



晶体管光耦
Photo Transistor

AT851

Product Data Sheet

AOTE DCC
RELEASE

台湾奥特半导体科技有限公司

TAIWAN AOTE SEMICONDUCTOR TECHNOLOGY CO.,LTD

www.aotesemi.com

概述 Description

AT851是一款由发光二极管和光电晶体管组成的高耐压($V_{CEO} \geq 350V$)光电耦合器。 四引脚封装 , 三种形式 (DIP,DIP-M,SMD) 。

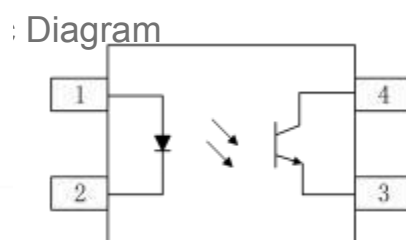
The AT851 is a photoelectric coupler composed of light-emitting diode and phototransistor. It is high voltage resistance($V_{CEO} \geq 350V$). It is packaged in a 4-pin small outline SOP package of three forms such as DIP、 DIP-M、 SMD.

特性 Features

- 电流转换比(CTR)范围: 50% ~600% ($I_F = 5mA, V_{CE} = 5V$)
Current transfer ratio: 50% ~600% ($I_F = 5mA, V_{CE} = 5V$)
- 输入-输出隔离电压 ($V_{ISO} = 5000 \text{ Vrms}$)
High isolation voltage between input and output($V_{ISO} = 5000 \text{ Vrms}$)
- 集电极-发射极击穿电压 $BV_{CEO} \geq 350V$
Collector - emitter breakdown voltage $BV_{CEO} \geq 350V$
- 工作温度 : $-55^\circ\text{C} \sim +100^\circ\text{C}$
Operating Temperature: $-55^\circ\text{C} \sim +100^\circ\text{C}$
- 符合加强绝缘标准
Meet reinforced insulation standards
- 符合安规标准 : UL 1577 , VDE DIN EN60747-5-5 (VDE 0884-5) , CQC11-471543-2022
Meet safety standard approval: UL 1577, VDE DIN EN60747-5-5 (VDE 0884-5) , CQC11-471543-2022

应用 Applications

- 开关电源 , 智能电表
Switching power supply, intelligent meter
- 工业控制 , 测量仪器
Industrial control, measuring instruments
- 办公设备 , 比如复印机
Office equipment such as copiers
- 家用电器 , 比如空调、风扇、热水器等
Household appliances: such as air conditioners, fans, water heaters, etc.



Pin Configuration

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



产品型号命名规则。 rdercode

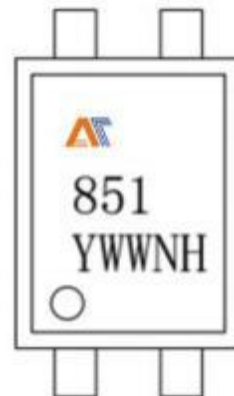
AT851 -UN Y-W(V)(ZZ)

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 (851: 851)
- 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 (D:DIP, S:SMD, M:DIP-M)
- 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 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 “N” 代表星期几
“N” denotes day of the week
- 印字中的 “H” 代表无卤
“H” denotes Halogen-free



绝缘和安规信息 Insulation and safety related specifications

| 项目 Item | 符号 Symbol | 数值 value | 单位 Unit | 备注 Remark |
|---------------------------------------|-------------------|-------------|-------------------|--|
| 爬电距离 Creepage Distance | L | >7.0 | mm | 从输入端到输出端，沿本体最短距离路径 Measured from input terminals to output terminals, shortest distance path along body |
| 电气间隙 Clearance Distance | L | >7.0 | mm | 从输入端到输出端，通过空气的最短距离 Measured from input terminals to output terminals, shortest distance through air |
| 绝缘距离 Insulation Thickness | DTI | >0.4 | mm | 发射器和探测器之间的绝缘厚度 Insulation thickness between emitter and detector |
| 峰值隔离电压 Peak Isolation Voltage | V _{IORM} | 1500 | V _{peak} | DIN/EN/IEC EN60747-5-5 |
| 瞬态隔离电压 Transient isolation voltage | V _{IOTM} | 7000 | V _{peak} | DIN/EN/IEC EN60747-5-5 |
| 隔离电压 Isolation Voltage | V _{iso} | >5000 | V _{rms} | For 1 min |

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 | I _F | 60 | mA |
| | 反向电压 Reverse Voltage | V _R | 6 | V |
| | 功耗 Power Dissipation | P _D | 100 | mW |
| | 额定值降低因子(在 Ta = 100°C 以上) Power dissipation Derating factor (above Ta = 100°C) | P _{DD} | 2.9 | mW/°C |
| 接收端 output | 集电极功耗 Collector Power Dissipation | P _C | 150 | mW |
| | 集电极电流 Collector Current | I _C | 50 | mA |
| | 集电极-发射极电压 Collector-Emitter Voltage | V _{CEO} | 350 | V |
| | 发射极-集电极电压 Emitter-Collector Voltage | V _{ECO} | 7 | V |
| 总功耗 Total Power Dissipation | | P _{tot} | 200 | mW |
| 隔离电压 Isolation Voltage | | V _{iso} | 5000 | V _{rms} |
| 工作温度 Operating Temperature | | T _{opr} | -55 ~ +100 | °C |
| 存储温度 Storage Temperature | | T _{stg} | -55 ~ +125 | °C |
| 焊接温度 Soldering Temperature | | T _{sol} | 260 | °C |

产品特性参数 Electro-optical characteristics(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 | V_F | $I_F = 10\text{mA}$ | - | 1.2 | 14 | V |
| | 反向电流 Reverse Current | I_R | $V_R = 5\text{V}$ | - | - | 10 | μA |
| | 输入电容 Terminal Capacitance | C_t | $V = 0, f = 1\text{KHz}$ | - | 30 | 250 | pF |
| 接收端 Output | 集电极暗电流 Collector Dark Current | I_{CEO} | $V_{CE} = 200\text{V}$ | - | - | 100 | nA |
| | 集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage | BV_{CEO} | $I_C = 0.1\text{mA}, I_F = 0\text{mA}$ | 350 | - | - | V |
| | 发射极-集电极击穿电压 Emitter-Collector Breakdown Voltage | BV_{ECO} | $I_C = 0.1\text{mA}, I_F = 0\text{mA}$ | 7 | - | - | V |
| 传输特性 Transfer Characteristics | 电流传输比 Current Transfer Ratio | CTR^* | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | 50 | - | 600 | % |
| | 集电极-发射极饱和压降 Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F = 20\text{mA}, I_C = 1\text{mA}$ | - | - | 0.4 | V |
| | 隔离电阻 Isolation Resistance | R_{ISO} | DC500V, 40 ~ 60% R.H. | 1×10^{12} | - | - | Ω |
| | 隔离电容 Isolation capacitance | C_{ISO} | $V = 0, f = 1\text{MHz}$ | - | 0.6 | - | pF |
| | 截止频率 Cut-off Frequency | F_C | $V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ | - | 80 | - | kHz |
| | 上升时间 Rise Time | T_r | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ | - | 4 | 18 | μs |
| 下降时间 Fall Time | T_f | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ | - | 5 | 18 | μs | |

 注* : 电流传输比= $I_C/I_F \times 100\%$ 。

 Note* : $CTR = I_C/I_F \times 100\%$.

典型光电特性曲线 Typical Electro-optical characteristics curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current

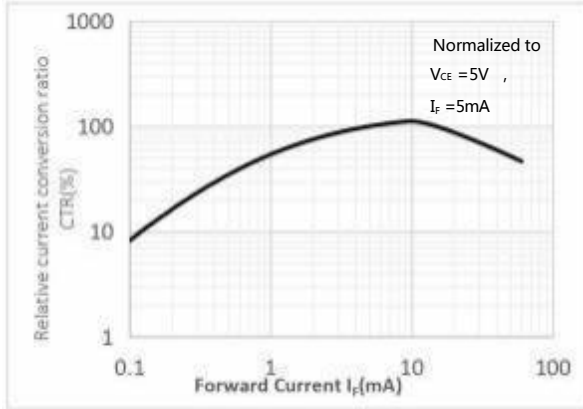


Fig.2 Forward Current vs. Forward Voltage

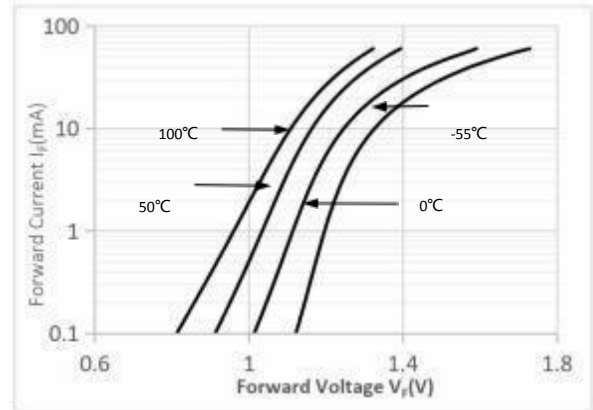


Fig.3 Collector Current vs. Collector-emitter Voltage

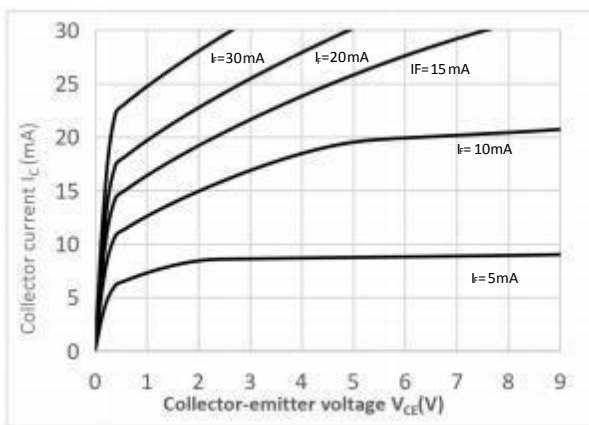


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

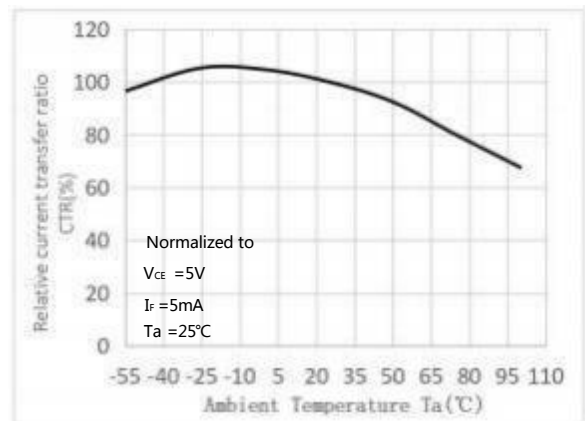


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

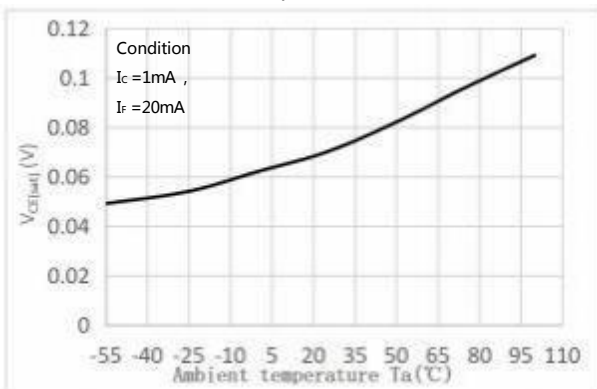


Fig.6 Collector Dark Current vs Ambient Temperature

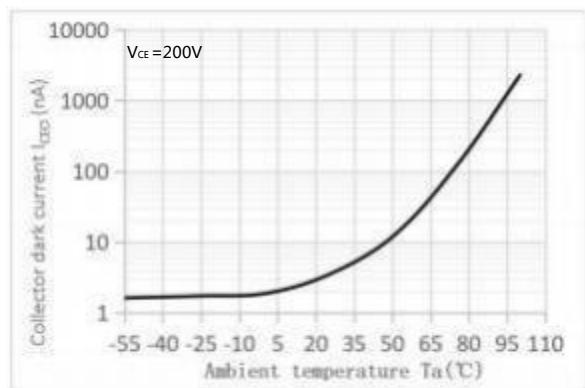


Fig.7 Response Time vs. Ambient Temperature

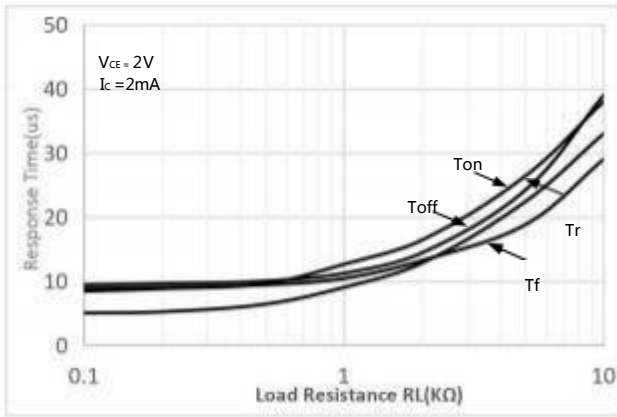


Fig.8 Collector-emitter Saturation Voltage vs Forward Current

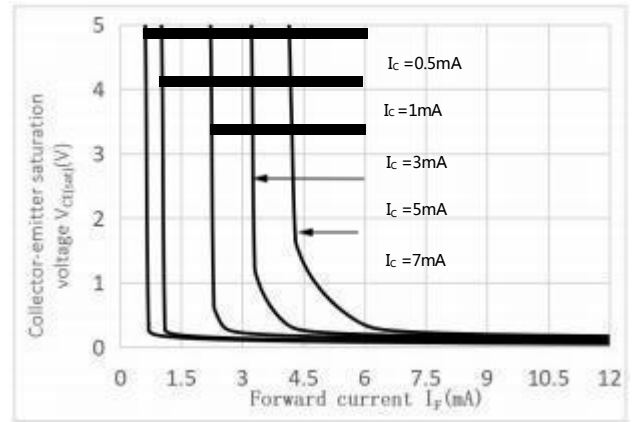
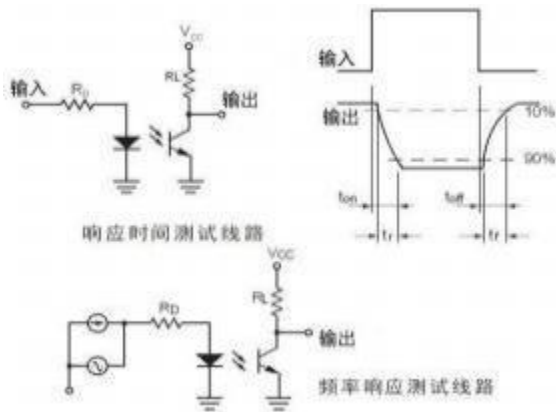


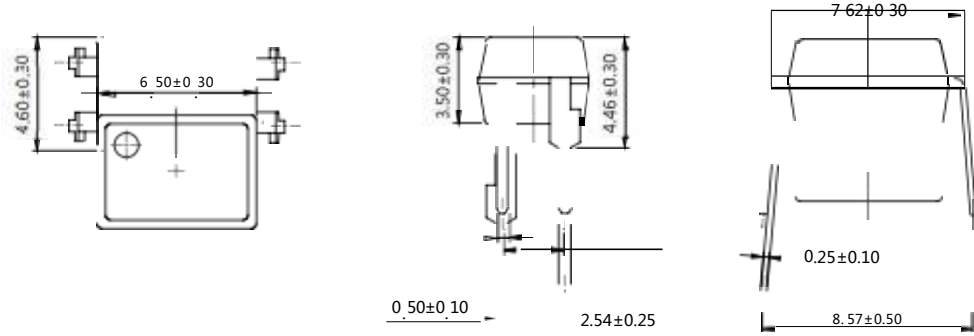
Fig.7 Switching Time Test Circuit & Wave forms



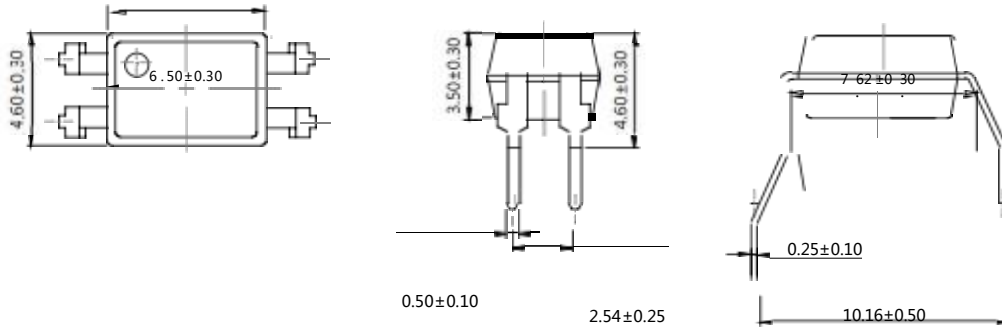
外形尺寸

Outline Dimensions

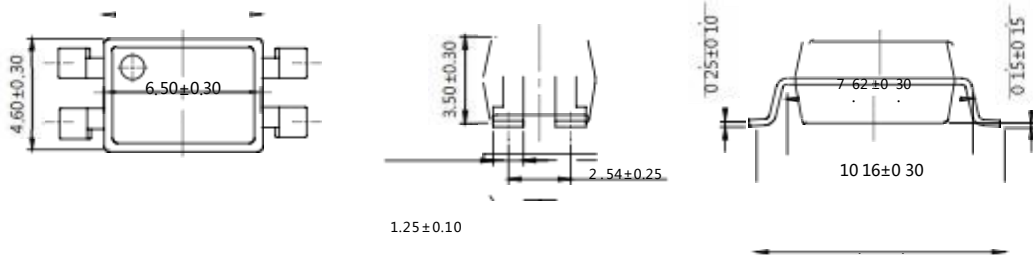
DIP4



DIP4-M

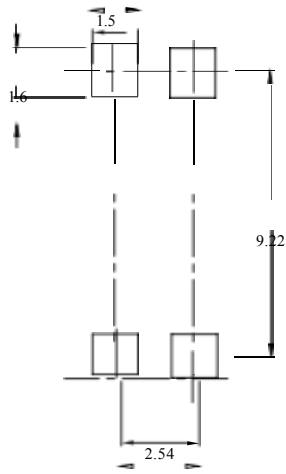


SMD4



单位 Unit: mm

建议焊盘布局 Recommended pad Layout

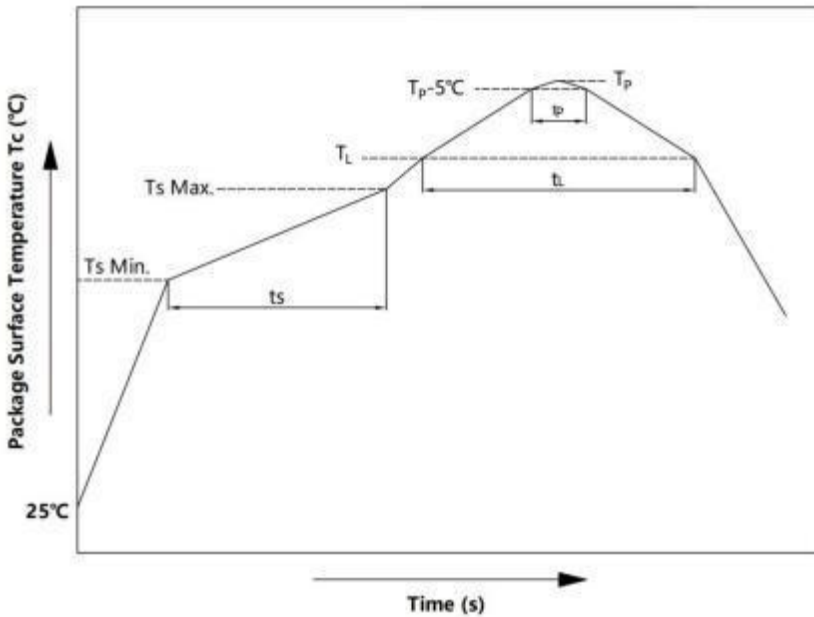


单位 Unit: mm

注：上图为产品正视图。

Note: The picture above is the front view of the product.

回流焊温度曲线图 solderReflowprofile



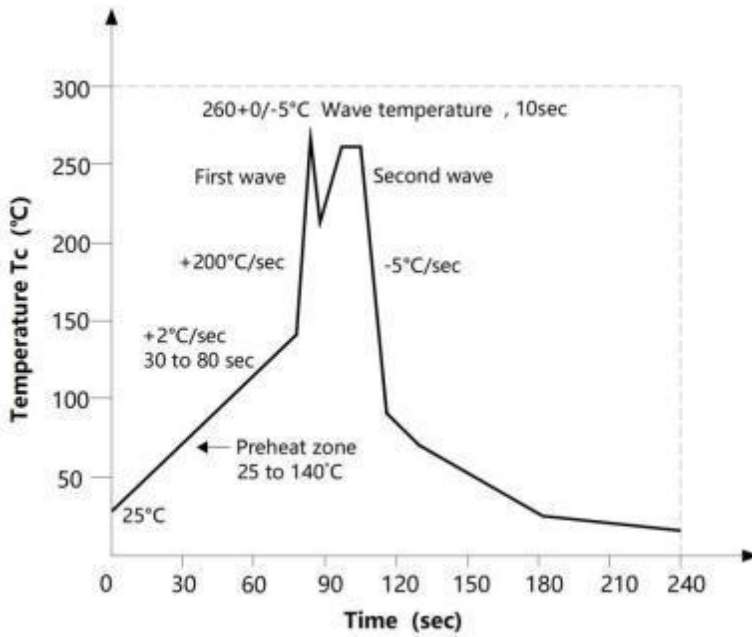
| 项目 Item | 符号 Symbol | 最小位 Min. | 最大值 Max. | 单位 Unit |
|---|--------------|-------------|-------------|--------------------|
| 预热温度 Preheat Temperature | T_s | 150 | 200 | $^\circ\text{C}$ |
| 预热时间 Preheat Time | t_s | 60 | 120 | s |
| 升温速率 Ramp-Up Rate (T_L to T_P) | - | - | 3 | $^\circ\text{C/s}$ |
| 液相线温度 Liquidus Temperature | T_L | 217 | | $^\circ\text{C}$ |
| 时间高于 T_L Time Above T_L | t_l | 60 | 150 | s |
| 峰值温度 Peak Temperature | T_P | - | 260 | $^\circ\text{C}$ |
| T_c 在($T_P - 5$)和 T_P 之间的时间 Time During Which T_c Is Between ($T_P - 5$) and T_P | t_p | - | 30 | s |
| 降温速率 Ramp-down Rate(T_P to T_L) | - | - | 6 | $^\circ\text{C/s}$ |

注 Note :

建议在所示的温度和时间条件下进行回流焊，最多不能超过三次；

Reflow soldering is recommended at the temperatures and times shown, no more than three times;

波峰焊温度曲线图 wavesoldering 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 $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ，时间 $\leq 3\text{s}$ 。
Hand soldering iron requirements：Temperature： $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$, within 3s.

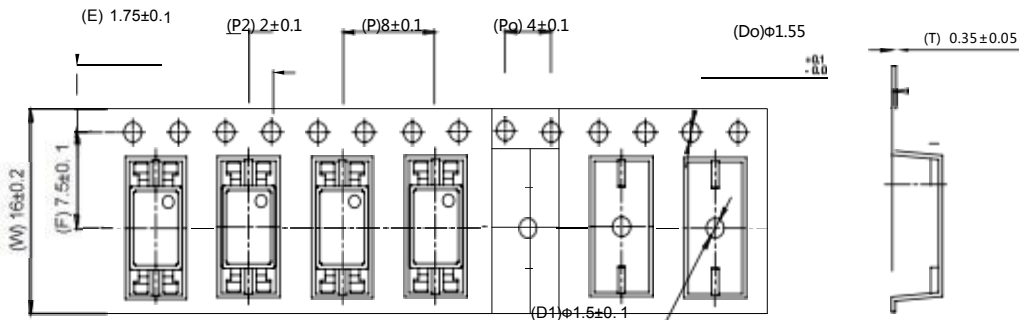
装 packing

■ 汇总表summaytable

| 封装式 | 包装方式式 | 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 |
|--------------|-------------------------------------|------------------|-----------------|--------------------|--------------------------|-----------------|----------------------|---|
| SMD4 | 卷盘 ($\phi 330\text{mm}$ 蓝盘) | 2000只/盘 | 2盘/盒 | 10盒/箱 | 450*390*0.1mm | 340*60*340mm | 620*360*365mm | 首尾端空至少200mm |
| DIP4 | 管装 (500*12*11mm) | 100只/管 | 50管/盒 | 10盒/箱 | 不适用 | 525*128*56mm | 535*275*300mm | 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*58mm | 535*295*310mm | |
| Package Type | packingFom | Quantity perReel | Quantity perBOX | Quantity percarton | AtistaticBag specifcaton | oxspecification | carton specification | Nlote |
| SMD4 | Reel ($\phi 330\text{mm}$ Blue) | 2000 pcs/reel | 2 reels/box | 10 boxes/ctn | 450*390*0.1mm | 340*60*340mm | 620*360*365mm | Leave at least 200mm of blank space at both ends |
| DIP4 | Tube (500*12*11mm) | 100 pcs/tube | 50 tubes/box | 10 boxes/ctn | NA | 525*128*56mm | 535*275*300mm | 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*58mm | 535*295*310mm | |

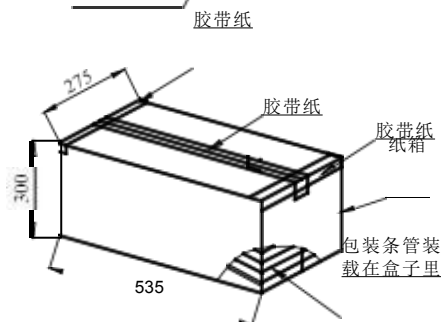
■ 编带包装Tape&Reel

- 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：100只。
Qty/Tube：100 pcs.
- 2) 每箱数量：50000只。
Qty/ctn：50000 pcs.
- 3) 内包装：每盒50管。
Inner packing：50 Tube/box.
- 4) 示意图 Schematic：



单位/Unit：mm

注意 Attention

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