For Sales and Service
MachineVisionDirect.com
+1 (800) 834-5588
Support@MachineVisionDirect.com

AP-1600T-USB

Technical Datasheet

See the possibilities

IMX273

Apex Series

The Apex Series cameras are 3-sensor R-G-B prism cameras that separate the incoming light into red, green and blue wavelengths, which are directed to three separate image sensors.

The cameras deliver exceptionally accurate R-G-B raw image data ideal for demanding color machine vision applications across a range of industries including pharmaceutical, electronics, printing/packaging and imaging in microscopy and medical diagnostics equipment.

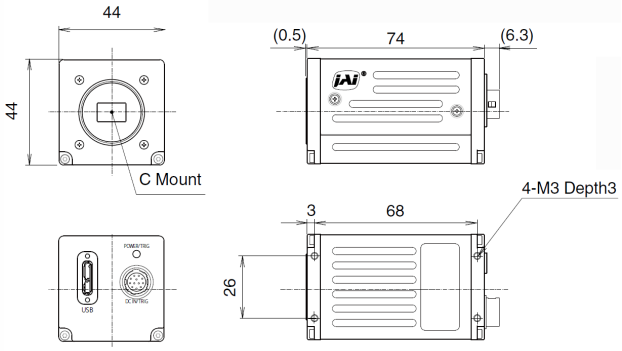
Specification Highlights

SENSOR:	IMX273	**SHUTTER:**	Global Shutter
FORMAT:	1/2.9″	**FRAME RATE:**	79 fps
PIXEL SIZE:	3.45 x 3.45 µm	**INTERFACE:**	USB3 Vision (PoUSB)
LENS MOUNT:	C-Mount	**RESOLUTION MP:**	1.6 MP
SPECTRUM:	Color (Visible + NIR)	**RESOLUTION WxH:**	1456 x 1088 px

For Sales and Service
MachineVisionDirect.com
+1 (800) 834-5588
Support@MachineVisionDirect.com

Specifications	AP-1600T-USB
Sensor	1/2.9" 3-CMOS global shutter (IMX273)
Active pixels	1456 (h) x 1088 (v) x 3 (R,G,B)
Frame rate, full frame	78.9 frames/sec. @ 8-bit
Active area	5.02 mm (h) x 3.75 mm (v) - 6.27 mm diagonal
Pixel size	3.45 µm x 3.45 µm
System clock	74.25 MHz (for pulse generator)
Read-out modes	
Full ROI (single)	1456 (h) x 1088 (v) up to 78.9 fps H: 16 to 1456 pixels in 16 pixel steps V: 2 to 1088 lines in 2 line steps
ROI (multi) Binning	Up to 4 non-overlapping areas can be defined. 1x2, 2x1, 2x2
EMVA 1288 Parameters Absolute sensitivity Maximum SNR	12-bit output format 3.72 p (λ = 525 nm) 40.68 dB
Traditional SNR*	>60 dB (0 dB gain, 10-bit)
Video signal output	8/10/12-bits per channel† (24/30/36-bit RGB)
Video modes	Normal, Single ROI, Multi ROI, Sequencer
Gain	Manual control - master mode or individual R/G/B channels Auto gain control - off, continuous, one-push
White balance	Off, 4 presets (3200K, 5000K, 6500K, 7500K), or one-push/continuous AWB using gain or exposure time (3000K to 9000K)
Gamma/LUT	0.45 to 1.0 (9 steps) or 257-point programmable LUT
Shading correction	Flat shading, color shading
Trigger input	Opto In (2), Pulse Generators (4), Software, NAND Out (2), User Output (4)
Exposure modes	Timed/EPS, Trigger Width, Auto
Electronic shutter	(can be set independently for R/G/B channels) 15.26 µs to 8 sec. in 1 µs steps (8-bit) 15.26 µs to 8 sec. in 1 µs steps (10-bit)
Auto Level Control (ALC)	Shutter range from 100 µs to 13.427 ms, gain range from 0 dB to +12 dB. Tracking speeds and max. values adjustable.
Pre-processing functions	Color enhancer, edge enhancer, color space conversion (RGB to HSI, XYZ, sRGB, Adobe RGB), blemish compensation (200 px/channel)
Operating temp. (ambient)	-5°C to +45°C (20 to 80% non-condensing)
Storage temp. (ambient)	-25°C to +60°C (20 to 80% non condensing)
Vibration	3G (20 Hz to 200 Hz, XYZ directions)
Shock	50G
Regulations	CE (EN61000-6-2, EN61000-6-3) FCC Part 15 Class B, RoHS/WEEE
Power 12-pin USB 3.0	+12V to +24V DC ± 10%. 5.3 W typical @ +12 V Bus power: not supported
Lens mount	C-mount
Dimensions (H x W x L)	44 mm x 44 mm x 74 mm (excl. connectors)
Weight	170 g
Ordering Information	
AP-1600T-USB AP-1600T-USB-NF	3-CMOS prism color camera with USB3 Vision Same as above with IR-cut filter removed

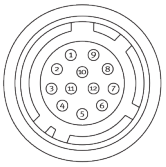
Dimensions



Outside size tolerance ± 0.3 mm

Connector pin-out

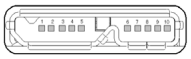
DC In / Trigger



HIROSE HR10A-10R-12PB(71)

Pin		
	1	Ground
	2	DC in +12V to +24V
	3	Opto In2-
	4	Opto In2+
	5	Opto In1+
	6	Opto In1+
	7	Opto Out 1-
	8	Opto out 1+
	9	TTl out 1
	10	Not Used
	11	DC in +12V to +24V
	12	Ground

USB 3.0 Interface

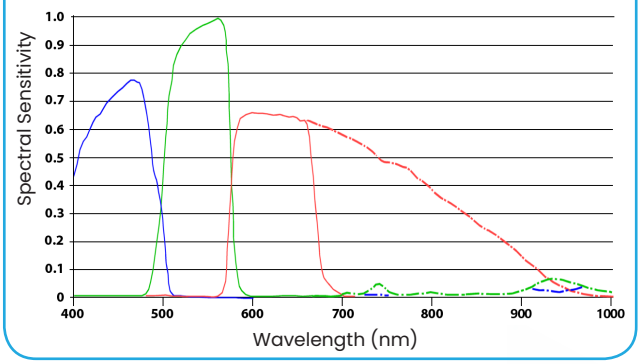


Micro B type - ZX3600-B-10P or equiv.

No.	I/O	Name	Note
1	I	VBUS IN	Power (VBUS)
2	I/O	DM	USB2.0 Differential pair (-)
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 (+)

Spectral response

Relative response - sensors + prism combined



*Traditional SNR is based on random noise in a single frame, where EMVA SNR measurements consider more comprehensive noise sources and variance over time.

†12-bit output available in video processing bypass mode. See manual for details.

For Sales and Service
MachineVisionDirect.com
+1 (800) 834-5588
Support@MachineVisionDirect.com

Product Highlights

- High resolution prism-based 3CMOS camera
- Full spatial resolution and true RGB color values with no interpolation
- Individual analog gain and exposure control for R, G, and B channels
- Available with or without IR-cut filter for applications needing extended red/NIR response
- Color and edge enhancement functions
- On-board RGB to HSI, XYZ, sRGB and Adobe RGB color space conversions
- Single and multi-ROI's
- RGB video output with 8, 10, or 12-bits per channel*
- Compact size and smart design
- Excellent shock and vibration resistance
- USB3 Vision interface
- C-mount lens mount

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

Additional Product Images