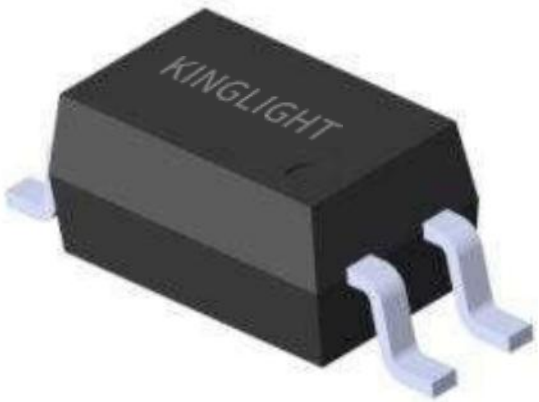
Kinglight®
晶台微电子



# KL3H4

# PHOTO TRANSISTOR

## SSOP4 晶体管光耦(AC交流)




＊本文档中包含的信息反映了具有代表性的使用场景，仅供技术参考。
The information contained in this document reflects representative usage scenarios and is intended for technical reference only.
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Product models and specifications mentioned in this document are subject to change or improvement without notice. Customers should refer to the latest data sheets in the product specifications prior to production use.
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The information in this document applies to typical use in electronic component applications. For special applications, please contact Kinglight Microelectronics for further assistance.
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# 1. 产品特点 Product features

- 电流转换率(Current transfer ratio)
  CTR: Min. 20% at $I_F$ = ±1mA, $V_{CE}$ = 5V
- 输入与输出间高隔离电压(Viso=3750 V rms)
  High isolation voltage between input and output (Viso=3750 V rms)
- 符合无卤素(溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Compliance Halogen Free (Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- 符合欧盟REACH法规 Compliance with EU REACH
- 无Pb且符合ROHS标准 Pb free and RoHS compliant
- 安全审批 Safety approval
  CQC认证已批准(编号:CQC25001468787) CQC approved (No.CQC25001468787)
  UL认证已批准 (编号:UL-US-2555217-0) UL approved (No.UL-US-2555217-0)
  VDE认证已批准(编号:40061363) VDE approved (No.40061363)

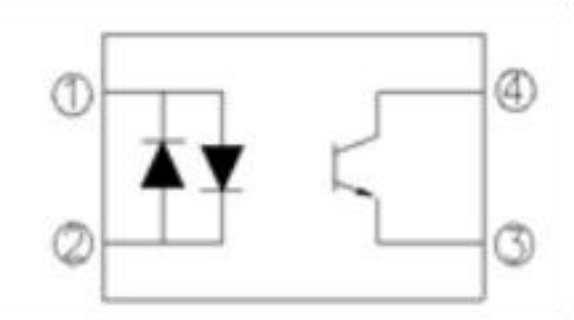
# 2. 产品描述 Product Description

- KL3H4光耦合器由两个反向并联的红外发射二极管和光电晶体管构成光电耦合器
  The KL3H4 series devices consist of two infrared emitting diodes, connected in inverse parallel, optically coupled to a phototransistor detector with green compound
- 采用4引脚小外形SMD封装的器件
  They are packaged in a 4-pin small outline SMD package

# 3. 产品应用 Product Applications

- 交流线路监视器 AC line monitor
- 可编程控制器 Programmable controllers
- 电话线接口 Telephone line interface
- 未知极性直流传感器 Unknown polarity DC sensor

# 4. 功能图 Functional Diagram




引脚配置 Pin Configuration
1. 阳极/阴极 Anode / Cathode
2. 阴极/阳极 Cathode / Anode
3. 发射极 Emitter
4. 集电极 Collector

## 5. 光电特性 Electrical-Optical characteristics

• 最大限度额定值(温度=25ºC) Absolute Maximum Ratings($T_a$=25ºC)

| 参数 Parameter | | 符号 Symbol | 额定值 Rated Value | 单位 Unit |
|---|---|---|---|---|
| 输入 Input | 正向电流 Forward current | $I_F$ | ±50 | mA |
| | 峰值正向电流(10μs脉冲) Peak forward current (10μs，pulse) | $I_{Fp}$ | 1 | A |
| | 功耗 Power Dissipation (注.$T_a$=100°C 以下功率不会下降) (No derating required up to $T_a$=100℃) | $P_D$ | 70 | mW |
| 输出 Output | 功耗 Power dissipation | $P_C$ | 150 | mW |
| | 降额系数（$T_a$=80°C 以上） Derating factor (above $T_a$=80℃) | | 3.7 | mW/℃ |
| | 集电极-发射极电压 Collector and emitter Voltage | $V_{CEO}$ | 80 | V |
| | 发射极-集电极电压 Emitter and Collector Voltage | $V_{ECO}$ | 6 | V |
| 总功耗 Total Consume Power | | $P_{TOT}$ | 200 | mW |
| 隔离电压 *1 Isolation Voltage | | $V_{iso}$ | 3750 | Vrms |
| 工作温度 Operating temperature | | $T_{OPR}$ | -55 to +100 | ℃ |
| 储存温度 Storage temperature | | $T_{STG}$ | -55 to +125 | ℃ |
| 焊接温度 *2 Soldering temperature | | $T_{SOL}$ | 260 | ℃ |

附注(Notes):

1* 交流电源1分钟内, 相对湿度40~60%环境下, 隔离电压测试方法, 引脚1&2短接在一起, 引脚3&4短接在一起
AC for 1 minute, 40~60%RH in this test, Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together

2* 焊接时间为10秒 Soldering time is 10 seconds

## 6. 电气特性($T_a$=25℃,除非另有规定)

## Electrical Characteristics ($T_a$=25℃ unless specified otherwise)

| 参数 Parameter | | 符号 Symbol | 最小值 Min. | 规格值 Typ. | 最大值 Max. | 单位 Unit | 条件 Condition |
|---|---|---|---|---|---|---|---|
| 输入 Input | 正向电压 Forward voltage | $V_F$ | - | 1.2 | 1.4 | V | $I_F$=±20mA |
| | 输入电容 Input capacitance | $C_{in}$ | - | 50 | 250 | pF | V=0, f=1kHz |
| 输出 Output | 集电极暗电流 Collector-Emitter dark current | $I_{CEO}$ | - | - | 100 | nA | $V_{CE}$=20V $I_F$ =0mA |
| | 集电极-发射极击穿电压 Collector-Emitter breakdown voltage | $V_{CEO}$ | 80 | - | - | V | $I_C$=0.1mA $I_F$=0mA |
| | 发射极-集电极击穿电压 Emitter-Collector breakdown voltage | $V_{ECO}$ | 6 | - | - | V | $I_E$=0.01mA $I_F$=0mA |
| 传输特性 Transfer Characteristics | 集电极-发射极饱和压降 Collector-Emitter saturation voltage | $V_{CE(sat)}$ | - | 0.1 | 0.2 | V | $I_F$=±20mA $I_C$=1mA |
| | 隔离电阻 Isolation resistance | $R_{ISO}$ | $5x10^{10}$ | $10^{11}$ | - | Ω | $V_{IO}$=500Vdc 40~60% R.H. |
| | 浮动电容 Floating capacitance | $C_f$ | - | 0.6 | 1.0 | pF | $V_{IO}$=0V f=1MHz |
| | 上升时间 Response Time (Rise) | $t_r$ | - | - | 18 | μs | $V_{CE}$=2V, $I_C$=2mA $R_L$=100Ω |
| | 下降时间 Response Time (Fall) | $t_f$ | - | - | 18 | μs | |

• 温度$T_a$=25℃下规格值 Typical values at $T_a$ = 25℃

• 传输特性等级表($T_a$=25℃, 除非另有规定)

Transfer Characteristics level table ($T_a$=25℃ unless specified otherwise)

| 参数 Parameter | | 符号 Symbol | 最小值 Min. | 规格值 Typ.* | 最大值 Max. | 单位 Unit | 条件 Condition |
|---|---|---|---|---|---|---|---|
| 电流传输比 Current transfer ratio | KL3H4 | CTR | 20 | - | 300 | % | $I_F$=±1mA $V_{CE}$=5V |
| | KL3H4-A | | 50 | - | 150 | | |
| | KL3H4-B | | 100 | - | 300 | | |
| | KL3H4-KB | | 100 | - | 300 | | $I_F$=±5mA $V_{CE}$=5V |

# 7. 特性曲线 Characteristic Curves

图1 正向电流与正向电压的关系

Fig.1 Forward Current vs Forward Voltage

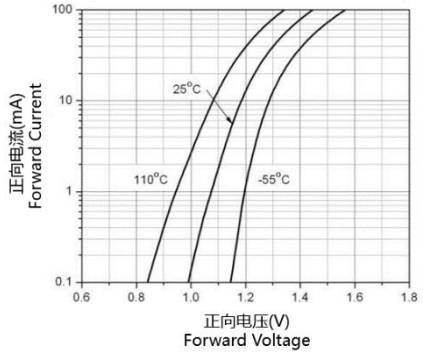



图2 集电极电流vs正向电流曲线图

Fig.2 Collector Current vs. Forward Current Diagram

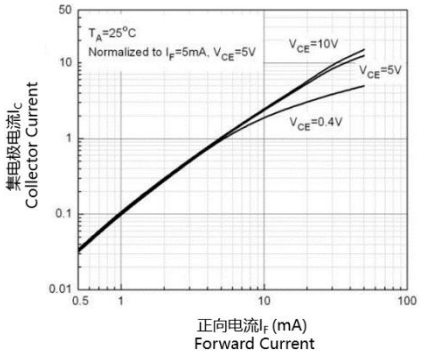



图3 电流转换比 vs正向电流曲线图

Fig.3 Current Transfer Ratio vs Forward Current Curve

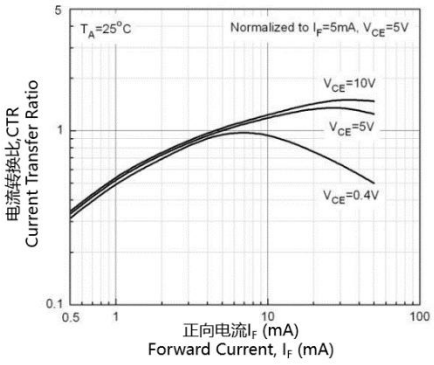



图4 集电极电流 vs环境温度曲线图

Fig.4 Collector Current vs. Ambient Temperature

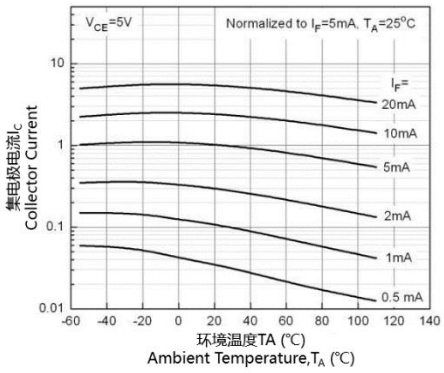



图5 电流转换比vs环境温度曲线图

Fig.5 Current Transfer Ratio vs Ambient Temperature Curve

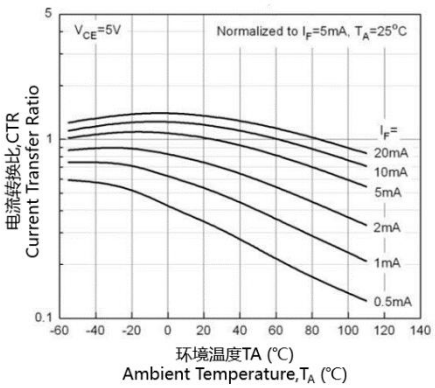



图6 集电极电流 vs 集电极-发射电压曲线图

Fig.6 Collector Current vs. Collector-Emitter Voltage Diagram

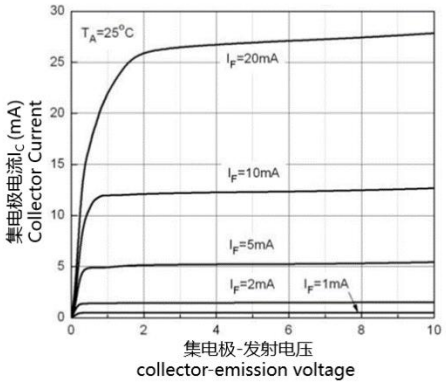


图7 集电极电流 vs集电极-发射电压曲线图

Fig.7 Collector Current vs.
Collector-Emitter Voltage Diagram

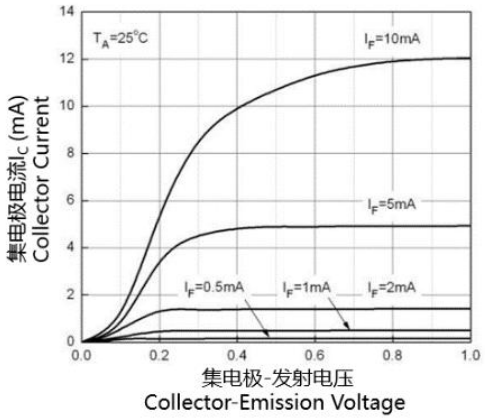



图8 集电极暗电流 vs 环境温度曲线图

Fig.8 Collector Dark Current vs.
Ambient Temperature Curve

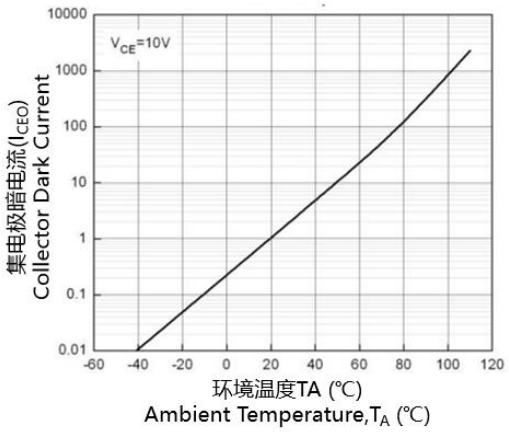



图9 集电极-发射极饱和电压 vs 环境温度曲线图

Fig.9 Collector-Emitter Saturation Voltage
vs. Ambient Temperature Curve

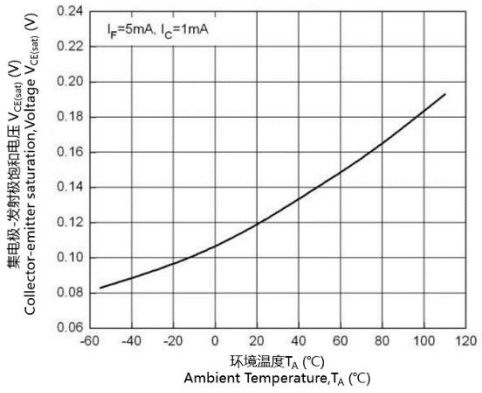



图10 响应时间 vs 负载电阻曲线图

Fig.10 Switching Time vs. Load
Resistance Diagram

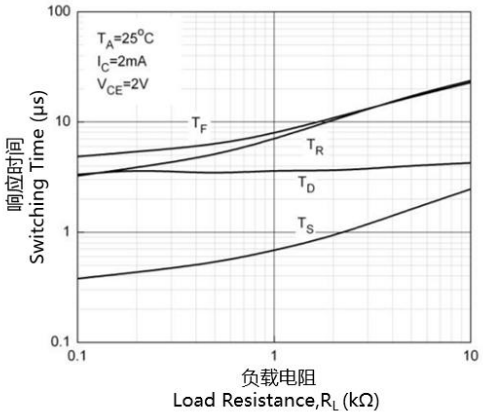
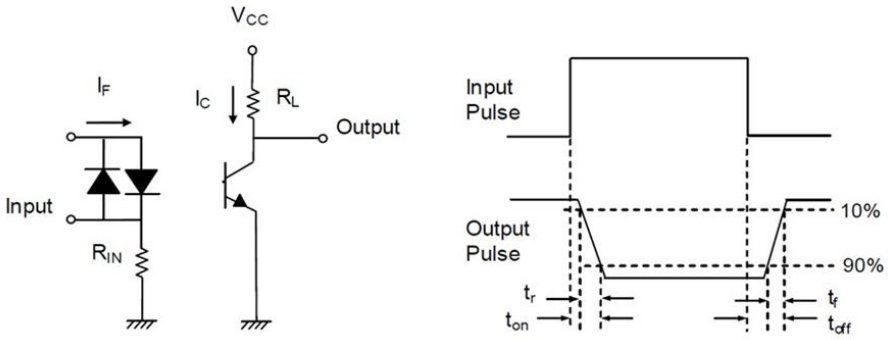



图11 开关时间测试电路及波形

Fig.11 Switching Time Test Circuit & Waveforms



# 8. 订单信息 Order Information

• 零件编号 Part Number

## KL3H4-X-Y-V-W

**附注(Notes):**

X = 表示CTR等级(A、B、KB或无) CTR Rank (A、B 、KB or none)

Y = 载带和卷轴包装方式(TA或TB )
Tape and reel option (TA or TB )

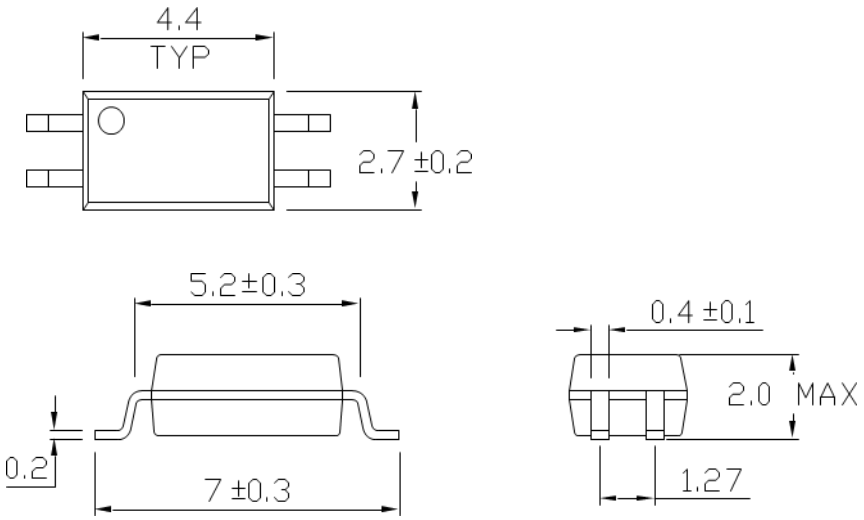
V = 表示VDE标识(客户指定镭射字符才加"V")
VDE (Only add "V" to laser characters specified by the customer)

W =表示包装数量(无或T05) Packaging Quantity(none or T05)

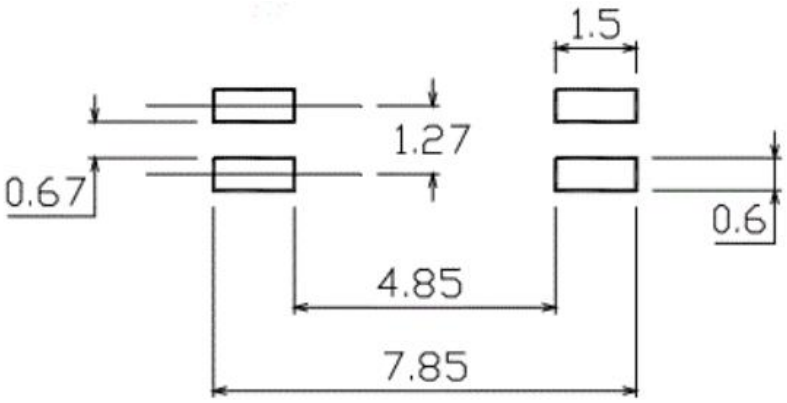
| 选项<br>Option | 描述<br>Description | 包装数量<br>Packing quantity |
|---|---|---|
| TA | TA料带 & 卷轴选择<br>TA tape & reel option | 每卷5000pcs<br>5000 units per reel |
| TB | TB料带 & 卷轴选择<br>TB tape & reel option | 每卷5000pcs<br>5000 units per reel |
| TA-V | TA料带 & 卷轴选择+VDE<br>TA tape & reel option+VDE | 每卷5000pcs<br>5000 units per reel |
| TB-V | TB料带 & 卷轴选择+VDE<br>TB tape & reel option+VDE | 每卷5000pcs<br>5000 units per reel |
| / | 内盒装：每盒3盘<br>Inner box packaging：3reels/box | 每盒15000pcs<br>15000 pcs per box |
| / | 每箱装：10个内盒<br>Pack per Carton: 10inner boxes | 每箱150000pcs<br>150000 pcs per reel Carton |

| 选项<br>Option | 描述<br>Description | 包装数量<br>Packing quantity |
|---|---|---|
| TA-T05 | TA料带 & 卷轴选择<br>TA tape & reel option | 每卷6000pcs<br>6000 units per reel |
| TB-T05 | TB料带 & 卷轴选择<br>TB tape & reel option | 每卷6000pcs<br>6000 units per reel |
| TA-V-T05 | TA料带 & 卷轴选择+VDE<br>TA tape & reel option+VDE | 每卷6000pcs<br>6000 units per reel |
| TB-V-T05 | TB料带 & 卷轴选择+VDE<br>TB tape & reel option+VDE | 每卷6000pcs<br>6000 units per reel |
| / | 内盒装：每盒3盘<br>Inner box packaging：3reels/box | 每盒18000pcs<br>18000pcs per box |
| / | 每箱装：10个内盒<br>Pack per Carton: 10inner boxes | 每箱180000pcs<br>180000pcs per Carton |

## 9. 封装尺寸(单位:毫米) Package Drawing(Unit:mm)




• 表面贴装引线框架及推荐焊盘布局 Recommended pad layout for surface mount lead frame



# 10. 设备标记 Device marking







(范本参考 Template reference)

**备注Notes**

KL = 表示晶台微电子有限公司 Denotes Kinglight Microelectronics

3H4 = 表示设备部件号 Denotes Device Part Number

R = 表示CTR等级(A、B、KB或无) CTR Rank (A、B、KB or none)

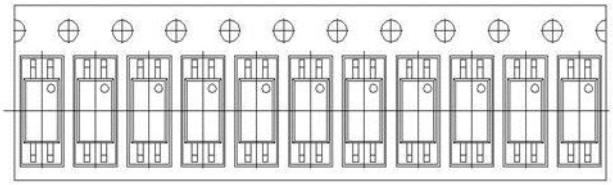
Y = 表示1位年份代码 Denotes 1 digit Year code

WW = 表示2位周别代码 Denotes 2 digit Week code

V = 表示VDE标识(客户指定镭射字符才加"V")
VDE (Only add "V" to laser characters specified by the customer)

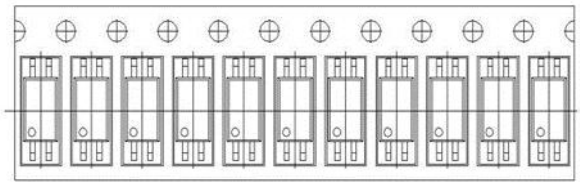
# 11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



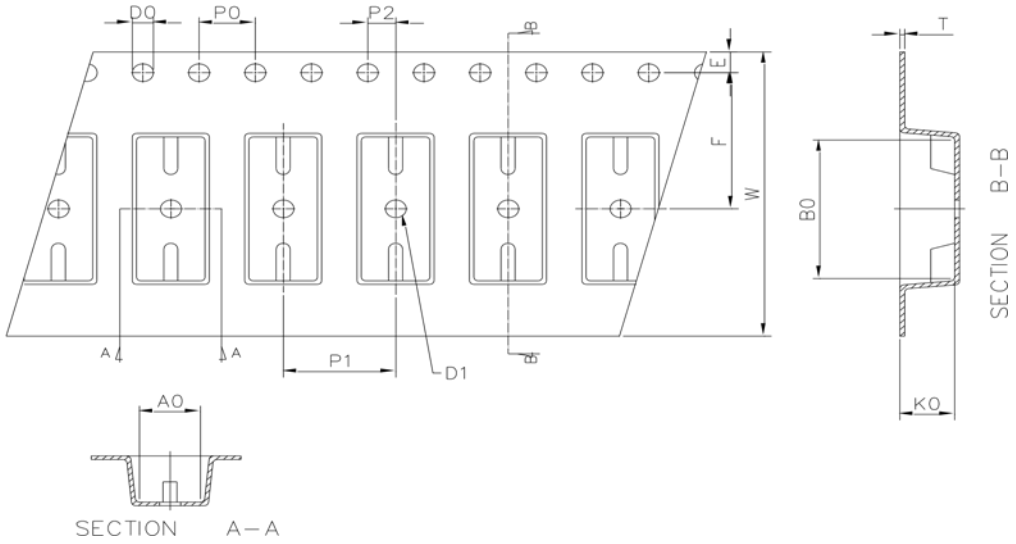
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

## 料带尺寸Material belt size



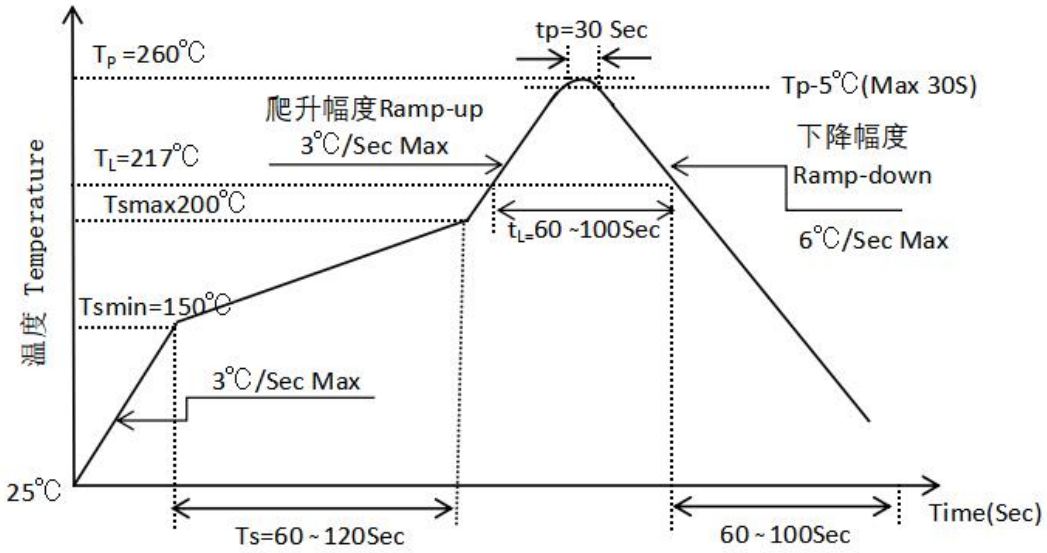

| 尺寸编号 Dimension No. | A0 | B0 | D0 | D1 | E | F |
|---|---|---|---|---|---|---|
| 尺寸(mm) Dimension(mm) | 3.00±0.10 | 7.45±0.10 | 1.50+0.1/-0 | 1.50±0.10 | 1.75±0.10 | 5.50±0.10 |
| 尺寸编号 Dimension No. | P0 | P1 | P2 | t | W | K0 |
| 尺寸(mm) Dimension(mm) | 4.00±0.15 | 4.00±0.10 | 2.00±0.10 | 0.30±0.05 | 12.1±0.2 | 2.45±0.1 |

# 12. 焊接温度曲线 Temperature Profile Of Soldering

## • 回流焊温度曲线 Reflow soldering

建议在下面所示的温度和时间分布条件下, 进行一次回流焊作业, 不得超过三次

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.




| 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 | | ℃ |
| 高于液相线温度($T_L$ )的时间<br>Time above Liquidus Temperature $T_L$ | $t_L$ | 60 | 100 | 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 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 |