (4 Images)   |

### GeniCam™ Features (in compliance with SFNC 2.1.0)

|                   |  |
|-------------------|--|
| Timer             | Timer Selector: Timer 1 ... 3<br>TimerTriggerSource:<br>Off, Line0, Software, Action1, TriggerSkipped<br>ExposureStart, ExposureEnd, FrameStart, FrameEnd,<br>TimerDelay: 0 µsec ... 2 sec, Step Size: 1 µsec<br>TimerDuration: 10 µsec ... 2 sec, Step Size: 1 µsec |
| User Sets         | Factory Settings: Default (read only)<br>Freely Programmable: UserSet1, UserSet2, UserSet3<br>Parameters: any user definable Parameter   |
| Acquisition Abort | Delay up to 69 msec  |

### Vendor Specific Features

|                          |   |
|--------------------------|---|
| DSNU / PRNU (FPN)        | Based on offset / gain per column                                       |
| Correction               |   |
| High Dynamic Range (HDR) | Piecewise linear response, up to 90 dB                                  |
| Burst Mode               | NA  |
| eVA Applet Enable        | On / Off  |
| eVA A. Overlapped Images | Number of images than can be processed in parallel in eVA               |
| Temperature measurement  | Internal sensor temperature<br>range: 0 °C .. +85 °C, accuracy: ±1,0 °C |

**Embedded Visual Applets**

|                   |   |
|-------------------|---|
| eVA_Info          | Version, platform and applet information  |
| ImgIn             | Maximum resolution: 4096 x 3072<br>Maximum frame rate at full resolution: 60 fps<br>Interface: 12 bit, parallelism 8, 96 MHz<br>Buffered within camera via FIFO, up to 16 lines<br>Max bandwidth: 4096 x 3072, 60 fps, 12 bit (1080 MB/s)                                 |
| ImgOut            | Maximum resolution: 4096 x 14336 (8 bit), x 7168 (10 bit)<br>Maximum frame rate via GigE: 9 fps (full frame)<br>Interface: 12 bit, parallelism 4, 96 MHz<br>Buffered within camera via memory, up to 4 images<br>Please note: images are transferred as 8 or 10 bit to PC |
| MetaDataOut       | Defines properties of images transferred to ImgOut.   |
| ChunkOut          | NA  |
| Inputs            | In{0,1,2,3,4}<br>Input 0: Connected to IN1 (line0)<br>Input 1: Connected to RS485_IN_A<br>Input 2: Connected to RS485_IN_B<br>Input 3: Connected to GND<br>Input 4: Connected to GND  |
| Outputs           | Out{0,1,2,3}<br>Output 0: Connected to eVAOutput1<br>Output 1: Connected to eVAOutput2<br>Output 2: Connected to eVAOutput3<br>Output 3: Connected to RS485_OUT_A   |
| FPGA              | Xilinx Spartan 6 XC6SLX150-3CSG484C<br>Please note: the FPGA is shared with the camera design   |
| Dynamic Memory    | 2 ports, 64 bit   |
| Persistent Memory | NA  |
| LicenseStatus     | Provides information of installed licenses  |

**Factory Settings after Start-Up**

|                         |  |
|-------------------------|--|
| Operation Mode          | Free running, overlapped mode                |
| Analog Controls         | Exposure Time: 4 msec, Gain: 0 dB, Offset: 0 |
| Pixel Format            | Mono8  |
| Partial Scan            | Off  |
| Acquisition Frame Rate  | Off  |
| Timer                   | Off  |
| Transmission Delay      | Off  |
| Defect Pixel Correction | On   |
| FPN Correction          | On   |
| eVA Applet Enable       | Off  |
| Digital Input           | Line0, invert = false, trigger source = All  |
| Digital Output          | Line1/2/3, invert = false, line source = Off |