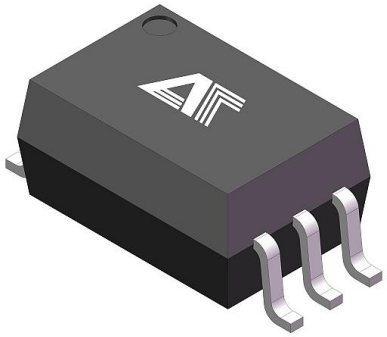
AOTE SEMICONDUCTOR



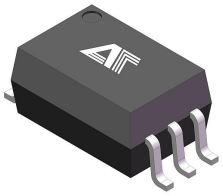
智能功率模块接口光耦
Intelligent Power Module Optocoupler

AT840

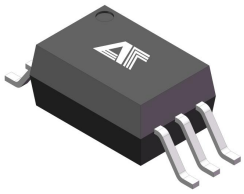
Product Data Sheet

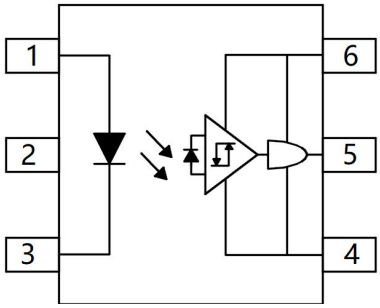
AOTE DCC
RELEASE

SOP6-P



SOP6-W





Pin Configuration
1.Anode
2.NC
3.Cathode
4.GND
5.VO
6.VCC

◆ 封装逻辑原理图 Encapsulation logic schematic

AT840 光耦采用高效光电转换技术，结合先进封装工艺，提供输入输出间的可靠隔离，支持SOP6-P、SOP6-W封装形式，适配多样化场景需求。

The AT840 optocoupler adopts high-efficiency photoelectric conversion technology and advanced packaging processes, providing reliable input-output isolation. It supports package types SOP6-P、SOP6-W to meet diverse application requirements.

◆ 主要特征 Main features

- 输入-输出隔离电压Vios=5000Vrms
  Input output isolation voltage：Vios=5000Vrms
- 20 kV/μs最小共模抑制;20 kV/μs minimum Common Mode Rejection
- 4.5V 至 20V 宽工作电压范围；4.5V ~ 20V Wide operating VCC Range
- 爬电距离>7.0mm ; Creepage distance > 7.0mm;
- 输入-输出绝缘距离 >0.4mm ； Input-Output insulation Thickness > 0.4mm
- 防潮等级 class1； MSL class1
- 产品符合 ROHS、REACH 及 HF 等环保法规要求;
  The products comply with ROHS, REACH and HF;

◆ 应用领域 Applications

- 交流/直流无刷电机驱动器 AC/DC brushless motor driver；高压反馈干扰，确保电机调速精度与可靠性；High voltage feedback interference ensures the accuracy and reliability of motor speed regulation;
- 工业变频与逆变器Industrial frequency conversion and inverter；缩短开关死区时间，优化IGBT/MOSFET的开关效率；Shorten the dead time of the switch，Optimizing the switching efficiency of IGBT/MOSFET
- 工业逆变器与USP电源Industrial inverters and USP power supplies通过高共模瞬态抗扰度（CMR15kV/μs抵御电压浪涌Resist voltage surges through high common mode transient immunity（CMR>15kV/μs）
- 充电桩与车载充电器Charging stations and car chargers；隔离车辆与充电设备的通信接口，防止地电位差导致信号失真；Communication interface between isolated vehicles and charging equipment，Prevent signal distortion caused by ground potential difference;

◆ 极限参数 Absolute Maximum Ratings (Ta =25℃)

参数 Parameter			符号 Symbol	额定值 Rating	单位 Unit
发射端 Input	平均输入电流 Average Input Current		IF(AVG)	10	mA
	峰值瞬态输入电流 Peak Transient Input Current	脉宽<1 us, 300pps pulse width<1 us, 300pps	IF(TRAN)	1.0	A
		脉宽<200 us 占空比<1% pulse width<200 us Duty Cycle<1%		40	mA
	反向电压 Reverse Input Voltage		VR	5	V
	输入功耗 Input Power Dissipation		PI	45	mW
接收端 output	平均输出电流 Average Output Current		IO	25	mA
	电源电压 Supply Voltage		VCC	25	V
	输出电压 Output Voltage		VO	-0.5 ~VCC	V
总功耗 Total Power Dissipation			Ptot	210	mW
隔离电压 Isolation voltage			VISO	5000	Vrms
工作温度 Operating Temperature			Topr	-40 ~+100	℃
存储温度 Storage Temperature			Tstg	-55 ~+125	℃

◆ 推荐操作条件 Recommended Operating Conditions

参数 Parameter	符号 Symbol	最小值 Min	最大值 Max.	单位 Unit
电源电压 Power Supply Voltage	VCC	4.5	20	V
开启电流 Forward Input Current (ON)	IF(ON)	6.0	10.0	mA
关断电压 Forward Input Voltage (OFF)	VF(OFF)	0	0.8	V
操作温度 Operating Temperature	TA	-40	+100	℃

◆ 产品特性参数Product characteristic parameters (Ta =25℃)

参数 Parameter		符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
发射端 Input	正向电压 Forward Voltage	VF	IF =6mA	-	1.5	1.7	V
	反向击穿电压 Reverse Voltage	BVR	IR =10uA	5	-	-	V
	开启电流 Open the current	IFLH	-	-	2.2	5	mA
	输入正向电压的温度系数 Temperature Coefcient of Input Forward Voltage	ΔVF/ΔTA	IF =6mA	-	-1.7	-	mV/°C
	输入电容 Capacitance	C-in	V=0,f=1MHz	-	60	-	pF
接收端 Output	输出漏电流 Output leakage current (Vo=VCC+0.5V)	IOHH	VCC=5V,IF =10mA	-	-	100	uA
			VCC=20V,IF =10mA	-	-	500	
	低电平输出短路电流 Low level output Short-circuit power	IOSL	VO=VCC=5.5V, VF =0V	25	-	-	mA
			VO =VCC=20V, VF =0V	50	-	-	
	高电平输出短路电流 High level output Short-circuit power	IOSH	VCC=5.5V IF =6mA,VO =GND	-	-	-25	mA
			VCC=20V, IF =6mA,VO =GND	-	-	-50	mA
	高电平电源电流 High Level Supply Current	ICCH	VCC=5.5V IF =10mA,IO =Open	-	1.5	2.5	mA
			VCC=20V IF =10mA,IO =Open	-	1.6	2.5	
	低电平电源电流 Low Level Supply Current	ICCL	VCC=5.5V VF =0V,IO =Open	-	1.9	3	
			VCC=20V VF =0V,IO =Open	-	2	3	
	低电平输出电压 Low Level Output Voltage	VOL	IOL=6.4mA	-	-	0.5	V
	高电平输出电压 High Level Output Voltage	VOH	IOH=-2.6mA	2.4	VCC-1.1	-	V

◆ 开关特性参数 Switching Specification parameters (Ta =25℃)

参数 Parameter	符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
逻辑低电平传输延迟 Propagation Delay Time to Low Output Level	TPHL	TR/TF =5ns 100%duty cycle ZO =50Ω, VO =5V 带峰值电容	-	150	350	ns
逻辑高电平传输延迟 Propagation Delay Time to High Output Level	TPLH		-	110	350	ns
脉宽失真 Pulse Width Distortion |tPHL-tPLH|	PWD		-	-	250	ns
传输延迟差 Propagation Delay Diference Between Any Two Parts (tPHL-tPLH)*	PDD		-100	-	250	ns
输出上升时间 Output Rise Time (10% ~90%)	Tr		-	16	-	ns
输出下降时间 Output Fall Time (90% ~10%)	Tf		-	20	-	ns
输出高电平共模抑制 Output High Level Common Mode Transient Immunity	|CMH|	TA =25℃ |VCM|=1000V IF =6.0mA, VCC=5V	20	-	-	kV/μs
输出低电平共模抑制 Output Low Level Common Mode Transient Immunity	|CML|	TA =25℃, |VCM|=1000V VF =0V,VCC=5V	20	-	-	kV/μs
隔离电阻 Input-Output Resistance	RISO	VI-O ≤ 500V	-	10^{12}	-	Ω
隔离电容 Input-Output Capacitance	CISO	VI-O =0V Freq=1.0MHz	-	0.6	-	pF

◆ 电性特性曲线Electrical characteristic curve(Ta =25℃)

Fig.1 Low Level output Voltage vs Ambient Temperature

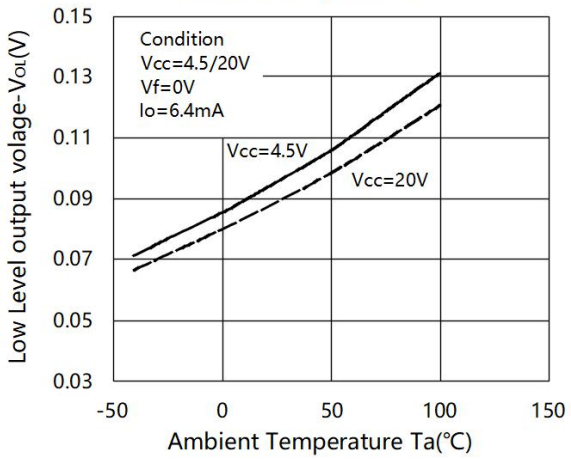


Fig.2 High Level output current vs Ambient Temperature

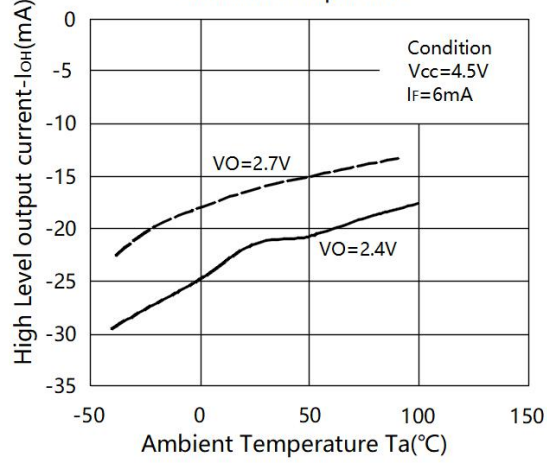


Fig.3 output Voltage vs Input current

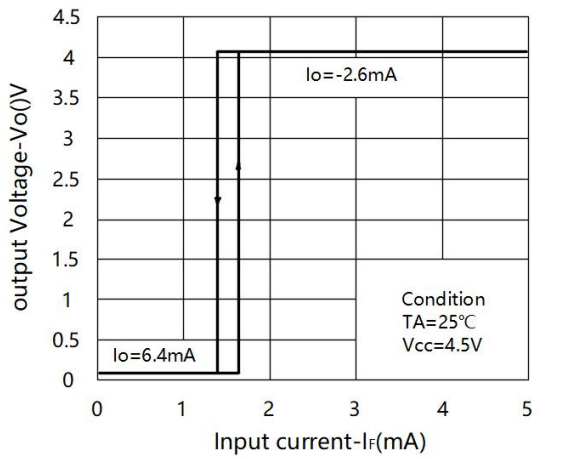


Fig.4 Input current vs Forward Voltage

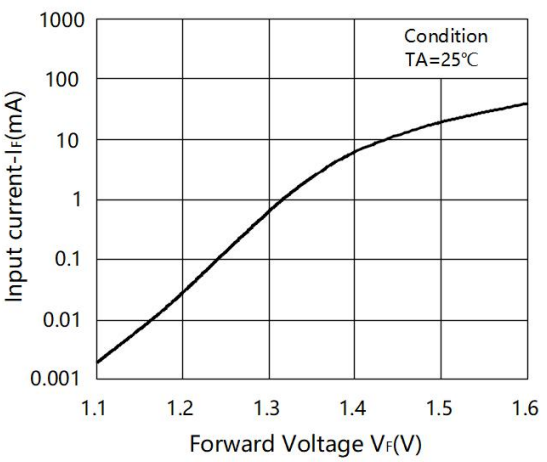


Fig.5 Propagation delay vs. Ambient tempertature

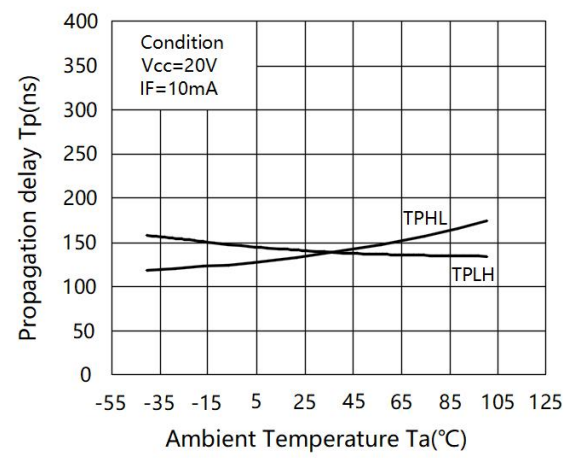


Fig.6 Output voltage vs. Supply Voltage

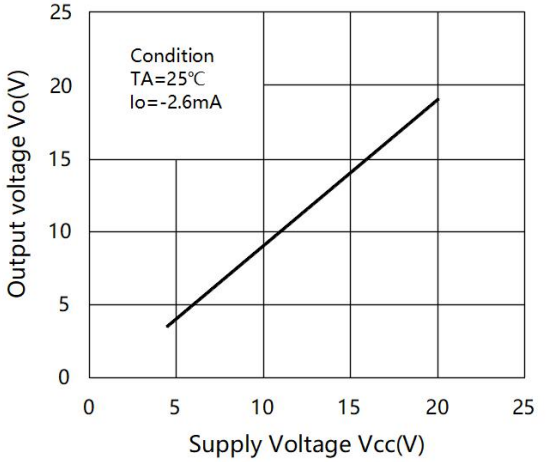


Fig.7 Protagation delay vs. Supply Voltage

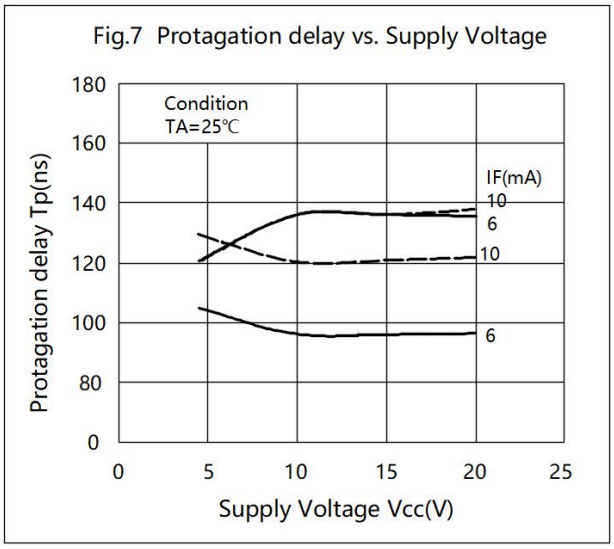


Fig.8 High level output Voltage vs. High output current

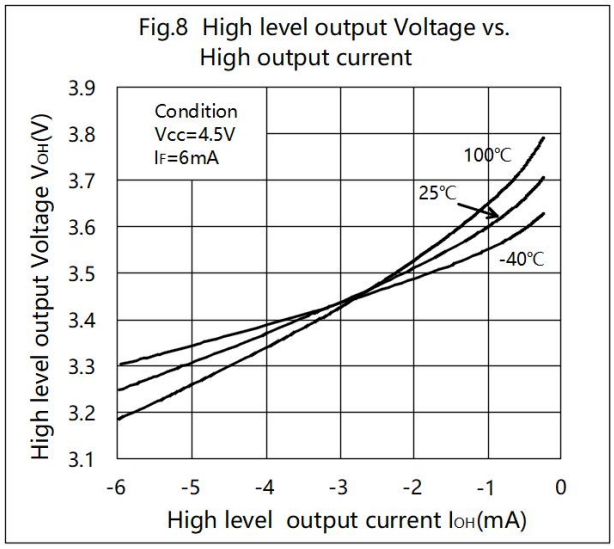
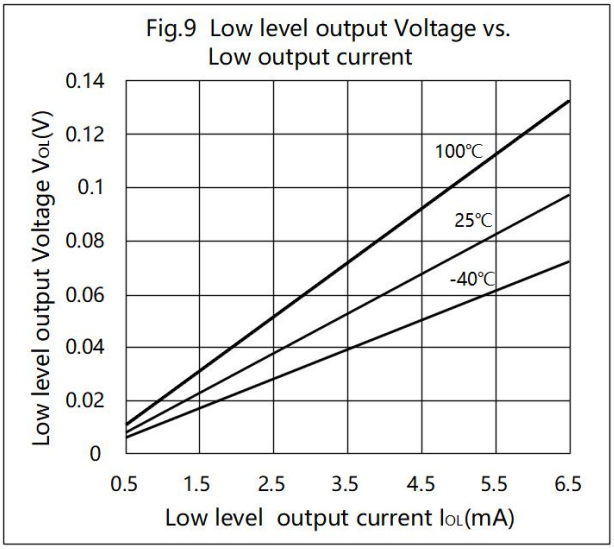
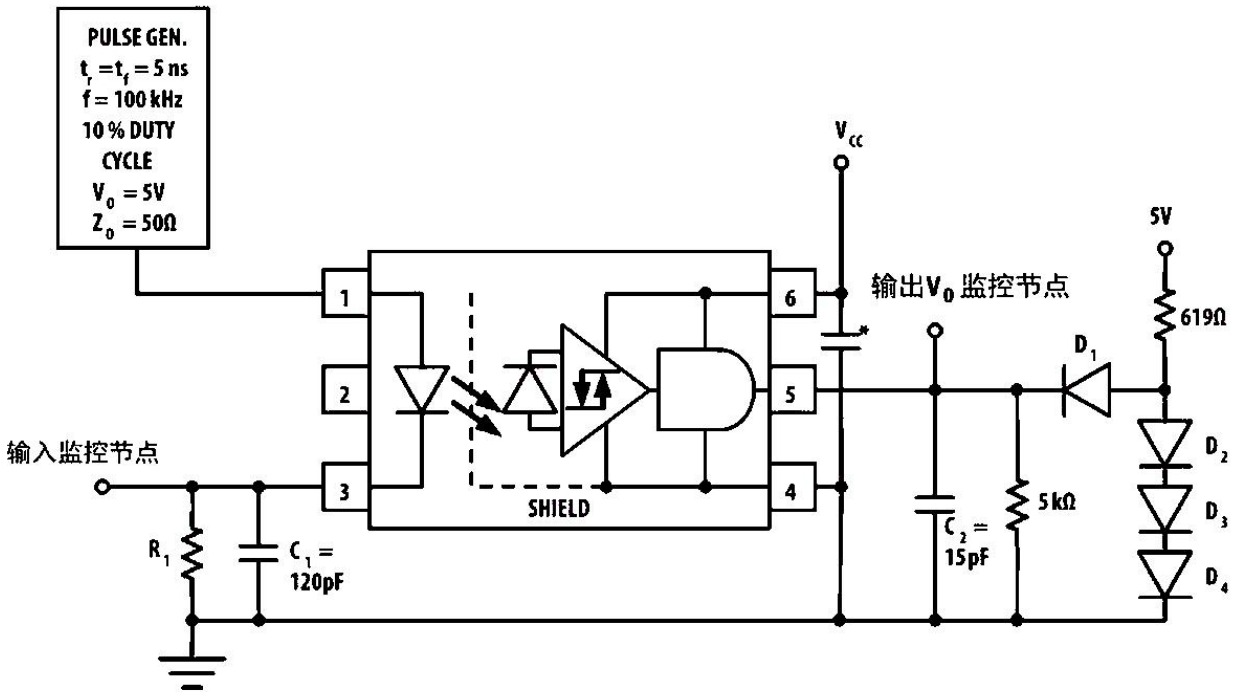


Fig.9 Low level output Voltage vs. Low output current



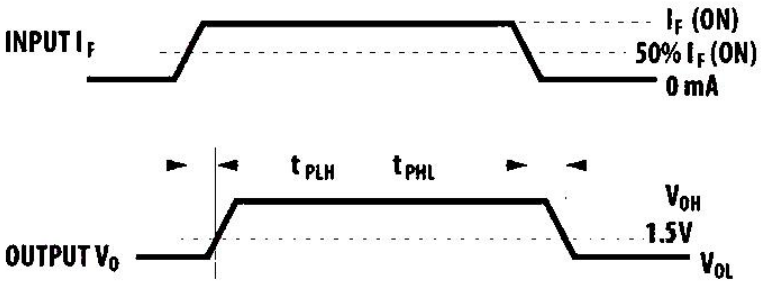
◆ **延迟时间测试电路 Propagation Delay Time Test Circuit**



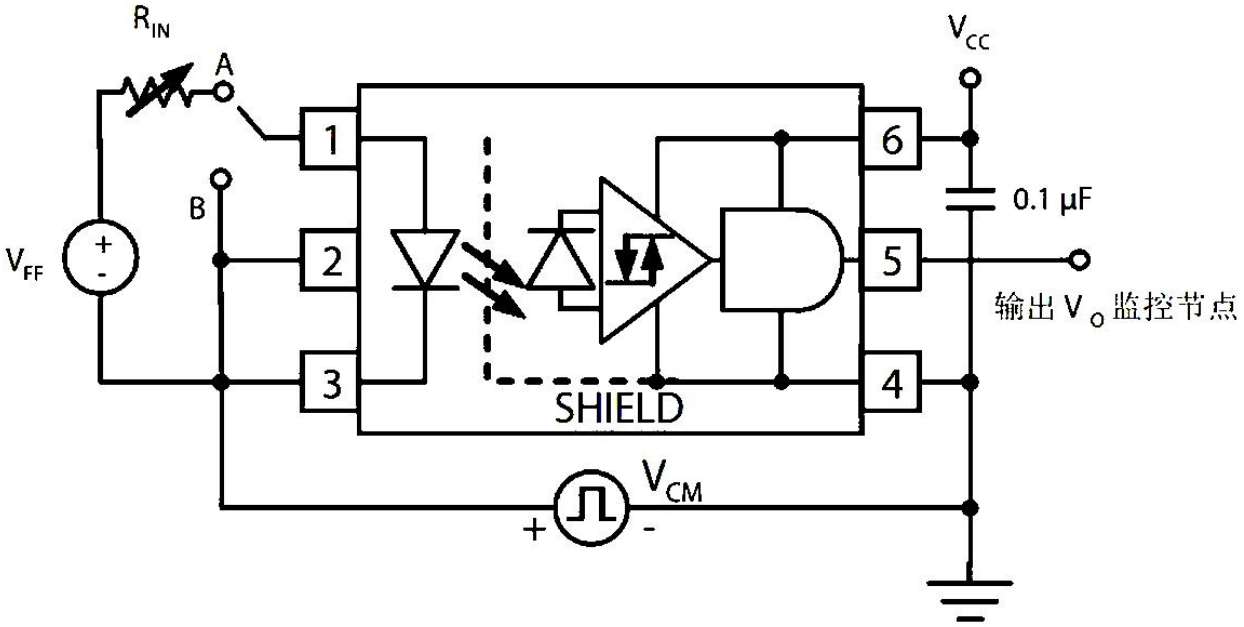
探针和夹具电容包含在C_1和C_2中。

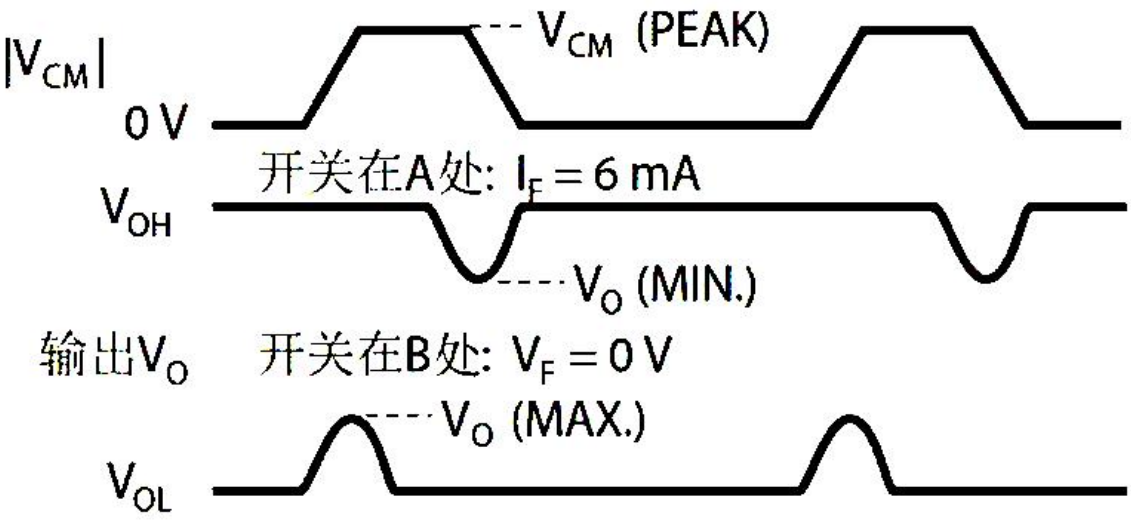
R_1	580Ω	330Ω
$I_{F(ON)}$	6 mA	10 mA

二极管为1N916或1N3064。



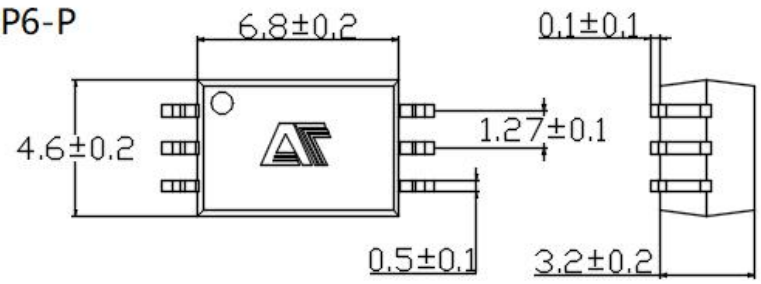
◆ **CMR 测试电路 Test Circuit for Common Mode Transient Immunity**

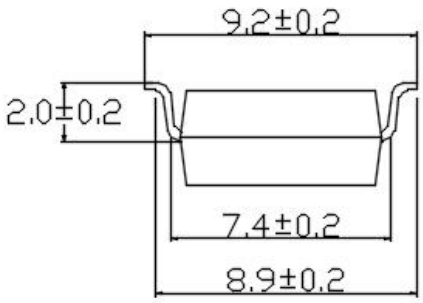




◆ **外形尺寸Overall dimension**

SOP6-P





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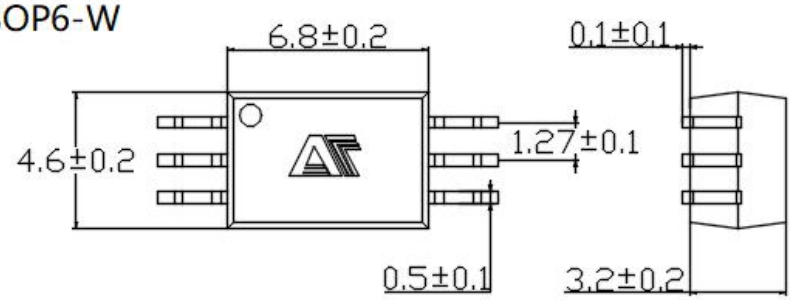
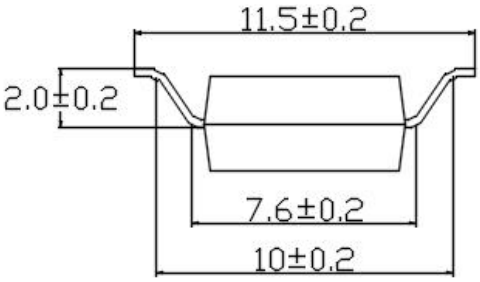
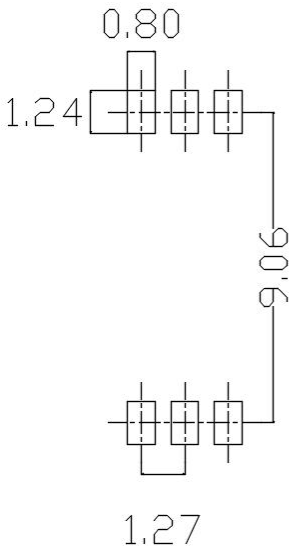




推荐焊盘：

Recommended



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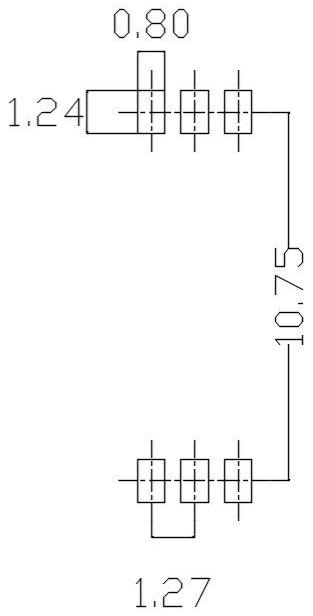


SOP6-W

单位：mm

◆ 产品型号命名规则 Order code

AT 840 -UN Y-W(V)(ZZ)
① ② ③ ④ ⑤ ⑥ ⑦

① 公司代码 Company Code (AT: 奥特 Aote)
② 产品系列 Product Series (840)
③ 框架类型 Lead Frame (Cu: 铜框架 Copper)
④ 树脂类型 Epoxy Type (H: 无卤 Halogen-free)
⑤ 封装形式 Package (S: SOP)
⑥ 器件工作温度范围 Device Operating Temperature Range (特殊范围需填或者空白 Special Range need to be filled in or left blank)
⑦ 内部补充代码 Internal Supplementary Code (数字或者空白 Number or Non)

◆ 印字信息 Marking Information

- 印字中“ ”为奥特品牌LOGO
  “ ”denotes LOGO
- 印字中“Y”代表年份； A(2018),B(2019),C(2020) … …
  “Y”denotes YEAR： A(2018), B(2019), C(2020) … …
- 印字中“WW”代表周号
  “WW”denotes Week’s number
- 印字中“ E”代表内部代码
  “E”denotes Internal code
- 印字中的“H”代表无卤
  “H”denotes Halogen-free

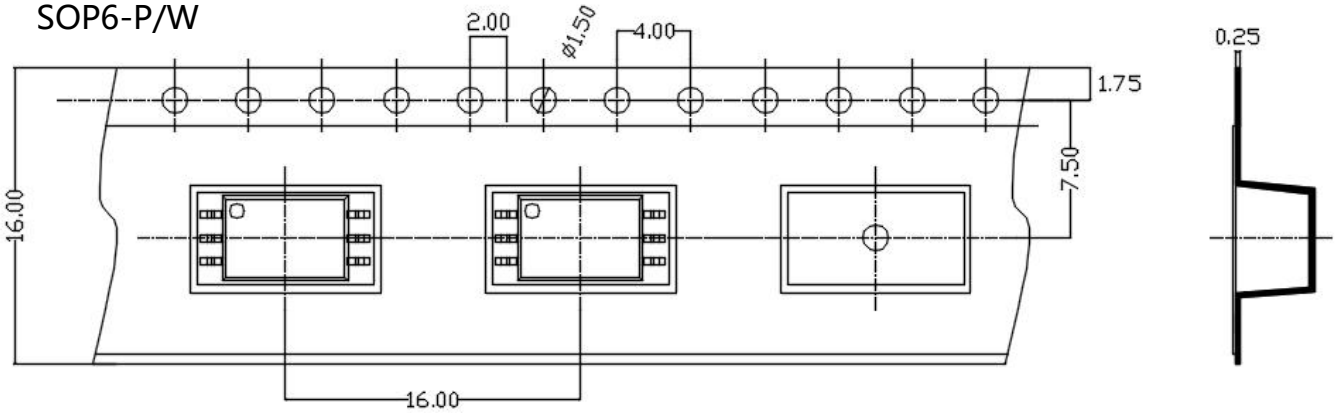
◆ 包装packing

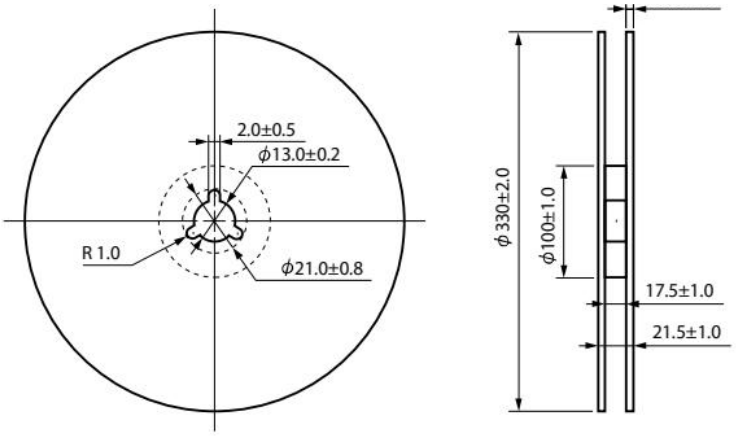
封装形式	包装方式	盘数量	盒数量	箱数量	静电袋规格	盒规格	箱(双瓦楞)规　格	备注
SOP6	卷盘 (ϕ330mm 蓝盘)	1000 只/盘	2 盘/盒	10 盒/箱	380*380mm	340*60*340 mm	620*360*365mm	首尾端空至少 200mm
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
SOP6	Reel (ϕ330mm Blue)	1k pcs/reel	2Reel/box	10box/ctn	380*380mm	340*60*340 mm	620*360*365mm	Leave at least 200mm of blank space at both ends

▪ 编带包装 Tape & Reel

1) 每卷数量：1000 只；Qty/reel：1000 pcs；
2) 每箱数量：20000 只；Qty/ctn：20000 pcs；
3) 内包装：每盒 2 盘；Inner packing：2 reels/box；
4) 示意图 Schematic:

SOP6-P/W



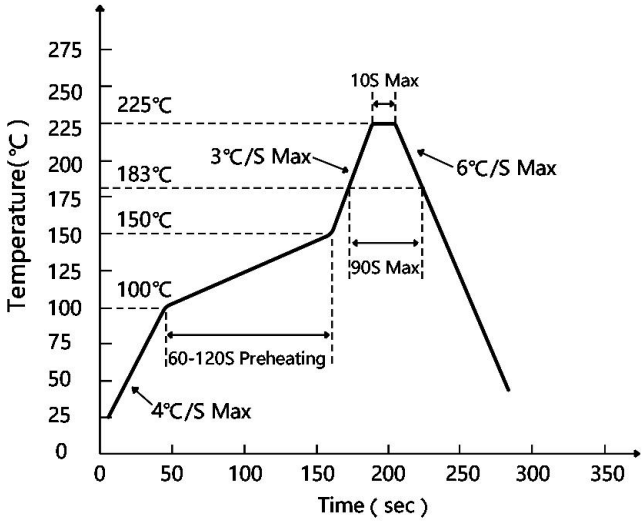


单位：mm

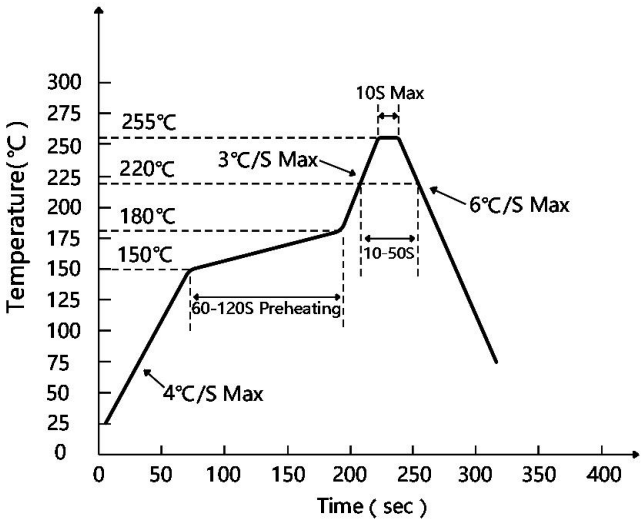
◆ 可靠性测试 Reliability Test Items And Conditions

实验项目 Test Items	参考标准 Reference	实验条件 Test Conditions	时间 Time	样品数 Quantity	判据 Criterion
可焊性 Solderability	JESD22-B102	Tsol=（245±5）℃, t=5s;	1 次1 times	22	0/22
耐焊接热 Resistance to Soldering Heat	JESD22-A106	Tsol=（260±5）℃, t=10s	3 次3 times	22	0/22
静电放电 ESD-HBM	JESD22-A114	Ta=25℃, HBM (2000V)	正反各 3 次 P&N 3 times	10	0/10
高温贮存 High emperature Storage	JESD22-A103	Ta=125℃	1000h	22	0/22
低温贮存 Low Temperature Storage	JESD22-A119	Ta= -55℃	1000h	22	0/22
冷热冲击 Thermal Shock	JESD22-A104	-55℃(15min)⟷ 125℃(15min)	循环 300 次 300 cycles	22	0/22
常温寿命试验 Lifespan Test	JESD22-A108	Ta=25℃, IF=50mA ， Vcc=5V	1000h	22	0/22
高温寿命试验 DC Operating Life	JESD22-A108	Ta=110℃, IF=20mA ， Vcc=5V	1000h	76	0/76
高温高湿偏压 High Temperature High Humidity bias Voltage	JESD22-A101	Ta =85℃ , RH=85% IF=0mA ， VCE=64V	1000h	22	0/22
高温偏压 High Temperature bias Voltage	JESD22-A108	Ta =110℃ , IF=0mA ， VCE=80V	1000h	22	0/22
高压蒸汽试验 High pressure steam test	JESD22-A102	P=15PSIG ， 121℃, 100%RH	96h	22	0/22

◆ 回流焊温度曲线图 Solder Reflow Profile

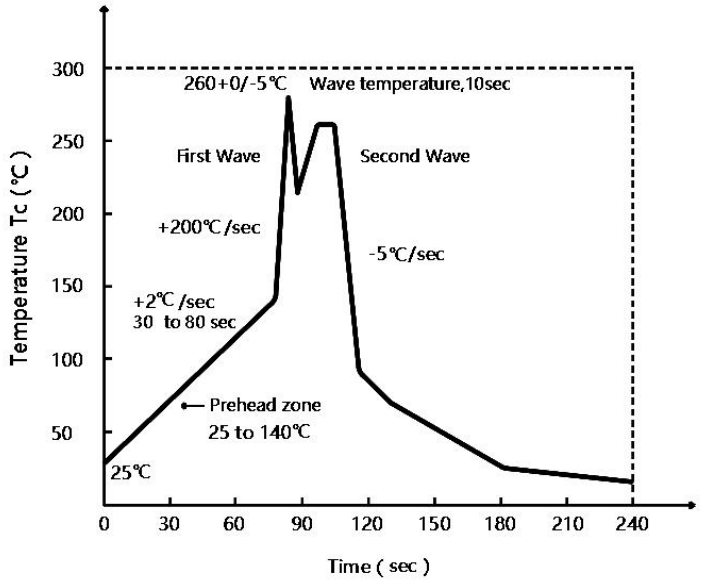


有铅制程 Lead Process



无铅制程 Lead Process

◆ 波峰焊温度曲线图 Wave Soldering Profile



◆ 手工烙铁焊接 Soldering with hand soldering iron

A. 手工烙铁焊仅用于产品返修或样品测试;

Hand soldering iron is only used for product rework or sample testing;

B. 手工烙铁焊要求: 温度 350℃ ± 5℃, 时间≤3s。

Hand soldering iron requirements: Temperature: 350℃ ± 5℃, within 3s.

◆ 注意 Attention

- 奥特半导体实施动态技术迭代机制，产品规格可能随工艺升级调整，最新技术参数以官网发布版本为准。

AOTE implements dynamic technical updates. Specifications are subject to change. Refer to the official website for the latest version.

- 用户需严格遵循本规格书限定的操作条件，因超范围使用（包括但不限于过载、高温、非兼容电路设计）导致的器件失效，不在质量保证范围内。

Users must strictly adhere to specified conditions. Failures caused by misuse (overload, high temperature, incompatible circuits) are excluded from warranty.

- 医疗设备、工业控制等关键场景应用前，需联系技术支持获取定制化验证方案。

Contact technical support for customized validation in critical applications (medical devices, industrial control).

- 本文档有效期至2025年12月31日，后续更新将通过官网公告推送。

This document is valid until Dec 31, 2025. Updates will be notified on the official website.

- 如需对技术参数或应用方案进行进一步确认，欢迎通过以下渠道获取官方支持：

For further clarification on technical specifications or application solutions, please contact us through official channels: