

Toshiba Photoreflective sensor Infrared LED + Phototransistor

# TLP921

## Inkjet printer's ink-level monitoring

TLP921 is a reflective photosensor combining a GaAs infrared LED with a Si phototransistor.

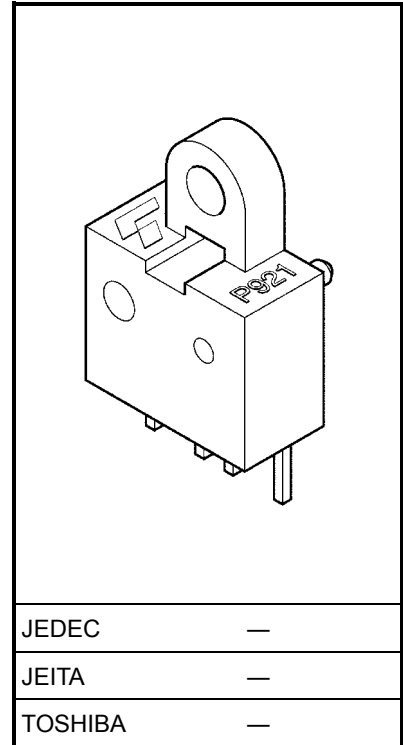
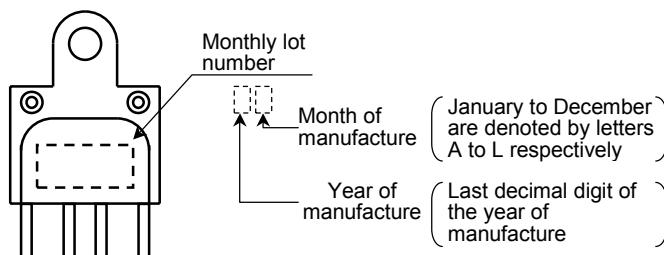
- Flush-mount package on PCB: Applied PCB thickness = 1.6 mm or thinner
- Positioning pin and single-sided screw-mount type
- Short lead type: Lead length =  $2.8 \pm 0.3$  mm
- Phototransistor impermeable to visible light
- Package material: polybutylene-terephthalate (UL94V-0, black)

### Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	$I_F$	50	mA
	Forward current derating (Ta > 25°C)	$\Delta I_F/^\circ\text{C}$	-0.33	mA/°C
	Reverse voltage	$V_R$	5	V
Detector	Collector-Emitter voltage	$V_{CEO}$	35	V
	Emitter-Collector voltage	$V_{ECO}$	5	V
	Collector power dissipation	$P_C$	75	mW
	Collector power dissipation derating (Ta > 25°C)	$\Delta P_C/^\circ\text{C}$	-1	mW/°C
	Collector current	$I_C$	50	mA
	Operating temperature	$T_{opr}$	-30~85	°C
Storage temperature	$T_{stg}$	-40~100	°C	
Soldering temperature (5 s) (Note 1)	$T_{sol}$	260	°C	

Note 1: Soldering is performed 1.5 mm from the bottom of the package.

## Marking

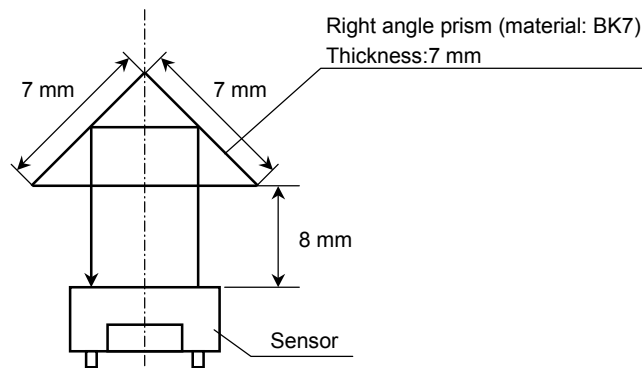


Weight: 0.35 g (typ.)

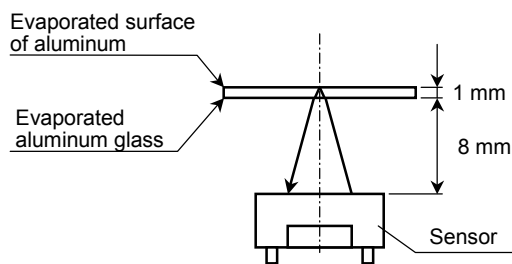
## Electrical and Optical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 20 \text{ mA}$	—	1.25	1.4	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Peak emission wavelength	$\lambda_P$	$I_F = 20 \text{ mA}$	—	940	—	nm
Detector	Dark current	$I_D (I_{CEO})$	$V_{CE} = 24 \text{ V}, I_F = 0$	—	—	0.1	$\mu\text{A}$
	Peak sensitivity wavelength	$\lambda_P$	—	—	870	—	nm
Coupled	Collector current	$I_C$	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$ (Note 2)	580	—	2600	$\mu\text{A}$
	Leakage current	$I_{LEAK}$	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$ (Note 3)	—	—	120	$\mu\text{A}$
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	$I_F = 20 \text{ mA}, I_C = 0.3 \text{ mA}$	—	0.1	0.4	V
	Rise time	$t_r$	$V_{CE} = 2 \text{ V}, I_C = 0.5 \text{ mA}$	—	38	90	$\mu\text{s}$
	Fall time	$t_f$	$R_L = 1 \text{ k}\Omega, d = 8 \text{ mm}$ (Note 4)	—	48	110	

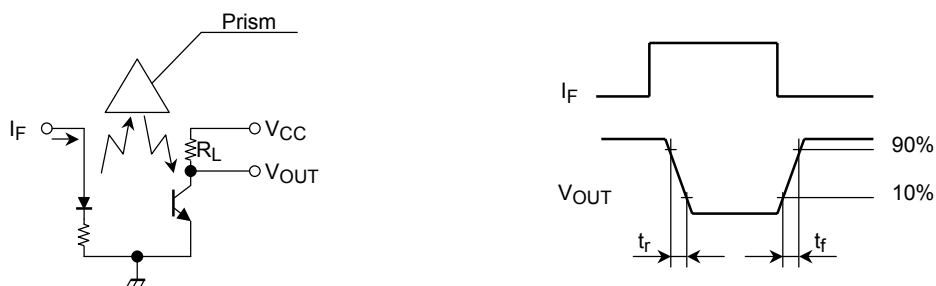
Note 2: The following drawings show condition and the layout of reflectors.



Note 3: Measurement layout drawing for leakage current



Note 4: Measurement circuit and waveforms for Switching time

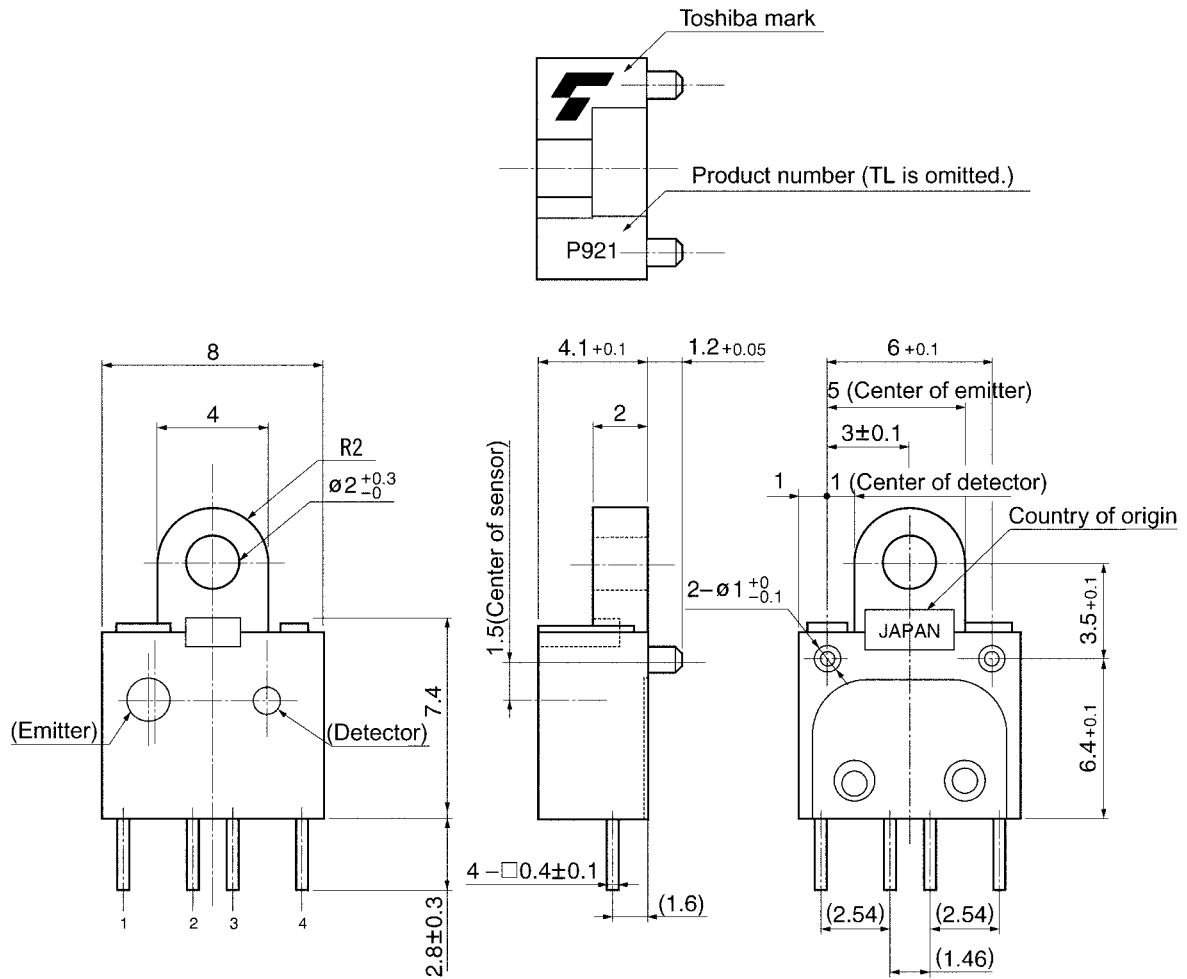


**Handling Precautions**

- When removing flux with chemicals after soldering, clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent. Chemical residue on the LED emitter or the photodetector inside the phototransistor case may adversely affect the optical characteristics of the device and may drastically reduce the collector current.
- The case is made of polybutylene-terephthalate. Oil or chemicals may cause the package to melt or crack. Care must be taken in relation to the environment in which the device is to be installed.
- Mount the device on a level surface.
- The collector current characteristic will deteriorate over time due to current flowing in the infrared LED. The design of circuits which incorporate the device must take into account the change in collector current over time.
- When the 2-mm hole is used as screw fixation, please fastening torque 0.1 N or less.

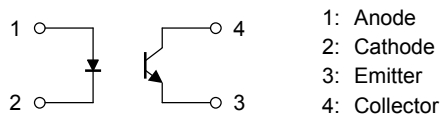
## Package Dimensions

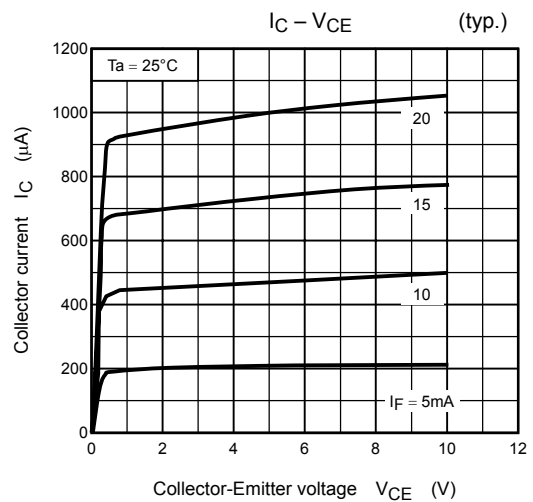
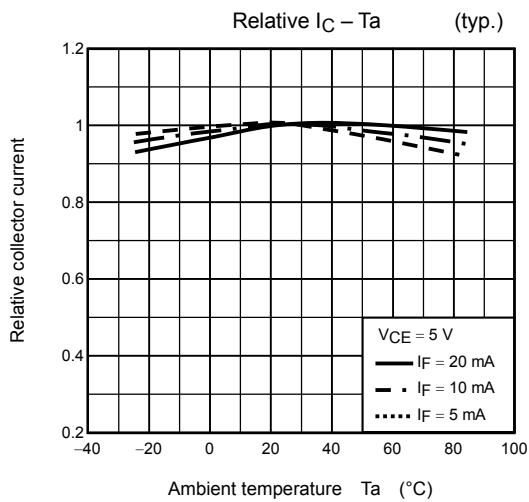
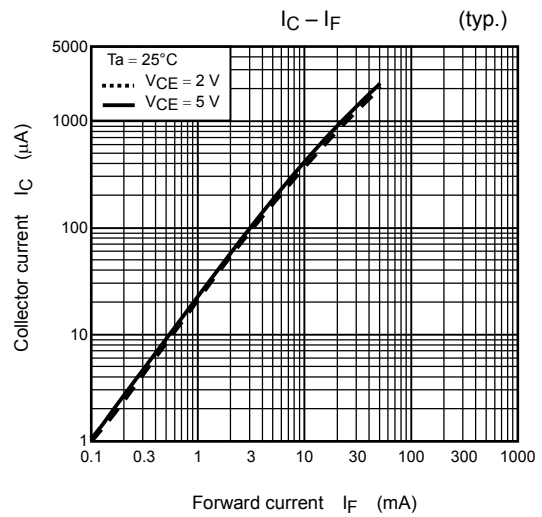
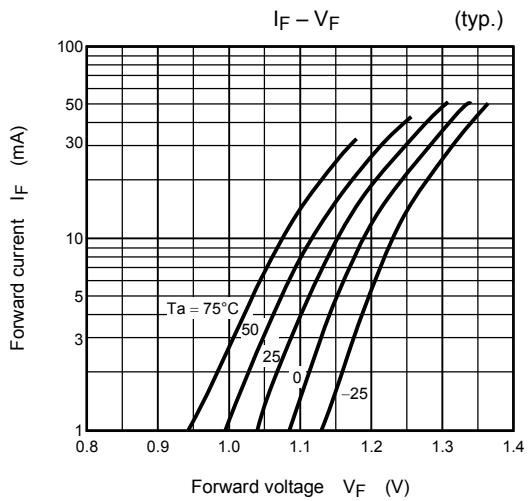
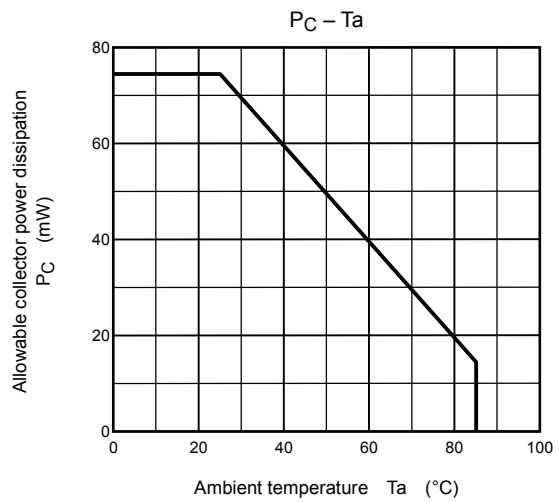
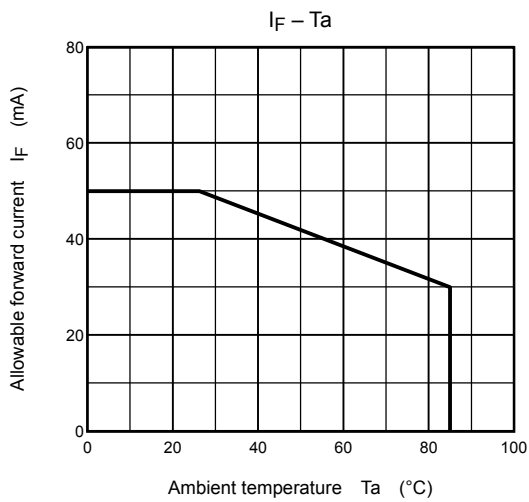
Unit: mm  
 ( ): reference value  
 Tolerance is  $\pm 0.2$  unless otherwise specified.

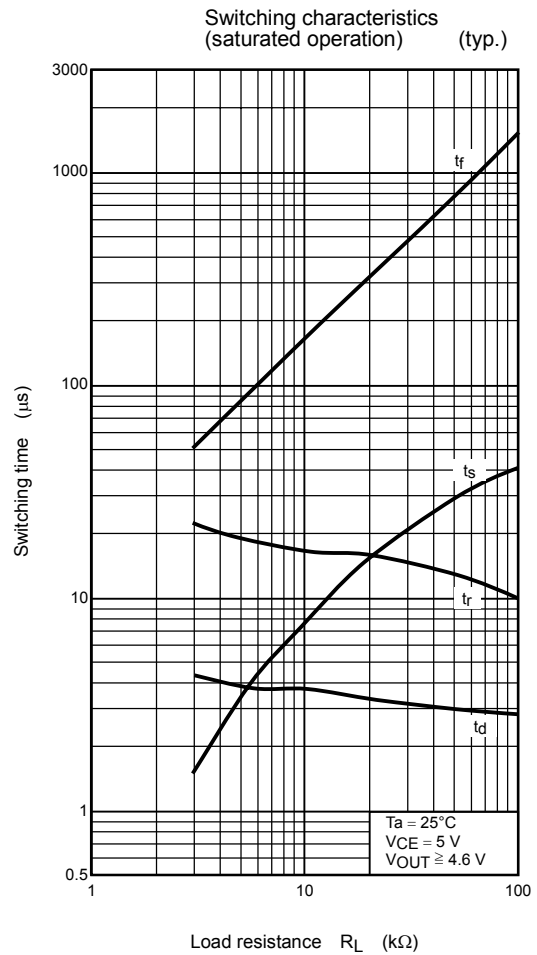
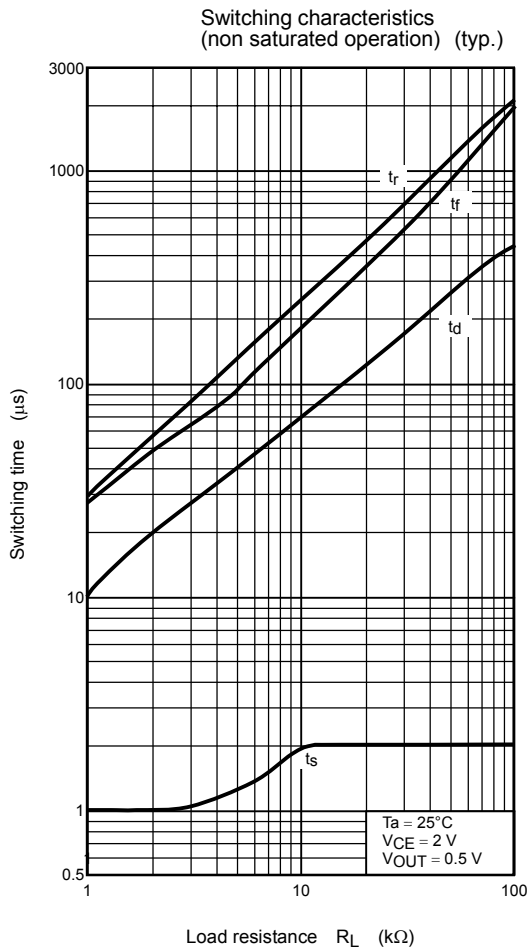
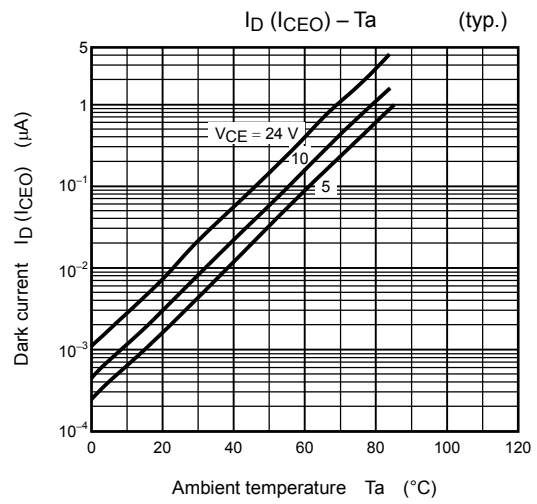
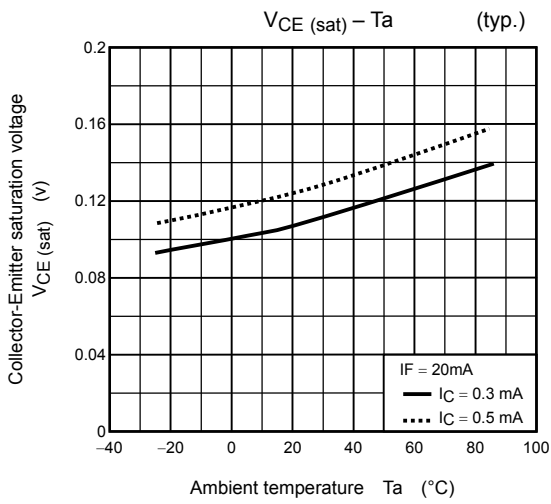


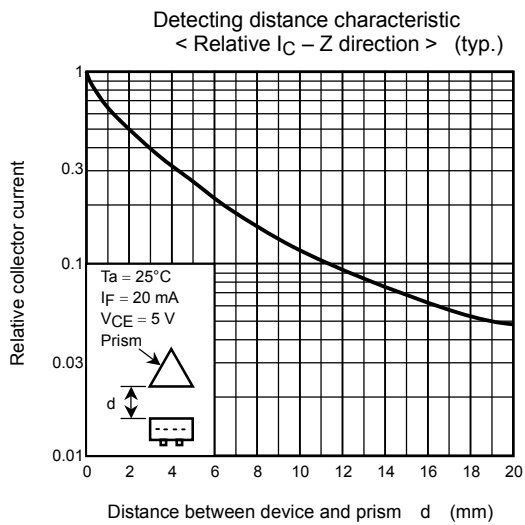
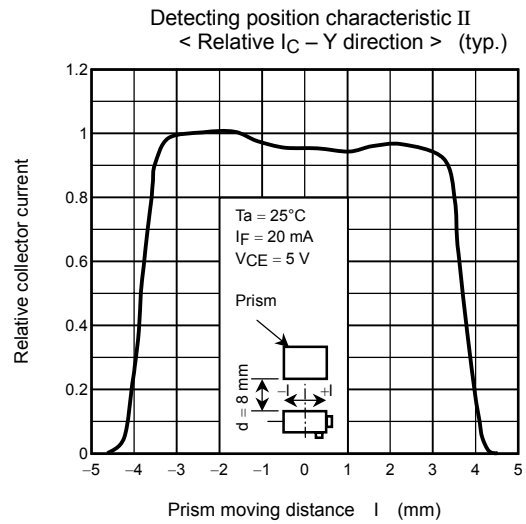
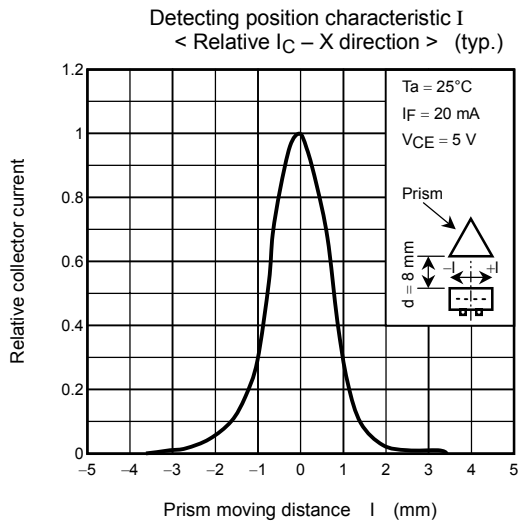
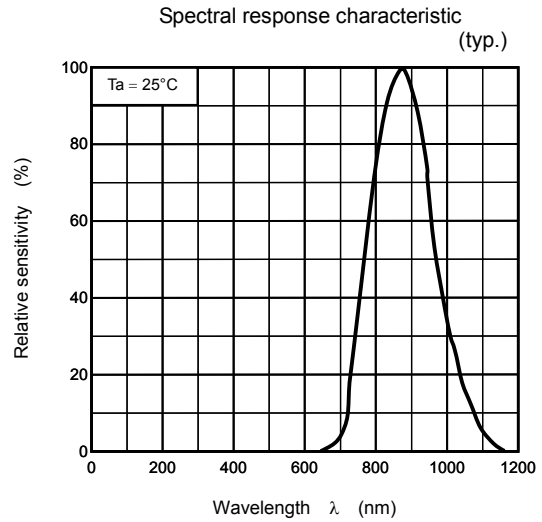
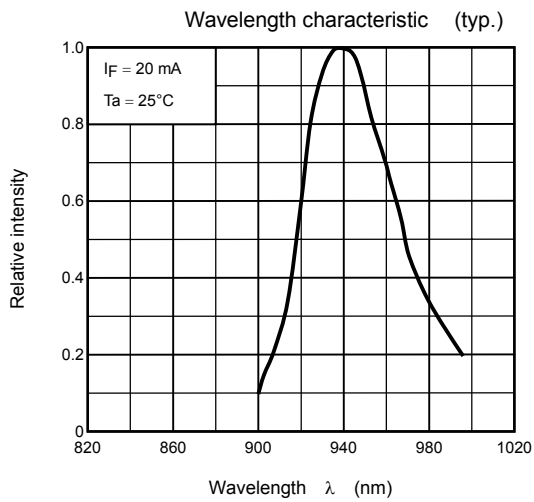
Weight: 0.35g (typ.)

## Pin connection









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