

Toshiba Photoreflective sensor Infrared LED + Phototransistor

TLP921

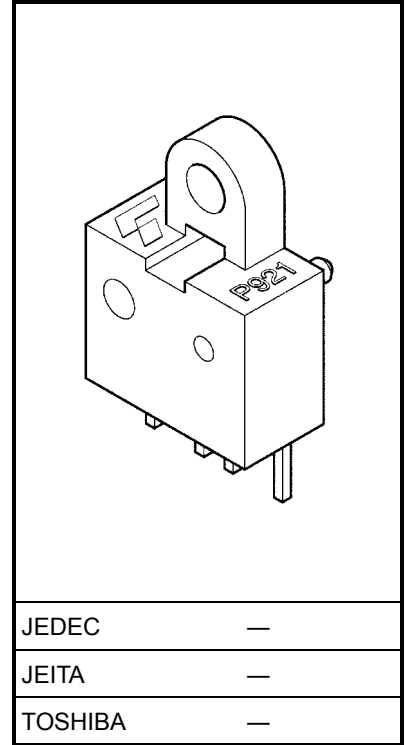
Inkjet printer's ink-level monitoring

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 ± 0.3 mm
- Phototransistor impermeable to visible light
- Package material: polybutylene-terephthalate (UL94V-0, black)

Maximum Ratings (Ta = 25°C)

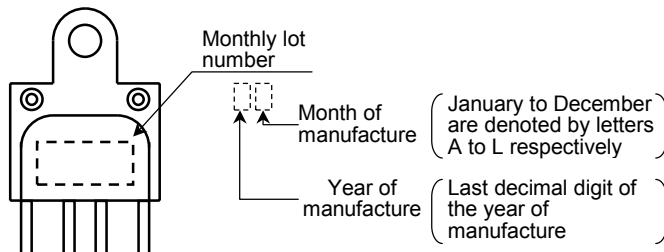
Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating (Ta > 25°C)	$\Delta I_F/^\circ\text{C}$	-0.33	mA/°C
	Reverse voltage	V_R	5	V
Detector	Collector-Emitter voltage	V_{CEO}	35	V
	Emitter-Collector voltage	V_{ECO}	5	V
	Collector power dissipation	P_C	75	mW
	Collector 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	



Weight: 0.35 g (typ.)

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

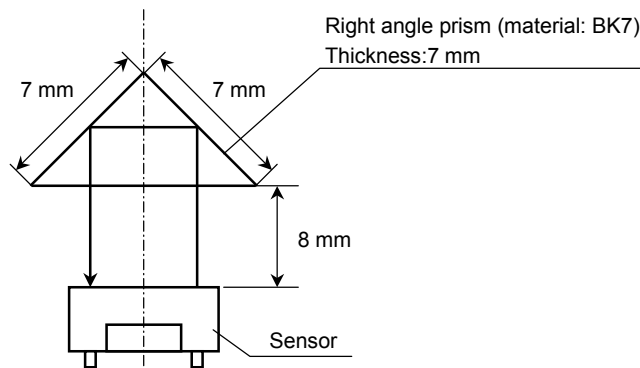
Marking



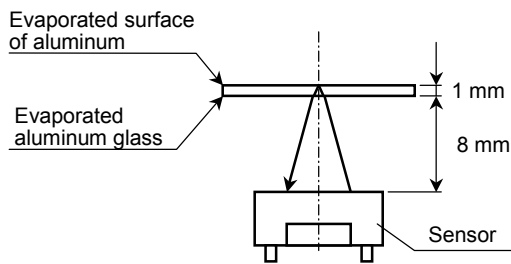
Electrical and Optical Characteristics (Ta = 25°C)

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	μA
	Peak emission wavelength	λ_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	μA
	Peak sensitivity wavelength	λ_P	—	—	870	—	nm
Coupled	Collector current	I_C	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$ (Note 2)	580	—	2600	μA
	Leakage current	I_{LEAK}	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$ (Note 3)	—	—	120	μA
	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	μs
	Fall time	t_f	$R_L = 1 \text{ k}\Omega, d = 8 \text{ mm}$ (Note 4)	—	48	110	

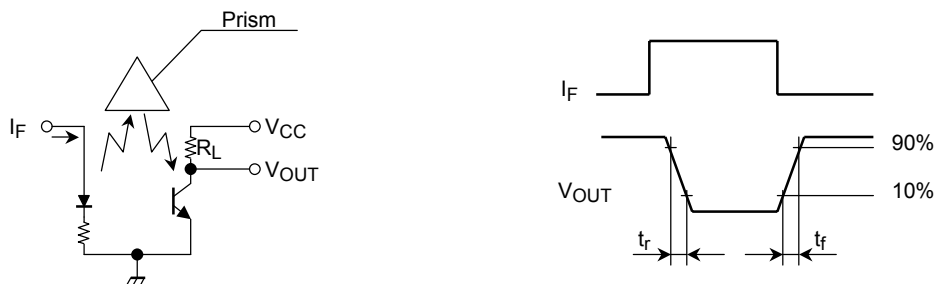
Note 2: The following drawings show condition and the layout of reflectors.



Note 3: Measurement layout drawing for leakage current



Note 4: Measurement circuit and waveforms for Switching time

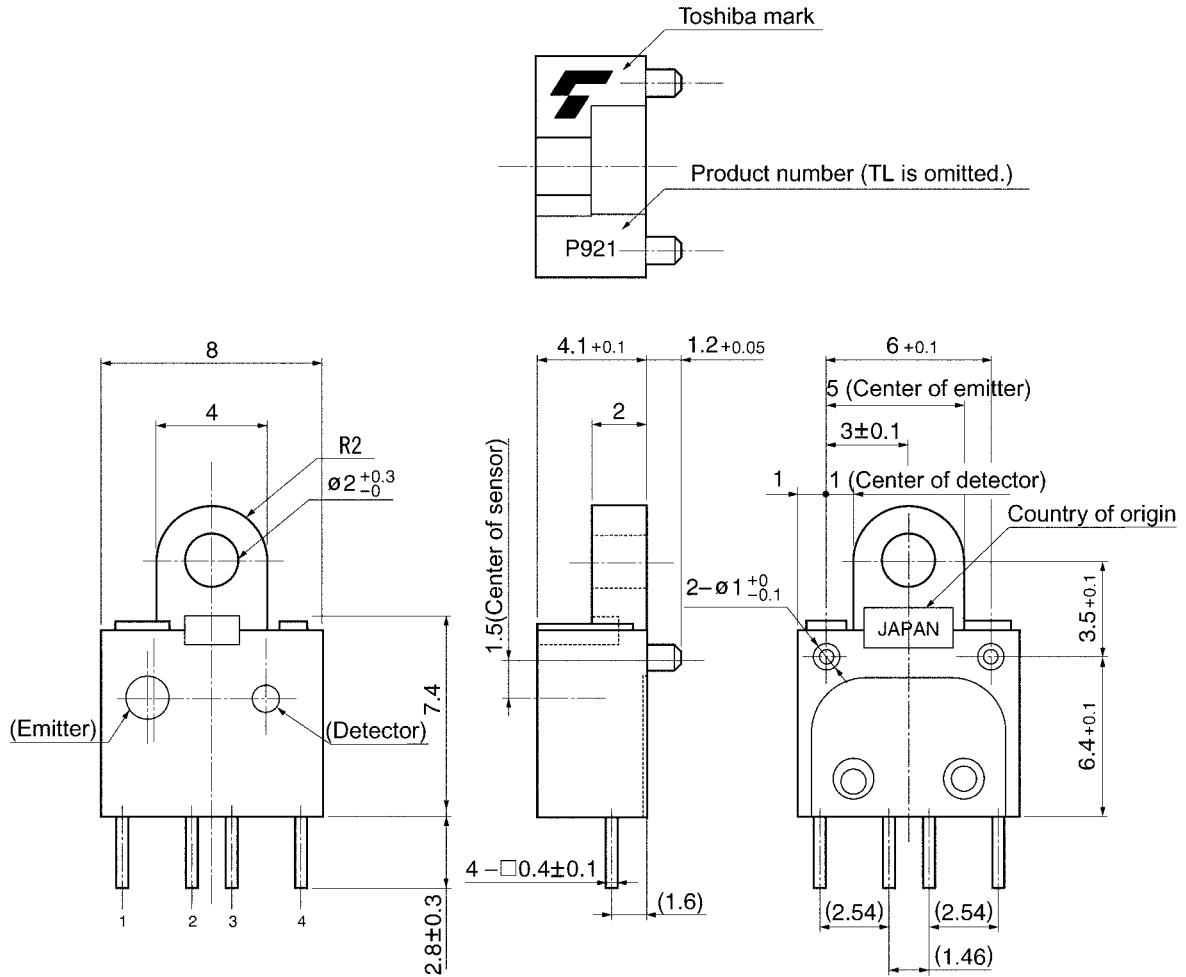


Handling Precautions

- 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.

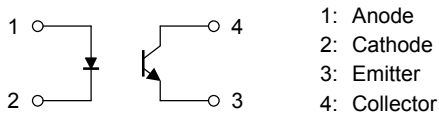
Package Dimensions

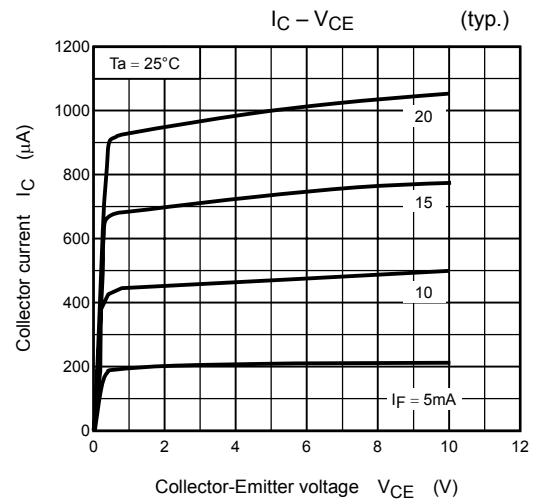
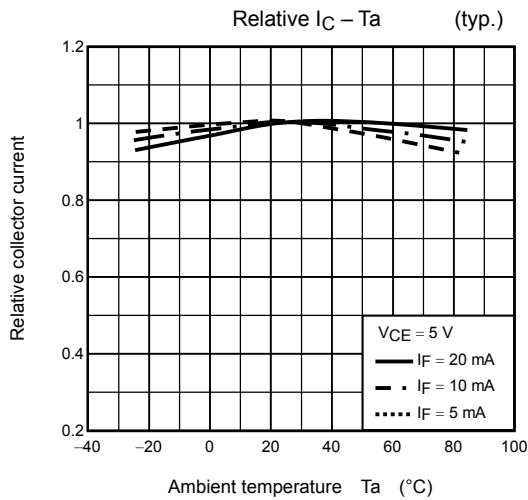
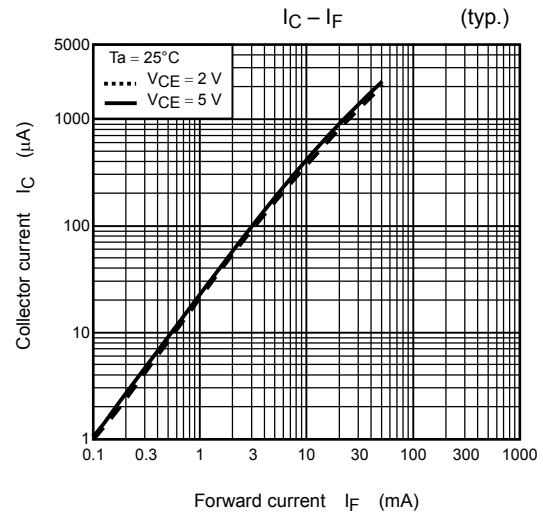
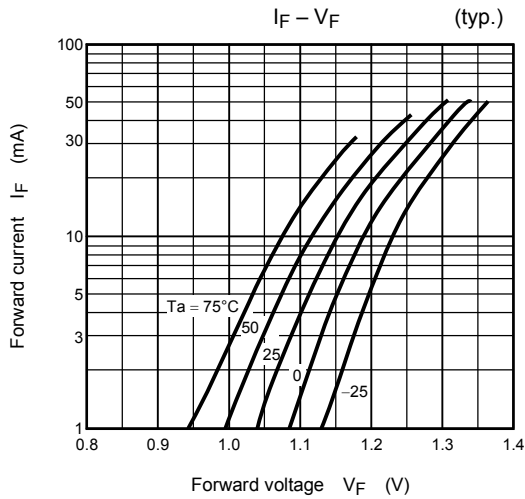
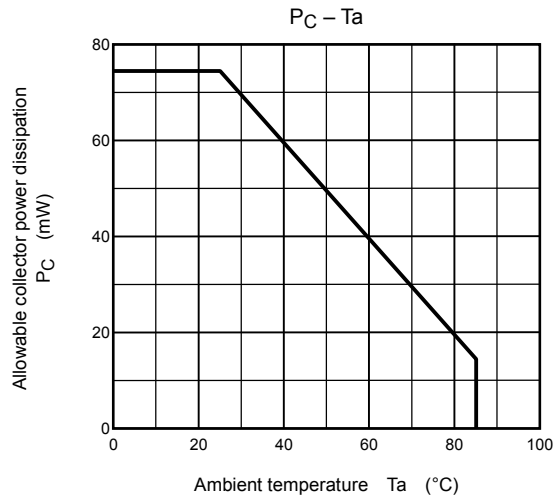
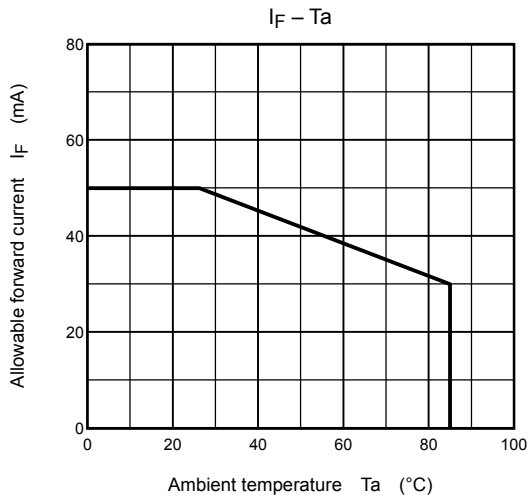
Unit: mm
 (): reference value
 Tolerance is ±0.2 unless otherwise specified.

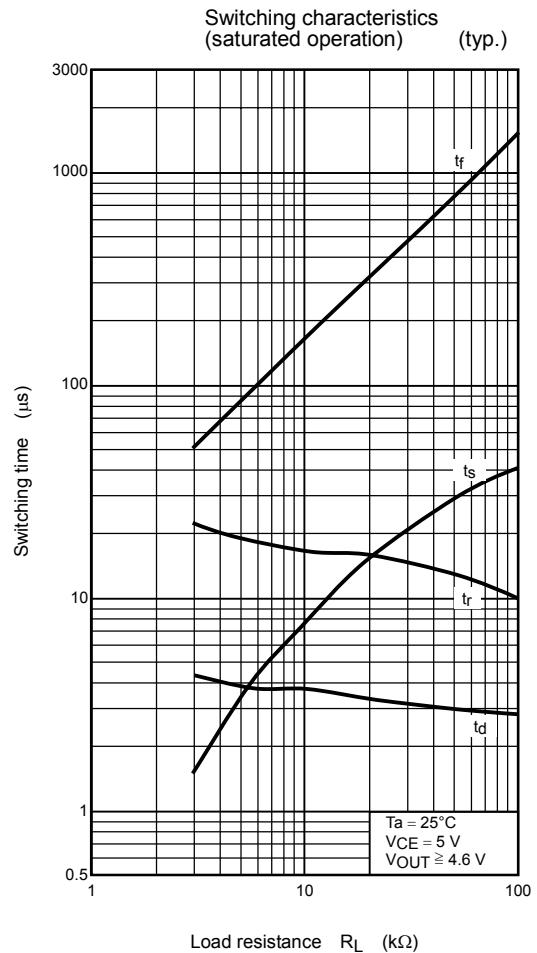
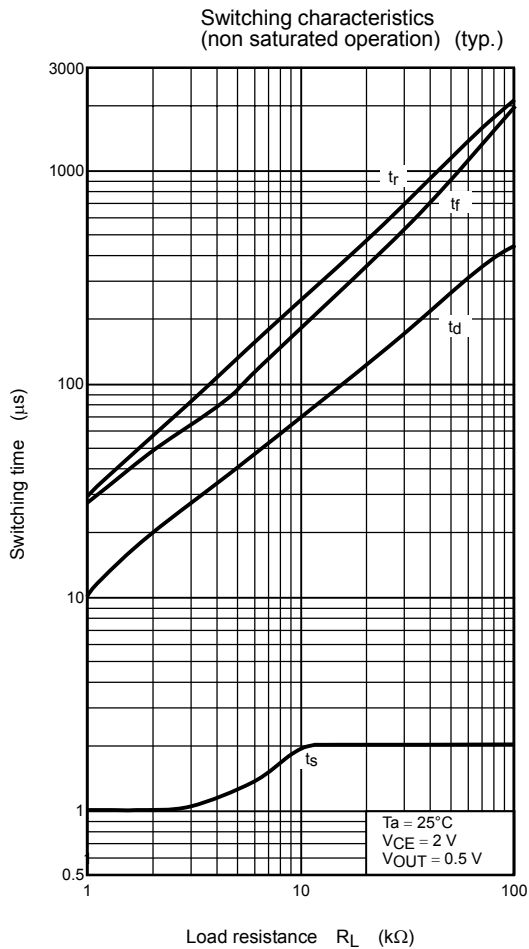
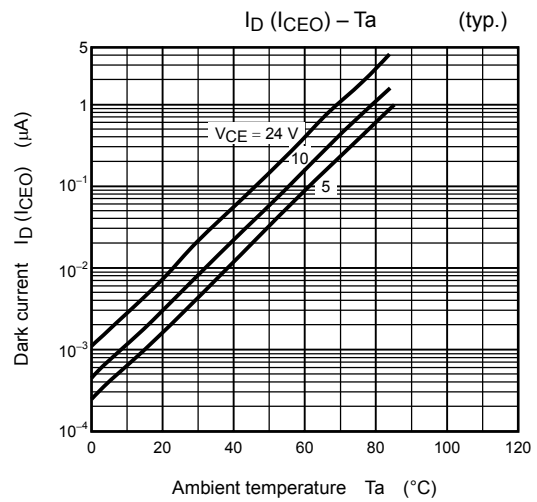
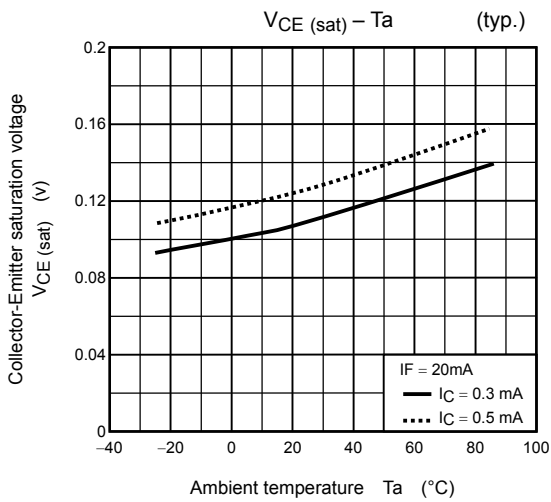


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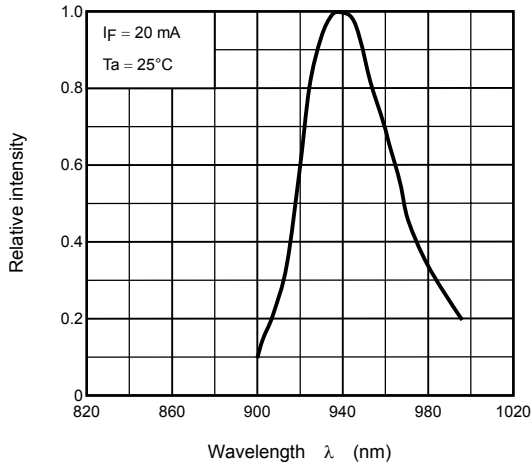
Pin connection



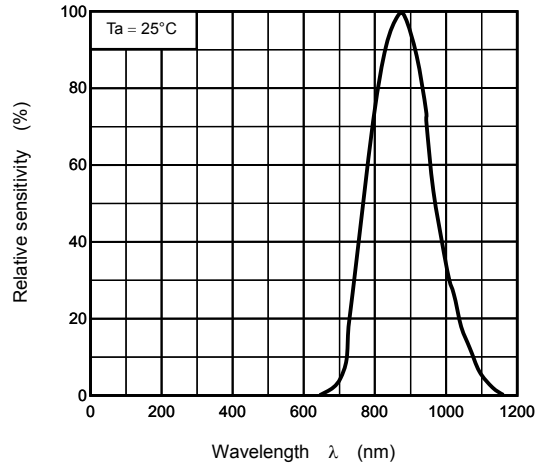




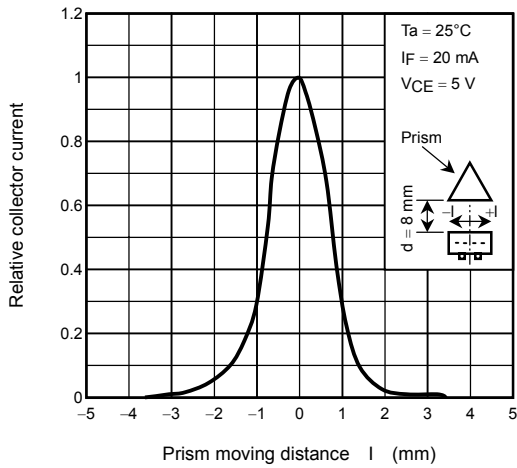
Wavelength characteristic (typ.)



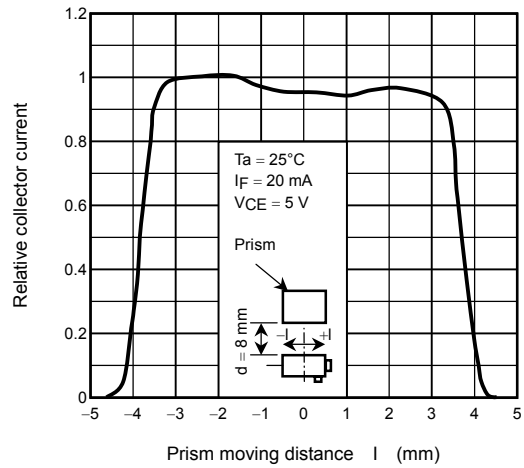
Spectral response characteristic (typ.)



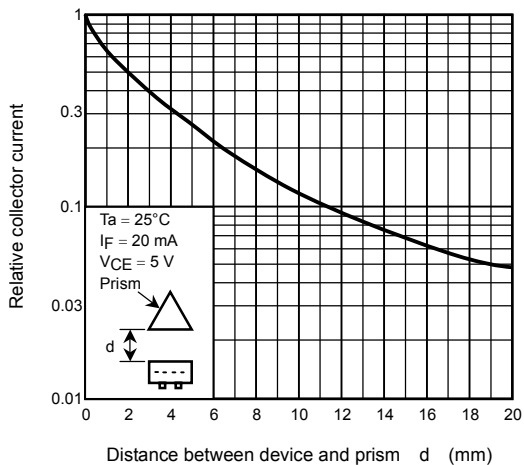
Detecting position characteristic I
< Relative I_C - X direction > (typ.)



Detecting position characteristic II
< Relative I_C - Y direction > (typ.)



Detecting distance characteristic
< Relative I_C - Z direction > (typ.)



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