

S9702

## RGB color sensor

The S9702 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 S9702 has a 3-segment (RGB) photosensitive area of  $\square 1$  mm. When compared to the previous model (S9032-02), the S9702 is significantly miniaturized (package size 55% less in cubic volume, PC board mount space 43% less in area).

### 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
- Photosensitive area: 3-segment (RGB) photosensitive area of  $\square 1$  mm

### Applications

- Portable or mobile equipment
- RGB-LCD backlight monitors
- Detectors for various light sources
- 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

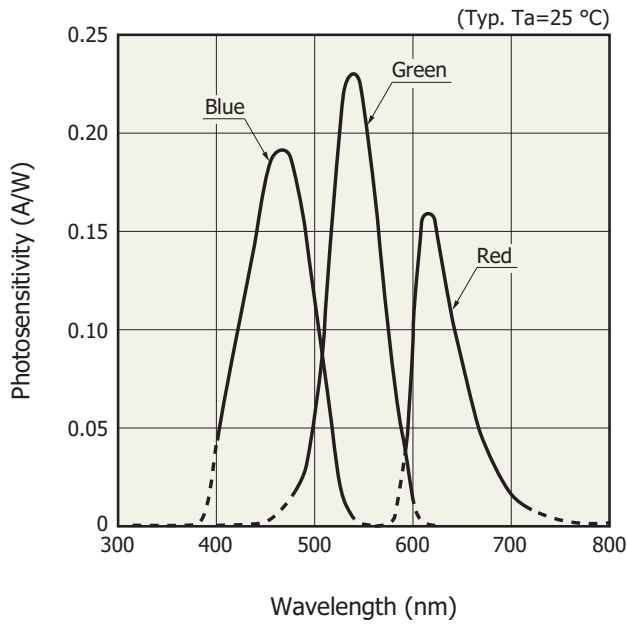
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### 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	-		
Photosensitivity	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	-	1	50	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%	-	0.1	1.0	$\mu$ s	
Terminal capacitance	$C_t$	$V_R = 0$ V, $f = 10$ kHz	-	12	25	pF	

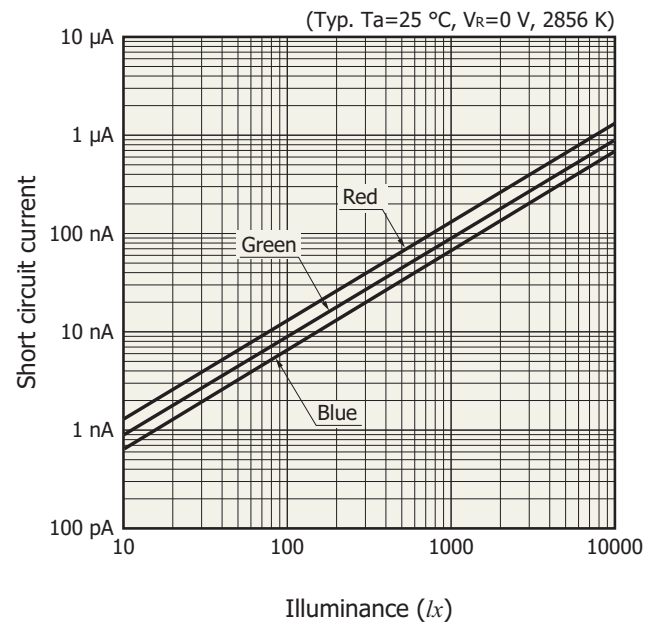
This product does not support lead-free soldering. For details on reflow soldering conditions, please contact our sales office.

**Spectral response**



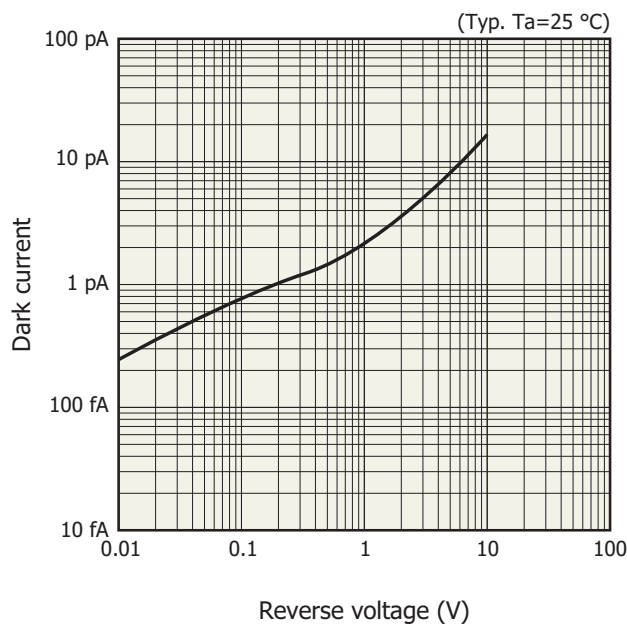
KSPDB0246EA

**Linearity**



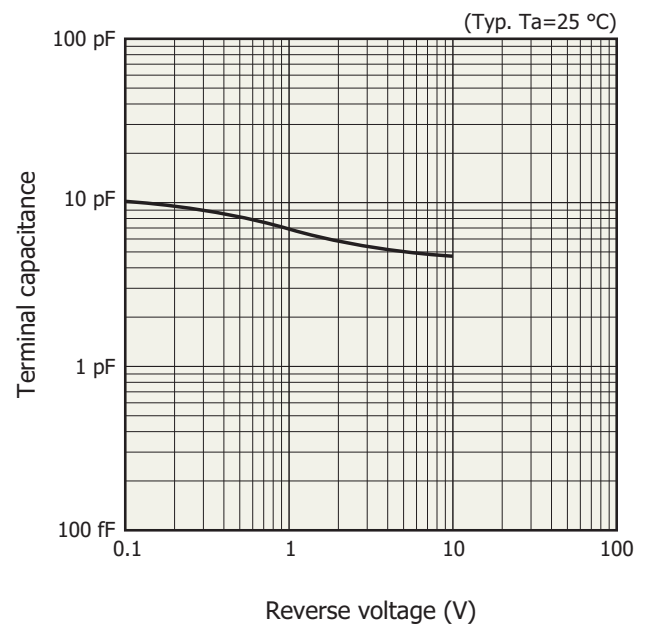
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**Dark current vs. reverse voltage**



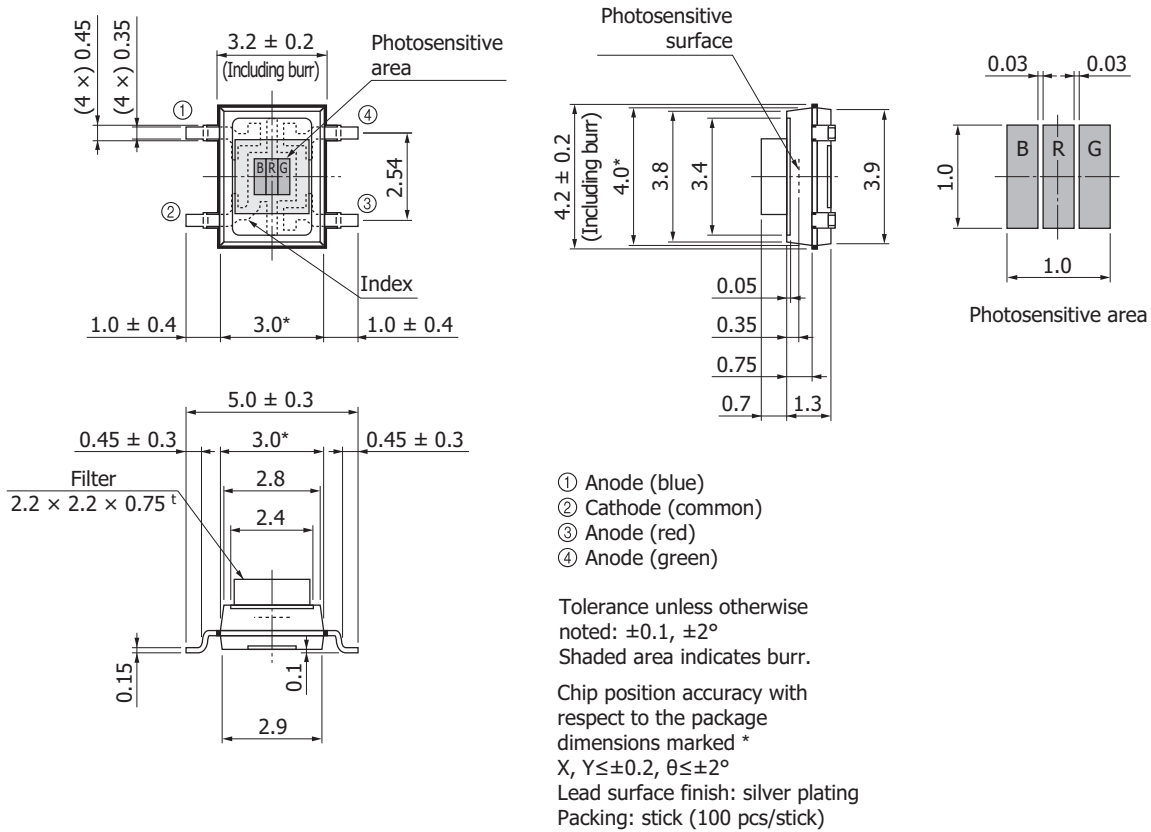
KSPDB0252EA

**Terminal capacitance vs. reverse voltage**



KSPDB0253EA












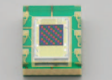


### Dimensional outline (unit: mm)



KSPDA0170EC

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.

## Line-up of RGB color sensors

Type no.	Type	Photosensitive area (mm)	Package (mm)	Peak sensitivity wavelength (nm)		Photosensitivity				Photo		
				B	G	B	G	R	B		G	R
S9032-02	Photodiode	 $\phi 2.0$	4 × 4.8 × 1.8 <sup>t</sup> 6 pin (filter 0.75 <sup>t</sup> )	B	460	B	0.18 (A/W) [ $\lambda=460$ nm]					
				G	540	G	0.23 (A/W) [ $\lambda=540$ nm]					
				R	620	R	0.16 (A/W) [ $\lambda=620$ nm]					
S9702	Photodiode	 1.0 × 1.0	3 × 4 × 1.3 <sup>t</sup> 4 pin (filter 0.75 <sup>t</sup> )	B	460	B	0.18 (A/W) [ $\lambda=460$ nm]					
				G	540	G	0.23 (A/W) [ $\lambda=540$ nm]					
				R	620	R	0.16 (A/W) [ $\lambda=620$ nm]					
S10917-35GT	Photodiode	 1.0 × 1.0	3 × 1.6 × 1.0 <sup>t</sup> COB (on-chip filter)	B	460	B	0.2 (A/W) [ $\lambda=460$ nm]					
				G	540	G	0.23 (A/W) [ $\lambda=540$ nm]					
				R	620	R	0.17 (A/W) [ $\lambda=620$ nm]					
S10942-01CT	Photodiode	 1.0 × 1.0	3 × 1.6 × 1.0 <sup>t</sup> COB (on-chip filter)	*		B	0.21 (A/W) [ $\lambda=460$ nm]					
						G	0.25 (A/W) [ $\lambda=540$ nm]					
						R	0.45 (A/W) [ $\lambda=640$ nm]					
S9706	Digital photo IC	 1.2 × 1.2	4 × 4.8 × 1.8 <sup>t</sup> 6 pin (filter 0.75 <sup>t</sup> )	B	465	Low	B	0.21 (LSB/lx)	High	B	1.9 (LSB/lx)	
				G	540		G	0.45 (LSB/lx)		G	4.1 (LSB/lx)	
				R	615		R	0.64 (LSB/lx)		R	5.8 (LSB/lx)	
S11012-01CR	Digital photo IC	 1.2 × 1.2	3.43 × 3.8 × 1.6 <sup>t</sup> COB (on-chip filter)	*		Low	B	0.3 (LSB/lx)	High	B	2.6 (LSB/lx)	
							G	0.6 (LSB/lx)		G	5.3 (LSB/lx)	
							R	1.4 (LSB/lx)		R	12.9 (LSB/lx)	
S11059-02DT /-03DS	I <sup>2</sup> C compatible color sensor	 0.56 × 1.22	3 × 4.2 × 1.3 <sup>t</sup> 10 pin (on-chip filter)	B	460	Low	B	4.4 (count/lx)	High	B	44.8 (count/lx)	
				G	530		G	8.3 (count/lx)		G	85.0 (count/lx)	
				R	615		R	11.2 (count/lx)		R	117.0 (count/lx)	
				IR	855		IR	3.0 (count/lx)		IR	30.0 (count/lx)	

\* Refer to the spectral response of each product's datasheet.

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### Precautions

- Disclaimer
- Metal, ceramic, plastic package products
- Surface mount type products

Information described in this material is current as of February, 2016.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

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