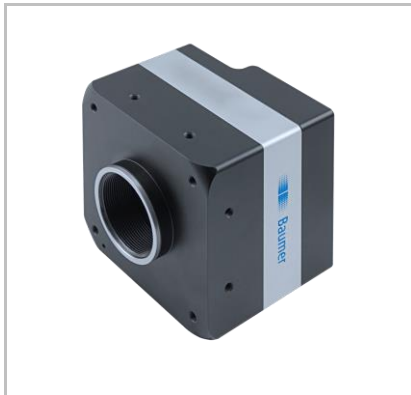


LXG-20C.JP

Technical Data

 Art. No.
11207604


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

Sensor Information

Model Name	CMOSIS CMV-2000 V3
Type	2/3" progressive scan CMOS
Shutter	Global
Native Resolution	2048 x 1088 pixels
Scan Area	11.26 mm x 5.98 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 1088	140/56 fps	7.12 msec
Pixel Formats	BayerGB10(Sensor); BayerGB8/BayerGB10Packed(GigE)			
Partial Scan	True Partial Scan, Region of Interest (ROI) arbitrary			

Image Pre-Processing

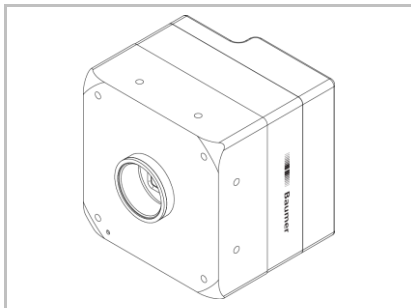
Analog Controls	Exposure Time (33 μsec ... 1 sec Step Size 1 μsec) Gain (0 ... 12 dB), Offset (0 ... 63 LSB 10 bit)
Gamma Correction	NA
LUT	NA
Color Models	No (Raw Bayer data only)
Color Tolerance	NA
Color Processing	NA
Color Adjustment	NA
Binning	NA
Decimation	NA
Image Flipping	NA
Defect Pixel Correction	via Defect Pixel List with up to 1000 Pixel Coordinates

Process Synchronization

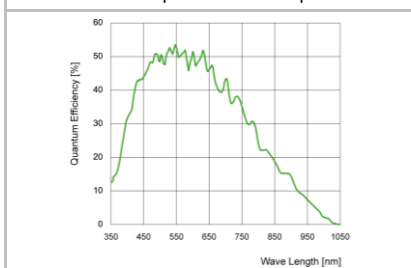
Modes	Free Running, Trigger
Free Running	Continuous or Adjustable Acquisition Frame Rate (0.01 ... 3690 Hz)
Trigger Sources	line0, Software, ActionCommand, Timer1Start, eVAOutput1, All (except Timer1Start/eVAOutput1) or Off
Trigger Delay	0 ... 2 sec, Tracking and buffering of up to 256 triggers
Sequencer 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

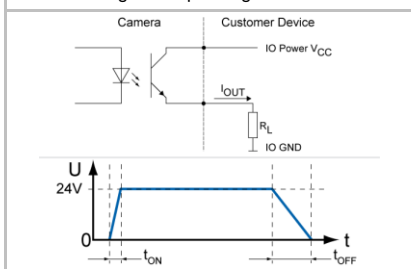
Lines	Input: Line 0, Output: Line1, Line 2, Line 3
Circuit Times	Output: $t_{\text{ON}} = \text{typ. } 2 \mu\text{sec}$ $t_{\text{OFF}} = \text{typ. } 30 \mu\text{sec}$
Output Sources	Off, ExposureActive, ReadoutActive, FrameActive, TriggerReady, TriggerOverlapped, TriggerSkipped, Line 0, UserOutput{1,2,3},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



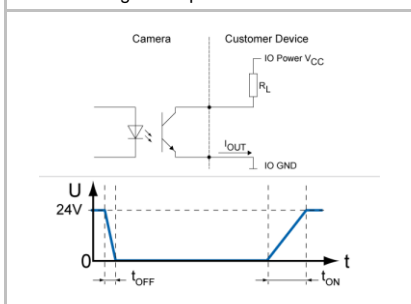
Sensor Graph: Relative Response

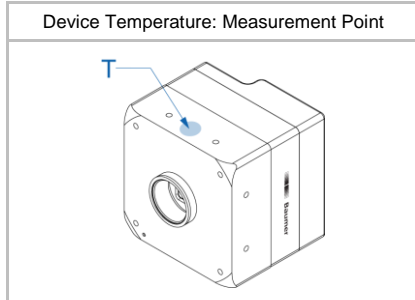
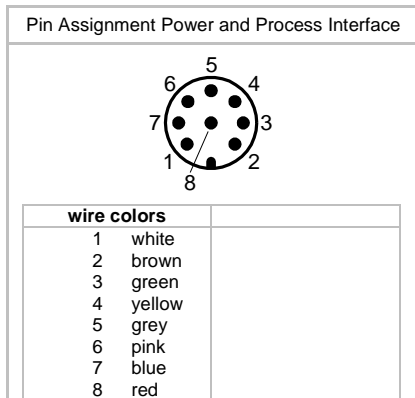
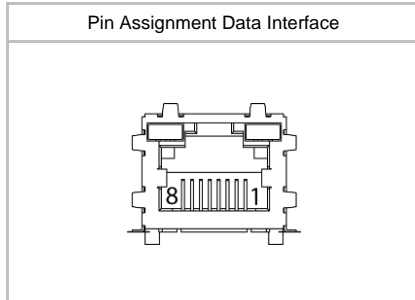
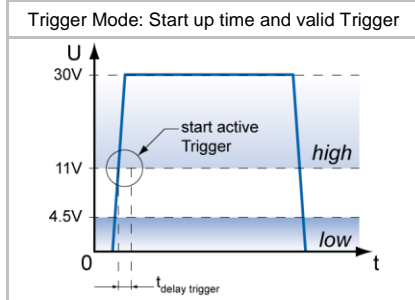
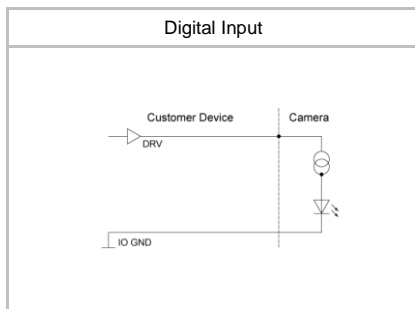


Digital Output: High Active



Digital Output: Low Active





Interfaces and Connectors

Data Interface	Gigabit Ethernet	Transfer Rate	1000 Mbits/sec
(lower GigE port not used)	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-

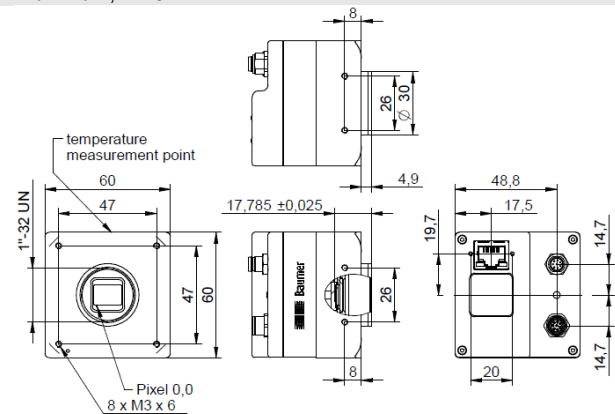
Power and Process Interface #1 (top)	Connector:	SACC-DSI-M8MS-8CON-M8-L180 SH
	Assignment:	1 – OUT3 (line3) 5 – IO Power VCC
		2 – Power VCC 6 – OUT1 (line1)
		3 – IN1 (line0) 7 – GND
		4 – IO GND 8 – OUT2 (line2)

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



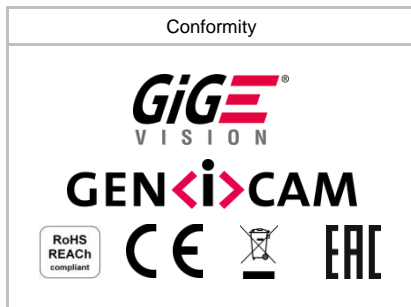
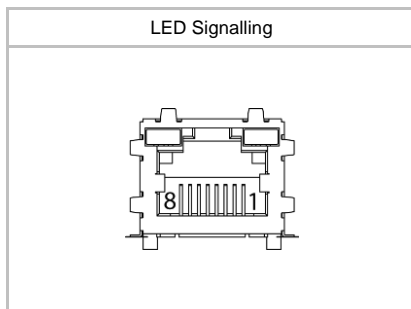
Weight 340 g

Optical Data

Lens Mount	C-Mount
Optical Filter	UV/IR Cut

Electrical Data

Power Supply (ext.)	VCC: 12 ... 24 V DC ± 20%
	I: 200 ... 390 mA
Power over Ethernet	Class 0 device
	VCC: 36 ... 57 V DC
	I: 116 mA @ 48 VDC
Power Consumption	approx. 4.8 W @ 24 VDC and 140 fps
	approx. 5.5 W @ 48 VDC (PoE) and 140 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 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)

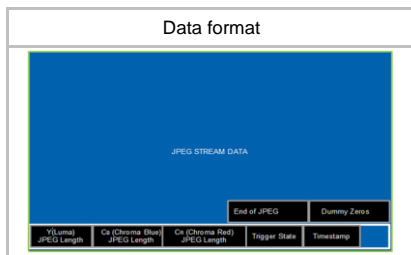
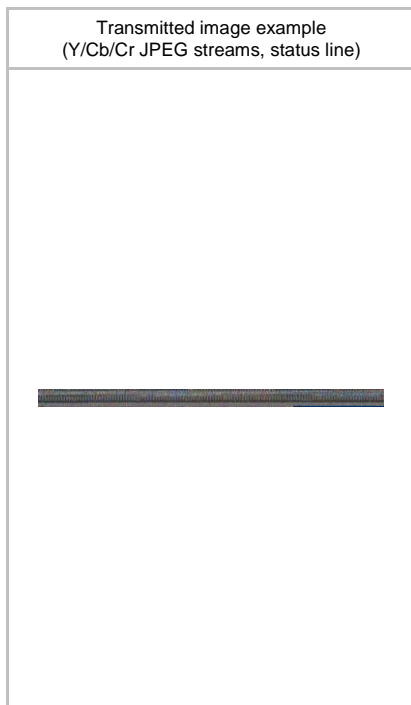
Events Transmission via Asynchronous Message Channel	GigEVisionError, HeartbeatTimeOut, EventLost, EventDiscarded, Line{0,1,2,3}RisingEdge, Line{0,1,2,3}FallingEdge, Action1, ExposureStart, ExposureEnd, FrameStart, FrameEnd, TriggerReady, TriggerOverlapped, TriggerSkipped, Timer{1,2,3}End
Frame Counter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



Integrated JPEG Image Compression

Preview image	-			
Color processing	Integrated color processor for high quality color calculation Transform RGB to Y, Cb, Cr Downsample Cb, Cr 2x2 Manual White Balance Automatic White Balance via user software			
JPEG compression	Compression of 8 bit Y, Cb and Cr 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 1024 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, Y, Cb,Cr			
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	1088	86,9	193,9
	2000	1000	97,9	196,0
	1920	1080	93,9	194,9
	1536	768	165,8	195,8
	1024	512	294,1	154,7
	640	480	313,1	96,5
	256	256	572	37,7
Compression examples (depends on actual image)	Resolution: 2048 x 1088 (2,1 MByte)	JPEG quality	JPEG stream size	Reduction to
		90 %	359 KB	1:6
		80%	219 KB	1:10
		70%	168 KB	1:13
		50%	114 KB	1:19
		35%	92 KB	1:23
Notes	ROI x frame rate ≤ 196 MP/s JPEG quality range 30-90% Minimum ROI with JPEG processing: 256x256 Width and height must be a multiple of 8 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