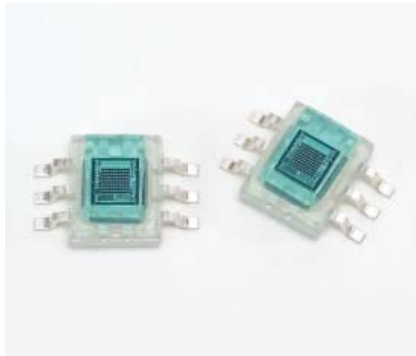


# Si photodiode



S9032-02

## RGB color sensor

The S9032-02 is a color sensor molded into a plastic package having a 3-channel (RGB) photodiode sensitive to the blue ( $\lambda_p=460$  nm), green ( $\lambda_p=540$  nm) and red ( $\lambda_p=620$  nm) regions of the spectrum. The S9032-02 has a 3-segment (RGB) circular active area of  $\phi 2$  mm.

### Features

- 3-channel (RGB) Si photodiode
- Surface-mount small plastic package
- Spectral response range close to the human eye sensitivity
- No sensitivity in the near IR region
- Active area: 3-segment (RGB) circular active area of  $\phi 2$  mm

### Applications

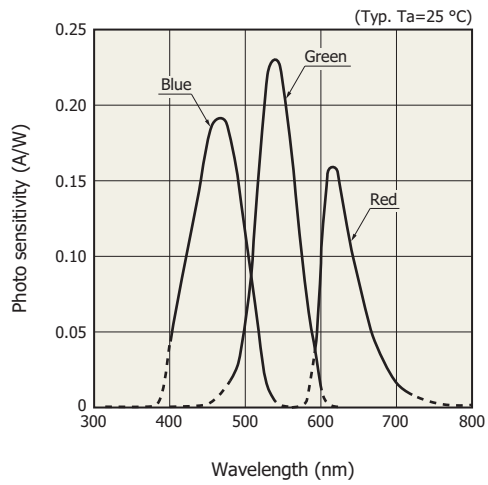
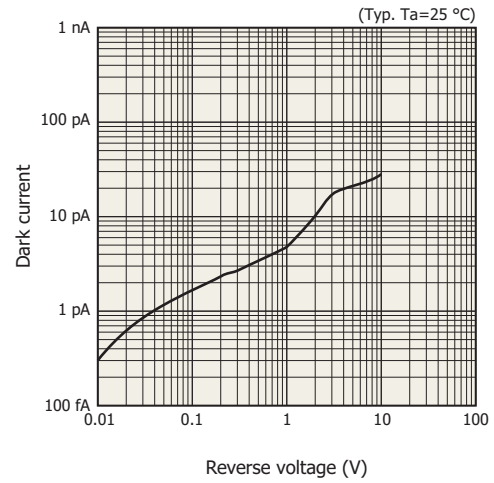
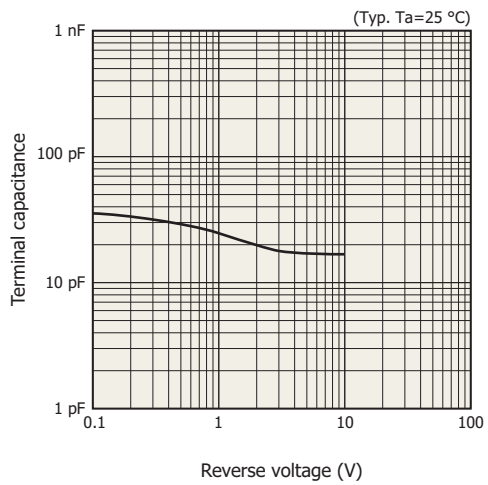
- Color adjustment for LED back light system for LCD
- Color adjustment for LCD projector
- Color tester
- Color detection

### Absolute maximum ratings

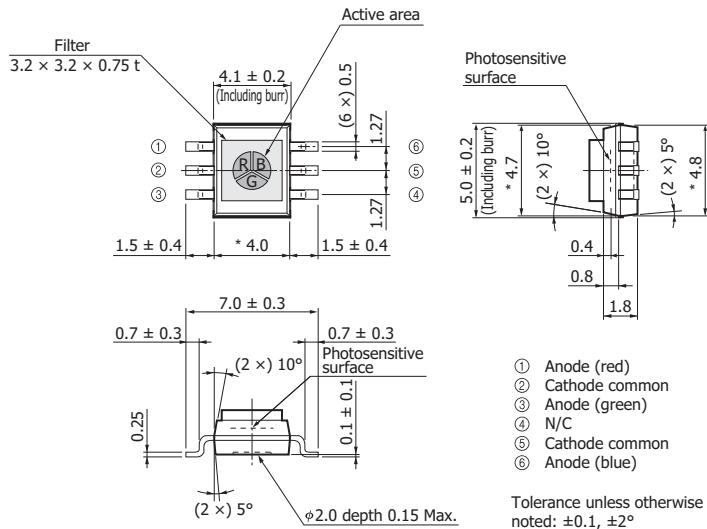
Parameter	Symbol	Value	Unit
Reverse voltage	$V_R$ Max.	10	V
Operating temperature	$T_{opr}$	-25 to +85	°C
Storage temperature	$T_{stg}$	-40 to +85	°C

### Electrical and optical characteristics ( $T_a = 25$ °C, per element )

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Spectral response range	$\lambda$	Blue	-	400 to 540	-	nm	
		Green	-	480 to 600	-		
		Red	-	590 to 720	-		
Peak sensitivity wavelength	$\lambda_p$	Blue	-	460	-	nm	
		Green	-	540	-		
		Red	-	620	-		
Photo sensitivity	S	$\lambda = \lambda_p$	Blue	0.13	0.18	-	A/W
			Green	0.18	0.23	-	
			Red	0.11	0.16	-	
Dark current	$I_D$	$V_R = 1$ V All elements	-	5	100	pA	
Temperature coefficient of $I_D$	$T_{CID}$		-	1.12	-	times/°C	
Rise time	$t_r$	$V_R = 0$ V, $R_L = 1$ k $\Omega$ 10 to 90 %	-	0.2	1.0	$\mu$ s	
Terminal capacitance	$C_t$	$V_R = 0$ V $f = 10$ kHz	-	40	80	pF	

**Spectral response****Dark current vs. reverse voltage****Terminal capacitance vs. reverse voltage**

### Dimensional outline (unit: mm)



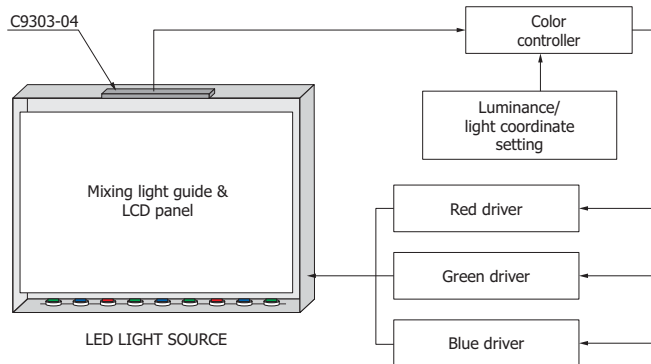
Tolerance unless otherwise noted:  $\pm 0.1$ ,  $\pm 2^\circ$   
 Shaded area indicates burr.  
 Chip position accuracy with respect to the package dimensions marked \*  
 $X, Y \pm 0.2$ ,  $\theta \pm 2^\circ$   
 Lead surface finish: silver plating  
 Packing: stick (50 pcs/stick)

KSPDA0162EA

Note: If excessive vibration is continuously applied to the glass filter, there is a risk that the filter may come off, so secure the glass filter with a holder.

### Application example

Optical feedback of backlight for TFT-LCD using a color sensor module C9303-04 (integrated with the S9032-02)



LED: Made by Lumileds (LUXEON), <http://www.lumileds.com/>

KACCC0289EA

### Line-up of RGB color sensors

Type No.		Spectral response range (nm)	Peak sensitivity wavelength (nm)	Photo sensitivity $\lambda = \lambda_p$ (A/W)	Dark current $V_R = 1$ V All elements total Max. (pA)	Active area size (mm)	Package
S7505-01	B	400 to 540	460	0.18	200	1.5 × 1.5 (× 2)	Surface mount type plastic
	G	480 to 600	540	0.23		1.5 × 1.5	
	R	590 to 720	620	0.16		1.5 × 1.5	
S9032-02	B	400 to 540	460	0.18	100	φ2/3 elements	Surface mount type plastic
	G	480 to 600	540	0.23			
	R	590 to 720	620	0.16			
S9702	B	400 to 540	460	0.18	50	1 × 1/3 elements	Surface mount type, small plastic
	G	480 to 600	540	0.23			
	R	590 to 720	620	0.16			
S10170	B	400 to 540 800 to 1000	See the datasheet. (spectral response)	0.21 *1	50	1 × 1/3 elements	Surface mount type, small and thin plastic
	G	480 to 600 760 to 1000		0.28 *2			
	R	590 to 1000		0.45 *3			

\*1:  $\lambda = 460$  nm \*2:  $\lambda = 540$  nm \*3:  $\lambda = 640$  nm

Information furnished by HAMAMATSU is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein. ©2008 Hamamatsu Photonics K.K.

# HAMAMATSU

www.hamamatsu.com

HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Higashi-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81) 53-434-3311, Fax: (81) 53-434-5184

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P.O.Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49) 08152-3750, Fax: (49) 08152-2658

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: 33-(1) 69 53 71 00, Fax: 33-(1) 69 53 71 10

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44) 1707-294888, Fax: (44) 1707-325777

North Europe: Hamamatsu Photonics Norden AB: Smidesvägen 12, SE-171 41 Solna, Sweden, Telephone: (46) 8-509-031-00, Fax: (46) 8-509-031-01

Italy: Hamamatsu Photonics Italia S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39) 02-935-81-733, Fax: (39) 02-935-81-741