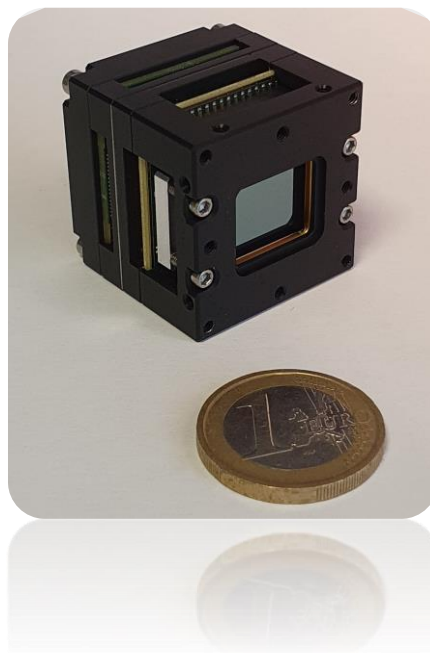


VGA Smart Thermal Imaging Handheld Platform The most compact OEM High Resolution Uncooled Infrared SWaP Platform in the World

- **Ultimate Embedded Solution for Handheld Systems Makers** -



SmartIR640P is a simple and immediate solution for integrators of handheld infrared devices (such as monocular, binocular, head-up displays). It can also be the reference design to be customized and become the handheld core part of the finished end-product of system integrator.

SmartIR640P first model today embeds a 640x480 pixels thermal core, but it will in the future also implement any of DEVICE-ALAB infrared engine core ranges.

It features low-power consumption, providing an agility of configurations and addressing the medium volume application makers.

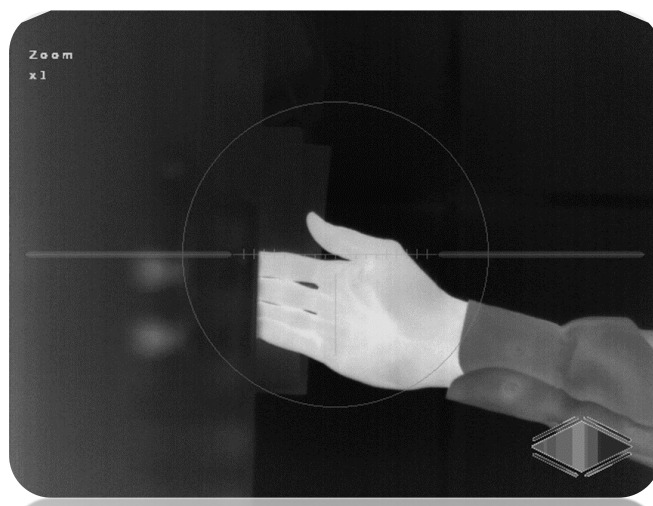
SmartIR640P is the ideal plug and play handheld platform, offering altogether hardware and software for **image processing, power management and control**. It complies to **video digital standards BT656_8 or YCbCr_10 or Mono_16** to stream video to interface digital display unit (OLED, LCD...) and standard video output as analog PAL/NTSC or Digital. A firmware reference design

on a small MCU enables the system integrator to design and manage **his own overlay, reticle, symbol and text**, as well as **handling the battery power** and **customizing the buttons pad**.

SmartIR640P is ready for **integration into your application thanks to a GUI** which provides high level services (configuration and control). This enables to customize and to inlay the application embedded as overlay, reticle, symbol and texts.

SCOPE OF USE

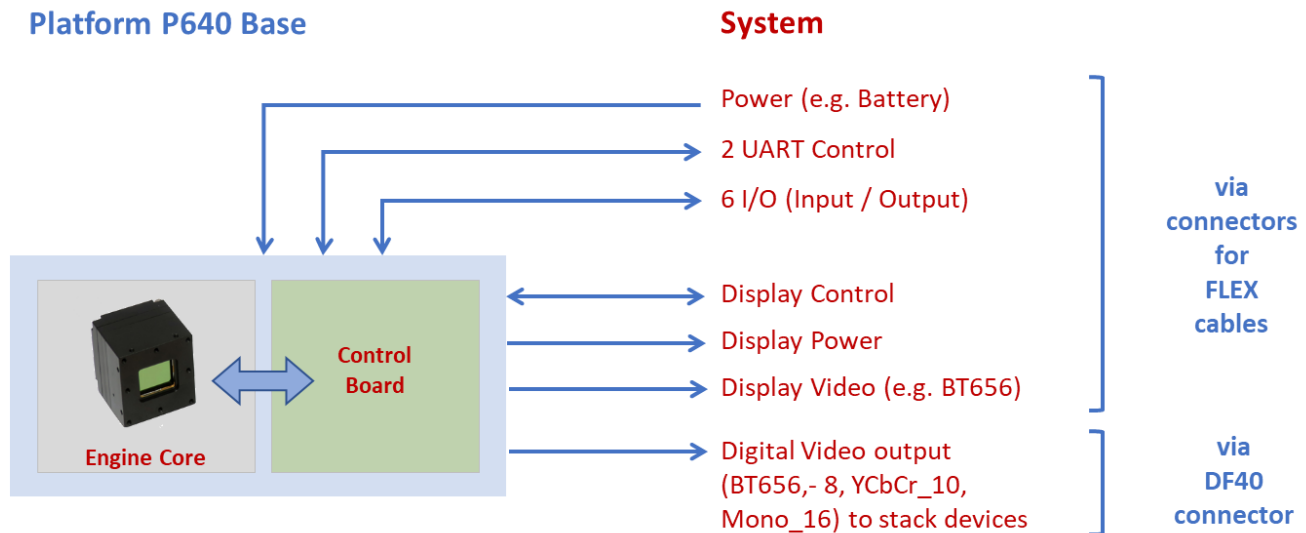
- Handheld Thermal Imaging camera
- Night Vision Goggles and Sights
- Clip-on Sights
- Dismounted Soldier Devices
- Monocular and Binocular
- Fusion Imaging Core



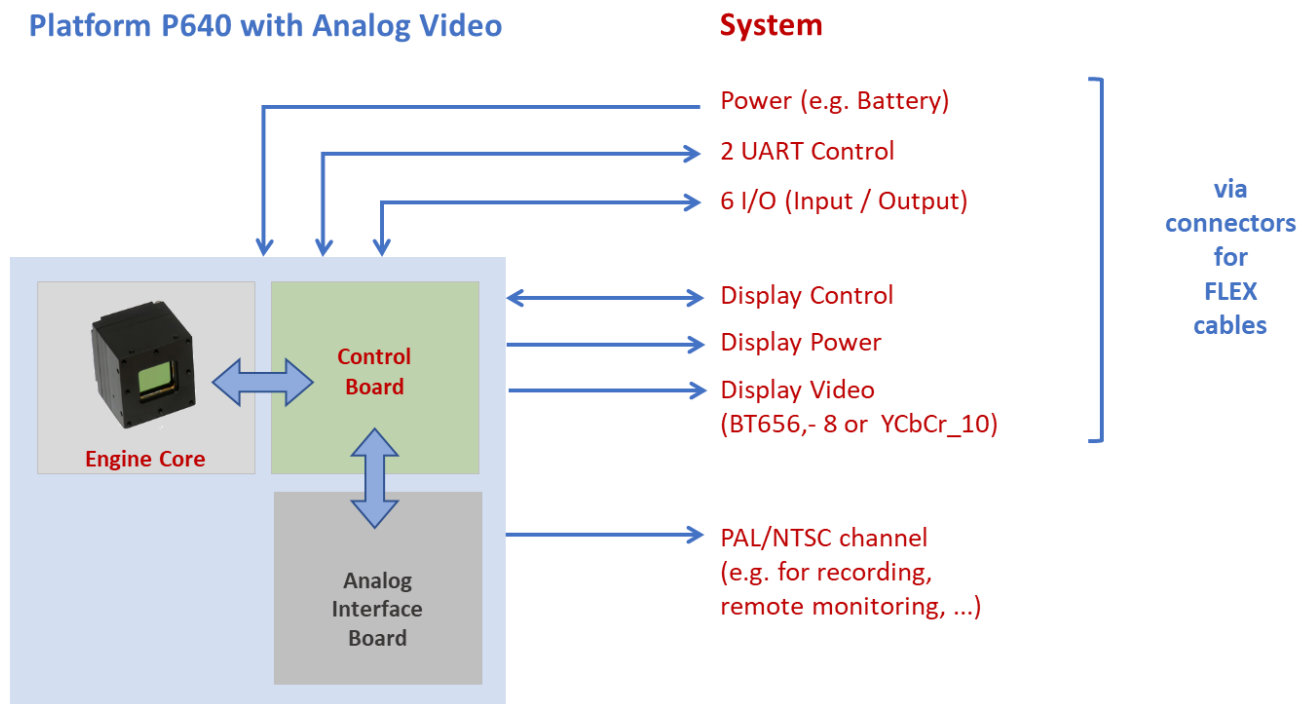
HANDHELD PLATFORM ARCHITECTURE AND POSSIBLE EXTERNAL INTERFACE UNITS

Two configurations are available

Platform P640 Base



Platform P640 with Analog Video

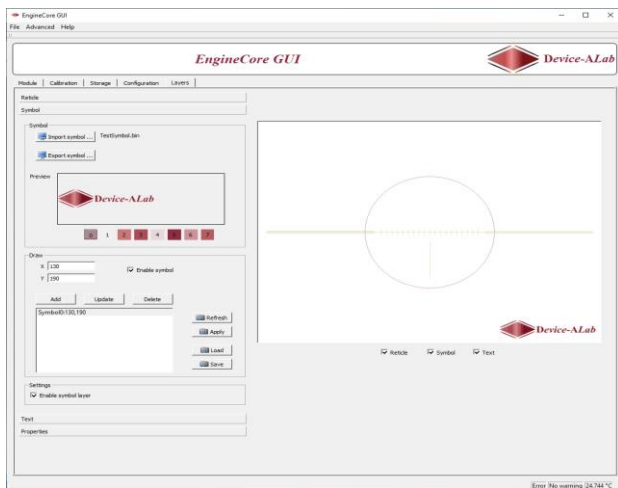


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GUI (GRAPHIC USER INTERFACE)

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

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



FIRMWARE REFERENCE DESIGN

An open source software - with a micro-controller device embedded on DEVICE-ALAB Control Board - provides full access of application services. As such, the system integrator can natively manage the video stream and implement the user interface (push buttons and menu), handles overlay, symbol, text inlays and drive the display unit of its choice.

This firmware reference design is based on FreeRTOS and delivered in C.

KEY TECHNICAL SPECIFICATIONS OF HANDHELD PLATFORM BASE

FEATURES	SmartIR640P	DESCRIPTION
Camera resolution	640x480 pixels	Micro-bolometer technology with 17µm pixel pitch
Spectral response (LWIR) NETD (F/1 ; 300K ; @30 Hz)	8 – 14 µm < 50 mK	SmartIR640P fits to PICO640-046; PICO640-046+; PICO640S+ detectors Without optic Standard performance grade. Refer to Performance Grade section
Power consumption	< 1.7 W	@ 30 Hz Frame rate with Shutter-Less mode set ON
Interface connector	DF40C-60DP (Header)	and other connectors for flex cables
<u>Video:</u> Format	BT656 (8 bits) YCbCr (10 bits) Mono16 (16bits)	Only NUC and BPC treatment available in Mono16
External Pixel Clock Synchronization	No	
<u>Digital output/input:</u> Control Upgrade	UART UART	
Electrical digital output/Input:	3.3V CMOS	
Charge of type of battery	Per 2 cells or 4 cells (Ni-CD, Ni-MH, Li-Ion)	
Power Supply Voltage Input	3.5V to 14V	
Power Supply Output	5V	Limited to 100mA max
External Frame trigger	No	Not available
Mechanical Shutter	No	
Mechanical Shutter management	No	Not available
Shutter-Less	Optional	Two points Shutter-less (optional on demand)
User Configuration Storage	1 to 8	On module
Storage Calibration Table	Up to 2	On module for Shutter-less
Time to image	< 3 s	Time from power ON at power supply to first useable image
<u>Image Processing:</u> Calibration	Yes	Configuration dependence Two point calibration (software triggered) One point calibration (software 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
Overlay Reticule	4	including alignment compensation
Overlay Symbols	28	8 colors with transparency per symbols, configurable size and position
Overlay Text	2 fonts	Configurable fonts
Image Flip	Yes	
Full Frame Rate	120 Hz 60 Hz	Full Frame rate on demand only
Nominal Frame Rate	30 Hz (standard)	
Exportable Frame Rate	9 Hz	
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
Mechanical Shock (TWS)	1000g, 0.4ms, ½ sine X & Y axis 700g, 0.3ms, ½ sine Z axis	
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 27 mm ³	With open casing, excluding optics
Weight	< 46 g	With open casing, excluding optics
Storage Data Retention	> 20 years	
Customer configurations available on demand for following interfaces: Analog video output (PAL-NTSC) with specific power supply		

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KEY TECHNICAL SPECIFICATIONS OF HANDHELD PLATFORM WITH ANALOG VIDEO (PAL-NTSC)

FEATURES	PARAMETERS	DESCRIPTION
Base Camera Resolution	640 x 480 pixels	Micro-bolometer technology with 17µm pixel pitch
Spectral response (LWIR)	8 – 14 µm	SmartIR640P fits to PICO640-046; PICO640-046+; PICO640S+ detectors
NETD (F/1 ; 300K ; @30 Hz)	< 50 mK	Without optics Standard performance grade. Refer to Performance Grade section
Power consumption	< 2.1 W	@ 30 Hz Frame rate with Shutter-Less mode and analog video output set ON
Image Resolution of Video Standard	576i/480i	
Standard Frame rate	25.00Hz/29.97Hz	
Exportable Frame rate	8.33Hz/7.49Hz	
Mechanical Shutter	No	
Mechanical Shutter Management	No	Not available
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	<3s	Time from power ON at power supply to first useable image
<u>Digital output/input:</u>	UART	
Control	UART	
Upgrade	3.3V CMOS	
Electrical digital output/Input:		
Image Processing and calibration	Yes	Refer to Key Specification sheet of Handheld Platform Base
Video output 1 Connector	HD-BNC (Micro-BNC female)	can be removed on demand
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.	On one quiet line per CCIR Rec. 569 for PAL and @ Video output 1
Video Group Delay and Gain	59 dB max.	On one quiet line per NTC-7 for NTSC and @ Video output 1
	+/-0.05 µs/+/-1.0dB	Ref. at 0.24 MHz to 4.3 MHz for PAL and @ Video output 1
	+0.1 µs/+/-1.0dB	Ref. at 0.20 MHz to 4.0 MHz for NTSC and @ Video output 1
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
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
Size: Length x Width x Height	30.0 x 30.0 x 35 mm ³	With open casing & HD-BNC connector and excluding optics
Weight	< 60g	With open casing & HD-BNC connector and excluding optics
Storage Data Retention	> 20 years	
Accessory for Evaluation:		
Camera Interface Cable with Unterminated leads (Samtec SESDT-10-32-G-20.0-L)		
HD-BNC to BNC 75 Ohm Cable		

ORDER YOUR OWN AND GET IT!

VGA Handheld Platform (With housing and standard qualification and standard performance grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
SmartIR640P No Shutter	30 Hz	60 mm; HFOV: 10.3°; F/1.25	30 x 30 x 90 mm ³ / 280 g	P640-1201ABEAE-CXDP1-20M
SmartIR640P No Shutter	30 Hz	50 mm; HFOV: 12.3°; F/1.02	30 x 30 x 80 mm ³ / 220 g	P640-1201AANA-E-CXDP1-20M
SmartIR640P No Shutter	30 Hz	35 mm; HFOV: 16.9°; F/1.14	30 x 30 x 61 mm ³ / 94 g	P640-1201AVAI-CXDP1-20M
SmartIR640P No Shutter	30 Hz	25 mm; HFOV: 24.8°; F/1.20	30 x 30 x 49 mm ³ / 115 g	P640-1201AIAI-CXDP1-20M
SmartIR640P No Shutter	30 Hz	19 mm; HFOV: 32.3°; F/1.03	30 x 30 x 49 mm ³ / 80 g	P640-1201AQAI-CXDP1-20M
SmartIR640P No Shutter	30 Hz	16.7 mm; HFOV: 37.5°; F/1.25	30 x 30 x 60 mm ³ / 78 g	P640-1201AHAI-CXDP1-20M
SmartIR640P No Shutter	30 Hz	7.5 mm; HFOV: 90°; F/1.40	30 x 30 x 50 mm ³ / 68 g	P640-1201AGAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	60 mm; HFOV: 16.9°; F/1.25	30 x 30 x 90 mm ³ / 280 g	P640-1201EBEAE-CXDP1-20M
SmartIR640P No Shutter	9 Hz	50 mm; HFOV: 10.3°; F/1.02	30 x 30 x 80 mm ³ / 220 g	P640-1201EANA-E-CXDP1-20M
SmartIR640P No Shutter	9 Hz	35 mm; HFOV: 12.3°; F/1.14	30 x 30 x 61 mm ³ / 94 g	P640-1201EVAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	25 mm; HFOV: 24.8°; F/1.20	30 x 30 x 49 mm ³ / 115 g	P640-1201EIAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	19 mm; HFOV: 32.3°; F/1.03	30 x 30 x 49 mm ³ / 80 g	P640-1201EQAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	16.7 mm; HFOV: 37.5°; F/1.25	30 x 30 x 60 mm ³ / 78 g	P640-1201EHAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	7.5 mm; HFOV: 90°; F/1.40	30 x 30 x 50 mm ³ / 68 g	P640-1201EGAI-CXDP1-20M
SmartIR640P No Shutter	30 Hz	No	30 x 30 x 27 mm ³ / 46 g	P640-1201AXAI-CXDP1-20M
SmartIR640P No Shutter	9 Hz	No	30 x 30 x 27 mm ³ / 46 g	P640-1201EXAI-CXDP1-20M

VGA Handheld Platform with Analog video (PAL/NTSC) (With housing and standard qualification and standard performance grade)	VIDEO SPEED	LENS	DIMENSION/WEIGHT	PART NUMBER
SmartIR640P No Shutter	25/30 Hz	60 mm; HFOV: 10.3°; F/1.25	30 x 30 x 98 mm ³ / 294 g	P640-1101ABEAE-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	50 mm; HFOV: 12.3°; F/1.02	30 x 30 x 88 mm ³ / 234 g	P640-1101AANA-E-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	35 mm; HFOV: 16.9°; F/1.14	30 x 30 x 69 mm ³ / 108 g	P640-1101AVAI-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	25 mm; HFOV: 24.8°; F/1.20	30 x 30 x 57 mm ³ / 130 g	P640-1101AIAI-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	19 mm; HFOV: 32.3°; F/1.03	30 x 30 x 57 mm ³ / 94 g	P640-1101AQAI-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	16.7 mm; HFOV: 37.5°; F/1.25	30 x 30 x 68 mm ³ / 90 g	P640-1101AHAI-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	7.5 mm; HFOV: 90°; F/1.40	30 x 30 x 58 mm ³ / 82 g	P640-1101AGAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	60 mm; HFOV: 10.3°; F/1.25	30 x 30 x 98 mm ³ / 294 g	P640-1101EBEAE-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	50 mm; HFOV: 12.3°; F/1.02	30 x 30 x 88 mm ³ / 234 g	P640-1101EANA-E-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	35 mm; HFOV: 16.9°; F/1.14	30 x 30 x 69 mm ³ / 108 g	P640-1101EVAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	25 mm; HFOV: 24.8°; F/1.20	30 x 30 x 57 mm ³ / 130 g	P640-1101EIAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	19 mm; HFOV: 32.3°; F/1.03	30 x 30 x 57 mm ³ / 94 g	P640-1101EQAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	16.7 mm; HFOV: 37.5°; F/1.25	30 x 30 x 68 mm ³ / 90 g	P640-1101EHAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	7.5 mm; HFOV: 90°; F/1.40	30 x 30 x 58 mm ³ / 82 g	P640-1101EGAI-EXDP3-20M
SmartIR640P No Shutter	25/30 Hz	No	30 x 30 x 35 mm ³ / 60 g	P640-1101AXAI-EXDP3-20M
SmartIR640P No Shutter	8.33/7.49 Hz	No	30 x 30 x 35 mm ³ / 60 g	P640-1101EXAI-EXDP3-20M

Note about Part numbering:

The two of three last digits 20 refer to **compatibility with display units**. These are summarized in table of compatibility version.

The very 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** and **TWS mechanical shock qualified**.

PERFORMANCE GRADE

SmartIR640P offers a performance grade:

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

Operability is the number of valid pixels, including defective line or column. These defects can be corrected by the core but can appear during operation depending on conditions.

On demand, the defective line or column can be removed by sorting test of camera handheld platform.

COMPATIBILITY VERSION OF HANDHELD PLATFORM VERSUS THE DISPLAY UNIT

RELEASE VERSION	RELEASE DATE	NEW FEATURES
<u>20</u>	October 2019	MicroOled MDP01CPFC & MDM01BS driver board

WHAT'S IN THE BOX

Handheld Platform of Thermal Imaging Camera

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

General Notices:

This OEM handheld platform is intended only for product evaluation, development or incorporation into other product or sub-system. It is not a finished end-product fitting to general consumer use. As such, this module is out of the scope of the European Union (EU) directives concerning electromagnetic compatibility (EMC).

The products described herein are subject to French Government Export Controls regulation except for models with frame rate lower or equal to 9 Hz