

PHOTODIODE

# Si photodiode S10170

## RGB color sensor integrated in small and thin package



S10170 is a color sensor molded into a plastic package having a 3-channel (RGB) photodiode sensitive to the Red ( $\lambda=590$  nm Min.), Green ( $\lambda=480$  to 600 nm) and Blue ( $\lambda=400$  to 540 nm) regions of the spectrum. When compared to the previous model (S9702), S10170 is significantly miniaturized the package size by 80 % in cubic volume and PC board mount space by 77 % in area. S10170 is ideal for RGB-LCD backlight monitors installed in such as mobile phones.

### Features

- 3-channel (R, G, B) Si photodiode
- Small, thin package:  $3.0 \times 1.6 \times 10$  mm
- Active area:  $1 \times 1$  mm/3-segment (RGB)
- RoHS-compatible
- Surface mount type

### Applications

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

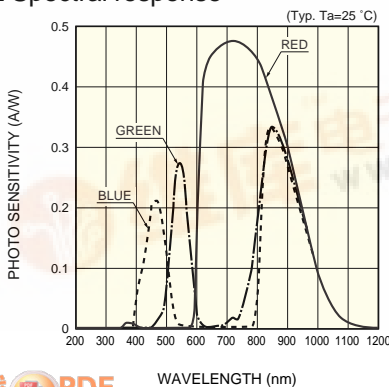
### Absolute maximum ratings

Parameter	Symbol	Value	Unit
Reverse voltage	$V_R$ Max	10	V
Operating temperature	$T_{opr}$	-25 to +85	$^{\circ}C$
Storage temperature	$T_{stg}$	-40 to +100	$^{\circ}C$

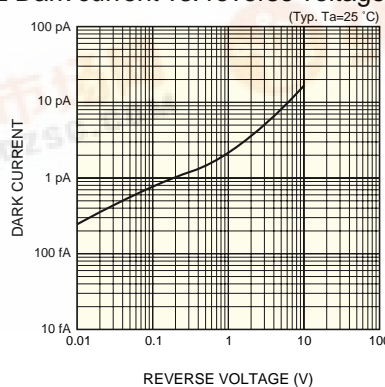
### Electrical and optical characteristics ( $T_a=25^{\circ}C$ , per element)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Spectral response range	$\lambda$	Blue	-	400 to 540 800 to 1000	-	nm
		Green	-	480 to 600 760 to 1000	-	
		Red	-	590 to 1000	-	
Photo sensitivity	S	Blue ( $\lambda=460$ nm)	0.16	0.21	-	A/W
		Green ( $\lambda=540$ nm)	0.23	0.28	-	
		Red ( $\lambda=640$ nm)	0.40	0.45	-	
Dark current	$I_D$	$V_R=1$ V, All elements	-	1	50	pA
Temperature coefficient of $I_D$	$T_{CID}$		-	1.12	-	times/ $^{\circ}C$
Rise time	$t_r$	$V_R=0$ V, $R_L=1$ k $\Omega$ , 10 to 90 %	-	0.1	-	$\mu s$
Terminal capacitance	$C_t$	$V_R=0$ V, $f=10$ kHz	-	12	25	pF

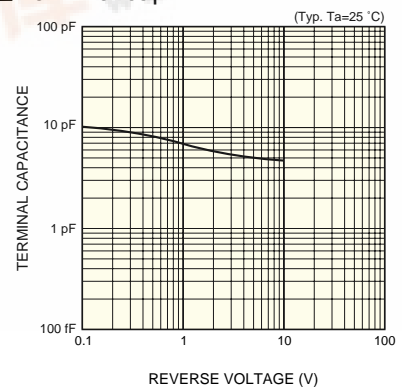
### Spectral response



### Dark current vs. reverse voltage

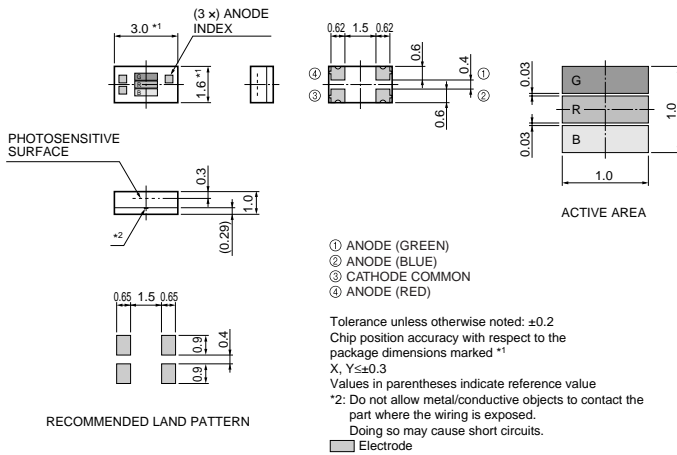


### Terminal capacitance vs. reverse voltage



Since this photodiode has sensitivity in the infrared region, infrared light must be filtered out as needed.

■ Dimensional outline (unit: mm)



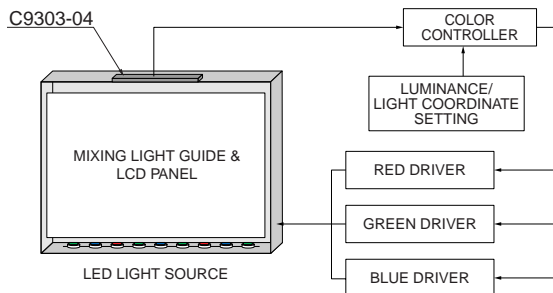
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■ Line-up of RGB color sensors

Type No.	Spectral response range		Peak sensitivity wavelength (nm)	Photo sensitivity $\lambda = \lambda \rho$		Dark current $V_R = 1 V$ all elements Max. (pA)	Active area (mm)		Package
	B	G		B	G		B	G	
S7505-01	B	400 to 540	460	B	0.18	200	B	1.5 × 1.5 (× 2)	Surface-mount type plastic
	G	480 to 600	540	G	0.23		G	1.5 × 1.5	
	R	590 to 720	620	R	0.16		R	1.5 × 1.5	
S9032-02	B	400 to 540	460	B	0.18	100	φ2/3-element		Surface-mount type plastic
	G	480 to 600	540	G	0.23				
	R	590 to 720	620	R	0.16				
S9702	B	400 to 540	460	B	0.18	50	1 × 1/3-element		Surface-mount type, miniature plastic
	G	480 to 600	540	G	0.23				
	R	590 to 720	620	R	0.16				
S8751	B	400 to 540	460	B	0.21	100	1 × 1		Surface-mount type plastic
	G	480 to 600	540	G	0.25				
	R	590 to 720	660	R	0.42				
S8752	B	400 to 540	460	B	0.21	100	1 × 1		Plastic
	R	590 to 720	660	R	0.42				

■ Application example

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



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

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