Bobcat-640

Datasheet Document

ENG-2012-DSD019-R001

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Revision History

Issue	Issue date	Reason for changes	Modified by	Approved by
000.01	15/10/2012	Initial draft	JDS	
000.02	01/07/2013	Document name changed from DS to DSD	CDU	
000.03	10/09/2013	Weight updated, no standard lens: Table 3.4 updated, merged scientific (added) and industrial datasheet in this document: Table 1.1, Table 2.2, Table 3.2, Table 3.3 updated	CDU	
000.04	30/12/2013	Update specifications	JDS	
000.05	15/01/2014	Update specifications	JDS	PMN
000.06	26/01/2014	Trigger specifications added	JDS	PMN
001	21/03/2014	First released issue	CDU	JDS

Change Details

This table lists all changes of this issue compared to the previous released one.

Chapter/Section	Changes	Modified by
Table 2.5	Trigger specifications added	JDS

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List of Abbreviations

ADC	Analog Digital Convertor
ADU	Analog to Digital Unit
CL	Camera Link
FPA	Focal Plane Array
GigE	Gigabit Ethernet
ITR	Integrate Then Read
IWR	Integrate While Read
SDK	Software Development Kit
SMA	Sub-Miniature version A connector
SWIR	Short-Wave Infrared

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1. Configurations and General Description

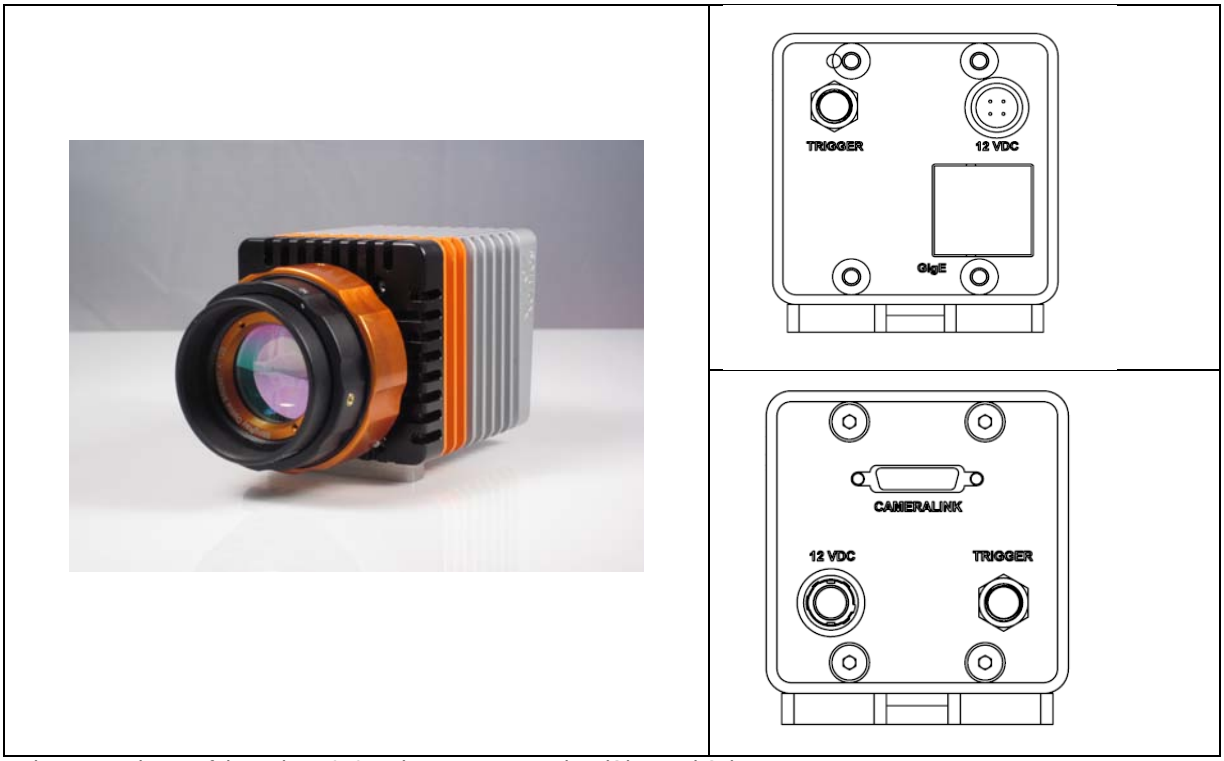

Figure 1-1 Picture of the Bobcat-640 and connector overview (GigE and CL)

Camera	Product Number	General Description
Bobcat-640-GigE-Industrial	XEN-000298	High resolution SWIR imaging Camera with TE1 stabilization and GigE interface
Bobcat-640-CL-Industrial	XEN-000297	High resolution SWIR imaging Camera with TE1 stabilization and Cameralink interface
Bobcat-640V-GigE-Industrial	XEN-000139	High resolution VisNIR imaging Camera with TE1 stabilization and GigE interface
Bobcat-640V-CL-Industrial	XEN-000140	High resolution VisNIR imaging Camera with TE1 stabilization and Cameralink interface
Bobcat-640-GigE-Scientific	XEN-000296	High resolution SWIR imaging Camera with TE1 stabilization and GigE interface
Bobcat-640V-GigE-Scientific	XEN-000099	High resolution VisNIR imaging Camera with TE1 stabilization and GigE interface

Table 1-1 Bobcat-640 camera configurations and general description

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General Description and Applications

The Bobcat-640 is a very compact SWIR camera using an InGaAs FPA sensor for imaging in the 900 to 1700nm wavelength range (optionally also 400 to 1700nm). The camera has a CL or GigE output, low noise and dark current, together with low weight, power and size. Moreover, various C-mount lenses (SWIR or Visible) are available. Finally, different image processing algorithms are implemented onboard, that make the camera very well suited for various applications, such as waste sorting, food inspection, on-line quality control, imaging of hot objects (300 to 800°C range), machine vision & process control and failure analysis.

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2. Specifications

2.1. ROIC Specifications

ROIC Specifications	Bobcat-640	Unit
ROIC type	ROIC with CTIA topology	
ROIC Read Noise High Gain (1)	60	electrons rms
ROIC Read Noise Low Gain (1)	400	electrons rms
Integration Capacitor High Gain	6.7	fF
Integration Capacitor Low Gain	85	fF
Full Well High Gain	$80x10^3$	electrons
Full Well Low Gain	$1.1x10^6$	electrons
Readout modes	Integrate Then Read (ITR) Integrate While Read (IWR)	

Table 2-1 ROIC specifications

(1) Typical value, measured in dark at 25°C FPA temperature

2.2. Sensor Specifications

Array Specifications	Bobcat-640	Unit
Sensor type	InGaAs FPA; ROIC with CTIA topology	
Spectral Band	0.9 to 1.7	µm
	Optional 0.4 to 1.7 (VisNIR)	µm
Array format	640x512	pixels
Pixel pitch	20	µm
Quantum Efficiency SWIR sensor (1)	80	%
Quantum Efficiency VisNIR sensor (2)	85	%
Dark Current (3)	$0.8x10^6$	electrons/s
Pixel operability	>99	%
Cooling	TE1	

Table 2-2 Array specifications

(1) Typical value @ 1600nm
(2) Typcal value @ 950nm
(3) Typical value, measured at 25°C FPA temperature

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2.3. Camera Specifications

Imaging specifications Bobcat-640	
Maximal Frame rate (full frame)	100 Hz
Window of interest	Yes
Smallest window of interest	32x4
Exposure time range (1)	1 – 40000 µs
Digital output data	16 bit (with 14-bit ADC resolution)
Gain (in High Gain mode)	1.28 electron/ADU
Gain (in Low Gain mode)	16.2 electron/ADU
Camera Read Noise Low Gain (2)	400 electrons rms
Camera Read Noise High Gain (2)	120 electrons rms
Dynamic Range Low Gain	68 dB
Dynamic Range High Gain	56 dB

Table 2-3 Camera imaging specifications Bobcat-640

(1) At 25°C FPA temperature

(2) Typical value, measured in dark at t_{exp} = 0.1ms and 25°C FPA temperature

On Board Image Processing Features Bobcat 640	
Image correction	Bobcat CL: 3 TrueNUCs onboard: - Low Gain / ITR (50 – 20000 µs) - High Gain / ITR (100 – 10000 µs) - High Gain / IWR (8500 – 40000 µs)
	Bobcat GigE: up to 4 NUCs for fixed exposure time can be uploaded (1)
Auto-Gain and Offset	
Auto-Exposure	only for Bobcat-CL
Trigger possibilities	

Table 2-4 On board image processing features

(1) For Bobcat-GigE: TrueNUC can only be used in Xeneth software.

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Camera Specifications		
Interfaces		
Camera control	RS-232	Bobcat-CL
	GigE	Bobcat-GigE
Image Acquisition	Cameralink	Bobcat-CL
	GigE	Bobcat-GigE
Trigger	Trigger In / Out (configurable)	
Power Requirements		
Power consumption (1)	2.8W	Bobcat-CL
	4W	Bobcat-GigE
Maximal power consumption	10W	
Input Voltage	12 V	
Start-up time	< 10 s	
Trigger Characteristics		
Trigger-in delay (SMA trigger) (2)	3.3 us	falling edge
	3.1 us	rising edge
Trigger-in delay (CC1 trigger) (only for Bobcat-CL)	1.3 us	rising and falling edge
Trigger-in jitter	± 0.05 us	
Physical characteristics		
Dimensions (3)	55W x 55H x 72L	Bobcat-CL
	55W x 55H x 81,7L	Bobcat-GigE
Weight camera head (3)	285g	Bobcat-CL
	334g	Bobcat-GigE
Environmental specifications		
Shock	40G, 11ms, halfsine profile, according to MIL-STD810G	
Sine Vibration	5G (20 to 2000 Hz), according to MIL-STD883J	
Operating case temperature	-40 to 70°C	
Storage temperature	-45 to 85°C	

Table 2-5 Camera specifications Bobcat-640: operating mode – interfaces – power requirements – trigger characteristics - physical characteristics – environmental specifications

(1) Typical value, measured without TEC
(2) With Trigger-in voltage = 5V
(3) Without Lens

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Lens configuration	
SWIR lens 25mm f/1.4 for 640 (20um)	OPT-000062
VIS lens 50mm f/0.95 for 640 (20um)	OPT-000031
SWIR lens 50mm f/2.0 + mount/filter holder	ASY-000657 (including OPT-000172)
SWIR lens 75mm f/2.0 for 640 (20um) + mount/filter holder	ASY-000443 (including OPT-000025)
SWIR lens 100mm f/2.0 for 640 (20um)	ASY-000444 (including OPT-000026)
SWIR lens 200mm f/2.4 + mount/filter holder	ASY-000658 (including OPT-000173)
SWIR zoom lens 75-300mm f/6.0 + mount/filter holder	ASY-000548 (including OPT-000027)
C-mount Extension rings	OPT-000119

Table 2-6 Lens configuration

Software		
Xeneth SDK	Optional	Bobcat-640-Industrial
	Standard	Bobcat-640-Scientific
Xeneth Advanced	Standard	Bobcat-640-Industrial & Scientific

Table 2-7 Software

Accessories				
Ethernet Cable 5m		ELC-001330	Optional	Bobcat-GigE-industrial
			Standard	Bobcat-GigE-scientific
Frame grabber	NI 1429	ELC-001337	Optional	Bobcat-CL
	NI 1433	ELC-001986	Optional	
	Euresys Grablink	ELC-002139	Optional	
Camera-Link Cable MDR to SDR		ELC-001281	Optional	Bobcat-CL
Camera-Link Cable SDR to SDR		ELC-002171	Optional	Bobcat-CL
Power supply		ASY-001268	standard	Bobcat-CL&GigE
Power cord		ELC-001288	optional (EUR)	Bobcat-CL&GigE
		ELC-001500	optional (USA)	Bobcat-CL&GigE
		ELC-001501	optional (UK)	Bobcat-CL&GigE
Bobcat case		ASY-000057	standard	Bobcat-CL&GigE

Table 2-8 Accessories

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