

The most compact and lightest SXGA 12 μm thermal imaging core in the world Shutterless capable, ready to integrate OEM Camera



IrLugX1M3E™ is an affordable compact and a featherweight thermal imaging camera embedding the new generation of the **1280 x 1024 micro-bolometer with 12 μm pixel** pitch in a ceramic package.

This module is especially designed for simple integration into customer sub-system, enabling low-power consumption, providing an agility of configurations and addressing the medium and high volumes OEMs for **professional markets**.

IrLugX1M3E™ is the plug and play perfect core engine, thanks to **easy to use video digital standard as YCbCr** with 10 bits streaming video up to 3G-SDI or CameraLink with 16 bits. This thermal imaging camera includes the software that performs in real time recording sequence, single image capture and display and **optional Shutterless function**.

IrLugX1M3E™ is ready to integrate in your application thanks to a GUI providing high level services (Configuration and control).

TYPICAL APPLICATIONS

SCOPE OF USE

UAVs, UGVs and Robotics
Handheld Thermal Imaging Devices
Surveillance, Security and Maritime Cameras
Night Vision Goggles
Automotive and Aircraft Safety Vision
Machine Vision Inspection
Medical Imaging



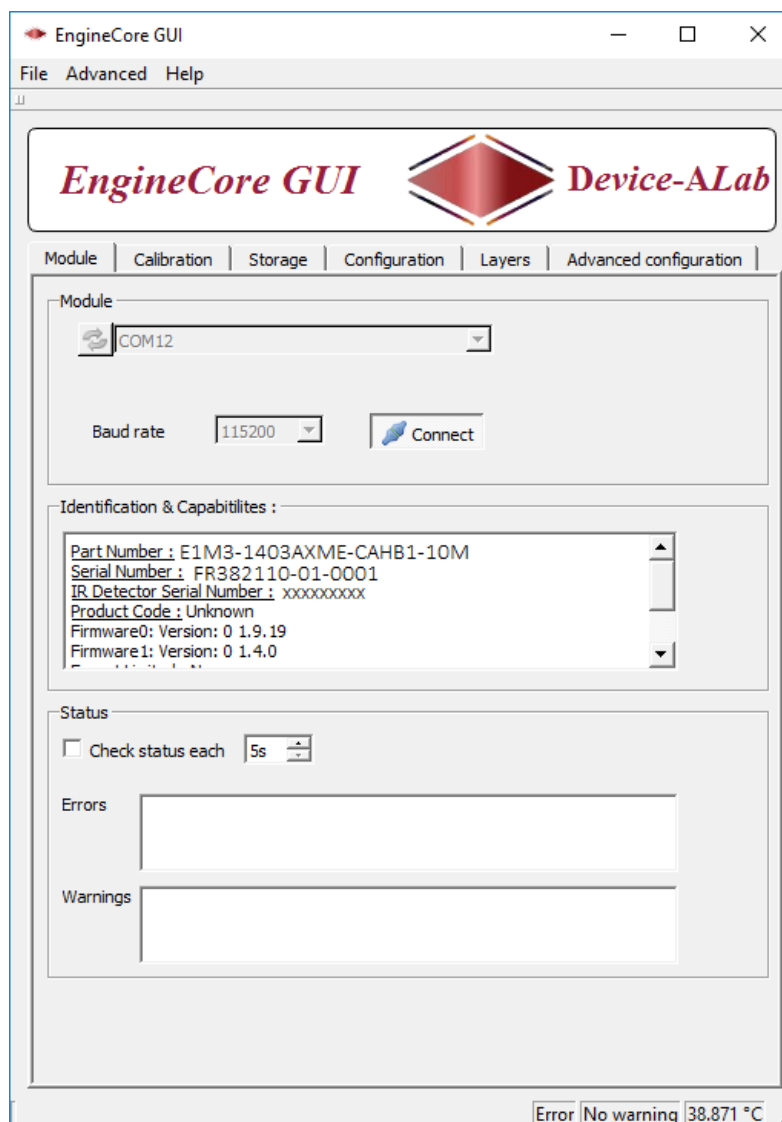
OUTSTANDING IMAGE QUALITY



GUI (GRAPHIC USER INTERFACE)

A user-friendly interface - **natively provided with DEVICE-ALAB Engine Core** - enables system integrator to set-up, control and configuration the camera in a very intuitive manner: BPR (Bad Pixel Replacement), NUC (Non-Uniformity Correction), Calibration (shutterless), AGC (Automatic Gain Correction...) and Calibration can be managed with a few clicks for an optimal set-up.

The GUI includes the manager and maker of the **embedded custom features** (see illustration hereafter)



POSSIBLE MODULARITY OF ENGINE CORE

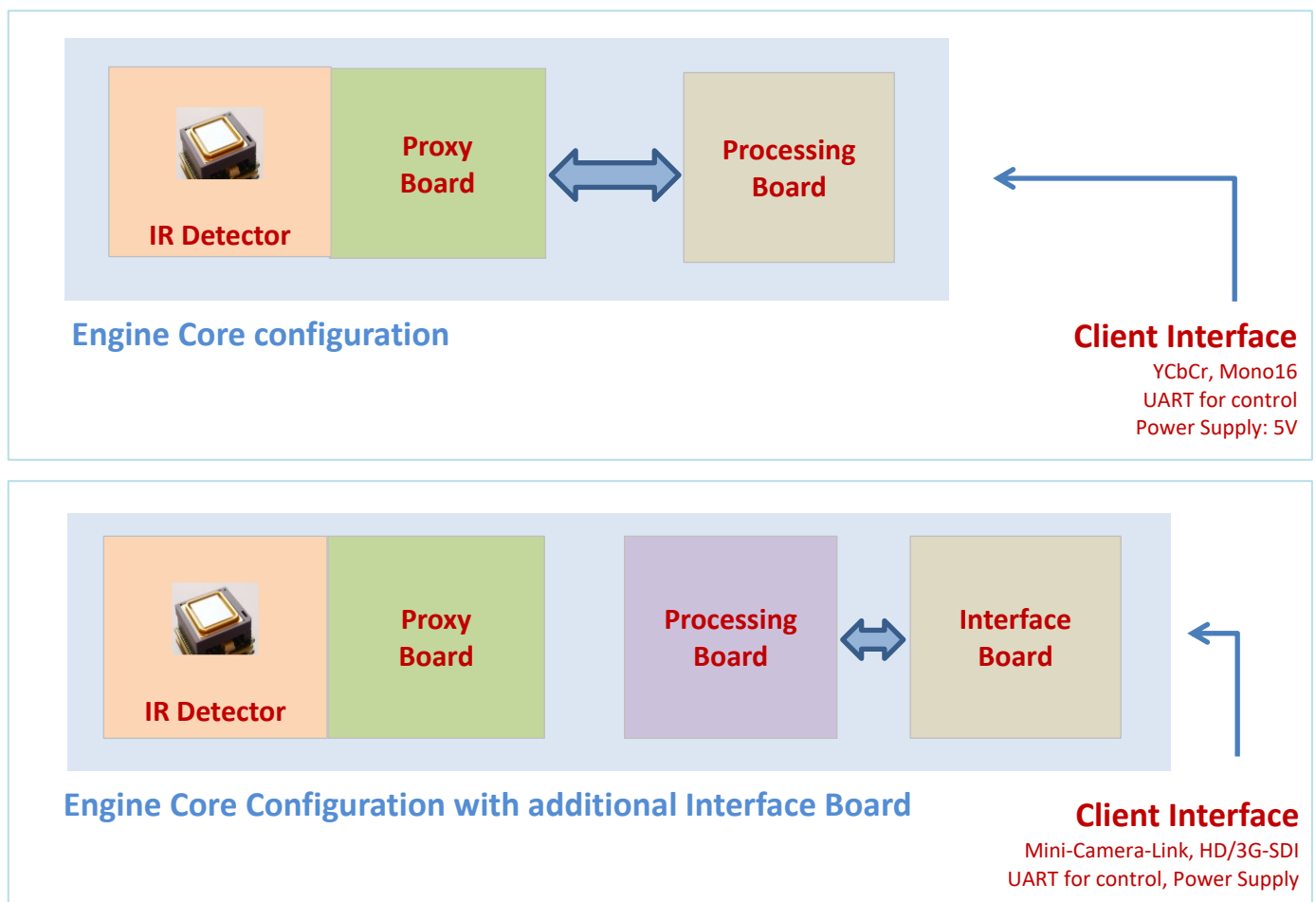
IrLugX1M3E™ is developed using a modular concept and architecture, enabling to embed the optimized and just needed interface to the aimed application.

A Processing Board embeds the image processing into the module.

An Interface Board can be added to the previous stack (see figure below).

Many different standard outputs are available on demand: YCbCr, Mono16, HD/3G-SDI or Camera-Link interface with specific Power Supply. Such a wide choice of variants perfectly serves the designers of electrooptical systems in Surveillance and Security, UAVs, UGVs and Machine Vision applications.

As for handheld and portable devices, **IrLugX1M3E™** also fits as the fundamental Infrared stack. However, a “Platform” is an alternative to be seriously considered: it natively features a microcontroller, power management and video stack, which secures and smoothens device integration.



Technical characteristics described in this data sheet are for information only and are not contractual. Because of ongoing product enhancements, specifications are subject to change without notice.
IrLugX1M3E-Specsheetrev4 © December 2021 - All rights reserved.

KEY SPECIFICATIONS OF ENGINE CORE MODEL

FEATURES	PARAMETERS	DESCRIPTION
Camera resolution	1280x1024 pixels	Based on ATTO1280 (Micro-bolometer technology with 12 μm pixel pitch)
Spectral response (LWIR)	8 – 14 μm	Without optics
NETD (F/1 ; 300K ; 30 Hz)	< 60 mK (standard) < 50 mK (on demand)	Refer to Performance Grade section for more details on Operability and NETD
Power consumption	< 2.8 W	@ 30 Fps Engine core with Shutter-Less mode set OFF
Interface connector:	DF40C-60DP (Header)	
<u>Video:</u> Format	YCbCr (10 bits) Mono16 (16bits)	NUC and BPC are the sole processing items available in this mode
External Pixel Clock Synchronization	Yes	
<u>Digital output/input:</u> Control Upgrade	UART UART	
<u>Electrical digital output/Input:</u> <u>Power Supply:</u> Voltage External Frame trigger	3.3V (Standard) or 1.8V (optional) 5.0V +10% Yes	Option available on demand Free run software frame trigger; External hardware frame trigger Frame trigger replication
No Shutter	Standard	
Mechanical Shutter management	Yes	Trigger of external shutter
Shutter-Less	Optional	Two points Shutter-less (optional on demand)
User Configuration Storage	Up to 4	On module
Storage Calibration Table	Up to 4	On module
Time to image	< 6 s	Time from power supply ON
<u>Image Processing:</u> Calibration	Yes	Configuration dependence Two point calibration (software triggered) One point calibration (software and hardware triggered)
Image Optimization	NUC; BPC; AGC (Brightness, Contrast)	Tunable local AGC: Linear 1%; Smooth
Rescale	x1 to x4	Continuous zoom, depending on configuration
Color Rendering	Yes	White Hot; Black Hot; Glow; Fire; Iron; Rainbow; Custom
Symbology (OSD)	28 areas	Configurable Position, Size, Alpha, Color, Content
Image Flip	Yes	
Full Frame Rate	60 Hz	Full Frame rate on demand only
Nominal Frame Rate	30 Hz (standard) 9 Hz	Exportable Frame Rate: 9 Hz
Qualification grade	Industrial (Standard grade) Extended or Military (MIL-STD-810E)	For Military grade only with selective sorting test concerning climatic stress screening based on MIL-HDBK-2164A
Mechanical Shock (TWS)	1000g, 0.4ms, ½ sine X & Y axis 700g, 0.3ms, ½ sine Z axis	For only configuration of module without shutter
Operating temperature range	-20°C ; +60°C (Standard grade) -40°C; +70°C (Extended or Military grade)	For Military grade only with selective sorting test concerning climatic stress screening based on MIL-HDBK-2164A
Size: Length x Width x Height Weight	35 x 35 x 27 mm ³ < 90 g	With mechanical casing, excluding optics and mechanical Shutter With mechanical casing, excluding optics and mechanical Shutter
Storage Data Retention	> 20 years	

KEY SPECIFICATIONS OF CAMERA-LINK MODEL

FEATURES	PARAMETERS	DESCRIPTION
Sensor resolution & performance	refer to Engine Core table above	
Video Format	16 bits	Camera-Link Data
Standard Frame rate	30 Hz	
Maximum Frame rate	60 Hz	Full Frame rate on demand only
Exportable Frame rate	9 Hz	
No Shutter	Standard	
Mechanical Shutter Management	Yes	Trigger of external shutter Activated Input
Shutter-Less	Optional	Two points Shutter-less (optional on demand)
User Configuration Storage	4	On module
Storage Calibration Table	Up to 4	On module
Time to image	< 6 s	Time from power on at power supply pin
Image Processing and calibration	Yes	Refer to Key Specification sheet of Engine Core Model
Camera-Link Connector	3M – SDR 26 pin	
PoCL (Power over Camera-Link)	12V	Standard Compliance of Camera-Link
External Trigger Input	Yes	100 Ohm terminated LVDS logic Standard
Camera Communication and Control	Via SerTFG, SerTC LVDS serial Interface	
HR10 Hirose – 6 pin Connector	HR10-7R-6PA	Mapping part: HR10A-7P-6S
Positive Power Supply	8V to 32V max. DC	Polarity Reverse Supply protection
Power Consumption	<4.1 W	@ 30 Hz Frame rate with Shutter-Less mode set OFF
Shutter Requested Output	3V3 CMOS	Digital logic, 330 Ohm in serial internal resistor
Shutter Activated Input	3V3 or 5V0	Digital logic
External Trigger Input	3V3 or 5V0	Digital logic
Qualification grade	Industrial (Standard grade) Extended or Military (MIL-STD-810G)	For Military grade only with selective sorting test concerning climatic stress screening based on MIL-HDBK-2164A
Operating temperature range	-20°C ; +60°C (Standard grade) -40°C ; +70°C (Extended or Military grade)	
Size: Length x Width x Height	35 x 35 x 47 mm ³	With mechanical casing, excluding optics and mechanical Shutter
Weight	<90 g	With mechanical casing, excluding optics and mechanical Shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
<ul style="list-style-type: none"> - Camera-Link Frame Grabber board - Camera-Link Cable 		

KEY SPECIFICATIONS OF SDI CAMERA MODEL

FEATURES	PARAMETERS	DESCRIPTION
Sensor resolution & performance	refer to Engine Core table above	
Video Format	HD-3G	Switchable via RS422/RS485 Control
Image Resolution	1080p25, 1080p29.97, 1080p30	ANSI/SMPTE-292 (HD-SDI; 1.485Gbit/s)
Standard/Standard Frame rate	1080p50, 1080p59.94, 1080p60	ANSI/SMPTE-424M (3G-SDI; 2.97Gbits/s)
Exportable Frame rate	8.33Hz-7.49Hz	
No Shutter	Standard	
Mechanical Shutter Management	Yes	Trigger of external shutter Activated Input/Shutter Requested output
Shutter-Less	Optional	Two points Shutter-less (optional on demand)
User Configuration Storage	Up to 4	On module
Storage Calibration Table	Up to 4	On module
Time to image	< 6 s	Time from power on at power supply pin
Image Processing and calibration	Yes	Refer to Key Specification sheet of Engine Core Model with image processing for human vision
Video output Connector	HD-BNC (Micro-BNC female)	
Video Output Impedance	75 Ohm	ANSI/SMPTE (Compliance of 3G-SDI Standard)
Video Output Signal Level	Compliance of 3G-SDI Standard	ANSI/SMPTE
Error bit with CRC	Compliance of 3G-SDI Standard	ANSI/SMPTE including 100m max. length cable
Latency time	<1/4 of frame	
HR10 Hirose – 16 pin Connector	HR25-9TR-16PA	Mating part: HR25-9TJ-16S
Camera Communication and Control	RS422/RS485	Full duplex mode , compliance with ANSI/TIA/EIA-422/EIA485, up to 500Kps
Positive Power Supply Voltage	8V to 32V max. DC	Polarity Reverse Supply protection
Power Supply status LED	Yes	Green color Led for Power on, possible disable
Power Supply Over Coax	12V to 14V @ < 4.5W	
Power Consumption	< 4.5 W	@ 1080p30 video format with Shutter-Less mode set OFF
Output External GenLock (Synchronization)	CMOS 2V5	
Horizontal Synchronization/ Input External GenLock	LVDS (+/-350 mV c/c) ECL logic	Differential signal (100 Ohm impedance matching)
Vertical Synchronization	LVDS (+/-350 mV c/c) ECL logic	Differential signal (100 Ohm impedance matching)
Shutter Requested Output	CMOS 2V5	
Shutter Activated Input	CMOS 2V5, 3V3 or TLL 5V0	
Qualification grade	Industrial (Standard grade) Military (Extended or MIL-STD-810G)	For Military grade only with selective sorting test concerning climatic stress screening based on MIL-HDBK-2164A
Operating temperature range	-20°C ; +60°C (Standard grade) -40°C ; +70°C (Extended or Military grade)	
Size: Length x Width x Height	35 x 35 x 43 mm ³	With mechanical casing, excluding optics and mechanical Shutter
Weight	<90 g	With mechanical casing, excluding optics and mechanical Shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
Camera Interface cable for camera control, power supply, other signals		
PCIe SDI Video Capture board		
HD-BNC to BNC 75 Ohm Cable		

ORDER YOUR OWN AND GET IT!

SXGA Engine Core MODEL (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
IrLugX1M3E No Shutter	30 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 101 mm ³ / 325 g	E1M3-1401ABEMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	30 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 80 mm ³ / 140 g	E1M3-1401ABKMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	30 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 110 mm ³ / 260 g	E1M3-1401AATMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	30 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 106 mm ³ / 245 g	E1M3-1401AAOMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	30 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 108 mm ³ / 280 g	E1M3-1401AAYMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 101 mm ³ / 325 g	E1M3-1401EBEMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 80 mm ³ / 140 g	E1M3-1401EBKMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 110 mm ³ / 260 g	E1M3-1401EATMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 106 mm ³ / 245 g	E1M3-1401EAOMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 108 mm ³ / 280 g	E1M3-1401EAYMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	30 Hz	No	35 x 35 x 41 mm ³ / 100 g	E1M3-1401AXMI-CAHB1- <u>10S</u>
IrLugX1M3E No Shutter	9 Hz	No	35 x 35 x 41 mm ³ / 100 g	E1M3-1401EXMI-CAHB1- <u>10S</u>

SXGA MODEL with Camera-Link (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
IrLugX1M3E No Shutter	30 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 107 mm ³ / 365 g	E1M3-1501ABEMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	30 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 86 mm ³ / 180 g	E1M3-1501ABKMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	30 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 116 mm ³ / 300 g	E1M3-1501AATMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	30 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 112 mm ³ / 285 g	E1M3-1501AAOMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	30 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 114 mm ³ / 320 g	E1M3-1501AAYMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 107 mm ³ / 365 g	E1M3-1501EBEMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 86 mm ³ / 180 g	E1M3-1501EBKMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 116 mm ³ / 300 g	E1M3-1501EATMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 112 mm ³ / 285 g	E1M3-1501EAOMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 114 mm ³ / 320 g	E1M3-1501EAYMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	30 Hz	No	35 x 35 x 47 mm ³ / 140 g	E1M3-1501AXMI-CACL1- <u>11S</u>
IrLugX1M3E No Shutter	9 Hz	No	35 x 35 x 47mm ³ / 140 g	E1M3-1501EXMI-CACL1- <u>11S</u>

SXGA MODEL with SDI (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
IrLugX1M3E No Shutter	30/29.97 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 107 mm ³ / 360 g	E1M3-1801ABEMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	30/29.97 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 86 mm ³ / 175 g	E1M3-1801ABKMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	30/29.97 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 116 mm ³ / 295 g	E1M3-1801AATMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	30/29.97 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 112 mm ³ / 280 g	E1M3-1801AAOMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	30/29.97 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 114 mm ³ / 315 g	E1M3-1801AAYMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	60 mm; HFOV: 14.4°; F/1.25	62 x 62 x 107 mm ³ / 360 g	E1M3-1801EBEMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	35 mm; HFOV: 24.4°; F/1.10	37 x 37 x 86 mm ³ / 175 g	E1M3-1801EBKMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	19 mm; HFOV: 44.0°; F/1.05	47 x 47 x 116 mm ³ / 295 g	E1M3-1801EATMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	15 mm; HFOV: 60.4°; F/1.10	35 x 35 x 112 mm ³ / 280 g	E1M3-1801EAOMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	8.5 mm; HFOV: 84.5°; F/1.05	45 x 45 x 114 mm ³ / 315 g	E1M3-1801EAYMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	30/29.97 Hz	No	35 x 35 x 47 mm ³ / 135 g	E1M3-1801AXMI-CASD4- <u>12S</u>
IrLugX1M3E No Shutter	8.33/7.49 Hz	No	35 x 35 x 47mm ³ / 1135 g	E1M3-1801EXMI-CASD4- <u>12S</u>

Note of Part numbering:

The two of three last digits refer to different product versions. These are summarized in table of **compatibility version**.

The last digit means the **maturity level** of the device. For example: **S** refers to engineering Sample.

M refers to Mass production unit which is **MIL-STD-810G** qualified.

PERFORMANCE GRADE

IrLugX1M3E™ offers a performance grade:

FEATURES	Standard Grade	High Grade
NETD	<60mK	<50mK
Operability	>99.5%	>99.8%
Bad line	<=1 outside 320x240 central area	0
Bad column	<=1 outside 320x240 central area	0

Operability is the number of valid pixels, including defective line or column.

Theses defects are corrected by the core but can appear during operation depending on conditions.

COMPATIBILITY VERSION OF CAMERA MODEL VERSUS THE HOST CONTROLLER INTERFACE

RELEASE VERSION	RELEASE DATE	NEW FEATURES
<u>10</u>	May 2021	Engine Core independent of customer operating system
<u>11</u>	Mayr 2021	Camera-Link Frame Grabber ⁽¹⁾
<u>12</u>	May 2021	SDI Frame Grabber ⁽²⁾

(1) Compatible with the frame grabber boards:

- 1624 Grablink Base of EURESYS manufacturer
- 1433 of National Instrument manufacturer
- Xcelera-CL PX4 of Teledyne manufacturer

(2) Compatible with the frame grabber boards:

- Grabber DeckLink Duo 2 of BlackMagic

WHAT'S IN THE BOX

Module of Thermal Imaging Camera

ICD (mechanical drawings)

GUI

Documentation (user's guide)

Downloadable on Device-ALab website through customer access

General Notices:

This OEM module is intended only for product evaluation, development or incorporation into other product or sub-system. It is not a finished end-product fit for general consumer use. As such, this module is without the scope of the European Union (EU) directives concerning electromagnetic compatibility (EMC).

The products described herein are subject to French Government Export Controls except the products of lower or equal than 9 Hz frame rates.