NQUNXIN
群芯微电子

中国芯 光电梦



# 光继电器

Photo Relay

# QXV25A

宁波群芯微电子股份有限公司
NINGBO QUNXIN MICROELECTRONICS CO., LTD.

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68 Yuhaidong Road, Hangzhou Bay New District, Ningbo, Zhejiang, China

## 概述 Description

QX25A光继电器由红外发光二极管和光电发生器、MOSFET耦合组成。 QXV25A实现低导通电阻。
The QXV25A PhotoRelay consist of a photo MOSFET、Photovoltage generator、infrared LED. The QXV25A achieves low on-resistance.

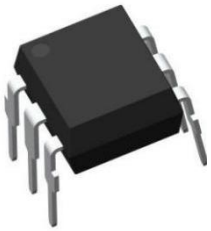
## 特性 Features

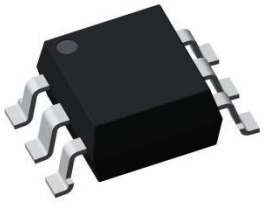
- 常开，单刀单掷
  Normally opened (SPST)
- 控制 600V 交流或者直流电压
  Control 600V AC or DC voltage
- 开关 100mA 负载
  Switch 100mA loads
- 控制低电平模拟信号
  Controls low-level analog signal
- 低电平断态漏电流
  Low-level off state leakage current
- 高隔离电压 5000$V_{rms}$ (DIP/SMD)
  High isolation voltage 5000$V_{rms}$ (DIP/SMD)
- 无铅，符合 RoHS 标准
  Lead free, meet RoHS standards

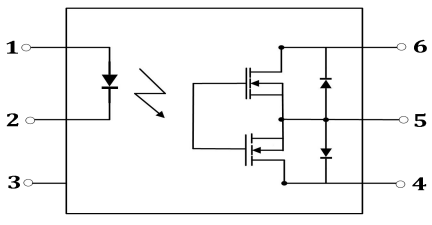
## 应用 Applications

- 通讯产品(个人电脑,笔记本电脑)
  Communications products (Personal computers, Laptops)
- 调制解调器/传感器
  Modem/Sensor
- 移动电话 /安全设备
  Mobile phones/Security equipment
- 测量和测试设备
  Measuring and Testing equipment
- 工厂自动化设备
  Plant automation equipment
- 高速检验机器
  High-speed inspection machines

## 封装和原理图 Package and Schematic Diagram








Pin Configuration
1. AN
2. CA
3. N/CO
4. D1
5.Source
6. D2

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## 产品型号命名规则 Order Code

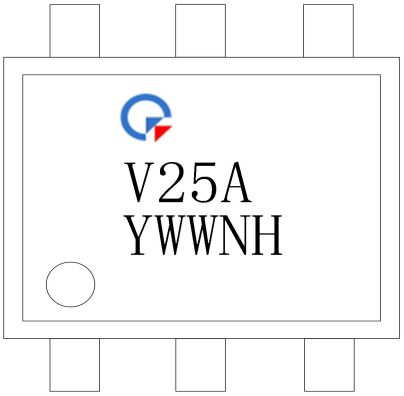
**QX V25A - UN Y - W (V) (ZZ)**

① ② ③ ④ ⑤ ⑥ ⑦

① 公司代码 Company Code（QX：群芯 Qunxin）
② 产品系列 Product Series（V25A: V25A）
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）
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“”为群芯品牌 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 the day of the week
- 印字中的“H”代表无卤
  “H”denotes Halogen-free

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## 绝缘和安规信息 Insulation and Safety related specifications

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

## 极限参数 Absolute Maximum Ratings ($T_A$=25℃)

| 参数<br>Parameter | | 符号<br>Symbol | | 额定值<br>Rating | 单位<br>Unit |
|---|---|---|---|---|---|
| 发射端<br>Input | LED 正向电流<br>LED Forward Current | $I_F$ | | 50 | mA |
| | LED 反向电压<br>LED Reverse Voltage | $V_R$ | | 5 | V |
| | 峰值正向电流<br>Peak Forward Current | $I_{FP}$ | | 1 | A |
| | 输入功率<br>Power Dissipation | $P_{in}$ | | 75 | mW |
| 接收端<br>Output | 负载电压(AC 峰值)<br>Load Voltage (Peak AC) | $V_L$ | | 600 | V |
| | 持续负载电流<br>Continuous Load Current | $I_L$ | A | 0.1 | A |
| | | | B | 0.11 | A |
| | | | C | 0.16 | A |
| | 峰值负载电流<br>Peak Load Current | $I_{peak}$ | | 0.15 | A |
| | 输出功率<br>Power Dissipation | $P_{out}$ | | 500 | mW |
| ~输入输出瞬时耐受电压<br>Isolation Voltage | | $V_{ISO}$ | | 5000 | $V_{rms}$ |
| 工作温度<br>Operating Temperature | | $T_{opr}$ | | -40~+85 | ℃ |
| 存储温度<br>Storage Temperature | | $T_{stg}$ | | -40~+100 | ℃ |
| 焊接温度<br>Soldering Temperature | | $T_{sol}$ | | 260 | ℃ |

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## 产品特性参数 Electro-optical Characteristics ($T_A$=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 | LED 开启电流 LED Operate Current | $I_{Fon}$ | | $I_L$ = MAX | - | 0.6 | 3 | mA |
| | LED 关断电流 LED Turn Off Current | $I_{Foff}$ | | $I_L$ = MAX | 0.1 | 0.3 | - | mA |
| | LED 正向压降 LED Dropout Voltage | $V_F$ | | $I_F$=5mA | 1 | 1.29 | 1.4 | V |
| 接收端 Output | 导通电阻 On Resistance | $R_{on}$ | A | $I_F$ = 5 mA $I_L$ = MAX. Within 1s on time | - | 30 | 70 | Ω |
| | | | B | | - | 20 | 50 | Ω |
| | | | C | | - | 10 | 30 | Ω |
| | 关断漏电 Off State Leakage Current | $I_{Leak}$ | | $I_F$ = 0 mA $V_L$ = 600V | - | - | 1 | μA |
| 传输特性 Transfer Characteristics | 开启时间 Turn On Time | $T_{on}$ | | IF=5mA，IL=MAX | - | 0.15 | 2 | ms |
| | 关断时间 Turn Off Time | $T_{off}$ | | IF=5mA，IL=MAX | - | 0.2 | 1 | ms |
| | I/O 电容 I/O Capacitance | $C_{ISO}$ | | f = 1 MHz $V_B$ =0V | - | 0.8 | 1.5 | pF |
| | 初始 I/O 隔离电阻 Initial I/O Isolation Resistance | $R_{ISO}$ | | 500 V DC | 1000 | - | - | MΩ |

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## 典型光电特性曲线 Typical Electro-Optical Characteristics Curves

Fig.1 LED Dropout Voltage vs. Ambient Temperature

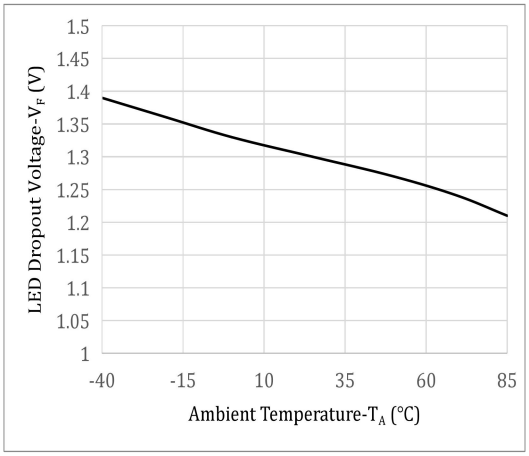


Fig.2 Output Current vs. Output Voltage

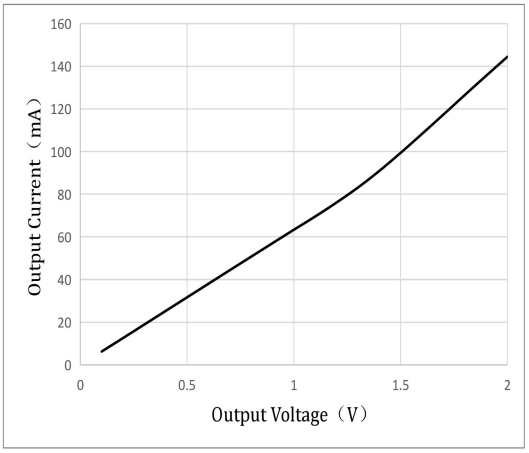


Fig.3 On Resistance vs. Ambient Temperature

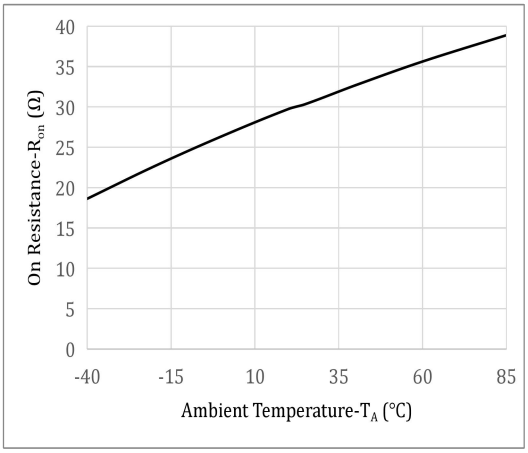


Fig.4 Load Current vs. Ambient Temperature

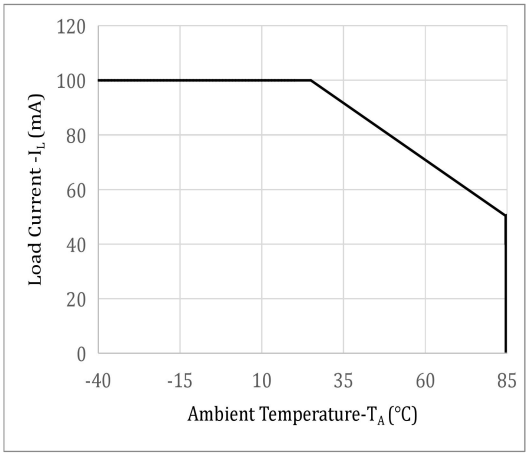


Fig.5 LED Operate Current vs. Ambient Temperature

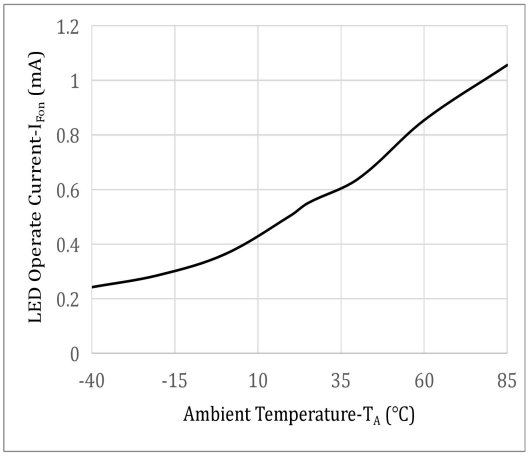


Fig.6 LED Turn Off Current vs. Ambient Temperature

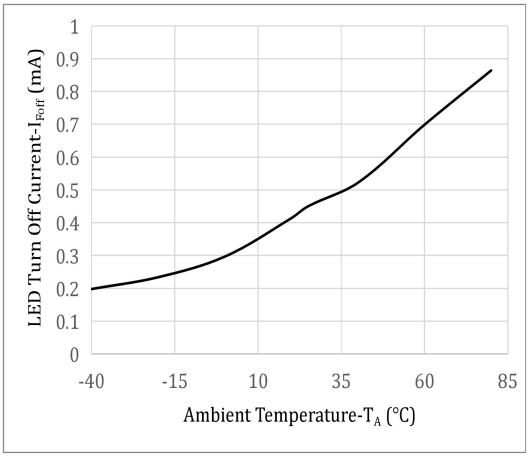


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Fig.7 Turn On Time vs. Ambient Temperature

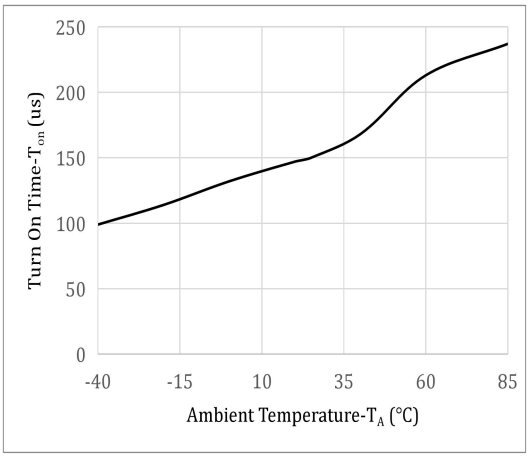



Fig.8 Turn Off Time vs. Ambient Temperature

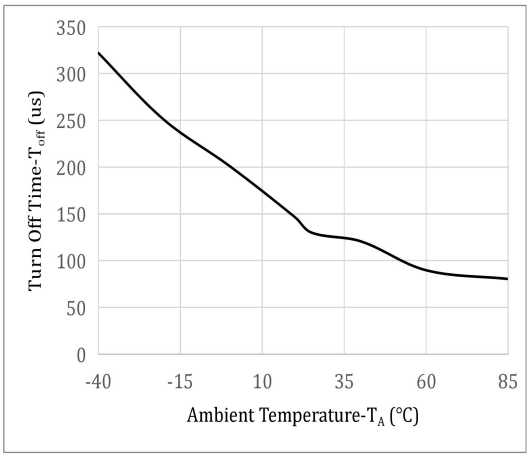



Fig.9 Turn On Time vs. LED Forward Current

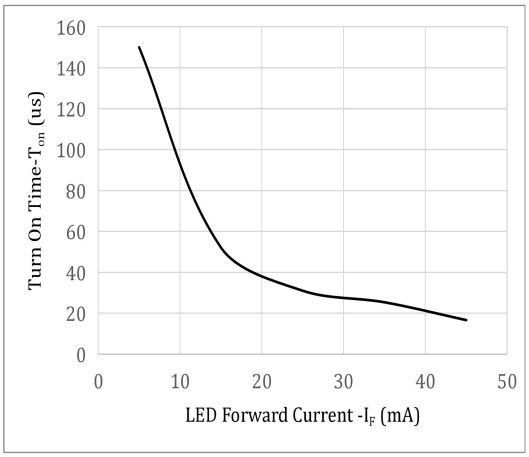



Fig.10 Turn Off Time vs. LED Forward Current

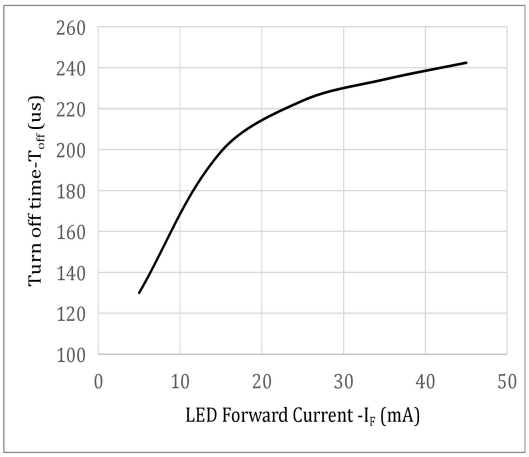
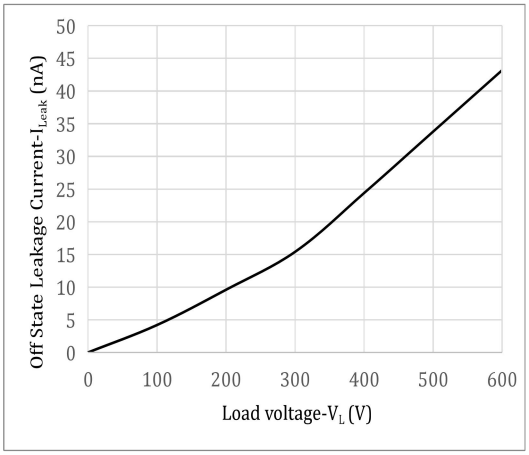



Fig.11 Off State Leakage Current vs. Load Voltage

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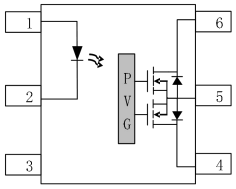
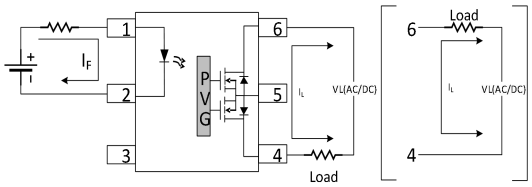
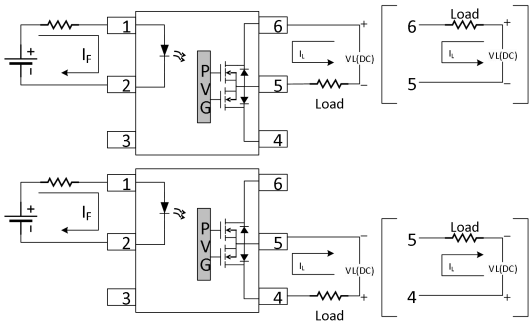
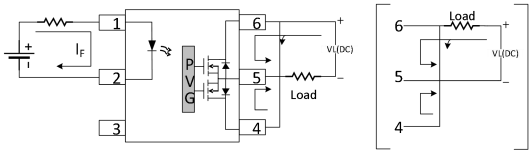
## 示意图和连接方式 Schematic And Wiring Diagrams

| 示意图<br>Schematic | 输出方式<br>Output Configuration | 负载类型<br>Load Type | 连接方式<br>Connection | 接线示意图<br>Wiring diagram |
|---|---|---|---|---|
|  | 1 Form A | AC/DC | A |  |
| | | DC | B | <br>可以当作 2 通道 A 类型输出使用（但是，连续负载电流总和不能超过极限参数值）<br>Can be also connected as 2 Form A type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.) |
| | | DC | C |  |

注：端子 3 未被使用。

Note: Terminal 3 cannot be used.

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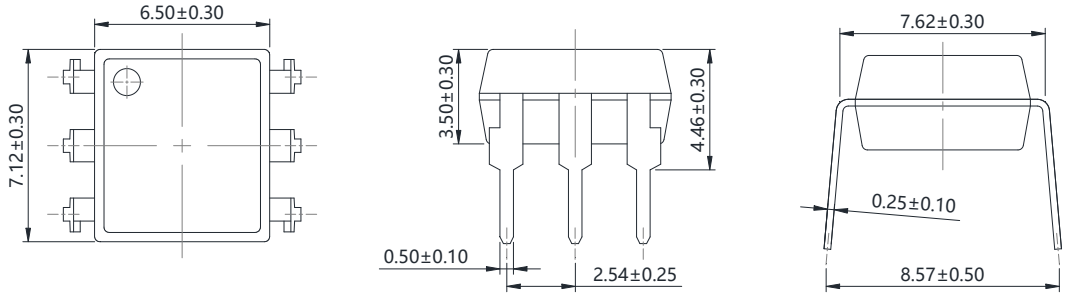
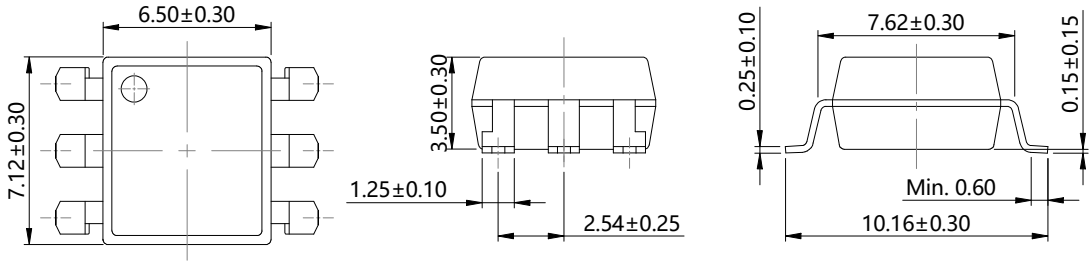
## 外形尺寸 Outline Dimensions

DIP6

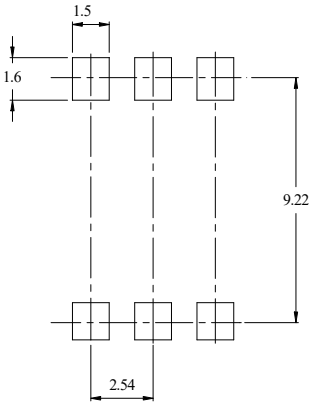



SMD6




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.

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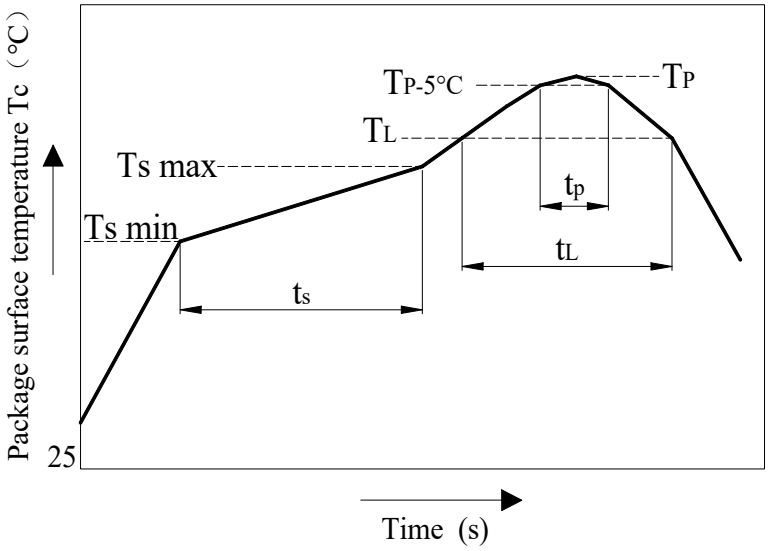
## 回流焊温度曲线图 Solder Reflow Profile




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

注：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。

Note: Reflow soldering is recommended at the temperatures and times shown, no more than three times.

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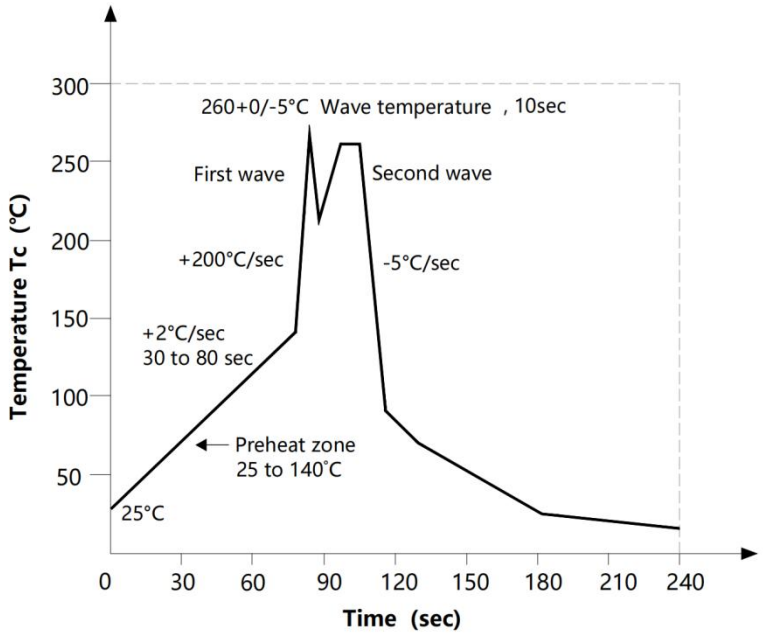
## 波峰焊温度曲线图 Wave Soldering Profile




## 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 360℃ ± 5℃，时间≤3s。

Manual soldering method Temperature: 360℃ ± 5℃, within 3s.

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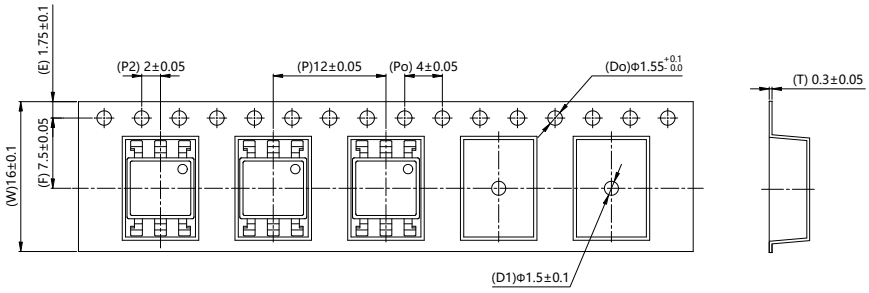
## 包装 Packing

■ 汇总表 Summary table

| 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 |
|---|---|---|---|---|---|---|---|---|
| SMD6 | 卷盘 (ϕ330mm 蓝盘) | 1k 只/盘 | 2 盘/盒 | 10 盒/箱 | 450*390*0.1mm | 353*340*60mm | 650*375*365mm | 首端空 50 个空格，末端空 100 个空格 |
| DIP6 | 管装 (500*12*11mm) | 65 只/管 | 50 管/盒 | 10 盒/箱 | 不适用 | 525*130*57mm | 550*280*320mm | 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 |
| SMD6 | Reel (ϕ330mm Blue) | 1k pcs/reel | 2 reels /box | 10 boxes /ctn | 450*390*0.1mm | 353*340*60mm | 650*375*365mm | Leave 50 Spaces at the beginning and 100 Spaces at the end |
| DIP6 | Tube (500*12*11mm) | 65 pcs/tube | 50 tubes/box | 10 boxes/ctn | Not applicable | 525*130*57mm | 550*280*320mm | Use blue and white rubber stoppers for each tube, with the same direction |

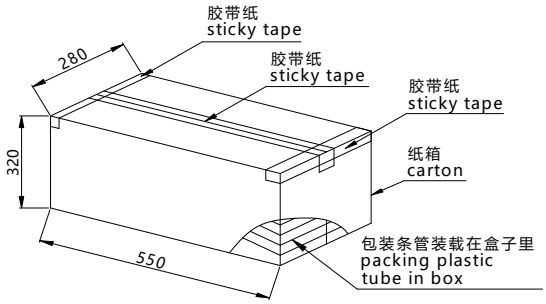
■ SMD6 编带包装 Tape & Reel

1) 每卷数量：1000 只。
   Qty/reel：1000 pcs.
2) 每箱数量：20000 只。
   Qty/ctn：20000 pcs.
3) 内包装：每盒 2 盘。
   Inner packing：2 reels /box.
4) 示意图 Schematic：




■ DIP6 条管包装 Tube

5) 每条管数量：65 只。
   Qty/tube：65 pcs.
6) 每箱数量：32500 只。
   Qty/ctn：32500 pcs.
7) 内包装：每盒 50 管。
   Inner packing：50 tubes/box.
8) 示意图 Schematic：




单位 Unit：mm

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