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SWIR CAMERA DATA SHEET

WIDY SenS 640G STE

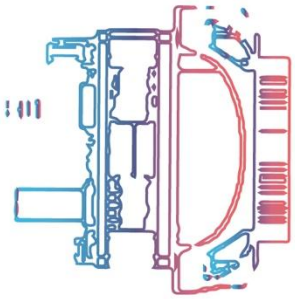
Manufacturer: New Imaging Technologies (NIT)

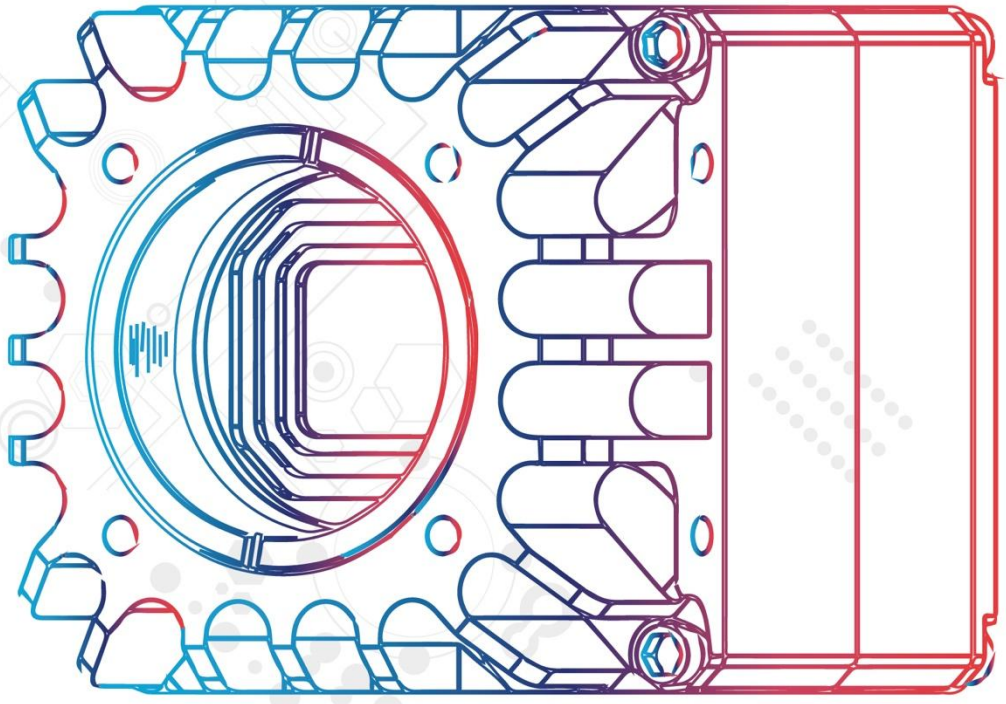
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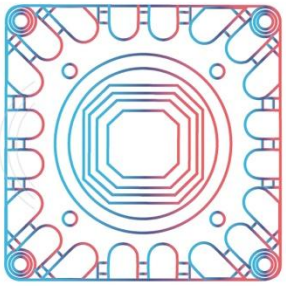
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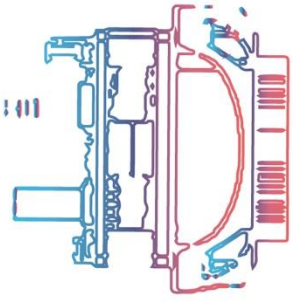
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WiDy SenS 640 G-STE

Camera Datasheet

DOCUMENT

Date	Modification	Revision
20/06/2019	Document creation	V1.0
12/09/2019	Update with additional heat dissipaters	V1.1
12/12/2019	Update POE & modified heat dissipaters	V1.2
16/09/2020	Revised Hirose connector pins	V1.3-V1.4
09/12/2022	Hirose connector reference correction	V1.5
04/04/2025	Accessories and software update	V1.6



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OVERVIEW

Commercial Reference

Commercial reference	Description	Ordering information
WIDY SenS 640G-STE	WiDy SENS GIGABIT CAMERA	9SEC1601AT31EC0X
WIDY SenS 640G-STE	WiDy SENS POE GIGABIT CAMERA	9SEC1601AT31GC0X

References

Index	Title of document	Revision	Issued by
R1	WiDy SenS Gigabit camera interface		NIT
R2	GIGE VISION Video Streaming and Device Control Over Ethernet		Standard

A reference document contains elements, which are used to draft this specification.

Subject

This document specifies the camera:

- Sensor description
- Presentation
- Mechanical dimension and optics interface
- Electrical and video interface
- Functionalities
- Software compatibility
- Electro-optics characteristics
- Environment
- Accessories
- Annexes

Definitions, Terminology and abbreviations

- NIT : New Imaging Technologies
- FPGA : Field Programmable Gate Array
- L : Length
- H : Height
- W : Width
- WDR : Wide Dynamic Range
- FPN : Fixed Pattern Noise

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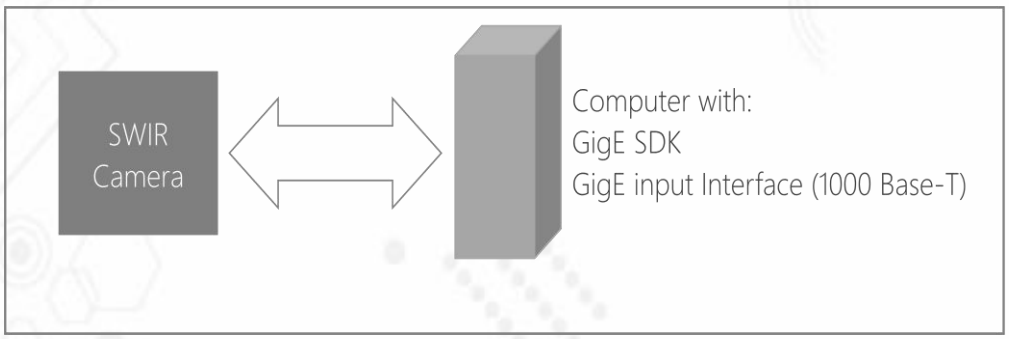
Sensor description

Optical format	1 inch
Active pixel	640x512
Material	InGaAs
Pixel size	Square 15 x 15µm
Readout mode	Global Shutter
Option	CDS
Dual mode	LOG or CTIA
Packaging	OEP252

PRESENTATION AND CONFIGURATION

General presentation

The WIDY SenS 640G-STE integrates the T-Cooled sensor NSC1601T-SI Monochrome. This camera integrates control of temperature to improve the intrinsic characteristics of the sensor.



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Camera configuration

The camera is composed of Sensor, ADC, FPGA and Interface boards:

- Sensor board which integrate the sensor and the Peltier (thermoelectric cooling).
- ADC board
- FPGA board delivering the entire control signal sensor and the camera processing
- Interface board which integrates the management of the main power supply, the trigger, the Peltier management and the Gigabit transceiver.

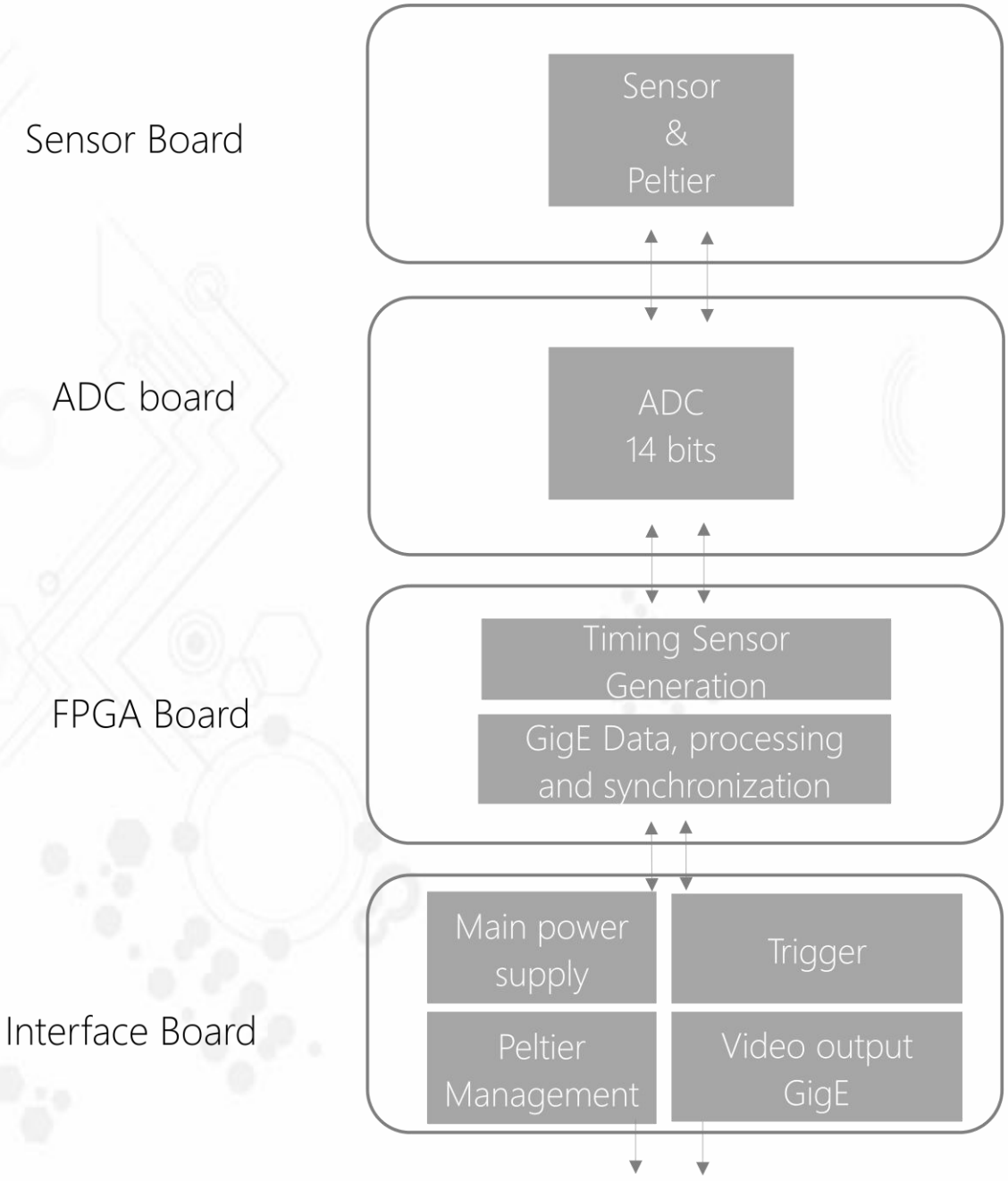
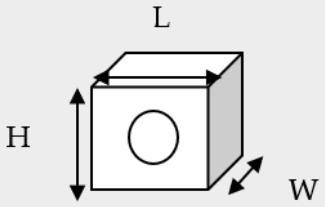
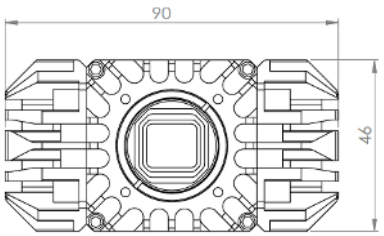
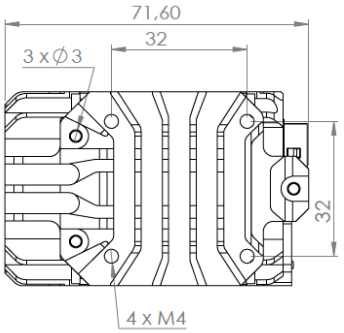
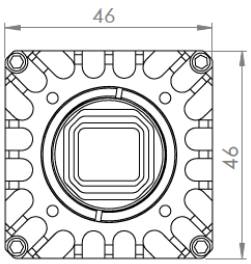
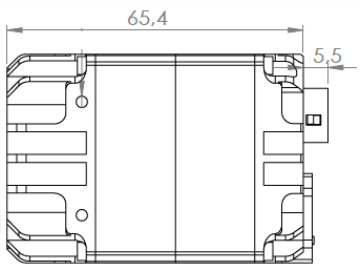


Figure 1 Camera architecture

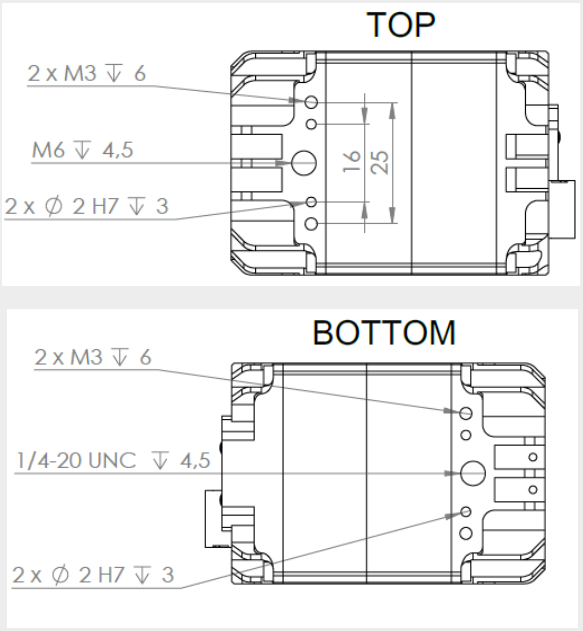
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SPECIFICATIONS

Mechanical dimension and optics interface

Mechanical dimensions	L: 77.3mm H: 46mm W: 71.6mm with heat dissipaters L : 46mm H: 46mm W: 65.4mm (without the connector and heat dissipaters) 
Camera With heat dissipaters Without heat dissipaters	   
Mount	C
Weight	Camera <240g without heat dissipaters <340g with heat dissipaters

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Interface	

Electrical Video Interface

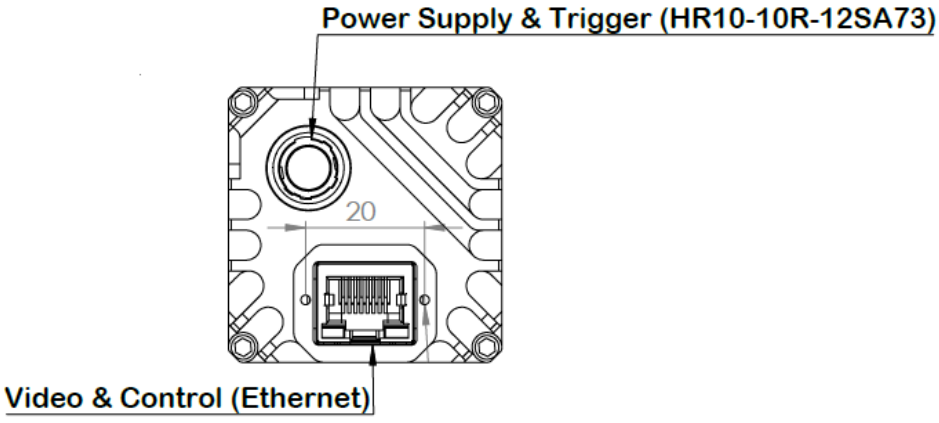


Figure 2 electrical and videos interface

- Power supply & Trigger

Power supply signal is provided through Hirose connector.
9SEC1601AT31GC0X Reference only is also PoE camera.
Power supply range is 6 to 15V.

Reference	Designation	Manufacturer
HR10-10R-12SA	Connector Female 12 positions	Hirose

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Please Connect the External Power Supply with the Hirose HR10-10R-12SA connector that includes the trigger connections using the included 1.5m long cable.

The corresponding pins on the cable are as follows:
- Red and Violet/(or Orange) cables: Power
- Blue and Brown cables: Power Ground
- Green cable: Trigger (In/Out)
- Yellow cable: Trigger1 Out (programmable)
- White cable: Trigger2 Out (programmable)
- Black cable: Trigger Ground

A synchronization signal can be provided through the Hirose connector.
2 configurations modes are available:

- Internal mode: The trigger is defined as an output. The trigger high level duration coincides with the exposure time.
- External mode: the trigger is defined as an input.

The voltage range of the trigger signal must be [0-3.3V / LVTTL format].

2 options in External trigger mode:
1/
High level: integration start on sensor pixels.
Falling edge: Integration stop and beginning of the reading and send of the image on the video output connector.
2/
High level: Integration start on sensor pixels
Integration time is equal to the exposure time register.

A delay is selectable in trigger input and output.

Hirose Connector : HR10-10R-12SA73		
Pin	Signal Name	Note
1	+ Voltage	Power Supply (+12V)
2	- Voltage	Return Power Supply
3	Trigger OUT2	
4	Trigger OUT1	
5	Not connected	
6	Not connected	
7	Reserved	
8	- Voltage	Return Power Supply
9	+ Voltage	Power Supply (+12V)
10	Trigger	LVTTL (3.3V)
11	Not connected	
12	GND	

Figure 3 pinout reference

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- Output Data & Control

The WIDY SenS 640G-STE provides video Data & Control through the Ethernet connector.

Reference	Designation	Manufacturer
RJHSE338A1A	Ethernet Connector	Amphenol

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FUNCTIONALITIES

Camera

The following features are embedded on the camera:

Camera mode	Frame rate	Up to 225Hz (in full resolution)
	Mode of sensor	Standard Global shutter: Sensor Reading : ITR or IWR 4 modes: Log, Linear Low Gain, Linear High Gain and Linear High Gain with CDS.
	Output Type	14 bits (RAW) or 8 bits (with Min/Max stretching histogram)
	Exposure time	Integration time variable from 10us to 220ms in ITR Integration time variable from 100us to 220ms in IWR Maximum integration time in Log mode: 10ms
	AET (automatic exposure time)	On/Off The AET automatically calculates the exposure time depending on the mean histogram.
	AET Setup	The setup is selectable from 0 to 100% related to the entire dynamic in 14 bits (0 to 16383).
	Trigger	Internal/External (LVTTL)
	Trigger delay	Delay selectable
	Partial reading mode	Possible to integer just a part of the sensor (ROI) and display only this window on the video output. This option allows a frame rate increase on the ROI
Features control	Min/Max Settings for display – Histogram Stretching	Automatic/Manual. In Automatic the gain and offset are calculating depending of the histogram. In Manual you can choose the gain and offset you want to apply on the image.
	NbIgnorePixels	In percentage of the total number of pixels in the image. Number of pixels ignored for the histogram calculation.
	NUC correction	Correction 1-Point or 2-Point calibrated in factory (User can carry out own NUC)
	Nuc mode	Automatic/Manual In manual you can load any NUC calibration file from the flash. In automatic the camera interpolates the NUC depending on exposure time.
	Bad pixel correction	Correction of bad pixel calibrated in factory (possible to realize it also by user)
	Temperature	Temperature sensor reading. Resolution: 0.1462°C/LSB
TEC control	Control of the temperature	Single stage TE cooler Note: The NUC and BPR files are delivered only for +25°C
	TEC mode	3 modes : • Low current < 1 W • Medium current < 2 W • Large current < 4 W
	Cooling capacity	*See following Note on cooling capacity

- TEC temperature setting

The cooling temperature capacity greatly depends on the heat dissipation. By default, with the additional heat dissipaters, the achievable TEC setting is typical 10° below ambient temperature depending on convection possibilities. By default, the NUCs are calibrated in factory at 25°C.

The heat dissipaters on the side of the camera have 4 standard M4 threads distant by 32mm to fix an additional fan for increased performance (increased temperature delta). They can also be dismounted for a more compact integration into a system. In this case, the user must assure the heat dissipation. Achievable TEC temperature then depends on the heat dissipation performance of the assembly. For more detailed information, contact us at .



SOFTWARE COMPATIBILITY

- Software Development Kit

A SDK is delivered with the camera. It is called NITLIBRARY.
The SDK is coded in C++ which provides primary functionalities to interface with NIT USB cameras. It contains functions related to the device management, the parameters settings (pixel clock, exposure time, sensor mode…) to integrate our cameras in your project.

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ELECTRO-OPTICS CHARACTERISTICS

Consumption	<5W TECless
	<4 W TEC only
Dynamic Range	120dB typical in Log 63dB typical in CTIA (Low Gain) 49 dB typical in CTIA (High Gain)
Full well capacity (in CTIA)	>380ke- (Low Gain) >17ke- (High Gain)
MTF @ 33pl/mm (typical)	>50%
Sensor Noise	High Gain with CDS<50e- Low Gain < 270e- Log < 340e-
Logarithmic sensibility	600 lsb/decade
QE	>70%

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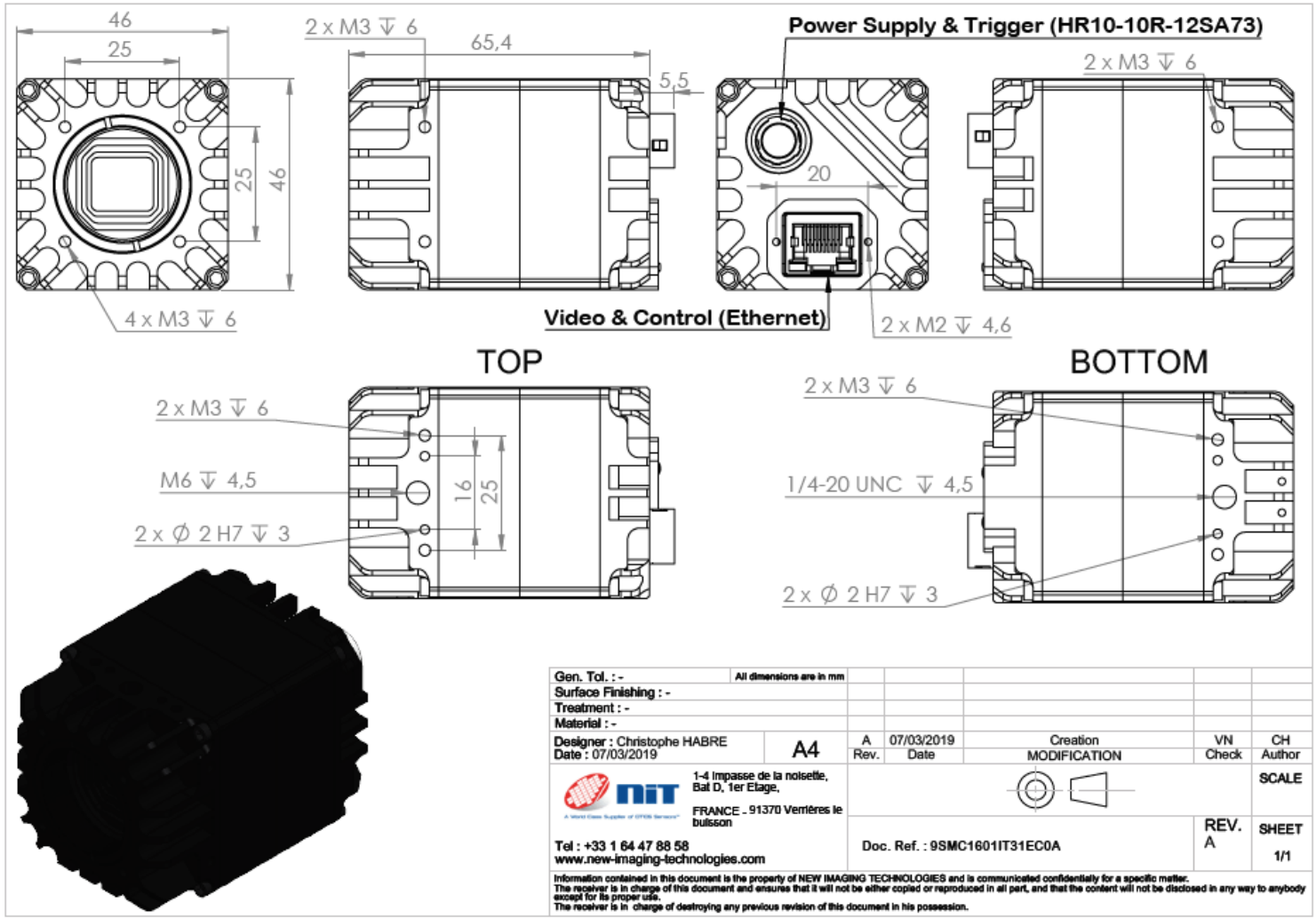
ENVIRONMENT & ACCESSORIES

Storage	**-20 to 80°C**
Operating Temperature	**-20 to 71°C**

	Hirose cable	Power supply	SDK
WiDy SenS 640G-STE	✓	✓	✓

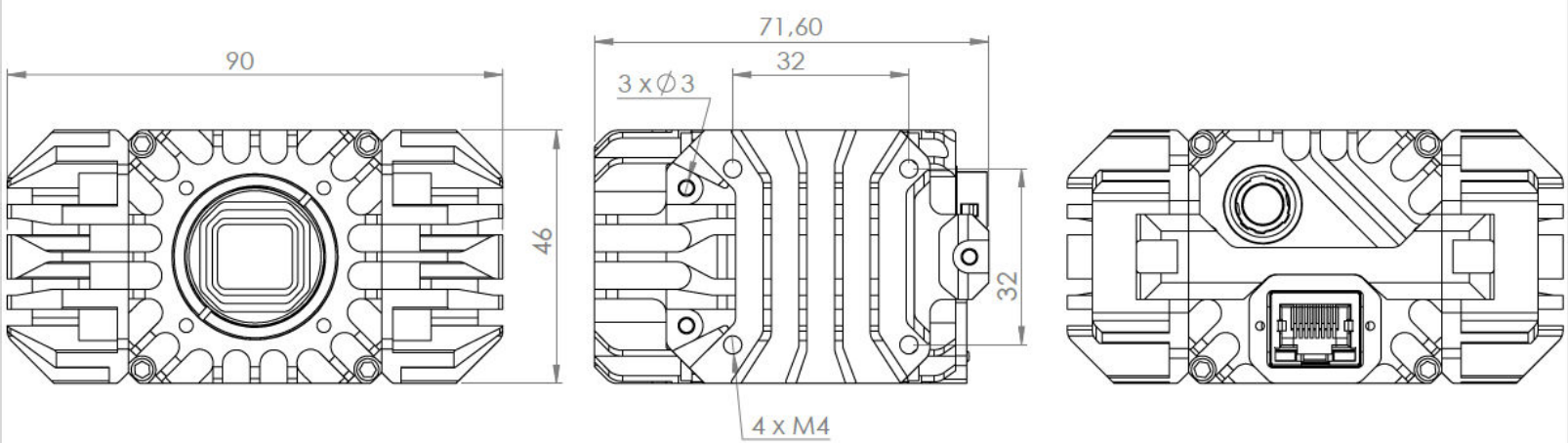
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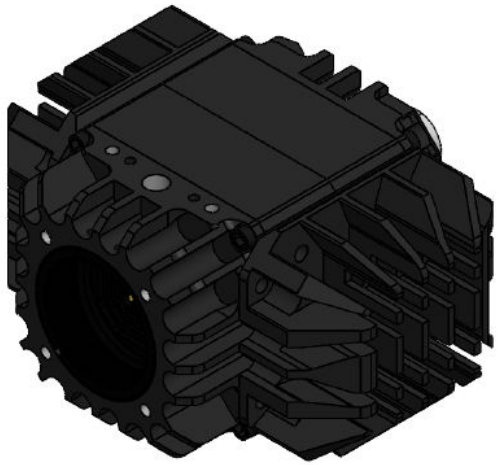
ANNEXES \ Camera Interface without Heat Dissipaters



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ANNEXES \ Camera Interface with Heat Dissipaters





Gen. Tol. : - All dimensions are in mm						
Surface Finishing : -						
Treatment : -						
Material : -						
Designer : Christophe HABRE Date : 09/10/2019	A4	B Rev.	31/03/2015 Date	Modification des radiateurs MODIFICATION	VN Check	CH Author
1-4 impasse de la noisette, Bat D, 1er Etage, FRANCE - 91370 Verrières le buisson Tel : +33 1 64 47 88 58 www.new-imaging-technologies.com						SCALE
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