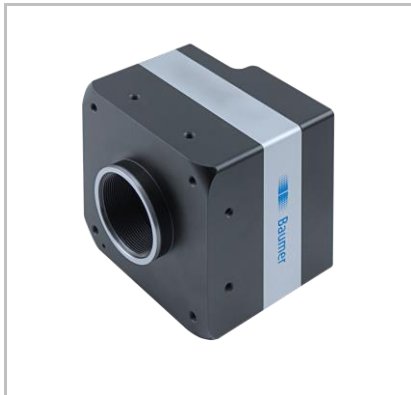


LXG-40M.P

Technical Data Art. No. 11155099


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

Sensor Information

Model Name	CMOSIS CMV-4000 V3
Type	1" progressive scan CMOS
Shutter	Global
Native Resolution	2048 x 2048 pixels
Scan Area	11.26 mm x 11.26 mm
Pixel Size	5.5 μm x 5.5 μm

Data Quality

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

Readout Noise (σ)	0.4 LSB @ 8 bit, 1.6 LSB @ 10 bit (typical)
Dynamic Range	54.5 dB (typical)

Acquisition Formats

Image Formats	Format	Resolution	Sensor/GigE	t_{readout}
	Full Frame	2048 x 2048	74/29 fps	13.3 msec
Pixel Formats	Mono10 (Sensor), Mono8 (GigE Interface)			
Partial Scan	True Partial Scan, Region of Interest (ROI) arbitrary			

Image Pre-Processing

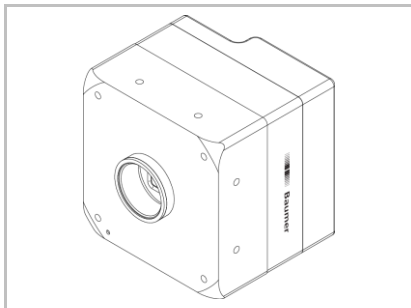
Analog Controls	Exposure Time (57 μsec ... 1 sec Step Size 1 μsec) Gain (0 ... 12 dB), Offset (0 ... 63 LSB 10 bit)
Gamma Correction	NA
LUT	NA
Color Models	Mono
Color Tolerance	Only on Color Cameras
Color Processing	NA
Color Adjustment	NA
Binning	NA
Decimation	NA
Image Flipping	Horizontal
Defect Pixel Correction	via Defect Pixel List with up to 1000 Pixel Coordinates, 10 Lines, 10 Columns

Process Synchronization

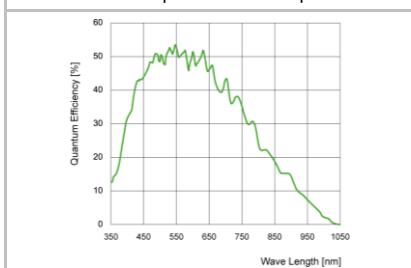
Modes	Free Running, Trigger
Free Running	Continuous or Adjustable Acquisition Frame Rate (0.01 ... 4830 Hz)
Trigger Sources	line0, Software, ActionCommand, Timer1Start, eVAOutput1, All (except Timer1Start/eVAOutput1) or Off
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 512 triggers
Sequencer 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 $t_{\text{delay flash}} \leq 3 \mu\text{sec}$, $t_{\text{duration}} = t_{\text{exposure}} + 18 \mu\text{sec}$

Digital I/Os

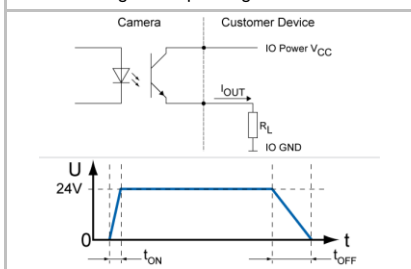
Lines	Input: Line 0, Output: Line1, Line 2, Line 3
Circuit Times	Output: $t_{\text{ON}} = \text{typ. } 2 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 30 \mu\text{sec}$
Output Sources	Off, ExposureActive, ReadoutActive, FrameActive, TriggerReady, TriggerOverlapped, TriggerSkipped, Line 0, UserOutput{1,2,3},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



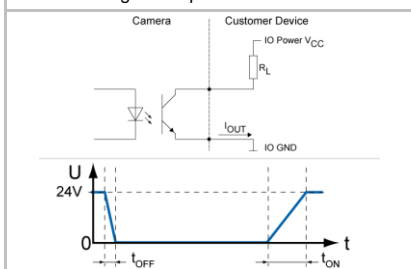
Sensor Graph: Relative Response

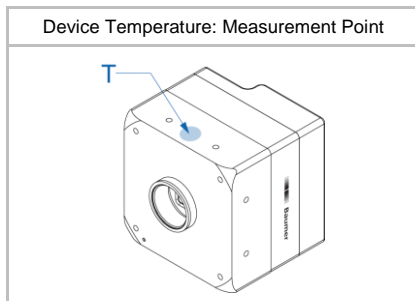
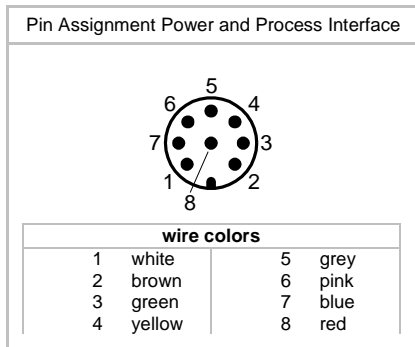
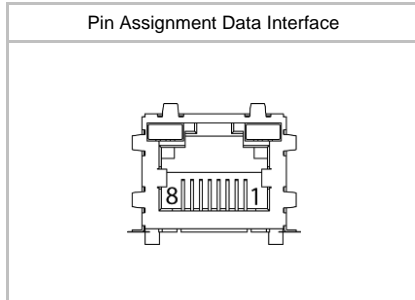
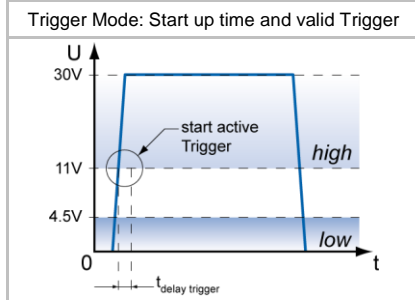
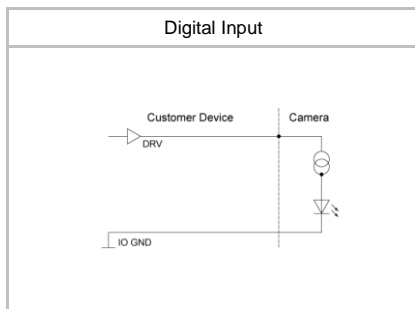


Digital Output: High Active



Digital Output: Low Active

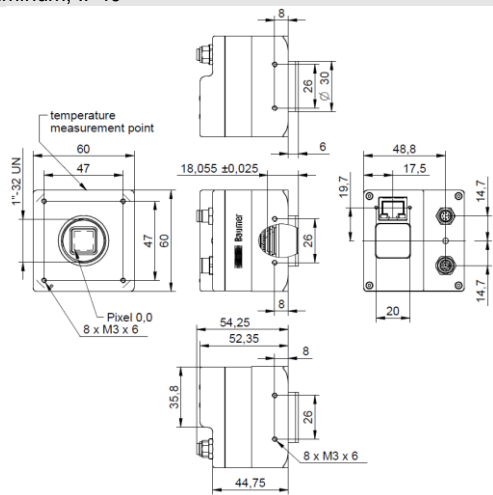




Interfaces and Connectors

Data Interface (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 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 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

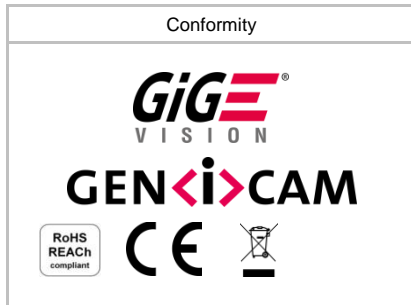
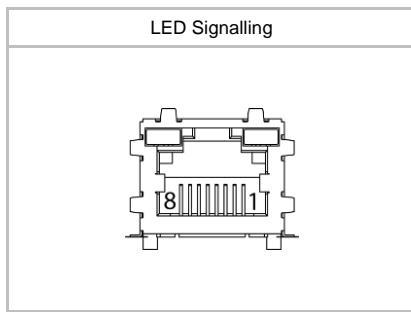
Housing	Aluminum, IP40
Dimensions	
Weight	340 g

Optical Data

Lens Mount	C-Mount
Optical Filter	Dust Protection Glass

Electrical Data

Power Supply (ext.)	VCC:	12 ... 24 V DC ± 20%
	I:	267 ... 533 mA
Power over Ethernet	Class 0 device	
	VCC:	36 ... 57 V DC
	I:	123 mA @ 48 VDC
Power Consumption	approx.	6.4 W @ 24 VDC and 74 fps
	approx.	5.9 W @ 48 VDC (PoE) and 74 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 µsec
	Trigger Delay out of treadout:	4.0 µsec
	max. Trigger Delay during treadout:	30.0 µsec
Digital Output	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 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 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 ³²
Lost Frame Counter	up to 2 ²⁴ - 1, counts discarded images when FIFO is full
Payload Size	4 ... 4.194.516 Byte
Transmission Delay	0 .. 2 ³² -1 Ticks (1 Tick = 8 nsec)
Timestamp	64 bit
Packet Delay	0 .. 2 ³² -1 Ticks (1 Tick = 8 nsec)
Packet Resend	Resend Buffer: 240 MB (16 Images)

GenICam™ Features (in compliance with SFNC 2.1.0)

Timer	Timer Selector: Timer 1 ... 3 TimerTriggerSource: Off, Line0, Software, Action1, TriggerSkipped ExposureStart, ExposureEnd, FrameStart, FrameEnd, TimerDelay: 0 µsec ... 2 sec, Step Size: 1 µsec TimerDuration: 10 µsec ... 2 sec, Step Size: 1 µsec
User Sets	Factory Settings: Default (read only) Freely Programmable: UserSet1, UserSet2, UserSet3 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

Embedded Visual Applets

eVA_Info	Version, platform and applet information
ImgIn	Maximum resolution: 2048 x 2048 Maximum frame rate at full resolution: 74 fps Interface: 12 bit, parallelism 8, 80 MHz Buffered within camera via FIFO, up to 16 lines Max bandwidth: 2048 x 2048, 74 fps, 12 bit (444 MB/s)
ImgOut	Maximum resolution: 2048 x 2048 Maximum frame rate via GigE: 29 fps (full frame) Interface: 12 bit, parallelism 4, 80 MHz Buffered within camera via memory, up to 16 images Please note: images are transferred as 8 bit to PC
MetaDataOut	Defines properties of images transferred to ImgOut.
ChunkOut	NA
Inputs	In{0,1,2,3,4} Input 0: Connected to IN1 (line0) Input 1: Connected to RS485_IN_A Input 2: Connected to RS485_IN_B Input 3: Connected to GND Input 4: Connected to GND
Outputs	Out{0,1,2,3} Output 0: Connected to eVAOutput1 Output 1: Connected to eVAOutput2 Output 2: Connected to eVAOutput3 Output 3: Connected to RS485_OUT_A
FPGA	Xilinx Spartan 6 XC6SLX150-3CSG484C Please note: the FPGA is shared with the camera design
Dynamic Memory	3 ports, 32 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