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# PNA1401LF, PNZ102F

## Silicon NPN Phototransistors

For optical control systems

### ■ Features

- Flat window design which is suited to optical systems
- Low dark current :  $I_{CEO} = 5 \text{ nA}$  (typ.)
- Fast response :  $t_r, t_f = 3 \mu\text{s}$  (typ.)
- Wide directional sensitivity
- Base pin for easy circuit design (PNZ102F)

### ■ Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
Collector to emitter voltage	$V_{CEO}$	30	V
Collector to base voltage	$V_{CBO}^*$	40	V
Emitter to collector voltage	$V_{ECO}$	5	V
Emitter to base voltage	$V_{EBO}^*$	5	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$	150	mW
Operating ambient temperature	$T_{opr}$	-25 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-30 to +100	$^\circ\text{C}$

\* PNZ102F only

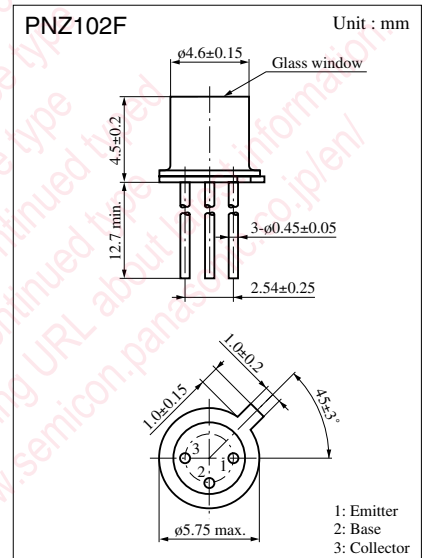
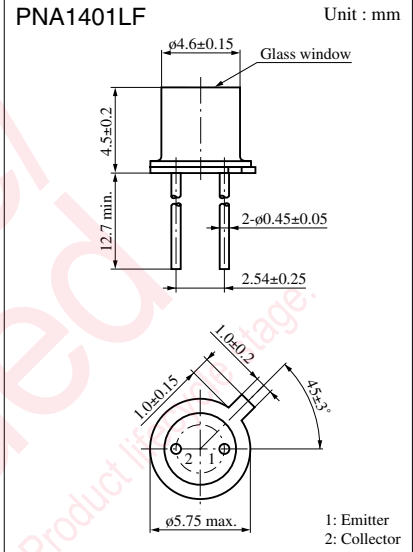


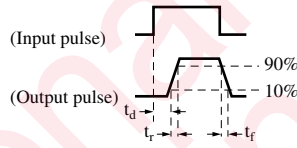
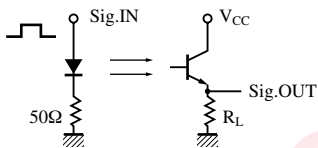
Photo-detectors

■ Electro-Optical Characteristics (Ta = 25°C)

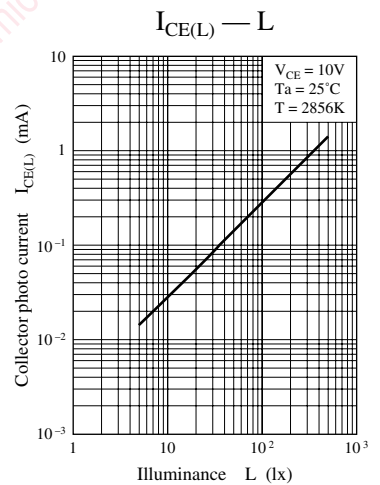
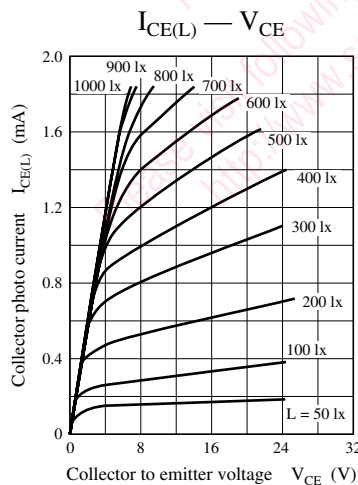
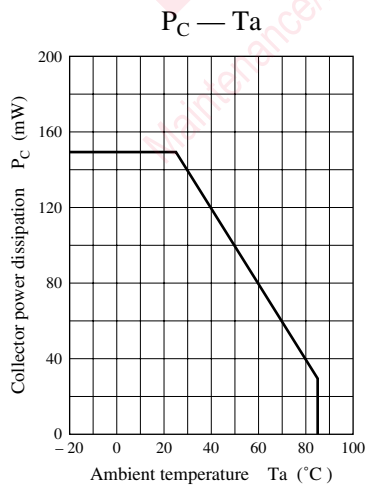
Parameter	Symbol	Conditions	min	typ	max	Unit
Dark current	$I_{CEO}$	$V_{CE} = 10V$		5	300	nA
Collector photo current	$I_{CE(L)}$	$V_{CE} = 10V, L = 100 \text{ lx}^{*1}$	0.1	0.3		mA
Peak sensitivity wave length	$\lambda_p$	$V_{CE} = 10V$		800		nm
Acceptance half angle	$\theta$	Measured from the optical axis to the half power point		40		deg.
Response time	$t_r, t_f^{*2}$	$V_{CC} = 10V, I_{CE(L)} = 5mA, R_L = 100\Omega$		3		$\mu s$
Collector saturation voltage	$V_{CE(sat)}$	$L = 500 \text{ lx}^{*1}$		0.2	0.4	V
		PNA1401LF $I_{CE(L)} = 0.1mA$ PNZ102F $I_{CE(L)} = 0.1mA$				

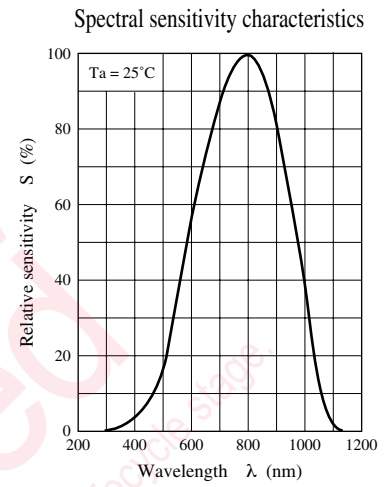
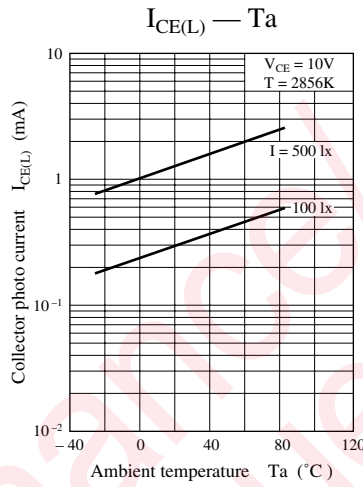
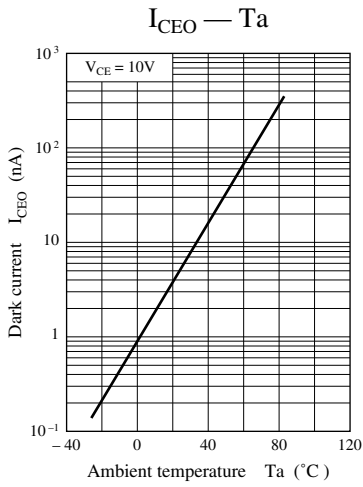
\*1 Measurements were made using a tungsten lamp (color temperature T = 2856K) as a light source.

\*2 Switching time measurement circuit

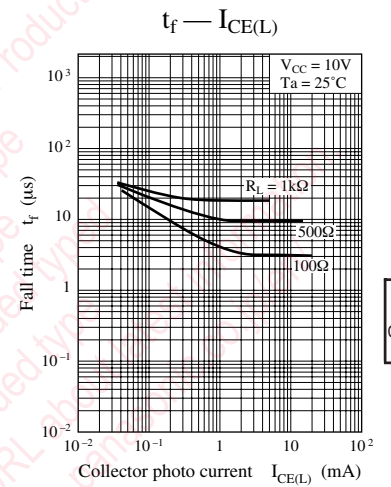
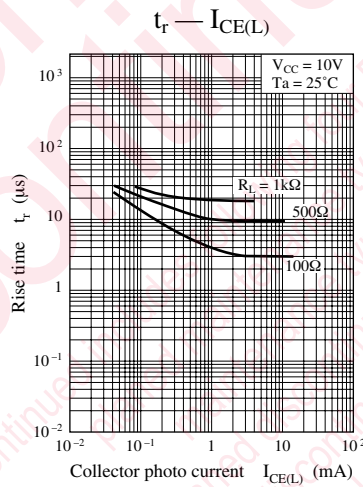
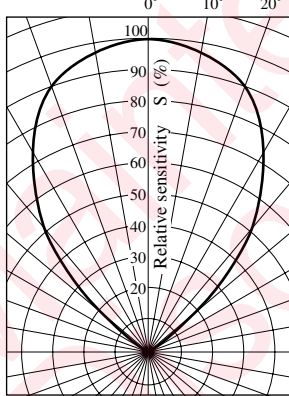


$t_d$ : Delay time  
 $t_r$ : Rise time (Time required for the collector photo current to increase from 10% to 90% of its final value)  
 $t_f$ : Fall time (Time required for the collector photo current to decrease from 90% to 10% of its initial value)





**Directivity characteristics**



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