

NOCTURN

Digital Low-Light CMOS Camera

Application Note

NOCTURN Camera:
Network Compatible for
Centralized Surveillance



PHOTONIS Digital Imaging, LLC.
6170 Research Road | Suite 208
Frisco, TX USA 75033
T: +1 (469) 713-6108
F: +1 (469) 713-2880
www.photonis.com

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As global tensions increase, the need for 24/7 surveillance to protect both mobile and fixed assets must be reliable under a wide range of environmental and operational conditions. Cameras chosen as part of a wide area surveillance network need to have the capability to provide quality imaging across a wide range of lighting conditions and also have simple connectivity options for easy installation and service.

A wide range of Internet Protocol (IP) cameras are available on the market today. They offer simple plug-and-play connectivity to any existing network and are both compact and inexpensive. But in tactical surveillance situations, the need to see in low light levels is critical. Many commercial cameras offer near-infrared (NIR) LED technology to boost their ability to see in low light, which ironically can also disclose the presence of a surveillance system to an enemy reconnaissance team equipped with NIR detection capabilities. The use of thermal detection is also commonly used to augment daytime cameras, but thermal has difficulty detecting objects that have little or no heat signature, such as a vehicle parked for a long period of time, and cannot see into windows of buildings or vehicles.

The ideal surveillance camera would provide a single solution with the capability to see equally well in day or nighttime lighting conditions without supplemental night lighting requirements, while still providing simple standard connectivity to allow multiple video feeds to be viewed in one standard location. Such a camera would eliminate the need for separate day and night systems, and simplify cabling and power requirements.

In addition to simplified connectivity, surveillance cameras need to be miserly power consumers. Remote static cameras often rely on solar power, while vehicular and man-portable systems often rely on battery power. Optimizing a surveillance camera for Size, Weight and Power (SWaP) reductions can conserve power for critical observations.

Nocturn from PHOTONIS is the first day-through-night CMOS camera that provides Gigabit Ethernet or USB3 connectivity options with digital images that can be seen at less than 4e- lighting conditions, or approximately quarter moon. It provides full SXGA resolution (1280 x 1024) in a small solid state camera optimized for surveillance in 24/7 lighting conditions. Nocturn is a digital solution, which prevents damage to its components in full lighting conditions, while offering superior low light resolution. The camera offers a standard CS-mount to accommodate a wide range of lenses for both long-range and up-close applications.

SWaP considerations were incorporated into the design of Nocturn. The base camera is approximately 37mm³ with a typical power consumption of 1.8W.

Nocturn is powered by a solid-state CMOS sensor technology specifically designed to enhance low light imaging. The sensor uses large 9.7µm x 9.7µm pixels outfitted with microlenses to enhance the quantum efficiency of the sensor. The CMOS sensor can provide either monochrome (Lynx sensor) or color (Kameleon sensor) images.

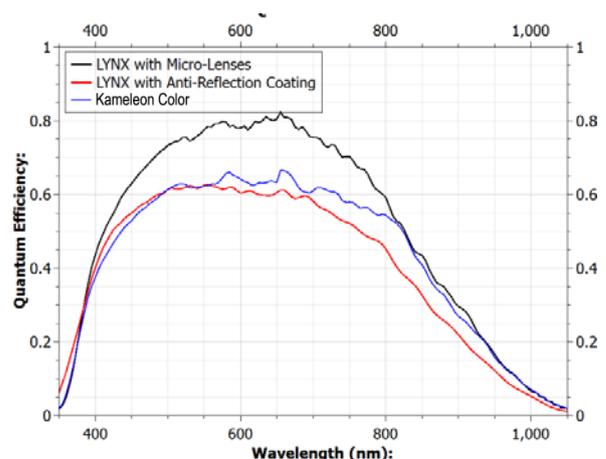


Figure 1: QE Curves for Nocturn CMOS Sensors

Simplified network connectivity is important in today's tactical environments. Just as online transactions can be hacked, so can remote surveillance networks. Many tactical communications systems have encryption technologies that protect the entire IP transmission as well as each piece of data within. This allows for critical communications, whether telephone, radio, GPS or video, to be safely and securely sent back to central command without the need for specialized cabling.

Nocturn camera can provide full 30, 50 or 60 Hz frame rates over Gigabit Ethernet (GigE) via Ethernet RJ-45 connectors or via standard USB3 connections for simple field connectivity and replacement. The camera can also accommodate on-screen display of text, standard shapes and graphics to provide additional information, such as the overlay of GPS coordinates or the compass direction the camera is facing, and include them in the video stream.

Nocturn camera is ideal for long range surveillance. Since the camera has no need for secondary illuminators, it can detect and amplify the available photons using situational lighting conditions without an increase in power consumption. In a side-by-side comparison to similar low light cameras and commercial CCD surveillance cameras, Nocturn showed significant probability of identification of objects at long range in quarter-moon lighting conditions and across all Field of View variables.

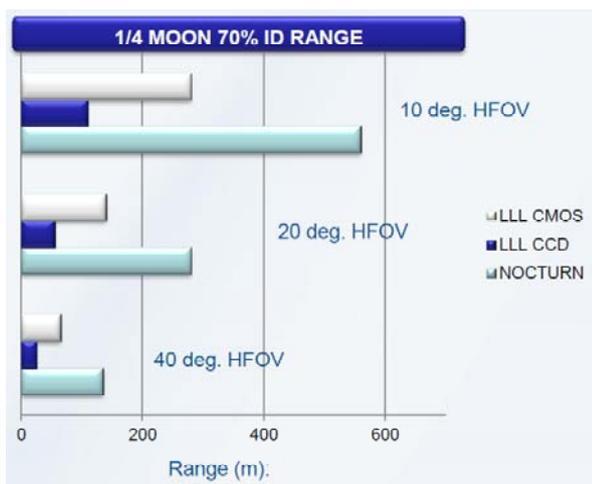


Figure 2: 70% Probability of Identification Comparison of Cameras

Nocturn also features an 8X zoom function, allowing the user to zoom into a region where better detail is needed, such as reading license plates or ascertaining if the subject is armed.



Figure 3: Zoom Function of Nocturn Camera

Whether your surveillance application is static or mobile, the Nocturn camera is the ideal single-unit solution for day through night imaging. Low power consumption and a small size provide a large SXGA image which is ideal for long-range observation. Nocturn can be equipped with your choice of Gigabit Ethernet or USB3 connectivity for simple command communications with additional models providing additional video output options. Nocturn camera also offers an option for a low light color as well as monochrome imaging.

About Nocturn:

Nocturn is the first day-through-night single-camera solution capable of true low-light imaging. PHOTONIS' expertise in image intensifiers for low light detection has been applied to the CMOS technology in Nocturn to minimize signal noise while collecting and amplifying photons as economically as possible.

The compact size and low power consumption of Nocturn make it ideal for a wide variety of applications, including long range surveillance, mobile imaging, man-portable, rifle scopes and more. It is offered in several models that provide a wide range of video output and connectivity options. For more information about the Nocturn camera family, including videos, applications and specifications, please visit us on the web at:

www.nocturncamera.com

About PHOTONIS Technologies:

PHOTONIS is a high-technology manufacturer, specializing in the detection and amplification of electrons, ions and photons for defense, science, and physics applications and instruments. We are the world's largest provider of Image Intensifier Tubes to global markets. Our expertise in optimizing analog technologies has led us to create a series of digital low light solutions.

For more information, visit:

www.photonis.com