

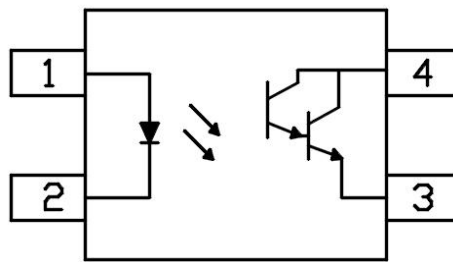
达林顿光耦

Darlington optocoupler

AT415

Product Data Sheet

AOTE DCC
RELEASE



Pin Configuratic

- 1.Anode
- 2.Cathode
- 3.Emitter
- 4.Collector

◆ 封装逻辑原理图 Encapsulation logic schematic

AT415 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SOP4封装形式，适配多样化场景需求。

The AT415 optocoupler adopts high-efficiency photoelectric conversion technology and advanced packaging processes, providing reliable input-output isolation. Support SOP4 encapsulation format, Adapt to diverse scene requirements.

◆ 产品特征Product features

- 输入-输出隔离电压Vios=3750Vrms
Input output isolation voltage: Vios=3750 Vrms
- 电流传输比CTR:600-7500% Current Transfer Ratio: CTR:600-7500%
- 峰值击穿电压:BVCEO=40V; Peak breakdown voltage:BVCEO=40V
- 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

- 光伏储能系统Photovoltaic energy storage system
数据采集、逆变器控制、保护电路Data collection, inverter control, protection circuit
- 工业自动化控制 industrial automation control
继电器驱动、电机控制、PLC接口Relay drive, motor control, PLC interface
- 电源管理Power management
开关电源反馈隔离、家用电器电源控制 Switching power supply feedback isolation、Home appliance power control
- 通信与数字电路Communication and Digital Circuits
高频信号传输、逻辑电路驱动High frequency signal transmission、logic circuit driving



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

参数 Parameter		符号 Symbol	额定值 Rating	单位 Unit
发射端 Input	正向电流 Forward Current	IF	50	mA
	峰值正向电流(1us, 脉冲) Peak forward current (1us, pulse)	IFP	1000	mA
	反向电压 Reverse Voltage	VR	6	V
	功耗 Power Dissipation	PD	60	mW
接收端 Output	集电极功耗 Collector Power Dissipation	PC	150	mW
	集电极电流 Collector Current	IC	100	mA
	集电极-发射极电压 Collector-Emitter voltage	VCEO	40	V
	发射极-基极电压 Emitter-Base voltage	VEBO	7	V
	集电极-基极电压 Collector-Base voltage	VCBO	30	V
	发射极-集电极电压 Emitter-Collector voltage	VECO	5	V
隔离电压 Isolation Voltage		Viso	3750	Vrms
工作温度 Operating Temperature		Topr	-55 ~+110	°C
存储温度 Storage Temperature		Tstg	-55 ~+125	°C
焊接温度 Soldering Temperature		Tsol	260	°C

◆ 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
正向电流 Forward Current	IF	5	15	mA
集电极-发射极电压 Collector-Emitter Voltage	VCEO	5	40	V
集电极电流 Collector Current	IC	5	75	mA

◆ 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 =10mA	-	1.2	1.4	V
	反向电流 Reverse Current	IR	VR =3V	-	-	10	uA
	输入电容 Terminal Capacitance	Ct	V=0, F =1KHz	-	30	250	pF
接收端 Output	集电极暗电流 Collector Dark Current	ICEO	VCE=10V	-	-	100	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BVCEO	IC =0.1mA, IF =0	40			V
	发射极-集电极击穿电压 Emitter-Collector Breakdown Voltage	BVECO	IE =0.001mA, IF =0	6	-	-	V
传输特性 Transfer Characteristics	电流传输比 Current Transfer Ratio	CTR*	IF =1mA , VCE =2V	600	-	7500	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	VCE(sat)	IF =20mA, IC =5mA	-	0.8	1	V
	隔离电阻 Isolation Resistance	RISO	DC=500V 40 ~60%R.H.	5x10 ¹⁰	-	-	Ω
	隔离电容 Isolation capacitance	CISO	V=0, F=1MHz	-	0.6	1.0	pF
	截止频率 Cut-off frequency	Fc	VCE =5V, IC =2mA, RL=100Ω, -3dB	-	6	-	KHz
	上升时间 Rise Time	Tr	VCE =2V, IC =10mA, RL =100Ω	-	10	300	μs
	下降时间 Fall Time	Tf		-	15	250	μs

注 电流传输比= $I_C/I_F \times 100\%$ 。

Note*: $CTR=I_C/I_F \times 100\%$ 。

◆ 电性特性曲线Electrical characteristic curve($T_a = 25^\circ\text{C}$)

Fig.1 Relative Current Transfer Ratio vs. Forward Current

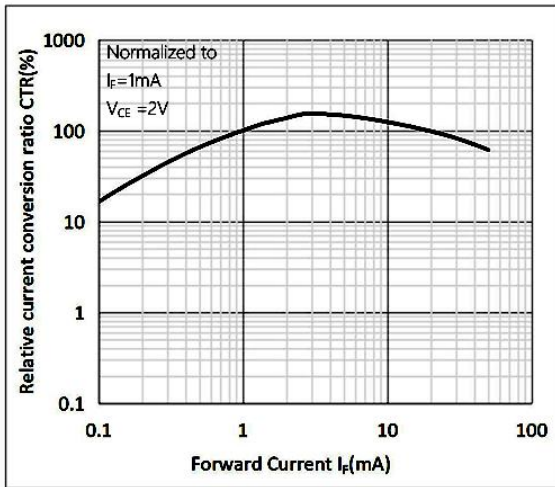


Fig.2 Forward Current vs. Forward Voltage

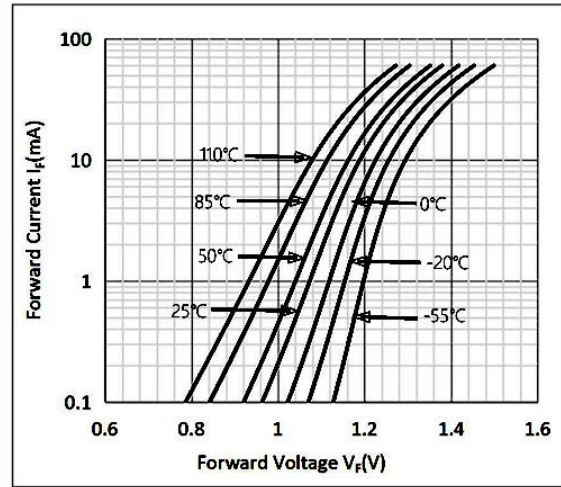


Fig.3 Collector Current vs. Collector-emitter Voltage

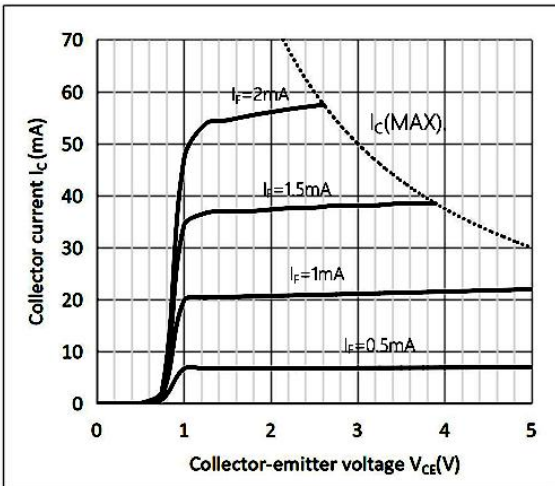


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

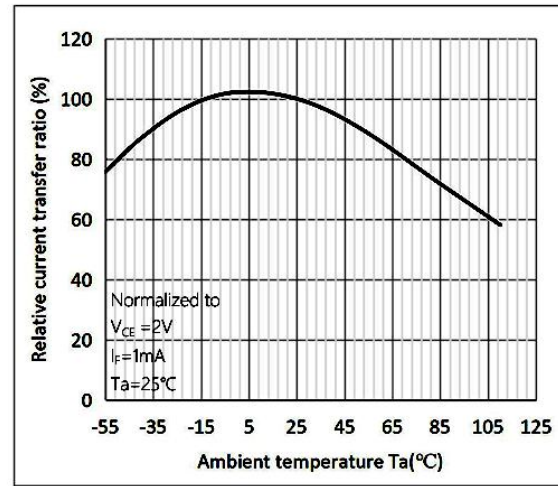


Fig.5 Collector Dark Current vs Ambient Temperature

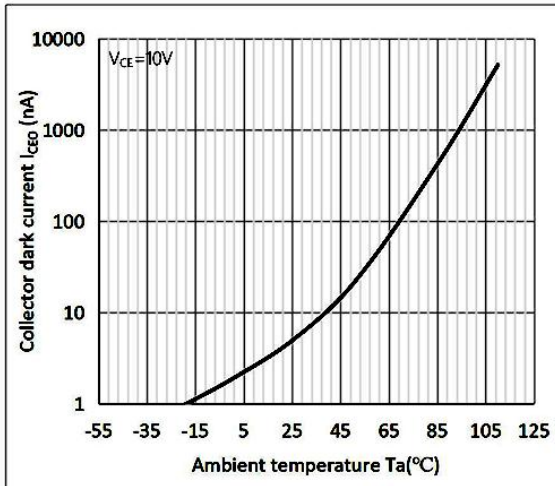
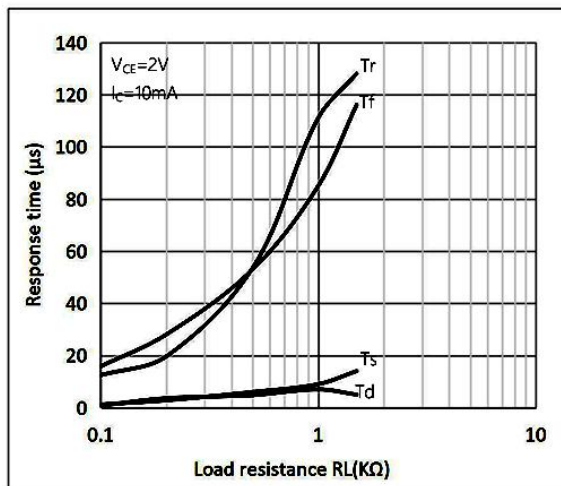
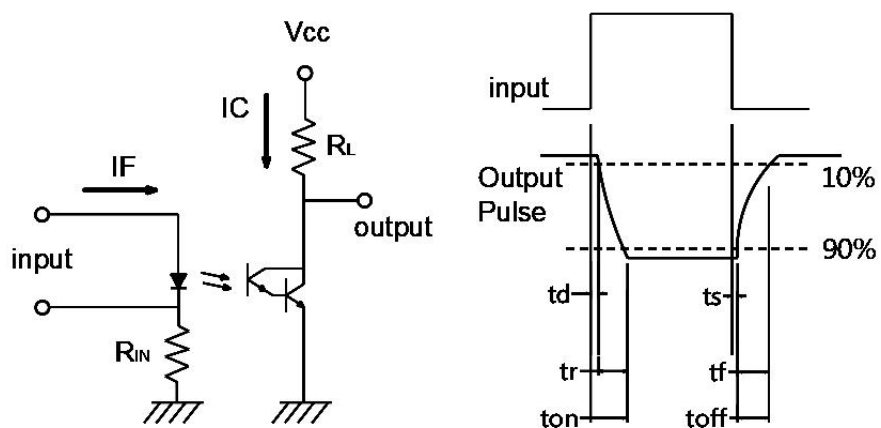


Fig.6 Response Time vs. Load Resistance



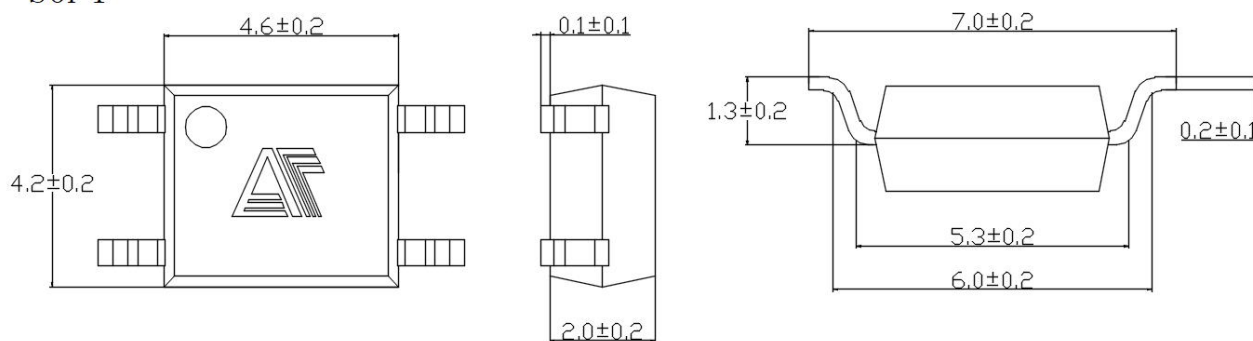
◆ 开关时间测试电路 Switching Time Test Circuit



◆ 外形尺寸Overall dimension

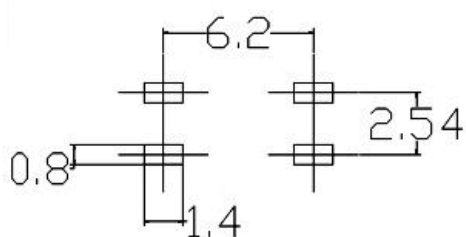
SOP-4

SOP4



推荐焊盘:

Recommended Solder



单位: mm

◆ 产品型号命名规则 Order Code

AT 415 - 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 (415)
- ③ 框架类型 Lead Frame (Cu: 铜框架 Copper)
- ④ 树脂类型 Epoxy (H: 无卤 Halogen-free)
- ⑤ 封装形式 Package (D: DIP ; S: SMD)
- 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 or None)
- ⑦ 内部补充代码 Internal Supplementary Code (数字或者空白 Number or None)

◆ 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



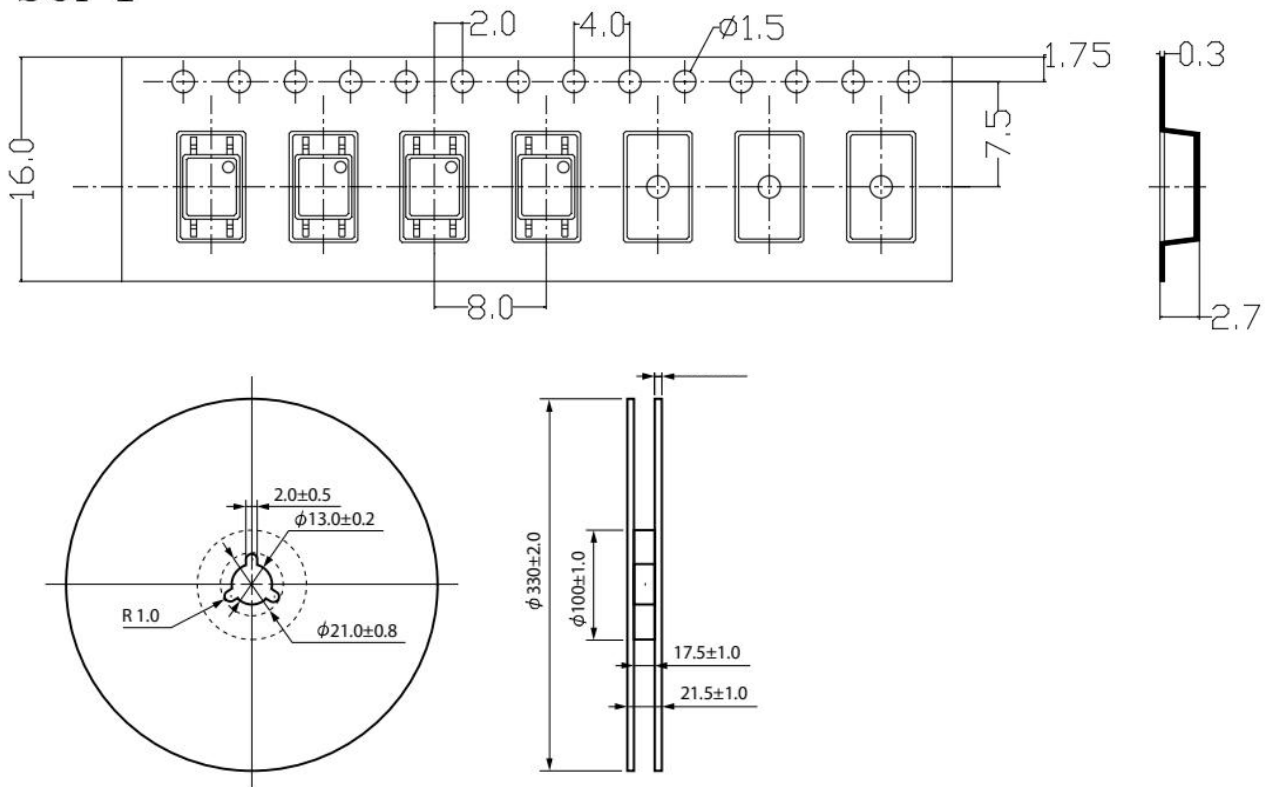
◆ 包装packing

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
SOP4	卷盘 ($\phi 330$ mm 蓝盘)	3000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	34*6*34cm	62*36*36.5cm	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
SOP4	Reel ($\phi 330$ mm Blue)	3000 pcs /reel	2 reels /box	10 boxes /ctn	450*390*0.1mm	34*6*34cm	62*36*36.5cm	Leave at least 200mm of blank space at both ends

• 编带包装 Tape & Reel

- 1) 每卷数量: 3000 只; Qty/reel: 3000 pcs;
- 2) 每箱数量: 60000 只; Qty/ctn: 60000 pcs;
- 3) 内包装: 每盒 2 盘; Inner packing: 2 reels/box;
- 4) 示意图 Schematic:

SOP4

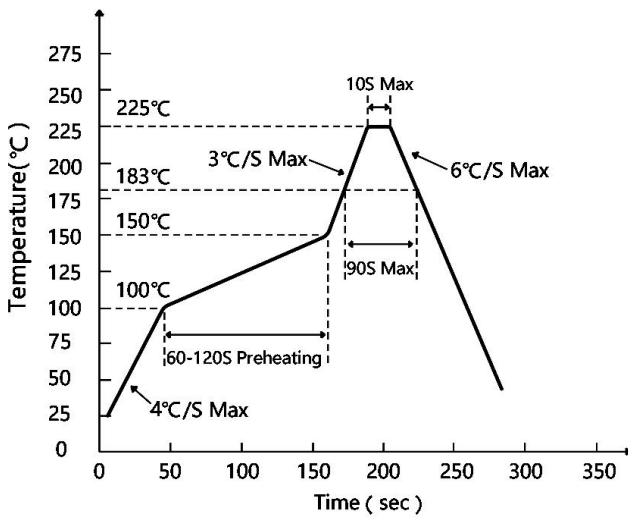


单位: mm

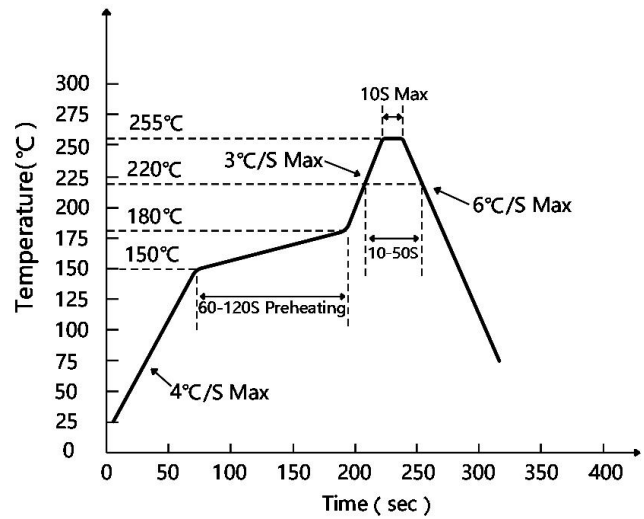
◆ 可靠性测试 Reliability Test Items And Conditions

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) °C, t=5s;	1 次1 times	22	0/22
耐焊接热Resistance to Soldering Heat	JESD22-A106	Tsol= (260±5) °C, t=10s	3 次3 times	22	0/22
静电放电 ESD-HBM	JESD22-A114	Ta=25°C, 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°C	1000h	22	0/22
低温贮存 Low Temperature Storage	JESD22-A119	Ta= -55°C	1000h	22	0/22
冷热冲击 Thermal Shock	JESD22-A104	-55°C(15min)←→ 125°C(15min)	循环 300 次 300 cycles	22	0/22
常温寿命试验 Lifespan Test	JESD22-A108	Ta=25°C, IF=50mA , Vcc=5V	1000h	22	0/22
高温寿命试验 DC Operating Life	JESD22-A108	Ta=110°C, IF=20mA , Vcc=5V	1000h	76	0/76
高温高湿偏压 High Temperature High Humidity bias Voltage	JESD22-A101	Ta =85°C , RH=85% IF=0mA , VCE=64V	1000h	22	0/22
高温偏压 High Temperature bias Voltage	JESD22-A108	Ta =110°C , IF=0mA , VCE=80V	1000h	22	0/22
高压蒸汽试验 High pressure steam test	JESD22-A102	P=15PSIG , 121°C, 100%RH	96h	22	0/22

◆ 回流焊温度曲线图 Solder Reflow Profile

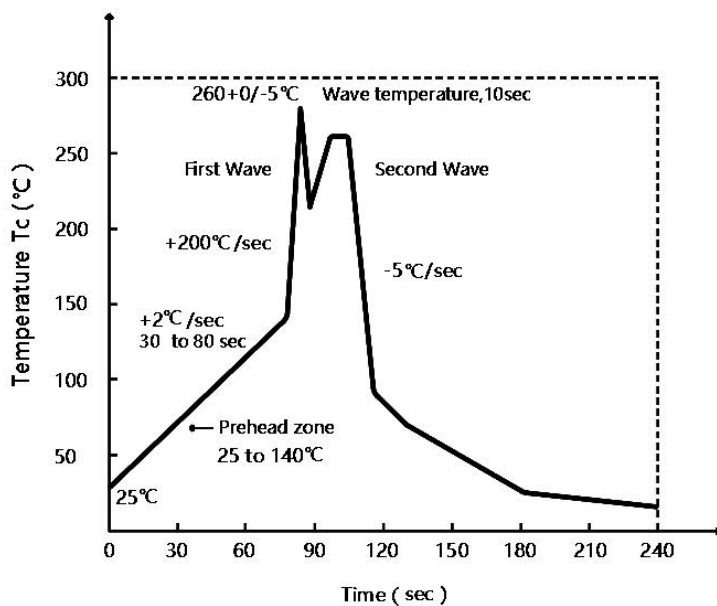


有铅制程 Lead Process



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 $350^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 时间 $\leq 3\text{s}$.

Hand soldering iron requirements: Temperature: $350^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 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: