# PEMBROKE INSTRUMENTS, LLC

SWIR CAMERA DATA SHEET

## WIDY SWIR 640M S

Manufacturer: New Imaging Technologies (NIT)

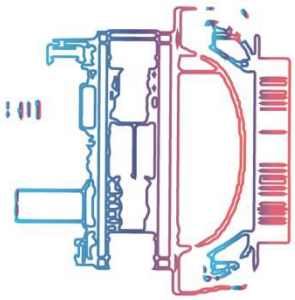
Technical data reproduced from the original manufacturer datasheet.

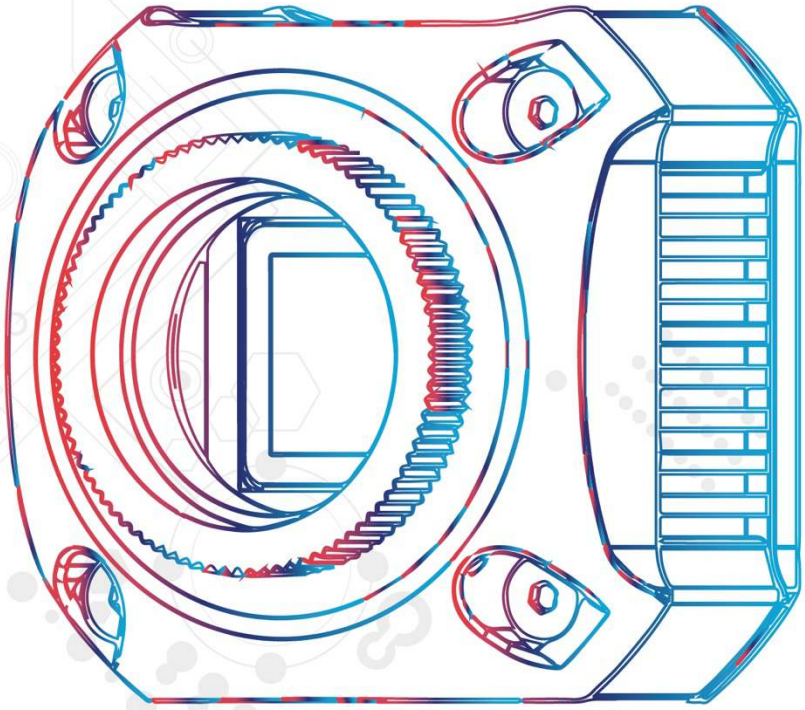
---

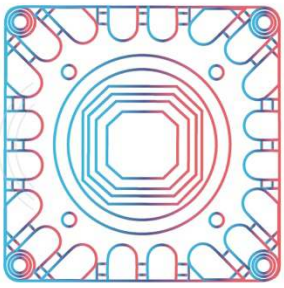
**For a quote or more information email**

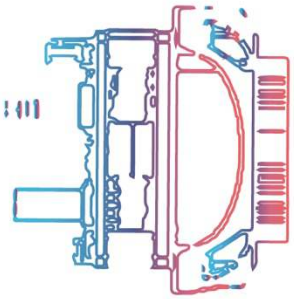
**sales@pembrokeinstruments.com**

www.new-imaging-technologies.com









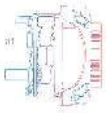
# WiDy SWIR 640M-S
# Camera Datasheet



# DOCUMENT

| Date | Modification | Revision |
|---|---|---|
| **17/08/2015** | Document creation | V1.0 |
| **31/10/2016** | Update | V1.1 |
| **04/01/2017** | Update | V1.2 |
| **10/01/2017** | Update | V1.3 |
| **09/06/2017** | Update for corrections | V1.4 |
| **22/02/2019** | Update communication with UART (use of SerTC and SerTFG from the camlink) | V2.0 |
| **19/03/2019** | Template update | V3.0 |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



# Table of contents

DOCUMENT ..... 2
OVERVIEW ..... 4
Commercial Reference ..... 4
References ..... 4
Subject ..... 5
Definitions, Terminology and abbreviations ..... 5
Sensor description ..... 5
..... 6
PRESENTATION AND CONFIGURATION ..... 6
General presentation ..... 6
Camera configuration ..... 7
SPECIFICATIONS ..... 8
Mechanical dimension and optics interface ..... 8
Electrical Video Interface ..... 9
FUNCTIONALITIES ..... 12
Camera ..... 12
SOFTWARE COMPATIBILITY ..... 13
ELECTRO-OPTICS CHARACTERISTICS ..... 14
ENVIRONMENT & ACCESSORIES ..... 15
ANNEXES \ SWIR Camera Interface ..... 16
..... 16
ANNEXES \ SWIR Module Interface ..... 17
..... 18

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# OVERVIEW

## Commercial Reference

| Commercial reference | Description | Ordering information |
|---|---|---|
| WIDY SWIR 640M-S | CAMLINK Monochrome camera | 9SMC1201IY31MC0X |
| WIDY SWIR 640M-S-OEM | CAMLINK Monochrome module | 9SMC1201IY31MF0X |

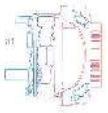
Note: Module is an OEM version so it will be supplied without the body and the rear cover.

## References

| Ind | Title of document | Revision | Issued by |
|---|---|---|---|
| **R1** | Datasheet sensor NSC1201 | V1.1 | NIT |
| **R2** | SWIR CAMLINK camera interface drawing | - | NIT |
| **R3** | SWIR CAMLINK module interface drawing | - | NIT |
| **R4** | Specification of the Camera Link Interface Standard for Digital Cameras and Frame Grabber | | NORM |
| **R5** | WiDyCAM Reference Guide | | NIT |
| **R6** | Serial NITCAM Protocol | | NIT |

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

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



# 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

# Sensor description

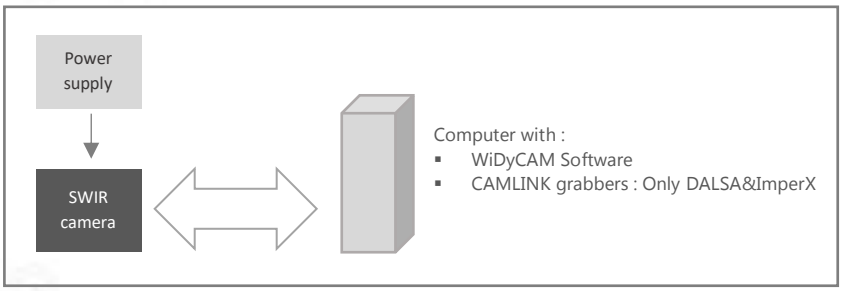
| | |
|---|---|
| Optical format | 1 inch |
| Output | Buffered analog differential |
| Active pixels | 640x512 |
| Material | InGaAs |
| QE | >70% (from 900nm – 1.7µm) |
| Pixel size | Square 15x15µm$^2$ |
| Dynamic range | 120dB typical |
| Packaging | CLCC52 |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# PRESENTATION AND CONFIGURATION

## General presentation

The WIDY SWIR 640M-S exists in different versions, module or camera which integrates the sensor NSC1201-SI Monochrome. This camera does not integer control of temperature thanks to the pixel design and the NUC correction.




*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# Camera configuration

The camera is composed of **sensor and interface boards**:

- Sensor board which integrates the sensor and the Analog to digital conversion.
- Interface board which integrates the management of the main power supply, the trigger and FPGA circuit for sensor signal generating.

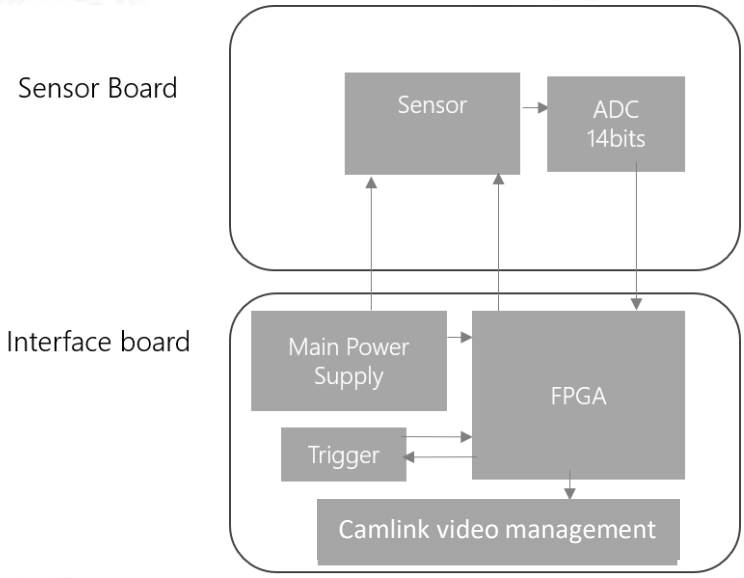
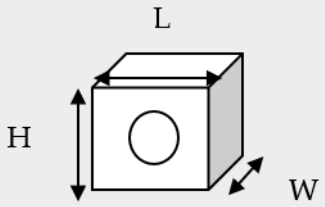
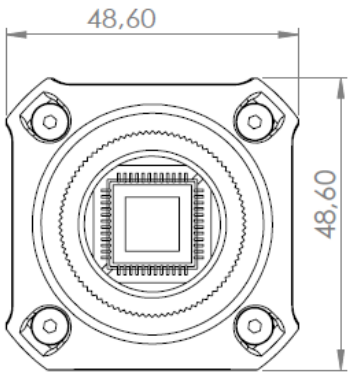
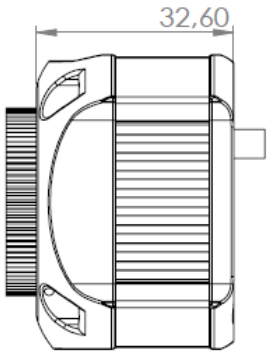
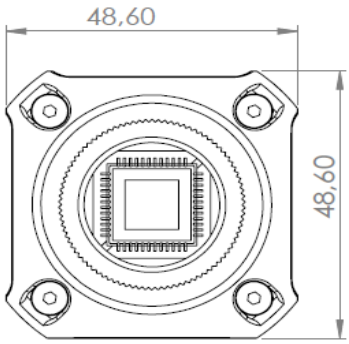
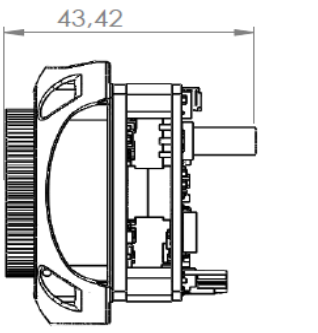



*Figure 1 Camera architecture*

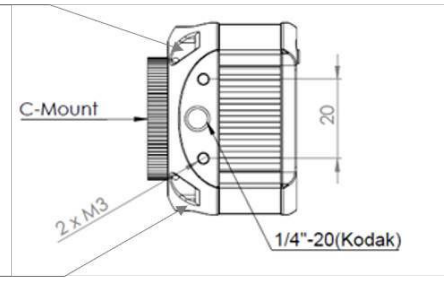
*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# SPECIFICATIONS

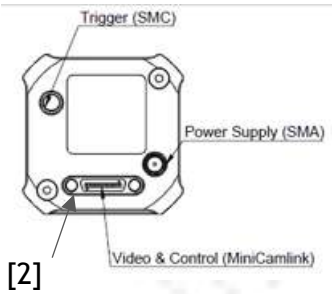
## Mechanical dimension and optics interface

| | |
|---|---|
| Mechanical dimensions | L : 48.6mm H: 48.6mm W: 43.42mm (with the connector)<br> |
| Camera | <br> |
| Module | <br> |
| Mount | CS and C |
| | |
| Weight | Camera <125g<br>Module < 90g |
| | |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

| | |
|---|---|
| Interface | DIN913 1xM1,6 screw<br>(Fixing focus lens)<br><br><br>DIN913 1xM1,6 screw<br>(Fixing focus lens) |

# Electrical Video Interface




[2]

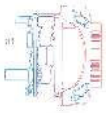
*Figure 2 electrical and videos interface*

- Power supply

Power supply signal is provided through SMA connector.
Power supply range is 4 to 12V (**Nominal 5V**).

| Reference | Designation | Manufacturer |
|---|---|---|
| CONSMA008 | SMA connector | Lynx Technologies |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



## Output Data

The WIDY SWIR 640M-S provides a 14-bit output rawdata through CameraLink specification [R4] and a mini CamLink connector (SDR26) [2].

| Reference | Designation | Manufacturer |
|---|---|---|
| 12226-1150-00FR | SDR26 connector | 3M |

The camera sends 14 bits data (default configuration) through the CameraLink interface.
This configuration respects the CameraLink Standard (base configuration):

| Base Configuration | | | | | | |
|---|---|---|---|---|---|---|
| Port/bit | 8-bit x 1~3* | 10-bit x 1~2 | 12-bit x 1~2 | 14-bit x 1 | 16-bit x 1 | 24-bit RGB |
| Port A0 | A0 | A0 | A0 | A0 | A0 | R0 |
| Port A1 | A1 | A1 | A1 | A1 | A1 | R1 |
| Port A2 | A2 | A2 | A2 | A2 | A2 | R2 |
| Port A3 | A3 | A3 | A3 | A3 | A3 | R3 |
| Port A4 | A4 | A4 | A4 | A4 | A4 | R4 |
| Port A5 | A5 | A5 | A5 | A5 | A5 | R5 |
| Port A6 | A6 | A6 | A6 | A6 | A6 | R6 |
| Port A7 | A7 | A7 | A7 | A7 | A7 | R7 |
| Port B0 | B0 | A8 | A8 | A8 | A8 | G0 |
| Port B1 | B1 | A9 | A9 | A9 | A9 | G1 |
| Port B2 | B2 | nc | A10 | A10 | A10 | G2 |
| Port B3 | B3 | nc | A11 | A11 | A11 | G3 |
| Port B4 | B4 | B8 | B8 | A12 | A12 | G4 |
| Port B5 | B5 | B9 | B9 | A13 | A13 | G5 |
| Port B6 | B6 | nc | B10 | nc | A14 | G6 |
| Port B7 | B7 | nc | B11 | nc | A15 | G7 |
| Port C0 | C0 | B0 | B0 | nc | nc | B0 |
| Port C1 | C1 | B1 | B1 | nc | nc | B1 |

| Base Configuration | | | | | | |
|---|---|---|---|---|---|---|
| Port/bit | 8-bit x 1~3* | 10-bit x 1~2 | 12-bit x 1~2 | 14-bit x 1 | 16-bit x 1 | 24-bit RGB |
| Port C2 | C2 | B2 | B2 | nc | nc | B2 |
| Port C3 | C3 | B3 | B3 | nc | nc | B3 |
| Port C4 | C4 | B4 | B4 | nc | nc | B4 |
| Port C5 | C5 | B5 | B5 | nc | nc | B5 |
| Port C6 | C6 | B6 | B6 | nc | nc | B6 |
| Port C7 | C7 | B7 | B7 | nc | nc | B7 |
| * If only using a single channel, use Port A. If using two channels, use Port A and B. | | | | | | |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

## Communication

Serial NITCAM is the protocol used to communicate with the camera. See [R6] for more details.
SerTC and SerTFG link are used to send or receive commands from the camera.

## Synchronization connectors

A synchronization signal can be provided through a standard female SMC connector .
2 configurations modes are available:

- From camera to external source, SMC connector is defined as an output
- From external source to camera, SMC connector is defined as an input

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

Rising edge: integration start on sensor pixels.
High level: integration start on sensor pixels.
Falling edge: Stop of the integration and beginning of the reading and send of the image on the video output connector.

| Reference | Designation | Manufacturer |
|---|---|---|
| 152140 | SMC connector | Amphenol |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# FUNCTIONALITIES

## Camera

Different operation modes can be controlled with WiDyCAM Software. For more details see [R5].

| | | |
|---|---|---|
| **Camera mode** | Frame rate | Up to 100Hz (Pixel clock 66.66MHz) |
| | Mode of sensor | **Standard Global shutter**:<br>Integration time variable from 100us to 25ms (255 values).<br>**Optional Integration time from 100 µs to 200 ns.**<br>Contact NIT for more information. |
| | Trigger | Input or Output |
| | 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 |
| **Software control (all functions are realized on computer)** | Min/Max Settings for display – Histogram Stretching | Automatic or Manual.<br>In Automatic the gain and offset are calculating depending of the histogram.<br>Choose of the region of the interest for histogram calculation.<br>In Manual you can choose the gain and offset you want to apply on the image. |
| | Zoom | Bicubic zoom function available. |
| | Gamma correction | From 0 to 3. |
| | Contrast enhancement | Contrast improvement by local histogram equalization |
| | Colour maps | Grey, Jet, Hot, HSV, Rainbow, Cool, Night Vision |
| | Cross Hair | Display of the cross hair with variable position, color and dimension. |
| | Filters | Canny, Laplace, Sharp, High Boost, Invert |
| | NUC correction | Correction 1-Point or 2-Point calculated in factory (possible to realize it also by user) – For more details See [R5] |
| | Bad pixel correction | Correction of bad pixel in factory (possible also by user)– For more details See [R5] |
| | Recording videos | Recording video in .AVI or. PTW (Raw 14 bits) |
| | Image capture | .jpeg, .png or. Tiff |
| | Horizontal and vertical inversion | Flip on the image in horizontal and vertical |
| **Analysis Functions (all functions are realized on computer)** | Histogram computation | |
| | Statistics analysis | |
| | ROI (region of interest) | |
| | Cross section Profiles | |
| | Rectilinear profiles | |
| | Linear profiles | |

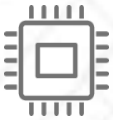
*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



# SOFTWARE COMPATIBILITY

Our Software WiDyCAM is only compatible with **DALSA** Frame grabbers (32bits or 64bits) and **ImperX** (64 bits only).
The software is compatible with Windows 7, 8, 8.1 or 10.

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



# ELECTRO-OPTICS CHARACTERISTICS

| | |
|---|---|
| **Consumption** | 1.5W |
| **Dynamic Range** | 120dB typical |
| **MTF @ 33pl/mm (typical)** | >50% |
| **Logarithmic sensibility** | 600 lsb/decade |

*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.



# ENVIRONMENT & ACCESSORIES

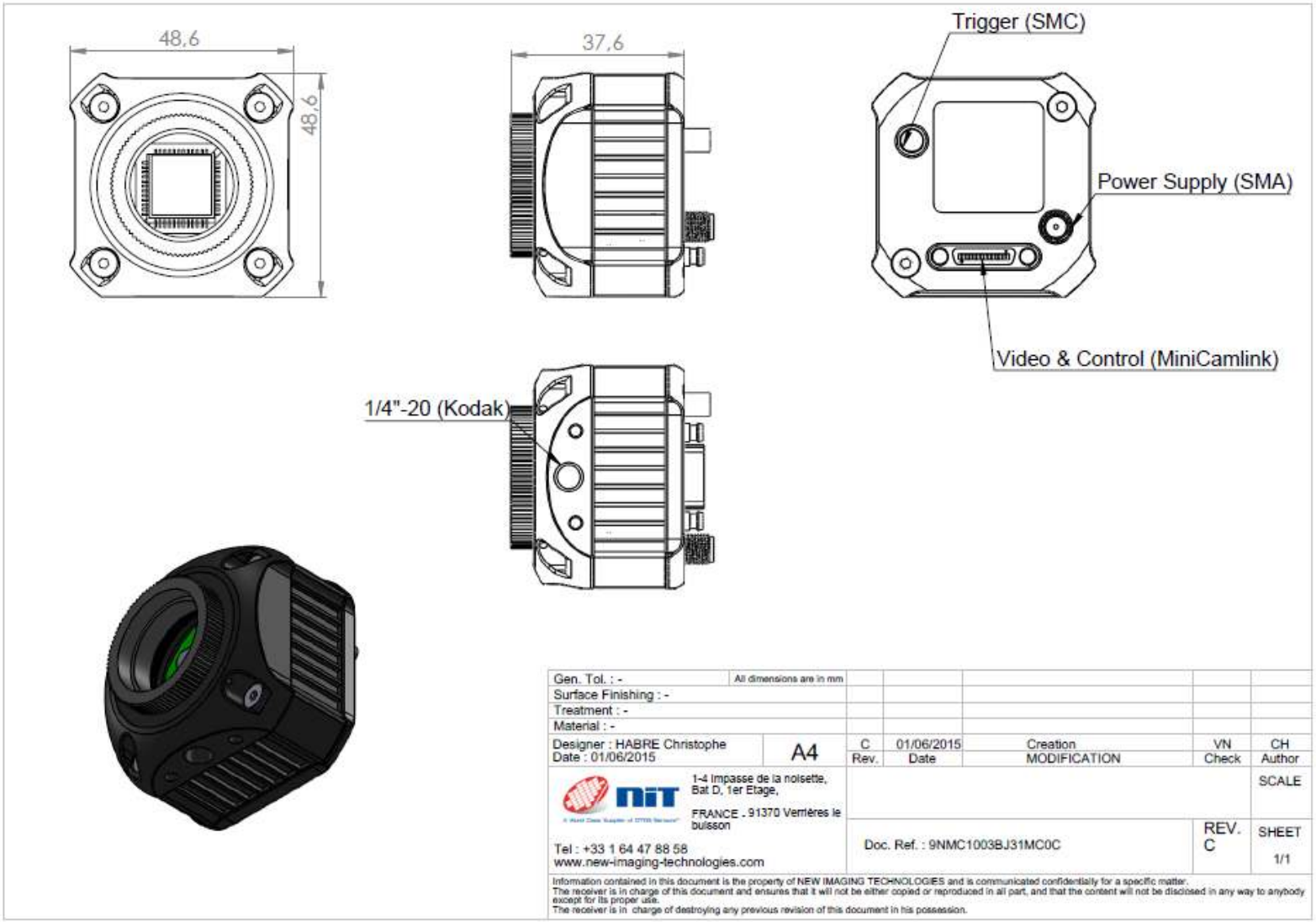
| | |
|---|---|
| **Storage temperature** | -20 to 80°C |
| **Operating Temperature** | -10 to 71°C |
| **Vibration** | 15g RMS from 5Hz to 500Hz (on the three axes) |
| **Shock** | 3 bumps at 75g ½ sinus during 6 ms (on the three axes) |

| | USB3-Mini USB3 cable | USB2-Mini USB2 cable | USB - SMA cable | BNC-SMC cable | WiDyCAM Software | ADAPTATOR CS/C |
|---|---|---|---|---|---|---|
| **WIDY SWIR 640V-S**<br><br>**WIDY SWIR 640V-S-OEM** | | | ✓ | ✓* | ✓ | ✓ |

*Available in option

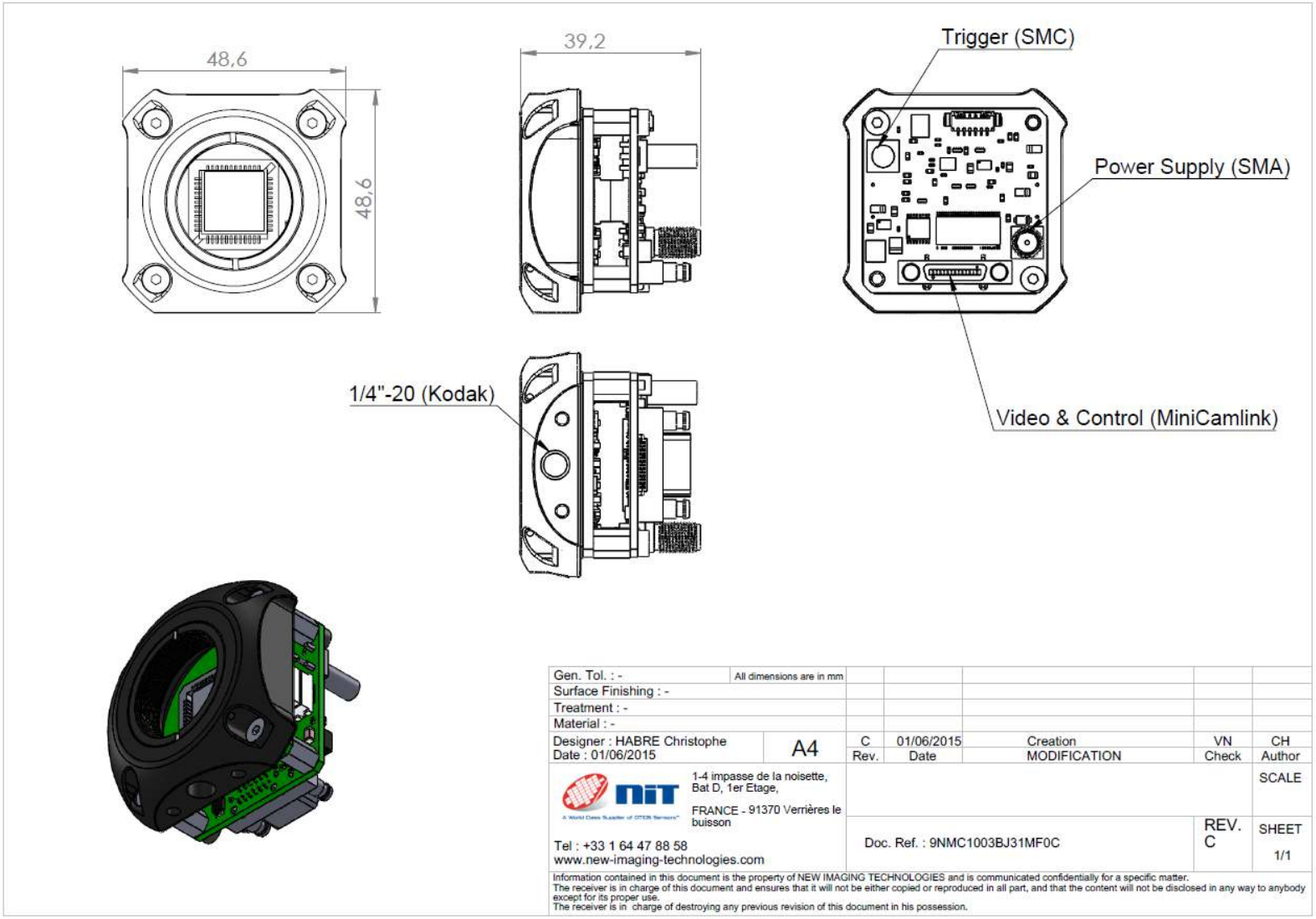
*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# ANNEXES \ SWIR Camera Interface




*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.

# ANNEXES \ SWIR Module Interface




*Products and specifications discussed herein are for evaluation and reference purposes only and are subject to change by NIT without notice.
Products are only warranted by NIT to meet NIT's production data sheet specifications.


PEMBROKE
INSTRUMENTS
Imagining a Brighter Tomorrow
Advanced
Imaging Solutions
for a Smarter World
greateyes
CHARLIE
Avenir
PHOTONICS
ARIS
Compact USS spectrometer
NYLIS
High resolution spectrometer
pembrokeinstruments.com
sales@pembrokeinstruments.com
+1-650-550-8618
CAMERAS | SPECTROMETERS | IMAGING SOLUTIONS