

InGaAs 光电二极管芯片——APD050A

InGaAs Photodiode Chip—APD050A

◇ 应用范围 Applications

吉比特以太网、同步光网络 OC-48、吉比特无源光网络、光纤信道
Gigabit Ethernet、SONET OC-48、GPON、Fiber Channel

◇ 最大绝对额定值 Absolute Maximum Rating

参数名称 Parameter	符号 Symbol	额定值 Rating		单位 Unit
		最小 Min	最大 Max	
APD 偏置电压 APD voltage supply	V_{PD}	-	V_{BR}	V
工作温度 Operating temperature	T_C	-45	+85	°C
贮存温度 Storage temperature	T_{STG}	-45	+125	°C
正向电流 Forward current	I_F	-	5	mA
反向电流 Reverse current	I_R	-	3	mA
静电放电敏感度 ESD susceptibility	-	500	-	V

◇ 光电性能 The Opto-electronic Characteristics (@ $T_C=22\pm 3^\circ\text{C}$)

特性参数 Parameters	符号 Sym.	测试条件 Test conditions	最小 Min	典型 Typ	最大 Max	单位 Unit	
光谱响应范围 Response Spectrum	λ	$V_R=V_{BR}-3V$	1000~1680			nm	
光敏面直径 Photosensitive diameter	ϕ	—	50			μm	
响应度 Responsivity	R_e	$\lambda=1.55\mu\text{m}, \phi_e=1\mu\text{w}, V_R=V_{BR}-3V$	10	-	-	A/W	
倍增因子 Multiplication factor	M	$\lambda=1.55\mu\text{m}, \phi_e=1\mu\text{w}, V_R=V_{BR}-3V$	10	-	-	-	
最大增益 Maximum multiplication factor	M_{max}	$\lambda=1.55\mu\text{m}, \phi_e=1\mu\text{w}, V_R=V_{BR}-1V$	20	-	-	-	
反向击穿电压 Reverse breakdown voltage	V_{BR}	$I_D=100\mu\text{A}, \phi_e=0\mu\text{w}$	40	-	50	V	
反向穿通电压 Punch-through voltage	V_P	$\lambda=1.55\mu\text{m}, \phi_e=1\mu\text{w}, M=1.1$	20	-	30	V	
工作电压范围 ⁽¹⁾ Range of operation voltage	ΔV_P	$\lambda=1.55\mu\text{m}, \phi_e=1\mu\text{w}$	18	20	-	V	
暗电流 Dark current	I_D	$V_R=V_{BR}-3V, \phi_e=0$	-	-	10	nA	
正向压降 Forward voltage	V_F	$I_F=1\text{mA}$	-	0.7	1.0	V	
电容 Capacitance	C	$V_R=V_{BR}-3V$	-	-	0.5	pF	
-3dB 截止频率 -3dB cut-off frequency	BW	$V_R=V_{BR}-3V, R_L=50\Omega$	2.5	-	-	GHz	
击穿电压温度系数 Temperature coefficient of V_{BR}	γ	$I_D=100\mu\text{A}, \phi_e=0\mu\text{w}$	-45~+20°C	0.13	0.14	0.15	V/°C
			+20~+85°C	0.08	0.11	0.12	

⁽¹⁾ 工作电压范围：反向击穿电压与反向穿通电压的差值，即 $V_{BR}-V_P$ 。

Range of operation voltage: The difference of the reverse breakdown voltage and the punch-through voltage.

典型特性曲线 Typical Performance Curves (@Tc=22±3°C)

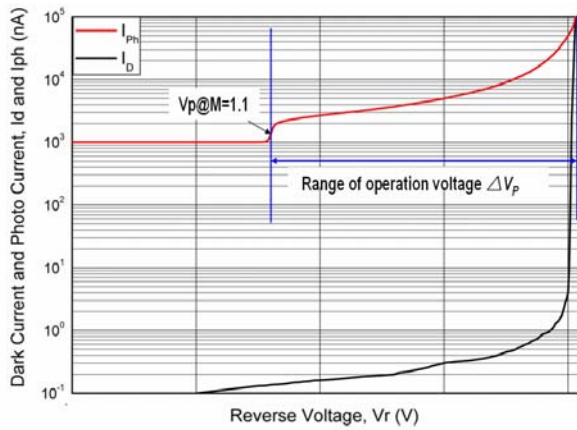


图 1 光电流、暗电流曲线

Figure 1 Photo Current and Dark Current vs. Reverse Voltage

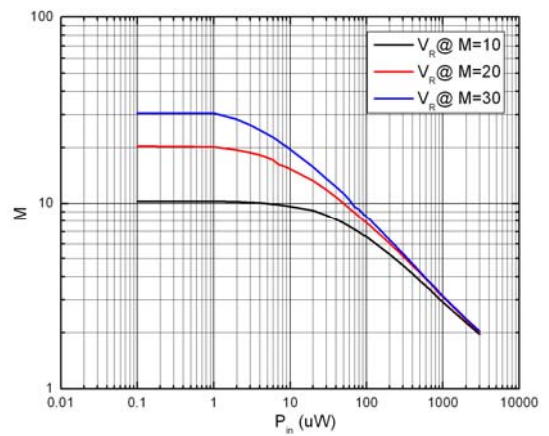


图 2 倍增因子与输入光功率关系

Figure 2 Multiplication Factor vs. Input Optical Power

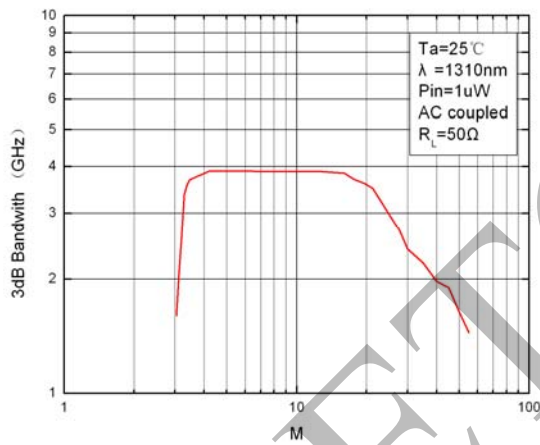


图 3 APD 芯片带宽与倍增因子关系

Figure 3 APD Bandwidth vs. Multiplication Factor

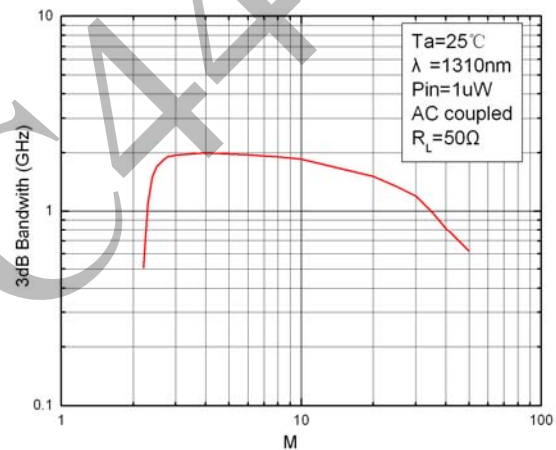


图 4 APD-TIA(GN1032W)带宽与倍增因子关系

Figure 4 APD-TIA(GN1032W) Bandwidth vs. Multiplication Factor

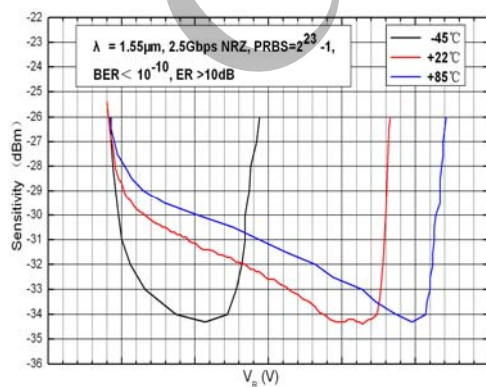


图 5 APD-TIA(GN1032W)灵敏度与偏置电压关系

Figure 5 APD-TIA(GN1032W) Sensitivity vs. Bias Voltage

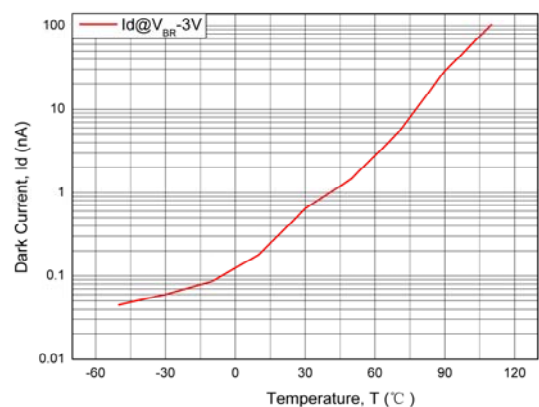


图 6 暗电流与温度关系

Figure 6 Dark Current vs. Temperature

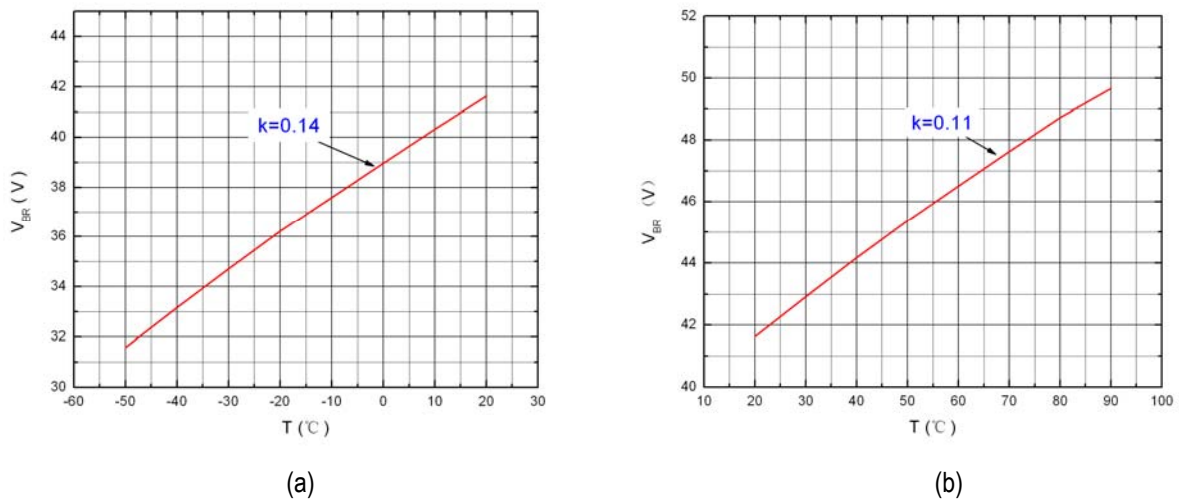
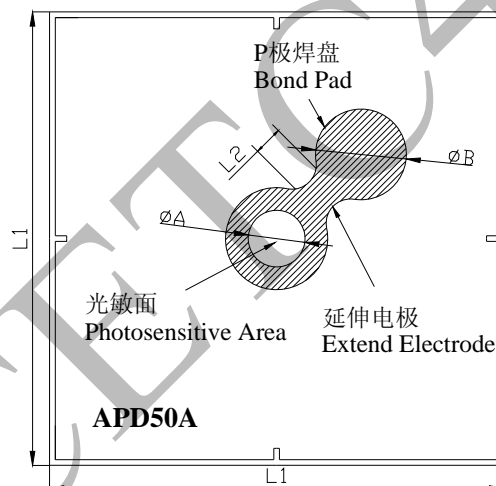


图 7 击穿电压温度系数 (a): $-45^{\circ}\text{C} \sim +20^{\circ}\text{C}$, (b): $+20^{\circ}\text{C} \sim +85^{\circ}\text{C}$
 Figure 7 Breakdown Voltage vs. Temperature (a): $-45^{\circ}\text{C} \sim +20^{\circ}\text{C}$, (b): $+20^{\circ}\text{C} \sim +85^{\circ}\text{C}$

◇ 芯片结构图及尺寸 Outline Diagram & Die Dimensions



芯片尺寸 Die Size / L1	300 μm ×300 μm
芯片厚度 Die Thickness	150 ± 10 μm
P 极焊盘直径 Bond Pad Diameter / ϕ B	65 μm (推荐压焊金丝 18 μm)
光敏面直径 Photosensitive Diameter / ϕ A	50 μm
延伸电极长度 Extend Electrode Length / L2	25 μm
P-电极 P metal	Au
N-电极 N metal	Au

◇ 结构及功能介绍 Introduction

InGaAs 雪崩光电二极管芯片结构为平面正照型，正面为 P 极，背面为 N 极，其基本功能为将光信号转换为电信号，并对光电流进行内部放大。

The structure of InGaAs avalanche photodiode, which can convert optical signal to current signal and multiple it internally, is planar and front illuminated with P electrode on the top and N electrode on the bottom.

◇ 使用注意事项 Precautions

- 应采取必要的 ESD 防护措施，以避免芯片被静电损伤。
Take appropriate ESD protections to avoid damage.
- 由于 InP 基芯片易碎，取用时需十分小心。请勿使用镊子，推荐使用真空吸附方式取用芯片。
InP chips are fragile and easily damaged. Special caution should be used when handling. Do not handle with tweezers. A vacuum tip with a flat surface is recommended.
- 压焊力度、温度等参数需小心设置，以免损坏芯片。
Bonding force and temperature should be applied in a gradual fashion.

◇ 质量可靠性保证 Qualification Information

本产品符合 Telcordia-GR-468-CORE 中对产品可靠性规定的各项要求。

All APD chips have passed all qualification requirements as specified by Telcordia-GR-468.

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