CNZ1002

Photo Interrupter

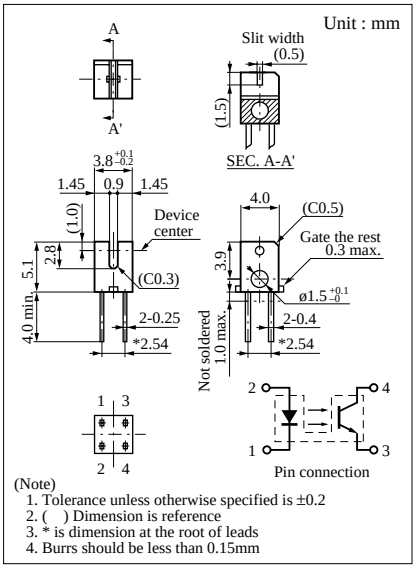
For contactless SW, object detection

■ Overview

CNZ1002 is an ultraminiature, highly reliable transmissive photosensor in which a high efficiency GaAs infrared light emitting diode chip and a high sensitivity Si phototransistor chip are integrated in a double molded resin package.

■ Features

- Ultraminiature : 4.0 × 3.8 mm (height : 5.1 mm)
- Fast response : t_r, t_f = 35 µs (typ.)
- Highly precise position detection : 0.25 mm
- Gap width : 0.9 mm



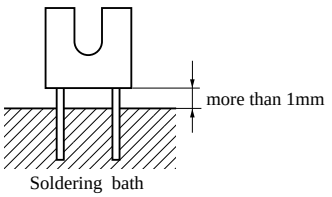
■ Absolute Maximum Ratings (Ta = 25˚C)

Parameter		Symbol	Ratings	Unit
Input (Light emitting diode)	Reverse voltage (DC)	V_R	6	V
	Forward current (DC)	I_F	50	mA
	Power dissipation	P_D *1	75	mW
Output (Photo transistor)	Collector current	I_C	20	mA
	Collector to emitter voltage	V_{CEO}	35	V
	Emitter to collector voltage	V_{ECO}	6	V
	Collector power dissipation	P_C *2	75	mW
Temperature	Operating ambient temperature	T_{opr}	–25 to +85	˚C
	Storage temperature	T_{stg}	– 40 to +100	˚C
	Soldering temperature	T_{sol} *3	260	˚C

*1 Input power derating ratio is 1.0mW/˚C at Ta ≥ 25˚C.

*2 Output power derating ratio is 1.0mW/˚C at Ta ≥ 25˚C.

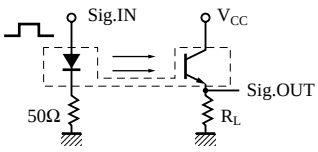
*3 Soldering time is within 5 seconds.

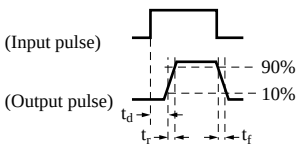


■ Electrical Characteristics (Ta = 25˚C)

Parameter		Symbol	Conditions	min	typ	max	Unit
Input characteristics	Forward voltage (DC)	V_F	I_F = 20mA		1.2	1.4	V
	Reverse current (DC)	I_R	V_R = 3V			10	µA
Output characteristics	Collector cutoff current	I_{CEO}	V_{CE} = 20V			100	nA
Transfer characteristics	Collector current	I_C	V_{CE} = 5V, I_F = 1.5mA	65		480	µA
	Collector to emitter saturation voltage	$V_{CE(sat)}$	I_F = 3mA, I_C = 30µA			0.4	V
	Response time	t_r, t_f *	V_{CC} = 5V, I_C = 0.1mA, R_L = 1000Ω		35		µs

* Switching time measurement circuit



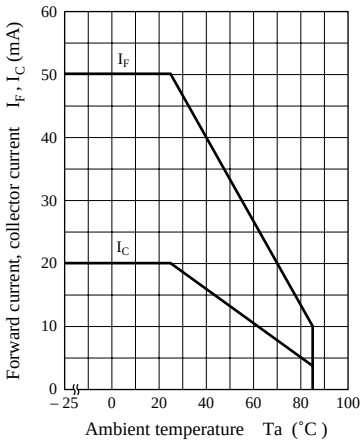


t_d : Delay time

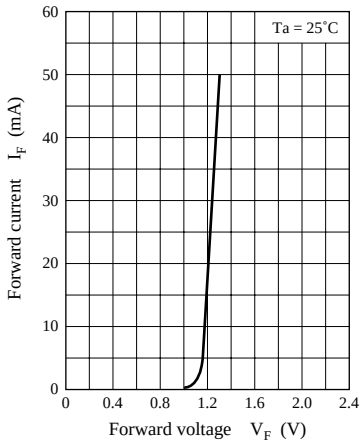
t_r : Rise time (Time required for the collector current to increase from 10% to 90% of its final value)

t_f : Fall time (Time required for the collector current to decrease from 90% to 10% of its initial value)

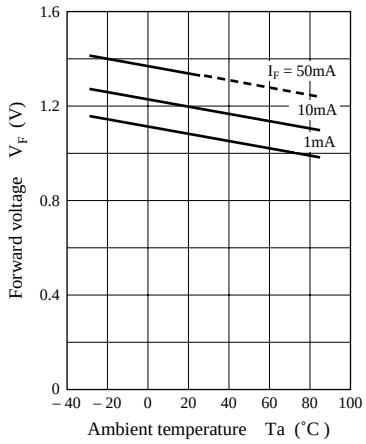
I_F , I_C — Ta



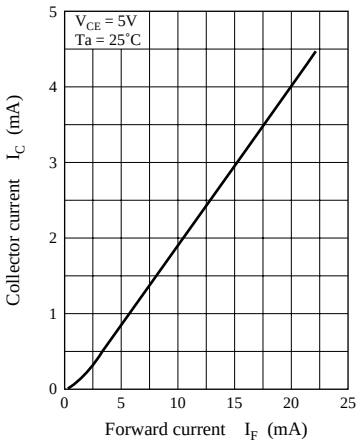
I_F — V_F



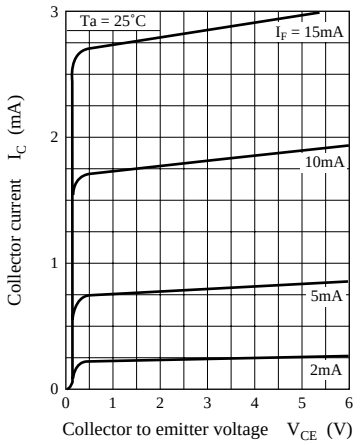
V_F — Ta



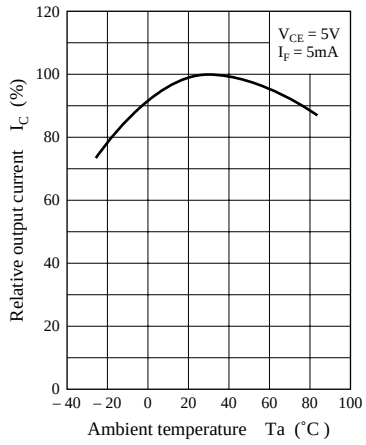
I_C — I_F



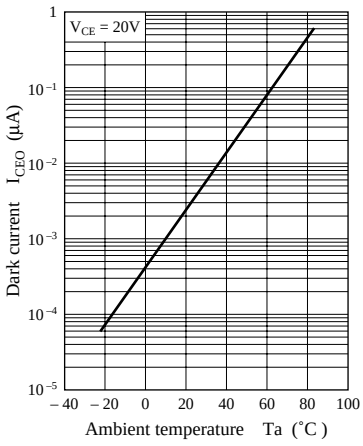
I_C — V_{CE}



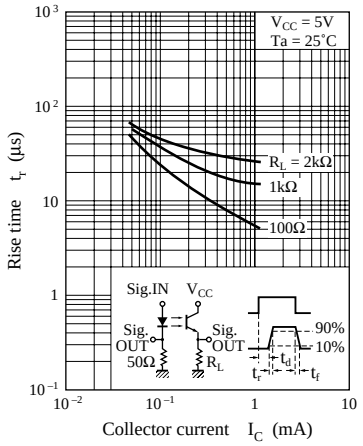
I_C — Ta



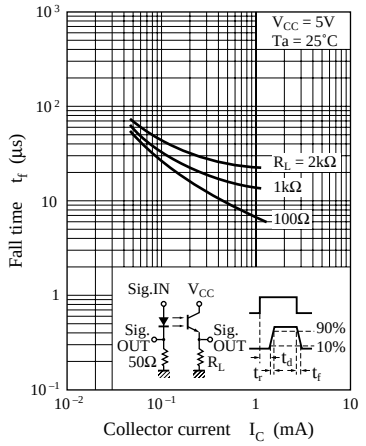
I_{CEO} — Ta



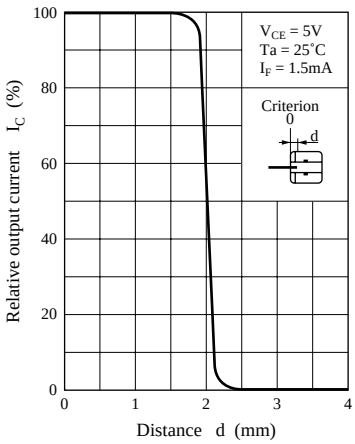
t_r — I_C



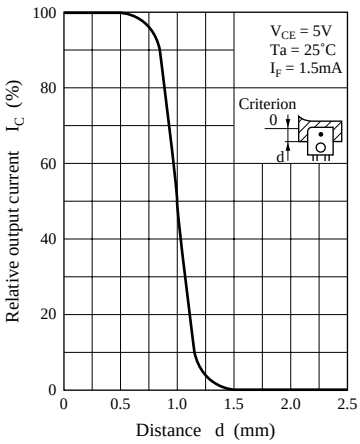
t_f — I_C



I_C — d (1)


100
80
60
40
20
0
0
1
2
3
4
Relative output current I_C (%)
Distance d (mm)
V_{CE} = 5V
Ta = 25˚C
I_F = 1.5mA
Criterion
0
d

I_C — d (2)


100
80
60
40
20
0
0
0.5
1.0
1.5
2.0
2.5
Relative output current I_C (%)
Distance d (mm)
V_{CE} = 5V
Ta = 25˚C
I_F = 1.5mA
Criterion
0
d