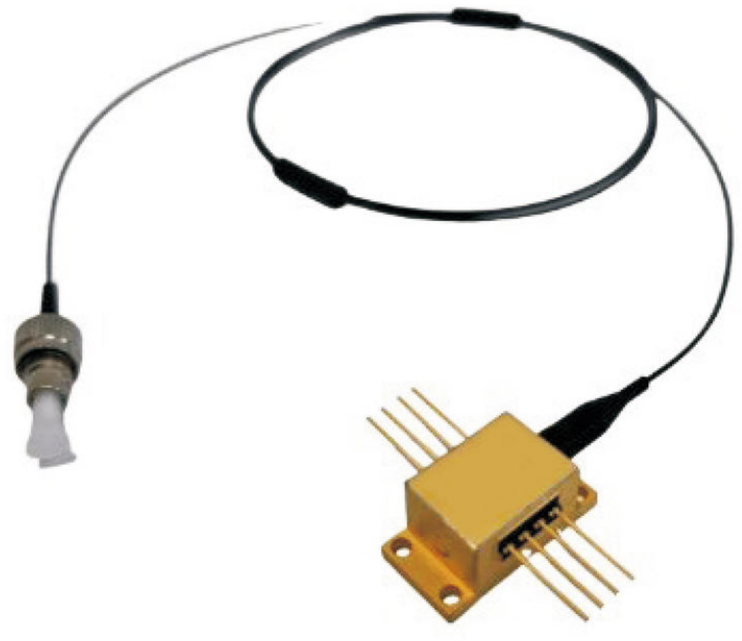
OP401D InGaAs SPAD Detector



Product Features

- Working wavelength: 0.95 μm~1.65 μm;
- Designed for single photon detection applications;
- Internal integrated three-stageTec cooler;
- 62.5/125 μm multimode pigtail;
- Butterfly airtight encapsulated modules.

Main photoelectric indicators

Linear mode parameters

Characteristic parameters	Test conditions (TC=25±5°C unless otherwise specified)	Minimal	Greatest	Unit
Effective detection surface diameter *d*	-	25	-	μm
Spectral Response Range	-	950	1650	nm
Reverse breakdown voltage V_{BR}	I_R=10 μA, Φe=0	60	85	V
Responsiveness R_e	Φe=1μW, VR=(V_{BR}-1)V, λ=1550 nm±50 nm	8	-	A/W
Dark Current I_D	V_{DC}=(V_{BR}-1) V,Φe=0	-	1	nA
Capacitance C_{tot}	V_{DC}=(V_{BR}-1) V,*f* = 1MHz	-	0.6	pF
Temperature coefficient of breakdown voltage η	TC=-45 ~ +30℃, IR =10μA, φe=0	0.10	0.15	V/℃

Geiger mode parameters

Characteristic parameters	Test Condition	Minimal	Greatest	Unit
Single Photon Detection Efficiency *PDE*	T_A = -40 ± 5°C, μ = 1, f_g = 1.25 GHz, f_P = 625 kHz, *DCR* ≤ 3.0 kHz, λ = 1.55 μm	20	-	%
Dark Count Rate *DCR*	T_A = -40 ± 5 °C, f_g = 1.25 GHz. SPDE = 20%, λ = 1.55μm	-	3	kcps
Post-Pulse Probability APP (500 ns)	T_A = -40 ± 5°C, μ = 1, f_g = 1.25 GHz, f_P = 625 kHz. DCR ≤ 3.0 kHz, SPDE = 20%, λ = 1.55 μm	-	1	%
Time Jitter T_J	SPDE=20%	-	300	ps

Note: λ is the wavelength of incident light, T_A is the value of test temperature, μ is the average number of photons per pulse, f_g is the frequency of gating signal, and f_g is the frequency of optical pulse signal.

Absolute maximum ratings and recommended operating conditions

Serial Number		Parameters	Rated Value
Absolutely Maximum rating	1	Storage temperature T_{STG}	-50℃~+85℃
	2	Operating ambient temperature T_C	-50℃~60℃
	3	Welding temperature T_{sld} (time)	260℃(10s)
	4	Reverse DC bias voltage V_{DC}	VBR+5V
	5	Input optical power φ_e (continuous)	1mW
	6	Forward current I_F (continuous)	200μA
	7	Electrostatic Discharge Sensitivity *ESD*	⩾300V
	8	Pigtail Tension	3.0N
	9	TEC Voltage	11.9 V
	10	TEC Current	0.8 A

Serial Number		Parameters	Rated Value
Recomm endation	1	APD chip operating temperature T_{th}	-50℃~-30℃
Referral working conditions	2	Reverse DC bias voltage V_{DC}	V_{BR}+1V to V_{BR}+5V

Typical Characteristic Curve

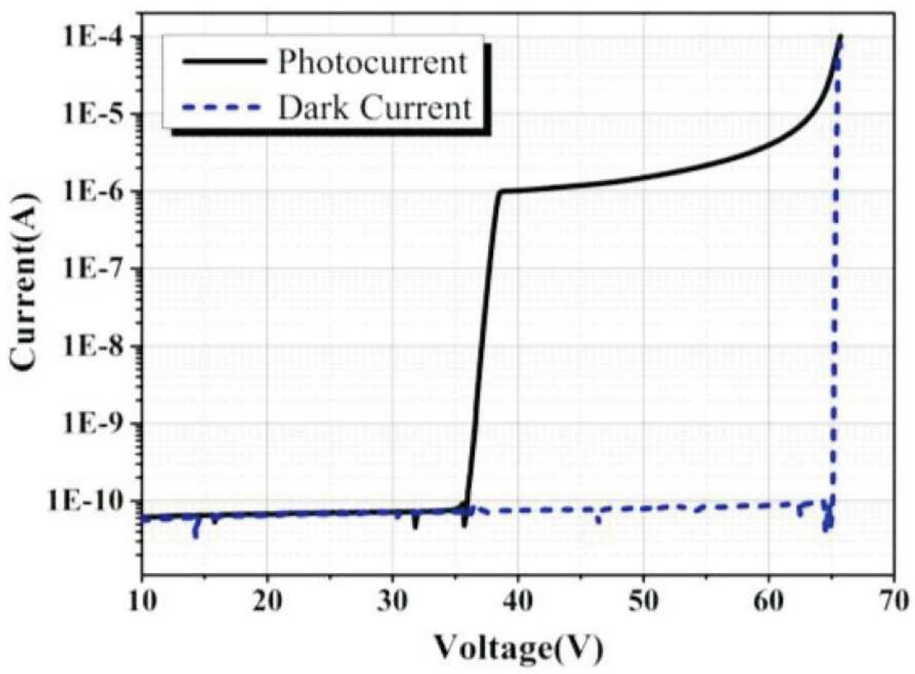


Fig. 1 Photocurrent and dark current curves

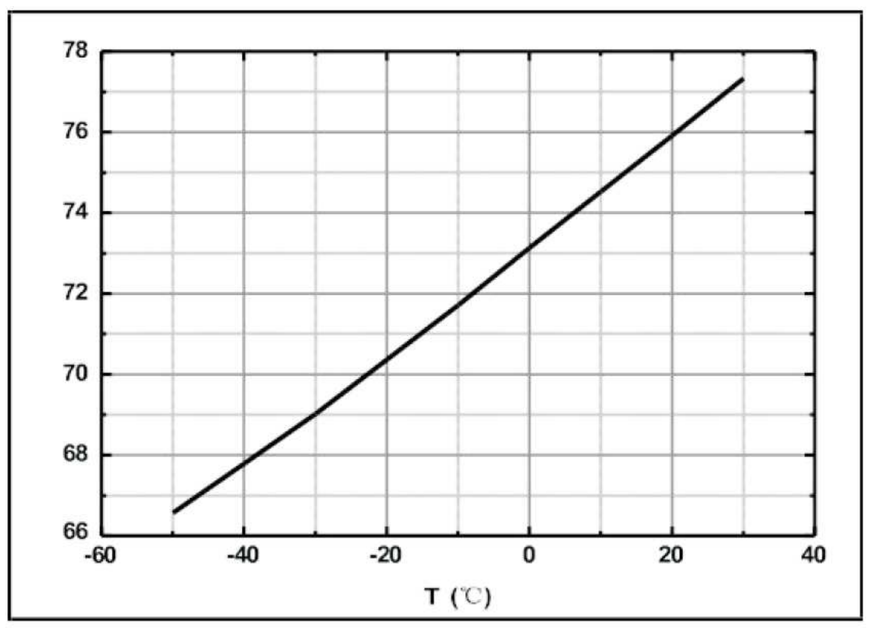
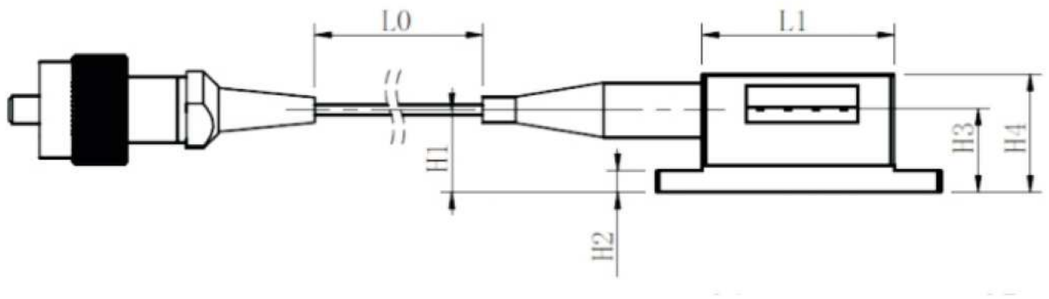


Fig. 2 Temperature coefficient of breakdown voltage

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



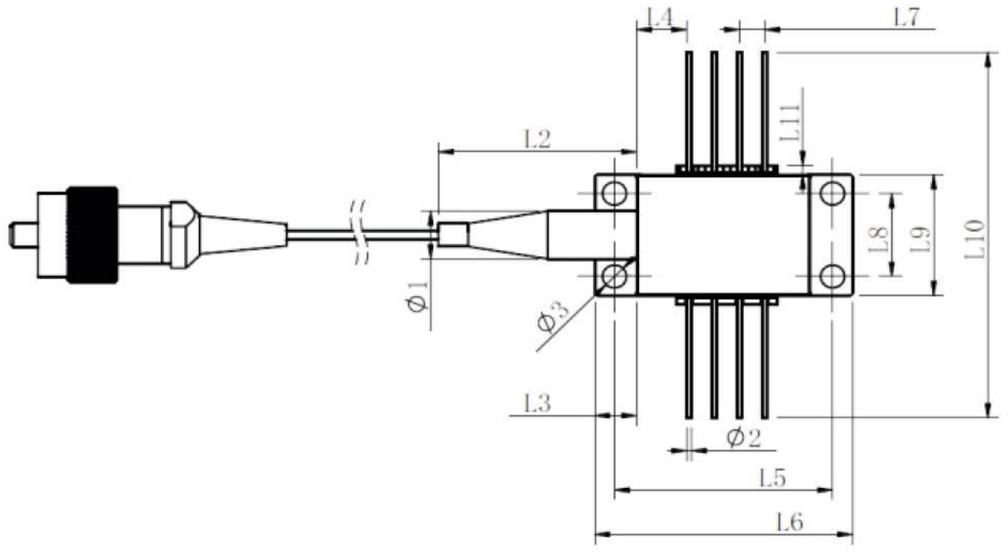


Figure 3 Product form factor

The external dimensions of the product are shown in Table

notation	minimum value	nominal value	maximum value	notation	minimum value	nominal value	maximum value	notation	minimum value	nominal value	maximum value
H1	7.40	7.45	7.50	L2	10.00	13.50	30.00	L8	8.70	8.90	9.10
H2	1.80	2.00	2.20	L3	4.05	4.25	4.45	L9	12.50	12.70	12.90
H3	7.57	7.77	7.97	L4	3.74	3.94	4.14	L10	38.20	38.40	38.60
H4	10.50	10.70	10.90	L5	21.80	22.00	22.20	ϕ1	3.00	3.50	6.60
L0	1000.0	-	-	L6	25.80	26.00	26.20	ϕ2	0.40	0.50	0.60
L1	17.30	17.50	17.70	L7	-	2.54	-	ϕ3	2.20	2.40	2.60

—Output Port Definitions

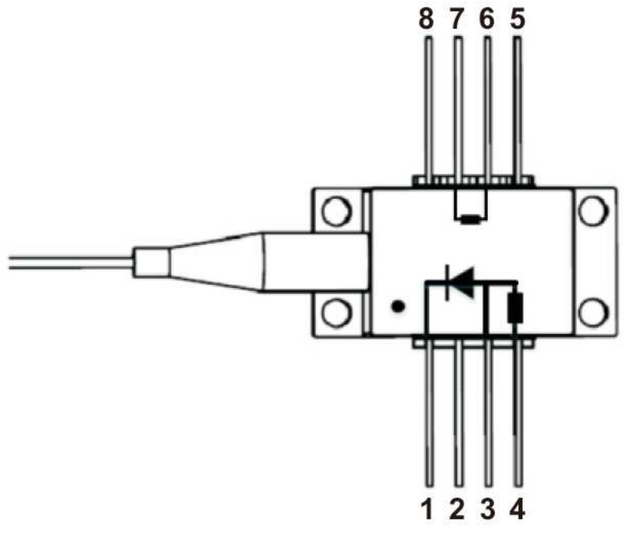


Fig. 4 Pin arrangement and numbering (top view)

Outlet Number	Name (symbol)	Outlet Numbering	Name
1	Diode N-pole (APD_N)	5	Chiller Negative (TEC-)
2	Shell Ground (GND)	6	Thermistor (R_th)
3	Diode P-pole (APD_P)	7	Thermistor (R_th)
4	Signal sampling terminal P+50Ω (OUT)	8	Chiller Positive (TEC+)

■TEC\NTC Electrical Parameters

NTC (Temperature Sensitive Resistor): R_T = 10kΩ@25°C, β= 3450, 5%.

TEC (temperature difference cooler): I_{MAX} = 0.8 A, V_{MAX} = 11.9 V, T_{HMAX} = 200°C.