CCD Line Camera with External Trigger (Page 1 of 3)

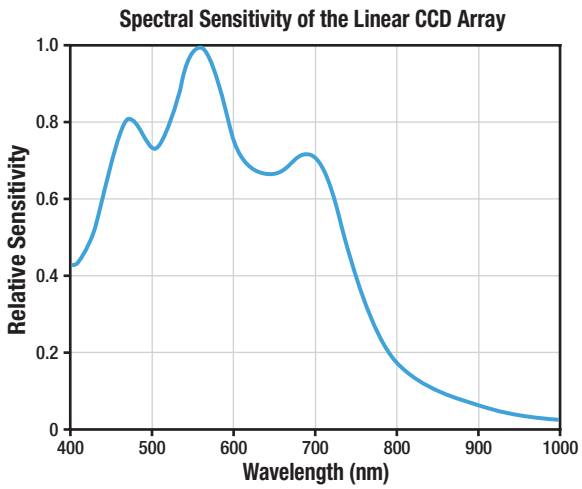
NEW products

LC100

Features

- Input and Output Triggers
- Five User Configurable General Purpose I/O Ports (GPIO)
- Up to 16 Independently Programmable Regions of Interest
- Internal Simple Pattern Matching Logic
- Dust Proof, Rugged Housing for Field Usage
- Trigger Cable Included
- USB2.0 Interface
- Versatile Software Package (Splicco) and Driver Package (C/C++, VB, DotNet, LabVIEW) Included
- F-Mount Compatible via Included Adapter
- Compatible with 30 mm and 60 mm Cage Systems
- Ø1/2" Post Mountable

Thorlabs' LC100 Line Camera is designed for applications in optics, imaging, spectroscopy, biology, and industrial process control. It incorporates a 2048 pixel CCD array and is capable of detecting light in the 350 to 1100 nm range with scan rates up to 900 scans per second (450 Hz with external trigger). This line camera offers a trigger input and output, an analog output, and five digital software-controlled General Purpose Input/Outputs (GPIOs). The delay of the trigger input and output can be adjusted, and the analog output allows one to monitor the intensity of a selectable single pixel of the CCD line.



The LC100 line camera itself is capable of analyzing up to 16 freely definable regions of interest (ROIs) from the recorded line scans; it can analyze each spectrum independently using simple pattern matching. The five GPIOs can be programmed to return specific logic patterns according to the results of the spectrum analysis.

The rugged, dust-proof housing makes this line camera ideal for field applications and process control. Typical applications include using it as a sensor in custom spectrometers or interferometers as well as position or size sensing devices. These cameras are also used in defect sensing applications as well as for fill level and edge detection.

The housing has eight 4-40 taps with the corresponding spacings to make it compatible with both Thorlabs' 30 mm and 60 mm cage assemblies. In addition, the housing is SM2-threaded (2.035"-40) for lens tube compatibility. A 1/4"-20 (M6) tap is provided for post mounting.

Software

Features

- Operates up to 10 Devices Simultaneously
- Auto-Detection of Compatible Devices
- Available Filters: Peak Finder, Smoothing, Averaging, Flip/Revert Picture
- Algorithms: Gaussian Transformation
- Normalized Y Axis
- Persistence Option
- User-Selectable Zoom and Colors
- Scan Saving and Loading in JDX and CSV Formats
- Copy-to-Clipboard and Snapshot Functions
- Printable Windows
- Tabbed or Cascading Measurement Windows
- Gaussian Data Fitting
- Timed and Fast Sequential Recording

Adjustable Parameters

- Integration Time
- Trigger Modes: Internal, External, Continuous, Single Shot
- Averaging Method: Gliding or Block Average
- Smoothing Method: Block Smoothing
- Picture Flip and Revert

CCD Line Camera with External Trigger (Page 2 of 3)

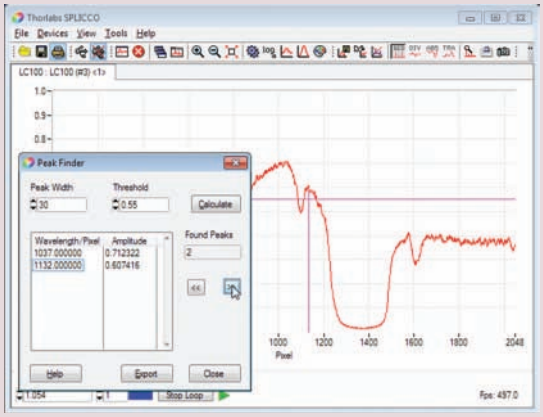


Figure 1. Screenshot showing the peakfinder, which lists all peaks that meet the minimum user-determined peak height (threshold) and width.

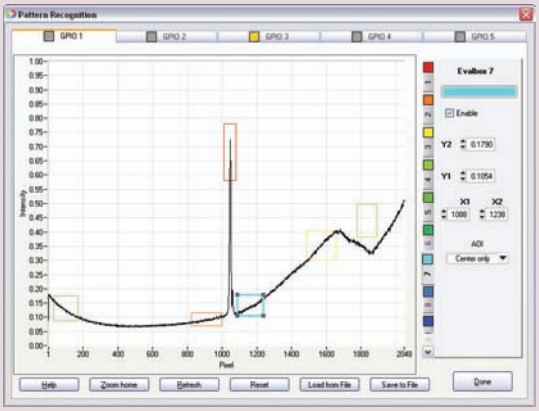


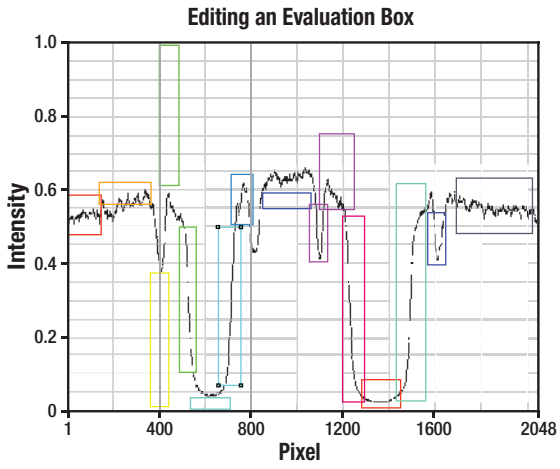
Figure 2. Up to 16 region of interest (evaluation boxes) can be defined with adjustable sizes at arbitrary locations in the scan diagram. They will be evaluated during scans. The results can be linked for simple pattern matching and combined with customized logic to control the five GPIOs.

Software Features

Pattern Recognition

The LC100 Camera's Pattern Recognition is a powerful tool when evaluating a scan. It is possible to observe the intensities detected within certain pixel ranges, compare them with given margins, and output the result as a logical signal representing "True/False" information.

For this purpose, collected data can be divided into regions of interest known as Evaluation Boxes. Each rectangular evaluation box is defined by a pixel range in one direction and a range of correlated intensities in the other. For evaluation, the intensity values in the region of interest (ROI) are compared with one or more of the 6 possible user-selected criterion. This evaluation result is provided via GPIOs. An example is shown to the right.



Trigger Setup

The Trigger Setup allows one to independently set the timing between internal (software) or external (hardware) trigger event, exposure control, and flash signal.

Trigger In Delay

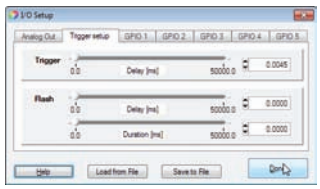
This delay between the trigger (internal single shot or external) slope and start of the CCD exposure can be set from 4.5 µs to 50 s.

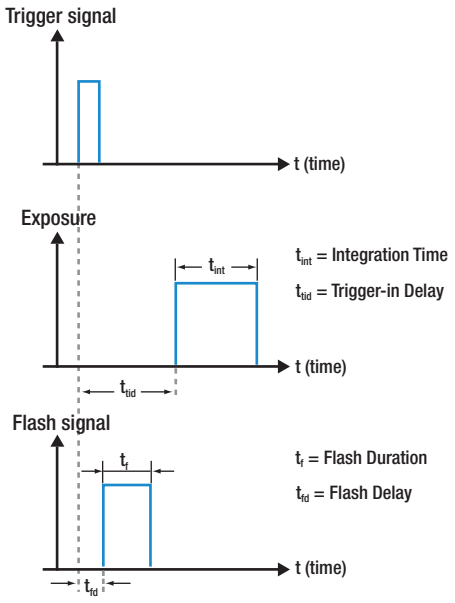
Flash Delay

Flash delay, which can be set from 0 – 50 s, is the time interval between the trigger (internal or external) slope and flash control pulse. The flash-out signal can be assigned to any of the five GPIOs.

Flash Duration

The flash duration is set using a slide bar and can have a minimum value of 0 seconds and a maximum value of 50 seconds. The trigger-in delay can be set even higher than the sum of the flash delay and flash duration. This can be useful for fluorescence applications where a flash or UV LED is used for excitation of a probe. The time diagram to the far right illustrates the timing.





CCD Line Camera with External Trigger (Page 3 of 3)

ITEM #	LC100(/M)
Detector Range (CCD Chip)	350 - 1100 nm
CCD Pixel Size	14 µm x 56 µm (14 µm Pitch)
CCD Sensitivity	240 V / (lx · s)
CCD Dynamic Range[a]	333
CCD Pixel Number	2048
Integration Time	1.055 ms – 50 s
Scan Rate Internal Trigger	900 Scans/s[b] (Max)
S/N Ratio[c]	≤2000 : 1
Trigger Input	BNC
Trigger Signal	TTL 5 V and 3.3 V
Trigger Frequency, Scan Rate	450 Hz (Max), 450 Scans/s[b]
Trigger Puls Length	50 ns (Min)
Trigger Delay	4.5 µs
Number of GPIOs[d]	5
GPIO[d] Type	3.3 V TTL
Region of Interests (ROI)	16
Analog Output	0 - 4 V (Programmable)
Interface	Hi-Speed USB2.0 (480 Mbit/s)
Dimensions	80 mm x 80 mm x 33 mm (3.13" x 3.13" x 1.30")
Weight	<0.4 kg

LC100
(Post Not Included)

Trigger Cable
(Included)

Pin Configuration of Trigger Cable Connector

CONNECTOR PINS	PIN #	DESCRIPTION
	1	Trigger Input, LL TTL
	2	Common GND (Trigger and GPIO)
	3	Analog Output
	4 - 8	GPIO Ports 1 - 5, LL TTL

a) Ratio of saturation voltage to dark current voltage
b) 1.055 ms integration time and depends on connected PC
c) With 10x averaging, depending on integration time; for single shot use CCD dynamic range
d) GPIO: General Purpose Input/Output

ITEM #	$	£	€	RMB	DESCRIPTION
LC100	$ 1,250.00	£ 900.00	€ 1.087,50	¥ 9,962.50	USB 2.0 Smart Line Camera, 2048 Pixel, Si CCD Array, Imperial
LC100/M	$ 1,250.00	£ 900.00	€ 1.087,50	¥ 9,962.50	USB 2.0 Smart Line Camera, 2048 Pixel, Si CCD Array, Metric

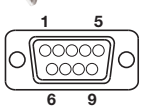
Trigger Cables for Cameras

The CAB-DCU-T1 and CAB-DCU-T2 USB trigger cables are designed for use with our DCU223 and DCU224 USB CCD Cameras as well as for our DCC1240 CMOS Camera (see pages 1593 - 1595). Both cables provide an additional trigger input and USB connection when connected to these cameras via the Micro D-Sub. In addition, the CAB-DCU-T1 provides an additional trigger output.

Use the input trigger to initiate the exposure of the camera. The output trigger can be used to start external events (e.g., a strobe light). The trigger configuration (i.e., the delay of the input trigger and timing of the output trigger) can be set using the provided software or LabVIEW drivers. Both cables can also be used with our Shack-Hartmann Wavefront Sensors (WFS150/WFS300 series, WFS10 series) although, in this case, only the trigger in function will be available.

CAB-DCU-T2

CAB-DCU-T1



ITEM #	CAB-DCU-T1	CAB-DCU-T2
Device Side Connector	Micro D-Sub, 90° Angled	Micro D-Sub, Straight
PC Side Connector	USB 2.0 A Male	
USB Standard	Hi-Speed USB 2.0 (480 Mbit/s)	
Trigger In (Bare Wire)	X	X
Flash and Digital Out (Bare Wire)	X	
Wire Gauge USB	24AWG/2C and 28AWG/1PR	
Shielding	Double-Shielded 80 °C 30 V	
Length	3 m	

PIN	CAB-DCU-T1	CAB-DCU-T2
1	Flash Strobe Output -	Not Connected
2	Trigger Input +	
3	Shield	
4	USB +5 V	
5	USB GND	
6	Flash Strobe Output +	Not Connected
7	Trigger Input -	
8	USB D+	
9	USB D-	

ITEM #	$	£	€	RMB	DESCRIPTION
CAB-DCU-T1	$ 133.00	£ 95.76	€ 115,71	¥ 1,060.01	USB and Trigger Cable (In/Out) for Cameras, 3 m
CAB-DCU-T2	$ 78.00	£ 56.16	€ 67,86	¥ 621.66	USB and Trigger Cable (In Only) for Cameras, 3 m