



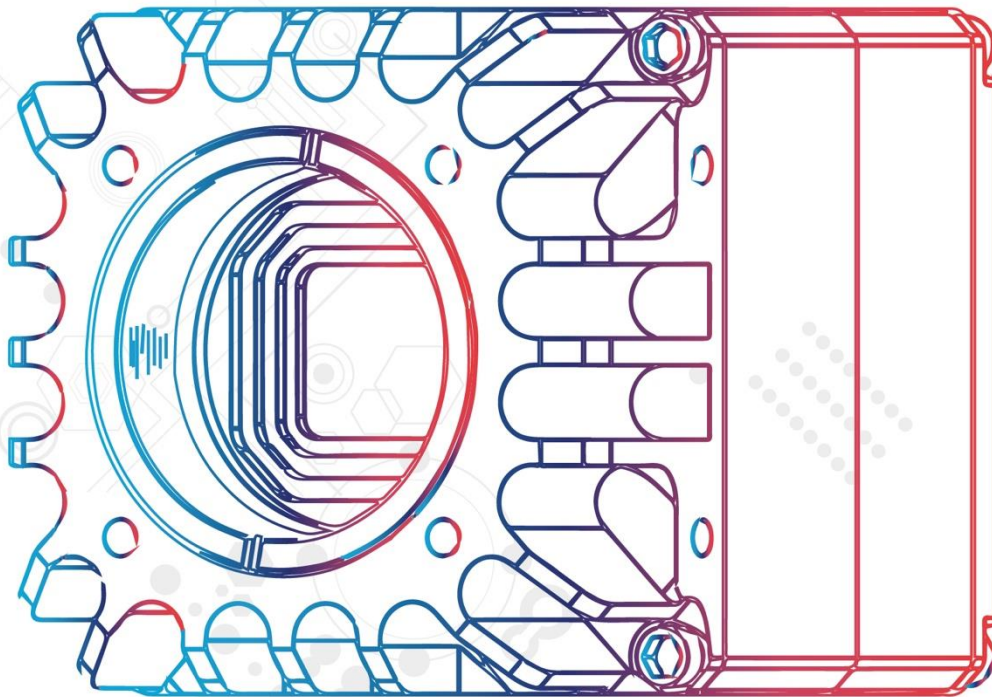
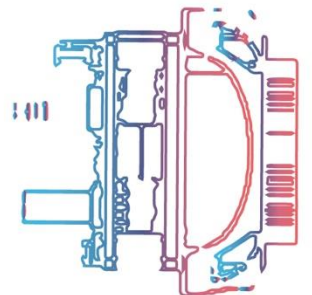
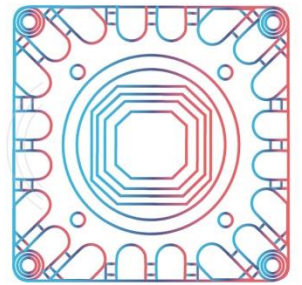
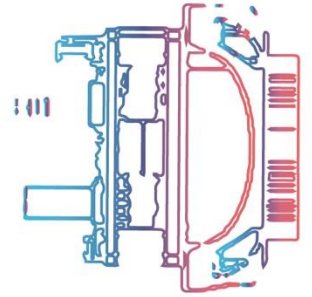
Pembroke Instruments, LLC

120 Stanford Heights Avenue
San Francisco, CA 94127 USA

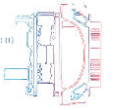
Tel. 415-860-4217

www.pembrokeinstruments.com

sales@pembrokeinstruments.com



LiSa SWIR 2K M-SE Camera Datasheet



DOCUMENT

Date	Modification	Revision
Sept 7, 2020	Document creation	V1.0

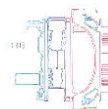
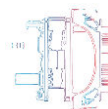


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OVERVIEW

Commercial Reference

Commercial reference	Description	Ordering information
LiSa SWIR 2K M-SE	LiSa SWIR CAMERALINK EMBEDDED CAMERA	9SEC1801AT31MC0X

References

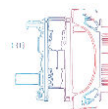
Index	Title of document	Revision	Issued by
R1	NITLINK PROTOCOL		NIT
R2	NITLINK REFERENCE GUIDE		NIT
R3	Specification of the Camera Link Interface Standard for Digital Cameras and Frame Grabber		Norm

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

Sensor description

Optical format	2/3" inch
Active pixel	2048x1
Material	InGaAs
Pixel size	Square 7,5 x 7,5µm*
Readout mode	Global Shutter
Option	CDS
Mode	Linear CTIA
Packaging	Custom metal**

*Future version 7,5x200µm available soon

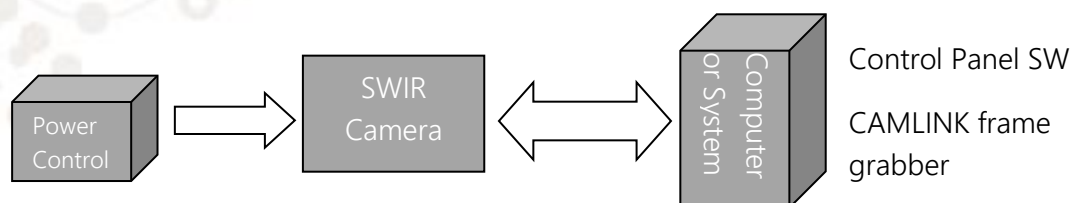
** CLCC Packaging to be proposed soon

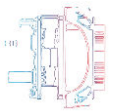


PRESENTATION AND CONFIGURATION

General presentation

The LiSa SWIR 2K-M-SE integrates the T-Cooled sensor NSC1801T-SI Monochrome. This camera integrates control of temperature to improve the intrinsic characteristics of the sensor.





Camera configuration

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

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

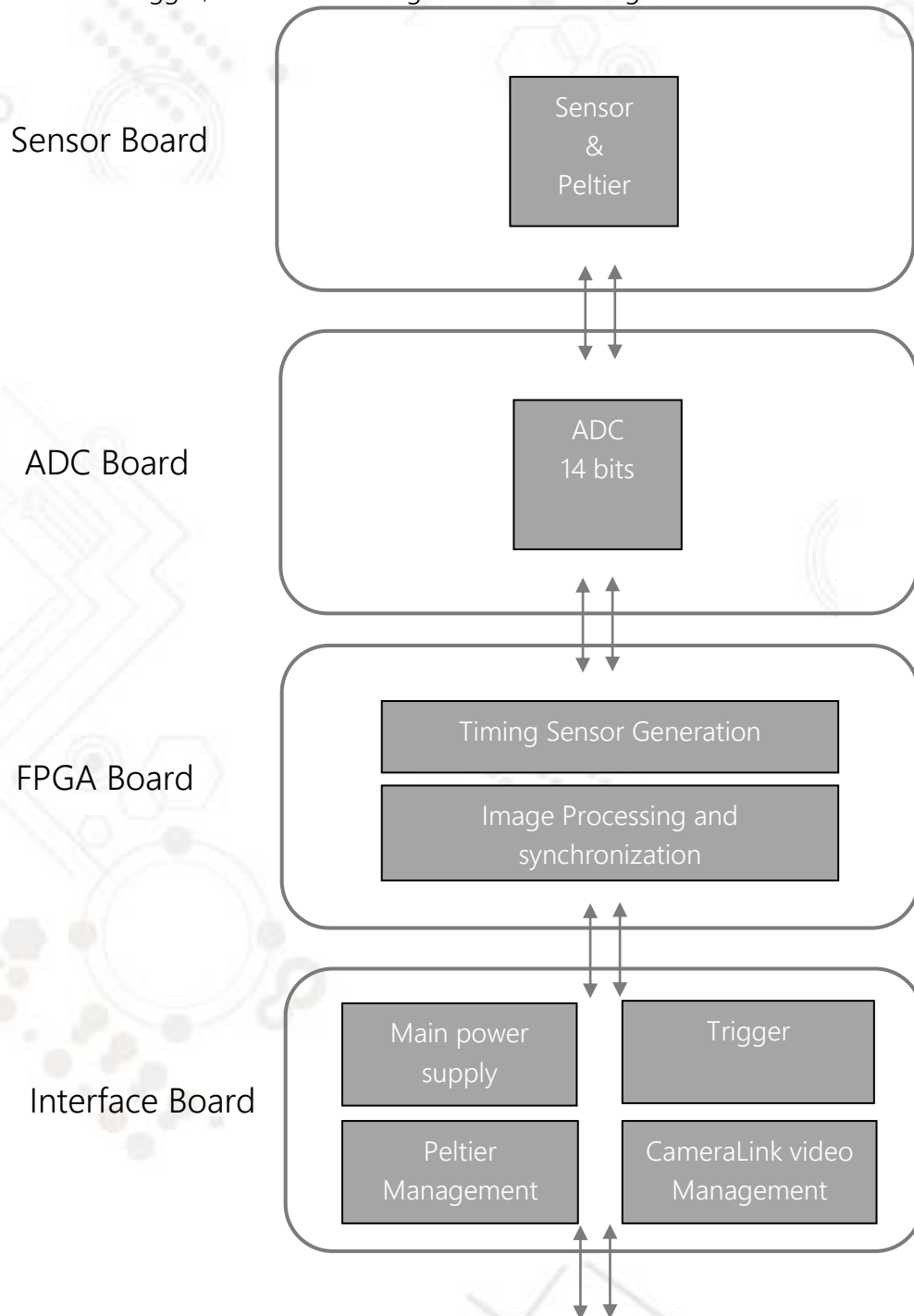
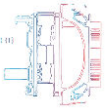
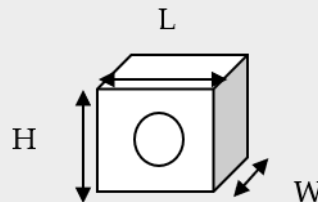
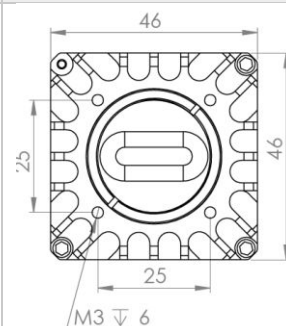
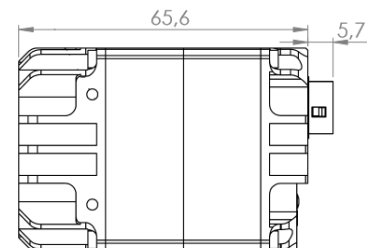


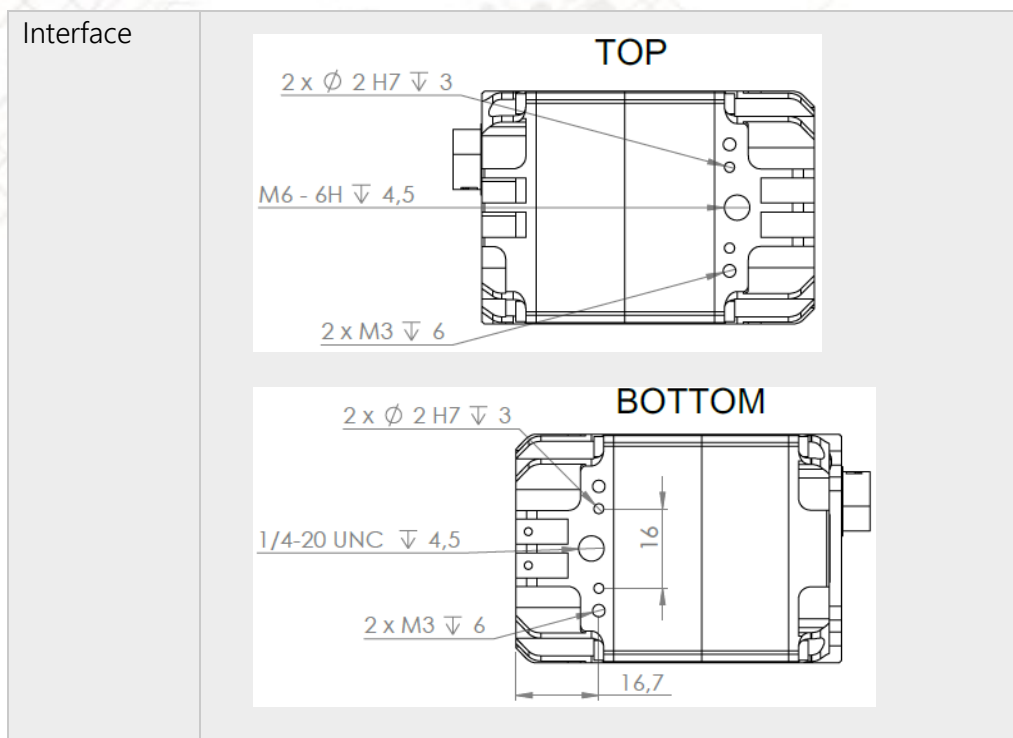
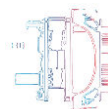
Figure 1 Camera architecture



SPECIFICATIONS

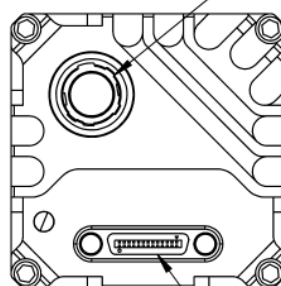
Mechanical dimension and optics interface

Mechanical dimensions	L : 46mm H: 46mm W: 65.6mm (without the connectors) 	
Camera	 	
Without heat dissipaters		
Mount	C	
Weight	Camera <250g	



Electrical Video Interface

Power Supply & Trigger (HIROSE)



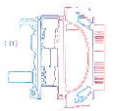
Video & Control (MiniCamlink)

Figure 2 electrical and videos interface

Power supply & Trigger

Power supply signal and trigger are provided through Hirose connector. Power supply range is 6 to 15V. (nominal 12V)

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



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

The corresponding pins on the cable are as follows:

- Red and Violet cables: Power +
- Blue and Brown cables: Power Ground
- Black cable: Ground
- Green cable: Trigger (In/Out)
- Yellow cable: TriggerOut1
- White cable: TriggerOut2

A synchronization signal can be provided through the Hirose connector or the camera control CC1.

2 configurations modes are available:

- o Internal mode: The trigger is defined as an output. The trigger high level duration coincides with the exposure time (only available in the Hirose connector).
- o External mode: the trigger is defined as an input.

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

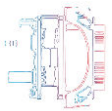
2/ High level: Integration start on sensor pixels

Integration time is equal to the exposure time register.

A delay is selectable in trigger input and output.

Hirose Connector : HE10-10R-12SA73		
Pin	Signal Name	Note
1	+ Voltage	Power Supply (+12V)
2	- Voltage	Return Power Supply
3	TriggerOut2	
4	TriggerOut1	
5	Not connected	
6	Reserved	
7	Reserved	
8	- Voltage	Return Power Supply
9	+ Voltage	Power Supply (+12V)
10	Trigger	LVTTTL (3.3V)
11	Not connected	
12	GND	

Figure 3 pinout reference



Output Data

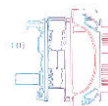
The LiSa SWIR 2K-M-SE provides output data video through mini Camlink connector (SDR26) [2].

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

The camera provides 14 bits Rawdata, 12 bits, 10 bits or 8 bits (Histogram processing) through the CameraLink interface.

This configuration respects the CameraLink Standard in base configuration:

Reference	Designation	Manufacturer	Picture
12226-1150-00FR	SDR26 connector	3M	[2]
GROUP	Camera connector	Name	Comment
CAMLINK	1	Inner Shield	Shield
	14	Inner Shield	Shield
	2	X0-	LVDS DATA
	15	X0+	LVDS DATA
	3	X1-	LVDS DATA
	16	X1+	LVDS DATA
	4	X2-	LVDS DATA
	17	X2+	LVDS DATA
	5	Xclk-	LVDS CLOCK
	18	Xclk+	LVDS CLOCK
	6	X3-	LVDS DATA
	19	X3+	LVDS DATA
	7	SerTC+	Communication
	20	SerTC-	Communication
	8	SerTFG-	Communication
	21	SerTFG+	Communication
	9	CC1-	Trigger Input
	22	CC1+	Trigger Input
	10	CC2+	Not used
	23	CC2-	Not used
	11	CC3-	Not used
	24	CC3+	Not used
	12	CC4+	Not used
	25	CC4-	Not used
	13	Inner Shield	Shield
	26	Inner Shield	Shield



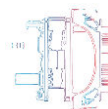
Base Configuration						
Port/bit	8-bit x 1~3*	10-bit x 1~2	12-bit x 1~2	14-bit x 1	16-bit x 1	24-bit RGB
Port A0	A0	A0	A0	A0	A0	R0
Port A1	A1	A1	A1	A1	A1	R1
Port A2	A2	A2	A2	A2	A2	R2
Port A3	A3	A3	A3	A3	A3	R3
Port A4	A4	A4	A4	A4	A4	R4
Port A5	A5	A5	A5	A5	A5	R5
Port A6	A6	A6	A6	A6	A6	R6
Port A7	A7	A7	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

■ Communication

The communication uses two LVDS port from Camlink Connector.

7	20	100 Ω	PAIR6+	7	20	SerTC+
20	7	terminated	PAIR6-	20	7	SerTC-
8	19	Z0-	PAIR7-	8	19	SerTFG-
21	6	Z0+	PAIR7+	21	6	SerTFG+

The camera can be controlled by the user via an RS232 compatible asynchronous serial interface. The interface is contained with the Cameralink interface. The protocol of communication is defined in [R3].



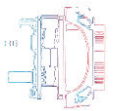
FUNCTIONALITIES

Camera

The following features are embedded on the camera:

Camera mode	Frame rate	Up to 60KHz @40MHz Pixel Clock (50MHz to be evaluated)
	Mode of sensor	<u>Standard Global shutter:</u> Sensor Reading: ITR 3 modes: Linear Low Gain, Linear Medium Gain, Linear High Gain CDS possible on all 3 gains.
	Output Type	14 bits (RAW), 12 bits, 10 bits and 8 bits (with Min/Max histogram stretching). Interlaced pixel possible for 12 bits, 10 bits and 8 bits.
	Exposure time	Integration time variable from 10us to 220ms
	Trigger	Internal/External (LVTTL) Internal (camera control CC1) Exposure time fixed by the trigger width or exposure time register.
	Trigger Output 1 Trigger Output 2	6 modes available: - Trigger input copy - Trigger ready - Low level (LVTTL) - High level (LVTTL) - Exposing - Imaging
	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
	Image inversion	Flip horizontal
Features control	Min/Max Settings for display – Histogram Stretching	You can choose manually the gain and offset you want to apply on the image. There is no automatic gain/offset control.
	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

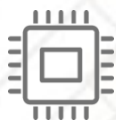
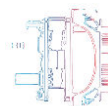




- TEC temperature setting

The cooling temperature capacity greatly depends on the heat dissipation. By default, with the additional heat dissipaters, the achievable TEC setting is 5 to 10° below ambient temperature depending on convection possibilities. By default, the NUCs are calibrated in factory at 25°C.

Heat dissipaters can be mounted on the side of the camera for increased performance (increased temperature delta by 10 to 15°C). For more detailed information, contact us at info@new-imaging-technologies.com.

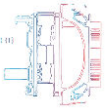


ELECTRO-OPTICS CHARACTERISTICS

Consumption	<5W TECless
	<4 W TEC only
Dynamic Range	64 dB typical in Low Gain 58 dB typical in Medium Gain 48 dB typical in High Gain
Full well capacity (in CTIA)	> 6520ke- (Low Gain) > 375ke- (Medium Gain) > 65ke- (High Gain)
MTF @ 33lp/mm (typical)	> 50%*
Sensor Noise	TBD
Logarithmic sensibility	600 lsb/decade
QE	> 70%

*performance to be confirmed

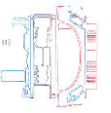




ENVIRONMENT & ACCESSORIES

Storage	-40 to 80 °C
Operating Temperature	-20 to 71 °C

	Power supply cable	WiDyLink SW
LiSa SWIR 640M-SE	✓	✓



ANNEXES Camera Interface

