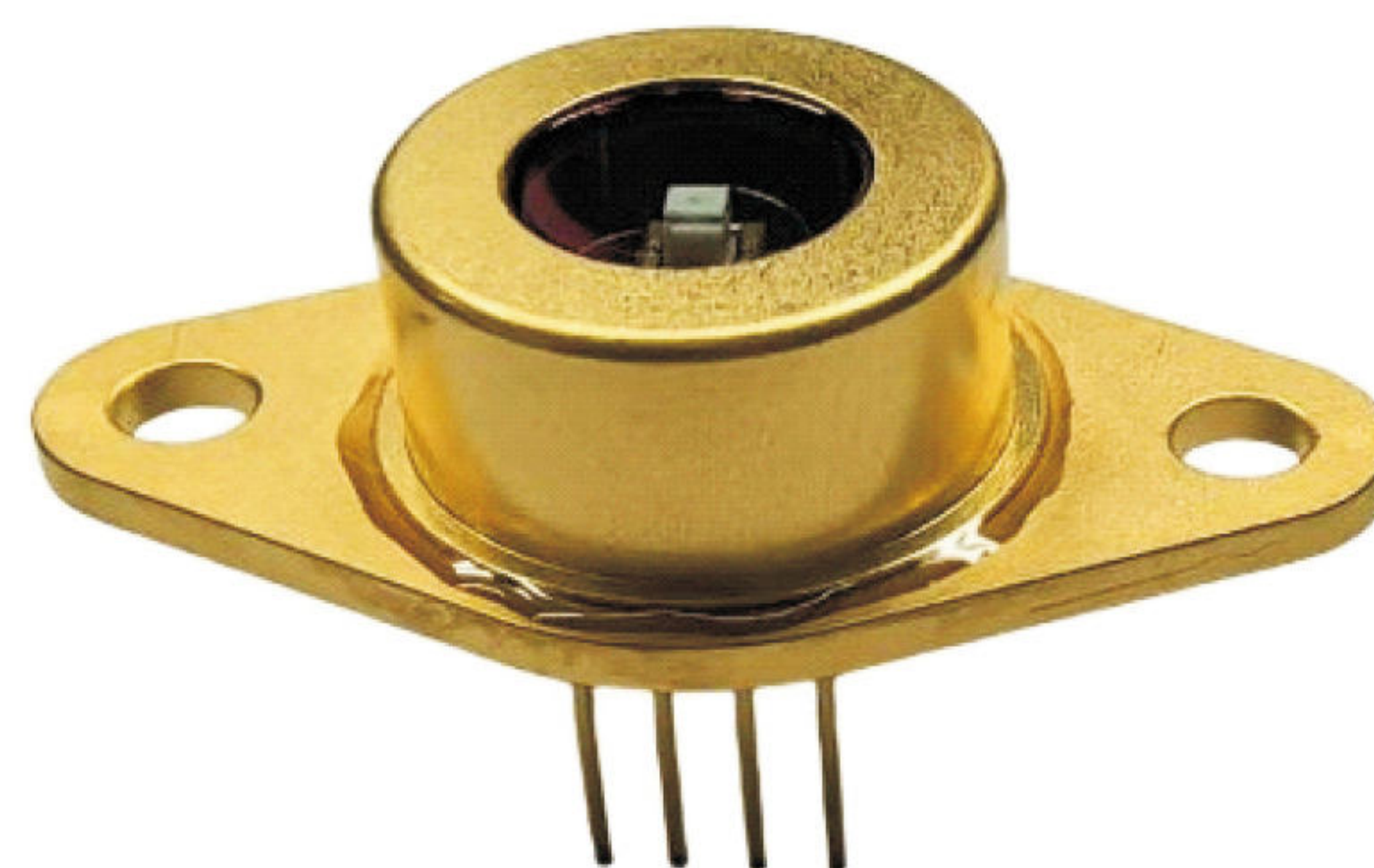


OP320D Negative Feedback Avalanche Photodiode

Product Features

- Optical Wavelength Range: 0.95 μm ~1.65 μm ;
- Designed specifically for single photon counting applications;
- Free Running Mode operation;
- Built in Quenching Resistor (Available Option: 200 k Ω);
- Built in 3-stage Thermoelectric cooler;
- Free Space/62.5 μm multi-mode fiber.



The opto-electronic characteristics

Linear mode parameters (TC=25 \pm 5 $^{\circ}\text{C}$)

parameters	Symbol	Test conditions	Min	Max	Unit
Effective Optical Diameter	d	—	25	—	μm
Optical Wavelength Range	λ	—	950	1650	nm
Breakdown Voltage	V_{BR}	$I_D = 0.1 \mu\text{A}$	60	90	V
Responsivity	R_e	$\lambda = 1.55 \mu\text{m}, V_R = V_{BR} - 1\text{V}, \phi_e = 1 \mu\text{W}$	8	—	A/W
Dark current	I_D	$V_R = V_{BR} - 1\text{V}, \phi_e = 0$	—	1	nA
Terminal Capacitance	C_{tot}	$V_R = V_{BR} - 1\text{V}, f = 1\text{MHz}$	—	0.6	pF
Operating voltage temperature coefficient	η	$T_C = -45 \sim +30^{\circ}\text{C}, I_R = 10 \mu\text{A}, \phi_e = 0$	0.10	0.15	V/ $^{\circ}\text{C}$

Geiger mode parameters

parameters	Symbol	Test conditions	Min	Max	Unit
Photon detection efficiency	PDE	$T_A = -40 \pm 5^{\circ}\text{C}, \mu = 1, f_p = 50 \text{ kHz}, \lambda = 1.55 \mu\text{m}$	15	—	%
Dark Count Rate	DCR	$T_A = -40 \pm 5^{\circ}\text{C}, \text{SPDE} \geq 15\%, \lambda = 1.55 \mu\text{m}$	—	10	kcps
Post-Pulse Probability APP	APP	$T_A = -40 \pm 5^{\circ}\text{C}, \mu = 1, f_p = 50 \text{ kHz}, \text{SPDE} \geq 15\%, \lambda = 1.55 \mu\text{m}, \Delta t = 1 \mu\text{s}$	—	4	%
Pulse output amplitude V_{out}	V_{out}	$\text{PDE} = 20\%, R = 50 \Omega$	0.5	—	mV

Note : λ : Spectral response; T_A : device temperature; μ : under a certain average photon number per pulse; f_p : versus the photon trigger repetition rate.

Absolute maximum ratings & Optical values

Serial Number	Parameters	Symbol	Rated Value	
absolute maximum ratings	1	Storage temperature	T_{STG}	-50 $^{\circ}\text{C}$ ~+85 $^{\circ}\text{C}$
	2	Operating temperature	T_C	-50 $^{\circ}\text{C}$ ~60 $^{\circ}\text{C}$
	3	Soldering temperature(time)	T_{sld}	260 $^{\circ}\text{C}$ (10s)
	4	Reverse voltage	V_{DC}	$V_{BR} + 5\text{V}$
	5	Optical Power (continuous)	ϕ_e	1mW
	6	Forward current (continuous)	I_F	200 μA
	7	Electro-static discharge	E_{SD}	$\geq 300\text{V}$
	8	TEC voltage	$V_{TEC-MAX}$	6.8 V
	9	TEC current	$I_{TEC-MAX}$	1.0 A

Serial Number	Parameters	Symbol	Rated Value	
Optical values	1	APD chip operating temperature	T_{th}	-50 $^{\circ}\text{C}$ ~-30 $^{\circ}\text{C}$
	2	Reverse DC bias voltage	V_{DC}	$V_{BR} + 1\text{V}$ to $V_{BR} + 5\text{V}$

Typical Characteristic Curve

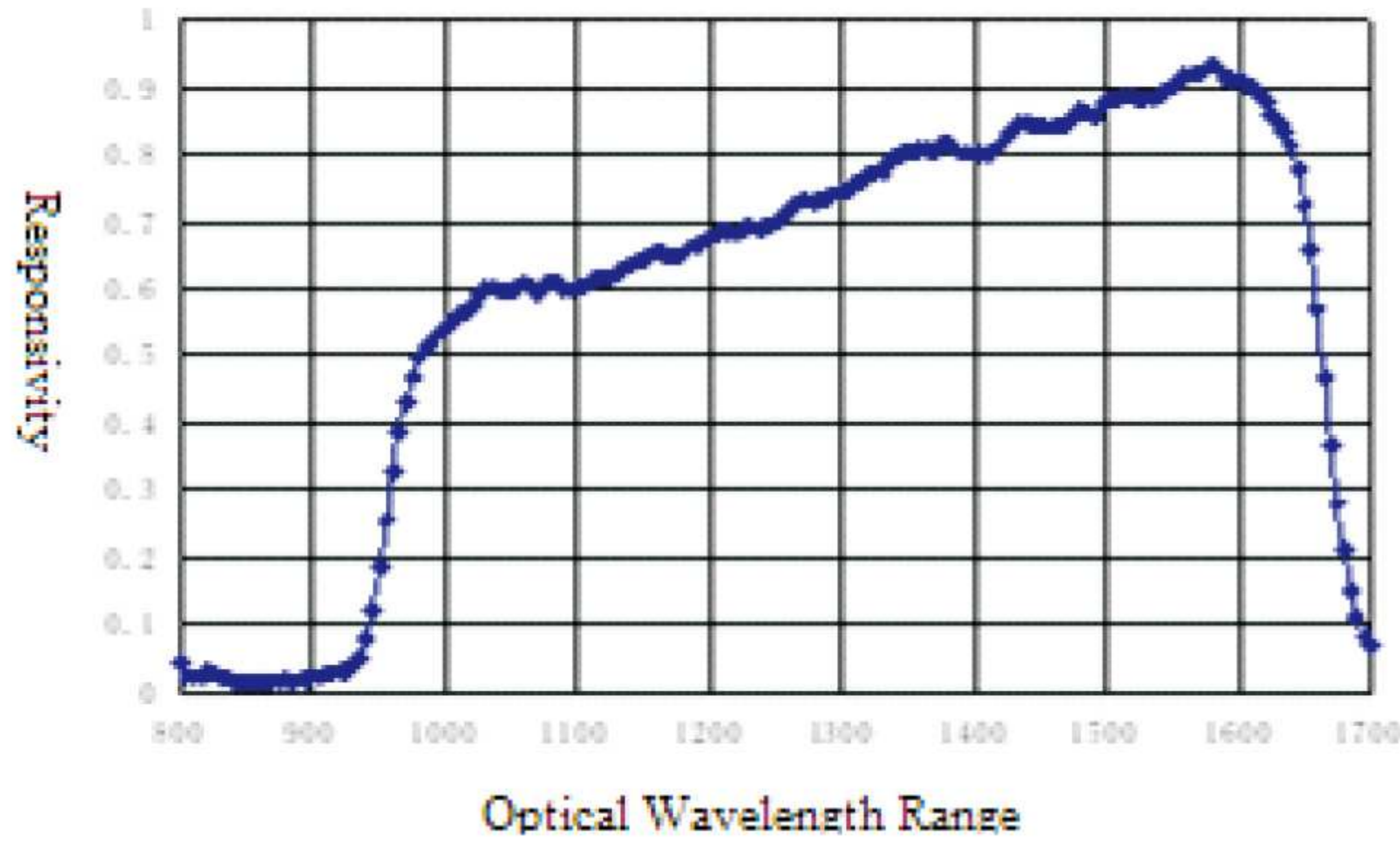


Figure 1. InGaAs spectral response curve

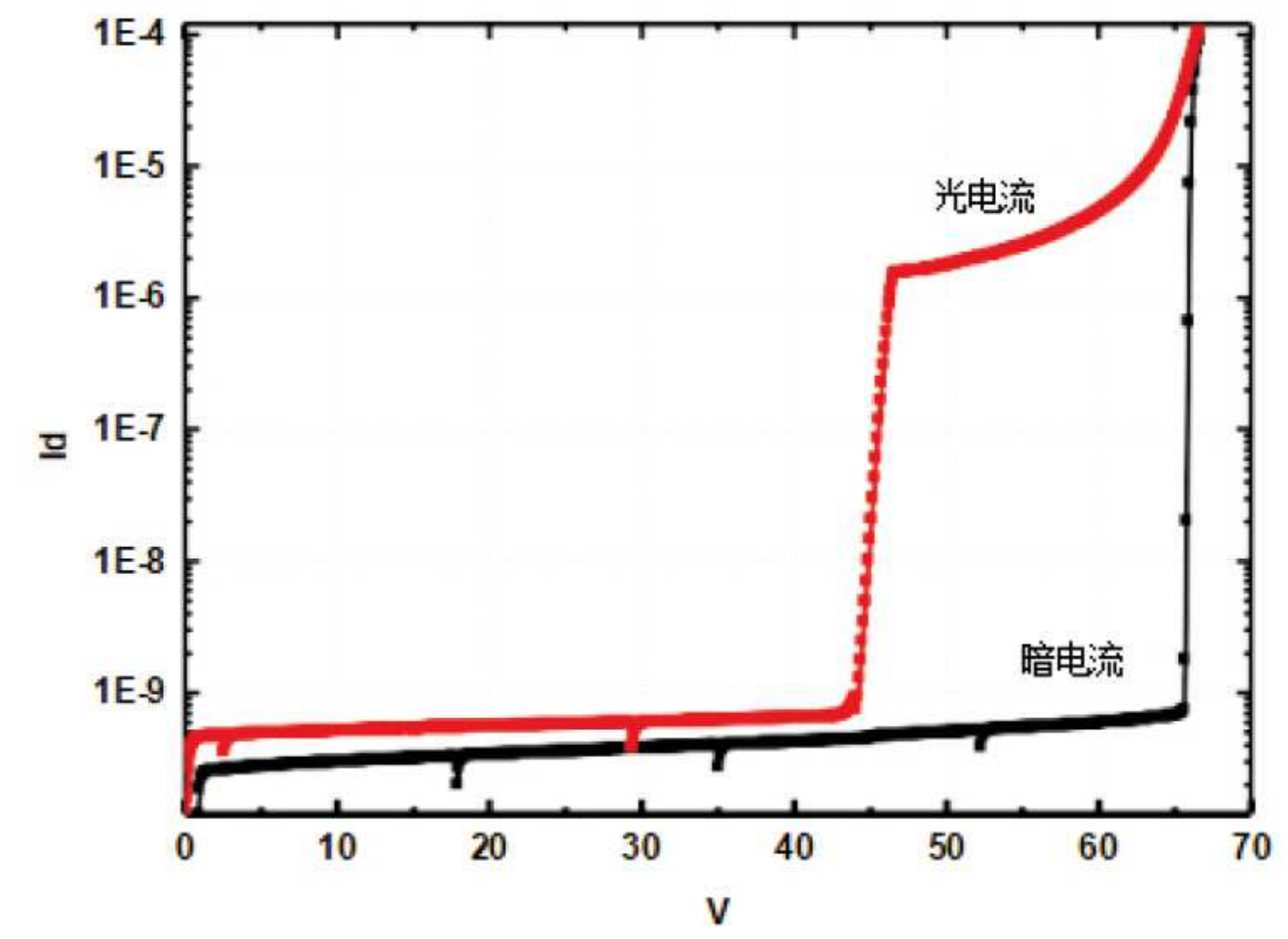


Figure 2. Photocurrent and dark current vs reverse voltages

Mechanical Dimension & Pin Layout

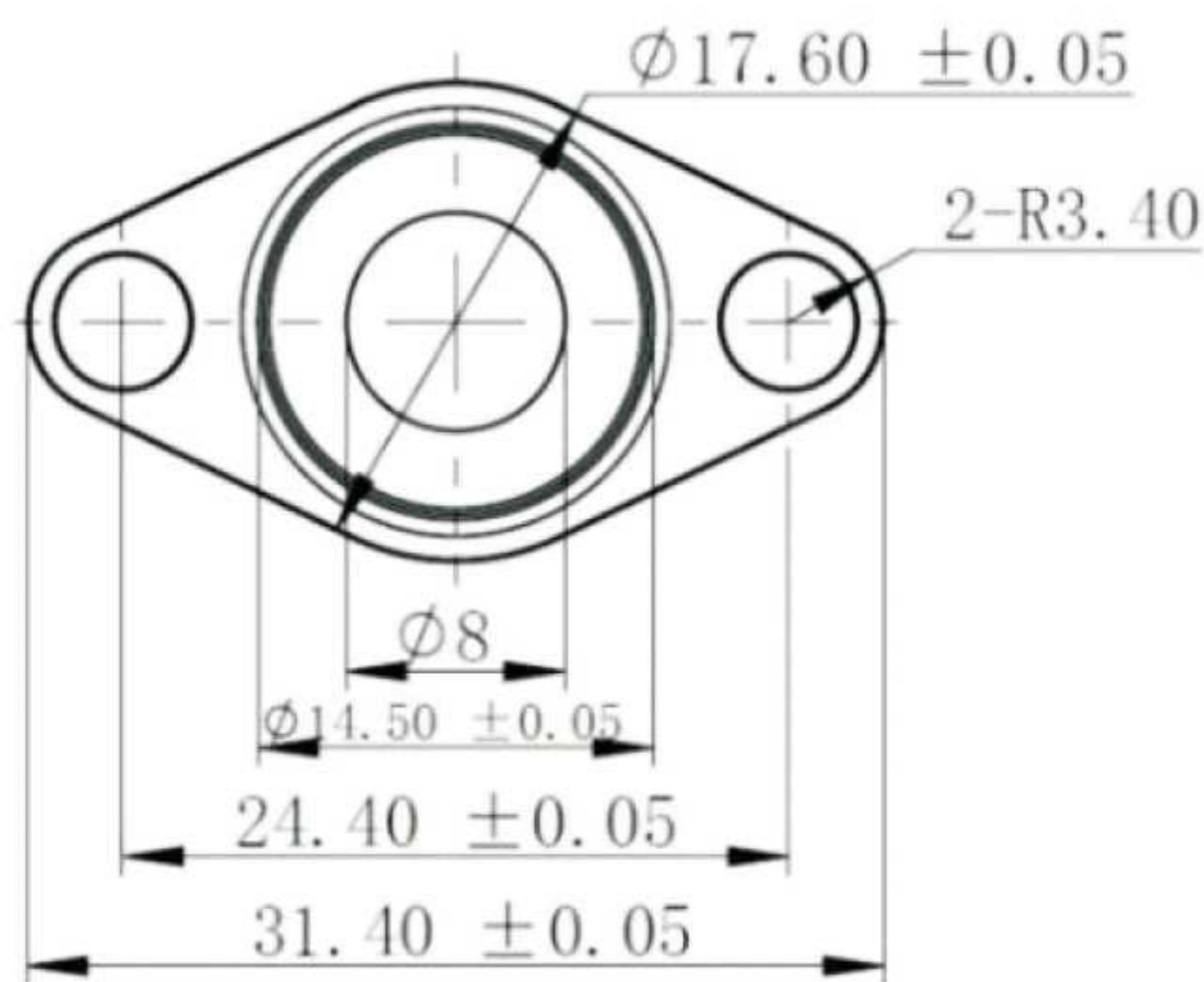


Figure 3. mechanical dimension 1 (Unmarked tolerance $\pm 0.1\text{mm}$)

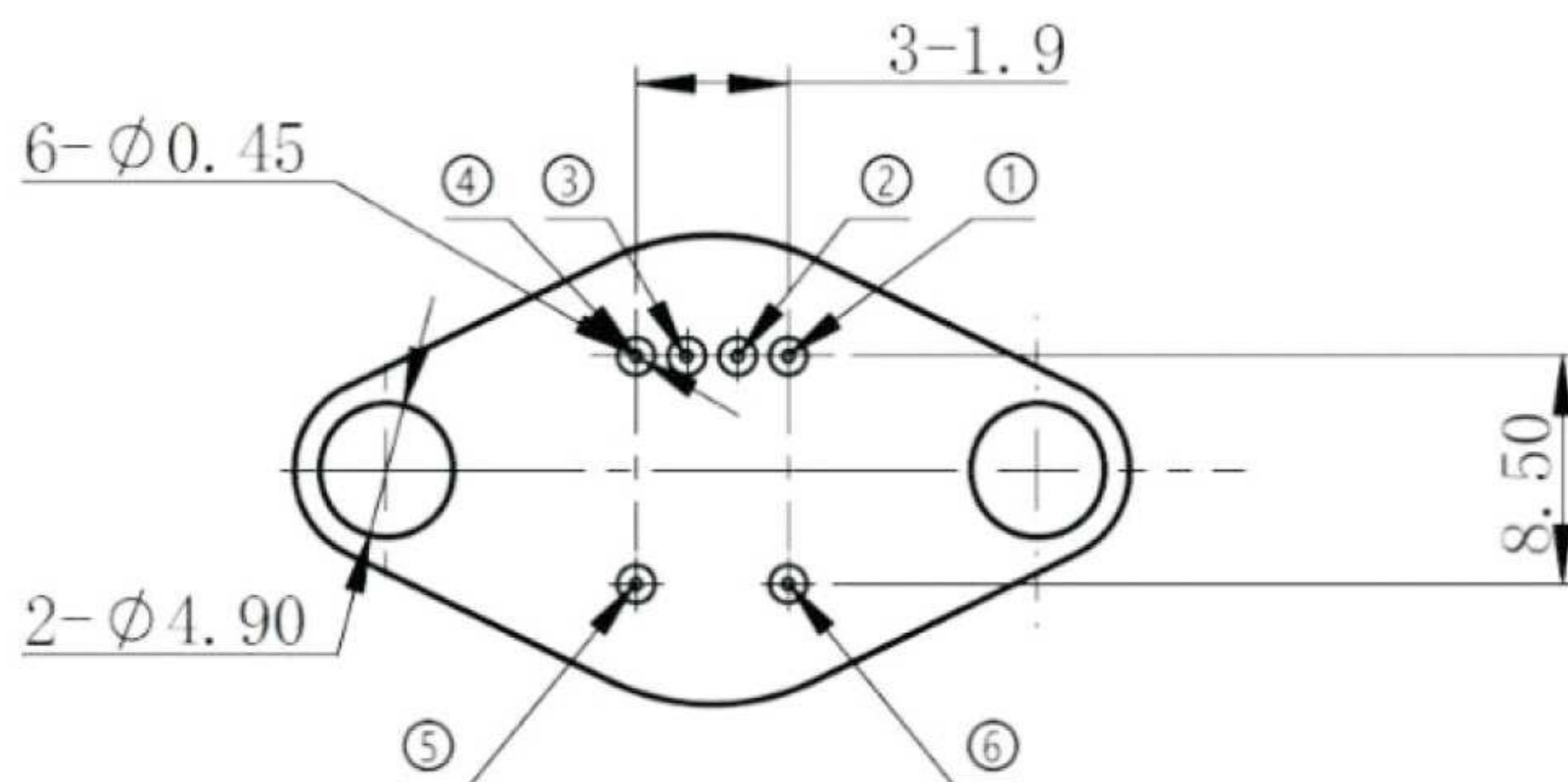
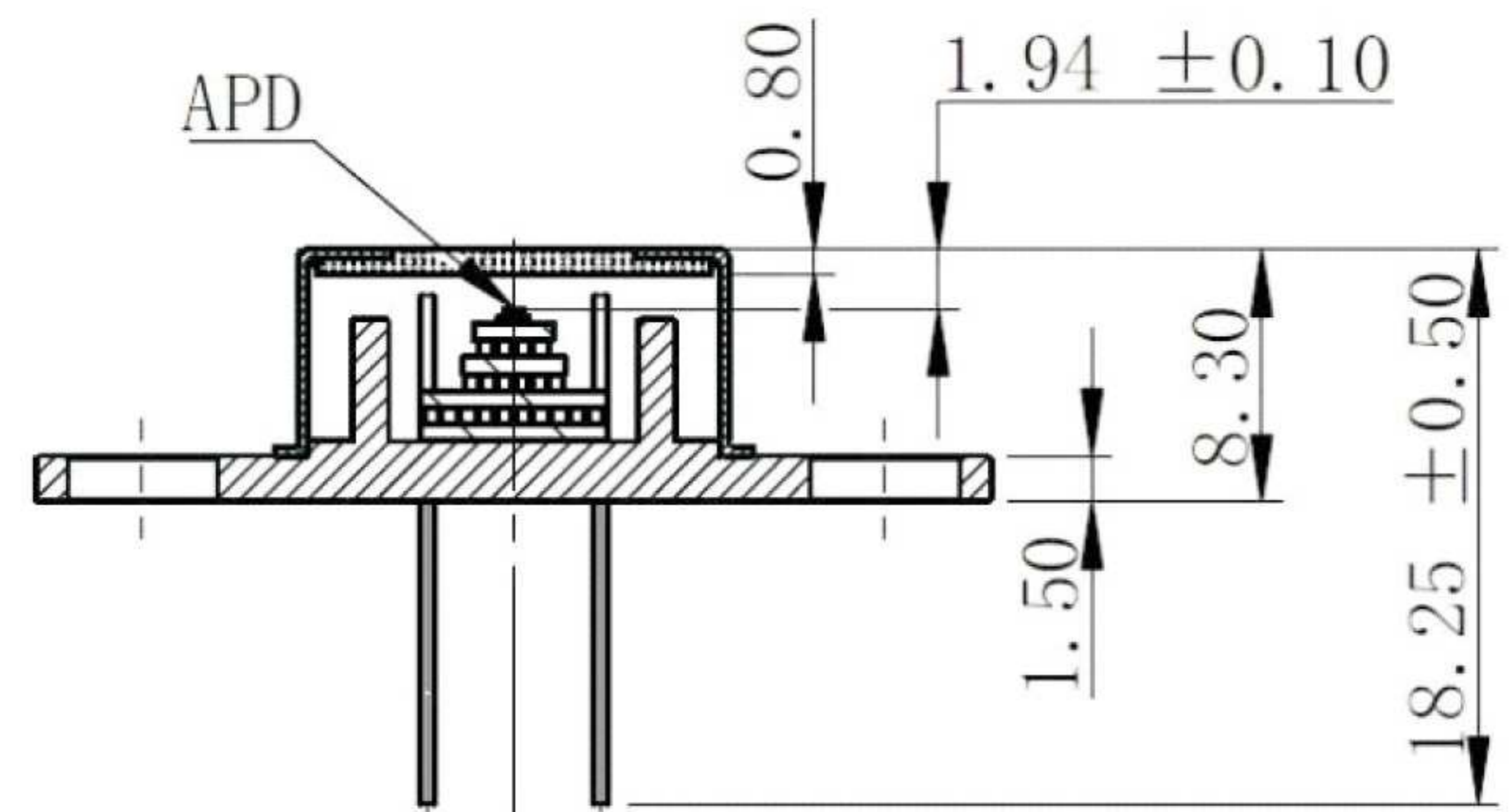


Figure 4. mechanical dimension 2 (Unmarked tolerance $\pm 0.1\text{mm}$)

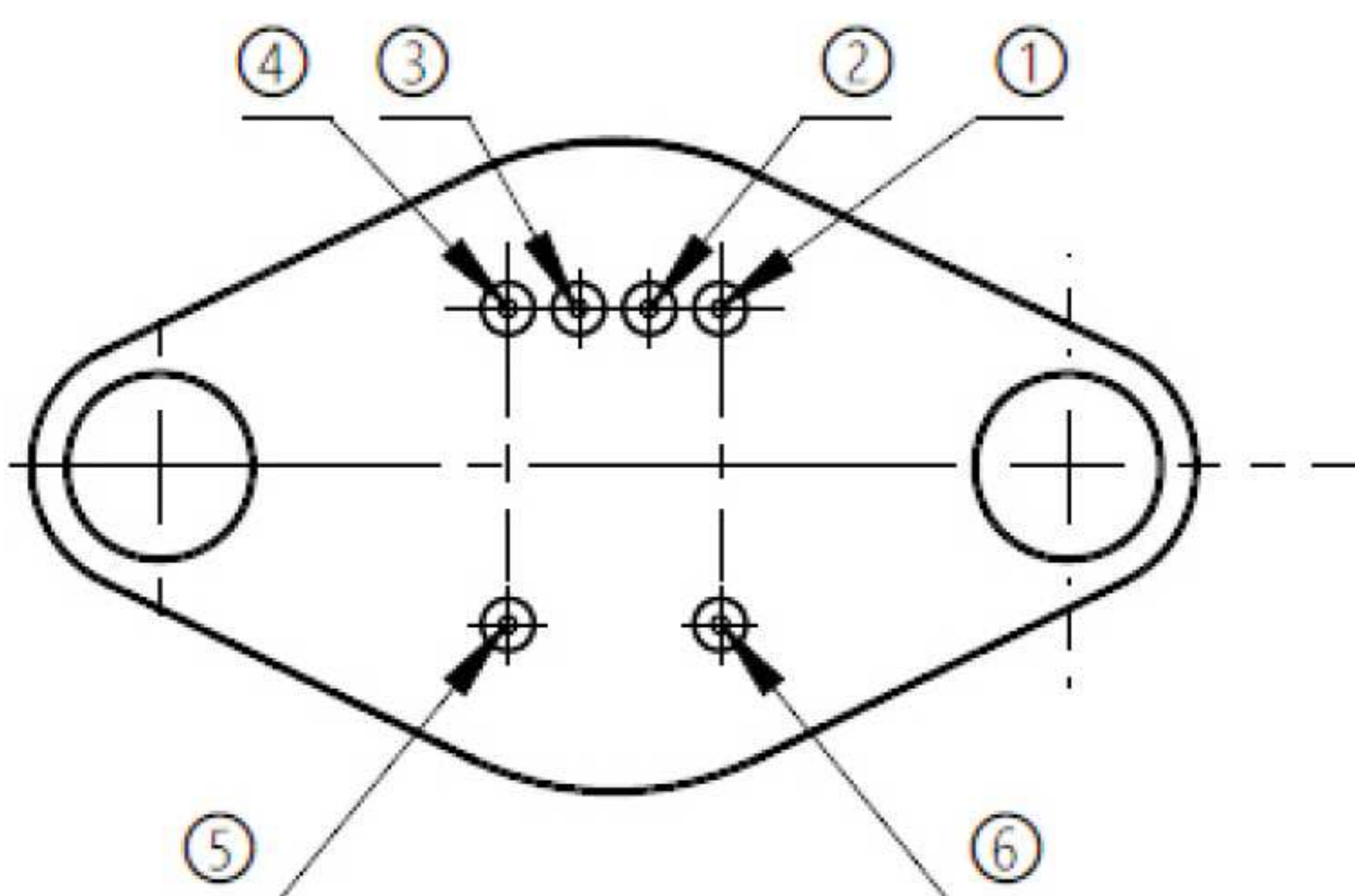
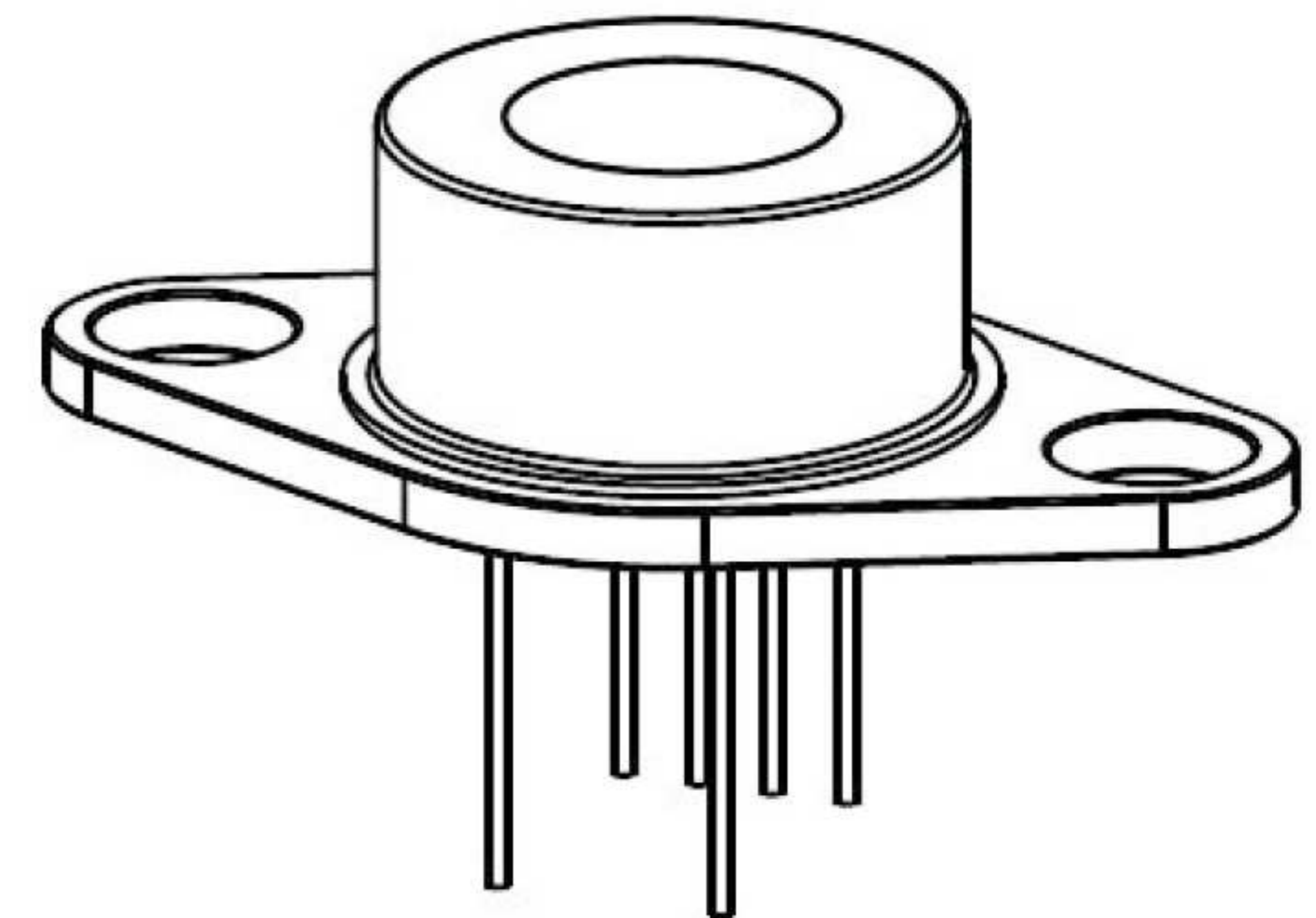


Figure 5. The lead definition (Top View)

NO.	Symbol	Description
1	TEC-	N-contact (Cathode)
2	NTC	Thermistor 1
3	NTC	Thermistor 2
4	TEC+	P-contact (Anode)
5	APD-N	TEC (+)
6	APD-P	TEC (-)

TEC\NTC Electrical Characteristics

NTC(Negative Temperature Coefficient) : $R_T = 10\text{k}\Omega@25^\circ\text{C}$, $\beta = 3450$, 5%。

TEC(Thermoelectric cooler) : $I_{\text{MAX}} = 1.0\text{ A}$, $V_{\text{MAX}} = 6.8\text{ V}$, $T_{\text{HMAX}} = 200^\circ\text{C}$ 。