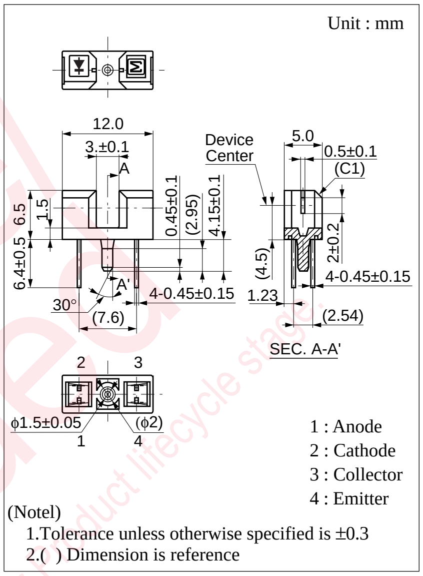
ON1387

Photo Interrupters

■ Outline

ON1387 is a transmittive photosensor series in which a high efficiency GaAs infrared light emitting diode is used as the light emitting element, and a high sensitivity phototransistor is used as the light detecting element. The two elements are arranged so as to face each other, and objects passing between them are detected.



1 : Anode
2 : Cathode
3 : Collector
4 : Emitter

(Notel)
1.Tolerance unless otherwise specified is ±0.3
2.( ) Dimension is reference

■ Features

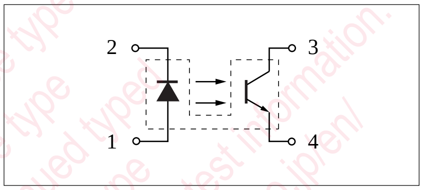
- Position detection accuracy : 0.3 mm
- Gap width : 3 mm
- Type which is directly attached to PCB(with attachment positioning pins)

■ Adsolute Maximum Ratings T_a=25°C

Parameter		Symbol	Ratings	Unit
Input (Light emitting diode)	Reverse voltage (DC)	V_R	3	V
	Forward current (DC)	I_F	50	mA
	Power dissipation[*1]	P_D	75	mW
Output (Photo transistor)	Collector current	I_C	20	mA
	Collector to emitter voltage	V_{CEO}	30	V
	Emitter to collector voltage	V_{ECO}	5	V
	Collector power dissipation[*2]	P_C	100	mW
Temperature	Operating ambient temperature	T_{opr}	–25 ~ +85	°C
	Storage temperature	T_{stg}	–40 ~ +100	°C

Note) *1 : Input power derating ratio is 1.0 mW/°C at T_a=25°C.
*2 : Output power derating ratio is 1.33 mW/°C at T_a=25°C.

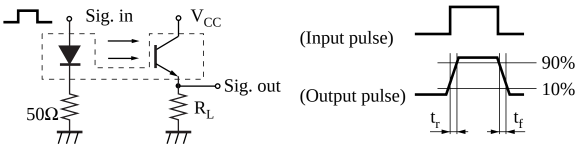
Internal connection



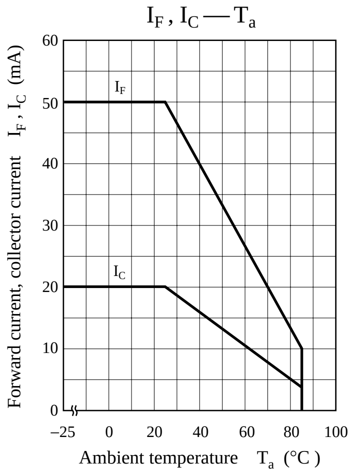
■ Electrical Characteristics T_a=25±3°C

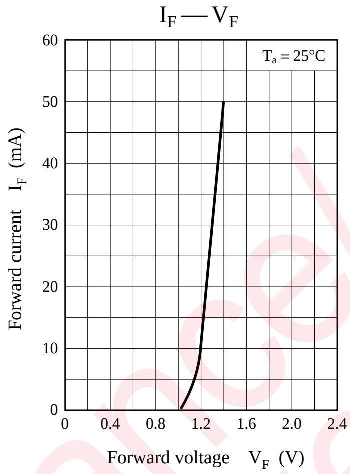
Parameter		Symbol	Conditions	min	typ	max	Unit
Input characteristics	Forward voltage (DC)	V_F	I_F=20mA		1.25	1.4	V
	Reverse current (DC)	I_R	V_R=3V			10	µA
Output characteristics	Collector cutoff current	I_{CEO}	V_{CE}=10V		10	200	nA
Transfer characteristics	Collector current	I_C	V_{CC}=5V, I_F=20mA, R_L=100Ω	1.5		15	mA
	Collector to emitter saturation voltage	$V_{CE(sat)}$	I_F=40mA, I_C=1mA			0.4	V
	Response time[*]	t_r , t_f	V_{CC}=5V, I_C=1mA, R_L=100Ω		5		µs

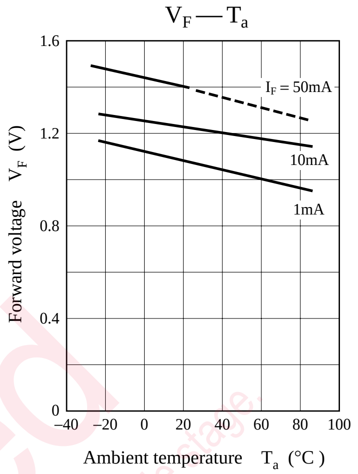
Note) * : Switching time measurement circuit

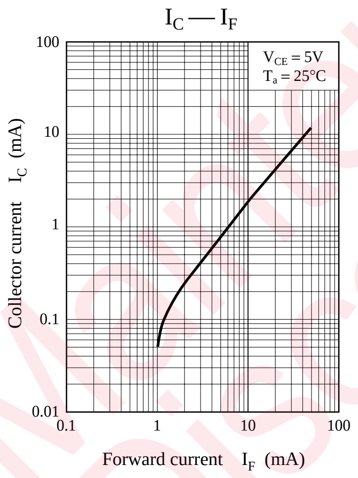


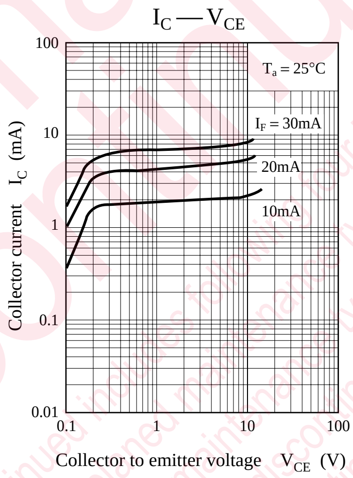
t_r : Rise time (Time required for the collector current to increase from 10% to 90% of its final value)
t_f : Fall time (Time required for the collector current to decrease from 90% to 10% of its initial value)

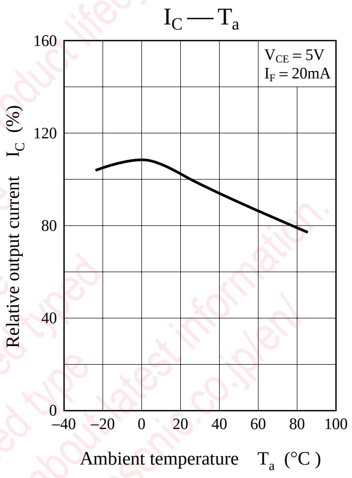

I_F, I_C — T_a
Forward current, collector current I_F, I_C (mA)
60
50
40
30
20
10
0
I_F
I_C
−25
0
20
40
60
80
100
Ambient temperature T_a (°C)

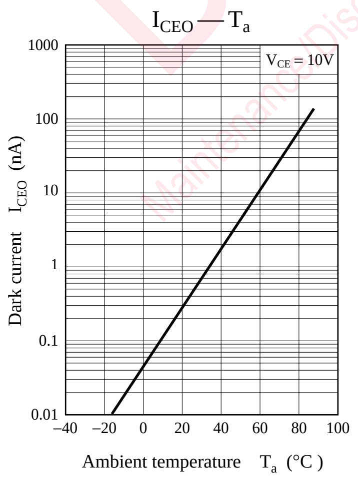

I_F — V_F
T_a = 25°C
Forward current I_F (mA)
60
50
40
30
20
10
0
0
0.4
0.8
1.2
1.6
2.0
2.4
Forward voltage V_F (V)

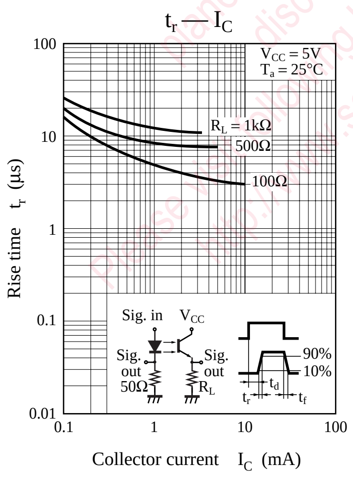

V_F — T_a
Forward voltage V_F (V)
1.6
1.2
0.8
0.4
0
I_F = 50mA
10mA
1mA
−40
−20
0
20
40
60
80
100
Ambient temperature T_a (°C)

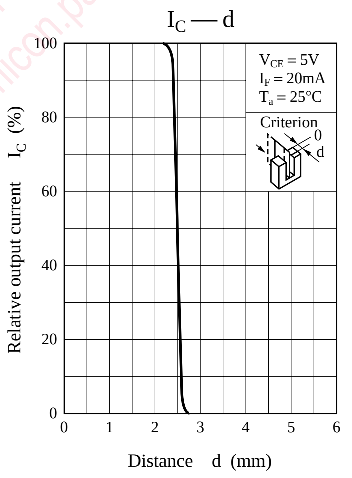

I_C — I_F
V_{CE} = 5V
T_a = 25°C
Collector current I_C (mA)
100
10
1
0.1
0.01
0.1
1
10
100
Forward current I_F (mA)


I_C — V_{CE}
T_a = 25°C
I_F = 30mA
20mA
10mA
Collector current I_C (mA)
100
10
1
0.1
0.01
0.1
1
10
100
Collector to emitter voltage V_{CE} (V)


I_C — T_a
V_{CE} = 5V
I_F = 20mA
Relative output current I_C (%)
160
120
80
40
0
−40
−20
0
20
40
60
80
100
Ambient temperature T_a (°C)


I_{CEO} — T_a
V_{CE} = 10V
Dark current I_{CEO} (nA)
1000
100
10
1
0.1
0.01
−40
−20
0
20
40
60
80
100
Ambient temperature T_a (°C)


t_r — I_C
V_{CC} = 5V
T_a = 25°C
R_L = 1kΩ
500Ω
100Ω
Rise time t_r (μs)
100
10
1
0.1
0.01
Sig. in
V_{CC}
Sig. out 50Ω
Sig. out R_L
90%
10%
t_d
t_r
t_f
0.1
1
10
100
Collector current I_C (mA)


I_C — d
V_{CE} = 5V
I_F = 20mA
T_a = 25°C
Criterion
0
d
Relative output current I_C (%)
100
80
60
40
20
0
0
1
2
3
4
5
6
Distance d (mm)

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