

# OP301D InGaAs Geiger Mode Negative Feedback Avalanche Photodiode

## Product Features

OP301D is an InGaAs avalanche photodiode photon counter device with a monolithic negative feedback resistor. Based on the high gain characteristics of Geiger mode, the product multiplies the detected photon Geiger into macroscopic current. The negative feedback resistor performs dynamic voltage dividing to realize the self-quenching and self-recovery of the Geiger avalanche electric field in the avalanche photodiode. OP301D adopts TO coaxial pigtail package structure, and the incoming optical interface is single/multimode fiber with FC/UPC connector (0.9mm tight sleeve protection tube).



## Main photoelectric indicators

### Linear mode parameters

Characteristic Parameters	Test conditions ( $T_c=25\pm5^\circ\text{C}$ unless otherwise specified)	Minimal	Greatest	Unit
Spectral Response Range	-	950	1650	nm
Reverse breakdown voltage $V_{BR}$	$I_D=100\text{nA}$	60	85	V
Responsiveness $R_e$	$\lambda=1.55\mu\text{m}$ , $V_R=V_{BR}-1\text{V}$ , $\phi_e=1\mu\text{W}$ .	8	-	A/W
Dark Current $I_D$	$V_R=V_{BR}-1\text{V}$ , $\phi_e=0$	-	1	nA
Capacitance $C_{tot}$	$V_R=V_{BR}-1\text{V}$ , $f=1\text{MHz}$	-	0.6	pF
Integrated resistor value $R_s$	$I_F=200\mu\text{A}$ , $\phi_e=0$	200±50		KΩ
Temperature coefficient of breakdown voltage $\eta$	$T_c=-45\sim+30^\circ\text{C}$ , $I_R=10\mu\text{A}$ , $\phi_e=0$	0.10	015	V/°C

### Geiger model parameters

Characteristic Parameters	Test Condition ( $T_c=-40\pm3^\circ\text{C}$ , $f_p=50\text{KHz}$ )	Minimal	Greatest	Unit
Single Photon Detection Efficiency $PDE$	$\lambda=1550\text{nm}$	15	-	%
Dark Count Rate $DCR$	$PDE=15\%$	-	10	kcps
Post-Pulse Probability APP	$PDE=15\%$ , $\lambda=1550\text{nm}$ , $\Delta t=1\mu\text{s}$	-	15	%
Pulse output amplitude $V_{out}$	$PDE=15\%$ , $R=50\Omega$	0.5	-	mV

Note:  $\lambda$  is the wavelength of incident light,  $f_p$  is the frequency of optical pulse signal, and R is the sampling resistance.

## Absolute maximum ratings and recommended operating conditions

Serial Number	Parameters	Rated Value	
Absolutely Maximum Rating	1	Storage temperature $T_{STG}$	$-50^\circ\text{C}\sim+85^\circ\text{C}$
	2	Operating ambient temperature $T_c$	$-50^\circ\text{C}\sim60^\circ\text{C}$
	3	Welding temperature $T_{sld}$ (time)	$260^\circ\text{C}(10\text{s})$
	4	Reverse DC bias voltage $V_{DC}$	$V_{BR}+5\text{V}$
	5	Input optical power $\phi_e$ (continuous)	1mW
	6	Forward current $I_F$ (continuous)	200μA
	7	Electrostatic Discharge Sensitivity $ESD$	$\geq 300\text{V}$
	8	Pigtail Tension	3.0N

Serial Number	Parameters	Rated Value	
Recommendation working conditions	1	APD chip operating temperature $T_{th}$	$-50^\circ\text{C}\sim-30^\circ\text{C}$
	2	Reverse DC bias voltage $V_{DC}$	$V_{BR}+1\text{V}\sim V_{BR}+5\text{V}$

## Typical Characteristic Curve

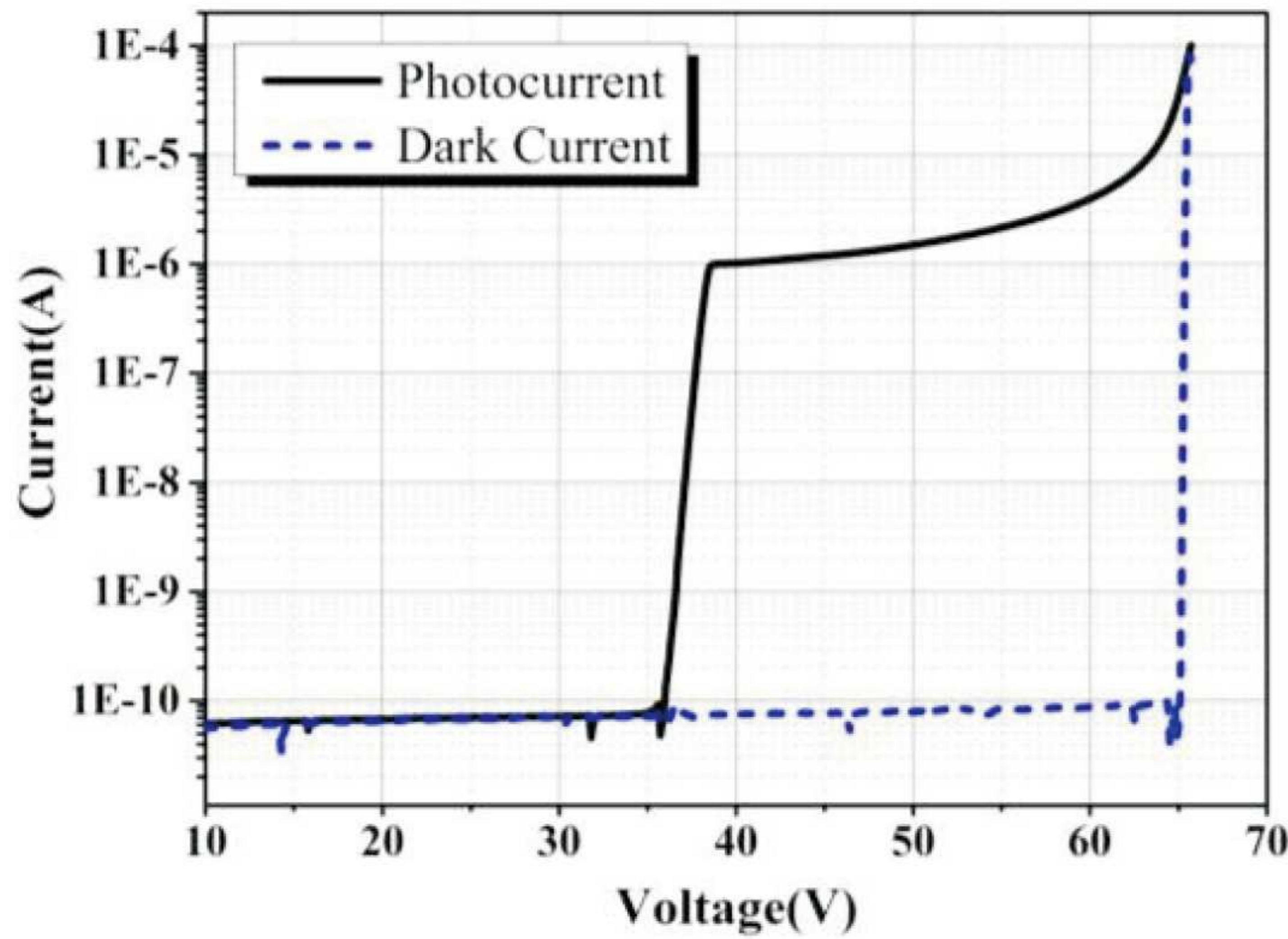


Fig. 1 Photocurrent and dark current curves

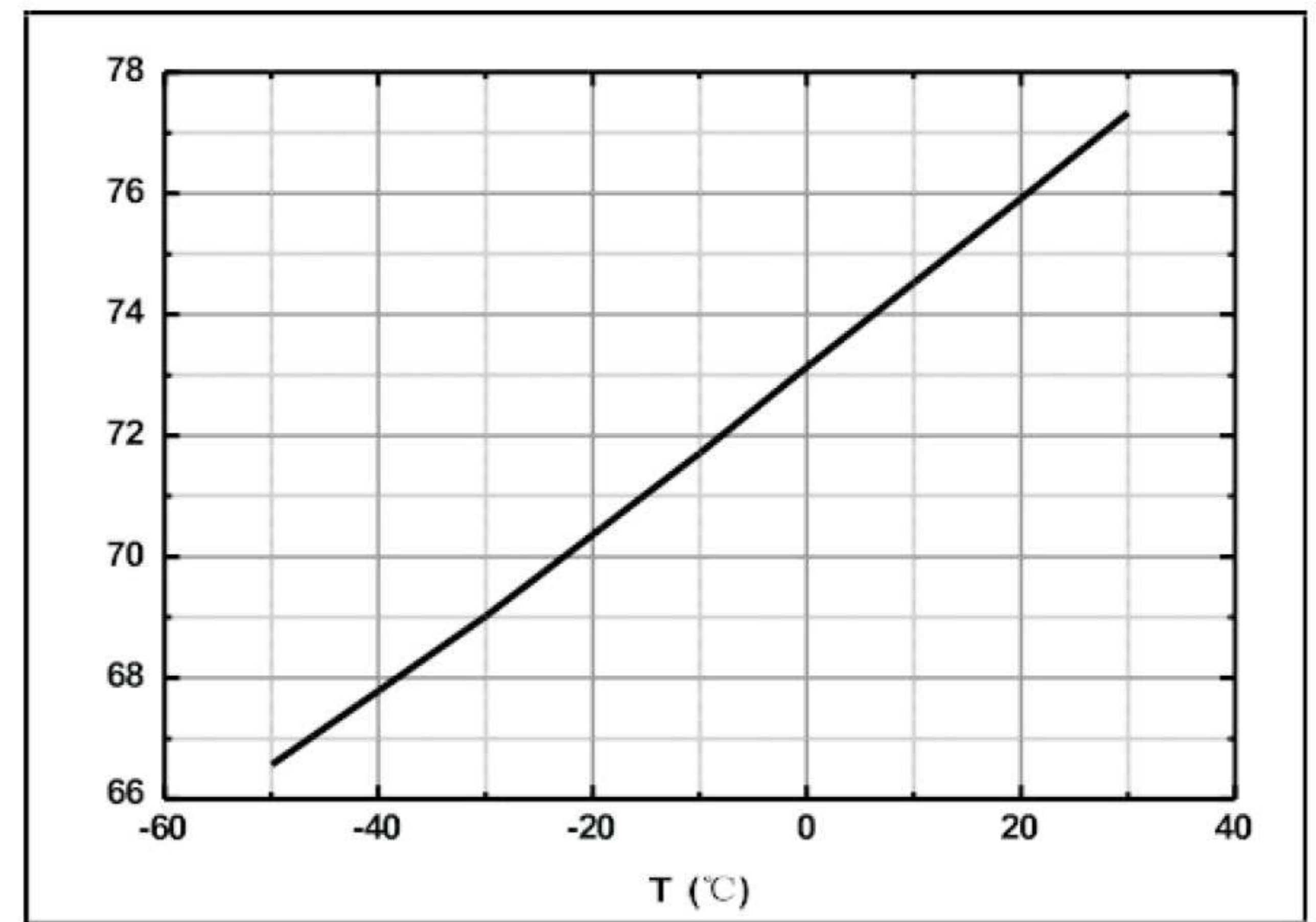
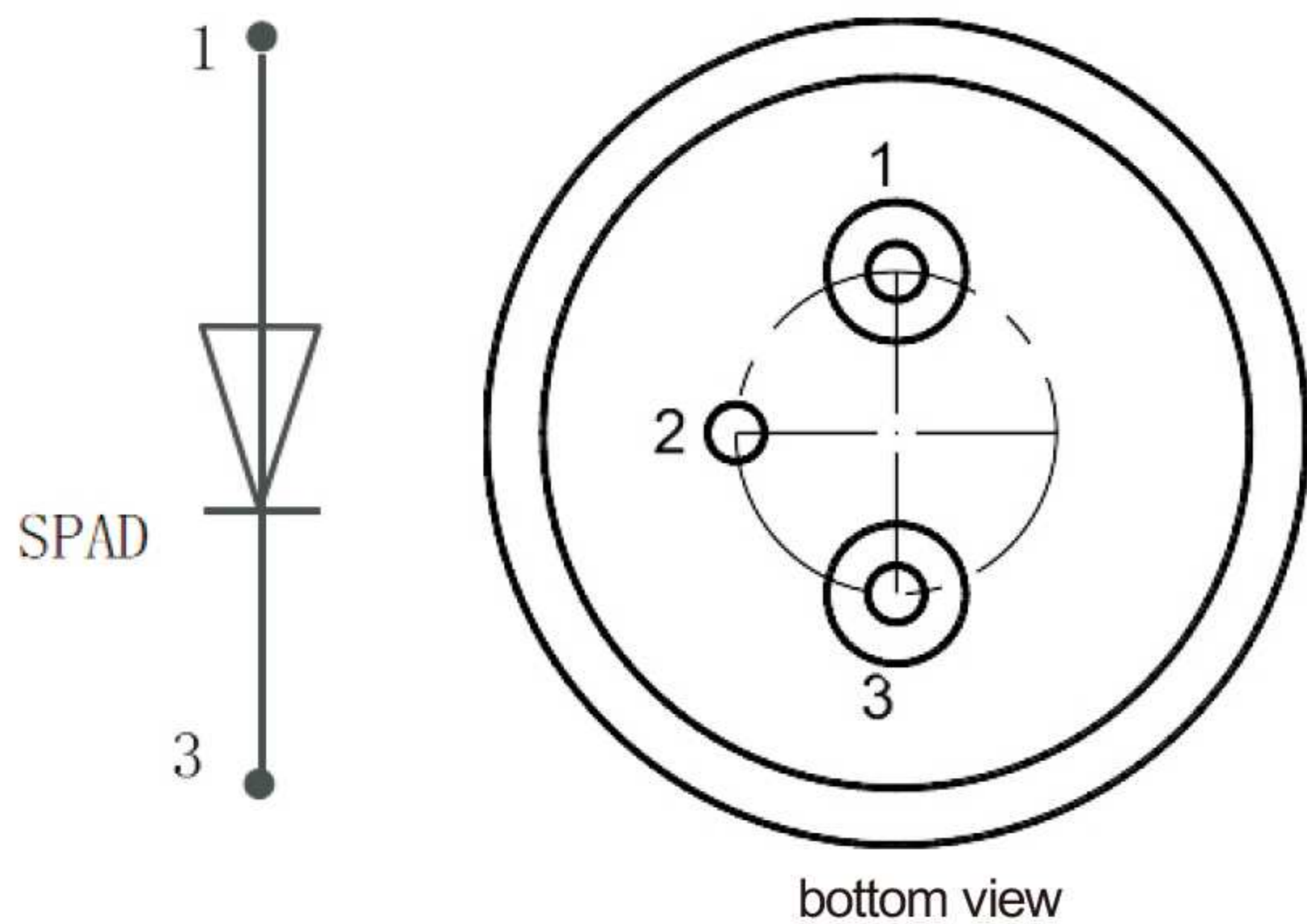
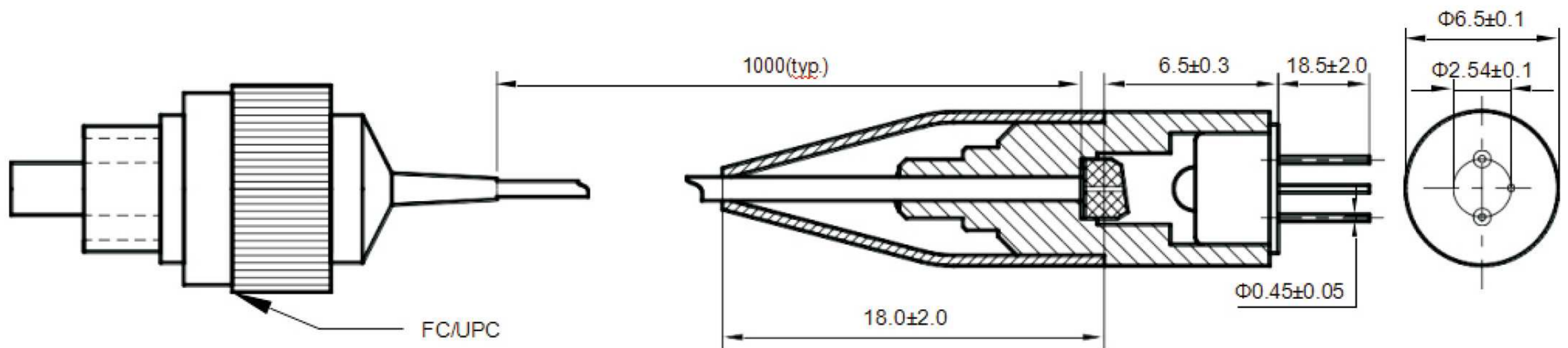


Fig. 2 Temperature coefficient of breakdown voltage

## Package form factor, dimensions, equivalent circuitry, and pin definitions (in mm)



PIN#	Sym.	Description
1	P	P (Anode)
2	G	Ground
3	N	N (Cathode)

Note: If not specifically required, the fiber optic interface is singlemode fiber (0.9mm tight protection tube), fiber length 1.0 m.