FLIR · CORE BY indigo

PHOTON
OEM THERMAL IMAGING CAMERA CORE

2.1 inch
51.4mm

2.0 inch
49.8mm

1.8 inch
45.0mm

THE INDUSTRY STANDARD THERMAL IMAGING CAMERA CORE:
For Applications Where Reliability and Performance Are Priorities

The Photon OEM Camera Core is a compact, all-in-one thermal imager with outstanding sensitivity and image quality. The on-focal-plane circuitry, combined with FLIR's advanced signal processing electronics, enables the camera to maintain excellent dynamic range and image uniformity over a wide temperature range.

Integrators have embedded tens of thousands of Photon cores in a myriad of applications including automotive night vision systems, firefighting equipment, unmanned vehicle payloads, weapon sights, low-power security & surveillance products, and more.

Photon rear view of 30-pin connector.

The Photon OEM Camera Core is designed to be a high-volume thermal imaging component that customers can integrate into products or systems of their own design. Most OEM customers connect directly to the Photon's 30-pin connector for power (in), video (out), and other functions.

The Photon's 30-pin connector also facilitates the interface to camera control devices, and provides access to the digital data output. OEM customers typically order the Photon core in this configuration.

While FLIR normally sells its factory-calibrated and tested Photon cameras with an associated lens, a lens-less camera core configuration is also available. An optional software program called Alternate Lens Cal is available to enable customers to perform a supplementary gain calibration.

**Photon Lens-Less Camera Core Configuration
Shown with Optional Aperture Plate Installed**

Part Number	No Lens	14.25mm	19mm	35mm	50mm
NTSC 30Hz	500-0305-01-00	412-0035-14-07	412-0035-09-07	412-0035-17-07	412-0035-18-07
NTSC 8Hz	500-0305-01-00S	412-0035-14-07S	412-0035-09-07S	412-0035-17-07S	412-0035-18-07S
PAL 25Hz	500-0305-02-00	412-0035-56-07	412-0035-52-07	412-0035-57-07	412-0035-58-07
PAL 9Hz	500-0305-02-00S	412-0035-56-07S	412-0035-52-07S	412-0035-57-07S	412-0035-58-07S

PHOTON BENEFITS

- **Widest Operating Temperature and Highest Shock Rating of Any Thermal Camera**

- **2X Digital Zoom Enables Close-Up Imaging and Electronic Pan/Tilt in Zoom Mode**

- **2-second Turn-On Time for "On-Demand" Applications**

- **Fully Integrated Design Supports OEM and Commercial Customers & Applications**

- **Digital Detail Enhancement (DDE) Sharpening Filter Brings Out Detail in Image Data**

Images from Photons mounted in Ground Vehicles

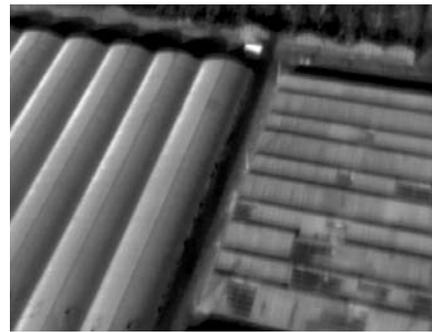Suspected Improvised Explosive Device (IED) is located under a tanker truck.

Photon's E-Zoom feature gets a closer look at suspected IED while staying at a safe distance.
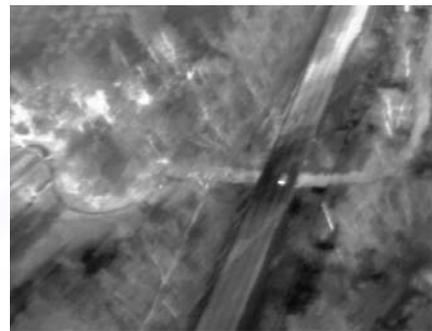

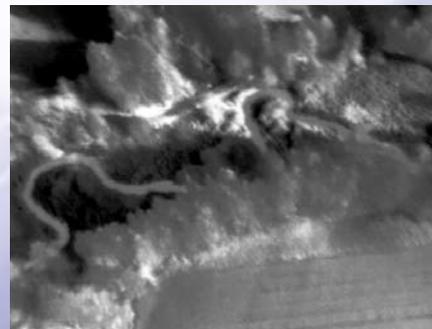Photon-equipped UGV tracks intruder while on night perimeter patrol.

Images from Photons in Unmanned Aerial Vehicles (UAVs)

Vehicles and people detected in the vicinity of warehouses from 500' altitude.

A small vehicle tracked from 750'.

Surveillance of a tree-line from 1,000'.

Specifications subject to change without notice.

◈ PHOTON

PHOTON OEM ACCESSORY KIT

For evaluation purposes, FLIR offers an optional OEM Accessory Kit that enables customers to operate a Photon until they develop their own interface. The Kit contains a power supply, breakout box (called an I/O Module), an interface cable, and a small adapter circuit (called a Wearsaver) that attaches between the camera connector and interface cable.

The Accessory Kit also includes a rear cover that encloses the Wearsaver adapter and provides for secure connection to the interface cable. The end-user only needs to provide a video cable and monitor, and an RS-232 cable if remote control of the Photon is desired.

A camera control software program (GUI) is available for download at:

www.corebyindigo.com/service/softwareupdates/

Photon OEM Accessory Kit

Photon rear view showing
15-pin connector

PHOTON OEM ACCESSORY KIT CONTENTS

The Photon OEM Accessory Kit part number is 421-0021-00. These items may also be ordered individually.

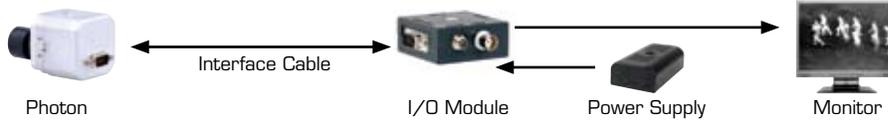| Part	Accessory Item	Functional Description	
250-0194-00	Wearsaver	An adapter that converts the 30-pin SAMTEC connector on the Photon power board to a 15-pin D-Sub connector.	
261-1273-00	Wearsaver Cover	Rear cover encloses the wearsaver adapter and provides jack posts for secure interface cable connection.	
308-0076-00-02	6' Interface Cable, Photon to I/O Module	Provides electrical interface by means of a 15-pin mating connector at the camera end, and 18-pin connector at the I/O module end. Optional accessories include 3' and 10' interface cable lengths.	
333-0005-00	I/O Module	A molded "break-out-box" providing electrical interface to the camera, connectors for power-in (Switchcraft), video-out (BNC), com port (RS-232, 9-pin D-Sub), and a 15-pin connector for serial LVDS digital data. The I/O Module is designed to mate with the SIPO for conversion of serial LVDS to a parallel digital data signal.	
206-0001-20 & 208-0004-02	AC/DC Power Supply & Line Cord	Provides nominal power (9 VDC) to operate the Photon.	

OPTIONAL ACCESSORIES

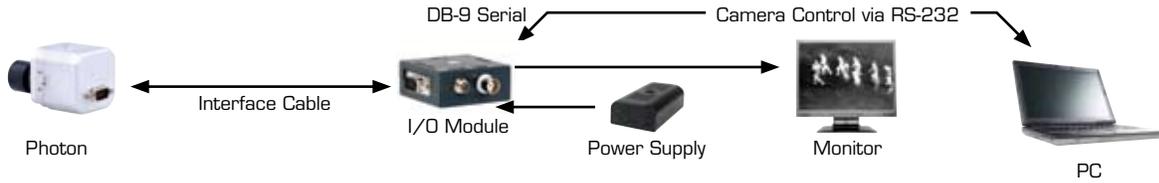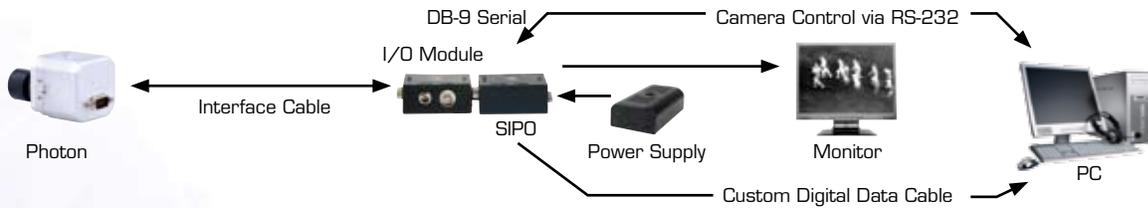| Part	Accessory Item	Functional Description
110-0102-46	SDK for Windows & Embedded	The Photon SDK enables camera control using one of several programming languages including VB6, VB.net, C#, and C++ (MFC). Code examples are included to help illustrate how some of the camera control functions can be used.
110-0102-63	Alternate Lens Cal Software	Allows OEM customers that purchase lens-less camera cores to perform a supplementary gain calibration using their own optics, while retaining the original factory calibration data should it be needed again.
261-1357-00	Tripod Adapter	Adapter furnishes a ¼" x 20 helicoil insert.
308-0013-00 308-0016-00-03	Interface Cable, SIPO to NI PCI-1422 Interface Cable, SIPO to Bit Flow Road Runner	Either of these cables can be used with a SIPO (333-0008-00) to transfer digital data to the selected frame grabber. Contact FLIR's Client Services for camera files.
308-0076-00-01 308-0076-00-03	3' Interface Cable to I/O Module 10' Interface Cable to I/O Module	The standard interface cable provided with the Accessory Kit is 6'. Two other interface cable lengths are available: 3' and 10'.
308-0126-00-01 308-0126-00-02 308-0126-00-03	3' Power/Video Cable 6' Power/Video Cable 10' Power/Video Cable	Interface cable from Photon camera providing connectors for power in and output video (only) available in 3', 6', and 10' lengths. This cable replaces the standard interface cable and I/O module when serial control and digital video are not required.
333-0008-00	Serial-In, Parallel-Out Module (SIPO)	The SIPO converts serial digital data output into a parallel data format for use with a frame grabber. The SIPO mates directly to the I/O module's digital data port, and furnishes a 68-pin connector that can be interfaced to a compatible frame grabber via a 308-0013 or -0016 digital cable.
421-0008-00	Rechargeable Battery & Cable Kit consisting of: - 206-0002-10 Battery Pack 7.2V, Li-Ion; Charger - 260-0007-10 Battery Cable	Rechargeable Lithium-Ion battery will power a Photon camera for 6+ hours on a full charge. The battery is furnished with charger (not shown) and an 8" cable that interfaces to the I/O module. The nominal voltage output of the battery is 7.2 VDC.
421-0025-00	Ethernet Module	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 and the full 14-bit bandwidth digital video. Analog video is also output via a BNC connector.
500-0312-00	EMI Rear Enclosure Assembly	With appropriate grounding, cable shielding, and power, this enclosure mitigates radiated EMI emissions to near CE class A performance levels (~OdB margin).

Specifications subject to change without notice.

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CAMERA CONFIGURATIONS

Stand Alone Operation with Accessory Kit

Photon — Interface Cable — I/O Module — Power Supply — Monitor

Accessory Kit and Customer-Furnished PC: Remote Operation

DB-9 Serial · Camera Control via RS-232

Photon — Interface Cable — I/O Module — Power Supply — Monitor — PC

Accessory Kit, SIPO and Customer-Furnished Desktop PC: Digital Data Collection

DB-9 Serial · Camera Control via RS-232

Photon — Interface Cable — I/O Module — SIPO — Power Supply — Monitor — PC — Custom Digital Data Cable

NOTE: An appropriate frame grabber, as well as image acquisition & processing software, must be supplied and supported by the customer.
The frame grabber may be either a Bit Flow Road Runner Model 14 or National Instruments PCI-1422 IMAQ, depending on the digital cable and type of software planned for use by the customer.

Ethernet Module and Customer-Furnished PC: Digital Data Collection

RJ-45 CAT-5 · Camera Control & Digital Data

Photon — Interface Cable — Ethernet Module — Power Supply — Monitor — PC
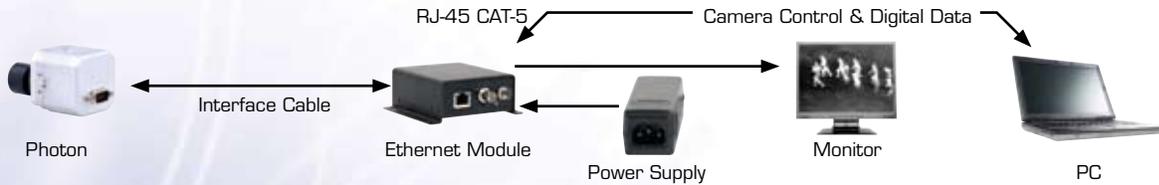
The Ethernet Module enables Photon control and video display/capture on a PC. Due to variability in user platforms and networks, FLIR does not guarantee the accuracy of captured video.

OVERVIEW OF THE PHOTON ELECTRICAL INTERFACE

Photon 15-pin D-Sub Connector Pin Definitions

Pin #	Signal Name	Signal Definition
1	VIDEO_HI	Analog Video, positive output
2	SD_FSYNC+	Digital Port 1 Sync, positive output
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	VIDEO_LO	Analog Video, negative output
7	SD_CLK+	Digital Port 1 Clock, positive output
8	SD_DATA+	Digital Port 1 Output Data, positive output
9	TX	Primary Serial Communication transmit
10	PWR_IN	Input Voltage
11	SD_CLK-	Digital Port 1 Clock, negative output
12	SD_FSYNC-	Digital Port 1 Sync, negative output
13	SD_DATA-	Digital Port 1 Output Data, negative output
14	RX	Primary Serial Communication receive
15	PWR IN	Input Voltage

15-pin HD D-Sub (M) connector on camera
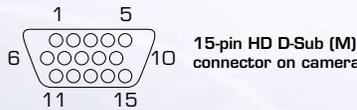
The 15-pin high density D-Sub connector pin definitions are provided in the case that the wearsaver adapter is used. The signals on this connector include input power, analog video output, serial communication for camera control, and the digital data output.

LENS DATA

| Focal Length	14.25mm Lens	19mm Lens	35mm Lens	50mm Lens
f/ number	1.3	1.4	1.4	1.7
Field of View	50° x 38°	36° x 27°	20° x 15°	14° x 11°
IFoV (milliradians)	2.667	2.000	1.086	0.760
Minimum Focus Distance	0.13 meters	0.3 meters	0.7 meters	1.8 meters
Hyperfocal Distance	5 meters	7.5 meters	26 meters	35 meters
Hyperfocal Depth of Field	2.5 meters	3.8 meters	13 meters	18 meters
Weight (as pictured)	179 g	155 g	209 g	251 g
Length (Lens only)	30.7mm	19.5mm	43.4mm	66.9mm
Diameter (maximum)	42.0mm	26.0mm	42.0mm	45.0 mm
Athermal Design	Yes – All Lenses			
Nominal Wavelength	8.0 to 14.0 microns			

* Note: Photon lenses are not designed, calibrated, or specified for close focus use. Questions? Email: oem@indigosystems.com

DIRECT INTERFACE TO SAMTEC CONNECTOR

Pin definitions of the 30-pin board connector for interface to the SAMTEC TFML-115-02-S-D-P connector (J1) are shown below. This is the primary connector interface to the Photon camera.
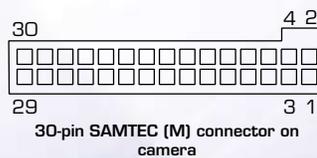
Note that FLIR's pinout differs from SAMTEC pinout

30-pin SAMTEC (M) connector on camera
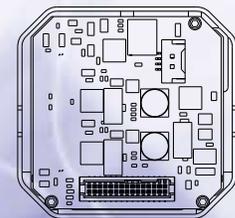
Power Board to External I/O Connector Pin Definitions

Pin #	Signal Name	Signal Definition	Pin #	Signal Name	Signal Definition	Pin #	Signal Name	Signal Definition
1,2,5,6	GND	Ground	13	LVDS_VID2+	Digital Port 2 Output Data, positive output	22	SD_CLK-	Digital Port 1 Clock, negative output
3	3.15V_OUT	3.15V output	14	SD_DATA-	Digital Port 1 Output Data, negative output	23	LVDS_VID0-	Digital Port 2 Clock, negative output
4	PWR_IN	Input voltage	15	LVDS_VID2-	Digital Port 2 Output Data, negative output	24	SD_ CLK+	Digital Port 1 Clock, positive output
7	1.5V_OUT	1.5V output	16	SD_ DATA+	Digital Port 1 Output Data, positive output	25	TEMP2	Temp Sensor port 2
8		Not connected	17	LVDS_VID1+	Digital Port 2 Sync, positive output	26	DIS0_EXT	Frame Sync input
9	RX2	Spare Serial Communication receive	18	SD_FSYNC-	Digital Port 1 Sync, negative output	27	DIS2_EXT	Discrete Input Channel 2
10	RX	Primary Serial Communication receive	19	LVDS_VID1-	Digital Port 2 Sync, negative output	28	VIDEO_LO	Analog Video, negative output
11	TX2	Spare Serial Communication transmit	20	SD_ FSYNC+	Digital Port 1 Sync, positive output	29	DIS1_EXT	Discrete Input, Channel 1
12	TX	Primary Serial Communication transmit	21	LVDS_VID0+	Digital Port 2 Clock, positive output	30	VIDEO_HI	Analog Video, positive output

Note: The mating connector is SAMTEC SFML-115-T1-S-D-K

Specifications subject to change without notice.

SPECIFICATIONS

System Overview

System Type	Uncooled LWIR Thermal Imager
Sensor Type	324x256 VOx Microbolometer
Pixel Size	38 µm
Spectral Band	7.5 – 13.5 µm
Performance	< 85mK NEdT at f/1.6

Outputs

Analog Video	NTSC @ 30 Hz
	PAL @ 25 Hz (optional)
	9 Hz option for export (factory set)
Digital Video	8- or 14-bit serial LVDS

Operation

Image Control	Invert, revert, 2x digital zoom, digital detail enhancement (DDE)
Camera Control	Autonomous, or manual via GUI or RS-232 serial command
Signal Interface	30-pin SAMTEC connector for power, video, communication, digital data, external sync, direct access to e-zoom & polarity

Power

Input Voltage	Range 5 – 24 VDC
Power Dissipation	1.6W steady-state
Time to Image	~2 seconds

Environmental

Operating Temp Range	-40 – +80 °C external temp
Storage Temp Range	-50 – +85 °C external temp
Scene Temp Range	To 150 °C standard
Shock	70 g shock pulse, 11ms half-sine profile
Vibration	4.3 g ms random vibration for 8 hours (three axes)
Humidity	Non-condensing, 5% – 95%

Physical Attributes

Size	51.4 x 49.8 x 34.0 mm (less lens)
Weight	97g (core only, no lens or cover)
Mounting Interface	7 heatsink attach points, M3

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