

Agilent AECS-1000-AA02 Color Sensing Application Kit—Transmissive Data Sheet

Description

Agilent's color sensing application kit is a light-to-voltage converting device. The application kit consists of a color sensor front end, followed by post-sensor amplifiers. Featuring a filter coated photodiode, the color sensor converts the primary components of light, namely, Red (R), Green (G) and Blue (B), into photocurrent. The amplifier amplifies and converts photocurrent into analog voltages for each of the R, G, B component, denoted by V_{ROUT} , V_{GOUT} and V_{BOUT} , respectively. In order to cater for different lighting conditions, gain selection of either 1X or 10X has been incorporated into the application kit.

Theory of Operation

The application kit is used for incident light sensing where the sensor is placed facing light source directly. The R, G, B components of the light falling on the sensor is converted into equivalent analog voltage representations. Given that any colored light is uniquely represented by the ratio of the primary colors, the sensor provides a definite manner of measuring light color. In addition, the sensor is also responsive to

light intensity where its outputs increase linearly with increasing light intensity. In addition, the sensor can also be used to measure color of a medium placed between light source and the sensor. Examples include liquid and transparent materials such as glass and plastic.

Applications

Being able to accurately and consistently 'name' a color, the color sensor opens up opportunities to manipulate and control color. It is ideal for color detection, color measurement and color control in both open and closed loop systems. Potential areas of application are office automation, quality control and color coding in such industries as food, textile, paint, assembly and packaging, environmental lighting, consumer good, pharmaceutical, medical and research and automotive.

Note: The application kit is only meant for engineering evaluation purposes and not for reliability testing.

ESD WARNING:

Normal precautions should be taken to avoid static discharge.

Features

- Convert color point of light to analog voltage
- Integrated photodiode and amplifier
- Integral R, G, B color filters
- Gain selection switch
- Operating temperature: 0° to +50°C



AECS-1000 Absolute Maximum Ratings

Subjecting the device beyond maximum ratings may cause permanent damage to the device; these are stress rating beyond which proper operation of device is not guaranteed. Prolonged exposure to these extreme conditions may also affect reliability of the device.

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_S	0	50	°C
Operating Temperature	T_A	0	50	°C
Supply Voltage	V_{DD}	5.0	6.0	V

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Operating Temperature	T_S	0	25	50	°C	
Supply Voltage	V_{DD}	5.0	5.5	6.0	V	
Supply Current	I_{DD}		20		mA	

Electrical Characteristics

Electrical Characteristics at $V_{DD} = 5V$, $T_A = 25^\circ C$, $R_L = 10\text{ k}\Omega$

Parameter	Symbol	Remark	Min.	Typ.	Max.	Unit
Dark Voltage	V_D	$E_e=0$	0		20	mV
Maximum Output Voltage	V_{omax}			3.0	3.3	V
Output Voltage ^[1]	V_{OUT}	$E_e=3.034\text{ mW/cm}^2$ Refer to Note 2.	1.0	1.5	2.0	V
		$E_e=3.618\text{ mW/cm}^2$ Refer to Note 3.	1.0	1.5	2.0	V
		$E_e=2.639\text{ mW/cm}^2$ Refer to Note 4.	1.0	1.5	2.0	V
Output rise time	t_r			10	100	μs
Output fall time	t_f			10	100	μs
Irradiance responsivity ^[1]	R_e	Refer to Note 2.	B	0.49		$V/(mW/cm^2)$
			G	0.12		$V/(mW/cm^2)$
			R	0.07		$V/(mW/cm^2)$
		Refer to Note 3.	B	0.33		$V/(mW/cm^2)$
			G	0.41		$V/(mW/cm^2)$
			R	0.09		$V/(mW/cm^2)$
		Refer to Note 4.	B	0.10		$V/(mW/cm^2)$
			G	0.11		$V/(mW/cm^2)$
			R	0.57		$V/(mW/cm^2)$

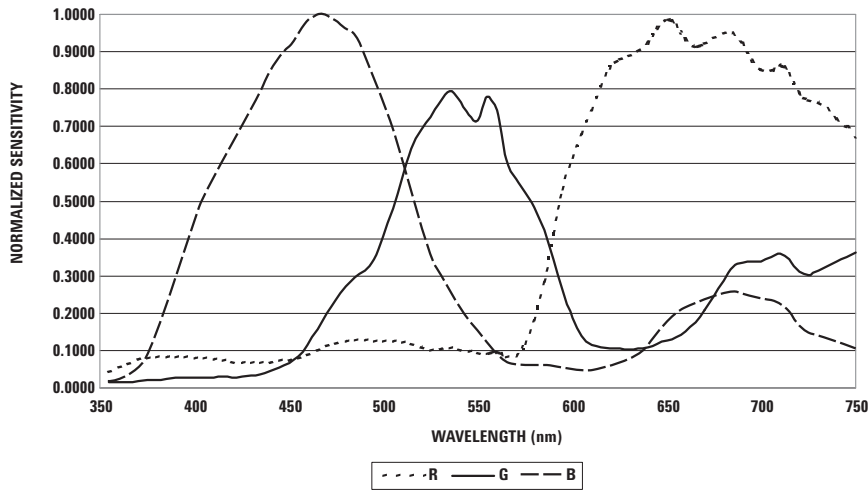
Notes:

- Responses with gain selection set to 1X. Increasing the gain selection to 10X will result in a ten fold increase in output voltage.
- Test condition is blue light of peak wavelength 468 nm and spectral half width 30 nm.
- Test condition is green light of peak wavelength 519 nm and spectral half width 20 nm.
- Test condition is red light of peak wavelength 636 nm and spectral half width 35 nm.

ESD WARNING:

Normal precautions should be taken to avoid static discharge.

Color Sensor Spectral Response



Pin Configuration

Pin	Description	Normal Operation
1	V _{DD}	5V DC supply
2	Gnd	Ground
3	VRout	Analog voltage output for Red
4	VGout	Analog voltage output for Green
5	VBout	Analog voltage output for Blue

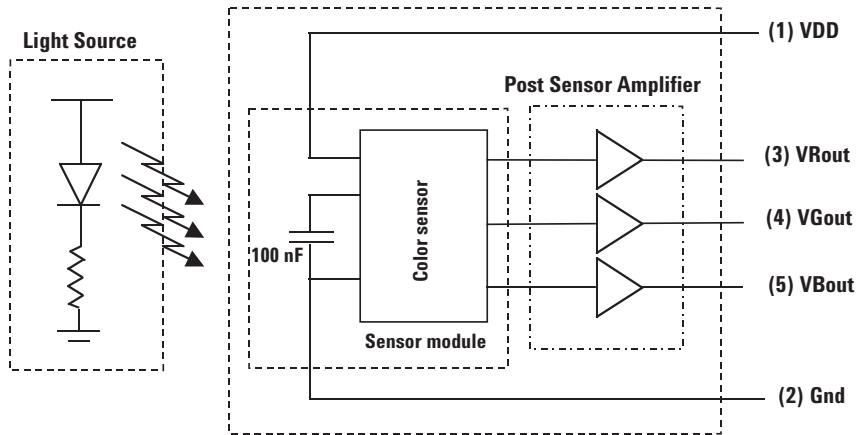


Figure 1. Schematic of Transmissive Application Kit.

ESD WARNING:
Normal precautions should be taken to avoid static discharge.

www.agilent.com/semiconductors

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or
(916) 788-6763

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (65) 6756 2394

India, Australia, New Zealand: (65) 6755 1939

Japan: (+81 3) 3335-8152(Domestic/International), or
0120-61-1280(Domestic Only)

Korea: (65) 6755 1989

Singapore, Malaysia, Vietnam, Thailand, Philippines,
Indonesia: (65) 6755 2044

Taiwan: (65) 6755 1843

Data subject to change.

Copyright © 2004 Agilent Technologies, Inc.

January 28, 2004

5989-0618EN



Agilent Technologies