

NOCTURN U3 Interface Control Document

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Document Revisions

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April 16, 2014	A.01	Engineering release
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1 Introduction

1.1 Scope

This document describes the electrical and mechanical interfaces to the NOCTURN U3 camera module only. Operational instructions and additional support documentation are described in separate documents. Please contact PHOTONIS technical support if you require additional information.

2 Electrical and Mechanical Interfaces

2.1 Introduction

The NOCTURN product name identifies a family of low light level cameras developed around the PHOTONIS' 1280 × 1024 LYNX CMOS imaging sensor. The “U3” model indicates that the NOCTURN camera has an integrated interface board that can be used to output digital video over a USB 3.0 Vision compatible interface. This section provides detailed information on the NOCTURN U3 specifications, power requirements as well as the electrical and mechanical interface of the module.

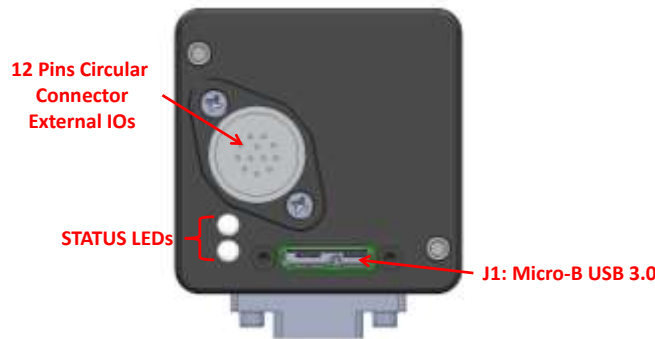


Figure 1 Back Side View of the NOCTURN U3 Camera

2.2 NOCTURN U3 Specifications

The NOCTURN U3 is a rugged low light camera module that features high-definition, high sensitivity and high dynamic range with low power consumption. Depending on the model, it provides either monochrome or color real-time imaging capabilities from daylight to sub quarter moon illumination in the visible and near infrared spectrum. Detailed specifications of the NOCTURN U3 camera are given in Table 1.

Table 1 NOCTURN U3 Specifications

Parameter	Specification
Sensor Resolution	1280 × 1024 Pixels

Parameter	Specification
Sensor Pixel Pitch	9.7 μm \times 9.7 μm
Sensor Well Capacity	> 25000 e-
Sensor Dynamic Range	> 60 dB
Sensor Read Noise	< 5 e- med.
Sensor Quantum Efficiency	> 60%-80% at 600nm depending on sensor configuration
Frame Rate	50, 60 or 100 (monochrome version only) Hz with full field resolution (user adjustable)
Sensor Image Lag	< 0.1 %
Sensor Shutter Mode	Rolling
Lens Mount	CS
Dimensions (W \times H \times D)	41 mm \times 41 mm \times 58 mm
Weight	< 150 grams
Digital Video Output	Monochrome: Monochrome 8 / 10 bit over USB 3 Color: Monochrome 8 / 10 bit, Color 24 bit YCbCr or YUV (4:2:2 format) over USB 3
Communication	Serial via External interface or USB
Image Correction	Bad pixel replacement and 2 points non uniformity correction
Contrast Enhancement	Contrast stretching, equalization and adaptive equalization
Gain Control	Automatic gain and exposure control or manual
Digital Zoom	Up to 8X (0.001 increment resolution)
Synchronization	Frame start trigger (2 to 12V or over USB 3 serial interface) Analog output strobe reference (2 to 12V or over USB 3 serial interface)

Parameter	Specification
OSD	Full on screen display capability with text, standard geometrical shape and graphics
Camera/Imaging Start Up Time	< 10 seconds
Operating Temperature	0° to +50° C
Storage Temperature	-50° to +80° C
Input Voltage	USB powered
Power (Typical)	60/50Hz mode ~3.5W (typ.)

2.3 Quantum Efficiency

The typical quantum efficiencies as a function of wavelength for the LYNX monochrome CMOS imagers for versions with and without micro-lenses as well as color are shown in *Figure 2*.

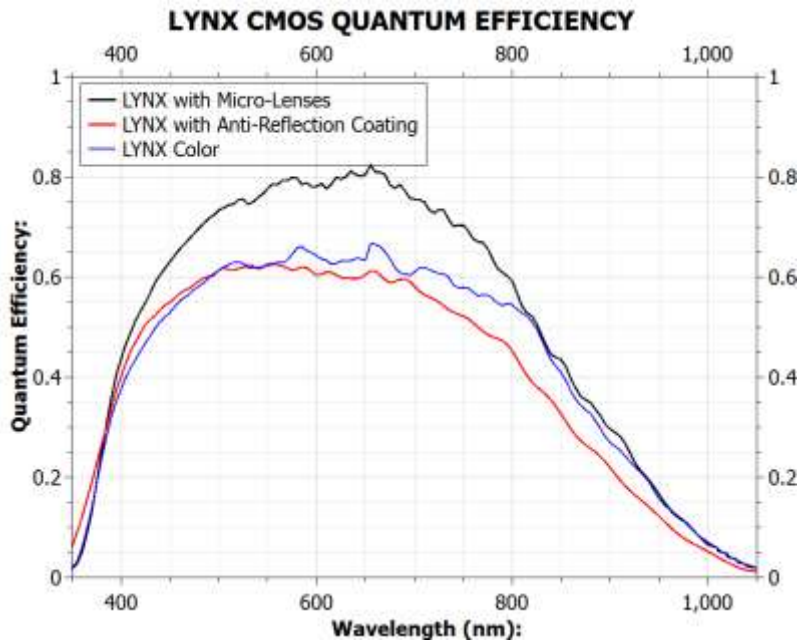


Figure 2 LYNX CMOS Quantum Efficiency Curves

2.4 Electrical Interfaces

2.4.1 12 Pin Circular Connector: External IOs

The external 12 pin circular connector electrical interface is given in *Table 2*. The physical pin numbering convention is shown in *Figure 3*.



Figure 3 12 Pin Circular Connector

Table 2 12 Pin Circular Connector: External IOs

Pin	Signal Name	Function	Description
1	NC	NA	NA
2	NC	NA	NA
3	NC	NA	NA
4	ISO_EXT_TRIGGER_IN_N	Input	External Trigger Input N Bias with 2-12VDC12mA Max
5	GND	Ground	Ferrite Bead to DGND, Primary Ground Return
6	ISO_EXT_TRIGGER_IN_P	Input	External Trigger Input P Bias with 2-12VDC12mA Max
7	ISO_EXT_TRIGGER_OUT_N	Output	External Trigger Output N Bias with 2-12VDC 12mA Max
8	ISO_EXT_TRIGGER_OUT_P	Output	External Trigger Output P Bias with 2-12VDC12mA Max
9	RTS_FROM_FPGA_RS232	I/O	RS232 Level RTS
10	CTS_TO_FPGA_RS232	I/O	RS232 Level CTS
11	TXD_FROM_FPGA_RS232	I/O	RS232 Level TXD
12	RXD_TO_FPGA_RS232	I/O	RS232 Level RXD
SHELL	GND_CHASSIS	Ground	Primary Ground Return

2.4.2 J1- Micro-B USB 3.0 Connector

The micro-B USB 3.0 connector electrical interface is given in Table 3 and physical pin number convention in Figure 4.



Figure 4 J1- Micro-B USB 3.0 Connector

Table 3 J1- Micro-B USB 3.0 Connector

Pin	Signal Name	Function	Description
1	VBUS	Power	USB Power
2	-DATA	I/O	USB DATA-
3	+DATA	I/O	USB DATA+
4	ID	I/O	OTG Identification
5	GND	Return	Primary Power Return
6	MicB_SSTX-	I/O	SS Transmitter DATA-
7	MicB_SSTX+	I/O	SS Transmitter DATA+
8	GND DRAIN	Return	Primary Signal Return
9	MicB_SSRX-	I/O	SS Receiver DATA-
10	MicB_SSRX+	I/O	SS Receiver DATA+
SHELL		Shield	Connector metal shell

2.5 Mechanical Interface

2.5.1 Basic Mechanical Dimensions

The basic mechanical dimensions of the NOCTURN U3 camera are provided in Figure 5. A more detailed drawing can be requested from PHOTONIS.

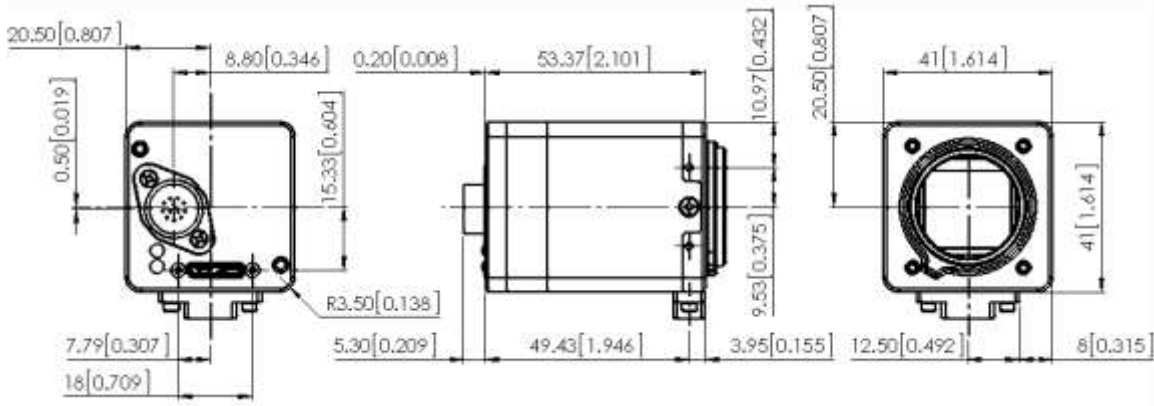


Figure 5 Basic Mechanical Dimensions of the NOCTURN U3 Camera (all dimensions are in mm [in])

2.5.2 Mount Interfaces

The NOCTURN U3 cameras are delivered with a ¼”-20 tripod mount adapter (see Figure 6). This tripod mount adapter can be attached to the camera using two 2-56 (3/16” long) thread socket head cap screws on all four sides of the module parallel to the optical axis.

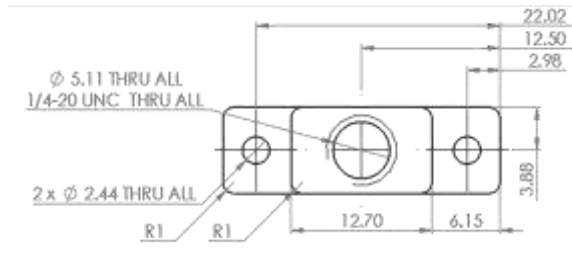


Figure 6 Basic Mechanical Dimensions of the Tripod Mount adapter (all dimensions are in mm [in])

2.5.3 Focus Adjustments

In the event that focus cannot be achieved through normal lens operation, the lens mount ring (see Figure 7) can be adjusted to compensate for small variation in the back focal flange distance of the lens. This is done by loosening the lens mount 2-56 setscrew and performing a flange back adjustment.

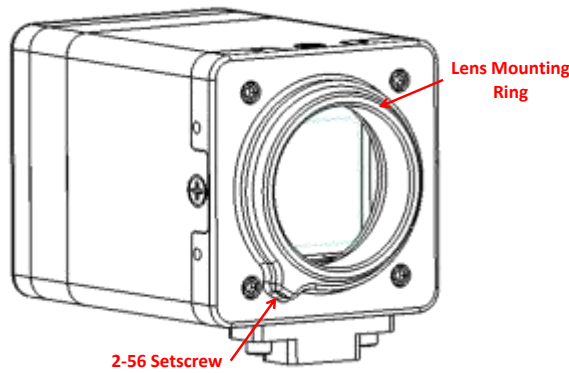


Figure 7 Location of Setscrew to Loosen Lens Mounting Ring for Focus Adjustments

2.6 Optical Interface

The NOCTURN U3 is designed to work with 1” optical format cs mount lens¹. C mount lens with 1” optical format can be utilized as well as long as a 5mm cs to c mount adapter is inserted between the lens back flange and the NOCTURN U3 lens mounting ring.

2.7 Input Power Specifications

The NOCTURN U3 is powered via the USB interface from a personal computer (must be able to provide 900 mA for USB 3.0).

Table 4 NOCTURN U3 Input power Specifications

Parameter	Description	Min	Typ	Max	Units
V_{in}	Input Voltage	--	5	--	V
I_{cc}	Input Current	--	700	--	mA

2.8 Communication Interface

Control of the camera can either be done using three different methods. The first one is through the GenICam interface implemented over the USB 3 interface (please refer to the user guide for further details). The second and third methods are done using serial communication protocol over either the RS-232 interface on the 12 pins circular connector or by creating a serial bridge over the USB 3 interface with the Pleora SDK.

For the RS-232 port located on the 12 pins circular connector, the serial port settings should be 8 bits data, no parity, 1 stop bit and no flow control with a default baud rate of 115200

¹ A lens extender can be purchase separately from PHOTONIS to utilized lenses designed for 2/3” and 1/2” format imagers

bits per second. The user should refer to the NOCTURN U3 manual for a list of valid commands and communication syntax examples.

3 Video Interface

The NOCTURN U3 uses a Pleora NTx-U3 frame grabber interface board that complies with the USB 3 Vision standard. Details for this interface can be found on the AIA website.

4 Electrical Connectors

This section provides the part number of all the user accessible connectors and suggested mating connector when applicable.

4.1 12 Pin Circular Connector:

Camera Connector:

Manufacturer: HIROSE ELECTRIC CO LTD

Description: CONN RECEPT 12POS MALE DIP

Manufacturer part number: HR10A-10R-12PB(71)

Mating Connector:

Manufacturer: HIROSE ELECTRIC CO LTD

Description: CONN HR10A PLUG 12POS FEMALE

Manufacturer Part Number: HR10A-10P-12S(73)

4.2 J1- Micro-B USB 3.0 Connector:

Camera Connector:

Manufacturer: MILL-MAX MANUFACTURING CORP.

Description: CONN MICRO USB B 3.0 VERT SMT

Manufacturer Part Number: 897-10-010-00-300002 or equivalent.

Mating Connector:

Manufacturer: Newnex Technology Corp. (or equivalent)

Description: USB3.0 A to Micro B locking screws cable.

Manufacturer Part Number: US2-AMCBI1-5M or equivalent.