Cores and components
for thermal imaging applications

Photon™ 640

Thermal imaging core with uncooled detector
producing ultra sharp images of 644 x 512 pixels




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The Photon 640 core has been especially designed for Original Equipment Manufacturers (OEM). It can be easily integrated into systems that require an advanced, uncooled thermal imaging solution. The Photon 640 offers crisp thermal images of 644 x 512 pixels. It produces a clear image in total darkness, through smoke, dust and light fog.

Excellent image quality
The Photon 640 incorporates an uncooled Vanadium Oxide (VOx) focal plane array consisting of 644 x 512 pixels. This maintenance free system delivers crisp video images which can be displayed on virtually any monitor that accepts composite video. The focal plane array delivers outstanding image quality and sensitivity. The Photon 640 detects temperature differences of 50 mK or less at F/1.0 with FLIR's proprietary noise filtering applied.

Choice of lenses
The Photon 640 is available with a 21.5 mm, 25 mm, 35 mm, 49 mm , 50 mm, 60 mm and a 100 mm lens. Lenses are not interchangeable and must be specified at time of order. A version without lens is also available. Optional Remote Alternate Lens Calibration Software is available to enable customers to perform a supplementary gain calibration.

Compact, easy to integrate
The Photon 640 is a very compact and lightweight package. The core weight is only 170 grams, not including rear cover or lens. It can easily be integrated in small locations. The integrator can interface directly to the Photon 640 SAMTEC 30-pin electrical connector for power (in), video (out), RS-232 commands, serial digital data and other select functions. Optionally a 26-pin connector is available.

Advanced video processing
Photon 640 supplies PAL analog video at 8.3 Hz or NTSC analog video at 7.5 Hz as a standard. Versions supplying 25 Hz PAL or 30 Hz NTSC are available, subject to obtaining a validated export license from the US Department of Commerce for use outside the USA. A choice of 8- or 14-bit digital video is output simultaneously with the analog format. The digital data protocol is serial LVDS. Video processing features include multiple automatic, dynamic image optimization algorithms, as well as polarity control (white-hot/black-hot), image orientation control (invert / revert), and freeze-frame capability. Color lookup tables are also supported in the Photon 640.

Wide operating temperature range
The Photon 640 surpasses the requirements of the most demanding ambient temperature requirements with an operating temperature range between -40°C to +80°C.

Digital Zoom
The Photon 640 core incorporates a 2x, 4x digital zoom feature. In analog video, at 2x digital zoom, the center 320 x 240 pixels of the FPA are upsampled to the full 640 x 480 pixels image resolution. At 4x digital zoom the same happens with the center 160 x 120 pixels. This enables close-up imaging at safe stand-off distances.

Proven technology with a wide range of possibilities
The Photon 640 is designed for easy integration in airborne, land or maritime systems. The modules have been integrated into many of FLIR Systems successful thermal imaging cameras. Numerous systems, used for a wide variety of applications, are out in the field with a proven track record. Applications include security and surveillance, unmanned aerial vehicles, firefighting , maritime, airborne and numerous other applications.

Ethernet Kit
This 100/1000 baseT Ethernet Interface module allows for camera control along with real-time streaming uncompressed video data from the Photon via standard ethernet hardware. The adapter auto senses network capability and runs at standard 100-megabit or full gigabit ethernet speed. The module includes the ethernet interface adapter and camera cabling. The module allows capture of both 8-bit data or the full 14-bit bandwidth digital video. Analog video is also output via a BNC connector.

Software Developers Kit (SDK) to create applications for camera control and/or acquiring digital data
The Photon 640 SDK enables customers to create their own applications for camera control as well as data acquisition using one of several interfaces. Languages supported include VB6, VB.net, C#, and C++ (MFC). Code examples are included to help illustrate how some of the functions can be used. The Photon 640 SDK also works on Linux. There is an example in the SDK that works in the Linux environment. It has everything needed to write your own Photon 640 control application.

User interface
A customizable graphical user interface allows integrators to create their own look and feel to the final system.

Advanced image processing
The Photon 640 contains an advanced Digital Detail Enhancement (DDE) video processing algorithm. This is a sharpening filter which aids in making edges and other image details more distinct in both night and daytime conditions.

No Thermo-Electric Cooler (TEC)
The Photon 640 employs a novel combination of on-FPA circuitry and non-uniformity compensation (NUC) processing to eliminate the thermo-electric cooler (TEC). FLIR's patented approach to TEC-less operation enables the camera to operate over a wide temperature range while maintaining excellent dynamic range and image uniformity. Two significant benefits are realized from TEC-less operation: reduced power consumption and an "instant-on" capability. The time to image is less than 3 seconds - ideal for on-demand applications.

Accessory Kit
The accessory kit provides an easy way to operate the Photon 640 core until a more direct interface to the 30-pin SAMTEC connector on the back of the unit is developed by the end-user. The interface documentation to enable such connections is provided. The kit consists of the following parts: a power supply, I/O Module, an interface cable, and an EMI adapter board and cover that provides a 26-pin D-sub connector to the camera for secure connection to the interface cable.

Photon™ 640

Technical specifications

IMAGING PERFORMANCE

Detector type	Focal Plane Array(FPA), uncooled Vanadium Oxide microbolometer: 644 x 512 pixels
Spectral range	7.5 to 13.5
Thermal sensitivity	< 50 mK at f/1.0 (NEdT at the camera output is measured with FLIR's proprietary noise reduction applied in the as shipped configuration. Typical performance is approximately 35mK with f/1.0 optics.)
Image frequency *	7.5 Hz (NTSC) or 8.3 Hz (PAL)
Electronic Zoom / Pan	2x, 4x
Image processing	Digital Detail Enhancement (DDE).

LENSES

	21.5 mm	25 mm	35 mm	49 mm	50 mm	60 mm	100 mm
Field of View	41° (H) x 33° (V)	36° (H) x 29° (V)	26° (H) x 20° (V)	19° (H) x 14° (V)	18° (H) x 14° (V)	15° (H) x 11° (V)	9° (H) x 7° (V)
f/number	1,1	1,4	1,4	1,1	1,7	1,25	1,6
IFOV (mrad)	1,163	1	0,714	0,51	0,5	0,416	0,25
Minimum focus distance	4 m	2 m	3 m	20 m	5 m	2 m	10 m
Hyperfocal distance	16 m	13 m	26 m	81 m	35 m	115 m	160 m
Hyperfocal depth of field	7.8 m	6.5 m	13 m	41 m	18 m	58 m	80 m
Length (lens only)	25.4 mm	30.2 mm	43.4 mm	54.6 mm	66.9 mm	56.6 mm	111.8 mm
Diameter	45.2 mm	43.0 mm	42.0 mm	63.5 mm	45.0 mm	61.5 mm	82.0 mm
Coating Type	Abrasian resistant	High Durability	High Durability	Abrasian resistant	High Durabiliy	Diamond like	Hard carbon

IMAGE PRESENTATION

Video output	RS170 EIA/NTSC or CCIR/PAL composite video
Connector types	30-pin SAMTEC connector for video, power, communication and digital data 26-pin-D-sub connector optionally available

POWER

Requirements	7 - 14 V DC
Consumption	< 3 W Steady State

ENVIRONMENTAL SPECIFICATION

Operating temperature range	-40°C to +80°C
Storage temperature range	-50°C to +85°C
Humidity	Non-condensing humidity in the range 5% to 95%
Shock	70 g shock pulse with 11 ms half-sine profile
Vibration	4.3 g rms random vibration for 8 hours (three axes)

INTERFACES

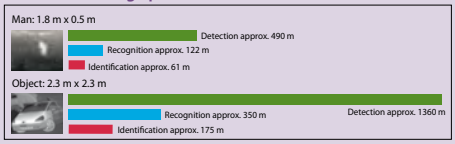
RS-232	Command and control all functions

PHYSICAL CHARACTERISTICS

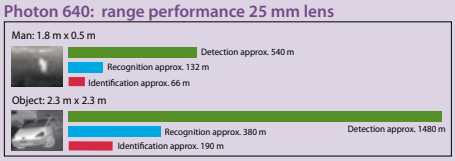
	21.5 mm	25 mm	35 mm	49 mm	50 mm	60 mm	100 mm
Weight (lens + core)	273 grams	250 grams	249 grams	498 grams	280 grams	317 grams	631 grams
Size (lens +core) L x B x H in mm	65.5 x 63.5 x 61.7	84.8 x 63.5 x 61.7	84.8 x 63.5 x 61.7	111.8 x 65.8 x 61.7	109.2 x 63.5 x 61.7	97.5 x 63.5 x 61.7	152.7 x 82.0 x 82.0

* 30 Hz (NTSC) or 25 Hz (PAL) available. Subject to approval of the US Department of Commerce for use outside the USA

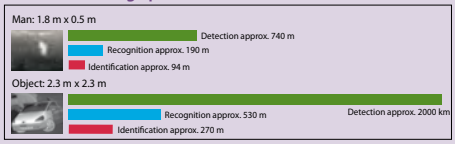
Photon 640: range performance 21.5 mm lens



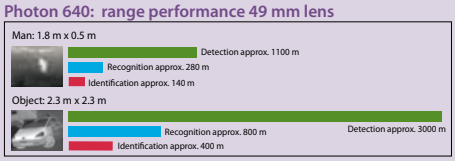
Photon 640: range performance 25 mm lens



Photon 640: range performance 35 mm lens



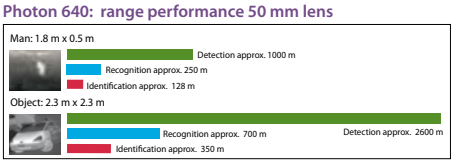
Photon 640: range performance 49 mm lens



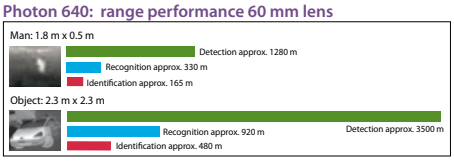
Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.

Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

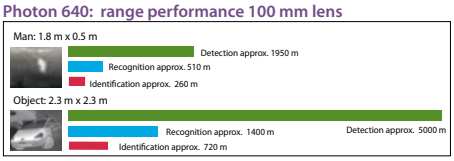
Photon 640: range performance 50 mm lens



Photon 640: range performance 60 mm lens



Photon 640: range performance 100 mm lens



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