



Product Sheet

Monochrome Camera

MSC2-M42-1-A



MSC2-M42-1-A
Specifications subject to change
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Version 007

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1. Description

The MSC2 monochrome camera incorporates a high performance 4MP CMOS sensor. The spectral sensitivity of the camera can be tailored to users' needs by placement of one or more filters inside the camera. This miniature camera can operate at up to 89 frames per second in full frame mode. The camera is USB3 Vision-compliant with many pre-built software options such as 2ndlook graphical camera software. Programmers can build camera applications in Windows, Linux, Raspberry PI, MacOS, and Python environments using the included SDKs. Power is supplied through the USB3 interface. The MSC2-M42-1-A is ultra-compact, ultra-light, and designed for demanding high resolution imaging applications.

2. Key Features

Snapshot Operation

High Frame Rate (up to 89 FPS at full frame; faster frame rates for smaller ROIs)

High Performance (4MP Global Shutter CMOS Sensor)

USB3 Vision & GenICam Compliant

Ultracompact (28 mm x 28 mm x 47 mm)

Ultralight (< 55 g)

Low Power Requirement (< 4W from USB cable)

Multiple M2 and M4 Mounting Points

Tripod adaptor with ¼-20 thread included

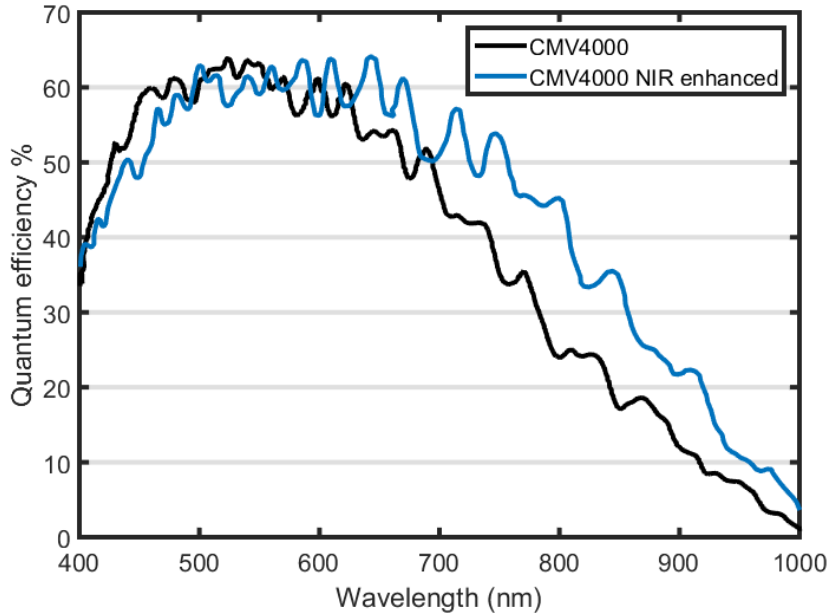
SDK for Windows, Linux, Raspberry PI, MacOS and Python included

3. Applications

The camera is suitable for a variety of applications where images from a custom tailored spectral range is desired. Combined with Spectral Devices SBC-1 miniature vision computer, the MSC2-M42-1-A offers an easy-to-use lightweight and modular imaging solution for UAV users.

4. Spectral Characteristics

Spectral response of the MSC-M42-1-A



Spectral devices can customize the spectral response of the camera using a combination of short pass, long pass, bandpass and notch filters. Please inquire with your specific requirements. The NIR-enhanced version is optional.

5. Specifications

Lens Mount	C-mount
Sensor Type	CMOS
Sensor Model	AMS CMV4000
Sensor Format	1-inch
Number of Spectral Channels	1
Image Pixels	2048 x 2048
Effective Pixel Size (H x V)	5.5 μm x 5.5 μm
Capture Method	Area
Spectral Channel	Can be customized to user requirements
Spectral Bandwidth	Can be customized to user requirements
Shutter Type	Global
Sync System	External trigger (Hardware, Software) / Free run
Maximum Frame Rate (at Full Frame)	8bits output 89 fps 10bits output 45 fps 12bits output 37 fps
ADC bit width	10bits / 12bits

Video Format	8bits / 10bits / 12bits output (Support packed on 10bits / 12bits)
Noise Level	8bits output: <3 digits (Gain 0 dB) 10bits output: <12 digits (Gain 0 dB) 12bits output: <48 digits (Gain 0 dB)
Sensitivity (*1)	210 Lux
Exposure time	22 μ s to 16.77 seconds (Default: 11,116.0 μ s)
Digital Gain	0 to 13.9 dB (Default: 0 dB)
Black Level	8bits output: 0 to 15 digits 10bits output: 0 to 63 digits 12bits output: 0 to 255 digits
ROI	Horizontal: 32 to 2,048 pixels Vertical: 32 to 2,048 lines (Default: 2,048 x 2,048) Adjustable Steps for size: 16 pixels in horizontal direction / 4 lines in vertical direction Adjustable Steps for offset: 2 pixels in horizontal direction / 2 lines in vertical direction
Multi ROIs (*2)	8 regions (Default: 1 region)
Binning	1, 2
Decimation	1, 2
HDR	Yes
Image Flip	Horizontal / Vertical / Horizontal and Vertical / Off
Defective Pixel Correction	Yes
Number of ROIs	8
Auto Exposure	Supported
Auto Gain	Supported
Operational Mode	Edge preset Trigger / Pulse width Trigger / Start Stop Trigger / Free run
User Setting Storage	Supported
Communication	Through USB3.0 bus
Interface	USB3.0 Super speed (USB3.0 micro B)
Protocol	USB3 Vision® 1.0.1, GenICam Standard Version (SFNC 2.2, PFNC 2.0) compliant
Input / Output	Three GPIOs, One Camera Hardware Reset
Power Input Voltage	+5V (typ.) (This conforms to USB standard)
Power Consumption	Less than 4.0 W
Case Construction	Anodized Aluminum
Mounting Holes	4 x M4 (bottom), 2 x M4 (top), 3 x M2 (4 sides)
Overall Size	28 mm x 28 mm x 47 mm (W x H x L)
Weight	< 55 g
Operational Temperature / Humidity	Minimum Environmental Temperature: 0 deg. C, Environmental Humidity: 0 to 85 %RH (No condensation) Maximum Camera housing temperature (top plate) shall not exceed 55 deg. C

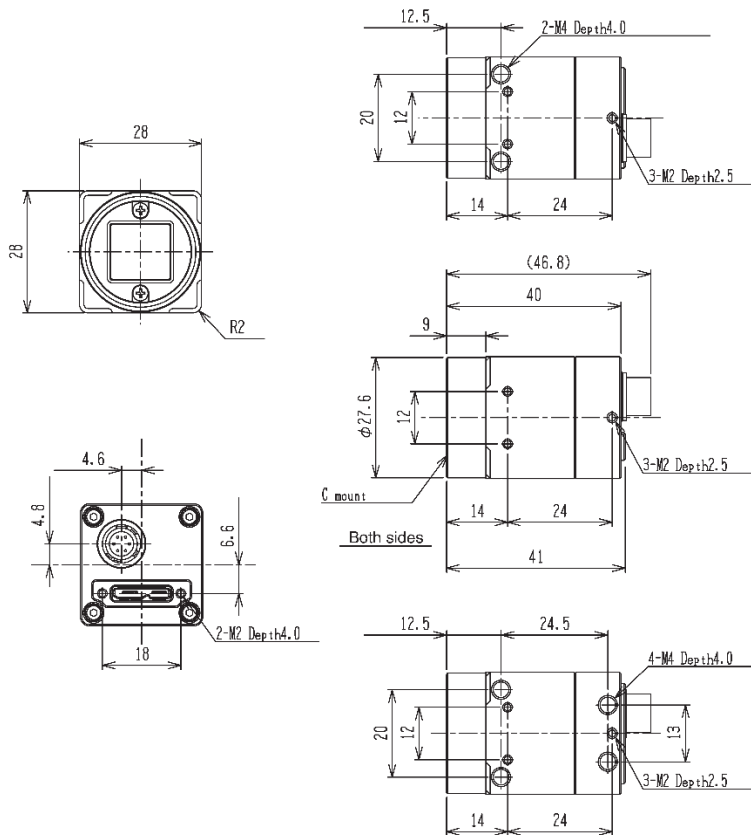
Storage Temperature / Humidity	Environmental Temperature: -30 to +65 deg. C Environmental Humidity: 0 to 85 %RH (No condensation)
Vibration	20 Hz to 200 Hz to 20 Hz (5 min. / cycle), acceleration 10 G, XYZ 3 directions 30 min. each
Shock Acceleration	38 G, half amplitude 6 ms, XYZ 3 directions 3 times each
Standard Compliancy	EMS: EN61000-6-2, EMI: EN55011
RoHS	RoHS Compliant

(*1) The sensitivity was measured as the luminance when white level achieved 100 % using the settings and conditions below.

Camera Setting		Environment	
Parameter	Setting	Parameter	Setting
Gain Up	0 dB	Light Source	Light Box (White)
AGC	Off	Color temperature	5,100K
White Balance	Optimum	Lens	
Electrical Shutter	1/30 seconds	F on Lens	F5.6
Black Level	Optimum	Target Luminance	IM-600 (Topcon)
Gamma	Factory Setting		

(*2) The multiple ROI regions cannot set on the same horizontal line.

6. Mechanical Drawings



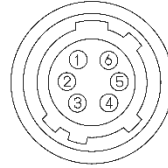
7. External Connector Specifications

External Connectors	USB: USB3.0 MicroB type, I/O signals: HR10A-7R-6PB(Hirose) or equivalent
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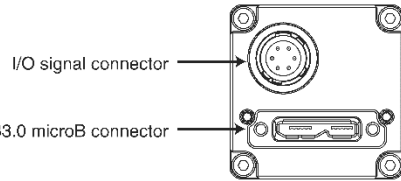
- ▶ This connector is for the output signal, not for the power of the camera. The camera power is supplied in +5V from the USB cable
It does not affect the voltage for the input signal

Pin Assignment

Pin No.	Signal Name	I/O	Signal Voltage	
			Low	High
1	GND for I/O signal	-	0V	
2	Output 2(IO3)	OUT	0.8V or lower	+3.3 - +24V
3	Output 1(IO2)	OUT	0.8V or lower	+3.3 - +24V
4	Input 2(IO1)	IN	0.7V or lower	+2.5 - +5V
5	Input 1(IO0)	IN	0.7V or lower	+2.5 - +5V
6	Power supply for output signal (IO_VCC)	-	+3.3 to +24 Vdc	



[Rear view]



I/O signal connector

USB3.0 microB connector

*Please use HR10A-7P-6S (Hirose) or equivalent for the cable

8. SDKs

Included with the MSC2-M42-1-A is an industrial-grade SDK for camera control and image capture. The SDK is compatible with variety of Windows, Linux, Raspberry PI, and MacOS operating systems. It includes drivers, libraries, documentation, and samples. Environments such as Python and OpenCV are also supported.

Operating System	Development Environments	SDK Includes
Windows 10 (32bit / 64bit) Windows 8.1 (32bit / 64bit) Windows 7 SP1 (32bit / 64bit)	Visual Studio 6 Visual Studio 2003 Visual Studio 2005 Visual Studio 2008 Visual Studio 2010 Visual Studio 2012 Visual Studio 2013 Visual Studio 2015 Visual Studio 2017 Visual Studio 2022 MinGW (Minimalist GNU for Windows) embarcadero Free C++ Compiler Python 3.6.x Python 3.7.x	Windows driver Windows SDK StApi (Visual C++, .net Framework 2.0, C) StGenTL module Viewing Software (StViewer) Sample Programs (Visual C++, Visual C#, Visual Basic, C) DirectShow Filter Documentation
Ubuntu 18.04 (64bit) Ubuntu 18.04 (ARM 64bit) Raspberry Pi OS (32bit)	Python 3.6.x Python 3.7.x	StApi (C++, C) StGenTL module Viewing Software (StViewer) Sample Programs (C++, C) Documentation
MacOSX Sierra MacOSX High Sierra	Python 3.6.x Python 3.7.x	StApi (C++) StGenTL module

MacOSX Catalina		Viewing Software (StViewer) Sample Programs Documentation
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9. Windows Software (optional)

2ndLook is a complete image acquisition software package that enables users to connect and acquire images from one or more cameras on a single PC. Offers real-time synchronized video recording from GenICam-compliant USB3 Vision, GigE Vision, and DirectShow cameras (Figure 10.1). Easily record directly to popular file formats such as AVI and TIFF. Record from multiple cameras to different file formats concurrently. Easy to use interface with interactive help and user guides. Demo version provides all features, except save to disk function.