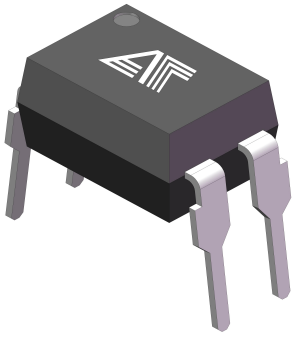
AOTE SEMICONDUCTOR

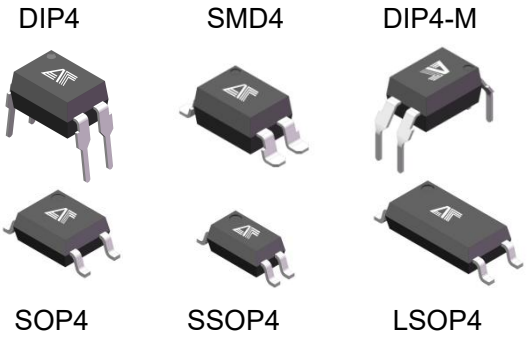


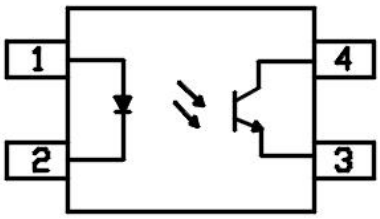
晶体管光耦
Photo Transistor

AT8801X

Product Data Sheet

AOTE DCC
RELEASE





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

◆ 封装逻辑原理图 Encapsulation logic schematic

AT8801X 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DIP4、DIP4-M、SMD4及SOP4、SSOP4、LSOP4六款封装形式，适配多样化场景需求。

The AT8801X series optocoupler adopts high-efficiency photoelectric conversion technology and advanced packaging processes, providing reliable input-output isolation. It supports six package types (DIP4, DIP4-M, SMD4 and SOP4、SSOP4、LSOP4) to meet diverse application requirements.

◆ 产品特征Product features

- 输入-输出隔离电压(SSOP4,SOP4:Viso=3750 Vrms;LSOP4,DIP4,DIP4-M,SMD4:Viso=5000Vrms) High isolation voltage between input and output (SSOP4, SOP4: Viso=3750Vrms; LSOP4, DIP4, DIP4-M, SMD4: Viso=5000Vrms)
- 电流传输比CTR:80-400%范围：Current transmission ratio CTR: 80-400% range
- 集电极-发射极峰值击穿电压:BVCEO=130V; Collector emitter peak breakdown voltage BVCEO=130V
- 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

- DC-DC 转换器：通常有升压转换器、降压转换器、反相转换器;
  DC-DC converter：Usually divided into boost converters、Buck converter、Inverting Converter;
- 通讯设备:分有线通讯设备、无线通讯设备;Communications equipment:Divided into wired communication equipment and wireless ommunication equipment;
- 可编程控制器：分为PLC、PLA；Programmable controller：Divided into PLC, PLA;
- 信号传输：交通信号设备、通讯领域信号设备、网络信号设备三大类;
  Signal transmission：There are three major categories of traffic signal equipment, communication signal equipment, and network signal equipment

◆ 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	正向电流 Forward Current		IF	50	mA
	反向电压 Reverse Voltage		VR	6	V
	峰值正向电流(1us ， 脉冲) Peak forward current (1us, pulse)		IFP	1000	mA
	功耗 Power Dissipation	DIP4/DIP4-M/ SMD4/SOP4/LSOP4	PD	70	mW
		SSOP4	PD	45	mW
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	130	V
	发射极-集电极电压 Emitter-Collector Voltage		VECO	7	V
隔离电压 Isolation Voltage		DIP4、DIP4-M、SMD4、LSOP4	Viso	5000	Vrms
		SOP4、SSOP4	Viso	3750	Vrms
工作温度 Operating Temperature			Topr	-55 ~+110	℃
存储温度 Storage Temperature			Tstg	-55 ~+125	℃
焊接温度 Soldering Temperature			Tsol	260	℃

◆ 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	130	V
集电极电流 Collector Current	IC	5	35	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	1.0	1.35	1.8	V
	反向电流 Reverse Current	IR	VR =6V	-	-	10	uA
	输入电容 Terminal Capacitance	Ct	V=0V, F =1KHz	-	30	-	pF
接收端 Output	集电极暗电流 Collector Dark Current	I_{CEO}	VCE=75V, IF =0mA	-	-	100	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CEO}	IC =0.1mA, IF =0mA	75	130	-	V
	发射极-集电极电压 Emitter-Collector Voltage	BV_{ECO}	IE =10uA, IF =0mA	7	12	-	V
传输特性 Transfer Characteristics	电流传输比 Current Transfer Ratio	CTR*	IF=1mA , VCE=5V	80	-	400	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	VCE(sat)	IF =1.6mA, IC =0.6mA	-	0.16	0.4	V
	隔离电阻 Isolation Resistance	R_{ISO}	DC500V,40 ~60%R.H.	$1x10^{12}$	-	-	Ω
	隔离电容 Isolation capacitance	C_{ISO}	V=0,f=1MHz	-	0.3	0.5	pF
	上升时间 Rise Time	Tr	IF =1.6mA VCC=5V RL =0.75kΩ	-	5	-	μs
	下降时间 Fall Time	Tf		-	5.5	-	μs
	开启时间 Turn-on time	T_{ON}		1	6	20	μs
	关断时间 Turn-off time	T_{OFF}		1	6	20	μs

注: 电流传输比=I_C/I_F x 100%。

Note*: CTR=I_C/I_F x 100%.

• 电流传输比分档表 CTR Classification Table (IF =1mA, VCE=5V, Ta =25℃)

代码Code	最小值min	最大值max
A	80	160
B	130	260
C	200	400

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

Fig1.Relative Current Transfer Ratio vs. Forward Current

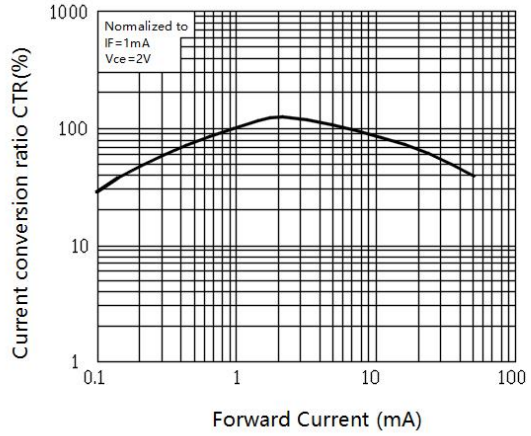


Fig.2 Forword Current vs Forward Voltage

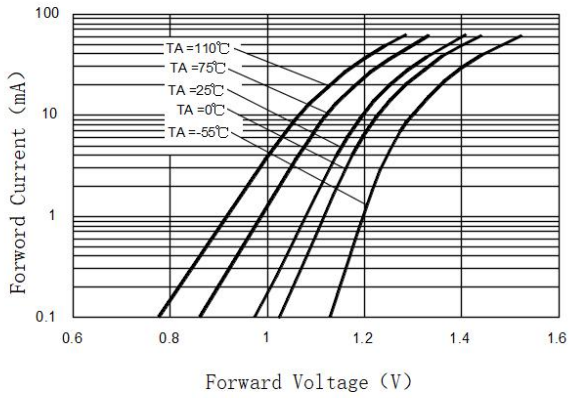


Fig.3 Collector Current vs. Collect-emitter voltage

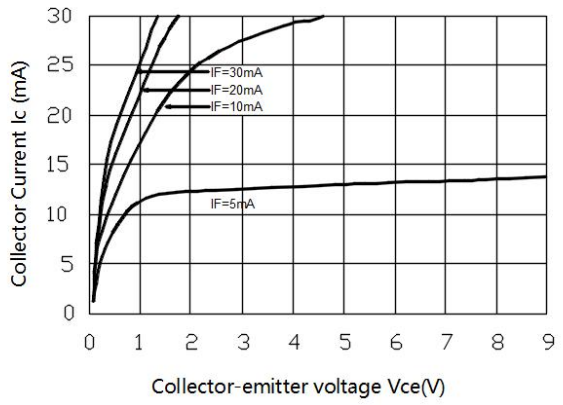


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

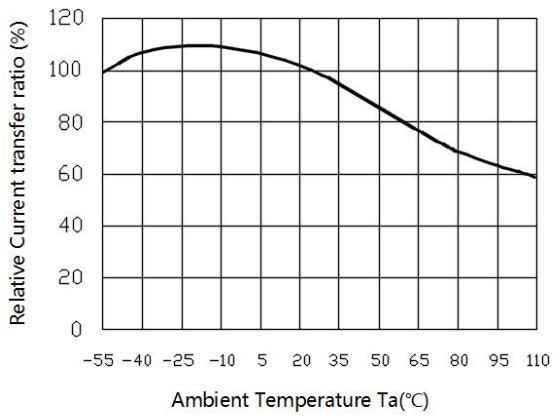


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

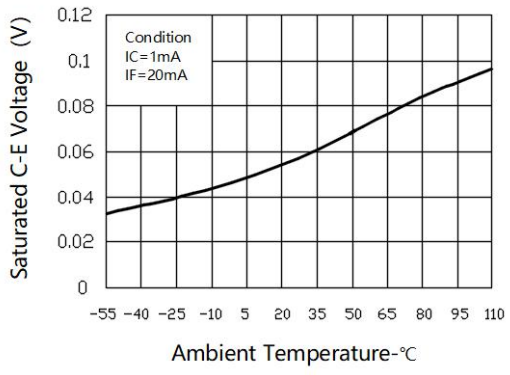


Fig.6 Collector Dark Current vs. Ambient Temperature

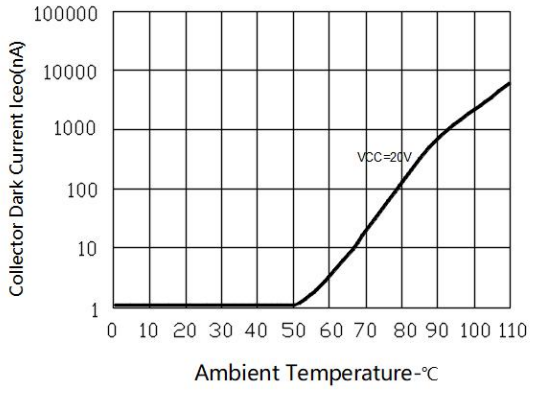


Fig.7 Response Time vs. LoadResistance

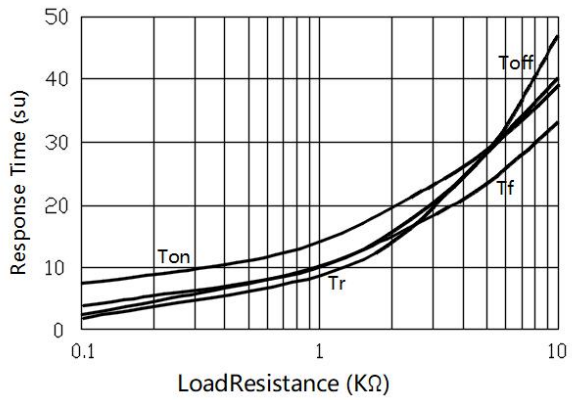


Fig.8 Frequency Response

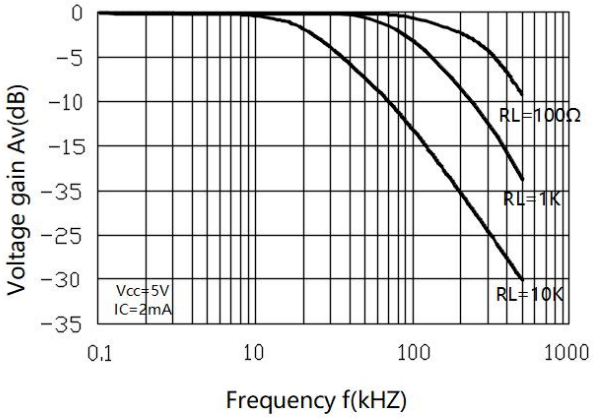


Fig. 9 Collector_emitter Saturation Voltage vs. Forward Current

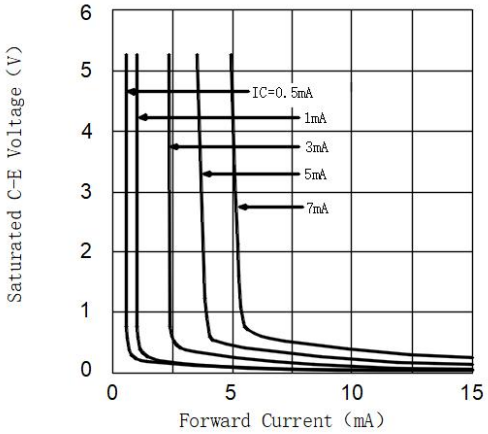
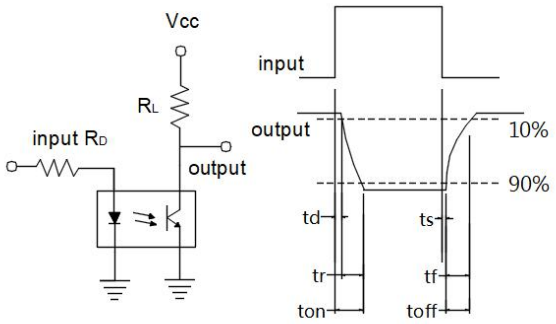
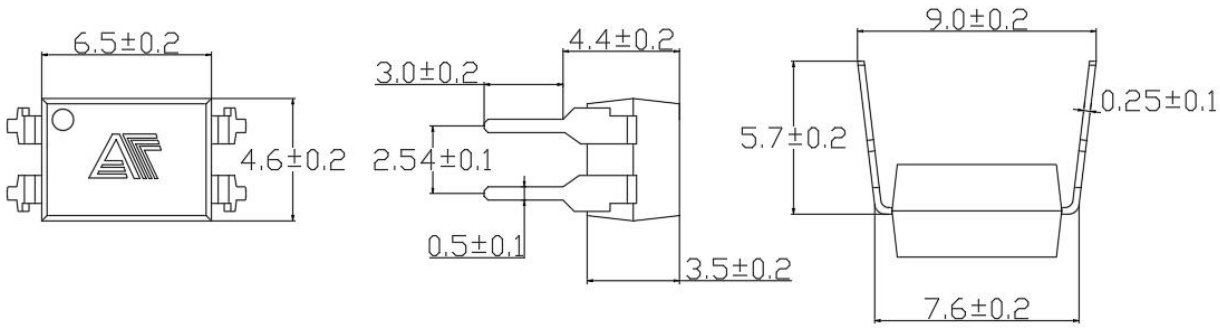


Fig.10 Switching Time Test Circuit & Wavefoms

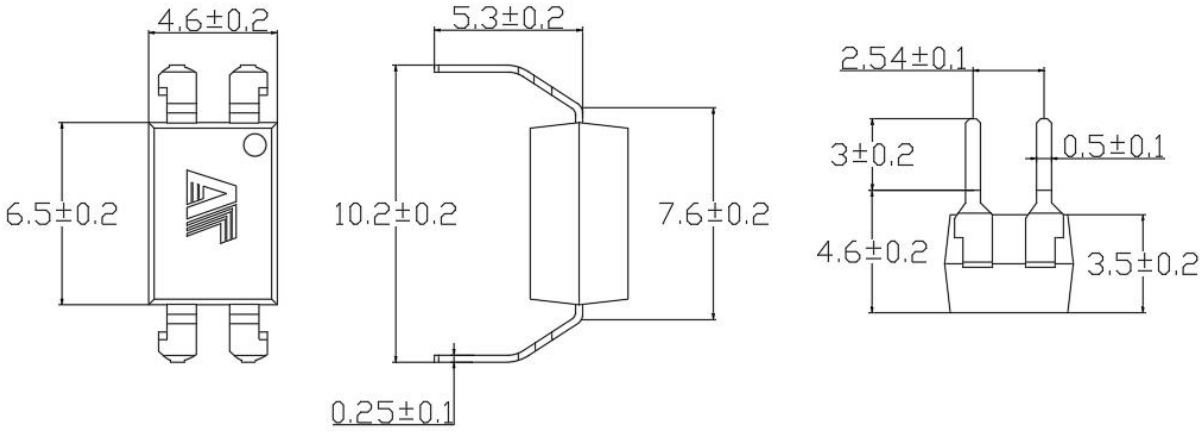


◆ 外形尺寸Overall dimension

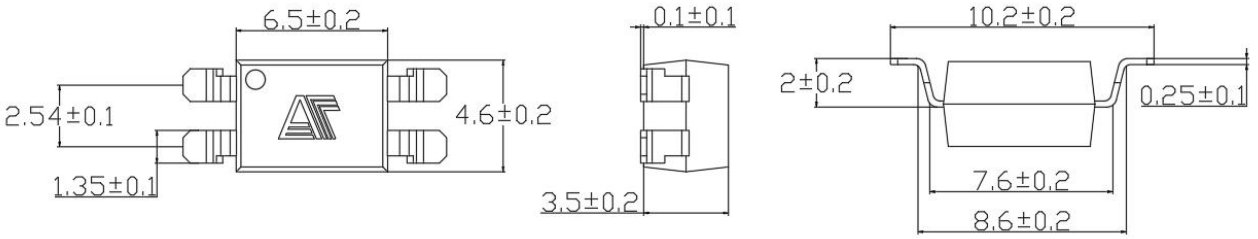
DIP4



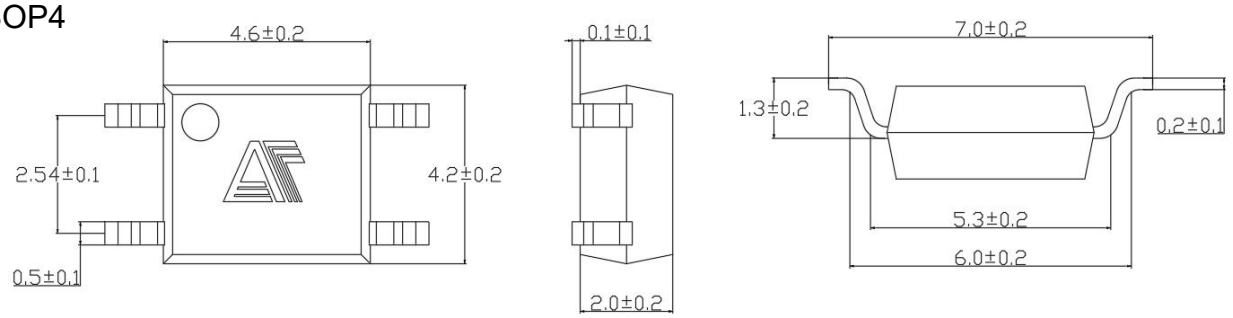
DIP4-M



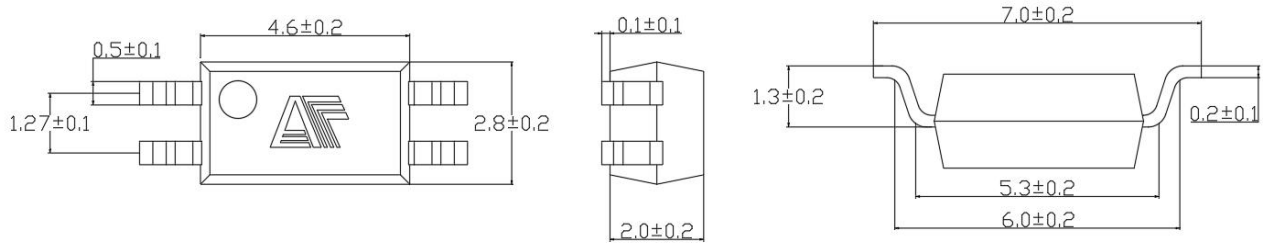
SMD4



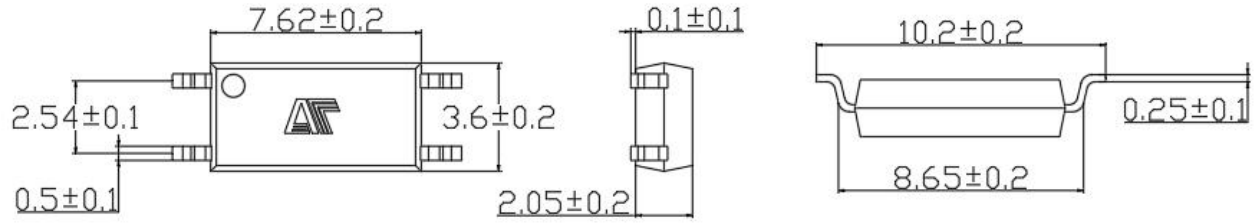
SOP4



SSOP4

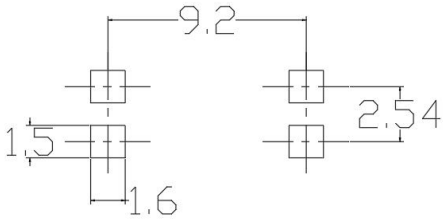


LSOP-4

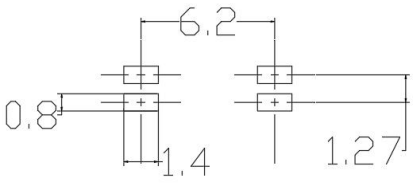


推荐焊盘：

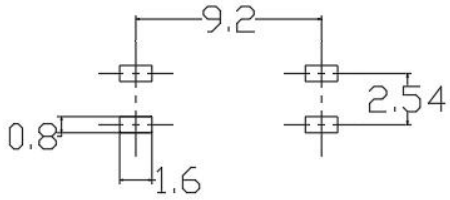
Recommended



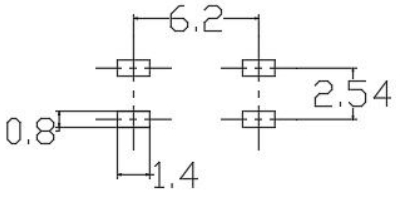
SMD4



SSOP4



LSOP4



SOP4

单位：mm

◆ 产品型号命名规则 Order code

AT 8801 X - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① 公司代码 Company Code (AT: 奥特 Aote)
② 产品系列 Product Series (8801X)
③ CTR 档位 Classification A、 B、C 或无 (代码 Code: A、 B、Cor None)
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 (D:DIP4、 M:DIP4-M、 R:SMD4、T:SOP4、 S:SSOP4、 L:LSOP4)
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： A、 B、C 或无
  “X” denotes the classification： A、 B、C or None
- 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
DIP4	管装 (500*12*11mm)	100 只/管	50 管/盒	10 盒/箱	不适用	525*128*56 mm	535*275*300m m	每管使用蓝白胶塞，方向须一致
DIP4-M	管装 (500*13*11mm)	100 只/管	50 管/盒	10 盒/箱	不适用	525*136*58 mm	535*295*310m m	每管使用蓝白胶塞，方向须一致
SMD4	卷盘 (ϕ330mm蓝盘)	2000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	340*60*340 mm	620*360*365m m	首尾端空至少 200mm
SOP4	卷盘 (ϕ330mm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
SSOP4	卷盘 (ϕ330m卷盘)	3000 只/盘	2 盘/盒	10 盒/箱	450*390* 0.1mm	34*6*34cm	38*36*36.5cm	首端各空 50 个空格，末端空 100
LSOP4	卷盘 (ϕ330mm 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**
DIP4	Tube (500*12*11mm)	100 pcs/tube	50 tubes/box	10 boxes/ctn	NA	525*128*56 mm	535*275*300m m	Use blue and white rubber plugs for each tube in the same direction
DIP4-M	Tube (500*13*11mm)	100 pcs/tube	50 tubes/box	10 boxes/ctn	NA	525*136*58 mm	535*295*310m m	
SMD4	Reel (ϕ330mm Blue)	2000 pcs/reel	2 reels/box	10 boxes/ctn	450*390*0.1mm	340*60*340 mm	620*360*365m m	Leave at least 200mm of blank space at both ends
SOP4	Reel (ϕ330mm 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
SSOP4	Reel (ϕ330mm Blue)	3000 pcs /reel	2 reels /box	10 boxes /ctn	450*390*0.1mm	34*6*34cm	38*36*36.5cm	Leave 50 Spaces at the beginning and 100 Spaces at the end
LSOP4	Reel (ϕ330mm Blue)	3000 pcs/reel	2 reels/box	10 boxes/ctn	450*390* 0.1mm	340*60* 340mm	620*360* 365mm	Guard band 50mm min.

• DIP-4, DIP4-M 条管包装 Tape & Tube

1) 每箱数量： 50000 只； Qty/ctn： 50000 pcs

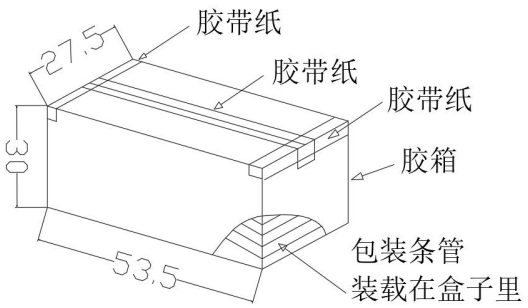
2) 内包装 Inner packing：

i. 每条管 100 只 100pcs /tube。

ii. 每盒 50 条管 50tubes/box。

3) 示意图 Schematic：

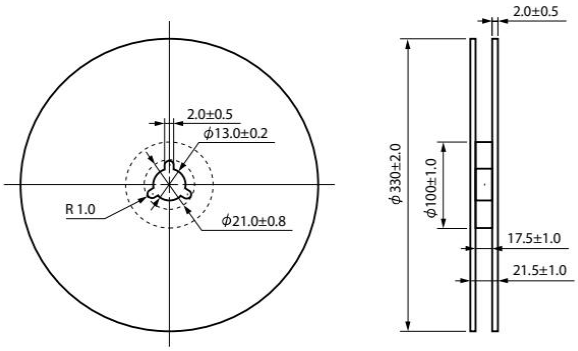
4) 示意图 Schematic

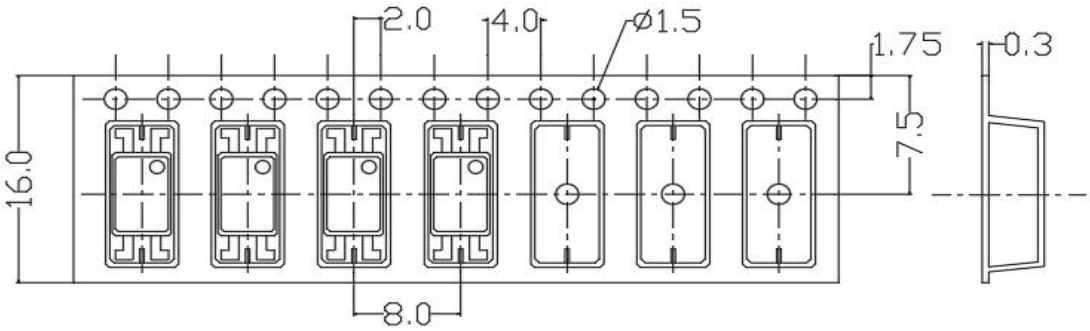


单位：mm

• SMD4 编带包装 Tape & Reel

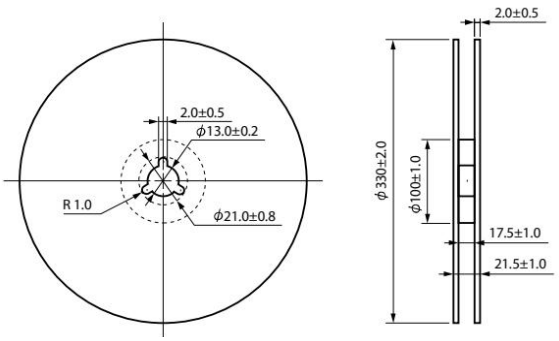
1) 每卷数量：2000 只；
Qty/reel：2000 pcs；
2) 每箱数量：40000 只；
Qty/ctn：40000 pcs；
3) 内包装：每盒 2 盘；
Inner packing：2 reels/box；
4) 示意图 Schematic:

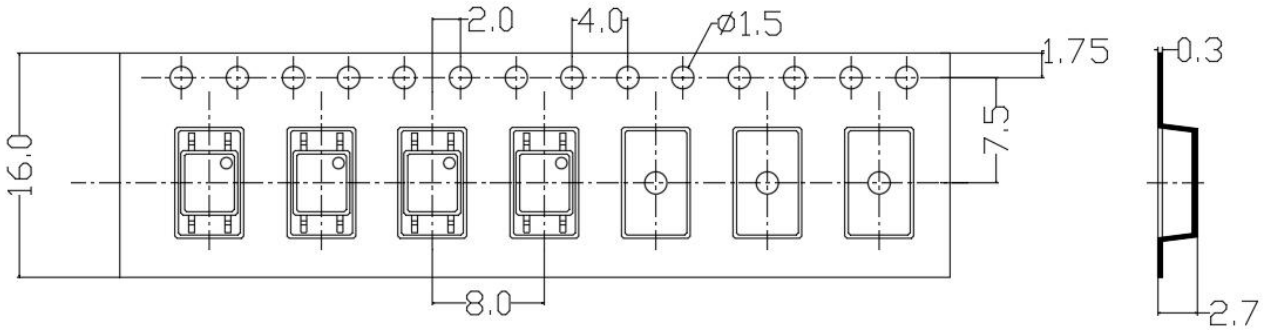




• SOP4 编带包装 Tape & Reel

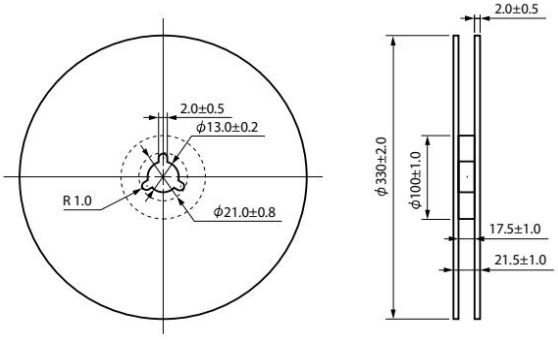
1) 每卷数量：3000 只；Qty/reel：3000 pcs；
2) 每箱数量：60000 只；Qty/ctn：60000 pcs；
3) 内包装：每盒 2 盘；
Inner packing：2 reels/box；
4) 示意图 Schematic:

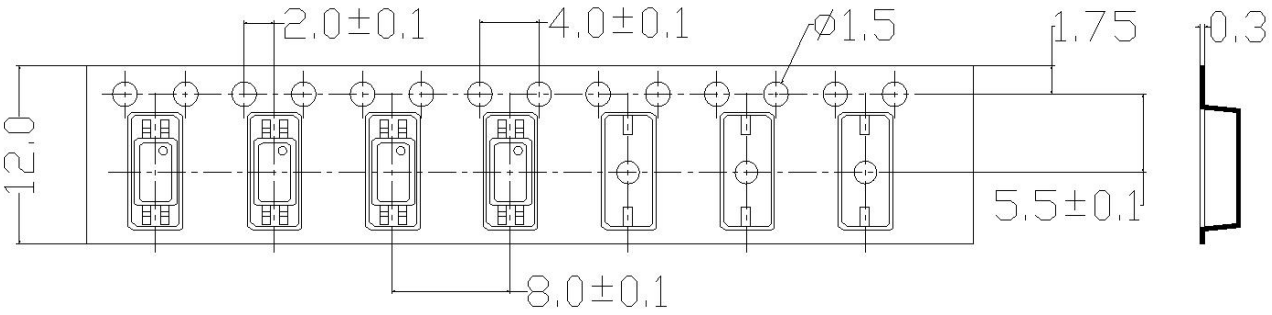




• SSOP4编带包装 Tape & Reel

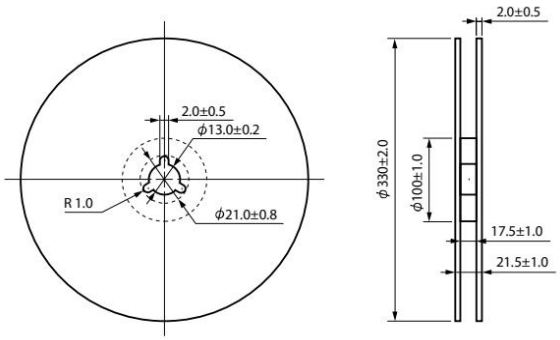
1) 每卷数量：3000 只；Qty/reel：3000 pcs；
2) 每箱数量：60000 只；Qty/ctn：60000 pcs；
3) 内包装：每盒 2 盘；
Inner packing：2 reels/box；
4) 示意图 Schematic:

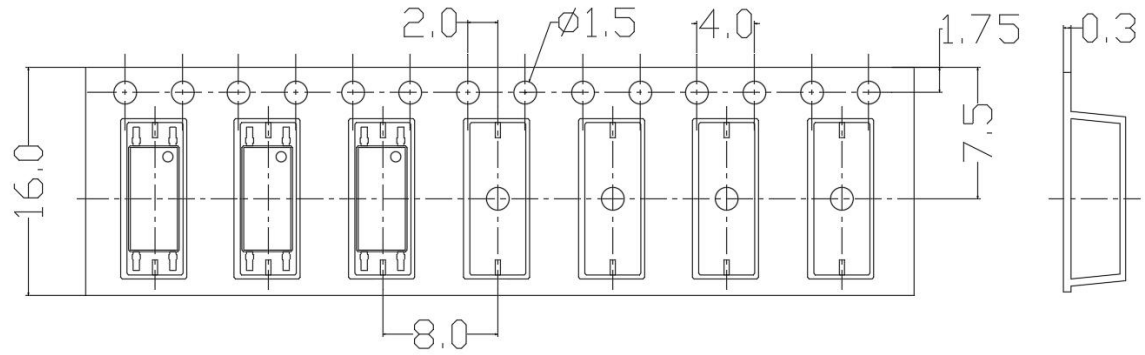




• LSOP4编带包装 Tape & Reel

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：



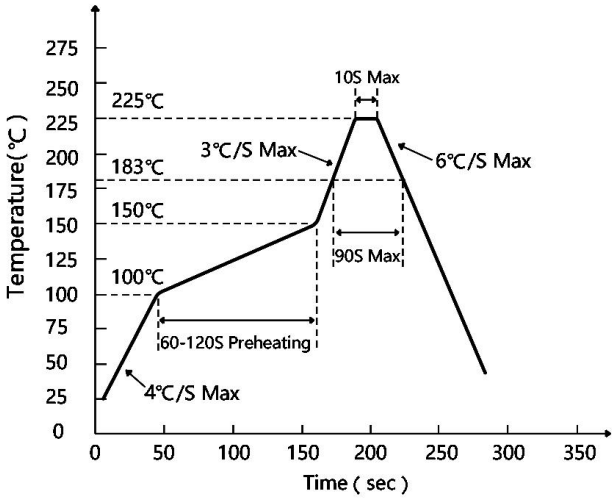


单位：mm

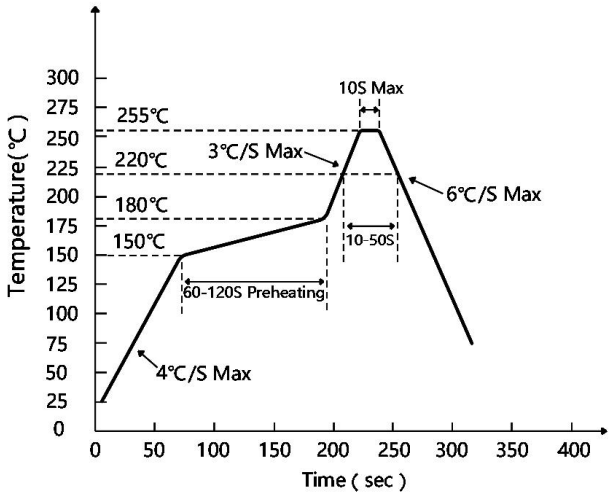
◆ 可靠性测试 Reliability Test Items And Conditions

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）℃, 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

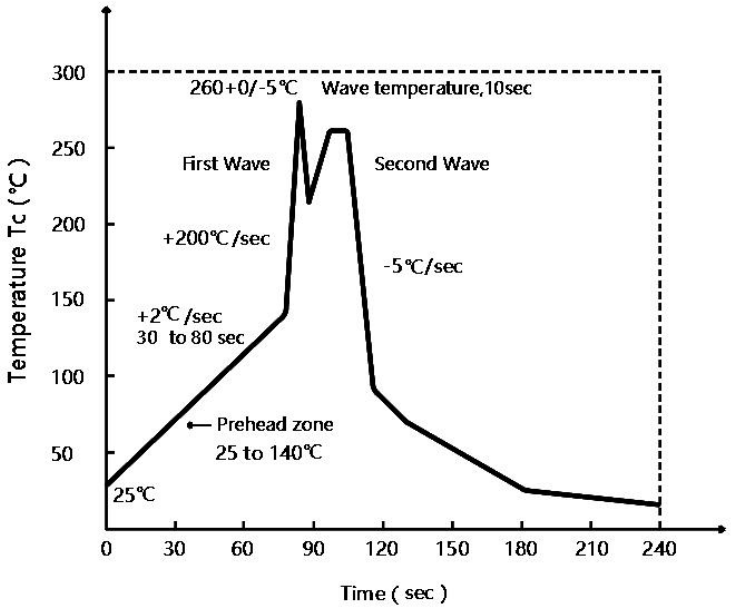


有铅制程 Lead Process



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: