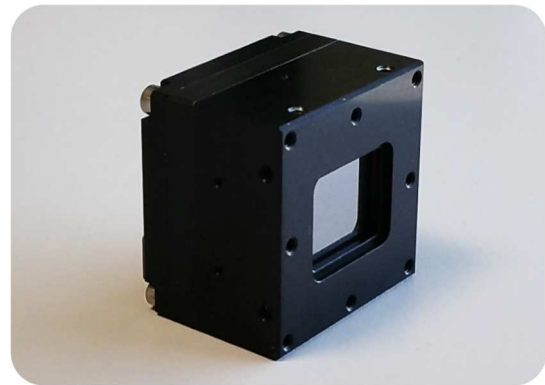
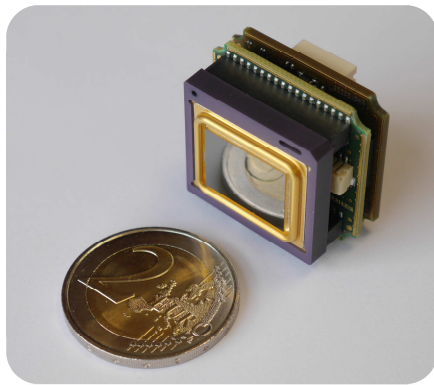


The QVGA+ Smart Thermal Imaging Camera One of the Most Compact and Lightest High Resolution of InfraRed Camera OEM in the World

- **Best Embedded Solution for Core Engine Camera Integrator** -



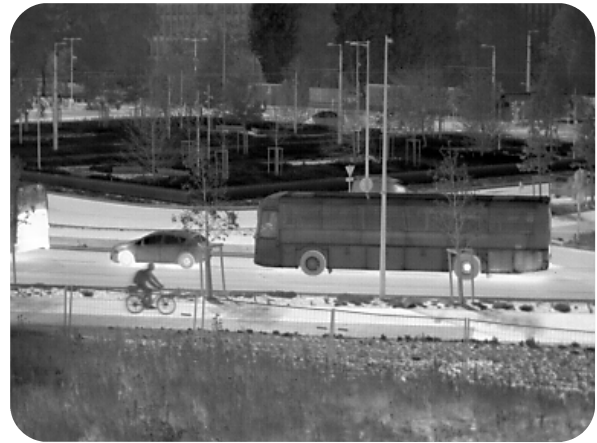
SmartIR384B is an affordable compact and a featherweight thermal imaging camera module especially designed for simply being integrated into the customer sub-system, enabling a high image quality with low-power consumption, providing an agility of configurations and addressing the medium volumes application makers

SmartIR384B is the plug and play perfect core engine, thanks to **easy to use video digital standard as BT656** with 8 bits streaming video. This thermal imaging camera includes the software that performs image processing and control

SmartIR384B is ready to integrate in your application thanks to a GUI providing high level services (Configuration and control)

SCOPE OF USE

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



KEY TECHNICAL SPECIFICATIONS OF ENGINE CORE MODEL

FEATURES	SmartIR384B	DESCRIPTION
Camera resolution	384x288 pixels	Micro-bolometer technology with 17µm pixel pitch : PICO384-053 detector
Spectral response (LWIR) NETD (F/1 ; 300K ; 30 Hz)	8 – 14 µm < 60 mK	Without optics
Power consumption	< 1.1 W	SmartIR384EB @ 30 Fps engine core only with Shutter-Less mode set OFF
Interface connector:	DF40C-60DP (Header)	
<u>Video:</u> Format	BT656 (8 bits) YCbCr (10 bits) Mono16 (16bits)	Only NUC and BPC treatment 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	3.3V (Standard) or 1.8V (optional) 5.0V +-10%	Optional on demand
<u>External Frame trigger</u>	Yes for SmartIR384B No for SmartIR384E	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	1	On module
Storage Calibration Table	Up to 8	On module
Time to image	< 3 s	Time from power on at power supply
<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)	AGC: Linear 1%; Enhanced; Manual, ROI, Smooth
Rescale	x1 to x4	Continuous zoom, depending on configuration
Color Rendering	Yes	White Hot; Black Hot; Glow; Fire; Iron; Rainbow; Custom
Symbology (OSD)	16 areas	Configurable Position, Size, Alpha, Color, Content
Image Flip	Yes	
Full Frame Rate	60 Hz	
Nominal Frame Rate	30 Hz (standard)	
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)	
Size : Length x Width x Height	30.0 x 30.0 x 23 mm ³	With mechanical encased, excluding optic and mechanical Shutter
Weight	< 38 g	With mechanical encased, excluding optic and mechanical Shutter
Storage Data Retention	> 20 years	
Customer configurations available on demand for following interfaces: SDI; Camera-Link; Analog video output (PAL-NTSC) with specific power supply		

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. SmartIR384B-Specsheetrev4 © Jan 2020 - All rights reserved.

KEY SPECIFICATIONS OF ANALOG CAMERA MODEL (PAL/NTSC)

FEATURES	PARAMETERS	DESCRIPTION
Base Camera Resolution	384 x 288 pixels	Micro-bolometer technology with 17µm pixel pitch : PICO384-053 detector
Spectral response (LWIR) NETD (F/1 ; 300K ; @30 Hz)	8 – 14 µm < 60 mK	Without optics
Video Standard	PAL/NTSC	
Image Resolution of Video Standard	288i/240i	
Standard Frame rate	25.00Hz/29.97Hz	
Exportable Frame rate	8.33Hz/7.49Hz	
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	1	On module
Storage Calibration Table	Up to 8	On module
Time to image	< 3 s	Time from power on at power supply pin
Image Processing and calibration	Yes	Refer to Key Specification sheet of Engine Core Model
Video output 1 Connector	HD-BNC (Micro-BNC female)	
Video output 2 Connector	Samtec (TEM-110-02-03.0-G-D-L1)	20 pin Connector, Mapping part : Samtec ISDE-10-D-L
Video Output Impedance	75 Ohm	
Video Output Signal Level	1V p/p	CCIR Rec. 569 for PAL/ FCC for NTSC
Video Differential Gain and Phase	+3% / +3°max.	CCIR Rec. 569 for PAL/ FCC for NTSC
Video Signal to Noise ratio (Unweighted, 5 MHz activated Low Pass filter)	62 dB max. 59 dB max.	On one quiet line per CCIR Rec. 569 for PAL and @ Video output 1 On one quiet line per NTC-7 for NTSC and @ Video output 1
Video Group Delay and Gain	+0.05 µs/+1.0dB +0.1 µs/+1.0dB	Ref. at 0.24 MHz to 4.3 MHz for PAL and @ Video output 1 Ref. at 0.20 MHz to 4.0 MHz for NTSC and @ Video output 1
Power supply and digital signal Connector	Samtec (TEM-110-02-03.0-G-D-L1)	20 pin Connector
Positive Power Supply Voltage	4V to 14V max. DC	Polarity Reverse, Over and Under Supply protection and limitation
Power Consumption	<1.5 W < 1.8 W	SmartIR384B @ 30 Hz Frame rate with Shutter-Less mode set OFF SmartIR384E @ 30 Hz Frame rate with Shutter-Less mode set OFF
Camera Communication and Control	RS232	Compliance with EIA/TIA-232E, IUT-T V.28, up to 460 kbps
External Trigger Input	3V3 or 5V0	Digital logic, 5 K Ohm pull-down internal resistor, only for SmartIR384B
Data CLK Output: PAL/NTSC	BT656, 3V3 CMOS	Digital BT656, 29.5 MHz/24.54 MHz
Video data Output (Data_0 to Data_7)	BT656, 8 bits, 3V3 CMOS	Digital BT656
Shutter Requested Output	Yes, 3V3 CMOS	Digital logic
Shutter Activated Input	Yes, 3V3 or 5V0	Digital logic
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 For only configuration of module without shutter
Mechanical Shock (TWS)	1000g, 0.4ms, ½ sine X & Y axis 700g, 0.3ms, ½ sine Z axis	
Size : Length x Width x Height	30.0 x 30.0 x 39 mm ³	With mechanical encased & HD-BNC connector, excluding optic and mechanical Shutter
Weight	< 50g	With mechanical encased & HD-BNC connector, excluding optic and mechanical Shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
<ul style="list-style-type: none"> - Camera Interface Cable with Unterminated leads (Samtec SESDT-10-32-G-20.0-L) - HD-BNC to BNC 75 Ohm Cable 		

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KEY SPECIFICATIONS OF CAMERA-LINK MODEL

FEATURES	PARAMETERS	DESCRIPTION
Base Camera Resolution	384 x 288 pixels	Micro-bolometer technology with 17µm pixel pitch : PICO384-053 detector
Spectral response (LWIR) NETD (F/1 ; 300K ; @30 Hz)	8 – 14 µm < 60 mK	Without optics
Video Format	16 bits	Camera-Link Data
Standard Frame rate	30 Hz	
Maximum Frame rate	60 Hz	
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	1	On module
Storage Calibration Table	Up to 8	On module
Time to image	< 3 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, only for SmartIR384B
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	<1.4 W <1.6 W	SmartIR384B @ 30 Hz Frame rate with Shutter-Less mode set OFF SmartIR384E @ 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, only for SmartIR384B
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
Operating temperature range	-20°C ; +60°C (Standard grade) -40°C ; +70°C (Extended or Military grade)	
Size : Length x Width x Height	30 x 30 x 40 mm ³	With mechanical encased & connectors, excluding optic and mechanical Shutter
Weight	< 60g	With mechanical encased & connectors, excluding optic and mechanical Shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
- Camera-Link Frame Grabber board		
- Camera-Link Cable		

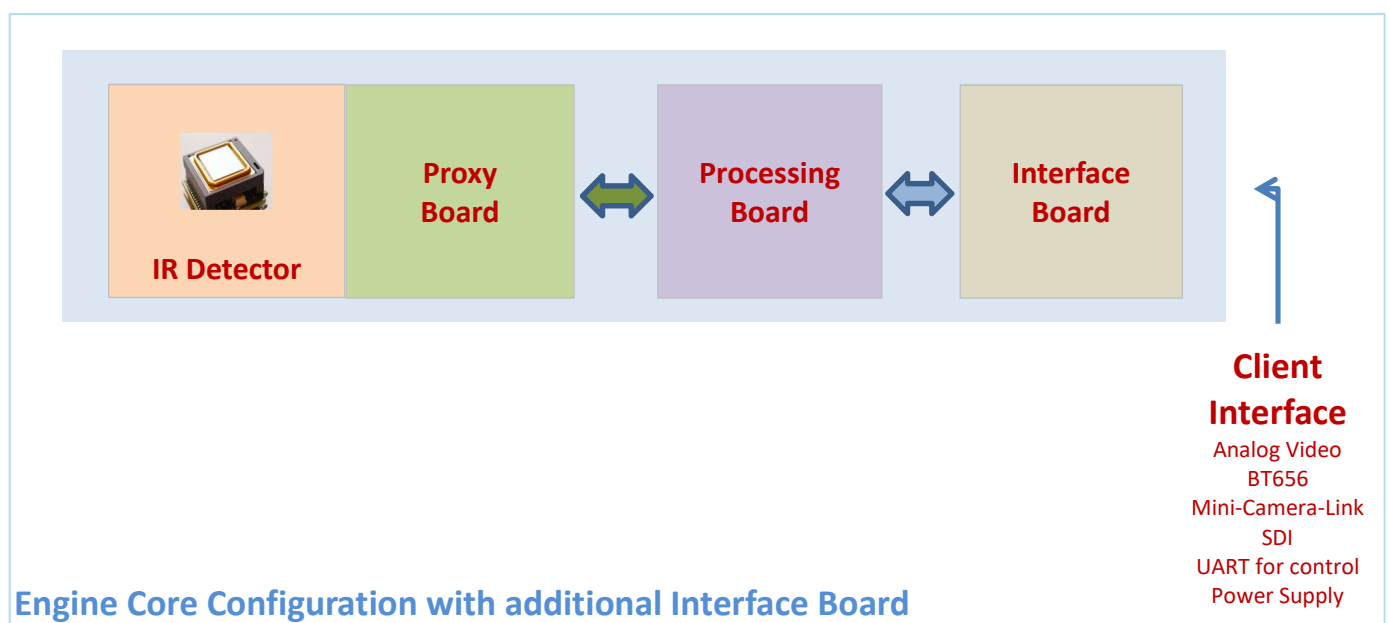
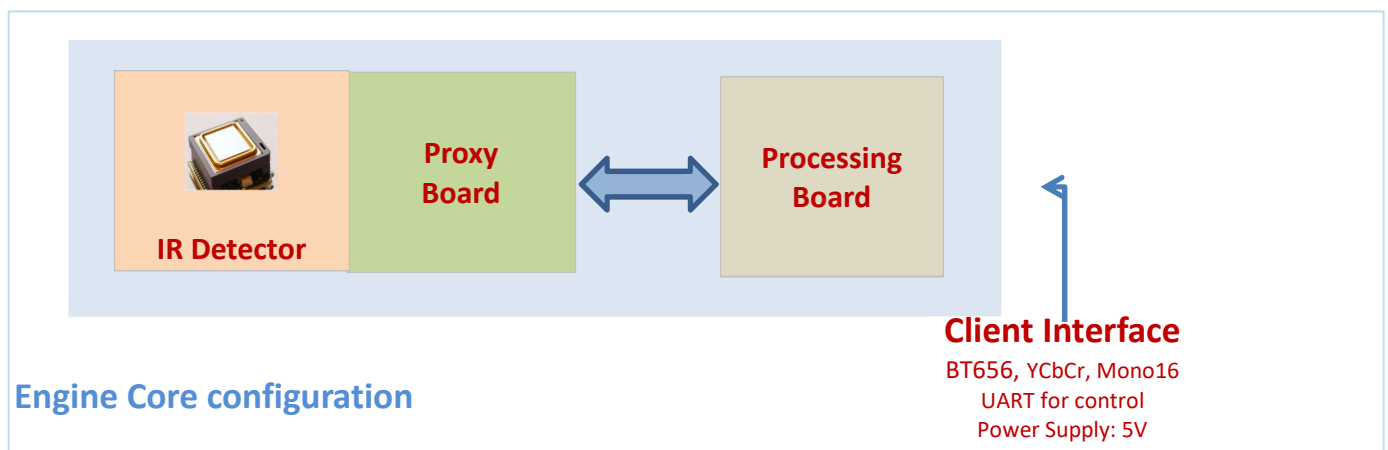
POSSIBLE MODULARITY OF ENGINE CORE

SmartIR384B is developed using a modular concept and architecture.

A Processing Board embeds the image processing into the module mainly for Hunting Goggles and Nature Viewing, Surveillance and Security, UAVs, UGVs and Machine Vision applications.

For handheld and portable application, an Interface Board can be added to the previous stack (see figure below), allowing to embed the optimized and just needed interface to the aimed application.

Many different standard outputs are available on demand: BT656, SDI, Camera-Link, Analog Video output (PAL-NTSC) interface with specific Power Supply.



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ORDER YOUR OWN AND GET IT!

Engine Core QVGA+ MODEL (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
SmartIR384B No Shutter	30 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 56 mm ³ / 86 g	E38B-1401AVAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	30 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 56 mm ³ / 96 g	E384-1401AIAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	30 Hz	19 mm; HFOV: 19.4°; F/1.23	30 x 30 x 44 mm ³ / 72 g	E384B-1401AJAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	30 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 44 mm ³ / 70 g	E384B-1401AHAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	30 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 56 mm ³ / 60 g	E384B-1401AGAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 56 mm ³ / 86 g	E384B-1401EVAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 56 mm ³ / 96 g	E384B-1401EIAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	19 mm; HFOV: 19.4°; F/1.23	30x 30 x 44 mm ³ / 72 g	E384B-1401EJAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 44 mm ³ / 70 g	E384B-1401EHAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 56 mm ³ / 60 g	E384B-1401EGAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	30 Hz	No	30 x 30 x 23 mm ³ / 38 g	E384B-1401AXAI-CAHB1- <u>10S</u>
SmartIR384B No Shutter	9 Hz	No	30 x 30 x 23 mm ³ / 38 g	E384B-1401EXAI-CAHB1- <u>10S</u>

QVGA+ MODEL with Analog Video (PAL/NTSC) (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
SmartIR384B No Shutter	25/30 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 65 mm ³ / 98 g	E384B-1101AVAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	25/30 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 65 mm ³ / 108 g	E384B-1101AIAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	25/30 Hz	19 mm; HFOV: 19.4°; F/1.23	30 x 30 x 53 mm ³ / 72 g	E384B-1101AQAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	25/30 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 53 mm ³ / 82 g	E384B-1101AHAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	25/30 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 62 mm ³ / 72 g	E384B-1101AGAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 65 mm ³ / 98 g	E384B-1101EVAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 65 mm ³ / 108 g	E384B-1101EIAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	19 mm; HFOV: 19.4°; F/1.23	30 x 30 x 53 mm ³ / 84 g	E384B-1101EQAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 53 mm ³ / 82 g	E384B-1101EHAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 62 mm ³ / 72 g	E384B-1101EGAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	25/30 Hz	No	30 x 30 x 39 mm ³ / 50 g	E384B-1101AXAI-CASM1- <u>10S</u>
SmartIR384B No Shutter	8.33/7.49 Hz	No	30 x 30 x 39 mm ³ / 50 g	E384B-1101EXAI-CASM1- <u>10S</u>

QVGA+ MODEL with Camera-Link (With housing and standard grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
SmartIR384B No Shutter	30 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 77 mm ³ / 108 g	E384B-1501AVAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	30 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 74 mm ³ / 118 g	E384B-1501AIAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	30 Hz	19 mm; HFOV: 19.4°; F/1.23	30 x 30 x 62 mm ³ / 94 g	E384B-1501AQAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	30 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 62 mm ³ / 92 g	E384B-1501AHAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	30 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 58 mm ³ / 82 g	E384B-1501AGAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	35 mm; HFOV: 10.5°; F/1.14	38 x 38 x 77 mm ³ / 108 g	E384B-1501EVAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	25 mm; HFOV: 15°; F/1.20	30 x 30 x 74 mm ³ / 118 g	E384B-1501EQAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	19 mm; HFOV: 19.4°; F/1.23	30 x 30 x 62 mm ³ / 94 g	E384B-1501EIAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	16.7 mm; HFOV: 22.5°; F/1.25	30 x 30 x 62 mm ³ / 92 g	E384B-1501EHAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	7.5 mm; HFOV: 51°; F/1.40	30 x 30 x 58 mm ³ / 82 g	E384B-1501EGAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	30 Hz	No	30 x 30 x 40 mm ³ / 60 g	E384B-1501AXAI-CACL1- <u>11S</u>
SmartIR384B No Shutter	9 Hz	No	30 x 30 x 40 mm ³ / 60 g	E384B-1501EXAI-CACL1- <u>11S</u>

Note of Part numbering:

The two of three last digits 10 or 11 means different product versions. These are summarized in table of compatibility version.

The last digit means the maturity level of the device. For example: **S** is meaning an engineering sample device. **M** is meaning the mass production device.

COMPATIBILITY VERSION OF CAMERA MODEL VERSUS THE HOST CONTROLLER INTERFACE

RELEASE VERSION	RELEASE DATE	NEW FEATURES
<u>10</u>	June 2017	Engine Core independing on customer operating system
<u>11</u>	July 2019	Camera-Link Frame Grabber ⁽¹⁾

- (1) Compatible with the frame grabber boards:
- 1624 Grablink Base of EURESYS manufacturer
 - 1433 of National Instrument manufacturer
 - Xcelera-CL PX4 of Teledyne manufacturer

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.