

SmartBlue™

Digital Linescan Camera

2048 Pixels, CameraLink™ Output

- Preliminary -



SmartBlue™: highly affordable dual output CCD camera delivers high sensitivity, fast readout, high dynamic range, and low image lag.

Introduction

The New SmartBlue™ digital linescan cameras incorporate the latest in photodiode array technology based on the industry standard Reticon® devices with state of the art electronics and a robust industrial camera housing. The linescan photodiode array is a Pinned Photodiode Charge Couple Device which allows for high sensitivity, fast readout, while maintaining high dynamic range, and low image lag.

The New SmartBlue™ cameras are cost effective high performance digital linescan cameras, and feature a CameraLink™ digital interface. These cameras feature geometrically precise photodiode CCD image sensor with 14 um square pixels with a resolution of 2048 pixels. This “next generation” array can achieve data rates up to 80 MHz with superior noise immunity, precise linearity, and high CTE.

The SmartBlue™ digital cameras are designed for high line rate applications with low to moderate light conditions and where small size, and low cost are required.

The two-point Flat Field pixel correction circuits give the user the flexibility of correcting video data to compensate for non-uniformities in lighting, lens, or CCD sensor variations. Adjustable gain and offset controls allow users to compensate for variations in illumination found in the “real-world” applications.

The robust design in conjunction with PerkinElmer’s ultra modern manufacturing techniques allows the SmartBlue™ camera to deliver consistent, reliable performance while the rugged industrial design metal housing provides the maximum protection in a variety of harsh environments and factory floor conditions.

Features and Benefits

- High Speed 80 MHz data rate.
- 14 um square pixels in 2048 element resolution.
- Small size 101.6 x 57.2 x 38.1mm
- 8/10/12- bit output format
- High line rates up to 37 kHz
- 66db Dynamic Range
- High Sensitivity Pinned Photo Diode CCD Sensor
- CameraLink™ base output
- User Controlled Smart Pixel Correction
- Antiblooming control
- Single 12VD.C. power supply
- Electronic exposure control
- Adjustable gain levels
- Real time status LEDs
- RoHS compliant and CE mark certified

Applications

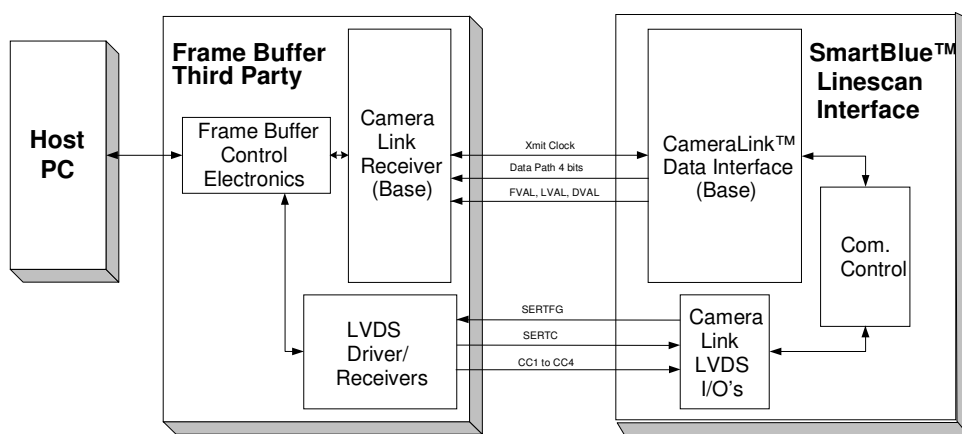
- High speed inspection
- Postal / Parcel sorting
- Web inspection
- Surface Inspection
- OCR / Bar Code Reading

Introduction (continued)

SmartBlue™ cameras transform light imaged during an exposure period into a digital video signal. Antiblooming structures within the CCD sensor ensure superior performance over a wide range of lighting conditions. User defined control is possible for line rate, exposure time, video gain and offset.

SmartBlue™ cameras have an internal self diagnostics with real time status LEDs in addition to a test pattern mode to allow the user to quickly debug and isolate potential problems within an imaging system. In the self diagnostic test pattern mode, an internal pattern generator will output data via the CameraLink™ interface while the status LEDs will indicate operation of the camera communication control signals.

The SmartBlue™ linescan cameras may be interfaced to any CameraLink™ compatible frame grabber card, allowing for a tested, 'plug and play' imaging solution. Typical high performance linescan applications include lumber processing, document scanning, dimensional gauging, biomedical imaging, bar code scanning, and many more industrial and scientific measurement applications.



Sensor Description

The SmartBlue™ cameras contain a dual output, high performance, high resolution PerkinElmer -Reticon linescan CCD image sensor (PerkinElmer Optoelectronics part HL2048PAG) featuring a pinned photodiode pixel. This sensor is designed and manufactured using strict engineering and manufacturing controls learned from over 30+ years of sensor design and manufacturing experience.

PerkinElmer has combined the best features of high-sensitivity photodiode detection and a high-speed charge coupled (CCD) scanning to offer an uncompromising solution to the increasing demands of advanced imaging applications. These high performance imagers feature low noise, high sensitivity, impressive charge storage capacity, and lag-free dynamic imaging. The 14µm square contiguous pixels in these imagers reproduce images with minimum information loss and artefact generation, while their unique photodiode structure provides excellent blue response extending below 200nm and into the ultraviolet.

The sensor quantum efficiency (QE) and responsivity as a function of wave length is shown in Figure 1. All SmartBlue™ cameras are delivered with a standard glass sensor window having a cut off at about 350nm. A fused quartz window option is available for applications requiring improved UV response. Contact your factory representative for additional details.

SmartBlue™ Camera Specifications

Sensor Characteristics		
Pixel size	14 x 14	µm
Window material	Glass	nm
Spectral range	200 – 1000	nm
Resolution	2048	pixels
Aperture length	28.7	mm
Max. line rate	37.3	kHz

Electro-Optical Characteristics		
PRNU	+/- 10	%FS
Dynamic range	66	db
Peak responsivity	27 (nom gain)	DN / nJ / cm ²
Anti blooming	100:1	ratio

Connectors	
Input power	Hirose 6-pin, HR10A
Data & comm	MDR26

Camera Features		
Data rate	80	Mhz
Output format	8 / 10 / 12	bit
# of channels	1 or 2	
Trigger mode	Master or slave	
Exposure mode	Internal or external	
Gain – step, max.	0.035, 32	db
Flat field pixel correction	2-point, user selectable	
Data interface	CameraLink™, base	
Control interface	CameraLink™, serial	
Input supply	12 +/- 10%	Volts DC
Power dissipation	< 7	Watts

Mechanical		
Size	101.6 x 57.2 x 38.1	Mm
Optical mount	U-mount, MA2-1-6H	
Weight	245	Grams
Sensor alignment	250	µm
Operation temperature	0 to 55 (non-condensing)	°C
Storage temperature	-40 to 80 (non-condensing)	°C
Regulatory	CE, RoHS compliant	

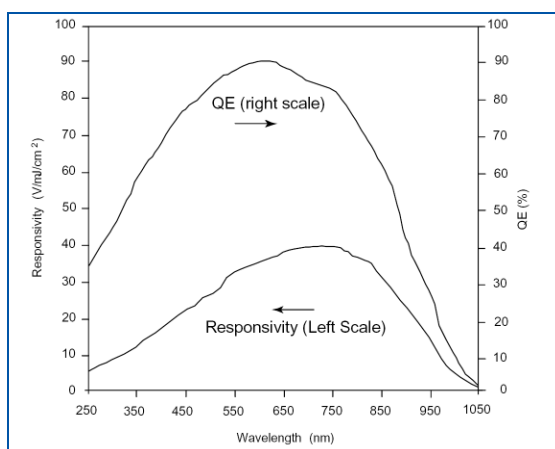


Figure 1
Spectral Sensitivity Curve
(1x Gain)

*Optical Interface

SmartBlue™ cameras are equipped with a U-Mount lens interface (MA2-1-6H) that is aligned to the CCD sensor imaging surface. This standard lens interface allows the user to select the optimum lens to suit their particular application. Adapters are available to accept C, U, or F (Nikon Bayonet) type lenses. For assistance in choosing camera adapters, extensions, and lenses contact PerkinElmer Optoelectronics.

Operating Modes

The SmartBlue™ cameras can operate in a Master (free-run) or Slave (triggered) exposure Modes. When the camera is set to Master Mode, the cameras exposure time is set by an internal line rate counter which can be user controlled. The default factory setting is for maximum line rate operation determined by the CCD linescan sensor length. When the camera is set to Slave (triggered) Mode, the cameras exposure time and line rates are determined by the users input signals to the camera by the Camera Control lines of the CameraLink™ interface. The operating mode selection is set via commands sent to the camera over the serial control lines of the CameraLink interface. An internal oscillator sets the digitized video output data rate to the maximum of 40 MHz per channel or 80 MHz total.

Camera I/O's

The SmartBlue™ camera only requires a single +12 volt DC supply for operation. Power is supplied to the camera through a single Hirose HR10A input connector located at the rear of the camera.

The data output signals are compliant with CameraLink™ Specifications base configuration. User selectable bit depth of 8, 10 or 12 data bits along with 1 or 2 video channel configurations are selected via commands sent to the camera over the serial interface. Video data is sent to the single 26 pin CameraLink connector located at the rear of the camera.

The CameraLink™ specification allows for four manufacturer defined Low Voltage Differential Signal (LVDS) camera control signal (CC1 – CC4) inputs. For the SmartBlue™ cameras, CC1 is a user input for supplied Line Transfer (LT) and Line Reset (LR) signals. This allows external user control of the cameras line rate and exposure time settings for the various camera configuration modes. CC2 to CC4 are reserved for future assignments.

Flat Field 2-Point Correction

The SmartBlue™ Smart digital cameras have a user controlled Flat Field 2-point pixel correction to allow compensation for non-ideal imaging conditions due to lighting, lens artefacts, or CCD sensor variations. The Flat Field correction uses a two-point algorithm to pixel correct dark and illuminated fields and stores the correction coefficients within the camera flash memory. There are five of selectable tables to allow storage of correction coefficients for different operating modes or conditions.

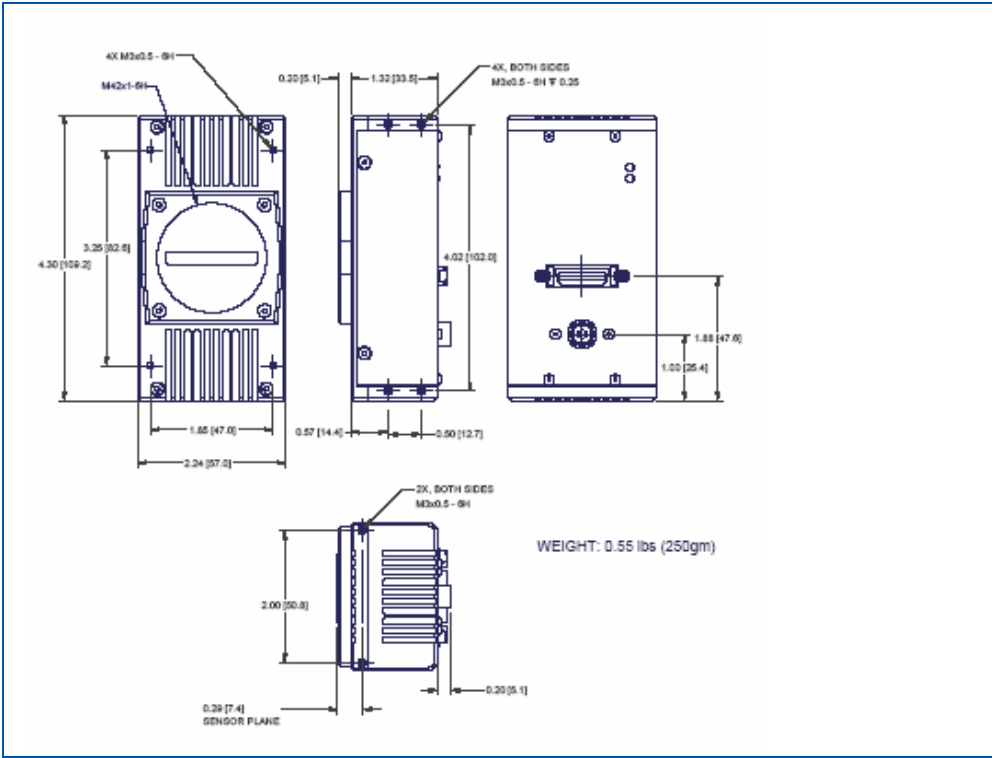


Figure 2
Mechanical Drawings

Ordering Information

Part Number	Resolution	Window	Aperture Length	Max. Line Rate
SB2480CLG-011	2048	Glass	28.7 mm	37.3 kHz
SB2480CLQ-011	2048	Quartz	28.7 mm	37.3 kHz



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