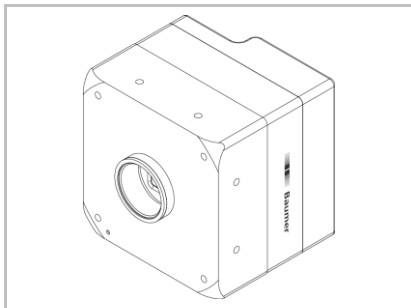
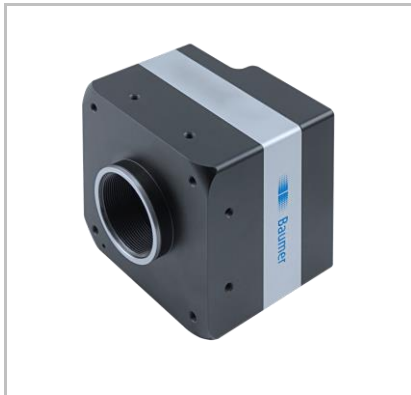
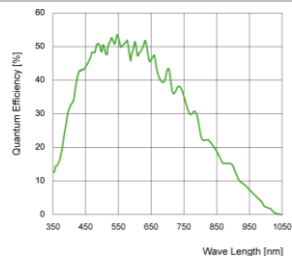


LXG-40M.JP

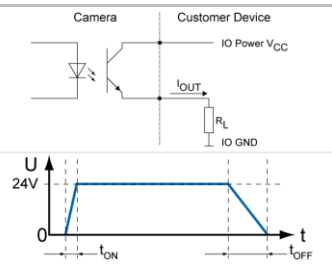
Technical Data Art. No. 11206988



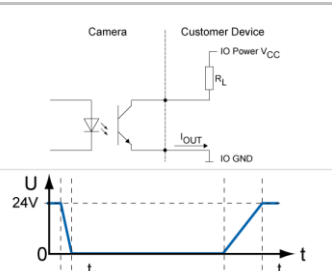
Sensor Graph: Relative Response



Digital Output: High Active



Digital Output: Low Active



Digital Monochrome Matrix Camera, Gigabit Ethernet, Integrated JPEG Image Compression

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
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 / Mono10Packed (GigE)			
Partial Scan	True Partial Scan, Region of Interest (ROI) arbitrary			

Image Pre-Processing

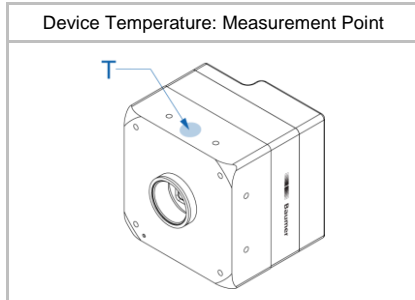
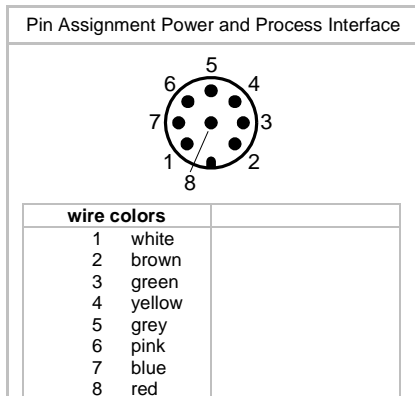
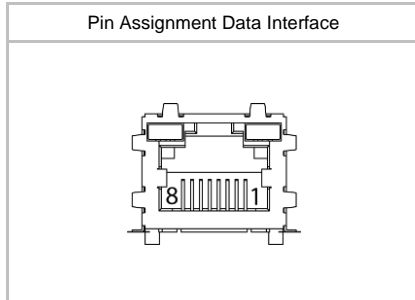
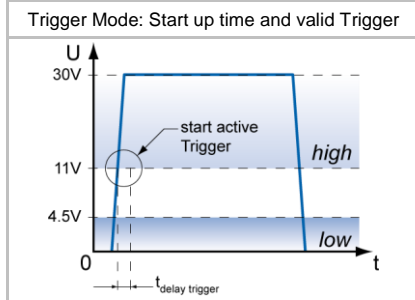
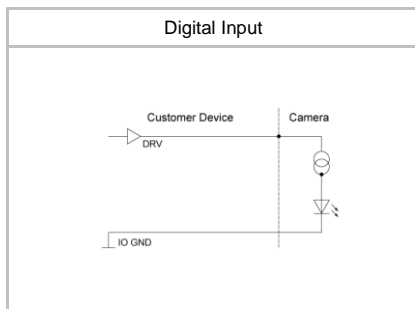
Analog Controls	Exposure Time (50 μsec ... 1 sec Step Size 1 μsec) Gain (0 ... 12 dB), Offset (0 ... 63 LSB 10 bit)
Gamma Correction	NA
LUT	NA
Color Models	Mono
Color Tolerance	Only on Color Cameras
Color Processing	NA
Color Adjustment	NA
Binning	NA
Decimation	NA
Image Flipping	Horizontal
Defect Pixel Correction	via Defect Pixel List with up to 1000 Pixel Coordinates

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 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 $t_{\text{delay flash}} \leq 3 \mu\text{sec}$, $t_{\text{duration}} = t_{\text{exposure}} + 18 \mu\text{sec}$

Digital I/Os

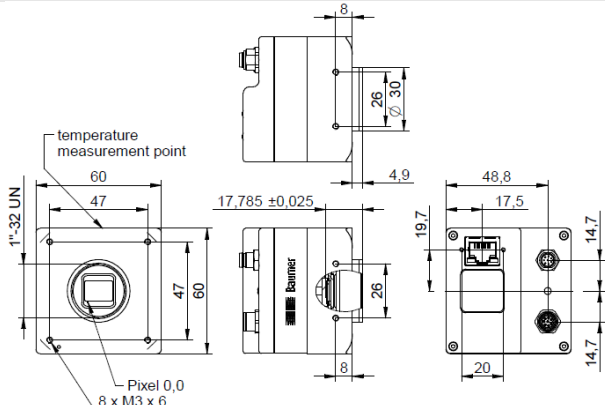
Lines	Input: Line 0, Output: Line1, Line 2, Line 3
Circuit Times	Output: $t_{\text{ON}} = \text{typ. } 2 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 30 \mu\text{sec}$
Output Sources	Off, ExposureActive, ReadoutActive, FrameActive, TriggerReady, TriggerOverlapped, TriggerSkipped, Line 0, UserOutput{1,2,3}, 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



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

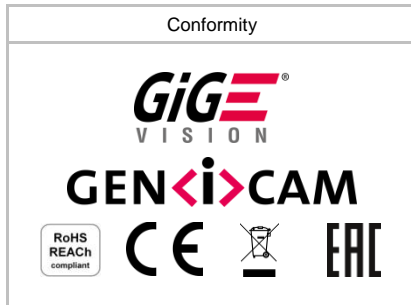
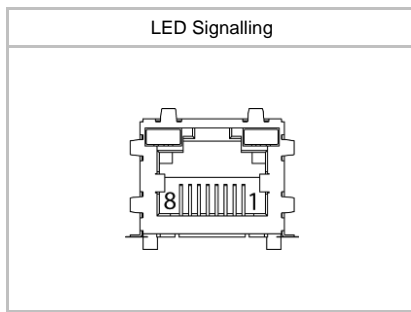
Housing	Aluminum, IP40
Dimensions	
Weight	340 g

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. 7.2 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: 30.0 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 bis +70 °C
Operating Temperature	+5°C ... +60°C
Device Temperature	T _{max} = 60 °C @ Measurement Point
Humidity	10 % ... 90 % non-condensing
Conformity	RoHS, REACH, CE, EAC

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)

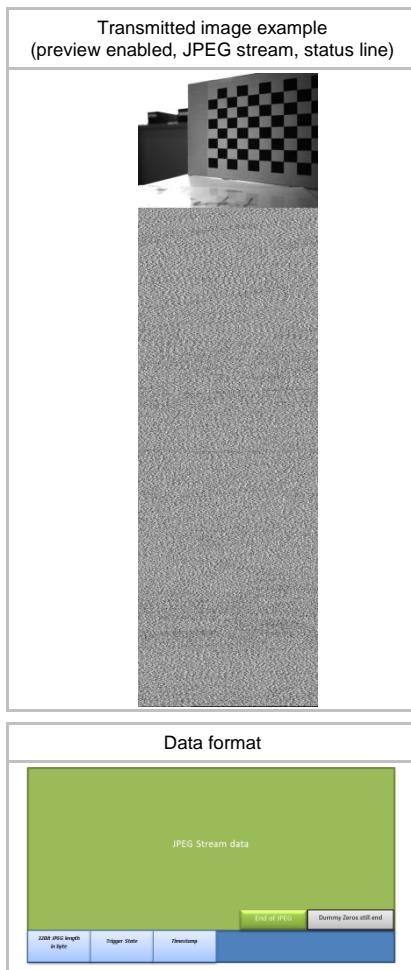
Events Transmission via Asynchronous Message Channel	GigEVisionError, HeartbeatTimeOut, EventLost, EventDiscarded, Line{0,1,2,3}RisingEdge, Line{0,1,2,3}FallingEdge, Action1, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerReady, TriggerOverlapped, TriggerSkipped, Timer{1,2,3}End
Frame Counter	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) Correction	Based on offset / gain per column
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 range: 0 °C .. +85 °C, accuracy: ±1,0 °C



Integrated JPEG Image Compression

Preview image	Obtained with 4x4 subsampling Resolution is 512 x 512 for full frame			
JPEG compression	Compression of 8 bit monochrome images with configurable compression rate / image quality based on "JPEG still image data compression standard" from William B. Pennebaker and Joan L. Mitchell (1993) Output is Huffman stream without JPEG header JPEG stream is split in lines of ROI width / 4 pixel The number of lines is variable and depends on JPEG compression ratio and image contents			
Status line	Last line of the image			
First DWORD	JPEG stream length in bytes			
Second DWORD	Trigger State: IN1 (line0): bit 0, IN2_RS485+ (line4): bit 1, IN3_RS485+ (line5): bit 2			
Third DWORD	Time stamp, resolution is 1 µs			
ROI examples (JPEG quality = 90%)	Width	Height	Frame rate	Throughput [MP/s]
	2048	2048	74	313
	2048	1088	140	312
	1536	768	197	232
	1024	512	292	153
	640	480	310	95
Compression examples (depends on actual image)	Resolution: 2048 x 2048 (4,2 MP)			
	JPEG quality	JPEG file size	Reduction to	
	90 %	490 KB	1:8	
	80%	244 KB	1:16	
	70%	155 KB	1:26	
	50%	96 KB	1:42	
	35%	76 KB	1:53	
Notes	JPEG quality range 30-90% Minimum ROI with JPEG processing: 128x128 Width and height must be a multiple of 16 JPEG stream does not include JPEG header, needs to be added by user software before writing JPEG file			

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
JPEG compression	Off
Digital Input	Line0, invert = false, trigger source = All
Digital Output	Line1/2/3, invert = false, line source = Off