

# SP-20000M-USB

## Technical Datasheet

CMV20000



See the possibilities



## Apex Series

**USB**<sup>™</sup>  
VISION

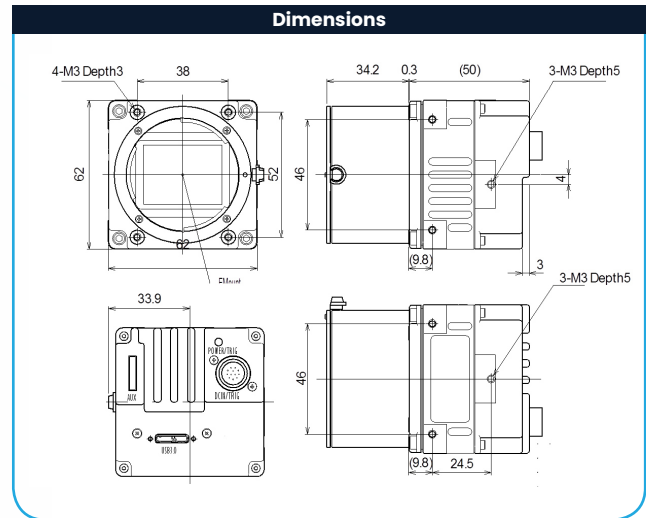
Spark Series area scan cameras are the perfect choice for machine vision applications demanding high quality images with the highest possible throughput. They feature the latest CMOS imagers delivering high resolution images at speeds as much as 10 times faster than traditional CCD cameras.

For example, 45-megapixel (MP) models can deliver over 50 fps output while some 5-MP models run at 250 fps or more. Using the region-of-interest (ROI) feature, even higher frame rates can be achieved.

### Specification Highlights

<b>SENSOR:</b>	CMV20000	<b>SHUTTER:</b>	Global Shutter
<b>FORMAT:</b>	41.0 mm	<b>FRAME RATE:</b>	16 fps
<b>PIXEL SIZE:</b>	6.4 x 6.4 $\mu\text{m}$	<b>INTERFACE:</b>	USB3 Vision
<b>LENS MOUNT:</b>	F-Mount	<b>RESOLUTION MP:</b>	20 MP
<b>SPECTRUM:</b>	Monochrome (Visible + NIR)	<b>RESOLUTION WxH:</b>	5120 x 3840 px

Specifications		SP-20000-USB
Sensor		41 mm CMOS global shutter (CMV20000)
System clock		40 MHz (for pulse generator)
Frame rate, full frame		16 frames/sec.
Active area		32.77 mm (h) x 24.58 mm (v), 41 mm diagonal
Cell size		6.4 μm (h) x 6.4 μm (v)
Active pixels		5120 (h) x 3840 (v)
Horizontal output frequency		62.402 kHz (31.201 kHz for V-binning)
Read-out modes		
Full ROI		5120 (h) x 3840 (v) @ 16 fps Any start position. 8-5120 pixels wide x 2-3840 lines high Width in 8 pixels/step Height in 2 lines/step
Binning (mono)		1x2, 2x1, 2x2 (frame rate does not change)
EMVA 1288 Parameters		10-bit output format
Absolute sensitivity (mono)		16.05 p (λ = 525 nm)
Absolute sensitivity (color)		18.14 p (λ = 525 nm)
Maximum SNR (mono)		40.24 dB
Maximum SNR (color)		38.32 dB
Traditional SNR*	mono color	>53 dB (0 dB gain) >51 dB (0 dB gain, green)
Video signal output	mono color	8/10/12-bit monochrome 8/10/12-bit Bayer Some video functions not available with 12-bit
Auto-iris lens video output		0.7Vp-p, with 0.3V horiz. sync
Gain		Manual/automatic 0 dB to +24 dB
White balance (SP-20000C)		Manual, one-push auto, or continuous (3000K to 9000K)
Gamma		0.45-1.0 (8 steps) or 256-point LUT
Synchronization		Internal
Trigger input		TTL, LVDS, Opto In, Pulse Generators (2), Software, User Out (4)
Trigger modes		EPS, Trigger Width, Timed RCT (with ALC), PIV, Sequence
Electronic shutter		
Timed exposure		304 μs to 8 sec in 1 μs steps
Auto shutter		1/16 to 1/3289 sec.
Auto Level Control (ALC)		Shutter range from 1/16 to 1/3289, gain range from 0 dB to +24 dB. Tracking speeds and max values adjustable.
Pre-processing functions		Flat field correction, color shading correction (SP-20000C), blemish compensation (up to 1000 pixels)
Operating temperature		-45°C to +70°C <sup>†</sup>
Storage temperature		-45°C to +70°C
Humidity		20 - 80% non-condensing
Vibration		10 G (20Hz to 200Hz XYZ)
Shock		80 G
Regulations		CE (EN61000-6-2, EN61000-6-3), FCC Part 15 class B, RoHS/WEEE
Power		12V to 24V DC ± 10%. 5.4W typical (full frame @ 12V)
Lens mount		F-mount or M42 mount
Dimensions (H x W x L)		62 mm x 62 mm x 84.5 mm
Weight		350 g
Ordering Information		
SP-20000M-USB-F		Monochrome camera with USB3 Vision & F-mount
SP-20000C-USB-F		Color camera with USB3 Vision & F-mount
SP-20000M-USB-M42		Monochrome camera with USB3 Vision & M42 mount
SP-20000C-USB-M42		Color camera with USB3 Vision & M42 mount



### Connector pin-out

#### DC In / Trigger

HIROSE HR10A-10R-12PB-01

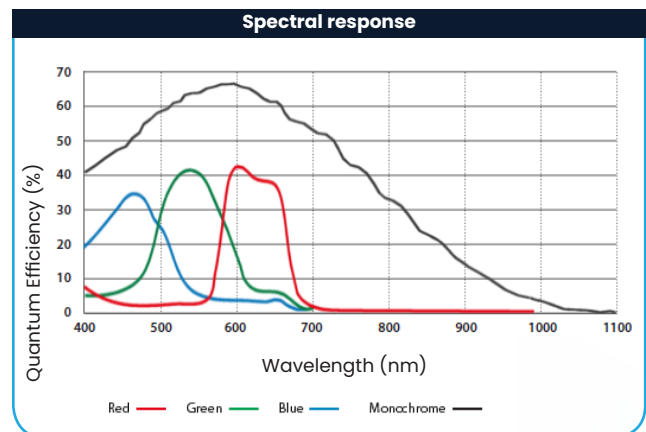
Pin	Signal
1	GND
2	+12V to +24V DC input
3	GND
4	NC
5	Opto In-
6	Opto In+
7	Opto Out-
8	Opto Out+
9	TTL out 1
10	TTL in 1
11	+12V to +24V DC input
12	GND

#### USB 3.0 Interface

Micro B type - ZX3600-B-10P or equiv.

No	I/O	Name	Note
1	I	VBUS IN	Power (VBUS) <sup>1</sup>
2	I/O	DM	USB2.0 Differential pair (-) <sup>2</sup>
3	I/O	DP	USB2.0 Differential pair (+)
4	-	OTG ID	USB OTG ID for identifying lines
5	-	GND	GND
6	O	FX3 SSTXM	USB3.0 Signal Transmission line (-)
7	O	FX3 SSTXP	USB3.0 Signal Transmission line (+)
8	-	GND	GND
9	I	FX3 SSRXP	USB3.0 Signal Receiving line (-)
10	I	FX3 SSRXM	USB3.0 Signal Receiving line (+)

<sup>1</sup>SP-20000-USB does not accept power over USB  
<sup>2</sup>Does not work with USB 2.0



\*Traditional SNR is based on random noise in a single frame, where EMVA SNR measurements consider more comprehensive noise sources and variance over time. For a more complete description, see the manual.

<sup>†</sup>Reduced performance may occur when operating outside the standard range of -5°C to +45°C

## Product Highlights

- Large format 20 MP CMOS imager (global shutter)
- 16 fps at full resolution
- 6.4  $\mu\text{m}$  square pixels
- User selectable ROI
- Horizontal and vertical binning (monochrome models) for increased sensitivity
- Flat-field and blemish compensation plus in-camera CMOS pattern correction
- CMOS imager includes correlated double sampling (CDS) function for improved uniformity
- 8/10/12-bit digital output over USB3 Vision interface\*
- Monochrome or Bayer color models
- F-mount or M42 lens mounts
- Automatic Level Control (ALC) for dynamic lighting conditions

\* Some video processing functions not available with 12-bit output

## Additional Product Images



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