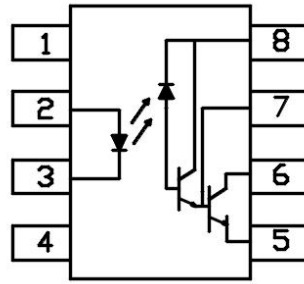
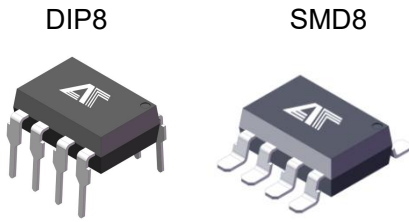


达林顿光耦
Darlington optocoupler

6N138M

Product Data Sheet

AOTE DCC
RELEASE



- Pin Configuration**
- 1.NC
 - 2.Anode
 - 3.Cathode
 - 4.NC
 - 5.GND
 - 6.V O
 - 7.V B
 - 8.VCC

◆ 封装逻辑原理图 Encapsulation logic schematic

6N138M 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DIP8及SMD8两种封装形式，适配多样化场景需求。

The 6N138M optocoupler adopts high-efficiency photoelectric conversion technology and advanced packaging processes, providing reliable input-output isolation. It supports two package types (DIP8 SMD8) to meet diverse application requirements.

◆ 产品特征Product features

- 输入-输出隔离电压Vios=5000Vrms
Input output isolation voltage: Vios=5000 Vrms
- 电流传输比CTR:400-2000% Current Transfer Ratio: CTR:400-2000%
- 峰值击穿电压:BVCEO=80V; Peak breakdown voltage:BVCEO=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

- 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	70	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	80	V
	发射极-集电极电压 Emitter-Collector Voltage	VECO	7	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
电源电压 Supply Voltage	VCC	2.7	5.5	V
开启电流 Forward Input Current (ON)	IF(ON)	0.5	12.0	mA
关断电压 Forward Input Voltage (OFF)	VF(OFF)	0	0.8	V

◆ 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	-	1.4	-	V
	反向电流 Reverse Current	IR	VR =5V	-	-	10	uA
	输入电容 Terminal Capacitance	Ct	V=0V, F =1KHz	-	60	-	pF
接收端 Output	正向电压的温度系数 Input Diode Temperature Coefficient	$\Delta VF/\Delta TA$	IF =16mA	-	-1.8	-	mV/°C
	高电平电源电流 High Level Supply Current	ICCH	IF=1.6 mA, VO =Open, VCC=18V	-	0.4	1.5	mA
	低电平电源电流 Low Level Supply Current	ICCL	IF= 0 mA, VO =Open, VCC=18V	-	0.01	10	μA
传输特性 Transfer Characteristics	低电平输出电压 LOW Level Output Voltage	VOL	IF = 0.5 mA, IO =2 mA VCC=4.5V	-	0.1	0.2	V
			IF = 1.6 mA, IO =8 mA VCC=4.5V				
			IF = 5.0 mA, IO =15 mA VCC=4.5V				
			IF = 12 mA, IO =24 mA VCC=4.5V				
	高电平输出电流 HIGH Level Output Current	IOH	VO =VCC=18 V IF =0mA	-	0.05	100	μA
	电流传输比* Current Transfer Ratio	CTR	IF =0.5 mA, VCC=4.5V VO =0.4 V	400	2000	-	%
IF =1.6 mA, VCC=4.5V VO =0.4 V			500	1600	-	%	
电阻 (输入到输出) Resistance (Input to Output)	RI-O	VI-O = 500 Vdc, RH < 45%	-	10 ¹²	-	Ω	
电容 (输入到输出) Resistance (Input to Output)	CI-O	f = 1 MHz	-	0.6	-	pF	

注：电流传输比= $I_c/I_f \times 100\%$; Note*: CTR= $I_c/I_f \times 100\%$.

◆ 开关特性 Switching Specification

参数 Parameter	符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
输出高电平传播延迟 Propagation Delay Time to High Output Level	tPHL	IF = 0.5 mA, RI = 4.7 kΩ	-	5	30	μs
		IF = 0.5 mA, RI = 4.7 kΩ TA = 25°C	-	5	25	μs
		IF = 12 mA, RI = 270 Ω	-	0.2	2	μs
		IF = 12 mA, RI = 270 Ω TA = 25°C	-	0.2	1	μs
输出低电平传播延迟 Propagation Delay Time to Low Output Level	tPLH	IF = 0.5 mA, RI = 4.7 kΩ	-	18	90	μs
		IF = 0.5 mA, RI = 4.7 kΩ TA = 25°C	-	18	60	μs
		IF = 12 mA, RI = 270 Ω	-	2	10	μs
		IF = 12 mA, RI = 270 Ω TA = 25°C	-	2	7	μs
输出高电平共模瞬态抑制 Common Mode Transient Immunity at High Output Level	CMH	IF = 0 mA, TA = 25°C RI = 2.2 kΩ, VCM = 10Vp-p	1000	10000	-	V/μs
输出低电平共模瞬态抑制 Common Mode Transient Immunity at Low Output Level 	CML	IF = 1.6 mA, TA = 25°C RI = 2.2 kΩ, VCM = 10Vp-p	1000	10000	-	V/μs

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

Fig.1 Output current vs. Output Voltage

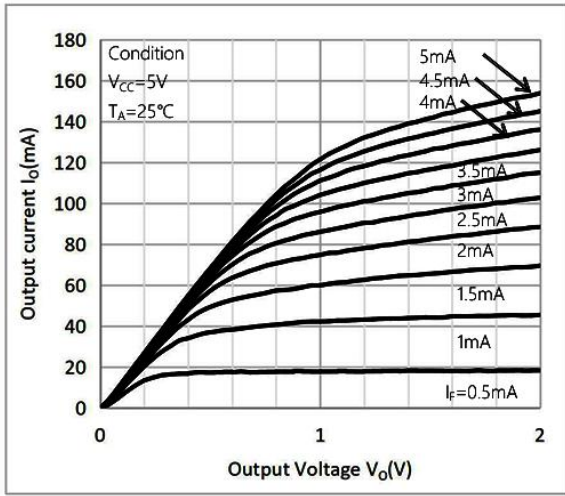


Fig.2 Current transfer ratio vs. Input current

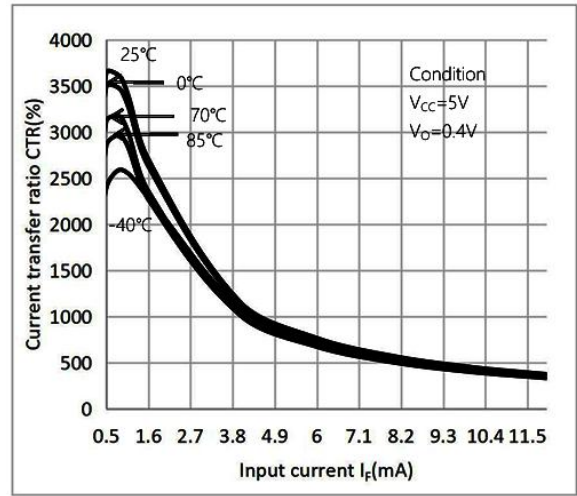


Fig.3 Output current vs. Input current

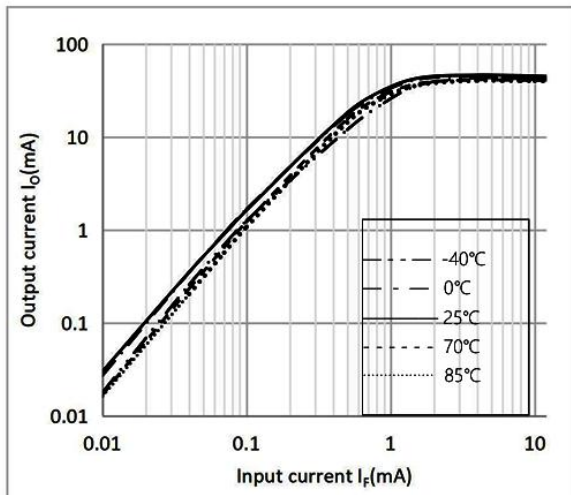


Fig.4 Input current vs. Forward Voltage

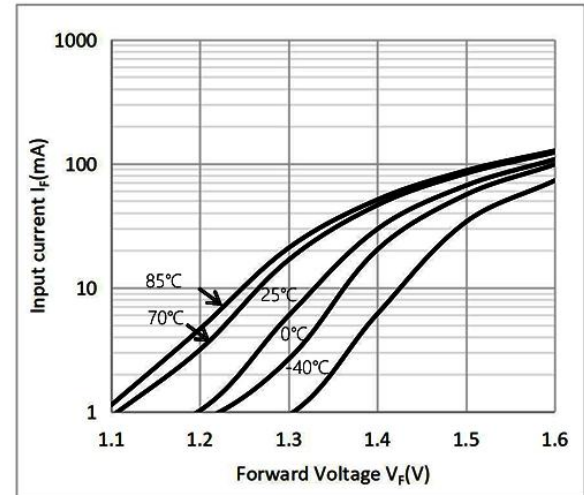


Fig.5 Propagation delay vs. Ambient temperature

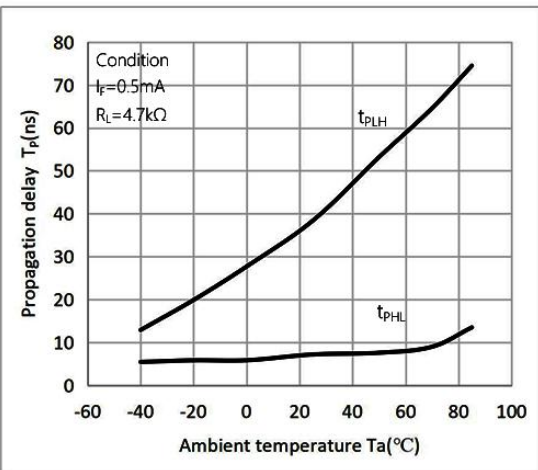


Fig.6 Propagation delay vs. Ambient temperature

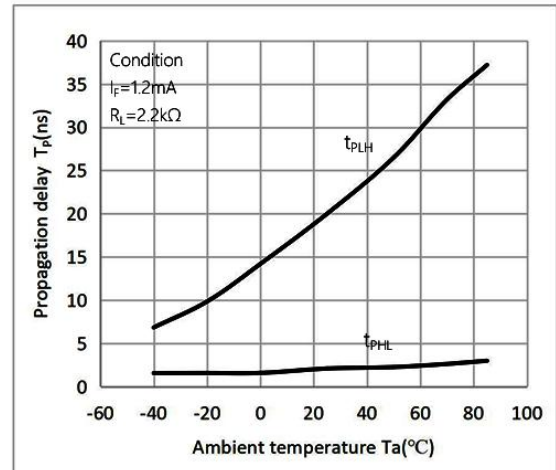


Fig.7 Propagation delay vs. Ambient temperature

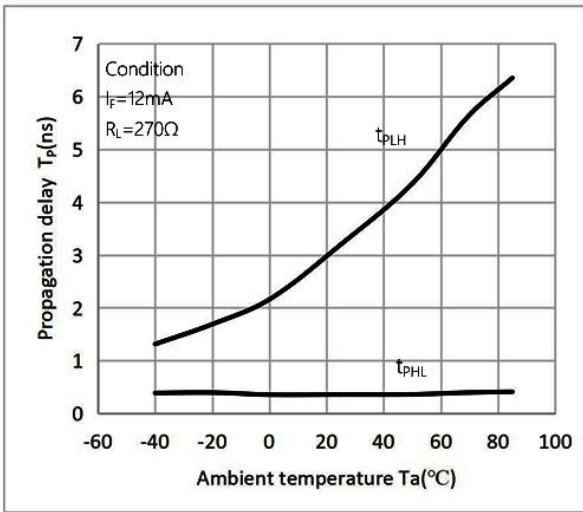


Fig.8 Forward Voltage vs. Ambient temperature

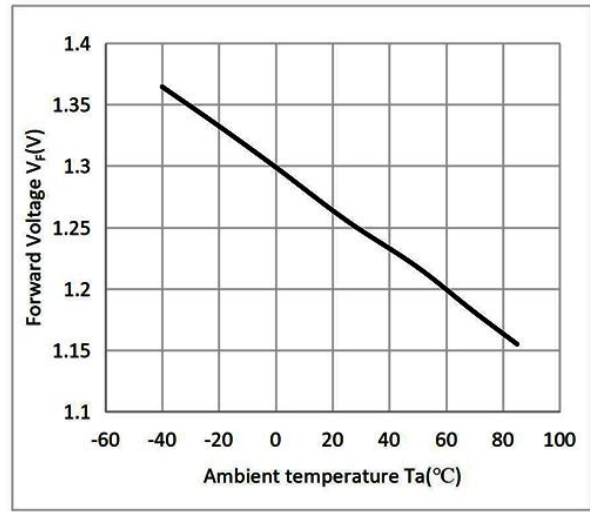
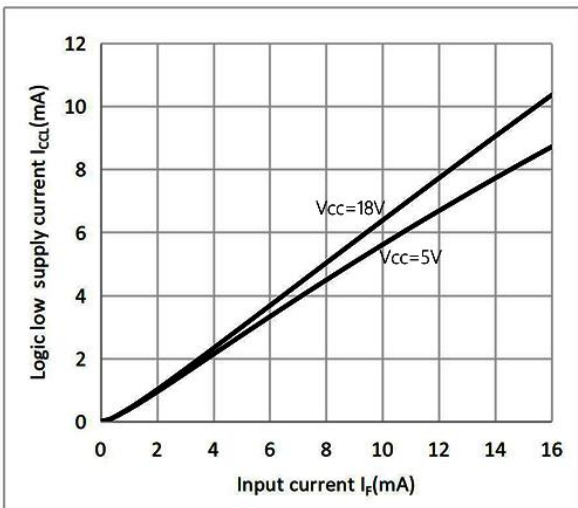
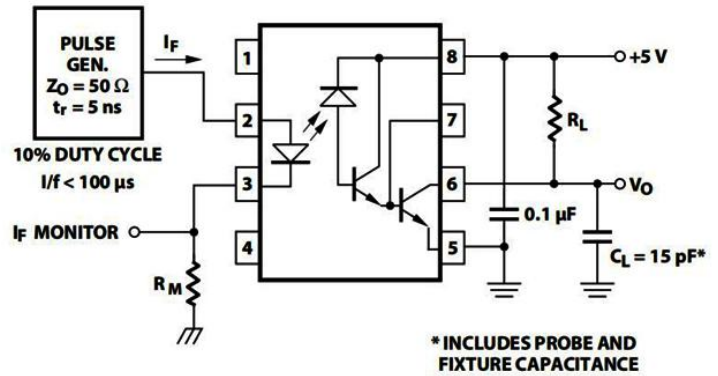
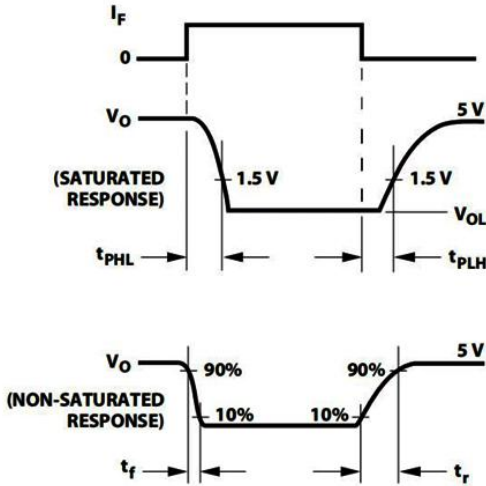


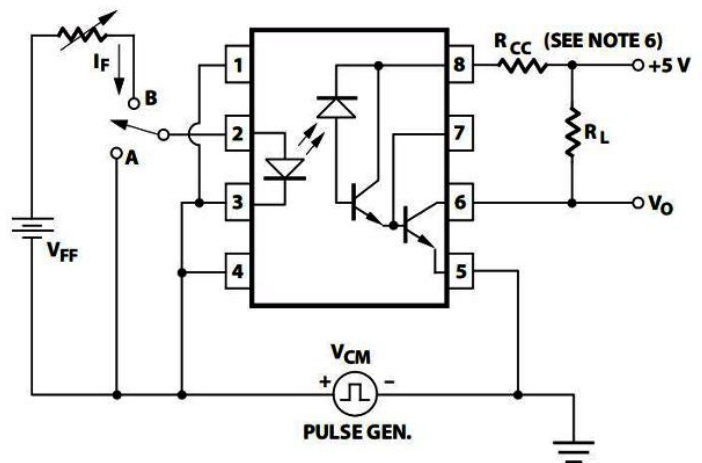
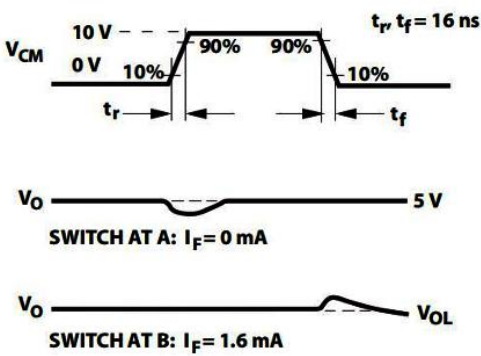
Fig.9 Logic low supply current vs. Input current



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

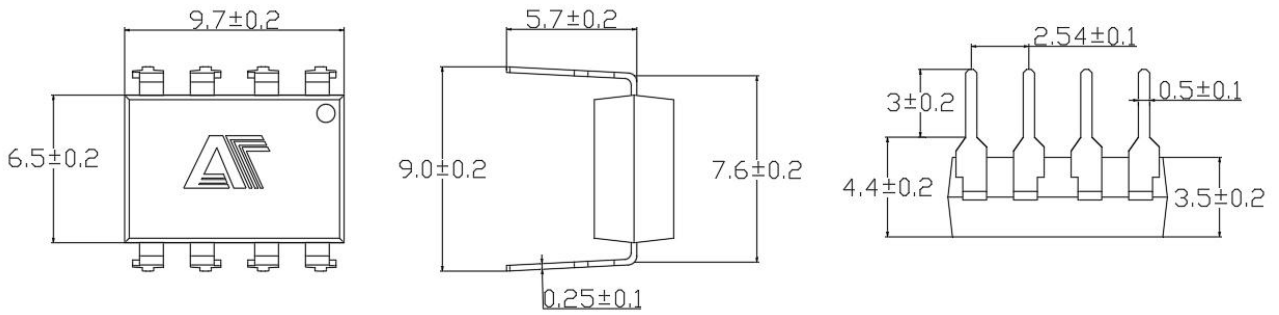


◆ **CMR测试电路 Test Circuit for Common Mode Transient Immunity**

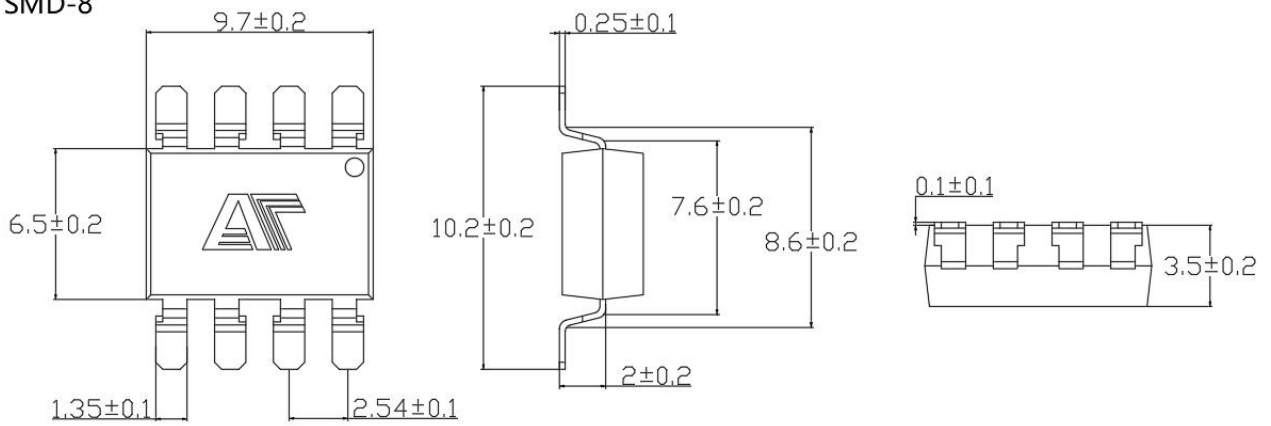


◆ 外形尺寸Overall dimension

DIP8

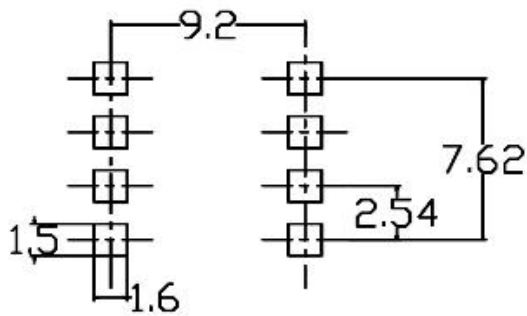


SMD-8





推荐焊盘:

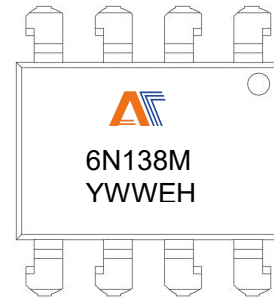
Recommended



单位: mm

◆ 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

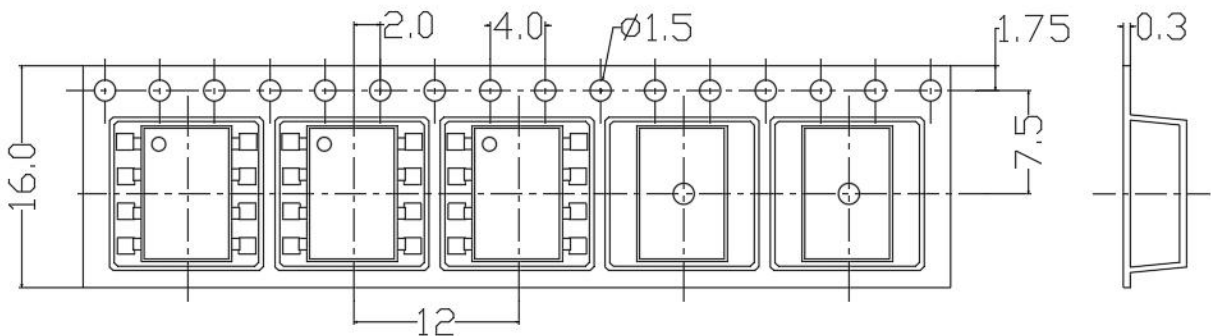
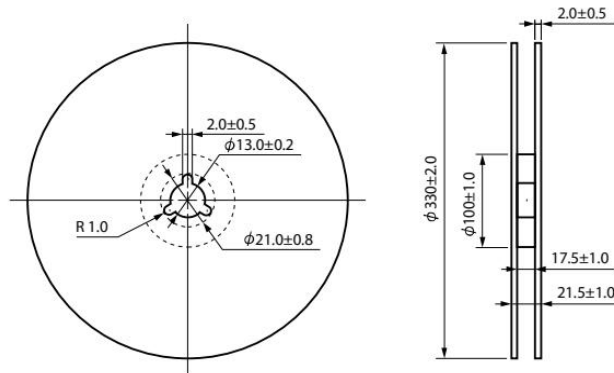


◆ 包装packing

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
SMD8	卷盘 ($\phi 330\text{mm}$ 蓝盘)	1000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	340*60*340 mm	620*360*365mm	首尾端空至少200mm
DIP8	管装 (500*12*11mm)	45 只/管	50 管/盒	10 盒/箱	不适用	525*128*56 mm	535*275*300mm	每管使用蓝白胶塞, 方向须一致
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
SMD8	Reel ($\phi 330\text{mm}$ Blue)	1000 pcs/reel	2 reels/box	10 boxes/ctn	450*390*0.1mm	340*60*340 mm	620*360*365mm	Leave at least 200mm of blank space at both ends
DIP8	Tube (500*12*11mm)	45 pcs/tube	50 tubes/box	10 boxes/ctn	NA	525*128*56 mm	535*275*300mm	Use blue and white rubber plugs for each tube in the same direction

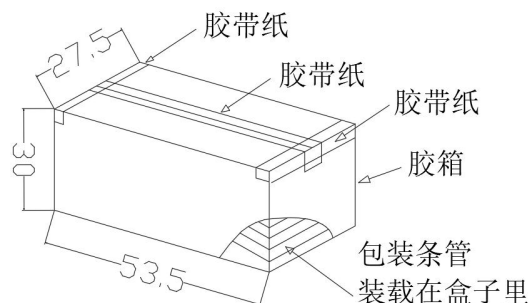
• 编带包装 Tape & Reel

- 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:



• 管条包装Tape&Tube

- 1) 每管数量: 45 只。
Qty/Tube : 45 pcs.
- 2) 每箱数量: 22500 只。
Qty/ctn: 22500 pcs.
- 3) 内包装: 每盒 50 管。
Inner packing: 50 Tube/box.
- 4) 示意图 Schematic

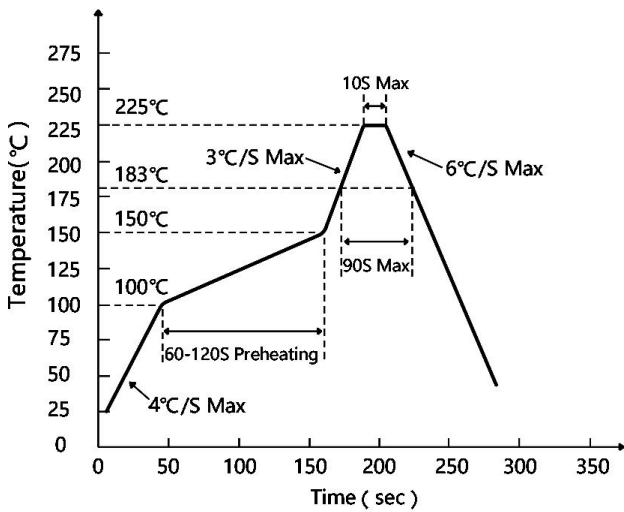


单位: mm

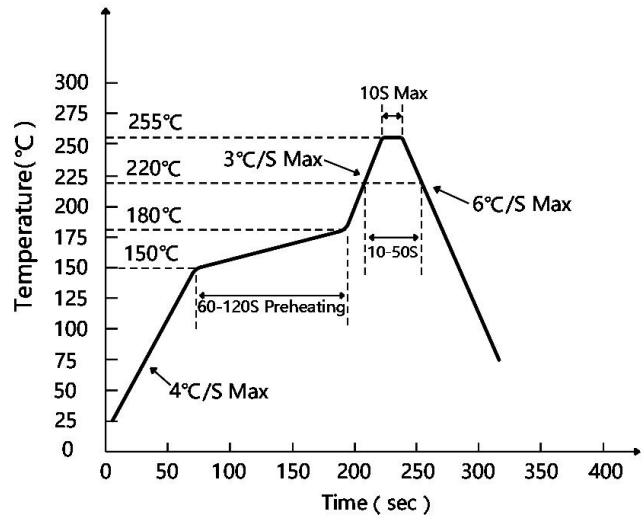
◆ 可靠性测试 Reliability Test Items And Conditions

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**

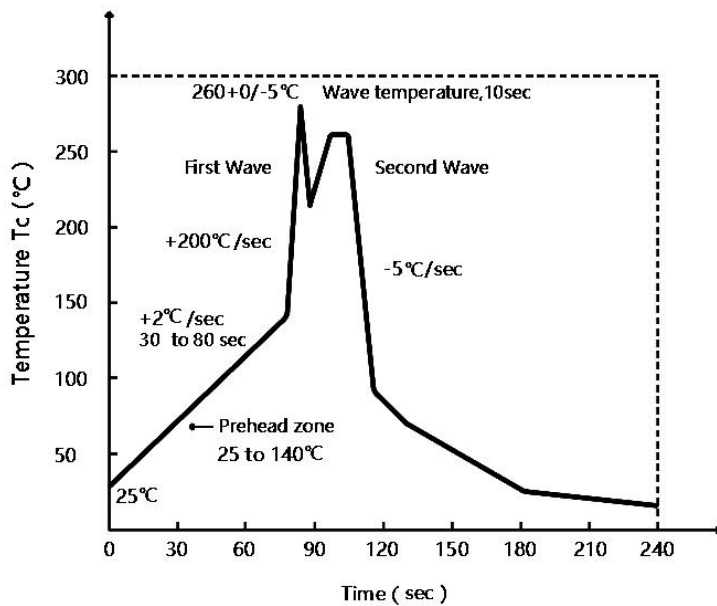


有铅制程 Lead Process



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: