

The sole ultra SWaP European-made VGA thermal imaging camera core

No more struggle choosing between size, weight or power!



MicroCube640E™ is Device-ALab latest generation of thermal cores in 12 μ m pixel pitch featuring true SWaP. This module is especially designed for simple integration into customer sub-system, enabling low size, low-power consumption, providing an agility of configurations and addressing the medium and high volumes.

MicroCube640E™ is the plug and play perfect engine core, thanks to **easy to use video digital standard**. Several data formats are available: **BT656, RGB24, YCbCr, MONO16 on various interfaces such as USB-UVC and MIPI-CSI2**. All variants include the software that performs image processing and control.

MicroCube640E™ ready to integrate in your system!

MicroCube640E



PRELIMINARY SPECIFICATIONS

Plug, Sense&Play the Heat

TYPICAL APPLICATIONS

MicroCube640E™ is the ideal candidate for all applications where consumption and/or footprint are key factors, namely

UAVs,

UGVs,

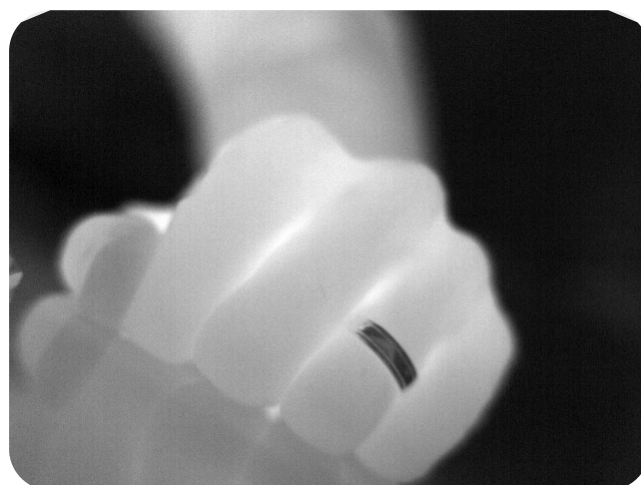
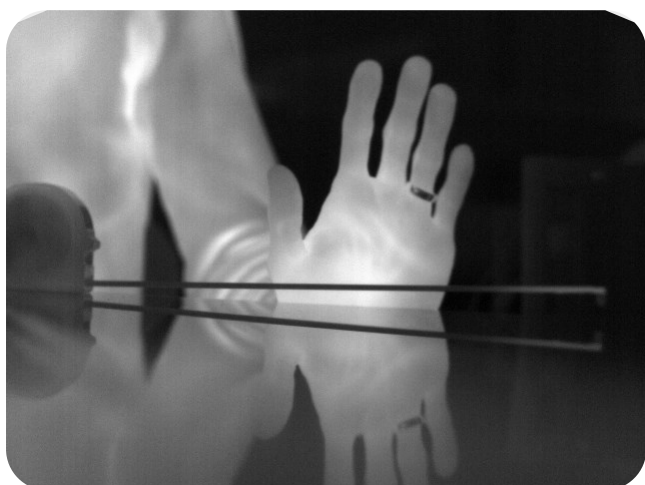
robot-type platforms

Night Vision Goggles and Sights

All battery-powered equipments.



OUTSTANDING IMAGE QUALITY



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.
MicroCube40ES-Preliminary-Specsheetrev3.0 © Dec 2022 - All rights reserved.

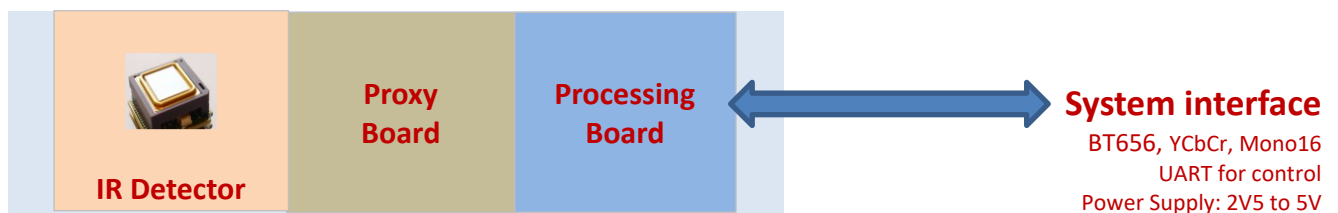
MODULARITY VIA ENGINE CORE VARIANTS

MicroCube640E is developed using a modular concept and architecture, enabling to embed the optimized and just needed interface to the aimed application.

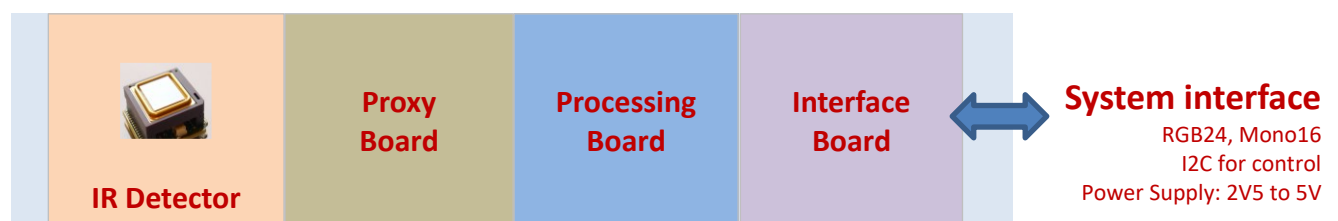
A Processing Board embeds the image processing into the module.

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

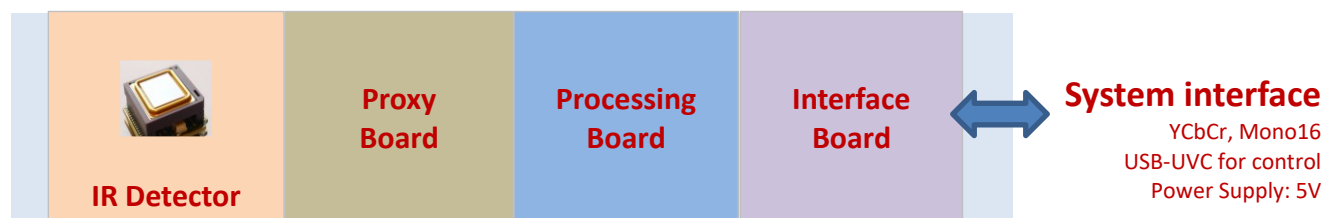
Different standard outputs are available, natively or on demand: BT656, YCbCr, Mono 16 bits CMOS and MIPI-CSI interface with specific Power Supply. Such a wide choice of variants perfectly serves the designers of electrooptical systems in Surveillance and Security, UAVs, UGVs and Machine Vision applications.



Native Engine Core variant



MIPI-CSI Engine Core variant



UVC Engine Core variant

KEY TECHNICAL SPECIFICATIONS OF ENGINE CORE NATIVE VARIANT

FEATURES	PARAMETERS	DESCRIPTION
Camera resolution	640x480 pixels	Micro-bolometer technology with 12μm pixel pitch : Camera fits to ATTO640 detector
Spectral response (LWIR)	8 – 14 μ m	Without optics
NETD (F/1 ; 300K ; 30 Hz)	< 50 mK < 40 mK	Can be optimized on demand only. Refer to Performance Grade section
Power consumption maximum typical	< 1.1 W 0.950 W	@ 30 Fps engine core with Shutter-Less mode set OFF
Interface connector: Video: Format External Pixel Clock Synchronization Digital output/input: Control Upgrade Electrical digital output/Input: Power Supply: Voltage External Frame trigger No Shutter Mechanical Shutter management Shutter-Less User Configuration Storage Storage Calibration Table Time to image Image Processing: Calibration Image Optimization Rescale Color Rendering Symbology (OSD) Image Flip Full Frame Rate Nominal Frame Rate Exportable Frame rate Qualification grade Mechanical Shock (TWS) Operating temperature range Length x Width x Height Weight Storage Data Retention	DF40C-60DP (Header) BT656 (8 bits) YCbCr (10 bits) Mono16 (16bits) Yes UART UART 3.3V 2.5V to 5.0V Yes Standard Yes Optional 8 Up to 8 < 3 s Yes NUC; BPC; AGC (Brightness, Contrast) x1 to x4 Yes 28 areas Yes 60 Hz 30 Hz (standard) 9 Hz Industrial (Standard grade) Extended or Military (MIL-STD-810E) 1000g, 0.4ms, ½ sine X & Y axis 700g, 0.3ms, ½ sine Z axis -20°C; +60°C (Standard grade) -40°C; +70°C (Extended or Military grade) 22.0 x 22.0 x 26.8 mm ³ < 25 g > 20 years	Mating part: DF40HC(4.0)-60DS NUC and BPC treatment available in this mode Overvoltage protection (up to 20V), Polarity Reverse Supply protection Free run software frame trigger; External hardware frame trigger Frame trigger replication Trigger of external shutter Two points Shutter-less (optional on demand) On module On module Time from power on at power supply Two point calibration (software triggered) One point calibration (software and hardware triggered) Tunable local AGC: Linear 1% Continuous zoom, depending on configuration White Hot; Black Hot; Glow; Fire; Iron; Rainbow; Custom Configurable Position, Size, Alpha, Color, Content For Military grade only with selective sorting test concerning climatic stress screening based on MIL-HDBK-2164A For only configuration of module without shutter With mechanical casing, excluding optics and mechanical shutter With mechanical casing, excluding optics and mechanical shutter

KEY SPECIFICATIONS OF MIPI-CSI CORE VARIANT

FEATURES	PARAMETERS	DESCRIPTION
Sensor resolution & performance	refer to Engine Core table above	
Interface standard	MIPI-CSI2	
Lane number	1 lane	
Lane max speed	600Mbit/s	
<u>Image Resolution</u>	640x480	
Video Format	RGB24 (8bits) Mono16 (16bits)	
<u>Standard/Standard Frame rate</u>		
Full Frame Rate	60 Hz	
Nominal Frame Rate	30 Hz (standard)	
Exportable Frame rate	9 Hz	
No Shutter	Standard	
Mechanical Shutter Management		Trigger of external shutter Activated Input/Shutter On demand output
Shutter-Less	Yes	Two points Shutter-less (configuration dependent)
User Configuration Storage	Optional	On module
Storage Calibration Table	8	On module
Time to image	Up to 8	Time from power on at power supply pin (configuration dependent)
	<3 s	
Image Processing and calibration	Yes	refer to Engine Core table above with image processing for human vision
Latency time	<1/4 of frame	
Interface connector	DF40-40DP (Header)	Mating part: DF40HC(4.0)-40DS
Camera Communication and Control	I2C 3.3V	
Power Supply Voltage	2.5V to 5.0V	Overvoltage protection (up to 20V), Polarity Reverse Supply protection
Power Supply status LED	Yes	Green color Led for Power on, possible disable
Power Consumption		@ 30Hz with Shutter-Less mode set OFF and MIPI-CSI2 on
maximal	< 1.3 W	
typical	<1.1 W	
Input trigger	CMOS 3V3	
Shutter Requested Output	CMOS 3V3	
Shutter Activated Input	CMOS 3V3	
Qualification grade	refer to Engine Core table above	
Mechanical Shock (TWS)	refer to Engine Core table above	
Operating temperature range	refer to Engine Core table above	
Length x Width x Height	22.0 x 22.0 x 26.8 mm ³ (typical)	With mechanical casing, excluding optics and mechanical shutter
Weight	< 25g	With mechanical casing, excluding optics and mechanical shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
Board connector to flex cable, flex cables 15 pins & 22 pins		

KEY SPECIFICATIONS OF USB-UVC CORE VARIANT

FEATURES	PARAMETERS	DESCRIPTION
Sensor resolution & performance	refer to Engine Core table above	
Interface standard	USB	
<u>Image interface</u>	USB UVC 1.1	
Resolution	640x480	
Video Format	YCbCr (8bits) Mono16 (16bits)	
<u>Standard/Standard Frame rate</u>		
Full Frame Rate	60 Hz	
Nominal Frame Rate	30 Hz (standard)	
Exportable Frame rate	9 Hz	
No Shutter	Standard	
Mechanical Shutter Management	Yes	Trigger of external shutter Activated Input/Shutter On demand output
Shutter-Less	Optional	Two points Shutter-less (configuration dependent)
User Configuration Storage	8	On module
Storage Calibration Table	Up to 8	On module
Time to image	<3 s	Time from power on at power supply pin (configuration dependent)
Image Processing and calibration	Yes	refer to Engine Core table above with image processing for human vision
Latency time	Not applicable	
Interface connector	DF40-40DP (Header)	Mating part: DF40HC(4.0)-40DS
Camera Control	USB UVC or CDC	To be define
Power Supply Voltage	5.0V +/- 10%	
Power Supply status LED	No	
Power Consumption		@ 30Hz with Shutter-Less mode set OFF
maximal	< 1.7 W	
typical	<1.6 W	
Input trigger	CMOS 3V3	
Shutter Requested Output	CMOS 3V3	
Shutter Activated Input	CMOS 3V3	
Qualification grade	refer to Engine Core table above	
Mechanical Shock (TWS)	refer to Engine Core table above	
Operating temperature range	refer to Engine Core table above	
Length x Width x Height	22.0 x 22.0 x 26.8 mm ³ (typical)	With mechanical casing, excluding optics and mechanical shutter
Weight	< 25g	With mechanical casing, excluding optics and mechanical shutter
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
Board connector to USB-C connector		

ORDER YOUR OWN AND GET IT!

Engine Core VGA MODEL (With housing and standard qualification and standard performance grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
MicroCube640™ No Shutter	30 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1401ABNHI-DAHBI-10S
MicroCube640™ No Shutter	30 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1401AAMHI-DAHBI-10S
MicroCube640™ No Shutter	30 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1401ABTHI-DAHBI-10S
MicroCube640™ No Shutter	30 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1401ABOHI-DAHBI-10S
MicroCube640™ No Shutter	9 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1401EBNHI-DAHBI-10S
MicroCube640™ No Shutter	9 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1401EAMHI-DAHBI-10S
MicroCube640™ No Shutter	9 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1401EBTHI-DAHBI-10S
MicroCube640™ No Shutter	9 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1401EBOHI-DAHBI-10S
MicroCube640™ No Shutter	30 Hz	No	22x22x27 mm ³ / 25 g	E640-1401AXHI-DAHBI-10S
MicroCube640™ No Shutter	9 Hz	No	22x22x27 mm ³ / 25 g	E640-1401EXHI-DAHBI-10S

VGA MODEL with MIPI-CSI (With housing and standard qualification and standard performance grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
MicroCube640™ No Shutter	30 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1601ABNHI-DAMP1-21S
MicroCube640™ No Shutter	30 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1601AAMHI-DAMP1-21S
MicroCube640™ No Shutter	30 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1601ABTHI-DAMP1-21S
MicroCube640™ No Shutter	30 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1601ABOHI-DAMP1-21S
MicroCube640™ No Shutter	9 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1601EBNHI-DAMP1-21S
MicroCube640™ No Shutter	9 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1601EAMHI-DAMP1-21S
MicroCube640™ No Shutter	9 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1601EBTHI-DAMP1-21S
MicroCube640™ No Shutter	9 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1601EBOHI-DAMP1-21S
MicroCube640™ No Shutter	30 Hz	No	22x22x27 mm ³ / 25 g	E640-1601AXHI-DAMP1-21S
MicroCube640™ No Shutter	9 Hz	No	22x22x27 mm ³ / 25 g	E640-1601EXHI-DAMP1-21S

VGA MODEL with USB-UVC (With housing and standard qualification and standard performance grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
MicroCube640™ No Shutter	30 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1201ABNHI-DAUB5-21S
MicroCube640™ No Shutter	30 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1201AAMHI-DAUB5-21S
MicroCube640™ No Shutter	30 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1201ABTHI-DAUB5-21S
MicroCube640™ No Shutter	30 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1201ABOHI-DAUB5-21S
MicroCube640™ No Shutter	9 Hz	5.5 mm; HFOV: 86.1°; F/1.2	22x22x43mm ³ / 44 g	E640-1201EBNHI-DAUB5-21S
MicroCube640™ No Shutter	9 Hz	7.5 mm; HFOV: 61°; F/1.2	32x32x49 mm ³ / 71 g	E640-1201EAMHI-DAUB5-21S
MicroCube640™ No Shutter	9 Hz	9.2 mm; HFOV: 50°; F/1.0	22x22x43mm ³ / 43 g	E640-1201EBTHI-DAUB5-21S
MicroCube640™ No Shutter	9 Hz	13.6 mm; HFOV: 32°; F/1.0	22x22x42 mm ³ / 43 g	E640-1201EBOHI-DAUB5-21S
MicroCube640™ No Shutter	30 Hz	No	22x22x27 mm ³ / 25 g	E640-1201AXHI-DAUB5-21S
MicroCube640™ No Shutter	9 Hz	No	22x22x27 mm ³ / 25 g	E640-1201EXHI-DAUB5-21S

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** is meaning an engineering sample device.

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

PRELIMINARY SPECIFICATIONS

Plug, Sense&Play the Heat

PERFORMANCE GRADE

MicroCube640E offers a performance grade:

FEATURES	High Grade	Ultra-High Grade
NETD	<50mK	<40mK
Operability	>99.8%	>99.8%
Bad line	0	0
Bad column	0	0

NETD with conditions: F/1 ; 300K ; 30 Hz

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

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

WHAT'S IN THE BOX

Module of Thermal Imaging Camera

ICD (mechanical drawings) }
Documentation (user's guide) } Downloadable on Device-ALab website through customer access

For MIPI-CSI variant only: Driver package for Nvidia Jetson Xavier and Raspberry PI4
For USB-UVC variant: command UART through USB com port

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.