



Cube HDR Camera

v1.6-10_21



ADiis is a division of EASii IC



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INTRODUCTION

ADiis designed, developed and manufacture a complete Cameras Product line for the aeronautical domain. Based on strong internal expertise and experience, ADiis manage every step of the development (Sensor selection, architecture design, schematic and layout of complex electronic boards).

ADiis cameras are dedicated to fulfill the needs of aeronautics application and the following functional features:

- CMOS "Global Shutter" image sensor: no image distortion in time (no rolling shutter effect);
- 1920x1080p60 (60 progressive frames per second), non-interlaced video: no "comb" effect;
- Especially fast automatic gain control (to adapt to major and/or fast brightness changes);
- Double integration (automatic) to make it possible to "see" more detail in shaded areas (inside the cabin) and light zones (outside), and to limit glare effects;
- CoaXPress (1920x1080p60) digital video interface.



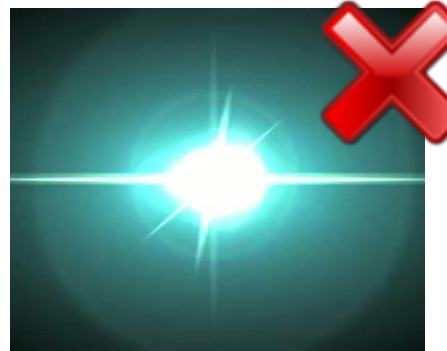
No "comb" effect



No image distortion



No back-lighting



No glare

The Cube HDR is a compact camera that fulfills the needs of aeronautics domain. It can be used for various applications and can be placed inside or outside the aircraft.

The camera fits perfectly with our video streamer that can handle the camera power over cable, the camera configuration, and video **h.264** or **h.265** compression, streaming over Ethernet or video recording.

CAMERA HEAD FEATURES

SENSOR

- 2 Mpixels CMOS image sensor (VG5761– ST)
- Optical format: 1/ 2.5"
- Pixel array: 1944 x 1204
- Pixel size: 3.2µm x3.2µm
- Shutter type: Global shutter
- Frame rate: 60fps @full resolution
- Sensor bit depth: 10 bits HDR
- Analog Gain: x1, x2, x4
- Sensor type: Color (Bayer arrangement) / Monochrome

OPTICS

- S-Mount (M12x0.5)
- Standard S-Mount lens (focal length: 2.8mm, 4mm, 5.5mm, 8.5mm, 12mm)
- The S-Mount lens is integrated in the camera casing
- Sapphire protection window
- Optics for image color sensors integrate an IR-cut filter

EMBEDDED FUNCTIONS

- Fast automatic exposure control
- High Dynamic Range mode
- Exposure Mode: automatic or manual
- Shutter speed: from 5µs (1/200 000s) to 500ms
- Exposure correction in automatic exposure mode: exposure compensation to adjust the exposure for challenging lighting conditions
- White balance: manual setting by independent Red/Blue gain

POWER SUPPLY

- Power supply voltage: 24 VDC over CoaXPress
- Power consumption: 3 W typical

VIDEO FORMAT

- 1944x1204 p60 digital RAW Bayer 8bits video format

CAMERA INTERFACE

- Two CoaXPress HD-BNC connectors (second connector is optional)
- Control interface is fully compliant to CoaXPress 1.1.1 standard
- Default operating bitrate is 3.125 Gbps on single lane (CXP3_X1) and can be set up to 6.25 Gbps on both lanes (CXP6_X2).
- Supports GenICam (GenApi & SFNC 2.4)
- Interoperability has been tested with most CoaXPress framegrabbers vendors (Matrox, Euresys, ActiveSilicon, SiliconSoftware, etc.)

CoaXPress (CXP) is a digital interface standard that allows the transmission of video, control and power over a single 75 ohms coaxial cable. The standard is maintained by J11A and revision 1.1.1 is described in J11A-CXP-001-2015 published on Dec 29, 2015.

CASING / MECHANICS

- Aspect: Black anodized aluminum
- Certification: IP66
- Camera head dimensions: 30 x 30 x 50 mm
- Camera head weight: 80 g

LENS AND OPTICAL PERFORMANCES

The camera can be fitted with different S-Mount lenses.

Manufacturer	Model	Optical format	Focal length	Aperture (f-stop)	Horizontal Field Of View	Veritcal Field Of View	Depth Of Field
Lensation	B3M2818C (*)	1/2.5"	2.8mm	F2.2	120°	75°	30 cm to ∞
Sunex	DSL202A (*)	1/3"	3.9mm	F/2.6	94°	60°	30 cm to ∞
Sunex	DSL945D-650	1/2.3"	5.5 mm	F/2.5	60°	40°	30 cm to ∞
Sunex	DSL936D-650	1/2"	8.5 mm	F/3.2	42°	26°	30 cm to ∞
Sunex	DSL901J-650	1/3"	12 mm	F/3.0	30°	20°	30 cm to ∞

(*) with wide angle optics there is vignetting. It can be reduced with a shorter windows holder (can be sold with the lens)

In green the default and recommended multipurpose lens configuration.

IMAGE SENSOR PERFORMANCES

Features	Resolution details
Pixel array	1944 x 1204
Sensor technology	65 nm CMOS imager process global shutter
Pixel size	3.2 μm x 3.2 μm
HDR characteristics	2 exposure periods within a single frame, Both stored in pixel nodes, custom merge
Analog gain	X8 maximum
Digital gain	X0 to x32 maximum in 1/256 steps
Dynamic range (linear mode)	92 dB
Peak signal-to-noise ratio (on pixel)	41.5 dB
Pixel sensitivity	11586 mV/μW.cm-2.s at 850 nm 11.4 V/Lux.s (D65, no filter)
Peak quantum efficiency	63 %
Temporal read noise	2.5 e (non-HDR) 2.9 e (HDR mode)
Image lag	< 0.05 % (@2000 e)
Frame rate full resolution	60 fps
Glass filter	Double anti-reflective (AR) coating

ENVIRONMENTAL SPECIFICATIONS

The 2Mpixels Cube HDR camera is tested according the following DO-160 chapters and procedures:

	STREAMER RECORDER Control Unit
Operational temperature	-55°C to +70°C Variation speed 10°C/min (DO-160-G §4.5.2 & §4.5.4 Cat D2)
Altitude	116 mbar (50 000 ft) (DO-160-G §4.6.1 Cat D2)
Vibration	aircraft zone 1: Fuselage (DO-160-G §8.1 Cat S Curve C)
Explosion (No Test)	The temperature of the housing does not exceed 200°C in normal or failure operation.
EMI Radiated	(DO-160-G §21 Cat H)

Reports can be provided on demand

CABLE LENGTH

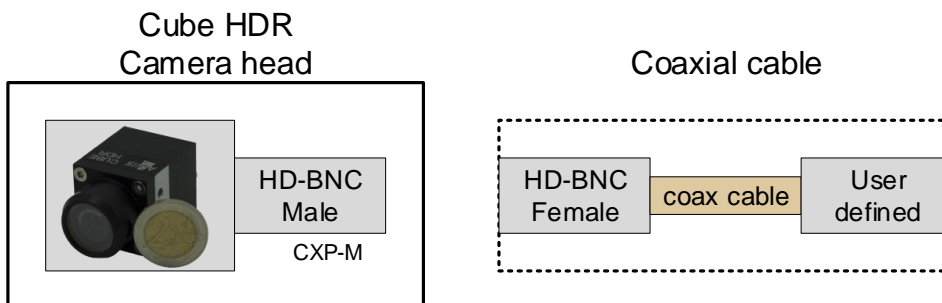
The total cable length between the camera and the frame grabber must not exceed the following distances depending on the cable type.

It is possible to insert up to 3 cable breaks with this distance but the different connectors have to be qualified to pass 3 GHz signals or more and must have a low insertion loss.

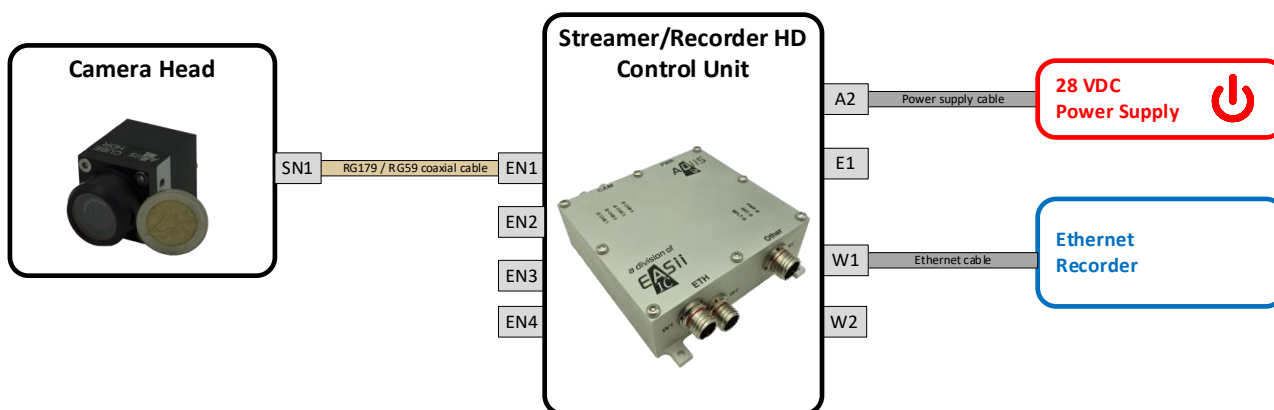
	CXP Théory					HUBER+SUSNER	HUBER+SUSNER	Recomended
	Bit Rate (Gbps)	Base Freq (MHz)	Attenuation (dB)	@ Frequency (GHz)	Equivalent Belden 1694A (m)	RG179	RG302 RG59	Belden 1855A
CXP-1	1.25	625	-22	0.625	135 m	20m	45m	45m
CXP-2	2.5	1250	-27.2	1.25	115 m	20m	45m	45m
Default config CXP-3	3.125	1562.5	-28.1	1.5625	105 m	20m	45m	45m
CXP-5	5	2500	-22.6	2.5	65 m	20m	40m	40m
CXP-6	6.25	3125	-17.8	3.125	45 m	10m	20m	20m

SYSTEM CONFIGURATION

The diagrams below show system configuration examples for the Cube-HDR 2M pixels camera.

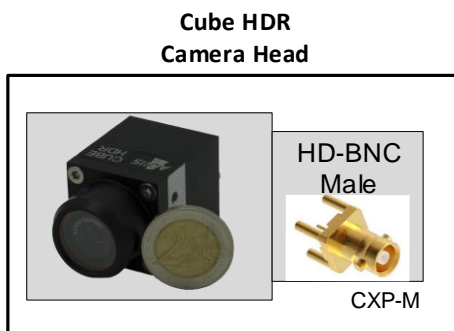


Minimal system configuration with ADiIS StreamerHD/Encoder



CONNECTORS AND WIRING

Cube HDR Camera Head



Connector

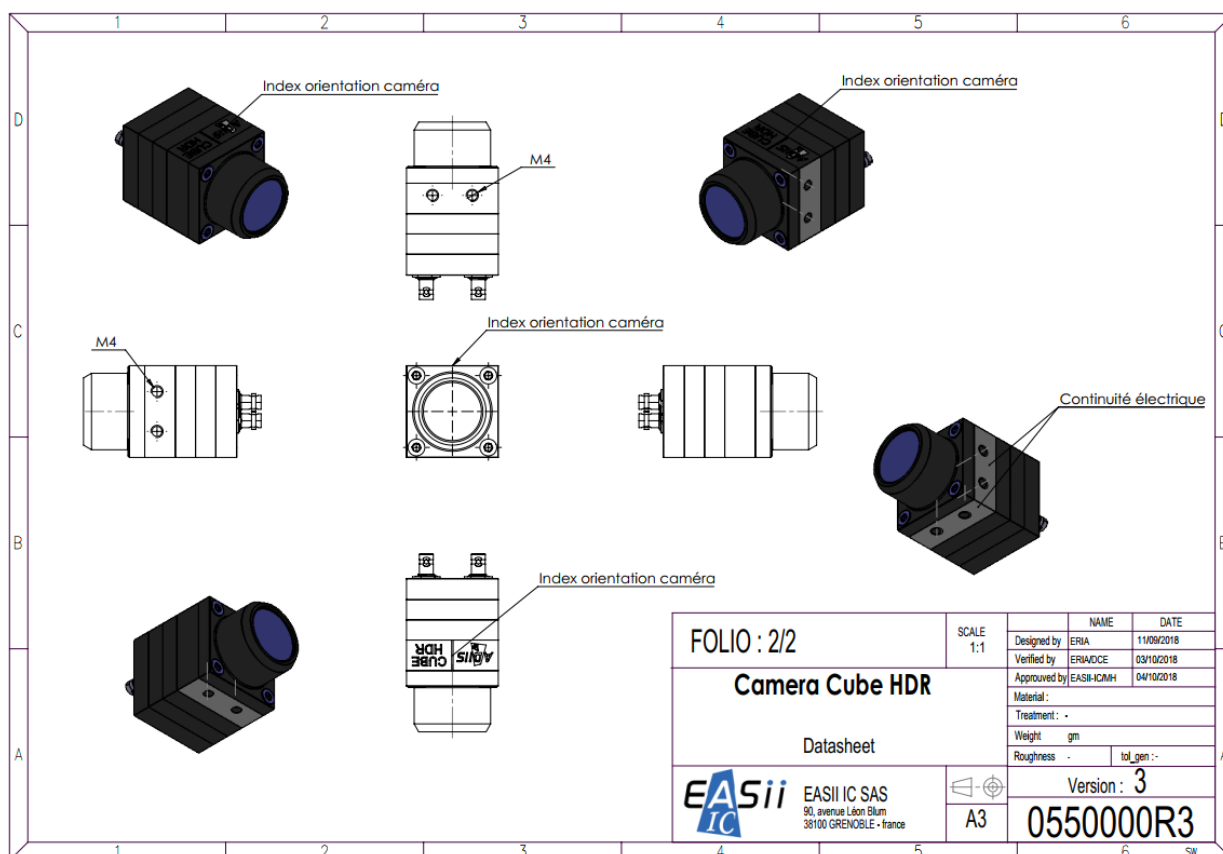
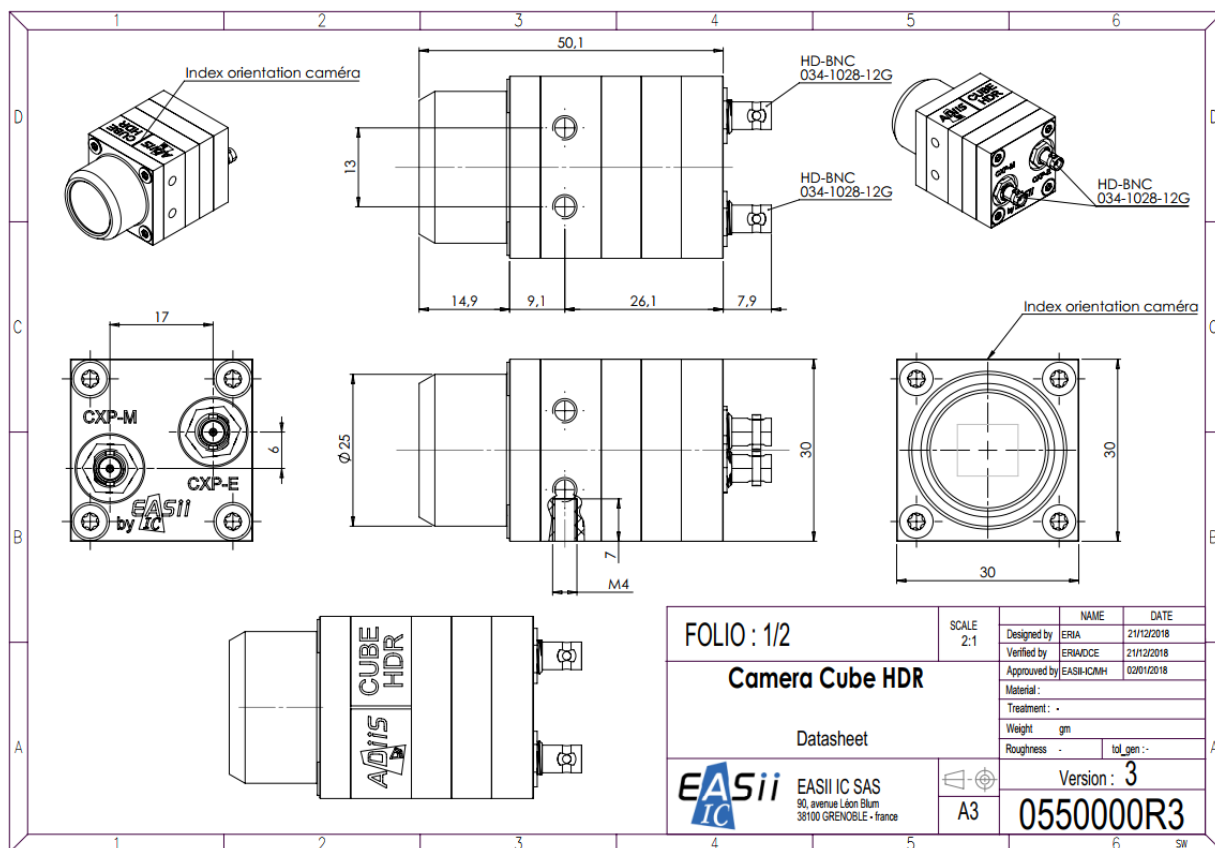
Connector type: 75 ohms male HD-BNC, Straight

Connector reference: 34-1028-12G (Amphenol).

Connector identification: CXP-M for "master" & CXP-E for "extension" (optional)

EXTERNAL VIEW DRAWING

Cube HDR Camera



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