

APPLICATION NOTE

KLI SERIES COLOR LINEAR IMAGE SENSORS SPECTRAL RESPONSE CHARACTERISTICS

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KLI Series Color Linear Image Sensor Spectral Response Characteristics:

The Eastman Kodak Company is the world leader in imaging, serving both consumers and imaging professionals. Customers have come to expect, from Kodak, a certain excellence in color reproduction. In keeping with this tradition, the Microelectronics Technology Division has developed two filter technologies for use in the manufacture of its linear color image sensors. Specially formulated filter sets are placed on a tri-linear image sensor to provide the required color response depending on the application.

The first filter set, Filter Group I, is formulated for scanning color negative medium. Color separation has been optimized for color negative film. Additionally, the off-band rejection is considered one of the best in the industry. The second filter set, Filter Group II, has improved responsivity which makes it an excellent choice for reflective scans. This document details the performance characteristics of these filter sets.



Spectral Response Characteristics for KLI Series Image Sensors; Filter Group I:

Devices: *KLI-2113, KLI-6003, KLI-8013*

A filter set has been implemented for a series of tri-linear image sensors optimized for color negative scanning. Values for the various nominal wavelength positions are shown in Table 1 with corresponding tolerances for responsivity and wavelength as indicated for Filter Group I Color Image Sensors. See Figure 1 for clarification of parameters.

Filter	Parameter	Wavelength (nm)	Responsivity Tolerance (3 σ)	λ Tolerance (nm)
Green	$\lambda_{0,g}$	542	$\pm 18\%$	± 13.4
	$\lambda_{1,g}$	514	-	± 11.3
	$\lambda_{2,g}$	583	-	± 13.7
Blue	$\lambda_{0,b}$	465	$\pm 18\%$	± 17.3
	$\lambda_{1,b}$	426	-	± 15.4
	$\lambda_{2,b}$	501	-	± 15.1
Red	$\lambda_{0,r}$	650	$\pm 16\%$	
	$\lambda_{1,r}$	616	-	± 9.6

Table 1.
Filter Variation Parameters for Filter Group I Color Image Sensors

Note:
Linear Device Part Marking Code: B



Spectral Response Characteristics for KLI Series Image Sensors; Filter Group II:

Devices: *KLI-10203, KLI-14403*

A second filter set has been implemented for a series of tri-linear image sensors optimized for use in reflective scanning. Group II filter properties differ from the previously mentioned filter set design. Values for the various nominal wavelength positions are shown in Table 2 with corresponding tolerances for responsivity and wavelength indicated. See Figure 1 for clarification of parameters.

Filter	Parameter	Wavelength (nm)	Responsivity Tolerance (3 σ)	λ Tolerance (nm)
Green	$\lambda_{0,g}$	535	$\pm 12\%$	± 8
	$\lambda_{1,g}$	506	-	± 8
	$\lambda_{2,g}$	577	-	± 8
Blue	$\lambda_{0,b}$	462	$\pm 12\%$	± 8
	$\lambda_{1,b}$	413	-	± 8
	$\lambda_{2,b}$	505	-	± 8
Red	$\lambda_{0,r}$	650	$\pm 12\%$	-
	$\lambda_{1,r}$	598	-	± 8

Table 2.
Filter Variation Parameters for Filter Group II Color Image Sensors

Note:
Linear Device Part Marking Code: E



KLI Series Color Linear Image Sensor Spectral Response Characteristics:**Technical Appendix:**

Independent of filter type, a degree of variation in the spectral response for the KLI-series tri-linear image sensors can be expected from the natural manufacturing tolerances of the process. This variation is due to the combined variations in filter properties (net density and filter peak wavelength position) and the device properties (sensitivity and film thickness variations).

Values for gauging filter performance are determined from Figure 1. The center (or peak) transmission wavelength is specified as λ_0 , and the 50% points are given as λ_1 and λ_2 , corresponding to the near and far wavelength sides of the filter pass band.

For the red filter, only the near wavelength value is presented. The red filter, as well as the blue and green filters, exhibits a high level of transmission beyond the 700nm (i.e., the filters become transparent). The far wavelength edge is assumed controlled by the system IR cut filter characteristics.

Note:

Spectral response data is measured at various points during the fabrication process, using parameters which gauge process control but, which may or may not represent the values shown in Figure 1. Final device spectral response curves are measured on a lot sample basis. Net device response is measured on a 100% inspection basis, using the integrated response to a balanced white source



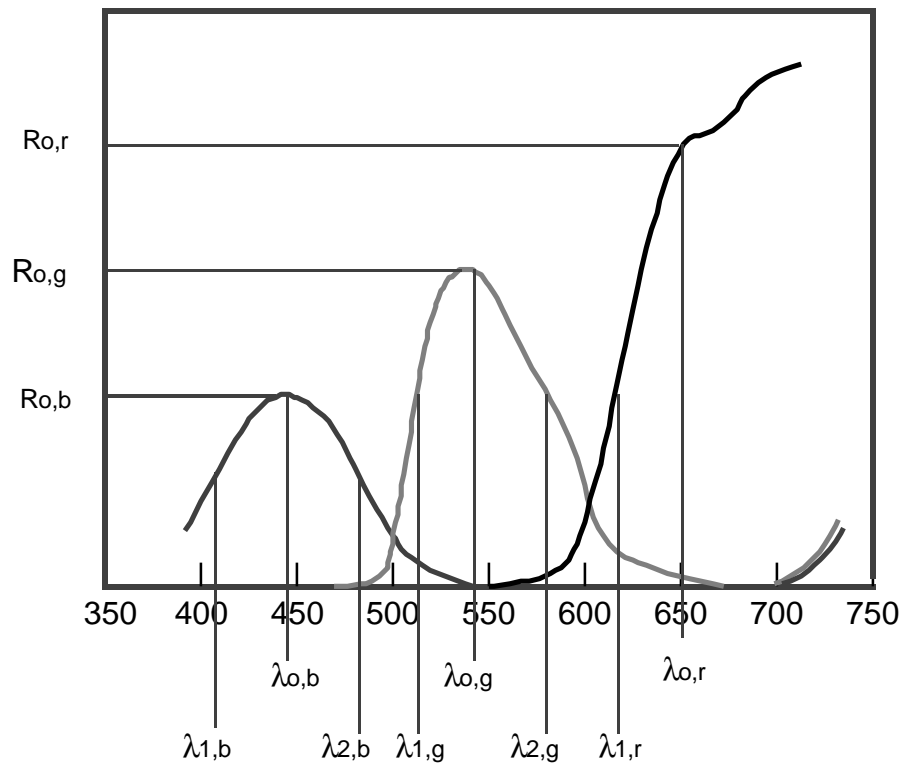


Figure 1.
Responsivity Variation Tracking Parameters for
Filter Group I Color Image Sensors

