

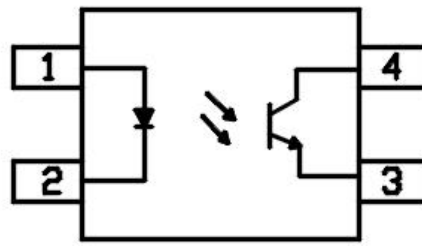
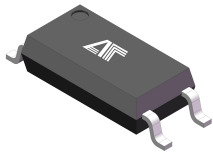
晶体管光耦 Photo Transistor

AT101X

Product Data Sheet

AOTE DCC
RELEASE

LSOP4



Pin Configuration

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

封装逻辑原理图 Encapsulation logic schematic

AT101X系列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LSOP4封装形式，适配多样化场景需求。

The AT101X series optocoupler adopts high-efficiency photoelectric conversion technology and advanced packaging processes, providing reliable input-output isolation. It supports package types (LSOP4) to meet diverse application requirements.

产品特征 Product features

- 输入-输出隔离电压 $V_{ios}=5000V_{rms}$
Input output isolation voltage: $V_{ios}=5000 V_{rms}$
- 电流传输比CTR:50-600%范围: Current transmission ratio CTR: 50-600% range
- 集电极-发射极峰值击穿电压: $BV_{CEO}=80V$; Collector emitter peak breakdown voltage $BV_{CEO}=80V$
- 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

- 工业控制 Industrial control
工业自动化设备 (PLC模块、传感器接口) Industrial automation equipment (PLC module, sensor interface)
测量仪器信号隔离 Measurement instrument signal isolation
- 电源系统 Power Systems:
智能电表、开关电源设计应用 Design and application of smart meters and switching power supplies
光伏逆变器、储能系统应用 Photovoltaic inverters, energy storage system applications
- 消费电子 Consumer Electronics:
家用电器主控电路 (空调、冰箱、热水器) Main control circuit for household appliances (air conditioning, refrigerator, water heater);
办公设备 (复印机) Office equipment (copier)



◆ 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
	反向电压 Reverse Voltage	VR	6	V
	功耗 Power Dissipation	PD	70	mW
	热阻(结-环境) Thermal Resistance Junction to Ambient	RthJ-A	250	°C/W
	热阻(结-壳) Thermal Resistance Junction to Case	RthJ-C	180	°C/W
接收端 Output	集电极功耗 Collector Power Dissipation	PC	150	mW
	集电极电流 Collector Current	IC	50	mA
	集电极-发射极电压 Collector-Emitter Voltage	VCEO	80	V
	发射极-集电压 Emitter - Collector Voltage	VECO	6	V
隔离电压 Isolation Voltage		Viso	5000	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	70	V
集电极电流 Collector Current	IC	5	75	mA

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

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 =20mA	-	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=20V IF=0mA	-	-	100	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BVCEO	IC =0.1mA IF =0mA	80	-	-	V
传输特性 Transfer Characteristics	发射极-集电极击穿电压 Emitter-Collector Breakdown Voltage	BVECO	IE=10μA, IF=0mA	6	-	-	V
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	VCE(sat)	IF=10mA, IE=1mA	-	-	0.3	V
	开启响应时间(ON) Response Time (ON)	Ton	VCE=5V, IC=5mA RL=100Ω	-	4	-	uS
	关断响应时间(OFF) Response Time (OFF)	Toff	VCE=5V, IC=5mA RL=100Ω	-	3	-	uS
	上升时间 Rise Time	Tr	VCE=5V, IC=5mA RL=100Ω	-	2	18	uS
	下降时间 Fall Time	Tf	VCE=5V, IC=5mA RL=100Ω	-	3	18	uS
	截止频率 Cut-off Frequency	Fc	VCE=5V, IC=2mA RL=100Ω, -3dB	-	80	-	KHZ

注 电流传输比= $I_C/I_F \times 100\%$ 。

Note*: $CTR=I_C/I_F \times 100\%$ 。

• 电流传输比分档表 CTR Classification Table (Ta=25°C)

符号 Symbol	条件 Condition	最小 Min	典型 Typ	最大 Max	单位 Unit
AT1010	IF=5mA ,VCE=5V	50	-	600	%
AT1012	IF=10mA ,VCE=5V	63	-	125	%
AT1013	IF=10mA ,VCE=5V	100	-	200	%
AT1014	IF=10mA ,VCE=5V	160	-	320	%
AT1016	IF=10mA ,VCE=5V	100	-	300	%
AT1017	IF=5mA ,VCE=5V	80	-	160	%
AT1018	IF=5mA ,VCE=5V	130	-	260	%
AT1019	IF=5mA ,VCE=5V	200	-	400	%

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

Fig.1 Forward Current vs Forward Voltage

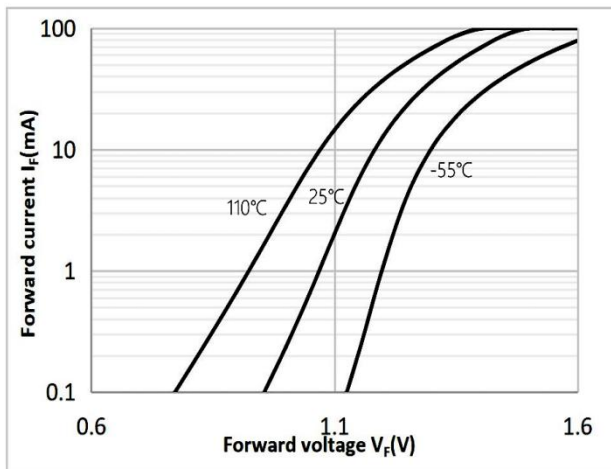


Fig.2 Collector Dark Current I_{C0} vs Ambient Temperature

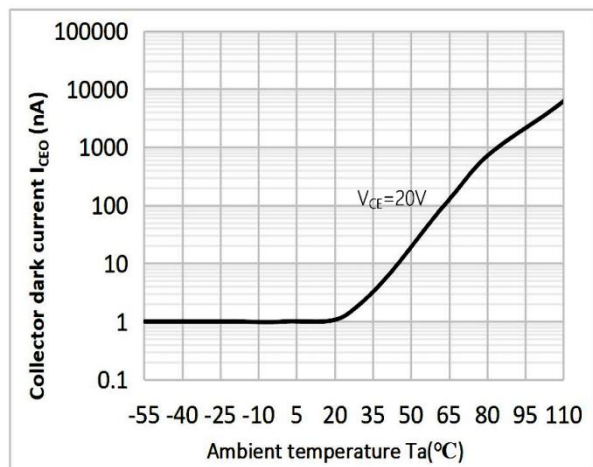


Fig.3 Collector Current vs. Collector-emitter Voltage

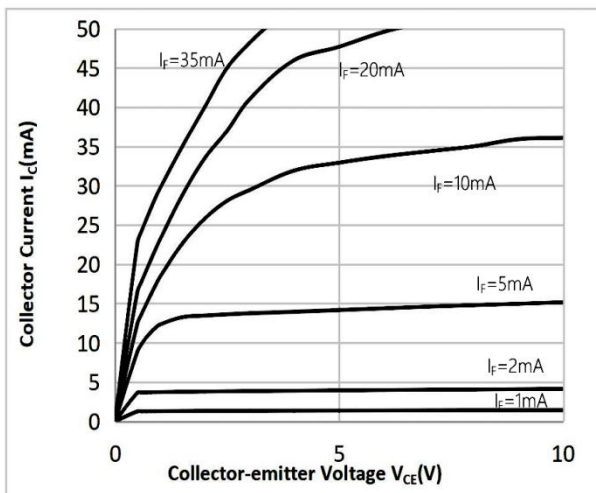


Fig.4 Relative Collector Current vs Forward Current

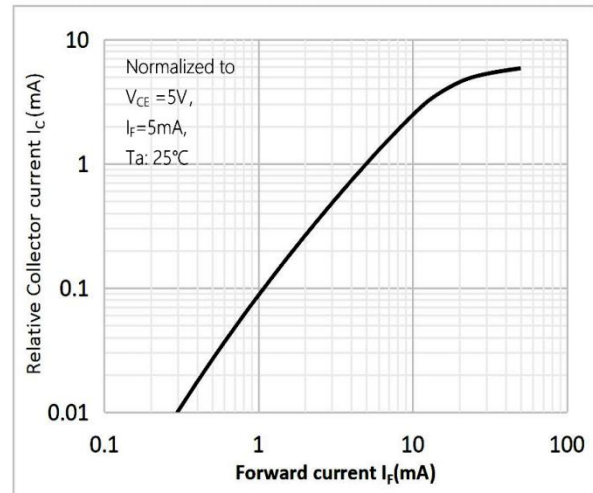


Fig.5 Relative Current Transfer Ratio vs. Forward Current

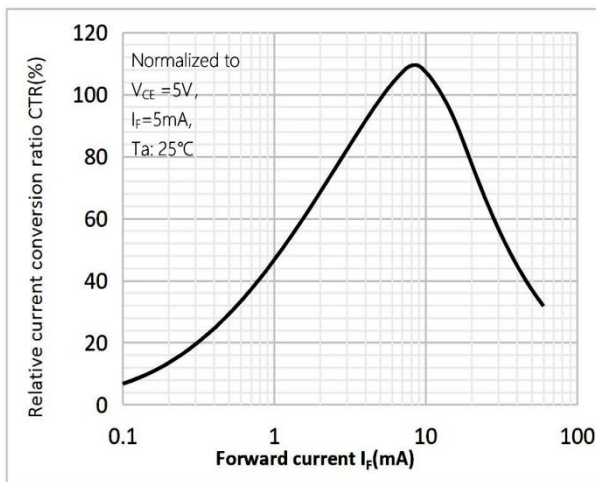


Fig.6 Relative Current transfer ratio vs Ambient temperature

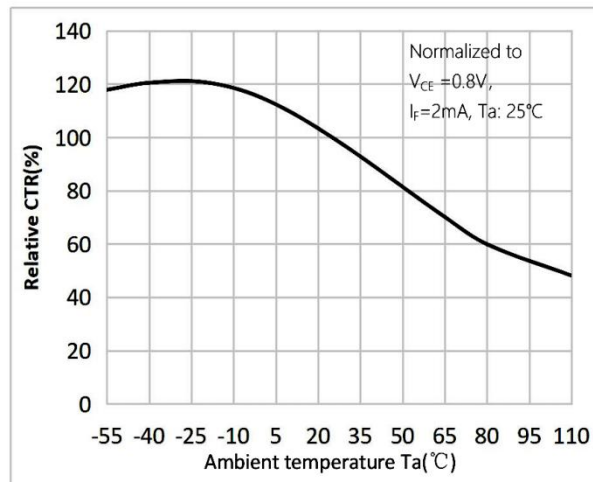


Fig.7 Relative Current transfer ratio vs Ambient temperature

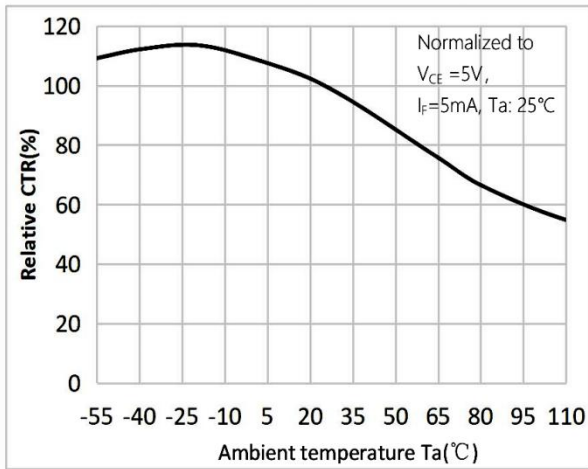


Fig.8 Collector-emitter Saturation Voltage vs. Ambient temperature

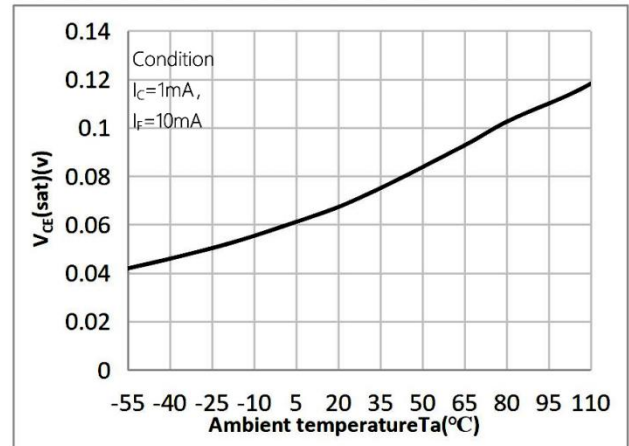


Fig.9 Turn on/Turn off vs. Collector Current

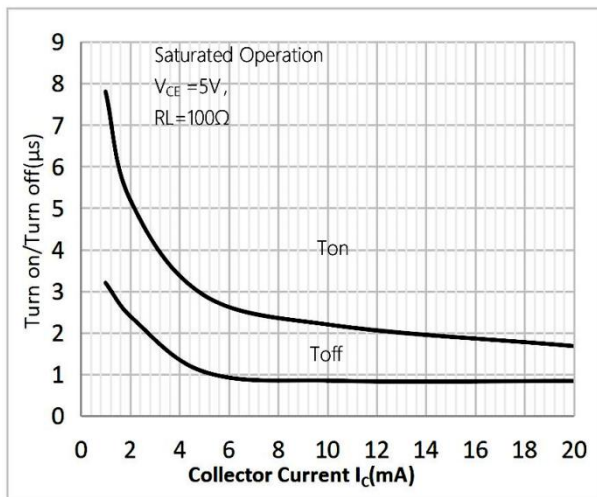
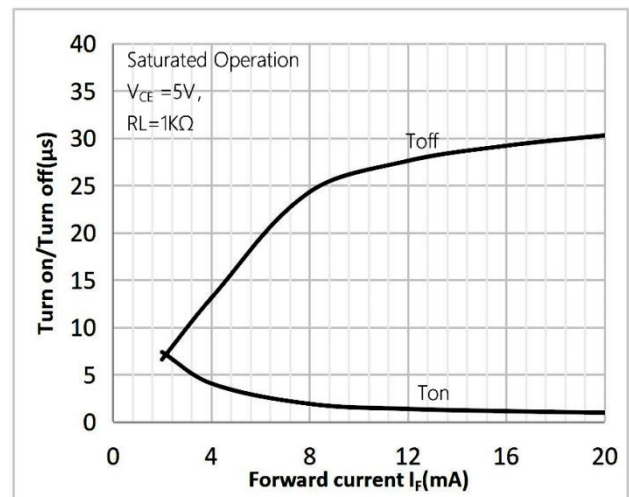
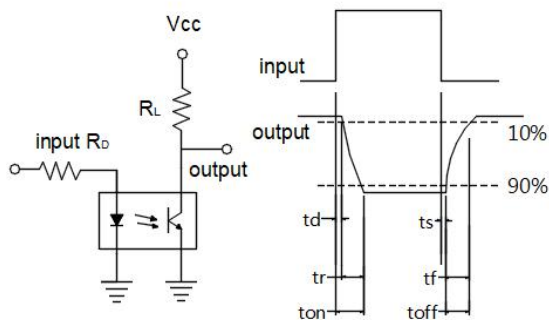


Fig.10 Turn on/Turn off vs Forward current

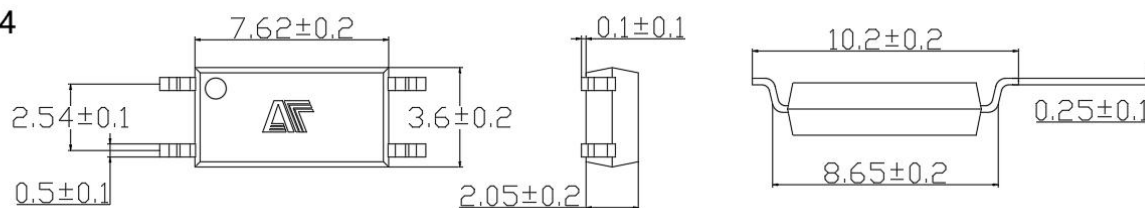


响应时间测试电路
Test Circuit for Response Time



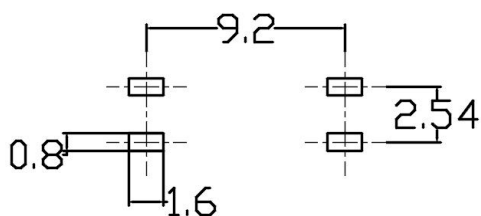
◆ 外形尺寸Overall dimension

LSOP-4



推荐焊盘:

Recommended



单位: mm

◆ 产品型号命名规则 Order Code

AT 101 X - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① 公司代码 Company Code (AT: 奥特 A)
- ② 产品系列 Product Series (101X)
- ③ CTR 档位 Classification (代码 Code: 0,1,2,3....)
- ④ 框架类型 Lead Frame (Cu: 铜框架 Copper)
- ⑤ 树脂类型 Epoxy Type (H: 无卤 Halogen-free)
- ⑥ 封装形式 Package (L: LSOP)
- ⑦ 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)
- ⑧ 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
- 印字中的 “X” 代表产品分档: 0、1、2、3....
“X” denotes the classification: 0、1、2、3....
- 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 “N” 代表星期几
“N” denotes the day of the week
- 印字中的 “H” 代表无卤
“H” denotes Halogen-free

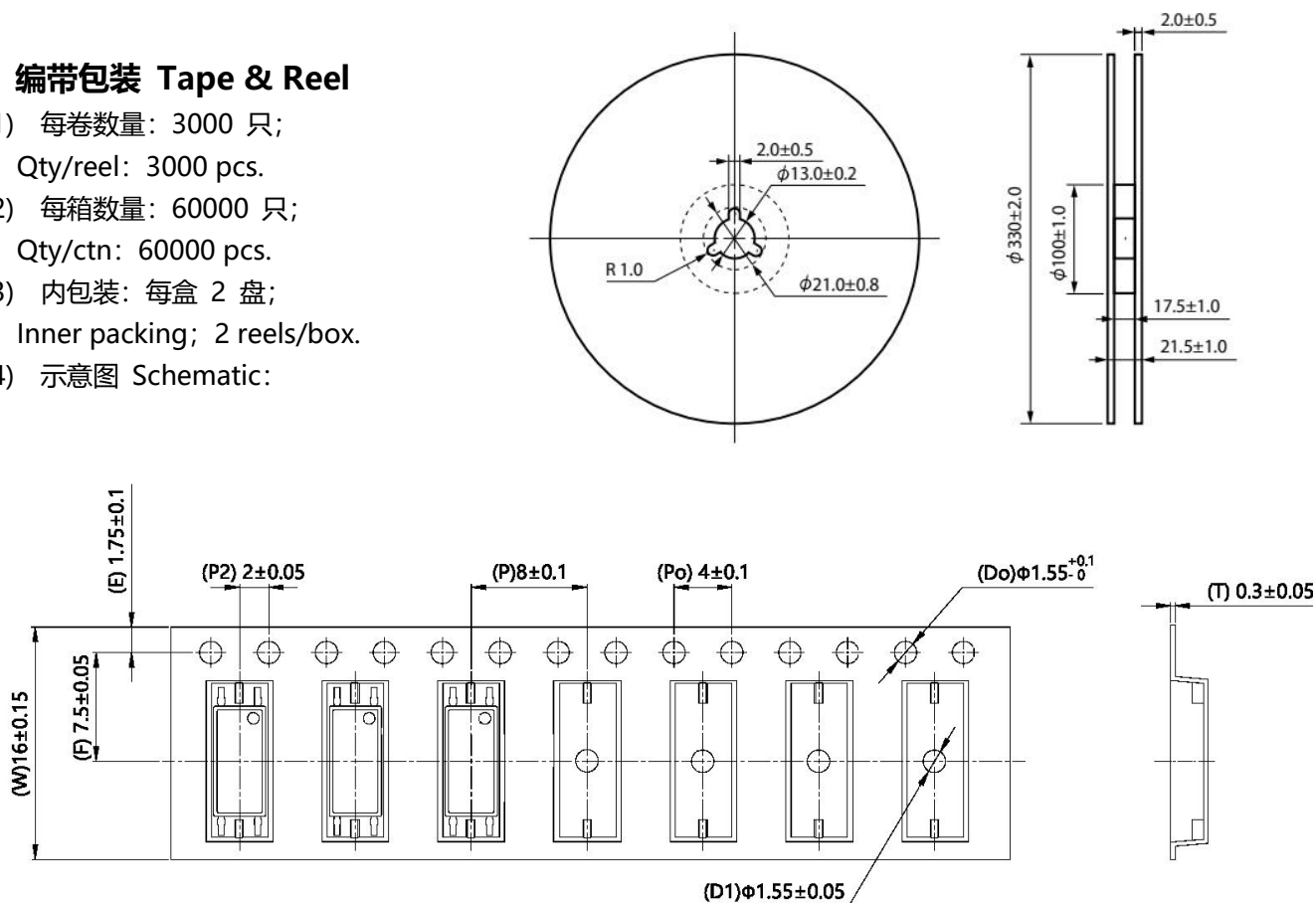


◆ 包装packing

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
LSOP4	卷盘 ($\phi 330\text{mm}$ 蓝盘)	3000 只/盘	2 盘/盒	10 盒/箱	450*390* 0.1mm	340*60* 340mm	620*360* 365mm	首尾端空至少 50mm
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
LSOP4	Reel ($\phi 330\text{mm}$ Blue)	3000 pcs/reel	2 reels/box	10 boxes/ctn	450*390* 0.1mm	340*60* 340mm	620*360* 365mm	Guard band 50mm min.

• 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:

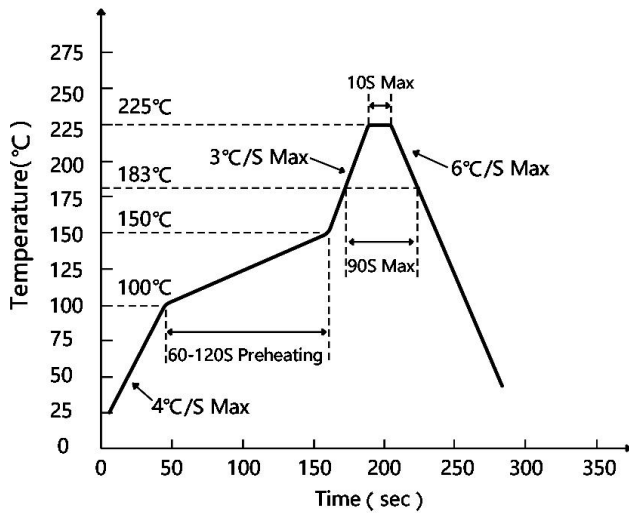


单位: mm

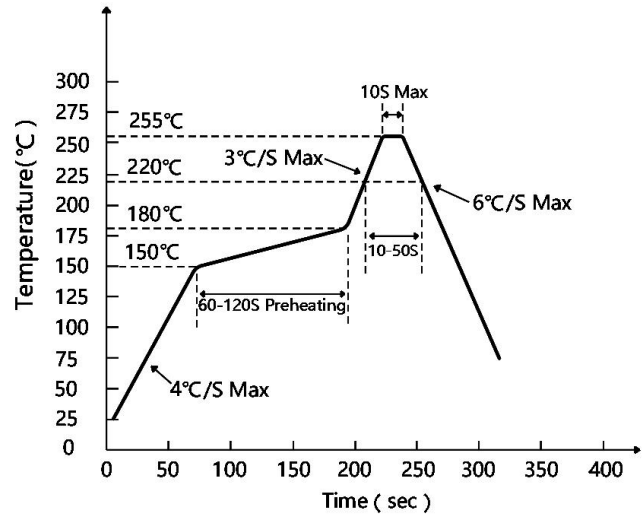
◆ 可靠性测试 Reliability Test Items And Conditions

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

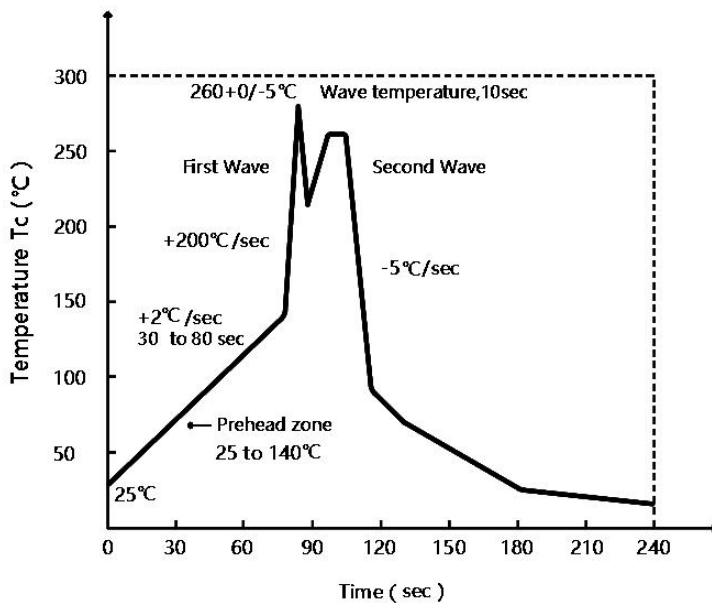


：有铅制程 Lead Process



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: